Appendix C

Site C Clean Energy Project
Water Quality Monitoring for River Road, South Bank Initial Access Road, BC Hydro Left Bank Debris Boom and L2 Powerhouse 2022 Annual Report

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EXECUTIVE SUMMARY

Tetra Tech Canada Inc. (Tetra Tech) was retained by BC Hydro (the client) to develop and implement a surface water quality monitoring program at midstream and discharge locations along River Road ditch near Blind Corner and below Howe Pit, in proximity to the South Bank Initial Access Road (SBIAR), and along the L3 Creek catchment. The River Road and SBIAR locations have been sampled monthly, except when frozen or dry conditions exist, since initiation of the program in 2017. Additional monitoring locations were added in October 2020 at the L2 Powerhouse Area, for evaluation of effectiveness of mitigations, effectively making the slope non-PAG, and the BC Hydro Left Bank Debris Boom (LBDB). Sampling at L3 Creek was terminated in April 2021 after a sufficient dataset of trends over time had been collected. Details of the 2022 sampling locations, objectives, and requirements for testing at each location are presented in Section 5 of this report.

This water quality sampling program is conducted in accordance with BC Hydro Site C Clean Energy Project Construction Environmental Management Plan (CEMP), Rev. 10, Appendix E (Rev. 6.0) Acid Rock Drainage and Metal Leachate Management Plan - Section 5.2.1.7 (BC Hydro, 2022), which specifies requirements for road cut monitoring. This water quality program is one component of numerous water quality monitoring programs, including regular monitoring in the Peace River receiving environment, reported under separate cover (Ecofish, 2023a).

The monitoring program includes locations at the discharge points and at midstream locations as well as locations upstream from the discharge to characterize variation to water chemistry within the catchment due to mixing and inflow of water from multiple sources. Throughout the report the "RB" and "LB" nomenclature refers to right and left riverbanks (when facing downstream), respectively.

In accordance with the CEMP, results for the monitoring program locations are evaluated against the British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife and Agriculture (BCAWQG).

Water quality measurements collected at discharge locations along River Road and downstream locations at SBIAR that exceed the BCAWQG-FST values are reported to BC Hydro within 24 hours of receiving the results, and subsequently to the provincial Emergency Management BC hotline, the Independent Environmental Monitor, and the office of the Comptroller of Water Rights. The complete results of sampling at all locations are presented in a monthly routine memo to BC Hydro.

The results of monthly monitoring are compiled and tracked for changes over time with special interest in metals associated with ARD-ML drainage, e.g., iron, aluminum, arsenic, cadmium, cobalt, copper, manganese, silver, and zinc. The trend charts are updated quarterly and included with the routine memo for that month’s sampling event. The results of time series trend analysis are evaluated against the British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife and Agriculture (BCAWQG) freshwater long-term (FLT) chronic values for sulphate since no short-term (FST) exceedance value is applicable.

River Road

Access road construction in 2016-2017, on the north/left bank, between Howe Pit and the Peace River along River Road cut through bedrock. Current mitigation along River Road adjacent to the PAG slopes includes a cut-off ditch above the slope, which diverts surface flows into limestone lined “Chimney ditches” which then feed into the River Road ditch below the slope. The River Road ditch adjacent to the PAG slope includes a bentonite liner and limestone rip-rap to provide neutralization potential and mitigate against acidic drainage. The limestone in the ditch was replaced in July 2021 to provide fresh surfaces for acid buffering.

A total of ten (10) monitoring locations were monitored in the River Road catchment near Blind Corner to monitor the effectiveness of the limestone rip-rap in the ditch line and on the rock slope, and to observe longer term

influences from the Potentially Acid Generating (PAG) outcrop at Blind Corner and potential run-off/seepage from Howe Pit (non-Site C impacted area) on the water collected in the River Road ditch. Water quality sampling was attempted on a routine monthly basis from six of the River Road catchment locations, 1) in the lower chimney drain (LBRR-LC), 2) the upper chimney drain (LBRR-UC); 3) upstream of the lower chimney drain within the River Road ditch (LBRR-12+500), which in 2022 was sometimes sampled slightly downstream at LBRR-12+450 due to rip-rap at the location, 4) at the discharge of culvert RR-11 (LBRR-DD), 5) RR-9 culvert (LBRR-RR9) and 6) RR-8 culvert (LBRR-8). The LBRR-EDP location previously sampled was discontinued in 2022 due to overlap in sampling purpose and location with LBRR-12+500. In situ testing, without lab sampling, is conducted at four additional locations within the River Road ditch at LBRR-12+600, LBRR-12+700, LBRR-12+810 and LBRR-12+920. Occasionally, discharge from the outlet of culverts LBRR-DD, LBRR-RR9 and/or LBRR-RR8 is observed, which potentially reaches the Peace River and is documented in field notes and each of the routine monthly memos.

During 2022, outside of dry or frozen conditions, lab samples were collected from River Road during seven (7) sampling events in months resulting in a sum of thirteen (13) samples. Two samples were collected from LBRR-DD (January, March), two samples from LBRR-UC (March, June), six samples from LBRR-12+500 (March, May, June, August, September, October), and three samples from LBRR-RR9 (January, March, May). No in situ or lab samples were collected from RR8 or LBRR-LC in 2022 due to dry or frozen conditions.

Of the total thirteen (13) water quality samples collected from River Road locations in 2022, exceedances to the BCAWQG-FST were measured for total arsenic (2), total iron (7), total manganese (1), total zinc (2), dissolved aluminum (3) and dissolved iron (1). Of the three discharge locations, one exceedance was measured at LBRR-DD for dissolved aluminum and seven exceedances were measured at RR9 for total arsenic (1), total iron (3), total manganese (1), total zinc (1) and dissolved aluminum (1) during the months of January, March, and May 2022. The RR8 culvert was not sampled in 2022, or previously in 2021, due to water not reaching this point in the ditch

Water quality measurements along River Road have indicated that run-off water quality is influenced by active acid rock drainage and metal leaching (ARD-ML) processes within the River Road ditch catchment, however neutral drainage conditions prevail and the elevated metals concentrations are generally attributed to sediment loading from the roadway or from sediment in the ditchline. Elevated metal levels at River Road have also been correlated in the past with periods of naturally elevated metals concentrations in the Peace River during freshet and after high precipitation events. As per CEMP Appendix E Section 5.2.1.7, it is recommended that water quality monitoring is continued on a monthly basis at the established locations within the River Road catchment.

SBIAR

The South Bank Initial Access Road (SBIAR) shale slope was initially exposed in 2015 as part of road construction works on the south bank between Relocated Surplus Excavation Material (RSEM) R6 and Area A. The total area of the shale slope is approximately 14,000 m^2, between both the East and West slopes. Management and mitigation measures include reduction of surface contact water through capture of up-gradient flow and diversion through a pipe to limit flow along the exposed shale slope, and collection of any remaining PAG contact water in ditches. It is noted that the water flowing in the ditches do not have a direct downstream receptor; the water from the east ditch passes under the road via culvert to the downstream location in the west ditch where all water flows into a limestone armored spillway into a ditch which conveys to the PRHP RSEM R6 pond (permitted for PAG contact water and subject to monitoring before discharge). The effectiveness of the mitigation is evaluated through monthly monitoring of water quality stations along the road.

In 2022, four (4) monitoring locations were sampled at SBIAR, which included two stations in each of the east and wet ditch at the toe of the PAG slope exposure. The west upstream and downstream SBIAR ditches (RBSBIAR-DS, RBSBIAR-US) and east upstream and downstream SBIAR ditches (RBSBIAR-EDS and RBSBIAR-EUS). The sample stations are to monitor for potential long-term influence on water quality from construction of the SBIAR

facility. Sampling at the SBIAR monitoring locations was conducted monthly in 2017, 2019, 2020, 2021 and 2022 and quarterly in 2018.

During 2022, outside of dry or frozen conditions, lab samples were collected from SBIAR during nine (9) sampling events (January, March through October) resulting in a sum of twenty-four (24) samples. Six (6) samples were collected from RBSBIAR-US (May through October), nine (9) samples from RBSBIAR-DS (January, March through October), seven (7) samples from both RBSBIAR-EUS (January, May through October) and two (2) samples from RBSBIAR-EDS (May, June).

In situ testing was completed on a monthly basis, with sufficient water available at some, but not all, SBIAR locations for eleven (11) months between January to December 2022. Frozen conditions in February 2022 prevented any sampling or in situ measurements.

During 2022, BCAWQG-FST exceedances were measured at the RBSBIAR-DS location for total iron (2), total zinc (1) and dissolved aluminum (1). No exceedances were measured at RBSBIAR-US. At the RBSBIAR-EUS location, exceedances were measured for total arsenic (1), total iron (2) and total zinc (1).At the RBSBIAR-EDS location, BCAWQG-FST exceedances were measured for total arsenic (1), total iron (1) and dissolved aluminum (1).

L2 Powerhouse Area

Two sample locations were established at the L2 Powerhouse area adjacent to the powerhouse on the Right Bank in October 2020. The L2 area was identified for sampling due to the exposure of a shale slope during excavation for the Powerhouse and continues to evaluate the water quality for potential impact from shale exposures in the area.

The lower L2 Area PAG slope is mitigated by covering of the slope that effectively makes it a non-PAG contact surface. The water quality monitoring program has been put in place to verify that the mitigation applied is working and that non-PAG contact water is observed in this area. The L2 Powerhouse is an area of active construction which may influence the sampling stations. The water management at this area is difficult to follow as there is active construction throughout the area and multiple sources of water input and discharges. Water is tested and pumped to treatment as needed.

The L2-US location was sampled ten (10) times between January and December 2022, resulting in BCAWQG-FST exceedances measured above the guidelines for total iron (1) and dissolved aluminum (1).

The L2-DS location was sampled seven (7) times between May and December 2022, resulting in BCAWQG-FST exceedances measured above the guidelines for ammonia (1), total arsenic (2), total iron (4), total lead (1), total silver (1), total zinc (2), dissolved aluminum (5), and pH (1).

BC Hydro Left Bank Debris Boom

Shale was exposed during construction of the BC Hydro Left Bank Debris Boom (LBDB) anchor area in approximately March 2020. The LBDB PAG slope exposures will eventually be completely inundated with the reservoir formation. Water quality sampling at LBDB provides data to apply to understanding of water discharge and flooding in subsequent phases of increased elevation of the Peace River and during water diversion through the Diversion Tunnels. Sample locations were established and first sampled on October 8, 2020, to characterize water quality in the LBDB area for ARD-ML monitoring.

LBP Pond is the only location within the area that has been consistently available for sampling. Limited surface flow is observed in this area, and the only time that the sample stations in the LBDB area can be sampled, except for the LBP Pond location, is immediately following a significant rainfall event. In 2022, the Armor ditch locations were

sampled in two months, March (LBDB-WDS only) and May. Sampling was possible in May 2022 due to the heavy rainfall event occurring in the seven days prior to the sampling event. These ditches are otherwise generally dry.

During 2022, the LBP Pond was sampled eight (8) times from March through October. In March 2022, the west downstream Armor Ditch (LBDB-WDS) was sampled. In May 2022, the west and east downstream Armor Ditches (LBDB-WDS, LBDB-EDS) and laydown drainage ditches (LBDB-LD-MS, LBDB-LD-DS) were sampled. Frozen or dry conditions prevailed in the Armor Ditch upstream ditches (LBDB-EUS, LBDB-WUS) and upstream laydown drainage (LBDB-LD-US) locations throughout all of 2022 and were not sampled.

The LBP Pond samples reported BCAWQG-FST exceedances above the guidelines in total iron (5), total manganese (2), total zinc (1) and dissolved iron (2) between April and October 2022. Water is not commonly observed to discharge from the LBP Pond, but if it does it passes through a limestone lined water management ditch system to the downstream monitoring station.

As a result of one sample event on May 31, 2022, that included the armor ditches and laydown drainage, BCAWQG-FST exceedances were measured in the midstream laydown drainage (LBDB-LD-MS) for total cobalt, total iron, total manganese, dissolved aluminum, and dissolved iron. No exceedances were measured at the sampled LBDB-LD-DS, LBDB-EDS or LBDB-WDS locations on May 31, 2022. Field samplers confirmed that there was no direct connectivity to the Peace River during this sampling event.

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ACRONYMS & ABBREVIATIONS

Acronyms/Abbreviations	Definition
ARD	Acid Rock Drainage
ARD-ML	Acid Rock Drainage and Metal Leaching
BC MoE	BC Ministry of Environment and Climate Change Strategy Water Protection & Sustainability Branch
BCAWQG	British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife and Agriculture
°C	Degrees Celsius
CEMP	Construction Environmental Management Plan
DOC	Dissolved Organic Carbon
FB	Field Blank
FST	Freshwater Short-Term Maximum
FLT	Long-term Maximum
L/s	Litres per second
LBDB	Left Bank Debris Boom
LBRR	Left Bank River Road (referring to Sample ID)
Lorax	Lorax Environmental Services Ltd.
mg/L	milligrams per litre
ML	Metal Leaching
PAG	Potentially Acid Generating
PRHP	Peace River Hydro Partners
ppm	parts per million
RBSIBAR	Right bank South Bank Initial Access Road (referring to Sample ID)
RPD	Relative Percent Difference
RSEM	Relocated Surplus Excavation Material
SBIAR	South Bank Initial Access Road
TB	Travel Blank
µg/L	micrograms per litre
WQG	Water Quality Guideline

LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of BC Hydro and their agents. Tetra Tech Canada Inc. (Tetra Tech) does not accept any responsibility for the accuracy of any of the data, the analysis, or the recommendations contained or referenced in the report when the report is used or relied upon by any Party other than BC Hydro, or for any Project other than the proposed development at the subject site. Any such unauthorized use of this report is at the sole risk of the user. Use of this document is subject to the Limitations on the Use of this Document attached in the Appendix or Contractual Terms and Conditions executed by both parties.

1.0 INTRODUCTION

Tetra Tech Canada Inc. (Tetra Tech) was retained by BC Hydro (the client) to develop and implement a surface water quality monitoring program at locations around the Site C project site where bedrock shale exposures, classified as potentially acid generating (PAG), may have the potential to contribute to water quality changes due to acid rock drainage and metal leaching (ARD-ML) potential of the shale bedrock.

We acknowledge this work is being conducted on the traditional territory of Treaty 8 First Nations of Dunne Zaa, Cree and Tse'khene cultural descent.

Monitoring locations were established by Tetra Tech in conjunction with BC Hydro personnel. Where possible (and applicable), they are coincident with the locations and station names used in 2016 by Lorax Environmental Services Ltd. (Lorax) for water quality monitoring on behalf of Peace River Hydro Partners (PRHP) prior to BC Hydro taking over sampling of these stations. Water sampling locations with UTM coordinates are shown in the attached maps in Figures 1 through 3. Photos of the water sampling locations during 2022 are included in the Photographs (1 through 32) section of the Appendix.

Locations along River Road ditch near Blind Corner and below Howe Pit, and in proximity to the South Bank Initial Access Road (SBIAR) have been sampled monthly, except when frozen or dry conditions exist, since initiation of the program in 2017. Additional monitoring locations were added in October 2020 at the L2 Powerhouse Area and the BC Hydro Left Bank Debris Boom (LBDB). These locations are also sampled monthly, outside of frozen or dry conditions. The monitoring program includes locations at the discharge points and at midstream locations as well as locations upstream from the discharge to characterize variation to water chemistry within the catchment due to mixing and inflow of water from multiple sources.

This report documents the sampling events conducted monthly between January and December of 2022 and the results of water quality monitoring. Results are discussed in the context of ARD-ML management and mitigation.

The water conveyance facilities at River Road ditch near Blind Corner and SBIAR are identified as having potential for direct ARD-ML impacts due to exposure of shale bedrock during construction related activities. River Road and SIBAR are downstream of the dam.

The LBDB area has an exposed PAG slope in the central part of the area. Water quality sampling at LBDB provides information on the water quality at locations upstream and downstream of the PAG slope exposure. Ultimately, this area will be flooded by reservoir flooding.

The L2 Powerhouse area is sampled to establish upstream and downstream water quality characterization and for ARD-ML PAG slope monitoring in the L2 Powerhouse area and adjacent to the powerhouse on the Right Bank.

2.0 MONITORING PROGRAM SET-UP AND PURPOSE

Water quality sampling has been scheduled during approximately the third week of each month during from 2017 to 2022 to support a continuous monitoring record for reportable water quality compliance. The monitoring locations are visited monthly, and samples are collected except under frozen or dry conditions. The 2022 monitoring period commenced with the first sample event on January 25-26, 2022 and was completed with the twelfth and final sample event of the year on December 11, 2022. Each sampling event was completed by BC Hydro personnel and was documented by field notes and photographs, including during dry and frozen conditions.

2.1 Monitoring Program Requirements and Comparison Criteria

Requirements for the development and implementation of the water quality monitoring programs are mandated under the Environmental Assessment Certificate – Condition 3, and the Federal Decision Statement – Condition 7. Reporting of the program results are required on an annual basis. These requirements were carried forward and presented in the BC Hydro Site C Clean Energy Project Construction Environmental Management Plan (CEMP), Revision 10 (March 9, 2022), Appendix E (Rev 6.0) Acid Rock Drainage and Metal Leachate Management Plan.

In accordance with the CEMP Appendix E Section 5.2.1.7, analytical results for all monitoring locations are evaluated against the British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife and Agriculture (BCAWQG) freshwater short-term maximum (FST) values[1](BC MOE, 2021). Water quality measurements recorded at the sampling stations are reported to BC Hydro within 24 hours of receiving lab results, and a routine memo is prepared on a monthly basis to summarize field in situ and analytical lab results. The monthly results are compiled for long-term trend analysis in trend charts. The long-term trends data is evaluated against the BCAWQG freshwater long-term (BCAWQG-FLT) chronic values in Appendix B, Table B1 to B4 and trend charts in Figure 6 to 56.

Water quality measurements collected at discharge locations along River Road and downstream locations at SBIAR that exceed the BCAWQG-FST values are reported to BC Hydro within 24 hours of receiving the results, and subsequently to the provincial Emergency Management BC hotline, the Independent Environmental Monitor, and the office of the Comptroller of Water Rights. The complete results of sampling at all locations are presented in a monthly routine memo to BC Hydro.

Under BCAWQG, the intention of freshwater long-term (FLT; “chronic”) WQG’s are for the protection of the most sensitive species and life stage against sub-lethal and lethal effects for indefinite explores, and uses an averaging period, whereas the freshwater short-term (FST; “acute”) WQG’s are intended to protect against severe effects, e.g., lethality, to the most sensitive species and life stage over a defined short-term exposure period approach (BC MOE, 2021).

2.2 Analytical Program Parameters

An off-site laboratory analytical program was designed to measure a suite of parameters suitable for screening the water quality against the BCAWQG-FST for surface water. The sampling and analytical procedures implemented during 2022 were commensurate with Tetra Tech’s monitoring programs from 2017 to 2021, and the program previously implemented in 2016 by Lorax for parameters, analytical methods, and detection limits. Samples were collected in a set of clean bottles provided by the lab and were submitted for analysis.

Analysis was conducted for the following parameters:

- Total Metals, Low Level (including Hg);
- Dissolved Metals, Low Level (including Hg);
- Hardness;

[1] The British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife and Agriculture document has been updated frequently during the course of the monitoring program, and has undergone revisions in March 2016, January 2017, March 2018, and August 2019. Screening of the monthly water quality results are performed against the contemporary guideline values. During the 2021 monitoring program, water quality results were evaluated against the August 2019 guidelines. The Total Molybdenum guideline was updated in September 2021 and this updated criteria is being used as of 2022 reporting. The BCAWQ-FST Total Molybdenum value increased by an order of magnitude. This change does not affect 2022 reporting.

- pH;
- Alkalinity: Total/Species (CO_3^{2-} , HCO_3^-, OH^-);
- Acidity;
- Solids: Total Suspended (TSS) and Total Dissolved (TDS);
- Anions: Nitrogen species (nitrite, nitrate, ammonia), Sulphate, Chloride; and
- Dissolved Organic Carbon (DOC).

2.3 Summary of Parameters of Interest

Some of the key parameters that were monitored during this program are described below. Although some of these parameters do not have BCAWQG-FST guidelines, they can be useful indicators to potential changes in water chemistry related to ARD-ML processes.

Alkalinity and pH are important water quality parameters to indicate the ratio between residual alkalinity and acidity in solution and are key indicators for onset of acidic conditions within neutral to alkaline waters when monitored over time. Neutralization of acidity by carbonate, and to a lesser degree silicate, minerals can temporarily increase alkalinity through release of the bicarbonate ion into solution, thereby buffering pH at a near constant value. Bicarbonate will continue to react with, and deplete, any residual acidity. Once all carbonate and bicarbonate sources are depleted, alkalinity no longer is available to neutralize acidity and pH will drop. An indicator for accelerating acid generating processes is when increasing alkalinity is observed without proportional change to pH. The BCAWQG-FST guideline for pH ranges from 6.5-9.0. There is no BCAWQG-FST guideline for alkalinity or acidity.

Water clarity is measured as turbidity (nephelometric turbidity units, NTU) or as total suspended solids (TSS), which is an indicator of the amount of sediment (generally accepted as silt sized particles and coarser, or >0.45 µm in diameter), contained within the water column. TSS can increase if sediment loading occurs due to erosion, or due to rapid precipitation of secondary minerals from chemical reactions such as neutralization of acidic water. The bulk chemistry of water with high TSS tends to mimic the chemical composition of the source sediment being eroded, or in the case of mineral precipitation tends to be high in iron as iron-oxide minerals are the most common secondary mineral to form. Rapid temporal changes to TSS measurements within a catchment due to formation of secondary minerals can indicate presence of active ARD-ML reactions. The BCAWQG-FST guideline is based on deviations relative to background TSS.

Measurements such as total dissolved solids (TDS), electrical conductivity (EC) and salinity are indicators for the concentration of dissolved components and/or ions in solution. Sudden or gradual increases in these parameters can indicate changes in water chemistry such as an increase in reactive ions or dissolved metals as a result of potential metal leaching processes. Changes to these parameters in association with changes to pH or alkalinity may also indicate active metal leaching processes. BCAWQG-FST guidelines are not defined for these parameters.

Dissolved sulphate can originate from anthropogenic sources, microbial processes and through chemical processes related to degradation of rock forming minerals in environments with potential for acid generation through the oxidation of primary sulphide (e.g., pyrite) or dissolution of sulphate minerals (e.g., gypsum). Elevated sulphate concentrations may indicate oxidation, or weathering, of PAG materials in proximity to sample collection locations, however, it may also indicate influence from regional groundwater sources. Water quality with elevated sulphate and pH > 7.0 may indicate ARD-ML processes with sufficient acid neutralizing materials, whereas sulphate with decreasing pH may indicate a shortage of acid neutralizing materials. Sulphate is commonly reactive with several

cations and metal ions under ambient environmental conditions forming both soluble and non-soluble mineral precipitates.

Marine shales such as the local Shaftsbury Formation commonly contain sulphide minerals (mainly pyrite, FeS_2) and may also have primary sulphate minerals such as anhydrite ($CaSO_4$), gypsum ($CaSO_4 \cdot 2H_2O$), or barite ($BaSO_4$), and/or other sulphate minerals. Preliminary characterization determined that the primary sulfur species in the shale was sulphide with some detectable sulphate (Klohn Crippen Berger, 2015). Based on this mineral association and site observations, it is possible that groundwater contacting fractured bedrock could contain naturally elevated sulphate concentrations. Only one well from the Main Civil Works (MCW) Site was reported in the baseline groundwater sampling conducted as part of the project's Environmental Impact Statement (Hemmera Envirochem Inc. and BGC Engineering Inc., 2012) which did indicate groundwater contained elevated sulphate.

Groundwater monitoring from 2016-2020 up-gradient and down-gradient of RSEM R5a and R5b measured elevated sulphate concentrations below the BCAWQG-FLT guideline, as reported in the Site C Clean Energy Project, 2020 Q4 Groundwater Quality, Monitoring Report for RSEM R5a and R5b (Lorax, 2020). These results indicate the presence of sulphate in the groundwater systems. It is noted that the down-gradient monitoring wells at RSEM R5b were screened in overburden materials above the bedrock contact. The guideline value for sulphate is not stated in the short-term BCAWQG-FST guideline, however, a long-term average guideline value is stated (variable with hardness) and is referenced in this report.

Water hardness is derived from the total concentration of calcium and magnesium ions in solution, and often reported as mg/L of dissolved $CaCO_3$) is known to mitigate the effect of certain metals on aquatic organisms, and the guidelines are presented with equations derived from experimental data for sulphate and numerous metals (cadmium, copper, fluoride, lead, manganese, silver and zinc that tests a range of hardness specific to each metal or sulphate). Water hardness classification on-site is Hard to Very Hard (180 to >250mg/L, and up to 1,000 mg/L, dependent on location) and is often measured above the guideline threshold used to calculate BCAWQG-FST guideline values. Where the ambient hardness values exceed the guideline limited listed for BCAWQG, the exceedance criteria have been calculated using the upper limit "capped" hardness value instead of the measured ambient hardness.

Water quality screening efforts have focused on elements with BCAWQG-FST guidelines, which include pH, ammonia, chloride, nitrite, total concentrations of arsenic, boron, cobalt, iron, lead, manganese, molybdenum, silver, and zinc, and dissolved concentrations of aluminum, cadmium, and iron. Changes in concentrations of some elements or metals, reported as both total and dissolved, can have various implications for water quality under ARD-ML conditions. The solubility of individual elements can vary with pH. Geochemical modelling completed by Klohn Crippen Berger (2015) identified copper, cobalt, cadmium, and zinc as having high probability of leaching into solution of site water during oxidation of the local shale bedrock under oxic acid rock generating and metal leaching conditions.

Formation of iron-oxide precipitate is a widely recognized indicator of active ARD-ML processes. Total iron concentrations are associated with ARD-ML due to liberation of ferric iron from the oxidation of primary iron bearing sulphides. Subsequent formation of iron-oxide or iron hydroxide minerals can precipitate when acidic waters are neutralized and may be present as suspended solids or can form scaling on reactive surfaces such as limestone.

Aluminum is abundant in rock forming minerals and can be released as part of oxidation and degradation of rocks during ARD-ML processes. Aluminum is soluble in acidic water and is typically not soluble in neutral and alkaline waters. Aluminum, as Al^{3+}, can also contribute to the acidity along with H^+. When concentrations of aluminum are measured in detectible concentrations in neutral or alkaline water, it is possible that the formation of very fine aluminum hydroxide clays may occur in previously acidic waters that have been neutralized. Aluminum hydroxide mineral species (e.g., polymorphs of gibbsite or hydrargillite) can form on rock surfaces and are indicators of acid

generating conditions. Precipitation of aluminum and iron hydroxide produced by weathering may occur on and reduce the exposure of acid generating and acid neutralizing minerals. (Price, 2009).

Concentrations of aluminum, iron and copper are typically low in neutral pH drainage, however, elements such as antimony, arsenic, cadmium, molybdenum, selenium, and zinc can be present in neutral pH drainage (BC MEM, 1998). Neutral pH metal leaching is an important mechanism to be observed on the Site C project as several of these neutral pH soluble elements are prevalent in the shale bedrock. These elements can be concentrated within secondary mineral formation on shale bedrock during prolonged period of low moisture, then released into run-off water in elevated concentration during high precipitation events.

3.0 SAMPLE LOCATIONS

A list of sample locations is provided in the attached Table 1 and the locations are shown on Figures 1 through 3. A summary of the rock cut locations that are subject to monthly monitoring are presented in the following sections, along with a description of the monthly sampling and in situ testing locations.

3.1 Description of River Road Sample Locations

Access road construction in 2016-2017, on the north/left bank, between Howe Pit and the Peace River along River Road cut through bedrock. ARD-ML management and mitigation along River Road adjacent to the PAG slopes includes a cut-off ditch above the slope, which diverts surface flows into limestone lined “Chimney ditches” which then feed into the River Road ditch below the slope. The River Road ditch adjacent to the PAG slope includes a bentonite liner and limestone rip-rap to provide neutralization potential and mitigate against acidic drainage. The limestone in the ditch was replaced in July 2021 to provide fresh surfaces for acid buffering.

Sample locations are established along the River Road ditch for in situ testing, primarily as a means of monitoring the effectiveness of the limestone rip-rap and to observe longer term trends related to the PAG outcrop at Blind Corner and run-off/seepage from Howe Pit. A total of ten (10) monitoring locations are established in the River Road catchment near Blind Corner, shown in Figure 1. The River Road ditch was refreshed with new limestone in July of 2021. See Section 5.3 for additional discussion of management and mitigation of ARD-ML in this area.

The six sample stations include 1) lower chimney drain (LBRR-LC), 2) upper chimney (LBRR-UC), 3) upstream of the lower chimney drain within the River Road ditch (formerly LBRR-12+500, was sampled at LBRR-12+450 during 2022 due to significant rip-rap over the channel), 4) discharge of culvert RR-11 (LBRR-DD), and downstream drainage culvert outlets at 5) RR8 and 6) RR9. The four stations with in situ monitoring only stations include LBRR-12+600, LBRR-12+700, LBRR-12+810 and LBRR-12+920.

The River Road Ditch Diversion pipe, installed in March 2018, is to address erosion and sediment control by transport of run-off water into an elongated ditchline to reduce flow velocities and to promote settlement of suspended sediment. Inlets to culverts RR9 and RR8 are slightly elevated from the ditch base which will allow water to pond within the ditch and infiltrate or discharge via the culverts only if water levels reach sufficient height. Both culverts are made of HDPE materials. The monitoring program includes sampling of discharge from these LBRR-RR8 and LBRR-RR9 culverts.

The established River Road monitoring locations are shown in Figure 1 and photos of the locations are included in the Photographs section of the Appendix. Water quality lab data results are provided in Appendix B, Table B1 and discussed in Section 5.3.

3.1.1 Limestone Ditch Status and Maintenance

Current mitigation along River Road adjacent to the PAG slopes includes a cut-off ditch above the slope, which diverts surface flows into limestone lined “Chimney ditches” which then feed into the River Road ditch below the slope. The River Road ditch adjacent to the PAG slope includes a bentonite liner and limestone rip-rap to provide neutralization potential and mitigate against acidic drainage.

The placed limestone rip-rap is effective at mitigating the pH of the drainage when there are fresh surfaces of limestone available for chemical reactions. Potentially acidic leachate generated from the rock cut-slopes reacts with the alkaline limestone to help neutralize water as it passes through the rip-rap lined ditch. Mineral precipitates can accumulate on rip-rap over time which reduce the effectiveness of the limestone. Periodic refreshing or replacement of limestone has been completed over the life of the project. No maintenance activities were completed in 2022 as the limestone continued to work effectively with minor precipitate coatings noted as well as road sediment encroachment.

With increased use of River Road, sediment and erosion control measures are needed to be addressed to manage the sediment load coming off of the road and into the ditch. The limestone is monitored for accumulation of precipitates and sediment and refreshed either by cleaning or replacement as needed.

Maintenance 2017-2020

In 2017, the collection ditch on the cut-bank (north) side of River Road between approximately 12+340 and 12+960 (Blind Corner) was lined with limestone rip-rap to assist with mitigating the potential effects of ARD-ML from PAG bedrock that was exposed during the initial road construction in 2015 and early 2016. Limestone was also placed between stations LBRR+920 and LBRR-DD to manage the pH of baseline drainage water at the outflow location. Limestone rip-rap within the ditch between road stations 12+600 and 12+900 continued to be maintained in 2018, including completion of a hydroseeding program and a limestone buttress as the tow of the shale slope at blind corner to support long-term erosion control and slope stability in March 2018. The hydroseed appeared to remain in place on the slope, however, germination was not successful at year’s end. No maintenance activities were completed in 2020.

Maintenance in 2021

In early July 2021, rip-rap was replaced with fresh limestone from the start of Blind Corner ditch up to but not including under the diversion pipe. During replacement of limestone the contractor removed the previously installed bentonite liner. Placement of new bentonite liner and replacement of limestone was subsequently completed in 2021.

Maintenance in 2022

No maintenance requirements for limestone in 2022.

3.2 Description of South Bank Initial Access Road Locations

The South Bank Initial Access Road (SBIAR) shale slope was initially exposed in 2015 as part of road construction works on the south bank between Relocated Surplus Excavation Material (RSEM) R6 and Area A. The total area of the shale slope is approximately 14,000 m^2, between both the East and West slopes. Management and mitigation measures includes reduction of surface contact water through capture of up-gradient flow and diversion through a pipe to limit flow along the exposed shale slope, and collection of any remaining PAG contact water in ditches which is captured and conveyed to PRHP RSEM R6 Settlement Ponds (permitted for PAG contact water). The

effectiveness of the mitigation is evaluated through monthly monitoring of water quality stations along the road, and visual inspection of the slopes and ditches during the ARD/ML audit inspections.

A total of four (4) monitoring locations are established in the SBIAR catchment to monitor water quality flowing in the SBIAR ditches at the toe of the SBIAR road cut. The four sample locations allow for data collection from the east and west SBIAR ditches. This provides long-term characterization of SBIAR water management from the upstream location in the west ditch (RBSBIAR-US) and the downstream location in the west ditch (RBSBIAR-DS), as well as upstream and downstream sampling locations in the east ditch, (RBSBIAR-EUS and RBSBIAR-EDS, respectively).

It is noted that the water flowing from the downstream locations do not have a direct downstream receptor; the water from the east ditch passes under the road via culvert to the downstream location in the west ditch where all water flows into a limestone armored spillway into a ditch which conveys to the PRHP RSEM R6 pond. There is an intensive water quality monitoring program in the pond (continuous in situ measurements of pH, conductivity; daily lab analysis for all parameters) conducted prior to discharge by Lorax (Lorax, 2023), Ecofish Research Ltd. (Ecofish 2023a) and others, as well as Peace River receiving environment monitoring conducted by Ecofish (Ecofish, 2023a) and others.

The established RBSBIAR monitoring locations are shown in Figure 2 and photos of the locations are included in the Photographs section of the Appendix. Water quality lab data results are provided in Appendix B, Table B2 and discussed in Section 5.4.

3.3 Description of L2 Powerhouse Area Sampling Locations

The L2 Powerhouse area is sampled to establish upstream and downstream water quality characterization and for ARD-ML PAG slope monitoring in the L2 Powerhouse area and adjacent to the powerhouse on the Right Bank. The two sample locations were established in October 2020. The L2 area was identified at that time for sampling due to the exposure of a shale slope during excavation for the Powerhouse. The RB Foundation Enhancement work (January 2022) included additional shale excavation. Mitigation and monitoring are addressed as per the site's EPPs. The L2 Powerhouse is an area of active construction which may influence the results of sampling month to month. The water management at this area is complex and there may be multiple sources of water input and discharges.

The water quality monitoring program has been put in place to evaluate if shale excavations are contributing to water quality impacts in the area. Due to the complex construction activities in this area and presence of both AFDE and PRHP construction teams, the water quality monitoring program discussed in this report is only one component of the overall program.

The lower L2 Area PAG slope exposed in 2020 was mitigated by covering of the slope that effectively makes it a non-PAG contact surface. The lower slope was bolted and covered in mesh and shotcrete. The slope treatment was subsequently removed, and the slope was shotcrete to support stability. The L2-DS is established at the base of this slope adjacent to the Powerhouse. Water from the intermediate slope flows in a ditch and down to the L2-DS station area. The water that collects at this location is tested and collected via vac truck for water treatment as needed.

The L2-DS sample location is adjacent to the L2 Powerhouse, specifically collected from the pump tubing on the west side of the culvert and approximately 1-2 m from the south rock ditch wall and 1-2 m from the culvert. Sandbags in the ditching adjacent to the Powerhouse are used to separate AFDE and PRHP water in this area. In 2022, the L2-DS location had variable conditions, for example, excavations occurred on the slope west of sample location (January 2022), a sand bag berm separating concrete contact water from PAG contact water was observed to be

leaking (0.5-1.0 L/s) with water from concrete contact water leaking into PAG contact water (July 2022), and works continued to occur in the L2-DS area with material being placed close to the sample area (August 2022). The end result is that the water management and conveyance in this area is frequently changing due to construction activities and therefore the water quality results may be influenced by changing conditions.

The L2-US station is located upstream from the L2 Powerhouse in a ditch line. Water at this station is pumped to the AFDE treatment plant, as required.

Representative photos of the L2 Area are included in the Photographs section of the Appendix. Water quality lab data results are provided in Appendix B, Table B3 and discussed in Section 5.5. A map showing the locations is in Figure 2.

3.4 Description of BC Hydro Left Bank Debris Boom Sampling Locations

Shale was exposed during construction of the BC Hydro Left Bank Debris Boom (LBDB) anchor area in approximately March 2020. In September 2020, the river at Phase 1 elevation (~410 m) followed by a partial block and diversion of the Peace River to allow construction of the main Site C dam in October 2020, causing the river/reservoir to flood up to stage 2 levels (~417-420 m). The final river/reservoir elevation is ~ 460 m.

The ditches above the 420 m elevation are lined with 3–10-inch size fraction limestone as a management measure to provide additional buffering capacity to leachate entering the ditches. The area below 420 m elevation was flooded by the head pond after construction in early Fall 2020, and therefore that area did not require rip-rap. The area above 420 m elevation will be exposed prior to flooding to the final river/reservoir elevation of around 460 m elevation planned for 2024. Seeding with ESC mix completed on exposed soil areas after they were track packed and loosened.

Water quality sampling at LBDB provides data to apply to understanding of water discharge and flooding in subsequent phases of increased elevation of the Peace River and during water diversion through the Diversion Tunnels. Sample locations were established and first sampled on October 8, 2020, to characterize water quality in the LBDB area for ARD-ML monitoring. The purpose of sampling is to monitor PAG contact water from shale exposed during construction in March 2020, and that drains to the Peace River.

The initial sampling locations included the LBP Pond location and LB Side Channel. The LBP Pond sample location has been sampled regularly since initiation. The LB Side Channel was only sampled in 2020 prior to inundation of the Peace River and this station is now back flooded and no longer considered.

Additional sample locations were added in July 2021 following a review of the area during the Tetra Tech ARD/ML site audits. Water management structures and ditch linings were also amended. The water management structures were improved to manage flow and prevent erosion and ditches were lined with limestone to provide acid buffering capacity. These were proactive measures to manage signs of erosion and initial signs of ARD/ML generation on the exposed shale slopes.

Monitoring locations were added to the west and east armor ditch, which captures water from the shale slopes at upstream and downstream locations. These four stations are named as LBDB-WUS (west ditch upstream), LBDB-WDS, LBDB-EUS, and LBDB-EDS. Three stations were also added along the LBP Pond flow path. Station LBDB-LD-US captures water upstream of and draining into the LBP Pond. Station LBLD-LD-MS is downstream of LBP Pond, and station LDBD-LD-DS is further downstream prior to discharge to the Peace River.

Limited surface flow is observed in this area, and the only time that the sample stations in the LBDB area can be sampled, except for the LBP Pond location, is immediately following a significant rainfall event. Sample staff are instructed to sample these locations outside of regular monitoring events, if possible, when high rainfall is observed.

A representative photo of the LBDB locations is included in Photographs section of the Appendix. Water quality lab data results are provided in Appendix B, Table B4 and discussed in Section 5.6. A map showing the locations is in Figure 3.

4.0 LOCAL CONDITIONS

4.1 Weather Conditions - Temperature and Precipitation

The minimum, maximum, and average daily temperature and the seven-day temperature range preceding each sampling event are summarized in the attached Table 2. The total precipitation measured for the seven days preceding each sample event and the precipitation on the day prior to and the day of the sample event are also summarized in Table 2. The temperature and precipitation data were sourced from BC Hydro's Site C Meteorological and Air Quality Station (Figure 4; BC Hydro, 2022), Station 7C Site C North Camp. A summary of mean daily temperature recorded on sampling events, and precipitation recorded prior to and during the sampling event is provided in Table 4-1.

Sampling events in 2022 were primarily conducted on dry days with little to no precipitation, except for minor precipitation of 2.44 mm on morning of June 27 and 1.07 mm on morning of December 11. The precipitation on April 18 and September 29 fell in the evening after the sampling event.

Table 4-1: Sample Event Temperature and Precipitation

Routine Memo No.	Sample Event No.	Sample Event Date	Mean Daily Temperature (°C)	Precipitation on Sample Event (mm)	Precipitation for 7 Days Prior to Sample Event (mm)
1	1	25-26-Jan-22	2.9	None	None
N/A	2[1]	17-Feb-22	-7.7	None	None
2	3	30-Mar-22	6.9	None	None
3	4	18-Apr-22	-6.4	4.08	1.32
4	5	30-31-May-22	14.6	None	59.7
5	6	26-27-Jun-22	16.5	2.44	7.41
6	7	24-25-Jul-22	19.2	None	None
7	8	29-30-Aug-22	20.3	0.10	0.59
8	9	28-29-Sep-22	14.1	0.12	0.15
9	10	30-31-Oct-22	4.0	None	7.52
10	11	28-29-Nov-22	-17.6	0.16	4.01
	12	11-Dec-22	-18.9	1.07	1.85

[1] No sampling or in situ measurements due to frozen or no flow conditions.

4.2 Classification of Seasonal Flows in Ditch

Residence time for water is low in the investigated area ditches due to their small catchment size. The climate data was used to evaluate water availability and potential water source for flows that were observed in the ditches.

The flows in ditches are susceptible to seasonal change and flow rate is highly influenced by local precipitation events, thus the classification of flow in ditches can assist to interpret the source and subsequent chemical fluctuations in water sampled (attached Table 3). For example, flows in ditches can be attributed to shallow or regional groundwater, spring freshet or surface run-off, dependant on the season and amount of precipitation recorded in the previous 24-hours and 7-days to the sampling event.

When significant or moderate precipitation has occurred in the previous 7-days, but minimal precipitation within the prior 24-hour period to the sampling event, the flows in ditches can result from shallow groundwater flow, mainly through unconsolidated overburden. The highest amount of precipitation in the preceding seven days to and during the sampling event was documented to occur in May 2022 (59.7 mm). The second highest precipitation occurred in June 2022 (7.41mm). Precipitation data shows limited influence from precipitation and a much stronger correlation with freshet (Table 4). These values in the river are heavily influenced by the freshet and snowmelt during April, May, June as discussed below.

During spring freshet and snow melt, sampling events (e.g., April 18, May 30-31, and June 26-27) can be classified as having a ‘dilution’ effect to the water chemistry, although increased TSS from turbid high flows can counteract this effect. To the contrary, during more arid seasons with little to no precipitation occurring in the previous 7-days and 24-hours, flows in ditches can be attributed to regional groundwater baseline seepage. In this event, when precipitation and sampling occur following dry periods, the surface chemistry of the rocks will be washed into the ditches and be concentrated.

There was significant rainfall prior to the May 30-31 event and moderate rainfall prior to and during the April 18 and June 26-27 sampling events. The rainfall, along with potential freshet snowmelt, increased turbidity and flow in the ditches resulting in short-term effects on measurements such as TDS, TSS and potentially total metal concentrations from flushing of exposed slopes and ditch fill material.

As outlined in section 2.3, regional bedrock groundwater in locations sampled are suspected to have elevated concentrations of dissolved sulphates due to groundwater interaction with local pyritic-shale bedrock and local bacteria, In previous sampling years from 2017 to 2021, it was observed that elevated sulphate may, to some degree, be related to dry periods following minimal precipitation during the previous 7-day and 24-hours to the sampling event. In 2022, outside of the moderate to high rainfall prior to the April, May and June sampling events, there did not appear to be elevated sulphate related to dry periods in the trend analysis. Sulphate and TDS commonly follow similar trends.

The classification of seasonal flows in ditches, therefore, are important to consider when interpreting fluctuations and exceedances in parameters measured in water quality guidelines over the period of one year.

4.3 Peace River Turbidity and TSS

Turbidity of the Peace River is monitored by BC Hydro through a series of continuous data loggers situated both upstream and downstream of the dam construction area. Time series data is collected from the left and right banks of the Peace River up-gradient of the Moberly River (stations PAM-LB and PAM-RB, respectively) were provided to Tetra Tech by Ecofish to provide a general understanding of influence by precipitation on natural sediment within the Peace River upstream from the construction area surrounding sampling events.

The turbidity data, measured in NTU, is converted to a value representing TSS, in mg/L, using a conversion factor developed by Ecofish using calibration of field measurements with laboratory data (Ecofish, 2023b).

The data considered by Tetra Tech include turbidity measurements for the seven days prior to the sampling event, the day of, during, and the day following the sampling event (Appendix Table 4). The daily mean turbidity and TSS measurements are elevated in May 2022 and June 2022 during freshet and snowmelt. Turbidity and TSS spiked during spring freshet in the months of May and June, then decrease to baseline conditions for the remainder of 2022. The turbidity and TSS measurements outside of May and June report below 15 NTU and 12 mg/L TSS, as summarized in Appendix Table 4. In May 2022, the values are generally higher on the Left bank compared to the Right Bank, and in June 2022 the opposite is observed, and values are higher on the Right bank, as summarized in Table 4-2.

Table 4-2: Elevated Turbidity and TSS during Water Quality Sample Events in 2022

Sampling Date	Turbidity (NTU)		TSS (mg/L)	
	LB	RB	LB	RB
May 30, 2022	1955.4	1407.9	1525.5	1098.3
May 31, 2022	854.3	615.1	874.5	629.6
June 26, 2022	150.5	108.3	176.4	127.0
June 27, 2022	159.4	114.8	179.8	129.4

NTU: Nephelometric Turbidity Units

The highest reported 7-day precipitation to occur prior to a sampling event, recorded on May 23-29, 2022 (59.70 mm), is consistent with the spike in TSS and turbidity values. Figure 4-1 illustrates the variability and trends in turbidity and TSS during 2022 (Ecofish, 2023b) and can be reviewed in conjunction with the precipitation events listed in Appendix Table 2.

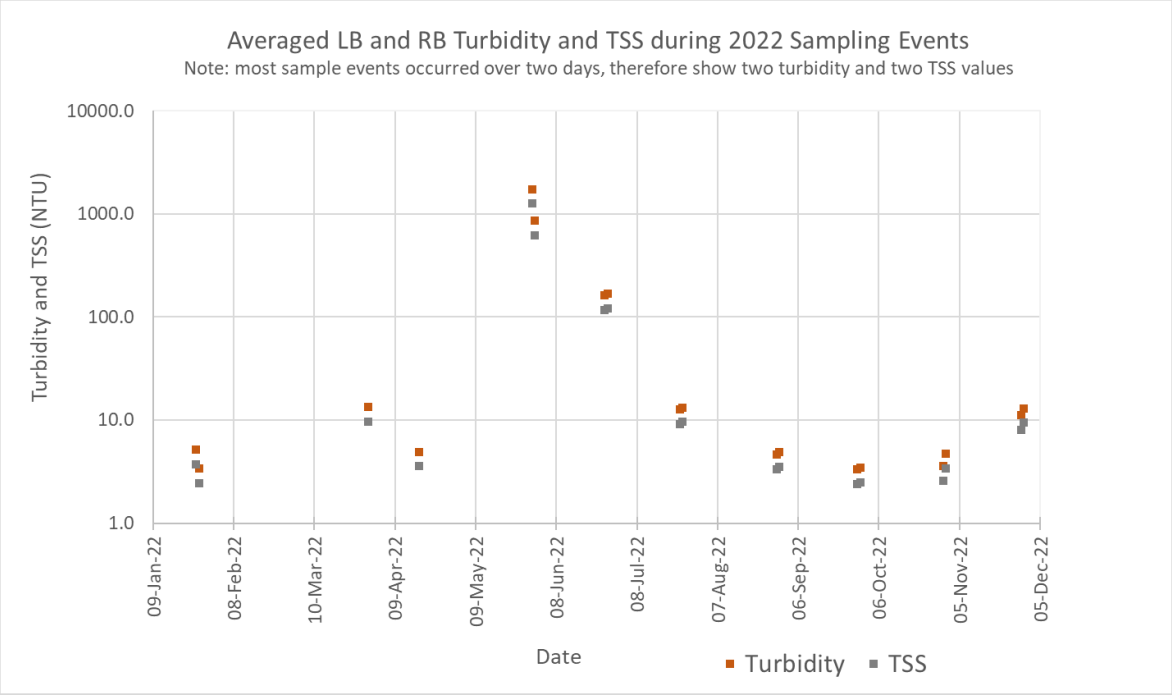

Figure 4-1: Turbidity and TSS during Water Quality Sample Events in 2022

5.0 WATER QUALITY MONITORING PROGRAM RESULTS

5.1 Sample Events in 2022

A summary of each water quality sampling event and corresponding analytical results in ten (10) routine memos summarizing twelve (12) sampling events at the RR, SBIAR, L2 Powerhouse and LBDB catchments reported monthly to BC Hydro between January to December 2022. No sampling or in situ measurements were collected in February 2022 due to frozen no flow conditions.

The attached Table 1 presents a summary of the dates of the sampling events and which locations had in situ or lab testing completed.

Field notes document field observations at each monitoring location including estimated flow rate and water clarity, site conditions and construction activities, if applicable to monitoring. In situ tests are completed with record of measurements for water temperature, hardness, alkalinity, pH, and electrical conductivity collected using a hand-held meter. The in situ test data is presented in the Appendix Tables 6, 8, 10 and 12.

Laboratory results for all locations are provided in Appendix B (Tables B1 to B4). A summary of BCAWQG-FST water quality exceedances listed by monitoring location and month are listed in Tables 7, 9, 11 and 13.

Appendix Table 14 presents a summary of minimum, maximum and mean values for measurements at discharge and downstream locations in 2022.

5.2 Quality Control and Quality Assurance Program

5.2.1 Overview of QA/QC Program

The Quality Control and Quality Assurance (QA/QC) program is based first and foremost on experienced field staff familiar with the water quality monitoring program adhering to the British Columbia Field Sampling Manual, Part A and Part E (BC MoE, 2013) for sample collection procedures and QA/QC practises. New sample containers were acquired from the laboratory prior to the sampling event and all handling of the containers, sampling devices and equipment during sample collection was completed wearing new nitrile gloves to minimize potential for contamination of the samples. A new disposable syringe and 0.45 µm filter are used for each sample being submitted for dissolved metals, as per field sampling procedures (BC MoE, 2013). A peristaltic pump and 0.45 µm high capacity inline filter is used when the water is too turbid for the manual syringe filtering, All samples were stored in a cooler filled with ice packs at a temperature between approximately 4°C and 8°C.

The program incorporates the use of a Travel Blank (TB), Field Blank (FB) and replicate sample to test for potential contamination during sample collection, handling, or laboratory preparation, and to evaluate the precision of laboratory analysis. Travel Blanks were prepared by the laboratory and Field Blanks were prepared in the field at sample collection sites by field staff using the same source water as was used for the Travel Blank.

5.2.2 Laboratory QA/QC

Analytical results were received monthly from ALS Laboratories (ALS). The lab implements a detailed QC program into the sample analysis which includes a series of checks and evaluations for consistency in the sample analysis. The QC program includes method blanks, certified reference materials, laboratory control samples and duplicates.

The QC Lot reported on Assay Certificates consistently met internal ALS Data Quality Objectives throughout the year.

5.2.3 Tetra Tech QA/QC

The analytical results of the QA samples (TB, FB, and replicate samples) were reviewed by Tetra Tech, and if potential contamination or concerns with analytical results were identified, they were discussed with the laboratory and/or the field sampler representatives, with reanalysis of samples completed for verification if necessary. Appendix Table 5 provides the results of the field and travel blanks (Table 5a) and replicate samples (Table 5b) in the QA program.

5.2.3.1 Blank Samples

Travel Blanks were prepared by the laboratory and Field Blanks were prepared in the field at sample collection sites by field staff using the same sourced water. If the source distilled water was contaminated, similar elemental anomalies would be expected in both the TB and the FB. Blank samples were considered to 'fail' where any measured value was in concentrations above the reported detection limits for that parameter. Elemental concentrations measured above detection limit can be attributed to field contamination or calibration of analytical instrumentation. During 2022, TB and FB data showed minimal occurrences of any significant concentrations of values above the detection limit. As a result, no reruns were required by the lab during 2022.

Elemental concentrations measuring above the analytical detection limits in TB and FB samples occurred thirteen (13) times during the 2022 monitoring period, as detailed in the attached Table 5a. The above detection limit values were noted for alkalinity (1 sample), ammonia (7 samples), barium (2 samples), magnesium (1 sample), molybdenum (1 sample) and sodium (1 sample).

The pH for the TB and FB samples ranged from 4.96 to 5.85, with an average pH value of 5.38 from the 2022 sampling events. This pH range is typical for distilled water used for the TB and FB samples.

5.2.3.2 Replicate Samples

Replicate samples were evaluated using Relative Percent Difference (RPD). When an RPD value is less than 30% it is considered an acceptable threshold for variation of surface waters.

Field replicate samples with differences of elemental concentrations above the acceptable threshold of RPD > 30% had occurrences for a variable number of parameters measured during all ten sampling events in 2022, including: January 25 (7 events), March 30 (5), April 18 (2), May 18 (6), June 26 (3), July 25 (9), August 29 (19) and September 28 (5), October 30 (3), November 28 (3), and December 11 (14). Discrepancies are attributed to sediment disturbance during the collection of the first sample. The field staff were informed of these issues and were reminded of the importance of QC procedures during replicate sampling.

5.2.3.3 Total vs Dissolved Concentrations

Tetra Tech also reviewed the data for more general anomalies and inconsistencies. The total and dissolved concentrations for the full suite of elements were continued to be compared since there are frequent occurrences of dissolved concentrations exceeding total concentrations. The results were screened for analytical error, then assessed for expected natural variability of surface waters. Most instances were due to measurements at or near the analytical detection limit and could be explained by being within an acceptable range of error up to five times the lower detection limit for the respective element. In this case of reporting within five times of detection limit, the total concentrations are considered equal to the dissolved concentrations.

Dissolved concentrations exceeding total concentrations in samples were calculated within the acceptable threshold of an RPD < 30%, with exception of the following occurrences in three sampling events in 2022: May (antimony, tin, tungsten), August (antimony, molybdenum, silicon), October (selenium, two samples).

5.3 River Road Water Quality Monitoring

Dry, freezing and/or low or no flow conditions prevented consistent sampling at the River Road monitoring locations in 2022. In situ measurements were not collected from each station consistently every month due to dry or frozen conditions. Field observations were documented each month and results for each monthly sampling event were plotted on a quarterly basis on time series charts for trend and qualitative correlation analysis.

Sufficient flowing water permitted samples to be collected during 2022 from the following stations, with the sampled months listed in parentheses:

- LBRR-DD (January, March);
- LBRR-12+500 (March, May, June, August, September, October);
- RR8 (no samples);
- RR9 (January, March, May);
- LBRR-UC (March, June); and
- LBRR-LC (no samples).

A summary of water quality exceedances at River Road relative to BCAWQG-FST listed by monitoring location and month are listed in Table 7, and the screening results based on the laboratory data are tabulated in Appendix B, Table B1.

5.3.1 In Situ Measurements and Field Observations

Values for pH, conductivity, hardness, alkalinity, water temperature, estimated flow and turbidity measured at the River Road monitoring locations are included in Table 6. At River Road during 2022, the range in water temperatures was -0.10 °C to 27.2 °C. Measurements of pH ranged between 7.38 to 9.80, alkalinity ranged between 40 and 240 ppm, hardness ranged between 450 to 800 ppm and conductivity between 654 to 2,560 µS/cm.

Flows within the River Road ditch are ephemeral. During 2022, flow was noted at the LBRR-DD discharge location in January and March 2022, and at RR9 in January, March, and May. No flow was noted at RR8 throughout the year. In 2022, no flow was observed at LBRR-LC (Lower Chimney; Midstream) and in March and June at LBRR-UC (Upper Chimney). Flow was observed at the LBRR-12+500 (alternative LBRR-12+450 location during 2022) in March, May, June, August, September, and October, and further up the LBRR ditch at LBRR-12+600 (4), LBRR-12+700 (7), LBRR-12+810 (7) and LBRR-12+920 (7) during between four to seven months of the 12-month monitoring period. Dry or frozen conditions prevailed for the remainder of 2022.

In the River Road catchment, considering all sampling conditions, TSS measurement ranged from a low of 11.8 mg/L (January; LBRR-DD) to a high of 5,190 mg/L (January; RR9). For all stations, the combined average TSS was 496 mg/L, and each sample location showed variable TSS that was seasonally correlated with highs typically in January (likely due to warming and brief melting period on the sampling date) and March (early freshet), and lowest values in the drier summer months. The source of TSS is primarily attributed to River Road run-off, scouring of sediment deposited within the River Road ditch and washing from the cut-slopes.

5.3.2 Freshwater Short-Term Maximum Exceedances

The summary of exceedances is presented in Table 7 and summarized below. The complete data results from the samples are summarized in Appendix B, Table B1.

Of the total thirteen (13) samples collected from River Road during 2022, sixteen (16) occurrences of elevated total metal concentrations above the BCAWQG-FST were measured, for total arsenic (2), total iron (7), total manganese (1), total zinc (2), dissolved aluminum (3) and dissolved iron (1). Neutral to alkaline laboratory pH values were measured with pH ranging between 6.99 to 8.17.

At the three RR discharge locations, there was one exceedance measured at LBRR-DD (dissolved aluminum, January) and seven exceedances measured at RR9 (total arsenic, total manganese, total zinc, January; total iron, January, March, May; dissolved aluminum, May). No sampling occurred at the RR8 discharge location. Non-discharge locations along River Road measured BCAWQG-FST exceedances in total arsenic (1), total iron (3), total zinc (1), and dissolved aluminum (1) at LBRR-12+500 (in March, May, June) and total and dissolved iron at LBRR-UC (March). The exceedances are attributed to washing, or flushing, of sediment and secondary mineral precipitate during freshet (or precipitation following a dry period), as water contacted accumulated sediment within the ditch in addition to the exposed shale, colluvium, and overburden cut-banks.

5.3.3 Trend Monitoring and Details of 2022 Sample Results

Data results from 2017 to 2022 at River Road monitoring stations have been compiled and plotted for trend analysis. Please refer to Figures 6 to 17 for time series charts.

Monthly water quality monitoring measures instantaneous ambient conditions at the time of sampling and as discussed in Section 3.1 the measurements are highly susceptible to temporal climate conditions due to the small catchment and short residence time of water within the River Road ditch. Event data characterizes the influences of seasonal conditions at the site.

Time series charts for pH and alkalinity, TSS and TDS, sulphate, total and dissolved aluminum, and total and dissolved iron at River Road were presented in the 2017 and 2018 annual reports (Tetra Tech 2017 and Tetra Tech 2018), but not in the 2019 annual report due to lack of water quality data in 2019 (Tetra Tech 2019). Water quality sampling has been inconsistent at the River Road locations since 2017 due to frequent low flow or frozen conditions. There is minimal data available from mid-2018 to the end of 2019, and variable amounts of data in 2017 and 2021 from different stations and times. The available data makes it challenging to discern seasonal trends at River Road. Additional data collection and ongoing time series trend analysis is needed to support interpretation of trends.

The measured pH values collected at River Road have remained within an acceptable BCAWQG-FST range (pH 6.5 to 9.0) during 2022 sampling events that show more consistency in 2020-22 relative to more variability in pH during 2017 and 2018 when pH values varied below and above the acceptable BCAWQG-FST. During 2022, alkalinity generally increased from March to October and pH remain relatively consistent whereas acidity is more variable, especially at the LBRR-12+500 and LBRR-UC locations. The collection of acidity data is limited to primarily 2020-22 and will continue to be monitored.

During 2022, TDS and TSS values at River Road sample locations generally remain within range of measurements in 2017 through 2021. Although limited and inconsistent data is available, the LBRR-12+500 location shows the highest TDS values in 2022 relative to the other RR locations sampled. During 2022, TSS values show a general decreasing trend from March to October and measured within range of values in 2017 to 2021. During 2022, sulphate concentrations measure within range of values collected from 2017 to 2021, which continue to straddle

the BCAWQG-FLT guideline value of 429 mg/L (guideline variable based on hardness) and shows a slight increasing trend from March to October yet there is insufficient data to show conclusive trends in 2022.

During 2022, total and dissolved aluminum shows an overall decreasing trend to occur from March to October and remains within range of measurements in 2017 to 2021.

During 2022, total iron varies in concentration that measures below and above the BCAWQG-FST guideline and within range of measurements since 2017. Total iron, similar to total aluminum and TSS values, measure similarly and follow a similar trend at the LBRR-12+500, LBRR-UC and RR9 locations in 2022. During 2022, dissolved iron remains below the BCAWQG-FST guideline with exception to one measurement at LBRR-UC in March 2022.

Metal concentrations for a number of elements, including total aluminum, total iron, total arsenic, total cobalt, total and dissolved copper, and total zinc show a trend from a higher value at freshet, coincident with elevated TSS values) in the spring that gradually decreases through summer and autumn to October 2022. In 2022, metals generally measure within range of concentrations since 2017.

5.4 SBIAR Water Quality Monitoring

The South Bank Initial Access Road (SBIAR) shale slope was initially exposed in 2015 as part of road construction works on the south bank between RSEM R6 and Area A. The total area of the shale slope is approximately 14,000 m^2, between both the East and West slopes.

At SBIAR, sufficient flowing water permitted samples to be collected during 2022 from:

- RBSBIAR-US (May to October);
- RBSBIAR-DS (January, March to October);
- RBSBIAR-EUS (January, May to October);
- RBSBIAR-EDS (May, June).

In situ measurements were collected in the same months when sampling was possible, and low flow conditions in January and March also allowed in situ measurements when sample collection was not possible. Field observations were documented each month and results for each monthly sampling event were plotted on a quarterly basis on time series charts for trend and qualitative correlation analysis.

A summary of BCAWQG-FST water quality exceedances at SBIAR listed by monitoring location and month are listed in Table 9. The complete set of screening results based on the laboratory data are tabulated in Appendix B, Table B2.

5.4.1 In Situ Measurements and Field Observations

Values for water temperature, pH, total alkalinity, and electrical conductivity measured at the SBIAR monitoring locations are included in Table 8. At the SBIAR locations during 2022, the range in water temperatures was -0.1 °C to 26.4 °C. Measurements of pH ranged between 7.17 to 10.85, alkalinity ranged between 40 and 240 ppm, hardness ranged between 100 to 800 ppm and conductivity between 177 to 1,297 µS/cm.

Flows in the SBIAR ditch system can vary between increase from the upstream to downstream locations, with flows of approximately 0.01 L/s to 3.0 L/s. Isolated pools with no flow were observed at RBSBIAR-US in March and October 2022.

5.4.2 Freshwater Short-Term Maximum Exceedances

Concentrations of total arsenic, total iron, total zinc, and dissolved aluminum were measured as exceedances to the BCAWQG-FST at various locations in the SBIAR catchment during 2022 (Appendix Table 9). Concentrations typically increase at downstream locations due to the influence of sediment washing in the ditchline and influence of SBIAR cut-slope.

In 2022, at the upstream SBIAR locations, no exceedances were measured at RBSBIAR-US in six sampling events and total arsenic (1), total iron (2) and total zinc (1) were measured at RBSBIAR-EUS in seven sampling events.

In 2022, at the downstream SBIAR locations, total iron (2), total zinc (1) and dissolved aluminum (1) were measured at RBSBIAR-DS in nine sampling events, and total arsenic (1), total iron (1) and dissolved aluminum (1) were measured at RBSBIAR-EDS in two sampling events.

It is noted that the water flowing from the downstream locations do not have a direct downstream receptor; the water from the east ditch passes under the road via culvert to the downstream location in the west ditch where all water flows into a limestone armored spillway into a ditch which conveys to the RSEM R6 pond. Details of water flow and the intensive water quality monitoring program in RSEM R6 is referenced in Section 3.2 above.

5.4.3 Trend Monitoring and Details of 2022 Sample Results

Monthly water quality monitoring measures instantaneous ambient conditions at the time of sampling and, as discussed in Section 4, the measurements are highly susceptible to temporal climate conditions due to the small catchment and short residence time of water in the SBIAR ditch. Recurring trends at SBIAR over the monitoring periods sine 2017 may be preliminary indications of long-term trends and are discussed below and summarized in the attached Figures 18 to 30. In 2018 and 2019 a trend was observed for total metals showing a potential progressive increase in concentrations was occurring, although this appears to have been short-term and temporary and has not been observed in the subsequent monitoring years.

Alkalinity and pH values indicate that waters have remained alkaline from 2017 through 2022. Alkalinity is more variable than pH values. In 2020 and 2021, an overall increase in alkalinity is observed to occur between freshet in the spring towards the fall and winter month, although this is more variable with no trend observed in 2022. Acidity measured during 2022 remains within range of values collected since 2018. Acidity values commonly measure higher in the east ditch (RBSBIAR-EDS and RBSBIAR-EUS) than in the west ditch (RBSBIAR-DS and RBSBIAR-US).

Typically, the SBIAR ditches measure variable TSS and TDS values attributable to the relatively small catchment and short residence time of waters that are subsequently sensitive to flux in surface water inputs from precipitation. In 2022, TDS values have remained relatively constant at the SBIAR locations.

During 2022, sulphate measures within range of values collected since 2017. Sulphate values show more variability during 2020 than in 2021, 2022 and previous years (2017 to 2019). The RBSBIAR-DS location shows a decreasing trend from April to July, then consistent with sulphate values at all sample locations. A seasonal trend in the SBIAR ditches is observed whereby sulphate concentration peaks in spring/early summer followed by an overall decrease.

Ammonia (NH_4 as N) is subject to a temperature and pH-dependent BCAWQG-FST and BCAWQG-FLT guideline. Although no exceedances are measured to the BCAWQG-FST, it is observed that ammonia values measure higher in the downstream SBIAR ditches (RBSBIAR-DS/-EDS) than the upstream ditches from 2017 to 2022.

During 2022, total and dissolved aluminum measure within range of values collected since 2017. The west downstream ditch measures the higher dissolved aluminum values than the other SBIAR locations in 2022, which differs from commonly higher and similar aluminum values in the east ditch sample locations since 2018.

Total and dissolved iron measure within range of values collected since 2017. Total iron shows a more variable trend below and above the BCAWQG-FST guideline, whereas dissolved iron commonly remains below detection limit and the BCAWQG-FST guideline.

During 2022, the concentrations of metals, such as arsenic, cadmium, cobalt, copper, and zinc measure within range of values in previous years from 2018 to 2021.

Monthly sampling in the SBIAR catchment occurred from 2017 to 2022 and will need to continue to be monitored going forward into 2023 for effective observations of trends.

5.5 L2 Powerhouse

Water quality sampling commenced at the BC Hydro L2 Powerhouse area in October 2020 and continued sampling through the 2022 monitoring period.

The L2 Powerhouse L2 DS location was sampled seven times from May to August and from October to December. The L2 US location was sampled ten times, January, and April to December. The other months noted dry or frozen conditions and sampling could not be completed. In situ measurements were collected in each month where a sample for lab testing was collected.

A summary of in situ measurements are provided in Table 10 and water quality BCAWQG-FST exceedances measured at the L2 Powerhouse location are listed in Table 11. Screened lab data results are tabulated in Appendix B, Table B3.

Water from the L2 Powerhouse area is conveyed to AFDE RSEM R6 pond as needed or water treatment facility that discharges to the sediment pond. Water from the AFDE RSEM R6 pond is monitored prior to discharge.

5.5.1 Field Observations and In Situ Measurements

In situ measurements collected from May to December 2022 at L2 DS recorded a range of pH 8.30 to 11.09 with mean pH value of 9.25, electrical conductivity 397 to 1,491 µs/cm, hardness 50 to 450 ppm, alkalinity 80 to 240 ppm, water temperature 5.3 to 20.5 °C and flow 0.5 to 3.0 L/s, with turbidity ranging between clear to turbid.

In situ measurements collected from January to December 2022 at L2 US recorded a range of pH 7.44 to 9.88 with mean pH value of 8.36, electrical conductivity 435 to 1,240 µs/cm, hardness 250 and 450 ppm, alkalinity 80 to 280 ppm, water temperature -0.1 to 20.9 °C, flow from stagnant to 6.0 L/s, and turbidity of clear to slightly turbid.

5.5.2 Freshwater Short-Term Maximum Exceedance

In the seven sampling events during 2022 at the L2 DS location, there were seventeen BCAWQG-FST exceedances measured, including for ammonia (1), total arsenic (2), total iron (4), total lead (1), total silver (1), total zinc (2), dissolved aluminum (5) and pH > 9.0 (1).

In the ten sampling events during 2022 at the L2 US location, there were two BCAWQG-FST exceedances measured, including for total iron (1) and dissolved aluminum (1) in the month of January.

At L2 DS, the pH is consistently alkaline, and the pH value exceeded the upper limit of the BCAWQG-FST guideline (pH 6.5-9.0) in May 2022. Dissolved aluminum exceeded the BCAWQG-FST guideline (100 µg/L) value in five of the total seven sample events with concentrations ranging between 41.3 to 207 µg/L in six samples with a mean value of 120.7 µg/L, and one significantly higher concentration of 1,960 µg/L in one sample (May 2022). At L2-DS,

In the same month of May 2022, there were exceedances measured for ammonia, total arsenic, total iron, total lead, total silver, total zinc, dissolved aluminum coincident with an alkaline pH above the acceptable range. At L2-DS, total iron exceeded the BCAWQG-FST guideline four times in May, June, August, and October 2022. Total arsenic and total zinc exceedances were measured in May and August, and dissolved aluminum exceedances were measured in May, June, July, August, October, November, and December 2022.

5.5.3 Trend Monitoring and Details of 2022 Sample Results

Trend charts for the L2 Powerhouse sampling stations present consistent neutral to alkaline pH values and slightly higher pH values at L2-DS relative to L2-US. Total alkalinity values are highly variable whereas acidity values are commonly at or below detection limit. Trend monitoring is discussed below and summarized in the attached Figures 31 to 44.

Sulphate, TDS and TSS values show variable trend throughout 2022, with a spike in sulphate in May and June, decreasing TDS trend following May, and TSS indicates opposite trends at L2-DS relative to L2-US. Metal concentrations show a spike in the month of May at L2-DS, whereas concentrations are relatively consistent at L2-US. The spike in metal concentrations at L2-DS is observed for total and dissolved aluminum, total and dissolved iron, total arsenic, total cobalt, total zinc, dissolved cadmium (to a lesser degree). At L2-DS, total and dissolved selenium show measure a spike in concentration in July 2022.

The dissolved aluminum concentration is consistently above the BCAWQG-FST guideline with a decreasing trend at L2-DS in 2022, whereas the L2-US location shows a more consistent trend and below the BCAWQG-FST guideline.

Total iron shows differing trends at L2-DS and L2-US with BCAWQG-FST guideline exceedances measured at L2-DS in May and June, with a decreasing trend in 2022, whereas total iron shows a consistent trend at L2-US below the guideline. Dissolved iron concentrations have not exceeded the BCAWQG-FST guideline at L2-DS and L2-US since sampling commenced in October 2020 thru to December 2022. There is a possible ‘lag’ in a decreasing trend that first occurs at L2-US in April, then occurs at L2-DS in May for dissolved iron.

Total arsenic concentration measured BCAWQG-FST exceedances at L2 DS and not at L2 US in 2022, with a sharp decline in concentration from May to July at L2-DS and a consistent trend at L2-US. Total cobalt shows a similar decreasing trend from May to July at both L2-US and L2-DS, with no BCAWQG-FST exceedances. Total zinc and dissolved cadmium similarly measure higher concentrations at L2-US relative to the L2-DS location, and a decreasing trend from May to September 2022 at both locations.

Total and dissolved selenium do not have a BCAWQG-FST guideline for reporting requirements, although it is noted that both total and dissolved selenium measure above the long-term BCAWQG-FLT guideline value at L2-DS in June and July 2022, and at L2-US in May, July, and September 2022.

5.6 BC Hydro Left Bank Debris Boom

Water quality sampling commenced at the BC Hydro LBDB area in October 2020 and continued sampling through the 2022 monitoring period. The most consistently sampled location is LBP Pond. Limited surface flow is observed in this area, and the only time that the sample stations in the LBDB area can be sampled, except for the LBP Pond location, is immediately following a significant rainfall event. Sample staff are instructed to sample these locations outside of regular monitoring events, if possible, when high rainfall is observed.

The LBP Pond was sampled eight times from March through October 2022. The downstream location in the west armour ditch (LBDB-WDS) was sampled twice, in March and May 2022. Three additional locations were able to

sampled due to a heavy rain event in May, that include the downstream station in east armour ditch (LBDB-EDS), and the laydown drainage stations downstream from the LBP Pond (LBDB-LD-MS and LBDB-LD-DS). The sample locations are summarized on Figure 3.

A summary of water quality exceedances at LBDB relative to BCAWQG-FST listed by monitoring location and month are listed in Table 13, and the screening results based on the laboratory data are tabulated in Appendix B, Table B4.

5.6.1 Field Observations and In Situ Measurements

In 2022, in situ measurements were collected from LBP Pond (March to October), LBDB-WDS (March, May) and LBDB-EDS (May).

At the LBP Pond, a range of in situ measurements were collected for pH (6.55 to 7.99), electrical conductivity (640 to 5,170 µs/cm), hardness (150 or 800 ppm), alkalinity (40 to 240 ppm), water temperature (0.3 to 25.6 °C) and flow (0.0 to 0.10 L/min).

At the LBDB-WDS Armor Ditch, in March and May 2022, respectively, in situ measurements for pH (8.13 and 7.89), electrical conductivity (2,520 and 3,550 µs/cm), hardness (800 ppm), alkalinity (120 and 180 ppm), water temperature (1.8 and 20.8 °C) and estimated flow (<5 mL/s to 0.08 L/min).

At the LBDB-EDS Armor Ditch, in May 2022, in situ measurements for pH (8.42), electrical conductivity (4,300 µs/cm), hardness (800 ppm), alkalinity (240 ppm), water temperature (15.6 °C) and estimated flow (0.15 L/min).

5.6.2 Freshwater Short-Term Maximum Exceedances

In 2022, at the LBP Pond location there BCAWQG-FST exceedances measured for total iron (5), total manganese (2), total zinc (1), dissolved iron (2). This is not a discharge station and water discharging from the LBP Pond area passes through a limestone lined ditch. Water is not commonly observed to discharge from the LBP Pond, but if it does it passes through a limestone lined water management ditch system to the downstream monitoring station.

No BCAWQG-FST exceedances were measured during 2022 at the downstream east and west Armor Ditches, LBDB-EDS and LBDB-WDS. Water flow from the Armor Ditch sample locations is considered discharge locations.

In May 2022, the laydown drainage was sampled at the midstream LBDB-LD-MS location, which measured five BCAWQG-FST exceedances for total cobalt, total iron, total manganese, dissolved aluminum, and dissolved iron. The downstream laydown drainage LBDB-LD-MS location sampled in May 2022 measured no exceedances.

5.6.3 Trend Monitoring and Details of 2022 Sample Results

Sampling at BC Hydro's LBDB area has primarily been limited to sampling at the LBP Pond location, therefore comment on trend observations are limited to this location. Trend monitoring will continue in 2023 with the availability of further monthly sampling data. Trend charts are provided in Figures 45 to 56.

At LBP Pond, pH values have remained neutral to alkaline with pH values at or above 7.0. Total alkalinity values consistently increase through the year from March to October 2022, which is a similar trend observed to occur in the previous year. Acidity values measure within a consistent range through both 2021 and 2022. Sulphate values show a gradual increasing trend through the year from March to October 2022, that measures above the BCAWQG-FLT guideline from April onwards. This differs from a more consistent measurement for sulphate values

above the BCAWQG-FLT during the 2021 monitoring period. TDS values follow a similar trend to sulphate with a relatively consistent trend in 2021 followed by an increasing trend in 2022, although within similar range of values. consistent whereas TSS values are more variable and within a similar range in both 2021 and 2022.

Dissolved aluminum measured at LBP Pond is relatively consistent and well below the guideline in 2022. Total and dissolved iron concentrations follow similar trends in 2022 relative to previous years. At LBP Pond, total iron exceeds the BCAWQG-FST guideline in April, May, July, September, and October, whereas dissolved iron exceeds the BCAWQG-FST in April and October 2022.

6.0 CONCLUSIONS AND RECOMMENDATIONS

A water quality monitoring program was implemented on behalf of BC Hydro to monitor the water quality at PAG exposure locations from River Road at Blind Corner, South Bank Initial Access Road, BC Hydro Left Bank Debris Boom, and L2 Powerhouse. Upstream, midstream, and downstream and discharge monitoring locations were established to characterize water quality and to maintain a continuous monitoring record commensurate with previous sampling completed in 2016 by Lorax on behalf of PRHP (where applicable). The water quality program is conducted in accordance with the CEMP, Appendix E (Rev 6.0) Acid Rock Drainage and Metal Leachate Management Plan, Section 5.2.1.7 (BC Hydro, 2022).

The program has incorporated monthly in situ water quality measurements and observations with laboratory analysis outside of frozen or dry conditions. Field observations were recorded from all areas monthly regardless of weather conditions or ability to collect in situ measurements or take samples for lab testing.

Water chemistry is monitored to identify influence of ARD-ML processes on water quality at River Road from construction related exposed PAG shale at Blind Corner, shale exposed in the east and west ditches within SBIAR, and construction PAG shale exposures at the BC Hydro LBDB and L2 Powerhouse areas.

The sampled locations are generally ephemeral. Residence time for water is low in the investigated area ditches due to their small catchment size. The flows in ditches are susceptible to seasonal change and flow rate is highly influenced by local precipitation events, thus the classification of flow in ditches can assist to interpret the source and subsequent chemical fluctuations in water sampled. For example, flows in ditches can be attributed to shallow or regional groundwater, spring freshet or surface run-off, dependent on the season and amount of precipitation recorded before and during the sampling event. Monthly water quality monitoring measures instantaneous water quality and may not be reflective of long-term baseline conditions.

The water quality program is achieving the purpose of evaluating water quality from dam site areas where construction related PAG exposures and PAG contact surface water is identified. The results of the program demonstrate that ARD/ML processes are occurring, however the management and mitigation measures implemented are working and that water quality remains primarily neutral to alkaline with metal concentrations dominantly below the established water quality criteria. The water quality monitoring program provides a framework for identifying water quality concerns from the exposed rock cuts in a timely manner and implementing the required mitigation measures.

6.1 River Road Water Quality Monitoring

Water quality laboratory data was collected from four locations (LBRR-DD, LBRR-UC, LBRR-12+500 and RR9) and in situ measurements were collected at eight of a total eleven water sample locations along the River Road

catchment in 2022. The LBRR-12+500 location was actually sampled closer to LBRR-12+450 during 2022 due to large rip-rap at LBRR-12+500.

In situ field measurements of pH within the River Road ditch indicated a neutral to alkaline pH throughout the 2022 sampling year. In 2018 and 2019, acidic waters were collected in the upper portions of the ditch underlying the exposed shale cut-bank. However, in these instances the pH values progressively returned to circumneutral levels at the discharge location in part due to contact with limestone rip-rap in the ditch, and potential alkalinity input from groundwater or outflow from the upper cut-off ditch. The observation of consistent neutral to alkaline pH drainage conditions at all locations in River Road area in 2022 are indicative of changes in the exposed PAG slope over time. Visual observations show that the slope has weathered and developed a partial clay capping surface which may be limiting ARD/ML reactions, and sections of the exposed PAG slope have been observed to have naturally revegetated in localized areas.

Exceedances of total arsenic, total iron, total zinc, dissolved iron, total manganese, and dissolved aluminum were noted in sampling events in the first half of the year, dominantly between January and May, with one occurrence of total iron in June. The exceedances are primarily attributed to washing, or flushing, of sediment and secondary mineral precipitate during freshet (or precipitation following a dry period), as water contacted accumulated sediment within the ditch in addition to the exposed shale, colluvium, and overburden cut-banks. It is anticipated that sediment in the ditch will continue to accumulate a small amount of secondary mineral formed by up-gradient ARD-ML processes. These minerals commonly contain an elevated concentration of metals related to ML and mineral precipitation from acid neutralizing reactions. Sediment is also introduced into the ditch from the roadway.

Review, in previous years, of the Peace River monitoring data from Ecofish show that there are seasonal fluctuations in total metals concentrations and concentrations are highest during initial freshet in the Peace River. Ecofish note in their 2021 annual report (Ecofish, 2022) that for the monitoring conducted in 2021, there were natural exceedances in the Peace River of the BCWQG for the protection of aquatic life, including total iron at upstream Peace River location. Natural exceedances occurred predominantly during the freshet period (April to the end of June 2021) and were observed at all sample sites. Exceedances were most often associated with elevated concentrations of suspended solids in the Peace River (Ecofish, 2022).

ARD-ML management and mitigation along River Road adjacent to the PAG slopes includes a cut-off ditch above the slope, which diverts surface flows into limestone rip-rap lined “Chimney ditches” which then feed into the River Road ditch below the slope. The River Road ditch adjacent to the PAG slope includes a bentonite liner and limestone rip-rap to provide neutralization potential and mitigate against acidic drainage.

Chemical efficiency of the limestone to buffer acidic water is decreased when coated in precipitate. The formation of mineral scale can concentrate metals from solution as a result of the aqueous acid-base reactions. The mineral scale and sludge are susceptible to scouring and being washed during heavier rain events which has potential to reduce overall water quality conveyed down-gradient. The limestone rip-rap in the River Road ditch was replaced in July 2021, due to the accumulation of mineral scale onto the limestone, and sample events. in July and August 2021 was limited due to dry or frozen conditions. Visual inspection of the limestone during 2022 showed minimal precipitate formation in the surfaces, although some limestone rip-rap was obscured due to road sediment entering the ditches. The analytical results from 2022, combined with visual inspection, support that the limestone is effective in the maintenance of neutral alkaline drainage conditions and managing metal concentrations. The effectiveness and impact of the limestone rip-rap will continue to be monitored in future sampling events and analyzed for trend analysis over time.

The seasonal flows in ditches are important to consider when interpreting fluctuations and exceedances in parameters measured in water quality guidelines. The source of TSS is primarily from River Road run-off, scouring of sediment deposited within the River Road ditch and washing from the cut-slopes. Seasonally, elevated TSS

levels have been noted to occur during spring melt and freshet season, typically April, when water flow can wash elevated precipitates from rock. The January and April/May 2022 sampling events represents both a warming event with melting and early spring freshet conditions.

TSS measurements at RR9 were very high in January then decreased in March and May 2022, and LBRR-12+500 shows similar elevated TSS in March followed by a decreasing trend. Looking at the March event, TSS is higher at RR9 relative to upstream stations analyzed in the same month. As a result, total arsenic, total iron, total manganese, and total zinc were elevated above the BCAWQG-FST at RR9 in January, and a discharge rate of 2 L/s of turbid flow discharge to the Peace River. The total arsenic and total iron values are significantly higher than the dissolved arsenic and dissolved iron values, suggesting further the suspended sediment loading rather than the dissolved phase of the metals are the source of exceedances. The measured lab pH of 8.04 to 8.07 (LBRR-RR9) and 7.89 to 8.09 (LBRR 12+500) are both within the acceptable range for BCAWQG-FST and indicate neutral to alkaline conditions. Low pH water has capacity to dissolve metals more readily than neutral, or alkaline, water.

The purpose of the diversion pipe is to address erosion and sediment control by transport of run-off water into an elongated ditchline to reduce flow velocities and to promote settlement of suspended sediment prior to discharge at RR8 and RR9. Inlets to culverts RR9 and RR8 are slightly elevated from the ditch base which will allow water to pond within the ditch and infiltrate or discharge via the culverts only if water levels reach sufficient height. In previous years it was noted that the diversion pipe was successfully reducing the amount of direct high TSS discharge into the Peace River by allowing the water to be collected and slowly infiltrate into the River Road ditch.

On May 31, 2022, a discharge of estimated 200 mL/s flow rate from RR9 measured BCAWQG-FST exceedances in total iron and dissolved aluminum that are interpreted to be related to freshet and subsequent increase in turbidity and TSS, as shown in the EcoFish data. Exceedances are often associated with elevated concentrations of suspended solids in the Peace River. In May 2022, parameters such as total aluminum, total arsenic, total cobalt, total iron, and total zinc associate with elevated TSS values. In January 2022, there appears to be an increase in these metals and TSS that may be associated with an early anomalous temporary increase in temperature above 0°C during the sampling event on January 25-26, 2022, followed by sub-zero temperatures. No association with elevated turbidity and TSS in the Peace River were measured on January 25-26, 2022, indicating a very short-term flux in temperature and TSS.

The lower chimney (water quality monitored at LBRR-LC) drains into the River Road ditch down-gradient of LBRR 12+500 and up-gradient of LBRR-RR9. The LBRR-LC location was not measured in 2022. The upper chimney LBRR-UC location sampled in March and June 2022, recorded exceedances of total and dissolved iron in March and none in June 2022. Since there is minimal data available for 2022, there is no to minimal indication that sediment accumulation is occurring on the limestone of the lower chimney ditch.

Recommendations for River Road

The River Road sampling stations demonstrate consistent neutral to alkaline drainage conditions in 2022. Additional slope mitigation is not required, and disturbance of the shale slope is to be avoided as it may re-initiate ARD/ML processes if fresh surfaces are exposed. If erosion or scouring of the shale slope and fresh surface exposures are noted, additional short-term in situ monitoring in the River Road ditch should be evaluated to quantify the effect of fresh shale exposure on water quality, and if required additional mitigation should be considered.

The sediment source for elevated TSS is mainly attributed to scouring of accumulated sediment within the ditch from road grading and run-off from previous events, which includes washing, or flushing, of the exposed shale, colluvium, and overburden cut-banks. Continued management of the drainage system is required to reduce the amount of sediment infilling to the ditch from road grading operations as this sediment encases the limestone which

reduces chemical efficiency for ARD mitigation and prematurely fills the cistern, which limits its performance to supress TSS.

The limestone rip-rap lining was replaced in July 2021 and continues to be monitored to assess needs for maintenance, cleaning, descaling and/or removal and replacement of new limestone. With increased use of River Road, sediment and erosion control measures will be needed to address the management of sediment load coming from the road into the ditch, until such time that River Road is paved. The limestone is monitored for accumulation of precipitates and sediment and refreshed either by cleaning or replacement as needed, which was not determined to be required during 2022.

During the sampling events in 2022, discharge from River Road to the Peace River was noted during January, March, and May, with BCAWQG-FST exceedances measured at RR9 in each of January, March and May 2022, and LBRR-DD in January 2022. No discharge at RR8 was observed from 2020 to 2022. It is recommended that in situ water quality measurements are collected from any discharge observed from culvert RR8 and/or RR9 during high flow events even if outside of regular sampling events.

As per CEMP Appendix E Section 5.2.1.7, it is recommended that water quality monitoring is continued on a monthly basis within the River Road catchment at the downstream stations. Continuous monthly monitoring will evaluate the effectiveness of ARD-ML mitigation strategies. There may be opportunities to reduce in situ sampling analysis at the upstream locations given the consistency of in situ measurements over time. The sampling locations and frequency of monitoring will be reviewed with BC Hydro for the 2023 sampling year.

6.2 SBIAR Water Quality Monitoring

Water quality data was collected from four established sampling locations in 2022 that measure water directly from within the SBIAR ditch locations. The ditch samples provide long-term characterization of SBIAR water management and water quality originating from the SBIAR PAG slope at the upstream and downstream location in the east and west ditches.

Water flowing through the SBIAR ditch has no direct downstream receptor, and all water in the east and west ditches is conveyed directly to the PRHP RSEM R6 pond which is an approved PAG contact water management facility. Downstream water quality is monitored by PRHP within the PRHP RSEM R6 pond for management prior to discharge into the Peace River.

Evidence of active ARD-ML processes are observed on the shale slopes in SBIAR through observation of secondary iron hydroxide mineral formation. Alkalinity and pH indicate that the waters in SBIAR ditches have consistently remained alkaline during the monitoring periods from 2017 through 2022.

During the 2022 sampling period, sulphate values remained below the BCAWQG-FLT long-term guidelines at SBIAR sample locations. From 2017 to 2019, the upstream location in both east and west ditches showed relatively low and consistent sulphate values. In July 2020, sulphate values at the RBSBIAR-US location sharply increased then remained at an elevated level through 2021 and 2022. Sulphate values at the RBSBIAR-EUS location sharply increased in July 2020 followed by a decrease to former levels, then spiked again in May 2021 followed by a gradual decrease and levelling off at a consistently higher sulphate trend from late 2021 through 2022. In 2022, sulphate values remained below BCAWQG-FLT, however, there was some seasonable variability noted.

Screening of analytical data during 2022 for the downstream ditch locations resulted in BCAWQG-FST guideline exceedances at RBSBIAR-DS for total iron (2), total zinc (1) and dissolved aluminum (1) in two of nine total samples analyzed in 2022. Exceedances at RBSBIAR-EDS were measured for total arsenic (1), total iron (1) and dissolved aluminum (1) in one sample from May 2022 of two total samples analyzed in 2022.

Recommendations for SBIAR Water Quality Monitoring

The collection of one up-gradient and one down-gradient water sample from both the western and eastern SBIAR ditch is suggested to continue through 2023 for comparative purposes.

Downstream water is collected within the PRHP RSEM R6 pond for management prior to discharge into the Peace River. As per CEMP Appendix E, Section 5.2.1.7, since there is low to moderate risk of negative downstream effects on water quality, monitoring of water quality within SBIAR is recommended to be continued on a monthly basis in 2023. It is recommended that BC Hydro implement a long-term solution for the Site C operations phase for the exposed shale slope due to potential for ongoing ARD/ML processes.

6.3 L2 Powerhouse Water Quality Monitoring

Water conveyed to AFDE RSEM R6 pond from this area is non-PAG contact. Water that is acidic or elevated in metals from the L2 Powerhouse area is pumped to the water treatment facility which discharges treated water to the RSEM R6 pond. Water is monitored by PRHP prior to discharge from the RSEM R6 pond.

During 2022 ongoing construction of the Powerhouse adjacent to the L2 slope included concrete works which may have mixed with drainage at the base of the L2 slope. Several exceedances of BCAWQG-FST were observed throughout 2022 as described in Section 5.3. Due to the complex construction activities and water management that diverts water around the site, the sample stations may be influenced by factors outside of the shale excavations.

Tetra Tech infers that the elevated dissolved aluminum, elevated pH, and ammonia are inter-related, and the concentrations are not representative of a PAG leachate issue and are possibly related to the construction activities/concrete in the Powerhouse area.

The ammonia BCAWQG-FST guideline value is dependent on pH value, and, since pH is above the upper limit of the guideline it is a capped value that calculates one exceedance in ammonia in May 2022 due to the high pH. The source of ammonia is thought to be from the construction activities at the L2 Powerhouse and is inferred to be structure material and admixtures in concrete cement at the sample location (Bai et al., 2005).

Aluminum is primarily in the solid phase than in the dissolved phase at both L2 DS and L2 US. Total concentrations of aluminum are higher than dissolved concentrations at L2-US, but total and dissolved aluminum measure relatively similar concentrations at L2-DS. The source of the elevated dissolved aluminum at L2 DS sample location is not thought to be related to ARD-ML processes given the maintenance of neutral/alkaline pH and low overall iron and sulphate. The source of the continued elevated dissolved aluminum at the L2-DS sample location could be related to construction activities including concrete pouring, which is known to contain components high in aluminum concentration. The identification of ammonia supports this.

It is noted that water quality in the L2-DS area as well as the adjacent area for the AFDE foundation enhancement trial drilling program, both contained an excess of dissolved aluminum. This was investigated and determined that the most likely source of the dissolved aluminum to be originating from the RCC concrete which contains fly-ash (21.2% aluminum oxide) and General use (GU) cement (5% aluminum oxide).

Recommendations for L2 Powerhouse Water Quality Monitoring

Due to the evolving nature of this area and significant construction activity, it is important to evaluate the potential for changing flow patterns and confirm that the established sampling locations are appropriate for the purpose and collecting the intended waters. The water quality monitoring program will be modified as needed in relation to construction changes associated with this work. Focus on aluminum monitoring and tracking construction activities

that may be contributing aluminum and, occasionally, associated with elevated metals or pH that may be related to ARD-ML processes.

The recommendation to field staff is to maintain a consistent single sample location as often as possible at L2-DS and to continue to note observations of change in location in metres when necessary and other observations noted in construction activities. The recommendation applies more generally to the complete water quality monitoring program to allow for consistent interpretation of changes at a monitoring location.

6.4 BC Hydro Left Bank Debris Boom Monitoring

Sampling at BC Hydro's LBDB area commenced in 2020 and initially included sampling at LBP Pond and a Peace River side channel location, which is now flooded. Additional sample locations were added in July 2021 following a review of the area to monitor construction contact water. The added monitoring locations are located in the armor ditches at the toe of the exposed construction PAG faces and laydown drainages downstream of the LBP Pond. All locations were monitored in 2022 and sampled monthly outside of dry or frozen conditions.

Water management structures and ditch linings were amended in 2021 to improve flow management, prevent erosion and provide acid buffering capacity with limestone lining of ditches. These were proactive measures to manage signs of erosion and initial signs of ARD/ML generation on the exposed shale slopes. Mitigation and management controls were implemented in the LBDB area as discussed in Section 3.4. The exposed PAG slopes are temporary and PAG exposures will be fully inundated by the reservoir inundation, forecast in late 2023.

The LBP Pond station is the only station that has had consistent sample collection monthly. The other sampling stations are generally dry except after heavy rainfall events. Sampling of the armor ditches and laydown drainage in May and March was possible due to significant precipitation the previous seven days prior to the sampling event.

At LBP Pond, in eight sampling events between March to October 2022 there were BCAWQG-FST exceedances measured for total iron, total manganese, total zinc and dissolved iron. Water is not commonly observed to discharge from the LBP Pond, but if it does it passes through a limestone lined water management ditch system.

In 2022, the east downstream LBDB-EDS ditch location, the west downstream LBDB-WDS ditch location, the midstream laydown drainage LBDB-LD-MS and the downstream laydown drainage LBDB-LD-DS were sampled in May 2022 (LBDB-WDS sampled in March and May). The LBDB-LD-MS sampling in May 2022, had five BCAWQG-FST exceedances including total cobalt, total iron, total manganese, dissolved aluminum, and dissolved iron.

Field samplers confirmed that there was no direct discharge to the Peace River, and that the sampled ditches drain to sufficiently sized sumps to retain water from the ditches.

Recommendations for LBDB Water Quality Monitoring

BC Hydro should continue to monitor water quality on a monthly frequency to monitor future construction related activities in and around the catchment area. The exposed PAG slopes should continue to be monitored for evidence of ARD-ML processes including precipitate formation and oxidation staining.

LBP Pond is the only location within the area that has been consistently available for sampling. Limited surface flow is observed in this area, and the only time that the sample stations in the LBDB area can be sampled, except for the LBP Pond location, is immediately following significant precipitation. Field sampling staff are instructed to sample these locations outside of regular monitoring events, if possible, when high rainfall is observed.

7.0 CLOSURE

We trust this document meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully submitted,
Tetra Tech Canada Inc.

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
E. A. MASSEY
56480

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PERMIT TO PRACTICE
TETRA TECH CANADA INC.
PERMIT NUMBER: 1001972

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FIGURES

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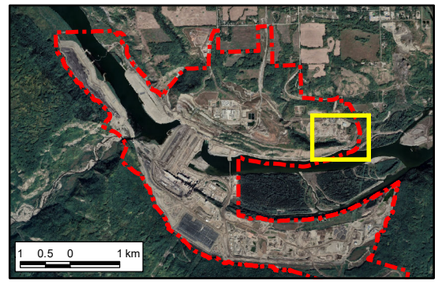
LEGEND

- Water Sample (Insitu Testing Only)
- Water Sample (Insitu Testing & External Lab Testing)
- Discharge Location
- Culvert
- Ditch
- Ditch Diversion
- Howe Pit
- Blind Corner Outcrop
- Site C Project Boundary

Sample ID	Easting	Northing
LBRR-RR8	632262	6229624
LBRR-RR9	632460	6229680
LBRR-EDP	632715	6229832
LBRR-DD	632853	6229862
LBRR-LC	632856	6229899
LBRR-12+500	632914	6229921
LBRR-12+600	632948	6229983
LBRR-12+700	632992	6230078
LBRR-12+810	633039	6230195
LBRR-12+920	633000	6230282
LBRR-UC	633018	6230253



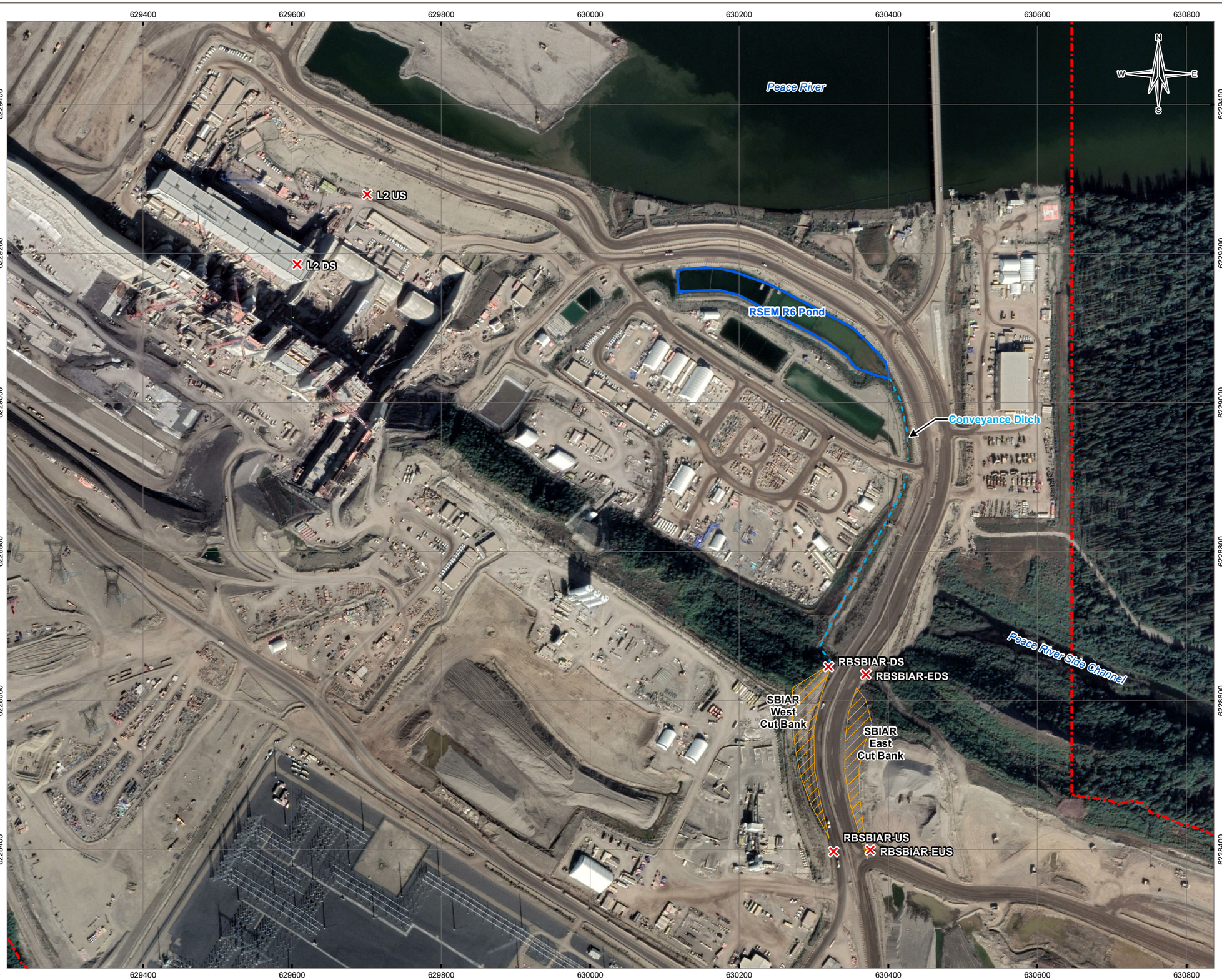
NOTES
Base data source:
Imagery provided by Google; Maxar (2022).

STATUS
ISSUED FOR USE

SITE C WATER QUALITY MONITORING 2022 ANNUAL REPORT

River Road Monitoring Locations (LB)

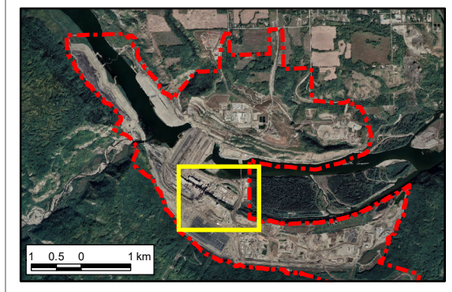
PROJECTION UTM Zone 10	**DATUM** NAD83				**CLIENT** BC Hydro Power smart
Scale: 1:3,500 — 50 25 0 50 Metres					TETRA TECH
FILE NO. VMIN03021-05_Fig01_WaterSamplesLBRR.mxd					
OFFICE Tt-VANC	**DWN** SL	**CKD** BB	**APVD** EM	**REV** 0	**Figure 1**
DATE February 8, 2023	**PROJECT NO.** ENG.VMIN03021-05				



LEGEND

- Water Sample (Insitu Testing & External Lab Testing)
- Ditch
- Cut Bank
- RSEM R6 Pond
- Site C Project Boundary

Sample ID	Easting	Northing
RBSBIAR-US	630327	6228397
RBSBIAR-EUS	630376	6228399
RBSBIAR-DS	630320	6228645
RBSBIAR-EDS	630370	6228635
L2 US	629701	6229279
L2 DS	629607	6229185



NOTES
Base data source:
Imagery provided by Google; Maxar (2022).

STATUS
ISSUED FOR USE

SITE C WATER QUALITY MONITORING 2022 ANNUAL REPORT

SBIAR and L2 Powerhouse Monitoring Locations (RB)

PROJECTION UTM Zone 10	**DATUM** NAD83		**CLIENT** BC Hydro Power smart
Scale: 1:5,000 — 100 50 0 100 Metres			TETRA TECH
FILE NO. VMIN03021-05_Fig02_WaterSamplesRB.mxd			
OFFICE Tt-VANC	**DWN** SL	**CKD** BB	**APVD** EM / **REV** 0
DATE February 8, 2023	**PROJECT NO.** ENG.VMIN03021-05		**Figure 2**

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627600 627800 628000 628200 628400 628600

6232200 6232000 6231800 6231600 6231400

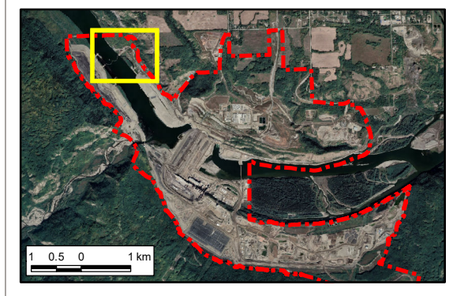
LBDB-WUS
LBDB-EUS
LBP-Pond
LBDB-LD-US
LBDB-WDS
LBDB-EDS
LBDB-LD-MS
LBDB-LD-DS
LBDB Side Channel E
Peace River

N W E S

LEGEND

- Water Sample (Insitu Testing & External Lab Testing)
- Discharge Location
- Site C Project Boundary

Sampe ID	Easting	Northing
LBDB-EDS	627994	6231856
LBDB-EUS	628202	6231908
LBDB-LD-DS	628093	6231766
LBDB-LD-MS	628147	6231844
LBDB-LD-US	628257	6231876
LBDB-WDS	627969	6231883
LBDB-WUS	628189	6231933
LBP-Pond	628227	6231885
LBDB Side Channel E	628311	6231511



NOTES
Base data source:
Imagery provided by Google; Maxar (2022).

STATUS
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SITE C WATER QUALITY MONITORING 2022 ANNUAL REPORT

LBDB Monitoring Locations (LB)

PROJECTION UTM Zone 10		**DATUM** NAD83		**CLIENT** BC Hydro Power smart
Scale: 1:4,000 80 40 0 80 Metres				TETRA TECH
FILE NO. VMIN03021-05_Fig03_WaterSamplesLBDB.mxd				
OFFICE Tt-VANC	**DWN** SL	**CKD** BB	**APVD** EM	**REV** 0
DATE February 8, 2023	**PROJECT NO.** ENG.VMIN03021-05			**Figure 3**

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Station Number	Station Name	Easting (m)	Northing (m)
1	Attachie Flat Upper Terrace	597998	6232920
3	Attachie Plateau	595065	6233032
4	Bear Flat	610671	6238140
6	Farrell Creek	580787	6220239
7B	Site C North Camp	630127	6230625
7C	Site C North Camp/PRHP	630211	6230677
8	Old Fort	634890	6230532
9	85th Avenue	633033	6233949
10	Tea Creek	626800	6234314
11	Taylor	639207	6226964

570000 580000 590000 600000 610000 620000 630000 640000

6260000 6250000 6240000 6230000 6220000 6210000 6200000

N W E S

Hwy 97
Hwy 29
Halfway River
Cache Creek
Peace River
Charlie Lake
Boudreau Lake
Moberly River
Farrell Creek
Lynx Creek
Pine River

Station 4 - Bear Flat
Station 3 - Attachie Plateau
Station 1 - Attachie Flat Upper Terrace
Station 10 - Tea Creek
Station 7C - Site C North Camp/PRHP
Station 7B - Site C North Camp
Station 6 - Farrell Creek
Station 11 - Taylor

Fort St. John
Fort St. John Airport
Station 9 - 85th Avenue
Station 8 - Old Fort
Taylor
Hudson's Hope

LEGEND

Station Type

- Meteorological Only - used for Temperature and Precipitation data
- Meteorological Only
- Air Quality Only
- Meteorological and Air Quality
- Environment Canada Meteorological Station

Base Features

- City/District Municipality
- Highway
- Main Road
- Local Road
- Resource/Recreational Road
- Railway
- Residential
- Contour (100 m)
- Watercourse
- Waterbody
- Wetland
- Wooded Area

NOTES
Station locations provided by BC Hydro and RWDI (September 2017).
Base data source: CanVec 1:250,000.

STATUS
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SITE C WATER QUALITY MONITORING 2022 ANNUAL REPORT

BC Hydro – Site C Meteorological and Air Quality Stations

PROJECTION: UTM Zone 10	DATUM: NAD83				CLIENT: BC Hydro Power smart
Scale: 1:250,000 (5 2.5 0 5 Kilometres)					TETRA TECH
FILE NO.: VMIN03021-05_Fig04_BCH_ClimateStations.mxd					
OFFICE: Tt-VANC	DWN: SL	CKD: YL	APVD: EM	REV: 0	Figure 4
DATE: February 8, 2023	PROJECT NO.: ENG.VMIN03021-05				

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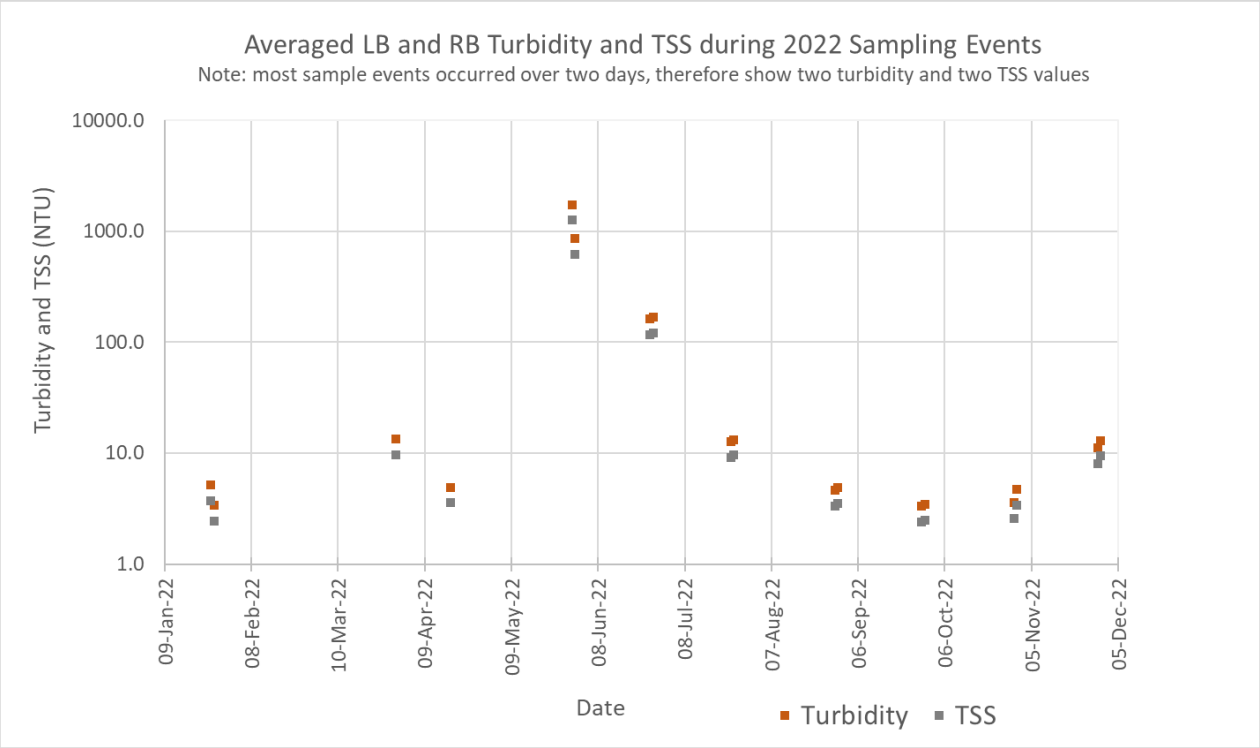
Figure 5: Turbidity and TSS Measured in the Peace River



**Average turbidity and TSS across the Peace River include both left bank and right bank.*

EcoFish Disclaimer: TSS:turbidity relationship used was the same all year. Note, these relationships are specific to a particular make/model of sensor. Please exercise caution if relationship applied to any data collected.

Figure 6: pH at River Road Locations

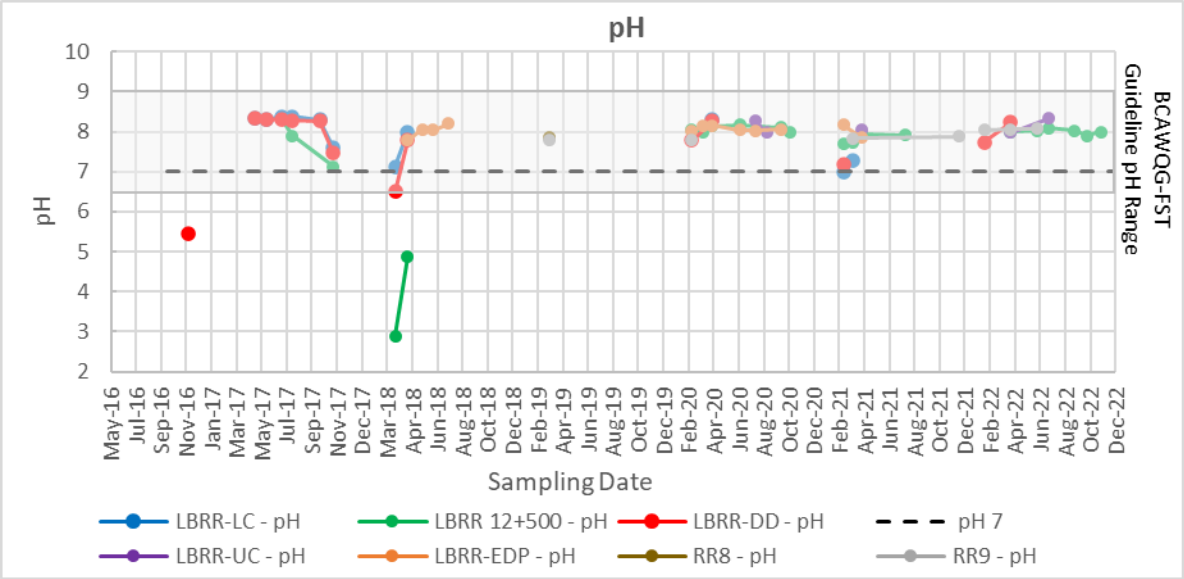


Figure 7: Total Alkalinity at River Road Locations

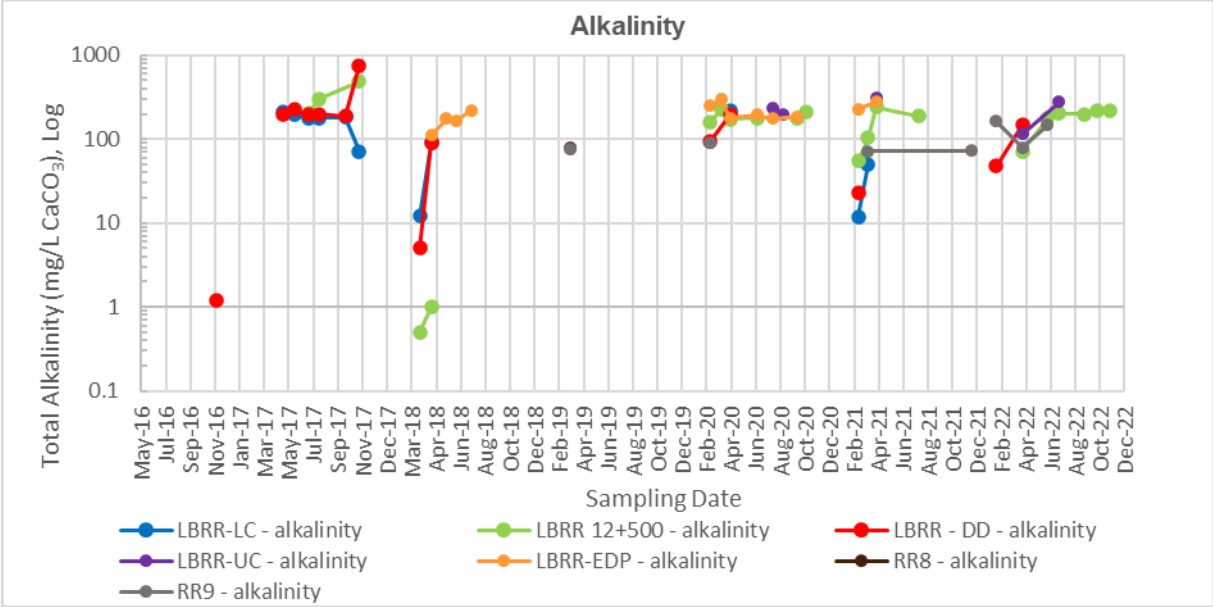


Figure 8: Acidity at River Road Locations

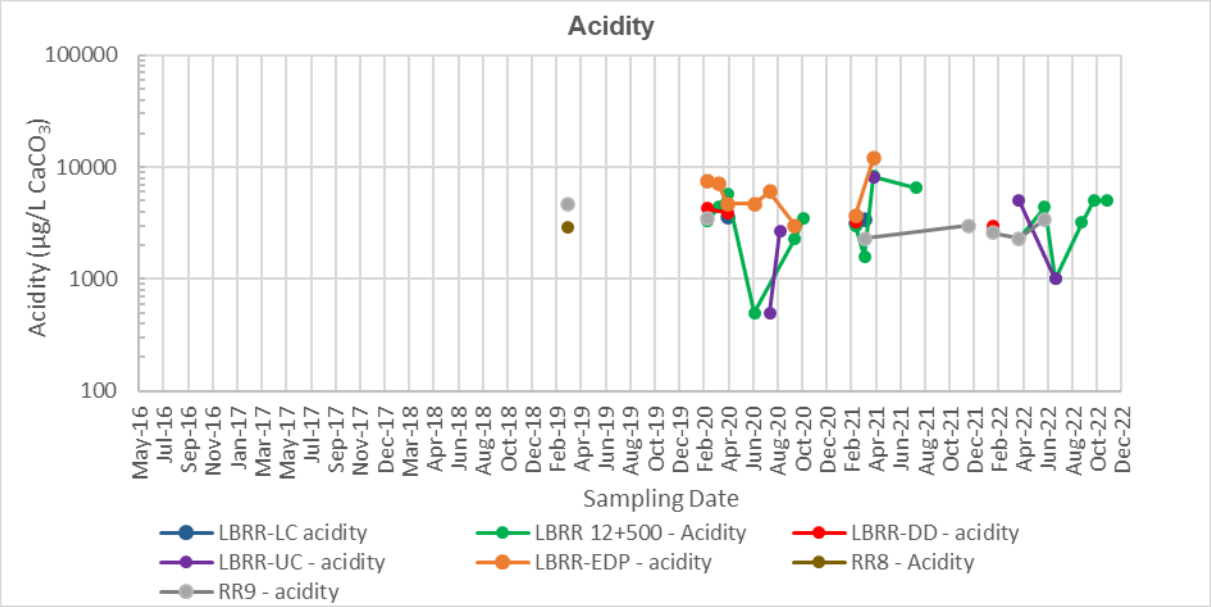


Figure 9: Sulphate at River Road Locations

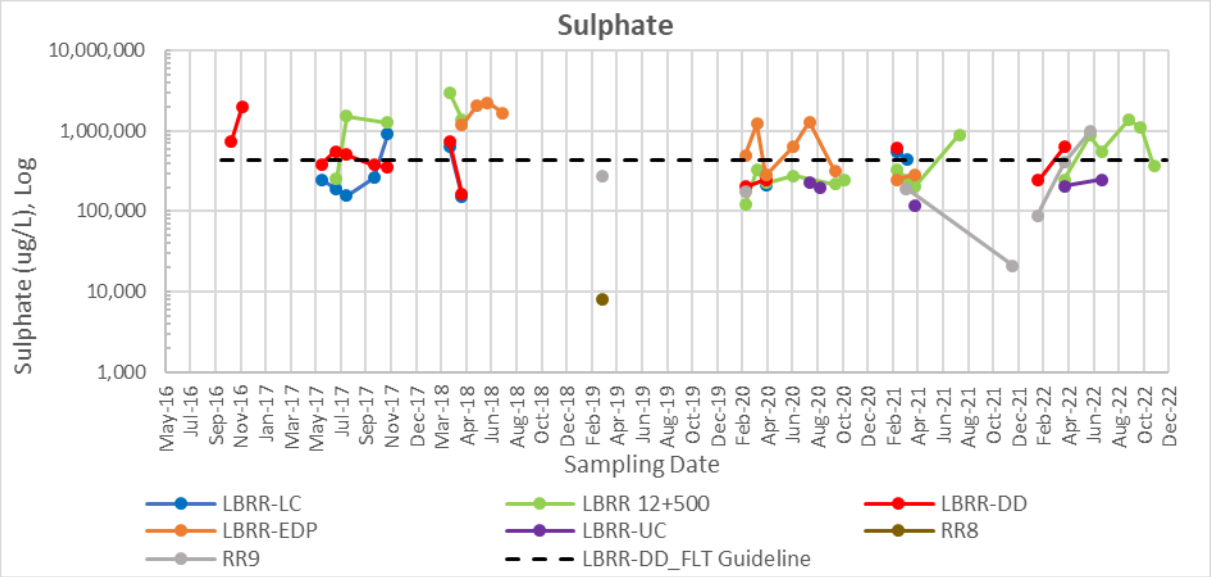


Figure 10a: Total Dissolved Solids (TDS) at River Road Locations

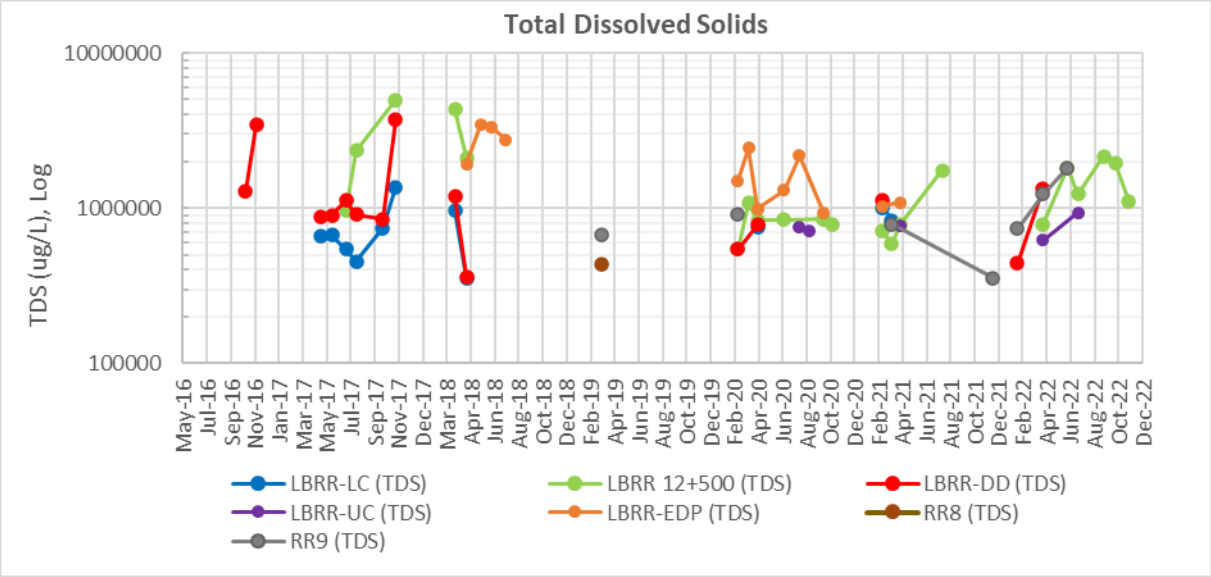


Figure 10b: Total Suspended Solids (TSS) at River Road Locations

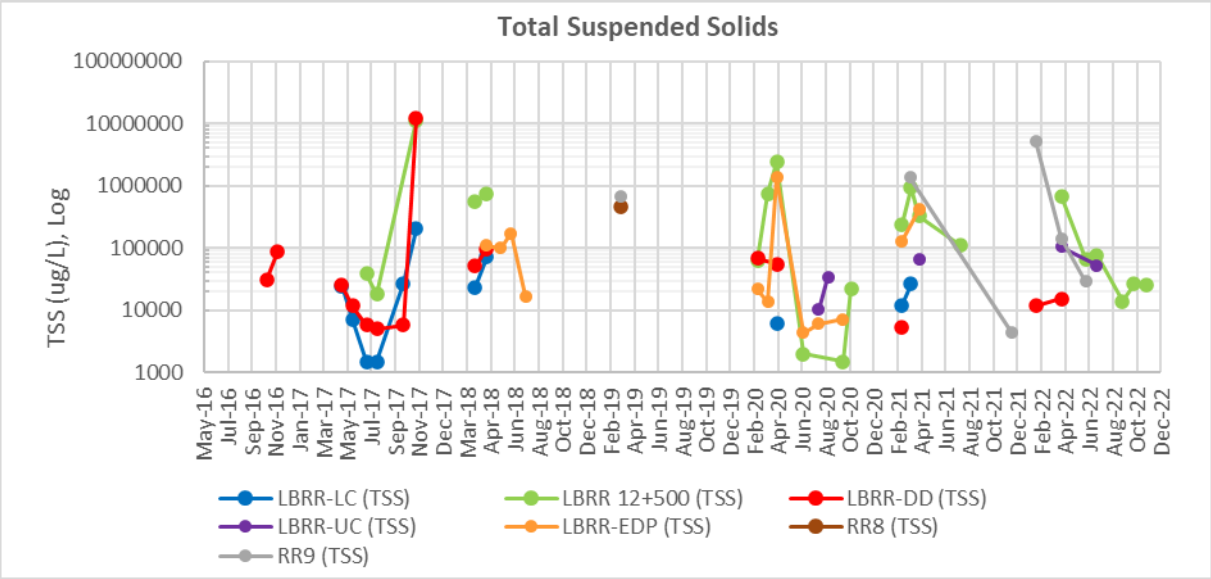


Figure 11a: Total Aluminum at River Road Locations

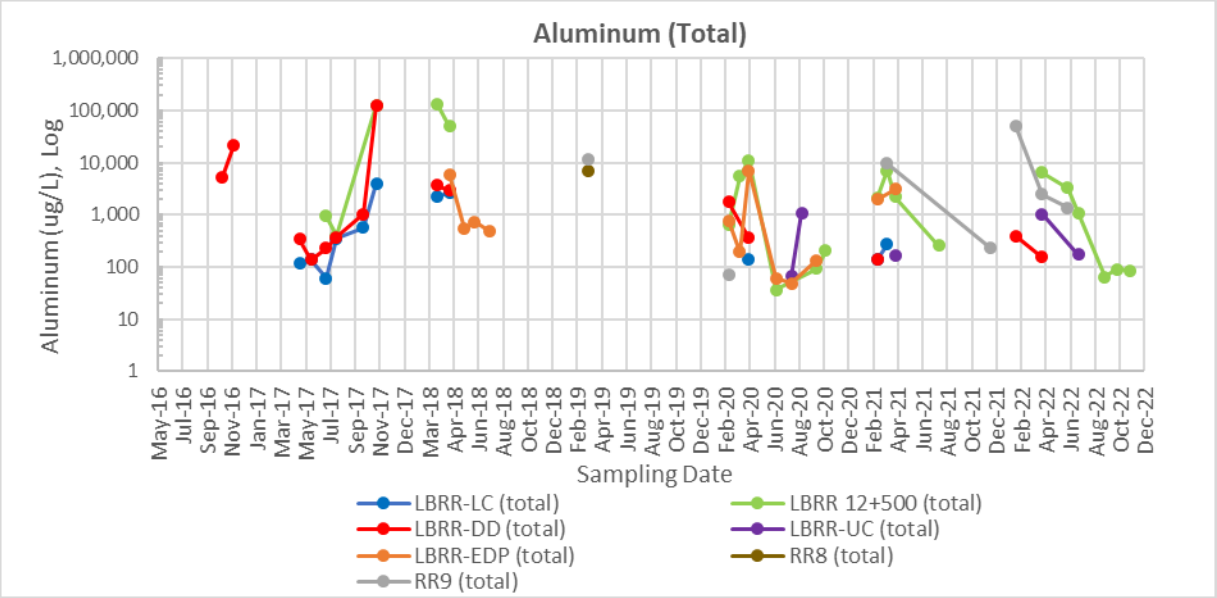


Figure 11b: Dissolved Aluminum at River Road Locations

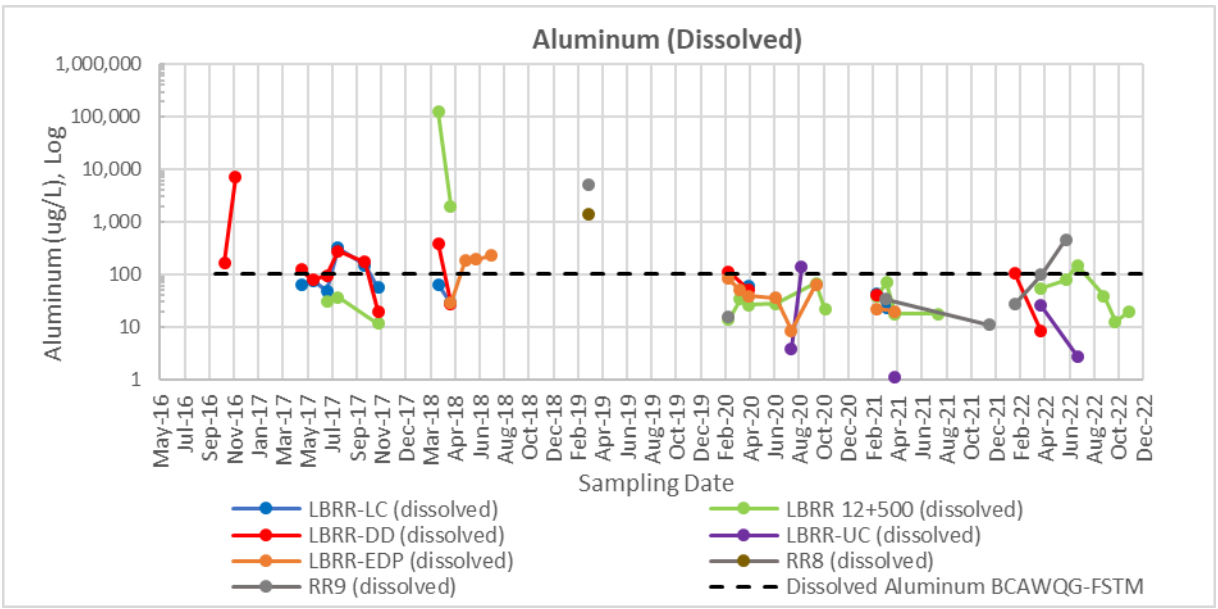


Figure 12a: Total Iron at River Road Locations

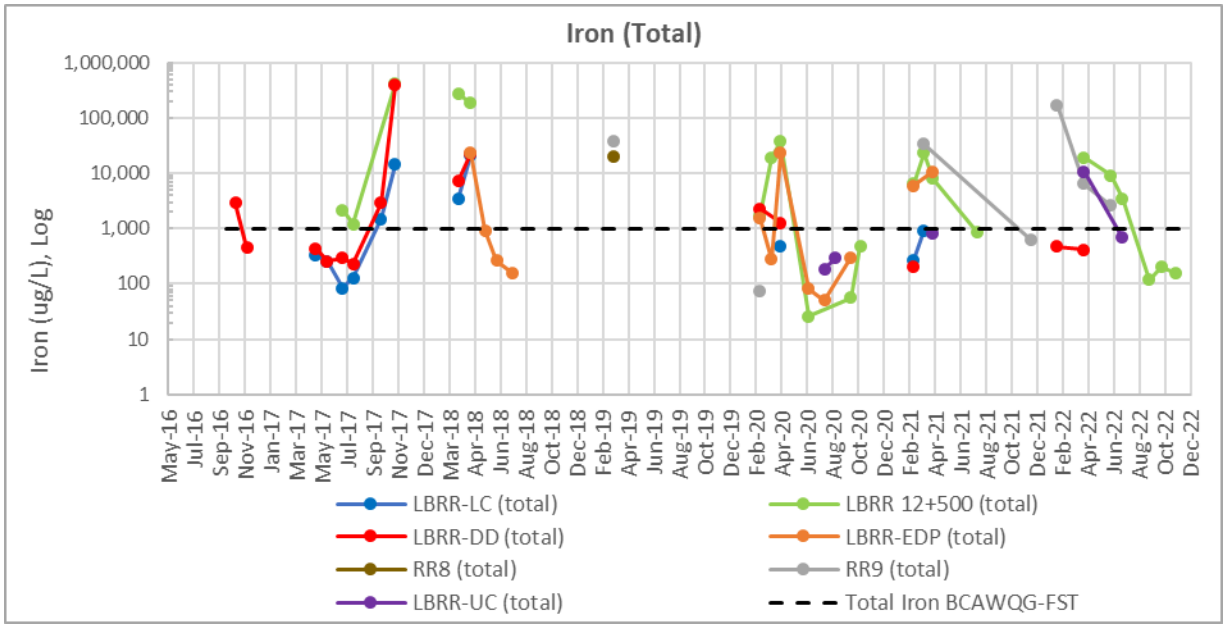


Figure 12b: Dissolved Iron at River Road Locations

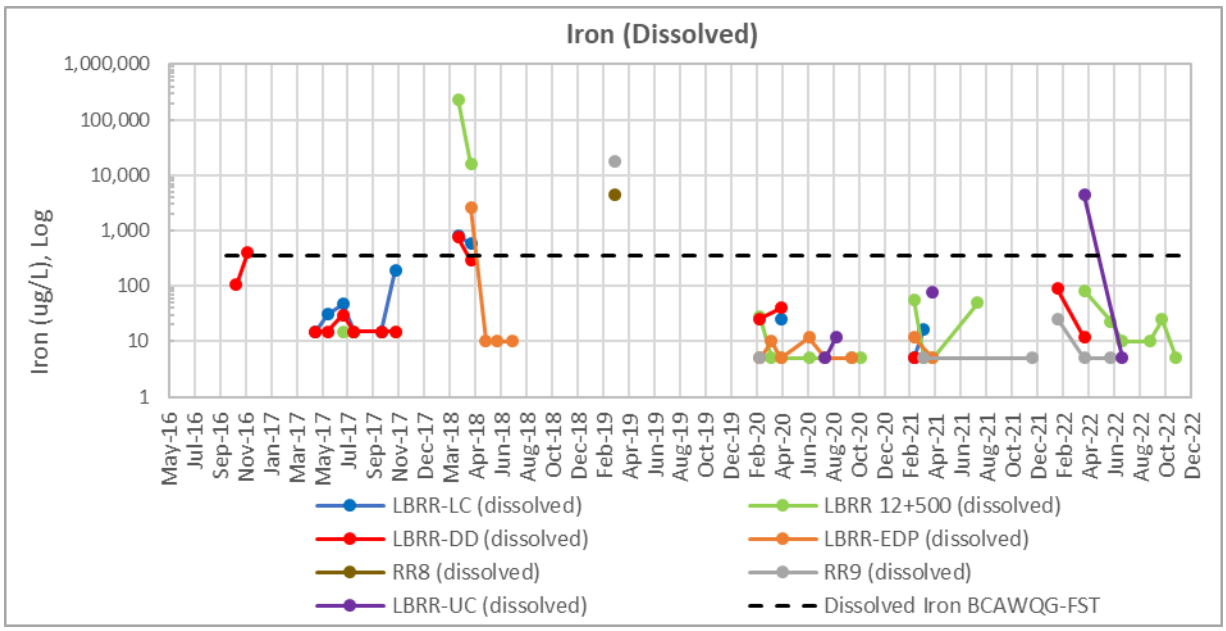


Figure 13: Total Arsenic at River Road Locations

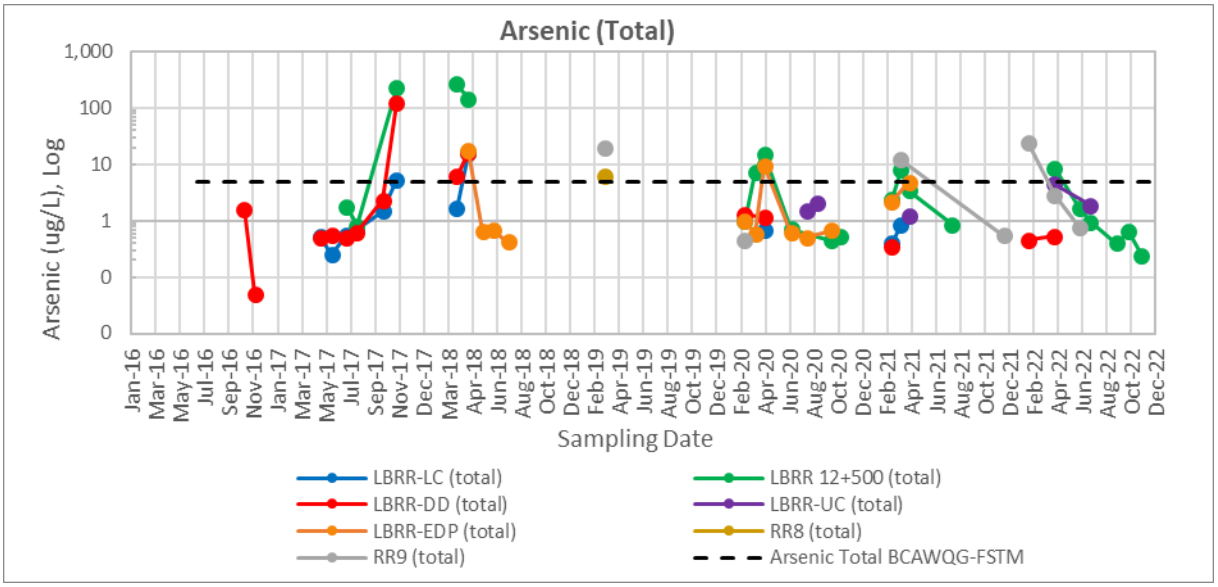


Figure 14: Dissolved Cadmium at River Road Locations

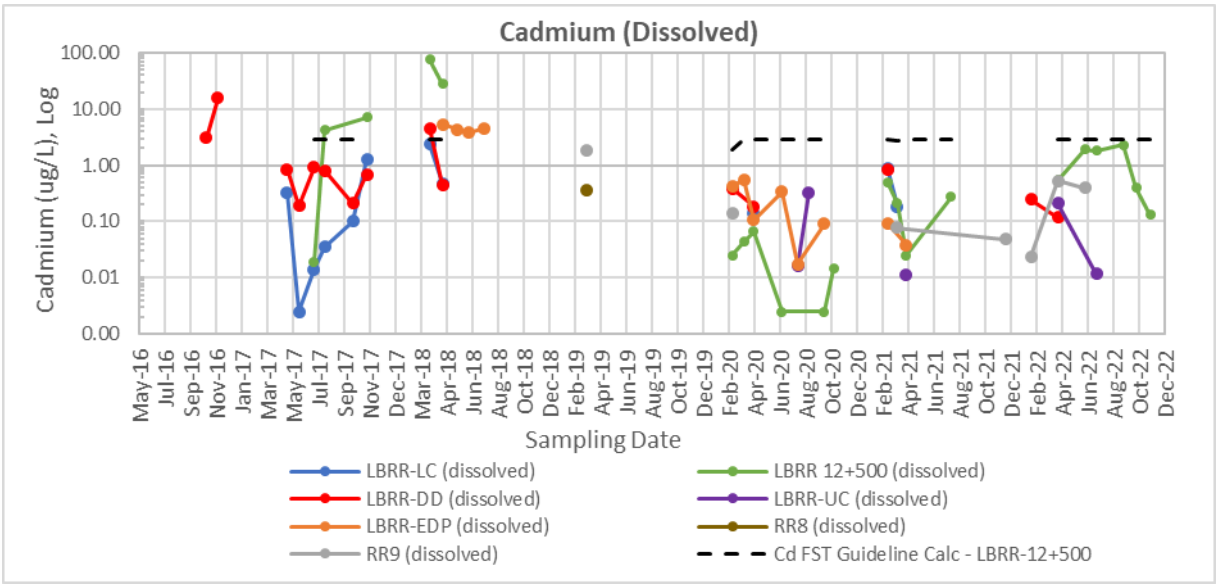


Figure 15: Total Cobalt at River Road Locations

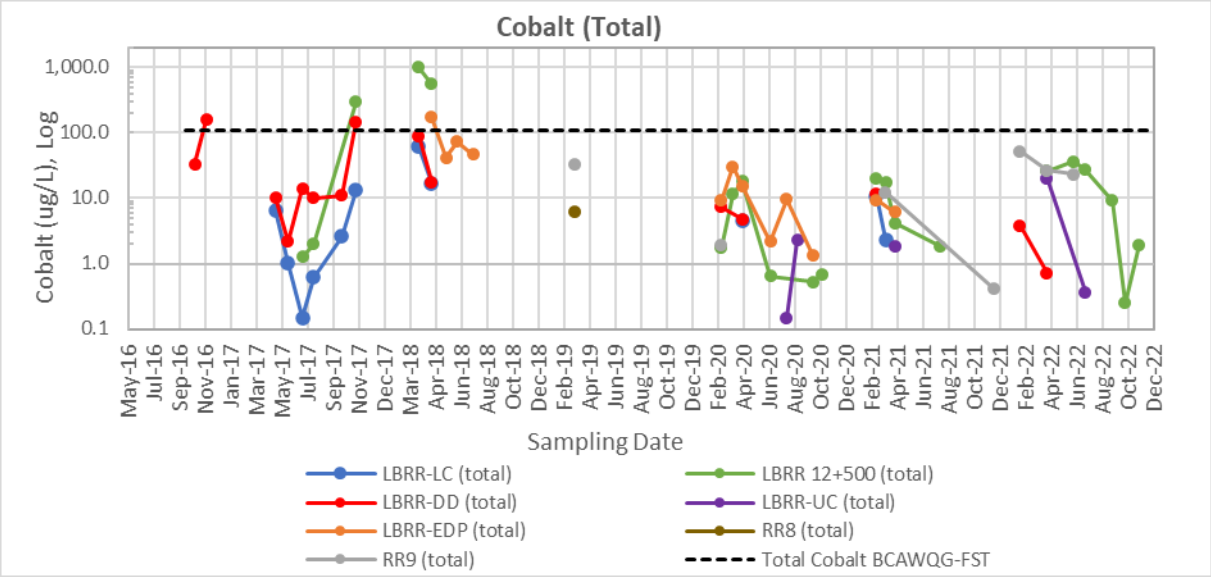


Figure 16: Dissolved Copper at River Road Locations

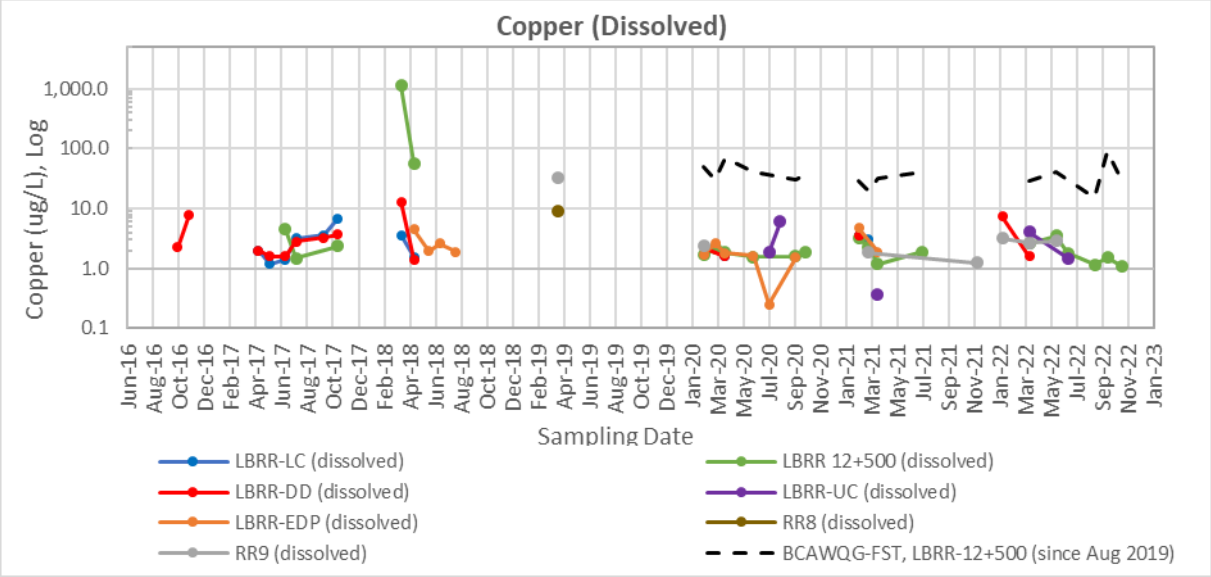


Figure 17: Total Zinc at River Road Locations

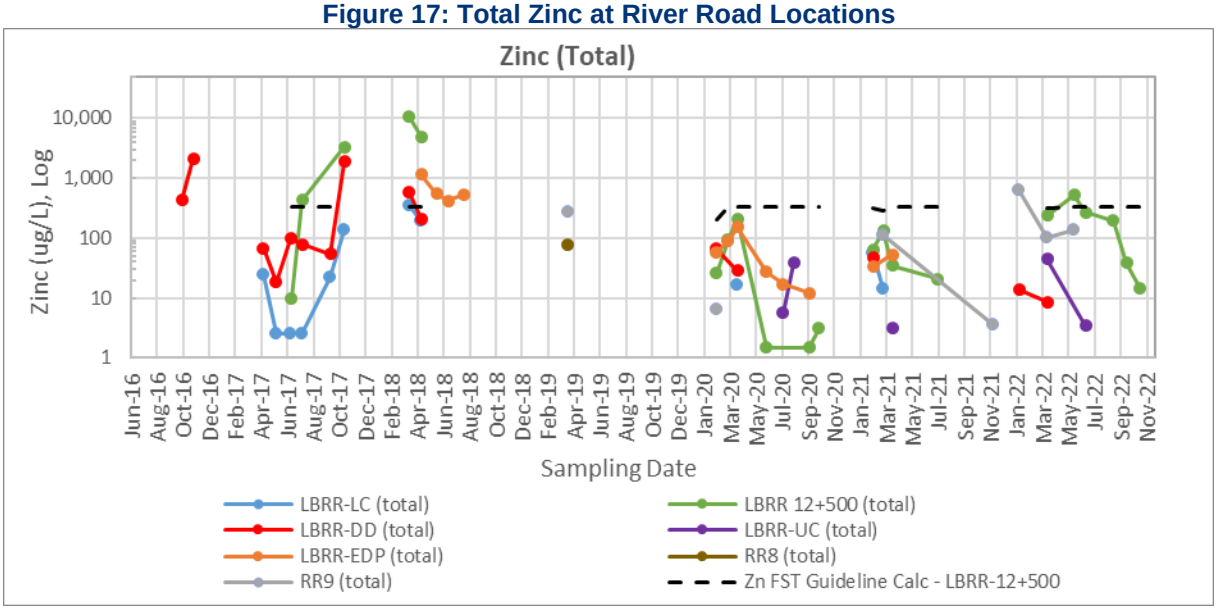


Figure 18: pH at RBSBIAR Locations

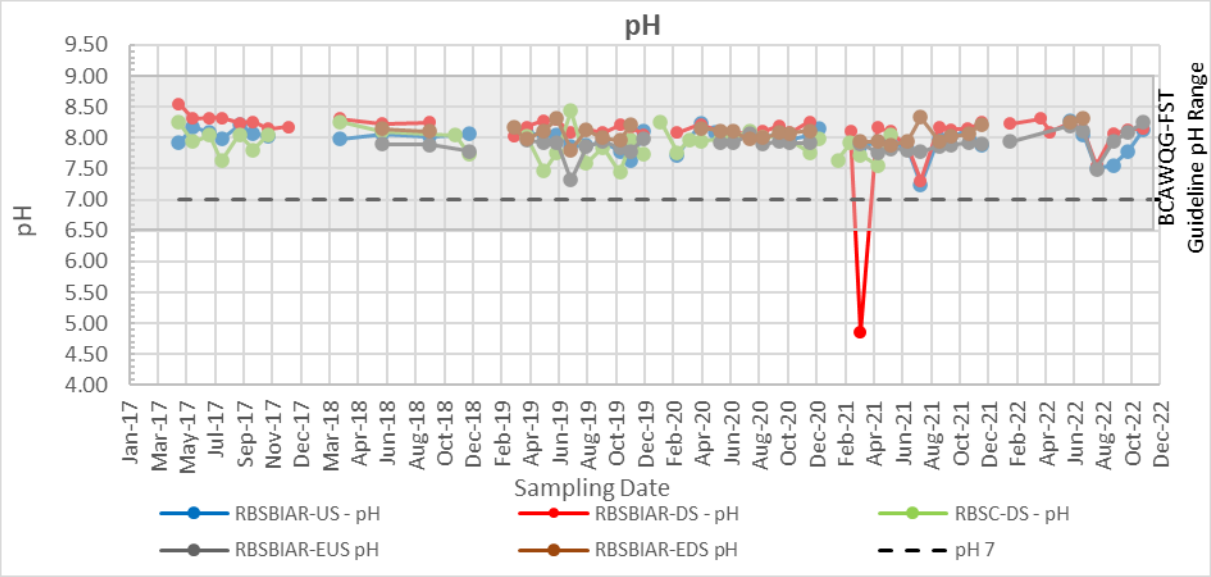


Figure 19: Total Alkalinity at RBSBIAR Locations

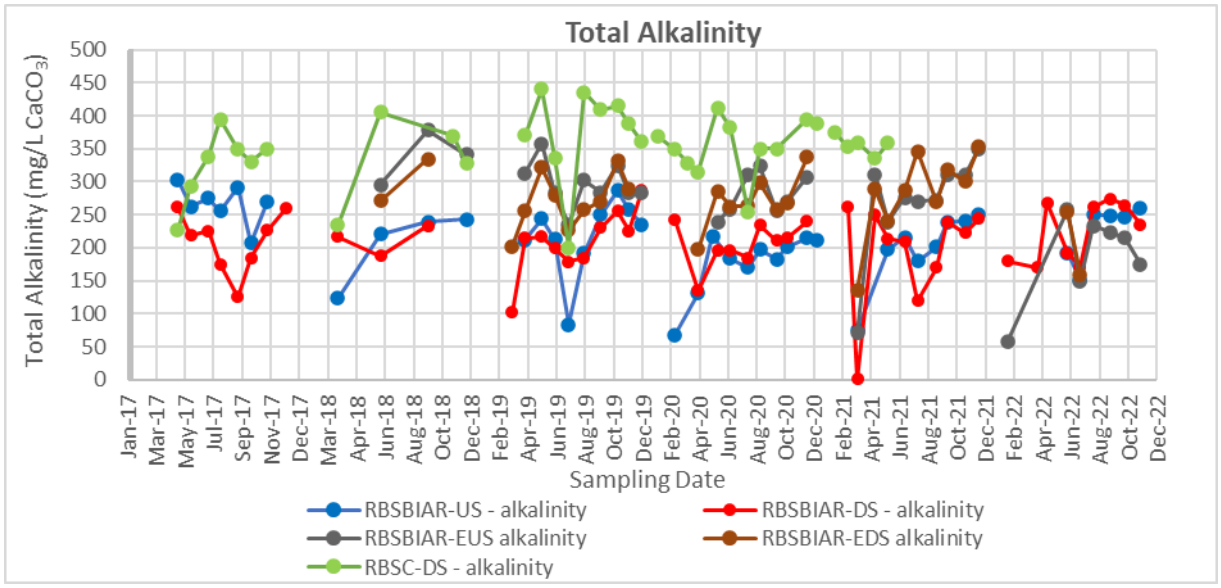


Figure 20: Acidity at RBSBIAR Locations

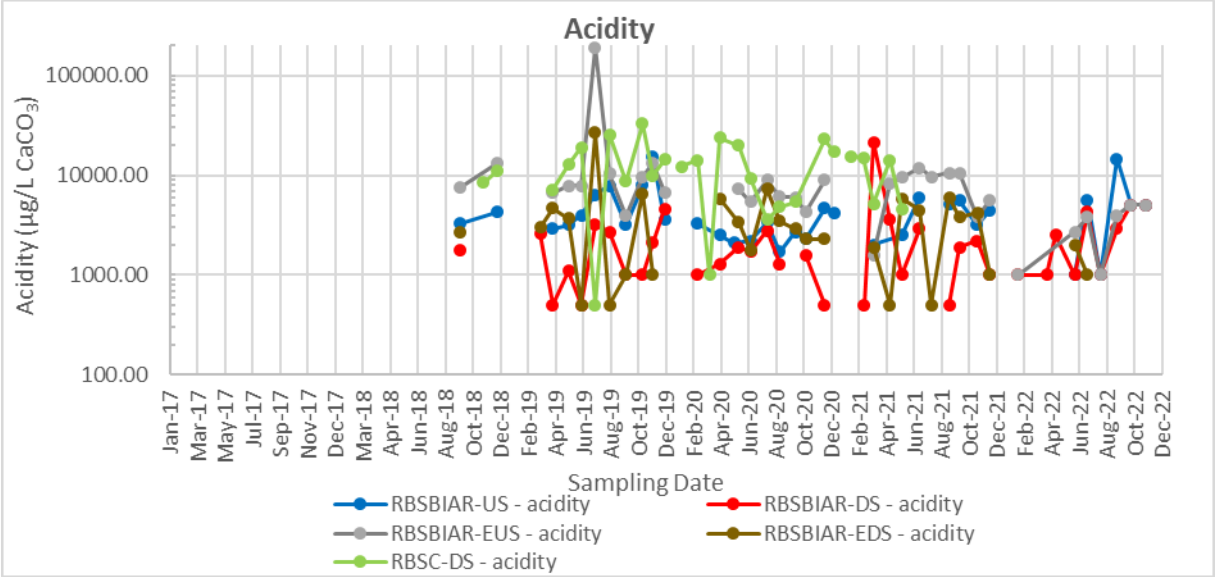


Figure 21: Sulphate at RBSBIAR Locations

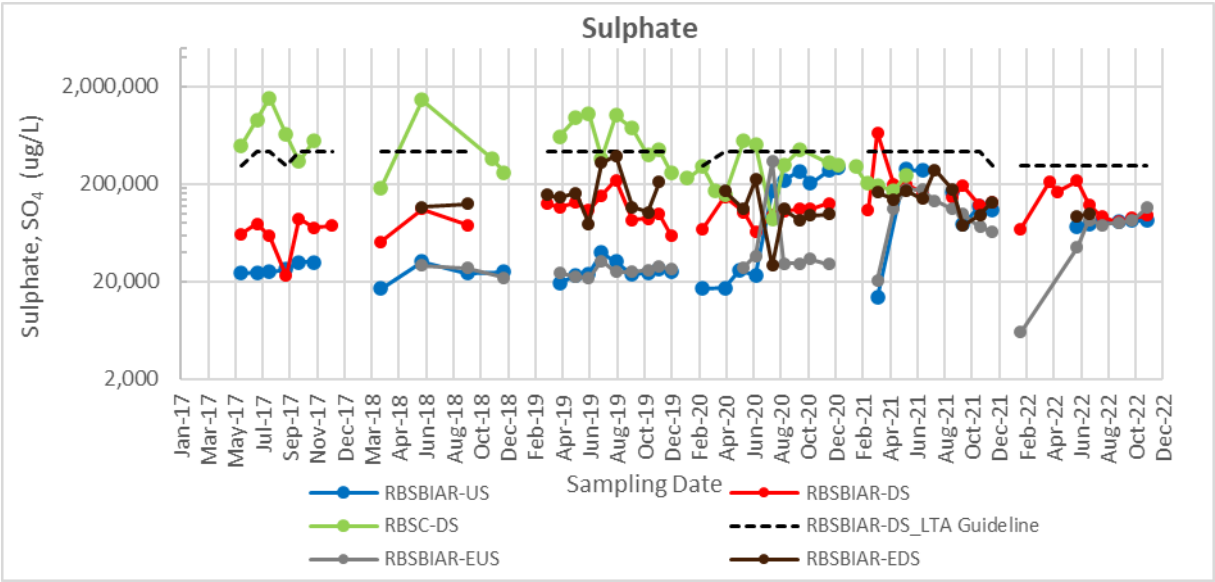


Figure 22a: Total Dissolved Solids (TDS) at RBSBIAR Locations

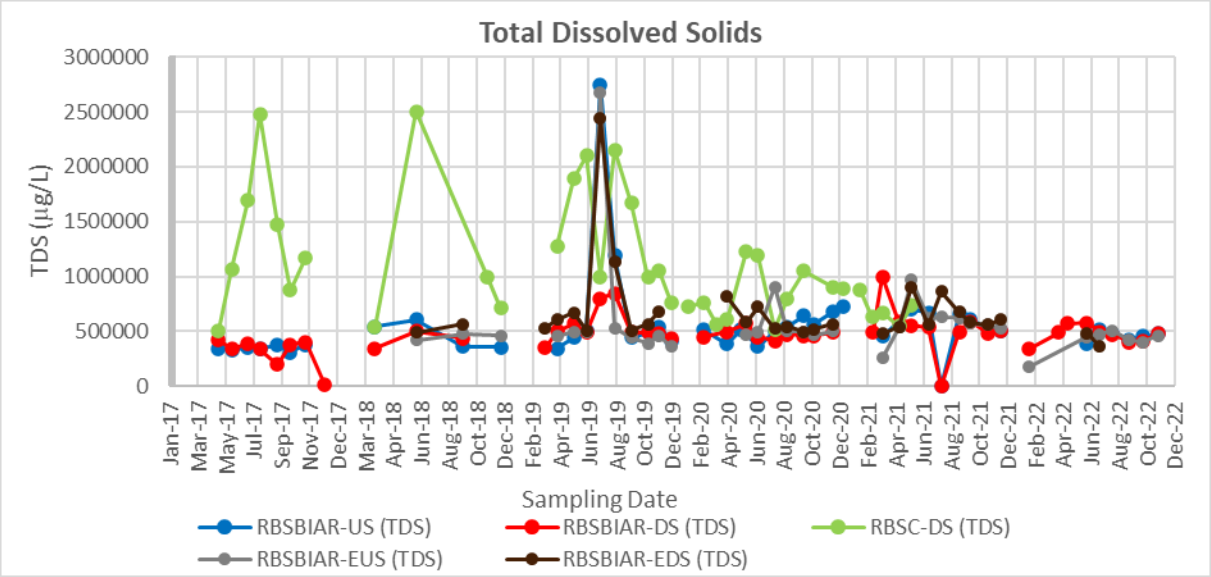


Figure 22b: Total Suspended Solids (TSS) at RBSBIAR Locations

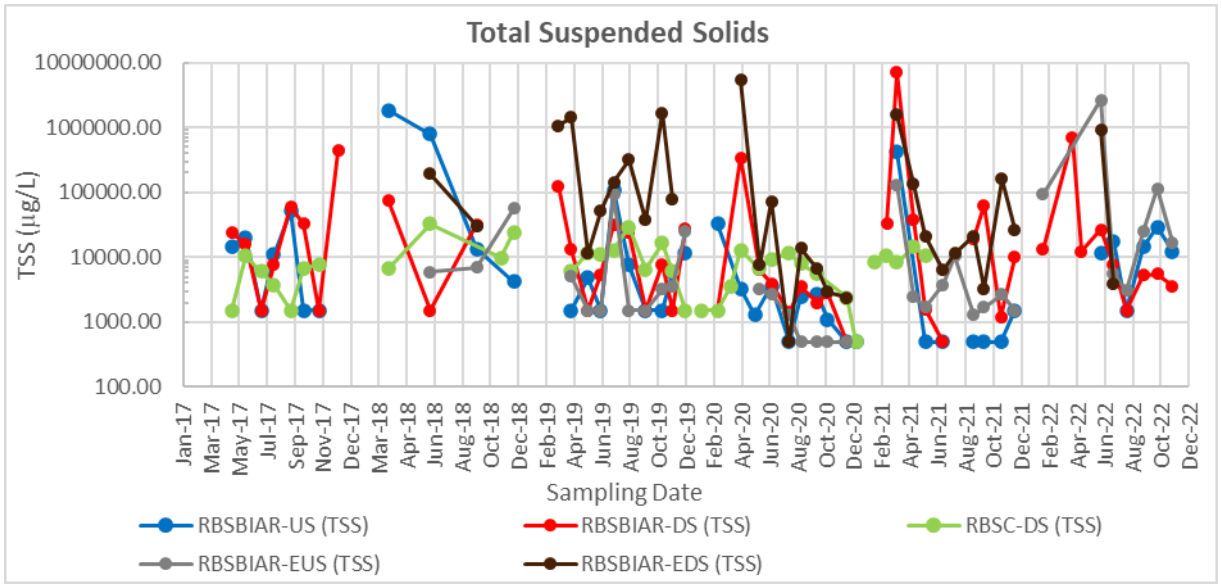


Figure 23a: Total Aluminum at RBSBIAR Locations

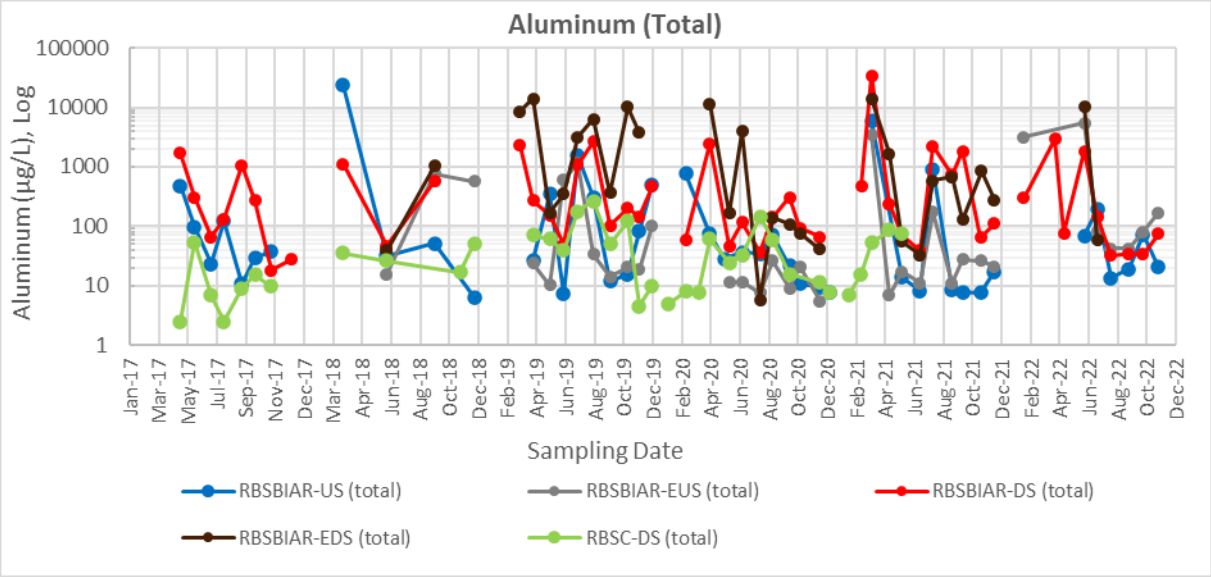


Figure 23b: Dissolved Aluminum at RBSBIAR Locations

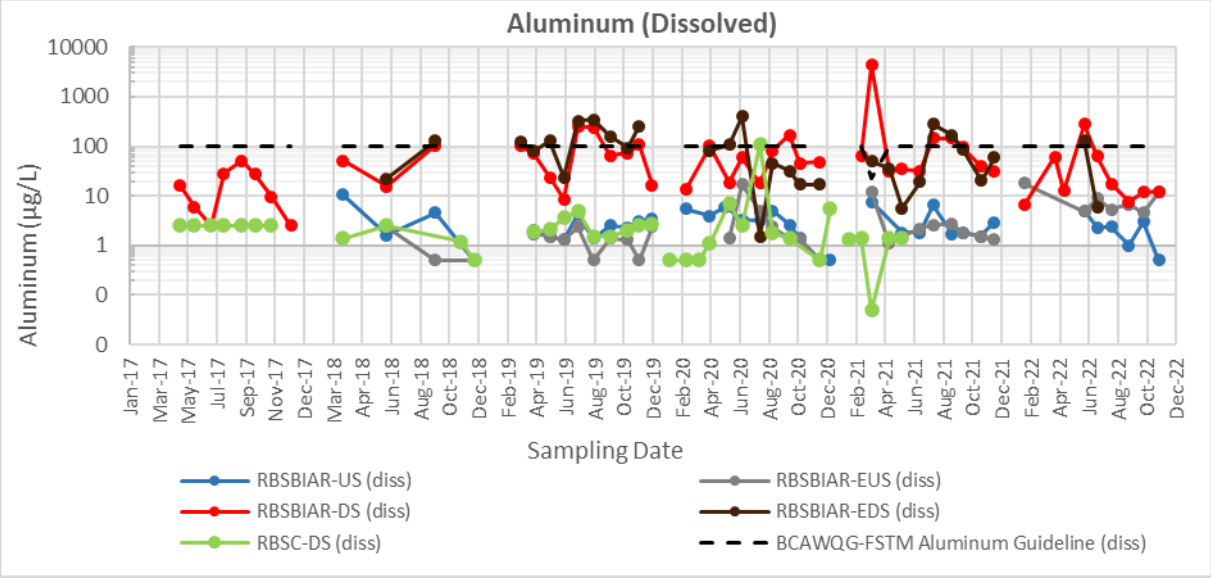


Figure 24a: Total Iron at RBSBIAR Locations

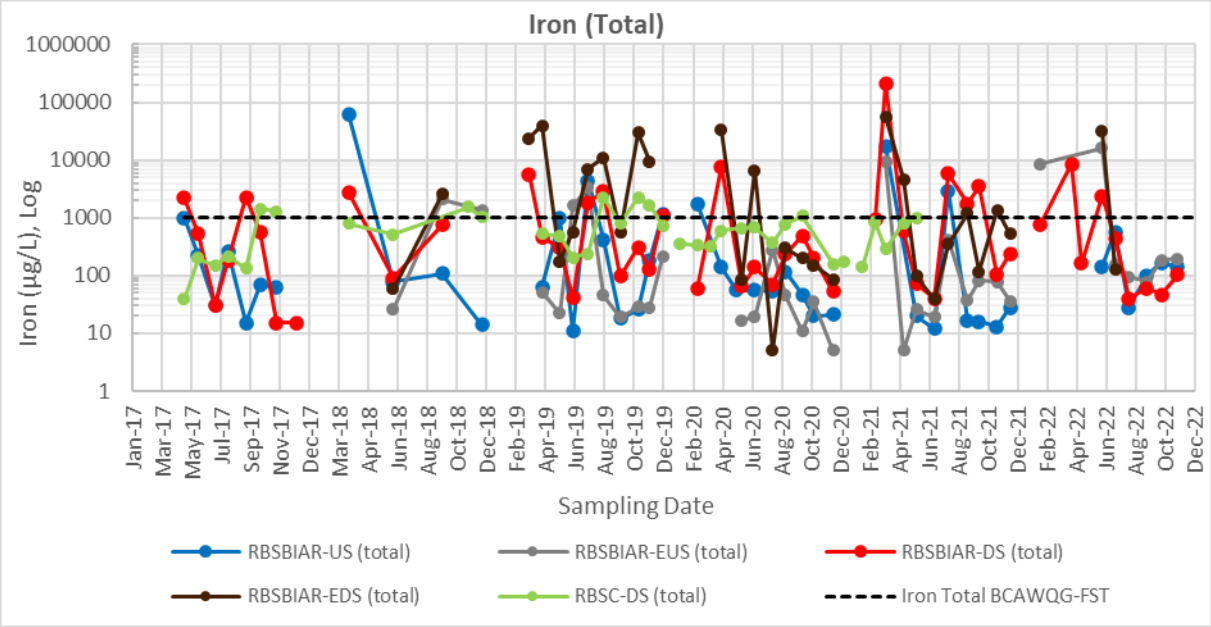


Figure 24b: Dissolved Iron at RBSBIAR Locations

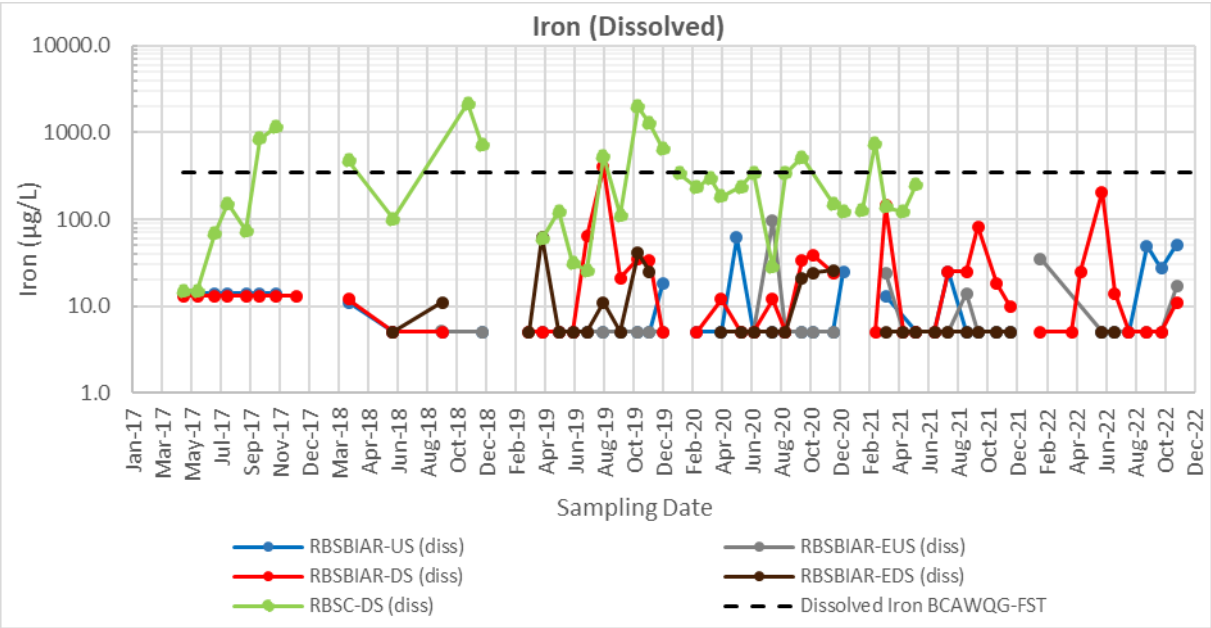


Figure 25: Total Arsenic at RBSBIAR Locations

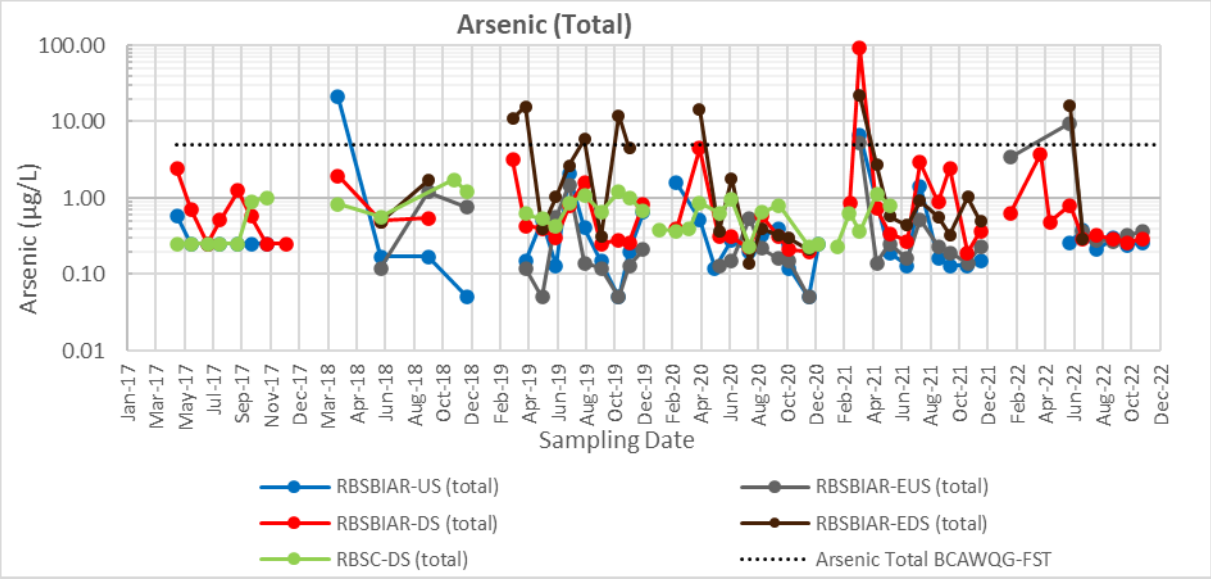


Figure 26: Dissolved Cadmium at RBSBIAR Locations

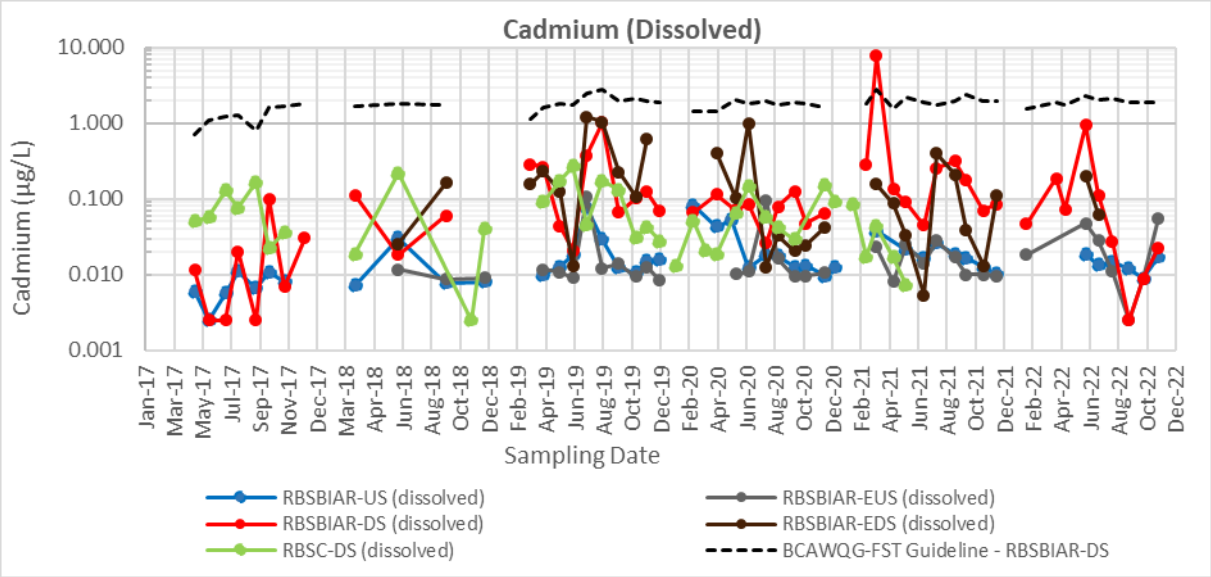


Figure 27: Total Cobalt at RBSBIAR Locations

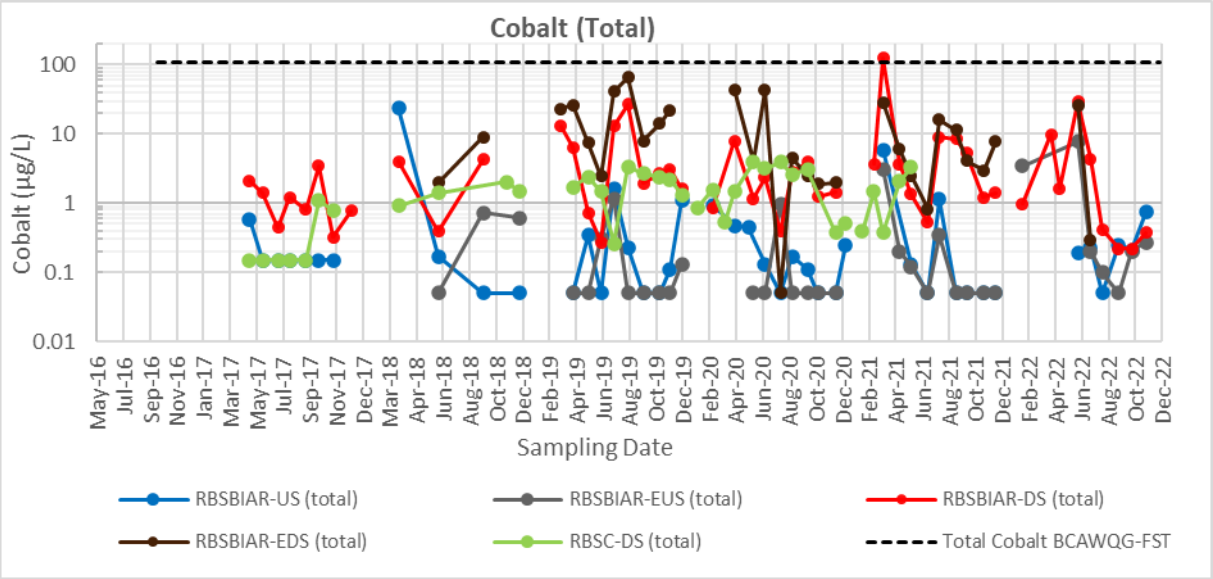


Figure 28: Dissolved Copper at RBSBIAR Locations

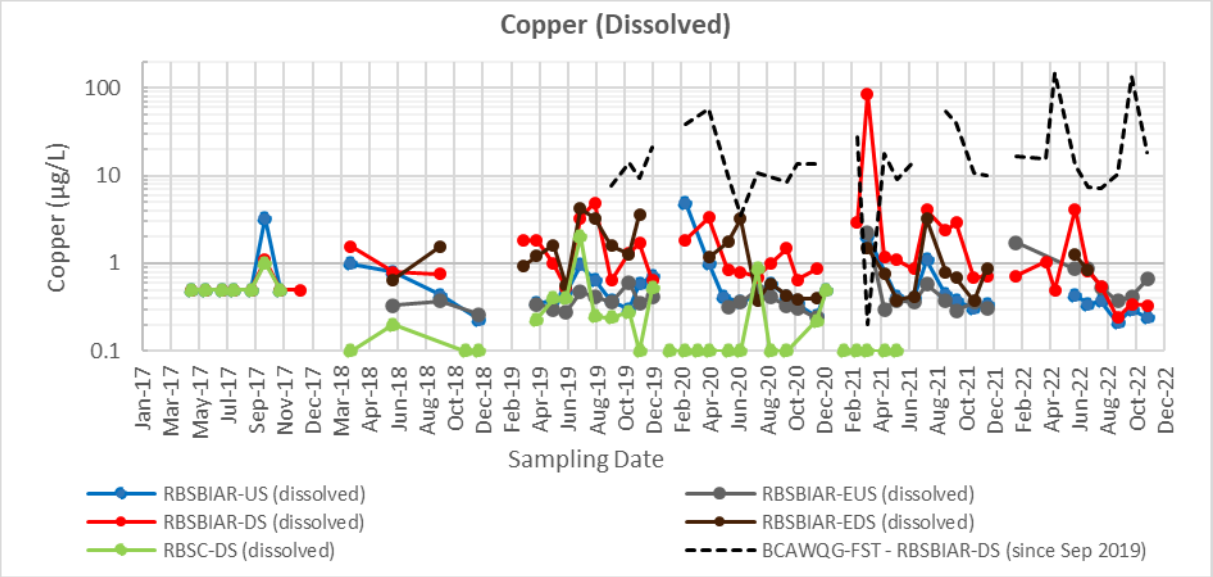


Figure 29: Total Zinc at RBSBIAR Locations

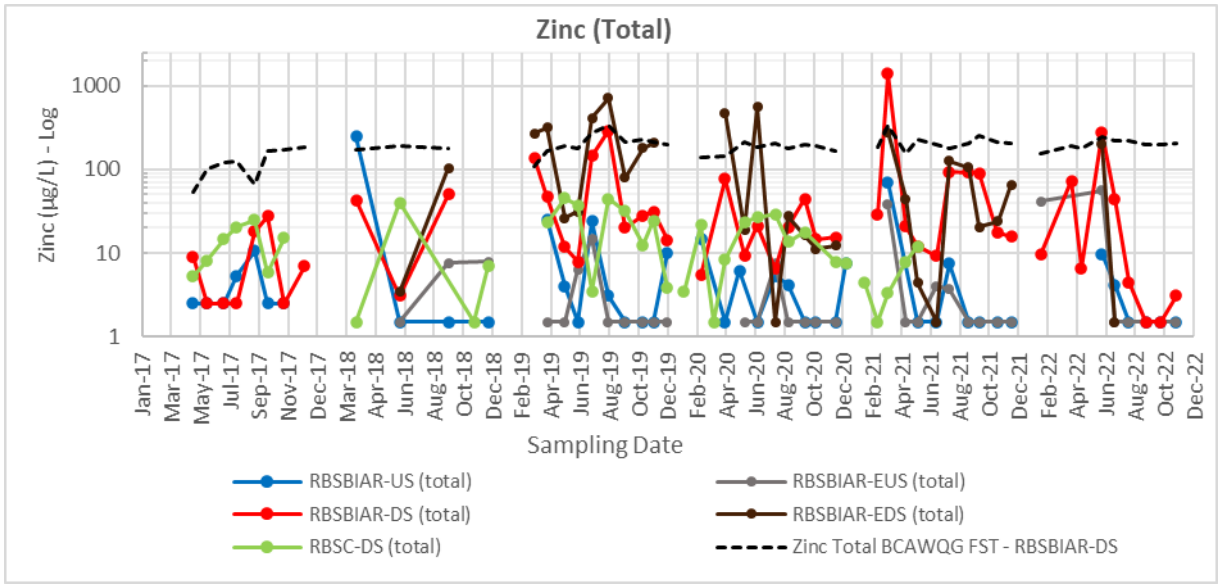


Figure 30a: RBSBIAR West Ditch Downstream (DS) / Upstream (US) Ratio - Total Zinc

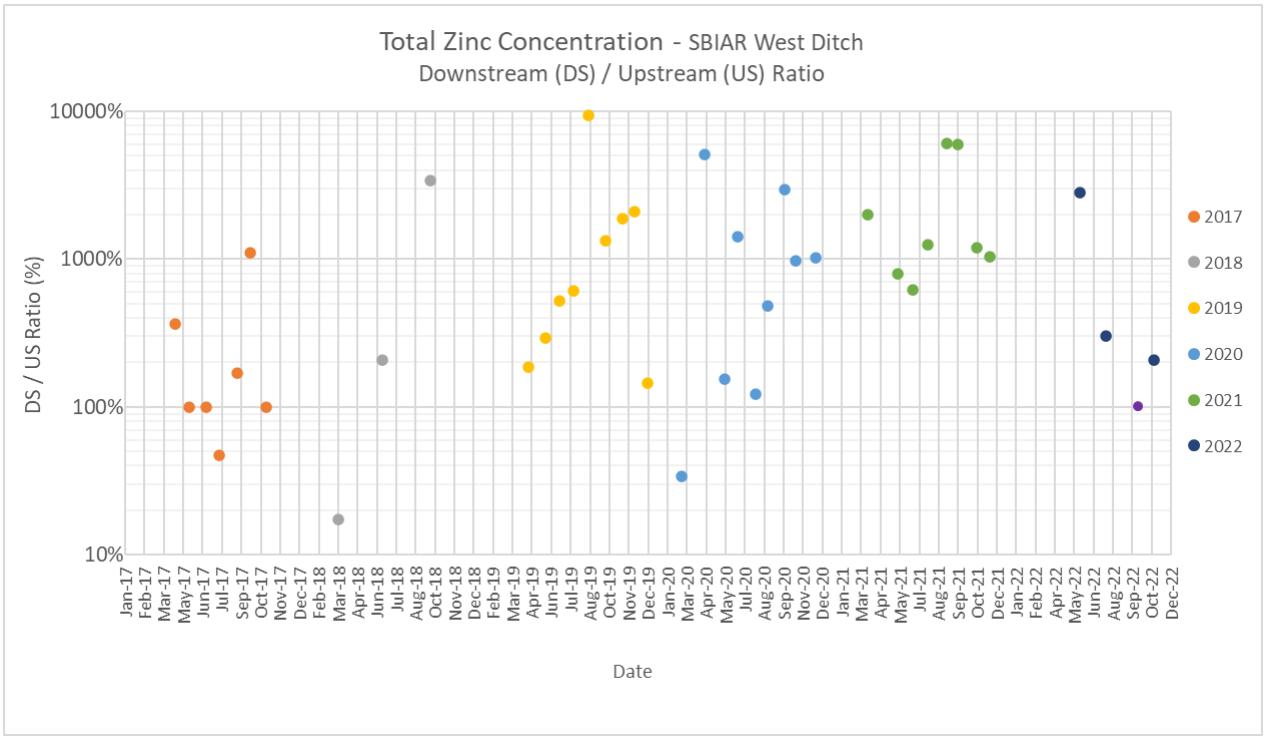


Figure 30b: RBSBIAR East Ditch Downstream (EDS), Upstream (EUS) Ratio - Total Zinc

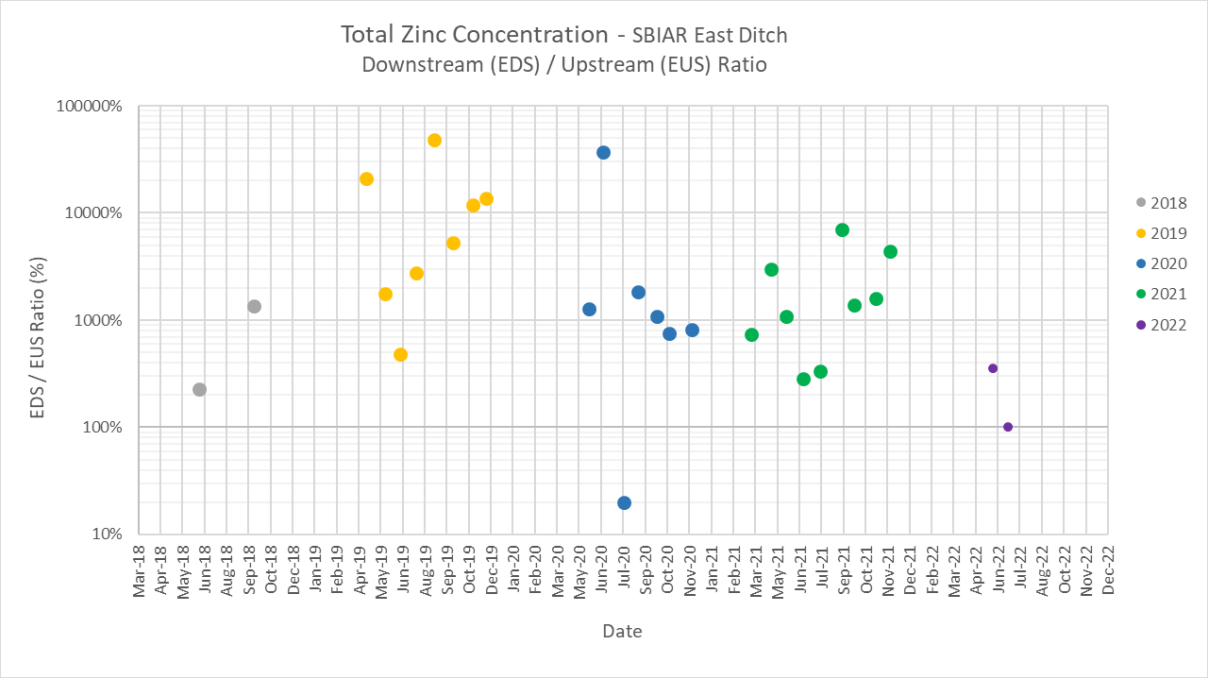


Figure 31: pH at L2 Powerhouse Locations

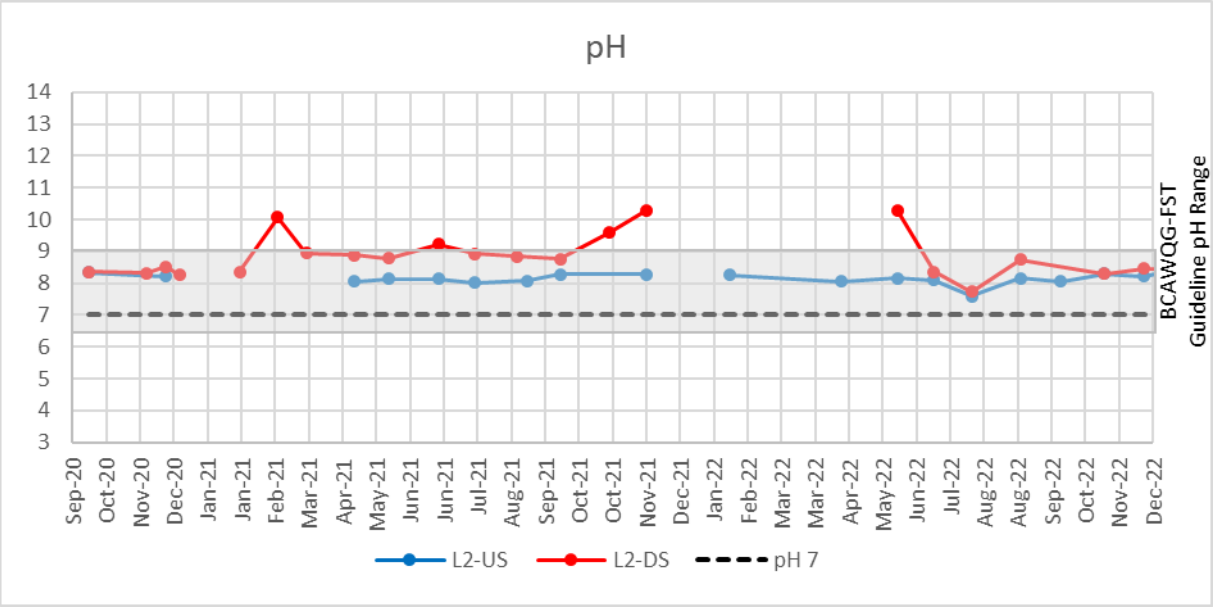


Figure 32: Total Alkalinity at L2 Powerhouse Locations

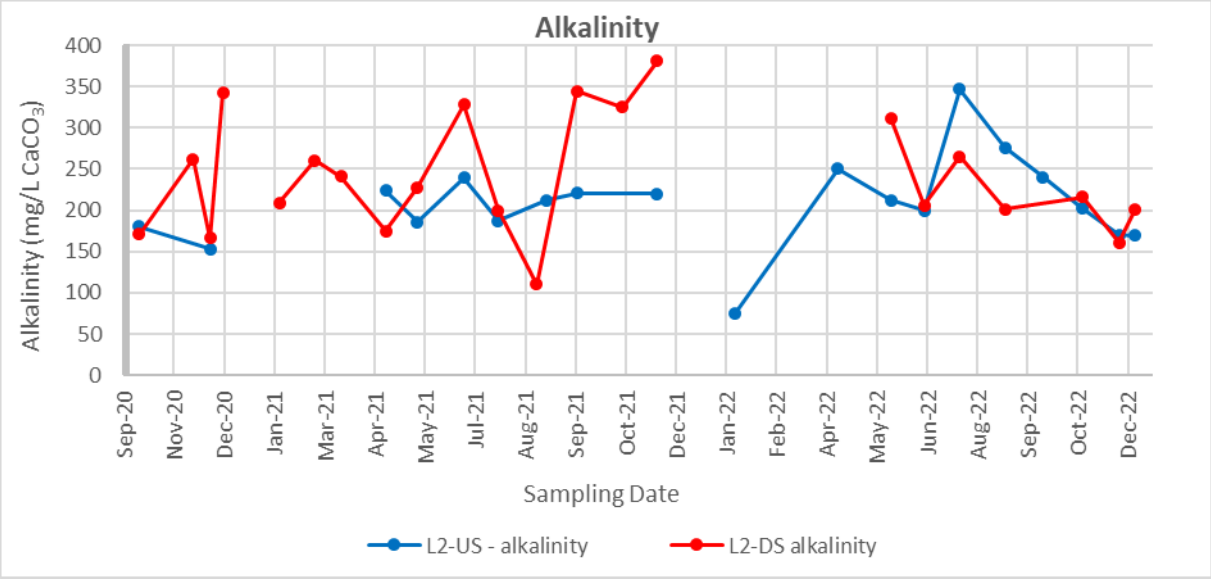


Figure 33: Acidity at L2 Powerhouse Locations

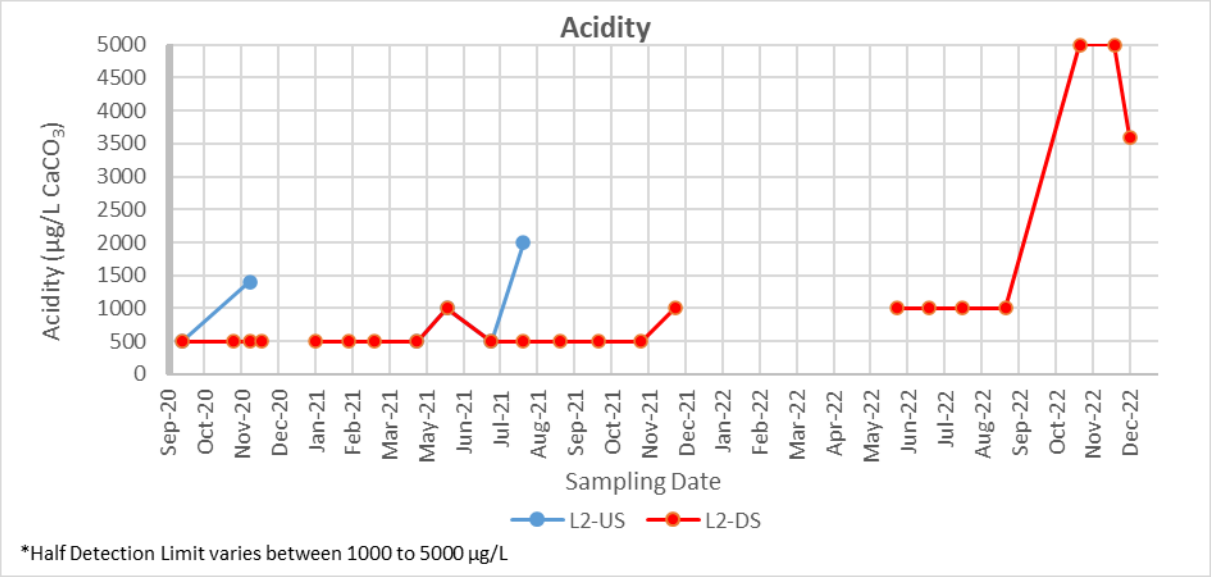


Figure 34: Sulphate at L2 Powerhouse Locations

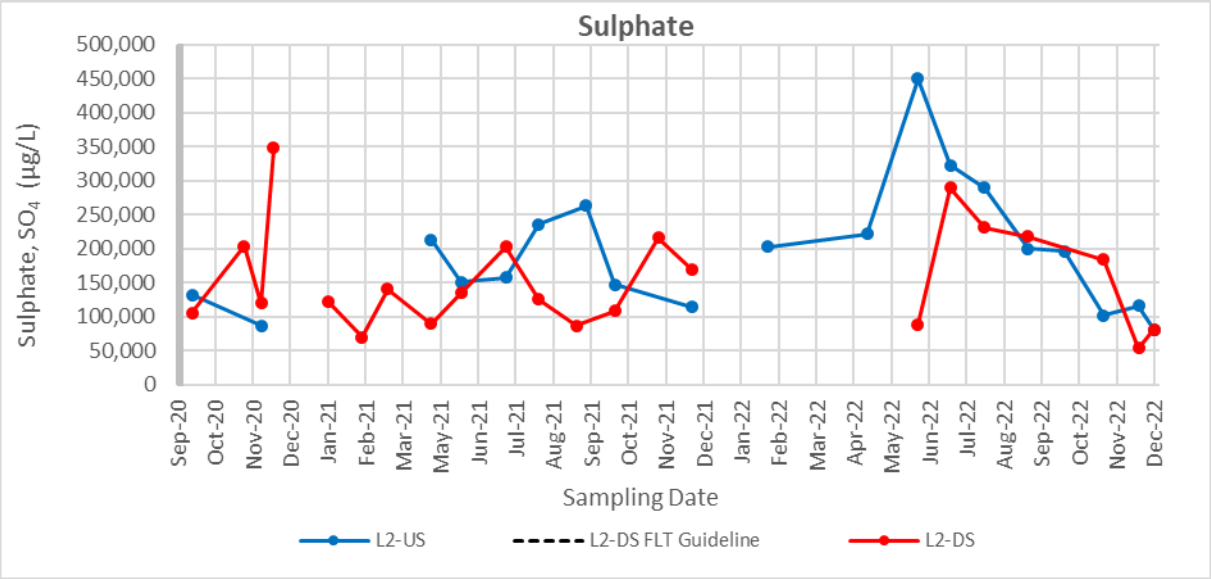


Figure 35a: Total Dissolved Solids (TDS) at L2 Powerhouse Locations

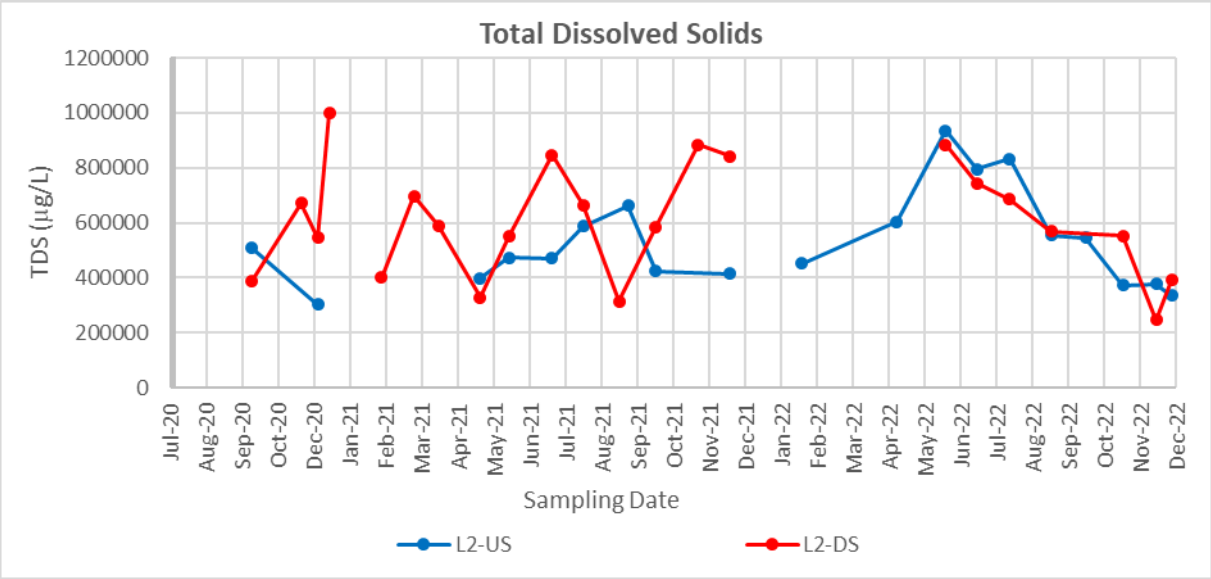


Figure 35b: Total Suspended Solids (TSS) at L2 Powerhouse Locations

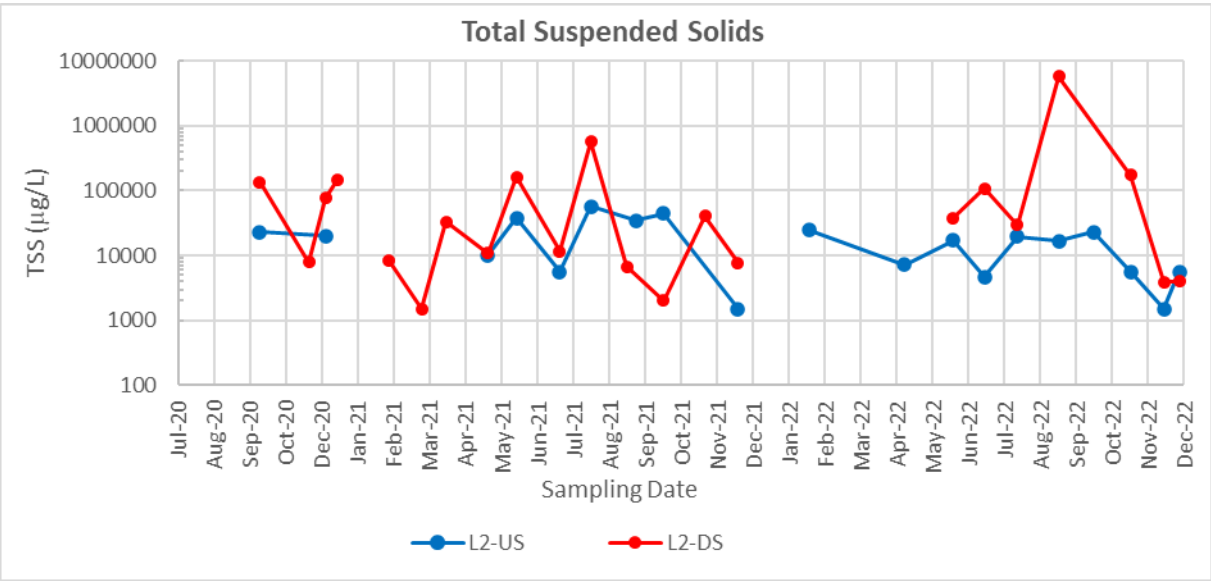


Figure 36a: Total Aluminum at L2 Powerhouse Locations

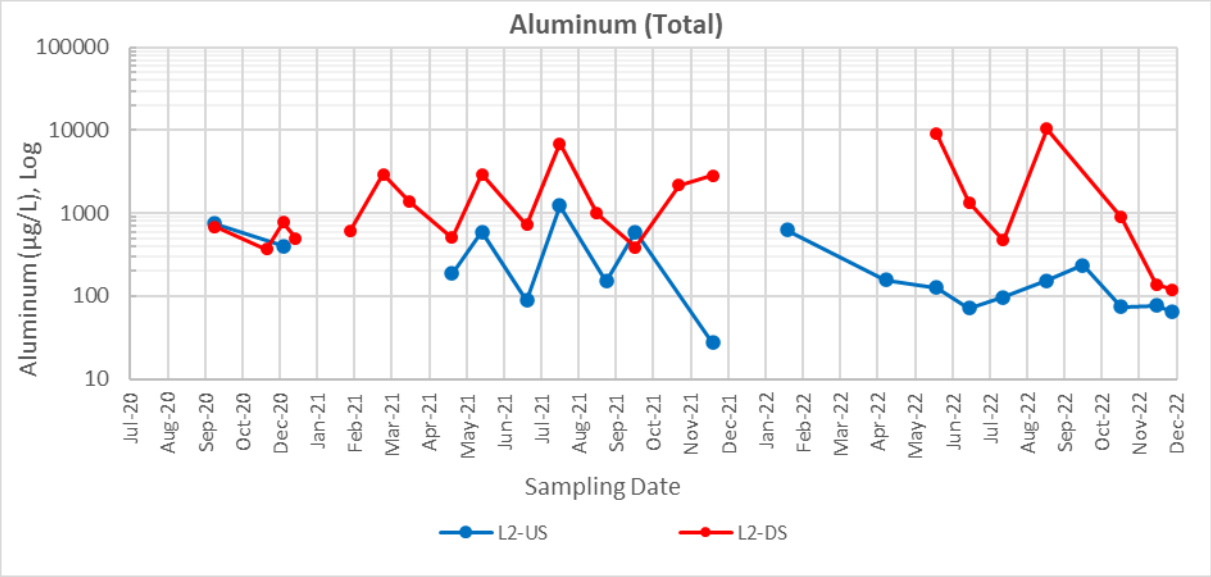


Figure 36b: Dissolved Aluminum at L2 Powerhouse Locations

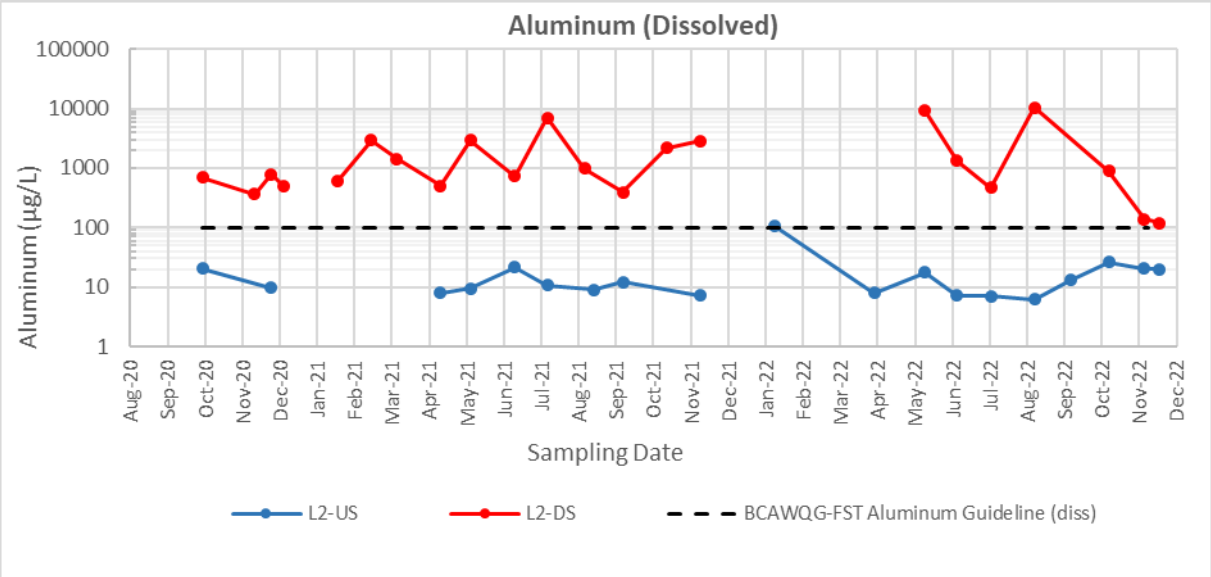


Figure 37a: Total Iron at L2 Powerhouse Locations

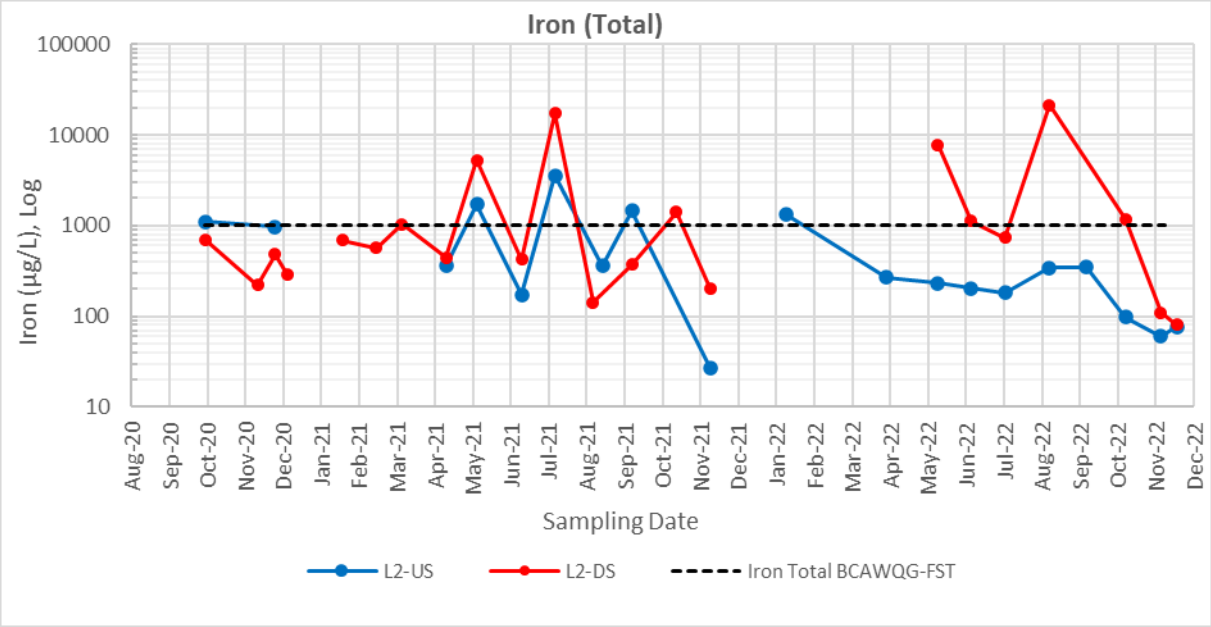


Figure 37b: Dissolved Iron at L2 Powerhouse Locations

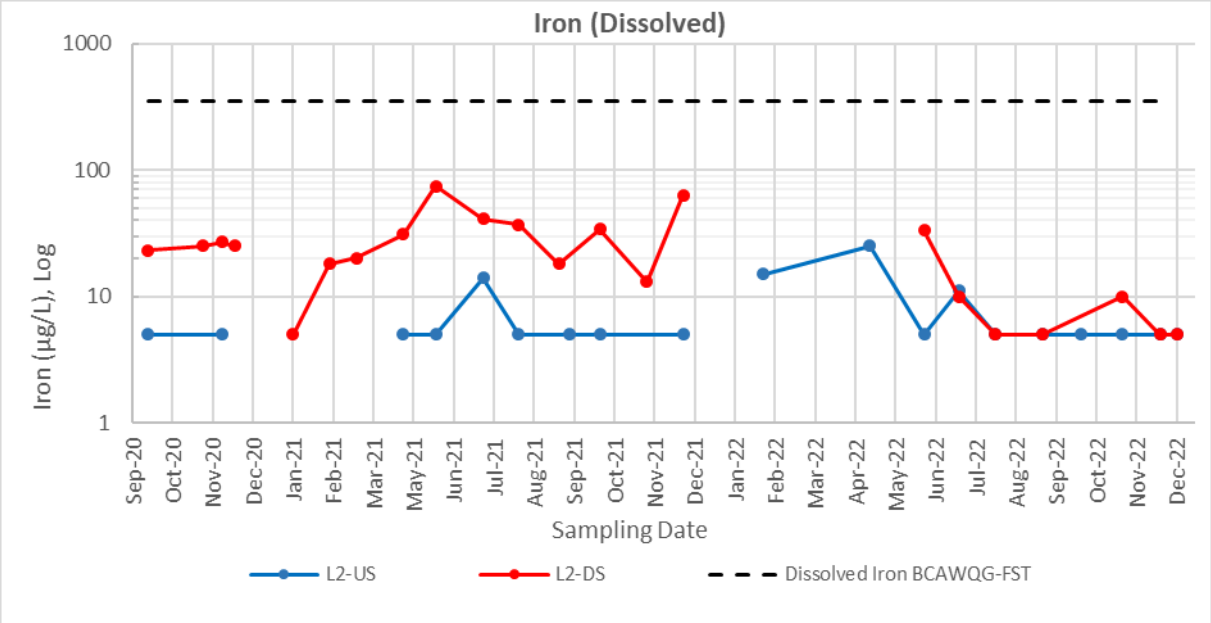


Figure 38: Total Arsenic at L2 Powerhouse Locations

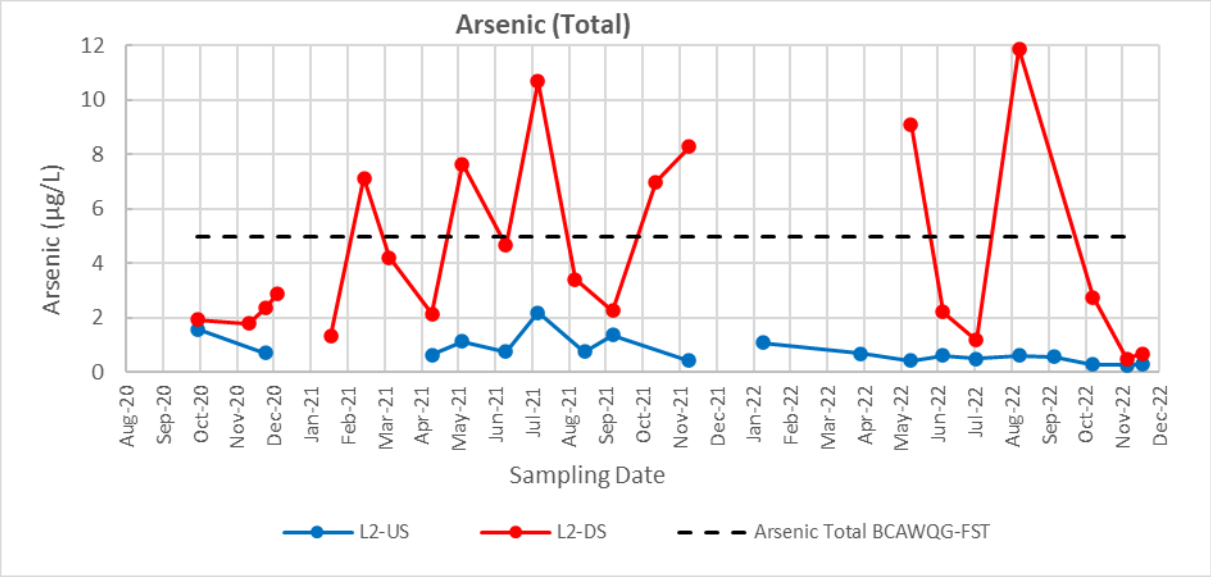


Figure 39: Dissolved Cadmium at L2 Powerhouse Locations

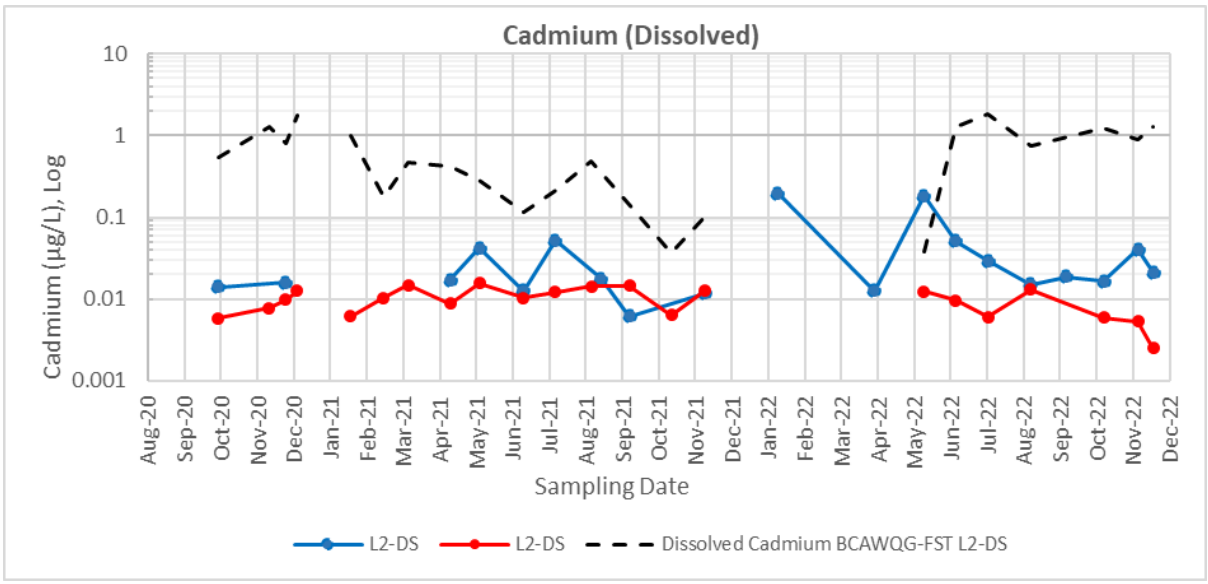


Figure 40: Total Cobalt at L2 Powerhouse Locations

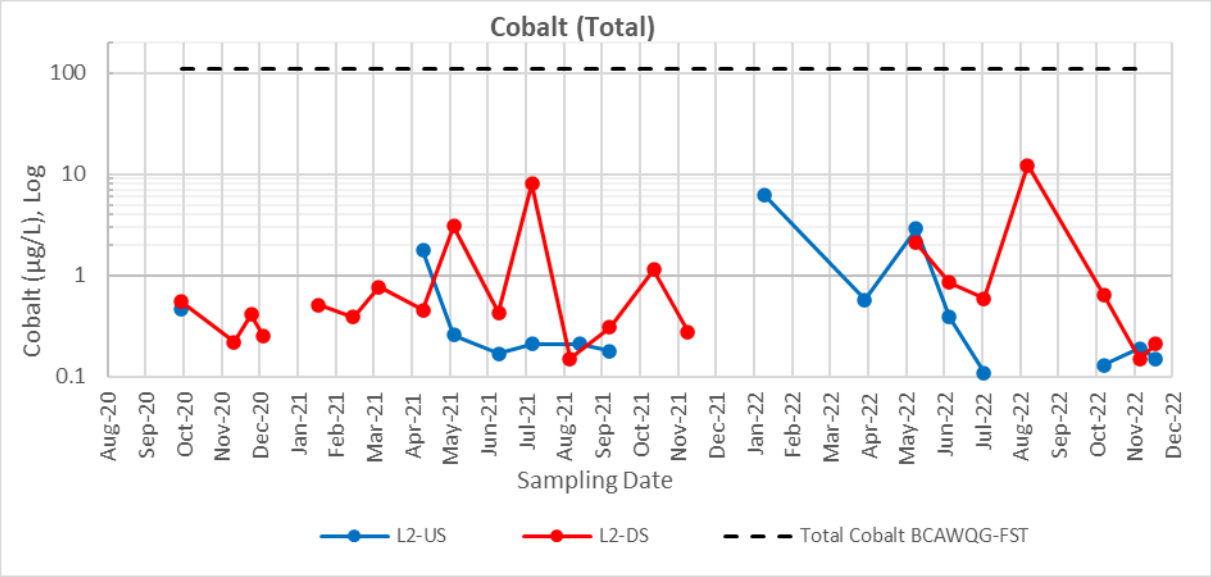


Figure 41: Dissolved Copper at L2 Powerhouse Locations

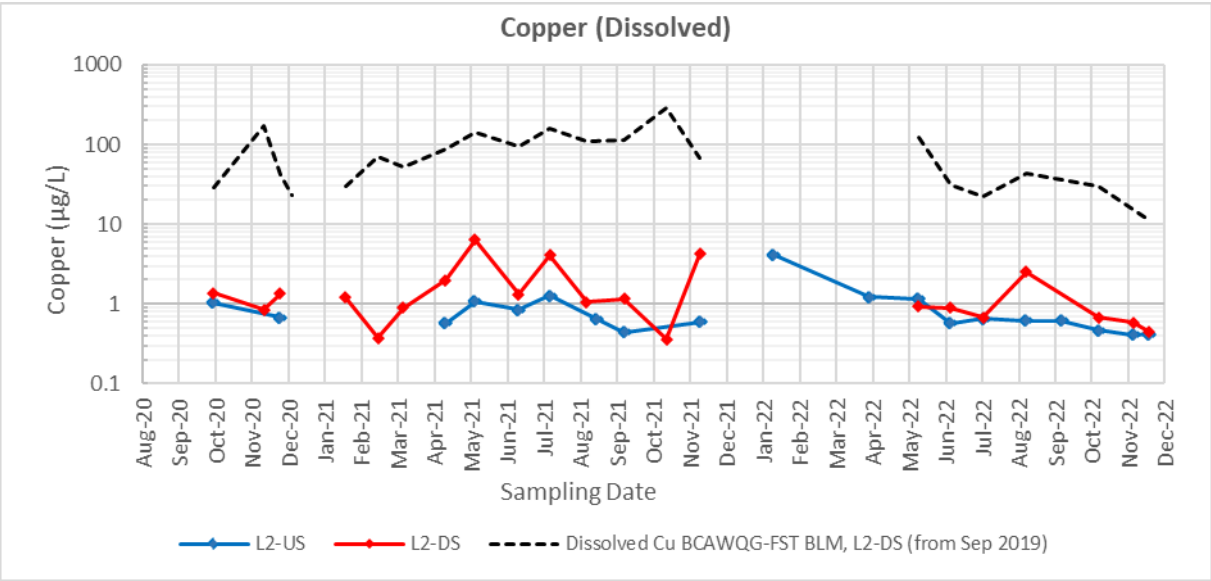


Figure 42: Total Zinc at L2 Powerhouse Locations

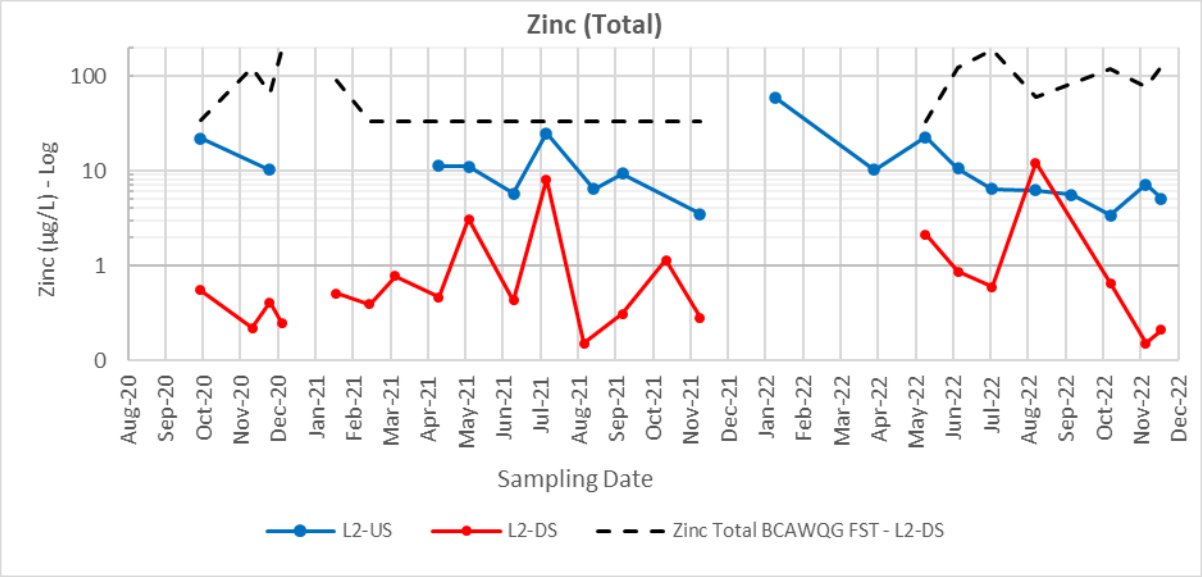


Figure 43: Total Selenium at L2 Powerhouse Locations

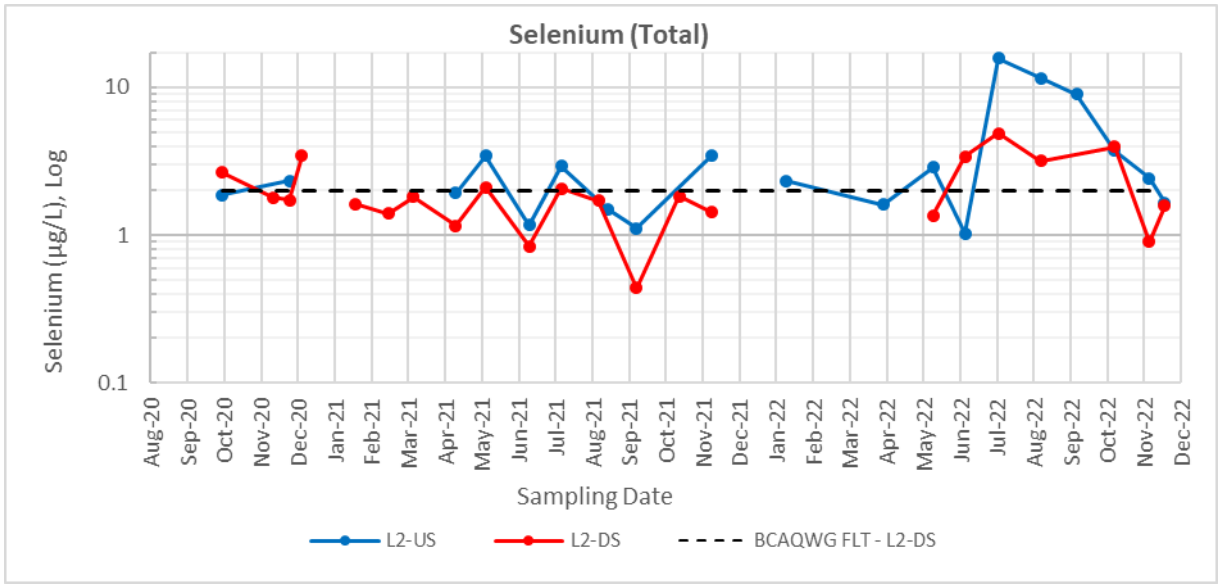


Figure 44: Dissolved Selenium at L2 Powerhouse Locations

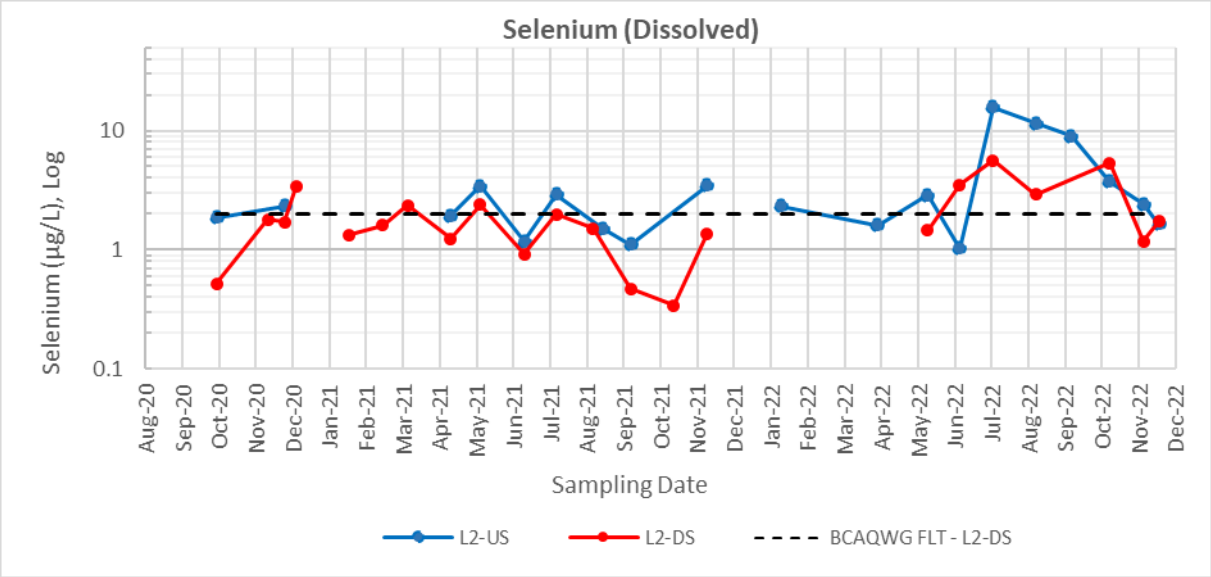


Figure 45: pH at LBDB Locations

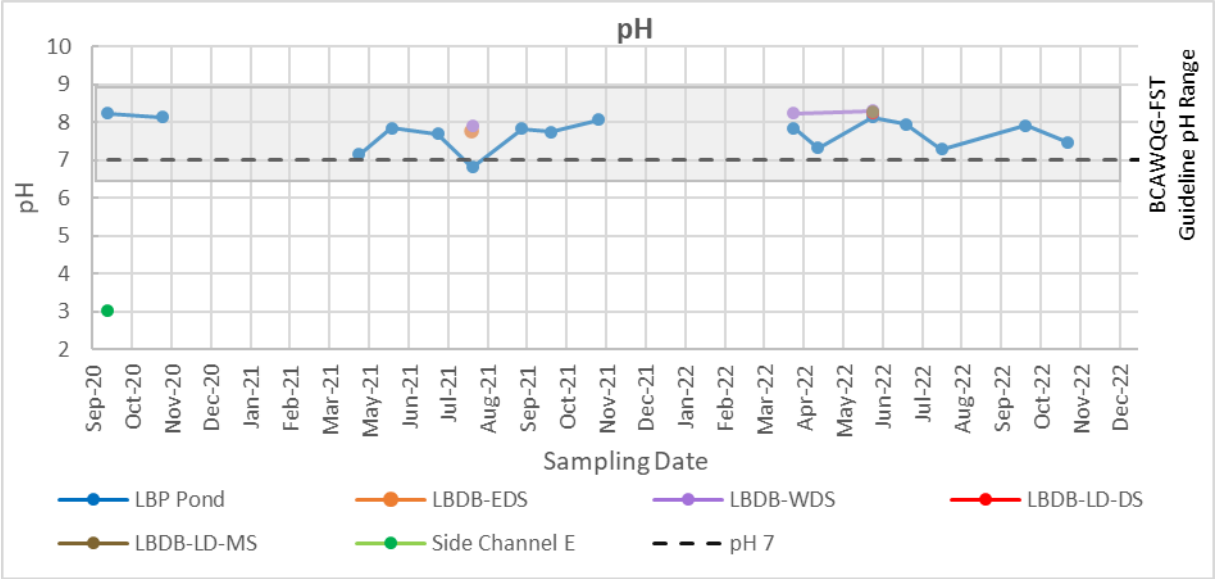


Figure 46: Total Alkalinity at LBDB Locations

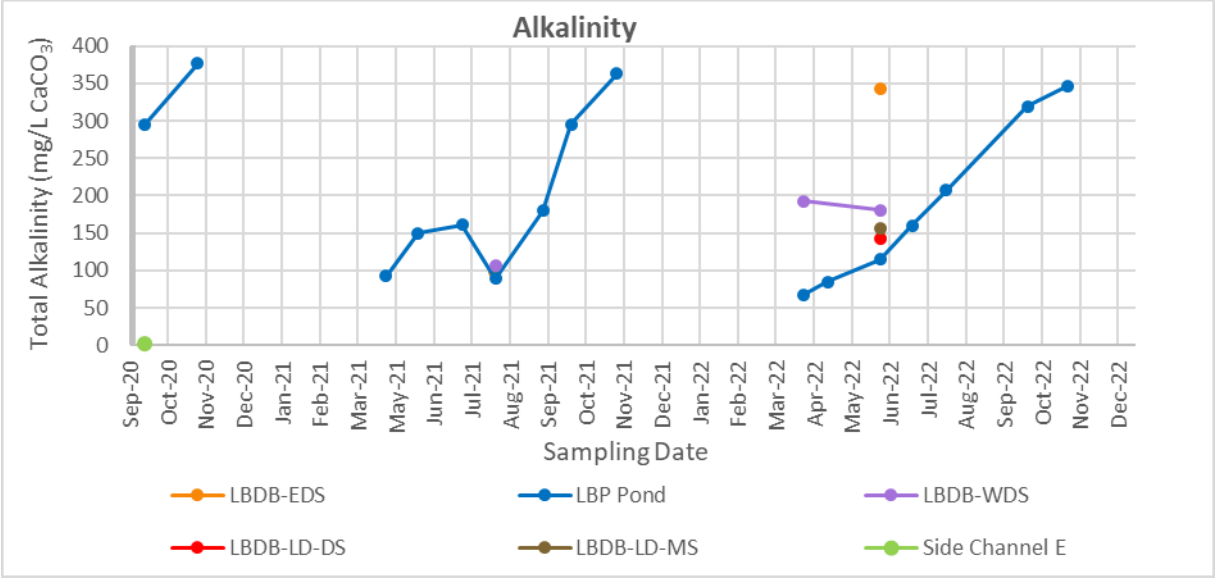


Figure 47: Acidity at LBDB Locations

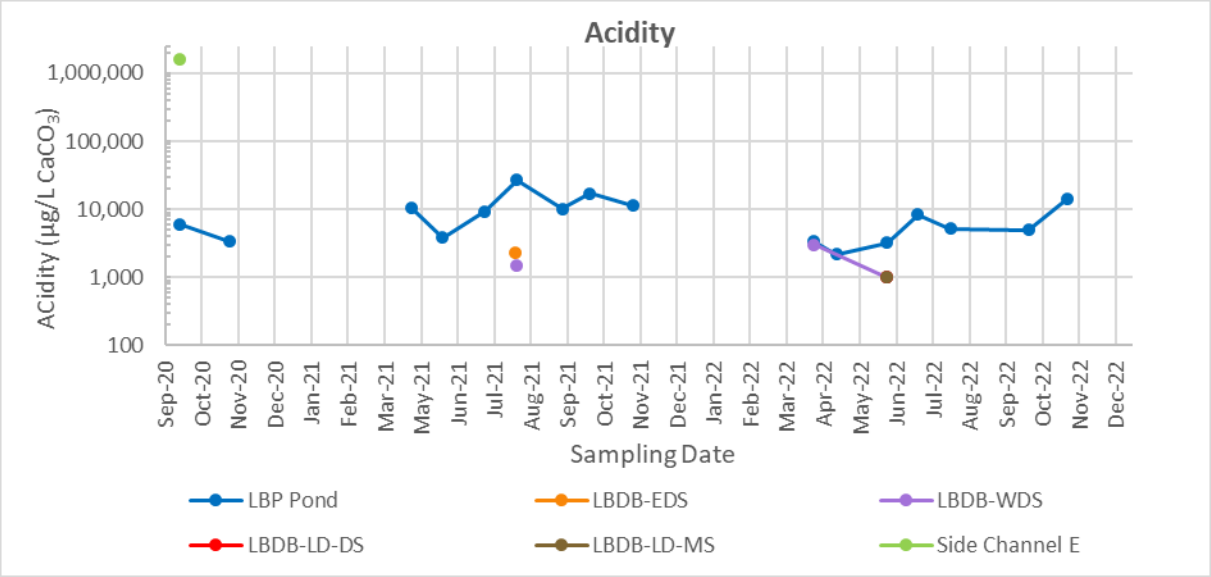


Figure 48: Sulphate at LBDB Locations

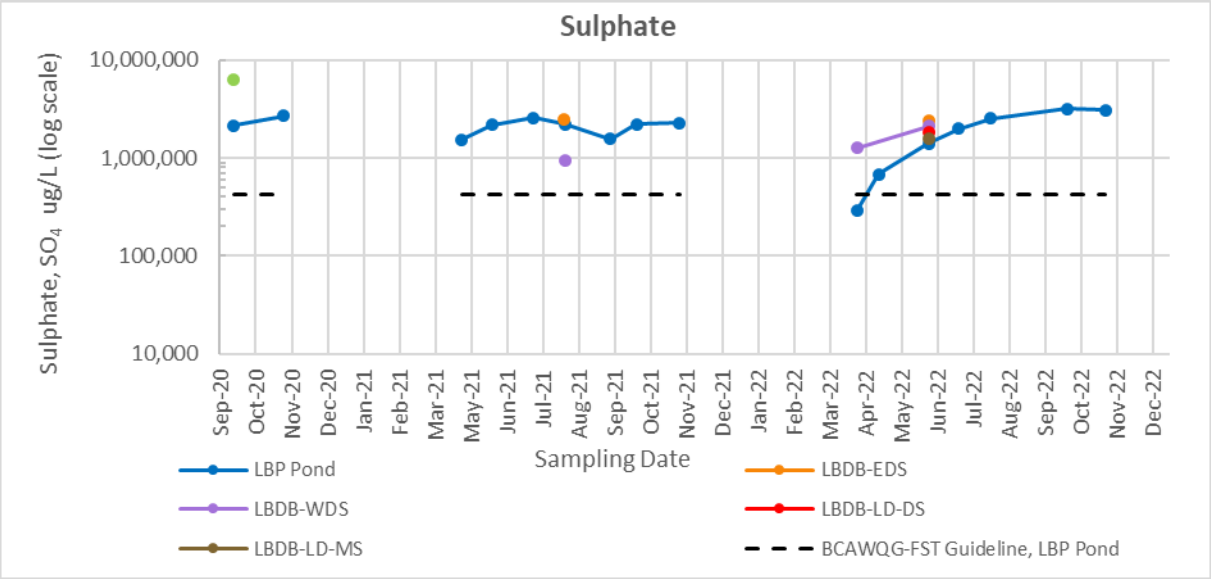


Figure 49a: Total Dissolved Solids (TDS) at LBDB Locations

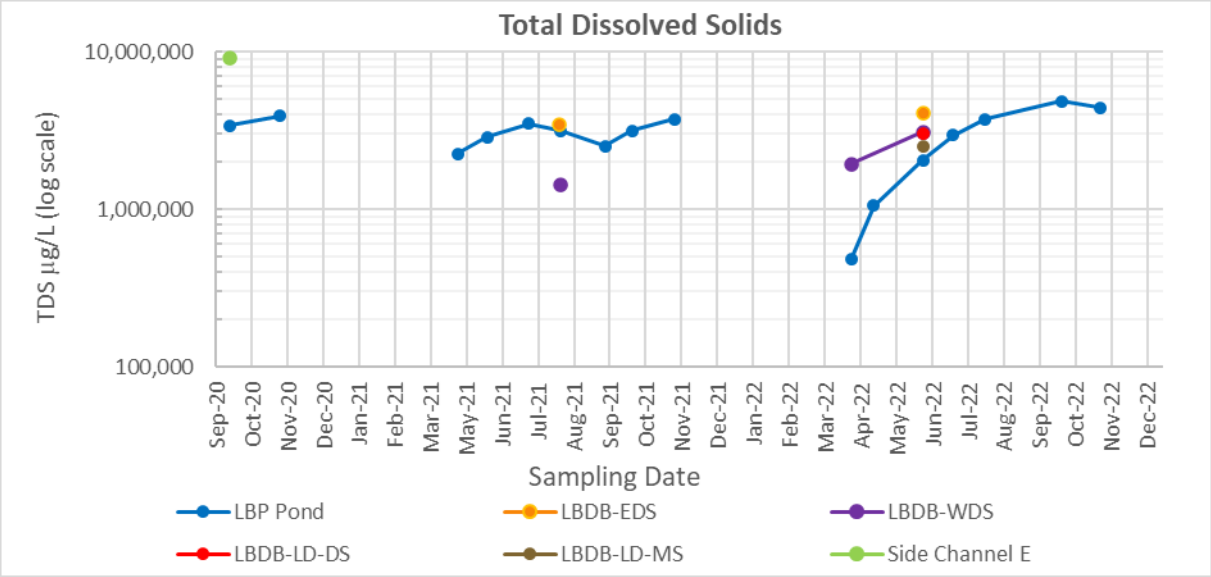


Figure 49b: Total Suspended Solids (TSS) at LBDB Locations

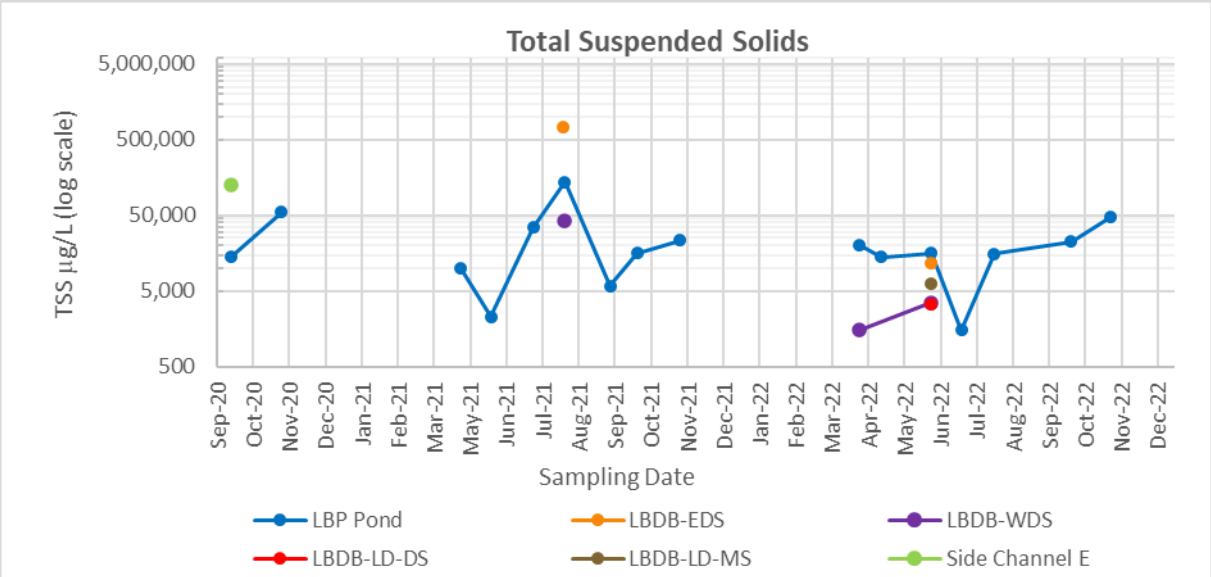


Figure 50a: Total Aluminum at LBDB Locations

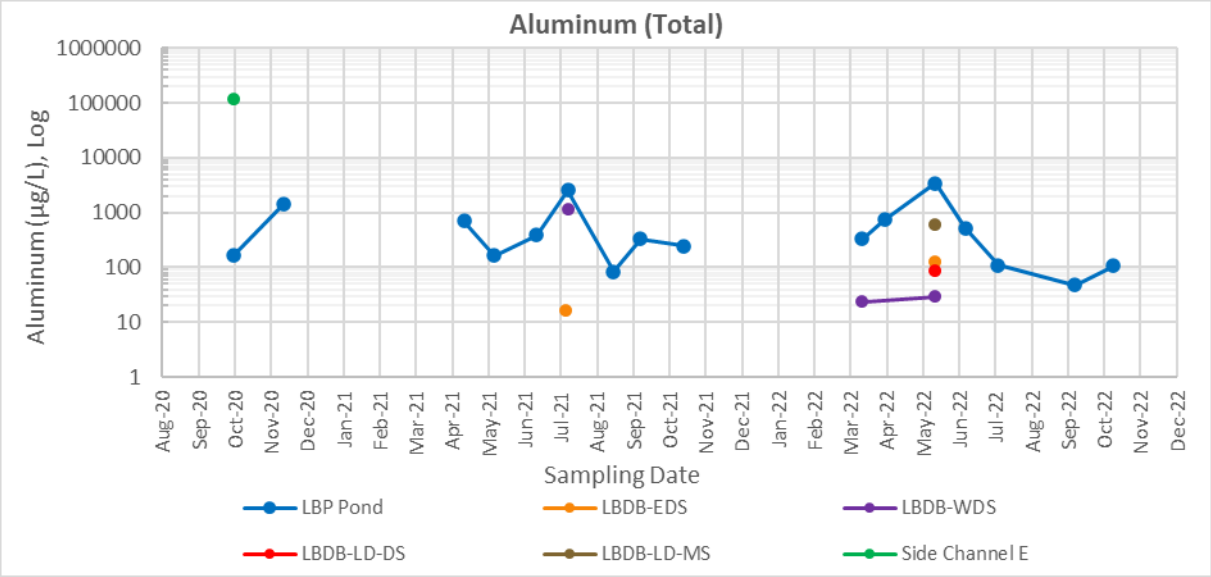


Figure 50b: Dissolved Aluminum at LBDB Locations

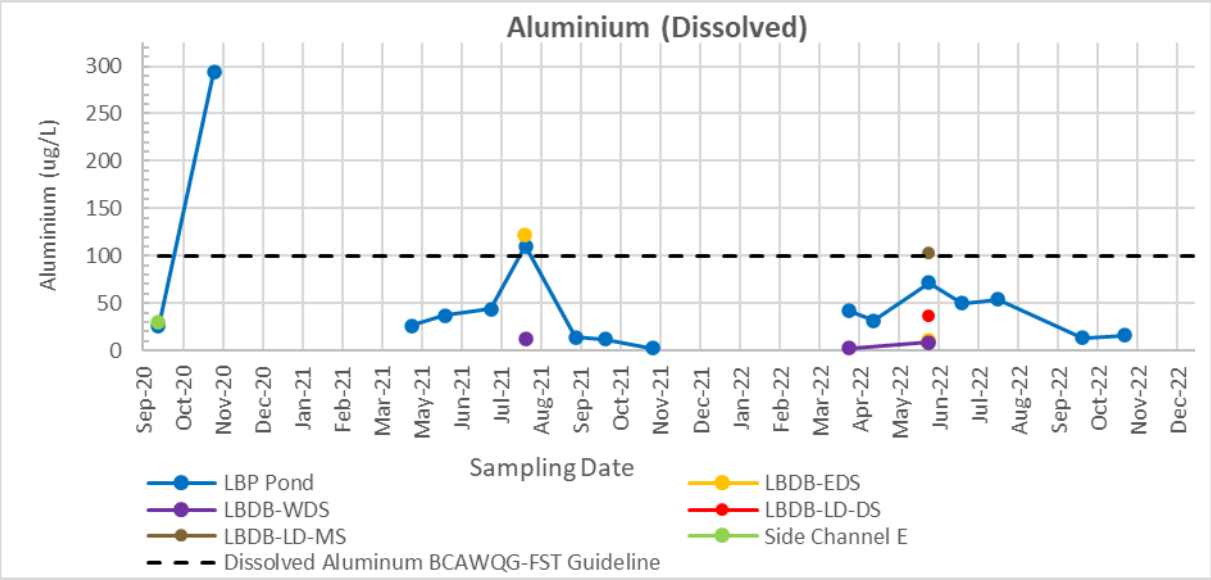


Figure 51a: Total Iron at LBDB Locations

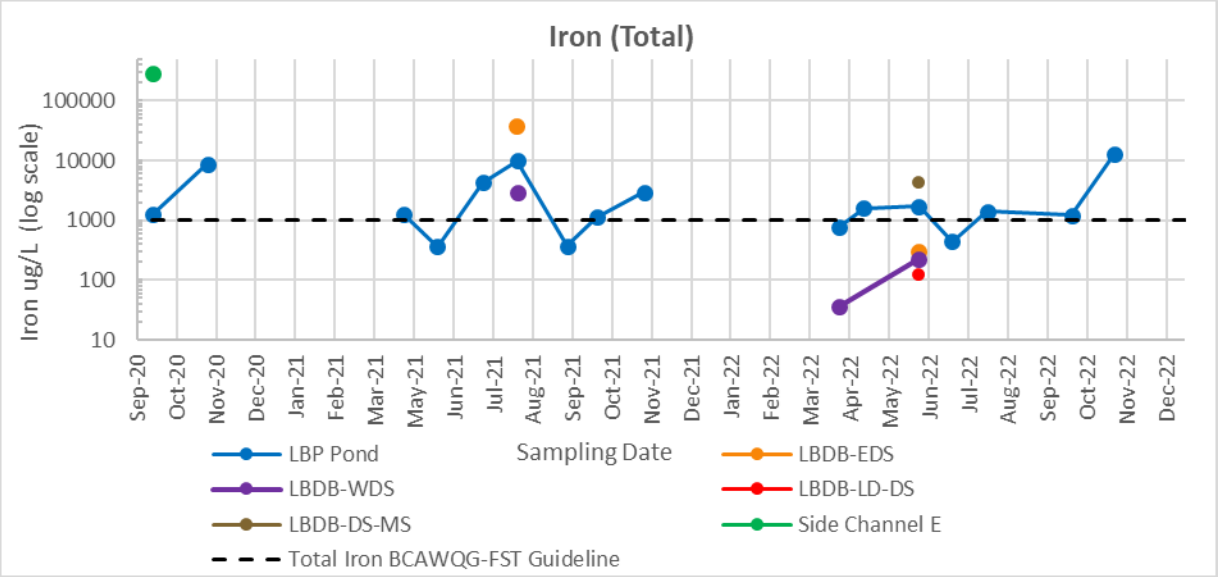


Figure 51b: Dissolved Iron at LBDB Locations

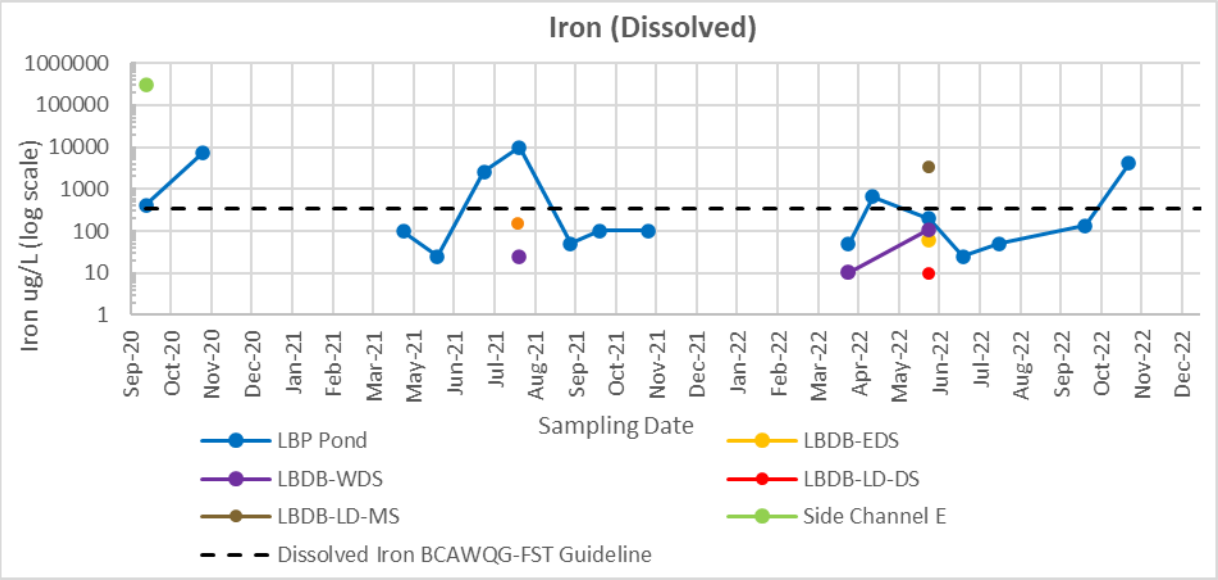


Figure 52: Total Arsenic at LBDB Locations

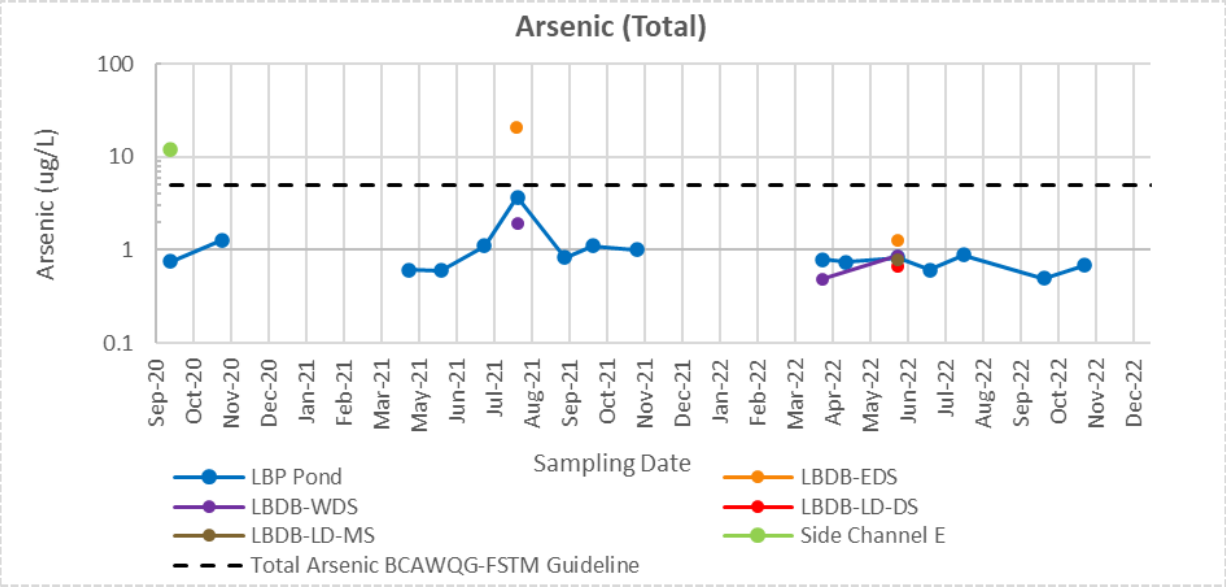


Figure 53: Dissolved Cadmium at LBDB Locations

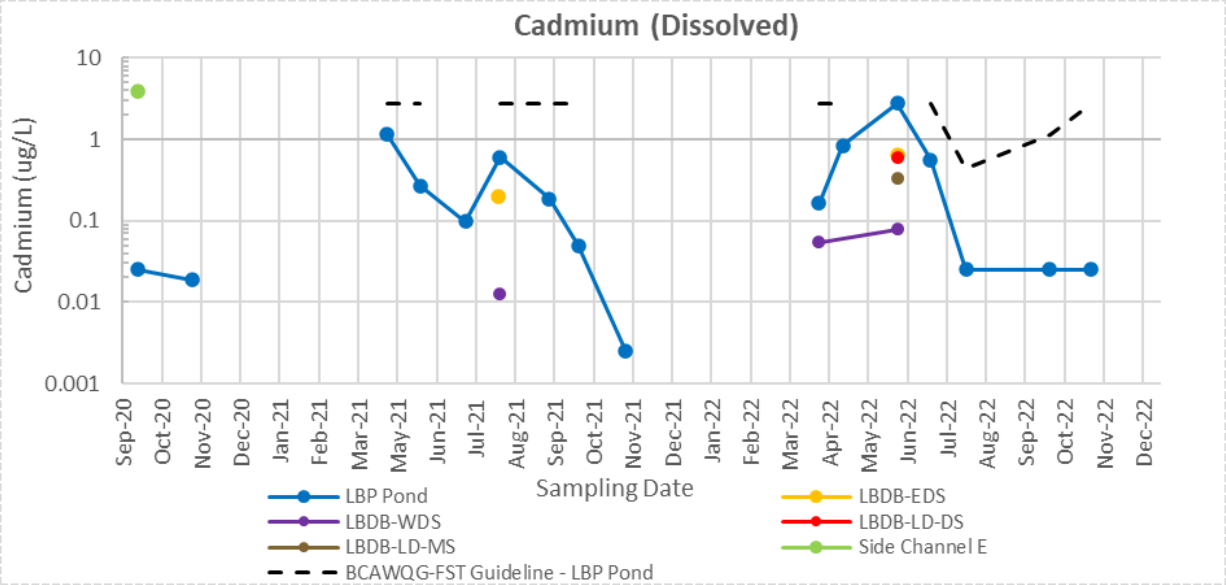


Figure 54: Total Cobalt at LBDB Locations

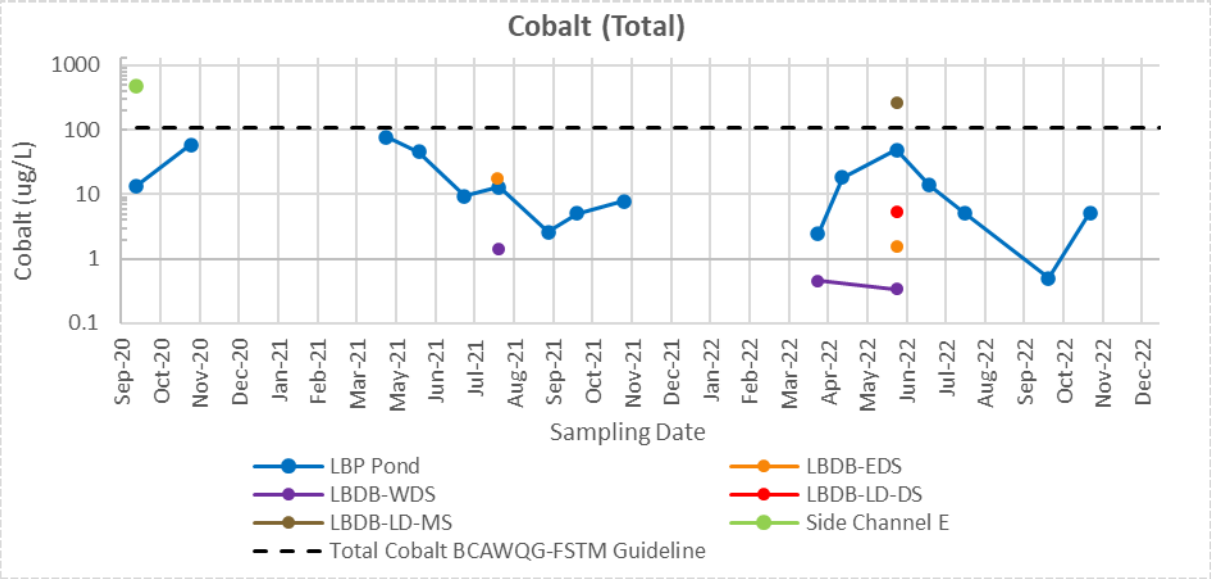


Figure 55: Dissolved Copper at LBDB Locations

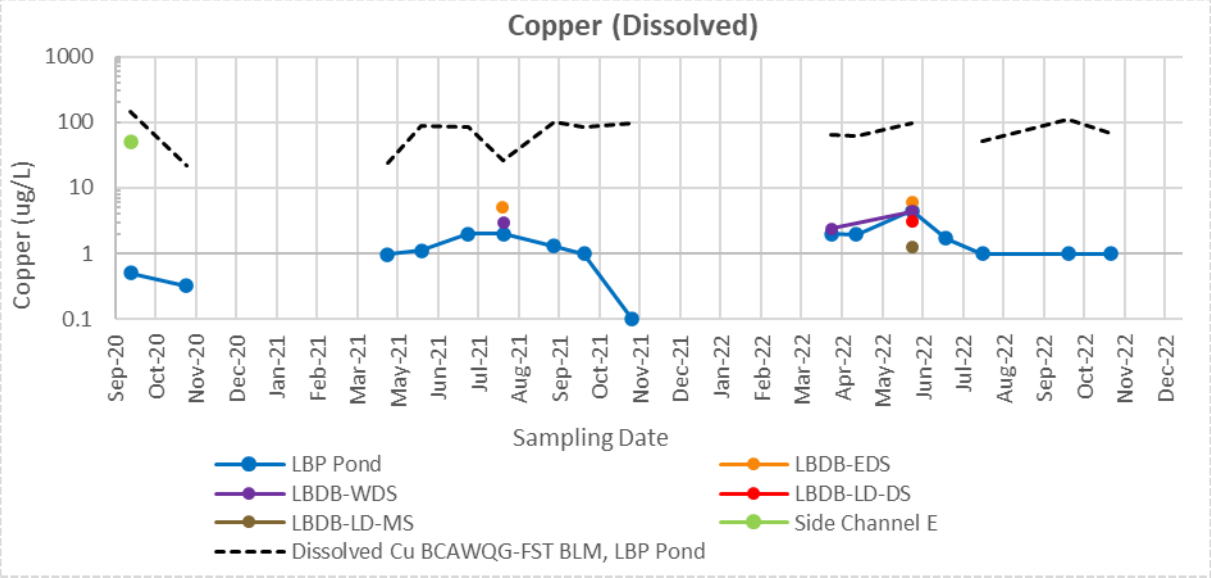
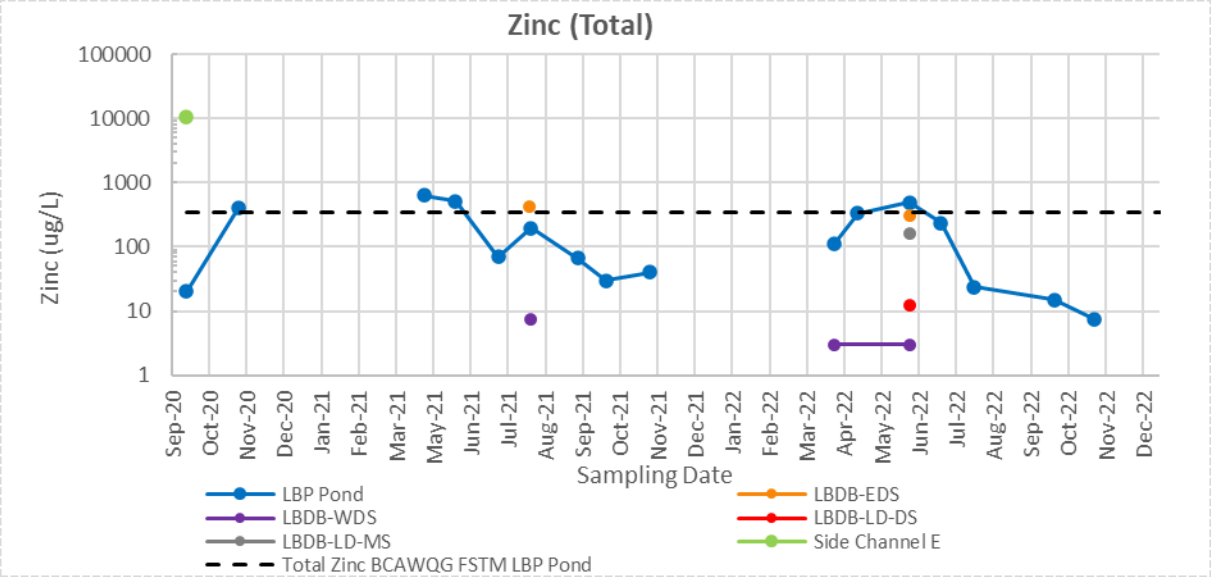


Figure 56: Total Zinc at LBDB Locations



TABLES

Table 1: Water Sampling Locations and In Situ and Lab Events

		Routine Memo Number:			1		N/A		2		3		4		5		6		7		8		9		10					
		Sampling Event Number:			1		2		3		4		5		6		7		8		9		10		11		12			
Catchment	Sample Site	UTM Coordinates Zone 10 (NAD83)		Elevation	25-26-Jan-22		17-Feb-22		30-Mar-22		18-Apr-22		30-31-May-22		26-27-Jun-22		24-25-Jul-22		29-30-Aug-22		28-29-Sep-22		30-31-Oct-22		28-29-Nov-22		11-Dec-22			
		Easting	Northing		In-Situ	Lab	In-Situ	Lab	In-Situ	Lab	In-Situ	Lab	In-Situ	Lab	In-Situ	Lab	In-Situ	Lab	In-Situ	Lab	In-Situ	Lab	In-Situ	Lab	In-Situ	Lab	In-Situ	Lab		
Right Bank - South Bank Initial Access Road	RBSBIAR-US	630327	6228397	468	✓				✓				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
	RBSBIAR-DS	630320	6228645	445	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
	RBSBIAR-EUS	630376	6228399	465	✓	✓							✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
	RBSBIAR-EDS	630370	6228635	437					✓				✓	✓	✓	✓														
Left Bank River Road	LBRR-DD*	632853	6229862	422	✓	✓			✓	✓																				
	LBRR-LC	632856	6229899	427																										
	LBRR-UC	633018	6230253	463					✓	✓					✓	✓	✓													
	LBRR-12+500	632914	6229921	432					✓	✓			✓	✓	✓	✓			✓	✓	✓	✓	✓	✓						
	LBRR-12+600	632948	6229983	436					✓				✓		✓								✓							
	LBRR-12+700	632992	6230078	443					✓				✓		✓		✓		✓		✓		✓							
	LBRR-12+810	633039	6230195	454					✓				✓		✓		✓		✓		✓		✓							
	LBRR-12+920	633000	6230282	463					✓				✓		✓		✓		✓		✓		✓							
	RR8*	632262	6229624	412																										
	RR9*	632460	6229680	413	✓	✓			✓	✓			✓	✓																
L2 Powerhouse	L2 DS	629607	6229185	385									✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓		
	L2 US	629701	6229279	414	✓	✓					✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Left Bank Debris Boom	LBP Pond	628227	6231885	458					✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
	LBDB-WUS	628189	6231933	-																										
	LBDB-WDS	627969	6231883	-					✓	✓			✓	✓																
	LBDB-EUS	628202	6231908	-																										
	LBDB-EDS	627994	6231856	-									✓	✓																
	LBDB-LD-US	628257	6231876	-																										
	LBDB-LD-MS	628147	6231844	-									✓	✓																
	LBDB-LD-DS*	628093	6231766	-									✓	✓																

*Discharge Location.

All elevations are approximate

All sample stations include sample collection for lab testing and in-situ measurements. Except for LBRR+12+600, LBRR+12+700, LBRR+12+810, and LBRR+12+920 which include in-situ measumrents only.

Table 2: Temperature and Precipitation - Daily and 7-day Average

Date	Time Period	Precipitation[1]		Temperature[1]			Summary
Sample Event Date Bolded		Precipitation Event	Total (mm)	Mean (°C)	Minimum (°C)	Maximum (°C)	24 Hr and 7 Day Precipitation
January 18-24, 2022	7 days	none	0.00	-6.6	-26.5	9.0	No precipitation
January 24, 2022	24 hrs.	none	0.00	2.8	0.2	4.3	No precipitation
January 25-26, 2022	**24 hrs.**	**none**	**0.00**	**2.9**	**-1.8**	**7.8**	**No precipitation**
February 10-16, 2022	**7 days**	**none**	**0.00**	**-2.6**	**-13.7**	**9.7**	No precipitation
February 16, 2022	24 hrs.	none	0.00	-10.7	-13.2	-7.6	No precipitation
February 17, 2022	**24 hrs.**	**none**	**0.00**	**-7.7**	**-16.5**	**0.0**	**No precipitation**
March 23-29, 2022	7 days	none	0.00	1.7	-4.3	12.2	No precipitation
March 29, 2022	24 hrs.	none	0.00	5.9	-2.5	12.2	No precipitation
March 30, 2022	**24 hrs.**	**none**	**0.00**	**6.9**	**1.7**	**11.3**	**No precipitation**
April 11-17, 2022	7 days	April 11, 12, 17	1.32	-4.9	-11.5	2.9	Minimal (1.32 mm) precipitation in previous 7 days
April 17, 2022	24 hrs.	evening	1.05	0.04	0.0	0.29	minimal (1.05 mm) precipitation
April 18, 2022	**24 hrs.**	**evening**	**4.08**	**-6.4**	**-9.8**	**-2.9**	**minimal (4.08 mm) precipitation following the sampling event**
May 23-29, 2022	7 days	May 23, 27, 28. 29	59.70	11.7	4.7	21.9	Significant (59.7 mm) precipitation in previous 7 days
May 29, 2022	24 hrs.	none	0.00	12	6.4	16.6	No precipitation
May 30-31, 2022	**24 hrs.**	**none**	**0.00**	**14.6**	**6.1**	**20.6**	**No precipitation**
June 19-25, 2022	7 days	June 18, 19, 23	7.41	15.7	8.2	26.9	Moderate (7.41 mm) precipitation in previous 7 days
June 25, 2022	24 hrs.	none	0.00	18.8	8.2	26.9	No precipitation
June 26-27, 2022	**24 hrs.**	**June 27, early morning**	**2.44**	**16.5**	**11.9**	**23.6**	**Minimal (2.44 mm) precipitation during sampling event**
July 17-23, 2022	7 days	none	0.00	19.6	9.9	28.7	No precipitation
July 23, 2022	24 hrs.	none	0.00	20.8	12.4	28.7	No precipitation
July 24-25, 2022	**24 hrs.**	**none**	**0.00**	**19.2**	**11.1**	**25.8**	**No precipitation**
August 22-28, 2022	7 days	August 24 and 27	0.59	20.2	12.1	31.8	Minimum (0.59 mm) precipitation in previous 7 days
August 28, 2022	24 hrs.	none	0.00	17.1	13	21.5	No precipitation.
August 29-30, 2022	**24 hrs.**	**August 29, early morning**	**0.10**	**20.3**	**14.4**	**26.3**	**Minimal (0.10 mm) precipitation prior to sampling (morning)**
September 21-27, 2022	7 days	Sept 22 and 25	0.15	14.7	3.9	26	Minimal (0.15 mm) precipitation in previous 7 days
September 27, 2022	24 hrs.	none	0.00	17.4	9.6	26	No precipitation
September 28-29, 2022	**24 hrs.**	**Sept. 29, evening**	**0.12**	**14.1**	**7.8**	**21.6**	**Minimal precipitation (0.12 mm) following sampling (evening)**
October 23-29, 2022	7 days	October 23, 24, 25	7.52	2.46	-6.4	9.7	Moderate (7.52 mm) precipitation in previous 7 days
October 29, 2022	24 hrs.	none	0.00	5.1	2.7	8.1	No precipitation
October 30-31, 2022	**24 hrs.**	**none**	**0.00**	**4.0**	**-2.0**	**9.3**	**No precipitation**
November 21-27, 2022	7 days	November 26 and 27	4.01	2.1	-10.3	8.8	Low (4.01 mm) precipitation in previous 7 days
November 27, 2022	24 hrs.	**morning**	**3.57**	-9.11	-10.3	-6.8	Moderate (3.57 mm) precipitation
November 28-29, 2022	**24 hrs.**	**Nov 28 and 29**	**0.16**	**-17.6**	**-23.4**	**-10.8**	**Minimal (0.16 mm) precipitation during and following (evening) sampling**
December 4-10, 2022	7 days	December 4, 5 and 10	1.85	-13.3	-28.1	-0.2	Minimal (1.85 mm) precipitation in previous 7 days
December 10, 2022	24 hrs.	**afternoon**	**0.72**	-18.4	-19.8	-11.4	Minimal (0.72 mm) precipitation
December 11, 2022	**24 hrs.**	**early morning**	**1.07**	**-18.9**	**-21.4**	**-16.8**	**Minimal (1.07 mm) precipitation prior to sampling (early morning)**

[1] BC Ministry of Environment, BC Air quality data: Fort St John North Camp C_Met_60 weather station. https://envistaweb.env.gov.bc.ca/.

Table 3: Classification of Flows in Ditch

Sample Event Date Bolded	Time Period	Precipitation Event	Total (mm)	Mean (°C)	24 Hr and 7 Day Precipitation	Classification
January 18-24, 2022	7 days	none	0.00	-6.6	No precipitation	Regional groundwater flow; frozen conditions.
January 24, 2022	24 hrs.	none	0.00	2.8	No precipitation	
January 25-26, 2022	**48 hrs.**	**none**	**0.00**	**2.9**	**No precipitation**	
March 23-29, 2022	7 days	none	0.00	1.7	No precipitation	Regional groundwater flow; frozen to near frozen and warming conditions.
March 29, 2022	24 hrs.	none	0.00	5.9	No precipitation	
March 30, 2022	**24 hrs.**	**none**	**0.00**	**6.9**	**No precipitation**	
April 11-17, 2022	7 days	April 11, 12, 17	1.32	-4.9	Minimal (1.32 mm) precipitation in previous 7 days	Regional groundwater flow; frozen to near frozen conditions.
April 17, 2022	24 hrs.	evening	1.05	0.04	Minimal (1.05 mm) precipitation	
April 18, 2022	**24 hrs.**	**evening**	**4.08**	**-6.4**	**Minimal (4.08 mm) precipitation following the sampling event**	
May 23-29, 2022	7 days	May 23, 27, 28. 29	59.70	11.7	Significant (59.7 mm) precipitation in previous 7 days	Surface runoff and early spring freshet; melting and warming conditions.
May 29, 2022	24 hrs.	none	0.00	12	No precipitation	
May 30-31, 2022	**48 hrs.**	**none**	**0.00**	**14.6**	**No precipitation**	
June 19-25, 2022	7 days	June 18, 19, 23	7.41	15.7	Minimal (7.41 mm) precipitation in previous 7 days	Surface runoff and spring freshet; melting and warming conditions.
June 25, 2022	24 hrs.	none	0.00	18.8	No precipitation	
June 26-27, 2022	**48 hrs.**	**June 27, early morning**	**2.44**	**16.5**	**Minimal (2.44 mm) precipitation during sampling event**	
July 17-23, 2022	7 days	none	0.00	19.6	No precipitation	Late freshet surface runoff, shallow and regional groundwater flow.
July 23, 2022	24 hrs.	none	0.00	20.8	No precipitation	
July 24-25, 2022	**48 hrs.**	**none**	**0.00**	**19.2**	**No precipitation**	
August 22-28, 2022	7 days	August 24 and 27	0.59	20.2	Minimum (0.59 mm) precipitation in previous 7 days	Shallow or regional groundwater flow; warm temperatures.
August 28, 2022	24 hrs.	none	0.00	17.1	No precipitation.	
August 29-30, 2022	**48 hrs.**	**August 29, early morning**	**0.10**	**20.3**	**Minimal (0.10 mm) precipitation prior to sampling (morning)**	
September 21-27, 2022	7 days	Sept 22 and 25	0.15	14.7	Minimal (0.15 mm) precipitation in previous 7 days	Shallow or regional groundwater flow; warm temperatures.
September 27, 2022	24 hrs.	none	0.00	17.4	No precipitation	
September 28-29, 2022	**48 hrs.**	**Sept. 29, evening**	**0.12**	**14.1**	**Minimal precipitation (0.12 mm) following sampling (evening)**	
October 23-29, 2022	7 days	October 23, 24, 25	7.52	2.5	Minimal (7.52 mm) precipitation in previous 7 days	Shallow or regional groundwater flow and surface runoff; cooling temperatures.
October 29, 2022	24 hrs.	none	0.00	5.1	No precipitation	
October 30-31, 2022	**48 hrs.**	**none**	**0.00**	**4.0**	**No precipitation**	
November 21-27, 2022	7 days	November 26 and 27	4.01	2.1	Minimal (4.01 mm) precipitation in previous 7 days	Shallow or regional groundwater flow; near to frozen conditions.
November 27, 2022	24 hrs.	**morning**	**3.57**	-9.11	Moderate (3.57 mm) precipitation	
November 28-29, 2022	**48 hrs.**	**Nov 28 and 29**	**0.16**	**-17.6**	**Minimal (0.16 mm) precipitation during and following (evening) sampling**	
December 4-10, 2022	7 days	December 4, 5 and 10	1.85	-13.3	Minimal (1.85 mm) precipitation in previous 7 days	Regional groundwater flow; frozen conditions.
December 10, 2022	24 hrs.	**afternoon**	**0.72**	-18.4	Minimal (0.72 mm) precipitation	
December 11, 2022	**24 hrs.**	**early morning**	**1.07**	**-18.9**	**Minimal (1.07 mm) precipitation prior to sampling (early morning)**	

Table 4: Turbidity and TSS of the Peace River for Water Sampling Events

Date	Turbidity (Daily Mean) and TSS Measurements and Calculations Peace River above Moberly River			
Sampling Event Date Bolded	Left Bank		Right Bank	
	NTU [1]	TSS [1] (mg/L)	NTU [1]	TSS [1] (mg/L)
January 18-24, 2022	2.7	2.0	4.1	2.9
January 24, 2022	3.0	2.1	4.1	3.0
January 25, 2022	4.2	3.1	6.0	4.3
January 26, 2022	2.7	2.0	4.1	2.9
January 27, 2022	2.7	2.0	4.2	3.1
March 23-29, 2022	13.8	9.9	5.5	4.0
March 29, 2022	10.6	7.6	4.2	3.0
March 30, 2022	20.2	14.5	6.5	4.7
March 31, 2022	19.6	14.1	5.3	3.8
April 11-17, 2022	7.1	5.1	5.3	3.8
April 17, 2022	4.3	3.1	3.6	2.6
April 18, 2022	4.8	3.5	5.0	3.6
April 19, 2022	5.9	4.2	8.5	6.1
May 23-29, 2022	1213.6	873.8	963.1	693.5
May 29, 2022	4842.8	3486.8	3771.8	2715.7
May 30, 2022	1955.4	1407.9	1525.5	1098.3
May 31, 2022	854.3	615.1	874.5	629.6
June 1, 2022	513.6	369.8	610.9	439.9
June 19-25, 2022	459.4	330.7	507.4	365.3
June 25, 2022	175.9	126.6	203.4	146.5
June 26, 2022	150.5	108.3	176.4	127.0
June 27, 2022	159.4	114.8	179.8	129.4
June 28, 2022	168.5	121.3	149.5	107.7
July 17-23, 2022	16.4	11.8	16.8	12.1
July 23, 2022	11.2	8.1	10.3	7.4
July 24, 2022	13.3	9.6	11.9	8.6
July 25, 2022	14.2	10.2	12.3	8.9
July 26, 2022	26.7	19.2	24.4	17.5
August 22-28, 2022	4.9	3.6	3.2	2.3
August 28, 2022	4.4	3.2	2.8	2.0
August 29, 2022	4.7	3.4	4.6	3.3
August 30, 2022	4.7	3.4	5.1	3.7
August 31, 2022	7.2	5.2	9.2	6.6
September 21-27, 2022	4.3	3.1	2.7	2.0
September 27, 2022	3.7	2.6	2.6	1.9
September 28, 2022	3.8	2.7	2.8	2.0
September 29, 2022	3.9	2.8	3.1	2.2
September 30, 2022	3.5	2.5	2.8	2.0
October 23-29, 2022	5.9	4.3	4.1	2.9
October 29, 2022	5.7	4.1	2.8	2.0
October 30, 2022	3.2	2.3	4.0	2.9
October 31, 2022	3.9	2.8	5.4	3.9
November 1, 2022	4.3	3.1	3.7	2.7
November 21-27, 2022	6.4	4.6	9.0	6.5
November 27, 2022	6.4	4.6	8.3	6.0
November 28, 2022	9.2	6.6	13.1	9.5
November 29, 2022	10.7	7.7	15.3	11.0
November 30, 2022	10.8	7.6	14.5	10.3
December 4-10, 2022	11.1	7.9	10.7	7.6
December 10, 2022	11.0	7.8	9.3	6.6
December 11, 2022	10.0	7.1	8.0	5.7
December 12, 2022	10.4	7.4	8.2	5.8

[1] NTU (Nephelometric Turbidity Unit) and TSS (total suspended sediment) data provided by Ecofish Ltd., January 23, 2023.

NTU: to some extent, measures (scattered light at 90 degrees from the incident light beam) how much light reflects for a given amount of particulates dependent upon properties of the particles, e.g. their shape, color, and reflectivity.

Note: 7-day average turbidity values are calculated as the average turbidity measured during the prior seven days to the sampling event.

Table 5a: QAQC - Travel and Field Blanks

Parameter	Unit	RDL	Field Blank	Travel Blank	Field Blank	Travel Blank	Field Blank	Travel Blank	Field Blank	Travel Blank	Field Blank	Travel Blank	Field Blank	Travel Blank	Field Blank	Travel Blank	Travel Blank	Field Blank	Travel Blank	Field Blank	Travel Blank	Field Blank	Travel Blank	Field Blank
			25-Jan-22	26-Jan-22	30-Mar-22	30-Mar-22	18-Apr-22	18-Apr-22	30-May-22	31-May-22	26-Jun-22	27-Jun-22	25-Jul-22	25-Jul-22	30-Aug-22	30-Aug-22	29-Sep-22	29-Sep-22	31-Oct-22	30-Oct-22	28-Nov-22	28-Nov-22	11-Dec-22	11-Dec-22
Physical Parameters																								
Acidity (as $CaCO_3$)	µg/L	1000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000
Alkalinity (Total as $CaCO_3$)	mg/L	1.0	<1000	<1000	<1000	<1000	<1000	<1000	**1800**	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000
Electrical Conductivity (EC)	µS/cm	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Hardness as $CaCO_3$, dissolved	µg/L	500														<600							<600	0
Hardness as $CaCO_3$, from total Ca/Mg	µg/L		<600	<600	<600	<600	<600	<600	<600	<600	<600	<600	<600	<600	<600	<600	<600	<600	<600	<600	<600	<600	<600	<600
pH	pH Units	0.1	5.52	5.35	5.63	5.64	5.29	5.12	5.36	5.85	5.17	5.72	5.15	5.40	5.27	5.50	5.59	5.06	5.20	5.43	4.96	5.37	5.73	5.12
Total Dissolved Solids (TDS)	µg/L	10000	<10000	<10000	<10000	<10000	<10000	<10000	<10000	<10000	<10000	<10000	<10000	<10000	<10000	<10000	<10000	<10000	<10000	<10000	<10000	<10000	<10000	<10000
Total Suspended Solids (TSS)	µg/L	3000	<3000	<3000	<3000	<3000	<3000	<3000	<3000	<3000	<3000	<3000	<3000	<3000	<3000	<3000	<3000	<3000	<3000	<3000	<3000	<3000	<3000	<3000
Alkalinity (Hydroxide as $CaCO_3$)	µg/L	1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000
Alkalinity (Carbonate as $CaCO_3$)	µg/L	1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000
Alkalinity (Bicarbonate as $CaCO_3$)	µg/L	1000	<1000	<1000	<1000	<1000	<1000	<1000	**1800**	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000
Anions and Nutrients																								
Ammonia (NH_4 as N)	µg/L	5.0	<5	<5	**30.6**	<5	<5	<5	<5	<5	**5.5**	<5	<5	<5	**7.8**	**8.5**	<5	<5	<5	**5.8**	**6.1**	**5.1**	<5	<5
Chloride (Cl^-)	µg/L	500	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500
Nitrate (NO_3^- as N)	µg/L	5.0	<5	<5	-	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Nitrite (NO_2^- as N)	µg/L	1.0	<1	<1	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Sulphate (SO_4)	µg/L	300	<300	<300	<300	<300	<300	<300	<300	<300	<300	<300	<300	<300	<300	<300	<300	<300	<300	<300	<300	<300	<300	<300
Dissolved Organic Carbon (DOC)	µg/L	500	-	-	-	-	-	-	-	-	-	-	-	-	-	<500	-	-	-	-	-	-	<500	-
Metals, Total																								
Aluminum	µg/L	3.0	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Antimony	µg/L	0.10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Arsenic	µg/L	0.10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Barium	µg/L	0.10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.11**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.31**	<0.1	<0.1
Beryllium	µg/L	0.10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Bismuth	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	µg/L	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Cadmium	µg/L	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Calcium	µg/L	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Cesium	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium	µg/L	0.10	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cobalt	µg/L	0.10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Copper	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	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Iron	µg/L	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Lead	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Lithium	µg/L	1.0	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Magnesium	µg/L	5.0	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	**5.5**	<5	<5	<5	<5	<5	<5	<5	<5	<5
Manganese	µg/L	0.10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Mercury	µg/L	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Molybdenum	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	**0.239**	<0.05	<0.05	<0.05	<0.05	0.058	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Nickel	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phosphorus	µg/L	50.0	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Potassium	µg/L	50.0	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Rubidium	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Selenium	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Silicon	µg/L	100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Silver	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sodium	µg/L	50.0	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	**77**	<50	<50	<50	<50	<50	<50	<50	<50	<50
Strontium	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Sulfur	µg/L	500	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500
Tellurium	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Thallium	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Thorium	µg/L	0.10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tin	µg/L	0.10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Titanium	µg/L	0.30	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Tungsten	µg/L	0.10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Uranium	µg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	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	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Zinc	µg/L	3.0	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Zirconium	µg/L	0.06	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Metals, Dissolved																								
Aluminum	µg/L	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	<1	-
Antimony	µg/L	0.10	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	<0.1	-
Arsenic	µg/L	0.10	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	<0.1	-
Barium	µg/L	0.10	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	<0.1	-
Beryllium	µg/L	0.10	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	<0.1	-
Bismuth	µg/L	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	-	-	-	<0.05	-

Parameter	Unit	RDL	Field Blank	Travel Blank	Field Blank	Travel Blank	Field Blank	Travel Blank	Field Blank	Travel Blank	Field Blank	Travel Blank	Field Blank	Travel Blank	Field Blank	Travel Blank	Travel Blank	Field Blank	Travel Blank	Field Blank	Travel Blank	Field Blank	Travel Blank	Field Blank
			25-Jan-22	26-Jan-22	30-Mar-22	30-Mar-22	18-Apr-22	18-Apr-22	30-May-22	31-May-22	26-Jun-22	27-Jun-22	25-Jul-22	25-Jul-22	30-Aug-22	30-Aug-22	29-Sep-22	29-Sep-22	31-Oct-22	30-Oct-22	28-Nov-22	28-Nov-22	11-Dec-22	11-Dec-22
Boron	µg/L	10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	<10	-	-	-	-	-	-	<10	-
Cadmium	µg/L	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	-	-	-	-	-	-	<0.005	-
Calcium	µg/L	50.0	-	-	-	-	-	-	-	-	-	-	-	-	-	<50	-	-	-	-	-	-	<50	-
Cesium	µg/L	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	-	-	-	-	-	-	<0.01	-
Chromium	µg/L	0.10	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5	-
Cobalt	µg/L	0.10	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	<0.1	-
Copper	µg/L	0.20	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-	-	-	<0.2	-
Iron	µg/L	10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	<10	-	-	-	-	-	-	<10	-
Lead	µg/L	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	-	-	-	<0.05	-
Lithium	µg/L	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	<1	-
Magnesium	µg/L	5.0	-	-	-	-	-	-	-	-	-	-	-	-	-	<5	-	-	-	-	-	-	<5	-
Manganese	µg/L	0.10	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	<0.1	-
Mercury	µg/L	0.005	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	-	-	-	-	-	-	<0.005	-
Molybdenum	µg/L	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	-	-	-	<0.05	-
Nickel	µg/L	0.50	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5	-
Phosphorus	µg/L	50.0	-	-	-	-	-	-	-	-	-	-	-	-	-	<50	-	-	-	-	-	-	<50	-
Potassium	µg/L	50.0	-	-	-	-	-	-	-	-	-	-	-	-	-	<50	-	-	-	-	-	-	<50	-
Rubidium	µg/L	0.20	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-	-	-	<0.2	-
Selenium	µg/L	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	-	-	-	-	-	-	<0.05	-
Silicon	µg/L	50.0	-	-	-	-	-	-	-	-	-	-	-	-	-	<50	-	-	-	-	-	-	<50	-
Silver	µg/L	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	-	-	-	-	-	-	<0.01	-
Sodium	µg/L	50.0	-	-	-	-	-	-	-	-	-	-	-	-	-	<50	-	-	-	-	-	-	<50	-
Strontium	µg/L	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-	-	-	<0.2	-
Sulfur	µg/L	500	-	-	-	-	-	-	-	-	-	-	-	-	-	<500	-	-	-	-	-	-	<500	-
Tellurium	µg/L	0.20	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-	-	-	<0.2	-
Thallium	µg/L	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	-	-	-	-	-	-	<0.01	-
Thorium	µg/L	0.10	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	<0.1	-
Tin	µg/L	0.10	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	<0.1	-
Titanium	µg/L	0.30	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.3	-	-	-	-	-	-	<0.3	-
Tungsten	µg/L	0.10	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	<0.1	-
Uranium	µg/L	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	-	-	-	-	-	-	<0.01	-
Vanadium	µg/L	0.50	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5	-
Zinc	µg/L	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	<1	-
Zirconium	µg/L	0.06	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-	-	-	<0.2	-
Laboratory Work Order Number			FJ2200226	FJ2200232	FJ2200791	FJ2200791	FJ2200923	FJ2200923	FJ2201382	FJ2201370	FJ2201678	FJ2201687	FJ2201959	FJ2201959	FJ2202383	FJ2202383	FJ2202765	FJ2202765	FJ2203077	FJ2203067	FJ2203325	FJ2203325	FJ2203454	FJ2203454
Laboratory Identification Number			FJ2200226-005	FJ2200232-003	FJ2200791-009	FJ2200791-010	FJ2200923-001	FJ2200923-002	FJ2201382-008	FJ2201370-001	FJ2201678-009	FJ2201687-003	FJ2201959-009	FJ2201959-008	FJ2202383-003	FJ2202383-002	FJ2202765-002	FJ2202765-003	FJ2203077-002	FJ2203067-007	FJ2203325-005	FJ2203325-004	FJ2203454-004	FJ2203454-005

Notes:

RDL - Reportable detection limit

RPD - Relative percent difference calculated as (ABS[(difference between two values)]/((sum of two values/2))*100

Blank indicates RPD not calculated. RPD cannot be calculated if one or more of the analytical results is less than detection limits or within 5 times the RDL.

Shaded gray only - exceeds BCAWQG-FSTM guideline.

Blank - not analyzed.

Table 5b: QAQC - Field Replicate Samples

Parameter	Unit	RDL	RBSBIAR-DS	RBSBIAR-DS-R	RPD %	RBSBIAR-DS	RBSBIAR-DS-R	RPD %	LBP-Pond	LBP-Pond-R	RPD %	L2-US	L2-US-R	RPD %	RBSBIAR-DS	RBSBIAR-DS-R	RPD %
			25-Jan-22			30-Mar-22			18-Ap-22			30-May-22			26-Jun-22		
Physical Parameters																	
Acidity (as $CaCO_3$)	μg/L	1000	<2000	<2000	0.0	<2000	<2000	0.0	2200	2200	0.0	2800	<2000	33.3	4300	4200	2.4
Alkalinity (Total as $CaCO_3$)	mg/L	1.0	180000	191000	5.9	170000	168000	1.2	84700	94400	10.8	212000	214000	0.9	171000	166000	3.0
Electrical Conductivity (EC)	μS/cm	2.0	583	590	1.2	793	789	0.5	1370	1380	0.7	1240	1290	4.0	729	718	1.5
Hardness as $CaCO_3$, dissolved	μg/L	500	253000	253000	0.0	305000	302000	1.0	555000	540000	2.7	498000	488000	2.0	339000	340000	0.3
Hardness as $CaCO_3$, from total Ca/Mg	μg/L	500	262000	264000	0.8	383000	385000	0.5	593000	601000	1.3	502000	498000	0.8	343000	340000	0.9
pH	pH Units	0.1	8.23	8.22	0.1	8.31	8.31	0.0	7.32	7.33	0.1	8.16	8.18	0.2	8.13	8.15	0.2
Total Dissolved Solids (TDS)	μg/L	10000	339000	337000	0.6	487000	475000	2.5	1050000	1050000	0.0	934000	892000	4.6	494000	516000	4.4
Total Suspended Solids (TSS)	μg/L	3000	13300	15100	12.7	698000	618000	12.2	14000	12600	10.5	17300	18500	6.7	7700	8300	7.5
Alkalinity (Hydroxide as $CaCO_3$)	μg/L	1000	<1000	<1000	0.0	<1000	<1000	0.0	<1000	<1000	0.0	<1000	<1000	0.0	<1000	<1000	0.0
Alkalinity (Carbonate as $CaCO_3$)	μg/L	1000	<1000	<1000	0.0	5400	3800	34.8	<1000	<1000	0.0	<1000	<1000	0.0	<1000	<1000	0.0
Alkalinity (Bicarbonate as $CaCO_3$)	μg/L	1000	180000	191000	5.9	165000	164000	0.6	84700	94400	10.8	212000	214000	0.9	171000	166000	3.0
Anions and Nutrients																	
Ammonia (NH_4 as N)	μg/L	5.0	116	121	4.2	220	244	10.3	<5	<5	0.0	10.1	46.3	128.4	283	283	0.0
Chloride (Cl^-)	μg/L	500	27800	28000	0.7	25800	26000	0.8	6260	5100	20.4	18900	19400	2.6	52900	53000	0.2
Nitrate (NO_3^- as N)	μg/L	5.0	746	770	3.2	-	-	-	25.8	<25	3.1	607	582	4.2	849	851	0.2
Nitrite (NO_2^- as N)	μg/L	1.0	10.7	10.8	0.9	-	-	-	10.8	<5	73.4	5.3	10.6	66.7	8.7	10	13.9
Sulphate (SO_4)	μg/L	300	69800	69100	1.0	210000	212000	0.9	681000	686000	0.7	450000	448000	0.4	124000	122000	1.6
Dissolved Organic Carbon (DOC)	μg/L		2440	2920	17.9	1980	2950	39.4	9340	9680	3.6	2680	2200	19.7	1020	1110	8.5
Metals, Total																	
Aluminum	μg/L	3.0	296	373	23.0	2940	3870	27.3	740	769	3.8	126	170	29.7	144	163	12.4
Antimony	μg/L	0.10	0.3	0.31	3.3	0.5	0.58	14.8	0.14	0.14	0.0	0.6	0.61	1.7	0.31	0.32	3.2
Arsenic	μg/L	0.10	0.62	0.69	10.7	3.73	5.05	30.1	0.74	0.8	7.8	0.42	0.49	15.4	0.29	0.3	3.4
Barium	μg/L	0.10	142	135	5.1	206	263	24.3	41.8	44.7	6.7	74.9	78.2	4.3	73.7	73.8	0.1
Beryllium	μg/L	0.10	<0.1	<0.1	0.0	0.257	0.326	23.7	<0.1	<0.1	0.0	<0.1	<0.1	0.0	<0.1	<0.1	0.0
Bismuth	μg/L	0.05	<0.05	<0.05	0.0	<0.05	0.056	0.0	<0.05	<0.05	0.0	<0.05	<0.05	0.0	<0.05	<0.05	0.0
Boron	μg/L	10	36	35	2.8	83	83	0.0	71	71	0.0	268	269	0.4	121	121	0.0
Cadmium	μg/L	0.005	0.0806	0.0858	6.3	0.505	0.61	18.8	0.953	0.964	1.1	0.21	0.209	0.5	0.149	0.145	2.7
Calcium	μg/L	50	75600	75800	0.3	109000	111000	1.8	143000	142000	0.7	142000	140000	1.4	97400	97000	0.4
Cesium	μg/L	0.01	0.092	0.113	20.5	0.687	0.917	28.7	0.034	0.035	2.9	0.029	0.037	24.2	0.039	0.044	12.0
Chromium	μg/L	0.10	0.93	1.12	18.5	6.45	8.35	25.7	0.52	0.51	1.9	0.74	0.75	1.3	<0.5	<0.5	0.0
Cobalt	μg/L	0.10	0.98	1.31	28.8	9.81	10.7	8.7	18.1	18.8	3.8	3.18	3.1	2.5	4.32	4.16	3.8
Copper	μg/L	0.50	1.74	2.18	22.4	11.5	14.5	23.1	1.95	1.96	0.5	1.66	1.73	4.1	1.82	1.83	0.5
Iron	μg/L	10	764	934	20.0	8480	11400	29.4	1590	1760	10.1	233	372	46.0	436	477	9.0
Lead	μg/L	0.05	0.348	0.421	19.0	3.85	5.09	27.7	0.191	0.182	4.8	0.136	0.197	36.6	0.05	0.073	37.4
Lithium	μg/L	1.0	12.6	13.3	5.4	36.3	35.5	2.2	33.2	32.6	1.8	74.4	73.2	1.6	30.8	30.7	0.3
Magnesium	μg/L	5.0	17700	18100	2.2	27000	26200	3.0	57400	59800	4.1	35700	36000	0.8	24200	23800	1.7
Manganese	μg/L	0.10	27.2	34.5	23.7	267	318	17.4	2080	2160	3.8	114	118	3.4	70.6	70.6	0.0
Mercury	μg/L	0.005	<0.005	<0.005	0.0	0.0181	0.0055	106.8	<0.005	<0.005	0.0	0.0066	0.0083	22.8	<0.005	<0.005	0.0
Molybdenum	μg/L	0.05	3.8	3.83	0.8	4.37	5.65	25.5	1.25	1.29	3.1	3.64	3.58	1.7	3.84	3.86	0.5
Nickel	μg/L	0.5	7.05	8.07	13.5	35.2	37.9	7.4	45.4	47.1	3.7	23.5	23.2	1.3	20	19.5	2.5
Phosphorus	μg/L	50.0	54	55	1.8	373	502	29.5	53	63	17.2	<50	<50	0.0	<50	<50	0.0
Potassium	μg/L	50.0	2900	2940	1.4	3910	4170	6.4	10000	10500	4.9	3490	3480	0.3	4250	4120	3.1
Rubidium	μg/L	0.2	1.82	1.83	0.5	8.11	9.92	20.1	2.11	2.32	9.5	1.45	1.66	13.5	1.95	1.84	5.8
Selenium	μg/L	0.05	0.962	1.01	4.9	1.75	1.6	9.0	0.498	0.541	8.3	2.86	2.81	1.8	0.797	0.654	19.7
Silicon	μg/L	100	3580	3620	1.1	6940	8320	18.1	2650	2800	5.5	4500	4640	3.1	4780	4770	0.2
Silver	μg/L	0.01	<0.01	<0.01	0.0	0.064	0.08	22.2	0.014	0.014	0.0	0.038	0.036	5.4	<0.01	<0.01	0.0
Sodium	μg/L	50.0	28100	27300	2.9	50100	44600	11.6	95200	98900	3.8	99700	101000	1.3	52200	51400	1.5
Strontium	μg/L	0.2	321	322	0.3	578	614	6.0	350	353	0.9	815	827	1.5	528	527	0.2
Sulfur	μg/L	500	29600	30700	3.6	77600	73700	5.2	216000	221000	2.3	167000	167000	0.0	46900	45500	3.0
Tellurium	μg/L	0.2	<0.2	0.23	14.0	<0.2	<0.2	0.0	<0.2	<0.2	0.0	<0.2	<0.2	0.0	<0.2	<0.2	0.0
Thallium	μg/L	0.01	0.017	0.018	5.7	0.101	0.127	22.8	0.012	0.013	8.0	0.018	0.02	10.5	0.016	0.017	6.1
Thorium	μg/L	0.10	0.11	0.15	30.8	1.76	2.35	28.7	<0.1	<0.1	0.0	<0.1	<0.1	0.0	<0.1	<0.1	0.0
Tin	μg/L	0.10	<0.1	<0.1	0.0	0.15	0.16	6.5	<0.1	<0.1	0.0	0.16	0.15	6.5	<0.1	<0.1	0.0
Titanium	μg/L	0.30	5.84	6.64	12.8	42.4	54.2	24.4	8.03	8.03	0.0	2.26	3.88	52.8	0.97	1.82	60.9
Tungsten	μg/L	0.10	<0.1	<0.1	0.0	<0.1	<0.1	0.0	<0.1	<0.1	0.0	<0.1	<0.1	0.0	<0.1	<0.1	0.0
Uranium	μg/L	0.01	1.12	1.13	0.9	1.98	2.04	3.0	1.31	1.32	0.8	2.78	2.77	0.4	1.26	1.26	0.0
Vanadium	μg/L	0.50	1.2	1.43	17.5	10.3	13.9	29.8	1.65	1.68	1.8	0.73	0.84	14.0	<0.5	0.53	5.8
Zinc	μg/L	3.0	9.6	11.8	20.6	72.4	85.7	16.8	330	344	4.2	22.6	23.8	5.2	44.6	43.9	1.6
Zirconium	μg/L	0.06	<0.2	<0.2	0.0	0.66	0.84	24.0	0.3	0.28	6.9	<0.2	<0.2	0.0	<0.2	<0.2	0.0
Metals, Dissolved																	
Aluminum	μg/L	1.0	6.6	13.7	70.0	61.2	60.4	1.3	31.4	34.4	9.1	17.8	19.2	7.6	62.8	63.4	1.0
Antimony	μg/L	0.10	0.28	0.28	0.0	0.28	0.29	3.5	<0.5	<0.5	0.0	0.62	0.6	3.3	0.26	0.26	0.0
Arsenic	μg/L	0.10	0.26	0.25	3.9	0.23	0.26	12.2	<0.5	<0.5	0.0	0.32	0.31	3.2	0.19	0.18	5.4
Barium	μg/L	0.10	112	115	2.6	31.9	34.2	7.0	38.2	38.9	1.8	77.9	78.1	0.3	69.7	70.6	1.3
Beryllium	μg/L	0.10	<0.1	<0.1	0.0	<0.1	<0.1	0.0	<0.1	<0.1	0.0	<0.1	<0.1	0.0	<0.1	<0.1	0.0
Bismuth	μg/L	0.05	<0.05	<0.05	0.0	<0.05	<0.05	0.0	<0.25	<0.25	0.0	<0.05	<0.05	0.0	<0.05	<0.05	0.0
Boron	μg/L	10.0	32	31	3.2	69	67	2.9	66	64	3.1	252	250	0.8	124	127	2.4
Cadmium	μg/L	0.005	0.0465	0.0726	43.8	0.187	0.192	2.6	0.836	0.864	3.3	0.184	0.18	2.2	0.112	0.113	0.9
Calcium	μg/L	50.0	72500	72100	0.6	86700	86000	0.8	132000	128000	3.1	138000	136000	1.5	94400	95100	0.7
Cesium	μg/L	0.01	<0.01	<0.01	0.0	0.022	0.023	4.4	<0.05	<0.05	0.0	<0.01	<0.01	0.0	0.031	0.034	9.2
Chromium	μg/L	0.10	<0.5	<0.5	0.0	<0.5	<0.5	0.0	<0.5	<0.5	0.0	<0.5	<0.5	0.0	<0.5	<0.5	0.0
Cobalt	μg/L	0.10	0.55	1.22	75.7	5.69	5.72	0.5	17	17	0.0	2.89	2.78	3.9	4	3.94	1.5
Copper	μg/L	0.20	0.72	1.08	40.0	1.04	2.9	94.4	1.94	1.23	44.8	1.16	1.12	3.5	0.82	0.77	6.3
Iron	μg/L	10.0	<10	<10	0.0	<10	<10	0.0	662	764	14.3	<10	<10	0.0	14	20	35.3
Lead	μg/L	0.05	<0.05	<0.05	0.0	<0.05	<0.05	0.0	<0.25	<0.25	0.0	<0.05	<0.05	0.0	<0.05	<0.05	0.0
Lithium	μg/L	1.0	12.5	13.6	8.4	30.9	29.6	4.3	30.3	29.4	3.0	74.8	72.8	2.7	30.4	30.7	1.0
Magnesium	μg/L	5.0	17500	17800	1.7	21400	21200	0.9	54800	53400	2.6	37300	36100	3.3	25000	25000	0.0
Manganese	μg/L	0.10	12.7	24.3	62.7	118	125	5.8	1970	1990	1.0	110	106	3.7	63.8	62.6	1.9
Mercury	μg/L	0.005	<0.005	<0.005	0.0	<0.005	<0.005	0.0	<0.005	<0.005	0.0	<0.005	<0.005	0.0	<0.005	<0.005	0.0
Molybdenum	μg/L	0.05	3.66	3.69	0.8	4.76	5.59	16.0	1.21	1.15	5.1	3.63	3.5	3.6	3.57	3.54	0.8
Nickel	μg/L	0.50	5.94	7.85	27.7	23.2	23.3	0.4	43.1	42.8	0.7	21.9	21.5	1.8	17.7	17.3	2.3
Phosphorus	μg/L	50.0	<50	<50	0.0	<50	<50	0.0	<250	<250	0.0	<50	<50	0.0	<50	<50	0.0
Potassium	μg/L	50.0	2810	2820	0.4	3020	3220	6.4	9050	9100	0.6	3830	3720	2.9	4060	4020	1.0
Rubidium	μg/L	0.20	1.06	1.13	6.4	2.08	2.3	10.0	1.75	1.72	1.7	1.4	1.41	0.7	1.78	1.75	1.7
Selenium	μg/L	0.05	0.994	1.08	8.3	1.48	1.45	2.0	0.436	0.385	12.4	3.13	3.27	4.4	0.818	0.828	1.2

Parameter	LBP-Pond	LBP-Pond-R	RPD %	RBSBIAR-DS	RBSBIAR-DS-R	RPD %	RBSBIAR-DS	RBSBIAR-DS-R	RPD %	RBSBIAR-DS	RBSBIAR-DS-R	RPD %	L2-US	L2-US-R	RPD %	L2-DS	L2-DS-R	RPD %
	25-Jul-22			29-Aug-22			28-Sep-22			30-Oct-22			28-Nov-22			11-Dec-22		
Physical Parameters																		
Acidity (as $CaCO_3$)	5200	3500	39.1	2900	<2000	36.7	<10000	<10000	0.0	<10000	<10000	0	<10000	<10000	0.0	3600	3600	0.0
Alkalinity (Total as $CaCO_3$)	207000	201000	2.9	274000	266000	3.0	264000	262000	0.8	235000	263000	11.2	170000	178000	4.6	201000	201000	0.0
Electrical Conductivity (EC)	3870	3890	0.5	668	670	0.3	665	669	0.6	717	726	1.2	524	534	1.9	525	530	0.9
Hardness as $CaCO_3$, dissolved	2160000	2180000	0.9	314000	96400	106.0	312000	312000	0.0	315000	314000	0.3	264000	270000	2.2	214000	217000	1.4
Hardness as $CaCO_3$, from total Ca/Mg	2010000	2030000	1.0	371000	328000	12.3	346000	346000	0.0	352000	350000	0.6	272000	268000	1.5	211000	226000	6.9
pH	7.28	7.3	0.3	8.06	8.13	0.9	8.14	8.11	0.4	8.15	8.15	0.0	8.22	8.21	0.1	8.46	8.47	0.1
Total Dissolved Solids (TDS)	3720000	3850000	3.4	402000	412000	2.5	409000	396000	3.2	486000	486000	0.0	377000	383000	1.6	392000	360000	8.5
Total Suspended Solids (TSS)	15500	9300	50.0	5300	4300	20.8	5600	5200	7.4	3600	5200	36.4	<3000	<3000	0.0	4000	4400	9.5
Alkalinity (Hydroxide as $CaCO_3$)	<1000	<1000	0.0	<1000	<1000	0.0	<1000	<1000	0.0	<1000	<1000	0.0	<1000	<1000	0.0	<1000	<1000	0.0
Alkalinity (Carbonate as $CaCO_3$)	<1000	<1000	0.0	<1000	<1000	0.0	<1000	<1000	0.0	<1000	<1000	0.0	<1000	<1000	0.0	15200	15200	0.0
Alkalinity (Bicarbonate as $CaCO_3$)	207000	201000	2.9	274000	266000	3.0	264000	262000	0.8	235000	263000	11.2	170000	178000	4.6	186000	186000	0.0
Anions and Nutrients																		
Ammonia (NH_4 as N)	5.4	5.4	0.0	118	122	3.3	104	110	5.6	208	210	1.0	<5	8.7	54.0	37.1	49.2	28.0
Chloride (Cl^-)	4690	4480	4.6	26600	26500	0.4	28200	28400	0.7	35100	34700	1.1	4160	4290	3.1	10700	10700	0.0
Nitrate (NO_3^- as N)	<25	<25	0.0	652	654	0.3	491	496	1.0	835	824	1.3	530	541	2.1	445	443	0.5
Nitrite (NO_2^- as N)	<5	<5	0.0	11.3	10.9	3.6	8.6	8.3	3.6	7.8	6.8	13.7	<1	1.1	9.5	5.5	5.6	1.8
Sulphate (SO_4)	2530000	2570000	1.6	82500	81600	1.1	90500	91800	1.4	95800	94900	0.9	116000	117000	0.9	81200	81000	0.2
Dissolved Organic Carbon (DOC)	21400	24800	14.7	1540	1630	5.7	790	1640	70.0	2610	2640	1.1	1430	1630	13.1	1360	1470	7.8
Metals, Total																		
Aluminum	111	299	91.7	34.7	32.1	7.8	33.2	31.5	5.3	74.7	67	10.9	76.6	58.4	27.0	119	123	3.3
Antimony	0.14	0.16	13.3	0.13	0.12	8.0	0.14	0.16	13.3	0.15	0.15	0.0	0.37	0.27	31.3	0.64	0.55	15.1
Arsenic	0.89	0.99	10.6	0.29	0.28	3.5	0.26	0.21	21.3	0.29	0.32	9.8	0.25	0.22	12.8	0.68	0.55	21.1
Barium	35.1	36.2	3.1	208	203	2.4	168	170	1.2	115	115	0.0	65.2	62.8	3.7	65.5	64.5	1.5
Beryllium	<0.1	<0.1	0.0	<0.1	<0.1	0.0	<0.1	<0.1	0.0	<0.1	<0.1	0.0	<0.1	<0.1	0.0	0.176	<0.1	55.1
Bismuth	<0.05	<0.05	0.0	<0.05	<0.05	0.0	<0.05	<0.05	0.0	<0.05	<0.05	0.0	<0.05	<0.05	0.0	<0.05	<0.05	0.0
Boron	269	269	0.0	100	97	3.0	90	90	0.0	102	100	2.0	27	27	0.0	55	60	8.7
Cadmium	0.0475	0.0524	9.8	0.0122	0.0118	3.3	0.0065	0.0066	1.5	0.0305	0.0185	49.0	0.0357	0.0326	9.1	0.0244	0.0109	76.5
Calcium	430000	437000	1.6	106000	89500	16.9	93100	93100	0.0	100000	99500	0.5	77900	79400	1.9	59100	65000	9.5
Cesium	0.014	0.024	52.6	0.023	0.021	9.1	0.02	0.018	10.5	0.019	0.02	5.1	0.01	<0.01	0.0	0.066	0.02	107.0
Chromium	<0.5	<0.5	0.0	<0.5	<0.5	0.0	<0.5	<0.5	0.0	<0.5	<0.5	0.0	0.72	0.85	16.6	1.14	1.13	0.9
Cobalt	5.09	4.52	11.9	0.22	0.19	14.6	0.22	0.19	14.6	0.37	0.39	5.3	0.27	0.27	0.0	0.21	<0.1	71.0
Copper	0.57	0.82	36.0	<0.5	<0.5	0.0	<0.5	<0.5	0.0	<0.5	0.53	5.8	0.55	0.52	5.6	0.83	0.68	19.9
Iron	1410	1350	4.3	60	54	10.5	47	47	0.0	104	105	1.0	60	41	37.6	80	59	30.2
Lead	0.053	0.12	77.5	<0.05	<0.05	0.0	<0.05	<0.05	0.0	0.054	0.056	3.6	0.05	<0.05	0.0	0.155	0.069	76.8
Lithium	87.5	90.4	3.3	33	32.8	0.6	38.8	39.5	1.8	24.6	23.5	4.6	8.1	8.4	3.6	9.8	10.4	5.9
Magnesium	228000	229000	0.4	25800	25500	1.2	27500	27600	0.4	24800	24600	0.8	18800	16900	10.6	15500	15500	0.0
Manganese	1780	1690	5.2	9.3	8.28	11.6	8.58	8.23	4.2	17	17.1	0.6	8.64	8.37	3.2	3.66	3.59	1.9
Mercury	<0.005	<0.005	0.0	<0.005	<0.005	0.0	<0.005	<0.005	0.0	<0.005	<0.005	0.0	<0.005	<0.005	0.0	<0.005	<0.005	0.0
Molybdenum	0.688	0.77	11.2	1.89	1.71	10.0	2.03	2.12	4.3	3.15	2.99	5.2	2.1	2.14	1.9	5.07	5.34	5.2
Nickel	36.4	33.2	9.2	2.49	2.36	5.4	2.64	2.76	4.4	2.7	2.5	7.7	3.61	3.49	3.4	0.84	0.62	30.1
Phosphorus	<50	<50	0.0	<50	<50	0.0	<50	<50	0.0	<50	<50	0.0	<50	57	13.1	101	<50	67.5
Potassium	12400	12700	2.4	2800	2680	4.4	3380	3440	1.8	2890	2850	1.4	1970	2000	1.5	3760	3830	1.8
Rubidium	5.53	5.94	7.1	1.12	1.14	1.8	1.07	1.03	3.8	0.87	0.9	3.4	0.85	1.04	20.1	2.42	2.28	6.0
Selenium	0.396	0.348	12.9	1	0.835	18.0	0.904	0.9	0.4	0.959	0.884	8.1	2.43	2.4	1.2	1.58	1.43	10.0
Silicon	3550	3510	1.1	5400	5230	3.2	5030	5130	2.0	4500	4460	0.9	4080	4160	1.9	5870	5840	0.5
Silver	<0.01	<0.01	0.0	<0.01	<0.01	0.0	<0.01	<0.01	0.0	<0.01	<0.01	0.0	<0.01	<0.01	0.0	0.02	<0.01	66.7
Sodium	350000	352000	0.6	44600	43100	3.4	41500	43200	4.0	45500	45900	0.9	12600	14400	13.3	36500	35700	2.2
Strontium	1000	1020	2.0	422	402	4.9	360	362	0.6	385	387	0.5	227	229	0.9	134	147	9.3
Sulfur	796000	810000	1.7	29300	27200	7.4	32300	31900	1.2	33300	32600	2.1	41700	43600	4.5	28900	29400	1.7
Tellurium	0.24	0.22	8.7	<0.2	<0.2	0.0	<0.2	<0.2	0.0	<0.2	<0.2	0.0	<0.2	<0.2	0.0	0.2	<0.2	0.0
Thallium	0.012	0.014	15.4	<0.01	<0.01	0.0	<0.01	<0.01	0.0	<0.01	<0.01	0.0	0.013	<0.01	26.1	0.025	<0.01	85.7
Thorium	<0.1	<0.1	0.0	<0.1	<0.1	0.0	<0.1	<0.1	0.0	<0.1	<0.1	0.0	<0.1	<0.1	0.0	<0.1	<0.1	0.0
Tin	<0.1	<0.1	0.0	0.23	0.22	4.4	0.68	0.7	2.9	0.16	0.16	0.0	<0.1	<0.1	0.0	0.18	<0.1	57.1
Titanium	1.11	1.8	47.4	0.58	0.44	27.5	0.76	<0.3	86.8	1.71	1.72	0.6	1.36	1.08	23.0	1.16	1.22	5.0
Tungsten	<0.1	<0.1	0.0	<0.1	<0.1	0.0	<0.1	<0.1	0.0	<0.1	<0.1	0.0	<0.1	<0.1	0.0	0.24	0.16	40.0
Uranium	2.55	2.73	6.8	1.34	1.28	4.6	1.29	1.28	0.8	2.03	1.96	3.5	1.52	1.41	7.5	1.66	1.72	3.6
Vanadium	0.64	0.74	14.5	0.66	0.63	4.7	<0.5	<0.5	0.0	<0.5	<0.5	0.0	0.57	<0.5	13.1	1.71	1.22	33.4
Zinc	23.8	20.8	13.5	<3	<3	0.0	<3	<3	0.0	3.1	<3	3.3	7.2	7.4	2.7	3.2	<3	6.5
Zirconium	<0.2	<0.2	0.0	<0.2	<0.2	0.0	<0.2	<0.2	0.0	<0.2	<0.2	0.0	<0.2	<0.2	0.0	0.22	<0.2	9.5
Metals, Dissolved																		
Aluminum	53.9	126	80.2	7.7	7.8	1.3	11.8	8.7	30.2	12.2	11.3	7.7	20.2	18.9	6.6	66.6	68.4	2.7
Antimony	<1	<1	0.0	0.13	<0.1	26.1	0.12	0.12	0.0	0.13	0.13	0.0	0.28	0.28	0.0	0.53	0.53	0.0
Arsenic	<1	<1	0.0	0.25	0.21	17.4	0.24	0.15	46.2	0.22	0.23	4.4	0.18	0.24	28.6	0.51	0.57	11.1
Barium	36.4	36.6	0.5	173	<0.1	199.8	166	166	0.0	119	119	0.0	59	62.4	5.6	59.8	60.1	0.5
Beryllium	<0.2	<0.2	0.0	<0.1	<0.1	0.0	<0.1	<0.1	0.0	<0.1	<0.1	0.0	<0.1	<0.1	0.0	<0.1	<0.1	0.0
Bismuth	<0.5	<0.5	0.0	<0.05	<0.05	0.0	<0.05	<0.05	0.0	<0.05	<0.05	0.0	<0.05	<0.05	0.0	<0.05	<0.05	0.0
Boron	280	277	1.1	124	<10	170.1	94	95	1.1	98	100	2.0	27	26	3.8	60	61	1.7
Cadmium	<0.05	<0.05	0.0	<0.005	<0.005	0.0	0.0089	<0.005	56.1	0.0226	0.0122	59.8	0.0407	0.038	6.9	<0.005	0.0069	31.9
Calcium	450000	454000	0.9	79000	<50	199.7	84600	85400	0.9	86700	86400	0.3	77200	78900	2.2	60200	60700	0.8
Cesium	<0.1	<0.1	0.0	0.019	<0.01	62.1	0.012	0.016	28.6	0.011	0.011	0.0	<0.01	<0.01	0.0	<0.01	<0.01	0.0
Chromium	<1	<1	0.0	<0.5	<0.5	0.0	<0.5	<0.5	0.0	<0.5	<0.5	0.0	0.61	0.6	1.7	0.85	0.86	1.2
Cobalt	5.04	4.5	11.3	0.16	<0.1	46.2	0.2	0.19	5.1	0.31	0.33	6.3	0.19	0.22	14.6	<0.1	<0.1	0.0
Copper	<2	<2	0.0	0.24	<0.2	18.2	0.34	0.36	5.7	0.33	0.33	0.0	0.41	0.38	7.6	0.45	0.43	4.5
Iron	<100	<100	0.0	<10	<10	0.0	<10	<10	0.0	11	11	0.0	<10	<10	0.0	<10	<10	0.0
Lead	<0.5	<0.5	0.0	<0.05	<0.05	0.0	<0.05	<0.05	0.0	<0.05	<0.05	0.0	<0.05	<0.05	0.0	<0.05	<0.05	0.0
Lithium	87.4	87.2	0.2	41.3	<1	190.5	38.9	39.7	2.0	24.9	25.4	2.0	8.1	7.4	9.0	10.6	10.6	0.0
Magnesium	251000	255000	1.6	28300	23400	19.0	24400	24000	1.7	24000	23800	0.8	17300	17800	2.8	15400	15800	2.6
Manganese	1860	1790	3.8	6.44	<0.1	193.9	7.2	6.83	5.3	15	14.6	2.7	6.49	7.59	15.6	1.38	1.65	17.8
Mercury	<0.005	<0.005	0.0	<0.005	<0.005	0.0	<0.005	<0.005	0.0	<0.005	<0.005	0.0	<0.005	<0.005	0.0	<0.005	<0.005	0.0
Molybdenum	0.815	0.763	6.6	2.26	<0.05	191.3	2.08	2.06	1.0	2.98	2.85	4.5	2.16	2.18	0.9	5	5.04	0.8
Nickel	38.6	35.3	8.9	2.26	<0.5	127.5	2.3	2.21	4.0	2.44	2.41	1.2	3.47	3.49	0.6	<0.5	<0.5	0.0
Phosphorus	<500	<500	0.0	<50	<50	0.0	<50	<50	0.0	<50	<50	0.0	<50	<50	0.0	<50	<50	0.0
Potassium	12000	12200	1.7	3780	<50	194.8	3270	3240	0.9	2950	2940	0.3	1930	2020	4.6	3890	3810	2.1
Rubidium	5.87	5.77	1.7	0.72	<0.2	113.0	1.2	1.08	10.5	0.89	0.73	19.8	0.77	0.85	9.9	2.34	2.18	7.1
Selenium	0.305	0.358	16.0	1.17	<0.05	183.6	1.07	1.01	5.8	1.21	1.15	5.1	2.98	2.84	4.8	1.72	1.69	1.8

Parameter	Unit	RDL	RBSBIAR-DS	RBSBIAR-DS-R	RPD %	RBSBIAR-DS	RBSBIAR-DS-R	RPD %	LBP-Pond	LBP-Pond-R	RPD %	L2-US	L2-US-R	RPD %	RBSBIAR-DS	RBSBIAR-DS-R	RPD %	LBP-Pond	LBP-Pond-R	RPD %	RBSBIAR-DS	RBSBIAR-DS-R	RPD %	RBSBIAR-DS	RBSBIAR-DS-R	RPD %	RBSBIAR-DS	RBSBIAR-DS-R	RPD %	L2-US	L2-US-R	RPD %	L2-DS	L2-DS-R	RPD %
			25-Jan-22			30-Mar-22			18-Ap-22			30-May-22			26-Jun-22			25-Jul-22			29-Aug-22			28-Sep-22			30-Oct-22			28-Nov-22			11-Dec-22		
Silicon	µg/L	50.0	3040	2970	2.3	2680	2560	4.6	2050	2010	2.0	4510	4420	2.0	4740	4780	0.8	2950	2840	3.8	5260	<50	196.2	4920	5050	2.6	4550	4460	2.0	4030	4080	1.2	5690	5690	0.0
Silver	µg/L	0.01	<0.01	<0.01	0.0	<0.01	<0.01	0.0	<0.05	<0.05	0.0	<0.01	<0.01	0.0	<0.01	<0.01	0.0	<0.1	<0.1	0.0	<0.01	<0.01	0.0	<0.01	<0.01	0.0	<0.01	<0.01	0.0	<0.01	<0.01	0.0	<0.01	<0.01	0.0
Sodium	µg/L	50.0	28100	27300	2.9	43900	40800	7.3	89000	87300	1.9	108000	105000	2.8	49300	49600	0.6	369000	372000	0.8	46400	<50	199.6	41700	41000	1.7	47100	47500	0.8	11600	12300	5.9	33600	34000	1.2
Strontium	µg/L	0.2	315	305	3.2	481	483	0.4	338	335	0.9	743	747	0.5	494	487	1.4	1020	1010	1.0	351	<0.2	199.8	373	379	1.6	385	385	0.0	215	223	3.7	141	139	1.4
Sulfur	µg/L	500	29700	33000	10.5	69400	66000	5.0	247000	240000	2.9	169000	165000	2.4	41800	42200	1.0	985000	991000	0.6	36100	30800	15.8	35500	36200	2.0	35400	35100	0.9	41800	41000	1.9	32700	32700	0.0
Tellurium	µg/L	0.20	<0.2	<0.2	0.0	<0.2	<0.2	0.0	<1	<1	0.0	<0.2	<0.2	0.0	<0.2	<0.2	0.0	<2	<2	0.0	<0.2	<0.2	0.0	<0.2	<0.2	0.0	<0.2	<0.2	0.0	<0.2	<0.2	0.0	<0.2	<0.2	0.0
Thallium	µg/L	0.01	<0.01	<0.01	0.0	0.011	0.013	16.7	<0.05	<0.05	0.0	0.015	0.014	6.9	0.015	0.016	6.5	<0.1	<0.1	0.0	<0.01	<0.01	0.0	<0.01	<0.01	0.0	<0.01	<0.01	0.0	<0.01	<0.01	0.0	0.012	<0.01	18.2
Thorium	µg/L	0.10	<0.1	<0.1	0.0	<0.1	<0.1	0.0	<0.5	<0.5	0.0	<0.1	<0.1	0.0	<0.1	<0.1	0.0	<1	<1	0.0	<0.1	<0.1	0.0	<0.1	<0.1	0.0	<0.1	<0.1	0.0	<0.1	<0.1	0.0	<0.1	<0.1	0.0
Tin	µg/L	0.10	<0.1	<0.1	0.0	<0.1	<0.1	0.0	<0.5	<0.5	0.0	0.11	0.1	9.5	<0.1	<0.1	0.0	<1	<1	0.0	0.24	<0.1	82.4	0.56	0.6	6.9	0.12	0.13	8.0	<0.1	<0.1	0.0	<0.1	<0.1	0.0
Titanium	µg/L	0.30	<0.3	<0.3	0.0	<0.3	<0.3	0.0	<1.5	<1.5	0.0	<0.3	<0.3	0.0	<0.3	<0.3	0.0	<3	<3	0.0	<0.3	<0.3	0.0	<0.3	<0.3	0.0	<0.3	<0.3	0.0	<0.3	<0.3	0.0	<0.3	<0.3	0.0
Tungsten	µg/L	0.10	<0.1	<0.1	0.0	<0.1	<0.1	0.0	<0.5	<0.5	0.0	<0.1	<0.1	0.0	<0.1	<0.1	0.0	<1	<1	0.0	<0.1	<0.1	0.0	<0.1	<0.1	0.0	<0.1	<0.1	0.0	<0.1	<0.1	0.0	0.15	0.15	0.0
Uranium	µg/L	0.01	1.02	1.05	2.9	1.5	1.43	4.8	1.1	1.07	2.8	2.55	2.54	0.4	1.17	1.16	0.9	2.74	2.77	1.1	1.22	<0.01	196.7	1.26	1.27	0.8	1.74	1.7	2.3	1.54	1.59	3.2	1.56	1.6	2.5
Vanadium	µg/L	0.50	<0.5	<0.5	0.0	<0.5	<0.5	0.0	<2.5	<2.5	0.0	<0.5	<0.5	0.0	<0.5	<0.5	0.0	<5	<5	0.0	<0.5	<0.5	0.0	<0.5	<0.5	0.0	<0.5	<0.5	0.0	<0.5	<0.5	0.0	0.92	0.97	5.3
Zinc	µg/L	1.0	5.8	8	31.9	17.5	18	2.8	308	308	0.0	21.3	20.2	5.3	29.1	28.4	2.4	20.5	12.5	48.5	1	1.2	18.2	1.1	<1	9.5	2.1	2.3	9.1	7	7.2	2.8	<1	<1	0.0
Zirconium	µg/L	0.06	<0.2	<0.2	0.0	<0.2	<0.2	0.0	<1	<1	0.0	<0.2	<0.2	0.0	<0.2	<0.2	0.0	<2	<2	0.0	<0.2	<0.2	0.0	<0.2	<0.2	0.0	<0.2	<0.2	0	<0.2	<0.2	0	<0.2	<0.2	0.0
Laboratory Work Order Number			FJ2200226	FJ2200226		FJ2200791	FJ2200791		FJ2200923	FJ2200923		FJ2201382	FJ2201382		FJ2201678	FJ2201678		FJ2201959	FJ2201959		FJ2202362	FJ2202362		FJ2202748	FJ2202748		FJ2203067	FJ2203067		FJ2203325	FJ2203325		FJ2203454	FJ2203454	
Laboratory Identification Number			FJ2200226-001	FJ2200226-003		FJ2200791-003	FJ2200791-004		FJ2200923-005	FJ2200923-006		FJ2201382-002	2201382-003		FJ2201678-003	FJ2201678-004		FJ2201959-00	FJ2201959-007		FJ2202362-001	FJ2202362-007		FJ2202748-002	FJ2202748-003		FJ2203067-003	FJ2203067-004		FJ2203325-00	2203325-002		FJ2203454-00	2203454-003	

Notes:

RDL - Reportable detection limit

RPD - Relative percent difference calculated as (ABS[(difference between two values)]/((sum of two values/2))*100

Blank indicates RPD not calculated. RPD cannot be calculated if one or more of the analytical results is less than detection limits or within 5 times the RDL.

RPD greater than 30%

Blank - not analyzed.

Table 6: River Road - In Situ Water Quality Sampling

Sample Site	Date	In-Situ Tests - 2022						
		pH	EC (µS/cm)	Hardness (ppm)	Alkalinity (ppm)	Water Temp (°C)	Estimated Flow (L/sec)	Turbidity
LBRR-DD [1]	26-Jan-22	8.38	654	450	40	0	0.1	clear
	30-Mar-22	8.46	1886	800	120	1.6	0.02	clear
LBRR-LC	No Measurements							
LBRR-UC	30-Mar-22	7.48	1069	600	80	-0.1	0.1	clear
	27-Jun-22	8.10	1424	450	180	14.4	0.08	clear
	24-Jul-22	8.04	1274	450	240	18.3	0.05	clear
	30-Aug-22	n/a - not recorded					0.02	clear
	29-Sep-22	n/a - not recorded					0.01	clear
	31-Oct-22	n/a - not recorded					0.02	clear
LBRR-12+500	30-Mar-22	7.57	1250	600	40	0.2	0.25	turbid
	31-May-22	7.38	2,090	800	180	11.1	0.3	clear
	27-Jun-22	7.62	1790	800	180	14.7	0.2	clear
	30-Aug-22	7.48	2560	800	180	19.6	0.05	clear
	29-Sep-22	7.56	2410	800	180	13.6	0.01	clear
	31-Oct-22	8.69	1673	800	120	3.4	0.1	clear
LBRR-12+600	30-Mar-22	7.86	1255	600	40	0.1	0.25	slightly turbid
	31-May-22	8.34	1,601	450	180	15.2	0.3	clear
	27-Jun-22	8.34	1465	450	180	16.2	0.2	clear
	31-Oct-22	9.07	1625	800	120	2	0.1	clear
LBRR-12+700	30-Mar-22	7.58	1332	600	80	0	0.2	slightly turbid
	31-May-22	8.17	1,630	800	240	15.1	0.3	clear
	27-Jun-22	8.28	1498	450	180	16.2	0.2	clear
	24-Jul-22	8.24	1635	450	180	19.9	0.1	clear
	30-Aug-22	8.28	1576	450	180	18.6	0.08	clear
	29-Sep-22	8.75	1673	450	180	13	0.08	clear
	31-Oct-22	9.80	1602	800	120	1.9	0.1	clear
LBRR-12+810	30-Mar-22	7.43	1302	600	80	0	0.2	slightly turbid
	31-May-22	7.47	1,583	450	240	15.6	0.2	clear
	27-Jun-22	8.28	1430	450	240	17.5	0.2	clear
	24-Jul-22	7.44	1624	450	180	20.2	0.1	clear
	30-Aug-22	7.44	1556	450	180	18.4	0.06	clear
	29-Sep-22	7.80	1622	450	180	13.1	0.08	clear
	31-Oct-22	8.85	1541	800	120	1.8	0.1	clear
LBRR-12+920	30-Mar-22	7.99	1451	600	80	-0.1	0.08	slightly turbid
	31-May-22	8.14	1,518	450	240	11.8	0.2	clear
	27-Jun-22	8.19	1453	450	240	16.3	0.15	clear
	24-Jul-22	8.11	1621	450	240	21.4	0.15	clear
	30-Aug-22	8.23	1485	450	180	23.3	0.1	clear
	29-Sep-22	8.38	1585	450	180	12.8	0.06	clear
	31-Oct-22	8.93	1599	800	120	2.1	0.1	clear
RR8 [1]	No Measurements							
RR9 [1]	25-Jan-22	8.47	789	450	120	1.6	2	high turbidity
	30-Mar-22	8.18	1730	600	80	8.9	0.3	slightly turbid
	31-May-22	8.30	2230	800	180	27.2	0.2	clear
LBRR-EDP	No Measurements							

[1] **Discharge station**

Table 7: River Road - Water Quality Exceedances Summary (BCAWQG-FST)

Sampling Location	Sampling Dates	Total Arsenic (As)	Total Iron (Fe)	Total Manganese (Mn)[2]	Total Zinc (Zn)[2]	Dissolved Aluminum (Al)[1]	Dissolved Iron (Fe)
LBRR-DD *	26-Jan-22					✓	
LBRR-12+500	30-Mar-22	✓	✓				
	31-May-22		✓		✓		
	27-Jun-22		✓			✓	
LBRR-UC	30-Mar-22		✓				✓
RR9 *	26-Jan-22	✓	✓	✓	✓		
	30-Mar-22		✓				
	31-May-22		✓			✓	

British Columbia Ministry of Environment, Water Protection & Sustainability Branch. 2019. British Columbia Approved Water Quality Guidelines (BCAWQG): Aquatic Life, Wildlife & Agriculture Summary Report. Referenced Guidelines are for Freshwater Aquatic Life water use and Short Term Maximum (FST) WQG. Exceedances denoted by a check mark.

[1]Calculated guideline is pH dependent for dissolved Aluminum.

[2]Hardness-dependent parameters (Mn, Zn) use capped hardness values in guideline calculations.

* Discharge Station

Table 8: RBSBIAR - In Situ Water Quality Measurements

Sample Site	Date	In-Situ Tests - 2022						
		pH	EC (µS/cm)	Hardness (ppm)	Alkalinity (ppm)	Water Temp (°C)	Estimated Flow (L/sec)	Turbidity
RBSBIAR-US	25-Jan-22	10.85	194	199	80	0.1	0.1	turbid
	30-Mar-22	7.85	940	450	120	3.1	isolated pools	clear
	30-May-22	7.86	668	250	240	12.7	0.4	clear
	26-Jun-22	7.50	813	250	240	11	0.25	clear
	24-Jul-22	7.43	822	250	240	14.9	0.15	clear
	29-Aug-22	7.25	749	250	240	17.5	0.03	clear
	28-Sep-22	7.17	783	375	240	13.9	0.01	clear
	30-Oct-22	7.95	730	450	120	6.2	isolated pools	clear
RBSBIAR-DS	25-Jan-22	8.44	631	250	120	-0.1	1	clear
	30-Mar-22	8.50	760	450	120	2.2	0.3	slightly turbid
	18-Apr-22	9.14	1,001	450	80	0.1	0.3	clear
	30-May-22	7.81	935	450	240	14.1	1	clear
	26-Jun-22	8.30	857	450	240	17.8	2	clear
	24-Jul-22	8.22	838	250	240	18.8	3	clear
	29-Aug-22	8.26	731	450	240	16.68	1.5	clear
	28-Sep-22	8.16	750	450	240	13.5	1.5	clear
	30-Oct-22	8.71	798	450	120	5.4	1	clear
RBSBIAR-EUS	25-Jan-22	8.82	177	100	40	0.1	0.1	slightly turbid
	30-May-22	7.68	727	450	240	15.5	2.5	highly turbid
	26-Jun-22	7.82	703	250	240	26.4	0.2	clear
	24-Jul-22	7.82	820	250	240	25.6	0.2	clear
	29-Aug-22	8.00	772	250	240	19.6	0.1	clear
	28-Sep-22	8.04	711	375	200	16.3	0.07	clear
	30-Oct-22	9.05	719	450	120	4.3	0.1	clear
RBSBIAR-EDS	30-Mar-22	8.35	1297	800	120	1.7	0.08	slightly turbid
	30-May-22	7.89	785	450	240	15.3	2	highly turbid
	26-Jun-22	8.12	587	250	240	25.2	2	clear

Table 9: RBSBIAR - Water Quality Exceedances Summary (BCAWQG-FST)

	Sampling Dates	Total Arsenic (As)	Total Iron (Fe)	Total Zinc (Zn)[2]	Dissolved Aluminum (Al)[3]
RBSBIAR-US (West ditch; upstream)	30-May-22				
	26-Jun-22				
	24-Jul-22				
	29-Aug-22				
	28-Sep-22				
	30-Oct-22				
RBSBIAR-DS (West ditch; downstream)	25-Jan-22				
	30-Mar-22		✓		
	18-Apr-22				
	30-May-22		✓	✓	✓
	26-Jun-22				
	24-Jul-22				
	29-Aug-22				
	28-Sep-22				
	30-Oct-22				
RBSBIAR-EUS (East ditch; upstream)	25-Jan-22		✓	✓	
	30-May-22	✓	✓		
	26-Jun-22				
	24-Jul-22				
	29-Aug-22				
	28-Sep-22				
	30-Oct-22				
RBSBIAR-EDS (East ditch; downstream)	30-May-22	✓	✓		✓
	26-Jun-22				

British Columbia Ministry of Environment, Water Protection & Sustainability Branch. 2019. British Columbia Approved Water Quality Guidelines (BCAWQG): Aquatic Life, Wildlife & Agriculture Summary Report. Referenced Guidelines are for Freshwater Aquatic Life (F) water use and Short Term Maximum (ST) WQG. Exceedances denoted by a check mark.

[1]Copper-dissolved guideline is dependant on pH, hardness and Dissolved Organic Carbon

[2]Hardness-dependent parameters (Zn, Cd) use capped hardness values in guideline calculations.

[3]Calculated guideline is pH dependent for dissolved Aluminum.

Table 10: L2 Powerhouse - In Situ Water Quality Sampling

Sample Site	Date	In-Situ Tests - 2022						
		pH	EC (µS/cm)	Hardness (ppm)	Alkalinity (ppm)	Water Temp (°C)	Estimated Flow (L/sec)	Turbidity
L2 US	26-Jan-22	9.88	575	450	80	-0.1	0.0	clear
	18-Apr-22	9.83	822	450	120	0.2	none	clear
	30-May-22	7.44	1174	450	240	18.1	none	slightly turbid
	26-Jun-22	7.45	1209	450	240	20.7	stagnant	clear
	24-Jul-22	7.65	1240	450	240	20.9	0.2	clear
	29-Aug-22	8.10	915	450	240	16.7	1.0	clear
	28-Sep-22	7.90	885	450	240	10.8	1.5	clear
	30-Oct-22	8.27	565	450	280	7.3	3.0	clear
	28-Nov-22	8.6	570	450	120	5.2	3.0	clear
	11-Dec-22	8.45	435	250	120	6.8	6.0	clear
L2 DS	30-May-22	11.09	1080	50	240	12.4	0.5	turbid
	26-Jun-22	8.87	1282	250	240	15	1.5	clear
	24-Jul-22	8.30	1491	250	240	13.3	2.0	clear
	29-Aug-22	8.96	966	100	180	20.5	1.0	turbid
	30-Oct-22	9.62	903	450	180	9	1.5	slightly turbid
	28-Nov-22	9.01	397	250	80	5.3	3.0	clear
	11-Dec-22	8.90	561	250	120	6.7	2.0	clear

Table 11: L2 Powerhouse - Water Quality Exceedances Summary (BCAWQG-FST)

	Sampling Dates	pH > 9.0	Ammonia (NH4 as N)[3]	Total Arsenic (As)	Total Iron (Fe)	Total Lead (Pb)	Total Silver (Ag)	Total Zinc (Zn)[2]	Dissolved Aluminum (Al)[1]
L2 US	26-Jan-22				✓				✓
	18-Apr-22								
	30-May-22								
	26-Jun-22								
	24-Jul-22								
	29-Aug-22								
	28-Sep-22								
	30-Oct-22								
	28-Nov-22								
	11-Dec-22								
L2 DS	30-May-22	✓	✓	✓	✓	✓	✓	✓	✓
	26-Jun-22				✓				✓
	24-Jul-22								✓
	29-Aug-22			✓	✓			✓	✓
	30-Oct-22				✓				✓
	28-Nov-22								
	11-Dec-22								

British Columbia Ministry of Environment, Water Protection & Sustainability Branch. 2019. British Columbia Approved Water Quality Guidelines (BCAWQG): Aquatic Life, Wildlife & Agriculture Summary Report. Referenced Guidelines are for Freshwater Aquatic Life (F) water use and Short Term Maximum (ST) WQG. Exceedances denoted by a check mark.

[1]Calculated guideline is pH dependent for dissolved Aluminum.

[2]Hardness-dependent parameters (Zn) use capped hardness values in guideline calculations.

[3]Ammonia guideline is based on temperature and pH

Table 12: LBDB - In Situ Water Quality Sampling

Sample Site		Date	In-Situ Tests - 2022						
			pH	EC (µS/cm)	Hardness (ppm)	Alkalinity (ppm)	Water Temp (°C)	Estimated Flow (L/min)	Turbidity
Laydown Drainage	LBDB-LD-US	N/A	-	-	-	-	-	-	-
	LBP Pond	30-Mar-22	7.99	640	150	40	1.7	no flow	slightly turbid
		18-Apr-22	7.65	1,500	800	60	0.3	no flow	slightly turbid
		31-May-22	6.55	2,630	800	120	19.4	0.10	slightly turbid
		26-Jun-22	7.00	3,350	800	180	25.6	0.02	clear (algae on surface)
		25-Jul-22	7.25	4,220	800	180	21.3	no flow	slightly turbid
		29-Aug-22	7.23	4,830	800	240	20.4	no flow	clear
		28-Sep-22	7.36	5,140	800	240	15.5	no flow	clear
		31-Oct-22	7.74	5,170	800	180	0.5	no flow	orange tinge; bio sheen
	LBDB-LD-MS	31-May-22	6.94	2,890	450	180	18.6	0.10	clear
	LBDB-LD-DS	31-May-22	8.24	3,260	800	240	22.7	0.10	clear
Upstream Armor Ditch	LBDB-EUS	N/A	-	-	-	-	-	-	-
	LBDB-WUS	N/A	-	-	-	-	-	-	-
Downstream Armor Ditch	LBDB-EDS	31-May-22	8.42	4,300	800	240	15.6	0.15	clear
	LBDB-WDS	30-Mar-22	8.13	2520	800	120	1.8	<5 mL/s from small 'sump'	-
		31-May-22	7.89	3,550	800	180	20.8	0.08	clear

Table 13: LBDB - Water Quality Exceedances Summary (BCAWQG-FST)

Sampling Location		Sampling Dates	Total Cobalt (Co)	Total Iron (Fe)	Total Manganese (Mn)[2]	Total Zinc (Zn)[2]	Dissolved Aluminum (Al)[1]	Dissolved Iron (Fe)
Laydown Drainage	LBDB-LD-US	N/A						
	LBP Pond	30-Mar-22						
		18-Apr-22		✓				✓
		31-May-22		✓		✓		
		26-Jun-22						
		25-Jul-22		✓				
		29-Aug-22			✓			
		28-Sep-22		✓				
		31-Oct-22		✓	✓			✓
	LBDB-LD-MS	31-May-22	✓	✓	✓		✓	✓
	LBDB-LD-DS	31-May-22						
Downstream Armor Ditch	LBDB-EDS	31-May-22						
	LBDB-WDS	30-Mar-22						
		31-May-22						

British Columbia Ministry of Environment, Water Protection & Sustainability Branch. 2019. British Columbia Approved Water Quality Guidelines (BCAWQG): Aquatic Life, Wildlife & Agriculture Summary Report. Referenced Guidelines are for Freshwater Aquatic Life water use and Short Term Maximum (FST) WQG. Exceedances denoted by a check mark.

[1]Calculated guideline is pH dependent for dissolved Aluminum.

[2]Hardness-dependent parameters (Mn, Zn) use capped hardness values in guideline calculations.

Table 14: Discharge and Downstream Locations - Minimum, Maximum and Mean Values

Discharge/Downstream Locations	Unit	LBRR-DD			RR9			RBSBIAR-DS			RBSBIAR-EDS			LBDB WDS			LBDB EDS	L2-DS		
		2 Sample Events			3 Sample Events			9 Sample Events			2 Sample Events			2 Sample Events			1 Sample Event	Eleven Sample Events		
		Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean		Minimum	Maximum	Mean
Hardness as CaCO3	µg/L	292000	903000	597500	210000	1180000	707000	253000	376000	315555.556	274000	357000	315500	1020000	1790000	1405000	1540000	6920	297000	172560
pH	pH Units	7.74	8.24	7.99	8.04	8.07	8.05	7.56	8.31	8.10	8.25	8.32	8.29	8.23	8.31	8.27	8.53	7.73	10.30	8.79
Acidity (Total as CaCO3)	µg/L	3000	2600	3000	2300	3400	2767	1000	5000	2633	159000	255000	207000	181000	193000	187000	343000	1000	5000	2514
Alkalinity (Total as CaCO3)	mg/L	48	79.3	73.5	163	146	75.1	180	274	203	1000	2000	1500	1000	3000	2000	1000	161	312	223
Total Dissolved Solids (TDS)	µg/L	440000	1230000	890000	735000	1820000	1261667	339000	578000	471000	362000	484000	423000	1940000	3100000	2520000	4060000	246000	884000	581714
Total Suspended Solids (TSS)	µg/L	11800	5190000	13450	29300	5190000	1787100	1500	698000	85967	3900	910000	456950	1500	3500	2500	11500	3900	5830000	884071
Anions and Nutrients																				
Chloride (Cl-)	µg/L	18100	268000	86050	126000	268000	175000	25800	56400	38056	27200	61100	44150	5000	5000	5000	<10000	6700	88100	46129
Sulphate (SO4)	µg/L	244000	406000	437500	88700	978000	490900	69800	217000	127633	94400	98900	96650	1270000	2120000	1695000	2380000	53600	290000	163757
Metals, Total																				
Aluminum	µg/L	157	51100	278	1360	51100	18303	31.7	2940	607	58.9	10400	5229	24	29.6	26.8	126	119	10500	3227
Iron	µg/L	411	170000	443	2630	170000	59700	40	8480	1384	130	31200	15665	37	223	130	307	80	21200	4599
Arsenic	µg/L	0.46	24.7	0.495	0.78	24.7	9.44	0.26	3.73	0.8	0.3	16.1	8.2	0.5	0.9	0.7	1.26	0.5	11.9	4.0
Cadmium	µg/L	0.126	5.14	0.208	0.91	5.14	2.35	0.0065	1.29	0.24	0.06	1.33	0.695	0.066	0.069	0.067	0.701	0.018	0.472	0.101
Cobalt	µg/L	0.72	53	2.285	23.1	53	34.3	0.22	29.1	5.23	0.29	26.5	13.40	0.34	0.46	0.40	1.58	0.15	12.20	2.40
Copper	µg/L	1.9	156	5.02	7.8	156	57.5	0.56	20.4	6.13	1.02	42.4	21.7	2.7	4.6	3.7	6.85	0.8	52.7	11.4
Zinc	µg/L	8.5	624	11.05	103	624	289.0	3.1	273.0	59.1	1.50	201	101	3	3	3	312	3	213	46
Metals, Dissolved																				
Aluminum	µg/L	8.2	98	57.6	26.70	468	197.6	6.6	284	52.94	5.8	130	67.90	2.90	8.60	5.75	10.9	41.30	1960.00	383.41
Iron	µg/L	12	26	51	26.00	26.00	26.0	5.00	206	59.00	5.00	5.00	5.00	10.00	108.00	59.00	63	10.00	33.00	17.67
Arsenic	µg/L	0.3	0.21	0.335	0.18	0.21	0.2	0.15	0.26	0.23	0.170	0.19	0.18	0.44	0.72	0.58	1.24	0.38	7.99	2.48
Cadmium	µg/L	0.119	0.534	0.1845	0.024	0.534	0.3	0.009	0.94	0.177	0.063	0.203	0.133	0.055	0.079	0.067	0.642	0.005	0.013	0.009
Cobalt	µg/L	0.58	21.9	2.11	0.41	21.9	13.8	0.16	26.6	4.37	0.17	7.54	3.86	0.25	0.41	0.33	1.4	0.11	0.16	0.14
Copper	µg/L	1.6	3.22	4.445	2.66	3.22	2.9	0.24	4.12	1.0	0.84	1.25	1.05	2.40	4.42	3.41	6.01	0.45	2.53	0.96
Zinc	µg/L	6.3	30.2	8.45	3.2	30.2	16.4	1.0	133	24.1	1.3	11.3	6.30	2.50	2.50	2.50	279	1.10	3.00	1.95

*<Detection Limit values use half the value to calculate mean values.

PHOTOGRAPHS

Photo 1: River Road LBRR-UC location, September 2022.

Photo 2: River Road LBRR-LC location, September 2022.

Photo 3: River Road LBRR-12+920 location, October 31, 2022.

Photo 4: River Road LBRR-12+810 location, September 2022.

Photo 5: River Road LBRR-12+700 location, September 2022.

Photo 6: River Road LBRR-12+600 location, September 2022.

Photo 7: River Road LBRR-12+500 location, September 2022.

Photo 8: River Road LBRR-12+450 location sampled as proxy for LBRR-12+500, September 2022.

Photo 9: River Road LBRR-DD location, outlet of culvert, September 2022.

Photo 10: River Road LBRR-DD location, discharge area, September 2022.

Photo 11: River Road RR9 inlet location, September 2022. Sample collected at outlet location on opposite side of road.

Photo 12: River Road RR8 outlet location, sample collection location, September 2022.

Photo 13: RBSBIAR-US location, looking upstream, September 2022.

Photo 14: RBSBIAR-US location, looking downstream, September 2022.

Photo 15: RBSBIAR-DS location, looking upstream, September 2022.

Photo 16: RBSBIAR-DS location, looking downstream, September 2022.

Photo 17: RBSBIAR-EUS location, looking upstream, September 2022.

Photo 18: RBSBIAR-EUS location, looking downstream, September 2022.

Photo 19: RBSBIAR-EDS location, September 2022.

Photo 20: RBSBIAR-EDS location, looking upstream, September 2022.

Photo 21: L2-US location, looking northwest, September 2022.

Photo 22: L2-US sample location, September 2022.

Photo 23: L2-DS location, September 2022. Sample collected in corner adjacent to powerhouse walls

Photo 24: LBP Pond location, September 2022.

Photo 25: LBDB-EDS location, looking upstream, September 2022.

Photo 26: LBDB-EDS location, looking downstream, September 2022.

Photo 27: LBDB-EUS location, September 2022.

Photo 28: LBDB-LD-US location, September 2022.

Photo 29: LBDB-LD-MS location, September 2022.

Photo 30: LBDB-LD-DS location, September 2022. Discharges to overgrown vegetated area.

Photo 31: LBDB-WUS location, September 2022.

Photo 32: LBDB-WDS location, September 2022.

APPENDIX A

TETRA TECH'S LIMITATIONS ON THE USE OF THIS DOCUMENT

LIMITATIONS ON USE OF THIS DOCUMENT

GEOENVIRONMENTAL

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APPENDIX B

SURFACE WATER ANALYTICAL LABORATORY RESULT TABLES

B1 – 2022 Surface Water Laboratory Analytical Results from River Road Monitoring Locations Evaluated against the BCAWQG-FST Guidelines

B2 – 2022 Surface Water Laboratory Analytical Results from SBIAR Monitoring Locations Evaluated against the BCAWQG-FST Guidelines

B3 – 2022 Surface Water Laboratory Analytical Results from L2 Powerhouse Monitoring Locations Evaluated against the BCAWQG-FST Guidelines

B4 – 2022 Surface Water Laboratory Analytical Results from Left Bank Debris Boom Monitoring Locations Evaluated against the BCAWQG-FST Guidelines

Appendix B1: LBRR Surface Water Analytical Results

Parameter	Unit	RDL	BCAWQG - FST [1]	BCAWQG-FLT [2]	LBRR-DD	LBRR-DD	LBRR-12+500	LBRR-12+500	LBRR-12+500	LBRR-12+500	LBRR-12+500
					26-Jan-22	30-Mar-22	30-Mar-22	31-May-22	27-Jun-22	30-Aug-22	29-Sep-22
Physical Parameters											
Acidity (Total as $CaCO_3$)	µg/L	1000	NG	NG	3000	<2000	2300	4400	1000	3200	5000
Alkalinity (Total as $CaCO_3$)	mg/L	1.0	NG	NG	48	147	71.7	174	202	200	218
Electrical Conductivity (EC)	µS/cm	2.0	NG	NG	646	1770	1170	2190	1670	2490	2150
Hardness as CaCO3, dissolved	µg/L	500	NG (Acceptable ranges exist when calculating exceedances for Cd, Cu, Pb, Mn, Zn)	NG (Acceptable ranges exist when calculating exceedances for Cd, Cu, Pb, Mn, Zn)	292000	903000	463000	1100000	850000	1560000	1410000
Hardness as CaCO3, from total Ca/Mg (New January 2020)	µg/L	500			296000	980000	599000	1180000	876000	1510000	1500000
pH	pH Units	0.10	6.5 - 9	6.5-9.0	7.74	8.24	8	8.03	8.09	8.02	7.89
Total Dissolved Solids (TDS)	µg/L	10000	NG	NG	440000	1340000	790000	1810000	1230000	2160000	1960000
Total Suspended Solids (TSS)	µg/L	3000	NG	NG	11800	15100	689000	65900	76600	13800	26400
Alkalinity (Hydroxide) as $CaCO_3$	µg/L	1000	NG	NG	<1000	<1000	<1000	<1000	<1000	<1000	<1000
Alkalinity (Carbonate as $CaCO_3$)	µg/L	1000	NG	NG	<1000	<1000	<1000	<1000	<1000	<1000	<1000
Alkalinity (Bicarbonate as $CaCO_3$)	µg/L	1000	NG	NG	48000	147000	71700	174000	202000	200000	218000
Anions and Nutrients (Matrix: Water)											
Ammonia (NH_4 as N)	µg/L	5.0	pH dependent (6.5-9.0)	pH dependent (6.5-9.0)	14.1	15.8	138	89.6	51.7	6.7	<5
Ammonia FST Guideline	µg/L		pH dependent (at Temp 4 °C or in situ T)		10300	3950	6220	6220	4950	6220	7420
Ammonia FLT Guideline	µg/L			pH dependent (at Temp 4 °C or in situ T)	1980	1970	1200	1200	952	1200	1430
Chloride (Cl^-)	µg/L	500	600,000	150,000	18100	154000	174000	123000	164000	98100	111000
Nitrate (NO_3^- as N)	µg/L	5.0-100	NG	NG	120			496	236	79.6	45.7
Nitrite (NO_2^- as N)	µg/L	1.0-20	Cl-dependent (> 10,000 µg/L) Guideline: 600 ug/L	Cl-dependent (> 10,000 µg/L) Guideline: 200 ug/L	5.2			<10	9.1	<5	<5
Sulphate (SO_4) [3]	µg/L	300	NG	309,000 - 429,000	244000	631000	246000	883000	552000	1360000	1120000
SO4 FLT Guideline Calc	µg/L		NG	Hardness 76,000-180,000 = 309,000 Hardness 181,000-250,000 = 429,000 Hardness > 250,000 site-specific	309000	429000	309000	429000	429000	429000	429000
Dissolved Organic Carbon (DOC)	mg/L	1.0	NG	NG	14.4	4.52	5.36	7.3	4.70	2940	4.03
Metals, Total											
Aluminum	µg/L	3.00	NG	NG	399	157	6420	3310	1090	65.5	91.1
Antimony	µg/L	0.1-0.2	NG	NG	<0.1	0.19	0.66	0.29	0.25	<0.2	<0.5
Arsenic	µg/L	0.10	5.0	5.0	0.46	0.53	**8.56**	1.7	0.95	0.4	0.64
Barium	µg/L	0.10	NG	NG	42.1	42.3	275	57.4	67.5	28.8	29.8
Beryllium	µg/L	0.10	NG	NG	<0.1	<0.1	0.615	0.844	0.287	0.112	<0.1
Bismuth	µg/L	0.05-0.10	NG	NG	<0.05	<0.05	0.066	<0.05	<0.05	<0.1	<0.25
Boron	µg/L	10.0	1200	1200	31	56	40	120	106	178	134
Cadmium	µg/L	0.005	NG	NG	0.29	0.126	1.62	3.12	2.03	2.28	0.528
Calcium	µg/L	50	NG	NG	89400	273000	176000	319000	229000	406000	413000
Cesium	µg/L	0.01		NG	0.017	0.019	0.704	0.029	0.057	0.027	<0.05
Chromium [4]	µg/L	0.1-0.7	NG	NG	<0.5	<0.5	14.4	2.81	1.49	<0.5	<0.5
Cobalt	µg/L	0.10	110	4.0	3.85	0.72	26.3	36.2	27.6	9.33	<0.5
Copper [3]	µg/L	0.50	Calc. based on Hardness	2 to 10	8.14	1.9	24.7	19.8	4.12	1.35	<2.5
Cu STM Guideline Calc.	µg/L		Hardness 13,000 - 400,000 : calc.; Hardness > 400,000 is Capped Value of 400,000								
Cu LTA Guideline Calc.	µg/L			Hardness 50,000 - 250,000: calc.; Hardness > 250,000, Cu = 10							
Iron	µg/L	10	1000	NG	475	411	**19400**	**9050**	**3500**	120	203
Lead [3]	µg/L	0.05-0.1	Calc. based on Hardness	Calc. based on Hardness	0.088	0.155	5.18	0.26	0.416	<0.1	<0.25
Pb FST Guideline Calc (Based on Hardness as CaCO3), applies to water hardness 8000-360,000 µg/L	µg/L		Hardness ≤ 8000 is 3; Hardness 8000-360,000: calc. Hardness>360,000 is Capped Value of 360,000		319	417	417	417	417	417	417
Pb FLT Guideline Calc (Based on Hardness as CaCO3)	µg/L			Hardness 8000-360,000: calc. Hardness > 360,000 is Capped Value of 360,000	16	20	20	20	20	20	20
Lithium	µg/L	1.0	NG	NG	13.3	45.8	34.7	75.1	76.7	128	89.9
Magnesium	µg/L	5.0	NG	NG	17800	72400	38700	92800	74000	120000	113000
Manganese [3]	µg/L	0.10	Calc. based on hardness	Calc. based on Hardness	229	30.3	664	517	402	258	18.9
Mn FST Guideline Calc (Based on Hardness as CaCO3)	µg/L		Hardness 25,000 - 259,000 : calc.; Hardness > 259,000 is Capped Value of 259,000		3394.2	3394.2	3394.2	3394.2	3394.2	3394.2	3394.2
Mn FLT Guideline Calc (Based on Hardness as CaCO3)	µg/L			Hardness 37,000 - 450,000: calc.; Hardness > 450,000 is Capped Value of 450,000	1889.8	2585.0	2585.0	2585.0	2585.0	2585.0	2585.0
Mercury (Based on methyl Hg & total mass Hg)	µg/L	0.005	NG	Calc.	0.0074	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Molybdenum	µg/L	0.05	2000	≤ 1000	3.47	3.17	4.78	2.83	2.85	0.729	1.87
Nickel	µg/L	0.5	NG		15.8	17.4	85.7	220	189	226	51.7
Phosphorus	µg/L	50-100	NG	NG	92	<50	804	128	69	<100	<250
Potassium	µg/L	50.0	NG	NG	20800	7960	7220	8320	7660	11000	11000
Rubidium	µg/L	0.2	NG	NG	2.98	1.47	7.85	3.12	3.18	4.73	4.24
Selenium	µg/L	0.05	NG	2.0	1.08	2.59	2.05	2.73	0.95	1.4	1.4
Silicon	µg/L	100		NG	5320	3310	9870	6500	6390	6510	5470
Silver [3]	µg/L	0.01-0.02	0.10 - 3.0	0.05 - 1.5	<0.01	0.011	0.115	<0.01	0.011	<0.02	<0.05
Ag FST Guideline Calc			Hardness ≤ 100,000 Ag = 0.10 Hardness > 100,000 Ag = 3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0
Ag FLT Guideline Calc				Hardness ≤ 100,000 Ag = 0.05 Hardness > 100,000 Ag = 1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Sodium	µg/L	50.0	NG	NG	6110	32800	33000	56700	53400	40100	39500
Strontium	µg/L	0.2	NG	NG	169	911	1300	1020	798	1280	1620
Sulfur	µg/L	500	NG	NG	97100	233000	89800	316000	210000	497000	380000
Tellerium	µg/L	0.2-0.4	NG	NG	<0.2	0.22	0.34	<0.2	<0.2	<0.4	<1
Thallium	µg/L	0.01-0.055	NG	NG	0.018	0.012	0.145	0.039	0.033	0.045	<0.05
Thorium	µg/L	0.1-0.2	NG	NG	<0.1	0.11	3.45	1.33	0.26	<0.2	<0.5
Tin	µg/L	0.1-0.2	NG	NG	<0.1	<0.1	0.19	<0.1	<0.1	<0.2	<0.5
Titanium	µg/L	0.3-1.2	NG	NG	2.7	4.54	106	4.2	16.2	0.91	1.72
Tungsten	µg/L	0.1-0.2	NG	NG	<0.1	<0.1	0.15	<0.1	<0.1	<0.2	<0.5
Uranium	µg/L	0.01	NG	NG	1.5	3.84	3.99	6.96	4.14	3.1	4.11
Vanadium	µg/L	0.5-1.0	NG	NG	<0.5	0.73	18.1	1.51	1.87	<1	<2.5
Zinc [3]	µg/L	3.0	Calc. based on Hardness	Calc. based on Hardness	13.6	8.5	236	**524**	268	196	38.1
Zn FST Guideline Calc.	µg/L		Hardness < 90,000 = 33.0 Hardness 90,000 - 500,000, Calc. Hardness > 500,000, Capped Value		184.5	340.5	312.8	340.5	340.5	340.5	340.5
Zn FLT Guideline Calc.	µg/L			Hardness < 90,000 = 7.5 Hardness 90,000 - 330,000, Calc. Hardness > 330,000, Capped Value	159.0	187.5	187.5	187.5	187.5	187.5	187.5
Zirconium	µg/L	0.06-0.12	NG	NG	<0.2	<0.2	1.14	0.22	0.23	<0.4	<1
Metals, Dissolved											
Aluminum [5]	µg/L	1.0	100	50	**107**	8.2	53.9	79.1	**152**	39.1	12.5
Al FST Guideline Calc (based on pH)	µg/L		pH < 6.5 : calc. Al pH ≥ 6.5 : 100.0 Al		100	100	100	100	100	100	100
Al FLT Guideline Calc (based on median pH)	µg/L			median pH < 6.5 : calc. Al median pH ≥ 6.5 : 50.0 Al	50	50	50	50	50	50	50
Antimony	µg/L	0.1-0.2	NG	NG	<0.1	0.16	0.17	0.27	0.2	<0.2	<0.5
Arsenic	µg/L	0.10	NG	NG	0.3	0.37	0.19	0.15	0.2	<0.2	<0.5
Barium	µg/L	0.10	NG	NG	40.6	43.6	44.1	47.3	53.5	24.8	27.9
Beryllium	µg/L	0.1-0.2	NG	NG	<0.1	<0.1	<0.1	<0.1	0.104	0.108	<0.1
Bismuth	µg/L	0.05-0.1	NG	NG	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<0.25
Boron	µg/L	10.0	NG	NG	28	48	29	117	105	131	143
Cadmium [3]	µg/L	0.005	Calc. based on Hardness	Calc. based on hardness	0.25	0.119	0.542	1.89	1.81	2.29	0.399
Cd FST Guideline Calc.	µg/L		Hardness 7,000 - 455,000, Calc. Hardness > 455,000, is Capped Value of 455,000		1.77	2.80	2.80	2.80	2.80	2.80	2.80
Cd FLT Guideline Calc.	µg/L			Hardness 3,400 - 285,000, Calc. Hardness > 285,000, is Capped Value of 285,000	0.46	0.46	0.46	0.46	0.46	0.46	0.46
Calcium	µg/L	50.0	NG	NG	88000	251000	135000	294000	220000	412000	380000
Cesium	µg/L	0.01	NG	NG	<0.01	<0.01	0.012	0.018	<0.02	0.027	<0.05
Chromium	µg/L	0.10	NG	NG	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cobalt	µg/L	0.10	NG	NG	3.64	0.58	17.9	31.4	27.5	9.57	<0.5
Copper [6]	µg/L	0.20	Calc. based on BLM Model	Calc. based on BLM Model	7.29	1.6	2.61	3.53	1.83	1.16	1.53
Cu FST Guideline Value (Acute)	µg/L		BLM Ligand Model value		50.5	28	28.8	41.8	29.9	15	90
Cu FLT Guideline Value (Chronic)	µg/L			BLM Ligand Model value	8.7	5.4	5.4	6.2	4.8	2.2	13.5
Iron	µg/L	10.0-20.0	350	NG	90	12	82	23	10	10	25
Lead	µg/L	0.05-0.1	NG	NG	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<0.25
Lithium	µg/L	1.0	NG	NG	14.5	43.5	26.9	75.5	75.5	105	88.6
Magnesium	µg/L	5.0	NG	NG	17600	67000	30600	89300	72900	129000	112000
Manganese	µg/L	0.10	NG	NG	239	21.4	402	488	377	252	14.9
Mercury	µg/L	0.005	NG	NG	0.0154	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Molybdenum	µg/L	0.05	NG	NG	3.61	3.2	2.99	3.23	2.98	0.63	1.8
Nickel	µg/L	0.50	NG	NG	14.9	16.9	56	188	190	212	53.3
Phosphorus	µg/L	50.0-100.0	NG	NG	<50	<50	<50	<50	<100	<100	<250
Potassium	µg/L	50.0	NG	NG	21200	8050	6140	8300	8000	9350	11500
Rubidium	µg/L	0.20	NG	NG	2.97	1.48	1.46	3.1	2.62	4.36	3.48

Appendix B1: LBRR Surface Water Analytical Results

Parameter	Unit	RDL	BCAWQG - FST [1]	BCAWQG-FLT [2]	LBRR-DD	LBRR-DD	LBRR-12+500	LBRR-12+500	LBRR-12+500	LBRR-12+500	LBRR-12+500
					26-Jan-22	30-Mar-22	30-Mar-22	31-May-22	27-Jun-22	30-Aug-22	29-Sep-22
Selenium	µg/L	0.05	NG	2.0	1.09	2.58	1.61	2.44	1.01	1.26	1.1
Silicon	µg/L	50.0	NG	NG	5220	2840	1950	5330	5630	5720	5380
Silver	µg/L	0.01-0.02	NG	NG	<0.01	<0.01	<0.01	<0.01	<0.02	<0.02	<0.05
Sodium	µg/L	50.0	NG	NG	5910	31000	29700	54100	54700	44000	42600
Strontium	µg/L	0.20	NG	NG	172	832	1080	968	802	1320	1690
Sulfur	µg/L	500	NG	NG	96700	200000	77200	319000	218000	408000	430000
Tellerium	µg/L	0.2-0.4	NG	NG	<0.2	<0.2	<0.2	<0.2	<0.4	<0.4	<1
Thallium	µg/L	0.01	NG	NG	0.015	<0.01	0.017	0.04	0.032	0.043	<0.05
Thorium	µg/L	0.1-0.2	NG	NG	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.5
Tin	µg/L	0.1-0.2	NG	NG	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.5
Titanium	µg/L	0.3-0.6	NG	NG	0.38	<0.3	<0.9	<0.3	<0.6	<0.6	<1.5
Tungsten	µg/L	0.1-0.2	NG	NG	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	<0.5
Uranium	µg/L	0.01	NG	NG	1.43	3.62	2.12	6.22	3.87	3.16	4.35
Vanadium	µg/L	0.5-1.0	NG	NG	<0.5	<0.5	<0.5	<0.5	<1	<1	<2.5
Zinc	µg/L	1.00	NG	NG	10.6	6.3	44.8	214	243	188	34.3
Zirconium	µg/L	0.06-0.12	NG	NG	<0.2	<0.2	<0.2	<0.2	<0.4	<0.4	<1
Laboratory Work Order Number					FJ2200232	FJ2200791	FJ2200791	FJ2201370	FJ2201687	F2202383	FJ2202765
Laboratory Identification Number				FJ2200232	FJ2200232-002	FJ2200791-006	FJ2200791-007	FJ2201370-008	FJ2201687-001	FJ2202383-001	FJ2202765-001

Notes:

Screening completed on BCAWQG-FST [1] and FLT [2] guideline values.

[1] BC Ministry of Environment, Water Protection & Sustainability Branch (2019). British Columbia Approved Water Quality Guidelines (BCAWQG): Aquatic Life, Wildlife & Agriculture Summary Report. 36 pp. Referenced for Freshwater Aquatic Life (F) water use and Short Term Maximum (ST) guidelines.

[2] BC Ministry of Environment, Water Protection & Sustainability Branch (2018). British Columbia Approved Water Quality Guidelines (BCAWQG): Aquatic Life, Wildlife & Agriculture Summary Report. 36 pp. Referenced for Freshwater Aquatic Life (F) water use and Long Term Average (LT) guidelines.

[3] Guideline is hardness dependant. Where results are above laboratory reportable detection limits, guideline limits have been evaluated based on individual sample hardness. Sample-specific guideline values are listed in parentheses after the laboratory result, where applicable.

[4] Guideline is for Chromium (IV) cation. Analytical results are for unspeciated Chromium. Where analytical results exceed the guideline, speciated analysis may be warranted.

[5] Guideline is pH dependant.

NG - No Guideline

Detection limit can vary as described in the COA. Detection limit can be raised when dilutation is required due to high Dissolved Solids/Electrical Conductivity (DLDS), e.g. nitrite.

BOLD and shaded dark gray: Exceeds BCAWQG-FST (Freshwater Short Term) guideline.

Shaded Light Gray: Exceeds BCAWQG-FLT (Freshwater Long Term) guideline.

RED - Measured value is below detection limit (DL); value shown is 50% of DL

Blank - Not analyzed

Appendix B1: LBRR Surface Water Analytical Results

Parameter	Unit	RDL	BCAWQG - FST [1]	BCAWQG-FLT [2]	LBRR-12+500 31-Oct-22	LBRR-UC 30-Mar-22	LBRR-UC 27-Jun-22	RR9 25-Jan-22	RR9 30-Mar-22	RR9 31-May-22
Physical Parameters										
Acidity (Total as $CaCO_3$)	µg/L	1000	NG	NG	5000	5000	1000	2600	2300	3400
Alkalinity (Total as $CaCO_3$)	mg/L	1.0	NG	NG	221	115	279	163	79.3	146
Electrical Conductivity (EC)	µS/cm	2.0	NG	NG	1470	985	1340	758	1700	2320
Hardness as CaCO3, dissolved	µg/L	500	NG (Acceptable ranges exist when calculating exceedances for Cd, Cu, Pb, Mn, Zn)	NG (Acceptable ranges exist when calculating exceedances for Cd, Cu, Pb, Mn, Zn)	738000	398000	641000	210000	731000	1180000
Hardness as CaCO3, from total Ca/Mg (New January 2020)	µg/L	500			746000	445000	639000	1290000	828000	1280000
pH	pH Units	0.10	6.5 - 9	6.5-9.0	7.99	7.97	8.33	8.04	8.05	8.07
Total Dissolved Solids (TDS)	µg/L	10000	NG	NG	1100000	622000	931000	735000	1230000	1820000
Total Suspended Solids (TSS)	µg/L	3000	NG	NG	26000	104000	52400	5190000	142000	29300
Alkalinity (Hydroxide) as $CaCO_3$	µg/L	1000	NG	NG	<1000	<1000	<1000	<1000	<1000	<1000
Alkalinity (Carbonate as $CaCO_3$)	µg/L	1000	NG	NG	<1000	<1000	12000	<1000	<1000	<1000
Alkalinity (Bicarbonate as $CaCO_3$)	µg/L	1000	NG	NG	221000	115000	267000	163000	79300	146000
Anions and Nutrients (Matrix: Water)										
Ammonia (NH_4 as N)	µg/L	5.0	pH dependent (6.5-9.0)	pH dependent (6.5-9.0)	30.7	140	<5	392	151	40.8
Ammonia FST Guideline	µg/L		pH dependent (at Temp 4 °C or in situ T)		6220	6220	3150	6220	4950	4950
Ammonia FLT Guideline	µg/L			pH dependent (at Temp 4 °C or in situ T)	1200	1200	606	1200	952	952
Chloride (Cl^-)	µg/L	500	600,000	150,000	217000	121000	172000	131000	268000	126000
Nitrate (NO_3^- as N)	µg/L	5.0-100	NG	NG	240		<25	587		421
Nitrite (NO_2^- as N)	µg/L	1.0-20	Cl-dependent (> 10,000 µg/L) Guideline: 600 ug/L	Cl-dependent (> 10,000 µg/L) Guideline: 200 ug/L	6.2		<5	26.6		<20
Sulphate (SO_4) [3]	µg/L	300	NG	309,000 - 429,000	364000	206000	249000	88700	406000	978000
SO4 FLT Guideline Calc	µg/L		NG	Hardness 76,000-180,000 = 309,000 Hardness 181,000-250,000 = 429,000 Hardness > 250,000 site-specific	429000	309000	309000	309000	429000	429000
Dissolved Organic Carbon (DOC)	mg/L	1.0	NG	NG	5.08	13.6	6.33	5.88	5.99	7.61
Metals, Total										
Aluminum	µg/L	3.00	NG	NG	85.6	1020	173	51100	2450	1360
Antimony	µg/L	0.1-0.2	NG	NG	0.15	0.25	0.24	1.48	0.4	0.3
Arsenic	µg/L	0.10	5.0	5.0	0.24	4.52	1.88	**24.7**	2.85	0.78
Barium	µg/L	0.10	NG	NG	41.4	96.2	83.4	3570	116	55.4
Beryllium	µg/L	0.10	NG	NG	<0.1	0.146	<0.1	3.01	0.201	0.207
Bismuth	µg/L	0.05-0.10	NG	NG	<0.05	<0.05	<0.05	0.807	<0.05	<0.05
Boron	µg/L	10.0	1200	1200	84	28	44	62	56	124
Cadmium	µg/L	0.005	NG	NG	0.133	0.288	0.0306	5.14	0.91	1
Calcium	µg/L	50	NG	NG	204000	123000	167000	398000	233000	332000
Cesium	µg/L	0.01		NG	0.01	0.112	0.114	4.32	0.246	0.024
Chromium [4]	µg/L	0.1-0.7	NG	NG	<0.5	1.96	<0.5	227	4.94	1.1
Cobalt	µg/L	0.10	110	4.0	1.96	20.3	0.37	53	26.7	23.1
Copper [3]	µg/L	0.50	Calc. based on Hardness	2 to 10	1.36	21.7	2.32	156	8.78	7.8
Cu STM Guideline Calc.	µg/L		Hardness 13,000 - 400,000 : calc.; Hardness > 400,000 is Capped Value of 400,000							
Cu LTA Guideline Calc.	µg/L			Hardness 50,000 - 250,000: calc.; Hardness > 250,000, Cu = 10						
Iron	µg/L	10	1000	NG	160	**10700**	695	**170000**	**6470**	**2630**
Lead [3]	µg/L	0.05-0.1	Calc. based on Hardness	Calc. based on Hardness	<0.05	0.843	0.501	69.7	1.79	0.109
Pb FST Guideline Calc (Based on Hardness as CaCO3), applies to water hardness 8000-360,000 µg/L	µg/L		Hardness ≤ 8000 is 3; Hardness 8000-360,000: calc. Hardness>360,000 is Capped Value of 360,000		417	417	417	182	417	417
Pb FLT Guideline Calc (Based on Hardness as CaCO3)	µg/L			Hardness 8000-360,000: calc. Hardness > 360,000 is Capped Value of 360,000	20	20	20	10	20	20
Lithium	µg/L	1.0	NG	NG	37.9	13.8	21.1	79.7	50.2	73.2
Magnesium	µg/L	5.0	NG	NG	57400	33600	53900	73000	59900	110000
Manganese [3]	µg/L	0.10	Calc. based on hardness	Calc. based on Hardness	50.6	626	13.3	**5270**	671	380
Mn FST Guideline Calc (Based on Hardness as CaCO3)	µg/L		Hardness 25,000 - 259,000 : calc.; Hardness > 259,000 is Capped Value of 259,000		3394.2	3394.2	3394.2	2612	3394.2	3394.2
Mn FLT Guideline Calc (Based on Hardness as CaCO3)	µg/L			Hardness 37,000 - 450,000: calc.; Hardness > 450,000 is Capped Value of 450,000	2585.0	2356.2	2585.0	1432	2585.0	2585.0
Mercury (Based on methyl Hg & total mass Hg)	µg/L	0.005	NG	Calc.	<0.005	<0.005	<0.005	0.278	<0.005	<0.005
Molybdenum	µg/L	0.05	2000	≤ 1000	2.89	3.66	5.94	4.55	4.09	3.35
Nickel	µg/L	0.5	NG		21.1	43.7	3.78	174	95.6	147
Phosphorus	µg/L	50-100	NG	NG	<50	294	57	7320	244	<50
Potassium	µg/L	50.0	NG	NG	6310	5850	6620	17100	9090	9730
Rubidium	µg/L	0.2	NG	NG	1.78	2.36	3.37	48.8	4.5	3.66
Selenium	µg/L	0.05	NG	2.0	0.634	0.661	0.472	1.28	2.17	2.6
Silicon	µg/L	100		NG	4870	3980	6010	60300	5560	4800
Silver [3]	µg/L	0.01-0.02	0.10 - 3.0	0.05 - 1.5	<0.01	0.03	0.016	1.23	0.042	<0.01
Ag FST Guideline Calc			Hardness ≤ 100,000 Ag = 0.10 Hardness > 100,000 Ag = 3.0		3.0	3.0	3.0	3.0	3.0	3.0
Ag FLT Guideline Calc				Hardness ≤ 100,000 Ag = 0.05 Hardness > 100,000 Ag = 1.5	1.5	1.5	1.5	1.5	1.5	1.5
Sodium	µg/L	50.0	NG	NG	58700	28600	48700	57800	47800	60300
Strontium	µg/L	0.2	NG	NG	766	381	529	1360	1900	1160
Sulfur	µg/L	500	NG	NG	130000	75800	93600	40700	151000	398000
Tellerium	µg/L	0.2-0.4	NG	NG	<0.2	<0.2	<0.2	<1	0.44	0.2
Thallium	µg/L	0.01-0.055	NG	NG	0.018	0.043	0.035	1.12	0.064	0.043
Thorium	µg/L	0.1-0.2	NG	NG	<0.1	1.79	<0.1	18.8	1.15	0.36
Tin	µg/L	0.1-0.2	NG	NG	<0.1	<0.1	<0.1	0.83	<0.1	<0.1
Titanium	µg/L	0.3-1.2	NG	NG	1.51	6.3	3.55	354	51.3	2.44
Tungsten	µg/L	0.1-0.2	NG	NG	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1
Uranium	µg/L	0.01	NG	NG	3.26	6.58	5.63	6.87	3.39	6.82
Vanadium	µg/L	0.5-1.0	NG	NG	<0.5	2.58	1.26	134	6.95	0.68
Zinc [3]	µg/L	3.0	Calc. based on Hardness	Calc. based on Hardness	14.5	44.8	3.4	**624**	103	140
Zn FST Guideline Calc.	µg/L		Hardness < 90,000 = 33.0 Hardness 90,000 - 500,000, Calc. Hardness > 500,000, Capped Value		340.5	264.0	340.5	106.5	340.5	340.5
Zn FLT Guideline Calc.	µg/L			Hardness < 90,000 = 7.5 Hardness 90,000 - 330,000, Calc. Hardness > 330,000, Capped Value	187.5	187.5	187.5	81	187.5	187.5
Zirconium	µg/L	0.06-0.12	NG	NG	<0.2	<0.2	1.64	<1	0.78	<0.2
Metals, Dissolved										
Aluminum [5]	µg/L	1.0	100	50	19	25.2	2.8	26.7	98	**468**
Al FST Guideline Calc (based on pH)	µg/L		pH < 6.5 : calc. Al pH ≥ 6.5 : 100.0 Al		100	100	100	100	100	100
Al FLT Guideline Calc (based on median pH)	µg/L			median pH < 6.5 : calc. Al median pH ≥ 6.5 : 50.0 Al	50	50	50	50	50	50
Antimony	µg/L	0.1-0.2	NG	NG	0.14	0.18	0.23	0.24	0.18	0.28
Arsenic	µg/L	0.10	NG	NG	0.16	0.57	1.54	0.21	0.18	0.21
Barium	µg/L	0.10	NG	NG	42	57.4	75.2	142	47.2	54.8
Beryllium	µg/L	0.1-0.2	NG	NG	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Bismuth	µg/L	0.05-0.1	NG	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	µg/L	10.0	NG	NG	82	24	44	23	49	126
Cadmium [3]	µg/L	0.005	Calc. based on Hardness	Calc. based on hardness	0.132	0.211	0.0118	0.0242	0.534	0.4
Cd FST Guideline Calc.	µg/L		Hardness 7,000 - 455,000, Calc. Hardness > 455,000, is Capped Value of 455,000		2.80	2.44	2.80	1.13	2.80	2.80
Cd FLT Guideline Calc.	µg/L			Hardness 3,400 - 285,000, Calc. Hardness > 285,000, is Capped Value of 285,000	0.46	0.46	0.46	0.34	0.46	0.46
Calcium	µg/L	50.0	NG	NG	200000	110000	167000	63000	212000	317000
Cesium	µg/L	0.01	NG	NG	<0.01	<0.01	0.02	<0.01	<0.01	0.02
Chromium	µg/L	0.10	NG	NG	<0.5	<0.5	<0.5	0.97	<0.5	<0.5
Cobalt	µg/L	0.10	NG	NG	1.94	18.4	<0.1	0.41	21.9	19.2
Copper [6]	µg/L	0.20	Calc. based on BLM Model	Calc. based on BLM Model	1.1	4.05	1.5	3.22	2.66	2.92
Cu FST Guideline Value (Acute)	µg/L		BLM Ligand Model value		31.1	69.9	50.2	38.4	34.7	45.5
Cu FLT Guideline Value (Chronic)	µg/L			BLM Ligand Model value	4.6	12.8	5.6	6.3	6.6	7.5
Iron	µg/L	10.0-20.0	350	NG	5	**4340**	5	26	5	5
Lead	µg/L	0.05-0.1	NG	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Lithium	µg/L	1.0	NG	NG	36.1	11.8	22.5	14.3	46.3	78.8
Magnesium	µg/L	5.0	NG	NG	57900	29900	54500	12800	49000	95300
Manganese	µg/L	0.10	NG	NG	48.6	617	0.46	93.2	534	326
Mercury	µg/L	0.005	NG	NG	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Molybdenum	µg/L	0.05	NG	NG	2.92	2.64	5.7	5.27	3.46	3.39
Nickel	µg/L	0.50	NG	NG	20.7	39.7	2.96	3.75	81.2	121
Phosphorus	µg/L	50.0-100.0	NG	NG	<50	<50	<50	<50	<50	<50
Potassium	µg/L	50.0	NG	NG	6350	5470	7140	9820	7940	9090
Rubidium	µg/L	0.20	NG	NG	1.82	1.17	2.77	2.56	1.93	3.71

Appendix B1: LBRR Surface Water Analytical Results

Parameter	Unit	RDL	BCAWQG - FST [1]	BCAWQG-FLT [2]	LBRR-12+500	LBRR-UC	LBRR-UC	RR9	RR9	RR9
					31-Oct-22	30-Mar-22	27-Jun-22	25-Jan-22	30-Mar-22	31-May-22
Selenium	µg/L	0.05	NG	2.0	0.779	0.458	0.662	0.618	1.95	2.44
Silicon	µg/L	50.0	NG	NG	5130	3170	6120	1720	2130	3780
Silver	µg/L	0.01-0.02	NG	NG	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sodium	µg/L	50.0	NG	NG	59800	25700	51100	57800	40600	56500
Strontium	µg/L	0.20	NG	NG	795	341	548	529	1660	1060
Sulfur	µg/L	500	NG	NG	137000	66000	98900	38800	129000	348000
Tellerium	µg/L	0.2-0.4	NG	NG	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Thallium	µg/L	0.01	NG	NG	0.018	<0.01	0.025	0.017	0.018	0.044
Thorium	µg/L	0.1-0.2	NG	NG	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tin	µg/L	0.1-0.2	NG	NG	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Titanium	µg/L	0.3-0.6	NG	NG	<0.3	0.33	<0.3	0.52	<0.3	<0.3
Tungsten	µg/L	0.1-0.2	NG	NG	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Uranium	µg/L	0.01	NG	NG	3.43	4.69	5.21	0.606	2.86	7
Vanadium	µg/L	0.5-1.0	NG	NG	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Zinc	µg/L	1.00	NG	NG	11	29.6	<1	3.2	30.2	15.9
Zirconium	µg/L	0.06-0.12	NG	NG	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Laboratory Work Order Number					FJ2203077	FJ2200791	FJ2201687	FJ2200226	FJ2200791	FJ2201370
Laboratory Identification Number				FJ2200232	FJ2203077-001	FJ2200791-008	FJ2201687-002	FJ2200226-004	FJ2200791-005	FJ2201370-007

Notes:

Screening completed on BCAWQG-FST [1] and FLT [2] guideline values.

[1] BC Ministry of Environment, Water Protection & Sustainability Branch (2019). British Columbia Approved Water Quality Guidelines (BCAWQG): Aquatic Life, Wildlife & Agriculture Summary Report. 36 pp. Referenced for Freshwater Aquatic Life (F) water use and Short Term Maximum (ST) guidelines.

[2] BC Ministry of Environment, Water Protection & Sustainability Branch (2018). British Columbia Approved Water Quality Guidelines (BCAWQG): Aquatic Life, Wildlife & Agriculture Summary Report. 36 pp. Referenced for Freshwater Aquatic Life (F) water use and Long Term Average (LT) guidelines.

[3] Guideline is hardness dependant. Where results are above laboratory reportable detection limits, guideline limits have been evaluated based on individual sample hardness. Sample-specific guideline values are listed in parentheses after the laboratory result, where applicable.

[4] Guideline is for Chromium (IV) cation. Analytical results are for unspeciated Chromium. Where analytical results exceed the guideline, speciated analysis may be warranted.

[5] Guideline is pH dependant.

NG - No Guideline

Detection limit can vary as described in the COA. Detection limit can be raised when dilutation is required due to high Dissolved Solids/Electrical Conductivity (DLDS), e.g. nitrite.

BOLD and shaded dark gray: Exceeds BCAWQG-FST (Freshwater Short Term) guideline.

Shaded Light Gray: Exceeds BCAWQG-FLT (Freshwater Long Term) guideline.

RED - Measured value is below detection limit (DL); value shown is 50% of DL

Blank - Not analyzed

Appendix B2: SBIAR Surface Water Analytical Results

Parameter	Unit	RDL	BCAWQG - FST 1	BCAWQG - FLT 2	RBSBIAR-DS 25-Jan-22	RBSBIAR-DS 30-Mar-22	RBSBIAR-DS 18-Apr-22	RBSBIAR-DS 30-May-22	RBSBIAR-DS 26-Jun-22	RBSBIAR-DS 24-Jul-22	RBSBIAR-DS 29-Aug-22
Physical Parameters											
Acidity (Total as $CaCO_3$)	µg/L	1000	NG	NG	1000	1000	2500	1000	4300	1000	2900
Alkalinity (Total as $CaCO_3$)	mg/L	1.0	NG	NG	180	170	268	192	171	261	274
Electrical Conductivity (EC)	µS/cm	2.0	NG	NG	583	793	905	955	729	741	668
Hardness as CaCO3, dissolved	µg/L	500	NG	NG	253000	305000	282000	376000	339000	344000	314000
Hardness as CaCO3, from total Ca/Mg (New January 2020)	µg/L				262000	383000	305000	385000	343000	303000	371000
pH	pH Units	0.10	6.5 - 9	6.5-9.0	8.23	8.31	8.09	8.24	8.13	7.56	8.06
Total Dissolved Solids (TDS)	µg/L	10000	NG	NG	339000	487000	569000	578000	494000	475000	402000
Total Suspended Solids (TSS)	µg/L	3000	NG	NG	13300	698000	12200	26500	7700	1500	5300
Alkalinity (Hydroxide) as $CaCO_3$	µg/L	1000	NG	NG	<1000	<1000	<1000	<1000	<1000	<1000	<1000
Alkalinity (Carbonate as $CaCO_3$)	µg/L	1000	NG	NG	<1000	5400	<1000	<1000	<1000	<1000	<1000
Alkalinity (Bicarbonate as $CaCO_3$)	µg/L	1000	NG	NG	180000	165000	268000	192000	171000	261000	274000
Anions and Nutrients											
Ammonia (NH_4 as N)	µg/L	5.0	pH dependent (6.5-9.0)	pH dependent (6.5-9.0)	116	220	335	248	283	204	118
Ammonia FST Guideline	µg/L		pH dependent (at Temp 4 °C or in situ T)		3950	3150	4950	3950	4950	11900	4950
Ammonia FLT Guideline				pH dependent (at Temp 4 °C or in situ T)	759	606	952	759	952	1970	952
Chloride (Cl^-)	µg/L	500	600000	150,000	27800	25800	37500	56400	52900	52200	26600
Nitrate (NO_3^- as N)	µg/L	5.0-25.0	NG	NG	746		1780	1280	849	613	652
Nitrite (NO_2^- as N)	µg/L	1.0-5.0	Cl-dependent (> 10,000 µg/L) Guideline: 600 ug/L	Cl-dependent (> 10,000 µg/L) Guideline: 200 ug/L	10.7		11.5	8.40	8.7	19.7	11.3
Sulphate (SO_4) [3]	µg/L	300	NG	309,000 - 429,000	69800	210000	167000	217000	124000	92100	82500
SO4 FLT Guideline Calc	µg/L		NG	Hardness 76,000-180,000 = 309,000 Hardness 181,000-250,000 = 429,000 Hardness > 250,000 site-specific	309000	309000	309000	309000	309000	309000	309000
Dissolved Organic Carbon (DOC)	mg/L	1.0	NG	NG	2.44	1.98	0.84	1.72	1.02	1.72	1540
Metals, Total											
Aluminum	µg/L	3.00	NG	NG	296	2940	75.4	1830	144	31.7	34.7
Antimony	µg/L	0.10	NG	NG	0.3	0.5	0.31	0.31	0.31	0.23	0.13
Arsenic	µg/L	0.10	5.0	5.0	0.62	3.73	0.48	0.8	0.29	0.32	0.29
Barium	µg/L	0.10	NG	NG	142	206	33.8	80.9	73.7	127	208
Beryllium	µg/L	0.10	NG	NG	<0.1	0.257	<0.1	0.544	<0.1	<0.1	<0.1
Bismuth	µg/L	0.05	NG	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	µg/L	10.0	1200	1200	36	83	134	96	121	148	100
Cadmium	µg/L	0.005	NG	NG	0.0806	0.505	0.0794	1.29	0.149	0.0252	0.0122
Calcium	µg/L	50	NG	NG	75600	109000	87700	105000	97400	85200	106000
Cesium	µg/L	0.01	NG	NG	0.092	0.687	0.041	0.037	0.039	0.033	0.023
Chromium [4]	µg/L	0.1-1.0	NG	NG	0.93	6.45	<0.5	1.12	<0.5	<0.5	<0.5
Cobalt	µg/L	0.10	110	4.0	0.98	9.81	1.63	29.1	4.32	0.42	0.22
Copper [3]	µg/L	0.50	Calc. based on Hardness	2 to 10	1.74	11.5	0.77	20.4	1.82	0.56	0.25
Cu FST Guideline Calc. (relevant prior to August 2019)	µg/L		Hardness 13,000 - 400,000 : calc.; Hardness ≥ 400,000 is Capped Value of 400,000								
Cu FLT Guideline Calc. (relevant prior to August 2019)	µg/L			Hardness 50,000 - 250,000: calc.; Hardness > 250,000, Cu = 10							
Iron	µg/L	10	1000	NG	764	**8480**	161	**2360**	436	40	60
Lead [3]	µg/L	0.05	101 - 348	Calc. based on Hardness	0.348	3.85	0.093	0.177	0.05	<0.05	<0.05
Pb FST Guideline Calc (Based on Hardness as CaCO3), applies to water hardness 8000-360,000 µg/L	µg/L		Based on Hardness 8000-360,000 Hardness ≤ 8000: 3 Hardness > 8000 : calc.		266.1	337.6	305.6	417.0	386.3	393.5	350.4
Pb FLT Guideline Calc (Based on Hardness as CaCO3)	µg/L			Applies to Hardness 8000-360,000 Hardness ≤ 8000, NG Hardness > 8000 : calc.	13.7	16.5	15.2	19.6	18.4	18.7	17.0
Lithium	µg/L	1.0	NG	NG	12.6	36.3	43.4	41.4	30.8	26.6	33
Magnesium	µg/L	5.0	NG	NG	17700	27000	20900	29800	24200	22000	25800
Manganese [3]	µg/L	0.10	Calc. based on Hardness	Calc. based on Hardness	27.2	267	40.1	311	70.6	14.7	9.3
Mn FST Guideline Calc (Based on Hardness as CaCO3)	µg/L		Applies to Hardness 25000-259000 µg/L Mn : calc.		3328.1	3394.2	3394.18	3394.18	3394.18	3394.18	3394.18
Mn FLT Guideline Calc (Based on Hardness as CaCO3)	µg/L			Applies to Hardness 37000-450000 µg/L Mn : calc.	1718.2	1947.0	1845.8	1845.8	1845.8	1845.8	1986.6
Mercury (Based on methyl Hg & total mass Hg)	µg/L	0.005	NG	Calc.	<0.005	0.0181	<0.005	<0.005	<0.005	<0.005	<0.005
Molybdenum	µg/L	0.05	2000	≤ 1000	3.8	4.37	4.56	4.16	3.84	3.42	1.89
Nickel	µg/L	0.50	NG	NG	7.05	35.2	10.8	92.8	20	4.59	2.49
Phosphorus	µg/L	50.0	NG	NG	54	373	<50	60	<50	<50	<50
Potassium	µg/L	50.0	NG	NG	2900	3910	2910	3940	4250	3860	2800
Rubidium	µg/L	0.2	NG	NG	1.82	8.11	2.24	1.87	1.95	1.61	1.12
Selenium	µg/L	0.05	NG	2.0	0.962	1.75	1.14	1.33	0.797	0.66	1
Silicon	µg/L	100.0	NG	NG	3580	6940	3290	4420	4780	5190	5400
Silver [3] (Based on Hardness < or > 100000)	µg/L	0.01	0.10 - 3.0	0.05 - 1.5	<0.01	0.064	<0.01	0.042	<0.01	<0.01	<0.01
Ag FST Guideline Calc	µg/L		Hardness ≤ 100,000 Ag = 0.10 Hardness > 100,000 Ag = 3.0		3.00	3.0	3.0	3.0	3.0	3.0	3.0
Ag FLT Guideline Calc	µg/L			Hardness ≤ 100,000 Ag = 0.05 Hardness > 100,000 Ag = 1.5	1.50	1.5	1.5	1.5	1.5	1.5	1.5
Sodium	µg/L	50.0	NG	NG	28100	50100	94800	47500	52200	45000	44600
Strontium	µg/L	0.2	NG	NG	321	578	551	600	528	455	422
Sulfur	µg/L	500.0	NG	NG	29600	77600	67600	78900	46900	33500	29300
Tellerium	µg/L	0.2	NG	NG	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Thallium	µg/L	0.01	NG	NG	0.017	0.101	0.017	0.019	0.016	0.012	<0.01
Thorium	µg/L	0.10	NG	NG	0.11	1.76	<0.1	1.74	<0.1	<0.1	<0.1
Tin	µg/L	0.10	NG	NG	<0.1	0.15	<0.1	<0.1	<0.1	0.71	0.23
Titanium	µg/L	0.3-4.5	NG	NG	5.84	42.4	1.4	2.8	0.97	0.47	0.58
Tungsten	µg/L	0.10	NG	NG	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Uranium	µg/L	0.01	NG	NG	1.12	1.98	1.21	3.28	1.26	1.05	1.34
Vanadium	µg/L	0.50	NG	NG	1.2	10.3	0.82	0.56	<0.5	0.62	0.66
Zinc [3] (Based on Hardness < or > 90,000)	µg/L	3.0	Calc. based on Hardness	Calc. based on Hardness	9.6	72.4	6.6	**273**	44.6	4.5	1.5
Zn FST Guideline Calc.	µg/L		Hardness 90,000 - 500,000, Calc. Hardness > 500,000, is Capped Value of 500,000		155.25	194.25	177	247.5	219.75	223.5	201
Zn FLT Guideline Calc.				Hardness 90,000 - 330,000, Calc. Hardness > 330,000, is Capped Value of 330,000	130	169	151.5	187.5	187.5	187.5	175.5
Zircronium	µg/L	0.06	NG	NG	<0.2	0.66	<0.2	<0.2	<0.2	<0.2	<0.2
Metals, Dissolved											
Aluminum [5]	µg/L	1.0	100	50	6.6	61.2	12.7	**284**	62.8	17.5	7.7
Al FST Guideline Calc (based on pH)	µg/L		pH < 6.5 : calc. Al pH ≥ 6.5 : 100.0 Al		100	100	100	100	100	100	100
Al FLT Guideline Calc (based on median pH)	µg/L			median pH < 6.5 : calc. Al median pH ≥ 6.5 : 50.0 Al	50	50	50	50	50	50	50
Antimony	µg/L	0.10	NG	NG	0.28	0.28	<0.5	0.3	0.26	0.24	0.13
Arsenic	µg/L	0.10	NG	NG	0.26	0.23	0.25	0.15	0.19	0.26	0.25
Barium	µg/L	0.10	NG	NG	112	31.9	29	74.6	69.7	135	173
Beryllium	µg/L	0.10	NG	NG	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Bismuth		0.05	NG	NG	<0.05	<0.05	<0.25	<0.05	<0.05	<0.05	<0.05
Boron	µg/L	10.0	NG	NG	32	69	125	87	124	126	124
Cadmium [3] (Based on Hardness as $CaCO_3$)	µg/L	0.005	Calc. based on Hardness	Calc. based on hardness	0.0465	0.187	0.0724	0.942	0.112	0.0273	0.0025
Cd FST Guideline Calc.	µg/L		Hardness 7,000 - 455,000, Calc. Hardness > 455,000, is Capped Value of 455,000		1.530	1.855	1.711	2.301	2.068	2.100	1.911
Cd FLT Guideline Calc.				Hardness 3,400 - 285,000, Calc. Hardness > 285,000, is Capped Value of 285,000	0.419	0.457	0.454	0.457	0.457	0.457	0.457
Calcium	µg/L	50.0	NG	NG	72500	86700	80400	102000	94400	94800	79000
Cesium		0.01	NG	NG	<0.01	0.022	<0.05	0.023	0.031	0.031	0.019
Chromium	µg/L	0.10	NG	NG	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cobalt	µg/L	0.10	NG	NG	0.55	5.69	1.45	26.6	4	0.41	0.16
Copper [6]	µg/L	0.20	Calc. based on BLM Model	Calc. based on BLM Model	0.72	1.04	0.5	4.12	0.82	0.55	0.24
Cu FST Guideline Value (Acute)	µg/L		BLM Ligand Model value		16.9	15.5	148.1	13.1	7.5	7.1	10.4
Cu FLT Guideline Value (Chronic)	µg/L			BLM Ligand Model value	3.2	3.1	28.2	2.6	1.2	0.8	1.8
Iron	µg/L	10.0	350	NG	5	5	25	206	14	5	5
Lead	µg/L	0.05	NG	NG	<0.05	<0.05	<0.25	<0.05	<0.05	<0.05	<0.05
Lithium	µg/L	1.0	NG	NG	12.5	30.9	41	40.5	30.4	25.8	41.3
Magnesium	µg/L	5.0	NG	NG	17500	21400	19700	29400	25000	26100	28300
Manganese	µg/L	0.10	NG	NG	12.7	118	35	298	63.8	15.1	6.44
Mercury	µg/L	0.005	NG	NG	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Molybdenum	µg/L	0.05	NG	NG	3.66	4.76	4.46	3.87	3.57	3.46	2.26
Nickel	µg/L	0.50	NG	NG	5.94	23.2	10.4	85.4	17.7	4.96	2.26

Appendix B2: SBIAR Surface Water Analytical Results

Parameter	Unit	RDL	BCAWQG - FST 1	BCAWQG - FLT 2	RBSBIAR-DS	RBSBIAR-DS	RBSBIAR-DS	RBSBIAR-DS	RBSBIAR-DS	RBSBIAR-DS	RBSBIAR-DS
					25-Jan-22	30-Mar-22	18-Apr-22	30-May-22	26-Jun-22	24-Jul-22	29-Aug-22
Phosphorus	µg/L	50.0	NG	NG	<50	<50	<250	<50	<50	<50	<50
Potassium	µg/L	50.0	NG	NG	2810	3020	2720	4140	4060	4120	3780
Rubidium	µg/L	0.20	NG	NG	1.06	2.08	1.97	1.82	1.78	1.73	0.72
Selenium	µg/L	0.05	NG	2.0	0.994	1.48	1.1	1.43	0.818	0.669	1.17
Silicon	µg/L	50.0	NG	NG	3040	2680	2910	4040	4740	5180	5260
Silver	µg/L	0.01	NG	NG	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01
Sodium	µg/L	50.0	NG	NG	28100	43900	88100	48900	49300	52100	46400
Strontium	µg/L	0.20	NG	NG	315	481	524	546	494	469	351
Sulfur	µg/L	500	NG	NG	29700	69400	61400	77400	41800	36300	36100
Tellurium	µg/L	0.20	NG	NG	<0.2	<0.2	<1	<0.2	<0.2	<0.2	<0.2
Thallium	µg/L	0.01	NG	NG	<0.01	0.011	<0.05	0.016	0.015	<0.01	<0.01
Thorium	µg/L	0.10	NG	NG	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1
Tin	µg/L	0.10	NG	NG	<0.1	<0.1	<0.5	<0.1	<0.1	0.85	0.24
Titanium	µg/L	0.30	NG	NG	<0.3	<0.3	<1.5	<0.3	<0.3	<0.3	<0.3
Tungsten	µg/L	0.10	NG	NG	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1
Uranium	µg/L	0.01	NG	NG	1.02	1.5	1.14	2.56	1.17	1.08	1.22
Vanadium	µg/L	0.50	NG	NG	<0.5	<0.5	<2.5	<0.5	<0.5	<0.5	<0.5
Zinc	µg/L	1.00	NG	NG	5.8	17.5	2.5	133	29.1	3.3	1
Zircronium	µg/L	0.06	NG	NG	<0.2	<0.2	<1	<0.2	<0.2	<0.2	<0.2
Laboratory Work Order Number					FJ2200226	FJ2200791	FJ2200923	FJ2201382	FJ2201678	FJ2201959	F2202362
Laboratory Identification Number					FJ2200226-001	FJ2200791-003	FJ2200923-005	FJ2201382-004	FJ2201678-003	FJ2201959-003	FJ2202362-001

Appendix B2: SBIAR Surface Water Analytical Results

Parameter	Unit	RDL	BCAWQG - FST 1	RBSBIAR-DS	RBSBIAR-DS	RBSBIAR-US	RBSBIAR-US	RBSBIAR-US	RBSBIAR-US	RBSBIAR-US	RBSBIAR-US
				28-Sep-22	30-Oct-22	30-May-22	26-Jun-22	24-Jul-22	29-Aug-22	28-Sep-22	30-Oct-22
Physical Parameters											
Acidity (Total as $CaCO_3$)	µg/L	1000	NG	5000	5000	1000	5700	1000	14700	5000	5000
Alkalinity (Total as $CaCO_3$)	mg/L	1.0	NG	264	235	192	152	250	249	247	260
Electrical Conductivity (EC)	µS/cm	2.0	NG	665	717	678	668	744	714	726	715
Hardness as CaCO3, dissolved	µg/L	500	NG	312000	315000	274000	359000	356000	321000	332000	308000
Hardness as CaCO3, from total Ca/Mg (New January 2020)	µg/L			346000	352000	279000	338000	317000	391000	366000	344000
pH	pH Units	0.10	6.5 - 9	8.14	8.15	8.27	8.05	7.5	7.56	7.78	8.14
Total Dissolved Solids (TDS)	µg/L	10000	NG	409000	486000	383000	520000	481000	424000	456000	478000
Total Suspended Solids (TSS)	µg/L	3000	NG	5600	3600	11700	17500	1500	14500	29400	12400
Alkalinity (Hydroxide) as $CaCO_3$	µg/L	1000	NG	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000
Alkalinity (Carbonate as $CaCO_3$)	µg/L	1000	NG	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000
Alkalinity (Bicarbonate as $CaCO_3$)	µg/L	1000	NG	264000	235000	192000	152000	250000	249000	247000	260000
Anions and Nutrients											
Ammonia (NH_4 as N)	µg/L	5.0	pH dependent (6.5-9.0)	104	208	<5	<5	<5	<5	11.8	40.2
Ammonia FST Guideline	µg/L		pH dependent (at Temp 4 °C or in situ T)	4950	3950	3150	4950	13600	13600	8770	4950
Ammonia FLT Guideline				952	759	606	952	1970	1970	1690	952
Chloride (Cl^-)	µg/L	500	600000	28200	35100	57300	72000	64900	49100	56100	44000
Nitrate (NO_3^- as N)	µg/L	5.0-25.0	NG	491	835	811	888	544	846	926	312
Nitrite (NO_2^- as N)	µg/L	1.0-5.0	Cl-dependent (> 10,000 µg/L) Guideline: 600 ug/L	8.6	7.8	3.3	<5	4.2	1.5	1.2	1.3
Sulphate (SO_4) [3]	µg/L	300	NG	90500	95800	72900	78200	84100	82800	84500	84400
SO4 FLT Guideline Calc	µg/L		NG	309000	309000	309000	309000	309000	309000	309000	309000
Dissolved Organic Carbon (DOC)	mg/L	1.0	NG	0.79	2.61	1.61	1.14	1.2	1540	1.5	1.61
Metals, Total											
Aluminum	µg/L	3.00	NG	33.2	74.7	68.2	192	13.5	19	72.3	20.6
Antimony	µg/L	0.10	NG	0.14	0.15	0.3	0.18	0.16	0.13	0.17	<0.1
Arsenic	µg/L	0.10	5.0	0.26	0.29	0.26	0.38	0.21	0.3	0.24	0.26
Barium	µg/L	0.10	NG	168	115	124	84.5	78.1	91	96.3	74.5
Beryllium	µg/L	0.10	NG	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Bismuth	µg/L	0.05	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	µg/L	10.0	1200	90	102	36	28	33	41	34	28
Cadmium	µg/L	0.005	NG	0.0065	0.0305	0.0223	0.0293	0.0164	0.0146	0.0218	0.0295
Calcium	µg/L	50	NG	93100	100000	85200	102000	95000	121000	109000	102000
Cesium	µg/L	0.01	NG	0.02	0.019	0.01	0.035	<0.01	<0.01	<0.01	<0.01
Chromium [4]	µg/L	0.1-1.0	NG	<0.5	<0.5	<0.5	0.53	<0.5	<0.5	<0.5	<0.5
Cobalt	µg/L	0.10	110	0.22	0.37	0.19	0.23	0.05	0.25	0.21	0.74
Copper [3]	µg/L	0.50	Calc. based on Hardness	0.25	0.25	0.64	0.81	0.25	0.25	0.68	0.25
Cu FST Guideline Calc. (relevant prior to August 2019)	µg/L		Hardness 13,000 - 400,000 : calc.; Hardness ≥ 400,000 is Capped Value of 400,000								
Cu FLT Guideline Calc. (relevant prior to August 2019)	µg/L										
Iron	µg/L	10	1000	47	104	143	563	28	101	169	141
Lead [3]	µg/L	0.05	101 - 348	<0.05	0.054	0.088	0.247	<0.05	<0.05	0.127	<0.05
Pb FST Guideline Calc (Based on Hardness as CaCO3), applies to water hardness 8000-360,000 µg/L	µg/L		Based on Hardness 8000-360,000 Hardness ≤ 8000: 3 Hardness > 8000 : calc.	347.5	351.8	294.57	415.5	411.08	360.34	376.13	341.87
Pb FLT Guideline Calc (Based on Hardness as CaCO3)	µg/L			16.9	17.0	14.80	19.5	19.34	17.36	17.98	16.64
Lithium	µg/L	1.0	NG	38.8	24.6	7.5	9.3	10	9.9	10	8.2
Magnesium	µg/L	5.0	NG	27500	24800	16100	20200	19300	21600	22700	21700
Manganese [3]	µg/L	0.10	Calc. based on Hardness	8.58	17	38.7	28.6	34.2	300	139	829
Mn FST Guideline Calc (Based on Hardness as CaCO3)	µg/L		Applies to Hardness 25000-259000 µg/L Mn : calc.	3394.18	3394.18	3394.2	3394.2	3394.2	3394.2	3394.2	3394.2
Mn FLT Guideline Calc (Based on Hardness as CaCO3)	µg/L			1845.8	1845.8	1810.6	2184.6	2171.4	2017.4	2065.8	1960.2
Mercury (Based on methyl Hg & total mass Hg)	µg/L	0.005	NG	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Molybdenum	µg/L	0.05	2000	2.03	3.15	1.94	1.17	1.38	1.66	1.36	1.7
Nickel	µg/L	0.50	NG	2.64	2.7	1.15	1.3	0.82	1.19	0.84	2.35
Phosphorus	µg/L	50.0	NG	<50	<50	<50	<50	<50	<50	<50	<50
Potassium	µg/L	50.0	NG	3380	2890	3500	4050	4200	4500	4620	3750
Rubidium	µg/L	0.2	NG	1.07	0.87	0.67	0.84	0.78	0.86	0.85	0.5
Selenium	µg/L	0.05	NG	0.904	0.959	0.755	0.572	0.546	0.542	0.532	0.191
Silicon	µg/L	100.0	NG	5030	4500	3890	5090	5390	6100	5760	4600
Silver [3] (Based on Hardness < or > 100000)	µg/L	0.01	0.10 - 3.0	<0.01	<0.01	0.038	<0.01	<0.01	<0.01	<0.01	<0.01
Ag FST Guideline Calc	µg/L		Hardness ≤ 100,000 Ag = 0.10 Hardness > 100,000 Ag = 3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Ag FLT Guideline Calc	µg/L			1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Sodium	µg/L	50.0	NG	41500	45500	23200	29200	28600	36700	30500	27700
Strontium	µg/L	0.2	NG	360	385	402	253	243	273	252	269
Sulfur	µg/L	500.0	NG	32300	33300	25800	29200	30800	29900	30800	28000
Tellerium	µg/L	0.2	NG	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Thallium	µg/L	0.01	NG	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
Thorium	µg/L	0.10	NG	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tin	µg/L	0.10	NG	0.68	0.16	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Titanium	µg/L	0.3-4.5	NG	0.76	1.71	1.32	5.74	0.41	0.45	1.74	0.35
Tungsten	µg/L	0.10	NG	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Uranium	µg/L	0.01	NG	1.29	2.03	1.13	1.11	1.01	0.989	0.986	0.967
Vanadium	µg/L	0.50	NG	<0.5	<0.5	<0.5	1.09	0.66	0.62	0.72	<0.5
Zinc [3] (Based on Hardness < or > 90,000)	µg/L	3.0	Calc. based on Hardness	1.5	3.1	9.7	4.2	1.5	1.5	1.5	1.5
Zn FST Guideline Calc.	µg/L		Hardness 90,000 - 500,000, Calc. Hardness > 500,000, is Capped Value of 500,000	199.5	201.75	171	234.75	232.5	206.25	214.5	196.5
Zn FLT Guideline Calc.				174	176.25	145.5	187.5	187.5	180.75	187.5	171
Zircronium	µg/L	0.06	NG	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Metals, Dissolved											
Aluminum [5]	µg/L	1.0	100	11.8	12.2	5	2.3	2.4	1	3	0.5
Al FST Guideline Calc (based on pH)	µg/L		pH < 6.5 : calc. Al pH ≥ 6.5 : 100.0 Al	100	100	100	100	100	100	100	100
Al FLT Guideline Calc (based on median pH)	µg/L			50	50	50	50	50	50	50	50
Antimony	µg/L	0.10	NG	0.12	0.13	0.3	0.15	0.16	0.15	0.11	<0.1
Arsenic	µg/L	0.10	NG	0.24	0.22	0.19	0.11	0.12	0.23	0.15	0.13
Barium	µg/L	0.10	NG	166	119	127	78.1	85.7	85.6	87.3	70
Beryllium	µg/L	0.10	NG	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Bismuth		0.05	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	µg/L	10.0	NG	94	98	32	28	30	47	35	28
Cadmium [3] (Based on Hardness as $CaCO_3$)	µg/L	0.005	Calc. based on Hardness	0.0089	0.0226	0.0188	0.0133	0.0146	0.0119	0.0089	0.0174
Cd FST Guideline Calc.	µg/L		Hardness 7,000 - 455,000, Calc. Hardness > 455,000, is Capped Value of 455,000	1.899	1.918	1.661	2.194	2.175	1.955	2.024	1.874
Cd FLT Guideline Calc.				0.457	0.457	0.444	0.457	0.457	0.457	0.457	0.457
Calcium	µg/L	50.0	NG	84600	86700	82700	108000	105000	90600	99400	91000
Cesium		0.01	NG	0.012	0.011	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium	µg/L	0.10	NG	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cobalt	µg/L	0.10	NG	0.2	0.31	0.13	0.05	0.05	0.19	0.15	0.3
Copper [6]	µg/L	0.20	Calc. based on BLM Model	0.34	0.33	0.43	0.34	0.37	0.21	0.3	0.24
Cu FST Guideline Value (Acute)	µg/L		BLM Ligand Model value	136.2	18.6	11.4	7.1	4.2	6	92.6	10.4
Cu FLT Guideline Value (Chronic)	µg/L			26.6	3.6	2.2	1.4	0.5	0.7	16.8	2
Iron	µg/L	10.0	350	5	11	5	5	5	49	27	51
Lead	µg/L	0.05	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Lithium	µg/L	1.0	NG	38.9	24.9	7	9.4	9.6	9.8	9.5	8.8
Magnesium	µg/L	5.0	NG	24400	24000	16400	21600	22800	23100	20300	19600
Manganese	µg/L	0.10	NG	7.2	15	36	17.4	36.3	248	153	317
Mercury	µg/L	0.005	NG	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Molybdenum	µg/L	0.05	NG	2.08	2.98	1.93	1.33	1.42	1.84	1.53	1.39
Nickel	µg/L	0.50	NG	2.3	2.44	0.96	0.76	0.82	1.03	0.7	1.02

Appendix B2: SBIAR Surface Water Analytical Results

Parameter	Unit	RDL	BCAWQG - FST 1	RBSBIAR-DS	RBSBIAR-DS	RBSBIAR-US	RBSBIAR-US	RBSBIAR-US	RBSBIAR-US	RBSBIAR-US	RBSBIAR-US
				28-Sep-22	30-Oct-22	30-May-22	26-Jun-22	24-Jul-22	29-Aug-22	28-Sep-22	30-Oct-22
Phosphorus	µg/L	50.0	NG	<50	<50	<50	<50	<50	<50	<50	<50
Potassium	µg/L	50.0	NG	3270	2950	3800	4380	4470	5340	4540	3710
Rubidium	µg/L	0.20	NG	1.2	0.89	0.55	0.68	0.84	0.69	0.71	0.61
Selenium	µg/L	0.05	NG	1.07	1.21	0.959	0.542	0.634	0.584	0.604	0.657
Silicon	µg/L	50.0	NG	4920	4550	3790	4750	5390	5600	5420	4780
Silver	µg/L	0.01	NG	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sodium	µg/L	50.0	NG	41700	47100	24600	31100	32900	37500	30800	26600
Strontium	µg/L	0.20	NG	373	385	371	265	247	224	258	244
Sulfur	µg/L	500	NG	35500	35400	26300	27800	33400	35600	33600	30800
Tellurium	µg/L	0.20	NG	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Thallium	µg/L	0.01	NG	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Thorium	µg/L	0.10	NG	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tin	µg/L	0.10	NG	0.56	0.12	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Titanium	µg/L	0.30	NG	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Tungsten	µg/L	0.10	NG	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Uranium	µg/L	0.01	NG	1.26	1.74	1.06	1.12	1.03	0.92	0.93	0.93
Vanadium	µg/L	0.50	NG	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Zinc	µg/L	1.00	NG	1.1	2.1	2.9	1.4	1	0.5	1.2	0.5
Zircronium	µg/L	0.06	NG	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Laboratory Work Order Number				FJ2202748	FJ2203067	FJ2201382	FJ2201678	FJ2201959	F2202362	FJ2202748	FJ2203067
Laboratory Identification Number				FJ2202748-002	FJ2203067-003	FJ2201382-005	FJ2201678-005	FJ2201959-005	FJ2202362-002	FJ2202748-004	FJ2203067-005

Appendix B2: SBIAR Surface Water Analytical Results

Parameter	Unit	RDL	BCAWQG - FST 1	RBSBIAR-EDS	RBSBIAR-EDS	RBSBIAR-EUS	RBSBIAR-EUS	RBSBIAR-EUS	RBSBIAR-EUS	RBSBIAR-EUS	RBSBIAR-EUS	RBSBIAR-EUS
				30-May-22	26-Jun-22	25-Jan-22	30-May-22	26-Jun-22	24-Jul-22	29-Aug-22	28-Sep-22	30-Oct-22
Physical Parameters												
Acidity (Total as $CaCO_3$)	µg/L	1000	NG	2000	1000	1000	2700	3800	1000	4000	5000	5000
Alkalinity (Total as $CaCO_3$)	mg/L	1.0	NG	255	159	57.7	258	150	233	224	215	175
Electrical Conductivity (EC)	µS/cm	2.0	NG	800	555	189	727	609	730	708	668	666
Hardness as CaCO3, dissolved	µg/L	500	NG	357000	274000	75800	335000	338000	389000	363000	335000	323000
Hardness as CaCO3, from total Ca/Mg (New January 2020)	µg/L			440000	264000	100000	382000	337000	343000	434000	384000	349000
pH	pH Units	0.10	6.5 - 9	8.25	8.32	7.94	8.2	8.11	7.49	7.94	8.09	8.25
Total Dissolved Solids (TDS)	µg/L	10000	NG	484000	362000	176000	446000	472000	510000	422000	400000	459000
Total Suspended Solids (TSS)	µg/L	3000	NG	910000	3900	94100	2650000	5700	3100	24700	114000	16800
Alkalinity (Hydroxide) as $CaCO_3$	µg/L	1000	NG	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000
Alkalinity (Carbonate as $CaCO_3$)	µg/L	1000	NG	<1000	4200	<1000	<1000	<1000	<1000	<1000	<1000	<1000
Alkalinity (Bicarbonate as $CaCO_3$)	µg/L	1000	NG	255000	155000	57700	258000	150000	233000	224000	215000	175000
Anions and Nutrients												
Ammonia (NH_4 as N)	µg/L	5.0	pH dependent (6.5-9.0)	66.9	<5	128	15.6	13.2	18.2	<5	23	6.3
Ammonia FST Guideline	µg/L		pH dependent (at Temp 4 °C or in situ T)	3150	3150	6220	3950	4950	13600	7420	4950	3150
Ammonia FLT Guideline				606	606	1430	759	952	1970	1430	952	606
Chloride (Cl^-)	µg/L	500	600000	61100	27200	14600	61500	54500	69700	63300	53800	45600
Nitrate (NO_3^- as N)	µg/L	5.0-25.0	NG	1470	721	378	1550	926	909	441	393	1240
Nitrite (NO_2^- as N)	µg/L	1.0-5.0	Cl-dependent (> 10,000 µg/L) Guideline: 600 ug/L	6.6	4.8	64.9	4.3	7.3	2.4	2.5	2.7	13.2
Sulphate (SO_4) [3]	µg/L	300	NG	94400	98900	6070	44500	85400	76700	80500	84800	114000
SO4 FLT Guideline Calc	µg/L		NG	309000	309000	309000	309000	309000	309000	309000	309000	309000
Dissolved Organic Carbon (DOC)	mg/L	1.0	NG	2.1	1.74	15.9	2.07	2.68	1.87	1920	2.19	3.89
Metals, Total												
Aluminum	µg/L	3.00	NG	10400	58.9	3130	5500	83.8	42.3	41.9	80.2	170
Antimony	µg/L	0.10	NG	1.47	0.17	0.54	1.08	0.24	0.14	0.12	0.12	0.16
Arsenic	µg/L	0.10	5.0	16.1	0.29	3.44	9.6	0.36	0.28	0.27	0.33	0.36
Barium	µg/L	0.10	NG	774	163	201	474	225	247	278	230	113
Beryllium	µg/L	0.10	NG	0.847	<0.1	<0.5	0.373	<0.1	<0.1	<0.1	<0.1	<0.1
Bismuth	µg/L	0.05	NG	<0.25	<0.05	<0.25	<0.25	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	µg/L	10.0	1200	<50	29	<50	<50	24	28	32	25	25
Cadmium	µg/L	0.005	NG	1.33	0.0598	0.242	0.461	0.0308	0.0116	0.0078	0.0437	0.0535
Calcium	µg/L	50	NG	127000	77400	33300	112000	98900	99600	129000	108000	98600
Cesium	µg/L	0.01	NG	1.99	0.021	0.643	1.11	0.02	<0.01	<0.01	0.012	0.023
Chromium [4]	µg/L	0.1-1.0	NG	19.3	0.93	7.75	10.5	0.51	<0.5	<0.5	<0.5	<0.5
Cobalt	µg/L	0.10	110	26.5	0.29	3.48	7.72	0.2	0.1	0.05	0.2	0.27
Copper [3]	µg/L	0.50	Calc. based on Hardness	42.4	1.02	10.5	18	1.03	0.57	0.59	0.77	0.93
Cu FST Guideline Calc. (relevant prior to August 2019)	µg/L		Hardness 13,000 - 400,000 : calc.; Hardness ≥ 400,000 is Capped Value of 400,000									
Cu FLT Guideline Calc. (relevant prior to August 2019)	µg/L											
Iron	µg/L	10	1000	**31200**	130	**8470**	**16000**	156	96	78	187	197
Lead [3]	µg/L	0.05	101 - 348	20.6	0.149	4.02	10.6	0.121	0.063	0.055	0.114	0.158
Pb FST Guideline Calc (Based on Hardness as CaCO3), applies to water hardness 8000-360,000 µg/L	µg/L		Based on Hardness 8000-360,000 Hardness ≤ 8000: 3 Hardness > 8000 : calc.	412.55	294.57	57.4	380.46	384.81	416.97	416.97	380.46	363.20
Pb FLT Guideline Calc (Based on Hardness as CaCO3)	µg/L			19.40	14.80	5.5	18.15	18.32	19.57	19.57	18.15	17.47
Lithium	µg/L	1.0	NG	28.4	8.1	5.4	12.4	9.9	11.4	11	10.8	8
Magnesium	µg/L	5.0	NG	29900	17200	4190	24900	21900	22900	27300	27700	25000
Manganese [3]	µg/L	0.10	Calc. based on Hardness	926	9.61	230	380	12	6.63	15.3	17.8	17.5
Mn FST Guideline Calc (Based on Hardness as CaCO3)	µg/L		Applies to Hardness 25000-259000 µg/L Mn : calc.	3394.2	3394.2	1375.3	3394.2	3394.2	3394.2	3394.2	3394.2	3394.2
Mn FLT Guideline Calc (Based on Hardness as CaCO3)	µg/L			2175.8	1810.6	938.5	2079.0	2092.2	2316.6	2202.2	2079.0	2026.2
Mercury (Based on methyl Hg & total mass Hg)	µg/L	0.005	NG	0.0062	<0.005	0.017	<0.005	0.0056	<0.005	<0.005	<0.005	<0.005
Molybdenum	µg/L	0.05	2000	1.94	3.43	2.84	1.89	2.94	1.13	1.18	1.14	5.64
Nickel	µg/L	0.50	NG	80.8	1.51	10.6	23	1.39	0.66	0.73	0.87	1.68
Phosphorus	µg/L	50.0	NG	1240	<50	299	569	<50	<50	<50	<50	<50
Potassium	µg/L	50.0	NG	5300	4330	3020	4420	4570	4620	4240	4460	4310
Rubidium	µg/L	0.2	NG	17.2	0.77	6.72	9.14	0.96	0.91	0.86	0.63	0.82
Selenium	µg/L	0.05	NG	1.04	1.51	0.285	0.74	1.12	0.707	0.703	0.666	0.828
Silicon	µg/L	100.0	NG	17700	3890	6220	11700	3900	5230	3840	4190	4380
Silver [3] (Based on Hardness < or > 100000)	µg/L	0.01	0.10 - 3.0	0.433	<0.01	0.053	0.241	<0.01	<0.01	<0.01	<0.01	<0.01
Ag FST Guideline Calc	µg/L		Hardness ≤ 100,000 Ag = 0.10 Hardness > 100,000 Ag = 3.0	3.0	3.0	0.100	3.0	3.0	3.0	3.0	3.0	3.0
Ag FLT Guideline Calc	µg/L			1.5	1.5	0.050	1.5	1.5	1.5	1.5	1.5	1.5
Sodium	µg/L	50.0	NG	20000	15100	4460	9890	14300	16600	22100	18200	16200
Strontium	µg/L	0.2	NG	346	207	206	272	263	264	313	260	237
Sulfur	µg/L	500.0	NG	32900	37800	3780	15300	31600	28400	29900	30100	39700
Tellerium	µg/L	0.2	NG	<1	<0.2	<1	<1	<0.2	<0.2	<0.2	<0.2	<0.2
Thallium	µg/L	0.01	NG	0.467	<0.01	0.09	0.252	0.018	<0.01	<0.01	<0.01	0.01
Thorium	µg/L	0.10	NG	3.9	<0.1	0.95	1.79	<0.1	<0.1	<0.1	<0.1	<0.1
Tin	µg/L	0.10	NG	0.72	0.43	<0.5	0.57	0.4	<0.1	0.18	0.32	<0.1
Titanium	µg/L	0.3-4.5	NG	118	1.18	50.6	109	1.97	1.12	0.86	1.4	4.6
Tungsten	µg/L	0.10	NG	<0.5	<0.1	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1
Uranium	µg/L	0.01	NG	3.68	1.19	0.806	2.03	1.61	1.12	1.33	1.24	2.46
Vanadium	µg/L	0.50	NG	36.4	<0.5	11.7	19.4	0.65	0.77	0.68	0.78	0.94
Zinc [3] (Based on Hardness < or > 90,000)	µg/L	3.0	Calc. based on Hardness	201	1.5	**41.5**	56.1	1.5	1.5	1.5	1.5	1.5
Zn FST Guideline Calc.	µg/L		Hardness 90,000 - 500,000, Calc. Hardness > 500,000, is Capped Value of 500,000	233.25	171.00	33.00	216.75	219.00	257.25	237.75	216.75	207.75
Zn FLT Guideline Calc.				188	146	7.50	188	188	188	188	188	182
Zircronium	µg/L	0.06	NG	1	<0.2	<1	1.13	<0.2	<0.2	<0.2	<0.2	<0.2
Metals, Dissolved												
Aluminum [5]	µg/L	1.0	100	**130**	5.8	18.2	4.8	8.9	5.3	6.7	4.6	11.9
Al FST Guideline Calc (based on pH)	µg/L		pH < 6.5 : calc. Al pH ≥ 6.5 : 100.0 Al	100	100	100	100	100	100	100	100	100
Al FLT Guideline Calc (based on median pH)	µg/L			50	50	50	50	50	50	50	50	50
Antimony	µg/L	0.10	NG	0.17	0.16	0.33	0.16	0.18	0.14	0.12	0.11	0.15
Arsenic	µg/L	0.10	NG	0.19	0.17	0.41	0.26	0.28	0.18	0.14	0.13	0.31
Barium	µg/L	0.10	NG	181	169	81.3	193	224	264	231	201	116
Beryllium	µg/L	0.10	NG	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Bismuth		0.05	NG	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	µg/L	10.0	NG	32	25	19	18	24	27	36	26	23
Cadmium [3] (Based on Hardness as $CaCO_3$)	µg/L	0.005	Calc. based on Hardness	0.203	0.063	0.0182	0.0478	0.0279	0.0109	0.0025	0.0089	0.0552
Cd FST Guideline Calc.	µg/L		Hardness 7,000 - 455,000, Calc. Hardness > 455,000, is Capped Value of 455,000	2.182	1.661	0.442	2.043	2.062	2.383	2.219	2.043	1.968
Cd FLT Guideline Calc.				0.457	0.444	0.172	0.457	0.457	0.457	0.457	0.457	0.457
Calcium	µg/L	50.0	NG	103000	80400	25800	99200	97300	111000	96600	93600	90400
Cesium		0.01	NG	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium	µg/L	0.10	NG	<0.5	0.82	0.75	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cobalt	µg/L	0.10	NG	7.54	0.17	0.16	0.18	0.13	0.05	0.05	0.05	0.19
Copper [6]	µg/L	0.20	Calc. based on BLM Model	1.25	0.84	1.72	0.86	0.86	0.53	0.37	0.42	0.66
Cu FST Guideline Value (Acute)	µg/L		BLM Ligand Model value	14.2	11.9	52	12.8	15.5	5.9	10.1	112.8	24.9
Cu FLT Guideline Value (Chronic)	µg/L			2.7	2.3	8.8	2.4	3.5	0.8	1.8	20.8	4.7
Iron	µg/L	10.0	350	5	5	35	5	5	5	5	5	17
Lead	µg/L	0.05	NG	0.059	0.063	<0.05	0.055	<0.05	<0.05	<0.05	<0.05	<0.05
Lithium	µg/L	1.0	NG	18.1	7.7	2.3	7.1	9.6	10.9	10.9	10.3	8.9
Magnesium	µg/L	5.0	NG	24200	17700	2770	21200	23100	27200	29500	24700	23600
Manganese	µg/L	0.10	NG	199	4.26	18.9	24.9	8.28	4.71	8.57	5.96	10.3
Mercury	µg/L	0.005	NG	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Molybdenum	µg/L	0.05	NG	1.72	3.64	2.62	1.88	2.86	1.24	1.38	1.33	5.58
Nickel	µg/L	0.50	NG	25.9	1.18	1.06	1.49	1.24	0.56	0.61	0.52	1.29

Appendix B2: SBIAR Surface Water Analytical Results

Parameter	Unit	RDL	BCAWQG - FST 1	RBSBIAR-EDS	RBSBIAR-EDS	RBSBIAR-EUS	RBSBIAR-EUS	RBSBIAR-EUS	RBSBIAR-EUS	RBSBIAR-EUS	RBSBIAR-EUS	RBSBIAR-EUS
				30-May-22	26-Jun-22	25-Jan-22	30-May-22	26-Jun-22	24-Jul-22	29-Aug-22	28-Sep-22	30-Oct-22
Phosphorus	µg/L	50.0	NG	<50	<50	<50	<50	<50	<50	<50	<50	<50
Potassium	µg/L	50.0	NG	3810	4420	2440	3970	4860	4930	5210	4270	4330
Rubidium	µg/L	0.20	NG	0.84	0.58	0.71	0.71	0.93	0.92	0.84	0.65	0.51
Selenium	µg/L	0.05	NG	0.864	1.65	0.198	0.603	1.21	0.784	0.824	0.818	0.95
Silicon	µg/L	50.0	NG	4100	3860	1650	4240	3900	5250	3620	4120	4160
Silver	µg/L	0.01	NG	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sodium	µg/L	50.0	NG	21200	13900	4340	10400	15100	19200	22600	17900	16000
Strontium	µg/L	0.20	NG	272	198	184	241	248	274	262	266	243
Sulfur	µg/L	500	NG	34800	33600	3020	17400	31600	30600	34800	34300	41600
Tellurium	µg/L	0.20	NG	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Thallium	µg/L	0.01	NG	0.016	0.01	<0.01	0.015	0.012	<0.01	<0.01	<0.01	<0.01
Thorium	µg/L	0.10	NG	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Tin	µg/L	0.10	NG	0.42	0.53	<0.1	1.86	0.39	<0.1	0.18	0.25	<0.1
Titanium	µg/L	0.30	NG	<0.3	<0.3	0.73	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Tungsten	µg/L	0.10	NG	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Uranium	µg/L	0.01	NG	1.91	1.2	0.527	1.53	1.55	1.15	1.21	1.16	2.16
Vanadium	µg/L	0.50	NG	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Zinc	µg/L	1.00	NG	11.3	1.3	3.5	0.5	0.5	0.5	0.5	0.5	1.2
Zircronium	µg/L	0.06	NG	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Laboratory Work Order Number				FJ2201382	FJ2201678	FJ2200226	FJ2201382	FJ2201678	FJ2201959	F2202362	FJ2202748	FJ2203067
Laboratory Identification Number				FJ2201382-007	FJ2201678-007	FJ2200226-002	FJ2201382-006	FJ2201678-006	FJ2201959-004	FJ2202362-003	FJ2202748-005	FJ2203067-006

Notes:

Screening completed on BC AWQG-FWAL FST 1 and FLT 2 guideline values.

[1] BC Ministry of Environment, Water Protection & Sustainability Branch (2019), British Columbia Approved Water Quality Guidelines (BCAWQG): Aquatic Life, Wildlife & Agriculture Summary Report. 36 pp. Referenced for Freshwater Aquatic Life (FWAL) water use and Short Term Maximum (FST) guidelines.
[2] BC Ministry of Environment, Water Protection & Sustainability Branch (2018). British Columbia Approved Water Quality Guidelines (BCAWQG): Aquatic Life, Wildlife & Agriculture Summary Report. 36 pp. Referenced for Freshwater Aquatic Life (FWAL) water use and Long Term Average (FLT) guidelines.
[3] Guideline is hardness dependant. Where results are above laboratory reportable detection limits, guideline limits have been evaluated based on individual sample hardness. Sample-specific guideline values are listed in parentheses after the laboratory result, where applicable.
[4] Guideline is for Chromium (IV) cation. Analytical results are for unspeciated Chromium. Where analytical results exceed the guideline, speciated analysis may be warranted.
[5] Guideline is pH dependant.
[6] Guideline is Dissolved Organic Carbon (DOC) dependent. BML Model assumed 10% DOC and Humic acid 10% of DOC value, due to no DOC in lab analysis.
NG - No Guideline
Detection limit can vary as described in the COA. Detection limit can be raised when dilutation is requited due to high Dissolved Solids/Electrical Conductivity (DLDS), e.g. nitrite.
BOLD and shaded dark gray: Exceeds BCAWQG-FFST (Short-term Maximum) guideline.
Shaded Light Gray: Exceeds BCAWQG-FLT (Long-term Average) guideline.
RED - Measured value is below detection limit (DL); value shown is 50% of DL
Blank - Not analyzed

Appendix B3 L2 Powerhouse Area Water Analytical Results

Parameter	Unit	RDL	BCAWQG - FST 1	BCAWQG - FLT 2	L2 DS 30-May-22	L2 DS 26-Jun-22	L2 DS 24-Jul-22	L2 DS 29-Aug-22	L2-DS 30-Oct-22
Physical Parameters									
Acidity (Total as $CaCO_3$)	µg/L	1000; 2000	NG	NG	1000	1000	1000	1000	5000
Alkalinity (Total as $CaCO_3$)	mg/L	1.0	NG	NG	312	206	265	201	216
Electrical Conductivity (EC)	µS/cm	2.0	NG	NG	1090	1210	998	899	825
Hardness as CaCO3, dissolved	µg/L	500	NG	NG	6920	211000	297000	125000	206000
Hardness as CaCO3, from total Ca/Mg (New January 2020)	µg/L				21300	268000	273000	284000	255000
pH	pH Units	0.10	6.5 - 9.0	6.5-9.0	**10.3**	8.35	7.73	8.73	8.3
Total Dissolved Solids (TDS)	µg/L	10000	NG	NG	884000	744000	685000	568000	553000
Total Suspended Solids (TSS)	µg/L	3000	NG	NG	37900	109000	29700	5830000	174000
Alkalinity (Hydroxide) as $CaCO_3$	µg/L	1000	NG	NG	<1000	<1000	<1000	<1000	<1000
Alkalinity (Carbonate as $CaCO_3$)	µg/L	1000	NG	NG	257000	4400	<1000	20200	3000
Alkalinity (Bicarbonate as $CaCO_3$)	µg/L	1000	NG	NG	54500	202000	265000	181000	213000
Anions and Nutrients									
Ammonia (NH_4 as N)	µg/L	5.0	pH dependent (6.5-9.0); GL capped at pH 9.0	pH dependent (6.5-9.0); GL capped at pH 9.0	**1230**	149	65.6	867	362
Ammonia FST Guideline	µg/L				685	2520	10300	1300	3150
Ammonia FLT Guideline				pH dependent (**at Temp 4 °C** or in situ T)	132	484	1980	249	606
Chloride (Cl^-)	µg/L	500	600000	150,000	88100	69900	56600	51600	39300
Nitrate (NO_3^- as N)	µg/L	5.0-25.0	NG	NG	278	1840	786	951	840
Nitrite (NO_2^- as N)	µg/L	1.0-5.0	Cl-dependent (> 10,000 µg/L) Guideline: 600 ug/L	Cl-dependent (> 10,000 µg/L) Guideline: 200 ug/L	9.6	39.3	14.3	26.3	52.7
Sulphate (SO_4) [3]	µg/L	300	NG	309,000 - 429,000	88500	290000	231000	218000	184000
SO4 FLT Guideline Calc	µg/L		NG	Hardness 76,000-180,000 = 309,000; Hardness 181,000-250,000 = 429,000; Hardness > 250,000 site-specific	309000	429000	309000	309000	309000
Dissolved Organic Carbon (DOC)	mg/L	1.0	NG	NG	8.01	3.56	4.25	3890	3.48
Metals, Total									
Aluminum	µg/L	3.00	NG	NG	9130	1340	472	10500	890
Antimony	µg/L	0.10	NG	NG	3.99	1.77	0.81	2.7	1.93
Arsenic	µg/L	0.10	5.0	5.0	**9.11**	2.22	1.18	**11.9**	2.74
Barium	µg/L	0.10	NG	NG	526	174	102	1440	137
Beryllium	µg/L	0.10	NG	NG	0.399	<0.1	<0.1	1.09	<0.1
Bismuth	µg/L	0.05	NG	NG	<0.25	<0.05	<0.05	0.292	<0.05
Boron	µg/L	10.0	1200	1200	462	244	161	250	135
Cadmium	µg/L	0.005	NG	NG	0.0768	0.0374	0.0456	0.472	0.0345
Calcium	µg/L	50	NG	NG	5420	77800	76300	87500	74400
Cesium	µg/L	0.01	NG	NG	1.4	0.192	0.062	2.66	0.142
Chromium [4]	µg/L	0.1-1.0	NG	NG	14.1	9.45	1.31	16.9	2.96
Cobalt	µg/L	0.10	110	4.0	2.12	0.86	0.59	12.2	0.65
Copper [3]	µg/L	0.50	Calc. based on Hardness	2 to 10	13.5	5.28	2.5	52.7	3.61
Cu FST Guideline Calc. (relevant prior to August 2019)	µg/L		Hardness 13,000 - 400,000 : calc.; Hardness ≥ 400,000 is Capped Value of 400,000						
Cu FLT Guideline Calc. (relevant prior to August 2019)	µg/L			Hardness 50,000 - 250,000: calc.; Hardness > 250,000, Cu = 10					
Iron	µg/L	10	1000	NG	**7770**	**1120**	731	**21200**	1180
Lead [3]	µg/L	0.05	101 - 348	Calc. based on Hardness	**4.05**	0.842	0.519	10.9	1.02
Pb FST Guideline Calc (Based on Hardness as CaCO3), applies to water hardness 8000-360,000 µg/L	µg/L		Based on Hardness 8000-360,000 Hardness ≤ 8000: 3 Hardness > 8000 : calc.		3.0	211.2	326.4	108.5	204.9
Pb FLT Guideline Calc (Based on Hardness as CaCO3)	µg/L			Applies to Hardness 8000-360,000 Hardness ≤ 8000, NG Hardness > 8000 : calc.	3.4	11.5	16.0	7.5	11.3
Lithium	µg/L	1.0	NG	NG	48.8	32.7	22.8	44.9	22.6
Magnesium	µg/L	5.0	NG	NG	1890	18000	20000	16000	16800
Manganese [3]	µg/L	0.10	Calc. based on Hardness	Calc. based on Hardness	53.3	20.5	30.1	332	34.6
Mn FST Guideline Calc (Based on Hardness as CaCO3)	µg/L		Applies to Hardness 25000-259000 µg/L Mn : calc.		616.3	2865.2	3394.2	1917.5	2810.1
Mn FLT Guideline Calc (Based on Hardness as CaCO3)	µg/L			Applies to Hardness 37000-450000 µg/L Mn : calc.	635.4	1533.4	1911.8	1155.0	1511.4
Mercury (Based on methyl Hg & total mass Hg)	µg/L	0.005	NG	Calc.	<0.005	0.0076	<0.005	<0.005	<0.005
Molybdenum	µg/L	0.05	2000	≤ 1000	44	25.3	7.68	10.6	45.8
Nickel	µg/L	0.50	NG		7.82	2.08	2.39	25.5	2.11
Phosphorus	µg/L	50.0	NG	NG	310	75	50	1940	132
Potassium	µg/L	50.0	NG	NG	26800	12800	5680	7110	10300
Rubidium	µg/L	0.2	NG	NG	40.2	9.05	3.92	31.2	10.6
Selenium	µg/L	0.05	NG	2.0	1.35	3.39	4.86	3.19	3.95
Silicon	µg/L	100.0	NG	NG	21300	10500	5670	23100	8060
Silver [3] (Based on Hardness < or > 100000)	µg/L	0.01	0.10 - 3.0	0.05 - 1.5	**0.208**	0.022	0.011	0.142	0.011
Ag FST Guideline Calc	µg/L		Hardness ≤ 100,000 Ag = 0.10 Hardness > 100,000 Ag = 3.0		0.100	3.0	3.0	3.0	3.0
Ag FLT Guideline Calc	µg/L			Hardness ≤ 100,000 Ag = 0.05 Hardness > 100,000 Ag = 1.5	0.050	1.5	1.5	1.5	1.5
Sodium	µg/L	50.0	NG	NG	219000	196000	104000	174000	108000
Strontium	µg/L	0.2	NG	NG	99.6	276	316	474	191
Sulfur	µg/L	500.0	NG	NG	33000	111000	81300	68100	61100
Tellerium	µg/L	0.2	NG	NG	<1	<0.2	<0.2	<1	<0.2
Thallium	µg/L	0.01	NG	NG	0.07	0.027	0.018	0.149	0.018
Thorium	µg/L	0.10	NG	NG	<0.5	0.26	<0.1	11.1	0.4
Tin	µg/L	0.10	NG	NG	1.46	0.66	2.11	0.51	0.46
Titanium	µg/L	0.3-4.5	NG	NG	10.6	30.1	9.37	51.5	15.3
Tungsten	µg/L	0.10	NG	NG	3.78	0.91	0.71	<0.5	1.95
Uranium	µg/L	0.01	NG	NG	0.66	2.74	2.16	5.68	2.41
Vanadium	µg/L	0.50	NG	NG	34.5	6.45	2.8	30.2	9.16
Zinc [3] (Based on Hardness < or > 90,000)	µg/L	3.0	Calc. based on Hardness	Calc. based on Hardness	**41.1**	17.7	16.6	**213**	24.2
Zn FST Guideline Calc.	µg/L		Hardness 90,000 - 500,000, Calc. Hardness > 500,000, is Capped Value of 500,000		33.0	123.8	188.3	59.3	120.0
Zn FLT Guideline Calc.	µg/L			Hardness 90,000 - 330,000, Calc. Hardness > 330,000, is Capped Value of 330,000	7.5	98.25	162.75	33.75	94.5
Zircronium	µg/L	0.06	NG	NG	<1	1.52	0.36	2.18	1.38
Metals, Dissolved									
Aluminum [5]	µg/L	1.0	100	50	**1960**	**207**	**112**	**133**	**164**
Al FST Guideline Calc (based on pH)	µg/L		pH < 6.5 : calc. Al pH ≥ 6.5 : 100.0 Al		100	100	100	100	100
Al FLT Guideline Calc (based on median pH)	µg/L			median pH < 6.5 : calc. Al median pH ≥ 6.5 : 50.0 Al	50	50	50	50	50
Antimony	µg/L	0.10	NG	NG	7.1	1.35	0.87	4.73	1.85
Arsenic	µg/L	0.10	NG	NG	7.99	1.38	0.95	3.82	2.35
Barium	µg/L	0.10	NG	NG	74.2	87.9	92	614	92.3
Beryllium	µg/L	0.10	NG	NG	<0.1	<0.1	<0.1	<0.1	<0.1
Bismuth		0.05	NG	NG	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	µg/L	10.0	NG	NG	429	241	131	272	127
Cadmium [3] (Based on Hardness as $CaCO_3$)	µg/L	0.005	Calc. based on Hardness	Calc. based on hardness	0.0124	0.0096	0.006	0.013	0.0059
Cd FST Guideline Calc.	µg/L		Hardness 7,000 - 455,000, Calc. Hardness > 455,000, is Capped Value of 455,000		0.04	1.27	1.80	0.74	1.24
Cd FLT Guideline Calc.	µg/L			Hardness 3,400 - 285,000, Calc. Hardness > 285,000, is Capped Value of 285,000	0.03	0.37	0.46	0.25	0.36
Calcium	µg/L	50.0	NG	NG	2430	54000	81000	30400	55800
Cesium	µg/L	0.01	NG	NG	0.023	0.044	0.014	0.044	0.024
Chromium	µg/L	0.10	NG	NG	4.11	6.62	0.54	1.23	2.11
Cobalt	µg/L	0.10	NG	NG	<0.1	0.16	0.14	0.11	<0.1
Copper [6]	µg/L	0.20	Calc. based on BLM Model	Calc. based on BLM Model	0.93	0.9	0.68	2.53	0.67
Cu FST Guideline Value (Acute)	µg/L		BLM Ligand Model value		121.7	31.1	22	43.2	29.7
Cu FLT Guideline Value (Chronic)	µg/L			BLM Ligand Model value	39.3	3.8	2.5	10.2	5.6
Iron	µg/L	10.0	350	NG	33	10	5	5	10
Lead	µg/L	0.05	NG	NG	<0.05	<0.05	<0.05	<0.05	<0.05
Lithium	µg/L	1.0	NG	NG	35.4	30.5	22.2	26.7	21.5

Parameter	Unit	RDL	BCAWQG - FST 1	BCAWQG - FLT 2	L2 DS	L2 DS	L2 DS	L2 DS	L2-DS
					30-May-22	26-Jun-22	24-Jul-22	29-Aug-22	30-Oct-22
Magnesium	µg/L	5.0	NG	NG	208	18400	23000	12000	16300
Manganese	µg/L	0.10	NG	NG	0.41	0.72	9.83	2.85	4.38
Mercury	µg/L	0.005	NG	NG	<0.005	<0.005	<0.005	<0.005	<0.005
Molybdenum	µg/L	0.05	NG	NG	50.8	22.1	7.84	14.5	42.2
Nickel	µg/L	0.50	NG	NG	0.99	0.8	1.51	0.83	1.05
Phosphorus	µg/L	50.0	NG	NG	60	<50	<50	<50	<50
Potassium	µg/L	50.0	NG	NG	25200	12000	5480	7530	9680
Rubidium	µg/L	0.20	NG	NG	20.4	7.07	3.46	3.15	7.65
Selenium	µg/L	0.05	NG	2.0	1.46	3.51	5.62	2.91	5.36
Silicon	µg/L	50.0	NG	NG	11200	8740	4840	5420	7440
Silver	µg/L	0.01	NG	NG	<0.01	<0.01	<0.01	<0.01	<0.01
Sodium	µg/L	50.0	NG	NG	224000	186000	106000	187000	102000
Strontium	µg/L	0.20	NG	NG	40.6	205	329	240	173
Sulfur	µg/L	500	NG	NG	33700	100000	80300	91000	68400
Tellurium	µg/L	0.20	NG	NG	<0.2	<0.2	<0.2	<0.2	<0.2
Thallium	µg/L	0.01	NG	NG	<0.01	0.012	<0.01	0.02	<0.01
Thorium	µg/L	0.10	NG	NG	<0.1	<0.1	<0.1	<0.1	<0.1
Tin	µg/L	0.10	NG	NG	1.16	0.2	2.54	0.16	0.19
Titanium	µg/L	0.30	NG	NG	0.69	0.7	<0.3	<0.3	0.71
Tungsten	µg/L	0.10	NG	NG	10.2	0.89	0.98	0.66	2.02
Uranium	µg/L	0.01	NG	NG	0.292	2.5	2.04	2.94	2.1
Vanadium	µg/L	0.50	NG	NG	16.8	3.72	1.16	5.3	6.53
Zinc	µg/L	1.00	NG	NG	1.6	1.1	3	<1	<1
Zircronium	µg/L	0.06	NG	NG	<0.2	<0.2	<0.2	<0.2	<0.2
Laboratory Work Order Number					FJ2201382	FJ2201678	FJ2201959	F2202362	FJ2203067
Laboratory Identification Number					FJ2201382-001	FJ2201678-001	FJ2201959-001	FJ2202362-004	FJ2203067-002

Appendix B3 L2 Powerhouse Area Water Analytical Results

Parameter	Unit	RDL	BCAWQG - FST 1	BCAWQG - FLT 2	L2-DS	L2-DS	L2 US	L2 US	L2 US
					28-Nov-22	11-Dec-22	26-Jan-22	18-Apr-22	30-May-22
Physical Parameters									
Acidity (Total as $CaCO_3$)	µg/L	1000; 2000	NG	NG	5000	3600	1000	1000	2800
Alkalinity (Total as $CaCO_3$)	mg/L	1.0	NG	NG	161	201	75.4	250	212
Electrical Conductivity (EC)	µS/cm	2.0	NG	NG	384	525	598	948	1240
Hardness as CaCO3, dissolved	µg/L	500	NG	NG	148000	214000	244000	234000	498000
Hardness as CaCO3, from total Ca/Mg (New January 2020)	µg/L				152000	211000	259000	235000	502000
pH	pH Units	0.10	6.5 - 9.0	6.5-9.0	8.45	8.46	8.25	8.06	8.16
Total Dissolved Solids (TDS)	µg/L	10000	NG	NG	246000	392000	451000	604000	934000
Total Suspended Solids (TSS)	µg/L	3000	NG	NG	3900	4000	24600	7200	17300
Alkalinity (Hydroxide) as $CaCO_3$	µg/L	1000	NG	NG	<1000	<1000	<1000	<1000	<1000
Alkalinity (Carbonate as $CaCO_3$)	µg/L	1000	NG	NG	9200	15200	<1000	<1000	<1000
Alkalinity (Bicarbonate as $CaCO_3$)	µg/L	1000	NG	NG	152000	186000	75300	250000	212000
Anions and Nutrients									
Ammonia (NH_4 as N)	µg/L	5.0	pH dependent (6.5-9.0); GL capped at pH 9.0	pH dependent (6.5-9.0); GL capped at pH 9.0	24	37.1	89.7	71.3	10.1
Ammonia FST Guideline	µg/L				2010	2010	3150	4950	3950
Ammonia FLT Guideline				pH dependent (**at Temp 4 °C** or in situ T)	387	387	606	952	759
Chloride (Cl^-)	µg/L	500	600000	150,000	6700	10700	10900	14200	18900
Nitrate (NO_3^- as N)	µg/L	5.0-25.0	NG	NG	286	445	470	120	607
Nitrite (NO_2^- as N)	µg/L	1.0-5.0	Cl-dependent (> 10,000 µg/L) Guideline: 600 ug/L	Cl-dependent (> 10,000 µg/L) Guideline: 200 ug/L	3.9	5.5	43.7	9.7	5.3
Sulphate (SO_4) [3]	µg/L	300	NG	309,000 - 429,000	53600	81200	203000	222000	450000
SO4 FLT Guideline Calc	µg/L		NG	Hardness 76,000-180,000 = 309,000; Hardness 181,000-250,000 = 429,000; Hardness > 250,000 site-specific	309000	309000	309000	309000	429000
Dissolved Organic Carbon (DOC)	mg/L	1.0	NG	NG	2.18	1.36	16	0.92	2.68
Metals, Total									
Aluminum	µg/L	3.00	NG	NG	139	119	624	157	126
Antimony	µg/L	0.10	NG	NG	0.32	0.64	0.53	0.31	0.6
Arsenic	µg/L	0.10	5.0	5.0	0.5	0.68	1.08	0.67	0.42
Barium	µg/L	0.10	NG	NG	48.8	65.5	158	66.2	74.9
Beryllium	µg/L	0.10	NG	NG	<0.1	0.176	<0.1	<0.1	<0.1
Bismuth	µg/L	0.05	NG	NG	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	µg/L	10.0	1200	1200	34	55	64	324	268
Cadmium	µg/L	0.005	NG	NG	0.0183	0.0244	0.396	0.0397	0.21
Calcium	µg/L	50	NG	NG	44900	59100	77200	66500	142000
Cesium	µg/L	0.01	NG	NG	0.026	0.066	0.15	0.024	0.029
Chromium [4]	µg/L	0.1-1.0	NG	NG	0.61	1.14	2.96	<0.5	0.74
Cobalt	µg/L	0.10	110	4.0	0.15	0.21	8.64	0.96	3.18
Copper [3]	µg/L	0.50	Calc. based on Hardness	2 to 10	1.19	0.83	6.56	0.98	1.66
Cu FST Guideline Calc. (relevant prior to August 2019)	µg/L		Hardness 13,000 - 400,000 : calc.; Hardness ≥ 400,000 is Capped Value of 400,000						
Cu FLT Guideline Calc. (relevant prior to August 2019)	µg/L			Hardness 50,000 - 250,000: calc.; Hardness > 250,000, Cu = 10					
Iron	µg/L	10	1000	NG	109	80	**1320**	267	233
Lead [3]	µg/L	0.05	101 - 348	Calc. based on Hardness	0.101	0.155	0.462	0.215	0.136
Pb FST Guideline Calc (Based on Hardness as CaCO3), applies to water hardness 8000-360,000 µg/L	µg/L		Based on Hardness 8000-360,000 Hardness ≤ 8000: 3 Hardness > 8000 : calc.		134.5	215.1	254.1	241.0	417.0
Pb FLT Guideline Calc (Based on Hardness as CaCO3)	µg/L			Applies to Hardness 8000-360,000 Hardness ≤ 8000, NG Hardness > 8000 : calc.	8.6	11.7	13.2	12.7	19.6
Lithium	µg/L	1.0	NG	NG	6.3	9.8	27.5	76.3	74.4
Magnesium	µg/L	5.0	NG	NG	9710	15500	16200	16800	35700
Manganese [3]	µg/L	0.10	Calc. based on Hardness	Calc. based on Hardness	5.29	3.66	169	130	114
Mn FST Guideline Calc (Based on Hardness as CaCO3)	µg/L		Applies to Hardness 25000-259000 µg/L Mn : calc.		2171.0	2898.3	3228.88	3118.68	3394.18
Mn FLT Guideline Calc (Based on Hardness as CaCO3)	µg/L			Applies to Hardness 37000-450000 µg/L Mn : calc.	1256.2	1546.6	1678.6	1634.6	2585
Mercury (Based on methyl Hg & total mass Hg)	µg/L	0.005	NG	Calc.	<0.005	<0.005	0.006	<0.005	0.0066
Molybdenum	µg/L	0.05	2000	≤ 1000	3.15	5.07	4.8	1.82	3.64
Nickel	µg/L	0.50	NG		0.76	0.84	28.6	4.25	23.5
Phosphorus	µg/L	50.0	NG	NG	<50	101	60	<50	<50
Potassium	µg/L	50.0	NG	NG	2170	3760	3400	1980	3490
Rubidium	µg/L	0.2	NG	NG	1.71	2.42	4	1.06	1.45
Selenium	µg/L	0.05	NG	2.0	0.897	1.58	2.32	1.61	2.86
Silicon	µg/L	100.0	NG	NG	3920	5870	3580	3420	4500
Silver [3] (Based on Hardness < or > 100000)	µg/L	0.01	0.10 - 3.0	0.05 - 1.5	<0.01	0.02	0.013	<0.01	0.038
Ag FST Guideline Calc	µg/L		Hardness ≤ 100,000 Ag = 0.10 Hardness > 100,000 Ag = 3.0		3.0	3.0	3.0	3.0	3.0
Ag FLT Guideline Calc	µg/L			Hardness ≤ 100,000 Ag = 0.05 Hardness > 100,000 Ag = 1.5	1.5	1.5	1.5	1.5	1.5
Sodium	µg/L	50.0	NG	NG	24800	36500	23000	144000	99700
Strontium	µg/L	0.2	NG	NG	122	134	352	509	815
Sulfur	µg/L	500.0	NG	NG	20300	28900	78000	93900	167000
Tellerium	µg/L	0.2	NG	NG	<0.2	0.2	<0.2	<0.2	<0.2
Thallium	µg/L	0.01	NG	NG	<0.01	0.025	0.021	<0.01	0.018
Thorium	µg/L	0.10	NG	NG	<0.1	<0.1	0.24	<0.1	<0.1
Tin	µg/L	0.10	NG	NG	0.3	0.18	1.77	0.14	0.16
Titanium	µg/L	0.3-4.5	NG	NG	3.14	1.16	7.7	3.22	2.26
Tungsten	µg/L	0.10	NG	NG	<0.1	0.24	0.53	<0.1	<0.1
Uranium	µg/L	0.01	NG	NG	0.938	1.66	1.57	1.55	2.78
Vanadium	µg/L	0.50	NG	NG	1.04	1.71	1.86	1.22	0.73
Zinc [3] (Based on Hardness < or > 90,000)	µg/L	3.0	Calc. based on Hardness	Calc. based on Hardness	3.7	3.2	59.5	10.2	22.6
Zn FST Guideline Calc.	µg/L		Hardness 90,000 - 500,000, Calc. Hardness > 500,000, is Capped Value of 500,000		76.5	126.0	148.5	141.0	339.0
Zn FLT Guideline Calc.	µg/L			Hardness 90,000 - 330,000, Calc. Hardness > 330,000, is Capped Value of 330,000	51	100.5	123	115.5	187.5
Zircronium	µg/L	0.06	NG	NG	<0.2	0.22	0.3	<0.2	<0.2
Metals, Dissolved									
Aluminum [5]	µg/L	1.0	100	50	41.3	66.6	**104**	8	17.8
Al FST Guideline Calc (based on pH)	µg/L		pH < 6.5 : calc. Al pH ≥ 6.5 : 100.0 Al		100	100	100	100	100
Al FLT Guideline Calc (based on median pH)	µg/L			median pH < 6.5 : calc. Al median pH ≥ 6.5 : 50.0 Al	50	50	50	50	50
Antimony	µg/L	0.10	NG	NG	0.33	0.53	0.51	<0.5	0.62
Arsenic	µg/L	0.10	NG	NG	0.38	0.51	0.38	<0.5	0.32
Barium	µg/L	0.10	NG	NG	44	59.8	138	52.6	77.9
Beryllium	µg/L	0.10	NG	NG	<0.1	<0.1	<0.1	<0.1	<0.1
Bismuth		0.05	NG	NG	<0.05	<0.05	<0.05	<0.25	<0.05
Boron	µg/L	10.0	NG	NG	35	60	48	336	252
Cadmium [3] (Based on Hardness as $CaCO_3$)	µg/L	0.005	Calc. based on Hardness	Calc. based on hardness	0.0053	0.0025	0.197	0.0125	0.184
Cd FST Guideline Calc.	µg/L		Hardness 7,000 - 455,000, Calc. Hardness > 455,000, is Capped Value of 455,000		0.88	1.29	1.47	1.41	2.80
Cd FLT Guideline Calc.	µg/L			Hardness 3,400 - 285,000, Calc. Hardness > 285,000, is Capped Value of 285,000	0.28	0.37	0.41	0.40	0.46
Calcium	µg/L	50.0	NG	NG	42900	60200	73200	65900	138000
Cesium	µg/L	0.01	NG	NG	<0.01	<0.01	<0.01	<0.05	<0.01
Chromium	µg/L	0.10	NG	NG	<0.5	0.85	2	<0.5	<0.5
Cobalt	µg/L	0.10	NG	NG	<0.1	<0.1	6.27	0.58	2.89
Copper [6]	µg/L	0.20	Calc. based on BLM Model	Calc. based on BLM Model	0.58	0.45	4.13	1.23	1.16
Cu FST Guideline Value (Acute)	µg/L		BLM Ligand Model value		15.2	11.4	101.6	142.9	20.2
Cu FLT Guideline Value (Chronic)	µg/L			BLM Ligand Model value	2.9	2.2	19.3	25	3.3
Iron	µg/L	10.0	350	NG	5	5	15	25	5
Lead	µg/L	0.05	NG	NG	<0.05	<0.05	<0.05	<0.25	<0.05
Lithium	µg/L	1.0	NG	NG	5.8	10.6	26.6	85.4	74.8

Parameter	Unit	RDL	BCAWQG - FST 1	BCAWQG - FLT 2	L2-DS	L2-DS	L2 US	L2 US	L2 US
					28-Nov-22	11-Dec-22	26-Jan-22	18-Apr-22	30-May-22
Magnesium	µg/L	5.0	NG	NG	9970	15400	14900	16900	37300
Manganese	µg/L	0.10	NG	NG	1.78	1.38	135	89.5	110
Mercury	µg/L	0.005	NG	NG	<0.005	<0.005	<0.005	<0.005	<0.005
Molybdenum	µg/L	0.05	NG	NG	3.09	5	5.06	1.41	3.63
Nickel	µg/L	0.50	NG	NG	0.66	<0.5	21.9	3.28	21.9
Phosphorus	µg/L	50.0	NG	NG	<50	<50	<50	<250	<50
Potassium	µg/L	50.0	NG	NG	2150	3890	3490	1860	3830
Rubidium	µg/L	0.20	NG	NG	1.48	2.34	3.18	<1	1.4
Selenium	µg/L	0.05	NG	2.0	1.18	1.72	2.48	1.13	3.13
Silicon	µg/L	50.0	NG	NG	3750	5690	2920	2840	4510
Silver	µg/L	0.01	NG	NG	<0.01	<0.01	<0.01	<0.05	<0.01
Sodium	µg/L	50.0	NG	NG	20700	33600	22200	140000	108000
Strontium	µg/L	0.20	NG	NG	114	141	348	520	743
Sulfur	µg/L	500	NG	NG	18900	32700	74000	97100	169000
Tellurium	µg/L	0.20	NG	NG	<0.2	<0.2	<0.2	<1	<0.2
Thallium	µg/L	0.01	NG	NG	<0.01	0.012	<0.01	<0.05	0.015
Thorium	µg/L	0.10	NG	NG	<0.1	<0.1	<0.1	<0.5	<0.1
Tin	µg/L	0.10	NG	NG	0.26	<0.1	2.02	<0.5	0.11
Titanium	µg/L	0.30	NG	NG	<0.3	<0.3	0.3	<1.5	<0.3
Tungsten	µg/L	0.10	NG	NG	<0.1	0.15	0.6	<0.5	<0.1
Uranium	µg/L	0.01	NG	NG	1.07	1.56	1.42	1.35	2.55
Vanadium	µg/L	0.50	NG	NG	0.65	0.92	<0.5	<2.5	<0.5
Zinc	µg/L	1.00	NG	NG	2.1	<1	15.6	<5	21.3
Zircronium	µg/L	0.06	NG	NG	<0.2	<0.2	<0.2	<1	<0.2
Laboratory Work Order Number					FJ2203325	FJ2203454	FJ2200232	FJ2200923	FJ2201382
Laboratory Identification Number					FJ2203325-003	FJ2203454-001	FJ2200232-001	FJ2200923-004	FJ2201382-002

Appendix B3 L2 Powerhouse Area Water Analytical Results

Parameter	Unit	RDL	BCAWQG - FST 1	BCAWQG - FLT 2	L2 US 26-Jun-22	L2 US 24-Jul-22	L2 US 29-Aug-22	L2-US 28-Sep-22	L2-US 30-Oct-22
Physical Parameters									
Acidity (Total as $CaCO_3$)	µg/L	1000; 2000	NG	NG	6400	1000	1000	4200	5000
Alkalinity (Total as $CaCO_3$)	mg/L	1.0	NG	NG	200	347	276	240	202
Electrical Conductivity (EC)	µS/cm	2.0	NG	NG	1060	1140	862	793	553
Hardness as CaCO3, dissolved	µg/L	500	NG	NG	427000	514000	384000	367000	260000
Hardness as CaCO3, from total Ca/Mg (New January 2020)	µg/L				431000	461000	389000	417000	260000
pH	pH Units	0.10	6.5 - 9.0	6.5-9.0	8.09	7.58	8.15	8.05	8.29
Total Dissolved Solids (TDS)	µg/L	10000	NG	NG	794000	833000	554000	546000	373000
Total Suspended Solids (TSS)	µg/L	3000	NG	NG	4700	19500	16900	22800	5600
Alkalinity (Hydroxide) as $CaCO_3$	µg/L	1000	NG	NG	<1000	<1000	<1000	<1000	<1000
Alkalinity (Carbonate as $CaCO_3$)	µg/L	1000	NG	NG	<1000	<1000	<1000	<1000	<1000
Alkalinity (Bicarbonate as $CaCO_3$)	µg/L	1000	NG	NG	200000	347000	276000	240000	202000
Anions and Nutrients									
Ammonia (NH_4 as N)	µg/L	5.0	pH dependent (6.5-9.0); GL capped at pH 9.0	pH dependent (6.5-9.0); GL capped at pH 9.0	26.4	<5	<5	18.3	7.2
Ammonia FST Guideline	µg/L				4950	11900	3950	4950	3150
Ammonia FLT Guideline				pH dependent (**at Temp 4 °C** or in situ T)	952	1970	759	952	606
Chloride (Cl^-)	µg/L	500	600000	150,000	22400	32900	21400	21800	6430
Nitrate (NO_3^- as N)	µg/L	5.0-25.0	NG	NG	330	991	1060	995	849
Nitrite (NO_2^- as N)	µg/L	1.0-5.0	Cl-dependent (> 10,000 µg/L) Guideline: 600 ug/L	Cl-dependent (> 10,000 µg/L) Guideline: 200 ug/L	<5	<5	<5	2.7	1
Sulphate (SO_4) [3]	µg/L	300	NG	309,000 - 429,000	323000	290000	200000	196000	102000
SO4 FLT Guideline Calc	µg/L		NG	Hardness 76,000-180,000 = 309,000; Hardness 181,000-250,000 = 429,000; Hardness > 250,000 site-specific	429000	429000	309000	309000	309000
Dissolved Organic Carbon (DOC)	mg/L	1.0	NG	NG	1.84	3.17	1830	1830	2.34
Metals, Total									
Aluminum	µg/L	3.00	NG	NG	71.7	97.4	153	234	73.6
Antimony	µg/L	0.10	NG	NG	0.57	0.5	0.53	0.44	0.35
Arsenic	µg/L	0.10	5.0	5.0	0.61	0.5	0.6	0.56	0.28
Barium	µg/L	0.10	NG	NG	76.4	79.7	71.6	85.8	77.4
Beryllium	µg/L	0.10	NG	NG	<0.1	<0.1	<0.1	<0.1	<0.1
Bismuth	µg/L	0.05	NG	NG	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	µg/L	10.0	1200	1200	356	155	94	61	35
Cadmium	µg/L	0.005	NG	NG	0.0649	0.0427	0.0324	0.0268	0.025
Calcium	µg/L	50	NG	NG	124000	130000	108000	120000	76800
Cesium	µg/L	0.01	NG	NG	0.017	0.019	0.031	0.052	0.012
Chromium [4]	µg/L	0.1-1.0	NG	NG	<0.5	0.71	0.88	1.26	1.04
Cobalt	µg/L	0.10	110	4.0	0.35	0.25	0.25	0.36	0.2
Copper [3]	µg/L	0.50	Calc. based on Hardness	2 to 10	0.93	1	1.36	2.13	0.62
Cu FST Guideline Calc. (relevant prior to August 2019)	µg/L		Hardness 13,000 - 400,000 : calc.; Hardness ≥ 400,000 is Capped Value of 400,000						
Cu FLT Guideline Calc. (relevant prior to August 2019)	µg/L			Hardness 50,000 - 250,000: calc.; Hardness > 250,000, Cu = 10					
Iron	µg/L	10	1000	NG	204	182	343	345	98
Lead [3]	µg/L	0.05	101 - 348	Calc. based on Hardness	0.088	0.142	0.174	0.295	0.057
Pb FST Guideline Calc (Based on Hardness as CaCO3), applies to water hardness 8000-360,000 µg/L	µg/L		Based on Hardness 8000-360,000 Hardness ≤ 8000: 3 Hardness > 8000 : calc.		417.0	417.0	417.0	417.0	275.5
Pb FLT Guideline Calc (Based on Hardness as CaCO3)	µg/L			Applies to Hardness 8000-360,000 Hardness ≤ 8000, NG Hardness > 8000 : calc.	19.6	19.6	19.6	19.6	14.1
Lithium	µg/L	1.0	NG	NG	72.5	32.2	18.6	14	8.5
Magnesium	µg/L	5.0	NG	NG	29400	33100	29000	28600	16700
Manganese [3]	µg/L	0.10	Calc. based on Hardness	Calc. based on Hardness	178	13.4	10.4	11.7	6.78
Mn FST Guideline Calc (Based on Hardness as CaCO3)	µg/L		Applies to Hardness 25000-259000 µg/L Mn : calc.		3394.18	3394.18	3394.18	3394.18	3394.18
Mn FLT Guideline Calc (Based on Hardness as CaCO3)	µg/L			Applies to Hardness 37000-450000 µg/L Mn : calc.	2483.8	2585	2294.6	2219.8	1749
Mercury (Based on methyl Hg & total mass Hg)	µg/L	0.005	NG	Calc.	<0.005	<0.005	<0.005	<0.005	0.0135
Molybdenum	µg/L	0.05	2000	≤ 1000	2.59	2.03	2.14	3.07	2.09
Nickel	µg/L	0.50	NG		5.93	2.59	1.89	1.68	1.86
Phosphorus	µg/L	50.0	NG	NG	<50	<50	<50	51	<50
Potassium	µg/L	50.0	NG	NG	3450	3610	3350	3360	2500
Rubidium	µg/L	0.2	NG	NG	1.68	1.62	1.65	2	1.03
Selenium	µg/L	0.05	NG	2.0	1.03	15.8	11.5	9.01	3.73
Silicon	µg/L	100.0	NG	NG	5270	5820	5660	5840	4530
Silver [3] (Based on Hardness < or > 100000)	µg/L	0.01	0.10 - 3.0	0.05 - 1.5	<0.01	<0.01	<0.01	<0.01	<0.01
Ag FST Guideline Calc	µg/L		Hardness ≤ 100,000 Ag = 0.10 Hardness > 100,000 Ag = 3.0		3.0	3.0	3.0	3.0	3.0
Ag FLT Guideline Calc	µg/L			Hardness ≤ 100,000 Ag = 0.05 Hardness > 100,000 Ag = 1.5	1.5	1.5	1.5	1.5	1.5
Sodium	µg/L	50.0	NG	NG	116000	83400	64400	55600	16400
Strontium	µg/L	0.2	NG	NG	881	521	357	282	219
Sulfur	µg/L	500.0	NG	NG	124000	107000	83900	70900	37900
Tellerium	µg/L	0.2	NG	NG	<0.2	<0.2	<0.2	<0.2	<0.2
Thallium	µg/L	0.01	NG	NG	0.021	0.014	0.01	0.012	<0.01
Thorium	µg/L	0.10	NG	NG	<0.1	<0.1	0.13	<0.1	<0.1
Tin	µg/L	0.10	NG	NG	0.2	0.28	0.14	0.29	<0.1
Titanium	µg/L	0.3-4.5	NG	NG	1.42	2.49	4.29	5.77	1.38
Tungsten	µg/L	0.10	NG	NG	<0.1	<0.1	<0.1	0.27	<0.1
Uranium	µg/L	0.01	NG	NG	2.28	2.6	2.37	2.33	1.48
Vanadium	µg/L	0.50	NG	NG	0.75	1.11	1.68	1.28	0.57
Zinc [3] (Based on Hardness < or > 90,000)	µg/L	3.0	Calc. based on Hardness	Calc. based on Hardness	10.5	6.4	6.2	5.6	3.4
Zn FST Guideline Calc.	µg/L		Hardness 90,000 - 500,000, Calc. Hardness > 500,000, is Capped Value of 500,000		285.8	340.5	253.5	240.8	160.5
Zn FLT Guideline Calc.	µg/L			Hardness 90,000 - 330,000, Calc. Hardness > 330,000, is Capped Value of 330,000	187.5	187.5	187.5	187.5	135
Zircronium	µg/L	0.06	NG	NG	<0.2	<0.2	<0.2	0.31	<0.2
Metals, Dissolved									
Aluminum [5]	µg/L	1.0	100	50	7.2	7	6.2	13.1	26.2
Al FST Guideline Calc (based on pH)	µg/L		pH < 6.5 : calc. Al pH ≥ 6.5 : 100.0 Al		100	100	100	100	100
Al FLT Guideline Calc (based on median pH)	µg/L			median pH < 6.5 : calc. Al median pH ≥ 6.5 : 50.0 Al	50	50	50	50	50
Antimony	µg/L	0.10	NG	NG	0.49	0.56	0.49	0.39	0.35
Arsenic	µg/L	0.10	NG	NG	0.42	0.35	0.31	0.37	0.22
Barium	µg/L	0.10	NG	NG	73.2	82.5	63.2	73.5	76.2
Beryllium	µg/L	0.10	NG	NG	<0.1	<0.1	<0.1	<0.1	<0.1
Bismuth		0.05	NG	NG	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	µg/L	10.0	NG	NG	370	134	89	62	33
Cadmium [3] (Based on Hardness as $CaCO_3$)	µg/L	0.005	Calc. based on Hardness	Calc. based on hardness	0.0514	0.0295	0.0151	0.0188	0.0165
Cd FST Guideline Calc.	µg/L		Hardness 7,000 - 455,000, Calc. Hardness > 455,000, is Capped Value of 455,000		2.62	2.80	2.35	2.24	1.57
Cd FLT Guideline Calc.	µg/L			Hardness 3,400 - 285,000, Calc. Hardness > 285,000, is Capped Value of 285,000	0.46	0.46	0.46	0.46	0.43
Calcium	µg/L	50.0	NG	NG	120000	142000	107000	104000	75500
Cesium	µg/L	0.01	NG	NG	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium	µg/L	0.10	NG	NG	<0.5	0.54	0.6	0.89	0.95
Cobalt	µg/L	0.10	NG	NG	0.39	0.11	<0.1	<0.1	0.13
Copper [6]	µg/L	0.20	Calc. based on BLM Model	Calc. based on BLM Model	0.57	0.65	0.62	0.62	0.47
Cu FST Guideline Value (Acute)	µg/L		BLM Ligand Model value		13.4	13.8	13.9	131.9	15.7
Cu FLT Guideline Value (Chronic)	µg/L			BLM Ligand Model value	1.9	1.4	2,4	25.9	3.0
Iron	µg/L	10.0	350	NG	11	5	5	5	5
Lead	µg/L	0.05	NG	NG	<0.05	<0.05	<0.05	<0.05	<0.05
Lithium	µg/L	1.0	NG	NG	71	31.4	18.6	13.4	8.7

Parameter	Unit	RDL	BCAWQG - FST 1	BCAWQG - FLT 2	L2 US	L2 US	L2 US	L2-US	L2-US
					26-Jun-22	24-Jul-22	29-Aug-22	28-Sep-22	30-Oct-22
Magnesium	µg/L	5.0	NG	NG	31000	38600	28300	26000	17400
Manganese	µg/L	0.10	NG	NG	223	8.06	2.83	2.56	4.11
Mercury	µg/L	0.005	NG	NG	<0.005	<0.005	<0.005	<0.005	<0.005
Molybdenum	µg/L	0.05	NG	NG	2.56	2.36	2.19	3.1	2.09
Nickel	µg/L	0.50	NG	NG	5.27	2.44	1.4	1.04	1.76
Phosphorus	µg/L	50.0	NG	NG	<50	<50	<50	<50	<50
Potassium	µg/L	50.0	NG	NG	3220	3760	3320	3300	2500
Rubidium	µg/L	0.20	NG	NG	1.53	1.62	1.27	1.42	0.99
Selenium	µg/L	0.05	NG	2.0	1.1	18	12.4	12	4.52
Silicon	µg/L	50.0	NG	NG	5340	5590	5400	5460	4330
Silver	µg/L	0.01	NG	NG	<0.01	<0.01	<0.01	<0.01	<0.01
Sodium	µg/L	50.0	NG	NG	110000	95600	63200	53900	16400
Strontium	µg/L	0.20	NG	NG	830	537	358	289	216
Sulfur	µg/L	500	NG	NG	113000	115000	84900	80300	35800
Tellurium	µg/L	0.20	NG	NG	<0.2	<0.2	<0.2	<0.2	<0.2
Thallium	µg/L	0.01	NG	NG	0.018	<0.01	<0.01	<0.01	<0.01
Thorium	µg/L	0.10	NG	NG	<0.1	<0.1	<0.1	<0.1	<0.1
Tin	µg/L	0.10	NG	NG	0.17	0.29	<0.1	0.17	<0.1
Titanium	µg/L	0.30	NG	NG	<0.3	<0.3	<0.3	<0.3	<0.3
Tungsten	µg/L	0.10	NG	NG	<0.1	<0.1	<0.1	0.29	<0.1
Uranium	µg/L	0.01	NG	NG	2.1	2.63	2.27	2.18	1.47
Vanadium	µg/L	0.50	NG	NG	<0.5	<0.5	<0.5	<0.5	<0.5
Zinc	µg/L	1.00	NG	NG	8.4	4.4	2	1.8	2.8
Zircronium	µg/L	0.06	NG	NG	<0.2	<0.2	<0.2	<0.2	<0.2
Laboratory Work Order Number					FJ2201678	FJ2201959	F2202362	FJ2202748	FJ2203067
Laboratory Identification Number					FJ2201678-002	FJ2201959-002	FJ2202362-005	FJ2202748-001	FJ2203067-001

Appendix B3 L2 Powerhouse Area Water Analytical Results

Parameter	Unit	RDL	BCAWQG - FST 1	BCAWQG - FLT 2	L2-US	L2-US
					28-Nov-22	11-Dec-22
Physical Parameters						
Acidity (Total as $CaCO_3$)	µg/L	1000; 2000	NG	NG	5000	6900
Alkalinity (Total as $CaCO_3$)	mg/L	1.0	NG	NG	170	169
Electrical Conductivity (EC)	µS/cm	2.0	NG	NG	524	458
Hardness as CaCO3, dissolved	µg/L	500	NG	NG	264000	212000
Hardness as CaCO3, from total Ca/Mg (New January 2020)	µg/L				272000	228000
pH	pH Units	0.10	6.5 - 9.0	6.5-9.0	8.22	8.34
Total Dissolved Solids (TDS)	µg/L	10000	NG	NG	377000	336000
Total Suspended Solids (TSS)	µg/L	3000	NG	NG	1500	5600
Alkalinity (Hydroxide) as $CaCO_3$	µg/L	1000	NG	NG	<1000	<1000
Alkalinity (Carbonate as $CaCO_3$)	µg/L	1000	NG	NG	<1000	8600
Alkalinity (Bicarbonate as $CaCO_3$)	µg/L	1000	NG	NG	170000	161000
Anions and Nutrients						
Ammonia (NH_4 as N)	µg/L	5.0	pH dependent (6.5-9.0); GL capped at pH 9.0	pH dependent (6.5-9.0); GL capped at pH 9.0	<5	7
Ammonia FST Guideline	µg/L				3950	3150
Ammonia FLT Guideline				pH dependent (**at Temp 4 °C** or in situ T)	759	606
Chloride (Cl^-)	µg/L	500	600000	150,000	4160	4000
Nitrate (NO_3^- as N)	µg/L	5.0-25.0	NG	NG	530	416
Nitrite (NO_2^- as N)	µg/L	1.0-5.0	Cl-dependent (> 10,000 µg/L) Guideline: 600 ug/L	Cl-dependent (> 10,000 µg/L) Guideline: 200 ug/L	<1	<1
Sulphate (SO_4) [3]	µg/L	300	NG	309,000 - 429,000	116000	80900
SO4 FLT Guideline Calc	µg/L		NG	Hardness 76,000-180,000 = 309,000; Hardness 181,000-250,000 = 429,000; Hardness > 250,000 site-specific	309000	309000
Dissolved Organic Carbon (DOC)	mg/L	1.0	NG	NG	1.43	1.36
Metals, Total						
Aluminum	µg/L	3.00	NG	NG	76.6	65.4
Antimony	µg/L	0.10	NG	NG	0.37	0.26
Arsenic	µg/L	0.10	5.0	5.0	0.25	0.28
Barium	µg/L	0.10	NG	NG	65.2	70.8
Beryllium	µg/L	0.10	NG	NG	<0.1	<0.1
Bismuth	µg/L	0.05	NG	NG	<0.05	<0.05
Boron	µg/L	10.0	1200	1200	27	23
Cadmium	µg/L	0.005	NG	NG	0.0357	0.0302
Calcium	µg/L	50	NG	NG	77900	66500
Cesium	µg/L	0.01	NG	NG	0.01	0.012
Chromium [4]	µg/L	0.1-1.0	NG	NG	0.72	0.67
Cobalt	µg/L	0.10	110	4.0	0.27	0.3
Copper [3]	µg/L	0.50	Calc. based on Hardness	2 to 10	0.55	0.73
Cu FST Guideline Calc. (relevant prior to August 2019)	µg/L		Hardness 13,000 - 400,000 : calc.; Hardness ≥ 400,000 is Capped Value of 400,000			
Cu FLT Guideline Calc. (relevant prior to August 2019)	µg/L			Hardness 50,000 - 250,000: calc.; Hardness > 250,000, Cu = 10		
Iron	µg/L	10	1000	NG	60	77
Lead [3]	µg/L	0.05	101 - 348	Calc. based on Hardness	0.05	0.075
Pb FST Guideline Calc (Based on Hardness as CaCO3), applies to water hardness 8000-360,000 µg/L	µg/L		Based on Hardness 8000-360,000 Hardness ≤ 8000: 3 Hardness > 8000 : calc.		281.0	212.5
Pb FLT Guideline Calc (Based on Hardness as CaCO3)	µg/L			Applies to Hardness 8000-360,000 Hardness ≤ 8000, NG Hardness > 8000 : calc.	14.3	11.6
Lithium	µg/L	1.0	NG	NG	8.1	6
Magnesium	µg/L	5.0	NG	NG	18800	15100
Manganese [3]	µg/L	0.10	Calc. based on Hardness	Calc. based on Hardness	8.64	7.44
Mn FST Guideline Calc (Based on Hardness as CaCO3)	µg/L		Applies to Hardness 25000-259000 µg/L Mn : calc.		3394.18	2876.24
Mn FLT Guideline Calc (Based on Hardness as CaCO3)	µg/L			Applies to Hardness 37000-450000 µg/L Mn : calc.	1766.6	1537.8
Mercury (Based on methyl Hg & total mass Hg)	µg/L	0.005	NG	Calc.	<0.005	<0.005
Molybdenum	µg/L	0.05	2000	≤ 1000	2.1	2.35
Nickel	µg/L	0.50	NG		3.61	2.7
Phosphorus	µg/L	50.0	NG	NG	<50	54
Potassium	µg/L	50.0	NG	NG	1970	1940
Rubidium	µg/L	0.2	NG	NG	0.85	0.9
Selenium	µg/L	0.05	NG	2.0	2.43	1.65
Silicon	µg/L	100.0	NG	NG	4080	4280
Silver [3] (Based on Hardness < or > 100000)	µg/L	0.01	0.10 - 3.0	0.05 - 1.5	<0.01	<0.01
Ag FST Guideline Calc	µg/L		Hardness ≤ 100,000 Ag = 0.10 Hardness > 100,000 Ag = 3.0		3.0	3.0
Ag FLT Guideline Calc	µg/L			Hardness ≤ 100,000 Ag = 0.05 Hardness > 100,000 Ag = 1.5	1.5	1.5
Sodium	µg/L	50.0	NG	NG	12600	13400
Strontium	µg/L	0.2	NG	NG	227	173
Sulfur	µg/L	500.0	NG	NG	41700	28600
Tellerium	µg/L	0.2	NG	NG	<0.2	<0.2
Thallium	µg/L	0.01	NG	NG	0.013	<0.01
Thorium	µg/L	0.10	NG	NG	<0.1	<0.1
Tin	µg/L	0.10	NG	NG	<0.1	<0.1
Titanium	µg/L	0.3-4.5	NG	NG	1.36	0.86
Tungsten	µg/L	0.10	NG	NG	<0.1	<0.1
Uranium	µg/L	0.01	NG	NG	1.52	1.39
Vanadium	µg/L	0.50	NG	NG	0.57	0.55
Zinc [3] (Based on Hardness < or > 90,000)	µg/L	3.0	Calc. based on Hardness	Calc. based on Hardness	7.2	5.1
Zn FST Guideline Calc.	µg/L		Hardness 90,000 - 500,000, Calc. Hardness > 500,000, is Capped Value of 500,000		163.5	124.5
Zn FLT Guideline Calc.	µg/L			Hardness 90,000 - 330,000, Calc. Hardness > 330,000, is Capped Value of 330,000	138	99
Zircronium	µg/L	0.06	NG	NG	<0.2	<0.2
Metals, Dissolved						
Aluminum [5]	µg/L	1.0	100	50	20.2	19.7
Al FST Guideline Calc (based on pH)	µg/L		pH < 6.5 : calc. Al pH ≥ 6.5 : 100.0 Al		100	100
Al FLT Guideline Calc (based on median pH)	µg/L			median pH < 6.5 : calc. Al median pH ≥ 6.5 : 50.0 Al	50	50
Antimony	µg/L	0.10	NG	NG	0.28	0.24
Arsenic	µg/L	0.10	NG	NG	0.18	0.21
Barium	µg/L	0.10	NG	NG	59	64.7
Beryllium	µg/L	0.10	NG	NG	<0.1	<0.1
Bismuth		0.05	NG	NG	<0.05	<0.05
Boron	µg/L	10.0	NG	NG	27	25
Cadmium [3] (Based on Hardness as $CaCO_3$)	µg/L	0.005	Calc. based on Hardness	Calc. based on hardness	0.0407	0.0213
Cd FST Guideline Calc.	µg/L		Hardness 7,000 - 455,000, Calc. Hardness > 455,000, is Capped Value of 455,000		1.60	1.28
Cd FLT Guideline Calc.	µg/L			Hardness 3,400 - 285,000, Calc. Hardness > 285,000, is Capped Value of 285,000	0.43	0.37
Calcium	µg/L	50.0	NG	NG	77200	60700
Cesium	µg/L	0.01	NG	NG	<0.01	<0.01
Chromium	µg/L	0.10	NG	NG	0.61	0.56
Cobalt	µg/L	0.10	NG	NG	0.19	0.15
Copper [6]	µg/L	0.20	Calc. based on BLM Model	Calc. based on BLM Model	0.41	0.42
Cu FST Guideline Value (Acute)	µg/L		BLM Ligand Model value		9.0	9.1
Cu FLT Guideline Value (Chronic)	µg/L			BLM Ligand Model value	1.6	1.7
Iron	µg/L	10.0	350	NG	5	5
Lead	µg/L	0.05	NG	NG	<0.05	<0.05
Lithium	µg/L	1.0	NG	NG	8.1	7

Parameter	Unit	RDL	BCAWQG - FST 1	BCAWQG - FLT 2	L2-US	L2-US
					28-Nov-22	11-Dec-22
Magnesium	µg/L	5.0	NG	NG	17300	14700
Manganese	µg/L	0.10	NG	NG	6.49	3.82
Mercury	µg/L	0.005	NG	NG	<0.005	<0.005
Molybdenum	µg/L	0.05	NG	NG	2.16	2.43
Nickel	µg/L	0.50	NG	NG	3.47	1.93
Phosphorus	µg/L	50.0	NG	NG	<50	<50
Potassium	µg/L	50.0	NG	NG	1930	2060
Rubidium	µg/L	0.20	NG	NG	0.77	0.98
Selenium	µg/L	0.05	NG	2.0	2.98	1.93
Silicon	µg/L	50.0	NG	NG	4030	4370
Silver	µg/L	0.01	NG	NG	<0.01	<0.01
Sodium	µg/L	50.0	NG	NG	11600	13300
Strontium	µg/L	0.20	NG	NG	215	158
Sulfur	µg/L	500	NG	NG	41800	30300
Tellurium	µg/L	0.20	NG	NG	<0.2	<0.2
Thallium	µg/L	0.01	NG	NG	<0.01	<0.01
Thorium	µg/L	0.10	NG	NG	<0.1	<0.1
Tin	µg/L	0.10	NG	NG	<0.1	<0.1
Titanium	µg/L	0.30	NG	NG	<0.3	<0.3
Tungsten	µg/L	0.10	NG	NG	<0.1	<0.1
Uranium	µg/L	0.01	NG	NG	1.54	1.23
Vanadium	µg/L	0.50	NG	NG	<0.5	<0.5
Zinc	µg/L	1.00	NG	NG	7	3.6
Zircronium	µg/L	0.06	NG	NG	<0.2	<0.2
Laboratory Work Order Number					FJ2203325	FJ2203454
Laboratory Identification Number					FJ2203325-001	FJ2203454-002

Appendix B4 LBDB Area Water Analytical Results

Parameter	Unit	RDL	BCAWQG - FST 1	BCAWQG - FLT 2	LBP POND 30-Mar-22	LBP POND 18-Apr-22	LBP POND 31-May-22	LBP POND 26-Jun-22	LBP POND 25-Jul-22	LBP POND 29-Aug-22	LBP POND 28-Sep-22	LBP POND 31-Oct-22
Physical Parameters												
Acidity (Total as $CaCO_3$)	µg/L	1000	NG	NG	3400	2200	3200	8300	5200	18700	5000	14400
Alkalinity (Total as $CaCO_3$)	mg/L	1.0	NG	NG	67.4	84.7	115	160	207	244	319	347
Electrical Conductivity (EC)	µS/cm	2.0	NG	NG	727	1370	2740	3190	3870	4560	4500	4330
Hardness as CaCO3, dissolved	µg/L	500	NG	NG	279000	555000	990000	1570000	2160000	2590000	2640000	2410000
Hardness as CaCO3, from total Ca/Mg (New January 2020)	µg/L				332000	593000	1110000	1570000	2010000	2720000	2780000	2440000
pH	pH Units	0.10	6.5 - 9	6.5-9.0	7.85	7.32	8.14	7.95	7.28	7.59	7.91	7.48
Total Dissolved Solids (TDS)	µg/L	10000	NG	NG	480000	1050000	2040000	2950000	3720000	4290000	4840000	4390000
Total Suspended Solids (TSS)	µg/L	3000	NG	NG	20300	14000	15700	1500	15500	12300	22200	46600
Alkalinity (Hydroxide) as $CaCO_3$	µg/L	1000	NG	NG	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000
Alkalinity (Carbonate as $CaCO_3$)	µg/L	1000	NG	NG	<1000	<1000	<1000	<1000	<1000	<1000	<1000	<1000
Alkalinity (Bicarbonate as $CaCO_3$)	µg/L	1000	NG	NG	67400	84700	115000	160000	207000	244000	319000	347000
Anions and Nutrients												
Ammonia (NH_4 as N)	µg/L	5.0	pH dependent (6.5-9.0)	pH dependent (6.5-9.0)	99	<5	122	7.7	5.4	32.2	6.0	87.6
Ammonia FST Guideline	µg/L		pH dependent (**at Temp 4 °C** or in situ T)		7420	17100	4950	6220	17100	11900	7420	13600
Ammonia FLT Guideline	µg/L			pH dependent (**at Temp 4 °C** or in situ T)	1430	1970	952	1200	1970	1970	1430	1970
Chloride (Cl^-)	µg/L	500	600000	150,000	2540	6260	<10000	<10000	4690	10000	14400	16400
Nitrate (NO_3^- as N)	µg/L	5.0-25.0	NG	NG		25.8	219	<100	<25	<50	<50	<50
Nitrite (NO_2^- as N)	µg/L	1.0-5.0	Cl-dependent (> 10,000 µg/L) Guideline: 600 ug/L	Cl-dependent (> 10,000 µg/L) Guideline: 200 ug/L		10.8	<20	<20	<5	<10	<10	<10
Sulphate (SO_4) [3]	µg/L	300	NG	309,000 - 429,000	291000	681000	1400000	1990000	2530000	3020000	3190000	3060000
SO4 FLT Guideline Calc	µg/L		NG	Hardness 76,000-180,000 = 309,000 Hardness 181,000-250,000 = 429,000 Hardness > 250,000 site-specific	429000	429000	429000	429000	429000	429000	429000	429000
Dissolved Organic Carbon (DOC)	mg/L	1.0	NG	NG	13.3	9.34	14.4	16.3	21.4	23.8	30.8	27.1
Metals, Total												
Aluminum	µg/L	3.00	NG	NG	332	740	3420	519	111	59.2	48.2	107
Antimony	µg/L	0.10	NG	NG	0.19	0.14	0.21	<0.2	0.14	<0.5	<1	<0.5
Arsenic	µg/L	0.10	5.0	5.0	0.79	0.74	0.83	0.61	0.89	0.57	<1	0.69
Barium	µg/L	0.10	NG	NG	43.4	41.8	38.8	28.2	35.1	31.7	27.4	20.4
Beryllium	µg/L	0.10	NG	NG	<0.1	<0.1	0.583	0.122	<0.1	<0.1	<0.2	<0.1
Bismuth	µg/L	0.05	NG	NG	<0.05	<0.05	<0.1	<0.1	<0.05	<0.25	<0.5	<0.25
Boron	µg/L	10.0	1200	1200	48	71	164	222	269	340	301	273
Cadmium	µg/L	0.005	NG	NG	0.216	0.953	2.99	0.62	0.0475	<0.05	<0.05	0.0424
Calcium	µg/L	50	NG	NG	84800	143000	232000	349000	430000	568000	552000	491000
Cesium	µg/L	0.01	NG	NG	0.078	0.034	<0.02	<0.02	0.014	<0.05	<0.1	<0.05
Chromium [4]	µg/L	0.1-1.0	NG	NG	0.5	0.52	<1	<0.5	<0.5	<0.5	<1	0.55
Cobalt	µg/L	0.10	110	4.0	2.43	18.1	48.8	13.8	5.09	3.76	<1	5.21
Copper [3]	µg/L	0.50	Calc. based on Hardness	2 to 10	2.74	1.95	5.96	1.64	0.57	<2.5	<5	<2.5
Cu FST Guideline Calc. (relevant prior to August 2019)	µg/L		Hardness 13,000 - 400,000 : calc.; Hardness ≥ 400,000 is Capped Value of 400,000									
Cu FLT Guideline Calc. (relevant prior to August 2019)	µg/L			Hardness 50,000 - 250,000: calc.; Hardness > 250,000, Cu = 10								
Iron	µg/L	10	1000	NG	785	1590	1710	438	1410	737	1220	12800
Lead [3]	µg/L	0.05	101 - 348	Calc. based on Hardness	0.479	0.191	<0.1	<0.1	0.053	<0.25	<0.5	<0.25
Pb FST Guideline Calc (Based on Hardness as CaCO3), applies to water hardness 8000-360,000 µg/L	µg/L		Based on Hardness 8000-360,000 Hardness ≤ 8000: 3 Hardness > 8000 : calc.		301.4	417.0	417.0	417.0	417.0	417.0	417.0	417.0
Pb FLT Guideline Calc (Based on Hardness as CaCO3)	µg/L			Applies to Hardness 8000-360,000 Hardness ≤ 8000, NG Hardness > 8000 : calc.	15.1	19.6	19.6	19.6	19.6	19.6	19.6	19.6
Lithium	µg/L	1.0	NG	NG	14.2	33.2	74.6	92	87.5	86	63.2	49.2
Magnesium	µg/L	5.0	NG	NG	29300	57400	129000	170000	228000	315000	341000	295000
Manganese [3]	µg/L	0.10	Calc. based on Hardness	Calc. based on Hardness	294	2080	2180	1830	1780	4010	625	9390
Mn FST Guideline Calc (Based on Hardness as CaCO3)	µg/L		Applies to Hardness 25000-259000 µg/L Mn : calc.		3394.2	3394.2	3394.2	3394.2	3394.2	3394.2	3394.2	3394.2
Mn FLT Guideline Calc (Based on Hardness as CaCO3)	µg/L			Applies to Hardness 37000-450000 µg/L Mn : calc.	1832.6	2585	2585	2585	2585	2585	2585	2585
Mercury (Based on methyl Hg & total mass Hg)	µg/L	0.005	NG	Calc.	0.0065	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Molybdenum	µg/L	0.05	2000	≤ 1000	1.87	1.25	0.822	0.24	0.688	0.987	1.08	1.04
Nickel	µg/L	0.50	NG		8.2	45.4	153	91.9	36.4	25.3	14.3	18.2
Phosphorus	µg/L	50.0	NG	NG	128	53	<100	<100	<50	<250	<500	<250
Potassium	µg/L	50.0	NG	NG	7050	10000	17000	9850	12400	17900	21400	19200
Rubidium	µg/L	0.2	NG	NG	1.69	2.11	4.75	4.52	5.53	8	7.04	6.41
Selenium	µg/L	0.05	NG	2.0	1.05	0.498	0.798	0.352	0.396	0.311	<0.5	<0.25
Silicon	µg/L	100.0	NG	NG	1890	2650	6780	5560	3550	<500	<1000	1740
Silver [3] (Based on Hardness < or > 100000)	µg/L	0.01	0.10 - 3.0	0.05 - 1.5	0.027	0.014	<0.02	<0.02	<0.01	<0.05	<0.1	<0.05
Ag FST Guideline Calc	µg/L		Hardness ≤ 100,000 Ag = 0.10 Hardness > 100,000 Ag = 3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Ag FLT Guideline Calc	µg/L			Hardness ≤ 100,000 Ag = 0.05 Hardness > 100,000 Ag = 1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Sodium	µg/L	50.0	NG	NG	43600	95200	260000	264000	350000	485000	443000	436000
Strontium	µg/L	0.2	NG	NG	328	350	648	836	1000	1260	1170	1010
Sulfur	µg/L	500.0	NG	NG	122000	216000	561000	732000	796000	1050000	1080000	1080000
Tellerium	µg/L	0.2	NG	NG	<0.2	<0.2	<0.4	<0.4	0.24	<1	<2	<1
Thallium	µg/L	0.01	NG	NG	0.023	0.012	0.032	<0.02	0.012	<0.05	<0.1	<0.05
Thorium	µg/L	0.10	NG	NG	0.11	<0.1	<0.2	<0.2	<0.1	<0.5	<1	<0.5
Tin	µg/L	0.10	NG	NG	<0.1	<0.1	<0.2	<0.2	<0.1	<0.5	<1	<0.5
Titanium	µg/L	0.3-4.5	NG	NG	3.78	8.03	<0.6	<0.6	1.11	<1.5	<3	<1.5
Tungsten	µg/L	0.10	NG	NG	<0.1	<0.1	<0.2	<0.2	<0.1	<0.5	<1	<0.5
Uranium	µg/L	0.01	NG	NG	2.21	1.31	1.77	2.43	2.55	3.08	3.6	2.48
Vanadium	µg/L	0.50	NG	NG	1.2	1.65	<1	<1	0.64	<2.5	<5	<2.5
Zinc [3] (Based on Hardness < or > 90,000)	µg/L	3.0	Calc. based on Hardness	Calc. based on Hardness	113	330	497	236	23.8	<15	<30	<15
Zn FST Guideline Calc.	µg/L		Hardness 90,000 - 500,000, Calc. Hardness > 500,000, is Capped Value of 500,000		174.8	340.5	340.5	340.5	340.5	340.5	340.5	340.5
Zn FLT Guideline Calc.	µg/L			Hardness 90,000 - 330,000, Calc. Hardness > 330,000, is Capped Value of 330,000	149.3	187.5	187.5	187.5	187.5	187.5	187.5	187.5
Zircronium	µg/L	0.06	NG	NG	<0.2	0.3	<0.4	<0.4	<0.2	<1	<2	<1
Metals, Dissolved												
Aluminum [5]	µg/L	1.0	100	50	41.6	31.4	71.9	50	53.9	16.3	13.3	16
Al FST Guideline Calc (based on pH)	µg/L		pH < 6.5 : calc. Al pH ≥ 6.5 : 100.0 Al		100	100	100	100	100	100	100	100
Al FLT Guideline Calc (based on median pH)	µg/L			median pH < 6.5 : calc. Al median pH ≥ 6.5 : 50.0 Al	50	50	50	50	50	50	50	50
Antimony	µg/L	0.10	NG	NG	0.16	<0.5	0.2	<0.5	<1	<1	<1	<1
Arsenic	µg/L	0.10	NG	NG	0.38	<0.5	0.38	0.52	<1	<1	<1	<1
Barium	µg/L	0.10	NG	NG	29.9	38.2	35.3	29.4	36.4	31.8	26.4	20.5
Beryllium	µg/L	0.10	NG	NG	<0.1	<0.1	<0.2	<0.1	<0.2	<0.2	<0.2	<0.2
Bismuth		0.05	NG	NG	<0.05	<0.25	<0.1	<0.25	<0.5	<0.5	<0.5	<0.5
Boron	µg/L	10.0	NG	NG	38	66	173	227	280	455	328	290
Cadmium [3] (Based on Hardness as $CaCO_3$)	µg/L	0.005	Calc. based on Hardness	Calc. based on hardness	0.163	0.836	2.78	0.558	<0.05	<0.05	<0.05	<0.05
Cd FST Guideline Calc.	µg/L		Hardness 7,000 - 455,000, Calc. Hardness > 455,000, is Capped Value of 455,000		1.69	2.80	2.80	2.80	2.80	2.80	2.80	2.80
Cd FLT Guideline Calc.	µg/L			Hardness 3,400 - 285,000, Calc. Hardness > 285,000, is Capped Value of 285,000	0.45	0.46	0.46	0.46	0.46	0.46	0.46	0.46
Calcium	µg/L	50.0	NG	NG	72700	132000	215000	348000	450000	476000	536000	469000
Cesium	µg/L	0.01	NG	NG	<0.01	<0.05	<0.02	<0.05	<0.1	<0.1	<0.1	<0.1
Chromium	µg/L	0.10	NG	NG	<0.5	<0.5	<1	<0.5	<1	<1	<1	<1
Cobalt	µg/L	0.10	NG	NG	2.1	17	46.2	13.7	5.04	3.57	<1	5.67
Copper [6]	µg/L	0.20	Calc. based on BLM Model	Calc. based on BLM Model	2.0	1.94	4.49	1.71	<2	<2	<2	<2
Cu FST Guideline Value (Acute)	µg/L		BLM Ligand Model value		64.9	60.4	97.7	92.3	51.7	76.3	109.1	66.7
Cu FLT Guideline Value (Chronic)	µg/L			BLM Ligand Model value	12	11.1	20.2	25.6	4.8	7.7	13.5	6.4
Iron	µg/L	10.0	350	NG	48	662	201	25	50	50	134	4130
Lead	µg/L	0.05	NG	NG	<0.05	<0.25	<0.1	<0.25	<0.5	<0.5	<0.5	<0.5
Lithium	µg/L	1.0	NG	NG	12.3	30.3	83.3	95.6	87.4	88.7	63	56.6

Parameter	Unit	RDL	BCAWQG - FST 1	BCAWQG - FLT 2	LBP POND	LBP POND	LBP POND	LBP POND	LBP POND	LBP POND	LBP POND	LBP POND
					30-Mar-22	18-Apr-22	31-May-22	26-Jun-22	25-Jul-22	29-Aug-22	28-Sep-22	31-Oct-22
Magnesium	µg/L	5.0	NG	NG	23700	54800	110000	171000	251000	341000	316000	302000
Manganese	µg/L	0.10	NG	NG	237	1970	1900	1700	1860	3470	576	9390
Mercury	µg/L	0.005	NG	NG	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0058
Molybdenum	µg/L	0.05	NG	NG	1.66	1.21	0.668	0.27	0.815	1.18	1.14	0.92
Nickel	µg/L	0.50	NG	NG	6.95	43.1	137	93.5	38.6	23.8	12.3	19.3
Phosphorus	µg/L	50.0	NG	NG	<50	<250	<100	<250	<500	<500	<500	<500
Potassium	µg/L	50.0	NG	NG	6360	9050	15200	10400	12000	19800	21500	20200
Rubidium	µg/L	0.20	NG	NG	1.08	1.75	4.49	4.26	5.87	5.49	8.57	7
Selenium	µg/L	0.05	NG	2.0	1.03	0.436	0.567	0.386	0.305	<0.5	<0.5	<0.5
Silicon	µg/L	50.0	NG	NG	1290	2050	6270	5470	2950	508	<500	1660
Silver	µg/L	0.01	NG	NG	<0.01	<0.05	<0.02	<0.05	<0.1	<0.1	<0.1	<0.1
Sodium	µg/L	50.0	NG	NG	36000	89000	247000	279000	369000	490000	458000	473000
Strontium	µg/L	0.20	NG	NG	294	338	588	802	1020	1110	1210	1020
Sulfur	µg/L	500	NG	NG	99500	247000	505000	706000	985000	1300000	1200000	1030000
Tellurium	µg/L	0.20	NG	NG	<0.2	<1	<0.4	<1	<2	<2	<2	<2
Thallium	µg/L	0.01	NG	NG	<0.01	<0.05	0.033	<0.05	<0.1	<0.1	<0.1	<0.1
Thorium	µg/L	0.10	NG	NG	<0.1	<0.5	<0.2	<0.5	<1	<1	<1	<1
Tin	µg/L	0.10	NG	NG	<0.1	<0.5	<0.2	<0.5	<1	<1	<1	<1
Titanium	µg/L	0.30	NG	NG	2.07	<1.5	<0.6	<1.5	<3	<3	<3	<3
Tungsten	µg/L	0.10	NG	NG	<0.1	<0.5	<0.2	<0.5	<1	<1	<1	<1
Uranium	µg/L	0.01	NG	NG	2	1.1	1.24	2.45	2.74	3.15	3.52	2.51
Vanadium	µg/L	0.50	NG	NG	<0.5	<2.5	<1	<2.5	<5	<5	<5	<5
Zinc	µg/L	1.00	NG	NG	98.2	308	431	225	20.5	<10	<10	<10
Zircronium	µg/L	0.06	NG	NG	0.32	<1	<0.4	<1	<2	<2	<2	<2
Laboratory Work Order Number					FJ2200791	FJ2200923	FJ2201370	FJ2201678	FJ2201959	F2202362	FJ2202748	FJ2203077
Laboratory Identification Number					FJ2200791-001	FJ2200923-003	FJ2201370-002	FJ2201678-008	FJ2201959-006	FJ2202362-006	FJ2202748-006	FJ2203077-003

Notes:

Screening completed on BCAWQG-FST [1] and FLT [2] guideline values.

[1] BC Ministry of Environment, Water Protection & Sustainability Branch (2019). British Columbia Approved Water Quality Guidelines (BCAWQG): Aquatic Life, Wildlife & Agriculture

[2] BC Ministry of Environment, Water Protection & Sustainability Branch (2018). British Columbia Approved Water Quality Guidelines (BCAWQG): Aquatic Life, Wildlife & Agriculture

[3] Guideline is hardness dependant. Where results are above laboratory reportable detection limits, guideline limits have been evaluated based on individual sample hardness. Sample-

[4] Guideline is for Chromium (IV) cation. Analytical results are for unspeciated Chromium. Where analytical results exceed the guideline, speciated analysis may be warranted.

[5] Guideline is pH dependant.

NG - No Guideline

Detection limit can vary as described in the COA. Detection limit can be raised when dilutation is required due to high Dissolved Solids/Electrical Conductivity (DLDS), e.g. nitrite.

BOLD and shaded dark gray: Exceeds BCAWQG-FST (Freshwater Short Term) guideline.

Shaded Light Gray: Exceeds BCAWQG-FLT (Freshwater Long Term) guideline.

RED - Measured value is below detection limit (DL); value shown is 50% of DL

Blank - Not analyzed

Appendix B4 LBDB Area Water Analytical Results

Parameter	Unit	RDL	BCAWQG - FST 1	BCAWQG - FLT 2	LBDB-EDS Armor	LBDB-WDS Armor	LBDB-WDS Armor	LBDB-LD-DS	LBDB-LD-MS
					31-May-22	30-Mar-22	31-May-22	31-May-22	31-May-22
Physical Parameters									
Acidity (Total as $CaCO_3$)	µg/L	1000	NG	NG	1000	3000	1000	1000	1000
Alkalinity (Total as $CaCO_3$)	mg/L	1.0	NG	NG	343	193	181	143	156
Electrical Conductivity (EC)	µS/cm	2.0	NG	NG	4670	2380	3750	3460	3050
Hardness as CaCO3, dissolved	µg/L	500	NG	NG	1540000	1020000	1790000	1320000	1170000
Hardness as CaCO3, from total Ca/Mg (New January 2020)	µg/L				1690000	1150000	1910000	1440000	1270000
pH	pH Units	0.10	6.5 - 9	6.5-9.0	8.53	8.23	8.31	8.23	8.27
Total Dissolved Solids (TDS)	µg/L	10000	NG	NG	4060000	1940000	3100000	2990000	2520000
Total Suspended Solids (TSS)	µg/L	3000	NG	NG	11500	1500	3500	3300	6300
Alkalinity (Hydroxide) as $CaCO_3$	µg/L	1000	NG	NG	<1000	<1000	<1000	<1000	<1000
Alkalinity (Carbonate as $CaCO_3$)	µg/L	1000	NG	NG	32400	<1000	3800	<1000	<1000
Alkalinity (Bicarbonate as $CaCO_3$)	µg/L	1000	NG	NG	310000	193000	177000	143000	156000
Anions and Nutrients									
Ammonia (NH_4 as N)	µg/L	5.0	pH dependent (6.5-9.0)	pH dependent (6.5-9.0)	22.9	7.0	13.3	44.4	1350
Ammonia FST Guideline	µg/L		pH dependent (**at Temp 4 °C** or in situ T)		2010	3950	3150	3950	3150
Ammonia FLT Guideline	µg/L			pH dependent (**at Temp 4 °C** or in situ T)	387	759	606	759	606
Chloride (Cl^-)	µg/L	500	600000	150,000	<10000	<10000	<10000	<10000	<10000
Nitrate (NO_3^- as N)	µg/L	5.0-25.0	NG	NG	177		<100	<100	365
Nitrite (NO_2^- as N)	µg/L	1.0-5.0	Cl-dependent (> 10,000 µg/L) Guideline: 600 ug/L	Cl-dependent (> 10,000 µg/L) Guideline: 200 ug/L	<20		<20	<20	<20
Sulphate (SO_4) [3]	µg/L	300	NG	309,000 - 429,000	2380000	1270000	2120000	1850000	1590000
SO4 FLT Guideline Calc	µg/L		NG	Hardness 76,000-180,000 = 309,000 Hardness 181,000-250,000 = 429,000 Hardness > 250,000 site-specific	429000	429000	429000	429000	429000
Dissolved Organic Carbon (DOC)	mg/L	1.0	NG	NG	33.8	14.4	32.4	22.8	18.7
Metals, Total									
Aluminum	µg/L	3.00	NG	NG	126	24	29.6	86.9	600
Antimony	µg/L	0.10	NG	NG	0.52	0.25	0.46	0.27	<0.5
Arsenic	µg/L	0.10	5.0	5.0	1.26	0.49	0.87	0.66	0.79
Barium	µg/L	0.10	NG	NG	45	37.2	93.3	27.4	43.9
Beryllium	µg/L	0.10	NG	NG	<0.5	<0.2	<0.2	<0.2	<0.5
Bismuth	µg/L	0.05	NG	NG	<0.25	<0.1	<0.1	<0.1	<0.25
Boron	µg/L	10.0	1200	1200	243	74	185	228	173
Cadmium	µg/L	0.005	NG	NG	0.701	0.0687	0.066	0.67	1.56
Calcium	µg/L	50	NG	NG	278000	262000	390000	290000	273000
Cesium	µg/L	0.01	NG	NG	<0.05	<0.02	<0.02	0.023	<0.05
Chromium [4]	µg/L	0.1-1.0	NG	NG	<2.5	<1	<1	<1	<2.5
Cobalt	µg/L	0.10	110	4.0	1.58	0.46	0.34	5.38	269
Copper [3]	µg/L	0.50	Calc. based on Hardness	2 to 10	6.85	2.7	4.61	3.56	<2.5
Cu FST Guideline Calc. (relevant prior to August 2019)	µg/L		Hardness 13,000 - 400,000 : calc.; Hardness ≥ 400,000 is Capped Value of 400,000						
Cu FLT Guideline Calc. (relevant prior to August 2019)	µg/L			Hardness 50,000 - 250,000: calc.; Hardness > 250,000, Cu = 10					
Iron	µg/L	10	1000	NG	307	37	223	122	4320
Lead [3]	µg/L	0.05	101 - 348	Calc. based on Hardness	<0.25	<0.1	<0.1	<0.1	<0.25
Pb FST Guideline Calc (Based on Hardness as CaCO3), applies to water hardness 8000-360,000 µg/L	µg/L		Based on Hardness 8000-360,000 Hardness ≤ 8000: 3 Hardness > 8000 : calc.		417.0	417.0	417.0	417.0	417.0
Pb FLT Guideline Calc (Based on Hardness as CaCO3)	µg/L			Applies to Hardness 8000-360,000 Hardness ≤ 8000, NG Hardness > 8000 : calc.	19.6	19.6	19.6	19.6	19.6
Lithium	µg/L	1.0	NG	NG	169	28.5	46.5	81.9	61.3
Magnesium	µg/L	5.0	NG	NG	241000	121000	228000	173000	144000
Manganese [3]	µg/L	0.10	Calc. based on Hardness	Calc. based on Hardness	186	62.4	46.2	1120	19200
Mn FST Guideline Calc (Based on Hardness as CaCO3)	µg/L		Applies to Hardness 25000-259000 µg/L Mn : calc.		3394.2	3394.2	3394.2	3394.2	3394.2
Mn FLT Guideline Calc (Based on Hardness as CaCO3)	µg/L			Applies to Hardness 37000-450000 µg/L Mn : calc.	2585	2585	2585	2585	2585
Mercury (Based on methyl Hg & total mass Hg)	µg/L	0.005	NG	Calc.	0.0064	0.0054	0.0064	<0.005	<0.005
Molybdenum	µg/L	0.05	2000	≤ 1000	6.1	3.06	5.19	1.34	1.01
Nickel	µg/L	0.50	NG		19.7	5.41	7.74	29.7	206
Phosphorus	µg/L	50.0	NG	NG	<250	<100	<100	<100	<250
Potassium	µg/L	50.0	NG	NG	13800	5580	12200	19100	21000
Rubidium	µg/L	0.2	NG	NG	2.41	0.74	1.7	3	9.71
Selenium	µg/L	0.05	NG	2.0	2.21	1.22	1.47	0.543	0.447
Silicon	µg/L	100.0	NG	NG	4600	3150	5780	4130	4660
Silver [3] (Based on Hardness < or > 100000)	µg/L	0.01	0.10 - 3.0	0.05 - 1.5	<0.05	<0.02	<0.02	<0.02	<0.05
Ag FST Guideline Calc	µg/L		Hardness ≤ 100,000 Ag = 0.10 Hardness > 100,000 Ag = 3.0		3.0	3.0	3.0	3.0	3.0
Ag FLT Guideline Calc	µg/L			Hardness ≤ 100,000 Ag = 0.05 Hardness > 100,000 Ag = 1.5	1.5	1.5	1.5	1.5	1.5
Sodium	µg/L	50.0	NG	NG	597000	184000	281000	351000	278000
Strontium	µg/L	0.2	NG	NG	1400	1100	1190	737	674
Sulfur	µg/L	500.0	NG	NG	934000	464000	865000	760000	628000
Tellerium	µg/L	0.2	NG	NG	<1	<0.4	<0.4	<0.4	<1
Thallium	µg/L	0.01	NG	NG	<0.05	<0.02	0.033	0.028	0.082
Thorium	µg/L	0.10	NG	NG	<0.5	<0.2	<0.2	<0.2	<0.5
Tin	µg/L	0.10	NG	NG	<0.5	<0.2	<0.2	<0.2	<0.5
Titanium	µg/L	0.3-4.5	NG	NG	2.96	<0.6	0.7	1.17	<1.5
Tungsten	µg/L	0.10	NG	NG	<0.5	<0.2	<0.2	<0.2	<0.5
Uranium	µg/L	0.01	NG	NG	17.7	13.1	10.3	1.94	1.46
Vanadium	µg/L	0.50	NG	NG	<2.5	<1	<1	<1	<2.5
Zinc [3] (Based on Hardness < or > 90,000)	µg/L	3.0	Calc. based on Hardness	Calc. based on Hardness	312	<6	<6	12.2	164
Zn FST Guideline Calc.	µg/L		Hardness 90,000 - 500,000, Calc. Hardness > 500,000, is Capped Value of 500,000		340.5	340.5	340.5	340.5	340.5
Zn FLT Guideline Calc.	µg/L			Hardness 90,000 - 330,000, Calc. Hardness > 330,000, is Capped Value of 330,000	187.5	187.5	187.5	187.5	187.5
Zircronium	µg/L	0.06	NG	NG	<1	<0.4	<0.4	<0.4	<1
Metals, Dissolved									
Aluminum [5]	µg/L	1.0	100	50	10.9	2.9	8.6	36.5	103
Al FST Guideline Calc (based on pH)	µg/L		pH < 6.5 : calc. Al pH ≥ 6.5 : 100.0 Al		100	100	100	100	100
Al FLT Guideline Calc (based on median pH)	µg/L			median pH < 6.5 : calc. Al median pH ≥ 6.5 : 50.0 Al	50	50	50	50	50
Antimony	µg/L	0.10	NG	NG	0.51	0.23	<0.5	0.28	<0.5
Arsenic	µg/L	0.10	NG	NG	1.24	0.44	0.72	0.54	0.53
Barium	µg/L	0.10	NG	NG	41.7	34.6	96.8	25.7	44.7
Beryllium	µg/L	0.10	NG	NG	<0.5	<0.2	<0.5	<0.2	<0.5
Bismuth		0.05	NG	NG	<0.25	<0.1	<0.25	<0.1	<0.25
Boron	µg/L	10.0	NG	NG	244	66	198	237	176
Cadmium [3] (Based on Hardness as $CaCO_3$)	µg/L	0.005	Calc. based on Hardness	Calc. based on hardness	0.642	0.0548	0.0788	0.599	0.333
Cd FST Guideline Calc.	µg/L		Hardness 7,000 - 455,000, Calc. Hardness > 455,000, is Capped Value of 455,000		2.80	2.80	2.80	2.80	2.80
Cd FLT Guideline Calc.	µg/L			Hardness 3,400 - 285,000, Calc. Hardness > 285,000, is Capped Value of 285,000	0.46	0.46	0.46	0.46	0.46
Calcium	µg/L	50.0	NG	NG	262000	232000	380000	282000	247000
Cesium	µg/L	0.01	NG	NG	<0.05	<0.02	<0.05	<0.02	<0.05
Chromium	µg/L	0.10	NG	NG	<2.5	<1	<2.5	<1	<2.5
Cobalt	µg/L	0.10	NG	NG	1.39	0.41	<0.5	5.08	279
Copper [6]	µg/L	0.20	Calc. based on BLM Model	Calc. based on BLM Model	6.01	2.4	4.42	3.09	1.26
Cu FST Guideline Value (Acute)	µg/L		BLM Ligand Model value		187	106.2	158	147.7	142.7
Cu FLT Guideline Value (Chronic)	µg/L			BLM Ligand Model value	43.4	18.4	31.4	29.1	27.2
Iron	µg/L	10.0	350	NG	63	10	108	10	3320
Lead	µg/L	0.05	NG	NG	<0.25	<0.1	<0.25	<0.1	<0.25
Lithium	µg/L	1.0	NG	NG	184	25.4	54.4	91.9	71.1

Parameter	Unit	RDL	BCAWQG - FST 1	BCAWQG - FLT 2	LBDB-EDS Armor	LBDB-WDS Armor	LBDB-WDS Armor	LBDB-LD-DS	LBDB-LD-MS
					31-May-22	30-Mar-22	31-May-22	31-May-22	31-May-22
Magnesium	µg/L	5.0	NG	NG	214000	106000	204000	149000	134000
Manganese	µg/L	0.10	NG	NG	169	59.4	41.8	1030	18200
Mercury	µg/L	0.005	NG	NG	0.0115	<0.005	0.0102	<0.005	<0.005
Molybdenum	µg/L	0.05	NG	NG	6	3.07	5.17	1.35	0.656
Nickel	µg/L	0.50	NG	NG	17.7	5.24	7.16	26.7	208
Phosphorus	µg/L	50.0	NG	NG	<250	<100	<250	<100	<250
Potassium	µg/L	50.0	NG	NG	13300	5490	11800	17500	21400
Rubidium	µg/L	0.20	NG	NG	2.4	0.56	1.56	2.98	9.67
Selenium	µg/L	0.05	NG	2.0	2.19	1.12	1.15	0.538	0.328
Silicon	µg/L	50.0	NG	NG	4220	2970	5400	3780	4300
Silver	µg/L	0.01	NG	NG	<0.05	<0.02	<0.05	<0.02	<0.05
Sodium	µg/L	50.0	NG	NG	577000	171000	273000	331000	283000
Strontium	µg/L	0.20	NG	NG	1280	972	1130	700	617
Sulfur	µg/L	500	NG	NG	858000	434000	771000	685000	556000
Tellurium	µg/L	0.20	NG	NG	<1	<0.4	<1	<0.4	<1
Thallium	µg/L	0.01	NG	NG	<0.05	<0.02	<0.05	0.032	0.08
Thorium	µg/L	0.10	NG	NG	<0.5	<0.2	<0.5	<0.2	<0.5
Tin	µg/L	0.10	NG	NG	<0.5	<0.2	<0.5	<0.2	<0.5
Titanium	µg/L	0.30	NG	NG	<1.5	<1.5	<1.5	<0.6	<1.5
Tungsten	µg/L	0.10	NG	NG	<0.5	<0.5	<0.5	<0.2	<0.5
Uranium	µg/L	0.01	NG	NG	18.5	3.6	11	2.03	1.46
Vanadium	µg/L	0.50	NG	NG	<2.5	<2.5	<2.5	<1	<2.5
Zinc	µg/L	1.00	NG	NG	279	<5	<5	9.8	146
Zircronium	µg/L	0.06	NG	NG	<1	<1	<1	<0.4	<1
Laboratory Work Order Number					FJ2201370	FJ2200791	FJ2201370	FJ2201370	FJ2201370
Laboratory Identification Number					FJ2201370-005	FJ2200791-002	FJ2201370-006	FJ2201370-004	FJ2201370-003

Notes:

Screening completed on BCAWQG-FST [1] and FLT [2] guideline values.

[1] BC Ministry of Environment, Water Protection & Sustainability Branch (2019). British Columbia Approved Water Quality Guidelines (BCAWQG): Aquatic Life, Wildlife & Agriculture

[2] BC Ministry of Environment, Water Protection & Sustainability Branch (2018). British Columbia Approved Water Quality Guidelines (BCAWQG): Aquatic Life, Wildlife & Agriculture

[3] Guideline is hardness dependant. Where results are above laboratory reportable detection limits, guideline limits have been evaluated based on individual sample hardness. Sample-

[4] Guideline is for Chromium (IV) cation. Analytical results are for unspeciated Chromium. Where analytical results exceed the guideline, speciated analysis may be warranted.

[5] Guideline is pH dependant.

NG - No Guideline

Detection limit can vary as described in the COA. Detection limit can be raised when dilutation is required due to high Dissolved Solids/Electrical Conductivity (DLDS), e.g. nitrite.

BOLD and shaded dark gray: Exceeds BCAWQG-FST (Freshwater Short Term) guideline.

Shaded Light Gray: Exceeds BCAWQG-FLT (Freshwater Long Term) guideline.

RED - Measured value is below detection limit (DL); value shown is 50% of DL

Blank - Not analyzed