Hydrogeology and Hydrology Characterization Report

Glenmore Landfill

City of Kelowna

19 December 2023

→ **The Power of Commitment**

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S3		Kathleen Murr Allan Molenhuis	Rose Marie Rocca		Roxy Hasior		
S3	01	Kathleen Murr Allan Molenhuis	Rose Marie Rocca		Roxy Hasior		Dec. 19, 2023

GHD

138 East 7th Avenue, Suite 100

Vancouver, British Columbia V5T 1M6, Canada

T +1 604 214 0510 | **F** +1 604 214 0525 | **E** info-northamerica@ghd.com | **ghd.com**

The Power of Commitment

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1. Introduction

GHD Limited (GHD) was retained by the City of Kelowna (City) to complete this Hydrogeology and Hydrology Characterization Report (HHCR) for the Glenmore Landfill (Site). The Site operates under Operational Certificate 12218 (OC), issued by the British Columbia (BC) Ministry of Environment and Climate Change Strategy (Ministry) on December 8, 2000, and most recently amended on May 30, 2023. The Operational Certificate is presented in **Appendix A**.

For the purpose of this report, the term Landfill refers to the Glenmore Landfill waste footprint, including future fill areas, and the term Site refers to all facilities and works within the Site boundary, as defined by Section 1.5.1 of the OC.

1.1 Purpose and Scope of this Report

Section 3.2 of the OC states that an HHCR must be submitted to the Ministry on, or before December 31, 2024, and that an updated HHCR must be submitted at least once every ten years following December 31, 2024. The purpose of this report is to provide the 2024 HHCR for the Site. The scope of this report is to produce an HHCR that includes the required information specified in Section 10.1 *Hydrogeology and Hydrology Characterization Report* of the BC Landfill Criteria for Municipal Solid Waste (BC Ministry of Environment, 2016).

1.2 Limitations

This report: has been prepared by GHD for City of Kelowna and may only be used and relied on by City of Kelowna and the Ministry of Environment and Climate Change Strategy for the purpose agreed between GHD and City of Kelowna as set out in section 1.1 of this report.

GHD otherwise disclaims responsibility to any person other than City of Kelowna arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to the information provided in historical documents provided by the City and publicly available information provided online at the date of preparing the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

1.3 Site Location

The Site is located in Kelowna, BC and is approximately 1.5 kilometres (km) east of Okanagan Lake and 9 km northeast of downtown Kelowna. The civic address of the scale house and public drop-off area is 2710 John Hindle Drive. A Site location map is presented on **Figure 1.1.**

1.4 Landfilling Operations

1.4.1 Municipal Waste

The Landfill accepts approximately 120,000 tonnes of municipal solid waste annually. The Landfill footprint is approximately 81 ha. Landfilling of municipal solid waste began in 1966 within Phase 1, Phase 2, and Phase 3. Phases 1 and 2 together are known as the North Landfill and Phase 3 is referred to as the Slough. Phases 1 and 2 are delineated by an east-west gravity drain that is part of the leachate collection system.

Each of the three areas relies largely on a natural control liner system (i.e., natural clay subsurface). In 2001, the footprint of the landfill was expanded to the north with construction of the lined North Expansion Area (now referred to as fill Area 2), and in 2019 a liner was installed at the former public drop-off area (fill Area 1). Additional liner was constructed in Area 2 in 2020.

Today, municipal waste is deposited in the lined and natural control liner portions of Phase 1 & Phase 2, with some select filing of construction and demolition waste in Phase 3 (the Slough). It should also be noted that the Municipality operates a Compost Facility (or Composting Facility) south of Phase 3.

For a detailed description of historical, active, and future municipal solid waste landfilling, refer to the 2023 Design, Operations, and Closure Plan (GHD, 2023). The Phases of the Landfill and the Compost Facility are briefly described below and presented on **Figure 1.2**.

– Phase 1: Historical and active disposal area located in the northern portion of the Landfill. This area is unlined except for the northwestern and southwestern areas of Phase 1 (see **Figure 1.2** for location of geomembrane liners).
– Phase 2: Historical and active disposal area located in the central portion of the Landfill. This area is unlined except for the historic public drop-off area in northwest corner of Phase 2.
– Phase 3: Historical disposal area located south of Phase 2. Active disposal in Phase 3 is limited to select construction and demolition materials. Historical landfilling in this area began by infilling the Slough, formally known as Alki Lake. Landfill cells were developed by excavating and infilling successive trenches. Trench depths have been inferred to be up to 10.4 m (SLR, 2011). The northern end of the Slough received two lifts of waste and the southern end received one lift of waste (CH2M Hill, 2008).
– Compost Facility: Located south of Phase 3. The composting infrastructure is currently being upgraded from a turned windrow system to an aerated static pile (ASP) system. Runoff from the compost facility has been managed by directing flow towards the landfill footprint. The ASP composting system will be equipped with a leachate management system that includes collection under the compost piles and discharge to the sewer via a new composting leachate lift station.

Groundwater monitoring wells are instrumented throughout and surrounding the Site to monitor groundwater elevation and quality. A map presenting historical investigation locations is presented on **Figure 1.3** and a map presenting the current groundwater, leachate, and surface water monitoring network is presented on **Figure 1.4**.

1.4.2 Biosolids

According to the City, biosolids organic waste (roughly 3% solids) were accepted at the Site for land spreading in the northern end of Phase 1 between 2000 and 2008. The organic waste was generated at the Brandt’s Creek Trade Waste Treatment Plant and was high in nitrogen and was used as a fertiliser replacement. It is estimated that approximately ¾ of the organic waste received by the Landfill was spread in the northern end of Phase 1 and the remaining ¼ was spread in the northeast corner of the Site. Available application records indicate that approximately 3,688,092 L were applied at the Site in 2005; 6,298,500 L in 2006; 4,870,500 L in 2007; and 1,759,500 L in 2008 (Golder, 2012).

Additionally, the City reports that between approximately 1990 and 1993, primary and tertiary biosolids (roughly 20% solids) were deposited in the form of liquid sludge at the northeast corner of the Site (northeast of Phase 2), as part of a biosolids composting program. The biosolids were deposited into above ground pits construction of hog fuel. Once the pits were filled, the sludge was mixed up and allowed to decompose for a period of at least one year, at which time it is inferred that the sludge was spread on the surface of the adjacent farmlands and to landscape the perimeter berms of the Landfill (Golder, 2012).

2. Land and Water Use

2.1 Zoning and Land Use

Figure 2.1 provides a map of the zoning and land use of the Site and within 1 kilometre (km) of the Site.

The majority of the Site is zoned as agricultural (A1) and forms part of the Agricultural Land Reserve (ALR). The operation of the Landfill is a legal non-conforming land use for the property. The Site entrance facilities are located at the south end of the Site on a lot zoned for public and institutional uses (P4).

The lands within 1 km of the Site are mainly undeveloped or active agricultural properties including Bredin Farm to the north and Tutt Farm to the west (zoned as agricultural A1). Residential and public lands are also present to the east southeast, and west of the Site. Directly east of the Site is Eagle View Park (zoned as park P), Quail Ridge subdivision (zoned as rural urban RU), and the Okanagan Golf Club (zoned as public and institutional P). Further to the southeast of the Site is another residential area along Glenmore Road (zoned as rural residential RR, mobile homes MH, and multi-dwelling zones MF). Directly west of the Site is North Glenmore Dog Park (zoned as park P).

2.2 Groundwater Use

Figure 2.2 illustrates the groundwater supply wells present within at least a 1 km radius of the Site. The groundwater well locations and detailed well records were soured from iMapBC, which was accessed in September 2023. The detailed well records are in **Appendix B.**

There are six groundwater supply wells located within a 1 km radius of the Site. As presented in Table 1, one well is decommissioned and the remaining wells are unlicensed with unknown existing water use. Each of the wells are located hydraulically upgradient or cross-gradient from the Site. iMapBC does not show any groundwater supply wells within 1 km radius downgradient of the Site. Table 2.1, below, details the groundwater supply wells listed on iMapBC.

Additionally, SLR Consulting Canada Ltd. (SLR) completed a door-to-door survey in March 2014 to locate any water wells within a 500 m radius of the Site. SLR did not identify any existing water wells during the door-to-door survey (SLR Consulting Canada Ltd., 2015).

Table 2.1 Groundwater Supply Well Details for Wells Located within 1 km of the Site

Well Tag	Installation Date	Screened Geologic Unit	Well Yield (GPM)	Use; driller notes
23247	1970	Bedrock	9	Unknown/other/not listed
99677	2005	Hardpan (likely clay)	Not applicable	Decommissioned (2018)
19830	1966	Bedrock	0.5	No use; no suitable formation for a well
71857	1979	Bedrock	minimal	No use; well yield not suitable for use
20594	1967	Clay	5	Likely no use; due to the presence of thick black water that never cleared
2936	1948	Unknown	Not specified	Unknown/other/not listed

2.3 Surface Water Use

Figure 2.2 illustrates the surface water points of diversion present within a 1 km radius of the Site. The points of diversion and water use licenses were soured from iMapBC, which was accessed in November 2023. The licenses are in **Appendix B**.

There are four surface water points of diversion within a 1 km radius of the Site. Surface water point of diversion C134394 (formerly C123789) is on-Site for pumping of water from the Northeast Pond (NE Pond) and the remaining three are hydraulically upstream of the Site at the McKinley Reservoir. Surface water points of diversion C029197, C034631, and C061861 are all for the storage of water diverted from Kelowna Creek into the McKinley Reservoir.

It should be noted that clean water from the onsite ponds (NE Pond, Tutt Pond, and Bredin Pond) is used for irrigation by the farmers on the adjacent agricultural lands.

Downstream of the Site is Little Robert Lake and Robert Lake both of which are alkali lakes (or salt flats). Neither lake include surface water diversion points but are key surface water bodies to consider when assessing the hydrology of the Site. Robert Lake is situated within the Robert Lake Regional Park which is a 2 ha conservation area. There are no trails or access to the lake. Robert Lake is considered a sensitive ecosystem used by a number of wildlife species. Additional discussion of the Site's hydrology is included in Section 3.3, below.

3. Site Physical Setting

3.1 Climate

The climate of the Central Okanagan is marked by hot, dry summers, and cool winters. Climatic data for the Site is based on Environment Canada's 1981-2010 Climate Normals for the Kelowna Airport climate station (Climate ID 1123970). The Kelowna Airport climate station is located approximately 2.5 km to the east of the Site at an elevation of approximately 430 metres above mean sea level (m AMSL). The average annual temperature is 8.1 degrees Celsius. The average annual precipitation is 386.9 millimetres (mm). On average 89 centimetres (cm) of snowfall is recorded per year and 311.3 mm of rainfall is recorded. The average total monthly precipitation and average daily temperature records are presented in Table 3.1, below.

Table 3.1 Local Climate

Month	Daily Average Temperature (°C)	Average Monthly Precipitation (mm)
January	-2.5	31.0
February	-0.9	19.0
March	4.1	21.6
April	8.4	29.1
May	12.8	40.2
June	16.6	45.9
July	19.5	37.2
August	19.1	32.1
September	13.9	32.4
October	7.3	29.2
November	1.6	36.7
December	-2.6	32.6
Annual	8.1	386.9
Source: Environment Canada Canadian Climate Normals 1981-2010. Kelowna A Climate Station (Climate ID 1123970)		

3.2 Topography

The Site is situated in the north-south trending Glenmore Valley. The Site is bordered by mountainous terrain to the north, west, east, and south-east of the Site. Quail Ridge is to the east, Tutt Mountain to the east, Bredin Hill to the northeast, and Diamond Mountain to the southwest. A larger mountainous area is also present further west of the Site which contains Stephens Coyote Ridge.

The Site gradually slopes to the south ranging in elevation from approximately 475 m AMSL (at the north Site boundary) to 445 m AMSL (at the south Site boundary). The Landfill, which is located at the centre of the Site, is presently mounded to an elevation of 465 m AMSL at Phase 1. The Slough is the lowest lying area of the Site at 440 m AMSL. The Compost Facility is at an approximate elevation of 445 m AMSL.

Surrounding the Site, the topography rises to 520 m AMSL to the north, 560 m AMSL to the west, and 530 m AMSL to the east. South of the Site, lands slope gently down towards the south to an elevation of approximately 435 m AMSL at Robert Lake. A map presenting the topography in the vicinity of the Site is provided on **Figure 3.1**.

3.3 Hydrology and Drainage

3.3.1 Regional and Site Hydrology

The regional and Site hydrologic setting is illustrated on **Figure 3.2**.

The Site is situated within the Okanagan River watershed that includes six main lakes, the Okanagan, Kalamalka, Wood, Skaha, Vaseux and Osoyoos. Closest to the Landfill is Okanagan Lake, which is approximately 1.5 km west and upstream of the Site at 342 m AMSL. Okanagan Lake drains into the Okanagan River, which subsequently drains to Lake Skaha, Vaseux Lake, then Osoyoos Lake, and ultimately to the Columbia River.

As previously described, the Landfill is situated in the north-south trending Glenmore Valley. Stormwater from the surrounding mountainous terrain flows into the valley following topography. Stormwater that flows onto Site is managed by the Site stormwater management system, as described in Section 3.3.2. Stormwater that is not captured on-Site drains to the south following the topography of the valley floor and/or infiltrates into the subsurface.

North of the Site, the prominent surface water features include McKinley Reservoir (515 m AMSL), Bubna Slough (500 m AMSL), and Slough 2 (509 m AMSL). Ellison Lake, a smaller regional lake, is found 2.5 km northeast and upstream of the Site. South of the Site, the prominent surface water features include Little Robert Lake (440 m AMSL) and Robert Lake (434 m AMSL).

While not illustrated on **Figure 3.2**, a review of aerial photographs shows Little Robert Lake occasionally (during period of high precipitation) discharges at its south end and that discharge will flow into Robert Lake.

As illustrated on **Figure 3.2**, drainage from the McKinley Reservoir toe drain flows to the south and passes beneath Glenmore Road N. before discharging to the western Bredin Farm field. **Figure 3.2** also show drainage from Bubna Slough. Bubna Slough is subject to evaporative conditions; however, occasional discharge will also flow southwards and join the McKinley Reservoir discharge on Bredin Farm. Flow from both upstream sources, along with the majority of stormwater that falls or flows into Bredin Farm area ultimately enters Bredin Pond and joins the Site’s drainage system.

Figure 3.2 also shows surface water drainage to the northeast of Bredin Farm flows to the south and drains into the Northeast Pond.

3.3.2 Site Drainage

The Site drainage features are illustrated on **Figure 3.3**.

Site surface water and surface water run-on from the surrounding mountainous terrain is captured and managed by three constructed ponds: Northeast Pond (NE Pond), Bredin Pond and Tutt Pond. Surface water from the NE Pond flows to Bredin Pond, which flows into Tutt Pond. Water from Tutt Pond is pumped out for irrigation use on the farmlands located southwest of the Landfill. There is an overflow weir located between Tutt Pond and the Slough that allows for water to discharge from Tutt Pond to the Slough at high water levels.

The Slough does not have any overland outlet drainage points and is drained by the east-west gravity drain that separates the Phase 2 and Phase 3 area.

Precipitation that lands on Site areas outside the limit of waste or Landfill areas with intermediate cover is managed as clean surface water via the Surface Water Management System. The remaining precipitation that lands on the Site (in specific the Landfill areas without intermediate cover and Compost Facility) is managed as leachate.

During large storm events, run-off from the Glenmore Valley can cause excess Site stormwater. Excess run-off may flow into the on-Site ponds or infiltrate into the subsurface. Stormwater and excess run-off that flows onto the southeastern portion of the Site (i.e. from the administrative building area) can follow the drainage pathways that reach Little Robert Lake via a drainage culvert that flows under John Hindle Drive at the south end of the Site. The City reports that very little stormwater drainage has been observed discharging from the Site.

Stormwater that enters the on-Site ponds ultimately flow into Tutt Pond which is equipped with an emergency by-pass system whereby water can be pumped from Tutt Pond via temporary pumps and hoses, across the Compost Facility, and into the drainage system at the south end of the Site. From there water would flow into Little Robert Lake.

Throughout the Site's history, pumping from Tutt Pond to Little Robert Lake has only occurred twice, between April 15 and July 10, 2018 and April 29 to May 28, 2019. Typically, surface water is managed by evaporation or being used for irrigation (as described above).

3.4 Geologic Setting

The Site-specific geology presented below is based on a review of technical and investigative reports completed by others and borehole logs provided by the City. Historical investigative locations are presented on **Figure .3**. The available stratigraphic and instrumentation logs for the Site are provided in **Appendix C.1**.

Geology underlying the Site consists of overburden sediments of variable thickness which overlie volcanic and sedimentary bedrock. GHD has simplified the sequency of overburden sediments based on geologic deposition environments to support an understanding of the hydrogeologic function of the Site. Geologic units consist of glaciolacustrine silt and clay deposits which overlie glaciofluvial sands and gravels, which overlie a glacial till unit. Overburden material is primarily found in the valley floor and pinches out towards the sides of the Glenmore Valley. Bedrock underlies the glacial till unit.

Based on these results, four major stratigraphic units are present on Site:

1. Glaciolacustrine silt and clay (Clay Unit)
2. Glaciofluvial sand and gravel (Sand and Gravel Unit)
3. Glacial till (Till Unit)
4. Bedrock (Bedrock Unit)

Three cross-sections were prepared to illustrate the interpreted stratigraphy of the Site. The cross-section map is presented on **Figure 3.4**.

– Cross-section A-A' (**Figure 3.4A**) – stratigraphy in a north to south orientation across the length of the Site.
– Cross-section B-B' (**Figure 3.4B**) – stratigraphy in a west to east orientation across Bredin Pond, Phase 1, and the NE Pond.
– Cross-section C-C' (**Figure 3.4C**) – stratigraphy in a southwest to northeast orientation across the northern portion of the Compost Facility and southern portion of Phase 3.

Additional, historical, cross-sections illustrating the complex geology underlying the Site are presented in **Appendix C.2.**

Clay Unit

As illustrated in the geologic cross-sections, a Clay Unit up to 15 m in thickness is present underlying the Ponds (Bredin, Northeast and likely Tutt), the Slough, and Compost Facility. The clay unit is not likely present underlying Phase 1 and the northern half of Phase 2. As illustrated on **Figure 3.4A**, the clay unit is relatively thin in the southern end of the Slough. These are glaciolacustrine sediments that include grey laminated (varved) silty clay with trace sand and gravel (USCS classification CH). The silty clays are described as highly plastic, (plasticity index >30%), suggesting that the clay unit may include volcanic ash (SLR, 2011). The trace gravels present within the clay unit are interpreted as dropstones. The silty clay deposits are overlain by more variable glaciofluvial sediments that include silty sands and (generally USCS classification SM, with one sample as SP-SM), lean clays (USCS classification CL), sandy silts (USCS classification ML), and highly plastic silty clays consistent with glaciolacustrine deposits (SLR, 2011).

Historical cross-sections included in **Appendix C.2** illustrate a rise in the Clay Unit along the southern Site boundary. This rise may create a natural berm to restrict very shallow groundwater flow from flowing off-Site. As illustrated in the cross-sections there is some uncertainty in this interpretation. It should be noted that a shallow Clay Unit berm would not prevent migration of impacted groundwater within the underlying geologic units.

A review of the stratigraphic logs for the Site shows occasional seams of more permeable sandy clays or clayey sands within the Clay Unit. The existing geologic data is insufficient to map these seams; however, it is possible that the seams represent preferential pathways for groundwater flow through the Clay Unit.

Sand and Gravel Unit

Underlying the Clay Unit are glaciofluvial sands and gravels that, where present, range from 0.6 to 10 m in thickness, with the thickest sand and gravel deposits at the north end of the Site and the thinnest deposits at the Slough. The sand and gravel deposits did not appear in every borehole log, suggesting that the Sand and Gravel Unit forms a discontinuous deposit across the Site.

Till Unit

A glacial till is present underlying the Sand and Gravel Unit (where present) or the Clay Unit. The glacial till which is estimated to range between 1.22 and 25 m in thickness (Gartner Lee Limited., 1990) is interpreted to be present across the Site. The till has been characterized as silty sand with gravel (USCS classification SM) and silty gravel with sand (USCS classification GM). Large (>0.5 m thickness) bedrock boulders were encountered near the base of the till underlying the Slough. Till soils were generally described as being dense to very dense (SLR, 2011). GHD's review of the Site's geology shows that the glacial Till Unit can vary across the Site in composition, density, and hydrogeologic character.

Bedrock Unit

Bedrock is exposed at ground surface to the north, east, and west of the Site and slopes towards the centre of the Site. Two bedrock units were encountered. Bedrock in the north, centre, and east areas of the Site was formed in the early Cenozoic era and is composed of Kettle River Formation volcanic rocks, including dacite, obsidian, basalt, and breccia (Church, 1981). The bedrock has been described as weathered at and for several meters below its surface (SLR, 2011). A second bedrock unit was encountered below the volcanic rocks in the south, west and northeast areas of the Site and is composed of sedimentary deposits including siltstone, mudstones, and sandstones of the White Lake Formation (Golder, 2014). The White Lake Formation was noted to contain interbedded, light gray fine sand and thin coal lenses in the northeastern area of the Site.

Bedrock at the Site is inferred to have an undulating surface with a depression directly underlying the Slough. The cross-sections do not extend to the flanking mountains (Quail Ridge to the east and Stephens Coyote Ridge to the west). but would illustrate increasing bedrock elevations in both directions. The elevations of these small mountains are 560 and 630 m AMSL, respectively, and the mountains are comprised of thin overburden and bedrock outcroppings. Thus, the bedrock surface in Cross-Sections B-B' and C-C' would rise to form the valley walls. Cross-section B-B' and C-C' are located between Tutt Hill and Bredin Mountain and to the south of Tutt Mountain, respectively. Bredin Hill and Tutt Mountain appear to form a north to south ridge of elevated bedrock. The City notes the White Lake Formation was encountered in Area 3 of Phase 1 when blasting and quarrying into Bredin Hill. A review of aerial photographs show thin overburden and bedrock outcrops are present over Tutt Mountain and Bredin Hill. Both cross-sections illustrate the interpreted rise in bedrock.

3.5 Hydrogeologic Setting

The BC aquifer classification system indicates Aquifer 469[1] and Aquifer 470[2] are present at the Site. The extent of these aquifers is illustrated on **Figure 3.5**. Aquifer 469 is an overburden aquifer composed of sands and gravels with moderate productivity, low vulnerability, and low demand. Aquifer 470 is a bedrock aquifer composed of volcanic rocks likely belonging to the Penticton Group or Harper Ranch Group (BC Ministry of Environment, 2012). The bedrock of the White Lake Formation is found within the Penticton Group (Church, 1981 and Hoy, 2021).

In general, the geologic units described in Section 3.4 may be grouped into the following hydrogeologic units identified in brackets:

1. Clay Unit (acts as a leaky aquitard)
2. Sand and Gravel Unit (Aquifer 469)
3. Till Unit (acts as a leaky aquitard)
4. Bedrock (Aquifer 470)

Horizontal groundwater flow at the Site occurs primarily in the Sand and Gravel Unit and the underlying Bedrock Unit. Groundwater flow is interpreted to be generally flowing from north to south, through the Landfill, the Slough, and the Compost Facility towards the mouth of the valley. It is likely that during periods of high precipitation, precipitation falling on the valley walls and mountains/hills to the east and west of the valley follow bedrock topography and flow towards the centre of the Site. Once flow reaches the centre of the Site, it joins the primary flow path to the south.

The Till Unit has a wide range of hydraulic conductivities and is inferred to vary in composition laterally across the Site. The Till Unit is considered a leaky aquitard, a confining unit with areas that transmits water at a very slow rate. The Till Unit partially separates the Sand and Gravel Unit from the Bedrock Unit below it. Flow within the Till Unit may be a combination of horizontal and vertical flow depending on the composition.

A portion of groundwater/leachate recharges the Slough, which acts as a hydraulic sink. From the Slough, groundwater/leachate slowly infiltrates the underlying silt and clay deposits and the Sand and Gravel Unit. A review of the 2022 inferred direction of groundwater flow figures indicate a portion of groundwater that does not recharge the Slough also flows south toward the Site boundary.

A review of the 2022 vertical hydraulic gradients on Site indicates that vertical groundwater flows upwards in the northern area of the Site, as well as near the eastern and western Site boundaries. Slight downward vertical gradients occur in the Slough and compost facility areas, specifically monitoring well nests GL-28, GL-29, GL-34, GL-35 and GL-39.

A detailed description of the Site hydrogeology, specifically hydraulically conductivity testing and horizontal and vertical groundwater flow direction, is presented in Sections 3.5.1 to 3.5.3.

3.5.1 Hydraulic Conductivity Testing

In support of this HHCR, GHD completed a field investigation at the Site between July 5 and 8, 2023. The purpose of the field investigation was to perform hydraulic conductivity testing at Site monitoring wells to estimate hydraulic conductivities of the overburden sediments and bedrock underlying the Site.

[1] British Columbia Groundwater Wells and Aquifers, Aquifer 469 Summary. https://apps.nrs.gov.bc.ca/gwells/aquifers/469

[2] British Columbia Groundwater Wells and Aquifers, Aquifer 470 Summary. https://apps.nrs.gov.bc.ca/gwells/aquifers/470

GHD completed single wells response testing (SWRT) at 9 monitoring wells installed in the overburden and bedrock. The tests were completed using solid PVC slugs, Solinst™ water level meters, and Solinst™ Levelogger pressure transducers. Barometric pressure was simultaneously recorded using a Solinst™ Barologger pressure transducer.

Each test was completed by inducing a sudden change in the water level and measuring the response of the aquifer within the monitoring well being tested (i.e., measuring the change in water level over time). The water level change was induced by introducing or removing a known volume or "slug" into and out of each well. The change in water level over time is recorded using a pressure transducer installed in the well prior to beginning the test.

Prior to each test, GHD measured and recorded static water levels, removed all dedicated sampling equipment (e.g., tubing) from the monitoring well, and installed a Solinst™ Levelogger pressure transducer. The solid PVC slug was then quickly lowered into the well to displace the static water level. Following this near instantaneous change in static water level, the recovery of water level in the well to at least 90 percent of the total initial displacement was recorded by the pressure transducer. Manual water level measurements were also recorded with a water level meter to validate the pressure transducer measurements.

GHD analyzed the results of the recovery tests using the AQTESOLV© (v. 4.01) software. GHD used monitoring well/borehole specific data along with time-displacement data collected during the SWRT with the Bouwer-Rice (1976) and Hvorslev (1951) solutions for unconfined and confined aquifers to estimate hydraulic conductivity values for each test.

The estimated geometric mean hydraulic conductivities for each monitoring well are included in **Table 3.1**, below. Individual AQTESOLV solution output sheets are provided in **Appendix D.**

Table 3.2 Estimated Hydraulic Conductivity Values

Monitoring Well ID	Stratigraphy	Screened Unit	Test Type	Analytical Solution	Number of Tests	Geometric Mean Hydraulic Conductivity (m/sec)
Upgradient						
GL-23-1	Sand, compact	Sand and Gravel	Falling and Rising Head	Bouwer and Rice, 1976	4	1.1×10^{-6}
GL-24-1	Sand, compact followed by silty sand (till)	Sand and Gravel	Falling and Rising Head	Bouwer and Rice, 1976	4	9.6×10^{-6}
GL-41-2	Gravel and silt, trace clay (till)	Till	Falling and Rising Head	Bouwer and Rice, 1976	6	1.0×10^{-3}
GL-41-1	Bedrock	Bedrock	Rising Head	Bouwer and Rice, 1976	1*	3.5×10^{-9}
Landfill Vicinity						
GL-5-2	Sand followed by gravelly silt (till)	Till	Falling and Rising Head	Bouwer and Rice, 1976	7	1.2×10^{-4}
GL-26-2	Clayey silt	Till	Rising Head	Hvorslev, 1951	1**	6.0×10^{-8}
GL-34-3	Lean clay, trace sand followed by fat clay, trace sand	Till	Falling and Rising Head	Bouwer and Rice, 1976	6	7.5×10^{-6}
GL-35-3	Silty sand with gravel (till)	Till	Falling and Rising Head	Bouwer and Rice, 1976	6	7.3×10^{-6}

Monitoring Well ID	Stratigraphy	Screened Unit	Test Type	Analytical Solution	Number of Tests	Geometric Mean Hydraulic Conductivity (m/sec)
Compost Facility Vicinity						
G-L27-1	Bedrock, some fractures	Bedrock	Falling and Rising Head	Hvorslev, 1951	1	1.4×10^{-6}
GL-27-2	Silty clay, some sand and gravel (till)	Till	Falling and Rising Head	Bouwer and Rice, 1976	2	4.3×10^{-10}
G-L29-2	Sand and silt (till)	Till	Falling and Rising Head	Bouwer and Rice, 1976	1	5.0×10^{-9}
G-L40-2	Bedrock	Bedrock	Rising Head	Bouwer and Rice, 1976	1*	7.9×10^{-8}
Downgradient						
GL-28-2	Silty sand	Till	Falling and Rising Head	Bouwer and Rice, 1976	4	1.6×10^{-6}
GL-39-1	SILT, some sand and gravel	Till	Falling and Rising Head	Bouwer and Rice, 1976	2*	1.7×10^{-5}
GL-39-2	SAND, fine to coarse, silty, trace coarse gravel	Sand and Gravel	Falling and Rising Head	Bouwer and Rice, 1976	2*	1.5×10^{-9}
GL-42-1	(Till) SAND and GRAVEL, silty	Till	Rising Head	Bouwer and Rice, 1976	1*	9.2×10^{-9}
Notes: * completed by SNC, ** completed by Golder						

In 2019, SNC Lavalin completed single wells response tests at monitoring wells GL-39-1, GL-39-2, GL-40-2, GL-41-1, and GL-42-1 (SNC Lavalin Inc., 2020). The hydraulic conductivity estimates are provided in **Table 3.1** for reference.

In summary, the hydraulic conductivity ranges for each unit include:

– Sand and Gravel Unit: 1.5×10^{-9} m/sec to 9.6×10^{-6} m/sec
– Till Unit: 4.3×10^{-10}m/sec to 1.0×10^{-3} m/sec
– Bedrock Unit: 3.5×10^{-9} m/sec to 1.4×10^{-6} m/sec

The Till Unit has a wide range of hydraulic conductivity values, which suggests that the composition of the till varies laterally across the Site. The till is inferred to be a leaky aquitard separating the Sand and Gravel Unit from the Bedrock Unit. Areas where the Till Unit is more permeable and is characterized by a higher hydraulic conductivity estimate may represent preferential pathways for vertical migration of Landfill derived impacts.

3.5.2 Horizontal Flow Direction

Groundwater elevations for Site monitoring wells from 2015 through 2022 are presented in **Table 2**. Hydrographs showing groundwater elevations between 2015 through 2022 at the upgradient, landfill vicinity, compost vicinity, and downgradient monitoring wells are presented in **Appendix E.**

The highest groundwater elevations in the overburden are observed at GL-41-3 (located upgradient to the north of the landfill) and GL-15-2 (located upgradient to the southwest west of the landfill). Groundwater elevations at GL-41-3 and GL-15-2 ranged from 448.26 to 449.02 m AMSL, and 448.09 to 448.20 m AMSL in 2022 respectively. The lowest groundwater elevations in the overburden are observed at 09BH06-S, which ranged from 435.67 to 435.76 m AMSL in 2022.

A review hydrographs and historical water elevation data shows that water elevations have been generally consistent over the past eight years with no overall decreasing or increasing trends. The hydrographs show some evidence of seasonal trends in groundwater elevations with high elevations occurring following the spring freshet and is associated with a period of groundwater recharge. This pattern is more apparent in the upgradient monitoring locations and locations in the central portion of the Site. Several of the downgradient monitoring wells have shown a slight increasing trend in groundwater elevations since 2015. These include GL-28-3, GL-28-1, 09BH03 and 09BH06-D. The reason for the increase is unclear.

Horizontal groundwater flow on Site occurs primarily in the Sand and Gravel Unit (Aquifer 469) and the underlying bedrock (Aquifer 470). Groundwater flow is interpreted to be generally flowing from north to south, through the Landfill vicinity, the Slough and the Compost Facility towards the mouth of the valley. It is likely that during periods of high precipitation, precipitation falling on the valley walls and small mountains/hills to the east and west of the valley follow bedrock topography and flow towards the centre of the Site. Once flow reaches the centre of the Site, it joins the primary flow path to the south.

It should be noted that the Sand and Gravel Unit is discontinuous throughout the Site or is unsaturated in portions of the Site and there may be some localized differences in groundwater flow which reflect this.

To illustrate the groundwater flow patterns at the Site, groundwater elevations were used to create groundwater contour maps for March, June, August, and October 2022. Groundwater contours were generated for the Sand and Gravel Unit as shown on **Figure 3.6A** through **Figure 3.6D** and the Till Unit on **Figure 3.7A** through **Figure 3.7D**. Groundwater contours for the Bedrock Unit were not generated due to an insufficient dataset.

The following observations are drawn based on a review of groundwater contour maps:

– Within both the Sand and Gravel Aquifer and Till Unit, the overall groundwater flow direction is to the south following Site topography (i.e., towards the mouth of the valley).
– Within the Sand and Gravel Aquifer, components of flow are directed from topographic high points into the center of the Site where hydraulic gradients are relatively flat. This pattern is not observed within the Till Unit.
– Within the Till Unit, a hydraulic high-point is present in the vicinity of well nest GL-29-1/2. Hydraulic conductivity testing at these wells shows relatively low permeability within the Till Unit. This zone of low permeability is likely to act as a barrier for downward flow which results in the hydraulic high point.
  - As previously described, the composition of the Till Unit varies significantly across the Site. It is likely that other low-permeable areas exist across the Site and that these areas would create localized hydraulic high points. Areas with high permeability are expected to promote flow which may result in localized hydraulic low points.
– Although groundwater flow in bedrock was not mapped, it is anticipated that groundwater flow would follow Site topography. Groundwater in bedrock would flow eastward and westward from the valley walls and flanking mountains/hills and then flow to the south down the valley.

A comparison between groundwater elevations and ground surface in the central portion of the Site shows that groundwater elevations are close to or even above grade. The presence of water elevations above grade supports this interpretation and shows that groundwater discharge to low-lying areas (i.e., the Slough) is likely still occurring particularly during periods of higher groundwater levels such as during the spring freshet. As shown on the geological cross-sections, the groundwater elevations measured in each of the geological units are not that dissimilar. This provides evidence that the Till Unit separating the Sand and Gravel Unit and Bedrock Unit may not provide a significant hydraulic barrier to vertical groundwater migration and is therefore considered a leaky aquitard. Flow within the till unit is inferred to be a combination of horizontal and vertical flow due to lateral variation in grain size across the Site.

3.5.3 Vertical Flow Direction

The vertical component of groundwater flow was determined from the nested wells at the Site as shown in Table 3.3 below. Vertical gradients are presented in an upgradient to downgradient and shallow to deep fashion.

Table 3.3 2022 Vertical Gradient Calculations

Nested Wells Location	Location	Hydrogeologic Units	March 2022 (m/m)	June 2022 (m/m)	August 2022 (m/m)	October 2022 (m/m)
GL-1-1 & GL-1-2	North of Phase 1	Till Unit & Till Unit	0.01	0.01	0.01	0.01
GL-41-1 & GL-41-3	North of Phase 1	Bedrock & Till Unit	-0.003	-0.003	-0.005	-0.005
GL-2-1 & GL-2-2	West of Phase 2	Clay Unit	0.08	0.08	0.07	0.06
GL-4-1 & GL-4-2	East of Phase 2	Sand and Gravel Unit & Clay Unit	0.14	0.15	0.13	0.13
GL-5-1 & GL-5-2	West of Phase 2	Till & Bedrock Unit	0.0004	0.0027	-0.0003	0.0002
GL-34-1 & GL-34-3	Phase 3 Slough	Fill and Clay Unit	-0.05	-0.04	-0.04	-0.04
GL-35-1 & GL-35-3	Phase 3 Slough	Fill and Clay Unit	-0.07	-0.10	-0.08	-0.08
GL-8-1 & GL-8-2	West of Phase 3 Slough	Clay Unit & Sand and Gravel Unit	0.07	0.03	0.11	0.11
GL-26-1 & GL-26-2	East of Phase 3	Bedrock & Till Unit	2.14*	2.26*	2.48*	2.32*
GL-26-1 & GL-26-4	East of Phase 3 Slough	Till/Bedrock & Bedrock Unit	0.13	0.14	0.15	0.14
GL-27-1 & GL-27-2	Compost Facility	Bedrock & Clay /Till Unit	0.12	0.13	0.14	0.15
GL-29-1 & GL-29-2	Compost Facility	Sand and Gravel & Till Unit	-0.02	-0.03	-0.02	-0.01
GL-42-1 & GL-42-2	South Perimeter	Till Unit	0.03	Damaged	Damaged	Damaged
GL-39-1 & GL-39-2	South perimeter	Till Unit	-0.01	-0.01	-0.01	-0.01
GL-28-1 & GL-28-2	South of Site	Sand and Gravel & Clay Unit	-0.03	-0.02	-0.02	-0.02
09BH06-D & 09BH06-S	South of Site	Sand and Gravel Unit & Clay Unit	Artesian	Artesian	0.06	0.06
Notes: Positive values are upward gradients; negative values are downward gradients. * - vertical gradients in GL-26-1/2 are unexpectedly large due to a small difference in screen mid-point elevations and larger differences in water elevations. This results may be anomalous or may indicate						

The 2022 vertical hydraulic gradients indicate a spatial pattern where vertical groundwater flows upwards in the northern area of the Site, as well as near the eastern and western Site boundaries. Slight downward vertical gradients are observed in the Slough and Compost Facility, specifically at monitoring well nests GL-28, GL-29, GL-34, GL-35 and GL-39. This may be related to groundwater recharge from the topographic high areas to the north, east, and west of the Site. Historical reporting suggests that minimal vertical groundwater migration is observed near the sidewalls of Glenmore Valley, (Gartner Lee Limited, 1992). Additionally, a downward vertical gradient has been observed at the Site at the GL-6/GL-18, GL-8/GL-16, GL-15, GL-27, and GL-28 well series (Golder Associates Ltd., 2012). With the exception of GL-28, these groundwater monitoring locations are located in the vicinity of the Slough. Monitoring well nest GL28 is located immediately downgradient of the compost facility.

An assessment of Site bedrock hydrogeology completed by Golder Associates and SLR Consulting identified upward hydraulic gradients between the bedrock and overburden sediments and concluded that groundwater within the bedrock acts as a source of recharge for the overlying aquifer (Golder Associates and SLR Consulting, 2015). The 2022 monitoring results generally agree with this assessment. It’s important to note that upwards vertical gradient from bedrock to the overburden sediments will prevent downward migration of landfill derived impacts into the Bedrock unit.

Vertical groundwater flow throughout the Site footprint is noted to be upwards provided the leachate level within the Landfill is maintained at an elevation at or below 437 m AMSL (Golder Associates Ltd., 2016). Provided the leachate collections systems are maintained and leachate mounding is prevented within the waste, vertical hydraulic gradients will be directed upwards from the underlying groundwater flow zones into the waste. Leachate mounding could result in a reversal of vertical hydraulic gradients surrounding the waste mound which may promote downward migration of leachate into the subsurface, particularly in the areas where the natural control liner is not present or thin.

Artesian Conditions

A review of the groundwater elevations between 2012 and 2022, see Table 2, shows artesian conditions (groundwater levels above ground surface) at a number of monitoring locations. As shown in Table 3.4, below, artesian conditions are noted in many of the Phase 3/Slough area, Compost Facility, and downgradient monitoring wells. It is noted that artesian conditions are more prevalent during periods of high precipitation (i.e., March or the spring freshet).

As noted by Golder Associates and SLR, upward hydraulic gradients will limit the downward migration of landfill derived impacts into bedrock. Upward gradients will also limit downward migration of impacts into the overburden sediments.

The following provides a list of the monitoring wells, locations, screened hydrogeologic unit, and frequency of water levels above grade:

Table 3.4 Wells Characterized by Artesian Conditions

Monitor	Frequency	Site Location	Hydrogeologic Unit
GL-2-2	1 out of 33	West of Phase 2	Clay Unit
GL-8-2	1 out of 34	West of Phase 3/Slough	Clay Unit
GL-42-1	1 out of 9	South Boundary	Till Unit
06BH02	3 out of 18	East of Compost Facility	Sand and Gravel Unit
GL-27-2	3 out of 33	Compost Facility	Till Unit
GL-10-1	4 out of 34	East of Phase 3/Slough	Clay Unit
09BH04	4 out of 9	Downgradient (South of Site)	Sand and Gravel Unit
GL-27-4	4 out of 32	Compost Facility	Surficial fill
GL-32-2	5 out of 7	Phase 3/Slough	Clay Unit/Till Unit
GL-32-3	6 out of 8	Phase 3/Slough	Till Unit
GL-27-3	7 out of 32	Compost Facility	Till Unit
GL-17-2	13 out of 34	Compost Facility	Till Unit
09BH06-D	13 out of 17	Downgradient (South of Site)	Sand and Gravel Unit
GL-8-1	14 out of 34	West of Phase 3/Slough	Sand and Gravel Unit
GL-35-1	18 out of 30	Phase 3/Slough	Fill material/Clay Unit
GL-17-1	25 out of 25	Compost Facility	Bedrock
GL-35-2	25 out of 28	Phase 3/Slough	Clay Unit
GL-27-1	26 out of 26	Compost Facility	Bedrock
GL-2-1	27 out of 33	West of Phase 2	Clay Unit
GL-26-1	27 out of 33	East of Phase 3/Slough	Bedrock
GL-35-3	28 out of 31	Phase 3/Slough	Till

4. Environmental Monitoring Program

As reported in the 2022 Annual Water Monitoring Report (Keltech, 2023), water quality at the Site is monitored at least semi-annually through a network of groundwater monitoring wells, leachate collection stations, and surface water monitoring stations.

The network includes groundwater monitoring wells located upgradient, in the vicinity of the Landfill and Compost Facility, and downgradient. The monitoring well network includes several sets of nested wells which monitor groundwater quality and water elevation in the Clay Unit, Sand and Gravel Unit, Till Unit, and Bedrock Unit.

The 2022 environmental monitoring program (EMP) included quarterly leachate quality monitoring at four locations: North Pumphouse Manhole (N. Pumphouse MH), P1 Leachate Manhole 2 (P1 Leachate MH-2), P2-A2 Leachate Manhole, and the South Leachate Wet Well (S. Leachate WW).

Surface water quality is currently monitored quarterly at eight (8) locations: Bredin Pond, the NE Pond, Tutt Pond, the Bubna Slough, the Slough, Slough #2, Little Robert Lake, and Robert Lake. As part of the EMP, background surface water quality is represented by the Bubna Slough, Slough #2, Little Robert Lake, and Robert Lake.

For the purposes of this HHCR, upgradient surface water quality is characterized by Bubna Slough and Slough #2 and downgradient surface water quality is represented by Little Robert Lake and Robert Lake. The remaining locations represent on-Site surface water quality.

The historical monitoring network is presented on **Figure 1.3** and the installation details are presented on **Table 1**. The 2022 EMP network is presented on **Figure 1.4**. The groundwater monitoring well network included in the EMP and referenced throughout this report is summarized in **Table 4.1,** below.

Table 4.1 includes a list of groundwater monitoring wells that are sampled for water quality. It should be noted that depth to water measurements is collected at all available groundwater monitoring wells.

Table 4.1 Groundwater Quality Monitoring Well Network

Monitoring well ID	Lithology	Hydrogeologic Classification
Upgradient Monitoring Wells		
GL-41-1 (onsite at north Site boundary)	Volcanic bedrock, brown, hard	Bedrock Unit
GL-41-2 (onsite at north Site boundary)	Gravel and silt, trace clay (till)	Till Unit
GL-41-3 (onsite at north Site boundary)	Silt, some clay, sand, and trace silt	Sand and Gravel Unit
GL-23-1 (offsite northeast)	Sand, compact	Sand and Gravel Unit
GL-15-1 (offsite west)	Bedrock	Bedrock Unit
GL-15-2 (offsite west)	Sandy silt and gravel (till)	Till Unit
Landfill Vicinity Monitoring Wells		
GL-2-1 (artesian)	Silty clay followed by silty sand	Clay Unit
GL-2-2	Silty clay	Clay Unit
GL-4-1	Silty gravel and sand	Sand and Gravel Unit / Till Unit
GL-4-2	Silty clay	Clay Unit
GL-5-2	Sand followed by gravelly silt (till)	Till Unit
Slough Monitoring Wells		

Monitoring well ID	Lithology	Hydrogeologic Classification
GL-16-1	Very dense silt to laminated silt (weathered bedrock)	Bedrock Unit
GL-17-1 (artesian)	Bedrock	Bedrock Unit
GL-20-1	Silty sand, some gravel, and traces of clay and cobbles (till)	Till Unit
GL-35-3	Silty sand with gravel (till)	Till Unit
Compost Monitoring Wells		
GL-12-1	Silty sand (till)	Till Unit
GL-27-1 (artesian)	Bedrock, some fractures	Bedrock Unit
GL-27-3	Layered clay followed by silty clay (till)	Clay Unit / Till Unit
GL-29-1	Sand and silt followed by bedrock	Sand and Gravel Unit
GL-29-2	Sand and silt (till)	Till Unit
Downgradient Monitoring Wells		
GL-42-1	Sand and gravel, trace silt (till)	Till Unit
GL-42-2	Clayey silt	Till Unit
GL-39-1	Silt, some sand, clay and gravel (till)	Till Unit
GL-39-2	Silty sand, trace gravel and clay	Sand and Gravel Unit
GL-28-1 (offsite)	Sand, some gravel, bedrock	Sand and Gravel Unit
GL-28-2 (offsite)	Silty sand	Sand within Clay Unit
GL-28-3 (offsite)	Layered silty clay, some sand	Clay Unit
09BH03 (offsite)	Sand, trace silt	Sand and Gravel
09BH06-D (offsite)	Silty sand	Sand and Gravel
Notes: * - monitoring well is included in the groundwater compliance assessment		

5. Site Impact Assessment

The following sections provide a discussion of current water quality impacts as a result of the Site activities.

The Site impact assessment focuses on landfill leachate impacts to the surrounding environment under the assumption that the majority of impacts would originate from areas of the Landfill where the natural liner is thin or is not present. Leachate collection and liner systems would mitigate impacts to the underlying aquifer units and the majority of the compost leachate generated at the Compost Facility is collected and managed appropriately. Therefore, impacts to groundwater or surface water quality are most likely attributable to areas of the Landfill where the natural control line is thin or not present.

The section begins by describing the current monitoring program and focuses the discussion of water quality to key leachate impact indicator parameters and applicable water quality standards.

The discussion follows a lines of evidence approach broken out into geographic areas to assess the potential of leachate impacts. Lines of evidence include a comparison of key leachate indicator parameter concentrations between background, leachate, and downgradient groundwater, spatial and temporal distribution of key leachate indicator parameters with a comparison to interpreted groundwater flow paths and an investigation of major ion geochemical patterns.

5.1 Indicator Parameters

Historical analytical results, including a full list of parameter concentrations, are presented in **Appendix F**; however, a list of typical water quality indicator parameters has been selected to focus the discussion of water quality. Water quality indicator parameters were selected based on parameters that are typically elevated in landfill leachate and show notable increases in leachate impacted water as well as those that have been observed at elevated concentrations in water at the Site.

Many other analytical parameter concentrations also change in leachate impacted water, but not generally at the high levels of change. GHD has considered several secondary analytical parameters to provide supporting evidence to the key parameters.

Eight indicator parameters have been selected for the site to assess potential impacts to groundwater and surface water quality. The rational for the leachate indicator parameters is presented in **Table 5.1**, below:

Table 5.1 Leachate Indicator Parameters

Leachate Indicator Parameter	Rationale
Alkalinity	Alkalinity increases downgradient of landfills primarily due to elevated levels of dissolved carbon dioxide in affected water (produced by the biological breakdown of organic material) causing the dissolution of carbonate from natural geologic materials within the aquifer.
Chloride	Chloride is generally abundant in municipal waste and is formed in part by the degradation of various wastes. Chloride is a very useful leachate indicator parameter as it is not subject to retardation processes and thus migrates at essentially the same rate as groundwater flow. External factors such as road salt and dust suppressant may have impacts on background water quality levels of chloride.
Nitrate (as N) and/or Ammonia (as N)	High concentrations of nitrate are observed when landfill leachate is in an aerobic environment. In this stage, the landfill is in a chemically oxidizing state where oxidized chemical species such as nitrate dominate and oxidized species such as nitrate or nitrite decrease in concentrations. High concentrations of nitrate are also observed in water impacted by compost facilities. As the landfill enters a reducing state, nitrogen species are reduced to ammonia. Given the age of the historical portion of the Site, higher ammonia may be present. Elevated nitrate and ammonia concentrations can also be associated with compost and agricultural sources. Both should be considered when assessing nitrate and ammonia levels.
Sulphate	Construction and demolition waste landfills often generate elevated concentrations of sulphate in leachate-affected waters due to the abundance of sulphate available from drywall in the waste stream. It is noted that an increase in calcium may also be associated with drywall and can be used as a secondary indicator parameter. However, calcium ions are subject to move complex geochemical process while in groundwater (sorption, precipitation) and may not occur at comparable levels of impact. Potash fertilizer use may also increase sulphate concentrations in groundwater.

Leachate Indicator Parameter	Rationale
Total Dissolved Solids (TDS)	TDS is caused by the increased cations and anions in solution due to the breakdown and dissolution of waste materials and salts.
Boron	Boron occurs naturally in borate minerals; however, it is relatively rare in the natural environment. Boron is an additive in fiberglass and various detergent and cleaning products. Elevated boron may be observed in municipal solid wastes leachate.
Iron and Manganese	Concentrations of metals typically increase in leachate-affected groundwater due to the alteration of redox conditions within the groundwater. The breakdown of dissolved organic matter within leachate consumes dissolved oxygen and related oxygen sources in groundwater and creates reducing conditions. Where conditions are reducing, naturally-occurring iron and manganese oxides within the geologic material are reduced to more soluble forms, which results in an increase in dissolved iron and manganese concentrations.

5.2 Applicable Background Concentrations

GHD completed a Site-Specific Background and Compliance Water Quality Review (GHD, 2023) to determine Site-specific background groundwater and surface concentrations and assess water quality compliance at the Landfill. Site-specific background concentrations were determined following CSR Protocol 9 *Establishing Local Background Concentrations in* Groundwater. GHD's technical memo is presented in **Appendix G**.

As presented in the technical memo, Site-specific background concentrations were determined for the parameters that exceeded both the CSR standards and regional background concentrations as well as parameters that are not included in Table 1 of Protocol 9.

The Site-specific background concentrations are listed in **Table 5.2**, below. To support this impact assessment, GHD has calculated Site-specific background concentrations for each of the leachate indicator parameters. These concentrations supplement the background groundwater dataset for the Sand and Gravel Unit background wells (GL-41-3, GL-23-1, and GL-0-3) and the Till Unit background wells (GL-41-2, GL-15-2, and GL-0-2).

Table 5.2 Overall 95th Percentile Background Concentrations in Groundwater

Exceedance Parameter	Units	Sand and Gravel Unit 95th Percentile Concentration	Glacial Till Unit 95th Percentile Concentration
Chloride	mg/L	556.4	717.4
Nitrate (as N)	mg/L	2.5	n/a
Sulphate	mg/L	763.7	347.6 (maximum*)
Sodium	mg/L	n/a	1,423
Lithium	ug/L	62.2	76.61
Strontium	ug/L	n/a	18,282
Alkalinity, total (as CaCO3)	mg/L	1,401.0	n/a
Total Dissolved Solids	mg/L	2,250.0	n/a
Uranium	µg/L	227.7	30.0 (maximum*)
Notes: n/a – not applicable; parameter not assessed as there were no exceedances.			

Exceedance Parameter	Units	Sand and Gravel Unit 95th Percentile Concentration	Glacial Till Unit 95th Percentile Concentration
* Only two values remained after removing outliers from the sulphate and uranium datasets for the glacial till wells. Therefore, it was not possible to calculate 95th percentile concentrations and the maximum of the remaining values was used.			

5.3 Applicable Water Quality Standards

The BC Contaminated Site Regulation (CSR) standards are the applicable groundwater quality criteria for the Site (refer to OC Condition 3.7) and supersede previously used Site criteria. The applicability of BCs water quality classes is explained below.

The groundwater quality criteria applicable to the Site include:

- BC CSR Aquatic Freshwater Life (AW)
- BC CSR Drinking Water Use (DW)
- BC CSR Irrigation Water Use (IW)

The BC water quality guidelines (WQGs) were used as the most applicable water quality criteria for Little Robert Lake and Robert Lake. As mentioned in Section 3.3, these surface water bodies are natural alkaline lakes and so are unique environments that aren't necessarily applicable to freshwater aquatic life criteria. However, in the absence of Site-specific criteria, the following BC WQGs were applied:

- BC Water Quality Guidelines (WQG) Aquatic Life Long-Term Chronic (AW LT)
- BC WQG Aquatic Life Short-Term Acute (AW ST)
- BC WQG Irrigation Long-Term Chronic (IW LT)
- BC WQG Irrigation Short-Term Acute (IW ST)

The short-term chronic WQGs are the primary criteria. Where short-term chronic criteria are not available, long-term chronic WQGs were used.

BC Water Quality Classes

BC Contaminated Sites Regulation (CSR)

As outlined in the BC MOE document Protocol 21 the applicability of BC groundwater quality classes depends on the potential for groundwater or surface water at the Site to flow to surface water bodies that may support aquatic life as well as the current and future water uses in the vicinity of the site.

CSR AW standards

Protocol 21 states that CSR AW standards apply to sites located within 500 m of an aquatic receiving environment (i.e., a surface water body containing aquatic life) unless it can be demonstrated that the groundwater discharges into a different surface water body (located greater than 500 m from the site) or that groundwater does not migrate to within 500 m of a surface water body that contains aquatic life. Little Robert Lake and Robert Lake are located within 500 m of the south Site boundary and are recharged by groundwater (Little Robert Lake may only become hydraulically connected to groundwater during flooding events) thus each lake represents an aquatic receiving environment.

The AW standards identified in Schedule 3.2 of the CSR apply to groundwater quality at the Site.

CSR DW standards

Protocol 21 states that both current and future drinking water use must be considered when determining whether CSR DW standards apply to a site. Future land use in the vicinity of the Site may include potable water supply from Aquifer 469 and Aquifer 470 thus; the drinking water exposure pathway is applicable for the Site.

The DW standards identified in Schedule 3.2 of the CSR apply to groundwater quality at the Site.

CSR IW standards

Similar to drinking water, future groundwater use in the vicinity of the Site may include irrigation. Thus, the irrigation water exposure pathway is applicable for the Site.

The IW standards identified in Schedule 3.2 of the CSR apply to groundwater quality at the Site.

BC Water Quality Guidelines (WQG)

WQG AW LT and WGQ AW ST standards

Technical Guidance 15: Concentration Limits for the Protection of Aquatic Receiving Environments (TG15) states that WQGs apply to water quality in aquatic receiving environments [surface water or porewater (i.e., groundwater)] located at or beyond 10 m of the high-water mark. Little Robert Lake and Robert Lake are downstream aquatic life environments and so WQGs apply to surface water samples collected from these lakes. WQGs do not apply to groundwater at the Site compliance wells since these lakes are located greater than 10 m from the Site.

WQG IW LT and WGQ IW ST standards

Surface water from the on-Site stormwater ponds is used for irrigation use on the adjacent farmland therefore the IW WQGs are applicable at these ponds. Surface water from Little Robert Lake and Robert Lake are not used for irrigation. These are alkaline lakes and so water quality is not suitable for irrigation therefore IW WQGs do not apply.

5.4 Overburden Groundwater Quality

5.4.1 Background Water Quality Assessment

Background groundwater quality at the Site is represented by monitoring wells installed north and north-east of the Phase 1 area. In the Sand and Gravel Unit this includes: GL-41-3, GL-23-1, and GL-0-3. In the Till Unit this includes monitoring wells: GL-41-2, GL-15-2 and GL-0-2 (historically monitored).

Monitoring wells have been selected to represent background water quality based on the following selection criteria:

– Hydraulically upgradient or cross-gradient of the Landfill footprint and Site activities,
– Historically used as a background location
– Stable water quality with no clear indication of impacts from the Landfill or Site activities
– Screened within a hydrogeologic unit present upgradient and downgradient of the Landfill footprint

Largely, the monitoring wells chosen to represent background are located in a clear upgradient position, north and north-east of the Landfill. Monitoring wells GL-15-2 is located southwest of the Phase 3 area; however, due to groundwater flow directed inward to the landfill, this location is in an upgradient position and is a suitable representative for background.

The locations of the background wells are illustrated on **Figure 1.2**.

There are no background wells screening the shallow silt and clay deposits (i.e., the Clay Unit). Groundwater availability is expected to be low (i.e., low well yield) and of poor water quality due to high fines content. It is recommended that a background well be installed or added to the monitoring program in order to complete a Protocol 9 assessment in the Clay Unit.

Background water quality in bedrock is represented by GL-41-1 (discussed in Section 4.6).

A summary of the available leachate indicator parameter concentrations reported at the upgradient wells are presented in **Table 5.3**, below. Historical results from 2015 to 2022 have been used to derive the ranges below.

Historical water quality data is presented in **Appendix F.** The Background Water Quality Memo, prepared by GHD, dated October 11, 2023, is presented in **Appendix G.**

Table 5.3 2015-2022 Concentrations Ranges of Leachate Indicator Parameters in Background Wells

Parameter	Units	Sand and Gravel Unit (Background)				Till Unit (Background)			
		GL-41-3	GL-23-1	GL-0-3	95th Percentile	GL-15-2(1)	GL-41-2	GL-0-2	95th Percentile
Alkalinity, total	mg/L	533 - 622	962 – 1,180	396 – 525	1401.0	650 – 817	533 – 608	255 – 340	1,034
Ammonia, total	mg/L	ND – 0.141	ND – 0.04	ND – 0.274	0.163	ND – 0.0076	ND – 0.174	0.0926 – 0.317	0.221(2)
Chloride	mg/L	250 - 471	31.9 – 35	121 – 154	556.4	214 – 361	232 – 423	6.8 – 71.6	717.4
Nitrate (as N)	mg/L	1.18 – 1.78	ND – 0.066	ND – 1.88	2.5	1.79 – 7.69	1.46 – 2.14	ND - 0.049	82.23
Sulphate	mg/L	108 - 160	376 – 416	293 – 613	763.7	3,730 – 7,190	109 – 175	294 - 349	347.6(2)
TDS	mg/L	1010 – 1,580	1370 – 1,660	1420 – 2,060	2250.0	6,990 – 11,900	986 – 1,410	296 – 1,050	14,593
Boron	mg/L	0.0242 – 0.0322	0.0289 – 0.0379	0.0238 – 0.0377	0.0634	ND – 0.017	0.0236 – 0.0331	ND – 0.0568	0.07596
Iron	mg/L	ND – 0.0136	ND – 0.045	ND – 0.064	0.0801	ND	ND – 0.097	0.113 – 0.225	0.003(2)
Manganese	mg/L	0.00133 – 0.00731	0.00534 – 0.87	ND – 0.00191	1.69	ND – 0.00028	ND – 0.164	0.126 – 0.234	0.000382(2)

Notes: (ND) – non-detect; TDS - total dissolved solids
Alkalinity, total is reported as $CaCO_3$; ammonia, total is reported as N
Boron, iron, and manganese are reported as dissolved concentrations
(1) Monitoring well GL-15-2 is located cross-gradient from the landfill footprint and has been previously identified as a suitable background well
(2) Only two values remained after removing outliers from the data set. Therefore, it was not possible to calculate 95th percentile concentrations and the maximum values was used.

In the Sand and Gravel Unit, background groundwater quality at the Site can be characterized by moderate to high alkalinity, sulphate, TDS concentrations with variable but, overall, moderately elevated chloride concentrations. Chloride is elevated at GL-41-3 and 09BH03 but only slightly elevated at GL-23-1 and GL-0-3. Low concentrations of boron, iron, and manganese are also noted.

Background water quality in the Till Unit can be characterized by elevated concentrations of alkalinity, chloride, nitrate, and sulphate. Concentrations of TDS are significantly elevated.

The presence of elevated concentrations of leachate indicator parameters in background water quality indicates generally poor natural water quality and this needs to be considered when assessing the potential for landfill impacts downgradient of the landfill. Using Protocol 9 is an appropriate approach to assessing water quality at the Site as it considers naturally elevated concentrations in background water quality.

5.4.2 Leachate Quality

A leachate management plan (LMP) has been implemented at the Site to provide short and long-term solutions to collect and dispose of leachate. Leachate generated within Phase 1 and Phase 2 areas of the Site is collected using gravity drains that convey leachate through a leachate forcemain, located along the west side of the Site, to the municipal sanitary sewer system. Leachate generated in the Phase 3 (Slough) area is collected via an east-west gravity drain that runs along the boundary between the Phase 2 and Phase 3 area. After flowing to the west, leachate collected from the Phase 3 (Slough) area flows north and is pumped off-Site to the municipal sanitary sewer system.

As previously described, portions of the Site are constructed with a natural control liner system which includes greater than 2 m of in-situ native clay (with hydraulic conductivity values between 10^{-6} and 10^{-9} cm/sec) (Keltech, 2023). The presence of the natural control liner system supports the collection of leachate via gravity drains. However, GHD has noted several areas where this natural or native clay liner is unlikely to be present or is thin. These areas may allow for downward migration of leachate into the underlying subsurface.

Vertical hydraulic gradients at the Site have historically been upwards provided leachate elevations are maintained at or below 437 mAMSL. Meaning groundwater flow, in general, is upwards into the landfill footprint not downwards. Maintaining and continuing to implement the LMP will continue to ensure that leachate levels are maintained, and that a leachate mound does not form in the Site's footprint. This will reduce the long-term risk of leachate impacts downgradient of the Site.

Leachate quality at the Site is currently monitored at four locations within the leachate collection system:

– P2 A2 Leachate MH, located along the west side of Phase 1
  - represents leachate from the lined area within Phase 1

– S Leachate WW, located at southwest corner of Phase 2
  - represents leachate collected from Phase 2 and Phase 3/Slough areas via the east-west gravity drain

– P1 Leachate MH-2, located at the southwest side of Phase 1
  - represents a combination of leachate from the lined area between Phase 1 and Phase 2 and S Leachate Wet Well (WW)
  - N Pumphouse MH, located at the west side of Phase 1
  - represents a composite of collected leachate from across the Site just before leachate flows into Leachate Lift Station #3 and is pumped off-Site

The locations of the leachate monitoring points are presented on **Figure 1.2.** The 2022 concentration ranges of the eight leachate indicator parameters, as well as four secondary parameters, observed at the Site are summarized in **Table 5.4**, below.

Table 5.4 2022 Concentrations of Leachate Indicator Parameters

Parameter	Unit	N Pumphouse MH	P1 Leachate MH-2	P2 A2 Leachate MH	S Leachate WW	Median Leachate Concentration	Sand and Gravel Unit 95th Percentile	Till Unit 95th Percentile
Alkalinity, total	mg/L	2,290 – 5,740	4,330 – 10,900	2,450 – 4,550	4,110 – 6,400	4,895	1,401.0	1,034
Ammonia, total	mg/L	23.3 – 52.9	465 – 1,320	69.8 – 212	38.9 – 68.3	69.55	0.163	0.221(2)
Chloride	mg/L	439 – 792	719 – 2,050	934 – 1,480	654 – 859	832	556.4	717.4
Nitrate (as N)	mg/L	ND	ND	ND – 7.7	ND – 0.142	0.05	2.5	82.23
Sulphate	mg/L	754 – 1,850	ND - 451	ND - 410	1,620 – 1,880	602.5	763.7	347.6(2)
TDS	mg/L	4,310 – 9,140	4,670 – 10,300	4,200 – 6200	7,390 – 10,800	7,435	2,250.0	14,593
Boron	ug/L	947 – 1,850	3,310 – 14,800	3,870 – 6170	1,610 – 1,990	2,650	63.4	75.96

Parameter	Unit	N Pumphouse MH	P1 Leachate MH-2	P2 A2 Leachate MH	S Leachate WW	Median Leachate Concentration	Sand and Gravel Unit 95th Percentile	Till Unit 95th Percentile
Iron	ug/L	ND – 32.8	499 – 4,640	1,870 – 136,000	ND – 69.2	299.5	80.1	3(2)
Manganese	ug/L	106 – 311	1,260 – 4,540	1,070 – 3,690	104 – 275	168.5	1,690	0.382(2)

Notes: TDS - total dissolved solids

Alkalinity, total is reported as $CaCO_3$; ammonia, total is reported as N.

Boron, iron, and manganese are reported as dissolved concentrations.

(2) Only two values remained after removing outliers from the data set. Therefore, it was not possible to calculate 95th percentile concentrations and the maximum values was used.

As summarized above, leachate quality at the Site varies between the four leachate sources. In general, concentrations of indicator parameters alkalinity, ammonia, chloride (in comparison to the Sand and Gravel Unit water quality), boron, manganese, and iron are elevated in comparison to background water quality. Median concentrations of nitrate were notably lower within the leachate collection system in comparison to background concentrations. Median concentrations of TDS in leachate were much less than the 95th percentile in the Till Unit. Median concentrations of sulphate were only moderately elevated in leachate in comparison to background concentrations in the Till Unit and are less than the 95th percentile in the Sand and Gravel Unit. It should be noted that sulphate concentrations in S Leachate WW contains high sulphate concentrations.

In comparison to the typical leachate strength listed in the BC Environmental Monitoring at Municipal Solid Waste Landfills, concentrations of total ammonia and total alkalinity are particularly elevated while chloride is moderately elevated. It should also be noted that concentrations of hardness, total phosphorus (as P), and sodium are elevated in leachate at the Site. Concentrations of BOD and COD are also moderately elevated.

The 2022 leachate quality data shows that leachate at the Site also contains a number of Polycyclic Aromatic Hydrocarbons (PAHs), fatty acids, aggregate hydrocarbons, and Volatile Organic Compounds (VOCs). Organic compounds are not included in the current groundwater or surface water monitoring programs at the Site. In particular, the 2022 monitoring results show elevated levels of BTEX (benzene, toluene, ethylbenzene, and xylene), chlorinated VOCs (1,1-DCA, 1,2-DCA, cis-1,2-DCE, TCE, and vinyl chloride).

With the exception of potentially naturally occurring fatty acids and aggregate hydrocarbons, organic compounds are anthropogenic in origin. These components may provide useful leachate indicator parameters during future water quality assessments. However, the concentrations reported in the 2022 Annual Water Monitoring Report (Keltech Environmental Ltd, 2023) are not significantly elevated and detectable concentrations in the surrounding environment may not exist.

5.4.3 Landfill Vicinity Groundwater Quality

Landfill vicinity groundwater quality at the Site is represented by monitoring wells installed within and directly surrounding the landfill in the Phase 1 and Phase 2 areas. In the clay unit this includes monitoring wells: GL-2-2 and GL-4-2. In the Sand and Gravel Unit this includes monitoring well: GL-4-1. In the Till Unit this includes monitoring wells: GL-2-1 and GL-5-2. The locations of the landfill vicinity wells are illustrated on **Figure 1.2**.

A summary of the available 2022 leachate indicator parameter concentrations reported at the landfill vicinity wells are presented in **Table 5.5A and Table 5.5B**, below. Each data set is compared to it's corresponding 95th percentile background concentration. Note that GL-5-2 was only sampled once in 2022.

Table 5.5A 2022 Concentrations Ranges of Leachate Indicator Parameters at Landfill Vicinity Wells – Clay Unit and Sand and Gravel Unit

Parameters	Units	Clay Unit		Sand and Gravel Unit	
		GL-2-2	GL-4-2	GL-4-1	95th Percentile
Alkalinity, total	mg/L	233 - 275	719 - 823	520 - 575	1401.0
Ammonia, total	mg/L	ND – 0.085	ND - ND	0.101 – 0.134	0.163
Chloride	mg/L	68.1 – 70.6	36.4 – 41.6	18.2 – 18.8	556.4
Nitrate (as N)	mg/L	ND	ND - ND	ND - ND	2.5
Sulphate	mg/L	465 - 473	440 - 488	507 - 551	763.7
TDS	mg/L	998 - 1030	1410 - 1410	1280 - 1300	2250.0
Boron	mg/L	0.0065 – 0.0084	0.0192 – 0.0217	0.0114 – 0.0124	0.0634
Iron	mg/L	0.0562 – 0.126	0.0063 – 0.0571	**0.586 – 0.687**	0.0801
Manganese	mg/L	0.135 – 0.311	0.0196 – 0.228	0.0727 – 0.0755	1.69

Notes: TDS - total dissolved solids
Alkalinity, total is reported as CaCO3; ammonia, total is reported as N.
Boron, iron, and manganese are reported as dissolved concentrations
Bold text indicates concentrations above the 95th percentile criteria

There is insufficient background water quality data to calculate the 95th percentile for the Clay Unit; however, a general assessment of the leachate indicator parameters shows similar parameter concentrations in comparison to the Sand and Gravel water quality and Till Unit water quality (below). This provides evidence that landfill derived impacts are minor, if present, in the Clay Unit in the vicinity of the landfill.

In comparison to the 95th percentile of background, indicator parameter concentrations are low in the Sand and Gravel Unit in the vicinity of the landfill.

Table 5.5B 2022 Concentrations Ranges of Leachate Indicator Parameters at Landfill Vicinity Wells – Till Unit

Parameters	**Units**	**Till Unit**		
		GL-2-1	GL-5-2	95th Percentile
Alkalinity, total	mg/L	201 - 227	425	1034
Ammonia, total	mg/L	0.058 – 0.075	ND	0.221(2)
Chloride	mg/L	90.5 - 101	173	717.4
Nitrate (as N)	mg/L	ND - ND	ND - ND	82.23
Sulphate	mg/L	**573 - 632**	291	347.6(2)
TDS	mg/L	1120 - 1220	1070	14593
Boron	mg/L	0.0077 – 0.0096	0.0248	0.07596
Iron	mg/L	**0.954 – 1.02**	ND	0.003(2)
Manganese	mg/L	**0.112 – 0.119**	0.00023	0.000382(2)

Notes: TDS - total dissolved solids
Alkalinity, total is reported as CaCO3; ammonia, total is reported as N.
Boron, iron, and manganese are reported as dissolved concentrations
(2) Only two values remained after removing outliers from the data set. Therefore, it was not possible to calculate 95th percentile concentrations and the maximum values was used.
Bold text indicates concentrations above the 95th percentile criteria

Till Unit groundwater in the landfill vicinity is generally lower than or comparable to the 95th percentile of background water quality with the exception of sulphate, iron and manganese at GL-2-1. Iron exceedances were also noted at GL-4-1. These exceedances are likely due to naturally poor groundwater quality and potentially minor leachate derived impacts.

5.4.4 Phase 3/Slough Groundwater Quality

Slough groundwater quality at the Site is represented by three monitoring wells installed at or near the perimeter of the Slough in the Phase 3 area. In the Till Unit this includes monitoring wells: GL-20-1 and GL-35-3, both on the west Slough perimeter. In the bedrock unit, this includes well GL16-1, located immediately west of the Slough. The locations of these monitoring wells are illustrated on **Figure 1.2**.

A summary of the available 2022 leachate indicator parameter concentrations reported at the Slough wells are presented in **Table 5.6**, below. Each data set is compared to it's corresponding 95th percentile background concentration. Note that GL-35-3 was only sampled once in 2022.

Table 5.6 2022 Concentration Ranges of Leachate Indicator Parameters – Slough Wells

Parameters	Units	Till Unit		
		GL-20-1	GL-35-3	95th Percentile
Alkalinity, total	mg/L	**2,820 – 3,130**	**1,530**	1,034
Ammonia, total	mg/L	**70.4 – 85.7**	**1.36**	0.221(2)
Chloride	mg/L	370 - 399	344	717.4
Nitrate (as N)	mg/L	ND - ND	ND - ND	82.23
Sulphate	mg/L	172 - 251	**2,940**	347.6(2)
TDS	mg/L	4,210 – 4,510	6,730	14,593
Boron	mg/L	**1.89 – 2.8**	0.0588	0.07596
Iron	mg/L	**10.2 – 19.4**	**12.5**	0.003(2)
Manganese	mg/L	**0.256 – 0.409**	**0.325**	0.000382(2)

Notes: TDS - total dissolved solids

Alkalinity, total is reported as $CaCO_3$; ammonia, total is reported as N.

Boron, iron, and manganese are reported as dissolved concentrations

(2) Only two values remained after removing outliers from the data set. Therefore, it was not possible to calculate 95th percentile concentrations and the maximum values was used.

Bold text indicates concentrations above the 95th percentile criteria

Groundwater in the Till Unit well GL-35-3 has elevated concentrations of some parameters compared to the 95th percentile, including alkalinity, ammonia, boron, iron and manganese. Sulphate concentrations at GL-35-3 also greatly exceeded the 95th percentile concentration for sulphate, which suggest leachate derived impacts.

Water quality at GL-20-1 is characterized by elevated concentrations of total alkalinity, ammonia, boron, iron, and manganese when compared to the 95th percentile background concentrations, suggesting groundwater in the Slough vicinity, particularly in the area surrounding GL-20-1, has moderate leachate-derived impacts. It is also noted that the groundwater at GL-20-1 has been physically described as resembling leachate.

5.4.5 Compost Facility Groundwater Quality

Compost Facility groundwater quality in the vicinity of the Compost Facility is represented by monitoring wells GL-27-3 and GL-29-2 (see **Figure 1.2**). As noted in Section 4.1, GL-27-3 is completed partially in the Clay Unit and the Till Unit. GL-29-2 is completed in the Till Unit. Given the low expected permeability of the Clay Unit, GL-27-3 has been considered a Till Unit well for this assessment.

A summary of the available 2022 leachate indicator parameter concentrations reported at the Compost Facility wells are presented in **Table 5.7**, below. Each data set is compared to it's corresponding 95th percentile background concentration. Note that GL-27-3 was only sampled once in 2022.

Table 5.7 2022 Concentrations Ranges of Leachate Indicator Parameters – Compost Facility Vicinity Wells

Parameters	Units	Till Unit		
		GL-27-3	GL-29-2	95th Percentile
Alkalinity, total	mg/L	479	293 – 316	1,034
Ammonia, total	mg/L	0.933	ND – ND	0.221(2)
Chloride	mg/L	585	220 – 232	717.4
Nitrate (as N)	mg/L	ND	ND - ND	82.23
Sulphate	mg/L	10,300	5,030 – 4,710	347.6(2)
TDS	mg/L	20,000	7,590 – 7,680	14,593
Boron	mg/L	0.0324	0.0368 – 0.0231	0.07596
Iron	mg/L	3.94	ND – 0.0223	0.003(2)
Manganese	mg/L	0.466	0.0258 – 0.432	0.000382(2)

Notes: TDS - total dissolved solids

Alkalinity, total is reported as CaCO3; ammonia, total is reported as N.

Boron, iron, and manganese are reported as dissolved concentrations

(2) Only two values remained after removing outliers from the data set. Therefore, it was not possible to calculate 95th percentile concentrations and the maximum values was used.

Bold text indicates concentrations above the 95th percentile criteria

The comparison of indicator parameter concentrations versus the 95th percentile background concentrations shows elevated concentrations of ammonia, sulphate, TDS, iron, and manganese at GL-27-3 which is indicative of water quality impacts. The 2022 results from GL-29-2 show elevated levels of sulphate, iron, and manganese while the other indicators are comparable or lower that the 95th percentile. This may indicate water quality impacts; however, if present, they are minor.

The Sand and Gravel Unit is discontinuous in the Compost Facility and is generally thin or above the water table where it does exist. There are currently no monitoring wells screened within the Sand and Gravel Unit in the compost facility. A review of the compost facility borehole logs suggests the Sand and Gravel Unit is thickest in the vicinity of historical monitoring well GL-40-2/3 at approximately 441.25 to 446.05 m AMSL, which is likely above the water table at this location.

5.4.6 Downgradient Groundwater Quality

Downgradient groundwater quality south of the southern site boundary is represented by monitoring well nest GL-28 and GL-39 (situated along the southern Site boundary north of Little Robert Lake), monitoring well 09BH03 (located in a down to cross-gradient position southeast of the Site boundary), and monitoring well nest 09BH06 (situated west of Robert Lake). Given that these wells are located immediately downgradient of the landfill boundary, water quality impacts may have originated from a combination of leachate from the Phase 1 and Phase 2 area, debris in the Slough, or the Compost Facility. The locations of the landfill vicinity wells are illustrated on **Figure 1.2**.

A summary of the available 2022 leachate indicator parameter concentrations reported at the downgradient vicinity wells are presented in **Table 5.8A** and **Table 5.8B**, below. Note that monitoring well 09BH06-S has not been monitored since 2015 and has therefore not been included in the downgradient water quality analysis. Monitoring wells 09BH03 and 09BH06-D were only sampled during the spring 2022 monitoring event. GL-42 is sampled quarterly; however, only the spring 2022 data was available at the time of writing this report and is sufficient to characterize water quality.

Table 5.8A 2022 Concentration Ranges of Leachate Indicator Parameters – Downgradient Clay Unit and Sand and Gravel Unit Wells

Parameter	Units	Clay Unit		Sand and Gravel Unit				
		GL-28-2*	GL-28-3	GL-28-1	GL-39-2	09BH03(1)	09BH06-D	95th Percentile
Alkalinity	mg/L	615 - 621	736 - 782	469 - 477	351 – 394	396 – 525	308	1,401.0
Ammonia	mg/L	ND - ND	ND – ND	0.051 – 0.09	ND – ND	ND – 0.274	0.147	0.163
Chloride	mg/L	57.8 – 62.1	67.2 – 80.8	84 – 93.5	126 – 158	121 – 154	6.5	556.4
Nitrate (as N)	mg/L	10.8 – 13.2	8.24 – 9.3	ND - 0.187	ND – ND	ND – 1.88	0.931	2.5
Sulphate	mg/L	3,120 – 3,160	4,510 – 4,640	2,070 – 2,130	951 – 1,410	293 – 613	294	763.7
TDS	mg/L	5,040 – 5,170	7,210 – 7,700	3,450 – 3,630	1,820 – 1,960	1420 – 2,060	730	2,250.0
Boron	mg/L	0.0164 – 0.0186	ND – 0.221	0.0151 – 0.0179	0.0067 - 0.0075	0.0238 – 0.0377	0.0104	0.0634
Iron	mg/L	ND – ND	ND - ND	0.0068 – 0.19	ND – ND	ND – 0.064	0.378	0.0801
Manganese	mg/L	0.0155 – 0.0204	0.12 – 0.364	0.154 – 0.279	0.00365 - 0.00407	ND – 0.00191	0.162	1.69

Notes: TDS - total dissolved solids
Alkalinity, total is reported as CaCO3; ammonia, total is reported as N.
Boron, iron, and manganese are reported as dissolved concentrations
Bold text indicates concentrations above the 95th percentile criteria
* GL-28-2 is located within a sand lense in the Clay Unit

As shown above, there are elevated indicator parameters in GL-28-3 when compared to GL-28-2. This may be due to natural variation as GL-28-2 is screened within a sand lense in the Clay Unit and GL-28-3 is screened directly within the Clay Unit.

The results from the downgradient Sand and Gravel Unit well GL-28-2 shows elevated concentrations of nitrate, sulphate, TDS, and manganese. Slightly elevated levels of chloride in comparison to the 95th percentile of background are present at GL-39-2 and 09BH03. The remaining indicator parameter concentrations are generally comparable or lower than background. The comparison above provides evidence that water quality at GL-28-2 has been impacted by Site activities. The presence of chloride at elevated concentrations may indicates some water quality impacts; however, they are minor.

Table 5.8B 2022 Concentration Ranges of Leachate Indicator Parameters – Downgradient Till Unit Wells

Parameters	Units	Till Unit			
		GL-39-1	GL-42-1	GL-42-2	95th Percentile
Alkalinity	mg/L	546 – 637	900	1,040	1,034
Ammonia	mg/L	ND – ND	**0.624**	ND	0.221(2)
Chloride	mg/L	145 – 149	48.6	81.5	717.4
Nitrate (as N)	mg/L	5.88	ND	9.08	82.23
Sulphate	mg/L	**2,670 – 2,740**	28.2	**2,790**	347.6(2)

Parameters	Units	Till Unit			
		GL-39-1	GL-42-1	GL-42-2	95th Percentile
TDS	mg/L	4,700 – 4,720	3,380	5,080	14,593
Boron	mg/L	0.0137 – 0.0143	0.0731	0.0348	0.07596
Iron	mg/L	ND – ND	**1.82**	ND	0.003(2)
Manganese	mg/L	**0.0114 – 0.0134**	**0.139**	**0.207**	0.000382(2)

Notes: TDS - total dissolved solids

Alkalinity, total is reported as CaCO3; ammonia, total is reported as N.

Boron, iron, and manganese are reported as dissolved concentrations

(2) Only two values remained after removing outliers from the data set. Therefore, it was not possible to calculate 95th percentile concentrations and the maximum values was used.

Bold text indicates concentrations above the 95th percentile criteria

With the exception of GL-42-1, Till Unit groundwater quality south of the landfill property is characterized by elevated sulphate and manganese concentrations compared to the 95th percentile background water quality. Concentrations of ammonia and iron are elevated in GL-42-1. Other Till Unit indicator parameter concentrations are generally comparable to the 95th percentile in background. The collections of elevated parameters may indicate minor landfill-related water quality impacts. It should be noted that the GL-42-1 analytical results for the June 2022 monitoring event are described as being invalid due to surface water infiltration in the City of Kelowna's *2022 Glenmore Landfill Annual Monitoring Report.* The 2022 analytical results are comparable to the historical monitoring record (June 2020 – June 2021), and as such, the 2022 analytical results were used in the downgradient water quality assessment.

5.4.7 Compliance - Groundwater Quality

The allowable contaminate concentrations in groundwater leaving a site need to account for upgradient water quality. Using the guidance provided in Protocol 9, Site-specific 95th percentile background concentrations have been calculated for the Sand and Gravel Unit and Till Unit (the monitoring well network does not include appropriate Clay Unit or Bedrock Unit background wells). As described in Section 4.3, an exceedance of the published water quality standards at the Site boundary needs to be confirmed with a comparison to the regional and then Site-specific background water quality. Where parameters exceed published water quality standards and regional and Site-specific background water quality, water quality exceedances are confirmed.

The use of Protocol 9 in assessing water quality leaving a Site is discussed in **Appendix G**.

Table 5.9, below, provides a summary of the water quality exceedances reported at the property boundary monitors in the 2022 water quality data set. The table also provides a summary of the exceedances which are confirmed using regional and Site-specific background concentrations.

Table 5.9 2022 Groundwater Compliance Exceedances

Compliance Location	Exceedances of Water Quality Criteria (2022)	Exceedances also above Regional Background Concentrations	Exceedances also above Site-Specific Background Concentrations
Sand and Gravel Unit			
GL-28-1	– Lithium(DW) – Molybdenum(IW) – Sodium(DW) – Strontium(DW) – Uranium(DW)(IW) – Sulphate(DW)	– Uranium(DW)(IW) – Sulphate(DW)	– Sulphate(DW)
GL-28-2	– Lithium(DW) – Sodium(DW) – Strontium(DW) – Uranium(DW)(IW) – Nitrate (as N)(DW) – Sulphate(DW)	– Uranium(DW)(IW) – Nitrate (as N) (DW) – Sulphate(DW)	– Nitrate (as N)(DW)(MAC) – Sulphate(DW)(AO)
GL-39-2	– Lithium(DW) – Molybdenum(IW) – Sodium(DW) – Uranium(DW)(IW) – Chloride(IW) – Sulphate(DW)	– Uranium(DW)(IW) – Sulphate(DW) – Chloride(IW)	– Sulphate(DW)
Glacial Till Unit			
GL-42-2	– Lithium(DW) – Molybdenum(IW) – Sodium(DW) – Strontium(DW) – Uranium(DW)(IW) – Sulphate(DW)	– Lithium(DW) – Uranium(DW)(IW) – Sulphate(DW)	– Lithium(DW) – Uranium(DW)(IW) – Sulphate(DW)
GL-39-1	– Lithium(DW) – Molybdenum(IW) – Sodium(DW) – Strontium(DW) – Uranium(DW)(IW) – Chloride(IW) – Sulphate(DW)	– Sodium(DW) – Strontium(DW) – Uranium(DW)(IW) – Sulphate(DW) – Chloride(IW)	– Sulphate(DW)(AO) – Uranium(DW)(IW)
GL-42-1	– Lithium(DW) – Sodium(DW) – Strontium(DW)	– Lithium(DW) – Sodium(DW) – Strontium(DW)	– Lithium(DW)
Clay Unit			
GL-28-3	– Arsenic(DW) – Cobalt(DW) – Lithium(DW) – Molybdenum(IW)	– Lithium(DW) – Molybdenum(IW) – Nickel(DW) – Sodium(DW)	– Lithium(DW) – Molybdenum(IW) – Nickel(DW) – Sodium(DW)

Compliance Location	Exceedances of Water Quality Criteria (2022)	Exceedances also above Regional Background Concentrations	Exceedances also above Site-Specific Background Concentrations
	– Nickel[(DW)] – Sodium[(DW)] – Strontium[(DW)] – Uranium[(DW)(IW)] – Sulphate[(DW)(AW)]	– Uranium[(DW)(IW)] – Sulphate[(DW)(AW)]	– Uranium[(DW)(IW)] – Sulphate[(DW)(AW)]
Notes: DW: Schedule 3.2 Generic Numerical Water Standards Column 6 for the protection of Drinking Water. IW: Schedule 3.2 Generic Numerical Water Standards Column 4 for the protection of Irrigation Water. AW: Schedule 3.2 Generic Numerical Water Standards Column 3 for the protection of Aquatic Life.			

In summary, confirmed water quality exceedances at compliance locations are listed below.

Groundwater – Sand and Gravel Unit:

– GL-28-1 (Sulphate)
– GL-39-2 (Sulphate)
– GL-28-2 (Nitrate, Sulphate)

Groundwater –Till Unit:

– GL-42-2 (Sulphate, Lithium, Uranium)
– GL-39-1 (Sulphate, Uranium)
– GL-42-1 (Lithium)

Groundwater –Clay Unit:

– GL-28-3: (Lithium, Molybdenum, Nickel, Sodium, Uranium, Sulphate)

Based on a comparison of water quality in the vicinity of the Site boundary against the CSR water quality standards, regional and Site-specific background water quality, a number of exceedances are present which may be landfill related. However, after comparing those exceedances to landfill leachate concentrations, the following conclusions were made:

1. The concentration of nitrate, lithium, and uranium reported at GL-28-2, GL-39-1, GL-41-1, and GL-42-2 are greater than the concentrations reported in leachate indicating that landfill leachate is not the cause or not solely the cause of nitrate, lithium, and uranium exceedances in groundwater at the property boundary:
    a. The concentration of nitrate in leachate ranged from non-detect to 7.7 mg/L in 2022, which is below the CSR DW criteria of 10 mg/L. Nitrate in landfill leachate is below the CSR DW and so the nitrate exceedance at GL-28-2 is not resulting from leachate. Elevated nitrate may be related to the nearby agriculture activities.
    b. The concentration of lithium in landfill leachate ranged from 31.9 to 290 µg/L in 2022, which is lower than the concentration reported at GL-41-1 (861 µg/L) and GL-42-2 (861 µg/L). As such, landfill leachate cannot solely be the cause of the lithium exceedance at GL-42-2. This is likely related to natural variation in water quality.
    c. The concentration of uranium in leachate ranged from 1.98 to 32.2 ug/L in 2022, which is well below the concentrations measured at GL-39-1 (244 ug/L) and GL-42-2 (122 ug/L). As such, landfill leachate cannot solely be the cause of the uranium exceedance at GL-39-1 and GL-42-2. This is likely related to natural variation in water quality.
2. Sulphate concentrations in landfill leachate range significantly (<10 mg/L to 1,880 mg/L). Sulphate concentrations from the Phase 3 (Slough) area are elevated and reported at concentrations ranging from 1,620 to 1,880 mg/L in

2022. Groundwater at the property boundary was reported at concentrations ranging from 28.2 mg/L to 4,640 mg/L in 2022. This indicating that the source of sulphate in groundwater may be landfill derived. More elevated sulphate in groundwater at the property boundary in comparison to leachate show that some contribution from natural sources is also occurring.

3. Monitoring well GL-28-3 is a shallow well screened in silt and clay. Concentrations of leachate indicator parameters reported at GL-28-3 are elevated above the Landfill Vicinity Clay Unit wells GL-2-2 and GL-4-2; however, without a proper background monitoring well to compare against, it is unclear if the metals exceedances are due to natural variation in the Clay Unit or leachate impacts.

5.5 Bedrock Unit Groundwater Quality

The Bedrock Unit groundwater monitoring network and key indicator parameter concentrations are presented in **Table 5.10**, below. Historical water quality results from decommissioned bedrock wells have not been considered when characterizing bedrock groundwater.

As previously described, there are no compliance wells screened in the Bedrock Unit and as such, Bedrock Unit groundwater has not been compared to 95th percentile concentrations.

Table 5.10 2022 Concentration Ranges of Leachate Indicator Parameters – Bedrock Wells

Parameter	Units	Background Wells		Landfill Vicinity			Compost Vicinity
		GL-41-1	GL-15-1	GL-16-1	GL-17-1	GL-27-1	GL-29-1
Alkalinity, total	mg/L	611 - 623	414	833	1,220 – 1,450	1,270 – 1,570	590 - 617
Ammonia, total	mg/L	ND - ND	ND	0.118	0.3 – 0.347	0.241 – 0.242	0.09 – 0.118
Chloride	mg/L	279 - 297	9.27	130	65.6 – 70.9	36.8 – 37.6	0.62 – 71.2
Sulphate	mg/L	183 - 204	292	1,410	ND – 1.9	13.2 – 17.3	2 - 213
TDS	mg/L	1,160 – 1,240	811	2,790	1,250 – 1,520	1,140 – 1,600	1,240 – 1,250
Boron	mg/L	0.0369 – 0.0391	0.0079	0.0765	0.0831 – 0.0849	0.0674 – 0.0735	0.366 – 0.403
Iron	mg/L	ND – 0.0022	ND	0.235	1.62 – 1.87	0.625 – 0.683	0.121 – 0.156
Manganese	mg/L	0.0018 – 0.00764	0.000794	0.153	0.0496 – 0.0499	0.0829 – 0.0923	0.469 – 0.478

Notes: TDS - total dissolved solids
Alkalinity, total is reported as $CaCO_3$; ammonia, total is reported as N.
Boron, iron, and manganese are reported as dissolved concentrations.
Bold text indicates concentrations that exceed the background concentrations

Background groundwater quality in bedrock is characterized by low concentrations of metals and ammonia with moderate concentrations of alkalinity, sulphate, and TDS.

Since there are no downgradient or compliance bedrock monitoring wells included in the EMP, the bedrock locations presented above were compared to CSR DW standards to assess potential Landfill related impact in Landfill Vicinity and Compost wells, as follows:

– At the background wells, at least one of lithium, sodium, strontium, uranium, and chloride concentrations exceed the CSR DW Standard during the monitoring period. The remaining concentrations were below standard.

- At the Landfill vicinity and Compost Facility wells, at least one of lithium, sodium, strontium, and arsenic concentrations exceed the CSR DW standard during the monitoring period. The remaining concentrations were below standard.
- At Landfill vicinity well GL-16-1, sulphate exceeded the CSR DW standard.

These results suggest that the presence of metals and chloride in Landfill vicinity and Compost Facility wells are not likely Landfill related. As mentioned in previous sections, the presence of sulphate in overburden groundwater may be attributable to Landfill leachate and so the presence of sulphate in bedrock at GL-16-1 (Compost Facility well) may also be landfill derived. A lines of evidence approach was taken to assess bedrock groundwater quality for sulphate:

- The highest sulphate concentrations are at overburden wells GL-27-3 (10,300 mg/L) and GL-29-2 (5,030 to 4710 mg/L), which are both located in the Compost Facility.
- The presence of sulphate in bedrock groundwater at GL-16-1 (1,410 mg/L) is similar in concentration to the neighbouring overburden wells GL-8-1 (1,200 mg/L in 2010) and GL-8-2 (1,900 to 3,200 in 2009-2015). These concentrations exceed the CSR DW standard (500 mg/L).
- Vertical gradients between these wells are variable with flow changing direction from upward to downward depending on the month. Since water elevations are variable between overburden and bedrock (meaning groundwater mixes between these units), the presence of sulphate in bedrock may be attributable to the presence of leachate in overburden.
- As shown in the concentration versus time plot (**Appendix H**), sulphate at GL-16-1 shows a decreasing trend over time. At overburden well GL-35-1, which is in the vicinity, a decreasing trend in sulphate is also occurring. Water quality trends are not apparent at GL-27-3 and GL-29-2.
- Trends for the remaining leachate indicator parameters do not indicate that water quality in bedrock is worsening over time in this area (i.e., no trend or decreasing trends are present).

Based on the above, sulphate in bedrock groundwater is likely attributable to the Landfill. Improvements in water quality is occurring.

5.6 Temporal Trends

Temporal trends in groundwater chemistry at the Site are evaluated using concentration versus time plots for each of the key leachate indicator parameter concentrations over time for the upgradient, landfill vicinity, compost vicinity and downgradient wells. Leachate indicator parameters alkalinity, ammonia, boron, chloride, COD, manganese, sulphate and TDS.

As discussed in Section 6.1**,** concentration versus time plots were created for select upgradient, landfill vicinity, compost vicinity and downgradient monitoring wells, as presented in **Appendix H**. Concentration versus time plots for alkalinity, ammonia, boron, chemical oxygen demand (COD), chloride, manganese, sulphate and TDS are provided. Changes in parameter concentrations are considered on aggregate to identify temporal trends that may indicate landfill derived impacts.

In general, concentrations in groundwater show consistent or decreasing parameter concentrations over time. The following exceptions are noted:

- GL-15-2: Chloride and sulphate concentrations have been increasing since 2011. TDS concentrations increased from 2011 through 2020 but have been decreasing since 2020. GL-15-2 is located upgradient of the Site and cannot be impacted by Site activities.
- GL-12-1: Chloride, OD and manganese concentrations have been increasing since 2013. Increasing ammonia concentrations are also noted since 2019.
- GL-28-2: Sulphate concentrations have been slightly increasing since 2015.
- GL-28-3: Sulphate TDS concentrations have been increasing since 2015.

Increasing trends in leachate indicator parameters can be correlated with the progressive migration of leachate within groundwater. Thus, increasing trends observed at GL-12-1 and GL-28-3 may indicate landfill derived impacts and fit the pattern of southern groundwater flow. The increasing chloride and TDS concentrations are likely derived from road salt use on Glenmore Road N. It should be noted that there is insufficient data to identify meaningful temporal trends in the monitoring wells installed in 2019. Further monitoring is recommended to establish trends.

Monitoring well GL-12-1 was identified in 2022 as having surface water infiltration impacts and was therefore decommissioned. The screened intervals of monitoring wells GL-13-1 (430.7 – 434.0 m AMSL) and GL-17-2 (430.5 – 434.0 m AMSL), in the same vicinity as monitoring well GL-12-1, are both screened with the till at a similar elevation to GL-12-1 (432.9 – 436.0 m AMSL). Groundwater analytical data from monitoring wells GL-13-1- and GL-17-2 can be utilized to assess groundwater quality in the till unit in this area.

5.7 Spatial Distribution Plots

The lateral extent of leachate in groundwater was evaluated through the use of chemical spatial distribution plots or isopleths. Leachate indicator parameters (alkalinity, chloride, nitrate, sulphate and TDS) were selected as these parameters provide an important framework for understanding the behaviour of leachate plume evolution.

Appendix I presents the isopleths for wells screened in Sand and Gravel Unit, Till Unit and Bedrock Units. The 2022 analytical data from the June and October 2022 monitoring events was averaged for each location to create the isopleths.

Appendix I presents the isopleth contours prepared for alkalinity, chloride, nitrate, sulphate and TDS in the Sand and Gravel Unit, Till Unit Sand and Bedrock Units. Gravel, Till and Bedrock units. The following observations are drawn based on the general spatial patterns illustrated in each of the hydrogeologic units.

<u>Sand and Gravel Unit</u>

Chloride concentrations are highest in the GL-15 well nest, indicating that chloride impacts in the Sand and Gravel Unit are likely derived from road salt use on Glenmore Drive N, as opposed to being landfill derived. Sulphate and TDS concentrations are also highest at the GL-15 well nest, further suggesting off-Site sources of impacts are contributing to water quality alterations in the vicinity of and downgradient of the Site.

The isopleths indicate that in the alkalinity concentrations are highest in the vicinity of the Stage 3, Slough area and attenuate as groundwater flows towards the South.

<u>Till Unit</u>

Chloride, TDS, and sulphate concentrations are highest in the Till Unit immediately downgradient of the Phase 3 Slough area. Concentrations of these parameters decrease as groundwater flows to the south. GL-35-1, located directly west of the Slough, has the highest alkalinity concentration, with concentrations also decreasing as groundwater flows south.

<u>Bedrock Unit</u>

The highest concentrations of chloride in the Bedrock Unit are found in upgradient well GL-41-1. This suggests chloride impacts at this location are from off-Site sources. Sulphate is also elevated in the bedrock aquifer at upgradient monitoring wells GL-15-1 and GL-41-1. The spatial distribution plots provide some evidence that the bedrock aquifer has not been impacted by leachate derived impacts. The Bedrock Unit is considered to have little to no leachate derived impacts.

5.8 Surface Water Quality

Surface water quality on Site was monitored at eight locations in 2022. These locations include Bredin Pond, the NE Pond, Tutt Pond, the Bubna Slough, the Slough, and Slough #2. Little Robert Lake and Robert Lake are sampled to assess off-Site downgradient surface water bodies. **Table 5.11**, below, provides a comparison of select indicator parameter concentrations ranges from 2022 compared against the 95th percentile background surface water quality calculated from the Bubna Slough and Slough #2.

Table 5.1 2022 Concentration Ranges of Leachate Indicator Parameters – Surface Water

Parameter	Units	95th Percentile of Background Surface Water(1)	Bredin Pond	NE Pond	Tutt Pond	Slough	L. Robert Lake	Robert Lake
Alkalinity, total (as CaCO3)	mg/L	1037	584 – 688	907 – 1,020	652 – 745	1,170 – 2,240	656 – 719	1,290 – 1,930
Ammonia, total (as N)	mg/L	0.0411	ND – 0.16	ND - 0.27	0.03 – 0.33	0.15 – 4.12	0.03 – 0.20	0.09 – 0.22
Chloride	mg/L	812.1	167 – 185	173 – 220	218 – 284	367 – 1,000	82.2 - 120	188 – 350
Nitrate	mg/L	-	ND – 0.011	ND – 0.02	ND	ND	ND	ND
Sulphate	mg/L	1520	203 – 315	513 – 655	605 – 997	1,340 – 3,530	1,810 – 2,930	3,540 – 6,280
Phosphate, total (as P)	mg/L	0.0733	0.10 – 0.20	0.12 – 0.51	0.20 – 0.54	1.34 – 2.05	1.45 – 1.68	2.74 – 3.89
TDS	mg/L	4187	1,030 – 1,270	1,740 – 1,950	1,870 – 2,630	3,760 – 8,760	3,190 – 4,600	6,680 – 11,200
Field Conductivity	uS/cm	6438	1,784 – 2,044	2,640 – 2,915	2,597 – 3,393	2,695 – 11,216	4,227 – 5,528	8,300 – 12,671
Aluminium	mg/L	0.0411	0.0069 - 0.086	0.0582 – 210	0.0822 – 0.283	0.469 – 0.711	0.231 – 7.270	0.242 – 0.848
Arsenic	mg/L	0.00618	0.000699 – 0.00179	0.002 – 0.00411	0.00245 – 0.00478	0.0231 – 0.0475	0.00432 – 0.00898	0.0073 – 0.0121
Boron	mg/L	38.8	0.50 - 1.17	0.05 – 0.07	0.03 – 0.04	0.23 – 0.58	0.03 – 0.03	0.04 – 0.08
Chromium	mg/L	0.000345	0.00026 – 0.00078	ND – 0.00066	0.00032 – 0.00092	0.00172 – 0.00245	0.00054 – 0.0156	ND – 0.00185
Iron	mg/L	0.0785	0.01 – 0.08	0.07 – 0.30	0.09 – 0.43	0.62 – 1.00	0.24 – 10.30	0.26 – 1.06
Manganese	mg/L	0.0552	0.04 – 0.05	0.05 – 0.21	0.06 – 0.20	0.04 – 0.06	0.31 – 2.08	0.06 – 0.21
Uranium	mg/L	0.0329	0.0203 – 0.0245	0.0321 – 0.0403	0.0357 – 0.0535	0.038 – 0.0684	0.0287 – 0.0552	0.0882 – 0.109

Notes: (ND) – Non-detect; **Bold** – concentration is above the 95th percentile background.
Metals parameters are reported as total concentrations (aluminum, arsenic, boron, chromium, iron, manganese, and uranium)
(1) 95th percentile values calculated using Slough #2 and Bubna Slough analytical data

Background surface water quality at the Site (as represented by the Bubna Slough and Slough #2) can be characterized by high alkalinity, chloride, sulphate, and TDS concentrations. Concentrations of metals parameters are slightly elevated as well which, when combined with the general chemistry parameters indicate relatively poor surface water quality which is typical of sloughs. Similar to the groundwater assessment, the use of Protocol 9 is appropriate to assess surface water quality at the Site, to ensure that poor natural upgradient water quality is considered in the surface water assessment, as elevated contaminant concentrations in the upstream surface water adds to the contaminant mass downstream of the landfill.

The following observations are drawn based on the surface water quality comparison presented above:

- Indicator parameter concentrations in the NE Pond and Bredin Pond (located on either side of the Phase 1 area) are generally comparable to or better than background with the exception of occasionally elevated metals parameters. This provides evidence that there are no significant landfill impacts within these surface water bodies.
- Indicator parameter concentrations at Tutt Pond (located west of the Phase 3 area) are elevated in comparison to the NE Pond and Bredin Pond and more parameters are noted above the 95th percentile background concentrations. The comparison indicates that some landfill derived impacts maybe present within Tutt Pond.
- As expected, water quality in the Slough is significantly impacted by Site activities (and is managed as leachate). Water quality in the Slough is characterized by elevated TDS, chloride and sulphate concentrations that are significantly higher than background concentrations. Arsenic, aluminium, boron, and iron concentrations in the Slough are all significantly elevated compared to the 95th percentile background concentrations.
- Surface water quality at the downgradient receptors Little Robert Lake and Robert Lake are significantly lower than the Slough but many parameters, particularly metals parameters, remain higher than background concentrations and are higher than Bredin Pond and the NE Pond. This is likely due to the concentrative effect of seasonal evaporation on the lake. Both landfill-derived and naturally occurring metals do not evaporate seasonally with the surface water, leaving higher concentrations of metals in the surface water bodies during periods with low water levels. Over time, the cumulative effects of evaporation cycles cause the metal concentrations in surface water to slowly increase over time. Additional discussion on temporal trends in surface water quality is provided below.
- A comparison between the water quality in the two downgradient receptors shows increased parameter concentrations in Robert Lake. Little Robert Lake and Robert Lake are found at elevations of approximately 440 mAMSL and 434 mAMSL. Shallow groundwater in the vicinity of Little Robert Lake and Robert Lake is found between 437 and 436 mAMSL. Artesian conditions and a comparison of groundwater levels and the elevation of Robert Lake show that shallow groundwater is likely discharging into Robert Lake. Little Robert Lake is at an elevation that is higher (by approximately 3 m) than groundwater. Impacts to this lake may originate from the concentrative effect of evaporation cycles on the lake, as well as the occasional overflow from the southeastern corner of the Site which drains beneath John Hindle Drive or from surface water drainage in the ditching along John Hindle Drive.
- To better understand potential contaminant sources and how those sources may drain or flow to Little Robert Lake, it is recommended that the City add additional surface water monitoring locations to the EMP. A surface water monitoring point should be added within the ditch along John Hindle Drive, upstream of the culvert flowing into Little Robert Lake. A second additional surface water monitoring point should be added to characterize surface water runoff from the southeast corner of the Site. This point should be located before the confluence of the John Hindle Drive ditch. It is recognized that surface water flow in these bodies is limited. Monitoring will need to be completed during or immediately after rainfall events.
- In order to understand the potential connection between Little Robert Lake and Robert Lake and as groundwater discharge to Robert Lake may be the cause for increasing water quality issues in the lake, the Robert Lake monitoring point should be relocated to the landfill side of the lake (i.e., the northern end of the lake).

5.8.1 Temporal Trends – Surface Water

Appendix H includes concentration versus time plots that illustrates concentrations of select analytical parameters reported in the each of the surface water monitoring stations between 2015 and 2022. Concentration versus time plots for alkalinity, ammonia, boron, chemical oxygen demand (COD), chloride, manganese, sulphate, and TDS are provided. Changes in parameter concentrations are considered on aggregate to identify temporal trends that may indicate landfill derived impacts. Increasing trends in leachate indicator parameters are typically correlated with the progressive migration of leachate within groundwater and a thus a useful line of evidence to identify landfill related impacts.

In general, the Concentration versus Time plots show generally consistent concentrations over time. The following exceptions are noted:

- With the exception of ammonia, decreasing trends or improving water quality is seen in the Slough. While improvements in water quality are observed, concentrations are still well above background concentrations and there are notable impacts within the Slough.
- Concentrations of TDS, sulphate, manganese, and COD have followed increasing trends in Little Robert Lake since approximately 2018. Levels of each are now well above background and other landfill vicinity surface water bodies. The increasing trends may indicate landfill derived impacts within the lake are worsening; however, the remaining indicator parameters have remained consistent. Ongoing monitoring is recommended.

Appendix J.1 presents a plot of Robert Lake water elevations and sulphate concentrations from March 2018 to October 2022 in Little Robert Lake and Robert Lake. **Appendix J-2** presents alkalinity and chloride concentrations with Rober Lake Elevations. The water elevation in Robert Lake fluctuates between 434.8 and 435.3 m AMSL, with the lowest elevations occurring during the late summer and fall months (August through December) and the highest elevations occurring during the winter and spring months (February through June). The sulphate concentration in Robert Lake has inverse relationship with the water elevation in the lake, with the highest sulphate concentrations occurring when water levels are lowest and the lowest concentrations occurring when water levels are highest. This suggests that evaporation has a significant seasonal influence on water quality in the lake. Hot, dry periods with high evaporation concentrate contaminants in the lake, while precipitation and surface runoff during wet periods dilute the contaminants in a cyclical pattern.

It is also noted that since the March 2018 monitoring event, sulphate concentrations have, overall, been increasing steadily in Robert Lake, suggesting a source of impacts in additional to evaporative effects is impacted surface water in the lake. This corresponds with increasing trends in sulphate concentrations in groundwater at the Site’s southern/downgradient property boundary. However, the City has provided anecdotal evidence of a longer, 20-year cycle of high and low water levels in Robert Lake. The increasing trend may be related to a longer term trend of evaporation and increasing concentrations in the Robert Lake.

The monitoring wells located between Little Robert Lake, Robert Lake, and the Site boundary are not part of the current water quality monitoring program. It is recommended that monitoring wells 09BH05-S/D and 09BH04 be added to the monitoring program to provide additional spatial data between the lakes and the Site. If monitoring well nest 09BH05-S/D is not accessible, the City should consider adding a replacement monitoring well nest to east of Little Robert Lake. This will give a good spatial distribution of potential impacts flowing south from the Site boundary.

5.8.2 Downgradient – Surface Water Quality

Based on the results of the Protocol 9 assessment, several parameters were determined to exceed the applicable surface water quality criteria and the local 95th percentile background surface water concentrations at Little Robert Lake and Robert Lake. The parameters that exceeded the applicable water quality criteria and Site-specific background concentrations are summarized in **Table 4.11A** and **Table 4.11B**.

Table 5.2 2022 Surface Water Compliance Exceedances – Little Robert Lake

Monitoring Location	Exceedances of Applicable Water Quality Criteria (2022)	Exceedances also above Site-Specific Background Concentrations
Little Robert Lake	– Chloride(IW-ST) – Sulphate(AW-LT) – Aluminium(AW-ST, AW-LT, IW-ST) – Arsenic(AW-ST) – Chromium(IW-LT) – Iron(AW-ST) – Uranium(AW-LT, IW-LT) – Field Conductivity(IW-LT) – Total Alkalinity (as CaCO3)(IW-LT) – Total Phosphorus (as P)(AW-ST)	– Sulphate(AW-LT) – Aluminium(AW-ST, AW-LT, IW-ST) – Arsenic(AW-ST) – Chromium(IW-LT) – Iron(AW-ST) – Uranium(AW-LT, IW-LT) – Total Phosphorus (as P)(AW-ST)
Notes: AW-ST: BCWQG Aquatic Life Short-Term Maximum guideline. AW-LT: BCWQG Aquatic Life Long-Term Average guideline. IW-ST: BCWQG Irrigation Water Short-Term Maximum guideline. IW-LT: BCWQG Irrigation Water Long-Term Average guideline.		

Table 5.3 2022 Surface Water Compliance Exceedances –Robert Lake

Monitoring Location	Exceedances of Applicable Water Quality Criteria (2022)	Exceedances also above Site-Specific Background Concentrations
Robert Lake	– Chloride(IW-ST, AW-LT) – Sulphate(AW-LT) – Ammonia(AW-ST) – Aluminium(AW-ST, AW-LT) – Arsenic(AW-ST) – Chromium(IW-LT) – Iron(AW-ST) – Molybdenum(IW-ST, IW-LT) – Uranium(AW-LT, IW-LT) – Total Alkalinity (as CaCO3)(IW-LT) – Total Phosphorus (as P)(AW-ST) – Field Conductivity(IW-LT)	– Sulphate(AW-LT) – Total Alkalinity (as CaCO3)(IW-LT) – Aluminium(AW-ST, AW-LT) – Arsenic(AW-ST) – Chromium(IW-LT) – Iron(AW-ST) – Uranium(AW-LT, IW-LT) – Molybdenum(IW-ST, IW-LT) – Total Phosphorus (as P)(AW-ST) – Field Conductivity(IW-LT)
Notes: AW-ST: BCWQG Aquatic Life Short-Term Maximum guideline. AW-LT: BCWQG Aquatic Life Long-Term Average guideline. IW-ST: BCWQG Irrigation Water Short-Term Maximum guideline. IW-LT: BCWQG Irrigation Water Long-Term Average guideline.		

As summarized above, there are a number of parameters within Little Robert Lake and Robert Lake that are confirmed exceedances following Protocol 9.

As described in the preceding sections, a large portion of the water quality impact in both Little Robert Lake and Robert Lake are likely due to the concentrative effect of seasonal evaporation. Over time, the effects of evaporation cycles cause concentrations in surface water to slowly increase over time. However, this effect does not explain the overall increasing trends in Lake Robert. The presence of landfill-related sulphate impacts in groundwater at the Site boundary suggests that increasing concentrations of sulphate in Robert Lake maybe related to the landfill. The presence of artesian conditions in wells adjacent to Robert Lake provide additional evidence that landfill impacted groundwater may be influencing surface water quality.

In addition to impacted groundwater discharging to Robert Lake, impacts may be related to surface water flow into Little Robert Lake which occasionally overflows into Robert Lake.

Additional surface water monitoring is required to identify potential sources of impacts in Little Robert Lake and Robert Lake.

5.9 Geochemical Analysis – Piper Plots

A geochemical analysis of water quality data has been completed to support the interpretation of water quality presented in the preceding sections. This analysis includes an assessment of the major ion chemistry across the Site

This analysis builds upon the water quality results through the use of tri-linear Piper plots. Tri-linear Piper plot diagrams present the major ions as percentages which can be used to determine patterns in the geochemical character of water samples. Cations (positive ions) and anions (negative ions) are plotted in two triangles which are projected onto a central diamond. This central diamond presents the data from all major ions at once. Samples with similar geochemical characteristics (i.e., similar major ion percentages) will be located relatively close to one another.

Groundwater monitoring locations that plot in proximity to one another have similar major ion chemistry and thus groupings can be used to determine the likelihood of leachate impact or potentially alternate sources of water quality alterations. Water quality samples that plot in proximity to leachate samples indicate an increased likelihood of being impacted by the landfill. Groundwater monitoring locations that plot in closer proximity to non-impacted locations indicate a decreased likelihood of being impacted by landfill related sources.

Appendix K presents Piper plots prepared using the 2022 analytical results for the overburden and bedrock aquifers, as well as surface water monitoring locations.

The following conclusions can be drawn from an analysis of the Piper plots for the overburden monitoring locations (**Appendix K-1** and **Appendix K-2**):

- In general, water quality from the 2022 monitoring period plot in three clusters, one towards the top of the diamond, one in the central portion of the diamond, and one towards the bottom of the diamond.
- Background water quality samples plot in the central portion of the diamond. Waters in this area are classified as mixed type. Monitoring wells which plot with the central cluster have similar major ion chemistry to background and are unlikely to be impacted by leachate. This includes, GL-4-1, GL-4-2, GL-5-2, 09BH03, GL-35-3, and GL-42-2.
- Many of the wells in the landfill vicinity, compost area and downgradient overburdens wells plot in the cluster towards the top of the diamond due to higher percentages of chloride, sulphate, calcium and magnesium and lower percentages of bicarbonate. This suggests that the major ion chemistry of these locations has been altered from background.
- Leachate water quality plots towards the bottom of the diamond due to increased percentages of sodium and potassium and alkalinity (as $CaCO_2$);
- The positioning of leachate monitoring results away from the two other primary clusters shows that the major ion chemistry differs between the leachate and groundwater. This provides a good line of evidence that overburden groundwater has not been impacted by leachate or at least has not been impacted to the point of altering the major ion chemistry.
  - However, it should be noted that the leachate quality originated from the collection system in the Phase 1 and Phase 2 areas of the Site. Leachate quality in the Phase 3, Slough, area is not available. Thus, alterations to the overburden groundwater chemistry shown by the Piper plots may be related to the Phase 3 area.
- GL-20-1 and GL-42-1 (both Till Unit wells) plot in the bottom portion of the diamond beyond the leachate samples. Typically, leachate impacted water quality plots between leachate and background.

- o Alterations to the overburden groundwater chemistry at GL-20-1 and GL-42-1 may be related to the Phase 3 area or an alternate source (e.g. the Compost Facility).

– The sample collected from GL-42-1 has large charge balance (may be due to lab error or contribution from another ion that is not included in the Piper plot). The placement of this well on the Piper plot is likely unrepresentative.

– The results from GL-20-1 may represent a combination of leachate impacts plus an additional source.

The following conclusions can be drawn from an analysis of the Piper plots for the bedrock locations (**Appendix K-3**):

– The upgradient bedrock wells plot in the central portion of the diamond similar to overburden. Again, this water is classified as mixed type.

– The landfill vicinity monitor, GL-16-1, plots in the central cluster and has similar major ion chemistry to background.

– The fall sample collected from GL-29-1 has large charge balance (may be due to lab error or contribution from another ion that is not included in the Piper plot). The placement of this well on the Piper plot is likely unrepresentative.

– Monitoring wells GL-17-1 and GL-27-1, located immediately downgradient of the Slough, have distinct geochemical characteristics when plotted on a Piper plot. Water in these wells is characterized by a low percentage of chloride anions, higher percentage of bicarbonate alkalinity, and a high sodium and potassium percentage. Water quality in these well is geochemically similar to GL-20-1 and may represent a combination of landfill-derived impacts plus some other source.

The following conclusions can be drawn from an analysis of the Piper plots for surface water locations (**Appendix K-4**):

– Surface water quality plots in the central portion to the right corner of the diamond which is classified as mixed type water and sodium-chloride type water respectively. Background surface water quality from Bubna Slough is found in the central portion of the diamond while the Slough #2 is found towards the right corner of the diamond.

– The samples collected from the Slough and Robert Lake plot in a location similar to Slough #2 and thus have similar major ion chemistry that is different than the remaining surface water monitoring stations.

- o Slough #2 is located north of the Site, does not have a natural outlet (see **Figure 3.2**), and would be subject to evaporative conditions and concentrative effects. As discussed in the preceding section, landfill derived impacts are present in Slough. Similar major ion chemistry between Robert Lake, the Slough, and Slough #2 does not provide a clear indication or pattern that indicates landfill derived impacts in the Robert Lake. The similarities between the major ion chemistry at the three surface water bodies shows how evaporative conditions can mimic landfill derived impacts.

– Little Robert Lake is plotted slight right of the main cluster of surface water monitors due to a higher percentage of sulphate anions. This shows major ion chemistry in Little Robert Lake is dissimilar to Robert Lake and Slough #2 but also dissimilar to upstream location Bubna Slough and the on-Site ponds. This suggests less influence from evaporative conditions. If evaporative conditions influenced water quality in Little Robert Lake, ion percentages would be similar to Robert Lake and Slough #2. Differing major ion percentages from Bubna Slough and the on-Site ponds suggest an alternate source of impacts has influenced water quality in the Little Robert Lake.

– Bubna Slough and the stormwater management ponds surrounding the Site have similar major ion chemistry to one another and plot in the central portion of the diamond. This clustering shows that major ion chemistry is similar between background surface water quality and the three ponds (Bredin Pond, Tutt Pond and the NE Pond). Thus, any Site related impacts in the ponds are not significant enough to alter the major ion chemistry.

6. Conceptual Site Model

The Conceptual Site Model (CSM) was developed based on the existing dataset and may need to be updated when new Site information becomes available. Updates should be considered based on evolving water quality at the Site, additional geologic or hydrogeologic information, or changes in the Site operations. The CSM is presented visually on a North-South cross-section, presented on **Figure 6.1** and a West-East cross section, presented on **Figure 6.2.**

The CSM is intended to present a high-level summary of the hydrogeologic functioning of the Site which describes leachate migration in light of the Site's topography, overburden flow zones, bedrock flow zones and nearby receptors (i.e., surface water bodies).

The Site is situated within the Glenmore Valley which runs north-south, parallel to Lake Okanagan with topography on the north, east and west sloping towards the Site. The hydrostratigraphy at the Site is generally described as a glaciolacustrine Clay Unit which contains varying amounts of silt, overlying a discontinuous, glaciofluvial Sand and Gravel Unit, overlying a glacial Till Unit of varying composition. Bedrock beneath the Site has an undulating surface with a depression directly underlying the Slough area and mountains to the east and west of the Site. Bedrock across much of the Site consists of volcanic rock while sedimentary bedrock has been encountered in the south, west and northeast areas of the Site.

A portion of the precipitation falling on the Landfill Phase 1 and Phase 2 will infiltrate through the landfill cover and create leachate. Precipitation falling into Phase 3 (Slough) falls directly into waste and creates leachate. Portions of Phase 1 are completed with geosynthetic liners while the remaining Phase 1, Phase 2, and Phase 3 areas rely on a natural control layer (i.e., the Clay Unit) to limit downward migration of leachate into the subsurface. The Landfill is completed with leachate collection systems which collects and send leachate off-Site for treatment. The leachate management mechanisms will reduce potential for subsurface impacts; however, in areas where the natural control layer is thin or not present, downward migration of leachate into the underlying subsurface may occur which will impact the underlying groundwater flow zones.

The ridges and mountains surrounding the Landfill serve as local groundwater recharge zones in the vicinity of the Site. Precipitation that falls on the mountains and ridges infiltrates the ground surface and flow inwards to the Site. In addition to infiltration from the mountains and ridges, groundwater at the Site is recharged by upgradient flux from the north. A portion of surface water and overland flow will infiltrate the subsurface where the Clay Unit is thin or not present and will slowly infiltrate through the Clay Unit over time as it acts as a leaky aquitard.

Horizontal groundwater flow on Site is interpreted to occur primarily in the glaciofluvial Sand and Gravel Unit (Aquifer 469) and the underlying Bedrock Unit (Aquifer 470). Groundwater flow is interpreted to be controlled by the topography of the region and has a primary flow path from north to south, through the Landfill, the Slough, and the Compost Facility towards the mouth of the valley. Groundwater and surface water runoff from the surrounding mountains and valley walls to the east and west of the Site likely follow bedrock topography and flows towards the centre of the Site. Once flow reaches the centre of the Site, it joins the primary flow path to the south.

The Sand and Gravel Unit is discontinuous throughout the Site or is unsaturated in portions of the Site and there may be some localized differences in groundwater flow which reflect this. The Till Unit has a wide range of hydraulic conductivities and is inferred to vary in composition laterally across the Site. The Till Unit is considered a leaky aquitard, that partially separates the Sand and Gravel Unit from the Bedrock Unit below it. Flow within the Till Unit may be a combination of horizontal and vertical flow depending on the composition.

Groundwater flows to the south towards Little Robert Lake and Robert Lake. Little Robert Lake and Robert Lake are both located within 500 m of the south Site boundary and a comparison of groundwater elevations and lake elevations shows that Robert Lake is recharged by groundwater (Little Robert Lake may only become hydraulically connected to groundwater during flooding events) thus each lake represents a downgradient receiving water body. In addition to the lakes, any downgradient water users should be considered potential receptors.

Upgradient groundwater flowing onto the Site is generally of poor quality with elevated concentrations of several leachate indicator parameters.

Following Protocol 9, it was demonstrated that overburden groundwater concentrations at the south property boundary are higher than background concentrations and exceed the CSR DW standards for a number of analytes in the Sand and Gravel and Till Units. The Site impact assessment presented above shows that minor leachate impacts are likely present in the overburden, immediately downgradient of the Slough, within the Compost facility. Landfill related water quality impacts have resulted in compliance exceedances at the property boundary. The primary analyte of concern is sulphate.

Leachate indicator parameter concentrations at the 09BH06 well nest (located furthest downgradient, west of Robert Lake) are lower in concentration than the compliance wells, with reduced TDS, chloride, and sulphate concentrations. This suggests natural attenuation is occurring off-Site.

The current monitoring program does not include an upgradient well within the Clay Unit and thus a Protocol 9 assessment cannot be completed (90th percentile cannot be calculated). Concentrations of leachate indicator parameters reported in the Clay Unit at the downgradient Site boundary result in a number of compliance exceedances which may be Landfill related or may be due to natural variation in water quality.

The current monitoring well network does not include a downgradient/Site boundary well within the Bedrock Unit a so a compliance assessment using Protocol 9 cannot be completed. Within bedrock, background groundwater quality is characterized by low concentrations of metals and ammonia with moderate concentrations of alkalinity, sulphate, and TDS. Bedrock groundwater within the Compost Facility appears to be impacted by the Landfill. Impact is less pronounced in bedrock than overburden and water quality is improving over time. No other impacts to bedrock groundwater are observed.

Surface water bodies in the region without inlets or outlets are subject to evaporative conditions which cause seasonal concentrative effects on water quality. During periods of low precipitation, concentrations are observed to increase (i.e., water quality worsens) and during periods of higher precipitation water quality appears improved. Overall, the evaporative effects result in generally poor surface water quality in the sloughs and lakes surrounding the Site. There is anecdotal evidence of long-term, 20-year cycles of evaporation and recharge which may contribute to apparent long-term worsening trends in water quality in surface water bodies in the region.

Site surface water, surface water run-on from the surrounding mountainous terrain, occasional discharge from the Mckinely Reservoir, and run-on from areas north of the Site, is captured and managed by three constructed ponds: Northeast Pond (NE Pond), Bredin Pond and Tutt Pond. Surface water captured by the NE Pond flows to Bredin Pond, which flows into Tutt Pond. Water from Tutt Pond is typically allowed to evaporate and/or is pumped out for irrigation use on the farmlands located southwest of the Landfill. There is an overflow weir located between Tutt Pond and the Slough that allows for water to discharge from Tutt Pond to the Slough at high water levels. Tutt Pond is also equipped with an emergency by-pass system whereby water can be pumped from Tutt Pond, across the Compost Facility, and into the drainage system at the south end of the Site. From there water would flow into Little Robert Lake.

Utilizing Protocol 9 to assess surface water quality at the Site show that surface water quality in the on-Site stormwater management ponds is generally comparable to upstream or background surface water. Minor landfill-derived impacts are present in Tutt Pond. There are a number of parameters within Little Robert Lake and Robert Lake that are confirmed exceedances following Protocol 9.

It is unclear what portion, if, any, the exceedances in Little Robert Lake or Robert Lake can be attributed to the Landfill. Some lines of evidence (groundwater flow direction, artesian conditions adjacent to Robert Lake, presence of landfill impacts at the Site boundary) suggest that impacts are landfill related. However, potential evaporative conditions or other non-Site related sources may be the cause.

GHD is unable to confirm the source of water quality impacts in Little Robert Lake and Robert Lake (the two downgradient surface water receptors) but is unable to rule out the landfill as a contributing factor. It’s likely that a large portion of the impacts, particularly in Robert Lake, are related to evaporative conditions.

Data gaps exist in the current understanding of the Site's hydrologic and hydrogeologic functioning which make understanding potential downgradient impacts difficult. A number of additional monitoring points have been recommended to assist in future HHCR updates.

7. Conclusions

The following conclusions are summarized based on the findings of this report:

1. Based on the subsurface field activities, the interpretation of the geologic framework for the Site includes the following major geologic and hydrogeologic units. The hydrogeologic units are in brackets.
   a. Glaciolacustrine silt and clay deposits (Clay Unit - acts as a leaky aquitard)
   b. Glaciolacustrine silt and clay deposits (Clay Unit - acts as a leaky aquitard)
   c. Glaciofluvial sand and gravel (Sand and Gravel Unit - Aquifer 469)
   d. Glacial till (Till Unit - acts as a leaky aquitard)
   e. Bedrock - (Bedrock Unit - Aquifer 470)
2. Single well response tests were not completed in wells screened in the Clay Unit. The hydraulic conductivity ranges for the remaining hydrogeologic units, include:
   a. Sand and Gravel Unit ranges from 1.5 x 10-9 m/sec to 9.6 x 10-6 m/sec
   b. Till Unit ranges from 4.3 x 10-10 m/sec to 1.0 x 10-3 m/sec
   c. Bedrock Unit ranges from 3.5 x 10-9 m/sec to 1.4 x 10-6 m/sec.
3. Groundwater flows horizontally towards the centre of the Site from the walls of the valley following topography. Once groundwater reaches the vicinity of the Site, it flows from north to south towards the mouth of Glenmore Valley.
4. The Sand and Gravel Unit is discontinuous throughout the Site. The Till Unit has a varying geologic composition and hydraulic conductivity throughout the Site. For this reason, the Till Unit is considered a leaky aquitard; where the unit is more permeable downward flow to the underlying Bedrock Unit may occur.
5. Generally, groundwater is flowing upward in well nests near the ridge walls and within the Landfill vicinity. Downward groundwater flow occurs in the vicinity of the Slough. Artesian conditions were observed at the 09BH06 well nest (west of Robert Lake) during the March and June 2022 events.
6. Alkalinity, chloride, nitrate and/or ammonia, sulphate, TDS, boron, iron, and manganese were selected as leachate indicator parameters for the Site.
7. Upgradient groundwater is generally of poor quality with elevated concentrations of many leachate indicator parameters.
8. The majority of the wells in the Landfill vicinity and compost area overburden wells contain moderate to elevated concentrations of chloride, sulphate, and TDS.
9. Groundwater in the Sand and Gravel and Till Unit overburden compliance wells have elevated concentrations of sulphate, TDS, nitrate, lithium, and uranium that exceed the CSR DW or IW standards. These concentrations were compared against landfill leachate concentrations, to assess whether exceedances are likely landfill derived or not. Results indicate that sulphate exceedances are Landfill related. However, impacts are relatively minor.
10. The current monitoring network does not include an upgradient monitoring well in the Clay Unit or a Bedrock Unit monitoring well at the downgradient boundary. Thus, a compliance assessment cannot be completed following Protocol 9.
11. Upstream/background surface water is of poor quality with elevated concentrations of many leachate indicator parameters.

12. Some evidence for minor landfill derived impact is present in Tutt Pond. Concentrations are exceeding the IW standards and thus surface water should not be used to irrigate the adjacent farm field.
13. Several lines of evidence suggest that Little Robert Lake and Robert Lake have been impacted by the landfill; however, water quality in both water bodies shows influence from evaporative effects. It is unclear what portion of water quality impacts are related to the Site and what can be attributed to evaporative effects or other non-Landfill related sources. Additional monitoring has been recommended.

8. Recommendations

Based on the conclusions of the HHCR, the following recommendations can be made:

Environmental Monitoring Program

1. Continue the EMP with the following changes:
   a. Monitor Little Robert Lake and Robert Lake as part of the downgradient/compliance surface water monitoring network instead of background. The 2022 EMP (2022 City of Kelowna Annual Monitoring Report) includes Little Robert Lake and Robert Lake as part of the background surface water monitoring network. This change is recommended because it is unclear what portion of water quality issues is related to the Landfill.
      i. The monitoring point within Robert Lake should be relocated to the north end of the lake closest to the Landfill.
      ii. Two additional surface water monitoring points should be added to the EMP to identify potential surface water impacts originating from the ditching along John Hindle Drive and/or from the stormwater management system that services the administration buildings. There is limited surface water flow coming from both areas and thus, sampling/monitoring will need to be completed during or shortly after a precipitation event. One monitoring location should be added along the ditching just upstream of the Site. The second at the discharge point (culvert) which drains stormwater in the southeast corner of the Site.
   b. An upgradient Clay Unit monitoring well should be added to the routine water quality monitoring program.
   c. An additional Bedrock Unit monitoring well should be completed along the southern, downgradient Site boundary. This well should be added to the routine water quality monitoring program.
   d. To better understand the spatial distribution of groundwater quality impacts south of the Site boundary, monitoring well nest 09BH05S/D and monitoring well 09BH04 should be added to the routine water quality monitoring program. GHD understands that well nest 09BH05S/D may not be accessible. The City should consider replacing the well nest with well to the east of Little Robert Lake.

Future HHCR and Water Quality Assessments

2. As per Section 3.2 of the OC, this HHCR should be submitted the ENV before December 31, 2024.
3. An updated HHCR should be submitted once every ten years (i.e. December 31, 2034).
4. Future annual monitoring reports should include a more detailed assessment of surface water and potential landfill related impacts in Little Robert Lake and Robert Lake. Assessments should incorporate the additional monitoring data recommended above. Future reports should also include an assessment of groundwater quality compliance following Protocol 9.

Operations

5. Upgrade the Compost facility so runoff from the facility is directed to the Site leachate management system, instead of overland flowing into the Slough.

6. Continue to work towards installing a surface water bypass system to eliminate the need for Tutt Farm irrigation with Tutt Pond water.

PROFESSIONAL
PROVINCE OF
R A. MOLENHUIS
#56844
BRITISH COLUMBIA
GEOSCIENTIST

December 20, 2023

Allan Molenhuis, P.Geo
Hydrogeologist

+1 519 340 3872
allan.molenhuis@ghd.com

Rose Marie Rocca, P.Geo
Hydrogeologist

+1 604 340 2977
rosemarie.rocca@ghd.com

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Tables

Table 1

Monitoring Well Details
Hydrogeology and Hydrology Characterization Report
Glenmore Landfill
City of Kelowna

City's Current Monitoring Well ID	Consultant Initial Monitoring Well ID	Monitoring Well		Geodetic Elevations					Screen Details			Drilling				
		UTM Zone 10 N Coordinates		Grade	Piezo	Top of screen	Bottom of Screen	Top of Screen	Bottom of Screen	Screen Length	Lithology					
		Northing	Easting	(m AMSL)	(m AMSL)	(m AMSL)	(m AMSL)	(m bgs)	(m bgs)	(m bgs)		Method	Company	Consultant	Year	Current Status
North and North East of Phase 1																
GL-41-1	GL-41-1	5537673.4	326191.3	449.7	450.6	440.6	439	9.1	10.7	1.6	volcanic bedrock, brown, hard	Sonic Core	VanMars	SNC Lavalin	2019	Active
GL-41-2	GL-41-2	5537673.3	326191.5	449.7	450.6	443.3	442.4	6.4	7.3	0.9	gravel and silt, trace clay (till)	Sonic Core	VanMars	SNC Lavalin	2019	Active
GL-41-3	GL-41-3	5537675.7	326192.7	449.7	450.6	447	445.5	2.7	4.2	1.5	silt, some clay followed by sand, trace silt	HSA	On the Mark	SNC Lavalin	2019	Active
GL-0-1	12-1A	5537338.6	326498.8	449.2	450	429.1	426	20.1	23.2	3.1	sandy clay (till) followed by bedrock	Sonic Core	MudBay	SLR	2012	Decomm in September2020
GL-0-2	12-1B	5537338.6	326498.8	449	450	435	431.9	14	17.1	3.1	sandy silt, some gravel (suspect till) followed by sand and silt, some clay, trace gravel	Sonic Core	MudBay	SLR	2012	Decomm in September2020
GL-0-3	12-1C	5537338.6	326498.8	449.42	450.49	439.9	436.9	9.5	12.5	3	sand and gravel followed by sand, trace silt and gravel	Sonic Core	MudBay	SLR	2012	Decomm in September2020
GL-23-1	GL-23-1	5537307.3	326976.6	446	446.6	437.8	436.3	8.2	9.7	1.5	sand, compact	HSA	Beck	Golder	2007	Active
GL-24-1	GL-24-1	5537291.1	327107.7	446.8	447.6	443.6	441.6	3.2	5.2	2	sand, compact followed by silty sand (till)	HSA	Beck	Golder	2007	Active
GL-1-1	GL-1-1	5537230.4	327134.1	446.3	446.9	435.8	434.3	10.5	12	1.5	silt, some gravel (till)	HSA	-	Gartner Lee	1990	Active
GL-1-2	GL-1-2	5537230.4	327134.1	446.3	447	443.8	440.3	2.5	6	3.5	silty sand followed by sand	HSA	-	Gartner Lee	1990	Active
GL-22-1	GL-22-1	5537429.7	326934.5	449.4	450.3	438.2	436.6	11.2	12.8	1.6	sand, trace silt	HSA	Beck	Golder	2007	Decomm in Sept/Oct2016
Phase 1																
GL-3-5	12-14	5537050.6	326414.3	457.1	457.4	435.5	433.9	21.6	23.2	1.6	sand and gravel followed by silty clay with sand	Sonic Core	MudBay	SLR	2012	Decomm in 2017
GL-3-1	GL-3-1	5537029.2	326492	-	-	-	-	?	46.9	-	volcanic bedrock	Air Rotary	-	Gartner Lee	1990	Decomm in May 2011
GL-3-2	GL-3-2	5537029.2	326492	-	-	-	-	16.8	18.5	1.7	silty sand some gravel (till)	HSA	-	Gartner Lee	1990	Decomm in May 2011
GL-3-3	GL-3-3	5537029.2	326492	-	-	-	-	0.5	3.5	3	fill followed by silty clay	HSA	-	Gartner Lee	1990	Decomm in May 2011
Phase 2																
GL-6-1 (2011)	GL-6-1 (2011)	5536528.3	326582.8	439.7	440.5	437.9	434.8	1.8	4.9	3.1	Interbedded clay and garbage (municipal solid waste)	Sonic Core	Beck	SLR	2011	Decomm in September2021
GL-18-1	GL-18-1	5536537.1	326574.7	-	-	-	-	>24	-	-	bedrock	Sonic Core	Beck	SLR	2011	Decomm in May 2011
GL-18-2	GL-18-2	5536537.1	326574.7	442.6	442.9	426.4	423.4	16.2	19.2	3	silty sand	Mud Rotary	Foundex	Golder	2005	Decomm in January 2019
GL-18-3	GL-18-3	5536537.1	326574.7	442.9	442.8	437.5	434.6	5.4	8.3	2.9	landfill refusal	Mud Rotary	Foundex	Golder	2005	Decomm in January 2020
West of Phase 2																
GL-2-1	GL-2-1	5536880.9	326219.1	438.6	439	430.6	429.1	8	9.5	1.5	silty clay followed by silty sand	HSA	-	Gartner Lee	1990	Active
GL-2-2	GL-2-2	5536880.9	326219.1	438.9	439	436.4	432.9	2.5	6	3.5	silty clay	HSA	-	Gartner Lee	1990	Active
GL-5-1	GL-5-1	5536592.3	326175.4	439	440	421	420	18	19	1	crystalline bedrock	Air Rotary	-	Gartner Lee	1990	Active
GL-5-2	GL-5-2	5536592.3	326175.4	439.2	440.1	431.7	429.2	7.5	10	2.5	sand followed by gravelly silt (till)	HSA	-	Gartner Lee	1990	Active
GL-5-3	GL-5-3	5536592.3	326175.4	439.2	440.2	437.2	434.2	2	5	3	silty clay	HSA	-	Gartner Lee	1990	Active
East of Phase 2																
GL-4-1	GL-4-1	5536929.9	326887.8	441.1	441.4	433.4	432.4	7.7	8.7	1	silty gravel and sand	HSA	-	Gartner Lee	1990	Active
GL-4-2	GL-4-2	5536929.9	326887.8	441.1	441.4	439.4	435.9	1.7	5.2	3.5	silty clay	HSA	-	Gartner Lee	1990	Active

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City's Current Monitoring Well ID	Consultant Initial Monitoring Well ID	Monitoring Well UTM Zone 10 N Coordinates		Geodetic Elevations		Screen Details						Drilling				
		Northing	Easting	Grade (m AMSL)	Piezo (m AMSL)	Top of screen (m AMSL)	Bottom of Screen (m AMSL)	Top of Screen (m bgs)	Bottom of Screen (m bgs)	Screen Length (m bgs)	Lithology	Method	Company	Consultant	Year	Current Status
Phase 3 Slough																
GL-34-1	11-26A	5536303.3	326445.5	439.2	440	433.2	431.7	6	7.5	1.5	fat clay (reworked soil, fill) with 7 cm sand lenses	Sonic Core	Beck	SLR	2011	Active
GL-34-2	11-26B	5536303.3	326445.5	439.2	439.7	428.5	427.6	10.7	11.6	0.9	silty sand, clay layers	Sonic Core	Beck	SLR	2011	Active
GL-34-3	11-26C	5536303.3	326445.5	439.3	440.1	425.7	424.8	13.6	14.5	0.9	lean clay, trace sand followed by fat clay, trace sand	Sonic Core	Beck	SLR	2011	Active
GL-30-1	11-13A1	5536286	326746.8	439.2	440	432.6	431.1	6.6	8.1	1.5	fat clay (reworked soil, fill) with 10 cm sand lens	Sonic Core	Beck	SLR	2011	Decomm in Oct 2019
GL-30-2	11-13B	5536286	326746.8	439.4	440.7	427.5	426.6	11.9	12.8	0.9	silty sand followed by fat clay	Sonic Core	Beck	SLR	2011	Decomm in Oct 2019
GL-30-3	11-13C	5536286	326746.8	439.4	440.6	424.3	423.4	15.1	16	0.9	fat clay	Sonic Core	Beck	SLR	2011	Decomm in Oct 2019
GL-31-1	11-18A1	5536191.5	326639.6	439.4	440.3	432.5	431	6.9	8.4	1.5	fat clay (reworked soil, fill) followed by lean clay (native)	Sonic Core	Beck	SLR	2011	Decomm in September2021
GL-31-2	11-18B1	5536191.5	326639.6	439.2	440	428.6	427.7	10.6	11.5	0.9	lean clay followed by silt with sand	Sonic Core	Beck	SLR	2011	Active
GL-31-3	11-18C	5536191.5	326639.6	439.5	440.4	425.2	424.2	14.3	15.3	1	silt some sand	Sonic Core	Beck	SLR	2011	Damaged 2020
GL-32-1	11-21A1	5536093.5	326735	438.2	439	433.6	432.1	4.6	6.1	1.5	fat clay (native) with 1 cm sand lenses	Sonic Core	Beck	SLR	2011	Decomm in September2021
GL-32-2	11-21B	5536093.5	326735	437.8	438.7	429.7	428.8	8.1	9	0.9	lean clay with sand lenses followed by silty sand	Sonic Core	Beck	SLR	2011	Decomm in September2021
GL-32-3	11-21C1	5536093.5	326735	437.8	438.6	427.9	426.9	9.9	10.9	1	silty sand, trace clay	Sonic Core	Beck	SLR	2011	Decomm in September2021
GL-33-1	11-22A	5536202.4	326837.1	439.4	440	433.8	430.7	5.6	8.7	3.1	fat clay (reworked soil, fill) followed by silty sand with gravel (suspect till)	Sonic Core	Beck	SLR	2011	Decomm in Oct 2019
GL-33-2	11-22B	5536202.4	326837.1	439.5	440.1	430.5	429	9	10.5	1.5	silty sand with gravel (suspect till)	Sonic Core	Beck	SLR	2011	Decomm in Oct 2019
GL-33-3	11-22C	5536202.4	326837.1	439.5	440.2	427.7	426.2	11.8	13.3	1.5	silty sand with gravel (suspect till) followed by volcanic bedrock (weak)	Sonic Core	Beck	SLR	2011	Decomm in Oct 2019
GL-35-1	11-31A1	5536105.2	326411.2	438.1	439	432	430.5	6.1	7.6	1.5	fat clay (reworked soil, fill) follwed by silty sand and lean clay	Sonic Core	Beck	SLR	2011	Active
GL-35-2	11-31B	5536105.2	326411.2	438.1	439	427.5	425.9	10.6	12.2	1.6	lean clay	Sonic Core	Beck	SLR	2011	Active
GL-35-3	11-31C	5536105.2	326411.2	438.4	439.3	425.1	423.6	13.3	14.8	1.5	silty sand with gravel (till)	Sonic Core	Beck	SLR	2011	Active
GL-36-1	11-3A	5536496.4	326764.1	439.2	439.8	433.7	430.7	5.5	8.5	3	fat clay (reworked soil, fill) followed by fat clay (native) with cm sand layers	Sonic Core	Beck	SLR	2011	Decomm in Oct 2019
GL-36-2	11-3B	5536496.4	326764.1	439.3	440	429.1	427.6	10.2	11.7	1.5	fat clay (native), trace sand followed by sandy silt	Sonic Core	Beck	SLR	2011	Decomm in Oct 2019
GL-37	12-11	5536489.1	326646.4	439.3	440.1	437.5	431.4	1.8	7.9	6.1	interbedded silt clay and garbage followed by clay, silty layers with wood chunks	Sonic Core	MudBay	SLR	2012	Decomm in 2017
GL-38	12-10	5536488.9	326634.4	439.3	440.1	437.5	431.5	1.8	7.8	6	interbedded silt clay and garbage followed by fat clay (reworked soil, fill). No recovery below 5 m.	Sonic Core	MudBay	SLR	2012	Decomm in 2017
West of Phase 3 Slough																
GL-8-1	GL-8-1	5535944.5	326391.9	438.8	439.7	431.3	429.8	7.5	9	1.5	sand, some gravel	HSA	-	Gartner Lee	1990	Active
GL-8-2	GL-8-2	5535944.5	326391.9	438.8	439.6	438.3	434.8	0.5	4	3.5	clay	HSA	-	Gartner Lee	1990	Active
GL-14-1	GL-14-1	5536265	326258.7	453.3	453.8			>8			bedrock	Mud Rotary	Foundex	Golder	2005	Decomm in 2016
East of Phase 3 Slough																
GL-7-1	GL-7-1	5536434.3	326891	439	439.7	436	435.5	3	3.5	0.5	weathered bedrock	Air Rotary	-	Gartner Lee	1990	Active
GL-26-1	09-2-1	5535984.6	326863.3	440.9	441.4	435.8	434.3	5.1	6.6	1.5	clayey silt followed by bedrock, some fractures	Odex	-	Golder	2009	Active
GL-26-2	09-2-2	5535984.6	326863.3	440.7	441.6	437	435.5	3.7	5.2	1.5	clayey silt, trace sand and gravel	HSA	-	Golder	2009	Active
GL-26-3	09-2-3	5535984.6	326863.3	440.7	441.5	438.6	437.3	2.1	3.4	1.3	silty gravelly sand followed by layered clayey silt	SSA	-	Golder	2009	Active
GL-26-4	09-2-4	5535984.6	326863.3	440.7	441.5	417.8	414.8	22.9	25.9	3	bedrock	Odex	-	Golder	2009	Active
GL-10-1	GL-10-1	5535933	326821.6	438.4	439.4	435.5	430	2.9	8.4	5.5	silty clay, some sand and gravel	HSA	-	Gartner Lee	1990	Active
12-16	12-16	5536514.5	326448.7	-	-	-	-	6.1	10.7	4.6	fat clay (reworked soil, fill)	HSA	On the Mark	SLR	2012	Decomm in 2012
GL-25-1	09-1-1	5536149	327105.1	458.3	459	443.7	440.7	14.6	17.6	3	sand and gravel with silty clay (till)	Odex	-	Golder	2009	Decomm in 2016
GL-25-2	09-1-2	5536149	327105.1	458.3	459.108	456.5	455	1.8	3.3	1.5	interbedded clay and silty clay	SSA	-	Golder	2009	Decomm in 2016

Table 1

Monitoring Well Details
Hydrogeology and Hydrology Characterization Report
Glenmore Landfill
City of Kelowna

City's Current Monitoring Well ID	Consultant Initial Monitoring Well ID	Monitoring Well UTM Zone 10 N Coordinates Northing	Easting	Geodetic Elevations Grade (m AMSL)	Piezo (m AMSL)	Top of screen (m AMSL)	Bottom of Screen (m AMSL)	Top of Screen (m bgs)	Screen Details Bottom of Screen (m bgs)	Screen Length (m bgs)	Lithology	Drilling Method	Company	Consultant	Year	Current Status
Compost Facility - South of Phase 3 Slough																
GL-27-1	09-3-1	5535841.1	326462.8	438.7	441.6	415.1	413.6	23.6	25.1	1.5	bedrock , some fractures	Odex	-	Golder	2009	Active
GL-27-2	09-3-2	5535841.1	326462.8	438.7	440.8	428.2	426.7	10.5	12	1.5	silty clay, some sand and gravel (till)	SSA	-	Golder	2009	Active
GL-27-3	09-3-3	5535841.1	326462.8	438.6	440.8	430.2	428.7	8.4	9.9	1.5	layered clay followed by silty clay, some sand and gravel (till)	HSA	-	Golder	2009	Active
GL-27-4	09-3-4	5535841.1	326462.8	438.7	440.6	437.9	436.9	0.8	1.8	1	sandy gravelly silt (fill)	SSA	-	Golder	2009	Active
GL-17-1	GL-17-1	5535791.4	326494.6	439.2	440.3	-	-	>18	-	-	bedrock	Mud Rotary	Foundex	Golder	2005	Active
GL-17-2	GL-17-2	5535791.4	326494.6	439.2	439.8	434.4	431.4	4.8	7.8	3	silty gravelly sand (till)	Mud Rotary	Foundex	Golder	2005	Active
GL-13-1	GL-13-1	5535791.4	326494.6	-	439.8	-	-	4.6	7.6	3	silty sand with gravel (till)	HSA	-	Gartner Lee	1998	Active
GL-12-1	GL-12-1	5535729.1	326538.3	441.3	442.3	435.2	432.2	6.1	9.1	3	silty sand (till)	HSA	-	Gartner Lee	1998	Active
GL-29-1	12-4A	5535749.3	326652.7	443.9	445.1	402.4	399.4	41.5	44.5	3	sand and silt followed by bedrock	Sonic Core	MudBay	SLR	2012	Active
GL-29-2	12-4B	5535749.3	326652.7	443.9	444.8	436	432.9	7.9	11	3.1	sand and silt (till)	Sonic Core	MudBay	SLR	2012	Active
West of Compost Facility																
GL-15-1	GL-15-1	5535905.1	326176.5	452	452.3	-	-	>12	-	-	bedrock	Mud Rotary	Foundex	Golder	2005	Active
GL-15-2	GL-15-2	5535905.1	326176.5	451.7	452	448.6	445.6	3.1	6.1	3	sandy silt and gravel (till)	Mud Rotary	Foundex	Golder	2005	Active
East of Compost Facility																
06BH02	06BH02	5535672.4	327122.8	445.6	445.4	437.6	434.6	8	11	3	clay followed by sand and gravel	HSA	Kamloops	EBA	2006	Active
South Perimeter of Site																
GL-39-1	GL-39-1	5535296.8	326790.4	439.5	440.4	430.7	429.5	8.8	10	1.2	silt, some sand, clay and gravel (till)	HSA	On the Mark	SNC Lavalin	2019	Active
GL-39-2	GL-39-2	5535297.6	326789.1	439.6	440.5	435.3	433.5	4.3	6.1	1.8	silty sand , trace gravel and clay	HSA	On the Mark	SNC Lavalin	2019	Active
GL-39-3	GL-39-3	5535298.3	326787.8	439.6	440.6	438.1	436.6	1.5	3	1.5	silty clay, some sand	HSA	On the Mark	SNC Lavalin	2019	Active
GL-40-1	GL-40-1	5535525.2	326465.2	449.7	450.5	446.7	445.1	3	4.6	1.6	sand and gravel, trace clay and silt (till)	HSA	On the Mark	SNC Lavalin	2019	Active
GL-40-2	GL-40-2	5535523.8	326466.4	449.6	450.4	435	433.4	14.6	16.2	1.6	volcanic bedrock, brown, hard	Sonic Core	VanMars	SNC Lavalin	2019	Decomm in September2021
GL-40-3	GL-40-3	5535523.7	326466.2	449.6	450.4	439.8	438	9.8	11.6	1.8	clay and silt, some sand, trace gravel (till)	Sonic Core	VanMars	SNC Lavalin	2019	Decomm in September2021
GL-42-1	GL-42-1	5535422.7	326636.2	447.6	448.4	429.3	427.7	18.3	19.9	1.6	sand and gravel, trace silt (till)	Sonic Core	VanMars	SNC Lavalin	2019	Active
GL-42-2	GL-42-2	5535422.6	326636.2	447.6	448.4	437.5	436	10.1	11.6	1.5	clayey silt	Sonic Core	VanMars	SNC Lavalin	2019	Active
GL-42-3	GL-42-3	5535423.9	326637.6	447.7	448.5	441	439.2	6.7	8.5	1.8	sand, gravel and cobbles (till)	Sonic Core	VanMars	SNC Lavalin	2019	Active
09BH01	09BH01	5535385.2	326712.8	-	-	-	-	-	-	-	-	SSA	Beck	SLR	2011	Decomm in Aug 2011
South and South East of Site																
09BH05-S	09BH05-S	5535090.7	326805.6	-	-	-	-	11.2	14.2	1.8	silty sand	HSA	Kel	EBA	2009	Inaccessible
09BH05-D	09BH05-D	5535090.7	326805.6	-	-	-	-	22	23	1.8	sand, some gravel, trace silt	HSA	Kel	EBA	2009	Inaccessible
09BH06-S	09BH06-S	5534457.6	326917.6	435.9	435.9	431.9	430.4	4	5.5	1.8	silty clay	HSA	Kel	EBA	2009	Active
09BH06-D	09BH06-D	5534457.6	326917.6	435.6	435.8	428.6	425.6	7	10	1.8	silty sand	HSA	Kel	EBA	2009	Active
09BH07	09BH07	5535293.6	327214.6	440.9	441	434.4	431.4	6.5	9.5	1.8	sand, trace silt	HSA	Kel	EBA	2009	Damaged 2020
09BH03	09BH03	5535064.2	327413.6	440.8	441	434.7	431.7	6.1	9.1	1.8	sand, trace silt	HSA	Kel	EBA	2009	Active
09BH04	09BH04	5535008.4	327178.2	436.2	436.4	425	422	11.2	14.2	1.8	sand and gravel, trace clay	HSA	Kel	EBA	2009	Active
GL-28-1	09-4-1	5535273.8	326721.5	442.1	442.1	424.6	423.1	17.5	19	1.5	sand, some silt followed by gravel, some sand, trace silt	Odex	-	Golder	2009	Active
GL-28-2	09-4-2	5535273.8	326721.5	441.4	441.8	435.9	434.4	5.5	7	1.5	silty sand	HSA	-	Golder	2009	Active
GL-28-3	09-4-3	5535273.8	326721.5	441.4	441.7	438.9	437.4	2.5	4	1.5	layered silty clay, some sand	SSA	-	Golder	2009	Active

Notes:
Source: 2022 Annual Water Monitoring Report for Glenmore Landfill (Keltech Environmental, March 24, 2023)
\- - no data
HSA - hollow stem auger
SSA - solid stem auger

Table 2

Hydraulic Elevation Monitoring Results
Hydrogeology and Hydrology Characterization Report
Glenmore Landfill
City of Kelowna

Well ID	Monitoring Well UTM Zone 10 N Coordinates		Geodetic Elevations		Date																	
	Northing	Easting	Grade (m AMSL)	Piezo (m AMSL)	3/17/2015	6/4/2015	8/27/2015	11/2/2015	3/22/2016	5/16/2016	9/16/2016	11/24/2016	3/21/2017	6/5/2017	8/16/2017	9/22/2017	11/14/2017	3/16/2018	5/25/2018	8/30/2018	11/16/2018	3/21/2019
GL-0-1	5537338.6	326498.8	449.20	450.00	444.11	444.20	444.21	444.21	444.36	444.69	444.91	444.93	444.93	445.45	445.62	445.63	445.66	445.62	446.34	446.86	446.73	446.51
GL-0-2	5537338.6	326498.8	449.00	450.00	440.94	440.85	440.75	440.70	440.86	440.94	440.99	441.00	441.07	441.31	441.35	441.31	441.28	441.40	441.83	443.05	442.59	442.62
GL-0-3	5537338.6	326498.8	449.42	450.49	440.90	440.79	440.69	440.64	440.80	440.88	440.92	440.93	441.01	441.24	441.29	441.24	441.22	441.35	441.58	443.06	442.58	442.59
GL-1-1	5537230.4	327134.1	446.30	446.90	445.08	444.92	444.46	444.57	445.45	445.57	444.82	445.07	445.44	445.85	444.82	444.69	444.84	445.73	445.76	444.81	445.36	445.67
GL-1-2	5537230.4	327134.1	446.30	447.00	444.99	444.84	444.39	444.54	445.35	445.51	444.74	444.99	445.37	445.67	444.74	444.61	444.81	445.69	445.65	444.73	445.25	445.58
GL-2-1	5536880.9	326219.1	438.60	439.00	438.79	438.76	437.46	438.05	438.89	438.64	438.22	438.65	439.00	438.97	438.61	438.55	438.85	439.00	438.88	438.69	439.00	439.00
GL-2-2	5536880.9	326219.1	438.90	439.00	438.59	438.58	437.72	437.95	438.76	438.38	437.76	438.41	438.56	438.84	438.19	438.24	438.69	438.87	438.61	438.48	438.81	436.59
GL-3-5	5537050.6	326414.3	457.10	457.40	439.18	439.10	439.01	439.03	439.02	439.20	439.15	439.11	439.34	Decommisioned	-	-	-	-	-	-	-	-
GL-4-1	5536929.9	326887.8	441.10	441.40	440.06	440.21	439.99	440.04	440.25	440.25	440.07	440.07	440.34	440.23	440.08	440.07	440.16	440.55	440.44	439.82	439.99	440.15
GL-4-2	5536929.9	326887.8	441.10	441.40	439.75	439.70	439.52	439.59	439.78	439.72	439.60	439.66	440.68	440.53	439.95	439.99	440.24	440.72	439.80	439.33	439.51	439.65
GL-5-1	5536592.3	326175.4	439.00	440.00	438.59	438.62	437.51	437.49	438.67	438.53	437.93	438.43	438.59	438.96	438.49	438.41	438.69	438.99	438.87	438.56	438.84	438.91
GL-5-2	5536592.3	326175.4	439.20	440.10	438.59	438.63	437.47	437.51	438.65	438.50	437.89	438.48	438.63	438.95	438.44	438.39	438.71	438.99	438.84	438.56	438.82	438.87
GL-5-3	5536592.3	326175.4	439.20	440.20	438.57	438.61	437.34	437.33	438.61	438.43	437.81	438.44	438.58	438.89	438.38	438.35	438.70	438.94	438.81	438.53	438.81	438.86
GL-6-1 (2011)	5536528.3	326582.8	439.70	440.50	437.89	437.87	437.56	437.56	437.93	437.89	437.70	437.82	438.16	438.40	438.07	437.90	437.90	438.43	438.52	437.54	437.97	438.36
GL-7-1	5536434.3	326891	439.00	439.70	438.05	438.11	437.81	437.84	438.14	438.13	437.95	438.02	438.30	438.49	438.23	438.11	438.12	NM	NM	NM	438.21	438.46
GL-8-1	5535944.5	326391.9	438.80	439.70	438.86	438.78	437.53	437.26	438.83	438.78	438.05	438.75	439.03	438.97	438.56	438.54	438.75	438.99	438.92	438.84	438.94	438.86
GL-8-2	5535944.5	326391.9	438.80	439.60	438.14	438.14	437.29	437.09	438.19	438.02	437.68	438.04	438.48	438.49	437.93	437.89	438.16	438.73	438.47	438.12	438.34	438.72
GL-9-1	-	-	-	-	439.50	439.50	439.41	439.39	Artesian	Artesian	Artesian	Artesian	Artesian	Artesian	Artesian	Artesian	Artesian	Artesian	Artesian	Artesian	Artesian	Artesian
GL-9-2	-	-	-	-	437.93	437.94	437.51	437.68	438.03	437.94	437.67	437.83	438.24	438.44	438.11	437.98	438.04	438.52	438.57	438.08	438.21	438.46
GL-9-3	-	-	-	-	437.89	437.90	437.46	437.64	437.95	437.90	437.61	437.79	438.18	438.37	438.03	437.89	437.96	438.43	438.49	438.00	438.14	438.46
GL-10-1	5535933	326821.6	438.40	439.40	437.90	438.15	437.37	437.94	438.03	437.91	437.60	438.01	438.26	438.42	438.01	437.88	438.19	438.48	438.52	437.95	438.21	438.48
GL-12-1	5535729.1	326538.3	441.30	442.30	440.22	440.16	439.99	439.89	440.96	440.49	440.08	440.00	440.28	440.56	NM	440.31	440.10	NM	440.72	440.28	439.96	439.77
GL-13-1	5535791.4	326494.6	-	439.80	439.14	439.10	438.96	438.90	439.27	439.31	439.24	439.32	439.41	439.51	439.51	439.47	439.32	439.61	439.67	439.40	439.25	439.33
GL-15-1	5535905.1	326176.5	452.00	452.30	448.06	447.40	447.67	447.78	448.52	448.40	448.99	448.54	448.71	448.22	448.03	447.83	447.41	447.80	448.44	448.57	447.75	447.30
GL-15-2	5535905.1	326176.5	451.70	452.00	448.60	448.00	448.25	448.33	449.11	448.85	449.50	449.08	449.32	447.76	448.42	448.29	448.00	448.71	448.99	448.95	448.23	447.92
GL-16-1	-	-	-	-	438.87	438.78	437.57	437.28	438.89	438.78	438.07	437.76	439.05	439.03	438.58	438.55	438.77	439.01	438.94	438.85	438.96	438.83
GL-17-1	5535791.4	326494.6	439.20	440.30	-	439.94	439.91	439.94	439.99	439.97	439.98	-	-	440.16	-	-	-	-	-	439.96	Artesian	440.25
GL-17-2	5535791.4	326494.6	439.20	439.80	439.08	439.07	438.90	438.96	439.15	439.11	439.11	439.19	439.34	439.37	439.34	439.32	439.32	439.57	439.51	439.30	439.22	439.25
GL-18-2	5536537.1	326574.7	442.60	442.90	439.09	439.50	439.38	439.59	439.74	439.78	439.67	439.66	439.69	439.74	439.62	439.65	439.76	440.10	440.30	440.00	440.02	Decommisioned
GL-18-3	5536537.1	326574.7	442.90	442.80	437.99	437.93	437.66	437.66	438.18	438.09	437.82	437.89	438.22	438.60	438.31	438.12	438.09	438.68	438.69	437.67	438.07	-
GL-20-1	-	-	-	-	438.21	438.26	437.84	437.71	438.20	438.16	437.90	438.03	438.63	438.55	438.22	438.10	438.16	438.72	438.59	438.39	438.33	438.48
GL-23-1	5537307.3	326976.6	446.00	446.60	444.58	444.48	444.13	444.14	445.01	444.90	444.22	444.65	445.27	445.19	444.40	444.35	444.47	445.23	445.35	444.43	444.64	445.15
GL-24-1	5537291.1	327107.7	446.80	447.60	444.98	444.82	444.39	444.52	445.42	445.84	444.80	445.03	445.52	445.78	444.85	444.68	444.84	445.65	445.84	444.84	446.33	445.64
06BH02	5535672.4	327122.8	445.60	445.40	444.10	444.27	444.13	444.35	444.80	445.23	445.20	445.33		-	445.26	445.17	445.11	-	-	-	-	445.37
09BH03	5535064.2	327413.6	440.80	441.00	435.87	435.76	435.63	435.64	436.28	436.38	436.40	436.25	436.60	436.60	-	436.14	436.05	-	436.47	436.39	436.32	436.34
09BH04	5535008.4	327178.2	436.20	436.40	436.06	435.94	435.77	435.88	-	436.32	-	-	-	-	-	-	436.17	-	-	-	-	436.35
09BH06-D	5534457.6	326917.6	435.60	435.80	435.62	435.59	435.35	435.47	435.79	435.65	435.70	435.75	-	-	435.67	435.58	435.62	-	-	435.77	-	435.83
09BH06-S	5534457.6	326917.6	435.90	435.90	435.42	435.43	435.07	435.31	435.52	435.40	435.36	435.49	435.60	435.53	435.31	435.35	435.43	-	435.57	435.56	435.57	435.69
09BH07	5535293.6	327214.6	440.90	441.00	437.05	436.97	436.83	436.91	437.77	437.70	438.47	438.00	439.43	438.78	439.29	438.63	438.35	-	-	439.68	439.38	439.70
GL-26-1	5535984.6	326863.3	440.90	441.40	440.60	440.59	440.45	440.45	440.92	440.92	440.78	440.82	441.07	441.31	441.16	441.09	441.02	441.31	-	441.23	441.17	441.17
GL-26-2	5535984.6	326863.3	440.70	441.60	438.18	438.61	437.78	438.29	438.28	438.18	437.92	438.26	438.55	438.65	438.23	438.13	438.46	438.82	438.75	438.37	438.47	438.55
GL-26-3	5535984.6	326863.3	440.70	441.50	438.26	438.57	437.80	438.25	438.35	438.20	437.95	438.34	438.63	438.72	438.23	438.12	438.45	438.89	438.78	438.43	438.51	438.57
GL-26-4	5535984.6	326863.3	440.70	441.50	438.18	438.44	437.74	438.10	438.31	438.15	437.86	438.25	438.55	438.64	438.19	438.09	438.39	438.86	438.79	438.42	438.48	438.49
GL-27-1	5535841.1	326462.8	438.70	441.60	439.97	439.62	439.58	439.59	439.83	439.85	439.79	440.03	-	-	-	-	-	-	-	-	440.19	441.30
GL-27-2	5535841.1	326462.8	438.70	440.80	438.33	438.14	438.05	438.04	438.52	438.23	438.20	438.41	438.57	438.61	438.38	438.29	438.44	440.28	-	439.98	438.32	438.84
GL-27-3	5535841.1	326462.8	438.60	440.80	438.41	438.30	438.00	438.02	438.54	438.35	438.18	438.41	438.78	438.71	438.40	438.35	438.50	-	-	439.93	438.53	439.19
GL-27-4	5535841.1	326462.8	438.70	440.60	438.26	438.15	437.57	437.72	438.30	438.00	437.76	438.47	438.55	438.59	438.05	437.97	438.46	-	-	439.78	438.36	438.96
GL-28-1	5535273.8	326721.5	442.10	442.10	436.38	436.24	436.13	436.11	436.61	436.45	436.67	436.60	436.89	436.80	436.84	436.52	436.43	436.84	436.86	436.61	436.70	436.63
GL-28-2	5535273.8	326721.5	441.40	441.80	436.70	436.45	436.42	436.29	436.84	436.70	436.92	436.85	437.28	437.10	437.39	436.82	436.66	437.25	437.33	436.87	437.05	436.92
GL-28-3	5535273.8	326721.5	441.40	441.70	436.70	436.46	436.44	436.31	436.88	436.69	436.93	436.86	437.29	437.10	437.39	436.81	436.65	437.23	437.31	436.86	437.04	436.85
GL-29-1	5535749.3	326652.7	443.90	445.10	440.18	440.23	440.15	440.16	440.46	440.47	440.49	440.46	440.63	440.83	440.78	440.73	440.73	440.90	441.06	440.91	440.93	440.92
GL-29-2	5535749.3	326652.7	443.90	444.80	441.42	441.44	441.17	440.99	441.06	441.36	441.17	441.40	441.37	441.76	441.31	441.02	440.74	441.58	441.85	441.31	441.26	441.10
GL-30-1	5536286	326746.8	439.20	440.00	437.91	437.92	437.66	437.65	437.87	437.94	437.77	437.85	438.13	438.37	438.13	438.01	438.00	438.38	438.49	438.02	438.10	438.37
GL-30-2	5536286	326746.8	439.40	440.70	438.07	438.08	437.82	437.80	438.02	438.10	437.95	438.03	438.33	438.53	438.17	438.14	438.15	438.56	438.63	438.17	438.26	438.48
GL-30-3	5536286	326746.8	439.40	440.60	438.07	438.14	437.88	437.91	438.08	438.17	438.06	438.10	438.29	438.52	438.22	438.13	438.18	438.56	438.64	438.20	438.29	438.49
GL-31-1	5536191.5	326639.6	439.40	440.30	437.86	437.87	437.58	437.50	437.86	437.86	437.67	437.76	438.03	438.22	438.01	437.91	437.90	438.23	438.36	438.07	438.03	438.24
GL-31-2	5536191.5	326639.6	439.20	440.00	437.95	437.98	437.72	437.61	438.01	438.00	437.82	437.89	438.22	438.41	438.16	438.04	438.04	438.40	438.52	438.12	438.21	438.43
GL-31-3	5536191.5	326639.6	439.50	440.40	437.99	437.99	437.82	437.70	438.20	438.03	437.77	437.87	438.31	438.57	438.28	438.17	438.18	438.48	438.59	438.17	438.32	438.51
GL-32-1	5536093.5	326735	438.20	439.00	437.80	437.86	437.63	437.55	437.86	437.89	437.73	437.75	438.04	-	-	438.00	437.94	-	-	-	-	-
GL-32-2	5536093.5	326735	437.80	438.70	437.99	438.00	437.76	437.72	-	-	437.88	437.96	-	-	-	-	-	-	-	-	-	-
GL-32-3	5536093.5	326735	437.80	438.60	438.04	438.08	437.79	437.75	438.13	438.09	437.89	437.99	-	-	-	-	-	-	-	-	-	-
GL-33-1	5536202.4	326837.1	439.40	440.00	438.11	438.15	437.85	437.86	437.94	438.16	437.98	438.05	438.33	438.54	438.28	438.15	438.14	438.57	438.64	438.15	438.24	438.46
GL-33-2	5536202.4	326837.1	439.50	440.10	438.12	438.16	437.86	437.88	437.94	438.17	438.00	438.06	438.35	438.55	438.29	438.16	438.16	438.58	438.66	438.16	438.24	438.46
GL-33-3	5536202.4	326837.1	439.50	440.20	438.12	438.16	437.86	437.88	437.96	438.16	438.00	438.05	438.34	438.54	438.28	438.15	438.16	438.57	438.65	438.14	438.24	438.47
GL-34-1	5536303.3	326445.5	439.20	440.00	437.94	438.00	437.68	437.44	437.98	437.99	437.81	437.83	438.16	438.40	438.21	438.07	438.06	438.36	438.48	438.19	438.28	438.38
GL-34-2	5536303.3	326445.5	439.20	439.70	438.38	438.38	437.84	437.55	438.36	438.28	438.03	438.19	438.59	438.73	438.41	438.30	438.36	438.72	438.69	438.47	438.61	438.72
GL-34-3	5536303.3	326445.5	439.30	440.10	438.40	438.41	437.86	437.55	438.40	438.32	438.04	438.21	438.60	438.74	438.43	438.32	438.37	438.73	438.75	438.51	438.62	438.73

Table 2

Hydraulic Elevation Monitoring Results
Hydrogeology and Hydrology Characterization Report
Glenmore Landfill
City of Kelowna

Well ID	Monitoring Well UTM Zone 10 N Coordinates		Geodetic Elevations		Date																
	Northing	Easting	Grade (m AMSL)	Piezo (m AMSL)	6/6/2019	7/12/2019	8/12/2019	8/13/2019	10/28/2019	3/21/2020	6/4/2020	9/15/2020	11/26/2020	3/29/2021	6/15/2021	9/29/2021	10/26/2021	3/29/2022	6/24/2022	9/29/2022	10/27/2022
GL-0-1	5537338.6	326498.8	449.20	450.00	446.40	446.30	446.22	-	446.00	445.87	-	Decommisione	-	-	-	-	-	-	-	-	-
GL-0-2	5537338.6	326498.8	449.00	450.00	442.27	442.16	442.05	-	441.88	441.76	-	-	-	-	-	-	-	-	-	-	-
GL-0-3	5537338.6	326498.8	449.42	450.49	442.25	442.14	442.02	-	441.84	441.72	-	-	-	-	-	-	-	-	-	-	-
GL-1-1	5537230.4	327134.1	446.30	446.90	445.34	445.10	444.87	-	445.13	445.73	445.57	445.04	445.29	445.44	445.16	444.41	444.90	445.28	445.17	444.57	444.93
GL-1-2	5537230.4	327134.1	446.30	447.00	445.23	445.00	444.77	-	445.03	445.61	445.45	444.95	445.20	445.34	445.08	444.33	444.83	445.20	445.09	444.49	444.87
GL-2-1	5536880.9	326219.1	438.60	439.00	438.74	-	438.50	-	438.78	438.77	438.81	438.69	438.90	438.87	438.59	438.83	438.75	438.99	438.87	438.66	438.79
GL-2-2	5536880.9	326219.1	438.90	439.00	438.55	-	438.12	-	438.61	438.99	438.40	438.52	438.64	438.64	438.18	438.65	438.30	438.58	438.48	438.35	438.49
GL-3-5	5537050.6	326414.3	457.10	457.40	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
GL-4-1	5536929.9	326887.8	441.10	441.40	439.90	439.88	439.81	-	439.89	440.25	440.32	439.90	439.90	440.10	439.86	439.69	439.77	440.18	440.08	439.73	439.78
GL-4-2	5536929.9	326887.8	441.10	441.40	439.35	439.32	439.26	-	439.35	439.60	439.57	439.26	439.33	439.48	439.25	439.08	439.17	439.53	439.37	439.10	439.16
GL-5-1	5536592.3	326175.4	439.00	440.00	438.62	438.55	438.29	-	438.62	438.82	438.57	438.59	438.71	438.72	438.33	438.51	438.47	438.62	438.58	438.32	438.49
GL-5-2	5536592.3	326175.4	439.20	440.10	438.61	438.49	438.29	-	438.62	438.80	438.52	438.57	438.68	438.69	438.29	438.65	438.42	438.62	438.55	438.33	438.49
GL-5-3	5536592.3	326175.4	439.20	440.20	438.58	438.45	438.22	-	438.62	438.78	438.48	438.55	438.66	438.67	438.22	438.79	438.36	438.58	438.51	438.31	438.47
GL-6-1 (2011)	5536528.3	326582.8	439.70	440.50	438.14	437.84	437.02	-	437.54	438.20	438.16	437.86	437.51	438.21	438.11	Decommisione	-	-	-	-	-
GL-7-1	5536434.3	326891	439.00	439.70	438.31	-	438.05	-	437.82	438.32	438.30	438.00	438.02	438.30	438.18	437.84	437.86	438.14	438.13	437.72	437.72
GL-8-1	5535944.5	326391.9	438.80	439.70	438.63	438.70	438.59	-	438.67	438.88	438.69	438.86	439.03	438.67	438.90	438.74	438.41	438.74	438.83	438.60	438.69
GL-8-2	5535944.5	326391.9	438.80	439.60	438.26	438.15	437.90	-	438.12	439.39	438.27	438.05	438.21	438.37	437.73	438.04	437.93	438.30	438.66	437.96	438.05
GL-9-1	-	-	-	-	Artesian	439.57	-	-	439.57	439.54	439.52	439.52	439.54	439.54	439.53	439.57	439.57	-	-	-	-
GL-9-2	-	-	-	-	438.29	438.16	438.03	-	437.93	438.31	438.28	437.95	438.08	438.33	438.16	Decommisione	-	-	-	-	-
GL-9-3	-	-	-	-	438.21	438.09	437.97	-	437.87	438.26	438.21	437.89	439.04	438.29	438.11	-	-	-	-	-	-
GL-10-1	5535933	326821.6	438.40	439.40	438.19	438.11	438.13	-	438.00	438.25	438.22	437.75	438.11	438.30	438.07	437.71	437.89	438.12	438.10	437.62	437.78
GL-12-1	5535729.1	326538.3	441.30	442.30	439.75	439.68	439.68	-	439.65	440.06	440.06	440.06	439.95	439.99	439.84	439.69	439.66	440.19	440.20	439.98	439.95
GL-13-1	5535791.4	326494.6	-	439.80	439.16	439.11	439.07	-	439.06	439.33	439.35	439.30	439.26	439.26	439.24	439.08	439.09	439.40	439.42	439.26	439.26
GL-15-1	5535905.1	326176.5	452.00	452.30	446.87	448.30	448.61	-	447.22	447.45	448.93	449.00	448.82	448.04	448.87	447.25	447.50	447.66	447.97	448.47	447.75
GL-15-2	5535905.1	326176.5	451.70	452.00	447.34	448.54	449.03	-	447.64	448.01	449.43	450.09	449.39	448.53	449.38	447.71	448.11	448.33	448.60	449.02	448.26
GL-16-1	-	-	-	-	437.42	437.69	438.63	-	438.72	438.93	438.74	439.01	439.08	439.00	438.97	438.79	438.47	438.77	438.93	438.62	438.72
GL-17-1	5535791.4	326494.6	439.20	440.30	440.25	440.25	440.23	-	440.05	440.21	440.23	440.24	440.18	440.17	440.19	440.19	440.13	440.17	440.15	440.20	440.10
GL-17-2	5535791.4	326494.6	439.20	439.80	439.05	439.02	438.98	-	438.99	439.72	439.21	439.18	439.18	439.15	439.12	439.01	439.03	439.19	439.27	439.12	439.13
GL-18-2	5536537.1	326574.7	442.60	442.90	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
GL-18-3	5536537.1	326574.7	442.90	442.80	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
GL-20-1	-	-	-	-	438.35	438.21	438.02	-	438.16	438.40	438.28	438.17	438.25	438.38	438.08	438.19	437.99	438.28	438.33	438.03	438.11
GL-23-1	5537307.3	326976.6	446.00	446.60	445.02	444.86	444.58	-	444.80	445.37	445.36	444.35	444.95	445.26	444.94	443.80	444.73	444.78	445.00	444.39	444.48
GL-24-1	5537291.1	327107.7	446.80	447.60	445.34	445.10	444.83	-	445.09	445.72	445.59	445.01	445.27	445.43	445.16	444.37	444.86	445.26	445.13		444.91
06BH02	5535672.4	327122.8	445.60	445.40	445.37	-		445.37	445.37	-	Artesian			Artesian	CAN	CNL	CNL	Damaged	445.87	445.91	445.76
09BH03	5535064.2	327413.6	440.80	441.00	435.99	-	437.52	-	436.74	-	437.08	436.84	436.58	436.42	436.97	436.97	436.80	436.94	437.12	Damaged	-
09BH04	5535008.4	327178.2	436.20	436.40	436.35	-	Artesian	-	436.35	-		Artesian	Artesian	Artesian	Artesian	Artesian	Artesian	Artesian	Artesian	Artesian	Artesian
09BH06-D	5534457.6	326917.6	435.60	435.80	435.83	-	Artesian	-	435.83	-	Artesian	Artesian	Artesian	Artesian	Artesian	Artesian	Artesian	Artesian	Artesian	435.93	435.90
09BH06-S	5534457.6	326917.6	435.90	435.90	435.68	-	435.58	-	435.61	-	435.71	435.64	435.71	435.76	435.71	435.64	435.66	435.76	435.73	435.69	435.67
09BH07	5535293.6	327214.6	440.90	441.00	439.64	-	439.70	-	439.05	-	439.18	-	-	436.11	Damaged	Damaged	Damaged	-	-	-	-
GL-26-1	5535984.6	326863.3	440.90	441.40	441.21	441.16	441.12	-	441.03	441.43	441.28	441.19	441.16	441.29	441.24	441.01	441.02	440.98	441.15	441.03	441.02
GL-26-2	5535984.6	326863.3	440.70	441.60	438.46	438.49	438.49	-	438.34	438.50	438.59	438.17	438.38	438.50	438.33	438.16	438.30	438.41	438.44	438.06	438.24
GL-26-3	5535984.6	326863.3	440.70	441.50	438.40	438.60	438.85	-	438.39	438.49	438.61	438.14	438.41	438.45	438.32	438.21	438.39	438.49	438.53	438.19	438.42
GL-26-4	5535984.6	326863.3	440.70	441.50	438.32	438.47	438.69	-	438.29	438.41	438.53	438.06	438.34	438.38	438.29	438.17	438.35	438.52	438.56	438.26	438.39
GL-27-1	5535841.1	326462.8	438.70	441.60	440.24	440.23	440.24	-	440.11	440.10	440.25	440.16	440.16	440.15	440.17	440.00	440.09	440.18	440.19	440.14	440.15
GL-27-2	5535841.1	326462.8	438.70	440.80	438.65	438.53	438.45	-	438.39	438.64	438.65	438.36	438.41	438.54	438.48	438.23	438.24	438.57	438.51	438.25	438.23
GL-27-3	5535841.1	326462.8	438.60	440.80	438.46	438.36	438.25	-	438.33	438.61	438.56	438.33	438.48	438.62	438.41	438.20	438.23	438.59	438.63	438.27	438.32
GL-27-4	5535841.1	326462.8	438.70	440.60	438.55	438.41	438.29	-	438.21	438.59	438.60	438.23	438.38	438.53	438.43	438.03	438.08	438.95	438.91	438.52	438.18
GL-28-1	5535273.8	326721.5	442.10	442.10	436.60	436.79	436.79	-	436.68	-	436.89	437.06	436.79	436.71	437.25	436.78	436.71	436.82	436.80	436.78	436.71
GL-28-2	5535273.8	326721.5	441.40	441.80	436.82	436.97	436.93	-	436.87	-	437.17	437.50	437.09	436.98	438.19	437.08	436.98	437.20	437.06	436.98	436.92
GL-28-3	5535273.8	326721.5	441.40	441.70	436.82	436.96	436.93	-	436.86	-	436.16	437.49	437.08	436.98	438.21	437.08	436.98	437.20	437.06	436.98	436.93
GL-29-1	5535749.3	326652.7	443.90	445.10	440.80	440.85	440.81	-	440.74	440.94	440.93	440.88	440.83	440.92	440.92	440.74	440.77	440.81	440.82	440.74	440.73
GL-29-2	5535749.3	326652.7	443.90	444.80	441.24	441.28	441.38	-	441.12	441.56	441.73	441.40	441.37	441.33	441.23	440.90	440.79	441.60	441.82	441.27	441.00
GL-30-1	5536286	326746.8	439.20	440.00	438.21	438.06	437.86	-	Decommisione	-	-	-	-	-	-	-	-	-	-	-	-
GL-30-2	5536286	326746.8	439.40	440.70	438.32	438.19	438.06	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GL-30-3	5536286	326746.8	439.40	440.60	438.36	438.23	438.11	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GL-31-1	5536191.5	326639.6	439.40	440.30	438.09	437.96	437.83	-	437.72	438.06	438.06	-		-	-	-	-	-	-	-	-
GL-31-2	5536191.5	326639.6	439.20	440.00	438.25	438.13	438.01	-	437.90	438.26	438.23	437.97	438.07	438.29	438.12	437.78	437.79	438.10	438.07	437.75	437.72
GL-31-3	5536191.5	326639.6	439.50	440.40	438.32	438.23	438.10	-	438.01	438.33	438.33	-	-	Damaged	Damaged	Damaged/Dec	ecommissione	-	-	-	-
GL-32-1	5536093.5	326735	438.20	439.00	-	-		-	437.20			437.93	437.94		CNA	ecommissioned		-	-	-	-
GL-32-2	5536093.5	326735	437.80	438.70	-	-		-	-	-	-	438.04		CNA	CNA	-	-	-	-	-	-
GL-32-3	5536093.5	326735	437.80	438.60	-	-		-	-	-	-	-	-	CNA	CNA	-	-	-	-	-	-
GL-33-1	5536202.4	326837.1	439.40	440.00	438.32	438.18	438.07	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GL-33-2	5536202.4	326837.1	439.50	440.10	438.33	438.20	438.09	-	Decommisione	-	-	-	-	-	-	-	-	-	-	-	-
GL-33-3	5536202.4	326837.1	439.50	440.20	438.33	438.21	438.08	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GL-34-1	5536303.3	326445.5	439.20	440.00	438.20	438.12	438.02	-	437.95	438.22	438.20	438.04	438.11	438.27	438.11	437.87	437.88	438.08	438.08	437.87	437.86
GL-34-2	5536303.3	326445.5	439.20	439.70	438.47	438.38	438.26	-	438.25	438.29	438.48	438.36	438.49	438.60	438.39	438.21	438.18	438.43	438.38	438.14	438.17
GL-34-3	5536303.3	326445.5	439.30	440.10	438.47	438.19	438.27	-	438.25	438.57	438.48	438.35	438.48	438.60	438.40	438.22	438.18	438.42	438.38	438.13	438.16

Table 2

Hydraulic Elevation Monitoring Results
Hydrogeology and Hydrology Characterization Report
Glenmore Landfill
City of Kelowna

Well ID	Monitoring Well UTM Zone 10 N Coordinates		Geodetic Elevations		Date																	
	Northing	Easting	Grade (m AMSL)	Piezo (m AMSL)	3/17/2015	6/4/2015	8/27/2015	11/2/2015	3/22/2016	5/16/2016	9/16/2016	11/24/2016	3/21/2017	6/5/2017	8/16/2017	9/22/2017	11/14/2017	3/16/2018	5/25/2018	8/30/2018	11/16/2018	3/21/2019
GL-35-1	5536105.2	326411.2	438.10	439.00	438.17	438.17	437.02	436.75	438.12	438.01	437.52	437.95	438.29	-	438.03	437.98	438.13	-	-	438.15	438.32	-
GL-35-2	5536105.2	326411.2	438.10	439.00	438.74	438.66	437.58	437.27	438.77	438.59	438.03	438.64	438.96	-	438.54	438.49	438.66	-	-	-	438.88	-
GL-35-3	5536105.2	326411.2	438.40	439.30	438.73	438.65	437.73	437.27	438.69	438.58	438.04	438.63	438.94	439.06	438.54	438.49	438.66	438.87	-	438.79	438.86	-
GL-36-1	5536496.4	326764.1	439.20	439.80	438.10	438.16	438.03	437.99	438.13	438.19	438.13	-	438.10	438.33	438.18	438.13	438.20	438.35	438.51	438.02	438.26	438.40
GL-36-2	5536496.4	326764.1	439.30	440.00	438.39	438.44	438.24	438.28	438.47	438.52	438.44	438.49	438.60	438.73	438.55	438.48	438.53	438.88	439.00	438.56	438.62	438.83
GL-36-3	-	-	-	-	438.46	438.49	438.29	438.34	438.59	438.58	438.50	438.53	438.67	438.77	438.56	438.48	438.53	438.79	438.88	438.53	438.60	438.81
GL-37	5536489.1	326646.4	439.30	440.10	437.89	437.86	437.53	437.57	437.86	437.88	437.70	437.75	438.15	438.37	438.05	Decommision	-	-	-	-	-	-
GL-38	5536488.9	326634.4	439.30	440.10	437.88	437.86	437.52	437.57	437.80	437.88	437.69	437.80	438.14	438.37	438.04	-	-	-	-	-	-	-
GL-39-1	5535296.8	326790.4	439.50	440.40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GL-39-2	5535297.6	326789.1	439.60	440.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GL-39-3	5535298.3	326787.8	439.60	440.60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GL-40-1	5535525.2	326465.2	449.70	450.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GL-40-2	5535523.8	326466.4	449.60	450.40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GL-40-3	5535523.7	326466.2	449.60	450.40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GL-41-1	5537673.4	326191.3	449.70	450.60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GL-41-2	5537673.3	326191.5	449.70	450.60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GL-41-3	5537675.7	326192.7	449.70	450.60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GL-42-1	5535422.7	326636.2	447.60	448.40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GL-42-2	5535422.6	326636.2	447.60	448.40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GL-42-3	5535423.9	326637.6	447.70	448.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:
Source: 2022 Annual Water Monitoring Report for Glenmore Landfill (Keltech Environmental, March 24, 2023)
\- - no data (well not installed or data not available)
CNA - could not access
CNL - could not locate

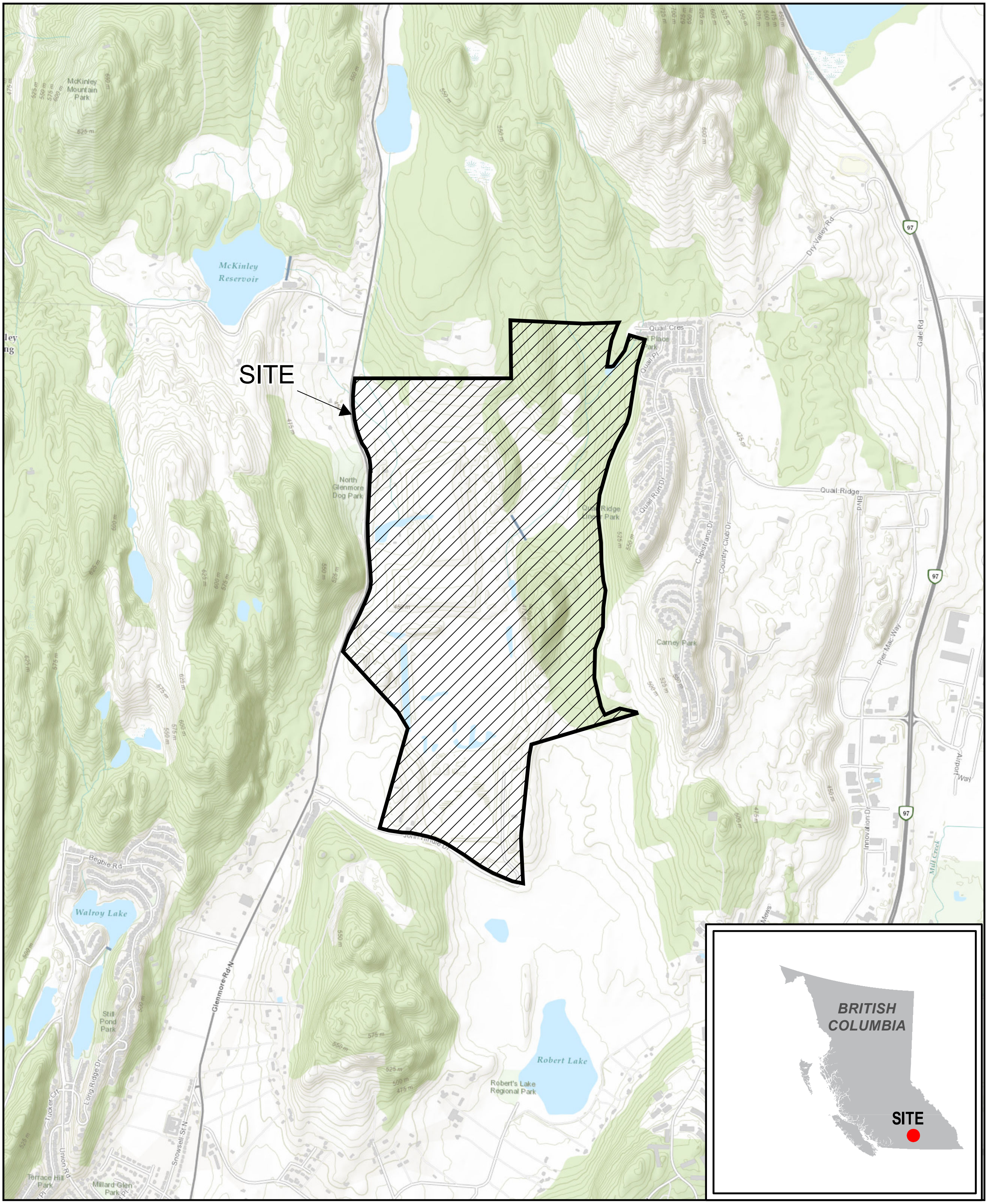
Table 2

Hydraulic Elevation Monitoring Results
Hydrogeology and Hydrology Characterization Report
Glenmore Landfill
City of Kelowna

Well ID	Monitoring Well UTM Zone 10 N Coordinates Northing	Easting	Geodetic Elevations Grade (m AMSL)	Piezo (m AMSL)	6/6/2019	7/12/2019	8/12/2019	8/13/2019	10/28/2019	3/21/2020	6/4/2020	Date 9/15/2020	11/26/2020	3/29/2021	6/15/2021	9/29/2021	10/26/2021	3/29/2022	6/24/2022	9/29/2022	10/27/2022
GL-35-1	5536105.2	326411.2	438.10	439.00	438.26	438.13	437.94	-	438.13	438.37	438.13	438.18	438.26	438.36	437.98	438.12	437.94	438.21	438.17	437.95	438.04
GL-35-2	5536105.2	326411.2	438.10	439.00	438.64	438.71	438.60	-	438.68	438.84	438.69	438.83	439.00	CNA	438.94	438.70	438.41	438.68	438.84	438.52	438.60
GL-35-3	5536105.2	326411.2	438.40	439.30	438.64	438.69		-	438.67	438.83	438.67	438.82	438.98	438.91	438.93	438.69	438.41	438.69	438.84	438.53	438.61
GL-36-1	5536496.4	326764.1	439.20	439.80	438.38	438.22	438.04	-	Decommision	-	-	-	-	-	-	-	-	-	-	-	-
GL-36-2	5536496.4	326764.1	439.30	440.00	438.72	438.59	438.47	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GL-36-3	-	-	-	-	438.69	438.56	438.45	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GL-37	5536489.1	326646.4	439.30	440.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GL-38	5536488.9	326634.4	439.30	440.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GL-39-1	5535296.8	326790.4	439.50	440.40	-	-	-	-	-	437.09	437.14	437.43	437.13	437.02	437.20	437.04	437.04	437.19	437.15	437.21	437.07
GL-39-2	5535297.6	326789.1	439.60	440.50	-	-	-	-	-	437.13	437.23	437.51	437.20	437.06	437.51	437.09	437.08	437.25	437.19	437.24	437.12
GL-39-3	5535298.3	326787.8	439.60	440.60	-	-	-	-	-	437.19	437.21	437.63	437.28	437.14	437.49	437.12	437.05	437.43	437.23	437.15	437.15
GL-40-1	5535525.2	326465.2	449.70	450.50	-	-	-	-	-	-	-	-	-	Dry	Dry	Dry	Dry	445.35	Dry	Dry	Dry
GL-40-2	5535523.8	326466.4	449.60	450.40	-	-	-	-	-	443.50	443.27	443.08	441.58	442.91	440.62	ecommissione	-	-	-	-	-
GL-40-3	5535523.7	326466.2	449.60	450.40	-	-	-	-	-	443.55	443.29	443.12	441.61	442.96	440.58	-	-	-	-	-	-
GL-41-1	5537673.4	326191.3	449.70	450.60	-	-	-	-	-	448.39	448.13	447.76	447.41	448.23	447.91	447.86	447.86	448.07	448.18	448.06	448.08
GL-41-2	5537673.3	326191.5	449.70	450.60	-	-	-	-	-	448.33	448.15	447.65	447.36	448.18	447.86	447.80	447.81	448.04	448.15	448.04	448.06
GL-41-3	5537675.7	326192.7	449.70	450.60	-	-	-	-	-	448.36	448.16	447.66	447.38	448.20	447.87	447.82	447.82	448.09	448.20	448.09	448.11
GL-42-1	5535422.7	326636.2	447.60	448.40	-	-	-	-	-	440.04	440.05	449.37	440.04	439.99	439.96	439.90	439.82	438.01	Damaged	-	-
GL-42-2	5535422.6	326636.2	447.60	448.40	-	-	-	-	-	439.79	439.79	440.16	439.82	439.72	439.74	439.71	439.63	437.75	437.66	437.64	437.55
GL-42-3	5535423.9	326637.6	447.70	448.50	-	-								Dry	Dry	Dry	Dry	438.95	Damaged	-	-

Notes:
Source: 2022 Annual Water Monitoring Report for Glenmore Landfill (Keltech Environmental, March 2
- - no data (well not installed or data not available)
CNA - could not access
CNL - could not locate

Figures



Paper Size ANSI A

0 170 340 510 680

Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 11N

N

GHD

CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY
CHARACTERIZATION REPORT

Project No. 12605725
Revision No. -
Date Oct 13, 2023

SITE LOCATION MAP

FIGURE 1.1

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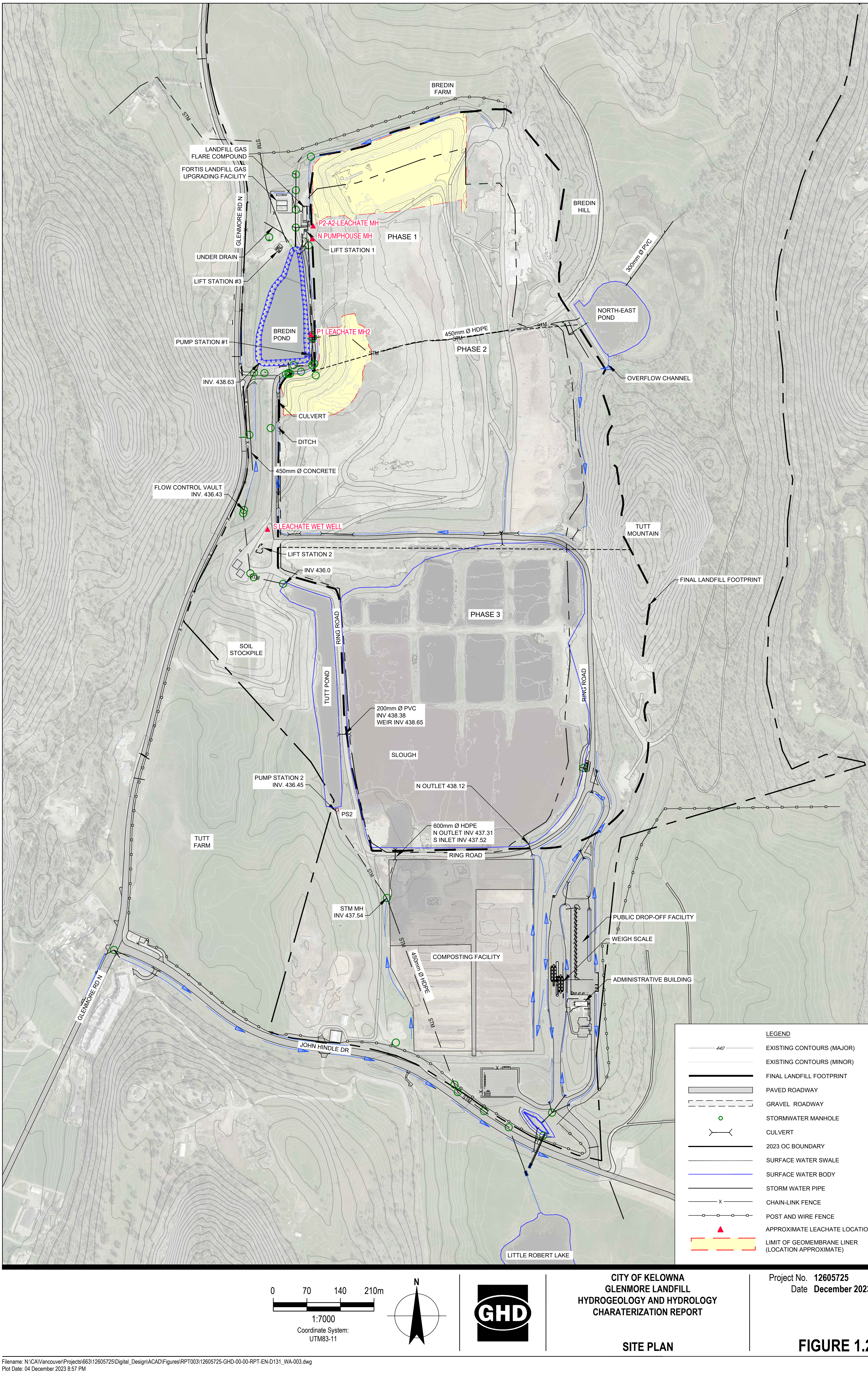
Print date: 13 Oct 2023 - 13:05

Data source: ESRI Topographic Basemap, Accessed 2023; ESRI Data & Maps 2008 Data Distribution Application (DDA); GHD.



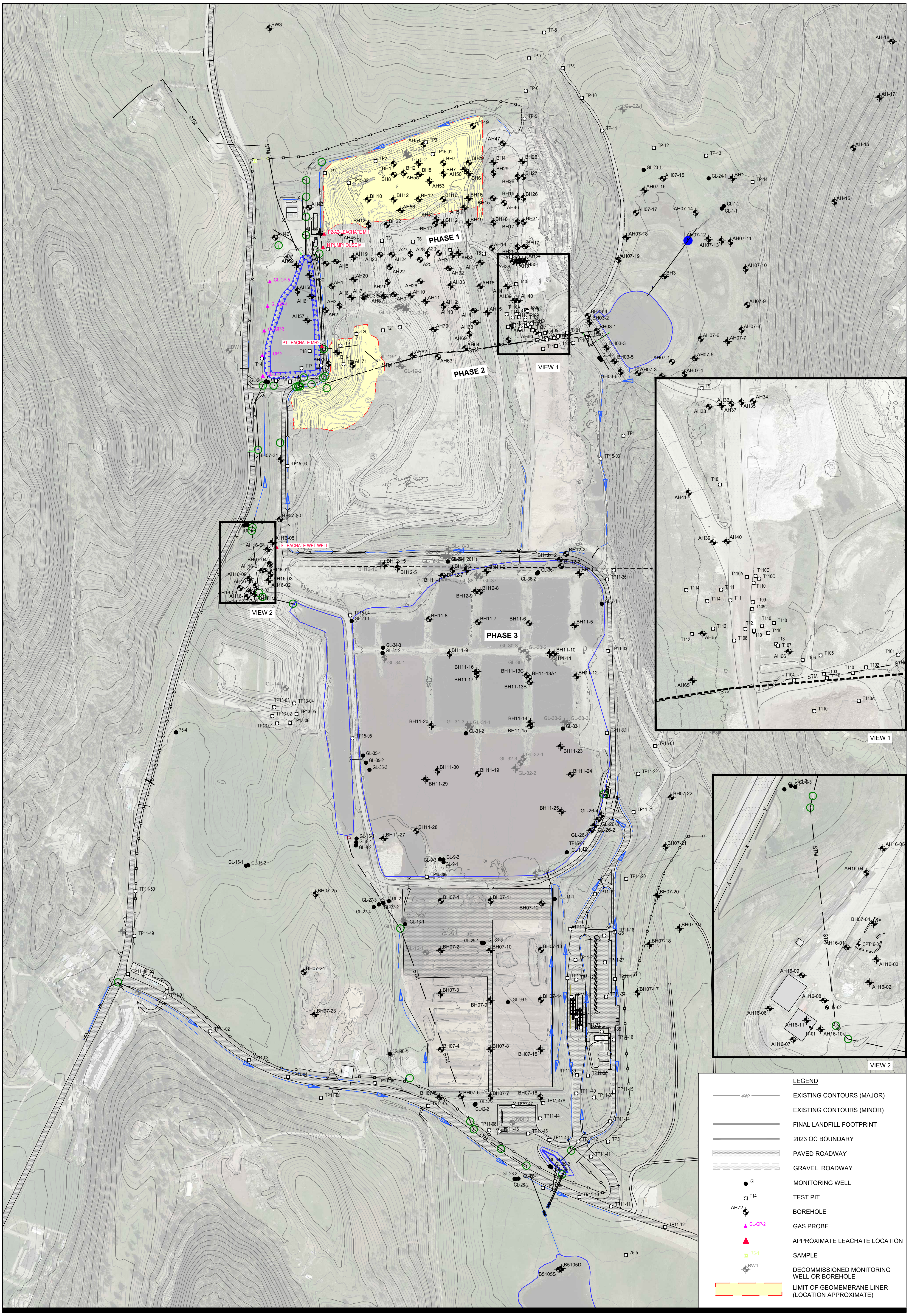
CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY
CHARATERIZATION REPORT

SITE PLAN

Project No. 12605725
Date December 2023

FIGURE 1.2

Filename: N:\CA\Vancouver\Projects\663\12605725\Digital_Design\ACAD\Figures\RPT003\12605725-GHD-00-00-RPT-EN-D131_WA-003.dwg
Plot Date: 04 December 2023 8:57 PM



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Coordinate System: UTM83-11

N

GHD

CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY CHARATERIZATION REPORT

INVESTIGATIVE LOCATIONS

Project No. **12605725**
Date **December 2023**

FIGURE 1.3

Filename: N:\CA\Vancouver\Projects\663\12605725\Digital_Design\ACAD\Figures\RPT003\12605725-GHD-00-00-RPT-EN-D132_WA-003.dwg
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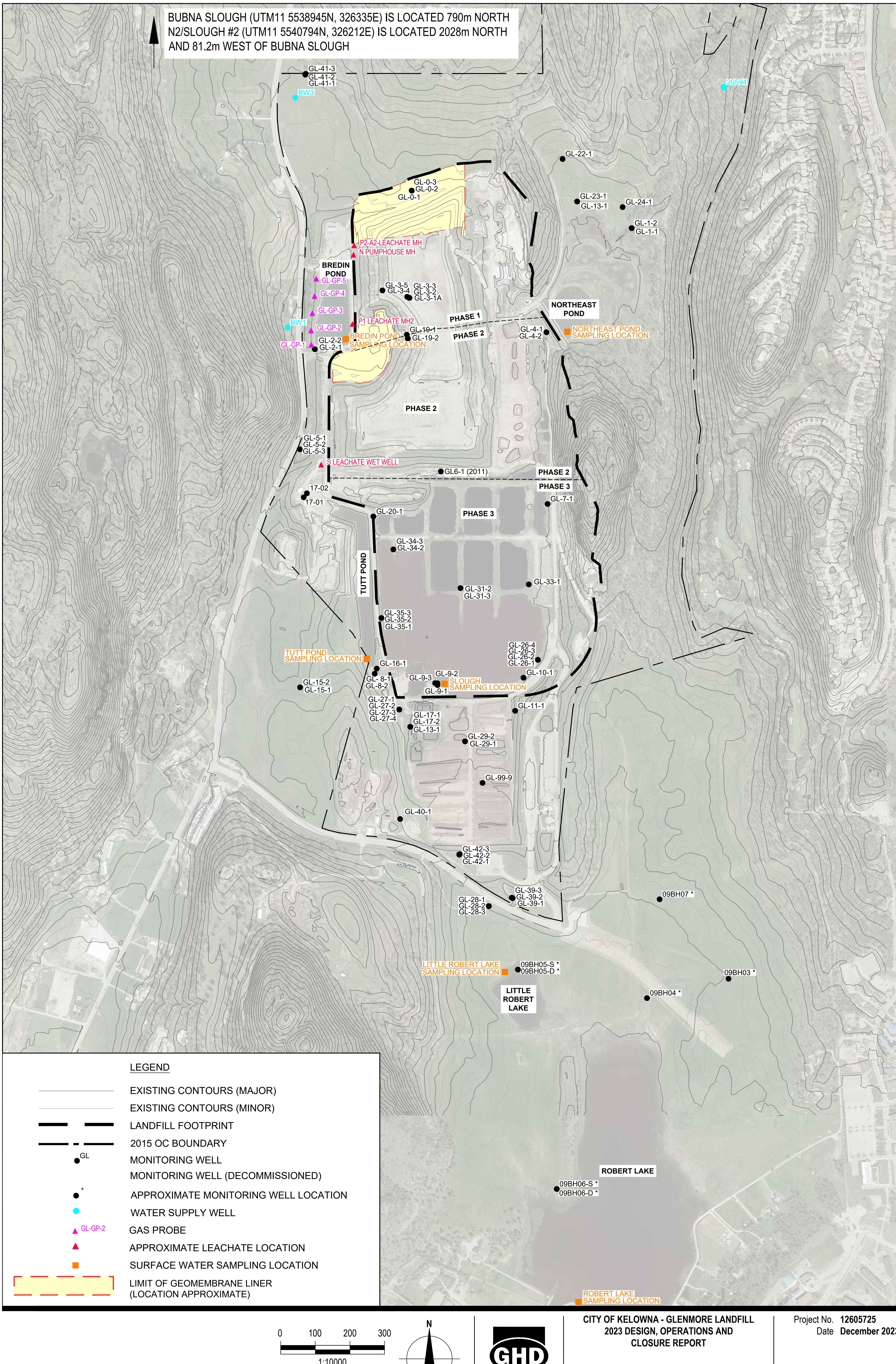

GHD

CITY OF KELOWNA - GLENMORE LANDFILL
2023 DESIGN, OPERATIONS AND
CLOSURE REPORT

MONITORING NETWORK

Project No. 12605725
Date December 2023

FIGURE 1.4

Filename: N:\CA\Vancouver\Projects\663\12605725\Digital_Design\ACAD\Figures\RPT003\12605725-GHD-00-00-RPT-EN-D133_WA-003.dwg
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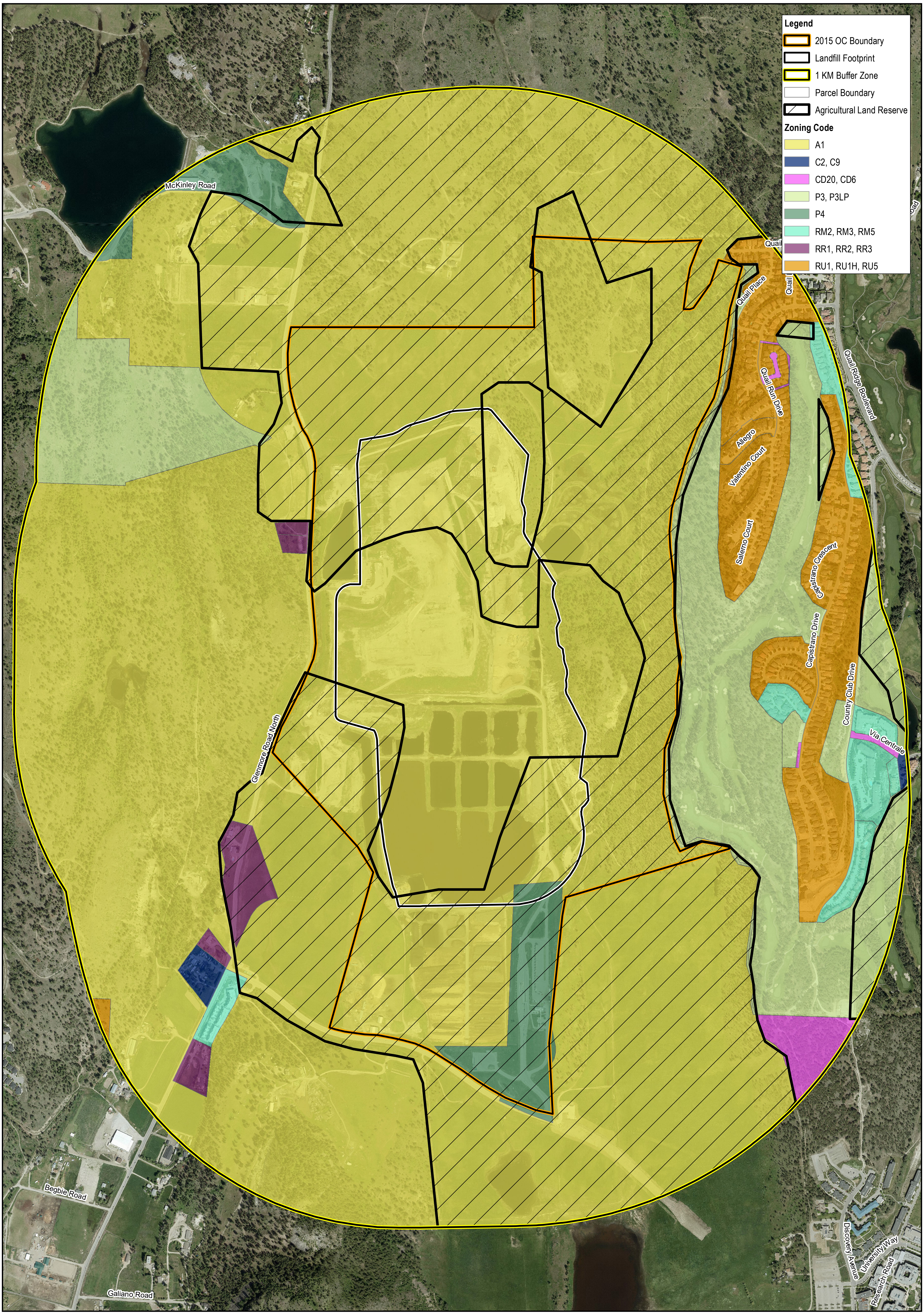

Paper Size ANSI B

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Meters

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 11N

N

GHD

CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY
CHARACTERIZATION REPORT

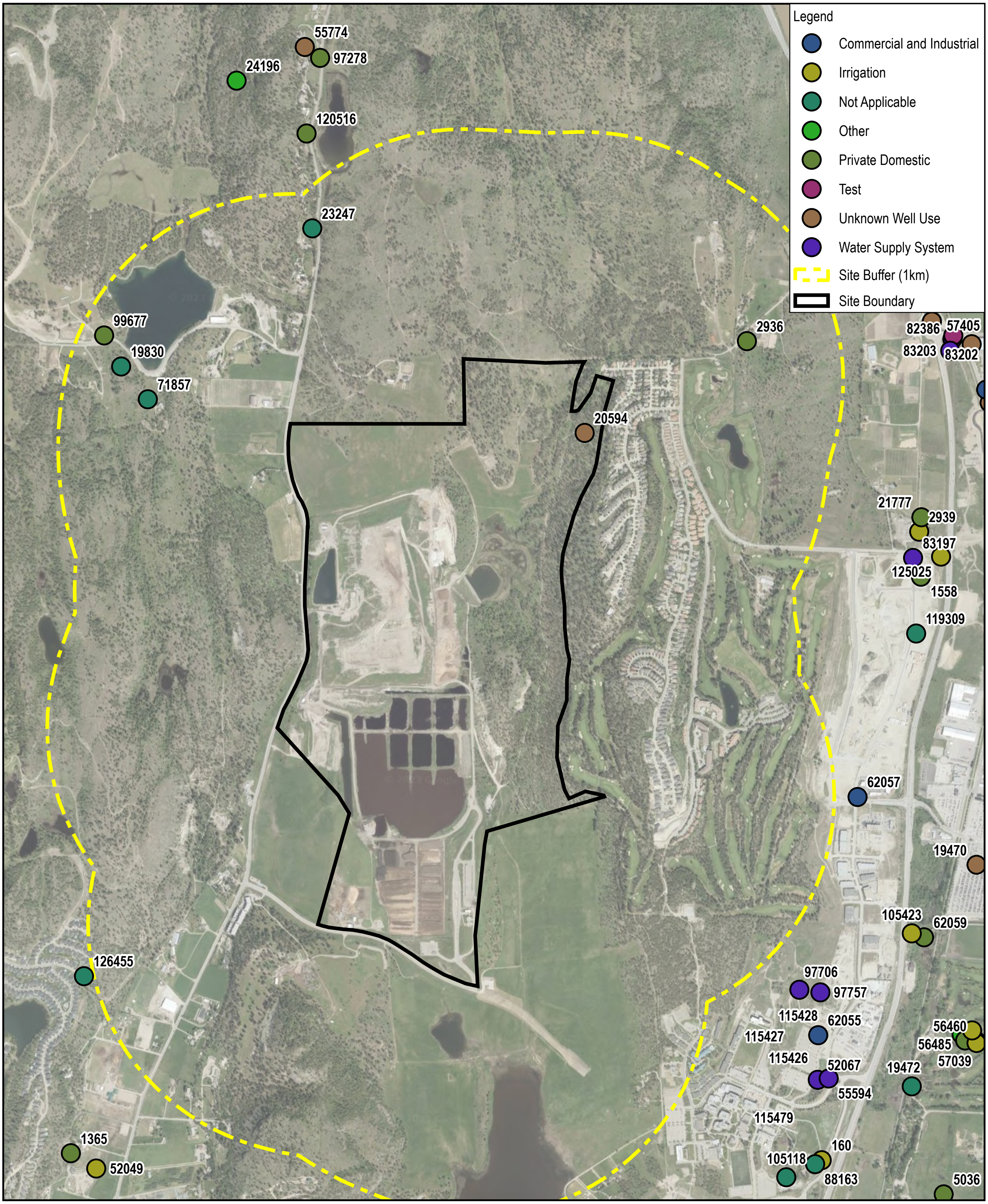
Project No. 12605725
Revision No. -
Date Oct 13, 2023

ZONING AND LAND USE

FIGURE 2.1

Q:\GIS\PROJECTS\12605000s\12605725\GIS\Maps\Deliverables\092023_PRE003\12605725_002_PRE003_ZoningandLandUse.mxd
Print date: 13 Oct 2023 - 13:09

Data source: City of Kelowna open data download, accessed 2018. Aerial: City of Kelowna Orthophotos, May 21, 2017



Paper Size ANSI A

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 11N

N

GHD

CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY
CHARACTERIZATION REPORT

SITE HYDROLOGY AND DRAINAGE

Project No. 12605725
Revision No. -
Date Oct 13, 2023

FIGURE 2.2

Q:
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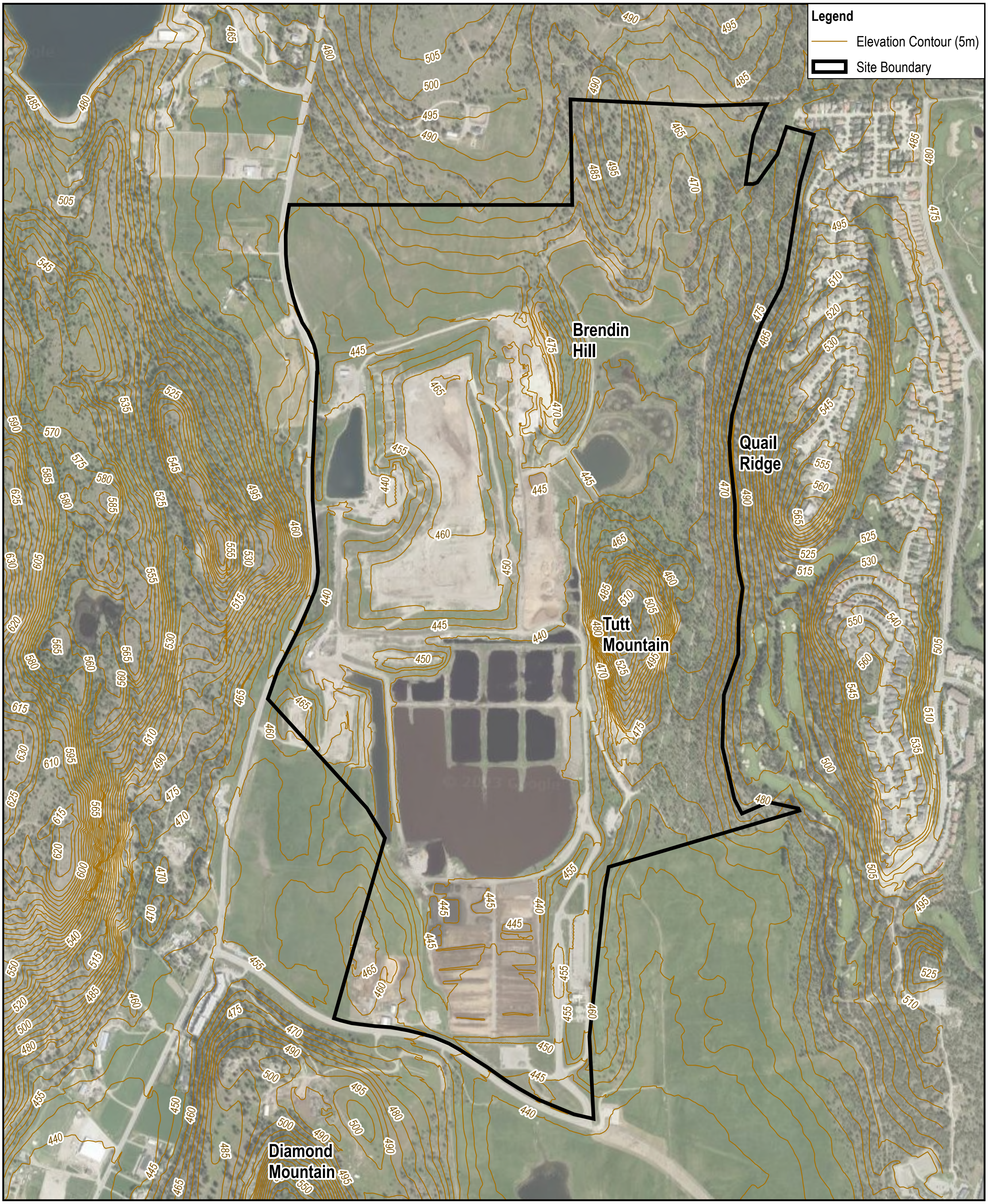
Print date: 13 Oct 2023 - 13:31

Data source: ESRI Topographic Basemap, Accessed 2023; ESRI Data & Maps 2008 Data Distribution Application (DDA); GHD. Elevation sourced from GHD Existing Conditions Figure C-4 dated 10/25/2018.



Paper Size ANSI A

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 11N

N

GHD

CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY
CHARACTERIZATION REPORT

SITE TOPOGRAPHY

Project No. 12605725
Revision No. -
Date Nov 1, 2023

FIGURE 3.1

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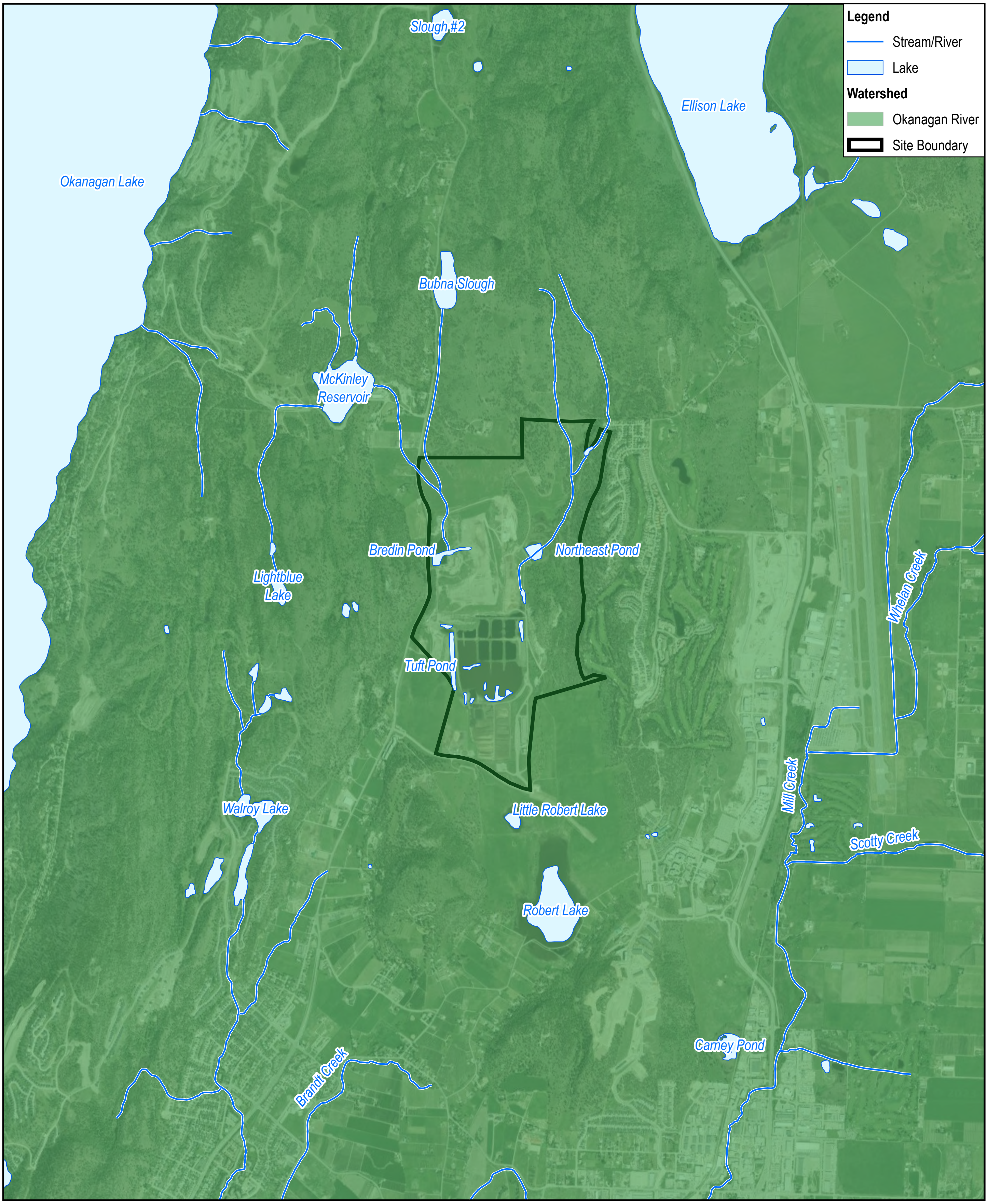

Paper Size ANSI A
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Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 11N

N

GHD

CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY CHARACTERIZATION REPORT

REGIONAL HYDROLOGY AND DRAINAGE

Project No. 12605725
Revision No. -
Date Oct 13, 2023

FIGURE 3.2

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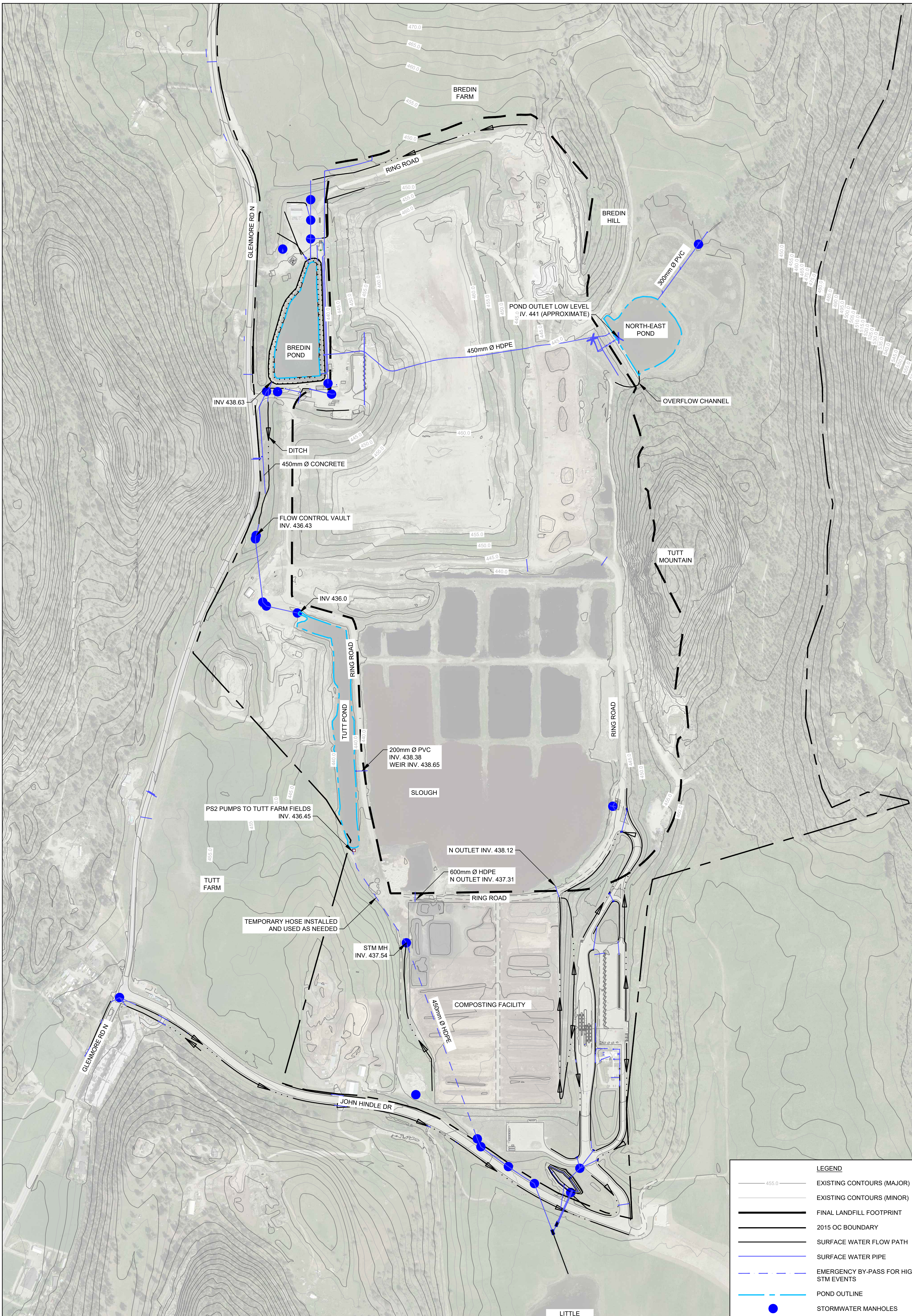

0 70 140 210m

1:7000

Coordinate System:

N

GHD

CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY
CHARATERIZATION REPORT

EXISTING CONDITIONS SURFACE WATER WORKS

Project No. 12605725
Date December 2023

FIGURE 3.3

Filename: N:\CA\Vancouver\Projects\663\12605725\Digital_Design\ACAD\Figures\RPT003\12605725-GHD-00-00-RPT-EN-D134_WA-003.dwg
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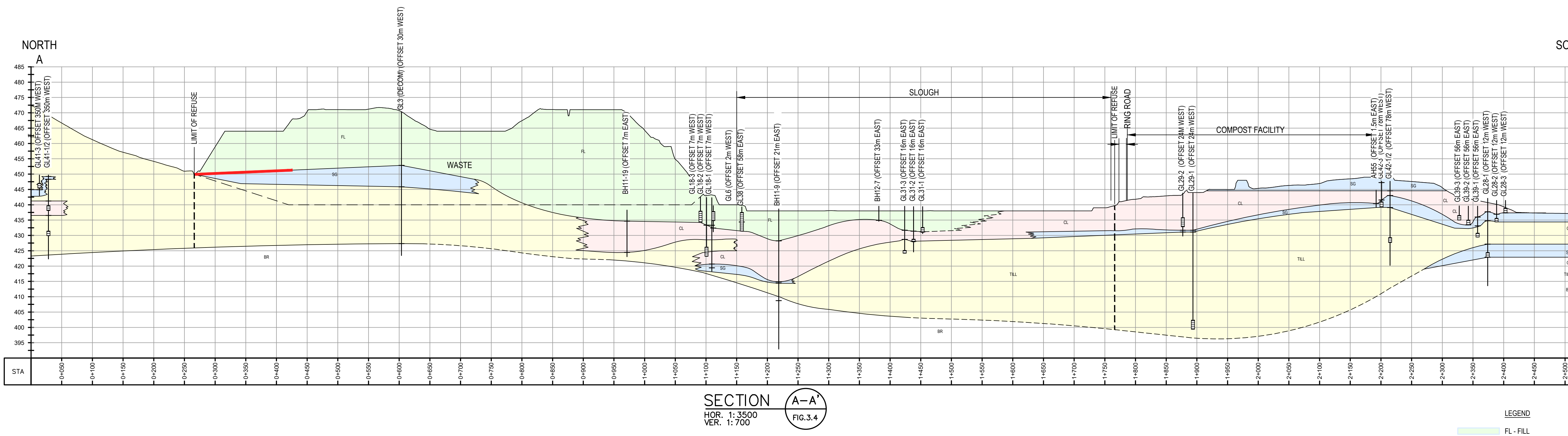

LEGEND

- FL - FILL
- CL - CLAY
- SG - SAND & GRAVEL
- TL - TILL
- SD - SAND
- BR - BEDROCK
- EXTENT OF GEOMEMBRANE LINER

NOTE:
* BOREHOLE STRATIGRAPHY NOT USED IN CROSS-SECTION

0 35 70 105 140 175 210m

GHD

CITY OF KELOWNA - GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY CHARACTERIZATION REPORT

Project No. 12605725
Date December 2023

SECTION A-A'

FIGURE 3.4A

Filename: N:\CA\Vancouver\Projects\663\12605725\Digital_Design\ACAD\Figures\RPT003\12605725-GHD-00-00-RPT-EN-D103_WA-003.dwg
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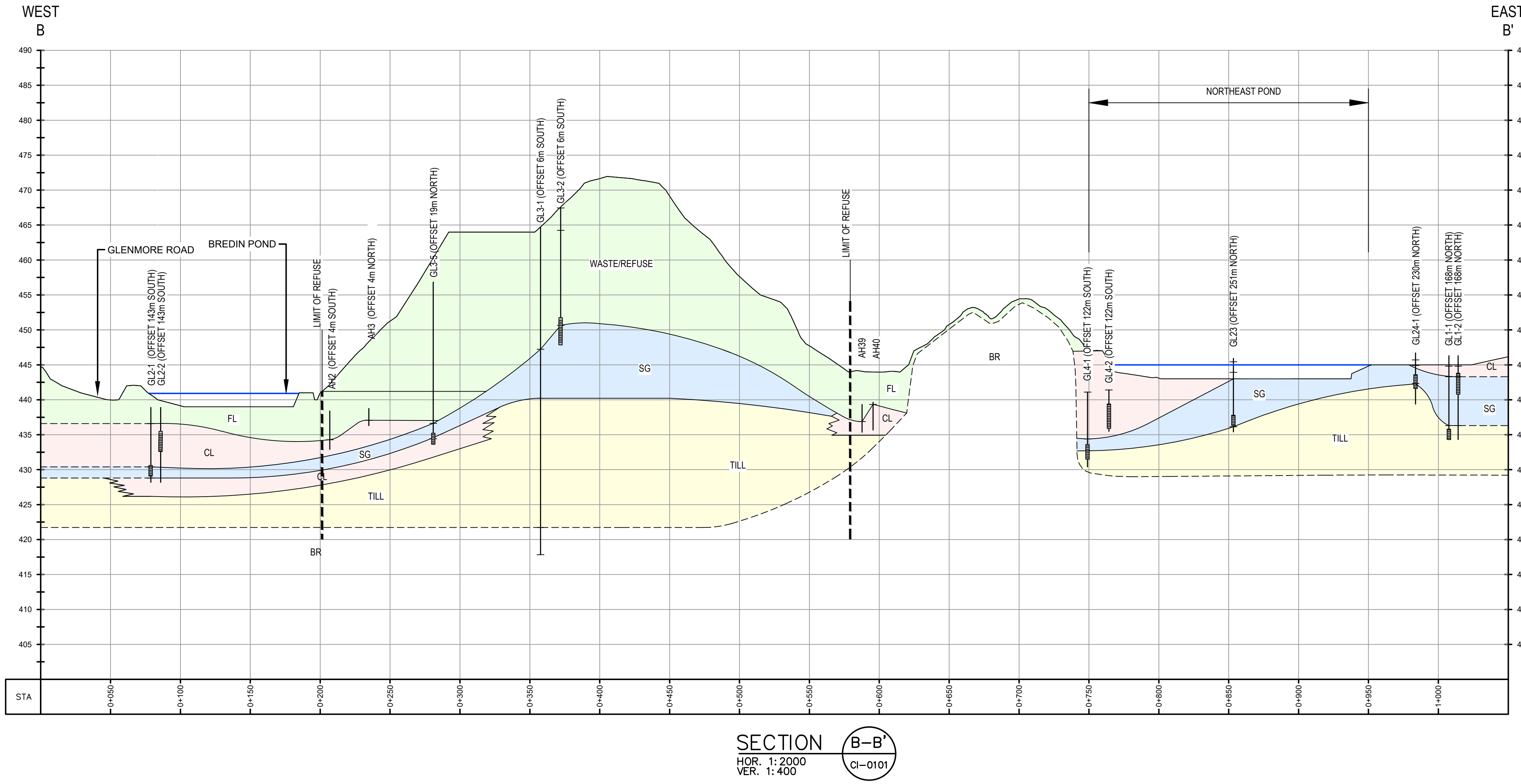


LEGEND

FL - FILL
CL - CLAY
SG - SAND & GRAVEL
TL - TILL
SD - SAND
BR - BEDROCK

NOTE:
* BOREHOLE STRATIGRAPHY NOT USED IN CROSS-SECTION

0 20 40 60 80 100 120m

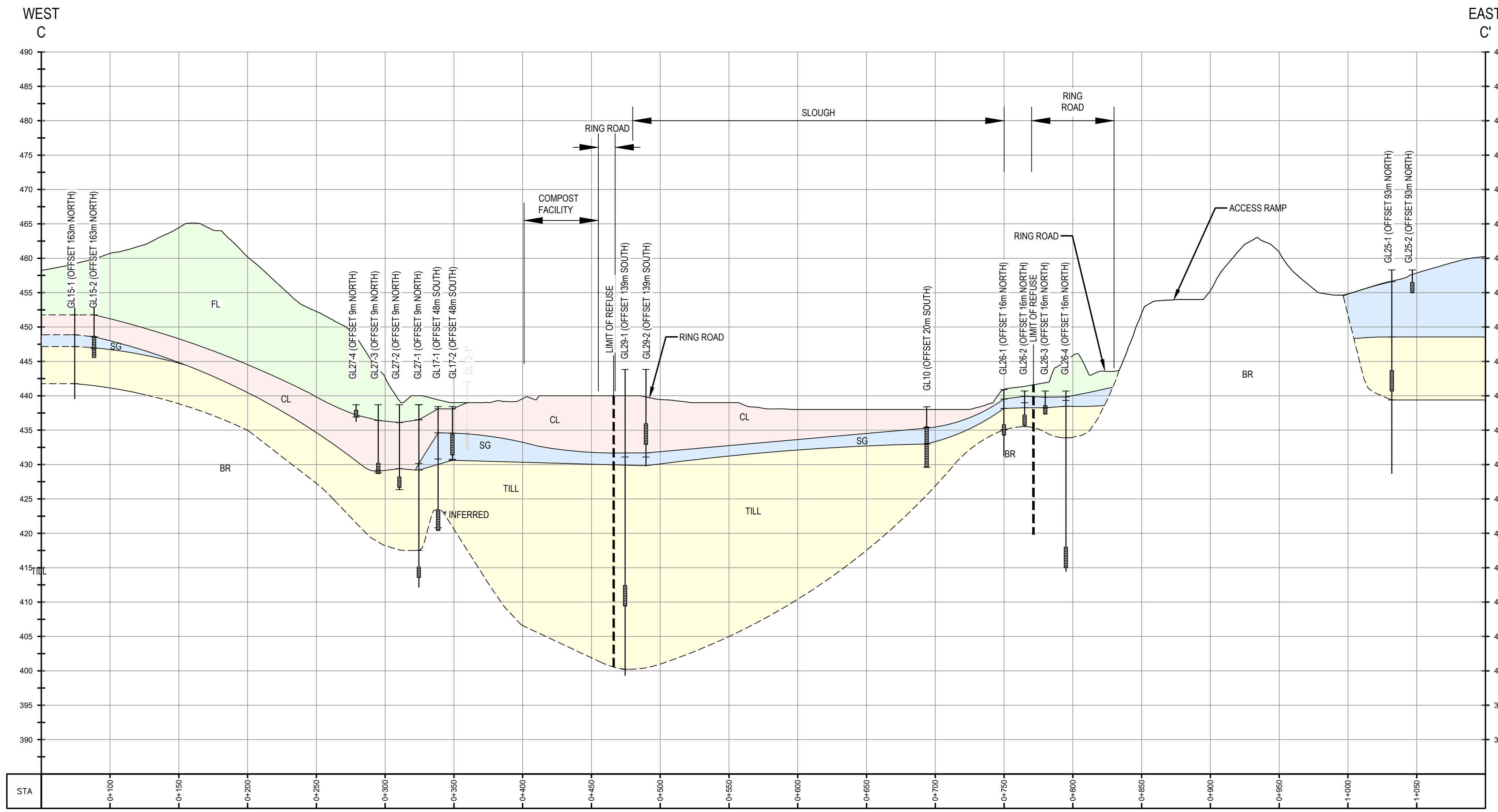
CITY OF KELOWNA - GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY
CHARACTERIZATION REPORT

Project No. 12605725
Date December 2023

SECTION B-B'

FIGURE 3.4B

Filename: N:\CA\Vancouver\Projects\663\12605725\Digital_Design\ACAD\Figures\RPT003\12605725-GHD-00-00-RPT-EN-D103_WA-003.dwg
Plot Date: 04 December 2023 10:41 PM



SECTION C–C'
HOR. 1: 2000
VER. 1: 400
CI–0101

LEGEND

- FL - FILL
- CL - CLAY
- SG - SAND & GRAVEL
- TL - TILL
- SD - SAND
- BR - BEDROCK

NOTE:
* BOREHOLE STRATIGRAPHY NOT USED IN CROSS-SECTION

0 20 40 60 80 100 120m

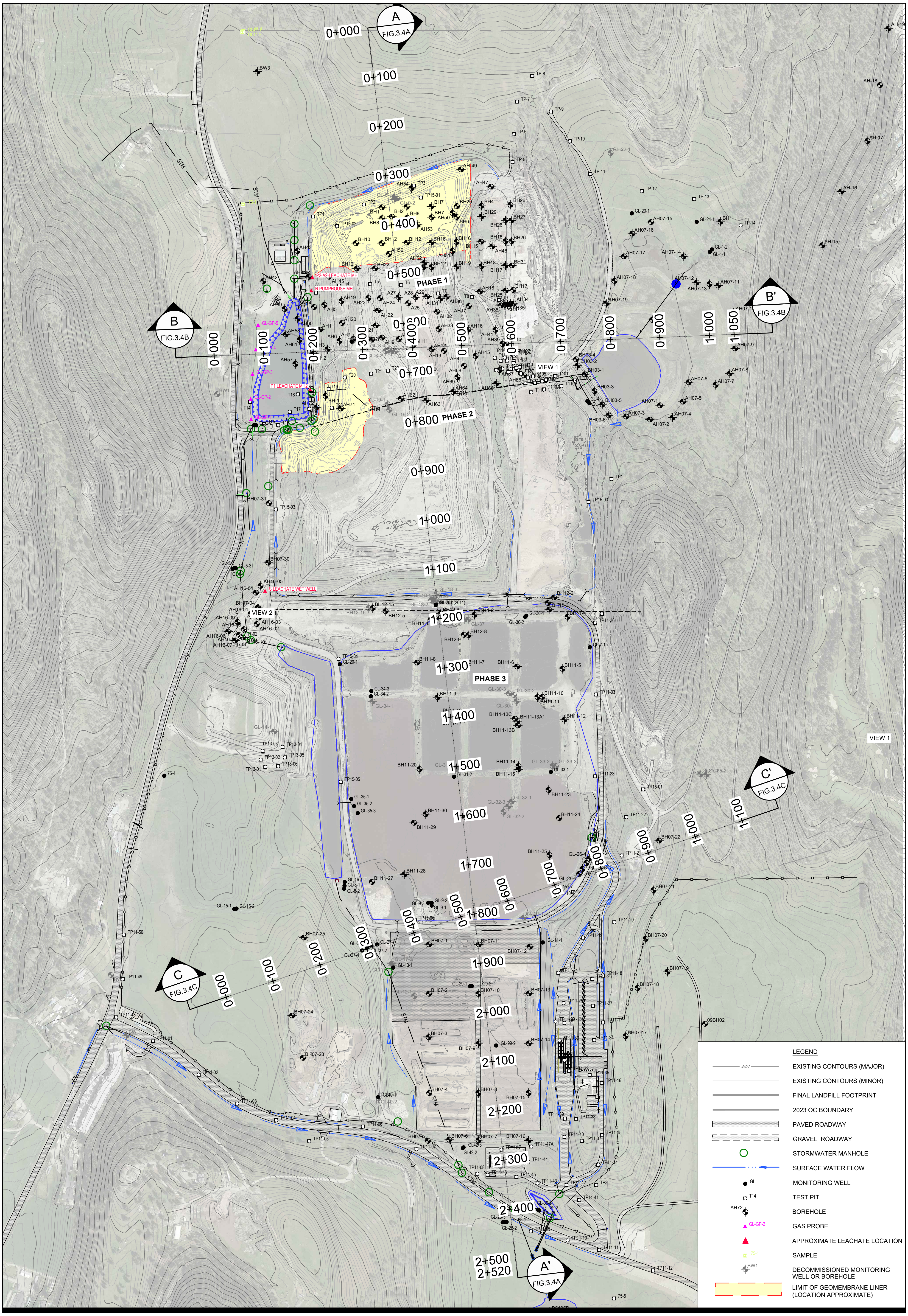
CITY OF KELOWNA - GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY CHARACTERIZATION REPORT

Project No. 12605725
Date December 2023

SECTION C-C'

FIGURE 3.4C

Filename: N:\CA\Vancouver\Projects\663\12605725\Digital_Design\ACAD\Figures\RPT003\12605725-GHD-00-00-RPT-EN-D103_WA-003.dwg
Plot Date: 04 December 2023 10:45 PM



0 70 140 210m

1:7000

Coordinate System: UTM83-11

N

GHD

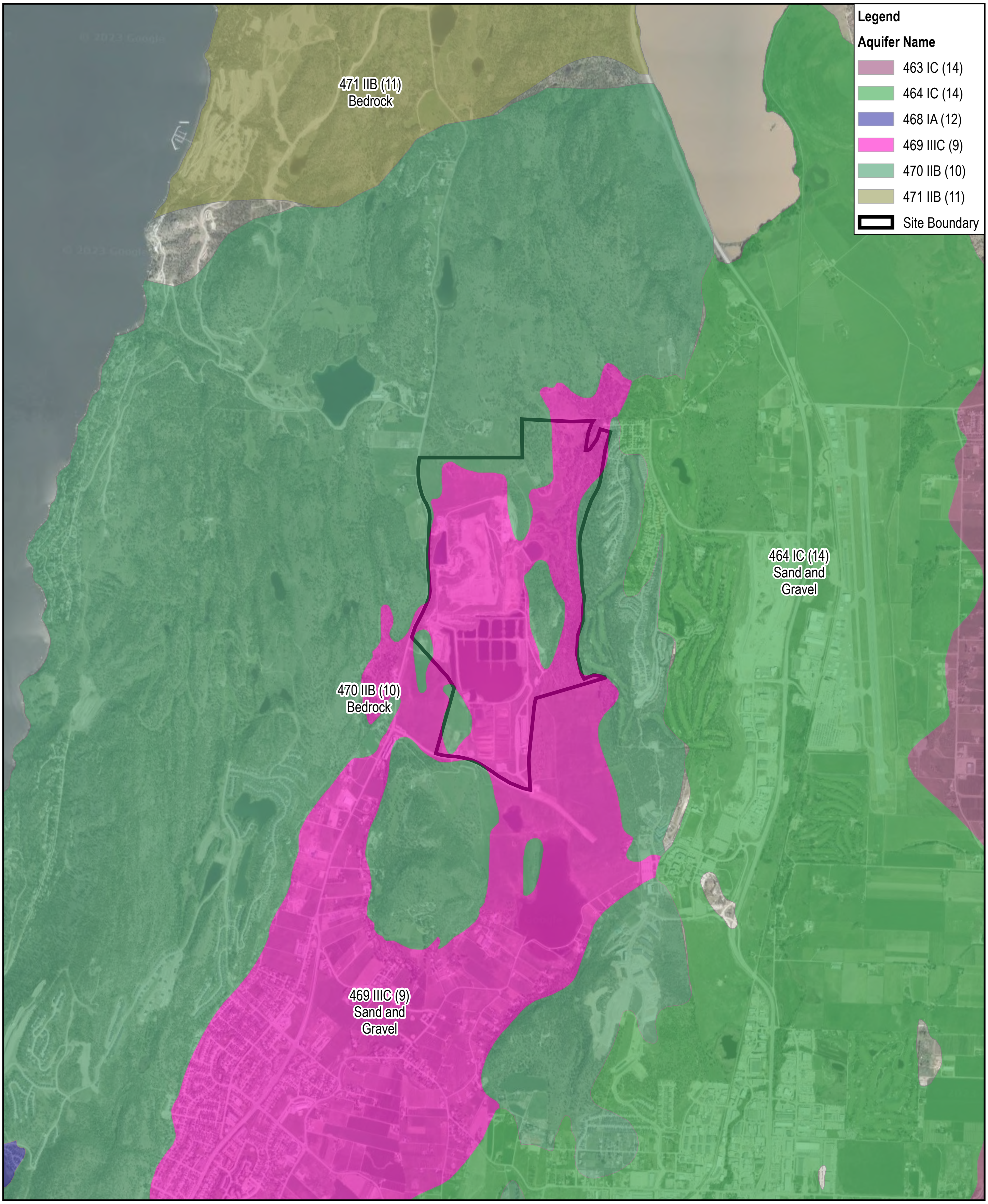
CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY
CHARATERIZATION REPORT

Project No. 12605725
Date December 2023

CROSS-SECTION MAP

FIGURE 3.4

Filename: N:\CA\Vancouver\Projects\663\12605725\Digital_Design\ACAD\Figures\RPT003\12605725-GHD-00-00-RPT-EN-D135_WA-003.dwg
Plot Date: 04 December 2023 10:37 PM



Paper Size ANSI A

0 250 500 750 1,000

Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 11N

N

GHD

CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY
CHARACTERIZATION REPORT

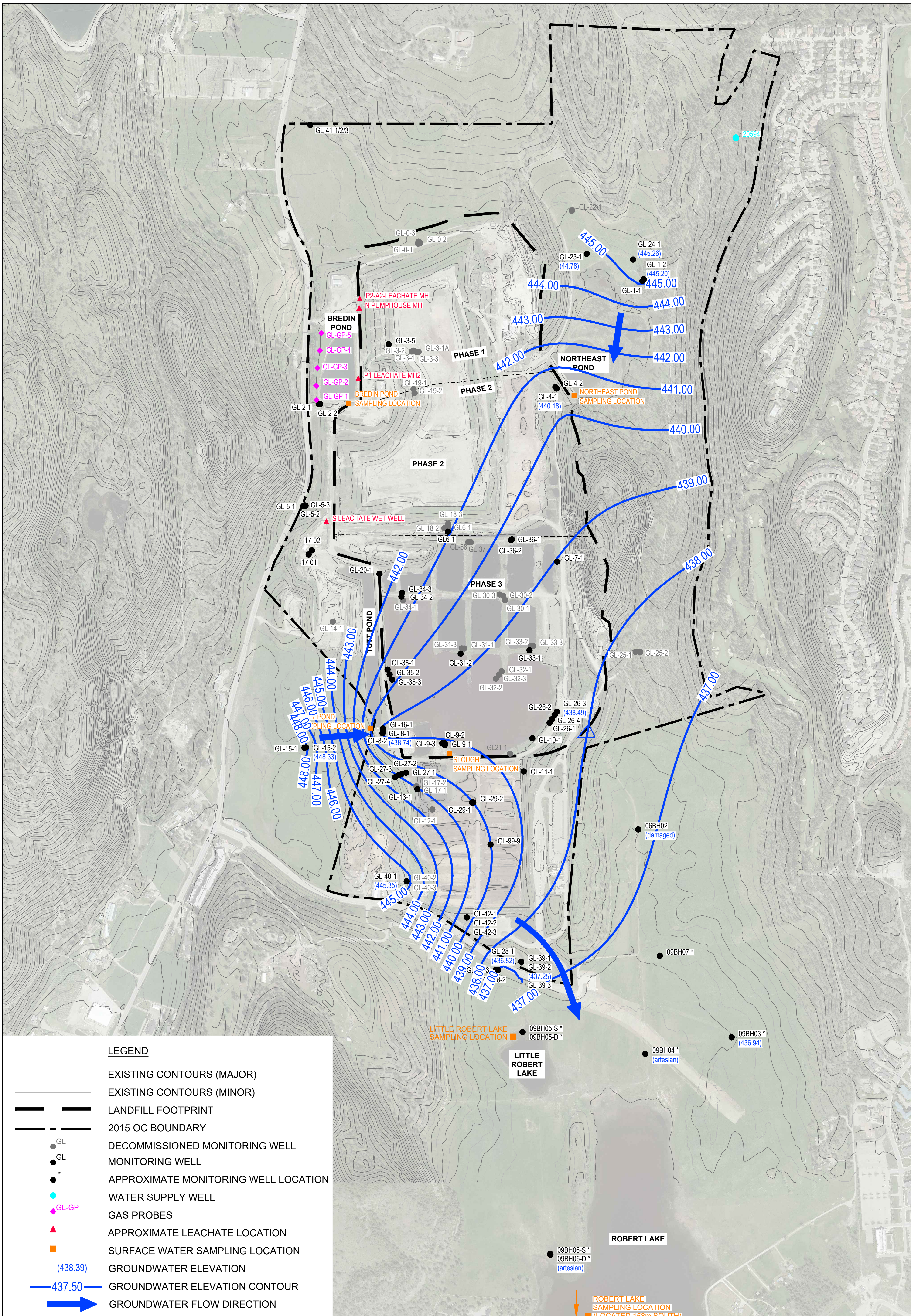
Project No. 12605725
Revision No. -
Date Oct 13, 2023

REGIONAL AQUIFER MAP

FIGURE 3.5

Q:
\GIS\PROJECTS\12605000s\12605725\GIS\Maps\Deliverables\SiteCharacterizationReport\SiteCharacterizationReport\SiteCharacterizationRepo
Print date: 13 Oct 2023 - 13:35

Data source: ESRI Topographic Basemap, Accessed 2023; ESRI Data & Maps 2008 Data Distribution Application (DDA); GHD. Elevation sourced from GHD Existing Conditions Figure C-4 dated 10/25/2018.



0 100 200 300

1:10000

N

GHD

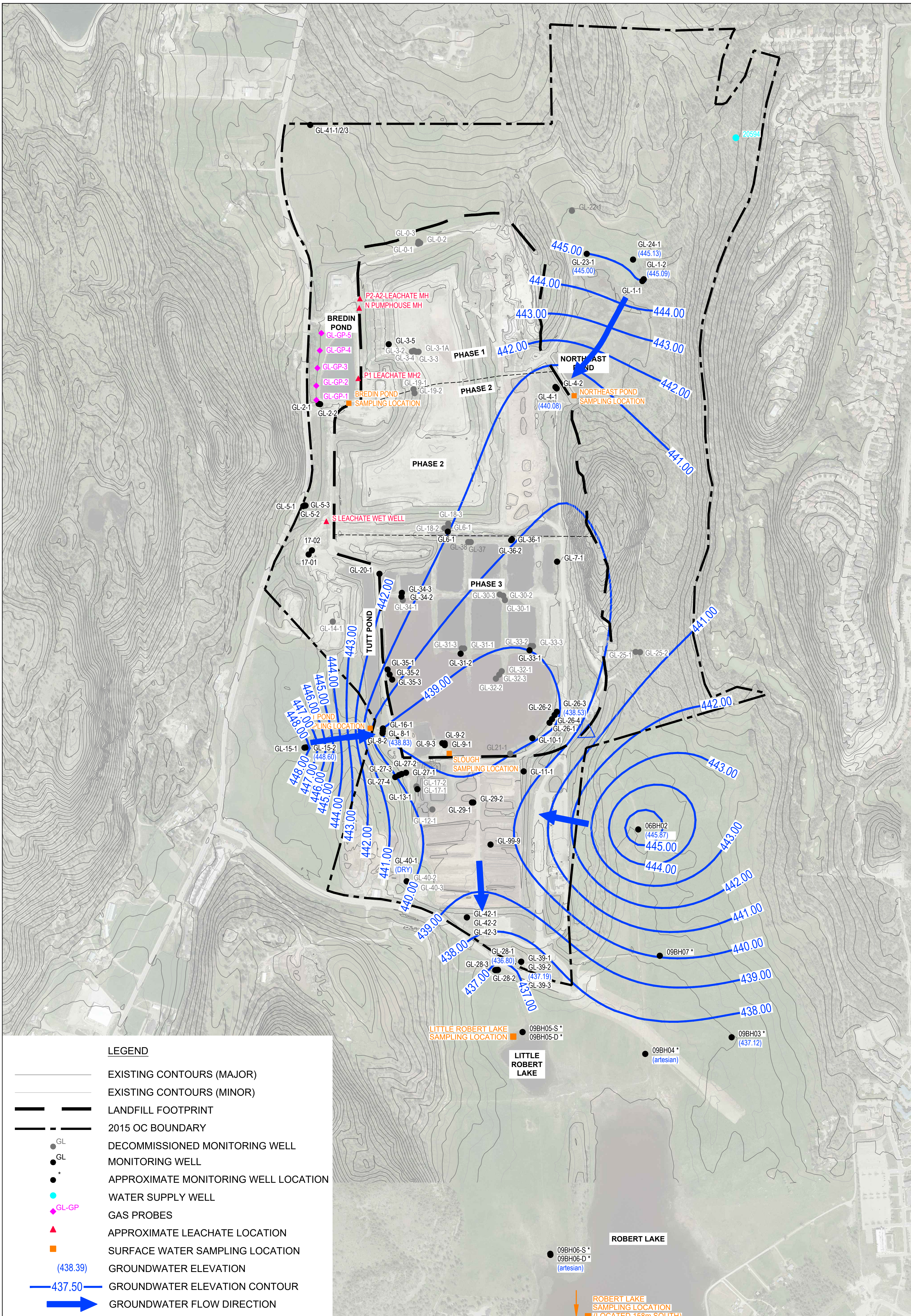
CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY CHARACTERIZATION REPORT

SAND AND GRAVEL UNIT GROUNDWATER ELEVATION CONTOURS (MARCH 2022)

Project No. 12605725
Date December 2023

FIGURE 3.6A

Filename: N:\CA\Vancouver\Projects\663\12605725\Digital_Design\ACAD\Figures\RPT003\12605725-GHD-00-00-RPT-EN-D104_WA-003.dwg
Plot Date: 04 December 2023 10:52 PM



LEGEND

EXISTING CONTOURS (MAJOR)
EXISTING CONTOURS (MINOR)
LANDFILL FOOTPRINT
2015 OC BOUNDARY
GL DECOMMISSIONED MONITORING WELL
GL MONITORING WELL
* APPROXIMATE MONITORING WELL LOCATION
WATER SUPPLY WELL
GL-GP GAS PROBES
APPROXIMATE LEACHATE LOCATION
SURFACE WATER SAMPLING LOCATION
(438.39) GROUNDWATER ELEVATION
437.50 GROUNDWATER ELEVATION CONTOUR
GROUNDWATER FLOW DIRECTION

0 100 200 300
1:10000

N

GHD

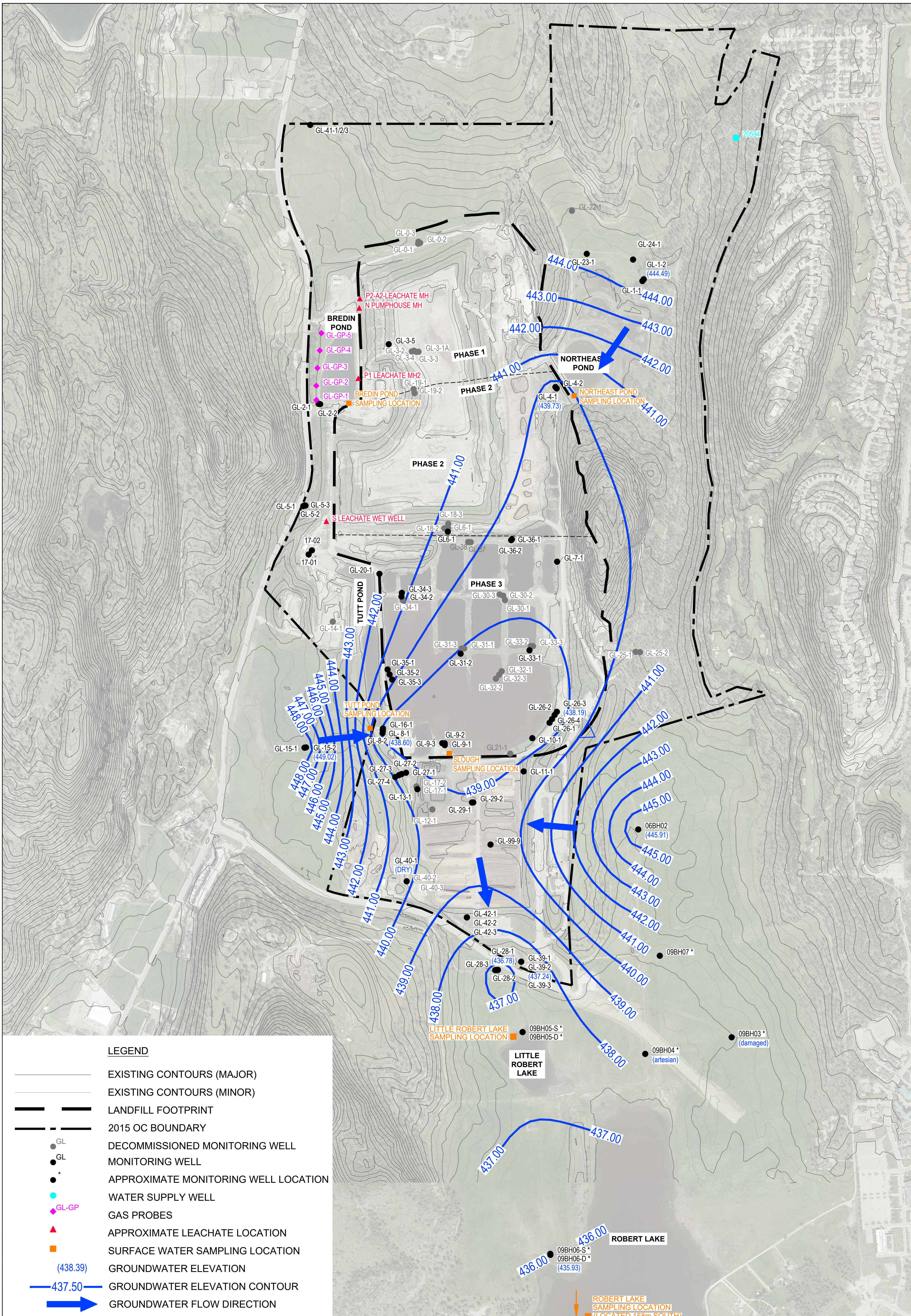
CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY CHARACTERIZATION REPORT

SAND AND GRAVEL UNIT GROUNDWATER ELEVATION CONTOURS (JUNE 2022)

Project No. 12605725
Date December 2023

FIGURE 3.6B

Filename: N:\CA\Vancouver\Projects\663\12605725\Digital_Design\ACAD\Figures\RPT003\12605725-GHD-00-00-RPT-EN-D105_WA-003.dwg
Plot Date: 04 December 2023 11:11 PM



0 100 200 300
1:10000

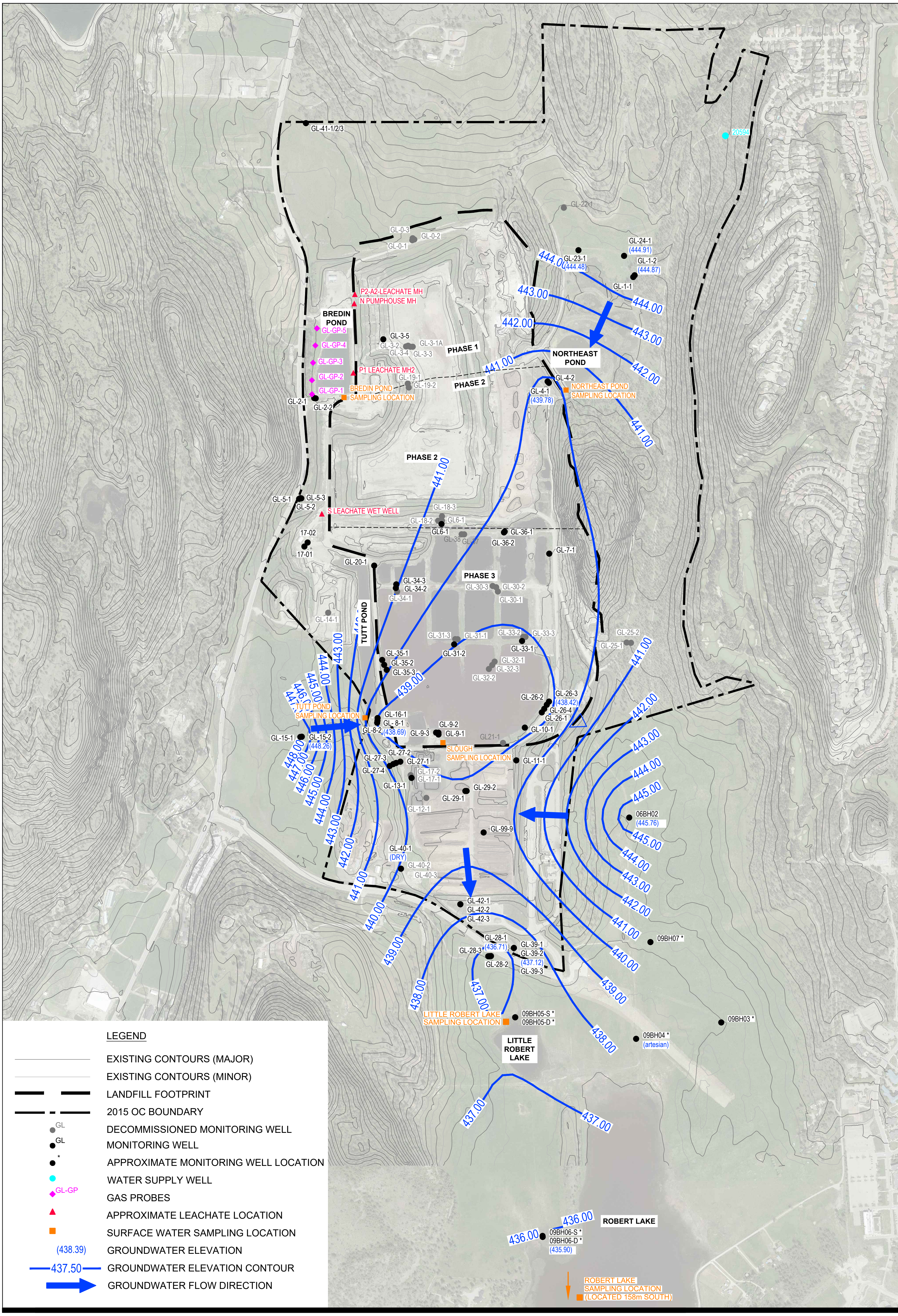
CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY CHARACTERIZATION REPORT

SAND AND GRAVEL UNIT GROUNDWATER ELEVATION CONTOURS (AUGUST 2022)

Project No. 12605725
Date December 2023

FIGURE 3.6C

Filename: N:\CA\Vancouver\Projects\663\12605725\Digital_Design\ACAD\Figures\RPT003\12605725-GHD-00-00-RPT-EN-D106_WA-003.dwg
Plot Date: 05 December 2023 1:17 AM



0 100 200 300

1:10000

N

GHD

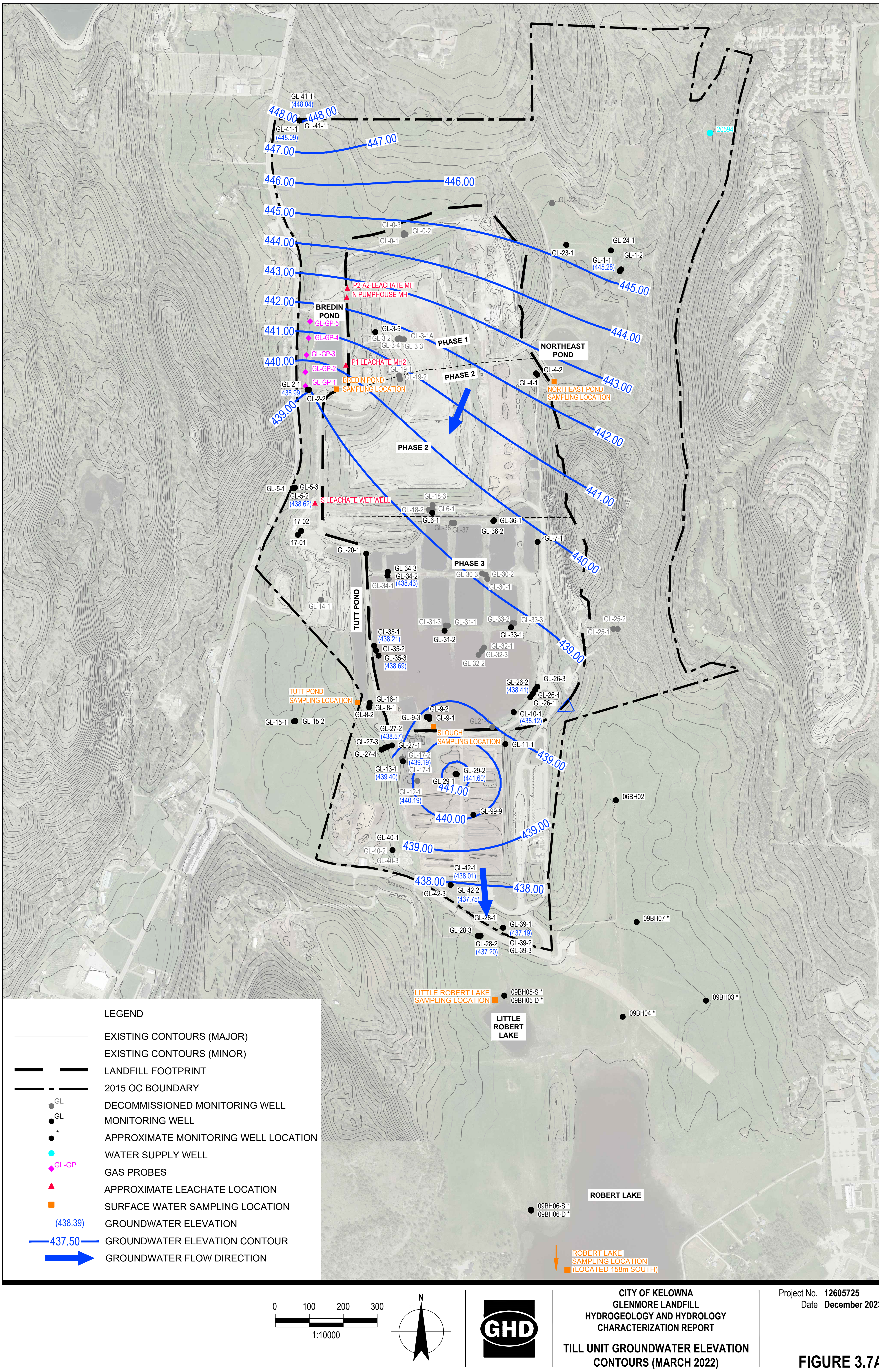
CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY CHARACTERIZATION REPORT

SAND AND GRAVEL UNIT GROUNDWATER ELEVATION CONTOURS (OCTOBER 2022)

Project No. 12605725
Date December 2023

FIGURE 3.6D

Filename: N:\CA\Vancouver\Projects\663\12605725\Digital_Design\ACAD\Figures\RPT003\12605725-GHD-00-00-RPT-EN-D107_WA-003.dwg
Plot Date: 05 December 2023 1:19 AM



GHD

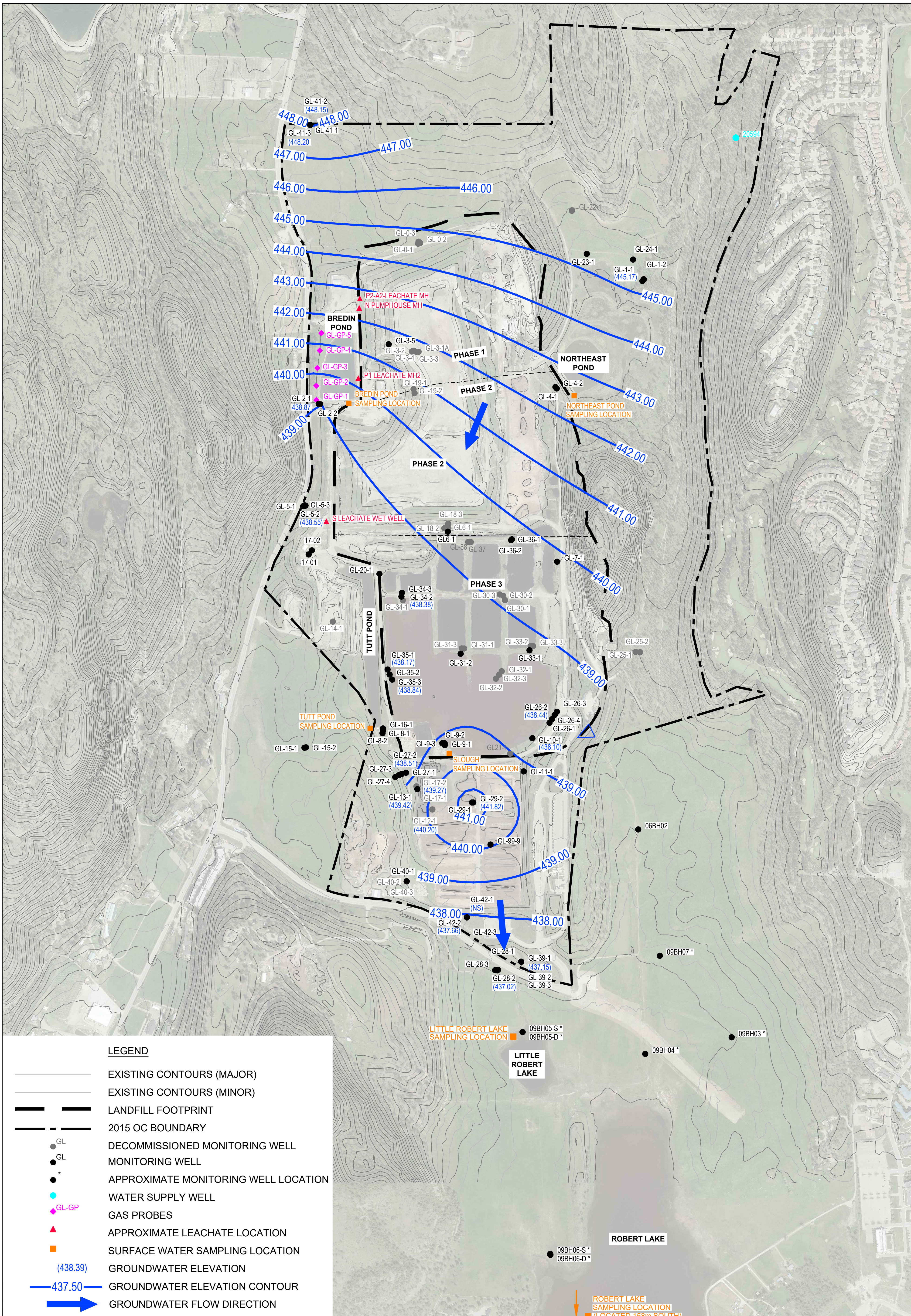
CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY
CHARACTERIZATION REPORT

TILL UNIT GROUNDWATER ELEVATION
CONTOURS (MARCH 2022)

Project No. 12605725
Date December 2023

FIGURE 3.7A

Filename: N:\CA\Vancouver\Projects\663\12605725\Digital_Design\ACAD\Figures\RPT003\12605725-GHD-00-00-RPT-EN-D108_WA-003.dwg
Plot Date: 05 December 2023 1:39 AM



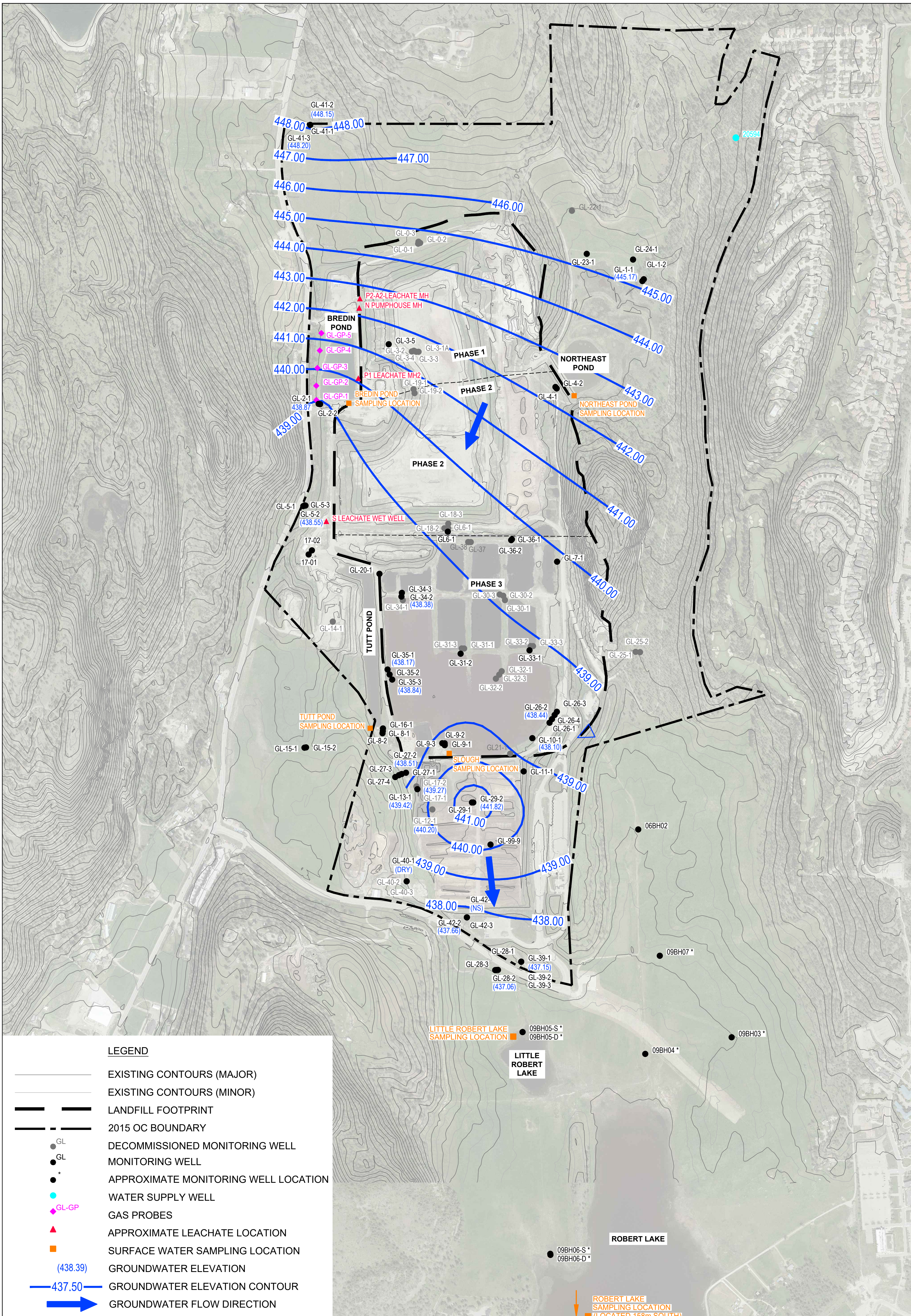
CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY CHARACTERIZATION REPORT

TILL UNIT GROUNDWATER ELEVATION CONTOURS (JUNE 2022)

Project No. 12605725
Date December 2023

FIGURE 3.7B

Filename: N:\CA\Vancouver\Projects\663\12605725\Digital_Design\ACAD\Figures\RPT003\12605725-GHD-00-00-RPT-EN-D109_WA-003.dwg
Plot Date: 05 December 2023 1:52 AM



0 100 200 300

1:10000

N

GHD

CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY CHARACTERIZATION REPORT

TILL UNIT GROUNDWATER ELEVATION CONTOURS (AUGUST 2022)

Project No. 12605725
Date December 2023

FIGURE 3.7C

Filename: N:\CA\Vancouver\Projects\663\12605725\Digital_Design\ACAD\Figures\RPT003\12605725-GHD-00-00-RPT-EN-D110_WA-003.dwg
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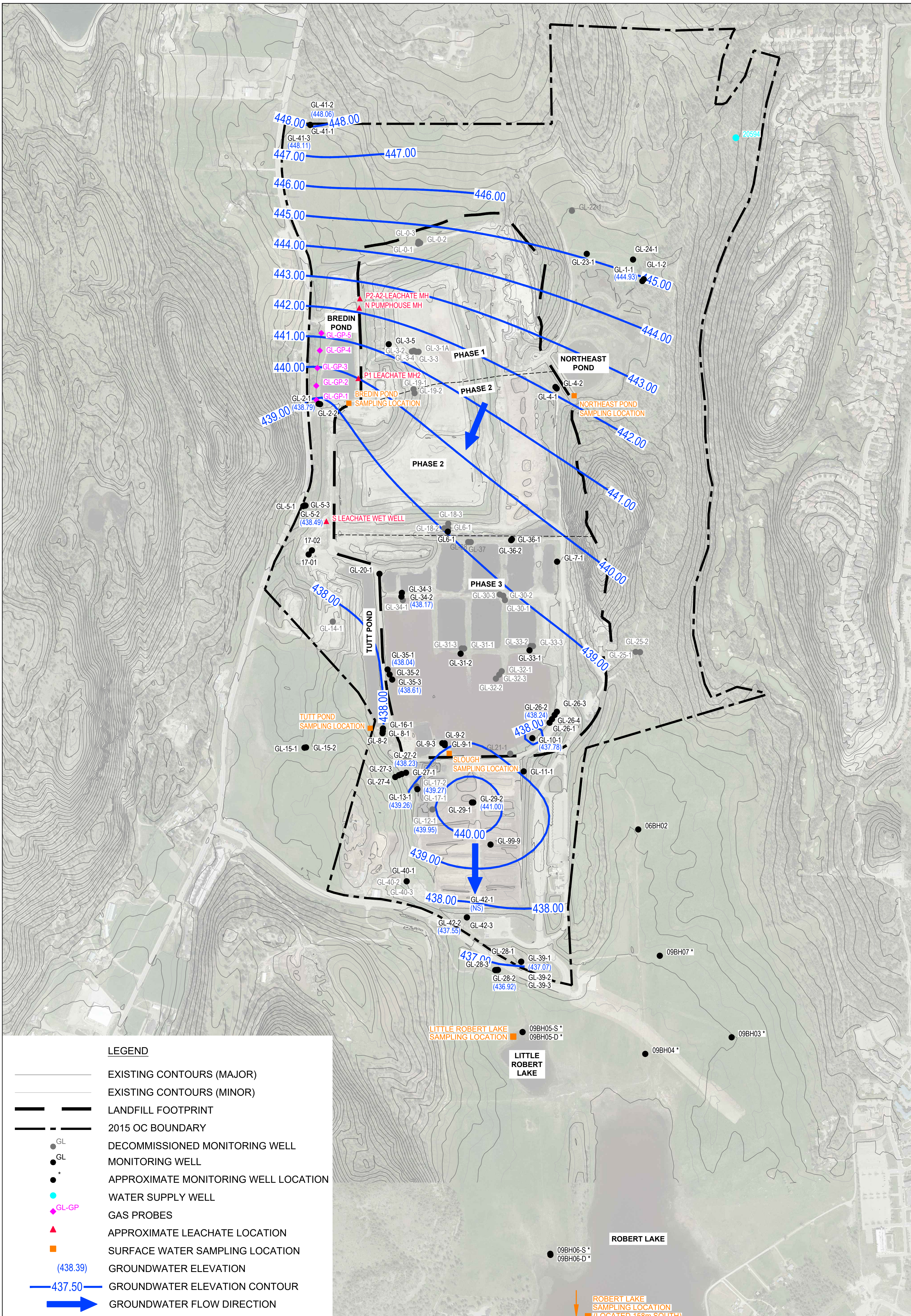


0 100 200 300

1:10000

N

GHD

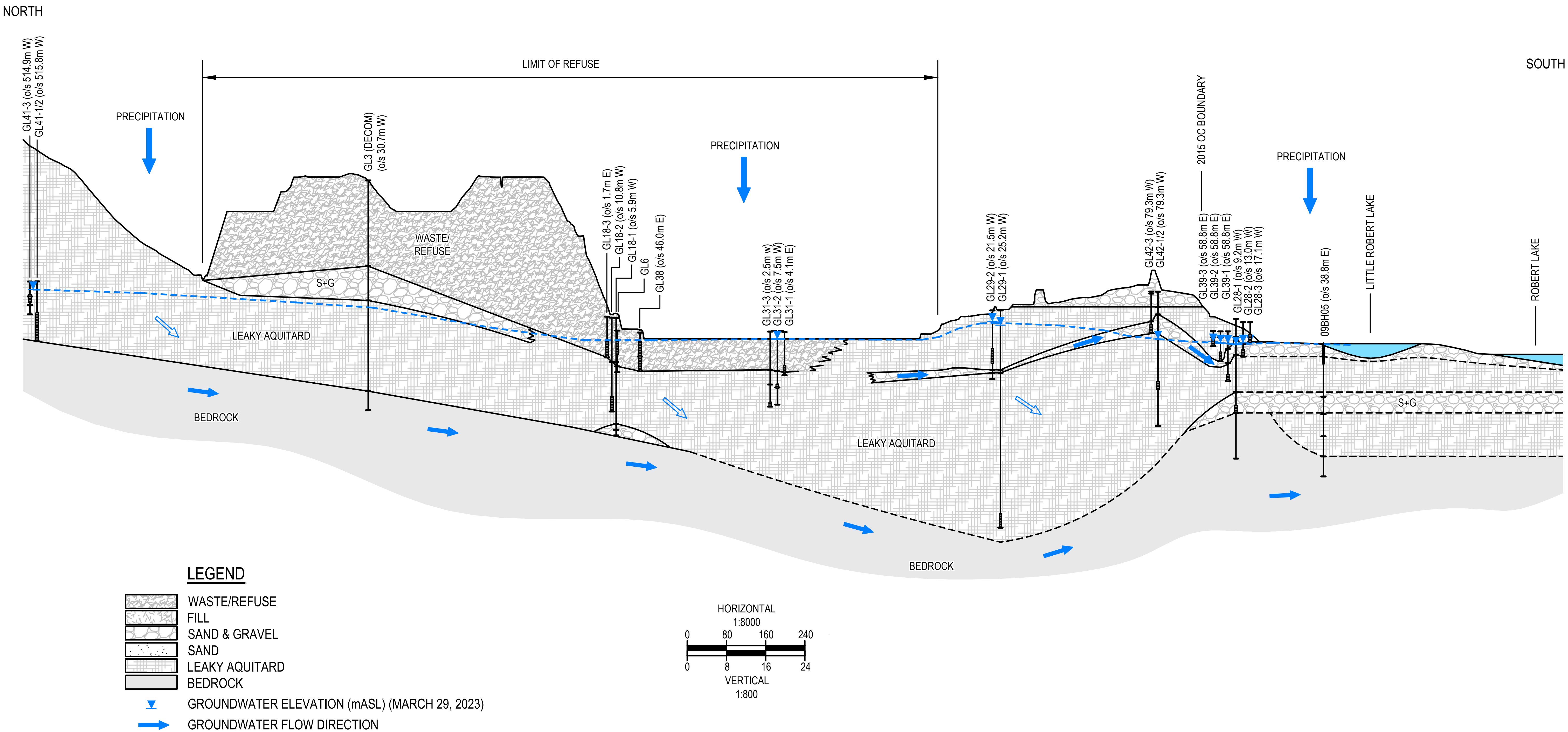
CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY
CHARACTERIZATION REPORT

TILL UNIT GROUNDWATER ELEVATION CONTOURS (OCTOBER 2022)

Project No. **12605725**
Date **December 2023**

FIGURE 3.7D

Filename: N:\CA\Vancouver\Projects\663\12605725\Digital_Design\ACAD\Figures\RPT003\12605725-GHD-00-00-RPT-EN-D111_WA-003.dwg
Plot Date: 04 December 2023 11:32 PM



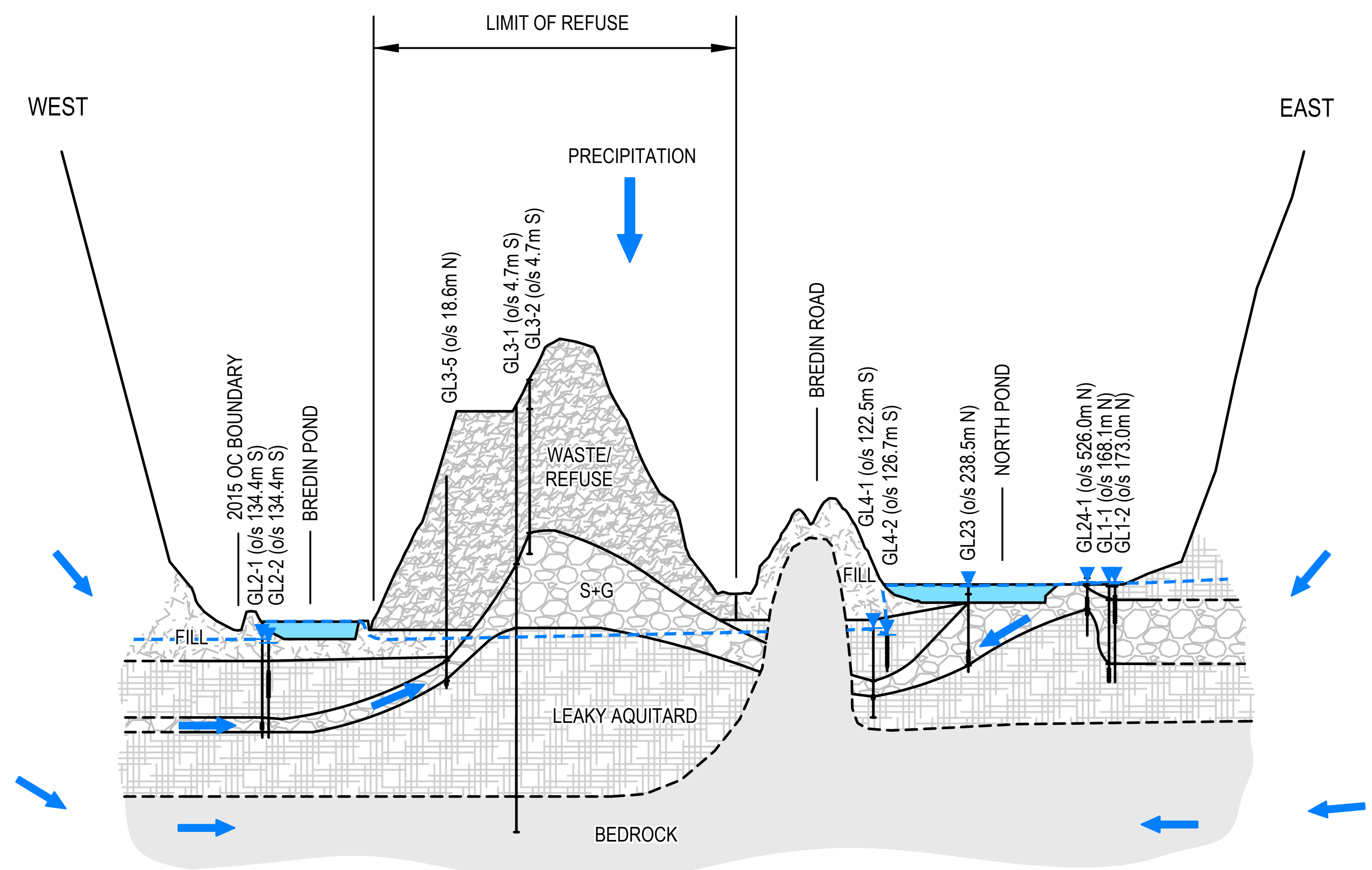
CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY CHARACTERIZATION REPORT

CONCEPTUAL FLOW MODEL - SCHEMATIC CROSS-SECTION NORTH - SOUTH

Project No. 12605725
Date November 2023

FIGURE 3.8

Filename: N:\CA\Vancouver\Projects\663\12605725\Digital_Design\ACAD\Figures\RPT003\12605725-GHD-00-00-RPT-EN-D130_WA-003.dwg
Plot Date: 29 November 2023 10:38 PM



LEGEND

- WASTE/REFUSE
- FILL
- SAND & GRAVEL
- SAND
- LEAKY AQUITARD
- BEDROCK
- GROUNDWATER ELEVATION (mASL) (MARCH 29, 2023)
- GROUNDWATER FLOW DIRECTION

HORIZONTAL 1:8000 — 0, 80, 160, 240

VERTICAL 1:800 — 0, 8, 16, 24

NOTE:
PRIMARY FLOW PATHWAY FOR THE WEST-EAST CROSS-SECTION IS TOWARDS THE READER.
ARROWS ILLUSTRATE SECONDARY FLOW PATHWAYS.

GHD

CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY CHARACTERIZATION REPORT

CONCEPTUAL FLOW MODEL - SCHEMATIC CROSS-SECTION WEST - EAST

Project No. **12605725**
Date **October 2023**

FIGURE 3.9

Filename: N:\CA\Vancouver\Projects\663\12605725\Digital_Design\ACAD\Figures\RPT003\12605725-GHD-00-00-RPT-EN-D130_WA-003.dwg
Plot Date: 19 October 2023 7:18 PM

Appendices

Appendix A

Operational Certificate

May 30, 2023

Tracking Number: 384004
Authorization Number: 12218

REGISTERED MAIL

CITY OF KELOWNA
City Hall
1435 Water Street
Kelowna BC V1Y 1J4

Dear Operational Certificate Holder:

Enclosed is Amended Operational Certificate 12218 issued under the provisions of the *Environmental Management Act*. Your attention is respectfully directed to the terms and conditions outlined in the operational certificate. An annual fee will be determined according to the Permit Fees Regulation.

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

Requirements may also be specified by the *Environmental Management Act* and regulations including, but not limited to, the Contaminated Sites Regulation, Environmental Data Quality Assurance Regulation, Hazardous Waste Regulation, Landfill Gas Management Regulation, Organic Matter Recycling Regulation, Ozone Depleting Substances and Other Halocarbons Regulation, Recycling Regulation, Spill Reporting Regulation, Storage of Recyclable Material Regulation, Waste Discharge Regulation and Codes of Practice.

When a spill occurs, or there is an imminent risk of one occurring, the responsible person must ensure that it is reported in accordance with the Spill Reporting Regulation. Additional information on spill reporting requirements is available at gov.bc.ca/reportaspill.

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

Ministry of Environment and Climate Change Strategy
Environmental Protection Division
1259 Dalhousie Dr.
Kamloops BC V2C 5Z5
Authorizations - South Region
Telephone: (250) 371-6200
Facsimile: (250) 828-4000

Administration of this operational certificate will be carried out by staff from the Environmental Protection Division's Regional Operations Branch. Documents pertinent to the operational certificate are to be submitted by email or electronic transfer to the director, in accordance with the ministry Data & Report Submissions website at: http://www2.gov.bc.ca/gov/content/environment/waste-management/waste-discharge-authorization/data-and-report-submissions, or as further instructed.

For more information about how the Ministry will assess compliance with your operational certificate please refer to gov.bc.ca/environmentalcompliance.

For more information about how to make changes to your operational certificate and to access waste discharge amendment forms and guidance, please refer to gov.bc.ca/wastedischarge-authorizations.

Yours truly,

Carol Danyluk, P.Eng.
for Director, *Environmental Management Act*
Authorizations - South Region

MINISTRY OF ENVIRONMENT AND CLIMATE CHANGE STRATEGY

OPERATIONAL CERTIFICATE

12218

Under the Provisions of the Environmental Management Act

CITY OF KELOWNA

City Hall
1435 Water Street
Kelowna BC V1Y 1J4

is authorized to manage waste and recyclable material from the Regional District of Central Okanagan and environs (including Reserve Land), and also the Big White area, at the Glenmore Landfill located 9 kilometres north-east of the Kelowna city centre, British Columbia, subject to the conditions listed below. Contravention of any of these conditions is a violation of the *Environmental Management Act* and may result in prosecution.

This Operational Certificate supersedes all previous versions of Operational Certificate 12218 issued under the authority of the *Environmental Management Act.*

Glossary

Capitalized terms referred to in this authorization are defined below. Other terms used in this authorization have the same meaning as those defined in the *Environmental Management Act*, applicable regulations, and the Landfill Criteria;

"Contaminated Soil" means soil in which the concentration of a substance is greater than or equal to the lowest applicable industrial land use standard under the Contaminated Sites Regulation, and below any applicable standards that classify the soil as Hazardous Waste under the Hazardous Waste Regulation;

"Facility" means the Landfill including all facilities and works on the Facility Site including the Landfill, Leachate Management Works, Stormwater Management Works, and Facility Entrance;

Date issued: December 8, 2000
Date amended: May 30, 2023
(most recent)

Carol Danyluk, P.Eng.
for Director, *Environmental Management Act*
Authorizations - South Region

"Facility Entrance" means the authorized works in section 1.4.1 of this operational certificate;

"Facility Site" means the location of the Facility in section 1.5.1 of this operational certificate;

"Facility Site Boundary" means the perimeter boundary of the Facility Site;

"International Waste" means International waste as defined in the latest amended version of the Government of Canada International Waste Directive TAHD-DSAT-IE-2002-17-6, October 15, 2012;

"Landfill" means the authorized works in section 1.1.5 of this operational certificate;

"Landfill Criteria" means the Landfill Criteria for Municipal Solid Waste Second Edition June 2016, as amended or replaced from time to time;

"Leachate Management Works" means the authorized works in section 1.2.3 of this operational certificate;

"Province" means His Majesty the King in right of British Columbia;

"Regulatory Document" means any document that the operational certificate holder is required to cause to be prepared or submit to the director or the Province, pursuant to: (i) this authorization; (ii) any regulation made under the *Environmental Management Act* that regulates the Facility described in this authorization or the discharge of waste from that Facility; or (iii) any order issued under the *Environmental Management Act* directed against the operational certificate holder that is related to the Facility described in this authorization or the discharge of waste from that Facility;

"Significant Works" means the Landfill, Leachate Management Works, Stormwater Management Works;

"Stormwater Management Works" means the authorized works in section 1.3.1 of this operational certificate;

1. AUTHORIZED DISCHARGES AND WORKS

1.1 Landfill

This section applies to the discharge of waste to the Landfill. The site reference number for this discharge is E104956.

1.1.1 The maximum authorized rate of waste discharge is:

(a) 200,000 tonnes per calendar year of municipal solid waste;
(b) 30,000 tonnes per calendar year of Contaminated Soil;
(c) 1,000 tonnes per calendar year of International Waste.

1.1.2 The characteristics of the waste discharge to the Landfill must be:

(a) municipal solid waste;
(b) soil;
(c) other waste as authorized in writing by the director,
(d) waste asbestos as per Section 40 of the Hazardous Waste Regulation(HWR) under the *Environmental Management Act*.

The following types of wastes must not be discharged:

(1) Hazardous wastes, other than those specifically approved for disposal to authorized landfills, as defined in the Hazardous Waste Regulation (HWR) under the *Environmental Management Act*.
(2) Anatomical, pathological, and untreated biomedical wastes as defined in the *Guidelines for the Management of Biomedical Wastes in Canada* (Canadian Council of Ministers of the Environment, February 1992) with exception of the limited biomedical wastes described within the City of Kelowna "Solid Waste Management Regulation Bylaw No. 10106, revised October 25, 2021".
(3) Bulk liquids and semi-solid wastes, which contain free liquids, as determined by US EPA Method 9095A Paint Filter Liquids Test, Test Methods for Evaluating Solid Wastes-Physical/Chemical Methods (EPA Publication No. Sw-846).
(4) Hog fuel, log yard debris and chipped wood waste. The reuse of these materials for temporary roads, dust control or a component of alternative daily cover is permitted.
(5) Recyclable materials, including automobiles, white goods, other large metallic objects and tires

(6) Animal carcasses, with the exception of those of a domestic nature, those resulting from animal road kills, or those resulting from animal control activities of the Ministry of Environment's Conservation Officer Service (COS).

(7) Mortalities from agricultural operations, with the exception of carcasses that cannot be disposed of in accordance with the Code of Practice for Agricultural Environmental Management under the Environmental Management Act.

1.1.3 Composting of yard waste must be in accordance with the Organic Matter Recycling Regulation under the *Environmental Management Act*.

1.1.4 The discharged waste must originate from within the Regional District of Central Okanagan including Reserve Lands, and the Big White area, subject to the following:

(a) Waste discharged to this landfill must satisfy the requirements of the Regional District of Central Okanagan Solid Waste Management Plan.

(b) Waste discharged to this landfill must not contravene the Regional Solid Waste Management Plan of the Regional District from which the waste originated.

1.1.5 The works authorized are a landfill with an area of 81 ha, and related appurtenances as specified in the most recent Design, Operations, and Closure Plan (DOCP) under Section 3.1.

At a minimum, active landfill cells must include an impermeable base liner.

1.1.6 The waste discharge is authorized to the Landfill approximately located as shown on Site Plan A.

1.1.7 The operational certificate holder must ensure that the authorized works, excluding final cover in active landfilling areas, are complete and fully operational as per the most recent DOCP, under Section 3.1.

1.2 Leachate Management

This section applies to the management of leachate from the Landfill.

1.2.1 The operational certificate holder must collect and convey the leachate from the Landfill prior to discharge.

1.2.2 The treated leachate effluent is authorized to be discharged to the City of Kelowna municipal sewage collection system.

1.2.3 The authorized works are leachate collection, conveyance, treatment and discharge works, and related appurtenances approximately located as shown on Site Plan A.

1.2.4 The operational certificate holder must ensure that the Leachate Management Works are complete and fully operational as per the most recent DOCP, under Section 3.1.

1.3 Stormwater Management

This section applies to the management of stormwater from the Landfill.

1.3.1 The authorized Stormwater Management works are specified in the most recent DOCP required under Section 3.1. The Stormwater Management works include use of Bredin Pond, Tutt Pond, Northeast Pond, conveyance systems (ditches, pipes, culverts), pump houses, irrigation systems and an overflow to the Slough. Stormwater that has been diverted to the Slough must be managed as leachate.

1.3.2 The operational certificate holder must ensure that the Stormwater Management Works are complete and fully operational as per the most recent DOCP, under Section 3.1.

1.4 Facility Entrance

This section applies to the Facility Entrance.

1.4.1 The authorized works are sign(s), gate, fence, weigh scale, attendant hut, waste and recyclable material drop-off and storage facilities, and related appurtenances approximately located as shown on Site Plan A.

1.4.2 The operational certificate holder must ensure that the authorized works are complete and fully operational, as per the most recent DOCP, under Section 3.1.

1.5 Location of Facility

This section applies to the location of the Facility.

1.5.1 The location of the Facility is: (per Parcel Identification [PID])
PID 024-353-281, Part of PID 024-353-302, PID 024-353-329,
PID 024-353-752, PID 011-843-322, PID 011-843-331,
PID 011-843-357, PID 011-843-365, PID 011-843-373,
PID 011-845-163, PID 011-843-381, Part of PID 029-954-444,
PID 029-954-398, PID 011-843-071, PID 011-843-187,
PID 011-843-195, PID 011-843-209, PID 011-843-217, and
PID 011-843-390

Approximately located as shown on Site Plan A

2. GENERAL REQUIREMENTS

2.1 General Provisions

Where this Authorization provides that the director may require an action to be carried out, the operational certificate holder must carry out the action in accordance with the requirements of the director.

2.2 Use of Qualified Professional(s)

The operational certificate holder must cause a Qualified Professional to:

(a) Design and inspect the construction of the Significant Works, and,

(b) Certify documents related to the Significant Works including plans, specifications, drawings, construction reports, assessments, reviews, investigations, studies, surveys, programs, reports and as-built record drawings.

(c) Submit a completed Declaration of Competency and a Conflict of Interest Disclosure Statement with each document.

2.3 Regulatory Documents

(a) The operational certificate holder must retain all Regulatory Documents for a period of at least 7 years after they are made.

(b) If requested by a director or an officer, the operational certificate holder must submit the requested Regulatory Documents to the director or officer within 14 days of the request.

2.4 Construction Report(s)

(a) The operational certificate holder must cause a Qualified Professional to:

(i) carry out inspections before and during the construction or modification of Significant Works, and,
(ii) certify construction report(s) and submit them to the director as part of the Annual Report.

(b) The construction report(s) must demonstrate that the Significant Works have been constructed in accordance with this operational certificate and the most recent DOCP, describe any technical changes that arose from the inspections and testing and how they were addressed, and include as-built record drawings of the constructed Significant Works, all the inspection and testing reports and results including geologic inspection report, quality control and quality assurance testing, soil test data including field and laboratory data, as described in the Landfill Criteria section 10.2 Construction Report(s).

2.5 **Buffer Zone**

The operational certificate holder must ensure that the footprint of the Landfill is located a minimum of 50 m from the Facility Site Boundary.

2.5.1 A berm of suitable material must be maintained to limit visibility of the active waste discharge area where practical for travelers using the Glenmore Road and John Hindle Drive.

2.6 **Additional Requirements**

The director may require the operational certificate holder to:

(a) Cause a Qualified Professional to certify and submit to the director additional, amended or improved documents of the Facility including plans, specifications, drawings, construction reports, assessments, reviews, investigations, studies, surveys, programs, reports and as-built record drawings.

(b) Carry out actions in accordance with the additional, amended or improved documents submitted, and additional actions as specified.

(c) Repair, alter, remove, improve or add to existing facilities and works, or construct new facilities and works, at the Facility.

3. OPERATING AND PERFORMANCE REQUIREMENTS

3.1 Design, Operations, and Closure Plan (DOCP)

(a) The following DOCP has been certified by a Qualified Professional and submitted by the operational certificate holder to the director on March 26, 2019; 2018 Design, Operations and Closure Plan – Glenmore Landfill – GHD Ltd.

(b) The operational certificate holder must cause a Qualified Professional to certify and submit an updated DOCP to the director, as necessary to keep the DOCP up to date, at least once every five years.

(c) The operational certificate holder must carry out the most recent DOCP and design, construct, operate, inspect, maintain, monitor, and close the Facility, in compliance with most recent DOCP.

(d) The DOCP must comply with the requirements of this operational certificate, include the information specified in all the relevant items listed in the Landfill Criteria Section 10.3 Design, Operations and Closure Plan, and, if a Landfill Criteria Upgrading Plan is required pursuant to Section 3.2 of this operational certificate, conform with the Landfill Criteria Upgrading Plan.

3.2 Hydrogeology and Hydrology Characterization Report (HHCR)

(a) The operational certificate holder must cause a Qualified Professional to certify and submit an up-to-date HHCR, to the director, on or before December 31, 2024.

(b) The HHCR must include the information specified in all the items listed in the Landfill Criteria, Section 10.1 Hydrogeology and Hydrology Characterization Report.

(c) The operational certificate holder must cause a Qualified Professional to certify and submit an updated HHCR to the director, at least once every ten years after the date specified in the preceding (a).

3.3 **Multiple and/or Spare Works and Auxiliary Power Facilities**

The operational certificate holder must provide and install multiple and/or spare works and auxiliary power facilities to ensure that the Significant Works are operational as specified in this operational certificate, including during maintenance, breakdowns and electrical power outages.

3.4 **Maintenance of the Facility**

(a) The operational certificate holder must cause persons that are qualified and trained, to operate, regularly inspect, and maintain the Facility, in good working order.

(b) The operational certificate holder must prepare documents of the qualification and training of the persons operating, inspecting and maintaining the Facility, and of Facility inspections, operation and maintenance.

3.5 **Facility Manager and Operator Certification**

(a) The operational certificate holder must ensure that at least one person responsible for the management of the Facility is certified, and maintains certification by The Solid Waste Association of North America (SWANA) as a Manager of Landfill Operations, and at least one person responsible for the operation of the Facility is certified, and maintains certification by SWANA as a Landfill Operator.

(b) The operational certificate holder must prepare documents of the SWANA certification and training of the person(s) responsible for the management and operation of the Facility.

3.6 **Stormwater Quality**

(a) The operational certificate holder must ensure that the Facility does not cause the concentration of any substance in the stormwater flowing from the Facility Site Boundary, to be of worse quality than:

(i) the applicable long-term average, short-term maximum, maximum allowable concentration, maximum acceptable concentration, and/or aesthetic objective, specified in the British Columbia Approved and Working Water Quality Guidelines, for the applicable water use(s), for that substance,

or,

(ii) if the local background concentration of any substance is of worse quality than (i), the local background concentration of that substance.

(b) The operational certificate holder must cause a Qualified Professional to determine the applicable water use(s) and the applicable long-term average, short-term maximum, maximum allowable concentration, maximum acceptable concentration, and/or aesthetic objective, specified in the British Columbia Approved and Working Water Quality Guidelines, for the applicable water use(s), for substances, and, if the preceding (a)(ii) is being used, the local background concentration of substance(s), and include such determinations in the Annual Operations and Monitoring Report.

3.7 Groundwater Quality

(a) The operational certificate holder must ensure that the Facility does not cause the concentration of any substance in groundwater flowing from the Facility Site Boundary to be greater than:

(i) the lowest of the Contaminated Sites Regulation Generic Numerical Water Standards, for the applicable water use(s), for that substance.

or,

(ii) if the local background concentration of any substance is greater than (i), the local background concentration of that substance.

(b) The operational certificate holder must cause a Qualified Professional to determine the applicable water use(s) in accordance with the latest approved version of Protocol 21 for Contaminated Sites, Water Use Determination, and, if the preceding (a)(ii) is being used, the local background concentration of substance(s) in accordance with the latest approved version of Protocol 9 for Contaminated Sites, Determining Background Groundwater Quality or another method recommended by a Qualified Professional, and include such determinations in the Annual Operations and Monitoring Report.

3.8 Complaints

The operational certificate holder must prepare documents of complaints with regard to matters relevant to this operational certificate, including environmental, bear, and nuisance complaints. These documents must include the source and nature of the complaint, actions, responses, and corresponding dates and times.

3.9 Soil

All soil discharged at the Landfill site must be beneficially reused as cover, berms, and/or roads within the waste cells.

Soil containing contaminants in concentrations that are less than the threshold to be characterized as Contaminated Soil does not contribute to the annual discharge limit in Section 1.1.1(b).

Contaminated Soil must not be used as final cover or deposited within 1.2 meters of the seasonal high groundwater level.

4. MONITORING

4.1 Monitoring and Sampling Facilities

The operational certificate holder must maintain measurement, monitoring and sampling facilities for waste, leachate, treated leachate effluent, stormwater, groundwater, and landfill gas, in compliance with, and including at locations specified in, the most recent DOCP under Section 3.1.

4.2 Monitoring and Sampling

The operational certificate holder must carry out measurement, monitoring and sampling of waste, leachate, treated leachate effluent, stormwater, groundwater, and landfill gas, in compliance with, and including at frequencies and for substances specified in, the most recent DOCP under Section 3.1.

4.3 Sampling Procedures

The operational certificate holder must carry out sampling in accordance with the procedures described in the "British Columbia Field Sampling Manual for Continuous Monitoring and the Collection of Air, Air-Emission, Water, Wastewater, Soil, Sediment, and Biological Samples, 2013 Edition (Permittee)" or most recent edition, or by alternative procedures as authorized by the director. A copy of the above manual is available on the Ministry web page at https://www2.gov.bc.ca/gov/content/environment/research-monitoring-reporting/monitoring/laboratory-standards-quality-assurance.

Date issued: December 8, 2000
Date amended: May 30, 2023
(most recent)

Carol Danyluk, P.Eng.
for Director, *Environmental Management Act*
Authorizations - South Region

4.4 Analytical Procedures

The operational certificate holder must carry out analyses in accordance with procedures described in the "British Columbia Laboratory Manual (2015 Permittee Edition)", or the most recent edition or by alternative procedures as authorized by the director. A copy of the above manual is available on the Ministry web page at https://www2.gov.bc.ca/gov/content/environment/research-monitoring-reporting/monitoring/laboratory-standards-quality-assurance.

4.5 Quality Assurance

(a) The operational certificate holder must obtain from the analytical laboratory(ies) their precision, accuracy and blank data for each sample set submitted by the operational certificate holder and an evaluation of the data acceptability, based on criteria set by such laboratory.

(b) The operational certificate holder must collect, prepare and submit for analysis by the analytical laboratory(ies) quality control (QC) samples for each parameter. As a minimum,

-The number of QC samples should be 20% of all samples collected (environmental + QC samples) within 48 hours of each other, and,

-Include duplicate, field and trip blank samples for each parameter.

(c) The operational certificate holder must submit samples to analytical laboratory(ies) that meet the definition of a qualified laboratory under the Environmental Data Quality Assurance Regulation.

4.6 Data Uploading

The operational certificate holder must cause the analytical laboratory(ies) to upload monitoring and analytical data required by this operational certificate, to the Ministry's Environmental Monitoring System (EMS) database, on or before 30 days after the data is available, or as further instructed by the director.

5. REPORTING

5.1 Electronic Reporting

The operational certificate holder must submit all data required to be submitted under this section by email to the Ministry's Routine Environmental Reporting Submission Mailbox (RERSM) at Envauthorizationsreporting@gov.bc.ca or as otherwise instructed by the director. For guidelines on how to properly name the files and email subject lines or for more information visit the Ministry website: https://www2.gov.bc.ca/gov/content/environment/waste-management/waste-discharge-authorization/data-and-report-submissions/routine-environmental-reporting-submission-mailbox.

5.2 Non-compliance Notification

The operational certificate holder must immediately notify the director by email at EnvironmentalCompliance@gov.bc.ca, or as otherwise instructed by the director of any non-compliance with the requirements of this Authorization and must immediately take remedial action to remedy any effects of such non-compliance.

5.3 Non-compliance Reporting

The operational certificate holder must, within 30 days of any non-compliance event, submit to the director a written report that includes, but is not necessarily limited to, the following:

(a) all relevant test results obtained by the operational certificate holder related to the non-compliance,

(b) an explanation of the most probable cause(s) of the non-compliance, and

(c) a description of remedial action planned and/or taken by the operational certificate holder to prevent similar non-compliance(s) in the future.

The operational certificate holder must submit all non-compliance reporting required to be submitted under this section by email to the Ministry's Compliance Reporting Submission Mailbox (CRSM) at

EnvironmentalCompliance@gov.bc.ca or as otherwise instructed by the director. For guidelines on how to report a non-compliance or for more information visit the Ministry website: http://www2.gov.bc.ca/gov/content/environment/waste-management/waste-discharge-authorization/data-and-report-submissions/non-compliance-reporting-mailbox.

5.4 Annual Operations and Monitoring Report

(a) The operational certificate holder must cause a Qualified Professional to certify and submit an Annual Operations and Monitoring Report, for the preceding calendar year, to the director on or before March 31 of each year.

(b) The Annual Operations and Monitoring Report must include the following information:

Operations Report:

(i) Tonnages and categories of waste and recyclable material received at the Facility, and how they were managed,
(ii) Tonnages and categories of waste discharged to the Landfill,
(iii) Leachate volume collected and conveyed to municipal sewer system, and leachate quality;
(iv) Remaining volume and life of the Landfill;
(v) Summary of DOCP implementation;
(vi) Summary of screening/revegetation efforts;
(vii) Summary of construction report(s);
(viii) Summary of complaints;
(ix) Summary of non-compliance notifications and reporting;
(x) For the next calendar year, summary of planned DOCP implementation and construction of Significant Works,

Environmental Monitoring Plan Report:

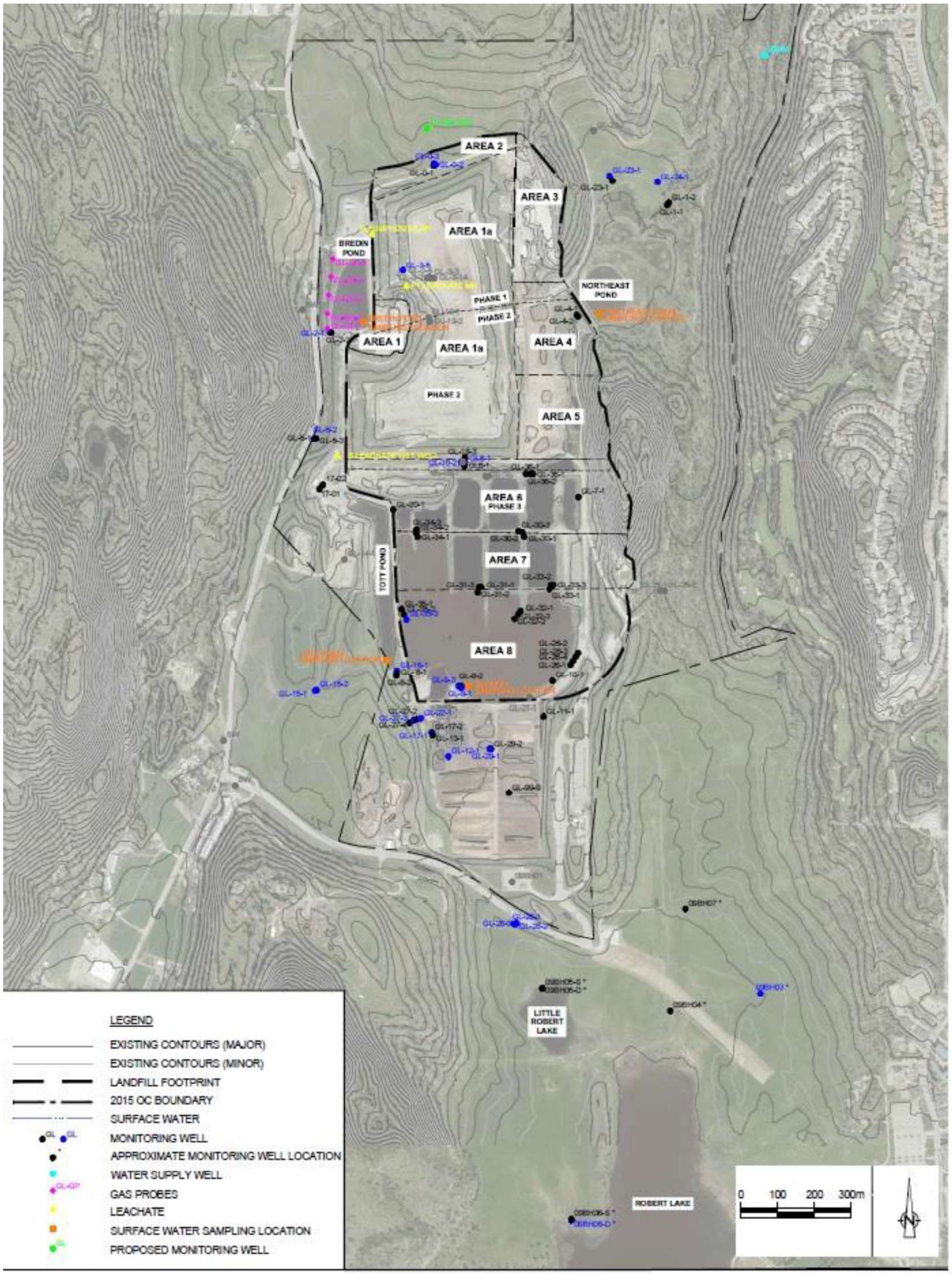
(xi) Site plan(s), sampling locations, stormwater and surface water flow paths, groundwater elevations, gradients and flow directions;
(xii) Measurement, monitoring and sampling facilities, locations, frequencies, substances, sampling and analytical procedures, quality assurance and quality control;
(xiii) Data including laboratory analysis and quality assurance and quality control results;
(xiv) Data tabulation, trend analysis, graphs, diagrams, and interpretation;

(xv) Discussion and determinations required by section 3.5 of this operational certificate,
(xvi) Discussion and determination of compliance with section 3.6 of this operational certificate,
(xvii) Discussion and determination of compliance with section 3.7 of this operational certificate,
(xviii) Results, conclusions, recommendations and changes to the environmental monitoring plan.

5.5 **Publication of Documents**

The Ministry of Environment and Climate Change Strategy publishes Regulatory Documents on its website for the purpose of research, public education and to provide transparency in the administration of environmental laws. The operational certificate holder acknowledges that the Province may publish any Regulatory Documents submitted by the operational certificate holder, excluding information that would be exempted from disclosure if the document was disclosed pursuant to a request under section 5 of the *Freedom of Information and Protection of Privacy Act*, and the operational certificate holder consents to such publication by the Province.

SITE PLAN



Date issued: December 8, 2000
Date amended: May 30, 2023
(most recent)

Carol Danyluk, P.Eng.
for Director, *Environmental Management Act*
Authorizations - South Region

Appendix B

Land and Water Use Information

Groundwater Wells and Aquifers

Well Summary

Well Tag Number: 2936
Well Identification Plate Number:
Owner Name: BAKER
Intended Water Use: Private Domestic
Artesian Condition: No

Well Status: New
Well Class: Water Supply
Well Subclass:
Aquifer Number:
Technical Report: N/A

Observation Well Number:
Observation Well Status:
Environmental Monitoring System (EMS) ID:
Alternative specs submitted: No
Drinking Water Area Indicator: No

Licensing Information

Licensed Status: Unlicensed

Licence Number:

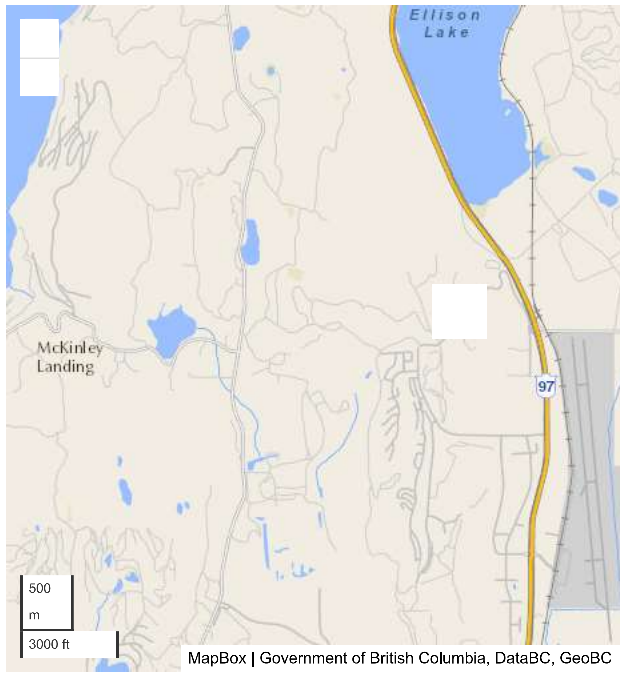
Location Information

Street Address: DRY VALLEY RD
Town/City: KELOWNA

Legal Description:

Lot	8
Plan	1453
District Lot	
Block	
Section	23
Township	23
Range	
Land District	41
Property Identification Description (PID)	

Description of Well Location:



Geographic Coordinates - North American Datum of 1983 (NAD 83)

Latitude: 49.96988
Longitude: -119.39714
UTM Easting: 328105
UTM Northing: 5538036
Zone: 11
Coordinate Acquisition Code: (20 m accuracy) Digitized from 1:5,000 mapping

Well Activity

Activity	Work Start Date	Work End Date	Drilling Company	Date Entered
Legacy record	1948-01-01	1948-01-01	Unknown	August 13th 2003 at 5:38 AM

Well Work Dates

Start Date of Construction	End Date of Construction	Start Date of Alteration	End Date of Alteration	Start Date of Decommission	End Date of Decommission
1948-01-01	1948-01-01				

Well Completion Data

Total Depth Drilled:
Finished Well Depth: 30 ft bgl
Final Casing Stick Up:
Depth to Bedrock:
Ground elevation:

Estimated Well Yield: 0 USgpm
Well Cap:
Well Disinfected Status: Not Disinfected
Drilling Method: Excavating
Method of determining elevation: Unknown

Static Water Level (BTOC): 23 feet btoc
Artesian Flow:
Artesian Pressure (head):
Artesian Pressure (PSI):
Orientation of Well: VERTICAL

Lithology

From (ft bgl)	To (ft bgl)	Raw Data	Description	Moisture	Colour	Hardness	Observations	Water Bearing Flow Estimate (USGPM)
There are no records to show								

Casing Details

From (ft bgl)	To (ft bgl)	Casing Type	Casing Material	Diameter (in)	Wall Thickness (in)	Drive Shoe
There are no records to show						

Surface Seal and Backfill Details

Surface Seal Material:
Surface Seal Installation Method:
Surface Seal Thickness:
Surface Seal Depth:

Backfill Material Above Surface Seal:
Backfill Depth:

Liner Details

Liner Material:
Liner Diameter:
Liner from:

Liner Thickness:
Liner to:

Liner perforations

From (ft bgl)	To (ft bgl)
There are no records to show	

Screen Details

Intake Method:
Type:
Material:
Opening:
Bottom:

Installed Screens

From (ft bgl)	To (ft bgl)	Diameter (in)	Assembly Type	Slot Size
There are no records to show				

Well Development

Developed by:

Development Total Duration:

Well Yield

Estimation Method:
Static Water Level Before Test:
Hydrofracturing Performed: No

Estimation Rate:
Drawdown:
Increase in Yield Due to Hydrofracturing:

Estimation Duration:

Well Decommission Information

Reason for Decommission:
Sealant Material:
Decommission Details:

Method of Decommission:
Backfill Material:

Pumping Test Information and Aquifer Parameters

Start Date Pumping Test	Pumping Test Description	Test Duration (min)	Boundary Effect	Storativity	Transmissivity (m^2/day)	Hydraulic Conductivity (m/day)	Specific Yield	Specific Capacity (L/s/m)	Analysis Method	Comments
There are no records to show										

Comments

NO LOG GIVEN. NO LITHOLOGIC INFORMATION AVAILABLE. T.D. 30'

Documents

- WTN 2936_Well Record.pdf

Disclaimer

Groundwater Wells and Aquifers

Well Summary

Well Tag Number: 19830
Well Identification Plate Number:
Owner Name: C STEPHENS
Intended Water Use: Not Applicable
Artesian Condition: No

Well Status: New
Well Class: Unknown
Well Subclass:
Aquifer Number: 1191
Technical Report: N/A

Observation Well Number:
Observation Well Status:
Environmental Monitoring System (EMS) ID:
Alternative specs submitted: No
Drinking Water Area Indicator: No

Licensing Information

Licensed Status: Unlicensed
Licence Number:

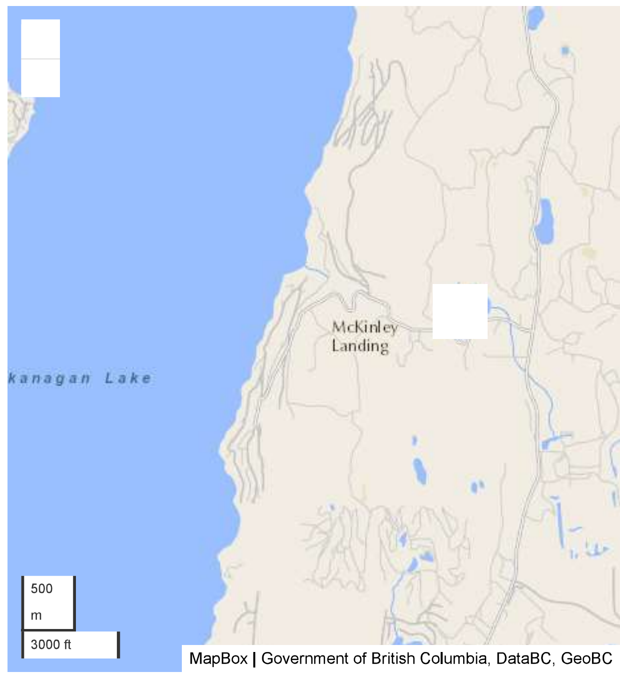
Location Information

Street Address:
Town/City: KELOWNA

Legal Description:

Lot	
Plan	
District Lot	
Block	
Section	21
Township	23
Range	
Land District	41
Property Identification Description (PID)	

Description of Well Location:



Geographic Coordinates - North American Datum of 1983 (NAD 83)
Latitude: 49.96811
Longitude: -119.435
UTM Easting: 325384
UTM Northing: 5537927
Zone: 11
Coordinate Acquisition Code: (100 m accuracy) Digitized from old Dept. of Lands, Forests and Water Resources maps

Well Activity

Activity	Work Start Date	Work End Date	Drilling Company	Date Entered
Legacy record	1966-02-01	1966-02-01	Art Moore & Son	August 13th 2003 at 3:04 AM

Well Work Dates

Start Date of Construction	End Date of Construction	Start Date of Alteration	End Date of Alteration	Start Date of Decommission	End Date of Decommission
1966-02-01	1966-02-01				

Well Completion Data

Total Depth Drilled:
Finished Well Depth: 25 ft bgl
Final Casing Stick Up:
Depth to Bedrock: 25 feet bgl
Ground elevation:

Estimated Well Yield: 0 USgpm
Well Cap:
Well Disinfected Status: Not Disinfected
Drilling Method: Other
Method of determining elevation: Unknown

Static Water Level (BTOC):
Artesian Flow:
Artesian Pressure (head):
Artesian Pressure (PSI):
Orientation of Well: VERTICAL

Lithology

From (ft bgl)	To (ft bgl)	Raw Data	Description	Moisture	Colour	Hardness	Observations	Water Bearing Flow Estimate (USGPM)
0	1	topsoil						
1	4	gravel sand and clay						
4	6.6	cemented gravel						
6.6	14	clay with some sand						
14	18	clay and gravel (w.b.)						
18	23	clay and rocks						
23	24	light brown clay						
24	25	yellow clay						
25	25	bedrock						

Casing Details

From (ft bgl)	To (ft bgl)	Casing Type	Casing Material	Diameter (in)	Wall Thickness (in)	Drive Shoe
There are no records to show						

Surface Seal and Backfill Details

Surface Seal Material:
Surface Seal Installation Method:
Surface Seal Thickness:
Surface Seal Depth:

Backfill Material Above Surface Seal:
Backfill Depth:

Liner Details

Liner Material:
Liner Diameter:
Liner from:

Liner Thickness:
Liner to:

Liner perforations

From (ft bgl)	To (ft bgl)
There are no records to show	

Screen Details

Intake Method:
Type:
Material:
Opening:
Bottom:

Installed Screens

From (ft bgl)	To (ft bgl)	Diameter (in)	Assembly Type	Slot Size
There are no records to show				

Well Development

Developed by:

Development Total Duration:

Well Yield

Estimation Method:
Static Water Level Before Test:
Hydrofracturing Performed: No

Estimation Rate:
Drawdown:
Increase in Yield Due to Hydrofracturing:

Estimation Duration:

Well Decommission Information

Reason for Decommission:
Sealant Material:
Decommission Details:

Method of Decommission:
Backfill Material:

Pumping Test Information and Aquifer Parameters

Start Date Pumping Test	Pumping Test Description	Test Duration (min)	Boundary Effect	Storativity	Transmissivity (m^2/day)	Hydraulic Conductivity (m/day)	Specific Yield	Specific Capacity (L/s/m)	Analysis Method	Comments
There are no records to show										

Comments

METHOD OF DRILLING = DRILLED

Documents

- WTN 19830_Well Record.pdf

Disclaimer

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

082E.093.4.2.3.

82 E.093
4.2.3

E/14 - S 1/2

UP No MAPPING

1

UNITS	MERIDIAN	RANGE (TENS / UNITS)	SECTION (TENS / UNITS)	QUARTER (NE SE SW NW)	LAND DISTRICT (TENS / UNITS)
TOWNSHIP					

GROUND — WATER DIVISION, WATER INVESTIGATIONS BRANCH, DEPT. OF LANDS, FORESTS, and WATER RESOURCES, VICTORIA, B.C.

LOCATION (COMPLETE LEGAL DESCRIPTION) Sec 21 TP 23 Osoyoos Dist.

OWNER'S NAME Mr. & Mrs. C Stephens ADDRESS "Wild Life Sanctuary" McKinley Rd., Glenmore Dist. Kelowna

DRILLER'S NAME Moore & Son ADDRESS Box 13 Winfield DATE OF COMPLETION Feb /66

DEPTH 25' ELEVATION OF COLLAR (163) CASING DIAM. 6" LENGTH ____ TYPE ____

METHOD OF DIGGING Drilled SCREEN ☐ SIZE ____ LENGTH ____ TYPE ____

LOCATION OF SCREEN ____ DEVELOPED ☐ DESCRIBE ____

PERFORATED CASING ☑ LENGTH 3' 6" LOCATION OF PERFORATIONS ____

WTN 19830

GRAVEL PACK ☐ LENGTH ____ DIAM. ____ SIZE GRAVEL, ETC. ____

PUMP ☐ TYPE ____ POWER ____

CAPACITY ____ OTHER DATA ____

COSTS WELL ____ PUMP ____ PUMP HOUSE, ETC. ____

MAINTENANCE ____

DISTANCE TO WATER FROM TOP OF CASING ____ ☐ ESTIMATED ☐ MEASURED ELEVATION ____ FLUCTUATION ____

HIGH WATER ____ MONTH ____ LOW WATER ____ MONTH ____ OBSERVATION DATA ☐ FILE No. ____

WATER USE No suitable formation for a well. Water seeped in at approx. 1/2 I.G.P.M. through an open hole.

North of OS 1

82E/14 495

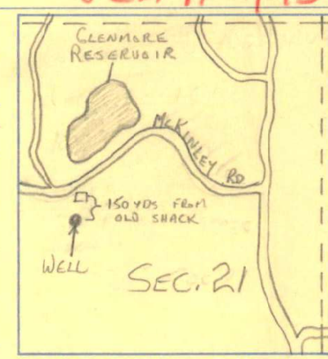
MAX. RATE WITHDRAWAL ☐ ESTIMATED ☐ MEASURED ____

TEMPERATURE ____ PUMPS SAND ☐ ____

CLOGS SCREEN ☐ TYPE DEPOSIT ____ AQUIFER DATA ____

LICENSE No. ____ DATE LICENSE ____ AMOUNT ____

DATE APPLICATION ____ USE ____



LOCATION SKETCH—INDICATE NORTH

Approx. 700' south of the Glenmore Reservoir
100 yds south of the Flintoff Ranch gate.
North of sheet 1.

MUNICIPALITY (UNITS / TENS)

WATER QUALITY: ANALYSIS, SOFT, HARD, HIGH IRON, HIGH SULPHUR, SALTY, ALKALINE, SALINE, POLLUTED, INADEQUATE QUALITY

DRY HOLE, INADEQUATE QUANTITY, PUMPING TEST

CAPACITY GPD.: $0 - 10^3$, $10^3 - 10^4$, $10^4 - 10^5$, $10^5 - 10^6$, 10^6

METHOD: DUG, DRIVEN, DRILLED, JETTED, BORED

DEPTH: 0 — 25, 25 — 50, 50 — 100, 100 — 200, 200 — 400, >400

OBSERVATION, ABANDONED, DEVELOPED, SCREEN, PERF. CASING, GRAVEL ENV., PUMP

TYPE WELL: FLOWING, NON-FLOW ARTESIAN, WATER TABLE, PART CONFINED

RELIABILITY OF DATA: GOOD, FAIR, POOR

ROCK, SPRING

1008

CHARACTER OF SUPPLY AQUIFER: SAND, GRAVEL, TILL

WATER USE: DOMESTIC, GARDEN, STOCK, COOLING, IRRIGATION, INDUSTRIAL, WATERWORKS

SUPPLY AQUIFER (UNITS / TENS) · OTHER AQUIFER PRESENT (UNITS / TENS) · OTHER AQUIFER PRESENT (UNITS / TENS)

SYSTEMS EQUIPMENT LIMITED, VICTORIA—CANADA O 2231-65 SYSTEMSORT

LOG

FROM	TO	DESCRIPTION	NAME
0	1	TOP SOIL	
1	4	GRAVEL SAND + CLAY	
4	6'6"	CEMENTED GRAVEL	
6'6"	14'	CLAY WITH SOME SAND	
14	18	CLAY + GRAVEL (W.B)	
18	23	CLAY + ROCKS	
23	24	LIGHT BROWN CLAY	
24	25	YELLOW CLAY	
25	–	BEDROCK	

SAMPLE No. ______ DATE ______

LAB. ______

COLIFORM ORGANISMS ______

TOTAL BACTERIA ______

COLOUR ______ ODOUR ______

TASTE ______

PUMPING TEST SUMMARY

TEST BY ______

DATE ______ FILE No. ______

SPECIFIC CAPACITY ______ PERMIABILITY ______

STORAGE COEFF ______ TRANSMISSIBILITY ______

REMARKS ______

ANALYSIS

	PPM
Total Hardness	
Carbonate Hard	
Magnesium Hard	
Fe	
SO_2	
Ca	
Mg	
Na	
K	
HCO_3	
CO_3	
Cl	
SO_4	
NO_3	
B	
E	
Total Dis-solids	
Total Alkalinity	
Suspended Solids	
Ph	

OTHER DATA

SIZE ANALYSIS, ETC. ______

CARD BY D. J. DATE April 66

SOURCES INFORMATION Moore + Son

Groundwater Wells and Aquifers

Well Summary

Well Tag Number: 20594
Well Identification Plate Number:
Owner Name: WILFRED WERGER
Intended Water Use: Unknown Well Use
Artesian Condition: No

Well Status: New
Well Class: Unknown
Well Subclass:
Aquifer Number: 469
Technical Report: N/A

Observation Well Number:
Observation Well Status:
Environmental Monitoring System (EMS) ID:
Alternative specs submitted: No
Drinking Water Area Indicator: No

Licensing Information

Licensed Status: Unlicensed
Licence Number:

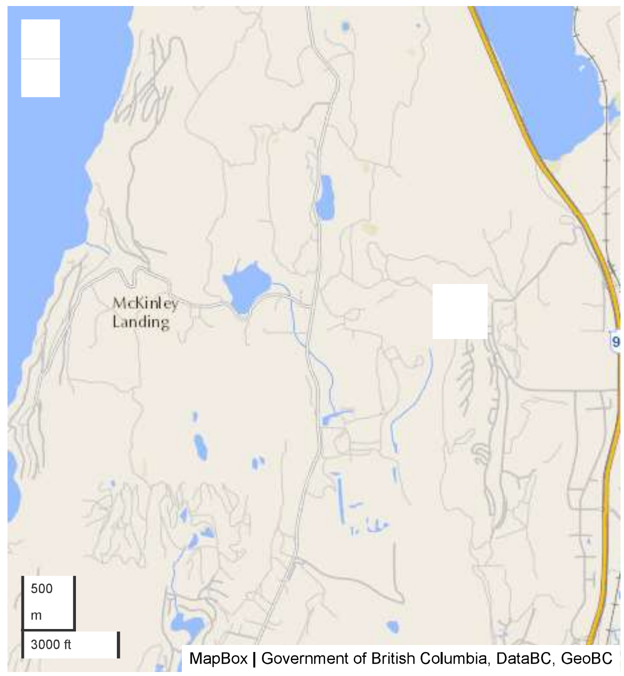
Location Information

Street Address: GLENMORE RD
Town/City: KELOWNA

Legal Description:

Lot	2
Plan	16293
District Lot	
Block	
Section	16
Township	23
Range	
Land District	41
Property Identification Description (PID)	

Description of Well Location:



Geographic Coordinates - North American Datum of 1983 (NAD 83)
Latitude: 49.966091
Longitude: -119.406788
UTM Easting: 327400
UTM Northing: 5537637
Zone: 11
Coordinate Acquisition Code: (100 m accuracy) Digitized from old Dept. of Lands, Forests and Water Resources maps

Well Activity

Activity	Work Start Date	Work End Date	Drilling Company	Date Entered
Legacy record	1967-04-01	1967-04-01	Okanagan Rotary Well Drilling	August 13th 2003 at 8:01 AM

Well Work Dates

Start Date of Construction	End Date of Construction	Start Date of Alteration	End Date of Alteration	Start Date of Decommission	End Date of Decommission
1967-04-01	1967-04-01				

Well Completion Data

Total Depth Drilled:
Finished Well Depth: 105 ft bgl
Final Casing Stick Up:
Depth to Bedrock:
Ground elevation:
Estimated Well Yield: 5 USgpm
Well Cap:
Well Disinfected Status: Not Disinfected
Drilling Method: Other
Method of determining elevation: Unknown
Static Water Level (BTOC): 35 feet btoc
Artesian Flow:
Artesian Pressure (head):
Artesian Pressure (PSI):
Orientation of Well: VERTICAL

Lithology

From (ft bgl)	To (ft bgl)	Raw Data	Description	Moisture	Colour	Hardness	Observations	Water Bearing Flow Estimate (USGPM)
0	10	brown clay, sand and rocks						
10	42	hard clay -yellowish- then light brown						
42	64	hard grey clay						
64	86	slate, white and black rock w.b.						
86	105	hard clay and white lime						

Casing Details

From (ft bgl)	To (ft bgl)	Casing Type	Casing Material	Diameter (in)	Wall Thickness (in)	Drive Shoe
There are no records to show						

Surface Seal and Backfill Details

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

Liner Details

Liner Material:
Liner Diameter:
Liner from:
Liner Thickness:
Liner to:

Liner perforations

From (ft bgl)	To (ft bgl)
There are no records to show	

Screen Details

Intake Method:
Type:
Material:
Opening:
Bottom:

Installed Screens

From (ft bgl)	To (ft bgl)	Diameter (in)	Assembly Type	Slot Size
There are no records to show				

Well Development

Developed by:
Development Total Duration:

Well Yield

Estimation Method:
Static Water Level Before Test:
Hydrofracturing Performed: No
Estimation Rate:
Drawdown:
Increase in Yield Due to Hydrofracturing:
Estimation Duration:

Well Decommission Information

Reason for Decommission:
Sealant Material:
Decommission Details:
Method of Decommission:
Backfill Material:

Pumping Test Information and Aquifer Parameters

Start Date Pumping Test	Pumping Test Description	Test Duration (min)	Boundary Effect	Storativity	Transmissivity (m^2/day)	Hydraulic Conductivity (m/day)	Specific Yield	Specific Capacity (L/s/m)	Analysis Method	Comments
There are no records to show										

Comments

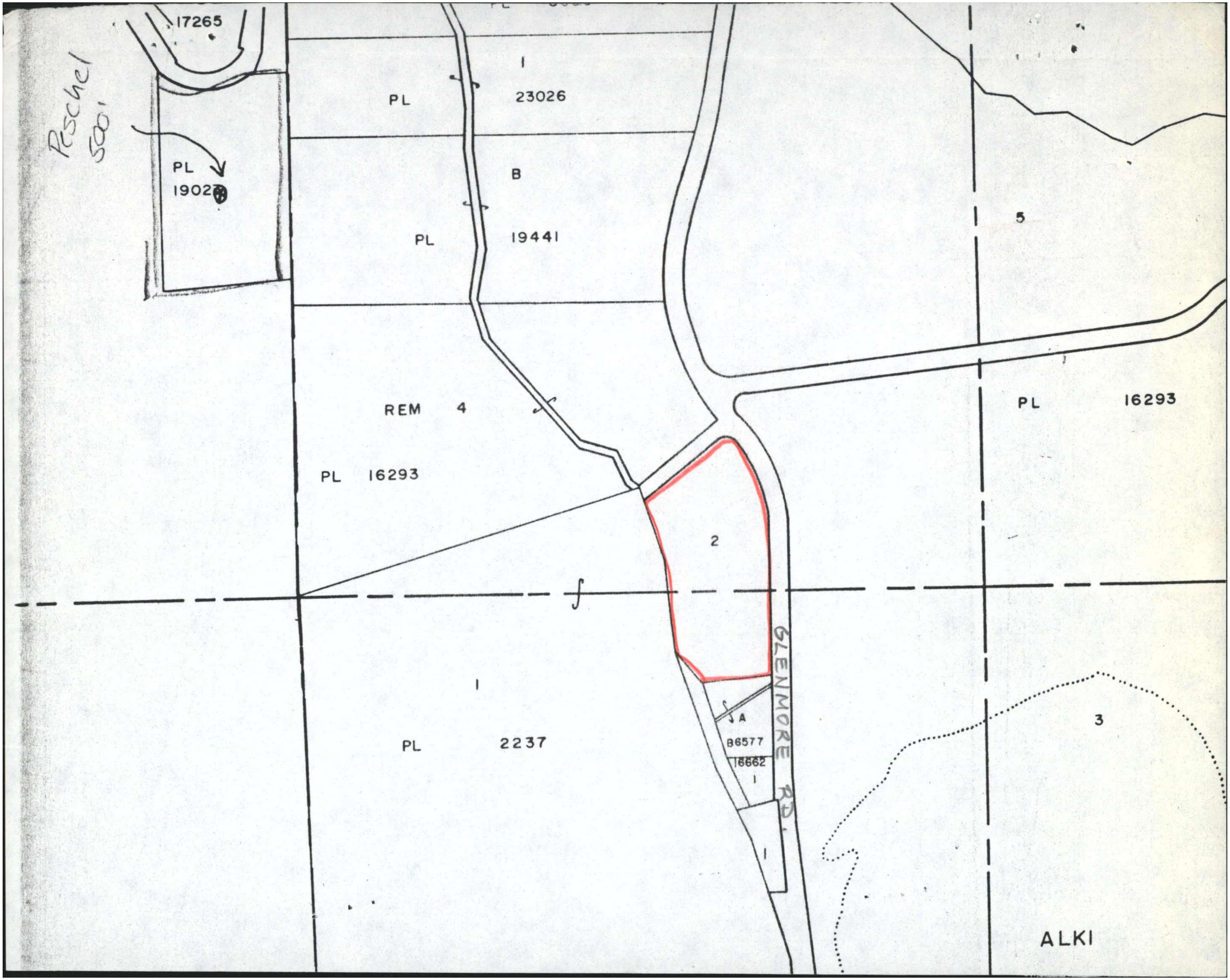
METHOD OF DRILLING = DRILLED

Documents

- WTN 20594_Well Record.pdf

Disclaimer

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


17265
Peschel
500'
PL
1902
1
PL
23026
B
PL
19441
REM
4
PL
16293
2
1
PL
2237
GLENMORE RD.
A
B6577
16662
1
1
5
PL
16293
3
ALKI

82E·093·4·2·4

MERIDIAN | RANGE (TENS / UNITS) | SECTION (TENS / UNITS) | QUARTER (NE SE SW NW) | LAND DISTRICT (TENS / UNITS) 1

GROUND — WATER DIVISION, WATER INVESTIGATIONS BRANCH, DEPT. OF LANDS, FORESTS, and WATER RESOURCES, VICTORIA, B.C.

Osoyoos Dist

No Mapping

LOCATION Lot 2 Plan 16293 GLENMORE RD. KELOWNA SEC. 16+21 TP 23
(COMPLETE LEGAL DESCRIPTION)

OWNER'S NAME Wilfred Werger ADDRESS R.R.1 Glenmore (Kelowna city) WTN20594

DRILLER'S NAME Okanagan Rotary Water Wells ADDRESS ____ DATE OF COMPLETION Apr 1/67

DEPTH 105' ELEVATION OF COLLAR 105 CASING DIAM. 6¼" LENGTH ____ TYPE ____

METHOD OF DIGGING drilled SCREEN ☐ SIZE ____ LENGTH ____ TYPE ____

LOCATION OF SCREEN ____ DEVELOPED ☐ DESCRIBE ____

PERFORATED CASING ☐ LENGTH ____ LOCATION OF PERFORATIONS ____

GRAVEL PACK ☐ LENGTH ____ DIAM. ____ SIZE GRAVEL, ETC. ____

PUMP ☐ TYPE ____ POWER ____

CAPACITY ____ OTHER DATA ____

COSTS WELL ____ PUMP ____ PUMP HOUSE, ETC. ____

MAINTENANCE ____

DISTANCE TO WATER FROM TOP OF CASING 35' ☐ ESTIMATED ☑ MEASURED ELEVATION ____ FLUCTUATION ____

HIGH WATER ____ MONTH ____ LOW WATER ____ MONTH ____ OBSERVATION DATA ☐ FILE No. ____

WATER USE ____

MAX. RATE WITHDRAWAL ☐ ESTIMATED ☐ MEASURED ____

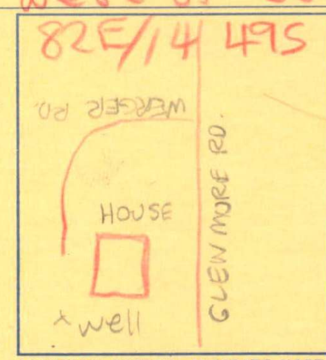
TEMPERATURE ____ PUMPS SAND ☐ ____

CLOGS SCREEN ☐ TYPE DEPOSIT ____ AQUIFER DATA ____

LICENSE No. ____ DATE LICENSE ____ AMOUNT ____

DATE APPLICATION ____ USE ____

west of OS2



LOCATION SKETCH—INDICATE NORTH

METHOD: DUG, DRIVEN, DRILLED, JETTED, BORED

DEPTH: 0 — 25, 25 — 50, 50 — 100, 100 — 200, 200 — 400, >400

OBSERVATION, ABANDONED, DEVELOPED, SCREEN, PERF. CASING, GRAVEL ENV., PUMP

TYPE WELL: FLOWING, NON-FLOW ARTESIAN, WATER TABLE, PART CONFINED

ROCK, SPRING

RELIABILITY OF DATA: GOOD, FAIR, POOR

WATER USE: DOMESTIC, GARDEN, STOCK, COOLING, IRRIGATION, INDUSTRIAL, WATERWORKS

CHARACTER OF SUPPLY AQUIFER: SAND, GRAVEL, TILL

MUNICIPALITY (TENS / UNITS)

WATER QUALITY: ANALYSIS, SOFT, HARD, HIGH IRON, HIGH SULPHUR, SALTY, ALKALINE, SALINE, POLLUTED, INADEQUATE QUALITY

DRY HOLE, INADEQUATE QUANTITY, PUMPING TEST

CAPACITY GPD.: $0 - 10^3$, $10^3 - 10^4$, $10^4 - 10^5$, $10^5 - 10^6$, 10^6

SUPPLY AQUIFER (TENS / UNITS) | OTHER AQUIFER PRESENT (TENS / UNITS) | OTHER AQUIFER PRESENT (TENS / UNITS)

VISIrecord® 12708

992

LOG

FROM	TO	DESCRIPTION	NAME
0	10	brown clay, sand & rocks	
10	42	hard clay - yellowish - then light brown.	
42	64	hard grey clay	
64	86	slate, white & black rock W.B.	
86	105	hard clay & white lime	

SAMPLE No. ______ DATE ______

LAB. ______

COLIFORM ORGANISMS ______

TOTAL BACTERIA ______

COLOUR ______ ODOUR ______

TASTE ______

PUMPING TEST SUMMARY

TEST BY ______

DATE ______ FILE No. ______

SPECIFIC CAPACITY ______ PERMIABILITY ______

STORAGE COEFF ______ TRANSMISSIBILITY ______

REMARKS bailed 5 g.p.m.
thick black water - never cleared

OTHER DATA

SIZE ANALYSIS, ETC. ______

CARD BY AA. DATE Dec 68

SOURCES INFORMATION Okanagan Rotary Water Wells

ANALYSIS

	PPM
Total Hardness	
Carbonate Hard	
Magnesium Hard	
Fe	
SO_2	
Ca	
Mg	
Na	
K	
HCO_3	
CO_3	
Cl	
SO_4	
NO_3	
B	
E	
Total Dis-solids	
Total Alkalinity	
Suspended Solids	
Ph	

Groundwater Wells and Aquifers

Well Summary

Well Tag Number: 23247
Well Identification Plate Number:
Owner Name: CHARLES PROKES
Intended Water Use: Not Applicable
Artesian Condition: No

Well Status: New
Well Class: Unknown
Well Subclass:
Aquifer Number: 464
Technical Report: N/A

Observation Well Number:
Observation Well Status:
Environmental Monitoring System (EMS) ID:
Alternative specs submitted: No
Drinking Water Area Indicator: No

Licensing Information

Licensed Status: Unlicensed

Licence Number:

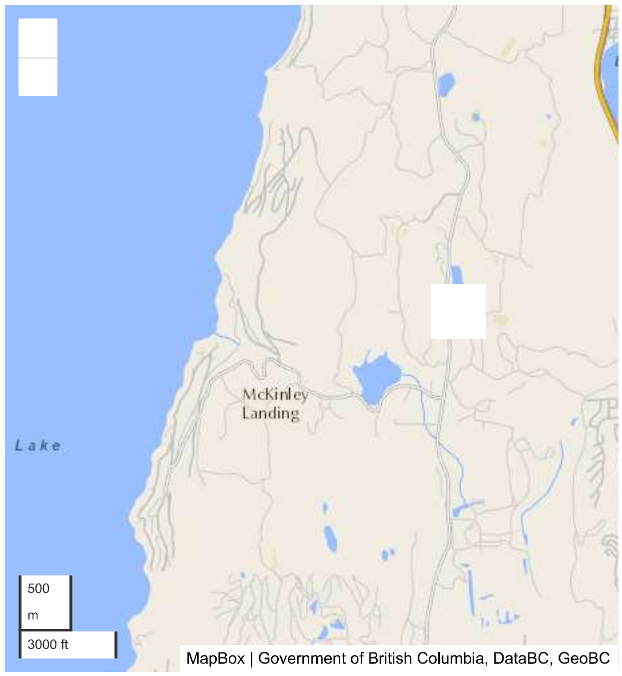
Location Information

Street Address: GLENMORE RD
Town/City: KELOWNA

Legal Description:

Lot	A
Plan	22105
District Lot	
Block	
Section	21
Township	23
Range	
Land District	41
Property Identification Description (PID)	

Description of Well Location:



Geographic Coordinates - North American Datum of 1983 (NAD 83)

Latitude: 49.97374
UTM Easting: 326215
Zone: 11

Longitude: -119.4237
UTM Northing: 5538526
Coordinate Acquisition Code: (100 m accuracy) Digitized from old Dept. of Lands, Forests and Water Resources maps

Well Activity

Activity	Work Start Date	Work End Date	Drilling Company	Date Entered
Legacy record	1970-01-26	1970-01-26	Oasis Drilling	August 13th 2003 at 11:01 AM

Well Work Dates

Start Date of Construction	End Date of Construction	Start Date of Alteration	End Date of Alteration	Start Date of Decommission	End Date of Decommission
1970-01-26	1970-01-26				

Well Completion Data

Total Depth Drilled:
Finished Well Depth: 37 ft bgl
Final Casing Stick Up:
Depth to Bedrock: 34 feet bgl
Ground elevation:

Estimated Well Yield: 9 USgpm
Well Cap:
Well Disinfected Status: Not Disinfected
Drilling Method: Other
Method of determining elevation: Unknown

Static Water Level (BTOC): 8 feet btoc
Artesian Flow:
Artesian Pressure (head):
Artesian Pressure (PSI):
Orientation of Well: VERTICAL

Lithology

From (ft bgl)	To (ft bgl)	Raw Data	Description	Moisture	Colour	Hardness	Observations	Water Bearing Flow Estimate (USGPM)
0	1	topsoil						
1	7	oxidized till						
7	9	oxidized sand						
9	16	clay and boulders						
16	34	gravel (med. - coarse)					W.B.	
34	37	bedrock						

Casing Details

From (ft bgl)	To (ft bgl)	Casing Type	Casing Material	Diameter (in)	Wall Thickness (in)	Drive Shoe
There are no records to show						

Surface Seal and Backfill Details

Surface Seal Material:
Surface Seal Installation Method:
Surface Seal Thickness:
Surface Seal Depth:

Backfill Material Above Surface Seal:
Backfill Depth:

Liner Details

Liner Material:
Liner Diameter:
Liner from:

Liner Thickness:
Liner to:

Liner perforations

From (ft bgl)	To (ft bgl)
There are no records to show	

Screen Details

Intake Method:
Type:
Material:
Opening:
Bottom:

Installed Screens

From (ft bgl)	To (ft bgl)	Diameter (in)	Assembly Type	Slot Size
There are no records to show				

Well Development

Developed by:

Development Total Duration:

Well Yield

Estimation Method:
Static Water Level Before Test:
Hydrofracturing Performed: No

Estimation Rate:
Drawdown:
Increase in Yield Due to Hydrofracturing:

Estimation Duration:

Well Decommission Information

Reason for Decommission:
Sealant Material:
Decommission Details:

Method of Decommission:
Backfill Material:

Pumping Test Information and Aquifer Parameters

Start Date Pumping Test	Pumping Test Description	Test Duration (min)	Boundary Effect	Storativity	Transmissivity (m^2/day)	Hydraulic Conductivity (m/day)	Specific Yield	Specific Capacity (L/s/m)	Analysis Method	Comments
There are no records to show										

Comments

METHOD OF DRILLING = DRILLED. ESTIMATED YIELD: 9 GALS/MIN. SLOTTED PIPE.

Documents

- WTN 23247_Well Record.pdf

Disclaimer

Groundwater Wells and Aquifers

Well Summary

Well Tag Number: 71857
Well Identification Plate Number:
Owner Name: PESCHEL OTTO
Intended Water Use: Not Applicable
Artesian Condition: No

Well Status: New
Well Class: Unknown
Well Subclass:
Aquifer Number:
Technical Report: N/A

Observation Well Number:
Observation Well Status:
Environmental Monitoring System (EMS) ID:
Alternative specs submitted: No
Drinking Water Area Indicator: No

Licensing Information

Licensed Status: Unlicensed
Licence Number:

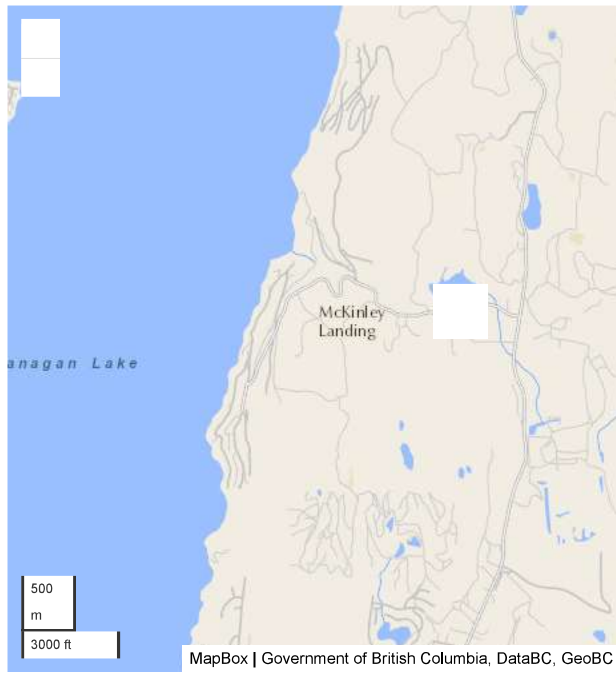
Location Information

Street Address: MCKINLEY RESERVOIR
Town/City: WINFIELD

Legal Description:

Lot	A
Plan	19023
District Lot	
Block	
Section	21
Township	23
Range	
Land District	41
Property Identification Description (PID)	

Description of Well Location: MCKINLEY RESERVOIR



Geographic Coordinates - North American Datum of 1983 (NAD 83)
Latitude: 49.966851
Longitude: -119.433309
UTM Easting: 325501
UTM Northing: 5537783
Zone: 11
Coordinate Acquisition Code: (unknown, accuracy based on parcel size) No ICF cadastre, poor or no location sketch; site located in center of primary parcel

Well Activity

Activity	Work Start Date	Work End Date	Drilling Company	Date Entered
Legacy record	1979-06-19		Okanagan Water Well Drilling	August 13th 2003 at 9:05 AM

Well Work Dates

Start Date of Construction	End Date of Construction	Start Date of Alteration	End Date of Alteration	Start Date of Decommission	End Date of Decommission
1979-06-19					

Well Completion Data

Total Depth Drilled:
Finished Well Depth: 500 ft bgl
Final Casing Stick Up:
Depth to Bedrock:
Ground elevation:

Estimated Well Yield:
Well Cap:
Well Disinfected Status: Not Disinfected
Drilling Method: Other
Method of determining elevation: Unknown

Static Water Level (BTOC):
Artesian Flow:
Artesian Pressure (head):
Artesian Pressure (PSI):
Orientation of Well: VERTICAL

Lithology

From (ft bgl)	To (ft bgl)	Raw Data	Description	Moisture	Colour	Hardness	Observations	Water Bearing Flow Estimate (USGPM)
0	500	ROCK HOLE	0 nothing entered		0 nothing entered			

Casing Details

From (ft bgl)	To (ft bgl)	Casing Type	Casing Material	Diameter (in)	Wall Thickness (in)	Drive Shoe
There are no records to show						

Surface Seal and Backfill Details

Surface Seal Material: Other
Surface Seal Installation Method:
Surface Seal Thickness:
Surface Seal Depth:

Backfill Material Above Surface Seal:
Backfill Depth:

Liner Details

Liner Material:
Liner Diameter:
Liner from:

Liner Thickness:
Liner to:

Liner perforations

From (ft bgl)	To (ft bgl)
There are no records to show	

Screen Details

Intake Method:
Type:
Material: Other
Opening:
Bottom:

Installed Screens

From (ft bgl)	To (ft bgl)	Diameter (in)	Assembly Type	Slot Size
There are no records to show				

Well Development

Developed by:

Development Total Duration:

Well Yield

Estimation Method:
Static Water Level Before Test:
Hydrofracturing Performed: No

Estimation Rate:
Drawdown:
Increase in Yield Due to Hydrofracturing:

Estimation Duration:

Well Decommission Information

Reason for Decommission:
Sealant Material:
Decommission Details:

Method of Decommission:
Backfill Material:

Pumping Test Information and Aquifer Parameters

Start Date Pumping Test	Pumping Test Description	Test Duration (min)	Boundary Effect	Storativity	Transmissivity (m^2/day)	Hydraulic Conductivity (m/day)	Specific Yield	Specific Capacity (L/s/m)	Analysis Method	Comments
There are no records to show										

Comments

NOT CASED. VERY LITTLE H20. METHOD OF DRILLING = DRILLED

Documents

- WTN 71857_Well Record.pdf

Disclaimer

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Okanagan Water Well Drilling Ltd.

3706 - 24th AVENUE • VERNON, B.C. V1T 1L9 • PHONE 542-7827

Date June 19 1979

Phone

NAME Otto Peschel

ADDRESS P.O.B. 1114 Kelowna

Lot 11 Bl Sec 21 Twp 23

Plan 10033 L.D. 41 ODYD

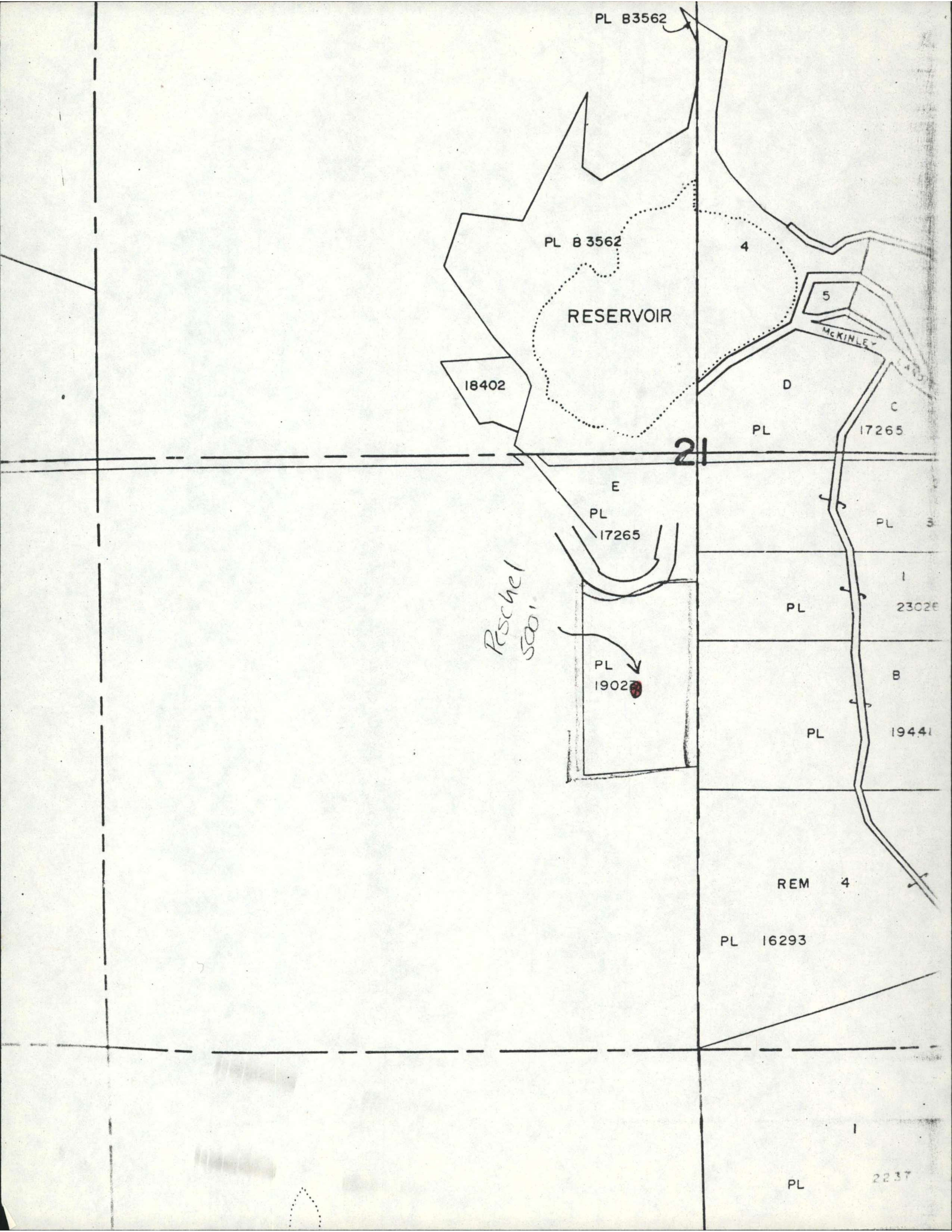
DESCRIPTION	PRICE PER	AMOUNT
0 rock hole (charge for 500') half to be paid for by Otto Peschel	$1350	$3325.00
Mathilde O. Peschel		
Drilled at the Winfield water reservoir		

RECEIVED IN GOOD ORDER

TAX	
TOTAL	$3325.00

ORDER NO. | CASH | CHEQUE

TERMS: DEPOSIT OF 25% ON COMPLETION



PL B3562
PL B 3562
4
5
RESERVOIR
McKINLEY
18402
D
C
PL
17265
21
E
PL
17265
PL
3
1
PL
23028
Pischel
500'
PL
19028
B
PL
19441
REM
4
PL
16293
1
PL
2237

82E 093423 WTN 71857 #3

WATER WELL RECORD

DEPT. OF ENVIRONMENT, WATER RESOURCES SERVICE, WATER INVESTIGATIONS BRANCH — VICTORIA, BRITISH COLUMBIA

Z ___ WELL NO. ___ E ___ N ___

Z X Y NO.

LEGAL DESCRIPTION: LOT A SEC. 21 TP. 23 R. ___ D.L. ___ LAND DISTRICT 050Y005 PLAN 19023

DESCRIPTIVE LOCATION MCKINLEY RESERVOIR LICENCE NO. ___ DATE ___

OWNER'S NAME OTTO PESCHEL ADDRESS P.O. BOX 1114 KELOWNA

DRILLER'S NAME OKANAGAN WATER WELL ADDRESS ___ DATE COMPLETED JUNE 79 79/06/19

NAT. TOPO. SHEET NO. ___

DEPTH 500' ELEVATION OF ___ ☐ ESTIMATED ☐ SURVEYED CASING DIAM. ___ LENGTH ___

METHOD OF CONSTRUCTION DRILLED CASING DIAM ___ LENGTH ___

SCREEN LOCATION ___ SCREEN ☐ SIZE ___ LENGTH ___ TYPE ___

SANITARY SEAL YES ☐ NO ☐ SCREEN ☐ SIZE ___ LENGTH ___ TYPE ___

PERFORATED CASING ☐ LENGTH ___ PERFORATIONS FROM ___ TO ___

GRAVEL PACK ☐ LENGTH ___ DIAM. ___ SIZE GRAVEL, ETC. ___

DISTANCE TO WATER ___ ☐ ESTIMATED WATER LEVEL

FROM ___ ☐ MEASURED ELEVATION ___ ARTESIAN PRESSURE ___

DATE OF WATER LEVEL MEASUREMENT ___ WATER USE ___

PRODUCTION TEST SUMMARY

DATE ___

TEST BY ___

BAIL TEST ☐ PUMP TEST ☐ DURATION OF TEST ___

RATE ___ DRAWDOWN ___

WATER LEVEL AT COMPLETION OF TEST ___

AVAILABLE DRAWDOWN ___ SPECIFIC CAPACITY ___

PERMEABILITY ___ STORAGE COEFF. ___

TRANSMISSIVITY ___

RECOMMENDED PUMPING RATE ___

RECOMMENDED PUMP SETTING ___

LITHOLOGY

FROM	TO	DESCRIPTION
0	500'	ROCK HOLE.

Tried 4 wells on this property very little water in any of them. well not cased.

CHEMISTRY

TEST BY ___ DATE ___

TOTAL DISSOLVED SOLIDS ___ mg/l TEMPERATURE ___ °C pH ___ SILICA (SiO_2) ___ mg/l

CONDUCTANCE ___ μmhos/cm AT 25°C TOTAL IRON (Fe) ___ mg/l TOTAL HARDNESS ($CaCO_3$) ___ mg/l

TOTAL ALKALINITY ($CaCO_3$) ___ mg/l PHEN. ALKALINITY ($CaCO_3$) ___ mg/l MANGANESE (Mn) ___ mg/l

COLOUR ___ ODOUR ___ TURBIDITY ___

ANIONS	mg/l	epm
CARBONATE (CO_3)		
BICARBONATE (HCO_3)		
SULPHATE (SO_4)		
CHLORIDE (Cl)		
$NO_2 + NO_3$ (NITROGEN)		
* TKN. (NITROGEN)		
PHOSPHORUS (P)		

CATIONS	mg/l	epm
CALCIUM (Ca)		
MAGNESIUM (Mg)		
SODIUM (Na)		
POTASSIUM (K)		
IRON (DISSOLVED)		

* TKN = TOTAL KJELDAHL NITROGEN CHEMISTRY SITE NO. ___

NO_2 = NITRITE NO_3 = NITRATE

007171

CHEMISTRY FIELD TESTS

TEST BY ___ DATE ___ EQUIPMENT USED ___

CONTENTS OF FOLDER

☐ DRILL LOG ☐ PUMP TEST DATA ☐ CHEMICAL ANALYSIS

☐ SIEVE ANALYSIS ☐ GEOPHYSICAL LOGS ☐ REPORT

OTHER ___

SOURCES OF INFORMATION DRILLER

NORTH

WEST

EAST

SOUTH

CARD BY P.J.W. DATE Jan. 21, 1980

ADDITIONAL DATA ADDED BY

REMARKS

Groundwater Wells and Aquifers

Well Summary

Well Tag Number: 99677
Well Identification Plate Number:
Owner Name: D G FLINTOFT
Intended Water Use: Private Domestic
Artesian Condition: No

Well Status: Closure
Well Class: Water Supply
Well Subclass: Not Applicable
Aquifer Number: 467
Technical Report: N/A

Observation Well Number:
Observation Well Status:
Environmental Monitoring System (EMS) ID:
Alternative specs submitted: No
Drinking Water Area Indicator: No

Licensing Information

Licensed Status: Unlicensed

Licence Number:

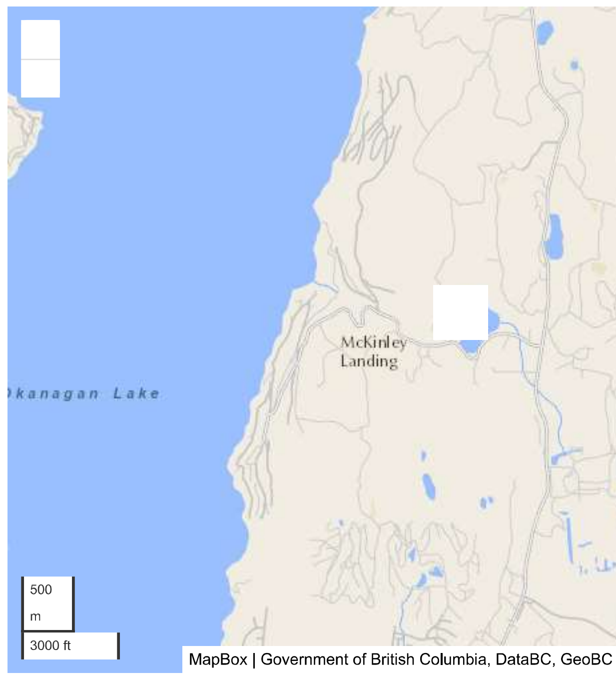
Location Information

Street Address: 2010 MCKINLEY ROAD
Town/City: KELOWNA

Legal Description:

Lot	A
Plan	18402
District Lot	
Block	
Section	21
Township	23
Range	
Land District	41
Property Identification Description (PID)	008249334

Description of Well Location: SW CORNER OF LOT



Geographic Coordinates - North American Datum of 1983 (NAD 83)
Latitude: 49.9693
Longitude: -119.4361
UTM Easting: 325310
UTM Northing: 5538062
Zone: 11
Coordinate Acquisition Code: (10 m accuracy) Handheld GPS with accuracy of +/- 10 metres

Well Activity

Activity	Work Start Date	Work End Date	Drilling Company	Date Entered
Decommission report	2018-10-10	2018-10-10		February 21st 2020 at 1:35 PM
Legacy record	2005-08-15	2005-08-15		February 22nd 2010 at 8:07 AM

Well Work Dates

Start Date of Construction	End Date of Construction	Start Date of Alteration	End Date of Alteration	Start Date of Decommission	End Date of Decommission
2005-08-15	2005-08-15			2018-10-10	2018-10-10

Well Completion Data

Total Depth Drilled: 13.5 ft bgl
Finished Well Depth: 13.5 ft bgl
Final Casing Stick Up: 18 inches
Depth to Bedrock:
Ground elevation: 489.4 feet

Estimated Well Yield:
Well Cap: WOOD FRAME ON CONCRETE LID
Well Disinfected Status: Not Disinfected
Drilling Method:
Method of determining elevation: GPS

Static Water Level (BTOC): 7 feet btoc
Artesian Flow:
Artesian Pressure (head):
Artesian Pressure (PSI):
Orientation of Well: VERTICAL

Lithology

From (ft bgl)	To (ft bgl)	Raw Data	Description	Moisture	Colour	Hardness	Observations	Water Bearing Flow Estimate (USGPM)
0	2	SILT, TILL						
2	13	SAND, SILT, GRAVEL						
13	13.5	HARDPAN LAYER						

Casing Details

From (ft bgl)	To (ft bgl)	Casing Type	Casing Material	Diameter (in)	Wall Thickness (in)	Drive Shoe
0	13.5		Open hole	36		Not Installed

Surface Seal and Backfill Details

Surface Seal Material:
Surface Seal Installation Method:
Surface Seal Thickness:
Surface Seal Depth:

Backfill Material Above Surface Seal:
Backfill Depth:

Liner Details

Liner Material:
Liner Diameter:
Liner from:

Liner Thickness:
Liner to:

Liner perforations

From (ft bgl)	To (ft bgl)
There are no records to show	

Screen Details

Intake Method:
Type:
Material:
Opening:
Bottom:

Installed Screens

From (ft bgl)	To (ft bgl)	Diameter (in)	Assembly Type	Slot Size
There are no records to show				

Well Development

Developed by: Pumping

Development Total Duration:

Well Yield

Estimation Method:
Static Water Level Before Test:
Hydrofracturing Performed: No

Estimation Rate:
Drawdown:
Increase in Yield Due to Hydrofracturing:

Estimation Duration:

Well Decommission Information

Reason for Decommission: HOOKED TO GEID DOMESTIC
Sealant Material: BENTONITE
Decommission Details: CONCRETE RINGS LEFT IN PLACE

Method of Decommission: POURED

Backfill Material: RIVER ROCK

Pumping Test Information and Aquifer Parameters

Start Date Pumping Test	Pumping Test Description	Test Duration (min)	Boundary Effect	Storativity	Transmissivity (m^2/day)	Hydraulic Conductivity (m/day)	Specific Yield	Specific Capacity (L/s/m)	Analysis Method	Comments
There are no records to show										

Comments

MEASUREMENTS FROM GROUND LEVEL. RECOMMENDED PUMP TYPE: JET PUMP. METHOD OF DRILLING: BACK HOE. WELL DEVELOPED IN 1969 WHEN HOUSE WAS BUILT. NO RECORD OF THESE WORKS. WELL HAS BEEN IN USE SINCE 1969. FLUCT RATES WITH LOW WATER YEARS BUT HAS NEVER RUN DRY.

Documents

- WTN 99677_Well Decommission.PNG
- WTN 99677_Well Decommission.pdf

Disclaimer

Province of British Columbia
Water Act

ORDER

Section 39 of the
Water Act of British Columbia
RSBC 1996, Chap. 483

File Numbers: 0254102, 0281437 & 0370025

IN THE MATTER OF Conditional Water Licence No. 029197, Conditional Water Licence No. 034631 and Conditional Water Licence No. 061861 held by the Glenmore-Ellison Improvement District (herein referred to as GEID), which authorizes the storage behind the McKinley Reservoir Dam from Kelowna Creek.

WHEREAS the GEID plans the following construction for the McKinley Dam Headworks Upgrade Project which can be categorized as:

1. Construction of a new intake structure including concrete work, inlet pipe fittings, and trashrack,
2. Excavation through existing dam at high elevation for pipe installation,
3. Construction of an intake valve chamber,
4. Installation of a 900 mm diameter Ductile Iron intake pipe along the upstream face of the dam, through the dam, and along the downstream dam face, including required earthwork, trenching and backfilling, and
5. Construction of a valve chamber at downstream toe of dam.

WHEREAS the GEID requests authorization to proceed with the McKinley Dam Headworks Upgrade Project; and

WHEREAS the GEID has submitted the following design documents of the proposed work:

1. McKinley Reservoir Dam Improvements, Predesign Report, dated May 2003, by Ker Wood Leidal Associates Ltd. (herein referred to as KWL),
2. McKinley Reservoir Dam Improvements, Technical Memorandum (Predesign Report Update), dated September 22, 2003, by KWL,
3. Preliminary Design Plans, Drawing Set No. 2028-008, revision 0, dated September 2003, by KWL, and
4. Contract No. 2028-008A documents, technical specifications and supervision plan., dated September 2003, by KWL..

WHEREAS a Senior Dam Safety Officer from the Dam Safety Section has reviewed and approved the plans for the upgrade.

NOW THEREFORE pursuant to Section 39 of the *Water Act* of British Columbia, RSBC 1996, Chap. 483, and pursuant to the Dam Safety Regulation, BC Reg. 44/2000, OIC 131/2000, I, Glen Davidson, P.Eng., Deputy Comptroller of Water Rights, hereby order that Glenmore-Ellison Irrigation District has authorization to proceed with the McKinley Dam Headworks Upgrade subject to the following conditions:

1. Signed Final Design Plans, KWL Drawing Set No. 2028-008, are to be submitted to the Dam Safety Officer for authorization to proceed,
2. Existing McKinley Dam and Balancing Reservoir Operation, Maintenance and Surveillance Manual and Emergency Preparedness Plan is to be upgraded following completion of the McKinley Dam Headworks Upgrade Project,
3. Changes, of a minor nature, may be made to the design provided that they are signed off by the Project Engineer, and
4. Drawings of record are to be produced on completion of the project and kept with the records of the dam and an electronic (pdf) copy of the drawing of record sent to the Dam Safety Officer for our files.

THIS ORDER does not relieve you of obtaining all other permits and approvals from all other agencies.

THIS ORDER is dated at Victoria, British Columbia this 7th day of October, 2003.

Glen Davidson, P.Eng
Deputy Comptroller of Water Rights

WATER RESOURCES SERVICE
WATER RIGHTS BRANCH

DEPARTMENT OF LANDS, FORESTS, AND WATER RESOURCES

THE PROVINCE OF BRITISH COLUMBIA—WATER ACT

CONDITIONAL WATER LICENCE

Glenmore Irrigation District of 1481 Water Street, Kelowna, B. C.

is/are hereby authorized to store water as follows:—

(*a*) The source(s) of the water-supply is/are Kelowna Creek and storage in Glenmore balancing reservoir.

(*b*) The point(s) of storage is/are located as shown on the attached plan.

(*c*) The date from which this licence shall have precedence is 17th July, 1968.

(*d*) The purpose for which the water is to be used is as set out in Conditional Water Licence No. 15908.

(*e*) The maximum quantity of water which may be stored is 35 acre feet per annum, and such additional quantity as the Engineer may from time to time determine should be allowed for losses.

(*f*) The period of the year during which the water may be stored is 1st October to 15th June.

(*g*) The land upon which the water is to be used and to which this licence is appurtenant is as set out in Conditional Water Licence No. 15908.

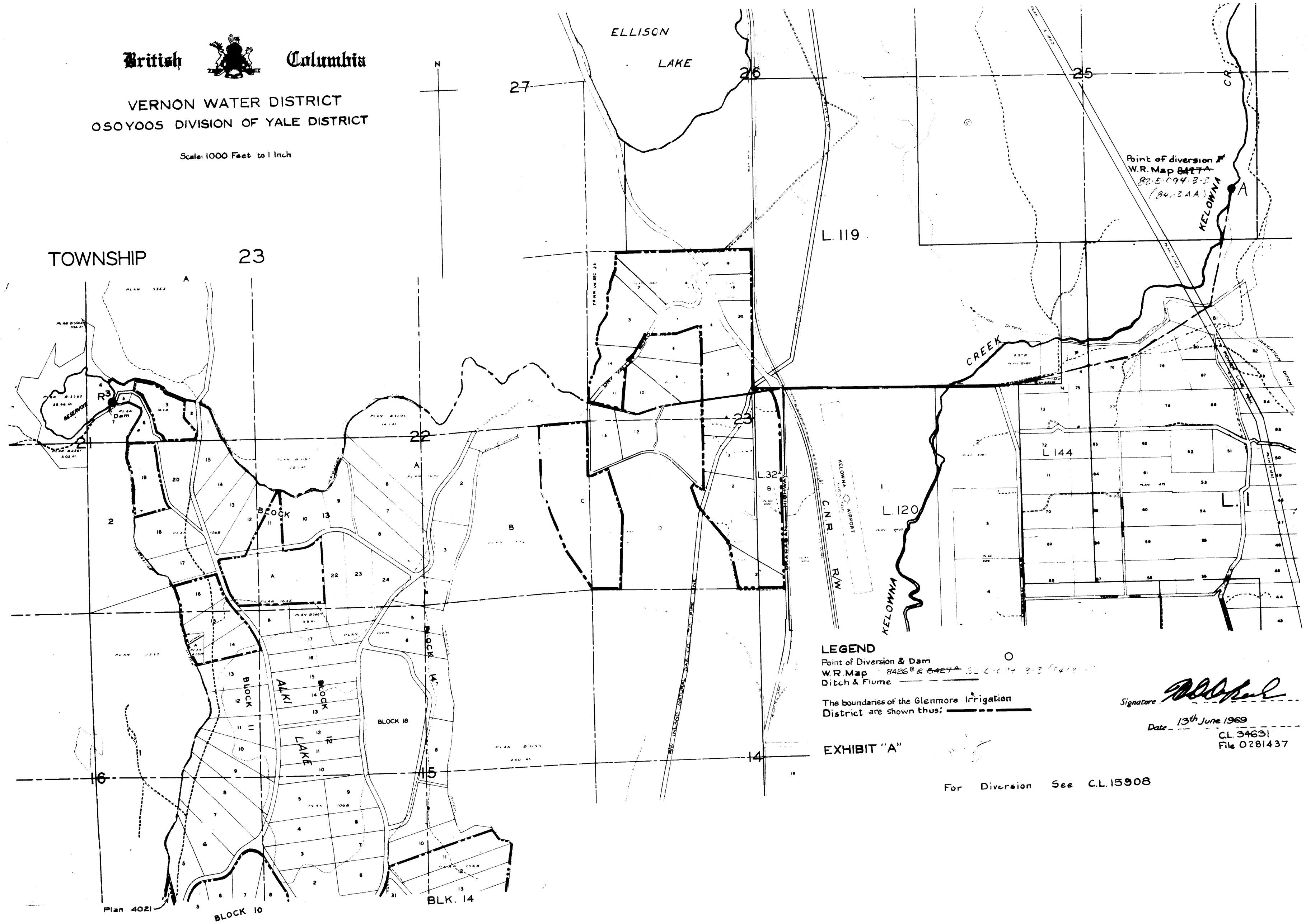
(*h*) The works authorized to be constructed are ditch, flume and dam, and they shall be located approximately as shown on the attached plan.

(*i*) The construction of the said works has been completed and the water shall be beneficially used on or before the 31st day of December, 1971.

ENTERED ON
Map No. 8426B 8427A
By

H. D. DeBeck,
Comptroller of Water Rights.

File No. 0281437 Date issued: 13 June 1969 Conditional Licence No. 34631


British Columbia
VERNON WATER DISTRICT
OSOYOOS DIVISION OF YALE DISTRICT
Scale: 1000 Feet to 1 Inch
TOWNSHIP 23
ELLISON LAKE
L. 119
L. 120
L. 144
L. 1
L. 32
KELOWNA CREEK
C.N.R. R/W
KELOWNA AIRPORT
ALKI LAKE
BLOCK 11
BLOCK 13
BLOCK 14
BLOCK 18
BLOCK 10
BLK. 14
Plan 4021
R3
Dam
Point of diversion A
W.R. Map 8427A
82.E.094.3.2 (84.3AA)
LEGEND
Point of Diversion & Dam
W.R. Map 8426B & 8427A
Ditch & Flume
The boundaries of the Glenmore Irrigation District are shown thus:
EXHIBIT "A"
Signature
Date 13th June 1969
C.L. 34631
File 0281437
For Diversion See C.L. 15908

Province of British Columbia
Water Act

ORDER

Section 39 of the
Water Act of British Columbia
RSBC 1996, Chap. 483

File Numbers: 0254102, 0281437 & 0370025

IN THE MATTER OF Conditional Water Licence No. 029197, Conditional Water Licence No. 034631 and Conditional Water Licence No. 061861 held by the Glenmore-Ellison Improvement District (herein referred to as GEID), which authorizes the storage behind the McKinley Reservoir Dam from Kelowna Creek.

WHEREAS the GEID plans the following construction for the McKinley Dam Headworks Upgrade Project which can be categorized as:

1. Construction of a new intake structure including concrete work, inlet pipe fittings, and trashrack,
2. Excavation through existing dam at high elevation for pipe installation,
3. Construction of an intake valve chamber,
4. Installation of a 900 mm diameter Ductile Iron intake pipe along the upstream face of the dam, through the dam, and along the downstream dam face, including required earthwork, trenching and backfilling, and
5. Construction of a valve chamber at downstream toe of dam.

WHEREAS the GEID requests authorization to proceed with the McKinley Dam Headworks Upgrade Project; and

WHEREAS the GEID has submitted the following design documents of the proposed work:

1. McKinley Reservoir Dam Improvements, Predesign Report, dated May 2003, by Ker Wood Leidal Associates Ltd. (herein referred to as KWL),
2. McKinley Reservoir Dam Improvements, Technical Memorandum (Predesign Report Update), dated September 22, 2003, by KWL,
3. Preliminary Design Plans, Drawing Set No. 2028-008, revision 0, dated September 2003, by KWL, and
4. Contract No. 2028-008A documents, technical specifications and supervision plan., dated September 2003, by KWL..

WHEREAS a Senior Dam Safety Officer from the Dam Safety Section has reviewed and approved the plans for the upgrade.

NOW THEREFORE pursuant to Section 39 of the *Water Act* of British Columbia, RSBC 1996, Chap. 483, and pursuant to the Dam Safety Regulation, BC Reg. 44/2000, OIC 131/2000, I, Glen Davidson, P.Eng., Deputy Comptroller of Water Rights, hereby order that Glenmore-Ellison Irrigation District has authorization to proceed with the McKinley Dam Headworks Upgrade subject to the following conditions:

1. Signed Final Design Plans, KWL Drawing Set No. 2028-008, are to be submitted to the Dam Safety Officer for authorization to proceed,
2. Existing McKinley Dam and Balancing Reservoir Operation, Maintenance and Surveillance Manual and Emergency Preparedness Plan is to be upgraded following completion of the McKinley Dam Headworks Upgrade Project,
3. Changes, of a minor nature, may be made to the design provided that they are signed off by the Project Engineer, and
4. Drawings of record are to be produced on completion of the project and kept with the records of the dam and an electronic (pdf) copy of the drawing of record sent to the Dam Safety Officer for our files.

THIS ORDER does not relieve you of obtaining all other permits and approvals from all other agencies.

THIS ORDER is dated at Victoria, British Columbia this 7th day of October, 2003.

Glen Davidson, P.Eng
Deputy Comptroller of Water Rights

WATER MANAGEMENT BRANCH

MINISTRY OF ENVIRONMENT & Parks

THE PROVINCE OF BRITISH COLUMBIA—WATER ACT

CONDITIONAL WATER LICENCE

Glenmore Irrigation District of R. R. #1, Glenmore Road, Kelowna, B. C. V1Y 7P9

is hereby authorized to divert and store water as follows:

(a) The stream on which the rights are granted is Kelowna Creek and the reservoir is McKinley Reservoir.

(b) The point of storage is located as shown on the attached plan.

(c) The date from which this licence shall have precedence is 5th March, 1982.

(d) The purpose for which this licence is issued is as set out in Conditional Water Licence 61860.

(e) The maximum quantity of water which may be diverted into storage is 182 acre feet per annum.

(f) The period of the year during which the water may be stored is 1st October to 30th June.

(g) The land upon which the water is to be used and to which this licence is appurtenant is as set out in Conditional Water Licence.

(h) The works authorized to be constructed are dam and reservoir, which shall be located approximately as shown on the attached plan.

(i) The construction of the said works shall be completed and the water beneficially used prior to the 31st day of December, 1990. Thereafter, the licensee shall continue to make a regular beneficial use of water in the manner authorized herein.

(j) Construction of the dam authorized under clause (h) hereof shall not be commenced until plans of same have been submitted to and approved by the Comptroller of Water Rights.

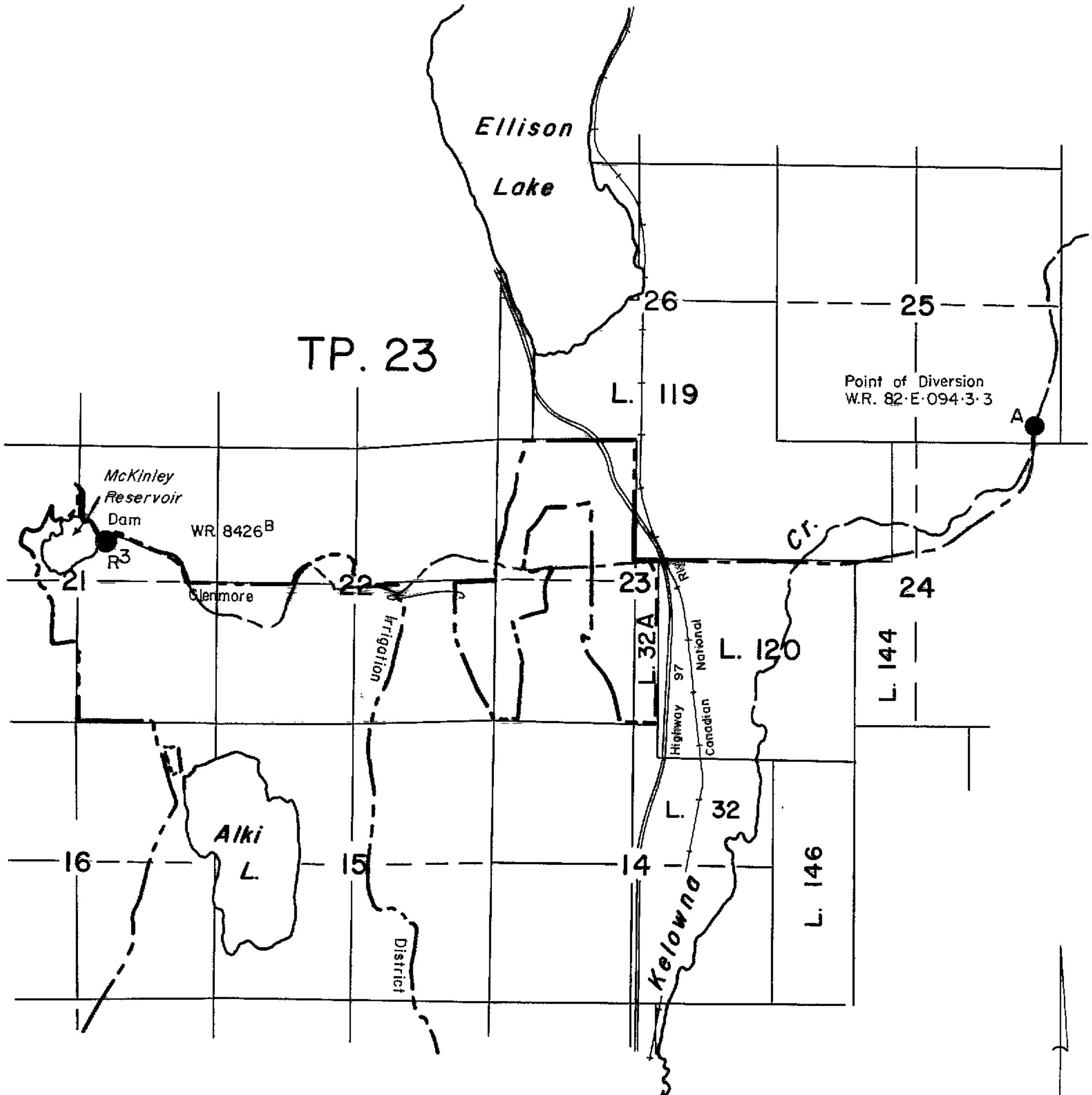
(k) The reservoir area shall be cleared and the debris disposed of in such a manner and extent as directed by the Comptroller of Water Rights.

J. E. Farrell
Deputy Comptroller of Water Rights

File No. 0370025 Date issued: 30th January, 1987 CONDITIONAL LICENCE 61861

W-183

Province of British Columbia



WATER DISTRICT : VERNON
PRECINCT : KELOWNA
LAND DISTRICT : OSOYOOS DIVISION OF YALE

Signature ....
Date ..... January 30, 1987

LEGEND

Scale : 40 Chains to 1 Inch
Point of Diversion, Dam : ●
Map Number : WR 82·E·094·3·3, WR. 8426^{B}
Pipe : ——— — ———

C.L. 61861
File 0370025

For Diversion See C.L. 61860

Province of British Columbia
Water Act

ORDER

Section 39 of the
Water Act of British Columbia
RSBC 1996, Chap. 483

File Numbers: 0254102, 0281437 & 0370025

IN THE MATTER OF Conditional Water Licence No. 029197, Conditional Water Licence No. 034631 and Conditional Water Licence No. 061861 held by the Glenmore-Ellison Improvement District (herein referred to as GEID), which authorizes the storage behind the McKinley Reservoir Dam from Kelowna Creek.

WHEREAS the GEID plans the following construction for the McKinley Dam Headworks Upgrade Project which can be categorized as:

1. Construction of a new intake structure including concrete work, inlet pipe fittings, and trashrack,
2. Excavation through existing dam at high elevation for pipe installation,
3. Construction of an intake valve chamber,
4. Installation of a 900 mm diameter Ductile Iron intake pipe along the upstream face of the dam, through the dam, and along the downstream dam face, including required earthwork, trenching and backfilling, and
5. Construction of a valve chamber at downstream toe of dam.

WHEREAS the GEID requests authorization to proceed with the McKinley Dam Headworks Upgrade Project; and

WHEREAS the GEID has submitted the following design documents of the proposed work:

1. McKinley Reservoir Dam Improvements, Predesign Report, dated May 2003, by Ker Wood Leidal Associates Ltd. (herein referred to as KWL),
2. McKinley Reservoir Dam Improvements, Technical Memorandum (Predesign Report Update), dated September 22, 2003, by KWL,
3. Preliminary Design Plans, Drawing Set No. 2028-008, revision 0, dated September 2003, by KWL, and
4. Contract No. 2028-008A documents, technical specifications and supervision plan., dated September 2003, by KWL..

WHEREAS a Senior Dam Safety Officer from the Dam Safety Section has reviewed and approved the plans for the upgrade.

NOW THEREFORE pursuant to Section 39 of the *Water Act* of British Columbia, RSBC 1996, Chap. 483, and pursuant to the Dam Safety Regulation, BC Reg. 44/2000, OIC 131/2000, I, Glen Davidson, P.Eng., Deputy Comptroller of Water Rights, hereby order that Glenmore-Ellison Irrigation District has authorization to proceed with the McKinley Dam Headworks Upgrade subject to the following conditions:

1. Signed Final Design Plans, KWL Drawing Set No. 2028-008, are to be submitted to the Dam Safety Officer for authorization to proceed,
2. Existing McKinley Dam and Balancing Reservoir Operation, Maintenance and Surveillance Manual and Emergency Preparedness Plan is to be upgraded following completion of the McKinley Dam Headworks Upgrade Project,
3. Changes, of a minor nature, may be made to the design provided that they are signed off by the Project Engineer, and
4. Drawings of record are to be produced on completion of the project and kept with the records of the dam and an electronic (pdf) copy of the drawing of record sent to the Dam Safety Officer for our files.

THIS ORDER does not relieve you of obtaining all other permits and approvals from all other agencies.

THIS ORDER is dated at Victoria, British Columbia this 7th day of October, 2003.

Glen Davidson, P.Eng
Deputy Comptroller of Water Rights

WATER RESOURCES SERVICE
WATER RIGHTS BRANCH

DEPARTMENT OF LANDS, FORESTS, AND WATER RESOURCES

THE PROVINCE OF BRITISH COLUMBIA—WATER ACT

CONDITIONAL WATER LICENCE

Glenmore Irrigation District of 1481 Water Street, Kelowna, B.C.

is/are hereby authorized to store water as follows:—

(a) The source(s) of the water-supply is/are Kelowna Creek and the reservoir is the Glenmore Balancing Reservoir.

(b) The point(s) of storage is/are located as shown on the attached plan.

(c) The date from which this licence shall have precedence is 11th December, 1963.

(d) The purpose for which the water is to be used is as set out in Conditional Water Licence No. 15908.

(e) The maximum quantity of water which may be stored is 772 acre feet per annum, and such additional quantity as the Engineer may from time to time determine should be allowed for losses.

(f) The period of the year during which the water may be stored is 1st October to 15th June.

(g) ~~The land upon which the water is to be used and to which~~ This licence is appurtenant ~~is~~ to the Irrigation Undertaking of the Glenmore Irrigation District.

(h) The works authorized to be constructed are earth fill dam,

and they shall be located approximately as shown on the attached plan.

(i) The construction of the said works has been commenced, and shall be completed and the water beneficially used on or before the 31st day of December, 1966.

ENTERED ON
Map 8401
By R.M. E.B.

Gordon J.A. Kidd,
Comptroller of Water Rights.

FILE No. 0254102 Date issued: 1 September 1964

CONDITIONAL LICENCE No. 29197

Province of British Columbia
Water Sustainability Act

CONDITIONAL WATER LICENCE

The owner of the undertaking to which this licence is appurtenant is hereby authorized to divert, use, and store water as follows:

a) The stream on which the rights are granted is Avocet Creek, and the reservoir is on the creek.

b) The point of diversion is located as shown on the attached plan.

c) The date from which this licence shall have precedence is March 10, 2008.

d) The purpose for which this licence is issued is land improvement.

e) The maximum quantity of water which may be diverted is 123,348 cubic metres per year.

f) The period of the year during which the water may be used is January 1 to December 31.

g) The undertaking upon which the water is to be used and to which this licence is appurtenant is the land improvement project of the licensee under Operation Certificate MR 12218 (Glenmore Landfill).

h) The authorized works are dam, pumphouse, pond, and pipe which shall be located approximately as shown on the attached plan.

i) The construction of the said works has been completed and the water is being beneficially used. The licensee shall continue to make regular beneficial use of the water in a manner authorized herein.

j) This Licence is issued in substitution of Conditional Water Licence C123789.

k) The dam authorized under clause (h) is subject to the Dam Safety Regulation and shall be designed, constructed and maintained to the satisfaction of a Dam Safety Officer under the *Water Sustainability Act* and in accordance with the Canadian Dam Association Guidelines.

l) This licence is issued under the *Water Sustainability Act* (the Act). The exercise of rights under the licence is subject to the Act and its regulations, the terms and conditions of the licence, orders under the Act and the rights of licensees whose rights have precedence on the stream or on an aquifer. The licensee must comply with all such requirements, as well as the provisions of all other applicable enactments. In exercising rights under the licence, the licensee must exercise reasonable care to avoid damaging land, works, trees or other property, and must make full compensation to the owners for damage or loss resulting from construction, maintenance, use, operation or failure of the works.

m) During all phases of construction and maintenance of the licenced works and related activities, the holder of this licence is subject to the habitat protection requirements, described in the document entitled *"Terms and Conditions for Construction and Maintenance of Licensed Works"* (dated March 1, 2017). Those habitat protection requirements are hereby incorporated into this licence as if written herein as licence conditions, which requirements must be implemented by the licensee in conjunction with any guidance provided by a Water Manager or Habitat Officer.

Michael Epp
Assistant Water Manager

Province of British Columbia
Water Sustainability Act

CONDITIONAL WATER LICENCE

The owner of the undertaking to which this licence is appurtenant is hereby authorized to divert, use, and store water as follows:

a) The stream on which the rights are granted is Avocet Creek, and the reservoir is on the creek.

b) The point of diversion is located as shown on the attached plan.

c) The date from which this licence shall have precedence is March 10, 2008.

d) The purpose for which this licence is issued is land improvement.

e) The maximum quantity of water which may be diverted is 123,348 cubic metres per year.

f) The period of the year during which the water may be used is January 1 to December 31.

g) The undertaking upon which the water is to be used and to which this licence is appurtenant is the land improvement project of the licensee under Operation Certificate MR 12218 (Glenmore Landfill).

h) The authorized works are dam, pumphouse, pond, and pipe which shall be located approximately as shown on the attached plan.

i) The construction of the said works has been completed and the water is being beneficially used. The licensee shall continue to make regular beneficial use of the water in a manner authorized herein.

j) This Licence is issued in substitution of Conditional Water Licence C123789.

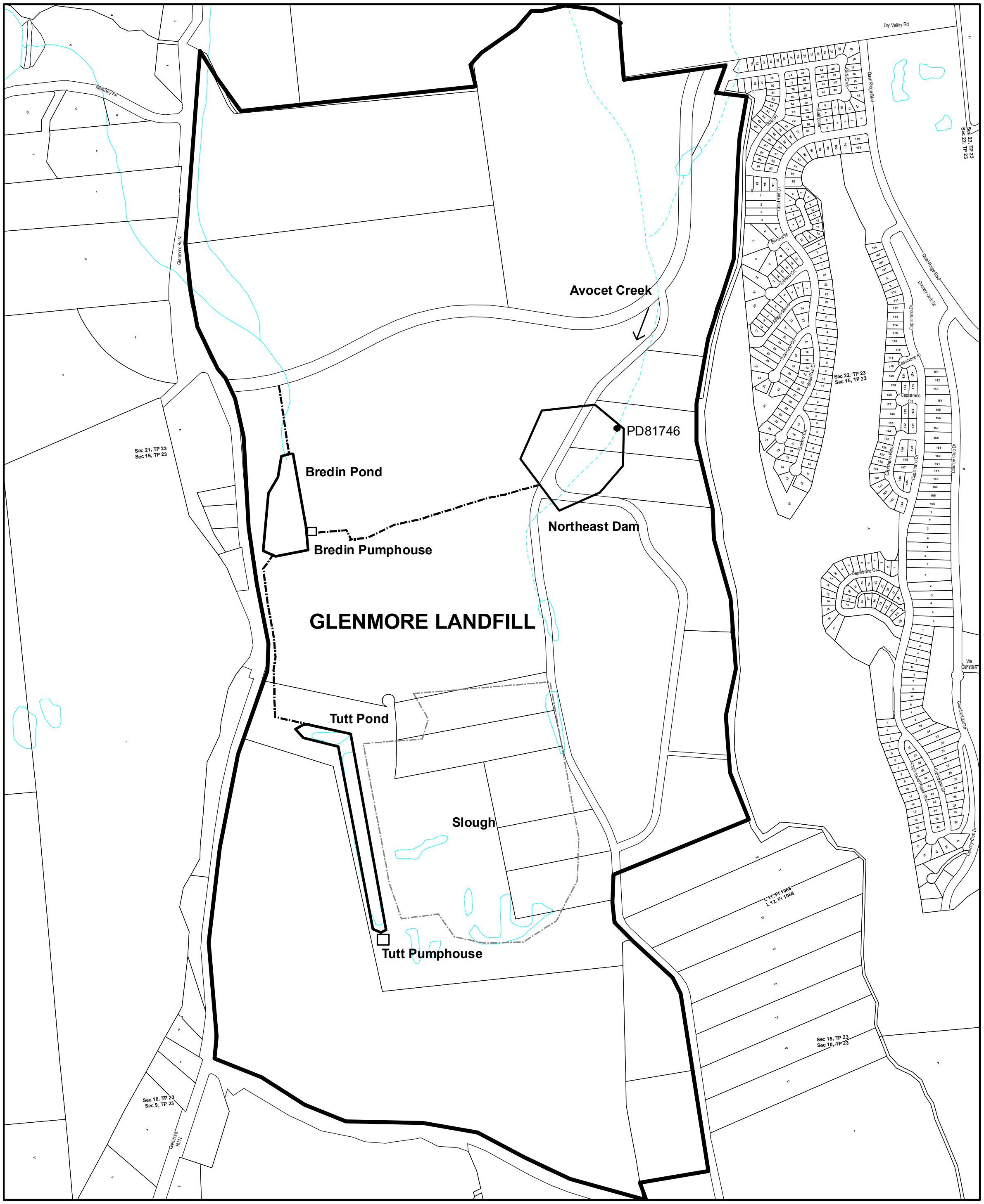
k) The dam authorized under clause (h) is subject to the Dam Safety Regulation and shall be designed, constructed and maintained to the satisfaction of a Dam Safety Officer under the *Water Sustainability Act* and in accordance with the Canadian Dam Association Guidelines.

l) This licence is issued under the *Water Sustainability Act* (the Act). The exercise of rights under the licence is subject to the Act and its regulations, the terms and conditions of the licence, orders under the Act and the rights of licensees whose rights have precedence on the stream or on an aquifer. The licensee must comply with all such requirements, as well as the provisions of all other applicable enactments. In exercising rights under the licence, the licensee must exercise reasonable care to avoid damaging land, works, trees or other property, and must make full compensation to the owners for damage or loss resulting from construction, maintenance, use, operation or failure of the works.

m) During all phases of construction and maintenance of the licenced works and related activities, the holder of this licence is subject to the habitat protection requirements, described in the document entitled *"Terms and Conditions for Construction and Maintenance of Licensed Works"* (dated March 1, 2017). Those habitat protection requirements are hereby incorporated into this licence as if written herein as licence conditions, which requirements must be implemented by the licensee in conjunction with any guidance provided by a Water Manager or Habitat Officer.

Michael Epp
Assistant Water Manager

WATER SUSTAINABILITY ACT



Water District: Vernon

Precinct: Kelowna

Land District: ODYD

Map Number: 082.E.096

Scale:1:12,000

Signature:

Date: July 31, 2018

Licence: C134394

File: 8002781

LEGEND:

Point of Diversion: ●

Pipe:

The boundaries of this land to which this licence is appurtenant are shown thus:

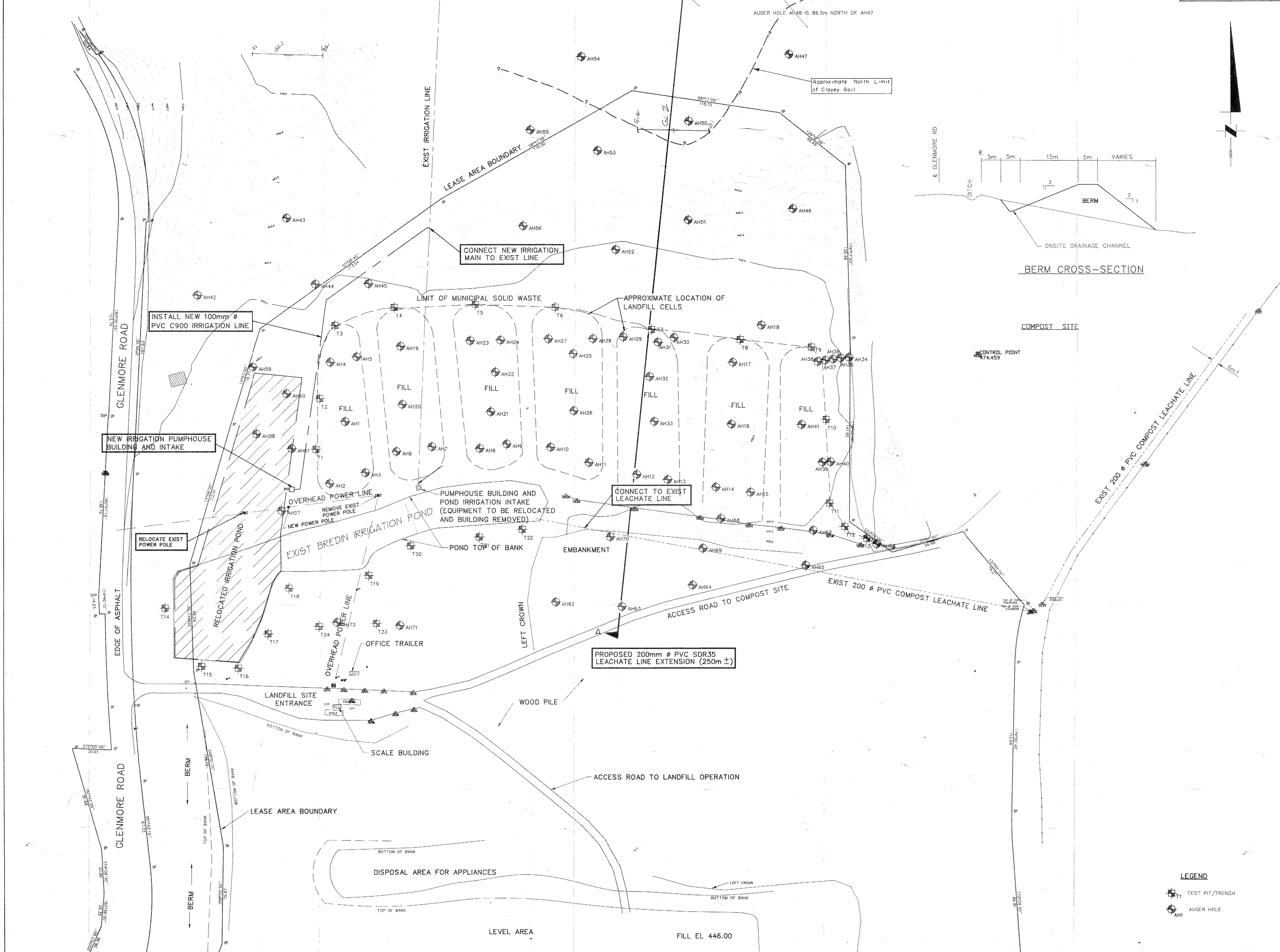
Appendix C

Stratigraphy

Appendix C.1

Stratigraphic and Instrumentation Logs

Figure 1



GOLDER ASSOCIATES Ltd. 243-1889 Springfield Road Kelowna, British Columbia V1Y-5V5	UMA Engineering Ltd. Engineers & Planners British Columbia Alberta Saskatchewan Manitoba Ontario Yukon Territory Northwest Territories	Drawn DEW Design DWT Approved Date NOV. 27, 1992 Scale 1:1000	THE CITY OF KELOWNA ENGINEERING DEPARTMENT GLENMORE LAND FILL SITE BREDIN IRRIGATION POND RELOCATION GEOTECHNICAL INVESTIGATION LOCATIONS	Job No. 1694-087 Drawing No. 1 Rev.No 0

RECORD OF BOREHOLE AH2

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

BORING DATE: Sept 9, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp W Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		438.38							
0	Topsoil (FILL).		0.00 – 438.08							
	Brown clayey SILT and silty CLAY cover (FILL).		0.30 – 437.31							
1–4	Municipal Solid Waste (FILL).		1.07 – 434.27						436.88	Sept 9, 1992 Water level based on observat-ions made at time of drilling.
4	Soft to Firm brown silty CLAY.		4.11 – 433.81							
5	Soft to firm brown clayey SILT, some sand layers.		4.57 – 432.89							
	END OF HOLE		5.49							

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Sept 9, 1992

PROJECT: Pond Relocation

PROJECT LOCATION: Glenmore Dump

PROJECT NUMBER: 922-4172

Sampler Hammer: 63.5 kg., Drop 0.76m.

RECORD OF BOREHOLE AH3

BORING DATE: Sept 9, 1992

BORING LOCATION: See Figure 1

SHEET: 1 OF 1

DATUM: Geodetic

BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp W Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		438.75							
0	Topsoil (FILL).		0.00							
	Brown clayey SILT and silty CLAY cover (FILL).		438.45 0.30							
1	Municipal Solid Waste (FILL).		438.14 0.61							Sept 9, 1992 Water level based on observations made at time of drilling.
2	Soft to Firm brown clayey SILT, some sand.		437.07 1.68							
	END OF HOLE		436.31 2.44							
3										
4										
5										
6										
7										
8										
9										
10										

DRILL RIG: Mobil P70

DRILLING CONTRACTOR: Sandwell

DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM

CHECKED: BLJM

DATE: Sept 9, 1992

RECORD OF BOREHOLE AH4

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

BORING DATE: Sept 9, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp W Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		438.86							
0	Topsoil (FILL).		0.00							
	Brown clayey SILT and silty CLAY cover (FILL).		438.56 / 0.30							
1	Municipal Solid Waste (FILL).		437.64 / 1.22							
2										Sept 9, 1992 Water level based on observations made at time of drilling.
3	Soft to Firm brown to grey silty CLAY.		435.81 / 3.05							
4	END OF HOLE		434.90 / 3.96							
5										
6										
7										
8										
9										
10										

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Sept 9, 1992

PROJECT: Pond Relocation

PROJECT LOCATION: Glenmore Dump

PROJECT NUMBER: 922-4172

Sampler Hammer: 63.5 kg., Drop 0.76m.

RECORD OF BOREHOLE AH5

BORING DATE: Sept 9, 1992

BORING LOCATION: See Figure 1

SHEET: 1 OF 1

DATUM: Geodetic

BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp W Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		439.39							
0	Topsoil (FILL).		0.00							
	Brown clayey SILT cover (FILL).		439.09 / 0.30							
1	Municipal Solid Waste (FILL).		438.53 / 0.86							Augerhole dry upon completion of drilling
2	Firm brown silty CLAY and clayey SILT.		437.87 / 1.52							
	END OF HOLE		436.95 / 2.44							
3										
4										
5										
6										
7										
8										
9										
10										

DRILL RIG: Mobil P70

DRILLING CONTRACTOR: Sandwell

DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM

CHECKED: BLJM

DATE: Sept 9, 1992

RECORD OF BOREHOLE AH6

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

BORING DATE: Sept 9, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp —o W— Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		438.75							
0	Topsoil (FILL).		0.00							
	Brown clayey SILT cover (FILL).		438.45 / 0.30							
1	Municipal Solid Waste (FILL).		437.84 / 0.91							Augerhole dry upon completion of drilling
2	Firm brown to grey clayey SILT.		437.07 / 1.68							
	END OF HOLE		436.31 / 2.44							
3										
4										
5										
6										
7										
8										
9										
10										

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Sept 9, 1992

RECORD OF BOREHOLE AH7

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

BORING DATE: Sept 9, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp W Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		438.89							
0	Topsoil (FILL).		0.00							
	Brown silty CLAY and clayey SILT cover (FILL).		438.59 / 0.30							
1	Municipal Solid Waste (FILL).		437.82 / 1.07							
3	Firm brown to grey silty CLAY.		435.23 / 3.66							Sept 9, 1992 Water level based on observations made at time of drilling.
5	END OF HOLE		433.71 / 5.18							

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Sept 9, 1992

RECORD OF BOREHOLE AH8

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

BORING DATE: Sept 9, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp W Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		438.64							
0	Topsoil (FILL).		0.00							
	Brown silty CLAY cover (FILL).		438.34 / 0.30							
1	Municipal Solid Waste (FILL).		438.03 / 0.61							
2	Firm to stiff brown silty CLAY.		436.20 / 2.44							Sept 9, 1992 Water level based on observations made at time of drilling.
3				1	AS					
4	END OF HOLE		434.68 / 3.96							
5										
6										
7										
8										
9										
10										

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Sept 9, 1992

RECORD OF BOREHOLE AH9

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

BORING DATE: Sept 9, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp W Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		438.60							
0	Topsoil (FILL).		0.00 / 438.30							
	Municipal Solid Waste (FILL).		0.30							Sept 9, 1992 Water level based on observations made at time of drilling.
	Soft to Firm brown to grey silty CLAY.		432.81 / 5.79							
7	END OF HOLE		431.59 / 7.01							

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Sept 9, 1992

RECORD OF BOREHOLE AH10

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

BORING DATE: Sept 9, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp W Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		438.83							
0	Topsoil (FILL).		0.00 / 438.53							
	Brown clayey SILT cover (FILL).		0.30 / 437.76							
1	Municipal Solid Waste (FILL).		1.07 / 435.93							
3	Firm to stiff brown to grey silty CLAY.		2.90 / 434.87							Sept 9, 1992 Water level based on observations made at time of drilling.
4	END OF HOLE		3.96							

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Sept 9, 1992

PROJECT: Pond Relocation

PROJECT LOCATION: Glenmore Dump

PROJECT NUMBER: 922-4172

Sampler Hammer: 63.5 kg., Drop 0.76m.

RECORD OF BOREHOLE AH11

BORING DATE: Sept 9, 1992

BORING LOCATION: See Figure 1

SHEET: 1 OF 1

DATUM: Geodetic

BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp W Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		438.38							
0	Topsoil (FILL).		0.00							
	Brown silty CLAY cover (FILL).		438.08 0.30							
1	Municipal Solid Waste (FILL).		437.47 0.91							
2										
3										
4										Sept 9, 1992
5	Soft to Firm brown silty CLAY.		433.81 4.57							Water level based on observat-ions made at time of drilling.
	END OF HOLE		432.89 5.49							
6										
7										
8										
9										
10										

DRILL RIG: Mobil P70

DRILLING CONTRACTOR: Sandwell

DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM

CHECKED: BLJM

DATE: Sept 9, 1992

PROJECT: Pond Relocation

PROJECT LOCATION: Glenmore Dump

PROJECT NUMBER: 922-4172

Sampler Hammer: 63.5 kg., Drop 0.76m.

RECORD OF BOREHOLE AH12

BORING DATE: Sept 9, 1992

BORING LOCATION: See Figure 1

SHEET: 1 OF 1

DATUM: Geodetic

BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp W Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface	438.85							
0	Topsoil (FILL).	0.00							
	Brown silty CLAY cover (FILL).	438.55 / 0.30							
1									
	Municipal Solid Waste (FILL).	437.63 / 1.22							
2									
	Soft to Firm brown silty CLAY.	436.11 / 2.74							Sept 9, 1992 Water level based on observations made at time of drilling.
3									
4	END OF HOLE	434.89 / 3.96							
5									
6									
7									
8									
9									
10									

DRILL RIG: Mobil P70

DRILLING CONTRACTOR: Sandwell

DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM

CHECKED: BLJM

DATE: Sept 9, 1992

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

RECORD OF BOREHOLE AH13

BORING DATE: Sept 9, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp — W — Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface	438.53							
0	Topsoil (FILL).	0.00							
	Brown silty CLAY cover (FILL).	438.23 / 0.30							
1	Municipal Solid Waste (FILL).	437.31 / 1.22							
2									Sept 9, 1992 Water level based on observations made at time of drilling.
5	Soft to Firm brown to grey silty CLAY.	433.35 / 5.18							
6			1	AS					
7	END OF HOLE	431.52 / 7.01							

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Sept 9, 1992

RECORD OF BOREHOLE AH14

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

BORING DATE: Sept 9, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE – DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES – NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp W Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		438.91							
0	Topsoil (FILL).		0.00							
	Brown silty CLAY cover (FILL).		438.61 / 0.30							
1	Municipal Solid Waste (FILL).		438.00 / 0.91							
2										Sept 9, 1992 Water level based on observat-ions made at time of drilling.
3	Soft to Firm brown silty CLAY.		436.47 / 2.44							
4	END OF HOLE		434.95 / 3.96							
5										
6										
7										
8										
9										
10										

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Sept 9, 1992

RECORD OF BOREHOLE AH15

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

BORING DATE: Sept 9, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE DESCRIPTION	ELEV / DEPTH	SAMPLES NUMBER	TYPE	BLOWS / 0.15m.	N	REC/ATT	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp W Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface	439.15							
0	Topsoil (FILL).	0.00							
	Brown silty CLAY and clayey SILT cover (FILL).	438.85 / 0.30							
1									
	Municipal Solid Waste (FILL).	437.78 / 1.37							
2									∇ Sept 9, 1992 Water level based on observat-ions made at time of drilling.
3									
4	Soft to Firm brown silty CLAY.	435.04 / 4.11							
5									
	END OF HOLE	433.66 / 5.49							
6									
7									
8									
9									
10									

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Sept 9, 1992

RECORD OF BOREHOLE AH16

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

BORING DATE: Sept 9, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES NUMBER	TYPE	BLOWS / 0.15m.	N	REC/ATT	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp —O W— Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		438.40							
0	Topsoil (FILL).		0.00							
	Brown silty CLAY cover (FILL).		438.10 / 0.30							
1	Municipal Solid Waste (FILL).		437.33 / 1.07							
2										Sept 9, 1992 Water level based on observat-ions made at time of drilling.
5	Soft to Firm grey silty CLAY.		432.91 / 5.49							
7	END OF HOLE		431.39 / 7.01							

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Sept 9, 1992

RECORD OF BOREHOLE AH17

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

BORING DATE: Sept 9, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	REC/ATT	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp —o W— Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		438.66							
0	Topsoil (FILL).		0.00 438.36							
	Brown silty CLAY and clayey SILT cover (FILL).		0.30 437.44							
1–4	Municipal Solid Waste (FILL).		1.22 434.55							Sept 9, 1992 Water level based on observations made at time of drilling.
4–5	Firm to stiff brown silty CLAY.		4.11 433.17							
	END OF HOLE		5.49							

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

LOGGED: BLJM
CHECKED: BLJM
DATE: Sept 9, 1992

Golder Associates

RECORD OF BOREHOLE AH18

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

BORING DATE: Sept 9, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	REC/ATT	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp —o W— Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		439.19 / 0.00							
0	Topsoil.		438.89 / 0.30							
0.30–4.57	Firm to stiff brown silty CLAY and clayey SILT.		434.62 / 4.57							Augerhole dry upon completion of drilling
4.57	END OF HOLE									

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Sept 9, 1992

RECORD OF BOREHOLE AH19

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

BORING DATE: Sept 9, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	ELEV / DEPTH
	Ground Surface	438.84
0	Topsoil (FILL).	0.00
	Brown silty CLAY cover (FILL).	438.54 0.30
1	Municipal Solid Waste (FILL).	437.77 1.07
3	Firm brown silty CLAY.	435.49 3.35
4	END OF HOLE	434.88 3.96

SAMPLES: NUMBER | TYPE | BLOWS / 0.15m. | N | REC/ATT

PENETRATION RESISTANCE BLOWS/0.3m

WATER CONTENT, PERCENT Wp W Wl

PIEZOMETER OR STANDPIPE INSTALLATION

Sept 9, 1992
Water level based on observat-ions made at time of drilling.

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Sept 9, 1992

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

RECORD OF BOREHOLE AH20

BORING DATE: Sept 9, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	REC/ATT	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp W Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		438.63							
0	Topsoil (FILL).		0.00							
			438.33 / 0.30							
1	Brown silty CLAY and clayey SILT cover (FILL).									
			437.11 / 1.52							
2–4	Municipal Solid Waste (FILL).									Sept 9, 1992 Water level based on observations made at time of drilling.
			434.36 / 4.27							
5	Soft to firm brown silty CLAY.									
			433.14 / 5.49							
	END OF HOLE									

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Sept 9, 1992

RECORD OF BOREHOLE AH21

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

BORING DATE: Sept 9, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	REC/ATT	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp W Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		438.45							
0	Topsoil (FILL).		0.00							
	Brown silty CLAY cover (FILL).		438.15 / 0.30							
1	Municipal Solid Waste (FILL).		437.69 / 0.76							
2										Sept 9, 1992 Water level based on observat-ions made at time of drilling.
4	Soft to firm brown to grey silty CLAY.		434.03 / 4.42							
5	END OF HOLE		432.96 / 5.49							

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Sept 9, 1992

RECORD OF BOREHOLE AH22

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

BORING DATE: Sept 9, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	REC/ATT	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp W Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface	438.76							
0	Topsoil (FILL).	0.00							
	Brown to grey silty CLAY and clayey SILT cover (FILL).	438.46 0.30							
1									
	Municipal Solid Waste (FILL).	437.54 1.22							Sept 9, 1992 Water level based on observations made at time of drilling.
2									
3									
4									
	Soft to firm brown silty CLAY.	434.34 4.42							
5			1	AS					
	END OF HOLE	433.27 5.49							
6									
7									
8									
9									
10									

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Sept 9, 1992

RECORD OF BOREHOLE AH23

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

BORING DATE: Sept 9, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	REC/ATT	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp W Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		439.46							
0	Topsoil (FILL).		0.00							
	Brown silty CLAY and clayey SILT cover (FILL).		439.16 0.30							
1	Municipal Solid Waste (FILL).		438.55 0.91							
4	Soft to firm brown silty CLAY.		435.04 4.42							Sept 9, 1992 Water level based on observations made at time of drilling.
	END OF HOLE		433.97 5.49							

Depth scale: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Sept 9, 1992

RECORD OF BOREHOLE AH24

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

BORING DATE: Sept 9, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES NUMBER	TYPE	BLOWS / 0.15m.	N	REC/ATT	PENETRATION RESISTANCE BLOWS/0.3m / WATER CONTENT, PERCENT Wp W Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		439.41							
0	Topsoil (FILL).		0.00							
	Brown silty CLAY and clayey SILT cover (FILL).		439.11 / 0.30							
1	Municipal Solid Waste (FILL).		438.80 / 0.61							
2–3	Soft to firm brown silty CLAY.		437.89 / 1.52							Augerhole dry upon completion of drilling
4	END OF HOLE		435.45 / 3.96							

Depth scale: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Sept 9, 1992

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

RECORD OF BOREHOLE AH25

BORING DATE: Sept 9, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	REC/ATT	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp W Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface	438.65							
0	Topsoil (FILL).	0.00							
	Brown silty CLAY and clayey SILT cover (FILL).	438.35 / 0.30							
	Municipal Solid Waste (FILL).	438.04 / 0.61							Sept 9, 1992 Water level based on observat-ions made at time of drilling.
	Soft to firm brown to grey silty CLAY.	434.38 / 4.27							
	END OF HOLE	433.16 / 5.49							

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Sept 9, 1992

RECORD OF BOREHOLE AH26

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

BORING DATE: Sept 9, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	REC/ATT	PENETRATION RESISTANCE BLOWS/0.3m / WATER CONTENT, PERCENT Wp —o W— Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		438.68							
0	Topsoil (FILL).		0.00							
	Brown silty CLAY and clayey SILT cover (FILL).		438.38 0.30							
1	Municipal Solid Waste (FILL).		437.77 0.91							Sept 9, 1992 Water level based on observations made at time of drilling.
5	Soft brown silty CLAY.		433.96 4.72							
	END OF HOLE		433.19 5.49							

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Sept 9, 1992

RECORD OF BOREHOLE AH27

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

BORING DATE: Sept 10, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE – DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES – NUMBER	TYPE	BLOWS / 0.15m.	N	REC/ATT	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp W Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		439.34							
0	Topsoil (FILL).		0.00							
	Municipal Solid Waste (FILL).		439.09 / 0.25							
1										
2	Soft to firm brown silty CLAY.		437.51 / 1.83							Augerhole dry upon completion of drilling
3										
4	END OF HOLE		435.38 / 3.96							
5										
6										
7										
8										
9										
10										

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Sept 10, 1992

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

RECORD OF BOREHOLE AH28

BORING DATE: Sept 10, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	REC/ATT	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp W Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		438.79							
0	Topsoil (FILL).		0.00 / 438.49							
	Brown silty CLAY and clayey SILT cover (FILL).		0.30 / 437.72							
1	Municipal Solid Waste (FILL).		1.07 / 435.59							
2										
3	Soft to firm brown to grey silty CLAY.		3.20 / 434.83	1	AS					Sept 10, 1992 Water level based on observations made at time of drilling.
4	END OF HOLE		3.96							
5										
6										
7										
8										
9										
10										

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Sept 10, 1992

RECORD OF BOREHOLE AH29

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

BORING DATE: Sept 10, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	REC/ATT	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp W Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		438.83							
0	Topsoil (FILL).		0.00 / 438.53							
	Brown to grey silty CLAY and clayey SILT cover (FILL).		0.30 / 437.61							
1–4	Municipal Solid Waste (FILL).		1.22 / 434.72							Sept 10, 1992 Water level based on observat-ions made at time of drilling.
4–5	Soft to firm brown to grey silty CLAY.		4.11 / 433.34							
	END OF HOLE		5.49							

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Sept 10, 1992

RECORD OF BOREHOLE AH30

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

BORING DATE: Sept 10, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	REC/ATT	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp W Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		438.69							
0	Topsoil.		0.00							
			438.39 / 0.30							
1–2	Brown silty CLAY and clayey SILT.									Augerhole dry upon completion of drilling
			436.25 / 2.44							
	END OF HOLE									

Depth scale: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Sept 10, 1992

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

RECORD OF BOREHOLE AH31

BORING DATE: Sept 10, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

SOIL PROFILE: DESCRIPTION	ELEV / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	REC/ATT	PENETRATION RESISTANCE BLOWS/0.3m / WATER CONTENT, PERCENT Wp —o W— Wl	PIEZOMETER OR STANDPIPE INSTALLATION
Ground Surface	438.68							
Topsoil (FILL).	0.00							
Brown to grey silty CLAY cover (FILL).	438.38 / 0.30							
Municipal Solid Waste (FILL).	437.16 / 1.52							Sept 10, 1992 Water level based on observations made at time of drilling.
Soft to firm brown to grey silty CLAY.	434.72 / 3.96							
END OF HOLE	433.19 / 5.49							

DEPTH SCALE (m): 0 1 2 3 4 5 6 7 8 9 10

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Sept 10, 1992

PROJECT: Pond Relocation

PROJECT LOCATION: Glenmore Dump

PROJECT NUMBER: 922-4172

Sampler Hammer: 63.5 kg., Drop 0.76m.

RECORD OF BOREHOLE AH32

BORING DATE: Sept 10, 1992

BORING LOCATION: See Figure 1

SHEET: 1 OF 1

DATUM: Geodetic

BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	REC/ATT	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp — W — Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		438.71							
0	Topsoil (FILL).		0.00							
	Brown to grey silty CLAY and clayey SILT cover (FILL).		438.41 0.30							
2	Municipal Solid Waste (FILL).		436.88 1.83							Sept 10, 1992 Water level based on observations made at time of drilling.
4	Soft to firm brown silty CLAY.		434.75 3.96							
	END OF HOLE		433.22 5.49							

Depth scale: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

DRILL RIG: Mobil P70

DRILLING CONTRACTOR: Sandwell

DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM

CHECKED: BLJM

DATE: Sept 10, 1992

RECORD OF BOREHOLE AH33

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

BORING DATE: Sept 10, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	REC/ATT	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp W Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		438.55							
0	Topsoil (FILL).		0.00							
	Brown to grey silty CLAY and clayey SILT cover (FILL).		438.25 / 0.30							
1	Municipal Solid Waste (FILL).		437.48 / 1.07							Sept 10, 1992 Water level based on observat-ions made at time of drilling.
6	Soft to firm grey silty CLAY.		432.76 / 5.79							
7	END OF HOLE		431.54 / 7.01							

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Sept 10, 1992

RECORD OF BOREHOLE AH34

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

BORING DATE: Sept 10, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp W Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		440.35							
0	Topsoil.		0.00							
			440.05 / 0.30							
	Brown silty CLAY.									
			439.44 / 0.91							
1–4	Loose brown SAND and GRAVEL.									Sept 10, 1992 Water level based on observat-ions made at time of drilling.
			436.08 / 4.27							
	END OF HOLE (Refusal)									
5										
6										
7										
8										
9										
10										

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Sept 10, 1992

PROJECT: Pond Relocation

PROJECT LOCATION: Glenmore Dump

PROJECT NUMBER: 922-4172

Sampler Hammer: 63.5 kg., Drop 0.76m.

RECORD OF BOREHOLE AH35

BORING DATE: Sept 10, 1992

BORING LOCATION: See Figure 1

SHEET: 1 OF 1

DATUM: Geodetic

BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp W Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		439.91							
0	Topsoil.		0.00							
			439.61 / 0.30							
1	Brown clayey SILT.									
			438.08 / 1.83							Sept 10, 1992 Water level based on observat-ions made at time of drilling.
2–5	Loose brown medium to coarse SAND, trace gravel.									
			434.73 / 5.18							
	Compact to dense grey silty SAND, some gravel (TILL).		434.42 / 5.49							
	END OF HOLE									

DRILL RIG: Mobil P70

DRILLING CONTRACTOR: Sandwell

DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM

CHECKED: BLJM

DATE: Sept 10, 1992

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

RECORD OF BOREHOLE AH36

BORING DATE: Sept 10, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp W Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		439.64							
0	Topsoil.		0.00 / 439.34							
	Brown clayey SILT.		0.30 / 438.57							
1	Brown silty CLAY.		1.07 / 435.68							
4	Loose to compact brown gravelly medium SAND.		3.96 / 434.15							Sept 10, 1992 Water level based on observat-ions made at time of drilling.
	END OF HOLE		5.49							

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Sept 10, 1992

RECORD OF BOREHOLE AH37

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

BORING DATE: Sept 10, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp —O W— Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		439.55							
0	Topsoil.		0.00							
	Brown clayey SILT.		439.25 / 0.30							
1	Firm to stiff brown and grey silty CLAY.		438.48 / 1.07							
5	Loose brown SAND, trace to some gravel.		433.91 / 5.64							Sept 10, 1992 Water level based on observations made at time of drilling.
7	END OF HOLE		432.54 / 7.01							

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Sept 10, 1992

RECORD OF BOREHOLE AH38

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

BORING DATE: Sept 10, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp W Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		439.40							
0	Topsoil (FILL).		0.00 / 439.10							
	Brown clayey SILT cover (FILL).		0.30 / 438.49							
1	Municipal Solid Waste (FILL).		0.91 / 437.57							
2	Firm to stiff brown silty CLAY.		1.83 / 435.74							Sept 10, 1992 Water level based on observat-ions made at time of drilling.
	END OF HOLE		3.66							

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Sept 10, 1992

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

RECORD OF BOREHOLE AH39

BORING DATE: Sept 10, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp —O^W— Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		439.32							
0	Topsoil (FILL).		0.00 / 439.02							
	Brown clayey SILT cover (FILL).		0.30 / 438.56							
1–2	Municipal Solid Waste (FILL).		0.76 / 436.88							Sept 10, 1992 Water level based on observations made at time of drilling.
3	Soft to firm brown silty CLAY.		2.44 / 435.36							
4	END OF HOLE		3.96							

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Sept 10, 1992

RECORD OF BOREHOLE AH40

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

BORING DATE: Sept 10, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp — W — Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		439.64							
0	Topsoil (FILL).		0.00 / 439.34							
	Brown clayey SILT.		0.30 / 439.03							
1–3	Soft to firm brown silty CLAY.		0.61 / 435.68							Augerhole dry upon completion of drilling
4	END OF HOLE		3.96							
5										
6										
7										
8										
9										
10										

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Sept 10, 1992

RECORD OF BOREHOLE AH41

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

BORING DATE: Sept 10, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	REC/ATT	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp W Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		439.21							
0	Topsoil (FILL).		0.00							
			438.91 / 0.30							
	Brown silty CLAY and clayey SILT cover (FILL).									
1			438.14 / 1.07							
2										Sept 10, 1992 Water level based on observations made at time of drilling.
3	Municipal Solid Waste (FILL).									
4			434.64 / 4.57							
5	Soft to firm brown silty CLAY.		433.72 / 5.49							
	END OF HOLE									
6										
7										
8										
9										
10										

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Sept 10, 1992

RECORD OF BOREHOLE AH42

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

BORING DATE: Sept 10, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT (Wp 20, W 40, 60, Wl 80)	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface	440.81							
0	TOPSOIL.	0.00							
	Brown dessicated clayey SILT.	440.51 / 0.30							
1	Firm to stiff brown silty CLAY, occasional pockets and thin seams of sand.	439.90 / 0.91							
2			1	AS				○	
3–4			2	AS					
5			3	AS				○	
6	Soft to firm brown silty CLAY, occasional seams of fine sand, some gravel.	435.02 / 5.79							▽ Sept 10, 1992 Water level based on observations made at time of drilling.
			4	AS				○	
7	END OF HOLE	433.80 / 7.01							

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Sept 10, 1992

RECORD OF BOREHOLE AH43

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

BORING DATE: Sept 10, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT (Wp 20 40 W 60 80 Wl)	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		442.13							
0	TOPSOIL.		0.00 / 441.83							
	Brown dessicated clayey SILT.		0.30 / 441.37							
1	Soft to firm brown silty CLAY.		0.76 / 440.91							
	Loose brown fine to medium SAND.		1.22 / 440.45							
2–4	Firm to stiff brown silty CLAY.		1.68 / 438.02	1	AS				o	
				2	AS				o	
4	Loose brown silty fine SAND.		4.11 / 437.25							Sept 10, 1992 Water level based on observations made at time of drilling.
5	Loose brown medium to coarse SAND, some gravel.		4.88 / 436.64	3	AS					
	END OF HOLE		5.49							

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Sept 10, 1992

RECORD OF BOREHOLE AH44

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

BORING DATE: Sept 10, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	ELEV / DEPTH	SAMPLE NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface	440.15						
0	TOPSOIL.	0.00 / 439.85						
	Brown dessicated clayey SILT.	0.30 / 439.24						
1–2	Firm to stiff brown silty CLAY.	0.91 / 437.25	1	AS			H	Backfilled with cuttings.
3	Loose brown silty fine SAND.	2.90 / 437.00						Sept 14, 1992
4	Soft brown silty CLAY.	3.15 / 434.97	2	AS				
5	Soft brown clayey SILT, occasional pockets of medium sand.	5.18 / 434.36	3	AS				
6	Compact to dense brown silty SAND, some gravel, trace cobbles (TILL-LIKE).	5.79 / 433.14	4	AS				
7	END OF HOLE	7.01						

PENETRATION RESISTANCE BLOWS/0.3m

WATER CONTENT, PERCENT: Wp — W — Wl; 20, 40, 60, 80

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Sept 10, 1992

RECORD OF BOREHOLE AH45

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

BORING DATE: Sept 10, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DESCRIPTION (SOIL PROFILE)	ELEV / DEPTH	SAMPLE NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT (Wp, W, Wl: 20, 40, 60, 80)	PIEZOMETER OR STANDPIPE INSTALLATION
Ground Surface	439.78							
TOPSOIL.	0.00							
Brown dessicated clayey SILT.	439.48 / 0.30							
Firm to stiff brown silty CLAY.	439.18 / 0.60	1	AS					
Loose brown medium SAND.	437.19 / 2.59							Sept 10, 1992 Water level based on observations made at time of drilling.
Soft brown silty CLAY.	2.74	2	AS					
Soft brown clayey SILT, occasional seams of sand, trace gravel.	435.06 / 4.72							
Loose brown SAND and GRAVEL.	434.60 / 5.18							
END OF HOLE	434.29 / 5.49							

DEPTH SCALE (m): 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Sept 10, 1992

RECORD OF BOREHOLE AH46

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

BORING DATE: November 5, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp — W — Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		441.98							
0	TOPSOIL		0.00							
	Firm to stiff brown silty CLAY. (upper 0.9m dessicated)		441.53 / 0.45							
										Nov 5, 1992 Water level based on observat-ions made at time of drilling.
4	Loose to compact brown to grey silty SAND and GRAVEL with some clay and occasional cobbles.		437.88 / 4.10							
5	END OF HOLE		436.48 / 5.50							

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Nov 5, 1992

RECORD OF BOREHOLE AH47

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

BORING DATE: November 5, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp — W — Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		448.25							
0	TOPSOIL		0.00							
			447.80 / 0.45							
1–2	Firm to stiff brown silty CLAY. (upper 0.6m dessicated)									Augerhole dry upon completion.
			445.35 / 2.90							
3	Loose to compact light brown SILT with a trace of clay and some sand.									
			445.05 / 3.20							
	Compact brown SAND with some silt.									
			444.45 / 3.80							
4–5	Compact to dense brown silty SAND and GRAVEL with a trace of clay and occasional cobbles. (TILL)									
			442.75 / 5.50							
	END OF HOLE									

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Nov 5, 1992

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

RECORD OF BOREHOLE AH48

BORING DATE: November 5, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp W Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		454.05							
0	TOPSOIL		0.00 453.60							
	Loose to compact brown SILT with a trace to some clay and some sand.		0.45 452.85							
1	Compact to dense brown silty SAND and GRAVEL with occasional cobbles. (TILL)		1.20 451.60							Augerhole dry upon completion.
2	END OF HOLE		2.45							
3										
4										
5										
6										
7										
8										
9										
10										

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Nov 5, 1992

RECORD OF BOREHOLE AH49

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

BORING DATE: November 5, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp W Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		452.06							
0	TOPSOIL		0.00							
			451.61 / 0.45							
1	Loose brown sandy SILT with a trace to some gravel.									
			450.56 / 1.50							
2										Augerhole dry upon completion.
3	Loose brown SAND with a trace to some gravel.									
			448.06 / 4.00							
4	END OF HOLE									
5										
6										
7										
8										
9										
10										

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Nov 5, 1992

RECORD OF BOREHOLE AH50

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

BORING DATE: November 5, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp W Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		446.75							
0	TOPSOIL		0.00							
	Firm to stiff brown dessicated silty CLAY.		446.30 / 0.45							
1	Stiff brown clayey SILT with some sand and some gravel.		445.55 / 1.20							
2	Compact to dense brown silty SAND and GRAVEL with occasional cobbles.		445.05 / 1.70							Augerhole dry upon completion.
	END OF HOLE		444.30 / 2.45							
3										
4										
5										
6										
7										
8										
9										
10										

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Nov 5, 1992

RECORD OF BOREHOLE AH51

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

BORING DATE: November 5, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	DESCRIPTION	ELEV / DEPTH	NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	WATER CONTENT, PERCENT (Wp 20 40 60 80 Wl)	PIEZOMETER OR STANDPIPE INSTALLATION
0	Ground Surface	441.36 / 0.00							
	TOPSOIL	440.91 / 0.45							
1–2	Firm to stiff brown silty CLAY. (upper 0.6m dessicated)	438.76 / 2.60	1	AS				~40	Backfilled with auger cuttings.
3	Loose brown gravelly SAND with a trace of silt.	437.66 / 3.70							Augerhole Dry Nov 9, 1992
	Compact grey sandy SILT with some gravel and some clay. (TILL)	437.36 / 4.00							
4	END OF HOLE								

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Nov 5, 1992

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

RECORD OF BOREHOLE AH52

BORING DATE: November 5, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp — W — Wl (20, 40, 60, 80)	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		439.83							
0	TOPSOIL		439.38 / 0.00 – 0.45							
1–4	Firm to stiff brown silty CLAY. (upper 0.9m dessicated)		435.73 / 4.10							
~3				1	AS				O	Nov 5, 1992 Water level based on observat-ions made at time of drilling.
4–5.5	Loose to compact brown silty SAND with some gravel and occasional seams of coarse sand.		434.33 / 5.50							
	END OF HOLE									

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Nov 5, 1992

PROJECT: Pond Relocation

PROJECT LOCATION: Glenmore Dump

PROJECT NUMBER: 922-4172

Sampler Hammer: 63.5 kg., Drop 0.76m.

RECORD OF BOREHOLE AH53

BORING DATE: November 5, 1992

BORING LOCATION: See Figure 1

SHEET: 1 OF 1

DATUM: Geodetic

BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp W Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		443.91							
0	TOPSOIL		0.00 / 443.61							
	Firm to stiff brown dessicated clayey SILT.		0.30 / 443.01							
1	Firm to stiff brown silty CLAY. (upper 0.3m dessicated)		0.90 / 441.61							Augerhole dry upon completion.
	Loose brown fine silty SAND.		2.30 / 441.31							
3	Compact to dense brown gravelly silty SAND with occasional cobbles. (TILL)		2.60 / 439.91							
4	END OF HOLE		4.00							

DRILL RIG: Mobil P70

DRILLING CONTRACTOR: Sandwell

DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM

CHECKED: BLJM

DATE: Nov 5, 1992

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

RECORD OF BOREHOLE AH54

BORING DATE: November 5, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp W Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		448.47							
0	TOPSOIL		0.00							
	Firm brown dessicated clayey SILT.		448.02 0.45							
1	Compact to dense brown gravelly silty SAND.		447.37 1.10							Augerhole dry upon completion.
3	Dense brown gravelly silty SAND with occasional cobbles. (TILL)		445.37 3.10							
4	END OF HOLE		444.47 4.00							

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Nov 5, 1992

RECORD OF BOREHOLE AH55

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

BORING DATE: November 5, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT (Wp 20 40 W 60 Wl 80)	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface	444.71							
0	TOPSOIL	0.00							
	Firm to stiff brown dessicated clayey SILT.	444.26 / 0.45							
1	Firm to stiff brown silty CLAY.	443.51 / 1.20							Augerhole dry upon completion.
			1	AS				o (approx. 42)	
4	Compact to dense brown gravelly silty SAND. (TILL)	440.41 / 4.30							
5	END OF HOLE	439.21 / 5.50							

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Nov 5, 1992

PROJECT: Pond Relocation

PROJECT LOCATION: Glenmore Dump

PROJECT NUMBER: 922-4172

Sampler Hammer: 63.5 kg., Drop 0.76m.

RECORD OF BOREHOLE AH56

BORING DATE: November 5, 1992

BORING LOCATION: See Figure 1

SHEET: 1 OF 1

DATUM: Geodetic

BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp W Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		441.42							
0	TOPSOIL		0.00 / 440.97							
	Firm to stiff brown dessicated clayey SILT with a trace of sand.		0.45 / 439.92							
1										Augerhole dry upon completion.
2	Loose to compact brown gravelly SAND with some silt.		1.50 / 438.82							
3	Compact to dense brown gravelly silty SAND with occasional cobbles. (TILL)		2.60 / 437.42							
4	END OF HOLE		4.00							
5										
6										
7										
8										
9										
10										

DRILL RIG: Mobil P70

DRILLING CONTRACTOR: Sandwell

DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM

CHECKED: BLJM

DATE: Nov 5, 1992

RECORD OF BOREHOLE AH57

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

BORING DATE: November 5, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp W Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface	438.28							
0	TOPSOIL	0.00							
	Firm brown silty CLAY, some gravel, organics (FILL).	437.98 / 0.30							Nov 5, 1992 (water level); Water level based on observations made at time of drilling.
1.52	Firm to stiff brown silty CLAY, occasional thin seams of sand.	436.76 / 1.52							
	Firm brown clayey SILT, occasional thin seams of sand.	433.56 / 4.72							
	Firm to soft grey silty CLAY.	432.18 / 6.10							
	Soft grey sandy clayey SILT.	431.12 / 7.16							
	END OF HOLE	429.75 / 8.53							

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Nov 5, 1992

PROJECT: Pond Relocation

PROJECT LOCATION: Glenmore Dump

PROJECT NUMBER: 922-4172

Sampler Hammer: 63.5 kg., Drop 0.76m.

RECORD OF BOREHOLE AH58

BORING DATE: November 5, 1992

BORING LOCATION: See Figure 1

SHEET: 1 OF 1

DATUM: Geodetic

BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT (Wp, W, Wl; 20, 40, 60, 80)	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		438.45							
0	TOPSOIL		0.00							
			438.00 / 0.45							
1										Nov 9, 1992
2										
3	Firm to stiff brown silty CLAY (upper 0.6m dessicated), occasional pockets and thin seams of sand.									Backfilled with auger cuttings.
4				1	AS			H		
			433.88 / 4.57							
5				2	AS			H		
6	Firm grey clayey SILT, occasional pockets and thin seams of sand.									
7	END OF HOLE		431.44 / 7.01							
8										
9										
10										

DRILL RIG: Mobil P70

DRILLING CONTRACTOR: Sandwell

DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM

CHECKED: BLJM

DATE: Nov 5, 1992

PROJECT: Pond Relocation

RECORD OF BOREHOLE AH59

SHEET: 1 OF 1

PROJECT LOCATION: Glenmore Dump

BORING DATE: November 5, 1992

DATUM: Geodetic

PROJECT NUMBER: 922-4172

BORING LOCATION: See Figure 1

BOREHOLE TYPE: 140 mm Auger

Sampler Hammer: 63.5 kg., Drop 0.76m.

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT (Wp — W — Wl; 20 40 60 80)	PIEZOMETER OR STANDPIPE INSTALLATION
0	Ground Surface	439.04 / 0.00							
	TOPSOIL	438.59 / 0.45							
1–4	Firm to stiff brown silty CLAY, occasional thin sand seams.	434.77 / 4.27	1	AS				o	
5–7	Firm brown to grey clayey SILT, some thin sand seams.	432.03 / 7.01	2	AS				o	Hole caved - no water detected to 4.57m depth
7	END OF HOLE								

DRILL RIG: Mobil P70

DRILLING CONTRACTOR: Sandwell

DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM

CHECKED: BLJM

DATE: Nov 5, 1992

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

RECORD OF BOREHOLE AH60

BORING DATE: November 5, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	WATER CONTENT, PERCENT (Wp 20, 40, 60, 80 Wl)	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface	438.57							
0	TOPSOIL	0.00							
	Firm brown clayey SILT, some sand.	438.12 / 0.45							
1	Firm to stiff brown silty CLAY (upper 0.3m dessicated), occasional pockets and thin seams of sand.	437.50 / 1.07							Nov 9, 1992
2			1	AS					
3			2	AS			H		Backfilled with auger cuttings.
4.72	Firm grey clayey SILT, some seams of sand.	433.85 / 4.72							
5.49	END OF HOLE	433.08 / 5.49							

PENETRATION RESISTANCE BLOWS/0.3m

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Nov 5, 1992

PROJECT: Pond Relocation

PROJECT LOCATION: Glenmore Dump

PROJECT NUMBER: 922-4172

Sampler Hammer: 63.5 kg., Drop 0.76m.

RECORD OF BOREHOLE AH61

BORING DATE: November 5, 1992

BORING LOCATION: See Figure 1

SHEET: 1 OF 1

DATUM: Geodetic

BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT (Wp — W — Wl; 20, 40, 60, 80)	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		438.36							
0	TOPSOIL		0.00							
	Firm to stiff brown silty CLAY (upper 0.9m dessicated), occasional pockets and thin seams of sand.		438.06 / 0.30							
3				1	AS				o (approx. 55)	
4	Stiff brown to grey clayey SILT, occasional pockets and thin seams of sand.		434.25 / 4.11							Nov 6, 1992. Water level based on observations made at time of drilling.
7	END OF HOLE		431.35 / 7.01							

Depth scale: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

DRILL RIG: Mobil P70

DRILLING CONTRACTOR: Sandwell

DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM

CHECKED: BLJM

DATE: Nov 5, 1992

PROJECT: Pond Relocation

PROJECT LOCATION: Glenmore Dump

PROJECT NUMBER: 922-4172

Sampler Hammer: 63.5 kg., Drop 0.76m.

RECORD OF BOREHOLE AH62

BORING DATE: November 6, 1992

BORING LOCATION: See Figure 1

SHEET: 1 OF 1

DATUM: Geodetic

BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp W Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		441.39							
0	Brown Clayey SILT, some organics, cover (FILL).		0.00							
	Municipal Solid Waste (FILL).		441.09 / 0.30							
	Firm to stiff grey to brown silty CLAY.		437.58 / 3.81							Nov 6, 1992. Water level based on observations made at time of drilling.
	END OF HOLE		435.90 / 5.49							

DRILL RIG: Mobil P70

DRILLING CONTRACTOR: Sandwell

DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM

CHECKED: BLJM

DATE: Nov 6, 1992

PROJECT: Pond Relocation

PROJECT LOCATION: Glenmore Dump

PROJECT NUMBER: 922-4172

Sampler Hammer: 63.5 kg., Drop 0.76m.

RECORD OF BOREHOLE AH63

BORING DATE: November 6, 1992

BORING LOCATION: See Figure 1

SHEET: 1 OF 1

DATUM: Geodetic

BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp W Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		442.43							
0	Brown Sandy Clayey SILT, some gravel, cover (FILL).		0.00							
	Municipal Solid Waste (FILL).		0.15							
5										Nov 6, 1992 Water level based on observat-ions made at time of drilling.
	Firm grey to brown silty CLAY.		436.94 5.49							
	END OF HOLE		433.90 8.53							

DRILL RIG: Mobil P70

DRILLING CONTRACTOR: Sandwell

DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM

CHECKED: BLJM

DATE: Nov 6, 1992

RECORD OF BOREHOLE AH64

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

BORING DATE: November 6, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp — W — Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		442.88							
0	SILT, organics and wood chips, cover (FILL).		0.00							
	Municipal Solid Waste (FILL).		0.30							
5										Nov 6, 1992 Water level based on observat-ions made at time of drilling.
	Firm grey to brown silty CLAY.		437.24 / 5.64							
7	END OF HOLE		435.87 / 7.01							

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Nov 6, 1992

PROJECT: Pond Relocation

RECORD OF BOREHOLE AH65

SHEET: 1 OF 2

PROJECT LOCATION: Glenmore Dump

BORING DATE: November 6, 1992

DATUM: Geodetic

PROJECT NUMBER: 922-4172

BORING LOCATION: See Figure 1

BOREHOLE TYPE: 140 mm Auger

Sampler Hammer: 63.5 kg., Drop 0.76m.

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp W Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		443.42							
0	SAND and GRAVEL, some silt, cover (FILL).		0.00							
	Municipal Solid Waste (FILL).		0.15							
1										
2										
3										
4										
5										
6										
7										
8										
9										Water level based on observations made at time of drilling.
			433.67 / 9.75							▽ Nov 6, 1992
10										

CONTINUED ON NEXT PAGE

DRILL RIG: Mobil P70

DRILLING CONTRACTOR: Sandwell

DRILLER: Ray/Rick

LOGGED: BLJM

CHECKED: BLJM

DATE: Nov 6, 1992

Golder Associates

RECORD OF BOREHOLE AH65

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

BORING DATE: November 6, 1992
BORING LOCATION: See Figure 1

SHEET: 2 OF 2
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp —o W— Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	CONTINUED FROM PREVIOUS PAGE									
10	Soft to firm grey silty CLAY.									
11			431.84 / 11.58							
	END OF HOLE									
12										
13										
14										
15										
16										
17										
18										
19										
20										

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Nov 6, 1992

PROJECT: Pond Relocation

PROJECT LOCATION: Glenmore Dump

PROJECT NUMBER: 922-4172

Sampler Hammer: 63.5 kg., Drop 0.76m.

RECORD OF BOREHOLE AH66

BORING DATE: November 9, 1992

BORING LOCATION: See Figure 1

SHEET: 1 OF 1

DATUM: Geodetic

BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT (Wp 20 40 W 60 Wl 80)	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		444.31							
0	Loose Brown Sandy SILT, some clay, some gravel, some pieces of plastic, some cobbles (FILL).		0.00							
3.66	Compact to dense Black Organic Matter (FILL).		440.65 / 3.66							
5				1	AS				o	
7.01	Compact to dense dark grey Gravelly Sandy SILT, some clay (TILL-LIKE).		437.30 / 7.01							Nov 9, 1992 Water level based on observations made at time of drilling.
~9.7				2	AS				o	
10.06	END OF HOLE		434.25 / 10.06							

DRILL RIG: Mobil P70

DRILLING CONTRACTOR: Sandwell

DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM

CHECKED: BLJM

DATE: Nov 9, 1992

RECORD OF BOREHOLE AH67

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

BORING DATE: November 9, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp W Wl	PIEZOMETER OR STANDPIPE INSTALLATION
0	Ground Surface	440.38 / 0.00							
	Topsoil (FILL).	440.08 / 0.30							
3	Municipal Solid Waste (FILL).	434.74 / 5.64							Nov 9, 1992 Water level based on observations made at time of drilling.
6	Firm to stiff brown silty CLAY.	433.37 / 7.01							
7	END OF HOLE								

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Nov 9, 1992

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

RECORD OF BOREHOLE AH68

BORING DATE: November 9, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp —o W— Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		439.44							
0	Topsoil (FILL).		0.00							
	Municipal Solid Waste (FILL).		0.15							
3			436.09							Nov 9, 1992
	Firm to stiff brown silty CLAY.		3.35							Water level based on observations made at time of drilling.
4	END OF HOLE		435.48 3.96							

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Nov 9, 1992

RECORD OF BOREHOLE AH69

PROJECT: Pond Relocation
PROJECT LOCATION: Glenmore Dump
PROJECT NUMBER: 922-4172
Sampler Hammer: 63.5 kg., Drop 0.76m.

BORING DATE: November 9, 1992
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Geodetic
BOREHOLE TYPE: 140 mm Auger

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp W Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		442.50							
0	Brown Sandy Clayey SILT, trace gravel cover (FILL)		0.00							
	Municipal Solid Waste (FILL).		0.15							
5	Firm to stiff brown silty CLAY.		437.17 / 5.33							Nov 9, 1992 Water level based on observations made at time of drilling.
7	END OF HOLE		435.49 / 7.01							

DRILL RIG: Mobil P70
DRILLING CONTRACTOR: Sandwell
DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM
CHECKED: BLJM
DATE: Nov 9, 1992

PROJECT: Pond Relocation

RECORD OF BOREHOLE AH70

SHEET: 1 OF 1

PROJECT LOCATION: Glenmore Dump

BORING DATE: November 9, 1992

DATUM: Geodetic

PROJECT NUMBER: 922-4172

BORING LOCATION: See Figure 1

BOREHOLE TYPE: 140 mm Auger

Sampler Hammer: 63.5 kg., Drop 0.76m.

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp — W — Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		441.74							
0	Brown Sandy Clayey SILT, trace gravel cover (FILL)		0.00							
	Municipal Solid Waste (FILL).		0.10							
7										Nov 9, 1992 Water level based on observat-ions made at time of drilling.
	Firm to stiff brown silty CLAY.		434.12 / 7.62							
	END OF HOLE		433.21 / 8.53							

DRILL RIG: Mobil P70

DRILLING CONTRACTOR: Sandwell

DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM

CHECKED: BLJM

DATE: Nov 9, 1992

PROJECT: Pond Relocation

RECORD OF BOREHOLE AH71

SHEET: 1 OF 1

PROJECT LOCATION: Glenmore Dump

BORING DATE: November 9, 1992

DATUM: Geodetic

PROJECT NUMBER: 922-4172

BORING LOCATION: See Figure 1

BOREHOLE TYPE: 140 mm Auger

Sampler Hammer: 63.5 kg., Drop 0.76m.

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp —W— Wl	PIEZOMETER OR STANDPIPE INSTALLATION
0	Ground Surface		439.07							
	Sand and Gravel (FILL).		0.00							
	Brown Sandy Clayey SILT cover (FILL).		0.20							
	Municipal Solid Waste (FILL).		438.62 0.45							
	Firm to stiff grey to brown silty CLAY.		436.48 2.59							Nov 9, 1992 Water level based on observations made at time of drilling.
5	END OF HOLE		434.19 4.88							

DRILL RIG: Mobil P70

DRILLING CONTRACTOR: Sandwell

DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM

CHECKED: BLJM

DATE: Nov 9, 1992

PROJECT: Pond Relocation

RECORD OF BOREHOLE AH72

SHEET: 1 OF 1

PROJECT LOCATION: Glenmore Dump

BORING DATE: November 9, 1992

DATUM: Geodetic

PROJECT NUMBER: 922-4172

BORING LOCATION: See Figure 1

BOREHOLE TYPE: 140 mm Auger

Sampler Hammer: 63.5 kg., Drop 0.76m.

DEPTH SCALE (m)	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV / DEPTH	SAMPLES: NUMBER	TYPE	BLOWS / 0.15m.	N	OTHER TESTS	PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT, PERCENT Wp W Wl	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface		439.02							
0	Sand and Gravel (FILL).		0.00							
	Brown Clayey SILT cover (FILL).		0.10							
	Municipal Solid Waste (FILL).		0.30							
2	Firm to stiff grey to brown silty CLAY.		436.73 / 2.29							Nov 9, 1992. Water level based on observations made at time of drilling.
4	END OF HOLE		435.06 / 3.96							

Depth scale: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

DRILL RIG: Mobil P70

DRILLING CONTRACTOR: Sandwell

DRILLER: Ray/Rick

Golder Associates

LOGGED: BLJM

CHECKED: BLJM

DATE: Nov 9, 1992

RECORD OF TEST PITS

November 10, 1992 — 922-4172

TEST PIT NO.	DEPTH (m)	SOIL DESCRIPTION
T1	0.0 - 0.45	**TOPSOIL.**
(west end)	0.45 - 2.44	Firm to stiff brown clayey **SILT** and silty **CLAY** (desiccated in upper 0.7m), trace sand.
		Standing groundwater at 1.83m below existing ground surface in open test pit.
		438.4 − 1.8 = 436.6
T1	0.0 - 0.30	**TOPSOIL (FILL).**
(east end)	0.30 - 0.91	Brown clayey **SILT** cover **(FILL).**
	0.91 - 1.83	**MUNICIPAL SOLID WASTE (FILL).**
T2	0.0 - 0.30	**TOPSOIL.**
(west end)	0.30 - 2.44	Firm to stiff brown clayey **SILT** and silty **CLAY** (desiccated in upper 0.7m), trace to some sand.
		Standing groundwater at 1.83m below existing ground surface in open test pit.
T2	0.0 - 0.30	**TOPSOIL (FILL).**
(east end)	0.30 - 0.76	Brown clayey **SILT** cover **(FILL).**
	0.76 - 1.83	**MUNICIPAL SOLID WASTE (FILL).**

RECORD OF TEST PITS		
November 10, 1992		922-4172
T3 (north end)	0.0 - 0.30 0.30 - 2.59	**TOPSOIL.** Firm to stiff brown clayey **SILT** and silty **CLAY** (desiccated in upper 0.6m), trace sand. Standing groundwater at 2.13m below existing ground surface in open test pit.
T3 (south end)	0.0 - 0.30 0.30 - 0.91 0.91 - 1.68	**TOPSOIL (FILL).** Brown clayey **SILT** cover **(FILL).** **MUNICIPAL SOLID WASTE (FILL).**
T4 (north end)	0.0 - 0.30 0.30 - 2.74	**TOPSOIL.** Firm to stiff brown clayey **SILT** and silty **CLAY** (desiccated in upper 0.6m), trace sand. Standing groundwater at 1.98m below existing ground surface in open test pit.
T4 (south end)	0.0 - 0.30 0.30 - 0.76 0.76 - 1.83	**TOPSOIL (FILL).** Brown silty **CLAY** cover **(FILL).** **MUNICIPAL SOLID WASTE (FILL).**

RECORD OF TEST PITS November 10, 1992 — 922-4172		
T5 (north end)	0.0 - 0.30 0.30 - 2.43	**TOPSOIL.** Firm to stiff brown clayey **SILT** and silty **CLAY** (desiccated in upper 0.7m), trace to some sand. Standing groundwater at 1.98m below existing ground surface in open test pit.
T5 (south end)	0.0 - 0.30 0.30 - 0.91 0.91 - 1.83	**TOPSOIL (FILL).** Brown silty **CLAY** cover **(FILL).** **MUNICIPAL SOLID WASTE (FILL).**
T6 (north end)	0.0 - 0.30 0.30 - 2.43	**TOPSOIL.** Firm to stiff brown clayey **SILT** and silty **CLAY** (desiccated in upper 0.9m), trace sand. Standing groundwater at 1.83m below existing ground surface in open test pit.
T6 (south end)	0.0 - 0.30 0.30 - 0.76 0.76 - 1.68	**TOPSOIL (FILL).** Brown clayey **SILT** cover **(FILL).** **MUNICIPAL SOLID WASTE (FILL).**

RECORD OF TEST PITS November 10, 1992 — 922-4172		
T7 (north end)	0.0 - 0.30 0.30 - 2.13	**TOPSOIL.** Firm to stiff brown clayey **SILT** and silty **CLAY** (desiccated in upper 0.9m), trace sand. Standing groundwater at 1.68m below existing ground surface in open test pit.
T7 (south end)	0.0 - 0.30 0.30 - 0.91 0.91 - 1.68	**TOPSOIL (FILL).** Brown silty **CLAY** cover **(FILL).** **MUNICIPAL SOLID WASTE (FILL).**
T8 (north end)	0.0 - 0.30 0.30 - 1.98	**TOPSOIL.** Firm to stiff brown clayey **SILT** and silty **CLAY** (desiccated in upper 0.6m), trace to some sand. Standing groundwater at 1.68m below existing ground surface in open test pit.
T8 (south end)	0.0 - 0.30 0.30 - 1.07 1.07 - 1.68	**TOPSOIL (FILL).** Brown clayey **SILT** cover **(FILL).** **MUNICIPAL SOLID WASTE (FILL).**

RECORD OF TEST PITS		
November 10, 1992		922-4172
T9	0.0 - 0.30	**TOPSOIL.**
(north end)	0.30 - 2.13	Firm to stiff brown clayey **SILT** and silty **CLAY** (desiccated in upper 0.9m), trace to some sand.
		Standing groundwater at 1.68m below existing ground surface in open test pit.
T9	0.0 - 0.30	**TOPSOIL (FILL).**
(south end)	0.30 - 0.91	Brown clayey **SILT** cover **(FILL).**
	0.91 - 1.68	**MUNICIPAL SOLID WASTE (FILL).**
T10	0.0 - 0.30	**TOPSOIL.**
(east end)	0.30 - 2.13	Firm to stiff brown clayey **SILT** and silty **CLAY** (desiccated in upper 0.6m), trace to some sand.
		Standing groundwater at 1.98m below existing ground surface in open test pit.
T10	0.0 - 0.30	**TOPSOIL (FILL).**
(west end)	0.30 - 1.07	Brown silty **CLAY** cover **(FILL).**
	1.07 - 1.83	**MUNICIPAL SOLID WASTE (FILL).**

RECORD OF TEST PITS November 10, 1992		922-4172
T11 (west end)	0.0 - 0.30 0.30 - 0.91 0.91 - 1.83	**TOPSOIL (FILL).** Brown silty **CLAY** cover **(FILL).** **MUNICIPAL SOLID WASTE (FILL).** Standing groundwater at 1.83m depth.
T11 (east end)	0.0 - 0.30 0.30 - 1.83	**TOPSOIL.** Firm to stiff brown fissured silty **CLAY**, trace sand, dark brown staining from 1.22 to 1.83m depth. Test pit dry at east end.
T12 (west end)	0.0 - 0.30 0.30 - 0.91 0.91 - 1.83	**TOPSOIL (FILL).** Brown silty **CLAY** cover **(FILL).** **MUNICIPAL SOLID WASTE (FILL).** Test pit dry at west end.
T12 (east end)	0.0 - 0.30 0.30 - 0.91 0.91 - 1.52	**TOPSOIL (FILL).** Brown silty **CLAY**, some sand **(FILL).** Firm to stiff brown silty **CLAY.** Test pit dry at east end.

T13 (north end)	0.0 - 1.52	Loose to compact brown silty **SAND** and **COBBLES**, some gravel **(FILL)**. Test pit dry at north end.
T13 (south end)	0.0 - 0.61 0.61 - 0.91 0.91 - 1.52	Brown clayey **SILT**, some sand cover **(FILL)**. **MUNICIPAL SOLID WASTE (FILL)**. Brown silty **SAND** and **COBBLES**, some gravel **(FILL)**. Test pit dry at south end.
T14	0.0 - 0.30 0.30 - 0.91 0.91 - 2.44 2.44 - 3.05	**TOPSOIL (FILL)**. Brown silty **CLAY** cover **(FILL)**. Construction debris (pieces of wood, metal, concrete and brick) **(FILL)**. Stiff brown silty **CLAY**. Standing groundwater at 1.52m below existing ground surface in open test pit.
T15	0.0 - 0.15 0.15 - 1.37 1.37 - 1.52	**TOPSOIL (FILL)**. Brown silty **CLAY** cover **(FILL)**. Construction debris (pieces of wood and concrete). Standing groundwater at 0.91m below existing ground surface in open test pit.

RECORD OF TEST PITS November 10, 1992 922-4172		
T16	0.0 - 0.15 0.15 - 1.52	**TOPSOIL.** Firm to stiff brown fissured silty **CLAY.** Standing groundwater at 0.91m below existing ground surface in open test pit.
T17	0.0 - 0.15 0.15 - 0.61 0.61 - 0.76 0.76 - 1.68	**TOPSOIL.** Brown silty **CLAY** cover **(FILL).** **MUNICIPAL SOLID WASTE (FILL).** Stiff to firm brown silty **CLAY.** Standing groundwater at 1.4m below existing ground surface in open test pit.
T18	0.0 - 0.15 0.15 - 1.22 1.22 - 2.74	**TOPSOIL.** Firm to stiff brown desiccated silty **CLAY.** Firm to stiff brown fissured silty **CLAY.** Test pit dry.
T19	0.0 - 0.15 0.15 - 1.52 1.52 - 1.83	**TOPSOIL.** Brown silty **CLAY** cover **(FILL).** Construction debris (pieces of wood and concrete). Standing groundwater at 1.52m below existing ground surface in open test pit.

RECORD OF TEST PITS		
November 10, 1992		922-4172
T20	0.0 - 0.15 0.15 - 0.91 0.91 - 1.83	**TOPSOIL.** Firm to stiff brown desiccated silty **CLAY.** Firm to stiff brown fissured silty **CLAY.** Standing groundwater at 1.52m below existing ground surface in open test pit.
T21	0.0 - 0.08 0.08 - 1.68	Wood mulch **(FILL).** Firm to stiff brown fissured silty **CLAY.** Standing groundwater at 1.52m below existing ground surface in open test pit.
T22	0.0 - 0.15 0.15 - 0.91 0.91 - 1.83	**TOPSOIL.** Firm to stiff brown desiccated silty **CLAY.** Firm to stiff brown fissured silty **CLAY.** Standing groundwater at 1.52m below existing ground surface in open test pit.
T23	0.0 - 0.30 0.30 - 1.37	Brown silty **CLAY**, some sand and gravel cover **(FILL).** **MUNICIPAL SOLID WASTE (FILL).** Standing groundwater at 1.22m below existing ground surface in open test pit.

RECORD OF TEST PITS		
November 10, 1992		922-4172
T24	0.0 - 0.15	**TOPSOIL.**
	0.15 - 0.76	Brown silty **CLAY** cover **(FILL).**
	0.76 - 1.22	**MUNICIPAL SOLID WASTE (FILL).**
		Standing groundwater at 0.91m below existing ground surface in open test pit.

2011/2012 Monitoring Wells - Naming Convention

Consultant Monitoring Well ID	City Monitoring Well ID Revised
BH11-3A	GL 36-1
BH11-3B	GL 36-2
BH11-3C	GL 36-3
BH11-13A1	GL 30-1
BH11-13B	GL 30-2
BH11-13C	GL 30-3
BH11-18A1	GL 31-1
BH11-18B1	GL 31-2
BH11-18C	GL 31-3
BH11-21A1	GL 32-1
BH11-21B	GL 32-2
BH11-21C1	GL 32-3
BH11-22A	GL 33-1
BH11-22B	GL 33-2
BH11-22C	GL 33-3
BH11-26A	GL 34-1
BH11-26B	GL 34-2
BH11-26C	GL 34-3
BH11-31A	GL 35-1
BH11-31B	GL 35-2
BH11-31C	GL 35-3
BH12-1A	GL 0-1
BH12-1B	GL 0-2
BH12-1C	GL 0-3
BH12-4A	GL29-1
BH12-4B	GL29-2
BH12-10	GL38
BH12-11	GL37
BH12-14	GL 3-5 (2012)
GL6-1 (2011)	GL6-1 (2011)

Bedrock wells

GL 0-1 GL 33-3 bed/sand

GL 3-1 (dest)

GL 5-1

GL 7-1

GL 9-1

GL 14-1?

GL 15-1?

GL 16-1

GL 17-1

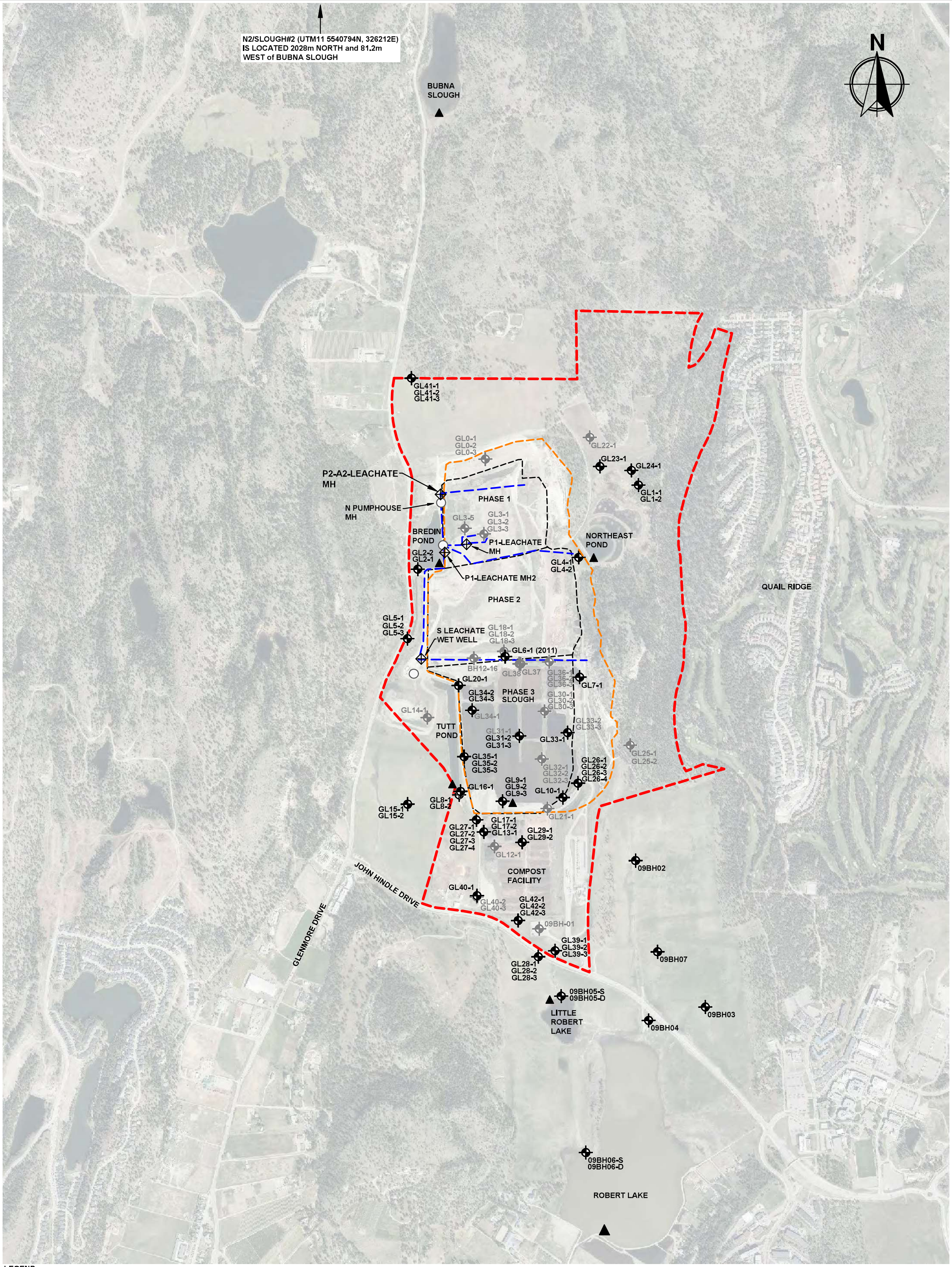
GL 18-1 -dst

GL 26-1 (bedrock/clay)

GL 26-4

GL 27-1

GL 29-1 bedrock/silt+sand



LEGEND

- APPROXIMATE SITE BOUNDARY (REPORTING ONLY)
- APPROXIAMTE EXTENTS OF LANDFILL (BASED ON ACTIVE AND/OR HISTORICAL LANDFILLING ACTIVITIES)
- LEACHATE COLLECTION SYSTEM
- LIMITS OF FOOTPRINT
- BH00-01 MONITORING WELL LOCATION
- GL32-1 MONITORING WELL (DECOMMISSIONED)
- APPROXIMATE MANHOLE LOCATION
- APPROXIMATE LEACHATE SAMPLING LOCATION
- APPROXIMATE SURFACE WATER SAMPLING LOCATION

300 0 300

SCALE METRES

REFERENCES

1.) **COORDINATE REFERENCE:** UTM ZONE 11n, NAD83
2.) **MAP REFERENCES:** KELOWNA ONLINE MAPPING SERVICE

PROJECT	2022 ANNUAL WATER MONITORING REPORT FOR GLENMORE LANDFILL 2720 JOHN HINDLE DRIVE, KELOWNA, BC
TITLE	SITE PLAN
CLIENT	CITY OF KELOWNA

CONSULTANT			FIGURE
Keltech Environmental Ltd.	PROJECT No.	2022-059	2
	REVISION	00	
	DATE	03-03-2023	
	CADD	AR	
	CHECK	GCS	

GL 0-1

SLR

SLR CONSULTING (CANADA) LTD.

C
P
A
S

missing
GL 19-1, 19-2
GL

Kelowna, BC

BOREHOLE LOG

BOREHOLE NO: BH12-1A

SURFACE ELEVATION: 449.04 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
									stickup, jplug	
0					Ground Surface					449
0					**sandy SILT** medium sand,some clay, firm, brown, dry					
1										448
	■	BH12-1A-1								
2										447
					silty LEAN CLAY trace to some fine sand, medium plasticity, firm, brown, moist					
3										446
					- gypsum crystals in sand laminations at 3.7 and 4.3 m					
4										445
	■	BH12-1A-2								
5										444
					SAND AND GRAVEL some clay, some silt, compact, brown, moist - some cobbly green/white granite at 5.3 m					
6								▽	GW = 6.32 mbg (October 3, 2012)	443
7										442
	■	BH12-1A-3								
8										441
9										440
									bentonite chips to 18.9 m	
10										439
	■	BH12-1A-4			**SAND** medium, trace gravel, trace fines, loose, brown, moist					
11										438
					sandy CLAY (till) some silt, some gravel, firm, brown, moist					
12										437
13					- grey, dry at 13.1					436
	■	BH12-1A-5			- coarse fraction increasing, very hard at 13.7 m					
14					- cobbles encountered at 14 m					435
15					- wet between 15.2 and 15.8 m					434
16					- fractured green rock between 16.2 and 19.5 m					433
	■	BH12-1A-6								
17										432
					- moist at 19.5 m					
18										431

DRILLING METHOD: Core Sample

Notes: ■ SONIC CORE SAMPLE

DRILL DATE: September 25, 2012

LOGGED BY: JN

DRILLER NAME: Mud Bay

GC0-1

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: BH12-1A
SURFACE ELEVATION: 449.04 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 / 10 / 100 / 1000 / 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
									bentonite pellets to 19.8 m	
20		BH12-1A-7							silica sand	429
21										428
22										427
23		BH12-1A-8			**BEROCK** orange rusty colour on rock fragments, some volcanic ash, dense, light green, dry					426

End of borehole at 23.2 m

Well Completion Details:
Screened interval from 20.1 m to 23.2 m below surface
Elevation at top of casing (TOC) = 449.991 m

Groundwater Information:
Depth to groundwater from TOC = 7.27 m (October 3, 2012)

(1) - Water added during drilling from surface to 23.2 m
GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

GSA %:
BH12-1A-1: 13.9 Gravel, 23.8 Sand, 23.6 Silt, 38.6 Clay
BH12-1A-2: <0.10 Gravel, 2.59 Sand, 17.5 Silt, 79.9 Clay
BH 12-1A-3: 36.3 Gravel, 25.6 Sand, 30.3 Silt, 7.79 Clay
BH 12-1A-4: 21.5 Gravel, 69.3 Sand, 5.01 Silt, 4.24 Clay

SLR CANADA V5.2 219.05164 CITY OF KELOWNA GLENMORE LANDFILL NOV 2012.GPJ SLR_CAN V5.2.GDT 2/14/13

DRILLING METHOD: Core Sample
DRILL DATE: September 25, 2012
LOGGED BY: JN
DRILLER NAME: Mud Bay
Notes: SONIC CORE SAMPLE

GL 0-2

SLR SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: BH12-1B
SURFACE ELEVATION: 448.95 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv)	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
					Ground Surface				stickup, jplug	
0					**sandy SILT** fine to medium sand, some clay, hard, brown, dry					449
1		BH12-1B-1				0				448
2					- dark brown to black organic layer from 2.4 to 2.7 m					447
3					**silty LEAN CLAY** trace fine sand, medium plasticity, laminated, firm to hard, brown, dry					446
4		BH12-1B-2				0				445
5					**SAND AND GRAVEL** medium to coarse sand, some silt, loose, brown, dry to moist					444
6					- gypsum crystals at 6.4 m				bentonite chips to 12.8 m	443
7		BH12-1B-3			- coarse fraction increasing at 7.0 m - cobbles, very dense, grey at 7.5 m	0				442
8					- increasing silt from 8.2 to 8.5 m			▼	GW = 8.01 mbg (October 3, 2012)	441
9					- silty, soft, grey from 8.8 to 9.1 m - dry, grey from 9.4 and 10.1 m					440
10		BH12-1B-4				0				439
11										438
12					- increased fine sand, moist to wet from 11.9 to 12.5 m					437
13		BH12-1B-5			**sandy SILT** fine to medium sand with 2 mm seams fine sand, trace to some clay, firm to hard, dark grey, dry to moist	0			bentonite seal silica sand	436 / 435
14					**sandy CLAY** some silt, some gravel, occasional cobble, very dense (suspect TILL), dark grey, moist - 4 cm sand seams at 14.2 m - granite cobbles at 14.3 m					434
15		BH12-1B-6				0				433
16		BH12-1B-7			**SAND AND SILT** some clay, trace gravel, compact, grey, moist to wet	0				432
17					End of borehole at 17.1 m					

Well Completion Details:
Screened interval from 14.0 m to 17.1 m below surface
Elevation at top of casing (TOC) = 449.945 m

DRILLING METHOD: Core Sample
Notes: SONIC CORE SAMPLE
DRILL DATE: September 25, 2012
LOGGED BY: JN
DRILLER NAME: Mud Bay

GLO-2

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: BH12-1B
SURFACE ELEVATION: 448.95 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
					Groundwater Information: Depth to groundwater from TOC = 9.01 m (October 3, 2012) (1) - Water added during drilling from surface to 17.1 m GSA - grain size analysis M - moisture content Att - Atterberg limits MSW - Municipal solid waste GSA %: BH12-B-6: 9.7 Gravel, 38.9 Sand, 37.8 Silt, 13.6 Clay					

DRILLING METHOD: Core Sample

DRILL DATE: September 25, 2012

LOGGED BY: JN

DRILLER NAME: Mud Bay

Notes: SONIC CORE SAMPLE

GC 0-3

SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: BH12-1C
SURFACE ELEVATION: 449.32 m

DEPTH (m)	SOIL DESCRIPTION	WELL COMPLETION NOTES	ELEVATION (m)
	Ground Surface	stickup, jplug	450
0	**sandy SILT** medium sand, some clay, firm to hard, brown, dry; - organic layer between 2.4 and 2.7 m		449, 448, 447
2.7	**silty CLAY** trace fine grained sand, medium plasticity, laminations, very firm to hard, brown, moist	bentonite chips to 8.2 m	446, 445
5.2	**SAND AND GRAVEL** trace to some some silt, loose, brown, moist	GW = 8.45 mbg (October 3, 2012); bentonite pellets to 9.1 m	444, 443, 442, 441, 440
10.1	**SAND** fine to coarse, trace gravel, trace silt, loose, brown, moist to wet; - medium to coarse from 10.4 m; - layer gravel from 11 to 11.3 m; gravel increasing with depth	silica sand	439, 438, 437

Field test data columns: ORGANIC VAPOUR LEVEL (ppmv) 1, 10, 100, 1000, 10000; SAMPLE TYPE, SAMPLE ID, SPT COUNT, SOIL TYPE, WELL COMPLETION, WATER LEVEL.

End of borehole at 12.5 m

Well Completion Details:
Screened interval from 9.5 m to 12.5 m below surface
Elevation at top of casing (TOC) = 450.531 m

Groundwater Information:
Depth to groundwater from TOC = 9.66 m (October 3, 2012)

(1) - Water added during drilling from surface to 12.5 m
GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

DRILLING METHOD: Core Sample
DRILL DATE: September 25, 2012
LOGGED BY: JN
DRILLER NAME: Mud Bay
Notes:

Sheet 1 of 1

BOREHOLE NO. GL1-1

PROJECT NAME: GLENMORE LANDFILL HYDROGEOLOGICAL INVESTIGATION

CLIENT: CITY OF KELOWNA — DATE: 28/11/90

BOREHOLE TYPE: 0.20 m Hollow Stem Auger with 0.05 m split spoon — GEOLOGIST: SBS

GROUND ELEVATION: 106.30m.a.s.l — PROJECT NO. 90-732

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	SAMPLE NO.	TYPE	'N' VALUE	% WATER	COMMENT
	LIGHT BROWNISH GREY FINE SAND	1	SS	12		
		2	SS	32		
1.5	GREY SILTY CLAY	3	SS	42		
		4	SS	43		-grain size
3.1	BROWN MEDIUM SAND occasional silt and clay layered	5	SS	18		
		6	SS	12		-grain size
		7	SS	-		-no blow-count
5		8	SS	11		
		9	SS	9		
		10	SS	-		-no blow-count
		11	SS	14		
		12	SS	49		
8.5	GRAVELLY COARSE SAND with trace silt	13	SS	76		
9.9 / 10	LIGHT GREY SILT TILL with some gravel	14	SS	60+		-grain size
		15	SS	80+		
		16	SS	80+		
12.0	EOH					
15						

Monitor details and number: GL 1-2, GL 1-1

Column headings also printed: STRATIGRAPHY; PENETRATION RESISTANCE BLOWS/0.3m; WATER CONTENT % (W_P — W_L)

BOREHOLE NO. GL2-1

PROJECT NAME GLENMORE LANDFILL HYDROGEOLOGICAL INVESTIGATION

CLIENT CITY OF KELOWNA — DATE 28/11/90

BOREHOLE TYPE 0.20 m Hollow Stem Auger with 0.05 m — GEOLOGIST SBS

GROUND ELEVATION 98.47 m.a.s.l. — PROJECT NO. 90-732

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS AND NUMBER	SAMPLE NO.	TYPE	'N' VALUE	% WATER	PENETRATION RESISTANCE BLOWS/0.3m	WATER CONTENT % / COMMENT (Wp — WL)
	GREENISH BROWN CLAY TOPSOIL			1	SS	8			
0.76	FILL MATERIAL			2	SS	7			
				3	SS	7			
2.3	GREENISH GREY SILT CLAY with grey weathered, vertical microfractures and varved silt layers			4	SS	17			
				5	SS	16			
				6	SS	-			-grain size -no blow-count
5				7	SS	10			
				8	SS	8			
6.1	GREY SILT CLAY with varved silt layers			9	SS	5			
				10	SS	2			-grain size
				11	SS	-			-spoon sank under own weight
8.5	GREY SILTY FINE SAND			12	SS	6			
				13	SS	4			-grain size
10.1	GREY SILT CLAY with varved silt layers			14	SS	-			-spoon sank under own weight
				15	SS	-			
10.7	EOH		GL 2-2 GL 2-1						
15									
20									

Gartner Lee Limited

BOREHOLE NO. GL3-I decom

PROJECT NAME: GLENMORE LANDFILL HYDROGEOLOGICAL INVESTIGATION

CLIENT: CITY OF KELOWNA — DATE: 28/11/90

BOREHOLE TYPE: 0.15 m Steel Casing with Air Rotary Rig — GEOLOGIST: SBS

GROUND ELEVATION: 98.90 m.a.s.l. [illegible] — PROJECT NO. 90-732

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS AND NUMBER	SAMPLE NO.	SAMPLE TYPE	'N' VALUE	% WATER	PENETRATION RESISTANCE BLOWS/0.3m	WATER CONTENT % / COMMENT (Wp — WL)
0	GREY CLAY								
				1	C				
				2	C				
				3	C				
5.2	VARVED CLAYEY SILT								
10				4	C				
				5	C				
				6	C				
15				7	C				
				8	C				
17.5	GRAVEL			9	C				
20				10	C				
				11	C				
				12	C				
24.5	GREY CLAY with some gravel			13	C				
25									

BOREHOLE NO. GL3-1 decom

PROJECT NAME GLENMORE LANDFILL HYDROGEOLOGICAL INVESTIGATION

CLIENT CITY OF KELOWNA — DATE 28/11/90

BOREHOLE TYPE 0.15 m Steel Casing with Air Rotary Rig — GEOLOGIST SBS

GROUND ELEVATION 98.90 m.a.s.l. — PROJECT NO. 90-732

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS AND NUMBER	SAMPLE NO.	SAMPLE TYPE	'N' VALUE	% WATER	PENETRATION RESISTANCE BLOWS/0.3m	WATER CONTENT % (Wp–WL) / COMMENT
	GREY CLAY with some gravel								
25.9	GREY GRAVEL with some clay			14	C				
27.4	GREY CLAYEY SILT with some gravel			15	C				
30									
				16	C				
				17	C				
34.7	GREY SILTY GRAVEL								
35				18	C				
36.6	GREY SILT CLAY			19	C				
				20	C				
39.5	GREY CLAY with some sand			21	C				
40									
41.5	GREY CLAY GRAVEL			22	C				
43.0	DARK GREY VOLCANIC BEDROCK			23	C				
45									
46.9	EOH			24	C				
50									

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: GL3-1 (Decom)
SURFACE ELEVATION: 454.70 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run # / % Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
					Monitoring well decommissioned May 27, 2011				concrete to 0.9 m	454
1										453
2										452
3										451
4										450
5										449
6										448
7										447
8										446
9										445
10										444
11										443
12										442
13										441
14										440
15										439
16										438
17										437
18										436
19										435

DRILLING METHOD: Core Sample

DRILL DATE: May 27, 2011
LOGGED BY: JN
DRILLER NAME: Beck

Notes:

Sheet 1 of 3

SLR CANADA V5.2 219.05164 CITY OF KELOWNA GLENMORE LANDFILL FINAL.GPJ SLR_CAN V5.2.GDT 9/22/11

SLR SLR CONSULTING (CANADA) LTD.	CLIENT: City of Kelowna PROJECT: Glenmore Landfill - Phase 3 ADDRESS: 2105 Glenmore Road North, Kelowna, BC SLR JOB NO: 219.05164	BOREHOLE LOG BOREHOLE NO: GL3-1 (Decom) SURFACE ELEVATION: 454.70 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run # / % Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
										434
21										
									grout from 0.9 to 42.7 m	433
22										
										432
23										
										431
24										
										430
25										
										429
26										
										428
27										
										427
28										
										426
29										
										425
30										
										424
31										
										423
32										
										422
33										
										421
34										
										420
35										
										419
36										
										418
37										
										417
38										
										416
39										
										415

DRILLING METHOD: Core Sample	Notes:	
DRILL DATE: May 27, 2011 / LOGGED BY: JN / DRILLER NAME: Beck		Sheet 2 of 3

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: GL3-1 (Decom)
SURFACE ELEVATION: 454.70 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run # % Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
41										414
42										413
					End of borehole at 42.7 m GL3-1 was a 150 mm diameter steel water well. Decommissioning was completed by grouting the inside of the well, as it could not be drilled out.					412

DRILLING METHOD: Core Sample

DRILL DATE: May 27, 2011

LOGGED BY: JN
DRILLER NAME: Beck

Notes:

BOREHOLE NO. GL3-2

PROJECT NAME: GLENMORE LANDFILL HYDROGEOLOGICAL INVESTIGATION

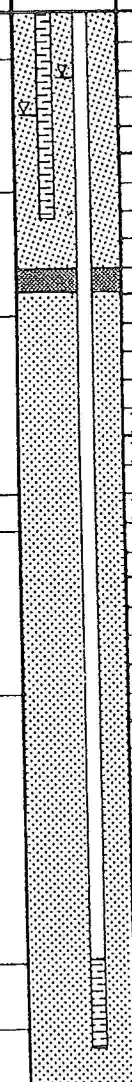
CLIENT: CITY OF KELOWNA — DATE: 28/11/90

BOREHOLE TYPE: 0.20 m Hollow Stem Auger with 0.05 m split spoon — GEOLOGIST: SBS

GROUND ELEVATION: 98.91 m.a.s.l. — PROJECT NO. 90-732

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	SAMPLE NO.	TYPE	'N' VALUE	% WATER	PENETRATION RESISTANCE BLOWS/0.3m	WATER CONTENT % / COMMENT (WP — WL)
	SILTY CLAY TOPSOIL		1		11			
0.76	FILL MATERIAL		2		19			
			3		10			
			4		14			
3.2	GREENISH BROWN SILT CLAY with grey weathered microfractures		5		16			
			6		11			
			7		8			
5 / 5.3	GREY CLAY		8		-			-spoon sank under own weight
			9		2			
			10		-			-spoon sank under own weight
			11		-			
8.5	9.1 GREY SILT CLAY with some sand		12		3			-grain size
	GREY SANDY SILT		13		-			
10			14		-			-spoon sank under own weight
			15		22			
12.2	GREY SILTY CLAY		16		28			
			17		11			-grain size
			18		2			-spoon sank under own weight
			19		-			
15			20		4			
			21		3			
			22		1			
16.8	GREY SILTY MEDIUM SAND		23		25			
18.0	GREY SILT TILL with some gravel		24		99			
			25		73+			-grain size
19.1	EOH		26		90+			
20								

MONITOR DETAILS AND NUMBER:



GL 3-3
GL 3-2

SLR SLR CONSULTING (CANADA) LTD.	CLIENT: City of Kelowna PROJECT: Glenmore Landfill - Phase 3 ADDRESS: 2105 Glenmore Road North, Kelowna, BC SLR JOB NO: 219.05164	**BOREHOLE LOG** BOREHOLE NO: GL3-2/GL3-3 (Decom) SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run #	% Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
0						Monitoring well decommissioned August 25 and 26, 2011				concrete to 0.3 m	
1											1.0
2											2.0
3											3.0
4											4.0
5											5.0
6											6.0
7											7.0
8											8.0
9											9.0
10											10.0
11											11.0
12											12.0
13											13.0
14											14.0
15										grout from 0.3 to 30.2 m	15.0
16											16.0
17											17.0
18											18.0
19											19.0

DRILLING METHOD: Mud Rotary Drilling	Notes:	
DRILL DATE: August 26, 2011 — LOGGED BY: EM — DRILLER NAME: Beck		Sheet 1 of 2

SLR SLR CONSULTING (CANADA) LTD.	CLIENT: City of Kelowna PROJECT: Glenmore Landfill - Phase 3 ADDRESS: 2105 Glenmore Road North, Kelowna, BC SLR JOB NO: 219.05164	**BOREHOLE LOG** BOREHOLE NO: GL3-2/GL3-3 (Decom) SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run # % Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
21										21.0
22										22.0
23										23.0
24										24.0
25										25.0
26										26.0
27										27.0
28										28.0
29										29.0
30										30.0
					End of borehole at 30.2 m Wells GL3-2 and GL3-3 were housed within one steel monument that was too long to be pulled out completely. Approximately 5 m of the monument were pulled out when it broke off. The overlying 5 m of MSW and fill were excavated to provide access for the drill rig. Mud rotary drilling technology was used to drill down inside the monument to decommission the wells.					

DRILLING METHOD: Mud Rotary Drilling	Notes:	
DRILL DATE: August 26, 2011	LOGGED BY: EM DRILLER NAME: Beck	Sheet 2 of 2

PROJECT No.: Glenmore Landfill

RECORD OF BOREHOLE: GL 3-2 (2005)

d 110m

SHEET 1 OF 2

LOCATION: See Figure 1

BORING DATE: Mar 2 2005

DATUM:

SAMPLER HAMMER, 140lbs.; DROP, 30in.

INCLINATION: -90°

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa nat V. + Q - ● rem V. ⊕ U - O (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT Wp ⊢—O W—⊣ Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION GL 3-2(2005)
0	Foundex Explorations; Bomadier Simco 2800 120 mm dia. Mud Rotary	GROUND SURFACE									
0–15.85		LANDFILL REFUSE (Paper, plastic, wood etc. and soil) (FILL)		0.00							Filter sand; Bentonite seal; Grout and bentonite
15.85–20		Refer to Gartner Lee Soil Stratigraphy (GL 3-2)Nov 28, 1990		15.85							

Depth scale marks: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20

CONTINUED NEXT PAGE

DEPTH SCALE

1 : 100

Golder Associates

LOGGED: RR

CHECKED: GTI

BOREHOLE BOREHOLES.GPJ GLDR_CAN.GDT 10/1/06

PROJECT No.: Glenmore Landfill

RECORD OF BOREHOLE: GL 3-2 (2005)

dl(om

SHEET 2 OF 2

LOCATION: See Figure 1

BORING DATE: Mar 2 2005

DATUM:

SAMPLER HAMMER, 140lbs.; DROP, 30in.

INCLINATION: -90°

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (nat V. + Q - ●; rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT Wp ⊢ W ⊣ Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION GL 3-2(2005)
20–27.43	Foundex Explorations; Bomadier Simco 2800 120 mm dia. Mud Rotary	Refer to Gartner Lee Soil Stratigraphy (GL 3-2)Nov 28, 1990*(continued)*									Grout and bentonite; Bentonite seal; Filter sand
		Compact to dense silty SAND. (INFERRED)		27.43							50 mm dia. PVC Screen
		Dense to very dense SILT, some gravel. (INFERRED)		28.04							Filter sand
		End of BOREHOLE.		30.78							

Depth scale marks: 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40

DEPTH SCALE
1 : 100

Golder Associates

LOGGED: RR
CHECKED: GTI

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: GL3-2 (2005) (Decom)
SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run # / % Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
					Monitoring well decommissioned May 27, 2011				concrete to 0.9 m	
1										1.0
2										2.0
3										3.0
4										4.0
5										5.0
6										6.0
7										7.0
8										8.0
9										9.0
10										10.0
11										11.0
12										12.0
13										13.0
14									grout from 0.9 to 27.4 m	14.0
15										15.0
16										16.0
17										17.0
18										18.0
19										19.0

DRILLING METHOD: Core Sample

DRILL DATE: May 27, 2011
LOGGED BY: JN
DRILLER NAME: Beck

Notes:

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: City of Kelowna
PROJECT: Glenmore Landfill - Phase 3
ADDRESS: 2105 Glenmore Road North, Kelowna, BC
SLR JOB NO: 219.05164

BOREHOLE LOG

BOREHOLE NO: GL3-2 (2005) (Decom)

SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run # % Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
21										21.0
22										22.0
23										23.0
24										24.0
25										25.0
26										26.0
27										27.0
					End of borehole at 27.4 m					

DRILLING METHOD: Core Sample

DRILL DATE: May 27, 2011

LOGGED BY: JN

DRILLER NAME: Beck

Notes:

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: City of Kelowna
PROJECT: Glenmore Landfill - Phase 3
ADDRESS: 2105 Glenmore Road North, Kelowna, BC
SLR JOB NO: 219.05164

BOREHOLE LOG

BOREHOLE NO: GL3-4 (Decom)
SURFACE ELEVATION: 454.21 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run # / % Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
0					Monitoring well decommissioned May 28, 2011				concrete to 0.9 m	454
1										453
2										452
3										451
4										450
5										449
6										448
7									grout from 0.9 to 14.6 m	447
8										446
9										445
10										444
11										443
12										442
13										441
14										440
15										439
16										438
17										437
18										436
19										435

DRILLING METHOD: Core Sample

DRILL DATE: May 28, 2011

LOGGED BY: JN
DRILLER NAME: Beck

Notes:

SLR CANADA V5.2 219.05164 CITY OF KELOWNA GLENMORE LANDFILL FINAL.GPJ SLR_CAN V5.2.GDT 9/22/11

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: City of Kelowna
PROJECT: Glenmore Landfill - Phase 3
ADDRESS: 2105 Glenmore Road North, Kelowna, BC
SLR JOB NO: 219.05164

BOREHOLE LOG

BOREHOLE NO: GL3-4 (Decom)
SURFACE ELEVATION: 454.21 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run # / % Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
										434
21										433
22										432
23										431
24										430
25									bentonite from 14.6 m to 36.6 m	429
26										428
27										427
28										426
29										425
30										424
31										423
32										422
33										421
34										420
35										419
36										418
					End of borehole at 36.6 m					

DRILLING METHOD: Core Sample

DRILL DATE: May 28, 2011

LOGGED BY: JN
DRILLER NAME: Beck

Notes:

QL 3-5

SLR CONSULTING (CANADA) LTD.

CLIENT: City of Kelowna
PROJECT: Glenmore Landfill
ADDRESS: 2105 Glenmore Road North, Kelowna, BC
SLR JOB NO: 219.05164

BOREHOLE LOG (2012)

BOREHOLE NO: BH12-14
SURFACE ELEVATION: 456.83 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
									stickup, jplug	457
0					Ground Surface **SAND AND SILT (fill - cover for waste pile)** some gravel, some clay					456
0.4–19.2					**MUNICIPAL SOLID WASTE (MSW)** strong odour, moist to wet				bentonite chips to 19.2 m	455–438

Depth scale: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18

Elevation scale: 457, 456, 455, 454, 453, 452, 451, 450, 449, 448, 447, 446, 445, 444, 443, 442, 441, 440, 439, 438

DRILLING METHOD: Core Sample

DRILL DATE: September 28, 2012

LOGGED BY: JN

DRILLER NAME: Mud Bay

Notes: SONIC CORE SAMPLE

GL3-5

BOREHOLE LOG (2012)

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE NO: BH12-14
SURFACE ELEVATION: 456.83 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 / 10 / 100 / 1000 / 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
										437
20	■	BH12-14-1			**CLAY with SILT AND SAND (native)** firm, laminations, brown, moist				bentonite pellets to 21 m	
					SAND AND GRAVEL some silt, trace clay, loose to compact, dark grey, wet - organics throughout (small sticks, trace wood chips)					436
21	■	BH12-14-2							silica sand	
										435
22					- wood chips at 22.1 m					
					silty CLAY with SAND laminations, high plasticity, firm, brown, moist					434
23										

End of borehole at 23.2 m

Well Completion Details:
Screened interval from 21.6 m to 23.2 m below surface
Elevation at top of casing (TOC) = 457.981 m

(1) - Water added during drilling from surface to 23.2 m
GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

GSA %:
BH12-14-1: 1.5 Gravel, 4.1 Sand, 21.5 Silt, 72.9 Clay
BH12-14-2: 6.4 Gravel, 38.5 Sand, 34.3 Silt, 20.7 Clay

DRILLING METHOD: Core Sample

Notes: ■ SONIC CORE SAMPLE

DRILL DATE: September 28, 2012
LOGGED BY: JN
DRILLER NAME: Mud Bay

BOREHOLE NO. GL4-1

PROJECT NAME GLENMORE LANDFILL HYDROGEOLOGICAL INVESTIGATION

CLIENT CITY OF KELOWNA DATE 28/11/90

BOREHOLE TYPE 0.20 m Hollow Stem Auger with 0.05 m Split Spoon GEOLOGIST SBS

GROUND ELEVATION 100.56 m.a.s.l. PROJECT NO. 90-732

441.4'✓

440.6
DRAINAGE TILE @ DAM
0.8 mb
TPC

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS AND NUMBER	SAMPLE NO.	TYPE	'N' VALUE	% WATER	PENETRATION RESISTANCE BLOWS/0.3m	WATER CONTENT % / COMMENT (Wp — WL)
	GREENISH BROWN SILT CLAY with grey weathered microfractures			1	SS	13			
				2	SS	9			
		439.9		3	SS	13			
				4	SS	15			
	3.8			5	SS	14			-grain size
	GREENISH BROWN CLAY with grey weathered microfractures			6	SS	6			
5		435.9		7	SS	5			
				8	SS	-			
	6.7			9	SS	-			-spoon sank under own weight
	GREY MEDIUM SAND	433.4		10	SS	-			
	8.4			11	SS	23			-grain size
	GREY GRAVELLY SILT TILL with some sand and pebbles	432.4		12	SS	60+			
10				13		55+			
	10.7			14	SS	58+			
	EOH			15	SS	83+			-grain size
15			GL4-2 GL4-1						
20									

EOH
4-1 - 9.6m
4-2 5.9m

BOREHOLE NO. GL5-1

PROJECT NAME: GLENMORE LANDFILL HYDROGEOLOGICAL INVESTIGATION

CLIENT: CITY OF KELOWNA — DATE: 28/11/90

BOREHOLE TYPE: 0.15 m Steel Casing with Air Rotary Rig — GEOLOGIST: SBS

GROUND ELEVATION: 99.26 m.a.s.l. — PROJECT NO. 90-732

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS AND NUMBER	SAMPLE NO.	SAMPLE TYPE	'N' VALUE	% WATER	PENETRATION RESISTANCE BLOWS/0.3m	WATER CONTENT % / COMMENT (Wp — WL)
	GREY CLAY		0.15 m Steel Casing	1	C				
				2	C				
				3	C				
5				4	C				
	8.2			5	C				
	SILTY GRAVEL			6	C				
10	10.7			7	C				
	GRAVEL with some coarse sand			8	C				
	12.8								
	SANDY SILT			9	C				
15	15.4			10	C				
	LIGHT GREY CRYSTALLINE BEDROCK			11	C				
				12	C				
20	20.4		GL5-1	13	C				

BOREHOLE NO. GL5-2

PROJECT NAME GLENMORE LANDFILL HYDROGEOLOGICAL INVESTIGATION

CLIENT CITY OF KELOWNA DATE 11/28/90

BOREHOLE TYPE 0.20 Hollow Stem Auger with 0.05 m Split Spoon GEOLOGIST SBS

GROUND ELEVATION 99.49 m.a.s.l. PROJECT NO. 90-732

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS AND NUMBER	SAMPLE NO.	SAMPLE TYPE	SAMPLE 'N' VALUE	SAMPLE % WATER	PENETRATION RESISTANCE BLOWS/0.3m	WATER CONTENT % (Wp — WL) / COMMENT
	BROWNISH GREY SILT CLAY fractures			1	SS	4			
				2	SS	8			
				3	SS	9			
3.0	BROWNISH GREEN SILT CLAY fractures			4	SS	12			
				5	SS	13			
				6	SS	10			
5.0	BROWN SILTY FINE SAND			7	SS	7			
5.8	GREENISH GREY SILTY CLAY			8	SS	7			
				9	SS	4			-grain size
7.6	GREY SILTY GRAVEL SAND			10	SS	-			-sank under own weight
				11	SS	58			
				12	SS	49			
				13	SS	60+			
				14	SS	50			
				15	SS	35			-grain size
11.4	GREY SILT TILL EOH		GL5-3 GL5-2	16	SS	60+			-grain size

Depth scale: 5, 10, 15, 20

Dacom

BOREHOLE NO. GL6-1

PROJECT NAME GLENMORE LANDFILL HYDROGEOLOGICAL INVESTIGATION

CLIENT CITY OF KELOWNA **DATE** 11/28/90

BOREHOLE TYPE 0.20 m Hollow Stem Auger with 0.05 m Split Spoon **GEOLOGIST** SBS

GROUND ELEVATION 100.81 m.a.s.l. **PROJECT NO.** 90-732

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS AND NUMBER	SAMPLE NO.	SAMPLE TYPE	SAMPLE 'N' VALUE	SAMPLE % WATER	PENETRATION RESISTANCE BLOWS/0.3m	WATER CONTENT % / COMMENT (WP — WL)
0	FILL MATERIAL								
8.5	GREY SILTY CLAY				1	—			grain size spoon sank under own weight
10.7	EOH		GL6-1						
5, 10, 15 (scale)									

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: City of Kelowna
PROJECT: Glenmore Landfill - Phase 3
ADDRESS: 2105 Glenmore Road North, Kelowna, BC
SLR JOB NO: 219.05164

BOREHOLE LOG

BOREHOLE NO: GL6-1 (Decom)
SURFACE ELEVATION: 442.20 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run #	% Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
						Monitoring well decommissioned May 28, 2011				concrete to 0.9 m	442
1											441
2											440
3											439
4											438
5										grout from 0.9 to 8.8 m	437
6											436
7											435
8											434
9											433
10										bentonite from 8.8 m to 11.4 m	432
11											431
						End of borehole at 11.4 m					

DRILLING METHOD: Core Sample

DRILL DATE: May 28, 2011

LOGGED BY: JN

DRILLER NAME: Beck

Notes:

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: GL6-1 (2011)
SURFACE ELEVATION: 439.66 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run #	% Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
										stickup, jplug	440
0						Ground Surface					
0–2.4			1	40		**CLAY** some silt, some sand, some gravel, trace organic matter (roots, grass, wood debris), trace garbage (plastic), soft, laminated, brown, moist				bentonite seal	439
									▼	GW = 1.83 mbg (June 15, 2011)	438
2.4–5.5			2	100		**Interbedded CLAY AND GARBAGE (MSW)** Clay is firm, laminated, odour, grey, moist - black from 3.3 to 3.6 m - Garbage (foam, wood, plastic) from 3.3 to 4.0 m - 5 cm thick medium sand lens at 4.6 m				silica sand	437, 436, 435
4.7–7.2			3	100		**FAT CLAY (reworked soil, fill)** firm, laminated, brown, moist - gypsum crystals from 4.9 to 6.7 m					434, 433
7.2–8.5						**LEAN CLAY (native)** soft to very soft, grey, moist - wet from 7.6 to 8.5 m - 5 cm thick medium sand lens at 8.4 m					432

End of borehole at 8.5 m

Well Completion Details:
Screened interval from 1.8 m to 4.9 m below surface
Elevation at top of casing (TOC) = 440.521 m

Groundwater Information:
Depth to groundwater from TOC = 2.69 m (June 15, 2011)

(1) - Water added during drilling from surface to 8.5 m

GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

DRILLING METHOD: Core Sample
DRILL DATE: May 27, 2011
LOGGED BY: JN
DRILLER NAME: Beck

Notes:

BOREHOLE NO. BH7-1

PROJECT NAME GLENMORE LANDFILL HYDROGEOLOGICAL INVESTIGATION

CLIENT CITY OF KELOWNA

DATE 28/11/90

BOREHOLE TYPE 0.15 m Steel Casing with Air Rotary

GEOLOGIST SBS

GROUND ELEVATION 98.96 m.a.s.l.

PROJECT NO. 90-732

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS AND NUMBER	SAMPLE NO.	SAMPLE TYPE	'N' VALUE	% WATER	PENETRATION RESISTANCE BLOWS/0.3m	WATER CONTENT % / COMMENT (WP — WL)
	FILL MATERIAL FROM BORROW								
	1.2								
	LIGHT BROWN/GREY WEATHERED BEDROCK			1	C				
	3.0			2	C				
	LIGHT GREY/GREEN FRACTURED BEDROCK			3	C				
5									
	6.1			4	C				
	EOH		GL7-1						
10									
15									

BOREHOLE NO. GL8-1

PROJECT NAME GLENMORE LANDFILL HYDROGEOLOGICAL INVESTIGATION

CLIENT CITY OF KELOWNA — DATE 11/28/90

BOREHOLE TYPE 0.20 Hollow Stem Auger with 0.05 m Split Spoon — GEOLOGIST SBS

GROUND ELEVATION 98.90 m.a.s.l. — PROJECT NO. 90-732

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS AND NUMBER	SAMPLE NO.	TYPE	'N' VALUE	% WATER	PENETRATION RESISTANCE BLOWS/0.3m	WATER CONTENT % / COMMENT (Wp — WL)
	LIGHT GREY CLAY			1	SS	6			
	1.0 1.6 DARK BROWN		∇	2	SS	8			
	GREENISH GREY CLAY			3	SS	12			-grain size
				4	SS	11			
				5	SS	7			
				6	SS	6			-grain size
5				7	SS	5			
	5.6 GREY MEDIUM SAND with some gravel			8	SS	12			
				9	SS	33			
				10	SS	64			
				11	SS	60+			-grain size
				12	SS	66			
	9.9			13	SS	66			
10	BEDROCK? EOH		GL8-1						
15									
20									

BOREHOLE NO. GL8-2

PROJECT NAME GLENMORE LANDFILL HYDROGEOLOGICAL INVESTIGATION

CLIENT CITY OF KELOWNA DATE 28/11/90

BOREHOLE TYPE 0.20 m Hollow Stem Auger with 0.05 m Split Spoon GEOLOGIST SBS

GROUND ELEVATION 98.89 m.a.s.l. PROJECT NO. 90-732

DEPTH (m)	STRATIGRAPHIC DESCRIPTION *	STRATIGRAPHY	MONITOR DETAILS AND NUMBER	SAMPLE NO.	SAMPLE TYPE	SAMPLE 'N' VALUE	SAMPLE % WATER	PENETRATION RESISTANCE BLOWS/0.3m	WATER CONTENT % (Wp — WL) / COMMENT
	LIGHT GREY CLAY								
	1.0								
	1.6 DARK BROWN CLAY								
	GREENISH GREY CLAY								
5	5.6								
	GREY MEDIUM SAND with some gravel								
	9.9								
10	BEDROCK? EOH								
15									
20									

* taken from GL 8-1

Gartner Lee Limited

BOREHOLE NO. GL9-1

PROJECT NAME: GLENMORE LANDFILL HYDROGEOLOGICAL INVESTIGATION

CLIENT: CITY OF KELOWNA — DATE: 11/28/90

BOREHOLE TYPE: 0.15 m Steel Casing with Air Rotary — GEOLOGIST: SBS

GROUND ELEVATION: 98.74 m.a.s.l. — PROJECT NO. 90-732

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS AND NUMBER	SAMPLE NO.	SAMPLE TYPE	SAMPLE 'N' VALUE	SAMPLE % WATER	PENETRATION RESISTANCE BLOWS/0.3m	WATER CONTENT % (Wp—WL) / COMMENT
	BROWNISH GREY CLAY		∇						
				1	C				
				2	C				
5	5.2			3	C				
	GRAVEL with some coarse sand and silt			4	C				
				5	C				
	9.1			6	C				
10	GREY SILT TILL with some sand and gravel			7	C				
				8	C				
				9	C				
15				10	C				
				11	C				
				12	C				
20				13	C				
				14	C				
				15	C				
25				16	C				

BOREHOLE NO. GL9-1

PROJECT NAME	GLENMORE LANDFILL HYDROGEOLOGICAL INVESTIGATION
CLIENT	CITY OF KELOWNA
DATE	11/28/90
BOREHOLE TYPE	0.15.m Steel Casing with Air Rotary Rig
GEOLOGIST	SBS
GROUND ELEVATION	98.74 m.a.s.l.
PROJECT NO.	90-732

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS AND NUMBER	SAMPLE NO.	SAMPLE TYPE	'N' VALUE	% WATER	PENETRATION RESISTANCE BLOWS/0.3m	WATER CONTENT % / COMMENT (Wp — WL)
	GREY SILT TILL with some sand and gravel								
				17	C				
	28.7								
	GRAVEL AND COARSE SAND with some weathered bedrock			18	C				
30	30.5			19	C				
	WEATHERED BEDROCK			20	C				
	33.2			21	C				
	GREEN/GREY SOFT BEDROCK		GL9-1						
35									
40									
45									

BOREHOLE NO. GL9-2

PROJECT NAME: GLENMORE LANDFILL HYDROGEOLOGICAL INVESTIGATION

CLIENT: CITY OF KELOWNA — DATE: 11/28/90

BOREHOLE TYPE: 0.20 m Hollow Stem Auger with 0.05 m Split Spoon — GEOLOGIST: SBS

GROUND ELEVATION: 98.65 m.a.s.l. — PROJECT NO. 90-732

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS AND NUMBER	SAMPLE NO.	TYPE	'N' VALUE	% WATER	PENETRATION RESISTANCE BLOWS/0.3m	WATER CONTENT % / COMMENT (Wp — WL)
	BROWNISH GREY CLAY			1	SS	22			
				2	SS	14			-grain size
				3	SS	10			
	2.4								
	BROWN SILTY FINE SAND with trace gravel and pebbles			4	SS	42			
				5	SS	33			-grain size
	4.6			6	SS	45+			
5	COARSE SAND with trace gravel			7	SS	66			
	6.1			8	SS	104			
	DARK GREY GRAVELLY SILT TILL EOH (see GL9-3)		GL9-2	9	SS	50+			
10									
15									
20									

BOREHOLE NO. GL9-3

PROJECT NAME: GLENMORE LANDFILL HYDROGEOLOGICAL INVESTIGATION

CLIENT: CITY OF KELOWNA — DATE: 28/11/90

BOREHOLE TYPE: 0.20 m Hollow Stem Auger with 0.05 m Split Spoon — GEOLOGIST: SBS

GROUND ELEVATION: 98.73 m.a.s.l. — PROJECT NO. 90-732

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS AND NUMBER	SAMPLE NO.	TYPE	'N' VALUE	% WATER	PENETRATION RESISTANCE BLOWS/0.3m	WATER CONTENT % / COMMENT (Wp — WL)
	no samples taken above 20' (see GL9-2)		GL9-3						
6.1	POORLY SORTED SAND with trace gravel			1	SS	43			
6.9	DARK GREY GRAVELLY SILT TILL			2	SS	76			
				3	SS	60+			
8.4	FINE SILTY SAND			4	SS	127			-grain size
8.7	DARK GREY GRAVELLY SILT TILL with occasional silty sand lenses			5	SS	60+			-grain size
				6	SS	90+			
				7	SS	60+			
				8	SS	83			
12.2	EOH								

Gartner Lee Limited

BOREHOLE NO. GL10-1

PROJECT NAME: GLENMORE LANDFILL HYDROGEOLOGICAL INVESTIGATION

CLIENT: CITY OF KELOWNA

DATE: 28/11/90

BOREHOLE TYPE: 0.20 Hollow Stem Auger with 2" Split Spoon

GEOLOGIST: SBS

GROUND ELEVATION: 98.42 m.a.s.l.

PROJECT NO. 90-732

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS AND NUMBER	SAMPLE NO.	TYPE	'N' VALUE	% WATER	PENETRATION RESISTANCE BLOWS/0.3m	WATER CONTENT % / COMMENT (Wp — WL)
	GREEN/BROWN CLAY		GL10-1	1	SS	22			
				2	SS	18			
				3	SS	6			
	3.0			4	SS	7			
	GREEN/BROWN SILT with some sand and gravel			5	SS	31			
				6	SS	41			
5	5.3			7	SS	28			
	GREY SILTY CLAY with some sand and gravel			8	SS	55			
				9	SS	43			
				10	SS	55			
	8.4			11	SS	60			
	GREY SILTY CLAY TILL with some sand and gravel			12	SS	66+			
10									
15									
20									

*decommissioned in 2007

BOREHOLE LOG

PROJECT: 98-771

BOREHOLE: GL11-1

Monitoring Well Installation
Glenmore Landfill
FOR: City of Kelowna

DATE: 5 November 1998
GEOLOGIST RCD
ELEVATION 445.6 m ASL

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	TYPE	N VALUE	COMMENTS
0.3	Dark brown. Silty TOPSOIL with organics.			
1	Brown. Silty CLAY. Laminated. DTPL to APL, very stiff.	SS	20	Grain size analysis.
2.5	Greenish brown. Silty SAND TILL with gravel and some clay. Very stiff to dense. APL to WTPL.	SS	30	
4		SS	30	
6	Slow and difficult drilling at 6 m.	SS	48	
7		SS	41	
9		SS	34	Grain size analysis.
10		SS	31	
11	Slow and difficult drilling at 11 m.	SS	25	
13		SS	30	
15.2		SS	22	~~Grain size analysis.~~

Borehole completed at 15.2 m in silty SAND TILL, monitor dry on completion.

NOTES:

1. Borehole advanced using hollow stem auger drilling equipment.
2. Monitor construction: Schedule 40 PVC standpipe (51mm dia.) with 1.5 m slotted (#10 size) screen. Waterra standard flow tubing and foot-valve installed.
3. Surface completed with concrete seal.
4. Monitor provided with lockable protective steel housing.
5. Ground water not present, monitor dry, 6 Nov 98.
6. PVC monitor sitck-up above grade 0.20 m.

Column headings: DEPTH (m), STRATIGRAPHY, STRATIGRAPHIC DESCRIPTION, MONITOR DETAILS & NUMBER, SAMPLE (NUMBER, INTERVAL, TYPE, N VALUE, % WATER, % REC, % RQD), COMMENTS

BOREHOLE LOG

BOREHOLE LOG	PROJECT: 98-771	BOREHOLE: GL12-1	1 of 1
Monitoring Well Installation Glenmore Landfill FOR: City of Kelowna		DATE: 6 November 1998 GEOLOGIST RCD ELEVATION 442.0 m ASL	

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	SAMPLE NUMBER	INTERVAL	TYPE	N VALUE	% WATER	% REC	% RQD	COMMENTS
0.3	Dark brown. Silty TOPSOIL with organics.								
1	Brown. Silty CLAY. Laminated. APL.			SS	18				
1.8 / 2	Greenish brown. Silty SAND Till with gravel. Very dense. Moist.								Grain size analysis.
3				SS	30				
4	Gravel content increasing and colour change to reddish brown and black.			SS	40				
5									
6	Thin grey clay layer within till, saturated.			SS	37				Grain size analysis.
7	Till colour becomes dark grey. WTPL.			SS	58				
8									
9.1 / 9				SS	40				Grain size analysis.

Borehole completed at 9.1 m in silty SAND TILL.

NOTES:

1. Borehole advanced using hollow stem auger drilling equipment.
2. Monitor construction: Schedule 40 PVC standpipe (51mm dia.) with 1.5 m slotted (#10 size) screen. Waterra standard flow tubing and foot-valve installed.
3. Surface completed with concrete seal.
4. Monitor provided with lockable protective steel housing.
5. Water level measured on 6 Nov 98 at 3.68 m depth (from top of PVC pipe).
6. PVC monitor stick-up above grade 0.18m.

BOREHOLE LOG

PROJECT: 98-771

BOREHOLE: GL13-1 1 of 1

Monitoring Well Installation
Glenmore Landfill
FOR: City of Kelowna

DATE: 5 November 1998
GEOLOGIST RCD
ELEVATION 438.6 m ASL

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	SAMPLE TYPE	N VALUE	COMMENTS
0.3	Dark brown. Silty TOPSOIL with organics.			
1	Brown. CLAY. Increasing pebble content with depth. Rootlets present in upper 2 m, possibly fill. Past infilling of area reported by farmer.	SS	11	
2		SS	5	Grain size analysis.
3		SS	11	
		SS	10	
4		SS	8	
4.6	Brown. Silty SAND TILL with gravel. Wet, very dense, possible sand and gravel layers. Poor sample recovery due to gravel content.			
5		SS	>30	
		SS	>30	
6				Grain size analysis.
7	Weathered rock at 7.6 m.	SS	32	Grain size analysis.
7.9	Refusal on cobble or bedrock at 7.9 m. Pink granite-like rock fragments in split spoon.	~~SS~~	~~>30~~	

NOTES:
1. Borehole advanced using hollow stem auger drilling equipment.
2. Monitor construction: Schedule 40 PVC standpipe (51mm dia.) with 1.5 m slotted (#10 size) screen. Waterra standard flow tubing and foot-valve installed.
3. Surface completed with concrete seal.
4. Monitor provided with lockable protective steel housing.
5. Water level measured on 6 Nov 98 at 1.65 m depth (from top of PVC pipe).
6. PVC monitor stick-up above grade 0.17m.

PROJECT No.: Glenmore Landfill

LOCATION: See Figure 1

RECORD OF BOREHOLE: GA 14-1

GL

SHEET 1 OF 1

BORING DATE: Feb 22 2005

DATUM:

SAMPLER HAMMER, 140lbs.; DROP, 30in.

INCLINATION: -90°

BORING METHOD: Foundex Explorations; Bomadier Simco 2800 120 mm dia. Mud Rotary

DEPTH (m)	DESCRIPTION	ELEV. / DEPTH (m)	SAMPLE NUMBER	TYPE	BLOWS/0.3m	PIEZOMETER OR STANDPIPE INSTALLATION GA 14-1
0	GROUND SURFACE	453.10				Steel Well Protector in Concrete
	Loose dark brown organic SILT, some clay.	452.85 / 0.25				
	Very dense grey brown SILT, some sand, trace to some gravel. (GLACIAL TILL)		1	DO	N/R	
2			2	DO	>100	
		449.29 / 3.81				
4	Very dense light grey silty GRAVEL, trace sand grading to very dense light grey GRAVEL, some silt, trace sand. (WEATHERED BEDROCK)		3	DO	>100	
			4	DO	>100	
6			5	DO	>100	
8		444.87				Grout and bentonite
	Bedrock Encountered. Refer to ROCK LOG for continuation of rock description.					Screen?

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m: 20 40 60 80

SHEAR STRENGTH Cu, kPa: nat V. + Q - ● rem V. ⊕ U - O; 20 40 60 80

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp — W — Wl; 10 20 30 40

ADDITIONAL LAB. TESTING

DEPTH SCALE 1 : 100

Golder Associates

LOGGED: RR

CHECKED: GTI

BOREHOLE BOREHOLES.GPJ GLDR_CAN.GDT 10/1/06

RECORD OF BOREHOLE: GA 15-1

GL

PROJECT No.: Glenmore Landfill
LOCATION: See Figure 1
SAMPLER HAMMER, 140lbs.; DROP, 30in.

BORING DATE: Feb 23,24 2005
INCLINATION: -90°

SHEET 1 OF 1
DATUM:

Boring method: Foundex Explorations, Bomadier Simco 2800 120 mm dia. Mud Rotary

Depth (m)	Description	Elev. / Depth (m)	Sample No.	Type	Blows/0.3m	Piezometer or Standpipe Installation GA 15-1
0	GROUND SURFACE	451.77				Steel Well Protector in Concrete
	Loose dark brown organic SILT, some clay with roots at the surface.	0.15				
	Firm grey brown CLAY, some silt occasional root fibres grading to clayey SILT.	449.33 / 2.44	1	DO	6	
	Loose light brown SILT, trace fine sand.	448.87 / 2.90	2	DO	6	
	Compact brown gravelly SAND, some silt with cobbles.	447.19 / 4.57	3	DO	20	5/04/05 ∇
	Dense to very dense brown sandy SILT and GRAVEL with cobbles. (GLACIAL TILL)	444.68 / 7.09	4	DO	>100	Grout and bentonite
			5	DO	79	
	Very dense grey brown SILT, some gravel, trace sand. (GLACIAL TILL)	441.86 / 9.91	6	DO	>100	
	Very dense light grey silty GRAVEL, trace sand. (WEATHERED BEDROCK)	439.57	7	DO	>100	
12	Bedrock Encountered. Refer to ROCK LOG for continuation of rock description.					Screen?

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m: 20 40 60 80
SHEAR STRENGTH Cu, kPa: nat V. + Q - ● rem V. ⊕ U - O; 20 40 60 80
HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}
WATER CONTENT PERCENT: Wp W Wl; 10 20 30 40
ADDITIONAL LAB. TESTING

DEPTH SCALE
1 : 100

Golder Associates

LOGGED: RR
CHECKED: GTI

BOREHOLE BOREHOLES.GPJ GLDR_CAN.GDT 10/1/06

RECORD OF BOREHOLE: GA 15-2

PROJECT No.: Glenmore Landfill
LOCATION: See Figure 1
SAMPLER HAMMER, 140lbs.; DROP, 30in.

BORING DATE: Feb 23,24 2005
INCLINATION: -90°

SHEET 1 OF 1
DATUM:

BORING METHOD: Foundex Explorations, Bomadier Simco 2800 120 mm dia. Mud Rotary

DEPTH SCALE METRES	SOIL PROFILE DESCRIPTION	ELEV. DEPTH (m)	SAMPLE NUMBER	TYPE	BLOWS/0.3m	PIEZOMETER OR STANDPIPE INSTALLATION GA 15-2
0	GROUND SURFACE	451.48				Steel Well Protector in Concrete
	Loose dark brown organic SILT, some clay with roots at the surface.	0.15				
	Firm grey brown CLAY, some silt occasional root fibres grading to clayey SILT.	449.04 / 2.44	1	DO	6	Bentonite seal
	Loose light brown SILT, trace fine sand.	448.58 / 2.90	2	DO	6	Filter sand
4	Compact brown gravelly SAND, some silt with cobbles.	446.91 / 4.57	3	DO	20	5/04/05 ∇ ; 50 mm dia. PVC Screen
	Dense to very dense brown sandy SILT and GRAVEL with cobbles. (GLACIAL TILL)	445.38 / 6.10	4	DO	>100	
6	End of BOREHOLE.					

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m: 20 40 60 80
SHEAR STRENGTH Cu, kPa: nat V. + Q - ● ; rem V. ⊕ U - O ; 20 40 60 80
HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}
WATER CONTENT PERCENT: Wp — W — Wl ; 10 20 30 40
ADDITIONAL LAB. TESTING

DEPTH SCALE 1 : 100

Golder Associates

LOGGED: RR
CHECKED: GTI

PROJECT No.: Glenmore Landfill

RECORD OF BOREHOLE: GA 16-1

GL

SHEET 1 OF 1

LOCATION: See Figure 1

BORING DATE: Feb 24,25 2005

DATUM:

SAMPLER HAMMER, 140lbs.; DROP, 30in.

INCLINATION: -90°

BORING METHOD: Foundex Explorations; Bomadier Simco 2800 120 mm dia. Mud Rotary

DESCRIPTION	ELEV. / DEPTH (m)	SAMPLE NUMBER	TYPE	BLOWS/0.3m
GROUND SURFACE	438.75			
Loose to compact SILT, CLAY and SAND with miscellaneous debris. (FILL)	0.15			
Firm grey brown thinly layered CLAY, some silt.		1	DO	6
		2	DO	7
	435.25 / 3.51			
Soft grey brown thinly layered CLAY, trace to some silt.		3	DO	2
	433.11 / 5.64			
Loose brown SAND, some gravel, trace to some silt.		4	DO	5
	431.44 / 7.32			
Dense grey SAND and GRAVEL, trace to some silt grading to very dense grey SAND and GRAVEL.		5	DO	25
		6	DO	62
	429.69 / 9.07			
Very dense brown SILT grading to laminated SILT (WEATHERED BEDROCK)				
	427.78			
Bedrock Encountered. Refer to ROCK LOG for continuation of rock description.				

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m: 20 40 60 80

SHEAR STRENGTH Cu, kPa: nat V. + Q - ● rem V. ⊕ U - O: 20 40 60 80

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp —— W —— Wl: 10 20 30 40

ADDITIONAL LAB. TESTING

PIEZOMETER OR STANDPIPE INSTALLATION: GA 16-1

Steel Well Protector in Concrete 5/04/05

Grout and bentonite

Filter sand

Bentonite seal

Screen?

DEPTH SCALE (METRES): 0 2 4 6 8 10 12 14 16 18 20

DEPTH SCALE 1 : 100

Golder Associates

LOGGED: RR

CHECKED: GTI

BOREHOLE BOREHOLES.GPJ GLDR_CAN.GDT 10/1/06

RECORD OF BOREHOLE: GA 17-1

PROJECT No.: Glenmore Landfill
LOCATION: See Figure 1
SAMPLER HAMMER, 140lbs.; DROP, 30in.

BORING DATE: Feb 25,26 2005
INCLINATION: -90°

SHEET 1 OF 1
DATUM:

BORING METHOD: Foundex Explorations — Bomader Simco 2800 120 mm dia. Mud Rotary

SOIL PROFILE DESCRIPTION	ELEV. / DEPTH (m)	SAMPLE NUMBER	TYPE	BLOWS/0.3m	PIEZOMETER OR STANDPIPE INSTALLATION GA 17-1
GROUND SURFACE	438.42				Steel Well Protector in Concrete; 5/04/05 ∇
Loose dark brown clayey organic SILT. (reworked native)	438.11 / 0.30				
Stiff brown thinly layerd CLAY, trace to some silt occasional gravel inclusions.	436.28 / 2.13	1	DO	11	
Soft grey brown thinly layered CLAY, trace to some silt, occasional gravel.	434.61 / 3.81	2	DO	2	
Loose brown SILT, some gravel.	433.16 / 5.26	3	DO	11	
Very dense brown silty gravelly SAND with cobbles.	432.02 / 6.40	4	DO	101	
Very dense brown grey silty SAND and GRAVEL with cobbles.	430.80 / 7.62				
Very dense brown grey SILT and GRAVEL, some sand with cobbles grading to dark grey sandy SILT and GRAVEL with cobbles. (GLACIAL TILL)	426.99 / 11.43	5 / 6 / 7	DO / DO / DO	68 / 70 / 87	Grout and bentonite
Dense dark grey sandy SILT, some gravel with cobbles. (GLACIAL TILL)	422.72 / 15.70	8 / 9	DO / DO	45 / 38	
Compact dark grey SILT, some clay and fine gravel, trace sand with cobbles. (GLACIAL TILL)	421.35 / 17.07	10	DO	16	
Very dense grey layered GRAVEL with dark brown organic clayey SILT. (WEATHERED BEDROCK)	420.74		DO	>100	Filter sand
Soft dark brown organic clayey SILT					
Bedrock Encountered. Refer to ROCK LOG for continuation of rock description.					

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m: 20 40 60 80
SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - O; 20 40 60 80
HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}
WATER CONTENT PERCENT: Wp —O W— Wl; 10 20 30 40
ADDITIONAL LAB. TESTING

DEPTH SCALE METRES: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20

DEPTH SCALE
1 : 100

Golder Associates

LOGGED: RR
CHECKED: GTI

PROJECT No.: Glenmore Landfill

LOCATION: See Figure 1

RECORD OF BOREHOLE: GA 17-2

BORING DATE: Feb 26 2005

SHEET 1 OF 1

DATUM:

SAMPLER HAMMER, 140lbs.; DROP, 30in.

INCLINATION: -90°

BORING METHOD: Foundex Explorations; Bomadier Simco 2800 120 mm dia. Mud Rotary

DESCRIPTION	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	PIEZOMETER OR STANDPIPE INSTALLATION GA 17-2
GROUND SURFACE	438.38				
Loose dark brown clayey oraganic SILT. (reworked native)	438.08 / 0.30				Steel Well Protector in Concrete (04/05)
Stiff brown thinly layerd CLAY, trace to some silt occasional gravel inclusions.	436.25 / 2.13	1	DO	11	Bentonite
Soft grey brown thinly layered CLAY, trace to some silt occasional gravel.	434.57 / 3.81	2	DO	2	Filter sand; Bentonite seal
Loose brown SILT, some gravel.	433.12 / 5.26	3	DO	11	Filter sand
Very dense brown silty gravelly SAND with cobbles.	431.98 / 6.40	4	DO	101	50 mm dia. PVC Screen
Very dense brown grey silty SAND and GRAVEL with cobbles.	430.76				
Very dense brown grey SILT and GRAVEL, some sand with cobbles grading to dark grey sandy SILT and GRAVEL with cobbles. (GLACIAL TILL)	430.46 / 7.92	5	DO	68	
End of BOREHOLE.					

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m: 20 40 60 80

SHEAR STRENGTH Cu, kPa: nat V. + Q - ● rem V. ⊕ U - O; 20 40 60 80

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp —O W— Wl; 10 20 30 40

ADDITIONAL LAB. TESTING

DEPTH SCALE METRES: 0 2 4 6 8 10 12 14 16 18 20

BOREHOLE BOREHOLES.GPJ GLDR_CAN.GDT 10/1/06

DEPTH SCALE 1 : 100

Golder Associates

LOGGED: RR

CHECKED: GTI

Decom

RECORD OF BOREHOLE: GA 18-1

PROJECT No.: Glenmore Landfill
LOCATION: See Figure 1
BORING DATE: Feb 28 2005
SHEET 1 OF 2
DATUM:
SAMPLER HAMMER, 140lbs.; DROP, 30in.
INCLINATION: -90°

BORING METHOD: Foundex Explorations, Bomadier Simco 2800 120 mm dia. Mud Rotary

DEPTH SCALE METRES	SOIL PROFILE DESCRIPTION	ELEV. / DEPTH (m)	SAMPLE NUMBER	TYPE	BLOWS/0.3m	PIEZOMETER OR STANDPIPE INSTALLATION GA 18-1
0	GROUND SURFACE	442.31 / 0.00				Steel Well Protector in Concrete
	Loose mixed brown SILT, CLAY and SAND, trace gravel. (FILL)					Grout and bentonite
	LANDFILL REFUSE (Paper, plastic, wood etc. and soil) (FILL)	441.40 / 0.91	1	DO	7	
			2	DO	21	5/04/05 ∇ Bentonite seal
			3	DO	4	
			4	DO	8	
	Very soft grey brown thinly layered CLAY grading to very soft grey thinly layered CLAY, some silt with occasional grey clayey silt layers.	433.32 / 8.99	5	DO	1	
			6	DO	wh	
			7	DO	wh	
			8	DO	wh	Grout and bentonite
	Loose grey silty fine SAND.	426.16 / 16.15	9	DO	5	
	Very soft grey thinly layered CLAY, some silt.	423.72 / 18.59	10	DO	wh	
20						

Column headings also include: DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○) (20 40 60 80); HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT Wp —○W— Wl (10 20 30 40); ADDITIONAL LAB. TESTING; STRATA PLOT.

CONTINUED NEXT PAGE

Drum
GC

RECORD OF BOREHOLE: GA 18-1

PROJECT No.: Glenmore Landfill
LOCATION: See Figure 1
SAMPLER HAMMER, 140lbs.; DROP, 30in.
BORING DATE: Feb 28 2005
INCLINATION: -90°
SHEET 2 OF 2
DATUM:

Boring method: Foundex Explorations; Bomadier Simco 2800 120 mm dia. Mud Rotary

DEPTH SCALE METRES	SOIL PROFILE DESCRIPTION	ELEV. DEPTH (m)	SAMPLE NUMBER	TYPE	BLOWS/0.3m	PIEZOMETER OR STANDPIPE INSTALLATION GA 18-1
20	Very soft grey thinly layered CLAY, some silt. *(continued)*	420.67 21.64				Grout and bentonite
22	Compact light grey silty gravelly SAND.	419.45 22.86	11	DO	16	
	Very dense light grey silty SAND, some gravel grading to very dense light grey laminated silty SAND, trace gravel. (WEATHERED BEDROCK)	418.33				
24	Bedrock Encountered. Refer to ROCK LOG for continuation of rock description.					

Other columns (empty): DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20, 40, 60, 80); SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - O; 20, 40, 60, 80); HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6}, 10^{-5}, 10^{-4}, 10^{-3}); WATER CONTENT PERCENT (Wp —O W— Wl; 10, 20, 30, 40); ADDITIONAL LAB. TESTING. Depth scale continues 26, 28, 30, 32, 34, 36, 38, 40.

DEPTH SCALE 1 : 100

Golder Associates

LOGGED: RR
CHECKED: GTI

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: City of Kelowna
PROJECT: Glenmore Landfill - Phase 3
ADDRESS: 2105 Glenmore Road North, Kelowna, BC
SLR JOB NO: 219.05164

BOREHOLE LOG

BOREHOLE NO: GL18-1 (Decom)
SURFACE ELEVATION: 442.46 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run # / % Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
0					Monitoring well decommissioned May 30, 2011				concrete to 0.9 m	442
1										441
2										440
3										439
4										438
5									grout from 0.9 to 9.7 m	437
6										436
7										435
8										434
9										433
10										432
11										431
12										430
13										429
14										428
15										427
16										426
17									bentonite from 9.7 m to 24.1 m	425
18										424
19										423

DRILLING METHOD: Core Sample

DRILL DATE: May 30, 2011 LOGGED BY: JN DRILLER NAME: Beck

Notes:

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: City of Kelowna
PROJECT: Glenmore Landfill - Phase 3
ADDRESS: 2105 Glenmore Road North, Kelowna, BC
SLR JOB NO: 219.05164

BOREHOLE LOG

BOREHOLE NO: GL18-1 (Decom)
SURFACE ELEVATION: 442.46 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run # / % Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
										422
21										421
22										420
23										419
24					End of borehole at 24.1 m					

DRILLING METHOD: Core Sample

DRILL DATE: May 30, 2011
LOGGED BY: JN
DRILLER NAME: Beck

Notes:

PROJECT No.: Glenmore Landfill

LOCATION: See Figure 1

RECORD OF BOREHOLE: GA 18-2

BORING DATE: Mar 1 2005

SHEET 1 OF 1

DATUM:

SAMPLER HAMMER, 140lbs.; DROP, 30in.

INCLINATION: -90°

BORING METHOD: Foundex Explorations; Bomadier Simco 2800 120 mm dia. Mud Rotary

DEPTH (m)	DESCRIPTION	ELEV. / DEPTH (m)	SAMPLE NUMBER	TYPE	BLOWS/0.3m	PIEZOMETER OR STANDPIPE INSTALLATION GA 18-2
	GROUND SURFACE	442.35 / 0.00				Steel Well Protector in Concrete; Filter sand
0	Loose mixed brown SILT, CLAY and SAND, trace gravel. (FILL)	441.44 / 0.91				
0.91 – 8.99	LANDFILL REFUSE (Paper, plastic, wood etc. and soil) (FILL)		1	DO	7	Bentonite seal; 3/04/05 ∇
			2	DO	21	
			3	DO	4	Grout
			4	DO	8	
		433.36 / 8.99	5	DO	1	
8.99 – 16.15	Very soft grey brown thinly layered CLAY grading to very soft grey thinly layered CLAY, some silt with occasional grey clayey silt layers.		6	DO	wh	
			7	DO	wh	
		426.20 / 16.15	8	DO	wh	Bentonite seal
16.15 – 18.59	Loose grey silty fine SAND.	423.76 / 18.59	9	DO	5	50 mm dia. PVC Screen; Filter sand
18.59 – 19.15	Very soft grey thinly layered CLAY, some silt.	423.20 / 19.15				
	End of BOREHOLE.					

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m: 20 40 60 80

SHEAR STRENGTH Cu, kPa: nat V. + Q - ● ; rem V. ⊕ U - O : 20 40 60 80

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp —O W— Wl : 10 20 30 40

ADDITIONAL LAB. TESTING

DEPTH SCALE 1 : 100

Golder Associates

LOGGED: RR

CHECKED: GTI

RECORD OF BOREHOLE: GA 18-3

PROJECT No.: Glenmore Landfill
LOCATION: See Figure 1
SAMPLER HAMMER, 140lbs.; DROP, 30in.

BORING DATE: Mar 1 2005
INCLINATION: -90°

SHEET 1 OF 1
DATUM:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE – DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES – NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20, 40, 60, 80); SHEAR STRENGTH Cu, kPa nat V. + Q - ● rem V. ⊕ U - O (20, 40, 60, 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6}, 10^{-5}, 10^{-4}, 10^{-3}); WATER CONTENT PERCENT Wp —O W— Wl (10, 20, 30, 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION GA 18-3
		GROUND SURFACE		442.55							
0	Foundex Explorations; Bomadier Simco 2800 225 mm dia. Mud Rotary	Loose mixed brown SILT, CLAY and SAND, trace gravel. (FILL)		0.00							Steel Well Protector in Concrete
				441.63 / 0.91							Bentonite Seal
2–8		LANDFILL REFUSE (Paper, plastic, wood etc. and soil) (FILL)									Filter sand; 13/04/05 ▽; 150 mm dia. PVC Screen
				434.24 / 8.31							
		End of BOREHOLE.									

Depth scale marks: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20

DEPTH SCALE
1 : 100

Golder Associates

LOGGED: RR
CHECKED: GTI

RECORD OF MONITORING WELL: MW07-2 (GL-20)

PROJECT No.: 05-1440-252

LOCATION: See Figure 1

BORING DATE: May 16, 2007

INCLINATION: -90°

SHEET 1 OF 1

DATUM: Local

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20, 40, 60, 80); SHEAR STRENGTH Cu, kPa (nat V. + Q - ●; rem V. ⊕ U - O) (20, 40, 60, 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6}, 10^{-5}, 10^{-4}, 10^{-3}); WATER CONTENT PERCENT Wp ⊢ OW ⊣ Wl (20, 40, 60, 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		Ground Surface									
0	Beck Drilling & Environmental Services, Hollow Stem Auger	Very soft to soft dark brown/grey SILTY CLAY, occasional black rocks and organics, some fine sand intermixed with brown silty sand, some gravel. (FILL)		0.00							Concrete Riser; Cuttings; Bentonite Seal
1					1	DO	14				
2		Compact to dewnse grey silty SAND, some gravel, trace to some clay with cobbles. (TILL)		1.52	2	DO	36				Slotted Section Filter Sand
3					3	DO	32				Filter Sand
		End of MONITORING WELL.		3.35							
4											
5											
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AR

CHECKED: DRAFT

BOREHOLE 051440252_1000_LOGS.GPJ GLDR_CAN.GDT 19/3/09

PROJECT No.: 05-1440-252

RECORD OF MONITORING WELL: MW07-3 (GL-21)

SHEET 1 OF 1

LOCATION: See Figure 1

BORING DATE: May 16, 2007

DATUM: Local

INCLINATION: -90°

Boring Method: Beck Drilling & Environmental Services, Hollow Stem Auger

Depth (m)	Description	Elev. Depth (m)	Sample Number	Type	Blows/0.3m	Piezometer or Standpipe Installation
0	Ground Surface	0.00				Concrete Riser
	Loose/soft SILT, CLAY and SAND, some gravel, trace refuse with angular cobbles and boulders. (FILL)		1	DO	4	Bentonite Seal; Slotted Section Fileter Sand
2.95	Very soft to firm greyish-brown CLAY, trace to some thin silt seams, occasional rootlets.	2.95	2	DO	1	
			3	DO	8	Slough
5.03	Compact greyish brown silty SAND, some gravel and clay. (TILL)	5.03				
5.18	End of MONITORING WELL.	5.18				

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m: 20 40 60 80

SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - O; 20 40 60 80

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp —O W— Wl; 20 40 60 80

ADDITIONAL LAB. TESTING

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AR

CHECKED: DRAFT

RECORD OF AUGERHOLE: GL22-1

PROJECT No.: NE Pond
LOCATION: See Figure
BORING DATE: Oct. 31/07
INCLINATION: -90°
SHEET 1 OF 2
DATUM: Geodetic

Boring method: Beck Drilling, Hollow Stem Auger

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m: 20 40 60 80
SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - O; 20 40 60 80
HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}
WATER CONTENT PERCENT: Wp ⊢—○W—⊣ Wl; 10 20 30 40

PIEZOMETER OR STANDPIPE INSTALLATION: GL22-1

DEPTH SCALE METRES	SOIL PROFILE DESCRIPTION	ELEV. / DEPTH (m)	SAMPLE NUMBER	TYPE	BLOWS/0.3m	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
	GROUND SURFACE	449.54					
0	Organic WOOD MULCH, some silt and fine sand.	0.00					Concreted in stick up steel well protector.
	Firm to stiff grey dessicated layered CLAY, some light brown silt seams and inclussions, trace brown fine sand lenses.	449.24 / 0.30					
1	Stiff grey layered CLAY, some light bown silt seams and inclussions, trace to some brown fine sand, some silt seams and lenses.	448.63 / 0.91	1	AS			
2	Firm to stiff grey-brown laminated silty CLAY, some silt, trace clay layers and seams, trace to some fine sand lenses, and occasional decomposed root fibres.	447.72 / 1.83	2	DO	22		
3–4	Dense grey fine SAND, some fine to medium sand, occasional fine gravel layers.	446.78 / 2.77	3	DO	34		Bentonite seal.
5–6	Compact grey fine SAND, some brownish-grey clayey silt seams.	444.36 / 5.18	4	DO	13		Nov 9/07 ▽
7–8	Dense grey fine SAND, occasional fine to medium sand layers, and occasional grey clayey silt seams.	442.38 / 7.16	5	DO	40	Sieve	
9	Dense grey fine SAND, trace silt with slight rust brown oxidation.	440.65 / 8.89	6	DO		Sieve	Filter sand.
10							

Water content (O) plotted at sample 1 (~29%) and sample 2 (~40%).

CONTINUED NEXT PAGE

DEPTH SCALE 1 : 50

Golder Associates

LOGGED: AR
CHECKED:

PROJECT No.: NE Pond

LOCATION: See Figure

RECORD OF AUGERHOLE: GL22-1

BORING DATE: Oct. 31/07

INCLINATION: -90°

SHEET 2 OF 2

DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa nat V. + Q - ● rem V. ⊕ U - O (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT Wp ⊢—O W—⊣ Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION GL22-1
10–12.80	Beck Drilling / Hollow Stem Auger	Dense grey fine SAND, trace silt with slight rust brown oxidation *(continued)*		436.74 / 12.80							Filter sand. 50 mm dia. PVC well screen.
12.80–13.72		Dense grey fine SAND with cobbles, some medium to coarse sand and gravel (GLACIAL TILL).		435.83 / 13.72	7	DO	39				Native slough.
		End of AUGERHOLE.									

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AR

CHECKED:

RECORD OF AUGERHOLE: GL23-1

PROJECT No.: NE Pond

LOCATION: See Figure

BORING DATE: Nov. 5/07

DATUM: Geodetic

INCLINATION: -90°

BORING METHOD: Beck Drilling, Hollow Stem Auger

Depth (m)	Description	ELEV. / DEPTH (m)	Sample Number	Type	Blows/0.3m	Piezometer or Standpipe Installation GL23-1
0	GROUND SURFACE	445.93 / 0.00				Concreted in stick up steel well protector.
	Very loose brown organic WOOD MULCH, intermixed with some silt and sand.	445.72 / 0.20				
	Compact brownish-grey SILT and SAND, some gravel (FILL).	445.37 / 0.56				Bentonite seal.
	Stiff grey dessicated CLAY, some light brown silt seams.	445.01 / 0.91				
1	Stiff grey layered CLAY, some light brown silt seams and brown fine sand, some silt lenses.	443.94 / 1.98	1	AS		
2–9.75	Compact to dense brown fine SAND.	436.17 / 9.75	2	DO	19	Nov 9/07 ▽
			3	DO	13	Native slough.
			4	DO		50 mm dia. PVC well screen.
						Native slough.
10	Dense grey silty SAND, some gravel (GLACIAL TILL).		5	DO		

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m: 20, 40, 60, 80

SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - O; 20, 40, 60, 80

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6}, 10^{-5}, 10^{-4}, 10^{-3}

WATER CONTENT PERCENT: Wp ⊢—○W—⊣ Wl; 10, 20, 30, 40

ADDITIONAL LAB. TESTING

CONTINUED NEXT PAGE

DEPTH SCALE 1 : 50

Golder Associates

LOGGED: AR

CHECKED:

PROJECT No.: NE Pond

LOCATION: See Figure

RECORD OF AUGERHOLE: GL23-1

BORING DATE: Nov. 5/07

INCLINATION: -90°

DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa nat V. + Q - ● rem V. ⊕ U - O (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT Wp —O W— Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION GL23-1
10	Beck Drilling	Dense grey silty SAND, some gravel (GLACIAL TILL).*(continued)*		435.41 10.52	5	DO					Native slough.
		End of AUGERHOLE.									
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AR

CHECKED:

PROJECT No.: NE Pond

LOCATION: See Figure

RECORD OF AUGERHOLE: GL24-1

SHEET 1 OF 1

DATUM: Geodetic

BORING DATE: Nov. 5 and 6/07

INCLINATION: -90°

DEPTH SCALE METRES | BORING METHOD | SOIL PROFILE | SAMPLES | DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) | SHEAR STRENGTH Cu, kPa (nat V. + Q - ●; rem V. ⊕ U - O) (20 40 60 80) | HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) | WATER CONTENT PERCENT Wp ⊢—○W—⊣ Wl (10 20 30 40) | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION GL24-1

BORING METHOD: Beck Drilling, Hollow Stem Auger

DESCRIPTION	ELEV. DEPTH (m)	SAMPLE NUMBER	TYPE	BLOWS/0.3m
GROUND SURFACE	446.71			
Very loose dark brown organic SILT and fine SAND with roots (TOPSOIL).	0.00			
Compact greyish-brown silty fine SAND.	446.48 0.23			
Stiff grey dessicated CLAY, some light brown silt seams and lenses, and trace brown silt and fine sand lenses.	446.02 0.69			
Stiff grey layered CLAY, trace to some light brown silt seams and lenses, trace brown fine sand lenses and occasional root fibres.	445.69 1.02	1	AS	
Compact brown fine SAND, occasional coarse sand, and grey clay, some silt seams.	444.88 1.83	2	DO	10
		3	DO	20
Dense brownish-grey gravelly SAND with cobbles, some silt to silty (GLACIAL TILL).	442.26 4.44	4	DO	44
		5	DO	
		6	DO	
End of AUGERHOLE.	439.39 7.32			

Piezometer or standpipe installation GL24-1:

- Concreted in stick up steel well protector.
- Bentonite seal.
- Nov 8/07 ∇
- 50 mm dia. PVC well screen. Filter sand.
- Native slough.

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: AR

CHECKED:

PROJECT No.: 09-1440-0066

RECORD OF MONITORING WELL: GL25-1 (MW09-1-1)

SHEET 1 OF 2

LOCATION: See Figure 1

BORING DATE: June 11/09

DATUM:

SAMPLER HAMMER, 140lbs.; DROP, 30in.

INCLINATION: -90°

BORING METHOD: Odex B61

Stickup= 0.753m

DESCRIPTION	ELEV. DEPTH (m)	SAMPLE NUMBER	TYPE	BLOWS/0.3m	PIEZOMETER OR STANDPIPE INSTALLATION
Ground Surface					
Loose dark brown organic silt (forest cover).	0.05				Bentonite Grout
Loose to compact light brown sandy SILT with rootlets.	0.76				
Loose to compact light brown fine SAND, trace silt.		1	CS		
Stiff to very stiff interlayered CLAY and SILTY CLAY fissured with organic root matter infilling with occasional fine sand and silt partings.	1.68	2	DO	8	
		4/5	DO	8	
Very dense light brown silty SAND and GRAVEL with occasional very stiff brown silty clay layers, contains cobbles.	3.96	6	DO	50 for 3.5"	
		7	DO	50 for 5.5"	
Very dense light brown SAND, some silt and gravel.		8	DO	50 for 2.5"	
Very dense light brown silty SAND and GRAVEL with occasional very stiff brown silty clay layers, contains cobbles.	7.77	9	DO	50 for 6"	
Very dense grey and brown SAND and GRAVEL with silty clay, contains cobbles (Glacial Till).	9.75	10	CS		
		11	DO	78	
		12	DO	50 for 6"	
		13	DO		Bentonite
					Slotted Section Filter Sand
		14	DO	76	June 16/09 ▽
		15	CS		Sand
		16	DO	51	Bentonite
Fresh medium strong to strong light grey BEDROCK.	18.90	17	CS		

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m: 20 40 60 80

SHEAR STRENGTH Cu, kPa: nat V. + Q - ● rem V. ⊕ U - ○ 20 40 60 80

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp ⊢—○W—⊣ Wl 10 20 30 40

ADDITIONAL LAB. TESTING

CONTINUED NEXT PAGE

DEPTH SCALE 1 : 100

Golder Associates

LOGGED: BS

CHECKED: PVA

PROJECT No.: 09-1440-0066

RECORD OF MONITORING WELL: GL25-1 (MW09-1-1)

LOCATION: See Figure 1

BORING DATE: June 11/09

DATUM:

SAMPLER HAMMER, 140lbs.; DROP, 30in.

INCLINATION: -90°

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa nat V. + Q - ● rem V. ⊕ U - O (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT Wp ⊢—○W—⊣ Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
20	Odex B61	Fresh medium strong to strong light grey BEDROCK. *(continued)*			17	CS					Bentonite
22		Fresh medium strong to strong dark grey BEDROCK.		21.95							
		Fresh strong to very strong light grey BEDROCK.		22.56	18	CS					
24					19	CS					
26											
28											
30		End of MONITORING WELL.		29.57							
32											
34											
36											
38											
40											

DEPTH SCALE

1 : 100

Golder Associates

LOGGED: BS

CHECKED: PVA

RECORD OF MONITORING WELL: GL25-2 (MW09-1-2)

PROJECT No.: 09-1440-0066

LOCATION: See Figure 1

BORING DATE: June 2/09

SHEET 1 OF 1

DATUM:

SAMPLER HAMMER, 140lbs.; DROP, 30in.

INCLINATION: -90°

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	ELEV. DEPTH (m)	PIEZOMETER OR STANDPIPE INSTALLATION
		Ground Surface		Stickup= 0.95m
0	6" OD Solid Stem Augers R-59 (B53)	Loose dark brown organic silt (forest cover).	0.05	Bentonite
		Loose to compact light brown sandy SILT with rootlets.		
		Loose to compact light brown fine SAND, trace silt.	1.22	
2		Stiff to very stiff interlayered CLAY and SILTY CLAY fissured with organic root matter infilling with occasional fine sand and silt partings.	1.83	Slotted Section Filter Sand
		End of MONITORING WELL.	3.35	

Column headings: SAMPLES (NUMBER, TYPE, BLOWS/0.3m); DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20, 40, 60, 80); SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○) (20, 40, 60, 80); HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6}, 10^{-5}, 10^{-4}, 10^{-3}); WATER CONTENT PERCENT (Wp, W, Wl) (10, 20, 30, 40); ADDITIONAL LAB. TESTING; STRATA PLOT.

Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20

DEPTH SCALE

1 : 100

Golder Associates

LOGGED: BS

CHECKED: PVA

BOREHOLE 09-1440-0066 COMBINED FOR XSECTION.GPJ GLDR_CAN.GDT 6/24/10

PROJECT No.: 09-1440-0066

RECORD OF MONITORING WELL: GL26-1 (MW09-2-1)

SHEET 1 OF 1

LOCATION: See Figure 1

BORING DATE: June 3/09

DATUM:

SAMPLER HAMMER, 140lbs.; DROP, 30in.

INCLINATION: -90°

Boring method: Odex, R-59 (B53)

Depth (m)	Description	Elev. Depth (m)	Sample Number	Type	Blows/0.3m	Water content (%)	Piezometer or standpipe installation
	Ground Surface						Stickup= 0.735m
0	Loose light brown sandy SILT, trace to some clay and gravel contains rootlets and wood debris. (FILL)	0.00					Bentonite
	Dense light brown silty SAND and GRAVEL, contains cobbles.	1.37	1	DO	38	~8	June 12/09 ▽
	Very stiff to hard light brown layered CLAYEY SILT trace to little sand and gravel occasional fine sand partings.	2.74	2	DO	54	~13	
			3	DO	41	~13	Slotted Section Filter Sand
	Fresh, medium strong to strong, light grey BEDROCK, some fractures.	5.84	4	DO	>100		Sand
	Fresh, strong, light grey BEDROCK.	6.61	5	CS			Bentonite
	End of MONITORING WELL.	9.65					

Chart columns: DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20, 40, 60, 80); SHEAR STRENGTH Cu, kPa (nat V. + Q - ●; rem V. ⊕ U - ○) (20, 40, 60, 80); HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6}, 10^{-5}, 10^{-4}, 10^{-3}); WATER CONTENT PERCENT Wp —○W— Wl (10, 20, 30, 40); ADDITIONAL LAB. TESTING

DEPTH SCALE 1 : 100

Golder Associates

LOGGED: BS

CHECKED: PVA

PROJECT No.: 09-1440-0066

RECORD OF MONITORING WELL: GL26-2 (MW09-2-2)

SHEET 1 OF 1

LOCATION: See Figure 1

BORING DATE: June 3/09

DATUM:

SAMPLER HAMMER, 140lbs.; DROP, 30in.

INCLINATION: -90°

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE – DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa nat V. + Q - ● rem V. ⊕ U - O (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT Wp ⊢—○W—⊣ Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		Ground Surface									Stickup= 0.946m
0	8 5/8" OD Hollow Stem Augers R-59 (B53)	Loose light brown sandy SILT, trace to some gravel, contains rootlets and wood debris. (FILL)		0.00							
		Stiff brown desicated CLAY, contains root matter.		0.76							Bentonite
2		Dense light brown silty SAND and GRAVEL.		1.71							June 12/09 ∇
		Very stiff to hard light brown layered CLAYEY SILT, trace to little sand and gravel, occasional fine sand partings.		2.44							
4											Slotted Section Filter Sand
		End of MONITORING WELL.		5.18							
6											
8											
10											
12											
14											
16											
18											
20											

DEPTH SCALE

1 : 100

Golder Associates

LOGGED: BS

CHECKED: PVA

PROJECT No.: 09-1440-0066

RECORD OF MONITORING WELL: GL26-3 (MW09-2-3)

SHEET 1 OF 1

LOCATION: See Figure 1

BORING DATE: June 3/09

DATUM:

SAMPLER HAMMER, 140lbs.; DROP, 30in.

INCLINATION: -90°

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa nat V. + Q - ● rem V. ⊕ U - O (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT Wp ⊢—○W—⊣ Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		Ground Surface									Stickup= 0.856m
0	6" OD Solid Stem R-59 (B53)	Loose light brown sandy SILT, trace to some gravel, contains rootlets and wood debris. (FILL)		0.00							Bentonite
		Stiff brown desicated CLAY, contains root matter.		0.91							
2		Dense light brown silty gravelly SAND.		1.71							June 12/09 ∇
		Very stiff to hard light brown layered CLAYEY SILT, trace to little sand and gravel, occasional fine sand partings.		2.44							Slotted Section Filter Sand
		End of MONITORING WELL.		3.35							
4											
6											
8											
10											
12											
14											
16											
18											
20											

DEPTH SCALE

1 : 100

Golder Associates

LOGGED: BS

CHECKED: PVA

PROJECT No.: 09-1440-0066

RECORD OF MONITORING WELL: GL26-4 (MW09-2-4)

SHEET 1 OF 2

LOCATION: See Figure 1

BORING DATE: June 9/09

DATUM:

SAMPLER HAMMER, 140lbs.; DROP, 30in.

INCLINATION: -90°

Column headings: DEPTH SCALE METRES | BORING METHOD | SOIL PROFILE (DESCRIPTION, STRATA PLOT, ELEV. DEPTH (m)) | SAMPLES (NUMBER, TYPE, BLOWS/0.3m) | DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20, 40, 60, 80); SHEAR STRENGTH Cu, kPa (20, 40, 60, 80) nat V. + Q - ● rem V. ⊕ U - O | HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6}, 10^{-5}, 10^{-4}, 10^{-3}); WATER CONTENT PERCENT Wp W Wl (10, 20, 30, 40) | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION

Boring method (0–20 m): Odex, R-59 (B53)

Depth (m)	Description	Elev. / Depth (m)	Piezometer or standpipe installation
	Ground Surface		Stickup= 0.938m
0	Loose light brown sandy SILT, trace to some and gravel contains rootlets and wood debris. (FILL)	0.00	June 12/09
	Stiff brown desicated CLAY contains root matter.	0.86	
	Dense light brown silty gravelly SAND.	1.37	
2	Very stiff to hard light brown layered CLAYEY SILT trace to little sand and gravel occasional fine sand partings.	2.23	
	Fresh, medium strong to strong, light grey and grey, BEDROCK some fractures.	6.81	
	Fresh, strong, light grey, BEDROCK with a few fractures.	7.57	Bentonite Grout
	becoming dark grey	10.82	
	becoming grey	11.58	
	Fresh, strong to very strong, grey BEDROCK.	12.95	
20			

CONTINUED NEXT PAGE

DEPTH SCALE

1 : 100

Golder Associates

LOGGED: BS

CHECKED: PVA

PROJECT No.: 09-1440-0066

RECORD OF MONITORING WELL: GL26-4 (MW09-2-4)

LOCATION: See Figure 1

BORING DATE: June 9/09

DATUM:

SAMPLER HAMMER, 140lbs.; DROP, 30in.

INCLINATION: -90°

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa nat V. + Q - ● rem V. ⊕ U - ○ (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT Wp —○W— Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
20	Odex R-59 (B53)	Fresh, strong to very strong, grey BEDROCK. *(continued)*									Bentonite Grout
22				22.56							Bentonite
24		Fresh, strong to very strong, dark grey BEDROCK.									Slotted Section Filter Sand
26		End of MONITORING WELL.		26.21							
28											
30											
32											
34											
36											
38											
40											

DEPTH SCALE

1 : 100

Golder Associates

LOGGED: BS

CHECKED: PVA

RECORD OF MONITORING WELL: GL27-1 (MW09-3-1)

PROJECT No.: 09-1440-0066
LOCATION: See Figure 1
BORING DATE: June 4/09
SHEET 1 OF 2
DATUM:

SAMPLER HAMMER, 140lbs.; DROP, 30in.
INCLINATION: -90°

BORING METHOD: Odex R-59 (B53)

Stickup= 2.003m

DESCRIPTION	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	WATER CONTENT / ADDITIONAL LAB. TESTING
Ground Surface					
Loose dark brown organic SILT, trace to some sand (re-worked - Topsoil) (FILL).	0.10				
Stiff brown CLAY, trace to some silt, trace gravel (FILL).					
Compact brown silty SAND and GRAVEL, trace clay (FILL).	1.52	1	DO	12	
Stiff grey and brown thinly layered CLAY, occasional fine sand partings.	2.19	2	DO	7	
		3	DO	4	
Very loose to loose brown silty SAND.		4	DO	4	
Soft brown CLAYEY SILT, trace fine sand.	5.03	5	DO	4	
		6	DO	4	
Soft to firm grey and brown layered CLAY grading to very soft to soft grey and brown layered CLAY.		7	DO	0	60.6
		8	DO	1	54.4
Loose grey silty SAND and GRAVEL, trace to some clay.	8.53	9	DO	8	
Very stiff grey SILTY CLAY, little to some sand and gravel. (GLACIAL TILL)	9.50	10	DO	8	
		11	DO	19	
Hard dark grey and brown SILTY CLAY, trace to little sand.	11.94	12	DO	33	
Hard dark grey SILTY CLAY.	13.26	13	DO	62	
		14	DO	75	
		15	DO	>100	

PIEZOMETER OR STANDPIPE INSTALLATION: Bentonite Grout

CONTINUED NEXT PAGE

DEPTH SCALE
1 : 100

Golder Associates

LOGGED: BS
CHECKED: PVA

PROJECT No.: 09-1440-0066

RECORD OF MONITORING WELL: GL27-1 (MW09-3-1)

SHEET 2 OF 2

LOCATION: See Figure 1

BORING DATE: June 4/09

DATUM:

SAMPLER HAMMER, 140lbs.; DROP, 30in.

INCLINATION: -90°

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	PIEZOMETER OR STANDPIPE INSTALLATION
20	Odex R-59 (B53)	Hard dark grey SILTY CLAY. *(continued)*		16	DO	>100	Bentonite Grout
		Fresh, medium strong to strong, grey BEDROCK.	21.18	17	CS		Bentonite
		Fresh, medium strong to strong, dark grey BEDROCK, some fractures.	22.86	18	DO	>100	Slotted Section Filter Sand
				19	CS		
		Fresh, medium strong to strong, grey BEDROCK.	25.55	20	CS		Bentonite
		End of MONITORING WELL. Note: Measured water level 0.73m above ground surface on June 16, 2009.	26.52				

Column headings also include: SOIL PROFILE; STRATA PLOT; SAMPLES; DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20, 40, 60, 80); SHEAR STRENGTH Cu, kPa (nat V. + Q - ●; rem V. ⊕ U - ○) (20, 40, 60, 80); HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6}, 10^{-5}, 10^{-4}, 10^{-3}); WATER CONTENT PERCENT (Wp —○W— Wl) (10, 20, 30, 40); ADDITIONAL LAB. TESTING.

Depth scale: 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40

BOREHOLE 09-1440-0066 COMBINED FOR XSECTION.GPJ GLDR_CAN.GDT 6/24/10

DEPTH SCALE
1 : 100

Golder Associates

LOGGED: BS
CHECKED: PVA

PROJECT No.: 09-1440-0066

RECORD OF MONITORING WELL: GL27-2 (MW09-3-2)

SHEET 1 OF 1

LOCATION: See Figure 1

BORING DATE: June 5/09

DATUM:

SAMPLER HAMMER, 140lbs.; DROP, 30in.

INCLINATION: -90°

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE – DESCRIPTION	ELEV. DEPTH (m)	SAMPLES NUMBER	TYPE	BLOWS/0.3m	PIEZOMETER OR STANDPIPE INSTALLATION
		Ground Surface					Stickup= 0.76m
0	6" OD Solid Stem R-59 (B53)	Loose dark brown organic SILT, trace to some sand. (re-worked - Topsoil) (FILL)	0.10				
		Stiff brown CLAY, trace to some silt, trace gravel. (FILL)					
2		Soft black organic clayey SILT. (FILL)					
		Compact brown silty SAND and GRAVEL, some clay. (FILL)	2.59				June 12/09 ∇
4		Stiff grey and brown thinly layered CLAY, occasional fine sand and silt partings.	5.79				Bentonite Grout
6–8		Soft to firm grey and brown layered CLAY grading to very soft to soft grey and brown layered CLAY.	9.30				
10–12		Very stiff grey SILTY CLAY, little to some sand and gravel. (GLACIAL TILL)	12.34	1	CS		Bentonite; Slotted Section Filter Sand
		End of MONITORING WELL.					

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m: 20 40 60 80

SHEAR STRENGTH Cu, kPa: nat V. + Q - ● rem V. ⊕ U - O; 20 40 60 80

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp ⊢—○W—⊣ Wl; 10 20 30 40

ADDITIONAL LAB. TESTING

DEPTH SCALE 1 : 100

Golder Associates

LOGGED: BS

CHECKED: PVA

RECORD OF MONITORING WELL: GL27-3 (MW09-3-3)

PROJECT No.: 09-1440-0066

LOCATION: See Figure 1

BORING DATE: June 8/09

SHEET 1 OF 1

DATUM:

SAMPLER HAMMER, 140lbs.; DROP, 30in.

INCLINATION: -90°

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	ELEV. DEPTH (m)	SAMPLES (NUMBER / TYPE / BLOWS/0.3m)	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (nat V. + Q - ● rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT Wp —○W— Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		Ground Surface						Stickup= 0.824m
0	8 5/8" OD Hollow Stem Augers R-59 (B53)	Loose dark brown organic SILT, trace to some sand. (re-worked - Topsoil) (FILL)	0.10					
		Stiff brown CLAY, trace to some silt, trace gravel. (FILL)						June 12/09 ▽
2		Soft black organic clayey SILT. (re-worked - Topsoil)	1.68					
		Stiff grey and brown thinly layered CLAY, occasional fine sand and silt partings.	2.29					Bentonite Grout
6		Soft to firm grey and brown layered CLAY grading to very soft to soft grey and brown layered CLAY.	5.79					Bentonite
8								Slotted Section Filter Sand
		Stiff grey SILTY CLAY, little to some sand and gravel. (GLACIAL TILL)						
10		End of MONITORING WELL.	9.91					

Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20

DEPTH SCALE

1 : 100

Golder Associates

LOGGED: BS

CHECKED: PVA

PROJECT No.: 09-1440-0066

RECORD OF MONITORING WELL: GL27-4 (MW09-3-4)

BORING DATE: June 9/09

DATUM:

LOCATION: See Figure 1

SAMPLER HAMMER, 140lbs.; DROP, 30in.

INCLINATION: -90°

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa nat V. + Q - ● rem V. ⊕ U - O (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT Wp —O W— Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
											Stickup= 0.624m
0	6" OD Solid Stem R-59 (B53)	Ground Surface									
		Loose dark brown organic SILT, trace to some sand (re-worked - Topsoil) (Fill).		0.10							June 12/09 Bentonite ∇
		Loose to compact sandy gravelly SILT, trace to some clay contains wood debris (Fill).		1.27							Slotted Section Filter Sand
		Soft to firm black and brown clayey SILT (re-worked - Topsoil).		1.78							
2		Stiff grey and brown thinly layered CLAY, occasional fine sand and silt partings.		2.44							
		End of MONITORING WELL.									
4											
6											
8											
10											
12											
14											
16											
18											
20											

DEPTH SCALE

1 : 100

Golder Associates

LOGGED: BS

CHECKED: PVA

PROJECT No.: 09-1440-0066

RECORD OF MONITORING WELL: GL28-1 (MW09-4-1)

SHEET 1 OF 2

LOCATION: See Figure 1

BORING DATE: June 11/09

DATUM:

SAMPLER HAMMER, 140lbs.; DROP, 30in.

INCLINATION: -90°

Boring method: Odex R-59 (B53) (0 to ~13.7 m); Wash Boring R-59 (B53) (~13.7 to 20 m)

DESCRIPTION	ELEV. DEPTH (m)	SAMPLE NUMBER	TYPE	BLOWS/0.3m	WATER CONTENT PERCENT (annotated)	PIEZOMETER OR STANDPIPE INSTALLATION
Ground Surface						Stickup= 0.568m 437.96
Stiff to very stiff brown desicated CLAY.	0.00					
Very stiff grey layered SILTY CLAY, some fine sand and silt partings.	0.81	1	DO	9		
Loose oxidized brown SILT.		2	DO	5		August 25/09 435.16
Firm to stiff grey layered SILTY CLAY, some fine sand partings.	3.05	3	DO	5		
Loose brown silty fine SAND.	4.32	4	DO	9		
Very soft to soft grey thinly layered CLAY, occasional fine sand partings.	7.32	5	DO	1	64	Bentonite Grout
		6	DO	1	60.1	
		7	DO	3	55	
Very soft grey SILTY CLAY with occasional thin seams of clayey silt and fine to medium sand partings.	12.60	8	DO	0		
		9	DO	0		
Very loose brown fine to medium SAND, some silt.	14.94	10	DO	0		Bentonite
Compact to dense grey and brown GRAVEL, some sand, trace silt.	17.68					Slotted Section Filter Sand
Fresh, medium strong to strong, light grey BEDROCK with a few fractures.	19.20	11	DO	>50		Bentonite

Handwritten margin notes: 2.8; 433.66 4.3; 5; 430.66 7.3

CONTINUED NEXT PAGE

DEPTH SCALE 1 : 100

Golder Associates

LOGGED: BS

CHECKED: PVA

PROJECT No.: 09-1440-0066

RECORD OF MONITORING WELL: GL28-1 (MW09-4-1)

LOCATION: See Figure 1

BORING DATE: June 11/09

DATUM:

SAMPLER HAMMER, 140lbs.; DROP, 30in.

INCLINATION: -90°

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE – DESCRIPTION	ELEV. DEPTH (m)	PIEZOMETER OR STANDPIPE INSTALLATION
20–26.37	Wash Boring R-59 (B53)	Fresh, medium strong to strong, light grey BEDROCK with a few fractures. *(continued)*		Bentonite
		Fresh, medium strong to strong, grey and dark grey BEDROCK with a few fractures.	26.37	
		Fresh, medium strong to strong, light grey BEDROCK with a few fractures.	26.97	
		End of MONITORING WELL.	28.50	

Column headers: SAMPLES (NUMBER, TYPE, BLOWS/0.3m); DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20, 40, 60, 80); SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○) (20, 40, 60, 80); HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6}, 10^{-5}, 10^{-4}, 10^{-3}); WATER CONTENT PERCENT Wp —W— Wl (10, 20, 30, 40); ADDITIONAL LAB. TESTING; STRATA PLOT.

Depth scale: 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40

DEPTH SCALE

1 : 100

Golder Associates

LOGGED: BS

CHECKED: PVA

PROJECT No.: 09-1440-0066

RECORD OF MONITORING WELL: GL28-2 (MW09-4-2)

LOCATION: See Figure 1

BORING DATE: June 16/09

DATUM:

SAMPLER HAMMER, 140lbs.; DROP, 30in.

INCLINATION: -90°

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa nat V. + Q - ● rem V. ⊕ U - ○ (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT Wp —○W— Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		Ground Surface									Stickup= 0.602m
0	8 5/8" OD Hollow Stem Augers R-59 (B53)	Stiff to very stiff brown desicated CLAY (Grass @ surface).		0.00							
		Very stiff grey layered SILTY CLAY, some fine sand and silt partings grading to firm to stiff grey layered SILTY CLAY, some fine sand and silt partings.		0.81							Bentonite; August 25/09 ∇
		Loose brown silty fine SAND.		4.47							Slotted Section Filter Sand
		End of MONITORING WELL.		7.01							

DEPTH SCALE 1 : 100

Golder Associates

LOGGED: BS

CHECKED: PVA

BOREHOLE 09-1440-0066 COMBINED FOR XSECTION.GPJ GLDR_CAN.GDT 6/24/10

RECORD OF MONITORING WELL: GL28-3 (MW09-4-3)

PROJECT No.: 09-1440-0066

LOCATION: See Figure 1

BORING DATE: June 16/09

SHEET 1 OF 1

DATUM:

SAMPLER HAMMER, 140lbs.; DROP, 30in.

INCLINATION: -90°

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa nat V. + Q - ● rem V. ⊕ U - O (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT Wp W Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		Ground Surface									Stickup= 0.415m
0	6" OD Solid Stem R-59 (B53)	Stiff to very stiff brown desicated CLAY.		0.00							Bentonite
2		Very stiff grey layered SILTY CLAY, some fine sand and silt partings grading to firm to stiff grey layered SILTY CLAY, some fine sand and silt partings.		0.81							August 25/09 ▽ Slotted Section Filter Sand
4		End of MONITORING WELL.		4.06							

DEPTH SCALE

1 : 100

Golder Associates

LOGGED: BS

CHECKED: PVA

GC29-1

BOREHOLE LOG

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE NO: BH12-4A
SURFACE ELEVATION: 443.81 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 / 10 / 100 / 1000 / 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
									stickup, jplug	444
0					Ground Surface					
0					**SAND AND GRAVEL** trace silt, loose, brown, moist					443
1					**SAND AND SILT (till)** trace to some clay, trace gravel, compact, brown, moist					442
2					- some clay, some gravel, dense at 1.8 m - sand becoming coarser					441
4		BH12-4A-1				0		▼	GW = 4.50 mbg (October 3, 2012)	440 / 439
5					- very dense at 4.9 m					438
6					- cobbles encountered at 6.1, 6.7, 7.3 and 7.9 m					437
7		BH12-4A-2				0				436
8					- wet from 8.2 to 8.5 m					435
9					- cobbles at 8.8 m - brown from 9.0 to 9.8 m					434
10					- grey at 9.8 m - green cobbles at 10.4 m					433
11					- cobbles at 11.3 m					432
12		BH12-4A-3			**SAND** fine, some silt, trace gravel, loose, grey, wet	0				431
13		BH12-4A-4			**SAND AND SILT** some clay, some gravel, very dense, grey, moist - becoming loose, increased cobble/gravel at 13.4 m	0				430
14					- dense from 14 to 16.2 m					429
15–17										428 / 427
17					- cobbles at 17.4 m - very dense to 18.9 m					426
18					- increased silt, loose, wet between 18.6 and 18.9 m					425

DRILLING METHOD: Core Sample

Notes: SONIC CORE SAMPLE

DRILL DATE: September 26, 2012
LOGGED BY: JN
DRILLER NAME: Mud Bay

GC29-1

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: City of Kelowna
PROJECT: Glenmore Landfill - Phase 3
ADDRESS: 2105 Glenmore Road North, Kelowna, BC
SLR JOB NO: 219.05164

BOREHOLE LOG

BOREHOLE NO: BH12-4A
SURFACE ELEVATION: 443.81 m

DEPTH (m)	SAMPLE ID	SOIL DESCRIPTION	ORGANIC VAPOUR LEVEL (ppmv)	WELL COMPLETION NOTES	ELEVATION (m)
	BH12-4A-5	- 0.3 m silt layer, wet at 19.4 m - loose, dry at 19.7 m	0		424
20				bentonite chips to 40.2 m	
	BH12-4A-6	**SAND** fine, some silt, trace clay, loose to compact, wet - medium grained at 20.7 m	0		423
21		**SAND AND SILT** some clay, some gravel, dense, grey, moist - wet, silty sand laminations at 21.2 m - compact, grey, wet from 21.3 to 21.8 m - very dense at 21.9 m			422
22					421
23	BH12-4A-7	- cobble at 23 m	0		420
24					419
25		- green rock pieces at 25 m			
		- rusty rock pieces between 25.6 and 26.2 m			418
26	BH12-4A-8		0		
		- green cobble at 26.5 m			417
27		- cobble at 27.4 m			416
28		- 5 cm seam medium to coarse sand at 28.5 m			415
29		- very dense between 29.3 and 32.3 m (core steaming)			414
30					413
31	BH12-4A-9		0		412
32	BH12-4A-10	- sand seam from 32.3 to 32.6 m	0		411
33					410
34		- rusty rock pieces at 34.4 m			409
35					408
36					407
37					406
38	BH12-4A-11		0		405

DRILLING METHOD: Core Sample

DRILL DATE: September 26, 2012

LOGGED BY: JN

DRILLER NAME: Mud Bay

Notes: SONIC CORE SAMPLE

GC.29-1

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: BH12-4A
SURFACE ELEVATION: 443.81 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 / 10 / 100 / 1000 / 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
					- very dense to dense at 39.6 m					404
40									bentonite pellets to 41.1 m	403
41					- dense to compact at 41.5 m	0				402
42	■	BH12-4A-12							silica sand 50 mm 010 slot PVC pipe	401
43										400
44	■	BH12-4A-13			**BEDROCK** large rock pieces and crushed powdery rocks, white, dry					

End of borehole at 44.5 m

Well Completion Details:
Screened interval from 41.5 m to 44.5 m below surface
Elevation at top of casing (TOC) = 445.039 m

Groundwater Information:
Depth to groundwater from TOC = 5.73 m (October 3, 2012)

(1) - Water added during drilling from surface to 44.5 m
GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

GSA %:
BH12-4A-1: 18.6 Gravel, 32.5 Sand, 29.4 Silt, 19.5 Clay
BH12-4A-3: 3.8 Gravel, 54.8 Sand, 36.5, Silt, 4.8 Clay
BH12-4A-6: 8.4 Gravel. 63.1 Sand, 21.8 Silt, 6.7 Clay
BH12-4A-7:13.1 Gravel, 36.7 Sand, 31.1 Silt, 19.1 Clay

DRILLING METHOD: Core Sample
Notes: ■ SONIC CORE SAMPLE
DRILL DATE: September 26, 2012
LOGGED BY: JN
DRILLER NAME: Mud Bay

GL292.

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: BH12-4B
SURFACE ELEVATION: 443.82 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
					Ground Surface				stickup, jplug	444
0					**SAND AND GRAVEL** trace silt, loose, brown, moist					443
1	■	BH12-4B-1			**SAND AND SILT (till)** trace to some clay, trace gravel, compact, brown, moist - gravel increases at 1.5 m					442
2					- becoming dense at 2.1 m					441
3								▼	GW = 3.15 mbg (October 3, 2012)	440
4					- cobbles at 4.0 m				bentonite chips to 12.8 m	439
5					- cobbles at 4.9 m - increased sand, compact to loose from 5.5 to 6.7 m					438
6										437
7									silica sand	436
8					- 7 cm layer coarse sand at 8.2 m					435
9	■	BH12-4B-2			- 15 cm layer medium grained sand and gravel, loose, brown and wet					434
10	■	BH12-4B-3			- very dense at 9.8 m					433
11					No stratigraphy or samples from 11 to 14 m				sand bentonite pellets to 12.2 m	432
12										431
13									slough	430
14					End of borehole at 14.0 m					

Well Completion Details:
Screened interval from 7.9 m to 11.0 m below surface
Elevation at top of casing (TOC) = 444.876 m

Groundwater Information:
Depth to groundwater from TOC = 4.20 m (October 3, 2012)

(1) - Water added during drilling from surface to 14.0 m
GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

GSA %:
BH12-4B-2: 23.2 Gravel, 43.6 Sand, 25.7 Silt, 7.6 Clay

DRILLING METHOD: Core Sample
DRILL DATE: September 26, 2012
LOGGED BY: JN
DRILLER NAME: Mud Bay

Notes: ■ SONIC CORE SAMPLE

GL30-1

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: City of Kelowna
PROJECT: Glenmore Landfill - Phase 3
ADDRESS: 2105 Glenmore Road North, Kelowna, BC
SLR JOB NO: 219.05164

BOREHOLE LOG

BOREHOLE NO: BH11-13A1
SURFACE ELEVATION: 439.18 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run #	% Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
										stickup, jplug	440
0						Ground Surface					439
0–2.4			1	50		**Unconsolidated ORGANIC MATTER** (wood pieces, grading to chips and sawdust), trace garbage (metal and plastic), loose, brown, moist			GW = 1.70 mbg (June 15, 2011)		438–437
2.4–6.7			2	70		**Interbedded CLAY AND GARBAGE (MSW)** (garbage includes plastic, cloth, wire). Clay is firm, high plasticity, dark grey, moist - black at 5.2 m - 2 cm thick silt lens at 6.4 m - glass debris at 6.5 m				bentonite seal	436–433
6.7–11.3		BH11-13A1-1	3	100		**FAT CLAY (reworked soil, fill)** trace sand, soft, laminated, brown, moist - 10 cm thick fine sand lens at 7.5 m - increased silt and very soft from 7.8 to 9.4 m - wet at 10 m and 11.3 m				silica sand	432–429
		BH11-13A1-2	4	100							428
11.3–11.6						**FAT CLAY (native)** trace sand, soft, laminated, grey, moist					
11.6–12		BH11-13A1-3				**silty SAND** sand is fine, loose, grey, moist					

End of borehole at 12.0 m

Well Completion Details:
Screened interval from 6.6 m to 8.1 m below surface
Elevation at top of casing (TOC) = 440.098 m

Groundwater Information:
Depth to groundwater from TOC = 2.62 m (June 15, 2011)

(1) - Water added during drilling from surface to 12.0 m

GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

DRILLING METHOD: Core Sample

Notes: ■ SONIC CORE SAMPLE

DRILL DATE: May 17, 2011

LOGGED BY: JN
DRILLER NAME: Beck

GL 30-2.

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: City of Kelowna
PROJECT: Glenmore Landfill - Phase 3
ADDRESS: 2105 Glenmore Road North, Kelowna, BC
SLR JOB NO: 219.05164

BOREHOLE LOG

BOREHOLE NO: BH11-13B
SURFACE ELEVATION: 439.48 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run #	% Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
-1										stickup, jplug	440
0						Ground Surface					439
0–5.3			1	40		**Unconsolidated ORGANIC MATTER** (wood pieces, grading to chips and sawdust), trace garbage (metal and plastic), loose, brown, moist				GW = 1.84 mbg (June 15, 2011)	438
			2	30							437–435
5.3			3	0		**Interbedded CLAY AND GARBAGE (MSW)** (garbage includes plastic, cloth, wire). Clay is firm, high plasticity, dark grey, moist - no recovery from 5.5 to 8.5 m (refer to BH11-13A)				bentonite seal	434–430
9.4		BH11-13B-1	4	100		**FAT CLAY (native)** trace sand, very soft, grey, moist -wet from 11 to 11.3 m	GSA, Att, M				429
11.3		BH11-13B-2				**silty SAND** trace clay, loose, grey, wet	GSA			silica sand	428
12.1		BH11-13B-3	5	100		**FAT CLAY** soft, laminated, grey, moist					427–426
		BH11-13B-4					GSA, Att, M				425

End of borehole at 14.6 m

Well Completion Details:
Screened interval from 11.9 m to 12.8 m below surface
Elevation at top of casing (TOC) = 440.968 m

Groundwater Information:
Depth to groundwater from TOC = 3.33 m (June 15, 2011)

(1) - Water added during drilling from surface to 14.6 m
GSA - grain size analysis
M - moisture content
Att - Atterberg limits

DRILLING METHOD: Core Sample

Notes: ■ SONIC CORE SAMPLE

DRILL DATE: May 4, 2011
LOGGED BY: JN
DRILLER NAME: Beck

GC3F-2

- 2 -

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: City of Kelowna
PROJECT: Glenmore Landfill - Phase 3
ADDRESS: 2105 Glenmore Road North, Kelowna, BC
SLR JOB NO: 219.05164

BOREHOLE LOG

BOREHOLE NO: BH11-13B
SURFACE ELEVATION: 439.48 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run # / % Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
					MSW - Municipal solid waste					

DRILLING METHOD: Core Sample
DRILL DATE: May 4, 2011
LOGGED BY: JN
DRILLER NAME: Beck
Notes: SONIC CORE SAMPLE

GL-30-3

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: BH11-13C
SURFACE ELEVATION: 439.40 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run #	% Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
-1										stickup, jplug	440
0						Ground Surface					439
0			1	10		**Unconsolidated ORGANIC MATTER** (wood pieces, grading to chips and sawdust), trace garbage (glass, metal, plastic), loose, brown, dry					
1.76									▼	GW = 1.76 mbg (June 15, 2011)	438
2						**Interbedded CLAY AND GARBAGE (MSW)** (garbage includes plastic and wood). Clay is firm, high plasticity, odour, grey, moist					437
4			2	100		**FAT CLAY (reworked soil, fill)** firm, laminated, trace gypsum crystals, brown, moist					435
5		BH11-13C-1									434
7		BH11-13C-2	3	100		- becoming grey at 7 m				bentonite seal	432
7.5		BH11-13C-3				- 10 cm thick wet, fine sand lens at 7.5 m					
8.2						- concretion at 8.2 m					431
8.3						- 10 cm thick fine sand lens at 8.3 m					
10.1			4	100		- concretion at 10.1 m					429
11		BH11-13C-4				**FAT CLAY (native)** trace sand, soft, grey, moist					428
12.5		BH11-13C-5	5	100		**silty SAND** trace clay, trace gravel, loose, grey, wet	GSA				426
13.5		BH11-13C-6				**FAT CLAY** soft, laminated, grey, moist				silica sand	425
17.1			6	100		- 1 mm thick fine sand lens at 17.1 m					422
17.5		BH11-13C-7				- coarse sand lens with silt and gravel from 17.5 to 17.7 m					
17.7						End of borehole at 17.7 m					

SLR CANADA V5.2 219.05164 CITY OF KELOWNA GLENMORE LANDFILL FINAL.GPJ SLR_CAN V5.2.GDT 9/22/11

DRILLING METHOD: Core Sample

Notes: ▣ SONIC CORE SAMPLE

DRILL DATE: May 4, 2011

LOGGED BY: JN
DRILLER NAME: Beck

GL30-3

SLR SLR CONSULTING (CANADA) LTD.	CLIENT: **City of Kelowna** PROJECT: **Glenmore Landfill - Phase 3** ADDRESS: **2105 Glenmore Road North, Kelowna, BC** SLR JOB NO: **219.05164**	**BOREHOLE LOG** BOREHOLE NO: BH11-13C SURFACE ELEVATION: 439.40 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run # % Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
					Well Completion Details: Screened interval from 15.1 m to 16.0 m below surface Elevation at top of casing (TOC) = 440.790 m Groundwater Information: Depth to groundwater from TOC = 3.16 m (June 15, 2011) (1) - Water added during drilling from surface to 17.7 m GSA - grain size analysis M - moisture content Att - Atterberg limits MSW - Municipal solid waste					

DRILLING METHOD: Core Sample	Notes: SONIC CORE SAMPLE	
DRILL DATE: May 4, 2011 / LOGGED BY: JN / DRILLER NAME: Beck		Sheet 2 of 2

GC31-1

BOREHOLE LOG

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: City of Kelowna
PROJECT: Glenmore Landfill - Phase 3
ADDRESS: 2105 Glenmore Road North, Kelowna, BC
SLR JOB NO: 219.05164

BOREHOLE NO: BH11-18A1
SURFACE ELEVATION: 439.37 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run #	% Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
						Ground Surface				stickup, jplug	440
0			1	50		**Unconsolidated ORGANIC MATTER** (wood pieces, grading to chips and sawdust), trace garbage (metal), loose, brown, moist					439
2									▼	GW = 2.04 mbg (June 15, 2011)	437
3			2	100		**Interbedded CLAY AND GARBAGE (MSW)** Clay is firm, odour, dark grey, moist				bentonite seal	436
5		BH11-18A1-1	3	100		**FAT CLAY (reworked soil, fill)** laminated, firm, trace gypsum crystals, brown, moist					434
6		BH11-18A1-2									433
		BH11-18A1-3									
7		BH11-18A1-4				- large glass debris 7.2 to 8 m				silica sand	432
		BH11-18A1-5									
8		BH11-18A1-6				**LEAN CLAY (native)** trace sand, soft, grey, wet					431

End of borehole at 8.8 m

Well Completion Details:
Screened interval from 6.9 m to 8.4 m below surface
Elevation at top of casing (TOC) = 440.243 m

Groundwater Information:
Depth to groundwater from TOC = 2.91 m (June 15, 2011)

(1) - Water added during drilling from surface to 8.8 m

GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

DRILLING METHOD: Core Sample

Notes: SONIC CORE SAMPLE

DRILL DATE: May 18, 2011

LOGGED BY: JN
DRILLER NAME: Beck

Sheet 1 of 1

GC31-2

SLR CONSULTING (CANADA) LTD.

CLIENT: City of Kelowna
PROJECT: Glenmore Landfill - Phase 3
ADDRESS: 2105 Glenmore Road North, Kelowna, BC
SLR JOB NO: 219.05164

BOREHOLE LOG

BOREHOLE NO: BH11-18B1
SURFACE ELEVATION: 439.17 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run # / % Recovery	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
				Ground Surface			stickup, jplug	440
0–1.8			1 75	**Unconsolidated ORGANIC MATTER** (wood pieces, grading to chips and sawdust), trace garbage (plastic), loose, brown, moist		▼	GW = 1.67 mbg (June 15, 2011)	439–438
1.8–4.9			2 100	**Interbedded CLAY AND GARBAGE (MSW)** Garbage includes asphalt. Clay is firm, odour, grey, moist - wet from 4.3 to 4.9 m				437–435
4.9–8.0			3 100	**FAT CLAY (reworked soil, fill)** laminated, firm, trace gypsum crystals, brown, moist - large glass debris at 6.8 to 7.8 m - wet from 7.0 to 7.6 m			bentonite seal	434–432
8.0–11.2		BH11-18B-1	4 100	**LEAN CLAY (native)** trace sand, soft, grey, moist			silica sand	431–428
11.2–14.6		BH11-18B-2 BH11-18B-3 BH11-18B-4	5 100	**SILT with sand** some clay, loose, grey, wet	GSA			427–425

End of borehole at 14.6 m

Well Completion Details:
Screened interval from 10.6 m to 11.5 m below surface
Elevation at top of casing (TOC) = 440.100 m

Groundwater Information:
Depth to groundwater from TOC = 2.60 m (June 15, 2011)

(1) - Water added during drilling from surface to 14.6 m

GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

DRILLING METHOD: Core Sample
Notes: ■ SONIC CORE SAMPLE
DRILL DATE: May 10, 2011
LOGGED BY: JN
DRILLER NAME: Beck

Sheet 1 of 1

SLR CANADA V5.2 219.05164 CITY OF KELOWNA GLENMORE LANDFILL FINAL.GPJ SLR_CAN V5.2.GDT 9/22/11

GC313

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: City of Kelowna
PROJECT: Glenmore Landfill - Phase 3
ADDRESS: 2105 Glenmore Road North, Kelowna, BC
SLR JOB NO: 219.05164

BOREHOLE LOG

BOREHOLE NO: BH11-18C
SURFACE ELEVATION: 439.53 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run #	% Recovery	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
					Ground Surface			stickup, jplug	440
0–2.7			1	80	**Unconsolidated ORGANIC MATTER** (wood pieces, grading to chips and sawdust), trace cobbles, trace garbage (cloth, metal, plastic), loose, brown, moist		▼	GW = 2.06 mbg (June 15, 2011)	439–437
2.7–5.5			2	90	**Interbedded CLAY AND GARBAGE (MSW)** Clay is firm, odour, dark grey, moist - sand and gravel lens at 4.9 to 5 m - blue colour at 5.2 to 5.5 m				436–434
5.5–7.8			3	100	**FAT CLAY (reworked soil, fill)** laminated, firm, brown, moist - large glass debris from 7.2 to 7.8 m - 2 mm thick fine sand lens at 7.3 m - wet from 7.5 to 7.8 m			bentonite seal	433–432
7.8–10.7			4	100	**LEAN CLAY (native)** trace sand, soft, grey, moist - wet and very soft from 8.8 to 10.5				431–429
10.7–12.5					**sandy SILT** some clay, soft, grey, moist				428–427
12.5–12.9	■	BH11-18C-1	5	100	**LEAN CLAY** trace sand, soft, grey, moist - wet from 12.6 to 12.9 m	GSA, Att, M			426
12.9–15.3	■	BH11-18C-2			**SILT** some fine sand, laminated, soft, grey, moist - increased medium grained sand at 15.2 m			silica sand	425

End of borehole at 15.3 m

Well Completion Details:
Screened interval from 14.3 m to 15.3 m below surface
Elevation at top of casing (TOC) = 440.379 m

Groundwater Information:
Depth to groundwater from TOC = 2.91 m (June 15, 2011)

(1) - Water added during drilling from surface to 15.3 m
GSA - grain size analysis
M - moisture content
Att - Atterberg limits

DRILLING METHOD: Core Sample
Notes: ■ SONIC CORE SAMPLE
DRILL DATE: May 10, 2011
LOGGED BY: JN
DRILLER NAME: Beck

GC313

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: City of Kelowna
PROJECT: Glenmore Landfill - Phase 3
ADDRESS: 2105 Glenmore Road North, Kelowna, BC
SLR JOB NO: 219.05164

BOREHOLE LOG

BOREHOLE NO: BH11-18C
SURFACE ELEVATION: 439.53 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run #	% Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
						MSW - Municipal solid waste					

DRILLING METHOD: Core Sample

DRILL DATE: May 10, 2011 LOGGED BY: JN
DRILLER NAME: Beck

Notes: SONIC CORE SAMPLE

GC32-1

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: BH11-21A1
SURFACE ELEVATION: 438.06 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run # / % Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
					Ground Surface				stickup, jplug	
0					**Unconsolidated ORGANIC MATTER** (wood pieces, grading to chips and sawdust), loose, brown, moist					438
									GW = 0.73 mbg (June 15, 2011)	
1			1 55		**Interbedded CLAY AND GARBAGE (MSW)** Garbage includes plywood and plastic. Some sand, clay is firm, odour, dark grey, moist					437
2					- blue colour from 2.4 to 3.3 m				bentonite seal	436
3					**FAT CLAY (reworked soil, fill)** laminated, firm, brown, moist					435
4			2 100		- gypsum crystals from 4.0 to 4.3 m					434
5					**FAT CLAY (native)** laminated, soft, grey, moist				silica sand	433
6		BH11-21A1-1			- fine sand lenses (approx. 1 cm thick) from 5.5 to 6.1 m					432
7			3 100		**LEAN CLAY** soft, grey, moist - wet from 7.2 to 7.9 m					431
8		BH11-21A1-2								430

End of borehole at 8.5 m

Well Completion Details:
Screened interval from 4.6 m to 6.1 m below surface
Elevation at top of casing (TOC) = 438.952 m

Groundwater Information:
Depth to groundwater from TOC = 1.62 m (June 15, 2011)

(1) - Water added during drilling from surface to 8.5 m

GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

SLR CANADA V5.2 219.05164 CITY OF KELOWNA GLENMORE LANDFILL FINAL.GPJ SLR_CAN V5.2.GDT 9/22/11

DRILLING METHOD: Core Sample
Notes: SONIC CORE SAMPLE
DRILL DATE: May 17, 2011
LOGGED BY: JN
DRILLER NAME: Beck

GC322

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: City of Kelowna
PROJECT: Glenmore Landfill - Phase 3
ADDRESS: 2105 Glenmore Road North, Kelowna, BC
SLR JOB NO: 219.05164

BOREHOLE LOG

BOREHOLE NO: BH11-21B
SURFACE ELEVATION: 437.63 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run #	% Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
										stickup, jplug	438
0						Ground Surface				GW = 0.12 mbg (June 15, 2011)	
0–3			1	50		**Interbedded CLAY AND GARBAGE (MSW)** Garbage includes plywood, styrofoam, and plastic. Clay is firm, odour, grey, moist - blue colour from 2.4 to 3.0 m					437, 436, 435
3–4.7			2	100		**FAT CLAY (reworked soil, fill)** laminated, firm, brown, moist - gypsum crystals from 3.1 to 3.6 m				bentonite seal	434, 433
4.7–7						**FAT CLAY (native)** soft, grey, moist - wet and very soft from 4.7 to 5.5 m and 5.8 to 6.4 m					432, 431
7–8.6			3	100		**LEAN CLAY** soft, fine sand lenses throughout, grey, moist				silica sand	430, 429
8.6–9.4	■	BH11-21B-1				**silty SAND** trace clay, loose, grey, moist No recovery from 8.8 to 9.4 m					

End of borehole at 9.4 m

Well Completion Details:
Screened interval from 8.1 m to 9.0 m below surface
Elevation at top of casing (TOC) = 438.627 m

Groundwater Information:
Depth to groundwater from TOC = 1.12 m (June 15, 2011)

(1) - Water added during drilling from surface to 9.4 m

GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

DRILLING METHOD: Core Sample
DRILL DATE: May 11, 2011
LOGGED BY: JN
DRILLER NAME: Beck

Notes: ■ SONIC CORE SAMPLE

GC32-3

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: City of Kelowna
PROJECT: Glenmore Landfill - Phase 3
ADDRESS: 2105 Glenmore Road North, Kelowna, BC
SLR JOB NO: 219.05164

BOREHOLE LOG

BOREHOLE NO: BH11-21C1

SURFACE ELEVATION: 437.60 m

DEPTH (m)	SAMPLE ID	Sample Run #	% Recovery	SOIL DESCRIPTION	TEST DATA – Laboratory Analyses	WELL COMPLETION NOTES
				Ground Surface		stickup, jplug; GW = 0.06 mbg (June 15, 2011)
0 – 3.0		1	50	**Interbedded CLAY AND GARBAGE (MSW)** Garbage includes plywood and rocks. Clay is firm, odour, grey, moist - blue colour from 2.4 to 3.0 m		
3.0 – 4.7		2	100	**FAT CLAY (reworked soil, fill)** laminated, firm, brown, moist - gypsum crystals from 3.0 to 4.0 m		
4.7 – 5.8				**FAT CLAY (native)** soft, grey, wet		bentonite seal
5.8 – 8.5		3	100	**LEAN CLAY** trace sand, soft to very soft, grey, moist - 5 cm thick sand lens at 7.0 m - 7 cm thick fine sand lens at 8.1 m - wet from 7.3 to 7.5 m		
8.5 – 9.1				**silty SAND** trace clay, loose, grey, moist		
9.1 – 9.8	BH11-21C-1			**FAT CLAY** laminated, soft, grey, moist		
9.8 – 11.9	BH11-21C-2	4	100	**silty SAND** trace clay, loose, grey, moist - 5 cm (approx.) thick clay lens at 9.9, 10.5, and 10.8 m - wet from 10.5 to 10.7 m	GSA	silica sand

ELEVATION (m): 438, 437, 436, 435, 434, 433, 432, 431, 430, 429, 428, 427, 426

End of borehole at 11.9 m

Well Completion Details:
Screened interval from 9.9 m to 10.9 m below surface
Elevation at top of casing (TOC) = 438.635 m

Groundwater Information:
Depth to groundwater from TOC = 1.10 m (June 15, 2011)

(1) - Water added during drilling from surface to 14.6 m

GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

DRILLING METHOD: Core Sample

Notes: SONIC CORE SAMPLE

DRILL DATE: May 12, 2011

LOGGED BY: JN

DRILLER NAME: Beck

GC33-1

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: BH11-22A

SURFACE ELEVATION: 439.43 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run #	% Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
						Ground Surface				stickup, jplug	440
0			1	70		**Unconsolidated ORGANIC MATTER** (wood pieces, grading to chips and sawdust), some garbage (insulation, styrofoam, plastic, metal debris), loose, brown, moist			▼	GW = 1.77 mbg (June 15, 2011)	439
2			2	50		**Interbedded CLAY AND GARBAGE (MSW)** Garbage includes plywood and plastic. Some sand, clay is firm, odour, grey, moist - clay is black from 3.0 to 3.6 m				bentonite seal	437
5.5	■	BH11-22A-1	3	100		**FAT CLAY (reworked soil, fill)** trace sand, soft, laminated, grey, moist - wet from 5.5 to 6.7 m - fine sand lenses at 7.9 and 8.1 m				silica sand	434
8.3	■	BH11-22A-2				**silty SAND with gravel (suspect till)** trace clay, sand is medium to coarse, loose, grey, wet	GSA				431

End of borehole at 8.8 m

Well Completion Details:
Screened interval from 5.6 m to 8.7 m below surface
Elevation at top of casing (TOC) = 440.425 m

Groundwater Information:
Depth to groundwater from TOC = 2.76 m (June 15, 2011)

(1) - Water added during drilling from surface to 8.75 m

GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

DRILLING METHOD: Core Sample
DRILL DATE: May 13, 2011
LOGGED BY: EM
DRILLER NAME: Beck
Notes: ■ SONIC CORE SAMPLE

6C33-2

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: BH11-22B
SURFACE ELEVATION: 439.47 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run #	% Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
						Ground Surface				stickup, jplug	440
0			1	80		**Unconsolidated ORGANIC MATTER** (wood pieces, grading to chips and sawdust), some garbage, trace gravel, loose, brown, moist			GW = 1.80 mbg (June 15, 2011)		439–438
2.4			2	100		**Interbedded CLAY AND GARBAGE (MSW)** Garbage includes plywood and plastic. Some sand, clay is firm, odour, brown, moist - clay is black from 4.3 to 5.5 m				bentonite seal	437–435
5.5			3	100		**FAT CLAY (reworked soil, fill)** soft, laminated, grey, moist - concretions at 5.8 m and 5.9 m - wet and increased silt from 5.8 to 5.9 m - fine sand lenses at 7.9 and 8.1 m					434–432
8.1		BH11-22B-1 BH11-22B-2	4	100		**silty SAND with gravel (suspect till)** trace clay, sand is medium to coarse, loose, grey, wet - dense below 8.8 m - brown with green stripes from 8.8 to 11.0 m	GSA			silica sand	431–429
11						**Boulders** volcanic, soft, green, dry					428

End of borehole at 11.6 m

Well Completion Details:
Screened interval from 9.0 m to 10.5 m below surface
Elevation at top of casing (TOC) = 440.489 m

Groundwater Information:
Depth to groundwater from TOC = 2.82 m (June 15, 2011)

(1) - Water added during drilling from surface to 11.6 m

GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

DRILLING METHOD: Core Sample
Notes: ■ SONIC CORE SAMPLE
DRILL DATE: May 13, 2011
LOGGED BY: EM
DRILLER NAME: Beck

Sheet 1 of 1

SLR CANADA V5.2 219.05164 CITY OF KELOWNA GLENMORE LANDFILL FINAL.GPJ SLR_CAN V5.2.GDT 9/22/11

GC33-3

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: City of Kelowna
PROJECT: Glenmore Landfill - Phase 3
ADDRESS: 2105 Glenmore Road North, Kelowna, BC
SLR JOB NO: 219.05164

BOREHOLE LOG

BOREHOLE NO: BH11-22C
SURFACE ELEVATION: 439.45 m

DEPTH (m)	SAMPLE ID	Sample Run #	% Recovery	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION NOTES	ELEVATION (m)
-1 to 0				Ground Surface		stickup, jplug	440
0 – 2.4		1	80	**Unconsolidated ORGANIC MATTER** (wood pieces, grading to chips and sawdust), some garbage (styrofoam, asphalt, plastic), some sand, some gravel, loose, brown, moist		GW = 1.78 mbg (June 15, 2011)	
2.4 – 5.5		2	50	**Interbedded CLAY AND GARBAGE (MSW)** Garbage includes plastic, carpet, wire. Clay is firm, odour, brown, moist - some sand and gravel from 3.0 to 3.6 m - clay is black from 5.2 to 5.5 m			
5.5 – 7.8		3	100	**FAT CLAY (reworked soil, fill)** soft, laminated, grey, moist - very soft and wet at 6.7 m, 7.5 m, and 7.6 m (each section is approximately 5 cm thick) - fine sand lens at 7.8 m		bentonite seal	
7.8 – 10.4	BH11-22C-1; BH11-22C-2	4	100	**silty SAND with gravel (suspect till)** trace gravel, sand is medium to coarse, loose, grey, wet - dense below 8.5 m - green layers at 9.3 m			
10.4 – 11.6	BH11-22C-3			**BOULDERS** volcanic, soft, green, dry			
11.6 – 12.5	BH11-22C-4			**silty SAND with gravel (suspect till)** sand is medium to coarse, loose, green and brown, moist - orange mottles from 12.2 to 12.5 m			
12.5 – 14.6	BH11-22C-5	5	100	**volcanic BEDROCK** weak, white with green layers, dry			

Elevation scale: 440, 439, 438, 437, 436, 435, 434, 433, 432, 431, 430, 429, 428, 427, 426, 425

End of borehole at 14.6 m

Well Completion Details:
Screened interval from 11.8 m to 13.3 m below surface
Elevation at top of casing (TOC) = 440.569 m

Groundwater Information:
Depth to groundwater from TOC = 2.90 m (June 15, 2011)

(1) - Water added during drilling from surface to 14.6 m
GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

DRILLING METHOD: Core Sample
Notes: SONIC CORE SAMPLE
DRILL DATE: May 13, 2011
LOGGED BY: EM
DRILLER NAME: Beck

GL34-1

SLR SLR CONSULTING (CANADA) LTD.	CLIENT: City of Kelowna PROJECT: Glenmore Landfill - Phase 3 ADDRESS: 2105 Glenmore Road North, Kelowna, BC SLR JOB NO: 219.05164	**BOREHOLE LOG** BOREHOLE NO: BH11-26A SURFACE ELEVATION: 439.17 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run #	% Recovery	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
					Ground Surface			stickup, jplug	
0					**Unconsolidated ORGANIC MATTER** (wood pieces, grading to chips and sawdust), loose, brown, moist				439
1			1	60					438
							▼	GW = 1.65 mbg (June 15, 2011)	
2					**Interbedded CLAY AND GARBAGE (MSW)** Clay is soft, odour, grey, moist				437
3					- organic matter (roots, twigs) from 3.0 to 3.6 m			bentonite seal	436
4			2	100					435
	■	BH11-26A-1			**FAT CLAY (reworked soil, fill)** firm, laminated, brown, moist - gypsum crystals from 4.5 to 5.5 m				
5									434
6					**FAT CLAY (native)** trace sand, soft, laminated, grey, moist			silica sand	433
7	■	BH11-26A-2	3	100	- wet from 6.8 to 7.3 m - 7 cm thick fine sand lenses at 7.0 m and 7.2 m				432
8	■	BH11-26A-3				GSA, Att, M			431
					- wet at 8.4 m				

End of borehole at 8.5 m

Well Completion Details:
Screened interval from 6.0 m to 7.5 m below surface
Elevation at top of casing (TOC) = 440.065 m

Groundwater Information:
Depth to groundwater from TOC = 2.55 m (June 15, 2011)

(1) - Water added during drilling from surface to 8.5 m

GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

DRILLING METHOD: Core Sample	Notes: ■ SONIC CORE SAMPLE	
DRILL DATE: May 18, 2011	LOGGED BY: JN DRILLER NAME: Beck	Sheet 1 of 1

SLR CANADA V5.2 219.05164 CITY OF KELOWNA GLENMORE LANDFILL FINAL.GPJ SLR_CAN V5.2.GDT 9/22/11

CL34-2

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: City of Kelowna
PROJECT: Glenmore Landfill - Phase 3
ADDRESS: 2105 Glenmore Road North, Kelowna, BC
SLR JOB NO: 219.05164

BOREHOLE LOG

BOREHOLE NO: BH11-26B
SURFACE ELEVATION: 439.23 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run #	% Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
						Ground Surface				stickup, jplug	
0–2.4			1	40		**Unconsolidated ORGANIC MATTER** (wood pieces, grading to chips and sawdust), loose, brown, moist			▼	GW = 1.28 mbg (June 15, 2011)	439, 438, 437
2.4–3.6						**Interbedded CLAY AND GARBAGE (MSW)** Clay is firm, odour, grey, moist - blue-grey colour from 3 to 3.6 m					436
3.6–6.7			2	100		**FAT CLAY (reworked soil, fill)** firm, laminated, brown, moist - gypsum crystals from 3.9 to 5.2 m - wet from 6.4 to 6.6 m				bentonite seal	435, 434, 433
6.7–10.0		BH11-26B-1	3	100		**FAT CLAY (native)** trace sand, soft, laminated, grey, moist - wet from 7 to 7.5 m - 10 cm thick fine sand lens at 7.3 m - very soft from 8.5 to 10.1 m - 2 cm thick fine sand lens at 9.1 m					432, 431, 430, 429
10.0–12.2		BH11-26B-2, BH11-26B-3, BH11-26B-4	4	100		**silty SAND** trace clay, sand is fine to medium, loose, grey, moist - clay layers at 10.2 and 10.8 m (approx. 10 cm thick) - wet from 10.4 to 10.8 m and 11.3 to 11.9 m	GSA, GSA			silica sand	428

End of borehole at 12.2 m

Well Completion Details:
Screened interval from 10.7 m to 11.6 m below surface
Elevation at top of casing (TOC) = 440.073 m

Groundwater Information:
Depth to groundwater from TOC = 2.12 m (June 15, 2011)

(1) - Water added during drilling from surface to 12.2 m

GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

DRILLING METHOD: Core Sample
Notes: SONIC CORE SAMPLE
DRILL DATE: May 18, 2011
LOGGED BY: JN
DRILLER NAME: Beck

GL34-3

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: City of Kelowna
PROJECT: Glenmore Landfill - Phase 3
ADDRESS: 2105 Glenmore Road North, Kelowna, BC
SLR JOB NO: 219.05164

BOREHOLE LOG

BOREHOLE NO: BH11-26C
SURFACE ELEVATION: 439.26 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run #	% Recovery	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION NOTES	ELEVATION (m)
					Ground Surface		stickup, jplug	440
0			1	50	**Unconsolidated ORGANIC MATTER** (wood pieces, grading to chips and sawdust), garbage includes foam and plastic, loose, brown, moist		GW = 1.28 mbg (June 15, 2011)	439
1.8					**Interbedded CLAY AND GARBAGE (MSW)** Clay is firm, odour, grey, moist			437
4			2	75	**FAT CLAY (reworked soil, fill)** firm, laminated, brown, moist - gypsum crystals from 4.0 to 5.3 m - soft at 5.8 m			435
6.7			3	100	**FAT CLAY (native)** soft, laminated, grey, moist - wet at 6.7 m - 10 cm thick fine sand lens at 7.5 m - wet from 8.8 to 9.8 m - fine sandy silt lenses at 8.9 and 10.4 m (approx. 2 - 3 cm thick)		bentonite seal	432
10			4	100				429
10.5					**silty SAND** trace clay, soft, grey, moist - 10 cm thick clay layer at 10.7 m (grey, firm, laminated) - wet from 10.8 to 11.1 m and 11.6 to 12.5 m			428
12.5	■	BH11-26C-1						
13	■	BH11-26C-2	5	100	**LEAN CLAY** trace sand, firm, laminated, grey, moist - wet from 13.4 to 13.7 m	GSA, Att, M	silica sand	426
14	■	BH11-26C-3			**FAT CLAY** trace sand, firm, laminated, grey, moist - concretion at 14.0 m	GSA, Att, M		425
15	■	BH11-26C-4						424

End of borehole at 15.3 m

Well Completion Details:
Screened interval from 13.6 m to 14.5 m below surface
Elevation at top of casing (TOC) = 440.158 m

Groundwater Information:
Depth to groundwater from TOC = 2.17 m (June 15, 2011)

(1) - Water added during drilling from surface to 15.3 m

GSA - grain size analysis

DRILLING METHOD: Core Sample

Notes: ■ SONIC CORE SAMPLE

DRILL DATE: May 19, 2011

LOGGED BY: JN
DRILLER NAME: Beck

GC34-3

SLR CONSULTING (CANADA) LTD.	CLIENT: **City of Kelowna** PROJECT: **Glenmore Landfill - Phase 3** ADDRESS: **2105 Glenmore Road North, Kelowna, BC** SLR JOB NO: **219.05164**	**BOREHOLE LOG** BOREHOLE NO: BH11-26C SURFACE ELEVATION: 439.26 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run #	% Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
						M - moisture content Att - Atterberg limits MSW - Municipal solid waste					

DRILLING METHOD: Core Sample	Notes: SONIC CORE SAMPLE	
DRILL DATE: May 19, 2011 · LOGGED BY: JN · DRILLER NAME: Beck		Sheet 2 of 2

GL 35-1

SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: BH11-31A
SURFACE ELEVATION: 438.13 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run #	% Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
						Ground Surface				stickup, jplug	
0						**sandy GRAVEL** some cobbles, loose, grey, moist					438
			1	70		**Interbedded CLAY AND GARBAGE (MSW)** Clay is firm, laminated, odour. Garbage includes plastic, grey, moist - black from 1.8 to 2.4 m			▼	GW = 0.60 mbg (June 15, 2011)	437
1–3										bentonite seal	436, 435
4	■	BH11-31A-1	2	100		**FAT CLAY (reworked soil, fill)** firm, laminated, brown, moist - mottles from 3.5 to 3.8 m - fine to medium sand lenses at 3.8 m, 4.6 m, and 5.3 m					434
	■	BH11-31A-2									
5	■	BH11-31A-3				- soft at 5.5 m					433
6	■	BH11-31A-4								silica sand	432
7	■	BH11-31A-5				**silty SAND** some clay, sand is medium, soft, grey, wet					431
	■	BH11-31A-6	3	100		**LEAN CLAY** soft, laminated, grey, moist - wet from 7.9 to 8.4 m - 1 mm thick fine sandy silt lenses throughout from 7.9 m to 8.8 m - glass debris at 8.1 m - 10 cm thick fine sand lens at 9 m					
8	■	BH11-31A-7									430
9						End of borehole at 9.1 m					

Well Completion Details:
Screened interval from 6.1 m to 7.6 m below surface
Elevation at top of casing (TOC) = 438.917 m

Groundwater Information:
Depth to groundwater from TOC = 1.40 m (June 15, 2011)

(1) - Water added during drilling from surface to 9.1 m

GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

SLR CANADA V5.2 219.05164 CITY OF KELOWNA GLENMORE LANDFILL FINAL.GPJ SLR_CAN V5.2.GDT 9/22/11

DRILLING METHOD: Core Sample
DRILL DATE: May 25, 2011
LOGGED BY: JN
DRILLER NAME: Beck
Notes: ■ SONIC CORE SAMPLE

Sheet 1 of 1

GL35-2.

SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: **BH11-31B**
SURFACE ELEVATION: 438.13 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run #	% Recovery	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WATER LEVEL / WELL COMPLETION NOTES	ELEVATION (m)
					Ground Surface		stickup, jplug	
0					**sandy GRAVEL** some cobbles, loose, grey, moist		GW = 0.18 mbg (June 15, 2011)	438
1			1	70	**Interbedded CLAY AND GARBAGE (MSW)** Clay is firm, laminated, odour, contains wood debris, brown, moist			437
2					- grey from 2.4 to 3.6 m			436
3								435
4			2	100	**FAT CLAY (reworked soil, fill)** firm, laminated, brown, moist - mottles from 3.6 to 4.0 m - glass debris at 4.3 and 5.4 m			434
5							bentonite seal	433
6					**LEAN CLAY** trace sand, soft, laminated, grey, moist			432
7			3	30				431
8								430
9					- fine silty sand lenses at 8.5 m, 11.1 m, and 12.1 m (3 - 15 cm thick)			429
10		BH11-31B-1	4	100				428
11		BH11-31B-2			- wet from 11.1 to 11.4 m		silica sand	427
12		BH11-31B-3						426

End of borehole at 12.2 m

Well Completion Details:
Screened interval from 10.6 m to 12.2 m below surface
Elevation at top of casing (TOC) = 439.013 m

Groundwater Information:
Depth to groundwater from TOC = 1.06 m (June 15, 2011)

(1) - Water added during drilling from surface to 12.2 m

GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

DRILLING METHOD: Core Sample
Notes: SONIC CORE SAMPLE
DRILL DATE: May 25, 2011
LOGGED BY: JN
DRILLER NAME: Beck

G135-3

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: BH11-31C
SURFACE ELEVATION: 438.40 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run #	% Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
						Ground Surface				stickup, jplug	439
0						**sandy GRAVEL** some cobbles, loose, grey, moist				GW = 0.47 mbg (June 15, 2011)	438
1			1	50		**Interbedded CLAY AND GARBAGE (MSW)** Clay is firm, laminated, odour, grey, moist					437
4			2	100		**FAT CLAY (reworked soil, fill)** firm, laminated, brown, moist - mottles from 3.6 to 4.1 m - glass debris at 4.4 and 5.3 m - 2 mm thick fine sand lens at 5.3 m - no recovery from 5.5 to 8.5 m					434
7			3	0						bentonite seal	431
9			4	75		**LEAN CLAY** trace fine sand, laminated, very soft - 2 mm thick fine sand lenses at 11.3 and 11.4 m					429
11.5		BH11-31C-1				**silty SAND with gravel (Till)** sand is fine to medium, trace clay, loose, grey, moist					427
12		BH11-31C-2				- sand becoming coarse at 11.8 m - wet from 12.2 to 12.8 m	GSA				426
13		BH11-31C-3	5	100		- wet from 13.0 to 13.7 m	GSA				425
14		BH11-31C-4				- compact to dense below 13.7 m				silica sand	424
14.5		BH11-31C-5					GSA				
15											

End of borehole at 15.2 m

Well Completion Details:
Screened interval from 13.3 m to 14.8 m below surface
Elevation at top of casing (TOC) = 439.245 m

Groundwater Information:
Depth to groundwater from TOC = 1.32 m (June 15, 2011)

(1) - Water added during drilling from surface to 15.2 m
GSA - grain size analysis
M - moisture content
Att - Atterberg limits

DRILLING METHOD: Core Sample
Notes: SONIC CORE SAMPLE
DRILL DATE: May 25, 2011
LOGGED BY: JN
DRILLER NAME: Beck

GC35-3

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: City of Kelowna
PROJECT: Glenmore Landfill - Phase 3
ADDRESS: 2105 Glenmore Road North, Kelowna, BC
SLR JOB NO: 219.05164

BOREHOLE LOG

BOREHOLE NO: BH11-31C
SURFACE ELEVATION: 438.40 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run # / % Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
					MSW - Municipal solid waste					

DRILLING METHOD: Core Sample
DRILL DATE: May 25, 2011
LOGGED BY: JN
DRILLER NAME: Beck

Notes: SONIC CORE SAMPLE

GL 36-1

BOREHOLE LOG

SLR CONSULTING (CANADA) LTD.

CLIENT: City of Kelowna
PROJECT: Glenmore Landfill - Phase 3
ADDRESS: 2105 Glenmore Road North, Kelowna, BC
SLR JOB NO: 219.05164

BOREHOLE NO: BH11- 3A
SURFACE ELEVATION: 439.15 m

Depth (m)	Sample ID	Sample Run # / % Recovery	Soil Description	Test Data – Laboratory Analyses	Water Level	Well Completion Notes	Elevation (m)
-1			Ground Surface			stickup, jplug	440
0		1 / 40	**Unconsolidated ORGANIC MATTER** (wood pieces, grading to chips and sawdust), trace garbage (shingles, wire), loose, brown, dry		GW = 1.55 mbg (June 15, 2011)		439
2.4	BH11-3A-1	2 / 100	**Interbedded CLAY AND GARBAGE (MSW)** (garbage includes plastic and newspaper), soft, odour, grey/blue, moist			bentonite seal	436
4	BH11-3A-2, BH11-3A-3	2 / 100	**FAT CLAY (reworked soil, fill)** trace find sand, soft, brown, moist				435
6.2	BH11-3A-4	3 / 100	**FAT CLAY (native)** trace fine sand, very soft, grey, wet - 10 cm thick sand layer at 7.3 m - 1 cm thick sand lens at 8.2 m	GSA, M, Att		silica sand	433
9			End of borehole at 9.0 m				

Well Completion Details:
Screened interval from 5.5 m to 8.5 m below surface
Elevation at top of casing (TOC) = 440.270 m

Groundwater Information:
Depth to groundwater from TOC = 2.66 m (June 15, 2011)

(1) - Water added during drilling from surface to 9 m

GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

DRILLING METHOD: Core Sample
Notes: SONIC CORE SAMPLE
DRILL DATE: April 20, 2011
LOGGED BY: EM
DRILLER NAME: Beck

GL 36-2

SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: BH11- 3B
SURFACE ELEVATION: 439.22 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run #	% Recovery	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION NOTES	ELEVATION (m)
					Ground Surface		stickup, jplug	440
0–2.4			1	50	**Unconsolidated ORGANIC MATTER** (wood pieces, grading to chips and sawdust), trace garbage (shingles, wire), loose, brown, dry		GW = 0.99 mbg (June 15, 2011)	439–437
2.4–5.5			2	100	**Interbedded CLAY AND GARBAGE (MSW)** (garbage includes plastic and newspaper), soft, odour, grey/blue, moist		bentonite seal	437–434
5.5–6.1			3	100	**FAT CLAY (reworked soil, fill)** trace fine sand, soft, brown, moist			434–433
6.1–11.0			3, 4	100, 100	**FAT CLAY (native)** trace fine sand, very soft, grey, wet - increased fine sand from 7.3 - 7.6 m and 8.2 - 8.5 m		silica sand	433–428
11.0–12.0	Sonic core	BH11-3B-1			**sandy SILT** sand is fine grained, loose, grey, wet	GSA, M		428

End of borehole at 12.0 m

Well Completion Details:
Screened interval from 10.2 m to 11.7 m below surface
Elevation at top of casing (TOC) = 440.287 m

Groundwater Information:
Depth to groundwater from TOC = 2.06 m (June 15, 2011)

(1) - Water added during drilling from surface to 12 m

GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

DRILLING METHOD: Core Sample
Notes: SONIC CORE SAMPLE
DRILL DATE: April 20, 2011
LOGGED BY: EM
DRILLER NAME: Beck

GL 36-3

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: BH11- 3C
SURFACE ELEVATION: 439.23 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run #	% Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
						Ground Surface				stickup, jplug	440
0						**Unconsolidated ORGANIC MATTER** (wood pieces, grading to chips and sawdust), trace garbage (plastic), loose, brown, moist					439
1			1	50					▼	GW = 0.90 mbg (June 15, 2011)	438
2						**Interbedded CLAY AND GARBAGE (MSW)** (garbage includes plastic and newspaper), firm, laminated. Fine sand lenses throughout, brown, moist - wet, grey, and soft at 2.0 - 2.3 m and 3.3 - 4.2 m					437
3											436
4			2	100		**FAT CLAY (reworked soil, fill)** trace fine sand, laminated, soft, brown, moist					435
5											434
6						**FAT CLAY (native)** trace fine sand, soft, grey, wet				bentonite seal	433
7			3	100		- increased fine sand from 7.3 - 7.6 m and 8.1 - 9.8 m					432
8											431
9											430
10			4	100							429
11						**silty SAND** trace gravel, trace clay, sand is fine to medium, soft, grey, wet - 2 cm clay lens at 11.1 m					428
12	■	BH11-3C-1					GSA				427
						- increased silt , wet, and grey from 12.5 m to 12.8 m					
13	■	BH11-3C-2	5	100			GSA			silica sand	426
14	■	BH11-3C-3				**FAT CLAY** trace sand, laminated, soft, - increased silt, wet and grey from 14.3 to 14.5 m, brown, moist	GSA, Att, M				425

End of borehole at 14.9 m

Well Completion Details:
Screened interval from 12.7 m to 13.6 m below surface
Elevation at top of casing (TOC) = 440.183 m

Groundwater Information:
Depth to groundwater from TOC = 1.85 m (June 15, 2011)

(1) - Water added during drilling from surface to 14.9 m
GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

DRILLING METHOD: Core Sample

Notes: ■ SONIC CORE SAMPLE

DRILL DATE: April 21, 2011

LOGGED BY: EM/JN
DRILLER NAME: Beck

GC37

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: BH12-11
SURFACE ELEVATION: 439.31 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
					Ground Surface				stickup, jplug	440
0					**Unconsolidated ORGANIC MATTER** (wood pieces, grading to chips and sawdust), trace garbage, loose, brown, moist				bentonite pellets to 1.2 m	439
1									silica sand	438
2								▼	GW = 2.23 mbg (October 3, 2012)	437
3					**Interbedded medium grained SAND, CLAY AND GARBAGE (MSW)** black/grey, moist to wet - loose, odourous, black, wet from 2.7 to 4.9 m					436
4										435
5	■	BH12-11-1			**CLAY** poor recovery, silty layers with wood chunks, soft to firm, brown, moist to wet					434
6										433
7										432

End of borehole at 7.9 m

Well Completion Details:
Screened interval from 1.8 m to 7.9 m below surface
Elevation at top of casing (TOC) = 440.289 m

Groundwater Information:
Depth to groundwater from TOC = 3.21 m (October 3, 2012)

(1) - Water added during drilling from surface to 7.9 m
GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

DRILLING METHOD: Core Sample

Notes: ■ SONIC CORE SAMPLE

DRILL DATE: September 27, 2012

LOGGED BY: JN
DRILLER NAME: Mud Bay

GL38

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: BH12-10
SURFACE ELEVATION: 439.27 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 / 10 / 100 / 1000 / 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
					Ground Surface				stickup, jplug	440
0					**Unconsolidated ORGANIC MATTER** (wood pieces, grading to chips and sawdust), trace garbage, loose, brown, moist					439
1									bentonite pellets to 1.5 m	438
2					**Interbedded silty CLAY AND GARBAGE (MSW)** soft, grey, moist			▼	silica sand GW = 2.13 mbg (October 3, 2012)	437
3					- layer medium grained sand from 4.9 to 3.7 m - grey/black, odourous, compact, moist to wet					436
4		No samples								435
5					**FAT CLAY (reworked soil, fill)** soft, grey/blue, moist to wet					434
					No Recovery to 7.9 m					
6										433
7										432

End of borehole at 7.9 m

Well Completion Details:
Screened interval from 1.8 m to 7.9 m below surface
Elevation at top of casing (TOC) = 440.321 m

Groundwater Information:
Depth to groundwater from TOC = 3.18 m (October 3, 2012)

(1) - Water added during drilling from surface to 7.9 m
GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

DRILLING METHOD: Core Sample
DRILL DATE: September 27, 2012
LOGGED BY: JN
DRILLER NAME: Mud Bay
Notes:

RECORD OF BOREHOLE: P 2

PROJECT No.: Glenmore Landfill

LOCATION: See Figure 1

SAMPLER HAMMER, 140lbs.; DROP, 30in.

BORING DATE: Mar 3 2005

INCLINATION: -90°

SHEET 1 OF 1

DATUM:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE – DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES – NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa nat V. + Q - ● rem V. ⊕ U - ○ (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT Wp ⊢—○W—⊣ Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION P 2
0		GROUND SURFACE		0.00							
0–9.14	Foundex Explorations; Bomadier Simco 2800 120 mm dia. Mud Rotary	LANDFILL REFUSE (Paper, plastic, wood etc. and soil) (FILL)									Bentonite seal; Pea gravel; 50 mm dia. PVC Screen; Landfill refuse
		End of BOREHOLE.		9.14							

DEPTH SCALE

1 : 100

Golder Associates

LOGGED: RR

CHECKED: GTI

BOREHOLE BOREHOLES.GPJ GLDR_CAN.GDT 10/1/06

PROJECT: BASELINE GW QUALITY ASSESSMENT	CLIENT: WINSOME HILLS JOINT VENTURE	BOREHOLE NO: 06BH01
LOCATION: TUTT RANCH ON GLENMORE ROAD	CONTRACTOR: KAMLOOPS ENV. DRILLING LTD.	PROJECT NO: 808-8840400.001
KELOWNA, BC	EQUIPMENT: HOLLOW STEM AUGER	ELEVATION:

SAMPLE TYPE: GRAB, NO RECOVERY, SPT, A-CASING, SHELBY TUBE, CORE

BACKFILL TYPE: BENTONITE, PEA GRAVEL, SLOUGH, GROUT, DRILL CUTTINGS, SAND

Depth(m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	HEAD SPACE VAPOUR (ppm)	▲ STANDARD PENETRATION (N) ▲ 16 32 48 64 / ■ HEAD SPACE VAPOUR (ppm) ■ 2000 4000 6000 8000	WELL INSTALLATION	COMMENTS	Depth(ft)
0.0		TOPSOIL/silt, organics, grass roots, moist dark.						BENTONITE	0.0
1.0		CLAY, stiff, low plasticity, damp, olive grey.							
2.0									5.0
3.0		– becomes wet and soft from 2.7–3.3m.		1A					10.0
4.0		CLAY, stiff, damp.						SOLID PIPE	
5.0									15.0
		SAND, trace silt, loose, wet, brown.		1B					
6.0		CLAY, soft, high plasticity, moist, light grey.						SLOUGH	20.0
		SAND, trace silt, loose, wet, brown.							
		CLAY, soft, high plasticity, moist, greenish grey.							
7.0									
8.0									25.0
9.0				1C				BENTONITE	30.0
10.0									
11.0								SLOUGH	35.0
12.0									

UKO

EBA Engineering Consultants Ltd. Kelowna, B.C.	LOGGED BY: LM	COMPLETION DEPTH: 19.5 m
	REVIEWED BY: RT	COMPLETE: 06/04/11
	Fig. No: 06BH01	Page 1 of 2

PROJECT: BASELINE GW QUALITY ASSESSMENT	CLIENT: WINSOME HILLS JOINT VENTURE	BOREHOLE NO: 06BH01
LOCATION: TUTT RANCH ON GLENMORE ROAD	CONTRACTOR: KAMLOOPS ENV. DRILLING LTD.	PROJECT NO: 808-8840400.001
KELOWNA, BC	EQUIPMENT: HOLLOW STEM AUGER	ELEVATION:

SAMPLE TYPE: GRAB, NO RECOVERY, SPT, A-CASING, SHELBY TUBE, CORE

BACKFILL TYPE: BENTONITE, PEA GRAVEL, SLOUGH, GROUT, DRILL CUTTINGS, SAND

Depth(m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	HEAD SPACE VAPOUR (ppm)	▲ STANDARD PENETRATION (N) ▲ 16 32 48 64 / ■ HEAD SPACE VAPOUR (ppm) ■ 2000 4000 6000 8000	WELL INSTALLATION	COMMENTS	Depth(ft)
12.0 – 15.3								SLOUGH	40.0 – 50.0
15.3		SILT, trace sand, trace clay, wet, dark grey.						WELL SCREEN WITH SAND	50.0
17.4		SAND, trace gravel, medium grained, dense, wet, grey.							
19.2		SAND & GRAVEL (TILL), very dense.							
19.8		END OF HOLE AT 19.8m. INSTALLED GROUNDWATER MONITORING WELL.							65.0
24.0									

EBA Engineering Consultants Ltd.
Kelowna, B.C.

LOGGED BY: LM	COMPLETION DEPTH: 19.5 m
REVIEWED BY: RT	COMPLETE: 06/04/11
Fig. No: 06BH01	Page 2 of 2

06/03/23 04:00PM (8840400)

PROJECT: BASELINE GW QUALITY ASSESSMENT	CLIENT: WINSOME HILLS JOINT VENTURE	BOREHOLE NO: 06BH02
LOCATION: TUTT RANCH ON GLENMORE ROAD	CONTRACTOR: KAMLOOPS ENV. DRILLING LTD.	PROJECT NO: 808-8840400.001
KELOWNA, BC	EQUIPMENT: HOLLOW STEM AUGER	ELEVATION:

SAMPLE TYPE: GRAB, NO RECOVERY, SPT, A-CASING, SHELBY TUBE, CORE

BACKFILL TYPE: BENTONITE, PEA GRAVEL, SLOUGH, GROUT, DRILL CUTTINGS, SAND

Depth(m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	HEAD SPACE VAPOUR (ppm)	▲ STANDARD PENETRATION (N) ▲ 16 32 48 64 / ■ HEAD SPACE VAPOUR (ppm) ■ 2000 4000 6000 8000	WELL INSTALLATION	COMMENTS	Depth(ft)
0.0		TOPSOIL/silt, organics, grass roots, moist dark.						BENTONITE	0.0
		CLAY, very stiff, low plasticity, damp, light grey.							
1.0									
		SAND, trace silt, fine grained, loose, wet at 2.4m, yellowish brown.							5.0
2.0									
			GRAB	2A				SOLID PIPE	
3.0									10.0
		CLAY, medium stiff, medium plasticity, moist, greenish grey.							
4.0 ▼								SLOUGH	▼
									15.0
5.0									
			GRAB	2B					
6.0									20.0
								BENTONITE	
7.0									
									25.0
8.0								WELL SCREEN WITH SAND	
9.0									30.0
10.0		SAND & GRAVEL, cobbley, dense.							
									35.0
11.0		END OF HOLE AT 11.0m DUE TO REFUSAL. INSTALLED GROUNDWATER MONITORING WELL.							
12.0									

EBA Engineering Consultants Ltd. Kelowna, B.C.	LOGGED BY: LM	COMPLETION DEPTH: 11 m
	REVIEWED BY: RT	COMPLETE: 06/04/11
	Fig. No: 06BH02	Page 1 of 1

06/08/23 04:00PM (8840400)

Project: Tutt Ranch - 2009 Drilling Program	Client: The University of British Columbia	PROJECT NO. - BOREHOLE NO.
Tutt Ranch on Glenmore Road	Contractor: KEL Drilling	K23101360.002 - 09BH03
Kelowna, BC	Drilling Method: Hollow Stem Auger	

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	SPT (N)	NOTES & COMMENTS	Depth (ft)
0	SILT, trace to some clay, rootlets, dry, firm, dark brown (TOPSOIL)					0
	CLAY, silty, trace to some fine sand, dry to moist, firm, greenish brown	Disturbed	3A		Cement/Well Protective Casing	
1					Bentonite	
2	SAND, fine grained, trace to some silt, dry, loose to compact, light brown	SPT	3B	13		5
3	CLAY, 75mm (3") sand lense, dry to moist, firm, light brown	SPT	3C	9	Drill Cuttings	10
5		SPT	3D	7	Bentonite	15
6	SAND, fine grained, trace silt, wet, compact, medium brown	SPT	3E	18	Well screen with sand pack	20
8	- becomes difficult to drill split spoon blows count of 20 per 2" penetration becomes moist, compact to dense at 7.6m dpeth possible cobble, moved rig 1m north and re-drilled to a dpeth of 7.5m - becomes moist, compact to dense at 7.6m depth	Disturbed / SPT	3F / 3G	33		25
9	SAND & GRAVEL, trace silt, moist, very dense, medium brown (TILL)	SPT	3H	60		30
10	END OF BOREHOLE AT 9.4 METRES - REFUSAL. MONITORING WELL INSTALLED TO 9.1 METRES. STICK UP < 18" (0.46m).					

Depth scale (m): 0–15; Depth scale (ft): 0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 49

Monitoring well

eba

LOGGED BY: CC	COMPLETION DEPTH: 9.4m
REVIEWED BY: CC	COMPLETE: 6/22/2009
DRAWING NO: 09BH03	Page 1 of 1

Project: Tutt Ranch - 2009 Drilling Program	Client: The University of British Columbia	PROJECT NO. - BOREHOLE NO.
Tutt Ranch on Glenmore Road	Contractor: KEL Drilling	K23101360.002 - 09BH04
Kelowna, BC	Drilling Method: Hollow Stem Auger	

SAMPLE TYPE: DISTURBED, NO RECOVERY, SPT, A-CASING, SHELBY TUBE, CORE

BACKFILL TYPE: BENTONITE, PEA GRAVEL, SLOUGH, GROUT, DRILL CUTTINGS, SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE NUMBER	SPT (N)	NOTES & COMMENTS
0	SILT, trace to some clay, rootlets, dry to moist, firm, dark brown (TOPSOIL)			Cement/Well Protective Casing
1	CLAY, some silt, trace to some fine sand, moist, firm to stiff, greyish/greenish brown	4A		Bentonite
2		4B	10	
3				Drill Cuttings
		4C	7	
4				Bentonite
5	- becomes wet at 4.6m depth - very fine 25mm (1") sand lense at 4.9m depth	4D	6	
6	- 50mm (2") sand lense at 6.1m depth	4E	5	
7				
8	CLAY, sand lenses up to 100mm (4" thick), very wet, soft, bluish grey	4F		Drill Cuttings
9				Bentonite
	SAND, fine grained, some clay, wet, loose, grey	4G	3	
10	SAND & GRAVEL, trace clay, wet, loose to compact, greyish brown			
11		4H	9	
12	- becomes dense at 12.2m depth	4I	34	
13				Well screen with sand pack
14	GRAVEL, some sand, trace to some silt, moist to wet, very dense, greyish brown - blows count of 22 per 1" penetration	4J 4K		
15	END OF BOREHOLE AT 14.2 METRES. MONITORING WELL INSTALLED TO 14.2 METRES.			

LOGGED BY: CC	COMPLETION DEPTH: 14.2m
REVIEWED BY: CC	COMPLETE: 6/22/2009
DRAWING NO: 09BH04	Page 1 of 1

eba

Project: Tutt Ranch - 2009 Drilling Program	Client: The University of British Columbia	PROJECT NO. - BOREHOLE NO.
Tutt Ranch on Glenmore Road	Contractor: KEL Drilling	K23101360.002 - 09BH05
Kelowna, BC	Drilling Method: Hollow Stem Auger	

SAMPLE TYPE: DISTURBED, NO RECOVERY, SPT, A-CASING, SHELBY TUBE, CORE

BACKFILL TYPE: BENTONITE, PEA GRAVEL, SLOUGH, GROUT, DRILL CUTTINGS, SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	SPT (N)	NOTES & COMMENTS
0	SILT, trace sand, rootlets, moist, firm, dark brown				
	CLAY, some silt, trace to some sand, moist, firm, greenish brown		6A		Cement/Well Protective Casing
1	- stiff at 0.8m depth	SPT	6B	12	Bentonite
	Deep Well Groundwater Level at 0.126m Shallow Well Groundwater Level at 0.127m				
2		SPT	6C	15	
	- becomes trace sand, thin sand lense, moist at 2.3m depth	SPT	6D	8	Drill Cuttings
3	- becomes moist to damp, firm at 3.0m depth	SPT	6E	8	
4	- thin 1mm sand lense at 3.8m depth	SPT	6F	6	Bentonite
	- two 1mm thin sand lenses, soft to firm at 4.6m depth	SPT	6G	7	
5	CLAY & SILT, trace sand, moist to wet, soft, greenish brown	SPT	6H	7	
6	- becomes wet at 5.8m depth	SPT	6I		
		SPT	6J	5	
7		SPT	6K	4	
	- 12mm sand seam at 7.3m depth - becomes bluish green to grey at 7.6m depth	SPT	6L	3	
8					
9	- becomes silty at 9.1m depth	SPT	6M	4	
10					Bentonite
11	SAND, fine grained, some silt to silty, wet, loose to dense, grey	SPT	6N	16	Well screen with sand pack
		SPT	6O	7	
12		SPT	6P	12	Drill Cuttings
13					
14		SPT	6Q	2	
	CLAY, some silt, trace sand, moist to wet, soft, grey				Bentonite
15					

Depth (ft): 0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 49

Monitoring well | Monitoring well

eba	LOGGED BY: CC	COMPLETION DEPTH: 23.1m
	REVIEWED BY: CC	COMPLETE: 6/24/2009
	DRAWING NO: 09BH05	Page 1 of 2

Project: Tutt Ranch - 2009 Drilling Program	Client: The University of British Columbia	PROJECT NO. - BOREHOLE NO.
Tutt Ranch on Glenmore Road	Contractor: KEL Drilling	K23101360.002 - 09BH05
Kelowna, BC	Drilling Method: Hollow Stem Auger	

SAMPLE TYPE: DISTURBED, NO RECOVERY, SPT, A-CASING, SHELBY TUBE, CORE

BACKFILL TYPE: BENTONITE, PEA GRAVEL, SLOUGH, GROUT, DRILL CUTTINGS, SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	SPT (N)	NOTES & COMMENTS	Depth (ft)
15						50
		SPT	6R	3		
16						
					Drill Cuttings	55
17		SPT	6S	8		
	- 25mm (1") medium grained sand lense at 17.3m depth					
18						
	- coarse gravel at 18.3m depth					60
		SPT	6T	38	Bentonite	
19	SAND, some coarse grained gravel, trace to some silt, wet, compact to dense, grey				Well screen with sand pack	
						65
20		SPT	6U	25		
21						70
22						
23	- blows count of 18 per 1.5" penetration	SPT	6V			75
	BEDROCK (MUDSTONE)					
	END OF BOREHOLE AT 23.14 METRES. MONITORING WELL INSTALLED TO 22.9 METRES.					
24						80
25						
26						85
27						
28						90
29						95
30						98

	LOGGED BY: CC	COMPLETION DEPTH: 23.1m
eba	REVIEWED BY: CC	COMPLETE: 6/24/2009
	DRAWING NO: 09BH05	Page 2 of 2

Project: Tutt Ranch - 2009 Drilling Program	Client: The University of British Columbia	PROJECT NO. - BOREHOLE NO.
Tutt Ranch on Glenmore Road	Contractor: KEL Drilling	K23101360.002 - 09BH06
Kelowna, BC	Drilling Method: Hollow Stem Auger	

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE NUMBER	SPT (N)	NOTES & COMMENTS
0	SILT, trace clay, rootlets, dry, firm, dark brown (TOPSOIL)			
	CLAY, silty, trace fine sand, dry, stiff, greenish brown	5A		Cement/Well Protective Casing
	Deep Well Groundwater Level at 0.659m			
1	Shallow Well Groundwater Level at 0.931m	5B	10	Bentonite
2		5C	9	Drill Cuttings
	- becomes damp to moist, some silt with thin 1mm sand lense at 2.3m depth	5D	8	
3				Bentonite
	- 25mm thin silty sand lense at 3.2m depth	5E	6	
				Well screen with sand pack
4	- becomes wet at 3.8m depth			
	CLAY, silty to some silt, trace fine sand seams, moist to wet, soft, greyish brown	5F	5	Drill Cuttings
5		5G	6	
	- becomes trace to some sand at 5.3m depth	5H	2	
6	- sand seam at 5.8m depth	5I		Bentonite
		5J	2	
7	SAND, fine grained, some silt to silty, wet, loose, grey			Well screen with sand pack
		5K	9	
8	- becomes some silt, loose at 7.6m depth	5L	3	
		5M	1	Drill Cuttings
9	- becomes some silt to silty, some clay, coarse grained SAND at 9.0m depth	5N	9	
10	- trace gravel at 9.8m depth	5O	32	
	BEDROCK (MUDSTONE)			
11	END OF BOREHOLE AT 10.4 METRES - REFUSAL ON BEDROCK (MUD STONE). MONITORING WELL INSTALLED TO 10.0 METRES.			
12				
13				
14				
15				

Monitoring well | Monitoring well | Depth (ft): 0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 49

LOGGED BY: CC	COMPLETION DEPTH: 10.4m
REVIEWED BY: CC	COMPLETE: 6/24/2009
DRAWING NO: 09BH06	Page 1 of 1

eba

Project: Tutt Ranch - 2009 Drilling Program	Client: The University of British Columbia	PROJECT NO. - BOREHOLE NO.
Tutt Ranch on Glenmore Road	Contractor: KEL Drilling	K23101360.002 - 09BH07
Kelowna, BC	Drilling Method: Hollow Stem Auger	

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | GROUT | DRILL CUTTINGS | SAND

Depth (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	SPT (N)	NOTES & COMMENTS	Depth (ft)
0	SILT, some clay, rootlets, dry, firm, dark brown (TOPSOIL)				Cement/Well Protective Casing	0
	CLAY, some silt to silty, trace sand, dry to moist, stiff, greenish brown	DISTURBED	7A		Bentonite	
2		SPT	7B	20	Drill Cuttings	5
	SAND, trace silt, dry, compact, light brown					
3	CLAY, silty, trace sand, damp to moist, firm to stiff, greenish/greyish brown	SPT	7C	8	Bentonite	10
4					Drill Cuttings	
5	- becomes trace silt, damp to moist, stiff at 4.6m depth	SPT	7D	9	Bentonite	15
6					Well screen with sand pack	20
	SAND, fine grained, trace silt, wet, loose to compact, medium brown	SPT	7E	13		
8		SPT	7F	10		25
9	- loose at 9.1m depth					30
	CLAY, trace to some silt, moist to wet, loose, blue	SPT	7G	1	Sand	
10					Bentonite	
	SAND & GRAVEL, some silt and clay, damp, very dense, medium brown (TILL)	SPT	7H			35
11	- blows count of 20 per 2" penetration					
	END OF BOREHOLE AT 10.8 METRES - REFUSAL. MONITORING WELL INSTALLED TO 10.8 METRES. STICK UP < 18" (0.46m).					
12						40
13						
14						45
15						49

eba	LOGGED BY: CC	COMPLETION DEPTH: 10.8m
	REVIEWED BY: CC	COMPLETE: 6/23/2009
	DRAWING NO: 09BH07	Page 1 of 1

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: 09BH01 (Decom)
SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run # / % Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
					Monitoring well decommissioned August 26, 2011				concrete to 0.9 m	
1										1.0
2										2.0
3									bentonite from 0.9 m to 4.6 m	3.0
4										4.0
5										5.0
6										6.0
7										7.0
8										8.0
9									slough from 4.6 m to 13.7 m	9.0
10										10.0
11										11.0
12										12.0
13										13.0

End of borehole at 13.7 m

Groundwater Information:
Depth to groundwater from TOC = 4.30 m (August 30, 2011)

DRILLING METHOD: Solid Stem Auger Drilling

DRILL DATE: August 26, 2011
LOGGED BY: EM
DRILLER NAME: Beck

Notes:

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: BH11- 1
SURFACE ELEVATION: 439.28 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run #	% Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
0 – 2.4			1	100		**Unconsolidated ORGANIC MATTER** (wood pieces, grading to chips and sawdust), some sand, some gravel, loose, dry to 0.9 m - moist below 0.9 m				concrete to 1.2 m	
2.4 – 4.3			2	100		**Interbedded CLAY AND GARBAGE (MSW)** (garbage includes plastic and newspaper), odour, wet				grout from 1.2 to 4.6 m	
4.3 – 7.0		BH11-1-1	3	100		**FAT CLAY (reworked soil, fill)** trace silt, trace gypsum crystals, laminated, firm, brown					434, 433
7.0 – 8.2		BH11-1-2				**sandy SILT (native)** soft, grey, wet	GSA, Att, M				432, 431
8.2 – 9.4		BH11-1-3 BH11-1-4				**FAT CLAY** soft, grey, wet					430
9.4 – 12.5		BH11-1-5	4	100		**sandy SILT** fine grained sand, soft, grey, wet				bentonite seal	429, 428, 427
12.5 – 14.0		BH11-1-6	5	100		**silty SAND** trace clay, loose, grey, wet	GSA, M				426
14.0 – 15.2		BH11-1-7				**FAT CLAY** trace sand, laminated, soft, grey, wet	GSA, Att, M				425

End of borehole at 15.2 m

(1) - Water added during drilling from surface to 15.2 m

GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

DRILLING METHOD: Core Sample

Notes: SONIC CORE SAMPLE

DRILL DATE: April 18, 2011
LOGGED BY: EM
DRILLER NAME: Beck

BOREHOLE LOG

SLR CONSULTING (CANADA) LTD.

CLIENT: City of Kelowna
PROJECT: Glenmore Landfill - Phase 3
ADDRESS: 2105 Glenmore Road North, Kelowna, BC
SLR JOB NO: 219.05164

BOREHOLE NO: BH11- 2
SURFACE ELEVATION: 439.68 m

DEPTH (m)	SAMPLE ID	Sample Run # / % Recovery	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION NOTES	ELEVATION (m)
0–4.0		1 / 100 (0–2.4); 2 / 50 (2.4–5.5)	**Unconsolidated ORGANIC MATTER** (wood pieces, grading to chips and sawdust), some sand, some gravel, loose, dry to 0.9 m - 5 cm sand and gravel layer at 1.8 m		concrete to 1.0 m grout from 1.0 to 6.1 m	439–436
4.0–5.8			**Interbedded CLAY AND GARBAGE** (garbage includes plastic and newspaper), odour (MSW), grey, moist			435–434
5.8–7.6	BH11-2-1	3 / 100	**FAT CLAY (reworked soil, fill)** trace silt, trace sand, laminated,soft, grey, moist			433–432
7.6–8.2	BH11-2-2		**sandy SILT (native)** sand is fine to medium, soft, grey, wet			
8.2–8.8			**FAT CLAY** trace sand, soft, grey, moist			431
8.8–9.4	BH11-2-3		**silty SAND** sand is fine to medium, loose, grey, wet	GSA, M		
9.4–10.0	BH11-2-4	4 / 100	**SILT** some clay, trace sand, soft, grey, wet	GSA		430
10.0–14.3	BH11-2-5 BH11-2-6	5 / 100	**FAT CLAY** trace sand, laminated, soft, grey, moist - 5 cm long concretion at 12.5 m - wet at 14.0 m	GSA, M (BH11-2-6)	bentonite seal	429–426
14.3–15.2	BH11-2-7		**LEAN CLAY** trace sand, laminated, soft, grey, wet	GSA, M		425

End of borehole at 15.2 m

(1) - Water added during drilling from surface to 15.2 m

GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

DRILLING METHOD: Core Sample
Notes: SONIC CORE SAMPLE
DRILL DATE: April 19, 2011
LOGGED BY: EM
DRILLER NAME: Beck

Sheet 1 of 1

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: BH11- 4
SURFACE ELEVATION: 439.08 m

DEPTH (m)	SAMPLE ID	Sample Run #	% Recovery	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION NOTES	ELEVATION (m)
0 – 2.4		1	60	**Unconsolidated ORGANIC MATTER** (wood pieces, grading to chips and sawdust), some sand, some gravel, trace garbage (plastic), loose, brown, moist		concrete to 0.9 m	439
2.4 – 5.8	BH11-4-1	2	50	**Interbedded CLAY AND GARBAGE (MSW)** (garbage includes plastic and rope), soft, brown, moist		grout from 0.6 to 6.0 m	
5.8 – 6.4				**FAT CLAY (reworked soil, fill)** trace fine sand, laminated, soft, grey, moist			
6.4 – 10.0	BH11-4-2	3	100	**LEAN CLAY (native)** some fine sand, laminated, soft, grey, moist - wet at 6.4 - 7.0 m and 8.8 - 9.1 m	GSA, Att, M		
	BH11-4-3			- thin sand lenses (approximately 1 mm thick) from 8.4 m to 8.5 m			
10.0 – 13.0	BH11-4-4	4	100	**silty SAND** trace clay, sand is fine grained, loose, grey, wet - 3 - 5 cm thick clay lenses at 10.4 m and 11.4 m	GSA, M	bentonite seal	
	BH11-4-5						
	BH11-4-6			- increased silt from 12.5 to 13.1 m			
13.0 – 15.5	BH11-4-7	5	100	**FAT CLAY** trace sand, trace gravel, soft, grey, moist	GSA, Att, M		

End of borehole at 15.5 m

(1) - Water added during drilling from surface to 15.5 m

GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

DRILLING METHOD: Core Sample

Notes: SONIC CORE SAMPLE

DRILL DATE: April 19, 2011
LOGGED BY: EM
DRILLER NAME: Beck

Sheet 1 of 1

SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: **BH11- 5**
SURFACE ELEVATION: 439.06 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run #	% Recovery	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION NOTES	ELEVATION (m)
0 – 2.4			1	20	**Unconsolidated ORGANIC MATTER** (wood pieces, grading to chips and sawdust), some sand, some gravel, some garbage (plastic, wire), loose, brown, moist		concrete to 0.9 m	438, 437
2.4 – 3.6					**Interbedded CLAY AND GARBAGE (MSW)** (garbage includes plastic and rope). Clay is firm, high plasticity, grey, moist		grout from 0.6 to 4.3 m	436
3.6 – 6.4		BH11-5-1	2	100	**FAT CLAY (reworked soil, fill)** laminated, soft, brown, moist			435
		BH11-5-2			- wet and grey at 5.8 - 6.4 m			434, 433
6.4 – 9.1		BH11-5-3	3	100	**LEAN CLAY (native)** trace gravel, trace sand, laminated, brown, moist	GSA, Att, M		432
					- medium to coarse sand lens at 8.2 m			431, 430
9.1 – 12.4		BH11-5-4	4	100	**silty SAND** trace clay, loose, grey, wet	GSA, M	bentonite seal	429
		BH11-5-5			- medium to coarse sand lens with trace gravel at 11.1 - 11.3 m	GSA		428, 427
					- 10 cm thick coarse sand lens at 12.3 m			
12.4 – 15.1		BH11-5-6	5	100	**FAT CLAY** some sand, trace gravel, laminated, soft, grey, moist - medium sand lenses at 13.1 m, 14.3 m, 14.5 m, and 15.15 m (approximately 2 mm thick)	GSA, Att, M		426, 425, 424

End of borehole at 15.1 m

(1) - Water added during drilling from surface to 15.1 m

GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

DRILLING METHOD: Core Sample

Notes: SONIC CORE SAMPLE

DRILL DATE: April 21, 2011
LOGGED BY: EM/JN
DRILLER NAME: Beck

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SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: **BH11-6**
SURFACE ELEVATION: 438.81 m

DEPTH (m)	SAMPLE ID	Sample Run #	% Recovery	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION NOTES	ELEVATION (m)
0–2.4		1	20	**Unconsolidated ORGANIC MATTER** (wood pieces, grading to chips and sawdust), some black sand, some garbage, loose, brown, moist		concrete to 0.9 m	438, 437
2.4–3.0				**Interbedded CLAY AND GARBAGE (MSW)** (garbage includes rope). Clay is firm, high plasticity, blue/grey, moist			436
3.0–7.2	BH11-6-1	2	100	**FAT CLAY (reworked soil, fill)** laminated, soft, brown, moist - 2 cm fine sand lens at 3.6 m		grout from 0.9 to 6.7 m	435, 434, 433
	BH11-6-2	3	100				432
7.2–11.0	BH11-6-3			**LEAN CLAY (native)** some fine sand, laminated, soft, grey, moist			431, 430
	BH11-6-4	4	100			bentonite seal	429, 428
11.0–14.2	BH11-6-5	5	100	**sandy SILT** some clay, soft, sand is fine to medium, grey, moist	GSA, M		427, 426, 425
14.2–15.2	BH11-6-6			**FAT CLAY** trace sand, trace gravel, soft, laminated, brown, moist - fine sand lens at 14.2 m (approximately 4 cm thick)	GSA, M		424

End of borehole at 15.2 m

(1) - Water added during drilling from surface to 15.2 m

GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

DRILLING METHOD: Core Sample
DRILL DATE: April 25, 2011
LOGGED BY: JN
DRILLER NAME: Beck
Notes: SONIC CORE SAMPLE

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SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: BH11-7
SURFACE ELEVATION: 438.71 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run #	% Recovery	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION NOTES	ELEVATION (m)
0 – 2.4			1	65	**Unconsolidated ORGANIC MATTER** (wood pieces, grading to chips and sawdust), some garbage (shingles and plastic), loose, brown, moist		concrete to 0.9 m	438, 437
2.4 – 5.8			2	75	**Interbedded CLAY AND GARBAGE (MSW)** (garbage includes plastic, cloth, wire). Clay is firm, high plasticity, dark grey, moist		grout from 0.9 to 6.7 m	436, 435, 434, 433
5.8 – 10.1		BH11-7-1	3	100	**FAT CLAY (reworked soil, fill)** trace sand, trace garbage (wire and plastic) laminated, soft, brown, moist - 2 cm fine sand lens at 7.3 m - wet at 9.1 - 9.9 m			432, 431, 430, 429
10.1 – 12.2		BH11-7-2	4	100	**sandy LEAN CLAY (native)** sand is fine to medium, very soft, grey, moist - occasional cobbles at 11.6 m	GSA, M	bentonite seal	428, 427
12.2 – 15.3		BH11-7-3	5	100	**FAT CLAY** trace sand, laminated, very soft, grey, moist - fine grained sand lens at 14.8 m (approximately 1 mm thick)	GSA, M		426, 425, 424

End of borehole at 15.3 m

(1) - Water added during drilling from surface to 15.25 m

GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

DRILLING METHOD: Core Sample
DRILL DATE: April 25, 2011
LOGGED BY: JN
DRILLER NAME: Beck
Notes: SONIC CORE SAMPLE

Sheet 1 of 1

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SLR CONSULTING (CANADA) LTD.

CLIENT: City of Kelowna
PROJECT: Glenmore Landfill - Phase 3
ADDRESS: 2105 Glenmore Road North, Kelowna, BC
SLR JOB NO: 219.05164

BOREHOLE LOG

BOREHOLE NO: BH11- 8
SURFACE ELEVATION: 438.72 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run # / % Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
0 – 2.4			1 30		**Unconsolidated ORGANIC MATTER** (wood pieces, grading to chips and sawdust), trace grey clay, some garbage (wire, plastic, metal debris), loose, brown, moist				concrete to 0.9 m	438, 437
2.4 – 4.5			2 100		**Interbedded CLAY AND GARBAGE (MSW)** (garbage includes rope). Clay is soft, high plasticity, odour, grey, moist - 3 cm thick fine sand lens at 3.9 m - glass debris at 4.5 - 5.8 m				grout from 0.9 to 6.0 m	436, 435, 434
4.5 – 5.8		BH11-8-1			**FAT CLAY (reworked soil, fill)** trace sand, laminated, very soft, brown, moist					433
5.8 – 9.8		BH11-8-2	3 100		**FAT CLAY (native)** trace sand, laminated, soft, grey, moist - 2 mm thick fine sand lens at 8.1 m					432, 431, 430, 429
9.8 – 14.6		BH11-8-3	4 100 5 100		**silty SAND** some clay, sand is fine to medium, loose, grey, wet	GSA, M			bentonite seal	428, 427, 426, 425
14.6 – 15.2					**poorly graded SAND with gravel** very loose, grey, wet				slough	424
					End of borehole at 15.2 m					

(1) - Water added during drilling from surface to 15.2 m

GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

DRILLING METHOD: Core Sample

DRILL DATE: April 26, 2011

LOGGED BY: JN

DRILLER NAME: Beck

Notes: SONIC CORE SAMPLE

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SLR CONSULTING (CANADA) LTD.

CLIENT: City of Kelowna
PROJECT: Glenmore Landfill - Phase 3
ADDRESS: 2105 Glenmore Road North, Kelowna, BC
SLR JOB NO: 219.05164

BOREHOLE LOG

BOREHOLE NO: BH11- 9
SURFACE ELEVATION: 438.63 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run #	% Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
0–1.8			1	80		**Unconsolidated ORGANIC MATTER** (wood pieces, grading to chips and sawdust), trace garbage (plastic), loose, brown, moist				concrete to 0.9 m	438, 437
1.8–2.4						**Interbedded CLAY AND GARBAGE (MSW)** (garbage includes asphalt, wire). Clay is soft, high plasticity, odour, dark grey, moist					436
2.4–8.5			2	0		**No recovery**					435, 434, 433
			3	0						grout from 0.9 to 11.6 m	432, 431
8.5–10.4		BH11-9-1	4	100		**Interbedded CLAY AND GARBAGE (MSW)** some silt, high plasticity, large glass debris, very soft, grey, moist					430, 429
10.4–13.4		BH11-9-2				**LEAN CLAY (native)** trace sand, laminated, very soft, grey, moist	GSA, M				428, 427
						- 1 mm thick fine sand lens at 12.2 m					426
			5	100		- 1 cm fine sand lens at 13.1 m					
13.4–15.8		BH11-9-3				**SILT** grading to sandy silt, some clay, sand is fine to medium, very soft, grey, moist					425, 424
		BH11-9-4				- wet at 14.9 to 15.2 m	GSA				423
15.8–		BH11-9-5	6	100		**FAT CLAY** trace sand, occasional cobbles, laminated, very soft, grey, moist	GSA, Att, M				422, 421, 420
		BH11-9-6	7	100							419

DRILLING METHOD: Core Sample

Notes: SONIC CORE SAMPLE

DRILL DATE: April 26, 2011

LOGGED BY: JN

DRILLER NAME: Beck

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SLR CONSULTING (CANADA) LTD.

CLIENT: City of Kelowna
PROJECT: Glenmore Landfill - Phase 3
ADDRESS: 2105 Glenmore Road North, Kelowna, BC
SLR JOB NO: 219.05164

BOREHOLE LOG

BOREHOLE NO: BH11- 9
SURFACE ELEVATION: 438.63 m

DEPTH (m)	SAMPLE ID	Sample Run #	% Recovery	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION NOTES	ELEVATION (m)
		7	100	- becoming soft at 19.8 m			418
21				- wet at 20.7 - 21.0 m			417
22	BH11-9-7	8	100				416
23				- 2 mm thick fine sand lenses from 22.6 m to 23.8 m			415
24	BH11-9-8			**clayey GRAVEL** some medium sand, some silt, laminated, very soft, grey, moist			
	BH11-9-9				GSA		414
25				**silty SAND** some gravel, some silt, loose, grey, wet			413
26	BH11-9-10	9	100	**silty SAND with gravel (till)** some clay, compact, light grey, dry			412
27	BH11-9-11			- coarse sand lens from 26.7 to 27 m (sand is brown, loose, moist)			411
				clayey GRAVEL (till) some sand, dense, grey, moist - green layers at 27.1 m and from 29.6 to 29.9 m			
28	BH11-9-12	10	100			bentonite seal	410
29				- wet and white in colour from 29.4 to 29.6 m			409
30				**Weathered volcanic BEDROCK** weak, grey, dry			408
31	BH11-9-13	11	100				407
32							406
33				- green from 32.6 to 32.9 m, 33.5 to 33.8 m, and 35.4 to 35.7 m			405
34	BH11-9-14	12	100				404
35							403
36							402
37	BH11-9-18						401
38	BH11-9-15	13	100				
	BH11-9-16						400
39	BH11-9-17			- basalt-like material from 38.7 to 38.9 m (black, glassy, weak)			399

DRILLING METHOD: Core Sample

Notes: SONIC CORE SAMPLE

DRILL DATE: April 26, 2011
LOGGED BY: JN
DRILLER NAME: Beck

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SLR CONSULTING (CANADA) LTD.

CLIENT: City of Kelowna
PROJECT: Glenmore Landfill - Phase 3
ADDRESS: 2105 Glenmore Road North, Kelowna, BC
SLR JOB NO: 219.05164

BOREHOLE LOG

BOREHOLE NO: BH11- 9
SURFACE ELEVATION: 438.63 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run #	% Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
		BH11-9-19	14	100							398
41		BH11-9-20									
		BH11-9-21				- soft and green with black layers from 41.4 to 41.8 m and from 43.3 to 45.7 m					397
42											
											396
43		BH11-9-22									
											395
44			15	100							
		BH11-9-23									394
45											
											393

End of borehole at 45.7 m

(1) - Water added during drilling from surface to 45.7 m

GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

SLR CANADA V5.2 219.05164 CITY OF KELOWNA GLENMORE LANDFILL FINAL.GPJ SLR_CAN V5.2.GDT 9/22/11

DRILLING METHOD: Core Sample
DRILL DATE: April 26, 2011
LOGGED BY: JN
DRILLER NAME: Beck
Notes: SONIC CORE SAMPLE

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: BH11-10
SURFACE ELEVATION: 438.74 m

DEPTH (m)	SAMPLE ID	Sample Run #	% Recovery	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION NOTES	ELEVATION (m)
0				**Unconsolidated ORGANIC MATTER** (wood pieces, grading to chips and sawdust), some sand, trace cobbles, loose, brown, moist		concrete to1.1 m	438
1		1	75	**Interbedded CLAY AND GARBAGE (MSW)** (garbage includes styrofoam, plastic, wire). Clay is soft, high plasticity, laminated, odour, brown, moist - black at 2.1 m - plywood pieces from 2.1 to 5.5 m			437
2							436
3							435
4		2	25				434
5				**No recovery**		grout from 1.1 to 10.7 m	433
6							432
7		3	0				431
8							430
9	BH11-10-1			**Interbedded CLAY AND GARBAGE (MSW)** (garbage includes plywood), some silt. Clay is soft, high plasticity, grey, moist			429
	BH11-10-2			**silty SAND (native)** trace clay, loose, grey, wet			
10		4	100	**FAT CLAY** trace sand, laminated, soft, grey, moist			428
	BH11-10-3			**silty SAND** tracy clay, loose, grey, wet - 4 cm thick clay lens at 11 m	GSA		
11							427
12				**FAT CLAY** some silt, laminated, soft, grey, moist - thin sand lenses at 12.0 m, 13.1 m, and 14.5 m			426
13	BH11-10-4	5	100				425
14							424
15							423
16		6	100				422
17	BH11-10-5			**silty GRAVEL with sand** trace clay, occasional cobbles, loose, grey, wet	GSA	bentonite seal	421
	BH11-10-6			**silty GRAVEL with sand (Till)** trace clay, dense, green, moist - pink colour at 17.4 m	GSA		
18							420
19	BH11-10-8	7	100				419

DRILLING METHOD: Core Sample

Notes: SONIC CORE SAMPLE

DRILL DATE: April 28, 2011
LOGGED BY: JN
DRILLER NAME: Beck

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: City of Kelowna
PROJECT: Glenmore Landfill - Phase 3
ADDRESS: 2105 Glenmore Road North, Kelowna, BC
SLR JOB NO: 219.05164

BOREHOLE LOG

BOREHOLE NO: BH11-10

SURFACE ELEVATION: 438.74 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run #	% Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
			7	100							
		BH11-10-7				**Volcanic bedrock** grey, dry - black and glassy (basalt-like) at 20.3 to 20.4 m - wet from 20.7 to 21.0 m					418
21											
											417
22		BH11-10-9	8	100							
											416
23											
											415

End of borehole at 23.8 m

(1) - Water added during drilling from surface to 23.8 m

GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

DRILLING METHOD: Core Sample

Notes: SONIC CORE SAMPLE

DRILL DATE: April 28, 2011 LOGGED BY: JN DRILLER NAME: Beck

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: BH11-11
SURFACE ELEVATION: 438.68 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run #	% Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
0						**0-20.7 m: not logged** Refer to BH11-10				concrete to 0.6 m	438
1											437
2											436
3											435
4											434
5										grout from 0.6 to 9.8 m	433
6											432
7											431
8											430
9											429
10			1	100							428
11											427
12											426
13											425
14											424
15											423
16											422
17											421
18											420
19											419

DRILLING METHOD: Core Sample

Notes: SONIC CORE SAMPLE

DRILL DATE: April 29, 2011
LOGGED BY: JN
DRILLER NAME: Beck

SLR CANADA V5.2 219.05164 CITY OF KELOWNA GLENMORE LANDFILL FINAL.GPJ SLR_CAN V5.2.GDT 9/22/11

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: City of Kelowna
PROJECT: Glenmore Landfill - Phase 3
ADDRESS: 2105 Glenmore Road North, Kelowna, BC
SLR JOB NO: 219.05164

BOREHOLE LOG

BOREHOLE NO: BH11-11

SURFACE ELEVATION: 438.68 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run # / % Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
			1 100							418
21					**Volcanic Bedrock** grey, dry - green laminations from 20.9 to 21.2 m					417
22			2 100		- black layer at 21.9 to 22.2 m					416
23					- green laminations from 23.2 to 24.4 m, 28.6 to 28.8 m, and 29.9 to 32.9 m					415
24										414
25		BH11-11-1	3 85						bentonite seal	413
26										412
27		BH11-11-2								411
28			4 65							410
29		BH11-11-3			- rusty layers from 28.9 to 29.1 m					409
30										408
31		BH11-11-4	5 100							407
32										406
33		BH11-11-5			- moist from 32.9 to 33.2 m - dry and green from 33.2 to 34.4 m					405
34			12 100							404
35										403
36					- white from 36.3 to 37.2 m					402
37			13 100							401
38		BH11-11-6								400
		BH11-11-7								
39										399

DRILLING METHOD: Core Sample

Notes: SONIC CORE SAMPLE

DRILL DATE: April 29, 2011

LOGGED BY: JN
DRILLER NAME: Beck

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: BH11-11
SURFACE ELEVATION: 438.68 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run #	% Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
41		BH11-11-8	14	100							398
42											397
						End of borehole at 42.1 m					

(1) - Water added during drilling from surface to 42.1 m

GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

0 to 20.7 m not logged, refer to BH11-10

DRILLING METHOD: Core Sample
DRILL DATE: April 29, 2011
LOGGED BY: JN
DRILLER NAME: Beck

Notes: SONIC CORE SAMPLE

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: BH11-12
SURFACE ELEVATION: 439.34 m

DEPTH (m)	SAMPLE ID	Sample Run #	% Recovery	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION NOTES	ELEVATION (m)
0 – 2.7		1	50	**Unconsolidated ORGANIC MATTER** (wood pieces, grading to chips and sawdust), trace cobbles, loose, brown, dry		concrete to 0.6 m	439
2.7 – 6.4		2	40	**Interbedded CLAY AND GARBAGE (MSW)** (garbage includes cloth, plastic). Clay is soft, high plasticity, odour, grey, moist		grout from 0.6 to 7.3 m	436 – 435
6.4 – 10.2	BH11-12-1	3	100	**LEAN CLAY (native)** trace sand, laminated, very soft, grey, moist - 2 cm thick sand lens at 6.4 m - wet from 8.8 to 9.4 m			433 – 429
10.2 – 11.0	BH11-12-2	4	100	**silty SAND with gravel** trace clay, loose, grey, wet	GSA		429
11.0 – 11.6	BH11-12-3 BH11-12-4			**silty GRAVEL with sand (Till)** trace clay, trace cobbles, dense, grey, moist - wet from 11 to 11.3 m - green laminations from 11.3 to 11.6 m	GSA GSA	bentonite seal	428
11.6 – 12.2				**silty SAND with gravel (Till)** trace clay, trace cobbles, dense, grey, moist			427
12.2 – 14.6	BH11-12-5 BH11-12-6	5	100	**Boulder** soft, green and white, dry			426 – 425
14.6 – 15.1	BH11-12-7			**clayey GRAVEL** dense, green, moist			
15.1				End of borehole at 15.1 m			

(1) - Water added during drilling from surface to 15.1 m

GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

DRILLING METHOD: Core Sample

Notes: SONIC CORE SAMPLE

DRILL DATE: May 3, 2011
LOGGED BY: JN
DRILLER NAME: Beck

Sheet 1 of 1

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: BH11-14
SURFACE ELEVATION: 439.34 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run #	% Recovery	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION NOTES
0–2.4			1	50	**Unconsolidated ORGANIC MATTER** (wood pieces, grading to chips and sawdust), trace cobbles, trace garbage (rebar, metal, plastic), loose, brown, dry		concrete to 0.5 m
2.4–5.5			2	100	**Interbedded CLAY AND GARBAGE (MSW)** (garbage includes metal, rubber, plastic). Clay is firm, high plasticity, odour, brown, moist - clay is black and has a strong odour at 5.5 m		grout from 0.5 to 7.3 m
5.5–8.5	■ (7)	BH11-14-1	3	100	**FAT CLAY (reworked soil, fill)** firm, laminated, grey, moist - very soft from 7 to 8.5 m - increased silt from 7.8 to 8.5		
8.5–16.2			4	0	No recovery below 8.5 m		bentonite seal
			5	0			
			6	0			

Depth scale (m): 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16
Elevation scale (m): 439, 438, 437, 436, 435, 434, 433, 432, 431, 430, 429, 428, 427, 426, 425, 424

End of borehole at 16.2 m

(1) - Water added during drilling from surface to 16.2 m

GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

DRILLING METHOD: Core Sample
Notes: ■ SONIC CORE SAMPLE
DRILL DATE: May 5, 2011
LOGGED BY: JN
DRILLER NAME: Beck

SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: BH11-15
SURFACE ELEVATION: 439.42 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run #	% Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
0–2.4			1	50		**Unconsolidated ORGANIC MATTER** (wood pieces, grading to chips and sawdust), trace garbage (cloth and plastic), loose, brown, dry				concrete to 0.8 m	439
2.4–6.1			2	70		**Interbedded CLAY AND GARBAGE (MSW)** (garbage includes wood and plastic). Clay is firm, high plasticity, odour, dark grey, moist - 15 cm thick gravel layer at 4.6 m				grout from 0.8 to 7.3 m	
6.1–11.6		BH11-15-1	3	100		**FAT CLAY (reworked soil, fill)** laminated, soft, grey, moist					
		BH11-15-2	4	100		- wet at 9.1 m - small concretion at 9.5 m - 1 mm fine sand lens at 11.4					
11.6–16.2			5	0		No recovery below 11.6 m				bentonite seal	
			6	0							

Depth scale: 1–16 m; Elevation scale: 439–424 m.

End of borehole at 16.2 m

(1) - Water added during drilling from surface to 16.2 m

GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

DRILLING METHOD: Core Sample
DRILL DATE: May 6, 2011
LOGGED BY: JN
DRILLER NAME: Beck
Notes: SONIC CORE SAMPLE

SLR CANADA V5.2 219.05164 CITY OF KELOWNA GLENMORE LANDFILL FINAL.GPJ SLR_CAN V5.2.GDT 9/22/11

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SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: BH11-16
SURFACE ELEVATION: 438.95 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run #	% Recovery	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION NOTES	ELEVATION (m)
0–1.8			1	80	**Unconsolidated ORGANIC MATTER** (wood pieces, grading to chips and sawdust), trace garbage (foam and plastic), loose, brown, moist		concrete to 0.8 m	438
1.8–5.8			2	40	**Interbedded CLAY AND GARBAGE (MSW)** (garbage includes metal, wood and plastic). Clay is firm, high plasticity, odour, dark grey, moist		grout from 0.8 to 6.8 m	437, 436, 435, 434
5.8–8.5	Core	BH11-16-1	3	100	**FAT CLAY (reworked soil, fill)** trace sand, firm, grey, moist - glass debris at 6.4 m - gypsum crystals from 6.1 to 6.7 m			433, 432
	Core	BH11-16-2			- increased silt at 7.9 m			431
8.5–17.7			4	0	No recovery below 8.5 m			430, 429, 428
			5	0			bentonite seal	427, 426, 425, 424
			6	0				423, 422

End of borehole at 17.7 m

(1) - Water added during drilling from surface to 17.7 m

GSA - grain size analysis
M - moisture content

DRILLING METHOD: Core Sample

Notes: SONIC CORE SAMPLE

DRILL DATE: May 6, 2011
LOGGED BY: JN
DRILLER NAME: Beck

Sheet 1 of 2

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run # % Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
					Att - Atterberg limits MSW - Municipal solid waste					

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SLR JOB NO: 219.05164

BOREHOLE LOG

BOREHOLE NO: BH11-17
SURFACE ELEVATION: 439.05 m

DEPTH (m)	SAMPLE ID	Sample Run #	% Recovery	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION NOTES	ELEVATION (m)
0–1.8		1	70	**Unconsolidated ORGANIC MATTER** (wood pieces, grading to chips and sawdust), trace garbage (plastic), loose, brown, moist		concrete to 0.5 m	438
1.8–5.8		2	100	**Interbedded CLAY AND GARBAGE (MSW)** Clay is firm, odour, dark grey, moist - increased garbage from 4.9 to 5.5 m		grout from 0.5 to 7.0 m	437, 436, 435, 434
5.8–7.9	BH11-17-1	3	100	**FAT CLAY (reworked soil, fill)** trace sand, firm, grey, moist - wet at 7.3 m			433, 432
7.9–11.3	BH11-17-2, BH11-17-3	4	100	**LEAN CLAY (native)** laminated, very soft, fine sand lenses throughout, grey, wet			431, 430, 429
11.3–15.0	BH11-17-4, BH11-17-5	5	100	**sandy LEAN CLAY** soft, grey, moist - wet at 12.5 m	GSA	bentonite seal	428, 427, 426, 425
15.0–15.2	BH11-17-6			**silty SAND** trace gravel, trace clay, sand is medium to coarse, loose, grey, wet	GSA		424

End of borehole at 15.2 m

(1) - Water added during drilling from surface to 15.2 m

GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

DRILLING METHOD: Core Sample

Notes: SONIC CORE SAMPLE

DRILL DATE: May 9, 2011
LOGGED BY: JN
DRILLER NAME: Beck

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: City of Kelowna
PROJECT: Glenmore Landfill - Phase 3
ADDRESS: 2105 Glenmore Road North, Kelowna, BC
SLR JOB NO: 219.05164

BOREHOLE LOG

BOREHOLE NO: BH11-19
SURFACE ELEVATION: 438.26 m

DEPTH (m)	SAMPLE ID	Sample Run #	% Recovery	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION NOTES	ELEVATION (m)
0–1				**Unconsolidated ORGANIC MATTER** (wood pieces, grading to chips and sawdust), trace cobbles, trace garbage (cloth, metal, plastic), loose, brown, moist		concrete to 0.5 m	438
1–3.6		1	70	**Interbedded CLAY AND GARBAGE (MSW)** Clay is firm, odour, dark grey, moist - blue colour at 3 to 3.6 m		grout from 0.5 to 4.3 m	437, 436, 435
3.6–6.7	BH11-19-1 BH11-19-2	2	100	**FAT CLAY (reworked soil, fill)** laminated, firm, brown, moist - 5 cm thick fine sand lens at 4.0 m - trace gypsum crystals from 4.0 to 5.5 m - orange mottles from 4.0 to 4.6 m - very soft and wet from 5.8 to 6.7 m			434, 433, 432
6.7–7.9		3	100	**FAT CLAY (native)** laminated, soft, grey, moist			431
7.9–10.5	BH11-9-3			**LEAN CLAY** grey, moist - wet at 9.9 m		bentonite seal	430, 429, 428
10.5–11.6	BH11-9-4	4	100	**LEAN CLAY with sand** grey, moist - wet from 10.5 to 11.0 m - thin sand lenses throughout			427
11.6–13.9	BH11-9-5			**sandy LEAN CLAY** grey, moist - wet from 13.0 to 13.4 m	GSA		426, 425
13.9–15.2	BH11-9-6	5	100	**silty SAND** trace clay, trace gravel, soft, grey, moist	GSA		424

End of borehole at 15.2 m

(1) - Water added during drilling from surface to 15.2 m

GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

DRILLING METHOD: Core Sample
DRILL DATE: May 10, 2011
LOGGED BY: JN
DRILLER NAME: Beck
Notes: SONIC CORE SAMPLE

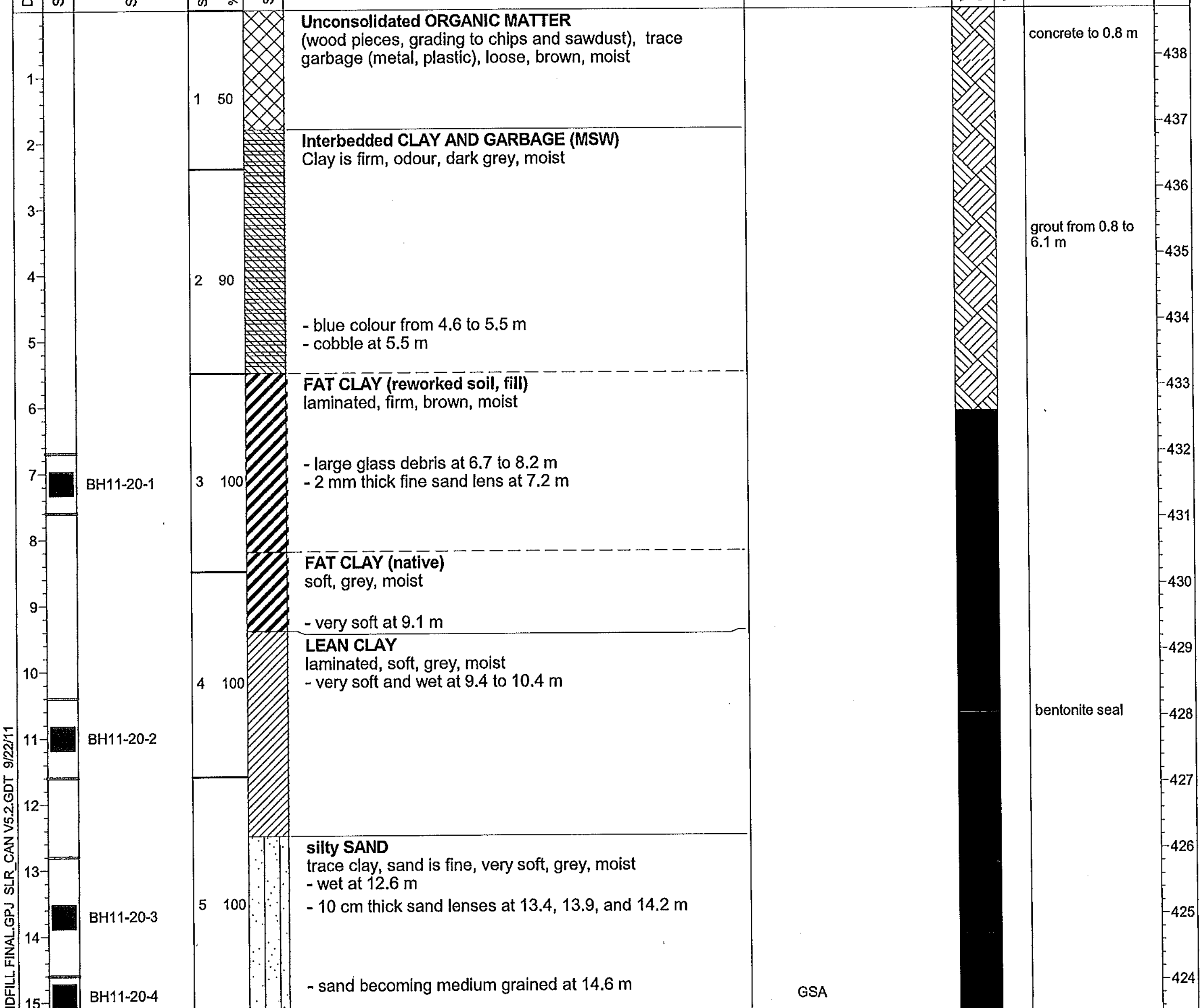
SLR CONSULTING (CANADA) LTD.

CLIENT: City of Kelowna
PROJECT: Glenmore Landfill - Phase 3
ADDRESS: 2105 Glenmore Road North, Kelowna, BC
SLR JOB NO: 219.05164

BOREHOLE LOG

BOREHOLE NO: BH11-20
SURFACE ELEVATION: 438.71 m

DEPTH (m)	SAMPLE ID	Sample Run #	% Recovery	SOIL DESCRIPTION	TEST DATA – Laboratory Analyses	WELL COMPLETION NOTES
0				**Unconsolidated ORGANIC MATTER** (wood pieces, grading to chips and sawdust), trace garbage (metal, plastic), loose, brown, moist		concrete to 0.8 m
1		1	50			
1.8				**Interbedded CLAY AND GARBAGE (MSW)** Clay is firm, odour, dark grey, moist		
3						grout from 0.8 to 6.1 m
4		2	90	- blue colour from 4.6 to 5.5 m - cobble at 5.5 m		
5.5				**FAT CLAY (reworked soil, fill)** laminated, firm, brown, moist		
7	BH11-20-1	3	100	- large glass debris at 6.7 to 8.2 m - 2 mm thick fine sand lens at 7.2 m		
8.2				**FAT CLAY (native)** soft, grey, moist - very soft at 9.1 m		
9.4				**LEAN CLAY** laminated, soft, grey, moist - very soft and wet at 9.4 to 10.4 m		
10		4	100			bentonite seal
11	BH11-20-2					
12.5				**silty SAND** trace clay, sand is fine, very soft, grey, moist - wet at 12.6 m - 10 cm thick sand lenses at 13.4, 13.9, and 14.2 m		
13.5	BH11-20-3	5	100			
15	BH11-20-4			- sand becoming medium grained at 14.6 m	GSA	



End of borehole at 15.2 m

(1) - Water added during drilling from surface to 15.2 m

GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

DRILLING METHOD: Core Sample
Notes: SONIC CORE SAMPLE
DRILL DATE: May 11, 2011
LOGGED BY: JN
DRILLER NAME: Beck

SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: BH11-23
SURFACE ELEVATION: 437.70 m

DEPTH (m)	SAMPLE ID	Sample Run #	% Recovery	SOIL DESCRIPTION	TEST DATA – Laboratory Analyses	WELL COMPLETION NOTES
0		1	60	**Interbedded CLAY AND GARBAGE (MSW)** Clay is firm, odour, laminated, grey, moist		concrete to 0.6 m
2.4	BH11-23-1	2	100	**FAT CLAY (reworked soil, fill)** firm, laminated, brown, moist - very soft, grey, and increased moisture at 4.5 m - 1-2 mm thick sand lenses at 4.7, 4.9, and 5.2 m		grout from 0.6 to 6.7 m
	BH11-23-2			- some garbage (plastic) and odour from 5.5 to 6.4 m (suspect carry-down from surface material)		
6.4	BH11-23-3 BH11-23-4	3	100	**LEAN CLAY (native)** soft, laminated, thin sand lenses throughout (1-2 mm thick), grey, moist		
8.2	BH11-23-5 BH11-23-6			**poorly graded SAND with silt** trace gravel, trace clay, medium sand, loose, grey, wet	GSA	
9.6	BH11-23-7	4	100	**FAT CLAY** trace sand, laminated, brown, moist - concretion at 11.1 m - thin sand lenses (approx. 2mm thick) from 11.3 to 11.6 m	GSA	
12.2	BH11-23-8			**poorly graded GRAVEL with silt and sand** trace clay, loose, brown, wet	GSA	bentonite seal
12.8	BH11-23-9 BH11-23-10	5	100	**clayey SAND with gravel (suspect till)** some silt, dense to very dense, brown and green, moist	GSA	
15.0	BH11-23-11			**BOULDERS** volcanic, soft, platy, green, dry		
15.5	BH11-23-12			**silty GRAVEL with sand (till)** dense to very dense, grey, wet		
15.8	BH11-23-13	6	100	**volcanic BEDROCK** weak, some black crystals throughout, green and white, dry		
17.7				End of borehole at 17.7 m		

Elevation (m): 437, 436, 435, 434, 433, 432, 431, 430, 429, 428, 427, 426, 425, 424, 423, 422, 421, 420

(1) - Water added during drilling from surface to 17.7 m

GSA - grain size analysis
M - moisture content

DRILLING METHOD: Core Sample

Notes: SONIC CORE SAMPLE

DRILL DATE: May 14, 2011
LOGGED BY: EM
DRILLER NAME: Beck

SLR	CLIENT: **City of Kelowna** PROJECT: **Glenmore Landfill - Phase 3** ADDRESS: **2105 Glenmore Road North, Kelowna, BC**	**BOREHOLE LOG** BOREHOLE NO: BH11-23
SLR CONSULTING (CANADA) LTD.	SLR JOB NO: **219.05164**	SURFACE ELEVATION: 437.70 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run # / % Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
					Att - Atterberg limits MSW - Municipal solid waste					

DRILLING METHOD: Core Sample	Notes: SONIC CORE SAMPLE	
DRILL DATE: May 14, 2011 — LOGGED BY: EM — DRILLER NAME: Beck		Sheet 2 of 2

SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: BH11-24
SURFACE ELEVATION: 437.70 m

DEPTH (m)	SAMPLE ID	Sample Run #	% Recovery	SOIL DESCRIPTION	TEST DATA – Laboratory Analyses	WELL COMPLETION NOTES	ELEVATION (m)
0				**Interbedded CLAY AND GARBAGE (MSW)** some coarse sand. Clay is firm, odour, laminated, grey, moist		concrete to 0.8 m	
1		1	60				437
2				- clay is blue-grey at 1.8 to 2.1 m		grout from 0.8 to 3.6 m	436
3		2	100	**FAT CLAY (reworked soil, fill)** firm, laminated, brown, moist - gypsum crystals from 3.3 to 4.0 m			435
4	BH11-24-1						434
5				- thin sand lens at 4.7 m			433
6				- trace gravel at 5.8 m			432
7	BH11-24-2	3	100	**silty SAND (native)** trace gravel, trace clay, sand is medium, grey, moist	GSA		431
	BH11-24-3			- wet from 6.8 to 7.2 m - fat clay layer from 7.3 to 7.6 m (trace sand, grey, moist)	GSA, Att, M		430
8	BH11-24-4				GSA		
				- 5 cm thick clay layer at 8.4 m			429
9		4	100	**FAT CLAY** trace sand, laminated, soft, grey, moist		bentonite seal	428
10							
11	BH11-24-5			- concretion at 11.1 m - wet from 11.3 to 11.4 m - 2 cm thick coarse sand lenses at 11.7 m and 12.5 m	GSA, Att, M		427
12		5	100	- wet from 12.5 to 12.6 m			426
13	BH11-24-6			**silty SAND with gravel (suspect till)** trace clay, compact, grey, moist	GSA		425
14	BH11-24-7			**volcanic BEDROCK** hard, white, dry			424
	BH11-24-8						423
				End of borehole at 14.8 m			

(1) - Water added during drilling from surface to 14.8 m

GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

DRILLING METHOD: Core Sample
DRILL DATE: May 16, 2011
LOGGED BY: JN
DRILLER NAME: Beck
Notes: SONIC CORE SAMPLE

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: BH11-25
SURFACE ELEVATION: 437.53 m

DEPTH (m)	SAMPLE ID	Sample Run # / % Recovery	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION NOTES
0 – 2.7		1 / 30	**Interbedded CLAY AND GARBAGE (MSW)** Garbage includes plywood. Clay is firm, odour, laminated, grey, moist		concrete to 0.6 m grout from 0.6 to 3.6 m
2.7 – 4.5		2 / 100	**FAT CLAY (reworked soil, fill)** firm, laminated, brown, moist		
4.5 – 7.9	BH11-25-1 BH11-25-2	3 / 100	**FAT CLAY (native)** trace sand, soft, laminated, grey, moist - wet from 5.0 to 5.2 m - fine sand lenses from 5.5 to 7.8 m (approx. 4 - 5 cm thick)		
7.9 – 10.8	BH11-25-3	4 / 100	**silty SAND** trace clay, trace gravel, loose, grey, moist - wet from 8.6 to 9.9 m and from 10.2 to 10.5 m	GSA	bentonite seal
10.8 – 13.0	BH11-25-4		**FAT CLAY** soft, laminated, grey, moist - concretion at 11.3 m - fine silty sand lenses at 11.4 and 12.3 m - 2 cm thick coarse sand lens at 12.5 m - wet from 12.5 to 12.8 m		
13.0 – 15.2	BH11-25-5 BH11-25-6 BH11-25-7 BH11-25-8	5 / 100	**silty SAND with gravel (Till)** trace clay, loose, grey, moist - compact below 13.9 m - wet from 14.3 to 14.7 m	GSA	

End of borehole at 15.2 m

(1) - Water added during drilling from surface to 15.2 m

GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

DRILLING METHOD: Core Sample
DRILL DATE: May 16, 2011
LOGGED BY: JN
DRILLER NAME: Beck
Notes: SONIC CORE SAMPLE

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: City of Kelowna
PROJECT: Glenmore Landfill - Phase 3
ADDRESS: 2105 Glenmore Road North, Kelowna, BC
SLR JOB NO: 219.05164

BOREHOLE LOG

BOREHOLE NO: BH11-27

SURFACE ELEVATION: 438.12 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run #	% Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
0						**Unconsolidated ORGANIC MATTER** (wood pieces, grading to chips and sawdust), loose, brown, moist				concrete to 0.4 m	438
1			1	90		**Interbedded CLAY AND GARBAGE (MSW)** Clay is firm, odour, grey, moist					437
2										grout from 0.4 to 4.9 m	436
3											435
4		BH11-27-1	2	100		**FAT CLAY (reworked soil, fill)** firm, laminated, brown, moist - gypsum crystals from 4 to 4.6 m					434
5		BH11-27-2									433
6		BH11-27-3				**silty SAND (native)** trace clay, sand is medium, soft, brown, moist					432
7		BH11-27-4	3	100		**LEAN CLAY** trace sand, laminated, firm, grey, wet - wet from 7.5 to 7.9 m	GSA, Att, M				431
8		BH11-27-5				**silty SAND** some clay, soft, grey, moist - wet from 8.2 to 8.4 m	GSA				430
9		BH11-27-6					GSA				429
10		BH11-27-7	4	100		- Clay lenses at 9.8 m and 10.8 m (5 to 10 cm thick) - wet from 9.9 to 10.7 m and 11.9 to 12.8 m - trace gravel at 10.7 m				bentonite seal	428
11		BH11-27-8					GSA				427
12											426
13		BH11-27-9	5	100		**FAT CLAY** trace cobbles, laminated, firm, grey, moist					425
14		BH11-27-10				**silty SAND with gravel (Till)** trace clay, sand is coarse, compact, grey, moist - wet from 14.6 to 14.9 m	GSA				424
15											423

End of borehole at 15.2 m

(1) - Water added during drilling from surface to 15.2 m

GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

DRILLING METHOD: Core Sample

Notes: SONIC CORE SAMPLE

DRILL DATE: May 19, 2011

LOGGED BY: JN
DRILLER NAME: Beck

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: City of Kelowna
PROJECT: Glenmore Landfill - Phase 3
ADDRESS: 2105 Glenmore Road North, Kelowna, BC
SLR JOB NO: 219.05164

BOREHOLE LOG

BOREHOLE NO: BH11-28
SURFACE ELEVATION: 438.11 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	Sample Run #	% Recovery	SOIL TYPE	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
0						**Unconsolidated ORGANIC MATTER** (wood pieces, grading to chips and sawdust), loose, brown, moist				concrete to 0.4 m	438
1			1	90		**Interbedded CLAY AND GARBAGE (MSW)** Clay is firm, odour, grey, moist					437
2										grout from 0.4 to 4.0 m	436
3											435
4		BH11-28-1	2	100		**FAT CLAY (reworked soil, fill)** firm, laminated, brown, moist - gypsum crystals from 4.1 to 4.9 m - mottles at 4.3 m - glass debris at 4.9 m					434
5		BH11-28-2				**FAT CLAY (native)** laminated, soft, grey, moist - very soft at 5.9 m - silt lenses at 5.9 m, 6.2 m, 6.4 m, and 7.3 m					433
6		BH11-28-3									432
7			3	100							431
8		BH11-28-4				**sandy LEAN CLAY** soft, grey, moist	GSA				430
9						**FAT CLAY** very soft, grey, moist				bentonite seal	429
10		BH11-28-5	4	100							428
11		BH11-28-6, BH11-28-7				**silty SAND with gravel (Till)** trace clay, occasional cobbles, compact, dark grey, moist - very dense below 10.7 m					427
12											426
13		BH11-28-8	5	100			GSA				425
14											424

End of borehole at 14.6 m

(1) - Water added during drilling from surface to 14.6 m

GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

DRILLING METHOD: Core Sample

DRILL DATE: May 19, 2011

LOGGED BY: JN

DRILLER NAME: Beck

Notes: SONIC CORE SAMPLE

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SLR CONSULTING (CANADA) LTD.

CLIENT: City of Kelowna
PROJECT: Glenmore Landfill - Phase 3
ADDRESS: 2105 Glenmore Road North, Kelowna, BC
SLR JOB NO: 219.05164

BOREHOLE LOG

BOREHOLE NO: BH11-29

SURFACE ELEVATION: 437.81 m

DEPTH (m)	SAMPLE ID	Sample Run #	% Recovery	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION NOTES	ELEVATION (m)
0		1	100	**Interbedded CLAY AND GARBAGE (MSW)** Clay is firm, some gravel, odour, grey, moist - dark grey and wet from 2.4 to 3.6 m		concrete to 0.9 m grout from 0.9 to 3.6 m	437, 436, 435
3	BH11-29-1	2	50	**FAT CLAY (reworked soil, fill)** soft, laminated, brown, moist - one cobble at 4.6 m - grey and very soft below 5.5 m			434, 433, 432
6	BH11-29-2	3	100	- glass debris at 6.6 m			431
7	BH11-29-3 BH11-29-4			**LEAN CLAY (native)** trace sand, laminated, very soft, grey, moist - wet from 7.1 to 7.3 m and 8.2 to 8.4 m	GSA, Att, M		430
8.5	BH11-29-5	4	100	**sandy LEAN CLAY** sand is fine to medium, soft, grey, wet - thin clay seams throughout from 10 to 10.5 m - sand is coarse from 11.0 to 11.3 m	GSA	bentonite seal	429, 428, 427
11.3	BH11-29-6			**FAT CLAY** trace sand, soft, laminated, grey, moist	GSA, Att, M		426
11.6	BH11-29-7	5	100	**silty SAND** trace clay, sand is fine, loose, grey, wet - clay seam at 12.2 m	GSA		
12.6	BH11-29-8 BH11-29-9			**FAT CLAY** trace sand, laminated, soft, grey, moist - wet from 13.1 to 13.7 m	GSA, Att, M		425, 424, 423
14.9				End of borehole at 14.9 m			

(1) - Water added during drilling from surface to 14.9 m

GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

DRILLING METHOD: Core Sample

Notes: SONIC CORE SAMPLE

DRILL DATE: May 20, 2011

LOGGED BY: EM
DRILLER NAME: Beck

SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: BH11-30
SURFACE ELEVATION: 437.57 m

DEPTH (m)	SAMPLE ID	Sample Run #	% Recovery	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	WELL COMPLETION NOTES
0				**Interbedded CLAY AND GARBAGE (MSW)** Clay is soft, odour, grey, moist		concrete to 0.9 m
		1	70			
						grout from 0.3 to 4.3 m
	BH11-30-1	2	100	**FAT CLAY (reworked soil, fill)** firm, laminated, brown, moist - gypsum crystals from 3.6 to 5.5 m - mottles from 3.6 to 4.3 m		
	BH11-30-2					
	BH11-30-3			- grey and very soft below 5.2 m		
	BH11-30-4			- fine sand lens at 6.1 m		
		3	100	- large glass debris at 6.7 m, 7.5 m, and 8.3 m		
	BH11-30-5					
				- wet from 8.5 to 9.1 m		
				LEAN CLAY (native) soft, grey, moist		
	BH11-30-6	4	100			
	BH11-30-7			**LEAN CLAY with sand** very soft, grey, moist - 2 cm thick medium sand lens at 11.4 m		
	BH11-30-8			**silty SAND** some to trace clay, sand is fine to medium, loose, grey, moist - 5 cm thick clay lenses at 11.7 m, 12 m, and 12.8 m - wet from 11.7 to 12.8 m and 13.2 to 14.6 m	GSA	
		5	100			
	BH11-30-9				GSA	
	BH11-30-10			**FAT CLAY** trace sand, very soft, grey, moist	GSA	
	BH11-30-11					
	BH11-30-12	6	100			
						bentonite seal
	BH11-30-13			**SILT** some clay, trace sand, very soft, laminated, grey, moist	GSA, Att, M	
	BH11-30-14			**FAT CLAY** trace sand, very soft, laminated, grey, moist		
		7	100	- silt lenses at 19.4 m and 20.3 m (1 - 3 cm thick)		

Depth scale (m): 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19
Elevation scale (m): 437, 436, 435, 434, 433, 432, 431, 430, 429, 428, 427, 426, 425, 424, 423, 422, 421, 420, 419, 418

DRILLING METHOD: Core Sample
Notes: SONIC CORE SAMPLE
DRILL DATE: May 24, 2011
LOGGED BY: JN
DRILLER NAME: Beck

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SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: BH11-30

SURFACE ELEVATION: 437.57 m

DEPTH (m)	SAMPLE ID	Sample Run #	% Recovery	SOIL DESCRIPTION	TEST DATA: Laboratory Analyses	ELEVATION (m)
	BH11-30-15	7	100	- concretions at 20.1 m and 22.4 m		417
21						416
22	BH11-30-16	8	100	- fine sand lenses from 22.6 m through 23.8 m (approx. 1 mm thick)		415
23	BH11-30-17			- cobble at 23.8 m	GSA, Att, M	414
24				**silty SAND with gravel (Till)** trace clay, sand is coarse, occasional cobbles, compact to dense, grey, moist		413
25	BH11-30-18	9	90	- wet from 25.3 to 26.2 m	GSA	412
26	BH11-30-19			- dark grey below 26.4 m - very dense below 26.8 m		411
27						410
28	BH11-30-20	10	100			409
29						408

End of borehole at 29.9 m

(1) - Water added during drilling from surface to 29.9 m

GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

DRILLING METHOD: Core Sample

Notes: SONIC CORE SAMPLE

DRILL DATE: May 24, 2011

LOGGED BY: JN
DRILLER NAME: Beck

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SLR CONSULTING (CANADA) LTD.

CLIENT: City of Kelowna
PROJECT: Glenmore Landfill - Phase 3
ADDRESS: 2105 Glenmore Road North, Kelowna, BC
SLR JOB NO: 219.05164

BOREHOLE LOG

BOREHOLE NO: BH12-2
SURFACE ELEVATION: 439.12 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
0					**Unconsolidated organic matter & garbage (MSW)** (wood pieces, grading to chips and sawdust), trace garbage (metal, plastic), loose, misc, wet				concrete	439
1										438
2										437
					Interbedded CLAY AND GARBAGE (MSW) layers of black sand with heavy odour, grey, moist					
3										436
					FAT CLAY (Native) silty, high plasticity, firm, brown, moist					
4					- crystals at 4.3 m					435
		BH12-2-1								
5					- becoming grey, soft at 5.2 m				bentonite seal	434
6										433
7					- very soft, wet at 6.7 m					432
8										431
9		BH12-2-2			- very soft, wet from 8.5 to 9.4 m					430

End of borehole at 9.4 m

(1) - Water added during drilling from surface to 9.4 m
GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

GSA %:
BH12-2-1: <0.10 Gravel, 0.28 Sand, 9.11 Silt, 90.6 Clay
BH12-2-2: <0.10 Gravel, 0.15 Sand, 29.4 Silt, 70.1 Clay

DRILLING METHOD: Core Sample
Notes: SONIC CORE SAMPLE
DRILL DATE: September 25, 2012
LOGGED BY: JN
DRILLER NAME: Mud Bay

SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: BH12-3
SURFACE ELEVATION: 437.90 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 / 10 / 100 / 1000 / 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
0				**SAND AND SILT** trace clay, loose, rootlets, dark brown, dry to moist				concrete	
1				**silty CLAY** high plasticity, firm, brown, moist					437
2				**interbedded CLAY AND GARBAGE (MSW)** some sand, odour					436
3				**silty CLAY** high pasticity, firm, brown, moist - crystals at 3.0 and 3.7 m					435
4									434
5				- becoming grey and soft at 4.9 m - wet at 5.2 m				bentonite seal	433
6									432
7	■	BH12-3-1		- wet at 6.7 m - 5 mm seam fine sand at 7.0 m - 5 mm seam fine sand at 7.3 m					431
8				- wet from 8.2 m to 8.8 m					430
9									429
9.4				End of borehole at 9.4 m					

(1) - Water added during drilling from surface to 9.4 m
GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

DRILLING METHOD: Core Sample
DRILL DATE: September 26, 2012
LOGGED BY: JN
DRILLER NAME: Mud Bay

Notes: ■ SONIC CORE SAMPLE

SLR CONSULTING (CANADA) LTD.	CLIENT: City of Kelowna PROJECT: Glenmore Landfill - Phase 3 ADDRESS: 2105 Glenmore Road North, Kelowna, BC SLR JOB NO: 219.05164	**BOREHOLE LOG** BOREHOLE NO: BH12-5 SURFACE ELEVATION: 441.62 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
0–2.7		BH12-5-1 (at ~1.3 m)			**SAND AND SILT (fill)** fine to medium sand, some clay, compact, brown, moist - becoming grey at 0.6 m - trace landfill waste (plastic) at 0.9 m - increasing sand content, occasional cobble at 1.5 m - increasing clay at 1.8 m				concrete	441, 440, 439
2.7–3.5					**silty CLAY & MSW** interbedded layers, some sand, some garbage (plastic, foil), some cobbles, odourous, grey to black, moist					438
3.5–5.2					**Unconsolidated ORGANIC MATTER** (wood chips grading to chips and sawdust) loose, black, moist - layer garbage at 5.0 m					437
5.2–7.2					**Interbedded CLAY AND GARBAGE (MSW)** Clay is firm, laminated, odourous. Garbage includes plastic, grey, moist				backfilled with bentonite	436, 435
7.2–11.0		BH12-5-2 (at ~7.6 m); BH12-5-3 (at ~10.4 m)			**silty CLAY - FAT CLAY (native)** laminations, firm, high plasticity, crystals to 7.9 m, black, moist - soft at 9.4 m - very soft, wet at 9.8 m - grey at 10.7 m					434, 433, 432, 431
11					End of borehole at 11.0 m					

(1) - Water added during drilling from surface to 11.0 m
GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

GSA %:
BH12-5-1: <0.10 Gravel, 0.51 Sand, 21.7 Silt, 70.1 Clay
BH15-5-3: <0.10 Gravel, <0.10 Sand, 28.3 Silt, 71.7 Clay

DRILLING METHOD: Core Sample	Notes: SONIC CORE SAMPLE	
DRILL DATE: September 27, 2012 / LOGGED BY: JN / DRILLER NAME: Mud Bay		Sheet 1 of 1

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SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: BH12-6
SURFACE ELEVATION: 439.18 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 / 10 / 100 / 1000 / 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
0–2.4					**Unconsolidated ORGANIC MATTER** (wood chips grading to chips and sawdust) loose, black, moist				concrete	439
2.4–4.6					**Interbedded CLAY AND GARBAGE (MSW)** Clay is firm, laminated, odourous. Garbage includes plastic, grey, moist					
4.6–9.4		BH12-6-1			**silty CLAY - FAT CLAY (native)** laminations, firm, high plasticity, crystals at 4.6 and 5.2 m, black, moist - soft at 5.5 m - very soft, grey, wet from 6.4 to 9.4 m				bentonite chips	
		BH12-6-2								

Depth scale: 1, 2, 3, 4, 5, 6, 7, 8, 9
Elevation scale: 439, 438, 437, 436, 435, 434, 433, 432, 431, 430

End of borehole at 9.4 m

(1) - Water added during drilling from surface to 9.4 m
GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

DRILLING METHOD: Core Sample
Notes: SONIC CORE SAMPLE
DRILL DATE: September 27, 2012
LOGGED BY: JN
DRILLER NAME: Mud Bay

SLR CANADA V5.2 219.05164 CITY OF KELOWNA GLENMORE LANDFILL NOV 2012.GPJ SLR_CAN V5.2.GDT 2/13/13

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SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: BH12-7
SURFACE ELEVATION: 439.34 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
0–2.4					**Unconsolidated ORGANIC MATTER** (wood chips grading to chips and sawdust) loose, brown, dry				concrete	439, 438, 437
2.4–4.3					**SAND AND GRAVEL (roadbase fill)** some silt, loose, brown, moist				bentonite chips	436
4		BH12-7-1			- odourous, black, wet layer at 4.0 m					435
		BH12-7-2			**FAT CLAY (reworked soil fill)** some silt, firm, grey/blue, moist					
					silty CLAY (native) firm, crystals, brown, moist					

End of borehole at 4.9 m

(1) - Water added during drilling from surface to 4.9 m
GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

GSA %:
BH12-6-1: 48.3 Gravel, 32.0 Sand, 11.1 Silt, 8.6 Clay
BH12-7-2: <0.10 Gravel, 5.0 Sand, 5.0 Silt, 90.0 Clay

DRILLING METHOD: Core Sample
DRILL DATE: September 27, 2012
LOGGED BY: JN
DRILLER NAME: Mud Bay
Notes: SONIC CORE SAMPLE

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SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
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ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: BH12-8
SURFACE ELEVATION: 438.75 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 / 10 / 100 / 1000 / 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
0					**Unconsolidated ORGANIC MATTER** (wood pieces, grading to chips and sawdust), trace garbage, loose, brown, moist				concrete	
1										438
2					**No recovery to 12.8 m** very soft					437
3										436
4										435
5										434
6										433
7									bentonite chips	432
8										431
9										430
10										429
11					**Interbedded silty CLAY AND GARBAGE (MSW)** soft, grey, moist - black layer (plastic, wood chips) from 11.6 to 11.9 m					428
12					- black layer (plastic, wood chips) from 12.5 to 12.8 m					427
13		BH12-8-1			**silty CLAY (native ?)** very soft, grey, wet					426
		BH12-8-2			- increased silt, saturated from 13.1 to 13.4 m					
		BH12-8-3			**SAND** some silt, loose, grey, moist to wet					425
14					End of borehole at 14.0 m					

(1) - Water added during drilling from surface to 14.0 m
GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

GSA %:
BH12-8-3: 0.2 Gravel, 88.8 Sand, 9.1 Silt, 1.9 Clay

DRILLING METHOD: Core Sample

DRILL DATE: September 27, 2012

LOGGED BY: JN
DRILLER NAME: Mud Bay

Notes: SONIC CORE SAMPLE

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SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: BH12-9
SURFACE ELEVATION: 438.68 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
0–2.4					**Unconsolidated ORGANIC MATTER** (wood pieces, grading to chips and sawdust), trace garbage, loose, brown, moist				concrete	438, 437, 436
2.4–4.9					**Interbedded silty CLAY AND GARBAGE (MSW)** soft, grey, moist - wet from 4.3 to 4.9 m					435, 434
4.9–11.0		No samples taken			**No Recovery to 11.0 m**				bentonite chips	433, 432, 431, 430, 429, 428

Depth scale: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11

End of borehole at 11.0 m

(1) - Water added during drilling from surface to 11.0 m
GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

DRILLING METHOD: Core Sample

DRILL DATE: September 27, 2012

LOGGED BY: JN

DRILLER NAME: Mud Bay

Notes:

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SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: BH12-12
SURFACE ELEVATION: 437.97 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 / 10 / 100 / 1000 / 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
0					**SAND AND SILT (fill)** trace clay, compact, brown, moist				concrete	
1					- organics, wet from 0.8 to 0.9 m					437
					Interbedded CLAY AND GARBAGE (MSW) some wood chips, blue/grey, moist					
2					**SILT AND CLAY (native)** high plasticity laminations, firm, brown, moist					436
3										435
					- crystals from 3.4 to 3.8 m					
4									bentonite chips	434
5										433
6										432
					- very soft, wet from 6.4 to 7.0 m					
7					- 3 cm seam medium grained sand at 6.9 m					431
		BH12-12-1			- wet from 7.3 to 7.9 m					
					End of borehole at 7.9 m					

(1) - Water added during drilling from surface to 7.9 m
GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

GSA %:
BH12-12-1: <0.10 Gravel, 5.02 Sand, 53.9 Silt, 41.1 Clay

DRILLING METHOD: Core Sample
Notes: SONIC CORE SAMPLE
DRILL DATE: September 28, 2012
LOGGED BY: JN
DRILLER NAME: Mud Bay

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SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: BH12-13
SURFACE ELEVATION: 437.97 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 / 10 / 100 / 1000 / 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
0					**SAND AND SILT (fill)** trace clay, compact, brown, moist - organics, wet from 0.8 to 0.9 m				concrete	
1					**Interbedded CLAY AND GARBAGE (MSW)** some wood chips, blue/grey, moist					437
2										436
3					**SILT AND CLAY (native)** high plasticity laminations, firm, brown, moist - crystals from 3.4 to 3.8 m					435
4		No samples							bentonite chips	434
5										433
6										432
7					- very soft, wet from 6.4 to 7.0 m - 3 cm seam medium grained sand at 6.7 m - increased silt, wet at 7.3 m					431
					End of borehole at 7.9 m					

(1) - Water added during drilling from surface to 7.9 m
GSA - grain size analysis
M - moisture content
Att - Atterberg limits
MSW - Municipal solid waste

DRILLING METHOD: Core Sample

DRILL DATE: September 28, 2012

LOGGED BY: JN

DRILLER NAME: Mud Bay

Notes:

Sheet 1 of 1

SLR CANADA V5.2 219.05164 CITY OF KELOWNA GLENMORE LANDFILL NOV 2012.GPJ SLR_CAN V5.2.GDT 2/13/13

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: City of Kelowna
PROJECT: Glenmore Landfill - Phase 3
ADDRESS: 2105 Glenmore Road North, Kelowna, BC
SLR JOB NO: 219.05164

BOREHOLE LOG

BOREHOLE NO: BH12-15
SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000 10000	BOREHOLE COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
					silty CLAY overburden, trace broken rock, compact, less rock starting at 1.5 m garbage observed at 2.1 m, brown, moist					
1										1.0
		BH12-15-1								
2										2.0
					Interbedded CLAY AND GARBAGE (MSW) silty CLAY, garbage includes mostly organics such as wood and plastics, brown, moist				backfilled with drill cuttings	
3										3.0
		BH12-15-2								
4										4.0
		BH12-15-3								
5										5.0
					could not drill past 5.5 m					
					End of borehole at 5.5 m No well installed					

DRILLING METHOD: Hollow Stem Auger Drilling

Notes: SPOON SAMPLE

DRILL DATE: November 16, 2012

LOGGED BY: Amber McAfee

DRILLER NAME: On the Mark Locates, Antin

Destroyed - leachate trench

BOREHOLE LOG

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE NO: BH12-16
SURFACE ELEVATION: /

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
-1									stickup, jplug	-1.0
0					Ground Surface					0.0
0					**silty CLAY** overburden, trace broken rock, compact, less rock starting at 1.5 m. garbage observed at 2.1 m, brown, moist					
1										1.0
2					**Interbedded CLAY AND GARBAGE (MSW)** silty CLAY, garbage includes mostly organics such as wood and plastics, brown, moist					2.0
3									bentonite seal	3.0
4										4.0
5										5.0
6	Spoon	BH12-16-1								6.0
7										7.0
7.6	Spoon	BH12-16-2			**FAT CLAY (reworked soil, fill)** soft, grey/blue, wet. garbage (MSW) observed 0.2 m thick at 8.1 and 10.2 m depths					
8									silica sand	8.0

DRILLING METHOD: Hollow Stem Auger Drilling

Notes: SPOON SAMPLE

DRILL DATE: November 16, 2012

LOGGED BY: Amber McAfee

DRILLER NAME: On the Mark Locates, Antin

Destroyed.

SLR

SLR CONSULTING (CANADA) LTD.

CLIENT: **City of Kelowna**
PROJECT: **Glenmore Landfill - Phase 3**
ADDRESS: **2105 Glenmore Road North, Kelowna, BC**
SLR JOB NO: **219.05164**

BOREHOLE LOG

BOREHOLE NO: BH12-16
SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SPT COUNT	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
9										9.0
	☐	BH12-16-3								
10										10.0
	☐	BH12-16-4								
11									backfilled with drill cuttings	11.0
12										12.0
	☐	BH12-16-5			**silty SAND** sand is fine to medium grained, loose, grey, wet					
					End of borehole at 12.2 m					
					Well Completion Details: Screened interval from 6.1 m to 10.7 m below surface Elevation at top of casing (TOC) = m **FAT CLAY** soft, grey, wet					

SLR CANADA V5.2 219.05164 CITY OF KELOWNA GLENMORE LANDFILL DEC 2012.GPJ SLR_CAN V5.2.GDT 12/4/12

DRILLING METHOD: Hollow Stem Auger Drilling

DRILL DATE: November 16, 2012

LOGGED BY: Amber McAfee

DRILLER NAME: On the Mark Locates, Antin

Notes: ☐ SPOON SAMPLE

Attachment 1

Borehole Logs

SNC·LAVALIN

Client: City of Kelowna	Borehole No. : GL39-1
Location: Glenmore Landfill, Kelowna, BC	PAGE 1 OF 1

Drilling Contractor	On The Mark	Date Monitored	2019 12 03	Project Number:	662036
Drilling Method	Hollow Stem Auger	Ground Surface Elev. (m)	439.530	Borehole Logged By:	NL
Borehole Dia. (m)	0.05	Top of Casing Elev. (m)	440.410	Date Drilled:	2019 10 22
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5535296.786	Easting: 326790.420	Log Typed By:	SGP/KP

Drilling Legend: Sample Interval; Auger Flight

Water/ Levels: Water Level 1; Water Level 2

○ Reading within indicated scale; ● Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: GL39-1

Depth in Metres	Soil Description	Blow Count	% Recovery
0	CLAY, silty, some fine grained sand, grey, very stiff.		
~1.6–2.1		27	58
~3.1–3.6		10	88
3.5	SAND, fine to coarse grained, silty, trace clay, trace gravel, coarse, brown with red staining.		
~3.7–4.2		13	92
4.6	At 4.6 m - water.	2	100
5.2	Below 5.2 m - fine grained sand, some silt, wet		
~6.1–6.7		3	100
6.4	SILT (TILL), some clay, some sand, fine grained, grey, very stiff, wet.		
~7.3–7.9		5	100
8.4	At 8.4 m - gravel.		
10.1	At 10.1 m - refusal.		
10.1	Bottom of hole at 10.1 m.		

Soil Vapour (ppm): 10^1 10^2 10^3 10^4

Well: SAND (0–0.15 m); BENTONITE; GL39-1; SAND (8.9–10.1 m)

NOTES

QA RRW 2020 01 28 Print Date:2020-01-31

SNC • LAVALIN

Client	Borehole No. : GL39-2
City of Kelowna	
Location	PAGE 1 OF 1
Glenmore Landfill, Kelowna, BC	

Drilling Contractor	On The Mark	Date Monitored	2019 12 03	Project Number:	662036
Drilling Method	Hollow Stem Auger	Ground Surface Elev. (m)	439.560	Borehole Logged By:	NL
Borehole Dia. (m)	0.05	Top of Casing Elev. (m)	440.460	Date Drilled:	2019 10 21
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5535297.554	Easting: 326789.145	Log Typed By:	SGP/KP

Drilling Legend
Sample Interval
Auger Flight

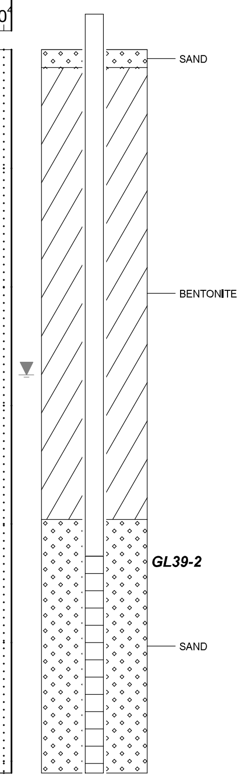
Water/ Levels
Water Level 1
Water Level 2

○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name 1: GL39-2

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
0	CLAY, silty, some sand, fine grained, grey, very stiff.						
3.5	SAND, fine to coarse grained, silty, trace gravel, coarse, trace clay, brown with red staining.						
	At 4.6 m - water.						
	Below 5.2 m - fine grained sand, some silt, wet.						
6.1	Bottom of hole at 6.1 m.						



NOTES

SNC·LAVALIN	Client **City of Kelowna**	**Borehole No. : GL39-3**
	Location **Glenmore Landfill, Kelowna, BC**	PAGE 1 OF 1

Drilling Contractor	On The Mark	Date Monitored	2019 12 03	Project Number:	662036
Drilling Method	Hollow Stem Auger	Ground Surface Elev. (m)	439.630	Borehole Logged By:	NL
Borehole Dia. (m)	0.05	Top of Casing Elev. (m)	440.560	Date Drilled:	2019 10 21
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5535298.264	Easting: 326787.825	Log Typed By:	SGP/KP

Drilling Legend
- Sample Interval
- Auger Flight

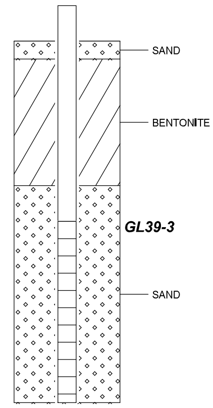
Water/ Levels
- Water Level 1
- Water Level 2

○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name 1: GL39-3

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
0	CLAY, silty, some sand, fine grained, grey, very stiff.						
3.1	Bottom of hole at 3.1 m.						



Depth scale: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

NOTES

QA RRW 2020 01 28 Print Date:2020-01-31

SNC-LAVALIN	Client **City of Kelowna**	**Borehole No. : GL40-1**
	Location **Glenmore Landfill, Kelowna, BC**	PAGE 1 OF 1

Drilling Contractor	On The Mark	Date Monitored	2019 12 03	Project Number:	662036
Drilling Method	Hollow Stem Auger	Ground Surface Elev. (m)	449.750	Borehole Logged By:	NL
Borehole Dia. (m)	0.05	Top of Casing Elev. (m)	450.490	Date Drilled:	2019 10 22
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5535525.235	Easting: 326465.169	Log Typed By:	SGP/KP

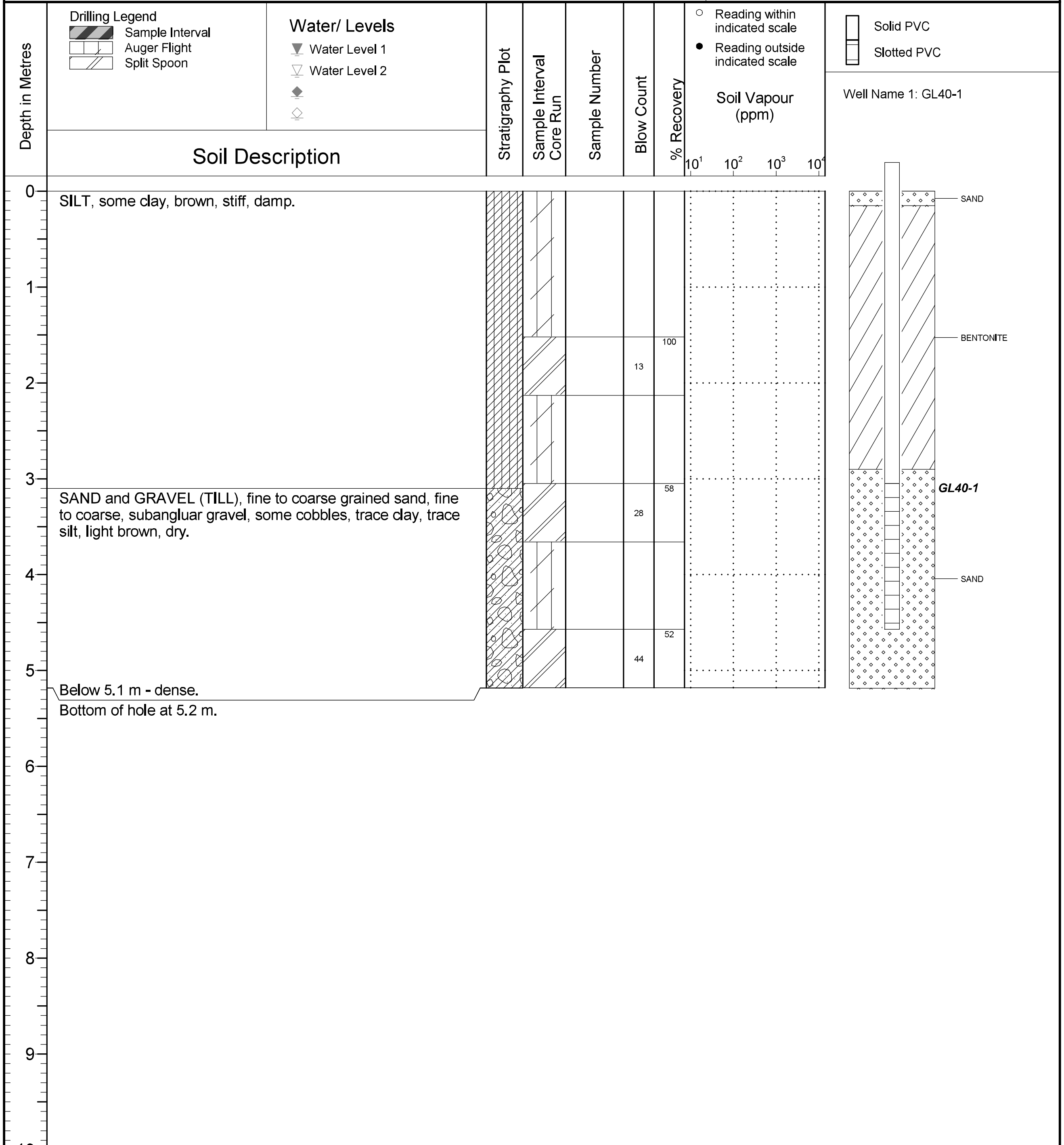
Drilling Legend: Sample Interval; Auger Flight; Split Spoon

Water/ Levels: Water Level 1; Water Level 2

Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: GL40-1



NOTES

QA RRW 2020 01 28 Print Date:2020-01-31

SNC·LAVALIN

Client	Borehole No. : GL40-2/3
City of Kelowna	
Location	PAGE 1 OF 2
Glenmore Landfill, Kelowna, BC	

Drilling Contractor	VanMars Drilling Ltd.	Date Monitored	2019 12 03	Project Number:	662036
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	449.650	Borehole Logged By:	NL
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	450.440 450.450	Date Drilled:	2019 11 15
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5535523.760	Easting: 326466.400	Log Typed By:	KP

Drilling Legend: Sample Interval; Vibrasonic

Water/ Levels: Water Level 1; Water Level 2

Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: GL40-3
Well Name 2: GL40-2

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
0	SILT, some clay, brown, stiff, damp.						
3.6	SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, subangular, some cobbles, trace clay, trace silt, light brown, dry.						
5.1	Below 5.1 m - dense.						
6.1						100	
8.2	SILT and SAND, fine grained, trace clay, light brown, very stiff, moist.						
9.1	CLAY and SILT (TILL), some sand, medium grained, trace gravel, coarse, grey-brown, stiff, wet.					100	

BENTONITE
SAND
GL40-3

NOTES

QA RRW 2020 01 28 Print Date:2020-02-04

SNC-LAVALIN	Client **City of Kelowna**	**Borehole No. : GL40-2/3**
	Location **Glenmore Landfill, Kelowna, BC**	PAGE 2 OF 2

Drilling Contractor	VanMars Drilling Ltd.	Date Monitored	2019 12 03	Project Number:	662036
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	449.650	Borehole Logged By:	NL
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	450.440 450.450	Date Drilled:	2019 11 15
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5535523.760	Easting: 326466.400	Log Typed By:	KP

Drilling Legend
- Sample Interval
- Vibrasonic

Water/ Levels
- Water Level 1
- Water Level 2

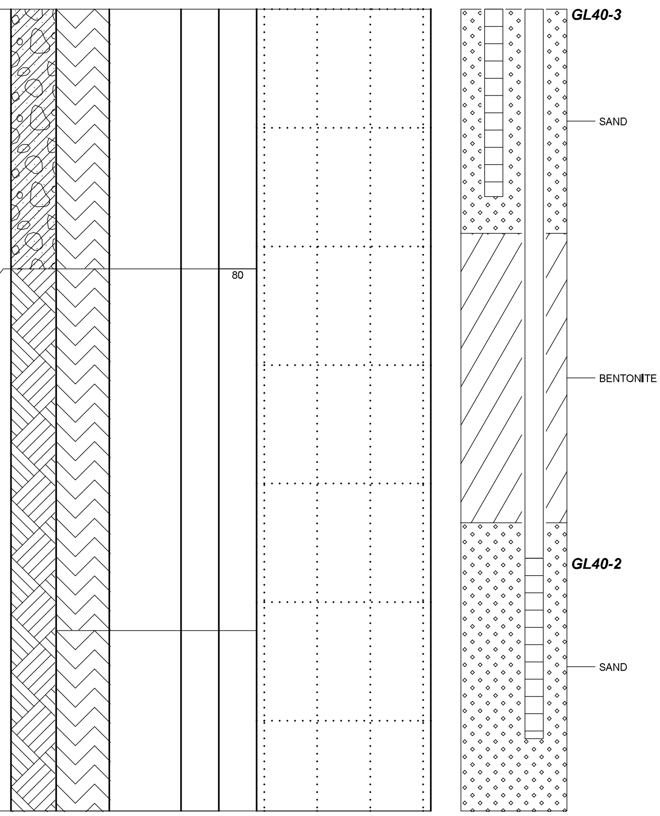
- Reading within indicated scale
- Reading outside indicated scale

- Solid PVC
- Slotted PVC

Well Name 1: GL40-3
Well Name 2: GL40-2

Depth in Metres | Soil Description | Stratigraphy Plot | Sample Interval Core Run | Sample Number | Blow Count | % Recovery | Soil Vapour (ppm) 10^1 10^2 10^3 10^4

Depth (m)	Soil Description
10	CLAY and SILT (TILL), some sand, medium grained, trace gravel, coarse, grey-brown, stiff, wet. *(continued)*
	Between 10.7 m and 11.0 m - SILT, SAND, and GRAVEL (TILL), fine to coarse grained sand, coarse gravel, dark grey-brown, wet.
11	Below 11.0 m - SILT, grey, very stiff, wet.
12	Below 11.9 m - SAND and GRAVEL (TILL), fine to coarse grained sand, fine to coarse gravel.
	Volcanic bedrock, brown, hard.
13	
14	
15	
16	
17	Bottom of hole at 16.8 m.
18	
19	
20	



NOTES

SNC·LAVALIN	Client **City of Kelowna**	**Borehole No. : GL41-1/2**
	Location **Glenmore Landfill, Kelowna, BC**	PAGE 1 OF 2

Drilling Contractor	VanMars Drilling Ltd.	Date Monitored	2019 12 03	Project Number:	662036
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	449.710	Borehole Logged By:	NL
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	450.570 450.550	Date Drilled:	2019 11 15
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5537673.352	Easting: 326191.337	Log Typed By:	KP

Drilling Legend
- Sample Interval
- Auger Flight
- Split Spoon

Water/ Levels
- Water Level 1
- Water Level 2

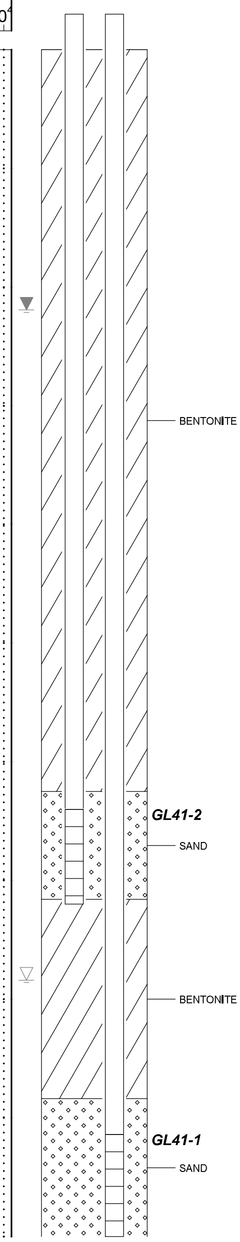
- Reading within indicated scale
- Reading outside indicated scale

Soil Vapour (ppm): 10^1 10^2 10^3 10^4

- Solid PVC
- Slotted PVC

Well Name 1: GL41-2
Well Name 2: GL41-1

Depth in Metres	Soil Description	Blow Count	% Recovery
0	SILT, some clay, brown, stiff, damp.		
1.5	Between 1.5 - 2.9 m - hard.	29	58
3.0	At 3.1 m - water.		
3.0	SAND, fine to coarse grained, trace silt, brown, loose, wet.	20	58
3.6	SAND, fine grained, trace silt, trace organics, brown, loose, wet.	15	58
4.2		9	58
4.8	SILT, clayey, brown, soft, wet.	15	
5.4		16	58
6.0	GRAVEL & SILT (TILL), subangular gravel, trace clay, brown, loose, wet.		120
7.2	SILT and CLAY (TILL), some sand, grey-brown, stiff, damp.		
7.6	Below 7.6 m - light brown, dry, crushed boulder.		
9.1	Volcanic bedrock, brown, hard.		110



NOTES

QA RRW 2020 01 28 Print Date:2020-02-04

SNC • LAVALIN	Client **City of Kelowna**	**Borehole No. : GL41-1/2**
	Location **Glenmore Landfill, Kelowna, BC**	PAGE 2 OF 2

Drilling Contractor	VanMars Drilling Ltd.	Date Monitored	2019 12 03	Project Number:	662036
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	449.710	Borehole Logged By:	NL
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	450.570 450.550	Date Drilled:	2019 11 15
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5537673.352	Easting: 326191.337	Log Typed By:	KP

Drilling Legend: Sample Interval; Auger Flight; Split Spoon

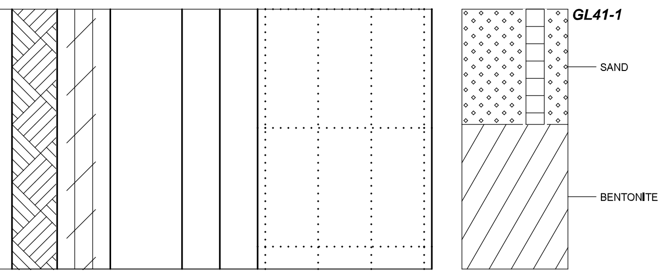
Water/ Levels: Water Level 1; Water Level 2

○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name 1: GL41-2
Well Name 2: GL41-1

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
10	Volcanic bedrock, brown, hard. *(continued)*						
12.2	Bottom of hole at 12.2 m.						



NOTES

QA RRW 2020 01 28 Print Date:2020-02-04

SNC·LAVALIN

Client
City of Kelowna

Location
Glenmore Landfill, Kelowna, BC

Borehole No. : GL41-3

Drilling Contractor	On The Mark	Date Monitored	2019 12 03	Project Number:	662036
Drilling Method	Hollow Stem Auger	Ground Surface Elev. (m)	449.720	Borehole Logged By:	NL
Borehole Dia. (m)	0.05	Top of Casing Elev. (m)	450.570	Date Drilled:	2019 10 22
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5537675.680	Easting: 326192.748	Log Typed By:	SGP/KP

Drilling Legend: Sample Interval; Auger Flight; Split Spoon

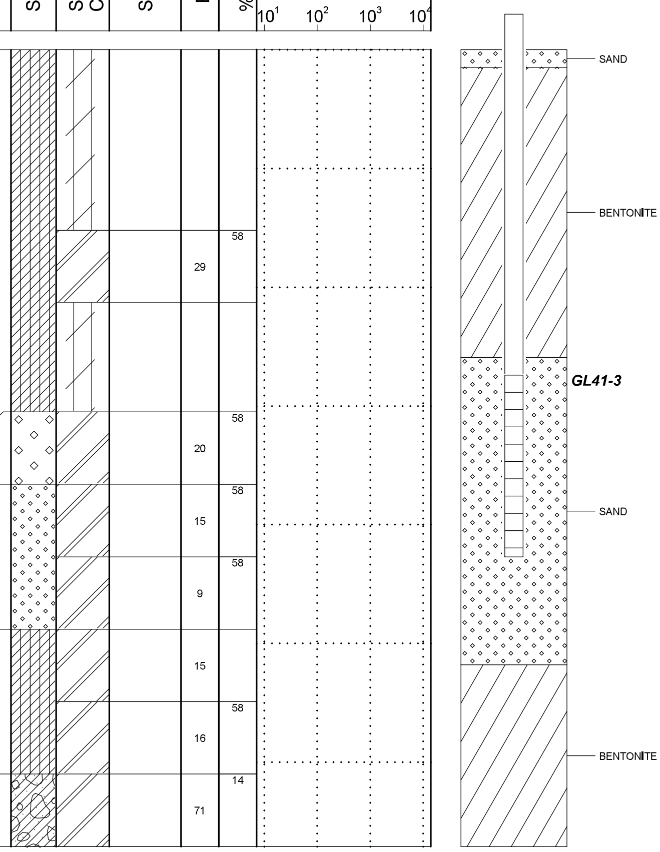
Water/ Levels: Water Level 1; Water Level 2

○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: GL41-3

Depth in Metres	Soil Description	Blow Count	% Recovery
0	SILT, some clay, brown, stiff, damp.		
1.5	Between 1.5 - 2.9 m - hard.	29	58
3	At 3.1 m - water.		
3.1	SAND, fine to coarse grained, trace silt, brown, loose, wet.	20	58
3.7	SAND, fine grained, trace silt, trace organics, brown, loose, wet.	15	58
		9	58
4.9	SILT, clayey, brown, soft, wet.	15	
		16	58
6.1	SAND (TILL), coarse grained.	71	14
6.7	Bottom of hole at 6.7 m.		



NOTES

QA RRW 2020 01 28 Print Date:2020-01-31

SNC-LAVALIN	Client **City of Kelowna**	**Borehole No. : GL42-1/2**
	Location **Glenmore Landfill, Kelowna, BC**	PAGE 1 OF 3

Drilling Contractor	VanMars Drilling Ltd.	Date Monitored	2019 12 03	Project Number:	662036
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	447.650	Borehole Logged By:	NL
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	448.430 448.420	Date Drilled:	2019 11 14
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5535422.733	Easting: 326636.214	Log Typed By:	KP

Drilling Legend: Sample Interval; Vibrasonic

Water/ Levels: Water Level 1; Water Level 2

Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: GL42-2
Well Name 2: GL42-1

Depth in Metres	Soil Description	% Recovery
0–0.45	CLAY and SAND, fine to coarse grained, subangular, grey-brown, loose.	68
0.45–1.2	SAND and GRAVEL, fine to coarse, subangular, trace cobbles.	
1.2–3.05	COBBLES (TILL), some sand, some gravel, trace silt, trace clay, grey-brown, loose.	
3.05–4.55	CLAY and COBBLES (TILL), some sand, some gravel, stiff.	92
4.55–6.1	SAND and GRAVEL(TILL), cobbley, grey-brown, loose.	
6.1–6.7	CLAY, GRAVEL and CLAY (TILL), subangular gravel, some silt, trace sand, grey-brown, stiff, dry.	75
6.7–8.5	SAND, GRAVEL and COBBLES (TILL), fine to coarse, subangular, grey-brown, loose, dry.	
8.5–10	CLAY, grey-brown, stiff, damp. Below 9.1 m - SILT, clayey, brown, medium stiff, moist.	100

Soil Vapour (ppm): 10^1 10^2 10^3 10^4

BENTONITE

SAND

NOTES

QA RRW 2020 01 28 Print Date:2020-01-31

SNC • LAVALIN	Client **City of Kelowna**	**Borehole No. : GL42-1/2**
	Location **Glenmore Landfill, Kelowna, BC**	PAGE 2 OF 3

Drilling Contractor	VanMars Drilling Ltd.	Date Monitored	2019 12 03
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	447.650
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	448.430 448.420
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5535422.733	Easting: 326636.214

Project Number:	662036
Borehole Logged By:	NL
Date Drilled:	2019 11 14
Log Typed By:	KP

Drilling Legend: Sample Interval; Vibrasonic

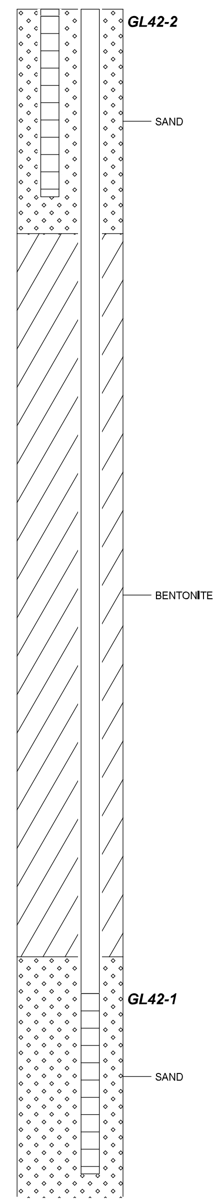
Water/ Levels: Water Level 1; Water Level 2

○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name 1: GL42-2
Well Name 2: GL42-1

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
10	CLAY, grey-brown, stiff, damp. *(continued)*						
12.2	At 12.2 m - sandy, some gravel, damp.					100	
13	COBBLES and SAND (TILL), subangular, trace silt, grey-brown, damp.						
	SILT (TILL), sandy, trace clay, grey-brown, stiff, loose, dry.						
	SAND, GRAVEL and COBBLES (TILL), grey, stiff, dry.						
15	CLAY (TILL), some silt, some gravel, subangular, grey, stiff, moist.					99	
	COBBLES (TILL), some clay, some sand, fine grained, grey, stiff.						
18	SAND and GRAVEL (TILL), fine to coarse, subangular, trace silt, dark grey-brown, loose, moist.					97	
	At 19.5 m - boulder.						
	Below 19.8 m - cobbles and gravel, subangular, some sand,						



NOTES

QA RRW 2020 01 28 Print Date:2020-01-31

SNC·LAVALIN	Client **City of Kelowna**	**Borehole No. : GL42-1/2**
	Location **Glenmore Landfill, Kelowna, BC**	

Drilling Contractor	VanMars Drilling Ltd.	Date Monitored	2019 12 03	Project Number:	662036
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	447.650	Borehole Logged By:	NL
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	448.430 448.420	Date Drilled:	2019 11 14
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5535422.733	Easting: 326636.214	Log Typed By:	KP

Drilling Legend
- Sample Interval
- Vibrasonic

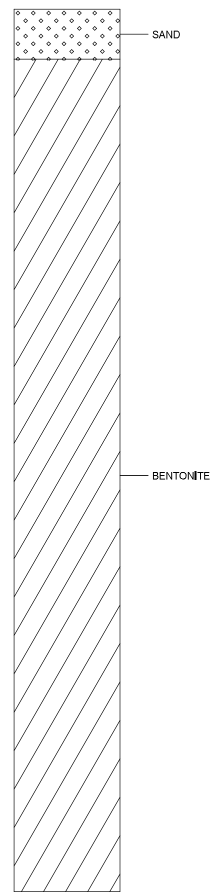
Water/ Levels
- Water Level 1
- Water Level 2

○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name 1: GL42-2
Well Name 2: GL42-1

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
20	light grey-brown, loose, damp. SAND and GRAVEL (TILL), fine to coarse, subangular, trace silt, dark grey-brown, loose, moist. *(continued)*						
21.3						1	
23.3	At 23.3 m - silty, trace clay.						
24.4						100	
27.4	Bottom of hole at 27.4 m.						



Depth scale: 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30

NOTES

SNC·LAVALIN	Client **City of Kelowna**	**Borehole No. : GL42-3**
	Location **Glenmore Landfill, Kelowna, BC**	PAGE 1 OF 1

Drilling Contractor	VanMars Drilling Ltd.	Date Monitored	2019 12 03	Project Number:	662036
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	447.660	Borehole Logged By:	NL
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	448.470	Date Drilled:	2019 11 14
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5535423.945	Easting: 326637.566	Log Typed By:	KP

Drilling Legend: Sample Interval; Vibrasonic

Water/ Levels: Water Level 1; Water Level 2

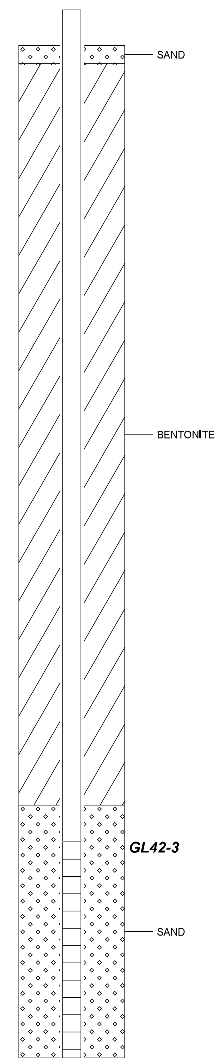
○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: GL42-3

Depth in Metres	Soil Description
0	CLAY and SAND, fine to coarse grained, subangular, grey-brown, loose.
	SAND and GRAVEL, fine to coarse, subangular, trace cobbles.
1	COBBLES (TILL), some sand, some gravel, trace silt, trace clay, grey-brown, loose.
3	CLAY and COBBLES (TILL), some sand, some gravel, stiff.
4	SAND and GRAVEL (TILL), cobbley, grey-brown, loose.
6	GRAVEL and CLAY (TILL), subangular gravel, some silt, trace sand, grey-brown, stiff, dry. Below 6.7 m - SAND, GRAVEL and COBBLES, fine to coarse, subangular, grey-brown, loose, dry.
8.5	Bottom of hole at 8.5 m.

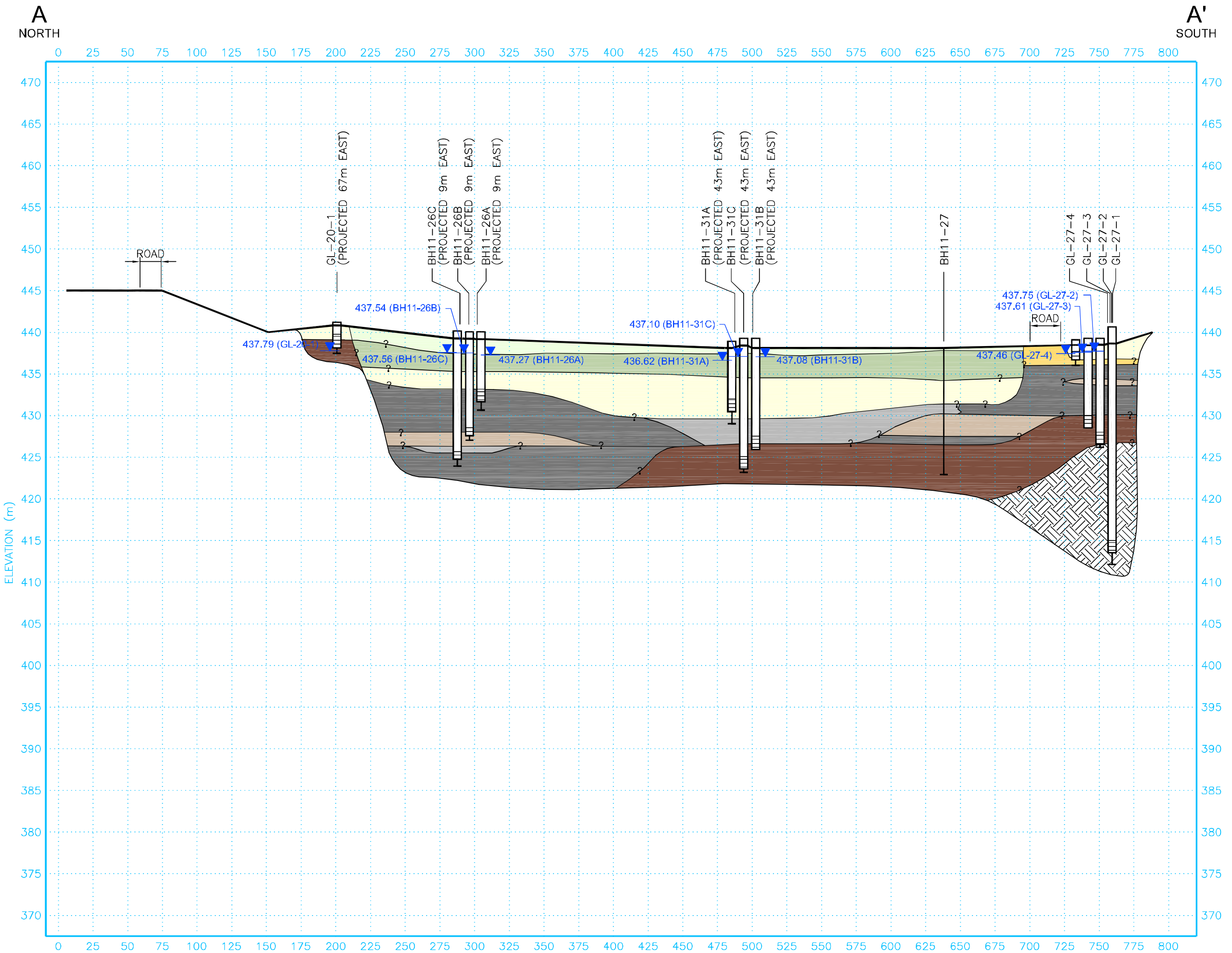
Columns: Stratigraphy Plot; Sample Interval Core Run; Sample Number; Blow Count; % Recovery; Soil Vapour (ppm) 10^1 10^2 10^3 10^4



NOTES

Appendix C.2

SLR Cross-Sections



VERTICAL SCALE 1:500

0 5 10 20 30 m

HORIZONTAL SCALE 1:3000

0 50 100 200 m

WHEN PLOTTED AT 11 x 17 PAGE SIZE

THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

LEGEND

- WELL
- SCREENED INTERVAL
- END OF HOLE
- BOREHOLE OR TESTPIT
- END OF HOLE
- WATER LEVEL (SEPTEMBER 8, 2011)
- GEOLOGIC CONTACT (QUERIED WHERE INFERRED)
- FILL (UNCONSOLIDATED WOODY ORGANIC MATTER)
- FILL (MUNICIPAL SOLID WASTE WITH INTERBEDDED CLAY)
- FILL (REWORKED CLAY)
- FILL (REWORKED SILTY SAND AND GRAVEL)
- LACUSTRINE DEPOSITS: CLAYS
- LACUSTRINE DEPOSITS: SANDY CLAYS
- LACUSTRINE DEPOSITS: SILTS AND SILTY SANDS
- TILL
- BEDROCK

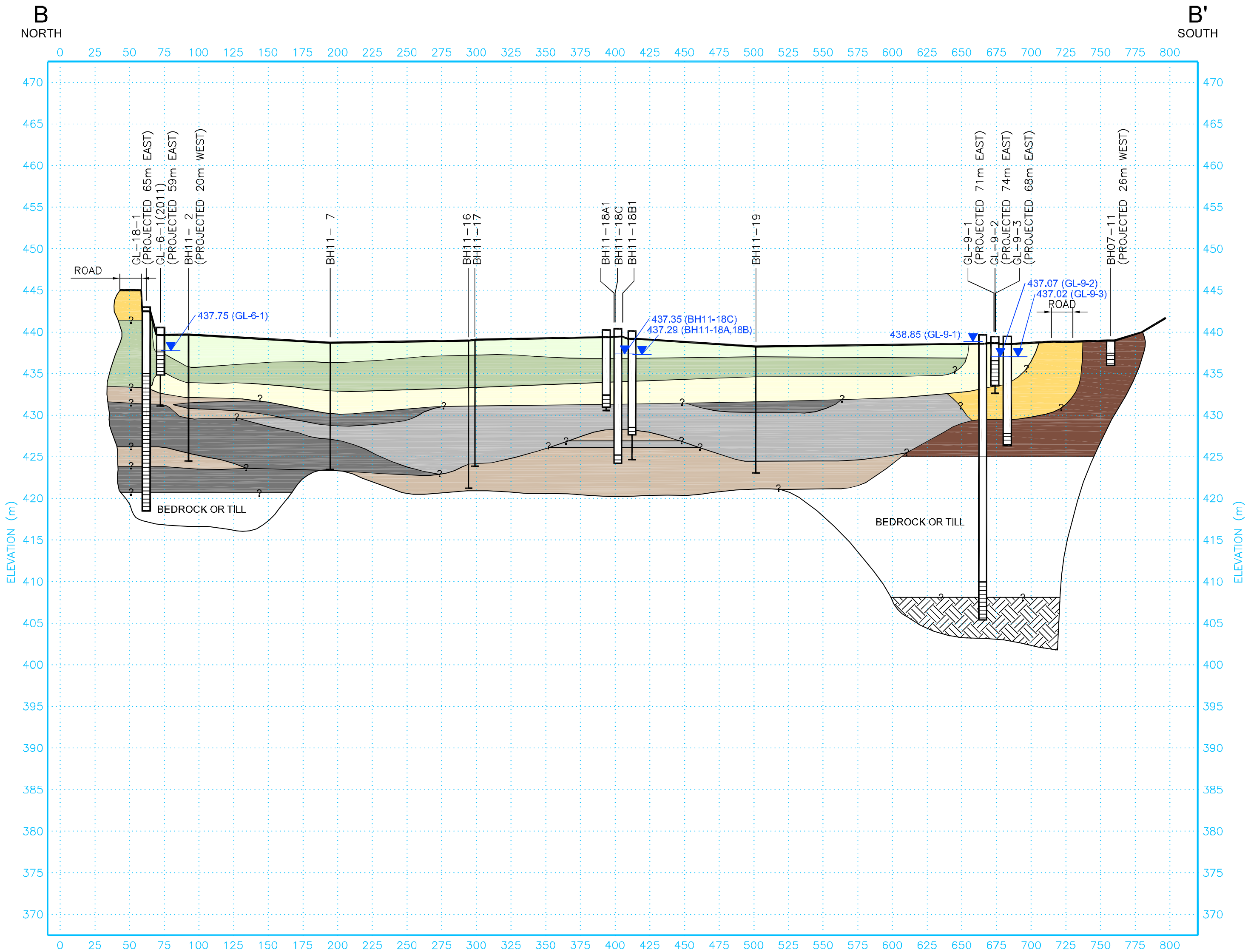
CITY OF KELOWNA
GLENMORE LANDFILL
2105 GLENMORE ROAD NORTH
KELOWNA, BC

Report
HYDROGEOLOGICAL STUDY FOR
GLENMORE LANDFILL PHASE 3

Drawing
CROSS SECTION A - A'

Date August 17, 2011	Scale AS SHOWN	Drawing No. 5
File Name S_219-05164-00-B6 -1	Project No. 219.05164.00000	

SLR



VERTICAL SCALE 1:500

0 5 10 20 30 m

HORIZONTAL SCALE 1:3000

0 50 100 200 m

WHEN PLOTTED AT 11 x 17 PAGE SIZE

THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

LEGEND

- WELL
- SCREENED INTERVAL
- END OF HOLE
- BOREHOLE OR TESTPIT
- END OF HOLE
- WATER LEVEL (SEPTEMBER 8, 2011)
- GEOLOGIC CONTACT (QUERIED WHERE INFERRED)
- FILL (UNCONSOLIDATED WOODY ORGANIC MATTER)
- FILL (MUNICIPAL SOLID WASTE WITH INTERBEDDED CLAY)
- FILL (REWORKED CLAY)
- FILL (REWORKED SILTY SAND AND GRAVEL)
- LACUSTRINE DEPOSITS: CLAYS
- LACUSTRINE DEPOSITS: SANDY CLAYS
- LACUSTRINE DEPOSITS: SILTS AND SILTY SANDS
- TILL
- BEDROCK

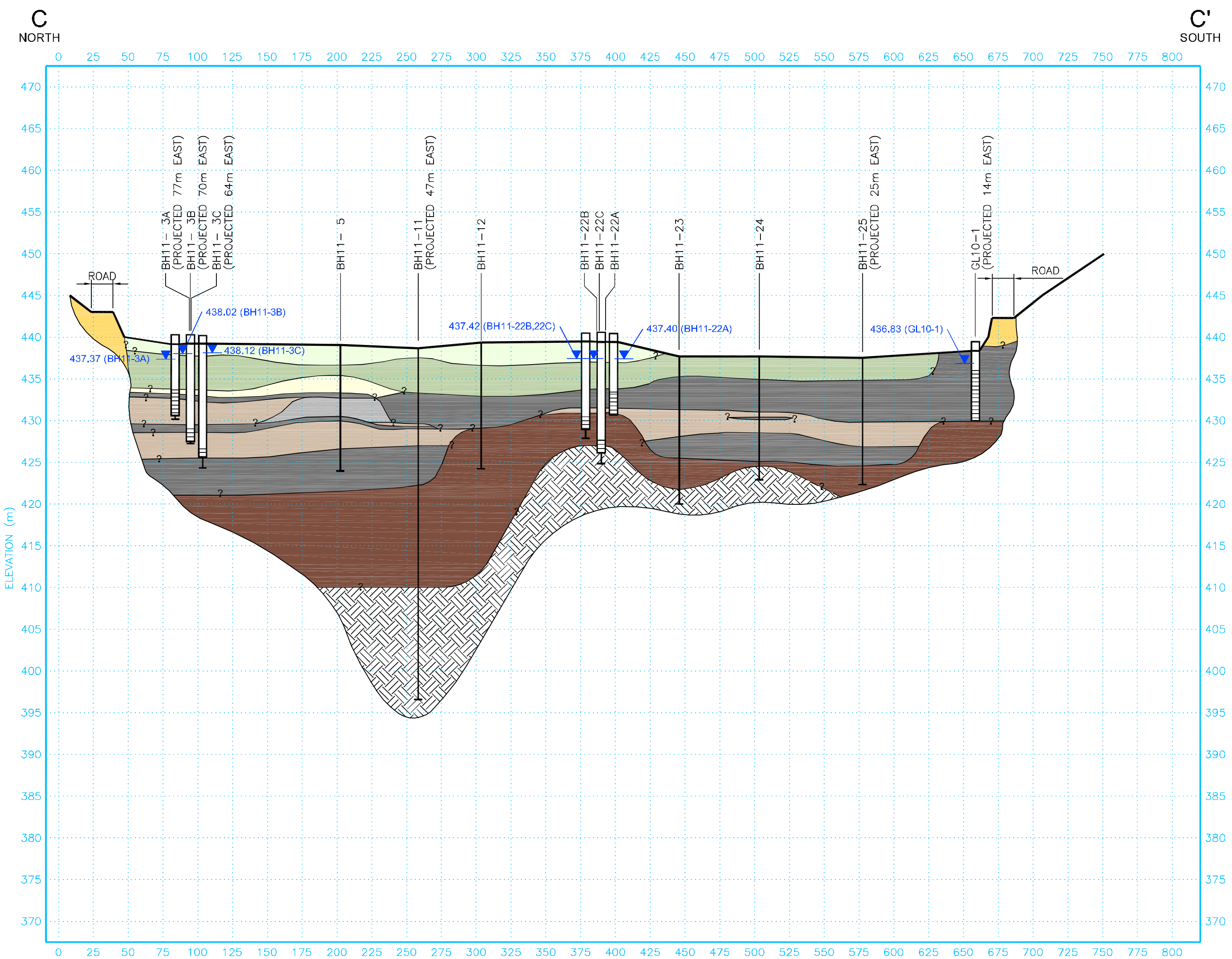
CITY OF KELOWNA
GLENMORE LANDFILL
2105 GLENMORE ROAD NORTH
KELOWNA, BC

Report
HYDROGEOLOGICAL STUDY FOR GLENMORE LANDFILL PHASE 3

Drawing
CROSS SECTION B - B'

Date	August 17, 2011	Scale	AS SHOWN	Drawing No.
File Name	S_219-05164-00-B6 -2	Project No.	219.05164.00000	6

SLR



VERTICAL SCALE 1:500

0 5 10 20 30 m

HORIZONTAL SCALE 1:3000

0 50 100 200 m

WHEN PLOTTED AT 11 x 17 PAGE SIZE

THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

LEGEND

- WELL
- SCREENED INTERVAL
- END OF HOLE
- BOREHOLE OR TESTPIT
- END OF HOLE
- WATER LEVEL (SEPTEMBER 8, 2011)
- GEOLOGIC CONTACT (QUERIED WHERE INFERRED)
- FILL (UNCONSOLIDATED WOODY ORGANIC MATTER)
- FILL (MUNICIPAL SOLID WASTE WITH INTERBEDDED CLAY)
- FILL (REWORKED CLAY)
- FILL (REWORKED SILTY SAND AND GRAVEL)
- LACUSTRINE DEPOSITS: CLAYS
- LACUSTRINE DEPOSITS: SANDY CLAYS
- LACUSTRINE DEPOSITS: SILTS AND SILTY SANDS
- TILL
- BEDROCK

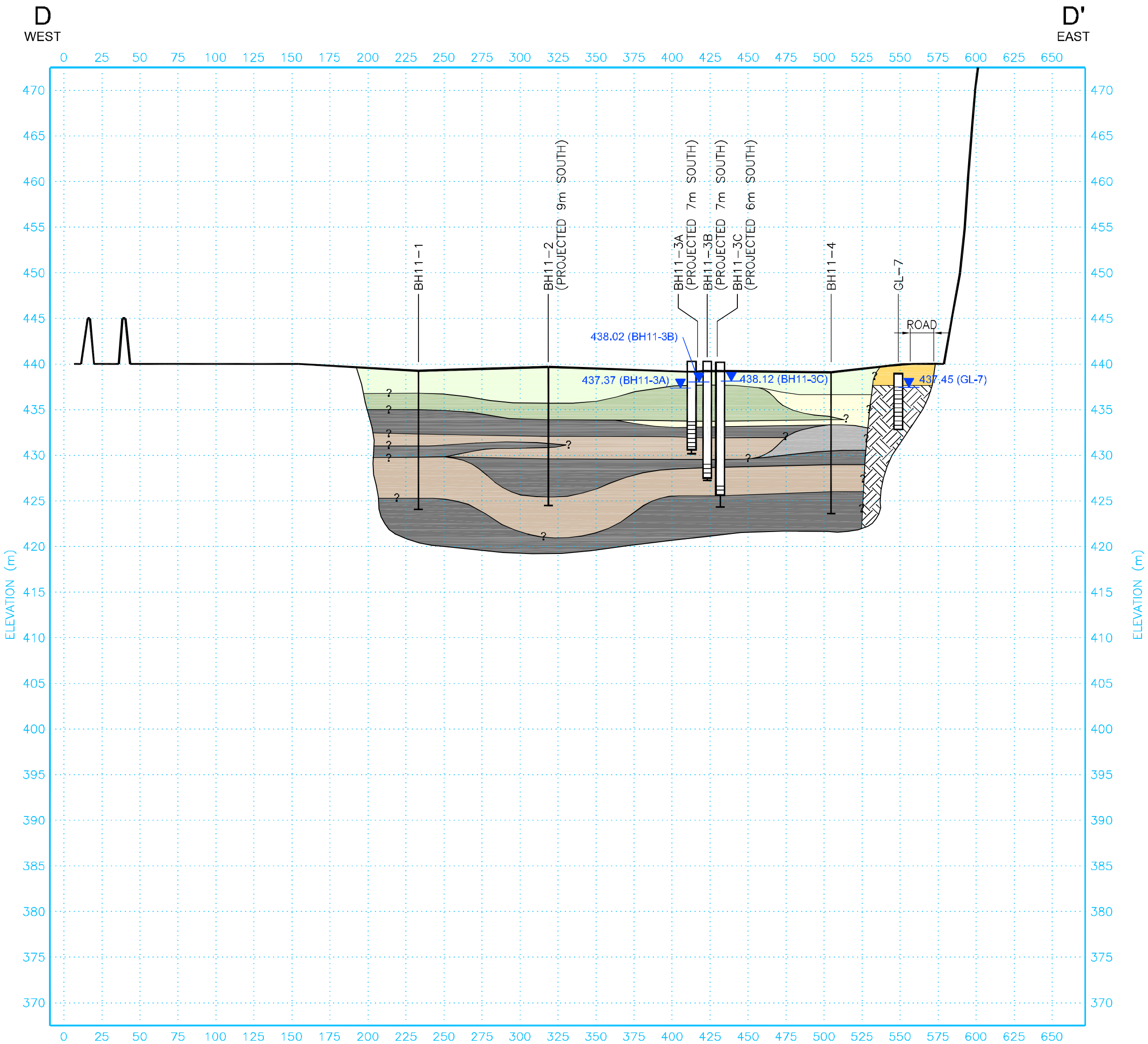
CITY OF KELOWNA
GLENMORE LANDFILL
2105 GLENMORE ROAD NORTH
KELOWNA, BC

Report
HYDROGEOLOGICAL STUDY FOR
GLENMORE LANDFILL PHASE 3

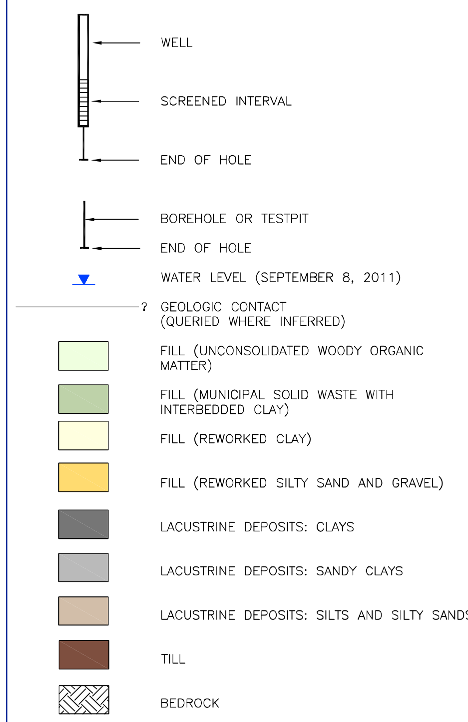
Drawing
CROSS SECTION C - C'

Date August 17, 2011	Scale AS SHOWN	Drawing No. 7
File Name S_219-05164-00-B6 -3	Project No. 219.05164.00000	

SLR



LEGEND



VERTICAL SCALE 1:500

0 5 10 20 30 m

HORIZONTAL SCALE 1:3000

0 50 100 200 m

WHEN PLOTTED AT 11 x 17 PAGE SIZE

THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

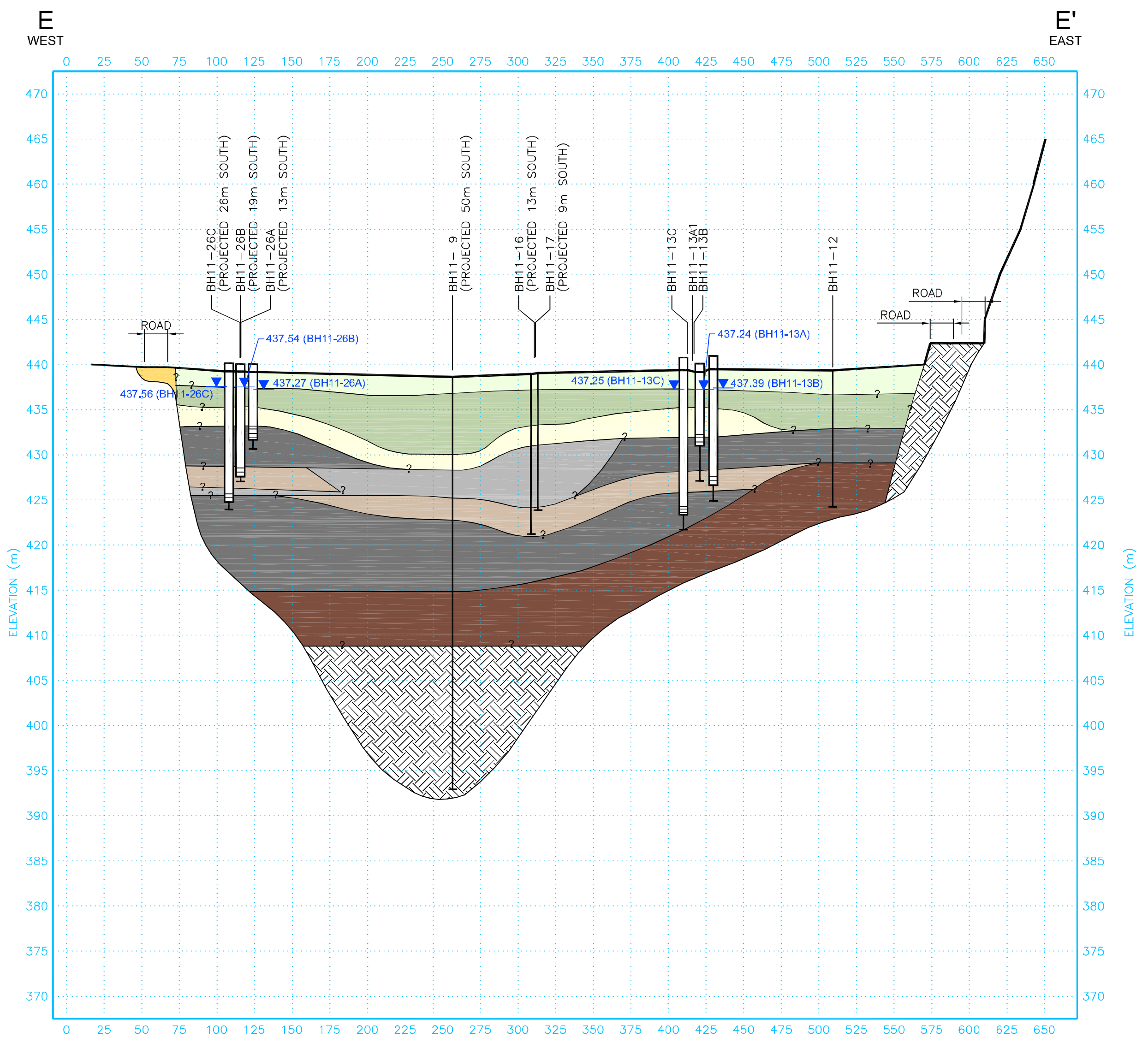
CITY OF KELOWNA
GLENMORE LANDFILL
2105 GLENMORE ROAD NORTH
KELOWNA, BC

Report
HYDROGEOLOGICAL STUDY FOR GLENMORE LANDFILL PHASE 3

Drawing
CROSS SECTION D - D'

Date August 17, 2011	Scale AS SHOWN	Drawing No. 8
File Name S_219-05164-00-B6-4	Project No. 219.05164.00000	

SLR



LEGEND

- WELL
- SCREENED INTERVAL
- END OF HOLE
- BOREHOLE OR TESTPIT
- END OF HOLE
- WATER LEVEL (SEPTEMBER 8, 2011)
- GEOLOGIC CONTACT (QUERIED WHERE INFERRED)
- FILL (UNCONSOLIDATED WOODY ORGANIC MATTER)
- FILL (MUNICIPAL SOLID WASTE WITH INTERBEDDED CLAY)
- FILL (REWORKED CLAY)
- FILL (REWORKED SILTY SAND AND GRAVEL)
- LACUSTRINE DEPOSITS: CLAYS
- LACUSTRINE DEPOSITS: SANDY CLAYS
- LACUSTRINE DEPOSITS: SILTS AND SILTY SANDS
- TILL
- BEDROCK

VERTICAL SCALE 1:500

0 5 10 20 30 m

HORIZONTAL SCALE 1:3000

0 50 100 200 m

WHEN PLOTTED AT 11 x 17 PAGE SIZE

THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

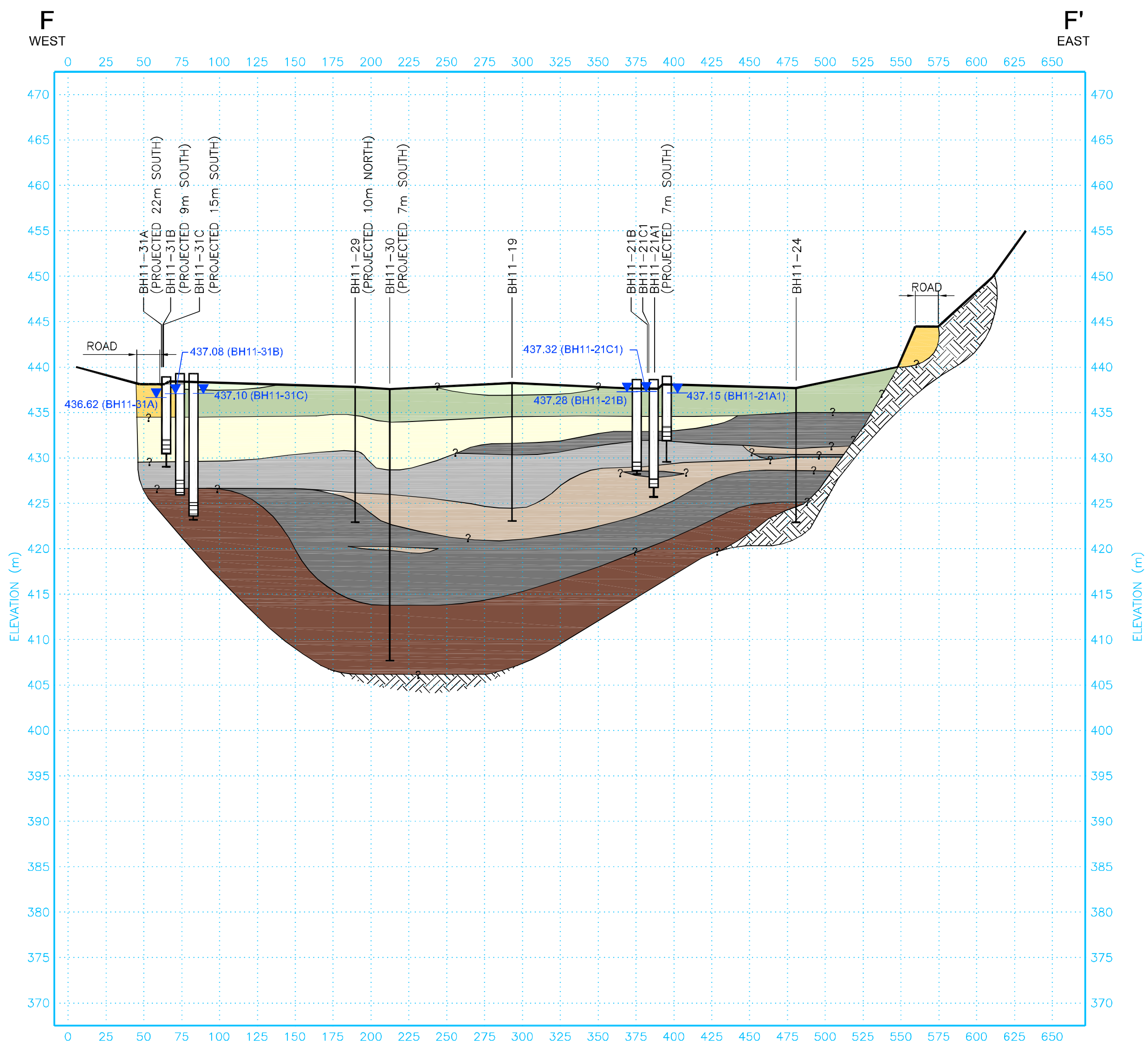
CITY OF KELOWNA
GLENMORE LANDFILL
2105 GLENMORE ROAD NORTH
KELOWNA, BC

Report
HYDROGEOLOGICAL STUDY FOR GLENMORE LANDFILL PHASE 3

Drawing
CROSS SECTION E - E'

Date: August 17, 2011	Scale: AS SHOWN	Drawing No. 9
File Name: S_219-05164-00-B6-5	Project No. 219.05164.00000	

SLR



LEGEND

- WELL
- SCREENED INTERVAL
- END OF HOLE
- BOREHOLE OR TESTPIT
- END OF HOLE
- WATER LEVEL (SEPTEMBER 8, 2011)
- ? GEOLOGIC CONTACT (QUERIED WHERE INFERRED)
- FILL (UNCONSOLIDATED WOODY ORGANIC MATTER)
- FILL (MUNICIPAL SOLID WASTE WITH INTERBEDDED CLAY)
- FILL (REWORKED CLAY)
- FILL (REWORKED SILTY SAND AND GRAVEL)
- LACUSTRINE DEPOSITS: CLAYS
- LACUSTRINE DEPOSITS: SANDY CLAYS
- LACUSTRINE DEPOSITS: SILTS AND SILTY SANDS
- TILL
- BEDROCK

VERTICAL SCALE 1:500

0 5 10 20 30 m

HORIZONTAL SCALE 1:3000

0 50 100 200 m

WHEN PLOTTED AT 11 x 17 PAGE SIZE

THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

CITY OF KELOWNA
GLENMORE LANDFILL
2105 GLENMORE ROAD NORTH
KELOWNA, BC

Report
HYDROGEOLOGICAL STUDY FOR GLENMORE LANDFILL PHASE 3

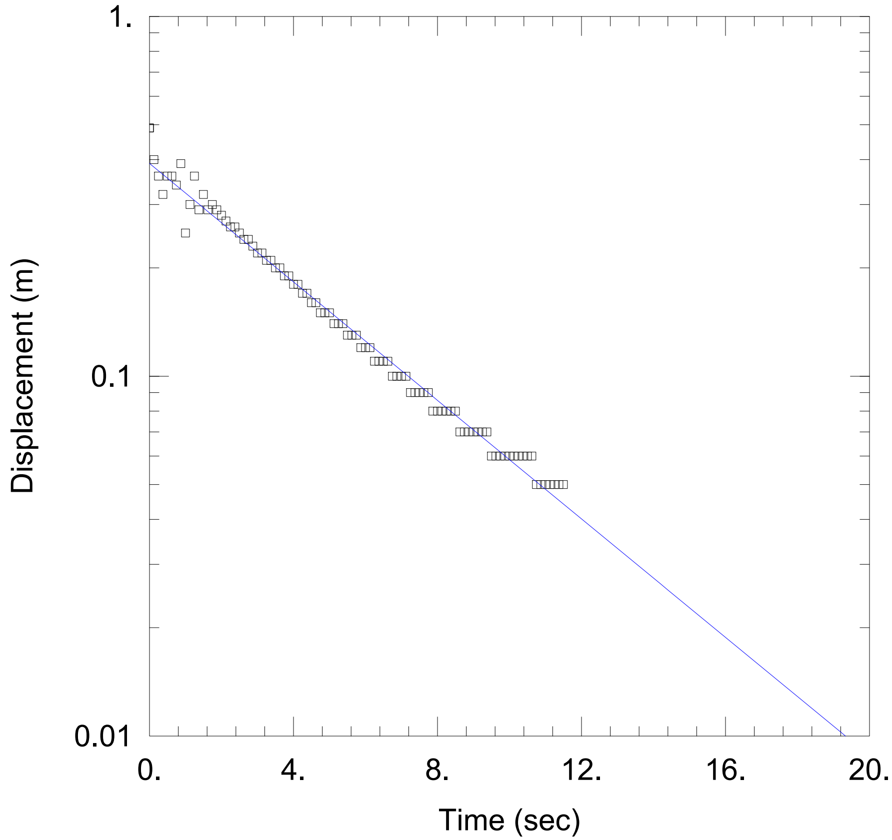
Drawing
CROSS SECTION F - F'

Date August 17, 2011	Scale AS SHOWN	Drawing No. 10
File Name S_219-05164-00-B6-6	Project No. 219.05164.00000	

SLR

Appendix D

AQTESOLVE Single Well Response Plots



GL5-2 TEST 1 FALLING HEAD

Data Set: \...\GL5-2 Test 1 Falling Head.aqt
Date: 07/11/23 Time: 17:32:41

PROJECT INFORMATION

Company: GHD
Client: City of Kelowna
Project: 12605725
Location: Glenmore Landfill
Test Well: GL5-2
Test Date: 6/8/2023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

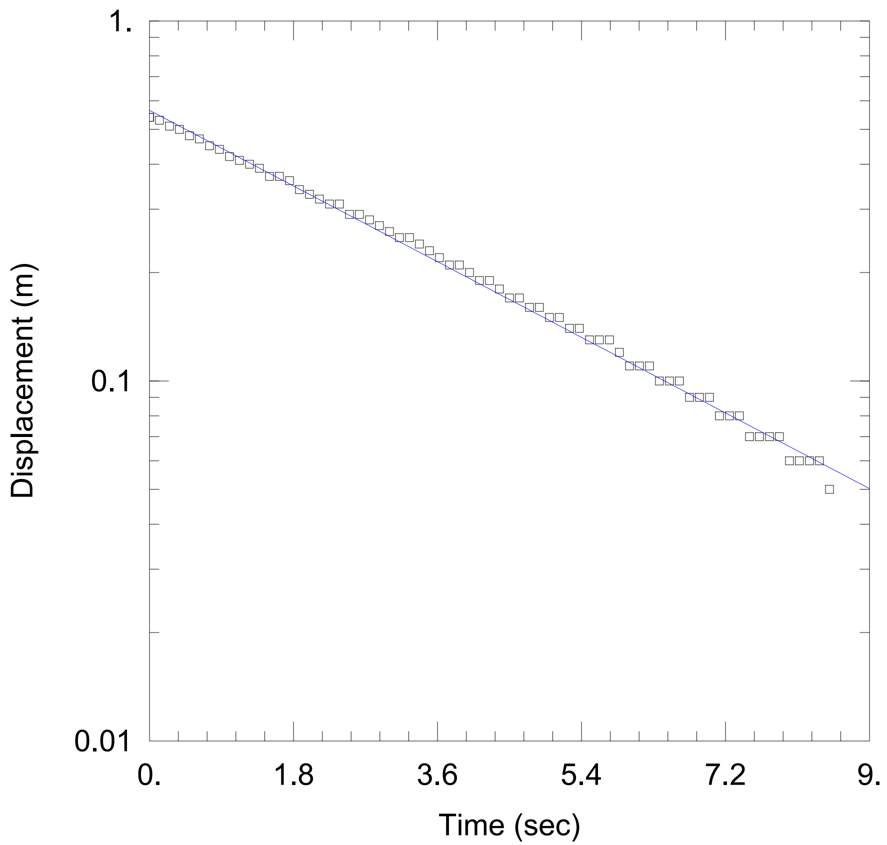
K = 8.959E-5 m/sec
y0 = 0.3901 m

AQUIFER DATA

Saturated Thickness: 5.55 m
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (GL5-2)

Initial Displacement: 0.49 m
Total Well Penetration Depth: 8.05 m
Casing Radius: 0.0254 m
Static Water Column Height: 5.554 m
Screen Length: 2.5 m
Well Radius: 0.075 m



GL5-2 TEST 2 RISING HEAD

Data Set: \...\GL5-2 Test 2 Rising Head.aqt
Date: 07/11/23 Time: 17:35:08

PROJECT INFORMATION

Company: GHD
Client: City of Kelowna
Project: 12605725
Location: Glenmore Landfill
Test Well: GL5-2
Test Date: 6/8/2023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

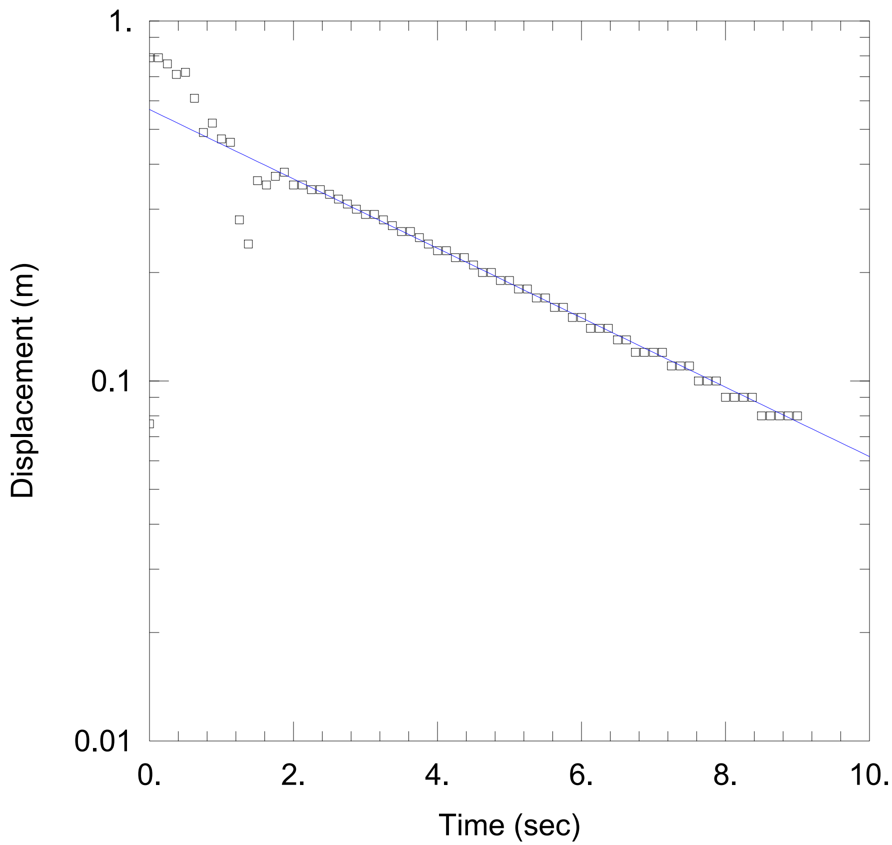
K = 0.0001271 m/sec
y0 = 0.5644 m

AQUIFER DATA

Saturated Thickness: 5.55 m
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (GL5-2)

Initial Displacement: 0.54 m
Total Well Penetration Depth: 8.05 m
Casing Radius: 0.0254 m
Static Water Column Height: 5.554 m
Screen Length: 2.5 m
Well Radius: 0.075 m



GL5-2 TEST 3 FALLING HEAD

Data Set: \...\GL5-2 Test 3 Falling Head.aqt
Date: 07/11/23 Time: 17:40:44

PROJECT INFORMATION

Company: GHD
Client: City of Kelowna
Project: 12605725
Location: Glenmore Landfill
Test Well: GL5-2
Test Date: 6/8/2023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0001049 m/sec
y0 = 0.5673 m

AQUIFER DATA

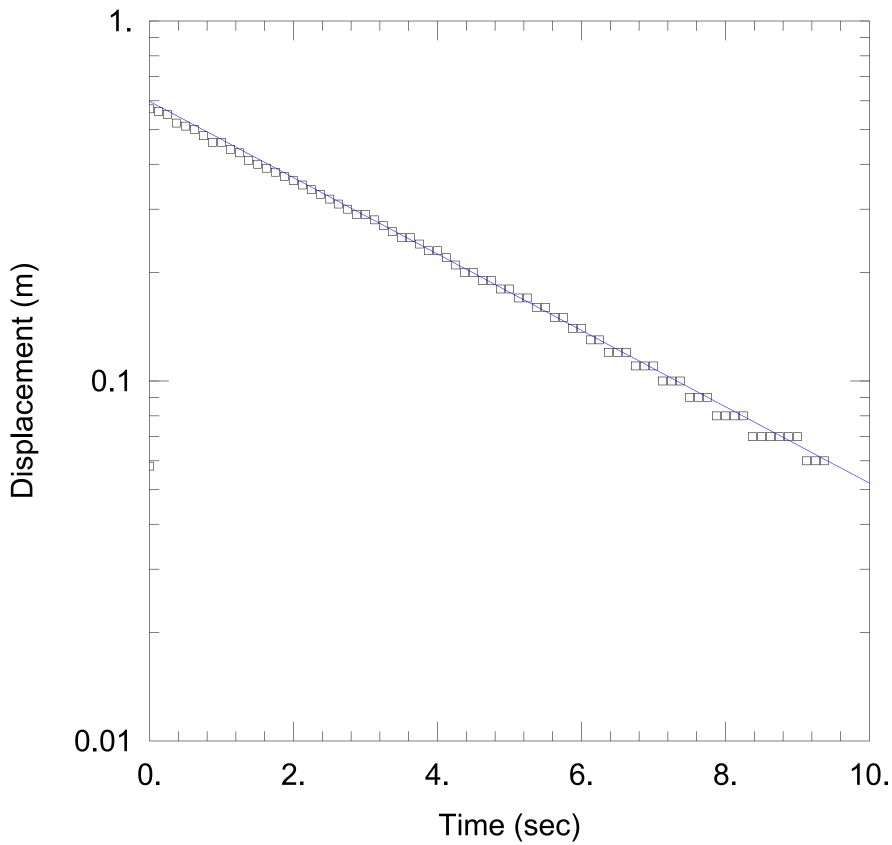
Saturated Thickness: 5.55 m

Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (GL5-2)

Initial Displacement: 0.076 m
Total Well Penetration Depth: 8.05 m
Casing Radius: 0.0254 m

Static Water Column Height: 5.554 m
Screen Length: 2.5 m
Well Radius: 0.075 m



GL5-2 TEST 4 RISING HEAD

Data Set: \...\GL5-2 Test 4 Rising Head.aqt
Date: 07/11/23 Time: 17:42:27

PROJECT INFORMATION

Company: GHD
Client: City of Kelowna
Project: 12605725
Location: Glenmore Landfill
Test Well: GL5-2
Test Date: 6/8/2023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

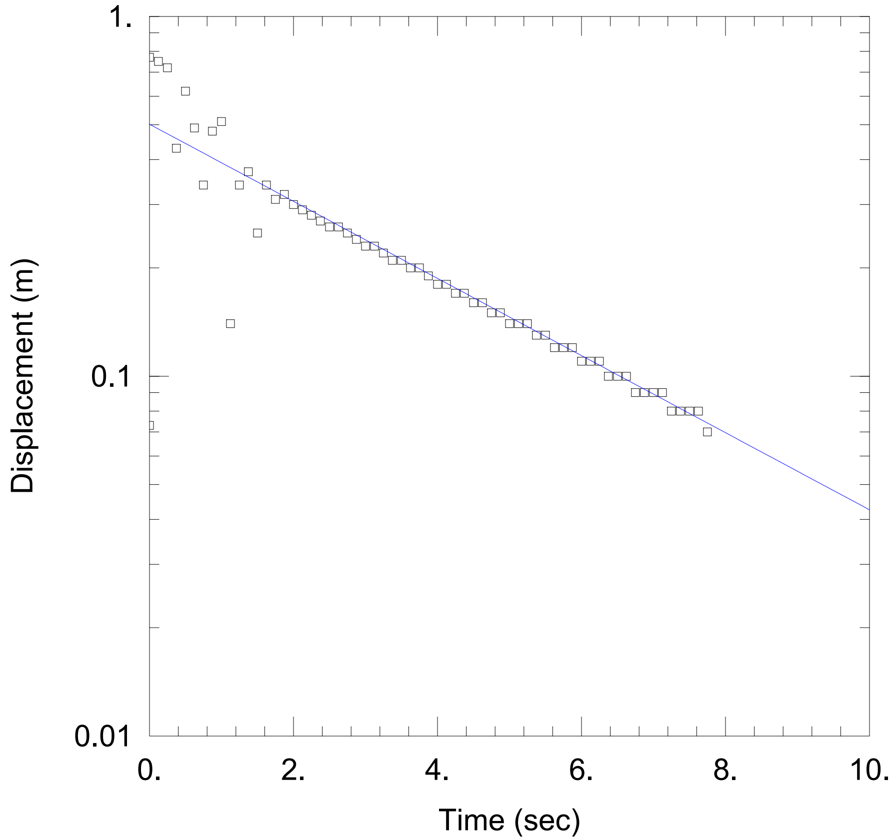
K = 0.0001149 m/sec
y0 = 0.5843 m

AQUIFER DATA

Saturated Thickness: 5.55 m
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (GL5-2)

Initial Displacement: 0.058 m
Total Well Penetration Depth: 8.05 m
Casing Radius: 0.0254 m
Static Water Column Height: 5.554 m
Screen Length: 2.5 m
Well Radius: 0.075 m



GL5-2 TEST 5 FALLING HEAD

Data Set: \...\GL5-2 Test 5 Falling Head.aqt
Date: 07/11/23 Time: 17:43:52

PROJECT INFORMATION

Company: GHD
Client: City of Kelowna
Project: 12605725
Location: Glenmore Landfill
Test Well: GL5-2
Test Date: 6/8/2023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0001166 m/sec
y0 = 0.5016 m

AQUIFER DATA

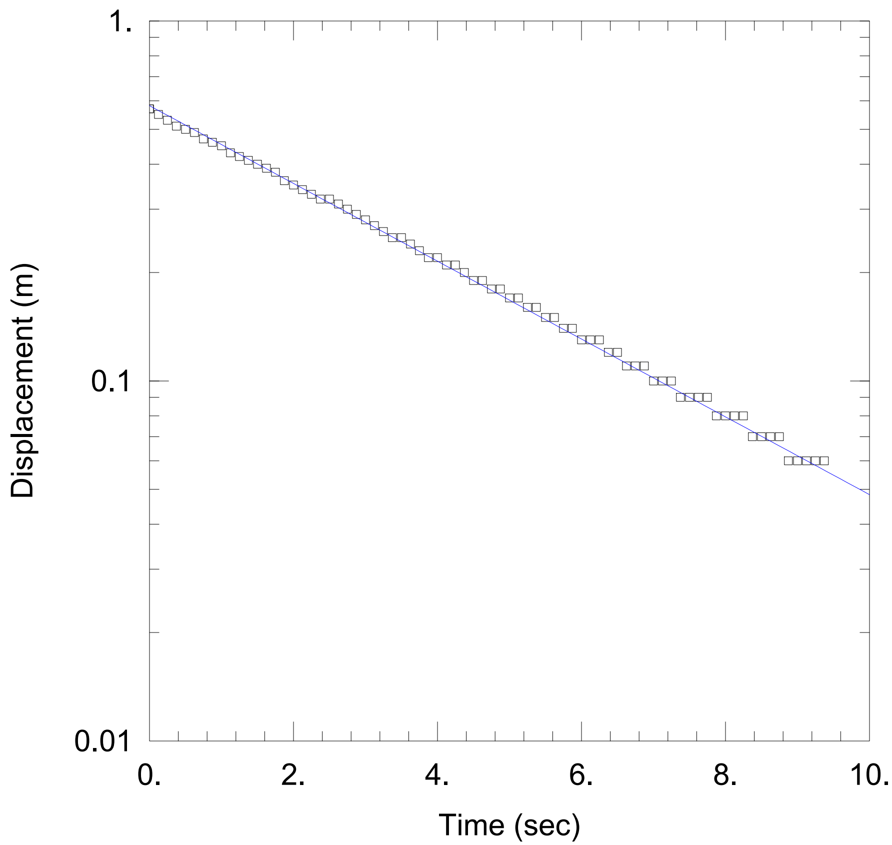
Saturated Thickness: 5.55 m

Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (GL5-2)

Initial Displacement: 0.073 m
Total Well Penetration Depth: 8.05 m
Casing Radius: 0.0254 m

Static Water Column Height: 5.554 m
Screen Length: 2.5 m
Well Radius: 0.075 m



GL5-2 TEST 6 RISING HEAD

Data Set: \...\GL5-2 Test 6 Rising Head.aqt
Date: 07/11/23 Time: 17:45:18

PROJECT INFORMATION

Company: GHD
Client: City of Kelowna
Project: 12605725
Location: Glenmore Landfill
Test Well: GL5-2
Test Date: 6/8/2023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

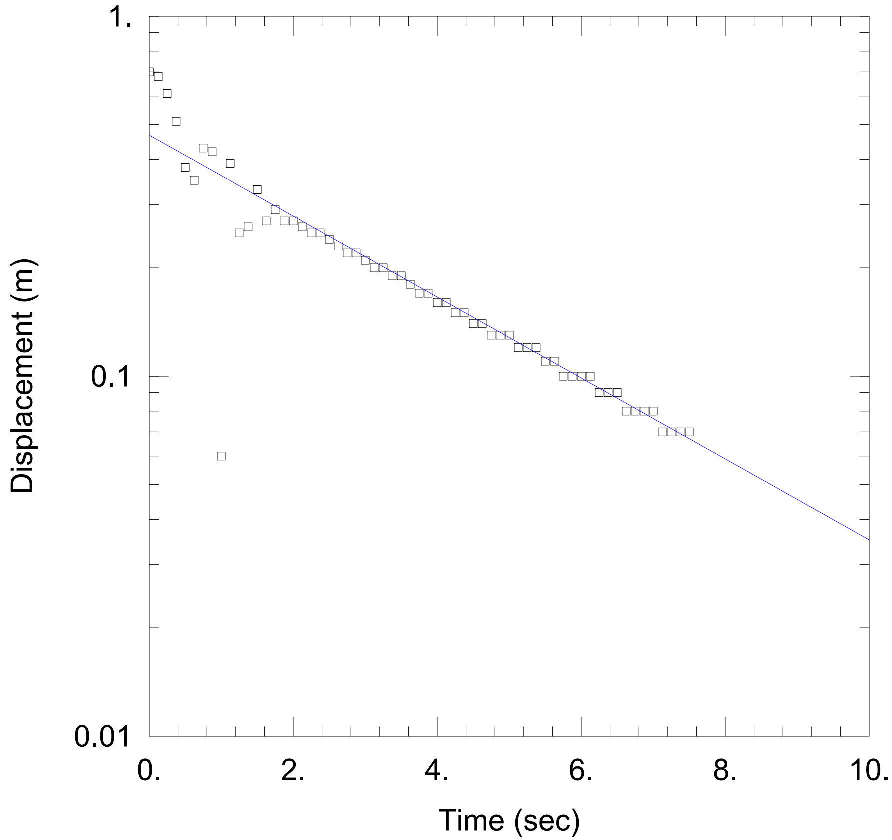
K = 0.0001176 m/sec
y0 = 0.5815 m

AQUIFER DATA

Saturated Thickness: 5.55 m
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (GL5-2)

Initial Displacement: 0.57 m
Total Well Penetration Depth: 8.05 m
Casing Radius: 0.0254 m
Static Water Column Height: 5.554 m
Screen Length: 2.5 m
Well Radius: 0.075 m



GL5-2 TEST 7 FALLING HEAD

Data Set: \...\GL5-2 Test 7 Falling Head.aqt
Date: 07/11/23 Time: 17:47:10

PROJECT INFORMATION

Company: GHD
Client: City of Kelowna
Project: 12605725
Location: Glenmore Landfill
Test Well: GL5-2
Test Date: 6/8/2023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

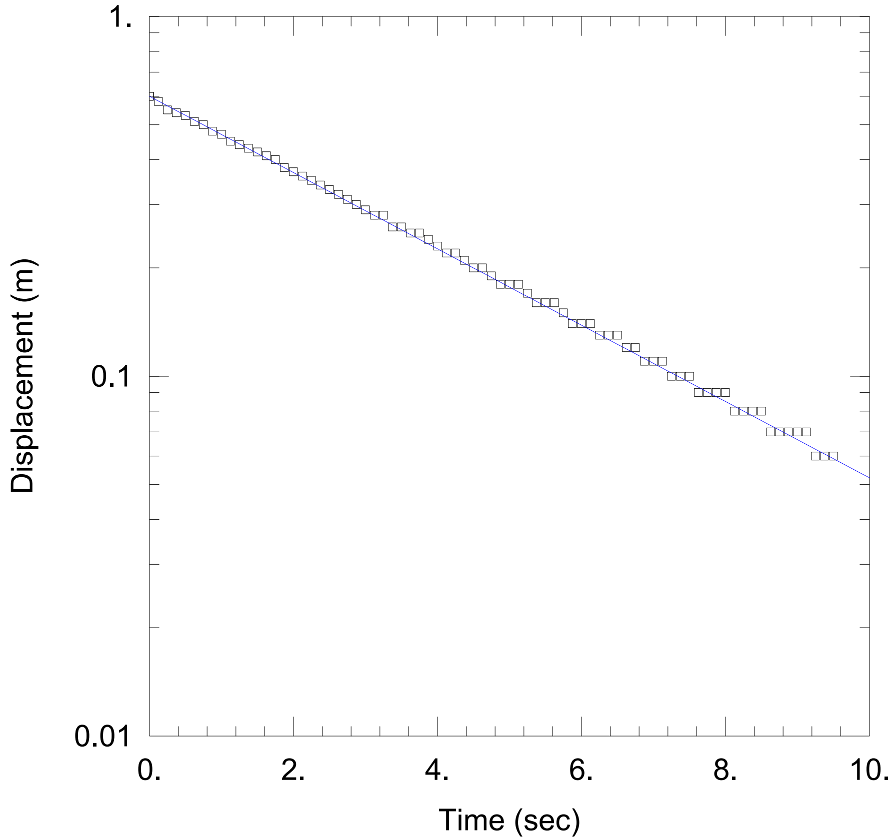
K = 0.0001224 m/sec
y0 = 0.4671 m

AQUIFER DATA

Saturated Thickness: 5.55 m
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (GL5-2)

Initial Displacement: 0.7 m
Total Well Penetration Depth: 8.05 m
Casing Radius: 0.0254 m
Static Water Column Height: 5.554 m
Screen Length: 2.5 m
Well Radius: 0.075 m



GL5-2 TEST 8 RISING HEAD

Data Set: \...\GL5-2 Test 8 Rising Head.aqt
Date: 07/11/23 Time: 17:48:27

PROJECT INFORMATION

Company: GHD
Client: City of Kelowna
Project: 12605725
Location: Glenmore Landfill
Test Well: GL5-2
Test Date: 6/8/2023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0001154 m/sec
y0 = 0.5997 m

AQUIFER DATA

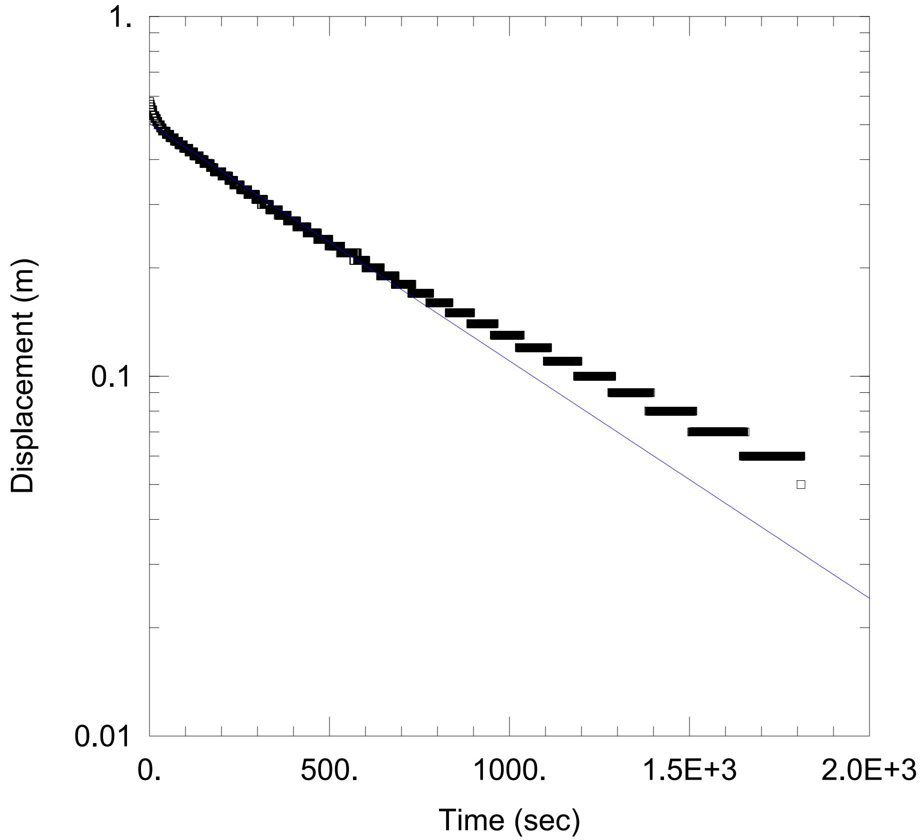
Saturated Thickness: 5.55 m

Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (GL5-2)

Initial Displacement: 0.6 m
Total Well Penetration Depth: 8.05 m
Casing Radius: 0.0254 m

Static Water Column Height: 5.554 m
Screen Length: 2.5 m
Well Radius: 0.075 m



GL23-1 TEST 1- FALLING HEAD

Data Set: \...\GL23-1 Test 1 Falling Head June 6 2023.aqt
Date: 07/11/23 Time: 13:51:10

PROJECT INFORMATION

Company: GHD
Client: City of Kelowna
Project: 12605725
Location: Glenmore Landfill
Test Well: GL23-1
Test Date: 6/6/2023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

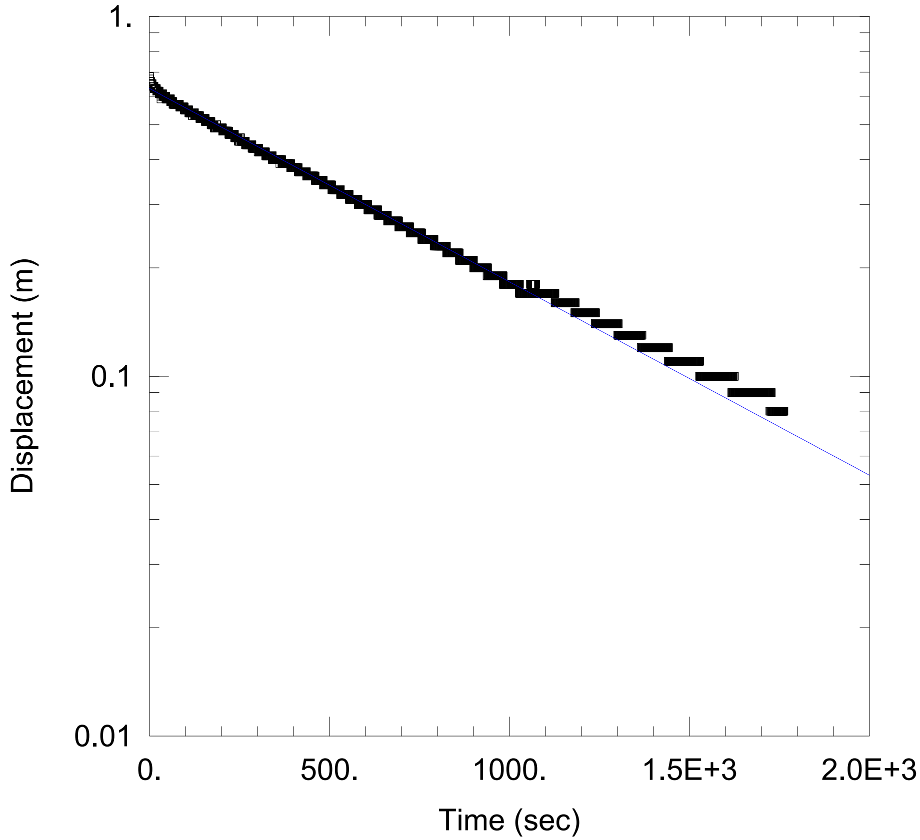
K = 1.21E-6 m/sec
y0 = 0.5039 m

AQUIFER DATA

Saturated Thickness: 7.704 m
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (GL23-1)

Initial Displacement: 0.58 m
Total Well Penetration Depth: 7.7 m
Casing Radius: 0.0254 m
Static Water Column Height: 7.704 m
Screen Length: 1.5 m
Well Radius: 0.075 m



GL23-1 TEST 2 - RISING HEAD

Data Set: \...\GL23-1 Test 2 Rising Head June 6 2023.aqt
Date: 07/11/23 Time: 13:54:21

PROJECT INFORMATION

Company: GHD
Client: City of Kelowna
Project: 12605725
Location: Glenmore Landfill
Test Well: GL23-1
Test Date: 6/6/2023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

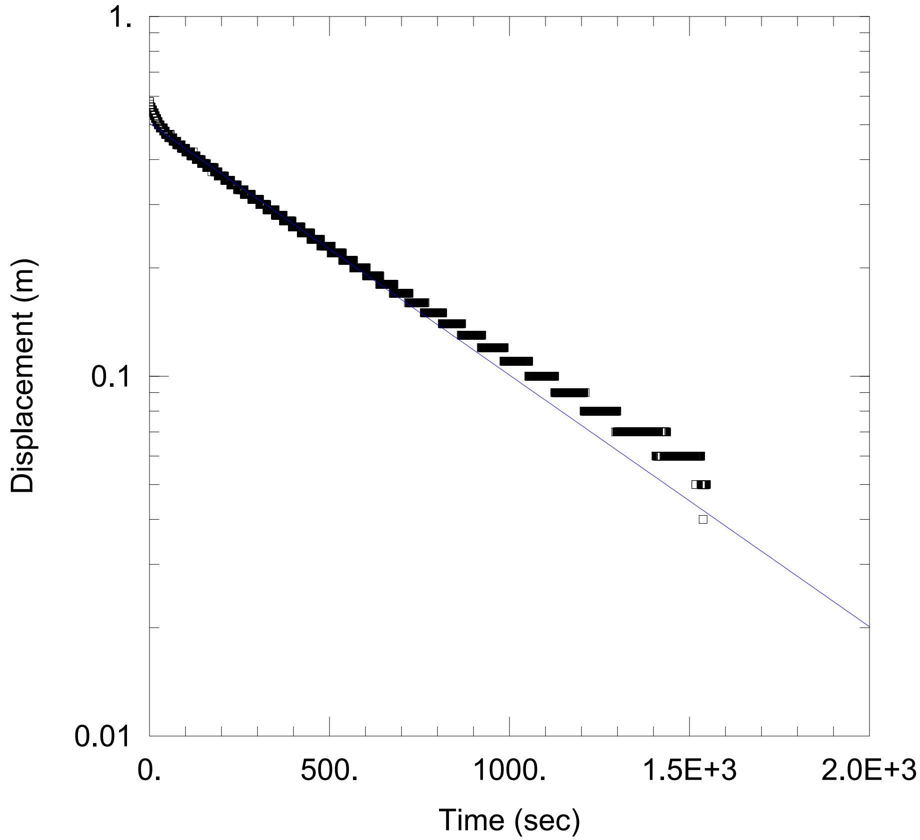
K = 9.855E-7 m/sec
y0 = 0.6305 m

AQUIFER DATA

Saturated Thickness: 7.704 m
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (GL23-1)

Initial Displacement: 0.68 m
Total Well Penetration Depth: 7.7 m
Casing Radius: 0.0254 m
Static Water Column Height: 7.704 m
Screen Length: 1.5 m
Well Radius: 0.075 m



GL23-1 TEST 3 - FALLING HEAD

Data Set: \...\GL23-1 Test 3 Falling Head June 6 2023.aqt
Date: 07/11/23 Time: 13:57:10

PROJECT INFORMATION

Company: GHD
Client: City of Kelowna
Project: 12605725
Location: Glenmore Landfill
Test Well: GL23-1
Test Date: 6/6/2023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

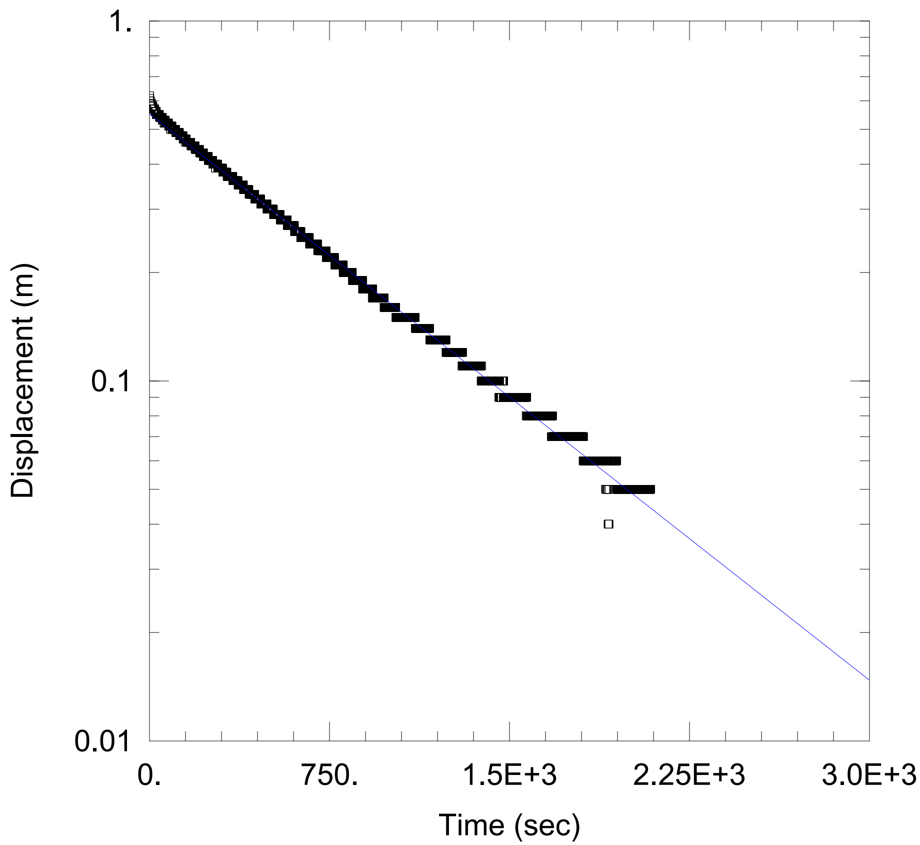
K = 1.282E-6 m/sec
y0 = 0.5039 m

AQUIFER DATA

Saturated Thickness: 7.704 m
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (GL23-1)

Initial Displacement: 0.58 m
Total Well Penetration Depth: 7.7 m
Casing Radius: 0.0254 m
Static Water Column Height: 7.704 m
Screen Length: 1.5 m
Well Radius: 0.075 m



GL23-1 TEST 4 - RISING HEAD

Data Set: \...\GL23-1 Test 4 Rising Head June 6 2023.aqt
Date: 07/11/23 Time: 13:57:59

PROJECT INFORMATION

Company: GHD
Client: City of Kelowna
Project: 12605725
Location: Glenmore Landfill
Test Well: GL23-1
Test Date: 6/6/2023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

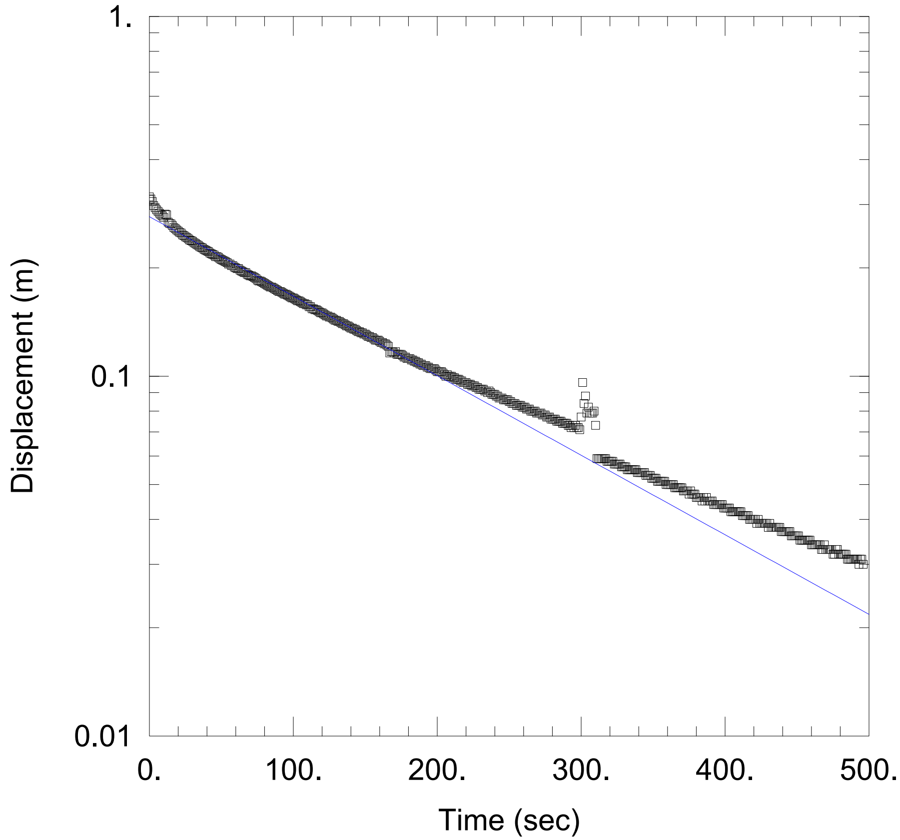
K = 9.616E-7 m/sec
y0 = 0.5518 m

AQUIFER DATA

Saturated Thickness: 7.704 m
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (GL23-1)

Initial Displacement: 0.62 m
Total Well Penetration Depth: 7.7 m
Casing Radius: 0.0254 m
Static Water Column Height: 7.704 m
Screen Length: 1.5 m
Well Radius: 0.075 m



GL24-1 TEST 1 FALLING HEAD

Data Set: \...\GL24-1 Test 1 Falling Head.aqt
Date: 11/03/23 Time: 10:18:24

PROJECT INFORMATION

Company: GHD
Client: City of Kelowna
Project: 12605725
Location: Glenmore Landfill
Test Well: GL24-1
Test Date: 6/6/2023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

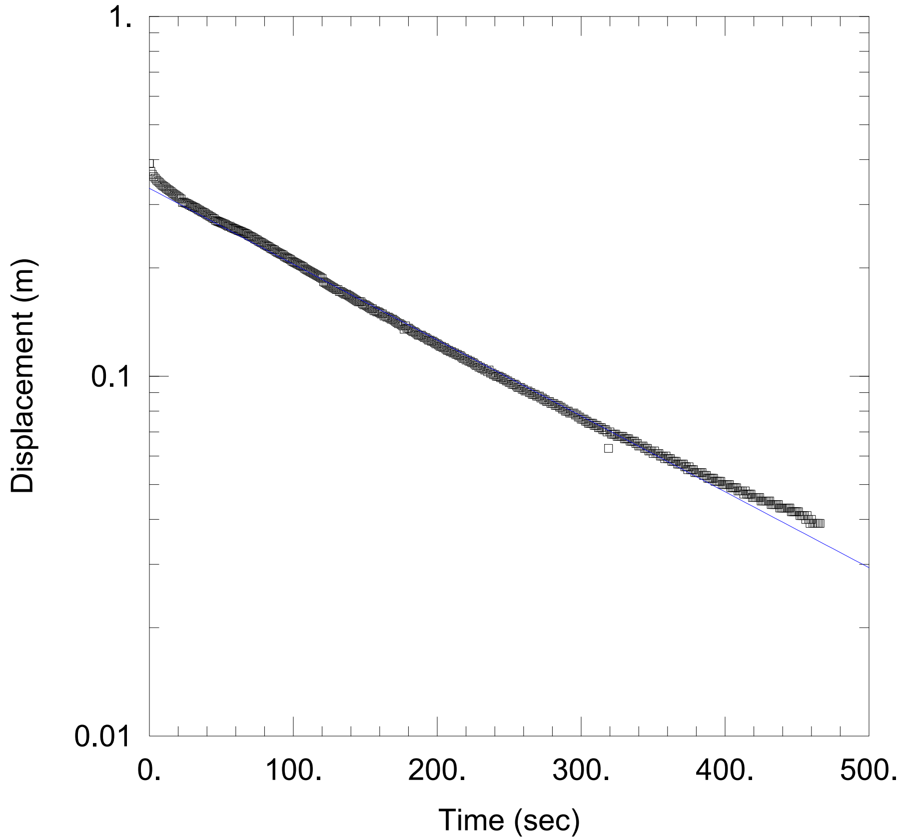
K = 9.648E-6 m/sec
y0 = 0.2776 m

AQUIFER DATA

Saturated Thickness: 0.34 m
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (GL24-1)

Initial Displacement: 0.31 m
Total Well Penetration Depth: 2.34 m
Casing Radius: 0.0254 m
Static Water Column Height: 0.338 m
Screen Length: 2. m
Well Radius: 0.075 m



GL24-1 TEST 2 RISING HEAD

Data Set: \...\GL24-1 Test 2 Rising Head.aqt
Date: 11/03/23 Time: 10:16:48

PROJECT INFORMATION

Company: GHD
Client: City of Kelowna
Project: 12605725
Location: Glenmore Landfill
Test Well: GL24-1
Test Date: 6/6/2023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

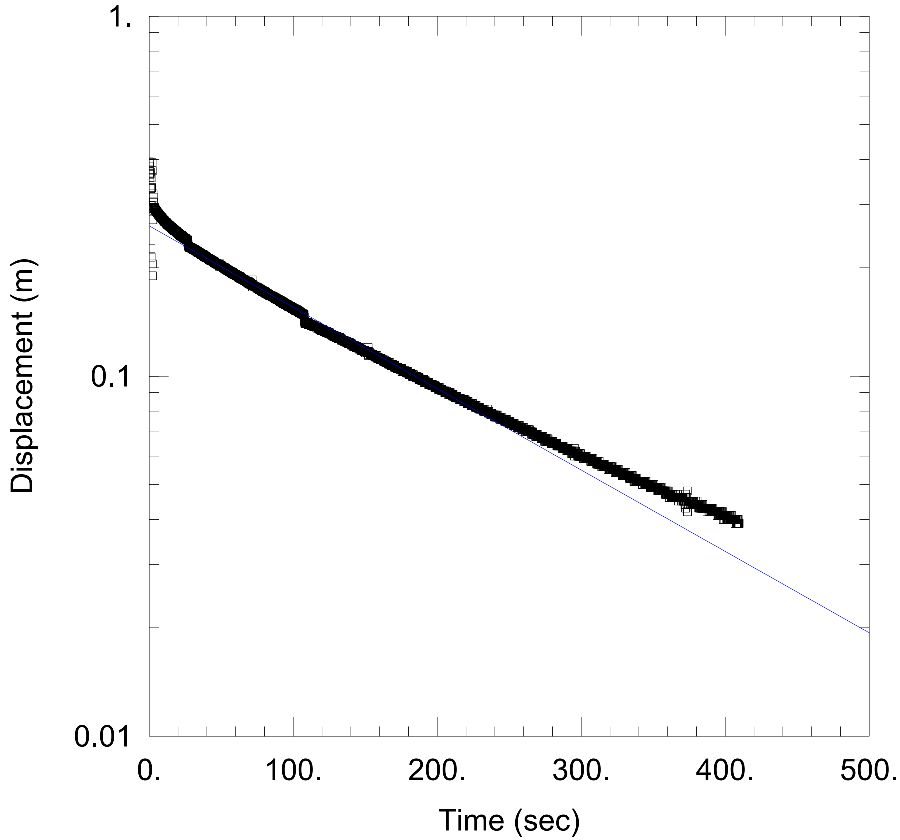
K = 9.204E-6 m/sec
y0 = 0.3328 m

AQUIFER DATA

Saturated Thickness: 0.34 m
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (GL24-1)

Initial Displacement: 0.39 m
Total Well Penetration Depth: 2.34 m
Casing Radius: 0.0254 m
Static Water Column Height: 0.338 m
Screen Length: 2. m
Well Radius: 0.075 m



GL24-1 TEST 3 FALLING HEAD

Data Set: \...\GL24-1 Test 3 Falling Head.aqt
Date: 11/03/23 Time: 10:16:04

PROJECT INFORMATION

Company: GHD
Client: City of Kelowna
Project: 12605725
Location: Glenmore Landfill
Test Well: GL24-1
Test Date: 6/6/2023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

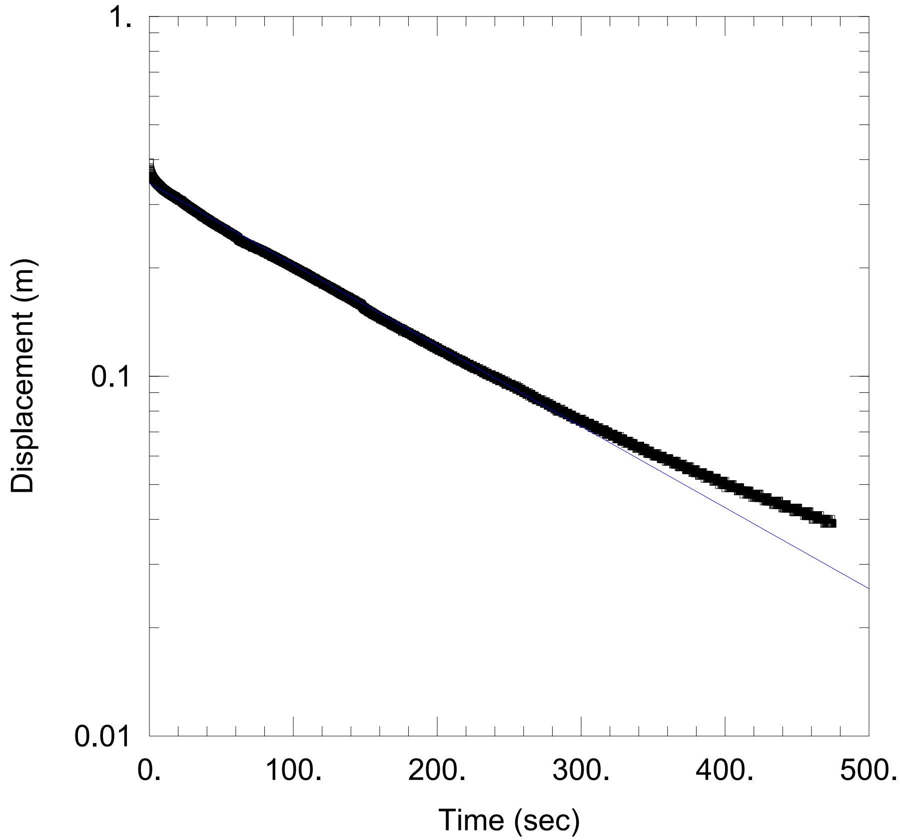
K = 9.866E-6 m/sec
y0 = 0.2615 m

AQUIFER DATA

Saturated Thickness: 0.34 m
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (GL24-1)

Initial Displacement: 0.39 m
Total Well Penetration Depth: 2.34 m
Casing Radius: 0.0254 m
Static Water Column Height: 0.338 m
Screen Length: 2. m
Well Radius: 0.075 m



GL24-1 TEST 4 RISING HEAD

Data Set: \...\GL24-1 Test 4 Rising Head.aqt
Date: 11/03/23 Time: 10:17:42

PROJECT INFORMATION

Company: GHD
Client: City of Kelowna
Project: 12605725
Location: Glenmore Landfill
Test Well: GL24-1
Test Date: 6/6/2023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

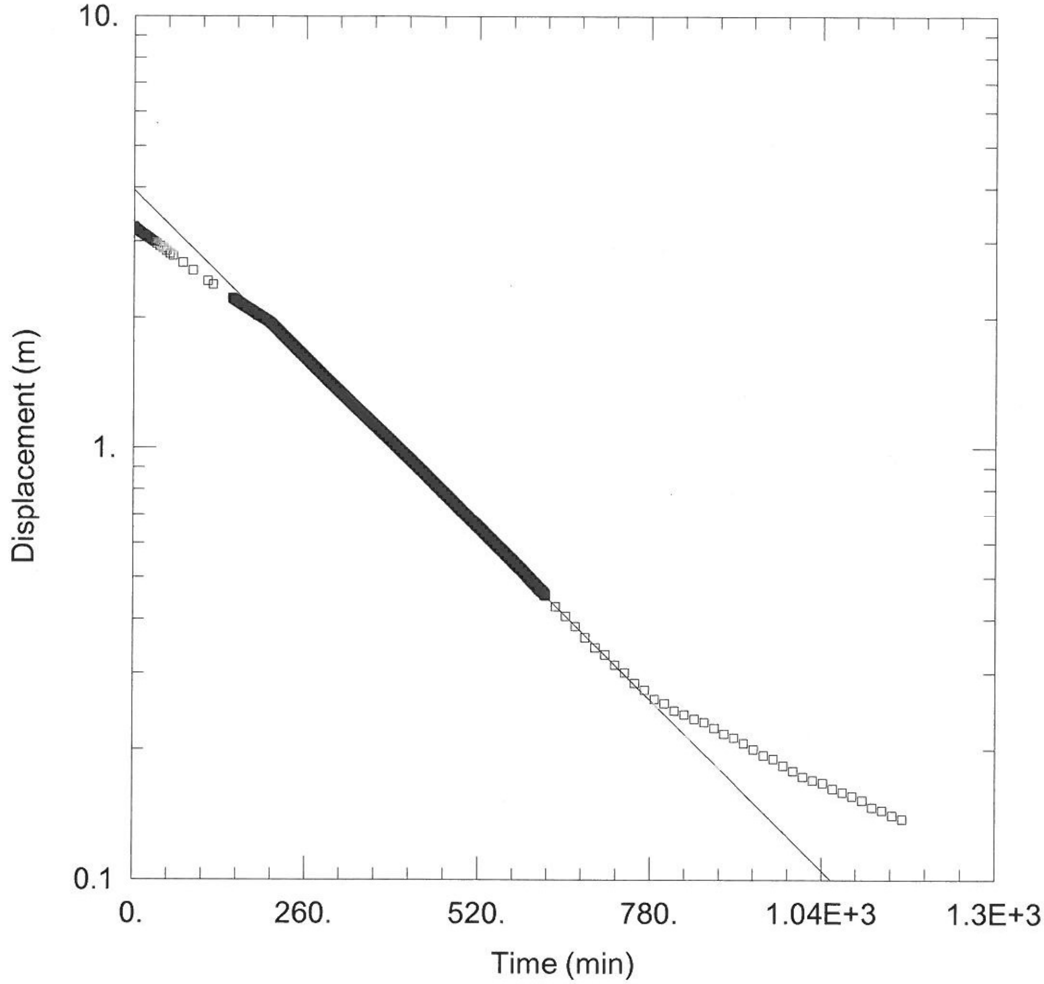
K = 9.835E-6 m/sec
y0 = 0.3436 m

AQUIFER DATA

Saturated Thickness: 0.34 m
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (GL24-1)

Initial Displacement: 0.39 m
Total Well Penetration Depth: 2.34 m
Casing Radius: 0.0254 m
Static Water Column Height: 0.338 m
Screen Length: 2. m
Well Radius: 0.075 m



HVORSLEV MW09-02-1

Data Set: N:\...\MW09-02-1 15Jun2009 Hvorslev.aqt
Date: 06/24/10 Time: 12:58:29

PROJECT INFORMATION

Company: Golder Associates Ltd.
Client: City of Kelowna
Project: 09-1444-0066
Location: Glenmore Landfill
Test Well: MW09-02-1
Test Date: June 15, 2009

AQUIFER DATA

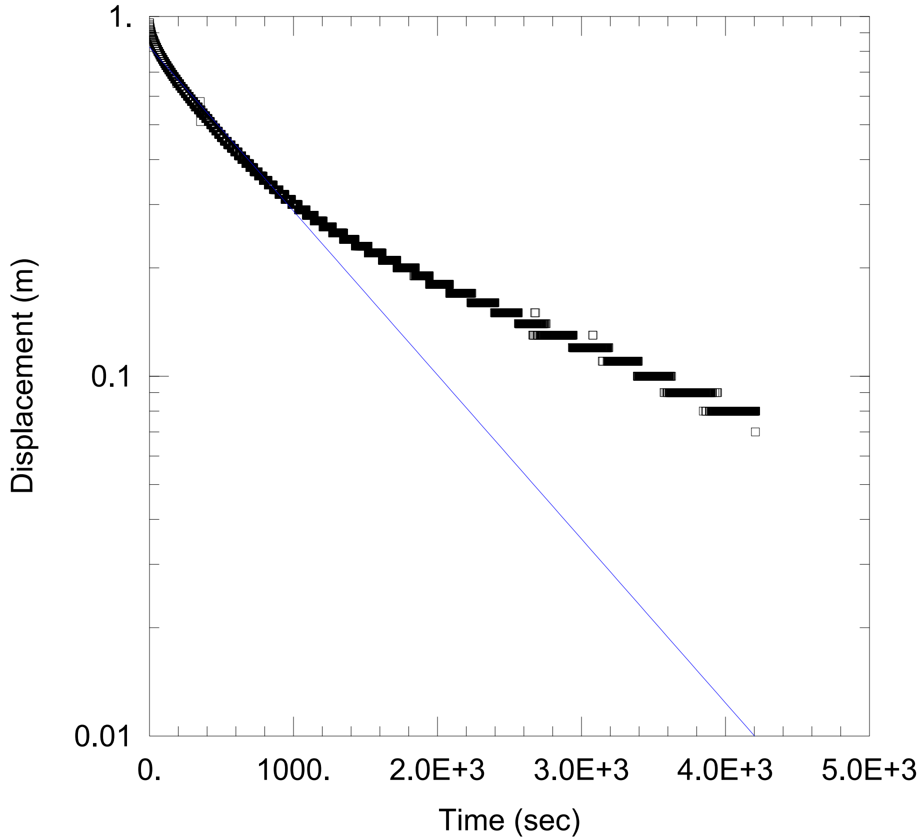
Saturated Thickness: 3.426 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW09-02-1)

Initial Displacement: 3.25 m
Total Well Penetration Depth: 3.426 m
Casing Radius: 0.0254 m
Static Water Column Height: 3.426 m
Screen Length: 1.521 m
Well Radius: 0.0254 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 5.9E-8 m/sec
y0 = 3.95 m



GL27-1 TEST 1 RISING HEAD

Data Set: \...\GL27-1 Test 1 RH.aqt
Date: 07/11/23 Time: 15:26:05

PROJECT INFORMATION

Company: GHD
Client: City of Kelowna
Project: 12605725
Location: Glenmore Landfill
Test Well: GL27-1
Test Date: 6/6/2023

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

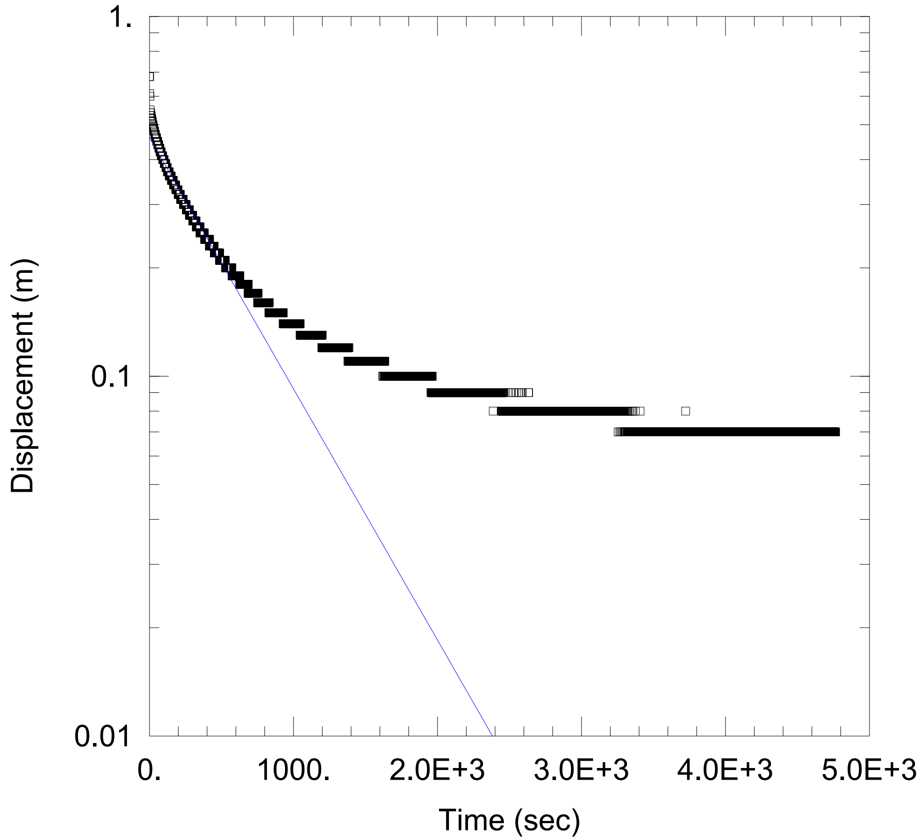
K = 1.092E-6 m/sec
y0 = 0.8216 m

AQUIFER DATA

Saturated Thickness: 21.87 m
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (GL27-1)

Initial Displacement: 0.96 m
Total Well Penetration Depth: 23.37 m
Casing Radius: 0.0254 m
Static Water Column Height: 21.87 m
Screen Length: 1.5 m
Well Radius: 0.075 m



GL27-1 TEST 2 FALLING HEAD

Data Set: \...\GL27-2 Test 2 FH.aqt
Date: 07/11/23 Time: 15:34:56

PROJECT INFORMATION

Company: GHD
Client: City of Kelowna
Project: 12605725
Location: Glenmore Landfill
Test Well: GL27-1
Test Date: 6/6/2023

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

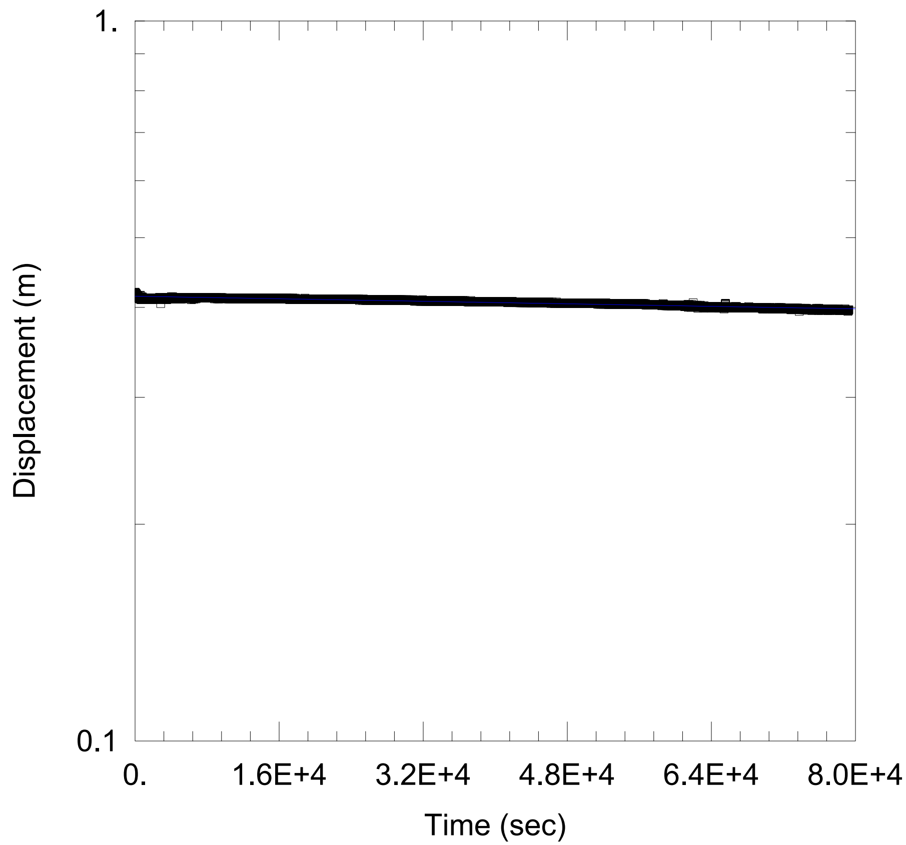
K = 1.674E-6 m/sec
y0 = 0.4604 m

AQUIFER DATA

Saturated Thickness: 21.87 m
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (GL27-1)

Initial Displacement: 0.68 m
Total Well Penetration Depth: 23.37 m
Casing Radius: 0.0254 m
Static Water Column Height: 21.87 m
Screen Length: 1.5 m
Well Radius: 0.075 m



GL27-2 TEST 1 FALLING HEAD

Data Set: \...\GL27-2 Test 1 Falling Head.aqt
Date: 07/13/23 Time: 10:37:24

PROJECT INFORMATION

Company: GHD
Client: City of Kelowna
Project: 12605725
Location: Glenmore Landfill
Test Well: GL27-2
Test Date: 6/6/2023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 4.363E-10 m/sec
y0 = 0.4146 m

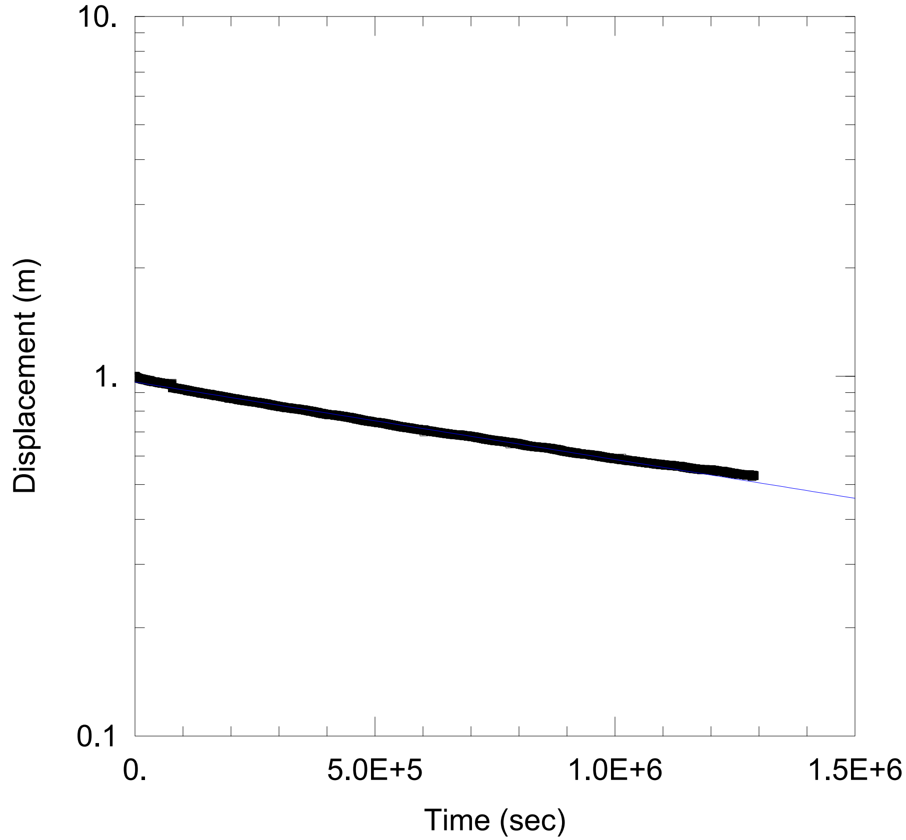
AQUIFER DATA

Saturated Thickness: 8.23 m Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (GL27-2I)

Initial Displacement: 0.42 m
Total Well Penetration Depth: 9.73 m
Casing Radius: 0.0254 m

Static Water Column Height: 8.227 m
Screen Length: 1.5 m
Well Radius: 0.075 m



GL27-2 TEST 2 RISING HEAD

Data Set: \...\GL27-2 Test 2 Rising Head.aqt
Date: 07/13/23 Time: 10:40:42

PROJECT INFORMATION

Company: GHD
Client: City of Kelowna
Project: 12605725
Location: Glenmore Landfill
Test Well: GL27-2
Test Date: 6/6/2023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 4.285E-10 m/sec
y0 = 0.9633 m

AQUIFER DATA

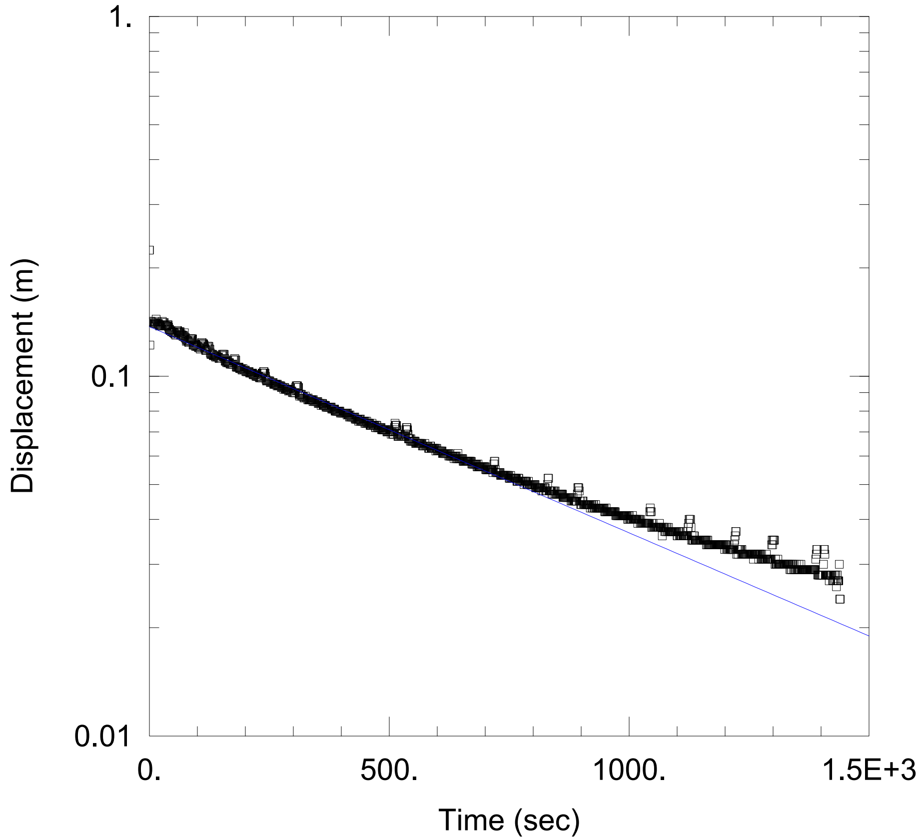
Saturated Thickness: 8.23 m

Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (GL27-2)

Initial Displacement: 0.997 m
Total Well Penetration Depth: 9.73 m
Casing Radius: 0.0254 m

Static Water Column Height: 8.227 m
Screen Length: 1.5 m
Well Radius: 0.075 m



GL28-2 TEST 1 FALLING HEAD

Data Set: \...\GL28-2 Test 1 Falling Head.aqt
Date: 07/12/23 Time: 15:22:04

PROJECT INFORMATION

Company: GHD
Client: City of Kelowna
Project: 12605725
Location: Glenmore Landfill
Test Well: GL28-2
Test Date: 6/7/2023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

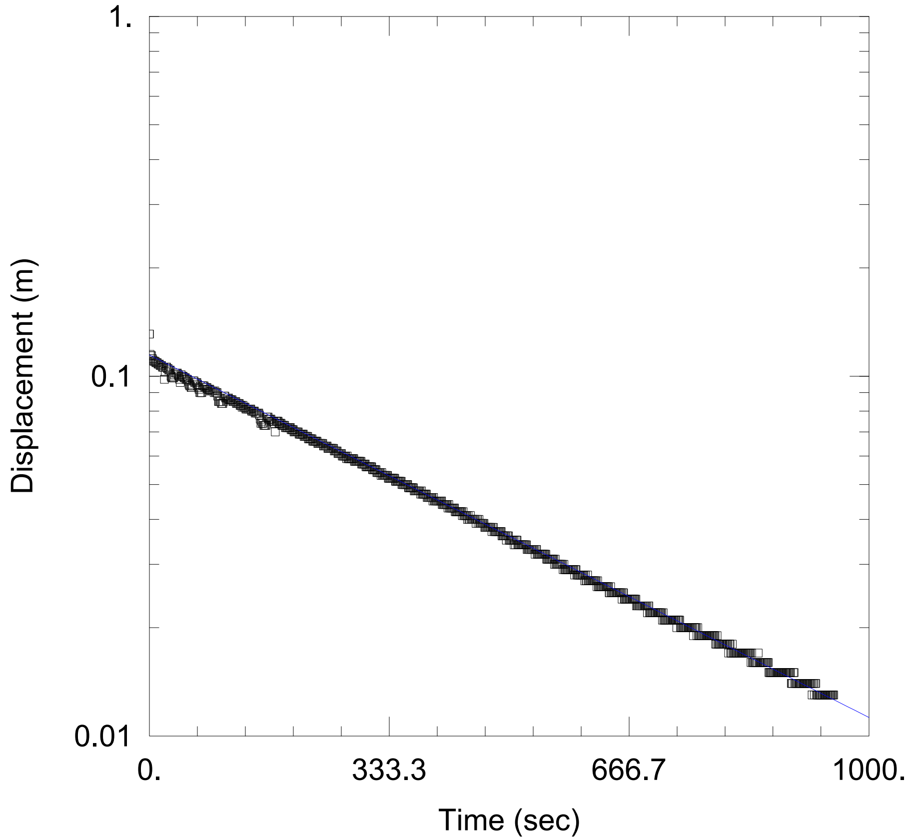
K = 9.88E-7 m/sec
y0 = 0.1373 m

AQUIFER DATA

Saturated Thickness: 1.03 m
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (GL28-2)

Initial Displacement: 0.224 m
Total Well Penetration Depth: 2.53 m
Casing Radius: 0.0254 m
Static Water Column Height: 1.034 m
Screen Length: 1.5 m
Well Radius: 0.075 m



GL28-2 TEST 2 RISING HEAD

Data Set: \...\GL28-2 Test 2 Rising Head.aqt
Date: 07/12/23 Time: 15:23:45

PROJECT INFORMATION

Company: GHD
Client: City of Kelowna
Project: 12605725
Location: Glenmore Landfill
Test Well: GL28-2
Test Date: 6/7/2023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

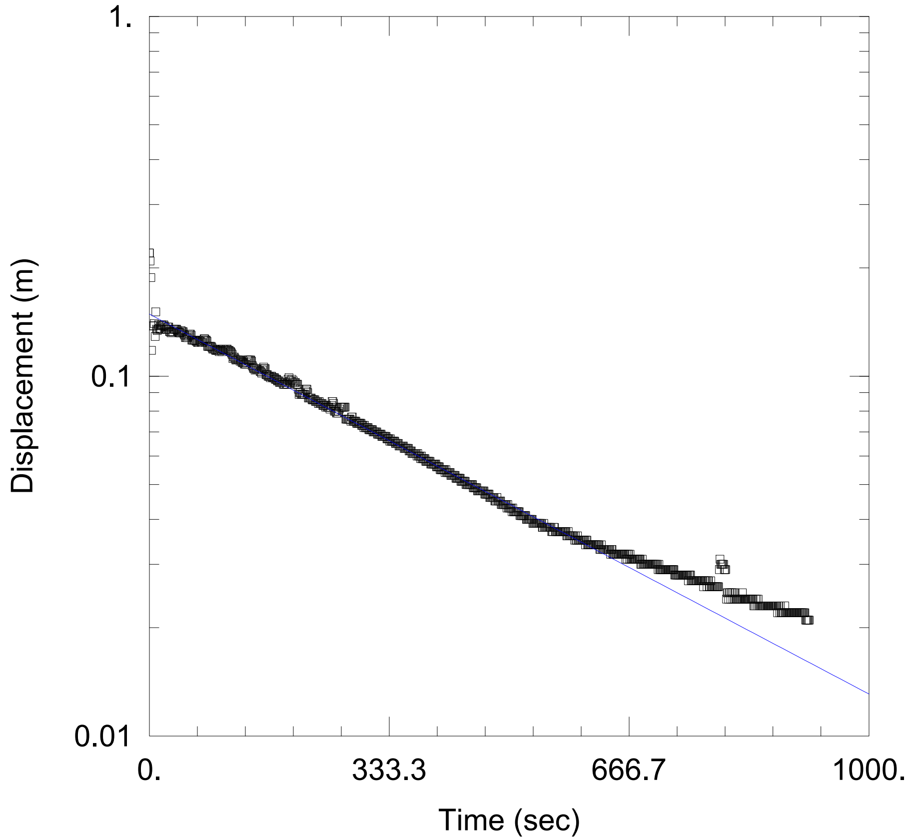
K = 1.737E-6 m/sec
y0 = 0.1146 m

AQUIFER DATA

Saturated Thickness: 1.03 m
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (GL28-2)

Initial Displacement: 0.131 m
Total Well Penetration Depth: 2.53 m
Casing Radius: 0.0254 m
Static Water Column Height: 1.034 m
Screen Length: 1.5 m
Well Radius: 0.075 m



GL28-2 TEST 3 FALLING HEAD

Data Set: \...\GL28-2 Test 3 Falling Head.aqt
Date: 07/12/23 Time: 15:25:18

PROJECT INFORMATION

Company: GHD
Client: City of Kelowna
Project: 12605725
Location: Glenmore Landfill
Test Well: GL28-2
Test Date: 6/7/2023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

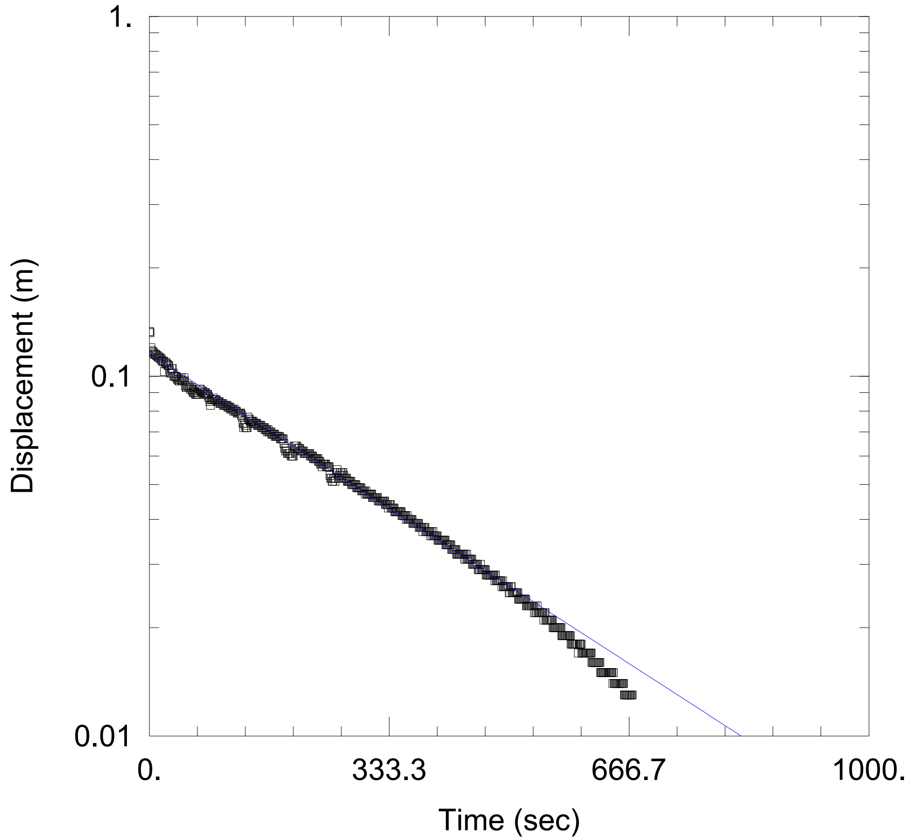
K = 1.82E-6 m/sec
y0 = 0.1488 m

AQUIFER DATA

Saturated Thickness: 1.03 m
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (GL28-2)

Initial Displacement: 0.22 m
Total Well Penetration Depth: 2.53 m
Casing Radius: 0.0254 m
Static Water Column Height: 1.034 m
Screen Length: 1.5 m
Well Radius: 0.075 m



GL28-2 TEST 4 RISING HEAD

Data Set: \...\GL28-2 Test 4 Rising Head.aqt
Date: 07/12/23 Time: 15:26:47

PROJECT INFORMATION

Company: GHD
Client: City of Kelowna
Project: 12605725
Location: Glenmore Landfill
Test Well: GL28-2
Test Date: 6/7/2023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 2.228E-6 m/sec
y0 = 0.1156 m

AQUIFER DATA

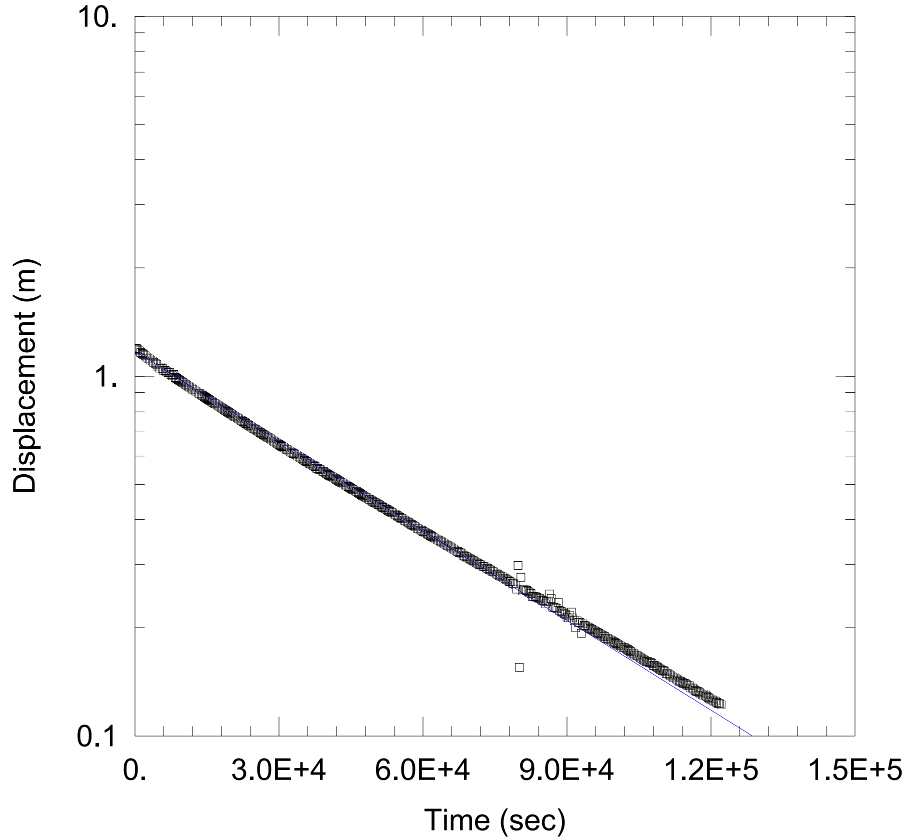
Saturated Thickness: 1.03 m

Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (GL28-2)

Initial Displacement: 0.133 m
Total Well Penetration Depth: 2.53 m
Casing Radius: 0.0254 m

Static Water Column Height: 1.034 m
Screen Length: 1.5 m
Well Radius: 0.075 m



GL29-2 RISING HEAD TEST

Data Set: \...\GL29-2 Test 1 Rising Head.aqt
Date: 07/12/23 Time: 16:56:16

PROJECT INFORMATION

Company: GHD
Client: City of Kelowna
Project: 12605725
Location: Glenmore Landfill
Test Well: GL29-2
Test Date: 6/8/2023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

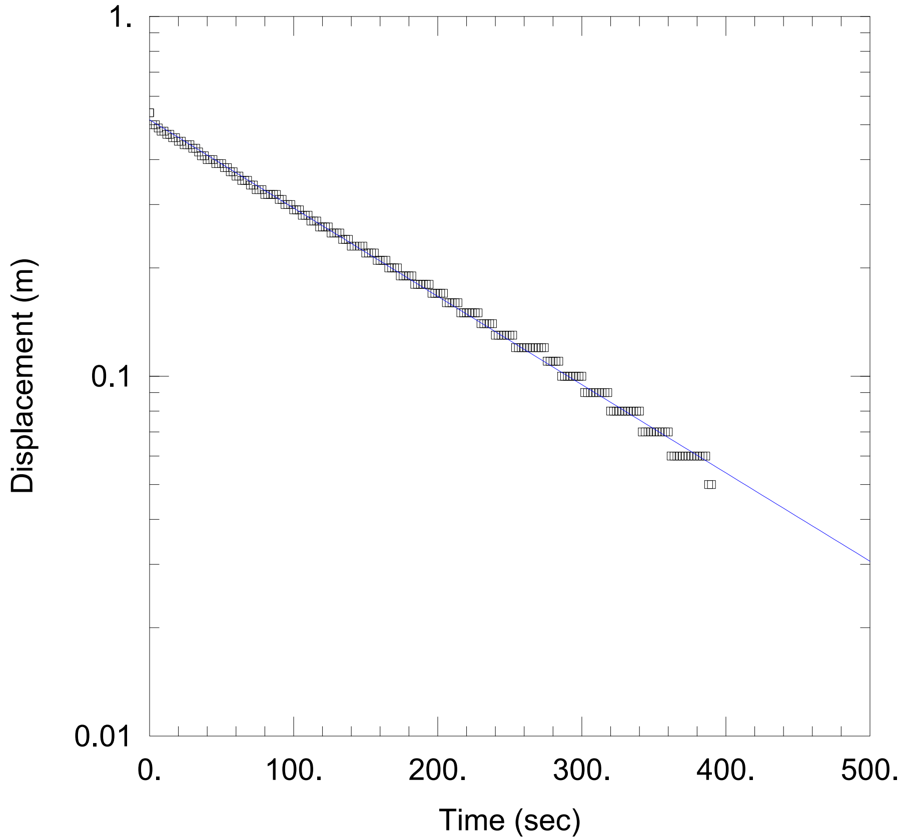
K = 5.042E-9 m/sec
y0 = 1.172 m

AQUIFER DATA

Saturated Thickness: 4.54 m
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (GL29-2)

Initial Displacement: 1.196 m
Total Well Penetration Depth: 11.14 m
Casing Radius: 0.0254 m
Static Water Column Height: 4.536 m
Screen Length: 6.6 m
Well Radius: 0.075 m



GL34-3 TEST 1 RISING HEAD

Data Set: \...\GL34-3 Test 1 Falling Head.aqt
Date: 07/12/23 Time: 10:52:13

PROJECT INFORMATION

Company: GHD
Client: City of Kelowna
Project: 12605725
Location: Glenmore Landfill
Test Well: GL34-3
Test Date: 6/7/2023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

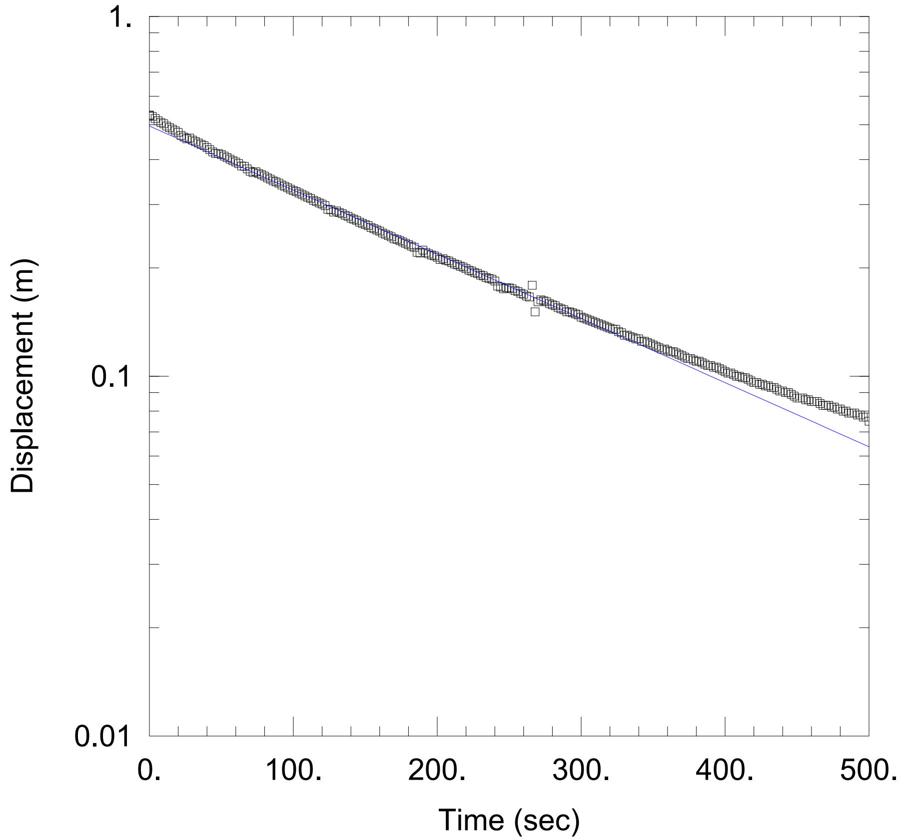
K = 8.648E-6 m/sec
y0 = 0.516 m

AQUIFER DATA

Saturated Thickness: 11.62 m
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (GL34-3)

Initial Displacement: 0.54 m
Total Well Penetration Depth: 12.52 m
Casing Radius: 0.0254 m
Static Water Column Height: 11.62 m
Screen Length: 0.9 m
Well Radius: 0.075 m



GL34-3 TEST 2 FALLING HEAD

Data Set: \...\GL34-3 Test 2 Rising Head.aqt
Date: 07/12/23 Time: 10:55:19

PROJECT INFORMATION

Company: GHD
Client: City of Kelowna
Project: 12605725
Location: Glenmore Landfill
Test Well: GL34-3
Test Date: 6/7/2023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

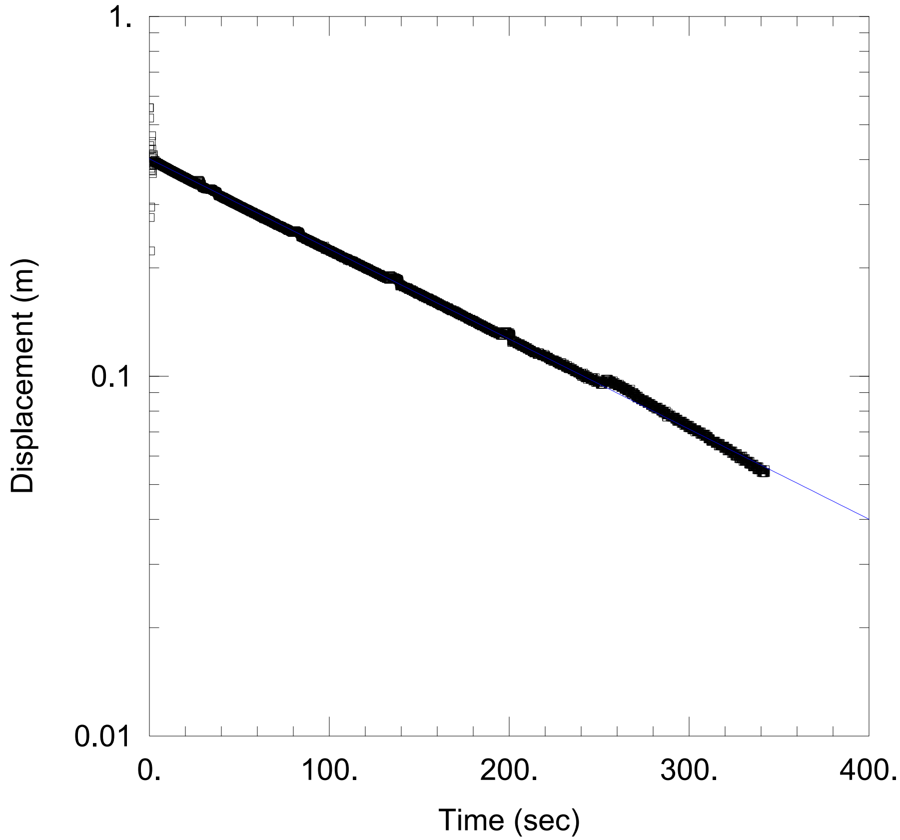
K = 6.284E-6 m/sec
y0 = 0.4959 m

AQUIFER DATA

Saturated Thickness: 11.62 m
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (GL34-3)

Initial Displacement: 0.53 m
Total Well Penetration Depth: 12.52 m
Casing Radius: 0.0254 m
Static Water Column Height: 11.62 m
Screen Length: 0.9 m
Well Radius: 0.075 m



GL34-3 TEST 3 FALLING HEAD

Data Set: \...\GL34-3 Test 3 Falling Head.aqt
Date: 07/12/23 Time: 10:56:57

PROJECT INFORMATION

Company: GHD
Client: City of Kelowna
Project: 12605725
Location: Glenmore Landfill
Test Well: GL34-3
Test Date: 6/7/2023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

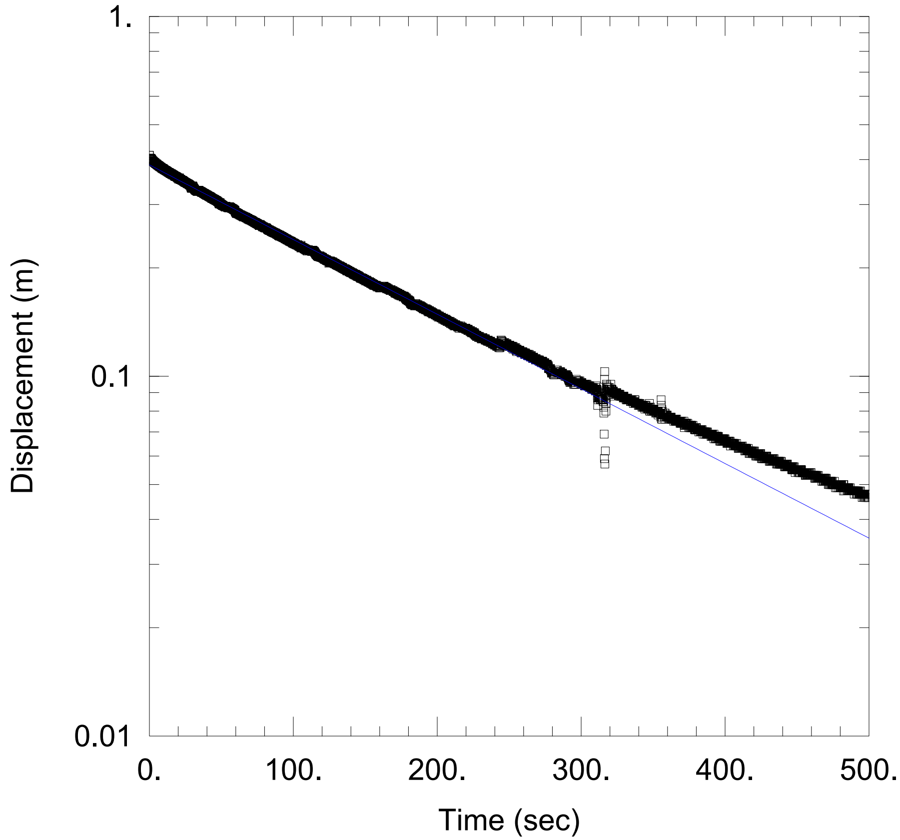
K = 8.825E-6 m/sec
y0 = 0.4019 m

AQUIFER DATA

Saturated Thickness: 11.62 m
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (GL34-3)

Initial Displacement: 0.557 m
Total Well Penetration Depth: 12.52 m
Casing Radius: 0.0254 m
Static Water Column Height: 11.62 m
Screen Length: 0.9 m
Well Radius: 0.075 m



GL34-3 TEST 4 RISING HEAD

Data Set: \...\GL34-3 Test 4 Rising Head.aqt
Date: 07/12/23 Time: 10:58:32

PROJECT INFORMATION

Company: GHD
Client: City of Kelowna
Project: 12605725
Location: Glenmore Landfill
Test Well: GL34-3
Test Date: 6/7/2023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 7.313E-6 m/sec
y0 = 0.3866 m

AQUIFER DATA

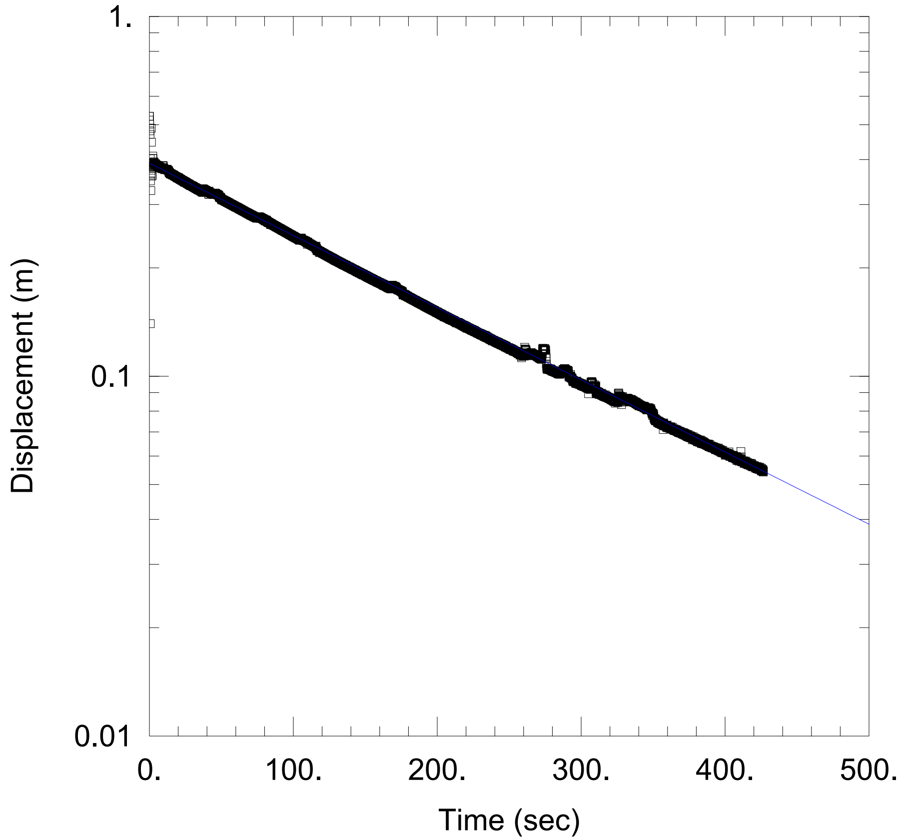
Saturated Thickness: 11.62 m

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (GL34-3)

Initial Displacement: 0.411 m
Total Well Penetration Depth: 12.52 m
Casing Radius: 0.0254 m

Static Water Column Height: 11.62 m
Screen Length: 0.9 m
Well Radius: 0.075 m



GL34-3 TEST 5 FALLING HEAD

Data Set: \...\GL34-3 Test 5 Falling Head.aqt
Date: 07/12/23 Time: 11:00:06

PROJECT INFORMATION

Company: GHD
Client: City of Kelowna
Project: 12605725
Location: Glenmore Landfill
Test Well: GL34-3
Test Date: 6/7/2023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 7.071E-6 m/sec
y0 = 0.3905 m

AQUIFER DATA

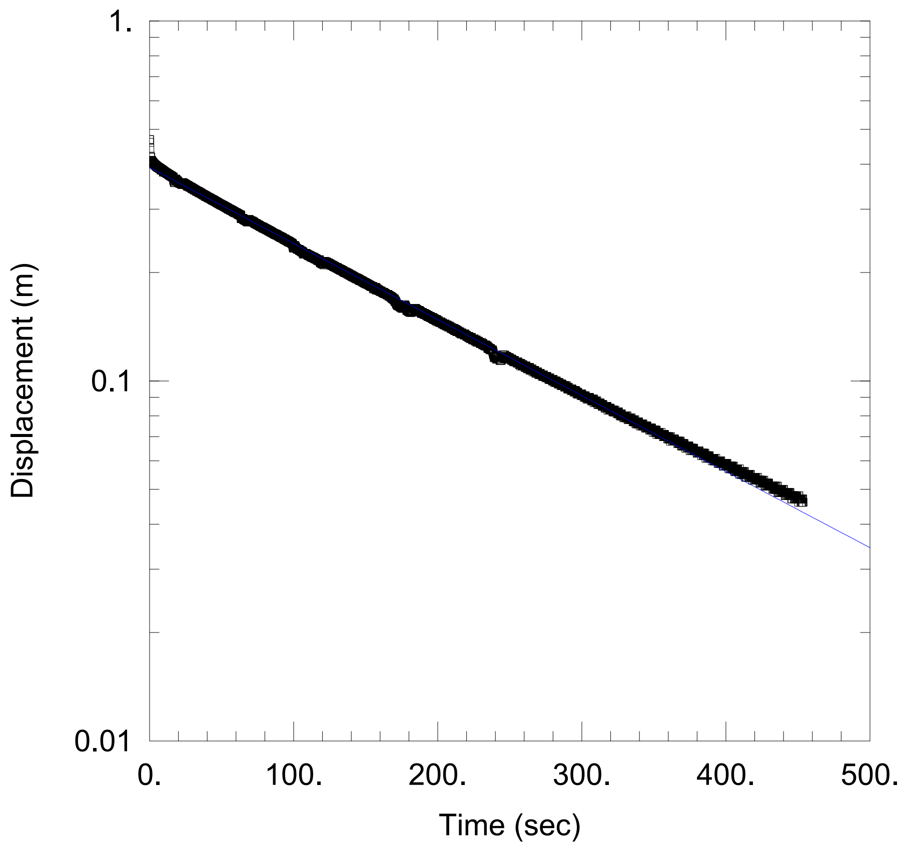
Saturated Thickness: 11.62 m

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (GL34-3)

Initial Displacement: 0.528 m
Total Well Penetration Depth: 12.52 m
Casing Radius: 0.0254 m

Static Water Column Height: 11.62 m
Screen Length: 0.9 m
Well Radius: 0.075 m



GL34-3 TEST 6 RISING HEAD

Data Set: \...\GL34-3 Test 6 Rising Head.aqt
Date: 07/12/23 Time: 11:03:15

PROJECT INFORMATION

Company: GHD
Client: City of Kelowna
Project: 12605725
Location: Glenmore Landfill
Test Well: GL34-3
Test Date: 6/7/2023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

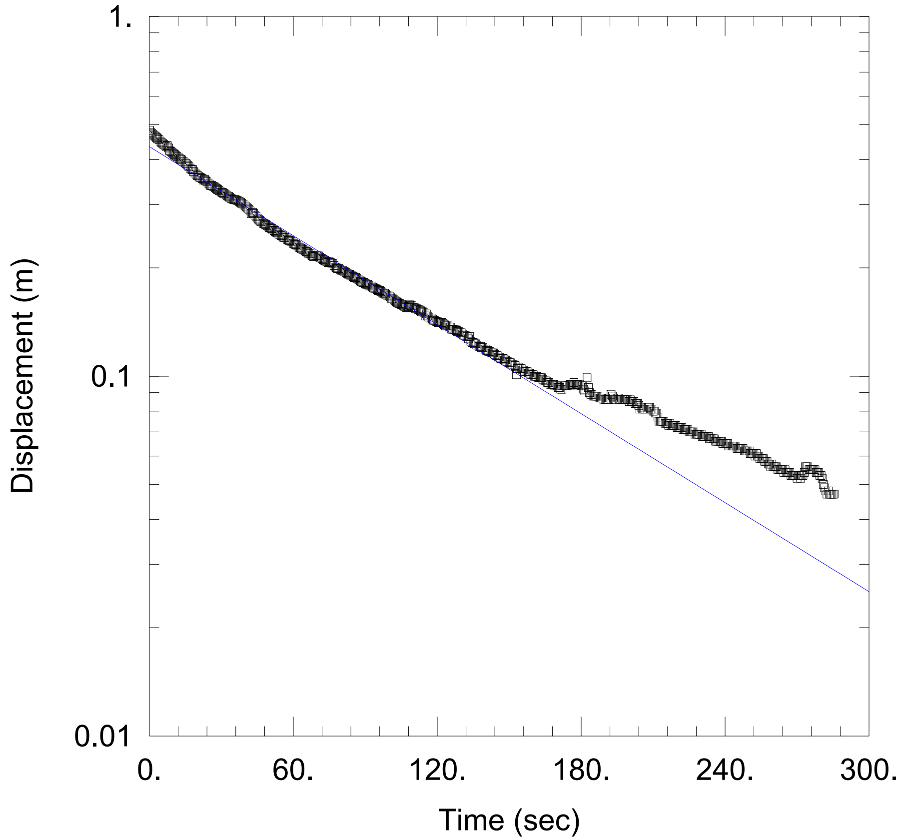
K = 7.445E-6 m/sec
y0 = 0.3919 m

AQUIFER DATA

Saturated Thickness: 11.62 m
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (GL34-3)

Initial Displacement: 0.468 m
Total Well Penetration Depth: 12.52 m
Casing Radius: 0.0254 m
Static Water Column Height: 11.62 m
Screen Length: 0.9 m
Well Radius: 0.075 m



GL35-3 TEST 1 FALLING HEAD

Data Set: \...\GL35-3 Test 1 Falling Head.aqt
Date: 07/12/23 Time: 12:33:51

PROJECT INFORMATION

Company: GHD
Client: City of Kelowna
Project: 12605725
Location: Glenmore Landfill
Test Well: GL35-3
Test Date: 6/6/2023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

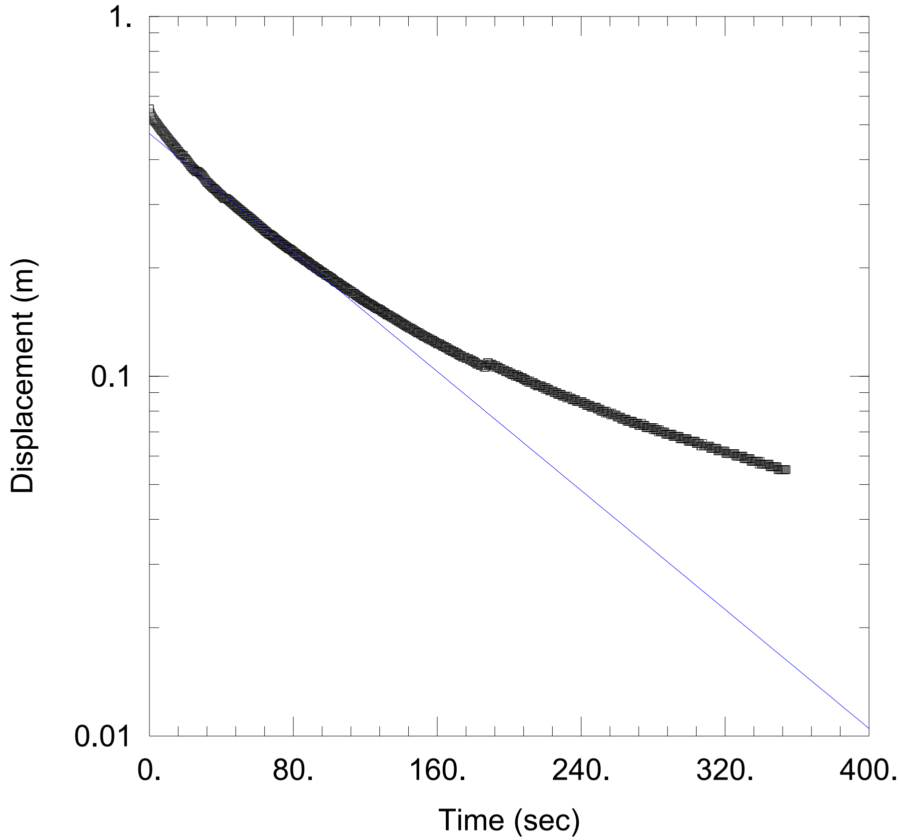
K = 7.442E-6 m/sec
y0 = 0.4343 m

AQUIFER DATA

Saturated Thickness: 12.22 m
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (GL35-3)

Initial Displacement: 0.483 m
Total Well Penetration Depth: 13.72 m
Casing Radius: 0.025 m
Static Water Column Height: 12.22 m
Screen Length: 1.5 m
Well Radius: 0.075 m



GL35-3 TEST 2 RISING HEAD

Data Set: \...\GL35-3 Test 2 Rising Head.aqt
Date: 07/12/23 Time: 12:36:57

PROJECT INFORMATION

Company: GHD
Client: City of Kelowna
Project: 12605725
Location: Glenmore Landfill
Test Well: GL35-3
Test Date: 6/6/2023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 7.464E-6 m/sec
y0 = 0.4726 m

AQUIFER DATA

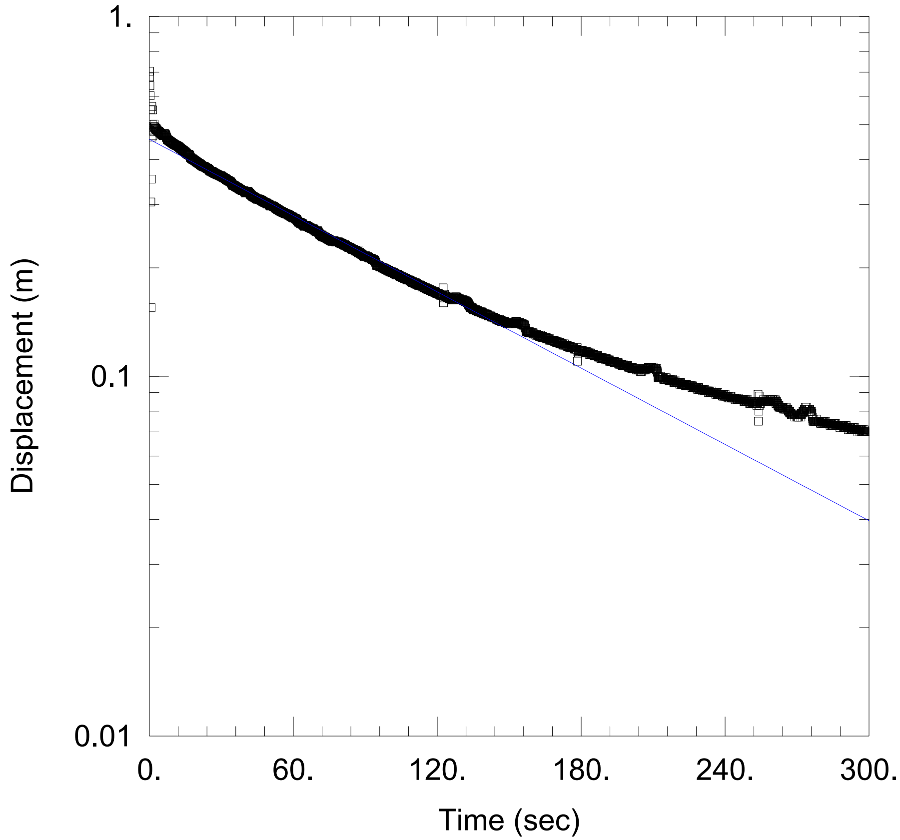
Saturated Thickness: 12.22 m

Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (GL35-3)

Initial Displacement: 0.553 m
Total Well Penetration Depth: 13.72 m
Casing Radius: 0.025 m

Static Water Column Height: 12.22 m
Screen Length: 1.5 m
Well Radius: 0.075 m



GL35-3 TEST 3 FALLING HEAD

Data Set: \...\GL35-3 Test 3 Falling Head.aqt
Date: 07/12/23 Time: 12:38:32

PROJECT INFORMATION

Company: GHD
Client: City of Kelowna
Project: 12605725
Location: Glenmore Landfill
Test Well: GL35-3
Test Date: 6/6/2023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

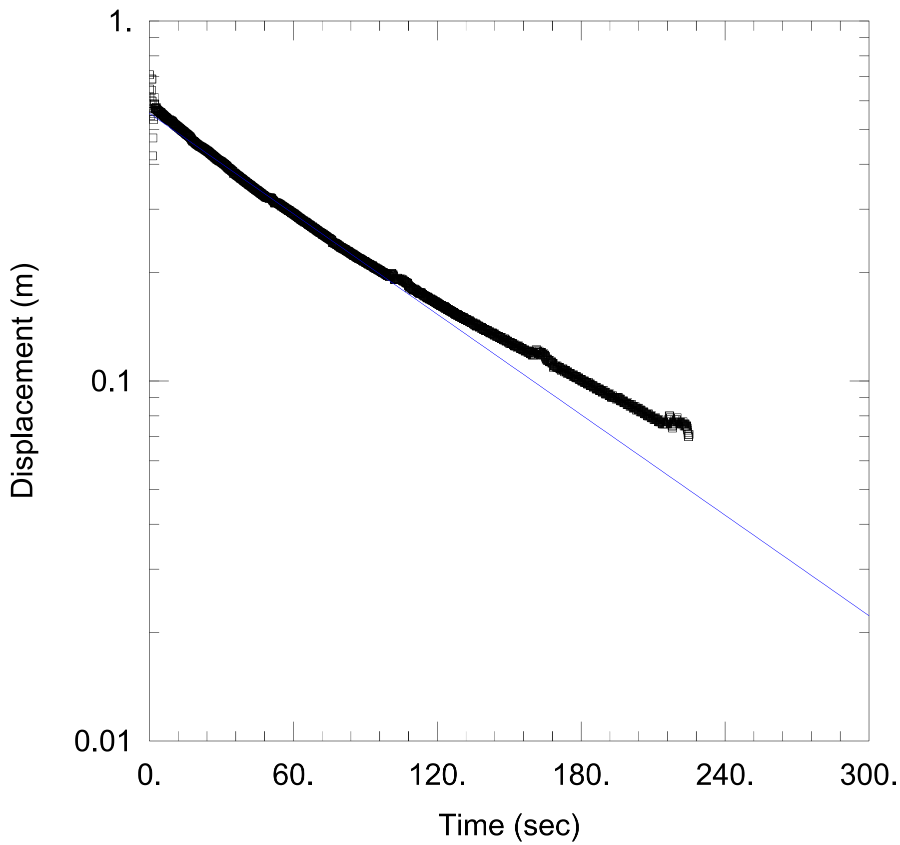
K = 6.38E-6 m/sec
y0 = 0.4555 m

AQUIFER DATA

Saturated Thickness: 12.22 m
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (GL35-3)

Initial Displacement: 0.704 m
Total Well Penetration Depth: 13.72 m
Casing Radius: 0.025 m
Static Water Column Height: 12.22 m
Screen Length: 1.5 m
Well Radius: 0.075 m



GL35-3 TEST 5 FALLING HEAD

Data Set: \...\GL35-3 Test 5 Falling Head.aqt
Date: 07/12/23 Time: 12:41:04

PROJECT INFORMATION

Company: GHD
Client: City of Kelowna
Project: 12605725
Location: Glenmore Landfill
Test Well: GL35-3
Test Date: 6/6/2023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 8.4E-6 m/sec
y0 = 0.5541 m

AQUIFER DATA

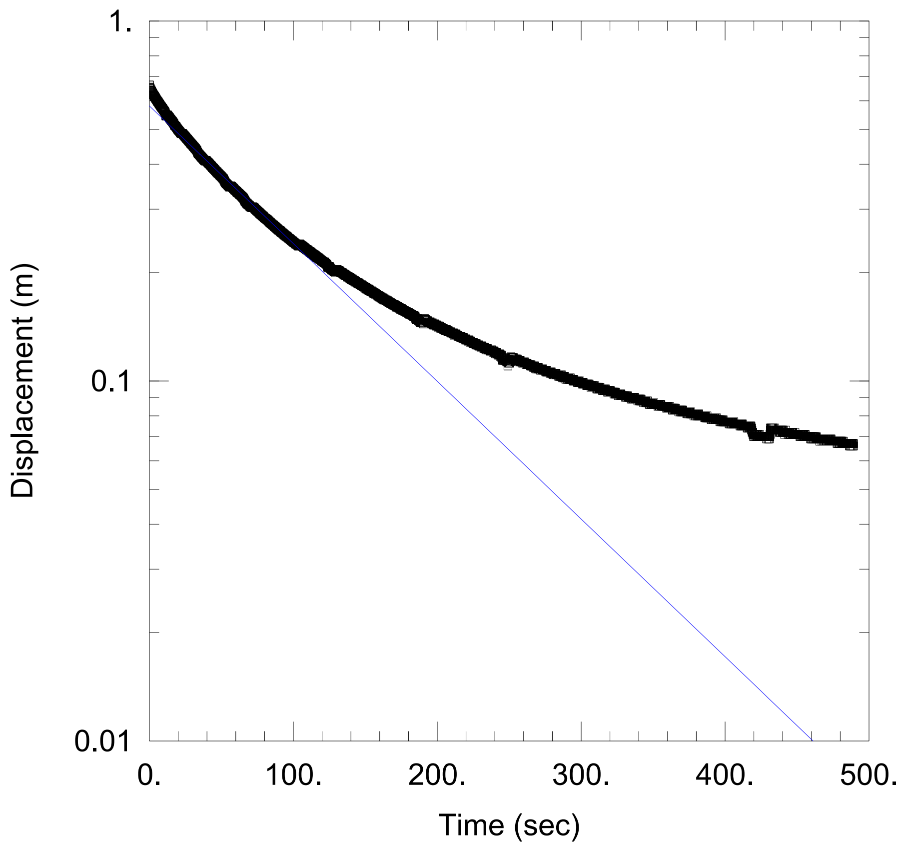
Saturated Thickness: 12.22 m

Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (GL35-3)

Initial Displacement: 0.709 m
Total Well Penetration Depth: 13.72 m
Casing Radius: 0.025 m

Static Water Column Height: 12.22 m
Screen Length: 1.5 m
Well Radius: 0.075 m



GL35-3 TEST 6 RISING HEAD

Data Set: \...\GL35-3 Test 6 Rising Head.aqt
Date: 07/12/23 Time: 12:42:33

PROJECT INFORMATION

Company: GHD
Client: City of Kelowna
Project: 12605725
Location: Glenmore Landfill
Test Well: GL35-3
Test Date: 6/6/2023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

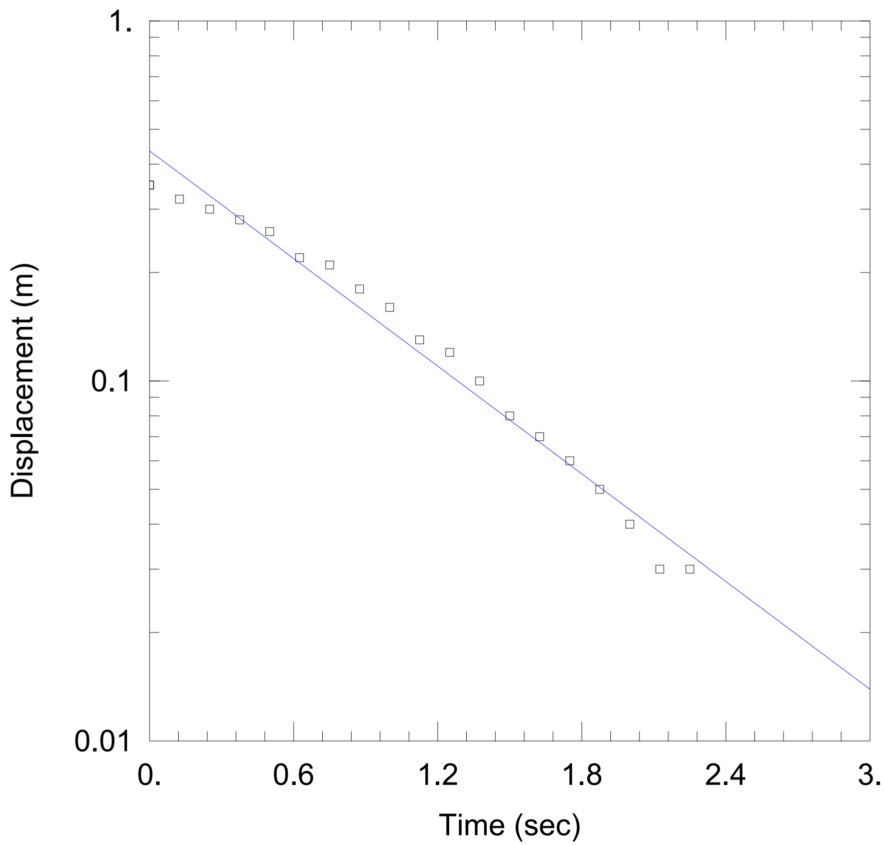
K = 6.906E-6 m/sec
y0 = 0.5806 m

AQUIFER DATA

Saturated Thickness: 12.22 m
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (GL35-3)

Initial Displacement: 0.664 m
Total Well Penetration Depth: 13.72 m
Casing Radius: 0.025 m
Static Water Column Height: 12.22 m
Screen Length: 1.5 m
Well Radius: 0.075 m



GL41-2 TEST 2 RISING HEAD

Data Set: \...\GL41-2 Test 2 Rising Head.aqt
Date: 07/13/23 Time: 11:28:51

PROJECT INFORMATION

Company: GHD
Client: City of Kelowna
Project: 12605725
Location: Glenmore Landfill
Test Well: GL41-2
Test Date: 6/682023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

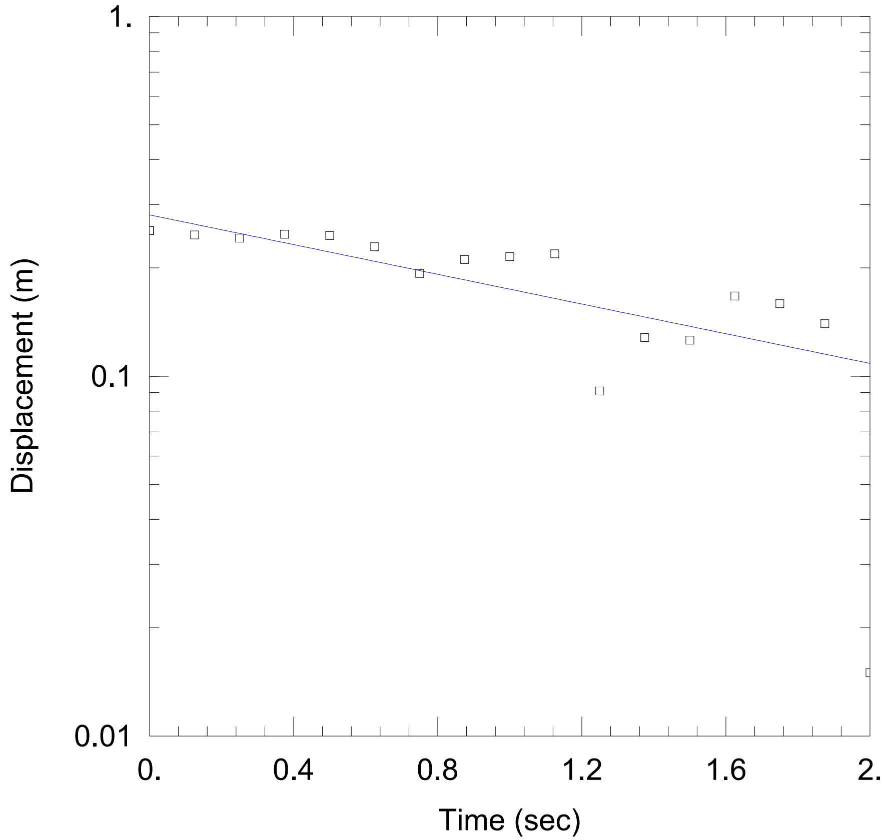
K = 0.001232 m/sec
y0 = 0.4354 m

AQUIFER DATA

Saturated Thickness: 4.14 m
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (GL41-2)

Initial Displacement: 0.35 m
Total Well Penetration Depth: 5.04 m
Casing Radius: 0.0254 m
Static Water Column Height: 4.139 m
Screen Length: 0.9 m
Well Radius: 0.075 m



GL41-2 TEST 3 RISING HEAD

Data Set: \...\GL41-2 Test 3 Falling Head.aqt
Date: 07/13/23 Time: 11:31:21

PROJECT INFORMATION

Company: GHD
Client: City of Kelowna
Project: 12605725
Location: Glenmore Landfill
Test Well: GL41-2
Test Date: 6/682023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

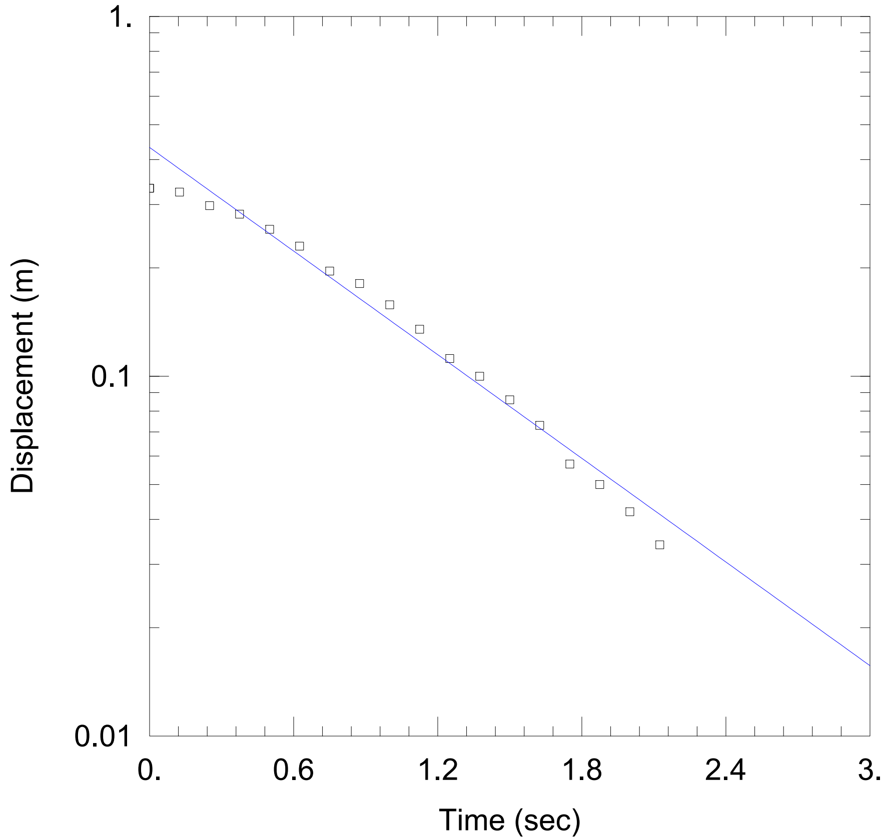
K = 0.0005105 m/sec
y0 = 0.2808 m

AQUIFER DATA

Saturated Thickness: 4.14 m
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (GL41-2)

Initial Displacement: 0.254 m
Total Well Penetration Depth: 5.04 m
Casing Radius: 0.0254 m
Static Water Column Height: 4.139 m
Screen Length: 0.9 m
Well Radius: 0.075 m



GL41-2 TEST 4 RISING HEAD

Data Set: \...\GL41-2 Test 4 Rising Head.aqt
Date: 07/13/23 Time: 11:33:55

PROJECT INFORMATION

Company: GHD
Client: City of Kelowna
Project: 12605725
Location: Glenmore Landfill
Test Well: GL41-2
Test Date: 6/682023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

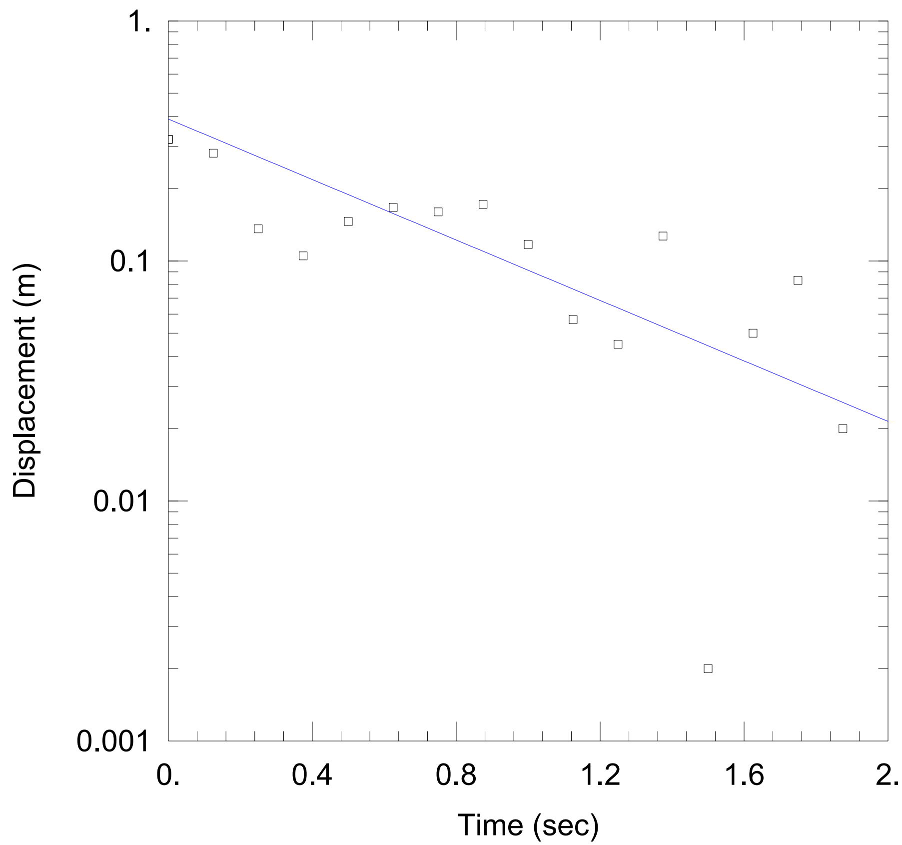
K = 0.001187 m/sec
y0 = 0.4323 m

AQUIFER DATA

Saturated Thickness: 4.14 m
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (GL41-2)

Initial Displacement: 0.333 m
Total Well Penetration Depth: 5.04 m
Casing Radius: 0.0254 m
Static Water Column Height: 4.139 m
Screen Length: 0.9 m
Well Radius: 0.075 m



GL41-2 TEST 5 FALLING HEAD

Data Set: \...\GL41-2 Test 5 Falling Head.aqt
Date: 07/13/23 Time: 11:36:01

PROJECT INFORMATION

Company: GHD
Client: City of Kelowna
Project: 12605725
Location: Glenmore Landfill
Test Well: GL41-2
Test Date: 6/682023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

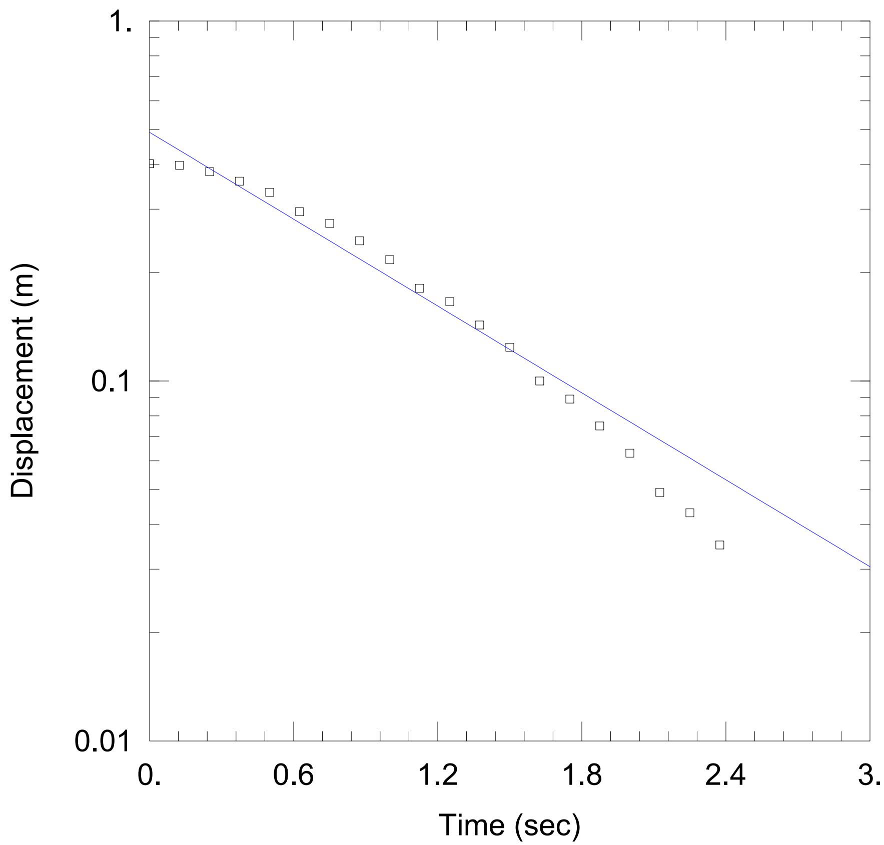
K = 0.001557 m/sec
y0 = 0.3899 m

AQUIFER DATA

Saturated Thickness: 4.14 m
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (GL41-2)

Initial Displacement: 0.321 m
Total Well Penetration Depth: 5.04 m
Casing Radius: 0.0254 m
Static Water Column Height: 4.139 m
Screen Length: 0.9 m
Well Radius: 0.075 m



GL41-2 TEST 6 RISING HEAD

Data Set: \...\GL41-2 Test 6 Rising Head.aqt
Date: 07/13/23 Time: 11:37:40

PROJECT INFORMATION

Company: GHD
Client: City of Kelowna
Project: 12605725
Location: Glenmore Landfill
Test Well: GL41-2
Test Date: 6/682023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0009944 m/sec
y0 = 0.4905 m

AQUIFER DATA

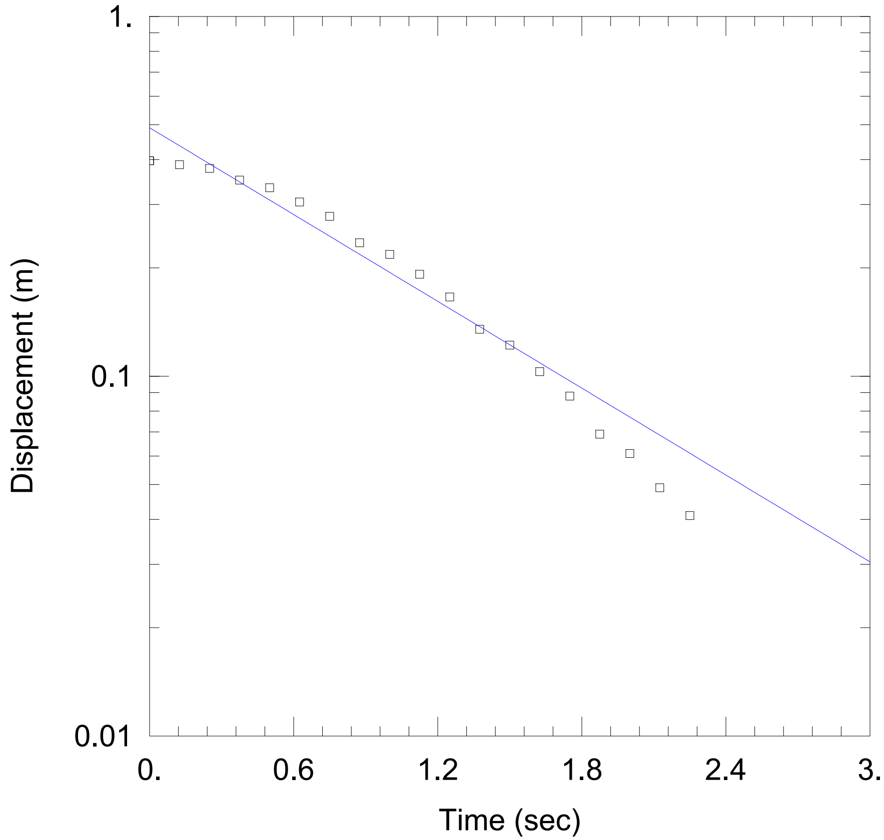
Saturated Thickness: 4.14 m

Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (GL41-2)

Initial Displacement: 0.401 m
Total Well Penetration Depth: 5.04 m
Casing Radius: 0.0254 m

Static Water Column Height: 4.139 m
Screen Length: 0.9 m
Well Radius: 0.075 m



GL41-2 TEST 8 RISING HEAD

Data Set: \...\GL41-2 Test 8 Rising Head.aqt
Date: 07/13/23 Time: 11:39:15

PROJECT INFORMATION

Company: GHD
Client: City of Kelowna
Project: 12605725
Location: Glenmore Landfill
Test Well: GL41-2
Test Date: 6/682023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0009944 m/sec
y0 = 0.4905 m

AQUIFER DATA

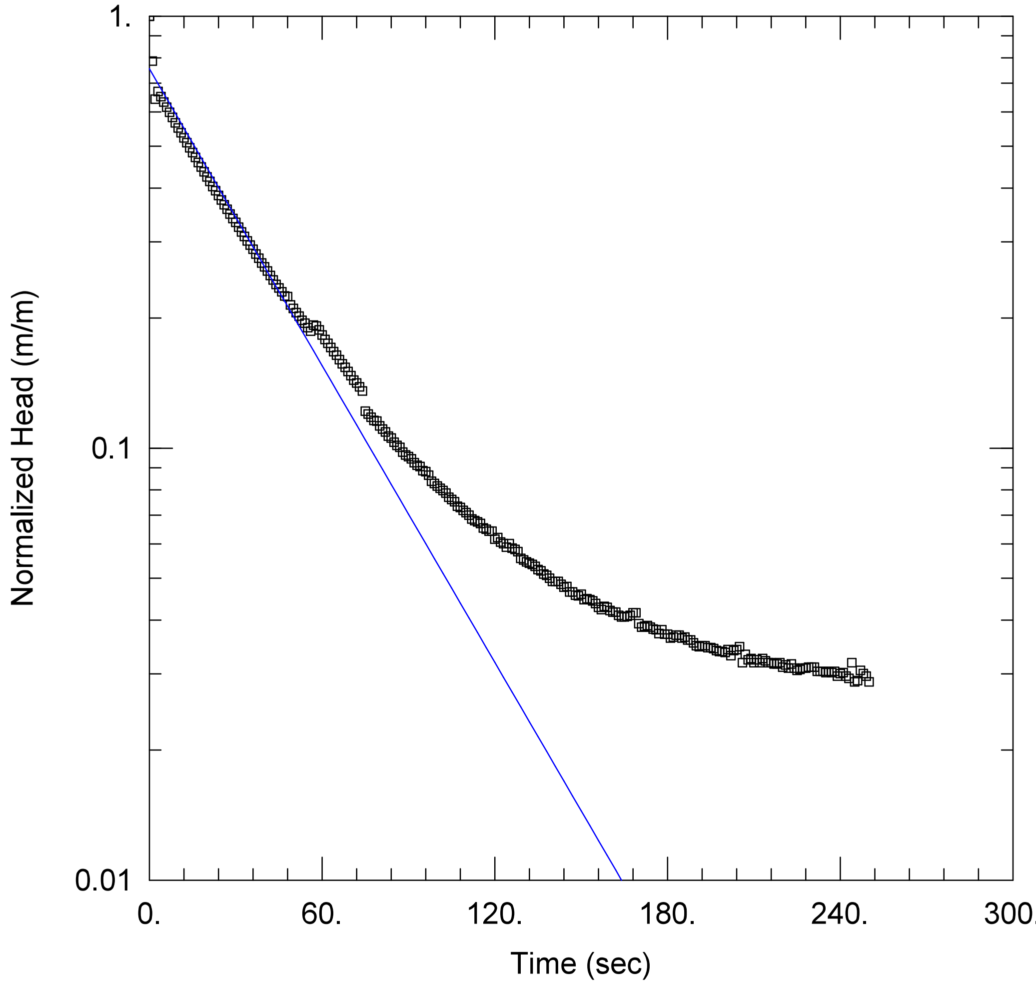
Saturated Thickness: 4.14 m

Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (GL41-2)

Initial Displacement: 0.397 m
Total Well Penetration Depth: 5.04 m
Casing Radius: 0.0254 m

Static Water Column Height: 4.139 m
Screen Length: 0.9 m
Well Radius: 0.075 m



WELL TEST ANALYSIS

Data Set: P:\...\GL39-1 falling head.aqt
Date: 12/13/19 Time: 14:28:01

PROJECT INFORMATION

Company: SNC Lavalin
Client: City of Kelowna
Project: 662036
Location: Glenmore Landfill, Kelowna, BC
Test Well: GL39-1
Test Date: 12 Dec 2019

AQUIFER DATA

Saturated Thickness: 10. m
Anisotropy Ratio (Kz/Kr): 1.

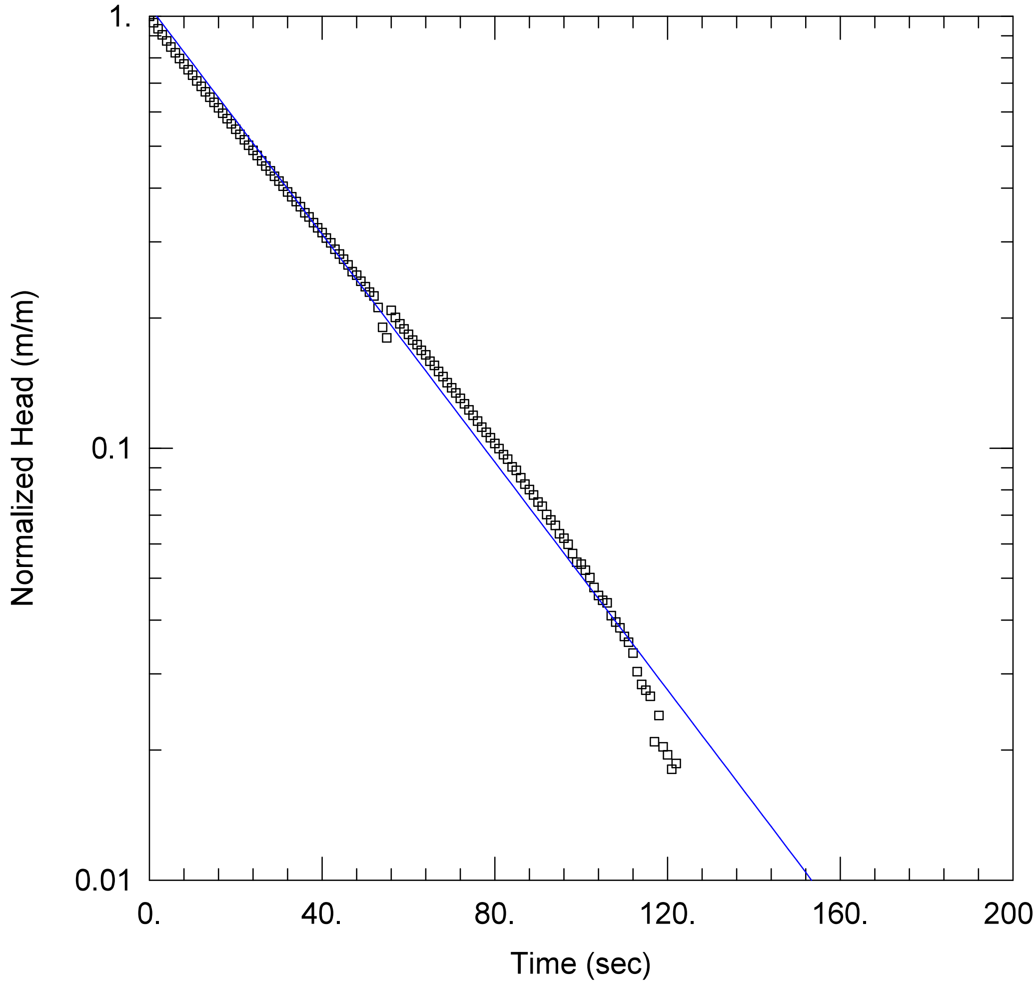
WELL DATA (GL39-1)

Initial Displacement: 0.5558 m
Total Well Penetration Depth: 6.92 m
Casing Radius: 0.0254 m
Static Water Column Height: 6.92 m
Screen Length: 1.2 m
Well Radius: 0.076 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 1.593E-5 m/sec
y0 = 0.4196 m



WELL TEST ANALYSIS

Data Set: P:\...\GL39-1 rising head.aqt
Date: 12/13/19 Time: 14:33:28

PROJECT INFORMATION

Company: SNC Lavalin
Client: City of Kelowna
Project: 662036
Location: Glenmore Landfill, Kelowna, BC
Test Well: GL39-1 Rising head
Test Date: 12 Dec 2019

AQUIFER DATA

Saturated Thickness: 10. m
Anisotropy Ratio (Kz/Kr): 1.

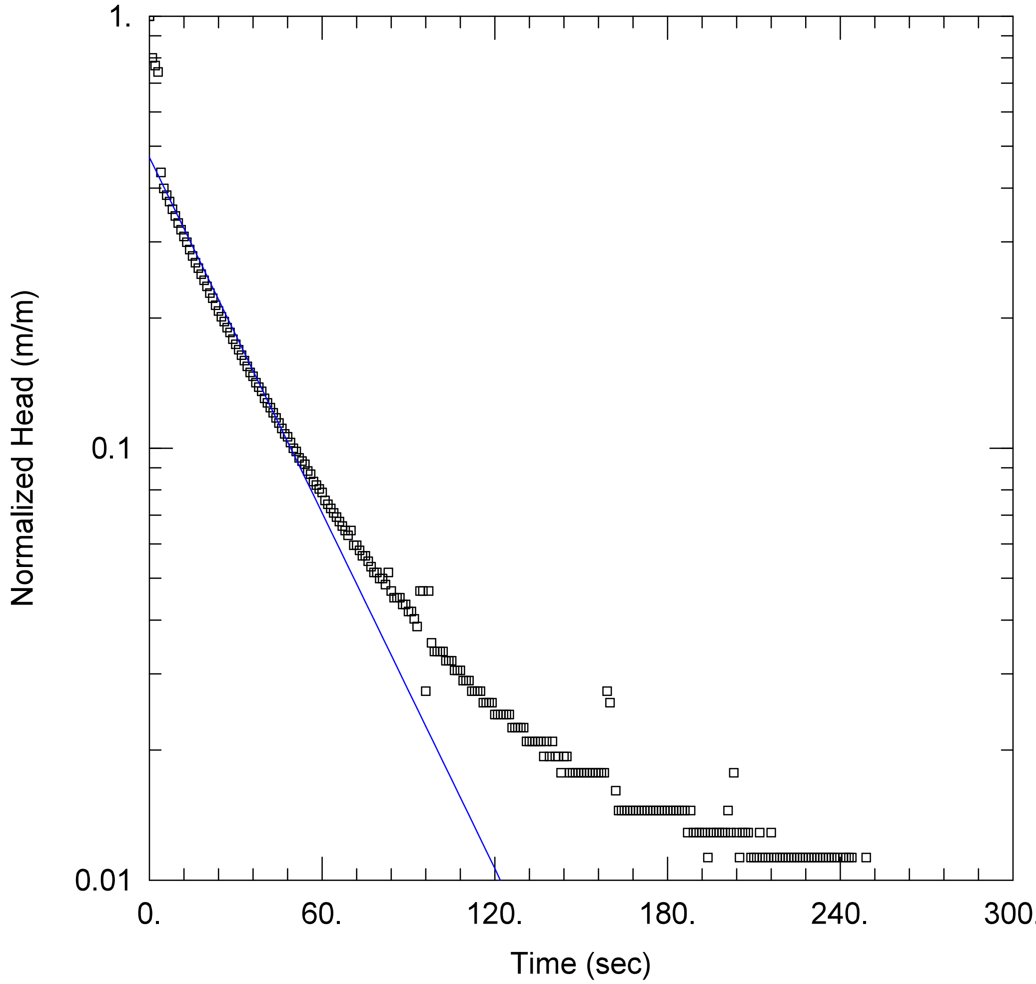
WELL DATA (GL39-1)

Initial Displacement: 0.349 m
Total Well Penetration Depth: 6.92 m
Casing Radius: 0.0254 m
Static Water Column Height: 6.92 m
Screen Length: 1.2 m
Well Radius: 0.076 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 1.834E-5 m/sec
y0 = 0.3674 m



WELL TEST ANALYSIS

Data Set: P:\...\GL39-2 falling head.aqt
Date: 12/13/19 Time: 14:45:07

PROJECT INFORMATION

Company: SNC Lavalin
Client: City of Kelowna
Project: 662036
Location: Glenmore Landfill, Kelowna, BC
Test Well: GL39-2 Falling Head
Test Date: 6 Dec 2019

AQUIFER DATA

Saturated Thickness: 5. m
Anisotropy Ratio (Kz/Kr): 1.

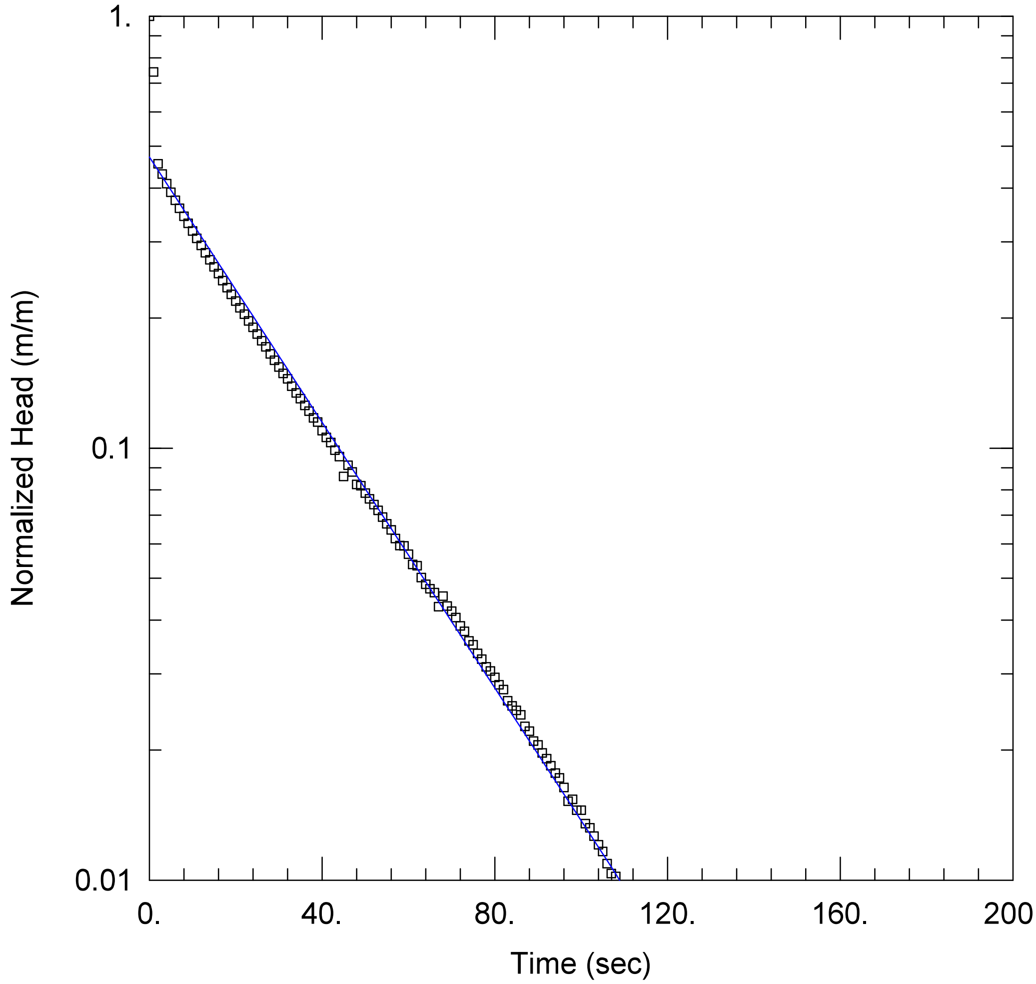
WELL DATA (GL39-2)

Initial Displacement: 0.621 m
Total Well Penetration Depth: 3.097 m
Casing Radius: 0.0254 m
Static Water Column Height: 3.097 m
Screen Length: 1.8 m
Well Radius: 0.076 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 1.284E-5 m/sec
y0 = 0.2925 m



WELL TEST ANALYSIS

Data Set: P:\...\GL39-2 rising head.aqt
Date: 12/13/19 Time: 14:52:41

PROJECT INFORMATION

Company: SNC Lavalin
Client: City of Kelowna
Project: 662036
Location: Glenmore Landfill, Kelowna, BC
Test Well: GL39-2 rising head
Test Date: 6 Dec 2019

AQUIFER DATA

Saturated Thickness: 5. m
Anisotropy Ratio (Kz/Kr): 1.

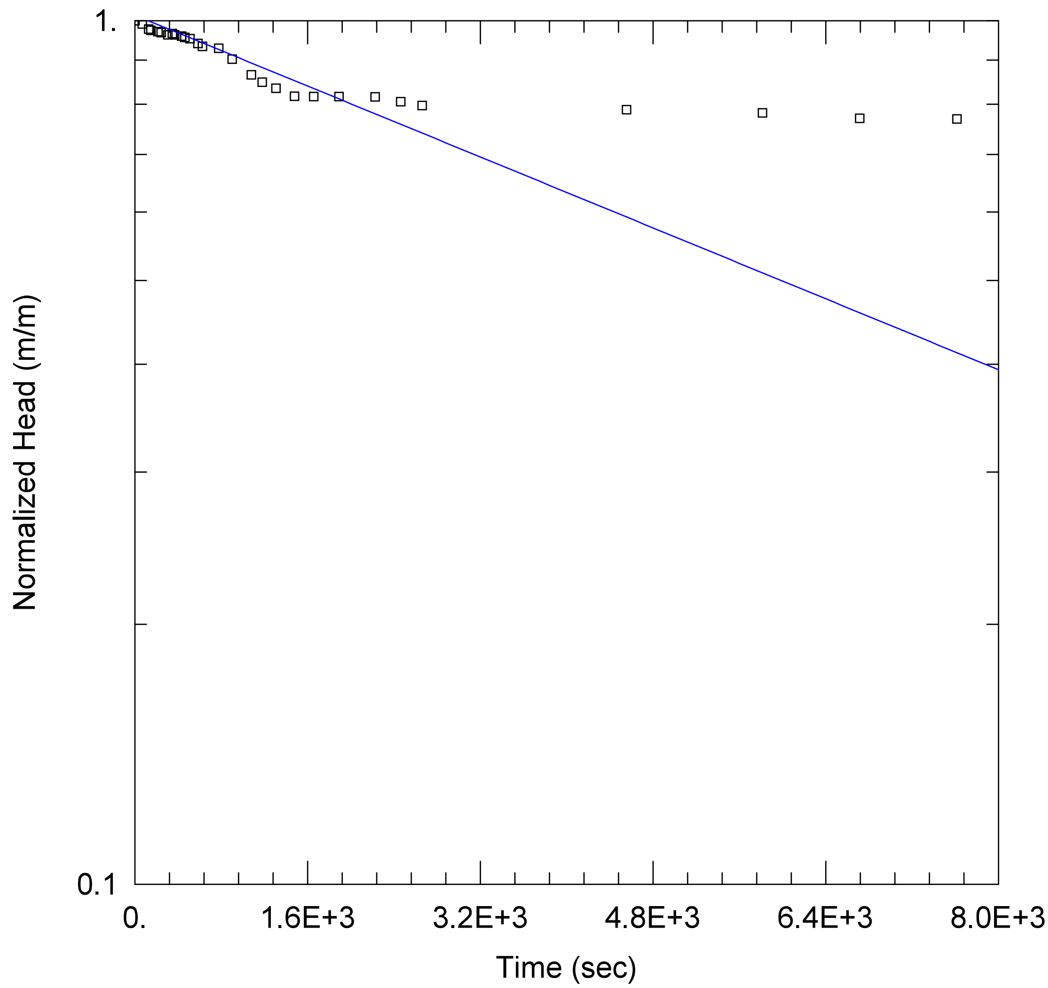
WELL DATA (GL39-2)

Initial Displacement: 0.6958 m
Total Well Penetration Depth: 3.097 m
Casing Radius: 0.0254 m
Static Water Column Height: 3.097 m
Screen Length: 1.8 m
Well Radius: 0.076 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 1.438E-5 m/sec
y0 = 0.3284 m



WELL TEST ANALYSIS

Data Set: P:\...\GL40-2 rising head.aqt
Date: 12/13/19 Time: 15:02:33

PROJECT INFORMATION

Company: SNC Lavalin
Client: City of Kelowna
Project: 662036
Location: Glenmore Landfill, Kelowna, BC
Test Well: GL40-2 rising head
Test Date: 3 Dec 2019

AQUIFER DATA

Saturated Thickness: 1.6 m Anisotropy Ratio (Kz/Kr): 1.

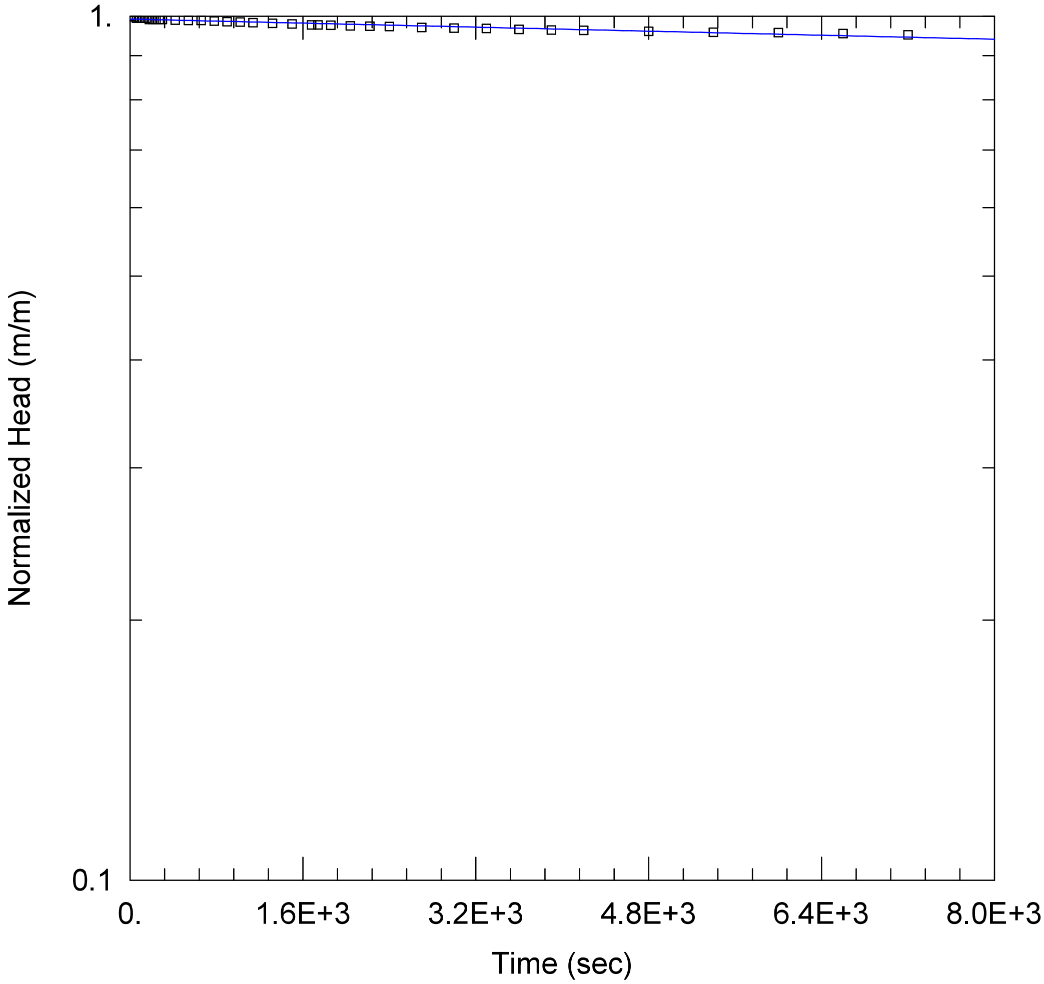
WELL DATA (GL40-2)

Initial Displacement: 10.86 m
Total Well Penetration Depth: 11.02 m
Casing Radius: 0.0254 m
Static Water Column Height: 11.02 m
Screen Length: 1.6 m
Well Radius: 0.076 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 7.905E-8 m/sec y0 = 11.01 m



WELL TEST ANALYSIS

Data Set: P:\...\GL41-1 rising head.aqt
Date: 12/13/19 Time: 15:09:14

PROJECT INFORMATION

Company: SNC Lavalin
Client: City of Kelowna
Project: 662036
Location: Glenmore Landfill, Kelowna, BC
Test Well: GL41-1 rising head
Test Date: 4 Dec 2019

AQUIFER DATA

Saturated Thickness: 1.6 m
Anisotropy Ratio (Kz/Kr): 1.

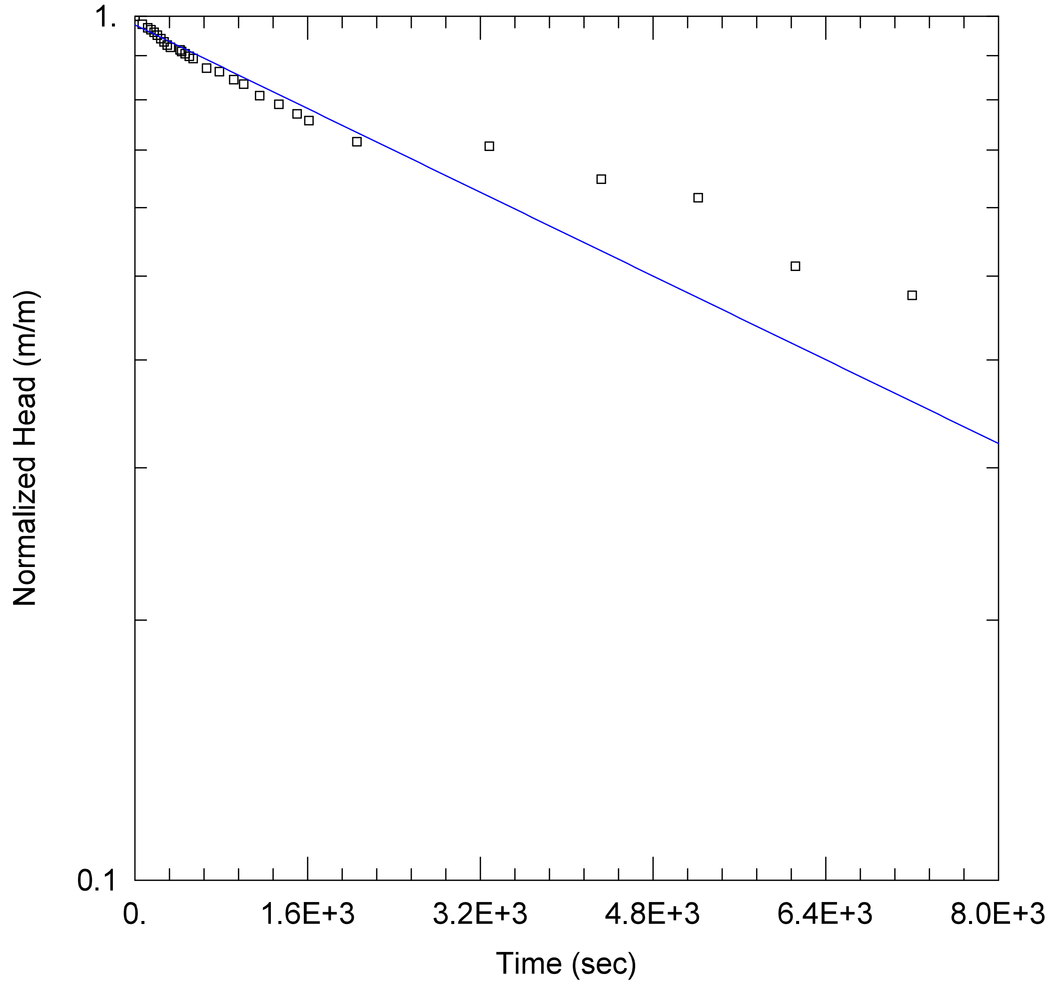
WELL DATA (GL41-1)

Initial Displacement: 2.703 m
Total Well Penetration Depth: 2.703 m
Casing Radius: 0.0254 m
Static Water Column Height: 2.703 m
Screen Length: 1.6 m
Well Radius: 0.076 m
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 3.479E-9 m/sec
y0 = 2.681 m



WELL TEST ANALYSIS

Data Set: P:\...\GL42-1 rising head.aqt
Date: 12/13/19 Time: 15:19:09

PROJECT INFORMATION

Company: SNC Lavalin
Client: City of Kelowna
Project: 662036
Location: Glenmore Landfill, Kelowna, BC
Test Well: GL42-1 rising head
Test Date: 3 Dec 2019

AQUIFER DATA

Saturated Thickness: 3. m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (GL42-1)

Initial Displacement: 8.125 m
Total Well Penetration Depth: 10.19 m
Casing Radius: 0.0254 m
Static Water Column Height: 10.19 m
Screen Length: 1.6 m
Well Radius: 0.076 m

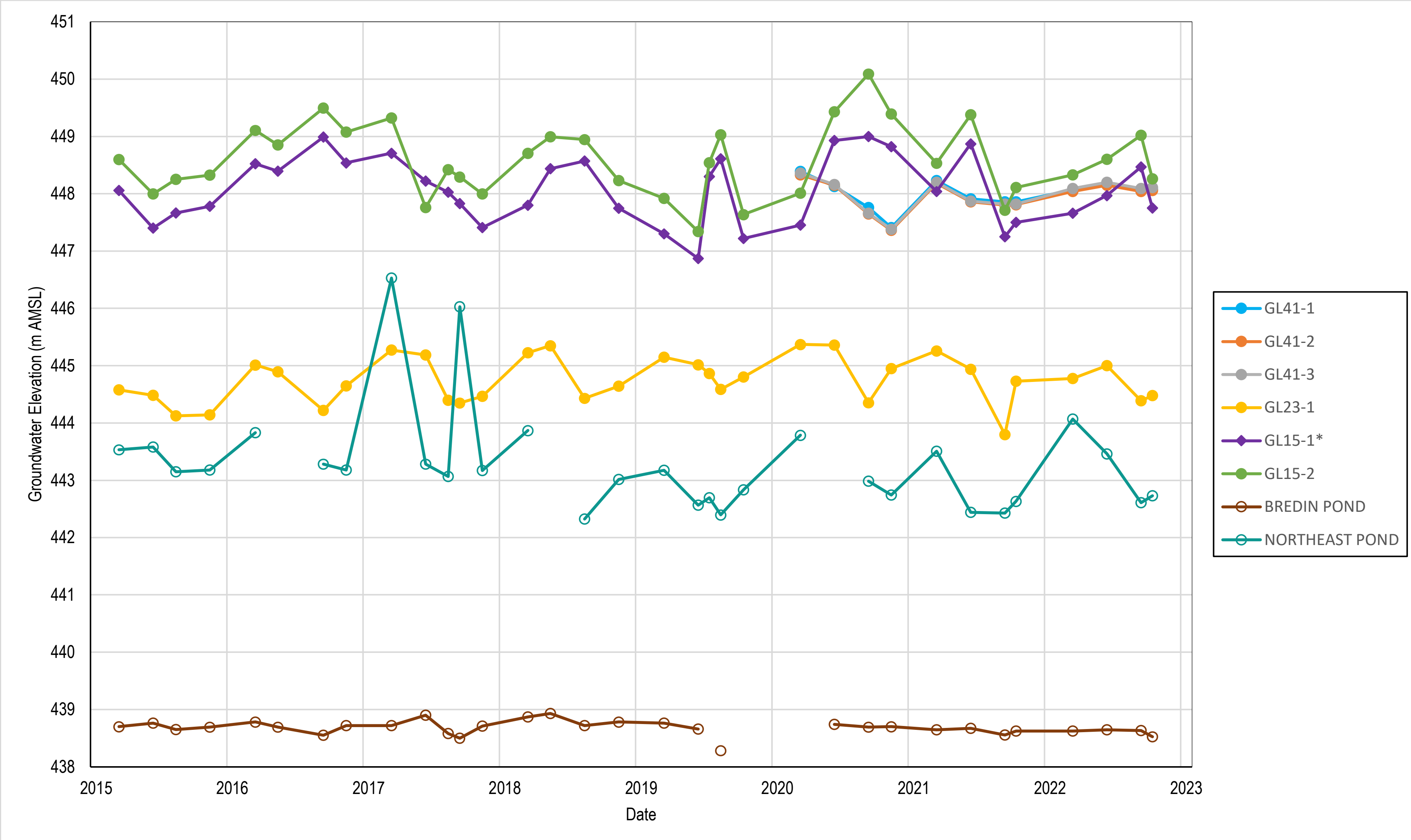
SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 9.221E-8 m/sec
y0 = 7.939 m

Appendix E

Hydrographs



NOTES

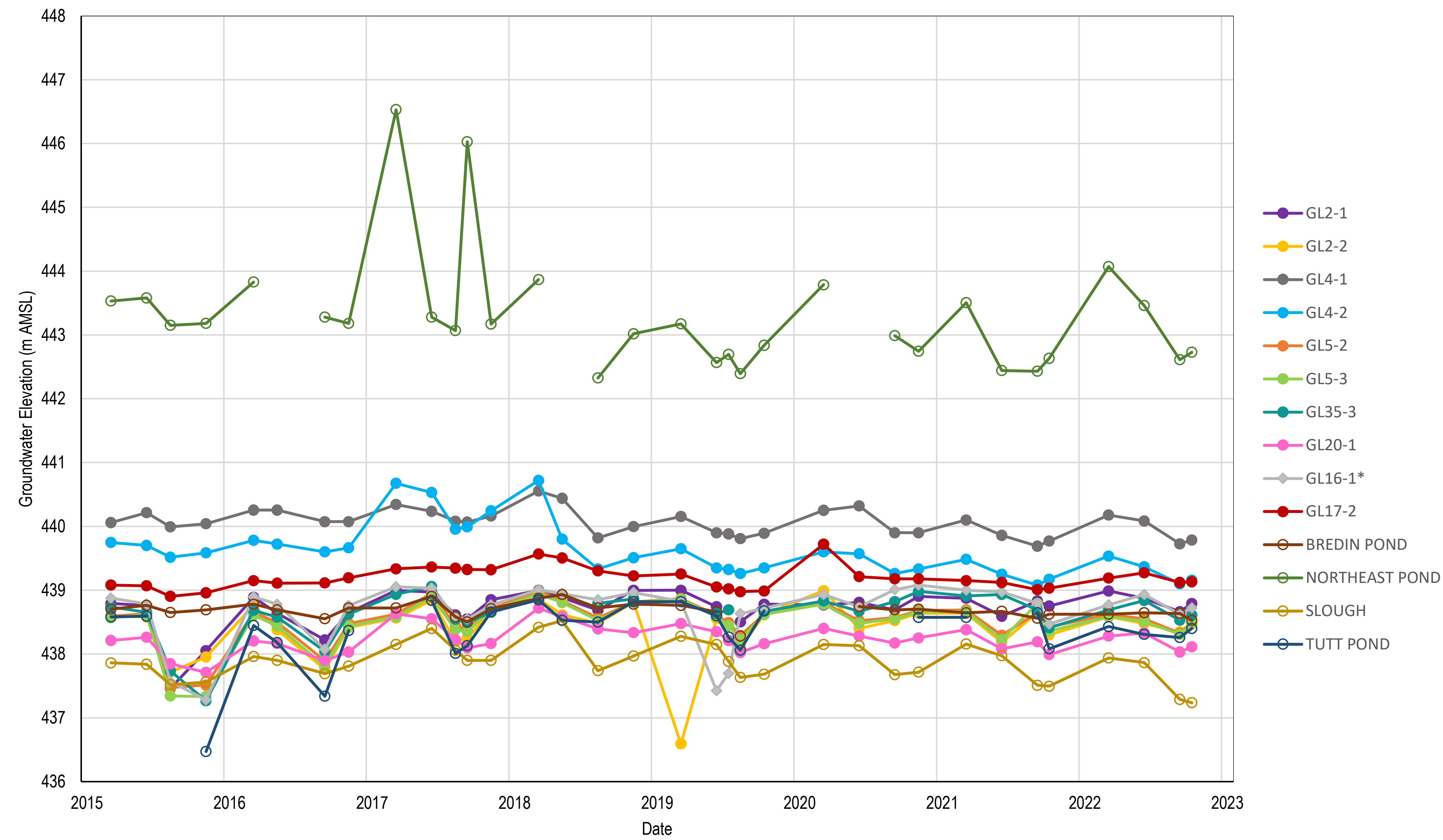
* Bedrock Well

CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY CHARACTERIZATION REPORT

Upgradient Wells Hydrograph 2015-2022

Project No. **12605725**
Date **September 2023**

FIGURE E-1



NOTES

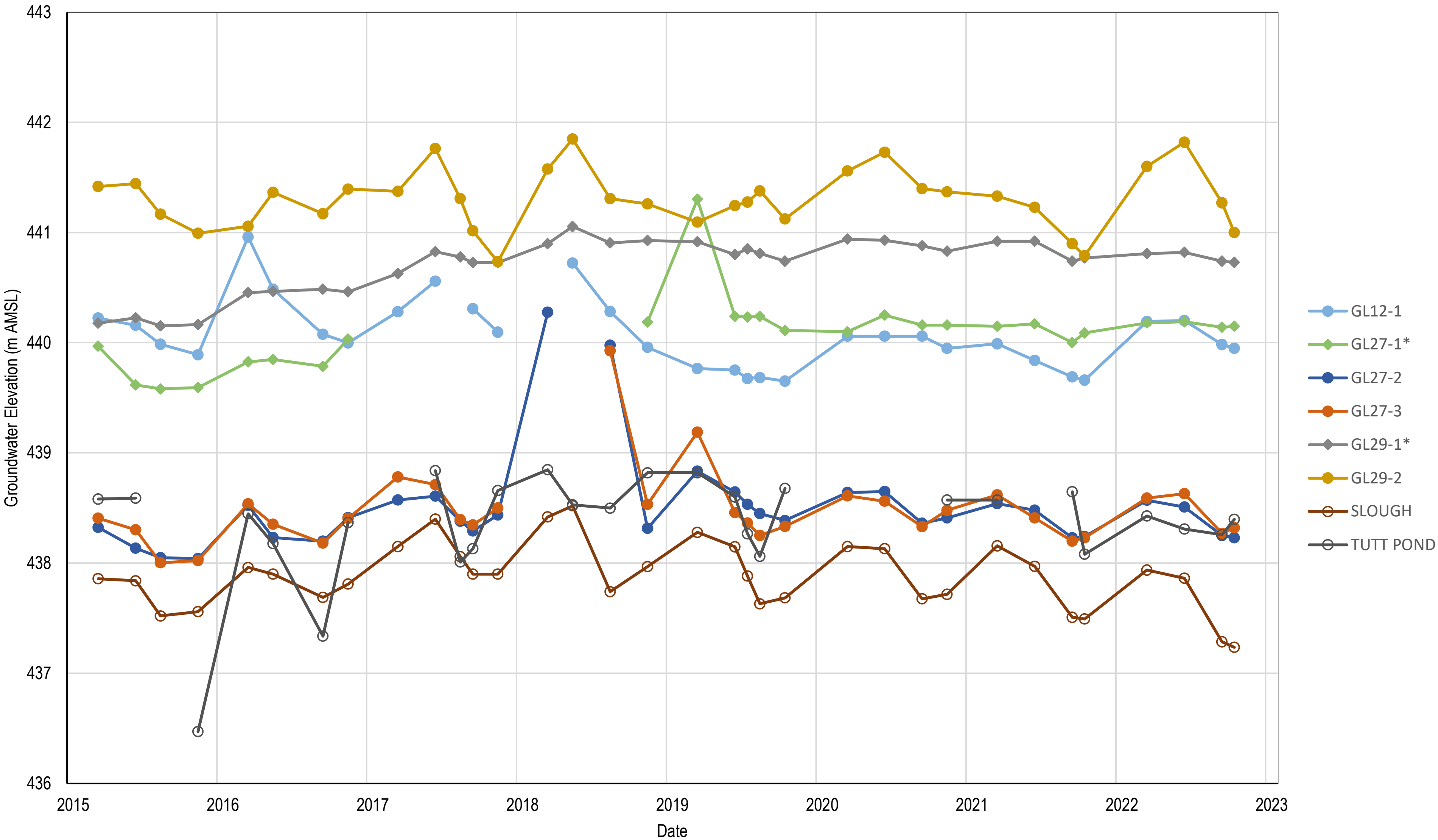
* Bedrock Well

CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY CHARACTERIZATION REPORT

Landfill Vicinity Wells Hydrograph 2015-2022

Project No. **12605725**
Date **September 2023**

FIGURE E-2



NOTES

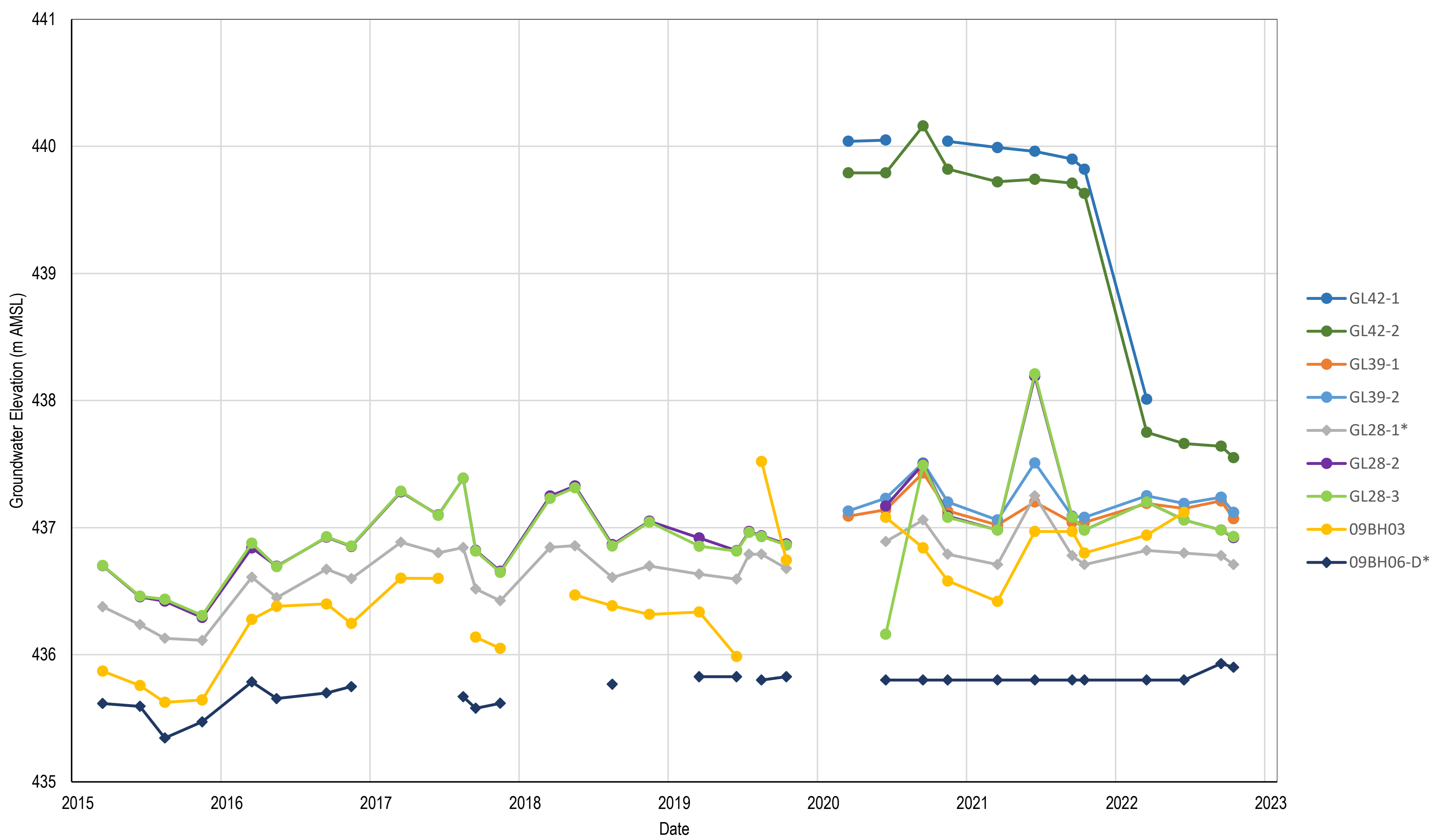
* Bedrock Well

CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY CHARACTERIZATION REPORT

Compost Vicinity Wells Hydrograph 2015-2022

Project No. **12605725**
Date **September 2023**

FIGURE E-3



NOTES

* Bedrock Well

Reference evelations were used for artesian wells

CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY CHARACTERIZATION REPORT

Downgradient Wells Hydrograph 2015-2022

Project No. **12605725**
Date **September 2023**

FIGURE E-4

Appendix F

Historical Water Quality Results

Table 1: Historical Summary of Analytical Results For Groundwater - Inorganics

			Physical Parameters														Dissolved Inorganics										
Sample	Sample	Sample Date	pH	Total Hardness	pH (field)	Conductivity	Field Conductivity	Total Dissolved Solids	Dissolved Organic Carbon	Phosphate	Ammonia, Total (as N)	Nitrate (as N)	Nitrite (as N)	Chloride	Fluoride	Sulfate	Total Alkalinity	Alkalinity, Bicarbonate (as CaCO3)	Alkalinity, Carbonate (as CaCO3)	Alkalinity, Hydroxide (as CaCO3)	Alkalinity, Phenolphthalein (as CaCO3)	Bromide	Hydrogen Sulfide	Sulfide	Chemical Oxygen Demand	Dissolved Phosphate	Ortho-Phosphate
Location	ID	(yyyy mm dd)	pH	mg/L	pH	µS/cm	µS/cm	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
09BH03	09BH03-20151105	2015 11 05	7.65	661	-	-	-	2,040	-	-	< 5.0	1,330	-	20	1,580	990	736	736	< 1.0	< 1.0	-	< 1.0	-	-	< 20	-	0.0079
	09BH03-20170601	2017 06 01	8.13	940	-	-	-	2,270	-	-	39.8	690	-	15	1,030	1,240	698	-	-	-	-	< 1.0	-	-	< 20	-	0.0087
	09BH03-180604	2018 06 04	7.53	1,130	6.87	-	3,665	2,800	7.39	0.0075	< 20	< 10	< 10	26.2	790	1,500	788	788	< 1.0	< 1.0	< 1.0	< 0.10	-	-	30	0.0075	-
	09BH03-190530	2019 05 30	7.80	929	6.81	-	3120	2,460	5.85	0.0090	274	1,880	< 10	27.9	1,510	1,090	780	780	< 1.0	< 1.0	< 1.0	< 0.10	-	-	26	0.0090	-
	09BH03-200609	2020 06 09	7.80	1,270	7.04	-	3,178	3,020	7.88	-	< 50	1,750	< 10	25.3	950	1,540	776	776	< 1.0	< 1.0	< 1.0	< 0.10	-	-	22	-	< 0.0050
	09BH03-210609	2021 06 09	7.94	812	7.08	-	2,869	1,800	7.73	-	120	1,010	< 100	11.1	< 1,000	939	713	713	< 1.0	< 1.0	< 1.0	< 1.00	-	-	< 20	-	< 0.0500
09BH04	09BH04-20151105	2015 11 05	7.19	1,120	-	-	-	2,730	-	-	346	< 100	-	31	1,350	1,130	1,400	1,400	< 1.0	< 1.0	-	< 1.0	-	-	22	-	0.0012
09BH06-S	09BH06-S-20131112	2013 11 12	-	353	-	-	-	700	-	-	87	< 50	-	8.3	940	230	392	-	-	-	-	-	-	-	< 20	-	-
	09BH06-S-20140602	2014 06 02	-	358	-	-	-	700	-	-	91	< 50	-	10.9	1,010	244	379	-	-	-	-	< 0.50	-	-	< 20	-	0.0199
	09BH06-S-20141117	2014 11 17	-	354	-	-	-	713	-	-	94	< 50	-	8	1,010	256	399	-	-	-	-	< 0.50	-	-	< 20	-	0.0177
	09BH06-S-20150610	2015 06 10	8.22	351	-	-	-	716	-	-	95.1	< 25	-	7.1	960	252	394	-	-	-	-	< 0.25	-	-	< 20	-	0.0205
	09BH06-S-20151105	2015 11 05	7.91	349	-	-	-	724	-	-	101	< 25	-	7.6	980	282	362	362	< 1.0	< 1.0	-	< 0.25	-	-	< 20	-	0.0157
09BH06-D	09BH06-D-20131112	2013 11 12	-	372	-	-	-	706	-	-	94	< 50	-	9.1	940	243	397	-	-	-	-	-	-	-	< 20	-	-
	DUP4-20131112	Duplicate	-	369	-	-	-	715	-	-	92	< 50	-	9	950	244	383	-	-	-	-	-	-	-	< 20	-	-
	QA/QC RPD%		-	1	-	-	-	1	-	-	2	*	-	1	1	0	4	-	-	-	-	-	-	-	*	-	-
	09BH06-D-20140602	2014 06 02	-	366	-	-	-	720	-	-	96	< 50	-	9.5	1,000	254	376	-	-	-	-	< 0.50	-	-	< 20	-	0.0125
	09BH06-D-20141117	2014 11 17	-	372	-	-	-	743	-	-	99.5	< 50	-	8.3	1,010	272	407	-	-	-	-	< 0.50	-	-	42	-	0.009
	09BH06-D-20150610	2015 06 10	8.21	385	-	-	-	770	-	-	102	< 25	-	7.9	940	285	398	-	-	-	-	< 0.25	-	-	< 20	-	0.0107
	09BH06-D-20151105	2015 11 05	7.93	369	-	-	-	760	-	-	100	< 25	-	7.7	940	295	365	365	< 1.0	< 1.0	-	< 0.25	-	-	< 20	-	0.008
	09BH06-D-20170606	2017 06 06	8.42	364	-	-	-	699	-	-	107	< 25	-	8.2	970	286	343	-	-	-	-	< 0.25	-	-	< 20	-	0.0092
	09BH06-D-180604	2018 06 04	7.76	387	6.99	-	1,289	800	2.98	0.0055	167	< 10	< 10	7.16	450	282	355	355	< 1.0	< 1.0	< 1.0	< 0.10	-	-	< 20	0.0055	-
	09BH06-D-190528	2019 05 28	8.04	435	7.08	-	1,229	968	2.88	0.0073	199	< 10	< 10	9.45	800	392	377	377	< 1.0	< 1.0	< 1.0	< 0.10	-	-	< 20	0.0073	-
	09BH06-D-200609	2020 06 09	7.95	422	7.3	-	1,038	849	2.26	-	96	< 10	< 10	8.22	790	327	373	373	< 1.0	< 1.0	< 1.0	< 0.10	-	-	< 20	-	< 0.0050
	09BH06-D-210608	2021 06 08	8.08	333	7.40	-	1,142	742	2.54	-	120	< 10	< 10	6.95	960	278	357	357	< 1.0	< 1.0	< 1.0	< 0.10	-	-	< 20	-	< 0.0050
GL0-1	GL0-1-20130625	2013 06 25	-	427	-	-	-	771	-	-	91.9	< 50	-	7.9	1,170	373	205	-	-	-	-	< 0.50	-	-	< 20	-	-
	GL0-1-20140603	2014 06 03	-	416	-	-	-	711	-	-	52.9	99	-	9.1	1,010	348	205	-	-	-	-	< 0.50	-	-	< 20	-	0.0596
	GL0-1-20141124	2014 11 24	-	436	-	-	-	711	-	-	58.4	< 50	-	9.3	970	355	209	-	-	-	-	< 0.50	-	-	< 20	-	0.0519
	DUP1-20141124	Duplicate	-	430	-	-	-	680	-	-	62.1	< 50	-	7.9	1,140	355	205	-	-	-	-	< 0.50	-	-	< 20	-	0.0518
	QA/QC RPD%		-	1	-	-	-	4	-	-	6	*	-	16	16	0	2	-	-	-	-	*	-	-	*	-	0
	GL0-1-20150608	2015 06 08	7.59	423	-	-	-	665	-	-	48.9	116	-	7.3	884	345	209	-	-	-	-	< 0.10	-	-	< 20	-	0.0637
	GL0-1-20151103	2015 11 03	7.65	423	-	-	-	682	-	-	77.4	< 25	-	7.1	990	354	206	-	-	-	-	< 0.25	-	-	< 20	-	0.0617
	GL0-1-20160524	2016 05 24	8.19	423	-	-	-	673	-	-	38.4	65	-	7.1	980	346	198	198	< 1.0	< 1.0	-	< 0.25	-	-	< 20	-	0.0555
	GL0-1-20170524	2017 05 24	8.32	418	-	-	-	671	-	-	9.7	131	-	7.2	1,000	350	196	-	-	-	-	< 0.25	-	-	< 20	-	0.0614
	GL0-1-180529	2018 05 29	7.81	415	7.65	-	934	690	0.87	0.0516	43	82	< 10	6.47	640	281	187	187	< 1.0	< 1.0	< 1.0	< 1.00	-	-	< 20	0.0516	-
	GL0-1-190523	2019 05 23	8.09	384	7.65	-	859	691	1.69	0.0174	< 20	109	< 10	6.33	730	326	191	191	< 1.0	< 1.0	< 1.0	< 0.10	-	-	< 20	0.0174	-
	GL0-1-200310	2020 03 10	7.94	405	-	-	-	705	1.01	-	284	49	< 10	6.82	860	316	189	189	< 1.0	< 1.0	< 1.0	< 0.10	-	-	< 20	-	0.0175

Associated CARO files available upon request.
Associated Exova file(s): 712940, 714233, 714243, 756693, 756810, 757047, 811364, 811710, 812030, 812741, 812985, 813438, 846260, 878316, 879073, 909346, 909448, 909654.
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RDL Denotes reported detection limit.

Table 1: Historical Summary of Analytical Results For Groundwater - Inorganics

			Physical Parameters														Dissolved Inorganics										
Sample Location	Sample ID	Sample Date (yyyy mm dd)	pH (pH)	Total Hardness (mg/L)	pH (field) (pH)	Conductivity (µS/cm)	Field Conductivity (µS/cm)	Total Dissolved Solids (mg/L)	Dissolved Organic Carbon (mg/L)	Phosphate (mg/L)	Ammonia, Total (as N) (µg/L)	Nitrate (as N) (µg/L)	Nitrite (as N) (µg/L)	Chloride (mg/L)	Fluoride (µg/L)	Sulfate (mg/L)	Total Alkalinity (mg/L)	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	Alkalinity, Carbonate (as CaCO3) (mg/L)	Alkalinity, Hydroxide (as CaCO3) (mg/L)	Alkalinity, Phenolphthalein (as CaCO3) (mg/L)	Bromide (mg/L)	Hydrogen Sulfide (mg/L)	Sulfide (mg/L)	Chemical Oxygen Demand (mg/L)	Dissolved Phosphate (mg/L)	Ortho-Phosphate (mg/L)
GL0-2	GL0-2-20130627	2013 06 27	-	506	-	-	-	956	-	-	183	6,410	-	49.4	1,410	395	294	-	-	-	-	< 0.50	-	-	< 20	-	-
	GL0-2-20140603	2014 06 03	-	465	-	-	-	744	-	-	101	181	-	20.9	1,240	326	255	-	-	-	-	< 0.50	-	-	< 20	-	0.0591
	GL0-2-20141124	2014 11 24	-	496	-	-	-	814	-	-	92.6	1,820	-	26.3	1,220	341	268	-	-	-	-	< 0.50	-	-	< 20	-	0.0553
	GL0-2-20150608	2015 06 08	7.8	479	-	-	-	675	-	-	213	< 10	-	9.6	1,090	317	273	-	-	-	-	< 0.10	-	-	< 20	-	0.0399
	GL0-2-20151103	2015 11 03	7.94	500	-	-	-	726	-	-	171	< 25	-	12.1	1,190	317	268	-	-	-	-	< 0.25	-	-	< 20	-	0.0446
	DUP1-20151103	Duplicate	7.94	510	-	-	-	774	-	-	167	49	-	13.1	1,220	326	255	-	-	-	-	< 0.25	-	-	< 20	-	0.0446
	QA/QC RPD%		0	2	-	-	-	6	-	-	2	*	-	8	2	3	5	-	-	-	-	*	-	-	*	-	0
	GL0-2-20160524	2016 05 24	8.22	468	-	-	-	700	-	-	208	< 25	-	6.8	1,240	310	266	266	< 1.0	< 1.0	-	< 0.25	-	-	< 20	-	0.0423
	GL0-2-20170524	2017 05 24	8.4	482	-	-	-	696	-	-	173	< 25	-	7.1	1,320	325	258	-	-	-	-	< 0.25	-	-	< 20	-	0.0463
	GL0-2-180529	2018 05 29	7.82	473	7.43	-	931	726	1.12	0.0173	211	< 10	< 10	9.63	1,050	296	258	258	< 1.0	< 1.0	< 1.0	< 1.00	-	-	< 20	0.0173	-
	DUP2-180529	Duplicate	7.85	469	7.43	-	931	698	1.17	0.0093	214	< 10	< 10	9.45	1,100	294	260	260	< 1.0	< 1.0	< 1.0	< 1.00	-	-	< 20	0.0093	-
	QA/QC RPD%		0	1	*	-		4	*	*	1	*	*	2	5	1	1	1	*	*	*	*	-	-	*	*	-
	GL0-2-190529	2019 05 29	8.01	546	7.5	-	1406	1,050	3.70	< 0.0050	173	16,800	47	71.6	1,050	349	340	340	< 1.0	< 1.0	< 1.0	< 1.00	-	-	< 20	< 0.0050	-
	GL0-2-200310	2020 03 10	7.95	456	-	-	-	721	1.18	-	317	< 10	< 10	7.88	1,150	303	255	255	< 1.0	< 1.0	< 1.0	< 0.10	-	-	< 20	-	0.0134
GL0-3	GL0-3-20130627	2013 06 27	-	762	-	-	-	1,500	-	-	< 5.0	49,500	-	123	1,580	400	436	-	-	-	-	< 1.0	-	-	27	-	-
	GL0-3-20140603	2014 06 03	-	747	-	-	-	1,440	-	-	< 5.0	48,600	-	124	1,190	385	445	-	-	-	-	< 1.0	-	-	20	-	0.0096
	GL0-3-20141124	2014 11 24	-	797	-	-	-	1,440	-	-	11.8	49,300	-	127	1,160	390	457	-	-	-	-	< 1.0	-	-	< 20	-	0.0059
	GL0-3-20150608	2015 06 08	7.65	772	-	-	-	1,390	-	-	13	47,700	-	121	1,120	391	456	-	-	-	-	< 0.50	-	-	48	-	0.0069
	GL0-3-20151103	2015 11 03	7.53	751	-	-	-	1,460	-	-	7.5	47,600	-	121	1,130	382	422	-	-	-	-	< 0.50	-	-	< 20	-	0.0068
	GL0-3-20160524	2016 05 24	8.1	754	-	-	-	1,450	-	-	9.6	49,100	-	127	1,220	401	442	442	< 1.0	< 1.0	-	< 1.0	-	-	< 20	-	0.0054
	GL0-3-20170524	2017 05 24	8.05	769	-	-	-	1,420	-	-	13.3	48,700	-	131	1,110	368	396	-	-	-	-	< 1.0	-	-	< 20	-	0.0063
	GL0-3-180529	2018 05 29	7.81	799	7.28	-	1826	1,480	5.47	0.0084	38	44,700	< 10	121	990	293	481	481	< 1.0	< 1.0	< 1.0	< 1.00	-	-	22	0.0084	-
	GL0-3-190529	2019 05 29	7.77	1,110	7.12	-	2776	2,060	6.89	< 0.0050	82	67,000	12	154	920	613	525	525	< 1.0	< 1.0	< 1.0	< 1.00	-	-	< 20	< 0.0050	-
	GL0-3-200310	2020 03 10	7.82	1,000	-	-	-	1,970	6.19	-	56	55,800	< 10	139	930	505	491	491	< 1.0	< 1.0	< 1.0	< 1.00	-	-	31	-	< 0.0050
GL1-1	GL 1-1-20091109	2009 11 09	-	866	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL1-1-20100810	2010 08 10	-	790	-	-	-	1,250	-	-	30	-	-	169	-	222	656	-	-	-	-	-	-	-	40	-	0.007
	GL30-1-20100810	Duplicate	-	780	-	-	-	1,300	-	-	40	-	-	168	-	219	660	-	-	-	-	-	-	-	10	-	0.008
	QA/QC RPD%		-	1	-	-	-	4	-	-	29	-	-	1	-	1	1	-	-	-	-	-	-	-	*	-	13
	GL1-1-20160531	2016 05 31	7.43	-	-	-	-	1,290	-	-	< 20	633	-	237	1,520	244	664	-	-	-	-	-	-	-	-	-	< 0.01
	GL1-1-20180927	2018 09 27	-	730	-	-	-	-	-	-	45	12	-	157	1,420	253	-	-	-	-	-	< 0.10	-	-	-	-	< 0.0050
	GL1-1-180612	2018 06 12	7.75	743	-	-	-	1,160	-	0.0115	62	58	< 10	173	1,250	242	627	627	< 1.0	< 1.0	< 1.0	< 0.10	-	-	-	0.0115	-
	GL1-1-190917	2019 09 17	7.94	763	-	-	-	1,200	4.15	-	76	< 10	< 10	153	1,520	269	628	628	< 1.0	< 1.0	< 1.0	< 0.10	-	-	-	-	< 0.0050
	GL1-1-200910	2020 09 10	8.12	746	-	-	-	1,200	3.45	-	52	< 10	< 10	131	1,570	284	646	646	< 1.0	< 1.0	< 1.0	< 0.10	-	-	-	-	< 0.0050

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Table 1: Historical Summary of Analytical Results For Groundwater - Inorganics

			Physical Parameters														Dissolved Inorganics										
Sample Location	Sample ID	Sample Date (yyyy mm dd)	pH	Total Hardness	pH (field)	Conductivity	Field Conductivity	Total Dissolved Solids	Dissolved Organic Carbon	Phosphate	Ammonia, Total (as N)	Nitrate (as N)	Nitrite (as N)	Chloride	Fluoride	Sulfate	Total Alkalinity	Alkalinity, Bicarbonate (as CaCO3)	Alkalinity, Carbonate (as CaCO3)	Alkalinity, Hydroxide (as CaCO3)	Alkalinity, Phenolphthalein (as CaCO3)	Bromide	Hydrogen Sulfide	Sulfide	Chemical Oxygen Demand	Dissolved Phosphate	Ortho-Phosphate
			pH	mg/L	pH	µS/cm	µS/cm	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
GL1-2	GL 1-2-20091109	2009 11 09	-	909	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL1-2-20100810	2010 08 10	-	840	-	-	-	1,140	-	-	< 10	-	-	191	-	201	675	-	-	-	-	-	-	-	60	-	0.006
	GL1-2-20160531	2016 05 31	7.66	-	-	-	-	1,190	-	-	< 20	29	-	232	1,420	209	660	-	-	-	-	-	-	-	-	-	< 0.01
	GL1-2-180612	2018 06 12	7.84	790	-	-	-	1,230	-	0.0102	71	< 10	< 10	216	1,270	238	640	640	< 1.0	< 1.0	< 1.0	< 0.10	-	-	-	0.0102	-
	GL1-2-20180927	2018 09 27	-	759	-	-	-	-	-	-	< 20	44	-	181	1,100	228	-	-	-	-	-	< 0.10	-	-	-	-	< 0.0050
	GL1-2-190917	2019 09 17	7.98	762	-	-	-	1,240	4.46	-	32	< 10	< 10	166	1,330	256	662	662	< 1.0	< 1.0	< 1.0	< 0.10	-	-	-	-	< 0.0050
	GL1-2-200910	2020 09 10	8.14	814	-	-	-	1,300	4.98	-	< 50	< 10	< 10	117	1,430	283	676	676	< 1.0	< 1.0	< 1.0	< 0.10	-	-	-	-	< 0.0050
GL2-1	GL 2-1-20091109	2009 11 09	-	348	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL 2-1-20120627	2012 06 27	-	380	-	-	-	670	-	-	50	-	-	22.5	-	212	306	-	-	-	-	-	-	-	10	-	0.004
	GL2-1-20100810	2010 08 10	-	360	-	-	-	604	-	-	40	-	-	16.8	-	170	317	-	-	-	-	-	-	-	< 10	-	0.004
	GL30-2-20100810	Duplicate	-	350	-	-	-	650	-	-	30	-	-	15.9	-	173	320	-	-	-	-	-	-	-	< 10	-	0.006
	QA/QC RPD%		-	3	-	-	-	7	-	-	29	-	-	6	-	2	1	-	-	-	-	-	-	-	*	-	*
	GL2-1-20110629	2011 06 29	-	359	-	-	-	638	-	-	50	-	-	21.3	-	203	302	-	-	-	-	-	-	-	< 10	-	0.09
	GL2-1-20111217	2011 12 17	-	372	-	-	-	640	-	-	20	< 10	-	18.1	-	207	332	-	-	-	-	-	-	-	< 10	-	< 0.01
	GL2-1-20121204	2012 12 04	-	348	-	-	-	642	-	-	90	< 100	-	18	-	192	326	-	-	-	-	-	-	-	14	-	< 0.002
	GL2-1-20130626	2013 06 26	-	418	-	-	-	660	-	-	34.3	< 50	-	23.2	830	225	291	-	-	-	-	< 0.50	-	-	< 20	-	-
	GL2-1-20140603	2014 06 03	-	418	-	-	-	707	-	-	17	54	-	32	770	266	292	-	-	-	-	< 0.50	-	-	< 20	-	0.0034
	DUP3-20140603	Duplicate	-	412	-	-	-	710	-	-	17.2	82	-	33	750	260	293	-	-	-	-	< 0.50	-	-	< 20	-	0.0031
	QA/QC RPD%		-	1	-	-	-	0	-	-	*	41	-	3	3	2	0	-	-	-	-	*	-	-	*	-	*
	GL2-1-20141124	2014 11 24	-	429	-	-	-	688	-	-	39.8	372	-	27.8	790	233	275	-	-	-	-	< 0.50	-	-	< 20	-	0.0044
	GL2-1-20150608	2015 06 08	7.89	444	-	-	-	713	-	-	14.6	36	-	34.5	730	281	306	-	-	-	-	0.31	-	-	< 20	-	0.0027
	GL2-1-20151103	2015 11 03	8.05	424	-	-	-	688	-	-	37.1	< 25	-	28.2	760	246	358	-	-	-	-	0.27	-	-	< 20	-	0.0028
	GL2-1-20160524	2016 05 24	8.21	445	-	-	-	730	-	-	< 5.0	97	-	34.9	720	275	289	289	< 1.0	< 1.0	-	0.31	-	-	< 20	-	0.0033
	DUP2-20160524	Duplicate	8.2	439	-	-	-	718	-	-	< 5.0	68	-	35.9	740	283	289	289	< 1.0	< 1.0	-	0.35	-	-	< 20	-	0.0027
	QA/QC RPD%		0	1	-	-	-	2	-	-	*	35	-	3	3	3	0	0	*	*	-	*	-	-	*	-	*
	GL2-1-20170524	2017 05 24	8.25	466	-	-	-	815	-	-	53.7	< 25	-	45.3	670	323	259	-	-	-	-	0.39	-	-	< 20	-	0.0016
	GL2-1-180528	2018 05 28	7.90	457	-	-	-	845	1.46	< 0.0050	92	< 250	< 250a	35.6	510	319	257	257	< 1.0	< 1.0	< 1.0	< 2.50	-	-	< 20	< 0.0050	-
	GL2-1-190523	2019 05 23	8.11	505	7.57	-	1119	903	1.77	< 0.0050	63	16	< 10	46.4	510	370	260	260	< 1.0	< 1.0	< 1.0	0.32	-	-	< 20	< 0.0050	-
	GL2-1-200609	2020 06 09	7.90	556	7.36	-	1,202	970	1.54	-	90	< 1,000	< 1,000a	54.0	< 10,000a	410	254	254	< 1.0	< 1.0	< 1.0	< 10.0	-	-	< 20	-	< 0.500
	GL2-1-200820	2020 08 20	8.10	473	7.46	-	1,435	1,000	1.72	-	73	-	-	63.4	-	-	237	237	< 1.0	< 1.0	< 1.0	0.44	-	-	< 20	-	< 0.0050
	DUPA-200820	Duplicate	8.10	476	7.46	-	1,435	992	2.18	-	69	-	-	63.2	-	-	240	240	< 1.0	< 1.0	< 1.0	0.44	-	-	< 20	-	< 0.0050
	QA/QC RPD%		0	1	*	-	*	1	*	-	*	-	-	0	-	-	1	1	*	*	*	*	-	-	*	-	*
	GL2-1-201019	2020 10 19	8.10	513	7.6	-	1,508	1,030	2.10	-	131	< 10	< 10	66.4	580	443	216	216	< 1.0	< 1.0	< 1.0	0.50	-	-	< 20	-	< 0.0050
	GL2-1-210512	2021 05 12	8.06	515	7.55	-	1,440	1,020	1.71	-	58	< 10	< 10	64.5	510	415	240	240	< 1.0	< 1.0	< 1.0	0.53	-	-	< 20	-	< 0.0050
	GL2-1-211005	2021 10 05	7.85	583	7.55	-	1,440	1,100	1.98	-	99	< 10	< 10	75.5	600	517	232	232	< 1.0	< 1.0	< 1.0	< 1.00	-	-	< 20	-	< 0.0050
GL2-2	GL 2-2-20091109	2009 11 09	-	359	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL2-2-20100810	2010 08 10	-	350	-	-	-	598	-	-	< 10	-	-	16.1	-	129	352	-	-	-	-	-	20	-		-	0.016
	GL2-2-200826	2020 08 26	8.06	405	7.36	-	1,142	751	1.29	-	< 50	< 100	< 100	37.4	< 1,000	273	305	305	< 1.0	< 1.0	< 1.0	< 1.00	< 20	-		-	< 0.0500
	GL2-2-201020	2020 10 20	7.91	464	7.55	-	1,234	810	1.25	-	< 50	< 10	< 10	46.7	660	309	283	283	< 1.0	< 1.0	< 1.0	0.29	< 20	-		-	< 0.0050
	GL2-2-210513	2021 05 13	7.91	485	7.49	-	1,280	891	2.74	-	< 50	< 10	< 10	50.7	660	352	280	280	< 1.0	< 1.0	< 1.0	0.39	36	-		-	< 0.0050
	GL2-2-211005	2021 10 05	7.92	511	7.45	-	1,199	894	1.72	-	61	< 10	< 10	48.1	620	370	285	285	< 1.0	< 1.0	< 1.0	< 1.00	< 20	-		-	< 0.0050
GL3-2	GL3-2-20091116	2009 11 16	-	337	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-
	GL3-2-20100810	2010 08 10	-	320	-	-	-	750	-	-	140	-	-	9.52	-	278	379	-	-	-	-	-	10	-		-	0.024

Associated CARO files available upon request.
Associated Exova file(s): 712940, 714233, 714243, 756693, 756810, 757047, 811364, 811710, 812030, 812741, 812985, 813438, 846260, 878316, 879073, 909346, 909448, 909654.
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RDL Denotes reported detection limit.

Table 1: Historical Summary of Analytical Results For Groundwater - Inorganics

Sample Location	Sample ID	Sample Date	Physical Parameters														Dissolved Inorganics										
			pH	Total Hardness	pH (field)	Conductivity	Field Conductivity	Total Dissolved Solids	Dissolved Organic Carbon	Phosphate	Ammonia, Total (as N)	Nitrate (as N)	Nitrite (as N)	Chloride	Fluoride	Sulfate	Total Alkalinity	Alkalinity, Bicarbonate (as CaCO3)	Alkalinity, Carbonate (as CaCO3)	Alkalinity, Hydroxide (as CaCO3)	Alkalinity, Phenolphthalein (as CaCO3)	Bromide	Hydrogen Sulfide	Sulfide	Chemical Oxygen Demand	Dissolved Phosphate	Ortho-Phosphate
		(yyyy mm dd)	pH	mg/L	pH	µS/cm	µS/cm	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
GL3-5	GL3-5-20130627	2013 06 27	-	1,260	-	-	-	1,950	-	-	48,000	< 100	-	90	960	< 10	2,100	-	-	-	-	< 1.0	-	-	152	-	-
	GL3-5 (2012)-20140609	2014 06 09	-	1,230	-	-	-	1,920	-	-	53,800	100	-	94	680	< 10	2,020	-	-	-	-	< 1.0	-	-	152	-	0.0016
	GL3-5 (2012)-20141125	2014 11 25	-	1,330	-	-	-	2,030	-	-	48,600	< 100	-	98	730	< 6.0	1,990	-	-	-	-	< 1.0	-	-	148	-	0.0018
	GL3-5 (2012)-20150609	2015 06 09	7.43	1,240	-	-	-	1,850	-	-	52,700	< 50	-	93.7	640	< 3.0	2,110	-	-	-	-	0.74	-	-	139	-	0.0015
	DUP1-20150609	Duplicate	7.41	1,230	-	-	-	1,860	-	-	48,100	< 25	-	92.6	600	< 1.5	2,140	-	-	-	-	0.8	-	-	138	-	0.0017
	QA/QC RPD%		0	1	-	-	-	1	-	-	9	*	-	1	6	*	1	-	-	-	-	8	-	-	1	-	*
	GL3-5 (2012)-20151109	2015 11 09	6.8	1,280	-	-	-	1,990	-	-	49,900	< 100	-	93	940	< 6.0	1,960	-	-	-	-	< 1.0	-	-	139	-	< 0.0010
GL4-1	GL 4-1-20091110	2009 11 10	-	630	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL 4-1-20120626	2012 06 26	-	-	-	-	-	1,170	-	-	-	-	-	7.4	-	142	792	-	-	-	-	-	-	-	-	-	-
	GL 4-1-20120704	2012 07 04	-	580	-	-	-	-	-	-	8,700	-	-	-	-	-	-	-	-	-	-	-	-	-	70	-	1.4
	GL4-1-20100810	2010 08 10	-	600	-	-	-	1,210	-	-	20	-	-	10.4	-	474	542	-	-	-	-	-	-	-	< 10	-	0.012
	GL4-1-20110629	2011 06 29	-	613	-	-	-	1,190	-	-	760	-	-	10.6	-	442	571	-	-	-	-	-	-	-	10	-	0.148
	GL4-1-20120625	2012 06 25	-	610	-	-	-	1,230	-	-	2,520	-	-	13.7	-	432	577	-	-	-	-	-	-	-	30	-	0.16
	GL4-1-20121203	2012 12 03	-	548	-	-	-	1,210	-	-	170	< 100	-	12.1	-	458	542	-	-	-	-	-	-	-	20	-	0.008
	GL4-1-20130627	2013 06 27	-	622	-	-	-	1,140	-	-	105	< 100	-	12	2,660	501	583	-	-	-	-	< 1.0	-	-	< 20	-	-
	DUP4-20130627	Duplicate	-	638	-	-	-	1,130	-	-	102	< 100	-	13	2,520	501	560	-	-	-	-	< 1.0	-	-	< 20	-	-
	QA/QC RPD%		-	3	-	-	-	1	-	-	3	*	-	8	5	0	4	-	-	-	-	*	-	-	*	-	-
	GL4-1-20140603	2014 06 03	-	597	-	-	-	1,140	-	-	94.6	< 100	-	15	2,180	482	527	-	-	-	-	< 1.0	-	-	< 20	-	0.006
	GL4-1-20141124	2014 11 24	-	646	-	-	-	1,160	-	-	102	< 100	-	16	2,510	514	524	-	-	-	-	< 1.0	-	-	< 20	-	0.0057
	GL4-1-20150608	2015 06 08	8	625	-	-	-	1,110	-	-	102	< 50	-	12.9	2,100	505	536	-	-	-	-	< 0.50	-	-	< 20	-	0.0068
	GL4-1-20151104	2015 11 04	8.09	591	-	-	-	1,130	-	-	117	< 50	-	12.2	2,010	492	522	-	-	-	-	< 0.50	-	-	< 20	-	0.0052
	GL4-1-200814	2020 08 14	8.18	642	7.95	-	1,846	1,280	2.82	-	126	< 100	< 100	16.7	1,540	498	563	563	< 1.0	< 1.0	< 1.0	< 1.00	-	-	< 20	-	< 0.0500
	GL4-1-201016	2020 10 16	8.11	616	7.69	-	1,582	1,260	3.18	-	116	< 10	< 10	17.7	1,900	501	536	536	< 1.0	< 1.0	< 1.0	< 0.10	-	-	< 20	-	< 0.0050
	GL4-1-210511	2021 05 11	8.17	618	7.62	-	1,831	1,300	5.18	-	113	11	< 10	16.6	1,910	482	562	562	< 1.0	< 1.0	< 1.0	< 0.10	-	-	< 20	-	< 0.0050
	GL4-1-211005	2021 10 05	8.00	632	7.55	-	1,747	1,320	3.04	-	148	< 10	< 10	15.5	1,930	534	555	555	< 1.0	< 1.0	< 1.0	< 1.00	-	-	< 20	-	< 0.0050
GL4-2	GL4-2-20091116	2009 11 16	-	1,040	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL4-2-20100810	2010 08 10	-	1,000	-	-	-	1,760	-	-	< 10	-	-	51.2	-	395	956	-	-	-	-	-	-	-	20	-	0.011
	GL4-2-20110629	2011 06 29	-	1,010	-	-	-	1,540	-	-	240	-	-	57	-	390	934	-	-	-	-	-	-	-	10	-	0.211
	GL4-2-20120626	2012 06 26	-	1,000	-	-	-	1,550	-	-	140	-	-	51.1	-	386	1,000	-	-	-	-	-	-	-	20	-	0.021
	GL4-2-20121203	2012 12 03	-	973	-	-	-	1,700	-	-	< 10	< 100	-	40.5	-	292	926	-	-	-	-	-	-	-	30	-	0.022
	GL4-2-200814	2020 08 14	8.04	846	7.71	-	2,259	1,610	5.89	-	< 50	< 100	< 100	61.7	2,040	480	845	845	< 1.0	< 1.0	< 1.0	< 1.00	-	-	< 20	-	< 0.0500
	GL4-2-201030	2020 10 30	8.01	765	7.46	-	2,207	1,460	4.41	-	< 50	< 10	< 10	49.4	2,520	473	812	812	< 1.0	< 1.0	< 1.0	0.27	-	-	< 20	-	< 0.0050
	GL4-2-210511	2021 05 11	8.13	818	7.43	-	2,200	1,500	6.52	-	< 50	< 10	< 10	55.6	2,510	456	807	807	< 1.0	< 1.0	< 1.0	< 1.00	-	-	< 20	-	< 0.0050
	GL4-2-211005	2021 10 05	7.95	829	7.40	-	2,023	1,760	4.25	-	59	< 10	< 10	46.0	2,670	475	843	843	< 1.0	< 1.0	< 1.0	< 1.00	-	-	< 20	-	< 0.0050
GL5-1	GL5-1-20091116	2009 11 16	-	77	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL5-1-20100810	2010 08 10	-	110	-	-	-	1,690	-	-	250	-	-	42.2	-	283	1,210	-	-	-	-	-	-	-	< 10	-	0.002
	GL5-2-20180528	2018 05 28	7.83	671	-	-	-	1,370	-	-	52	6,270	-	266	500	201	472	472	< 1.0	< 1.0	-	< 5.00	-	-	< 20	-	< 0.0050

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			Physical Parameters														Dissolved Inorganics										
Sample Location	Sample ID	Sample Date	pH	Total Hardness	pH (field)	Conductivity	Field Conductivity	Total Dissolved Solids	Dissolved Organic Carbon	Phosphate	Ammonia, Total (as N)	Nitrate (as N)	Nitrite (as N)	Chloride	Fluoride	Sulfate	Total Alkalinity	Alkalinity, Bicarbonate (as CaCO3)	Alkalinity, Carbonate (as CaCO3)	Alkalinity, Hydroxide (as CaCO3)	Alkalinity, Phenolphthalein (as CaCO3)	Bromide	Hydrogen Sulfide	Sulfide	Chemical Oxygen Demand	Dissolved Phosphate	Ortho-Phosphate
		(yyyy mm dd)	pH	mg/L	pH	µS/cm	µS/cm	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
GL5-2	GL5-2-20091116	2009 11 16	-	602	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL30-1-20091116	Duplicate	-	597	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	QA/QC RPD%		-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL5-2-20100810	2010 08 10	-	640	-	-	-	1,050	-	-	< 10	-	-	183	-	168	527	-	-	-	-	-	-	-	10	-	0.006
	GL30-3-20100810	Duplicate	-	640	-	-	-	1,120	-	-	< 10	-	-	181	-	167	526	-	-	-	-	-	-	-	10	-	0.007
	QA/QC RPD%		-	0	-	-	-	6	-	-	*	-	-	1	-	1	0	-	-	-	-	-	-	-	*	-	15
	GL5-2-20110704	2011 07 04	-	778	-	-	-	1,080	-	-	40	-	-	228	-	153	560	-	-	-	-	-	-	-	20	-	0.005
	GL 5-2-20120627	2012 06 27	-	710	-	-	-	1,160	-	-	< 10	-	-	243	-	171	522	-	-	-	-	-	-	-	10	-	0.005
	DUP C-20120627	Duplicate	-	730	-	-	-	1,130	-	-	30	-	-	246	-	171	520	-	-	-	-	-	-	-	40	-	0.005
	QA/QC RPD%		-	3	-	-	-	3	-	-	*	-	-	1	-	0	0	-	-	-	-	-	-	-	*	-	0
	GL5-2-20121205	2012 12 05	-	659	-	-	-	1,060	-	-	< 10	< 1,000	-	193	-	191	551	-	-	-	-	-	-	-	21	-	0.005
	GL5-2-20130626	2013 06 26	-	726	-	-	-	1,150	-	-	< 5.0	< 100	-	256	1,160	181	580	-	-	-	-	< 1.0	-	-	37	-	-
	GL5-2-20131114	2013 11 14	-	687	-	-	-	1,110	-	-	< 5.0	< 100	-	226	980	207	803	-	-	-	-	< 1.0	-	-	< 20	-	-
	GL5-2-20140603	2014 06 03	-	655	-	-	-	1,130	-	-	< 5.0	< 100	-	248	980	191	600	-	-	-	-	< 1.0	-	-	21	-	0.0046
	GL5-2-20141118	2014 11 18	-	636	-	-	-	1,000	-	-	5.9	< 100	-	176	940	210	691	-	-	-	-	< 1.0	-	-	< 20	-	0.0046
	DUP2-20141118	Duplicate	-	635	-	-	-	1,070	-	-	< 5.0	< 100	-	177	950	211	683	-	-	-	-	< 1.0	-	-	24	-	0.0047
	QA/QC RPD%		-	0	-	-	-	7	-	-	*	*	-	1	1	0	1	-	-	-	-	*	-	-	*	-	*
	GL5-2-20150608	2015 06 08	7.65	956	-	-	-	1,890	-	-	< 5.0	2,060	-	739	790	176	630	-	-	-	-	< 1.0	-	-	31	-	0.0036
	GL5-2-20151103	2015 11 03	7.94	623	-	-	-	1,060	-	-	5	< 50	-	165	940	219	539	-	-	-	-	< 0.50	-	-	< 20	-	0.0049
	GL5-2-20160526	2016 05 26	7.97	879	-	-	-	1,960	-	-	< 5.0	5,370	-	719	900	215	475	-	-	-	-	< 1.0	-	-	< 20	-	0.0031
	GL5-2-20170525	2017 05 25	8.22	782	-	-	-	1,690	-	-	< 5.0	5,720	-	550	840	209	510	-	-	-	-	< 1.0	-	-	< 20	-	0.0037
	DUP1-20170525	Duplicate	8.28	787	-	-	-	1,670	-	-	< 5.0	5,670	-	543	850	207	437	-	-	-	-	< 1.0	-	-	< 20	-	0.0038
	QA/QC RPD%		1	1	-	-	-	1	-	-	*	1	-	1	1	1	15	-	-	-	-	*	-	-	*	-	*
	GL5-2-180528	2018 05 28	7.83	671	7.08	-	2,100	1,370	4.60	< 0.0050	52	6,270	< 10	266	500	201	472	472	< 1.0	< 1.0	< 1.0	< 5.00	-	-	< 20	< 0.0050	-
	GL5-2-190527	2019 05 27	7.96	638	7.43	-	2396	1,300	4.40	0.0051	38	9,010	< 10	319	650	332	488	488	< 1.0	< 1.0	< 1.0	0.24	-	-	< 20	0.0051	-
	GL5-2-200611	2020 06 11	7.83	501	7.21	-	1,529	1,120	2.31	-	< 50	310	< 100	179	< 1,000	243	522	522	< 1.0	< 1.0	< 1.0	< 1.00	-	-	48	-	< 0.0500
	GL5-2-210603	2021 06 03	8.05	709	7.20	-	2,417	1,390	3.35	-	< 50	1,840	< 10	353	800	249	490	490	< 1.0	< 1.0	< 1.0	0.52	-	-	26	-	< 0.0050
GL5-3	GL5-3-20091116	2009 11 16	-	596	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL5-3-20100810	2010 08 10	-	600	-	-	-	974	-	-	< 10	-	-	180	-	155	474	-	-	-	-	-	-	-	20	-	0.022
GL6-1 (2011)	GL 6-1-20091110	2009 11 10	-	3,530	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL6-1-20110704	2011 07 04	-	1,220	-	-	-	9,120	-	-	230,000	-	-	840	-	930	6,900	-	-	-	-	-	-	-	1,120	-	5.6
	GL 6-1 (2011)-20120626	2012 06 26	-	1,510	-	-	-	10,100	-	-	275,000	-	-	809	-	1,800	6,150	-	-	-	-	-	-	-	1,300	-	-
	GL 6-1 (2011)-20120704	2012 07 04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.6
	GL6-1 (2011)-20130627	2013 06 27	-	1,200	-	-	-	9,310	-	-	251,000	< 250	-	951	1,100	779	6,020	-	-	-	-	10.4	-	-	1,220	-	-
	GL6-1-20131114	2013 11 14	-	1,650	-	-	-	12,400	-	-	235,000	< 500	-	965	438	3,740	7,020	-	-	-	-	10	-	-	1,120	-	-
	GL6-1 (2011)-20140609	2014 06 09	-	1,300	-	-	-	9,450	-	-	252,000	550	-	872	< 1,000	2,030	5,810	-	-	-	-	8.7	-	-	987	-	4.94
	GL6-1 (2011)-20141127	2014 11 27	-	1,580	-	-	-	13,800	-	-	234,000	840	-	943	449	3,480	7,150	7,150	< 100	< 100	-	9.4	-	-	1,030	-	6.39
	GL6-1 (2011)-20150615	2015 06 15	7.83	1,030	-	-	-	9,280	-	-	254,000	< 500	-	936	< 2,000a	1,710	5,920	-	-	-	-	9.4	-	-	1,110	-	4.24

Associated CARO files available upon request.
Associated Exova file(s): 712940, 714233, 714243, 756693, 756810, 757047, 811364, 811710, 812030, 812741, 812985, 813438, 846260, 878316, 879073, 909346, 909448, 909654.
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Table 1: Historical Summary of Analytical Results For Groundwater - Inorganics

			Physical Parameters														Dissolved Inorganics										
Sample Location	Sample ID	Sample Date	pH	Total Hardness	pH (field)	Conductivity	Field Conductivity	Total Dissolved Solids	Dissolved Organic Carbon	Phosphate	Ammonia, Total (as N)	Nitrate (as N)	Nitrite (as N)	Chloride	Fluoride	Sulfate	Total Alkalinity	Alkalinity, Bicarbonate (as CaCO3)	Alkalinity, Carbonate (as CaCO3)	Alkalinity, Hydroxide (as CaCO3)	Alkalinity, Phenolphthalein (as CaCO3)	Bromide	Hydrogen Sulfide	Sulfide	Chemical Oxygen Demand	Dissolved Phosphate	Ortho-Phosphate
		(yyyy mm dd)	pH	mg/L	pH	µS/cm	µS/cm	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
GL6-1 (2011) (cont'd)	GL6-1 (2011)-20170530	2017 05 30	7.4	1,260	-	-	-	7,540	-	-	119	< 250	-	941	< 1,000	1,210	4,370	-	-	-	-	8.4	-	-	< 20	-	2.69
	GL6-1(2011)-20121205	2012 12 05	-	1,980	-	-	-	9,940	-	-	245,000	< 10,000a	-	828	-	2,080	614	-	-	-	-	-	-	-	1,280	-	4
	GL6-1-180604	2018 06 04	7.45	1,900	6,987.0	15,700	14,230	10,800	339	0.224	334,000	< 5,000a	276	1,570	< 50,000a	12,000	3,960	3,960	< 1.0	< 1.0	< 1.0	< 50.0	0.49	1.08	881	0.224	-
	GL6-1 (2011)-190603	2019 06 03	7.80	1,270	7.42	11,200	11903	6,100	175	1.15	227,000	< 1,000	< 1,000a	527	< 10,000a	2,380	3,600	3,600	< 1.0	< 1.0	< 1.0	< 10.0	0.82	8.44	705	1.15	-
	DUP3-190603	Duplicate	7.72	1,240	7.42	-	11903	8,100	180	0.560	236,000	< 1,000	< 1,000a	559	< 10,000a	2,350	3,510	3,510	< 1.0	< 1.0	< 1.0	< 10.0	-	-	705	0.560	-
	QA/QC RPD%		1	2	*	-	*	28	3	69	4	*	*	6	*	1	3	3	*	*	*	*	-	-	0	69	-
	GL6-1-200611	2020 06 11	7.82	962	7.1	8,440	6,871	5,220	241	-	194,000	< 100	< 100	652	< 1,000	282	3,980	3,980	< 1.0	< 1.0	< 1.0	4.43	10.7	25.5	621	-	0.576
	GL6-1-210610	2021 06 10	7.07.72	1,230	6.99	8,020	7,919	4,570	211	-	210,000	< 100	< 100	659	< 1,000	25.0	3,990	3,990	< 1.0	< 1.0	< 1.0	5.22	0.29	6.00	842	-	0.413
GL7-1	GL7-1-20110704	2011 07 04	-	1,190	-	-	-	2,560	-	-	400	-	-	69.3	-	735	1,410	-	-	-	-	-	-	-	30	-	0.006
	GL7-1-20120625	2012 06 25	-	1,150	-	-	-	2,590	-	-	360	-	-	69.2	-	709	1,540	-	-	-	-	-	-	-	30	-	< 0.002
	GL7-1-20121205	2012 12 05	-	1,120	-	-	-	2,500	-	-	450	< 1,000	-	72	-	758	1,520	-	-	-	-	-	-	-	32	-	0.002
	GL7-1-20130626	2013 06 26	-	1,110	-	-	-	2,500	-	-	442	< 100	-	69	2,490	771	1,440	-	-	-	-	< 1.0	-	-	34	-	-
	GL7-1-20131114	2013 11 14	-	1,140	-	-	-	2,530	-	-	446	< 100	-	75	2,390	757	1,540	-	-	-	-	< 1.0	-	-	27	-	-
	DUP1-20131114	Duplicate	-	1,130	-	-	-	2,500	-	-	444	< 100	-	73	2,500	776	1,610	-	-	-	-	< 1.0	-	-	20	-	-
	QA/QC RPD%		-	1	-	-	-	1	-	-	0	*	-	3	4	2	4	-	-	-	-	*	-	-	*	-	-
	GL7-1-20140604	2014 06 04	-	1,190	-	-	-	2,560	-	-	435	< 100	-	57	2,420	671	1,780	-	-	-	-	< 1.0	-	-	24	-	< 0.0010
	GL7-1-20141125	2014 11 25	-	1,110	-	-	-	2,480	-	-	411	< 100	-	71	2,300	759	1,230	-	-	-	-	< 1.0	-	-	30	-	< 0.0010
	GL7-1-20150609	2015 06 09	7.32	1,090	-	-	-	2,430	-	-	408	< 25	-	58.4	1,770	669	1,800	-	-	-	-	0.54	-	-	28	-	0.0014
	GL7-1-20151109	2015 11 09	6.61	1,080	-	-	-	2,470	-	-	412	< 100	-	61	2,180	704	1,430	-	-	-	-	< 1.0	-	-	29	-	< 0.0010
GL8-1	GL 8-1-20091110	2009 11 10	-	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL8-1-20100810	2010 08 10	-	630	-	-	-	2,710	-	-	430	-	-	55.9	-	1,230	550	-	-	-	-	-	-	-	< 10	-	0.037
GL8-2	GL 8-2-20091110	2009 11 10	-	1,190	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL8-2-20100810	2010 08 10	-	928	-	-	-	8,530	-	-	20	-	-	528	-	2,830	2,800	-	-	-	-	-	-	-	120	-	0.298
	GL8-2-20110627	2011 06 27	-	1,040	-	-	-	7,520	-	-	220	-	-	512	-	2,760	2,520	-	-	-	-	-	-	-	100	-	0.158
	GL8-2-20111217	2011 12 17	-	652	-	-	-	7,360	-	-	60	< 100	-	511	-	2,940	2,470	-	-	-	-	-	-	-	120	-	0.35
	GL 8-2-20120626	2012 06 26	-	800	-	-	-	5,610	-	-	130	-	-	390	-	1,970	2,080	-	-	-	-	-	-	-	120	-	-
	DUP B-20120626	Duplicate	-	800	-	-	-	7,250	-	-	140	-	-	467	-	2,550	2,510	-	-	-	-	-	-	-	90	-	-
	QA/QC RPD%		-	0	-	-	-	26	-	-	7	-	-	18	-	26	19	-	-	-	-	-	-	-	29	-	-
	GL 8-2-20120704	2012 07 04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.05
	GL8-2-20121204	2012 12 04	-	581	-	-	-	7,350	-	-	90	220	-	478	-	2,830	2,600	-	-	-	-	-	-	-	113	-	0.324
	GL8-2-20130626	2013 06 26	-	1,180	-	-	-	7,140	-	-	64.4	350	-	459	3,200	3,260	1,930	-	-	-	-	3.6	-	-	487	-	-
	GL8-2-20131113	2013 11 13	-	800	-	-	-	7,050	-	-	25.8	< 250	-	460	3,600	2,870	2,210	-	-	-	-	-	-	-	76	-	-
	DUP2-20131113	Duplicate	-	808	-	-	-	7,070	-	-	22.6	< 250	-	459	3,600	2,870	2,130	-	-	-	-	-	-	-	80	-	-
	QA/QC RPD%		-	1	-	-	-	0	-	-	*	*	-	0	0	0	4	-	-	-	-	-	-	-	5	-	-
	GL8-2-20140605	2014 06 05	-	768	-	-	-	6,600	-	-	14	6,340	-	390	3,000	3,000	1,850	-	-	-	-	3.4	-	-	68	-	0.0704
	GL8-2-20141118	2014 11 18	-	626	-	-	-	5,580	-	-	15.6	2,770	-	389	3,700	2,840	2,040	-	-	-	-	2.5	-	-	78	-	0.166

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Associated Exova file(s): 712940, 714233, 714243, 756693, 756810, 757047, 811364, 811710, 812030, 812741, 812985, 813438, 846260, 878316, 879073, 909346, 909448, 909654.
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			Physical Parameters														Dissolved Inorganics										
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		(yyyy mm dd)	pH	mg/L	pH	µS/cm	µS/cm	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
GL8-2 (cont'd)	GL8-2-20150610	2015 06 10	8.29	837	-	-	-	6,800	-	-	18.1	15,700	-	390	2,700	3,320	1,630	-	-	-	-	2.6	-	-	64	-	0.0773
	DUP 2-20150610	Duplicate	8.3	833	-	-	-	6,900	-	-	20.5	15,400	-	383	2,700	3,280	1,650	-	-	-	-	2.7	-	-	70	-	0.0795
	QA/QC RPD%		0	0	-	-	-	1	-	-	*	2	-	2	0	1	1	-	-	-	-	4	-	-	9	-	3
	GL8-2-20151103	2015 11 03	8.03	683	-	-	-	6,730	-	-	12.4	11,200	-	392	3,700	3,290	1,580	-	-	-	-	2.7	-	-	59	-	0.141
GL9-1	GL 9-1-20091111	2009 11 11	-	510	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL9-1-20100810	2010 08 10	-	610	-	-	-	1,470	-	-	230	-	-	126	-	300	923	-	-	-	-	-	-	-	< 10	-	0.003
	GL9-1-20110628	2011 06 28	-	375	-	-	-	1,220	-	-	120	-	-	132	-	270	677	-	-	-	-	-	-	-	< 10	-	0.026
	GL 9-1-20120627	2012 06 27	-	420	-	-	-	1,320	-	-	140	-	-	153	-	263	690	-	-	-	-	-	-	-	20	-	< 0.002
	GL9-1-20121204	2012 12 04	-	392	-	-	-	1,350	-	-	160	< 100	-	152	-	299	684	-	-	-	-	-	-	-	18	-	< 0.002
	GL9-1-20130626	2013 06 26	-	418	-	-	-	1,260	-	-	167	< 100	-	153	770	279	727	-	-	-	-	< 1.0	-	-	< 20	-	-
	GL9-1-20131114	2013 11 14	-	410	-	-	-	1,230	-	-	155	< 100	-	155	580	254	872	-	-	-	-	< 1.0	-	-	< 20	-	-
	GL9-1-20140604	2014 06 04	-	374	-	-	-	1,190	-	-	106	< 100	-	156	820	244	879	-	-	-	-	< 1.0	-	-	< 20	-	< 0.0010
	DUP1-20140604	Duplicate	-	366	-	-	-	1,190	-	-	92.2	< 50	-	153	720	238	849	-	-	-	-	0.63	-	-	< 20	-	< 0.0010
	QA/QC RPD%		-	2	-	-	-	0	-	-	14	*	-	2	13	2	3	-	-	-	-	*	-	-	*	-	*
	GL9-1-20141125	2014 11 25	-	404	-	-	-	1,310	-	-	189	< 100	-	154	640	250	776	-	-	-	-	< 1.0	-	-	28	-	< 0.0010
	GL9-1-20150609	2015 06 09	8.9	332	-	-	-	1,140	-	-	76.2	< 25	-	153	590	224	833	-	-	-	-	0.72	-	-	< 20	-	< 0.0010
	GL9-1-20151109	2015 11 09	8.97	326	-	-	-	1,220	-	-	74.2	< 100	-	153	600	218	684	-	-	-	-	< 1.0	-	-	< 20	-	< 0.0010
	GL9-1-20170530	2017 05 30	8.9	363	-	-	-	1,150	-	-	314,000	< 50	-	159	660	223	693	-	-	-	-	0.71	-	-	1,150	-	< 0.0010
	GL9-1-180604	2018 06 04	8.03	480	7.21	-	2,027	1,390	2.53	< 0.0050	261	< 100	< 10	153	650	314	739	739	< 1.0	< 1.0	< 1.0	< 1.00	-	-	< 20	< 0.0050	-
	GL9-1-190530	2019 05 30	8.33	407	8.25	-	1961	1,330	1.44	< 0.0050	280	< 10	< 10	140	720	270	713	701	12.0	< 1.0	6.0	0.39	-	-	< 20	< 0.0050	-
	GL9-1-200611	2020 06 11	7.90	584	7.06	-	2,032	1,470	1.77	-	255	< 100	< 100	109	< 1,000	267	1,060	1,060	< 1.0	< 1.0	< 1.0	< 1.00	-	-	< 20	-	< 0.0500
	DUPC-200611	Duplicate	7.86	570	-	-	-	1,450	1.26	-	255	< 100	< 100	113	< 1,000	276	1,050	1,050	< 1.0	< 1.0	< 1.0	< 1.00	-	-	< 20	-	< 0.0500
	QA/QC RPD%		1	2	-	-	-	1	*	-	0	*	*	4	*	3	1	1	*	*	*	*	-	-	*	-	*
	GL9-1-210611	2021 06 11	7.75	746	6.79	-	2,568	1,630	0.74	-	239	< 100	< 100	99.0	< 1,000	277	1,220	1,220	< 1.0	< 1.0	< 1.0	< 1.00	-	-	35	-	< 0.0500
GL9-2	GL 9-2-20091111	2009 11 11	-	9,260	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL9-2-20100810	2010 08 10	-	6,980	-	-	-	40,200	-	-	800	-	-	1,300	-	23,000	720	-	-	-	-	-	-	-	100	-	0.011
	GL9-2-20110628	2011 06 28	-	8,320	-	-	-	40,500	-	-	40	-	-	1,150	-	25,300	606	-	-	-	-	-	-	-	110	-	0.095
	GL 9-2-20120627	2012 06 27	-	8,200	-	-	-	41,400	-	-	< 10	-	-	1,130	-	26,000	588	-	-	-	-	-	-	-	190	-	0.006
	GL9-2-20121204	2012 12 04	-	8,370	-	-	-	39,400	-	-	100	< 1,000	-	1,210	-	27,000	564	-	-	-	-	-	-	-	101	-	0.009
	Dup-B-20121204	Duplicate	-	7,980	-	-	-	39,800	-	-	< 10	< 1,000	-	1,120	-	27,100	564	-	-	-	-	-	-	-	89	-	0.006
	QA/QC RPD%		-	5	-	-	-	1	-	-	*	*	-	8	-	0	0	-	-	-	-	-	-	-	13	-	40
	GL9-2-20130626	2013 06 26	-	7,670	-	-	-	40,500	-	-	140	< 500	-	1,250	3,040	26,900	898	-	-	-	-	< 5.0	-	-	78	-	-
	DUP2-20130626	Duplicate	-	7,870	-	-	-	41,900	-	-	129	< 500	-	1,240	3,300	26,800	1,000	-	-	-	-	< 5.0	-	-	82	-	-
	QA/QC RPD%		-	3	-	-	-	3	-	-	8	*	-	1	8	0	11	-	-	-	-	*	-	-	5	-	-
	GL9-2-20131113	2013 11 13	-	7,950	-	-	-	40,900	-	-	485	< 500	-	1,250	3,100	25,500	950	-	-	-	-	-	-	-	64	-	-
	GL9-2-20140605	2014 06 05	-	8,100	-	-	-	39,300	-	-	11.9	720	-	1,230	3,240	26,100	1,030	-	-	-	-	7.8	-	-	78	-	0.0054
	GL9-2-20141125	2014 11 25	-	7,700	-	-	-	40,600	-	-	54.3	730	-	1,290	3,780	27,500	502	-	-	-	-	5.6	-	-	68	-	0.0054
	GL9-2-20150609	2015 06 09	8.05	7,650	-	-	-	38,700	-	-	92.3	< 500	-	1,270	2,400	27,100	1,080	-	-	-	-	5.9	-	-	64	-	0.0052
	GL9-2-20151104	2015 11 04	7.92	7,360	-	-	-	40,400	-	-	50.4	< 500	-	1,200	3,300	26,200	547	-	-	-	-	5.6	-	-	53	-	0.0057

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Sample Location	Sample ID	Sample Date (yyyy mm dd)	pH	Total Hardness	pH (field)	Conductivity	Field Conductivity	Total Dissolved Solids	Dissolved Organic Carbon	Phosphate	Ammonia, Total (as N)	Nitrate (as N)	Nitrite (as N)	Chloride	Fluoride	Sulfate	Total Alkalinity	Alkalinity, Bicarbonate (as CaCO3)	Alkalinity, Carbonate (as CaCO3)	Alkalinity, Hydroxide (as CaCO3)	Alkalinity, Phenolphthalein (as CaCO3)	Bromide	Hydrogen Sulfide	Sulfide	Chemical Oxygen Demand	Dissolved Phosphate	Ortho-Phosphate
			pH	mg/L	pH	µS/cm	µS/cm	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
GL9-3	GL 9-3-20091111	2009 11 11	-	217	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL9-3-20100810	2010 08 10	-	10,500	-	-	-	48,500	-	-	< 10	-	-	1,610	-	29,400	944	-	-	-	-	-	-	-	100	-	0.028
	GL9-3-20110628	2011 06 28	-	12,300	-	-	-	49,600	-	-	20	-	-	1,450	-	31,400	930	-	-	-	-	-	-	-	180	-	0.033
	GL9-A-20110628	Duplicate	-	11,400	-	-	-	50,100	-	-	30	-	-	1,400	-	31,500	932	-	-	-	-	-	-	-	190	-	0.032
	QA/QC RPD%		-	8	-	-	-	1	-	-	*	-	-	4	-	0	0	-	-	-	-	-	-	-	5	-	3
	GL 9-3-20120627	2012 06 27	-	11,000	-	-	-	51,700	-	-	30	-	-	1,360	-	31,400	948	-	-	-	-	-	-	-	230	-	0.008
	GL9-3-20121204	2012 12 04	-	10,400	-	-	-	50,200	-	-	< 10	< 1,000	-	1,500	-	31,800	947	-	-	-	-	-	-	-	156	-	< 0.002
	GL9-3-20130626	2013 06 26	-	10,400	-	-	-	51,900	-	-	17.1	< 500	-	1,540	2,340	32,600	1,420	-	-	-	-	< 5.0	-	-	100	-	-
	GL9-3-20131113	2013 11 13	-	10,500	-	-	-	49,000	-	-	9.6	560	-	1,590	2,420	31,500	1,450	-	-	-	-	-	-	-	281	-	-
	GL9-3-20140605	2014 06 05	-	10,800	-	-	-	48,700	-	-	7.4	< 500	-	1,530	2,320	31,800	1,580	-	-	-	-	10.5	-	-	88	-	0.0051
	GL9-3-20141125	2014 11 25	-	10,400	-	-	-	49,300	-	-	10.5	< 500	-	1,600	3,020	32,800	989	-	-	-	-	7.2	-	-	105	-	0.0054
	DUP4-20141124	Duplicate	-	10,400	-	-	-	49,800	-	-	10.7	650	-	1,610	3,030	33,100	1,010	-	-	-	-	8	-	-	121	-	0.0074
	QA/QC RPD%		-	0	-	-	-	1	-	-	*	*	-	1	0	1	2	-	-	-	-	11	-	-	14	-	31
	GL9-3-20150609	2015 06 09	7.92	10,400	-	-	-	48,200	-	-	16.5	< 500	-	1,590	< 2,000a	33,500	1,530	-	-	-	-	8.5	-	-	91	-	0.0042
	GL9-3-20151109	2015 11 09	7.69	9,720	-	-	-	50,200	-	-	9.9	< 500	-	1,530	3,200	32,100	926	-	-	-	-	6.2	-	-	124	-	0.0043
	GL9-3-20160526	2016 05 26	7.78	10,600	-	-	-	62,800	-	-	10.4	< 500	-	1,780	3,500	37,100	915	-	-	-	-	10.8	-	-	78	-	0.0049
	GL9-3-20170529	2017 05 29	7.9	11,100	-	-	-	46,400	-	-	30.5	< 500	-	1,680	2,700	34,600	834	-	-	-	-	11.2	-	-	80	-	0.0065
	GL9-3-180528	2018 05 28	7.68	11,300	7.22	-	3,210	53,000	25.1	< 0.0050	69	6,320	< 1,000a	238	4,350	199	862	862	< 1.0	< 1.0	< 1.0	< 10.0	-	-	86	< 0.0050	-
	GL9-3-190527	2019 05 27	7.73	12,600	7.54	-	44350	52,300	24.8	< 0.500	73	< 1,000	< 1,000a	1,540	< 10,000a	31,700	859	859	< 1.0	< 1.0	< 1.0	< 10.0	-	-	83	< 0.500	-
	GL9-3-200608	2020 06 08	7.80	10,200	7.32	-	36,600	52,600	23.6	-	< 50	< 5,000a	< 5,000a	1,400	< 50,000a	34,500	921	921	< 1.0	< 1.0	< 1.0	< 50.0	-	-	79	-	< 2.50
	GL9-3-210610	2021 06 10	7.74	10,700	7.29	-	41,476	54,200	18.8	-	< 50	< 1,000	< 1,000	1,600	< 10,000a	32,300	943	943	< 1.0	< 1.0	< 1.0	< 10.0	-	-	104	-	< 0.500
GL10-1	GL10-1-20091112	2009 11 12	-	7,010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL10-1-20100810	2010 08 10	-	6,430	-	-	-	31,200	-	-	170	-	-	1,400	-	14,800	3,470	-	-	-	-	-	-	-	480	-	0.059
	GL10-1-20110704	2011 07 04	-	8,310	-	-	-	31,700	-	-	140	-	-	1,420	-	17,600	3,200	-	-	-	-	-	-	-	210	-	0.035
	GL10-1-20120626	2012 06 26	-	8,760	-	-	-	33,800	-	-	140	-	-	1,450	-	19,300	2,640	-	-	-	-	-	-	-	230	-	0.006
	GL10-1-20121204	2012 12 04	-	8,350	-	-	-	33,000	-	-	210	< 1,000	-	1,270	-	19,400	267	-	-	-	-	-	-	-	228	-	0.004
	GL10-1-20130626	2013 06 26	-	7,720	-	-	-	31,400	-	-	142	< 500	-	1,270	1,860	18,800	2,540	-	-	-	-	10.5	-	-	166	-	-
	GL10-1-20140605	2014 06 05	-	6,550	-	-	-	28,900	-	-	81.5	< 500	-	1,130	1,900	17,400	2,560	-	-	-	-	11.1	-	-	145	-	0.0044
	GL10-1-20141125	2014 11 25	-	6,570	-	-	-	28,000	-	-	129	710	-	1,250	2,250	19,100	2,180	-	-	-	-	9.5	-	-	177	-	0.0063
	GL10-1-20150610	2015 06 10	7.95	6,240	-	-	-	26,600	-	-	170	< 500	-	1,020	< 2,000a	16,300	2,300	-	-	-	-	8.7	-	-	145	-	0.0024
	GL10-1-20151109	2015 11 09	7.57	5,980	-	-	-	25,100	-	-	152	< 500	-	963	< 2,000a	15,500	1,950	-	-	-	-	7.4	-	-	210	-	0.0019
	DUP2-20151109	Duplicate	7.64	5,800	-	-	-	25,200	-	-	173	< 500	-	998	2,200	16,100	1,960	-	-	-	-	7.9	-	-	126	-	0.0028
	QA/QC RPD%		1	3	-	-	-	0	-	-	13	*	-	4	*	4	1	-	-	-	-	7	-	-	50	-	*

Associated CARO files available upon request.
Associated Exova file(s): 712940, 714233, 714243, 756693, 756810, 757047, 811364, 811710, 812030, 812741, 812985, 813438, 846260, 878316, 879073, 909346, 909448, 909654.
All terms defined within the body of Keltech's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

Table 1: Historical Summary of Analytical Results For Groundwater - Inorganics

			Physical Parameters														Dissolved Inorganics										
Sample Location	Sample ID	Sample Date (yyyy mm dd)	pH	Total Hardness	pH (field)	Conductivity	Field Conductivity	Total Dissolved Solids	Dissolved Organic Carbon	Phosphate	Ammonia, Total (as N)	Nitrate (as N)	Nitrite (as N)	Chloride	Fluoride	Sulfate	Total Alkalinity	Alkalinity, Bicarbonate (as CaCO3)	Alkalinity, Carbonate (as CaCO3)	Alkalinity, Hydroxide (as CaCO3)	Alkalinity, Phenolphthalein (as CaCO3)	Bromide	Hydrogen Sulfide	Sulfide	Chemical Oxygen Demand	Dissolved Phosphate	Ortho-Phosphate
			pH	mg/L	pH	µS/cm	µS/cm	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
GL12-1	GL12-1-20091112	2009 11 12	-	3,250	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL12-1-20100811	2010 08 11	-	3,080	-	-	-	7,420	-	-	< 10	-	-	174	-	3,890	558	-	-	-	-	-	-	-	50	-	0.004
	GL12-1-20110629	2011 06 29	-	3,310	-	-	-	7,330	-	-	20	-	-	151	-	4,240	544	-	-	-	-	-	-	-	30	-	0.095
	GL30-1-20110629	Duplicate	-	3,400	-	-	-	7,270	-	-	30	-	-	151	-	4,190	542	-	-	-	-	-	-	-	20	-	0.092
	QA/QC RPD%		-	3	-	-	-	1	-	-	*	-	-	0	-	1	0	-	-	-	-	-	-	-	*	-	3
	GL 12-1-20111218	2011 12 18	-	3,160	-	-	-	8,050	-	-	< 10	3,660	-	168	-	3,040	571	-	-	-	-	-	-	-	40	-	0.03
	GL12-1-20120625	2012 06 25	-	3,520	-	-	-	7,750	-	-	< 10	-	-	173	-	4,400	589	-	-	-	-	-	-	-	70	-	0.003
	GL12-1-20121204	2012 12 04	-	3,610	-	-	-	7,920	-	-	< 10	5,830	-	182	-	4,770	606	-	-	-	-	-	-	-	72	-	0.007
	GL12-1-20130626	2013 06 26	-	3,720	-	-	-	8,440	-	-	5.4	8,300	-	222	2,200	4,980	767	-	-	-	-	< 2.5	-	-	63	-	-
	GL12-1-20131113	2013 11 13	-	3,900	-	-	-	8,560	-	-	6.7	5,870	-	251	1,800	4,820	860	-	-	-	-	-	-	-	69	-	-
	GL12-1-20140604	2014 06 04	-	4,090	-	-	-	9,790	-	-	69.6	2,640	-	467	2,900	5,550	1,170	-	-	-	-	< 2.5	-	-	258	-	0.357
	GL12-1-20141118	2014 11 18	-	3,910	-	-	-	9,400	-	-	86.6	< 250	-	404	1,600	5,610	1,110	-	-	-	-	< 2.5	-	-	219	-	0.0076
	GL12-1-20150609	2015 06 09	7.68	3,880	-	-	-	7,990	-	-	274	< 100	-	607	1,830	4,560	842	-	-	-	-	< 1.0	-	-	378	-	0.0016
	DUP3-20150609	Duplicate	7.64	3,900	-	-	-	8,000	-	-	279	< 50	-	603	1,650	4,430	855	-	-	-	-	0.63	-	-	372	-	0.0011
	QA/QC RPD%		1	1	-	-	-	0	-	-	2	*	-	1	10	3	2	-	-	-	-	*	-	-	2	-	*
	GL12-1-20151104	2015 11 04	7.31	3,480	-	-	-	8,290	-	-	252	< 250	-	455	2,000	4,980	744	-	-	-	-	< 2.5	-	-	260	-	< 0.0010
	GL12-1-20160524	2016 05 24	7.14	3,840	-	-	-	8,210	-	-	467	< 250	-	500	2,000	4,600	768	768	< 1.0	< 1.0	-	< 2.5	-	-	393	-	< 0.0010
	GL12-1-20160921	2016 09 21	7.34	3,590	-	-	-	8,290	-	-	648	< 250	-	574	2,000	4,430	824	-	-	-	-	< 2.5	-	-	657	-	0.0062
	GL12-1-20170529	2017 05 29	7.17	2,610	-	-	-	7,280	-	-	2,020	< 250	-	514	1,700	3,850	823	-	-	-	-	< 2.5	-	-	1,070	-	0.372
	GL12-1-20170926	2017 09 26	7.39	3,240	-	-	-	6,500	-	-	1,720	< 100	-	556	1,750	3,540	877	-	-	-	-	< 1.0	-	-	751	-	0.157
	GL12-1-180604	2018 06 04	7.31	3,390	6.73	-	58,741	6,950	382	0.0074	1,430	< 5,000a	< 10	1,050	1,220	9,180	865	865	< 1.0	< 1.0	< 1.0	< 50.0	-	-	542	0.0074	-
	GL12-1-180919	2018 09 19	7.07	3,890	6.99	-	5,880	7,730	190	< 0.0050	1,840	< 100	< 100	495	1,840	3,660	882	882	< 1.0	< 1.0	< 1.0	< 1.00	-	-	513	< 0.0050	-
	GL12-1-190527	2019 05 27	7.49	3,850	6.75	-	8360	7,860	155	0.0125	1,750	59	24	480	1,560	3,800	907	907	< 1.0	< 1.0	< 1.0	0.33	-	-	485	0.0125	-
	GL12-1-190919	2019 09 19	7.43	3,830	6.81	-	7380	7,920	175	-	1,270	< 100	< 100	496	1,190	3,620	886	886	< 1.0	< 1.0	< 1.0	< 1.00	-	-	458	-	< 0.0500
	GL12-1-200610	2020 06 10	7.39	4,490	6.78	-	6,947	8,040	203	-	4,260	< 100	< 100	610	1,200	3,880	997	997	< 1.0	< 1.0	< 1.0	< 1.00	-	-	544	-	< 0.0500
	GL12-1-201102	2020 11 02	7.51	4,720	6.64	-	8,081	8,040	179	-	7,300	< 1,000	< 10	603	1,400	3,820	948	948	< 1.0	< 1.0	< 1.0	0.84	-	-	566	-	< 0.0050
	GL12-1-210525	2021 05 25	7.69	4,090	6.69	-	7,982	7,150	156	-	4,360	< 1,000	< 10	568	1,430	3,850	915	915	< 1.0	< 1.0	< 1.0	< 10.0	-	-	563	-	< 0.0050
	GL12-1-211005	2021 10 05	7.27	4,140	6.67	-	7,452	7,940	174	-	4,660	< 100	< 100	579	1,300	4,280	928	928	< 1.0	< 1.0	< 1.0	< 1.00	-	-	536	-	< 0.0500
GL13-1	GL13-1-20091117	2009 11 17	-	3,530	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL13-1-20100811	2010 08 11	-	3,550	-	-	-	11,200	-	-	< 10	-	-	178	-	5,870	640	-	-	-	-	-	-	-	10	-	0.005
	GL13-1-20110627	2011 06 27	-	3,950	-	-	-	10,800	-	-	< 10	-	-	196	-	6,580	666	-	-	-	-	-	-	-	30	-	0.007
	GL13-1-20111217	2011 12 17	-	3,500	-	-	-	10,900	-	-	40	220	-	183	-	5,900	682	-	-	-	-	-	-	-	30	-	0.03
	DUPC-20111217	Duplicate	-	113	-	-	-	1,570	-	-	410	< 50	-	72.6	-	2.3	1,420	-	-	-	-	-	-	-	< 10	-	0.02
	QA/QC RPD%		-	187	-	-	-	150	-	-	*	*	-	86	-	200	70	-	-	-	-	-	-	-	*	-	40
	GL13-1-20120625	2012 06 25	-	3,580	-	-	-	9,930	-	-	< 10	-	-	170	-	5,900	647	-	-	-	-	-	-	-	30	-	0.007
	GL13-1-20121204	2012 12 04	-	3,440	-	-	-	9,990	-	-	< 10	< 1,000	-	174	-	5,750	672	-	-	-	-	-	-	-	41	-	0.006

Associated CARO files available upon request.
Associated Exova file(s): 712940, 714233, 714243, 756693, 756810, 757047, 811364, 811710, 812030, 812741, 812985, 813438, 846260, 878316, 879073, 909346, 909448, 909654.
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Table 1: Historical Summary of Analytical Results For Groundwater - Inorganics

			Physical Parameters														Dissolved Inorganics										
Sample Location	Sample ID	Sample Date	pH	Total Hardness	pH (field)	Conductivity	Field Conductivity	Total Dissolved Solids	Dissolved Organic Carbon	Phosphate	Ammonia, Total (as N)	Nitrate (as N)	Nitrite (as N)	Chloride	Fluoride	Sulfate	Total Alkalinity	Alkalinity, Bicarbonate (as CaCO3)	Alkalinity, Carbonate (as CaCO3)	Alkalinity, Hydroxide (as CaCO3)	Alkalinity, Phenolphthalein (as CaCO3)	Bromide	Hydrogen Sulfide	Sulfide	Chemical Oxygen Demand	Dissolved Phosphate	Ortho-Phosphate
		(yyyy mm dd)	pH	mg/L	pH	µS/cm	µS/cm	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
GL14-1	GL14-1-20091116	2009 11 16	-	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL14-1-20100811	2010 08 11	-	40	-	-	-	1,120	-	-	40	-	-	7	-	141	783	-	-	-	-	-	-	-	< 10	-	0.051
	GL14-1-20110704	2011 07 04	-	48	-	-	-	1,100	-	-	60	-	-	8.6	-	132	809	-	-	-	-	-	-	-	30	-	0.11
	GL14-1-20120627	2012 06 27	-	40	-	-	-	-	-	-	50	-	-	-	-	-	-	-	-	-	-	-	-	-	40	-	-
	GL14-1-20120704	2012 07 04	-	-	-	-	-	1,120	-	-	-	-	-	0.11	-	141	799	-	-	-	-	-	-	-	-	-	0.125
	GL14-1-20121204	2012 12 04	-	35	-	-	-	1,190	-	-	70	< 100	-	8.66	-	145	790	-	-	-	-	-	-	-	26	-	0.137
GL15-1	GL15-1-20091117	2009 11 17	-	702	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL30-3-20091117	Duplicate	-	662	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	QA/QC RPD%		-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL15-1-20140604	2014 06 04	-	335	-	-	-	782	-	-	15.2	233	-	6.7	2,190	261	446	-	-	-	-	< 0.50	-	-	< 20	-	0.076
	GL15-1-20141117	2014 11 17	-	340	-	-	-	793	-	-	38.3	72	-	10	1,950	280	479	-	-	-	-	< 0.50	-	-	< 20	-	0.0409
	GL15-1-20150610	2015 06 10	8.32	339	-	-	-	959	-	-	32.2	< 25	-	4.9	1,310	175	468	-	-	-	-	< 0.25	-	-	< 20	-	0.0308
	DUP4-20150610	Duplicate	8.3	326	-	-	-	804	-	-	32	< 25	-	7.2	1,960	269	469	-	-	-	-	< 0.25	-	-	< 20	-	0.0283
	QA/QC RPD%		0	4	-	-	-	18	-	-	1	*	-	38	40	42	0	-	-	-	-	*	-	-	*	-	8
	GL15-1-20151103	2015 11 03	8.12	336	-	-	-	814	-	-	47.7	< 25	-	8.5	1,900	269	457	-	-	-	-	< 0.25	-	-	< 20	-	0.155
	GL15-1-20160920	2016 09 20	8.01	385	-	-	-	874	-	-	17.8	89	-	12.3	1,760	295	446	-	-	-	-	< 0.25	-	-	< 20	-	0.0562
	GL15-1-20170925	2017 09 25	8.1	326	-	-	-	767	-	-	12.5	98	-	8.1	2,090	264	428	-	-	-	-	< 0.25	-	-	< 20	-	0.0338
	GL15-1-180928	2018 09 28	7.87	333	7.47	-	1,320	819	1.75	< 0.0050	78	23	< 10	8.32	1,810	280	441	441	< 1.0	< 1.0	< 1.0	< 0.10	-	-	21	< 0.0050	-
	GL15-1-190924	2019 09 24	8.09	327	7.35	-	1259	826	1.68	-	240	< 10	< 10	7.96	1,970	263	442	442	< 1.0	< 1.0	< 1.0	< 0.10	-	-	< 20	-	< 0.0050
	GL15-1-201104	2020 11 04	7.80	1,530	7.18	-	3,904	3,210	10.8	-	51	2,440	< 10	241	860	1,200	644	644	< 1.0	< 1.0	< 1.0	< 1.00	-	-	32	-	< 0.0050
	GL15-1-211007	2021 10 07	8.08	468	7.47	-	1,528	1,030	2.11	-	< 50	< 100	< 100	24.3	1,310	358	489	489	< 1.0	< 1.0	< 1.0	< 1.00	-	-	< 20	-	< 0.0500
GL15-2	GL15-2-20110704	2011 07 04	-	2,090	-	-	-	3,760	-	-	< 10	-	-	52.4	-	1,900	650	-	-	-	-	-	-	-	20	-	0.024
	GL15-2-20120627	2012 06 27	-	3,300	-	-	-	6,180	-	-	40	-	-	121	-	3,230	644	-	-	-	-	-	-	-	30	-	0.017
	GL15-2-20121205	2012 12 05	-	3,580	-	-	-	6,750	-	-	< 10	< 10,000a	-	155	-	4,020	686	-	-	-	-	-	-	-	63	-	0.018
	GL15-2-20130708	2013 07 08	-	3,920	-	-	-	7,970	-	-	< 5.0	8,850	-	143	< 1,000	4,190	822	-	-	-	-	< 2.5	-	-	30	-	-
	GL15-2-20140604	2014 06 04	-	3,290	-	-	-	7,380	-	-	< 5.0	7,610	-	159	2,100	4,000	1,030	-	-	-	-	< 2.5	-	-	36	-	0.0188
	GL15-2-20141117	2014 11 17	-	3,250	-	-	-	6,750	-	-	< 5.0	8,200	-	185	< 1,000	4,040	972	-	-	-	-	< 2.5	-	-	39	-	0.0193
	GL15-2-20150610	2015 06 10	7.84	3,700	-	-	-	7,960	-	-	< 5.0	7,690	-	197	1,000	4,800	900	-	-	-	-	< 2.5	-	-	38	-	0.017
	GL15-2-20151103	2015 11 03	7.5	3,910	-	-	-	7,970	-	-	< 5.0	7,470	-	182	1,100	4,800	807	-	-	-	-	< 2.5	-	-	32	-	0.0186
	GL15-2-20160920	2016 09 20	7.4	5,010	-	-	-	10,400	-	-	< 5.0	3,700	-	259	1,400	6,740	807	-	-	-	-	< 2.5	-	-	45	-	0.0166
	GL15-2-20170925	2017 09 25	7.59	4,190	-	-	-	8,470	-	-	7.6	3,120	-	181	1,300	4,560	794	-	-	-	-	< 2.5	-	-	41	-	0.0179
	GL15-2-180928	2018 09 28	7.41	3,300	6.88	-	7,089	6,990	15.4	< 0.0050	73	2,590	< 10	214	1,030	3,730	765	765	< 1.0	< 1.0	< 1.0	< 1.00	-	-	38	< 0.0050	-
	GL15-2-190924	2019 09 24	7.70	3,470	6.77	-	7047	7,220	12.2	-	< 20	3,550	< 100	246	< 1,000	4,060	748	748	< 1.0	< 1.0	< 1.0	< 1.00	-	-	26	-	< 0.0500
	GL15-2-201104	2020 11 04	7.69	6,230	6.94	-	10,680	11,900	19.0	-	< 50	1,690	< 10	360	1,020	7,190	794	794	< 1.0	< 1.0	< 1.0	< 10.0	-	-	33	-	< 0.0050
	DUP2-201104	Duplicate	7.67	6,360	-	-	-	11,200	19.5	-	< 50	1,790	< 10	367	970	7,160	797	797	< 1.0	< 1.0	< 1.0	< 10.0	-	-	32	-	< 0.0050
	QA/QC RPD%		0	2	-	-	-	6	3	-	*	6	*	2	5	0	0	0	*	*	*	*	-	-	*	-	*
	GL15-2-211007	2021 10 07	7.67	< 10.0	6.89	-	8,617	9,270	14.0	-	< 50	1,300	< 100	346	< 1,000	5,260	817	817	< 1.0	< 1.0	< 1.0	< 1.00	-	-	26	-	< 0.0500

Associated CARO files available upon request.

Associated Exova file(s): 712940, 714233, 714243, 756693, 756810, 757047, 811364, 811710, 812030, 812741, 812985, 813438, 846260, 878316, 879073, 909346, 909448, 909654.

All terms defined within the body of Keltech's report.

< Denotes concentration less than indicated detection limit or RPD less than indicated value.

- Denotes analysis not conducted.

n/a Denotes no applicable standard/guideline.

QA/QC RPD Denotes quality assurance/quality control relative percent difference

* RPDs are not calculated where one or more concentrations are less than five times RDL.

RDL Denotes reported detection limit.

Table 1: Historical Summary of Analytical Results For Groundwater - Inorganics

			Physical Parameters														Dissolved Inorganics										
Sample Location	Sample ID	Sample Date	pH	Total Hardness	pH (field)	Conductivity	Field Conductivity	Total Dissolved Solids	Dissolved Organic Carbon	Phosphate	Ammonia, Total (as N)	Nitrate (as N)	Nitrite (as N)	Chloride	Fluoride	Sulfate	Total Alkalinity	Alkalinity, Bicarbonate (as CaCO3)	Alkalinity, Carbonate (as CaCO3)	Alkalinity, Hydroxide (as CaCO3)	Alkalinity, Phenolphthalein (as CaCO3)	Bromide	Hydrogen Sulfide	Sulfide	Chemical Oxygen Demand	Dissolved Phosphate	Ortho-Phosphate
		(yyyy mm dd)	pH	mg/L	pH	µS/cm	µS/cm	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
GL16-1	GL 16-1-20091111	2009 11 11	-	1,840	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL 16-1-20111217	2011 12 17	-	987	-	-	-	4,500	-	-	< 10	220	-	166	-	2,240	985	-	-	-	-	-	-	-	10	-	0.04
	GL16-1-20100811	2010 08 11	-	1,700	-	-	-	6,750	-	-	470	-	-	252	-	3,520	1,170	-	-	-	-	-	-	-	< 10	-	0.012
	GL16-1-20110627	2011 06 27	-	1,210	-	-	-	4,780	-	-	< 10	-	-	168	-	2,480	982	-	-	-	-	-	-	-	10	-	0.024
	GL30-1-20110627	Duplicate	-	1,200	-	-	-	4,790	-	-	30	-	-	165	-	2,330	980	-	-	-	-	-	-	-	20	-	0.023
	QA/QC RPD%		-	1	-	-	-	0	-	-	*	-	-	2	-	6	0	-	-	-	-	-	-	-	*	-	4
	GL16-1-20120626	2012 06 26	-	1,260	-	-	-	4,490	-	-	500	-	-	162	-	2,270	1,170	-	-	-	-	-	-	-	30	-	0.011
	GL16-1-20121204	2012 12 04	-	1,020	-	-	-	4,170	-	-	1,130	120	-	154	-	2,110	1,190	-	-	-	-	-	-	-	34	-	0.018
	GL16-1-20130626	2013 06 26	-	1,040	-	-	-	4,200	-	-	448	< 250	-	153	1,500	2,080	1,100	-	-	-	-	< 2.5	-	-	35	-	-
	GL16-1-20131113	2013 11 13	-	949	-	-	-	4,160	-	-	39.9	590	-	158	< 1,000	1,940	1,120	-	-	-	-	-	-	-	< 20	-	-
	GL16-1-20140605	2014 06 05	-	930	-	-	-	3,880	-	-	382	< 100	-	154	900	1,970	1,200	-	-	-	-	< 1.0	-	-	< 20	-	0.0033
	GL16-1-20141118	2014 11 18	-	845	-	-	-	3,830	-	-	125	150	-	148	890	1,850	1,170	-	-	-	-	< 1.0	-	-	< 20	-	0.017
	GL16-1-20150610	2015 06 10	7.96	900	-	-	-	3,880	-	-	350	< 100	-	155	880	1,960	1,050	-	-	-	-	< 1.0	-	-	< 20	-	0.0046
	GL16-1-20151103	2015 11 03	7.76	827	-	-	-	3,670	-	-	34.9	260	-	151	940	1,860	1,180	-	-	-	-	< 1.0	-	-	< 20	-	0.0451
	DUP3-20151103	Duplicate	7.64	828	-	-	-	3,630	-	-	36.3	230	-	145	900	1,780	943	-	-	-	-	< 1.0	-	-	< 20	-	0.0448
	QA/QC RPD%		2	0	-	-	-	1	-	-	4	12	-	4	4	4	22	-	-	-	-	*	-	-	*	-	1
	GL16-1-20160524	2016 05 24	7.84	803	-	-	-	3,470	-	-	< 5.0	250	-	145	1,020	1,770	938	938	< 1.0	< 1.0	-	< 1.0	-	-	< 20	-	0.0526
	GL16-1-20170525	2017 05 25	8.51	833	-	-	-	3,530	-	-	< 5.0	330	-	139	940	1,710	898	-	-	-	-	< 1.0	-	-	< 20	-	0.0517
	DUP2-20170525	Duplicate	8.45	847	-	-	-	3,510	-	-	< 5.0	280	-	142	990	1,750	866	-	-	-	-	< 1.0	-	-	< 20	-	0.0528
	QA/QC RPD%		1	2	-	-	-	1	-	-	*	16	-	2	5	2	4	-	-	-	-	*	-	-	*	-	2
	GL16-1-180604	2018 06 04	7.67	762	7.11	-	3,660	3,180	2.93	0.0072	27	< 5,000a	< 10	273	690	4,040	944	944	< 1.0	< 1.0	< 1.0	< 50.0	-	-	24	0.0072	-
	GL16-1-190529	2019 05 29	7.83	756	7.03	-	4453	3,390	3.06	< 0.0500	68	< 100	< 100	133	1,240	1,480	965	965	< 1.0	< 1.0	< 1.0	< 1.00	-	-	< 20	< 0.0500	-
	GL16-1-200608	2020 06 08	7.98	699	7.08	-	3,720	3,020	1.59	-	256	< 1,000	< 1,000a	95.1	< 10,000a	1,270	973	973	< 1.0	< 1.0	< 1.0	< 10.0	-	-	< 20	-	< 0.500
	GL16-1-210609	2021 06 09	7.98	658	7.01	-	4,173	2,670	2.15	-	124	< 100	< 100	113	< 1,000	1,110	978	978	< 1.0	< 1.0	< 1.0	< 1.00	-	-	< 20	-	< 0.0500
GL17-1	GL17-1-20091112	2009 11 12	-	3,390	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL17-1-20100811	2010 08 11	-	3,280	-	-	-	9,080	-	-	50	-	-	172	-	4,600	678	-	-	-	-	-	-	-	30	-	0.003
	GL30-4-20100811	Duplicate	-	3,170	-	-	-	8,730	-	-	70	-	-	174	-	4,710	679	-	-	-	-	-	-	-	40	-	0.003
	QA/QC RPD%		-	3	-	-	-	4	-	-	33	-	-	1	-	2	0	-	-	-	-	-	-	-	*	-	*
	GL17-1-20110628	2011 06 28	-	3,580	-	-	-	8,930	-	-	180	-	-	164	-	5,060	664	-	-	-	-	-	-	-	40	-	0.088
	GL17-1-20120625	2012 06 25	-	130	-	-	-	1,610	-	-	340	-	-	71.5	-	6.7	1,480	-	-	-	-	-	-	-	20	-	0.034
	GL17-1-20121204	2012 12 04	-	98	-	-	-	1,570	-	-	360	< 100	-	72.6	-	6.3	614	-	-	-	-	-	-	-	33	-	0.031
	GL17-1-20160526	2016 05 26	8.18	118	-	-	-	1,480	-	-	371	< 100	-	71	2,040	< 6.0	1,330	-	-	-	-	< 1.0	-	-	< 20	-	0.0152
	GL17-1-20160919	2016 09 19	8.32	123	-	-	-	1,490	-	-	184	< 100	-	93	1,930	29.3	1,240	-	-	-	-	< 1.0	-	-	< 20	-	0.053
	GL17-1-20170531	2017 05 31	8.13	125	-	-	-	1,530	-	-	353	< 100	-	78	1,890	< 6.0	1,350	-	-	-	-	< 1.0	-	-	< 20	-	0.0146
	GL17-1-20170926	2017 09 26	7.95	121	-	-	-	1,480	-	-	334	< 100	-	81	1,950	7.6	1,310	-	-	-	-	< 1.0	-	-	< 20	-	0.0114
	GL17-1-180604	2018 06 04	7.83	127	7.3	-	2,044	1,480	2.54	< 0.0050	373	< 10	< 10	68.9	1,710	18.3	1,330	1,330	< 1.0	< 1.0	< 1.0	< 1.00	-	-	< 20	< 0.0050	-
	GL17-1-180919	2018 09 19	7.80	130	7.5	-	2,197	1,480	2.83	< 0.0050	287	< 100	< 10	88.4	2,060	45.7	1,220	1,220	< 1.0	< 1.0	< 1.0	0.40	-	-	< 20	< 0.0050	-

Associated CARO files available upon request.
Associated Exova file(s): 712940, 714233, 714243, 756693, 756810, 757047, 811364, 811710, 812030, 812741, 812985, 813438, 846260, 878316, 879073, 909346, 909448, 909654.
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QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

Table 1: Historical Summary of Analytical Results For Groundwater - Inorganics

			Physical Parameters														Dissolved Inorganics										
Sample Location	Sample ID	Sample Date (yyyy mm dd)	pH	Total Hardness	pH (field)	Conductivity	Field Conductivity	Total Dissolved Solids	Dissolved Organic Carbon	Phosphate	Ammonia, Total (as N)	Nitrate (as N)	Nitrite (as N)	Chloride	Fluoride	Sulfate	Total Alkalinity	Alkalinity, Bicarbonate (as CaCO3)	Alkalinity, Carbonate (as CaCO3)	Alkalinity, Hydroxide (as CaCO3)	Alkalinity, Phenolphthalein (as CaCO3)	Bromide	Hydrogen Sulfide	Sulfide	Chemical Oxygen Demand	Dissolved Phosphate	Ortho-Phosphate
			pH	mg/L	pH	µS/cm	µS/cm	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
GL17-1 (cont'd)	GL17-1-190527	2019 05 27	8.11	124	7.56	-	2558	1,490	2.02	< 0.0050	445	< 10	< 10	75.7	1,960	14.4	1,380	1,380	< 1.0	< 1.0	< 1.0	0.18	-	-	< 20	< 0.0050	-
	DUP1-190527	Duplicate	8.13	120	7.56	-	2558	1,470	1.76	< 0.0050	481	< 10	< 10	75.5	1,940	13.8	1,400	1,400	< 1.0	< 1.0	< 1.0	0.20	-	-	< 20	< 0.0050	-
	QA/QC RPD%		0	3	*	-	*	1	*	*	8	*	*	0	1	4	1	1	*	*	*	*	-	-	*	*	-
	GL17-1-190923	2019 09 23	8.11	128	7.67	-	2421	1,550	1.92	-	351	< 10	< 10	78.7	1,940	14.3	1,360	1,360	< 1.0	< 1.0	< 1.0	0.42	-	-	< 20	-	0.0715
	GL17-1-200608	2020 06 08	8.20	121	7.35	-	2,138	1,590	2.32	-	349	< 10	< 10	62.6	1,820	3.9	1,400	1,400	< 1.0	< 1.0	< 1.0	< 1.00	-	-	< 20	-	0.0500
	GL17-1-201020	2020 10 20	8.01	132	7.43	-	2,457	1,530	2.22	-	402	< 10	< 10	69.6	1,990	4.4	1,300	1,300	< 1.0	< 1.0	< 1.0	0.33	-	-	< 20	-	0.0103
	GL17-1-210604	2021 06 04	8.14	135	-	-	-	1,220	1.36	-	315	< 10	< 10	71.0	2,030	3.9	1,410	1,410	< 1.0	< 1.0	< 1.0	0.34	-	-	< 20	-	< 0.0050
	GL17-1-211006	2021 10 06	7.98	127	7.33	-	2,153	1,660	1.24	-	399	< 10	< 10	64.2	1,970	< 10.0	1,460	1,460	< 1.0	< 1.0	< 1.0	< 1.00	-	-	< 20	-	< 0.0050
GL17-2	GL17-2-20091112	2009 11 12	-	128	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL30-2-20091112	Duplicate	-	119	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	QA/QC RPD%		-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL17-2-20100811	2010 08 11	-	110	-	-	-	1,630	-	-	350	-	-	65.2	-	6.2	1,480	-	-	-	-	-	-	-	10	-	0.058
	GL17-2-20110628	2011 06 28	-	109	-	-	-	1,510	-	-	220	-	-	68	-	60	135	-	-	-	-	-	-	-	10	-	0.109
	GL17-2-20120625	2012 06 25	-	3,440	-	-	-	9,700	-	-	190	-	-	204	-	5,740	606	-	-	-	-	-	-	-	40	-	< 0.002
	GL17-2-20121204	2012 12 04	-	3,920	-	-	-	10,000	-	-	110	2,500	-	180	-	6,120	652	-	-	-	-	-	-	-	33	-	< 0.002
	GL17-2-20130626	2013 06 26	-	4,000	-	-	-	10,800	-	-	< 5.0	2,610	-	191	2,300	6,330	780	-	-	-	-	< 2.5	-	-	33	-	-
	GL17-2-20131113	2013 11 13	-	4,190	-	-	-	10,800	-	-	22.6	1,840	-	262	1,700	6,380	864	-	-	-	-	-	-	-	24	-	-
	GL17-2-20140605	2014 06 05	-	3,650	-	-	-	10,500	-	-	32.4	1,490	-	226	1,300	6,290	822	-	-	-	-	< 2.5	-	-	29	-	0.0025
	GL17-2-20141118	2014 11 18	-	3,860	-	-	-	11,300	-	-	47	1,330	-	247	1,400	6,820	966	-	-	-	-	< 2.5	-	-	40	-	0.0014
	GL17-2-20150608	2015 06 08	7.5	4,010	-	-	-	10,300	-	-	33.2	1,680	-	241	1,700	6,660	870	-	-	-	-	< 2.5	-	-	32	-	0.0025
	GL17-2-20151104	2015 11 04	7.65	3,760	-	-	-	11,100	-	-	9.3	1,970	-	257	1,700	7,000	705	-	-	-	-	< 2.5	-	-	26	-	0.0033
GL18-2	GL 18-2-20091110	2009 11 10	-	1,060	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL18-2-20100811	2010 08 11	-	1,380	-	-	-	6,930	-	-	1,400	-	-	568	-	3,800	154	-	-	-	-	-	-	-	40	-	0.005
	GL18-2-20110629	2011 06 29	-	1,510	-	-	-	6,440	-	-	710	-	-	572	-	3,770	260	-	-	-	-	-	-	-	40	-	0.078
	GL18-2-20120626	2012 06 26	-	1,480	-	-	-	6,820	-	-	1,020	-	-	572	-	3,620	156	-	-	-	-	-	-	-	40	-	0.004
	DUP-A-20120626	Duplicate	-	1,520	-	-	-	6,670	-	-	1,280	-	-	585	-	3,670	167	-	-	-	-	-	-	-	60	-	0.004
	QA/QC RPD%		-	3	-	-	-	2	-	-	23	-	-	2	-	1	7	-	-	-	-	-	-	-	*	-	*
	GL18-2-20121205	2012 12 05	-	1,380	-	-	-	6,600	-	-	1,450	< 10,000a	-	785	-	8,090	165	-	-	-	-	-	-	-	22	-	0.005
	GL18-2-20130627	2013 06 27	-	1,400	-	-	-	6,660	-	-	1,330	< 250	-	611	< 1,000	3,900	177	-	-	-	-	3.7	-	-	47	-	-
	GL18-2-20131114	2013 11 14	-	1,380	-	-	-	6,670	-	-	1,370	< 250	-	618	< 1,000	3,870	181	-	-	-	-	3.7	-	-	32	-	-
	GL18-2-20140609	2014 06 09	-	1,380	-	-	-	6,260	-	-	1,440	< 250	-	608	< 1,000	3,820	180	-	-	-	-	3.4	-	-	150	-	0.0043
	GL18-2-20141126	2014 11 26	-	1,380	-	-	-	6,330	-	-	1,370	760	-	613	< 1,000	3,780	680	-	-	-	-	3.5	-	-	38	-	0.0042
	DUP3-20141126	Duplicate	-	1,390	-	-	-	6,080	-	-	1,440	420	-	627	< 1,000	3,860	170	-	-	-	-	3.8	-	-	40	-	0.0033
	QA/QC RPD%		-	1	-	-	-	4	-	-	5	58	-	2	*	2	120	-	-	-	-	8	-	-	*	-	*
	GL18-2-20150615	2015 06 15	7.98	1,340	-	-	-	6,410	-	-	1,330	< 250	-	608	< 1,000	3,780	170	-	-	-	-	3.7	-	-	35	-	0.0043
	GL18-2-20170529	2017 05 29	7.95	1,370	-	-	-	6,310	-	-	1,390	< 250	-	619	< 1,000	3,820	141	-	-	-	-	3.2	-	-	< 20	-	0.0027
	GL18-2-180604	2018 06 04	7.38	1,410	7,797.8	8,140	7,172	6,140	2.92	0.0231	1,520	< 5,000a	< 10	1,130	230	8,810	138	138	< 1.0	< 1.0	< 1.0	< 50.0	< 0.01a	< 0.020	38	0.0231	-
	DUP-180604	Duplicate	7.43	1,430	7.79	-	7,172	6,310	2.91	0.0216	1,530	< 5,000a	< 10	1,130	250	8,740	139	139	< 1.0	< 1.0	< 1.0	< 50.0	-	-	36	0.0216	-
	QA/QC RPD%		1	1	*	-	*	3	0	*	1	*	*	0	*	1	1	1	*	*	*	*	-	-	*	*	-

Associated CARO files available upon request.
Associated Exova file(s): 712940, 714233, 714243, 756693, 756810, 757047, 811364, 811710, 812030, 812741, 812985, 813438, 846260, 878316, 879073, 909346, 909448, 909654.
All terms defined within the body of Keltech's report.
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\- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

Table 1: Historical Summary of Analytical Results For Groundwater - Inorganics

			Physical Parameters														Dissolved Inorganics										
Sample Location	Sample ID	Sample Date	pH	Total Hardness	pH (field)	Conductivity	Field Conductivity	Total Dissolved Solids	Dissolved Organic Carbon	Phosphate	Ammonia, Total (as N)	Nitrate (as N)	Nitrite (as N)	Chloride	Fluoride	Sulfate	Total Alkalinity	Alkalinity, Bicarbonate (as CaCO3)	Alkalinity, Carbonate (as CaCO3)	Alkalinity, Hydroxide (as CaCO3)	Alkalinity, Phenolphthalein (as CaCO3)	Bromide	Hydrogen Sulfide	Sulfide	Chemical Oxygen Demand	Dissolved Phosphate	Ortho-Phosphate
		(yyyy mm dd)	pH	mg/L	pH	µS/cm	µS/cm	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
GL20-1	GL20-1-20091112	2009 11 12	-	998	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL20-1-20100811	2010 08 11	-	997	-	-	-	6,910	-	-	13,000	-	-	868	-	33	5,940	-	-	-	-	-	-	-	1,500	-	0.36
	GL20-1-20110629	2011 06 29	-	113	-	-	-	6,900	-	-	317,000	-	-	880	-	600	582	-	-	-	-	-	-	-	110	-	3.8
	GL20-1-20111217	2011 12 17	-	997	-	-	-	7,110	-	-	354,000	< 200	-	986	-	< 3	5,820	-	-	-	-	-	-	-	1,500	-	0.49
	DUPA-20111217	Duplicate	-	988	-	-	-	7,140	-	-	364,000	< 200	-	982	-	< 3	5,810	-	-	-	-	-	-	-	1,400	-	0.64
	QA/QC RPD%		-	1	-	-	-	0	-	-	3	*	-	0	-	*	0	-	-	-	-	-	-	-	7	-	27
	GL20-1-20120625	2012 06 25	-	1,030	-	-	-	6,820	-	-	288,000	-	-	885	-	25.3	5,670	-	-	-	-	-	-	-	1,300	-	0.52
	GL20-1-20121203	2012 12 03	-	872	-	-	-	7,070	-	-	485,000	< 1,000	-	923	-	< 50	5,900	-	-	-	-	-	-	-	1,280	-	15.7
	GL20-1-20130625	2013 06 25	-	1,130	-	-	-	8,490	-	-	273,000	< 250	-	865	1,600	294	6,320	-	-	-	-	6.9	-	-	1,180	-	-
	GL20-1-20140605	2014 06 05	-	907	-	-	-	7,650	-	-	96,100	123,000	-	586	< 1,000	1,250	3,850	-	-	-	-	5.3	-	-	566	-	0.791
	DUP4-20140605	Duplicate	-	897	-	-	-	7,590	-	-	95,300	129,000	-	572	< 1,000	1,230	3,940	-	-	-	-	5.5	-	-	572	-	0.711
	QA/QC RPD%		-	1	-	-	-	1	-	-	1	5	-	2	*	2	2	-	-	-	-	4	-	-	1	-	11
	GL20-1-20141126	2014 11 26	-	945	-	-	-	7,430	-	-	180,000	< 250	-	819	< 1,000	21	6,130	-	-	-	-	6.8	-	-	923	-	6.4
	GL20-1-20150611	2015 06 11	7.84	848	-	-	-	7,590	-	-	110,000	27,200	-	724	< 1,000	754	5,200	-	-	-	-	5.7	-	-	655	-	0.66
	GL20-1-200826	2020 08 26	7.73	118	6.99	-	8514	5,240	122	-	140,000	< 100	< 100	506	< 1,000	86.3	4,460	4,460	< 1.0	< 1.0	< 1.0	< 1.00	-	-	422	-	2.39
	GL20-1-201020	2020 10 20	7.50	565	7	-	8,684	5,230	< 0.50	-	116,000	< 100	< 100	493	< 1,000	32.6	4,240	4,240	< 1.0	< 1.0	< 1.0	< 1.00	-	-	429	-	2.48
	GL20-1-210511	2021 05 11	7.72	686	7.04	-	8,487	5,750	0.81	-	94,500	< 100	< 100	467	< 1,000	132	4,520	4,520	< 1.0	< 1.0	< 1.0	< 1.00	-	-	423	-	< 0.0500
	GL20-1-210924	2021 09 24	7.60	565	6.90	-	8,332	5,520	118	-	111,000	582	50	463	320	14.7	4,740	4,740	< 1.0	< 1.0	< 1.0	2.62	-	-	445	-	0.0835
	DUP 2-210924	Duplicate	7.63	551	6.90	-	8,332	5,660	132	-	102,000	594	45	462	350	14.9	4,790	4,790	< 1.0	< 1.0	< 1.0	2.66	-	-	432	-	0.0863
	QA/QC RPD%		0	3	0	-	0	3	11	-	8	2	*	0	*	1	1	1	*	*	*	2	-	-	3	-	3
GL21-1	GL21-1-20091117	2009 11 17	-	4,230	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL21-1-20110705	2011 07 05	-	520	-	-	-	14,200	-	-	-	-	-	19	-	170	1,230	-	-	-	-	-	-	-	-	-	0.07
	GL 21-1-20110707	2011 07 07	-	-	-	-	-	-	-	-	40	-	-	-	-	-	-	-	-	-	-	-	-	-	140	-	-
	GL21-1-20120625	2012 06 25	-	4,660	-	-	-	14,800	-	-	< 10	-	-	697	-	8,380	1,120	-	-	-	-	-	-	-	110	-	0.052
	GL21-1-20121204	2012 12 04	-	4,300	-	-	-	14,600	-	-	90	1,880	-	628	-	7,910	1,160	-	-	-	-	-	-	-	125	-	0.042
GL22-1	GL 22-1-20091110	2009 11 10	-	1,050	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL22-1-20100811	2010 08 11	-	970	-	-	-	1,450	-	-	70	-	-	25.6	-	338	961	-	-	-	-	-	-	-	60	-	0.01
GL23-1	GL 23-1-20091110	2009 11 10	-	1,140	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL23-1-20100811	2010 08 11	-	1,000	-	-	-	1,640	-	-	40	-	-	30.9	-	352	1,220	-	-	-	-	-	-	-	50	-	0.005
	GL23-1-20110704	2011 07 04	-	1,160	-	-	-	1,720	-	-	40	-	-	31.9	-	467	1,170	-	-	-	-	-	-	-	160	-	0.008
	GL 23-1-20120627	2012 06 27	-	1,100	-	-	-	1,780	-	-	< 10	-	-	32.9	-	497	1,160	-	-	-	-	-	-	-	40	-	0.008
	GL23-1-20121203	2012 12 03	-	270	-	-	-	1,790	-	-	80	< 100	-	33.8	-	500	1,080	-	-	-	-	-	-	-	44	-	0.009
	GL23-1-20130627	2013 06 27	-	1,170	-	-	-	1,750	-	-	< 5.0	110	-	35	1,650	544	1,180	-	-	-	-	< 1.0	-	-	30	-	-
	GL23-1-20140603	2014 06 03	-	1,080	-	-	-	1,710	-	-	11.6	160	-	41	1,170	522	1,130	-	-	-	-	< 1.0	-	-	38	-	0.0065
	GL23-1-20141124	2014 11 24	-	1,210	-	-	-	1,790	-	-	26.9	< 100	-	37	1,210	624	1,100	-	-	-	-	< 1.0	-	-	48	-	0.0054
	GL23-1-20150608	2015 06 08	7.67	1,130	-	-	-	1,700	-	-	< 5.0	< 100	-	36	1,090	500	1,200	-	-	-	-	< 1.0	-	-	41	-	0.0059
	GL23-1-20151104	2015 11 04	7.68	1,050	-	-	-	1,570	-	-	17.2	< 100	-	33	940	390	1,130	-	-	-	-	< 1.0	-	-	37	-	0.0048
	GL23-1-20160526	2016 05 26	7.99	1,080	-	-	-	1,570	-	-	< 5.0	< 100	-	34	1,030	382	1,090	-	-	-	-	< 1.0	-	-	38	-	0.003
	GL23-1-20160531	2016 05 31	7.64	-	-	-	-	1,580	-	-	< 20	66	-	30.6	1,050	384	1,090	-	-	-	-	-	-	-	-	-	< 0.01
	GL23-1-20170525	2017 05 25	8.45	1,150	-	-	-	1,610	-	-	10.4	< 100	-	35	890	386	1,070	-	-	-	-	< 1.0	-	-	42	-	0.0034
	DUP3-20170525	Duplicate	8.41	1,150	-	-	-	1,580	-	-	< 5.0	< 100	-	35	900	387	1,020	-	-	-	-	< 1.0	-	-	37	-	0.0033
	QA/QC RPD%		0	0	-	-	-	2	-	-	*	*	-	0	1	0	5	-	-	-	-	*	-	-	*	-	*

Associated CARO files available upon request.
Associated Exova file(s): 712940, 714233, 714243, 756693, 756810, 757047, 811364, 811710, 812030, 812741, 812985, 813438, 846260, 878316, 879073, 909346, 909448, 909654.
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RDL Denotes reported detection limit.

Table 1: Historical Summary of Analytical Results For Groundwater - Inorganics

			Physical Parameters														Dissolved Inorganics										
Sample Location	Sample ID	Sample Date	pH	Total Hardness	pH (field)	Conductivity	Field Conductivity	Total Dissolved Solids	Dissolved Organic Carbon	Phosphate	Ammonia, Total (as N)	Nitrate (as N)	Nitrite (as N)	Chloride	Fluoride	Sulfate	Total Alkalinity	Alkalinity, Bicarbonate (as CaCO3)	Alkalinity, Carbonate (as CaCO3)	Alkalinity, Hydroxide (as CaCO3)	Alkalinity, Phenolphthalein (as CaCO3)	Bromide	Hydrogen Sulfide	Sulfide	Chemical Oxygen Demand	Dissolved Phosphate	Ortho-Phosphate
		(yyyy mm dd)	pH	mg/L	pH	µS/cm	µS/cm	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
GL23-1 (cont'd)	GL23-1-180529	2018 05 29	7.86	1,260	7.22	-	2,014	1,560	14.3	0.0062	36	< 10	66	34.2	710	341	1,090	1,090	< 1.0	< 1.0	< 1.0	0.27	-	-	39	0.0062	-
	GL23-1-190523	2019 05 23	8.01	1,170	7.7	-	2332	1,590	14.8	< 0.0050	33	72	< 10	34.0	660	384	1,120	1,120	< 1.0	< 1.0	< 1.0	0.27	-	-	30	< 0.0050	-
	GL23-1-190917	2019 09 17	7.78	1,130	-	-	-	1,610	16.4	-	60	< 10	< 10	35.0	750	394	1,090	1,090	< 1.0	< 1.0	< 1.0	< 0.10	-	-	-	-	< 0.0050
	GL23-1-200617	2020 06 17	7.97	1,000	6.95	-	2,150	1,530	14.6	-	< 50	134	< 100	32.3	< 1,000	405	964	964	< 1.0	< 1.0	< 1.0	< 1.00	-	-	33	-	< 0.0500
	GL23-1-200910	2020 09 10	7.98	1,130	-	-	-	1,660	14.8	-	< 50	28	< 10	33.1	780	402	1,110	1,110	< 1.0	< 1.0	< 1.0	0.32	-	-	-	-	< 0.0050
	GL23-1-210513	2021 05 13	7.85	1,080	7.06	-	2,319	1,370	13.9	-	< 50	10	< 10	33.2	760	376	1,180	1,180	< 1.0	< 1.0	< 1.0	0.33	-	-	22	-	< 0.0050
	DUP 1-210513	Duplicate	7.73	1,090	7.06	-	2,319	1,490	14.7	-	< 50	< 10	< 10	34.4	720	356	1,170	1,170	< 1.0	< 1.0	< 1.0	0.30	-	-	43	-	< 0.0050
	QA/QC RPD%		2	1	0	-	0	8	6	-	*	*	*	4	5	5	1	1	*	*	*	*	-	-	*	-	*
GL24-1	GL24-1-20100811	2010 08 11	-	1,200	-	-	-	2,110	-	-	< 10	-	-	91.4	-	762	852	-	-	-	-	-	-	-	20	-	0.034
	GL24-1-20160531	2016 05 31	7.64	-	-	-	-	1,570	-	-	< 20	11,700	-	188	1,270	349	778	-	-	-	-	-	-	-	-	-	0.1
	GL24-1-20180927	2018 09 27	-	1,760	-	-	-	-	-	-	31	61,600	-	99.1	1,140	1,450	-	-	-	-	-	< 0.10	-	-	-	-	< 0.0050
	GL24-1-180612	2018 06 12	7.63	1,300	-	-	-	2,380	-	0.0083	60	13,100	29	216	1,090	742	1,060	1,060	< 1.0	< 1.0	< 1.0	< 0.10	-	-	-	0.0083	-
	GL24-1-190917	2019 09 17	7.92	1,100	-	-	-	1,870	9.09	-	47	6,540	< 100	163	1,200	591	921	921	< 1.0	< 1.0	< 1.0	< 1.00	-	-	-	-	< 0.0500
	GL24-1-200910	2020 09 10	8.04	856	-	-	-	1,750	6.56	-	< 50	1,690	< 10	123	1,390	418	930	930	< 1.0	< 1.0	< 1.0	0.30	-	-	-	-	< 0.0050
GL25-1	GL25-1-20091117	2009 11 17	-	1,540	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL25-1-20100812	2010 08 12	-	1,480	-	-	-	2,630	-	-	< 10	-	-	67	-	1,350	455	-	-	-	-	-	-	-	60	-	0.016
GL26-1	GL26-1-20091112	2009 11 12	-	654	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL26-1-20100812	2010 08 12	-	527	-	-	-	1,230	-	-	30	-	-	8.9	-	309	706	-	-	-	-	-	-	-	10	-	0.005
	GL30-5-20100812	Duplicate	-	575	-	-	-	1,250	-	-	50	-	-	8.8	-	306	705	-	-	-	-	-	-	-	10	-	0.005
	QA/QC RPD%		-	9	-	-	-	2	-	-	50	-	-	1	-	1	0	-	-	-	-	-	-	-	*	-	0
GL26-2	GL26-2-20091116	2009 11 16	-	629	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL26-2-20100812	2010 08 12	-	491	-	-	-	1,210	-	-	< 10	-	-	15.5	-	346	655	-	-	-	-	-	-	-	20	-	0.013
	GL26-2-20110629	2011 06 29	-	634	-	-	-	1,160	-	-	< 10	-	-	14.8	-	357	644	-	-	-	-	-	-	-	< 10	-	0.108
	GL26-2-20120625	2012 06 25	-	670	-	-	-	1,210	-	-	30	-	-	18.3	-	367	644	-	-	-	-	-	-	-	20	-	0.006
	GL26-2-20121204	2012 12 04	-	572	-	-	-	1,200	-	-	100	< 100	-	14.9	-	357	643	-	-	-	-	-	-	-	23	-	< 0.002
	GL26-2-20130626	2013 06 26	-	673	-	-	-	1,170	-	-	62.7	120	-	15	1,380	410	666	-	-	-	-	< 1.0	-	-	< 20	-	-
	GL26-2-20131114	2013 11 14	-	639	-	-	-	1,160	-	-	68.3	< 50	-	19.3	1,320	417	818	-	-	-	-	< 0.50	-	-	< 20	-	-
	GL26-2-20140605	2014 06 05	-	665	-	-	-	1,130	-	-	52	< 50	-	14.3	1,170	400	782	-	-	-	-	< 0.50	-	-	< 20	-	0.0021
	DUP2-20140605	Duplicate	-	668	-	-	-	1,130	-	-	58.7	< 50	-	14.2	1,170	396	816	-	-	-	-	< 0.50	-	-	< 20	-	0.0014
	QA/QC RPD%		-	0	-	-	-	0	-	-	12	*	-	1	0	1	4	-	-	-	-	*	-	-	*	-	*
	GL26-2-20141117	2014 11 17	-	638	-	-	-	1,120	-	-	50.8	< 100	-	20	1,160	403	830	-	-	-	-	< 1.0	-	-	< 20	-	0.0023
	GL26-2-20150608	2015 06 08	7.58	643	-	-	-	1,120	-	-	80.2	99	-	19.1	1,170	406	735	-	-	-	-	< 0.50	-	-	< 20	-	0.0096
	GL26-2-20151104	2015 11 04	7.73	617	-	-	-	1,170	-	-	62.4	< 50	-	13.6	1,170	388	613	-	-	-	-	< 0.50	-	-	< 20	-	< 0.0010
GL26-3	GL26-3-20091111	2009 11 11	-	682	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL26-3-20100812	2010 08 12	-	538	-	-	-	1,500	-	-	< 10	-	-	62	-	499	604	-	-	-	-	-	-	-	20	-	0.03

Associated CARO files available upon request.
Associated Exova file(s): 712940, 714233, 714243, 756693, 756810, 757047, 811364, 811710, 812030, 812741, 812985, 813438, 846260, 878316, 879073, 909346, 909448, 909654.
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* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

Table 1: Historical Summary of Analytical Results For Groundwater - Inorganics

			Physical Parameters														Dissolved Inorganics										
Sample Location	Sample ID	Sample Date (yyyy mm dd)	pH	Total Hardness	pH (field)	Conductivity	Field Conductivity	Total Dissolved Solids	Dissolved Organic Carbon	Phosphate	Ammonia, Total (as N)	Nitrate (as N)	Nitrite (as N)	Chloride	Fluoride	Sulfate	Total Alkalinity	Alkalinity, Bicarbonate (as CaCO3)	Alkalinity, Carbonate (as CaCO3)	Alkalinity, Hydroxide (as CaCO3)	Alkalinity, Phenolphthalein (as CaCO3)	Bromide	Hydrogen Sulfide	Sulfide	Chemical Oxygen Demand	Dissolved Phosphate	Ortho-Phosphate
			pH	mg/L	pH	µS/cm	µS/cm	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
GL27-1	GL27-1-20091116	2009 11 16	-	94	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL27-1-20100812	2010 08 12	-	67	-	-	-	1,650	-	-	210	-	-	68	-	57	1,580	-	-	-	-	-	-	-	10	-	0.041
	GL27-1-20110629	2011 06 29	-	88	-	-	-	1,600	-	-	70	-	-	44	-	70	161	-	-	-	-	-	-	-	< 10	-	0.165
	GL 27-1-20120626	2012 06 26	-	94	-	-	-	1,660	-	-	70	-	-	36.5	-	8	1,600	-	-	-	-	-	-	-	20	-	-
	GL 27-1-20120704	2012 07 04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.121
	GL27-1-20121204	2012 12 04	-	73	-	-	-	1,670	-	-	100	< 100	-	39.8	-	6.3	1,570	-	-	-	-	-	-	-	18	-	0.128
	GL27-1-20130626	2013 06 26	-	88.4	-	-	-	1,730	-	-	126	< 100	-	37	3,540	< 10	1,550	-	-	-	-	< 1.0	-	-	< 20	-	-
	GL27-1-20131113	2013 11 13	-	93.5	-	-	-	1,630	-	-	107	< 100	-	41	3,400	< 10	1,500	-	-	-	-	-	-	-	< 20	-	-
	GL27-1-20140605	2014 06 05	-	94.4	-	-	-	1,630	-	-	126	< 100	-	38	3,420	< 10	1,560	-	-	-	-	< 1.0	-	-	< 20	-	0.12
	GL27-1-20141118	2014 11 18	-	86.8	-	-	-	1,640	-	-	171	< 100	-	39	3,280	< 10	1,640	-	-	-	-	< 1.0	-	-	38	-	0.115
	GL27-1-20150610	2015 06 10	8.41	87.1	-	-	-	1,470	-	-	122	< 100	-	38	3,250	< 6.0	1,590	-	-	-	-	< 1.0	-	-	< 20	-	0.102
	GL27-1-20151104	2015 11 04	8.18	86.6	-	-	-	1,610	-	-	180	< 100	-	36	3,080	< 6.0	1,500	-	-	-	-	< 1.0	-	-	< 20	-	0.0954
	GL27-1-20160526	2016 05 26	8.27	91.8	-	-	-	1,620	-	-	116	< 100	-	38	3,450	< 6.0	1,500	-	-	-	-	< 1.0	-	-	< 20	-	0.0886
	DUP-1-20160526	Duplicate	8.31	85.7	-	-	-	1,690	-	-	111	< 100	-	38	3,490	< 6.0	1,480	-	-	-	-	< 1.0	-	-	< 20	-	0.0902
	QA/QC RPD%		0	7	-	-	-	4	-	-	4	*	-	0	1	*	1	-	-	-	-	*	-	-	*	-	2
	GL27-1-20160919	2016 09 19	8.34	90.8	-	-	-	1,630	-	-	152	< 100	-	36	3,000	< 6.0	1,530	-	-	-	-	< 1.0	-	-	< 20	-	0.112
	GL27-1-20170525	2017 05 25	8.83	95.2	-	-	-	1,640	-	-	70.1	< 100	-	38	3,310	6	1,560	-	-	-	-	< 1.0	-	-	< 20	-	0.0674
	GL27-1-20170925	2017 09 25	8.14	92	-	-	-	1,650	-	-	155	< 100	-	32	3,260	6.6	1,450	-	-	-	-	< 1.0	-	-	< 20	-	0.0553
	GL27-1-180815	2018 08 15	7.98	89.6	7.63	-	1,870	1,680	2.57	0.0407	276	18	< 10	33.6	3,100	27.5	1,500	1,500	< 1.0	< 1.0	< 1.0	< 0.10	-	-	< 20	0.0407	-
	GL27-1-180919	2018 09 19	7.91	99.9	7.62	-	2,388	1,620	3.45	0.0445	220	< 10	< 10	35.1	3,210	19.2	1,450	1,450	< 1.0	< 1.0	< 1.0	< 0.10	-	-	< 20	0.0445	-
	GL27-1-190527	2019 05 27	8.20	90.6	7.67	-	2620	1,430	2.89	0.0794	272	< 10	< 10	36.2	3,020	21.8	1,480	1,480	< 1.0	< 1.0	< 1.0	< 0.10	-	-	< 20	0.0794	-
	GL27-1-190919	2019 09 19	8.22	92.8	7.48	-	2471	1,610	2.84	-	242	< 10	< 10	35.6	3,290	19.9	1,490	1,490	< 1.0	< 1.0	< 1.0	< 0.10	-	-	< 20	-	0.0424
	GL27-1-200608	2020 06 08	8.31	93.2	7.5	-	2,216	1,530	2.12	-	230	< 10	< 10	35.5	3,060	17.0	1,500	1,480	22.6	< 1.0	11.3	< 0.10	-	-	< 20	-	< 0.0050
	GL27-1-201022	2020 10 22	8.10	85.2	7.63	-	2,525	1,600	2.79	-	243	< 10	< 10	37.7	3,330	7.8	1,420	1,420	< 1.0	< 1.0	< 1.0	< 0.10	-	-	< 20	-	0.0567
	GL27-1-210602	2021 06 02	8.16	103	7.47	-	2,633	1,260	2.04	-	186	< 10	< 10	36.8	3,190	11.7	1,510	1,510	< 1.0	< 1.0	< 1.0	0.16	-	-	< 20	-	0.0558
	GL27-1-210924	2021 09 24	8.21	107	7.47	-	2,544	1,810	106	-	318	< 10	< 10	36.7	3,320	11.8	1,550	1,550	< 1.0	< 1.0	< 1.0	0.12	-	-	< 20	-	0.0391
GL27-2	GL27-1-20111217	2011 12 17	-	83	-	-	-	1,630	-	-	80	< 50	-	40.1	-	20.4	1,500	-	-	-	-	-	-	-	10	-	0.08
	GL27-2-20091116	2009 11 16	-	3,760	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL27-2-20100812	2010 08 12	-	3,540	-	-	-	14,300	-	-	290	-	-	740	-	6,590	708	-	-	-	-	-	-	-	130	-	0.057
GL27-3	GL27-3-20091112	2009 11 12	-	5,800	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL27-3-20100812	2010 08 12	-	4,700	-	-	-	17,800	-	-	500	-	-	800	-	8,490	645	-	-	-	-	-	-	-	60	-	0.007
	GL27-3-20110629	2011 06 29	-	5,170	-	-	-	16,700	-	-	470	-	-	610	-	9,700	639	-	-	-	-	-	-	-	30	-	0.268
	GL27-3-20111217	2011 12 17	-	4,500	-	-	-	17,100	-	-	410	< 200	-	582	-	10,900	653	-	-	-	-	-	-	-	40	-	0.04
	GL27-3-20120625	2012 06 25	-	5,060	-	-	-	16,400	-	-	520	-	-	543	-	9,620	638	-	-	-	-	-	-	-	70	-	0.003
	GL27-3-20121204	2012 12 04	-	4,480	-	-	-	15,900	-	-	660	< 1,000	-	502	-	9,230	626	-	-	-	-	-	-	-	62	-	0.002
	GL27-3-20130626	2013 06 26	-	5,280	-	-	-	17,200	-	-	730	< 500	-	589	1,300	11,100	864	-	-	-	-	< 5.0	-	-	53	-	-
	GL27-3-20131113	2013 11 13	-	4,890	-	-	-	16,200	-	-	552	< 500	-	577	1,390	9,840	876	-	-	-	-	-	-	-	31	-	-
	GL27-3-20140605	2014 06 05	-	5,120	-	-	-	16,300	-	-	564	< 250	-	586	< 1,000	10,600	967	-	-	-	-	4	-	-	47	-	0.0024
	GL27-3-20141118	2014 11 18	-	4,560	-	-	-	13,300	-	-	416	< 500	-	545	1,200	9,930	947	-	-	-	-	< 5.0	-	-	38	-	0.0055

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Associated Exova file(s): 712940, 714233, 714243, 756693, 756810, 757047, 811364, 811710, 812030, 812741, 812985, 813438, 846260, 878316, 879073, 909346, 909448, 909654.
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RDL Denotes reported detection limit.

			Physical Parameters														Dissolved Inorganics										
Sample Location	Sample ID	Sample Date (yyyy mm dd)	pH	Total Hardness	pH (field)	Conductivity	Field Conductivity	Total Dissolved Solids	Dissolved Organic Carbon	Phosphate	Ammonia, Total (as N)	Nitrate (as N)	Nitrite (as N)	Chloride	Fluoride	Sulfate	Total Alkalinity	Alkalinity, Bicarbonate (as CaCO3)	Alkalinity, Carbonate (as CaCO3)	Alkalinity, Hydroxide (as CaCO3)	Alkalinity, Phenolphthalein (as CaCO3)	Bromide	Hydrogen Sulfide	Sulfide	Chemical Oxygen Demand	Dissolved Phosphate	Ortho-Phosphate
			pH	mg/L	pH	µS/cm	µS/cm	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
GL27-3 (cont'd)	GL27-3-20150610	2015 06 10	8.07	4,990	-	-	-	17,900	-	-	615	< 500	-	600	< 2,000a	11,100	840	-	-	-	-	< 5.0	-	-	44	-	0.0015
	GL27-3-20151104	2015 11 04	7.88	4,380	-	-	-	16,000	-	-	487	< 500	-	557	< 2,000a	10,400	624	-	-	-	-	< 5.0	-	-	33	-	0.0043
	GL27-3-20160524	2016 05 24	7.85	4,850	-	-	-	16,200	-	-	582	< 500	-	620	< 2,000a	11,400	604	604	< 1.0	< 1.0	-	< 5.0	-	-	27	-	0.0025
	GL27-3-20170925	2017 09 25	7.82	5,080	-	-	-	15,200	-	-	600	< 500	-	543	< 2,000a	10,500	601	-	-	-	-	< 5.0	-	-	31	-	0.0027
	GL27-3-180815	2018 08 15	7.71	5,450	7.91	-	9,589	18,000	9.12	< 0.500	589	< 1,000	< 1,000a	516	970	10,200	622	622	< 1.0	< 1.0	< 1.0	< 10.0	-	-	< 20	< 0.500	-
	GL27-3-190527	2019 05 27	7.90	5,350	7.45	-	16199	13,500	7.11	< 0.500	57	1,470	< 1,000a	475	< 10,000a	9,330	610	610	< 1.0	< 1.0	< 1.0	< 10.0	-	-	< 20	< 0.500	-
	GL27-3-200608	2020 06 08	7.88	5,540	7.3	-	15,172	18,200	6.30	-	806	6,600	< 5,000a	442	< 50,000a	10,400	586	586	< 1.0	< 1.0	< 1.0	< 50.0	-	-	21	-	< 2.50
	GL27-3-210603	2021 06 03	7.95	6,070	7.38	-	17,777	19,800	8.09	-	823	< 2,500	< 2,500a	569	< 25,000a	11,400	571	571	< 1.0	< 1.0	< 1.0	< 25.0	-	-	21	-	< 1.25
GL27-4	GL27-4-20100812	2010 08 12	-	4,380	-	-	-	13,400	-	-	14,000	-	-	780	-	4,900	3,370	-	-	-	-	-	-	-	360	-	4.76
GL28-1	GL28-1-20091116	2009 11 16	-	1,680	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL30-5-20091116	Duplicate	-	1,720	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	QA/QC RPD%		-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL28-1-20100812	2010 08 12	-	1,600	-	-	-	3,990	-	-	210	-	-	64	-	1,840	655	-	-	-	-	-	-	-	20	-	0.009
	GL28-1-20110627	2011 06 27	-	944	-	-	-	3,060	-	-	< 10	-	-	27	-	1,700	346	-	-	-	-	-	-	-	10	-	0.009
	GL28-1-20120626	2012 06 26	-	550	-	-	-	1,610	-	-	130	-	-	11.3	-	954	139	-	-	-	-	-	-	-	< 10	-	0.003
	GL28-1-20121203	2012 12 03	-	1,680	-	-	-	3,870	-	-	220	< 100	-	38.7	-	2,240	649	-	-	-	-	-	-	-	18	-	< 0.002
	DUP-A-20121203	Duplicate	-	1,700	-	-	-	3,830	-	-	170	< 100	-	39.4	-	2,240	647	-	-	-	-	-	-	-	33	-	< 0.002
	QA/QC RPD%		-	1	-	-	-	1	-	-	26	*	-	2	-	0	0	-	-	-	-	-	-	-	*	-	*
	GL28-1-20130708	2013 07 08	-	1,740	-	-	-	3,530	-	-	175	< 100	-	28	680	1,510	368	-	-	-	-	< 1.0	-	-	< 20	-	-
	DUP1-20130708	Duplicate	-	1,740	-	-	-	4,220	-	-	178	< 100	-	34	890	1,890	619	-	-	-	-	< 1.0	-	-	< 20	-	-
	QA/QC RPD%		-	0	-	-	-	18	-	-	2	*	-	19	27	22	51	-	-	-	-	*	-	-	*	-	-
	GL28-1-20140603	2014 06 03	-	1,600	-	-	-	3,930	-	-	162	< 250	-	59	1,100	2,230	778	-	-	-	-	< 2.5	-	-	53	-	< 0.0010
	GL28-1-20141117	2014 11 17	-	1,690	-	-	-	3,970	-	-	165	130	-	53	1,070	2,270	897	-	-	-	-	< 1.0	-	-	< 20	-	< 0.0010
	GL28-1-20150611	2015 06 11	7.93	1,630	-	-	-	3,920	-	-	166	< 100	-	48	1,110	2,270	730	-	-	-	-	< 1.0	-	-	30	-	< 0.0010
	GL28-1-20151105	2015 11 05	7.65	1,600	-	-	-	3,930	-	-	170	< 100	-	50	1,150	2,280	626	626	< 1.0	< 1.0	-	< 1.0	-	-	46	-	< 0.0010
	GL28-1-20160524	2016 05 24	7.97	1,710	-	-	-	3,950	-	-	179	< 100	-	67	1,510	2,950	624	624	< 1.0	< 1.0	-	< 1.0	-	-	< 20	-	< 0.0010
	GL28-1-20160920	2016 09 20	7.69	1,740	-	-	-	4,080	-	-	173	< 100	-	54	1,220	2,380	612	-	-	-	-	< 1.0	-	-	< 20	-	0.0014
	GL28-1-20170711	2017 07 11	8.21	1,620	-	-	-	3,740	-	-	163	< 100	-	50	1,160	2,270	579	-	-	-	-	< 1.0	-	-	< 20	-	< 0.0010
	GL28-1-20170926	2017 09 26	7.67	1,620	-	-	-	3,460	-	-	145	< 100	-	48	1,110	2,190	554	-	-	-	-	< 1.0	-	-	< 20	-	< 0.0010
	GL28-1-180528	2018 05 28	7.72	1,710	6.99	-	3,741	3,730	4.85	< 0.0050	122	1,480	< 10	45.0	700	2,040	551	551	< 1.0	< 1.0	< 1.0	< 10.0	-	-	< 20	< 0.0050	-
	GL28-1-180925	2018 09 25	7.72	1,750	7.21	-	3,761	3,770	4.88	< 0.0050	163	< 1,000	< 10	41.8	960	2,150	531	531	< 1.0	< 1.0	< 1.0	< 0.10	-	-	< 20	< 0.0050	-
	DUP1-180925	Duplicate	7.73	1,730	7.21	-	3,761	3,930	4.81	< 0.0050	176	< 1,000	< 10	40.5	1,000	2,220	528	528	< 1.0	< 1.0	< 1.0	< 0.10	-	-	< 20	< 0.0050	-
	QA/QC RPD%		0	1	*	-	*	4	1	*	8	*	*	3	4	3	1	1	*	*	*	*	-	-	*	*	-
	GL28-1-190528	2019 05 28	7.81	1,690	7.12	-	3741	3,650	4.74	< 0.0500	236	< 100	< 100	38.3	1,100	2,060	531	531	< 1.0	< 1.0	< 1.0	< 1.00	-	-	< 20	< 0.0500	-
	GL28-1-190919	2019 09 19	7.78	1,650	7.39	-	3802	3,470	4.47	-	98	< 100	< 100	40.6	1,010	2,010	521	521	< 1.0	< 1.0	< 1.0	< 1.00	-	-	< 20	-	< 0.0500
	GL28-1-200610	2020 06 10	7.71	1,770	7.15	-	3,321	3,300	4.43	-	120	< 100	< 100	37.8	< 1,000	2,080	554	554	< 1.0	< 1.0	< 1.0	< 1.00	-	-	< 20	-	< 0.0500
	DUPB-200610	Duplicate	7.75	1,630	7.15	-	3,321	3,680	3.83	-	124	< 100	< 100	38.1	< 1,000	2,140	544	544	< 1.0	< 1.0	< 1.0	< 1.00	-	-	< 20	-	< 0.0500
	QA/QC RPD%		1	8	*	-	*	11	15	-	*	*	*	1	*	3	2	2	*	*	*	*	-	-	*	-	*

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			Physical Parameters														Dissolved Inorganics										
Sample Location	Sample ID	Sample Date (yyyy mm dd)	pH	Total Hardness	pH (field)	Conductivity	Field Conductivity	Total Dissolved Solids	Dissolved Organic Carbon	Phosphate	Ammonia, Total (as N)	Nitrate (as N)	Nitrite (as N)	Chloride	Fluoride	Sulfate	Total Alkalinity	Alkalinity, Bicarbonate (as CaCO3)	Alkalinity, Carbonate (as CaCO3)	Alkalinity, Hydroxide (as CaCO3)	Alkalinity, Phenolphthalein (as CaCO3)	Bromide	Hydrogen Sulfide	Sulfide	Chemical Oxygen Demand	Dissolved Phosphate	Ortho-Phosphate
			pH	mg/L	pH	µS/cm	µS/cm	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
GL28-1 (cont'd)	GL28-1-201104	2020 11 04	7.82	1,850	7.14	-	4,082	3,840	6.24	-	128	< 1,000	< 10	46.9	1,020	2,240	516	516	< 1.0	< 1.0	< 1.0	< 10.0	-	-	< 20	-	< 0.0050
	DUP3-201104	Duplicate	7.80	1,850	-	-	-	3,450	6.09	-	127	< 1,000	< 10	46.3	1,000	2,190	515	515	< 1.0	< 1.0	< 1.0	< 10.0	-	-	< 20	-	< 0.0050
	QA/QC RPD%		0	0	-	-	-	11	2	-	*	*	*	1	2	2	0	0	*	*	*	*	-	-	*	-	*
	GL28-1-210609	2021 06 09	7.83	1,720	6.99	-	3,969	3,130	7.14	-	82	< 100	< 100	57.4	1,270	1,910	542	542	< 1.0	< 1.0	< 1.0	< 1.00	-	-	25	-	< 0.0500
	GL28-1-211007	2021 10 07	7.80	1,860	7.04	-	3,843	3,550	8.00	-	119	< 100	< 100	65.4	< 1,000	1,940	550	550	< 1.0	< 1.0	< 1.0	< 1.00	-	-	< 20	-	< 0.0500
	DUP 3-211007	Duplicate	7.78	1,840	7.04	-	3,843	3,620	8.06	-	124	< 100	< 100	63.3	< 1,000	1,930	549	549	< 1.0	< 1.0	< 1.0	< 1.00	-	-	26	-	< 0.0500
	QA/QC RPD%		0	1	0	-	0	2	1	-	*	*	*	3	*	1	0	0	*	*	*	*	-	-	*	-	*
GL28-2	GL28-2-20091116	2009 11 16	-	1,530	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL28-2-20160524	2016 05 24	7.72	1,840	-	-	-	4,530	-	-	5.1	11,200	-	46	< 1,000	2,870	696	696	< 1.0	< 1.0	-	< 2.5	-	-	< 20	-	0.0082
	GL28-2-20160920	2016 09 20	7.5	1,810	-	-	-	4,760	-	-	< 5.0	12,100	-	49	< 1,000	2,760	693	-	-	-	-	< 2.5	-	-	< 20	-	0.0097
	DUP1-20160920	Duplicate	7.51	3,610	-	-	-	4,750	-	-	< 5.0	12,000	-	48	< 1,000	2,740	693	-	-	-	-	< 2.5	-	-	< 20	-	0.0089
	QA/QC RPD%		0	66	-	-	-	0	-	-	*	1	-	2	*	1	0	-	-	-	-	*	-	-	*	-	9
	GL28-2-20170711	2017 07 11	8.03	1,680	-	-	-	4,400	-	-	< 5.0	13,100	-	47	< 400	2,590	671	-	-	-	-	< 1.0	-	-	< 20	-	0.0093
	GL28-2-20170926	2017 09 26	7.48	1,920	-	-	-	4,640	-	-	< 5.0	12,100	-	50	< 400	2,840	670	-	-	-	-	< 1.0	-	-	< 20	-	0.0095
	GL28-2-180528	2018 05 28	7.42	1,900	6.77	-	4,680	4,730	6.09	< 0.0050	24	8,440	< 10	44.0	110	2,690	686	686	< 1.0	< 1.0	< 1.0	< 10.0	-	-	< 20	< 0.0050	-
	DUP1-180528	Duplicate	7.51	1,860	6.77	-	4,680	4,960	6.55	< 0.0050	27	8,560	< 1,000a	44.5	100	2,690	709	709	< 1.0	< 1.0	< 1.0	< 10.0	-	-	< 20	< 0.0050	-
	QA/QC RPD%		1	2	*	-	*	5	7	*	*	1	*	1	*	0	3	3	*	*	*	*	-	-	*	*	-
	GL28-2-180925	2018 09 25	7.60	2,280	6.97	-	5,093	5,370	8.34	< 0.0050	63	9,480	< 10	44.2	140	3,160	700	700	< 1.0	< 1.0	< 1.0	< 0.10	-	-	24	< 0.0050	-
	GL28-2-190528	2019 05 28	7.70	2,170	6.97	-	5200	5,280	6.36	< 0.0500	24	11,600	< 100	48.6	< 1,000	2,830	723	723	< 1.0	< 1.0	< 1.0	< 1.00	-	-	< 20	< 0.0500	-
	GL28-2-190919	2019 09 19	7.64	2,030	7.24	-	5225	5,380	5.96	-	48	10,600	< 100	51.7	< 1,000	2,790	700	700	< 1.0	< 1.0	< 1.0	< 1.00	-	-	< 20	-	< 0.0500
	GL28-2-200610	2020 06 10	7.66	1,730	6.95	-	3,882	4,250	4.99	-	< 50	9,190	< 100	32.0	< 1,000	2,490	587	587	< 1.0	< 1.0	< 1.0	< 1.00	-	-	< 20	-	< 0.0500
	GL28-2-201104	2020 11 04	7.70	2,200	6.9	-	5,499	4,790	6.26	-	< 50	9,400	< 10	42.9	130	3,020	677	677	< 1.0	< 1.0	< 1.0	< 0.10	-	-	< 20	-	< 0.0050
	GL28-2-210609	2021 06 09	7.76	1,910	6.86	-	8,381	4,610	6.84	-	< 50	11,400	< 100	46.3	< 1,000	2,670	675	675	< 1.0	< 1.0	< 1.0	< 1.00	-	-	39	-	< 0.0500
	GL28-2-211007	2021 10 07	7.66	2,460	6.84	-	5,591	5,450	6.29	-	< 50	10,000	< 100	53.0	< 1,000	3,050	728	728	< 1.0	< 1.0	< 1.0	< 1.00	-	-	< 20	-	< 0.0500
GL28-3	GL28-3-20091116	2009 11 16	-	1,760	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL28-3-20100812	2010 08 12	-	1,580	-	-	-	4,230	-	-	< 10	-	-	60	-	1,950	702	-	-	-	-	-	-	-	30	-	0.038
	GL28-3-20160524	2016 05 24	7.52	2,740	-	-	-	6,310	-	-	< 5.0	2,380	-	48	< 1,000	4,070	782	782	< 1.0	< 1.0	-	< 2.5	-	-	< 20	-	0.018
	GL28-3-20160920	2016 09 20	7.57	1,280	-	-	-	6,550	-	-	< 5.0	< 250	-	49	< 1,000	4,140	858	-	-	-	-	< 2.5	-	-	20	-	0.0332
	GL28-3-20170711	2017 07 11	8.13	2,480	-	-	-	6,160	-	-	8.4	690	-	48	< 1,000	4,000	840	-	-	-	-	< 2.5	-	-	< 20	-	0.0373
	GL28-3-20170926	2017 09 26	7.6	2,520	-	-	-	6,150	-	-	< 5.0	1,120	-	49	< 400	4,100	807	-	-	-	-	< 1.0	-	-	< 20	-	0.0358
	GL28-3-180528	2018 05 28	7.51	2,770	6.8	-	6,392	7,280	10.3	< 0.0050	29	5,640	< 10	45.9	230	3,780	870	870	< 1.0	< 1.0	< 1.0	< 10.0	-	-	23	< 0.0050	-
	GL28-3-180925	2018 09 25	7.60	3,080	7	-	6,777	7,490	12.1	< 0.0050	76	7,780	47	49.6	280	4,350	827	827	< 1.0	< 1.0	< 1.0	< 0.10	-	-	35	< 0.0050	-
	GL28-3-190528	2019 05 28	7.78	2,880	7	-	6743	6,780	8.29	< 0.0500	40	5,880	< 100	49.4	< 1,000	4,040	846	846	< 1.0	< 1.0	< 1.0	< 1.00	-	-	< 20	< 0.0500	-
	DUP2-190528	Duplicate	7.63	2,830	7	-	6743	7,120	7.97	< 0.0500	44	6,130	< 100	62.1	< 1,000	4,170	855	855	< 1.0	< 1.0	< 1.0	< 1.00	-	-	< 20	< 0.0500	-
	QA/QC RPD%		2	2	*	-		5	4	*	10	4	*	23	*	3	1	1	*	*	*	*	-	-	*	*	-
	GL28-3-190919	2019 09 19	7.65	2,790	7.19	-	6895	7,490	8.62	-	26	4,180	< 100	51.7	< 1,000	4,100	865	865	< 1.0	< 1.0	< 1.0	< 1.00	-	-	< 20	-	< 0.0500
	DUP1-190919	Duplicate	7.78	2,830	7.19	-	6895	7,330	8.84	-	37	4,000	< 100	48.8	< 1,000	3,900	844	844	< 1.0	< 1.0	< 1.0	< 1.00	-	-	< 20	-	< 0.0500
	QA/QC RPD%		2	1	*	-	*	2	3	-	35	4	*	6	*	5	2	2	*	*	*	*	-	-	*	-	*
	GL28-3-200610	2020 06 10	7.67	2,890	6.92	-	630.3	7,680	9.25	-	< 50	5,160	< 100	56.6	< 1,000	4,550	864	864	< 1.0	< 1.0	< 1.0	< 1.00	-	-	26	-	< 0.0500
	GL28-3-201105	2020 11 05	7.75	2,870	6.96	-	277.6	7,810	9.33	-	< 50	5,150	18	49.4	280	4,500	839	839	< 1.0	< 1.0	< 1.0	< 10.0	-	-	< 20	-	< 0.0050
	GL28-3-210609	2021 06 09	7.80	2,820	7.00	-	7,674	7,260	11.2	-	< 50	5,900	< 100	57.1	< 1,000	4,120	872	872	< 1.0	< 1.0	< 1.0	< 1.00	-	-	< 20	-	< 0.0500
	GL28-3-211007	2021 10 07	7.69	3,090	6.87	-	7,571	7,450	8.42	-	< 50	4,890	< 100	56.5	< 1,000	4,210	888	888	< 1.0	< 1.0	< 1.0	< 1.00	-	-	20	-	< 0.0500

Associated CARO files available upon request.
Associated Exova file(s): 712940, 714233, 714243, 756693, 756810, 757047, 811364, 811710, 812030, 812741, 812985, 813438, 846260, 878316, 879073, 909346, 909448, 909654.
All terms defined within the body of Keltech's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
\- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

Table 1: Historical Summary of Analytical Results For Groundwater - Inorganics

			Physical Parameters														Dissolved Inorganics										
Sample Location	Sample ID	Sample Date (yyyy mm dd)	pH	Total Hardness	pH (field)	Conductivity	Field Conductivity	Total Dissolved Solids	Dissolved Organic Carbon	Phosphate	Ammonia, Total (as N)	Nitrate (as N)	Nitrite (as N)	Chloride	Fluoride	Sulfate	Total Alkalinity	Alkalinity, Bicarbonate (as CaCO3)	Alkalinity, Carbonate (as CaCO3)	Alkalinity, Hydroxide (as CaCO3)	Alkalinity, Phenolphthalein (as CaCO3)	Bromide	Hydrogen Sulfide	Sulfide	Chemical Oxygen Demand	Dissolved Phosphate	Ortho-Phosphate
			pH	mg/L	pH	µS/cm	µS/cm	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
GL29-1	GL29-1-20130708	2013 07 08	-	444	-	-	-	1,160	-	-	216	< 100	-	24	1,000	186	910	-	-	-	-	< 1.0	-	-	< 20	-	-
	GL29-1-20131113	2013 11 13	-	493	-	-	-	1,280	-	-	219	< 100	-	36	1,190	356	836	-	-	-	-	-	-	-	< 20	-	-
	DUP3-20131113	Duplicate	-	495	-	-	-	1,240	-	-	206	< 100	-	37	1,180	358	750	-	-	-	-	-	-	-	< 20	-	-
	QA/QC RPD%		-	0	-	-	-	3	-	-	6	*	-	3	1	1	11	-	-	-	-	-	-	-	*	-	-
	GL29-1-20140603	2014 06 03	-	516	-	-	-	1,430	-	-	135	< 100	-	48	1,240	514	764	-	-	-	-	< 1.0	-	-	< 20	-	0.0088
	GL29-1-20141118	2014 11 18	-	699	-	-	-	1,950	-	-	253	< 100	-	74	1,230	958	708	-	-	-	-	< 1.0	-	-	37	-	0.002
	GL29-1-20150609	2015 06 09	8.12	629	-	-	-	1,900	-	-	244	< 25	-	63.5	1,200	804	692	-	-	-	-	0.29	-	-	27	-	0.0097
	GL29-1-20151105	2015 11 05	7.85	671	-	-	-	1,780	-	-	226	< 100	-	72	1,210	785	579	-	-	-	-	< 1.0	-	-	74	-	0.0161
	GL29-1-20160524	2016 05 24	7.94	682	-	-	-	1,650	-	-	61	640	-	77	1,220	667	593	593	< 1.0	< 1.0	-	< 1.0	-	-	116	-	0.0187
	GL29-1-20160921	2016 09 21	8.08	639	-	-	-	1,590	-	-	32.2	260	-	67	1,230	573	586	-	-	-	-	< 1.0	-	-	110	-	0.0231
	GL29-1-20170529	2017 05 29	8.1	586	-	-	-	1,300	-	-	20.6	1,100	-	57.9	1,130	408	642	-	-	-	-	< 0.50	-	-	90	-	0.0199
	GL29-1-20170926	2017 09 26	7.88	542	-	-	-	1,290	-	-	15.3	415	-	51.6	1,240	389	644	-	-	-	-	< 0.50	-	-	72	-	0.0243
	DUP1-20170926	Duplicate	7.88	539	-	-	-	1,330	-	-	17.9	383	-	53.1	1,240	401	645	-	-	-	-	< 0.50	-	-	72	-	0.0243
	QA/QC RPD%		0	1	-	-	-	3	-	-	*	8	-	3	0	3	0	-	-	-	-	*	-	-	0	-	0
	GL29-1-180604	2018 06 04	7.71	659	7.24	-	1,240	1,220	118	0.0343	166	26,900	< 10	58.1	310	161	450	450	< 1.0	< 1.0	< 1.0	< 0.10	-	-	321	0.0343	-
	GL29-1-180919	2018 09 19	7.70	683	7.38	-	1,389	1,190	93.7	< 0.0050	137	23,800	88	63.8	470	181	463	463	< 1.0	< 1.0	< 1.0	< 0.10	-	-	302	< 0.0050	-
	GL29-1-190603	2019 06 03	7.76	467	7.06	-	1715	1,160	12.8	< 0.0500	192	< 10	< 10	23.3	1,030	176	885	885	< 1.0	< 1.0	< 1.0	< 0.10	-	-	21	< 0.0500	-
	GL29-1-190924	2019 09 24	7.89	448	7	-	1731	1,160	11.1	-	102	< 10	< 10	29.7	1,180	211	820	820	< 1.0	< 1.0	< 1.0	< 0.10	-	-	25	-	< 0.0050
	GL29-1-200612	2020 06 12	7.04	421	7.01	-	1,380	1,110	6.25	-	199	< 100	< 100	21.8	< 1,000	185	758	-	-	-	-	< 1.00	-	-	31	-	< 0.0500
	GL29-1-201120	2020 11 20	7.84	442	7.07	-	1,723	1,050	3.16	-	230	< 10	< 10	22.9	1,290	172	814	814	< 1.0	< 1.0	< 1.0	< 0.10	-	-	< 20	-	< 0.0050
	GL29-1-210611	2021 06 11	7.90	460	7.00	-	1,705	1,070	3.11	-	200	< 100	< 100	22.1	1,320	183	859	859	< 1.0	< 1.0	< 1.0	< 1.00	-	-	< 20	-	< 0.0500
	GL29-1-211006	2021 10 06	7.89	436	7.37	-	1,660	1,100	6.01	-	222	< 10	< 10	26.6	1,310	190	801	801	< 1.0	< 1.0	< 1.0	< 0.10	-	-	< 20	-	< 0.0050
GL29-2	GL29-2-20130627	2013 06 27	-	2,830	-	-	-	7,910	-	-	67.9	< 250	-	243	2,200	5,020	335	-	-	-	-	< 2.5	-	-	69	-	-
	GL29-2-20131113	2013 11 13	-	2,910	-	-	-	7,890	-	-	99.1	< 250	-	252	1,400	4,820	351	-	-	-	-	-	-	-	53	-	-
	GL29-2-210608	2021 06 08	7.82	3,020	7.14	-	8,180	8,130	12.8	-	< 50	< 100	< 100	225	1,900	4,730	331	331	< 1.0	< 1.0	< 1.0	< 1.00	-	-	57	-	< 0.0500
	GL29-2-211006	2021 10 06	7.75	3,410	7.13	-	7,842	8,200	12.1	-	< 50	< 100	< 100	215	1,390	4,740	353	353	< 1.0	< 1.0	< 1.0	< 1.00	-	-	48	-	< 0.0500
GL31-1	GL31-3-20130627	2013 06 27	-	4,240	-	-	-	15,300	-	-	2,300	< 500	-	863	600	8,470	2,810	-	-	-	-	< 5.0	-	-	85	-	-
	GL31-3-20141126	2014 11 26	-	4,280	-	-	-	14,700	-	-	2,500	1,210	-	866	416	8,360	2,620	-	-	-	-	< 5.0	-	-	63	-	0.0085
GL31-3	BH 11-18C-20120627	2012 06 27	-	4,600	-	-	-	15,500	-	-	2,300	-	-	821	-	7,800	2,580	-	-	-	-	-	-	-	80	-	0.013
	GL31-3-20121205	2012 12 05	-	4,470	-	-	-	15,400	-	-	2,450	< 10,000a	-	569	-	3,820	2,560	-	-	-	-	-	-	-	39	-	0.004
	GL31-3-20131114	2013 11 14	-	4,310	-	-	-	15,800	-	-	2,240	< 500	-	875	393	8,510	2,700	-	-	-	-	< 5.0	-	-	58	-	-
	GL31-3-20140609	2014 06 09	-	4,420	-	-	-	14,900	-	-	2,460	< 250	-	833	< 1,000	8,070	2,780	-	-	-	-	4	-	-	60	-	0.0049
	GL31-3-20150611	2015 06 11	7.83	4,460	-	-	-	13,400	-	-	2,490	< 500	-	839	< 2,000a	8,140	2,920	-	-	-	-	< 5.0	-	-	62	-	0.0046
	GL31-3-20151109	2015 11 09	7.55	4,060	-	-	-	15,200	-	-	2,640	< 500	-	857	< 2,000a	8,440	2,590	-	-	-	-	< 5.0	-	-	34	-	0.0076
	DUP4-20151109	Duplicate	7.5	4,060	-	-	-	15,200	-	-	2,380	< 500	-	861	< 2,000a	8,460	2,600	-	-	-	-	< 5.0	-	-	33	-	0.0094
	QA/QC RPD%		1	0	-	-	-	0	-	-	10	*	-	0	*	0	0	-	-	-	-	*	-	-	*	-	21

Associated CARO files available upon request.
Associated Exova file(s): 712940, 714233, 714243, 756693, 756810, 757047, 811364, 811710, 812030, 812741, 812985, 813438, 846260, 878316, 879073, 909346, 909448, 909654.
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Table 1: Historical Summary of Analytical Results For Groundwater - Inorganics

Sample Location	Sample ID	Sample Date (yyyy mm dd)	Physical Parameters														Dissolved Inorganics										
			pH	Total Hardness	pH (field)	Conductivity	Field Conductivity	Total Dissolved Solids	Dissolved Organic Carbon	Phosphate	Ammonia, Total (as N)	Nitrate (as N)	Nitrite (as N)	Chloride	Fluoride	Sulfate	Total Alkalinity	Alkalinity, Bicarbonate (as CaCO3)	Alkalinity, Carbonate (as CaCO3)	Alkalinity, Hydroxide (as CaCO3)	Alkalinity, Phenolphthalein (as CaCO3)	Bromide	Hydrogen Sulfide	Sulfide	Chemical Oxygen Demand	Dissolved Phosphate	Ortho-Phosphate
			pH	mg/L	pH	µS/cm	µS/cm	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
GL35-3	BH11-31C-20111217	2011 12 17	-	1,100	-	-	-	37,000	-	-	57,300	< 500	-	4,000	-	10,800	17,000	-	-	-	-	-	-	-	2,400	-	0.16
	DUPB-20111217	Duplicate	-	1,090	-	-	-	37,900	-	-	56,600	< 500	-	4,110	-	10,900	15,600	-	-	-	-	-	-	-	2,500	-	0.17
	QA/QC RPD%		-	1	-	-	-	2	-	-	1	*	-	3	-	1	9	-	-	-	-	-	-	-	4	-	6
	BH11-31C-20120625	2012 06 25	-	2,740	-	-	-	10,900	-	-	2,740	-	-	546	-	5,150	2,620	-	-	-	-	-	-	-	50	-	0.008
	GL35-3-20121205	2012 12 05	-	2,680	-	-	-	10,900	-	-	2,590	< 10,000a	-	520	-	5,330	2,290	-	-	-	-	-	-	-	48	-	0.004
	DUP-C-20121205	Duplicate	-	2,720	-	-	-	10,800	-	-	2,720	< 10,000a	-	503	-	5,150	2,300	-	-	-	-	-	-	-	41	-	0.004
	QA/QC RPD%		-	1	-	-	-	1	-	-	5	*	-	3	-	3	0	-	-	-	-	-	-	-	*	-	*
	GL35-3-20130627	2013 06 27	-	2,220	-	-	-	8,910	-	-	2,330	< 250	-	475	2,200	4,630	2,400	-	-	-	-	2.6	-	-	38	-	-
	DUP3-20130627	Duplicate	-	2,240	-	-	-	8,910	-	-	2,350	270	-	483	2,400	4,650	2,380	-	-	-	-	2.5	-	-	36	-	-
	QA/QC RPD%		-	1	-	-	-	0	-	-	1	*	-	2	9	0	1	-	-	-	-	4	-	-	*	-	-
	GL35-3-20131113	2013 11 13	-	2,280	-	-	-	9,430	-	-	1,310	< 250	-	482	1,400	4,250	2,380	-	-	-	-	-	-	-	46	-	-
	GL35-3-20140609	2014 06 09	-	2,220	-	-	-	8,650	-	-	2,420	< 250	-	460	1,500	4,300	2,270	-	-	-	-	< 2.5	-	-	43	-	< 0.0010
	GL35-3-20141126	2014 11 26	-	2,060	-	-	-	8,860	-	-	3,210	270	-	478	1,600	4,280	2,680	-	-	-	-	2.8	-	-	33	-	0.0076
	GL35-3-20150611	2015 06 11	7.63	2,170	-	-	-	8,690	-	-	2,490	< 250	-	447	1,500	4,170	2,340	-	-	-	-	< 2.5	-	-	50	-	0.0037
	GL35-3-20151109	2015 11 09	7.67	2,030	-	-	-	12,000	-	-	6,870	< 500	-	676	< 2,000a	5,210	3,610	-	-	-	-	< 5.0	-	-	198	-	1.36
	GL35-3-20160526	2016 05 26	7.59	2,200	-	-	-	8,300	-	-	2,590	< 250	-	500	1,900	4,690	2,050	-	-	-	-	2.6	-	-	32	-	0.0291
	GL35-3-20170926	2017 09 26	7.45	2,010	-	-	-	7,480	-	-	1,870	< 250	-	403	1,400	3,750	1,990	-	-	-	-	2.6	-	-	21	-	< 0.0010
	GL35-3-180815	2018 08 15	7.29	2,070	6.98	-	6,480	8,230	7.93	< 0.0050	1,720	< 10	279	341	1,720	3,320	2,070	2,070	< 1.0	< 1.0	< 1.0	< 10.0	-	-	< 20	< 0.0050	-
	GL35-3-190530	2019 05 30	7.58	2,000	6.85	-	9132	7,760	4.72	< 0.0500	1,220	< 100	< 100	351	1,730	3,510	2,000	2,000	< 1.0	< 1.0	< 1.0	< 1.00	-	-	26	< 0.0500	-
	GL35-3-200608	2020 06 08	7.73	2,180	6.73	-	7,916	7,520	3.66	-	1,490	< 1,000	< 1,000a	325	1,410	3,410	1,920	1,920	< 1.0	< 1.0	< 1.0	< 10.0	-	-	< 20	-	< 0.500
	DUPA-200608	Duplicate	7.73	2,080	6.73	-	7,916	7,520	4.14	-	1,470	< 100	< 100	365	1,130	3,280	1,910	1,910	< 1.0	< 1.0	< 1.0	1.78	-	-	< 20	-	< 0.0500
	QA/QC RPD%		0	5	*	-	*	0	12	-	1	*	*	12	22	4	1	1	*	*	*	*	-	-	*	-	*
	GL35-3-210610	2021 06 10	7.49	1,860	6.67	-	8,182	6,380	3.60	-	1,200	< 100	< 100	343	1,600	3,050	1,810	1,810	< 1.0	< 1.0	< 1.0	1.40	-	-	< 20	-	< 0.0500
	DUP3-210610	Duplicate	7.47	1,870	6.67	-	8,182	6,440	3.54	-	1,210	< 100	< 100	337	1,630	3,050	1,790	1,790	< 1.0	< 1.0	< 1.0	1.48	-	-	< 20	-	< 0.0500
	QA/QC RPD%		0	1	0	-	0	1	2	-	1	*	*	2	2	0	1	1	*	*	*	6	-	-	*	-	*
GL37	GL37-20130708	2013 07 08	-	5,860	-	-	-	35,900	-	-	1,660	< 500	-	783	410	14,500	1,590	-	-	-	-	< 5.0	-	-	109	-	-
	GL37-20131114	2013 11 14	-	5,970	-	-	-	28,600	-	-	1,370	< 500	-	1,030	343	18,600	1,580	-	-	-	-	6.3	-	-	44	-	-
GL39-1	GL39-1-191205	2019 12 05	7.86	1,790	-	-	-	3,610	8.17	-	116	1,640	25	98.1	1,240	1,910	576	576	< 1.0	< 1.0	< 1.0	< 0.10	-	-	179	-	< 0.0050
	GL39-1-200609	2020 06 09	7.81	2,120	7.02	-	3,724	3,710	6.40	-	56	4,470	< 1,000a	102	< 10,000a	2,110	598	598	< 1.0	< 1.0	< 1.0	< 10.0	-	-	22	-	< 0.500
	GL39-1-201019	2020 10 19	7.85	1,970	7.03	-	4,547	4,140	8.10	-	< 50	5,840	< 10	134	1,230	2,120	574	574	< 1.0	< 1.0	< 1.0	< 0.10	-	-	29	-	< 0.0050
	GL39-1-210526	2021 05 26	7.71	3,300	6.92	-	5,480	4,660	8.82	-	< 50	6,500	< 10	144	1,140	460	659	659	< 1.0	< 1.0	< 1.0	< 2.50	-	-	< 20	-	< 0.0050
	GL39-1-210914	2021 09 14	-	2,630	6.96	-	5,187	5,370	9.04	-	< 50	5,300	< 10	149	1,290	2,790	677	677	< 1.0	< 1.0	< 1.0	< 1.00	-	-	22	-	< 0.0050
GL39-2	GL39-2-191205	2019 12 05	7.93	1,940	-	-	-	5,110	7.99	-	121	1,140	12	176	470	2,790	407	407	< 1.0	< 1.0	< 1.0	< 0.10	-	-	152	-	< 0.0050
	GL39-2-200609	2020 06 09	7.85	1,910	7.29	-	4,140	4,110	6.23	-	< 50	1,820	< 1,000a	174	< 10,000a	2,400	401	401	< 1.0	< 1.0	< 1.0	< 10.0	-	-	26	-	< 0.500
	GL39-2-201016	2020 10 16	7.88	1,240	7.35	-	3,324	2,990	6.14	-	< 50	1,400	< 10	180	500	1,540	374	374	< 1.0	< 1.0	< 1.0	< 1.00	-	-	21	-	< 0.0050
	DUP1-201016	Duplicate	7.90	1,260	7.69	-	1,582	3,090	5.89	-	< 50	1,440	< 10	181	< 2,500a	1,570	397	397	< 1.0	< 1.0	< 1.0	< 1.00	-	-	23	-	< 0.0050
	QA/QC RPD%		0	2	*	-	*	3	4	-	*	3	*	1	*	2	6	6	*	*	*	*	-	-	*	-	*
	GL39-2-210526	2021 05 26	7.98	1,090	7.31	-	3,323	2,350	5.28	-	< 50	588	< 10	154	510	1,250	436	436	< 1.0	< 1.0	< 1.0	< 2.50	-	-	< 20	-	< 0.0050
	DUP 2-210526	Duplicate	7.98	1,100	7.31	-	3,323	2,090	5.32	-	< 50	700	< 10	159	500	1,240	435	435	< 1.0	< 1.0	< 1.0	< 2.50	-	-	< 20	-	< 0.0050
	QA/QC RPD%		0	1	0	-	0	12	1	-	*	17	*	3	2	1	0	0	*	*	*	*	-	-	*	-	*
	GL39-2-210914	2021 09 14	-	1,800	7.27	-	4,281	3,820	5.79	-	< 50	1,940	< 10	130	410	2,140	472	472	< 1.0	< 1.0	< 1.0	< 2.50	-	-	30	-	< 0.0050
GL40-3	GL40-3-201117	2020 11 17	8.09	311	7.31	-	4,621	3,000	66.4	-	11,400	< 100	< 100	201	< 1,000	375	2,190	2,190	< 1.0	< 1.0	< 1.0	< 1.00	-	-	2,430	-	< 0.0500
	GL40-3-210610	2021 06 10	7.95	323	7.31	-	4,453	2,710	3.79	-	5,950	< 100	< 100	162	< 1,000	518	2,040	2,040	< 1.0	< 1.0	< 1.0	< 1.00	-	-	1,050	-	< 0.0500
GL41-1	GL41-1-200616	2020 06 16	8.03	661	7.43	-	2,257	1,400	6.70	-	54	1,060	< 100	399	< 1,000	185	497	497	< 1.0	< 1.0	< 1.0	< 1.00	-	-	28	-	< 0.0500
	GL41-1-201102	2020 11 02	8.03	735	7.56	-	248	1,530	5.81	-	< 50	1,570	< 10	371	720	138	592	592	< 1.0	< 1.0	< 1.0	< 0.10	-	-	23	-	0.0142
	GL41-1-210525	2021 05 25	8.09	755	7.27	-	2,558	2,000	6.50	-	< 50	1,300	< 10	399	660	163	596	596	< 1.0	< 1.0	< 1.0	< 1.00	-	-	26	-	< 0.0050

Associated CARO files available upon request.
Associated Exova file(s): 712940, 714233, 714243, 756693, 756810, 757047, 811364, 811710, 812030, 812741, 812985, 813438, 846260, 878316, 879073, 909346, 909448, 909654.
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- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

Table 1: Historical Summary of Analytical Results For Groundwater - Inorganics

			Physical Parameters														Dissolved Inorganics										
Sample Location	Sample ID	Sample Date (yyyy mm dd)	pH	Total Hardness	pH (field)	Conductivity	Field Conductivity	Total Dissolved Solids	Dissolved Organic Carbon	Phosphate	Ammonia, Total (as N)	Nitrate (as N)	Nitrite (as N)	Chloride	Fluoride	Sulfate	Total Alkalinity	Alkalinity, Bicarbonate (as CaCO3)	Alkalinity, Carbonate (as CaCO3)	Alkalinity, Hydroxide (as CaCO3)	Alkalinity, Phenolphthalein (as CaCO3)	Bromide	Hydrogen Sulfide	Sulfide	Chemical Oxygen Demand	Dissolved Phosphate	Ortho-Phosphate
			pH	mg/L	pH	µS/cm	µS/cm	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
GL41-2	GL41-2-191205	2019 12 05	8.05	530	-	-	-	1,230	6.32	-	174	1,560	50	301	700	138	558	558	< 1.0	< 1.0	< 1.0	< 0.10	-	-	< 20	-	< 0.0050
	GL41-2-200612	2020 06 12	7.44	726	7.24	-	2,073	1,390	6.13	-	< 50	1,500	< 100	387	< 1,000	166	563	-	-	-	-	< 1.00	-	-	< 20	-	< 0.0500
	DUPD-200612	Duplicate	7.50	743	7.24	-	2,073	1,370	6.38	-	< 50	1,460	< 100	404	< 1,000	164	559	-	-	-	-	< 1.00	-	-	< 20	-	< 0.0500
	QA/QC RPD%		1	2	*	-	*	1	4	-	*	3	*	4	*	1	1	-	-	-	-	*	-	-	*	-	*
	GL41-2-201022	2020 10 22	7.83	684	7.31	-	2,562	1,410	6.58	-	< 50	1,960	< 10	402	640	175	559	559	< 1.0	< 1.0	< 1.0	< 1.00	-	-	< 20	-	< 0.0050
	GL41-2-210525	2021 05 25	8.05	753	7.17	-	2,498	1,400	6.37	-	< 50	1,780	< 10	423	670	151	595	595	< 1.0	< 1.0	< 1.0	< 2.50	-	-	24	-	< 0.0050
	GL41-2-210907	2021 09 07	7.91	711	7.21	-	2,442	1,320	5.28	-	< 50	2,140	< 10	383	580	138	608	608	< 1.0	< 1.0	< 1.0	< 0.10	-	-	< 20	-	< 0.0050
GL41-3	GL41-3-200612	2020 06 12	7.40	755	7.26	-	2,133	1,580	6.68	-	141	1,180	< 100	423	< 1,000	159	575	-	-	-	-	< 1.00	-	-	< 200	-	< 0.0500
	GL41-3-201022	2020 10 22	7.86	696	7.31	-	2,621	1,400	6.93	-	< 50	1,380	< 10	423	650	160	570	570	< 1.0	< 1.0	< 1.0	< 1.00	-	-	< 20	-	< 0.0050
	GL41-3-210525	2021 05 25	8.05	792	7.20	-	2,646	1,340	6.71	-	< 50	1,510	< 10	471	660	160	618	618	< 1.0	< 1.0	< 1.0	< 2.50	-	-	24	-	< 0.0050
	GL41-3-210907	2021 09 07	7.87	723	7.22	-	2,545	1,400	5.94	-	< 50	1,780	< 10	406	590	143	622	622	< 1.0	< 1.0	< 1.0	< 0.10	-	-	26	-	< 0.0050
	DUP 1-210907	Duplicate	7.88	715	7.22	-	2,545	1,390	5.91	-	< 50	1,780	< 10	412	600	145	610	610	< 1.0	< 1.0	< 1.0	< 0.10	-	-	30	-	< 0.0050
	QA/QC RPD%		0	1	0	-	0	1	1	-	*	0	*	1	2	1	2	2	*	*	*	*	-	-	*	-	*
GL42-1	GL42-1-200612	2020 06 12	7.12	184	7.28	-	2,332	2,360	2.39	-	703	< 100	< 100	36.7	< 1,000	20.8	2,050	-	-	-	-	< 1.00	-	-	330	-	0.0580
	GL42-1-201106	2020 11 06	7.80	171	7.27	-	5,266	3,620	2.95	-	743	< 10	< 10	47.6	560	1.3	3,030	3,030	< 1.0	< 1.0	< 1.0	0.34	-	-	35	-	< 0.0050
	GL42-1-210603	2021 06 03	8.05	187	7.35	-	5,277	3,170	2.14	-	698	< 10	< 10	49.7	650	< 10.0	3,560	3,560	< 1.0	< 1.0	< 1.0	0.28	-	-	76	-	< 0.0050
GL42-2	GL42-2-200616	2020 06 16	8.08	855	7.45	-	4,649	3,910	6.51	-	461	1,760	232	64.3	< 1,000	2,050	928	928	< 1.0	< 1.0	< 1.0	< 1.00	-	-	519	-	< 0.0500
	GL42-2-201109	2020 11 09	7.76	1,270	7.34	-	5,360	4,220	7.70	-	83	883	153	63.6	590	2,250	918	918	< 1.0	< 1.0	< 1.0	< 10.0	-	-	89	-	< 0.0050
	GL42-2-210607	2021 06 07	8.02	1,230	7.34	-	5,808	4,340	7.36	-	< 50	8,820	< 250	70.9	< 2,500a	2,220	1,020	1,020	< 1.0	< 1.0	< 1.0	< 2.50	-	-	< 20	-	< 0.125

Associated CARO files available upon request.
Associated Exova file(s): 712940, 714233, 714243, 756693, 756810, 757047, 811364, 811710, 812030, 812741, 812985, 813438, 846260, 878316, 879073, 909346, 909448, 909654.
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QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

Table 2: Historical Summary of Analytical Results For Groundwater -Metals

Sample Location	Sample ID	Sample Date (yyyy mm dd)	pH	Total Hardness	pH (field)	Conductivity	Field Conductivity	Total Dissolved Solids	Dissolved Organic Carbon	Phosphate	Dissolved Aluminum	Dissolved Calcium	Dissolved Iron	Dissolved Magnesium	Dissolved Manganese	Dissolved Potassium	Dissolved Sodium	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Lead	Lithium	Mercury	Molybdenum	Nickel	Selenium	Silver	Strontium	Thallium	Tin	Titanium	Tungsten	Uranium	Vanadium	Zinc
			Physical Parameters								Dissolved Metals																														
			pH	mg/L	pH	µS/cm	µS/cm	mg/L	mg/L	mg/L	µg/L	mg/L	µg/L	mg/L	µg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
09BH03	09BH03-20151105	2015 11 05	7.65	661	-	-	-	2,040	-	-	< 10	87.9	< 30	107	< 10	5	458	< 0.50	< 1.0	< 20	< 5.0a	< 100	< 0.050	11.1	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	25.2	< 5.0	15.3	< 0.050	1,960	< 0.020	< 30	< 50	-	130	< 30	< 5.0
	09BH03-20170601	2017 06 01	8.13	940	-	-	-	2,270	-	-	< 10	132	< 30	149	< 10	6.4	494	< 0.50	< 1.0	23	< 5.0a	< 100	< 0.050	11.5	< 0.50	1.7	< 1.0	< 50	< 0.20	21.5	< 5.0	45.8	< 0.050	2,570	< 0.020	< 30	< 50	-	124	< 30	< 5.0
	09BH03-180604	2018 06 04	7.53	1,130	6.87	-	3,665	2,800	7.39	0.0075	< 5.0	156	153	179	< 0.20	6.95	604	< 0.20	0.63	17.4	< 0.10	14.4	0.045	21.0	0.17	8.16	< 0.20	29.9	< 0.010	26.4	3.25	44.8	< 0.050	3,300	< 0.020	< 0.20	< 5.0	< 1.0	168	1.5	< 4.0
	09BH03-190530	2019 05 30	7.80	929	6.81	-	3120	2,460	5.85	0.0090	< 5.0	129	< 10	147	3.51	5.53	449	< 0.20	< 0.50	15.8	< 0.10	13.0	0.039	18.8	0.12	1.24	< 0.20	33.3	< 0.010	20.8	0.75	26.0	< 0.050	3,040	< 0.020	< 0.20	< 5.0	< 1.0	161	< 1.0	< 4.0
	09BH03-200609	2020 06 09	7.80	1,270	7.04	-	3,178	3,020	7.88	-	1.2	184	< 2.0	197	0.089	7.9	92.3	0.064	0.500	24.1	< 0.010	13.3	0.0278	34.1	0.145	1.96	< 0.050	31.0	< 0.010	26.3	1.26	52.4	< 0.010	1,390	< 0.0040	< 0.050	< 0.20	< 0.20	207	1.91	1.1
09BH04	09BH04-20151105	2015 11 05	7.19	1,120	-	-	-	2,730	-	-	< 10	147	10,100	183	681	14	617	< 0.50	5	30	< 5.0a	< 100	< 0.050	< 0.50	1.12	< 1.0a	< 1.0	252	< 0.20	14.9	< 5.0	< 1.0	< 0.050	3,080	< 0.020	< 30	< 50	-	48.5	< 30	< 5.0
09BH06-S	09BH06-S-20131112	2013 11 12	-	353	-	-	-	700	-	-	< 10a	56.5	131	51.4	146	4.3	125	< 0.50	2.2	32	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	15	< 5.0	< 1.0	< 0.050	1,290	< 0.20	< 30	< 50	-	8.48	< 30	< 5.0
	09BH06-S-20140602	2014 06 02	-	358	-	-	-	700	-	-	< 10a	56.6	152	52.5	159	4.2	130	< 0.50	2.2	34	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	14.8	< 5.0	< 1.0	< 0.050	1,270	< 0.20	< 30	< 50	-	8.2	< 30	< 5.0
	09BH06-S-20141117	2014 11 17	-	354	-	-	-	713	-	-	< 10a	56.5	195	51.7	158	4.2	127	< 0.50	2.5	35	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	14.6	< 5.0	< 1.0	< 0.050	1,280	< 0.20	< 30	< 50	-	7.83	< 30	< 5.0
	09BH06-S-20150610	2015 06 10	8.22	351	-	-	-	716	-	-	16	56.9	485	50.7	162	4.2	127	< 0.50	3.3	35	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	14.6	< 5.0	< 1.0	< 0.050	1,270	< 0.010	< 30	< 50	-	7.26	< 30	< 5.0
	09BH06-S-20151105	2015 11 05	7.91	349	-	-	-	724	-	-	< 10	57.8	220	49.7	161	4.3	130	< 0.50	2.5	35	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	14.4	< 5.0	< 1.0	< 0.050	1,320	< 0.010	< 30	< 50	-	7.72	< 30	< 5.0
09BH06-D	09BH06-D-20131112	2013 11 12	-	372	-	-	-	706	-	-	< 10a	60.5	371	53.6	164	4.3	129	< 0.50	2.7	40	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	14.4	< 5.0	< 1.0	< 0.050	1,390	< 0.20	< 30	< 50	-	9.62	< 30	< 5.0
	DUP4-20131112	Duplicate	-	369	-	-	-	715	-	-	< 10a	59.9	360	53.3	160	4.2	127	< 0.50	2.7	39	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	14.4	< 5.0	< 1.0	< 0.050	1,370	< 0.20	< 30	< 50	-	9.36	< 30	< 5.0
	QA/QC RPD%		-	1	-	-	-	1	-	-	*	1	3	1	2	*	2	*	0	3	*	*	*	*	*	*	*	*	*	0	*	*	*	1	*	*	*	-	3	*	*
	09BH06-D-20140602	2014 06 02	-	366	-	-	-	720	-	-	< 10a	58.9	351	53.2	158	4.2	127	< 0.50	2.6	40	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	14.2	< 5.0	< 1.0	< 0.050	1,330	< 0.20	< 30	< 50	-	9.13	< 30	< 5.0
	09BH06-D-20141117	2014 11 17	-	372	-	-	-	743	-	-	< 10a	60.4	359	53.6	165	4.1	128	< 0.50	2.6	41	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	14.1	< 5.0	< 1.0	< 0.050	1,360	< 0.20	< 30	< 50	-	8.87	< 30	< 5.0
	09BH06-D-20150610	2015 06 10	8.21	385	-	-	-	770	-	-	< 10	64	385	54.7	168	4.3	131	< 0.50	2.6	42	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	14.1	< 5.0	< 1.0	< 0.050	1,430	< 0.010	< 30	< 50	-	9	< 30	< 5.0
	09BH06-D-20151105	2015 11 05	7.93	369	-	-	-	760	-	-	< 10	62	374	51.9	167	4.2	131	< 0.50	2.5	42	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	15.9	< 5.0	< 1.0	< 0.050	1,420	< 0.010	< 30	< 50	-	9.32	< 30	< 5.0
	09BH06-D-20170606	2017 06 06	8.42	364	-	-	-	699	-	-	< 10	60.1	395	51.9	182	4.3	142	< 0.50	2.9	41	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	15.6	< 5.0	< 1.0	< 0.050	1,440	< 0.010	< 30	< 50	-	6.31	< 30	< 5.0
	09BH06-D-180604	2018 06 04	7.76	387	6.99	-	1,289	800	2.98	0.0055	< 5.0	62.2	526	56.1	190	4.52	142	< 0.20	3.06	41.9	< 0.10	15.0	0.016	0.55	0.13	1.63	< 0.20	48.5	< 0.010	15.9	1.24	1.07	< 0.050	1,480	< 0.020	< 0.20	< 5.0	< 1.0	8.62	< 1.0	< 4.0
	09BH06-D-190528	2019 05 28	8.04	435	7.08	-	1,229	968	2.88	0.0073	< 5.0	69.2	431	63.5	199	4.69	151	< 0.20	2.80	52.5	< 0.10	8.5	0.011	0.91	0.22	0.63	< 0.20	60.3	< 0.010	17.0	< 0.40	< 0.50	< 0.050	1,740	< 0.020	< 0.20	< 5.0	< 1.0	11.6	< 1.0	< 4.0
	09BH06-D-200609	2020 06 09	7.95	422	7.3	-	1,038	849	2.26	-	< 1.0	70.1	459	60	199	4.73	156	< 0.050	2.85	48.2	< 0.010	15.0	0.0048	< 0.10	0.190	< 0.10	< 0.050	59.9	< 0.010	18.0	0.377	< 0.10	< 0.010	1,650	0.0045	< 0.050	< 0.20	< 0.20	10.2	< 0.20	< 1.0
	09BH06-D-210608	2021 06 08	8.08	333	7.40	-	-	-	-	-	< 1.0	57.4	405	46	165	4.08	129	< 0.050	3.73	37.4	< 0.010	16.6	0.0048	< 0.10	0.143	0.11	< 0.050	46.9	< 0.010	18.6	0.287	< 0.10	< 0.010	1,150	< 0.0040	< 0.050	< 0.20	< 0.20	6.03	< 0.20	< 1.0
GL0-1	GL0-1-20130625	2013 06 25	-	427	-	-	-	771	-	-	38	71.2	99	60.6	763	11.4	83.7	1	4.8	92	< 5.0a	< 100	0.059	< 0.50	1.82	< 1.0a	< 1.0	< 50	< 0.20	29.8	23.2	1.7	< 0.050	1,210	< 0.20	< 30	< 50	-	11.2	< 30	< 5.0
	GL0-1-20140603	2014 06 03	-	416	-	-	-	711	-	-	< 10a	63.9	< 30	62.3	135	10.2	69.8	< 0.50	3.2	66	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	24.1	< 5.0	< 1.0	< 0.050	1,370	< 0.20	< 30	< 50	-	4.93	< 30	< 5.0
	GL0-1-20141124	2014 11 24	-	436	-	-	-	711	-	-	< 10a	66.8	< 30	65.3	160	10.7	69.2	< 0.50	3.3	60	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	22.7	< 5.0	< 1.0	< 0.050	1,300	< 0.20	< 30	< 50	-	4.18	< 30	< 5.0
	DUP1-20141124	Duplicate	-	430	-	-	-	680	-	-	< 10a	66.6	< 30	64.1	159	10.7	68.5	< 0.50	3.3	60	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	23.2	< 5.0	< 1.0	< 0.050	1,300	< 0.20	< 30	< 50	-	4.39	< 30	< 5.0
	QA/QC RPD%		-	1	-	-	-	4	-	-	*	0	*	2	1	0	1	*	0	0	*	*	*	*	*	*	*	*	*	2	*	*	*	0	*	*	*	-	5	*	*
	GL0-1-20150608	2015 06 08	7.59	423	-	-	-	665	-	-	< 10	64.6	< 30	63.5	108	10.5	66.4	< 0.50	3.2	58	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	25.3	< 5.0	< 1.0	< 0.050	1,460	< 0.010	< 30	< 50	-	4.16	< 30	< 5.0
	GL0-1-20151103	2015 11 03	7.65	423	-	-	-	682	-	-	< 10	66.2	32	62.6	160	10.4	67.2	< 0.50	3.3	54	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	24.6	< 5.0	< 1.0	< 0.050	1,490	< 0.010	< 30	< 50	-	3.87	< 30	< 5.0
	GL0-1-20160524	2016 05 24	8.19	423	-	-	-	673	-	-	< 10	63.6	< 30	64.2	100	10.4	66.9	< 0.50	3.3	50	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	24.6	< 5.0	< 1.0	< 0.050	1,450	< 0.010	< 30	< 50	-	3.93	< 30	< 5.0
	GL0-1-20170524	2017 05 24	8.32	418	-	-	-	671	-	-	< 10	64	< 30	62.7	29	10.6	69.4	< 0.50	3.1	47	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	27.1	< 5.0	< 1.0	< 0.050	1,640	< 0.010	< 30	< 50	-	4.26	< 30	< 5.0
	GL0-1-180529	2018 05 29	7.81	415	7.65	-	934	690	0.87	0.0516	< 5.0	58.1	< 10	65.5	19.5	10.3	69.8	< 0.20	2.87	37.1	< 0.10	36.8	0.038	< 0.50	< 0.10	< 0.40a	< 0.20	16.6	< 0.010	27.2	0.82	< 0.50	< 0.050	1,370	< 0.020	< 0.20	< 5.0	< 1.0	4.53	< 1.0	< 4.0
	GL0-1-190523	2019 05 23	8.09	384	7.65	-	859	691	1.69	0.0174	< 5.0	54.9	< 10	59.8	13.9	9.85	63.1	< 0.20	3.23	39.9	< 0.10	42.3	0.118	0.77	< 0.10	0.58	< 0.20	15.7	< 0.010	30.5	0.69	< 0.50	< 0.050	1,560	< 0.020	< 0.20	< 5.0	< 1.0	4.31	< 1.0	< 4.0
	GL0-1-200310	2020 03 10	7.94	405	-	-	-	705	1.01	-	< 5.0	58.4	13	62.9	25.7	9.93	65.6	< 0.20	3.44	39.9	< 0.10	58.4	0.019	< 0.50	< 0.10	0.12	< 0.20	15.6	< 0.010	29.9	0.41	< 0.50	< 0.050	1,500	< 0.020	< 0.20	< 5.0	< 1.0	4.80	< 1.0	< 4.0
GL0-2	GL0-2-20130627	2013 06 27	-	506	-	-	-	956	-	-	< 10a	83.9	< 30	71.9	432	10.6	136	0.53	1.6	93	< 5.0a	< 100	< 0.050	< 0.50	1.14	< 1.0a	< 1.0	< 50	< 0.20	26.7	6.4	< 1.0	< 0.050	1,460	< 0.20	< 30	< 50	-	37.5	< 30	< 5.0
	GL0-2-20140603	2014 06 03	-	465	-	-	-	744	-	-	< 10a	75.3	< 30	67.4	169	10.1	72.6	< 0.50	3.4	61	< 5.0a	< 100	< 0.050	< 0.50	0.54	< 1.0a	< 1.0	< 50	< 0.20	23	< 5.0	< 1.0	< 0.050	1,400	< 0.20	< 30	< 50	-	7.73	< 30	< 5.0
	GL0-2-20141124	2014 11 24	-	496	-	-	-	814	-	-	< 10a	80.2	< 30	71.9	146	10.8	78.2	< 0.50	2.9	58	< 5.0a	< 100	0.067	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	22.3	< 5.0	< 1.0	< 0.050	1,360	< 0.20	< 30	< 50	-	11	< 30	< 5.0
	GL0-2-20150608	2015 06 08	7.8	479	-	-	-	675	-	-	< 10	78	276	68.9	228	10.8	63.3	< 0.50	4.6	56	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	22.5	< 5.0	< 1.0	< 0.050	1,460	< 0.010	< 30	< 50	-	3.27	< 30	< 5.0
	GL0-2-20151103	2015 11 03	7.94	500	-	-	-	726	-	-	< 10	83.8	143	70.7	234	10.3	92.7	< 0.50	3	61	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	25.8	< 5.0	< 1.0	< 0.050	1,650	< 0.010	< 30	< 50	-	19.5	< 30	< 5.0
	DUP1-20151103	Duplicate	7.94	510	-	-	-	774	-	-	< 10	86.4	142	71.4	238	11	90.9	< 0.50	2.8	62	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	25.1	< 5.0	< 1.0	< 0.050	1,590	0.013	< 30	< 50	-	18.9	< 30	< 5.0
	QA/QC RPD%		0	2	-	-	-	6	-	-	*	3	1	1	2	7	2	*	7	2	*	*	*	*	*	*	*	*	*	3	*	*	*	4	*	*	*	-	3	*	*
	GL0-2-20160524	2016 05 24	8.22	468	-	-	-	700	-	-	< 10	76	205	67.5	183	10.6	56.7	< 0.50	3.9	53	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	21.3	< 5.0	< 1.0	< 0.050	1,420	< 0.010	< 30	< 50	-	1.92	< 30	< 5.0
	GL0-2-20170524	2017 05 24	8.4	482	-	-	-	696	-	-	< 10	79.9	121	68.6	126	11.2	60.4	< 0.50	3.8	54	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	24.9	< 5.0	< 1.0	< 0.050	1,670	< 0.010	< 30	< 50	-	2.05	< 30	6.6
	GL0-2-180529	2018 05 29	7.82	473	7.43	-	931	726	1.12	0.0173	< 5.0	76.2	202	68.7	156	10.4	63.2	< 0.20	3.45	46.5	< 0.10	41.1	< 0.010	< 0.50	0.26	< 0.40a	< 0.20	32.0	< 0.010	22.8	1.07	< 0.50	< 0.050	1,360	< 0.020	< 0.20	< 5.0	< 1.0	3.10	< 1.0	5.1
	DUP2-180529	Duplicate	7.85	469	7.43	-	931	698	1.17	0.0093	< 5.0	74.8	199	68.6	152	10.5	63.2	< 0.20	3.41	45.5	< 0.10	40.7	0.010	< 0.50	0.23	< 0.40a	< 0.20	31.5	< 0.010	22.8	1.05	< 0.50	< 0.050	1,310	< 0.020	< 0.20	< 5.0	< 1.0	3.09	< 1.0	< 4.0
	QA/QC RPD%		0	1	*	-	*	4	*	*	*	2	1	0	3	1	0	*	1	2	*	1	*	*	*	*	*	2	*	0	*	*	*	4	*	*	*	*	0	*	*
	GL0-2-190529	2019 05 29	8.01	546	7.5	-	1406	1,050	3.70	< 0.0050	11.6	86.4	225	80.2	177	9.99	116	< 0.20	1.60	64.3	< 0.10	33.5	0.037	0.87	0.43	0.95	< 0.20	27.0	< 0.010	28.1	1.98	< 0.50	0.070	2,020	< 0.020	< 0.20	< 5.0	< 1.0	55.3	< 1.0	< 4.0
	GL0-2-200310	2020 03 10	7.95	456	-	-	-	721	1.18	-	< 5.0	73.1	113	66.4	179	10.4	58.3	< 0.20	3.78	51.5	< 0.10	56.8	0.021	< 0.50	0.24	< 0.10	< 0.20	32.0	< 0.010	25.8	1.03	< 0.50	< 0.050	1,500	< 0.020	< 0.20	< 5.0	< 1.0	3.01	< 1.0	< 4.0

Associated CARO file(s): 8052631, 8052802, 8060237, 8060737, 8061100, 8081412, 8091680, 8092458, 8092618, 9052219, 9052399, 9052558, 9052754, 9052937, 9060273, 9091657, 9092001, 9092208, 9092404, 9120616.
Associated Exova file(s): 622178, 653600, 712940, 714233, 714243, 756693, 756810, 757047, 811364, 811710, 812030, 812741, 812985, 846260, 878316, 879073, 909346, 909448, 909654.

< Denotes concentration less than indicated detection limit or RPD less than indicated value.
\- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

Table 2: Historical Summary of Analytical Results For Groundwater -Metals

			Physical Parameters								Dissolved Metals																														
Sample Location	Sample ID	Sample Date	pH	Total Hardness	pH (field)	Conductivity	Field Conductivity	Total Dissolved Solids	Dissolved Organic Carbon	Phosphate	Dissolved Aluminum	Dissolved Calcium	Dissolved Iron	Dissolved Magnesium	Dissolved Manganese	Dissolved Potassium	Dissolved Sodium	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Lead	Lithium	Mercury	Molybdenum	Nickel	Selenium	Silver	Strontium	Thallium	Tin	Titanium	Tungsten	Uranium	Vanadium	Zinc
		(yyyy mm dd)	pH	mg/L	pH	µS/cm	µS/cm	mg/L	mg/L	mg/L	µg/L	mg/L	µg/L	mg/L	µg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
GL0-3	GL0-3-20130627	2013 06 27	-	762	-	-	-	1,500	-	-	< 10a	117	< 30	114	29	11	191	< 0.50	< 1.0	33	< 5.0a	< 100	0.096	< 0.50	1.79	< 1.0a	< 1.0	< 50	< 0.20	14.6	< 5.0	2.3	< 0.050	1,930	< 0.20	< 30	< 50	-	123	< 30	< 5.0
	GL0-3-20140603	2014 06 03	-	747	-	-	-	1,440	-	-	< 10a	114	< 30	112	< 10	10.2	180	< 0.50	< 1.0	27	< 5.0a	< 100	0.185	< 0.50	2.32	< 1.0a	< 1.0	< 50	< 0.20	15.1	< 5.0	2.4	< 0.050	1,960	< 0.20	< 30	< 50	-	120	< 30	< 5.0
	GL0-3-20141124	2014 11 24	-	797	-	-	-	1,440	-	-	< 10a	123	< 30	119	13	11.3	192	< 0.50	< 1.0	27	< 5.0a	< 100	0.087	< 0.50	3.55	44.9	< 1.0	< 50	< 0.20	14.8	< 5.0	2.5	< 0.050	1,930	< 0.20	< 30	< 50	-	119	< 30	26.9
	GL0-3-20150608	2015 06 08	7.65	772	-	-	-	1,390	-	-	< 10	120	< 30	115	< 10	10.7	179	< 0.50	< 1.0	26	< 5.0a	< 100	0.149	< 0.50	1.67	3.4	< 1.0	< 50	< 0.20	15.4	< 5.0	2.2	< 0.050	2,050	< 0.010	< 30	< 50	-	119	< 30	18.7
	GL0-3-20151103	2015 11 03	7.53	751	-	-	-	1,460	-	-	< 10	118	< 30	111	< 10	10.2	188	< 0.50	< 1.0	24	< 5.0a	< 100	0.132	< 0.50	1.71	2.2	< 1.0	< 50	< 0.20	15.2	< 5.0	1.8	< 0.050	2,100	< 0.010	< 30	< 50	-	122	< 30	12.3
	GL0-3-20160524	2016 05 24	8.1	754	-	-	-	1,450	-	-	< 10	117	< 30	112	< 10	10.2	179	< 0.50	< 1.0	23	< 5.0a	< 100	0.216	< 0.50	1.26	1.7	< 1.0	< 50	< 0.20	14.1	< 5.0	2.2	< 0.050	1,930	< 0.010	< 30	< 50	-	111	< 30	10.7
	GL0-3-20170524	2017 05 24	8.05	769	-	-	-	1,420	-	-	< 10	120	< 30	114	< 10	10.4	180	< 0.50	< 1.0	24	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	15.9	< 5.0	1.3	< 0.050	2,160	< 0.010	< 30	< 50	-	124	< 30	7.1
	GL0-3-180529	2018 05 29	7.81	799	7.28	-	1,826	1,480	5.47	0.0084	< 5.0	123	< 10	120	1.88	10.4	187	< 0.20	< 0.50	21.7	0.26	23.8	0.028	< 0.50	0.32	1.79	< 0.20	41.1	< 0.010	14.4	1.86	1.14	< 0.050	1,910	< 0.020	0.40	< 5.0	< 1.0	130	< 1.0	10.8
	GL0-3-190529	2019 05 29	7.77	1,110	7.12	-	2776	2,060	6.89	< 0.0050	< 5.0	176	< 10	163	1.91	12.4	239	< 0.20	< 0.50	30.4	0.26	29.3	0.059	1.60	0.59	3.11	< 0.20	52.3	< 0.010	13.8	2.67	10.8	< 0.050	2,980	< 0.020	0.57	< 5.0	< 1.0	198	< 1.0	26.2
	GL0-3-200310	2020 03 10	7.82	1,000	-	-	-	1,970	6.19	-	< 5.0	154	64	150	1.85	11.9	230	< 0.20	< 0.50	28.3	0.17	37.7	0.046	1.12	0.49	2.43	< 0.20	50.1	< 0.010	14.4	2.60	6.33	< 0.050	2,800	< 0.020	< 0.20	< 5.0	< 1.0	178	< 1.0	9.3
GL1-1	GL 1-1-20091109	2009 11 09	-	866	-	-	-	-	-	-	78	67.1	< 100	170	23	10.2	147	< 2	< 2	40	< 0.4	60	< 0.1	< 4	0.4	< 10a	< 1	40	-	21	< 10	< 6	< 0.10	3,120	< 0.1	< 1	< 10	-	36	1	< 10
	GL1-1-20100810	2010 08 10	-	790	-	-	-	1,250	-	-	< 50a	62	< 100	155	9	10	140	< 2	< 2	40	< 0.4	70	< 0.10	< 4	0.3	< 10a	< 1	40	-	23	< 10	< 6	< 0.1	3,010	< 0.1	< 1	< 100	-	48	< 1	< 10
	GL30-1-20100810	Duplicate	-	780	-	-	-	1,300	-	-	85	61	160	152	35	14	154	< 2	6	40	< 0.4	50	< 0.10	< 4	0.4	< 10a	< 1	40	-	24	< 10	< 6	< 0.1	3,130	< 0.1	< 1	< 100	-	51	2	< 10
	QA/QC RPD%		-	1	-	-	-	4	-	-	*	2	*	2	118	33	10	*	*	0	*	33	*	*	*	*	*	0	-	4	*	*	*	4	*	*	*	-	6	*	*
	GL1-1-20160531	2016 05 31	7.43	-	-	-	-	1,290	-	-	< 50	71.2	< 100	182	27	-	174	< 1	< 5	50	< 1	60	< 0.1a	< 5	< 0.5	< 2a	< 1	49	-	24	< 2	< 5	< 0.5	3,410	< 0.2	-	< 50	-	56.3	< 10	-
	GL1-1-20180927	2018 09 27	-	730	-	-	-	-	-	-	< 5.0	58.9	< 10	142	53	9.78	154	< 0.20	0.51	41	< 0.10	63.7	0.142	< 0.50	0.2	1.06	< 0.20	38.9	< 0.010	27.3	1.77	1.02	< 0.050	2,830	< 0.020	< 0.20	< 5.0	-	48.9	< 1.0	< 4.0
	GL1-1-180612	2018 06 12	7.75	743	-	-	-	1,160	-	0.0115	< 5.0	58.3	< 10	145	36.5	9.94	155	< 0.20	< 0.50	42.6	< 0.10	44.7	0.118	< 0.50	0.17	1.01	< 0.20	41.8	< 0.010	26.8	1.78	1.71	< 0.050	2,890	< 0.020	< 0.20	< 5.0	< 1.0	49.6	< 1.0	< 4.0
	GL1-1-190917	2019 09 17	7.94	763	-	-	-	1,200	4.15	-	< 5.0	60.0	< 10	149	33.2	9.61	164	< 0.20	0.61	45.7	< 0.10	55.3	0.154	1.14	0.17	0.95	< 0.20	43.7	-	33.2	1.96	< 0.50	< 0.050	3,160	< 0.020	< 0.20	< 5.0	< 1.0	55.1	< 1.0	< 4.0
	GL1-1-200910	2020 09 10	8.12	746	-	-	-	1,200	3.45	-	2.4	63.4	3.4	143	29.4	9.46	153	0.095	0.624	43.0	< 0.010	45.8	0.123	0.19	0.156	1.28	0.078	39.7	-	29.6	1.85	0.41	< 0.010	3,120	0.0073	< 0.050	0.20	0.42	54.6	0.21	2.9
GL1-2	GL 1-2-20091109	2009 11 09	-	909	-	-	-	-	-	-	66	65.4	< 100	181	2	10.2	144	< 2	< 2	40	< 0.4	60	< 0.1	< 4	0.3	< 10a	< 1	50	-	20	< 10	< 6	< 0.10	3,160	< 0.1	< 1	< 10	-	36	2	< 10
	GL1-2-20100810	2010 08 10	-	840	-	-	-	1,140	-	-	< 50a	65	< 100	164	< 2	10	132	< 2	< 2	40	< 0.4	70	< 0.1	< 4	0.4	< 10a	< 1	40	-	20	< 10	< 6	< 0.1	3,220	< 0.1	< 1	< 100	-	46	2	< 10
	GL1-2-20160531	2016 05 31	7.66	-	-	-	-	1,190	-	-	< 50	69.3	< 100	174	< 2	-	161	< 1	< 5	< 50	< 1	60	< 0.1a	< 5	< 0.5	< 2a	< 1	49	-	21	< 2	< 5	< 0.5	3,310	< 0.2	-	< 50	-	49	< 10	< 40
	GL1-2-180612	2018 06 12	7.84	790	-	-	-	1,230	-	0.0102	< 5.0	61.7	< 10	154	0.34	10.8	169	< 0.20	0.99	64.4	< 0.10	49.8	0.022	< 0.50	< 0.10	1.83	< 0.20	38.1	< 0.010	28.0	1.34	0.78	< 0.050	3,040	< 0.020	< 0.20	< 5.0	< 1.0	61.6	4.2	< 4.0
	GL1-2-20180927	2018 09 27	-	759	-	-	-	-	-	-	< 5.0	59.2	< 10	148	14.7	10.6	149	< 0.20	0.7	47.1	< 0.10	45.4	0.029	< 0.50	0.1	0.95	< 0.20	38.5	< 0.010	18.5	1.18	1.59	< 0.050	2,910	< 0.020	< 0.20	< 5.0	-	49.8	3.2	< 4.0
	GL1-2-190917	2019 09 17	7.98	762	-	-	-	1,240	4.46	-	< 5.0	60.7	< 10	148	4.15	9.95	147	< 0.20	0.56	47.0	< 0.10	43.6	0.036	1.03	< 0.10	0.88	< 0.20	42.7	-	23.0	1.24	0.75	< 0.050	3,160	< 0.020	< 0.20	< 5.0	< 1.0	58.1	2.5	< 4.0
	GL1-2-200910	2020 09 10	8.14	814	-	-	-	1,300	4.98	-	2.2	68.1	< 2.0	156	3.48	10.8	157	0.087	0.752	49.8	< 0.010	39.2	0.0328	0.13	0.143	1.24	< 0.050	40.0	-	23.5	1.24	0.26	< 0.010	3,510	< 0.0040	< 0.050	0.26	< 0.20	59.8	2.34	< 1.0
GL2-1	GL 2-1-20091109	2009 11 09	-	348	-	-	-	-	-	-	64	75.8	230	38.6	124	3.6	75.2	< 2	2	120	< 0.4	< 40	< 0.1	< 4	0.5	< 10a	< 1	10	-	7	< 10	< 6	< 0.10	2,470	< 0.1	< 1	< 10	-	6	< 1	< 10
	GL2-1-20100810	2010 08 10	-	360	-	-	-	604	-	-	76	77	240	41	144	3	74	< 2	2	100	< 0.4	< 40	< 0.10	< 4	0.3	< 10a	< 1	10	-	7	< 10	< 6	< 0.1	2,710	< 0.1	< 1	< 100	-	8	< 1	< 10
	GL30-2-20100810	Duplicate	-	350	-	-	-	650	-	-	95	76	220	40	161	6	76	< 2	4	120	< 0.4	< 40	< 0.10	< 4	0.6	< 10a	< 1	10	-	7	< 10	< 6	< 0.1	2,670	< 0.1	< 1	< 100	-	8	1	10
	QA/QC RPD%		-	3	-	-	-	7	-	-	22	1	9	2	11	*	3	*	67	18	*	*	*	*	*	*	*	0	-	0	*	*	*	1	*	*	*	-	0	*	*
	GL2-1-20110629	2011 06 29	-	359	-	-	-	638	-	-	< 5	77.6	474	40.2	145	3.2	75.7	< 0.2	2.4	118	< 0.04	4	0.02	1.1	1.39	< 1a	< 0.1	12	-	9.2	2	< 0.6	< 0.01	3,410	< 0.01	< 0.1	< 10	-	6.3	0.5	< 1
	GL2-1-20111217	2011 12 17	-	372	-	-	-	640	-	-	< 50a	81.6	698	41	111	3.2	73.6	< 2	2	110	< 0.4	< 40	< 0.1	5	< 0.2	10	< 1	10	-	9	< 10	< 6	< 0.10	3,100	0.11	< 1	< 10	-	7	2	< 10
	GL 2-1-20120627	2012 06 27	-	380	-	-	-	670	-	-	< 50a	81	260	42	< 10	2	76	< 2	< 2	100	< 0.4	< 40	< 0.1	< 4	< 0.2	< 10a	< 1	10	-	5	< 10	< 6	< 0.10	2,900	< 0.1	< 1	< 100	-	7	< 1	< 10
	GL2-1-20121204	2012 12 04	-	348	-	-	-	642	-	-	< 50a	74.8	503	39.2	160	3.3	74.1	< 2.0	< 2.0	110	< 0.40	< 40	< 0.10	< 4.0	10.7	< 10a	< 1	< 10	-	7.64	< 10	< 6.0	< 0.10	2,950	< 0.10	< 1.0	< 10	-	8.8	1.02	< 10
	GL2-1-20130626	2013 06 26	-	418	-	-	-	660	-	-	< 10a	91	613	46.3	117	3.6	82.8	< 0.50	1.8	113	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	9.6	< 5.0	< 1.0	< 0.050	2,730	< 0.20	< 30	< 50	-	6.78	< 30	< 5.0
	GL2-1-20140603	2014 06 03	-	418	-	-	-	707	-	-	< 10a	89.4	381	47.2	91	3.6	85	< 0.50	1.4	119	< 5.0a	< 100	0.059	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	9.8	< 5.0	< 1.0	< 0.050	2,870	< 0.20	< 30	< 50	-	6.15	< 30	< 5.0
	DUP3-20140603	Duplicate	-	412	-	-	-	710	-	-	< 10a	89.3	402	46	96	3.5	84.3	< 0.50	1.4	118	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	9.5	< 5.0	< 1.0	< 0.050	2,830	< 0.20	< 30	< 50	-	6.12	< 30	< 5.0
	QA/QC RPD%		-	1	-	-	-	0	-	-	*	0	5	3	5	*	1	*	0	1	*	*	*	*	*	*	*	*	*	3	*	*	*	1	*	*	*	-	0	*	*
	GL2-1-20141124	2014 11 24	-	429	-	-	-	688	-	-	< 10a	92.4	629	48.2	157	3.7	82.4	< 0.50	1.6	120	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	8.7	< 5.0	< 1.0	< 0.050	3,040	< 0.20	< 30	< 50	-	6.28	< 30	< 5.0
	GL2-1-20150608	2015 06 08	7.89	444	-	-	-	713	-	-	< 10	97	226	49.1	54	3.7	85.8	< 0.50	1	127	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	9.5	< 5.0	< 1.0	< 0.050	3,170	< 0.010	< 30	< 50	-	6.16	< 30	< 5.0
	GL2-1-20151103	2015 11 03	8.05	424	-	-	-	688	-	-	< 10	95	330	45.4	186	3.7	83	< 0.50	< 1.0	119	< 5.0a	< 100	0.052	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	8.8	< 5.0	< 1.0	< 0.050	3,070	< 0.010	< 30	< 50	-	6.09	< 30	< 5.0
	GL2-1-20160524	2016 05 24	8.21	445	-	-	-	730	-	-	< 10	98.9	85	48.2	17	3.7	90.8	< 0.50	< 1.0	117	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	8.7	< 5.0	< 1.0	< 0.050	3,240	< 0.010	< 30	< 50	-	5.48	< 30	< 5.0
	DUP2-20160524	Duplicate	8.2	439	-	-	-	718	-	-	< 10	95.7	62	48.5	13	3.7	86.1	< 0.50	< 1.0	116	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	9	< 5.0	< 1.0	< 0.050	3,110	< 0.010	< 30	< 50	-	5.72	< 30	< 5.0
	QA/QC RPD%		0	1	-	-	-	2	-	-	*	3	31	1	27	*	5	*	*	1	*	*	*	*	*	*	*	*	*	3	*	*	*	4	*	*	*	-	4	*	*
	GL2-1-20170524	2017 05 24	8.25	466	-	-	-	815	-	-	< 10	103	651	50.6	158	3.7	95.5	< 0.50	1.3	112	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	11.4	< 5.0	< 1.0	< 0.050	3,480	< 0.010	< 30	< 50	-	5.58	< 30	< 5.0
	GL2-1-180528	2018 05 28	7.90	457	-	-	-	845	1.46	< 0.0050	< 5.0	83.5	796	60.3	151	4.12	116	< 0.20	1.34	103	< 0.10	9.7	0.039	< 0.50	< 0.10	< 0.40a	< 0.20	11.5	< 0.010	11.1	< 0.40	< 0.50	< 0.050	3,470	< 0.020	< 0.20	< 5.0	< 1.0	5.11	< 1.0	< 4.0
	GL2-1-190523	2019 05 23	8.11	505	7.57	-	1119	903	1.77	< 0.0050	< 5.0	109	29	56.6	231	4.20	106	< 0.20	0.59	103	< 0.10	15.9	0.071	< 0.50	< 0.10	< 0.40a	< 0.20	15.6	< 0.010	12.9	< 0.40	< 0.50	< 0.050	4,100	< 0.020	< 0.20	< 5.0	< 1.0	5.30	< 1.0	< 4.0

Associated CARO file(s): 8052631, 8052802, 8060237, 8060737, 8061100, 8081412, 8091680, 8092458, 8092618, 9052219, 9052399, 9052558, 9052754, 9052937, 9060273, 9091657, 9092001, 9092208, 9092404, 9120616.
Associated Exova file(s): 622178, 653600, 712940, 714233, 714243, 756693, 756810, 757047, 811364, 811710, 812030, 812741, 812985, 846260, 878316, 879073, 909346, 909448, 909654.
All terms defined within the body of Keltech's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
\- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

Table 2: Historical Summary of Analytical Results For Groundwater -Metals

Sample Location	Sample ID	Sample Date (yyyy mm dd)	pH (pH)	Total Hardness (mg/L)	pH (field) (pH)	Conductivity (µS/cm)	Field Conductivity (µS/cm)	Total Dissolved Solids (mg/L)	Dissolved Organic Carbon (mg/L)	Phosphate (mg/L)	Dissolved Aluminum (µg/L)	Dissolved Calcium (mg/L)	Dissolved Iron (µg/L)	Dissolved Magnesium (mg/L)	Dissolved Manganese (µg/L)	Dissolved Potassium (mg/L)	Dissolved Sodium (mg/L)	Antimony (µg/L)	Arsenic (µg/L)	Barium (µg/L)	Beryllium (µg/L)	Boron (µg/L)	Cadmium (µg/L)	Chromium (µg/L)	Cobalt (µg/L)	Copper (µg/L)	Lead (µg/L)	Lithium (µg/L)	Mercury (µg/L)	Molybdenum (µg/L)	Nickel (µg/L)	Selenium (µg/L)	Silver (µg/L)	Strontium (µg/L)	Thallium (µg/L)	Tin (µg/L)	Titanium (µg/L)	Tungsten (µg/L)	Uranium (µg/L)	Vanadium (µg/L)	Zinc (µg/L)
			Physical Parameters								Dissolved Metals																														
GL2-1 (Cont'd)	GL2-1-200609	2020 06 09	7.90	556	7.36	-	1,202	970	1.54	-	< 1.0	124	1,220	60	157	4.45	122	< 0.050	2.46	92.7	< 0.010	12.3	0.0075	< 0.10	0.0524	0.23	< 0.050	14.1	< 0.010	14.3	0.127	< 0.10	< 0.010	29.0	< 0.0040	< 0.050	< 0.20	< 0.20	5.07	< 0.20	< 1.0
	GL2-1-200820	2020 08 20	8.10	473	7.46	-	1,435	1,000	1.72	-	1.6	106	1,210	50.8	129	3.92	98.7	< 0.050	2.82	88.1	< 0.010	11.7	0.0068	0.15	0.0583	< 0.10	< 0.050	12.8	< 0.010	13.8	0.077	< 0.10	< 0.010	39.0	< 0.0040	< 0.050	< 0.20	< 0.20	4.13	< 0.20	< 1.0
	DUPA-200820	Duplicate	8.10	476	7.46	-	1,435	992	2.18	-	3.0	107	1,200	51	130	3.98	99.4	< 0.050	2.81	87.3	< 0.010	11.4	0.0057	0.12	0.0449	< 0.10	< 0.050	12.9	< 0.010	13.7	0.079	< 0.10	< 0.010	39.5	< 0.0040	0.113	< 0.20	< 0.20	4.13	< 0.20	< 1.0
	QA/QC RPD%		0	1	*	-	*	1	*	-	*	1	1	0	1	2	1	*	0	1	*	3	*	*	26	*	*	1	*	1	*	*	*	*	*	*	*	*	0	*	*
	GL2-1-201019	2020 10 19	8.10	513	7.6	-	1,508	1,030	2.10	-	< 1.0	125	1,490	48.8	129	4.18	101	< 0.050	3.25	76.5	< 0.010	6.3	< 0.0020	< 0.10	0.0526	< 0.10	< 0.050	11.2	< 0.010	14.9	0.087	< 0.10	< 0.010	3,840	< 0.0040	< 0.050	< 0.20	< 0.20	4.03	< 0.20	< 1.0
	GL2-1-210512	2021 05 12	8.06	515	-	-	-	-	-	-	< 1.0	119	954	53	126	4.24	117	< 0.050	2.37	72.9	< 0.010	11.0	0.0050	0.17	0.0343	< 0.10	< 0.050	13.6	< 0.010	14.1	0.093	< 0.10	< 0.010	3,840	< 0.0040	0.052	< 0.20	< 0.20	4.14	< 0.20	< 1.0
	GL2-1-211005	2021 10 05	7.85	583	7.55	-	-	-	-	-	7.5	134	1,130	60.3	126	4.4	127	< 0.050	2.12	73.5	< 0.010	40.7	0.0095	0.15	0.0428	0.56	< 0.050	13.8	< 0.010	15.4	0.084	< 0.10	< 0.010	3,620	< 0.0040	< 0.050	0.63	< 0.20	3.82	< 0.20	< 1.0
GL2-2	GL 2-2-20091109	2009 11 09	-	359	-	-	-	-	-	-	417	70.2	380	44.7	68	3.8	72.7	< 2	< 2	70	< 0.4	< 40	< 0.1	< 4	0.6	< 10a	< 1	10	-	5	< 10	< 6	< 0.10	2,430	< 0.1	< 1	< 10	-	< 4	1	< 10
	GL2-2-20100810	2010 08 10	-	350	-	-	-	598	-	-	< 50a	70	< 100	43	20	3	67	< 2	< 2	60	< 0.4	< 40	< 0.10	< 4	< 0.2	< 10a	< 1	10	-	5	< 10	< 6	< 0.1	2,480	< 0.1	< 1	< 100	-	8	< 1	< 10
	GL2-2-200826	2020 08 26	8.06	405	7.36	-	1,142	751	1.29	-	16.9	81.7	42.9	48.8	128	3.59	74.7	< 0.050	1.17	90.3	< 0.010	9.4	0.0636	0.18		0.38	< 0.050	9.73	< 0.010	9.21	0.396	< 0.10	< 0.010	3,280	< 0.0040	0.062	1.15	< 0.20	4.38	0.61	< 1.0
	GL2-2-201020	2020 10 20	7.91	464	7.55	-	1,234	810	1.25	-	< 1.0	108	23.7	47.2	98.6	3.96	74.5	< 0.050	1.21	109	< 0.010	6.6	0.232	0.27		0.27	< 0.050	10.2	< 0.010	10.4	0.268	< 0.10	< 0.010	4,010	< 0.0040	< 0.050	< 0.20	< 0.20	4.14	< 0.20	1.8
	GL2-2-210513	2021 05 13	7.91	485	7.49	-	-	-	-	-	< 1.0	102	49.2	55.9	76.4	4.43	97.6	0.055	1.15	108	< 0.010	13.6	0.0297	0.12		0.62	< 0.050	12.6	< 0.010	9.93	0.113	< 0.10	< 0.010	3,370	< 0.0040	< 0.050	< 0.20	< 0.20	3.57	< 0.20	< 1.0
	GL2-2-211005	2021 10 05	7.92	511	7.45	-	-	-	-	-	< 1.0	109	125	58.1	202	4.3	99.8	< 0.050	1.36	104	< 0.010	52.2	0.0544	0.21		0.59	< 0.050	12.4	< 0.010	14.0	0.354	< 0.10	< 0.010	3,450	< 0.0040	< 0.050	< 0.20	< 0.20	3.63	< 0.20	< 1.0
GL3-2	GL3-2-20080529	2008 05 29	-	-	-	-	-	-	-	-	370	35.6	630	56.1	175	6.8	161	< 2	6	50	< 1	< 20	7	< 5		< 10a	2	< 10	-	30	< 5	2	< 0.10	1,210	< 0.5	< 10	31	-	9	2	< 10
	GL3-2-20081104	2008 11 04	-	-	-	-	-	-	-	-	177	36	460	55.6	124	6.4	156	< 0.2	5.1	42	< 0.1	18	0.4	0.8		1	0.2	11	-	37	1.8	< 0.2	< 0.01	1,280	< 0.05	< 1	17.2	-	6.7	0.7	5
	GL3-2-20091116	2009 11 16	-	337	-	-	-	-	-	-	74	40.7	270	57.3	115	6.7	171	< 2	6	40	< 0.4	< 40	0.2	< 4		< 10a	< 1	< 10	-	34	< 10	< 6	< 0.10	1,200	< 0.1	< 1	< 10	-	6	< 1	< 10
	GL3-2-20100810	2010 08 10	-	320	-	-	-	750	-	-	88	34	< 100	57	135	6	162	< 2	4	40	< 0.4	< 40	0.2	< 4		< 10a	< 1	10	-	31	< 10	< 6	< 0.1	1,180	< 0.1	< 1	< 100	-	8	< 1	< 10
GL3-3	GL3-3-19990505	1999 05 05	-	-	-	-	-	-	-	-	67	104	1,620	258	664	53.9	335	< 5	< 10	241	< 0.5	825	4.8	< 0.8		2	< 2	33	-	< 1	2	< 4	< 1a	2,480	< 4a	13	< 0.4	-	-	< 0.1	< 0.6
	GL3-3-19990928	1999 09 28	-	-	-	-	-	-	-	-	73	110	1,060	261	585	59.4	321	< 5	< 10	242	< 0.5	944	7	< 0.8		1	7	37	-	< 1	5	< 4	< 1a	2,380	< 4a	17	< 0.4	-	-	3	0.6
	GL3-3-19991202	1999 12 02	-	-	-	-	-	-	-	-	44	109	2,530	268	584	67.8	330	< 5	< 10	244	< 0.5	992	< 0.5a	< 0.8	5.5	2	3	40	-	< 1	3	< 4	< 1a	2,510	< 4a	11	< 0.4	-	-	1	2.1
	GL3-3-20080529	2008 05 29	-	-	-	-	-	-	-	-	< 50a	32.5	6,180	52.2	131	6	151	< 2	< 2	20	< 1	< 20	< 0.1a	< 5	< 1	< 10a	2	< 10	-	20	< 5	< 2	< 0.10	1,160	< 0.5	< 10	10	-	8	< 1	< 10
	GL3-3-20081104	2008 11 04	-	-	-	-	-	-	-	-	25	37.1	1,160	61.8	178	7.1	158	< 0.2	1.7	24	< 0.1	29	< 0.01	0.6	0.2	< 1a	< 0.1	12	-	30	1.7	< 0.2	< 0.01	1,350	< 0.05	< 1	8.4	-	8.8	0.6	3
GL3-5	GL3-5-20130627	2013 06 27	-	1,260	-	-	-	1,950	-	-	< 10a	179	13,700	199	677	61.9	237	< 0.50	< 1.0	485	< 5.0a	1,810	< 0.050	0.68	3.12	< 1.0a	< 1.0	< 50	< 0.20	< 1.0	< 5.0	< 1.0	< 0.050	2,950	< 0.20	< 30	< 50	-	< 0.20	< 30	< 5.0
	GL3-5 (2012)-20140609	2014 06 09	-	1,230	-	-	-	1,920	-	-	< 10a	165	5,700	200	487	59.7	229	< 0.50	< 1.0	441	< 5.0a	1,760	< 0.050	0.55	3.86	< 1.0a	< 1.0	< 50	< 0.20	< 1.0	< 5.0	< 1.0	< 0.050	2,830	< 0.20	< 30	< 50	-	< 0.20	< 30	< 5.0
	GL3-5 (2012)-20141125	2014 11 25	-	1,330	-	-	-	2,030	-	-	< 10a	168	19,500	222	569	56.5	232	< 0.50	1.7	490	< 5.0a	1,790	< 0.050	0.7	3.36	< 1.0a	< 1.0	< 50	< 0.20	< 1.0	< 5.0	< 1.0	< 0.050	3,270	< 0.20	< 30	< 50	-	0.31	< 30	< 5.0
	GL3-5 (2012)-20150609	2015 06 09	7.43	1,240	-	-	-	1,850	-	-	11	170	27,800	199	414	67.5	243	< 0.50	2.4	470	< 5.0a	1,800	< 0.050	1.03	7.3	< 1.0a	< 1.0	< 50	< 0.20	< 1.0	< 5.0	< 1.0	< 0.050	3,080	< 0.010	< 30	< 50	-	< 0.20	< 30	< 5.0
	DUP1-20150609	Duplicate	7.41	1,230	-	-	-	1,860	-	-	10	163	27,200	201	412	66	238	< 0.50	2.3	469	< 5.0a	1,790	< 0.050	0.96	7.08	< 1.0a	< 1.0	< 50	< 0.20	< 1.0	< 5.0	< 1.0	< 0.050	3,040	< 0.020	< 30	< 50	-	< 0.20	< 30	< 5.0
	QA/QC RPD%		0	1	-	-	-	1	-	-	*	4	2	1	0	2	2	*	4	0	*	1	*	*	3	*	*	*	*	*	*	*	*	1	*	*	*	-	*	*	*
	GL3-5 (2012)-20151109	2015 11 09	6.8	1,280	-	-	-	1,990	-	-	< 10	172	14,000	205	416	61.6	229	< 0.50	1.3	481	< 5.0a	1,780	< 0.050	0.73	3.82	< 1.0a	< 1.0	< 50	< 0.20	< 1.0	< 5.0	< 1.0	< 0.050	3,130	< 0.010	< 30	< 50	-	0.21	< 30	< 5.0
GL4-1	GL 4-1-20091110	2009 11 10	-	630	-	-	-	-	-	-	< 50a	51	390	122	82	6.6	205	< 2	4	10	< 0.4	< 40	< 0.1	< 4	0.3	< 10a	< 1	40	-	30	< 10	< 6	< 0.10	2,010	< 0.1	< 1	< 10	-	33	< 1	10
	GL4-1-20100810	2010 08 10	-	600	-	-	-	1,210	-	-	< 50a	48	< 100	117	90	6	206	< 2	< 2	20	< 0.4	< 40	< 0.10	< 4	0.3	< 10a	< 1	40	-	31	< 10	< 6	< 0.1	2,180	< 0.1	< 1	< 100	-	49	< 1	< 10
	GL4-1-20110629	2011 06 29	-	613	-	-	-	1,190	-	-	< 5	50.8	574	118	90	6.2	186	< 0.2	5.9	16	< 0.04	7	0.02	3.1	0.44	3	< 0.1	34	-	19.2	< 1	9.8	< 0.01	2,560	< 0.01	< 0.1	< 10	-	35.9	1	3
	GL4-1-20120625	2012 06 25	-	610	-	-	-	1,230	-	-	< 50a	51	410	117	50	7	188	< 2	< 2	10	< 0.4	< 40	< 0.1	< 4	0.7	< 10a	< 1	30	-	20	< 10	< 6	< 0.10	2,070	< 0.1	< 1	< 100	-	38	< 1	< 10
	GL 4-1-20120626	2012 06 26	-	-	-	-	-	1,170	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL 4-1-20120704	2012 07 04	-	580	-	-	-	-	-	-	< 5	49	140	112	50	7	186	< 0.2	2.2	14	< 0.04	15	< 0.01	7.2	0.14	< 1a	< 0.1	34	-	7.4	< 1	16.5	< 0.01	2,440	< 0.01	< 0.1	< 100	-	37	2	1
	GL4-1-20121203	2012 12 03	-	548	-	-	-	1,210	-	-	< 50a	44.2	624	106	78	6.3	192	< 2	2.4	10	< 0.40	< 40	< 0.10	5.7	< 0.20	< 10a	< 1.0	20	-	37.6	< 10	< 6.0	< 0.10	2,190	< 0.10	< 1.0	< 10	-	47.4	1.44	< 10
	GL4-1-20130627	2013 06 27	-	622	-	-	-	1,140	-	-	< 10a	50.4	820	121	92	6.8	206	< 0.50	2.8	< 20	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	38.1	< 5.0	< 1.0	< 0.050	2,070	< 0.20	< 30	< 50	-	45.4	< 30	< 5.0
	DUP4-20130627	Duplicate	-	638	-	-	-	1,130	-	-	< 10a	52	840	123	95	7.2	210	< 0.50	2.6	< 20	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	36.9	< 5.0	< 1.0	< 0.050	2,050	< 0.20	< 30	< 50	-	46.1	< 30	< 5.0
	QA/QC RPD%		-	3	-	-	-	1	-	-	*	3	2	2	3	6	2	*	7	*	*	*	*	*	*	*	*	*	*	3	*	*	*	1	*	*	*	-	2	*	*
	GL4-1-20140603	2014 06 03	-	597	-	-	-	1,140	-	-	< 10a	50.5	820	114	89	6.4	199	< 0.50	2.7	< 20	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	38.3	< 5.0	< 1.0	< 0.050	2,040	< 0.20	< 30	< 50	-	42.3	< 30	< 5.0
	GL4-1-20141124	2014 11 24	-	646	-	-	-	1,160	-	-	< 10a	52.1	833	125	93	7.1	209	< 0.50	2.7	< 20	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	35.9	< 5.0	< 1.0	< 0.050	1,960	< 0.20	< 30	< 50	-	41.9	< 30	< 5.0
	GL4-1-20150608	2015 06 08	8	625	-	-	-	1,110	-	-	< 10	51.4	784	121	90	6.8	200	< 0.50	2.7	< 20	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	35.6	< 5.0	< 1.0	< 0.050	2,190	< 0.010	< 30	< 50	-	41.4	< 30	< 5.0
	GL4-1-20151104	2015 11 04	8.09	591	-	-	-	1,130	-	-	< 10	49.3	765	114	85	6.4	192	< 0.50	2.6	< 20	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	35.1	< 5.0	< 1.0	< 0.050	2,000	< 0.010	< 30	< 50	-	41.2	< 30	< 5.0
	GL4-1-200814	2020 08 14	8.18	642	7.95	-	1,846	1,280	2.82	-	< 1.0	54.1	786	123	85.7	7.03	207	< 0.050	2.90	16.5	< 0.010	17.7	0.0079	0.66	0.0329	< 0.10	< 0.050	40.2	< 0.010	35.6	0.387	< 0.10	< 0.010	2,470	< 0.0040	< 0.050	< 0.20	< 0.20	45.9	< 0.20	< 1.0
	GL4-1-201016	2020 10 16	8.11	616	7.69	-	1,582	1,260	3.18	-	1.9	51.8	732	118	81.0	6.73	198	< 0.050	2.58	16.0	< 0.010	15.8	0.0244	< 0.10	0.0360	0.11	< 0.050	37.8	< 0.010	33.6	0.356	< 0.10	< 0.010	2,380	< 0.0040	0.116	< 0.20	< 0.20	44.0	< 0.20	1.2
	GL4-1-210511	2021 05 11	8.17	618	7.62	-	-	-	-	-	< 1.0	52.3	568	118	77.0	7.57	202	< 0.050	2.93	14.9	< 0.010	20.9	0.0316	0.16	0.0701	0.14	< 0.050	38.8	< 0.010	30.6	0.327	< 0.10	< 0.010	2,210	< 0.0040	< 0.050	< 0.20	< 0.20	41.8	< 0.20	1.6
	GL4-1-211005	2021 10 05	8.00	632	7.55	-	-	-	-	-	< 1.0	57.1	588	119	75.7	7.1	205	< 0.050	2.33	15.7	0.020	47.7	0.0220	0.14	0.0370	0.86	< 0.050	36.5	< 0.010	30.1	0.310	< 0.10	< 0.010	2,400	< 0.0040	< 0.050	< 0.20	< 0.20	39.8	< 0.20	< 1.0
GL4-2	GL4-2-20091116	2009 11 16	-	1,040	-	-	-	-	-	-	< 50a	54.2	< 100	220	44	9	194	< 2	< 2	40	< 0.4	< 40	< 0.1	< 4	1.4	< 10a	< 1	30	-	80	< 10	< 6	< 0.10	3,060	< 0.1	< 1	< 10	-	101	2	10
	GL4-2-20100810	2010 08 10	-	1,000	-	-	-	1,760	-	-	< 50a	52	< 100	216	42	8	202	< 2	< 2	40	< 0.4	< 40	< 0.10	< 4	< 0.2	< 10a	< 1	30	-	72	< 10	< 6	< 0.1	3,140	< 0.1	< 1	< 100	-	103	2	< 10
	GL4-2-20110629	2011 06 29	-	1,010	-	-	-	1,540	-	-	5	51.5	62	213	170	7.8	183	< 0.2	2	35	< 0.04	6	0.12	6.8	0.97	3	< 0.1	30	-	72.6	4	9.6	< 0.01	3,980	< 0.01	< 0.1	< 10	-	86.8	3.4	4
	GL4-2-20120626	2012 06 26	-	1,000	-	-	-	1,550	-	-	< 50a	53	360	210	230	8	191	< 2	< 2	40	< 0.4	< 40	< 0.1	< 4	1.1	< 10a	< 1	20	-	61	< 10	< 6	< 0.10	3,030	< 0.1	< 1	< 100	-	69	2	< 10
	GL4-2-20121203	2012 12 03	-	973	-	-	-	1,700	-	-	< 50a	43	131	210	208	7.7	181	< 2	< 2.0	40	< 0.40	< 40	< 0.10	9.1	1.55	< 10a	< 1.0	20	-	69.2	< 10	< 6.0	< 0.10	3,020	< 0.10	< 1.0	< 10	-	84.8	3.3	< 10
	GL4-2-200814	2020 08 14	8.04	846	2.71	-	2,259	1,610	5.89	-	11.6	51.9	168	174	197	9.14	258	< 0.050	0.729	44.9	< 0.010	29.3	0.143	0.57	0.842	2.95	0.214	32.8	< 0.010	72.2	3.68	0.22	< 0.010	3,410	0.0071	< 0.050	0.79	0.26	78.0	1.30	4.1
	GL4-2-201030	2020 10 30	8.01	765	7.46	-	2,207	1,460	4.41	-	< 1.0	47.5	11.0	157	47.9	8.63	231	0.129	0.833	38.3	< 0.010	23.1	0.0457	< 0.10	0.211	0.90	< 0.050	29.6	< 0.010	98.3	2.10	0.86	< 0.010	2,910	< 0.0040	< 0.050	0.25	< 0.20	86.2	1.40	1.5
	GL4-2-210511	2021 05 11	8.13	818	7.43	-	-	-	-	-	< 1.0	49.3	5.0	169	21.5	8.96	247	< 0.050	0.747	36.4	< 0.010	30.1	0.0228	0.19	0.116	0.93	< 0.050	30.6	< 0.010	76.1	2.06	0.30	< 0.010	2,490	0.0057	< 0.050	< 0.20	< 0.20	73.6	0.99	1.4
	GL4-2-211005	2021 10 05	7.95	829	7.40	-	-	-	-	-	< 1.0	53.3	94.6	169	193	9.26	248	< 0.050	0.604	39.1	< 0.010	55.7	0.0292	0.19	0.674	0.63	< 0.050	28.2	< 0.010	81.8	2.30	0.12	< 0.010	2,600	0.0058	< 0.050	0.24	0.25	78.3	0.92	< 1.0

Associated CARO file(s): 8052631, 8052802, 8060237, 8060737, 8061100, 8081412, 8091680, 8092458, 8092618, 9052219, 9052399, 9052558, 9052754, 9052937, 9060273, 9091657, 9092001, 9092208, 9092404, 9120616.
Associated Exova file(s): 622178, 653600, 712940, 714233, 714243, 756693, 756810, 757047, 811364, 811710, 812030, 812741, 812985, 846260, 878316, 879073, 909346, 909448, 909654.
All terms defined within the body of Keltech's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
\- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

Table 2: Historical Summary of Analytical Results For Groundwater -Metals

Sample Location	Sample ID	Sample Date (yyyy mm dd)	pH pH	Total Hardness mg/L	pH (field) pH	Conductivity µS/cm	Field Conductivity µS/cm	Total Dissolved Solids mg/L	Dissolved Organic Carbon mg/L	Phosphate mg/L	Dissolved Aluminum µg/L	Dissolved Calcium mg/L	Dissolved Iron µg/L	Dissolved Magnesium mg/L	Dissolved Manganese µg/L	Dissolved Potassium mg/L	Dissolved Sodium mg/L	Antimony µg/L	Arsenic µg/L	Barium µg/L	Beryllium µg/L	Boron µg/L	Cadmium µg/L	Chromium µg/L	Cobalt µg/L	Copper µg/L	Lead µg/L	Lithium µg/L	Mercury µg/L	Molybdenum µg/L	Nickel µg/L	Selenium µg/L	Silver µg/L	Strontium µg/L	Thallium µg/L	Tin µg/L	Titanium µg/L	Tungsten µg/L	Uranium µg/L	Vanadium µg/L	Zinc µg/L
			Physical Parameters								Dissolved Metals																														
GL5-1	GL5-1-20091116	2009 11 16	-	77	-	-	-	-	-	-	< 50a	3.4	< 100	16.6	4	10.6	539	< 2	< 2	< 10	< 0.4	< 40	< 0.1	< 4	< 0.2	< 10a	< 1	580	-	7	< 10	< 6	< 0.10	1,050	< 0.1	< 1	< 10	-	< 4	< 1	< 10
	GL5-1-20100810	2010 08 10	-	110	-	-	-	1,690	-	-	71	13	840	20	34	9	604	< 2	< 2	10	< 0.4	40	< 0.1	< 4	< 0.2	< 10a	1	750	-	7	< 10	< 6	< 0.1	2,030	< 0.1	< 1	< 100	-	< 4	< 1	50
	GL5-2-20180528	2018 05 28	7.83	671	-	-	-	1,370	-	-	< 5.0	79.8	< 10	115	0.44	7.77	268	< 0.20	< 0.50	60.6	< 0.10	30.8	0.02	3.92	< 0.10	1.03	< 0.20	39.3	< 0.010	9.37	< 0.40	4.95	< 0.050	4,900	< 0.020	< 0.20	< 5.0	-	20	3.7	< 4.0
GL5-2	GL5-2-20091116	2009 11 16	-	602	-	-	-	-	-	-	132	68	180	105	12	7.6	128	< 2	< 2	30	< 0.4	< 40	< 0.1	< 4	0.2	< 10a	< 1	40	-	16	< 10	< 6	< 0.10	3,680	< 0.1	< 1	20	-	26	5	< 10
	GL30-1-20091116	Duplicate	-	597	-	-	-	-	-	-	< 50a	67.5	< 100	104	10	7.7	124	< 2	< 2	30	< 0.4	< 40	< 0.1	< 4	< 0.2	< 10a	< 1	40	-	17	< 10	< 6	< 0.10	3,590	< 0.1	< 1	< 10	-	25	4	< 10
	QA/QC RPD%		-	1	-	-	-	-	-	-	*	1	*	1	18	1	3	*	*	0	*	*	*	*	*	*	*	0	-	6	*	*	*	2	*	*	*	-	4	22	*
	GL5-2-20100810	2010 08 10	-	640	-	-	-	1,050	-	-	134	68	< 100	113	10	8	129	< 2	< 2	30	< 0.4	< 40	< 0.10	< 4	0.4	< 10a	< 1	40	-	15	< 10	< 6	< 0.1	3,750	< 0.1	< 1	< 100	-	27	4	< 10
	GL30-3-20100810	Duplicate	-	640	-	-	-	1,120	-	-	147	69	150	113	11	10	134	< 2	< 2	40	< 0.4	< 40	< 0.10	< 4	0.2	< 10a	< 1	40	-	14	< 10	< 6	< 0.1	3,870	< 0.1	< 1	< 100	-	28	5	10
	QA/QC RPD%		-	0	-	-	-	6	-	-	9	1	*	0	10	22	4	*	*	29	*	*	*	*	*	*	*	0	-	7	*	*	*	3	*	*	*	-	4	22	*
	GL5-2-20110704	2011 07 04	-	778	-	-	-	1,080	-	-	< 5	84.4	6	138	4	8.6	152	< 0.2	0.5	34	< 0.04	33	0.02	0.9	0.45	< 1a	< 0.1	45	-	17.1	1	1.8	< 0.01	4,300	< 0.01	< 0.1	< 10	-	24.3	7.4	< 1
	GL 5-2-20120627	2012 06 27	-	710	-	-	-	1,160	-	-	< 50a	78	100	126	< 10	8	150	< 2	< 2	30	< 0.4	< 40	< 0.1	7	< 0.2	< 10a	< 1	40	-	14	< 10	< 6	< 0.10	4,160	< 0.1	< 1	< 100	-	23	5	< 10
	DUP C-20120627	Duplicate	-	730	-	-	-	1,130	-	-	< 50a	79	140	129	< 10	7	158	< 2	< 2	40	< 0.4	< 40	< 0.1	4	< 0.2	< 10a	< 1	40	-	15	< 10	< 6	< 0.10	4,100	< 0.1	< 1	< 100	-	26	5	< 10
	QA/QC RPD%		-	3	-	-	-	3	-	-	*	1	33	2	*	13	5	*	*	29	*	*	*	55	*	*	*	0	-	7	*	*	*	1	*	*	*	-	12	0	*
	GL5-2-20121205	2012 12 05	-	659	-	-	-	1,060	-	-	52	72.3	97	116	< 10	7.7	145	< 2.0	< 2.0	30	< 0.40	50	< 0.10	5.1	< 0.20	< 10a	< 1	50	-	17.4	< 10	< 6.0	< 0.10	3,980	< 0.10	< 1.0	< 100	-	27.7	5.28	< 10
	GL5-2-20130626	2013 06 26	-	726	-	-	-	1,150	-	-	< 10a	80.9	< 30	127	10	8.9	163	< 0.50	< 1.0	35	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	18.6	< 5.0	< 1.0	< 0.050	3,770	< 0.20	< 30	< 50	-	28.1	< 30	< 5.0
	GL5-2-20131114	2013 11 14	-	687	-	-	-	1,110	-	-	< 10a	77.6	< 30	120	11	8.8	187	< 0.50	< 1.0	34	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	19.3	< 5.0	< 1.0	< 0.050	3,870	< 0.20	< 30	< 50	-	27.9	< 30	< 5.0
	GL5-2-20140603	2014 06 03	-	655	-	-	-	1,130	-	-	< 10a	73.7	< 30	114	< 10	8.1	174	< 0.50	< 1.0	37	< 5.0a	< 100	0.06	< 0.50	< 0.50	< 1.0a	< 1.0	51	< 0.20	19.2	< 5.0	< 1.0	< 0.050	3,660	< 0.20	< 30	< 50	-	26.7	< 30	< 5.0
	GL5-2-20141118	2014 11 18	-	636	-	-	-	1,000	-	-	< 10a	71.1	< 30	111	12	8.1	160	< 0.50	< 1.0	33	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	19.1	< 5.0	< 1.0	< 0.050	3,750	< 0.20	< 30	< 50	-	27.2	< 30	< 5.0
	DUP2-20141118	Duplicate	-	635	-	-	-	1,070	-	-	< 10a	70.2	< 30	112	12	8.2	161	< 0.50	< 1.0	33	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	17.4	< 5.0	< 1.0	< 0.050	3,730	< 0.20	< 30	< 50	-	24	< 30	< 5.0
	QA/QC RPD%		-	0	-	-	-	7	-	-	*	1	*	1	0	1	1	*	*	0	*	*	*	*	*	*	*	*	*	9	*	*	*	1	*	*	*	-	12	*	*
	GL5-2-20150608	2015 06 08	7.65	956	-	-	-	1,890	-	-	< 10	121	< 30	159	< 10	10.4	315	< 0.50	< 1.0	64	< 5.0a	< 100	< 0.050	1.7	< 0.50	< 1.0a	< 1.0	68	< 0.20	12.1	< 5.0	< 1.0	< 0.050	6,010	< 0.010	< 30	< 50	-	24.1	< 30	< 5.0
	GL5-2-20151103	2015 11 03	7.94	623	-	-	-	1,060	-	-	< 10	74.8	< 30	106	< 10	8.1	183	< 0.50	< 1.0	34	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	17.4	< 5.0	< 1.0	< 0.050	3,980	< 0.010	< 30	< 50	-	26.9	< 30	< 5.0
	GL5-2-20160526	2016 05 26	7.97	879	-	-	-	1,960	-	-	< 10	116	< 30	143	< 10	10	384	< 0.50	< 1.0	69	< 5.0a	< 100	2.39	4.26	< 0.50	< 1.0a	< 1.0	74	< 0.20	11.6	< 5.0	2.9	< 0.050	5,680	< 0.020	< 30	< 50	-	20.7	< 30	< 5.0
	GL5-2-20170525	2017 05 25	8.22	782	-	-	-	1,690	-	-	< 10	102	< 30	128	< 10	9.1	331	< 0.50	< 1.0	63	< 5.0a	< 100	< 0.050	3.64	< 0.50	< 1.0a	< 1.0	65	< 0.20	11.3	< 5.0	3.6	< 0.050	5,330	< 0.020	< 30	< 50	-	20.7	< 30	< 5.0
	DUP1-20170525	Duplicate	8.28	787	-	-	-	1,670	-	-	< 10	102	< 30	129	< 10	9.3	336	< 0.50	< 1.0	64	< 5.0a	< 100	< 0.050	3.59	< 0.50	< 1.0a	< 1.0	65	< 0.20	11.5	< 5.0	3.5	< 0.050	5,370	< 0.020	< 30	< 50	-	20.4	< 30	< 5.0
	QA/QC RPD%		1	1	-	-	-	1	-	-	*	0	*	1	*	2	1	*	*	2	*	*	*	1	*	*	*	0	*	2	*	3	*	1	*	*	*	-	1	*	*
	GL5-2-180528	2018 05 28	7.83	671	7.08	-	2,100	1,370	4.60	< 0.0050	< 5.0	79.8	< 10	115	0.44	7.77	268	< 0.20	< 0.50	60.6	< 0.10	30.8	0.020	3.92	< 0.10	1.03	< 0.20	39.3	< 0.010	9.37	< 0.40	4.95	< 0.050	4,900	< 0.020	< 0.20	< 5.0	< 1.0	20.0	3.7	< 4.0
	GL5-2-190527	2019 05 27	7.96	638	7.43	-	2396	1,300	4.40	0.0051	5.9	87.3	< 10	102	0.75	7.33	249	< 0.20	< 0.50	66.8	< 0.10	38.8	0.057	2.09	< 0.10	3.18	< 0.20	50.3	< 0.010	12.2	0.52	6.80	< 0.050	5,240	< 0.020	< 0.20	< 5.0	< 1.0	23.1	3.6	< 4.0
	GL5-2-200611	2020 06 11	7.83	501	7.21	-	1,529	1,120	2.31	-	4.2	65.3	< 2.0	82.1	0.187	6.98	195	< 0.050	0.339	48.2	< 0.010	24.9	0.0230	0.37	0.0245	0.47	< 0.050	36.8	< 0.010	12.5	0.325	0.36	< 0.010	3,720	< 0.0040	< 0.050	< 0.20	< 0.20	28.8	3.95	< 1.0
	GL5-2-210603	2021 06 03	8.05	709	7.20	-	-	-	-	-	< 1.0	103	< 2.0	110	0.061	8.27	258	< 0.050	0.339	59.8	< 0.010	42.2	0.0228	1.42	0.0290	0.99	< 0.050	54.8	< 0.010	11.9	0.310	1.58	< 0.010	4,970	< 0.0040	< 0.050	< 0.20	< 0.20	31.1	3.56	< 1.0
GL5-3	GL5-3-20091116	2009 11 16	-	596	-	-	-	-	-	-	74	108	150	79.5	9	5.8	125	< 2	< 2	120	< 0.4	< 40	< 0.1	< 4	0.5	< 10a	< 1	30	-	8	10	< 6	< 0.10	5,190	< 0.1	< 1	< 10	-	19	2	< 10
	GL5-3-20100810	2010 08 10	-	600	-	-	-	974	-	-	61	105	< 100	81	97	6	116	< 2	< 2	120	< 0.4	< 40	< 0.10	< 4	0.4	< 10a	< 1	30	-	6	< 10	< 6	< 0.1	5,320	< 0.1	< 1	< 100	-	20	2	< 10
GL6-1 (2011)	GL6-1-19990505	1999 05 05	-	-	-	-	-	-	-	-	60	226	228	812	740	182	6,740	25	50	37	< 0.5	470	< 0.5a	13.8	5.3	< 1a	< 2	30	-	45	6	< 4	< 1a	4,890	< 4a	17	26.2	-	-	< 0.1	< 0.6
	GL6-1-19990928	1999 09 28	-	-	-	-	-	-	-	-	< 8a	226	110	829	675	194	7,270	13	20	21.3	< 0.5	230	< 0.5a	3.5	4.3	< 1a	4	35	-	20	6	< 4	< 1a	4,940	< 4a	11	2.8	-	-	1	< 0.6
	GL6-1-19991202	1999 12 02	-	-	-	-	-	-	-	-	26	223	58	738	580	222	7,470	36	40	28.3	< 0.5	377	< 0.5a	8.7	4.3	< 1a	2	42	-	25	8	< 4	< 1a	5,110	< 4a	8	13	-	-	4	2.9
	GL6-1-20080529	2008 05 29	-	-	-	-	-	-	-	-	80	172	120	485	567	225	6,980	10	65	90	< 1	1,410	< 0.1a	47	6	30	2	40	< 0.1	30	20	22	0.1	5,010	< 0.5	20	500	-	29	13	20
	GL6-1-20081104	2008 11 04	-	-	-	-	-	-	-	-	60	207	< 100	594	470	306	5,940	30	131	120	< 1	2,100	< 0.10a	167	11	20	< 1	40	< 0.1	80	45	10	0.22	4,650	< 0.5	40	335	-	33	258	20
	GL30-2-20081104	Duplicate	-	-	-	-	-	-	-	-	130	220	< 500a	656	660	290	6,480	28	125	120	< 1	1,990	< 0.10a	171	11	20	< 1	40	-	50	55	7	0.27	4,160	< 0.5	40	387	-	31	285	10
	QA/QC RPD%		-	-	-	-	-	-	-	-	74	6	*	10	34	5	9	7	5	0	*	5	*	2	0	0	*	0	-	46	20	35	20	11	*	0	14	-	6	10	67
	GL 6-1-20091110	2009 11 10	-	3,530	-	-	-	-	-	-	< 50a	249	< 100	706	1,130	200	6,270	7	55	30	< 0.4	630	< 0.1	20	2.5	< 10a	< 1	40	-	31	20	17	< 0.10	6,880	< 0.1	10	< 10	-	34	7	< 10
	GL6-1-20110704	2011 07 04	-	1,220	-	-	-	9,120	-	-	123	107	118	232	218	540	2,270	2.3	35.1	329	< 0.04	3,430	0.01	418	26.7	3	< 0.1	46	-	3.4	42	29.5	0.02	3,340	< 0.01	2.9	59	-	1.3	116	3
	GL 6-1 (2011)-20120626	2012 06 26	-	1,510	-	-	-	10,100	-	-	214	127	2,890	290	500	500	3,030	5	12	290	< 0.4	2,850	< 0.1	53	26.1	20	< 1	170	-	< 1	40	11	< 0.10	3,480	< 0.1	8	110	-	53	15	< 10
	GL6-1 (2011)-20130627	2013 06 27	-	1,200	-	-	-	9,310	-	-	107	80.7	1,320	243	293	504	2,600	1.2	10.3	356	< 25a	3,090	< 0.50a	24.3	28.8	< 5.0a	< 1.0	53	< 0.20	2.9	36	< 10	< 0.10	3,690	< 1.0	< 150	77	-	9.94	< 150a	< 25
	GL6-1-20131114	2013 11 14	-	1,650	-	-	-	12,400	-	-	85	100	1,380	339	495	465	3,450	< 2.0	8.4	337	< 25a	2,810	< 1.0a	23	23	< 10a	< 1.0	54	< 0.20	6.2	30	< 20	< 0.20	4,110	< 2.0	< 150	86	-	87.5	< 150a	< 25
	GL6-1 (2011)-20140609	2014 06 09	-	1,300	-	-	-	9,450	-	-	86	79.4	640	268	299	410	2,750	1.5	6.9	309	< 25a	2,600	< 0.50a	19.9	19.4	< 5.0a	< 1.0	54	< 0.20	2.3	27.8	< 10	< 0.10	3,740	< 1.0	< 150	56	-	12.1	< 150a	< 25
	GL6-1 (2011)-20141127	2014 11 27	-	1,580	-	-	-	13,800	-	-	< 60a	76.2	1,240	337	319	413	3,560	< 2.0	4.7	290	< 50a	2,600	< 1.0a	18	10.1	< 10a	< 1.0	< 100	< 0.20	1.9	23	< 20	< 0.20	4,920	< 2.0	< 300	< 100	-	15.1	< 300a	< 50
	GL6-1 (2011)-20150615	2015 06 15	7.83	1,030	-	-	-	9,280	-	-	104	74.2	242	206	243	382	2,250	< 1.0	6.6	312	< 15a	2,460	< 0.050	22	27.3	< 2.0a	< 1.0	< 50	< 0.20	2	28.7	< 1.0	< 0.10	3,410	< 0.10	< 90	51	-	3.43	< 90	< 15
	GL6-1 (2011)-20170530	2017 05 30	7.4	1,260	-	-	-	7,540	-	-	124	136	374	223	334	498	2,110	< 1.0	5.8	449	< 15a	3,110	< 0.050	22.3	30.2	< 2.0a	< 1.0	< 50	< 0.20	1.4	35.1	1.6	< 0.10	3,670	< 0.10	< 90	< 50	-	0.92	< 90	< 15
	GL6-1(2011)-20121205	2012 12 05	-	1,980	-	-	-	9,940	-	-	700	143	561	394	690	510	4,060	< 20.0	< 20.0	200	< 4.0a	3,400	< 1.00a	61.9	< 2.0	< 100a	< 10	< 100	-	37.5	< 100	< 60a	< 1.00	3,770	< 1.00	< 10	< 1,000	-	257	23.5	< 100
	GL6-1-180604	2018 06 04	7.45	1,900	6,987.0	15,700	14,230	10,800	339	0.224	78.7	183	3,150	351	618	476	2,680	0.91	4.95	376	< 0.10	2,660	< 0.010	15.4	25.7	0.47	< 0.20	61.0	< 0.010	5.86	23.6	0.92	< 0.050	3,880	< 0.020	4.94	18.1	2.4	122	4.2	< 4.0

Associated CARO file(s): 8052631, 8052802, 8060237, 8060737, 8061100, 8081412, 8091680, 8092458, 8092618, 9052219, 9052399, 9052558, 9052754, 9052937, 9060273, 9091657, 9092001, 9092208, 9092404, 9120616.
Associated Exova file(s): 622178, 653600, 712940, 714233, 714243, 756693, 756810, 757047, 811364, 811710, 812030, 812741, 812985, 846260, 878316, 879073, 909346, 909448, 909654.
All terms defined within the body of Keltech's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

Table 2: Historical Summary of Analytical Results For Groundwater -Metals

			Physical Parameters								Dissolved Metals																													
Sample Location	Sample ID	Sample Date (yyyy mm dd)	pH pH	Total Hardness mg/L	pH (field) pH	Conductivity µS/cm	Field Conductivity µS/cm	Total Dissolved Solids mg/L	Dissolved Organic Carbon mg/L	Phosphate mg/L	Dissolved Aluminum µg/L	Dissolved Calcium mg/L	Dissolved Iron µg/L	Dissolved Magnesium mg/L	Dissolved Manganese µg/L	Dissolved Potassium mg/L	Dissolved Sodium mg/L	Antimony µg/L	Arsenic µg/L	Barium µg/L	Beryllium µg/L	Boron µg/L	Cadmium µg/L	Chromium µg/L	Cobalt µg/L	Copper µg/L	Lead µg/L	Lithium µg/L	Mercury µg/L	Molybdenum µg/L	Nickel µg/L	Selenium µg/L	Silver µg/L	Strontium µg/L	Thallium µg/L	Tin µg/L	Titanium µg/L	Tungsten µg/L	Uranium µg/L	Vanadium µg/L	Zinc µg/L
GL6-1 (2011)	GL6-1 (2011)-190603	2019 06 03	7.80	1,270	7.42	11,200	11903	6,100	175	1.15	86.8	190	507	192	412	421	1,490	1.10	5.96	321	< 0.10	2,660	< 0.010	16.7	21.7	11.9	< 0.20	41.5	< 0.010	1.44	19.3	0.50	< 0.050	3,160	< 0.020	4.82	11.2	1.9	19.2	3.1	< 4.0
	DUP3-190603	Duplicate	7.72	1,240	7.42	-	11903	8,100	180	0.560	87.1	191	467	185	402	427	1,420	1.09	5.93	320	< 0.10	2,710	< 0.010	16.8	21.6	< 0.40a	< 0.20	39.3	< 0.010	1.27	19.1	0.60	< 0.050	3,140	< 0.020	4.80	11.3	1.9	11.6	3.1	< 4.0
	QA/QC RPD%		1	2	*	-	*	28	3	69	0	1	8	4	2	1	5	1	1	0	*	2	*	1	0	*	*	5	*	13	1	*	*	1	*	0	1	*	49	0	*
	GL6-1-200611	2020 06 11	7.82	962	7.1	8,440	6,871	5,220	241	-	79.8	151	191	142	295	382	1,200	1.70	6.48	367	0.025	2,180	0.0081	18.1	22.2	0.88	0.151	28.1	< 0.010	1.31	23.7	0.86	< 0.010	2,850	< 0.0040	4.82	15.7	2.04	1.95	3.61	1.8
	GL6-1-210610	2021 06 10	7.07.72	1,230	6.99	-	-	-	-	-	79.0	229	1,180	160	439	356	988	0.810	4.88	398	0.029	3,510	0.0069	14.2	20.3	0.50	0.237	41.4	< 0.010	1.02	17.0	1.22	< 0.010	2,850	< 0.0040	3.19	11.2	1.67	0.228	2.69	2.3
GL7-1	GL7-1-20110704	2011 07 04	-	1,190	-	-	-	2,560	-	-	< 5	176	5,590	182	1,060	21.4	492	< 0.2	36.4	15	2.2	148	0.02	62.9	1.75	1	0.4	266	-	56.3	9	19.8	< 0.01	4,680	< 0.01	< 0.1	< 10	-	80.8	17.8	11
	GL7-1-20120625	2012 06 25	-	1,150	-	-	-	2,590	-	-	< 50a	164	12,600	180	1,260	20	509	< 2	13	10	1.6	160	< 0.1	7	1.9	< 10a	< 1	260	-	42	< 10	< 6	< 0.10	4,580	< 0.1	< 1	< 100	-	74	2	20
	GL7-1-20121205	2012 12 05	-	1,120	-	-	-	2,500	-	-	54	159	5,360	176	971	18.7	496	< 2.0	22.5	20	2.64	160	< 0.10	12.2	4.81	< 10a	< 1.0	300	-	60.2	< 10	< 6.0	< 0.10	4,440	< 0.10	< 1	< 100	-	85.6	3.27	10
	GL7-1-20130626	2013 06 26	-	1,110	-	-	-	2,500	-	-	< 10a	162	4,850	172	1,350	21	526	< 0.50	19.8	< 20	< 5.0a	120	< 0.10	< 1.0	1.88	< 1.0a	3.5	292	< 0.20	56.7	7.5	< 2.0	< 0.050	3,860	< 0.20	< 30	< 50	-	79.4	< 30	33.3
	GL7-1-20131114	2013 11 14	-	1,140	-	-	-	2,530	-	-	< 10a	160	5,290	179	922	20	509	< 0.50	22.3	< 20	< 5.0a	110	< 0.10	< 1.0	1.38	< 1.0a	< 1.0	263	< 0.20	60.6	7	< 2.0	< 0.050	4,150	< 0.20	< 30	< 50	-	79.5	< 30	89.8
	DUP1-20131114	Duplicate	-	1,130	-	-	-	2,500	-	-	< 10a	159	5,200	179	918	19.8	503	< 0.50	22.6	< 20	< 5.0a	120	< 0.10	< 1.0	1.4	< 1.0a	< 1.0	260	< 0.20	61.3	6.9	< 2.0	< 0.050	4,080	< 0.20	< 30	< 50	-	79.1	< 30	86.7
	QA/QC RPD%		-	1	-	-	-	1	-	-	*	1	2	0	0	1	1	*	1	*	*	9	*	*	1	*	*	1	*	1	1	*	*	2	*	*	*	-	1	*	4
	GL7-1-20140604	2014 06 04	-	1,190	-	-	-	2,560	-	-	< 10a	164	7,030	190	1,130	20.6	502	< 0.50	21.7	< 20	< 5.0a	120	< 0.10	< 1.0	1.83	< 1.0a	< 1.0	342	< 0.20	38.6	7.6	< 2.0	< 0.050	4,190	< 0.20	< 30	< 50	-	62.4	< 30	55.8
	GL7-1-20141125	2014 11 25	-	1,110	-	-	-	2,480	-	-	< 10a	144	5,600	183	861	18.8	471	< 0.50	22.8	< 20	< 5.0a	110	< 0.10	< 1.0	1.44	< 1.0a	< 1.0	273	< 0.20	50.4	6.6	< 2.0	< 0.050	4,030	< 0.20	< 30	< 50	-	69.8	< 30	36.1
	GL7-1-20150609	2015 06 09	7.32	1,090	-	-	-	2,430	-	-	< 10	151	7,710	173	963	19.5	478	< 0.50	26.7	< 20	< 5.0a	110	< 0.050	< 0.50	1.72	< 1.0a	1	284	< 0.20	40.7	7.3	< 1.0	< 0.050	4,050	< 0.020	< 30	< 50	-	65.4	< 30	61.6
	GL7-1-20151109	2015 11 09	6.61	1,080	-	-	-	2,470	-	-	< 10	155	3,030	169	904	19.7	464	< 0.50	13	< 20	< 5.0a	< 100	< 0.050	< 0.50	1.33	< 1.0a	< 1.0	291	< 0.20	44.6	7.3	< 1.0	< 0.050	3,840	< 0.020	< 30	< 50	-	65.1	< 30	45.4
GL8-1	GL8-1-20080529	2008 05 29	-	-	-	-	-	-	-	-	70	93	200	144	625	15.2	832	< 2	6	10	< 1	40	0.7	< 5	< 1	< 10a	2	150	-	40	< 5	< 2	< 0.1	12,300	< 0.5	< 10	52	-	12	3	10
	GL8-1-20081104	2008 11 04	-	-	-	-	-	-	-	-	210	86.9	180	139	494	14.9	746	< 2	5	20	< 1	70	0.1	< 5	1	< 10a	< 1	160	-	40	6	< 2	< 0.1	11,900	< 0.5	< 10	43	-	10	2	10
	GL 8-1-20091110	2009 11 10	-	60	-	-	-	-	-	-	86	20.4	< 100	2.2	421	2.4	19.6	< 2	8	10	< 0.4	40	0.32	< 4	0.8	< 10a	< 1	140	-	40	< 10	< 6	< 0.10	10,800	< 0.1	< 1	92	-	7	< 1	10
	GL8-1-20100810	2010 08 10	-	630	-	-	-	2,710	-	-	158	74	120	109	536	14	622	< 2	3	10	< 0.4	40	< 0.1	< 4	0.4	< 10a	< 1	140	-	44	< 10	< 6	< 0.1	11,200	< 0.1	< 1	< 100	-	11	< 1	< 10
GL8-2	GL8-2-20080529	2008 05 29	-	-	-	-	-	-	-	-	< 50a	63.5	660	316	525	32.2	3,100	< 2	23	20	< 1	130	0.4	9	3	10	2	180	-	160	27	14	< 0.1	7,890	< 0.5	< 10	127	-	172	25	10
	GL30-1-20080529	Duplicate	-	-	-	-	-	-	-	-	< 50a	63.4	620	316	518	32.1	3,120	< 2	23	20	< 1	130	0.4	10	2	10	2	180	-	160	27	15	< 0.1	7,680	< 0.5	< 10	122	-	166	22	< 10
	QA/QC RPD%		-	-	-	-	-	-	-	-	*	0	6	0	1	0	1	*	0	0	*	0	0	11	40	0	0	0	-	0	0	7	*	3	*	*	4	-	4	13	*
	GL8-2-20081104	2008 11 04	-	-	-	-	-	-	-	-	< 50a	40.6	160	309	291	34.6	3,410	< 2	23	30	< 1	200	< 0.10a	63	14	10	< 1	180	-	280	34	9	0.19	7,210	< 0.5	< 10	98	-	152	152	< 10
	GL 8-2-20091110	2009 11 10	-	1,190	-	-	-	-	-	-	< 50a	32.5	190	270	280	34	150	< 2	16	20	< 0.4	170	0.39	26	1.2	< 10a	< 1	140	-	294	30	< 6	< 0.10	5,390	< 0.1	< 1	< 10	-	119	26	110
	GL8-2-20100810	2010 08 10	-	928	-	-	-	8,530	-	-	< 50a	33	340	205	86	30	2,340	< 2	13	20	< 0.4	160	< 0.1	5	0.8	20	< 1	120	-	227	20	10	< 0.1	5,360	< 0.1	< 1	< 100	-	131	28	< 10
	GL8-2-20110627	2011 06 27	-	1,040	-	-	-	7,520	-	-	< 50a	40.9	322	228	406	23	2,320	< 2	7	20	< 0.4	140	0.51	6	2	< 10a	< 1	140	-	191	20	< 6	< 0.1	5,310	< 0.1	< 1	< 10	-	111	10	< 10
	GL8-2-20111217	2011 12 17	-	652	-	-	-	7,360	-	-	< 50a	26.4	74	142	110	19.8	2,120	< 2	13	20	< 0.4	150	0.58	18	0.4	20	< 1	130	-	300	20	< 6	< 0.10	4,460	0.43	< 1	< 10	-	134	20	< 10
	GL 8-2-20120626	2012 06 26	-	800	-	-	-	5,610	-	-	< 50a	42	2,420	169	400	38	1,330	< 2	6	30	< 0.4	200	0.27	10	1	10	< 1	70	-	104	20	7	0.71	3,930	< 0.1	< 1	< 100	-	74	18	< 10
	DUP B-20120626	Duplicate	-	800	-	-	-	7,250	-	-	< 50a	41	2,540	169	390	38	1,340	< 2	5	30	< 0.4	180	0.23	10	0.9	< 10a	< 1	70	-	94	20	< 6	< 0.1	3,900	< 0.1	< 1	< 100	-	73	16	< 10
	QA/QC RPD%		-	0	-	-	-	26	-	-	*	2	5	0	3	0	1	*	18	0	*	11	16	0	11	*	*	0	-	10	0	*	*	1	*	*	*	-	1	12	*
	GL8-2-20121204	2012 12 04	-	581	-	-	-	7,350	-	-	< 50a	22.4	86	128	96	19.6	2,170	< 2.0	8.3	30	< 0.40	150	0.18	22.5	2.37	< 10a	< 1.0	100	-	228	20	8.2	< 0.10	4,870	< 0.10	< 1.0	19	-	126	22	< 10
	GL8-2-20130626	2013 06 26	-	1,180	-	-	-	7,140	-	-	< 30a	76.5	< 90	240	613	25.7	2,160	< 1.0	2.3	< 30	< 15a	< 300	< 0.50a	< 5.0	< 1.0	< 5.0a	< 1.0	159	< 0.20	146	13.2	< 10	< 0.10	5,800	< 1.0	< 90	< 50	-	147	< 90	< 15
	GL8-2-20131113	2013 11 13	-	800	-	-	-	7,050	-	-	< 30a	36.4	150	172	198	24	2,150	< 1.0	4.2	< 50	< 25a	< 500	< 0.50a	< 5.0	< 1.0	5.1	< 1.0	121	< 0.20	225	15.4	< 10	< 0.10	4,150	< 1.0	< 150	< 50	-	125	< 150a	< 25
	DUP2-20131113	Duplicate	-	808	-	-	-	7,070	-	-	< 30a	36.9	< 150	174	200	24	2,190	< 1.0	4.6	< 50	< 25a	< 500	< 0.50a	< 5.0	< 1.0	5.8	< 1.0	125	< 0.20	229	16.4	< 10	< 0.10	4,250	< 1.0	< 150	< 50	-	137	< 150a	< 25
	QA/QC RPD%		-	1	-	-	-	0	-	-	*	1	*	1	1	0	2	*	9	*	*	*	*	*	*	13	*	3	*	2	6	*	*	2	*	*	*	-	9	*	*
	GL8-2-20140605	2014 06 05	-	768	-	-	-	6,600	-	-	< 30a	41.7	< 150	161	419	21	2,050	< 1.0	2.2	< 50	< 25a	< 500	< 0.50a	< 5.0	< 1.0	6	< 1.0	109	< 0.20	132	20.4	< 10	< 0.10	4,280	< 1.0	< 150	< 50	-	92.2	< 150a	< 25
	GL8-2-20141118	2014 11 18	-	626	-	-	-	5,580	-	-	< 30a	25.5	< 90	136	119	22.4	2,070	< 1.0	4.6	< 30	< 15a	< 300	< 0.50a	< 5.0	< 1.0	6.4	< 1.0	101	< 0.20	211	13.7	< 10	< 0.10	3,390	< 1.0	< 90	< 50	-	107	< 90	< 15
	GL8-2-20150610	2015 06 10	8.29	837	-	-	-	6,800	-	-	< 10	35.8	< 150	182	309	22	2,030	< 1.0	2.5	< 50	< 25a	< 500	0.124	< 1.0	< 1.0	6.6	< 1.0	106	< 0.20	121	16.3	< 1.0	< 0.10	4,310	< 0.10	< 150	< 50	-	87.9	< 150a	< 25
	DUP 2-20150610	Duplicate	8.3	833	-	-	-	6,900	-	-	< 10	34.8	< 150	181	305	21	1,950	< 1.0	2.4	< 50	< 25a	< 500	0.135	< 1.0	< 1.0	7.2	< 1.0	101	< 0.20	125	16.3	1.1	< 0.10	4,160	< 0.10	< 150	< 50	-	93.5	< 150a	< 25
	QA/QC RPD%		0	0	-	-	-	1	-	-	*	3	*	1	1	5	4	*	4	*	*	*	8	*	*	9	*	5	*	3	0	*	*	4	*	*	*	-	6	*	*
	GL8-2-20151103	2015 11 03	8.03	683	-	-	-	6,730	-	-	< 10	26.3	< 90	150	184	23.1	2,230	< 1.0	3.1	< 30	< 15a	< 300	< 0.050	< 1.0	< 1.0	6.8	< 1.0	98	< 0.20	170	14.4	1.3	< 0.10	3,530	< 0.10	< 90	< 50	-	92.2	< 90	< 15
GL9-1	GL 9-1-20091111	2009 11 11	-	510	-	-	-	-	-	-	< 50a	57	< 100	89.2	203	14.2	370	< 2	6	10	< 0.4	< 40	< 0.1	7	< 0.2	< 10a	< 1	110	-	7	< 10	< 6	< 0.10	3,760	< 0.1	< 1	< 10	-	6	2	40
	GL 9-1-20120627	2012 06 27	-	420	-	-	-	1,320	-	-	138	26	440	87	40	13	336	< 2	< 2	10	< 0.4	40	< 0.1	5	< 0.2	< 10a	< 1	120	-	< 1	< 10	< 6	< 0.10	970	< 0.1	18	< 100	-	< 4	1	< 10
	GL9-1-20100810	2010 08 10	-	610	-	-	-	1,470	-	-	< 50a	101	7,680	88	366	15	334	< 2	2	20	< 0.4	40	< 0.10	< 4	< 0.2	< 10a	< 1	160	-	2	< 10	< 6	< 0.1	4,830	< 0.1	< 1	< 100	-	5	< 1	150
	GL9-1-20110628	2011 06 28	-	375	-	-	-	1,220	-	-	< 5	20.4	657	78.6	48	11.4	286	< 0.2	0.9	4	< 0.04	38	< 0.01	1.1	0.12	< 1a	< 0.1	138	-	0.9	< 1	< 0.6	< 0.01	820	< 0.01	< 0.1	< 10	-	0.7	0.4	3
	GL9-1-20121204	2012 12 04	-	392	-	-	-	1,350	-	-	56	22.8	1,080	81.3	66	12	319	< 2.0	< 2.0	< 10	< 0.40	50	< 0.10	6.8	8.59	< 10a	< 1	120	-	< 1.0	< 10	< 6.0	< 0.10	854	< 0.10	< 1.0	< 10	-	< 4.0	1.91	< 10

Associated CARO file(s): 8052631, 8052802, 8060237, 8060737, 8061100, 8081412, 8091680, 8092458, 8092618, 9052219, 9052399, 9052558, 9052754, 9052937, 9060273, 9091657, 9092001, 9092208, 9092404, 9120616,
Associated Exova file(s): 622178, 653600, 712940, 714233, 714243, 756693, 756810, 757047, 811364, 811710, 812030, 812741, 812985, 846260, 878316, 879073, 909346, 909448, 909654.
All terms defined within the body of Keltech's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
\- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

Table 2: Historical Summary of Analytical Results For Groundwater -Metals

			Physical Parameters								Dissolved Metals																														
Sample Location	Sample ID	Sample Date	pH	Total Hardness	pH (field)	Conductivity	Field Conductivity	Total Dissolved Solids	Dissolved Organic Carbon	Phosphate	Dissolved Aluminum	Dissolved Calcium	Dissolved Iron	Dissolved Magnesium	Dissolved Manganese	Dissolved Potassium	Dissolved Sodium	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Lead	Lithium	Mercury	Molybdenum	Nickel	Selenium	Silver	Strontium	Thallium	Tin	Titanium	Tungsten	Uranium	Vanadium	Zinc
		(yyyy mm dd)	pH	mg/L	pH	µS/cm	µS/cm	mg/L	mg/L	mg/L	µg/L	mg/L	µg/L	mg/L	µg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
GL9-1 (Cont'd)	GL9-1-20130626	2013 06 26	-	418	-	-	-	1,260	-	-	< 10a	19.7	1,380	89.5	70	14.1	346	< 0.50	< 1.0	< 20	< 5.0a	< 100	< 0.10	< 1.0	< 0.50	< 1.0a	< 1.0	129	< 0.20	< 1.0	< 5.0	< 2.0	< 0.050	730	< 0.20	< 30	< 50	-	0.65	< 30	< 5.0
	GL9-1-20131114	2013 11 14	-	410	-	-	-	1,230	-	-	< 10a	12.5	471	91.9	32	14.1	353	< 0.50	< 1.0	< 20	< 5.0a	< 100	< 0.10	< 1.0	< 0.50	< 1.0a	< 1.0	127	< 0.20	< 1.0	< 5.0	< 2.0	< 0.050	464	< 0.20	< 30	< 50	-	0.31	< 30	< 5.0
	GL9-1-20140604	2014 06 04	-	374	-	-	-	1,190	-	-	< 10a	9.15	191	85.3	25	13.9	348	< 0.50	< 1.0	< 20	< 5.0a	< 100	< 0.10	< 1.0	< 0.50	< 1.0a	< 1.0	117	< 0.20	< 1.0	< 5.0	< 2.0	< 0.050	356	< 0.20	< 30	< 50	-	0.76	< 30	< 5.0
	DUP1-20140604	Duplicate	-	366	-	-	-	1,190	-	-	< 10a	9.21	184	83.4	24	13.5	342	< 0.50	< 1.0	< 20	< 5.0a	< 100	< 0.10	< 1.0	< 0.50	< 1.0a	< 1.0	117	< 0.20	< 1.0	< 5.0	< 2.0	< 0.050	356	< 0.20	< 30	< 50	-	0.25	< 30	< 5.0
	QA/QC RPD%		-	2	-	-	-	0	-	-	*	1	4	2	4	3	2	*	*	*	*	*	*	*	*	*	*	0	*	*	*	*	*	0	*	*	*	-	101	*	*
	GL9-1-20141125	2014 11 25	-	404	-	-	-	1,310	-	-	< 10a	12.8	60	90.3	15	13.8	348	< 0.50	< 1.0	< 20	< 5.0a	< 100	< 0.10	< 1.0	< 0.50	< 1.0a	< 1.0	126	< 0.20	< 1.0	< 5.0	< 2.0	< 0.050	572	< 0.20	< 30	< 50	-	< 0.20	< 30	< 5.0
	GL9-1-20150609	2015 06 09	8.9	332	-	-	-	1,140	-	-	< 10	7.76	80	75.9	19	12.9	332	< 0.50	< 1.0	< 20	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	101	< 0.20	1.2	< 5.0	< 1.0	< 0.050	316	< 0.020	< 30	< 50	-	< 0.20	< 30	< 5.0
	GL9-1-20151109	2015 11 09	8.97	326	-	-	-	1,220	-	-	< 10	8.97	103	73.7	25	12.9	313	< 0.50	< 1.0	< 20	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	98	< 0.20	1.7	< 5.0	< 1.0	< 0.050	372	< 0.020	< 30	< 50	-	0.41	< 30	< 5.0
	GL9-1-20170530	2017 05 30	8.9	363	-	-	-	1,150	-	-	< 10	9.1	127	82.7	27	13.7	359	< 0.50	< 1.0	< 20	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	112	< 0.20	2	< 5.0	< 1.0	< 0.050	357	< 0.020	< 30	< 50	-	0.3	< 30	< 5.0
	GL9-1-180604	2018 06 04	8.03	480	7.21	-	2,027	1,390	2.53	< 0.0050	< 5.0	49.8	253	86.3	104	13.8	340	< 0.20	0.80	7.7	< 0.10	44.3	< 0.010	< 0.50	< 0.10	< 0.40a	< 0.20	114	< 0.010	2.04	< 0.40	< 0.50	< 0.050	2,090	< 0.020	< 0.20	< 5.0	< 1.0	1.38	< 1.0	17.6
	GL9-1-190530	2019 05 30	8.33	407	8.25	-	1961	1,330	1.44	< 0.0050	9.0	28.2	54	81.8	20.5	13.4	336	< 0.20	< 0.50	7.8	< 0.10	38.8	< 0.010	0.77	< 0.10	< 0.40a	< 0.20	130	< 0.010	0.37	< 0.40	< 0.50	< 0.050	1,430	< 0.020	< 0.20	< 5.0	< 1.0	0.225	< 1.0	< 4.0
	GL9-1-200611	2020 06 11	7.90	584	7.06	-	2,032	1,470	1.77	-	< 1.0	100	19,300	80.9	411	14.8	320	< 0.050	0.238	28.6	0.070	36.3	0.0022	0.11	0.116	< 0.10	< 0.050	126	< 0.010	0.743	0.166	< 0.10	< 0.010	5,030	< 0.0040	< 0.050	< 0.20	< 0.20	1.96	0.23	< 1.0
	DUPC-200611	Duplicate	7.86	570	-	-	-	1,450	1.26	-	< 1.0	98.1	18,800	78.8	400	14.4	313	< 0.050	0.187	27.9	0.068	34.8	0.0131	0.12	0.120	< 0.10	< 0.050	128	< 0.010	0.726	0.152	< 0.10	< 0.010	5,110	< 0.0040	< 0.050	< 0.20	< 0.20	1.97	0.21	1.2
	QA/QC RPD%		1	2	-	-	-	1	*	-	*	2	3	3	3	3	2	*	*	2	3	4	*	*	3	*	*	2	*	2	*	*	*	2	*	*	*	*	1	*	*
	GL9-1-210611	2021 06 11	7.75	746	6.79	-	-	-	-	-	1.0	128	814	103	303	17.7	418	< 0.050	0.160	27.3	0.250	51.1	< 0.0020	< 0.10	0.0096	< 0.10	< 0.050	219	< 0.010	0.621	0.063	< 0.10	< 0.010	5,350	< 0.0040	< 0.050	0.28	< 0.20	2.63	< 0.20	< 1.0
GL9-2	GL9-2-20080529	2008 05 29	-	-	-	-	-	-	-	-	< 50a	294	< 10	1,760	313	84.2	9,840	< 2	17	< 10	< 1	< 20	0.3	< 5	4	50	2	90	-	80	< 5	11	< 0.10	11,200	< 0.5	< 10	814	-	987	4	30
	GL9-2-20081104	2008 11 04	-	-	-	-	-	-	-	-	60	290	1,480	1,740	289	79.3	9,950	< 2	21	< 10	< 1	< 20	< 0.1a	10	2	30	< 1	80	-	90	23	5	< 0.1	11,000	< 0.5	< 10	603	-	950	4	40
	GL 9-2-20091111	2009 11 11	-	9,260	-	-	-	-	-	-	659	79.5	2,670	2,200	473	110	12,400	< 2	16	< 10	< 0.4	< 40	0.14	4	2.3	< 10a	< 1	80	-	88	20	8	< 0.10	12,000	< 0.1	< 1	< 10	-	1,100	2	30
	GL 9-2-20120627	2012 06 27	-	8,200	-	-	-	41,400	-	-	960	408	140	1,800	370	91	9,800	< 2	6	10	< 0.4	< 40	0.2	6	1.2	20	< 1	60	-	100	10	20	< 0.10	12,200	< 0.1	< 1	< 100	-	542	2	10
	GL9-2-20100810	2010 08 10	-	6,980	-	-	-	40,200	-	-	144	345	2,170	1,490	500	104	9,940	< 2	18	< 10	< 0.4	< 40	< 0.1	4	2.8	10	< 1	60	-	93	20	11	< 0.1	12,000	< 0.1	< 1	< 100	-	874	3	20
	GL9-2-20110628	2011 06 28	-	8,320	-	-	-	40,500	-	-	< 5	398	296	1,780	296	85	9,780	< 0.2	4.1	12	< 0.04	< 4	0.3	1.3	2.57	18	< 0.1	50	-	101	14	24.4	< 0.01	11,300	0.01	< 0.1	< 10	-	794	1.2	13
	GL9-2-20121204	2012 12 04	-	8,370	-	-	-	39,400	-	-	< 50a	394	365	1,800	407	66.3	10,400	< 2.0	6.2	10	< 0.40	< 40	0.34	9	2.95	10	< 1.0	80	-	108	10	18.5	< 0.10	12,600	< 0.10	< 1.0	< 100	-	621	3.37	< 10
	Dup-B-20121204	Duplicate	-	7,980	-	-	-	39,800	-	-	< 50a	399	318	1,700	416	64.6	9,660	< 2.0	5.3	10	< 0.40	< 40	0.36	8.3	1.16	20	< 1.0	60	-	108	10	15.6	< 0.10	12,300	< 0.10	< 1.0	< 100	-	644	2.78	10
	QA/QC RPD%		-	5	-	-	-	1	-	-	*	1	14	6	2	3	7	*	16	0	*	*	6	8	87	67	*	29	-	0	0	17	*	2	*	*	*	-	4	19	*
	GL9-2-20130626	2013 06 26	-	7,670	-	-	-	40,500	-	-	< 150a	378	860	1,630	440	79	9,650	< 5.0	< 5.0	< 200	< 100a	< 2,000a	< 2.5a	< 25a	< 5.0	< 25a	< 2.5	< 200	< 0.20	104	< 25	< 50a	< 0.50	9,840	< 5.0a	< 600	< 200	-	578	< 600a	< 100
	DUP2-20130626	Duplicate	-	7,870	-	-	-	41,900	-	-	< 150a	387	880	1,680	450	81	9,960	< 5.0	< 5.0	< 200	< 100a	< 2,000a	< 2.5a	< 25a	< 5.0	< 25a	< 2.5	< 200	< 0.20	93.8	< 25	< 50a	< 0.50	10,100	< 5.0a	< 600	< 200	-	507	< 600a	< 100
	QA/QC RPD%		-	3	-	-	-	3	-	-	*	2	2	3	2	2	3	*	*	*	*	*	*	*	*	*	*	*	*	10	*	*	*	3	*	*	*	-	13	*	*
	GL9-2-20131113	2013 11 13	-	7,950	-	-	-	40,900	-	-	< 150a	406	980	1,680	590	82	9,970	< 5.0	< 5.0	< 100	< 50a	< 1,000a	< 2.5a	< 25a	< 5.0	< 25a	< 2.5	130	< 0.20	99.5	< 25	< 50a	< 0.50	10,000	< 5.0a	< 300	< 100	-	598	< 300a	< 50
	GL9-2-20140605	2014 06 05	-	8,100	-	-	-	39,300	-	-	< 150a	412	< 600a	1,720	380	84	10,300	< 5.0	< 5.0	< 200	< 100a	< 2,000a	< 2.5a	< 25a	< 5.0	< 25a	< 2.5	< 200	< 0.20	89.6	< 25	< 50a	< 0.50	11,200	< 5.0a	< 600	< 200	-	536	< 600a	< 100
	GL9-2-20141125	2014 11 25	-	7,700	-	-	-	40,600	-	-	< 150a	396	450	1,630	381	80	9,660	< 5.0	< 5.0	< 100	< 50a	< 1,000a	< 2.5a	< 25a	< 5.0	< 25a	4.2	< 100	< 0.20	92.1	< 25	< 50a	< 0.50	10,200	< 5.0a	< 300	< 100	-	478	< 300a	< 50
	GL9-2-20150609	2015 06 09	8.05	7,650	-	-	-	38,700	-	-	< 50	404	570	1,610	134	75	9,660	< 5.0	< 5.0	< 100	< 50a	< 1,000a	1.07	< 5.0	< 5.0	< 10a	< 2.5	< 100	< 0.20	96.7	< 25	< 2.5	< 0.50	10,300	< 0.50	< 300	< 100	-	483	< 300a	< 50
	GL9-2-20151104	2015 11 04	7.92	7,360	-	-	-	40,400	-	-	< 50	380	480	1,560	211	74	9,170	< 5.0	< 5.0	< 100	< 50a	< 1,000a	1.05	< 5.0	< 5.0	< 10a	< 2.5	< 100	< 0.20	98.7	< 25	< 2.5	< 0.50	9,750	< 0.50	< 300	< 100	-	496	< 300a	< 50
GL9-3	GL9-3-20080529	2008 05 29	-	-	-	-	-	-	-	-	60	280	40	2,440	66	108	12,600	< 2	27	10	< 1	< 20	0.3	6	< 1	60	2	130	-	70	< 5	19	< 0.10	13,100	< 0.5	< 10	1,040	-	1,760	6	50
	GL9-3-20081104	2008 11 04	-	-	-	-	-	-	-	-	< 50a	269	20	2,530	116	98.9	12,800	< 2	23	20	< 1	< 20	< 0.10a	10	2	40	< 1	110	-	80	30	15	< 0.1	11,200	0.5	< 10	809	-	1,370	3	60
	GL 9-3-20091111	2009 11 11	-	217	-	-	-	-	-	-	723	87	380	< 0.1	378	148	14,000	< 2	19	20	< 0.4	< 40	0.35	9	2.2	10	< 1	120	-	96	20	10	< 0.10	11,700	0.52	< 1	< 10	-	1,480	6	20
	GL9-3-20100810	2010 08 10	-	10,500	-	-	-	48,500	-	-	80	344	580	2,330	377	130	12,700	< 2	18	10	< 0.4	< 40	< 0.1	5	1.8	20	< 1	90	-	82	20	20	< 0.1	13,400	0.24	< 1	< 100	-	1,550	4	20
	GL9-3-20110628	2011 06 28	-	12,300	-	-	-	49,600	-	-	< 5	393	< 5	2,760	68	103	12,900	< 0.2	2.9	12	< 0.04	< 4	0.21	2.1	1.41	22	< 0.1	57	-	75.1	11	32.1	< 0.01	12,900	0.34	< 0.1	< 10	-	1,510	1.8	15
	GL9-A-20110628	Duplicate	-	11,400	-	-	-	50,100	-	-	< 5	407	5	2,520	52	108	11,800	< 0.2	1.5	12	< 0.04	< 4	0.23	2.3	1.65	27	< 0.1	60	-	77.3	12	42.2	0.02	12,700	0.32	< 0.1	< 10	-	1,440	2.1	19
	QA/QC RPD%		-	8	-	-	-	1	-	-	*	4	*	9	27	5	9	*	64	0	*	*	9	*	16	20	*	5	-	3	9	27	*	2	6	*	*	-	5	15	24
	GL 9-3-20120627	2012 06 27	-	11,000	-	-	-	51,700	-	-	< 50a	400	150	2,500	110	114	11,900	< 2	5	10	< 0.4	< 40	0.1	11	1.1	20	< 1	80	-	74	10	16	< 0.1	12,800	0.24	< 1	< 100	-	1,190	5	20
	GL9-3-20121204	2012 12 04	-	10,400	-	-	-	50,200	-	-	< 50a	370	< 50	2,300	35	97.2	12,000	< 2	7	< 10	< 0.40	< 40	< 0.10	11.7	2.91	20	< 1	90	-	86.2	10	22.1	< 0.10	13,700	0.47	< 1.0	< 100	-	1,680	5.11	10
	GL9-3-20130626	2013 06 26	-	10,400	-	-	-	51,900	-	-	< 150a	382	< 600a	2,280	< 100	110	11,500	< 5.0	< 5.0	< 200	< 100a	< 2,000a	< 2.5a	< 25a	< 5.0	< 25a	< 2.5	< 200	< 0.20	72	< 25	< 50a	< 0.50	10,800	< 5.0a	< 600	< 200	-	1,450	< 600a	< 100
	GL9-3-20131113	2013 11 13	-	10,500	-	-	-	49,000	-	-	< 150a	383	< 600a	2,310	110	116	11,300	< 5.0	< 5.0	< 200	< 100a	< 2,000a	< 2.5a	< 25a	< 5.0	< 25a	< 2.5	< 200	< 0.20	78.7	< 25	< 50a	< 0.50	11,000	< 5.0a	< 600	< 200	-	1,470	< 600a	< 100
	GL9-3-20140605	2014 06 05	-	10,800	-	-	-	48,700	-	-	< 150a	398	< 600a	2,380	110	114	11,800	< 5.0	< 5.0	< 200	< 100a	< 2,000a	< 2.5a	< 25a	< 5.0	< 25a	< 2.5	< 200	< 0.20	75.7	< 25	< 50a	< 0.50	11,700	< 5.0a	< 600	< 200	-	1,510	< 600a	< 100
	GL9-3-20141125	2014 11 25	-	10,400	-	-	-	49,300	-	-	< 150a	390	< 600a	2,300	< 100	121	11,600	< 5.0	< 5.0	< 200	< 100a	< 2,000a	< 2.5a	< 25a	< 5.0	< 25a	< 2.5	< 200	< 0.20	74.4	< 25	< 50a	< 0.50	11,400	< 5.0a	< 600	< 200	-	1,400	< 600a	< 100
	DUP4-20141124	Duplicate	-	10,400	-	-	-	49,800	-	-	< 150a	395	< 600a	2,300	< 100	123	11,700	< 5.0	< 5.0	< 200	< 100a	< 2,000a	< 2.5a	< 25a	< 5.0	< 25a	< 2.5	< 200	< 0.20	75.5	< 25	< 50a	< 0.50	11,500	< 5.0a	< 600	< 200	-	1,410	< 600a	< 100
	QA/QC RPD%		-	0	-	-	-	1	-	-	*	1	*	0	*	2	1	*	*	*	*	*	*	*	*	*	*	*	*	1	*	*	*	1	*	*	*	-	1	*	*
	GL9-3-20150609	2015 06 09	7.92	10,400	-	-	-	48,200	-	-	< 50	392	< 600a	2,280	< 100	113	11,300	< 5.0	< 5.0	< 200	< 100a	< 2,000a	< 0.25	< 5.0	< 5.0	< 10a	< 2.5	< 200	< 0.20	75.4	< 25	< 2.5	< 0.50	11,400	< 0.50	< 600	< 200	-	1,380	< 600a	< 100
	GL9-3-20151109	2015 11 09	7.69	9,720	-	-	-	50,200	-	-	< 50	369	< 600a	2,140	< 100	112	10,800	< 5.0	< 5.0	< 200	< 100a	< 2,000a	< 0.25	< 5.0	< 5.0	< 10a	< 2.5	< 200	< 0.20	83.5	< 25	< 2.5	< 0.50	10,600	< 0.50	< 600	< 200	-	1,440	< 600a	< 100

Associated Exova file(s): 622178, 653600, 712940, 714233, 714243, 756693, 756810, 757047, 811364, 811710, 812030, 812741, 812985, 846260, 878316, 879073, 909346, 909448, 909654.
All terms defined within the body of Keltech's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

Table 2: Historical Summary of Analytical Results For Groundwater -Metals

Sample Location	Sample ID	Sample Date	Physical Parameters								Dissolved Metals																													
			pH	Total Hardness	pH (field)	Conductivity	Field Conductivity	Total Dissolved Solids	Dissolved Organic Carbon	Phosphate	Dissolved Aluminum	Dissolved Calcium	Dissolved Iron	Dissolved Magnesium	Dissolved Manganese	Dissolved Potassium	Dissolved Sodium	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Lead	Lithium	Mercury	Molybdenum	Nickel	Selenium	Silver	Strontium	Thallium	Tin	Titanium	Tungsten	Uranium	Vanadium	Zinc
		(yyyy mm dd)	pH	mg/L	pH	µS/cm	µS/cm	mg/L	mg/L	mg/L	µg/L	mg/L	µg/L	mg/L	µg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
GL9-3 (Cont'd)	GL9-3-20160526	2016 05 26	7.78	10,600	-	-	-	62,800	-	-	< 50	385	< 600a	2,350	< 100	118	11,900	< 5.0	< 5.0	< 200	< 100a	< 2,000a	< 0.25	< 5.0	< 5.0	< 10a	< 2.5	< 200	< 0.20	75.9	< 25	< 2.5	< 0.50	11,200	< 0.50	< 600	< 200	-	1,410	< 600a	< 100
	GL9-3-20170529	2017 05 29	7.9	11,100	-	-	-	46,400	-	-	< 50	377	< 600a	2,470	140	121	12,800	< 5.0	5.1	< 200	< 100a	< 2,000a	< 0.25	< 5.0	< 5.0	16	< 2.5	< 200	< 0.20	116	< 25	< 2.5	< 0.50	10,700	< 0.50	< 600	< 200	-	1,430	< 600a	< 100
	GL9-3-180528	2018 05 28	7.68	11,300	7.22	-	3,210	53,000	25.1	< 0.0050	< 5.0	445	12	2,480	271	165	12,600	< 0.20	0.89	14.8	< 0.10	8.8	0.302	< 0.50	0.90	2.87	< 0.20	89.6	< 0.010	98.4	5.90	1.39	< 0.050	15,300	0.440	< 0.20	< 5.0	1.0	1,680	< 1.0	< 4.0
	GL9-3-190527	2019 05 27	7.73	12,600	7.54	-	44350	52,300	24.8	< 0.500	13.7	516	16	2,760	153	167	13,900	< 0.20	1.16	14.9	< 0.10	8.7	0.212	1.37	0.64	4.83	< 0.20	139	< 0.010	112	5.29	1.24	< 0.050	12,900	0.429	< 0.20	< 5.0	< 1.0	1,620	< 1.0	< 4.0
	GL9-3-200608	2020 06 08	7.80	10,200	7.32	-	36,600	52,600	23.6	-	159	430	19.3	2,230	217	238	12,900	0.150	1.19	15.8	0.021	11.2	0.145	1.31	1.07	3.44	< 0.050	135	< 0.010	110	6.26	1.94	0.016	13,000	0.409	< 0.050	0.83	0.50	1,780	1.05	1.5
	GL9-3-210610	2021 06 10	7.74	10,700	7.29	-	-	-	-	-	3.3	427	2.0	2,350	137	132	12,100	0.145	0.746	10.7	< 0.010	10.2	0.133	0.21	0.750	2.30	< 0.050	116	< 0.010	91.3	4.96	0.49	0.012	11,800	0.370	< 0.050	< 0.20	0.39	1,430	< 0.20	1.4
GL10-1	GL10-1-20091112	2009 11 12	-	7,010	-	-	-	-	-	-	< 50a	190	460	1,590	1,820	46	7,710	< 2	17	20	< 0.4	< 40	0.23	< 4	4.2	< 10a	< 1	400	-	98	50	7	< 0.1	17,400	0.6	< 1	< 10	-	2,540	3	10
	GL10-1-20100810	2010 08 10	-	6,430	-	-	-	31,200	-	-	< 50a	198	480	1,440	2,120	57	7,660	< 2	32	20	< 0.4	< 40	< 0.1	6	5	20	< 1	310	-	91	60	12	0.26	19,200	0.21	< 1	< 100	-	2,190	6	10
	GL10-1-20110704	2011 07 04	-	8,310	-	-	-	31,700	-	-	< 5	215	558	1,890	1,830	46	7,700	< 0.2	1.1	19	< 0.04	22	0.12	107	5.3	11	< 0.1	310	-	82.3	56	88.9	0.1	18,600	0.23	< 0.1	< 10	-	2,470	31.8	9
	GL10-1-20120626	2012 06 26	-	8,760	-	-	-	33,800	-	-	< 50a	259	1,150	1,970	1,940	46	7,670	< 2	10	20	< 0.4	< 40	< 0.1	14	4.9	10	< 1	350	-	71	60	24	< 0.10	20,300	0.22	< 1	< 100	-	2,230	6	20
	GL10-1-20121204	2012 12 04	-	8,350	-	-	-	33,000	-	-	< 50a	231	247	1,890	1,760	38.4	7,800	< 2	9.6	10	< 0.40	< 40	< 0.10	19.9	9.25	10	< 1.0	270	-	76.2	50	29.6	< 0.10	19,500	0.3	< 1.0	< 100	-	2,490	7.07	< 10
	GL10-1-20130626	2013 06 26	-	7,720	-	-	-	31,400	-	-	< 150a	250	1,050	1,720	1,810	44	7,920	< 5.0	< 5.0	< 100	< 50a	< 1,000a	< 2.5a	< 25a	< 5.0	< 25a	< 2.5	360	< 0.20	61.5	35	< 50a	< 0.50	15,200	< 5.0a	< 300	< 100	-	1,930	< 300a	< 50
	GL10-1-20140605	2014 06 05	-	6,550	-	-	-	28,900	-	-	< 150a	214	710	1,460	1,530	39	6,440	< 5.0	< 5.0	< 100	< 50a	< 1,000a	< 2.5a	< 25a	< 5.0	< 25a	< 2.5	310	< 0.20	66.8	39	< 50a	< 0.50	13,600	< 5.0a	< 300	< 100	-	1,770	< 300a	< 50
	GL10-1-20141125	2014 11 25	-	6,570	-	-	-	28,000	-	-	< 150a	217	1,450	1,460	1,540	40	6,460	< 5.0	< 5.0	< 100	< 50a	< 1,000a	< 2.5a	< 25a	< 5.0	< 25a	< 2.5	320	< 0.20	66.4	26	< 50a	< 0.50	13,600	< 5.0a	< 300	< 100	-	1,640	< 300a	< 50
	GL10-1-20150610	2015 06 10	7.95	6,240	-	-	-	26,600	-	-	< 50	231	1,330	1,380	1,450	35	5,830	< 5.0	< 5.0	< 100	< 50a	< 1,000a	< 0.25	< 5.0	< 5.0	< 10a	< 2.5	290	< 0.20	64.3	28	< 2.5	< 0.50	14,100	< 0.50	< 300	< 100	-	1,660	< 300a	< 50
	GL10-1-20151109	2015 11 09	7.57	5,980	-	-	-	25,100	-	-	< 20	228	< 300	1,310	1,370	36	5,530	< 2.0	< 2.0	< 100	< 50a	< 1,000a	< 0.10	< 2.0	3	4.1	< 1.0	290	< 0.20	67.2	25	< 1.0	< 0.20	13,300	< 0.20	< 300	< 100	-	1,660	< 300a	< 50
	DUP2-20151109	Duplicate	7.64	5,800	-	-	-	25,200	-	-	< 20	225	< 300	1,270	1,350	36	5,470	< 2.0	< 2.0	< 100	< 50a	< 1,000a	< 0.10	< 2.0	2.8	< 4.0a	< 1.0	280	< 0.20	61.1	24	< 1.0	< 0.20	13,200	< 0.20	< 300	< 100	-	1,540	< 300a	< 50
	QA/QC RPD%		1	3	-	-	-	0	-	-	*	1	*	3	1	0	1	*	*	*	*	*	*	*	7	*	*	4	*	10	4	*	*	1	*	*	*	-	8	*	*
GL12-1	GL 12-1-20111218	2011 12 18	-	3,160	-	-	-	8,050	-	-	< 50a	420	< 5	513	466	17.6	863	7	2	10	< 0.4	50	0.4	6	0.9	30	< 1	160	-	30	30	< 6	< 0.10	13,600	0.62	2	< 10	-	272	< 1	< 10
	GL12-1-20091112	2009 11 12	-	3,250	-	-	-	-	-	-	77	411	140	540	19	18.6	883	< 2	< 2	< 10	< 0.4	< 40	0.1	< 4	0.7	10	< 1	130	-	16	10	< 6	< 0.10	11,300	0.13	< 1	< 10	-	250	< 1	10
	GL12-1-20100811	2010 08 11	-	3,080	-	-	-	7,420	-	-	< 50a	400	140	504	68	17	896	< 2	< 2	< 10	< 0.4	< 40	< 0.1	< 4	0.9	< 10a	< 1	120	-	18	20	< 6	< 0.1	11,700	0.13	< 1	< 100	-	206	< 1	< 10
	GL12-1-20110629	2011 06 29	-	3,310	-	-	-	7,330	-	-	< 5	435	13	541	< 1	17.9	870	0.6	< 0.2	10	< 0.04	8	0.12	3.2	0.84	8	< 0.1	123	-	24.2	14	18.1	< 0.01	11,200	0.09	< 0.1	< 10	-	205	1.3	4
	GL30-1-20110629	Duplicate	-	3,400	-	-	-	7,270	-	-	< 5	445	5	557	< 1	17.4	892	0.4	0.2	9	< 0.04	8	0.12	3.4	0.69	9	< 0.1	111	-	20.7	12	17.1	< 0.01	11,100	0.07	< 0.1	< 10	-	206	1.4	4
	QA/QC RPD%		-	3	-	-	-	1	-	-	*	2	*	3	*	3	2	*	*	11	*	*	0	6	20	12	*	10	-	16	15	6	*	1	25	*	*	-	0	7	0
	GL12-1-20120625	2012 06 25	-	3,520	-	-	-	7,750	-	-	< 50a	473	640	569	790	21	952	< 2	< 2	10	< 0.4	< 40	0.15	< 4	1.6	20	< 1	140	-	23	20	< 6	< 0.10	12,900	0.19	< 1	< 100	-	210	1	10
	GL12-1-20121204	2012 12 04	-	3,610	-	-	-	7,920	-	-	< 50a	472	< 5	591	778	19.2	1,010	< 2.0	< 2.0	10	< 0.40	< 40	0.33	6.8	2.43	20	< 1.0	140	-	27.6	20	< 6.0	< 0.10	13,300	0.3	< 1.0	< 10	-	272	2.51	< 10
	GL12-1-20130626	2013 06 26	-	3,720	-	-	-	8,440	-	-	< 15a	472	< 60	616	549	23.5	1,130	< 0.50	< 1.0	< 20	< 10a	< 200	0.31	< 2.5	0.51	16.8	< 1.0	177	< 0.20	30.4	12	< 5.0	< 0.050	11,000	< 0.50	< 60	< 50	-	325	< 60	< 10
	GL12-1-20131113	2013 11 13	-	3,900	-	-	-	8,560	-	-	< 15a	489	< 60	652	696	24.8	1,110	0.55	< 1.0	< 20	< 10a	< 200	0.36	< 2.5	1.03	18.5	< 1.0	262	< 0.20	35.6	14.9	< 5.0	< 0.050	11,000	< 0.50	< 60	< 50	-	332	< 60	< 10
	GL12-1-20140604	2014 06 04	-	4,090	-	-	-	9,790	-	-	< 15a	493	62	694	2,280	55.7	1,290	< 0.50	8.6	< 20	< 10a	< 200	0.47	< 2.5	6.31	47.7	< 1.0	213	< 0.20	48.4	32	< 5.0	< 0.050	11,100	< 0.50	< 60	< 50	-	278	< 60	< 10
	GL12-1-20141118	2014 11 18	-	3,910	-	-	-	9,400	-	-	< 15a	467	786	667	4,640	42.8	1,240	< 0.50	6.1	< 30	< 15a	< 300	< 0.25	< 2.5	30	3.8	< 1.0	192	< 0.20	47.6	30.7	< 5.0	< 0.050	11,500	< 0.50	< 90	< 50	-	343	< 90	< 15
	GL12-1-20150609	2015 06 09	7.68	3,880	-	-	-	7,990	-	-	< 10	503	4,410	638	8,750	32.7	982	< 0.50	17.1	22	< 10a	< 200	< 0.050	0.83	13	1.4	< 1.0	185	< 0.20	41.5	39.2	< 1.0	< 0.050	10,600	0.073	< 60	< 50	-	312	< 60	< 10
	DUP3-20150609	Duplicate	7.64	3,900	-	-	-	8,000	-	-	10	502	4,340	642	8,580	31.8	969	< 0.50	16.9	21	< 10a	< 200	< 0.050	0.72	12.7	1.4	< 1.0	176	< 0.20	40.6	39	< 1.0	< 0.050	10,500	0.083	< 60	< 50	-	304	< 60	< 10
	QA/QC RPD%		1	1	-	-	-	0	-	-	*	0	2	1	2	3	1	*	1	5	*	*	*	*	2	0	*	5	*	2	1	*	*	1	13	*	*	-	3	*	*
	GL12-1-20151104	2015 11 04	7.31	3,480	-	-	-	8,290	-	-	< 10	451	3,880	572	4,230	32.1	982	< 0.50	9.3	< 20	< 10a	< 200	< 0.050	< 0.50	10.6	1.1	< 1.0	161	< 0.20	33	27.7	< 1.0	< 0.050	10,500	0.153	< 60	< 50	-	263	< 60	< 10
	GL12-1-20160524	2016 05 24	7.14	3,840	-	-	-	8,210	-	-	23	497	8,900	631	10,100	57.3	1,070	< 0.50	16.7	25	< 10a	< 200	< 0.050	1.8	9.8	< 1.0a	< 1.0	179	< 0.20	30.4	29.5	< 1.0	< 0.050	11,000	< 0.050	< 60	62	-	204	< 60	< 10
	GL12-1-20160921	2016 09 21	7.34	3,590	-	-	-	8,290	-	-	103	481	5,340	579	13,800	87.8	983	< 0.50	16.5	32	< 10a	330	< 0.050	3.26	5.4	< 1.0a	< 1.0	188	< 0.20	15.6	28.6	< 1.0	< 0.050	10,400	< 0.050	< 60	< 50	-	207	< 60	< 10
	GL12-1-20170529	2017 05 29	7.17	2,610	-	-	-	7,280	-	-	293	378	6,070	404	8,180	195	712	0.66	31.7	37	< 5.0a	540	< 0.050	12.8	4.08	1	< 1.0	137	< 0.20	10.6	25.2	< 1.0	< 0.050	7,740	< 0.050	< 30	< 50	-	120	< 30	< 5.0
	GL12-1-20170926	2017 09 26	7.39	3,240	-	-	-	6,500	-	-	86	449	12,700	513	11,600	145	805	< 0.50	24.2	40	< 10a	340	< 0.050	6.58	4.92	1.5	< 1.0	133	< 0.20	14.9	23.4	< 1.0	< 0.050	9,860	< 0.050	< 60	< 50	-	127	< 60	< 10
	GL12-1-180604	2018 06 04	7.31	3,390	6.73	-	58,741	6,950	382	0.0074	19.6	469	8,590	539	15,000	87.9	805	< 0.20	10.7	39.4	< 0.10	201	0.030	3.31	3.43	0.50	< 0.20	118	< 0.010	24.2	17.6	0.50	< 0.050	10,600	0.030	< 0.20	5.9	< 1.0	151	4.2	< 4.0
	GL12-1-180919	2018 09 19	7.07	3,890	6.99	-	5,880	7,730	190	< 0.0050	20.8	521	19,600	628	15,700	79.2	919	< 0.20	24.0	45.8	< 0.10	167	0.017	3.34	4.79	0.56	< 0.20	143	< 0.010	29.3	21.3	< 0.50	< 0.050	10,800	< 0.020	< 0.20	7.8	< 1.0	205	6.0	< 4.0
	GL12-1-190527	2019 05 27	7.49	3,850	6.75	-	8360	7,860	155	0.0125	17.4	474	12,500	648	14,800	66.6	909	< 0.20	13.3	37.2	< 0.10	137	0.026	2.99	4.60	0.55	< 0.20	128	< 0.010	30.7	20.9	< 0.50	< 0.050	12,300	0.021	< 0.20	< 5.0	< 1.0	225	3.0	< 4.0
	GL12-1-190919	2019 09 19	7.43	3,830	6.81	-	7380	7,920	175	-	12.4	500	20,500	626	16,700	61.4	859	< 0.20	24.2	35.0	< 0.10	117	< 0.010	2.53	4.91	0.41	< 0.20	126	< 0.010	28.5	20.3	< 0.50	< 0.050	13,100	< 0.020	< 0.20	< 5.0	< 1.0	227	3.6	< 4.0
	GL12-1-200610	2020 06 10	7.39	4,490	6.78	-	6,947	8,040	203	-	< 100a	583	19,700	736	22,000	85.1	780	< 5.00	21.0	48.7	< 1.00	214	< 0.200	< 10.0a	4.54	< 10.0a	< 5.00	144	< 0.010	21.2	27.1	< 10.0	< 1.00	13,600	< 0.400	< 5.00	< 20.0	< 20.0	288	< 20.0	< 100
	GL12-1-201102	2020 11 02	7.51	4,720	6.64	-	8,081	8,040	179	-	15.9	642	24,400	757	21,300	82.4	895	0.114	22.0	43.9	0.073	94.2	0.0075	1.99	5.17	0.50	< 0.050	133	< 0.010	21.4	24.7	0.51	< 0.010	15,000	0.0204	< 0.050	2.44	< 0.20	260	1.84	1.3
	GL12-1-210525	2021 05 25	7.69	4,090	6.69	-	-	-	-	-	9.8	512	14,800	683	15,200	70.6	816	0.089	11.4	33.5	0.048	95.7	0.0078	1.93	7.35	0.53	0.054	161	< 0.010	27.8	27.6	0.42	< 0.010	12,800	0.0269	0.052	1.36	< 0.20	250	1.38	2.6
	GL12-1-211005	2021 10 05	7.27	4,140	6.67	-	-	-	-	-	< 100	521	23,100	689	14,000	66.1	882	< 5.00	20.5	28.0	< 1.00	115	< 0.200	< 10.0a	5.87	< 10.0	< 5.00	134	< 0.010	24.0	26.6	< 10.0	< 1.00	12,200	< 0.400	< 5.00	< 20.0	< 20.0	211	< 20.0	< 100
GL13-1	GL13-1-20091117	2009 11 17	-	3,530	-	-	-	-	-	-	74	278	200	689	325	21	1,640	< 2	3	< 10	< 0.4	< 40	0.18	< 4	1	< 10a	< 1	90	-	53	10	< 6	< 0.10	7,550	< 0.1	5	< 10	-	142	< 1	< 10
	GL13-1-20100811	2010 08 11	-	3,550	-	-	-	11,200	-	-	79	308	340	675	138	22	1,660	< 2	3	< 10	< 0.4	< 40	< 0.1	< 4	0.9	< 10a	< 1	80	-	43	20	< 6	< 0.1	8,060	< 0.1	< 1	< 100	-	128	1	< 10
	GL13-1-20110627	2011 06 27	-	3,950	-	-	-	10,800	-	-	< 50a	326	47	762	207	20.2	1,760	< 2	2	< 10	< 0.4	< 40	0.13	< 4	1.4	< 10a	< 1	100	-	44	10	< 6	< 0.10	8,180	< 0.1	< 1	< 10	-	178	1	20

Associated CARO file(s): 8052631, 8052802, 8060237, 8060737, 8061100, 8081412, 8091680, 8092458, 8092618, 9052219, 9052399, 9052558, 9052754, 9052937, 9060273, 9091657, 9092001, 9092208, 9092404, 9120616.
Associated Exova file(s): 622178, 653600, 712940, 714233, 714243, 756693, 756810, 757047, 811364, 811710, 812030, 812741, 812985, 846260, 878316, 879073, 909346, 909448, 909654.
All terms defined within the body of Keltech's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

Table 2: Historical Summary of Analytical Results For Groundwater -Metals

			Physical Parameters								Dissolved Metals																														
Sample Location	Sample ID	Sample Date	pH	Total Hardness	pH (field)	Conductivity	Field Conductivity	Total Dissolved Solids	Dissolved Organic Carbon	Phosphate	Dissolved Aluminum	Dissolved Calcium	Dissolved Iron	Dissolved Magnesium	Dissolved Manganese	Dissolved Potassium	Dissolved Sodium	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Lead	Lithium	Mercury	Molybdenum	Nickel	Selenium	Silver	Strontium	Thallium	Tin	Titanium	Tungsten	Uranium	Vanadium	Zinc
		(yyyy mm dd)	pH	mg/L	pH	µS/cm	µS/cm	mg/L	mg/L	mg/L	µg/L	mg/L	µg/L	mg/L	µg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
GL13-1	GL13-1-20111217	2011 12 17	-	3,500	-	-	-	10,900	-	-	< 50a	292	< 5	673	46	19	1,610	< 2	4	< 10	< 0.4	< 40	0.12	7	0.4	10	< 1	120	-	55	20	< 6	< 0.10	9,590	0.43	< 1	< 10	-	193	4	< 10
(Cont'd)	DUPC-20111217	Duplicate	-	113	-	-	-	1,570	-	-	< 50a	19.2	453	15.8	83	11.8	555	< 2	4	220	< 0.4	70	< 0.1	10	0.2	< 10a	< 1	250	-	< 1	< 10	< 6	< 0.10	4,020	0.31	< 1	< 10	-	< 4	4	< 10
	QA/QC RPD%		-	187	-	-	-	150	-	-	*	175	*	191	57	47	97	*	*	*	*	*	*	35	*	*	*	70	-	*	*	*	*	82	32	*	*	-	*	0	*
	GL13-1-20120625	2012 06 25	-	3,580	-	-	-	9,930	-	-	< 50a	305	< 50	684	520	20	1,670	< 2	< 2	< 10	< 0.4	< 40	0.2	< 4	0.7	< 10a	< 1	80	-	50	10	9	< 0.10	8,250	< 0.1	< 1	< 100	-	124	1	10
	GL13-1-20121204	2012 12 04	-	3,440	-	-	-	9,990	-	-	< 50a	284	< 50	664	23	18.3	1,660	< 2	< 2.0	< 10	< 0.40	< 40	< 0.10	7.6	8.8	10	< 1.0	60	-	45.8	< 10	7.3	< 0.10	8,720	< 0.10	< 1.0	< 100	-	194	2.72	< 10
GL14-1	GL14-1-20091116	2009 11 16	-	40	-	-	-	-	-	-	535	5.8	490	6.2	42	1.1	381	< 2	3	20	< 0.4	190	< 0.1	< 4	0.5	< 10a	< 1	140	-	9	< 10	< 6	< 0.10	1,470	< 0.1	< 1	< 10	-	< 4	8	20
	GL14-1-20100811	2010 08 11	-	40	-	-	-	1,120	-	-	146	5	150	6	32	3	399	< 2	3	20	< 0.4	200	< 0.10	< 4	0.4	< 10a	< 1	130	-	9	< 10	< 6	< 0.1	1,470	< 0.1	< 1	< 100	-	< 4	9	< 10
	GL14-1-20110704	2011 07 04	-	48	-	-	-	1,100	-	-	87	7.3	72	7.2	41	1.6	413	< 0.2	2.2	19	< 0.04	185	0.02	16.9	0.36	2	< 0.1	121	-	8.2	< 1	19	< 0.01	1,390	< 0.01	< 0.1	< 10	-	1.3	9.4	2
	GL14-1-20120627	2012 06 27	-	40	-	-	-	-	-	-	< 50a	6	330	6	< 10	< 1	424	< 2	< 2	20	< 0.4	200	< 0.1	4	< 0.2	< 10a	< 1	130	-	5	< 10	< 6	< 0.10	1,490	< 0.1	< 1	< 100	-	< 4	5	< 10
	GL14-1-20120704	2012 07 04	-	-	-	-	-	1,120	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	GL14-1-20121204	2012 12 04	-	35	-	-	-	1,190	-	-	659	5.36	483	5.35	26	1.1	418	< 2.0	< 2.0	20	< 0.40	210	< 0.10a	6.7	9.04	< 10a	< 1.0	110	-	8.44	< 10	< 6.0	< 0.10	1,510	< 0.10	< 1.0	36	-	< 4.0	7.42	< 10
GL15-1	GL15-1-20091117	2009 11 17	-	702	-	-	-	-	-	-	< 50a	101	< 100	109	21	2.9	163	< 2	< 2	70	< 0.4	< 40	0.2	< 4	0.4	< 10a	< 1	20	-	6	< 10	< 6	< 0.10	5,710	< 0.1	< 1	< 10	-	31	2	< 10
	GL30-3-20091117	Duplicate	-	662	-	-	-	-	-	-	< 50a	94.5	< 100	104	20	2.5	157	< 2	< 2	60	< 0.4	< 40	< 0.1	< 4	0.4	20	< 1	20	-	6	< 10	< 6	< 0.10	5,710	< 0.1	< 1	< 10	-	30	2	10
	QA/QC RPD%		-	6	-	-	-	-	-	-	*	7	*	5	5	*	4	*	*	15	*	*	*	*	*	*	*	0	-	0	*	*	*	0	*	*	*	-	3	0	*
	GL15-1-20140604	2014 06 04	-	335	-	-	-	782	-	-	< 10a	31.9	< 30	62.1	67	< 2.0	176	< 0.50	< 1.0	29	< 5.0a	< 100	0.339	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	5.7	< 5.0	< 1.0	< 0.050	3,260	< 0.20	< 30	< 50	-	5.16	< 30	< 5.0
	GL15-1-20141117	2014 11 17	-	340	-	-	-	793	-	-	< 10a	32.3	< 30	63.1	148	< 2.0	178	< 0.50	< 1.0	31	< 5.0a	< 100	< 0.050	< 0.50	0.5	< 1.0a	< 1.0	< 50	< 0.20	6	< 5.0	< 1.0	< 0.050	3,440	< 0.20	< 30	< 50	-	5.76	< 30	< 5.0
	GL15-1-20150610	2015 06 10	8.32	339	-	-	-	959	-	-	< 10	32.7	< 30	62.4	88	< 2.0	191	< 0.50	< 1.0	28	< 5.0a	< 100	0.136	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	5.6	< 5.0	< 1.0	< 0.050	3,550	< 0.010	< 30	< 50	-	5.13	< 30	< 5.0
	DUP4-20150610	Duplicate	8.3	326	-	-	-	804	-	-	< 10	32.4	< 30	59.7	85	< 2.0	188	< 0.50	< 1.0	28	< 5.0a	< 100	0.141	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	5.9	< 5.0	< 1.0	< 0.050	3,540	< 0.010	< 30	< 50	-	5.23	< 30	< 5.0
	QA/QC RPD%		0	4	-	-	-	18	-	-	*	1	*	4	3	*	2	*	*	0	*	*	4	*	*	*	*	*	*	5	*	*	*	0	*	*	*	-	2	*	*
	GL15-1-20151103	2015 11 03	8.12	336	-	-	-	814	-	-	< 10	32.8	73	61.7	210	< 2.0	189	< 0.50	< 1.0	32	< 5.0a	< 100	< 0.050	< 0.50	1.69	< 1.0a	< 1.0	< 50	< 0.20	5.8	< 5.0	< 1.0	< 0.050	3,700	< 0.010	< 30	< 50	-	5.66	< 30	< 5.0
	GL15-1-20160920	2016 09 20	8.01	385	-	-	-	874	-	-	< 10	36.3	< 30	71.3	24	< 2.0	182	< 0.50	< 1.0	36	< 5.0a	< 100	0.363	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	5.9	< 5.0	< 1.0	< 0.050	3,850	0.012	< 30	< 50	-	6.74	< 30	< 5.0
	GL15-1-20170925	2017 09 25	8.1	326	-	-	-	767	-	-	< 10	31.9	< 30	59.8	20	< 2.0	175	< 0.50	< 1.0	28	< 5.0a	< 100	0.141	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	5.4	< 5.0	< 1.0	< 0.050	3,480	< 0.010	< 30	< 50	-	5.97	< 30	< 5.0
	GL15-1-180928	2018 09 28	7.87	333	7.47	-	1,320	819	1.75	< 0.0050	5.8	31.3	< 10	61.8	32.8	1.44	177	< 0.20	< 0.50	27.6	< 0.10	9.0	0.038	< 0.50	< 0.10	< 0.40a	< 0.20	17.8	< 0.010	5.71	< 0.40	< 0.50	< 0.050	3,470	< 0.020	< 0.20	< 5.0	< 1.0	5.67	< 1.0	< 4.0
	GL15-1-190924	2019 09 24	8.09	327	7.35	-	1259	826	1.68	-	< 5.0	31.0	< 10	60.6	45.2	1.55	173	< 0.20	< 0.50	30.5	< 0.10	14.0	0.020	< 0.50	< 0.10	0.14	< 0.20	17.8	< 0.010	6.18	0.63	< 0.50	< 0.050	3,690	< 0.020	< 0.20	< 5.0	< 1.0	6.04	1.0	< 4.0
	GL15-1-201104	2020 11 04	7.80	1,530	7.18	-	3,904	3,210	10.8	-	< 1.0	220	5.9	238	52.1	5.5	437	0.261	0.633	136	< 0.010	16.1	0.528	0.37	0.526	4.01	< 0.050	32.5	< 0.010	10.2	4.73	19.9	< 0.010	12,900	0.0152	< 0.050	< 0.20	< 0.20	95.8	5.75	2.2
	GL15-1-211007	2021 10 07	8.08	468	7.47	-	-	-	-	-	4.8	45.3	2.5	86	0.375	2.12	212	0.107	0.443	40.8	< 0.010	9.6	0.0891	0.23	0.0243	2.84	0.051	15.4	< 0.010	7.52	1.03	1.53	< 0.010	4,920	0.0073	0.070	< 0.20	< 0.20	13.6	1.32	2.1
GL15-2	GL15-2-20110704	2011 07 04	-	2,090	-	-	-	3,760	-	-	< 5	261	10	350	< 1	10	406	< 0.2	1.3	18	< 0.04	17	0.15	17.8	0.67	5	< 0.1	39	-	11.7	23	49.8	< 0.01	7,230	0.03	< 0.1	< 10	-	149	5.9	6
	GL15-2-20120627	2012 06 27	-	3,300	-	-	-	6,180	-	-	< 50a	397	400	562	< 10	10	590	< 2	< 2	20	< 0.4	< 40	< 0.1	7	< 0.2	< 10a	< 1	40	-	7	< 10	32	< 0.10	9,840	< 0.1	< 1	< 100	-	258	2	< 10
	GL15-2-20121205	2012 12 05	-	3,580	-	-	-	6,750	-	-	54	414	< 5	618	< 1	9.1	670	< 2.0	< 2.0	20	< 0.40	40	0.1	9	< 0.20	< 10a	< 1.0	60	-	12.7	< 10	34.9	< 0.10	10,400	< 0.10	< 1.0	< 1,000	-	332	2.65	< 10
	GL15-2-20130708	2013 07 08	-	3,920	-	-	-	7,970	-	-	< 15a	423	< 60	696	< 10	14.1	786	< 0.50	< 1.0	< 20	< 10a	< 200	< 0.25	5.9	< 0.50	2.6	< 1.0	58	< 0.20	13	< 5.0	47.3	< 0.050	8,850	< 0.50	< 60	< 50	-	393	< 60	< 10
	GL15-2-20140604	2014 06 04	-	3,290	-	-	-	7,380	-	-	< 15a	346	< 60	588	< 10	12.5	763	< 0.50	< 1.0	< 20	< 10a	< 200	< 0.25	5.5	< 0.50	< 2.5a	< 1.0	61	< 0.20	12.2	< 5.0	36.4	< 0.050	7,560	< 0.50	< 60	< 50	-	336	< 60	< 10
	GL15-2-20141117	2014 11 17	-	3,250	-	-	-	6,750	-	-	< 15a	339	< 60	584	< 10	13.2	720	< 0.50	< 1.0	< 20	< 10a	< 200	0.55	4.2	< 0.50	2.6	< 1.0	51	< 0.20	13.1	< 5.0	30.3	< 0.050	7,680	< 0.50	< 60	< 50	-	316	< 60	< 10
	GL15-2-20150610	2015 06 10	7.84	3,700	-	-	-	7,960	-	-	< 10	393	< 60	661	< 10	13	814	< 0.50	< 1.0	< 20	< 10a	< 200	0.276	6.68	< 0.50	2.3	< 1.0	< 50	< 0.20	12.5	< 5.0	41.9	< 0.050	8,660	< 0.050	< 60	< 50	-	349	< 60	< 10
	GL15-2-20151103	2015 11 03	7.5	3,910	-	-	-	7,970	-	-	< 10	409	< 60	703	< 10	13.3	858	< 0.50	< 1.0	< 20	< 10a	< 200	0.129	6.98	< 0.50	2.7	< 1.0	< 50	< 0.20	14.1	< 5.0	44.1	< 0.050	9,520	< 0.050	< 60	< 50	-	383	< 60	< 10
	GL15-2-20160920	2016 09 20	7.4	5,010	-	-	-	10,400	-	-	< 10	458	< 150	938	< 25	16	1,150	< 0.50	< 1.0	< 50	< 25a	< 500	0.06	9.67	< 0.50	2.8	< 1.0	63	< 0.20	14.1	< 5.0	62.8	< 0.050	11,400	< 0.050	< 150	< 50	-	511	< 150a	< 25
	GL15-2-20170925	2017 09 25	7.59	4,190	-	-	-	8,470	-	-	< 10	368	< 60	795	< 10	15.1	1,070	< 0.50	< 1.0	< 20	< 10a	< 200	0.061	8.64	< 0.50	3	< 1.0	55	< 0.20	15	< 5.0	51.9	< 0.050	8,810	< 0.050	< 60	< 50	-	423	< 60	< 10
	GL15-2-180928	2018 09 28	7.41	3,300	6.88	-	7,089	6,990	15.4	< 0.0050	< 5.0	284	< 10	629	< 0.20	13.9	992	< 0.20	0.73	12.8	< 0.10	12.2	0.041	4.77	0.19	2.92	< 0.20	49.2	< 0.010	17.8	1.69	19.3	< 0.050	6,020	< 0.020	< 0.20	< 5.0	< 1.0	318	2.1	< 4.0
	GL15-2-190924	2019 09 24	7.70	3,470	6.77	-	7047	7,220	12.2	-	< 5.0	336	< 10	638	0.28	13.0	794	< 0.20	0.72	20.1	< 0.10	17.0	0.045	5.62	0.19	2.61	< 0.20	52.8	< 0.010	17.4	1.66	28.3	< 0.050	8,810	< 0.020	< 0.20	< 5.0	< 1.0	355	2.0	< 4.0
	GL15-2-201104	2020 11 04	7.69	6,230	6.94	-	10,680	11,900	19.0	-	1.1	538	< 2.0	1,190	0.088	20.3	1,630	0.103	0.950	20.8	< 0.010	9.8	0.0432	22.4	0.297	4.75	< 0.050	64.9	< 0.010	21.3	2.80	82.1	< 0.010	14,900	0.0104	< 0.050	< 0.20	0.32	549	2.84	< 1.0
	DUP2-201104	Duplicate	7.67	6,360	-	-	-	11,200	19.5	-	1.0	542	< 2.0	1,220	0.091	20.6	1,660	0.107	0.948	21.4	< 0.010	9.5	0.0446	22.6	0.296	4.78	< 0.050	64.5	< 0.010	21.0	2.80	79.3	< 0.010	14,100	0.0101	< 0.050	< 0.20	0.32	545	2.80	< 1.0
	QA/QC RPD%		0	2	-	-	-	6	3	-	*	1	*	2	*	1	2	*	0	3	*	*	3	1	0	1	*	1	*	1	0	3	*	6	*	*	*	*	1	1	*
	GL15-2-211007	2021 10 07	7.67	< 10.0	6.89	-	-	-	-	-	8.7	< 4	3.0	< 0.5	0.258	19.7	< 1	0.085	0.840	18.8	< 0.010	6.2	0.0516	17.9	0.234	5.05	< 0.050	36.1	< 0.010	24.2	2.19	51.1	< 0.010	< 10.0	0.0093	< 0.050	0.22	0.68	453	2.47	1.3
GL16-1	GL 16-1-20091111	2009 11 11	-	1,840	-	-	-	-	-	-	124	180	620	339	960	28	26.8	< 2	15	10	< 0.4	60	0.14	< 4	2.6	< 10a	< 1	320	-	15	10	< 6	< 0.10	21,100	< 0.1	< 1	< 10	-	5	2	10
	GL 16-1-20111217	2011 12 17	-	987	-	-	-	4,500	-	-	< 50a	108	< 5	174	40	18.4	991	2	5	10	< 0.4	80	0.21	7	< 0.2	10	< 1	320	-	15	< 10	< 6	< 0.10	20,600	0.34	< 1	< 10	-	12	4	< 10
	GL16-1-20100811	2010 08 11	-	1,700	-	-	-	6,750	-	-	379	174	450	307	1,060	27	1,470	< 2	6	10	< 0.4	70	< 0.1	< 4	2.2	< 10a	< 1	260	-	12	10	< 6	< 0.1	19,800	< 0.1	< 1	< 100	-	13	2	< 10
	GL16-1-20110627	2011 06 27	-	1,210	-	-	-	4,780	-	-	< 50a	127	7	216	58	21.1	1,130	< 2	4	20	< 0.4	80	< 0.1	< 4	0.2	< 10a	< 1	300	-	15	< 10	< 6	< 0.1	20,600	< 0.1	< 1	< 10	-	13	1	< 10
	GL16-1-20110627	Duplicate	-	1,200	-	-	-	4,790	-	-	< 50a	130	15	214	63	21.8	1,130	< 2	4	20	< 0.4	60	< 0.1	< 4	0.7	< 10a	< 1	290	-	14	< 10	< 6	< 0.10	20,200	< 0.1	< 1	< 10	-	13	< 1	10
	QA/QC RPD%		-	1	-	-	-	0	-	-	*	2	*	1	8	3	0	*	0	0	*	29	*	*	*	*	*	3	-	7	*	*	*	2	*	*	*	-	0	*	*
	GL16-1-20120626	2012 06 26	-	1,260	-	-	-	4,490	-	-	< 50a	143	2,400	220	900	23	1,120	< 2	21	20	< 0.4	50	< 0.1	< 4	1.9	< 10a	< 1	270	-	12	< 10	< 6	< 0.10	23,200	< 0.1	< 1	< 100	-	10	2	10
	GL16-1-20121204	2012 12 04	-	1,020	-	-	-	4,170	-	-	< 50a	103	4,510	186	1,020	18	1,030	< 2.0	23	20	< 0.40	70	< 0.10	9.6	1.77	< 10a	< 1	230	-	10.6	< 10	< 6.0	< 0.10	20,800	< 0.10	< 1.0	< 10	-	9.2	2.94	< 10
	GL16-1-20130626	2013 06 26	-	1,040	-	-	-	4,200	-	-	< 15a	123	1,380	179	821	20.9	1,060	< 0.50	16.4	< 20	< 10a	< 200	< 0.25	< 2.5	1.56	< 2.5a	< 1.0	267	< 0.20	14.7	< 5.0	< 5.0	< 0.050	17,800	< 0.50	< 60	< 50	-	10.3	< 60	< 10

Associated CARO file(s): 8052631, 8052802, 8060237, 8060737, 8061100, 8081412, 8091680, 8092458, 8092618, 9052219, 9052399, 9052558, 9052754, 9052937, 9060273, 9091657, 9092001, 9092208, 9092404, 9120616.
Associated Exova file(s): 622178, 653600, 712940, 714233, 714243, 756693, 756810, 757047, 811364, 811710, 812030, 812741, 812985, 846260, 878316, 879073, 909346, 909448, 909654.
All terms defined within the body of Keltech's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

Table 2: Historical Summary of Analytical Results For Groundwater -Metals

			Physical Parameters								Dissolved Metals																														
Sample Location	Sample ID	Sample Date (yyyy mm dd)	pH pH	Total Hardness mg/L	pH (field) pH	Conductivity µS/cm	Field Conductivity µS/cm	Total Dissolved Solids mg/L	Dissolved Organic Carbon mg/L	Phosphate mg/L	Dissolved Aluminum µg/L	Dissolved Calcium mg/L	Dissolved Iron µg/L	Dissolved Magnesium mg/L	Dissolved Manganese µg/L	Dissolved Potassium mg/L	Dissolved Sodium mg/L	Antimony µg/L	Arsenic µg/L	Barium µg/L	Beryllium µg/L	Boron µg/L	Cadmium µg/L	Chromium µg/L	Cobalt µg/L	Copper µg/L	Lead µg/L	Lithium µg/L	Mercury µg/L	Molybdenum µg/L	Nickel µg/L	Selenium µg/L	Silver µg/L	Strontium µg/L	Thallium µg/L	Tin µg/L	Titanium µg/L	Tungsten µg/L	Uranium µg/L	Vanadium µg/L	Zinc µg/L
GL16-1	GL16-1-20131113	2013 11 13	-	949	-	-	-	4,160	-	-	< 15a	104	91	168	90	19.9	945	< 0.50	7.1	< 20	< 5.0a	< 100	< 0.25	< 2.5	< 0.50	< 2.5a	< 1.0	256	< 0.20	15.2	12.7	< 5.0	< 0.050	15,800	< 0.50	< 30	< 50	-	10	< 30	< 5.0
(Cont'd)	GL16-1-20140605	2014 06 05	-	930	-	-	-	3,880	-	-	< 15a	108	860	160	767	19.5	972	< 0.50	12.2	< 20	< 10a	< 200	< 0.25	< 2.5	1.14	< 2.5a	< 1.0	266	< 0.20	13.2	< 5.0	< 5.0	< 0.050	17,200	< 0.50	< 60	< 50	-	8.43	< 60	< 10
	GL16-1-20141118	2014 11 18	-	845	-	-	-	3,830	-	-	< 15a	92.3	256	149	277	19.5	950	< 0.50	8.7	< 20	< 5.0a	< 100	< 0.25	< 2.5	< 0.50	< 2.5a	< 1.0	268	< 0.20	15.5	< 5.0	< 5.0	< 0.050	15,900	< 0.50	< 30	< 50	-	9.17	< 30	< 5.0
	GL16-1-20150610	2015 06 10	7.96	900	-	-	-	3,880	-	-	< 10	106	1,020	154	819	19.1	933	< 0.50	14.4	< 20	< 10a	< 200	0.101	< 0.50	1.24	< 1.0a	< 1.0	260	< 0.20	14.4	< 5.0	< 1.0	< 0.050	16,600	< 0.050	< 60	< 50	-	9.18	< 60	< 10
	GL16-1-20151103	2015 11 03	7.76	827	-	-	-	3,670	-	-	< 10	95.4	< 30	143	60	18.7	997	< 0.50	7.1	< 20	< 5.0a	< 100	1.64	< 0.50	< 0.50	1.3	< 1.0	256	< 0.20	15.1	< 5.0	< 1.0	< 0.050	16,400	< 0.050	< 30	< 50	-	8.66	< 30	< 5.0
	DUP3-20151103	Duplicate	7.64	828	-	-	-	3,630	-	-	< 10	95.8	< 30	143	60	18.7	993	< 0.50	6.5	< 20	< 5.0a	< 100	1.61	< 0.50	< 0.50	1.1	< 1.0	254	< 0.20	14.2	< 5.0	< 1.0	< 0.050	16,200	< 0.050	< 30	< 50	-	8.1	< 30	< 5.0
	QA/QC RPD%		2	0	-	-	-	1	-	-	*	0	*	0	0	0	0	*	9	*	*	*	2	*	*	17	*	1	*	6	*	*	*	1	*	*	*	-	7	*	*
	GL16-1-20160524	2016 05 24	7.84	803	-	-	-	3,470	-	-	< 10	90.1	< 30	140	< 10	18.7	943	< 0.50	7.5	< 20	< 5.0a	< 100	0.508	< 0.50	< 0.50	< 1.0a	< 1.0	250	< 0.20	15.5	< 5.0	< 1.0	< 0.050	15,200	< 0.050	< 30	< 50	-	8.88	< 30	< 5.0
	GL16-1-20170525	2017 05 25	8.51	833	-	-	-	3,530	-	-	< 10	92.8	< 30	146	< 10	19.7	952	< 0.50	7.5	< 20	< 5.0a	< 100	0.418	< 0.50	< 0.50	< 1.0a	< 1.0	276	< 0.20	14.6	< 5.0	< 1.0	< 0.050	16,400	< 0.050	< 30	< 50	-	8.43	< 30	< 5.0
	DUP2-20170525	Duplicate	8.45	847	-	-	-	3,510	-	-	< 10	93.3	< 30	149	< 10	19.8	955	< 0.50	7.3	< 20	< 5.0a	< 100	0.385	< 0.50	< 0.50	< 1.0a	< 1.0	280	< 0.20	14.8	< 5.0	< 1.0	< 0.050	16,400	< 0.050	< 30	< 50	-	8.37	< 30	< 5.0
	QA/QC RPD%		1	2	-	-	-	1	-	-	*	1	*	2	*	1	0	*	3	*	*	*	8	*	*	*	*	1	*	1	*	*	*	0	*	*	*	-	1	*	*
	GL16-1-180604	2018 06 04	7.67	762	7.11	-	3,660	3,180	2.93	0.0072	< 5.0	96.5	< 10	126	0.45	18.1	815	< 0.20	5.98	13.4	< 0.10	71.0	0.172	< 0.50	< 0.10	0.63	< 0.20	256	< 0.010	15.5	< 0.40	< 0.50	< 0.050	15,400	< 0.020	< 0.20	< 5.0	< 1.0	7.93	< 1.0	< 4.0
	GL16-1-190529	2019 05 29	7.83	756	7.03	-	4453	3,390	3.06	< 0.0500	15.5	89.6	< 10	129	4.19	18.5	849	< 0.20	6.51	16.2	< 0.10	71.1	0.154	0.81	< 0.10	0.57	< 0.20	259	< 0.010	18.0	1.19	< 0.50	0.070	15,600	0.037	< 0.20	< 5.0	< 1.0	8.53	< 1.0	< 4.0
	GL16-1-200608	2020 06 08	7.98	699	7.08	-	3,720	3,020	1.59	-	3.6	95.1	424	112	335	19.9	832	0.062	18.4	13.6	0.011	65.3	0.0570	0.60	0.567	0.93	0.200	249	< 0.010	16.7	1.05	< 0.10	< 0.010	17,200	0.0192	< 0.050	< 0.20	1.71	6.69	< 0.20	1.7
	GL16-1-210609	2021 06 09	7.98	658	7.01	-	-	-	-	-	3.0	87.9	78.9	106	170	17.9	806	0.085	10.7	15.1	< 0.010	71.2	0.0338	< 0.10	0.216	0.48	< 0.050	285	< 0.010	15.9	0.885	< 0.10	< 0.010	15,300	0.0206	0.060	< 0.20	1.28	6.57	< 0.20	2.2
GL17-1	GL17-1-20091112	2009 11 12	-	3,390	-	-	-	-	-	-	72	341	4,680	617	3,640	20	1,240	< 2	3	10	< 0.4	< 40	< 0.1	< 4	4.8	< 10a	< 1	110	-	38	30	< 6	< 0.10	9,310	< 0.1	< 1	11	-	133	1	10
	GL17-1-20100811	2010 08 11	-	3,280	-	-	-	9,080	-	-	< 50a	355	920	582	3,290	22	1,250	< 2	3	10	< 0.4	< 40	< 0.10	< 4	5.1	< 10a	< 1	90	-	36	30	< 6	< 0.1	8,820	< 0.1	< 1	< 100	-	119	< 1	< 10
	GL30-4-20100811	Duplicate	-	3,170	-	-	-	8,730	-	-	62	341	1,160	563	3,640	21	1,210	< 2	3	10	< 0.4	< 40	< 0.10	< 4	5.2	< 10a	< 1	90	-	38	30	< 6	< 0.1	9,450	< 0.1	< 1	< 100	-	129	1	10
	QA/QC RPD%		-	3	-	-	-	4	-	-	*	4	23	3	10	5	3	*	0	0	*	*	*	*	2	*	*	0	-	5	0	*	*	7	*	*	*	-	8	*	*
	GL17-1-20110628	2011 06 28	-	3,580	-	-	-	8,930	-	-	< 5	381	2,170	638	3,260	17.3	1,290	< 0.2	1.8	16	< 0.04	14	0.11	1.1	7.97	4	< 0.1	94	-	35	31	3.3	< 0.01	8,700	0.01	< 0.1	< 10	-	143	0.9	9
	GL17-1-20120625	2012 06 25	-	130	-	-	-	1,610	-	-	< 50a	20	880	18	70	15	582	< 2	2	220	< 0.4	40	< 0.1	4	1	< 10a	< 1	200	-	< 1	< 10	< 6	< 0.10	3,990	< 0.1	< 1	< 100	-	< 4	2	< 10
	GL17-1-20121204	2012 12 04	-	98	-	-	-	1,570	-	-	< 50a	15.9	643	14.2	111	13.2	596	< 2	3.2	220	< 0.40	40	< 0.10	11.2	6.11	< 10a	< 1.0	170	-	< 1.0	< 10	< 6.0	< 0.10	3,920	< 0.10	< 1.0	< 10	-	< 4.0	3.33	< 10
	GL17-1-20160526	2016 05 26	8.18	118	-	-	-	1,480	-	-	< 10	18.8	961	17.4	62	14.9	616	< 0.50	< 1.0	231	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	243	< 0.20	< 1.0	< 5.0	< 1.0	< 0.050	3,630	< 0.050	< 30	< 50	-	< 0.20	< 30	< 5.0
	GL17-1-20160919	2016 09 19	8.32	123	-	-	-	1,490	-	-	< 10	19.8	836	17.8	58	14	564	< 0.50	1.4	178	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	184	< 0.20	< 1.0	< 5.0	< 1.0	< 0.050	3,510	< 0.010	< 30	< 50	-	0.31	< 30	< 5.0
	GL17-1-20170531	2017 05 31	8.13	125	-	-	-	1,530	-	-	< 10	20	1,680	18.2	69	15	614	< 0.50	2.4	216	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	227	< 0.20	< 1.0	< 5.0	< 1.0	< 0.050	3,840	< 0.020	< 30	< 50	-	< 0.20	< 30	< 5.0
	GL17-1-20170926	2017 09 26	7.95	121	-	-	-	1,480	-	-	< 10	19.5	1,430	17.5	57	14.9	563	< 0.50	2.1	212	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	227	< 0.20	< 1.0	< 5.0	< 1.0	< 0.050	3,720	< 0.020	< 30	< 50	-	< 0.20	< 30	< 5.0
	GL17-1-180604	2018 06 04	7.83	127	7.3	-	2,044	1,480	2.54	< 0.0050	< 5.0	22.0	1,250	17.4	46.5	14.4	562	< 0.20	1.64	198	< 0.10	81.8	< 0.010	< 0.50	0.26	< 0.40a	< 0.20	231	< 0.010	0.42	< 0.40	< 0.50	< 0.050	3,650	< 0.020	< 0.20	< 5.0	< 1.0	0.125	< 1.0	< 4.0
	GL17-1-180919	2018 09 19	7.80	130	7.5	-	2,197	1,480	2.83	< 0.0050	< 5.0	22.6	626	17.9	42.5	13.7	571	< 0.20	1.06	185	< 0.10	74.7	< 0.010	< 0.50	0.12	< 0.40a	< 0.20	206	< 0.010	0.35	< 0.40	< 0.50	< 0.050	3,650	< 0.020	< 0.20	< 5.0	< 1.0	0.276	< 1.0	< 4.0
	GL17-1-190527	2019 05 27	8.11	124	7.56	-	2558	1,490	2.02	< 0.0050	< 5.0	20.8	1,450	17.4	53.8	14.2	567	< 0.20	2.22	220	< 0.10	87.1	< 0.010	0.85	0.23	< 0.40a	< 0.20	237	< 0.010	0.45	0.51	< 0.50	< 0.050	4,140	< 0.020	< 0.20	< 5.0	< 1.0	0.175	< 1.0	< 4.0
	DUP1-190527	Duplicate	8.13	120	7.56	-	2558	1,470	1.76	< 0.0050	< 5.0	20.0	1,370	16.9	49.9	13.9	561	< 0.20	2.14	217	< 0.10	78.0	< 0.010	0.79	0.22	< 0.40a	< 0.20	227	< 0.010	0.48	0.51	< 0.50	< 0.050	3,950	< 0.020	< 0.20	< 5.0	< 1.0	0.297	< 1.0	< 4.0
	QA/QC RPD%		0	3	*	-	*	1	*	*	*	4	6	3	8	2	1	*	4	1	*	11	*	*	*	*	*	4	*	*	*	*	*	5	*	*	*	*	52	*	*
	GL17-1-190923	2019 09 23	8.11	128	7.67	-	2421	1,550	1.92	-	< 5.0	21.9	1,450	17.9	54.9	14.3	583	< 0.20	2.32	215	< 0.10	89.0	< 0.010	< 0.50	0.16	< 0.10	< 0.20	252	< 0.010	0.36	< 0.40	< 0.50	< 0.050	4,040	< 0.020	< 0.20	< 5.0	< 1.0	0.144	< 1.0	< 4.0
	GL17-1-200608	2020 06 08	8.20	121	7.35	-	2,138	1,590	2.32	-	1.2	22.6	1,750	15.7	46.9	15.4	629	< 0.050	3.27	218	0.015	69.1	0.0051	0.74	0.202	0.49	< 0.050	197	< 0.010	0.388	0.695	< 0.10	< 0.010	4,080	< 0.0040	< 0.050	< 0.20	0.38	0.0970	< 0.20	< 1.0
	GL17-1-201020	2020 10 20	8.01	132	7.43	-	2,457	1,530	2.22	-	1.4	23.9	1,790	17.4	51.3	17.4	531	< 0.050	2.61	277	0.011	52.6	< 0.0020	0.23	0.192	< 0.10	< 0.050	199	< 0.010	0.477	0.264	< 0.10	< 0.010	4,180	< 0.0040	< 0.050	0.23	0.44	0.129	< 0.20	1.1
	GL17-1-210604	2021 06 04	8.14	135	-	-	-	-	-	-	1.8	24.3	1,290	18.1	51.6	15.3	637	0.060	3.28	212	< 0.010	93.7	< 0.0020	0.24	0.151	10.2	0.279	245	< 0.010	0.488	0.368	0.12	< 0.010	4,150	< 0.0040	0.250	5.19	0.40	0.122	< 0.20	17.4
	GL17-1-211006	2021 10 06	7.98	127	7.33	-	-	-	-	-	1.7	20.8	1,640	18.3	47.9	15.9	694	< 0.050	2.81	224	< 0.010	87.7	< 0.0020	0.28	0.154	0.15	< 0.050	225	< 0.010	0.477	0.336	< 0.10	< 0.010	3,820	< 0.0040	< 0.050	0.36	0.35	0.0992	< 0.20	1.1
GL17-2	GL17-2-20091112	2009 11 12	-	128	-	-	-	-	-	-	4,020	20.6	2,560	18.6	194	15.7	554	< 2	< 2	190	< 0.4	< 40	< 0.1	5	1.3	< 10a	1	220	-	< 1	< 10	< 6	< 0.10	3,520	< 0.1	< 1	20	-	< 4	6	20
	GL30-2-20091112	Duplicate	-	119	-	-	-	-	-	-	< 50a	19.3	< 100	17.2	252	14.7	569	< 2	< 2	160	< 0.4	40	< 0.1	< 4	0.6	10	< 1	230	-	< 1	< 10	< 6	< 0.10	3,270	< 0.1	< 1	< 10	-	< 4	1	< 10
	QA/QC RPD%		-	7	-	-	-	-	-	-	*	7	*	8	26	7	3	*	*	17	*	*	*	*	74	*	*	4	-	*	*	*	*	7	*	*	*	-	*	143	*
	GL17-2-20100811	2010 08 11	-	110	-	-	-	1,630	-	-	130	19	770	17	247	15	562	< 2	3	210	< 0.4	60	< 0.10	< 4	0.8	< 10a	< 1	220	-	< 1	< 10	< 6	< 0.1	3,570	< 0.1	< 1	< 100	-	< 4	2	< 10
	GL17-2-20110628	2011 06 28	-	109	-	-	-	1,510	-	-	13	18.8	364	15.2	61	11.7	580	< 0.2	1.6	222	< 0.04	70	< 0.01	4.7	0.83	1	< 0.1	235	-	0.7	< 1	< 0.6	< 0.01	3,940	< 0.01	< 0.1	40	-	< 0.4	1.5	1
	GL17-2-20120625	2012 06 25	-	3,440	-	-	-	9,700	-	-	< 50a	318	6,180	643	2,480	20	1,580	< 2	4	20	< 0.4	< 40	< 0.10	< 4	1.6	< 10a	< 1	70	-	53	10	< 6	< 0.10	8,300	< 0.1	< 1	< 100	-	81	< 1	10
	GL17-2-20121204	2012 12 04	-	3,920	-	-	-	10,000	-	-	< 50a	394	569	712	2,800	17.6	1,520	< 2	< 2.0	20	< 0.40	< 40	0.26	7.2	7.1	< 10a	< 1.0	70	-	50.1	30	< 6.0	< 0.10	9,920	< 0.10	< 1.0	< 10	-	150	2.44	< 10
	GL17-2-20130626	2013 06 26	-	4,000	-	-	-	10,800	-	-	< 30a	404	< 90	727	2,380	21.8	1,700	< 1.0	< 1.0	< 30	< 15a	< 300	< 0.50a	< 5.0	3.4	< 5.0a	< 1.0	101	< 0.20	57.5	20.6	< 10	< 0.10	8,720	< 1.0	< 90	< 50	-	176	< 90	< 15
	GL17-2-20131113	2013 11 13	-	4,190	-	-	-	10,800	-	-	< 30a	427	390	759	2,600	24	1,710	< 1.0	< 1.0	< 50	< 25a	< 500	< 0.50a	< 5.0	4.2	< 5.0a	< 1.0	179	< 0.20	54.1	20.1	< 10	< 0.10	9,350	< 1.0	< 150	53	-	172	< 150a	< 25
	GL17-2-20140605	2014 06 05	-	3,650	-	-	-	10,500	-	-	< 30a	346	585	676	1,430	20.4	1,690	< 1.0	< 1.0	< 20	< 10a	< 200	< 0.50a	< 5.0	2.2	< 5.0a	< 1.0	104	< 0.20	58.3	15.1	< 10	< 0.10	7,610	< 1.0	< 60	< 50	-	155	< 60	< 10
	GL17-2-20141118	2014 11 18	-	3,860	-	-	-	11,300	-	-	< 30a	367	938	716	1,950	22.1	1,670	< 1.0	< 1.0	< 30	< 15a	< 300	< 0.50a	< 5.0	3.1	< 5.0a	< 1.0	93	< 0.20	54.4	14.1	< 10	< 0.10	7,930	< 1.0	< 90	< 50	-	163	< 90	< 15
	GL17-2-20150608	2015 06 08	7.5	4,010	-	-	-	10,300	-	-	< 10	378	442	745	1,180	22.2	1,710	< 1.0	< 1.0	< 30	< 15a	< 300	0.338	< 1.0	1.8	4.5	< 1.0	95	< 0.20	51.8	14.7	3.6	< 0.10	7,910	< 0.10	< 90	< 50	-	152	< 90	< 15
	GL17-2-20151104	2015 11 04	7.65	3,760	-	-	-	11,100	-	-	< 10	383	183	680	1,280	21.1	1,550	< 1.0	< 1.0	< 30	< 15a	< 300	0.144	< 1.0	2.9	< 2.0a	< 1.0	101	< 0.20	46	15.4	< 1.0	< 0.10	8,190	< 0.10	< 90	< 50	-	182	< 90	< 15

Associated CARO file(s): 8052631, 8052802, 8060237, 8060737, 8061100, 8081412, 8091680, 8092458, 8092618, 9052219, 9052399, 9052558, 9052754, 9052937, 9060273, 9091657, 9092001, 9092208, 9092404, 9120616,
Associated Exova file(s): 622178, 653600, 712940, 714233, 714243, 756693, 756810, 757047, 811364, 811710, 812030, 812741, 812985, 846260, 878316, 879073, 909346, 909448, 909654,
All terms defined within the body of Keltech's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

Table 2: Historical Summary of Analytical Results For Groundwater -Metals

Sample Location	Sample ID	Sample Date (yyyy mm dd)	Physical Parameters: pH (pH)	Total Hardness (mg/L)	pH (field) (pH)	Conductivity (µS/cm)	Field Conductivity (µS/cm)	Total Dissolved Solids (mg/L)	Dissolved Organic Carbon (mg/L)	Phosphate (mg/L)	Dissolved Metals: Dissolved Aluminum (µg/L)	Dissolved Calcium (mg/L)	Dissolved Iron (µg/L)	Dissolved Magnesium (mg/L)	Dissolved Manganese (µg/L)	Dissolved Potassium (mg/L)	Dissolved Sodium (mg/L)	Antimony (µg/L)	Arsenic (µg/L)	Barium (µg/L)	Beryllium (µg/L)	Boron (µg/L)	Cadmium (µg/L)	Chromium (µg/L)	Cobalt (µg/L)	Copper (µg/L)	Lead (µg/L)	Lithium (µg/L)	Mercury (µg/L)	Molybdenum (µg/L)	Nickel (µg/L)	Selenium (µg/L)	Silver (µg/L)	Strontium (µg/L)	Thallium (µg/L)	Tin (µg/L)	Titanium (µg/L)	Tungsten (µg/L)	Uranium (µg/L)	Vanadium (µg/L)	Zinc (µg/L)
GL18-2	GL 18-2-20091110	2009 11 10	-	1,060	-	-	-	-	-	-	< 50a	99.7	940	196	503	19	22.4	< 2	17	10	< 0.4	< 40	< 0.1	< 4	0.6	< 10a	< 1	10	-	32	< 10	< 6	< 0.10	4,990	< 0.1	< 1	< 10	-	< 4	< 1	20
	GL18-2-20100811	2010 08 11	-	1,380	-	-	-	6,930	-	-	258	281	1,640	164	544	20	1,460	< 2	12	20	< 0.4	< 40	< 0.10	< 4	0.8	< 10a	< 1	< 10	-	34	< 10	< 6	< 0.1	4,840	< 0.1	< 1	< 100	-	< 4	2	< 10
	GL18-2-20110629	2011 06 29	-	1,510	-	-	-	6,440	-	-	25	315	294	175	405	20.9	1,500	1.8	13.7	21	< 0.04	24	0.06	1.2	2.07	4	< 0.1	12	-	42.4	7	24	< 0.01	6,800	< 0.01	< 0.1	< 10	-	2.5	5.2	4
	GL18-2-20120626	2012 06 26	-	1,480	-	-	-	6,820	-	-	< 50a	314	1,210	169	460	19	1,550	8	9	10	< 0.4	< 40	< 0.1	< 4	0.6	< 10a	< 1	10	-	35	< 10	< 6	< 0.10	4,970	< 0.1	< 1	< 100	-	< 4	< 1	20
	DUP-A-20120626	Duplicate	-	1,520	-	-	-	6,670	-	-	< 50a	324	1,030	173	480	20	1,590	< 2	10	10	< 0.4	< 40	< 0.1	< 4	0.8	< 10a	< 1	10	-	36	< 10	6	< 0.10	5,230	< 0.1	< 1	< 100	-	< 4	1	< 10
	QA/QC RPD%		-	3	-	-	-	2	-	-	*	3	16	2	4	5	3	*	11	0	*	*	*	*	29	*	*	0	-	3	*	*	*	5	*	*	*	-	*	*	*
	GL18-2-20121205	2012 12 05	-	1,380	-	-	-	6,600	-	-	53	286	2,330	161	180	17.2	1,380	< 2.0	9.4	10	< 0.40	40	< 0.10	< 4.0	2.85	< 10a	< 1	10	-	38.6	< 10	6.4	< 0.10	4,890	< 0.10	< 1.0	< 1,000	-	< 4.0	< 1.0	< 10
	GL18-2-20130627	2013 06 27	-	1,400	-	-	-	6,660	-	-	< 30a	288	1,600	166	466	17.9	1,620	< 1.0	6.7	< 20	< 10a	< 200	< 0.50a	< 5.0	< 1.0	< 5.0a	< 1.0	< 50	< 0.20	37.4	< 5.0	< 10	< 0.10	4,230	< 1.0	< 60	< 50	-	< 0.20	< 60	< 10
	GL18-2-20131114	2013 11 14	-	1,380	-	-	-	6,670	-	-	< 15a	284	1,560	162	467	17.4	1,550	< 0.50	7.3	< 20	< 10a	< 200	< 0.25	< 2.5	< 0.50	< 2.5a	< 1.0	< 50	< 0.20	41.8	< 5.0	< 5.0	< 0.050	4,120	< 0.50	< 60	< 50	-	0.26	< 60	< 10
	GL18-2-20140609	2014 06 09	-	1,380	-	-	-	6,260	-	-	< 30a	280	1,640	164	472	17.7	1,540	< 1.0	7.3	< 20	< 10a	< 200	< 0.50a	< 5.0	< 1.0	< 5.0a	< 1.0	< 50	< 0.20	40.5	< 5.0	< 10	< 0.10	4,160	< 1.0	< 60	< 50	-	< 0.20	< 60	< 10
	GL18-2-20141126	2014 11 26	-	1,380	-	-	-	6,330	-	-	< 15a	283	1,550	163	465	17.6	1,540	< 0.50	6.5	< 20	< 10a	< 200	< 0.25	< 2.5	< 0.50	< 2.5a	< 1.0	< 50	< 0.20	39.3	< 5.0	< 5.0	< 0.050	4,230	< 0.50	< 60	< 50	-	< 0.20	< 60	< 10
	DUP3-20141126	Duplicate	-	1,390	-	-	-	6,080	-	-	< 30a	287	1,560	164	470	17.7	1,540	< 1.0	7.1	< 20	< 10a	< 200	< 0.50a	< 5.0	< 1.0	< 5.0a	< 1.0	< 50	< 0.20	39.7	< 5.0	< 10	< 0.10	4,230	< 1.0	< 60	< 50	-	< 0.20	< 60	< 10
	QA/QC RPD%		-	1	-	-	-	4	-	-	*	1	1	1	1	1	0	*	9	*	*	*	*	*	*	*	*	*	*	1	*	*	*	0	*	*	*	-	*	*	*
	GL18-2-20150615	2015 06 15	7.98	1,340	-	-	-	6,410	-	-	< 10	284	1,410	154	425	17.3	1,550	< 1.0	6.6	< 20	< 10a	< 200	< 0.050	< 1.0	< 1.0	< 2.0a	< 1.0	< 50	< 0.20	37.4	< 5.0	< 1.0	< 0.10	4,200	< 0.10	< 60	< 50	-	< 0.20	< 60	< 10
	GL18-2-20170529	2017 05 29	7.95	1,370	-	-	-	6,310	-	-	< 10	282	1,390	161	476	16.9	1,460	< 1.0	7.1	< 30	< 15a	< 300	< 0.050	< 1.0	< 1.0	2.4	< 1.0	< 50	< 0.20	41.1	< 5.0	< 1.0	< 0.10	4,260	< 0.10	< 90	< 50	-	2.23	< 90	< 15
	GL18-2-180604	2018 06 04	7.38	1,410	7.797.8	8,140	7,172	6,140	2.92	0.0231	< 5.0	306	1,610	158	524	17.7	1,450	< 0.20	6.92	9.7	< 0.10	32.6	0.018	< 0.50	< 0.10	< 0.40a	< 0.20	11.6	< 0.010	41.5	< 0.40	< 0.50	< 0.050	4,630	< 0.020	< 0.20	< 5.0	< 1.0	0.134	< 1.0	< 4.0
	DUP-180604	Duplicate	7.43	1,430	7.79	-	7,172	6,310	2.91	0.0216	< 5.0	311	1,600	158	521	17.9	1,450	< 0.20	6.95	9.5	< 0.10	31.5	0.027	< 0.50	< 0.10	< 0.40a	< 0.20	11.0	< 0.010	41.6	< 0.40	< 0.50	< 0.050	4,590	< 0.020	< 0.20	< 5.0	< 1.0	0.132	< 1.0	< 4.0
	QA/QC RPD%		1	1	*	-	*	3	0	*	*	2	1	0	1	1	0	*	0	2	*	3	*	*	*	*	*	5	*	0	*	*	*	1	*	*	*	*	2	*	*
GL20-1	GL20-1-20091112	2009 11 12	-	998	-	-	-	-	-	-	124	145	10,400	154	452	390	1,780	< 2	27	290	< 0.4	6,230	< 0.1	35	30.3	< 10a	5	90	-	10	60	< 6	< 0.10	2,290	< 0.1	8	93	-	< 4	33	< 10
	GL20-1-20100811	2010 08 11	-	997	-	-	-	6,910	-	-	209	132	17,400	162	471	490	1,730	< 2	34	410	< 0.4	6,190	< 0.1	44	35.7	< 10a	< 1	70	-	6	60	< 6	< 0.1	2,370	< 0.1	9	< 100	-	< 4	33	< 10
	GL20-1-20110629	2011 06 29	-	113	-	-	-	6,900	-	-	13	14.5	923	18.6	34	400	201	< 0.2	11.2	31	< 0.04	531	< 0.01	5.3	3.47	7	< 0.1	8	-	1.2	7	24.6	< 0.01	263	< 0.01	0.8	< 10	-	< 0.4	3	8
	GL20-1-20111217	2011 12 17	-	997	-	-	-	7,110	-	-	1,340	128	13,500	165	320	520	1,950	< 20	40	300	< 4a	6,300	< 1a	80	31	< 100a	< 10	< 100	-	< 10	< 100	< 60a	< 1.0	2,300	3.3	< 10	< 100	-	< 40a	20	< 100
	DUPA-20111217	Duplicate	-	988	-	-	-	7,140	-	-	< 500a	127	8,430	163	310	510	1,820	< 20	40	200	< 4a	6,400	< 1a	80	33	< 100a	< 10	< 100	-	< 10	< 100	< 60a	< 1.0	2,300	2.8	< 10	< 100	-	< 40a	30	< 100
	QA/QC RPD%		-	1	-	-	-	0	-	-	*	1	46	1	3	2	7	*	0	40	*	2	*	0	6	*	*	*	-	*	*	*	*	0	16	*	*	-	*	40	*
	GL20-1-20120625	2012 06 25	-	1,030	-	-	-	6,820	-	-	120	133	15,400	170	340	420	1,960	3	14	280	< 0.4	4,480	< 0.1	52	27	< 10a	< 1	70	-	1	60	< 6	< 0.10	2,260	< 0.1	8	< 100	-	4	21	10
	GL20-1-20121203	2012 12 03	-	872	-	-	-	7,070	-	-	< 500a	102	13,400	150	261	547	1,860	< 20	< 20.0	300	< 4.0a	4,800	< 1.00a	92.1	43.3	< 100a	< 10	< 100	-	< 10	< 100	< 60a	< 1.00	2,270	< 1.00	< 10	< 100	-	< 40a	29.2	< 100
	GL20-1-20130625	2013 06 25	-	1,130	-	-	-	8,490	-	-	116	87.4	4,040	221	1,120	390	2,640	2.5	23.3	250	< 25a	4,130	< 0.50a	35	28.4	5.9	3.5	69	< 0.20	10	76.4	< 10	< 0.10	2,890	< 1.0	< 150	104	-	2.79	< 150a	32
	GL20-1-20140605	2014 06 05	-	907	-	-	-	7,650	-	-	74	65.4	2,750	181	494	229	2,430	3.9	19.4	117	< 25a	2,700	0.56	16.9	19.1	17.9	5	69	< 0.20	27.4	54.9	< 10	< 0.10	2,520	< 1.0	< 150	< 50	-	42.7	< 150a	< 25
	DUP4-20140605	Duplicate	-	897	-	-	-	7,590	-	-	80	65.7	2,800	178	489	225	2,390	4.3	21.2	117	< 25a	2,620	0.57	19.1	21.3	20.1	5.3	65	< 0.20	28.1	60.5	< 10	0.11	2,500	< 1.0	< 150	< 50	-	43.5	< 150a	< 25
	QA/QC RPD%		-	1	-	-	-	1	-	-	8	0	2	2	1	2	2	10	9	0	*	3	2	12	11	12	6	6	*	3	10	*	*	1	*	*	*	-	2	*	*
	GL20-1-20141126	2014 11 26	-	945	-	-	-	7,430	-	-	173	93.8	6,170	173	310	275	2,090	1.6	20.6	374	< 15a	3,410	< 0.50a	34.2	22.6	< 5.0a	< 1.0	61	< 0.20	11.6	45.8	< 10	< 0.10	2,850	< 1.0	< 90	95	-	0.95	< 90	< 15
	GL20-1-20150611	2015 06 11	7.84	848	-	-	-	7,590	-	-	74	64.3	2,080	167	424	236	2,460	4	14.5	122	< 25a	3,010	0.636	16.9	29.9	19.2	1.5	86	< 0.20	29.3	87.6	2.4	0.2	2,210	0.11	< 150	< 50	-	48.2	< 150a	< 25
	GL20-1-200826	2020 08 26	7.73	118	6.99	-	2,514	5,240	122	-	19.6	5.1	897	25.6	54.1	40.5	404	0.198	3.46	58.9	0.099	24.3	0.0021	5.18	3.82	< 0.10	0.359	0.614	< 0.010	1.01	8.64	< 0.10	< 0.010	519	0.170	0.865	12.5	< 0.20	0.0021	2.43	< 1.0
	GL20-1-201020	2020 10 20	7.50	565	7	-	8,684	5,230	< 0.50	-	66.5	88.1	8,910	83.7	247	173	1,540	0.678	12.2	280	0.023	1,760	0.0205	25.0	18.7	0.36	0.051	65.4	< 0.010	3.93	32.7	0.27	< 0.010	2,500	< 0.0040	3.94	88.8	0.76	2.55	22.3	1.2
	GL20-1-210511	2021 05 11	7.72	686	7.04	-	-	-	-	-	76.7	68	11,600	125	401	175	1,830	0.624	13.6	255	0.025	2,280	0.0091	19.3	17.7	1.26	0.072	86.6	< 0.020	4.62	37.6	0.88	< 0.010	2,000	< 0.0040	3.52	90.6	0.59	7.02	20.6	1.7
	GL20-1-210924	2021 09 24	7.60	565	6.90	-	-	-	-	-	83.1	43.9	9,640	111	300	178	2,110	0.729	22.3	246	0.018	1,700	0.0145	25.2	18.8	0.74	0.055	47.1	< 0.010	8.91	40.9	0.97	< 0.010	1,920	< 0.0040	4.53	86.9	0.50	1.41	21.7	1.5
	DUP 2-210924	Duplicate	7.63	551	6.90	-	-	-	-	-	81.9	41.9	9,730	108	299	177	2,100	0.723	22.0	253	0.019	1,610	0.0140	25.4	19.1	0.73	< 0.050	43.7	< 0.010	5.20	39.5	1.01	< 0.010	1,980	< 0.0040	4.51	82.2	0.42	1.29	20.5	1.6
	QA/QC RPD%		0	3	0	-	-	-	-	-	1	5	1	3	0	1	0	1	1	3	*	5	4	1	2	1	*	7	*	53	3	4	*	3	*	0	6	*	9	6	*
GL21-1	GL21-1-20091117	2009 11 17	-	4,230	-	-	-	-	-	-	174	216	140	897	30	37	2,590	< 2	6	20	< 0.4	< 40	0.13	8	0.9	< 10a	< 1	140	-	68	20	< 6	< 0.10	12,700	0.36	< 1	16	-	792	3	< 10
	GL21-1-20110705	2011 07 05	-	520	-	-	-	14,200	-	-	< 5	201	10	4	< 1	< 1	386	0.3	3.8	21	< 0.04	6	0.2	22.6	0.7	15	< 0.1	120	-	61.4	16	43.8	< 0.01	13,600	0.18	< 0.1	< 10	-	848	4	10
	GL21-1-20120625	2012 06 25	-	4,660	-	-	-	14,800	-	-	< 50a	219	< 50	1,000	< 10	36	2,920	< 2	4	20	< 0.4	< 40	0.14	26	1.2	10	< 1	120	-	63	10	10	< 0.10	14,600	0.13	< 1	< 100	-	799	4	10
	GL21-1-20121204	2012 12 04	-	4,300	-	-	-	14,600	-	-	< 50a	206	< 50	919	< 10	34.1	2,940	< 2.0	4.4	20	< 0.40	< 40	< 0.10	22.9	< 0.20	10	< 1.0	100	-	64.3	20	11.2	< 0.10	15,000	0.2	< 1.0	< 100	-	999	4.71	< 10
GL22-1	GL 22-1-20091110	2009 11 10	-	1,050	-	-	-	-	-	-	109	95	< 100	198	951	16.5	166	< 2	6	110	< 0.4	< 40	< 0.1	< 4	3.1	< 10a	< 1	20	-	14	20	< 6	< 0.10	3,700	< 0.1	< 1	< 10	-	42	3	10
	GL22-1-20100811	2010 08 11	-	970	-	-	-	1,450	-	-	395	82	600	186	1,260	16	139	< 2	3	110	< 0.4	70	< 0.10	< 4	3.1	< 10a	< 1	20	-	14	20	< 6	< 0.1	3,800	< 0.1	< 1	< 100	-	51	2	< 10
GL23-1	GL 23-1-20091110	2009 11 10	-	1,140	-	-	-	-	-	-	< 50a	88	< 100	224	951	17.6	222	< 2	3	80	< 0.4	< 40	0.22	< 4	3.1	< 10a	< 1	30	-	15	20	< 6	< 0.10	3,770	< 0.1	< 1	< 10	-	75	2	< 10
	GL 23-1-20120627	2012 06 27	-	1,100	-	-	-	1,780	-	-	< 50a	81	60	228	80	15	231	< 2	< 2	70	< 0.4	< 40	< 0.1	7	< 0.2	< 10a	< 1	30	-	17	10	< 6	< 0.10	4,010	< 0.1	2	< 100	-	149	3	< 10
	GL23-1-20100811	2010 08 11	-	1,000	-	-	-	1,640	-	-	< 50a	77	160	201	638	15	207	< 2	2	80	< 0.4	40	< 0.1	< 4	1.6	< 10a	< 1	30	-	16	20	< 6	< 0.1	4,050	< 0.1	< 1	< 100	-	95	2	< 10
	GL23-1-20110704	2011 07 04	-	1,160	-	-	-	1,720	-	-	< 5	87.1	25	229	368	16.6	238	< 0.2	1.2	68	< 0.04	24	0.09	20.9	2.14	2	< 0.1	38	-	19.9	14	2.5	< 0.01	4,120	< 0.01	< 0.1	< 10	-	168	7.4	2
	GL23-1-20121203	2012 12 03	-	270	-	-	-	1,790	-	-	< 50a	72.4	17	21.8	454	16.4	233	< 2	< 2.0	70	< 0.40	< 40	0.18	12	7.61	< 10a	< 1	20	-	19.9	20	< 6.0	< 0.10	4,100	0.1	11.2	< 10	-	151	4.64	< 10
	GL23-1-20130627	2013 06 27	-	1,170	-	-	-	1,750	-	-	< 10a	82.6	35	233	253	16.5	238	< 0.50	< 1.0	72	< 5.0a	< 100	0.112	< 0.50	1.05	1.6	< 1.0	< 50	< 0.20	16.5	11.1	< 1.0	< 0.050	3,670	< 0.20	< 30	< 50	-	141	< 30	< 5.0
	GL23-1-20140603	2014 06 03	-	1,080	-	-	-	1,710	-	-	< 10a	75.8	< 30	215	185	14.7	219	< 0.50	< 1.0	67	< 5.0a	< 100	0.345	< 0.50	0.77	1.5	< 1.0	< 50	< 0.20	18.6	9.5	< 1.0	< 0.050	3,430	< 0.20	< 30	< 50	-	143	< 30	< 5.0

Associated CARO file(s): 8052631, 8052802, 8060237, 8060737, 8061100, 8081412, 8091680, 8092458, 8092618, 9052219, 9052399, 9052558, 9052754, 9052937, 9060273, 9091657, 9092001, 9092208, 9092404, 9120616.
Associated Exova file(s): 622178, 653600, 712940, 714233, 714243, 756693, 756810, 757047, 811364, 811710, 812030, 812741, 812985, 846260, 878316, 879073, 909346, 909448, 909654.
All terms defined within the body of Keltech's report.

\- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

Table 2: Historical Summary of Analytical Results For Groundwater -Metals

			Physical Parameters								Dissolved Metals																														
Sample Location	Sample ID	Sample Date	pH	Total Hardness	pH (field)	Conductivity	Field Conductivity	Total Dissolved Solids	Dissolved Organic Carbon	Phosphate	Dissolved Aluminum	Dissolved Calcium	Dissolved Iron	Dissolved Magnesium	Dissolved Manganese	Dissolved Potassium	Dissolved Sodium	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Lead	Lithium	Mercury	Molybdenum	Nickel	Selenium	Silver	Strontium	Thallium	Tin	Titanium	Tungsten	Uranium	Vanadium	Zinc
		(yyyy mm dd)	pH	mg/L	pH	µS/cm	µS/cm	mg/L	mg/L	mg/L	µg/L	mg/L	µg/L	mg/L	µg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
GL23-1 (Cont'd)	GL23-1-20141124	2014 11 24	-	1,210	-	-	-	1,790	-	-	< 10a	87.1	39	240	208	17.5	249	< 0.50	< 1.0	75	< 5.0a	< 100	0.313	< 0.50	0.7	1.6	< 1.0	< 50	< 0.20	16.8	9.5	< 1.0	< 0.050	3,990	< 0.20	< 30	< 50	-	139	< 30	< 5.0
	GL23-1-20150608	2015 06 08	7.67	1,130	-	-	-	1,700	-	-	< 10	82.6	< 30	224	19	15.3	211	< 0.50	< 1.0	72	< 5.0a	< 100	0.327	< 0.50	< 0.50	2.4	< 1.0	< 50	< 0.20	15.8	9	< 1.0	< 0.050	3,870	< 0.010	< 30	< 50	-	116	< 30	< 5.0
	GL23-1-20151104	2015 11 04	7.68	1,050	-	-	-	1,570	-	-	< 10	79	< 30	208	642	14.8	194	< 0.50	< 1.0	67	< 5.0a	< 100	0.307	< 0.50	0.56	1.2	< 1.0	< 50	< 0.20	17.3	13.4	< 1.0	< 0.050	3,700	0.011	< 30	< 50	-	99.1	< 30	< 5.0
	GL23-1-20160526	2016 05 26	7.99	1,080	-	-	-	1,570	-	-	< 10	78.4	< 30	215	77	14.9	203	< 0.50	< 1.0	70	< 5.0a	< 100	0.312	< 0.50	< 0.50	3	< 1.0	< 50	< 0.20	13.8	10.5	< 1.0	< 0.050	3,750	< 0.010	< 30	< 50	-	84.1	< 30	< 5.0
	GL23-1-20160531	2016 05 31	7.64	-	-	-	-	1,580	-	-	< 50	84.8	< 100	228	25	-	205	< 1	< 5	70	< 1	40	0.4	< 5	< 0.5	< 2a	< 1	39	-	17	9	< 5	< 0.5	4,040	< 0.2	-	< 50	-	90	< 10	< 40
	GL23-1-20170525	2017 05 25	8.45	1,150	-	-	-	1,610	-	-	< 10	82.6	< 30	229	33	14.9	191	< 0.50	< 1.0	72	< 5.0a	< 100	0.216	< 0.50	< 0.50	3.5	< 1.0	< 50	< 0.20	13.6	9.7	< 1.0	< 0.050	4,100	< 0.010	< 30	< 50	-	74.7	< 30	< 5.0
	DUP3-20170525	Duplicate	8.41	1,150	-	-	-	1,580	-	-	< 10	85	< 30	228	43	15.8	203	< 0.50	< 1.0	78	< 5.0a	< 100	0.219	< 0.50	< 0.50	3.4	< 1.0	< 50	< 0.20	13.7	9.8	< 1.0	< 0.050	4,270	< 0.010	< 30	< 50	-	73.4	< 30	< 5.0
	QA/QC RPD%		0	0	-	-	-	2	-	-	*	3	*	0	26	6	6	*	*	8	*	*	1	*	*	3	*	*	*	1	1	*	*	4	*	*	*	-	2	*	*
	GL23-1-180529	2018 05 29	7.86	1,260	7.22	-	2,014	1,560	14.3	0.0062	< 5.0	86.2	< 10	254	19.3	15.0	201	< 0.20	< 0.50	63.0	< 0.10	29.9	0.100	< 0.50	0.35	20.0	0.60	38.9	< 0.010	12.4	10.0	< 0.50	< 0.050	4,000	< 0.020	0.82	< 5.0	< 1.0	77.7	< 1.0	< 4.0
	GL23-1-190523	2019 05 23	8.01	1,170	7.7	-	2332	1,590	14.8	< 0.0050	< 5.0	87.3	< 10	231	5.34	15.7	199	< 0.20	0.56	71.7	< 0.10	34.4	0.076	0.80	0.35	1.95	< 0.20	42.5	< 0.010	13.6	10.6	< 0.50	< 0.050	4,940	< 0.020	< 0.20	< 5.0	< 1.0	80.5	< 1.0	< 4.0
	GL23-1-190917	2019 09 17	7.78	1,130	-	-	-	1,610	16.4	-	< 5.0	85.2	< 10	222	455	14.5	191	< 0.20	0.52	72.8	< 0.10	31.0	0.409	1.23	0.42	2.72	< 0.20	39.8	-	16.7	13.5	< 0.50	< 0.050	4,780	< 0.020	< 0.20	< 5.0	< 1.0	75.6	1.1	< 4.0
	GL23-1-200617	2020 06 17	7.97	1,000	6.95	-	2,150	1,530	14.6	-	< 1.0	85.7	< 2.0	192	316	13.7	178	< 0.050	0.581	64.8	< 0.010	30.4	0.0823	0.11	0.746	1.97	< 0.050	36.7	< 0.010	15.0	10.4	0.34	< 0.010	4,430	0.0073	< 0.050	< 0.20	< 0.20	68.9	0.97	1.2
	GL23-1-200910	2020 09 10	7.98	1,130	-	-	-	1,660	14.8	-	1.2	101	< 2.0	213	870	14.9	189	< 0.050	0.561	69.6	< 0.010	29.5	0.321	0.15	0.690	3.02	< 0.050	41.7	-	17.0	13.3	0.26	< 0.010	4,640	0.0139	< 0.050	< 0.20	< 0.20	74.7	0.79	2.2
	GL23-1-210513	2021 05 13	7.85	1,080	7.06	-	-	-	-	-	< 1.0	82.7	< 2.0	212	165	14.8	191	< 0.050	0.685	67.4	< 0.010	28.9	0.0358	0.33	0.574	1.68	< 0.050	36.7	< 0.010	13.8	9.61	0.29	< 0.010	3,980	< 0.0040	< 0.050	< 0.20	< 0.20	68.5	0.76	< 1.0
	DUP 1-210513	Duplicate	7.73	1,090	7.06	-	-	-	-	-	< 1.0	90.1	< 2.0	210	146	14.7	189	< 0.050	0.672	65.9	< 0.010	31.3	0.0323	0.35	0.523	1.97	0.075	40.6	< 0.010	13.6	9.58	0.26	< 0.010	4,170	< 0.0040	< 0.050	< 0.20	< 0.20	74.6	0.60	< 1.0
	QA/QC RPD%		2	1	0	-	-	-	-	-	*	9	*	1	12	1	1	*	2	2	*	8	10	*	9	16	*	10	*	1	0	*	*	5	*	*	*	*	9	*	*
GL24-1	GL24-1-20100811	2010 08 11	-	1,200	-	-	-	2,110	-	-	94	93	190	242	1,400	15	254	< 2	2	80	< 0.4	90	0.19	< 4	1.4	< 10a	< 1	20	-	38	20	< 6	< 0.1	4,170	< 0.1	< 1	< 100	-	94	2	< 10
	GL24-1-20160531	2016 05 31	7.64	-	-	-	-	1,570	-	-	< 50	73.6	< 100	203	7	-	210	< 1	< 5	70	< 1	100	< 0.1a	< 5	< 0.5	< 2a	< 1	25	-	11	3	9	< 0.5	2,470	< 0.2	-	< 50	-	75.9	< 10	< 40
	GL24-1-180612	2018 06 12	7.63	1,300	-	-	-	2,380	-	0.0083	< 5.0	91.6	< 10	260	342	12.6	391	< 0.20	1.60	61.7	< 0.10	78.6	0.342	< 0.50	1.95	5.47	< 0.20	43.1	< 0.010	24.9	15.1	2.39	< 0.050	3,760	< 0.020	< 0.20	< 5.0	< 1.0	154	2.8	< 4.0
	GL24-1-20180927	2018 09 27	-	1,760	-	-	-	-	-	-	< 5.0	130	< 10	349	810	15.2	516	0.21	1.67	83.3	< 0.10	89.1	0.256	< 0.50	2.12	6.55	< 0.20	46.2	< 0.010	22.6	19.8	6.22	< 0.050	5,100	0.029	< 0.20	< 5.0	-	192	3.3	< 4.0
	GL24-1-190917	2019 09 17	7.92	1,100	-	-	-	1,870	9.09	-	36.6	76.8	23	220	104	10.9	308	< 0.20	1.66	46.1	< 0.10	95.9	0.139	1.51	0.90	2.51	< 0.20	42.7	-	24.2	8.71	2.49	< 0.050	3,320	0.020	< 0.20	< 5.0	< 1.0	126	3.0	45.2
	GL24-1-200910	2020 09 10	8.04	856	-	-	-	1,750	6.56	-	< 1.0	64.6	< 2.0	169	24.7	9.03	226	0.148	1.18	35.2	< 0.010	77.2	0.105	0.35	0.555	1.85	< 0.050	31.6	-	23.6	4.64	2.35	< 0.010	2,620	0.0154	0.053	0.88	< 0.20	101	0.84	1.1
GL25-1	GL25-1-20091117	2009 11 17	-	1,540	-	-	-	-	-	-	< 50a	246	< 100	223	3,030	13.3	242	< 2	2	80	< 0.4	< 40	0.2	< 4	6.7	< 10a	< 1	20	-	20	20	< 6	< 0.10	7,760	0.18	< 1	< 10	-	49	< 1	10
	GL25-1-20100812	2010 08 12	-	1,480	-	-	-	2,630	-	-	221	209	< 100	233	2,330	12.5	234	< 2	< 2	50	< 0.4	< 40	0.1	10	5.3	< 10a	< 1	20	-	7	20	< 6	< 0.1	7,640	< 0.1	< 1	< 10	-	8	4	< 10
GL26-1	GL26-1-20091112	2009 11 12	-	654	-	-	-	-	-	-	< 50a	159	460	62.7	1,730	15.2	167	2	42	20	0.6	< 40	0.28	< 4	7	< 10a	< 1	180	-	275	30	< 6	< 0.10	1,670	< 0.1	< 1	< 10	-	52	< 1	< 10
	GL26-1-20100812	2010 08 12	-	527	-	-	-	1,230	-	-	< 50a	128	850	50.5	1,800	13.9	135	< 2	33	20	0.7	< 40	< 0.1	6	0.8	< 10a	< 1	200	-	56	< 10	< 6	< 0.1	1,670	< 0.1	< 1	< 10	-	12	2	10
	GL30-5-20100812	Duplicate	-	575	-	-	-	1,250	-	-	62	140	1,070	55.1	1,830	15.4	152	< 2	26	20	1.2	< 40	< 0.10	6	0.6	< 10a	< 1	190	-	51	< 10	< 6	< 0.1	1,670	< 0.1	< 1	< 10	-	11	2	10
	QA/QC RPD%		-	9	-	-	-	2	-	-	*	9	23	9	2	10	12	*	24	0	53	*	*	0	29	*	*	5	-	9	*	*	*	0	*	*	*	-	9	0	0
GL26-2	GL26-2-20091116	2009 11 16	-	629	-	-	-	-	-	-	< 50a	122	960	78.8	2,440	8.8	185	< 2	5	90	< 0.4	< 40	< 0.1	< 4	4	< 10a	< 1	60	-	25	< 10	< 6	< 0.10	1,550	< 0.1	< 1	< 10	-	27	1	< 10
	GL26-2-20100812	2010 08 12	-	491	-	-	-	1,210	-	-	83	93.9	890	62.3	1,130	8.3	141	< 2	5	60	< 0.4	< 40	< 0.10	5	2.6	< 10a	< 1	60	-	24	< 10	< 6	< 0.1	1,590	< 0.1	< 1	< 10	-	27	2	< 10
	GL26-2-20110629	2011 06 29	-	634	-	-	-	1,160	-	-	< 5	120	2,230	81.4	1,140	7.4	173	< 0.2	7	58	< 0.04	16	0.01	3.8	2.26	2	< 0.1	64	-	16.4	4	8.7	< 0.01	2,120	< 0.01	< 0.1	< 10	-	24.1	1.2	2
	GL26-2-20120625	2012 06 25	-	670	-	-	-	1,210	-	-	< 50a	127	2,280	86	1,060	8	182	< 2	4	50	< 0.4	< 40	< 0.10	< 4	1.6	< 10a	< 1	60	-	11	< 10	< 6	< 0.10	1,720	< 0.1	< 1	< 100	-	26	< 1	< 10
	GL26-2-20121204	2012 12 04	-	572	-	-	-	1,200	-	-	< 50a	108	2,070	73.6	883	7.7	172	< 2.0	5.2	50	< 0.40	< 40	< 0.10	5.6	7.16	< 10a	< 1.0	50	-	14.1	< 10	< 6.0	< 0.10	1,700	< 0.10	< 1.0	< 10	-	26.1	1.63	< 10
	GL26-2-20130626	2013 06 26	-	673	-	-	-	1,170	-	-	< 10a	129	2,300	85.5	731	8.7	189	< 0.50	4.3	37	< 5.0a	< 100	< 0.050	< 0.50	1.09	< 1.0a	< 1.0	70	< 0.20	19	< 5.0	< 1.0	< 0.050	1,610	< 0.20	< 30	< 50	-	28.2	< 30	< 5.0
	GL26-2-20131114	2013 11 14	-	639	-	-	-	1,160	-	-	< 10a	120	1,360	82.2	679	8.3	171	< 0.50	2.9	33	< 5.0a	< 100	< 0.050	< 0.50	0.69	< 1.0a	< 1.0	64	< 0.20	19.5	< 5.0	< 1.0	< 0.050	1,570	< 0.20	< 30	< 50	-	25.7	< 30	< 5.0
	GL26-2-20140605	2014 06 05	-	665	-	-	-	1,130	-	-	< 10a	126	1,530	85.1	698	8.9	191	< 0.50	3	37	< 5.0a	< 100	< 0.050	< 0.50	0.67	< 1.0a	< 1.0	73	< 0.20	18.3	< 5.0	< 1.0	< 0.050	1,610	< 0.20	< 30	< 50	-	24.7	< 30	< 5.0
	DUP2-20140605	Duplicate	-	668	-	-	-	1,130	-	-	< 10a	128	1,550	84.6	705	8.9	193	< 0.50	2.9	37	< 5.0a	< 100	< 0.050	< 0.50	0.6	< 1.0a	< 1.0	74	< 0.20	17.8	< 5.0	< 1.0	< 0.050	1,610	< 0.20	< 30	< 50	-	24.8	< 30	< 5.0
	QA/QC RPD%		-	0	-	-	-	0	-	-	*	2	1	1	1	*	1	*	*	*	*	*	*	*	*	*	*	*	*	3	*	*	*	0	*	*	*	-	0	*	*
	GL26-2-20141117	2014 11 17	-	638	-	-	-	1,120	-	-	< 10a	121	877	81.7	658	8.5	176	< 0.50	1.8	32	< 5.0a	< 100	< 0.050	< 0.50	0.54	< 1.0a	< 1.0	73	< 0.20	20.4	< 5.0	< 1.0	< 0.050	1,610	< 0.20	< 30	< 50	-	23.8	< 30	< 5.0
	GL26-2-20150608	2015 06 08	7.58	643	-	-	-	1,120	-	-	< 10	122	276	82	615	8.3	189	< 0.50	< 1.0	32	< 5.0a	< 100	< 0.050	< 0.50	0.58	< 1.0a	< 1.0	75	< 0.20	17.9	< 5.0	< 1.0	< 0.050	1,620	< 0.010	< 30	< 50	-	26.2	< 30	< 5.0
	GL26-2-20151104	2015 11 04	7.73	617	-	-	-	1,170	-	-	< 10	121	921	76.2	597	8.5	174	< 0.50	1.8	28	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	69	< 0.20	22	< 5.0	< 1.0	< 0.050	1,620	< 0.010	< 30	< 50	-	24.9	< 30	< 5.0
GL26-3	GL26-3-20091111	2009 11 11	-	682	-	-	-	-	-	-	< 50a	99.8	1,470	105	3,960	8.1	259	< 2	5	100	< 0.4	< 40	0.13	< 4	11.7	< 10a	< 1	20	-	24	< 10	< 6	< 0.10	1,710	< 0.1	< 1	< 10	-	45	1	30
	GL26-3-20100812	2010 08 12	-	538	-	-	-	1,500	-	-	62	75.3	170	84.9	1,090	8	197	< 2	2	70	< 0.4	< 40	< 0.1	4	2	< 10a	< 1	30	-	40	< 10	< 6	< 0.1	1,700	< 0.1	< 1	< 10	-	52	3	< 10
GL27-1	GL27-1-20091116	2009 11 16	-	94	-	-	-	-	-	-	< 50a	14.5	340	14	243	14.6	632	< 2	95	410	< 0.4	< 40	0.26	< 4	< 0.2	< 10a	< 1	210	-	243	< 10	< 6	< 0.10	2,970	< 0.1	< 1	< 10	-	< 4	3	< 10
	GL27-1-20100812	2010 08 12	-	67	-	-	-	1,650	-	-	129	10	700	10.2	123	14.6	645	< 2	68	440	< 0.4	50	< 0.10	9	< 0.2	< 10a	< 1	210	-	174	< 10	< 6	< 0.1	2,920	< 0.1	< 1	< 10	-	< 4	4	20
	GL27-1-20110629	2011 06 29	-	88	-	-	-	1,600	-	-	21	14	1,400	12.9	202	13.3	622	1.7	44.9	452	< 0.04	46	0.07	11	0.43	1	< 0.1	187	-	54.1	< 1	8.1	< 0.01	3,230	< 0.01	< 0.1	< 10	-	1	3.8	< 1
	GL 27-1-20120626	2012 06 26	-	94	-	-	-	1,660	-	-	< 50a	14	1,500	14	140	13	655	< 2	38	400	< 0.4	80	< 0.1	36	< 0.2	< 10a	< 1	190	-	48	< 10	< 6	< 0.1	3,020	< 0.1	< 1	< 100	-	< 4	4	< 10
	GL27-1-20121204	2012 12 04	-	73	-	-	-	1,670	-	-	< 50a	11.6	482	10.6	126	12.7	648	< 2.0	32	380	< 0.40	60	< 0.10	13.3	3.62	< 10a	< 1.0	160	-	43.2	< 10	< 6.0	< 0.10	3,040	< 0.10	< 1.0	< 10	-	< 4.0	4.14	< 10
	GL27-1-20130626	2013 06 26	-	88.4	-	-	-	1,730	-	-	< 15a	13.5	988	13.3	136	14.1	665	0.63	51.3	415	< 5.0a	< 100	< 0.25a	< 2.5	< 0.50	< 2.5a	< 1.0	220	< 0.20	72.6	< 5.0	< 5.0	0.103	2,670	< 0.50	< 30	< 50	-	1.54	< 30	< 5.0
	GL27-1-20131113	2013 11 13	-	93.5	-	-	-	1,630	-	-	< 15a	14.5	852	13.9	146	14.1	704	< 0.50	35.5	422	< 5.0a	< 100	< 0.25a	< 2.5	< 0.50	< 2.5a	< 1.0	219	< 0.20	56.6	< 5.0	< 5.0	< 0.050	2,960	< 0.50	< 30	< 50	-	1.41	< 30	< 5.0
	GL27-1-20140605	2014 06 05	-	94.4	-	-	-	1,630	-	-	< 10a	14.6	1,080	14.1	129	14.9	704	< 0.50	34.8	439	< 5.0a	< 100	< 0.10	< 1.0	< 0.50	< 1.0a	< 1.0	222	< 0.20	44.5	< 5.0	< 2.0	< 0.050	3,060	< 0.20	< 30	< 50	-	1.08	< 30	< 5.0

Associated CARO file(s): 8052631, 8052802, 8060237, 8060737, 8061100, 8081412, 8091680, 8092458, 8092618, 9052219, 9052399, 9052558, 9052754, 9052937, 9060273, 9091657, 9092001, 9092208, 9092404, 9120616.
Associated Exova file(s): 622178, 653600, 712940, 714233, 714243, 756693, 756810, 757047, 811364, 811710, 812030, 812741, 812985, 846260, 878316, 879073, 909346, 909448, 909654.
All terms defined within the body of Keltech's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
\- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

Table 2: Historical Summary of Analytical Results For Groundwater -Metals

			Physical Parameters								Dissolved Metals																														
Sample Location	Sample ID	Sample Date	pH	Total Hardness	pH (field)	Conductivity	Field Conductivity	Total Dissolved Solids	Dissolved Organic Carbon	Phosphate	Dissolved Aluminum	Dissolved Calcium	Dissolved Iron	Dissolved Magnesium	Dissolved Manganese	Dissolved Potassium	Dissolved Sodium	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Lead	Lithium	Mercury	Molybdenum	Nickel	Selenium	Silver	Strontium	Thallium	Tin	Titanium	Tungsten	Uranium	Vanadium	Zinc
		(yyyy mm dd)	pH	mg/L	pH	µS/cm	µS/cm	mg/L	mg/L	mg/L	µg/L	mg/L	µg/L	mg/L	µg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
GL27-1	GL27-1-20141118	2014 11 18	-	86.8	-	-	-	1,640	-	-	< 15a	13.4	882	12.9	117	13	619	< 0.50	28	419	< 5.0a	< 100	< 0.25a	< 2.5	< 0.50	< 2.5a	< 1.0	207	< 0.20	34.9	< 5.0	< 5.0	< 0.050	2,900	< 0.50	< 30	< 50	-	1.08	< 30	< 5.0
(Cont'd)	GL27-1-20150610	2015 06 10	8.41	87.1	-	-	-	1,470	-	-	< 10	13.7	878	12.9	110	13.9	706	< 0.50	26.5	406	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	204	< 0.20	42.6	< 5.0	< 1.0	< 0.050	2,930	< 0.050	< 30	< 50	-	1.23	< 30	< 5.0
	GL27-1-20151104	2015 11 04	8.18	86.6	-	-	-	1,610	-	-	< 10	13.4	39	12.9	106	13.2	626	< 0.50	20.5	365	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	198	< 0.20	36.2	< 5.0	< 1.0	< 0.050	2,770	< 0.020	< 30	< 50	-	1.02	< 30	< 5.0
	GL27-1-20160526	2016 05 26	8.27	91.8	-	-	-	1,620	-	-	< 10	13.9	662	13.8	102	14.1	708	< 0.50	17.4	432	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	221	< 0.20	43.2	< 5.0	< 1.0	< 0.050	2,900	< 0.050	< 30	< 50	-	1.02	< 30	< 5.0
	DUP-1-20160526	Duplicate	8.31	85.7	-	-	-	1,690	-	-	< 10	13.1	637	12.9	99	13.4	684	< 0.50	17.9	412	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	212	< 0.20	43.5	< 5.0	< 1.0	< 0.050	2,810	< 0.050	< 30	< 50	-	1.02	< 30	< 5.0
	QA/QC RPD%		0	7	-	-	-	4	-	-	*	6	4	7	3	5	3	*	3	5	*	*	*	*	*	*	*	4	*	1	*	*	*	3	*	*	*	-	0	*	*
	GL27-1-20160919	2016 09 19	8.34	90.8	-	-	-	1,630	-	-	< 10	14.2	695	13.5	104	13.5	633	< 0.50	17.8	433	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	204	< 0.20	37.2	< 5.0	< 1.0	< 0.050	2,970	< 0.050	< 30	< 50	-	0.9	< 30	< 5.0
	GL27-1-20170525	2017 05 25	8.83	95.2	-	-	-	1,640	-	-	< 10	14.5	713	14.3	101	14.2	710	< 0.50	33.1	451	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	233	< 0.20	79	< 5.0	< 1.0	< 0.050	3,120	< 0.050	< 30	< 50	-	0.94	< 30	< 5.0
	GL27-1-20170925	2017 09 25	8.14	92	-	-	-	1,650	-	-	< 10	14.1	690	13.8	95	13.7	645	< 0.50	17	438	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	220	< 0.20	44.9	< 5.0	< 1.0	< 0.050	2,960	< 0.020	< 30	< 50	-	0.82	< 30	< 5.0
	GL27-1-180815	2018 08 15	7.98	89.6	7.63	-	1,870	1,680	2.57	0.0407	< 5.0	14.9	521	12.7	82.1	12.4	584	< 0.20	28.7	470	< 0.10	75.0	0.038	< 0.50	< 0.10	< 0.40a	< 0.20	217	< 0.010	51.2	< 0.40	< 0.50	< 0.050	3,200	< 0.020	< 0.20	< 5.0	< 1.0	1.40	< 1.0	< 4.0
	GL27-1-180919	2018 09 19	7.91	99.9	7.62	-	2,388	1,620	3.45	0.0445	< 5.0	17.1	633	13.8	83.2	13.0	650	< 0.20	23.7	479	< 0.10	64.6	0.010	< 0.50	< 0.10	< 0.40a	< 0.20	228	< 0.010	29.2	< 0.40	< 0.50	< 0.050	3,180	< 0.020	< 0.20	< 5.0	1.2	0.965	< 1.0	< 4.0
	GL27-1-190527	2019 05 27	8.20	90.6	7.67	-	2620	1,430	2.89	0.0794	7.8	14.8	630	13.0	91.5	12.6	602	< 0.20	18.0	472	< 0.10	70.0	< 0.010	0.86	< 0.10	< 0.40a	< 0.20	216	< 0.010	20.9	< 0.40	< 0.50	< 0.050	3,220	< 0.020	< 0.20	< 5.0	1.4	0.983	< 1.0	< 4.0
	GL27-1-190919	2019 09 19	8.22	92.8	7.48	-	2471	1,610	2.84	-	< 5.0	15.3	560	13.2	90.6	13.2	605	< 0.20	16.4	443	< 0.10	69.6	< 0.010	< 0.50	< 0.10	< 0.10	< 0.20	212	< 0.010	7.11	< 0.40	< 0.50	< 0.050	3,070	< 0.020	< 0.20	< 5.0	1.2	0.933	< 1.0	< 4.0
	GL27-1-200608	2020 06 08	8.31	93.2	7.5	-	2,216	1,530	2.12	-	2.8	16.7	636	12.5	90.8	13.5	712	< 0.050	17.7	474	0.025	60.4	0.0051	0.80	0.0068	0.46	< 0.050	194	< 0.010	16.7	0.067	< 0.10	< 0.010	3,320	< 0.0040	< 0.050	0.24	1.35	0.666	0.31	1.0
	GL27-1-201022	2020 10 22	8.10	85.2	7.63	-	2,525	1,600	2.79	-	< 1.0	14.2	551	12.1	82.8	11	566	< 0.050	8.73	424	0.028	64.7	0.0099	< 0.10	0.0068	< 0.10	< 0.050	200	< 0.010	13.4	< 0.040	< 0.10	< 0.010	2,880	< 0.0040	< 0.050	< 0.20	1.25	0.585	0.27	< 1.0
	GL27-1-210602	2021 06 02	8.16	103	7.47	-	-	-	-	-	< 1.0	17.4	112	14.4	116	13.4	672	< 0.050	14.9	458	0.015	68.2	0.0027	0.12	0.0088	< 0.10	< 0.050	241	< 0.010	14.5	< 0.040	< 0.10	< 0.010	3,060	< 0.0040	< 0.050	< 0.20	1.28	0.741	< 0.20	< 1.0
	GL27-1-210924	2021 09 24	8.21	107	7.47	-	-	-	-	-	1.3	18.1	533	15	108	15	721	0.065	12.2	528	0.023	155	< 0.0020	0.27	0.0151	0.19	< 0.050	231	< 0.010	9.23	0.080	< 0.10	< 0.010	2,900	< 0.0040	0.083	0.28	1.38	0.824	< 0.20	1.0
GL27-2	GL27-1-20111217	2011 12 17	-	83	-	-	-	1,630	-	-	< 50a	13.6	1,140	12	178	11.2	604	2	59	410	< 0.4	70	0.13	8	< 0.2	< 10a	< 1	230	-	68	< 10	< 6	< 0.10	3,180	0.23	< 1	< 10	-	< 4	2	< 10
	GL27-2-20091116	2009 11 16	-	3,760	-	-	-	-	-	-	458	300	2,420	731	5,380	33	2,720	< 2	6	60	< 0.4	< 40	0.1	< 4	19.9	< 10a	< 1	50	-	59	30	< 6	< 0.10	15,000	0.28	< 1	15	-	90	3	< 10
	GL27-2-20100812	2010 08 12	-	3,540	-	-	-	14,300	-	-	410	298	690	679	1,940	40	2,900	< 2	7	40	< 0.4	60	< 0.1	8	9.2	< 10a	< 1	80	-	53	20	< 6	< 0.1	16,900	0.17	< 1	15	-	91	9	< 10
GL27-3	GL27-3-20091112	2009 11 12	-	5,800	-	-	-	-	-	-	< 50a	354	1,440	1,200	996	26	3,300	< 2	9	20	< 0.4	< 40	0.17	< 4	7	< 10a	< 1	70	-	51	20	< 6	< 0.10	11,500	0.22	< 1	< 10	-	94	1	20
	GL27-3-20100812	2010 08 12	-	4,700	-	-	-	17,800	-	-	131	332	2,440	940	588	31	3,190	< 2	10	20	< 0.4	< 40	< 0.10	8	3.8	< 10a	< 1	80	-	53	10	6	< 0.1	11,500	< 0.1	< 1	< 10	-	70	3	10
	GL27-3-20110629	2011 06 29	-	5,170	-	-	-	16,700	-	-	32	370	1,690	1,030	374	25.6	3,070	< 0.2	1.7	14	< 0.04	15	0.1	4.8	4.04	6	< 0.1	71	-	64.4	10	41.6	< 0.01	11,000	0.02	< 0.1	< 10	-	66	1.8	5
	GL27-3-20111217	2011 12 17	-	4,500	-	-	-	17,100	-	-	< 50a	320	1,270	900	270	23.4	2,800	< 2	7	< 10	< 0.4	< 40	0.13	8	2.3	10	< 1	100	-	69	20	< 6	< 0.10	11,600	0.43	< 1	< 10	-	98	6	< 10
	GL27-3-20120625	2012 06 25	-	5,060	-	-	-	16,400	-	-	< 50a	359	2,190	1,010	350	24	3,050	< 2	7	10	< 0.4	< 40	< 0.1	< 4	3.2	< 10a	< 1	70	-	58	10	< 6	< 0.10	11,400	< 0.1	< 1	< 100	-	75	1	20
	GL27-3-20121204	2012 12 04	-	4,480	-	-	-	15,900	-	-	< 50a	315	2,540	897	253	21.6	2,960	< 2.0	7.5	20	< 0.40	< 40	< 0.10	7.5	2.86	< 10a	< 1	70	-	62.3	10	6.2	< 0.10	9,440	< 0.10	< 1.0	< 100	-	97.4	2.16	< 10
	GL27-3-20130626	2013 06 26	-	5,280	-	-	-	17,200	-	-	< 60a	382	2,600	1,050	563	26	3,760	< 2.0	5.9	< 50	< 25a	< 500	< 1.0a	< 10a	2.6	< 10a	< 1.0	73	< 0.20	58.4	< 10	< 20	0.25	10,100	< 2.0	< 150	< 50	-	87.3	< 150a	< 25
	GL27-3-20131113	2013 11 13	-	4,890	-	-	-	16,200	-	-	< 60a	363	2,880	967	372	26	3,190	< 2.0	6.4	< 50	< 25a	< 500	< 1.0a	< 10a	< 2.0	< 10a	< 1.0	145	< 0.20	59.1	< 10	< 20	< 0.20	10,100	< 2.0	< 150	< 50	-	85.9	< 150a	< 25
	GL27-3-20140605	2014 06 05	-	5,120	-	-	-	16,300	-	-	< 60a	359	1,840	1,030	479	25	3,440	< 2.0	5.4	< 50	< 25a	< 500	< 1.0a	< 10a	< 2.0	< 10a	< 1.0	85	< 0.20	56.7	< 10	< 20	< 0.20	10,200	< 2.0	< 150	< 50	-	82.4	< 150a	< 25
	GL27-3-20141118	2014 11 18	-	4,560	-	-	-	13,300	-	-	< 30a	326	1,620	910	331	24	2,990	< 1.0	4.3	< 50	< 25a	< 500	< 0.50a	< 5.0	1.4	< 5.0a	< 1.0	73	< 0.20	58.6	< 5.0	< 10	< 0.10	9,270	< 1.0	< 150	< 50	-	84	< 150a	< 25
	GL27-3-20150610	2015 06 10	8.07	4,990	-	-	-	17,900	-	-	< 20	354	2,190	997	438	24	3,210	< 2.0	6	< 50	< 25a	< 500	< 0.10	< 2.0	< 2.0	< 4.0a	< 1.0	63	< 0.20	52.9	< 10	< 1.0	< 0.20	10,200	< 0.20	< 150	< 50	-	72.1	< 150a	< 25
	GL27-3-20151104	2015 11 04	7.88	4,380	-	-	-	16,000	-	-	< 10	316	1,190	873	298	22	2,780	< 1.0	3.3	< 50	< 25a	< 500	0.17	< 1.0	1.2	< 2.0a	< 1.0	72	< 0.20	57.6	< 5.0	< 1.0	< 0.10	9,000	< 0.10	< 150	< 50	-	79.4	< 150a	< 25
	GL27-3-20160524	2016 05 24	7.85	4,850	-	-	-	16,200	-	-	< 20	342	2,060	970	357	24	3,050	< 2.0	5	< 50	< 25a	< 500	0.12	< 2.0	< 2.0	< 4.0a	< 1.0	67	< 0.20	53.5	< 10	< 1.0	< 0.20	9,350	< 0.20	< 150	< 50	-	73.2	< 150a	< 25
	GL27-3-20170925	2017 09 25	7.82	5,080	-	-	-	15,200	-	-	< 10	361	2,630	1,010	435	25	3,400	< 1.0	5.8	< 50	< 25a	< 500	0.066	< 1.0	1.7	< 2.0a	< 1.0	69	< 0.20	49.8	< 5.0	< 1.0	< 0.10	9,860	< 0.10	< 150	< 50	-	79.4	< 150a	< 25
	GL27-3-180815	2018 08 15	7.71	5,450	7.91	-	9,589	18,000	9.12	< 0.500	< 5.0	392	2,260	1,090	688	27.7	3,000	< 0.20	5.73	14.6	< 0.10	42.9	0.127	< 0.50	2.83	< 0.40a	< 0.20	78.2	< 0.010	67.0	4.50	< 0.50	< 0.050	11,100	< 0.020	< 0.20	< 5.0	< 1.0	86.2	< 1.0	< 4.0
	GL27-3-190527	2019 05 27	7.90	5,350	7.45	-	16199	13,500	7.11	< 0.500	< 5.0	372	< 10	1,070	203	28.6	3,430	0.39	1.45	9.1	< 0.10	34.9	0.809	1.40	0.79	2.10	< 0.20	93.9	< 0.010	73.8	3.09	< 0.50	< 0.050	12,300	< 0.020	< 0.20	< 5.0	< 1.0	91.2	< 1.0	8.6
	GL27-3-200608	2020 06 08	7.88	5,540	7.3	-	15,172	18,200	6.30	-	1.4	439	4,610	1,080	555	42	3,830	< 0.050	9.61	9.77	0.014	33.7	0.0349	0.58	2.10	5.33	< 0.050	90.2	< 0.010	69.3	3.26	0.42	< 0.010	12,500	0.0162	< 0.050	0.41	< 0.20	73.6	0.23	1.1
	GL27-3-210603	2021 06 03	7.95	6,070	7.38	-	-	-	-	-	2.2	441	4,450	1,210	582	31.2	3,630	< 0.050	10.1	11.4	< 0.010	30.4	0.0214	0.27	2.26	0.73	< 0.050	70.5	< 0.010	64.8	3.50	0.77	< 0.010	11,800	0.0140	< 0.050	0.26	< 0.20	66.3	< 0.20	< 1.0
GL27-4	GL27-4-20100812	2010 08 12	-	4,380	-	-	-	13,400	-	-	< 50a	420	3,510	809	8,160	121	2,480	< 2	12	90	< 0.4	190	< 0.10	31	6.2	< 10a	< 1	20	-	2	20	7	< 0.1	10,400	< 0.1	< 1	30	-	20	24	< 10
GL28-1	GL28-1-20091116	2009 11 16	-	1,680	-	-	-	-	-	-	< 50a	211	390	282	1,390	11.2	550	< 2	3	50	< 0.4	< 40	< 0.1	< 4	5.4	< 10a	< 1	80	-	14	10	< 6	< 0.10	6,000	< 0.1	< 1	< 10	-	113	< 1	10
	GL30-5-20091116	Duplicate	-	1,720	-	-	-	-	-	-	62	218	990	286	1,140	11.5	556	< 2	4	50	< 0.4	< 40	< 0.1	< 4	4.1	< 10a	< 1	110	-	14	10	< 6	< 0.10	6,150	< 0.1	< 1	< 10	-	119	< 1	20
	QA/QC RPD%		-	2	-	-	-	-	-	-	*	3	87	1	20	3	1	*	29	0	*	*	*	*	27	*	*	32	-	0	0	*	*	2	*	*	*	-	5	*	67
	GL28-1-20100812	2010 08 12	-	1,600	-	-	-	3,990	-	-	< 50a	171	660	284	804	12.5	571	< 2	3	40	< 0.4	< 40	< 0.10	7	3.2	< 10a	< 1	90	-	11	< 10	< 6	< 0.1	6,310	< 0.1	< 1	< 10	-	62	2	20
	GL28-1-20110627	2011 06 27	-	944	-	-	-	3,060	-	-	< 50a	148	6	140	< 1	6.8	562	< 2	2	10	< 0.4	< 40	< 0.1	< 4	0.7	< 10a	< 1	60	-	35	< 10	< 6	< 0.10	3,090	< 0.1	< 1	< 10	-	97	< 1	< 10
	GL28-1-20120626	2012 06 26	-	550	-	-	-	1,610	-	-	< 50a	130	180	56	140	6	284	< 2	< 2	< 10	< 0.4	< 40	< 0.1	< 4	0.4	< 10a	< 1	10	-	33	< 10	< 6	< 0.10	1,710	< 0.1	< 1	< 100	-	15	< 1	< 10
	GL28-1-20121203	2012 12 03	-	1,680	-	-	-	3,870	-	-	< 50a	181	1,110	299	258	8.6	560	< 2.0	3	20	< 0.40	< 40	0.14	6.1	7.37	< 10a	1.1	70	-	14.8	< 10	< 6.0	0.2	6,850	0.24	< 1.0	< 10	-	120	3.82	< 10
	DUP-A-20121203	Duplicate	-	1,700	-	-	-	3,830	-	-	< 50a	183	1,150	304	262	8.4	564	< 2.0	2.5	20	< 0.40	< 40	< 0.10	6.6	4.8	< 10a	< 1.0	70	-	12.2	< 10	< 6.0	< 0.10	6,880	< 0.10	< 1.0	< 10	-	122	1.79	< 10
	QA/QC RPD%		-	1	-	-	-	1	-	-	*	1	4	2	2	2	1	*	18	0	*	*	*	8	42	*	*	0	-	19	*	*	*	0	*	*	*	-	2	72	*
	GL28-1-20130708	2013 07 08	-	1,740	-	-	-	3,530	-	-	< 10a	204	1,440	299	253	10.5	549	< 0.50	3.2	< 20	< 5.0a	< 100	< 0.10	< 1.0	1	< 1.0a	< 1.0	105	< 0.20	12.5	< 5.0	< 2.0	< 0.050	5,560	< 0.20	< 30	< 50	-	122	< 30	< 5.0
	DUP1-20130708	Duplicate	-	1,740	-	-	-	4,220	-	-	< 10a	205	1,460	299	253	10.6	547	< 0.50	3.3	< 20	< 5.0a	< 100	< 0.10	< 1.0	1	< 1.0a	< 1.0	107	< 0.20	13.1	< 5.0	< 2.0	< 0.050	5,560	< 0.20	< 30	< 50	-	125	< 30	< 5.0
	QA/QC RPD%		-	0	-	-	-	18	-	-	*	0	1	0	0	1	0	*	3	*	*	*	*	*	0	*	*	2	*	5	*	*	*	0	*	*	*	-	2	*	*

Associated CARO file(s): 8052631, 8052802, 8060237, 8060737, 8061100, 8081412, 8091680, 8092458, 8092618, 9052219, 9052399, 9052558, 9052754, 9052937, 9060273, 9091657, 9092001, 9092208, 9092404, 9120616.
Associated Exova file(s): 622178, 653600, 712940, 714233, 714243, 756693, 756810, 757047, 811364, 811710, 812030, 812741, 812985, 846260, 878316, 879073, 909346, 909448, 909654.
All terms defined within the body of Keltech's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

Table 2: Historical Summary of Analytical Results For Groundwater -Metals

			Physical Parameters								Dissolved Metals																														
Sample Location	Sample ID	Sample Date (yyyy mm dd)	pH	Total Hardness	pH (field)	Conductivity	Field Conductivity	Total Dissolved Solids	Dissolved Organic Carbon	Phosphate	Dissolved Aluminum	Dissolved Calcium	Dissolved Iron	Dissolved Magnesium	Dissolved Manganese	Dissolved Potassium	Dissolved Sodium	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Lead	Lithium	Mercury	Molybdenum	Nickel	Selenium	Silver	Strontium	Thallium	Tin	Titanium	Tungsten	Uranium	Vanadium	Zinc
			pH	mg/L	pH	µS/cm	µS/cm	mg/L	mg/L	mg/L	µg/L	mg/L	µg/L	mg/L	µg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
GL28-1	GL28-1-20140603	2014 06 03	-	1,600	-	-	-	3,930	-	-	< 10a	188	1,420	274	209	9.4	537	< 0.50	3.4	< 20	< 5.0a	< 100	< 0.10	< 1.0	0.77	< 1.0a	< 1.0	99	< 0.20	13.4	< 5.0	< 2.0	< 0.050	5,370	< 0.20	< 30	< 50	-	116	< 30	< 5.0
(Cont'd)	GL28-1-20141117	2014 11 17	-	1,690	-	-	-	3,970	-	-	< 10a	197	1,540	292	212	9.9	559	< 0.50	3	< 20	< 5.0a	< 100	< 0.10	< 1.0	0.63	< 1.0a	< 1.0	91	< 0.20	13.2	< 5.0	< 2.0	< 0.050	5,700	< 0.20	< 30	< 50	-	118	< 30	< 5.0
	GL28-1-20150611	2015 06 11	7.93	1,630	-	-	-	3,920	-	-	< 10	192	1,520	280	208	9.4	518	< 0.50	3.2	< 20	< 5.0a	< 100	< 0.050	< 0.50	0.6	< 1.0a	< 1.0	81	< 0.20	14	< 5.0	< 1.0	< 0.050	5,370	< 0.020	< 30	< 50	-	131	< 30	< 5.0
	GL28-1-20151105	2015 11 05	7.65	1,600	-	-	-	3,930	-	-	< 10	190	1,600	274	214	9.6	553	< 0.50	3.1	< 20	< 5.0a	< 100	< 0.050	< 0.50	0.5	< 1.0a	< 1.0	88	< 0.20	13.9	< 5.0	< 1.0	< 0.050	5,850	< 0.020	< 30	< 50	-	122	< 30	< 5.0
	GL28-1-20160524	2016 05 24	7.97	1,710	-	-	-	3,950	-	-	< 10	197	1,750	295	220	10.1	561	< 0.50	3.9	< 20	< 5.0a	< 100	< 0.050	< 0.50	0.58	< 1.0a	< 1.0	93	< 0.20	14.2	< 5.0	< 1.0	< 0.050	5,710	< 0.020	< 30	< 50	-	121	< 30	< 5.0
	GL28-1-20160920	2016 09 20	7.69	1,740	-	-	-	4,080	-	-	< 10	194	1,800	305	260	10.4	557	< 0.50	3.5	< 20	< 5.0a	< 100	< 0.050	< 0.50	0.6	< 1.0a	< 1.0	87	< 0.20	12.5	< 5.0	< 1.0	< 0.050	5,790	< 0.020	< 30	< 50	-	123	< 30	< 5.0
	GL28-1-20170711	2017 07 11	8.21	1,620	-	-	-	3,740	-	-	< 10	193	1,680	276	230	10	560	< 0.50	2.6	< 20	< 5.0a	< 100	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	90	< 0.20	12.2	< 5.0	< 1.0	< 0.050	5,500	< 0.020	< 30	< 50	-	109	< 30	< 5.0
	GL28-1-20170926	2017 09 26	7.67	1,620	-	-	-	3,460	-	-	< 10	189	1,720	279	237	10.4	519	< 0.50	3.3	< 20	< 5.0a	< 100	< 0.050	< 0.50	0.55	< 1.0a	< 1.0	88	< 0.20	12.4	< 5.0	< 1.0	< 0.050	5,480	< 0.020	< 30	< 50	-	107	< 30	< 5.0
	GL28-1-180528	2018 05 28	7.72	1,710	6.99	-	3,741	3,730	4.85	< 0.0050	< 5.0	201	333	292	148	11.7	536	< 0.20	1.01	14.7	< 0.10	18.3	0.193	< 0.50	0.48	0.98	< 0.20	81.1	< 0.010	12.4	1.96	0.72	< 0.050	5,950	< 0.020	< 0.20	< 5.0	< 1.0	123	< 1.0	< 4.0
	GL28-1-180925	2018 09 25	7.72	1,750	7.21	-	3,761	3,770	4.88	< 0.0050	< 5.0	207	1,220	300	301	11.3	553	< 0.20	1.49	9.7	< 0.10	20.2	0.041	< 0.50	0.70	< 0.40a	< 0.20	85.9	< 0.010	12.9	1.85	< 0.50	< 0.050	6,000	< 0.020	< 0.20	< 5.0	< 1.0	115	< 1.0	< 4.0
	DUP1-180925	Duplicate	7.73	1,730	7.21	-	3,761	3,930	4.81	< 0.0050	< 5.0	207	1,280	295	313	11.9	544	< 0.20	1.75	10.0	< 0.10	10.1	0.039	< 0.50	0.71	1.15	< 0.20	69.3	< 0.010	13.1	1.93	< 0.50	< 0.050	5,910	< 0.020	< 0.20	< 5.0	< 1.0	114	< 1.0	< 4.0
	QA/QC RPD%		0	1	*	-	*	4	1	*	*	0	5	2	4	5	2	*	16	3	*	67	*	*	1	*	*	21	*	2	*	*	*	2	*	*	*	*	1	*	*
	GL28-1-190528	2019 05 28	7.81	1,690	7.12	-	3741	3,650	4.74	< 0.0500	< 5.0	195	1,720	293	297	10.2	489	< 0.20	2.30	10.8	< 0.10	14.5	0.034	1.04	0.64	< 0.40a	< 0.20	91.1	< 0.010	13.0	1.66	< 0.50	< 0.050	6,420	< 0.020	< 0.20	< 5.0	< 1.0	119	< 1.0	< 4.0
	GL28-1-190919	2019 09 19	7.78	1,650	7.39	-	3802	3,470	4.47	-	< 5.0	193	1,710	284	300	9.94	448	< 0.20	2.36	10.0	< 0.10	18.8	0.021	< 0.50	0.60	< 0.10	< 0.20	80.7	< 0.010	12.4	1.71	< 0.50	< 0.050	6,190	< 0.020	< 0.20	< 5.0	< 1.0	120	< 1.0	< 4.0
	GL28-1-200610	2020 06 10	7.71	1,770	7.15	-	3,321	3,300	4.43	-	< 1.0	214	1,720	300	287	10.7	461	< 0.050	3.37	10.1	0.014	18.6	0.0107	0.14	0.536	0.21	< 0.050	83.0	< 0.010	12.6	0.871	< 0.10	< 0.010	6,210	0.0044	< 0.050	< 0.20	< 0.20	112	0.30	1.3
	DUPB-200610	Duplicate	7.75	1,630	7.15	-	3,321	3,680	3.83	-	< 1.0	208	1,760	269	276	10.3	415	< 0.050	3.67	10.9	0.019	11.1	0.0120	0.17	0.541	0.22	< 0.050	62.6	< 0.010	13.1	0.906	< 0.10	< 0.010	6,270	0.0050	< 0.050	< 0.20	< 0.20	112	0.24	1.4
	QA/QC RPD%		1	8	*	-	*	11	15	-	*	3	2	11	4	4	11	*	9	8	*	51	11	*	1	*	*	28	*	4	4	*	*	1	*	*	*	*	0	*	*
	GL28-1-201104	2020 11 04	7.82	1,850	7.14	-	4,082	3,840	6.24	-	< 1.0	237	1,770	306	320	11.5	454	< 0.050	2.90	9.69	0.022	16.4	0.0046	< 0.10	0.589	0.40	< 0.050	82.5	< 0.010	13.3	1.79	< 0.10	< 0.010	7,000	0.0045	< 0.050	< 0.20	< 0.20	118	< 0.20	1.4
	DUP3-201104	Duplicate	7.80	1,850	-	-	-	3,450	6.09	-	< 1.0	236	1,760	307	316	11.5	451	< 0.050	2.86	9.59	0.072	16.4	0.0059	< 0.10	0.577	2.83	< 0.050	84.1	< 0.010	13.1	1.76	< 0.10	< 0.010	7,000	0.0043	< 0.050	< 0.20	< 0.20	119	< 0.20	< 1.0
	QA/QC RPD%		0	0	-	-	-	11	2	-	*	0	1	0	1	0	1	*	1	1	*	0	*	*	2	*	*	2	*	2	2	*	*	0	*	*	*	*	1	*	*
	GL28-1-210609	2021 06 09	7.83	1,720	6.99	-	-	-	-	-	2.2	220	1,670	283	314	10.6	407	< 0.050	2.44	10.0	0.013	17.0	0.0057	0.15	0.565	0.34	< 0.050	82.9	< 0.010	12.1	1.76	< 0.10	< 0.010	5,950	0.0041	< 0.050	< 0.20	< 0.20	110	< 0.20	1.2
	GL28-1-211007	2021 10 07	7.80	1,860	7.04	-	-	-	-	-	6.7	195	1,830	333	341	11.7	442	< 0.050	2.68	10.6	0.014	12.3	0.0093	0.19	0.598	0.36	< 0.050	61.1	< 0.010	14.5	1.98	< 0.10	< 0.010	5,590	< 0.0040	< 0.050	< 0.20	< 0.20	123	< 0.20	< 1.0
	DUP 3-211007	Duplicate	7.78	1,840	7.04	-	-	-	-	-	13.7	192	1,880	330	334	12	454	< 0.050	2.96	10.9	< 0.010	12.1	0.0099	0.23	0.580	0.58	< 0.050	56.8	< 0.010	14.4	1.94	< 0.10	< 0.010	6,200	0.0043	< 0.050	< 0.20	< 0.20	121	< 0.20	< 1.0
	QA/QC RPD%		0	1	0	-	-	-	-	-	69	2	3	1	2	3	3	*	10	3	*	2	*	*	3	*	*	7	*	1	2	*	*	10	*	*	*	*	2	*	*
GL28-2	GL28-2-20091116	2009 11 16	-	1,530	-	-	-	-	-	-	< 50a	245	< 100	224	62	12	561	< 2	< 2	20	< 0.4	< 40	0.1	< 4	0.5	< 10a	< 1	40	-	4	< 10	< 6	< 0.10	4,940	< 0.1	< 1	< 10	-	130	1	< 10
	GL28-2-20160524	2016 05 24	7.72	1,840	-	-	-	4,530	-	-	< 10	308	< 30	261	33	11.4	698	< 0.50	< 1.0	< 20	< 5.0a	< 100	0.065	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	5.5	< 5.0	1.6	< 0.050	5,890	< 0.050	< 30	< 50	-	183	< 30	< 5.0
	GL28-2-20160920	2016 09 20	7.5	1,810	-	-	-	4,760	-	-	94	306	127	255	19	11.6	743	< 0.50	< 1.0	< 20	< 5.0a	< 100	0.221	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	4.1	< 5.0	2.2	< 0.050	6,160	< 0.050	< 30	< 50	-	184	< 30	< 5.0
	DUP1-20160920	Duplicate	7.51	3,610	-	-	-	4,750	-	-	76	608	235	508	37	23.4	1,480	< 0.50	< 1.0	27	< 10a	< 200	0.247	< 0.50	< 0.50	< 1.0a	< 1.0	95	< 0.20	3.9	< 5.0	2.1	< 0.050	12,300	< 0.050	< 60	< 50	-	178	< 60	< 10
	QA/QC RPD%		0	66	-	-	-	0	-	-	21	66	60	66	64	67	66	*	*	*	*	*	11	*	*	*	*	*	*	5	*	5	*	67	*	*	*	-	3	*	*
	GL28-2-20170711	2017 07 11	8.03	1,680	-	-	-	4,400	-	-	< 10	284	< 30	236	12	11	751	< 0.50	< 1.0	< 20	< 5.0a	< 100	0.105	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	4.9	< 5.0	1.7	< 0.050	5,460	< 0.050	< 30	< 50	-	170	< 30	< 5.0
	GL28-2-20170926	2017 09 26	7.48	1,920	-	-	-	4,640	-	-	< 10	317	< 30	275	18	12	714	< 0.50	< 1.0	< 20	< 5.0a	< 100	0.072	< 0.50	< 0.50	1.3	< 1.0	< 50	< 0.20	4.3	< 5.0	1.8	< 0.050	6,300	< 0.020	< 30	< 50	-	168	< 30	< 5.0
	GL28-2-180528	2018 05 28	7.42	1,900	6.77	-	4,680	4,730	6.09	< 0.0050	< 5.0	303	< 10	278	17.4	12.8	735	< 0.20	< 0.50	13.2	< 0.10	16.3	0.065	< 0.50	0.29	0.69	< 0.20	45.5	< 0.010	4.81	2.58	1.49	< 0.050	7,280	< 0.020	< 0.20	< 5.0	< 1.0	181	< 1.0	< 4.0
	DUP1-180528	Duplicate	7.51	1,860	6.77	-	4,680	4,960	6.55	< 0.0050	< 5.0	274	< 10	286	17.6	13.4	772	< 0.20	< 0.50	13.5	< 0.10	13.4	0.073	< 0.50	0.28	0.68	< 0.20	38.1	< 0.010	4.84	2.60	1.59	< 0.050	7,320	< 0.020	< 0.20	< 5.0	< 1.0	190	< 1.0	5.4
	QA/QC RPD%		1	2	*	-	*	5	7	*	*	10	*	3	1	5	5	*	*	2	*	20	12	*	*	1	*	18	*	1	1	6	*	1	*	*	*	*	5	*	*
	GL28-2-180925	2018 09 25	7.60	2,280	6.97	-	5,093	5,370	8.34	< 0.0050	39.7	382	< 10	322	20.4	14.1	862	< 0.20	< 0.50	14.1	< 0.10	17.8	0.075	< 0.50	0.31	1.06	< 0.20	51.0	< 0.010	5.07	2.85	1.33	< 0.050	7,980	< 0.020	< 0.20	< 5.0	< 1.0	196	1.1	< 4.0
	GL28-2-190528	2019 05 28	7.70	2,170	6.97	-	5200	5,280	6.36	< 0.0500	< 5.0	352	< 10	312	21.5	12.8	820	< 0.20	< 0.50	14.0	< 0.10	14.6	0.079	< 0.50	0.36	0.85	< 0.20	58.8	< 0.010	5.41	2.88	1.18	< 0.050	8,620	< 0.020	< 0.20	< 5.0	< 1.0	200	1.0	< 4.0
	GL28-2-190919	2019 09 19	7.64	2,030	7.24	-	5225	5,380	5.96	-	47.9	340	17	286	20.2	12.4	762	< 0.20	< 0.50	13.9	< 0.10	19.1	0.072	1.02	0.34	0.71	< 0.20	52.8	< 0.010	4.99	2.86	1.57	< 0.050	7,880	< 0.020	0.43	< 5.0	< 1.0	199	< 1.0	14.0
	GL28-2-200610	2020 06 10	7.66	1,730	6.95	-	3,882	4,250	4.99	-	< 1.0	301	< 2.0	237	8.74	12	657	< 0.050	0.466	12.5	< 0.010	18.6	0.0520	0.30	0.189	0.58	< 0.050	43.8	< 0.010	5.31	1.33	0.60	< 0.010	6,550	0.0053	< 0.050	< 0.20	< 0.20	151	1.15	1.1
	GL28-2-201104	2020 11 04	7.70	2,200	6.9	-	5,499	4,790	6.26	-	< 1.0	397	171	293	19.2	14.2	955	< 0.050	0.414	13.4	< 0.010	16.9	0.0582	28.2	0.310	1.13	< 0.050	53.9	< 0.010	5.86	3.06	1.05	< 0.010	8,600	0.0089	< 0.050	< 0.20	< 0.20	196	1.15	< 1.0
	GL28-2-210609	2021 06 09	7.76	1,910	6.86	-	-	-	-	-	5.0	327	6.7	264	23.6	12.9	775	< 0.050	0.341	13.4	< 0.010	19.4	0.0591	0.19	0.343	0.75	< 0.050	56.1	< 0.010	5.21	2.49	0.67	< 0.010	7,000	0.0085	< 0.050	0.21	< 0.20	180	0.78	1.2
	GL28-2-211007	2021 10 07	7.66	2,460	6.84	-	-	-	-	-	1.9	387	2.4	363	22.4	16.3	957	< 0.050	0.487	15.4	< 0.010	11.5	0.0505	0.24	0.336	1.02	< 0.050	39.7	< 0.010	6.39	2.79	1.02	< 0.010	8,080	0.0092	< 0.050	< 0.20	< 0.20	207	1.03	< 1.0
GL28-3	GL28-3-20091116	2009 11 16	-	1,760	-	-	-	-	-	-	< 50a	279	< 100	260	353	11.9	556	< 2	< 2	30	< 0.4	< 40	0.17	< 4	1.6	10	< 1	40	-	8	20	< 6	< 0.10	5,490	< 0.1	< 1	< 10	-	145	1	10
	GL28-3-20100812	2010 08 12	-	1,580	-	-	-	4,230	-	-	91	207	< 100	257	82	12.2	610	< 2	< 2	40	< 0.4	< 40	< 0.1	7	0.3	< 10a	< 1	30	-	5	10	< 6	< 0.1	5,430	< 0.1	< 1	< 10	-	73	3	< 10
	GL28-3-20160524	2016 05 24	7.52	2,740	-	-	-	6,310	-	-	< 10	377	< 60	438	173	12.3	1,000	< 0.50	< 1.0	20	< 10a	< 200	0.213	< 0.50	0.65	< 1.0a	< 1.0	52	< 0.20	11.4	8.8	< 1.0	< 0.050	7,550	< 0.050	< 60	51	-	238	< 60	< 10
	GL28-3-20160920	2016 09 20	7.57	1,280	-	-	-	6,550	-	-	< 10	158	< 30	215	194	5.5	514	< 0.50	< 1.0	< 20	< 5.0a	< 100	0.265	< 0.50	1.16	< 1.0a	< 1.0	< 50	< 0.20	11.9	11.6	< 1.0	< 0.050	3,660	< 0.050	< 30	< 50	-	263	< 30	< 5.0
	GL28-3-20170711	2017 07 11	8.13	2,480	-	-	-	6,160	-	-	< 10	296	< 60	423	18	10.2	1,000	< 0.50	< 1.0	< 20	< 10a	< 200	0.164	< 0.50	< 0.50	< 1.0a	< 1.0	< 50	< 0.20	12	< 5.0	< 1.0	< 0.050	6,650	< 0.050	< 60	< 50	-	245	< 60	< 10
	GL28-3-20170926	2017 09 26	7.6	2,520	-	-	-	6,150	-	-	< 10	300	< 60	430	192	10.6	1,020	< 0.50	< 1.0	< 20	< 10a	< 200	0.343	< 0.50	< 0.50	1.5	< 1.0	< 50	< 0.20	13.2	9.8	< 1.0	< 0.050	7,040	0.052	< 60	< 50	-	232	< 60	< 10
	GL28-3-180528	2018 05 28	7.51	2,770	6.8	-	6,392	7,280	10.3	< 0.0050	38.0	282	84	501	146	13.0	1,110	< 0.20	0.76	21.6	< 0.10	5.6	0.382	0.56	0.44	1.72	< 0.20	35.0	< 0.010	12.5	10.0	< 0.50	< 0.050	9,150	0.038	< 0.20	< 5.0	< 1.0	239	1.4	< 4.0
	GL28-3-180925	2018 09 25	7.60	3,080	7	-	6,777	7,490	12.1	< 0.0050	< 5.0	378	< 10	518	321	13.8	1,230	< 0.20	0.82	19.1	< 0.10	5.5	0.316	< 0.50	0.51	1.50	< 0.20	42.9	< 0.010	14.2	12.0	< 0.50	< 0.050	8,940	0.052	< 0.20	< 5.0	< 1.0	278	1.5	< 4.0
	GL28-3-190528	2019 05 28	7.78	2,880	7	-	6743	6,780	8.29	< 0.0500	6.7	343	< 10	491	50.2	12.0	1,170	< 0.20	0.71	18.1	< 0.10	< 5.0	0.128	1.12	0.19	1.14	< 0.20	51.3	< 0.010	13.6	7.20	< 0.50	< 0.050	9,270	0.033	< 0.20	< 5.0	< 1.0	268	1.4	< 4.0
	DUP2-190528	Duplicate	7.63	2,830	7	-	6743	7,120	7.97	< 0.0500	< 5.0	341	< 10	481	50.0	11.8	1,150	< 0.20	0.67	17.9	< 0.10	< 5.0	0.134	< 0.50	0.19	1.15	< 0.20	50.7	< 0.010	13.3	7.27	< 0.50	< 0.050	9,220	0.028	< 0.20	< 5.0	< 1.0	265	1.4	< 4.0
	QA/QC RPD%		2	2	*	-	*	5	4	*	*	1	*	2	0	2	2	*	*	1	*	*	5	*	*	1	*	1	*	2	1	*	*	1	*	*	*	*	1	0	*
	GL28-3-190919	2019 09 19	7.65	2,790	7.19	-	6895	7,490	8.62	-	< 5.0	342	< 10	469	175	11.5	1,090	< 0.20	0.62	18.5	< 0.10	10.0	0.212	< 0.50	0.25	1.14	< 0.20	45.4	< 0.010	13.0	9.41	< 0.50	< 0.050	8,880	0.041	< 0.20	< 5.0	< 1.0	274	1.3	< 4.0
	DUP1-190919	Duplicate	7.78	2,830	7.19	-	6895	7,330	8.84	-	< 5.0	352	< 10	475	174	11.7	1,110	< 0.20	0.68	17.9	< 0.10	16.3	0.225	1.18	0.27	1.13	< 0.20	46.5	< 0.010	13.3	9.41	< 0.50	< 0.050	8,890	0.039	< 0.20	< 5.0	< 1.0	272	1.3	< 4.0
	QA/QC RPD%		2	1	*	-	*	2	3	-	*	3	*	1	1	2	2	*	*	3	*	48	6	*	*	1	*	2	*	2	0	*	*	0	*	*	*	*	1	0	*

Associated CARO file(s): 8052631, 8052802, 8060237, 8060737, 8061100, 8081412, 8091680, 8092458, 8092618, 9052219, 9052399, 9052558, 9052754, 9052937, 9060273, 9091657, 9092001, 9092208, 9092404, 9120616.
Associated Exova file(s): 622178, 653600, 712940, 714233, 714243, 756693, 756810, 757047, 811364, 811710, 812030, 812741, 812985, 846260, 878316, 879073, 909346, 909448, 909654.
All terms defined within the body of Keltech's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
\- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

Table 2: Historical Summary of Analytical Results For Groundwater -Metals

Sample Location	Sample ID	Sample Date (yyyy mm dd)	pH pH	Total Hardness mg/L	pH (field) pH	Conductivity µS/cm	Field Conductivity µS/cm	Total Dissolved Solids mg/L	Dissolved Organic Carbon mg/L	Phosphate mg/L	Dissolved Aluminum µg/L	Dissolved Calcium mg/L	Dissolved Iron µg/L	Dissolved Magnesium mg/L	Dissolved Manganese µg/L	Dissolved Potassium mg/L	Dissolved Sodium mg/L
			Physical Parameters								Dissolved Metals						
GL28-3	GL28-3-200610	2020 06 10	7.67	2,890	6.92	-	630.3	7,680	9.25	-	< 1.0	395	< 2.0	462	130	12.7	1,190
	GL28-3-201105	2020 11 05	7.75	2,870	6.96	-	277.6	7,810	9.33	-	< 1.0	408	4.2	448	281	12.3	1,170
	GL28-3-210609	2021 06 09	7.80	2,820	7.00	-	-	-	-	-	1.7	339	< 2.0	479	27.0	12.6	1,170
	GL28-3-211007	2021 10 07	7.69	3,090	6.87	-	-	-	-	-	1.2	351	2.2	537	186	15.2	1,230
GL29-1	GL29-1-20130708	2013 07 08	-	444	-	-	-	1,160	-	-	< 10a	82.5	217	57.8	658	10.5	272
	GL29-1-20131113	2013 11 13	-	493	-	-	-	1,280	-	-	< 10a	83.7	597	69	1,130	9.8	315
	DUP3-20131113	Duplicate	-	495	-	-	-	1,240	-	-	< 10a	84	593	69.3	1,130	9.7	311
	QA/QC RPD%		-	0	-	-	-	3	-	-	*	0	1	0	0	1	1
	GL29-1-20140603	2014 06 03	-	516	-	-	-	1,430	-	-	< 10a	84.6	438	73.9	946	8.6	320
	GL29-1-20141118	2014 11 18	-	699	-	-	-	1,950	-	-	< 10a	106	1,980	105	1,530	9.8	411
	GL29-1-20150609	2015 06 09	8.12	629	-	-	-	1,900	-	-	< 10	99.5	823	92.4	1,250	9.3	391
	GL29-1-20151105	2015 11 05	7.85	671	-	-	-	1,780	-	-	< 10	116	176	92.5	1,070	9.6	347
	GL29-1-20160524	2016 05 24	7.94	682	-	-	-	1,650	-	-	< 10	128	94	87.9	861	10.2	306
	GL29-1-20160921	2016 09 21	8.08	639	-	-	-	1,590	-	-	< 10	118	47	83.6	885	9.7	312
	GL29-1-20170529	2017 05 29	8.1	586	-	-	-	1,300	-	-	< 10	115	< 30	72.8	< 10	10.2	272
	GL29-1-20170926	2017 09 26	7.88	542	-	-	-	1,290	-	-	< 10	101	< 30	70.2	312	9.8	262
	DUP1-20170926	Duplicate	7.88	539	-	-	-	1,330	-	-	< 10	99.6	< 30	70.6	307	9.8	258
	QA/QC RPD%		0	1	-	-	-	3	-	-	*	1	*	1	2	0	2
	GL29-1-180604	2018 06 04	7.71	659	7.24	-	1,240	1,220	118	0.0343	6.1	191	73	43.7	39.8	16.0	70.9
	GL29-1-180919	2018 09 19	7.70	683	7.38	-	1,389	1,190	93.7	< 0.0050	< 5.0	192	78	49.2	637	15.8	83.2
	GL29-1-190603	2019 06 03	7.76	467	7.06	-	1715	1,160	12.8	< 0.0500	38.8	87.4	65	60.3	557	11.1	284
	GL29-1-190924	2019 09 24	7.89	448	7	-	1731	1,160	11.1	-	8.3	79.6	584	60.6	704	9.74	267
	GL29-1-200612	2020 06 12	7.04	421	7.01	-	1,380	1,110	6.25	-	1.9	74.4	1,030	57	674	9.32	263
	GL29-1-201120	2020 11 20	7.84	442	7.07	-	1,723	1,050	3.16	-	1.1	84.5	898	56.1	532	10.3	276
	GL29-1-210611	2021 06 11	7.90	460	7.00	-	-	-	-	-	2.6	84.1	1,170	60.7	717	11.9	285
	GL29-1-211006	2021 10 06	7.89	436	7.37	-	-	-	-	-	2.9	75.9	1,740	59.9	875	9.71	259
GL29-2	GL29-2-20130627	2013 06 27	-	2,830	-	-	-	7,910	-	-	< 15a	333	276	486	3,310	20.2	1,230
	GL29-2-20131113	2013 11 13	-	2,910	-	-	-	7,890	-	-	< 30a	346	1,080	496	3,410	20.4	1,260
	GL29-2-210608	2021 06 08	7.82	3,020	7.14	-	-	-	-	-	3.1	371	10.2	509	307	22.6	1,200
	GL29-2-211006	2021 10 06	7.75	3,410	7.13	-	-	-	-	-	106	380	< 200	597	1,380	22.7	1,250
GL31-1	GL31-3-20130627	2013 06 27	-	4,240	-	-	-	15,300	-	-	< 60a	199	< 150	909	485	38	3,470
	GL31-3-20141126	2014 11 26	-	4,280	-	-	-	14,700	-	-	< 60a	195	7,070	921	435	38	3,250
GL31-3	BH 11-18C-20120627	2012 06 27	-	4,600	-	-	-	15,500	-	-	< 50a	207	4,440	992	1,240	41	3,460
	GL31-3-20121205	2012 12 05	-	4,470	-	-	-	15,400	-	-	56	202	6,580	964	1,020	37.3	3,350
	GL31-3-20131114	2013 11 14	-	4,310	-	-	-	15,800	-	-	< 60a	195	6,250	929	454	37	3,410
	GL31-3-20140609	2014 06 09	-	4,420	-	-	-	14,900	-	-	< 60a	194	1,690	955	521	39	3,490
	GL31-3-20150611	2015 06 11	7.83	4,460	-	-	-	13,400	-	-	< 20	202	9,360	961	446	40	3,660
	GL31-3-20151109	2015 11 09	7.55	4,060	-	-	-	15,200	-	-	21	190	2,000	870	421	38	3,430
	DUP4-20151109	Duplicate	7.5	4,060	-	-	-	15,200	-	-	< 20	189	720	871	420	38	3,450
	QA/QC RPD%		1	0	-	-	-	0	-	-	*	1	94	0	0	0	1
GL35-3	BH11-31C-20111217	2011 12 17	-	1,100	-	-	-	37,000	-	-	< 500a	8	< 50	264	< 10	400	13,100
	DUPB-20111217	Duplicate	-	1,090	-	-	-	37,900	-	-	< 500a	8	< 50	260	< 10	400	12,800
	QA/QC RPD%		-	1	-	-	-	2	-	-	*	0	*	2	*	0	2
	BH11-31C-20120625	2012 06 25	-	2,740	-	-	-	10,900	-	-	< 50a	265	10,800	505	480	46	2,630
	GL35-3-20121205	2012 12 05	-	2,680	-	-	-	10,900	-	-	58	258	11,400	495	250	39.6	2,490
	DUP-C-20121205	Duplicate	-	2,720	-	-	-	10,800	-	-	57	260	14,700	504	290	39.7	2,510
	QA/QC RPD%		-	1	-	-	-	1	-	-	2	1	25	2	15	0	1
	GL35-3-20130627	2013 06 27	-	2,220	-	-	-	8,910	-	-	< 30a	219	< 90	406	467	36.8	2,320
	DUP3-20130627	Duplicate	-	2,240	-	-	-	8,910	-	-	< 30a	220	< 90	410	470	37.2	2,340
	QA/QC RPD%		-	1	-	-	-	0	-	-	*	0	*	1	1	1	1
	GL35-3-20131113	2013 11 13	-	2,280	-	-	-	9,430	-	-	< 30a	221	15,100	419	471	38	2,270
	GL35-3-20140609	2014 06 09	-	2,220	-	-	-	8,650	-	-	< 30a	207	10,300	413	417	36.3	2,310
	GL35-3-20141126	2014 11 26	-	2,060	-	-	-	8,860	-	-	< 30a	186	6,480	387	391	38	2,200
	GL35-3-20150611	2015 06 11	7.63	2,170	-	-	-	8,690	-	-	< 10	205	18,700	402	438	37	2,290
	GL35-3-20151109	2015 11 09	7.67	2,030	-	-	-	12,000	-	-	< 20	175	< 150	387	385	61	3,180
	GL35-3-20160526	2016 05 26	7.59	2,200	-	-	-	8,300	-	-	< 10	209	20,700	407	442	35.6	2,340

Sample ID	Antimony µg/L	Arsenic µg/L	Barium µg/L	Beryllium µg/L	Boron µg/L	Cadmium µg/L	Chromium µg/L	Cobalt µg/L	Copper µg/L	Lead µg/L	Lithium µg/L	Mercury µg/L	Molybdenum µg/L	Nickel µg/L	Selenium µg/L	Silver µg/L	Strontium µg/L	Thallium µg/L	Tin µg/L	Titanium µg/L	Tungsten µg/L	Uranium µg/L	Vanadium µg/L	Zinc µg/L
GL28-3-200610	0.110	0.893	19.9	0.012	6.0	0.180	0.35	0.356	1.45	< 0.050	40.5	< 0.010	13.1	8.14	0.23	< 0.010	9,460	0.0300	< 0.050	0.22	< 0.20	273	1.68	1.8
GL28-3-201105	0.142	0.815	19.2	< 0.010	5.0	0.227	0.28	0.484	1.69	< 0.050	46.5	< 0.010	16.5	11.6	0.17	< 0.010	8,710	0.0416	0.087	0.34	< 0.20	269	2.02	3.0
GL28-3-210609	0.157	0.684	18.5	< 0.010	6.6	0.0836	0.34	0.118	1.62	< 0.050	51.5	< 0.010	12.9	4.96	0.13	< 0.010	8,070	0.0194	< 0.050	< 0.20	< 0.20	255	1.22	4.3
GL28-3-211007	0.139	0.820	21.5	< 0.010	4.5	0.208	0.34	0.191	1.42	< 0.050	32.7	< 0.010	17.3	9.09	0.29	< 0.010	8,300	0.0408	< 0.050	< 0.20	< 0.20	306	1.46	2.0
GL29-1-20130708	< 0.50	3	60	< 5.0a	< 100	< 0.050	< 0.50	1.25	< 1.0a	< 1.0	114	< 0.20	8.8	< 5.0	< 1.0	< 0.050	2,530	< 0.20	< 30	< 50	-	12.1	< 30	< 5.0
GL29-1-20131113	< 0.50	5.1	98	< 5.0a	< 100	< 0.050	< 0.50	2.91	< 1.0a	< 1.0	82	< 0.20	15.8	8.3	< 1.0	< 0.050	2,580	< 0.20	< 30	< 50	-	23.7	< 30	< 5.0
DUP3-20131113	< 0.50	5.1	96	< 5.0a	< 100	< 0.10	< 1.0	2.97	< 1.0a	< 1.0	79	< 0.20	15.8	8.5	< 2.0	< 0.050	2,570	< 0.20	< 30	< 50	-	22.8	< 30	< 5.0
QA/QC RPD%	*	0	2	*	*	*	*	2	*	*	4	*	0	2	*	*	0	*	*	*	-	4	*	*
GL29-1-20140603	< 0.50	3.8	108	< 5.0a	< 100	< 0.050	< 0.50	7.65	< 1.0a	< 1.0	63	< 0.20	16.5	8.2	< 1.0	< 0.050	2,520	< 0.20	< 30	< 50	-	27.9	< 30	< 5.0
GL29-1-20141118	< 0.50	6.5	134	< 5.0a	< 100	< 0.10	< 1.0	14.4	< 1.0a	< 1.0	61	< 0.20	21	8.8	< 2.0	< 0.050	3,460	< 0.20	< 30	< 50	-	30.4	< 30	< 5.0
GL29-1-20150609	< 0.50	4.5	111	< 5.0a	< 100	< 0.050	< 0.50	8.07	< 1.0a	< 1.0	51	< 0.20	20.2	8.8	< 1.0	< 0.050	3,370	< 0.020	< 30	< 50	-	31.6	< 30	< 5.0
GL29-1-20151105	< 0.50	1.9	93	< 5.0a	< 100	0.057	< 0.50	12.6	5.3	< 1.0	< 50	< 0.20	23.3	18.7	< 1.0	< 0.050	3,100	< 0.020	< 30	< 50	-	36	< 30	< 5.0
GL29-1-20160524	< 0.50	2.4	83	< 5.0a	240	0.097	0.58	5.88	13.5	< 1.0	< 50	< 0.20	29.9	30.1	< 1.0	< 0.050	2,880	< 0.020	< 30	< 50	-	46.9	< 30	< 5.0
GL29-1-20160921	0.5	2.3	86	< 5.0a	190	0.2	< 0.50	14.5	13.5	< 1.0	< 50	< 0.20	28.9	30.1	< 1.0	< 0.050	3,050	< 0.020	< 30	< 50	-	49.9	< 30	< 5.0
GL29-1-20170529	0.54	2.1	68	< 5.0a	210	0.07	< 0.50	1.64	13.4	< 1.0	51	< 0.20	23.8	19.8	< 1.0	< 0.050	2,770	< 0.010	< 30	< 50	-	41.1	< 30	< 5.0
GL29-1-20170926	0.52	2.1	69	< 5.0a	170	0.297	< 0.50	12.6	8.8	< 1.0	52	< 0.20	21.4	21.2	< 1.0	< 0.050	2,730	< 0.010	< 30	< 50	-	38.2	< 30	< 5.0
DUP1-20170926	0.53	2.2	68	< 5.0a	170	0.305	< 0.50	13	9.1	< 1.0	53	< 0.20	21.6	22.3	< 1.0	< 0.050	2,690	< 0.010	< 30	< 50	-	38.6	< 30	< 5.0
QA/QC RPD%	*	5	1	*	0	3	*	3	3	*	2	*	1	5	*	*	1	*	*	*	-	1	*	*
GL29-1-180604	1.30	3.64	51.9	< 0.10	512	0.267	2.08	2.15	84.0	< 0.20	16.4	< 0.010	40.1	30.8	0.69	< 0.050	1,570	0.039	< 0.20	< 5.0	1.7	21.5	5.5	6.1
GL29-1-180919	1.70	3.88	63.4	< 0.10	518	0.371	1.97	53.0	84.5	< 0.20	18.6	< 0.010	45.0	39.2	0.79	< 0.050	1,720	0.054	< 0.20	< 5.0	5.1	27.3	5.2	7.7
GL29-1-190603	0.80	1.67	52.4	0.20	92.0	0.053	< 0.50	20.1	1.92	< 0.20	118	< 0.010	9.71	6.47	0.60	< 0.050	3,190	< 0.020	< 0.20	< 5.0	1.0	19.0	< 1.0	< 4.0
GL29-1-190924	0.33	2.08	68.5	< 0.10	75.2	< 0.010	0.71	3.33	< 0.10	< 0.20	89.8	< 0.010	1.67	2.82	0.66	< 0.050	2,860	< 0.020	< 0.20	< 5.0	5.2	31.4	1.2	< 4.0
GL29-1-200612	0.478	4.78	68.4	0.089	59.8	0.0043	0.19	33.0	< 0.10	< 0.050	99.1	< 0.010	8.96	2.52	0.11	< 0.010	2,880	< 0.0040	0.051	0.29	4.51	25.2	0.30	< 1.0
GL29-1-201120	< 0.050	3.99	56.0	0.122	43.4	< 0.0020	0.15	47.6	< 0.10	< 0.050	95.0	< 0.010	8.94	1.39	< 0.10	< 0.010	3,000	< 0.0040	< 0.050	< 0.20	3.08	21.1	< 0.20	< 1.0
GL29-1-210611	< 0.050	4.80	64.2	0.124	48.4	< 0.0020	0.16	124	< 0.10	< 0.050	101	< 0.010	9.20	1.84	< 0.10	< 0.010	2,940	< 0.0040	< 0.050	< 0.20	6.33	16.3	< 0.20	< 1.0
GL29-1-211006	0.074	4.36	78.3	0.058	63.8	< 0.0020	0.31	73.1	< 0.10	< 0.050	72.2	< 0.010	8.47	1.30	0.15	< 0.010	2,760	< 0.0040	< 0.050	0.31	7.36	26.5	< 0.20	1.6
GL29-2-20130627	< 0.50	4.1	55	< 10a	< 200	< 0.25	< 2.5	17.7	< 2.5a	< 1.0	58	< 0.20	46.3	60.5	< 5.0	< 0.050	7,280	< 0.50	< 60	< 50	-	106	< 60	< 10
GL29-2-20131113	< 1.0	4.5	49	< 10a	< 200	< 0.50a	< 5.0	8.6	< 5.0a	< 1.0	109	< 0.20	31.2	30.1	< 10	< 0.10	7,240	< 1.0	< 60	< 50	-	66.7	< 60	< 10
GL29-2-210608	0.187	1.71	27.2	< 0.010	42.5	0.209	0.23	0.156	1.10	< 0.050	82.1	< 0.010	55.1	8.21	0.23	< 0.010	7,890	0.0124	0.135	< 0.20	< 0.20	140	< 0.20	4.0
GL29-2-211006	< 5.00	< 5.00	63.0	< 1.00	263	0.429	< 10.0a	1.69	< 10.0	< 5.00	101	< 0.010	60.9	19.4	< 10.0	< 1.00	8,350	< 0.400	< 5.00	< 20.0	< 20.0	206	< 20.0	< 100
GL31-3-20130627	< 2.0	4	< 50	< 25a	< 500	< 1.0a	< 10a	5.4	< 10a	< 1.0	55	< 0.20	33.7	< 10	< 20	< 0.20	9,270	< 2.0	< 150	< 50	-	25.6	< 150a	< 25
GL31-3-20141126	< 2.0	26.2	< 50	< 25a	< 500	< 1.0a	< 10a	4.6	< 10a	< 1.0	< 50	< 0.20	33	< 10	< 20	< 0.20	9,560	< 2.0	< 150	< 50	-	26	< 150a	< 25
BH 11-18C-20120627	< 2	19	30	< 0.4	< 40	< 0.1	18	11.1	40	< 1	50	-	33	20	11	< 0.10	10,900	< 0.1	< 1	< 100	-	28	6	< 10
GL31-3-20121205	< 2.0	19.1	30	< 0.40	50	< 0.10	18.2	7.67	< 10a	< 1.0	70	-	37.9	20	10.7	< 0.10	11,300	< 0.10	< 1.0	< 1,000	-	29.8	5.86	< 10
GL31-3-20131114	< 2.0	23.5	< 50	< 25a	< 500	< 1.0a	< 10a	4.9	< 10a	< 1.0	53	< 0.20	36.4	11	< 20	< 0.20	9,260	< 2.0	< 150	< 50	-	27.3	< 150a	< 25
GL31-3-20140609	< 2.0	11.1	< 50	< 25a	< 500	< 1.0a	< 10a	5.1	< 10a	< 1.0	62	< 0.20	34.4	10	< 20	< 0.20	9,540	< 2.0	< 150	< 50	-	24.7	< 150a	< 25
GL31-3-20150611	< 2.0	31.3	< 50	< 25a	< 500	< 0.10	< 2.0	4.2	< 4.0a	< 1.0	< 50	< 0.20	34.7	< 10	< 1.0	< 0.20	9,820	< 0.20	< 150	< 50	-	27.4	< 150a	< 25
GL31-3-20151109	< 2.0	16.2	< 50	< 25a	< 500	< 0.10	< 2.0	3.5	4.1	< 1.0	51	< 0.20	22.6	< 10	< 1.0	< 0.20	9,440	< 0.20	< 150	< 50	-	22.8	< 150a	< 25
DUP4-20151109	< 2.0	14.3	< 50	< 25a	< 500	< 0.10	< 2.0	3.6	< 4.0a	< 1.0	52	< 0.20	22.9	< 10	< 1.0	< 0.20	9,280	< 0.20	< 150	< 50	-	23.2	< 150a	< 25
QA/QC RPD%	*	12	*	*	*	*	*	3	*	*	2	*	1	*	*	*	2	*	*	*	-	2	*	*
BH11-31C-20111217	100	300	< 100	< 4a	1,300	8.1	250	< 2	200	< 10	< 100	-	10	< 100	< 60a	< 1.0	2,300	< 1	130	< 100	-	260	80	< 100
DUPB-20111217	100	300	< 100	< 4a	1,200	6.8	220	< 2	200	< 10	< 100	-	30	< 100	< 60a	< 1.0	2,200	< 1	140	100	-	270	70	< 100
QA/QC RPD%	0	0	*	*	8	17	13	*	0	*	*	-	100	*	*	*	4	*	7	*	-	4	13	*
BH11-31C-20120625	< 2	3	20	< 0.4	60	< 0.10	12	0.9	< 10a	< 1	370	-	< 1	< 10	6	< 0.10	12,300	< 0.1	< 1	< 100	-	20	6	10
GL35-3-20121205	< 2.0	3.8	20	< 0.40	130	< 0.10	14.7	< 0.20	< 10a	< 1	490	-	< 1.0	< 10	< 6.0	< 0.10	12,500	< 0.10	< 1.0	< 1,000	-	26.3	5.55	< 10
DUP-C-20121205	< 2.0	4	20	< 0.40	120	< 0.10	15.1	< 0.20	< 10a	< 1	490	-	< 1.0	< 10	8.2	< 0.10	12,400	< 0.10	54.1	< 1,000	-	25.8	5.84	< 10
QA/QC RPD%	*	5	0	*	8	*	3	*	*	*	0	-	*	*	*	*	1	*	*	*	-	2	5	*
GL35-3-20130627	< 1.0	< 1.0	< 30	< 15a	< 300	< 0.50a	< 5.0	< 1.0	< 5.0a	< 1.0	377	< 0.20	< 1.0	< 5.0	< 10	< 0.10	8,740	< 1.0	< 90	< 50	-	10	< 90	< 15
DUP3-20130627	< 1.0	< 1.0	< 30	< 15a	< 300	< 0.50a	< 5.0	< 1.0	< 5.0a	< 1.0	380	< 0.20	< 1.0	< 5.0	< 10	< 0.10	8,840	< 1.0	< 90	< 50	-	9.03	< 90	< 15
QA/QC RPD%	*	*	*	*	*	*	*	*	*	*	1	*	*	*	*	*	1	*	*	*	-	10	*	*
GL35-3-20131113	< 1.0	1.7	< 50	< 25a	< 500	< 0.50a	< 5.0	< 1.0	< 5.0a	< 1.0	402	< 0.20	< 1.0	< 5.0	< 10	< 0.10	9,040	< 1.0	< 150	< 50	-	10.1	< 150a	< 25
GL35-3-20140609	< 1.0	< 1.0	< 30	< 15a	< 300	< 0.50a	< 5.0	< 1.0	< 5.0a	< 1.0	406	< 0.20	< 1.0	< 5.0	< 10	< 0.10	8,080	< 1.0	< 90	< 50	-	9.53	< 90	< 15
GL35-3-20141126	< 1.0	2.3	< 50	< 25a	< 500	< 0.50a	< 5.0	< 1.0	< 5.0a	< 1.0	353	< 0.20	< 1.0	< 5.0	< 10	< 0.10	8,070	< 1.0	< 150	< 50	-	6.6	< 150a	< 25
GL35-3-20150611	< 1.0	1.1	< 50	< 25a	< 500	< 0.050	< 1.0	< 1.0	< 2.0a	< 1.0	368	< 0.20	< 1.0	< 5.0	< 10	< 0.10	8,730	< 0.10	< 150	< 50	-	4.21	< 150a	< 25
GL35-3-20151109	2.1	12	< 50	< 25a	< 500	< 0.10	4.4	< 2.0	< 4.0a	< 1.0	305	< 0.20	< 1.0	< 10	4	< 0.20	8,100	< 0.20	< 150	< 50	-	16.5	< 150a	< 25
GL35-3-20160526	< 1.0	1.4	< 30	< 15a	< 300	< 0.050	< 1.0	< 1.0	< 2.0a	< 1.0	377	< 0.20	< 1.0	< 5.0	< 1.0	< 0.10	8,350	< 0.10	< 90	< 50	-	3.83	< 90	< 15

Associated CARO file(s): 8052631, 8052802, 8060237, 8060737, 8061100, 8081412, 8091680, 8092458, 8092618, 9052219, 9052399, 9052558, 9052754, 9052937, 9060273, 9091657, 9092001, 9092208, 9092404, 9120616.
Associated Exova file(s): 622178, 653600, 712940, 714233, 714243, 756693, 756810, 757047, 811364, 811710, 812030, 812741, 812985, 846260, 878316, 879073, 909346, 909448, 909654.
All terms defined within the body of Keltech's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference

RDL Denotes reported detection limit.

Table 2: Historical Summary of Analytical Results For Groundwater -Metals

Sample Location	Sample ID	Sample Date (yyyy mm dd)	Physical Parameters								Dissolved Metals																														
			pH	Total Hardness	pH (field)	Conductivity	Field Conductivity	Total Dissolved Solids	Dissolved Organic Carbon	Phosphate	Dissolved Aluminum	Dissolved Calcium	Dissolved Iron	Dissolved Magnesium	Dissolved Manganese	Dissolved Potassium	Dissolved Sodium	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper	Lead	Lithium	Mercury	Molybdenum	Nickel	Selenium	Silver	Strontium	Thallium	Tin	Titanium	Tungsten	Uranium	Vanadium	Zinc
			pH	mg/L	pH	µS/cm	µS/cm	mg/L	mg/L	mg/L	µg/L	mg/L	µg/L	mg/L	µg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
GL35-3 (Cont'd)	GL35-3-20170926	2017 09 26	7.45	2,010	-	-	-	7,480	-	-	< 10	196	25,000	369	374	32.9	2,110	< 0.50	< 1.0	< 30	< 15a	< 300	< 0.050	< 0.50	< 0.50	< 1.0a	< 1.0	368	< 0.20	< 1.0	< 5.0	< 1.0	< 0.050	8,380	< 0.050	< 90	< 50	-	3.75	< 90	< 15
	GL35-3-180815	2018 08 15	7.29	2,070	6.98	-	6,480	8,230	7.93	< 0.0050	< 5.0	211	24,800	374	443	34.1	1,980	< 0.20	0.67	17.2	< 0.10	87.0	< 0.010	0.52	< 0.10	< 0.40a	< 0.20	413	< 0.010	0.21	< 0.40	< 0.50	< 0.050	8,860	< 0.020	< 0.20	< 5.0	< 1.0	4.17	1.2	< 4.0
	GL35-3-190530	2019 05 30	7.58	2,000	6.85	-	9132	7,760	4.72	< 0.0500	5.1	194	23,200	368	348	32.0	1,980	0.21	0.61	16.3	< 0.10	76.9	< 0.010	1.28	< 0.10	< 0.40a	< 0.20	421	< 0.010	0.27	0.46	< 0.50	< 0.050	9,410	< 0.020	< 0.20	< 5.0	< 1.0	7.01	1.3	< 4.0
	GL35-3-200608	2020 06 08	7.73	2,180	6.73	-	7,916	7,520	3.66	-	3.0	228	16,700	392	377	37.1	2,040	< 0.050	0.842	15.9	0.066	55.4	0.0077	1.73	0.0296	0.90	< 0.050	350	< 0.010	2.34	0.361	0.10	< 0.010	9,340	< 0.0040	< 0.050	1.16	< 0.20	21.9	1.25	< 1.0
	DUPA-200608	Duplicate	7.73	2,080	6.73	-	7,916	7,520	4.14	-	2.9	213	15,900	376	363	36.2	2,090	< 0.050	0.820	15.8	0.059	50.2	0.0067	1.62	0.0297	0.97	< 0.050	316	< 0.010	2.29	0.350	0.11	< 0.010	9,410	< 0.0040	< 0.050	1.19	< 0.20	21.0	1.23	< 1.0
	QA/QC RPD%		0	5	*	-	*	0	12	-	*	7	5	4	4	2	2	*	3	1	11	10	*	7	0	7	*	10	*	2	3	*	*	1	*	*	3	*	4	2	*
	GL35-3-210610	2021 06 10	7.49	1,860	6.67	-	-	-	-	-	2.5	213	463	322	347	26.9	1,670	< 0.050	0.162	16.3	0.038	64.2	< 0.0020	< 0.10	0.0148	0.19	< 0.050	408	< 0.010	2.14	0.427	< 0.10	< 0.010	7,440	< 0.0040	< 0.050	< 0.20	< 0.20	20.7	< 0.20	< 1.0
	DUP3-210610	Duplicate	7.47	1,870	6.67	-	-	-	-	-	1.7	212	35.9	325	351	27.2	1,720	< 0.050	0.151	16.3	0.037	63.2	0.0022	< 0.10	0.0173	0.16	< 0.050	413	< 0.010	2.16	0.403	< 0.10	< 0.010	7,470	< 0.0040	< 0.050	< 0.20	< 0.20	21.4	< 0.20	< 1.0
	QA/QC RPD%		0	1	0	-	-	-	-	-	*	0	171	1	1	1	3	*	*	0	*	2	*	*	*	*	*	1	*	1	6	*	*	0	*	*	*	*	3	*	*
GL37	GL37-20130708	2013 07 08	-	5,860	-	-	-	35,900	-	-	< 150a	285	6,850	1,250	1,160	200	6,650	< 5.0	15.2	< 100	< 50a	< 1,000a	< 2.5a	< 25a	< 5.0	176	< 2.5	< 100	< 0.20	104	57	< 50a	< 0.50	7,660	< 5.0a	< 300	< 100	-	251	< 300a	< 50
	GL37-20131114	2013 11 14	-	5,970	-	-	-	28,600	-	-	< 150a	298	7,060	1,270	1,150	210	7,010	< 5.0	16.1	< 100	< 50a	< 1,000a	< 2.5a	< 25a	< 5.0	< 25a	< 2.5	< 100	< 0.20	103	< 25	< 50a	< 0.50	8,160	< 5.0a	< 300	< 100	-	236	< 300a	< 50
GL39-1	GL39-1-191205	2019 12 05	7.86	1,790	-	-	-	3,610	8.17	-	< 5.0	180	< 10	326	161	12.4	406	< 0.20	< 0.50	14.8	< 0.10	20.4	0.070	< 0.50	1.40	0.89	< 0.20	61.6	< 0.010	21.5	1.89	4.89	< 0.050	5,690	0.034	< 0.20	< 5.0	< 1.0	191	< 1.0	< 4.0
	GL39-1-200609	2020 06 09	7.81	2,120	7.02	-	3,724	3,710	6.40	-	1.1	229	< 2.0	376	31.8	14.2	476	< 0.050	0.333	13.5	< 0.010	15.9	0.0609	0.50	0.286	1.19	< 0.050	67.4	< 0.010	22.4	1.07	10.6	< 0.010	45.5	0.0157	< 0.050	< 0.20	< 0.20	219	0.42	1.4
	GL39-1-201019	2020 10 19	7.85	1,970	2.03	-	4,547	4,140	8.10	-	1.7	253	3.9	324	10.2	13.5	380	< 0.050	0.472	12.4	< 0.010	8.4	0.0459	0.35	0.207	1.16	< 0.050	59.5	< 0.010	22.4	1.02	5.58	< 0.010	6,840	0.0144	< 0.050	0.24	< 0.20	219	0.23	1.4
	GL39-1-210526	2021 05 26	7.71	3,300	6.92	-	-	-	-	-	2.2	325	< 2.0	605	18.0	16.5	566	< 0.050	0.372	14.1	< 0.010	20.9	0.0578	0.21	0.220	1.58	< 0.050	96.0	< 0.010	22.1	1.00	14.6	< 0.010	8,270	0.0184	< 0.050	< 0.20	< 0.20	310	< 0.20	1.2
	GL39-1-210914	2021 09 14	-	2,630	6.96	-	-	-	-	-	2.5	284	9.1	466	16.1	16	578	0.059	0.619	14.3	< 0.010	33.6	0.0629	0.34	0.256	2.32	< 0.050	74.5	< 0.010	26.2	1.33	2.69	< 0.010	6,770	0.0189	< 0.050	< 0.20	< 0.20	276	< 0.20	1.9
GL39-2	GL39-2-191205	2019 12 05	7.93	1,940	-	-	-	5,110	7.99	-	5.7	183	< 10	360	13.3	11.3	741	< 0.20	0.51	16.2	< 0.10	15.2	0.050	12.9	0.16	1.75	< 0.20	28.6	< 0.010	21.5	2.18	12.2	< 0.050	4,940	< 0.020	< 0.20	< 5.0	< 1.0	131	< 1.0	< 4.0
	GL39-2-200609	2020 06 09	7.85	1,910	7.29	-	4,140	4,110	6.23	-	4.5	188	8.8	349	6.72	9.71	1.27	0.059	0.419	12.3	< 0.010	9.7	0.0480	7.30	0.137	1.74	< 0.050	23.6	< 0.010	23.2	1.33	4.73	< 0.010	27.6	0.0111	< 0.050	0.31	< 0.20	120	0.79	< 1.0
	GL39-2-201016	2020 10 16	7.88	1,240	7.35	-	3,324	2,990	6.14	-	1.6	117	< 2.0	230	4.88	7.93	531	0.082	0.422	12.9	< 0.010	10.9	0.0236	3.31	0.109	1.63	< 0.050	22.2	< 0.010	26.8	1.02	5.17	< 0.010	2,870	0.0089	0.132	< 0.20	< 0.20	89.8	0.61	< 1.0
	DUP1-201016	Duplicate	7.90	1,260	7.69	-	1,582	3,090	5.89	-	1.6	121	< 2.0	233	4.86	7.9	545	0.085	0.421	12.8	< 0.010	10.3	0.0213	3.29	0.105	1.48	< 0.050	22.0	< 0.010	26.9	1.02	5.22	< 0.010	2,840	0.0084	0.217	< 0.20	< 0.20	91.1	0.60	< 1.0
	QA/QC RPD%		0	2	*	-	-	3	4	-	*	3	*	1	0	0	3	*	0	1	*	6	10	1	4	10	*	1	*	0	0	1	*	1	*	*	*	*	1	*	*
	GL39-2-210526	2021 05 26	7.98	1,090	7.31	-	-	-	-	-	1.4	106	< 2.0	201	5.71	7.24	430	< 0.050	0.404	10.9	< 0.010	11.8	0.0176	1.15	0.0787	1.43	< 0.050	20.4	< 0.010	26.6	0.932	0.92	< 0.010	2,400	0.0067	0.055	0.22	< 0.20	80.6	0.38	< 1.0
	DUP 2-210526	Duplicate	7.98	1,100	7.31	-	-	-	-	-	1.1	106	< 2.0	203	5.38	7.32	434	0.059	0.354	10.6	< 0.010	11.2	0.0176	1.13	0.0828	1.67	< 0.050	20.7	< 0.010	26.5	0.906	0.95	< 0.010	2,440	0.0064	0.062	< 0.20	< 0.20	82.6	0.44	< 1.0
	QA/QC RPD%		0	1	0	-	-	-	-	-	*	0	*	1	6	1	1	*	13	3	*	5	0	2	5	15	*	1	*	0	3	3	*	2	*	*	*	*	2	*	*
	GL39-2-210914	2021 09 14	-	1,800	7.27	-	-	-	-	-	97.7	182	167	327	15.3	9.42	630	0.070	0.692	20.5	< 0.010	22.8	0.0369	2.81	0.283	2.02	0.075	21.5	< 0.010	29.3	1.83	11.9	< 0.010	3,770	0.0116	< 0.050	8.35	< 0.20	134	< 0.20	1.0
GL40-3	GL40-3-201117	2020 11 17	8.09	311	7.31	-	4,621	3,000	66.4	-	2.1	75.4	66.6	29.7	466	10.6	1,230	1.45	15.4	585	< 0.010	76.9	0.0058	0.24	0.119	< 0.10	< 0.050	283	< 0.010	1.52	1.13	< 0.10	< 0.010	8,370	< 0.0040	0.176	1.29	0.66	8.49	1.22	< 1.0
	GL40-3-210610	2021 06 10	7.95	323	7.31	-	-	-	-	-	1.4	77.5	42.0	31.3	451	11.2	1,090	0.602	4.35	272	< 0.010	75.5	< 0.0020	0.11	0.103	0.18	< 0.050	321	< 0.010	0.607	1.30	< 0.10	< 0.010	7,280	< 0.0040	< 0.050	1.04	0.65	6.76	0.94	< 1.0
GL41-1	GL41-1-200616	2020 06 16	8.03	661	7.43	-	2,257	1,400	6.70	-	3.4	69.4	4.0	118	669	17.4	249	0.122	1.30	192	< 0.010	45.7	0.393	0.58	1.01	1.17	< 0.050	38.3	< 0.010	12.0	4.80	0.79	< 0.010	2,540	0.0521	0.200	< 0.20	< 0.20	29.2	1.85	5.6
	GL41-1-201102	2020 11 02	8.03	735	7.56	-	248	1,530	5.81	-	2.1	61.4	< 2.0	141	215	18.6	312	0.156	1.20	118	< 0.010	50.6	0.311	1.68	0.229	1.69	< 0.050	44.2	< 0.010	11.0	2.40	0.54	< 0.010	2,830	0.0260	< 0.050	0.26	< 0.20	27.7	2.73	4.7
	GL41-1-210525	2021 05 25	8.09	755	7.27						2.6	71	< 2.0	140	1.05	17.9	282	0.112	1.03	158	< 0.010	36.0	0.0391	1.59	0.0478	1.82	< 0.050	44.2	< 0.010	8.48	2.15	0.46	< 0.010	2,860	0.0517	0.124	< 0.20	< 0.20	28.1	1.68	2.5
GL41-2	GL41-2-191205	2019 12 05	8.05	530	-	-	-	1,230	6.32	-	75.7	53.6	97	96.3	164	15.1	234	< 0.20	1.19	67.3	< 0.10	30.0	0.044	3.18	0.29	1.52	0.24	36.9	< 0.010	10.9	1.55	0.64	< 0.050	2,320	< 0.020	< 0.20	< 5.0	< 1.0	20.3	2.6	< 4.0
	GL41-2-200612	2020 06 12	7.44	726	7.24	-	2,073	1,390	6.13	-	< 1.0	71.1	< 2.0	133	0.111	16	279	0.073	1.05	87.9	< 0.010	25.2	0.0102	2.26	0.0429	1.13	< 0.050	45.2	< 0.010	7.49	0.479	0.49	0.010	3,120	0.0064	< 0.050	< 0.20	< 0.20	26.3	2.29	< 1.0
	DUPD-200612	Duplicate	7.50	743	7.24	-	2,073	1,370	6.38	-	< 1.0	71.4	< 2.0	137	0.085	16.3	284	0.074	1.06	87.8	< 0.010	25.2	0.0119	2.26	0.0404	1.13	< 0.050	45.3	< 0.010	7.45	0.454	0.51	< 0.010	3,080	0.0065	< 0.050	< 0.20	< 0.20	26.1	2.32	< 1.0
	QA/QC RPD%		1	2	*	-	*	1	4	-	*	0	*	3	*	2	2	*	1	0	*	0	15	0	6	0	*	0	*	1	5	*	*	1	*	*	*	*	1	1	*
	GL41-2-201022	2020 10 22	7.83	684	7.31	-	2,562	1,410	6.58	-	< 1.0	72.6	< 2.0	122	0.070	15.1	256	0.072	1.05	85.2	0.011	29.7	0.0149	2.44	0.0438	1.24	< 0.050	41.7	< 0.010	7.10	0.516	0.49	0.011	2,840	< 0.0040	< 0.050	< 0.20	< 0.20	25.8	2.54	< 1.0
	GL41-2-210525	2021 05 25	8.05	753	7.17	-	-	-	-	-	< 1.0	76.2	< 2.0	137	< 0.050	17.1	286	0.069	1.10	85.6	< 0.010	30.2	0.0082	1.87	0.0452	1.33	< 0.050	42.5	< 0.010	7.22	0.569	0.34	< 0.010	2,990	< 0.0040	< 0.050	< 0.20	< 0.20	24.5	2.20	< 1.0
	GL41-2-210907	2021 09 07	7.91	711	7.21	-	-	-	-	-	< 1.0	75.8	2.4	127	0.166	16.9	266	0.076	1.14	86.2	0.011	33.1	0.0111	2.13	0.0527	1.25	< 0.050	41.5	< 0.010	6.96	0.604	0.46	0.011	2,960	< 0.0040	< 0.050	< 0.20	< 0.20	24.6	1.76	< 1.0
GL42-1	GL42-1-200612	2020 06 12	7.12	184	7.28	-	2,332	2,360	2.39	-	< 1.0	35	2,940	23.4	343	9.87	1,530	0.225	2.67	551	0.025	82.3	0.0270	0.30	0.154	< 0.10	0.110	1,270	< 0.010	4.00	0.610	0.12	< 0.010	3,460	< 0.0040	0.115	1.00	0.24	1.73	1.36	1.7
	GL42-1-201106	2020 11 06	7.80	171	7.27	-	5,266	3,620	2.95	-	1.7	33.4	3,500	21.3	467	9.63	1,440	0.655	5.24	640	0.014	55.3	0.0334	0.48	0.292	0.19	0.065	1,270	< 0.010	3.08	0.932	< 0.10	< 0.010	3,360	< 0.0040	0.269	1.78	0.22	0.956	1.50	1.9
	GL42-1-210603	2021 06 03	8.05	187	7.35	-	-	-	-	-	3.8	36.1	3,650	23.5	322	9.8	1,490	0.654	10.4	689	0.013	91.0	0.0118	0.23	0.906	0.25	< 0.050	1,410	< 0.010	2.13	2.02	< 0.10	< 0.010	3,530	< 0.0040	0.087	1.49	0.37	0.603	0.61	< 1.0
GL42-2	GL42-2-200616	2020 06 16	8.08	855	7.45	-	4,649	3,910	6.51	-	55.4	89.2	122	153	1,320	7.78	973	0.353	2.53	102	0.013	48.3	0.195	0.18	1.88	0.63	0.167	105	< 0.010	18.4	6.50	0.21	< 0.010	4,000	0.0497	0.346	1.62	< 0.20	85.4	0.77	2.8
	GL42-2-201109	2020 11 09	7.76	1,270	7.34	-	5,360	4,220	7.70	-	30.2	117	51.3	238	606	8.76	1,350	0.868	1.74	47.2	< 0.010	43.1	0.719	3.51	1.88	2.36	0.068	200	< 0.010	21.7	9.37	0.73	< 0.010	5,560	0.0787	0.429	2.24	< 0.20	100	1.56	4.2
	GL42-2-210607	2021 06 07	8.02	1,230	7.34	-	-	-	-	-	< 1.0	119	3.7	227	655	9.69	1,170	1.03	1.42	65.7	0.013	49.3	0.188	0.27	1.18	7.23	0.127	156	< 0.010	19.4	8.82	0.53	< 0.010	5,650	0.0808	1.34	< 0.20	< 0.20	107	0.63	6.4
	GL41-3-200612	2020 06 12	7.40	755	7.26	-	2,133	1,580	6.68	-	< 1.0	69.3	2.2	141	7.31	17.2	290	0.080	1.07	104	< 0.010	24.2	0.0240	2.09	0.0981	1.37	< 0.050	47.5	< 0.010	8.33	0.925	0.53	< 0.010	3,080	0.0242	< 0.050	< 0.20	< 0.20	27.7	1.82	< 1.0
	GL41-3-201022	2020 10 22	7.86	696	7.31	-	2,621	1,400	6.93	-	2.1	70.9	4.7	126	5.82	17.1	273	0.075	1.14	91.5	< 0.010	27.7	0.0231	2.02	0.0589	2.26	< 0.050	41.3	< 0.010	8.25	0.910	0.35	< 0.010	2,840	0.0135	< 0.050	< 0.20	< 0.20	26.9	2.14	4.9
	GL41-3-210525	2021 05 25	8.05	792	7.20	-	-	-	-	-	2.3	75.8	< 2.0	146	5.15	18.7	299	0.064	1.12	95.1	< 0.010	28.8	0.0148	1.74	0.0691	1.68	< 0.050	45.3	< 0.010	7.54	0.755	0.35	< 0.010	3,050	0.0087	< 0.050	< 0.20	< 0.20	26.3	1.82	< 1.0
	GL41-3-210907	2021 09 07	7.87	723	7.22	-	-	-	-	-	5.7	74	10.4	131	2.82	19.3	288	0.088	1.24	92.8	< 0.010	32.3	0.0143	1.96	0.0610	1.53	< 0.050	43.4	< 0.010	7.97	0.756	0.39	< 0.010	2,810	0.0095	< 0.050	0.46	< 0.20	24.6	1.28	< 1.0
	DUP 1-210907	Duplicate	7.88	715	7.22	-	-	-	-	-	6.2	70.6	11.4	131	2.35	19	286	0.083	1.28	92.1	< 0.010	30.9	0.0166	1.92	0.0612	1.43	< 0.050	41.9	< 0.010	7.94	0.767	0.39	< 0.010	2,830	0.0093	< 0.050	0.63	< 0.20	23.8	1.57	< 1.0
	QA/QC RPD%		0	1	0	-	-	-	-	-	8	5	9	0	18	2	1	*	3	1	*	4	15	2	0	7	*	4	*	0	1	*	*	1	*	*	*	*	3	20	*

Associated CARO file(s): 8052631, 8052802, 8060237, 8060737, 8061100, 8081412, 8091680, 8092458, 8092618, 9052219, 9052399, 9052558, 9052754, 9052937, 9060273, 9091657, 9092001, 9092208, 9092404, 9120616.
Associated Exova file(s): 622178, 653600, 712940, 714233, 714243, 756693, 756810, 757047, 811364, 811710, 812030, 812741, 812985, 846260, 878316, 879073, 909346, 909448, 909654.
All terms defined within the body of Keltech's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality controll relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

Table 3: Historical Summary of Analytical Results For Surface Water - Inorganics

			Physical Parameters																	Dissolved Inorganics												
Sample Location	Sample ID	Sample Date (yyyy mm dd)	pH pH	Hardness mg/L	pH (field) pH	Temperature C	Conductivity µS/cm	Field Conductivity µS/cm	Total Dissolved Solids mg/L	Total Suspended Solids mg/	Dissolved Organic Carbon mg/	Total Nitrogen-N mg/L	Ammonia, Total (as N) µg/L	Nitrate (as N) µg/L	Nitrite (as N) µg/L	Nitrate+Nitrite Nitrogen µg/L	Chloride mg/L	Fluoride µg/L	Sulfate mg/L	Total Alkalinity mg/L	Alkalinity, Bicarbonate (as CaCO3) mg/L	Alkalinity, Carbonate (as CaCO3) mg/L	Alkalinity, Hydroxide (as CaCO3) mg/L	Alkalinity, Phenolphthalein (as CaCO3) mg/L	Bicarbonate mg/	Kjeldahl Nitrogen-N mg/L	Bromide mg/L	Chemical Oxygen Demand mg/L	Phosphate mg/L	Ortho-Phosphate mg/L	Total Organic Carbon mg/L	Total Phosphorous as P mg/L
BREDIN POND	Bredin Pond-20010611	2001 06 11	-	-	-	-	-	-	1,180	-	-	-	-	-	-	-	-	-	320	-	-	-	-	-	-	-	-	-	-	-	10	-
	Bredin Pond-20010815	2001 08 15	-	-	-	-	-	-	1,360	-	-	-	-	-	-	-	-	-	375	-	-	-	-	-	-	-	-	-	-	-	18	-
	Bredin Pond-20010920	2001 09 20	-	-	-	-	-	-	1,400	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16.3	-
	Bredin Pond-20080506	2008 05 06	8.46	-	-	-	1,470	-	1,000	-	-	-	140	< 20	-	-	79.8	-	198	546	-	-	-	-	-	0.75	-	14	-	< 0.01	11.2	-
	Bredin Pond-20080507	2008 05 07	-	-	-	-	-	-	-	< 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Bredin Pond-20080520	2008 05 20	8.39	728	-	-	1,470	-	994	< 1	-	-	120	189	-	-	94	-	216	542	-	-	-	-	-	1.16	-	20	-	< 0.01	11.8	-
	Bredin Pond-20090521	2009 05 21	-	85	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Bredin Pond-20091119	2009 11 19	-	716	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Bredin Pond-20130429	2013 04 29	8.82	757	-	-	1,860	-	1,170	< 3.0	-	-	28.9	< 100	-	-	128	1,530	285	-	-	-	-	-	-	-	< 1.0	42	-	0.0099	11.5	-
	Bredin Pond-20130528	2013 05 28	8.56	745	-	-	1,910	-	1,050	< 3.0	-	-	90.8	< 100	-	-	135	1,150	286	-	-	-	-	-	-	-	< 1.0	35	-	0.105	9.4	-
	Bredin Pond-20130718	2013 07 18	8.76	789	-	-	1,990	-	1,230	10.3	-	-	< 5.0	< 100	-	-	133	1,540	309	736	611	124	< 1.0	-	-	1.82	< 1.0	43	-	0.176	16.2	-
	Bredin Pond-20131016	2013 10 16	8.9	766	-	-	1,930	-	1,310	6.3	-	-	22.4	< 100	-	-	140	1,010	308	739	581	158	< 1.0	-	-	1.46	< 1.0	43	-	0.0011	11.2	-
	Bredin Pond-20140331	2014 03 31	8.66	759	-	-	1,950	-	1,240	< 3.0	-	-	96.8	460	-	-	129	1,170	307	724	617	107	< 1.0	-	-	1.09	< 1.0	34	-	0.056	9.83	-
	Bredin Pond-20140528	2014 05 28	8.86	754	-	-	1,960	-	1,280	3.1	-	-	12.3	< 100	-	-	134	1,480	315	628	494	134	< 1.0	-	-	1	< 1.0	34	-	0.0479	10.4	-
	Bredin Pond-20140828	2014 08 28	9.01	673	-	-	1,830	-	1,180	13.5	-	-	14.5	< 100	-	-	131	1,820	273	661	477	184	< 1.0	-	-	2.32	< 1.0	64	-	0.0016	15.2	-
	Bredin Pond-20150311	2015 03 11	-	721	-	-	1,790	-	1,110	< 3.0	-	-	80	1,080	-	-	120	1,190	257	638	542	96.2	< 1.0	-	-	0.965	< 0.50	22	-	0.0697	8.52	-
	Bredin Pond-20150616	2015 06 16	-	623	-	-	1,520	-	1,040	3.2	-	-	11.7	< 50	-	-	113	1,170	238	639	478	162	< 1.0	-	-	0.922	< 0.50	30	-	0.0045	9.01	-
	Bredin Pond-20151029	2015 10 29	9.27	553	-	-	1,560	-	980	< 3.0	-	-	34.1	356	-	-	107	1,100	216	574	390	184	< 1.0	-	-	0.938	< 0.50	32	-	0.0184	8.55	-
	BREDIN POND-20160518	2016 05 18	-	506	-	-	1,380	-	838	< 3.0	-	-	18.3	< 25	-	-	98.4	1,030	200	520	183	337	< 1.0	-	-	0.73	< 0.25	24	-	0.0048	8.31	-
	BREDIN POND-20160914	2016 09 14	-	597	-	-	1,540	-	980	< 3.0	-	-	8.5	< 50	-	-	112	1,190	222	592	421	171	< 1.0	-	-	0.866	< 0.50	38	-	< 0.0010	11.1	-
	BREDIN POND-20161116	2016 11 16	8.52	611	-	-	1,670	-	1,080	< 3.0	-	-	75.3	419	-	-	110	1,160	252	611	572	38.8	< 1.0	-	-	0.895	< 0.50	36	-	0.008	9.28	-
	BREDIN POND-20170418	2017 04 18	8.63	684	-	-	1,770	-	1,180	< 3.0	-	-	61.8	192	-	-	113	1,060	271	659	597	61.8	< 1.0	-	-	1.34	< 0.50	35	-	0.0033	11	-
	BREDIN POND-20170607	2017 06 07	8.72	732	-	-	1,880	-	1,170	4.9	-	-	73.6	< 50	-	-	125	1,250	306	705	619	86.4	< 1.0	-	-	0.976	< 0.50	28	-	0.0213	10.6	-
	BREDIN POND-20170907	2017 09 07	8.73	685	-	-	1,810	-	1,190	22.4	-	-	308	< 50	-	-	145	1,150	252	654	570	83.8	< 1.0	-	-	3.61	< 0.50	71	-	< 0.0010	19	-
	BREDIN POND-20171101	2017 11 01	8.41	649	-	-	1,720	-	1,030	3	-	-	215	939	-	-	145	1,220	223	617	591	26.6	< 1.0	-	-	1.19	< 0.50	21	-	0.0284	7	-
	BREDIN POND-180404	2018 04 04	8.77	580	9.08	9.4	1,450	1,235	918	65.3	-	3.27	176	897	< 10	897	128	870	144	477	389	88.2	< 1.0	44.1	-	2.37	0.17	76	0.0108	-	9.18	1.00
	BREDIN POND-180523	2018 05 23	8.36	604	8.7	21.6	1,710	1,764	1,070	< 3.3	-	2.69	449	1,360	48	1,410	153	450	211	519	504	14.7	< 1.0	7.4	-	1.28	< 0.10	< 20	0.100	-	7.65	0.257
	BREDIN POND-180906	2018 09 06	8.87	581	9.03	19.4	1,560	1,580	1,020	3.4	-	1.90	439	556	39	595	129	870	206	471	471	< 1.0	< 1.0	< 1.0	-	1.30	< 0.10	58	< 0.0050	-	10.8	0.159
	BREDIN POND-181107	2018 11 07	8.31	586	8.24	8	1,600	1,389	964	2.6	-	2.60	880	1,110	82	1,190	149	760	207	509	501	7.3	< 1.0	3.6	-	1.42	< 1.00	29	0.0653	-	7.15	0.172
	BREDIN POND-190329	2019 03 29	8.24	640	8.16	8.8	1,680	1,418	986	2.3	-	2.98	128	2,150	18	2,170	142	830	197	556	-	< 1.0	< 1.0	< 1.0	556	0.810	0.15	21	0.108	-	6.38	0.253
	BREDIN POND-190605	2019 06 05	8.84	750	8.62	21.7	1,880	1,671	1,330	3.0	-	0.875	54	33	16	48.6	160	880	296	653	451	202	< 1.0	101	-	0.826	< 0.10	< 20	< 0.0050	-	8.11	0.288
	BREDIN POND-190904	2019 09 04	9.17	721	9.63	21.6	1,870	1,715	1,220	5.0	9.45	1.04	135	< 10	< 10	< 10.0	178	980	281	624	328	296	< 1.0	148	-	1.04	< 0.10	27	-	0.0068	10.5	0.112
	BREDIN POND-191023	2019 10 23	8.60	663	9.43	9.6	1,790	1,788	1,120	7.7	6.89	1.53	42	562	15	577	169	840	224	557	557	< 1.0	< 1.0	< 1.0	-	0.950	< 0.10	22	-	< 0.0050	7.25	0.0803
	BREDINPOND-200407	2020 04 07	8.44	627	9.05	8.8	1,630	1,470	1,040	7.2	5.93	1.92	206	664	21	685	166	680	184	481	452	29.3	< 1.0	14.6	-	1.24	< 0.10	< 20	-	< 0.0050	6.84	0.0920
	BREDINPOND-200605	2020 06 05	8.80	565	8.76	19.4	1,460	1,344	935	2.0	6.99	0.615	< 50	< 10	< 10	< 10.0	159	600	155	493	356	137	< 1.0	68.5	-	0.615	0.12	< 20	-	< 0.0050	7.04	0.0593
	BREDINPOND-200917	2020 09 17	8.89	736	8.98	21.6	1,860	1,945	1,270	21.2	11.7	2.25	84	< 10	< 10	-	164	970	280	608	409	199	< 1.0	99.3	-	2.25	< 0.10	62	-	< 0.0050	13.4	0.146
	BREDINPOND-201028	2020 10 28	8.62	755	8.85	5.5	2,010	2,025	1,300	18.7	14.8	3.06	115	301	79	380	157	990	296	664	559	105	< 1.0	52.4	-	2.68	< 0.10	53	-	< 0.0050	14.8	0.219
	BREDIN POND-210323	2021 03 23	8.50	696	8.90	6.7	1,590	1,736.0	1,070	22.0	8.39	1.44	< 50	195	< 10	195	151	780	209	568	528	39.5	< 1.0	19.7	-	1.25	< 1.00	50	-	< 0.0050	8.57	0.0774
	BREDIN POND-210616	2021 06 16	8.82	797	8.83	20.1	1,880	1,963.0	1,310	2.8	9.53	1.17	76	< 10	< 10	< 10.0	170	1,030	296	713	502	210	< 1.0	105	-	1.17	< 0.10	39	-	< 0.0050	9.62	0.123
	BREDIN POND-211019	2021 10 19	8.35	832	8.41	11.2	2,010	2,038.0	1,340	-	9.33	2.86	1,670	68	45	113	188	1,030	275	700	679	20.0	< 1.0	10.0	-	2.74	< 0.10	21	-	< 0.0500	9.68	0.295
NORTHEAST POND	NE Pond-20130429	2013 04 29	8.72	899	-	-	2,220	-	1,260	3.1	-	-	95.1	< 100	-	-	137	2,080	417	-	-	-	-	-	-	-	< 1.0	43	-	0.369	14.9	-
	NE Pond-20130528	2013 05 28	8.76	948	-	-	2,360	-	1,670	4	-	-	56.9	< 100	-	-	145	1,640	465	-	-	-	-	-	-	-	< 1.0	51	-	0.503	13.5	-
	NE Pond-20130718	2013 07 18	8.83	951	-	-	2,400	-	1,540	< 3.0	-	-	65.1	< 100	-	-	150	1,820	446	870	684	186	< 1.0	-	-	1.88	< 1.0	41	-	0.445	17.7	-
	NE Pond-20131016	2013 10 16	8.78	937	-	-	2,430	-	1,750	6	-	-	149	< 100	-	-	157	1,700	432	871	726	145	< 1.0	-	-	1.59	< 1.0	48	-	0.157	16.9	-
	NE Pond-20140331	2014 03 31	8.66	858	-	-	2,230	-	1,490	5.5	-	-	8.2	< 100	-	-	133	1,400	405	808	696	112	< 1.0	-	-	1.29	< 1.0	39	-	0.27	12.1	-
	NE Pond-20140528	2014 05 28	8.77	814	-	-	2,190	-	1,190	< 3.0	-	-	62.2	< 100	-	-	137	1,800	379	785	659	127	< 1.0	-	-	1.17	< 1.0	37	-	0.353	11	-
	NE Pond-20140828	2014 08 28	8.96	775	-	-	2,160	-	1,440	10.3	-	-	17.6	< 100	-	-	150	1,940	363	780	581	199	< 1.0	-	-	2.35	< 1.0	80	-	0.114	18.8	-

Associated CARO file(s): 8040426, 8041402, 8041784, 8050436, 8052167, 8061543, 8071280, 8090442, 8110640, 8110821, 9032473, 9050543, 9060474, 9090312, N000861, 0040546, 0060737, 0091922, 20J3095.
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n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

Table 3: Historical Summary of Analytical Results For Surface Water - Inorganics

			Physical Parameters																	Dissolved Inorganics												
Sample Location	Sample ID	Sample Date (yyyy mm dd)	pH	Hardness	pH (field)	Temperature	Conductivity	Field Conductivity	Total Dissolved Solids	Total Suspended Solids	Dissolved Organic Carbon	Total Nitrogen-N	Ammonia, Total (as N)	Nitrate (as N)	Nitrite (as N)	Nitrate+Nitrite Nitrogen	Chloride	Fluoride	Sulfate	Total Alkalinity	Alkalinity, Bicarbonate (as CaCO3)	Alkalinity, Carbonate (as CaCO3)	Alkalinity, Hydroxide (as CaCO3)	Alkalinity, Phenolphthalein (as CaCO3)	Bicarbonate	Kjeldahl Nitrogen-N	Bromide	Chemical Oxygen Demand	Phosphate	Ortho-Phosphate	Total Organic Carbon	Total Phosphorous as P
			pH	mg/L	pH	C	µS/cm	µS/cm	mg/L	mg/	mg/	mg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
NORTHEAST POND (Cont'd)	NE Pond-20150311	2015 03 11	-	810	-	-	2,240	-	1,510	8.8	-	-	180	< 100	-	-	143	1,390	413	791	660	131	< 1.0	-	-	1.59	< 1.0	44	-	0.199	12.8	-
	NE Pond-20150616	2015 06 16	-	870	-	-	2,240	-	1,670	3.4	-	-	15.1	< 100	-	-	155	1,540	486	888	727	161	< 1.0	-	-	1.28	< 1.0	49	-	0.307	14.1	-
	NE Pond-20151029	2015 10 29	9.08	941	-	-	2,780	-	2,060	3.6	-	-	50.3	< 100	-	-	183	1,540	551	949	690	258	< 1.0	-	-	1.58	< 1.0	55	-	0.146	16.9	-
	NE POND-20160914	2016 09 14	-	1,060	-	-	3,160	-	2,310	14.1	-	-	26.4	< 100	-	-	212	1,820	744	1,090	871	217	< 1.0	-	-	2.71	< 1.0	74	-	0.125	20.6	-
	NE POND-20161116	2016 11 16	8.47	1,010	-	-	2,960	-	2,130	4.5	-	-	2,090	< 100	-	-	185	1,560	644	992	939	53	< 1.0	-	-	3.17	< 1.0	52	-	0.357	15.9	-
	NE POND-20170418	2017 04 18	8.62	944	-	-	2,460	-	1,630	3.6	-	-	73.4	< 100	-	-	146	1,320	539	852	766	85.4	< 1.0	-	-	1.11	< 1.0	33	-	0.085	13	-
	NE POND-20170607	2017 06 07	8.86	967	-	-	2,500	-	1,730	6.9	-	-	11.2	< 100	-	-	155	1,560	586	876	719	157	< 1.0	-	-	1.05	< 1.0	35	-	0.3	15	-
	NE POND-20170907	2017 09 07	9.31	1,050	-	-	2,790	-	2,070	4.2	-	-	71.8	< 100	-	-	192	1,570	685	933	530	403	< 1.0	-	-	2.13	< 1.0	57	-	0.15	20.7	-
	NE POND-20171101	2017 11 01	9.11	1,060	-	-	2,740	-	1,980	3.6	-	-	122	< 100	-	-	207	1,790	676	945	651	294	< 1.0	-	-	1.32	< 1.0	53	-	0.226	15.8	-
	NE SAMPLE-20160518	2016 05 18	-	913	-	-	2,760	-	1,950	< 3.0	-	-	21.9	< 100	-	-	167	1,440	598	943	747	196	< 1.0	-	-	1.29	< 1.0	47	-	0.172	17.2	-
	NORTHEAST POND-180404	2018 04 04	8.81	961	8.95	8.8	2,400	1,965	1,670	6.4	-	0.955	40	17	< 10	16.8	13.2	1,210	483	757	568	189	< 1.0	94.3	-	0.938	0.48	59	0.133	-	12.8	0.480
	NORTHEAST POND-180523	2018 05 23	8.80	937	8.72	24.1	2,440	2,436	1,740	< 2.5	-	0.988	67	< 10	< 10	< 10.0	133	920	431	717	542	175	< 1.0	87.6	-	0.988	< 0.10	< 20	0.0154	-	13.8	0.0810
	NORTHEAST POND-180906	2018 09 06	8.52	1,180	8.84	17.91	3,100	385	2,210	106	-	3.40	154	< 100	< 100	< 100	176	2,260	518	1,120	1,020	99.6	< 1.0	49.8	-	3.40	< 1.00	116	0.0660	-	20.8	1.24
	NORTHEAST POND-181107	2018 11 07	8.45	1,030	8.61	7.7	2,170	2,050	1,570	41.5	-	2.37	133	< 10	< 10	< 10.0	164	1,360	456	787	725	61.8	< 1.0	30.9	-	2.37	< 1.00	67	0.0951	-	18.3	0.452
	Northeast Pond	2019 03 29	8.49	724	8.72	10.9	1,910	1,577	1,080	28.5	-	1.36	24	< 10	< 10	< 10.0	113	1,010	349	603	-	46.7	< 1.0	23.4	556	1.36	0.23	49	0.109	-	8.16	0.383
	Northeast Pond	2019 06 05	8.60	1,010	8.33	22.4	2,570	2,267	1,800	7.2	-	1.33	195	< 10	< 10	< 10.0	161	1,260	506	858	712	146	< 1.0	72.9	-	1.33	< 0.10	32	< 0.0050	-	12.1	0.310
	Northeast Pond	2019 09 04	8.98	1,040	9.62	19.8	2,620	2,484	1,710	8.7	14.0	1.22	60	< 10	< 10	< 10.0	180	1,670	546	907	584	323	< 1.0	161	-	1.22	< 0.10	40	-	< 0.0050	14.5	0.144
	NE Pond	2019 10 23	8.52	1,040	9.04	9	2,710	2,659	1,850	3.8	11.2	1.25	225	224	< 10	224	194	1,600	523	987	987	< 1.0	< 1.0	< 1.0	-	1.02	< 0.10	35	-	< 0.0050	11.5	0.347
	NEPOND-200407	2020 04 07	8.46	1,000	9	9.3	2,470	2,264	1,810	2.4	11.0	0.863	< 50	< 10	< 10	< 10.0	167	1,370	543	821	753	68.3	< 1.0	34.2	-	0.863	< 0.10	34	-	< 0.0050	11.0	0.314
	NEPOND-200605	2020 06 05	8.72	1,050	8.67	20.2	2,460	2,311	1,820	3.2	14.5	1.33	199	< 10	< 10	< 10.0	160	1,310	488	870	662	208	< 1.0	104	-	1.33	< 0.10	48	-	0.104	15.2	0.357
	NEPOND-200918	2020 09 18	8.82	1,030	8.85	18.4	2,750	2,914	2,380	10.2	25.8	3.66	422	< 10	< 10	-	194	1,660	541	992	703	289	< 1.0	144	-	3.66	0.26	93	-	0.0212	26.3	0.457
	NEPOND-201028	2020 10 28	8.50	1,030	8.69	4.5	2,660	2,758	1,580	12.4	18.4	2.33	180	31	< 10	31.1	139	1,220	397	907	798	109	< 1.0	54.5	-	2.30	< 0.10	69	-	< 0.0050	19.0	0.322
	NE POND-210323	2021 03 23	8.42	963	8.5	6.5	2,200	2,392.0	1,640	6.0	12.4	0.965	< 50	< 10	< 10	< 10.0	143	1,380	424	851	801	50.0	< 1.0	25.0	-	0.965	< 1.00	42	-	< 0.0050	14.1	0.243
	NE POND-210616	2021 06 16	8.89	1,080	8.83	23.6	2,420	2,729	1,800	9.2	13.4	1.43	112	< 10	< 10	< 10.0	186	1,660	541	990	724	266	< 1.0	133	-	1.43	< 0.10	45	-	< 0.0050	13.8	0.227
	NE POND-211019	2021 10 19	8.60	1,220	8.70	10.8	2,960	2,980.8	2,040	-	14.8	1.95	735	< 10	25	25.0	201	1,840	569	1,020	846	172	< 1.0	86.2	-	1.92	< 1.00	41	-	< 0.0500	17.0	0.218
SLOUGH	Alki Lake-20080506	2008 05 06	9.49	-	-	-	20,000	-	17,500	-	-	-	490	23	-	-	1,050	-	4,680	7,420	-	-	-	-	-	13.1	-	556	-	< 1.00	285	-
	Alki Lake-20080507	2008 05 07	-	-	-	-	-	-	-	242	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Alki Lake-20080520	2008 05 20	9.43	1,070	-	-	22,000	-	18,400	88	-	-	1,770	25	-	-	1,130	-	4,980	8,220	-	-	-	-	-	20.8	-	440	-	< 1.00	307	-
	Alki Lake-20091119	2009 11 19	-	1,120	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Slough-20010619	2001 06 19	-	-	-	-	-	-	24,200	-	-	-	-	-	-	-	-	-	6,850	-	-	-	-	-	-	-	-	-	-	-	260	-
	Slough-20010815	2001 08 15	-	-	-	-	-	-	53,500	-	-	-	-	-	-	-	-	-	17,800	-	-	-	-	-	-	-	-	-	-	-	810	-
	Slough-20010920	2001 09 20	-	-	-	-	-	-	91,500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,440	-
	Slough-20090521	2009 05 21	-	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Slough-20130429	2013 04 29	9.51	715	-	-	20,000	-	18,000	154	-	-	1,330	< 500	-	-	1,260	2,700	5,110	-	-	-	-	-	-	-	12.8	618	-	5.65	163	-
	Slough-20130528	2013 05 28	9.46	789	-	-	22,400	-	20,100	72.7	-	-	428	< 500	-	-	1,480	831	6,030	-	-	-	-	-	-	-	10.5	559	-	6.54	187	-
	Slough-20130718	2013 07 18	9.65	803	-	-	27,200	-	25,900	356	-	-	364	< 500	-	-	1,780	996	7,630	9,320	4,000	5,320	< 5.0	-	-	36.9	17.2	920	-	6.3	251	-
	Slough-20131016	2013 10 16	9.73	567	-	-	38,900	-	37,600	142	-	-	998	< 500	-	-	2,740	< 2,000a	12,100	15,200	6,010	9,190	< 100	-	-	24.4	20.1	1,050	-	10.5	286	-
	Slough-20140331	2014 03 31	9.46	531	-	-	9,940	-	7,580	34.8	-	-	1,310	< 250	-	-	621	< 1,000	2,360	2,760	1,560	1,200	< 1.0	-	-	9.17	5.4	294	-	2.21	96	-
	Slough-20140528	2014 05 28	9.37	665	-	-	19,100	-	15,200	59.1	-	-	491	< 500	-	-	1,230	764	5,030	6,600	4,350	2,260	< 100	-	-	19.4	12.3	514	-	5.33	159	-
	Slough-20140828	2014 08 28	9.58	911	-	-	48,700	-	49,700	321	-	-	1,760	< 500	-	-	3,660	588	15,600	18,100	6,440	11,600	< 100	-	-	56.4	35	1,680	-	12.4	506	-
	Slough-20150311	2015 03 11	-	535	-	-	11,600	-	8,970	12.6	-	-	1,910	< 250	-	-	715	< 1,000	2,910	3,330	2,630	700	< 100	-	-	9.19	5.8	296	-	2.97	90.4	-
	Slough-20150616	2015 06 16	-	732	-	-	13,700	-	13,600	36.3	-	-	87.8	< 500	-	-	1,130	< 2,000a	4,610	5,780	5,760	19.2	< 1.0	-	-	12	10	458	-	4.31	149	-
	Slough-20151029	2015 10 29	9.59	999	-	-	46,700	-	42,700	47.9	-	-	465	< 500	-	-	3,700	< 2,000a	16,300	3,230	3,030	200	< 1.0	-	-	31.7	32	1,210	-	12	464	-
	SLOUGH-20160518	2016 05 18	-	687	-	-	14,100	-	10,800	16	-	-	509	< 500	-	-	881	< 2,000a	3,540	3,860	2,730	1,130	< 5.0	-	-	11.3	6.8	449	-	4.06	151	-
	SLOUGH-20160914	2016 09 14	-	1,300	-	-	28,200	-	24,000	43.8	-	-	815	< 500	-	-	2,110	< 2,000a	8,560	8,330	4,370	3,950	< 1.0	-	-	23.1	16.5	838	-	8.68	284	-
	SLOUGH-20161116	2016 11 16	9.38	974	-	-	22,400	-	20,000	49.4	-	-	1,300	< 500	-	-	1,630	< 2,000a	6,800	8,450	5,350	3,100	< 1.0	-	-	19.3	13.1	694	-	6.67	224	-
	SLOUGH-20170418	2017 04 18	9.23	681	-	-	7,460	-	5,860	10.3	-	-	913	< 250	-	-	466	< 1,000	1,880	2,070	1,400	672	< 1.0	-	-	7.41	2.8	242	-	2.25	77.3	-

Associated CARO file(s): 8040426, 8041402, 8041784, 8050436, 8052167, 8061543, 8071280, 8090442, 8110640, 8110821, 9032473, 9050543, 9060474, 9090312, N000861, 0040546, 0060737, 0091922, 20J3095.
All terms defined within the body of Keltech's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
\- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

Table 3: Historical Summary of Analytical Results For Surface Water - Inorganics

			Physical Parameters																	Dissolved Inorganics												
Sample Location	Sample ID	Sample Date (yyyy mm dd)	pH pH	Hardness mg/L	pH (field) pH	Temperature C	Conductivity µS/cm	Field Conductivity µS/cm	Total Dissolved Solids mg/L	Total Suspended Solids mg/	Dissolved Organic Carbon mg/	Total Nitrogen-N mg/L	Ammonia, Total (as N) µg/L	Nitrate (as N) µg/L	Nitrite (as N) µg/L	Nitrate+Nitrite Nitrogen µg/L	Chloride mg/L	Fluoride µg/L	Sulfate mg/L	Total Alkalinity mg/L	Alkalinity, Bicarbonate (as CaCO3) mg/L	Alkalinity, Carbonate (as CaCO3) mg/L	Alkalinity, Hydroxide (as CaCO3) mg/L	Alkalinity, Phenolphthalein (as CaCO3) mg/L	Bicarbonate mg/	Kjeldahl Nitrogen-N mg/L	Bromide mg/L	Chemical Oxygen Demand mg/L	Phosphate mg/L	Ortho-Phosphate mg/L	Total Organic Carbon mg/L	Total Phosphorous as P mg/L
SLOUGH (Cont'd)	SLOUGH-20170607	2017 06 07	9.04	738	-	-	7,660	-	5,880	11.3	-	-	574	< 250	-	-	504	< 1,000	2,010	2,160	1,650	505	< 1.0	-	-	6.85	4.1	245	-	2.54	89	-
	SLOUGH-20170907	2017 09 07	9.03	1,070	-	-	13,500	-	11,000	15.8	-	-	1,090	< 500	-	-	944	< 2,000a	3,580	4,700	3,410	1,300	< 1.0	-	-	17.2	5.6	644	-	5.6	232	-
	SLOUGH-20171101	2017 11 01	9.1	1,210	-	-	15,000	-	12,000	39.6	-	-	701	< 500	-	-	1,060	< 2,000a	3,980	4,050	2,820	1,220	< 1.0	-	-	19.4	6.8	630	-	5.68	261	-
	SLOUGH-180404	2018 04 04	8.94	744	8.85	10.5	3,660	2,328	2,440	41.0	-	9.47	168	1,080	108	1,190	274	660	791	902	656	246	< 1.0	123	-	8.28	1.09	250	1.00	-	65.1	2.78
	SLOUGH-180523	2018 05 23	8.82	840	8.63	26.3	6,050	6,029	4,440	11.5	-	10.5	1,330	< 250	< 10	< 250	391	590	1,310	1,540	1,220	322	< 1.0	161	-	10.5	< 2.50	299	2.57	-	117	3.46
	SLOUGH-180906	2018 09 06	9.02	1,170	9.16	18.9	12,100	11,069	10,200	26.2	-	20.0	516	< 100	< 100	< 100	695	1,230	2,480	3,480	3,480	< 1.0	< 1.0	< 1.0	-	20.0	3.90	627	2.28	-	306	6.33
	SLOUGH-181107	2018 11 07	9.04	1,120	8.97	7.4	6,930	6,117	5,520	41.2	-	12.5	926	101	< 100	101	544	< 1,000	1,910	1,830	1,270	552	< 1.0	276	-	12.4	1.14	355	1.94	-	193	2.67
	Slough	2019 03 29	8.94	662	9.11	9.8	3,670	3,169	2,470	20.0	-	6.49	138	< 100	< 100	< 100	257	< 1,000	766	946	-	245	< 1.0	122	701	6.49	< 1.00	176	0.797	-	53.0	1.44
	Slough	2019 06 05	8.92	879	8.69	21	6,270	5,270	4,620	14.8	-	8.16	627	< 100	< 100	< 100	438	< 1,000	1,470	1,660	1,230	435	< 1.0	217	-	8.16	< 1.00	241	0.814	-	89.2	2.34
	Slough	2019 09 04	9.11	1,010	9.21	21.3	10,200	9,072	7,930	43.7	135	13.5	281	< 100	< 100	< 100	748	< 1,000	2,460	2,590	1,740	848	< 1.0	424	-	13.5	2.95	399	-	1.12	139	2.65
	Slough	2019 10 23	9.14	1,090	9.44	11	10,200	9,820	8,030	97.7	132	13.7	408	< 100	< 100	< 100	759	< 1,000	2,560	2,430	2,430	< 1.0	< 1.0	< 1.0	-	13.7	3.50	525	-	0.825	142	3.61
	SLOUGH-200407	2020 04 07	9.03	778	9.41	9.9	5,070	4,428	3,770	37.5	74.6	9.78	192	< 10	< 10	< 10.0	365	500	1,210	1,170	810	365	< 1.0	182	-	9.78	1.44	281	-	0.360	84.3	1.67
	SLOUGH-200605	2020 06 05	9.02	867	9.01	20.6	5,220	5,012	4,260	18.4	78.6	6.93	382	< 10	34	33.8	385	530	1,280	1,430	973	457	-	229		6.89	1.62	199	-	0.864	80.0	1.77
	SLOUGH-200918	2020 09 18	9.61	893	9.63	18.6	8,600	9,004	7,100	13.8	117	7.88	211	< 10	< 10	-	699	710	2,280	2,100	821	1,280	-	642		7.88	< 2.50	291	-	< 0.0050	119	0.196
	SLOUGH-201028	2020 10 28	9.29	895	9.56	3.6	8,480	8,543	6,200	39.7	121	10.7	115	< 250	< 10	< 250	648	590	2,080	2,010	1,140	864	-	432		10.7	< 2.50	291	-	< 0.0050	137	1.19
	SLOUGH-210323	2021 03 23	8.78	918	9.03	8.5	3,900	4,350	3,190	30.4	50.2	4.50	559	< 100	< 100a	< 100	322	< 1,000	941	1,070	827	247	-	124		4.50	1.07	154	-	0.205	53.2	0.830
	Slough	2021 06 17	8.74	1,170	8.73	19.4	5,850	6,399.0	4,980	34.4	66.5	8.12	2,460	< 100	< 100a	< 100	439	< 1,000	1,590	1,590	1,270	317	-	158		8.12	1.44	214	-	1.21	72.4	1.37
	SLOUGH-210921	2021 09 21	9.25	2,050	9.23	17.5	12,500	12,713.0	9,900	-	125	16.2	331	< 100	< 100a	< 100	1,040	< 1,000	3,840	2,910	1,630	1,280	-	642		16.2	3.70	455	-	0.221	127	1.83
	SLOUGH-211020	2021 10 20	9.33	1,650	9.52	8.7	13,200	12,068	8,700	-	132	17.2	255	< 100	< 100a	< 100	911	< 1,000	3,380	2,890	1,550	1,340	-	672		17.2	3.45	489	-	0.110	134	2.18
TUTT POND	Tutt Pond-20010611	2001 06 11	-	-	-	-	-	-	630	-	-	-	-	-	-	-	-	-	89	-	-	-	-	-		-	-	-	-	-	31.7	-
	Tutt Pond-20010815	2001 08 15	-	-	-	-	-	-	4,140	-	-	-	-	-	-	-	-	-	1,200	-	-	-	-	-		-	-	-	-	-	44	-
	Tutt Pond-20010920	2001 09 20	-	-	-	-	-	-	300	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	14.8	-
	Tutt Pond-20080506	2008 05 06	8.35	-	-	-	2,130	-	1,320	-	-	-	240	65	-	-	123	-	318	605	-	-	-	-	-	1.07	-	28	-	0.15	18.1	-
	Tutt Pond-20080507	2008 05 07	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Tutt Pond-20080520	2008 05 20	8.3	850	-	-	2,000	-	1,420	2	-	-	230	60	-	-	142	-	371	636	-	-	-	-	-	1.58	-	31	-	0.3	20	-
	Tutt Pond-20090521	2009 05 21	-	150	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Tutt Pond-20091119	2009 11 19	-	967	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Tutt Pond-20130429	2013 04 29	8.65	831	-	-	2,340	-	1,620	7.1	-	-	335	< 100	-	-	176	1,300	529	-	-	-	-	-	-	-	< 1.0	35	-	0.355	12.6	-
	Tutt Pond-20130528	2013 05 28	8.71	894	-	-	2,460	-	1,670	3.3	-	-	81.6	< 100	-	-	182	900	540	-	-	-	-	-	-	-	< 1.0	37	-	0.33	11.6	-
	Tutt Pond-20130718	2013 07 18	8.82	869	-	-	2,430	-	1,560	3	-	-	20	< 100	-	-	184	1,300	542	665	535	130	< 1.0	-	-	1.26	< 1.0	36	-	0.273	12.3	-
	Tutt Pond-20130819	2013 08 19	8.69	874	-	-	2,540	-	1,720	3.9	-	-	52	< 100	-	-	191	1,430	566	699	584	116	< 1.0	-	-	1.43	< 1.0	44	-	0.353	13.5	-
	Tutt Pond-20130911	2013 09 11	8.82	906	-	-	2,550	-	1,920	16.3	-	-	18.5	< 100	-	-	197	970	573	739	623	116	< 1.0	-	-	1.98	< 1.0	53	-	0.43	16.7	-
	Tutt Pond-20131016	2013 10 16	8.5	943	-	-	2,700	-	1,920	< 3.0	-	-	1,520	< 100	-	-	205	820	623	764	733	31.6	< 1.0	-	-	2.67	< 1.0	38	-	0.679	13.3	-
	Tutt Pond-20140331	2014 03 31	8.56	923	-	-	2,510	-	1,690	3.1	-	-	440	530	-	-	190	920	565	710	637	73.4	< 1.0	-	-	1.63	< 1.0	34	-	0.332	11.8	-
	Tutt Pond-20140528	2014 05 28	8.68	984	-	-	2,680	-	1,810	3	-	-	48.4	< 100	-	-	204	1,190	693	710	614	96.7	< 1.0	-	-	0.977	< 1.0	35	-	0.187	11.4	-
	Tutt Pond-20140731	2014 07 31	8.79	964	-	-	2,740	-	1,940	< 3.0	-	-	63	< 100	-	-	219	1,240	753	674	531	143	< 1.0	-	-	1.24	< 1.0	44	-	0.236	13.4	-
	Tutt Pond-20140828	2014 08 28	8.78	967	-	-	2,870	-	2,140	15.4	-	-	15.7	< 100	-	-	232	1,510	780	705	564	141	< 1.0	-	-	1.36	< 1.0	52	-	0.277	13.1	-
	Tutt Pond-20140930	2014 09 30	8.54	999	-	-	2,680	-	1,840	< 3.0	-	-	1,160	< 100	-	-	214	1,280	706	720	649	71.9	< 1.0	-	-	2.37	< 1.0	52	-	0.664	25.6	-
	Tutt Pond-20150311	2015 03 11	-	822	-	-	2,190	-	1,460	11.8	-	-	15.3	< 100	-	-	182	1,070	454	665	554	112	< 1.0	-	-	3.33	< 1.0	58	-	0.068	12.8	-
	Tutt Pond-20150616	2015 06 16	-	864	-	-	2,170	-	1,530	< 3.0	-	-	13.3	< 100	-	-	189	980	594	667	537	129	< 1.0	-	-	1.05	< 1.0	39	-	0.137	12.3	-
	Tutt Pond-20150902	2015 09 02	8.5	1,060	-	-	2,960	-	2,100	8.8	-	-	712	110	-	-	212	940	784	718	669	48.4	< 1.0	-	-	1.84	< 1.0	45	-	0.602	12.6	-
	Tutt Pond-20151029	2015 10 29	8.46	960	-	-	2,840	-	1,910	4.4	-	-	1,090	160	-	-	195	920	740	721	681	39.8	< 1.0	-	-	2.3	< 1.0	39	-	0.464	10.9	-
	TUTT POND-20160518	2016 05 18	-	843	-	-	2,480	-	1,660	< 3.0	-	-	34.9	< 100	-	-	181	850	627	606	537	68.4	< 1.0	-	-	0.927	< 1.0	36	-	0.103	12.4	-
	TUTT POND-20160914	2016 09 14	-	960	-	-	2,660	-	1,860	< 3.0	-	-	234	< 100	-	-	193	940	702	687	608	78.6	< 1.0	-	-	1.36	< 1.0	44	-	0.318	12	-
	TUTT POND-20161116	2016 11 16	8.44	820	-	-	2,310	-	1,610	4.7	-	-	720	310	-	-	169	1,000	571	652	621	31.6	< 1.0	-	-	1.71	< 1.0	38	-	0.348	11.7	-
	TUTT POND-20170418	2017 04 18	8.63	777	-	-	2,090	-	1,420	< 3.0	-	-	99.2	59	-	-	146	840	462	633	570	63	< 1.0	-	-	0.987	< 0.50	34	-	0.107	10.8	-
	TUTT POND-20170607	2017 06 07	8.75	860	-	-	2,220	-	1,500	3.3	-	-	9.5	< 100	-	-	164	1,070	510	682	586	96.2	< 1.0	-	-	0.957	< 1.0	38	-	0.166	13.1	-
	TUTT POND-20170907	2017 09 07	8.54	1,010	-	-	2,790	-	2,020	< 3.0	-	-	58.9	< 100	-	-	203	980	743	744	680	64	< 1.0	-	-	1.32	< 1.0	47	-	0.23	14.8	-

Associated CARO file(s): 8040426, 8041402, 8041784, 8050436, 8052167, 8061543, 8071280, 8090442, 8110640, 8110821, 9032473, 9050543, 9060474, 9090312, N000861, 0040546, 0060737, 0091922, 20J3095.

All terms defined within the body of Keltech's report.

< Denotes concentration less than indicated detection limit or RPD less than indicated value.

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n/a Denotes no applicable standard/guideline.

QA/QC RPD Denotes quality assurance/quality control relative percent difference

* RPDs are not calculated where one or more concentrations are less than five times RDL.

RDL Denotes reported detection limit.

Table 3: Historical Summary of Analytical Results For Surface Water - Inorganics

Sample Location	Sample ID	Sample Date (yyyy mm dd)	pH pH	Hardness mg/L	pH (field) pH	Temperature C	Conductivity µS/cm	Field Conductivity µS/cm	Total Dissolved Solids mg/L	Total Suspended Solids mg/	Dissolved Organic Carbon mg/	Total Nitrogen-N mg/L	Ammonia, Total (as N) µg/L	Nitrate (as N) µg/L	Nitrite (as N) µg/L	Nitrate+Nitrite Nitrogen µg/L	Chloride mg/L	Fluoride µg/L	Sulfate mg/L	Total Alkalinity mg/L	Alkalinity, Bicarbonate (as CaCO3) mg/L	Alkalinity, Carbonate (as CaCO3) mg/L	Alkalinity, Hydroxide (as CaCO3) mg/L	Alkalinity, Phenolphthalein (as CaCO3) mg/L	Bicarbonate mg/	Kjeldahl Nitrogen-N mg/L	Bromide mg/L	Chemical Oxygen Demand mg/L	Phosphate mg/L	Ortho-Phosphate mg/L	Total Organic Carbon mg/L	Total Phosphorous as P mg/L
			Physical Parameters																	Dissolved Inorganics												
TUTT POND (Cont'd)	TUTT POND-20171101	2017 11 01	8.39	1,100	-	-	2,930	-	2,100	6	-	-	973	150	-	-	216	990	852	780	749	31.4	< 1.0	-	-	2.2	< 1.0	36	-	0.502	12.8	-
	TUTT POND-180404	2018 04 04	8.68	792	8	6.6	1,970	2,158	1,390	63.3	-	1.93	135	11	< 10	11.2	141	720	409	476	401	74.8	< 1.0	37.4	-	1.92	0.24	73	0.0069	-	14.3	0.388
	TUTT POND-180417	2018 04 17	8.64	799	8.66	9.3	2,080	2,184	1,470	22.7	-	12.6	39	4,930	< 10	4,930	145	570	443	510	449	61.2	< 1.0	30.6	-	7.67	0.18	34	< 0.0050	-	11.0	0.0651
	TUTT POND-180503	2018 05 03	8.62	681	8.02	6.1	1,740	1,539	1,110	< 5.0	-	3.13	442	584	22	606	157	650	225	475	413	61.2	< 1.0	30.6	-	2.52	< 0.10	24	0.0240	-	10.6	0.0873
	TUTT POND-180523	2018 05 23	8.46	708	8.49	22.4	1,930	1,987	1,210	< 2.0	-	2.11	161	803	65	868	182	540	276	530	500	30.3	< 1.0	15.2	-	1.24	< 0.10	< 20	0.0578	-	9.64	0.227
	TUTT POND-180615	2018 06 15	8.46	831	8.83	17.9	2,140	1,821	1,420	7.3	-	2.15	78	225	32	256	174	930	364	573	539	33.7	< 1.0	16.9	-	1.89	0.21	44	0.0180	-	10.6	0.232
	TUTT POND-180712	2018 07 12	8.82	748	9.04	23.7	2,050	1,902	1,410	3.0	-	1.01	46	< 100	< 10	< 100	160	830	354	586	433	152	< 1.0	76.2	-	1.01	< 1.00	32	0.0821	-	11.6	0.197
	TUTT POND-180906	2018 09 06	8.64	857	8.9	18.7	2,300	228.3	1,620	15.2	-	1.46	337	157	< 100	157	177	1,280	507	527	441	85.9	< 1.0	42.9	-	1.30	< 1.00	49	< 0.0500	-	14.2	0.362
	TUTT POND-181107	2018 11 07	8.39	909	8.37	7.9	2,150	1,882	1,400	8.4	-	1.71	297	500	53	552	175	790	504	586	562	23.9	< 1.0	11.9	-	1.16	< 1.00	39	0.132	-	11.1	0.322
	Tutt Pond	2019 03 29	8.22	792	8.33	9.00	1,940	1,618	1,230	12.3	-	2.50	248	1,180	23	1,200	136	600	396	498	-	< 1.0	< 1.0	< 1.0	498	1.30	0.13	28	0.230	-	7.49	0.472
	Tutt Pond	2019 05 06	8.47	975	8.5	17.3	2,400	2,076	1,660	5.4	-	1.02	191	64	12	75.3	192	650	636	628	582	46.6	< 1.0	23.3	-	0.944	0.16	45	0.0646	-	9.54	0.233
	Tutt Pond	2019 06 05	8.69	865	8.67	21.6	2,260	2,031	1,690	4.6	-	1.27	94	174	14	188	182	740	484	664	525	139	< 1.0	69.6	-	1.08	< 0.10	31	0.0075	-	9.46	0.330
	Tutt Pond	2019 09 04	8.76	912	8.84	21.3	2,500	2,312	1,660	10.7	12.1	1.37	181	< 10	< 10	< 10.0	202	870	565	680	510	170	< 1.0	85.1	-	1.37	< 0.10	52	-	0.0082	13.0	0.343
	Tutt Pond	2019 10 23	8.48	1,040	8.76	9.3	2,860	2,818	2,080	3.0	11.3	1.74	669	44	42	86.6	211	820	723	688	688	< 1.0	< 1.0	< 1.0	-	1.65	< 0.10	32	-	0.0988	11.3	0.494
	TUTTPOND-200407	2020 04 07	8.40	842	8.95	8	2,330	2,032	1,630	4.4	8.99	1.02	132	15	< 10	14.8	199	690	536	551	523	28.4	< 1.0	14.2	-	1.00	< 0.10	29	-	0.0128	9.20	0.124
	TUTTPOND-200605	2020 06 05	8.68	819	8.72	19.1	2,140	1,981	1,560	3.4	10.5	0.947	< 50	< 10	< 10	< 10.0	189	640	442	608	468	140	< 1.0	70.1	-	0.947	0.16	35	-	0.0982	11.0	0.312
	TUTTPOND-200918	2020 09 18	8.58	917	8.7	19.1	2,520	2,688	2,050	3.0	16.2	1.38	226	< 10	< 10	-	212	840	591	665	558	108	< 1.0	53.8	-	1.38	< 1.00	53	-	0.0431	16.4	0.306
	TUTTPOND-201028	2020 10 28	8.12	1,130	8.07	6.1	3,050	3,131	2,040	9.3	19.4	3.16	1,590	10	< 10	10.2	227	790	788	748	748	< 1.0	< 1.0	< 1.0	-	3.14	0.26	48	-	< 0.0050	19.4	0.935
	TUTT POND-210323	2021 03 23	8.42	990	8.63	7.7	2,250	2,541	1,780	9.2	7.67	1.32	< 50	< 10	< 10	< 10.0	185	670	573	624	589	35.2	< 1.0	17.6	-	1.32	< 1.00	46	-	< 0.0050	11.7	0.164
	TUTT POND-210616	2021 06 16	8.53	1,140	8.49	20.0	2,670	2,976.0	2,180	3.6	15.7	1.49	169	< 10	< 10	< 10.0	240	780	752	771	654	117	< 1.0	58.4	-	1.49	< 0.10	46	-	< 0.0050	15.8	0.371
	TUTT POND-210921	2021 09 21	8.62	1,250	8.56	15.9	3,180	3,201.0	2,340	-	12.6	1.43	153	< 10	< 10	< 10.0	258	800	926	698	568	130	< 1.0	65.0	-	1.43	< 0.10	< 20	-	0.0127	12.7	0.231
	TUTT POND-211020	2021 10 20	8.49	1,270	8.54	10.1	3,330	2,967.0	2,370	-	14.2	1.12	244	< 100	< 100a	< 100	272	< 1,000	818	721	651	69.9	< 1.0	34.9	-	1.12	< 1.00	37	-	< 0.0500	14.6	0.453
BUBNA SLOUGH	Bubna Slough-20150616	2015 06 16	-	1,280	-	-	4,340	-	3,250	12.8	-	-	26.2	< 250	-	-	1,000	< 1,000	623	857	693	165	< 1.0	-	-	2.52	< 2.5	145	-	< 0.0010	43.9	-
	BUBNA DISCHARGE-180420	2018 04 20	8.29	858	-	-	2,810	-	1,900	3.5	-	1.33	30	< 10	< 10	< 10.0	555	320	214	548	548	< 1.0	< 1.0	< 1.0	-	1.33	< 0.10	75	< 0.0050	-	20.6	0.0457
	BUBNA DISCHARGE-180503	2018 05 03	8.56	963	8.08	15.6	2,920	2,584	1,850	5.7	-	1.41	56	< 1,000	< 10	< 1,000	476	360	170	561	495	65.7	< 1.0	32.9	-	1.41	< 0.10	69	< 0.0050	-	24.1	0.0172
	BUBNA DISCHARGE-180615	2018 06 15	8.91	940	9.06	15.7	2,950	2,484	5,980	3.8	-	1.97	23	< 10	< 10	< 10.0	542	410	201	516	355	161	< 1.0	80.3	-	1.97	0.19	87	< 0.0050	-	27.6	0.0325
	BUBNA SLOUGH-181108	2018 11 08	8.36	1,110	8.43	3.1	3,330	3,359	2,200	4.7	-	1.32	38	< 100	< 100	< 100	630	< 1,000	268	661	639	21.6	< 1.0	10.8	-	1.32	< 1.00	75	< 0.0500	-	24.5	0.0336
	Bubna	2019 03 29	8.39	300	8.56	10.9	1,060	866	559	5.0	-	0.760	41	< 10	< 10	< 10.0	173	150	58.8	218	-	5.8	< 1.0	2.9	212	0.760	< 0.10	27	< 0.0050	-	6.68	0.0417
	Bubna	2019 05 06	8.71	961	8.41	19.2	3,050	2,559	1,790	16.0	-	1.57	90	< 10	< 10	< 10.0	573	340	207	646	514	132	< 1.0	66.1	-	1.57	0.13	74	< 0.0050	-	27.9	0.0372
	BUBNASLOUGH-200407	2020 04 07	8.33	819	8.66	8.7	2,620	2,431	1,710	2.8	20.9	1.02	< 50	< 10	< 10	< 10.0	506	320	158	502	489	12.3	< 1.0	6.2	-	1.02	< 0.10	53	-	< 0.0050	21.2	0.0165
	BUBNASLOUGH-200605	2020 06 05	8.44	724	8.44	19.8	2,690	2,573	1,790	3.8	24.7	1.36	78	< 10	< 10	< 10.0	540	320	166	627	572	54.7	< 1.0	27.4	-	1.36	< 0.10	66	-	< 0.0050	25.3	0.0216
	BUBNASLOUGH-200928	2020 09 28	8.28	897	7.97	14.9	3,200	3,317	2,070	2.6	21.3	1.66	285	< 100	< 100	-	635	< 1,000	213	655	655	< 1.0	< 1.0	< 1.0	-	1.66	< 1.00	62	-	< 0.0500	30.2	0.0156
	BUBNASLOUGH-201029	2020 10 29	8.29	888	8.32	4.3	3,230	3,248	1,710	3.8	23.0	2.00	637	< 100	< 100	< 100	518	< 1,000	204	692	692	< 1.0	< 1.0	< 1.0	-	2.00	< 1.00	121	-	< 0.0500	25.0	0.0222
	BUBNA SLOUGH-210412	2021 04 12	8.35	901	8.36	8.6	2,520	2,893	1,770	2.0	26.8	1.19	80	< 10	< 10	< 10.0	508	440	169	667	645	21.5	< 1.0	10.7	-	1.19	< 2.50	63	-	< 0.0050	34.7	0.0165
	BUBNA SLOUGH-210616	2021 06 16	8.52	944	8.46	19.9	2,710	3,018	1,800	3.0	18.0	1.68	153	< 100	< 100a	< 100	498	< 1,000	184	688	605	83.0	< 1.0	< 1.0	-	1.68	< 1.00	86	-	< 0.0500	24.8	0.0140
	BUBNA SLOUGH-211020	2021 10 20	8.54	1,040	8.63	9.1	3,530	3,587	2,010	-	24.8	1.85	297	< 100	< 100a	< 100	581	< 1,000	219	792	685	108	< 1.0	53.8	-	1.85	< 1.00	64	-	< 0.0500	24.9	0.0169
SLOUGH #2	SLOUGH #2-200407	2020 04 07	8.58	590	-	-	4,260	-	2,950	4.8	36.8	2.53	339	12	< 10	11.9	492	630	897	671	586	85.4	< 1.0	42.7	-	2.52	0.95	96	-	< 0.0050	37.3	0.0690
	SLOUGH #2-200605	2020 06 05	9.00	506	-	-	4,230	-	3,070	6.4	49.5	2.85	< 50	< 10	< 10	< 10.0	512	660	933	766	487	278	< 1.0	139	-	2.85	< 10.0	142	-	< 0.0050	52.0	0.0660
	SLOUGH #2-200917	2020 09 17	8.70	811	-	-	5,320	-	3,880	4.0	46.4	3.21	550	< 10	< 10	-	623	830	1,180	841	677	164	< 1.0	82.2	-	3.21	< 0.10	133	-	< 0.0050	48.3	0.0714
	SLOUGH #2-201029	2020 10 29	8.51	657	-	-	5,420	-	3,580	2.4	46.4	3.61	1,160	< 100	< 100	< 100	617	< 1,000	1,190	862	782	79.7	< 1.0	39.8	-	3.61	1.68	110	-	< 0.0500	48.4	0.0398
	SLOUGH # 2-210616	2021 06 16	8.90	704	8.95	19.4	4,420	4,926	3,370	4.8	40.7	2.82	118	< 100	< 100a	< 100	558	< 1,000	1,050	875	601	274	< 1.0	137	-	2.82	1.40	163	-	< 0.0500	41.6	0.0374
	SLOUGH #2_210412	2021 04 12	8.72	661	8.87	9.0	4,160	4,522.0	3,120	6.2	39.4	2.61	210	< 100	< 100a	< 100	484	< 1,000	907	802	628	174	< 1.0	86.9	-	2.61	1.40	99	-	< 0.0500	45.2	0.0543
	SLOUGH #2-211020	2021 10 20	8.61	788	8.74	9.8	6,080	5,874.0	3,910	-	45.9	4.36	1,280	< 100	< 100a	< 100	568	< 1,000	1,100	974	825	149	< 1.0	74.7	-	4.36	1.67	104	-	< 0.0500	47.6	0.0553
LITTLE ROBERT LK	Little Robert Lake-20150616	2015 06 16	-	990	-	-	3,340	-	2,750	22.4	-	-	36.7	< 100	-	-	86	< 400	1,570	782	531	252	< 1.0	-	-	2.79	< 1.0	104	-	1.18	34.6	-
	LITTLE ROBERT'S LAKE-20160921	2016 09 21	8.45	1,200	-	-	4,400	-	3,680	5.3	-	-	-	160	-	-	102	410	1,860	934	-	-	-	-	-	-	< 1.0	-	-	-	30.9	-
	LITTLE ROBERT LK-180417	2018 04 17	8.73	1,240	8.92	11	3,780	3,334	3,140	21.5	-	1.83	54	< 10	< 10	< 10.0	76.5	310	1,490	626	495	130	< 1.0	65.2	-	1.83	0.16	59	1.32	-	46.6	1.43
	LITTLE ROBERT LK-180503	2018 05 03	8.56	763	8.34	17.2	2,000	1,779	1,450	4.3	-	1.67	173	442	22	464	151	650	400	511	465	46.5	< 1.0	23.3	-	1.20	< 0.10	37	0.150	-	14.2	0.448
	LITTLE ROBERT LK-180615	2018 06 15	8.51	855	9.19	17.1	2,140	1,940	1,470	12.7	-	1.71	53	405	< 10	405	172	880	403	590	543	47.1	< 1.0	23.6	-	1.30	0.24	42	< 0.0500	-	16.0	0.235
	Little Robert Lk	2019 05 06	8.67	1,170	8.59	18.7	3,060	2,656	2,350	4.7	-	1.29	113	132	13	146	154	590	1,030	690	563	128	< 1.0	63.8	-	1.15	0.19	38	0.413	-	15.6	0.865

Associated CARO file(s): 8040426, 8041402, 8041784, 8050436, 8052167, 8061543, 8071280, 8090442, 8110640, 8110821, 9032473, 9050543, 9060474, 9090312, N000861, 0040546, 0060737, 0091922, 20J3095.
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Sample Location	Sample ID	Sample Date (yyyy mm dd)	pH pH	Hardness mg/L	pH (field) pH	Temperature C	Conductivity µS/cm	Field Conductivity µS/cm	Total Dissolved Solids mg/L	Total Suspended Solids mg/	Dissolved Organic Carbon mg/	Total Nitrogen-N mg/L	Ammonia, Total (as N) µg/L	Nitrate (as N) µg/L	Nitrite (as N) µg/L	Nitrate+Nitrite Nitrogen µg/L	Chloride mg/L	Fluoride µg/L	Sulfate mg/L	Total Alkalinity mg/L	Alkalinity, Bicarbonate (as CaCO3) mg/L	Alkalinity, Carbonate (as CaCO3) mg/L	Alkalinity, Hydroxide (as CaCO3) mg/L	Alkalinity, Phenolphthalein (as CaCO3) mg/L	Bicarbonate mg/	Kjeldahl Nitrogen-N mg/L	Bromide mg/L	Chemical Oxygen Demand mg/L	Phosphate mg/L	Ortho-Phosphate mg/L	Total Organic Carbon mg/L	Total Phosphorous as P mg/L
			Physical Parameters																	Dissolved Inorganics												
LITTLE ROBERT LK Cont'	Little Robert Lk	2019 06 05	9.02	987	8.84	22.3	2,690	2,335	2,010	3.8	-	1.32	84	< 100	< 100	< 100	181	< 1,000	749	637	384	253	< 1.0	127	-	1.32	< 1.00	36	0.209	-	12.7	0.787
	Little Robert Lk	2019 09 04	8.98	1,110	8.19	25	3,100	3,090	2,160	4.4	23.7	1.82	45	< 100	< 100	< 100	165	< 1,000	972	745	478	267	< 1.0	133	-	1.82	< 1.00	49	-	0.387	25.5	1.16
	LITTLEROBERTLAKE-200928	2020 09 28	8.72	1,330	8.76	14.2	4,350	4,285	3,490	153	24.0	2.85	211	< 100	< 100	-	115	< 1,000	1,720	675	520	155	< 1.0	77.7	-	2.85	< 1.00	93	-	0.564	27.2	1.50
	LITTLEROBERTLAKE-201029	2020 10 29	8.50	1,300	8.71	5	4,150	4,187	3,210	6.4	19.5	2.65	440	309	< 100	309	103	< 1,000	1,540	697	621	75.8	< 1.0	37.9	-	2.34	< 1.00	52	-	0.618	23.3	1.58
	LTTILEROBERTLAKE-200605	2020 06 05	8.86	1,240	8.97	20.5	3,520	3,393	3,040	8.8	23.5	1.78	< 50	< 10	< 10	< 10.0	116	430	1,630	648	414	234	< 1.0	117	-	1.78	< 1.00	50	-	0.604	25.7	0.592
	LITTLE ROBERT LAKE-210412	2021 04 12	8.42	1,560	8.59	10.8	4,200	4,486.0	3,740	29.0	24.4	1.58	110	< 100	< 100a	< 100	100	< 1,000	1,840	749	701	47.4	< 1.0	23.7	-	1.58	< 1.00	51	-	0.953	28.3	1.67
	Little Robert Lake	2021 06 17	9.08	1,620	9.29	20.6	4,220	4,945	4,320	30.4	16.6	1.90	< 50	< 100	< 100a	< 100	110	< 1,000	2,210	661	349	312	< 1.0	156	-	1.90	< 1.00	67	-	0.600	22.7	1.09
	LITTLE ROBERT LAKE-210922	2021 09 22	8.61	1,630	8.61	15.0	5,370	5,225	4,310	-	24.1	1.96	340	< 100	< 100a	< 100	123	< 1,000	2,500	772	629	142	< 1.0	71.1	-	1.96	< 1.00	66	-	0.440	24.7	1.44
	LITTLE ROBERT LAKE-211021	2021 10 21	8.47	1,520	8.47	8.3	5,020	4,527.0	4,110	-	22.1	2.45	486	< 100	< 100a	< 100	110	< 1,000	2,320	770	699	70.9	< 1.0	35.5	-	2.45	< 1.00	58	-	0.442	24.4	1.35
ROBERT LK	Robert Lake-20150616	2015 06 16	-	1,150	-	-	12,500	-	13,700	31.1	-	-	82	< 500	-	-	346	< 2,000a	8,420	1,760	1,230	530	< 1.0	-	-	5.85	< 5.0	233	-	4.85	82.3	-
	ROBERT'S LAKE 1-20160921	2016 09 21	9.67	1,450	-	-	21,800	-	21,300	19.7	-	-	-	< 500	-	-	524	< 2,000a	12,800	2,010	-	-	-	-	-	-	< 5.0	-	-	-	110	-
	ROBERT LAKE - NORTH-20161117	2016 11 17	-	1,150	-	-	15,600	-	13,300	188	-	-	510	< 500	-	-	358	< 2,000a	8,640	1,410	821	592	< 1.0	-	-	7.85	< 5.0	252	-	2.94	81.7	-
	ROBERT LAKE - SOUTH-20161117	2016 11 17	-	1,070	-	-	16,300	-	13,700	67.3	-	-	83.9	< 500	-	-	387	< 2,000a	9,250	1,440	783	661	< 1.0	-	-	8.09	< 5.0	258	-	2.6	82.1	-
	ROBERT LK-180417	2018 04 17	8.98	1,040	8.92	11	9,100	3,334	7,730	18.0	-	3.59	47	< 10	< 10	< 10.0	161	450	3,840	1,010	714	297	< 1.0	148	-	3.59	0.80	127	1.79	-	74.0	2.21
	ROBERT LK-180503	2018 05 03	8.98	1,090	8.58	19.3	8,740	7,684	7,330	17.0	-	4.71	119	1,350	< 10	1,350	145	520	3,850	1,010	713	296	< 1.0	148	-	3.36	< 10.0	109	1.61	-	39.7	2.45
	ROBERT LK-180614	2018 06 14	8.97	1,200	9.19	19.1	8,000	6,915	6,690	12.8	-	3.56	98	< 100	< 100	< 100	198	< 1,000	3,490	1,020	706	316	< 1.0	158	-	3.56	< 1.00	113	1.24	-	39.9	1.99
	ROBERT LK-180712	2018 07 12	9.02	1,120	9.22	27.2	8,110	7,162	6,820	12.6	-	3.98	66	< 10	< 10	< 10.0	205	710	3,280	1,110	766	347	< 1.0	173	-	3.98	< 0.10	115	1.02	-	49.9	2.14
	Robert Lk	2019 03 29	9.02	685	9.25	8	5,660	636.7	3,900	17.7	-	3.72	105	< 100	< 100	< 100	140	< 1,000	2,280	763	-	231	< 1.0	115	532	3.72	< 1.00	110	0.735	-	29.2	1.44
	Robert Lk	2019 05 06	8.92	1,060	8.6	20.9	7,900	6,464	6,200	34.7	-	5.44	139	< 10	< 10	< 10.0	209	660	3,310	1,180	859	321	< 1.0	160	-	5.44	0.94	165	1.59	-	48.4	2.22
	Robert Lk	2019 06 05	8.85	1,130	8.62	22	8,000	6,741	6,520	27.4	-	5.64	733	< 100	< 100	< 100	212	< 1,000	3,160	1,210	898	313	< 1.0	156	-	5.64	< 1.00	143	0.988	-	45.3	2.55
	Robert Lk	2019 09 04	8.91	1,490	8.61	26.6	10,300	10,048	8,440	42.3	53.4	5.52	372	< 100	127	127	279	< 1,000	4,350	1,660	1,210	459	< 1.0	229	-	5.40	1.14	154	-	1.61	59.8	3.71
	ROBERTLAKE-200407	2020 04 07	8.87	1,190	9.4	14	7,620	6,679	6,240	21.7	38.2	3.64	68	< 10	< 10	< 10.0	203	590	3,350	1,170	873	294	< 1.0	147	-	3.64	< 0.10	117	-	1.26	39.3	2.95
	ROBERTLAKE-200605	2020 06 05	8.81	1,220	8.86	21.1	7,520	735.8	7,100	147	53.3	7.34	438	< 1,000	< 10	< 1,000	193	630	3,560	1,440	1,090	349	< 1.0	175	-	7.34	< 10.0	245	-	2.70	57.5	4.96
	ROBERTLAKE-200928	2020 09 28	8.97	1,450	8.92	15.4	10,400	10,282	8,580	32.0	60.3	6.66	1,160	< 100	107	-	262	< 1,000	4,160	1,560	1,050	516	< 1.0	258	-	6.56	< 1.00	179	-	1.88	64.1	3.47
	ROBERTLAKE-201028	2020 10 28	8.94	1,380	9.18	4	9,880	9,840	7,960	44.7	58.4	6.80	129	< 250	79	< 250	245	630	4,160	1,580	1,100	477	< 1.0	239	-	6.72	0.98	153	-	0.869	68.3	3.47
	ROBERT LAKE-210412	2021 04 12	8.73	1,330	9.12	11.0	7,810	8,577	7,290	60.0	38.4	6.14	204	< 100	< 100a	< 100	190	< 1,000	3,200	1,440	1,050	393	< 1.0	196	-	6.14	< 1.00	213	-	1.75	46.7	3.28
	ROBERT LAKE-210616	2021 06 16	8.96	1,510	9.02	17.9	8,560	9,489	8,250	44.0	47.4	7.32	118	< 100	< 100a	< 100	242	< 1,000	4,110	1,690	1,150	541	< 1.0	270	-	7.32	< 1.00	234	-	1.12	57.0	3.46
	ROBERT LAKE-210922	2021 09 22	9.12	1,980	9.12	15.7	12,800	12,687.0	9,700	-	65.6	8.96	143	< 100	< 100a	< 100	365	< 1,000	6,060	2,110	1,300	810	< 1.0	405	-	8.96	1.33	271	-	1.68	77.7	3.80
	ROBERT LAKE-211021	2021 10 21	9.08	1,530	9.29	7.9	12,600	11,012.0	9,700	-	61.6	12.7	173	< 100	< 100a	< 100	336	< 1,000	5,790	2,020	1,290	731	< 1.0	365	-	12.7	1.22	255	-	1.37	76.1	3.82
DIFFUSER	DIFFUSER-180417	2018 04 17	8.98	1,090	9.26	12	9,030	8,592	7,570	19.3	-	2.69	56	< 10	< 10	< 10.0	168	460	3,890	1,010	720	294	< 1.0	147	-	2.69	0.80	132	1.86	-	61.0	5.73
	DIFFUSER-180503	2018 05 03	8.98	1,110	8.67	19.7	8,740	7,700	7,710	15.0	-	3.39	135	< 1,000	< 10	< 1,000	145	520	3,890	1,020	726	299	< 1.0	149	-	3.39	< 10.0	112	1.38	-	42.7	2.51
	DIFFUSER-180615	2018 06 15	8.99	1,230	9.29	19.5	7,940	6,818	10,400	10.8	-	3.86	48	< 10	< 10	< 10.0	182	970	3,350	1,050	691	363	< 1.0	181	-	3.86	0.91	99	0.710	-	41.6	1.97
JH Outfall	JH OUTFALL-180417	2018 04 17	8.68	861	8.89	10.3	2,100	2,069	1,580	28.0	-	1.53	23	486	< 10	486	150	650	485	520	441	78.8	< 1.0	39.4	-	1.04	0.20	30	< 0.0050	-	12.4	0.0576
	JH OUTFALL-180503	2018 05 03	8.63	710	8.31	16.1	1,830	1,586	1,150	< 3.3	-	2.56	469	1,090	21	1,110	148	670	241	476	411	65.4	< 1.0	32.7	-	1.45	< 0.10	31	0.0090	-	10.1	0.0928
QUAIL RIDGE	Treated Leachate Feb 02/00-20000202	2000 02 02	-	-	-	-	-	-	0.043	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Quail Ridge-20081104	2008 11 04	7.18	-	-	-	7,040	-	-	-	-	-	106,000	63,500	-	-	-	-	-	3,580	-	-	-	-	-	-	-	430	-	1.8	-	-
	Quail Ridge-20091119	2009 11 19	7.12	1,650	-	-	-	-	-	-	-	-	100,000	49,900	-	-	-	-	-	< 5	-	-	-	-	-	-	-	490	-	1.9	-	-
	Quail Ridge-20130312	2013 03 12	7.48,09	1,410	-	-	8,160	-	5,580	4.4	-	-	112,000	14,400	-	-	503	1,600	577	-	-	-	-	-	-	-	2.9	434	-	2.32	123	-
	Quail Ridge-20130911	2013 09 11	7.63	1,260	-	-	7,380	-	5,060	6.1	-	-	101,000	12,500	-	-	433	< 1,000	503	-	-	-	-	-	-	-	2.8	366	-	2.16	112	-
	Quail Ridge-20131211	2013 12 11	7.67	1,290	-	-	6,900	-	4,400	51.5	-	-	111,000	27,200	-	-	398	2,000	430	-	-	-	-	-	-	-	2.8	361	-	2.01	118	-
	Quail Ridge-20140408	2014 04 08	-	1,060	-	-	-	-	5,220	-	-	-	69,600	< 250	-	-	434	< 1,000	917	3,000	-	-	-	-	-	-	3.4	459	-	2.37	-	-
	Quail Ridge-20140610	2014 06 10	-	1,430	-	-	-	-	7,080	-	-	-	76,800	8,160	-	-	542	886	969	4,790	-	-	-	-	-	-	4.5	505	-	3.87	-	-
	Quail Ridge-20150122	2015 01 22	7.54	1,530	-	-	-	-	3,510	-	-	-	45,700	122,000	-	-	356	< 1,000	316	1,930	1,930	< 1.0	< 1.0	-	-	-	< 2.5	191	-	0.887	-	-
	Quail Ridge-20150615	2015 06 15	7.76	1,380	-	-	-	-	4,680	-	-	-	89,300	35,500	-	-	388	1,700	576	3,450	-	-	-	-	-	-	2.7	321	-	2.08	-	-
	Quail Ridge-20150915	2015 09 15	7.47	1,580	-	-	-	-	6,260	-	-	-	118,000	49,600	-	-	479	< 2,000a	912	4,290	4,290	< 1.0	< 1.0	-	-	-	< 5.0	407	-	2.83	-	-
	Quail Ridge-20151203	2015 12 03	7.46	1,580	-	-	-	-	6,160	-	-	-	118,000	64,200	-	-	451	1,000	804	4,150	4,150	< 1.0	< 1.0	-	-	-	3.2	377	-	2.76	-	-
	QUAIL RIDGE-20160315	2016 03 15	7.49	1,350	-	-	-	-	5,140	-	-	-	79,100	12,300	-	-	471	< 1,000	793	3,570	3,570	< 1.0	< 1.0	-	-	-	3.3	446	-	2.44	-	-
	QUAIL RIDGE-20160915	2016 09 15	-	1,650	-	-	-	-	6,580	-	-	-	104,000	9,710	-	-	508	1,900	1,070	4,090	-	-	-	-	-	-	3.5	447	-	3.01	-	-
	QUAIL RIDGE-20161117	2016 11 17	-	1,540	-	-	-	-	6,750	-	-	-	119,000	38,500	-	-	602	< 1,000	1,100	4,210	-	-	-	-	-	-	4	556	-	0.281	-	-

Associated CARO file(s): 8040426, 8041402, 8041784, 8050436, 8052167, 8061543, 8071280, 8090442, 8110640, 8110821, 9032473, 9050543, 9060474, 9090312, N000861, 0040546, 0060737, 0091922, 20J3095.
All terms defined within the body of Keltech's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
\- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

Table 4: Historical Summary of Analytical Results For Surface Water - Metals

Sample Location	Sample ID	Sample Date (yyyy mm dd)	Physical Parameters: pH (pH)	Total Hardness (mg/L)	pH (field) (pH)	Total Metals: Aluminum (µg/L)	Antimony (µg/L)	Arsenic (µg/L)	Barium (µg/L)	Beryllium (µg/L)	Bismuth (µg/L)	Boron (µg/L)	Cadmium (µg/L)	Calcium (µg/L)	Chromium (µg/L)	Cobalt (µg/L)	Copper (µg/L)	Iron (µg/L)	Lead (µg/L)	Lithium (µg/L)	Magnesium (µg/L)	Manganese (µg/L)	Mercury (µg/L)	Molybdenum (µg/L)	Nickel (µg/L)	Phosphorous (µg/L)	Potassium (µg/L)	Selenium (µg/L)	Silicon (µg/L)	Silver (µg/L)	Sodium (µg/L)	Strontium (µg/L)	Sulphur (µg/L)	Tellurium (µg/L)	Thallium (µg/L)	Thorium (µg/L)	Tin (µg/L)	Titanium (µg/L)	Tungsten (µg/L)	Uranium (µg/L)	Vanadium (µg/L)	Zinc (µg/L)	Zirconium (µg/L)
BREDIN POND	Bredin Pond-20010611	2001 06 11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Bredin Pond-20010711	2001 07 11	-	-	-	13	< 5	< 10	81	< 0.5a	10	18	< 0.5a	7,300	< 0.8	1.7	4	38	7	48	183,000	7.6	-	10	6	< 30	25,800	< 4a	2,840	< 1a	214,000	218	123,000	-	< 4a	-	< 3	2.7	-	-	8	0.8	-
	Bredin Pond-20010815	2001 08 15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Bredin Pond-20010816	2001 08 16	-	-	-	61	< 20a	< 50	12.5	< 3a	130	40	< 3a	7,700	< 4a	< 3	< 5a	448	34	37	170,000	7.5	-	< 5	27	< 100	20,600	< 20a	12,700	< 5a	192,000	233	115,000	-	< 20a	-	< 20	12	-	-	10	< 3	-
	Bredin Pond-20010920	2001 09 20	-	-	-	28	< 5	< 10	13.1	< 0.5a	11	< 2	< 0.5a	10,600	< 0.8	1.5	2	13	< 2	43	174,000	4	-	16	10	30	23,100	8	18,900	< 1a	209,000	371	128,000	-	< 4a	-	< 3	< 0.4	-	-	4	1	-
	Bredin Pond-20080506	2008 05 06	8.46	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Bredin Pond-20080507	2008 05 07	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Bredin Pond-20080520	2008 05 20	8.39	728	-	-	-	-	-	-	-	-	-	29,100	-	-	-	-	-	-	159,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Bredin Pond-20090521	2009 05 21	-	85	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Bredin Pond-20091119	2009 11 19	-	716	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Bredin Pond-20130429	2013 04 29	8.82	757	-	11	< 0.50	1	65	< 5.0a	-	< 100	< 0.050	41,200	< 0.50	< 0.50	< 1.0a	< 30	< 1.0	< 50	159,000	21	< 0.20a	11	< 5.0	-	-	1.2	-	< 0.050	203,000	-	-	-	< 0.20	-	-	< 50	-	27.7	< 30	< 5.0	-
	Bredin Pond-20130528	2013 05 28	8.56	745	-	< 10	< 0.50	1.1	68	< 5.0a	-	< 100	< 0.050	32,700	< 0.50	< 0.50	< 1.0a	< 30	< 1.0	< 50	161,000	60	< 0.20a	11	< 5.0	-	-	1	-	< 0.050	196,000	-	-	-	< 0.20	-	-	< 50	-	23.2	< 30	< 5.0	-
	Bredin Pond-20130718	2013 07 18	8.76	789	-	< 10	< 0.50	1.5	62	< 5.0a	-	< 100	< 0.050	40,600	< 0.50	< 0.50	< 1.0a	< 30	< 1.0	< 50	169,000	72	< 0.20a	13	< 5.0	-	-	< 1.0	-	< 0.050	197,000	-	-	-	< 0.20	-	-	< 50	-	24.6	< 30	< 5.0	-
	Bredin Pond-20131016	2013 10 16	8.9	766	-	< 10	< 0.50	1.4	67	< 5.0a	-	< 100	< 0.050	26,700	< 0.50	< 0.50	< 1.0a	< 30	< 1.0	< 50	170,000	< 10	< 0.20a	10.9	< 5.0	-	-	< 1.0	-	< 0.050	223,000	-	-	-	< 0.20	-	-	< 50	-	20.1	< 30	< 5.0	-
	Bredin Pond-20140331	2014 03 31	8.66	759	-	14	< 0.50	1.6	65	< 5.0a	-	< 100	< 0.050	38,600	0.51	< 0.50	< 1.0a	< 30	< 1.0	< 50	161,000	30	< 0.20a	15.2	< 5.0	-	-	1.2	-	< 0.050	195,000	-	-	-	< 0.20	-	-	< 50	-	29.5	< 30	< 5.0	-
	Bredin Pond-20140528	2014 05 28	8.86	754	-	108	< 0.50	1.6	< 20	< 5.0a	-	< 100	< 0.050	36,500	< 0.50	< 0.50	< 1.0a	125	< 1.0	< 50	161,000	57	< 0.20a	17.8	< 5.0	-	-	1.1	-	< 0.050	211,000	-	-	-	< 0.20	-	-	< 50	-	31.6	< 30	< 5.0	-
	Bredin Pond-20140828	2014 08 28	9.01	673	-	13	< 0.50	1.6	74	< 5.0a	-	< 100	< 0.050	22,600	< 0.50	< 0.50	< 1.0a	< 30	< 1.0	< 50	150,000	25	< 0.20a	15.5	< 5.0	-	-	1.5	-	< 0.050	184,000	-	-	-	< 0.20	-	-	< 50	-	25.8	< 30	< 5.0	-
	Bredin Pond-20150311	2015 03 11	-	721	-	11	< 0.50	1.3	78	< 5.0a	-	< 100	< 0.050	42,400	< 0.50	< 0.50	< 1.0a	< 30	< 1.0	< 50	149,000	11	< 0.20a	15.7	< 5.0	-	-	1.6	-	< 0.050	191,000	-	-	-	< 0.20	-	-	< 50	-	28.3	< 30	5.3	-
	Bredin Pond-20150616	2015 06 16	-	623	-	12	< 0.50	1.3	38	< 5.0a	< 200	< 100	< 0.050	20,400	< 0.50	< 0.50	< 1.0a	< 30	< 1.0	< 50	139,000	11	< 0.20a	15	< 5.0	< 300	11,000	1.2	7,460	< 0.050	174,000	2,620	75,600	0.41	< 0.20	< 0.10	< 30	< 50	-	24.2	< 30	33.5	-
	Bredin Pond-20151029	2015 10 29	9.27	553	-	22	< 0.50	1.5	60	< 5.0a	< 200	< 100	< 0.050	17,100	0.7	< 0.50	< 1.0a	< 30	< 1.0	< 50	124,000	< 10	< 0.20a	17	< 5.0	< 300	10,100	1.3	9,500	< 0.050	163,000	2,570	72,900	0.35	< 0.20	< 0.10	< 30	< 50	-	23.7	< 30	15.6	< 0.30
	BREDIN POND-20160518	2016 05 18	-	506	-	< 10	< 0.50	< 1.0	63	< 5.0a	-	< 100	< 0.050	10,400	< 0.50	< 0.50	< 1.0a	< 30	< 1.0	< 50	117,000	< 10	< 0.20a	13.8	< 5.0	-	-	1.6	-	< 0.050	155,000	-	-	-	< 0.20	-	-	< 50	-	22	< 30	< 5.0	-
	BREDIN POND-20160914	2016 09 14	-	597	-	13	< 0.50	< 1.0	< 20	< 5.0a	< 200	< 100	< 0.050	18,300	< 0.50	< 0.50	1.1	< 30	< 1.0	< 50	134,000	< 10	< 0.20a	15	< 5.0	< 300	13,500	1.4	7,430	< 0.050	181,000	3,050	-	-	< 0.20	-	< 30	< 50	-	22.3	< 30	< 5.0	-
	BREDIN POND-20161116	2016 11 16	8.52	611	-	14	< 0.50	1.4	46	< 5.0a	< 200	< 100	< 0.050	30,400	< 0.50	< 0.50	< 1.0a	< 30	< 1.0	< 50	130,000	< 10	< 0.20a	14.1	< 5.0	< 300	13,600	1.2	7,020	< 0.050	180,000	2,900	-	0.39	< 0.20	-	< 30	< 50	-	20.6	< 30	< 5.0	< 0.30
	BREDIN POND-20170418	2017 04 18	8.63	684	-	12	< 0.50	1.3	79	< 5.0a	< 200	< 100	< 0.050	46,000	0.53	< 0.50	1.7	< 30	< 1.0	< 50	138,000	19	< 0.20a	11	< 5.0	< 300	13,500	1.3	4,970	< 0.050	186,000	2,870	-	0.25	< 0.20	< 0.10	< 30	< 50	-	21.5	< 30	12.2	< 0.30
	BREDIN POND-20170607	2017 06 07	8.72	732	-	16	< 0.50	1.6	44	< 5.0a	< 200	< 100	< 0.050	47,400	< 0.50	< 0.50	< 1.0a	< 30	< 1.0	< 50	149,000	35	< 0.20a	13.8	< 5.0	< 300	13,100	1.1	2,290	< 0.050	203,000	2,920	-	0.47	< 0.20	< 0.10	< 30	< 50	-	23.4	< 30	< 5.0	< 0.30
	BREDIN POND-20170907	2017 09 07	8.73	685	-	29	< 0.50	1.4	87	< 5.0a	< 200	< 100	< 0.050	33,300	< 0.50	< 0.50	< 1.0a	41	< 1.0	< 50	146,000	74	< 0.20a	12.5	< 5.0	< 300	14,800	1.3	13,900	< 0.050	177,000	2,900	-	0.41	< 0.20	< 0.10	< 30	< 50	-	20.9	< 30	8.1	< 0.30
	BREDIN POND-20171101	2017 11 01	8.41	649	-	12	< 0.50	1.6	94	< 5.0a	< 200	< 100	< 0.050	41,400	< 0.50	< 0.50	1.3	< 30	< 1.0	< 50	133,000	< 10	< 0.20a	21.8	< 5.0	< 300	14,200	< 1.0	14,100	< 0.050	170,000	2,870	-	0.4	< 0.20	< 0.10	< 30	< 50	-	38.1	< 30	< 5.0	< 0.30
	BREDIN POND-180404	2018 04 04	8.77	580	9.08	53.8	< 0.20	1.11	78.1	< 0.10	< 0.10	28.1	0.060	38,700	0.94	0.14	1.56	92	< 0.20	25.4	117,000	8.34	< 0.010	18.8	0.96	187	11,500	1.94	< 1,000	< 0.050	148,000	2,850	52,700	< 0.50	< 0.020	< 0.10	< 0.20	< 5.0	< 1.0	27.4	3.5	9.6	0.12
	BREDIN POND-180523	2018 05 23	8.36	604	8.7	25.6	< 0.20	2.09	82.1	< 0.10	< 0.10	31.4	< 0.010	56,700	0.50	0.18	1.25	40	< 0.20	26.7	112,000	27.0	< 0.010	14.1	1.36	234	13,200	1.40	6,500	< 0.050	161,000	2,830	73,800	< 0.50	< 0.020	< 0.10	< 0.20	< 5.0	< 1.0	23.6	3.4	8.7	< 0.10
	BREDIN POND-180906	2018 09 06	8.87	581	9.03	33.1	< 0.20	1.71	90.6	< 0.10	< 0.10	21.9	0.020	35,000	0.68	0.19	1.88	44	< 0.20	27.2	120,000	51.4	< 0.010	9.74	1.20	145	11,600	1.29	9,200	< 0.050	165,000	2,940	87,500	< 0.50	< 0.020	< 0.10	< 0.20	< 5.0	< 1.0	17.8	2.8	5.9	0.12
	BREDIN POND-181107	2018 11 07	8.31	586	8.24	41.2	< 0.20	1.28	95.2	< 0.10	< 0.10	23.5	< 0.010	53,300	< 0.50	0.12	1.44	47	< 0.20	24.8	110,000	26.8	< 0.010	10.3	1.17	175	10,800	1.02	11,500	< 0.050	143,000	2,840	65,900	< 0.50	< 0.020	< 0.10	< 0.20	< 5.0	< 1.0	22.0	2.8	8.6	0.13
	BREDIN POND-190329	2019 03 29	8.24	640	8.16	41.2	< 0.20	1.54	98.2	< 0.10	< 0.10	29.4	< 0.010	61,600	0.74	0.16	1.35	50	< 0.20	28.2	118,000	78.3	< 0.040a	11.1	1.22	257	11,000	1.39	9,300	< 0.050	152,000	3,090	76,900	< 0.50	< 0.020	< 0.10	< 0.20	< 5.0	< 1.0	25.6	2.9	10.6	0.15
	BREDIN POND-190605	2019 06 05	8.84	750	8.62	15.0	< 0.20	2.28	97.0	< 0.10	< 0.10	48.7	0.012	55,600	< 0.50	0.19	1.02	17	< 0.20	33.5	148,000	21.9	< 0.040a	14.3	1.48	311	11,600	1.03	8,800	< 0.050	213,000	3,260	108,000	< 0.50	< 0.020	< 0.10	< 0.20	< 5.0	< 1.0	29.9	4.4	< 4.0	0.11
	BREDIN POND-190904	2019 09 04	9.17	721	9.63	37.3	< 0.20	1.89	99.3	< 0.10	< 0.10	22.3	< 0.010	22,400	< 0.50	0.18	0.57	55	< 0.20	37.4	161,000	12.8	< 0.010	14.7	1.33	129	13,000	1.36	9,600	< 0.050	214,000	3,450	109,000	< 0.50	< 0.020	< 0.10	< 0.20	< 5.0	< 1.0	26.6	3.0	< 4.0	< 0.10
	BREDIN POND-191023	2019 10 23	8.60	663	9.43	173	< 0.20	1.40	102	< 0.10	< 0.10	27.8	0.014	39,500	0.89	0.22	1.19	227	0.21	32.1	137,000	18.6	< 0.010	13.5	1.49	84	12,400	1.28	11,000	< 0.050	174,000	3,440	86,900	< 0.50	< 0.020	< 0.10	< 0.20	9.2	< 1.0	26.9	3.4	7.4	0.19
	BREDINPOND-200407	2020 04 07	8.44	627	9.05	87.1	0.101	0.875	72.4	< 0.010	< 0.010	25.9	0.0073	54,900	1.06	0.183	1.10	120	0.140	31.7	119,000	36.4	< 0.010	10.2	1.09	87	10,700	1.19	10,500	0.014	151,000	3,400	68,100	< 0.050	< 0.0040	0.015	0.050	4.55	< 0.20	24.7	2.94	3.7	0.207
	BREDINPOND-200605	2020 06 05	8.80	565	8.76	28.7	0.128	0.963	76.8	< 0.010	< 0.010	27.8	0.0056	44,300	0.32	0.149	1.00	35.8	0.056	27.4	110,000	13.0	< 0.010	8.84	0.941	50	9,510	0.90	410	< 0.010	140,000	3,430	58,100	< 0.050	< 0.0040	< 0.010	< 0.050	1.31	< 0.20	20.2	2.95	1.3	0.091
	BREDINPOND-200917	2020 09 17	8.89	736	8.98	56.3	0.181	2.48	65.6	< 0.010	< 0.010	41.9	0.0046	36,300	0.29	0.182	0.62	73.3	0.058	33.2	157,000	39.1	< 0.010	10.4	1.39	168	14,800	0.67	4,730	< 0.010	213,000	3,220	113,000	< 0.050	< 0.0040	0.011	< 0.050	2.67	< 0.20	20.1	2.63	3.0	0.183
	BREDINPOND-201028	2020 10 28	8.62	755	8.85	70.9	0.173	2.46	95.2	< 0.010	< 0.010	51.5	0.0053	40,900	0.38	0.244	0.88	88.1	0.094	36.5	159,000	44.5	< 0.010	10.8	1.59	269	15,700	0.70	800	0.011	225,000	3,430	120,000	< 0.050	< 0.0040	0.016	< 0.050	3.39	< 0.20	20.9	2.24	3.6	0.251
	BREDIN POND-210323	2021 03 23	8.50	696	8.90	27.4	0.120	1.08	113	< 0.010	< 0.010	48.7	0.0081	53,400	0.81	0.174	0.73	41.2	0.055	28.9	137,000	26.1	< 0.010	10.5	1.35	144	12,600	0.98	2,820	< 0.010	178,000	>100,000,000	82,000	< 0.050	< 0.0040	< 0.010	0.103	1.92	< 0.20	22.4	2.20	3.5	0.198
	BREDIN POND-210616	2021 06 16	8.82	797	8.83	9.8	0.159	1.69	85.8	< 0.010	< 0.010	42.8	0.0080	48,100	0.48	0.195	0.65	25.4	< 0.050	35.9	164,000	29.2	< 0.010	14.3	1.66	163	12,300	0.64	2,950	< 0.010	221,000	3,190	117,000	< 0.050	< 0.0040	< 0.010	< 0.050	0.82	< 0.20	26.1	1.70	1.7	0.100
	BREDIN POND-211019	2021 10 19	8.35	832	8.41	36.9	0.133	1.48	124	< 0.010	< 0.010	46.7	0.0055	52,400	0.38	0.166	0.33	65.7	0.053	39.3	170,000	64.0	< 0.010	14.4	1.35	318	15,800	0.68	12,000	< 0.010	224,000	4,140	99,800	< 0.050	< 0.0040	< 0.010	< 0.050	2.32	< 0.20	27.4	0.97	2.9	0.139
NORTHEAST POND	NE Pond-20130429	2013 04 29	8.72	899	-	73	< 0.50	2.1	53	< 5.0a	-	< 100	0.101	43,900	< 0.50	< 0.50	< 1.0a	93	< 1.0	< 50	192,000	59	< 0.20a	13.3	< 5.0	-	-	< 1.0	-	< 0.050	256,000	-	-	-	< 0.20	-	-	< 50	-	25.3	< 30	< 5.0	-
	NE Pond-20130528	2013 05 28	8.76	948	-	36	< 0.50	3.1	< 20	< 5.0a	-	< 100	< 0.050	51,200	0.6	< 0.50	1.4	59	< 1.0	< 50	199,000	99	< 0.20a	16.7	< 5.0	-	-	< 1.0	-	< 0.050	263,000	-	-	-	< 0.20	-	-	< 50	-	27.9	< 30	< 5.0	-
	NE Pond-20130718	2013 07 18	8.83	951	-	15	< 0.50	2.7	< 20	< 5.0a	-	< 100	< 0.050	48,200	< 0.50	< 0.50	< 1.0a	< 30	< 1.0	< 50	208,000	202	< 0.20a	15.4	< 5.0	-	-	< 1.0	-	< 0.050	285,000	-	-	-	< 0.20	-	-	< 50	-	23.3	< 30	< 5.0	-
	NE Pond-20131016	2013 10 16	8.78	937	-	56	< 0.50	3.1	73	< 5.0a	-	< 100	< 0.10	43,500	< 1.0	< 0.50	< 1.0a	69	< 1.0	< 50	201,000	22	< 0.20a	20.3	< 5.0	-	-	< 2.0	-	< 0.050	296,000	-	-	-	< 0.20	-	-	< 50	-	28.6	< 30	< 5.0	-
	NE Pond-20140331	2014 03 31	8.66	858	-	84	< 0.50	2.3	69	< 5.0a	-	< 100	< 0.050	49,700	< 0.50	< 0.50	< 1.0a	119	< 1.0	< 50	178,000	87	< 0.20a	18.2	< 5.0	-	-	< 1.0	-	< 0.050	230,000	-	-	-	< 0.20	-	-	< 50	-	26.2	< 30	< 5.0	-
	NE Pond-20140528	2014 05 28	8.77	814	-	23	< 0.50	2.5	52	< 5.0a	-	< 100	< 0.050	45,300	< 0.50	< 0.50	< 1.0a	32	< 1.0	< 50	170,000	59	< 0.20a	16.9	< 5.0	-	-	< 1.0	-	< 0.050	235,000	-	-	-	< 0.20	-	-	< 50	-	27.2	< 30	< 5.0	-
	NE Pond-20140828	2014 08 28	8.96	775	-	23	< 0.50	3.4	89	< 5.0a	-	< 100	< 0.050	23,300	< 0.50	< 0.50	< 1.0a	30	< 1.0	< 50	174,000	116	< 0.20a	13.2	< 5.0	-	-	< 1.0	-	< 0.050	225,000	-	-	-	< 0.20	-	-	< 50	-	22.1	< 30	< 5.0	-
	NE Pond-20150311	2015 03 11	-	810	-	56	< 0.50	2	96	< 5.0a	-	< 100	< 0.050	45,500	< 0.50	< 0.50	< 1.0a	94	< 1.0	< 50	169,000	113	< 0.20a	11.2	< 5.0	-	-	< 1.0	-	< 0.050	244,000	-	-	-	< 0.20	-	-	< 50	-	17.5	< 30	< 5.0	-
	NE Pond-20150616	2015 06 16	-	870	-	26	< 0.50	3.6	56	< 5.0a	< 200	< 100	< 0.050	31,800	< 0.50	< 0.50	< 1.0a	< 30	< 1.0	< 50	192,000	43	< 0.20a	16.2	< 5.0	390	17,400	< 1.0	3,730	< 0.050	286,000	3,060	147,000	0.61	< 0.20	< 0.10	< 30	< 50	-	21	< 30	< 5.0	-
	NE Pond-20151029	2015 10 29	9.08	941	-	64	< 0.50	4.3	83	< 5.0a	< 200	< 100	< 0.050	22,500	< 0.50	< 0.50	< 1.0a	94	< 1.0	< 50	215,000	47	< 0.20a	17.9	< 5.0	< 300	18,800	< 1.0	6,970	< 0.050	349,000	3,450	181,000	< 0.40	< 0.20	< 0.20	< 30	< 50	-	21.4	< 30	< 5.0	< 0.60
	NE SAMPLE-20160518	2016 05 18	-	913	-	< 10	< 0.50	4.2	72	< 5.0a	-	< 100	< 0.050	32,300	< 0.50	< 0.50	< 1.0a	< 30	< 1.0	< 50	202,000	29	< 0.20a	15.1	< 5.0	-	-	< 1.0	-	< 0.050	352,000	-	-	-	< 0.20	-	-	< 50	-	24	< 30	< 5.0	-
	NE POND-20160914	2016 09 14	-	1,060	-	44	< 0.50	5.8	104	< 5.0a	< 200	100	< 0.050	26,400	< 0.50	< 0.50	2	63	< 1.0	< 50	242,000	85	< 0.20a	19.6	< 5.0	350	27,300	< 1.0	8,680	< 0.050	442,000	3,690	-	-	< 0.20	-	< 30	< 50	-	26.5	< 30	< 5.0	-
	NE POND-20161116	2016 11 16	8.47	1,010	-	69	< 0.50	3.7	107	< 5.0a	< 200	< 100	< 0.050	34,300	< 0.50	< 0.50	< 1.0a	84	< 1.0	< 50	225,000	97	< 0.20a	21.4	< 5.0	410	22,700	< 1.0	7,500	< 0.050	388,000	3,520	-	< 0.40	< 0.20	-	< 30	< 50	-	27.7	< 30	< 5.0	0.69
	NE POND-20170418	2017 04 18	8.62	944	-	62	< 0.50	2.4	82	< 5.0a	< 200	< 100	< 0.050	51,400	< 0.50	< 0.50	< 1.0a	81	< 1.0	< 50	198,000	71	< 0.20a	18.9	< 5.0	< 300	17,000	< 1.0	3,590	< 0.050	300,000	3,240	-	< 0.40	< 0.20	< 0.20	< 30	< 50	-	28.6	< 30	< 5.0	0.78
	NE POND-20170607	2017 06 07	8.86	967	-	31	< 0.50	4.1	96	< 5.0a	< 200	< 100	< 0.050	46,400	< 0.50	< 0.50	< 1.0a	32	< 1.0	< 50	207,000	65	< 0.20a	17.7	< 5.0	390	17,300	< 1.0	3,040	< 0.050	316,000	3,360	-	0.55	< 0.20	< 0.10	< 30	< 50	-	25.6	< 30	15.8	0.61
	NE POND-20170907	2017 09 07	9.31	1,050	-	159	< 0.50	6.5	110	< 5.0a	< 200	< 100	< 0.050	17,200	< 0.50	< 0.50	1.6	162	< 1.0	< 50	244,000	25	< 0.20a	19.6	< 5.0	< 300	17,700	< 1.0	3,460	0.152	363,000	3,500	-	0.44	< 0.20	< 0.20	< 30	< 50	-	28.2	< 30	< 5.0	0.46
	NE POND-20171101	2017 11 01	9.11	1,060	-	100	< 0.50	5.3	90	< 5.0a	< 200	< 100	< 0.050	24,900	< 0.50	< 0.50	1.1	111	< 1.0	< 50	241,000	141	< 0.20a	24.7	< 5.0	< 300	18,700	< 1.0	2,580	< 0.050	370,000	3,430	-	< 0.40	< 0.20	< 0.20	< 30	< 50	-	34.4	< 30	< 6.0	0.45
	NORTHEAST POND-180404	2018 04 04	8.81	961	8.95	98.2	0.23	4.08	67.1	< 0.10	< 0.10	53.4	< 0.050	42,300	< 0.50	0.42	1.42	155	< 0.20	32.0	208,000	181	< 0.010	22.1	2.88	354	16,700	< 0.50	5,000	< 0.050	343,000	3,300	191,000	< 0.50	< 0.020	< 0.10	< 0.20	6.2	< 1.0	31.2	2.8	< 4.0	0.71
	NORTHEAST POND-180523	2018 05 23	8.80	937	8.72	23.6	0.27	4.63	79.9	< 0.10	< 0.10	66.3	0.010	44,700	< 0.50	0.36	1.17	39	< 0.20	31.7	200,000	44.6	< 0.010	23.9	2.57	90	19,200	< 0.50	< 1,000	< 0.050	279,000	3,640	224,000	< 0.50	< 0.020	< 0.10	< 0.20	< 5.0	< 1.0	32.3	3.3	4.4	0.19
	NORTHEAST POND-180906	2018 09 06	8.52	1,180	8.84	1,660	0.44	9.04	150	< 0.10	< 0.10	131	0.035	64,800	4.42	1.64	9.73	2,440	1.35	48.0	247,000	701	< 0.010	12.0	6.57	1,260	24,200	< 0.50	15,800	< 0.050	360,000	4,880	228,000	< 0.50	0.020	0.14	< 0.20	95.0	< 1.0	29.1	8.0	8.5	0.39

Associated CARO file(s): 8040426, 8041402, 8041784, 8050436, 8052167, 8061543, 8071280, 8090442, 8110640, 8110821, 9032473, 9050543, 9060474, 9090312, N000861, 0040546, 0060737, 0091922, 20J3095.
Associated Exova file(s): 107524, 115040, 417280, 438503, 47748, 593413, 610415, 653618, 683622, 714220, 714240, 95223.
All terms defined within the body of Keltech's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
\- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

Table 4: Historical Summary of Analytical Results For Surface Water - Metals

Sample Location	Sample ID	Sample Date (yyyy mm dd)	Physical Parameters: pH (pH)	Total Hardness (mg/L)	pH (field) (pH)	Total Metals: Aluminum (µg/L)	Antimony (µg/L)	Arsenic (µg/L)	Barium (µg/L)	Beryllium (µg/L)	Bismuth (µg/L)	Boron (µg/L)	Cadmium (µg/L)	Calcium (µg/L)	Chromium (µg/L)	Cobalt (µg/L)	Copper (µg/L)	Iron (µg/L)	Lead (µg/L)	Lithium (µg/L)	Magnesium (µg/L)	Manganese (µg/L)	Mercury (µg/L)	Molybdenum (µg/L)	Nickel (µg/L)	Phosphorus (µg/L)	Potassium (µg/L)	Selenium (µg/L)	Silicon (µg/L)	Silver (µg/L)	Sodium (µg/L)	Strontium (µg/L)	Sulphur (µg/L)	Tellurium (µg/L)	Thallium (µg/L)	Thorium (µg/L)	Tin (µg/L)	Titanium (µg/L)	Tungsten (µg/L)	Uranium (µg/L)	Vanadium (µg/L)	Zinc (µg/L)	Zirconium (µg/L)
NORTHEAST POND (Cont'd)	NORTHEAST POND-181107	2018 11 07	8.45	1,030	8.61	588	0.21	3.25	117	< 0.10	< 0.10	102	0.019	67,000	1.60	0.93	5.35	942	0.58	40.3	211,000	183	< 0.010	23.3	3.78	575	19,200	< 0.50	13,200	< 0.050	288,000	3,880	169,000	< 0.50	< 0.020	< 0.10	< 0.20	33.9	< 1.0	36.6	3.6	4.4	0.66
	Northeast Pond	2019 03 29	8.49	724	8.72	331	< 0.20	2.59	64.8	< 0.10	< 0.10	56.9	0.024	53,900	0.90	0.62	1.54	555	0.51	27.7	143,000	180	< 0.040a	11.9	3.11	345	11,500	< 0.50	8,100	< 0.050	192,000	2,780	135,000	< 0.50	< 0.020	< 0.10	< 0.20	18.0	< 1.0	25.1	2.7	4.2	0.52
	Northeast Pond	2019 06 05	8.60	1,010	8.33	140	0.23	3.77	93.4	< 0.10	< 0.10	102	0.026	52,700	< 0.50	0.56	1.92	194	0.21	44.9	214,000	119	< 0.040a	27.3	3.54	325	16,000	< 0.50	2,300	< 0.050	317,000	3,840	197,000	< 0.50	< 0.020	< 0.10	< 0.20	7.8	< 1.0	41.0	4.6	< 4.0	0.55
	Northeast Pond	2019 09 04	8.98	1,040	9.62	142	0.28	4.42	84.7	< 0.10	< 0.10	34.2	< 0.010	24,300	0.92	0.37	0.72	202	< 0.20	53.6	237,000	81.1	< 0.010	30.0	2.87	149	15,800	< 0.50	2,000	< 0.050	329,000	4,120	206,000	< 0.50	< 0.020	< 0.10	< 0.20	7.8	< 1.0	40.8	2.2	< 4.0	0.23
	NE Pond	2019 10 23	8.52	1,040	9.04	35.1	0.20	3.48	64.8	< 0.10	< 0.10	48.7	0.013	33,200	< 0.50	0.53	0.48	62	< 0.20	45.4	232,000	220	< 0.010	32.9	4.34	246	16,100	< 0.50	3,000	< 0.050	304,000	4,160	202,000	< 0.50	< 0.020	< 0.10	< 0.20	< 5.0	< 1.0	54.4	1.6	< 4.0	0.35
	NEPOND-200407	2020 04 07	8.46	1,000	9	27.2	0.178	3.37	39.2	< 0.010	< 0.010	61.0	0.0056	53,000	0.58	0.324	0.67	55.4	0.060	44.1	211,000	176	< 0.010	22.2	2.94	350	15,900	0.38	5,480	< 0.010	298,000	3,890	198,000	< 0.050	< 0.0040	0.011	< 0.050	2.04	< 0.20	40.9	2.12	< 1.0	0.572
	NEPOND-200605	2020 06 05	8.72	1,050	8.67	17.6	0.219	3.95	15.4	< 0.010	< 0.010	87.1	0.0069	52,600	0.14	0.245	0.32	36.8	< 0.050	40.2	223,000	132	< 0.010	18.6	2.45	343	17,600	0.28	2,760	< 0.010	328,000	4,210	211,000	< 0.050	< 0.0040	< 0.010	< 0.050	1.32	< 0.20	33.6	2.50	< 1.0	0.345
	NEPOND-200918	2020 09 18	8.82	1,030	8.85	73.4	0.345	6.45	115	< 0.010	< 0.010	78.0	0.0061	39,400	0.36	0.545	0.66	149	0.117	34.8	226,000	318	< 0.010	18.6	3.01	555	22,100	0.33	10,400	< 0.010	322,000	3,670	176,000	< 0.050	< 0.0040	0.016	< 0.050	5.71	< 0.20	26.6	4.09	3.0	0.716
	NEPOND-201028	2020 10 28	8.50	1,030	8.69	77.9	0.220	3.76	105	0.196	< 0.010	89.7	0.0084	40,500	0.27	0.621	10.6	151	0.157	48.2	225,000	261	< 0.010	22.0	3.28	344	17,600	0.22	10,000	< 0.010	323,000	4,230	194,000	< 0.050	< 0.0040	0.026	< 0.050	6.83	< 0.20	32.6	3.41	2.4	0.948
	NE POND-210323	2021 03 23	8.42	963	8.5	117	0.201	2.53	60.5	< 0.010	< 0.010	92.7	0.0067	57,300	0.49	0.492	1.15	187	0.122	33.8	199,000	112	< 0.010	24.3	3.41	297	15,100	0.26	5,270	< 0.010	278,000	7,730	165,000	< 0.050	< 0.0040	0.013	0.097	6.88	< 0.20	35.8	2.90	1.7	0.782
	NE POND-210616	2021 06 16	8.89	1,080	8.83	198	0.214	3.31	55.1	< 0.010	< 0.010	65.5	0.0087	38,300	0.62	0.495	0.96	329	0.222	47.7	239,000	105	< 0.010	31.9	3.81	262	15,700	0.21	6,120	< 0.010	321,000	4,020	198,000	< 0.050	< 0.0040	0.024	< 0.050	13.2	0.26	40.1	3.12	2.3	0.382
	NE POND-211019	2021 10 19	8.60	1,220	8.70	79.9	0.187	2.65	129	< 0.010	< 0.010	48.8	0.0117	40,400	0.36	0.392	0.48	160	0.084	54.6	272,000	118	< 0.010	45.7	3.69	260	19,700	0.26	4,040	0.021	379,000	4,770	220,000	< 0.050	< 0.0040	0.010	0.055	5.75	0.25	51.0	1.10	1.4	0.840
SLOUGH	Slough-20010619	2001 06 19	-	-	-	190	< 50a	140	430	< 50a	< 70	2,470	< 5a	2,700	< 8a	32	10	240	22	106	139,000	8	-	37	59	1,700	447,000	< 40a	1,720	< 10a	8,930,000	532	2,600,000	-	< 40a	-	< 30	5	-	-	< 10	< 6	-
	Slough-20010711	2001 07 11	-	-	-	260	< 100a	< 200a	108	< 10a	< 200	3,840	< 10a	< 5,000	< 20a	65	30	400	63	210	124,000	7.5	-	60	70	1,600	725,000	< 100a	4,340	< 30a	12,700,000	535	4,040,000	-	< 100a	-	< 80	63	-	-	53	< 20a	-
	Slough-20010815	2001 08 15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Slough-20010816	2001 08 16	-	-	-	-	< 200a	< 500a	95	< 30a	< 400	5,480	< 30a	< 10,000	< 40a	< 30a	< 50a	310	140	320	135,000	< 10	-	50	85	3,200	1,000,000	< 200a	4,050	< 50a	19,100,000	595	5,760,000	-	< 200a	-	< 200	70	-	-	< 50	< 30a	-
	Slough-20010920	2001 09 20	-	-	-	460580	< 200a	530	255	< 30a	< 400	8,110	< 30a	< 10,000	< 40a	130	< 50a	420	< 100a	310	194,000	20	-	55	220	8,600	1,570,000	< 200a	2,860	< 50a	29,700,000	845	9,400,000	-	< 200a	-	< 200	205	-	-	90	85	-
	Alki Lake-20080506	2008 05 06	9.49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Alki Lake-20080507	2008 05 07	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Alki Lake-20080520	2008 05 20	9.43	1,070	-	-	-	-	-	-	-	-	-	18,000	-	-	-	-	-	-	249,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Slough-20090521	2009 05 21	-	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Alki Lake-20091119	2009 11 19	-	1,120	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Slough-20130429	2013 04 29	9.51	715	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Slough-20130528	2013 05 28	9.46	789	-	2,530	13.5	91.7	< 100	< 50a	-	1,400	< 2.5a	14,200	< 25a	< 5.0a	< 25a	3,580	4.8	< 100	183,000	68	< 0.20a	60.3	34	-	-	< 50a	-	0.56	6,780,000	-	-	-	< 5.0a	-	-	140	-	195	< 300a	< 50	-
	Slough-20130718	2013 07 18	9.65	803	-	1,530	12.9	106	< 100	< 50a	-	1,700	< 2.5a	9,300	< 25a	< 5.0a	< 25a	2,160	< 2.5	< 100	188,000	< 50	< 0.20a	78.1	30	-	-	< 50a	-	< 0.50	8,690,000	-	-	-	< 5.0a	-	-	< 100	-	255	< 300a	< 50	-
	Slough-20131016	2013 10 16	9.73	567	-	< 150	20.9	162	< 200	< 100a	-	2,100	< 2.5a	6,400	< 25a	< 5.0a	< 25a	< 600	< 2.5	< 200	134,000	< 100	< 0.20a	86.3	37	-	-	< 50a	-	0.87	12,100,000	-	-	-	< 5.0a	-	-	< 200	-	436	< 600a	< 100	-
	Slough-20140331	2014 03 31	9.46	531	-	1,750	4.5	35.5	< 50	< 25a	-	520	< 0.50a	24,700	6.5	2.8	9.2	2,360	1.2	< 50	114,000	73	< 0.20a	27.6	13.8	-	-	< 10a	-	0.12	2,480,000	-	-	-	< 1.0a	-	-	104	-	81.8	< 150a	< 25	-
	Slough-20140528	2014 05 28	9.37	665	-	3,080	11.3	80.4	< 100	< 50a	-	1,000	< 1.0a	12,500	< 10a	4.3	10	4,520	1.7	< 100	154,000	84	< 0.20a	41	27	-	-	< 20a	-	0.3	5,250,000	-	-	-	< 2.0a	-	-	160	-	158	< 300a	< 50	-
	Slough-20140828	2014 08 28	9.58	911	-	2,330	22	198	< 200	< 100a	-	3,100	< 2.5a	7,400	< 25a	< 5.0a	< 25a	4,420	< 2.5	< 200	217,000	< 100	< 0.20a	91	43	-	-	< 50a	-	0.96	17,000,000	-	-	-	< 5.0a	-	-	< 200	-	491	< 600a	< 100	-
	Slough-20150311	2015 03 11	-	535	-	3,070	7.3	45.6	63	< 25a	-	560	< 0.50a	24,400	8.4	3.2	10.4	4,180	1.8	< 50	115,000	109	< 0.20a	30.1	16.3	-	-	< 10a	-	0.2	2,970,000	-	-	-	< 1.0a	-	-	159	-	109	< 150a	< 25	-
	Slough-20150616	2015 06 16	-	732	-	3,010	8.7	71.5	< 50	< 25a	< 1,000	900	< 0.10	14,900	7.4	3.1	11	3,550	1.9	64	169,000	85	< 0.20a	44.3	23	5,000	209,000	< 1.0	7,200	0.21	4,720,000	1,520	1,430,000	< 4.0	< 0.20	< 2.0	< 150	133	-	162	< 150a	< 25	-
	Slough-20151029	2015 10 29	9.59	999	-	1,540	14	153	< 200	< 100a	< 4,000	2,500	< 0.50a	10,100	< 10a	< 10a	< 50a	2,330	< 5.0	< 200	236,000	< 100	< 0.20a	153	< 50	11,700	662,000	< 5.0a	2,600	< 1.0	15,600,000	920	4,710,000	< 20	< 1.0a	< 10	< 600	< 200	-	543	< 600a	< 100	336
	SLOUGH-20160518	2016 05 18	-	687	-	2,860	6.1	51.3	52	< 25a	-	710	< 0.10	24,000	8.4	3.1	12	3,790	1.9	57	152,000	104	< 0.20a	36.4	21	-	-	< 1.0	-	< 0.20	3,610,000	-	-	-	< 0.20	-	-	131	-	126	< 150a	29	-
	SLOUGH-20160914	2016 09 14	-	1,300	-	3,600	10.3	124	< 200	< 100a	< 4,000	< 2,000a	< 0.25	12,100	7.9	< 5.0a	< 25a	4,870	< 2.5	< 200	308,000	100	< 0.20a	76.9	35	8,900	430,000	< 2.5a	13,500	< 0.50	8,390,000	1,450	-	-	< 0.50	-	< 600	220	-	309	< 600a	< 100	-
	SLOUGH-20161116	2016 11 16	9.38	974	-	1,490	6.9	79.5	< 100	< 50a	< 2,000	1,300	< 0.25	14,100	5.3	< 5.0a	< 25a	2,100	< 2.5	< 100	228,000	80	< 0.20a	60.9	28	8,200	346,000	< 2.5a	5,280	< 0.50	7,000,000	948	-	< 10	< 0.50	-	< 300	< 100	-	230	< 300a	< 50	94
	SLOUGH-20170418	2017 04 18	9.23	681	-	444	2.9	24.6	45	< 15a	< 600	370	0.056	35,800	2.3	1.1	6.4	655	< 1.0	< 50	144,000	98	< 0.20a	18.5	8	2,770	111,000	< 1.0	4,200	< 0.10	1,900,000	1,790	-	< 2.0	< 0.20	< 1.0	< 90	< 50	-	68.2	< 90	15	18.8
	SLOUGH-20170607	2017 06 07	9.04	738	-	395	3.4	29.2	45	< 15a	< 600	440	< 0.050	44,200	2.3	1.2	5.4	517	< 1.0	< 50	152,000	86	< 0.20a	19.3	9	3,160	115,000	< 1.0	2,280	< 0.10	1,790,000	2,120	-	< 2.0	< 0.20	< 1.0	< 90	< 50	-	67.4	< 90	< 15	15.5
	SLOUGH-20170907	2017 09 07	9.03	1,070	-	395	4.9	63	< 50	< 25a	< 1,000	1,010	< 0.050	37,400	3.3	2	8.5	630	< 1.0	68	237,000	101	< 0.20a	27.7	19	6,000	279,000	1.2	4,050	< 0.10	3,220,000	2,310	-	< 2.0	< 0.20	< 1.0	< 150	< 50	-	92.7	< 150a	< 25	22.5
	SLOUGH-20171101	2017 11 01	9.1	1,210	-	1,030	4.6	63.4	48	< 5.0a	< 200	1,070	0.072	33,200	4.7	2.1	10.9	1,380	1.6	77	273,000	105	< 0.20a	29.8	19.2	7,330	341,000	1.1	5,100	0.11	3,880,000	2,170	-	< 2.0	< 0.20	< 1.0	< 30	54	-	96.8	< 30	< 30	26.9
	SLOUGH-180404	2018 04 04	8.94	744	8.85	397	1.12	16.3	56.0	< 0.10	0.14	195	0.116	66,800	3.36	1.56	20.3	817	1.56	31.9	140,000	144	< 0.010	18.2	7.36	2,290	110,000	1.11	4,200	0.054	813,000	2,640	324,000	< 0.50	< 0.020	< 0.10	0.46	28.3	1.3	41.7	6.8	38.2	3.02
	SLOUGH-180523	2018 05 23	8.82	840	8.63	66.5	2.07	23.6	69.1	< 0.10	< 0.10	387	0.098	75,900	4.58	2.04	12.4	413	1.57	39.3	158,000	250	< 0.010	21.9	10.0	3,300	172,000	0.89	2,500	0.071	1,100,000	2,880	545,000	< 0.50	< 0.020	< 0.10	0.76	14.8	2.8	44.5	9.0	38.1	7.43
	SLOUGH-180906	2018 09 06	9.02	1,170	9.16	141	5.51	64.5	59.3	< 0.10	< 0.10	786	0.047	50,900	5.75	2.19	4.53	387	0.65	67.3	252,000	169	< 0.010	20.4	17.2	5,310	324,000	1.02	< 1,000	< 0.050	2,780,000	3,610	1,140,000	< 0.50	< 0.020	< 0.10	1.33	21.9	5.8	66.6	12.3	12.0	16.6
	SLOUGH-181107	2018 11 07	9.04	1,120	8.97	577	2.57	33.7	68.4	< 0.10	< 0.10	501	0.038	64,000	3.72	1.89	6.82	1,060	0.93	58.7	232,000	144	< 0.010	21.3	12.7	3,510	203,000	1.03	7,300	< 0.050	1,820,000	3,480	726,000	< 0.50	< 0.020	< 0.10	0.64	38.0	3.2	59.7	10.0	17.1	7.37
	Slough	2019 03 29	8.94	662	9.11	208	1.28	14.7	59.9	< 0.10	< 0.10	197	0.023	52,400	1.55	0.85	3.31	327	0.46	32.7	129,000	118	< 0.040a	10.5	5.26	1,480	79,200	0.73	6,600	< 0.050	671,000	2,600	312,000	< 0.50	< 0.020	< 0.10	0.27	13.2	1.1	25.6	5.4	9.3	2.40
	Slough	2019 06 05	8.92	879	8.69	293	3.22	31.6	55.2	< 0.10	< 0.10	471	0.027	54,900	1.67	1.06	3.23	451	0.40	53.4	180,000	46.8	< 0.040a	24.4	9.26	2,510	144,000	0.72	1,900	< 0.050	1,400,000	2,990	555,000	< 0.50	< 0.020	< 0.10	0.39	17.0	2.8	46.8	11.8	6.5	6.88
	Slough	2019 09 04	9.11	1,010	9.21	1,250	3.09	41.8	43.8	< 0.10	< 0.10	717	0.033	17,500	3.73	1.62	5.07	1,710	0.93	75.4	235,000	43.8	< 0.010	55.1	14.6	2,560	270,000	0.68	5,100	0.081	2,360,000	1,970	932,000	< 0.50	< 0.020	0.15	0.67	69.5	5.2	70.0	12.0	13.6	12.3
	Slough	2019 10 23	9.14	1,090	9.44	4,400	3.86	46.2	79.3	0.17	< 0.10	708	0.097	28,500	12.5	5.05	14.0	6,620	3.32	76.1	246,000	169	< 0.010	68.8	26.1	3,760	299,000	0.90	16,900	0.117	2,530,000	2,180	1,050,000	< 0.50	0.050	0.48	1.47	285	5.8	91.5	36.1	28.4	19.5
	SLOUGH-200407	2020 04 07	9.03	778	9.41	679	2.12	19.1	51.1	0.028	0.023	319	0.0265	47,900	2.80	1.61	6.35	988	0.683	49.1	160,000	60.2	< 0.010	25.9	9.18	1,840	138,000	0.69	7,620	0.016	1,030,000	2,620	457,000	< 0.050	0.0060	0.089	0.451	39.4	2.04	46.1	13.3	7.3	4.99
	SLOUGH-200605	2020 06 05	9.02	867	9.01	648	2.04	20.9	50.9	0.026	0.016	449	0.0152	45,400	1.98	1.26	4.45	915	0.498	56.3	183,000	25.1	< 0.010	24.7	9.00	1,530	151,000	0.51	2,450	0.012	1,060,000	3,040	530,000	< 0.050	0.0065	0.083	0.448	35.5	2.41	41.8	11.7	3.9	6.12
	SLOUGH-200918	2020 09 18	9.61	893	9.63	131	4.15	37.5	22.8	< 0.010	0.013	366	0.0191	8,200	0.96	0.589	3.64	209	0.297	54.0	212,000	7.14	< 0.010	33.2	8.75	213	250,000	0.43	1,610	< 0.010	1,660,000	1,740	741,000	0.058	< 0.0040	0.024	0.340	9.83	4.74	46.5	7.07	4.6	3.85
	SLOUGH-201028	2020 10 28	9.29	895	9.56	930	3.48	32.2	31.5	0.044	0.025	486	0.0298	16,600	2.74	1.35	4.18	1,190	0.772	71.0	207,000	48.4	< 0.010	31.7	11.4	1,280	229,000	0.67	5,060	0.022	2,010,000	1,530	847,000	< 0.050	0.0108	0.136	0.667	55.7	4.72	53.0	10.8	8.1	7.07
	SLOUGH-210323	2021 03 23	8.78	918	9.03	397	2.73	20.2	56.2	0.016	0.017	210	0.0197	55,000	1.83	0.998	3.05	628	0.436	45.6	189,000	80.0	< 0.010	15.5	6.68	1,080	106,000	0.65	3,130	0.010	793,000	2,620	412,000	< 0.050	0.0049	0.046	0.658	27.1	1.50	41.7	7.09	5.5	2.98
	SLOUGH-210617	2021 06 17	8.74	1,170	8.73	550	2.44	25.3	25.1	0.026	0.014	440	0.0163	31,800	1.48	0.796	2.27	609	0.458	68.6	264,000	32.9	< 0.010	18.0	8.03	1,740	150,000	0.52	4,420	< 0.010	1,470,000	2,680	637,000	0.065	0.0104	0.054	0.211	27.7	2.22	37.7	5.11	5.8	3.79
	SLOUGH-210921	2021 09 21	9.25	2,050	9.23	1,330	2.89	44.8	41.2	0.041	0.030	472	0.0339	16,200	3.61	1.65	4.54	1,750	1.03	78.6	488,000	51.7	< 0.010	50.9	14.4	2,120	349,000	0.93	4,710	0.018	3,020,000	1,400	1,520,000	0.094	0.0122	0.136	0.419	68.5	6.16	100	12.2	9.3	9.17
	SLOUGH-211020	2021 10 20	9.33	1,650	9.52	933	4.48	44.1	47.4	0.034	0.025	761	0.0290	13,700	2.85	1.81	3.85	1,460	0.815	103	393,000	38.6	< 0.010	71.7	14.4	1,960	334,000	1.39	4,360	0.018	3,370,000	1,440	1,410,000	0.123	0.0110	0.105	0.588	59.7	6.71	120	17.0	10.2	11.9
TUTT POND	Tutt Pond-20010611	2001 06 11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Tutt Pond-20010711	2001 07 11	-	-	-	83	< 20a	< 50	21	< 3a	55	177	< 3a	< 4	10	6	33	69	< 5a	22	1,720	43	-	2,570	< 5	3,780	431,000	< 20a	< 20	10	35	4.5	35,300	-	198,000	-	1,160,000	19,000	-	-	130	25	-
	Tutt Pond-20010815	2001 08 15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Tutt Pond-20010816	2001 08 16	-	-	-	< 40	< 20a	< 50	43.5	< 3a	73	178	< 3a	< 4	< 3a	< 5a	48	69	< 5a	32	2,420	< 20	-	2,730	< 5	3,770	438,000	< 20a	< 20	20.5	9	3	41,100	-	203,000	-	1,200,000	19,000	-	-	175	74	-
	Tutt Pond-20010920	2001 09 20	-	-	-	89	< 5	< 10	19	< 0.5a	< 7	12	< 0.5a	< 0.8	< 0.7	6	< 2a	6	< 1	4	310	< 4	-	6,790	< 1	437	25,800	< 4a	< 3	< 0.04	5	1.3	23,900	-	15,500	-	67,800	2,800	-	-	103	8.5	-
	Tutt Pond-20080506	2008 05 06	8.35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Tutt Pond-20080507	2008 05 07	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Tutt Pond-20080520	2008 05 20	8.3	850	-	-	-	-	-	-	-	-	-	67,900	-	-	-	-	-	-	165,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Tutt Pond-20090521	2009 05 21	-	150	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Tutt Pond-20091119	2009 11 19	-	967	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																		
	Tutt Pond-20130429	2013 04 29	8.65	831	-	157	< 0.50	3.3	66	< 5.0a	-	< 100	< 0.050	69,800	< 0.50	0.58	1.1	207	< 1.0	< 50	159,000	114	< 5.0	8.2		-	-	< 1.0	-	< 0.050	278,000	-	-	-	< 0.20	-	-	< 50	-	34.2	< 30	< 5.0	-
	Tutt Pond-20130528	2013 05 28	8.71	894	-	30	< 0.50	3.9	66	< 5.0a	-	< 100	< 0.050	74,300	< 0.50	0.52	1.6	38	< 1.0	< 50	172,000	43	< 5.0	9.3		-	-	< 1.0	-	< 0.050	292,000	-	-	-	< 0.20	-	-	< 50	-	33.5	< 30	< 5.0	-
	Tutt Pond-20130718	2013 07 18	8.82	869	-	21	< 0.50	4.3	54	< 5.0a	-	< 100	< 0.10	56,800	< 1.0	< 0.50	< 1.0a	< 30	< 1.0	< 50	178,000	32	< 5.0	8.7		-	-	< 2.0	-	< 0.050	282,000	-	-	-	< 0.20	-	-	< 50	-	31.7	< 30	< 5.0	-
	Tutt Pond-20130819	2013 08 19	8.69	874	-	49	< 0.50	4.4	56	< 5.0a	-	< 100	< 0.050	56,600	< 0.50	< 0.50	< 1.0a	61	< 1.0	< 50	179,000	71	< 5.0	8.6		-	-	< 1.0	-	< 0.050	304,000	-	-	-	< 0.20	-	-	< 50	-	28.1	< 30	< 5.0	-
	Tutt Pond-20130911	2013 09 11	8.82	906	-	104	< 0.50	5	66	< 5.0a	-	< 100	< 0.050	63,800	< 0.50	< 0.50	1	124	< 1.0	< 50	182,000	77	< 5.0	8.4		-	-	< 1.0	-	< 0.050	305,000	-	-	-	< 0.20	-	-	< 50	-	30.8	< 30	< 5.0	-
	Tutt Pond-20131016	2013 10 16	8.5	943	-	48	< 0.50	4.6	74	< 5.0a	-	< 100	< 0.10	74,600	< 1.0	< 0.50	< 1.0a	82	< 1.0	< 50	184,000	208	< 5.0	7.1		-	-	< 2.0	-	< 0.050	330,000	-	-	-	< 0.20	-	-	< 50	-	27.7	< 30	< 5.0	-

Associated CARO file(s): 8040426, 8041402, 8041784, 8050436, 8052167, 8061543, 8071280, 8090442, 8110640, 8110821, 9032473, 9050543, 9060474, 9090312, N000861, 0040546, 0060737, 0091922, 20J3095.
Associated Exova file(s): 107524, 115040, 417280, 438503, 47748, 593413, 610415, 653618, 683622, 714220, 714240, 95223.
All terms defined within the body of Keltech's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

Table 4: Historical Summary of Analytical Results For Surface Water - Metals

			Physical Parameters			Total Metals																																					
Sample Location	Sample ID	Sample Date (yyyy mm dd)	pH pH	Total Hardness mg/L	pH (field) pH	Aluminum µg/L	Antimony µg/L	Arsenic µg/L	Barium µg/L	Beryllium µg/L	Bismuth µg/L	Boron µg/L	Cadmium µg/L	Calcium µg/L	Chromium µg/L	Cobalt µg/L	Copper µg/L	Iron µg/L	Lead µg/L	Lithium µg/L	Magnesium µg/L	Manganese µg/L	Mercury µg/L	Molybdenum µg/L	Nickel µg/L	Phosphorus µg/L	Potassium µg/L	Selenium µg/L	Silicon µg/L	Silver µg/L	Sodium µg/L	Strontium µg/L	Sulphur µg/L	Tellurium µg/L	Thallium µg/L	Thorium µg/L	Tin µg/L	Titanium µg/L	Tungsten µg/L	Uranium µg/L	Vanadium µg/L	Zinc µg/L	Zirconium µg/L
TUTT POND (Cont'd)	Tutt Pond-20140331	2014 03 31	8.56	923	-	84	< 0.50	2.7	75	< 5.0a	-	< 100	< 0.050	81,100	< 0.50	0.53	< 1.0a	119	< 1.0	< 50	175,000	157	< 0.20a	9.3	< 5.0	-	-	< 1.0	-	< 0.050	284,000	-	-	-	< 0.20	-	-	< 50	-	33.4	< 30	< 5.0	-
	Tutt Pond-20140528	2014 05 28	8.68	984	-	119	< 0.50	3.8	66	< 5.0a	-	< 100	< 0.10	85,400	< 1.0	0.61	1.4	146	< 1.0	< 50	187,000	41	< 0.20a	9.6	< 5.0	-	-	< 2.0	-	< 0.050	329,000	-	-	-	< 0.20	-	-	< 50	-	38	< 30	< 5.0	-
	Tutt Pond-20140731	2014 07 31	8.79	964	-	26	< 0.50	4.7	< 20	< 5.0a	-	< 100	< 0.10	52,300	< 1.0	< 0.50	< 1.0a	32	< 1.0	< 50	202,000	55	< 0.20a	8.6	< 5.0	-	-	< 2.0	-	< 0.050	364,000	-	-	-	< 0.20	-	-	< 50	-	29.3	< 30	< 5.0	-
	Tutt Pond-20140828	2014 08 28	8.78	967	-	372	< 0.50	5.3	39	< 5.0a	-	< 100	< 0.10	64,700	< 1.0	0.62	1.2	461	< 1.0	< 50	195,000	156	< 0.20a	8.6	< 5.0	-	-	< 2.0	-	< 0.050	337,000	-	-	-	< 0.20	-	-	< 50	-	31.1	< 30	< 5.0	-
	Tutt Pond-20140930	2014 09 30	8.54	999	-	198	< 0.50	5.6	66	< 5.0a	-	< 100	< 0.10	77,600	< 1.0	0.64	1.1	253	< 1.0	< 50	195,000	320	< 0.20a	8.8	< 5.0	-	-	< 2.0	-	< 0.050	338,000	-	-	-	< 0.20	-	-	< 50	-	31.2	< 30	5.7	-
	Tutt Pond-20150311	2015 03 11	-	822	-	65	< 0.50	2.5	71	< 5.0a	-	< 100	< 0.050	70,600	< 0.50	< 0.50	1.3	90	< 1.0	< 50	157,000	51	< 0.20a	12.1	< 5.0	-	-	< 1.0	-	< 0.050	247,000	-	-	-	< 0.20	-	-	< 50	-	30.6	< 30	< 5.0	-
	Tutt Pond-20150616	2015 06 16	-	864	-	22	< 0.50	3.2	58	< 5.0a	< 200	< 100	< 0.050	47,300	< 0.50	< 0.50	1.1	< 30	< 1.0	< 50	181,000	13	< 0.20a	11	< 5.0	< 300	13,100	< 1.0	1,610	< 0.050	286,000	4,130	188,000	0.61	< 0.20	< 0.20	< 30	< 50	-	31	< 30	< 5.0	-
	Tutt Pond-20150902	2015 09 02	8.5	1,060	-	305	< 0.50	5.9	85	< 5.0a	< 200	< 100	< 0.050	91,600	0.64	0.79	< 1.0a	383	< 1.0	< 50	202,000	279	< 0.20a	10.3	< 5.0	660	15,900	< 1.0	9,670	< 0.050	359,000	5,280	269,000	0.54	< 0.20	< 0.20	< 30	< 50	-	40.6	< 30	6.4	0.7
	Tutt Pond-20151029	2015 10 29	8.46	960	-	131	< 0.50	4.6	75	< 5.0a	< 200	< 100	< 0.050	89,300	< 0.50	0.72	< 1.0a	149	< 1.0	< 50	179,000	251	< 0.20a	13.2	< 5.0	500	12,700	< 1.0	9,270	< 0.050	302,000	4,950	239,000	0.71	< 0.20	< 0.20	< 30	< 50	-	41.8	< 30	< 5.0	0.63
	TUTT POND-20160518	2016 05 18	-	843	-	35	< 0.50	2.5	62	< 5.0a	-	< 100	< 0.050	78,600	< 0.50	< 0.50	2	44	< 1.0	< 50	157,000	20	< 0.20a	13.6	< 5.0	-	-	1	-	< 0.050	281,000	-	-	-	< 0.20	-	-	< 50	-	43.4	< 30	< 5.0	-
	TUTT POND-20160914	2016 09 14	-	960	-	117	< 0.50	3.9	72	< 5.0a	< 200	< 100	< 0.050	79,300	< 0.50	< 0.50	< 1.0a	139	< 1.0	< 50	185,000	102	< 0.20a	12.1	< 5.0	390	14,800	< 1.0	7,550	< 0.050	333,000	4,990	-	-	< 0.20	-	< 30	< 50	-	40.1	< 30	< 5.0	-
	TUTT POND-20161116	2016 11 16	8.44	820	-	199	< 0.50	3.6	63	< 5.0a	< 200	< 100	< 0.050	72,400	< 0.50	0.66	1.4	220	< 1.0	< 50	155,000	164	< 0.20a	12.6	< 5.0	410	14,000	< 1.0	8,100	< 0.050	267,000	3,990	-	< 0.40	< 0.20	-	< 30	< 50	-	36.9	< 30	< 5.0	< 0.60
	TUTT POND-20170418	2017 04 18	8.63	777	-	73	< 0.50	2	72	< 5.0a	< 200	< 100	< 0.050	76,500	< 0.50	< 0.50	1.3	87	< 1.0	< 50	142,000	55	< 0.20a	10.7	< 5.0	< 300	12,400	< 1.0	6,190	< 0.050	234,000	3,650	-	0.35	< 0.20	< 0.10	< 30	< 50	-	31.9	< 30	< 5.0	0.69
	TUTT POND-20170607	2017 06 07	8.75	860	-	26	< 0.50	2.2	80	< 5.0a	< 200	< 100	< 0.050	79,100	< 0.50	< 0.50	1.3	32	< 1.0	< 50	161,000	20	< 0.20a	11.1	< 5.0	< 300	13,300	1	470	< 0.050	265,000	3,850	-	0.59	< 0.20	< 0.10	< 30	< 50	-	32.2	< 30	< 5.0	< 0.30
	TUTT POND-20170907	2017 09 07	8.54	1,010	-	42	< 0.50	3.6	56	< 5.0a	< 200	< 100	< 0.050	90,900	< 0.50	< 0.50	1.1	50	< 1.0	< 50	190,000	70	< 0.20a	10.9	< 5.0	300	14,800	< 1.0	5,170	< 0.050	304,000	4,790	-	0.48	< 0.20	< 0.20	< 30	< 50	-	43	< 30	< 5.0	0.38
	TUTT POND-20171101	2017 11 01	8.39	1,100	-	45	< 0.50	4.1	74	< 5.0a	< 200	< 100	< 0.050	120,000	< 0.50	0.56	< 1.0a	71	< 1.0	< 50	194,000	314	< 0.20a	10.5	< 5.0	610	15,300	< 1.0	10,400	< 0.050	329,000	5,790	-	0.55	< 0.20	< 0.20	< 30	< 50	-	49.4	< 30	< 6.0	0.58
	TUTT POND-180404	2018 04 04	8.68	792	8	291	< 0.20	2.05	56.5	< 0.10	< 0.10	39.8	0.011	70,600	1.02	0.57	4.76	419	< 0.20	25.5	149,000	61.5	< 0.010	14.8	2.31	226	13,600	1.38	< 1,000	< 0.050	249,000	3,690	162,000	< 0.50	< 0.020	< 0.10	< 0.20	18.3	< 1.0	38.7	4.0	6.5	0.46
	TUTT POND-180417	2018 04 17	8.64	799	8.66	181	< 0.20	1.82	60.1	< 0.10	< 0.10	47.6	< 0.010	67,200	1.12	0.53	1.89	269	< 0.20	25.3	153,000	61.0	< 0.010	14.6	2.41	115	13,000	1.10	< 1,000	< 0.050	248,000	3,590	183,000	< 0.50	< 0.020	< 0.10	< 0.20	10.6	< 1.0	38.0	3.6	5.2	0.36
	TUTT POND-180503	2018 05 03	8.62	681	8.02	22.8	0.22	1.95	69.3	< 0.10	< 0.10	46.6	0.017	56,900	0.68	0.29	2.50	37	< 0.20	30.1	131,000	23.4	-	15.6	1.55	82	14,800	1.48	2,000	< 0.050	200,000	3,090	98,500	< 0.50	< 0.020	< 0.10	< 0.20	< 5.0	< 1.0	26.4	4.4	7.2	0.24
	TUTT POND-180523	2018 05 23	8.46	708	8.49	1,170	< 0.20	2.28	83.2	< 0.10	< 0.10	34.9	< 0.010	68,200	10.2	0.38	2.14	104	< 0.20	27.7	131,000	53.1	< 0.010	14.3	8.73	219	14,700	1.23	3,500	< 0.050	206,000	3,610	114,000	< 0.50	< 0.020	< 0.10	< 0.20	< 5.0	< 1.0	26.9	4.3	8.0	0.16
	TUTT POND-180615	2018 06 15	8.46	831	8.83	34.7	< 0.20	2.70	84.5	< 0.10	< 0.10	37.9	0.011	73,800	< 0.50	0.34	1.80	59	< 0.20	34.9	157,000	45.6	< 0.010	14.9	1.93	244	13,900	1.05	3,300	< 0.050	246,000	3,820	149,000	< 0.50	< 0.020	< 0.10	< 0.20	< 5.0	< 1.0	31.2	3.7	5.3	0.16
	TUTT POND-180712	2018 07 12	8.82	748	9.04	57.3	< 0.20	2.81	80.7	< 0.10	< 0.10	41.1	0.014	53,000	< 0.50	0.32	2.28	80	< 0.20	31.1	150,000	26.8	< 0.010	13.7	1.87	221	13,100	0.86	4,600	< 0.050	230,000	3,410	137,000	< 0.50	< 0.020	< 0.10	< 0.20	< 5.0	< 1.0	26.1	3.2	< 4.0	0.13
	TUTT POND-180906	2018 09 06	8.64	857	8.9	472	0.24	3.26	99.5	< 0.10	< 0.10	37.1	0.022	69,200	1.54	0.90	3.91	719	0.35	28.9	166,000	141	< 0.010	13.5	3.49	329	14,500	1.09	10,800	< 0.050	271,000	4,550	206,000	< 0.50	< 0.020	0.10	< 0.20	29.2	< 1.0	34.3	6.3	6.8	0.67
	TUTT POND-181107	2018 11 07	8.39	909	8.37	138	< 0.20	2.77	96.3	< 0.10	< 0.10	45.7	< 0.010	91,600	0.58	0.58	2.00	234	< 0.20	29.7	165,000	116	< 0.010	12.0	3.10	368	14,400	1.05	9,600	< 0.050	262,000	4,190	189,000	< 0.50	< 0.020	< 0.10	< 0.20	8.5	< 1.0	36.6	4.7	5.1	0.38
	Tutt Pond	2019 03 29	8.22	792	8.33	202	< 0.20	2.25	91.7	< 0.10	< 0.10	31.1	0.018	93,900	0.73	0.62	2.02	308	0.25	26.6	135,000	301	< 0.040a	8.58	4.08	541	11,900	0.89	8,700	< 0.050	214,000	4,190	175,000	< 0.50	< 0.020	< 0.10	< 0.20	13.7	< 1.0	33.0	3.7	10.0	0.39
	Tutt Pond	2019 05 06	8.47	975	8.5	76.2	< 0.20	2.60	86.7	< 0.10	< 0.10	33.1	0.010	111,000	< 0.50	0.58	1.89	122	< 0.20	31.7	169,000	102	< 0.040a	9.12	2.34	227	11,400	0.80	1,100	< 0.050	285,000	5,450	230,000	< 0.50	< 0.020	< 0.10	< 0.20	< 5.0	< 1.0	44.5	3.4	< 4.0	0.26
	Tutt Pond	2019 06 05	8.69	865	8.67	43.6	< 0.20	3.08	76.6	< 0.10	< 0.10	45.3	0.010	78,400	< 0.50	0.39	1.04	66	< 0.20	33.8	162,000	55.8	< 0.040a	12.0	2.06	358	11,900	0.72	1,100	< 0.050	263,000	4,100	177,000	< 0.50	< 0.020	< 0.10	< 0.20	< 5.0	< 1.0	38.0	4.8	< 4.0	0.19
	Tutt Pond	2019 09 04	8.76	912	8.84	119	0.27	4.27	96.1	< 0.10	< 0.10	37.5	< 0.010	61,900	0.67	0.64	1.76	178	< 0.20	34.4	184,000	128	< 0.010	13.7	2.66	381	14,900	1.09	10,300	< 0.050	296,000	4,720	206,000	< 0.50	< 0.020	< 0.10	< 0.20	8.1	< 1.0	39.5	5.4	< 4.0	0.41
	Tutt Pond	2019 10 23	8.48	1,040	8.76	47.9	0.29	4.72	92.2	< 0.10	< 0.10	43.7	< 0.010	94,300	0.66	0.61	0.74	92	< 0.20	33.5	196,000	147	< 0.010	12.8	2.92	539	14,400	0.95	11,700	< 0.050	326,000	5,930	272,000	< 0.50	< 0.020	< 0.10	< 0.20	< 5.0	< 1.0	49.7	5.5	< 4.0	0.44
	TUTTPOND-200407	2020 04 07	8.40	842	8.95	41.9	0.149	2.33	60.9	< 0.010	< 0.010	57.6	0.0053	84,100	0.95	0.446	0.85	65.6	0.050	33.1	154,000	92.1	< 0.010	10.1	2.01	132	11,800	0.88	8,960	< 0.010	245,000	4,710	186,000	< 0.050	< 0.0040	0.013	< 0.050	2.72	< 0.20	37.0	3.82	1.8	0.407
	TUTTPOND-200605	2020 06 05	8.68	819	8.72	31.2	0.207	2.66	63.4	< 0.010	< 0.010	34.6	0.0062	81,800	0.21	0.418	1.19	59.8	0.054	28.7	149,000	39.0	< 0.010	10.1	1.98	296	12,300	0.70	550	< 0.010	237,000	4,810	168,000	< 0.050	< 0.0040	< 0.010	< 0.050	1.78	< 0.20	33.6	4.67	< 1.0	0.276
	TUTTPOND-200918	2020 09 18	8.58	917	8.7	47.8	0.276	4.25	73.2	< 0.010	< 0.010	30.2	0.0090	77,200	0.30	0.624	1.23	87.2	0.083	23.6	176,000	131	< 0.010	13.7	2.61	335	16,700	0.78	6,820	< 0.010	286,000	4,490	196,000	0.068	< 0.0040	0.013	< 0.050	3.75	< 0.20	36.0	5.49	1.3	0.646
	TUTTPOND-201028	2020 10 28	8.12	1,130	8.07	178	0.318	4.84	94.7	0.013	< 0.010	44.0	0.0133	114,000	0.71	0.811	1.48	273	0.178	33.5	205,000	470	< 0.010	11.0	3.85	1,120	16,400	1.69	8,250	< 0.010	364,000	5,650	314,000	< 0.050	< 0.0040	0.034	< 0.050	11.3	< 0.20	49.1	4.95	2.5	1.04
	TUTT POND-210323	2021 03 23	8.42	990	8.63	126	0.202	2.36	88.7	< 0.010	< 0.010	57.4	0.0080	95,200	0.66	0.648	1.44	198	0.134	28.4	183,000	190	< 0.010	10.1	3.11	191	13,600	1.38	2,100	0.051	310,000	4,290	233,000	< 0.050	< 0.0040	0.024	0.168	8.39	< 0.20	46.3	3.76	2.2	0.777
	TUTT POND-210616	2021 06 16	8.53	1,140	8.49	59.9	0.744	3.24	57.1	< 0.010	0.011	42.3	0.0073	104,000	0.44	0.767	1.91	103	0.133	32.2	214,000	149	< 0.010	14.1	3.71	423	16,800	1.32	2,800	< 0.010	364,000	4,690	287,000	< 0.050	< 0.0040	0.014	0.062	4.80	< 0.20	52.9	4.67	3.3	0.895
	TUTT POND-210921	2021 09 21	8.62	1,250	8.56	61.0	0.232	3.85	68.5	< 0.010	< 0.010	23.3	0.0049	85,000	0.34	0.450	0.96	88.8	0.072	35.4	252,000	31.1	< 0.010	12.5	2.81	283	15,600	1.41	8,730	< 0.010	432,000	5,940	355,000	< 0.050	< 0.0040	0.011	< 0.050	4.03	< 0.20	54.0	4.48	1.1	0.335
	TUTT POND-211020	2021 10 20	8.49	1,270	8.54	51.1	0.289	4.48	76.3	< 0.010	< 0.010	29.5	0.0055	105,000	0.41	0.465	0.94	89.6	0.081	39.1	245,000	55.7	< 0.010	12.8	2.87	450	16,700	1.18	8,600	< 0.010	433,000	5,920	359,000	0.053	< 0.0040	0.011	< 0.050	3.52	0.20	55.0	3.01	2.0	0.500
BUBNA DISCHARGE	Bubna Slough-20150616	2015 06 16	-	1,280	-	< 15	0.54	4.3	< 20	< 5.0a	< 200	< 100	< 0.050	41,500	< 0.50	< 0.50	< 2.5a	< 30	< 1.0	127	285,000	< 10	< 0.20a	4.6	< 5.0	< 300	51,700	< 1.0	7,070	< 0.050	571,000	2,990	191,000	< 1.0	< 0.20	< 0.50	< 30	< 50	-	15.4	< 30	18.9	-
	BUBNA DISCHARGE-180420	2018 04 20	8.29	858	-	13.1	0.25	2.24	23.0	< 0.10	< 0.10	21.1	< 0.010	60,900	< 0.50	< 0.10	0.61	20	< 0.20	67.1	171,000	6.71	< 0.040a	1.95	0.87	< 50	26,800	< 0.50	4,200	< 0.050	344,000	3,280	77,700	< 0.50	< 0.020	< 0.10	< 0.20	< 5.0	< 1.0	7.55	3.1	< 4.0	0.17
	BUBNA DISCHARGE-180503	2018 05 03	8.56	963	8.08	7.9	0.31	2.91	15.8	< 0.10	< 0.10	24.0	< 0.010	65,700	< 0.50	< 0.10	0.44	11	< 0.20	76.5	194,000	10.1	-	1.97	0.79	< 50	32,800	< 0.50	2,200	< 0.050	400,000	3,600	92,800	< 0.50	< 0.020	< 0.10	< 0.20	< 5.0	< 1.0	7.37	3.6	< 4.0	0.19
	BUBNA DISCHARGE-180615	2018 06 15	8.91	940	9.06	22.4	0.30	2.63	12.1	< 0.10	< 0.10	15.9	0.037	32,300	< 0.50	< 0.10	0.56	32	0.33	89.1	209,000	7.14	< 0.010	2.02	0.89	< 50	33,300	< 0.50	3,000	< 0.050	408,000	1,550	95,400	< 0.50	< 0.020	< 0.10	< 0.20	< 5.0	< 1.0	6.48	2.1	15.4	0.18
	BUBNA SLOUGH-181108	2018 11 08	8.36	1,110	8.43	82.5	0.28	2.17	19.7	< 0.10	< 0.10	36.2	< 0.010	45,800	< 0.50	< 0.10	< 0.40a	65	< 0.20	101	242,000	13.6	-	1.66	0.52	< 50	37,700	< 0.50	9,000	< 0.050	460,000	2,460	105,000	< 0.50	< 0.020	< 0.10	< 0.20	< 5.0	< 1.0	6.10	1.6	< 4.0	0.45
	Bubna-20190329	2019 03 29	8.39	300	-	176	< 0.20	1.13	14	< 0.10	< 0.10	13.6	< 0.010	23,500	< 0.50	< 0.10	0.51	59	< 0.20	25.4	58,600	11.9	< 0.040a	0.71	< 0.40	< 5041.7	9,620	< 0.50	2,500	< 0.050	113,000	1,160	-	< 0.50	< 0.020	< 0.10	< 0.20	< 5.0	-	2.04	1.9	< 4.0	0.23
	Bubna	2019 03 29	8.39	300	8.56	176	< 0.20	1.13	14.0	< 0.10	< 0.10	13.6	< 0.010	23,500	< 0.50	< 0.10	0.51	59	< 0.20	25.4	58,600	11.9	< 0.040a	0.71	< 0.40	< 50	9,620	< 0.50	2,500	< 0.050	113,000	1,160	24,400	< 0.50	< 0.020	< 0.10	< 0.20	< 5.0	< 1.0	2.04	1.9	< 4.0	0.23
	Bubna	2019 05 06	8.71	961	8.41	145	0.27	2.30	20.7	< 0.10	< 0.10	24.1	< 0.010	50,200	< 0.50	0.18	0.87	197	0.22	88.8	203,000	12.7	< 0.040a	1.29	0.95	< 50	30,500	< 0.50	< 1,000	< 0.050	405,000	2,830	85,200	< 0.50	< 0.020	< 0.10	< 0.20	< 5.0	< 1.0	5.59	2.4	< 4.0	0.31
	Bubna-20190506	2019 05 06	8.71	961	-	145	0.27	2.3	20.7	< 0.10	< 0.10	24.1	< 0.010	50,200	< 0.50	0.18	0.87	197	0.22	88.8	203,000	12.7	< 0.040a	1.29	0.95	< 5037.2	30,500	< 0.50	< 1,000	< 0.050	405,000	2,830	-	< 0.50	< 0.020	< 0.10	< 0.20	9.5	-	5.59	2.4	< 4.0	0.31
	BUBNASLOUGH-200407	2020 04 07	8.33	819	8.66	6.7	0.171	1.60	21.3	< 0.010	< 0.010	30.2	0.0093	53,900	0.14	0.0420	0.26	11.7	< 0.050	73.1	166,000	7.23	< 0.010	0.936	0.494	19	25,400	0.12	7,090	< 0.010	325,000	2,580	69,800	< 0.050	< 0.0040	< 0.010	< 0.050	0.46	< 0.20	4.01	2.13	3.0	0.065
	BUBNASLOUGH-200605	2020 06 05	8.44	724	8.44	3.1	0.218	1.68	11.1	< 0.010	< 0.010	17.2	< 0.0020	38,200	0.11	0.0370	0.44	7.5	< 0.050	44.7	153,000	6.79	< 0.010	0.815	0.437	13	25,000	< 0.10	5,080	< 0.010	289,000	2,270	61,500	< 0.050	< 0.0040	< 0.010	< 0.050	0.32	< 0.20	3.26	1.00	< 1.0	0.049
	BUBNASLOUGH-200928	2020 09 28	8.28	897	7.97	3.5	0.192	1.66	21.0	< 0.010	< 0.010	39.8	< 0.0020	42,600	0.13	0.0353	0.83	7.1	< 0.050	86.7	192,000	20.6	< 0.010	0.561	0.444	15	30,600	< 0.10	14,600	< 0.010	375,000	2,070	83,400	< 0.050	< 0.0040	< 0.010	< 0.050	0.25	< 0.20	2.25	0.81	1.6	0.036
	BUBNASLOUGH-201029	2020 10 29	8.29	888	8.32	3.3	0.147	1.45	20.2	< 0.010	< 0.010	32.0	< 0.0020	41,500	< 0.10	0.0365	0.33	5.3	< 0.050	98.6	190,000	3.80	< 0.010	0.940	0.456	26	31,500	< 0.10	14,900	< 0.010	378,000	2,140	79,500	< 0.050	< 0.0040	< 0.010	< 0.050	0.30	< 0.20	3.70	0.80	1.1	0.035
	BUBNA SLOUGH-210412	2021 04 12	8.35	901	8.36	2.4	0.160	1.37	24.4	< 0.010	< 0.010	29.6	< 0.0020	60,400	0.28	0.0478	0.28	6.0	< 0.050	82.4	182,000	6.00	< 0.010	1.16	0.538	19	28,000	< 0.10	7,040	< 0.010	341,000	2,690	68,800	< 0.050	< 0.0040	< 0.010	< 0.050	< 0.20	< 0.20	5.20	1.95	1.2	0.046
	BUBNA SLOUGH-210616	2021 06 16	8.52	944	8.46	< 2.0	0.234	1.79	17.2	< 0.010	< 0.010	33.2	0.0146	43,000	0.14	0.0516	0.31	8.3	< 0.050	87.1	203,000	6.85	< 0.010	1.28	0.434	27	31,300	< 0.10	8,780	< 0.010	384,000	1,690	76,000	< 0.050	< 0.0040	< 0.010	< 0.050	0.21	< 0.20	4.84	0.41	1.4	0.037
	BUBNA SLOUGH-211020	2021 10 20	8.54	1,040	8.63	3.3	0.148	1.58	14.2	< 0.010	< 0.010	32.6	0.0024	35,400	0.13	0.0450	< 0.20	6.7	< 0.050	101	231,000	2.28	< 0.010	1.54	0.460	35	37,900	0.12	11,600	< 0.010	439,000	1,520	82,500	0.053	< 0.0040	< 0.010	< 0.050	0.22	< 0.20	5.63	< 0.20	1.3	0.037
SLOUGH #2	SLOUGH #2-200407	2020 04 07	8.58	590	-	16.8	0.354	4.08	15.0	< 0.010	< 0.010	29.6	0.0047	52,000	0.32	0.290	1.09	51.4	0.072	109	112,000	129	< 0.010	3.46	1.19	68	71,700	0.20	7,290	< 0.010	782,000	1,300	347,000	< 0.050	< 0.0040	< 0.010	< 0.050	1.77	< 0.20	15.9	1.38	2.4	0.527
	SLOUGH #2-200605	2020 06 05	9.00	506	-	23.3	0.466	5.23	7.94	< 0.010	< 0.010	12.3	0.0061	35,800	0.59	0.322	0.70	64.3	0.101	67.8	101,000	41.0	< 0.010	3.77	1.49	46	71,400	0.16	6,470	< 0.010	823,000	1,260	335,000	< 0.050	< 0.0040	< 0.010	< 0.050	2.02	< 0.20	16.1	1.50	< 1.0	0.395
	SLOUGH #2-200917	2020 09 17	8.70	811	-	12.5	0.616	7.92	29.1	< 0.010	< 0.010	19.8	0.0081	38,500	0.30	0.265	0.55	37.5	0.062	122	174,000	37.1	< 0.010	6.94	1.76	75	118,000	0.20	9,930	0.015	997,000	1,470	595,000	< 0.050	< 0.0040	< 0.010	< 0.050	1.29	< 0.20	22.2	2.27	1.7	0.475
	SLOUGH #2-201029	2020 10 29	8.51	657	-	8.3	0.474	5.19	18.4	< 0.010	< 0.010	19.3	< 0.0020	37,100	0.13	0.181	< 0.20	33.2	0.070	156	137,000	39.2	< 0.010	5.18	1.18	55	96,100	0.20	8,580	< 0.010	1,100,000	1,180	481,000	< 0.050	< 0.0040	< 0.010	< 0.050	1.50	< 0.20	22.6	0.71	< 1.0	0.364
	SLOUGH #2_210412	2021 04 12	8.72	661	8.87	27.3	0.444	4.80	5.22	< 0.010	< 0.010	17.2	0.0051	53,300	0.35	0.296	0.99	96.0	0.264	120	128,000	97.4	< 0.010	4.40	1.51	61	81,600	0.12	6,240	< 0.010	922,000	1,330	373,000	< 0.050	< 0.0040	0.013	0.088	2.08	< 0.20	19.3	1.53	2.3	0.556
	SLOUGH # 2-210616	2021 06 16	8.90	704	8.95	6.3	0.760	5.57	7.69	< 0.010	0.015	22.6	0.0026	42,800	0.26	0.239	0.62	28.8	0.084	126	145,000	42.0	< 0.010	4.73	1.27	58	97,000	0.17	8,630	< 0.010	1,020,000	1,110	429,000	< 0.050	< 0.0040	< 0.010	< 0.050	0.94	< 0.20	19.7	0.83	1.3	0.315
	SLOUGH #2-211020	2021 10 20	8.61	788	8.74	12.6	0.427	5.21	24.0	< 0.010	< 0.010	16.8	0.0035	35,200	0.36	0.154	1.44	40.4	0.125	150	170,000	34.8	< 0.010	7.33	1.12	62	117,000	0.22	12,100	< 0.010	1,500,000	1,360	545,000	0.060	< 0.0040	< 0.010	< 0.050	1.17	< 0.20	30.2	< 0.20	4.2	0.344
LITTLE ROBERT LK	Little Robert Lake-20150616	2015 06 16	-	990	-	173	0.66	8.8	30	< 5.0a	< 200	< 100	< 0.050	73,200	0.61	0.64	< 2.5a	203	< 1.0	< 50	196,000	442	< 0.20a	5.1	< 5.0	1,220	36,200	< 1.0	3,690	< 0.050	619,000	2,050	471,000	< 1.0	< 0.20	< 0.50	< 30	< 50	-	14.5	< 30	< 5.0	-
	LITTLE ROBERT'S LAKE-20160921	2016 09 21	8.45	1,200	-	105	< 0.50	9.6	34	< 5.0a	< 200	< 100	< 0.050	118,000	< 0.50	< 0.50	< 2.5a	155	< 1.0	< 50	225,000	756	< 0.20a	5.6	< 5.0	3,8103,830	46,200	< 1.0	11,700	< 0.050	791,000	2,690	-	-	< 0.20	-	< 30	< 50	-	19.9	< 30	< 5.0	-
	LITTLE ROBERT LK-180417	2018 04 17	8.73	1,240	8.92	189	0.49	6.31	38.6	< 0.10	< 0.10	38.4	< 0.010	141,000	0.75	0.76	1.51	273	< 0.20	25.5	216,000	1,120	< 0.010	10.6	2.33	1,830	26,300	0.61	6,600	< 0.050	624,000	3,400	593,000	< 0.50	< 0.020	< 0.10	< 0.20	12.3	< 1.0	40.7	3.9	< 4.0	0.46
	LITTLE ROBERT LK-180503	2018 05 03	8.56	763	8.34	42.6	0.26	2.67	57.0	< 0.10	< 0.10	45.5	0.011	70,800	0.54	0.36	1.54	59	< 0.20	29.8	142,000	106	-	15.0	1.74	415	15,300	1.29	1,200	< 0.050	255,000	3,230	161,000	< 0.50	< 0.020	< 0.10	< 0.20	< 5.0	< 1.0	29.9	3.6	6.5	0.25
	LITTLE ROBERT LK-180615	2018 06 15	8.51	855	9.19	55.4	0.22	2.74	79.7	< 0.10	< 0.10	37.7	0.023	76,800	< 0.50	0.34	1.44	81	< 0.20	35.3	161,000	75.2	< 0.010	14.3	1.85	275	14,100	1.00	2,700	< 0.050	246,000	3,830	163,000	< 0.50	< 0.020	< 0.10	< 0.20	< 5.0	< 1.0	31.5	3.4	15.2	0.20
	Little Robert Lk	2019 05 06	8.67	1,170	8.59	112	0.30	3.61	60.7	< 0.10	< 0.10	35.6	< 0.010	139,000	< 0.50	0.55	1.57	162	< 0.20	35.3	199,000	68.1	< 0.040a	10.0	2.31	943	14,800	< 0.50	< 1,000	< 0.050	423,000	5,390	374,000	< 0.50	< 0.020	< 0.10	< 0.20	6.6	< 1.0	52.7	3.1	< 4.0	0.25
	Little Robert Lk	2019 06 05	9.02	987	8.84	32.1	0.32	4.17	70.2	< 0.10	< 0.10	38.3	< 0.010	82,100	< 0.50	0.36	0.68	52	< 0.20	39.0	190,000	81.7	< 0.040a	9.77	1.90	749	11,500	0.55	1,300	< 0.050	369,000	4,560	291,000	< 0.50	< 0.020	< 0.10	< 0.20	< 5.0	< 1.0	37.0	3.3	< 4.0	0.10
	Little Robert Lk	2019 09 04	8.98	1,110	8.19	18.8	0.57	7.15	65.0	< 0.10	< 0.10	80.0	< 0.010	101,000	0.63	0.25	0.35	31	< 0.20	37.9	208,000	93.8	< 0.010	6.60	1.48	1,280	22,000	< 0.50	3,700	< 0.050	442,000	4,940	379,000	< 0.50	< 0.020	< 0.10	< 0.20	< 5.0	< 1.0	24.2	1.0	< 4.0	0.10
	LITTLEROBERTLAKE-200928	2020 09 28	8.72	1,330	8.76	7,380	0.542	7.05	126	0.276	0.096	40.3	0.0648	167,000	15.5	5.09	12.5	8,430	3.93	50.3	221,000	376	< 0.010	7.20	13.7	1,520	25,900	0.48	16,800	0.037	632,000	4,300	673,000	< 0.050	0.0819	1.29	0.275	424	< 0.20	35.8	19.9	23.2	4.95
	LITTLEROBERTLAKE-201029	2020 10 29	8.50	1,300	8.71	224	0.521	6.26	46.4	< 0.010	< 0.010	35.9	0.0049	142,000	0.60	0.426	0.69	249	0.148	45.1	229,000	131	< 0.010	6.79	1.67	1,900	26,100	0.38	2,750	< 0.010	658,000	4,240	684,000	< 0.050	< 0.0040	0.036	< 0.050	13.5	< 0.20	34.3	2.82	1.6	0.400
	LTTILEROBERTLAKE-200605	2020 06 05	8.86	1,240	8.97	189	0.404	4.94	52.1	0.013	< 0.010	26.9	0.0088	144,000	0.54	0.639	1.11	274	0.182	20.1	213,000	63.5	< 0.010	9.98	2.17	1,430	19,700	0.25	1,060	< 0.010	561,000	4,750	602,000	< 0.050	< 0.0040	0.037	< 0.050	12.0	< 0.20	42.1	3.78	1.3	0.401
	LITTLE ROBERT LAKE-210412	2021 04 12	8.42	1,560	8.59	89.1	0.428	5.12	48.7	0.010	< 0.010	32.8	0.0043	188,000	0.33	0.552	1.23	138	0.146	41.3	265,000	190	< 0.010	9.36	2.12	1,900	25,200	0.28	610	< 0.010	732,000	4,580	770,000	0.058	< 0.0040	0.018	< 0.050	5.41	< 0.20	53.1	3.89	1.6	0.481
	LITTLE ROBERT LAKE-210617	2021 06 17	9.08	1,620	9.29	240	0.631	6.40	47.1	< 0.010	< 0.010	20.5	0.0068	130,000	0.63	0.522	1.07	293	0.193	48.5	314,000	119	< 0.010	8.17	1.90	1,330	24,200	0.27	1,610	< 0.010	841,000	4,330	878,000	< 0.050	< 0.0040	0.032	0.054	15.2	< 0.20	32.1	2.55	3.5	0.269
	LITTLE ROBERT LAKE-210922	2021 09 22	8.61	1,630	8.61	685	0.458	6.10	57.0	0.019	0.010	32.3	0.0090	139,000	1.74	0.778	3.89	906	0.449	47.6	312,000	177	< 0.010	8.58	2.78	1,540	31,500	0.37	2,970	< 0.010	969,000	4,910	915,000	< 0.050	0.0073	0.084	0.087	43.5	< 0.20	32.4	3.11	4.6	0.781
	LITTLE ROBERT LAKE-211021	2021 10 21	8.47	1,520	8.47	2.4	0.357	5.03	39.9	< 0.010	< 0.010	22.5	0.0029	135,000	0.15	0.276	0.27	15.6	< 0.050	44.2	288,000	244	< 0.010	8.43	1.06	1,700	29,500	0.24	1,390	< 0.010	705,000	5,420	727,000	< 0.050	< 0.0040	< 0.010	< 0.050	0.74	< 0.20	39.8	1.44	1.4	0.316
ROBERT LK	Robert Lake-20150616	2015 06 16	-	1,150	-	1,910	< 2.0	21.8	< 50	< 25a	< 1,000	< 500	< 0.10	60,100	3.6	< 2.0	< 10a	1,690	1.4	< 50	243,000	107	< 0.20a	72.7	11	5,000	90,000	1.2	9,200	< 0.20	4,290,000	4,130	2,580,000	< 4.0	< 0.20	< 2.0	< 150	82	-	145	< 150a	< 25	-
	ROBERT'S LAKE 1-20160921	2016 09 21	9.67	1,450	-	< 150	< 5.0	13.2	< 100	< 50a	< 2,000	< 1,000a	< 0.25	23,000	< 5.0a	< 5.0a	< 25a	< 300	< 2.5	< 100	331,000	< 50	< 0.20a	112	< 25	< 3,0002,720	120,000	< 2.5a	1,970	< 0.50	5,980,000	5,070	-	-	< 0.50	-	< 300	< 100	-	172	< 300a	< 50	-
	ROBERT LAKE - NORTH-20161117	2016 11 17	-	1,150	-	2,990	< 2.0	10.8	51	< 25a	< 1,000	< 500	< 0.10	40,700	4.3	< 2.0	< 10a	3,000	1.6	< 50	255,000	169	< 0.20a	85.9	< 10	3,700	89,000	< 1.0	11,400	< 0.20	4,430,000	3,710	-	-	< 0.20	-	< 150	149	-	131	< 150a	< 25	-

Associated CARO file(s): 8040426, 8041402, 8041784, 8050436, 8052167, 8061543, 8071280, 8090442, 8110640, 8110821, 9032473, 9050543, 9060474, 9090312, N000861, 0040546, 0060737, 0091922, 20J3095.
Associated Exova file(s): 107524, 115040, 417280, 438503, 47748, 593413, 610415, 653618, 683622, 714220, 714240, 95223.
All terms defined within the body of Keltech's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
\- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

Table 4: Historical Summary of Analytical Results For Surface Water - Metals

Sample Location	Sample ID	Sample Date	Physical Parameters: pH	Total Hardness	pH (field)	Total Metals: Aluminum	Antimony	Arsenic	Barium	Beryllium	Bismuth	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron
		(yyyy mm dd)	pH	mg/L	pH	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
ROBERT LK (Cont'd)	ROBERT LAKE - SOUTH-20161117	2016 11 17	-	1,070	-	2,750	< 2.0	11	< 50	< 25a	< 1,000	< 500	< 0.10	33,100	5.3	2.2	< 10a	3,410
	ROBERT LK-180417	2018 04 17	8.98	1,040	8.92	150	0.91	9.89	31.0	< 0.10	< 0.10	22.3	0.025	55,600	1.19	0.82	2.20	198
	ROBERT LK-180503	2018 05 03	8.98	1,090	8.58	58.8	0.65	10.2	32.8	< 0.10	< 0.10	31.7	0.033	63,000	< 0.50	0.74	1.83	77
	ROBERT LK-180614	2018 06 14	8.97	1,200	9.19	47.0	0.80	11.1	33.6	< 0.10	< 0.10	29.3	0.033	79,500	< 0.50	0.39	1.06	70
	ROBERT LK-180712	2018 07 12	9.02	1,120	9.22	110	0.57	9.51	23.8	< 0.10	< 0.10	44.8	0.029	71,300	0.52	0.31	1.18	101
	Robert Lk	2019 03 29	9.02	685	9.25	118	0.29	5.21	25.9	< 0.10	< 0.10	17.2	0.021	36,000	< 0.50	0.50	1.56	165
	Robert Lk	2019 05 06	8.92	1,060	8.6	691	0.53	7.39	42.8	< 0.10	< 0.10	32.0	0.061	59,300	1.49	0.88	2.42	777
	Robert Lk	2019 06 05	8.85	1,130	8.62	631	0.58	8.52	51.9	< 0.10	< 0.10	49.1	0.030	68,200	1.37	0.80	1.95	731
	Robert Lk	2019 09 04	8.91	1,490	8.61	1,040	0.76	13.8	55.8	< 0.10	< 0.10	81.9	0.027	92,800	2.51	1.15	3.00	1,230
	ROBERTLAKE-200407	2020 04 07	8.87	1,190	9.4	420	0.436	8.04	42.6	0.016	< 0.010	51.1	0.0189	63,900	0.98	1.02	2.84	515
	ROBERTLAKE-200605	2020 06 05	8.81	1,220	8.86	850	0.558	8.90	56.7	0.038	0.014	43.1	0.0434	96,800	2.19	1.64	2.84	1,150
	ROBERTLAKE-200928	2020 09 28	8.97	1,450	8.92	1,430	0.611	11.9	58.8	0.046	0.019	63.4	0.0379	93,200	2.70	1.23	3.38	1,330
	ROBERTLAKE-201028	2020 10 28	8.94	1,380	9.18	1,790	0.621	12.1	61.6	0.077	0.021	65.9	0.0484	66,400	3.08	1.48	3.97	1,770
	ROBERT LAKE-210412	2021 04 12	8.73	1,330	9.12	1,630	0.546	10.1	62.3	0.058	0.025	48.6	0.0478	62,200	3.28	1.85	4.79	1,950
	ROBERT LAKE-210616	2021 06 16	8.96	1,510	9.02	1,450	0.485	9.71	69.5	0.053	0.027	64.5	0.0425	93,500	2.74	1.51	5.88	1,730
	ROBERT LAKE-210922	2021 09 22	9.12	1,980	9.12	1,150	0.649	15.4	81.5	0.029	0.017	62.6	0.0383	44,500	2.47	1.29	3.63	1,210
	ROBERT LAKE-211021	2021 10 21	9.08	1,530	9.29	1,250	< 5.00	12.7	58.5	< 1.00a	< 1.00	278	< 0.200	42,500	< 10.0a	1.13	< 10.0	1,450
DIFFUSER	DIFFUSER-180417	2018 04 17	8.98	1,090	9.26	176	0.59	10.1	31.2	< 0.10	< 0.10	20.6	0.017	57,400	0.97	1.05	2.44	248
	DIFFUSER-180503	2018 05 03	8.98	1,110	8.67	51.5	0.67	10.5	33.2	< 0.10	< 0.10	30.0	0.033	64,700	< 0.50	0.74	1.64	69
	DIFFUSER-180615	2018 06 15	8.99	1,230	9.29	70.1	0.75	11.1	33.3	< 0.10	< 0.10	28.2	0.032	82,100	< 0.50	0.41	0.99	109
JH Outfall	JH OUTFALL-180417	2018 04 17	8.68	861	8.89	312	< 0.20	1.92	59.3	< 0.10	< 0.10	41.8	< 0.010	76,100	1.13	0.65	2.13	452
	JH OUTFALL-180503	2018 05 03	8.63	710	8.31	29.1	0.20	2.05	70.0	< 0.10	< 0.10	42.1	0.014	63,500	0.76	0.31	2.04	47
QUAIL RIDGE	Treated Leachate Feb 02/00-20000202	2000 02 02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Quail Ridge Leachate-20001115	2000 11 15	-	-	-	244	< 10a	< 20	245	< 1a	< 10	2,350	< 1a	102,000	19.6	16.2	56	476
	Quail Ridge Leachate-20010223	2001 02 23	-	-	-	740	-	-	-	-	-	-	-	148,000	-	-	-	1,750
	Quail Ridge Leachate-20010423	2001 04 23	-	-	-	780	-	-	-	-	-	-	-	125,000	-	-	-	1,090
	Quail Ridge Leachate-20050124	2005 01 24	-	-	-	74	1.9	15.6	272	0.4	< 0.5	1,880	< 0.01	110,000	15.9	9.8	196	700
	Quail Ridge Leachate-20051018	2005 10 18	-	-	-	110	3	27	340	< 1a	< 5	2,680	< 0.1a	109,000	25	14	1,650	800
	Quail Ridge-20071218	2007 12 18	-	-	-	84	2	13	330	< 0.5a	< 2	1,720	< 0.05a	137,000	17	8.8	340	2,000
	Quail Ridge-20080331	2008 03 31	-	-	-	< 100	< 1	5	220	< 0.2a	-	1,140	< 0.4a	106,000	8.5	5.62	160	1,200
	Quail Ridge-20081104	2008 11 04	7.18	-	-	69	2	9.7	310	< 0.5a	< 2	1,790	0.3	251,000	18	8.2	150	1,000
	Quail Ridge-20091119	2009 11 19	7.12	1,650	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Quail Ridge-20130312	2013 03 12	7.48.09	1,410	-	52	7.36	13.6	285	< 10a	-	1,710	< 0.25	151,000	15.7	8.82	214	703
	Quail Ridge-20130911	2013 09 11	7.63	1,260	-	75	5.33	10.1	265	< 10a	-	1,730	< 0.25	142,000	14.1	7.76	388	1,530
	Quail Ridge-20131211	2013 12 11	7.67	1,290	-	2,600	4.24	9.7	283	< 10a	-	1,680	< 0.25	149,000	16.8	8.61	168	3,620
	Quail Ridge-20140408	2014 04 08	-	1,060	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Quail Ridge-20140610	2014 06 10	-	1,430	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Quail Ridge-20150122	2015 01 22	7.54	1,530	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Quail Ridge-20150615	2015 06 15	7.76	1,380	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Quail Ridge-20150915	2015 09 15	7.47	1,580	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Quail Ridge-20151203	2015 12 03	7.46	1,580	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	QUAIL RIDGE-20160315	2016 03 15	7.49	1,350	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	QUAIL RIDGE-20160915	2016 09 15	-	1,650	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	QUAIL RIDGE-20161117	2016 11 17	-	1,540	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Sample ID	Lead	Lithium	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Phosphorus	Potassium	Selenium	Silicon	Silver	Sodium	Strontium	Sulphur	Tellurium	Thallium	Thorium	Tin	Titanium	Tungsten	Uranium	Vanadium	Zinc	Zirconium
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
ROBERT LAKE - SOUTH-20161117	1.6	< 50	241,000	123	< 0.20a	90.3	< 10	3,300	90,000	< 1.0	9,480	< 0.20	4,500,000	3,630	-	-	< 0.20	-	< 150	147	-	131	< 150a	< 25	-
ROBERT LK-180417	0.20	8.81	220,000	345	< 0.010	61.1	4.42	2,750	58,600	0.59	7,000	< 0.050	2,710,000	3,190	1,780,000	< 0.50	< 0.020	< 0.10	< 0.20	10.8	1.4	89.9	6.0	< 4.0	2.31
ROBERT LK-180503	< 0.20	12.3	225,000	242	-	55.5	4.05	2,610	57,100	0.58	5,800	< 0.050	2,460,000	3,540	1,700,000	< 0.50	< 0.020	< 0.10	< 0.20	5.0	1.0	82.2	6.2	4.8	1.86
ROBERT LK-180614	< 0.20	21.0	244,000	238	< 0.010	45.2	2.85	2,390	57,500	< 0.50	3,400	< 0.050	2,020,000	4,080	1,570,000	< 0.50	< 0.020	< 0.10	< 0.20	< 5.0	< 1.0	74.3	3.1	4.3	1.19
ROBERT LK-180712	< 0.20	19.8	229,000	95.7	< 0.010	47.5	2.92	2,270	51,700	< 0.50	1,700	< 0.050	1,840,000	4,050	1,310,000	< 0.50	< 0.020	< 0.10	< 0.20	5.5	< 1.0	73.3	2.4	< 4.0	0.85
Robert Lk (2019 03 29)	0.23	10.7	144,000	206	< 0.040a	36.8	2.70	1,530	31,100	< 0.50	4,600	< 0.050	1,240,000	2,170	890,000	< 0.50	< 0.020	< 0.10	< 0.20	7.5	< 1.0	54.1	3.1	< 4.0	1.30
Robert Lk (2019 05 06)	0.59	17.0	221,000	172	< 0.040a	47.5	4.42	2,400	46,600	0.51	8,200	< 0.050	1,960,000	3,530	1,300,000	< 0.50	< 0.020	< 0.10	< 0.20	40.7	< 1.0	76.8	5.0	7.1	2.33
Robert Lk (2019 06 05)	0.53	20.9	234,000	236	< 0.040a	39.2	4.41	2,700	47,700	0.71	6,900	< 0.050	2,020,000	3,750	1,290,000	< 0.50	< 0.020	< 0.10	< 0.20	34.2	< 1.0	71.7	5.0	7.1	1.64
Robert Lk (2019 09 04)	0.81	25.5	306,000	153	< 0.010	45.2	5.87	4,280	68,500	0.85	8,500	0.072	2,630,000	5,420	1,750,000	< 0.50	< 0.020	0.15	< 0.20	61.5	1.2	90.9	8.1	6.7	2.93
ROBERTLAKE-200407	0.399	19.4	250,000	192	< 0.010	53.2	4.56	3,000	48,700	0.56	8,020	< 0.010	1,740,000	3,380	1,350,000	< 0.050	< 0.0040	0.080	< 0.050	26.5	0.85	91.5	10.2	3.2	3.68
ROBERTLAKE-200605	0.660	15.1	239,000	373	< 0.010	56.6	5.80	4,250	51,100	0.49	4,780	< 0.010	1,800,000	4,530	1,230,000	0.052	0.0080	0.124	0.075	71.6	1.00	94.6	10.0	5.3	4.69
ROBERTLAKE-200928	0.864	24.0	296,000	168	< 0.010	52.9	6.02	3,770	63,200	0.79	9,630	< 0.010	2,410,000	4,650	1,740,000	0.054	0.0113	0.212	0.066	77.4	1.29	90.7	7.73	7.7	3.46
ROBERTLAKE-201028	1.24	27.4	295,000	145	< 0.010	56.6	6.68	3,920	62,600	1.08	13,100	0.018	2,280,000	4,100	1,680,000	< 0.050	0.0165	0.228	0.071	104	1.48	90.0	11.3	9.2	3.72
ROBERT LAKE-210412	1.33	22.6	286,000	261	< 0.010	66.3	7.22	3,620	54,100	0.61	15,100	0.012	2,070,000	3,700	1,410,000	< 0.050	0.0147	0.190	0.090	102	1.16	96.4	13.6	8.6	3.25
ROBERT LAKE-210616	1.18	25.2	311,000	291	< 0.010	58.0	6.38	3,840	63,100	0.50	15,000	< 0.010	2,300,000	4,060	1,550,000	< 0.050	0.0149	0.184	0.053	80.5	1.08	105	7.59	7.7	3.10
ROBERT LAKE-210922	1.20	22.6	453,000	127	< 0.010	76.2	7.53	4,120	90,200	1.25	13,500	< 0.010	3,460,000	4,990	2,270,000	< 0.050	0.0101	0.136	< 0.050	63.2	1.88	127	7.83	7.5	3.23
ROBERT LAKE-211021	< 5.00	26.9	345,000	105	< 0.010	60.1	4.95	4,110	66,200	< 10.0a	11,500	< 1.00	2,740,000	4,530	1,910,000	< 5.00	< 0.400	< 1.00	< 5.00	73.1	< 5.00	96.5	< 20.0	< 100	2.51
DIFFUSER-180417	0.27	8.99	230,000	355	< 0.010	60.8	4.72	2,900	60,800	0.57	7,400	< 0.050	2,440,000	3,170	1,840,000	< 0.50	< 0.020	< 0.10	< 0.20	12.7	1.2	90.2	6.2	4.5	2.30
DIFFUSER-180503	< 0.20	12.5	230,000	250	-	56.4	4.08	2,710	58,700	0.57	5,900	< 0.050	2,540,000	3,610	1,740,000	< 0.50	< 0.020	< 0.10	< 0.20	< 5.0	< 1.0	83.9	6.4	6.5	1.90
DIFFUSER-180615	< 0.20	20.3	249,000	243	< 0.010	44.9	2.99	2,410	59,400	< 0.50	3,600	< 0.050	2,000,000	4,130	1,600,000	< 0.50	< 0.020	< 0.10	0.26	5.3	< 1.0	73.0	3.2	5.3	1.15
JH OUTFALL-180417	0.30	27.2	163,000	84.2	< 0.010	14.9	2.72	96	13,700	1.22	< 1,000	< 0.050	272,000	3,630	201,000	< 0.50	< 0.020	< 0.10	< 0.20	17.7	< 1.0	38.4	4.1	5.4	0.45
JH OUTFALL-180503	< 0.20	32.0	134,000	27.3	-	15.8	1.67	84	15,200	1.55	2,300	< 0.050	212,000	3,320	113,000	< 0.50	< 0.020	< 0.10	< 0.20	< 5.0	< 1.0	28.3	4.5	6.1	0.24
Treated Leachate Feb 02/00-20000202	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Quail Ridge Leachate-20001115	< 4a	39	287,000	468	-	< 2	26	4,220	327,000	< 8a	18,500	< 2a	1,980,000	2,550	-	-	< 8a	-	< 6	86.6	-	-	15	22.4	-
Quail Ridge Leachate-20010223	-	-	325,000	1,120	-	-	-	-	262,000	-	19,000	-	1,710,000	-	-	-	-	-	-	-	-	-	-	-	-
Quail Ridge Leachate-20010423	-	-	253,000	914	-	-	-	-	204,000	-	17,600	-	1,240,000	-	-	-	-	-	-	-	-	-	-	-	-
Quail Ridge Leachate-20050124	2.5	38	302,000	579	-	3	21.4	-	245,000	1.8	16,200	0.1	1,660,000	3,430	-	-	< 0.05	-	5	71.1	-	4.1	11.6	16	21
Quail Ridge Leachate-20051018	23	40	310,000	614	< 0.1a	< 10	25	-	280,000	< 2	17,200	< 1a	1,880,000	3,960	-	-	< 0.5	-	10	102	-	< 5	16	50	30
Quail Ridge-20071218	9.5	53	282,000	938	-	< 5	17	-	170,000	1	17,500	< 0.5a	1,140,000	3,920	-	-	< 0.2	-	8	62.7	-	6.7	13	54	20
Quail Ridge-20080331	4	40	225,000	676	-	0.8	20	1,600	124,000	< 3.0a	7,060	< 1a	806,000	2,900	-	< 0.5	< 0.05	< 0.1	< 4	30	-	6.2	7.6	20	10
Quail Ridge-20081104	1	50	248,000	898	-	< 5	16	-	156,000	< 1	17,500	0.17	1,020,000	4,850	-	-	< 0.2	-	< 5	63.6	-	5.6	14	30	20
Quail Ridge-20091119	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Quail Ridge-20130312	4.8	< 50	252,000	650	< 0.20a	2.1	17.7	-	-	< 5.0a	-	0.061	1,420,000	-	-	-	< 0.50	-	-	71	-	4.1	< 60	68	-
Quail Ridge-20130911	7.3	< 50	219,000	588	< 0.20a	1.5	19.5	-	-	< 5.0a	-	0.064	1,390,000	-	-	-	< 0.50	-	-	78	-	3.29	< 60	142	-
Quail Ridge-20131211	6.3	< 50	222,000	548	< 2.5a	5.8	18.3	-	-	< 5.0a	-	0.13	1,160,000	-	-	-	< 0.50	-	-	181	-	3.87	< 60	67	-
Quail Ridge-20140408	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Quail Ridge-20140610	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Quail Ridge-20150122	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Quail Ridge-20150615	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Quail Ridge-20150915	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Quail Ridge-20151203	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
QUAIL RIDGE-20160315	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
QUAIL RIDGE-20160915	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
QUAIL RIDGE-20161117	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Associated CARO file(s): 8040426, 8041402, 8041784, 8050436, 8052167, 8061543, 8071280, 8090442, 8110640, 8110821, 9032473, 9050543, 9060474, 9090312, N000861, 0040546, 0060737, 0091922, 20J3095.
Associated Exova file(s): 107524, 115040, 417280, 438503, 47748, 593413, 610415, 653618, 683622, 714220, 714240, 95223.
All terms defined within the body of Keltech's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

Table 5: Historical Summary of Analytical Results For Leachate

Sample Location		N Pumphouse MH											
Sample ID		LEACHATE-PUMPHOUSE MANHOLE-20130312	N Pumphouse MH-20080205	N Pumphouse MH-20080219	N Pumphouse MH-20080304	N Pumphouse MH-20080325	N Pumphouse MH-20080408	N Pumphouse MH-20080424	N Pumphouse MH-20080507	N Pumphouse MH-20080521	N Pumphouse MH-20080617	N Pumphouse MH-20080626	N Pumphouse MH-20080708
Sample Date (yyyy mm dd)		2013 03 12	2008 02 05	2008 02 19	2008 03 04	2008 03 25	2008 04 08	2008 04 24	2008 05 07	2008 05 21	2008 06 17	2008 06 26	2008 07 08
Parameter	**Units**	**Analytical Results**											
Dissolved Inorganics													
Ammonia, Total (as N)	µg/L	118,000	-	-	-	-	-	-	-	-	-	-	-
Nitrate (as N)	µg/L	< 250	-	-	-	-	-	-	-	-	-	-	-
Nitrite (as N)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	490	-	-	-	-	-	-	-	-	-	-	-
Fluoride	µg/L	5,200	-	-	-	-	-	-	-	-	-	-	-
Sulfate	mg/L	503	-	-	-	-	-	-	-	-	-	-	-
Total Alkalinity	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity, Bicarbonate (as CaCO3)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity, Carbonate (as CaCO3)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity, Hydroxide (as CaCO3)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity, Phenolphthalein (as CaCO3)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Bromide	mg/L	3.3	-	-	-	-	-	-	-	-	-	-	-
Sulfide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Biochemical Oxygen Demand	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Chemical Oxygen Demand	mg/L	454	-	-	-	-	-	-	-	-	-	-	-
Phosphate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Ortho-Phosphate	mg/L	2.5	-	-	-	-	-	-	-	-	-	-	-
Total Organic Carbon	mg/L	120	-	-	-	-	-	-	-	-	-	-	-
Total Phosphorous as P	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Metals													
Dissolved Aluminum	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Calcium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Iron	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Manganese	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Potassium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Sodium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Antimony	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Barium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Boron	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Chromium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Copper	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Lead	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Lithium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Nickel	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Silver	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Thallium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Titanium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Uranium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Silicon	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Strontium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Tellurium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Thorium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Tin	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Zirconium	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Monocyclic Aromatic Hydrocarbons													
Benzene	µg/L	3.13	16	11	14	13	11	7	9	8	11	12	8
Ethylbenzene	µg/L	19.3	63	46	64	60	56	47	56	44	49	49	38
Toluene	µg/L	1.03	2	2	3	3	2	2	2	2	2	3	2
Xylenes	µg/L	9.35	9	9	11	13	12	10	12	7	11	8	9
Styrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Polycyclic Aromatic Hydrocarbons													
Naphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Methylnaphthalene, 1-	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Methylnaphthalene, 2-	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Benz(a)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b+j)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Chloronaphthalene, 2-	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Quinoline	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Volatile Organic Compounds													
Bromodichloromethane [BDCM]	µg/L	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Bromoform	µg/L	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Carbon Tetrachloride	µg/L	< 0.50	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Chlorobenzene	µg/L	3.8	3	2	2	3	3	3	3	3	2	3	2

Sample Location		N Pumphouse MH						
Sample ID		N Pumphouse MH-20131211	N Pumphouse MH-20140408	N Pumphouse MH-20140610	N Pumphouse MH-20150122	N Pumphouse MH-20150615	N Pumphouse MH-20150915	N Pumphouse MH-20151203
Sample Date (yyyy mm dd)		2013 12 11	2014 04 08	2014 06 10	2015 01 22	2015 06 15	2015 09 15	2015 12 03
Parameter	**Units**	**Analytical Results**						
Dissolved Inorganics								
Ammonia, Total (as N)	µg/L	108,000	64,800	65,300	40,600	95,000	99,700	111,000
Nitrate (as N)	µg/L	< 250	< 250	350	< 250	< 250	< 250	350
Nitrite (as N)	µg/L	-	-	-	-	-	-	-
Chloride	mg/L	380	506	553	368	377	416	441
Fluoride	µg/L	2,200	< 1,000	778	< 1,000	1,600	< 1,000	< 1,000
Sulfate	mg/L	376	1,130	860	299	545	548	698
Total Alkalinity	mg/L	-	3,440	4,930	2,100	3,470	3,640	3,640
Alkalinity, Bicarbonate (as CaCO3)	mg/L	-	-	-	2,100	-	3,640	3,640
Alkalinity, Carbonate (as CaCO3)	mg/L	-	-	-	< 1.0	-	< 1.0	< 1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	-	-	-	< 1.0	-	< 1.0	< 1.0
Alkalinity, Phenolphthalein (as CaCO3)	mg/L	-	-	-	-	-	-	-
Bromide	mg/L	2.6	4.2	4.7	< 2.5	2.6	3.3	2.9
Sulfide	mg/L	-	-	-	-	-	-	-
Biochemical Oxygen Demand	mg/L	-	-	-	-	-	-	-
Chemical Oxygen Demand	mg/L	381	626	660	205	357	421	415
Phosphate	mg/L	-	-	-	-	-	-	-
Ortho-Phosphate	mg/L	2.2	3.07	4.55	0.8	2.3	2.46	2.63
Total Organic Carbon	mg/L	106	-	-	-	-	-	-
Total Phosphorous as P	mg/L	-	-	-	-	-	-	-
Dissolved Metals								
Dissolved Aluminum	µg/L	-	94	82	20	36	42	46
Dissolved Calcium	mg/L	-	66.2	64.4	115	104	95	96.2
Dissolved Iron	µg/L	-	261	144	1,060	116	106	76
Dissolved Magnesium	mg/L	-	185	257	214	250	265	286
Dissolved Manganese	µg/L	-	283	299	841	423	377	395
Dissolved Potassium	mg/L	-	-	-	-	-	166	169
Dissolved Sodium	mg/L	-	1,770	2,260	686	1,140	1,370	1,520
Antimony	µg/L	-	3.8	11.8	< 0.50	3.3	7.69	8
Arsenic	µg/L	-	16.5	33.9	1.7	9.6	14.1	16
Barium	µg/L	-	100	148	201	238	247	256
Beryllium	µg/L	-	< 10	< 15	< 5.0	< 10	< 10	< 10
Boron	µg/L	-	1,590	1,640	890	1,390	1,490	1,520
Cadmium	µg/L	-	< 0.50	< 0.50	< 0.25	< 0.050	< 0.050	< 0.050
Chromium	µg/L	-	16.1	22.3	5.2	11.1	13.4	15
Cobalt	µg/L	-	6.6	6.1	3.27	7.03	6.92	7.7
Copper	µg/L	-	< 5.0	< 5.0	< 2.5	< 1.0	< 1.0	< 2.0
Lead	µg/L	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Lithium	µg/L	-	< 50	59	< 50	< 50	< 50	< 50
Mercury	µg/L	-	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Molybdenum	µg/L	-	3	4.6	< 1.0	1.4	2.2	1.3
Nickel	µg/L	-	25.8	26	8.5	14.1	16.1	17.6
Selenium	µg/L	-	< 10	< 10	< 5.0	< 1.0	1.7	< 1.0
Silver	µg/L	-	< 0.10	< 0.10	< 0.050	< 0.050	< 0.050	< 0.10
Thallium	µg/L	-	< 1.0	< 1.0	< 0.50	< 0.050	< 0.20	< 0.10
Titanium	µg/L	-	59	73	< 50	< 50	55	55
Tungsten	µg/L	-	-	-	-	-	-	-
Uranium	µg/L	-	22.5	16.2	3.61	5.43	5.09	4.55
Vanadium	µg/L	-	< 60	< 90	< 30	< 60	< 60	< 60
Zinc	µg/L	-	< 10	< 15	< 5.0	< 10	< 10	< 10
Bismuth	µg/L	-	-	-	-	-	< 400	< 400
Phosphorous	µg/L	-	-	-	-	-	2,640	3,180
Silicon	µg/L	-	-	-	-	-	15,700	15,400
Strontium	µg/L	-	-	-	-	-	3,610	3,440
Sulphur	µg/L	-	-	-	-	179,000	720,000	657,000
Tellurium	µg/L	-	-	-	-	< 1.0	< 1.0	< 2.0
Thorium	µg/L	-	-	-	-	< 0.50	< 0.50	< 1.0
Tin	µg/L	-	-	-	-	-	< 60	< 60
Zirconium	µg/L	-	-	-	-	17.8	19.2	22.3
Monocyclic Aromatic Hydrocarbons								
Benzene	µg/L	3.74	2.05	4.75	-	2.86	3.08	2.98
Ethylbenzene	µg/L	11.9	22.1	45.9	-	9.41	11	13.4
Toluene	µg/L	0.79	3.8	4.01	-	0.76	0.88	0.72
Xylenes	µg/L	9.62	19.8	40.5	-	5.25	5.45	7.9
Styrene	µg/L	-	-	-	-	-	-	-
Polycyclic Aromatic Hydrocarbons								
Naphthalene	µg/L	-	3.19	3.09	0.36	1.45	2.11	2.76
Methylnaphthalene, 1-	µg/L	-	-	-	-	-	-	-
Methylnaphthalene, 2-	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Acenaphthene	µg/L	-	0.33	0.263	0.2	0.328	0.508	0.415
Fluorene	µg/L	-	0.229	0.159	0.142	0.229	0.362	0.298
Phenanthrene	µg/L	-	0.245	0.184	0.074	0.09	0.154	0.125
Anthracene	µg/L	-	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Acridine	µg/L	-	< 0.050	< 0.060	< 0.050	< 0.050	< 0.050	< 0.050
Fluoranthene	µg/L	-	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Pyrene	µg/L	-	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Benz(a)anthracene	µg/L	-	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Chrysene	µg/L	-	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Benzo(b)fluoranthene	µg/L	-	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Benzo(b+j)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Benzo(a)pyrene	µg/L	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Indeno(1,2,3-cd)pyrene	µg/L	-	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Dibenz(a,h)anthracene	µg/L	-	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Benzo(g,h,i)perylene	µg/L	-	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Chloronaphthalene, 2-	µg/L	-	-	-	-	-	-	-
Quinoline	µg/L	-	< 0.050	< 0.050	< 0.050	< 0.050	< 0.070	< 0.050
Volatile Organic Compounds								
Bromodichloromethane [BDCM]	µg/L	< 1.0	< 1.0	-	-	< 1.0	< 1.0	< 1.0
Bromoform	µg/L	< 1.0	< 1.0	-	-	< 1.0	< 1.0	< 1.0
Carbon Tetrachloride	µg/L	< 0.50	< 0.50	-	-	< 0.50	< 0.50	< 0.50
Chlorobenzene	µg/L	4.2	< 1.0	-	-	2.7	2.4	2.3

Table 5: Historical Summary of Analytical Results For Leachate

Sample Location						
Sample ID		N PUMPHOUSE MH-20160315	N PUMPHOUSE MH-20160623	N PUMPHOUSE MH-20160915	N PUMPHOUSE MH-20161117	N PUMPHOUSE MH-20170914
Sample Date (yyyy mm dd)		2016 03 15	2016 06 23	2016 09 15	2016 11 17	2017 09 14
Parameter	**Units**					
Dissolved Inorganics						
Ammonia, Total (a	µg/L	76,800	11,400	99,000	140,000	87,000
Nitrate (as N)	µg/L	< 250	5,710	< 250	< 250	< 250
Nitrite (as N)	µg/L	-	-	-	-	-
Chloride	mg/L	420	217	502	671	503
Fluoride	µg/L	< 1,000	1,280	< 1,000	< 1,000	1,100
Sulfate	mg/L	573	347	893	996	954
Total Alkalinity	mg/L	3,190	934	3,920	4,680	3,760
Alkalinity, Bicarbo	mg/L	3,190	-	-	-	-
Alkalinity, Carbona	mg/L	< 1.0	-	-	-	-
Alkalinity, Hydroxi	mg/L	< 1.0	-	-	-	-
Alkalinity, Phenolp	mg/L	-	-	-	-	-
Bromide	mg/L	2.8	< 1.0	3.7	5.3	3.4
Sulfide	mg/L	-	-	-	-	-
Biochemical Oxyg	mg/L	-	-	-	-	-
Chemical Oxygen	mg/L	518	46	482	681	508
Phosphate	mg/L	-	-	-	-	-
Ortho-Phosphate	mg/L	2.29	0.222	3.01	0.392	3.33
Total Organic Car	mg/L	-	-	-	-	-
Total Phosphorou	mg/L	-	-	-	-	-
Dissolved Metals						
Dissolved Alumin	µg/L	59	< 10	49	58	70
Dissolved Calcium	mg/L	84.6	58.7	113	89.6	96.8
Dissolved Iron	µg/L	89	130	122	84	< 90
Dissolved Magnes	mg/L	236	149	291	262	270
Dissolved Mangar	µg/L	494	90	493	355	411
Dissolved Potassi	mg/L	182	31.6	177	243	177
Dissolved Sodium	mg/L	1,580	308	1,760	2,020	1,700
Antimony	µg/L	7.85	0.73	12.3	9.3	8.5
Arsenic	µg/L	21.8	2.3	24.8	23.5	17.2
Barium	µg/L	151	97	303	234	233
Beryllium	µg/L	< 10	< 5.0	< 10	< 10	< 15
Boron	µg/L	1,650	230	1,680	2,060	1,520
Cadmium	µg/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Chromium	µg/L	16.1	3.14	17	22.5	12.6
Cobalt	µg/L	6.57	0.84	8.5	11.5	5.2
Copper	µg/L	< 1.0	< 1.0	< 2.0	< 2.0	< 2.0
Lead	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Lithium	µg/L	< 50	< 50	52	< 50	52
Mercury	µg/L	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Molybdenum	µg/L	2.5	13.4	2	2	1.8
Nickel	µg/L	21.8	< 5.0	19.7	25.5	18
Selenium	µg/L	11.4	5	< 1.0	3,964	11.6
Silver	µg/L	< 0.050	< 0.050	< 0.10	< 0.10	< 0.10
Thallium	µg/L	< 0.050	< 0.010	< 0.10	< 0.10	< 0.10
Titanium	µg/L	< 50	< 50	58	67	59
Tungsten	µg/L	-	-	-	-	-
Uranium	µg/L	8.59	33.3	5.43	4.77	9.1
Vanadium	µg/L	< 60	< 30	< 60	< 60	< 90
Zinc	µg/L	< 10	< 5.0	< 10	< 10	< 15
Bismuth	µg/L	< 400	< 200	< 400	< 400	< 600
Phosphorous	µg/L	3,180	< 300	3,190	4,140	3,410
Silicon	µg/L	12,700	10,100	16,700	16,200	14,500
Strontium	µg/L	2,660	2,670	3,960	3,100	3,400
Sulphur	µg/L	793,000	93,800	322,000	520,000	604,000
Tellurium	µg/L	< 1.0	< 0.20	-	-	< 2.0
Thorium	µg/L	< 0.50	< 0.10	-	-	< 1.0
Tin	µg/L	< 60	< 30	< 60	< 60	< 90
Zirconium	µg/L	17.5	2.64	-	-	19.6
Monocyclic Aromatic Hydrocarbons						
Benzene	µg/L	2.96	-	-	3.43	3.34
Ethylbenzene	µg/L	15.8	-	-	22.8	18.8
Toluene	µg/L	1.04	-	-	1.29	0.7
Xylenes	µg/L	9.68	-	-	14.3	13.4
Styrene	µg/L	-	-	-	-	-
Polycyclic Aromatic Hydrocarbons						
Naphthalene	µg/L	2.94	0.19	1.57	3.55	1.53
Methylnaphthalen	µg/L	-	-	-	-	-
Methylnaphthalen	µg/L	-	-	-	-	-
Acenaphthylene	µg/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Acenaphthene	µg/L	0.346	< 0.050	0.222	0.4	0.325
Fluorene	µg/L	0.201	< 0.050	0.176	0.238	0.259
Phenanthrene	µg/L	0.124	< 0.050	0.081	0.16	0.154
Anthracene	µg/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Acridine	µg/L	< 0.050	< 0.050	< 0.050	< 0.070	< 0.050
Fluoranthene	µg/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Pyrene	µg/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Benz(a)anthracen	µg/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Chrysene	µg/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Benzo(b)fluoranth	µg/L	< 0.050	< 0.050	< 0.050	< 0.050	-
Benzo(b+j)fluoran	µg/L	-	-	-	-	-
Benzo(k)fluoranth	µg/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Benzo(a)pyrene	µg/L	< 0.010	< 0.010	< 0.0050	< 0.0050	< 0.0050
Indeno(1,2,3-cd)p	µg/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Dibenz(a,h)anthra	µg/L	< 0.050	< 0.050	< 0.0050	< 0.0050	< 0.0050
Benzo(g,h,i)peryle	µg/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Chloronaphthalen	µg/L	-	-	-	-	-
Quinoline	µg/L	< 0.070	< 0.050	< 0.050	< 0.050	< 0.070
Volatile Organic Compounds						
Bromodichloromet	µg/L	< 1.0	-	-	< 1.0	< 1.0
Bromoform	µg/L	< 1.0	-	-	< 1.0	< 1.0
Carbon Tetrachlor	µg/L	< 0.50	-	-	< 0.50	< 0.50
Chlorobenzene	µg/L	1.7	-	-	2.3	1.8

Sample Location		N Pumphouse MH											
Sample ID		N PUMPHOUSE MH-20171204	N Pumphouse MH	N Pumphouse MH	N Pumphouse MH-20180524	N Pumphouse MH	N Pumphouse MH-20181108	N Pumphouse MH	N Pumphouse MH-20190315	N Pumphouse MH	N Pumphouse MH-20190603	N Pumphouse MH	N Pumphouse MH-20190903
Sample Date (yyyy mm dd)		2017 12 04	2018 03 15	2018 05 24	2018 05 24	2018 11 08	2018 11 08	2019 03 15	2019 03 15	2019 06 03	2019 06 03	2019 09 03	2019 09 03
Parameter	**Units**	**Analytical Results**											
Dissolved Inorganics													
Ammonia, Total (a	µg/L	65,600	171	52,900	52,900	50,200	50,200	14,600	14,600	39,500	39,500	33,800	33,800
Nitrate (as N)	µg/L	< 250	7,230	< 100	< 100	< 250	< 250	3,530	3,530	< 100	< 100	< 10	< 10
Nitrite (as N)	µg/L	-	< 100	< 100	-	< 250	-	390	-	< 100	-	< 10	-
Chloride	mg/L	554	131	437	437	936	936	501	501	410	410	89.9	89.9
Fluoride	µg/L	< 1,000	< 1,000	< 1,000	< 1,000	< 2,500	< 2,500	< 1,000	< 1,000	1,100	1,100	110	110
Sulfate	mg/L	1,160	236	1,010	1,010	2,660	2,660	1,340	1,340	1,120	1,120	240	240
Total Alkalinity	mg/L	5,390	575	2,740	2,740	6,350	6,350	2,890	2,890	3,310	3,310	6,780	6,780
Alkalinity, Bicarbo	mg/L	-	575	2,740	2,740	6,350	6,350	2,790	2,790	3,310	3,310	6,780	6,780
Alkalinity, Carbona	mg/L	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	102	102	< 1.0	< 1.0	< 1.0	< 1.0
Alkalinity, Hydroxi	mg/L	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Alkalinity, Phenolp	mg/L	-	< 1.0	< 1.0	-	< 1.0	-	50.8	-	< 1.0	-	< 1.0	-
Bromide	mg/L	3.9	< 1.00	< 1.00	< 1.00	< 2.50	< 2.50	2.37	2.37	< 1.00	< 1.00	< 1.00	< 1.00
Sulfide	mg/L	-	< 0.020	31.7	-	102	-	26.7	-	46.1	-	129	-
Biochemical Oxyg	mg/L	-	< 5.5	63.7	-	301	-	111	-	58.3	-	275	-
Chemical Oxygen	mg/L	529	< 20	382	382	925	925	436	436	430	430	947	947
Phosphate	mg/L	-	0.0860	3.02	-	6.51	-	-	-	2.90	-	-	-
Ortho-Phosphate	mg/L	4.5	-	-	3.02	-	6.51	3.27	3.27	-	2.9	0.865	0.865
Total Organic Car	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Total Phosphorou	mg/L	-	0.143	4.00	-	8.06	-	4.30	-	3.99	-	10.1	-
Dissolved Metals													
Dissolved Alumin	µg/L	156	< 5.0	78.3	78.3	180	180	81.6	81.6	72.4	72.4	168	168
Dissolved Calcium	mg/L	66.2	69.3	83.0	83	54.6	54.6	57.9	57.9	83.1	83.1	50.6	50.6
Dissolved Iron	µg/L	53	11	97	97	68	68	48	48	52	52	62	62
Dissolved Magnes	mg/L	305	136	205	205	257	257	204	204	232	232	215	215
Dissolved Mangar	µg/L	317	27.9	305	305	196	196	157	157	316	316	154	154
Dissolved Potassi	mg/L	253	16.7	151	151	307	307	134	134	158	158	251	251
Dissolved Sodium	mg/L	3,250	184	1,330	1,330	4,180	4,180	1,960	1,960	1,720	1,720	4,200	4,200
Antimony	µg/L	4.66	< 0.20	9.61	9.61	25.1	25.1	8.90	8.9	6.92	6.92	11.2	11.2
Arsenic	µg/L	15.8	1.15	25.8	25.8	89.9	89.9	20.8	20.8	19.8	19.8	34.5	34.5
Barium	µg/L	172	78.9	205	205	142	142	85.7	85.7	159	159	156	156
Beryllium	µg/L	< 0.50	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Boron	µg/L	1,930	28.0	1,350	1,350	1,740	1,740	978	978	1,240	1,240	2,260	2,260
Cadmium	µg/L	< 0.025	0.015	0.011	0.011	0.012	0.012	0.013	0.013	< 0.010	< 0.010	0.014	0.014
Chromium	µg/L	26.5	2.63	15.7	15.7	45.7	45.7	14.3	14.3	15.3	15.3	47.6	47.6
Cobalt	µg/L	5	0.12	3.88	3.88	5.46	5.46	2.14	2.14	4.59	4.59	5.77	5.77
Copper	µg/L	2	1.09	< 0.40	< 0.40	< 0.40	< 0.40	0.68	0.68	0.43	0.43	0.48	0.41
Lead	µg/L	< 0.25	< 0.20	< 0.20	< 0.20	0.22	0.22	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Lithium	µg/L	65.8	36.9	54.6	54.6	49.2	49.2	55.4	55.4	48.8	48.8	64.5	64.5
Mercury	µg/L	< 0.25	< 0.010	< 0.010	< 0.010	< 0.200	< 0.200	< 0.100	< 0.100	< 0.010	< 0.010	< 0.010	< 0.010
Molybdenum	µg/L	2.33	18.9	6.22	6.22	5.33	5.33	7.16	7.16	3.32	3.32	5.46	5.46
Nickel	µg/L	27.5	1.02	21.8	21.8	33.6	33.6	13.2	13.2	16.6	16.6	33.1	33.1
Selenium	µg/L	14.4	7.41	2.58	2.58	1.35	1.35	2.42	2.42	0.96	0.96	20.7	20.7
Silver	µg/L	0.078	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Thallium	µg/L	< 0.050	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Titanium	µg/L	60.1	< 5.0	40.4	40.4	116	116	30.4	30.4	45.2	45.2	118	118
Tungsten	µg/L	-	< 1.0	2.3	-	4.8	-	1.8	-	2.4	-	4.9	-
Uranium	µg/L	14.2	39.5	25.0	25	37.2	37.2	33.3	33.3	16.8	16.8	26.2	26.2
Vanadium	µg/L	19.1	3.3	13.0	13	27.6	27.6	8.5	8.5	11.6	11.6	24.1	24.1
Zinc	µg/L	< 5.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Bismuth	µg/L	< 0.25	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phosphorous	µg/L	8,100	158	4,380	4,380	9,480	9,480	4,530	4,530	4,100	4,100	9,920	9,920
Silicon	µg/L	13,100	10,700	14,200	14,200	14,700	14,700	10,300	10,300	13,500	13,500	15,300	15,300
Strontium	µg/L	2,800	3,160	3,480	3,480	2,510	2,510	2,320	2,320	3,410	3,410	2,440	2,440
Sulphur	µg/L	1,180,000	100,000	431,000	-	1,420,000	-	581,000	-	473,000	-	2,810,000	-
Tellurium	µg/L	< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Thorium	µg/L	< 0.50	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Tin	µg/L	14.7	< 0.20	15.4	15.4	59.9	59.9	18.8	18.8	11.4	11.4	53.3	53.3
Zirconium	µg/L	32.7	0.18	21.5	21.5	51.1	51.1	15.1	15.1	18.7	18.7	50.6	50.6
Monocyclic Aromatic Hydrocarbons													
Benzene	µg/L	5.43	< 0.5	4.9	4.9	8.7	8.7	2.9	2.9	3.0	3	8.8	8.8
Ethylbenzene	µg/L	41.4	< 1.0	79.4	79.4	53.4	53.4	5.9	5.9	47.0	47	79.3	79.3
Toluene	µg/L	1.23	< 1.0	3.8	3.8	2.3	2.3	1.7	1.7	< 1.0	< 1.0	2.7	2.7
Xylenes	µg/L	31.1	< 2.0	59.6	59.6	86.4	86.4	7.3	7.3	26.8	26.8	99.6	99.6
Styrene	µg/L	-	< 1.0	< 1.0	-	< 1.0	-	< 1.0	-	< 1.0	-	< 1.0	-
Polycyclic Aromatic Hydrocarbons													
Naphthalene	µg/L	2.06	< 0.200	2.08	2.08	3.52	3.52	5.93	5.93	3.41	3.41	6.98	6.98
Methylnaphthalen	µg/L	-	< 0.100	0.620	-	0.545	-	1.06	-	0.644	-	0.947	-
Methylnaphthalen	µg/L	-	< 0.100	0.721	-	0.407	-	1.10	-	0.568	-	0.886	-
Acenaphthylene	µg/L	< 0.010	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200
Acenaphthene	µg/L	0.312	< 0.050	0.233	0.233	0.293	0.293	0.386	0.386	0.518	0.518	0.410	0.41
Fluorene	µg/L	0.234	< 0.050	0.164	0.164	0.212	0.212	0.221	0.221	0.336	0.336	0.271	0.271
Phenanthrene	µg/L	0.213	< 0.100	0.190	0.19	0.341	0.341	0.242	0.242	0.419	0.419	0.395	0.395
Anthracene	µg/L	< 0.030	< 0.010	0.019	0.019	< 0.010	< 0.010	0.019	0.019	0.023	0.023	0.045	0.045
Acridine	µg/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Fluoranthene	µg/L	0.05	< 0.030	< 0.030	< 0.030	0.172	0.172	0.090	0.09	0.118	0.118	0.150	0.15
Pyrene	µg/L	0.043	< 0.020	0.033	0.033	0.091	0.091	0.064	0.064	0.025	0.025	0.115	0.115
Benz(a)anthracen	µg/L	< 0.010	< 0.010	< 0.010	< 0.010	0.017	0.017	< 0.010	< 0.010	< 0.010	< 0.010	0.017	0.017
Chrysene	µg/L	< 0.010	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Benzo(b)fluoranth	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b+j)fluoran	µg/L	-	< 0.050	< 0.050	-	< 0.050	-	< 0.050	-	< 0.050	-	< 0.050	-
Benzo(k)fluoranth	µg/L	< 0.010	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Benzo(a)pyrene	µg/L	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Indeno(1,2,3-cd)p	µg/L	< 0.010	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Dibenz(a,h)anthra	µg/L	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo(g,h,i)peryle	µg/L	< 0.010	< 0.050	< 0.050	-	< 0.050	-	< 0.050	-	< 0.050	-	< 0.050	-
Chloronaphthalen	µg/L	-	< 0.100	< 0.100	-	< 0.100	-	< 0.100	-	< 0.100	-	< 0.100	-
Quinoline	µg/L	< 0.070	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Volatile Organic Compounds													
Bromodichloromet	µg/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
Bromoform	µg/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
Carbon Tetrachlor	µg/L	< 0.50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chlorobenzene	µg/L	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.1	< 1.1	< 1.0	< 1.0

Sample Location					
Sample ID		N Pumphous e MH	N Pumphous e MH-20191031	N Pumphous e MH	N Pumphouse MH
Sample Date (yyyy mm dd)		2019 10 31	2019 10 31	2020 03 05	2020 06 03
Parameter	**Units**				
Dissolved Inorganics					
Ammonia, Total (a	µg/L	52,300	52,300	55,100	35,000
Nitrate (as N)	µg/L	< 100	< 100	< 10	< 100
Nitrite (as N)	µg/L	< 100	-	< 10	< 100
Chloride	mg/L	401	401	337	530
Fluoride	µg/L	< 1,000	< 1,000	810	< 1,000
Sulfate	mg/L	1,160	1,160	859	1,350
Total Alkalinity	mg/L	3,440	3,440	2,900	3,310
Alkalinity, Bicarbo	mg/L	3,440	3,440	2,900	3,310
Alkalinity, Carbona	mg/L	< 1.0	< 1.0	< 1.0	< 1.0
Alkalinity, Hydroxi	mg/L	< 1.0	< 1.0	< 1.0	< 1.0
Alkalinity, Phenolp	mg/L	< 1.0	-	< 1.0	< 1.0
Bromide	mg/L	2.60	2.6	1.88	2.59
Sulfide	mg/L	75.3	-	46.3	38.4
Biochemical Oxyg	mg/L	60.2	-	79.4	113
Chemical Oxygen	mg/L	310	310	385	549
Phosphate	mg/L	-	-	-	-
Ortho-Phosphate	mg/L	1.00	1	2.01	3.42
Total Organic Car	mg/L	-	-	-	-
Total Phosphorou	mg/L	2.90	-	2.80	5.01
Dissolved Metals					
Dissolved Alumin	µg/L	40.7	40.7	32.7	105
Dissolved Calcium	mg/L	95.4	95.4	104	7.35
Dissolved Iron	µg/L	76.2	76.2	182	56.3
Dissolved Magnes	mg/L	272	272	293	157
Dissolved Mangar	µg/L	369	369	580	250
Dissolved Potassi	mg/L	146	146	138	168
Dissolved Sodium	mg/L	1,690	1,690	1,410	1,750
Antimony	µg/L	9.63	9.63	7.65	10.8
Arsenic	µg/L	35.4	35.4	21.3	46.1
Barium	µg/L	232	232	228	98.6
Beryllium	µg/L	0.024	0.024	0.017	< 0.010
Boron	µg/L	1,160	1,160	1,290	135
Cadmium	µg/L	0.0053	0.0053	0.0036	0.0088
Chromium	µg/L	18.0	18	13.8	18.6
Cobalt	µg/L	6.60	6.6	7.21	3.56
Copper	µg/L	0.22	0.22	0.13	0.97
Lead	µg/L	< 0.050	< 0.050	< 0.050	< 0.050
Lithium	µg/L	53.7	53.7	45.4	4.24
Mercury	µg/L	< 0.010	< 0.010	< 0.010	< 0.010
Molybdenum	µg/L	4.49	4.49	1.82	3.68
Nickel	µg/L	18.7	18.7	19.3	16.1
Selenium	µg/L	0.83	0.83	0.66	1.29
Silver	µg/L	< 0.010	< 0.010	0.018	< 0.010
Thallium	µg/L	< 0.0040	< 0.0040	< 0.0040	< 0.0040
Titanium	µg/L	52.0	52	46.6	44.1
Tungsten	µg/L	2.19	-	1.78	0.39
Uranium	µg/L	12.7	12.7	8.87	2.15
Vanadium	µg/L	12.0	12	9.97	14.9
Zinc	µg/L	1.6	1.6	< 1.0	2.0
Bismuth	µg/L	< 0.010	< 0.010	< 0.010	< 0.010
Phosphorous	µg/L	4,120	4,120	3,210	5,910
Silicon	µg/L	18,500	18,500	16,500	12,600
Strontium	µg/L	4,220	4,220	4,120	2,250
Sulphur	µg/L	497,000	-	331,000	489,000
Tellurium	µg/L	0.096	0.096	0.060	< 0.050
Thorium	µg/L	0.024	0.024	0.020	< 0.010
Tin	µg/L	11.3	11.3	5.44	25.0
Zirconium	µg/L	26.2	26.2	21.1	17.8
Monocyclic Aromatic Hydrocarbons					
Benzene	µg/L	6.0	6	4.1	4.0
Ethylbenzene	µg/L	54.4	54.4	84.6	52.2
Toluene	µg/L	1.8	1.8	3.6	< 2.0
Xylenes	µg/L	41.5	41.5	6.7	30.4
Styrene	µg/L	< 1.0	-	< 1.0	< 1.0
Polycyclic Aromatic Hydrocarbons					
Naphthalene	µg/L	3.80	3.8	1.62	3.60
Methylnaphthalen	µg/L	0.560	-	0.210	0.471
Methylnaphthalen	µg/L	0.391	-	0.163	0.266
Acenaphthylene	µg/L	< 0.0100	< 0.0100	< 0.200	< 0.200
Acenaphthene	µg/L	0.444	0.444	0.251	0.273
Fluorene	µg/L	0.333	0.333	0.177	0.186
Phenanthrene	µg/L	0.294	0.294	0.171	0.252
Anthracene	µg/L	< 0.0400	< 0.0400	0.013	0.018
Acridine	µg/L	0.0540	0.054	< 0.050	< 0.050
Fluoranthene	µg/L	0.0620	0.062	0.041	0.142
Pyrene	µg/L	0.0440	0.044	< 0.020	0.042
Benz(a)anthracen	µg/L	< 0.0100	< 0.0100	< 0.010	< 0.010
Chrysene	µg/L	< 0.0100	< 0.0100	< 0.050	< 0.050
Benzo(b)fluoranth	µg/L	-	-	-	-
Benzo(b+j)fluoran	µg/L	< 0.0100	-	< 0.050	< 0.050
Benzo(k)fluoranth	µg/L	< 0.0100	< 0.0100	< 0.050	< 0.050
Benzo(a)pyrene	µg/L	< 0.00500	< 0.00500	< 0.010	< 0.010
Indeno(1,2,3-cd)p	µg/L	< 0.0100	< 0.0100	< 0.050	< 0.050
Dibenz(a,h)anthra	µg/L	< 0.00500	< 0.00500	< 0.010	< 0.010
Benzo(g,h,i)peryle	µg/L	< 0.0100	-	< 0.050	< 0.050
Chloronaphthalen	µg/L	-	-	< 0.100	< 0.100
Quinoline	µg/L	< 0.0500	< 0.0500	< 0.050	< 0.050
Volatile Organic Compounds					
Bromodichloromet	µg/L	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	µg/L	< 1.0	< 1.0	< 1.0	< 1.0
Carbon Tetrachlor	µg/L	< 0.5	< 0.5	< 0.5	< 0.5
Chlorobenzene	µg/L	< 1.0	< 1.0	< 2.1	< 1.0

Table 5: Historical Summary of Analytical Results For Leachate

N Pumphouse MH						P1 Leachate MH									Sample Location		P1 Leachate MH						
N Pumphouse MH	N Pumphouse MH	N Pumphouse MH	N Pumphouse MH	N Pumphouse MH	N Pumphouse MH	Landfill Leachate-20061109	Landfill Leachate-20061116	Landfill Leachate-20061122		P1 LEACHATE MH-20130911	P1 LEACHATE MH-20140408	P1 LEACHATE MH-20140610	P1 LEACHATE MH-20150122	P1 LEACHATE MH-20150615	Sample ID		P1 LEACHATE MH-20150915	P1 LEACHATE MH-20151203	P1 LEACHATE MH-20160315	P1 LEACHATE MH-20160623	P1 LEACHATE MH-20160915	P1 LEACHATE MH-20161117	P1 LEACHATE MH-20170914
2020 09 30	2020 11 16	2021 03 18	2021 06 17	2021 09 16	2021 10 22	2006 11 09	2006 11 16	2006 11 22		2013 09 11	2014 04 08	2014 06 10	2015 01 22	2015 06 15	Sample Date (yyyy mm dd)		2015 09 15	2015 12 03	2016 03 15	2016 06 23	2016 09 15	2016 11 17	2017 09 14
Analytical Results															Parameter	Units	Analytical Results						
															Dissolved Inorganics								
101,000	29,800	37,300	56,500	70,600	32,000	-	-	-		102,000	82,000	73,700	23,900	78,300	Ammonia, Total (a	µg/L	91,500	78,200	58,300	17,300	18,400	71,100	74,300
< 100	1,240	1,950	< 100	< 100	< 100	-	-	-		< 250	< 250	< 250	< 100	< 250	Nitrate (as N)	µg/L	< 250	< 250	< 250	4,060	170	< 250	< 250
< 100	< 100	5,110	< 100	< 100	< 100	-	-	-		-	-	-	-	-	Nitrite (as N)	µg/L	-	-	-	-	-	-	-
605	369	548	518	704	362	-	-	-		445	391	319	304	355	Chloride	mg/L	389	306	435	219	246	392	408
< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	-	-	-		1,000	1,400	1,530	1,000	1,600	Fluoride	µg/L	1,200	1,200	< 1,000	1,100	1,230	1,400	< 4,000
1,200	813	1,430	1,360	1,620	834	-	-	-		448	878	784	374	959	Sulfate	mg/L	1,170	890	753	443	404	982	933
4,280	3,350	4,080	4,540	5,950	2,530	-	-	-		-	4,020	4,850	1,510	4,270	Total Alkalinity	mg/L	4,410	3,910	3,030	1,070	1,300	3,990	3,700
4,280	3,340	4,080	4,540	5,660	2,530	-	-	-		-	-	-	1,510	-	Alkalinity, Bicarbo	mg/L	4,410	3,910	3,030	-	-	-	-
< 1.0	8.7	< 1.0	< 1.0	292	< 1.0	-	-	-		-	-	-	< 1.0	-	Alkalinity, Carbon	mg/L	< 1.0	< 1.0	< 1.0	-	-	-	-
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	-	-	-		-	-	-	< 1.0	-	Alkalinity, Hydroxi	mg/L	< 1.0	< 1.0	< 1.0	-	-	-	-
< 1.0	4.3	< 1.0	< 1.0	146	< 1.0	-	-	-		-	-	-	-	-	Alkalinity, Phenol	mg/L	-	-	-	-	-	-	-
< 10.0	2.56	< 10.0	1.16	< 10.0	< 10.0	-	-	-		2.8	3.4	3.1	< 1.0	2.8	Bromide	mg/L	3.9	< 2.5	2.6	< 1.0	1	3.3	3.1
73.3	82.3	70.5	51.7	89.2	11.6	-	-	-		-	-	-	-	-	Sulfide	mg/L	-	-	-	-	-	-	-
269	334	88.0	64.0	200	34.0	-	-	-		-	-	-	-	-	Biochemical Oxyg	mg/L	-	-	-	-	-	-	-
789	460	472	562	653	188	-	-	-		413	433	353	117	336	Chemical Oxygen	mg/L	405	288	411	71	100	319	374
-	-	-	-	-	-	-	-	-		-	-	-	-	-	Phosphate	mg/L	-	-	-	-	-	-	-
2.96	2.67	2.04	0.647	4.00	0.923	-	-	-		2.34	3.27	3.94	0.43	3.32	Ortho-Phosphate	mg/L	3.26	3.32	0.503	0.27	0.502	0.319	3.09
-	-	-	-	-	-	-	-	-		114	-	-	-	-	Total Organic Car	mg/L	-	-	-	-	-	-	-
5.27	3.73	4.39	4.53	5.39	2.12	-	-	-		-	-	-	-	-	Total Phosphorou	mg/L	-	-	-	-	-	-	-
															Dissolved Metals								
60.7	116	70.1	160	68.1	61.3	-	-	-		-	41	22	13	29	Dissolved Alumin	µg/L	659	32	55	< 10	< 10	16	47
103	43.6	77.4	125	92.6	103	-	-	-		-	89.4	107	99.9	100	Dissolved Calciun	mg/L	102	97.9	124	83.2	85	94.3	106
30.8	< 200	69.1	< 200	118	51.8	-	-	-		-	695	65	1,830	< 90	Dissolved Iron	µg/L	100	156	224	92	276	80	93
234	135	197	209	183	302	-	-	-		-	301	389	186	304	Dissolved Magne	mg/L	369	364	203	156	172	336	310
490	101	211	253	313	273	-	-	-		-	442	475	636	440	Dissolved Manga	µg/L	419	505	860	215	650	473	560
161	132	138	222	120	129	-	-	-		-	-	-	-	-	Dissolved Potassi	mg/L	160	113	125	43.9	51.4	125	147
1,810	1,950	1,860	2,170	1,680	1,620	-	-	-		-	1,580	1,730	541	1,520	Dissolved Sodium	mg/L	1,880	1,500	1,090	419	409	1,670	1,590
11.1	17.3	14.0	12.8	15.8	16.0	-	-	-		-	2.43	1.35	< 0.50	1.4	Antimony	µg/L	< 0.50	1.52	2.64	0.76	< 0.50	1.9	5.2
31.2	41.6	53.6	33.8	43.8	43.4	-	-	-		-	10.1	6.7	1.4	7	Arsenic	µg/L	1.1	6.8	12.6	2.1	2.4	4.2	12.2
204	79.5	111	127	134	176	-	-	-		-	316	401	130	261	Barium	µg/L	304	330	145	92	108	254	251
0.024	< 1.00	0.024	< 1.00	0.022	0.024	-	-	-		-	< 10	< 10	< 5.0	< 15	Beryllium	µg/L	< 15	< 10	< 10	< 5.0	< 5.0	< 10	< 15
1,510	1,140	1,300	1,990	1,230	1,290	-	-	-		-	1,460	1,400	540	1,360	Boron	µg/L	1,370	1,040	1,170	360	460	1,390	1,330
0.0038	< 0.200	0.0056	< 0.200	0.0075	0.0068	-	-	-		-	< 0.25	< 0.25	< 0.10	< 0.050	Cadmium	µg/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
21.4	18.7	16.7	17.6	19.0	17.1	-	-	-		-	12.3	10.3	2.9	11.3	Chromium	µg/L	1.33	9.24	11.1	1.73	2.02	9.5	12.5
6.72	2.56	2.82	4.39	3.35	5.49	-	-	-		-	6.52	6.66	1.54	6.2	Cobalt	µg/L	1.31	4.68	4.62	1.5	1.98	6.6	5.6
0.60	< 10.0	0.49	< 10.0	0.27	0.39	-	-	-		-	< 2.5	< 2.5	< 1.0	< 2.0	Copper	µg/L	6	< 1.0	< 1.0	3.5	1.4	< 2.0	< 2.0
< 0.050	< 5.00	< 0.050	< 5.00	< 0.050	< 0.050	-	-	-		-	< 1.0	< 1.0	< 1.0	< 1.0	Lead	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
57.6	35.5	54.3	69.5	52.9	76.5	-	-	-		-	< 50	< 50	< 50	< 50	Lithium	µg/L	< 50	< 50	< 50	< 50	< 50	< 50	< 50
< 0.010	< 0.010	< 0.060	< 0.010	< 0.040	< 0.020	-	-	-		-	< 0.20	< 0.20	< 0.20	< 0.20	Mercury	µg/L	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
3.24	5.48	8.35	2.68	10.4	6.88	-	-	-		-	2.7	2.1	< 1.0	1.6	Molybdenum	µg/L	11.1	1.5	1.8	15.3	3.6	2.1	1.4
20.2	15.9	15.4	21.2	14.1	16.8	-	-	-		-	15.6	10.3	6.9	12.7	Nickel	µg/L	< 5.0	11.7	14.8	9	12.8	11.3	13
1.63	< 10.0	2.12	< 10.0	2.12	2.61	-	-	-		-	< 5.0	< 5.0	< 2.0	< 1.0	Selenium	µg/L	< 1.0	4.4	6.6	3.3	< 1.0	< 0.50< 1.0	5.9
< 0.010	< 1.00	< 0.010	< 1.00	< 0.010	< 0.010	-	-	-		-	0.072	0.086	< 0.050	< 0.10	Silver	µg/L	< 0.050	0.096	< 0.050	< 0.050	< 0.050	< 0.10	< 0.10
< 0.0040	< 0.400	< 0.0040	< 0.400	< 0.0040	< 0.0040	-	-	-		-	< 0.50	< 0.50	< 0.20	< 0.10	Thallium	µg/L	< 0.20	< 0.050	< 0.050	< 0.020	< 0.020	< 0.10	< 0.10
48.0	49.6	37.8	64.0	50.7	38.9	-	-	-		-	61	57	< 50	< 50	Titanium	µg/L	58	< 50	< 50	< 50	< 50	< 50	62
2.24	< 20.0	1.68	< 20.0	2.03	1.96	-	-	-		-	-	-	-	-	Tungsten	µg/L	-	-	-	-	-	-	-
14.2	13.3	25.2	16.8	24.5	19.7	-	-	-		-	11.5	3.9	5.96	6.22	Uranium	µg/L	1.71	3.72	10.1	29.1	9.13	8.91	8.64
9.96	< 20.0	9.46	< 20.0	10.2	10.0	-	-	-		-	< 60	< 60	< 30	< 90	Vanadium	µg/L	< 90	< 60	< 60	< 30	< 30	< 60	< 90
1.3	< 100	< 1.0	< 100	< 1.0	1.6	-	-	-		-	< 10	< 10	< 5.0	< 15	Zinc	µg/L	< 15	< 10	< 10	< 5.0	< 5.0	< 10	25
< 0.010	< 1.00	< 0.010	< 1.00	< 0.010	< 0.010	-	-	-		-	-	-	-	-	Bismuth	µg/L	< 600	< 400	< 400	< 200	< 200	< 400	< 600
4,110	4,070	4,720	4,390	3,290	4,740	-	-	-		-	-	-	-	-	Phosphorous	µg/L	3,770	3,610	2,050	< 300	590	3,570	3,170
16,500	5,810	13,600	5,880	12,400	16,700	-	-	-		-	-	-	-	-	Silicon	µg/L	17,500	16,800	13,800	13,000	14,200	18,400	16,600
3,540	1,600	3,120	2,570	2,960	4,350	-	-	-		-	-	-	-	-	Strontium	µg/L	4,220	3,900	2,930	2,640	2,550	4,050	3,910
407,000	519,000	444,000	631,000	344,000	462,000	-	-	-		-	-	-	-	308,000	Sulphur	µg/L	377,000	840,000	247,000	142,000	134,000	280,000	451,000
0.067	< 5.00	0.065	7.03	0.090	0.145	-	-	-		-	-	-	-	< 2.0	Tellurium	µg/L	< 0.20	< 1.0	< 1.0	< 0.40	-	-	< 2.0
0.019	< 1.00	0.020	< 1.00	0.015	0.017	-	-	-		-	-	-	-	< 1.0	Thorium	µg/L	0.16	< 0.50	< 0.50	< 0.20	-	-	< 1.0
6.33	41.6	27.5	38.7	26.3	20.1	-	-	-		-	-	-	-	-	Tin	µg/L	< 90	< 60	< 60	< 30	< 30	< 60	< 90
22.5	11.2	15.0	15.6	17.9	23.3	-	-	-		-	-	-	-	32.9	Zirconium	µg/L	3	38.9	13.1	4	-	-	31
															Monocyclic Aromatic Hydrocarbons								
4.6	3.7	4.6	6.9	8.4	1.6	4	4	4		3.08	1.76	1.69	-	1.29	Benzene	µg/L	1.88	1.28	2.4	-	-	1.3	1.7
42.7	43.1	53.5	48.1	64.1	11.7	42	46	40		9.49	9.32	3.15	-	1.7	Ethylbenzene	µg/L	3.84	3.73	11.9	-	-	1.65	7.33
2.2	1.4	2.6	1.8	1.8	< 1.0	1	1	1		1	1.6	0.66	-	12.8	Toluene	µg/L	< 0.50	< 0.50	0.69	-	-	0.9	< 0.45
25.5	32.1	36.1	37.8	52.5	7.8	9	9	9		8.7	8.4	4.33	-	1.55	Xylenes	µg/L	2.95	3.1	7.26	-	-	2.89	5.19
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	-	-	-		-	-	-	-	-	Styrene	µg/L	-	-	-	-	-	-	-
															Polycyclic Aromatic Hydrocarbons								
4.57	2.57	2.54	2.79	4.49	1.48	-	-	-		-	1.42	0.728	0.105	0.662	Naphthalene	µg/L	0.894	0.675	1.28	0.106	< 0.050	0.66	0.545
0.596	0.408	0.489	< 0.670	< 1.06	0.199	-	-	-		-	-	-	-	-	Methylnaphthalen	µg/L	-	-	-	-	-	-	-
0.282	0.246	0.227	< 0.536	< 1.06	< 0.100	-	-	-		-	-	-	-	-	Methylnaphthalen	µg/L	-	-	-	-	-	-	-
< 0.200	< 0.200	0.225	< 1.07	< 2.13	< 0.200	-	-	-		-	< 0.050	< 0.050	< 0.050	< 0.050	Acenaphthylene	µg/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
0.457	0.175	0.187	< 0.268	< 0.532	0.109	-	-	-		-	0.367	0.444	0.078	0.403	Acenaphthene	µg/L	0.416	0.347	0.234	0.057	< 0.050	0.311	0.339
0.273	0.120	0.144	< 0.268	< 0.532	0.074	-	-	-		-	0.335	0.431	0.08	0.294	Fluorene	µg/L	0.33	0.324	0.144	< 0.050	< 0.050	0.227	0.26
0.299	0.186	0.133	< 0.536	< 1.06	< 0.100	-	-	-		-	0.08	< 0.060	< 0.050	0.071	Phenanthrene	µg/L	0.074	< 0.050	0.074	< 0.050	< 0.050	< 0.050	0.104
0.035	0.016	0.172	< 0.054	< 0.106	< 0.010	-	-	-		-	< 0.050	< 0.050	< 0.050	< 0.050	Anthracene	µg/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
< 0.050	< 0.050	< 0.050	< 0.268	< 0.532	< 0.050	-	-	-		-	< 0.20	< 0.080	< 0.050	< 0.050	Acridine	µg/L	< 0.050	0.05	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
0.085	0.088	0.087	< 0.161	< 0.319	0.032	-	-	-		-	< 0.050	< 0.050	< 0.050	< 0.050	Fluoranthene	µg/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
0.050	0.052	0.532	< 0.107	< 0.213	< 0.020	-	-	-		-	< 0.050	< 0.050	< 0.050	< 0.050	Pyrene	µg/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
< 0.010	0.019	< 0.010	< 0.054	< 0.106	< 0.010	-	-	-		-	< 0.050	< 0.050	< 0.050	< 0.050	Benz(a)anthracen	µg/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
< 0.050	< 0.050	< 0.050	< 0.268	< 0.532	< 0.050	-	-	-		-	< 0.050	< 0.050	< 0.050	< 0.050	Chrysene	µg/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
-	-	-	-	-	-	-	-	-		-	< 0.050	< 0.050	< 0.050	< 0.050	Benzo(b)fluoranth	µg/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	-
< 0.050	0.061	< 0.050	< 0.268	< 0.532	< 0.050	-	-	-		-	-	-	-	-	Benzo(b+j)fluoran	µg/L	-	-	-	-	-	-	-
< 0.050	< 0.050	< 0.050	< 0.268	< 0.532	< 0.050	-	-	-		-	< 0.050	< 0.050	< 0.050	< 0.050	Benzo(k)fluoranth	µg/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
< 0.010	< 0.010	< 0.010	< 0.054	< 0.106	< 0.010	-	-	-		-	< 0.010	< 0.010	< 0.010	< 0.010	Benzo(a)pyrene	µg/L	< 0.010	< 0.010	< 0.010	< 0.010	< 0.0050	< 0.0050	< 0.0050
< 0.050	< 0.050	< 0.050	< 0.268	< 0.532	< 0.050	-	-	-		-	< 0.050	< 0.050	< 0.050	< 0.050	Indeno(1,2,3-cd)p	µg/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
< 0.010	< 0.010	< 0.010	< 0.054	< 0.106	< 0.010	-	-	-		-	< 0.050	< 0.050	< 0.050	< 0.050	Dibenz(a,h)anthra	µg/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.0050	< 0.0050	< 0.0050
< 0.050	< 0.050	< 0.050	< 0.268	< 0.532	< 0.050	-	-	-		-	< 0.050	< 0.050	< 0.050	< 0.050	Benzo(g,h,i)peryl	µg/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
< 0.100	< 0.100	< 0.100	< 0.536	< 1.06	< 0.100	-	-	-		-	-	-	-	-	Chloronaphthalen	µg/L	-	-	-	-	-	-	-
< 0.050	< 0.050	< 0.115	< 0.268	< 0.532	< 0.050	-	-	-		-	< 0.050	< 0.050	< 0.050	< 0.050	Quinoline	µg/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
															Volatile Organic Compounds								
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1		< 1.0	< 1.0	-	-	< 1.0	Bromodichlorome	µg/L	< 1.0	< 1.0	< 1.0	-	-	< 1.0	< 1.0
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1		< 1.0	< 1.0	-	-	< 1.0	Bromoform	µg/L	< 1.0	< 1.0	< 1.0	-	-	< 1.0	< 1.0
< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 1	< 1	< 1		< 0.50	< 0.50	-	-	< 0.50	Carbon Tetrachlo	µg/L	< 0.50	< 0.50	< 0.50	-	-	< 0.50	< 0.50
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	3	3	3		3.8	3.6	-	-	1.5	Chlorobenzene	µg/L	2.4	2.7	1.2	-	-	3.4	1.7

Table 5: Historical Summary of Analytical Results For Leachate

					Sample Location		P1 Leachate MH		P1 Leachate MH		P1 Leachate MH 2						S Leachate Wet Well							S
P1 LEACHATE MH-20171204	P1 Leachate MH	P1 Leachate MH	P1 Leachate MH-20180524	P1 Leachate MH	Sample ID		P1 Leachate MH-20180816	P1 Leachate MH	P1 Leachate MH	P1 Leachate MH-20190315							S LEACHATE WET WELL-20131211	S LEACHATE WET WELL-20140408	S LEACHATE WET WELL-20140610	S LEACHATE WET WELL-20150615	S LEACHATE WET WELL-20150915	S LEACHATE WET WELL-20151203	S LEACHATE WET WELL-20160315	
2017 12 04	2018 03 15	2018 05 24	2018 05 24	2018 08 16	Sample Date (yyyy mm dd)		2018 08 16	2018 11 08	2019 03 15	2019 03 15	2020 09 29	2020 11 16	2021 03 18	2021 06 18	2021 09 16	2021 10 22	2013 12 11	2014 04 08	2014 06 10	2015 06 15	2015 09 15	2015 12 03	2016 03 15	Sample Da
					Parameter	Units	Analytical Results																	Parameter
					Dissolved Inorganics																			**Dissolved Inorga**
88,900	59,400	67,700	67,700	61,600	Ammonia, Total (a	µg/L	61,600	60,700	43,000	43,000	462,000	110,000	433,000	175,000	892,000	935,000	128,000	65,400	46,500	189,000	255,000	224,000	99,200	Ammonia, Total (a
< 250	< 250	< 1,000	< 1,000	< 100	Nitrate (as N)	µg/L	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 500	< 250	< 250	< 500	< 500	< 500	< 250	Nitrate (as N)
-	< 250	< 1,000	-	< 100	Nitrite (as N)	µg/L	-	< 100	< 100	-	< 100	191	543	< 100	< 100	< 100	-	-	-	-	-	-	-	Nitrite (as N)
428	294	270	270	329	Chloride	mg/L	329	244	238	238	976	849	831	430	1,950	2,010	909	524	352	803	924	886	598	Chloride
1,100	< 2,500	1,140	1,140	1,600	Fluoride	µg/L	1,600	1,770	1,590	1,590	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	2,200	< 1,000	668	< 2,000	< 2,000	< 2,000	< 1,000	Fluoride
1,090	808	662	662	868	Sulfate	mg/L	868	795	661	661	326	261	< 10.0	686	< 10.0	< 10.0	1,860	1,190	533	2,370	2,310	1,620	857	Sulfate
4,130	2,370	3,390	3,390	3,710	Total Alkalinity	mg/L	3,710	3,360	2,500	2,500	5,110	4,600	6,580	2,920	10,100	10,600	-	3,250	2,990	7,730	8,640	6,960	4,450	Total Alkalinity
-	2,370	3,390	3,390	3,710	Alkalinity, Bicarbo	mg/L	3,710	3,360	2,500	2,500	5,110	4,600	6,580	2,920	10,100	10,600	-	-	-	-	8,640	6,960	4,450	Alkalinity, Bicarbo
-	< 1.0	< 1.0	< 1.0	< 1.0	Alkalinity, Carbona	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	Alkalinity, Carbona
-	< 1.0	< 1.0	< 1.0	< 1.0	Alkalinity, Hydroxi	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	Alkalinity, Hydroxi
-	< 1.0	< 1.0	-	< 1.0	Alkalinity, Phenolp	mg/L	-	< 1.0	< 1.0	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	-	-	-	-	-	-	-	Alkalinity, Phenolp
3.1	< 0.10	< 10.0	< 10.0	< 10.0	Bromide	mg/L	< 10.0	< 10.0	1.39	1.39	< 1.00	32.2	23.0	1.85	< 10.0	< 10.0	9.1	4.6	3	7.1	8.3	6.9	4.7	Bromide
-	28.9	29.5	-	36.5	Sulfide	mg/L	-	26.2	18.9	-	< 2.00	3.38	5.13	13.8	2.78	0.632	-	-	-	-	-	-	-	Sulfide
-	49.8	40.8	-	42.5	Biochemical Oxyg	mg/L	-	36.1	38.7	-	8,120	2,770	1,550	< 354	2,130	1,280	-	-	-	-	-	-	-	Biochemical Oxyg
444	294	212	212	243	Chemical Oxygen	mg/L	243	223	184	184	13,600	3,910	3,840	1,180	4,560	3,990	1,090	676	398	982	1,130	996	705	Chemical Oxygen
-	2.05	1.48	-	2.22	Phosphate	mg/L	-	0.975	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Phosphate
3.76	-	-	1.48	-	Ortho-Phosphate	mg/L	2.22	-	1.10	1.1	8.27	10.8	11.0	< 0.0500	3.95	2.91	7.66	3.37	3.05	6.68	8.29	7.03	3.71	Ortho-Phosphate
-	-	-	-	-	Total Organic Car	mg/L	-	-		-	-	-	-	-	-	-	273	-	-	-	-	-	-	Total Organic Car
-	2.53	2.44	-	3.38	Total Phosphorou	mg/L	-	2.36	2.15	-	29.1	20.6	17.3	3.36	15.2	18.9	-	-	-	-	-	-	-	Total Phosphorou
					Dissolved Metals																			**Dissolved Metals**
49.7	40.3	31.9	31.9	24.7	Dissolved Alumin	µg/L	24.7	22.9	14.6	14.6	67.4	101	169	24.1	191	149	-	96	103	82	77	66	62	Dissolved Alumin
95	109	122	122	106	Dissolved Calcium	mg/L	106	107	104	104	1,030	691	942	278	548	466	-	60.6	64.2	94.8	78.8	73.5	79.6	Dissolved Calcium
53	74	90	90	105	Dissolved Iron	µg/L	105	69	87	87	14,400	1,210	7,460	1,690	37,300	20,400	-	198	< 120	< 150	< 300	< 150	70	Dissolved Iron
344	200	378	378	326	Dissolved Magnes	mg/L	326	342	363	363	239	278	375	256	413	457	-	178	294	319	374	344	250	Dissolved Magnes
455	562	705	705	717	Dissolved Mangar	µg/L	717	593	661	661	14,300	8,140	13,500	2,920	7,660	7,450	-	251	335	320	297	308	460	Dissolved Mangar
175	157	117	117	105	Dissolved Potassi	mg/L	105	104	91.1	91.1	566	588	487	208	985	964	-	-	-	-	426	364	224	Dissolved Potassi
1,960	1,440	1,230	1,230	1,270	Dissolved Sodium	mg/L	1,270	1,210	1,080	1,080	1,190	972	896	834	1,770	1,810	-	1,850	3,100	3,590	4,490	3,530	1,820	Dissolved Sodium
2.53	4.88	2.25	2.25	2.57	Antimony	µg/L	2.57	2.08	0.53	0.53	17.2	10.9	13.1	4.30	20.3	23.1	-	3.9	15.5	19	27.4	16.1	7.8	Antimony
8.25	15.2	7.41	7.41	11.4	Arsenic	µg/L	11.4	7.73	2.72	2.72	36.9	30.9	27.2	5.77	33.5	54.8	-	17.7	46.7	60.9	75.3	46.9	21.7	Arsenic
258	128	382	382	344	Barium	µg/L	344	288	268	268	80.1	72.7	366	138	316	219	-	80	166	247	270	224	125	Barium
< 0.50	< 0.10	< 0.10	< 0.10	< 0.10	Beryllium	µg/L	< 0.10	< 0.10	< 0.10	< 0.10	0.010	< 1.00	0.025	0.015	0.052	0.059	-	< 10	< 20	< 25	< 50	< 25	< 10	Beryllium
1,610	1,270	1,090	1,090	1,090	Boron	µg/L	1,090	1,110	1,280	1,280	4,720	3,210	7,480	2,880	11,600	12,100	-	1,650	2,170	2,670	3,300	3,050	1,980	Boron
< 0.025	< 0.010	< 0.010	< 0.010	< 0.010	Cadmium	µg/L	< 0.010	< 0.010	< 0.010	< 0.010	0.0254	< 0.200	0.0582	0.0119	0.0614	0.0318	-	< 0.50	< 0.50	< 0.10	< 0.10	< 0.10	< 0.050	Cadmium
14.9	10.3	9.73	9.73	11.0	Chromium	µg/L	11	8.15	5.07	5.07	95.7	104	108	29.9	235	242	-	16.6	26.2	43.2	55.1	44.4	18.1	Chromium
5.7	4.06	5.62	5.62	5.61	Cobalt	µg/L	5.61	5.13	4.95	4.95	51.5	16.2	18.6	5.85	37.2	47.2	-	6.4	7.2	13.8	15.5	14.9	7.6	Cobalt
< 1.0	1.19	< 0.40	< 0.40	< 0.40	Copper	µg/L	< 0.40	< 0.40	< 0.40	< 0.40	1.86	< 10.0	2.22	0.24	2.48	1.98	-	< 5.0	< 5.0	< 4.0	< 4.0	< 4.0	< 2.0	Copper
< 0.25	< 0.20	< 0.20	< 0.20	0.20	Lead	µg/L	0.2	< 0.20	< 0.20	< 0.20	0.239	< 5.00	0.468	< 0.050	0.586	0.262	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	Lead
41.8	37.0	37.3	37.3	39.8	Lithium	µg/L	39.8	33.9	42.0	42	233	153	199	98.8	305	390	-	< 50	75	< 50	< 100	< 50	50	Lithium
< 0.25	< 0.010	< 0.010	< 0.010	< 0.020	Mercury	µg/L	< 0.020	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.040	< 0.010	< 0.040	0.057	-	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	Mercury
1.27	1.76	1.81	1.81	1.67	Molybdenum	µg/L	1.67	2.00	1.23	1.23	4.62	2.92	2.91	7.04	5.72	6.89	-	3.2	4.3	3.1	3.3	3	2.6	Molybdenum
14.3	11.1	11.5	11.5	11.7	Nickel	µg/L	11.7	9.42	9.33	9.33	204	128	130	46.9	273	354	-	26.8	30.2	36	40	37	23.7	Nickel
3.5	< 0.50	< 0.50	< 0.50	0.52	Selenium	µg/L	0.52	< 0.50	< 0.50	< 0.50	3.34	< 10.0	2.48	1.05	4.46	13.7	-	< 10	< 10	11	3.6	2.1	8.3	Selenium
0.086	< 0.050	< 0.050	< 0.050	< 0.050	Silver	µg/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.010	< 1.00	0.011	< 0.010	0.013	< 0.010	-	< 0.10	< 0.10	< 0.20	< 0.20	< 0.20	< 0.10	Silver
< 0.050	< 0.020	< 0.020	< 0.020	< 0.020	Thallium	µg/L	< 0.020	< 0.020	< 0.020	< 0.020	0.0068	< 0.400	< 0.0040	< 0.0040	< 0.0040	< 0.0040	-	< 1.0	< 1.0	< 0.20	< 0.20	< 0.20	< 0.10	Thallium
55.1	49.1	38.5	38.5	42.7	Titanium	µg/L	42.7	33.0	20.4	20.4	11.5	45.6	66.4	11.0	164	150	-	62	84	129	150	132	52	Titanium
-	1.4	2.7	-	2.5	Tungsten	µg/L	-	2.2	1.6	-	1.16	< 20.0	2.80	0.97	6.17	8.01	-	-	-	-	-	-	-	Tungsten
8.34	7.02	7.06	7.06	6.98	Uranium	µg/L	6.98	5.96	4.96	4.96	0.702	3.19	2.18	25.7	0.935	1.08	-	23.8	13.4	2.88	2.61	3.12	8.51	Uranium
18.9	10.8	18.3	18.3	18.3	Vanadium	µg/L	18.3	15.3	11.1	11.1	8.45	< 20.0	38.7	11.7	83.3	90.1	-	< 60	< 120	< 150	< 300	< 150	< 60	Vanadium
< 5.0	< 4.0	< 4.0	< 4.0	< 4.0	Zinc	µg/L	< 4.0	< 4.0	< 4.0	< 4.0	59.9	< 100	30.8	2.5	39.3	24.4	-	< 10	< 20	< 25	< 50	< 25	< 10	Zinc
< 0.25	< 0.10	< 0.10	< 0.10	< 0.10	Bismuth	µg/L	< 0.10	< 0.10	< 0.10	< 0.10	0.023	< 1.00	0.017	< 0.010	0.022	0.015	-	-	-	-	< 2,000	< 1,000	< 400	Bismuth
4,580	2,850	2,810	2,810	3,530	Phosphorous	µg/L	3,530	2,670	2,410	2,410	2,470	14,500	23,100	1,990	13,900	13,900	-	-	-	-	9,000	7,100	3,890	Phosphorous
18,200	17,800	23,000	23,000	21,000	Silicon	µg/L	21,000	21,000	20,300	20,300	33,600	23,400	42,100	21,300	34,400	30,600	-	-	-	-	17,300	16,200	12,000	Silicon
3,690	2,980	5,410	5,410	4,250	Strontium	µg/L	4,250	4,260	4,100	4,100	5,490	4,530	7,300	4,000	5,260	5,160	-	-	-	-	3,390	3,020	2,360	Strontium
528,000	358,000	329,000	-	326,000	Sulphur	µg/L	-	317,000	278,000	-	182,000	160,000	21,100	258,000	26,800	24,900	-	-	-	2,160,000	1,270,000	1,780,000	603,000	Sulphur
< 1.0	< 0.50	< 0.50	< 0.50	< 0.50	Tellurium	µg/L	< 0.50	< 0.50	< 0.50	< 0.50	0.159	< 5.00	0.201	< 0.050	0.230	0.422	-	-	-	< 4.0	< 4.0	< 4.0	< 2.0	Tellurium
< 0.50	< 0.10	< 0.10	< 0.10	< 0.10	Thorium	µg/L	< 0.10	< 0.10	< 0.10	< 0.10	0.020	< 1.00	0.033	< 0.010	0.057	0.119	-	-	-	< 2.0	< 2.0	< 2.0	< 1.0	Thorium
4.2	5.42	4.37	4.37	4.63	Tin	µg/L	4.63	3.83	1.12	1.12	2.63	< 5.00	4.04	0.945	11.0	12.4	-	-	-	-	< 300	< 150	< 60	Tin
34.5	16.2	45.1	45.1	42.0	Zirconium	µg/L	42	34.8	25.8	25.8	7.22	12.9	13.6	3.49	41.2	51.3	-	-	-	46.4	60.9	46.2	19.6	Zirconium
					Monocyclic Aromatic Hydrocarbons																			**Monocyclic Arom**
2.4	1.6	1.0	1	1.3	Benzene	µg/L	1.3	0.7	0.5	0.5	5.8	7.0	8.1	1.9	8.4	5.2	11.9	2.08	7.19	7.9	8.08	5.73	3.85	Benzene
12.5	10.5	< 1.0	< 1.0	5.9	Ethylbenzene	µg/L	5.9	< 1.0	< 1.0	< 1.0	25.0	29.1	39.2	6.3	39.3	33.3	123	26.2	70.4	44.4	43.9	42.1	27.2	Ethylbenzene
0.57	< 1.0	< 1.0	< 1.0	< 1.0	Toluene	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	268	274	318	70.5	200	120	18.6	4.61	6.26	2.36	2.08	1.52	1.49	Toluene
8.59	6.0	< 2.0	< 2.0	4.5	Xylenes	µg/L	4.5	< 2.0	< 2.0	< 2.0	45.0	57.0	66.5	9.7	51.9	40.8	121	23.7	60.1	43.7	40.7	33.9	18.9	Xylenes
-	< 1.0	< 1.0	-	< 1.0	Styrene	µg/L	-	< 1.0	< 1.0	-	28.4	96.9	36.5	3.8	25.4	11.8	-	-	-	-	-	-	-	Styrene
					Polycyclic Aromatic Hydrocarbons																			**Polycyclic Aroma**
0.806	1.04	1.05	1.05	0.607	Naphthalene	µg/L	0.607	0.254	0.313	0.313	1.12	1.19	0.894	0.283	< 1.32	0.591	-	3.6	4.91	10.8	3.41	11.8	4.43	Naphthalene
-	0.544	0.323	-	0.151	Methylnaphthalen	µg/L	-	< 0.100	< 0.116	-	< 0.100	0.105	< 0.100	< 0.100	< 0.658	< 0.100	-	-	-	-	-	-	-	Methylnaphthalen
-	0.687	0.496	-	< 0.100	Methylnaphthalen	µg/L	-	< 0.100	< 0.100	-	0.135	0.165	0.147	< 0.100	< 0.658	< 0.100	-	-	-	-	-	-	-	Methylnaphthalen
< 0.010	< 0.200	< 0.200	< 0.200	< 0.200	Acenaphthylene	µg/L	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200	< 1.32	< 0.200	-	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	Acenaphthylene
0.331	0.264	0.389	0.389	0.369	Acenaphthene	µg/L	0.369	0.213	0.321	0.321	< 0.050	< 0.050	< 0.050	0.094	< 0.329	< 0.050	-	0.358	0.42	0.454	0.504	0.457	0.465	Acenaphthene
0.237	0.166	0.263	0.263	0.279	Fluorene	µg/L	0.279	0.185	0.268	0.268	< 0.050	< 0.050	< 0.050	< 0.050	< 0.329	< 0.050	-	0.225	0.212	0.235	0.333	0.236	0.27	Fluorene
0.114	0.122	< 0.100	< 0.100	< 0.100	Phenanthrene	µg/L	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.100	< 0.658	< 0.100	-	0.272	0.261	0.205	0.157	0.185	0.189	Phenanthrene
0.021	< 0.010	0.019	0.019	0.017	Anthracene	µg/L	0.017	< 0.010	0.015	0.015	< 0.010	< 0.010	< 0.010	< 0.010	< 0.066	< 0.010	-	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	Anthracene
< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	Acridine	µg/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.092	0.082	0.202	< 0.050	< 0.329	0.205	-	< 0.080	< 0.070	< 0.050	< 0.050	< 0.070	< 0.050	Acridine
0.027	< 0.030	< 0.030	< 0.030	0.043	Fluoranthene	µg/L	0.043	< 0.040	0.072	0.072	< 0.030	< 0.030	< 0.030	< 0.030	< 0.197	< 0.030	-	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	Fluoranthene
0.022	0.029	0.029	0.029	0.037	Pyrene	µg/L	0.029	< 0.020	0.037	0.037	< 0.020	< 0.020	< 0.020	< 0.020	< 0.231	< 0.020	-	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	Pyrene
< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	Benz(a)anthracen	µg/L	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.066	< 0.010	-	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	Benz(a)anthracen
< 0.010	< 0.050	< 0.050	< 0.050	< 0.050	Chrysene	µg/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.329	< 0.050	-	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	Chrysene
-	-	-	-	-	Benzo(b)fluoranth	µg/L	-	-	-	-	-	-	-	-	-	-	-	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	Benzo(b)fluoranth
-	< 0.050	< 0.050	-	< 0.050	Benzo(b+j)fluoran	µg/L	-	< 0.050	< 0.050	-	< 0.050	0.053	< 0.050	< 0.050	< 0.329	< 0.050	-	-	-	-	-	-	-	Benzo(b+j)fluoran
< 0.010	< 0.050	< 0.050	< 0.050	< 0.050	Benzo(k)fluoranth	µg/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.329	< 0.050	-	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	Benzo(k)fluoranth
< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	Benzo(a)pyrene	µg/L	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.023	< 0.066	< 0.010	-	< 0.050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	Benzo(a)pyrene
< 0.010	< 0.050	< 0.050	< 0.050	< 0.050	Indeno(1,2,3-cd)p	µg/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.329	< 0.050	-	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	Indeno(1,2,3-cd)p
< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	Dibenz(a,h)anthra	µg/L	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.066	< 0.010	-	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	Dibenz(a,h)anthra
< 0.010	< 0.050	< 0.050	-	< 0.050	Benzo(g,h,i)peryle	µg/L	-	< 0.050	< 0.050	-	< 0.050	< 0.050	< 0.050	< 0.050	< 0.329	< 0.050	-	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	Benzo(g,h,i)peryle
-	< 0.100	< 0.100	-	< 0.100	Chloronaphthalen	µg/L	-	< 0.100	< 0.100	-	< 0.100	< 0.100	< 0.100	< 0.100	< 0.658	< 0.100	-	-	-	-	-	-	-	Chloronaphthalen
< 0.060	< 0.050	< 0.050	< 0.050	< 0.050	Quinoline	µg/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.456	0.253	< 0.182	< 0.133	0.897	0.400	-	< 0.050	< 0.050	< 0.20	< 0.080	< 0.050	< 0.050	Quinoline
					Volatile Organic Compounds																			**Volatile Organic**
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	Bromodichlorome	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	-	< 1.0	< 1.0	< 1.0	< 1.0	Bromodichloromet
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	Bromoform	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	-	< 1.0	< 1.0	< 1.0	< 1.0	Bromoform
< 0.50	< 0.5	< 0.5	< 0.5	< 0.5	Carbon Tetrachlo	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 1.0	< 0.50	-	< 0.50	< 0.50	< 0.50	< 0.50	Carbon Tetrachlo
2.3	< 1.0	2.6	2.6	< 2.9	Chlorobenzene	µg/L	< 2.9	3.1	3.9	3.9	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	-	2.3	2.1	1.2	< 1.0	Chlorobenzene

Table 5: Historical Summary of Analytical Results For Leachate

Sample Location	S Leachate Wet Well											
Sample ID	S LEACHATE WET WELL-20160623	S LEACHATE WET WELL-20160915	S LEACHATE WET WELL-20161117	S LEACHATE WET WELL-20170914	S LEACHATE WET WELL-20171204	S Leachate Wet Well	S Leachate Wet Well	S Leachate Wet Well-20180524	S Leachate Wet Well	S Leachate Wet Well-20180816	S Leachate Wet Well	S Leachate Wet Well-20181108
ate (yyyy mm dd)	2016 06 23	2016 09 15	2016 11 17	2017 09 14	2017 12 04	2018 03 15	2018 05 24	2018 05 24	2018 08 16	2018 08 16	2018 11 08	2018 11 08
Units		Analytical Results										
nics												
µg/L	119,000	192,000	142,000	90,800	71,800	71,600	54,500	54,500	56,200	56,200	48,800	48,800
µg/L	< 250	< 500	< 100	< 500	< 500	< 250	< 100	< 100	< 100	< 100	< 100	< 100
µg/L	-	-	-	-	-	< 250	< 100	-	< 100	-	< 100	-
mg/L	613	890	168	888	903	815	523	523	871	871	980	980
µg/L	< 1,000	< 2,000	< 400	< 10,000	< 2,000	< 2,500	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
mg/L	1,380	2,920	252	1,950	2,040	2,080	1,440	1,440	2,240	2,240	2,990	2,990
mg/L	4,030	9,780	24,600	5,680	6,440	5,380	3,890	3,890	5,470	5,470	6,690	6,690
mg/L	-	-	-	-	-	5,380	3,890	3,890	5,470	5,470	6,690	6,690
mg/L	-	-	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
mg/L	-	-	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
mg/L	-	-	-	-	-	< 1.0	< 1.0	-	< 1.0	-	< 1.0	-
mg/L	4.5	8.1	1.3	7.5	7	< 2.50	< 1.00	< 1.00	< 10.0	< 10.0	< 10.0	< 10.0
mg/L	-	-	-	-	-	87.9	63.0	-	93.8	-	85.4	-
mg/L	-	-	-	-	-	201	174	-	227	-	329	-
mg/L	686	1,110	967	1,110	1,020	784	711	711	826	826	988	988
mg/L	-	-	-	-	-	6.91	6.35	-	6.24	-	6.58	-
mg/L	3.98	9.72	22	7.43	8.23	-	-	6.35	-	6.24	-	6.58
mg/L	-	-	-	-	-	-	-	-	-	-	-	-
mg/L	-	-	-	-	-	7.35	7.43	-	9.07	-	8.24	-
;												
µg/L	91	99	100	199	170	172	154	154	187	187	177	177
mg/L	142	68.3	88.1	73.4	57.8	101	63.1	63.1	70.9	70.9	47.5	47.5
µg/L	< 90	< 300	< 120	< 150	< 100	89	59	59	69	69	56	56
mg/L	276	413	313	302	312	344	187	187	228	228	248	248
µg/L	538	207	364	433	300	581	451	451	273	273	180	180
mg/L	270	370	402	307	285	280	223	223	276	276	313	313
mg/L	2,250	5,330	2,970	3,560	3,680	3,530	2,100	2,100	3,130	3,130	4,450	4,450
µg/L	10	34.7	12.4	18	8	25.9	14.8	14.8	26.8	26.8	26.5	26.5
µg/L	29.7	83.9	35.9	45.2	32.7	73.5	42.1	42.1	87.4	87.4	91.3	91.3
µg/L	181	250	212	193	152	196	132	132	179	179	133	133
µg/L	< 15	< 50	< 20	< 25	< 1.0	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
µg/L	2,210	2,900	3,120	2,490	2,250	2,790	1,610	1,610	2,090	2,090	1,860	1,860
µg/L	< 0.050	< 0.10	< 0.050	< 0.050	< 0.050	0.014	0.011	0.011	0.015	0.015	0.013	0.013
µg/L	21.2	58.3	30.1	28.5	29	36.6	21.3	21.3	40.1	40.1	44.3	44.3
µg/L	7.7	13.8	13.3	6.6	5.7	7.37	4.62	4.62	5.98	5.98	4.93	4.93
µg/L	< 2.0	< 4.0	< 2.0	< 2.0	3.4	1.27	< 0.40	< 0.40	1.10	1.1	0.48	0.48
µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	0.26	0.26
µg/L	55	< 100	58	75	71	96.5	63.6	63.6	69.7	69.7	55.8	55.8
µg/L	< 0.20	< 0.20	< 0.20	< 0.20	< 0.25	< 0.010	< 0.010	< 0.010	< 0.020	< 0.020	< 0.200	< 0.200
µg/L	1.9	4.1	2.4	3.4	2.7	4.76	3.71	3.71	5.46	5.46	4.81	4.81
µg/L	25	41	33.8	32.8	30.7	28.6	22.3	22.3	30.6	30.6	32.2	32.2
µg/L	1.1	2.1	6.19	14.5	18.3	1.28	0.79	0.79	1.69	1.69	1.27	1.27
µg/L	< 0.10	< 0.20	< 0.10	< 0.10	0.14	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	0.053	0.053
µg/L	< 0.10	< 0.20	< 0.10	< 0.10	< 0.10	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
µg/L	55	210	103	77	61.4	130	67.6	67.6	119	119	101	101
µg/L	-	-	-	-	-	3.5	3.7	-	5.2	-	4.9	-
µg/L	8.23	3.24	3.06	15.4	9.8	22.0	17.1	17.1	22.7	22.7	39.2	39.2
µg/L	< 90	< 300	< 120	< 150	20.1	24.1	19.3	19.3	28.1	28.1	25.5	25.5
µg/L	< 15	< 50	< 20	< 25	< 10	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
µg/L	< 600	< 2,000	< 800	< 1,000	< 0.50	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
µg/L	4,510	10,400	6,100	7,600	9,180	11,100	7,970	7,970	10,300	10,300	9,850	9,850
µg/L	14,300	17,300	16,600	12,400	12,400	20,900	12,900	12,900	15,900	15,900	13,000	13,000
µg/L	4,180	3,530	3,200	2,870	2,440	4,270	2,490	2,490	3,150	3,150	2,250	2,250
µg/L	496,000	3,380,000	752,000	1,590,000	1,460,000	1,270,000	666,000	-	995,000	-	1,420,000	-
µg/L	< 2.0	-	-	< 2.0	< 2.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
µg/L	< 1.0	-	-	< 1.0	< 1.0	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
µg/L	< 90	< 300	< 120	< 150	28.6	56.6	30.6	30.6	67.0	67	65.2	65.2
µg/L	20.5	-	-	37.3	37.3	52.2	27.4	27.4	51.3	51.3	52.3	52.3
atic Hydrocarbons												
µg/L	-	-	6.16	6.5	7.77	6.1	4.8	4.8	7.9	7.9	8.7	8.7
µg/L	-	-	19.5	56.4	68	71.6	80.3	80.3	74.6	74.6	61.6	61.6
µg/L	-	-	22.3	1.73	1.82	1.5	4.0	4	3.2	3.2	2.3	2.3
µg/L	-	-	24.6	40.7	50.9	47.9	60.1	60.1	61.4	61.4	95.9	95.9
µg/L	-	-	-	-	-	< 1.0	< 1.0	-	< 1.0	-	< 1.0	-
atic Hydrocarbons												
µg/L	2.99	9.37	5.82	3.36	3.22	3.56	3.37	3.37	5.02	5.02	3.44	3.44
µg/L	-	-	-	-	-	1.11	0.897	-	0.967	-	0.548	-
µg/L	-	-	-	-	-	0.946	0.800	-	0.476	-	0.430	-
µg/L	< 0.050	< 0.050	< 0.050	< 0.050	0.011	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200
µg/L	0.351	0.368	0.384	0.389	0.42	0.422	0.397	0.397	0.438	0.438	0.276	0.276
µg/L	0.261	0.218	0.196	0.299	0.29	0.245	0.242	0.242	0.312	0.312	0.205	0.205
µg/L	0.268	0.203	0.161	0.327	0.34	0.302	0.333	0.333	0.464	0.464	0.365	0.365
µg/L	< 0.050	< 0.050	< 0.050	< 0.050	0.028	0.023	0.031	0.031	< 0.010	< 0.010	< 0.010	< 0.010
µg/L	< 0.070	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
µg/L	< 0.050	< 0.050	< 0.050	0.065	0.07	< 0.030	< 0.030	< 0.030	0.129	0.129	0.192	0.192
µg/L	< 0.050	< 0.050	< 0.050	0.064	0.065	0.032	0.039	0.039	0.104	0.104	0.089	0.089
µg/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.020	< 0.010	< 0.010	< 0.010	0.019	0.019	0.021	0.021
µg/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.020	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
µg/L	< 0.050	< 0.050	< 0.050	-	-	-	-	-	-	-	-	-
µg/L	-	-	-	-	-	< 0.050	< 0.050	-	< 0.050	-	< 0.050	-
µg/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.010	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
µg/L	< 0.010	0.0113	< 0.0050	0.005	0.0052	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
µg/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.010	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
µg/L	< 0.050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
µg/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.010	< 0.050	< 0.050	-	< 0.050	-	< 0.050	-
µg/L	-	-	-	-	-	< 0.100	< 0.100	-	< 0.100	-	< 0.100	-
µg/L	< 0.090	< 0.050	< 0.20	< 0.070	< 0.090	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Compounds												
µg/L	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
µg/L	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
µg/L	-	-	< 0.50	< 0.50	< 0.50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
µg/L	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

	Sample Location	S Leachate Wet Well										
	Sample ID	S Leachate Wet Well	S Leachate Wet Well-20190315	S Leachate Wet Well	S Leachate Wet Well-20190603	S Leachate Wet Well	S Leachate Wet Well-20190903	S Leachate Wet Well	S Leachate Wet Well-20191031	S Leachate Wet Well	S Leachate Wet Well	S Leachate Wet Well
	Sample Date (yyyy mm dd)	2019 03 15	2019 03 15	2019 06 03	2019 06 03	2019 09 03	2019 09 03	2019 10 31	2019 10 31	2020 03 05	2020 06 03	2020 09 29
Parameter	Units		Analytical Results									
Dissolved Inorganics												
Ammonia, Total (a	µg/L	17,800	17,800	28,600	28,600	25,900	25,900	59,500	59,500	25,000	28,600	103,000
Nitrate (as N)	µg/L	< 100	< 100	< 1,000	< 1,000	< 1,000	< 1,000	< 100	< 100	< 10	< 100	< 100
Nitrite (as N)	µg/L	< 100	-	< 100	-	< 1,000	-	< 100	-	< 10	< 100	< 100
Chloride	mg/L	698	698	587	587	949	949	908	908	487	540	673
Fluoride	µg/L	< 1,000	< 1,000	< 1,000	< 1,000	< 10,000	< 10,000	< 1,000	< 1,000	490	< 1,000	< 1,000
Sulfate	mg/L	1,950	1,950	1,570	1,570	2,500	2,500	2,370	2,370	1,200	1,350	1,260
Total Alkalinity	mg/L	3,870	3,870	3,390	3,390	7,300	7,300	7,670	7,670	2,570	2,630	4,400
Alkalinity, Bicarbo	mg/L	3,650	3,650	3,260	3,260	7,300	7,300	7,190	7,190	2,550	2,610	4,400
Alkalinity, Carbon	mg/L	222	222	123	123	< 1.0	< 1.0	484	484	17.4	22.7	< 1.0
Alkalinity, Hydroxi	mg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Alkalinity, Phenolp	mg/L	111	-	61.6	-	< 1.0	-	242	-	8.7	11.4	< 1.0
Bromide	mg/L	3.16	3.16	< 10.0	< 10.0	< 10.0	< 10.0	< 1.00	< 1.00	2.57	2.73	1.77
Sulfide	mg/L	46.5	-	60.9	-	139	-	178	-	63.9	49.1	95.7
Biochemical Oxyg	mg/L	195	-	114	-	323	-	354	-	111	174	-
Chemical Oxygen	mg/L	646	646	617	617	935	935	865	865	512	585	890
Phosphate	mg/L	-	-	2.66	-	-	-	-	-	-	-	-
Ortho-Phosphate	mg/L	5.40	5.4	-	2.66	8.72	8.72	1.91	1.91	3.59	3.67	3.93
Total Organic Car	mg/L	-	-	-	-	-	-	-	-	-	-	-
Total Phosphorou	mg/L	6.08	-	5.94	-	9.99	-	9.99	-	3.84	5.24	6.36
Dissolved Metals												
Dissolved Alumin	µg/L	124	124	129	129	186	186	149	149	66.7	91.7	107
Dissolved Calciu	mg/L	54.5	54.5	59.0	59	43.2	43.2	61.4	61.4	38.6	< 0.04	79
Dissolved Iron	µg/L	46	46	64	64	70	70	87.4	87.4	32.4	38.2	40.9
Dissolved Magne	mg/L	220	220	174	174	202	202	217	217	143	134	190
Dissolved Manga	µg/L	215	215	228	228	133	133	192	192	174	211	344
Dissolved Potass	mg/L	195	195	203	203	255	255	289	289	141	158	245
Dissolved Sodium	mg/L	2,770	2,770	2,300	2,300	4,380	4,380	4,120	4,120	1,700	1,820	2,770
Antimony	µg/L	11.6	11.6	6.14	6.14	13.7	13.7	33.9	33.9	6.82	8.65	15.1
Arsenic	µg/L	33.0	33	28.3	28.3	40.1	40.1	134	134	26.2	35.8	51.7
Barium	µg/L	85.6	85.6	89.2	89.2	145	145	177	177	56.7	77.7	157
Beryllium	µg/L	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.057	0.057	0.020	< 0.010	0.035
Boron	µg/L	1,390	1,390	1,470	1,470	2,140	2,140	1,740	1,740	1,160	< 2.0	2,070
Cadmium	µg/L	< 0.010	< 0.010	< 0.010	< 0.010	0.014	0.014	0.0119	0.0119	0.0042	0.0056	0.0079
Chromium	µg/L	18.2	18.2	17.8	17.8	54.2	54.2	52.5	52.5	13.2	14.3	33.9
Cobalt	µg/L	2.72	2.72	2.98	2.98	5.52	5.52	7.47	7.47	2.47	2.57	7.88
Copper	µg/L	0.63	0.63	0.60	0.6	0.45	0.72	0.48	0.48	0.42	0.57	0.25
Lead	µg/L	< 0.20	< 0.20	< 0.20	< 0.20	0.20	0.2	0.157	0.157	0.068	< 0.050	0.106
Lithium	µg/L	66.1	66.1	52.4	52.4	63.0	63	54.2	54.2	36.9	< 0.050	55.5
Mercury	µg/L	< 0.100	< 0.100	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Molybdenum	µg/L	4.22	4.22	2.42	2.42	5.80	5.8	6.04	6.04	3.23	2.67	2.71
Nickel	µg/L	17.8	17.8	17.3	17.3	36.9	36.9	34.1	34.1	12.5	13.5	23.7
Selenium	µg/L	0.76	0.76	0.78	0.78	26.6	26.6	1.25	1.25	0.73	< 0.10	0.89
Silver	µg/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	0.014	0.014	< 0.010	< 0.010	< 0.010
Thallium	µg/L	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.0040	< 0.0040	< 0.0040	< 0.0040	0.0050
Titanium	µg/L	48.4	48.4	52.2	52.2	120	120	124	124	27.2	32.7	65.1
Tungsten	µg/L	2.6	-	3.1	-	5.0	-	5.07	-	1.80	< 0.20	3.36
Uranium	µg/L	30.3	30.3	17.9	17.9	27.5	27.5	17.7	17.7	21.3	0.0206	7.62
Vanadium	µg/L	12.4	12.4	15.9	15.9	24.8	24.8	32.1	32.1	7.90	13.0	14.7
Zinc	µg/L	< 4.0	< 4.0	< 4.0	< 4.0	4.7	4.7	3.8	3.8	1.4	1.4	2.7
Bismuth	µg/L	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.010	< 0.010	< 0.010	< 0.010	0.011
Phosphorous	µg/L	6,880	6,880	6,440	6,440	10,300	10,300	9,650	9,650	3,860	4,860	6,040
Silicon	µg/L	10,300	10,300	10,300	10,300	14,500	14,500	14,500	14,500	7,810	10,000	15,300
Strontium	µg/L	2,050	2,050	2,310	2,310	2,220	2,220	2,470	2,470	1,460	1,870	2,440
Sulphur	µg/L	810,000	-	625,000	-	3,180,000	-	1,210,000	-	421,000	428,000	663,000
Tellurium	µg/L	< 0.50	< 0.50	< 0.50	< 0.50	0.62	0.62	0.132	0.132	0.079	< 0.050	0.121
Thorium	µg/L	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.030	0.03	0.014	< 0.010	0.021
Tin	µg/L	24.0	24	15.0	15	61.7	61.7	66.3	66.3	15.4	18.8	38.8
Zirconium	µg/L	21.5	21.5	17.6	17.6	55.2	55.2	60.0	60	12.1	13.8	27.0
Monocyclic Aromatic Hydrocarbons												
Benzene	µg/L	5.5	5.5	4.0	4	9.7	9.7	11.3	11.3	4.1	4.1	5.9
Ethylbenzene	µg/L	109	109	82.1	82.1	91.4	91.4	93.1	93.1	84.7	60.1	70.7
Toluene	µg/L	3.4	3.4	< 1.0	< 1.0	2.9	2.9	2.4	2.4	3.6	< 1.6	< 1.0
Xylenes	µg/L	72.8	72.8	46.6	46.6	120	120	98.2	98.2	58.9	34.7	41.8
Styrene	µg/L	< 1.0	-	< 1.0	-	< 1.0	-	< 2.0	-	< 1.0	< 1.0	< 1.0
Polycyclic Aromatic Hydrocarbons												
Naphthalene	µg/L	5.51	5.51	4.21	4.21	7.64	7.64	6.43	6.43	2.43	3.99	8.56
Methylnaphthalen	µg/L	1.03	-	0.811	-	1.23	-	1.09	-	0.408	0.569	1.03
Methylnaphthalen	µg/L	1.07	-	0.606	-	1.55	-	0.662	-	0.259	0.302	0.486
Acenaphthylene	µg/L	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200	< 0.0200	< 0.0200	< 0.200	< 0.200	< 0.200
Acenaphthene	µg/L	0.309	0.309	0.392	0.392	0.389	0.389	0.373	0.373	0.185	0.281	0.580
Fluorene	µg/L	0.205	0.205	0.269	0.269	0.267	0.267	0.337	0.337	0.124	0.195	0.319
Phenanthrene	µg/L	0.254	0.254	0.464	0.464	0.401	0.401	0.464	0.464	0.202	0.291	0.368
Anthracene	µg/L	0.021	0.021	0.031	0.031	0.063	0.063	< 0.0500	< 0.0500	0.015	0.018	0.040
Acridine	µg/L	< 0.050	< 0.050	0.137	0.137	< 0.050	< 0.050	< 0.0700	< 0.0700	< 0.050	< 0.050	< 0.050
Fluoranthene	µg/L	0.096	0.096	0.122	0.122	0.096	0.096	0.112	0.112	0.062	0.091	0.095
Pyrene	µg/L	0.070	0.07	0.063	0.063	0.077	0.077	0.100	0.1	0.045	0.054	0.069
Benz(a)anthracen	µg/L	< 0.010	< 0.010	0.015	0.015	0.016	0.016	< 0.0200	< 0.0200	< 0.010	< 0.010	< 0.010
Chrysene	µg/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.0300	< 0.0300	< 0.050	< 0.050	< 0.050
Benzo(b)fluoranth	µg/L	-	-	-	-	-	-	-	-	-	-	-
Benzo(b+j)fluoran	µg/L	< 0.050	-	< 0.050	-	< 0.050	-	< 0.0100	-	< 0.050	< 0.050	< 0.050
Benzo(k)fluoranth	µg/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.0100	< 0.0100	< 0.050	< 0.050	< 0.050
Benzo(a)pyrene	µg/L	< 0.010	< 0.010	< 0.010	< 0.010	0.023	0.023	0.00540	0.0054	< 0.010	< 0.010	< 0.010
Indeno(1,2,3-cd)p	µg/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.0100	< 0.0100	< 0.050	< 0.050	< 0.050
Dibenz(a,h)anthra	µg/L	0.016	0.016	0.017	0.017	< 0.010	< 0.010	< 0.00500	< 0.00500	< 0.010	< 0.010	< 0.010
Benzo(g,h,i)peryle	µg/L	< 0.050	-	< 0.050	-	< 0.050	-	< 0.0100	-	< 0.050	< 0.050	< 0.050
Chloronaphthalen	µg/L	< 0.100	-	< 0.100	-	< 0.100	-	-	-	< 0.100	< 0.100	< 0.100
Quinoline	µg/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.175	< 0.175	< 0.0800	< 0.0800	< 0.050	< 0.050	< 0.050
Volatile Organic Compounds												
Bromodichloromet	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Carbon Tetrachlo	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chlorobenzene	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Table 5: Historical Summary of Analytical Results For Leachate

					Sample Location		P2 A2 Leachate MH			
S Leachate Wet Well	S Leachate Wet Well	S Leachate Wet Well	S Leachate Wet Well	S Leachate Wet Well	Sample ID		P2 A2 Leachate MH	P2 A2 Leachate MH	P2 A2 Leachate MH	P2 A2 Leachate MH
2020 11 16	2021 03 18	2021 06 17	2021 09 15	2021 10 22	Sample Date (yyyy mm dd)		2021 03 19	2021 06 18	2021 09 16	2021 10 21
					Parameter	**Units**	**Analytical Results**			
					Dissolved Inorganics					
66,400	35,500	50,300	59,900	71,800	Ammonia, Total (a	µg/L	81,400	127,000	161,000	155,000
< 100	3,260	16,600	21,400	< 100	Nitrate (as N)	µg/L	< 100	221	< 100	388
< 100	961	7,970	20,000	10,300	Nitrite (as N)	µg/L	< 100	< 100	< 1,000	< 100
834	620	595	788	792	Chloride	mg/L	1,030	830	1,150	1,310
< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	Fluoride	µg/L	< 1,000	< 1,000	< 1,000	< 1,000
1,900	1,540	1,410	1,730	1,710	Sulfate	mg/L	345	305	115	145
5,940	4,230	4,680	6,670	7,290	Total Alkalinity	mg/L	2,940	3,390	4,450	4,470
5,680	3,910	4,380	5,770	6,070	Alkalinity, Bicarbo	mg/L	2,940	3,390	4,450	4,470
263	321	306	893	1,220	Alkalinity, Carbona	mg/L	< 1.0	< 1.0	< 1.0	< 1.0
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	Alkalinity, Hydroxi	mg/L	< 1.0	< 1.0	< 1.0	< 1.0
131	161	153	446	612	Alkalinity, Phenolp	mg/L	< 1.0	< 1.0	< 1.0	< 1.0
5.60	< 10.0	1.31	< 1.00	< 10.0	Bromide	mg/L	13.6	73.4	70.5	< 10.0
250	114	71.1	85.5	219	Sulfide	mg/L	0.114	1.80	3.41	2.49
469	178	123	351	605	Biochemical Oxyg	mg/L	1,270	3,260	3,160	< 34268.8
859	564	642	856	794	Chemical Oxygen	mg/L	1,870	6,460	4,690	644
-	-	-	-	-	Phosphate	mg/L	-	-	-	-
6.14	2.19	1.25	5.13	5.19	Ortho-Phosphate	mg/L	< 0.0500	< 0.0500	< 0.0500	< 0.0500
-	-	-	-	-	Total Organic Car	mg/L	-	-	-	-
7.84	5.03	6.07	6.66	7.70	Total Phosphorou	mg/L	3.19	5.79	4.42	1.66
					Dissolved Metals					
196	114	160	298	125	Dissolved Aluminu	µg/L	42.8	56.8	34.6	153
60.3	56.6	141	120	129	Dissolved Calcium	mg/L	280	675	525	163
< 200	36.4	< 200	< 200	29.3	Dissolved Iron	µg/L	6,890	37,900	85,300	9,530
229	195	235	262	249	Dissolved Magnes	mg/L	401	322	421	410
200	137	382	206	204	Dissolved Mangar	µg/L	4,990	20,800	21,900	671
271	208	222	283	221	Dissolved Potassi	mg/L	228	186	205	222
4,000	2,810	2,100	4,070	4,370	Dissolved Sodium	mg/L	1,270	922	1,070	1,380
37.3	14.2	13.4	39.2	32.9	Antimony	µg/L	4.20	9.73	4.10	< 5.00
81.4	79.4	32.7	95.5	95.0	Arsenic	µg/L	20.7	16.8	55.8	64.1
145	90.8	153	175	156	Barium	µg/L	380	924	1,240	1,830
< 1.00	0.031	1.72	< 1.00	0.053	Beryllium	µg/L	0.017	0.013	0.016	< 1.00
2,340	1,660	1,930	2,420	2,040	Boron	µg/L	5,170	7,330	6,100	4,710
< 0.200	0.0046	< 0.200	< 0.200	0.0082	Cadmium	µg/L	0.116	0.0198	0.0253	< 0.200
41.7	24.7	18.1	46.7	42.1	Chromium	µg/L	25.9	51.0	23.5	15.0
5.11	3.14	5.23	6.37	6.88	Cobalt	µg/L	61.9	157	31.8	15.8
< 10.0	0.42	27.1	< 10.0	0.66	Copper	µg/L	3.66	0.64	1.13	< 10.0
< 5.00	0.092	< 5.00	< 5.00	0.087	Lead	µg/L	0.370	< 0.050	0.130	< 5.00
65.9	64.6	68.1	74.6	92.8	Lithium	µg/L	39.9	65.0	37.7	29.3
< 0.010	< 0.040	< 0.010	< 0.040	< 0.020	Mercury	µg/L	< 0.040	< 0.010	< 0.040	< 0.020
5.62	4.27	3.78	5.92	4.09	Molybdenum	µg/L	60.7	4.43	6.49	8.25
31.0	17.6	23.0	25.3	27.1	Nickel	µg/L	305	356	149	183
12.2	1.07	< 10.0	< 10.0	1.12	Selenium	µg/L	3.97	2.32	2.12	< 10.0
< 1.00	< 0.010	< 1.00	< 1.00	< 0.010	Silver	µg/L	0.012	< 0.010	0.012	< 1.00
< 0.400	< 0.0040	< 0.400	< 0.400	< 0.0040	Thallium	µg/L	< 0.0040	< 0.0040	< 0.0040	< 0.400
99.8	52.3	38.0	75.2	67.3	Titanium	µg/L	19.1	5.49	22.8	30.3
< 20.0	2.54	< 20.0	< 20.0	4.65	Tungsten	µg/L	2.23	0.96	2.88	< 20.0
17.8	15.7	18.3	12.0	8.94	Uranium	µg/L	12.6	3.07	2.73	3.58
< 20.0	13.9	< 20.0	< 20.0	17.1	Vanadium	µg/L	19.3	7.39	36.0	39.7
< 100	1.1	< 100	< 100	1.2	Zinc	µg/L	15.7	15.1	13.2	< 100
< 1.00	0.013	< 1.00	< 1.00	< 0.010	Bismuth	µg/L	< 0.010	< 0.010	< 0.010	< 1.00
8,240	7,230	5,280	9,840	8,790	Phosphorous	µg/L	791	655	2,550	1,600
13,700	12,100	< 5,000	14,100	15,200	Silicon	µg/L	28,600	51,600	38,400	36,000
2,420	2,130	3,030	2,950	3,320	Strontium	µg/L	7,100	6,710	7,670	7,600
882,000	892,000	555,000	792,000	1,010,000	Sulphur	µg/L	140,000	121,000	49,600	58,000
< 5.00	< 0.050	13.7	< 5.00	0.169	Tellurium	µg/L	0.258	0.265	0.271	< 5.00
< 1.00	0.024	< 1.00	< 1.00	0.020	Thorium	µg/L	0.018	< 0.010	0.018	< 1.00
93.6	34.6	17.5	127	90.1	Tin	µg/L	1.99	1.41	2.00	< 5.00
30.9	20.3	17.6	37.4	43.9	Zirconium	µg/L	81.8	5.82	77.5	95.3
					Monocyclic Aromatic Hydrocarbons					
7.9	6.3	8.0	9.5	7.4	Benzene	µg/L	0.8	1.2	3.1	0.7
103	55.3	55.0	114	97.3	Ethylbenzene	µg/L	< 1.0	3.1	9.1	2.1
2.4	1.9	1.5	2.1	1.1	Toluene	µg/L	17.4	64.6	61.5	6.3
77.8	51.4	44.0	80.2	66.7	Xylenes	µg/L	5.5	11.4	20.3	2.8
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	Styrene	µg/L	2.3	3.5	2.3	< 1.0
					Polycyclic Aromatic Hydrocarbons					
5.43	3.06	2.47	6.43	3.57	Naphthalene	µg/L	< 0.200	0.525	< 2.09	< 1.97
0.808	0.549	0.596	1.19	< 1.09	Methylnaphthalen	µg/L	< 0.100	< 0.100	< 1.05	< 0.983
0.471	0.247	< 0.498	0.439	< 1.09	Methylnaphthalen	µg/L	< 0.100	0.109	< 1.05	< 0.983
< 0.200	< 0.200	< 0.995	< 0.200	< 2.18	Acenaphthylene	µg/L	< 0.200	< 0.200	< 2.09	< 1.97
0.354	0.229	0.265	0.503	< 0.545	Acenaphthene	µg/L	< 0.050	< 0.050	< 0.524	< 0.491
0.229	0.179	< 0.249	0.324	< 0.545	Fluorene	µg/L	< 0.050	< 0.050	< 0.524	< 0.491
0.340	0.266	< 0.498	0.422	< 1.09	Phenanthrene	µg/L	< 0.100	< 0.100	< 1.05	< 0.983
0.037	0.019	< 0.050	0.026	< 0.109	Anthracene	µg/L	< 0.010	< 0.038	< 0.105	< 0.098
< 0.050	< 0.050	< 0.249	< 0.050	< 0.545	Acridine	µg/L	< 0.050	0.539	< 0.524	< 0.491
0.110	0.077	< 0.149	0.111	< 0.327	Fluoranthene	µg/L	< 0.030	< 0.030	< 0.314	< 0.295
0.091	0.071	< 0.100	0.079	< 0.218	Pyrene	µg/L	< 0.020	0.045	< 0.209	< 0.197
0.021	< 0.010	< 0.050	< 0.010	< 0.109	Benz(a)anthracen	µg/L	< 0.010	< 0.039	< 0.105	< 0.098
< 0.050	< 0.050	< 0.249	< 0.050	< 0.545	Chrysene	µg/L	< 0.050	0.057	< 0.524	< 0.491
-	-	-	-	-	Benzo(b)fluoranth	µg/L	-	-	-	-
0.057	< 0.050	< 0.249	< 0.050	< 0.545	Benzo(b+j)fluoran	µg/L	< 0.050	< 0.150	< 0.524	< 0.491
< 0.050	< 0.050	< 0.249	< 0.050	< 0.545	Benzo(k)fluoranth	µg/L	< 0.050	0.076	< 0.524	< 0.491
< 0.010	< 0.010	< 0.050	< 0.010	< 0.109	Benzo(a)pyrene	µg/L	< 0.010	0.064	< 0.105	< 0.098
< 0.050	< 0.050	< 0.249	< 0.050	< 0.545	Indeno(1,2,3-cd)p	µg/L	< 0.050	0.102	< 0.524	< 0.491
< 0.010	< 0.010	< 0.050	< 0.010	< 0.109	Dibenz(a,h)anthra	µg/L	< 0.010	0.095	< 0.105	< 0.098
< 0.050	< 0.050	< 0.249	< 0.050	< 0.545	Benzo(g,h,i)peryle	µg/L	< 0.050	0.116	< 0.524	< 0.491
< 0.100	< 0.100	< 0.498	< 0.100	< 1.09	Chloronaphthalen	µg/L	< 0.100	< 0.100	< 1.05	< 0.983
< 0.050	< 0.050	< 0.249	< 0.050	< 0.545	Quinoline	µg/L	< 0.264	< 0.778	1.19	< 0.491
					Volatile Organic Compounds					
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	Bromodichloromet	µg/L	< 1.0	< 1.0	< 1.0	< 1.0
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	Bromoform	µg/L	< 1.0	< 1.0	< 1.0	< 1.0
< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	Carbon Tetrachlo	µg/L	< 0.5	< 0.5	< 0.5	< 0.5
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	Chlorobenzene	µg/L	< 1.0	< 1.0	< 1.0	< 1.0

Table 5: Historical Summary of Analytical Results For Leachate

Sample Location		N Pumphouse MH											
Sample ID		LEACHATE-PUMPHOUSE MANHOLE-20130312	N Pumphouse MH-20080205	N Pumphouse MH-20080219	N Pumphouse MH-20080304	N Pumphouse MH-20080325	N Pumphouse MH-20080408	N Pumphouse MH-20080424	N Pumphouse MH-20080507	N Pumphouse MH-20080521	N Pumphouse MH-20080617	N Pumphouse MH-20080626	N Pumphouse MH-20080708
Sample Date (yyyy mm dd)		2013 03 12	2008 02 05	2008 02 19	2008 03 04	2008 03 25	2008 04 08	2008 04 24	2008 05 07	2008 05 21	2008 06 17	2008 06 26	2008 07 08
Parameter	**Units**	**Analytical Results**											
Volatile Organic Compounds Cont.													
Chloroethane	µg/L	9.7	20	10	30	20	10	< 10	20	20	20	20	10
Chloroform	µg/L	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Chloromethane	µg/L	< 5.0	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Dibromochloromethane [DBCM]	µg/L	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Dibromoethane, 1,2-	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Dibromomethane	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Dichlorobenzene, 1,2-	µg/L	< 0.70	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	µg/L	< 1.0	1	< 1	< 1	< 1	< 1	1	< 1	< 1	< 1	< 1	< 1
Dichlorobenzene, 1,4-	µg/L	1.1	< 1	1	1	1	1	1	1	< 1	1	1	1
Dichloroethane, 1,1-	µg/L	17.6	13	12	13	12	11	11	15	15	19	21	11
Dichloroethane, 1,2-	µg/L	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Dichloroethylene, 1,1-	µg/L	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Dichloroethylene, 1,2-cis-	µg/L	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1
Dichloroethylene, 1,2-trans-	µg/L	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Dichloromethane	µg/L	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Dichloropropane, 1,2-	µg/L	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Dichloropropene, 1,3- (cis+trans)	µg/L	< 1.4	-	-	-	-	-	-	-	-	-	-	-
Dichloropropene, 1,3-cis-	µg/L	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Dichloropropene, 1,3-trans-	µg/L	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Tetrachloroethane, 1,1,1,2-	µg/L	< 1.0	-	-	-	-	-	-	-	-	-	-	-
Tetrachloroethane, 1,1,2,2-	µg/L	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Tetrachloroethylene	µg/L	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Trichloroethane, 1,1,1-	µg/L	< 1.0	8	5	5	6	5	5	6	6	3	9	3
Trichloroethane, 1,1,2-	µg/L	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Trichloroethylene	µg/L	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Trichlorofluoromethane	µg/L	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Vinyl Chloride	µg/L	< 1.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Gross Parameters													
VH (C6-C10)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
VPH (C6-C10)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
EPH (C10-C19)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
LEPH (C10-C19)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
EPH (C19-C32)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
HEPH (C19-C32)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
MTBE													
Methyl Tert-butyl Ether [MTBE]	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Resin and Fatty Acids													
Acetic Acid	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Butyric Acid	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Caporic Acid	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Heptanoic Acid	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Isobutyric Acid	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Isocaproic Acid	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Isovaleric Acid	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Propionic Acid	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Valeric Acid	mg/L	-	-	-	-	-	-	-	-	-	-	-	-

Sample Location		N Pumphouse MH						
Sample ID		N Pumphouse MH-20131211	N Pumphouse MH-20140408	N Pumphouse MH-20140610	N Pumphouse MH-20150122	N Pumphouse MH-20150615	N Pumphouse MH-20150915	N Pumphouse MH-20151203
Sample Date (yyyy mm dd)		2013 12 11	2014 04 08	2014 06 10	2015 01 22	2015 06 15	2015 09 15	2015 12 03
Parameter	**Units**	**Analytical Results**						
Volatile Organic Compounds								
Chloroethane	µg/L	6.3	1.3	-	-	6	6	4.3
Chloroform	µg/L	< 1.0	< 1.0	-	-	< 1.0	< 1.0	< 1.0
Chloromethane	µg/L	< 5.0	< 5.0	-	-	< 5.0	< 5.0	< 5.0
Dibromochloromethane [DBCM]	µg/L	< 1.0	< 1.0	-	-	< 1.0	< 1.0	< 1.0
Dibromoethane, 1,2-	µg/L	-	-	-	-	-	-	-
Dibromomethane	µg/L	-	-	-	-	-	-	-
Dichlorobenzene, 1,2-	µg/L	< 0.70	< 0.70	-	-	< 0.70	< 0.70	< 0.70
Dichlorobenzene, 1,3-	µg/L	< 1.0	< 1.0	-	-	< 1.0	< 1.0	< 1.0
Dichlorobenzene, 1,4-	µg/L	1.5	< 1.0	-	-	1.1	1.2	1.1
Dichloroethane, 1,1-	µg/L	16.2	1.5	-	-	12.4	9.4	6.4
Dichloroethane, 1,2-	µg/L	< 1.0	< 1.0	-	-	< 1.0	< 1.0	< 1.0
Dichloroethylene, 1,1-	µg/L	< 1.0	< 1.0	-	-	< 1.0	< 1.0	< 1.0
Dichloroethylene, 1,2-cis-	µg/L	< 1.0	< 1.0	-	-	< 1.0	< 1.0	< 1.0
Dichloroethylene, 1,2-trans-	µg/L	< 1.0	< 1.0	-	-	< 1.0	< 1.0	< 1.0
Dichloromethane	µg/L	< 5.0	< 5.0	-	-	< 5.0	< 5.0	< 5.0
Dichloropropane, 1,2-	µg/L	< 1.0	< 1.0	-	-	< 1.0	< 1.0	< 1.0
Dichloropropene, 1,3- (cis+trans)	µg/L	< 1.4	< 1.4	-	-	< 1.4	< 1.4	< 1.4
Dichloropropene, 1,3-cis-	µg/L	< 1.0	< 1.0	-	-	< 1.0	< 1.0	< 1.0
Dichloropropene, 1,3-trans-	µg/L	< 1.0	< 1.0	-	-	< 1.0	< 1.0	< 1.0
Tetrachloroethane, 1,1,1,2-	µg/L	< 1.0	< 1.0	-	-	< 1.0	< 1.0	< 1.0
Tetrachloroethane, 1,1,2,2-	µg/L	< 1.0	< 1.0	-	-	< 1.0	< 1.0	< 1.0
Tetrachloroethylene	µg/L	< 1.0	< 1.0	-	-	< 1.0	< 1.0	< 1.0
Trichloroethane, 1,1,1-	µg/L	1.6	< 1.0	-	-	1.6	1.1	< 1.0
Trichloroethane, 1,1,2-	µg/L	< 1.0	< 1.0	-	-	< 1.0	< 1.0	< 1.0
Trichloroethylene	µg/L	< 1.0	< 1.0	-	-	< 1.0	< 1.0	< 1.0
Trichlorofluoromethane	µg/L	< 1.0	< 1.0	-	-	< 1.0	< 1.0	< 1.0
Vinyl Chloride	µg/L	< 1.0	< 1.0	-	-	< 1.0	< 1.0	< 1.0
Gross Parameters								
VH (C6-C10)	µg/L	-	< 100	< 100	-	< 100	< 100	< 100
VPH (C6-C10)	µg/L	-	< 100	< 100	-	< 100	< 100	< 100
EPH (C10-C19)	µg/L	-	1,110	1,180	650	< 250	260	310
LEPH (C10-C19)	µg/L	-	1,110	1,170	650	< 250	250	310
EPH (C19-C32)	µg/L	-	640	850	720	< 250	< 250	< 250
HEPH (C19-C32)	µg/L	-	640	850	720	< 250	< 250	< 250
MTBE								
Methyl Tert-butyl Ether [MTBE]	µg/L	-	-	-	-	-	-	-
Resin and Fatty Acids								
Acetic Acid	mg/L	-	-	-	-	-	-	-
Butyric Acid	mg/L	-	-	-	-	-	-	-
Caporic Acid	mg/L	-	-	-	-	-	-	-
Heptanoic Acid	mg/L	-	-	-	-	-	-	-
Isobutyric Acid	mg/L	-	-	-	-	-	-	-
Isocaproic Acid	mg/L	-	-	-	-	-	-	-
Isovaleric Acid	mg/L	-	-	-	-	-	-	-
Propionic Acid	mg/L	-	-	-	-	-	-	-
Valeric Acid	mg/L	-	-	-	-	-	-	-

Associated CARO file(s): 8031228, 8052345, 8081555, 8110837, 9031248, 9060275, 9090105, mg/l, N000833, ug/L.
Associated Exova file(s): 506479, 507801, 509233, 600276, 602695, 605393, 608922, 611891, 614770, 617175, 619914, 625680, 627511, 629501.
All terms defined within the body of Keltech's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
\- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

Table 5: Historical Summary of Analytical Results For Leachate

					Sample Location		N Pumphouse MH												Sample Location					
N PUMPHOUSE MH-20160315	N PUMPHOUSE MH-20160623	N PUMPHOUSE MH-20160915	N PUMPHOUSE MH-20161117	N PUMPHOUSE MH-20170914	Sample ID		N PUMPHOUSE MH-20171204	N Pumphouse MH	N Pumphouse MH	N Pumphouse MH-20180524	N Pumphouse MH	N Pumphouse MH-20181108	N Pumphouse MH	N Pumphouse MH-20190315	N Pumphouse MH	N Pumphouse MH-20190603	N Pumphouse MH	N Pumphouse MH-20190903	Sample ID		N Pumphous e MH	N Pumphous e MH-20191031	N Pumphous e MH	N Pumphouse MH
2016 03 15	2016 06 23	2016 09 15	2016 11 17	2017 09 14	Sample Date (yyyy mm dd)		2017 12 04	2018 03 15	2018 05 24	2018 05 24	2018 11 08	2018 11 08	2019 03 15	2019 03 15	2019 06 03	2019 06 03	2019 09 03	2019 09 03	Sample Date (yyyy mm dd)		2019 10 31	2019 10 31	2020 03 05	2020 06 03
					Parameter	Units	Analytical Results												Parameter	Units				
					Volatile Organic Compounds														**Volatile Organic Compounds**					
5.2	-	-	3.7	9	Chloroethane	µg/L	< 3.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	2.0	2	< 2.0	< 2.0	Chloroethane	µg/L	< 2.2	< 2.2	< 2.0	< 2.0
< 1.0	-	-	< 1.0	< 1.0	Chloroform	µg/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	Chloroform	µg/L	< 1.0	< 1.0	< 1.0	< 1.0
< 5.0	-	-	< 5.0	< 5.0	Chloromethane	µg/L	< 5.0	-	-	-	-	-	-	-	-	-	-	-	Chloromethane	µg/L	-	-	-	-
< 1.0	-	-	< 1.0	< 1.0	Dibromochlorome	µg/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	Dibromochlorome	µg/L	< 1.0	< 1.0	< 1.0	< 1.0
-	-	-	-	-	Dibromoethane, 1	µg/L	-	< 0.3	< 0.3	-	< 0.3	-	< 0.3	-	< 0.3	-	< 0.3	-	Dibromoethane, 1	µg/L	< 0.3	-	< 0.3	< 0.3
-	-	-	-	-	Dibromomethane	µg/L	-	< 1.0	< 1.0	-	< 1.0	-	< 1.0	-	< 1.0	-	< 1.0	-	Dibromomethane	µg/L	< 1.0	-	< 1.0	< 1.0
< 0.70	-	-	< 0.70	< 0.50	Dichlorobenzene,	µg/L	< 0.50	< 0.5	< 0.5	< 0.5	0.6	0.6	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	Dichlorobenzene,	µg/L	< 0.5	< 0.5	< 0.5	< 0.5
< 1.0	-	-	< 1.0	< 1.0	Dichlorobenzene,	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	2.1	2.1	< 1.0	< 1.0	Dichlorobenzene,	µg/L	< 1.0	< 1.0	< 1.0	< 1.0
< 1.0	-	-	1.1	1.3	Dichlorobenzene,	µg/L	1.6	< 1.0	< 2.3	< 2.3	3.0	3	< 1.0	< 1.0	2.1	2.1	3.0	3	Dichlorobenzene,	µg/L	1.6	1.6	< 1.0	2.0
12.6	-	-	13.3	10.1	Dichloroethane, 1	µg/L	3.2	< 1.0	1.8	1.8	10.8	10.8	2.6	2.6	3.6	3.6	9.0	9	Dichloroethane, 1	µg/L	5.8	5.8	4.3	2.9
< 1.0	-	-	< 1.0	< 1.0	Dichloroethane, 1	µg/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	Dichloroethane, 1	µg/L	< 1.0	< 1.0	< 1.0	< 1.0
< 1.0	-	-	< 1.0	< 1.0	Dichloroethylene,	µg/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	Dichloroethylene,	µg/L	< 1.0	< 1.0	< 1.0	< 1.0
< 1.0	-	-	< 1.0	< 1.0	Dichloroethylene,	µg/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	Dichloroethylene,	µg/L	< 1.0	< 1.0	< 1.0	< 1.0
< 1.0	-	-	< 1.0	< 1.0	Dichloroethylene,	µg/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	Dichloroethylene,	µg/L	< 1.0	< 1.0	< 1.0	< 1.0
< 5.0	-	-	< 5.0	< 5.0	Dichloromethane	µg/L	< 5.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	Dichloromethane	µg/L	< 3.0	< 3.0	< 3.0	< 3.0
< 1.0	-	-	< 1.0	< 1.0	Dichloropropane,	µg/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	Dichloropropane,	µg/L	< 1.0	< 1.0	< 1.0	< 1.0
< 1.4	-	-	< 1.4	< 1.0	Dichloropropene,	µg/L	< 1.0	< 1.0	< 1.0	-	< 1.0	-	< 1.0	-	< 1.0	-	< 1.0	-	Dichloropropene,	µg/L	< 1.0	-	< 1.0	< 1.0
< 1.0	-	-	< 1.0	< 0.50	Dichloropropene,	µg/L	< 0.50	-	-	-	-	-	-	-	-	-	-	-	Dichloropropene,	µg/L	-	-	-	-
< 1.0	-	-	< 1.0	< 0.50	Dichloropropene,	µg/L	< 0.50	-	-	-	-	-	-	-	-	-	-	-	Dichloropropene,	µg/L	-	-	-	-
< 1.0	-	-	< 1.0	< 1.0	Tetrachloroethane	µg/L	< 1.0	-	-	-	-	-	-	-	-	-	-	-	Tetrachloroethane	µg/L	-	-	-	-
< 1.0	-	-	< 1.0	< 0.20	Tetrachloroethane	µg/L	< 0.20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	Tetrachloroethane	µg/L	< 0.5	< 0.5	< 0.5	< 0.5
< 1.0	-	-	< 1.0	< 1.0	Tetrachloroethyle	µg/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	Tetrachloroethyle	µg/L	< 1.0	< 1.0	< 1.0	< 1.0
< 1.0	-	-	< 1.0	< 1.0	Trichloroethane, 1	µg/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	Trichloroethane, 1	µg/L	< 1.0	< 1.0	< 1.0	< 1.0
< 1.0	-	-	< 1.0	< 0.50	Trichloroethane, 1	µg/L	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	Trichloroethane, 1	µg/L	< 1.0	< 1.0	< 1.0	< 1.0
< 1.0	-	-	< 1.0	< 1.0	Trichloroethylene	µg/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	Trichloroethylene	µg/L	< 1.0	< 1.0	< 1.0	< 1.0
< 1.0	-	-	< 1.0	< 1.0	Trichlorofluoromet	µg/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	Trichlorofluoromet	µg/L	< 1.0	< 1.0	< 1.0	< 1.0
< 1.0	-	-	< 1.0	< 0.40	Vinyl Chloride	µg/L	< 0.40	< 1.0	< 1.0	< 1.0	1.0	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	Vinyl Chloride	µg/L	< 1.0	< 1.0	< 1.0	< 1.0
					Gross Parameters														**Gross Parameters**					
< 100	-	-	< 100	-	VH (C6-C10)	µg/L	-	< 100	147	147	181	181	< 100	< 100	< 100	< 100	224	224	VH (C6-C10)	µg/L	< 100	< 100	104	< 100
< 100	-	-	< 100	-	VPH (C6-C10)	µg/L	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	VPH (C6-C10)	µg/L	< 100	< 100	< 100	< 100
260	< 250	< 250	400	< 250	EPH (C10-C19)	µg/L	250	< 250	766	766	346	346	681	681	724	724	953	953	EPH (C10-C19)	µg/L	330	330	< 250	< 250
260	< 250	< 250	400	< 250	LEPH (C10-C19)	µg/L	250	< 250	763	763	342	342	675	675	719	719	945	945	LEPH (C10-C19)	µg/L	325	-	< 250	< 250
< 250	< 250	< 250	< 250	< 250	EPH (C19-C32)	µg/L	< 250	< 250	660	660	< 250	< 250	429	429	474	474	858	858	EPH (C19-C32)	µg/L	< 250	< 250	< 250	426
< 250	< 250	< 250	< 250	< 250	HEPH (C19-C32)	µg/L	< 250	< 250	660	660	< 250	< 250	429	429	474	474	858	858	HEPH (C19-C32)	µg/L	< 250	-	< 250	426
					MTBE														**MTBE**					
-	-	-	-	-	Methyl Tert-butyl E	µg/L	-	< 1.0	< 1.0	-	< 1.0	-	< 1.0	-	< 1.0	-	< 1.0	-	Methyl Tert-butyl E	µg/L	< 1.0	-	< 1.0	< 1.0
					Resin and Fatty Acids														**Resin and Fatty Acids**					
-	-	-	-	-	Acetic Acid	mg/L	-	-	-	-	-	-	< 3.0	-	< 3.0	-	3.0	-	Acetic Acid	mg/L	< 3.0	-	23.4	< 3.0
-	-	-	-	-	Butyric Acid	mg/L	-	-	-	-	-	-	< 2.0	-	< 2.0	-	< 2.0	-	Butyric Acid	mg/L	< 2.0	-	7.2	< 2.0
-	-	-	-	-	Caporic Acid	mg/L	-	-	-	-	-	-	< 2.0	-	2.4	-	< 2.0	-	Caporic Acid	mg/L	< 2.0	-	3.5	< 2.0
-	-	-	-	-	Heptanoic Acid	mg/L	-	-	-	-	-	-	< 2.0	-	< 2.0	-	< 2.0	-	Heptanoic Acid	mg/L	< 2.0	-	< 2.0	< 2.0
-	-	-	-	-	Isobutyric Acid	mg/L	-	-	-	-	-	-	< 2.0	-	< 2.0	-	< 2.0	-	Isobutyric Acid	mg/L	< 2.0	-	< 2.0	< 2.0
-	-	-	-	-	Isocaproic Acid	mg/L	-	-	-	-	-	-	< 2.0	-	< 2.0	-	< 2.0	-	Isocaproic Acid	mg/L	< 2.0	-	< 2.0	< 2.0
-	-	-	-	-	Isovaleric Acid	mg/L	-	-	-	-	-	-	< 2.0	-	< 2.0	-	< 2.0	-	Isovaleric Acid	mg/L	< 2.0	-	< 2.0	< 2.0
-	-	-	-	-	Propionic Acid	mg/L	-	-	-	-	-	-	< 2.0	-	< 2.0	-	< 2.0	-	Propionic Acid	mg/L	< 2.0	-	3.8	< 2.0
-	-	-	-	-	Valeric Acid	mg/L	-	-	-	-	-	-	< 2.0	-	< 2.0	-	< 2.0	-	Valeric Acid	mg/L	< 2.0	-	2.0	< 2.0

Associated CARO file(s): 8031228, 8052345, 8081555, 8110837, 9031248, 9060275, 9090105, mg/l, N000833, ug/L.
Associated Exova file(s): 506479, 507801, 509233, 600276, 602695, 605393, 608922, 611891, 614770, 617175, 619914, 625680, 627511, 629501.
All terms defined within the body of Keltech's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
\- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

Table 5: Historical Summary of Analytical Results For Leachate

N Pumphouse MH						P1 Leachate MH									Sample Location		P1 Leachate MH						
N Pumphouse MH	N Pumphouse MH	N Pumphouse MH	N Pumphouse MH	N Pumphouse MH	N Pumphouse MH	Landfill Leachate-20061109	Landfill Leachate-20061116	Landfill Leachate-20061122		P1 LEACHATE MH-20130911	P1 LEACHATE MH-20140408	P1 LEACHATE MH-20140610	P1 LEACHATE MH-20150122	P1 LEACHATE MH-20150615	Sample ID		P1 LEACHATE MH-20150915	P1 LEACHATE MH-20151203	P1 LEACHATE MH-20160315	P1 LEACHATE MH-20160623	P1 LEACHATE MH-20160915	P1 LEACHATE MH-20161117	P1 LEACHATE MH-20170914
2020 09 30	2020 11 16	2021 03 18	2021 06 17	2021 09 16	2021 10 22	2006 11 09	2006 11 16	2006 11 22		2013 09 11	2014 04 08	2014 06 10	2015 01 22	2015 06 15	Sample Date (yyyy mm dd)		2015 09 15	2015 12 03	2016 03 15	2016 06 23	2016 09 15	2016 11 17	2017 09 14
Analytical Results															Parameter	Units	Analytical Results						
															Volatile Organic Compounds								
< 3.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 10	< 10	< 10		8.1	< 1.0	-	-	< 1.0	Chloroethane	µg/L	1.2	< 1.0	4	-	-	< 1.0	6
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1		< 1.0	< 1.0	-	-	< 1.0	Chloroform	µg/L	< 1.0	< 1.0	< 1.0	-	-	< 1.0	< 1.0
-	-	-	-	-	-	< 10	< 10	< 10		< 5.0	< 5.0	-	-	< 5.0	Chloromethane	µg/L	< 5.0	< 5.0	< 5.0	-	-	< 5.0	< 5.0
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1		< 1.0	< 1.0	-	-	< 1.0	Dibromochlorome	µg/L	< 1.0	< 1.0	< 1.0	-	-	< 1.0	< 1.0
< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	-	-	-		-	-	-	-	-	Dibromoethane, 1	µg/L	-	-	-	-	-	-	-
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	-	-	-		-	-	-	-	-	Dibromomethane	µg/L	-	-	-	-	-	-	-
< 0.5	< 0.5	< 0.5	< 0.5	0.5	< 0.5	< 1	< 1	< 1		< 0.70	< 0.70	-	-	< 0.70	Dichlorobenzene,	µg/L	< 0.70	< 0.70	< 0.70	-	-	< 0.70	< 0.50
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1		< 1.0	< 1.0	-	-	< 1.0	Dichlorobenzene,	µg/L	< 1.0	< 1.0	< 1.0	-	-	< 1.0	< 1.0
1.8	1.7	2.6	2.5	2.8	< 1.0	< 1	< 1	< 1		1.2	1.1	-	-	< 1.0	Dichlorobenzene,	µg/L	1.1	< 1.0	< 1.0	-	-	< 1.0	< 1.0
4.5	2.9	3.4	4.7	5.3	2.0	1	1	1		20.3	1.8	-	-	4.5	Dichloroethane, 1	µg/L	2.7	1.3	16.6	-	-	3.5	6.4
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1		< 1.0	< 1.0	-	-	< 1.0	Dichloroethane, 1	µg/L	< 1.0	< 1.0	< 1.0	-	-	< 1.0	< 1.0
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1		< 1.0	< 1.0	-	-	< 1.0	Dichloroethylene,	µg/L	< 1.0	< 1.0	< 1.0	-	-	< 1.0	< 1.0
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1		< 1.0	< 1.0	-	-	< 1.0	Dichloroethylene,	µg/L	< 1.0	< 1.0	< 1.0	-	-	< 1.0	< 1.0
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1		< 1.0	< 1.0	-	-	< 1.0	Dichloroethylene,	µg/L	< 1.0	< 1.0	< 1.0	-	-	< 1.0	< 1.0
< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 5	< 5	< 5		< 5.0	< 5.0	-	-	< 5.0	Dichloromethane	µg/L	< 5.0	< 5.0	< 5.0	-	-	< 5.0	< 5.0
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1		< 1.0	< 1.0	-	-	< 1.0	Dichloropropane,	µg/L	< 1.0	< 1.0	< 1.0	-	-	< 1.0	< 1.0
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	-	-	-		< 1.4	< 1.4	-	-	< 1.4	Dichloropropene,	µg/L	< 1.4	< 1.4	< 1.4	-	-	< 1.4	< 1.0
-	-	-	-	-	-	< 1	< 1	< 1		< 1.0	< 1.0	-	-	< 1.0	Dichloropropene,	µg/L	< 1.0	< 1.0	< 1.0	-	-	< 1.0	< 0.50
-	-	-	-	-	-	< 1	< 1	< 1		< 1.0	< 1.0	-	-	< 1.0	Dichloropropene,	µg/L	< 1.0	< 1.0	< 1.0	-	-	< 1.0	< 0.50
-	-	-	-	-	-	-	-	-		< 1.0	< 1.0	-	-	< 1.0	Tetrachloroethane	µg/L	< 1.0	< 1.0	< 1.0	-	-	< 1.0	< 1.0
< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 1	< 1	< 1		< 1.0	< 1.0	-	-	< 1.0	Tetrachloroethane	µg/L	< 1.0	< 1.0	< 1.0	-	-	< 1.0	< 0.20
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1		< 1.0	< 1.0	-	-	< 1.0	Tetrachloroethyle	µg/L	< 1.0	< 1.0	< 1.0	-	-	< 1.0	< 1.0
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1		< 1.0	< 1.0	-	-	< 1.0	Trichloroethane, 1	µg/L	< 1.0	< 1.0	< 1.0	-	-	< 1.0	< 1.0
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1		< 1.0	< 1.0	-	-	< 1.0	Trichloroethane, 1	µg/L	< 1.0	< 1.0	< 1.0	-	-	< 1.0	< 0.50
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1		< 1.0	< 1.0	-	-	< 1.0	Trichloroethylene	µg/L	< 1.0	< 1.0	< 1.0	-	-	< 1.0	< 1.0
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1		< 1.0	< 1.0	-	-	< 1.0	Trichlorofluoromet	µg/L	< 1.0	< 1.0	< 1.0	-	-	< 1.0	< 1.0
< 1.0	< 1.0	< 1.0	1.0	< 1.2	< 1.0	< 2	< 2	< 2		< 1.0	< 1.0	-	-	< 1.0	Vinyl Chloride	µg/L	< 1.0	< 1.0	< 1.0	-	-	< 1.0	< 0.40
															Gross Parameters								
< 100	< 100	173	168	199	< 100	-	-	-		-	< 100	< 100	-	< 100	VH (C6-C10)	µg/L	< 100	< 100	< 100	-	-	< 100	-
< 100	< 100	< 100	< 100	< 100	< 100	-	-	-		-	< 100	< 100	-	< 100	VPH (C6-C10)	µg/L	< 100	< 100	< 100	-	-	< 100	-
442	< 250	355	792	< 2,500	321	-	-	-		-	920	920	400	< 250	EPH (C10-C19)	µg/L	280	< 250	< 250	< 250	< 250	270	< 250
437	< 250	352	789	< 2,500	319	-	-	-		-	920	920	400	< 250	LEPH (C10-C19)	µg/L	280	< 250	< 250	< 250	< 250	270	< 250
292	< 250	1,180	2,400	< 2,500	< 250	-	-	-		-	450	590	430	< 250	EPH (C19-C32)	µg/L	< 250	< 250	< 250	< 250	< 250	< 250	< 250
292	< 250	1,180	2,400	< 2,500	< 250	-	-	-		-	450	590	430	< 250	HEPH (C19-C32)	µg/L	< 250	< 250	< 250	< 250	< 250	< 250	< 250
															MTBE								
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	-	-	-		-	-	-	-	-	Methyl Tert-butyl E	µg/L	-	-	-	-	-	-	-
															Resin and Fatty Acids								
25.7	5.9					-	-	-		-	-	-	-	-	Acetic Acid	mg/L	-	-	-	-	-	-	-
13.7	< 2.0					-	-	-		-	-	-	-	-	Butyric Acid	mg/L	-	-	-	-	-	-	-
5.6	< 2.0					-	-	-		-	-	-	-	-	Caporic Acid	mg/L	-	-	-	-	-	-	-
< 2.0	< 2.0					-	-	-		-	-	-	-	-	Heptanoic Acid	mg/L	-	-	-	-	-	-	-
7.0	< 2.0					-	-	-		-	-	-	-	-	Isobutyric Acid	mg/L	-	-	-	-	-	-	-
2.7	< 2.0					-	-	-		-	-	-	-	-	Isocaproic Acid	mg/L	-	-	-	-	-	-	-
< 2.0	< 2.0					-	-	-		-	-	-	-	-	Isovaleric Acid	mg/L	-	-	-	-	-	-	-
3.3	< 2.0					-	-	-		-	-	-	-	-	Propionic Acid	mg/L	-	-	-	-	-	-	-
5.0	< 2.0					-	-	-		-	-	-	-	-	Valeric Acid	mg/L	-	-	-	-	-	-	-

Associated CARO file(s): 8031228, 8052345, 8081555, 8110837, 9031248, 9060275, 9090105, mg/l, N000833, ug/L.
Associated Exova file(s): 506479, 507801, 509233, 600276, 602695, 605393, 608922, 611891, 614770, 617175, 619914, 625680, 627511, 629501.
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QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

Table 5: Historical Summary of Analytical Results For Leachate

					Sample Location		P1 Leachate MH		P1 Leachate MH		P1 Leachate MH 2						S Leachate Wet Well							S
P1 LEACHATE MH-20171204	P1 Leachate MH	P1 Leachate MH	P1 Leachate MH-20180524	P1 Leachate MH	Sample ID		P1 Leachate MH-20180816	P1 Leachate MH	P1 Leachate MH	P1 Leachate MH-20190315							S LEACHATE WET WELL-20131211	S LEACHATE WET WELL-20140408	S LEACHATE WET WELL-20140610	S LEACHATE WET WELL-20150615	S LEACHATE WET WELL-20150915	S LEACHATE WET WELL-20151203	S LEACHATE WET WELL-20160315	
2017 12 04	2018 03 15	2018 05 24	2018 05 24	2018 08 16	Sample Date (yyyy mm dd)		2018 08 16	2018 11 08	2019 03 15	2019 03 15	2020 09 29	2020 11 16	2021 03 18	2021 06 18	2021 09 16	2021 10 22	2013 12 11	2014 04 08	2014 06 10	2015 06 15	2015 09 15	2015 12 03	2016 03 15	Sample Da
					Parameter	**Units**	**Analytical Results**																	**Parameter**
					Volatile Organic Compounds																			**Volatile Organic**
6.9	8.9	< 2.0	< 2.0	< 2.0	Chloroethane	µg/L	< 2.0	< 2.0	< 2.0	< 2.0	< 8.0	9.9	17.4	4.7	< 6.8	< 3.0	< 2.0	< 1.0	-	1.4	1.1	< 1.0	< 1.0	Chloroethane
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	Chloroform	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	-	< 1.0	< 1.0	< 1.0	< 1.0	Chloroform
< 5.0	-	-	-	-	Chloromethane	µg/L	-	-		-	-	-	-	-	-	-	< 10	< 5.0	-	< 5.0	< 5.0	< 5.0	< 5.0	Chloromethane
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	Dibromochlorome	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	-	< 1.0	< 1.0	< 1.0	< 1.0	Dibromochlorome
-	< 0.3	< 0.3	-	< 0.3	Dibromoethane, 1	µg/L	-	< 0.3	< 0.3	-	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	-	-	-	-	-	-	-	Dibromoethane, 1
-	< 1.0	< 1.0	-	< 1.0	Dibromomethane	µg/L	-	< 1.0	< 1.0	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	-	-	-	-	-	-	-	Dibromomethane
< 0.50	< 0.5	< 0.5	< 0.5	< 0.5	Dichlorobenzene,	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 1.4	< 0.70	-	< 0.70	< 0.70	< 0.70	< 0.70	Dichlorobenzene,
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	Dichlorobenzene,	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	-	< 1.0	< 1.0	< 1.0	< 1.0	Dichlorobenzene,
1.1	< 1.0	< 1.0	< 1.0	< 1.2	Dichlorobenzene,	µg/L	< 1.2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	2.9	< 1.0	-	2	2.2	1.3	1.1	Dichlorobenzene,
3.2	2.3	< 1.0	< 1.0	1.0	Dichloroethane, 1	µg/L	1	< 1.0	< 1.0	< 1.0	6.8	5.0	5.4	1.2	3.7	1.5	5.2	< 1.0	-	< 1.0	< 1.0	< 1.0	1.1	Dichloroethane, 1
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	Dichloroethane, 1	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	60.9	65.2	53.6	19.5	69.4	21.8	< 2.0	< 1.0	-	< 1.0	< 1.0	< 1.0	< 1.0	Dichloroethane, 1
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	Dichloroethylene,	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	-	< 1.0	< 1.0	< 1.0	< 1.0	Dichloroethylene,
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	Dichloroethylene,	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	5.0	8.3	12.8	1.4	9.0	3.3	< 2.0	< 1.0	-	< 1.0	< 1.0	< 1.0	< 1.0	Dichloroethylene,
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	Dichloroethylene,	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	15.2	19.0	14.6	4.0	11.1	14.3	< 2.0	< 1.0	-	< 1.0	< 1.0	< 1.0	< 1.0	Dichloroethylene,
< 5.0	< 3.0	< 3.0	< 3.0	< 3.0	Dichloromethane	µg/L	< 3.0	< 3.0	< 3.0	< 3.0	264	234	174	54.1	12.4	< 3.0	< 10	< 5.0	-	< 5.0	< 5.0	< 5.0	< 5.0	Dichloromethane
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	Dichloropropane,	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5	1.8	< 1.6	< 1.0	1.7	< 1.0	< 2.0	< 1.0	-	< 1.0	< 1.0	< 1.0	< 1.0	Dichloropropane,
< 1.0	< 1.0	< 1.0	-	< 1.0	Dichloropropene,	µg/L	-	< 1.0	< 1.0	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.8	< 1.4	-	< 1.4	< 1.4	< 1.4	< 1.4	Dichloropropene,
< 0.50	-	-	-	-	Dichloropropene,	µg/L	-	-		-	-	-	-	-	-	-	< 2.0	< 1.0	-	< 1.0	< 1.0	< 1.0	< 1.0	Dichloropropene,
< 0.50	-	-	-	-	Dichloropropene,	µg/L	-	-		-	-	-	-	-	-	-	< 2.0	< 1.0	-	< 1.0	< 1.0	< 1.0	< 1.0	Dichloropropene,
< 1.0	-	-	-	-	Tetrachloroethane	µg/L	-	-		-		-	-	-	-	-	< 2.0	< 1.0	-	< 1.0	< 1.0	< 1.0	< 1.0	Tetrachloroethane
< 0.20	< 0.5	< 0.5	< 0.5	< 0.5	Tetrachloroethane	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 2.0	< 1.0	-	< 1.0	< 1.0	< 1.0	< 1.0	Tetrachloroethane
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	Tetrachloroethyle	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 3.3	1.8	1.0	1.1	< 1.0	< 1.0	< 2.0	< 1.0	-	< 1.0	< 1.0	< 1.0	< 1.0	Tetrachloroethyle
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	Trichloroethane, 1	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	-	< 1.0	< 1.0	< 1.0	< 1.0	Trichloroethane, 1
< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	Trichloroethane, 1	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0	< 1.0	-	< 1.0	< 1.0	< 1.0	< 1.0	Trichloroethane, 1
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	Trichloroethylene	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 2.4	2.7	7.0	< 1.0	3.9	1.8	< 2.0	< 1.0	-	< 1.0	< 1.0	< 1.0	< 1.0	Trichloroethylene
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	Trichlorofluoromet	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.1	< 1.0	< 1.0	1.4	< 1.0	< 2.0	< 1.0	-	< 1.0	< 1.0	< 1.0	< 1.0	Trichlorofluoromet
< 0.40	< 1.0	< 1.0	< 1.0	< 1.0	Vinyl Chloride	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 3.0	< 4.1	< 1.0	< 10.0	6.8	< 2.0	< 1.0	-	< 1.0	< 1.0	< 1.0	< 1.0	Vinyl Chloride
					Gross Parameters																			**Gross Parameter**
-	< 100	< 100	< 100	< 100	VH (C6-C10)	µg/L	< 100	< 100	< 100	< 100	1,430	889	1,570	287	1,240	481	-	< 100	120	130	140	< 100	< 100	VH (C6-C10)
-	< 100	< 100	< 100	< 100	VPH (C6-C10)	µg/L	< 100	< 100	< 100	< 100	1,050	425	1,100	194	918	270	-	< 100	< 100	< 100	< 100	< 100	< 100	VPH (C6-C10)
< 250	714	616	616	< 250	EPH (C10-C19)	µg/L	< 250	< 250	< 250	< 250	615	1,250	1,600	384	7,600	3,930	-	1,230	1,960	770	260	640	380	EPH (C10-C19)
< 250	712	615	615	< 250	LEPH (C10-C19)	µg/L	< 250	< 250	< 250	< 250	614	1,250	1,600	384	7,600	3,930	-	1,230	1,950	750	250	620	370	LEPH (C10-C19)
< 250	609	480	480	< 250	EPH (C19-C32)	µg/L	< 250	< 250	< 250	< 250	405	352	430	< 250	13,800	259	-	710	1,340	< 250	< 250	< 250	< 250	EPH (C19-C32)
< 250	609	480	480	< 250	HEPH (C19-C32)	µg/L	< 250	< 250	< 250	< 250	405	352	430	< 250	13,800	259	-	710	1,340	< 250	< 250	< 250	< 250	HEPH (C19-C32)
					MTBE																			**MTBE**
-	< 1.0	< 1.0	-	< 1.0	Methyl Tert-butyl E	µg/L	-	< 1.0	< 1.0	-	< 1.3	7.2	9.6	1.9	< 8.6	< 4.2	-	-	-	-	-	-	-	Methyl Tert-butyl E
					Resin and Fatty Acids																			**Resin and Fatty A**
-	-	-	-	-	Acetic Acid	mg/L	-	-	< 3.0	-	3,610	848					-	-	-	-	-	-	-	Acetic Acid
-	-	-	-	-	Butyric Acid	mg/L	-	-	< 2.0	-	1,730	169					-	-	-	-	-	-	-	Butyric Acid
-	-	-	-	-	Caporic Acid	mg/L	-	-	< 2.0	-	771	86.7					-	-	-	-	-	-	-	Caporic Acid
-	-	-	-	-	Heptanoic Acid	mg/L	-	-	< 2.0	-	124	11.6					-	-	-	-	-	-	-	Heptanoic Acid
-	-	-	-	-	Isobutyric Acid	mg/L	-	-	< 2.0	-	2,540	102					-	-	-	-	-	-	-	Isobutyric Acid
-	-	-	-	-	Isocaproic Acid	mg/L	-	-	< 2.0	-	19.0	6.6					-	-	-	-	-	-	-	Isocaproic Acid
-	-	-	-	-	Isovaleric Acid	mg/L	-	-	< 2.0	-	359	53.6					-	-	-	-	-	-	-	Isovaleric Acid
-	-	-	-	-	Propionic Acid	mg/L	-	-	< 2.0	-	445	466					-	-	-	-	-	-	-	Propionic Acid
-	-	-	-	-	Valeric Acid	mg/L	-	-	< 2.0	-	870	89.9					-	-	-	-	-	-	-	Valeric Acid

Associated CARO file(s): 8031228, 8052345, 8081555, 8110837, 9031248, 9060275, 9090105, mg/l, N000833, ug/L.
Associated Exova file(s): 506479, 507801, 509233, 600276, 602695, 605393, 608922, 611891, 614770, 617175, 619914, 625680, 627511, 629501.
All terms defined within the body of Keltech's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

Table 5: Historical Summary of Analytical Results For Leachate

Sample Location	S Leachate Wet Well											
Sample ID	S LEACHATE WET WELL-20160623	S LEACHATE WET WELL-20160915	S LEACHATE WET WELL-20161117	S LEACHATE WET WELL-20170914	S LEACHATE WET WELL-20171204	S Leachate Wet Well	S Leachate Wet Well	S Leachate Wet Well-20180524	S Leachate Wet Well	S Leachate Wet Well-20180816	S Leachate Wet Well	S Leachate Wet Well-20181108
ate (yyyy mm dd)	2016 06 23	2016 09 15	2016 11 17	2017 09 14	2017 12 04	2018 03 15	2018 05 24	2018 05 24	2018 08 16	2018 08 16	2018 11 08	2018 11 08
Units		Analytical Results										
Compounds												
µg/L	-	-	< 1.0	< 1.0	< 1.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
µg/L	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
µg/L	-	-	< 5.0	< 5.0	< 5.0	-	-	-	-	-	-	-
µg/L	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
µg/L	-	-	-	-	-	< 0.3	< 0.3	-	< 0.3	-	< 0.3	-
µg/L	-	-	-	-	-	< 1.0	< 1.0	-	< 1.0	-	< 1.0	-
µg/L	-	-	< 0.70	< 0.50	< 0.50	< 0.5	< 0.5	< 0.5	0.6	0.6	0.6	0.6
µg/L	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
µg/L	-	-	< 1.0	2.2	2.4	< 2.5	< 2.2	< 2.2	3.3	3.3	3.4	3.4
µg/L	-	-	< 1.0	1.6	2.2	1.8	1.5	1.5	3.6	3.6	9.7	9.7
µg/L	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
µg/L	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
µg/L	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
µg/L	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
µg/L	-	-	< 5.0	< 5.0	< 5.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
µg/L	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
µg/L	-	-	< 1.4	< 1.0	< 1.0	< 1.0	< 1.0	-	< 1.0	-	< 1.0	-
µg/L	-	-	< 1.0	< 0.50	< 0.50	-	-	-	-	-	-	-
µg/L	-	-	< 1.0	< 0.50	< 0.50	-	-	-	-	-	-	-
µg/L	-	-	< 1.0	< 1.0	< 1.0	-	-	-	-	-	-	-
µg/L	-	-	< 1.0	< 0.20	< 0.20	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
µg/L	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
µg/L	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
µg/L	-	-	< 1.0	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
µg/L	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
µg/L	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
µg/L	-	-	< 1.0	< 0.40	< 0.50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.1	1.1
s												
µg/L	-	-	< 100	-	-	136	159	159	186	186	219	219
µg/L	-	-	< 100	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100
µg/L	290	760	520	300	380	1,020	804	804	312	312	484	484
µg/L	280	750	510	290	380	1,020	799	799	306	306	480	480
µg/L	< 250	< 250	< 250	< 250	< 250	709	665	665	< 250	< 250	891	891
µg/L	< 250	< 250	< 250	< 250	< 250	709	665	665	< 250	< 250	891	891
µg/L	-	-	-	-	-	< 1.0	< 1.0	-	< 1.0	-	< 1.0	-
Acids												
mg/L	-	-	-	-	-	-	-	-	-	-	-	-
mg/L	-	-	-	-	-	-	-	-	-	-	-	-
mg/L	-	-	-	-	-	-	-	-	-	-	-	-
mg/L	-	-	-	-	-	-	-	-	-	-	-	-
mg/L	-	-	-	-	-	-	-	-	-	-	-	-
mg/L	-	-	-	-	-	-	-	-	-	-	-	-
mg/L	-	-	-	-	-	-	-	-	-	-	-	-
mg/L	-	-	-	-	-	-	-	-	-	-	-	-
mg/L	-	-	-	-	-	-	-	-	-	-	-	-

Sample Location		S Leachate Wet Well										
Sample ID		S Leachate Wet Well	S Leachate Wet Well-20190315	S Leachate Wet Well	S Leachate Wet Well-20190603	S Leachate Wet Well	S Leachate Wet Well-20190903	S Leachate Wet Well	S Leachate Wet Well-20191031	S Leachate Wet Well	S Leachate Wet Well	S Leachate Wet Well
Sample Date (yyyy mm dd)		2019 03 15	2019 03 15	2019 06 03	2019 06 03	2019 09 03	2019 09 03	2019 10 31	2019 10 31	2020 03 05	2020 06 03	2020 09 29
Parameter	Units		Analytical Results									
Volatile Organic Compounds												
Chloroethane	µg/L	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Chloroform	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane	µg/L	-	-	-	-	-	-	-	-	-	-	-
Dibromochlorome	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromoethane, 1	µg/L	< 0.3	-	< 0.3	-	< 0.3	-	< 0.3	-	< 0.3	< 0.3	< 0.3
Dibromomethane	µg/L	< 1.0	-	< 1.0	-	< 1.0	-	< 1.0	-	< 1.0	< 1.0	< 1.0
Dichlorobenzene,	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dichlorobenzene,	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dichlorobenzene,	µg/L	2.9	2.9	2.8	2.8	3.3	3.3	3.1	3.1	< 2.6	2.0	2.4
Dichloroethane, 1	µg/L	4.1	4.1	2.5	2.5	9.7	9.7	8.3	8.3	2.3	2.2	3.8
Dichloroethane, 1	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dichloroethylene,	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dichloroethylene,	µg/L	< 1.0	< 1.0	1.2	1.2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dichloroethylene,	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dichloromethane	µg/L	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Dichloropropane,	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dichloropropene,	µg/L	< 1.0	-	< 1.0	-	< 1.0	-	< 1.0	-	< 1.0	< 1.0	< 1.0
Dichloropropene,	µg/L	-	-	-	-	-	-	-	-	-	-	-
Dichloropropene,	µg/L	-	-	-	-	-	-	-	-	-	-	-
Tetrachloroethane	µg/L	-	-	-	-	-	-	-	-			
Tetrachloroethane	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Tetrachloroethyle	µg/L	< 1.0	< 1.0	1.5	1.5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethane, 1	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethane, 1	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethylene	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichlorofluoromet	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	1.3	1.3	< 1.8	< 1.8	< 1.0	< 1.0	< 1.0
Gross Parameters												
VH (C6-C10)	µg/L	206	206	127	127	270	270	200	200	237	< 100	120
VPH (C6-C10)	µg/L	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
EPH (C10-C19)	µg/L	1,020	1,020	458	458	2,580	2,580	600	600	337	< 250	2,300
LEPH (C10-C19)	µg/L	1,020	1,020	452	452	2,580	2,580	592	-	334	< 250	2,290
EPH (C19-C32)	µg/L	604	604	334	334	3,470	3,470	380	380	268	439	785
HEPH (C19-C32)	µg/L	604	604	334	334	3,470	3,470	380	-	267	439	785
MTBE												
Methyl Tert-butyl E	µg/L	< 1.0	-	< 1.0	-	< 1.0	-	< 1.0	-	< 1.0	< 1.0	< 1.0
Resin and Fatty Acids												
Acetic Acid	mg/L	< 3.0	-	< 3.0	-	3.5	-	< 3.0	-	< 3.0	< 3.0	23.1
Butyric Acid	mg/L	< 2.0	-	< 2.0	-	< 2.0	-	< 2.0	-	< 2.0	< 2.0	10.5
Caporic Acid	mg/L	< 2.0	-	2.3	-	< 2.0	-	< 2.0	-	< 2.0	< 2.0	4.9
Heptanoic Acid	mg/L	< 2.0	-	< 2.0	-	< 2.0	-	< 2.0	-	< 2.0	< 2.0	< 2.0
Isobutyric Acid	mg/L	< 2.0	-	< 2.0	-	< 2.0	-	< 2.0	-	< 2.0	< 2.0	4.0
Isocaproic Acid	mg/L	< 2.0	-	< 2.0	-	< 2.0	-	< 2.0	-	< 2.0	< 2.0	3.5
Isovaleric Acid	mg/L	< 2.0	-	< 2.0	-	< 2.0	-	< 2.0	-	< 2.0	< 2.0	< 2.0
Propionic Acid	mg/L	< 2.0	-	< 2.0	-	< 2.0	-	< 2.0	-	< 2.0	< 2.0	< 2.0
Valeric Acid	mg/L	< 2.0	-	< 2.0	-	< 2.0	-	< 2.0	-	< 2.0	< 2.0	2.7

Associated CARO file(s): 8031228, 8052345, 8081555, 8110837, 9031248, 9060275, 9090105, mg/l, N000833, ug/L.
Associated Exova file(s): 506479, 507801, 509233, 600276, 602695, 605393, 608922, 611891, 614770, 617175, 619914, 625680, 627511, 629501.
All terms defined within the body of Keltech's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
\- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

Table 5: Historical Summary of Analytical Results For Leachate

						Sample Location	P2 A2 Leachate MH			
S Leachate Wet Well	S Leachate Wet Well	S Leachate Wet Well	S Leachate Wet Well	S Leachate Wet Well		Sample ID	P2 A2 Leachate MH	P2 A2 Leachate MH	P2 A2 Leachate MH	P2 A2 Leachate MH
2020 11 16	2021 03 18	2021 06 17	2021 09 15	2021 10 22		Sample Date (yyyy mm dd)	2021 03 19	2021 06 18	2021 09 16	2021 10 21
					Parameter	Units	Analytical Results			
					Volatile Organic Compounds					
< 2.0	< 2.0	< 2.0	2.0	< 2.0	Chloroethane	µg/L	< 2.0	< 2.0	< 5.2	< 2.0
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	Chloroform	µg/L	< 1.0	1.2	< 1.0	< 1.0
-	-	-	-	-	Chloromethane	µg/L	-	-	-	-
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	Dibromochlorome	µg/L	< 1.0	< 1.0	< 1.0	< 1.0
< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	Dibromoethane, 1	µg/L	< 0.3	< 0.3	< 0.3	< 0.3
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	Dibromomethane	µg/L	< 1.0	< 1.0	< 1.0	< 1.0
0.5	< 0.5	< 0.5	< 0.5	< 0.5	Dichlorobenzene,	µg/L	< 0.5	< 0.5	< 0.5	< 0.5
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	Dichlorobenzene,	µg/L	< 1.0	< 1.0	< 1.0	< 1.0
3.6	3.4	3.1	2.8	2.7	Dichlorobenzene,	µg/L	< 1.0	< 1.0	< 1.0	< 1.0
5.8	3.6	5.6	6.0	4.3	Dichloroethane, 1	µg/L	< 1.0	< 1.0	2.2	< 1.0
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	Dichloroethane, 1	µg/L	2.0	7.6	10.6	< 1.0
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	Dichloroethylene,	µg/L	< 1.0	< 1.0	< 1.0	< 1.0
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	Dichloroethylene,	µg/L	< 1.0	2.0	6.7	5.7
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	Dichloroethylene,	µg/L	1.8	2.0	2.8	< 1.0
< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	Dichloromethane	µg/L	38.3	58.1	32.4	< 3.0
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	Dichloropropane,	µg/L	< 1.0	< 1.0	< 1.0	< 1.0
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	Dichloropropene,	µg/L	< 1.0	< 1.0	< 1.0	< 1.0
-	-	-	-	-	Dichloropropene,	µg/L	-	-	-	-
-	-	-	-	-	Dichloropropene,	µg/L	-	-	-	-
	-	-	-	-	Tetrachloroethane	µg/L	-	-	-	-
< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	Tetrachloroethane	µg/L	< 0.5	< 0.5	< 0.5	< 0.5
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	Tetrachloroethyle	µg/L	2.3	2.2	1.7	< 1.0
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	Trichloroethane, 1	µg/L	< 1.0	< 1.0	< 1.0	< 1.0
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	Trichloroethane, 1	µg/L	< 1.0	< 1.0	< 1.0	< 1.0
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	Trichloroethylene	µg/L	< 1.0	< 1.0	1.6	< 1.0
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	Trichlorofluoromet	µg/L	< 1.0	< 1.0	< 1.0	< 1.0
< 1.3	< 1.0	< 1.0	3.2	< 1.0	Vinyl Chloride	µg/L	< 1.0	< 1.0	< 2.8	1.9
					Gross Parameters					
215	235	179	114	< 100	VH (C6-C10)	µg/L	284	496	439	< 100
< 100	120	< 100	< 100	< 100	VPH (C6-C10)	µg/L	258	413	343	< 100
424	< 250	483	544	< 2,500	EPH (C10-C19)	µg/L	299	1,150	< 2,500	< 2,500
417	< 250	480	536	< 2,500	LEPH (C10-C19)	µg/L	299	1,140	< 2,500	< 2,500
322	< 250	685	313	< 2,500	EPH (C19-C32)	µg/L	< 250	859	< 2,500	< 2,500
322	< 250	685	313	< 2,500	HEPH (C19-C32)	µg/L	< 250	859	< 2,500	< 2,500
					MTBE					
< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	Methyl Tert-butyl E	µg/L	4.0	3.5	< 9.0	< 5.0
	-	-	-	-	**Resin and Fatty Acids**					
5.2	-	-	-	-	Acetic Acid	mg/L	-	-	-	-
< 2.0	-	-	-	-	Butyric Acid	mg/L	-	-	-	-
< 2.0	-	-	-	-	Caporic Acid	mg/L	-	-	-	-
< 2.0	-	-	-	-	Heptanoic Acid	mg/L	-	-	-	-
< 2.0	-	-	-	-	Isobutyric Acid	mg/L	-	-	-	-
< 2.0	-	-	-	-	Isocaproic Acid	mg/L	-	-	-	-
< 2.0	-	-	-	-	Isovaleric Acid	mg/L	-	-	-	-
< 2.0	-	-	-	-	Propionic Acid	mg/L	-	-	-	-
< 2.0	-	-	-	-	Valeric Acid	mg/L	-	-	-	-

Associated CARO file(s): 8031228, 8052345, 8081555, 8110837, 9031248, 9060275, 9090105, mg/l, N000833, ug/L.
Associated Exova file(s): 506479, 507801, 509233, 600276, 602695, 605393, 608922, 611891, 614770, 617175, 619914, 625680, 627511, 629501.
All terms defined within the body of Keltech's report.
< Denotes concentration less than indicated detection limit or RPD less than indicated value.
\- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

Appendix G

Background Water Quality Assessment

Technical Memorandum

07 December 2023

To	Mr. Scott Hoekstra (City)	**Contact No.**	250-469-8588
Copy to	Roxy Hasior (GHD)	**Email**	shoekstra@kelowna.ca
From	David R. Barton/tw/1	**Project No.**	12605725
Project Name	Glenmore Landfill Engineering Reports		
Subject	Glenmore Landfill Site Specific Background and Compliance Water Quality Review		

1. Introduction

GHD Limited (GHD) has prepared this technical memorandum (memo) for the City of Kelowna (City) to determine Site-specific background groundwater and surface water concentrations and assess water quality compliance at the Glenmore Landfill (Landfill). The Landfill is located at 2710 John Hindle Drive (Site). This assessment has been completed to satisfy the requirements of Section 3.7(b) of the Site Operational Certificate (OC) 12218, issued by the Ministry of Environment and Climate Change Strategy (the Ministry) on December 8, 2000, and most recently amended on May 30, 2023. The assessment has been completed using the guidance provided in *Protocol 9 for Contaminated Sites, Establishing Local Background Concentrations in Groundwater*, Version 2, published by the Ministry on February 1, 2021 (Protocol 9). The Site, Landfill, and monitoring locations are shown on Figure 1.

2. Background

In 2019, following an inspection of the Landfill, the Ministry issued a warning letter (Attachment 1) describing potential non-compliance issues. The Ministry determined that the Landfill was out of compliance with Section 2.8 of OC 12218 (Groundwater and Surface Water Quality Impairment). Groundwater concentrations were noted to exceed the applicable water quality criteria and background concentrations at downgradient compliance wells GL28-1, GL28-2, and GL28-3. Surface water concentrations were noted to exceed the applicable water quality criteria in Little Robert Lake. No background surface water quality data was available for comparison. In response to the warning letter, the City engaged GHD to complete a background water quality assessment for the Site.

GHD completed a background water quality assessment for the Site in 2020 (GHD Limited, 2020) to establish local background groundwater and surface water concentrations and to compare these concentrations to groundwater and surface water quality at the compliance monitoring locations. The assessment is included in Attachment 2. In the assessment, it was determined that insufficient monitoring wells and upstream surface water monitoring locations were present at the Site to characterize background groundwater and surface water quality in the hydrostratigraphic units underlying the Site. Additionally, most of the statistical analyses completed indicated that logarithmic distributions or multiple populations existed for the available data and therefore background concentrations could not be determined.

Following the 2019 warning letter, new groundwater monitoring wells GL41-1, GL41-2, and GL41-3 were installed upgradient of the Landfill at the northwest corner of the property boundary to characterize background groundwater. Additional groundwater monitoring wells GL39-1, GL39-2, GL39-3, GL42-1, and GL42-2 were installed downgradient of the Landfill adjacent to the south property boundary to assess groundwater compliance. Additionally, surface water quality monitoring was initiated at Bubna Slough and Slough 2, the closest upstream surface water bodies to the Site, to support the characterization of background surface water quality.

Since the initial background groundwater and surface water quality assessment was completed in 2020, a sufficient number of groundwater and surface water samples have been collected to assess local background groundwater and surface water quality in accordance with Protocol 9. Samples have been collected from the GL41 (background), GL39, and GL42 (compliance) series groundwater monitoring wells as well as from Slough 2 and Bubna Slough (background).

Background groundwater quality for the Site was assessed using the Protocol 9 options (2a and 2b) for establishing local background concentration in groundwater. Option 2a was also applied to estimate background concentrations in surface water based on surface water quality data from Bubna Slough and Slough 2.

In the 2021 revision of Protocol 9, a table was added that presents regional background concentrations for inorganic substances in groundwater for the Thompson Okanagan Region. The concentrations listed in Table 1 of Protocol 9 are considered representative of background groundwater quality and are applicable at the Site.

On May 30, 2023, the Ministry issued a revised version of OC 12218. In the revised OC, Section 2.8 has been removed and replaced with Section 3.7.

3. Assessment Methodology

Groundwater

Background concentrations and groundwater quality exceedances at compliance wells were determined following the below steps:

– Compliance groundwater analytical results from 2022 were compared to the applicable water quality criteria to establish a preliminary list of potential water quality exceedances.
– The water quality exceedances identified in step 1 were then compared to the regional background concentrations for the Thompson Okanagan Region listed in Table 1 of Protocol 9.
– Background concentrations were determined for the parameters that exceeded both the CSR standards and regional background concentrations as well as parameters that are not included in Table 1 of Protocol 9. Background concentrations for the selected parameters were determined using the statistical methods described in Options 2a and 2b of Protocol 9.

As illustrated on Figure 3.1, the substances that were found to exceed the applicable water quality criteria, the regional background concentrations (where applicable), and the Site-specific 95th percentile background concentrations are considered to be exceedances. After identifying exceedances, concentrations of the exceeding parameters at the compliance wells were compared to landfill leachate concentrations to assess whether the exceedances are likely leachate derived.

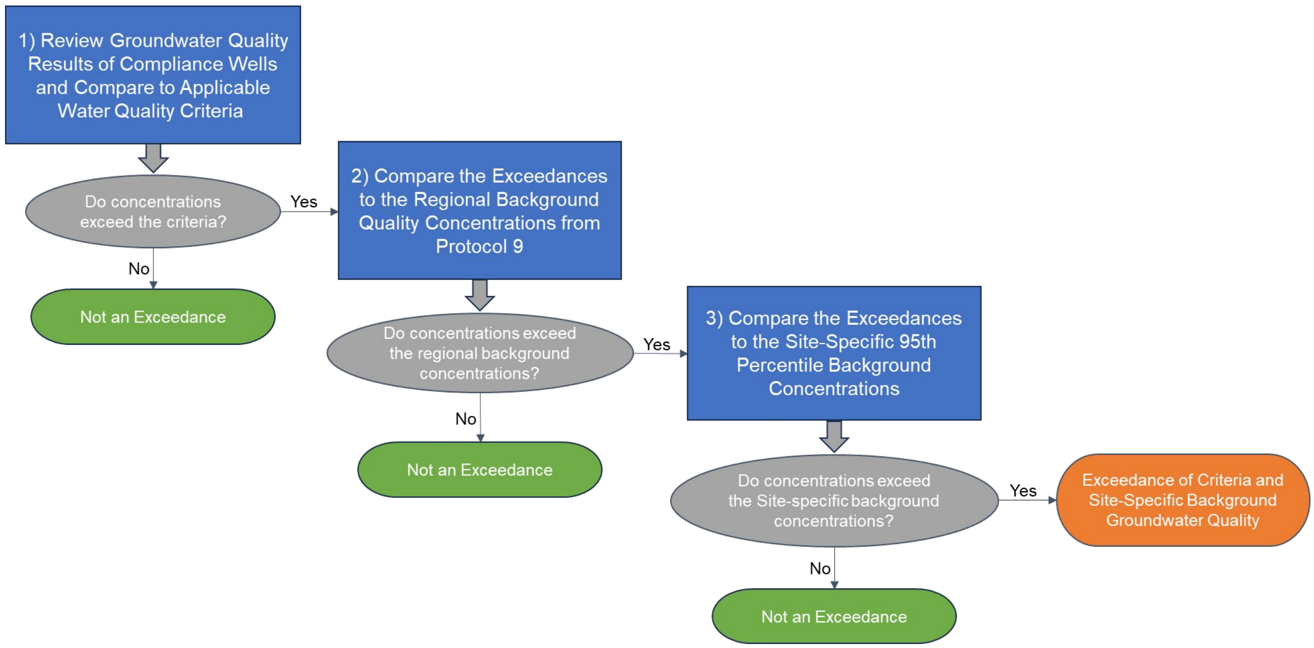

Figure 3.1 Groundwater Quality Exceedance Assessment Methodology

Surface Water

To establish Site-specific background concentrations for surface water at the Site, GHD applied the methodology described in Option 2a of Protocol 9. Under this option, background concentrations in surface water were established through the collection of samples from representative background locations (Slough 2 and Bubna Slough) located upstream of the Site.

4. Hydrogeologic Site Setting

This section provides a summary overview of the Site hydrogeologic setting. A detailed characterization of the Site hydrogeologic setting is provided in the 2023 Hydrology and Hydrogeology Characterization Report (HHCR).

4.1.1 Site Geology and Hydrogeology

Geology underlying the Site consists of overburden sediments of variable thickness which overlie volcanic and sedimentary bedrock. The overburden sediments consist of glaciolacustrine silt and clay deposits which overlie glaciofluvial sands and gravels, which overlie a glacial till unit. Overburden material is primarily found in the valley floor and pinches out towards the sides of the Glenmore Valley. Bedrock underlies the glacial till unit.

GHD’s review of the Site’s stratigraphy logs indicates that the glaciofluvial sand and gravel deposits range in thickness from 0 to 10.0 meters in thickness, with the thickest sand and gravel deposits at the north end of the Site and the thinnest deposits around the slough area. The sand and gravel deposits did not appear in every borehole log, suggesting that the sand and gravel layer forms a discontinuous deposit across the Site. Bedrock at the Site is inferred to have an undulating surface with a depression directly underlying the slough, causing groundwater in the bedrock aquifer to flow preferentially towards the slough.

The BC aquifer classification system indicates Aquifer 469[1] and Aquifer 470[2] are present at the Site. Aquifer 469 is an overburden aquifer composed of sands and gravels with moderate productivity, low vulnerability, and low demand. Aquifer 470 is a bedrock aquifer composed of volcanic rocks belonging to the Penticton Group or Harper Ranch Group.

In general, the geologic units described above may be grouped into the following hydrogeologic units identified in brackets:

1. Shallow silt and clay deposits (act as a leaky aquitard)
2. Glaciofluvial sand and gravel deposits (Aquifer 469)
3. Glacial till unit (act as a leaky aquitard)
4. Bedrock (Aquifer 470)

Horizontal groundwater flow at the Site occurs primarily in the glaciofluvial sand and gravel unit and the underlying bedrock unit. Groundwater flow is interpreted to be generally flowing from north to south, through the Landfill, the slough and the Compost Facility towards the mouth of the valley. It is likely that during periods of high precipitation, precipitation falling on the valley walls and small mountains to the east and west of the valley follow bedrock topography and flow towards the centre of the Site. Once flow reaches the centre of the Site, it joins the primary flow path to the south.

The glacial till unit has a wide range of hydraulic conductivities and is inferred to vary in composition laterally across the Site. The till unit is considered a leaky aquitard, a confining unit with areas that transmits water at a very slow rate. The till unit partially separates the sand and gravel unit from the bedrock unit below it. Flow within the glacial till may be a combination of horizontal and vertical flow depending on the composition.

A portion of groundwater/leachate recharges the slough, which acts as a hydraulic sink. From the slough, groundwater/leachate slowly infiltrates the underlying silt and clay deposits and the sand and gravel unit. A review of the 2022 inferred direction of groundwater flow figures indicate a portion of groundwater that does not recharge the slough also flows south toward the Site boundary.

A review of the 2022 vertical hydraulic gradients on Site indicates that vertical groundwater flows upwards in the northern area of the Site, as well as near the eastern and western Site boundaries. Slight downward vertical gradients occur in the slough and compost facility areas, specifically monitoring well nests GL28, GL29, GL34, GL35 and GL39.

5. Site Groundwater Monitoring Locations

5.1 Compliance/Downgradient Groundwater Monitoring Wells

The groundwater compliance wells for the Site are located along the south property boundary. The compliance wells and the hydrogeologic units they are screened in are listed below:

- GL28-3 (silt and clay)
- GL28-1 (sand and gravel unit)
- GL28-2 (sand and gravel unit)
- GL39-2 (sand and gravel unit)
- GL42-2 (glacial till unit)
- GL39-1 (glacial till unit)
- GL42-1 (glacial till unit)

[1] British Columbia Groundwater Wells and Aquifers, Aquifer 469 Summary. https://apps.nrs.gov.bc.ca/gwells/aquifers/469
[2] British Columbia Groundwater Wells and Aquifers, Aquifer 470 Summary. https://apps.nrs.gov.bc.ca/gwells/aquifers/470

Groundwater quality data from the compliance wells reported from 2022 was compared to the applicable water quality criteria listed in Section 6 and to the regional background concentrations for the Thompson Okanagan Region listed in Table 1 of Protocol 9. Parameters that were reported at concentrations exceeding the applicable water quality criteria and the regional background concentrations, as well as parameters that are not included in Protocol 9 Table 1 (i.e., chloride, nitrate, sulphate, and TDS) are presented in Table 7.2.

It should be noted that GL28-1 is drilled 10 m into bedrock but is screened in the overlying sand and gravel unit.

5.2 Background Groundwater Monitoring Locations

Table 5.1 lists the background groundwater monitoring locations selected for the Site. Selection criteria included:

– Hydraulically upgradient or cross-gradient of the Landfill footprint and Site activities.
– Historically used as a background location.
– Stable water quality with no clear indication of impacts from the Landfill or Site activities.
– Screened within a hydrogeologic unit present upgradient and downgradient of the Landfill footprint.

Wells that met these criteria are screened in the sand and gravel unit and the glacial till unit. There are no background wells screened in the silt and clay deposits.

Table 5.1 Background Groundwater Monitoring Locations

Well ID	Hydrogeologic Units	Location
GL41-3	Sand and gravel unit	Northwest property boundary
GL23-1	Sand and gravel unit	Northeast of Landfill footprint
GL0-3	Sand and gravel unit	North of Landfill footprint (decommissioned in 2021)
Site ID 12082 (off-Site)*	Sand and gravel unit	275 m southeast of the Site boundary (cross gradient)
GL41-2	Glacial till unit	Northwest property boundary
GL15-2	Glacial till unit	Southwest, off-Site
GL0-2	Glacial till unit	North of Landfill footprint (decommissioned in 2021)
* Source: BC Groundwater Database		

6. Applicable Groundwater Quality Criteria

The BC Contaminated Site Regulation (CSR) standards are the applicable water quality criteria for the Site (refer to OC Condition 3.7) and supersede previously used Site criteria. A detailed rationale on the applicability of BCs groundwater quality classes is provided in the 2023 DOCP.

The water quality criteria applicable to the Site include:

– BC CSR drinking water use (DW)
– BC CSR irrigation water use (IW)

7. Determination of Groundwater Quality Exceedances at the Property Boundary

7.1 Application of Protocol 9

Protocol 9 states that for background concentrations that fall within a single statistical population, the representative local background concentration for a substance in groundwater is the 95th percentile concentration of the data set. To establish local, Site-specific, background concentrations for the parameters listed in Table 7.2 (column 3), GHD calculated the 95th percentile concentrations for background groundwater in accordance with the methodology described in Options 2a and 2b of Protocol 9. Specifically, Protocol 9 specifies a two-step process in which first the 95th percentile concentration is determined for each of a minimum of three background wells, and then the local background value is set across the background wells as the 95th percentile of the individual well 95th percentile values. This process accounts for spatial variability in groundwater conditions within a unit by selecting an upper (95th) percentile of the individual well background estimates.

The 95th percentile concentrations were calculated using ProUCL Version 5.2. ProUCL is statistical software developed by the United States Environmental Protection Agency (US EPA) for environmental applications[3]. The 95th percentile represents the value below which 95 percent of the data points in the dataset are found. That is, 95 of 100 random samples from the background population (or 19 out of 20) are expected to have a concentration at or below the calculated 95th percentile.

The following steps were conducted in calculating the 95th percentile background concentrations for the Site:

1. Compiling and tabulating analytical data from the most recent six monitoring events for each of the site's background monitoring wells, as well as from Site 12082 of the Ministry's background groundwater database.
2. Establishing that the concentration data for each parameter occur collectively within a single statistical population. Specifically, that the groundwater monitored at each location has similar aquifer characteristics (depths, spatial proximity, upgradient of potential local anthropogenic impacts, etc.)
3. Determining the statistical data distribution for each data set (e.g., if the concentrations for a parameter in groundwater from each monitoring location fall within a normal, gamma or lognormal distribution).
4. Checking each data set for any statistical outliers. Statistical outliers were determined using ProUCL, taking into account the observed data distribution.
5. Calculating the 95th percentile concentration for each parameter for each background monitoring location.
6. Calculating the overall background value as the 95th percentile of the individual-well values calculated in step 5. Note that if fewer than three data points were available, the maximum reported concentration was used (this occurred for only two data sets – sulphate and uranium in groundwater from the till wells).

The methodologies employed by ProUCL in calculating percentile values for a data set is described in Section 3.3 of the ProUCL Technical Guide (USEPA, 2022)[4]. Other required test methods within ProUCL used in the data evaluation include goodness-of-fit tests to determine data distributions (Section 2.2 in USEPA, 2022) and testing for outliers (Sections 7.3 and 7.4 of USEPA, 2022). Due to the relatively small sample sizes available (i.e., up to 6 observations per background well), the following notes specify how the statistical calculations were applied:

– Many of the data sets were found to fit all three of the data distributions tested by ProUCL (i.e., normal, gamma and lognormal). The data distributions selected were therefore based on inspection of the probability plots (Q-Q plots) produced by ProUCL, as well as considering the diagnostic statistics provided in the goodness of fit tests.

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[3] https://www.epa.gov/land-research/proucl-software

[4] USEPA, June 2022. ProUCL Version 5.2.0 Technical Guide. United States Environmental Protection Agency, Office of Research and Development, Washington DC.

– In some cases, potential outlier values were identified. Each of these was reviewed and considered for applicability in the background calculations. Upon review, a small number of outliers were excluded from the background value calculations.
– Data distribution-based 95th percentile calculations were required, as rank-based (nonparametric) percentile estimates do not provide 95th percentile coverage for small data sets (see Section 3.3.1 of USEPA, 2022).

The analytical results used in step 5 of the statistical analysis are summarized in Table 1 for the sand and gravel unit and Table 2 for the glacial till unit. The 95th percentile concentrations for each monitoring well calculated in step 5 of the statistical analysis are presented in Table 3.

The overall 95th percentile background concentrations are presented in Table 7.1, below. These are considered the background concentrations for the Site.

Table 7.1 Overall 95th Percentile Background Concentrations in Groundwater

Exceedance Parameter	Units	Sand and Gravel Unit 95th Percentile Concentration	Glacial Till Unit 95th Percentile Concentration
Chloride	mg/L	556.4	717.4
Nitrate (as N)	mg/L	2.5	n/a
Sulphate	mg/L	763.7	347.6 (maximum*)
Sodium	mg/L	n/a	1423
Lithium	ug/L	62.2	76.61
Strontium	ug/L	n/a	18,282
Alkalinity, total (as CaCO3)	mg/L	1401.0	n/a
Total Dissolved Solids	mg/L	2250.0	n/a
Uranium	µg/L	227.7	30.0 (maximum*)

Notes:
n/a – not applicable; parameter not assessed as there were no exceedances.
* Only two values remained after removing outliers from the sulphate and uranium datasets for the glacial till wells. Therefore, it was not possible to calculate 95th percentile concentrations and the maximum of the remaining values was used.

7.2 Groundwater Quality Impact Assessment

Based on the results of this assessment, several parameters exceeded the applicable groundwater quality criteria, the regional background concentrations, and the Site-Specific background concentrations (i.e., 95th percentile concentration) at the Site compliance locations. The exceedances are presented in Table 7.2.

Table 7.2 Groundwater Quality Exceedances at Site Compliance Wells

Compliance Location	Exceedances of Water Quality Criteria (2022)	Exceedances also above Regional Background Concentrations	Exceedances also above Site-Specific Background Concentrations
Sand and Gravel Unit			
GL28-1	– Lithium(DW) – Molybdenum(IW) – Sodium(DW) – Strontium(DW) – Uranium(DW)(IW) – Sulphate(DW)	– Uranium(DW)(IW) – Sulphate(DW)	– Sulphate(DW)

Compliance Location	Exceedances of Water Quality Criteria (2022)	Exceedances also above Regional Background Concentrations	Exceedances also above Site-Specific Background Concentrations
GL28-2	– Lithium(DW) – Sodium(DW) – Strontium(DW) – Uranium(DW)(IW) – Nitrate (as N)(DW) – Sulphate(DW)	– Uranium(DW)(IW) – Nitrate (as N) (DW) – Sulphate(DW)	– Nitrate (as N)(DW)(MAC) – Sulphate(DW)(AO)
GL39-2	– Lithium(DW) – Molybdenum(IW) – Sodium(DW) – Uranium(DW)(IW) – Chloride(IW) – Sulphate(DW)	– Uranium(DW)(IW) – Sulphate(DW) – Chloride(IW)	– Sulphate(DW)
Glacial Till Unit			
GL42-2	– Lithium(DW) – Molybdenum(IW) – Sodium(DW) – Strontium(DW) – Uranium(DW)(IW) – Sulphate(DW)	– Lithium(DW) – Uranium(DW)(IW) – Sulphate(DW)	– Lithium(DW) – Uranium(DW)(IW) – Sulphate(DW)
GL39-1	– Lithium(DW) – Molybdenum(IW) – Sodium(DW) – Strontium(DW) – Uranium(DW)(IW) – Chloride(IW) – Sulphate(DW)	– Sodium(DW) – Strontium(DW) – Uranium(DW)(IW) – Sulphate(DW) – Chloride(IW)	– Sulphate(DW)(AO) – Uranium(DW)(IW)
GL42-1	– Lithium(DW) – Sodium(DW) – Strontium(DW)	– Lithium(DW) – Sodium(DW) – Strontium(DW)	– Lithium(DW)
Silt and Clay			
GL28-3	– Arsenic(DW) – Cobalt(DW) – Lithium(DW) – Molybdenum(IW) – Nickel(DW) – Sodium(DW) – Strontium(DW) – Uranium(DW)(IW) – Sulphate(DW)(AW)	– Lithium(DW) – Molybdenum(IW) – Nickel(DW) – Sodium(DW) – Uranium(DW)(IW) – Sulphate(DW)(AW)	– Lithium(DW) – Molybdenum(IW) – Nickel(DW) – Sodium(DW) – Uranium(DW)(IW) – Sulphate(DW)(AW)

Notes:

DW: Schedule 3.2 Generic Numerical Water Standards Column 6 for the protection of Drinking Water.

IW: Schedule 3.2 Generic Numerical Water Standards Column 4 for the protection of Irrigation Water.

AO: Aesthetic Objective

MAC: Maximum Acceptable Concentration

Concentrations of the exceeding parameters at the compliance wells were compared to landfill leachate concentrations to assess whether the exceedances are likely leachate derived or not. The following conclusions were made:

– The concentration of nitrate, lithium, and uranium reported at GL28-2, GL39-1, GL41-1, and GL42-2 are greater than the concentrations reported in Landfill leachate from Phase 1 and 2 indicating that landfill leachate is not solely the cause of nitrate, lithium, and uranium exceedances in groundwater at the property boundary:
  - The concentration of nitrate in Landfill leachate ranged from non-detect to 7.7 mg/L in 2022, which is below the CSR DW criteria of 10 mg/L. Nitrate in landfill leachate is protective of drinking water, and so the nitrate exceedance at GL28-2 is not resulting from leachate.
  - The concentration of lithium in landfill leachate ranged from 31.9 to 290 ug/L in 2022, which is lower than the concentration reported at GL41-1 (861 ug/L) and GL42-2 (861 ug/L). As such, landfill leachate cannot solely be the cause of the lithium exceedance at GL42-2.
  - The concentration of uranium in leachate ranged from 1.75 to 32.2 ug/L in 2022, which is well below the concentrations measured at GL39-1 (244 ug/L) and GL42-2 (122 ug/L). As such, landfill leachate cannot solely be the cause of the uranium exceedance at GL39-1 and GL42-2.

– Sulphate concentrations in landfill leachate (<10 mg/L to 1,880 mg/L) are similar to groundwater at the property boundary (28.2 mg/L to 4,640 mg/L), indicating that the source of sulphate in groundwater may be landfill derived.

– Monitoring well GL28-3 is a shallow well screened in silt and clay. The concentrations of dissolved metals reported at GL28-3 are substantially higher than the concentrations measured at nested wells GL28-2 and GL28-1, which are screened deeper within the sand and gravel unit. The elevated concentrations of dissolved metals at GL28-3 may be related to elevated turbidity of groundwater at GL28-3 due to the presence of silt and clay in groundwater samples.

8. Hydrology Site Setting

Surface water features on and off-Site are presented on Figure 1.

Two sloughs located north of the Site serve as the surface water background locations for the EMP. Slough 2 is 3.5 km and Bubna Slough is 1.5 km north of the Site.

Within the Site boundary, stormwater is directed to and contained in the three constructed ponds (Northeast Pond, Bredin Pond, and Tutt Pond) with no overland flow off the Site property under normal operating conditions. Stormwater from the Northeast Pond flows to Bredin Pond, which flows into Tutt Pond. Local farmers use water from Tutt Pond to irrigate their lands.

Additionally, Tutt Pond is equipped with an emergency by-pass system that allows water to be pumped from Tutt Pond via temporary pumps and hoses into the drainage system at the south end of the Site. Throughout the Site's history, emergency pumping from Tutt Pond has only occurred twice, between April 15 and July 10, 2018, and April 29 to May 28, 2019. During large storm events, run-off from the southeastern portion of the Site (i.e., from the administrative building area) can also enter the drainage system at the south end of the Site. This drainage system discharges to Little Robert Lake via a drainage culvert located at the south Site property boundary. The flow meter installed within the culvert shows that stormwater occasionally discharges from the Site.

The Slough, located at the centre of the Site, is the remnant of Alki Lake, a former lake, which was partially infilled with waste when landfilling began at the Site. The Slough does not have any overland outlet drainages. Water in the Slough is partially drained by the Landfill leachate collection system and is reduced through evaporation. A portion of water in the Slough also infiltrates into the underlying groundwater system.

There are two sloughs located south of the Site (downstream). Little Robert Lake is 250 m and Robert Lake is 650 m from the Site south boundary. Each of these surface water bodies are natural alkaline lakes and are considered potential off-Site aquatic receptors to the Landfill.

9. Surface Water Locations

For the purposes of this memo, surface water quality is characterized/assessed as follows:

– Background surface water quality is characterized by Slough 2 and Bubna Slough, which are located hydraulically upgradient, north of the Site boundary.
– Potential Site derived impact was assessed at Little Robert Lake and Robert Lake, which are located downstream of the Site.

Little Robert Lake is being assessed for Site derived impacts resulting from Site stormwater discharge and potential groundwater recharge. Robert Lake is being assessed for Site derived impacts resulting from groundwater recharge.

It should be noted that Little Robert and Robert Lake are not monitored as compliance locations under the 2022 Environmental Monitoring Program developed for the Site. Instead, these lakes are monitored as background locations. The surface water impact assessment presented herein is being completed as a voluntary and proactive measure, and is not required under the Landfill OC.

10. Applicable Surface Water Quality Criteria

The BC water quality guidelines (WQGs) were used in this assessment as the most applicable water quality criteria for Little Robert Lake and Robert Lake. As mentioned in Section 8, these surface water bodies are natural alkaline lakes and so are unique environments that aren't necessarily applicable to freshwater aquatic life criteria. However, in the absence of Site-specific criteria, BC WQGs were applied. Additional rationale for the selection of the applicable water quality criteria is included in the DOCP.

The water quality criteria used for this assessment include:

– – BC Water Quality Guidelines (WQG) Aquatic Life Long-Term Chronic (AW LT)
– – BC WQG Aquatic Life Short-Term Acute (AW ST)
– – BC WQG Irrigation Long-Term Chronic (IW LT)
– – BC WQG Irrigation Short-Term Acute (IW ST)

The short-term chronic WQGs are the primary criteria. Where short-term chronic criteria are not available, long-term chronic WQGs were used.

11. Determination of Surface Water Quality Exceedances

To identify surface water quality exceedances, the 2022 water quality dataset for Little Robert Lake was reviewed. Parameters that were reported at concentrations greater than the applicable criteria at Little Robert Lake are presented in Table 11.2.

11.1 Application of Protocol 9

To determine Site-specific background surface water concentrations, Protocol 9 was applied following the steps described in Section 3. As there are only two background surface water monitoring locations at the Site, data from the six most recent monitoring events at Slough 2 and Bubna Slough were treated as a single dataset from which 95th percentile concentrations were calculated. The analytical results used in the statistical analysis are presented in the attached Table 4. The 95th percentile results are summarized in Table 11.1.

Table 11.1 95th Percentile Concentrations in Background Surface Water

Parameter	Units	95th Percentile Concentration in Background Surface Water
Chloride	mg/L	812.1
Sulphate	mg/L	1520
Ammonia, Total (as N)	mg/L	1.22
Aluminium	mg/L	0.0411
Arsenic	mg/L	0.00618
Chromium	mg/L	3.45×10^{-4}
Iron	mg/L	0.0785
Uranium	mg/L	0.0329
Molybdenum*	mg/L	0.00733*
Field Conductivity	uS/cm	6438
Alkalinity, Total (as CaCO3)	mg/L	1037
Phosphorus, Total (as P)	mg/L	0.0733
Notes: * Molybdenum concentrations in background surface water do not fall within a normal, lognormal, or gamma distribution. The maximum concentration in background surface water from the most recent 6 samples at Slough 2 and Bubna Slough was used.		

11.2 Surface Water Impact Assessment

Based on the results of this assessment, several parameters were determined to exceed the applicable surface water quality criteria and the local 95th percentile background surface water concentrations at Little Robert Lake. The parameters that exceeded the applicable water quality criteria and Site-specific background concentrations are summarized in Table 11.2.

Table 11.2 Surface Water Quality Exceedances at Little Robert Lake

Monitoring Location	Exceedances of Applicable Water Quality Criteria (2022)	Exceedances also above Site-Specific Background Concentrations
Little Robert Lake	– Chloride(IW-ST) – Sulphate(AW-LT) – Aluminium(AW-ST, IW-ST) – Arsenic(AW-ST) – Chromium(IW-LT) – Iron(AW-ST) – Uranium(AW-LT, IW-LT) – Field Conductivity(IW-LT) – Total Alkalinity (as CaCO3)(IW-LT) – Total Phosphorus (as P)(AW-ST)	– Sulphate(AW-LT) – Aluminium(AW-ST, IW-ST) – Arsenic(AW-ST) – Chromium(IW-LT) – Iron(AW-ST) – Uranium(AW-LT, IW-LT) – Total Phosphorus (as P)(AW-ST)
Robert Lake	– Chloride(IW-ST, AW-LT) – Sulphate(AW-LT) – Ammonia(AW-ST) – Aluminium(AW-ST)	– Sulphate(AW-LT) – Total Alkalinity (as CaCO3)(IW-LT) – Aluminium(AW-ST) – Arsenic(AW-ST)

Monitoring Location	Exceedances of Applicable Water Quality Criteria (2022)	Exceedances also above Site-Specific Background Concentrations
	– Arsenic(AW-ST) – Chromium(IW-LT) – Iron(AW-ST) – Molybdenum(IW-ST) – Uranium(AW-LT, IW-LT) – Total Alkalinity (as CaCO3)(IW-LT) – Total Phosphorus (as P)(AW-ST) – Field Conductivity(IW-LT)	– Chromium(IW-LT) – Iron(AW-ST) – Uranium(AW-LT, IW-LT) – Molybdenum(IW-ST) – Total Phosphorus (as P)(AW-ST) – Field Conductivity(IW-LT)
Notes: AW-ST: BCWQG Aquatic Life Short-Term Maximum guideline. AW-LT: BCWQG Aquatic Life Long-Term Average guideline. IW-ST: BCWQG Irrigation Water Short-Term Maximum guideline. IW-LT: BCWQG Irrigation Water Long-Term Average guideline.		

Concentrations of the exceeding parameters at the compliance wells were compared to landfill leachate concentrations to assess whether the exceedances are potentially leachate derived or not. The following conclusions were made:

– The concentration of sulphate in Landfill leachate ranged from non-detect to 1,880 mg/L in 2022, which is lower or similar in concentration to surface water in Little Robert Lake and Robert Lake (1,810-6,280 mg/L) indicating that leachate is not solely the source of sulphate exceedances. The presence of Landfill-related sulphate impacts in groundwater at the Site boundary and an increasing sulphate trend at each lake suggests that sulphate impacts may be related to the Landfill. Additional monitoring is needed to further assess sources of sulphate, as described in the HHCR.
– Aluminium, uranium, and molybdenum are lower in concentration within Landfill leachate than compared to surface water collected from Little Robert and Robert Lake. Additionally, these metals and arsenic, chromium, and iron are not in high concentrations within the sand and gravel groundwater, which recharges Robert Lake, indicating that these exceedances may not be Landfill derived. As presented in the HHCR, higher concentrations of metals in the surface water bodies may be attributable to the evaporative condition of the lakes. Over time, the cumulative effects of evaporation cycles can cause metal concentrations in surface water to increase over time.

12. Summary

The available groundwater and surface water quality data for the Site from 2022 was assessed to determine Site-specific background water quality concentrations and water quality exceedances at groundwater compliance wells and at downstream surface water locations at Little Robert Lake and Robert Lake.

This assessment was completed by comparing compliance and downstream surface water concentrations to regional and Site-specific background concentrations and applicable water quality criteria. Site-specific background concentrations were determined using the guidance provided in Protocol 9. Exceedances are listed below.

Groundwater – Sand and Gravel Unit:

– GL28-1 (sulphate)
– GL28-2 (nitrate, sulphate)
– GL39-2 (sulphate)

Groundwater – Glacial Till Unit:

– GL42-2 (sulphate, lithium, uranium)
– GL39-1 (sulphate, uranium)
– GL42-1 (lithium)

Groundwater – Silt and Clay

– GL28-3: (lithium, molybdenum, nickel, sodium, uranium, sulphate)

Surface Water

– Little Robert Lake (sulphate, aluminium, arsenic, chromium, iron, uranium, total phosphorus
– Robert Lake (sulphate, aluminium, arsenic, chromium, iron, uranium, total phosphorus, total alkalinity, molybdenum, and field conductivity)

Based on a comparison of concentrations in Landfill leachate, compliance groundwater, and surface water, only sulphate cannot be ruled out as being Landfill derived.

Recommendations

– Apply Protocol 9 to future annual reports to determine local background concentrations.

Regards

David R Barton, GIT
Hydrogeologist in Training

Rose Marie Rocca, P.Geo.
Hydrogeologist

Tables

Table 1

Background Groundwater Quality Data Summary
Sand and Gravel Aquifer
Glenmore Landfill
City of Kelowna

Sample Location		GL41-3	GL41-3	GL41-3	GL41-3	GL41-3	GL41-3	GL23-1	GL23-1	GL23-1	GL23-1	GL23-1	GL23-1
Sample Date		20-Jun-20	22-Oct-20	25-May-21	7-Sep-21	6/15/2022	9/23/2022	5/23/2019	8/17/2019	6/17/2020	10-Sep-20	13-May-21	6/6/2022
Parameter	Units												
Chloride	mg/L	423	423	471	406	250	337	34	35	32.3	33.1	33.2	31.9
Nitrate (as N)	mg/L	1.18	1.38	1.51	1.78	1.32	1.75	0.072	ND (0.01)	0.134	0.028	0.01	0.041
Sulphate	mg/L	159	160	160	143	108	133	384	394	405	402	376	416
Alkalinity, total (as $CaCO_3$)	mg/L	575	570	618	622	533	587	1120	1090	964	1110	1180	962
Total Dissolved Solids	mg/L	1580	1400	1340	1400	1010	1230	1,590	1,610	1530	1660	1370	1610
Uranium	ug/L	27.7	26.9	26.3	24.6	14.1	19.3	80.5	75.6	68.9	74.7	68.5	73.5
Lithium	ug/L	47.5	41.3	45.3	43.4	31.1	37	42.5	39.8	36.7	41.7	36.7	39.6

Notes:
mg/L - milligrams per litre
uS/cm - microSiemens per centimetre
ND (50) - Not detedcted at the associated reporting limit

Table 1

Background Groundwater Quality Data Summary
Sand and Gravel Aquifer
Glenmore Landfill
City of Kelowna

Sample Location		GL0-3	GL0-3	GL0-3	GL0-3	GL0-3	GL0-3	09BH03	09BH03	09BH03	09BH03	09BH03	09BH03
Sample Date		11/3/2015	5/24/2016	5/24/2017	5/29/2018	5/29/2019	3/10/2020	6/1/2017	6/4/2018	5/30/2019	6/9/2020	6/9/2021	6/6/2022
Parameter	Units												
Chloride	mg/L	121	127	131	121	154	139	15	26.2	27.9	25.3	11.1	9.43
Nitrate (as N)	mg/L	47.6	49.1	48.7	44.7	67	55.8	0.69	ND (0.01)	1.88	1.75	1.01	0.931
Sulphate	mg/L	382	401	368	293	613	505	1024	1,500	1,090	1540	939	1070
Alkalinity, total (as $CaCO_3$)	mg/L	422	442	396	481	525	491	698	788	780	776	713	644
Total Dissolved Solids	mg/L	1460	1450	1420	1480	2060	1970	2270	2,800	2,460	3020	1,800	2200
Uranium	ug/L	111	124	130	198	178	122	124	168	161	207	115	140
Lithium	ug/L	ND (50)	ND (50)	ND (50)	41.1	52.3	50.1	ND (50)	29.9	33.3	31	22	20.2

Notes:
mg/L - milligrams per litre
uS/cm - microSiemens per centimetre
ND (50) - Not detedcted at the associated reporting limit

Table 2

Background Groundwater Quality Data Summary
Till Unit
Glenmore Landfill
City of Kelowna

Sample Location		GL41-2	GL41-2	GL41-2	GL41-2	GL41-2	GL41-2	GL15-2	GL15-2	GL15-2	GL15-2	GL15-2	GL15-2	GL0-2	GL0-2	GL0-2	GL0-2	GL0-2	GL0-2
Sample Date		6/12/2020	10/22/2020	5/25/2021	9/7/2021	15-Jun-22	9/23/2022	9/25/2017	9/28/2018	9/24/2019	11/4/2020	10/7/2021	10/5/2022	11/3/2015	5/24/2016	5/24/2017	5/29/2018	5/29/2019	3/10/2020
Parameter	Units																		
Chloride	mg/L	387	402	423	383	232	286	181	214	246	360	346	361	12.1	6.8	7.1	9.63	71.6*	7.88
Sulphate	mg/L	166	175	151	138	109	122	4560	3730	4060	7190	5260	4080	317	310	325	296	349	303
Sodium	mg/L	279	256	286	266	195	199	1070	992	794	1630*	ND (0.5)	786	92.7	56.7	60.4	63.2	116	58.3
Lithium	ug/L	45.2	41.7	42.5	41.5	29.7	32.9	55	49.2	52.8	64.9	36.1	39.6	ND (25)	ND (25)	ND (25)	32	27	32
Strontium	ug/L	3120	2840	2990	2960	2140	2440	8810	6020	8810	14900	ND (5)	6830	1650	1420	1670	1360	2020	1500
Uranium	ug/L	26.3	25.8	24.5	24.6	15.4	18	423	318	355	549	453	329	19.5*	1.92	2.05	3.1	55.3*	3.01

Notes:
mg/L - milligrams per litre
uS/cm - microSiemens per centimetre
ND (5) - Not detedcted at the associated reporting limit
* Value identified as outler and removed from the dataset

Table 3

Background Groundwater Quality Data Summary
95th Percentile Concentrations -
Sand and Gravel Aquifer and Glacial Till Unit
Glenmore Landfill
City of Kelowna

Hydrogeologic Unit		**Sand and Gravel Aquifer**					**Till Unit**		
Monitoring Location		GL41-3	GL23-1	GL0-3	09BH03	12082(1)	GL41-2	GL15-2	GL0-2
Parameter	Units								
Chloride	mg/L	515*	35.11	153*	32.73	54.6	476.3	417.3	12.31
Nitrate (as N)	mg/L	1.9	0.1	65.54*	2.1	1.0	n/a	n/a	n/a
Sulphate	mg/L	178	420.2	614.3	1619	2446.4	185.4	6919*	347.6
Alkalinity, total (as $CaCO_3$)	mg/L	638.7	1217	538.3	828	-	n/a	n/a	n/a
Total Dissolved Solids	mg/L	1643	1731	2121	3146	-	n/a	n/a	n/a
Uranium	ug/L	32.0	81.0	201.9	207.8	122.6	561.9	550.2	3.5*
Lithium	ug/L	50.8	43.5	57.6	36.8	185	49.0	66.9	35.1
Sodium	mg/L	n/a	n/a	n/a	n/a	n/a	312.6	1145	114.6
Strontium	ug/L	n/a	n/a	n/a	n/a	n/a	3370	14798	1995

Notes:
mg/L - milligrams per litre
uS/cm - microSiemens per centimetre
ND (50) - Not detedcted at the associated reporting limit
* Value identified as outler and removed from the dataset
n/a - not applicable; parameter not assessed as there were no exceedances
(1) - 95th percentile concentrations from Site ID 12082 (BC Groundwater Database)
 - Alkalinity and total dissolved solids data not available from Site ID 12082

Table 4

Background Surface Water Data Summary
Slough 2 and Bubna Slough
Glenmore Landfill
City of Kelowna

Sample Location		Slough #2	Slough #2	Slough #2	Slough #2	Slough #2	Slough #2	Bubna Slough	Bubna Slough	Bubna Slough	Bubna Slough	Bubna Slough	Bubna Slough
Sample Date		6/16/2021	10/20/2021	3/23/2022	6/21/2022	9/12/2022	10/19/2022	6/16/2021	10/20/2021	3/23/2022	6/21/2022	9/12/2022	10/19/2022
Parameter	Units												
Conductivity, field	uS/cm	4,926	5,874	3548	5057	5889	5950	3018	3587	1427	3023	3371	3403
Ammonia, Total (as N)	mg/L	0.118	1.28	0.189	0.622	0.535	1.28	0.153	0.297	ND (0.050)	ND (0.050)	0.233	0.384
Chloride	mg/L	558	568	363	643	778	759	498	581	301	552	668	665
Sulphate	mg/L	1050	1100	661	1160	1380	1410	184	219	97.7	185	217	220
Alkalinity, Total (as CaCO3)	mg/L	875	974	651	904	973	910	688	792	442	687	744	708
Phosphorus, Total (as P)	mg/L	0.0374	0.0553	0.0566	0.0582	0.148*	0.0799	0.014	0.0169	0.023	0.0235	0.02	0.0185
Aluminium	mg/L	0.0063	0.0126	0.0537	0.0179	0.0282	0.027	ND (0.002)	0.0033	0.0078	0.0039	0.0032	0.0053
Arsenic	mg/L	0.00557	0.00521	0.00337	0.00427	0.0055	0.00505	0.00179	0.00158	0.00108	0.00154	0.0016	0.0015
Chromium	mg/L	0.00026	0.00036	0.00033	0.00026	0.00022	ND (0.00025)	0.00014	0.00013	0.00018	0.00013	0.00018	0.00015
Iron	mg/L	0.0288	0.0404	0.0929	0.0343	0.0686	0.0567	0.0083	0.0067	0.0149	0.0072	0.0037	0.0067
Uranium	mg/L	0.0197	0.0302	0.0183	0.0249	0.0255	0.0305	0.00484	0.00563	0.00615	0.00493	0.00353	0.00466
Molybdenum	mg/L	0.00473	0.00733	0.00362	0.00528	0.00598	0.00658	0.00154	0.00128	0.00128	0.00138	0.00115	0.00126

Notes:
mg/L - milligrams per litre
uS/cm - microSiemens per centimetre
ND (0.025) - Not detedcted at the associated reporting limit
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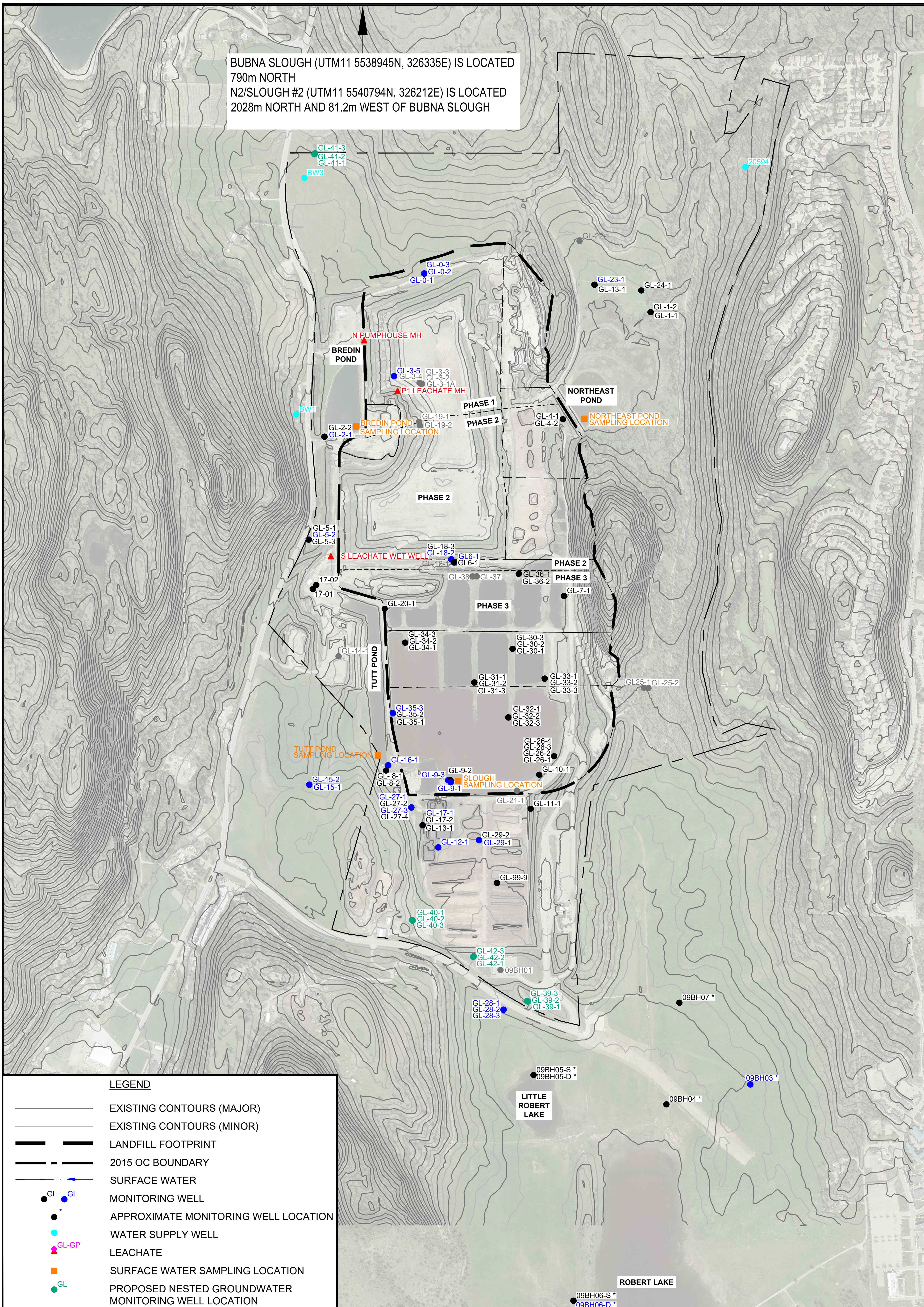
Figures



CITY OF KELOWNA - GLENMORE LANDFILL
BACKGROUND WATER QUALITY REVIEW

MONITORING LOCATIONS

12605725

Oct 5, 2023

FIGURE 1

CAD File: N:\CA\Vancouver\Projects\663\12605725\Digital_Design\ACAD\Figures\12605725-GHD-00-00-RPT-EN-D101_WA-001.dwg

Attachments

Attachment 1

January 24, 2020 Reference No. 084612-24

Mr. Scott Hoekstra
Solid Waste Supervisor
City of Kelowna
1435 Water Street
Kelowna, BC V1Y 1J4

Dear Mr. Hoekstra:

Re: Background Water Quality Review
Glenmore Landfill, City of Kelowna

1. Introduction

GHD Limited (GHD) has prepared this letter report for the City of Kelowna (City) to provide a background water quality review for the Glenmore Landfill (Site). This background water quality review has been conducted as part of the action plan to address a non-compliance identified in a July 23, 2019 inspection letter *Re: Warning Letter, Operational Certificate, 12218*, from the Ministry of Environment and Climate Change Strategy (ENV).

2. Site Setting

This section provides an overview of the physical Site setting.

2.1 Site Location and Physical Setting

The Site is located at 2720 John Hindle Drive in Kelowna, British Columbia (BC). The Site is approximately 1.5 kilometres (km) east of Okanagan Lake and 9 km northeast of downtown Kelowna. The Site is situated in a narrow-flat bottomed valley known as Glenmore Valley surrounded by two ridges. The eastern ridge of Glenmore Valley includes Bredin Hill, located to the northeast, and Tutt Mountain, located to the southeast of the Site. Glenmore Valley trends north-south, generally parallel with Okanagan Lake, and the valley floor gradually slopes towards the south. The adjacent land uses are a combination of roads, rural developments, agricultural lands, and natural forested land.

2.1.1 Site Geology and Hydrogeology

Based on previous investigations and data interpretations, volcanic bedrock and sedimentary bedrock are encountered in the vicinity of the Site. There are bedrock outcrops in ridges along the western and eastern sides of the valley. Overburden material is primarily found in the valley floor and pinches out towards the sides of the valley. There are three stratigraphic layers within the overburden:

- A glacial till overlying the bedrock.
- A glaciofluvial sands and gravels overlying the till.
- Glaciolacustrine silt and clay deposits overlying the glaciofluvial sands and gravels.

Although groundwater is encountered in all the stratigraphic units identified above, groundwater at the Site is interpreted to primarily flow horizontally through the sand and gravel and bedrock aquifers. Groundwater within these two aquifers is interpreted to flow towards the centre of the Site from the walls of the valley located to the east and west of the Site, however an unquantified portion of groundwater is also inferred to flow north to south along the floor of the valley. Additional monitoring wells have been installed at the Site to assist in quantifying the inferred north to south groundwater flow. The results of this investigation/analysis will be presented under separate cover.

Figure 1 presents a Site plan with the inferred groundwater flow directions.

2.1.2 Site Surface Water and Surface Water Drainage

Prior to the existence of the landfill at the Site, an alkaline lake known as Alki Lake occupied the area. A surface water outlet is inferred to have been historically present at the southwest corner of Alki Lake, which flowed towards Little Robert Lake and then Robert Lake (Golder, 2012). Alki Lake was infilled by the waste and what remains of Alki Lake is currently known as the Slough. The Slough does not have any overland outlet drainages. A leachate collection pipe is located between Phase 2 and Phase 3 of the landfill footprint, which does collect water from the Slough as well as Phase 2 of the landfill.

At present-day, surface water that flows on to the Site is contained and/or managed within the Site's surface water ponds. Site surface water run-off is managed in three constructed ponds, Northeast Pond, Bredin Pond, and Tutt Pond. Surface water from the Northeast Pond flows to Bredin Pond, which flows into Tutt Pond. An overflow pipe links Tutt Pond to the Slough. The water level in Tutt Pond is managed such that flow is directed towards the Slough. Surface water from Tutt Pond is also periodically used to irrigate the agricultural lands southwest of the Site.

Within the Landfill footprint, surface water runoff is managed as leachate through infiltration into the waste mass or collection in the Slough. As mentioned, the Slough was formerly used as a waste disposal area, therefore water drained from this area is managed as leachate.

Figure 2 illustrates the Site location and surface water features near the Site.

More details regarding the Site setting, geology, hydrogeology and surface water information can be found in 2018 Design, Operations, and Closure Plan (2018 DOCP) (GHD, 2018).

3. Current Groundwater and Surface Water Quality Monitoring Program

3.1 Current Groundwater and Surface Water Quality Monitoring Program

A groundwater and surface water monitoring program has been implemented at the Site as a part of the Site's Environmental Monitoring Program (EMP). The objective of the EMP is to detect the extent and magnitude of potential impacts to groundwater and surface water quality associated with the landfilling activities, ensure regulatory compliance, and to mitigate potential environmental risks.

3.2 Groundwater Monitoring Program

This section describes the EMP undertaken in 2018 as the 2019 EMP was in progress at the time of preparing this letter report. As of November 2019, there are 73 monitoring wells located onsite and offsite to be included in the Site's EMP.

There were 82 groundwater monitoring wells included in the Site's 2018 EMP. Hydraulic monitoring is conducted at each monitoring well on a quarterly basis. For the 2018 EMP, groundwater sample collection was conducted at 23 monitoring wells during the spring monitoring event and 9 monitoring wells during the fall event. Groundwater samples are collected for analysis of general chemistry parameters, nutrients, and dissolved metals. The wells sampled during the 2018 spring monitoring event and fall monitoring event are listed in Table 3.1 and Table 3.2, respectively. The wells are grouped based on their location relative to the landfill and screened hydrostratigraphic unit.

Table 3.1 2018 EMP - Spring

	Waste	Clay	Sand/Gravel	Till	Bedrock
North of Phase 1 (background)			GL0-3	GL0-2	GL0-1
Northeast of Phase 1 (background)			GL23-1		
Phase 1			GL3-5		
Phase 2	GL6-1 (2011)	GL2-1	GL5-2, GL18-2*		
Phase 3			GL35-3	GL9-3	GL9-1
South of Phase 3				GL12-1	GL29-1
Southwest of Phase 3		GL27-3			GL16-1, GL17-1, GL27-1
Downgradient of the Site (compliance)		GL28-3	GL28-2	GL28-1	

	Waste	Clay	Sand/Gravel	Till	Bedrock
Downgradient of the Site			09BH06D, 09BH03		
Notes: * GL18-2 was decommissioned in 2019					

Table 3.2 2018 EMP - Fall

	Waste	Clay	Sand/Gravel	Till	Bedrock
South of Phase 3				GL12-1	GL29-1
Southwest of Phase 3				GL15-2	GL17-1, GL27-1, GL15-1
Downgradient of the Site (compliance)		GL28-3	GL28-2	GL28-1	

Groundwater samples were collected and analyzed for general chemistry parameters, nutrients, and dissolved metals. The results of the groundwater water monitoring program are summarized in the annual monitoring reports prepared by a third party consultant.

Figure 2 illustrates the locations of the groundwater monitoring wells at the Site.

3.2.1 Additions to the Groundwater Monitoring Program

In the 2018 DOCP, GHD proposed to include 5 more of the existing monitoring wells in the Site's groundwater monitoring program for sample collection during the spring and fall monitoring events. It is anticipated that sampling at these locations will be included in the 2020 EMP. The additional monitoring wells are listed in Table 3.3 below.

Table 3.3 Additional Monitoring Wells From 2018 DOCP

	Waste	Clay	Sand/Gravel	Till	Bedrock
Area 1		GL2-2, GL4-2	GL2-1, GL4-1	GL20-1	

3.3 Surface Water Monitoring Program

There are four surface water sampling locations included in the Site's EMP. Surface water samples are analyzed for general chemistry parameters, nutrients, and total metals. In 2018, surface water collection was conducted in April, May, September, and November. All four surface water sampling locations are on-Site surface water management ponds, as follows:

- Northeast Pond – northeast corner of the Site
- Tutt Pond – west side of the Site

- Bredin Pond – northwest corner of the Site
- Slough – central area of the Site

As indicated in the 2018 Glenmore Landfill Annual Report (2019, City of Kelowna) (2018 Annual Report), significant quantities of surface water runoff from the upstream Bubna Slough and the Glenmore-Ellison Improvement District's McKinley Reservoir flowed onto the Site in the 2018 freshet season. To manage the excess surface water, surface water was pumped from Tutt Pond to Little Robert Lake as per the Surface Water Management Plan in the Comprehensive Site Development Plan (CH2MHILL, 2008) (CSDP). Surface water samples were collected from the Bubna Slough (Bubna Discharge), Little Robert Lake, and Robert Lake during four separate sampling events in 2018 to understand the potential impacts the excess surface water may have on Site and downstream surface water quality. These monitoring locations are not part of the "routine" surface water monitoring program, therefore there is a minimal historical dataset for surface water quality at these surface water bodies.

GHD proposed 3 additional surface water monitoring locations in the 2018 DOCP in anticipation of the construction of new surface water management infrastructure at the Site. The proposed additional surface water monitoring locations include:

- North surface water pond, located north of Landfill Gas (LFG) flare compound
- South surface water pond, located at southwest corner of the limit of waste
- Background ephemeral surface water locations north of the Site

The north surface water pond and the south surface water pond will be new lined ponds on Site. These ponds are scheduled constructed over the next 10 years.

4. Documentation Review

To assist with the background water quality review for the Site, the City provided GHD with reference documentation. The reference documentation includes previous reports detailing investigations completed on the properties immediately to the southeast of the Site, which are owned by the University of British Columbia Okanagan (UBCO). The City also provided GHD with a work plan prepared by SNC Lavalin to install additional monitoring wells at the Site for reference and review.

4.1 UBCO Water Quality Summary

UBCO retained EBA Engineering Consultants Ltd. (EBA) to complete a series of investigations on their lands adjacent to the Site from 2008 to 2010. UBCO owns nineteen property lots (UBCO Property) located to the southeast of the Site. The investigations and the BC Ministry of Environment's (BC MOE) response to the investigations are detailed in the following documents:

- *Baseline Groundwater Quality and Surface Water Quality Assessment*, November 2008. EBA.
- *Stage 1 Preliminary Site Investigation*, February 2010. EBA.

- *Stage 2 Preliminary Site Investigation*, February 2010. EBA.
- *Background Surface Water Investigation*, March 2010. EBA.
- *Application for Background Sulphate and Ammonia in Surface Water*, March 2010. BC MOE.

The key findings of each document, which are relevant to this letter report are summarized in the subsections below.

4.1.1 Baseline Groundwater Quality and Surface Water Quality Assessment, 2008. EBA

In 2008, UBCO retained EBA to conduct a baseline groundwater and surface water quality investigation on the UBCO Property. The following work was completed in the investigation:

- Two monitoring wells were scheduled for field monitoring and groundwater sample collection – 06BH01 and 06BH02. 06BH01 was located approximately 100 metres (m) north of Little Robert Lake and 06BH02 is located approximately 400 m southeast of the Slough. 06BH01 could not be sampled as it was destroyed prior to the field event.
- Groundwater monitoring and sample collection at one monitoring well (06BH02). Groundwater samples were analyzed for general chemistry parameters, dissolved metals, and volatile organic compounds (VOCs).
- Surface water monitoring and sample collection at two surface water sampling locations (Tutt Pond and Little Robert Lake). Surface water samples were collected for analysis of general chemistry parameters and total and dissolved metals.
- The groundwater sample analytical results were compared to the BC Contaminated Sites Regulation generic numerical water quality standards of the day for Aquatic Life, Irrigation, Livestock, and Drinking Water use. Groundwater analytical results were also compared to the BC Water Quality Guidelines for Freshwater Aquatic Life, Irrigation, Livestock, and Drinking Water use.
- Previous groundwater results from a monitoring well screened below the waste at the Glenmore Landfill was also included in the report for reference. The name of the monitoring well is not provided in this document.
- Data from a ‘background’ monitoring well is also included in the document, but the name of the monitoring well is not provided. The “background” monitoring well is described as being located up-gradient and cross gradient of the landfill footprint as leachate indicator parameter concentrations in groundwater sampled from this well were significantly lower than leachate concentrations measured in groundwater collected from wells located within the vicinity of the landfill. The range of concentrations recorded in the ‘background well’ for a number of water quality parameters between August 1993 and September 2003 are presented in the following table. In the document, the range of sodium concentrations between 1994 and 1996 were provided as a footnote in a table, the following table presents this data in the same format.

Table 4.1 Summary of UBCO Background Groundwater Concentrations - EBA 2008

Parameter	Range of concentrations (mg/L) in groundwater collected from the 'background' well August 1993 - September 2003
Sulphate	93 – 145
Sodium	63.4 – 71.4*
Hardness ($CaCO_3$)	220 – 342
Dissolved calcium	50 – 75
Dissolved magnesium	34 – 49
Dissolved manganese	0.05 – 0.35
Dissolved chloride	5 - 30
* Between November 1996 and September 2003. Concentrations were between 299 mg/L and 658 mg/L in 1994, 1995, and 1996.	

- Surface water analytical results were compared to the BC Water Quality Guidelines for Freshwater Aquatic Life, Irrigation, and Livestock.
- Concentrations of sulphate, sodium, and hardness were elevated in groundwater samples beneath the UBCO Property.
- Volatile organic compounds (VOC) were not detected in groundwater collected from 06BH02 in 2008. EBA compared the 2008 results to previous results from 2006, and noted trace concentrations of VOCs in groundwater collected from 06BH01 and 06BH02.
- Available information at the time of the investigation and a lack of water observed in Robert Lake indicated that the aquifer most likely to be impacted by leachate is not hydraulically connected to Robert Lake or the small pond (Little Robert Lake) on the UBCO Property, however further testing was recommended to confirm this observation. EBA indicated the slightly elevated levels of calcium, magnesium, and manganese in groundwater beneath the UBCO Property may be naturally occurring, and derived from the igneous bedrock or highly mineralized sedimentary bedrock in the area.
- EBA noted that elevated levels of sulphate in groundwater beneath the UBCO Property may also be a naturally-occurring phenomenon or background concentration, and not due to the landfill. It was indicated that a detailed hydrogeological study is required to confirm this.
- EBA concluded landfill leachate has not migrated to the UBCO property according to the interpretation of the concentration of chloride.
- EBA recommended further assessment of surface water hydrology and groundwater hydrogeology around the small pond (Little Robert Lake) was required to understand the level of interaction between the small pond and the sand and gravel aquifer.

4.1.2 Stage 1 Preliminary Site Investigation, 2010. EBA

- In 2009 to 2010, EBA conducted a Stage 1 Preliminary Site Investigation (PSI) at the UBCO Property. The investigations were completed on behalf of UBCO.
- EBA indicated the groundwater standards for the protection of aquatic life are considered to apply as aquatic habitat is located within 1 km to the UBCO Property. EBA indicated the CSR groundwater standards for drinking water (DW), livestock watering (LW) and irrigation watering (IW) do not apply to the UBCO Property.
- EBA identified the Glenmore Landfill as an area of potential environmental concern (APEC) for the UBCO Property as the groundwater beneath the Glenmore Landfill may flow toward the UBCO Property thus potentially contaminating it.
- The identified potential contaminants of concern (PCOC) included chloride, nitrate, sulphate, manganese, iron, and sodium as parameters associated with landfilling activities.
- A Stage 2 environmental investigation was considered warranted by EBA.

4.1.3 Background Surface Water Investigation, 2010. EBA

- EBA sampled two off-site reference ponds, N1 (Bubna Slough) and N2 (unnamed pond). N1 and N2 are alkaline surface water bodies similar in physical nature and lie within the same geologic setting to an unnamed small pond (Little Robert Lake) and Robert Lake in UBCO Property.
- EBA characterized water quality in an unnamed small pond (Little Robert Lake), Robert Lake, and N1 and N2 reference ponds. There was a wide variation in concentrations of sulphate and ammonia nitrogen that were also greater than the CSR AW standards of the day.
- Based on the analytical results, EBA concluded the water chemistry of the alkaline ponds is naturally variable. The variable water chemistry is likely a result of naturally occurring biophysical and chemical processes found in alkaline environments and the natural mineral and salt constituents found in the Glenmore Clay in which these ponds lie.
- There were no anthropogenic sources of sulphate and ammonia identified by EBA on the UBCO Property.
- EBA conducted a statistical review of the collected surface water quality data for sulphate and ammonia using the methodology detailed in the document *Protocol 9; Determining Background Groundwater Quality* (BC MOE, 2004). EBA concluded the 95th percentile concentrations of sulphate and ammonia nitrogen using both parametric and non-parametric methodologies are likely to be in the range of 15,000 mg/L to 20,000 mg/L for sulphate and 10.9 mg/L to 14.7 mg/L for ammonia nitrogen.
- EBA concluded that water quality in an unnamed small pond (Little Robert Lake) and Robert Lake reflect naturally occurring conditions and were no evidence of anthropogenic contamination.

4.1.4 Stage 2 Preliminary Site Investigation, 2010. EBA

- Eight boreholes (09BH01 to 09BH07 and 06BH01) were advanced and completed as groundwater monitoring wells on the UBCO Property. Four of the eight wells were completed as nested shallow and deep pairs.
- Groundwater was encountered at various depths, ranging from near ground surface in southerly wells to approximately 6 m below ground surface at 09BH03. No significant difference in groundwater elevation was observed between the nested well pairs.
- Using the BC CSR standards of the day, EBA concluded that CSR Drinking Water, Irrigation and Livestock standards do not apply to groundwater quality at the UBCO Property. EBA also concluded that the CSR Aquatic Life standards do not apply to the UBCO Property as no hydraulic connection exists between confined groundwater potentially affected by the Site and the surface water bodies on UBCO Property, and groundwater travel time to UBCO Property and downgradient surface water bodies was in excess of 50 years.
- EBA consulted with the MOE and determined that the BC CSR AW standards were appropriate for the UBCO Property based on the following rationale:
  - Ponds at UBCO Property are saline and water chemistry is generally hostile to aquatic life.
  - Ponds do not support trout or other fish species of value.
  - Ponds do not discharge to fish bearing water courses or other surface water bodies.
  - Ponds dry up seasonally.
- EBA reviewed the groundwater analytical results and noted that concentrations of chloride, sulphate, calcium, chromium, magnesium, manganese, selenium and sodium were elevated.
- The analysis of surface water samples collected from an unnamed small pond (Little Robert Lake) and Robert Lake found concentrations of the PCOCs to be less than the CSR AW standard, with the exception of dissolved sulphate and ammonia nitrogen.

The MOE reviewed EBA's report entitled *Background Surface Water Investigation* dated January 2010 and a revised report entitled *Background Surface Water Investigation* dated March 3, 2010. Based on the review, MOE responded in a letter entitled *Re: Application for Determination of Background Sulphate and Ammonia Nitrogen in Surface Water* dated March 9, 2010 accepting the report's conclusion that the representative background concentration of sulphate in surface water, at the UBCO Property, was 20,200 mg/L and ammonia nitrogen in surface water was 14.7 mg/L.

4.2 Planned Expansion of Monitoring Well Network in 2019

In accordance to the 2018 DOCP, SNC-Lavalin Inc. (SNC) proposed to install three nested monitoring wells at three locations along the southern property line of the Site and one monitoring well nest at one upgradient background location (Figure 1).

Each of the monitoring well nests installed along the southern property line will target the clay, sand, and till hydrostratigraphic units. After developing the wells, single well response testing and sampling will be completed for the purpose of:

- Determining hydraulic conductivity and groundwater flow velocity through each hydrostratigraphic unit.
- Attempt to characterize the flux of groundwater flowing through the Slough.
- Model the potential geochemical impacts to groundwater quality at the southern property line and within the Slough as recommended in the DOCP.

Currently all the upgradient background monitoring are located northeast to the landfill footprint. Nested monitoring wells GL0-1/2/3 will be decommissioned in 2020 to make way for the landfill expansion. The background nested monitoring wells described above are intended to replace GL0-1/2/3. The new background monitoring wells will also assist in determining the background groundwater quality in the northwest portion of the Site.

5. Background Water Quality Characterization

To attempt to characterize the background groundwater and surface water quality for the Site, GHD prepared a piper plot and completed a statistical analysis of the groundwater and surface water data available to GHD.

5.1 Piper Plots

To understand the groundwater quality trends of major ions for Site groundwater, a piper plot was generated using summer 2018 groundwater and leachate analytical results. Groundwater data from monitoring wells located north, northwest, southwest, and southeast of the landfill footprint as well as leachate data was included in the piper plot. The symbols for each monitoring well plotted in the piper plot are colour coded based on the screened hydrostratigraphic unit as summarized in Table 5.1. The piper plot is presented in Figure 3.

Table 5.1 Monitoring Wells Included in Piper Plots

Monitoring Well	Location Relative to Landfill Footprint	Screened Hydrostratigraphic Unit	Symbol Colour
GL0-1	North	Till/Bedrock	Green
GL0-2	North	Till	Blue
GL0-3	North	Sand and Gravel	Orange
GL1-1	North	Till	Blue
GL1-2	North	Clay/Sand and Gravel	Orange
GL2-1	Northwest	Clay	Red
GL15-1	Southwest	Bedrock	Green

Monitoring Well	Location Relative to Landfill Footprint	Screened Hydrostratigraphic Unit	Symbol Colour
GL15-2	Southwest	Sand and Gravel	Blue
GL23-1	North	Sand	Blue
GL24-1	North	Sand and Gravel	Blue
GL28-1	South	Till	Blue
GL28-2	South	Sand and Gravel	Orange
GL28-3	South	Clay	Red
09BH03	Southeast	Sand	Orange
09BH06-D	Southeast	Sand and Gravel	Orange

From review of Figure 3, a majority of the groundwater wells plot in a similar area in the centre of the piper plot. This indicates the ratio of major ions in groundwater chemistry is similar for these locations, indicating groundwater at these monitoring locations appears to have a similar source. It also appears that the ratio of major ions for the monitoring well nests do not drastically vary between the different hydrostratigraphic units.

Conversely, the leachate data points all plot in the bottom end of the diamond opposite from the groundwater data points, indicating little to no similarities between the groundwater chemistry ratios of major ions and leachate chemistry ratios for major ions.

Where groundwater is impacted by landfill leachate, the impacted groundwater data point typically plots between the leachate data point and background groundwater data point on a piper plot. This illustrates a “mixing” trend between the background groundwater and landfill leachate in typical cases where groundwater is impacted by landfill leachate.

5.2 Statistical Review of Site Background Water Quality

To characterize background groundwater and surface water quality for the Site, GHD completed a statistical review of the available water quality data for the Site. The statistical analysis for the background groundwater and surface water characterization was completed in accordance with BC ENV documents *Protocol 9 Determining Background Groundwater Quality* (BC ENV, 2018) (Protocol 9).

As per Protocol 9, to characterize background water quality for a site, at least three monitoring locations that represent unimpacted (i.e. no anthropogenic influence) water quality should be used. In cases where the site takes up a large area, additional sampling locations may be required. Protocol 9 also states that at least two water samples per year (e.g. spring and fall) should be collected from the sampling locations to account for seasonal fluctuations in water quality.

5.2.1 Background Groundwater Quality

Inputs

To complete the background groundwater quality characterization for the Site, GHD reviewed the available groundwater monitoring data for the Site. As indicated in Section 2.1.1, groundwater generally flows radially to the centre of the Site with a portion of groundwater flowing towards the south. Therefore to characterize background groundwater quality for the Site, groundwater quality from the north, east, and west should be considered. Furthermore, there are four hydrostratigraphic units at the Site, therefore background groundwater quality should be characterized for each hydrostratigraphic unit separately.

In recent years, most of the groundwater monitoring wells that are sampled at the Site are sampled once per year in the spring. GHD reviewed the analytical results for the Site from 1993 to 2001, which included spring and fall sampling events and found there were minimal seasonal fluctuations in Site groundwater quality.

The City also provided GHD with historical data from former water supply wells BW-1 and BW-3, both of which were located north of the landfill footprint.

Table 5.2 summarizes the monitoring wells that may be considered to be used to characterize background groundwater quality, the well's location relative to the landfill footprint, and screened hydrostratigraphic unit.

Waste disposal, composting and agricultural activities have occurred at and around the Site for many decades. As a result, it is difficult to quantify true "untouched" background groundwater conditions for the Site. The historical activities at and around the Site that have occurred in the vicinity of each monitoring well are also summarized in the Table 5.2 below.

Table 5.2 Monitoring Wells Considered for Background Groundwater Characterization

Monitoring Well	Location Relative to Landfill Footprint	Screened Hydrostratigraphic Unit	Historical Activities	Date of Activities
GL0-1	North	Till/Bedrock	-Composting and biosolids -Beverage manufacturing waste application as fertilizer replacement	-1993-2004, possibly earlier than 1993 -Beverage manufacturing waste application 2006-2008
GL0-2	North	Till		
GL0-3	North	Sand and Gravel		
GL1-1	North	Till	-Composting and leachate spill -Beverage manufacturing waste application as fertilizer replacement	-Composting 1978-1994 -Biosolids 1990-1994 -Leachate spill 2016
GL1-2	North	Clay/Sand and Gravel		

Monitoring Well	Location Relative to Landfill Footprint	Screened Hydrostratigraphic Unit	Historical Activities	Date of Activities
				-Beverage manufacturing waste application 2006-2008
GL2-1	Northwest	Sand	Woodwaste and fill material in area	Unknown
GL15-1	Southwest	Bedrock	Agriculture	Since 1959, at least
GL15-2	Southwest	Sand and Gravel	Agriculture	
GL23-1	North	Sand	Composting and leachate spill	-Composting 1978-1994 -Biosolids 1990-1994 -Leachate spill 2016 -Beverage manufacturing waste application 2006-2008
GL24-1	North	Sand and Gravel	-Composting and leachate spill -Beverage manufacturing waste application as fertilizer replacement	
09BH03	Southeast	Sand	Agriculture	Since 1959, at least
09BH06-D	Southeast	Sand and Gravel	Agriculture	Since 1959, at least

GL15-1 and GL15-2 are nested monitoring wells located to the southwest and upgradient of the landfill footprint, however surface water from Tutt Pond is at times used to irrigate the fields in the vicinity of these monitoring locations. As indicated in Section 2.1.2, surface water in Tutt Pond is sourced from stormwater run-off upstream of the landfill, therefore irrigating the fields in the vicinity of GL15-1/GL15-2 with water from Tutt Pond should not result in leachate impact to groundwater quality in this area. However, due to the perceived interference from using surface water from Tutt Pond for irrigation, GL15-1/GL15-2 have been excluded from the statistical analysis.

09BH06-D is located south of the landfill footprint adjacent to Little Robert Lake and may be located in the southerly flow path of groundwater from the landfill. For this statistical analysis 09BH06-D has also been excluded.

GL1-1/GL1-2, GL23-1, and GL24-1 are all located in the vicinity of a recent leachate spill, which occurred in 2016. Groundwater quality in these monitoring locations may not be representative of background conditions for the Site due to the recent leachate spill. As a result, these monitoring locations have been excluded from the statistical analysis.

Based on the identified historical activities in the potential background areas discussed above, and the exclusion of certain wells to be used for the statistical analysis, it appears there are a sufficient number of monitoring wells to only complete the statistical analysis for the sand and gravel unit.

The statistical analysis to determine the background conditions of selected parameters was completed for parameters greater than or similar to the applicable CSR groundwater standards at compliance location GL28-2 over the last three years. GHD notes that groundwater quality at the GL28-1/2/3 well series is also compared to the BC Water Quality Guidelines (WQGs) for Irrigation and Freshwater Aquatic Life as well as the Guidelines for Canadian Drinking Water Quality (GCDWQ). There have been exceedances for other parameters (e.g. fluoride, aluminum, and sodium) for the applicable WQGs and/or the GCDWQ over the past three years. Due to the limited quantity of suitable background groundwater monitoring locations for the Site, only the parameters exceeding the applicable CSR water quality standards were focused on in this letter report. Further statistical analyses for the parameters detected in concentrations greater than the applicable WQGs and/or the GCDWQ in groundwater at GL28-2 should be completed once additional background monitoring locations become available.

The analysis was completed for the following parameters:

- Conductivity
- Sulphate
- Nitrate
- Total dissolved solids (TDS)
- Manganese
- Molybdenum
- Uranium

The analytical results considered in the statistical analysis are summarized in the attached Table 1. The data presented in Table 1 includes annual groundwater analytical results for monitoring wells GL0-3, GL2-1, 09BH03 from 2016, 2017, and 2018. Table 1 also includes 1994 - 1999 groundwater analytical results for wells BW-1 and BW-3 provided by the City.

Statistical Analysis

The statistical analysis was completed in three trials for each parameter to include different groups of monitoring wells in the analysis. The well groups for each of the three trials are summarized in Table 5.3 below.

Table 5.3 Statistical Analysis Trial Groups

Trial Number	Trial Name	Wells Included
1	North Wells	GL0-3, GL2-1
2	North and East Wells	GL0-3, GL2-1, 09BH03
3	North and BW Wells	GL0-3, GL2-1, BW-1, BW-3

The North Wells were selected as they are all monitoring wells located north of the landfill footprint and hydraulically upgradient of the Site (Figure 1). The North Wells are interpreted to represent groundwater unimpacted by landfill activities. The North and East Wells trial group includes the same monitoring wells in the North Wells trial group plus 09BH03. 09BH03 is located southeast of the landfill footprint and is hydraulically upgradient/cross-gradient of the Site (Figure 1). 09BH03 is also interpreted to represent groundwater quality that is unimpacted by landfill activities. The North and BW Wells trial group includes the same monitoring wells as the North Wells plus BW-1 and BW-3. BW-1 and BW-3 are historic water wells that were located north or west of the landfill footprint (Figure 1). BW-1 and BW-3 are also interpreted to be hydraulically upgradient of the Site and represent unimpacted groundwater quality for the Site.

To complete the statistical analysis, the available dataset is processed to determine if the dataset creates a normal distribution. If the dataset is a normal distribution, the 95th percentile concentration may be used as the Site specific background concentration for a given parameter.

The results for each statistical analysis are summarized in Table 2, attached.

From review of Table 2, only four parameters have normal distributions under Trial 1, one parameter has a normal distribution under Trial 2, and two parameters have normal distributions under Trial 3. The results of the normal distribution datasets are summarized in Table 5.4 below.

Table 5.4 Statistical Analysis Trial Groups

Trial Number	Parameter	Units	95th Percentile Result	GL28-2 Range*
1	Conductivity, field	uS/cm	2,492.7	3,974 - 5,093
1	Total dissolved solids	mg/L	1,776.2	4,400 - 5,370
1	Molybdenum	µg/L	17.5	3.9 - 5.5
1	Sulphate	mg/L	380.2	2,590 - 3,160
2	Uranium	mg/L	198.4	168 - 200
3	Conductivity, field	uS/cm	2,878.4	3,974 - 5,093
3	Molybdenum	µg/L	23.7	3.9 - 5.5
*Concentration range for 2018 data collected by Kelowna				

From review of Table 5.4, molybdenum is the only parameter from the statistical analysis that has 95th percentile values that are greater than the historical concentration range detected at compliance location GL28-2. Uranium's 95th percentile result in Trial 2 is slightly less than the upperbound limit for the historical concentrations range detected in groundwater at GL28-2.

For the parameters not included in Table 5.4, their datasets either had logarithmic distributions or appeared to have multiple populations. Groundwater quality for each area relative to the landfill footprint (i.e. north, east, and west) is only represented by one monitoring location, which appears to be insufficient for representing the variable groundwater conditions surrounding the Site.

5.2.2 Background Surface Water Quality

Inputs

To complete the background surface water characterization for the Site, GHD reviewed the available dataset for surface water quality near the Site. The surface water sampling locations included in the routine EMP for the Site do not include an upstream sampling location. As a result, surface water analytical results from non-routine sampling locations and surface water samples collected by others were considered for this characterization.

Table 5.5 below summarizes the surface water sampling locations and their location relative to the landfill footprint.

Table 5.5 Surface Water Locations Considered for Background Characterization

Surface Water Sampling Location	Location Relative to Landfill Footprint
Bredin Pond	West - On site
Tutt Pond	West - On site
Northeast Pond	East - On site
Slough(1)	South - On site
Bubna Slough/N1	North
N2	North
Little Robert Lake(2)	South
Robert Lake	South

Notes:
(1) Surface water from Slough managed as leachate due to historical waste disposal in the Slough.
(2) Surface water was discharged from Tutt Pond to Little Robert Lake in spring 2018 due to high water levels experienced throughout the region.

Figure 2 illustrates the locations of the surface water sampling locations. From review of Table 5.5, surface water sampling locations Bubna Slough/N1 and N2, are upstream relative to the Site. The ponds are alkaline surface water bodies similar in physical nature to the Little Robert Lake (EBA, 2010). The analytical results from these surface water sampling locations were used in the statistical analysis.

The statistical analysis to determine the background surface water conditions of selected parameters was completed for parameters greater than or similar to the BC CSR water quality standards for Irrigation and/or the BC WQGs for Irrigation in Little Robert Lake as noted in the July 23, 2019 ENV inspection letter.

The statistical analysis was completed for the following parameters:

- Sulphate
- Chloride
- Ammonia
- pH
- Conductivity

The analytical results considered in the statistical analysis are summarized in the attached Table 3. The data presented in Table 3 includes quarterly analytical results for upstream surface water monitoring locations Bubna Slough/N1 from 2018. Table 3 also includes 2009-2010 surface water analytical results for upstream surface water locations Bubna Slough/N1 and N2 collected by others.

Statistical Analysis

To complete the statistical analysis, the available dataset is processed to determine if the dataset creates a normal distribution. If the dataset is a normal distribution, the 95th percentile concentration may be used as the Site specific background concentration for a given parameter.

The results for statistical analyses completed for each parameter are summarized in Table 4, attached.

From review of Table 4, conductivity and pH are the only parameters from the statistical analysis that have 95th percentile values that are greater than the historical concentration range detected at compliance location Little Robert Lake.

For the other parameters in this analysis, their datasets appeared to have multiple populations. As presented in Table 4, a portion of the data used in this analysis is from 2009-2010 and the other portion is from 2018. It may be beneficial to collect additional data from the two background surface water bodies considered in this analysis to create a more recent dataset.

In the *Background Surface Water Investigation*, EBA estimated the background concentrations for ammonia and sulphate in surface water to be 14.7 mg/L and 20,200 mg/L, respectively. This result was not replicated in this analysis. This may be due to a change in background surface water quality conditions in 2018 compared to 2009-2010 when EBA's investigation was completed.

6. Limitations

Based on the results of the statistical analysis, it appears there are a number of limitations and/or data gaps that affected the results of the analysis. The limitations are summarized as follows.

Groundwater

- At least three monitoring wells are required to complete a statistical analysis to characterize background groundwater quality as per BC ENV Protocol 9. There are four hydrostratigraphic units at the Site, however only one of the hydrostratigraphic units had at least three monitoring wells upgradient of the landfill footprint. As a result, the background groundwater characterization analysis was completed for the sand and gravel unit only in this letter report. The new monitoring well nest north of the landfill footprint will provide sufficient monitoring wells for analysis of the till unit. One more location is required for the bedrock and two more locations are required for the clay unit in order to complete a statistical analysis in accordance with BC ENV Protocol 9.
- A majority of the groundwater monitoring locations that were used in the analysis were north of the limit of waste, however groundwater is also interpreted to flow on to the Site from the east and west. Additional locations to the east and west (minimum one in each area) may assist in characterizing background groundwater quality for the Site.
- Groundwater quality in the surrounding areas of the Site may be impacted by numerous historical activities including composting, biosolids storage, fill storage, leachate spills, and agriculture. As a result, it is difficult to assess "untouched" water quality conditions for the Site. GL1-2, GL23-1, and GL24-1 were excluded from the statistical analysis due to a recent leachate spill in the vicinity of these monitoring wells.
- Groundwater quality at GL15-2 appears to have groundwater quality similar to GL28-2, however the area around GL15-2 is periodically irrigated using surface water from Tutt Pond. Surface water in Tutt Pond is sourced from surface water run-off upstream of the landfill footprint, therefore leachate impacts should not be apparent in groundwater at GL15-2. Nevertheless, GL15-2 was excluded from the statistical analysis due to the perceived interference from the irrigation activities.
- Some of the data included in the statistical analysis was from the late 1990s and may no longer be representative of current groundwater quality conditions.
- There are composting operations occurring in the southern potion of the Site between the landfill footprint and the compliance groundwater monitoring wells. This statistical analysis completed in this letter did not capture if groundwater quality is being influenced by the composting activities.

Surface Water

- At this time, there are no upstream surface water monitoring locations regularly included in the Site's EMP.
- The surface water data used from EBA's 2009-2010 investigation may not be representative of current background surface water conditions.

7. Summary

Based on the results of the background water quality characterization exercise, GHD summarizes the following:

- EBA conducted a statistical review for surface water quality for sulphate and ammonia at the UBCO Property in 2009. EBA concluded that the appropriate background concentration ranges for surface water quality were 15,000 mg/L to 20,000 mg/L for sulphate and 10.9 mg/L to 14.7 mg/L for ammonia nitrogen.
- In 2010, the BC MOE accepted EBA's conclusion that the representative background concentrations of sulphate in surface water was 20,200 mg/L and ammonia nitrogen in surface water was 14.7 mg/L at the UBCO Property.
- Groundwater quality for upgradient and compliance groundwater monitoring locations has a different proportional make-up of major ions compared to leachate data for the Site. A mixing trend between upgradient groundwater, leachate, and compliance locations groundwater is not apparent in the piper plot results.
- The statistical analysis to estimate the background concentration for certain groundwater parameters yielded mixed results. A majority of the statistical analyses completed indicated a logarithmic distributions or multiple populations existed for the available groundwater data and therefore a background concentration could not be determined.
- A majority of the groundwater monitoring wells used in the statistical analysis are located north of the landfill footprint, however groundwater is also interpreted to flow on to the Site from the east and west. Additional locations to the east and west (minimum one in each area) may assist in providing a more comprehensive data set for the statistical analysis.
- Background groundwater concentrations were estimated to be greater than the 2018 concentration range for groundwater quality at GL28-2 for two parameters:
    - Molybdenum: 23.7 mg/L or 24.6 mg/L
    - Uranium: 205 mg/L
- A majority of the statistical analyses completed indicated logarithmic distributions or multiple populations existed for the available surface water data.

- Background surface water concentrations were estimated to be greater than the 2018 concentration range for surface water quality at Little Robert Lake for two parameters:
  - Conductivity: 4,799.6 uS/cm
  - pH: 9.7

8. Recommendations

Based on the findings and limitations of this background water quality study, GHD provides the following recommendations to aid with determining representative background concentrations for the Site:

- Review the results of the one nested monitoring well installed north of the landfill footprint and the three nested monitoring wells installed in the southern area of the Site.
- Include an additional well located on the UBCO Property (09BH07) in the Site's EMP to further characterize groundwater quality southeast of the landfill footprint.
- Consider installing nested monitoring wells to the west of the Site away from the agricultural properties located west of the Site to characterize groundwater southwest of the landfill footprint.
- Collect surface water samples at least twice per year (spring and fall) from surface water bodies Bubna Slough/N1 and N2 to further characterize background surface water quality for the Site.
- Complete statistical analysis to establish background concentrations, using the data from the proposed background well locations.

Sincerely,

GHD

Michaela Dyck

Michaela Dyck, G.I.T.

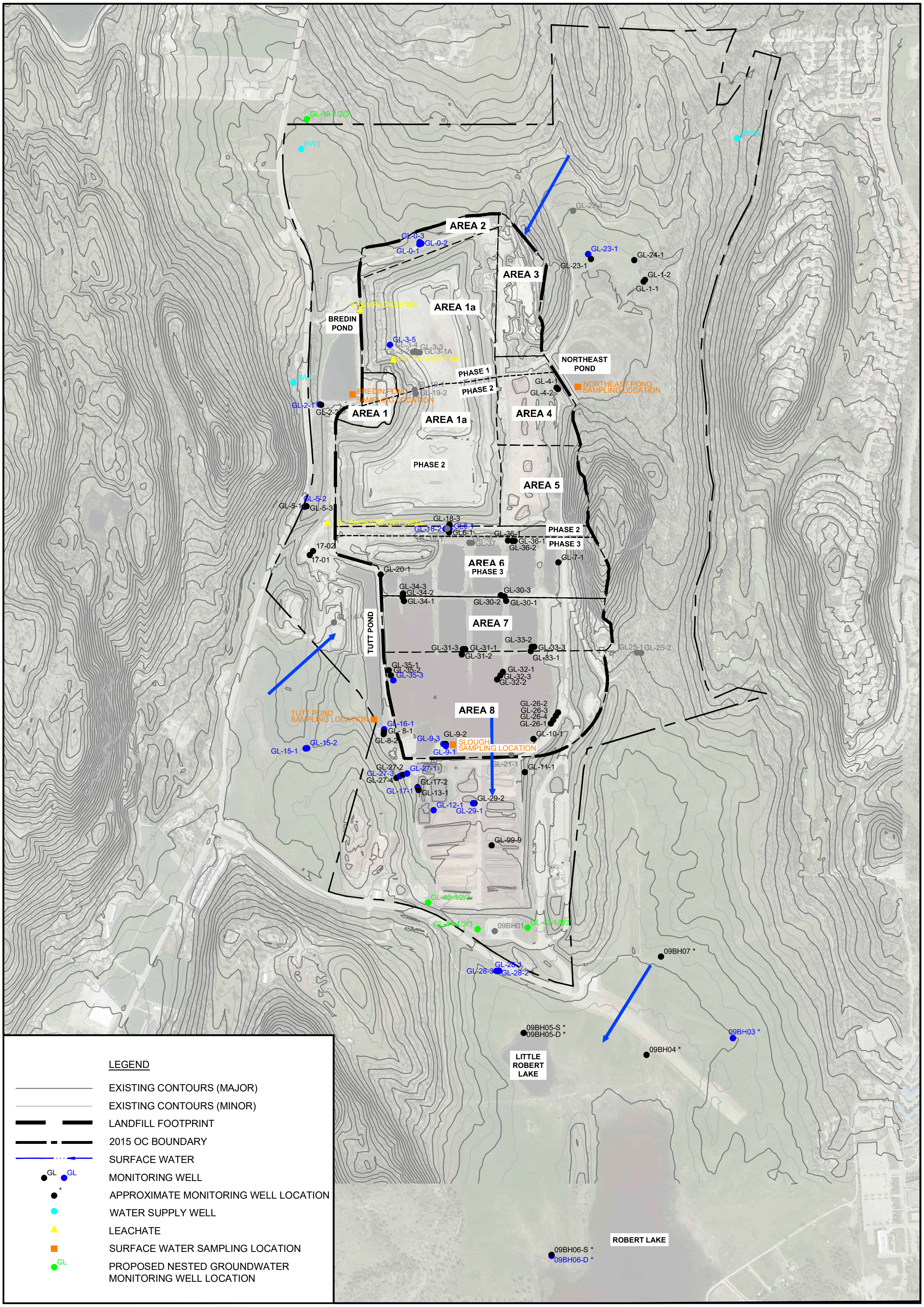
Michelle Uyeda

Michelle Uyeda, P.Eng., CSAP

MND/cs/02

Encl.

cc: Deacon Liddy (GHD)
Roxy Hasior (GHD)



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GHD

CITY OF KELOWNA - GLENMORE LANDFILL
BACKGROUND WATER QUALITY REVIEW

MONITORING LOCATIONS

084612-22

Dec 18, 2019

FIGURE 1

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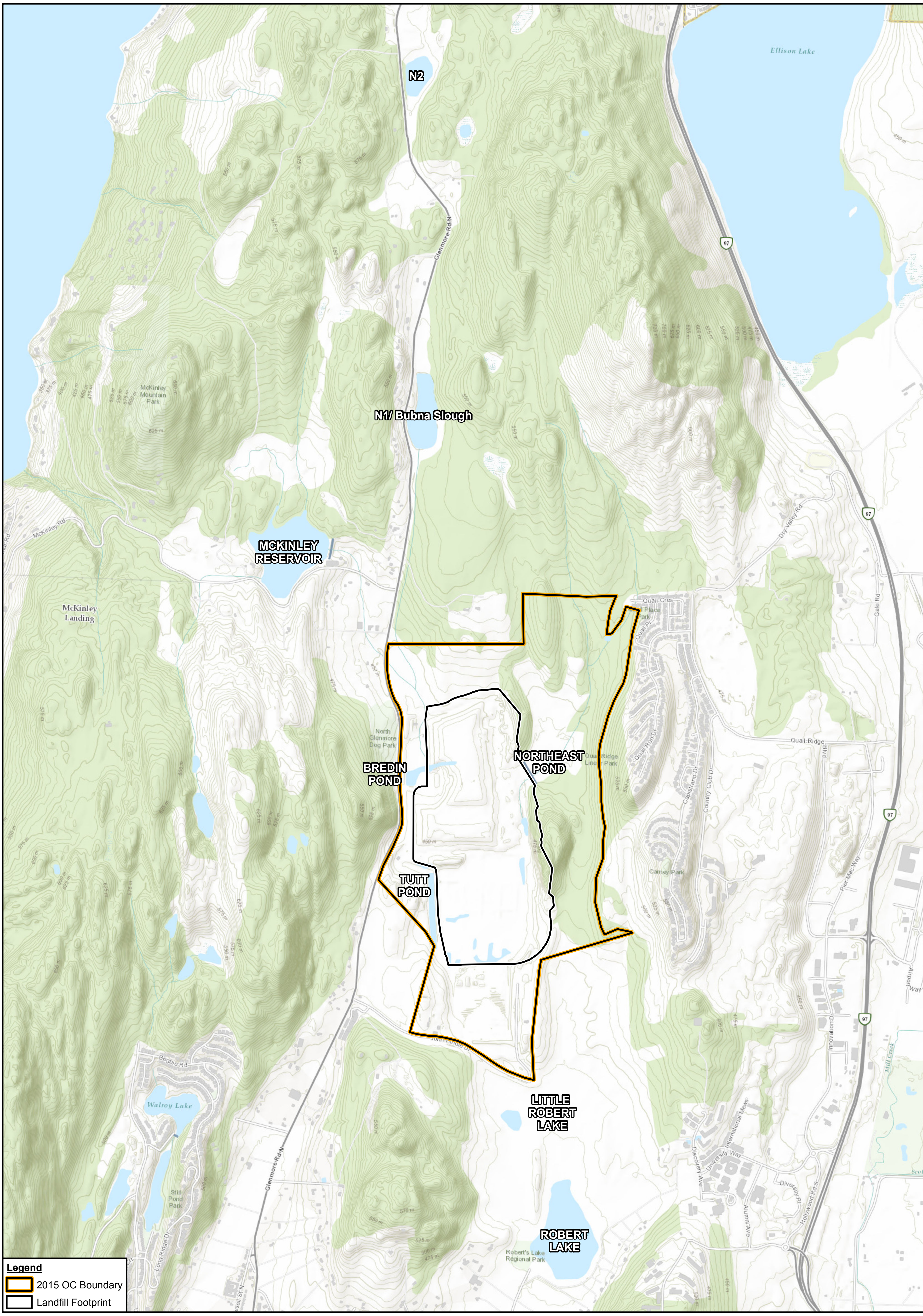


Source: ESRI Topographic Basemap - Accessed 2019

0 200 400 600
Meters

Coordinate System:
NAD 1983 UTM Zone 11N

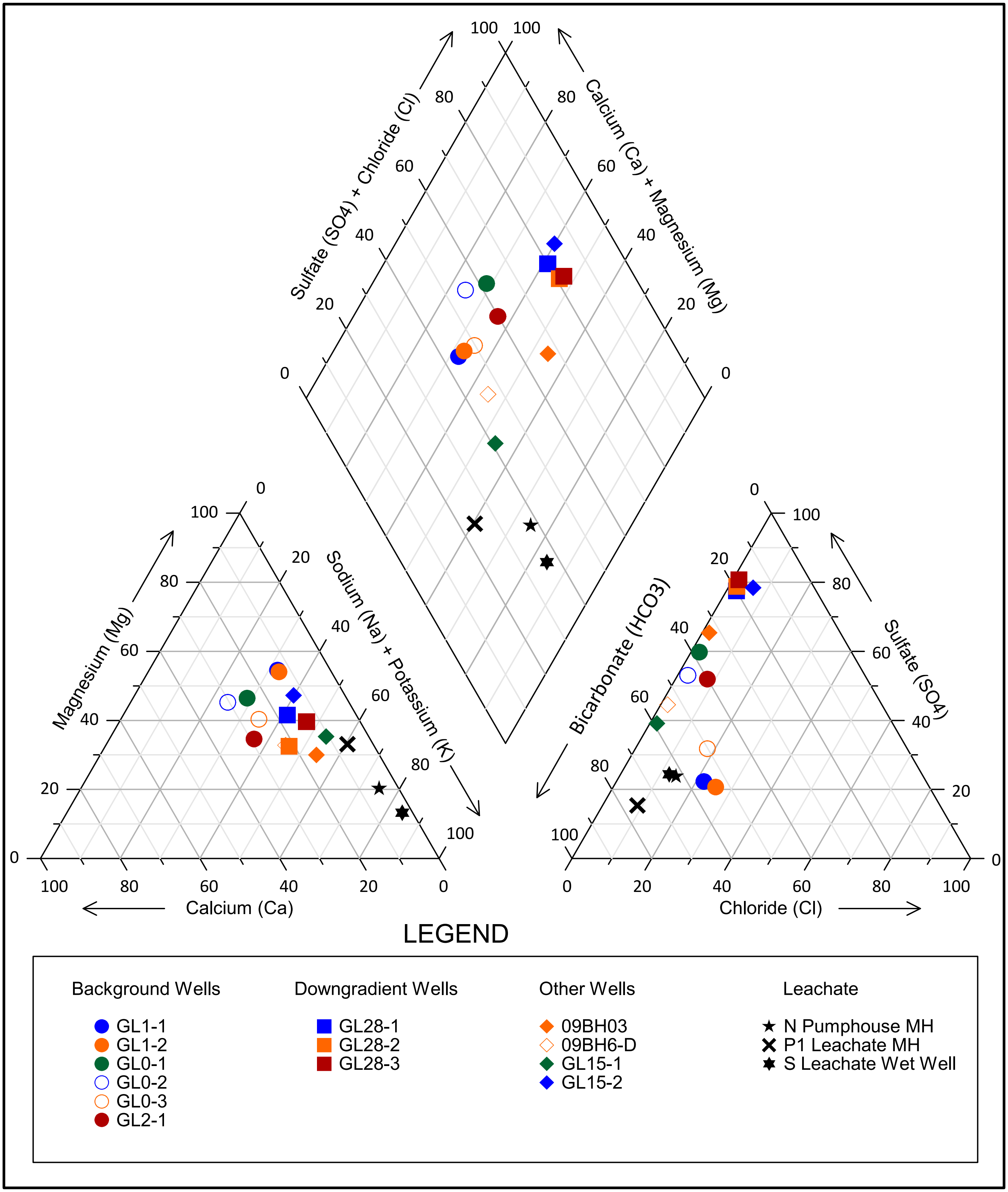
BACKGROUND WATER QUALITY REVIEW
GLENMORE LANDFILL
CITY OF KELOWNA

084612
Oct 17, 2019

SURFACE WATER MONITORING LOCATIONS

FIGURE 2

GIS File: Q:\GIS\PROJECTS\84000s\84612\Layouts\HOEK002\084612-00(HOEK002)GIS-OT001.mxd



GLENMORE LANDFILL
CITY OF KELOWNA
BACKGROUND WATER QUALITY REVIEW

PIPER PLOT

084612

December 16, 2019

FIGURE 3

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Table 1

Groundwater Data Summary
Background Water Quality Review
Glenmore Landfill
City of Kelowna

Sample Location		**GL0-3**	**GL0-3**	**GL0-3**	**GL2-1**	**GL2-1**	**GL2-1**	**GL2-1**	**09BH03**	**09BH03**	**09BH03**
Sample Date		**24-05-16**	**24-05-17**	**29-05-18**	**24-05-16**	**24-05-16**	**24-05-17**	**28-05-18**	**24-05-16**	**24-05-16**	**01-06-17**
Sampled By:		**Kelowna**	**Kelowna**	**Kelowna**	**Kelowna**	**Kelowna**	**Kelowna**	**Kelowna**	**Kelowna**	**Kelowna**	**Kelowna**
Parameter	Units										
Conductivity, field	uS/cm	1980	2066	1826	1080	1080	1222	-	2650	-	3010
Sulphate	mg/L	401	368	293	275	283	323	319	909	521	1240
Nitrate (as N)	mg/L	49.1	48.7	44.7	0.097	0.068	< 0.025	< 0.250	0.69	0.7	0.69
Total Dissovled Solids (TDS)	mg/L	1450	1420	1480	730	718	815	845	1980	1900	2270
Iron, dissolved	mg/L	< 0.030	< 0.030	< 0.010	0.085	0.062	0.651	0.796	<0.03	< 0.030	< 0.030
Manganese, dissolved	mg/L	< 0.010	< 0.010	0.00188	0.017	0.013	0.158	0.151	< 0.010	< 0.010	< 0.010
Molybdenum, dissolved	mg/L	0.0141	0.0159	0.0144	0.0087	0.009	0.0114	0.0111	0.0194	0.0191	0.0215
Uranium, dissolved	mg/L	0.111	0.124	0.13	0.00548	0.00572	0.00558	0.00511	0.117	0.115	0.124

Notes:
uS/cm - micro Siemes per centimetre
mg/L - miligrams per litre
Kelowna - City of Kelowna

Table 1

Groundwater Data Summary
Background Water Quality Review
Glenmore Landfill
City of Kelowna

Sample Location		**09BH03**	**GL28-2**	**GL28-2**	**GL28-2**	**GL28-2**	**GL28-2**	**GL28-2**	**GL28-2**	**GL28-2**	**GL28-2**
Sample Date		**04-06-18**	**24-05-16**	**20-09-16**	**20-09-16**	**11-07-17**	**26-09-17**	**28-05-18**	**28-05-18**	**25-09-18**	**28-05-19**
Sampled By:		**Kelowna**	**Kelowna**	**Kelowna**	**Kelowna**	**Kelowna**	**Kelowna**	**Kelowna**	**Kelowna**	**Kelowna**	**Kelowna**
Parameter	Units										
Conductivity, field	uS/cm	3665	4200	4600	-	3986	3974	4680	4680	5093	
Sulphate	mg/L	1500	2870	2740	2760	2590	2840	2690	2690	3160	2830
Nitrate (as N)	mg/L	< 0.010	11.2	12	12.1	13.1	12.1	8.56	8.44	9.48	11.6
Total Dissovled Solids (TDS)	mg/L	2800	4530	4750	4760	4400	4640	4730	4960	5370	5280
Iron, dissolved	mg/L	0.153	<0.03	0.127	0.235	< 0.030	< 0.030	< 0.010	< 0.010	< 0.010	< 0.010
Manganese, dissolved	mg/L	< 0.00020	0.033	0.019	0.037	0.012	0.018	0.0176	0.0174	0.0204	0.0215
Molybdenum, dissolved	mg/L	0.0264	0.0055	0.0041	0.0039	0.0049	0.0043	0.00484	0.00481	0.00507	0.00541
Uranium, dissolved	mg/L	0.168	0.183	0.184	0.178	0.17	0.168	0.19	0.181	0.196	0.2

Notes:
uS/cm - micro Siemes per centimetre
mg/L - miligrams per litre
Kelowna - City of Kelowna

Table 1

Groundwater Data Summary
Background Water Quality Review
Glenmore Landfill
City of Kelowna

Sample Location		**BW-3**	**BW-3**	**BW-3**	**BW-3**	**BW-3**	**BW-3**	**BW-3**	**BW-3**	**BW-3**	**BW-3**
Sample Date		**28-03-94**	**11-07-94**	**24-10-94**	**27-03-95**	**23-08-95**	**29-05-96**	**05-11-96**	**16-07-97**	**29-04-98**	**24-08-98**
Sampled By:		**Kelowna**	**Kelowna**	**Kelowna**	**Kelowna**	**Kelowna**	**Kelowna**	**Kelowna**	**Kelowna**	**Kelowna**	**Kelowna**
Parameter	Units										
Conductivity, field	uS/cm	1600	1600	2000	1600	1650	1950	1650	3100	2500	2800
Sulphate	mg/L										
Nitrate (as N)	mg/L										
Total Dissovled Solids (TDS)	mg/L										
Iron, dissolved	mg/L	<.005	<0.02	<0.02	-	<0.02	0.16	-	0.163	0.043	<0.003
Manganese, dissolved	mg/L	<0.005	<0.003	<0.003	-	0.002	0.007	-	0.0068	0.0061	0.074
Molybdenum, dissolved	mg/L	0.009	<0.02	<0.02	-	<0.02	0.007	-	0.01	<0.005	<0.005
Uranium, dissolved	mg/L	-	-	-	-	-	-	-	<0.06	<0.06	<0.06

Notes:
uS/cm - micro Siemes per centimetre
mg/L - miligrams per litre
Kelowna - City of Kelowna

Table 1

Groundwater Data Summary
Background Water Quality Review
Glenmore Landfill
City of Kelowna

Sample Location		**BW-3**	**BW-1**	**BW-1**	**BW-1**	**BW-1**	**BW-1**	**BW-1**
Sample Date		**28-09-99**	**28-03-94**	**11-07-94**	**25-10-94**	**27-03-95**	**23-08-95**	**29-05-96**
Sampled By:		**Kelowna**	**Kelowna**	**Kelowna**	**Kelowna**	**Kelowna**	**Kelowna**	**Kelowna**
Parameter	Units							
Conductivity, field	uS/cm	2350	-	-	-	-	-	-
Sulphate	mg/L							
Nitrate (as N)	mg/L							
Total Dissovled Solids (TDS)	mg/L							
Iron, dissolved	mg/L	0.047	<0.005	<0.02	<0.02	0.02	<0.02	0.03
Manganese, dissolved	mg/L	0.0013	<0.005	0.008	0.015	0.03	<0.001	0.007
Molybdenum, dissolved	mg/L	0.003	<0.005	<0.02	<0.02	<0.02	<0.02	0.007
Uranium, dissolved	mg/L	-	-	-	-	-	-	-

Notes:
uS/cm - micro Siemes per centimetre
mg/L - miligrams per litre
Kelowna - City of Kelowna

Table 2

Groundwater Statistical Analysis Summary
Background Water Quality Review
Glenmore Landfill
City of Kelowna

Parameter	Units	Number of Samples	Sample Locations	Mean	Median	Standard Deviation	Coefficient of Variance	Distribution	95th Percentile	GL28-2
Trial 1										
Field Conductivity	uS/cm	5	GL0-3, GL2-1	1634.8	1826	452.7	0.28	Normal	2492.7	3,974 - 5,093
Sulphate	mg/L	5	GL0-3, GL2-1	315.6	319	35.3	0.11	Normal	380.2	2,590 - 3,160
Nitrate	mg/L	6	GL0-3, GL2-1	23.8	22.5	26	1.09	Two Populations	-	8.44 - 13.1
Total Dissolved Solid	mg/L	6	GL0-3, GL2-1	1123.3	1132.5	360.3	0.32	Normal	1776.2	4,400 - 5,370
Manganese	ug/L	6	GL0-3, GL2-1	58	13.5	74.9	1.29	Two Populations	-	12 - 37
Molybdenum	ug/L	6	GL0-3, GL2-1	12.6	12.8	2.7	0.21	Normal	17.5	3.9 - 5.5
Uranium	ug/L	6	GL0-3, GL2-1	63.5	58.3	64	1.01	Two Populations	-	168 - 200
Trial 2										
Field Conductivity	uS/cm	8	GL0-3, GL2-1, 09BH03	2218	2023	978	0.44	Log	-	3,974 - 5,093
Sulphate	mg/L	9	GL0-3, GL2-1, 09BH03	615	323	482	0.78	Log	-	2,590 - 3,160
Nitrate	mg/L	8	GL0-3, GL2-1, 09BH03	18	0.7	24.5	1.36	Two Populations	-	8.44 - 13.1
Total Dissolved Solid	mg/L	10	GL0-3, GL2-1, 09BH03	1470	1435	774	0.53	Log	-	4,400 - 5,370
Manganese	ug/L	10	GL0-3, GL2-1, 09BH03	38.1	10	61.6	1.62	Two Populations	-	12 - 37
Molybdenum	ug/L	10	GL0-3, GL2-1, 09BH03	15	14	6	0.38	Log	-	3.9 - 5.5
Uranium	ug/L	10	GL0-3, GL2-1, 09BH03	79.6	114	65.5	0.82	Normal	198.4	168 - 200
Trial 3										
Field Conductivity	uS/cm	16	GL0-3, GL2-1, BW3	1935.9	1888	539.8	0.28	Normal	2878.4	3,974 - 5,093
Manganese	ug/L	18	GL0-3, GL2-1, BW3, BW1	24.8	7.5	47.7	1.92	Two Populations	-	12 - 37
Molybdenum	ug/L	18	GL0-3, GL2-1, BW3, BW1	14	14.3	5.6	0.4	Normal	23.7	3.9 - 5.5

Table 3

Surface Water Data Summary
Background Water Quality Review
Glenmore Landfill
City of Kelowna

Sample Location		**Bubna Slough/N1 Pond**	**Bubna Slough/N1 Pond**	**Bubna Slough/N1 Pond**	**Bubna Slough/N1 Pond**	**Bubna Slough/N1 Pond**	**Bubna Slough/N1 Pond**	**N2 Pond**	**N2 Pond**	**Little Robert Lake**	**Little Robert Lake**	**Little Robert Lake**
Sample Date		**12-11-09**	**10-02-10**	**20-04-18**	**03-05-18**	**15-06-18**	**08-11-18**	**12-11-09**	**10-02-10**	**17-04-18**	**03-05-18**	**15-06-18**
Sampled By:		**EBA**	**EBA**	**Kelowna**	**Kelowna**	**Kelowna**	**Kelowna**	**EBA**	**EBA**	**Kelowna**	**Kelowna**	**Kelowna**
Parameter	Units											
Conductivity, field	uS/cm	-	-	-	2584	2484	3359	-	-	3334	1779	1940
Conductivity, lab	uS/cm	-	-	2810	2920	3950	3330	-	-	3780	2000	2140
pH, field	s.u.	-	-	-	8.08	9.06	8.43	-	-	8.92	8.34	9.19
pH, lab	s.u.	9.06	8.94	8.29	8.56	8.91	8.36	9.46	9.24	8.73	8.56	8.51
Ammonia	mg/L	0.24	4.43	0.03	0.056	0.023	0.038	0.27	3.98	0.054	0.173	0.053
Chloride	mg/L	1420	383	555	476	542	630	4610	569	76.5	151	172
Sulphate	mg/L	822	186	214	170	201	268	20200	1200	1490	400	403

Notes:
mg/L - milligrams per litre
uS/cm - microSiemens per centimetre
Kelowna - City of Kelowna
EBA - EBA Engineering Consultants Ltd. Data sourced from *Background Surface Water Investigation Tutt Ranch* , 2010

Table 4

Surface Water Statistical Analysis Summary
Background Water Quality Review
Glenmore Landfill
City of Kelowna

Parameter	Units	Number of Samples	Sample Locations	Mean	Median	Standard Deviation	Coefficient of Variation	Distribution	95th Percentile	Little Robert Lake
Conductivity, field	uS/cm	4	Bubna Slough/N1	3252.5	3125	516	0.16	Normal	4799.6	2,000 - 3,780
Sulphate	mg/L	8	Bubna Slough/N1, N2	2907.6	241	6997.4	2.41	Two Populations	-	400 - 1,490
Chloride	mg/L	8	Bubna Slough/N1, N2	1148.1	562	1435.2	1.25	Two Populations	-	76.5 - 172
Ammonia	mg/L	8	Bubna Slough/N1, N2	1.1	0.1	1.9	1.68	Two Populations	-	0.053 - 0.173
pH, lab	s.u.	8	Bubna Slough/N1, N2	8.9	9.1	0.4	0.05	Normal	9.7	8.34 - 9.19

Attachment 2

BRITISH COLUMBIA

Report Date:July 23, 2019

File:12218

Report Number:129139

CITY OF KELOWNA

City Hall
1435 Water Street
Kelowna BC V1Y 1J4

Dear CITY OF KELOWNA

Re: Warning Letter, Operational Certificate, 12218

On June 11, 2019, Ministry of Environment, Environmental Protection Division staff conducted an inspection under *Environmental Management Act (EMA)*, 12218. The inspection determined that CITY OF KELOWNA is out of compliance with its Operational Certificate 12218, and the section(s) listed below. This Warning Letter lists the compliance verification information contained below.

Failure to comply with the requirements set out in your Operational Certificate is an offence under the *Environmental Management Act (EMA)*. Section 120(6) of *EMA* states as follows:

> *120(6) A person who, holding a permit or approval issued to the person under this Act to introduce waste into the environment, introduces waste into the environment without having complied with the requirements of the permit or approval commits an offence and is liable on conviction to a fine not exceeding $1 000 000 or imprisonment for not more than 6 months, or both.*

It should also be noted that, as an alternative to prosecution of the offence referenced above, the Ministry may initiate action to impose an administrative penalty against CITY OF KELOWNA. *The Administrative Penalties Regulation (EMA)* (B.C. Reg. 133/2014) (APR) was brought into force in 2014. The APR describes the prescribed provisions of the EMA as well as that of specified regulations under which administrative penalties can be assigned. Section 12(5) of the APR states as follows:

> *12(5) A person who fails to comply with a requirement of a permit or approval issued or given under the Act is liable to an administrative penalty not exceeding $40 000, unless the requirement the person failed to comply with is also a prescribed provision of the EMA or the regulations that is subject to a different maximum administrative penalty.*

I request that CITY OF KELOWNA immediately implement the necessary changes or modifications to correct the non-compliance(s) listed above with the *Environmental Management Act*. Further, I request that CITY OF KELOWNA notify this office in writing, by email or letter within 30 days of this letter, advising what corrective measures have been taken, and what else is being done, to prevent similar non-compliances in the future.

Please submit your response to the Ministry's Compliance Mailbox at EnvironmentalCompliance@gov.bc.ca.

As a result of this Warning, this authorization will be prioritized for follow-up inspection. The corrective measures will be reviewed by an Officer as part of the next inspection.

Finally, if you fail to take the necessary actions to restore compliance, you may be subject to escalating enforcement action. This Warning Letter and the alleged violations and circumstances to which it refers, will form part of the compliance history of CITY OF KELOWNA and will be taken into account in the event of future violations.

Inspection Details:

Requirement Description:	**1. AUTHORIZED DISCHARGES, 1.1, 1.1.1** 1.1.1.: This section applies to the discharge of refuse from municipal, commercial and light industrial sources to a sanitary landfill known as the Glenmore Landfill. The site reference number for this discharge is E104956. 1.1.1 The maximum authorized rate of waste discharge is 170,000 tonnes annually. The maximum quantity of waste discharged must not exceed the design capacity of the landfill as specified in an approved Design and Operations Plan. The final footprint and profile of the discharged waste must be within that specified in the Design and Operations Plan and approximately as shown on the attached locations map.
Details/Findings:	An office review was conducted on June 11, 2019 by Officer Kaylee Garnett (Officer) from the Ministry of Environment and Climate Change Strategy (Ministry) to verify compliance with the Operational Certificate 12218. This was a follow up inspection from a warning letter issued September 17, 2018. The contact for this inspection was Scott Hoekstra an operator for the City of Kelowna. The inspection period is from September 18, 2018 to June 11, 2019. Reports reviewed during this inspection; - The 2018 Annual Report dated March 30, 2019 (2019, report) which included the 2018 Glenmore Landfill Annual Water Quality Report by SNC-Lavalin dated March 13, 2019 (2019, WQ) - 2018 Design, Operation and Closure Plan (DOCP) and Financial Security Plan (FSP) dated November 1, 2018 by GHD Limited. The 2018 Annual Report was submitted to the Ministry dated March 30, 2019 . The annual tonnage for the Glenmore landfill was 166,916 t.
Compliance:	In
Requirement Description:	**2. OPERATING REQUIREMENTS, 2.1 Design, Operations and Closure Plans, 2.1.1** 2.1.1: The City must submit a Design, Operations and Closure Plan prepared by a suitably qualified professional for approval by the Director by June 30, 2016, and a Financial Security Plan by June 30, 2017. The Design, Operations and Closure Plan must address, but not be limited to, each of the subsections in the Landfill Criteria for Municipal Solid Waste unless otherwise approved by the Director, including performance, siting, design, operational, closure and post-closure criteria. The facilities must be developed, operated and closed in accordance with the Design, Operations and Closure Plan. Should there be any inconsistency between this Operation Certificate and the Design, Operations and Closure Plan, this Operational Certificate must take precedence.
Details/Findings:	The City of Kelowna submitted to the Ministry a Design, Operation and Closure Plan (DOCP) and a Financial Security Plan prepared by GHD Limited on March 27, 2019. This replaced the existing Plan from 2008 and rectified requirements from the June 2015 Permit Amendment. The Officer has now determined the Permittee is in compliance with this section.

Compliance:	In
Requirement Description:	**2. OPERATING REQUIREMENTS, 2.1 Design, Operations and Closure Plans, 2.1.2** 2.1.2: The Design, Operations and Closure plans must be reviewed every 5 years throughout the operating life of the landfill and updated to encompass the next 10 years of landfill operation and/or post-closure activities. The updated landfill design, operating and closure plans must be prepared by a professional engineer or geoscientist licensed to practice in the province of British Columbia and knowledgeable in such matters. The updated plans must be submitted to the Director for approval and must include any information relevant to the design, operations, closure and post-closure care of the landfill.
Details/Findings:	The City of Kelowna submitted to the Ministry a Design, Operation and Closure Plan (DOCP) and a Financial Security Plan prepared by GHD Limited on March 27, 2019. The signing authority was Deacon Liddy, Professional Engineer in good standing with the Association of Professional Engineers and Geoscientists of the Province of BC. This was an update to the existing Plan from 2008 that encompasses the next 10 years.
Compliance:	In
Actions to be taken:	Review the DOCP every five years.
Requirement Description:	**2. OPERATING REQUIREMENTS, 2.1 Design, Operations and Closure Plans, 2.1.3** 2.1.3: The landfill facility must be constructed and maintained in accordance with the approved Design, Operations and Closure plans and subject to the conditions set therein. A knowledgeable professional engineer must carry out field reviews of the landfill construction and installation of works. As-constructed drawings of the landfill and all works, including elevations relative to a common datum, must be submitted (or retained on site) to the Director. The as-constructed drawings must be sealed by a professional engineer or geoscientist who is licensed to practice in the province of British Columbia and knowledgeable in the appropriate field of study.
Details/Findings:	The City of Kelowna submitted to the Ministry a Design, Operation and Closure Plan (DOCP) and a Financial Security Plan prepared by GHD Limited on March 27, 2019. This report and included drawings were signed and sealed by Deacon Liddy, Professional Engineer in good standing with the Association of Professional Engineers and Geoscientists of the Province of BC.

Compliance:	In
Requirement Description:	**2. OPERATING REQUIREMENTS, 2.1 Design, Operations and Closure Plans, 2.1.4** 2.1.4: Written authorization from the Director must be obtained prior to implementing any changes to the approved plans. Based on any information obtained in connection with this facility, the Director may require revision of, or addition to, the design, operations and closure plans.
Details/Findings:	The Officer noted the new DOCP 2019 is currently in review by a director from Authorizations. However as noted in the last IR85264 there has already been changes to the facility layout since the approved CSDP (2008), therefore the Permittee is out of compliance with this section.
Compliance:	Out
Actions to be taken:	Written authorization from the Director must be obtained prior to implementing any changes to the approved plans.
Requirement Description:	**2. OPERATING REQUIREMENTS, 2.2 Qualified Professionals, 2.2.1** 2.2.1: All information, including plans, drawings, assessments, investigations, surveys, programs and reports, must be certified by a qualified professional. As-built plans and drawings of the facilities and works must be certified by a qualified professional. 2.2.1 "qualified professional" means a person who: (a) is registered in British Columbia with his or her appropriate professional association, acts under that professional association's code of ethics, and is subject to disciplinary action by that professional association; and (b) through suitable education, experience, accreditation and knowledge may be reasonably relied on to provide advice within his or her area of expertise as it relates to this Operational Certificate.
Details/Findings:	The City of Kelowna submitted to the Ministry a Design, Operation and Closure Plan (DOCP) and a Financial Security Plan prepared by GHD Limited on March 27, 2019. This report and included drawings were signed and sealed by Deacon Liddy, Professional Engineer in good standing with the Association of Professional Engineers and Geoscientists of the Province of BC
Compliance:	In

Requirement Description:	**2. OPERATING REQUIREMENTS, 2.5 Landfill Site Development, 2.5.1** 2.5.1: In accordance with the approved Design, Operations and Closure Plan, surface water diversions and groundwater drainage works must be installed to prevent surface water run-off and groundwater seepage from entering the waste discharge area. The effect of sediment transport from areas upgradient and within the landfill site must be considered when designing, installing and maintaining the surface water diversion system. Diversion and drainage structures must be maintained by the Operational Certificate Holders on a regular basis to the satisfaction of the Director.
Details/Findings:	As this was an office review, the Officer did not inspect the facility and could not determine if the drainage structures are in good working order.
Compliance:	Not Determined
Requirement Description:	**2. OPERATING REQUIREMENTS, 2.8 Ground and Surface Water Quality Impairment** 2.8: The quality of ground and surface water at the property boundary must not exceed the appropriate (e.g.freshwater aquatic life, drinking water, etc.) water quality criteria in the British Columbia Approved Water Quality Guidelines and A Compendium of Working Water Quality Guidelines for British Columbia, as amended from time to time, or their replacements approved by the Director in writing. Where natural background water quality exceeds the appropriate water quality criteria, the quality of ground and surface water at the property boundary must not exceed natural background water quality. Water quality criteria from other jurisdictions can only be used for contaminants which have not been dealt with in the British Columbia Guidelines. After considering existing and potential future uses of ground and surface water, a qualified professional may recommend the appropriate water quality criteria. The appropriate water quality criteria are subject to the approval of the Director in writing. If excursions result to the specified water quality criteria, the Director 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 Director.

Details/Findings:	Groundwater quality The 2018 Annual report from March 2019 states that well GL28- 1,2 and 3 is the best monitoring location for leachate migration offsite, as it is located downstream immediately off the permitted landfill boundary. Samples taken in May and September of 2018 for GL28-2 and 3 show levels exceeding the BCWQG aquatic life guidelines for nitrate and sulfate, exceeding drinking water standards for sulfates and irrigation guidelines for field conductivity. As did GL28-1 except with no elevated nitrate. Due to this, it was concluded that nitrate increase was “most likely the result of surface water contamination from local agriculture activity.” (2019, WQ) These exceedances were not found in up gradient background data well G23-1. GL28-1 – conductivity 3,761 µS/cm (Sept 25), sulfate 2,150 µg/L (Sept 25) GL28-2 - conductivity 4,860 µS/cm, (May 28), Nitrate 8,440 µg/L (May 28) and 9480 µg/L (sept 25), Sulfate 2,690 mg/l (May 28) and 3,160 mg/l (Sept 25), GL28-3 –conductivity 6,777 µS/cm (Sept 25), Nitrates 7,780 µg/L (Sep 25), sulfate 3,780 mg/l (May 28) and 4.350 mg/l (Sept 25) Surface water quality Little Robert Lake, outside the boundary, was used as an overflow for Tutt pond, within the boundary, in 2018. The BCWQG quality standards for Little Robert Lake showed exceedances in field conductivity and chloride for irrigation water and for aquatic life there was exceedances of pH, total ammonia (based on pH), chloride, and sulfate. There is no background data for Little Robert Lake. Little Robert Lake – conductivity 3,340 µg/L (Apr 17), chloride 172 mg/l (Jun 15), pH 9.19, total ammonia 173 µg/L (May 3), sulfate 3,840 mg/l (Jun 15) It should also be noted runoff collections ponds on the property, Tutt Pond, Northeast Pond and sometimes Bredin Pond are used to irrigate fields that are outside of the property boundary. There are few guidelines for irrigation water in the BCWQG; field conductivity, chloride, fluoride and, dependent on the crop, conductivity. Exceedance in chloride was observed in Tutt and Bredin pond, and the NE exceeded fluoride. The Director has not approved alternate terms of reference for water quality. These wells and surface waterbodies were found to exceed water quality standards at the property boundary, therefore the Permittee is out of compliance with this section.
Compliance:	Out
Actions to be taken:	Ensure that the quality of ground and surface water at the property boundary does not exceed the appropriate (e.g. freshwater aquatic life, drinking water, etc.) water quality criteria in the British Columbia Approved Water Quality Guidelines and A Compendium of Working Water Quality Guidelines for British Columbia, as amended from time to time, or their replacements approved by the Director in writing.

Requirement Description:	**3. MONITORING, 3.2 Management of Leachate Collection System Fluid** 3.2: Leachate collection sump fluid levels must be monitored and fluid removed from the leachate collection system as specified in the approved design, operating and closure plans. A sample of fluid from each of the leachate collection sumps must be collected on a quarterly basis and laboratory analyses obtained for the leachate indicator parameters identified in the monitoring program. The Director may vary the location and frequency of sampling and analyses of leachate collection system fluid should conditions warrant. Fluid recovered from the leachate collection system may be used within the landfill footprint for irrigation, dust suppression and/or re-circulated within the buried waste as well as directed to the Kelowna Wastewater Treatment facility unless otherwise directed by the Director. Other methods of treatment and/or disposal of the leachate collection sump fluids must have the prior approval of the Director.
Details/Findings:	Leachate Collection Monitoring plan outlined in the updated DOCP 2019 in Appendix L. Samples are taken quarterly at three monitoring locations for parameters of general chemistry, nutrients, dissolved metals, and petroleum hydrocarbon constituents. Leachate is managed through a recirculation piolet program or discharged to the City of Kelowna sewer that goes to the Wastewater Treatment facility.
Compliance:	In
Requirement Description:	**3. MONITORING, 3.3 Groundwater Contamination by Leachate** 3.3: Should it be determined that leachate is being generated and carried in the groundwater or surface water and, in the opinion of the Director, requires interception and treatment, appropriate remedial measures as approved by the Director must be implemented.
Details/Findings:	A detailed comparison of leachate quality and groundwater quality was not completed. The Water Quality report (2019, QW) stated in 7.2.4 that 'The results of the comparison are shown in Table 3d and suggest that groundwater quality in the GL28 well series is not impacted by leachate'. The table 3d does show that GL28 did exceed multiple water quality parameters and that the background up gradient well had no exceedances. This permit is currently under review and it has not yet been determined by a director if leachate has migrated.
Compliance:	Not Determined

Ministry of Environment and Climate Change Strategy

Compliance

Environmental Protection Division

Mailing Address:
102 Industrial Pl
Penticton BC V2A 7C8

Telephone: 250 490 8200
Facsimile: 250 490 2231
Website: www.gov.bc.ca/env

Actions to be taken:	The City of Kelowna is actively participating in a permit amendment. Water quality standards and leachate concerns should be addressed in the permit amendment and DCOP review. Should it be determined that leachate is being generated and carried in the groundwater or surface water and, in the opinion of the Director, requires interception and treatment, appropriate remedial measures as approved by the Director must be implemented.

Compliance History:
IR85264 - 2018-09-17 - Warning - Section 2.1 - Failure to update DOCP, Section 2.5.1 - Failure to maintain ditches, Section 2.8- Not meeting water quality standards.

The Ministry of Environment Compliance and Enforcement Policy and Procedure prescribes common requirements and procedures for all Ministry staff to ensure consistent and risk based assessment and response to noncompliance. Using the Non-Compliance Decision Matrix, the compliance determination for this inspection has been assessed as a Level 3, Category A.

General compliance information:
www.gov.bc.ca/environmentalcompliance
Non-Compliance Decision Matrix information:
www.gov.bc.ca/environment/how-compliance-is-assessed
Reporting and data submission requirements (to be sent to EnvAuthorizationsReporting@gov.bc.ca):
www.gov.bc.ca/submit-waste-authorization-reports

Please be advised that this inspection report may be published on the provincial government website within 7 days.

If you have any questions about this warning, please contact the undersigned.

Yours truly,

Kaylee Garnett
Environmental Protection Officer

cc:

Attachments:

Deliver via:

Email: ☐ **Fax:** ☐ **Mail:** ☐
Registered Mail: ☐ **Hand Delivery:** ☐

Ministry of Environment and Climate Change Strategy

Compliance

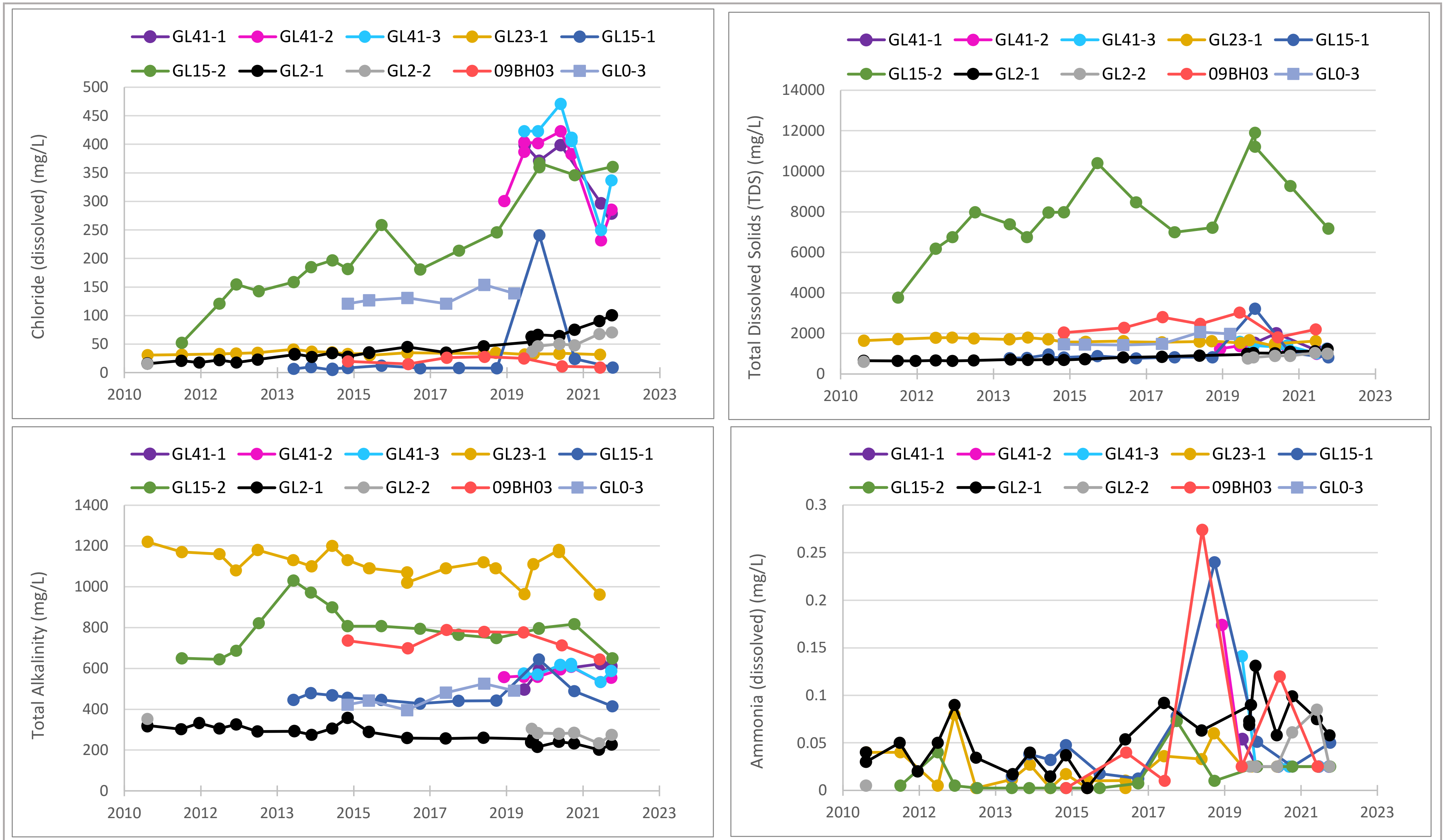
Environmental Protection Division

Mailing Address:
102 Industrial Pl
Penticton BC V2A 7C8

Telephone: 250 490 8200
Facsimile: 250 490 2231
Website: www.gov.bc.ca/env

Appendix H

Concentration vs Time Plots



CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY CHARACTERIZATION REPORT

CONCENTRATION VERSUS TIME PLOTS
UPGRADIENT WELLS

Project No. **12605725**
Date **October 2023**

FIGURE H-1

Filename: \\ghdnet\ghd\CA\Vancouver\Projects\663\12605725\Tech\Hydrogeology and Hydrology Characterization Report\Appendices\Appendix H Concentration vs Time Plots\Copy of Glenmore_CvT_Plots.xlsx
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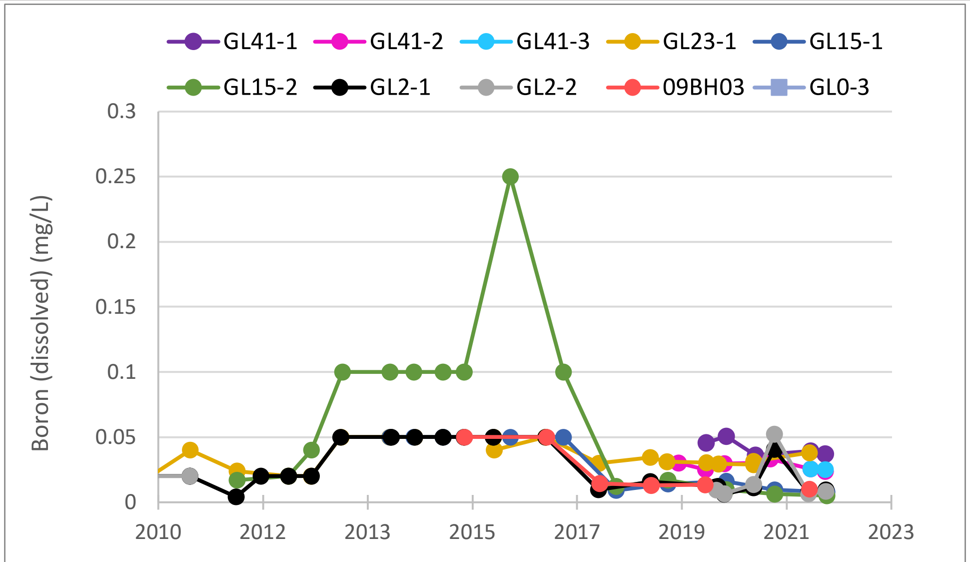

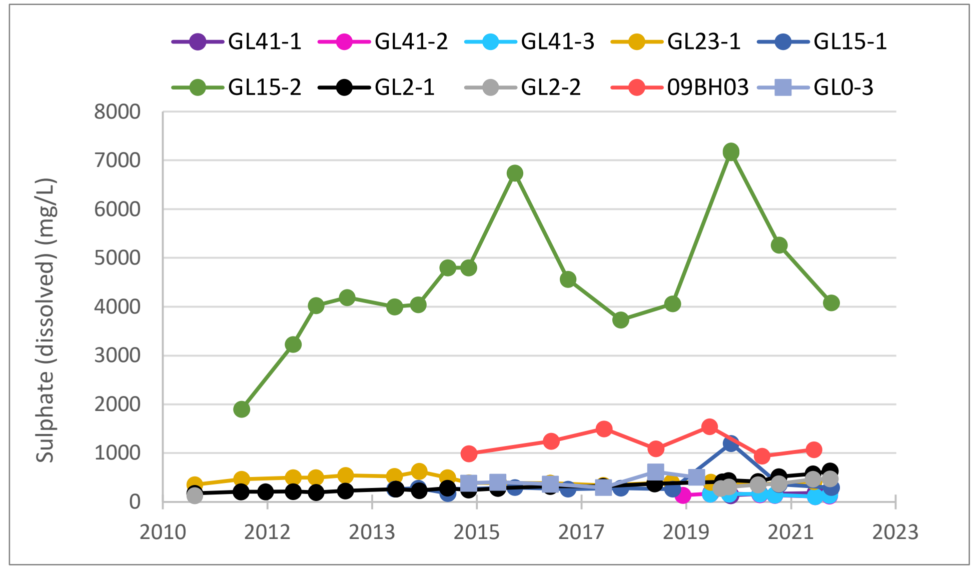

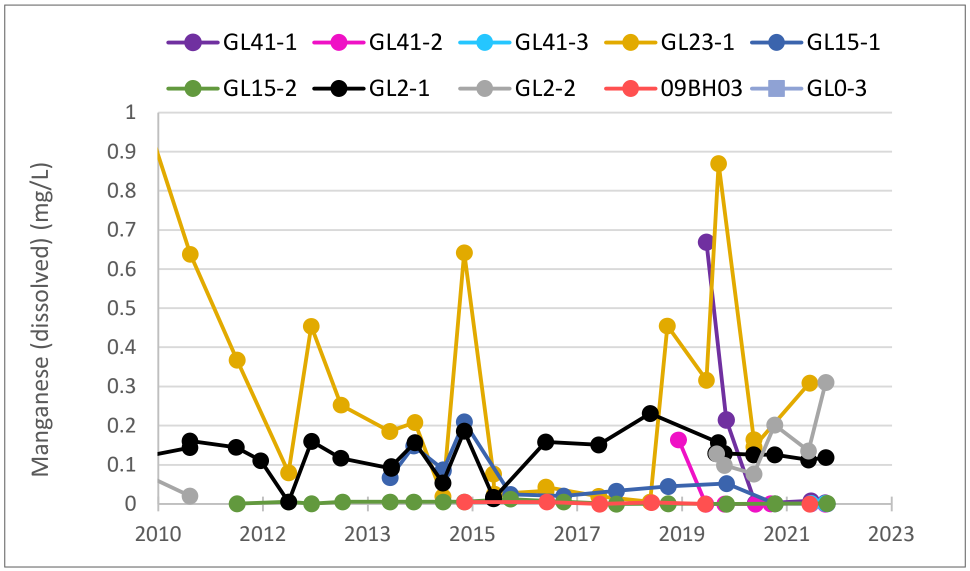

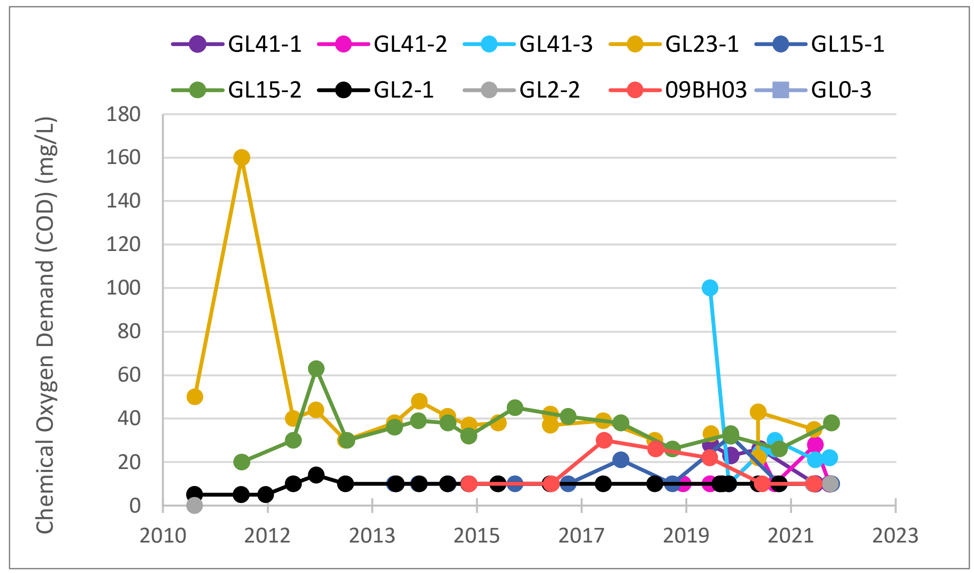

CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY CHARACTERIZATION REPORT

CONCENTRATION VERSUS TIME PLOTS
UPGRADIENT WELLS

Project No. **12605725**
Date **October 2023**

FIGURE H-2

Filename: \\ghdnet\ghd\CA\Vancouver\Projects\663\12605725\Tech\Hydrogeology and Hydrology Characterization Report\Appendices\Appendix H Concentration vs Time Plots\Copy of Glenmore_CvT_Plots.xlsx
Plot Date: 20 Oct 2023 11:23 AM

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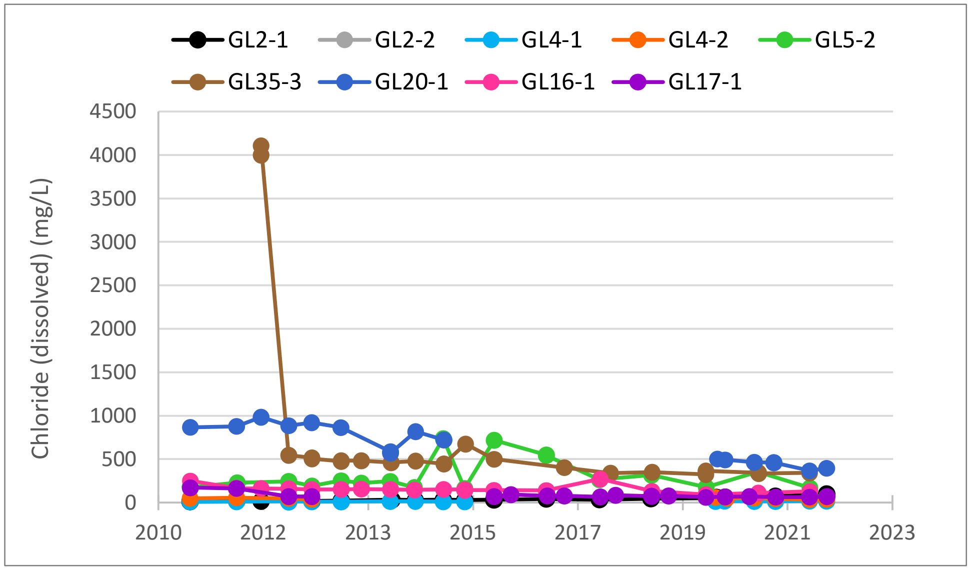

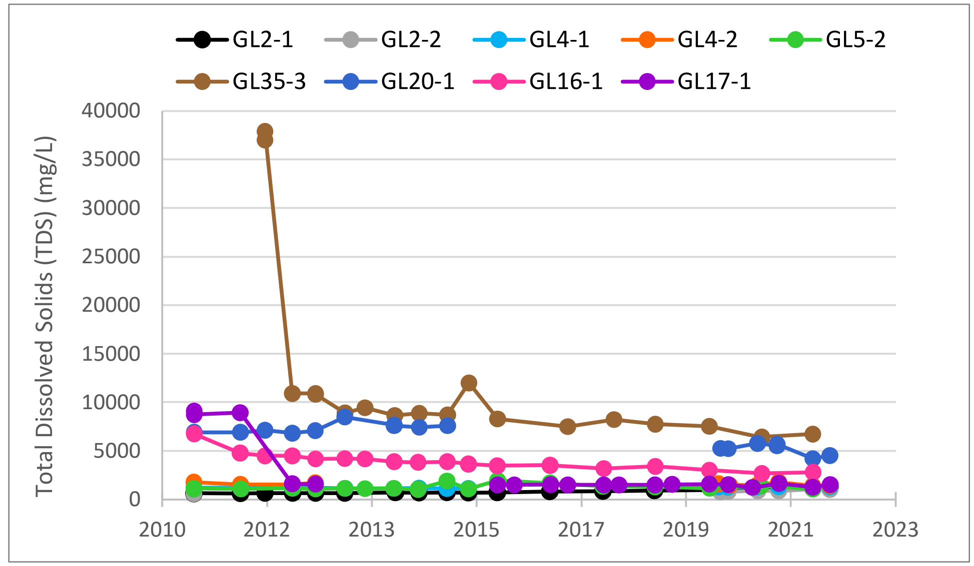

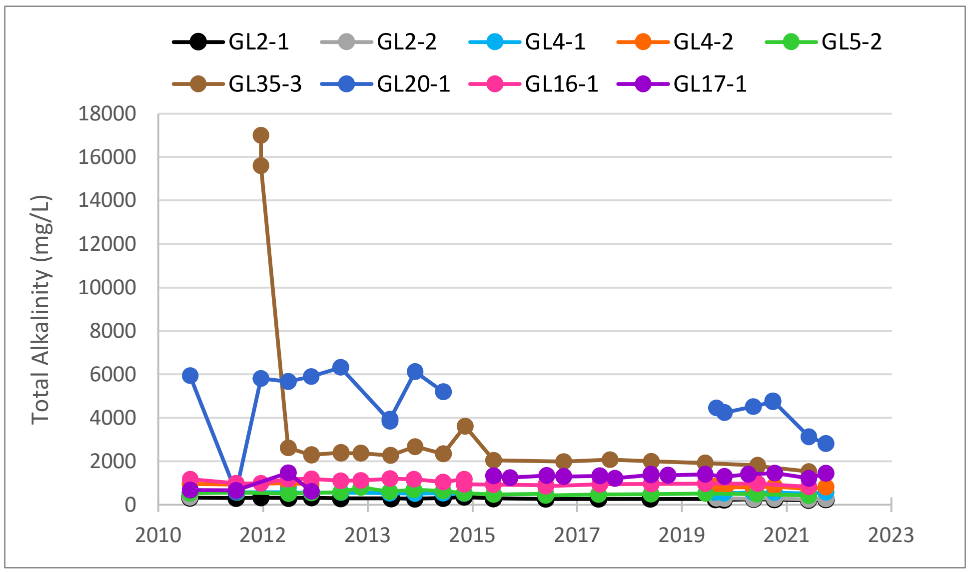

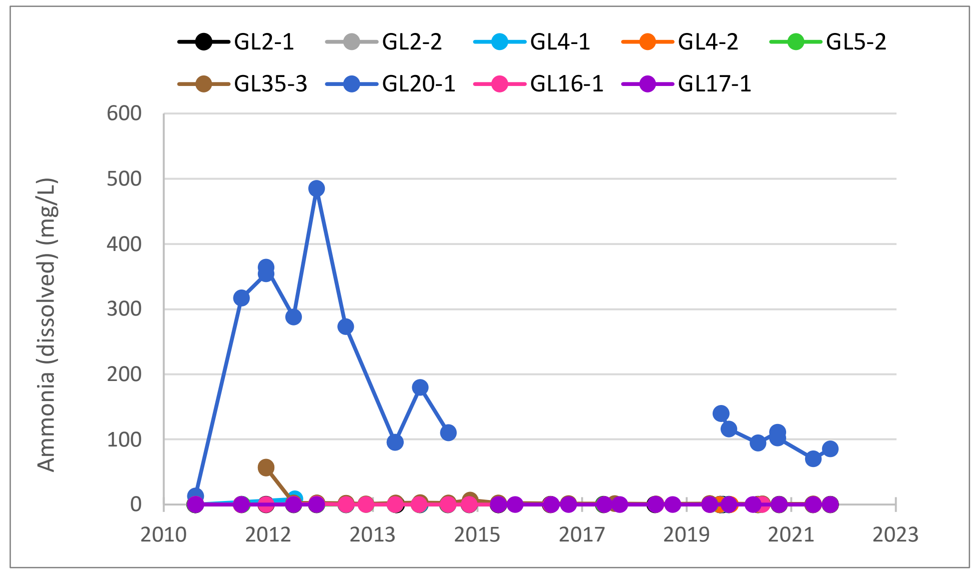

CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY CHARACTERIZATION REPORT

CONCENTRATION VERSUS TIME PLOTS
LANDFILL VICINITY WELLS

Project No. **12605725**
Date **October 2023**

FIGURE H-3

Filename: \\ghdnet\ghd\CA\Vancouver\Projects\663\12605725\Tech\Hydrogeology and Hydrology Characterization Report\Appendices\Appendix H Concentration vs Time Plots\Copy of Glenmore_CvT_Plots.xlsx
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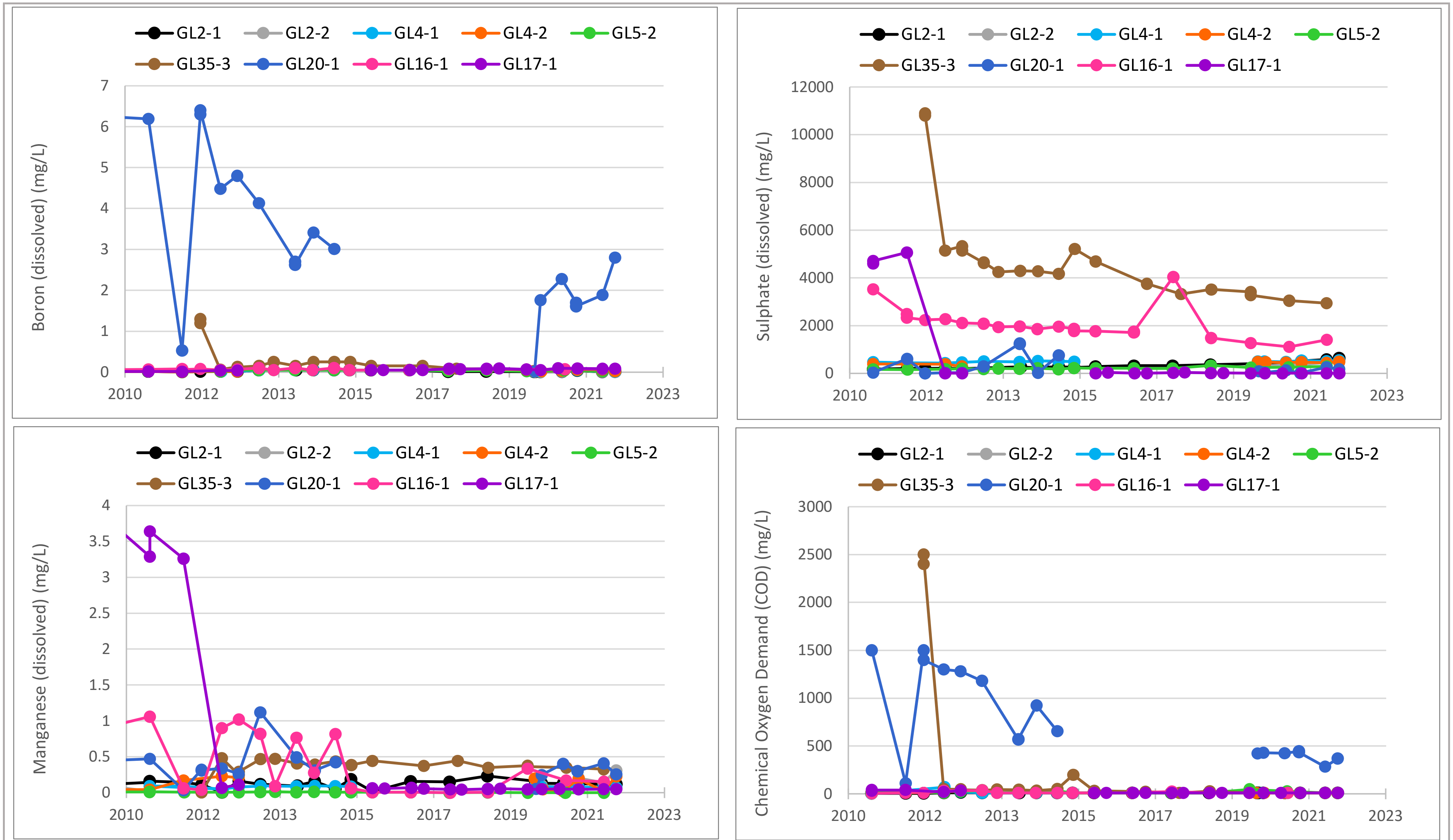

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CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY CHARACTERIZATION REPORT

CONCENTRATION VERSUS TIME PLOTS
LANDFILL VICINITY WELLS

Project No. **12605725**
Date **October 2023**

FIGURE H-4

Filename: \\ghdnet\ghd\CA\Vancouver\Projects\663\12605725\Tech\Hydrogeology and Hydrology Characterization Report\Appendices\Appendix H Concentration vs Time Plots\Copy of Glenmore_CvT_Plots.xlsx
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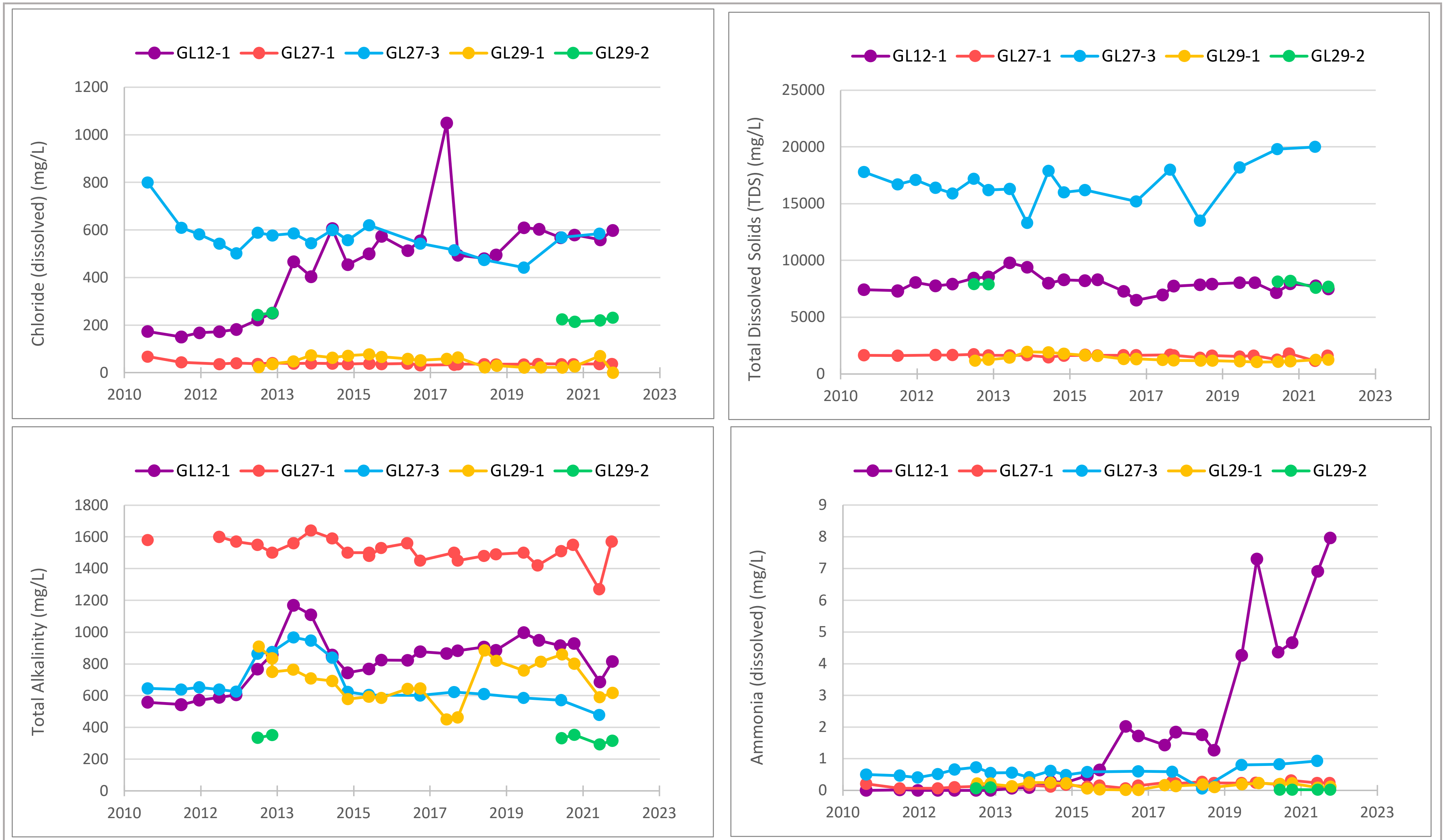

CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY CHARACTERIZATION REPORT

CONCENTRATION VERSUS TIME PLOTS
COMPOST VICINITY WELLS

Project No. **12605725**
Date **October 2023**

FIGURE H-5

Filename: \\ghdnet\ghd\CA\Vancouver\Projects\663\12605725\Tech\Hydrogeology and Hydrology Characterization Report\Appendices\Appendix H Concentration vs Time Plots\Copy of Glenmore_CvT_Plots.xlsx
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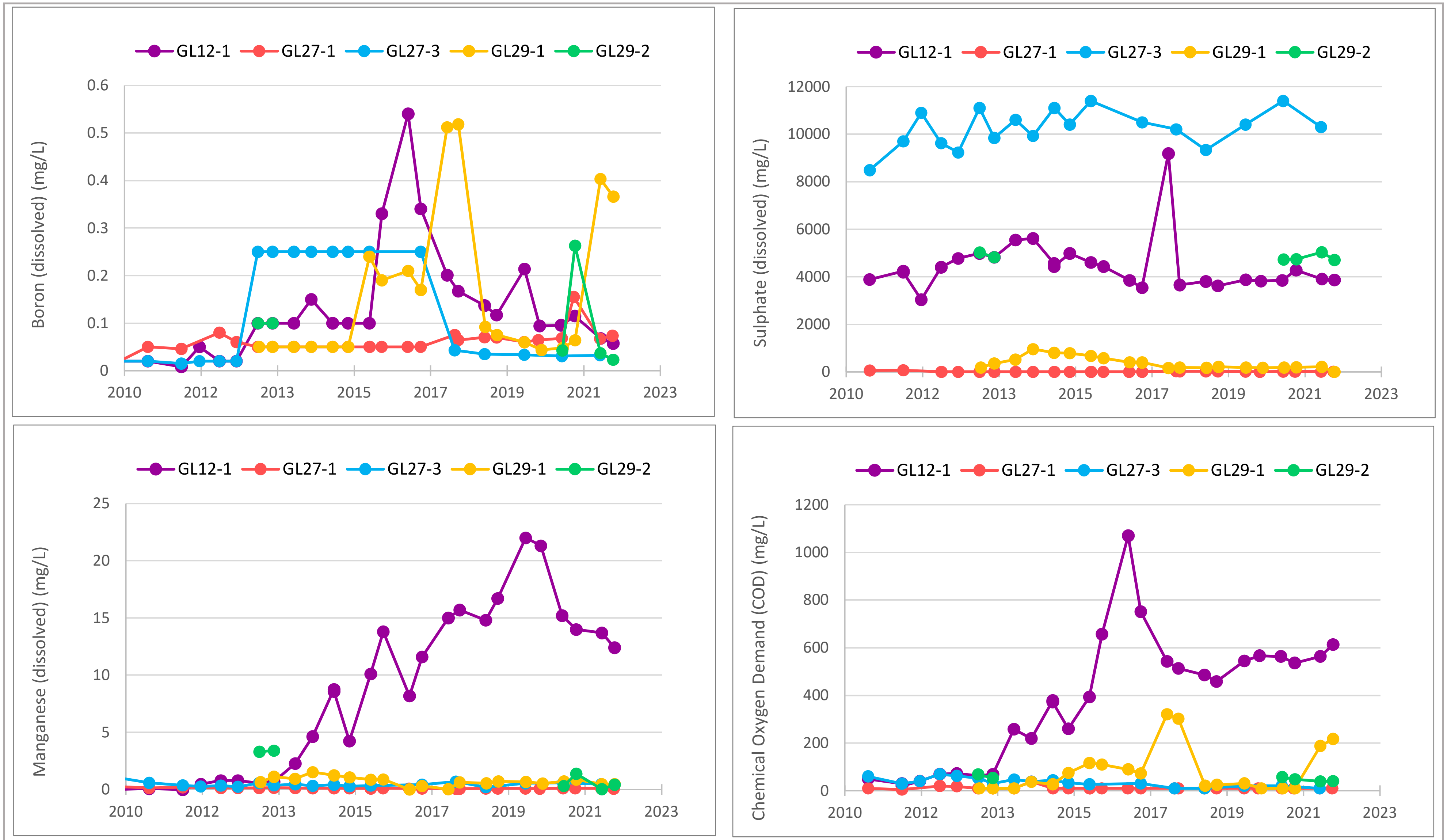

CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY CHARACTERIZATION REPORT

CONCENTRATION VERSUS TIME PLOTS
COMPOST VICINITY WELLS

Project No. **12605725**
Date **October 2023**

FIGURE H-6

Filename: \\ghdnet\ghd\CA\Vancouver\Projects\663\12605725\Tech\Hydrogeology and Hydrology Characterization Report\Appendices\Appendix H Concentration vs Time Plots\Copy of Glenmore_CvT_Plots.xlsx
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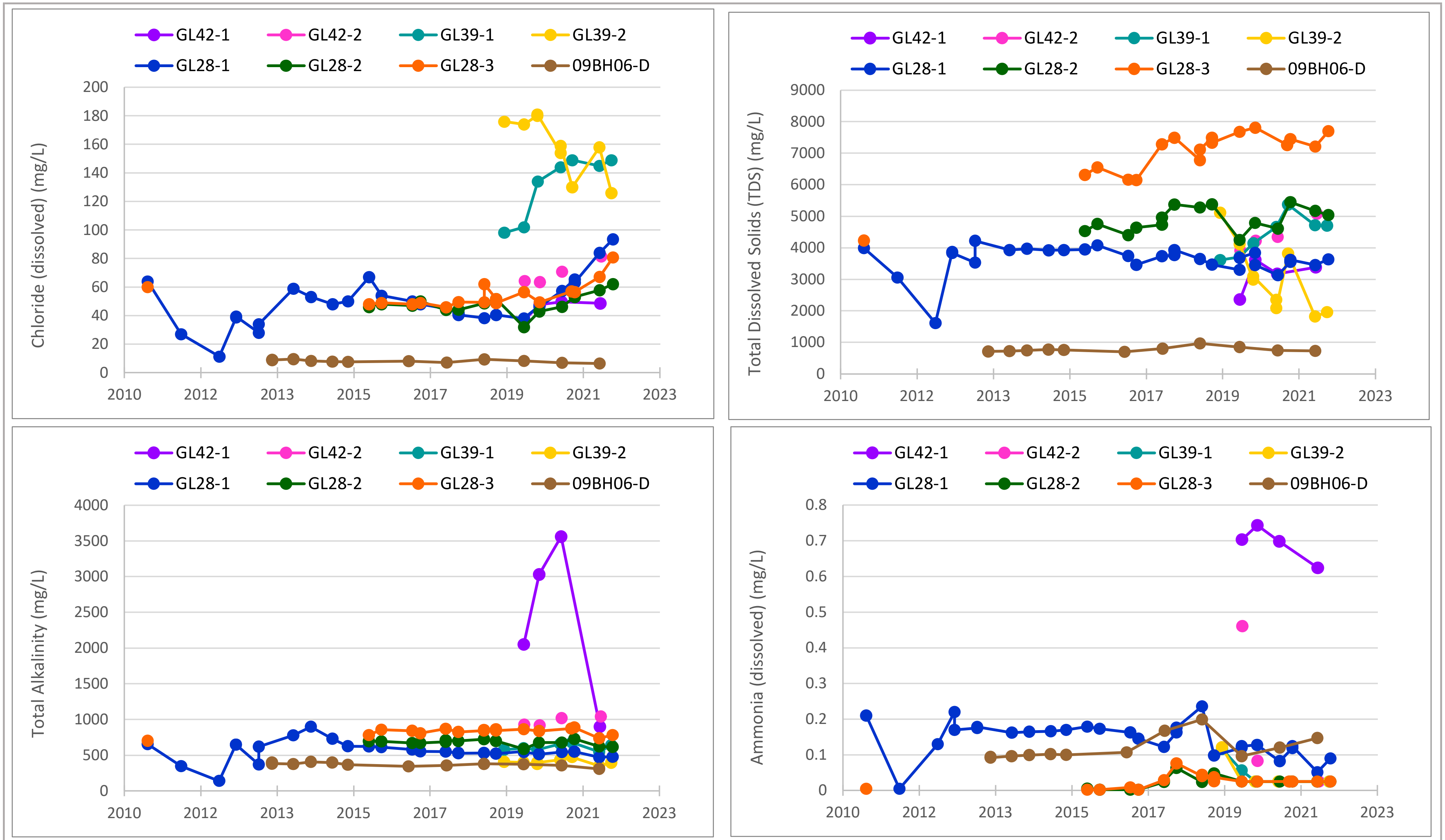

CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY CHARACTERIZATION REPORT

CONCENTRATION VERSUS TIME PLOTS
DOWNGRADIENT WELLS

Project No. **12605725**
Date **October 2023**

FIGURE H-7

Filename: \\ghdnet\ghd\CA\Vancouver\Projects\663\12605725\Tech\Hydrogeology and Hydrology Characterization Report\Appendices\Appendix H Concentration vs Time Plots\Copy of Glenmore_CvT_Plots.xlsx
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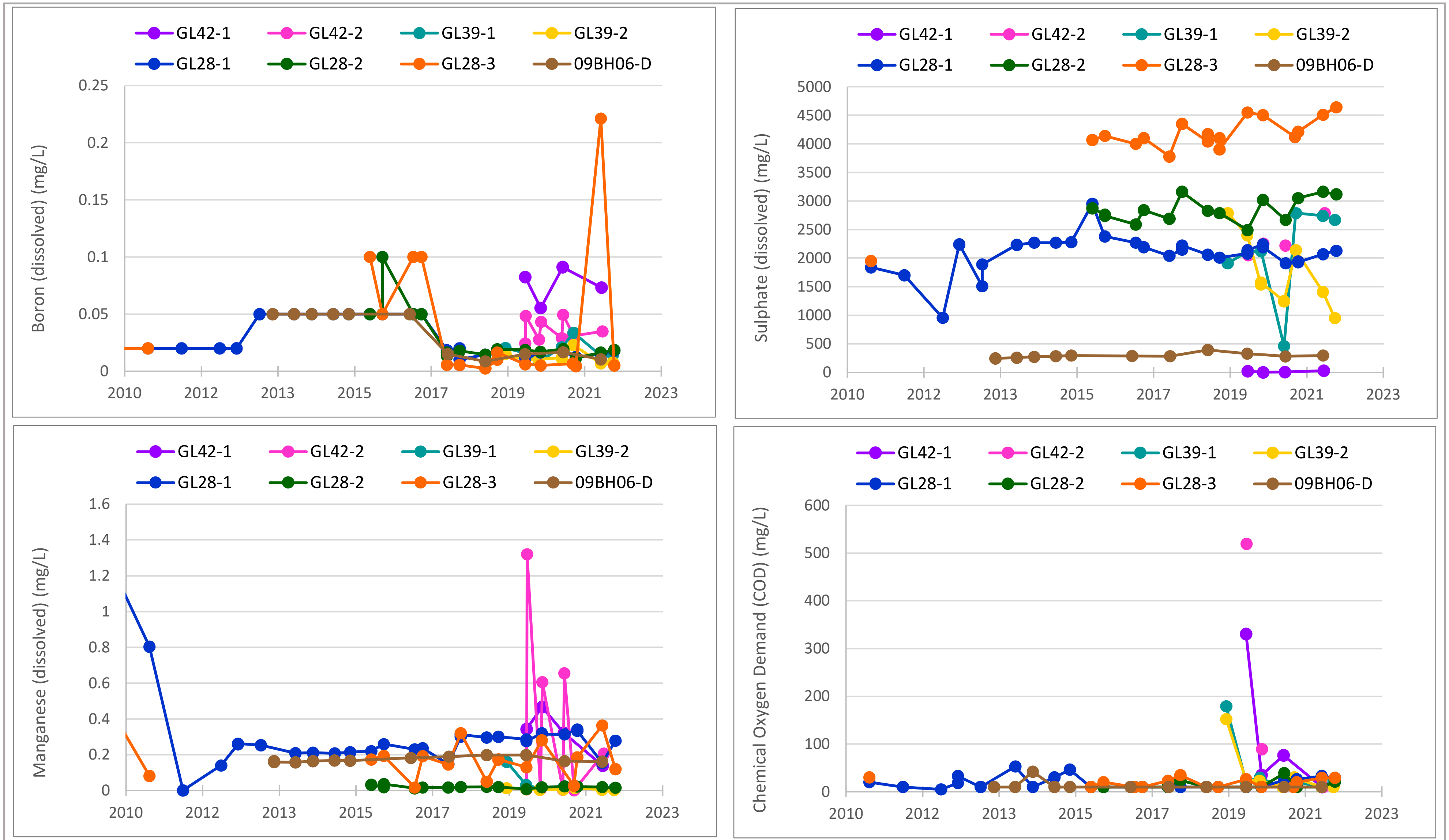

CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY CHARACTERIZATION REPORT

CONCENTRATION VERSUS TIME PLOTS
DOWNGRADIENT WELLS

Project No. **12605725**
Date **October 2023**

FIGURE H-8

Filename: \\ghdnet\ghd\CA\Vancouver\Projects\663\12605725\Tech\Hydrogeology and Hydrology Characterization Report\Appendices\Appendix H Concentration vs Time Plots\Copy of Glenmore_CvT_Plots.xlsx
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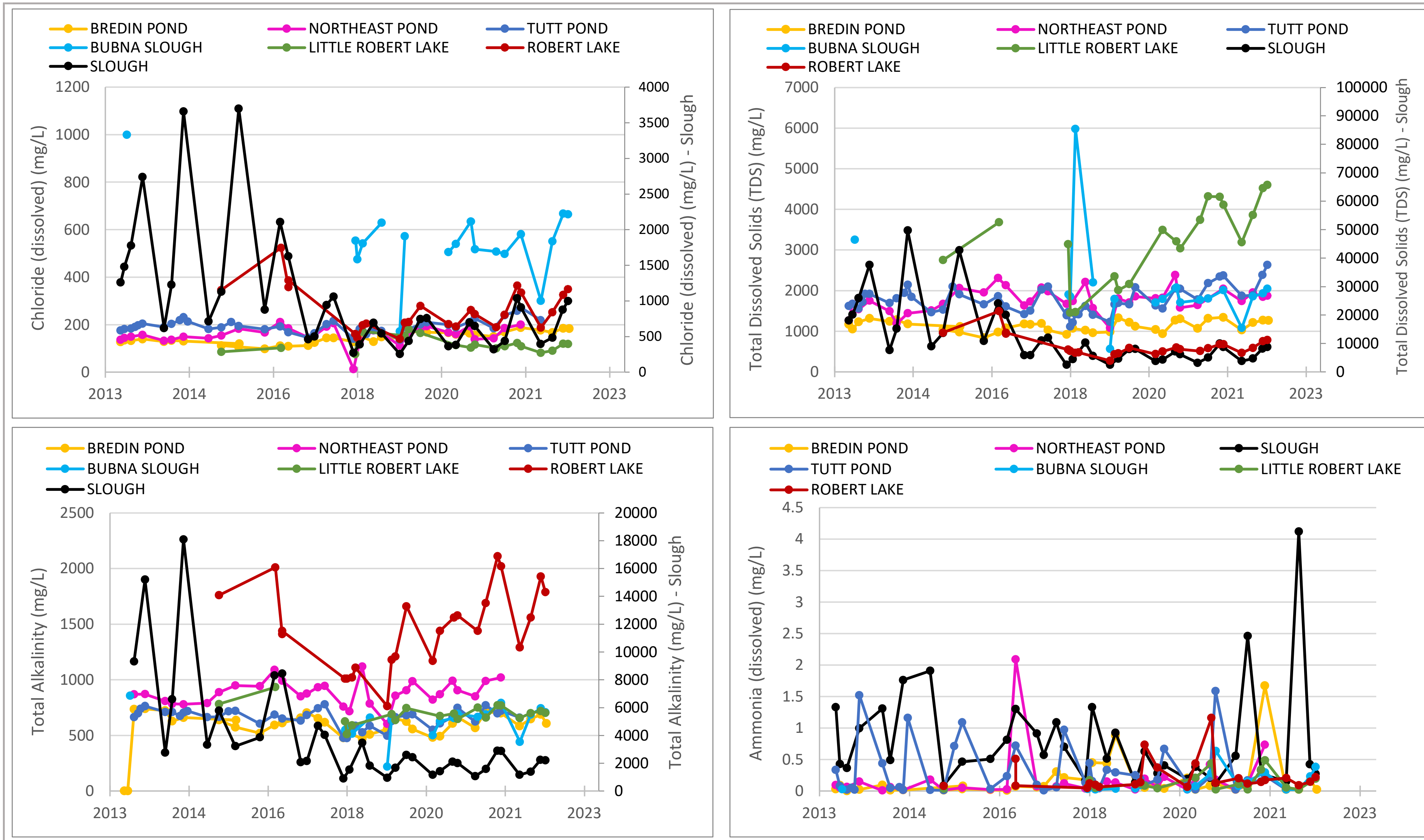

CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY CHARACTERIZATION REPORT

CONCENTRATION VERSUS TIME PLOTS
SURFACE WATER

Project No. **12605725**
Date **October 2023**

FIGURE H-9

Filename: \\ghdnet\ghd\CA\Vancouver\Projects\663\12605725\Tech\Hydrogeology and Hydrology Characterization Report\Appendices\Appendix H Concentration vs Time Plots\Glenmore_CvT_Plots_SURFACE_WATER.xlsx
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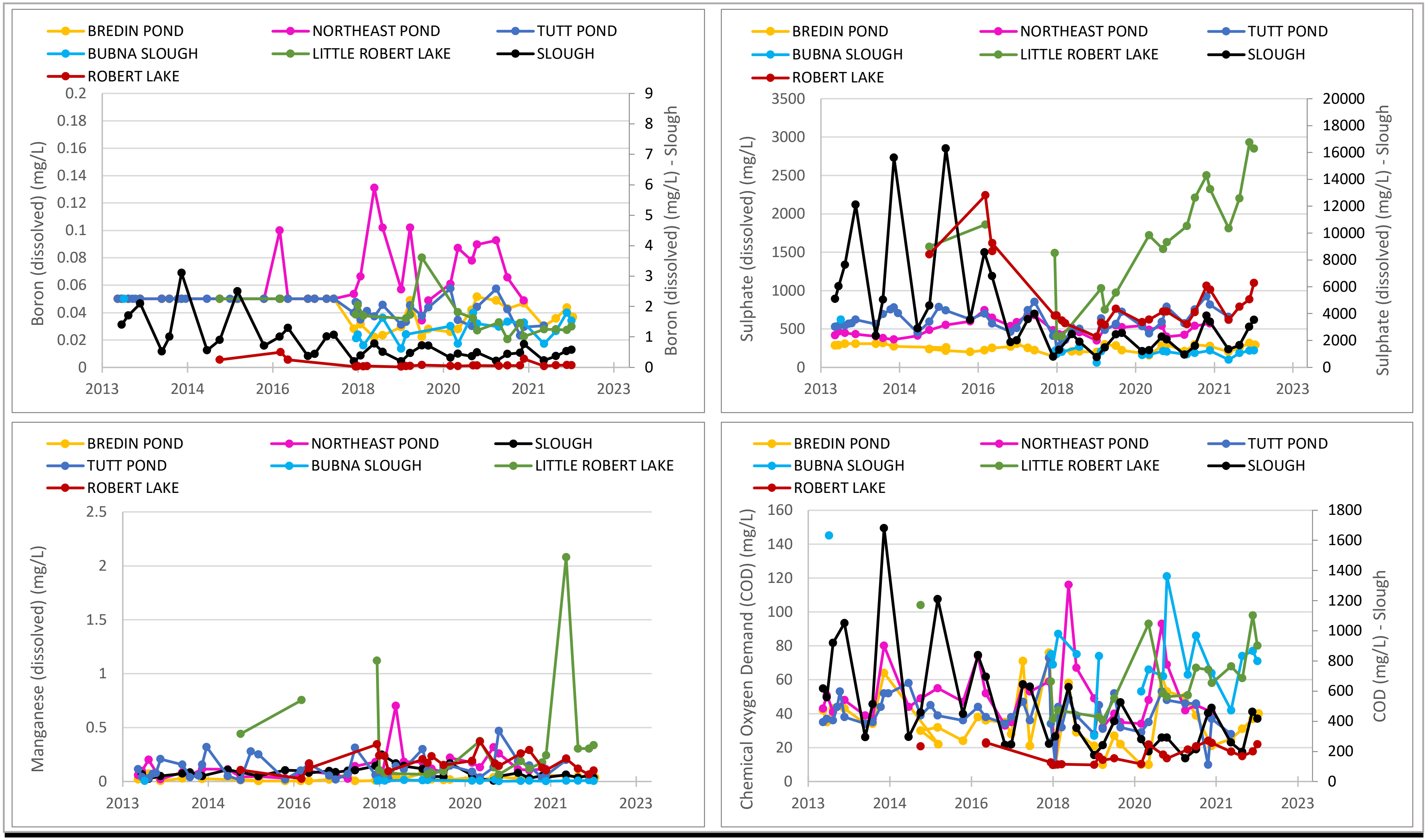


CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY CHARACTERIZATION REPORT

CONCENTRATION VERSUS TIME PLOTS
SURFACE WATER

Project No. **12605725**
Date **October 2023**

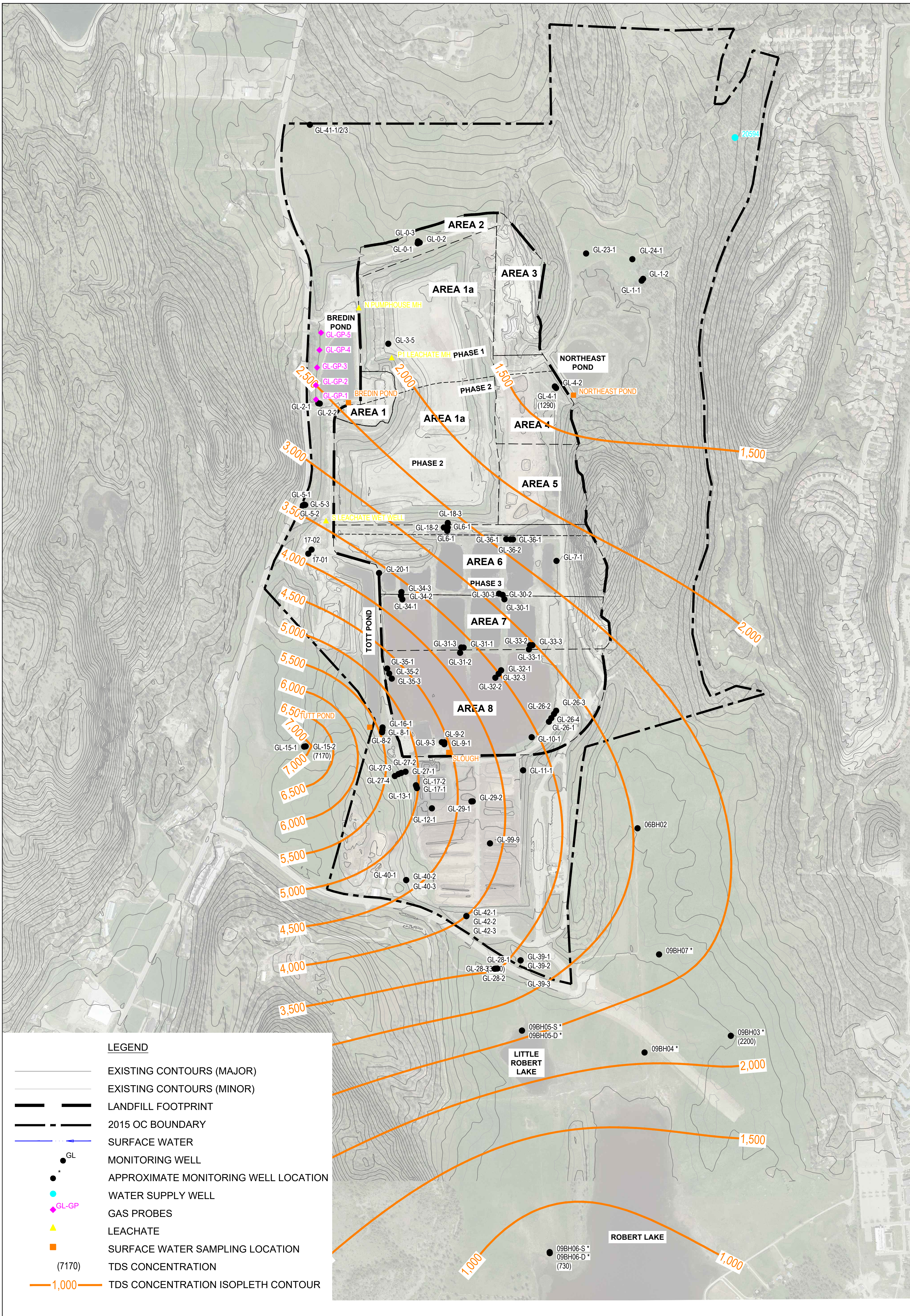
FIGURE H-10

Filename: \\ghdnet\ghd\CA\Vancouver\Projects\663\12605725\Tech\Hydrogeology and Hydrology Characterization Report\Appendices\Appendix H Concentration vs Time Plots\Glenmore_CvT_Plots_SURFACE_WATER.xlsx
Plot Date: 20 Oct 2023 11:27 AM

Data Source

Appendix I

Concentration Isopleth Figures



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CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY
CHARACTERIZATION REPORT

SAND AND GRAVEL UNIT
TDS CONCENTRATION ISOPLETHS

Project No. 12605725
Date October 2023

FIGURE I-1

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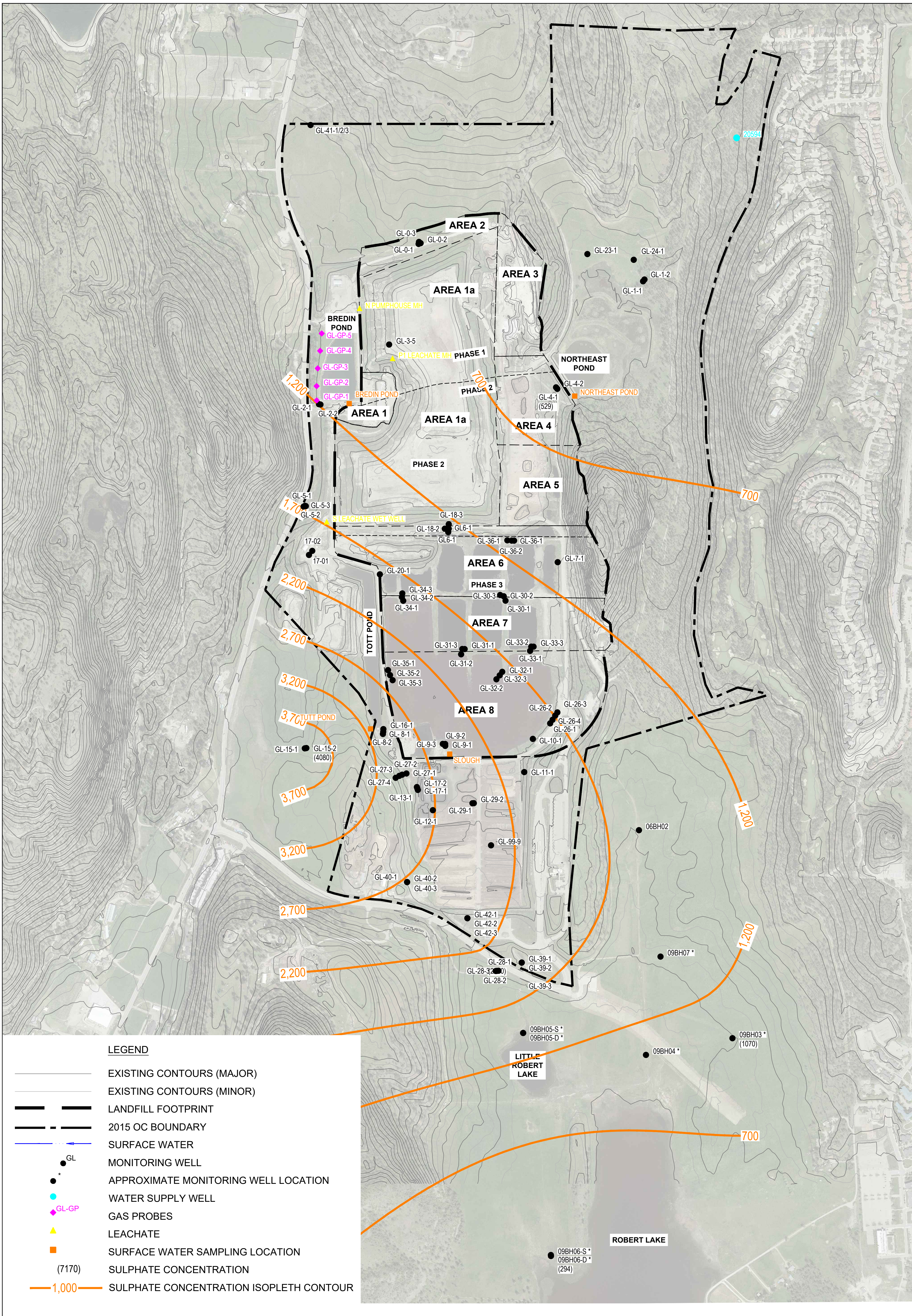

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GHD

CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY
CHARACTERIZATION REPORT

SAND AND GRAVEL UNIT
SULPHATE CONCENTRATION ISOPLETHS

Project No. 12605725
Date October 2023

FIGURE I-2

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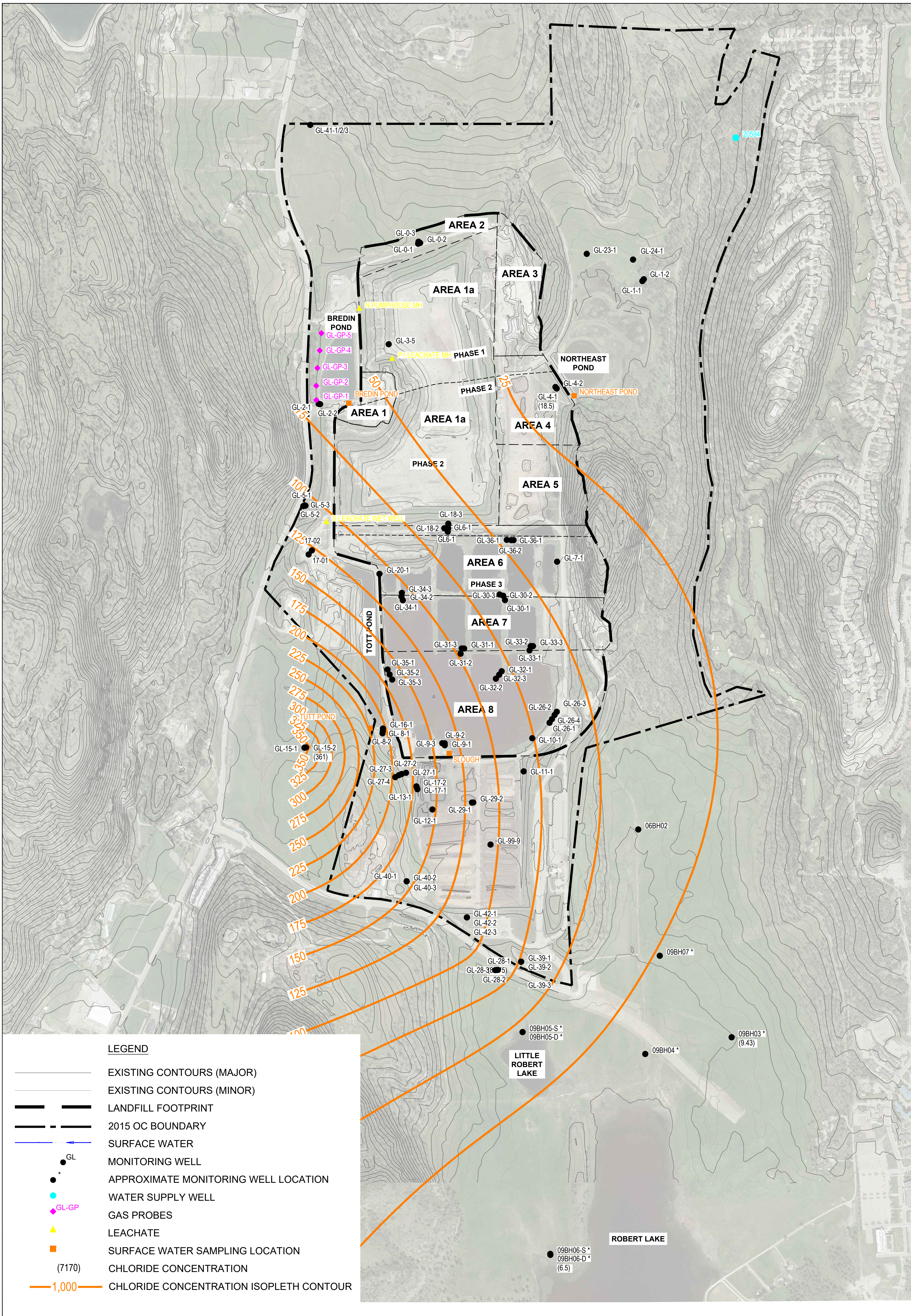

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GHD

CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY
CHARACTERIZATION REPORT

SAND AND GRAVEL UNIT
CHLORIDE CONCENTRATION ISOPLETHS

Project No. 12605725
Date October 2023

FIGURE I-3

Filename: N:\CA\Vancouver\Projects\663\12605725\Digital_Design\ACAD\Figures\RPT003\12605725-GHD-00-00-RPT-EN-D118_WA-003.dwg
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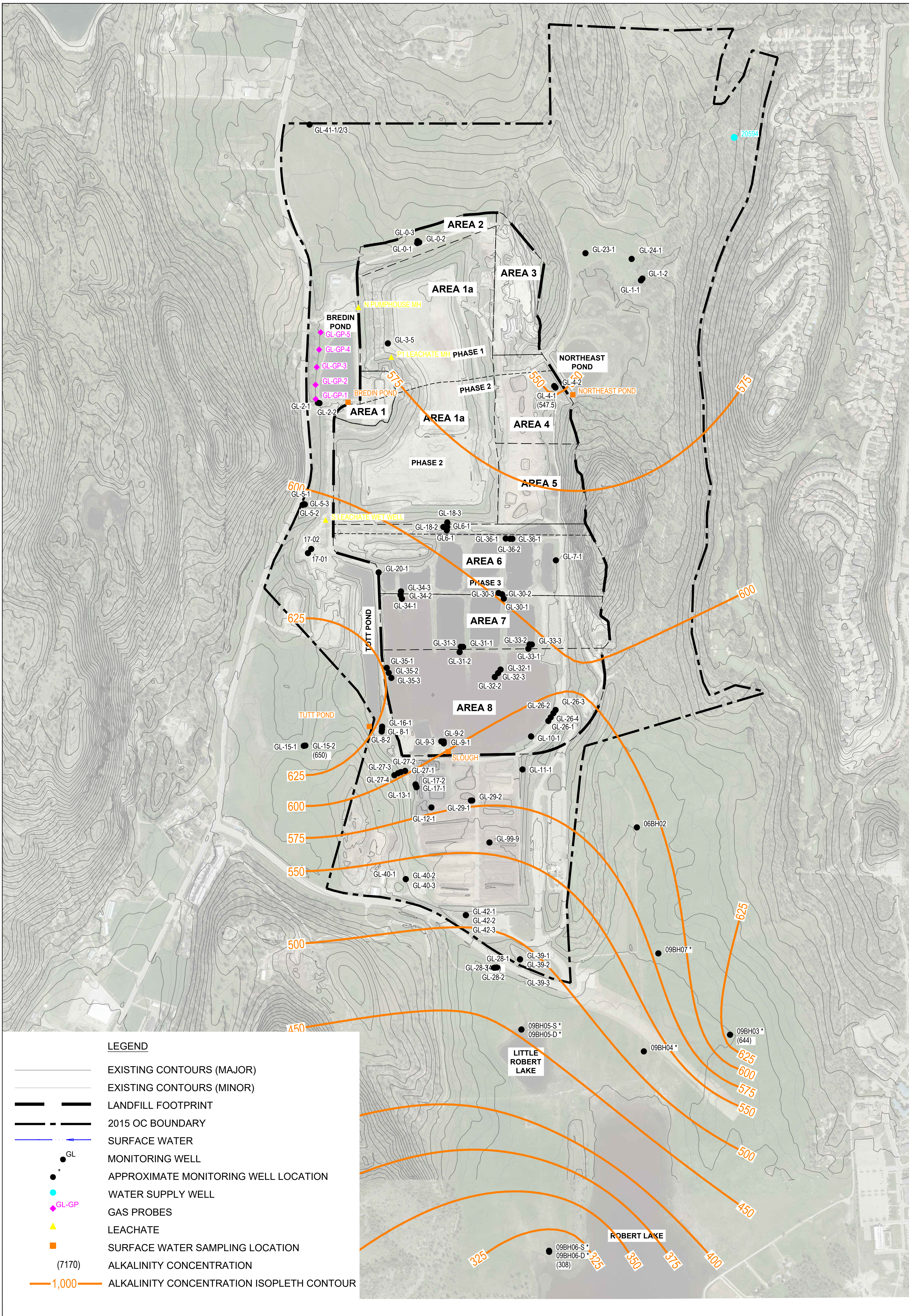

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CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY CHARACTERIZATION REPORT

SAND AND GRAVEL UNIT ALKALINITY CONCENTRATION ISOPLETHS

Project No. 12605725
Date October 2023

FIGURE I-4

Filename: N:\CA\Vancouver\Projects\663\12605725\Digital_Design\ACAD\Figures\RPT003\12605725-GHD-00-00-RPT-EN-D119_WA-003.dwg
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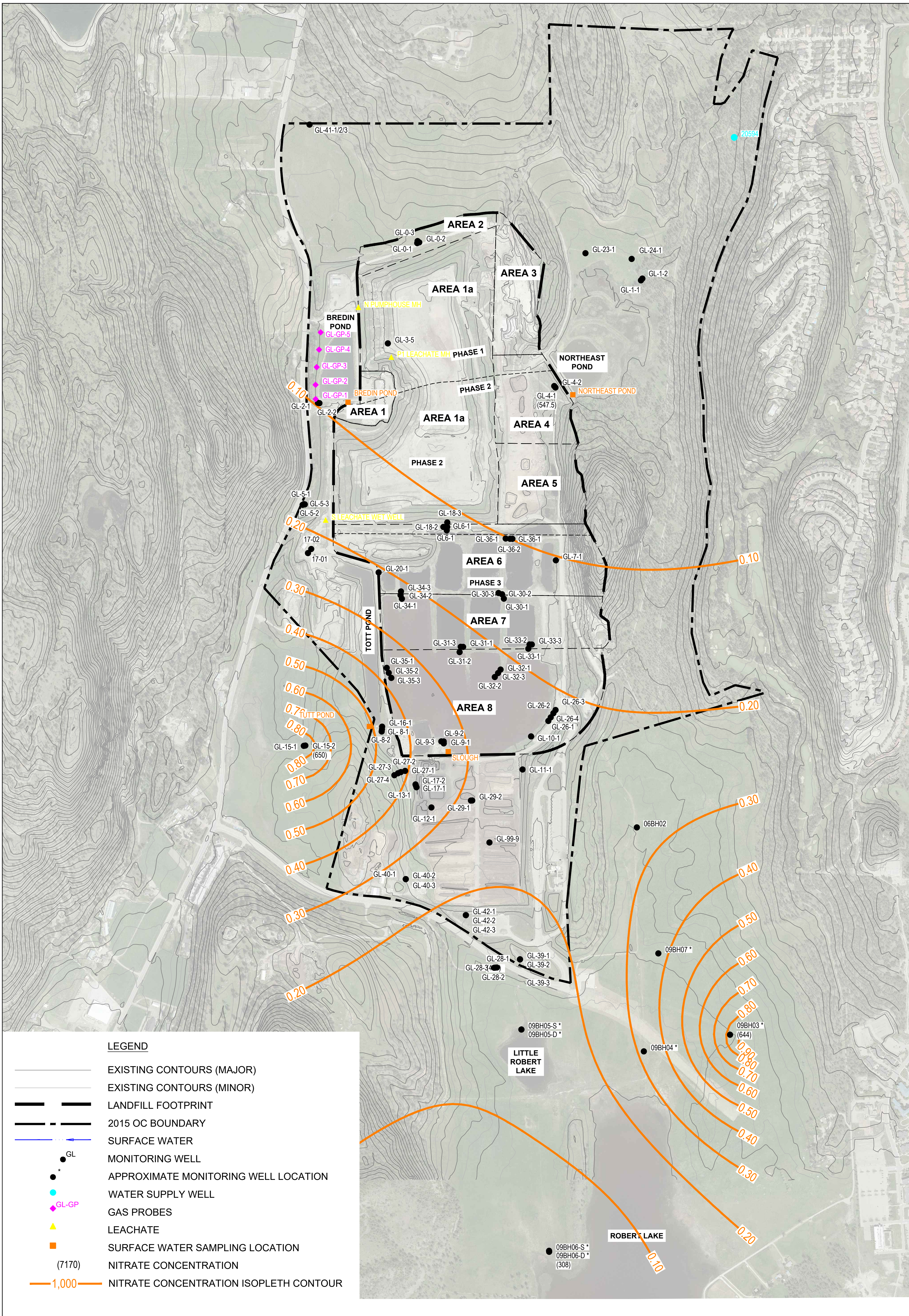

CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY CHARACTERIZATION REPORT

SAND AND GRAVEL UNIT
NITRATE CONCENTRATION ISOPLETHS

Project No. 12605725
Date October 2023

FIGURE I-5

Filename: N:\CA\Vancouver\Projects\663\12605725\Digital_Design\ACAD\Figures\RPT003\12605725-GHD-00-00-RPT-EN-D120_WA-003.dwg
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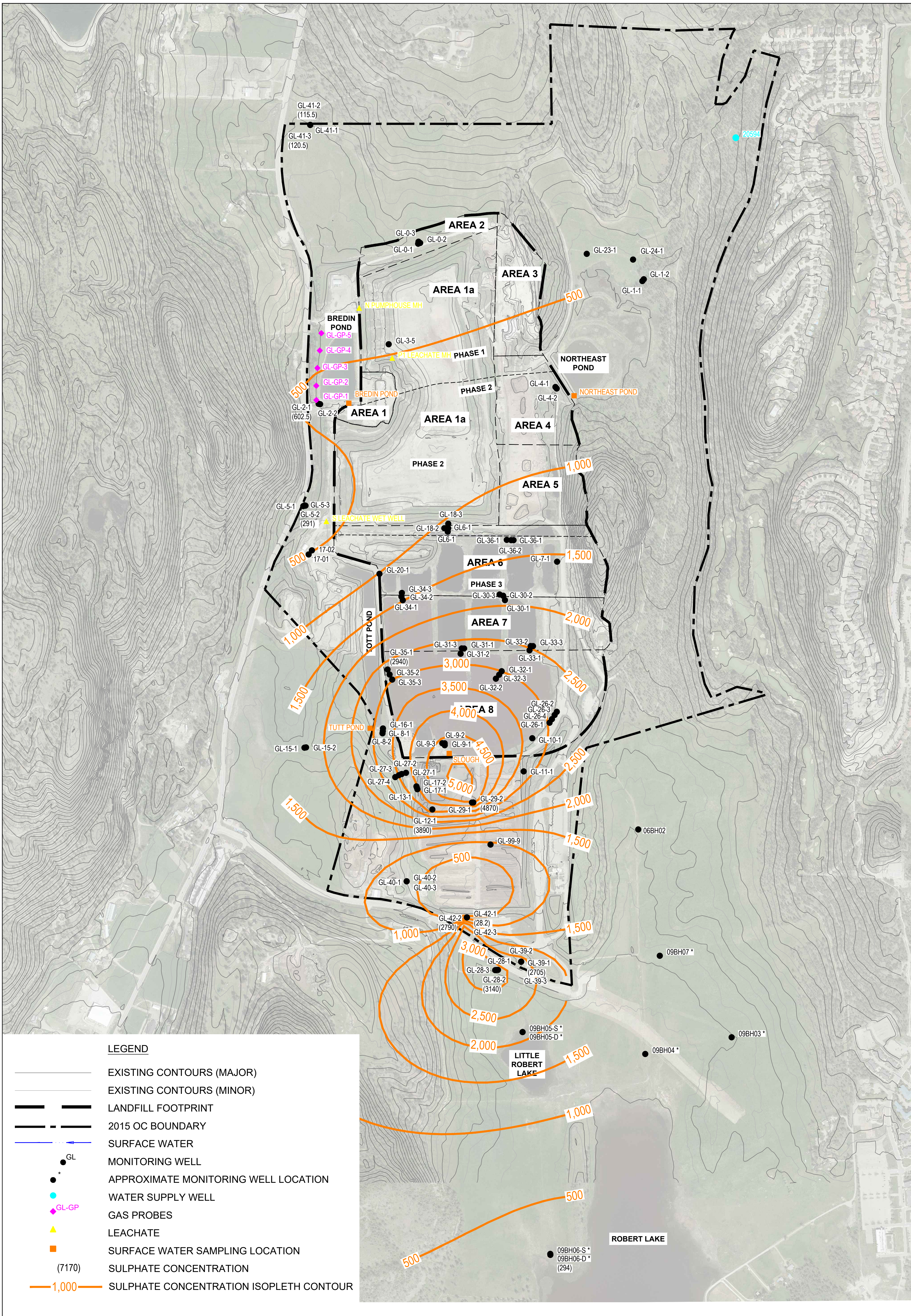

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CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY
CHARACTERIZATION REPORT

TILL UNIT
SULPHATE CONCENTRATION ISOPLETHS

Project No. 12605725
Date October 2023

FIGURE I-7

Filename: N:\CA\Vancouver\Projects\663\12605725\Digital_Design\ACAD\Figures\RPT003\12605725-GHD-00-00-RPT-EN-D121_WA-003.dwg
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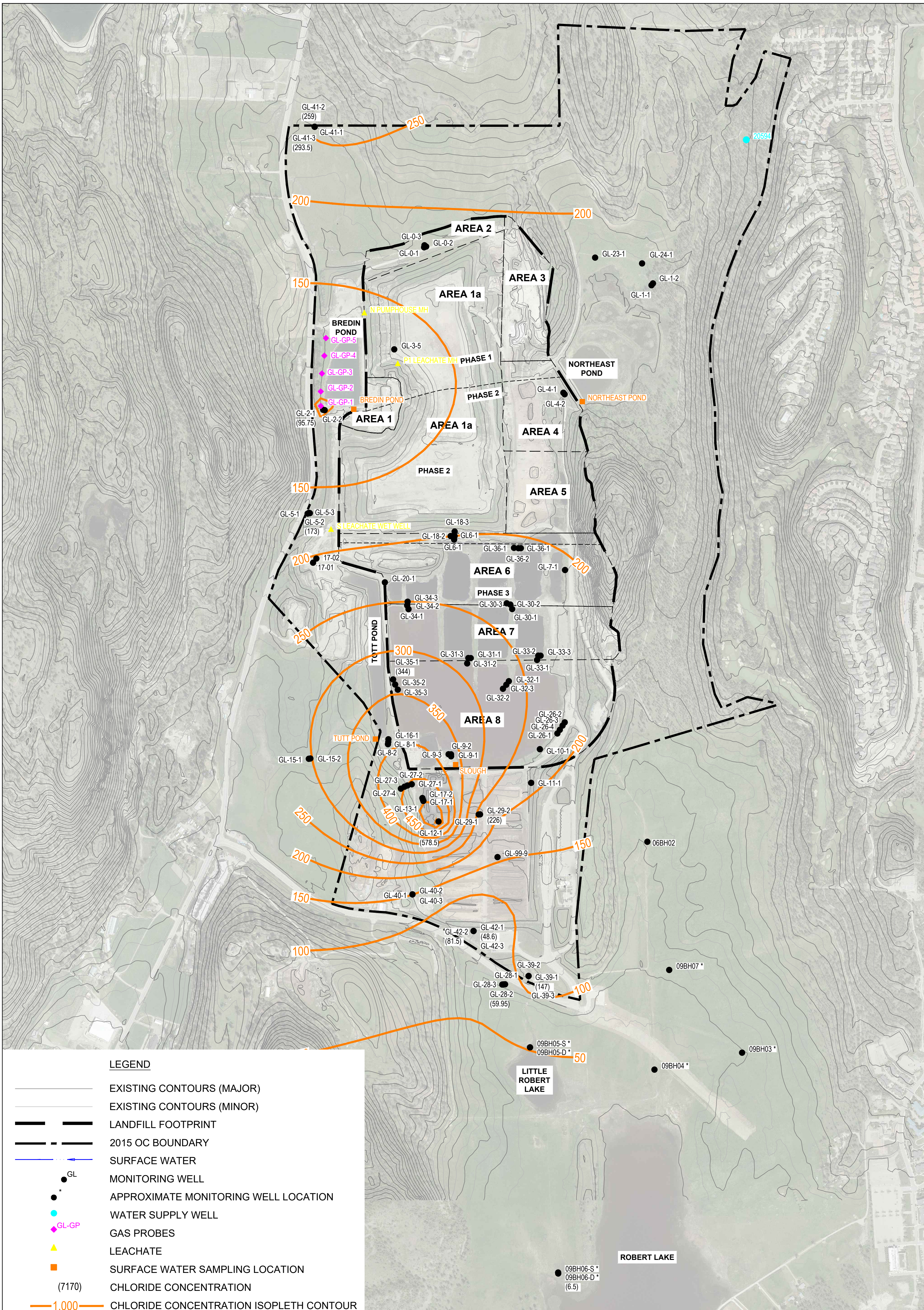

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CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY
CHARACTERIZATION REPORT

TILL UNIT
CHLORIDE CONCENTRATION ISOPLETHS

Project No. 12605725
Date October 2023

FIGURE I-8

Filename: N:\CA\Vancouver\Projects\663\12605725\Digital_Design\ACAD\Figures\RPT003\12605725-GHD-00-00-RPT-EN-D122_WA-003.dwg
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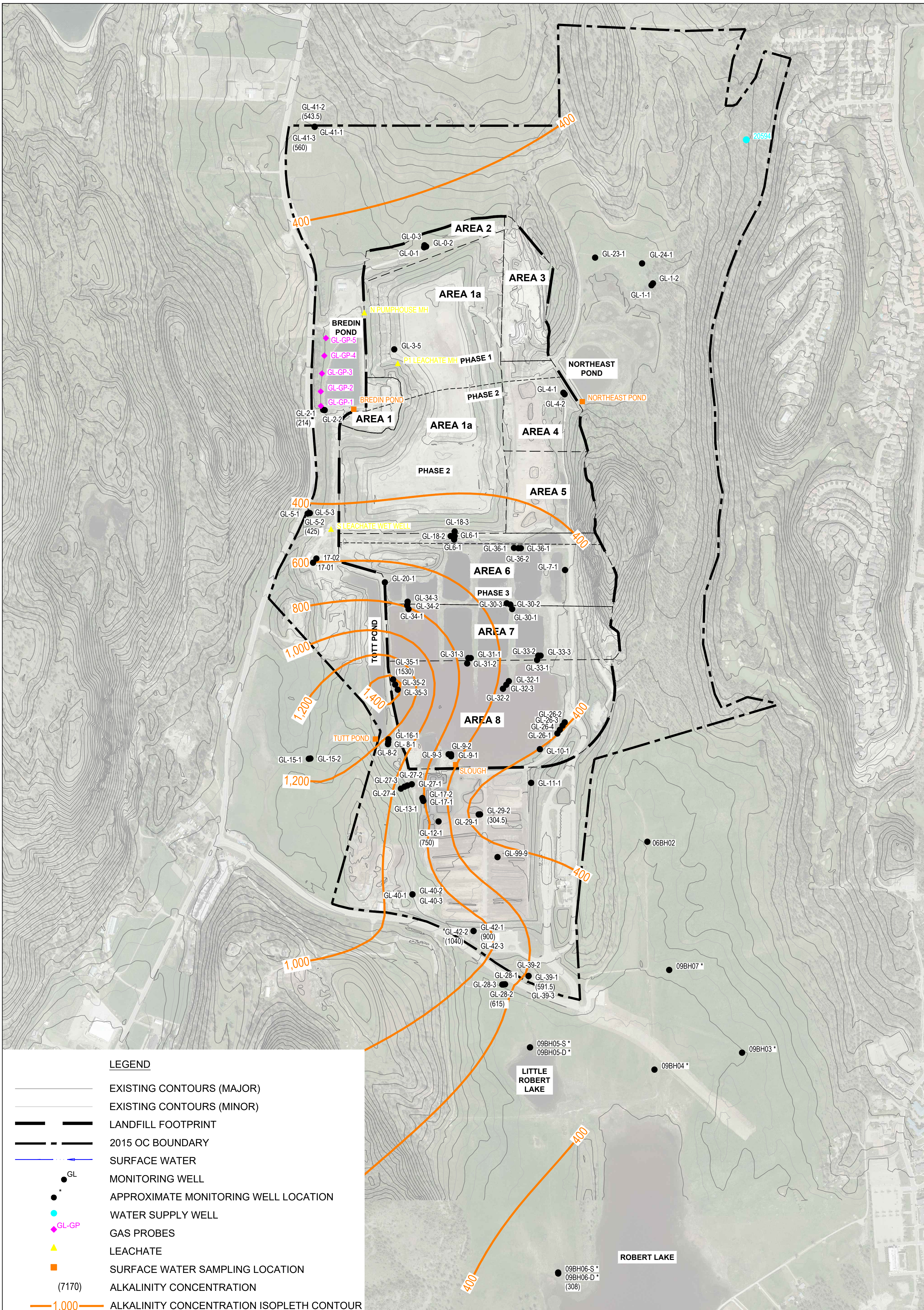

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CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY CHARACTERIZATION REPORT
TILL UNIT
ALKALINITY
CONCENTRATION ISOPLETHS

Project No. 12605725
Date October 2023

FIGURE I-9

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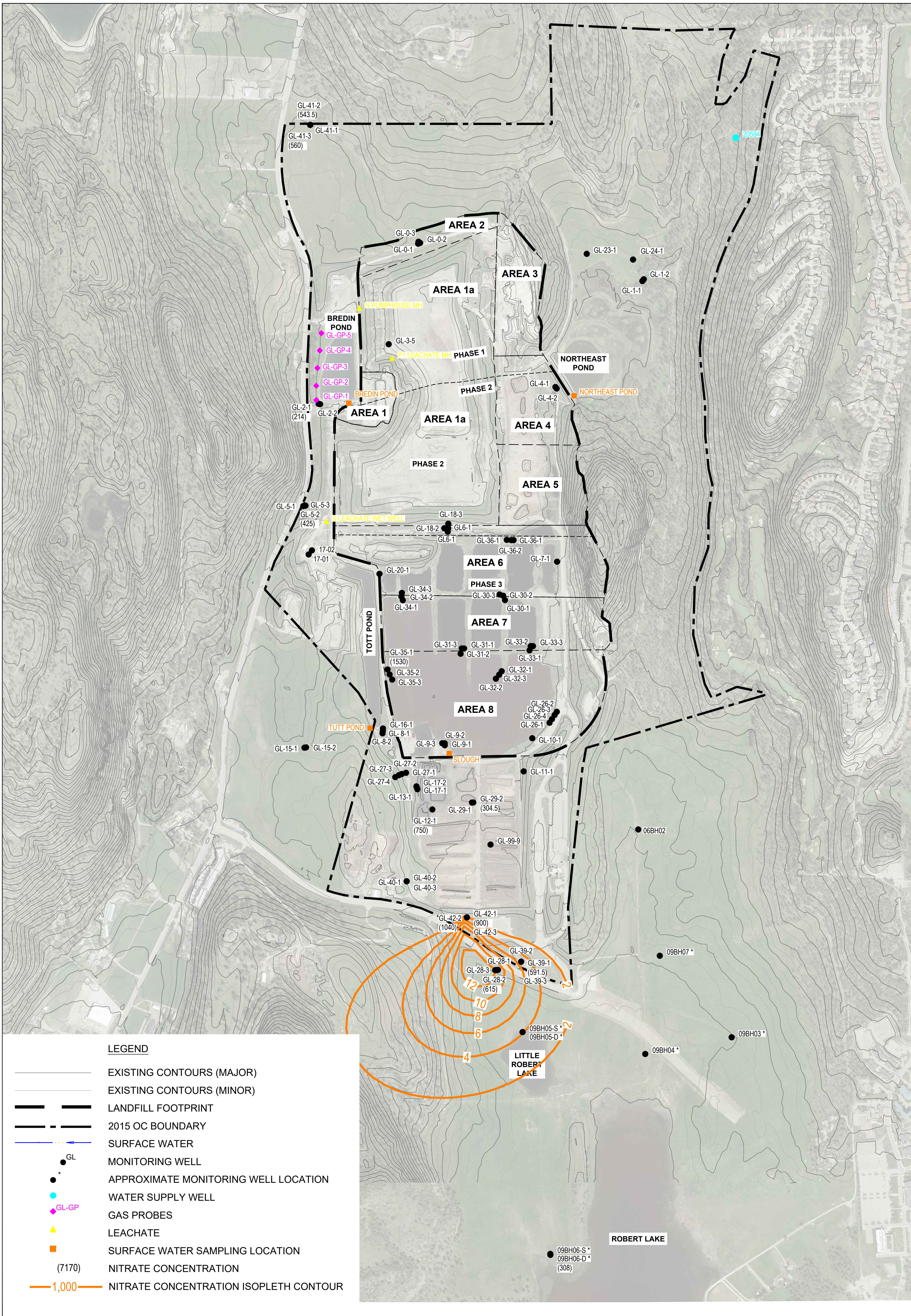

CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY
CHARACTERIZATION REPORT

TILL UNIT
NITRATE CONCENTRATION ISOPLETHS

Project No. 12605725
Date October 2023

FIGURE I-10

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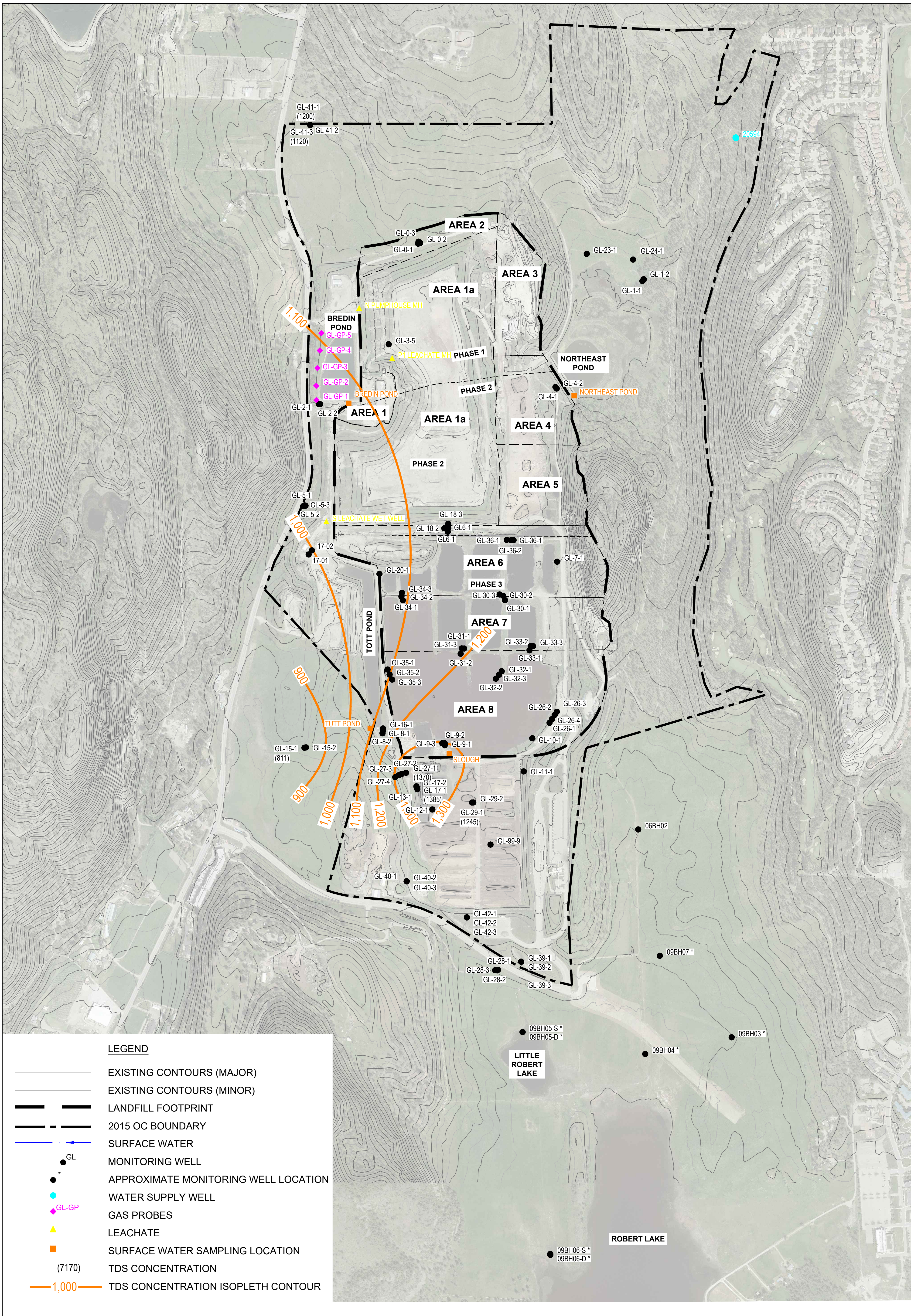

CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY
CHARACTERIZATION REPORT

BEDROCK UNIT
TDS CONCENTRATION ISOPLETHS

Project No. 12605725
Date October 2023

FIGURE I-11

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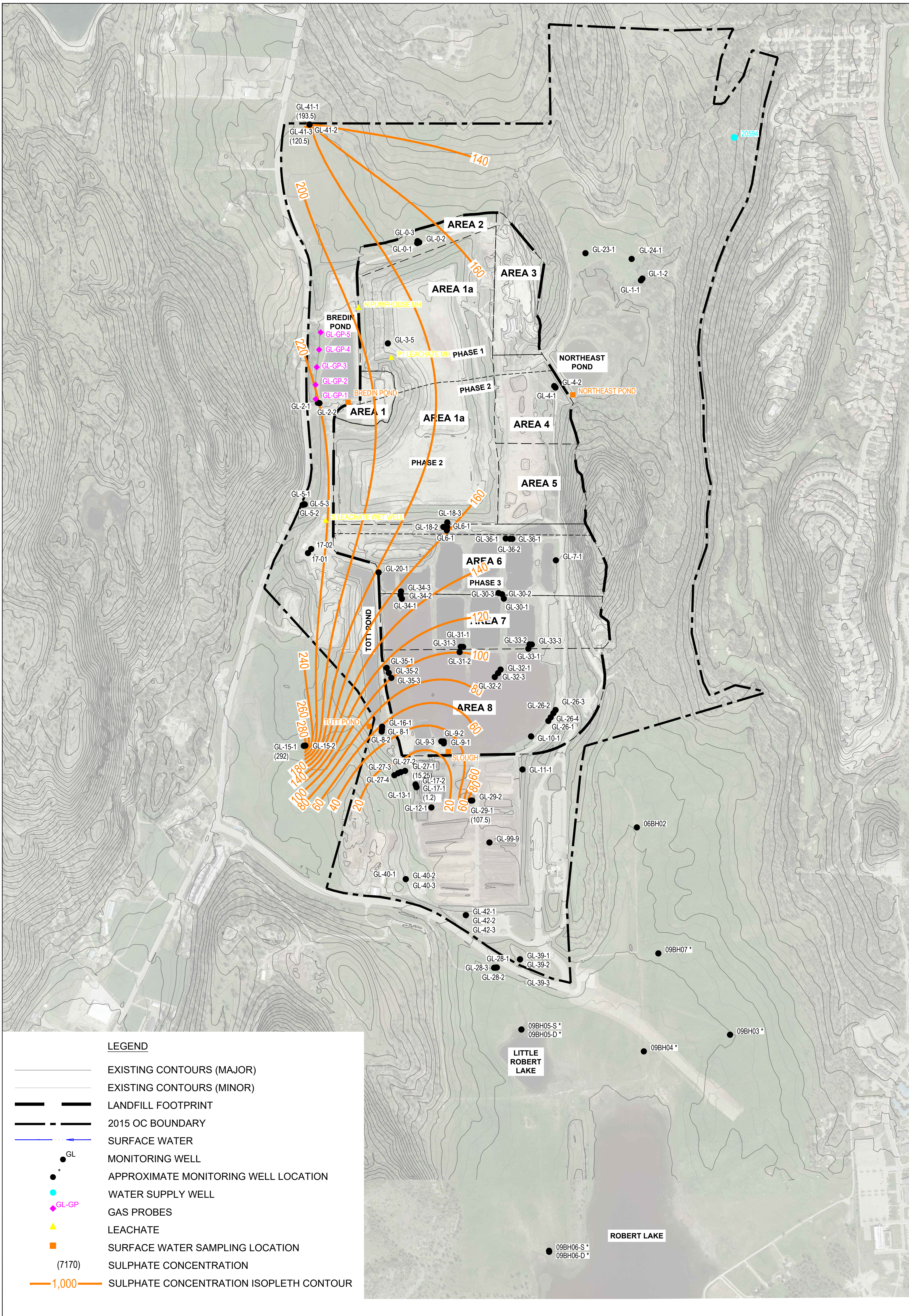

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CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY CHARACTERIZATION REPORT

BEDROCK UNIT
SULPHATE CONCENTRATION ISOPLETHS

Project No. 12605725
Date October 2023

FIGURE I-12

Filename: N:\CA\Vancouver\Projects\663\12605725\Digital_Design\ACAD\Figures\RPT003\12605725-GHD-00-00-RPT-EN-D126_WA-003.dwg
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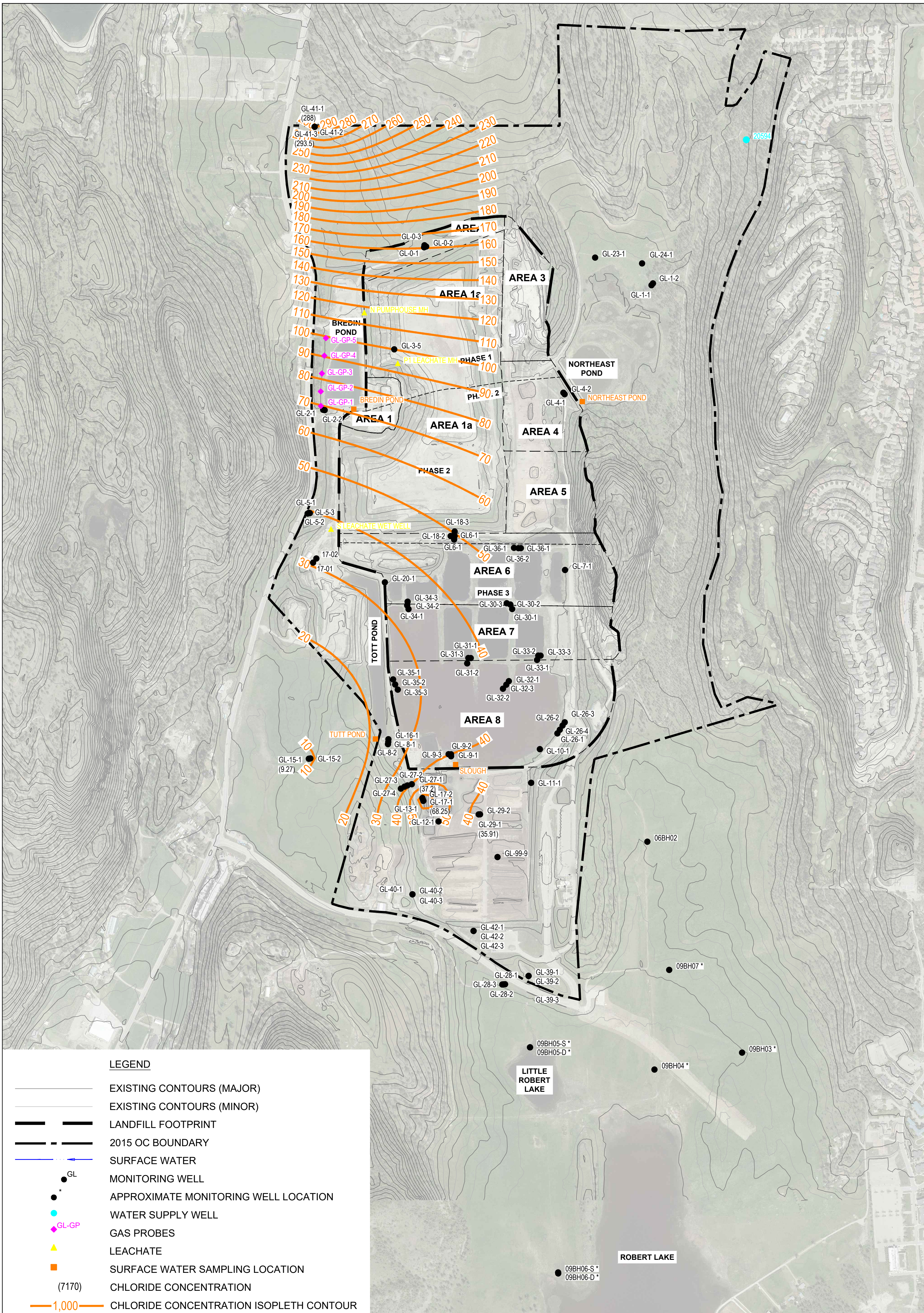

LEGEND

EXISTING CONTOURS (MAJOR)
EXISTING CONTOURS (MINOR)
LANDFILL FOOTPRINT
2015 OC BOUNDARY
SURFACE WATER
MONITORING WELL
APPROXIMATE MONITORING WELL LOCATION
WATER SUPPLY WELL
GAS PROBES
LEACHATE
SURFACE WATER SAMPLING LOCATION
(7170) CHLORIDE CONCENTRATION
1,000 CHLORIDE CONCENTRATION ISOPLETH CONTOUR

0 100 200 300
1:10000

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CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY CHARACTERIZATION REPORT

CHLORIDE BEDROCK UNIT
CHLORIDE CONCENTRATION ISOPLETHS

Project No. 12605725
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FIGURE I-13

Filename: N:\CA\Vancouver\Projects\663\12605725\Digital_Design\ACAD\Figures\RPT003\12605725-GHD-00-00-RPT-EN-D127_WA-003.dwg
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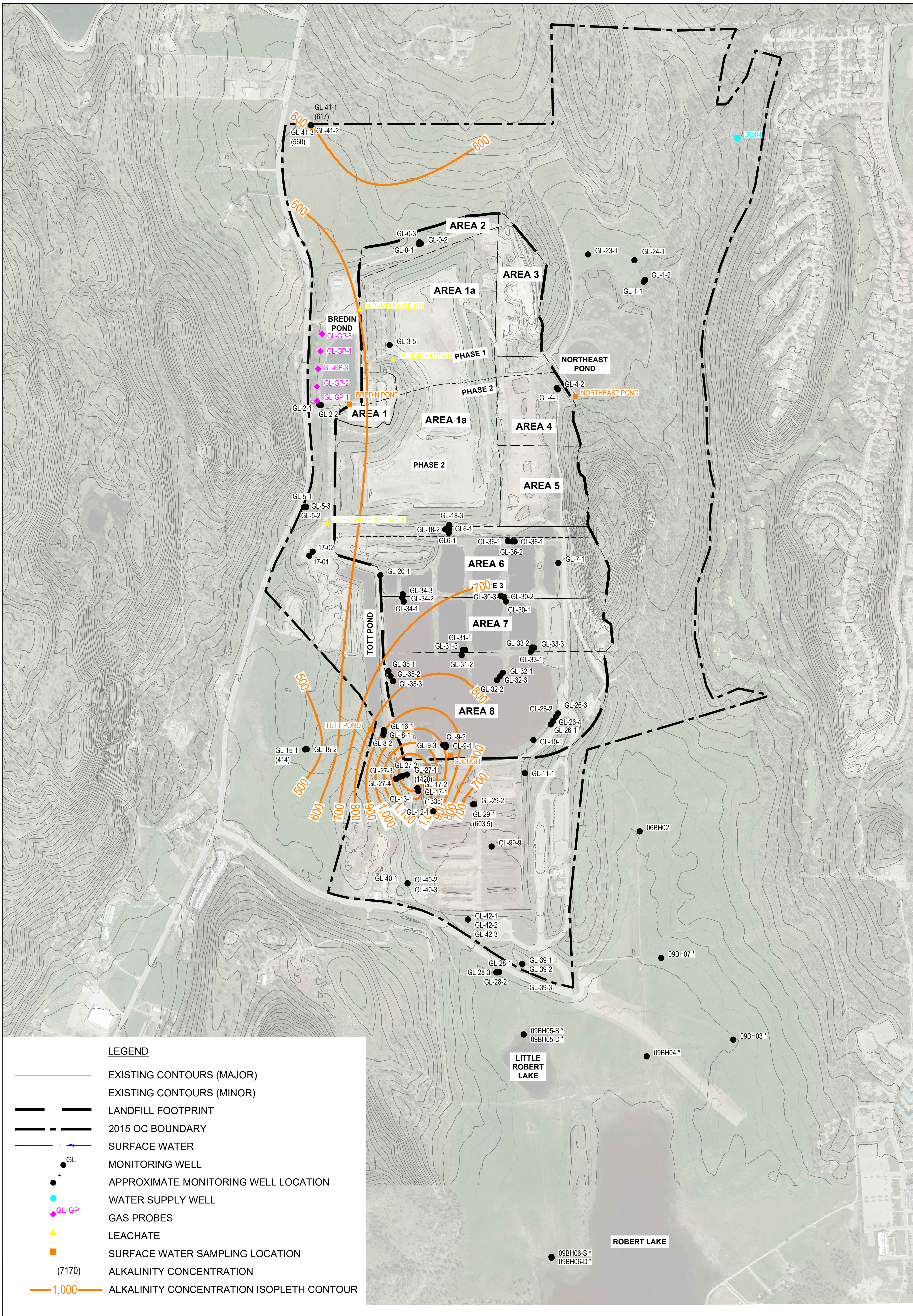

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CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY
CHARACTERIZATION REPORT

BEDROCK UNIT
ALKALINITY CONCENTRATION ISOPLETHS

Project No. **12605725**
Date **October 2023**

FIGURE I-14

Filename: N:\CA\Vancouver\Projects\663\12605725\Digital_Design\ACAD\Figures\RPT003\12605725-GHD-00-00-RPT-EN-D128_WA-003.dwg
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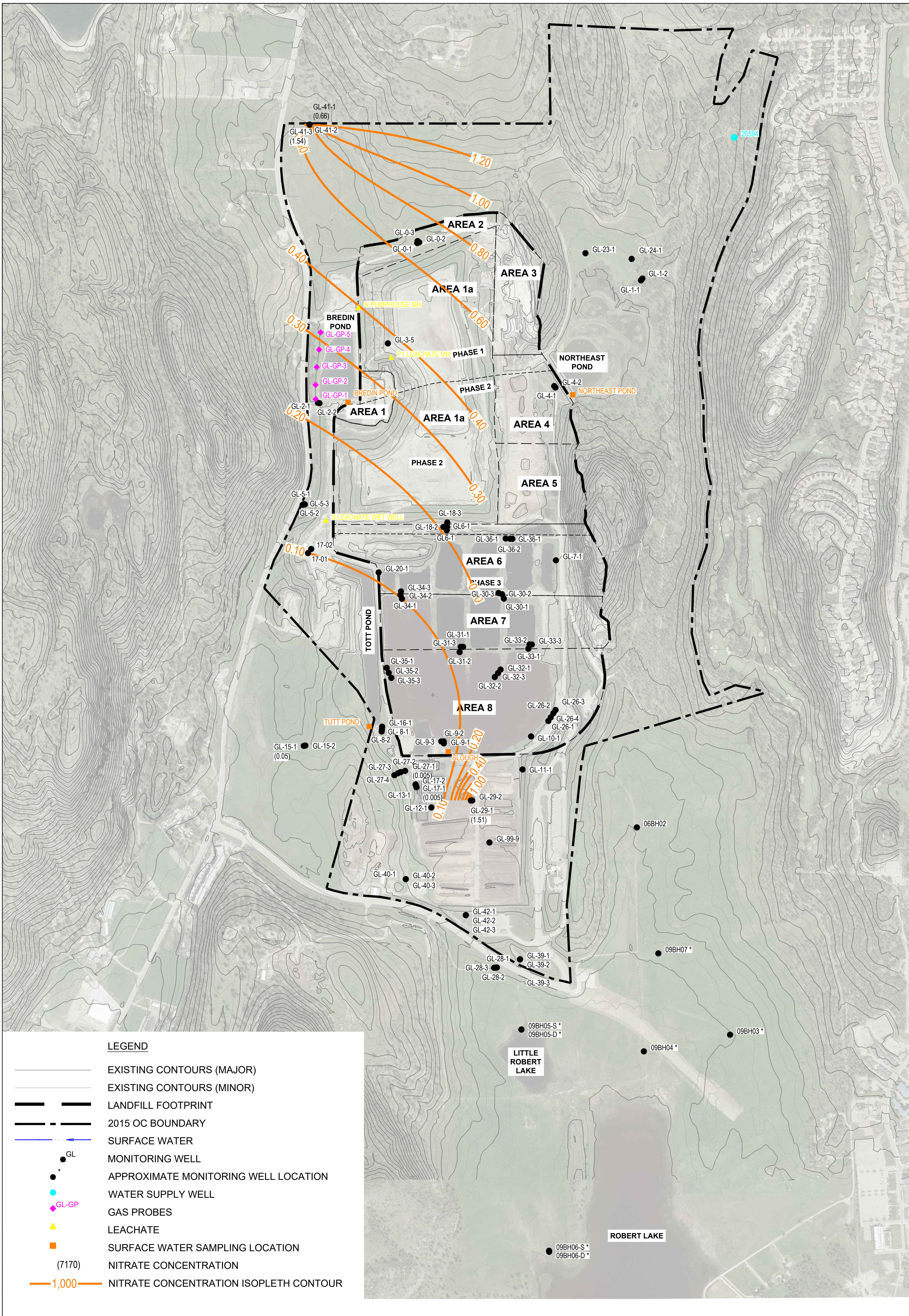

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CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY
CHARACTERIZATION REPORT

BEDROCK UNIT
NITRATE CONCENTRATION ISOPLETHS

Project No. 12605725
Date October 2023

FIGURE I-15

Filename: N:\CA\Vancouver\Projects\663\12605725\Digital_Design\ACAD\Figures\RPT003\12605725-GHD-00-00-RPT-EN-D129_WA-003.dwg
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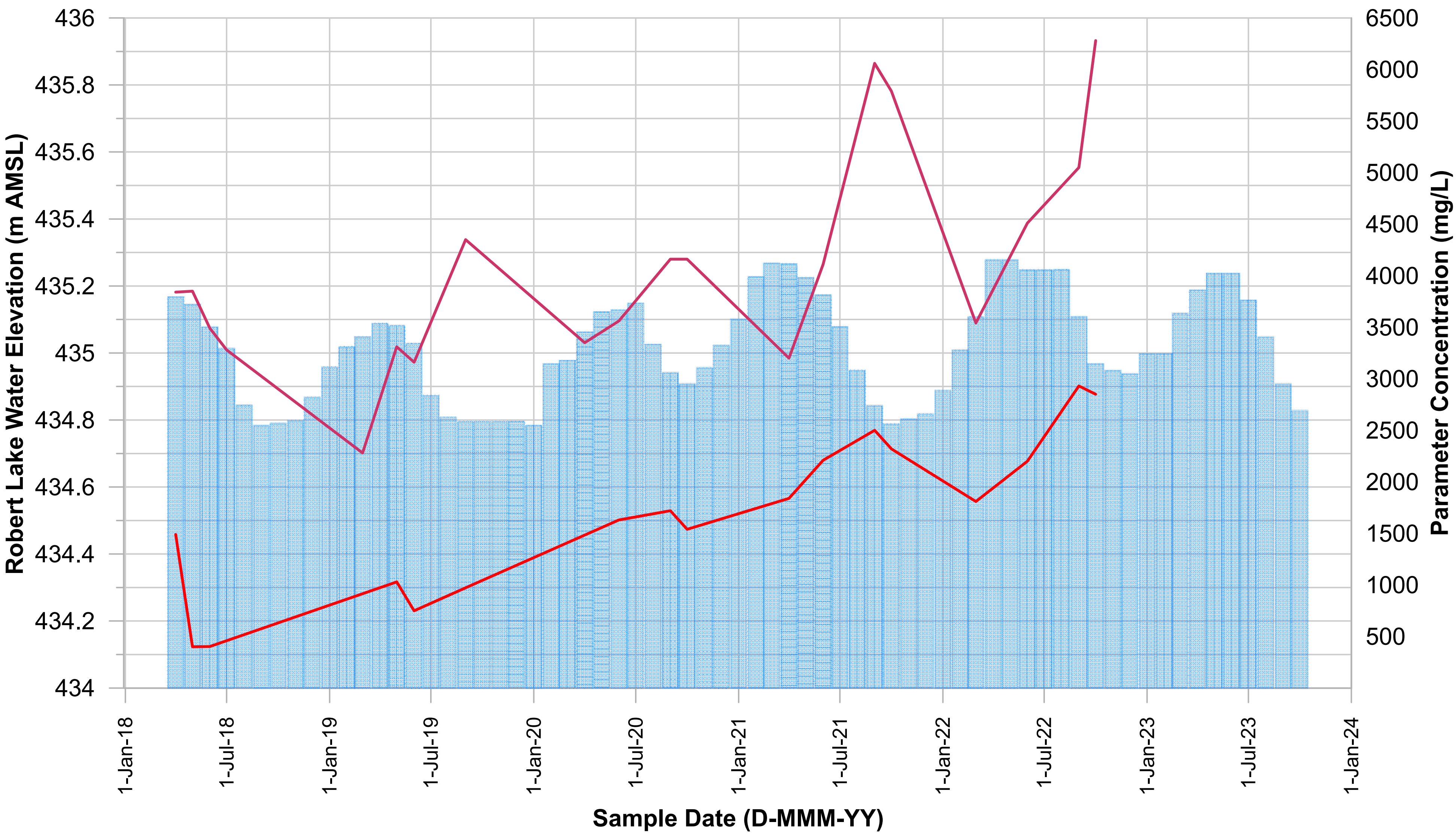
Appendix J

Robert Lake Elevation versus Indicator Parameter Concentrations



Legend

Water Elevation Data

Robert Lake Sulphate Concentration (mg/L)

Little Robert Lake Sulphate Concentration (mg/L)

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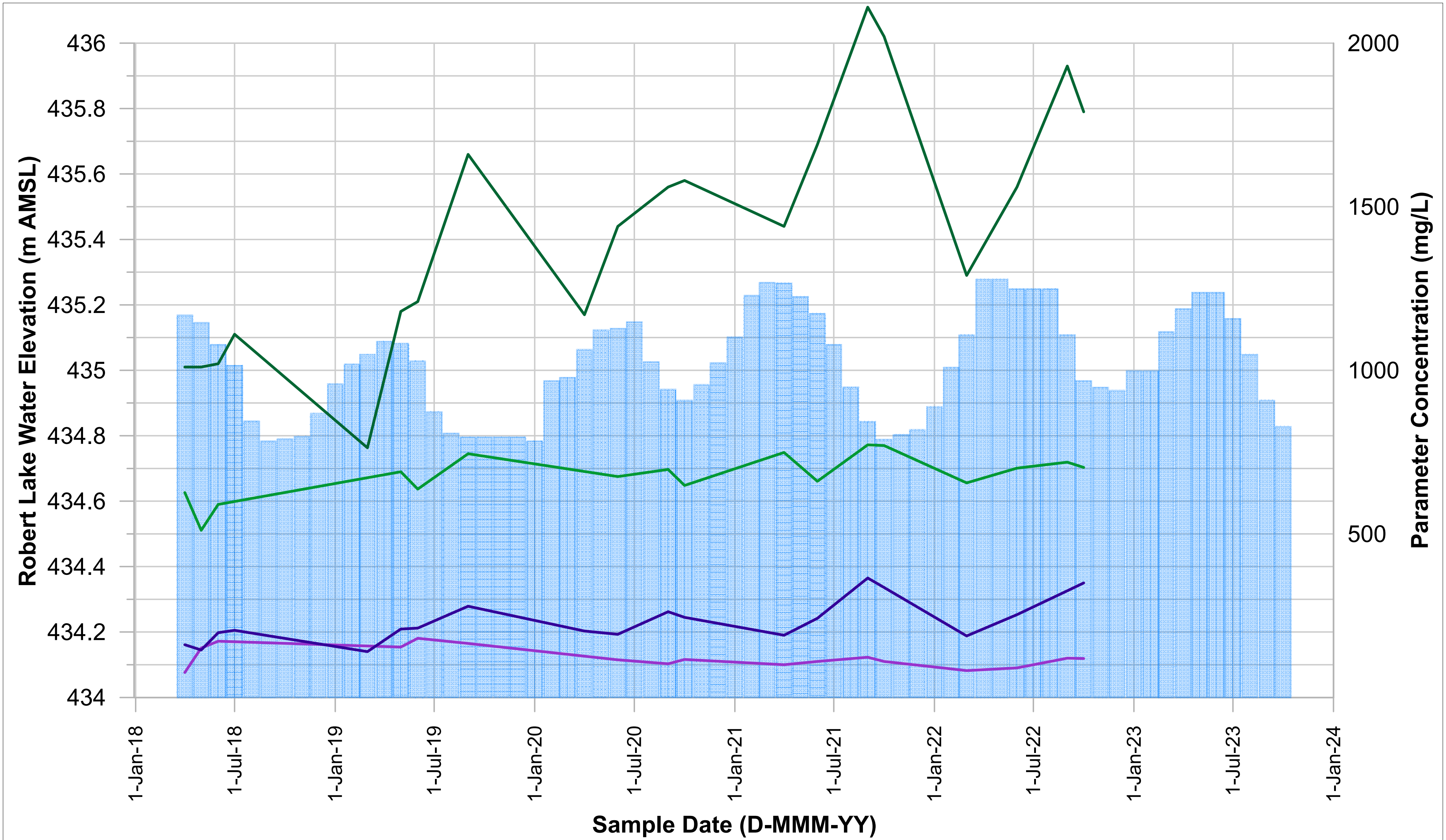
HYDROGEOLOGY AND HYDROLOGY
CHARACTERIZATION REPORT

Robert Lake Elevation vs Indicator Parameter Concentrations in L. Robert Lake and Robert Lake

Project No. **12605725**
Date **November 17, 2023**

FIGURE J-1

File: \\ghdnet\ghd\CA\Vancouver\Projects\663\12605725\Tech\Hydrogeology and Hydrology Characterization Report\Figures\DNU\Surfer\Robert Lake Elevation vs Sulphate Concentration.gpj



Legend

- Water Elevation Data
- Little Robert Lake Alkalinity Concentration (mg/L)
- Robert Lake Alkalinity Concentration (mg/L)
- Little Robert Lake Chloride Concentration (mg/L)
- Robert Lake Chloride Concentration (mg/L)

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HYDROGEOLOGY AND HYDROLOGY
CHARACTERIZATION REPORT

Robert Lake Elevation vs Indicator Parameter Concentrations in L. Robert Lake and Robert Lake

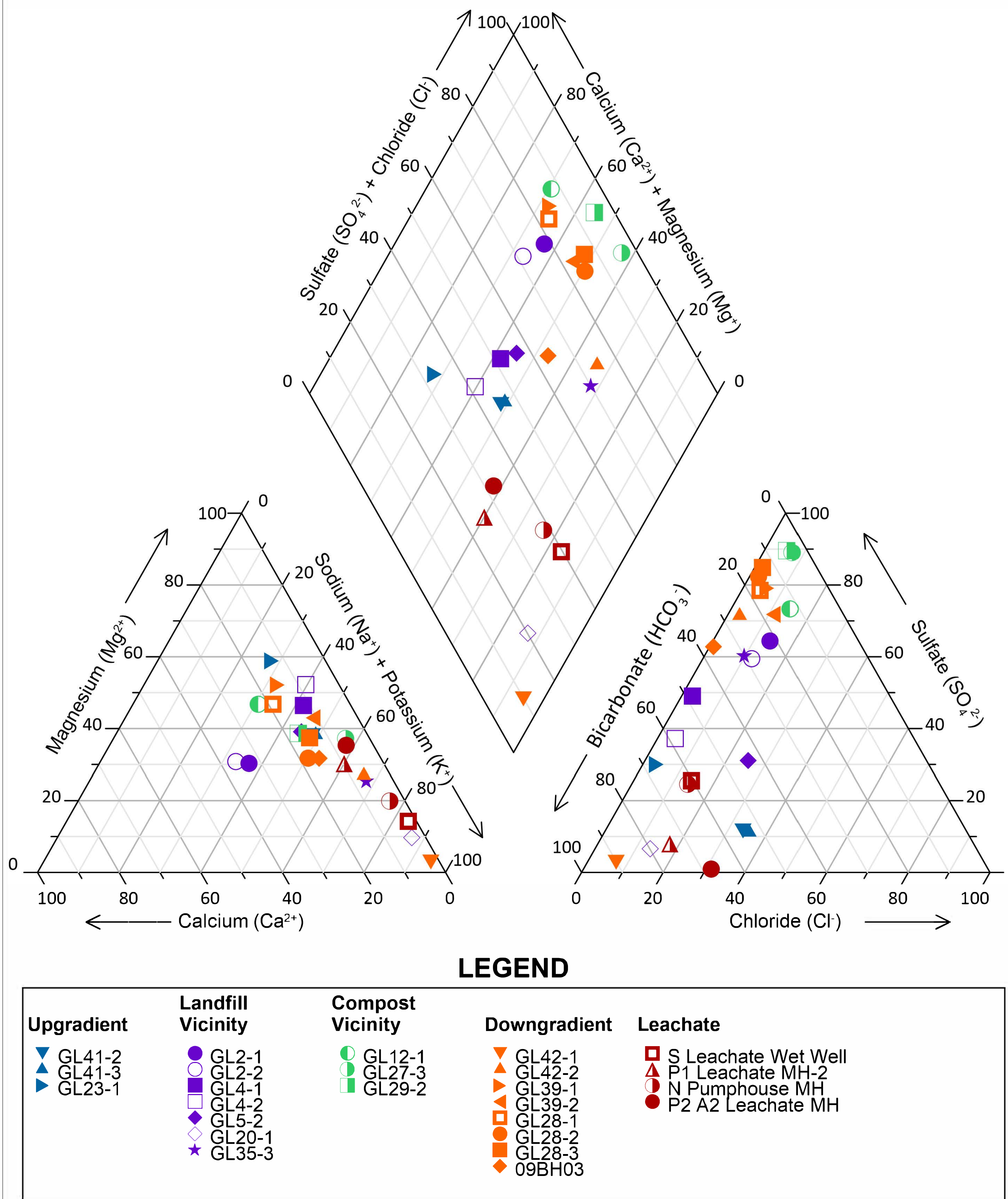
Project No. **12605725**
Date **November 17, 2023**

FIGURE J-2

File: \\ghdnet\ghd\CA\Vancouver\Projects\663\12605725\Tech\Hydrogeology and Hydrology Characterization Report\Figures\DNU\Surfer\Robert Lake Elevation vs Sulphate Concentration.gpj

Appendix K

Geochemical Analysis



CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY CHARACTERIZATION REPORT

GROUNDWATER OVERBURDEN WELL PIPER PLOT - SPRING 2022

Project No. **12605725**
Date **November 2023**

FIGURE K-1

\\ghdnet\ghd\CA\Vancouver\Projects\663\12605725\Tech\Hydrogeology and Hydrology Characterization Report\Appendices\Appendix J Piper Plots\Grapher\12605725_Glenmore_HHCR_Piper_Plot_Overburden Wells_June_2022.gpj
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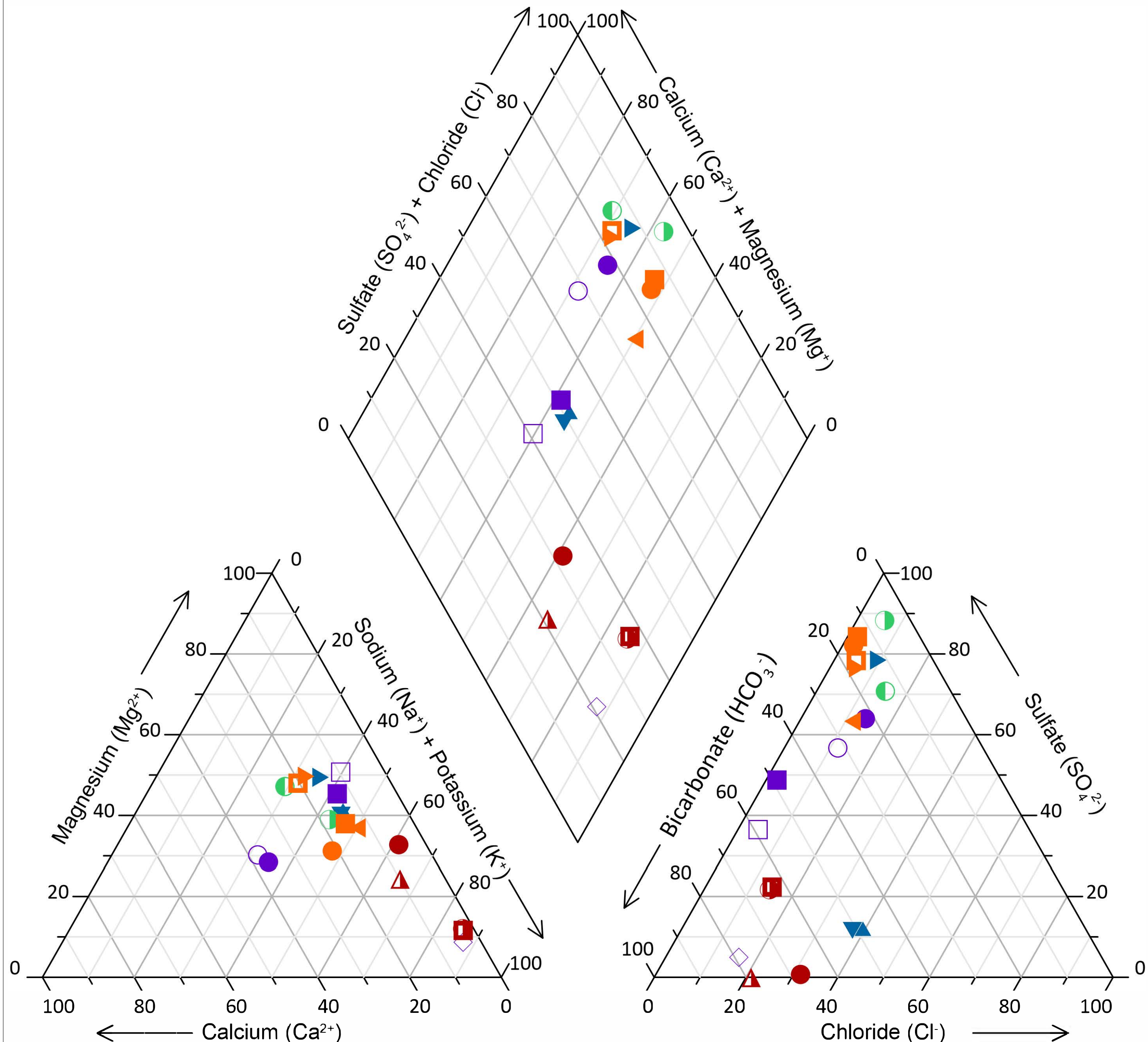

LEGEND

Upgradient	Landfill Vicinity	Compost Vicinity	Downgradient	Leachate
GL41-2	GL2-1	GL12-1	GL39-1	S Leachate Wet Well
GL41-3	GL2-2	GL29-2	GL39-2	P1 Leachate MH-2
GL15-2	GL4-1		GL28-1	N Pumphouse MH
	GL4-2		GL28-2	P2 A2 Leachate MH
	GL20-1		GL28-3	

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CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY
CHARACTERIZATION REPORT

GROUNDWATER OVERBURDEN WELL PIPER PLOT - FALL 2022

Project No. **12605725**
Date **November 2023**

FIGURE K-2

\\ghdnet\ghd\CA\Vancouver\Projects\663\12605725\Tech\Hydrogeology and Hydrology Characterization Report\Appendices\Appendix J Piper Plots\Grapher\12605725_Glenmore_HHCR_Piper_Plot_Overburden Wells_September_2022.gpj
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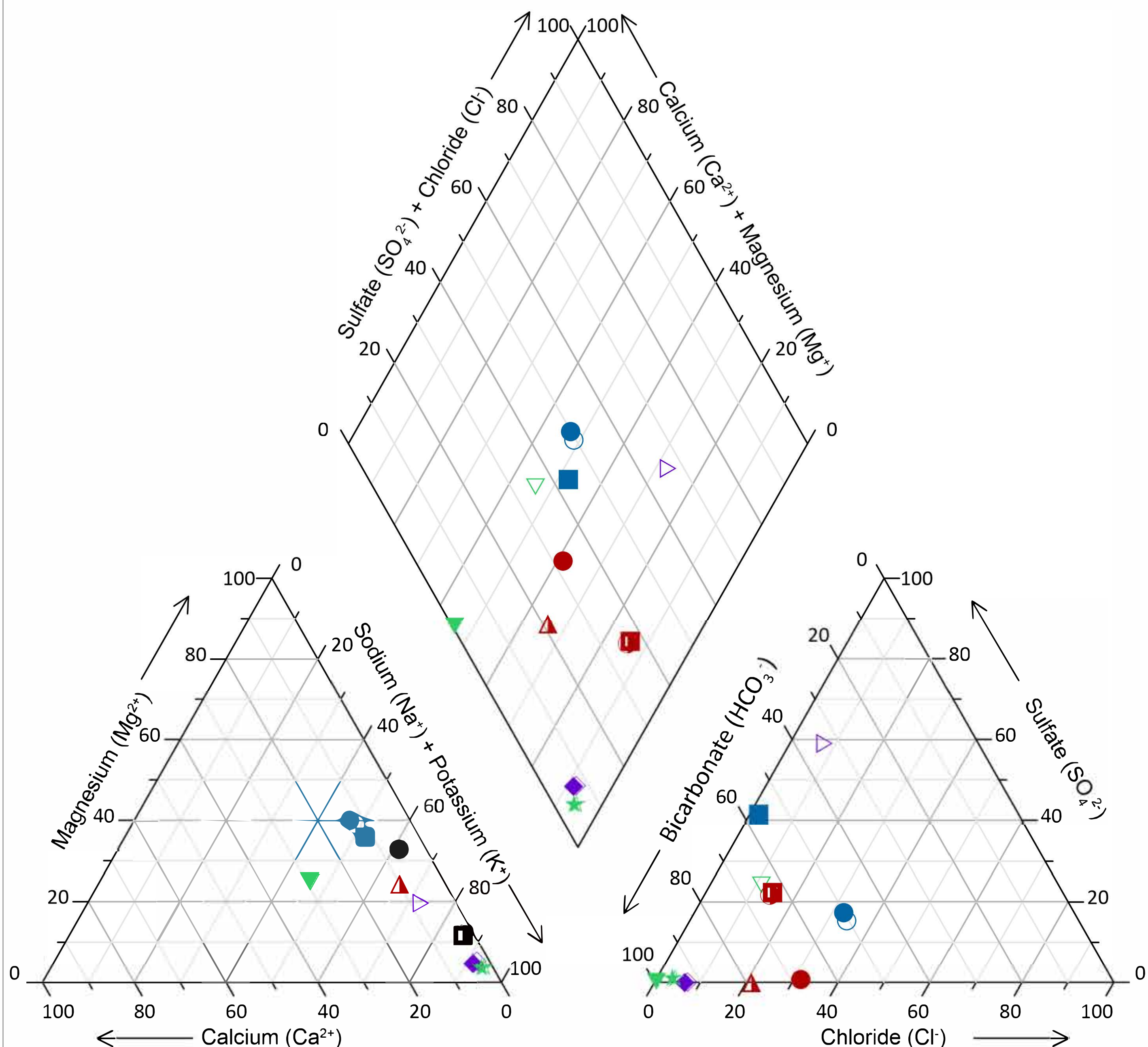

LEGEND

Bedrock Monitoring Wells

Upgradient (Fall)
- GL41-1
- GL15-1

Upgradient (Spring)
- GL41-1

Landfill Vicinity (Fall)
- GL17-1

Landfill Vicinity (Spring)
- GL16-1
- GL17-1

Compost Vicinity (Fall)
- GL27-1
- GL29-1

Compost Vicinity (Spring)
- GL27-1
- GL29-1

Leachate Median
- S Leachate Wet Well
- P1 Leachate MH-2
- N Pumphouse MH
- P2 A2 Leachate MH

CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY
CHARACTERIZATION REPORT

GROUNDWATER BEDROCK WELLS
PIPER PLOT - 2022

Project No. **12605725**
Date **November 2023**

FIGURE K-3

\\ghdnet\ghd\CA\Vancouver\Projects\663\12605725\Tech\Hydrogeology and Hydrology Characterization Report\Appendices\Appendix J Piper Plots\Grapher\12605725_Glenmore_HHCR_Piper_Plot_Bedrock Wells.gpj
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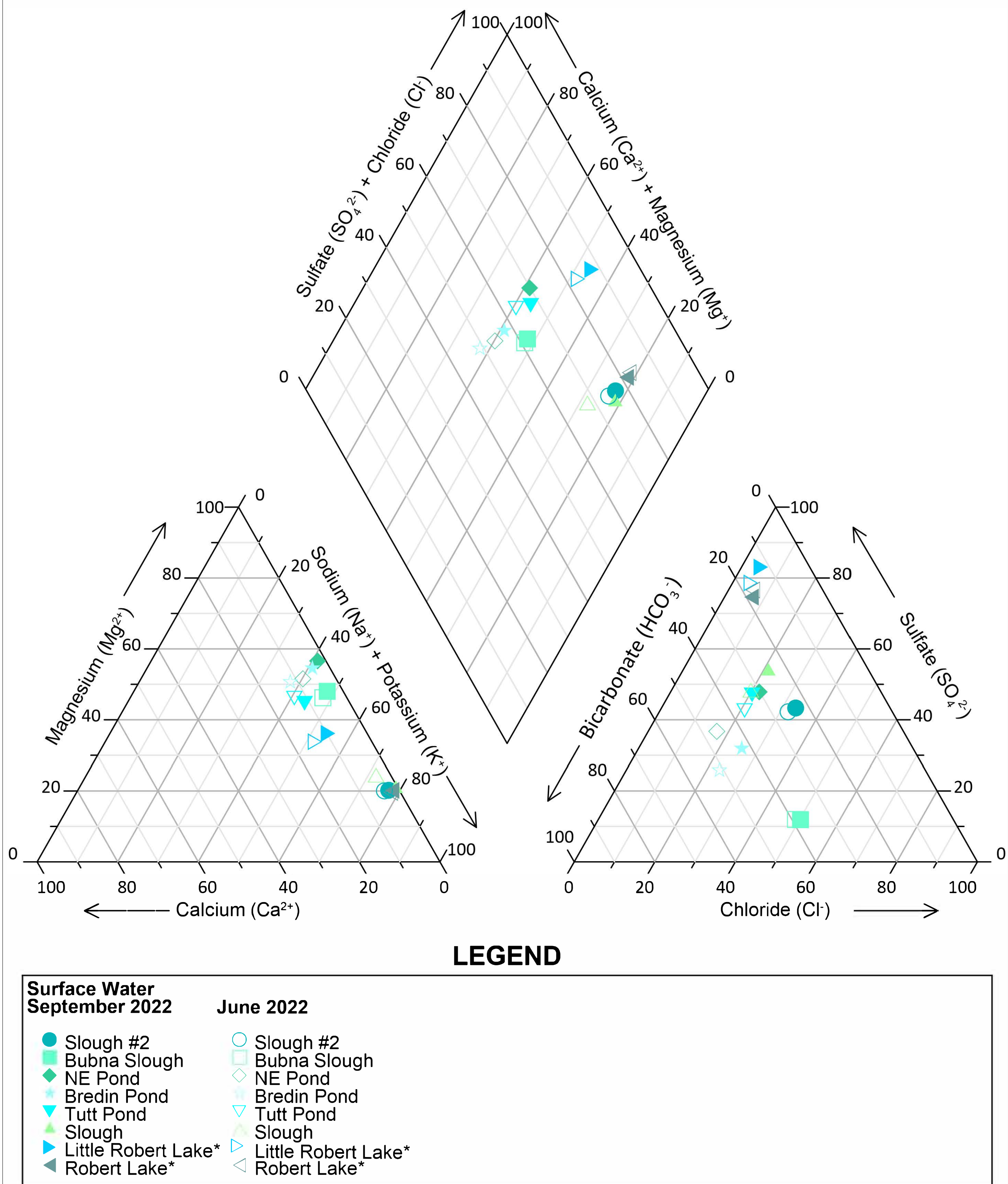

NOTES
* Offsite Surface Water Body

CITY OF KELOWNA
GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY
CHARACTERIZATION REPORT

SURFACE WATER
PIPER PLOT - 2022

Project No. **12605725**
Date **October 2023**

FIGURE K-4

\\ghdnet\ghd\CA\Vancouver\Projects\663\12605725\Tech\Hydrogeology and Hydrology Characterization Report\Figures\Grapher\12605725_Glenmore_HHCR_Piper_Plot_Surface Water_2022.gpj
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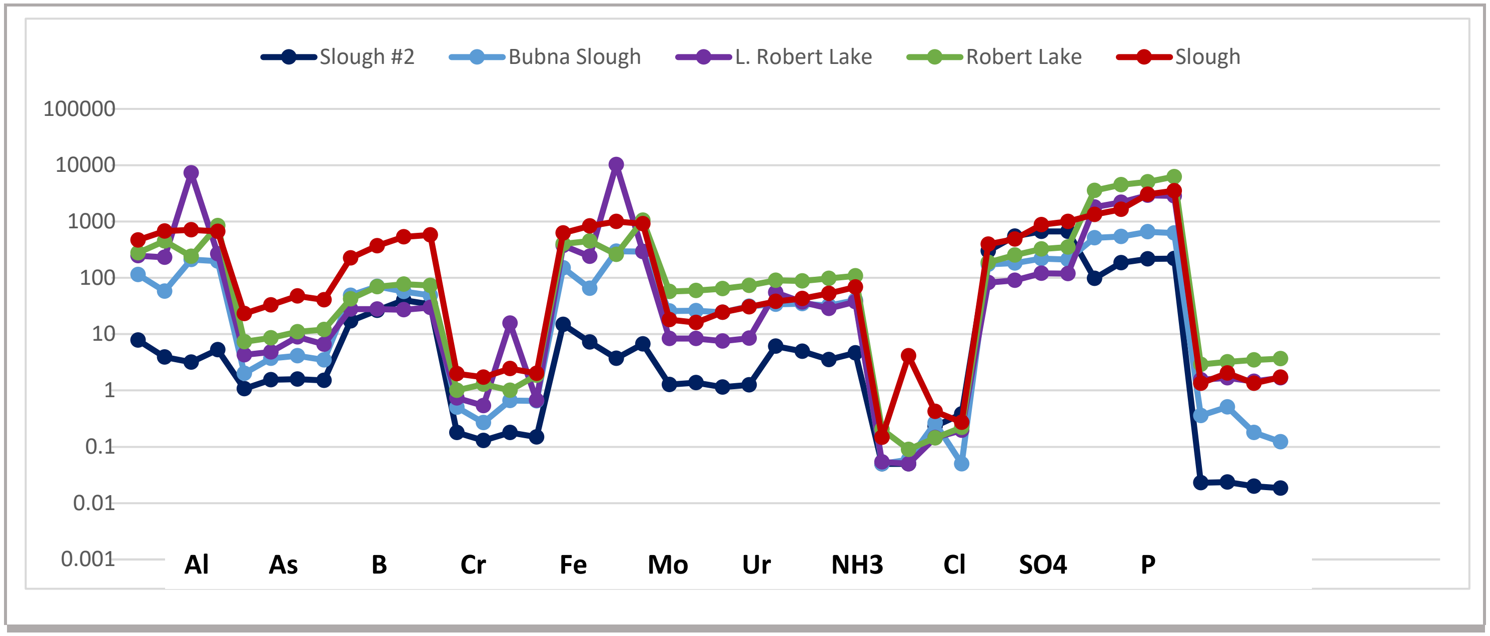

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CITY OF KELOWNA - GLENMORE LANDFILL
HYDROGEOLOGY AND HYDROLOGY
CHARACTERIZATION REPORT

Project No. **12605725**
Date **December 2023**

SURFACE WATER GEOCHEMICAL PROFILE

Figure K-5

Filename: \\ghdnet\ghd\CA\Vancouver\Projects\663\12605725\Tech\Hydrogeology and Hydrology Characterization Report\Appendices\Appendix K Piper Plots\Figure K-5 - SW Geochemical profile.xlsx
Plot Date: 4 Dec 2023 12:57 PM

Data Source

ghd.com

The Power of Commitment