2022 Annual Report: Elk Valley Regional and Site-Specific Groundwater Monitoring Program

Regional Groundwater Monitoring Program

Fording River Operations

Greenhills Operations

Line Creek Operations

Elkview Operations

Coal Mountain mine

Teck Coal Limited

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Appendix IV

Background Groundwater Monitoring 2022 SSGMP and RGMP Annual Report

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1 Background Groundwater Monitoring

1.1 Overview

A Background Assessment (2020 BGA) was completed by SNC-Lavalin (2020) to develop a list of mine-related constituents in groundwater. The objective of the BGA in 2020 was to assess whether mine-related constituents identified in surface water and other constituents exceeding *Contaminated Sites Regulation* (CSR) groundwater standards are suitable indicators of mine-related impacts to groundwater quality. The BGA was appended within the 2020 Regional Groundwater Monitoring Program (RGMP) Update (SNC-Lavalin, 2020).

The approach of the 2020 BGA was to identify wells representing background groundwater conditions at a variety of locations throughout the Elk Valley. The 2020 BGA was conducted to understand the natural variability of groundwater within the Elk Valley and to better quantify mine-related effects.

To conduct the 2020 BGA, well location in relation to mine activities was considered, analytical data were compiled, trends analysis conducted, and statistical significance was determined. Any wells determined to have no mine impacts were incorporated into the background monitoring network. Applied methods to classify wells were provided (SNC-Lavalin, 2020). The 95th percentile concentrations of sulphate and selenium were then calculated for the background monitoring well network, and these concentrations have been incorporated into the Se:SO4(S) plot (Figure BG-09). These wells were recommended to be monitored and sampled at least twice a year. A site location map, presenting the background monitoring network wells relative to Teck's Elk Valley operations, is included on Drawing BG-01. For the 2022 RGMP, the background network comprised 21 monitoring wells.

The primary outcome of the 2020 BGA (SNC-Lavalin 2020) was the list of non-Order mine-related constituents and naturally occurring parameters outlined in Table A.

Table A: List of Non-Order Mine-Related Constituents and Naturally Occurring Parameters

Non-Order Mine-Related Constituents	Naturally Occurring Parameters:
• antimony	• ammonia
• cobalt	• barium
• nickel	• boron
• nitrite	• fluoride
• total dissolved solids (TDS)	• lithium
• uranium	• manganese
	• molybdenum*
	• zinc

* molybdenum was considered a naturally occurring parameter based on the BGA (SNC-Lavalin, 2020) but has since been identified in operations and is considered a mine-related non-order constituent as it may be a by-product of antiscalants used for calcite treatment in specific locations.

Order Constituents, as defined by the Ministry in Permit 107517 (amended December 2022) include cadmium, nitrate, selenium and sulphate. Based on the BGA evaluation, the following were determined to be mine-related in groundwater: antimony, cobalt, nickel, nitrite, TDS and uranium. There were eight parameters that were determined to be naturally occurring and as such, non-mine-related.

Since the release of the 2020 BGA evaluation (SNC-Lavalin, 2020), molybdenum was added to the non-Order mine-related constituents because of its presence within antiscalants used for calcite treatment at specific water treatment locations (Azimuth 2021). However, no calcite treatment occurs upgradient of any wells included in the background monitoring network, and therefore, molybdenum concentrations reported from the background wells are inferred to be naturally occurring.

1.2 Groundwater Monitoring Well Locations

Table BG-01 presents well completion details of the 21 monitoring wells comprising the background network as presented in the 2020 RGMP Update (SNC-Lavalin, 2020). Monitoring wells that have since been drilled and completed (in 2021 and 2022) but must undergo evaluation prior to being assigned to the background monitoring network, are presented below. Currently, these wells are being monitored and sampled to acquire a robust data set of hydrostatic pressures and analytical results.

Wells currently under data acquisition prior to evaluation include:

- RG_MW_AC1A/B: a monitoring well pair installed near Alexander Creek in 2021 following recommendations from the 2020 RGMP Annual Report (SNC-Lavalin, 2021), both screened in unconsolidated materials.
- EV_MW22_GV5A/B: a monitoring well pair installed in 2022 along Grave Creek, near EV_G3-B, both screened in unconsolidated materials.
- FR_MW22_CH3A/B: a monitoring well pair installed in 2022 along the Chauncey Creek East Tributary, screened in siltstone bedrock and unconsolidated materials.
- FR_MW22_FRX3465 and FR_MW22_FRX3534: two pre-existing coal resource exploration boreholes, located on Castle Mountain, which were retrofitted with monitoring wells in 2022. These wells are screened in bedrock.
- FR_MW22_KCWD1A/B: a monitoring well pair installed in 2022 south of the Kilmarnock Diversion Intake Structure, screened in dolostone bedrock and unconsolidated materials.
- LC_MW_HC-1A/2A/3A: a monitoring well cluster installed in 2021 near Horseshoe Creek, all screened in unconsolidated materials.
- LC_MW_LC1-1A/2A/3A: a monitoring well cluster installed in 2021 near the confluence of Line Creek and Tornado Creek, all screened in unconsolidated materials.
- LC_MW22_LC1-1ABR: a monitoring well installed in 2022, also near the confluence of Line Creek and Tornado Creek, screened in shale bedrock.

Drawing BG-01 shows the locations of all background monitoring wells (the 21 wells within the initial network and the 17 under evaluation) relative to key surface water and mine site features. Additional well details for wells currently included in the background network (including screened material descriptions) are provided on borehole logs in Attachment I and summarized in Table BG-01 and 02.

The following sections provide an update on background groundwater quality conditions from the background monitoring wells, as outlined in SNC-Lavalin (2020).

1.3 Program Modifications

A summary of modifications to the groundwater monitoring programs in 2022 is provided in Table B below. Program modifications include any significant change to either program going forward compared to what was completed in previous years, such as the addition or removal of wells or changes in sampling frequency. Deviations from the program terms of reference are detailed in Appendix XIII.

Table B: Summary of RGMP Background Program Modifications

#	Well ID	Q[a]	Modification	Reason
1	GH_MW_BG1A/B/C	2	Dataloggers were installed to monitor continuous groundwater elevations.	Continuous groundwater level measurements will facilitate a more detailed assessment of groundwater in this area.

Notes:
[a] Q denotes Quarter (Q1, Q2, Q3, Q4).

1.4 Summary of Field Activities

Table C summarizes the field activities that took place in 2022, in addition to the quarterly SSGMP and RGMP monitoring and sampling.

Table C: Summary of 2022 RGMP Background Field Activities

#	Location	Q[a]	Field Activity	Reason
1	Grave Creek	2022 Q3	Drilled and installed a monitoring well pair along Grave Creek, near EV_G3B.	To investigate background groundwater quality in unconsolidated materials in the Grave Creek drainage.
2	Chauncey Creek	2022 Q3	Drilled and installed a monitoring well pair along the Chauncey Creek East Tributary.	To investigate background groundwater quality in both unconsolidated materials and siltstone bedrock in the Chauncey Creek drainage.
3	Castle Mountain	2022 Q3	Two pre-existing coal resource exploration boreholes, located at Castle Mountain, were retrofitted with monitoring wells.	To investigate background groundwater quality in bedrock at Castle Mountain.
4	Kilmarnock Creek	2022 Q3	Drilled and installed a monitoring well pair south of the Kilmarnock Diversion Intake Structure.	To investigate background groundwater quality in both unconsolidated materials and dolostone bedrock in the Kilmarnock Creek drainage.
5	Tornado Creek	2022 Q3	Drilled and installed a monitoring well near the confluence of Line Creek and Tornado Creek.	To investigate background groundwater quality in shale bedrock in the Tornado Creek drainage.

Notes:
[a] Q denotes Quarter (Q1, Q2, Q3, Q4).

1.5 Results

A summary of the background network's monitoring and sampling results is presented in Table D with references to supporting information (Drawings, Figures, Tables, and Attachments). Table D has been subdivided by geographical areas relative to Study Areas, as follows:

- Within Study Area 1 (Fording River Operation [FRO]/Greenhills Operations [GHO] Boundary).
- Upgradient of Study Area 2.
- Upgradient of Study Area 4 (GHO).
- Upgradient of Study Areas 5/6 (Line Creek Operations [LCO]).
- Upgradient of Study Area 7 (Elkview Operations [EVO]).
- Upgradient of Study Area 11 (Coal Mountain mine [CMm]).

Table D: Summary of 2022 Groundwater Monitoring and Sampling Results for the Background Monitoring Network

Hydrogeological Information		Description	Reference
Within Study Area 1 (FRO/GHO Boundary)			
Physical Hydrogeology	Monitoring Locations	Fording River Valley Flank, along Fording River: FR_MW_FRRD1 (Unconsolidated materials) Fording River Valley Flank along Fording River, Chauncey Creek Watershed: FR_MW_CH1-A (Unconsolidated materials), FR_MW_CH2 (Unconsolidated materials).	Tables BG-01 and -02 Drawing BG-01
	Relevant Monitoring Wells from Other Programs[a]	Chauncey Creek Watershed, near the East Tributary: FR_MW_CH3A/B (unconsolidated and siltstone bedrock) Castle Mountain: FR_MW22_FRX3465 (bedrock) and FR_MW22_FRX3534 (bedrock) Kilmarnock Creek Watershed: FR_MW22_KCWD1A/B (unconsolidated materials and dolostone bedrock).	Drawing BG-01
	Groundwater Elevation Trends	• Seasonal variability, dominated with a freshet-dominated regime: − FR_MW_FRRD1 – Higher groundwater elevations were measured in the late spring (March to April 2022); and − FR_MW_CH1-A and FR_MW_CH2 – Higher groundwater elevations were measured in the early summer (May to June 2022).	Figure BG-01 Table BG-02
	Hydraulic Gradients and Flow Direction	• Vertical Hydraulic Gradient: − FR_MW_FRRD1 and FR_MW_CH2 are single wells; Shallow well FR_MW_CH1-B was dry, therefore vertical gradients could not be calculated for FR_MW_CH1-A.. • Flow Direction: − Groundwater flow is inferred to be towards the Fording River valley bottom.	Table BG-02
Chemistry	2022 SSGMP/RGMP Order Constituents Results	• Concentrations of Order Constituents (OC) in groundwater were below primary screening criteria at all monitoring wells in 2022. • Concentrations of OC were within the historical ranges, except for dissolved selenium, which exceeded historical maximum concentrations at FR_MW_CH2.	Tables BG-03 and -04 Drawings BG-06 to -08
	Non-Order Mine-Related and Naturally Occurring Constituents[b]	• Mine-related: n/a. • Naturally Occurring: − Barium: FR_MW_CH2 (Q1 - Q4); − Lithium: FR_MW_CH2 (Q1 - Q4), FR_MW_CH1A (Q1); and • All other non-order mine-related and naturally occurring constituents were less than primary screening criteria.	Tables BG-03 and -04
	Mann-Kendall Trend Analysis	• Stable, decreasing or no trend were calculated for all parameters from each background well except for: − TDS: FR_MW_CH2 (Increasing).	Table E Attachment II
Upgradient of Study Area 2			
Physical Hydrogeology	Monitoring Location	Along Dry Creek, near the East Tributary: LC_PIZDC1307 (Unconsolidated, deep), LC_PIZDC1308 (Unconsolidated, shallow).	Tables BG-01 and -02 Drawing BG-01
	Groundwater Elevation Trends	• Seasonal variability, dominated with a freshet-dominated regime. − LC_PIZDC1307 and LC_PIZDC1308 – Higher groundwater elevations were measured in the early summer (May to June 2022).	Figure BG-02 Table BG-02
	Hydraulic Gradients and Flow Direction	• Vertical Hydraulic Gradient: − LC_PIZDC1307 and LC_PIZDC1308: 0.08 m/m downwards (Q1) to 0.001 m/m upwards (Q2). Downwards gradient also measured in Q3 and Q4. • Flow Direction: − Groundwater flow is inferred to be parallel to the Dry Creek Valley bottom.	Table BG-02 Drawing BG-01
Chemistry	2022 SSGMP/RGMP OC Results	• Concentrations of OC in groundwater were below primary screening criteria at both monitoring wells in 2022. • All concentrations of OC were within the historical ranges at both wells, with the exception of sulphate at LC_PIZDC1308, which exceeded the historical maximum concentration in Q2.	Tables BG-03 and -04 Drawings BG-02 to -05
	Non-Order Mine-Related and Naturally Occurring Constituents[b]	• Mine-related: n/a. • Naturally Occurring: − Barium: LC_PIZDC1307 (Q1 to Q4); − Lithium: LC_PIZDC1307 (Q1 to Q4) and LC_PIZDC1308 (Q1, Q3, and Q4); and − Molybdenum: LC_PIZDC1307 (Q1 to Q4). • All other non-order mine-related and naturally occurring constituents were less than primary screening criteria.	Tables BG-03 and -04

Table D (Cont'd): Summary of 2022 Groundwater Monitoring and Sampling Results for the Background Monitoring Network

Hydrogeological Information		Description	Reference
Upgradient of Study Area 2 (Cont'd)			
Chemistry (Cont'd)	Mann-Kendall Trend Analysis	• Stable, decreasing or no trend were calculated for most parameters from each background well, except for LC_PIZDC1308, where the following trends were noted: – Sulphate: probably increasing; – Cobalt: increasing; – Uranium: increasing; and • TDS: probably increasing and increasing when seasonality is considered (see Table E regarding Mann-Kendall trend analysis and seasonality).	Table E Attachment II
Upgradient of Study Area 4 (GHO)			
Physical Hydrogeology	Monitoring Location	• Elk River Valley Bottom: GH_MW_BG1A/B/C (All three unconsolidated materials). • Elk River Valley Bottom, Willow Creek Watershed: GH_MW-Willow-1D (Unconsolidated), GH_MW-Willow-2S/D (Both Unconsolidated). • Elk River Valley Bottom, Wolf Creek Watershed: GH_MW-Wolf-1S (Unconsolidated), GH_MW-Wolf-1D (Unconsolidated/Bedrock): – GH_MW-Wolf-2D (Unconsolidated/Bedrock).	Tables BG-01 and -02 Drawing BG-01
	Groundwater Elevation Trends	• Seasonal variability, dominated with a freshet-dominated regime. – GH_MW-Willow-1D, GH_MW-Willow-2S/D, GH_MW-Wolf-1S/D and GH_MW-Wolf-2D – Higher groundwater elevations were measured in the late spring to mid-summer (April to July 2022); and – GH_MW-Wolf-1S has been typically dry outside of freshet. The manual groundwater level measurements indicated 7 cm of standing water in the well, which is not considered representative of groundwater in the formation. • GH_MW_BG1A/B/C – Manual measurements, and continuous groundwater elevation data beginning in 2022 Q2, show relatively stable groundwater elevations.	Figure BG-03 Table BG-02
	Hydraulic Gradients and Flow Direction	• Vertical Hydraulic Gradient: – GH_MW_BG1A/B: 0.04 to 0.06 m/m upwards; – GH_MW_BG1B/C: 0.02 m/m to 0.04 m/m downwards (Q1, Q2 & Q4); 0.01 m/m upwards (Q3); – GH_MW-Willow-2S/D: 0.04 to 0.1 m/m downwards; and – GH_MW-Wolf-1S/D: GH_MW-Wolf-1S was dry in 2022 and therefore, a gradient could not be calculated. • Flow Direction: – The shallow groundwater flow is inferred to follow topography in Wolf and Willow creek watersheds; deep groundwater flow direction unknown.	Table BG-02
Chemistry	2022 SSGMP/RGMP OC Results	• Concentrations of OC in groundwater were below primary screening criteria at all monitoring wells in 2022. • Concentrations of OC were within the historical ranges, except for nitrate-N, which exceeded historical maximum concentrations at all wells.	Tables BG-03 and -04 Drawings BG-02 to -05
	Non-Order Mine-Related and Naturally Occurring Constituents[b]	• Mine-related: n/a. • Naturally Occurring: – Fluoride: GH_MW-Willow-2D (Q1, Q3, and Q4); – Barium: GH_MW-Willow-1D (Q1 to Q4); – Lithium: GH_MW_BG1A (Q1 to Q4), GH_MW-Willow-1D (Q1 to Q4), GH_MW-Willow-2D (Q1 to Q4); GH_MW-Willow-2S (Q1, to Q3), GH_MW-Wolf-1D (Q1 to Q4) and GH_MW-Wolf-2D (Q1 to Q4); and – Manganese: GH_MW-Wolf-1D (Q1 to Q3). • All other non-order mine-related and naturally occurring constituents were less than primary screening criteria.	Tables BG-03 and -04
	Mann-Kendall Trend Analysis	• Stable, decreasing or no trend were calculated for parameters for all other background wells, except for: – Nitrate-N: GH_MW_BG1C (probably increasing); and – Cadmium:GH_MW_Willow-2S (increasing)	Table E Attachment II

Table D (Cont'd): Summary of 2022 Groundwater Monitoring and Sampling Results for Background Monitoring Network

Hydrogeological Information		Description	Reference
Upgradient of Study Areas 5/6 (LCO)			
Physical Hydrogeology	Monitoring Location	Fording River Valley Bottom (LCO Processing Plant Area): LC_PIZP1103 (Unconsolidated materials), LC_PIZP1101 (Unconsolidated materials).	Tables BG-01 and -02 Drawing BG-01
	Relevant Monitoring Wells from Other Programs[a]	Horseshoe Creek: LC_MW_HC-1A/2A/3A (Unconsolidated materials); Tornado Creek: LC_MW_LC1-1A/2A/3A (Unconsolidated materials), LC_MW22_LC1-1ABR (Shale bedrock).	Drawing BG-01
	Groundwater Elevation Trends	• Groundwater elevations are relatively consistent, with minimal fluctuations.	Figure BG-03 Table BG-02
	Hydraulic Gradients and Flow Direction	• Vertical Hydraulic Gradient: – The well locations upgradient of Study Areas 5/6 are not complete as nested wells. Therefore, vertical gradients cannot be calculated. • Flow Direction: – Shallow groundwater flow is inferred to follow topography. To the northeast of the Process Plant Area, groundwater likely recharges through infiltration from Line Creek over the alluvial fan (refer to in-text Table E within the LCO report).	Table BG-02, Drawing BG-01
Chemistry	2022 SSGMP/RGMP OC Results	• Concentrations of OC in groundwater were below primary screening criteria at all monitoring wells in 2022, within historical ranges.	Tables BG-03 and -04 Drawings BG-02 to -05
	Non-Order Mine-Related and Naturally Occurring Constituents[b]	• Mine-related: n/a	Tables BG-03 and -04
		• Naturally Occurring: – Fluoride: LC_PIZP1101 (Q1 to Q4); – Boron: LC_PIZP1103 (Q3, Q4); – Lithium: LC_PIZP1103 (Q1 to Q4) and LC_PIZP1101 (Q1 to Q4); – Manganese: LC_PIZP1101 (Q1); and – Molybdenum: LC_PIZP1101 (Q1 to Q4); LC_PIZP1103 (Q1 to Q4). • All other non-order mine-related and naturally occurring constituents were less than primary screening criteria.	
	Mann-Kendall Trend Analysis	• Stable, decreasing or no trend were calculated for parameters from each background well, except for: – TDS: LC_PIZP1101 (increasing); – Uranium: LC_PIZP1101 (increasing); and – Nitrate-N: LC_PIZP1103 (increasing).	Table E Attachment II
Upgradient of Study Area 7 (EVO)			
Physical Hydrogeology	Monitoring Location	Elk River Valley, Grave Creek Watershed: EV_MW_GV4A (Bedrock, sandstone, interpreted to be Rocky Mountain Super Group) and EV_MW_GV4B (Unconsolidated materials).	Tables BG-01 and -02 Drawing BG-01
	Relevant Monitoring Wells from Other Programs[a]	Grave Creek Watershed: EV_MW22_GV5A/B (unconsolidated materials)	Drawing BG-01
	Groundwater Elevation Trends	• Groundwater elevations in both EV_MW_GV4A and EV_MW_GV4B had the highest response during late spring (June 2022), likely a response to freshet.	Figure BG-04 Table BG-02
	Hydraulic Gradients and Flow Direction	• Vertical Hydraulic Gradient: – EV_MW_GV4A/B: 0.1 m/m downward. • Flow Direction: – Shallow groundwater flow is inferred to follow topography. Bedrock flow direction unknown.	Table BG-02 Drawing BG-01
Chemistry	2022 SSGMP/RGMP OC Results	• Concentrations of OC in groundwater were below primary screening criteria at all monitoring wells in 2022, and within the historical ranges for each monitoring well. – However, dissolved selenium concentrations at EV_MW_GV4A and EV_MW_GV4B were the highest reported to date. This is discussed further in Section 1.6.	Tables BG-03 and -04; Drawings BG-02 to -05
	Non-Order Mine-Related and Naturally Occurring Constituents[b]	• Mine-related: n/a	Tables BG-03 and -04
		• Naturally Occurring: – Lithium: EV_MW_GV4A (Q1 to Q4) and EV_MW_GV4B (Q1 to Q4); and – Manganese: EV_MW_GV4A (Q2 to Q4). • All other non-order mine-related and naturally occurring constituents were less than primary screening criteria.	

Table D (Cont'd): Summary of 2022 Groundwater Monitoring and Sampling Results for Background Monitoring Network

Hydrogeological Information		Description	Reference
Upgradient of Study Area 7 (EVO) (Cont'd)			
Chemistry (Cont'd)	Mann-Kendall Trend Analysis	• Stable, decreasing or no trend were calculated for parameters from each background well, except for: – Nitrate: EV_MW_GV4A (probably increasing); – Sulphate: EV_MW_GV4B (increasing); and – Selenium: EV_MW_GV4A (probably increasing).	Table E Attachment II
Upgradient of Study Area 11 (CMm)			
Physical Hydrogeology	Monitoring Location	Michel Creek Watershed: CM_MW3-SH (Unconsolidated materials), CM_MW3-DP (Bedrock, siltstone, interpreted to be Fernie Fm) Lower Corbin Creek Watershed (Corbin Pond area): CM_MW6-DP (Bedrock, siltstone, interpreted to be Fernie Fm).	Tables BG-01 and -02 Drawing BG-01
	Groundwater Elevation Trends	• Pressure transducers were installed in CM_MW3-SH/DP in 2021 Q2. Only manual measurements are available for CM_MW6-DP. • Manual measurements (and continuous water level data where available), show the highest response in late spring/early summer (May/June 2022), likely a response to freshet.	Figure BG-05 Table BG-02
	Hydraulic Gradients and Flow Direction	• Vertical Hydraulic Gradient: – CM_MW3-SH/DP: 0.01 to 0.04 m/m upward (Q1 to Q4); and – CM_MW6-SH/DP: 0.06 to 0.1 m/m upward. Note: vertical hydraulic gradients were presented in Appendix IX in Table CM-02. Only the deep well (CM_MW6-DP) is considered a background well. • Flow Direction: – CM_MW6-DP: The horizontal gradient in the Lower Corbin Creek valley (Corbin Pond area) is steeper than in the Michel Creek valley. Details are within Table C of Appendix IX; and – CM_MW3-SH/DP: Shallow groundwater flow is inferred to follow topography.	Table BG-02 Table CM-02 (Appendix IX) Drawing BG-01
Chemistry	2022 SSGMP/RGMP OC Results	• Concentrations of OC in groundwater were below primary screening criteria at all monitoring wells in 2022. • Most of the 2022 ranges for OC were within the historical ranges. The following are exceptions, where the 2022 concentration was higher than historical: – CM_MW3-SH: 2022 Q2 dissolved cadmium; 2022 Q4 dissolved selenium; 2022 Q3 sulphate; and – CM_MW6-DP: 2022 Q3 dissolved selenium.	Tables BG-03 and -04 Drawings BG-02 to 05
	Non-Order Mine-Related and Naturally Occurring Constituents[b]	• Mine-related: n/a. • Naturally Occurring: – Boron: CM_MW3-DP (Q1 to Q4). This is consistent with historical results; – Chloride: CM_MW3-DP (Q1 to Q4). This is consistent with historical results; – Sodium: CM_MW3-DP (Q1 to Q4) and CM_MW6-DP (Q2 to Q4). This is consistent with historical results; – Lithium: CM_MW3-DP (Q1 to Q4), CM_MW3-SH (Q3) and CM_MW6-DP (Q2 to Q4); – Molybdenum: CM_MW3-DP (Q2); and • All other non-order mine-related and naturally occurring constituents were less than primary screening criteria.	Tables BG-03 and -04
	Mann-Kendall Trend Analysis	• Stable, decreasing or no trend for most calculated parameters, except at CM_MW3-SH: – Nitrate: increasing; – Sulphate: increasing; and – Selenium: increasing.	Table E Attachment II

Notes:
[a] – Other relevant monitoring wells are those in the area that are under evaluation for potential inclusion in the RGMP.
[b] – Non-order mine-related and naturally occurring constituents based on the Background Assessment (BGA) completed for the 2020 RGMP Update (SNC-Lavalin, 2020).

Table E presents Mann-Kendall trend analyses completed for the data sets obtained from background wells with seven or more sampling events, and with concentrations of Order Constituents and potentially mine-influenced non-OC greater than the method detection limit (MDL; Attachment II). Mann-Kendall trend analysis was not completed on any wells for dissolved antimony or nitrite-N due to concentrations typically at or below the MDL. Seasonality in chemistry was observed at LC_PIZDC1308. Therefore, trends were analyzed using the highest concentrations per year (typically Q1 for dissolved cobalt and Q2 for the remainder of the analyzed parameters) although fewer data points were available (indicated as 'seasonal' in Table E below).

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Table E: Background – Summary of Mann-Kendall Trend Analysis for Constituents of Interest

Well ID \ Parameter [1]	Nitrate	Sulphate	Total Dissolved Solids	Dissolved Cadmium	Dissolved Selenium	Dissolved Uranium	Dissolved Cobalt
Within Study Area 1 (FRO/GHO Boundary)							
FR_MW_CH1-A	Decreasing	Prob. Decreasing	No Trend	Stable	No Trend	No Trend	-
FR_MW_CH2	Stable	Stable	Increasing	-	No Trend	Decreasing	-
FR_MW_FRRD1	Decreasing	Decreasing	No Trend	Stable	Prob. Decreasing	Decreasing	-
Upgradient of Study Area 2							
LC_PIZDC1307	-	-	Prob. Decreasing	-	-	Decreasing	-
LC_PIZDC1308	Decreasing	No Trend	Prob. Increasing	Stable	Decreasing	Increasing	Stable
LC_PIZDC1308 (Seasonal[2])	Decreasing	Prob. Increasing	Increasing	Stable	Decreasing	Increasing	Increasing
Upgradient of Study Area 4 (GHO)							
GH_MW_BG1A	-	Prob. Decreasing	Decreasing	-	No Trend	Decreasing	Decreasing
GH_MW_BG1B	-	Decreasing	Stable	-	-	Stable	-
GH_MW_BG1C	Prob. Increasing	Decreasing	Decreasing	-	-	Stable	Stable
GH_MW-Willow-1D	-	Stable	Decreasing	-	-	Decreasing	-
GH_MW-Willow-2D	No Trend	No Trend	Prob. Decreasing	Decreasing	Decreasing	Decreasing	-
GH_MW-Willow-2S	Stable	Decreasing	No Trend	Increasing	Decreasing	No Trend	-
GH_MW-Wolf-1D	-	Decreasing	Stable	-	-	Decreasing	Decreasing
GH_MW-Wolf-2D	-	Decreasing	Decreasing	No Trend	Decreasing	Decreasing	Decreasing
Upgradient of Study Areas 5/6 (LCO)							
LC_PIZP1103	Increasing	Decreasing	No Trend	-	Decreasing	Decreasing	Decreasing
LC_PIZP1101	-	Decreasing	Increasing	-	-	Prob. Increasing	Stable

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Table E (Cont'd): Background – Summary of Mann-Kendall Trend Analysis for Constituents of Interest

Well ID \ Parameter [1]	Nitrate	Sulphate	Total Dissolved Solids	Dissolved Cadmium	Dissolved Selenium	Dissolved Uranium	Dissolved Cobalt
Upgradient of Study Areas 7 (EVO)							
EV_MW_GV4A	Prob. Increasing	Decreasing	Prob. Decreasing	-	Prob. Increasing	No Trend	-
EV_MW_GV4B	No Trend	Increasing	No Trend	No Trend	No Trend	Stable	-
Upgradient of Study Area 11 (CMm)							
CM_MW3-SH	Increasing	Increasing	No Trend	Stable	Increasing	Decreasing	-
CM_MW3-DP	-	Stable	Stable	-	-	Prob. Decreasing	-
CM_MW6-DP	-	No Trend	Decreasing	-	-	Decreasing	-

Notes:

[1] Where Constituents of Interest were measured above primary screening criteria in 2022, the trend result is ***italics***. Where increasing trends are noted, the cell is shaded yellow.

[2] Seasonality observed in concentrations of well. Mann-Kendall analysis completed on highest concentrations measured per year (typically Q1 for dissolved cobalt and Q2 for the others); however, only 7 seasonal data points are available. Seasonal trend analysis was completed where both a seasonal trend was visually identified, and where data has been collected over a minimum of seven years.

'-' denotes trend analysis was not completed as concentrations of parameter have consistently been less than, or marginally greater than, the detection limit.

1.6 Discussion

Groundwater quality results for OC in background wells were below the primary screening criteria during each quarter in 2022 and, generally, were consistent with historical data (Tables BG-3 and -4; Figures BG-06 to -08). Discussion of specific well's results is provided below.

Within Study Area 1 (FRO/GHO Boundary)

At FR_MW_FRRD1, FR_MW_CH1-A, and FR_MW_CH2, all OC concentrations were below primary screening criteria. In both 2022 Q3 and Q4, the concentration of dissolved selenium exceeded historical maximum concentrations at FR_MW_CH2, however the Mann-Kendall analysis did not identify a trend. When plotted on a Se:SO4(S) plot (Figure BG-09), the Q3 and Q4 samples fell outside the 95th percentile concentrations of background wells, which was used to define natural, non-contact water. The Q1 and Q2 samples were classified as natural, non-contact water.

Upgradient of Study Area 2

At LC_PIZDC1307 and LC_PIZDC1308, all OC concentrations were below primary screening criteria. OC concentrations were within historical ranges, with the exception of sulphate in Q2 at LC_PIZDC1308. The Mann-Kendall analysis identified a probably increasing trend for seasonal sulphate data; however, no trend was identified when all data was considered. When plotted on a Se:SO4(S) plot (Figure BG-09), the samples were classified as natural, non-contact water.

Upgradient of Study Area 4 (GHO)

In 2022, the dissolved selenium concentration at GH_MW_BG1A were below primary screening criteria, which was consistent with previously reported data. An anomalously high value of 5.52 µg/L was reported in the first sample collected from this well following installation, in Q4 2020 (which was less than primary screening criteria). In 2022, the maximum dissolved selenium value was 0.862 µg/L (reported in Q3). As shown in the Se:SO4(S) plot (Figure BG-09), groundwater at GH_MW_BG1A/B/C is not considered mine-influenced.

Upgradient of Study Areas 5/6 (LCO)

At LC_PIZP1101 and LC_PIZP1103, all OC concentrations were below primary screening criteria. When plotted on a Se:SO4(S) plot (Figure BG-09), the samples were classified as natural, non-contact water. Groundwater elevations at LC_PIZP1101 and LC_PIZP1103 were considered stable, with a relatively constant groundwater elevation throughout the year. Following well repairs made at LC_PIZP1101 in 2021, the well had not been resurveyed in time to include data herein and therefore, accurate groundwater elevations could not be calculated.

Upgradient of Study Area 7 (EVO)

Dissolved selenium concentrations at EV_MW_GV4A and EV_MW_GV4B were the highest reported to date. The maximum concentrations (7.31 µg/L at EV_MW_GV4A and 4.23 µg/L at EV_MW_GV4B) were obtained from samples collected during Q4. The reported 2022 dissolved selenium concentrations, although the highest reported to date, were generally consistent with the previously reported concentrations. On the Se-SO4(S) plot (Figure BG-09), EV_MW_GV4A/B plotted close to the mixing line, indicating mine--influence. The inferred boundaries defining non-contact water from mine--influenced water are based on 95th percentile concentrations of background wells. Therefore, continued monitoring should occur in conjunction with isotopic sampling to assess the provenance of the groundwater.

Upgradient of Study Area 11 (CMm)

At CM_MW3-SH, the Mann-Kendall trends for nitrate, sulphate, and dissolved selenium were increasing. Nitrate concentrations were lower than the historically high values exhibited 2021 (Figure BG-10). Sulphate concentrations were higher than previous years reaching 18.2mg/L (Q3) (17.1 mg/L Q1 2021 & 16.7 mg/L Q4 2020), sulphate had been identified as increasing in 2020 and this trend has continued through to 2022 (SNC-Lavalin, 2021). TDS trends were analyzed in 2022 following high concentrations in previous years, however in 2022 no trend was observed in TDS (Figure BG-10). Dissolved selenium concentrations in 2022 ranged from 0.24 µg/L (Q1) to 0.322 µg/L (Q4). CM_MW3-DP is screened in bedrock between 13.3 and 16.3 meters below ground surface (mbgs), while CM_MW3-SH is screened between 3.6 and 6.7 mbgs. Throughout 2022 an upward gradient was identified between CM_MW3-SH and CM_MW3-DP. Nitrate concentrations continued to be higher in CM_MW3-DP than in CM_MW3-SH, supporting the 2021 hypothesis that nitrate-N at CM_MW3-SH may be sourced from bedrock (SNC-Lavalin, 2022).

At CM_MW3-DP, chloride exceeded the CSR IW, CSR LW and CSR DW, and sodium exceeded the CSR DW for all 2022 results, which was consistent with results from 2020 and 2021. Sulphate concentrations were lower than 2021 values; however, Mann-Kendall analysis indicated a stable trend. Selenium concentrations ranged from 0.1 µg/L to 0.25 µg/L, which was consistent with previously reported ranges. Groundwater at CM_MW3-DP is not mine-influenced based on the Se:SO4(S) plot (Figure BG-09). Therefore, it has been inferred the chloride and sodium concentrations are naturally occurring.

At CM_MW6-DP, in which an upward vertical gradient sodium also exceeded the CSR DW in all quarters, and it has been inferred to be naturally occurring. On the Se:SO4(S) plot (Figure BG-09), CM_MW6-DP plots as natural, non-contact water, except during Q3, where it plots outside the natural boundary. However, the Q3 data point could be an outlier and should be confirmed with on-going monitoring. At this time, the monitoring wells selected for background monitoring and sampling are considered appropriate; however, they should be reassessed annually.

2 Recommendations

New and outstanding recommendations are presented in Table F below.

Table F: Summary of New and Outstanding Recommendations from SSGMPs and RGMP

Program	Recommendation
Regional Groundwater Monitoring Program	
Background	Continue to monitor/sample background locations at least two times in a year, as recommended in the 2020 RGMP Update (SNC-Lavalin, 2020).
Background	Update the Background Assessment as part of the 2023 RGMP Update, including a review of the adequacy of the current background monitoring well network. Continue to supplement the background monitoring network with new monitoring wells, which are intended to fill gaps in geographic area, aquifer type, and bedrock formation.
Background	It is recommended that RG_MW_AC1A/B should have pressure transducers installed.
Background	Sample groundwater at all background monitoring wells once for isotope analysis (^{3}H, ^{2}H, ^{18}O and potentially ^{14}C) to obtain a better understanding of the origin of groundwater in background monitoring wells.
Background	Assess trends of OC in background monitoring wells on an annual basis, and reassess if they should continue to be considered as representative of background groundwater quality in RGMP Updates.
Background	RG_DW-03-10 (Sparwood Well 4) in Study Area 8 should be added to the background monitoring network. 2022 results for this well are presented in the EVO Appendix in 2022.

3 References

Azimuth Consulting Group Inc. 2021. AMP Technical Memo MQ6-KU6.3-2021, Proposed surface water to groundwater triggers for the protection of drinking water users for Order and non-Order constituents using select surface water stations in the Elk Valley. Prepared for Teck Coal Limited. Dated November, 2021.

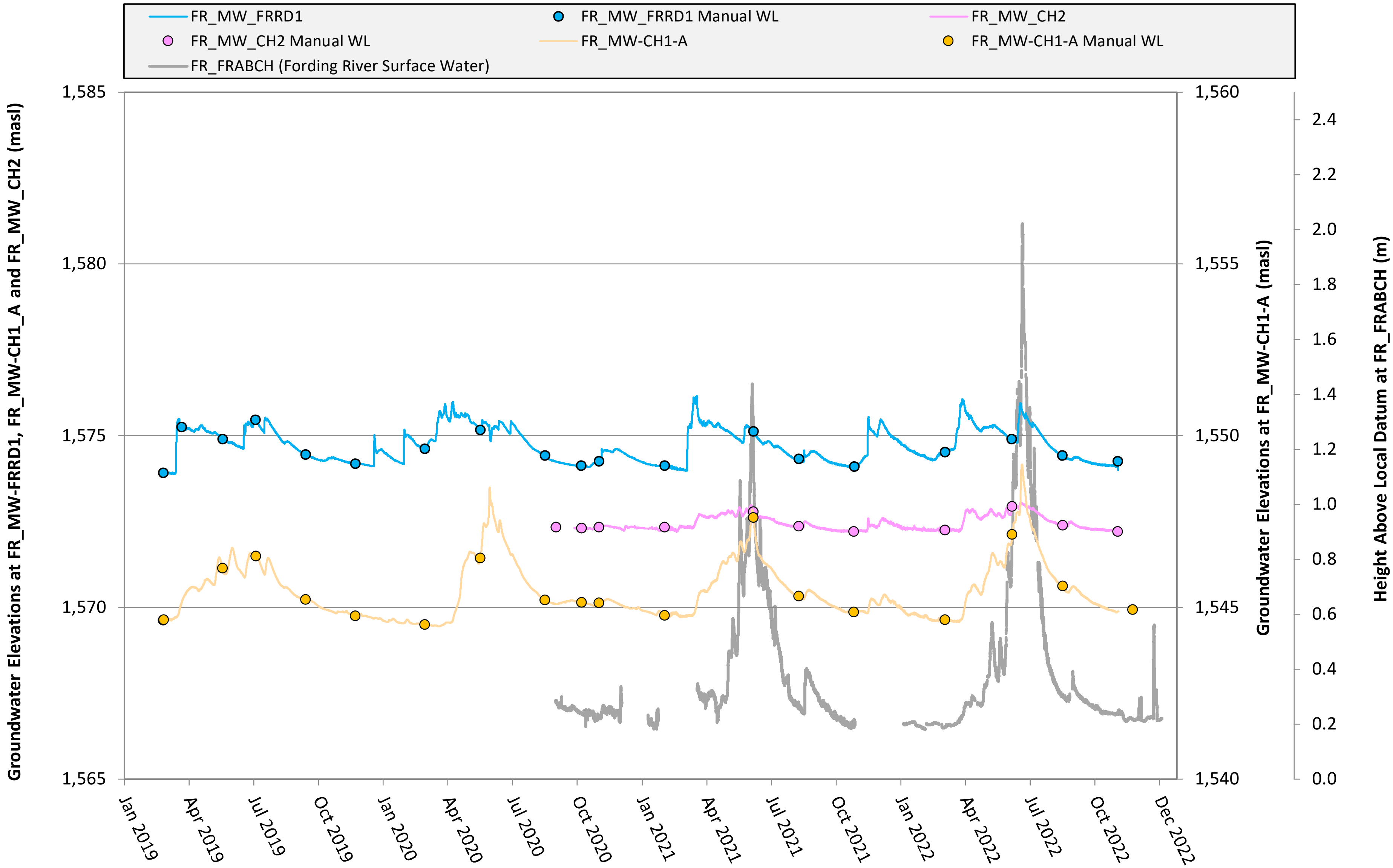
SNC-Lavalin Inc. 2020. 2020 Regional Groundwater Monitoring Program Update. Report prepared for Teck Coal Limited. Dated December 4, 2020.

SNC-Lavalin Inc. 2021. 2020 Annual Report: Elk Valley Regional and Site-Specific Groundwater Monitoring Programs. Report Prepared for Teck Coal Limited. Dated March 31, 2021.

SNC-Lavalin Inc. 2022. 2021 Annual Report: Elk Valley Regional and Site-Specific Groundwater Monitoring Programs. Report Prepared for Teck Coal Limited. Date March 29, 2022.

Figures

Figure BG-01: Background (Fording River Valley Bottom) - Hydrograph



Notes: Continuous water level data was compensated using barologger at FR_MW_STPSW. For 2022, FR_FRABCH data is preliminary stage data from continuous monitoring device.

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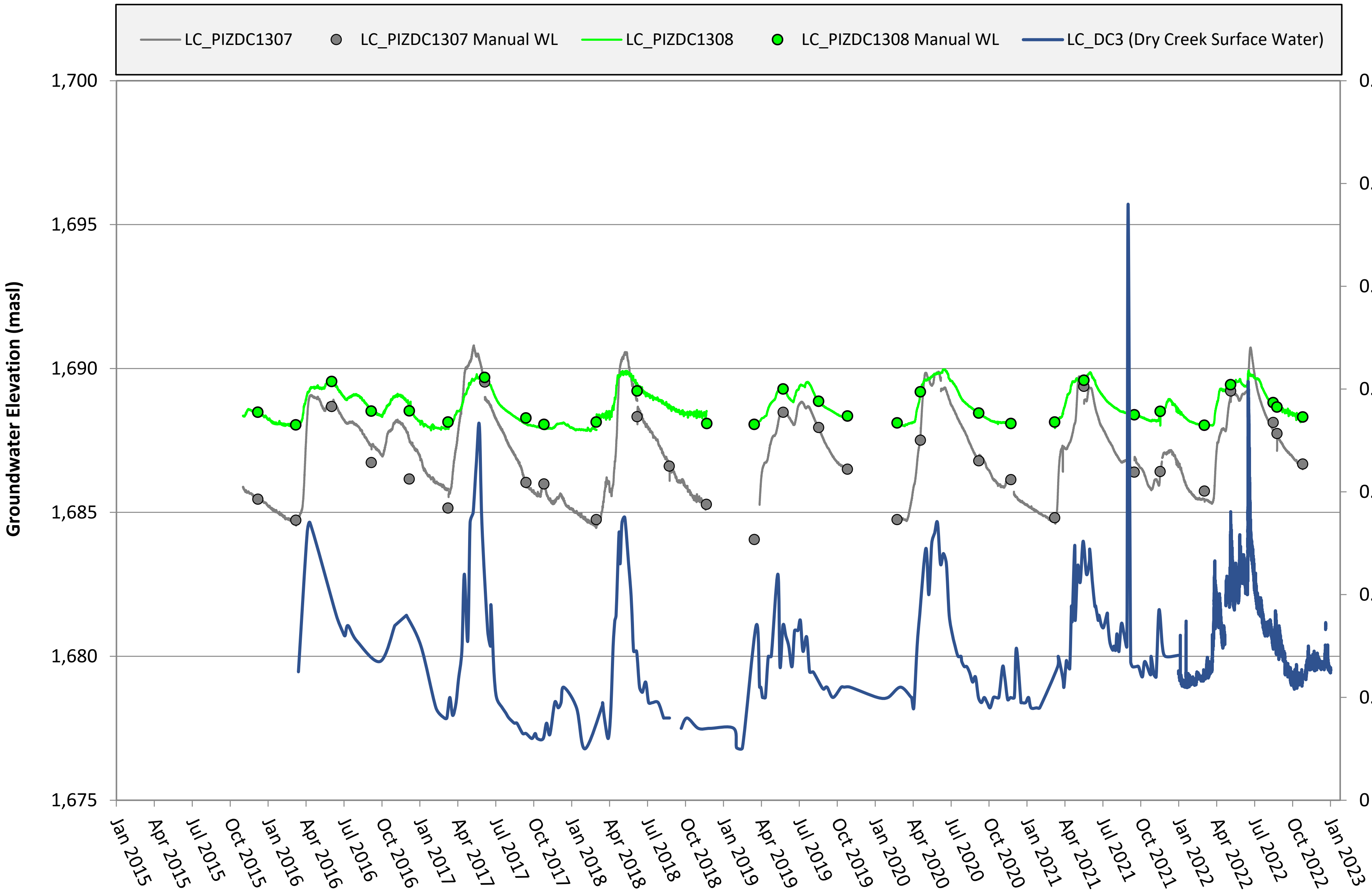
Figure BG-02: Background (Dry Creek) - Hydrograph



Notes: Continuous water level data was compensated using barologger at GH_MW_FC2. For 2022, LC_DC3 data is preliminary stage data from continuous monitoring device.

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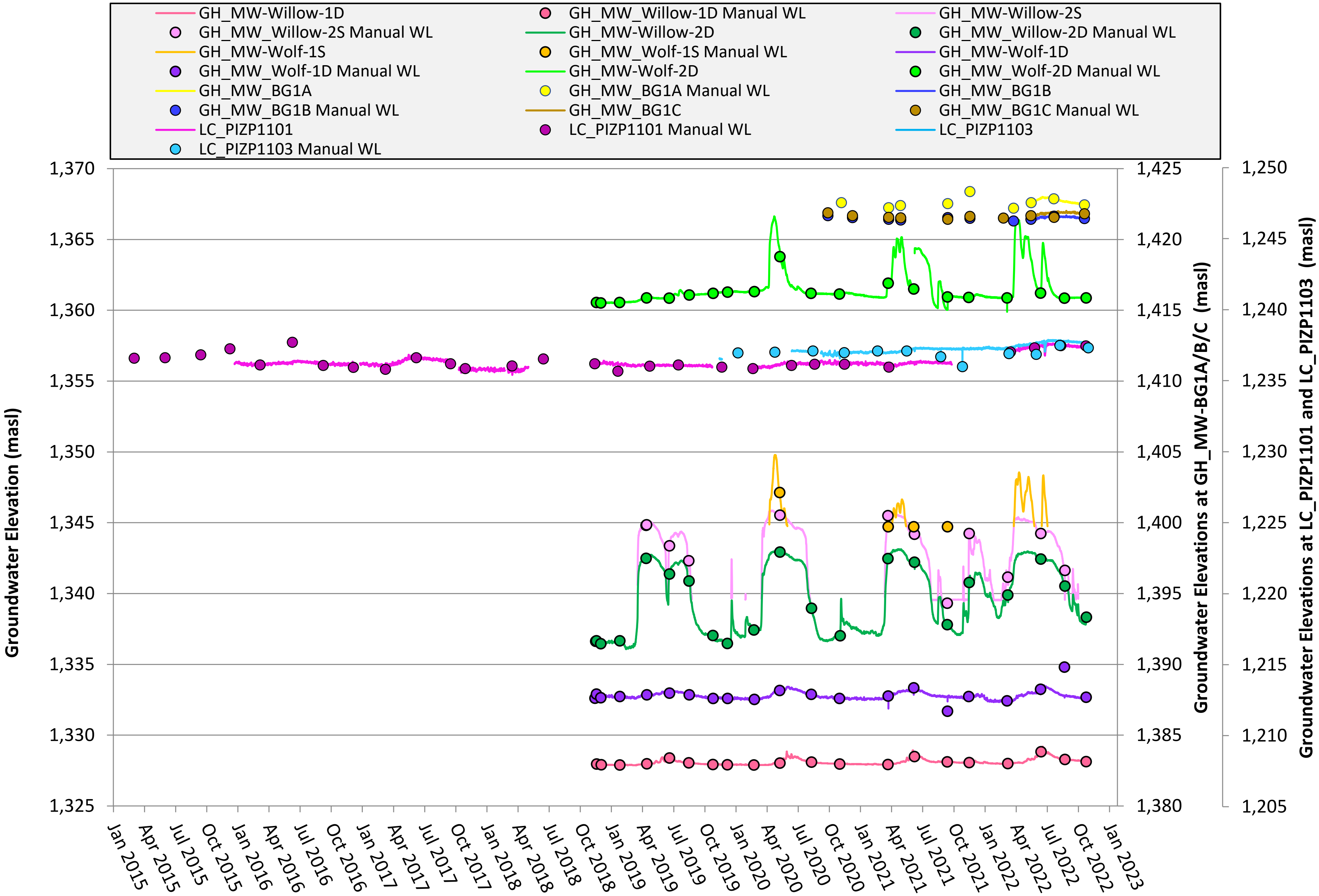
694450 / 2023 03 08
QAQC MB

Figure BG-03: Background (Elk River Valley Bottom) - Hydrograph



Notes: Continuous water level data was compensated using barologgers at GH_MW-Willow-1S (GH-series wells) and LC_MW_ER4B (LC-series wells). LC_PIZP1101 not resurveyed after repair so 2022 water elevations (logger and manual) are approximations.

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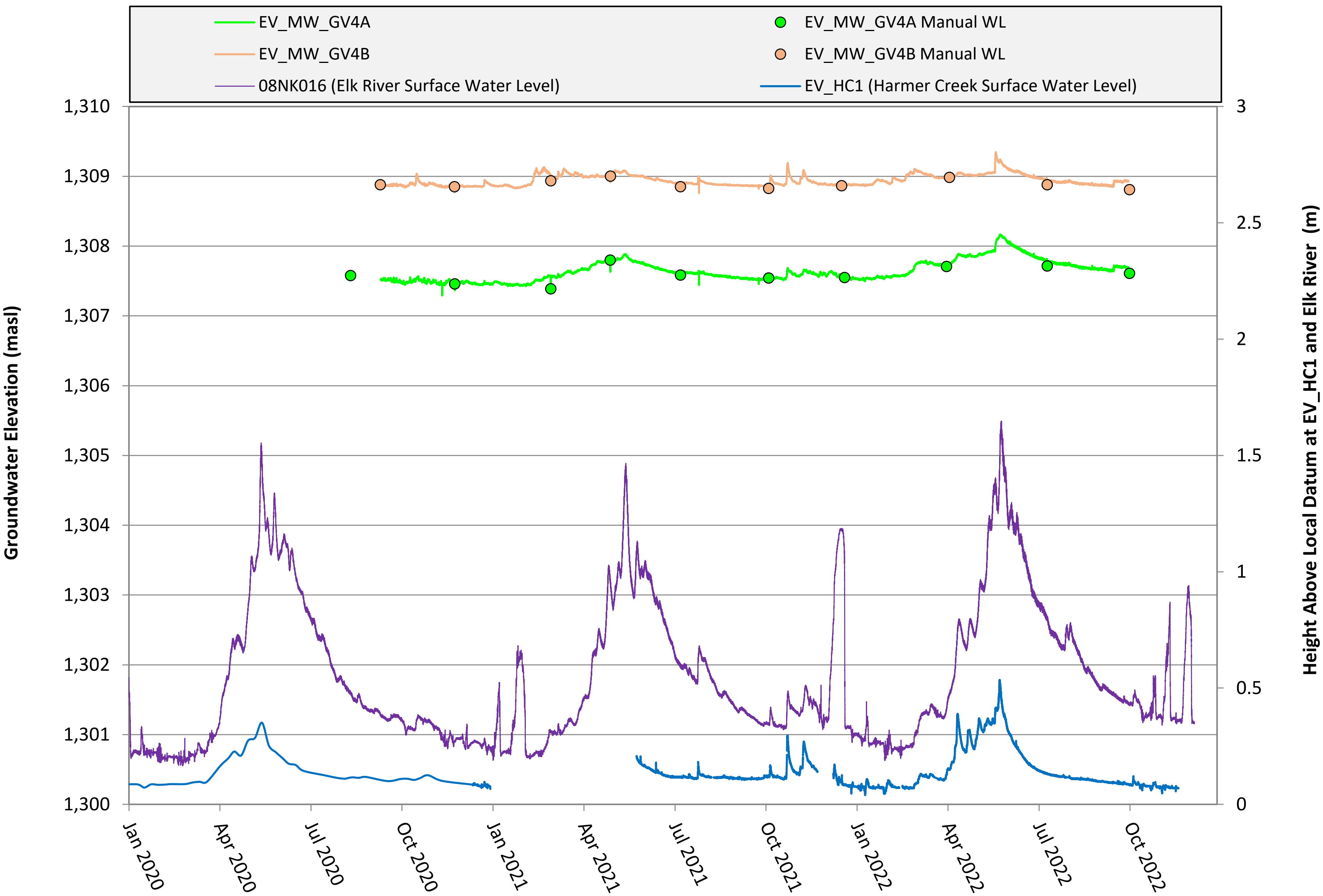
694450 / 2023 03 17
QAQC MB

Figure BG-04 : Background (Grave Creek) - Hydrograph



Note: Continuous water level data was compensated using barologgers at EV_MW_SPR1B.

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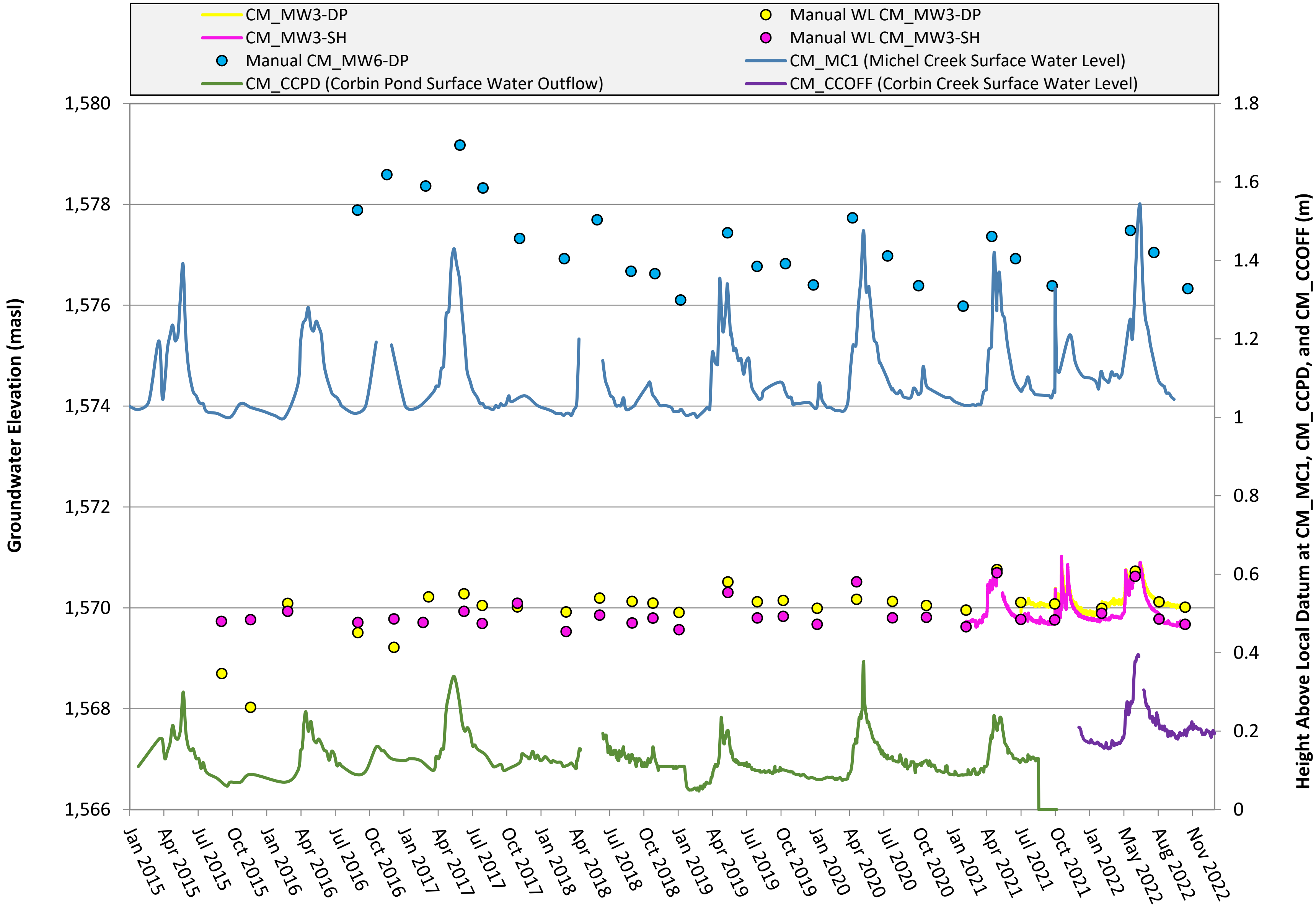
QAQC MB

Figure BG-05 : Background (Michel Creek Valley Bottom) - Hydrograph



Notes: Continuous water level data was compensated using barologgers at CM_MW5-DP. Corbin Pond surface water station CM_CCPD data is missing after November 2021, because the station was no longer safe to access. Water level from Corbin Creek surface water station CM_CCOFF is considered to be represenatative of the Corbin Pond Surface Water Outflow, and is plotted in 2022.

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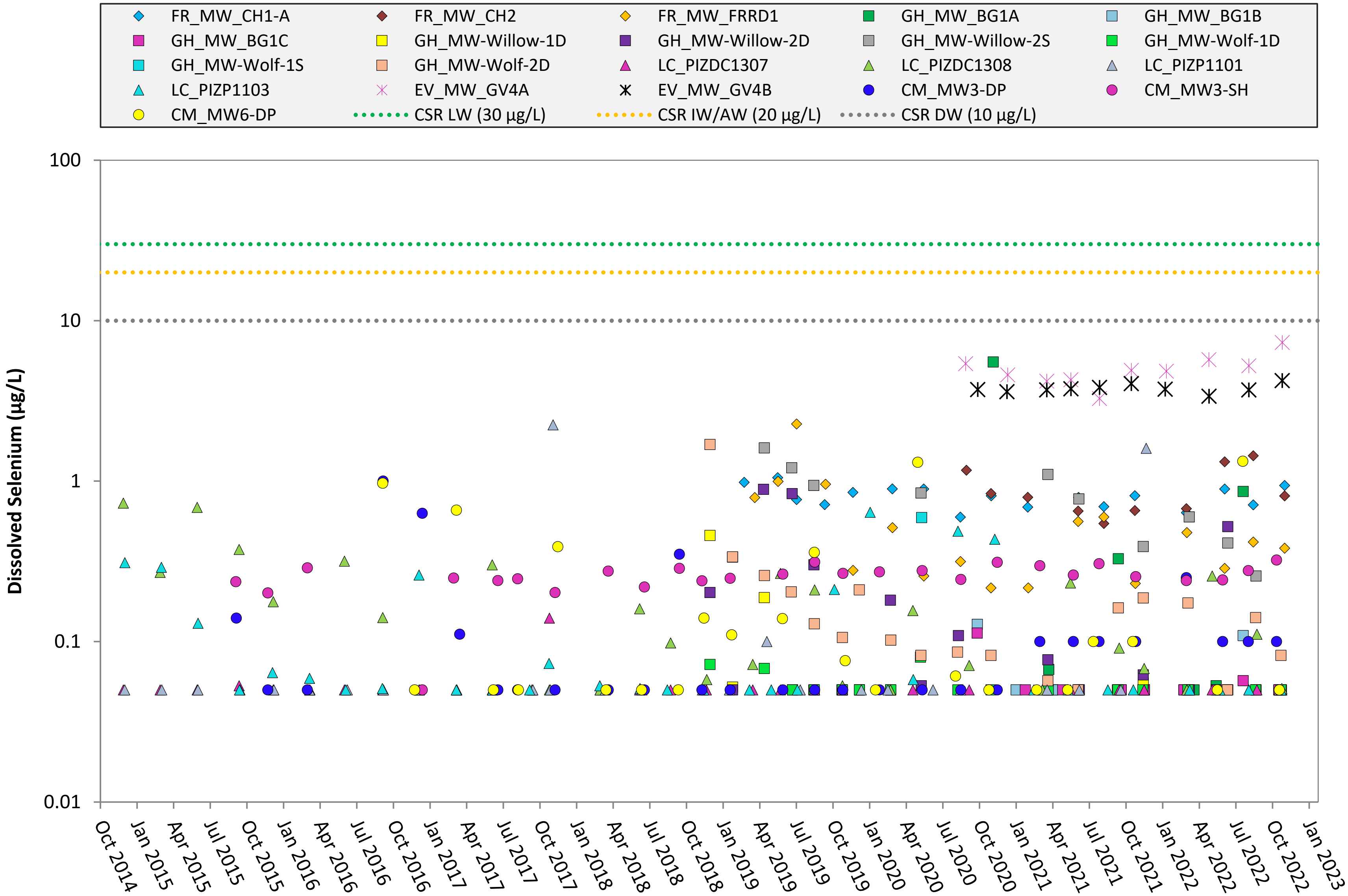
Figure BG-06: Background - Dissolved Selenium Concentrations



Note: Logarithmic scale has been applied on distribution of concentrations relative to applicable screening criteria. For concentrations measured below the method detection limit, the method detection limit (0.05 µg/L) was utilized for plotting purposes.

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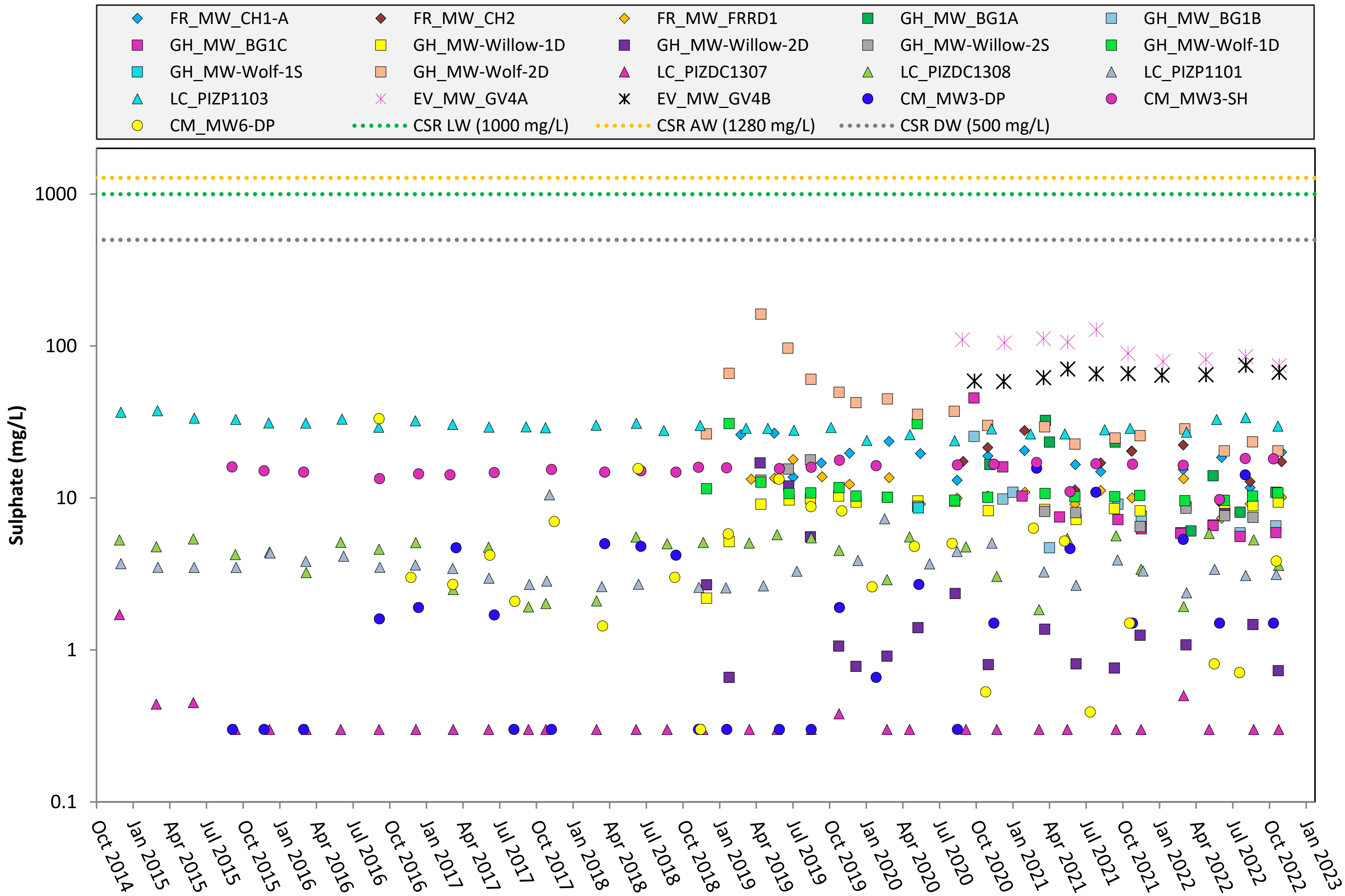
QAQC MB

Figure BG-07: Background - Sulphate Concentrations



Note: Logarithmic scale has been applied on distribution of concentrations relative to applicable screening criteria. For concentrations measured below the method detection limit, the method detection limit (0.3 mg/L) was utilized for plotting purposes.

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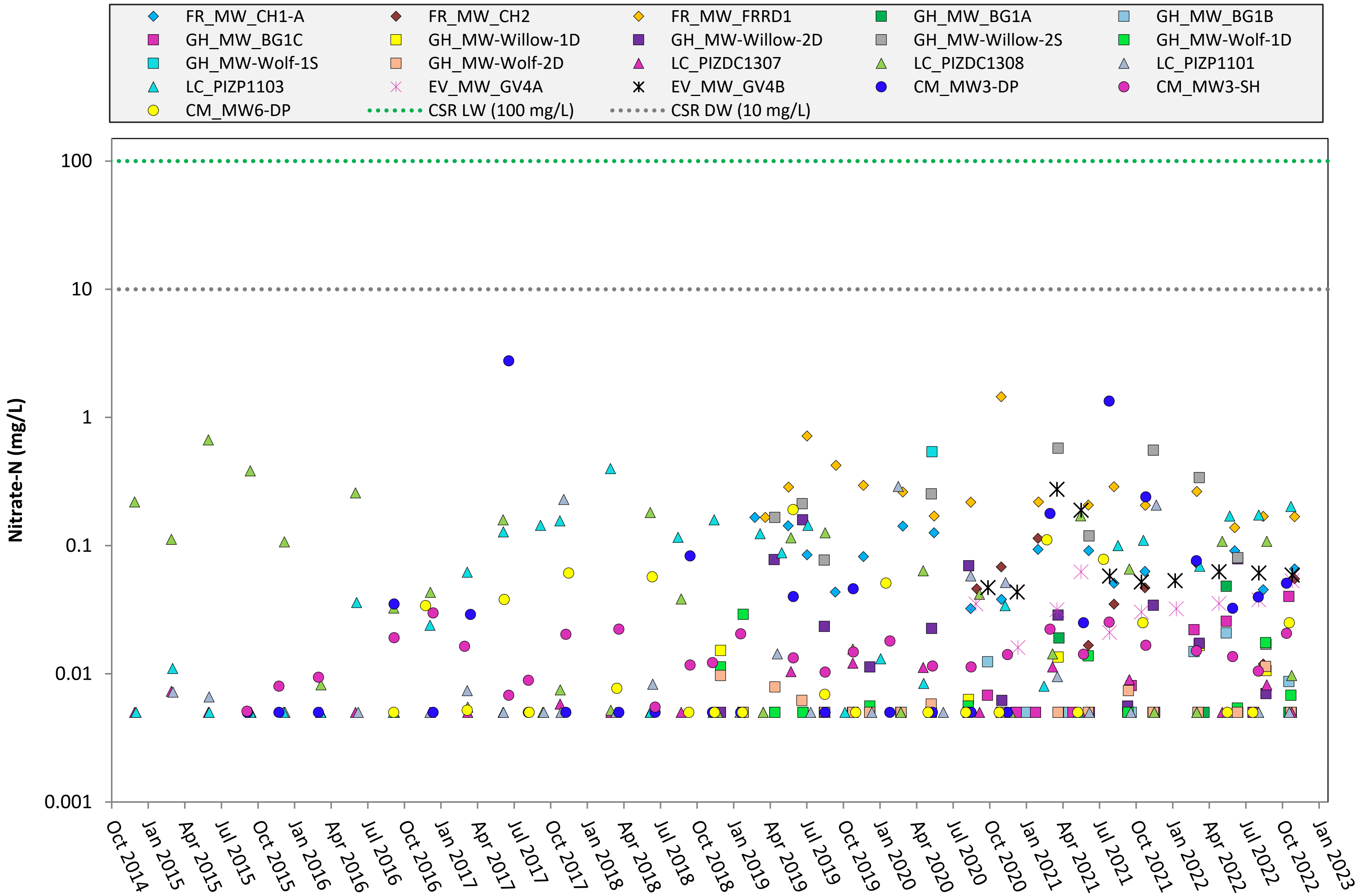
QAQC MB

Figure BG-08: Background - Nitrate-N Concentrations



Note: Logarithmic scale has been applied on distribution of concentrations relative to applicable screening criteria. For concentrations measured below the method detection limit, the method detection limit (0.005 mg/L) was utilized for plotting purposes.

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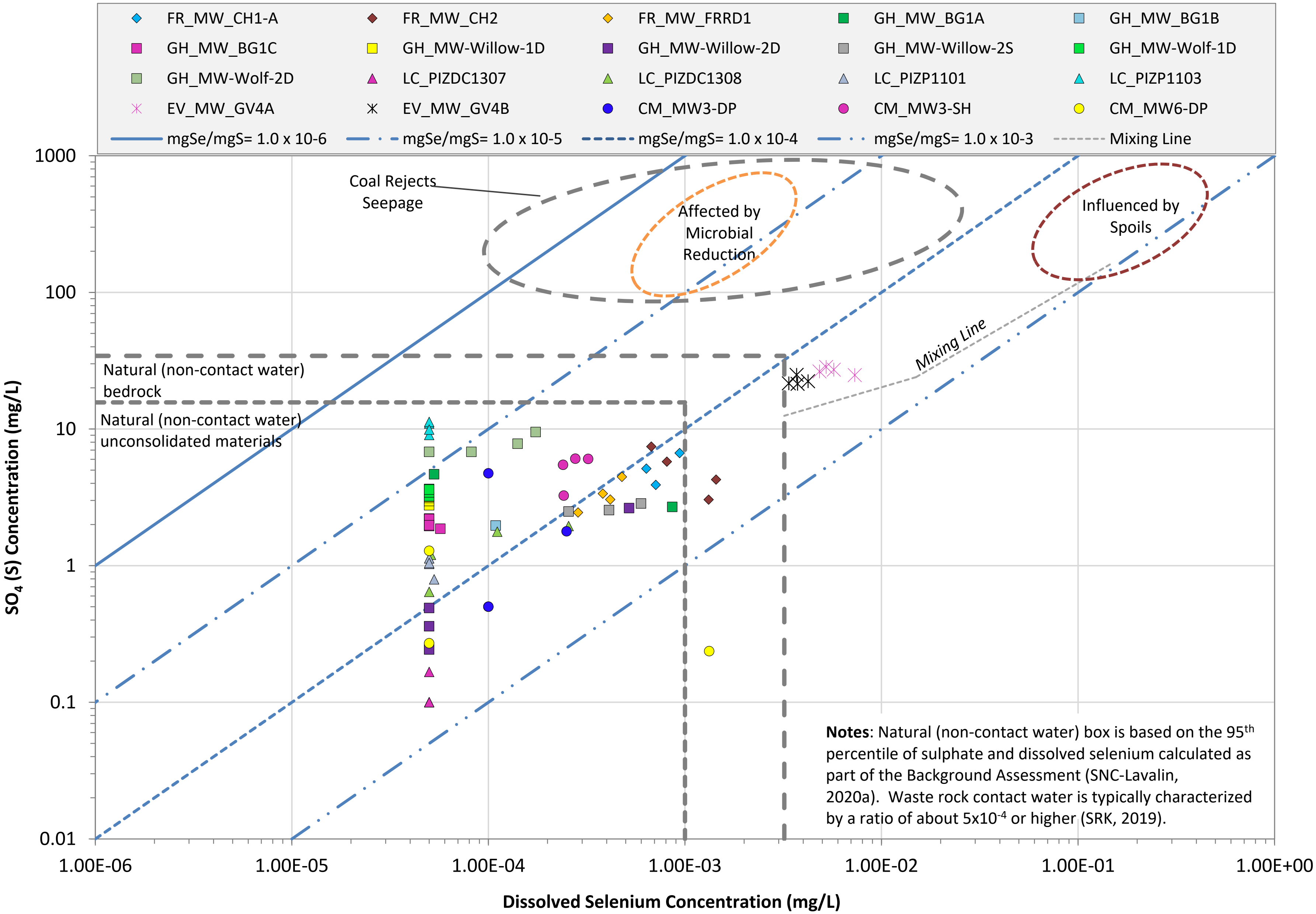
QAQC MB

Figure BG-09: Background - Se:SO4 (S)



Notes: Natural (non-contact water) box is based on the 95th percentile of sulphate and dissolved selenium calculated as part of the Background Assessment (SNC-Lavalin, 2020a). Waste rock contact water is typically characterized by a ratio of about $5x10^{-4}$ or higher (SRK, 2019).

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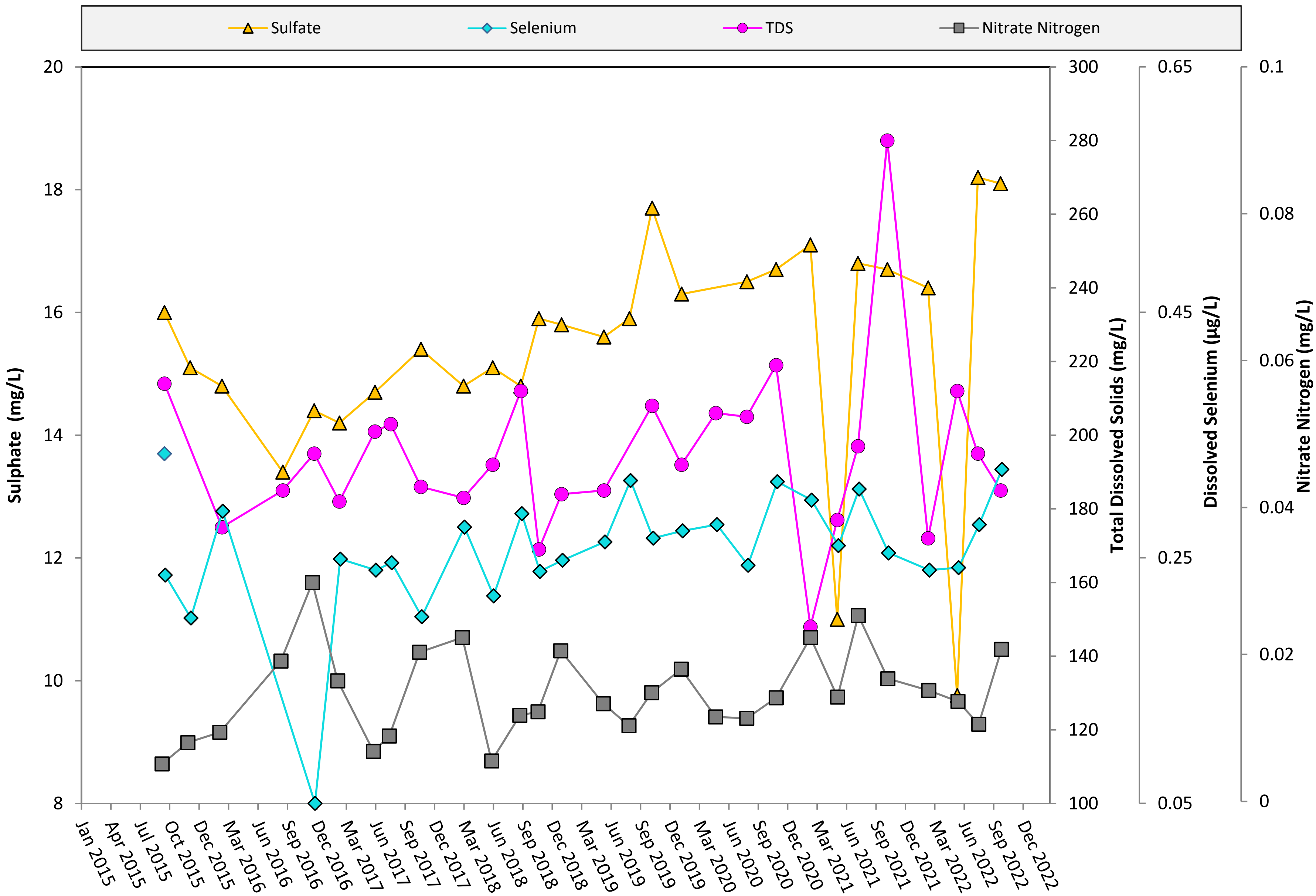
QAQC MB

Figure BG-10: Background - CM_MW3-SH



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QAQC MB

Tables

TABLE BG-01: Summary of Well Installation Details and Hydrogeological Information (Background)

Area	Well ID[a]	Monitoring Program[b]	Well Type	Monitoring Type[c]	Sampling Frequency		Logs (Y/N)	Coordinates (UTM NAD 83)		Ground Elevation	TOC Elevation	Stick Up Height	Drilled Depth	Well Diameter	Top of Screen Depth	Bottom of Screen Depth	Screened Formation	Depth to Bedrock	Hydraulic Conductivity
					Approved[d]	Recommended[f]		Easting	Northing	masl	masl	m	mbgs	mm	mbgs	mbgs		mbgs	m/s
Within Study Area 1 (FRO/GHO Boundary)	FR_MW_FRRD1	RGMP	Monitoring	WL, S	Q2, Q4	Q2, Q4	Y	653884	5556128	1581.02	1581.95	0.93	14.6	50	8.8	9.3	Sand	11.9	4.7E-05
	FR_MW_CH1-A	RGMP	Monitoring	WL, S	Q2, Q4	Q2, Q4	Y	655940	5552549	1562.01	1562.94	1.20	41.2	50	28.4	29.9	Sand and Gravel	38.4	-
	FR_MW_CH2	RGMP	Monitoring	WL, S	Q2, Q4	Q2, Q4	Y	656107	5552945	1573.39	1574.07	0.68	10.7	50	2.4	4.0	Gravel and silty sand	4.9	-
Upgradient of Study Area 2	LC_PIZDC1307[e]	RGMP	Monitoring	WL, S	Q2, Q4	Q2, Q4	Y	658169	5541230	1690.85	1691.77	0.92	35.1	49	32.8	34.8	Till	-	1.0E-07
	LC_PIZDC1308[e]	RGMP	Monitoring	WL, S	Q2, Q4	Q2, Q4	Y	658168	5541232	1690.85	1691.68	0.83	19.8	49	6.1	9.1	Colluvium and Till	-	7.0E-07
Upgradient of Study Area 4 (GHO)	GH_MW_BG1A	RGMP	Monitoring	WL, S	Q2, Q4	Q2, Q4	Y	645670	5565171	1448.63	1449.51	0.88	71.6	51	65.9	67.4	Sand and Gravel	69.8	-
	GH_MW_BG1B	RGMP	Monitoring	WL, S	Q2, Q4	Q2, Q4	Y	645664	5565168	1448.71	1449.69	0.98	47.8	-	45.3	46.8	Silty Sand and Gravel	-	-
	GH_MW_BG1C	RGMP	Monitoring	WL, S	Q2, Q4	Q2, Q4	Y	645663	5565165	1448.48	1449.34	0.86	38.5	-	38.1	37.7	Silty Sand and Gravel	-	-
	GH_MW-Willow-1D	RGMP	Monitoring	WL, S	Q2, Q4	Q2, Q4	Y	647475	5556081	1345.54	1346.42	0.88	37.8	51	35.7	37.5	Sand and Gravel	37.5	7.0E-04
	GH_MW-Willow-2S	RGMP	Monitoring	WL, S	Q2, Q4	Q2, Q4	Y	647553	5556015	1346.42	1346.85	0.85	22.0	51	6.1	7.6	Silty Sand	20.4	2.2E-05
	GH_MW-Willow-2D	RGMP	Monitoring	WL, S	Q2, Q4	Q2, Q4	Y	647553	5556015	1346.86	1347.70	0.84	22.0	51	15.2	18.3	Silty Sand and Gravel	20.4	1.4E-06
	GH_MW-Wolf-1S	RGMP	Monitoring	WL, S	Q2, Q4	Q2, Q4	Y	647378	5556787	1357.19	1358.14	0.95	35.1	51	9.5	12.5	Sand and Gravel	34.2	-
	GH_MW-Wolf-1D	RGMP	Monitoring	WL, S	Q2, Q4	Q2, Q4	Y	647377	5556787	1357.19	1358.13	0.95	35.1	51	31.7	34.8	Silty Sand and Gravel	34.2	1.9E-06
	GH_MW-Wolf-2D	RGMP	Monitoring	WL, S	Q2, Q4	Q2, Q4	Y	647501	5556856	1376.57	1377.48	0.91	18.9	51	15.5	18.6	Sand	18.3	-
Upgradient of Study Areas 5/6 (LCO)	LC_PIZP1103[e]	RGMP	Monitoring	WL, S	Q2, Q4	Q2, Q4	Y	654250	5528633	1264.06	1265.13	1.07	41.2	-	35.1	38.1	Clayey Silt	38.8	7.5E-08
	LC_PIZP1101[e,g]	RGMP	Monitoring	WL, S	Q2, Q4	Q2, Q4	Y	653960	5528263	1266.06	1267.06	1.00	41.2	-	38.2	41.2	Sand and Gravel	-	7.4E-04
Upgradient of Study Area 7 (EVO)	EV_MW_GV4A[e]	RGMP	Monitoring	WL, S	Q2, Q4	Q2, Q4	Y	656665	5522317	1310.87	1311.77	0.90	16.8	50	14.1	15.7	Sandstone Bedrock	13.4	7.5E-06
	EV_MW_GV4B[e]	RGMP	Monitoring	WL, S	Q2, Q4	Q2, Q4	Y	656662	5522318	1310.78	1311.83	1.05	6.1	50	4.3	5.8	Silty Gravel and Silt	-	5.3E-06
Upgradient of Study Area 11 (CMm)	CM_MW3-DP[e]	RGMP	Monitoring	WL, S	Q2, Q4	Q2, Q4	Y	668236	5482854	1572.15	1572.67	0.52	27.4	51	13.3	16.3	Bedrock	6.7	1.0E-07
	CM_MW3-SH[e]	RGMP	Monitoring	WL, S	Q2, Q4	Q2, Q4	Y	668236	5482853	1572.15	1572.65	0.50	27.4	51	3.6	6.7	Clay and Gravel	6.7	3.9E-04
	CM_MW6-DP[e]	RGMP	Monitoring	WL, S	Q2, Q4	Q2, Q4	Y	670118	5486464	1580.39	1581.28	0.89	41.7	51	38.7	41.7	Siltstone Bedrock	21.8	< 1.0E-07

Notes:
a: Wells have been included based on the background assessment completed as part of the 2020 RGMP Update.
b: RGMP denotes Regional Groundwater Monitoring Program.
c: WL = Water. Level S = Sample.
d: 2020 RGMP Update Report (approved BC ENV March 2020).
e: Location resurveyed in 2022.
f: 2020, and 2021 SSMP Annual Reports; 2021 SSGMP Update Report.
g: LC_PIZP1101 has been recently repaired. Re-surveying is required to update ground surface elevation and stickup.
masl denotes metres above sea level.
mbgs denotes metres below ground surface.
TOC denotes top of pipe casing.
"-" denotes data not available.

TABLE BG-02: Summary of Groundwater Levels and Sampling Information (Background)

Area	Well ID	Ground Elevation	TOC Elevation	Stick Up Height	Date of Static Water Level Measurement	Depth to Water	Potentiometric Elevation	Well Pairs	Calculated Vertical Gradient		Continuous Water Level Monitoring	Purging / Sampling Methodology
		masl	masl	m	yyyy-mm-dd	mbtoc	masl		m/m	Direction	Quarter	
Within Study Area 1 (FRO/GHO Boundary)	FR_MW_FRRD1	1581.02	1581.95	0.93	2022-03-04	7.44	1574.51	-	-	-	Yes	Q1, Q2: Peristaltic Q3, Q4:Submersible
					2022-06-06	7.06	1574.89					
					2022-08-16	7.54	1574.42					
					2022-11-02	7.71	1574.24					
	FR_MW_CH1-A	1562.01	1562.94	1.20	2022-03-03	18.29	1544.65	-	-	-	Yes	Submersible
					2022-06-06	15.81	1547.14					
					2022-08-16	17.31	1545.63					
					2022-11-02	18.00	1544.95					
	FR_MW_CH2	1573.39	1574.07	0.68	2022-03-03	1.81	1572.26	-	-	-	Yes	Peristaltic
					2022-06-06	1.13	1572.94					
					2022-08-16	1.68	1572.39					
					2022-11-02	1.86	1572.21					
Upgradient of Study Area 2	LC_PIZDC1307	1690.85	1691.77	0.92	2022-03-04	5.47	1686.30	LC_PIZDC1307 and LC_PIZDC1308	-0.078	Downward	Yes	Q1, Q2, Q3, Q4: Peristaltic
					2022-05-06	1.99	1689.78		0.001	Upward		
					2022-08-25	3.47	1688.30		-0.026	Downward		
					2022-10-26	4.53	1687.24		-0.053	Downward		
	LC_PIZDC1308	1690.85	1691.68	0.83	2022-03-04	3.34	1688.34	-	-	-	Yes	Q1, Q2, Q3, Q4: Peristaltic
					2022-05-06	1.93	1689.75					
					2022-08-25	2.71	1688.98					
					2022-10-26	3.06	1688.63					
Upgradient of Study Area 4 (GHO)	GH_MW_BG1A	1448.63	1449.51	0.88	2022-03-26	27.30	1422.21	GH_MW_BG1A and GH_MW_BG1B	0.043	Upward	Yes	Bladder
					2022-05-16	26.90	1422.61		0.057	Upward		
					2022-07-22	26.63	1422.88		0.059	Upward		
					2022-10-19	27.06	1422.45		0.047	Upward		
	GH_MW_BG1B	1448.71	1449.69	0.98	2022-03-26	28.38	1421.31	GH_MW_BG1B and GH_MW_BG1C	-0.024	Downward	Yes	Bladder
					2022-05-16	28.27	1421.42		-0.030	Downward		
					2022-07-22	28.04	1421.65		0.010	Upward		
					2022-10-19	28.21	1421.48		-0.039	Downward		
	GH_MW_BG1C	1448.48	1449.34	0.86	2022-02-25	27.82	1421.52	-	-	-	Yes	Bladder
					2022-05-16	27.65	1421.69					
					2022-07-22	27.78	1421.56					
					2022-10-19	27.51	1421.83					
	GH_MW-Willow-1D	1345.54	1346.42	0.88	2022-03-09	18.43	1327.99	-	-	-	Yes	Submersible
					2022-06-14	17.59	1328.83					
					2022-08-23	18.14	1328.29					
					2022-10-24	18.29	1328.14					
	GH_MW-Willow-2S	1346.42	1346.85	0.85	2022-03-09	6.55	1340.30	GH_MW-Willow-2S and GH_MW-Willow-2D	-0.044	Downward	Yes	Peristaltic
					2022-06-14	3.47	1343.39		-0.100	Downward		
					2022-08-23	6.06	1340.79		-0.028	Downward		
					2022-10-24	Dry	-		-	-		
	GH_MW-Willow-2D	1346.86	1347.70	0.84	2022-03-09	7.81	1339.89	-	-	-	Yes	Q1, Q4:Submersible Q2, Q3: Peristaltic
					2022-06-14	5.26	1342.44					
					2022-08-23	7.17	1340.53					
					2022-10-25	9.36	1338.34					
	GH_MW-Wolf-1S	1357.19	1358.14	0.95	2022-03-07	Dry	-	GH_MW-Wolf-1S and GH_MW-Wolf-1D	-	-	Yes	Not applicable
					2022-06-13	Dry	-					
					2022-08-22	Dry	-					
					2022-10-24	Dry	-					
	GH_MW-Wolf-1D	1357.19	1358.13	0.95	2022-03-07	25.71	1332.43	-	-	-	Yes	Submersible
					2022-06-13	24.90	1333.23					
					2022-08-22	23.34	1334.80					
					2022-10-24	25.46	1332.68					
	GH_MW-Wolf-2D	1376.57	1377.48	0.91	2022-03-07	16.59	1360.89	-	-	-	Yes	Submersible
					2022-06-13	16.25	1361.23					
					2022-08-22	16.61	1360.87					
					2022-10-24	16.59	1360.89					

Notes:
TOC denotes top of pipe casing.
masl denotes metres above sea level.
mbtoc denotes metres below top of casing.
"-" denotes data not available.
Quarter is represented as Q1, Q2, Q3, Q4.

TABLE BG-02: Summary of Groundwater Levels and Sampling Information (Background)

Area	Well ID	Ground Elevation	TOC Elevation	Stick Up Height	Date of Static Water Level Measurement	Depth to Water	Potentiometric Elevation	Well Pairs	Calculated Vertical Gradient		Continuous Water Level Monitoring	Purging / Sampling Methodology
		masl	masl	m	yyyy-mm-dd	mbtoc	masl		m/m	Direction	Quarter	
Upgradient of Study Areas 5/6 (LCO)	LC_PIZP1103	1264.06	1265.13	1.07	2022-03-11	28.23	1236.90	-	-	-	Yes	Bladder
					2022-05-25	27.79	1237.34					
					2022-08-05	27.65	1237.48					
					2022-10-24	27.82	1237.31					
	LC_PIZP1101	1266.06	1267.06	1.00	2022-03-11	30.03	1237.03	-	-	-	Yes	Bladder
					2022-05-20	29.74	1237.32					
					2022-08-05	29.59	1237.47					
					2022-10-20	29.61	1237.45					
Upgradient of Study Area 7 (EVO)	EV_MW_GV4A	1310.87	1311.77	0.90	2022-01-12	4.22	1307.55	EV_MW_GV4A and EV_MW_GV4B	-0.135	Downward	Yes	Peristaltic
					2022-04-28	4.06	1307.71		-0.131	Downward		
					2022-08-05	4.06	1307.71		-0.119	Downward		
					2022-10-27	4.16	1307.61		-0.123	Downward		
	EV_MW_GV4B	1310.78	1311.83	1.05	2022-01-09	2.97	1308.86	-	-	-	Yes	Peristaltic
					2022-04-28	2.85	1308.98					
					2022-08-05	2.95	1308.88					
					2022-10-27	3.02	1308.81					
Upgradient of Study Area 11 (CMm)	CM_MW3-DP	1572.15	1572.67	0.52	2022-03-03	2.68	1569.99	CM_MW3-DP and CM_MW3-SH	0.010	Upward	Yes	Bladder
					2022-06-01	1.94	1570.73		0.011	Upward		
					2022-08-04	2.55	1570.12		0.035	Upward		
					2022-10-13	2.66	1570.01		0.035	Upward		
	CM_MW3-SH	1572.15	1572.65	0.50	2022-03-03	2.76	1569.89	-	-	-	Yes	Bladder
					2022-06-01	2.03	1570.63					
					2022-08-04	2.87	1569.78					
					2022-10-13	2.98	1569.67					
	CM_MW6-DP	1580.39	1581.28	0.89	2022-05-19	3.80	1577.48	-	-	-	Yes	Bladder
					2022-07-21	4.24	1577.04					
					2022-10-20	4.96	1576.33					

Notes:
TOC denotes top of pipe casing.
masl denotes metres above sea level.
mbtoc denotes metres below top of casing.
"-" denotes data not available.
Quarter is represented as Q1, Q2, Q3, Q4.

TABLE BG-03: Summary of Analytical Results Compared to Primary Screening Criteria for Dissolved Organics, Nutrient and Organics in Groundwater (Background)

			Field Parameters					Physical Parameters						Dissolved Inorganics								Nutrients						Organics	
Sample Location	Sample ID	Sample Date	Field Temperature	pH (field)	Dissolved Oxygen	Field Conductivity	Field ORP	pH	Hardness	Conductivity	Total Suspended Solids	Total Dissolved Solids	Turbidity	Total Alkalinity	Bicarbonate	Carbonate	Hydroxide	Bromide	Chloride	Fluoride	Sulphate	Ammonia Nitrogen	Nitrate Nitrogen	Nitrite Nitrogen	Kjeldahl Nitrogen-N	Ortho-Phosphate	Phosphorus, Total	Total Organic Carbon	Dissolved Organic Carbon
		(yyyy mm dd)	C	pH	mg/L	µS/cm	mV	pH	mg/L	µS/cm	mg/L	mg/L	ntu	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
BC Standard																													
CSR Aquatic Life (AW)[a]			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1,500	2-3[b]	1,280-4,290[b]	1.31-18.5[c]	400	0.2-2[d]	n/a	n/a	n/a	n/a	n/a
CSR Irrigation Watering (IW)			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	100	1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
CSR Livestock Watering (LW)			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	600	1	1,000	n/a	100	10	n/a	n/a	n/a	n/a	n/a
CSR Drinking Water (DW)			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	250	1.5	500	n/a	10	1	n/a	n/a	n/a	n/a	n/a
Within Study Area 1 (FRO/GHO Boundary)																													
FR_MW_FRRD1	FR_MW-FRRD1_WG_2022_03_04_NP	2022 03 04	2.9	7.00	5.14	743	125.9	7.85	348	749	3.6	423	4.58	328	400	< 2.0	< 2.0	0.071	62.0	0.103	13.4	< 0.0050	0.264	< 0.0010	0.070	< 0.0010	0.0163	1.10	1.25
	FR_MW_MC10A_WG_2022_03_04_NP	Duplicate	-	-	-	-	-	7.85	346	751	4.8	420	4.60	335	408	< 2.0	< 2.0	0.071	62.0	0.102	13.3	< 0.0050	0.267	< 0.0010	0.065	< 0.0010	0.0139	1.19	1.10
	QA/QC RPD%		-	-	-	-	-	0	1	0	*	1	0	2	2	*	*	*	0	1	1	*	1	*	*	*	16	*	*
	FR_MW-FRRD1_WG_2022_06_06_NP	2022 06 06	4.4	7.23	3.8	732.4	49.0	7.91	313	722	1.7	405	1.70	319	389	< 2.0	< 2.0	< 0.050	54.0	0.120	7.35	< 0.0050	0.138	< 0.0010	< 0.050	< 0.0010	0.0049	1.03	1.15
	FR_MW-FRRD1_WG_2022_08_16_NP	2022 08 16	5.1	6.85	5.10	682	258.0	7.99	319	691	1.3	419	4.32	332	405	< 1.0	< 1.0	< 0.050	48.2	0.115	9.14	< 0.0050	0.169	< 0.0010	< 0.050	< 0.0010	0.0062	1.52	1.58
	FR_MW_MC10A_WG_2022_08_16_NP	Duplicate	-	-	-	-	-	7.93	320	684	2.6	394	4.27	342	417	< 1.0	< 1.0	< 0.050	48.2	0.113	9.17	< 0.0050	0.173	< 0.0010	< 0.050	< 0.0010	0.0063	1.76	1.72
	QA/QC RPD%		-	-	-	-	-	1	0	1	*	6	1	3	3	*	*	*	0	2	0	*	2	*	*	*	*	*	*
	FR_MW-FRRD1_WG_2022_11_02_NP	2022 11 02	5.0	6.96	6.06	657	204.8	7.88	322	596	13.6	414	31.0	333	407	< 2.0	< 2.0	< 0.050	34.6	0.136	10.1	< 0.0050	0.168	< 0.0010	0.133	< 0.0010	0.0268	0.80	0.74
	FR_MW_MC10A_WG_2022_11_02_NP	Duplicate	-	-	-	-	-	8.01	323	643	14.2	412	30.1	326	398	< 2.0	< 2.0	< 0.050	34.8	0.136	10.2	< 0.0050	0.166	< 0.0010	0.127	< 0.0010	0.0258	0.80	0.73
	QA/QC RPD%		-	-	-	-	-	2	0	8	4	0	3	2	2	*	*	*	1	0	1	*	1	*	*	*	4	*	*
FR_MW_CH1-A	FR_MW-CH1-A_WG_2022_03_03_NP	2022 03 03	4.4	7.76	3.37	295.9	-76.0	8.02	150	288	21.6	153	13.8	151	184	< 2.0	< 2.0	< 0.050	0.29	0.261	15.4	< 0.0050	0.0732	< 0.0010	0.115	< 0.0010	0.0360	0.63	1.08
	FR_MW-CH1-A_WG_2022_06_06_NP	2022 06 06	3.8	7.49	9.5	294.6	68.2	8.09	154	297	1.1	172	0.36	152	186	< 2.0	< 2.0	< 0.050	0.99	0.170	18.5	< 0.0050	0.0911	< 0.0010	< 0.050	< 0.0010	0.0055	1.04	0.88
	FR_MW_MC10A_WG_2022_06_06_NP	Duplicate	-	-	-	-	-	8.11	149	299	< 1.0	167	0.25	150	183	< 2.0	< 2.0	< 0.050	0.99	0.171	18.6	0.0313	0.0882	< 0.0010	0.051	< 0.0010	0.0059	1.75	1.03
	QA/QC RPD%		-	-	-	-	-	0	3	1	*	3	*	1	2	*	*	*	0	1	1	*	3	*	*	*	*	*	*
	FR_MW-CH1-A_WG_2022_08_16_NP	2022 08 16	5.9	7.73	8.57	252.0	90.7	8.15	139	257	< 1.0	157	0.74	138	168	< 1.0	< 1.0	< 0.050	0.20	0.145	11.7	< 0.0050	0.0453	< 0.0010	< 0.050	< 0.0010	0.0035	0.92	0.90
	FR_MW_CH1-A_WG_2022_11_02_NP	2022 11 02	5.3	7.75	7.69	279.9	43.9	8.16	154	275	1.3	183	0.45	152	186	< 2.0	< 2.0	< 0.050	0.21	0.184	20.0	< 0.0050	0.0658	< 0.0010	< 0.050	< 0.0010	< 0.0020	< 0.50	< 0.50
FR_MW_CH2	FR_MW_CH2_WG_2022_03_03_NP	2022 03 03	1.87	6.78	0.65	364	-68.1	7.79	187	358	5.6	194	5.88	181	220	< 2.0	< 2.0	< 0.050	0.17	0.114	22.3	0.568	0.0735	< 0.0010	0.671	< 0.0010	0.0171	0.66	0.95
	FR_MW_CH2_WG_2022_06_06_NP	2022 06 06	2.6	7.08	0.2	393.2	53.0	7.84	188	386	8.6	224	6.22	216	264	< 2.0	< 2.0	< 0.050	0.12	0.189	9.12	1.20	< 0.0050	< 0.0010	1.43	< 0.0010	0.0302	3.01	3.08
	FR_MW_CH2_WG_2022_08_16_NP	2022 08 16	7.8	7.24	0.27	345.7	-84.6	8.01	199	370	5.7	209	3.15	200	244	< 1.0	< 1.0	< 0.050	0.26	0.156	12.8	1.00	0.0119	< 0.0010	0.945	< 0.0010	0.0170	2.01	2.78
	FR_MW_CH2_WG_2022_11_02_NP	2022 11 02	4.4	7.34	3.08	373.0	-64.5	7.94	194	333	9.3	220	4.62	209	255	< 2.0	< 2.0	< 0.050	0.18	0.214	17.3	1.10	0.0550	0.0011	1.24	< 0.0010	0.0167	0.56	0.71
Upgradient of Study Area 2																													
LC_PIZDC1307	LC_PIZDC1307_WG_Q1-2022_NP	2022 03 04	2.6	7.90	0.44	395.7	-214.3	8.13	169	383	2.4	198	7.06	228	278	< 1.0	< 1.0	< 0.050	0.21	0.465	0.50	0.0896	< 0.0050	< 0.0010	0.140	< 0.0010	0.0108	1.44	1.37
	LC_PIZDC1307_WG_Q2_2022_NP	2022 05 06	3.5	7.96	0.46	400.7	-219.3	8.24	184	378	< 1.0	234	7.25	218	266	< 1.0	< 1.0	< 0.050	0.22	0.543	< 0.30	0.0946	< 0.0050	< 0.0010	< 0.500	0.0018	0.0117	1.55	1.23
	LC_PIZDC1307_WG_Q3-2022_NP	2022 08 25	10.1	8.07	0.29	407.7	-206.2	8.31	174	380	3.3	216	6.23	247	295	3.1	< 1.0	< 0.050	0.19	0.556	< 0.30	0.101	0.0082	< 0.0010	0.115	< 0.0010	0.0156	1.28	3.84
	LC_PIZDC1307_WG_Q4_2022_NP	2022 10 26	2.93	7.73	0.40	390.0	-17.9	8.06	180	368	6.3	191	13.0	220	269	< 1.0	< 1.0	< 0.050	0.18	0.540	< 0.30	0.105	< 0.0050	< 0.0010	< 0.500	< 0.0010	0.0191	1.22	1.38
	LC_CC1_WG_Q4_2022_NP1307	Duplicate	-	-	-	-	-	8.10	194	363	5.8	207	12.3	225	275	< 1.0	< 1.0	< 0.050	0.18	0.535	< 0.30	0.104	< 0.0050	< 0.0010	< 0.500	< 0.0010	0.0184	1.05	1.42
	QA/QC RPD%		-	-	-	-	-	0	7	1	8	8	6	2	2	*	*	*	*	1	*	1	*	*	*	*	4	*	*
LC_PIZDC1308	LC_PIZDC1308_WG_Q1-2022_NP	2022 03 04	2.7	7.22	0.39	485	-128	7.79	263	474	1.2	252	3.97	280	342	< 1.0	< 1.0	< 0.050	0.49	0.212	1.93	0.0409	< 0.0050	< 0.0010	0.079	< 0.0010	0.0022	1.64	1.42
	LC_PIZDC1308_WG_Q2_2022_NP	2022 05 06	3.1	6.88	0.70	707	56.6	7.72	388	674	< 1.0	412	0.27	404	493	< 1.0	< 1.0	< 0.050	1.97	0.141	5.84	< 0.0050	0.108	< 0.0010	< 0.500	0.0016	< 0.0020	2.56	2.86
	LC_PIZDC1308_WG_Q3-2022_NP	2022 08 25	7.6	7.01	0.26	745	65.5	7.93	394	683	< 1.0	411	0.19	418	510	< 1.0	< 1.0	< 0.050	1.84	0.152	5.31	< 0.0050	0.108	0.0024	0.065	< 0.0010	0.0072	2.78	5.02
	LC_PIZDC1308_WG_Q4_2022_NP	2022 10 26	4.29	7.32	0.18	530.70	4.20	7.63	296	526	< 1.0	294	0.40	319	389	< 1.0	< 1.0	< 0.050	0.83	0.213	3.60	0.0157	0.0097	< 0.0010	< 0.500	< 0.0010	0.0020	1.71	2.24
	LC_CC1_WG_Q4_2022_NP5	Duplicate	-	-	-	-	-	7.77	298	537	< 1.0	299	0.36	323	394	< 1.0	< 1.0	< 0.050	0.87	0.211	3.80	0.0163	0.0098	0.0010	< 0.500	< 0.0010	< 0.0020	1.72	1.80
	QA/QC RPD%		-	-	-	-	-	2	1	2	*	2	*	1	1	*	*	*	5	1	5	*	*	*	*	*	*	*	*

All terms defined within the body of SNC-Lavalin's report.
< Denotes concentration less than indicated detection limit.
\- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

[a] Standard to protect freshwater aquatic life.
[b] Standard varies with Hardness.
[c] Standard varies with pH and Temperature. Temperature assumed 10C.
[d] Standard varies with Chloride.

BOLD	Concentration greater than CSR Aquatic Life (AW) standard
ITALIC	Concentration greater than CSR Irrigation Watering (IW) standard
UNDERLINE	Concentration greater than CSR Livestock Watering (LW) standard
SHADED	Concentration greater than CSR Drinking Water (DW) standard

TABLE BG-03: Summary of Analytical Results Compared to Primary Screening Criteria for Dissolved Organics, Nutrient and Organics in Groundwater (Background)

Sample Location	Sample ID	Sample Date	Field Parameters					Physical Parameters						Dissolved Inorganics								Nutrients						Organics	
			Field Temperature	pH (field)	Dissolved Oxygen	Field Conductivity	Field ORP	pH	Hardness	Conductivity	Total Suspended Solids	Total Dissolved Solids	Turbidity	Total Alkalinity	Bicarbonate	Carbonate	Hydroxide	Bromide	Chloride	Fluoride	Sulphate	Ammonia Nitrogen	Nitrate Nitrogen	Nitrite Nitrogen	Kjeldahl Nitrogen-N	Ortho-Phosphate	Phosphorus, Total	Total Organic Carbon	Dissolved Organic Carbon
		(yyyy mm dd)	C	pH	mg/L	µS/cm	mV	pH	mg/L	µS/cm	mg/L	mg/L	ntu	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
BC Standard																													
CSR Aquatic Life (AW)[a]			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1,500	2-3[b]	1,280-4,290[b]	1.31-18.5[c]	400	0.2-2[d]	n/a	n/a	n/a	n/a	n/a
CSR Irrigation Watering (IW)			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	100	1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
CSR Livestock Watering (LW)			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	600	1	1,000	n/a	100	10	n/a	n/a	n/a	n/a	n/a
CSR Drinking Water (DW)			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	250	1.5	500	n/a	10	1	n/a	n/a	n/a	n/a	n/a
Upgradient of Study Area 4 (GHO)																													
GH_MW_BG1A	GH_MW_BG1A_WG_2022-01-03_NP	2022 03 22	4.3	7.30	0.09	559	-97.7	7.41	280	545	10.8	285	18.5	329	402	< 1.0	< 1.0	< 0.050	0.41	0.176	6.07	0.107	< 0.0050	0.0010	0.208	< 0.0010	0.0075	1.70	1.10
	GH_MW_BG1A_WG_2022-04-04_NP	2022 05 16	4.8	7.26	1.04	574	-85.9	7.71	309	563	23.6	300	16.9	319	389	< 1.0	< 1.0	< 0.050	0.92	0.198	14.0	0.0992	0.0482	< 0.0010	0.218	< 0.0010	0.0321	3.32	1.53
	GH_MW_BG1A_WG_2022-07-04_NP	2022 07 22	4.8	7.35	0.55	539	-91.2	7.29	312	551	5.0	342	20.0	341	416	< 1.0	< 1.0	< 0.050	0.49	0.179	8.06	0.104	< 0.0050	< 0.0010	0.116	< 0.0010	0.0084	1.69	1.51
	GH_MW_BG1A_WG_2022-10-03_NP	2022 10 19	5.2	7.28	0.40	583	-91.5	8.00	323	543	3.7	272	20.9	332	404	< 1.0	< 1.0	< 0.050	0.72	0.199	10.9	0.0971	< 0.0050	< 0.0010	0.132	< 0.0010	0.0079	1.30	1.40
GH_MW_BG1B	GH_MW_BG1B_WG_2022-01-03_NP	2022 02 25	0.6	7.25	2.02	539	-58.0	7.74	297	496	21.7	285	44.3	309	377	< 1.0	< 1.0	< 0.050	0.38	0.376	5.91	0.150	0.0149	< 0.0010	0.242	< 0.0010	0.0117	2.26	1.53
	GH_MW_BG1B_WG_2022-04-04_NP	2022 05 16	5.2	7.31	0.49	525	-113.6	7.73	287	508	21.1	264	38.3	304	371	< 1.0	< 1.0	< 0.050	0.36	0.417	6.63	0.156	0.0208	< 0.0010	0.204	< 0.0010	0.0135	2.53	1.74
	GH_MW_BG1B_WG_2022-07-04_NP	2022 07 22	5.4	7.52	1.22	501	-104.0	7.30	296	497	18.9	320	62.1	307	375	< 1.0	< 1.0	< 0.050	0.30	0.370	5.89	0.155	< 0.0050	< 0.0010	0.216	< 0.0010	0.0128	2.82	2.16
	GH_MW_BG1B_WG_2022-10-03_NP	2022 10 19	6.0	7.34	2.59	542	-89.8	7.83	301	500	17.3	228	62.6	310	378	< 1.0	< 1.0	< 0.050	0.34	0.419	6.55	0.157	0.0087	< 0.0010	0.217	< 0.0010	0.0080	2.08	1.75
GH_MW_BG1C	GH_MW_BG1C_WG_2022-01-03_NP	2022 02 25	3.3	7.23	0.40	545	-84.2	7.70	293	510	25.0	284	37.0	307	375	< 1.0	< 1.0	< 0.050	0.31	0.374	5.85	0.143	0.0221	< 0.0010	0.215	< 0.0010	0.0212	2.72	2.00
	GH_MW_BG1C_WG_2022-04-04_NP	2022 05 16	4.5	7.28	1.10	530	-103.5	7.80	292	517	17.6	272	36.1	291	355	< 1.0	< 1.0	< 0.050	0.27	0.412	6.59	0.146	0.0257	0.0010	0.234	< 0.0010	0.0127	2.22	2.00
	GH_MW_BG1C_WG_2022-07-04_NP	2022 07 22	4.7	7.20	0.68	507	96.9	7.31	298	510	8.4	324	35.9	316	385	< 1.0	< 1.0	< 0.050	0.19	0.367	5.58	0.145	< 0.0050	< 0.0010	0.199	< 0.0010	0.0049	2.37	2.46
	GH_MW_BG1C_WG_2022-10-03_NP	2022 10 19	4.5	7.37	1.50	541	-93.3	7.85	303	502	10.9	264	33.2	305	372	< 1.0	< 1.0	< 0.050	0.24	0.408	5.92	0.143	0.0401	< 0.0010	0.219	< 0.0010	0.0036	1.79	1.83
GH_MW-Willow-1D	GH_MW-WILLOW-1D_WG_2022_03_10_NP	2022 03 10	5.8	7.15	1.64	439.9	-165.7	8.28	146	321	35.8	259	31.7	252	308	1.7	< 1.0	< 0.050	7.64	0.790	8.81	0.0865	0.0166	< 0.0010	0.088	< 0.0010	0.0373	< 0.50	< 0.50
	GH_MW-WILLOW-1D_WG_2022-06-14_NP	2022 06 14	6.1	7.72	0.12	463.3	5.7	8.23	138	475	46.8	268	22.7	268	327	< 2.0	< 2.0	< 0.050	9.82	0.823	8.29	0.0748	< 0.0050	< 0.0010	0.123	< 0.0010	0.0410	< 0.50	< 0.50
	GH_MW-WILLOW-1D_WG_2022-07-04_NP	2022 08 23	7.7	7.60	-	418.5	-163.6	8.36	148	433	14.7	268	18.7	229	269	5.3	< 1.0	0.050	8.35	0.852	8.90	0.0986	0.0106	< 0.0010	0.108	< 0.0010	0.0279	0.76	0.75
	GH_MW-WILLOW-1D_WG_2022-10-03_NP	2022 10 25	6.9	7.56	0.28	810	-70.5	8.40	146	423	8.1	243	5.48	229	265	7.1	< 1.0	< 0.050	8.02	0.868	9.39	0.0854	< 0.0050	< 0.0010	0.086	< 0.0010	0.0113	< 0.50	< 0.50
GH_MW-Willow-2D	GH_MW-WILLOW-2D_WG_2022_03_10_NP	2022 03 10	7.1	7.11	1.59	662	-114.1	8.34	121	589	16.3	391	24.0	380	463	3.6	< 1.0	0.061	13.8	*1.18*	1.08	0.209	0.0173	< 0.0010	0.239	0.0093	0.0314	< 0.50	< 0.50
	GH_MW-WILLOW-2D_WG_2022-06-14_NP	2022 06 14	5.4	7.48	8.9	374.6	57.5	8.22	189	378	11.5	219	10.1	225	274	< 2.0	< 2.0	< 0.050	0.34	0.132	7.90	< 0.0050	0.0789	< 0.0010	0.117	0.0034	0.0239	3.51	3.78
	GH_MW-WILLOW-2D_WG_2022-07-04_NP	2022 08 23	12.8	7.56	0.17	546	-65.3	8.36	136	589	1.0	347	2.37	355	418	7.1	< 1.0	0.063	10.6	*1.07*	1.47	0.181	0.0070	< 0.0010	0.346	0.0022	0.0080	0.85	1.92
	GH_MW-WILLOW-2D_WG_2022-10-03_NP	2022 10 25	8.9	7.75	0.7	679.8	205.1	8.51	115	651	9.7	361	9.61	376	429	14.6	< 1.0	0.077	14.2	*1.38*	0.73	0.207	< 0.0050	0.0011	0.265	0.0030	0.0300	< 0.50	< 0.50
GH_MW-Willow-2S	GH_MW-WILLOW-2S_WG_2022_03_10_NP	2022 03 10	4.0	7.18	6.51	449.7	239.2	8.03	239	385	3.9	266	2.98	260	317	< 1.0	< 1.0	< 0.050	0.48	0.110	8.55	< 0.0050	0.339	< 0.0010	0.098	0.0109	0.0112	1.56	1.50
	GH_MW_MC10-A_WG_2022_03_10_NP	Duplicate	-	-	-	-	-	8.30	233	428	4.0	238	2.84	247	297	1.7	< 1.0	< 0.050	0.48	0.105	8.50	< 0.0050	0.336	< 0.0010	0.088	0.0102	0.0116	1.46	1.63
	QA/QC RPD%		-	-	-	-	-	3	3	11	*	11	5	5	7	*	*	*	*	5	1	*	1	*	*	7	4	*	*
	GH_MW-WILLOW-2S_WG_2022-06-14_NP	2022 06 14	5.4	7.66	10.03	375.8	58.9	8.20	190	380	8.2	226	2.69	236	288	< 2.0	< 2.0	< 0.050	0.36	0.137	7.64	< 0.0050	0.0804	< 0.0010	0.135	0.0048	0.0232	3.68	3.91
	GH_MW-WILLOW-2S_WG_2022-07-04_NP	2022 08 23	13.1	7.11	0.28	362.6	235.1	8.13	192	360	2.5	229	4.52	212	259	< 1.0	< 1.0	< 0.050	0.40	0.173	7.46	0.0445	0.0170	0.0013	0.124	0.0063	0.0153	3.44	3.62
GH_MW-Wolf-1D	GH_MW-WOLF-1D_WG_2022_03_07_NP	2022 03 07	5.8	8.28	1.71	410.8	-144.5	7.86	207	395	259	238	52.4	236	288	< 1.0	< 1.0	< 0.050	0.85	0.255	9.59	0.0926	< 0.0050	< 0.0010	0.295	< 0.0010	0.668	0.74	0.59
	GH_MW-WOLF-1D_WG_2022_06_13_NP	2022 06 13	5.6	7.03	0.13	414.1	57.9	7.79	206	418	20.9	248	28.6	251	306	< 2.0	< 2.0	< 0.050	0.84	0.238	9.64	0.0753	0.0054	< 0.0010	0.108	< 0.0010	0.0358	1.46	1.48
	GH_MW-WOLF-1D_WG_2022-07-04_NP	2022 08 22	6.5	7.53	-	383.4	-124.7	8.15	213	396	26.2	257	28.1	227	276	< 1.0	< 1.0	< 0.050	0.82	0.294	10.3	0.123	0.0175	0.0018	0.194	0.0015	0.0319	1.76	1.02
	GH_MW-WOLF-1D_WG_2022-10-03_NP	2022 10 24	4.1	7.30	0.12	746.9	-86.9	8.11	206	391	15.4	218	29.3	266	324	< 1.0	< 1.0	< 0.050	0.84	0.280	10.8	0.0941	0.0068	< 0.0010	0.151	< 0.0010	0.0284	0.61	< 0.50
GH_MW-Wolf-2D	GH_MW-WOLF-2D_WG_2022_03_07_NP	2022 03 07	5.9	8.07	2.32	547	-101.7	7.67	275	522	35.3	323	82.1	304	371	< 1.0	< 1.0	< 0.050	0.46	0.246	28.5	0.0094	< 0.0050	0.0015	0.119	0.0080	0.0656	2.74	1.48
	GH_MW-WOLF-2D_WG_2022_06_13_NP	2022 06 13	5.5	7.20	0.17	499.0	56.9	7.76	261	505	86.8	303	45.3	320	390	< 2.0	< 2.0	< 0.050	0.28	0.218	20.4	0.0161	< 0.0050	< 0.0010	< 0.050	< 0.0010	0.0345	1.71	1.71
	GH_MW-WOLF-2D_WG_2022-07-04_NP	2022 08 22	8.8	7.32	-	470.9	-34.1	7.96	270	497	62.2	320	52.8	287	350	< 1.0	< 1.0	< 0.050	0.40	0.264	23.4	0.0116	0.0114	0.0016	0.068	0.0086	0.0559	2.28	1.25
	GH_MW-WOLF-2D_WG_2022-10-03_NP	2022 10 24	5.3	7.23	0.5	471.6	197.6	8.02	256	472	31.3	267	30.7	288	351	< 1.0	< 1.0	< 0.050	0.28	0.264	20.4	0.0189	< 0.0050	< 0.0010	0.057	< 0.0010	0.0318	1.16	< 0.50

All terms defined within the body of SNC-Lavalin's report.
< Denotes concentration less than indicated detection limit.
\- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

[a] Standard to protect freshwater aquatic life.
[b] Standard varies with Hardness.
[c] Standard varies with pH and Temperature. Temperature assumed 10C.
[d] Standard varies with Chloride.

BOLD	Concentration greater than CSR Aquatic Life (AW) standard
ITALIC	Concentration greater than CSR Irrigation Watering (IW) standard
UNDERLINE	Concentration greater than CSR Livestock Watering (LW) standard
SHADED	Concentration greater than CSR Drinking Water (DW) standard

TABLE BG-03: Summary of Analytical Results Compared to Primary Screening Criteria for Dissolved Organics, Nutrient and Organics in Groundwater (Background)

			Field Parameters					Physical Parameters						Dissolved Inorganics								Nutrients						Organics	
Sample Location	Sample ID	Sample Date (yyyy mm dd)	Field Temperature C	pH (field) pH	Dissolved Oxygen mg/L	Field Conductivity µS/cm	Field ORP mV	pH pH	Hardness mg/L	Conductivity µS/cm	Total Suspended Solids mg/L	Total Dissolved Solids mg/L	Turbidity ntu	Total Alkalinity mg/L	Bicarbonate mg/L	Carbonate mg/L	Hydroxide mg/L	Bromide mg/L	Chloride mg/L	Fluoride mg/L	Sulphate mg/L	Ammonia Nitrogen mg/L	Nitrate Nitrogen mg/L	Nitrite Nitrogen mg/L	Kjeldahl Nitrogen-N mg/L	Ortho-Phosphate mg/L	Phosphorus, Total mg/L	Total Organic Carbon mg/L	Dissolved Organic Carbon mg/L
BC Standard																													
CSR Aquatic Life (AW)[a]			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1,500	2-3[b]	1,280-4,290[b]	1.31-18.5[c]	400	0.2-2[d]	n/a	n/a	n/a	n/a	n/a
CSR Irrigation Watering (IW)			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	100	1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
CSR Livestock Watering (LW)			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	600	1	1,000	n/a	100	10	n/a	n/a	n/a	n/a	n/a
CSR Drinking Water (DW)			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	250	1.5	500	n/a	10	1	n/a	n/a	n/a	n/a	n/a
Upgradient of Study Areas 5/6 (LCO)																													
LC_PIZP1101	LC_PIZP1101_WG_Q2-2022_N	2022 05 20	7.0	7.68	0.88	310.0	6.5	7.97	123	283	161	226	170	189	230	< 1.0	< 1.0	< 0.050	1.12	*1.79*	3.39	0.0587	< 0.0050	< 0.0010	< 0.500	0.0040	0.335	4.33	0.55
	LC_PIZP1101_WG_Q3-2022_N	2022 08 05	11.0	7.85	0.23	310.8	-115.6	8.22	120	295	185	277	225	182	222	< 1.0	< 1.0	< 0.050	1.18	*1.54*	3.09	0.0226	< 0.0050	< 0.0010	0.763	< 0.0010	0.604	2.35	1.22
	LC_CC3_WG_Q3-2022_NP	Duplicate	-	-	-	-	-	8.25	124	295	196	281	225	181	220	< 1.0	< 1.0	< 0.050	1.18	*1.56*	3.08	0.0223	< 0.0050	< 0.0010	0.793	< 0.0010	0.566	2.62	1.59
	QA/QC RPD%		-	-	-	-	-	0	3	0	6	1	0	1	1	*	*	*	0	1	0	*	*	*	4	*	6	*	*
	LC_PIZP1101_WG_Q4_2022_N	2022 10 20	9.1	7.99	0.18	293.4	-200.3	8.07	124	282	279	193	259	190	232	< 1.0	< 1.0	< 0.050	1.18	*1.85*	3.14	0.0520	< 0.0050	< 0.0010	< 0.500	< 0.0010	0.386	< 0.50	3.23
LC_PIZP1103	LC_PIZP1103_WG_Q1_2022_NP	2022 03 11	4.6	7.38	1.5	711.3	156.7	8.04	131	751	39.7	462	44.8	421	514	< 1.0	< 1.0	< 0.050	3.90	0.354	27.1	0.0644	0.0690	0.0014	0.110	0.0492	0.0860	1.31	0.59
	LC_PIZP1103_WG_Q2-2022_NP	2022 05 25	10.2	7.56	3.1	777	70.1	8.05	137	716	15.5	434	15.6	391	477	< 1.0	< 1.0	< 0.050	2.76	0.372	32.9	0.0145	0.170	0.0019	< 0.500	0.0284	0.0397	0.81	0.82
	LC_PIZP1103_WG_Q3-2022_NP	2022 08 05	11.5	7.51	3.65	750	140.0	8.32	143	713	13.3	473	15.0	400	470	8.5	< 1.0	< 0.050	2.66	0.325	33.8	0.0148	0.173	< 0.0010	< 0.500	0.0267	0.0508	1.00	3.58
	LC_PIZP1103_WG_Q4_2022_N	2022 10 24	6.70	7.68	3.18	751.90	59.50	8.05	148	739	5.0	464	2.17	447	545	< 1.0	< 1.0	< 0.050	4.02	0.416	29.7	0.0509	0.202	< 0.0010	< 0.500	0.0399	0.0412	0.82	1.20
Upgradient of Study Area 7 (EVO)																													
EV_MW_GV4A	EV_MW_GV4A_WG_2022_Q1_NP	2022 01 12	4.3	8.71	3.22	622	76.9	8.06	296	578	154	367	43.1	258	315	< 2.0	< 2.0	< 0.050	1.05	0.647	79.2	0.0068	0.0321	< 0.0010	< 0.050	< 0.0010	0.0697	2.92	3.11
	EV_MW_GV4A_WG_2022_Q2_NP	2022 04 28	4.3	7.35	1.09	653	-61.9	8.14	303	632	211	401	37.8	294	359	< 2.0	< 2.0	< 0.050	1.21	0.731	81.6	0.0284	0.0353	< 0.0010	0.118	< 0.0010	0.210	2.87	2.05
	EV_MW_GV4A_WG_2022_Q3_NP	2022 08 05	6.7	7.36	1.26	639	-51.8	7.52	309	612	53.1	410	8.57	272	331	< 2.0	< 2.0	< 0.050	1.22	0.636	85.4	0.0213	0.0377	< 0.0010	0.114	< 0.0010	0.0494	2.10	2.70
	EV_MW_GV4A_WG_2022_Q4_NP	2022 10 27	4.9	7.15	4.02	628	-21.0	8.01	352	597	24.6	354	6.75	304	371	< 2.0	< 2.0	< 0.050	1.10	0.694	74.4	0.0120	0.0531	< 0.0010	< 0.500	< 0.0010	0.0131	1.22	1.36
EV_MW_GV4B	EV_MW_GV4B_WG_2022_Q1_NP	2022 01 09	1.7	7.27	5.30	589	192.3	8.17	286	553	< 1.0	348	< 0.10	262	319	< 1.0	< 1.0	< 0.050	0.89	0.604	64.3	< 0.0050	0.0533	< 0.0010	< 0.050	0.0012	0.0026	0.88	0.98
	EV_MW_GV4B_WG_2022_Q2_NP	2022 04 28	3.4	7.41	5.48	575	172.4	8.24	308	555	2.0	339	0.27	266	324	< 2.0	< 2.0	< 0.050	0.94	0.586	64.8	< 0.0050	0.0626	0.0011	< 0.050	< 0.0010	0.0031	0.63	2.19
	EV_MW_GV4B_WG_2022_Q3_NP	2022 08 05	6.6	7.41	5.35	585	153.0	7.57	323	564	1.9	379	0.51	272	332	< 2.0	< 2.0	< 0.050	1.02	0.523	74.7	< 0.0050	0.0612	< 0.0010	< 0.050	< 0.0010	0.0029	< 0.50	1.25
	EV_MW_GV4B_WG_2022_Q4_NP	2022 10 27	5.7	7.16	5.38	585	105.0	7.98	340	558	< 1.0	324	0.27	294	358	< 2.0	< 2.0	< 0.050	0.97	0.596	67.1	< 0.0050	0.0590	< 0.0010	< 0.500	< 0.0010	0.0026	< 0.50	< 0.50
Upgradient of Study Area 11 (CMm)																													
CM_MW3-DP	CM_MW3-DP_WG_2022-02-01_N	2022 03 03	2.01	8.25	0.98	2,987	208.3	8.29	53.0	2,790	9.3	1,440	4.39	207	253	< 1.0	< 1.0	2.64	*807*	0.371	5.34	0.668	0.0762	< 0.0050	0.715	0.0072	0.0342	0.53	1.52
	CM_MW3-DP_WG_2022-06-01_N	2022 06 01	12.7	7.98	0.41	3,122	-124.8	8.27	49.7	3,040	5.2	1,420	0.43	202	247	< 1.0	< 1.0	2.87	*847*	0.406	< 1.50	0.635	0.0324	0.0097	0.753	0.0093	0.0246	0.53	0.58
	CM_MW3-DP_WG_2022-07-01_N	2022 08 04	7.6	8.24	0.72	2,934	-173.1	8.37	52.8	2,690	2.8	1,500	0.56	235	277	4.7	< 1.0	2.82	*790*	0.457	14.2	0.682	0.0397	< 0.0050	0.624	0.0015	0.0160	< 0.50	< 0.50
	CM_MW3-DP_WG_2022-10-01_N	2022 10 13	10.6	8.28	0.63	2,881	-152.0	8.18	50.2	2,680	3.1	1,340	0.86	208	254	< 1.0	< 1.0	2.77	*806*	0.440	< 1.50	0.671	0.0508	< 0.0050	0.682	0.0031	0.0130	< 0.50	0.98
CM_MW3-SH	CM_MW3-SH_WG_2022-02-01_N	2022 03 03	2.66	7.30	7.69	341	207.4	7.84	175	333	< 1.0	172	0.11	173	211	< 1.0	< 1.0	< 0.050	1.19	0.080	16.4	0.0068	0.0151	< 0.0010	< 0.050	0.0019	0.0031	< 0.50	< 0.50
	CM_NNP2_WG_2022-02-01_N	Duplicate	-	-	-	-	-	7.88	180	336	< 1.0	179	0.15	174	212	< 1.0	< 1.0	< 0.050	1.16	0.080	16.3	< 0.0050	0.0164	< 0.0010	< 0.050	0.0018	0.0035	< 0.50	< 0.50
	QA/QC RPD%		-	-	-	-	-	1	3	1	*	4	*	1	0	*	*	*	3	*	1	*	*	*	*	*	*	*	*
	CM_MW3-SH_WG_2022-06-01_N	2022 06 01	7.4	7.65	7.18	351.6	169.2	8.28	168	351	< 1.0	212	0.47	171	206	1.1	< 1.0	< 0.050	0.60	0.078	9.76	< 0.0050	0.0136	< 0.0010	< 0.050	< 0.0010	0.0032	1.01	1.34
	CM_NNP2_WG_2022-06-01_N	Duplicate	-	-	-	-	-	8.29	172	351	< 1.0	218	0.10	195	234	2.0	< 1.0	< 0.050	0.88	0.082	10.5	< 0.0050	0.0274	0.0013	0.052	< 0.0010	0.0036	0.99	1.05
	QA/QC RPD%		-	-	-	-	-	0	2	0	*	3	*	13	13	*	*	*	38	*	7	*	*	*	*	*	*	*	*
	CM_MW3-SH_WG_2022-07-01_N	2022 08 04	4.4	7.48	7.68	344.1	110.3	8.01	180	326	< 1.0	195	0.18	185	226	< 1.0	< 1.0	< 0.050	0.79	0.103	18.2	< 0.0050	0.0105	< 0.0010	< 0.050	< 0.0010	0.0038	< 0.50	< 0.50
	CM_MW3-SH_WG_2022-10-01_N	2022 10 13	4.6	7.40	6.72	341.3	43.9	7.97	185	320	< 1.0	185	0.16	172	210	< 1.0	< 1.0	< 0.050	1.22	0.116	18.1	< 0.0050	0.0207	< 0.0010	< 0.050	< 0.0010	0.0030	< 0.50	< 0.50

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n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

[a] Standard to protect freshwater aquatic life.
[b] Standard varies with Hardness.
[c] Standard varies with pH and Temperature. Temperature assumed 10C.
[d] Standard varies with Chloride.

BOLD	Concentration greater than CSR Aquatic Life (AW) standard
ITALIC	Concentration greater than CSR Irrigation Watering (IW) standard
UNDERLINE	Concentration greater than CSR Livestock Watering (LW) standard
SHADED	Concentration greater than CSR Drinking Water (DW) standard

TABLE BG-03: Summary of Analytical Results Compared to Primary Screening Criteria for Dissolved Organics, Nutrient and Organics in Groundwater (Background)

Sample Location	Sample ID	Sample Date (yyyy mm dd)	Field Parameters					Physical Parameters						Dissolved Inorganics								Nutrients						Organics	
			Field Temperature C	pH (field) pH	Dissolved Oxygen mg/L	Field Conductivity µS/cm	Field ORP mV	pH pH	Hardness mg/L	Conductivity µS/cm	Total Suspended Solids mg/L	Total Dissolved Solids mg/L	Turbidity ntu	Total Alkalinity mg/L	Bicarbonate mg/L	Carbonate mg/L	Hydroxide mg/L	Bromide mg/L	Chloride mg/L	Fluoride mg/L	Sulphate mg/L	Ammonia Nitrogen mg/L	Nitrate Nitrogen mg/L	Nitrite Nitrogen mg/L	Kjeldahl Nitrogen-N mg/L	Ortho-Phosphate mg/L	Phosphorus, Total mg/L	Total Organic Carbon mg/L	Dissolved Organic Carbon mg/L
BC Standard																													
CSR Aquatic Life (AW)[a]			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1,500	2-3[b]	1,280-4,290[b]	1.31-18.5[c]	400	0.2-2[d]	n/a	n/a	n/a	n/a	n/a
CSR Irrigation Watering (IW)			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	100	1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
CSR Livestock Watering (LW)			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	600	1	1,000	n/a	100	10	n/a	n/a	n/a	n/a	n/a
CSR Drinking Water (DW)			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	250	1.5	500	n/a	10	1	n/a	n/a	n/a	n/a	n/a
Upgradient of Study Area 11 (CMm)																													
CM_MW6-DP	CM_MW6-DP_WG_2022-05-19_N	2022 05 19	3.5	8.37	0.07	1,345	-198.4	8.61	34.3	1,270	4.4	803	4.19	702	808	24.2	< 1.0	0.104	36.5	0.405	0.81	0.344	< 0.0050	< 0.0010	0.396	0.0173	0.0218	0.84	1.05
	CM_NNP_WG_2022-05-19_N	Duplicate	-	-	-	-	-	8.60	34.8	1,240	4.0	756	2.98	692	798	22.8	< 1.0	< 0.250	39.0	0.414	7.97	0.352	0.423	0.0074	0.391	0.0076	0.0272	0.66	2.24
	QA/QC RPD%		-	-	-	-	-	0	1	2	*	6	34	1	1	6	*	*	7	2	*	2	*	*	1	78	22	*	*
	CM_MW6-DP_WG_2022-07-01_N	2022 07 21	17.5	8.26	0.29	1,326	-214.3	7.99	31.9	1,260	5.7	780	6.07	710	866	< 1.0	< 1.0	0.132	35.7	0.447	0.71	0.523	< 0.0050	< 0.0010	0.647	0.0152	0.0531	< 0.50	1.11
	CM_MW6-DP_WG_2022-10-01_N	2022 10 20	11.6	8.18	0.63	1,312	-28.2	8.48	32.6	1,240	7.7	725	0.11	703	822	17.8	< 1.0	< 0.250	35.2	0.383	3.85	0.533	< 0.0250	< 0.0050	0.573	0.0028	0.0344	< 0.50	1.28
Blanks																													
Field Blanks																													
FR_MW_FRRD1	FR_MW_MC10B_WG_2022_03_04_NP	2022 03 04	-	-	-	-	-	5.51	< 0.50	< 2.0	< 1.0	< 10	< 0.10	< 2.0	< 2.0	< 2.0	< 2.0	< 0.050	< 0.10	< 0.020	< 0.30	< 0.0050	< 0.0050	< 0.0010	< 0.050	< 0.0010	< 0.0020	< 0.50	< 0.50
LC_PIZP1101	WG_Q1-2022_013_MT3	2022 03 11	-	-	-	-	-	5.47	< 0.50	< 2.0	< 1.0	< 10	< 0.10	< 1.0	< 1.0	< 1.0	< 1.0	< 0.050	< 0.10	< 0.020	< 0.30	0.0408	< 0.0050	< 0.0010	< 0.050	< 0.0010	< 0.0020	< 0.50	< 0.50
CM_MW6-DP	CM_NNT_WG_2022-05-19_N	2022 05 19	-	-	-	-	-	5.43	< 0.50	< 2.0	< 1.0	< 10	< 0.10	< 1.0	< 1.0	< 1.0	< 1.0	< 0.050	< 0.10	< 0.020	< 0.30	< 0.0050	< 0.0050	< 0.0010	< 0.050	< 0.0010	< 0.0020	< 0.50	< 0.50
FR_MW-CH1-A	FR_MW_MC10B_WG_2022_06_06_NP	2022 06 06	-	-	-	-	-	5.50	< 0.50	< 2.0	< 1.0	< 10	< 0.10	< 2.0	< 2.0	< 2.0	< 2.0	< 0.050	< 0.10	< 0.020	< 0.30	0.0383	< 0.0050	< 0.0010	< 0.050	< 0.0010	< 0.0020	< 0.50	< 0.50
FR_MW_FRRD1	FR_MW_MC10B_WG_2022_08_16_NP	2022 08 16	-	-	-	-	-	5.26	< 0.50	< 2.0	< 1.0	< 10	< 0.10	< 1.0	< 1.0	< 1.0	< 1.0	< 0.050	< 0.10	< 0.020	< 0.30	< 0.0050	< 0.0050	< 0.0010	< 0.050	< 0.0010	< 0.0020	< 0.50	< 0.50
LC_PIZDC1307	LC_MT1_WG_Q4_2022_NP1	2022 10 26	-	-	-	-	-	5.52	< 0.50	< 2.0	< 1.0	< 10	< 0.10	< 1.0	< 1.0	< 1.0	< 1.0	< 0.050	< 0.10	< 0.020	< 0.30	0.0407	< 0.0050	< 0.0010	< 0.050	< 0.0010	< 0.0020	< 0.50	< 0.50
FR_MW_FRRD1	FR_MW_MC10B_WG_2022_11_02_NP	2022 11 02	-	-	-	-	-	5.77	< 0.50	< 2.0	< 1.0	< 10	< 0.10	< 2.0	< 2.0	< 2.0	< 2.0	< 0.050	< 0.10	< 0.020	< 0.30	< 0.0050	< 0.0050	< 0.0010	< 0.050	< 0.0010	< 0.0020	< 0.50	< 0.50
Trip Blanks																													
	CM_TRP_WS_2022-02-01_N	2022 03 03	-	-	-	-	-	5.62	< 0.50	< 2.0	< 1.0	< 10	< 0.10	< 1.0	< 1.0	< 1.0	< 1.0	< 0.050	< 0.10	< 0.020	< 0.30	0.0225	< 0.0050	< 0.0010	0.135	< 0.0010	< 0.0020	< 0.50	< 0.50
	FR_MW_MC10C_WG_2022_03_04_NP	2022 03 04	-	-	-	-	-	5.37	< 0.50	< 2.0	< 1.0	< 10	< 0.10	< 2.0	< 2.0	< 2.0	< 2.0	< 0.050	< 0.10	< 0.020	< 0.30	< 0.0050	< 0.0050	< 0.0010	< 0.050	< 0.0010	< 0.0020	< 0.50	< 0.50
	WG_Q2-2022_012_RD2	2022 05 20	-	-	-	-	-	5.17	< 0.50	< 2.0	< 1.0	< 10	< 0.10	< 1.0	< 1.0	< 1.0	< 1.0	< 0.050	< 0.10	< 0.020	< 0.30	< 0.0050	< 0.0050	< 0.0010	< 0.050	< 0.0010	< 0.0020	< 0.50	-
	FR_MW_MC10C_WG_2022_06_06_NP	2022 06 06	-	-	-	-	-	5.57	< 0.50	< 2.0	< 1.7	< 10	< 0.10	< 2.0	< 2.0	< 2.0	< 2.0	< 0.050	< 0.10	< 0.020	< 0.30	< 0.0050	< 0.0050	< 0.0010	< 0.050	< 0.0010	< 0.0020	< 0.50	< 0.50
	FR_MW_MC10C_WG_2022_08_16_NP	2022 08 16	-	-	-	-	-	5.37	< 0.50	< 2.0	< 1.0	< 10	< 0.10	< 1.0	< 1.0	< 1.0	< 1.0	< 0.050	< 0.10	< 0.020	< 0.30	< 0.0050	< 0.0050	< 0.0010	< 0.050	< 0.0010	< 0.0020	< 0.50	< 0.50

All terms defined within the body of SNC-Lavalin's report.
< Denotes concentration less than indicated detection limit.
- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

[a] Standard to protect freshwater aquatic life.
[b] Standard varies with Hardness.
[c] Standard varies with pH and Temperature. Temperature assumed 10C.
[d] Standard varies with Chloride.

BOLD	Concentration greater than CSR Aquatic Life (AW) standard
ITALIC	Concentration greater than CSR Irrigation Watering (IW) standard
UNDERLINE	Concentration greater than CSR Livestock Watering (LW) standard
SHADED	Concentration greater than CSR Drinking Water (DW) standard

TABLE BG-04: Summary of Analytical Results Compared to Primary Screening Criteria for Dissolved Metals in Groundwater (Background)

				Dissolved Metals																														
Sample Location	Sample ID	Sample Date (yyyy mm dd)	Hardness mg/L	Aluminum µg/L	Antimony µg/L	Arsenic µg/L	Barium µg/L	Beryllium µg/L	Bismuth µg/L	Boron µg/L	Cadmium µg/L	Calcium mg/L	Chromium µg/L	Cobalt µg/L	Copper µg/L	Iron µg/L	Lead µg/L	Lithium µg/L	Magnesium mg/L	Manganese µg/L	Mercury µg/L	Molybdenum µg/L	Nickel µg/L	Potassium mg/L	Selenium µg/L	Silver µg/L	Sodium mg/L	Strontium µg/L	Thallium µg/L	Tin µg/L	Titanium µg/L	Uranium µg/L	Vanadium µg/L	Zinc µg/L
BC Standard																																		
CSR Aquatic Life (AW)[a]			n/a	n/a	90	50	10,000	1.5	n/a	12,000	0.5-4[b]	n/a	10[d]	40	20-90	n/a	40-160[b]	n/a	n/a	n/a	0.25	10,000	250-1,500[b]	n/a	20	0.5-15[b]	n/a	n/a	3	n/a	1,000	85	n/a	75-2,400[b]
CSR Irrigation Watering (IW)			n/a	5,000	n/a	100	n/a	100	n/a	500	5	n/a	5[d]	50	200	5,000	200	2,500	n/a	200	1	10	200	n/a	20	n/a	n/a	n/a	n/a	n/a	n/a	10	100	1,000-5,000[c]
CSR Livestock Watering (LW)			n/a	5,000	n/a	25	n/a	100	n/a	5,000	80	1,000	50[d]	1,000	300	n/a	100	5,000	n/a	n/a	2	50	1,000	n/a	30	n/a	n/a	n/a	n/a	n/a	n/a	200	100	2,000
CSR Drinking Water (DW)			n/a	9,500	6	10	1,000	8	n/a	5,000	5	n/a	50[d]	20[e]	1,500	6,500	10	8	n/a	1,500	1	250	80	n/a	10	20	200	2,500	n/a	2,500	n/a	20	20	3,000
Health-based Value (HBV)[f]			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1,200	n/a	n/a	n/a	2,400	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Within Study Area 1 (FRO/GHO Boundary)																																		
FR_MW_FRRD1	FR_MW-FRRD1_WG_2022_03_04_NP	2022 03 04	348	1.1	< 0.10	0.13	367	< 0.020	< 0.050	< 10	0.0139	102	< 0.10	< 0.10	0.23	< 10	< 0.050	6.3	22.6	1.94	< 0.0050	0.497	< 0.50	1.22	0.478	< 0.010	28.5	138	< 0.010	< 0.10	< 0.30	0.459	< 0.50	< 1.0
	FR_MW_MC10A_WG_2022_03_04_NP	Duplicate	346	1.2	< 0.10	0.13	369	< 0.020	< 0.050	< 10	0.0149	102	< 0.10	< 0.10	0.22	< 10	< 0.050	6.2	22.2	1.56	< 0.0050	0.493	< 0.50	1.18	0.520	< 0.010	28.3	137	< 0.010	< 0.10	< 0.30	0.446	< 0.50	< 1.0
	QA/QC RPD%		1	*	*	*	1	*	*	*	*	0	*	*	*	*	*	2	2	22	*	1	*	3	8	*	1	1	*	*	*	3	*	*
	FR_MW-FRRD1_WG_2022_06_06_NP	2022 06 06	313	3.7	< 0.10	0.11	311	< 0.020	< 0.050	< 10	0.0097	91.8	< 0.10	< 0.10	0.26	< 10	< 0.050	6.6	20.3	1.12	< 0.0050	0.514	< 0.50	1.18	0.286	< 0.010	28.0	133	< 0.010	< 0.10	< 0.30	0.439	< 0.50	< 1.0
	FR_MW-FRRD1_WG_2022_08_16_NP	2022 08 16	319	3.5	< 0.10	0.14	324	< 0.020	< 0.050	< 10	0.0162	90.0	< 0.10	< 0.10	0.25	< 10	< 0.050	5.4	22.9	22.2	< 0.0050	0.542	< 0.50	1.37	0.417	< 0.010	30.4	135	< 0.010	< 0.10	< 0.30	0.544	< 0.50	1.0
	FR_MW_MC10A_WG_2022_08_16_NP	Duplicate	320	2.9	< 0.10	0.12	324	< 0.020	< 0.050	< 10	0.0134	90.1	0.15	< 0.10	0.27	< 10	< 0.050	6.4	23.0	22.1	< 0.0050	0.567	< 0.50	1.40	0.383	< 0.010	30.4	137	< 0.010	< 0.10	< 0.30	0.538	< 0.50	< 1.0
	QA/QC RPD%		0	*	*	*	0	*	*	*	*	0	*	*	*	*	*	17	0	0	*	5	*	2	8	*	0	1	*	*	*	1	*	*
	FR_MW-FRRD1_WG_2022_11_02_NP	2022 11 02	322	< 1.0	< 0.10	0.12	315	< 0.020	< 0.050	< 10	0.0122	91.1	< 0.10	< 0.10	0.26	< 10	< 0.050	4.7	22.9	16.6	< 0.0050	0.494	< 0.50	1.26	0.382	< 0.010	24.0	124	< 0.010	< 0.10	< 0.30	0.507	< 0.50	< 1.0
	FR_MW_MC10A_WG_2022_11_02_NP	Duplicate	323	< 1.0	< 0.10	0.12	320	< 0.020	< 0.050	< 10	0.0121	91.4	< 0.10	< 0.10	0.28	< 10	< 0.050	4.8	23.1	16.3	< 0.0050	0.485	< 0.50	1.29	0.374	< 0.010	23.8	125	< 0.010	< 0.10	< 0.30	0.499	< 0.50	< 1.0
	QA/QC RPD%		0	*	*	*	2	*	*	*	*	0	*	*	*	*	*	*	1	2	*	2	*	2	2	*	1	1	*	*	*	2	*	*
FR_MW_CH1-A	FR_MW-CH1-A_WG_2022_03_03_NP	2022 03 03	150	1.4	< 0.10	< 0.10	161	< 0.020	< 0.050	< 10	0.0205	39.2	< 0.10	< 0.10	0.25	< 10	< 0.050	10.9	12.6	22.8	< 0.0050	6.17	< 0.50	0.368	0.636	< 0.010	2.33	87.0	< 0.010	< 0.10	< 0.30	0.609	0.69	< 1.0
	FR_MW-CH1-A_WG_2022_06_06_NP	2022 06 06	154	< 1.0	< 0.10	< 0.10	66.8	< 0.020	< 0.050	< 10	0.0058	42.4	0.16	< 0.10	< 0.20	< 10	< 0.050	3.7	11.8	0.18	< 0.0050	0.521	< 0.50	0.342	0.893	< 0.010	1.54	73.9	< 0.010	< 0.10	< 0.30	0.600	< 0.50	< 1.0
	FR_MW_MC10A_WG_2022_06_06_NP	Duplicate	149	1.1	< 0.10	< 0.10	68.2	< 0.020	< 0.050	< 10	0.0070	41.4	0.16	< 0.10	< 0.20	< 10	< 0.050	3.7	11.2	0.34	< 0.0050	0.547	< 0.50	0.331	0.919	< 0.010	1.52	75.1	< 0.010	< 0.10	< 0.30	0.600	< 0.50	< 1.0
	QA/QC RPD%		3	*	*	*	2	*	*	*	*	2	*	*	*	*	*	*	5	*	*	5	*	3	3	*	1	2	*	*	*	0	*	*
	FR_MW-CH1-A_WG_2022_08_16_NP	2022 08 16	139	3.9	< 0.10	< 0.10	64.7	< 0.020	< 0.050	< 10	< 0.0050	37.8	0.19	< 0.10	0.42	< 10	< 0.050	3.6	10.8	0.17	< 0.0050	0.606	< 0.50	0.349	0.711	< 0.010	1.14	68.0	< 0.010	< 0.10	< 0.30	0.570	< 0.50	< 1.0
	FR_MW_CH1-A_WG_2022_11_02_NP	2022 11 02	154	< 1.0	< 0.10	0.12	79.9	< 0.020	< 0.050	< 10	< 0.0050	41.3	0.18	< 0.10	0.22	< 10	< 0.050	4.3	12.4	0.54	< 0.0050	0.600	< 0.50	0.366	0.939	< 0.010	1.07	75.7	< 0.010	< 0.10	< 0.30	0.552	< 0.50	< 1.0
FR_MW_CH2	FR_MW_CH2_WG_2022_03_03_NP	2022 03 03	187	< 1.0	0.13	0.25	1,220	< 0.020	< 0.050	14	0.0086	52.2	< 0.10	< 0.10	< 0.20	296	< 0.050	30.0	13.8	15.4	< 0.0050	0.799	< 0.50	2.45	0.674	< 0.010	2.02	76.2	< 0.010	< 0.10	< 0.30	0.640	< 0.50	1.8
	FR_MW_CH2_WG_2022_06_06_NP	2022 06 06	188	< 1.0	< 0.10	0.39	1,890	< 0.020	< 0.050	22	< 0.0050	53.5	< 0.10	0.14	< 0.20	671	< 0.050	42.8	13.3	45.2	< 0.0050	1.04	< 0.50	3.80	1.32	< 0.010	2.14	79.2	< 0.010	< 0.10	< 0.30	0.853	< 0.50	1.0
	FR_MW_CH2_WG_2022_08_16_NP	2022 08 16	199	3.9	0.13	0.40	1,910	< 0.020	< 0.050	22	< 0.0050	55.6	0.82	< 0.10	< 0.20	472	< 0.050	43.1	14.6	26.6	< 0.0050	0.998	0.80	4.03	1.44	< 0.010	2.40	85.8	< 0.010	< 0.10	< 0.30	0.861	< 0.50	1.2
	FR_MW_CH2_WG_2022_11_02_NP	2022 11 02	194	< 1.0	0.11	0.29	1,670	< 0.020	< 0.050	20	< 0.0050	53.3	< 0.10	< 0.10	< 0.20	187	< 0.050	38.0	14.7	16.8	< 0.0050	0.803	0.66	3.49	0.809	< 0.010	2.18	83.7	< 0.010	< 0.10	< 0.30	0.561	< 0.50	1.4
Upgradient of Study Area 2																																		
LC_PIZDC1307	LC_PIZDC1307_WG_Q1-2022_NP	2022 03 04	169	< 1.0	< 0.10	1.58	1,450	< 0.020	< 0.050	21	< 0.0100	36.2	< 0.10	< 0.10	< 0.20	1,120	< 0.050	69.2	19.2	8.06	< 0.0050	*31.9*	< 0.50	5.11	< 0.050	< 0.010	13.6	137	< 0.010	0.12	< 0.30	0.026	< 0.50	9.6
	LC_PIZDC1307_WG_Q2_2022_NP	2022 05 06	184	< 1.0	< 0.10	1.69	1,460	< 0.020	< 0.050	24	< 0.0050	39.5	< 0.10	< 0.10	< 0.20	1,120	< 0.050	76.0	20.7	8.21	< 0.0050	*31.4*	< 0.50	5.22	< 0.050	< 0.010	14.5	130	< 0.010	< 0.10	< 0.30	0.024	< 0.50	< 1.0
	LC_PIZDC1307_WG_Q3-2022_NP	2022 08 25	174	1.2	< 0.10	1.54	1,440	< 0.020	< 0.050	25	0.0093	37.0	< 0.10	< 0.10	< 0.20	975	< 0.050	72.1	19.8	7.81	< 0.0050	*33.1*	< 0.50	5.03	< 0.050	< 0.010	14.2	135	< 0.010	< 0.10	< 0.30	0.020	< 0.50	< 1.0
	LC_PIZDC1307_WG_Q4_2022_NP	2022 10 26	180	< 1.0	< 0.10	1.62	1,340	< 0.020	< 0.050	24	0.0091	38.5	< 0.10	< 0.10	< 0.20	941	< 0.050	73.5	20.3	7.44	< 0.0050	*31.2*	< 0.50	4.66	< 0.050	< 0.010	13.0	124	< 0.010	< 0.10	< 0.30	0.019	< 0.50	< 1.0
	LC_CC1_WG_Q4_2022_NP1307	Duplicate	194	1.3	< 0.10	1.63	1,430	< 0.020	< 0.050	26	0.0073	42.9	< 0.10	< 0.10	< 0.20	1,020	< 0.050	77.8	21.0	7.89	< 0.0050	*34.3*	< 0.50	4.90	< 0.050	< 0.010	13.9	140	< 0.010	< 0.10	< 0.30	0.019	< 0.50	1.8
	QA/QC RPD%		7	*	*	1	6	*	*	*	*	11	*	*	*	8	*	6	3	6	*	9	*	5	*	*	7	12	*	*	*	*	*	*
LC_PIZDC1308	LC_PIZDC1308_WG_Q1-2022_NP	2022 03 04	263	2.7	< 0.10	0.18	404	< 0.020	< 0.050	13	0.0192	70.6	< 0.10	1.01	< 0.20	734	< 0.050	24.6	21.0	69.2	< 0.0050	8.54	2.03	2.73	< 0.050	< 0.010	5.66	111	0.035	< 0.10	< 0.30	0.730	< 0.50	3.8
	LC_PIZDC1308_WG_Q2_2022_NP	2022 05 06	388	1.1	0.10	< 0.10	306	< 0.020	< 0.050	12	0.155	105	< 0.10	0.52	2.04	< 10	< 0.050	8.0	30.6	1.55	< 0.0050	1.27	1.28	1.92	0.256	< 0.010	1.40	106	0.017	< 0.10	< 0.30	1.59	< 0.50	2.8
	LC_PIZDC1308_WG_Q3-2022_NP	2022 08 25	394	2.0	< 0.10	< 0.10	320	< 0.020	< 0.050	12	0.135	106	< 0.10	0.58	0.59	12	< 0.050	8.8	31.4	9.82	< 0.0050	1.43	1.06	2.05	0.111	< 0.010	1.66	117	0.015	< 0.10	< 0.30	1.74	< 0.50	2.3
	LC_PIZDC1308_WG_Q4_2022_NP	2022 10 26	296	< 1.0	< 0.10	< 0.10	309	< 0.020	< 0.050	14	0.0298	77.6	< 0.10	0.50	< 0.20	79	< 0.050	18.1	24.8	39.9	< 0.0050	5.84	1.13	2.17	0.051	< 0.010	3.30	92.9	0.016	< 0.10	< 0.30	0.941	< 0.50	1.2
	LC_CC1_WG_Q4_2022_NP5	Duplicate	298	< 1.0	< 0.10	< 0.10	321	< 0.020	< 0.050	14	0.0350	78.4	< 0.10	0.51	< 0.20	80	< 0.050	17.8	24.8	39.0	< 0.0050	5.53	1.04	2.22	< 0.050	< 0.010	3.24	94.2	0.015	< 0.10	< 0.30	0.958	< 0.50	1.4
	QA/QC RPD%		1	*	*	*	4	*	*	*	16	1	*	2	*	1	*	2	0	2	*	5	*	2	*	*	2	1	*	*	*	2	*	*

All terms defined within the body of SNC-Lavalin's report.
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- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

BOLD	Concentration greater than CSR Aquatic Life (AW) standard
ITALIC	Concentration greater than CSR Irrigation Watering (IW) standard
UNDERLINE	Concentration greater than CSR Livestock Watering (LW) standard
SHADED	Concentration greater than CSR Drinking Water (DW) standard

[a] Standard to protect freshwater aquatic life.
[b] Standard varies with Hardness.
[c] Standard varies with pH.
[d] Individual standards exist for Cr +3 and Cr +6. Reported value represents more stringent standard.
[e] Interim BC MoE Regional Background Estimate (Protocol 9 Determining Background Groundwater Quality).
[f] Ramboll calculated health-based values for these two parameters based on toxicity values (tolerable daily intakes; TDI) and drinking water allocation factors (DW AFs), documented in Appendix IV.

TABLE BG-04: Summary of Analytical Results Compared to Primary Screening Criteria for Dissolved Metals in Groundwater (Background)

				Dissolved Metals																														
Sample Location	Sample ID	Sample Date (yyyy mm dd)	Hardness mg/L	Aluminum µg/L	Antimony µg/L	Arsenic µg/L	Barium µg/L	Beryllium µg/L	Bismuth µg/L	Boron µg/L	Cadmium µg/L	Calcium mg/L	Chromium µg/L	Cobalt µg/L	Copper µg/L	Iron µg/L	Lead µg/L	Lithium µg/L	Magnesium mg/L	Manganese µg/L	Mercury µg/L	Molybdenum µg/L	Nickel µg/L	Potassium mg/L	Selenium µg/L	Silver µg/L	Sodium mg/L	Strontium µg/L	Thallium µg/L	Tin µg/L	Titanium µg/L	Uranium µg/L	Vanadium µg/L	Zinc µg/L
BC Standard																																		
CSR Aquatic Life (AW)[a]			n/a	n/a	90	50	10,000	1.5	n/a	12,000	0.5-4[b]	n/a	10[d]	40	20-90	n/a	40-160[b]	n/a	n/a	n/a	0.25	10,000	250-1,500[b]	n/a	20	0.5-15[b]	n/a	n/a	3	n/a	1,000	85	n/a	75-2,400[b]
CSR Irrigation Watering (IW)			n/a	5,000	n/a	100	n/a	100	n/a	500	5	n/a	5[d]	50	200	5,000	200	2,500	n/a	200	1	10	200	n/a	20	n/a	n/a	n/a	n/a	n/a	n/a	10	100	1,000-5,000[c]
CSR Livestock Watering (LW)			n/a	5,000	n/a	25	n/a	100	n/a	5,000	80	1,000	50[d]	1,000	300	n/a	100	5,000	n/a	n/a	2	50	1,000	n/a	30	n/a	n/a	n/a	n/a	n/a	n/a	200	100	2,000
CSR Drinking Water (DW)			n/a	9,500	6	10	1,000	8	n/a	5,000	5	n/a	50[d]	20[e]	1,500	6,500	10	8	n/a	1,500	1	250	80	n/a	10	20	200	2,500	n/a	2,500	n/a	20	20	3,000
Health-based Value (HBV)[f]			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1,200	n/a	n/a	n/a	2,400	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Upgradient of Study Area 4 (GHO)																																		
GH_MW_BG1A	GH_MW_BG1A_WG_2022-01-03_NP	2022 03 22	280	1.7	< 0.10	2.62	250	< 0.020	< 0.050	23	< 0.0050	63.9	< 0.10	0.33	< 0.20	1,340	< 0.050	15.6	29.3	162	< 0.0050	5.12	< 0.50	2.62	< 0.050	< 0.010	4.46	106	< 0.010	< 0.10	< 0.30	1.20	< 0.50	1.3
	GH_MW_BG1A_WG_2022-04-04_NP	2022 05 16	309	2.8	< 0.10	1.44	242	< 0.020	< 0.050	24	< 0.0050	71.5	< 0.10	0.41	< 0.20	1,030	< 0.050	18.5	31.6	178	< 0.0050	5.68	0.67	2.68	0.053	< 0.010	10.8	128	< 0.010	0.10	< 0.30	1.28	< 0.50	< 1.0
	GH_MW_BG1A_WG_2022-07-04_NP	2022 07 22	312	< 1.0	< 0.10	2.48	243	< 0.020	< 0.050	23	< 0.0050	71.0	< 0.10	0.39	< 0.20	1,510	< 0.050	18.7	32.6	149	< 0.0050	5.14	0.58	2.74	0.862	< 0.010	5.37	110	< 0.010	< 0.10	< 0.30	1.16	< 0.50	< 1.0
	GH_MW_BG1A_WG_2022-10-03_NP	2022 10 19	323	< 1.0	< 0.10	1.89	233	< 0.020	< 0.050	23	< 0.0050	70.6	< 0.10	0.33	< 0.20	1,510	< 0.050	15.1	35.6	125	< 0.0050	5.02	0.52	2.38	< 0.050	< 0.010	7.29	115	< 0.010	< 0.10	< 0.30	0.938	< 0.50	< 1.0
GH_MW_BG1B	GH_MW_BG1B_WG_2022-01-03_NP	2022 02 25	297	1.1	< 0.10	1.00	241	< 0.020	< 0.050	13	< 0.0050	77.9	< 0.10	2.57	< 0.20	3,240	< 0.050	4.1	24.9	144	< 0.0050	3.17	4.76	1.26	< 0.050	< 0.010	3.03	107	0.036	< 0.10	< 0.30	0.205	< 0.50	1.8
	GH_MW_BG1B_WG_2022-04-04_NP	2022 05 16	287	4.1	< 0.10	0.92	248	< 0.020	< 0.050	14	< 0.0050	75.1	< 0.10	2.64	< 0.20	3,220	< 0.050	4.5	24.2	149	< 0.0050	3.24	5.15	1.36	< 0.050	< 0.010	3.48	110	0.042	< 0.10	< 0.30	0.241	< 0.50	2.5
	GH_MW_BG1B_WG_2022-07-04_NP	2022 07 22	296	< 1.0	< 0.10	1.01	243	< 0.020	< 0.050	12	< 0.0050	76.1	< 0.10	2.82	0.55	3,300	< 0.050	4.2	25.7	154	< 0.0050	3.25	5.75	1.36	0.109	< 0.010	3.74	101	0.043	< 0.10	< 0.30	0.286	< 0.50	1.3
	GH_MW_BG1B_WG_2022-10-03_NP	2022 10 19	301	1.1	< 0.10	0.93	248	< 0.020	< 0.050	13	< 0.0050	75.2	< 0.10	2.55	< 0.20	2,940	< 0.050	3.9	27.6	146	< 0.0050	3.22	4.62	1.24	< 0.050	< 0.010	5.48	108	0.043	< 0.10	< 0.30	0.324	< 0.50	< 1.0
GH_MW_BG1C	GH_MW_BG1C_WG_2022-01-03_NP	2022 02 25	293	< 1.0	0.10	0.99	182	< 0.020	< 0.050	13	< 0.0050	77.4	< 0.10	1.69	< 0.20	2,790	< 0.050	4.3	24.2	134	< 0.0050	3.33	3.69	1.14	< 0.050	< 0.010	5.01	255	< 0.010	< 0.10	< 0.30	0.671	< 0.50	< 1.0
	GH_MW_BG1C_WG_2022-04-04_NP	2022 05 16	292	1.8	0.16	1.05	203	< 0.020	< 0.050	14	< 0.0050	75.7	< 0.10	1.81	< 0.20	2,920	< 0.050	4.7	25.1	146	< 0.0050	3.39	4.02	1.27	< 0.050	< 0.010	5.29	291	< 0.010	< 0.10	< 0.30	0.732	< 0.50	< 1.0
	GH_MW_BG1C_WG_2022-07-04_NP	2022 07 22	298	< 1.0	0.23	1.16	194	< 0.020	< 0.050	13	< 0.0050	76.9	< 0.10	1.81	< 0.20	3,070	< 0.050	4.4	25.8	147	< 0.0050	3.34	4.17	1.27	0.057	< 0.010	5.03	289	< 0.010	< 0.10	< 0.30	0.794	< 0.50	< 1.0
	GH_MW_BG1C_WG_2022-10-03_NP	2022 10 19	303	1.6	0.17	1.05	196	< 0.020	< 0.050	13	< 0.0050	74.7	0.20	1.73	< 0.20	2,720	< 0.050	3.6	28.4	141	< 0.0050	3.21	4.54	1.18	< 0.050	< 0.010	4.55	287	< 0.010	< 0.10	< 0.30	0.642	< 0.50	26.0
GH_MW-Willow-1D	GH_MW-WILLOW-1D_WG_2022_03_10_NP	2022 03 10	146	2.6	< 0.10	0.32	1,770	< 0.020	< 0.050	140	< 0.0050	30.4	< 0.10	< 0.10	< 0.20	515	< 0.050	75.8	16.9	52.6	< 0.0050	4.71	< 0.50	0.900	< 0.050	< 0.010	48.6	672	< 0.010	< 0.10	< 0.30	0.128	< 0.50	1.1
	GH_MW-WILLOW-1D_WG_2022-06-14_NP	2022 06 14	138	2.5	< 0.10	0.26	1,670	< 0.020	< 0.050	135	< 0.0050	28.6	< 0.50	< 0.10	< 0.20	493	< 0.050	84.2	16.3	47.1	< 0.0050	4.52	< 0.50	0.912	< 0.050	< 0.010	53.1	659	< 0.010	< 0.10	< 0.30	0.113	< 0.50	< 1.0
	GH_MW-WILLOW-1D_WG_2022-07-04_NP	2022 08 23	148	2.0	< 0.10	0.34	1,710	< 0.020	< 0.050	149	< 0.0050	29.6	< 0.10	< 0.10	< 0.20	448	< 0.050	86.1	18.0	54.4	< 0.0050	5.12	< 0.50	0.957	< 0.050	< 0.010	47.8	686	< 0.010	< 0.10	< 0.30	0.113	< 0.50	< 1.0
	GH_MW-WILLOW-1D_WG_2022-10-03_NP	2022 10 25	146	1.6	< 0.10	0.34	1,630	< 0.020	< 0.050	130	< 0.0050	30.5	< 0.10	< 0.10	< 0.20	513	< 0.050	74.5	16.9	51.8	< 0.0050	5.10	< 0.50	0.875	< 0.050	< 0.010	43.8	661	< 0.010	< 0.10	< 0.30	0.109	< 0.50	1.0
GH_MW-Willow-2D	GH_MW-WILLOW-2D_WG_2022_03_10_NP	2022 03 10	121	2.0	< 0.10	1.17	957	< 0.020	< 0.050	330	< 0.0050	24.8	< 0.10	< 0.10	< 0.20	168	< 0.050	237	14.4	11.8	< 0.0050	4.37	< 0.50	1.95	< 0.050	< 0.010	123	435	< 0.010	< 0.10	< 0.30	0.254	< 0.50	< 1.0
	GH_MW-WILLOW-2D_WG_2022-06-14_NP	2022 06 14	189	1.1	< 0.10	0.15	187	< 0.020	< 0.050	12	0.0140	48.8	< 0.50	< 0.10	0.68	< 10	< 0.050	9.6	16.3	0.21	< 0.0050	0.677	< 0.50	0.930	0.520	< 0.010	6.92	126	< 0.010	< 0.10	< 0.30	0.481	< 0.50	< 1.0
	GH_MW-WILLOW-2D_WG_2022-07-04_NP	2022 08 23	136	1.2	< 0.10	1.15	912	< 0.020	< 0.050	258	< 0.0050	28.4	< 0.10	< 0.10	< 0.20	90	< 0.050	194	15.8	13.3	< 0.0050	4.22	< 0.50	1.85	< 0.050	< 0.010	96.1	383	< 0.010	< 0.10	< 0.30	0.230	< 0.50	< 1.0
	GH_MW-WILLOW-2D_WG_2022-10-03_NP	2022 10 25	115	1.1	< 0.10	1.46	923	< 0.020	< 0.050	328	< 0.0050	22.8	2.10	< 0.10	< 0.20	140	< 0.050	260	14.2	11.1	< 0.0050	4.41	< 0.50	1.99	< 0.050	< 0.010	129	427	< 0.010	< 0.10	< 0.30	0.181	< 0.50	< 1.0
GH_MW-Willow-2S	GH_MW-WILLOW-2S_WG_2022_03_10_NP	2022 03 10	239	1.4	< 0.10	0.15	229	< 0.020	< 0.050	12	0.0157	62.4	< 0.10	< 0.10	0.36	< 10	< 0.050	10.0	20.3	< 0.10	< 0.0050	0.630	< 0.50	1.01	0.598	< 0.010	9.20	174	< 0.010	< 0.10	< 0.30	0.652	< 0.50	< 1.0
	GH_MW_MC10-A_WG_2022_03_10_NP	Duplicate	233	1.0	< 0.10	0.16	221	< 0.020	< 0.050	12	0.0136	60.1	< 0.10	< 0.10	0.31	< 10	< 0.050	10.3	20.1	< 0.10	< 0.0050	0.629	< 0.50	0.986	0.568	< 0.010	9.08	174	< 0.010	< 0.10	< 0.30	0.671	< 0.50	< 1.0
	QA/QC RPD%		3	*	*	*	4	*	*	*	*	4	*	*	*	*	*	3	1	*	*	0	*	2	5	*	1	0	*	*	*	3	*	*
	GH_MW-WILLOW-2S_WG_2022-06-14_NP	2022 06 14	190	1.4	< 0.10	0.18	184	< 0.020	< 0.050	13	0.0120	48.3	< 0.50	< 0.10	0.44	< 10	< 0.050	10.4	16.8	< 0.10	< 0.0050	0.677	< 0.50	1.00	0.411	< 0.010	6.56	129	< 0.010	< 0.10	< 0.30	0.462	< 0.50	< 1.0
	GH_MW-WILLOW-2S_WG_2022-07-04_NP	2022 08 23	192	3.7	0.11	0.31	201	< 0.020	< 0.050	23	0.0168	47.4	< 0.10	< 0.10	0.75	15	< 0.050	14.4	17.9	5.13	< 0.0050	0.927	< 0.50	1.27	0.256	< 0.010	7.60	132	< 0.010	< 0.10	< 0.30	0.418	< 0.50	< 1.0
GH_MW-Wolf-1D	GH_MW-WOLF-1D_WG_2022_03_07_NP	2022 03 07	207	1.2	< 0.10	1.22	209	< 0.020	< 0.050	82	< 0.0050	48.1	< 0.10	0.12	< 0.20	717	< 0.050	31.2	21.1	*223*	< 0.0050	2.65	< 0.50	1.17	< 0.050	< 0.010	10.3	883	< 0.010	< 0.10	< 0.30	0.337	< 0.50	< 1.0
	GH_MW-WOLF-1D_WG_2022_06_13_NP	2022 06 13	206	10.9	< 0.10	1.15	188	< 0.020	< 0.050	82	< 0.0050	47.0	< 0.50	0.11	< 0.20	735	< 0.050	26.8	21.6	*206*	< 0.0050	2.36	< 0.50	1.16	< 0.050	< 0.010	9.52	787	< 0.010	< 0.10	< 0.30	0.256	< 0.50	< 1.0
	GH_MW-WOLF-1D_WG_2022-07-04_NP	2022 08 22	213	1.3	< 0.10	0.98	208	< 0.020	< 0.050	96	< 0.0050	47.3	< 0.10	0.12	0.22	784	< 0.050	31.0	23.0	*207*	< 0.0050	2.52	< 0.50	1.32	< 0.050	< 0.010	11.3	963	< 0.010	< 0.10	< 0.30	0.294	< 0.50	< 1.0
	GH_MW-WOLF-1D_WG_2022-10-03_NP	2022 10 24	206	1.1	< 0.10	0.88	203	< 0.020	< 0.050	92	< 0.0050	49.1	< 0.10	0.10	< 0.20	837	< 0.050	32.0	20.2	179	< 0.0050	2.46	< 0.50	1.15	< 0.050	< 0.010	10.1	905	< 0.010	< 0.10	< 0.30	0.260	< 0.50	< 1.0
GH_MW-Wolf-2D	GH_MW-Wolf-2D_WG_2022_03_07_NP	2022 03 07	275	1.6	0.13	1.06	71.8	< 0.020	< 0.050	46	0.0179	70.1	0.15	0.12	0.28	10	< 0.050	16.5	24.3	71.5	< 0.0050	2.92	1.10	2.14	0.174	< 0.010	15.8	425	0.024	< 0.10	< 0.30	2.56	< 0.50	1.4
	GH_MW-WOLF-2D_WG_2022_06_13_NP	2022 06 13	261	1.5	< 0.10	2.17	80.4	< 0.020	< 0.050	45	0.0204	64.2	< 0.50	0.40	< 0.20	165	< 0.050	14.4	24.5	92.6	< 0.0050	2.73	1.04	1.56	< 0.050	< 0.010	8.42	407	0.012	< 0.10	< 0.30	1.04	< 0.50	1.3
	GH_MW-WOLF-2D_WG_2022-07-04_NP	2022 08 22	270	1.8	< 0.10	1.46	72.3	< 0.020	< 0.050	51	0.0247	67.0	< 0.10	0.17	0.29	34	< 0.050	15.8	24.9	78.4	< 0.0050	6.28	1.03	1.89	0.141	< 0.010	11.8	446	0.024	< 0.10	< 0.30	1.70	< 0.50	< 1.0
	GH_MW-WOLF-2D_WG_2022-10-03_NP	2022 10 24	256	2.2	< 0.10	1.96	85.9	< 0.020	< 0.050	49	0.550	66.8	0.44	0.28	0.20	156	< 0.050	16.3	21.6	58.2	< 0.0050	2.93	0.82	1.40	0.082	< 0.010	7.65	443	0.020	< 0.10	< 0.30	0.945	< 0.50	1.3

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n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
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[a] Standard to protect freshwater aquatic life.
[b] Standard varies with Hardness.
[c] Standard varies with pH.
[d] Individual standards exist for Cr +3 and Cr +6. Reported value represents more stringent standard.
[e] Interim BC MoE Regional Background Estimate (Protocol 9 Determining Background Groundwater Quality).
[f] Ramboll calculated health-based values for these two parameters based on toxicity values (tolerable daily intakes; TDI) and drinking water allocation factors (DW AFs), documented in Appendix IV.

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SHADED	Concentration greater than CSR Drinking Water (DW) standard

TABLE BG-04: Summary of Analytical Results Compared to Primary Screening Criteria for Dissolved Metals in Groundwater (Background)

Sample Location	Sample ID	Sample Date (yyyy mm dd)	Hardness mg/L	Aluminum µg/L	Antimony µg/L	Arsenic µg/L	Barium µg/L	Beryllium µg/L	Bismuth µg/L	Boron µg/L	Cadmium µg/L	Calcium mg/L	Chromium µg/L	Cobalt µg/L	Copper µg/L	Iron µg/L	Lead µg/L	Lithium µg/L	Magnesium mg/L	Manganese µg/L	Mercury µg/L	Molybdenum µg/L	Nickel µg/L	Potassium mg/L	Selenium µg/L	Silver µg/L	Sodium mg/L	Strontium µg/L	Thallium µg/L	Tin µg/L	Titanium µg/L	Uranium µg/L	Vanadium µg/L	Zinc µg/L
				Dissolved Metals																														
BC Standard																																		
CSR Aquatic Life (AW)[a]			n/a	n/a	90	50	10,000	1.5	n/a	12,000	0.5-4[b]	n/a	10[d]	40	20-90	n/a	40-160[b]	n/a	n/a	n/a	0.25	10,000	250-1,500[b]	n/a	20	0.5-15[b]	n/a	n/a	3	n/a	1,000	85	n/a	75-2,400[b]
CSR Irrigation Watering (IW)			n/a	5,000	n/a	100	n/a	100	n/a	500	5	n/a	5[d]	50	200	5,000	200	2,500	n/a	200	1	10	200	n/a	20	n/a	n/a	n/a	n/a	n/a	n/a	10	100	1,000-5,000[c]
CSR Livestock Watering (LW)			n/a	5,000	n/a	25	n/a	100	n/a	5,000	80	1,000	50[d]	1,000	300	n/a	100	5,000	n/a	n/a	2	50	1,000	n/a	30	n/a	n/a	n/a	n/a	n/a	n/a	200	100	2,000
CSR Drinking Water (DW)			n/a	9,500	6	10	1,000	8	n/a	5,000	5	n/a	50[d]	20[e]	1,500	6,500	10	8	n/a	1,500	1	250	80	n/a	10	20	200	2,500	n/a	2,500	n/a	20	20	3,000
Health-based Value (HBV)[f]			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1,200	n/a	n/a	n/a	2,400	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Upgradient of Study Areas 5/6 (LCO)																																		
LC_PIZP1101	LC_PIZP1101_WG_Q2-2022_N	2022 05 20	123	3.1	< 0.10	0.98	404	< 0.020	< 0.050	22	< 0.0050	26.2	< 0.10	0.21	< 0.20	138	< 0.050	9.6	13.9	175	< 0.0050	*11.5*	0.72	0.756	< 0.050	< 0.010	21.5	194	< 0.010	< 0.10	< 0.30	1.91	< 0.50	< 1.0
	LC_PIZP1101_WG_Q3-2022_N	2022 08 05	120	8.4	< 0.10	0.98	373	< 0.020	< 0.050	29	0.0051	24.9	< 0.10	0.19	< 0.20	176	< 0.050	9.2	14.1	156	< 0.0050	*10.9*	< 0.50	0.770	< 0.050	< 0.010	22.9	180	< 0.010	< 0.10	< 0.30	2.00	< 0.50	< 1.0
	LC_CC3_WG_Q3-2022_NP	Duplicate	124	10.0	< 0.10	0.93	370	< 0.020	< 0.050	28	0.0072	26.6	< 0.10	0.19	< 0.20	168	< 0.050	9.8	14.0	154	< 0.0050	*11.6*	< 0.50	0.766	< 0.050	< 0.010	22.8	193	< 0.010	< 0.10	< 0.30	2.15	< 0.50	< 1.0
	QA/QC RPD%		3	17	*	5	1	*	*	*	*	7	*	*	*	5	*	6	1	1	*	6	*	1	*	*	0	7	*	*	*	7	*	*
	LC_PIZP1101_WG_Q4_2022_N	2022 10 20	124	70.4	< 0.10	1.04	392	< 0.020	< 0.050	24	0.0105	27.3	0.11	0.27	0.27	298	< 0.050	8.7	13.6	172	< 0.0050	*10.4*	0.52	0.776	< 0.050	< 0.010	19.9	185	< 0.010	< 0.10	1.75	2.06	< 0.50	1.0
LC_PIZP1103	LC_PIZP1103_WG_Q1_2022_NP	2022 03 11	131	6.1	0.17	0.86	63.7	< 0.020	< 0.050	472	< 0.0200	28.7	0.14	0.19	0.84	< 10	< 0.050	113	14.5	118	< 0.0050	*18.6*	0.60	1.49	< 0.050	< 0.010	131	828	0.012	0.12	< 0.30	1.86	< 0.50	6.9
	LC_PIZP1103_WG_Q2-2022_NP	2022 05 25	137	1.5	0.28	0.83	67.1	< 0.020	< 0.050	411	< 0.0150	29.1	1.07	< 0.10	1.58	24	< 0.050	107	15.7	108	< 0.0050	*17.2*	0.65	1.73	< 0.050	< 0.010	124	844	< 0.010	0.13	< 0.30	1.76	< 0.50	5.0
	LC_PIZP1103_WG_Q3-2022_NP	2022 08 05	143	1.7	0.26	0.84	68.6	< 0.020	< 0.050	*564*	0.0102	29.4	0.73	< 0.10	1.57	< 10	< 0.050	120	17.0	50.7	< 0.0050	*15.4*	< 0.50	1.60	< 0.050	< 0.010	136	848	< 0.010	0.11	< 0.30	1.68	< 0.50	2.3
	LC_PIZP1103_WG_Q4_2022_N	2022 10 24	148	96.8	0.32	0.84	72.6	< 0.020	< 0.050	*555*	0.0114	31.9	0.43	0.16	1.68	< 10	< 0.050	121	16.7	117	< 0.0050	*16.9*	1.19	1.78	< 0.050	< 0.010	147	846	0.012	< 0.10	< 0.30	2.10	< 0.50	2.5
Upgradient of Study Area 7 (EVO)																																		
EV_MW_GV4A	EV_MW_GV4A_WG_2022_Q1_NP	2022 01 12	296	< 1.0	0.26	0.35	52.9	< 0.020	< 0.050	18	0.0066	72.9	0.15	< 0.10	< 0.20	< 10	< 0.050	10.5	27.8	26.2	< 0.0050	3.65	0.52	1.28	4.84	< 0.010	24.9	342	0.013	< 0.10	< 0.30	5.65	< 0.50	2.0
	EV_MW_GV4A_WG_2022_Q2_NP	2022 04 28	303	1.4	0.32	1.89	40.2	< 0.020	< 0.050	18	0.0117	72.7	< 0.10	0.63	0.97	229	< 0.050	11.2	29.6	*307*	< 0.0050	2.95	1.52	1.60	5.72	< 0.010	21.6	401	0.011	< 0.10	< 0.30	5.04	0.55	3.4
	EV_MW_GV4A_WG_2022_Q3_NP	2022 08 05	309	1.1	0.23	1.28	41.2	< 0.020	< 0.050	20	0.0108	73.3	< 0.10	0.57	< 0.20	313	< 0.050	10.6	30.5	*330*	< 0.0050	2.82	1.11	1.54	5.23	< 0.010	22.4	349	0.018	< 0.10	< 0.30	3.71	< 0.50	< 1.0
	EV_MW_GV4A_WG_2022_Q4_NP	2022 10 27	352	< 1.0	0.16	1.06	46.2	< 0.020	< 0.050	14	0.0115	83.5	< 0.10	0.43	< 0.20	192	< 0.050	10.1	34.9	*202*	< 0.0050	2.22	1.16	1.44	7.31	< 0.010	11.4	346	0.020	< 0.10	< 0.30	2.74	0.53	< 1.0
EV_MW_GV4B	EV_MW_GV4B_WG_2022_Q1_NP	2022 01 09	286	< 1.0	< 0.10	< 0.10	60.1	< 0.020	< 0.050	< 10	0.0063	68.5	< 0.10	< 0.10	< 0.20	< 10	< 0.050	9.3	27.9	0.13	< 0.0050	1.56	< 0.50	1.06	3.74	< 0.010	2.68	279	< 0.010	< 0.10	< 0.30	1.31	< 0.50	< 1.0
	EV_MW_GV4B_WG_2022_Q2_NP	2022 04 28	308	< 1.0	< 0.10	< 0.10	69.9	< 0.020	< 0.050	< 10	0.0062	72.9	< 0.10	< 0.10	4.86	< 10	0.050	9.1	30.7	< 0.10	< 0.0050	1.51	< 0.50	1.10	3.38	< 0.010	2.73	290	< 0.010	< 0.10	< 0.30	1.31	< 0.50	< 1.0
	EV_MW_GV4B_WG_2022_Q3_NP	2022 08 05	323	< 1.0	< 0.10	< 0.10	68.6	< 0.020	< 0.050	11	0.0111	75.5	< 0.10	< 0.10	< 0.20	< 10	< 0.050	9.3	32.7	< 0.10	< 0.0050	1.70	< 0.50	1.18	3.70	< 0.010	2.96	278	< 0.010	< 0.10	< 0.30	1.41	< 0.50	< 1.0
	EV_MW_GV4B_WG_2022_Q4_NP	2022 10 27	340	< 1.0	< 0.10	< 0.10	68.3	< 0.020	< 0.050	12	0.0149	82.0	< 0.10	< 0.10	1.20	< 10	< 0.050	9.9	32.8	0.22	< 0.0050	1.79	< 0.50	1.14	4.23	< 0.010	2.90	295	< 0.010	< 0.10	< 0.30	1.41	< 0.50	1.7
Upgradient of Study Area 11 (CMm)																																		
CM_MW3-DP	CM_MW3-DP_WG_2022-02-01_N	2022 03 03	53.0	10.6	< 0.50	0.78	918	< 0.100	< 0.250	*542*	< 0.0250	12.7	< 0.50	< 0.50	< 1.00	< 50	< 0.250	1,380	5.16	32.1	< 0.0050	1.75	< 2.50	2.52	< 0.250	< 0.050	616	1,160	< 0.050	< 0.50	< 1.50	0.324	< 2.50	< 5.0
	CM_MW3-DP_WG_2022-06-01_N	2022 06 01	49.7	6.4	< 0.20	2.26	810	< 0.040	< 0.100	*509*	< 0.0100	12.3	< 0.20	< 0.20	0.47	68	< 0.100	1,370	4.62	63.8	< 0.0050	*10.8*	1.21	2.56	< 0.100	< 0.020	615	1,270	< 0.020	< 0.20	< 0.60	1.18	< 1.00	4.0
	CM_MW3-DP_WG_2022-07-01_N	2022 08 04	52.8	7.1	< 0.20	0.69	834	< 0.040	< 0.100	*544*	< 0.0100	12.8	< 0.20	< 0.20	< 0.40	53	< 0.100	1,760	5.06	34.6	< 0.0050	2.44	< 1.00	2.42	< 0.100	< 0.020	622	1,180	< 0.020	< 0.20	< 0.60	0.368	< 1.00	2.1
	CM_MW3-DP_WG_2022-10-01_N	2022 10 13	50.2	6.3	< 0.20	0.66	778	< 0.040	< 0.100	*561*	< 0.0100	12.0	< 0.20	< 0.20	< 0.40	24	< 0.100	1,290	4.92	28.1	< 0.0050	2.31	< 1.00	2.20	< 0.100	< 0.020	507	1,090	< 0.020	< 0.20	< 0.60	0.336	< 1.00	< 2.0
CM_MW3-SH	CM_MW3-SH_WG_2022-02-01_N	2022 03 03	175	1.6	< 0.10	0.11	82.8	< 0.020	< 0.050	20	0.0076	49.7	0.26	< 0.10	0.43	< 10	< 0.050	7.3	12.4	4.36	< 0.0050	0.796	< 0.50	0.684	0.240	< 0.010	4.06	274	< 0.010	< 0.10	< 0.30	0.188	< 0.50	3.1
	CM_NNP2_WG_2022-02-01_N	Duplicate	180	1.9	< 0.10	< 0.10	85.0	< 0.020	< 0.050	20	0.0129	51.5	0.24	< 0.10	0.38	< 10	< 0.050	7.4	12.5	4.60	< 0.0050	0.758	0.56	0.685	0.305	< 0.010	4.12	270	< 0.010	< 0.10	< 0.30	0.189	< 0.50	2.8
	QA/QC RPD%		3	*	*	*	3	*	*	*	*	4	*	*	*	*	*	1	1	5	*	5	*	0	*	*	1	1	*	*	*	1	*	*
	CM_MW3-SH_WG_2022-06-01_N	2022 06 01	168	1.4	< 0.10	0.11	86.1	< 0.020	< 0.050	19	0.0211	47.6	0.29	< 0.10	3.30	< 10	0.190	6.8	12.0	0.42	< 0.0050	0.944	0.70	0.654	0.242	< 0.010	3.68	280	< 0.010	< 0.10	< 0.30	0.190	< 0.50	11.8
	CM_NNP2_WG_2022-06-01_N	Duplicate	172	1.6	< 0.10	0.11	87.0	< 0.020	< 0.050	20	0.0093	48.5	0.29	< 0.10	1.50	< 10	0.107	8.0	12.4	0.33	< 0.0050	0.987	0.84	0.673	0.243	< 0.010	4.01	284	< 0.010	< 0.10	< 0.30	0.190	< 0.50	4.4
	QA/QC RPD%		2	*	*	*	1	*	*	*	*	2	*	*	75	*	*	16	3	*	*	4	*	3	*	*	9	1	*	*	*	0	*	*
	CM_MW3-SH_WG_2022-07-01_N	2022 08 04	180	1.2	< 0.10	0.12	86.4	< 0.020	< 0.050	25	0.0070	51.4	0.23	< 0.10	0.76	< 10	< 0.050	8.4	12.6	0.48	< 0.0050	0.981	< 0.50	0.702	0.277	< 0.010	3.83	279	< 0.010	< 0.10	< 0.30	0.211	< 0.50	3.4
	CM_MW3-SH_WG_2022-10-01_N	2022 10 13	185	1.8	< 0.10	0.14	90.7	< 0.020	< 0.050	28	0.0066	52.5	0.22	< 0.10	1.15	< 10	0.054	7.4	13.2	9.99	< 0.0050	0.856	< 0.50	0.719	0.322	< 0.010	3.71	280	< 0.010	< 0.10	< 0.30	0.200	< 0.50	8.7

All terms defined within the body of SNC-Lavalin's report.
< Denotes concentration less than indicated detection limit.
- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

[a] Standard to protect freshwater aquatic life.
[b] Standard varies with Hardness.
[c] Standard varies with pH.
[d] Individual standards exist for Cr +3 and Cr +6. Reported value represents more stringent standard.
[e] Interim BC MoE Regional Background Estimate (Protocol 9 Determining Background Groundwater Quality).
[f] Ramboll calculated health-based values for these two parameters based on toxicity values (tolerable daily intakes; TDI) and drinking water allocation factors (DW AFs), documented in Appendix IV.

BOLD	Concentration greater than CSR Aquatic Life (AW) standard
ITALIC	Concentration greater than CSR Irrigation Watering (IW) standard
UNDERLINE	Concentration greater than CSR Livestock Watering (LW) standard
SHADED	Concentration greater than CSR Drinking Water (DW) standard

TABLE BG-04: Summary of Analytical Results Compared to Primary Screening Criteria for Dissolved Metals in Groundwater (Background)

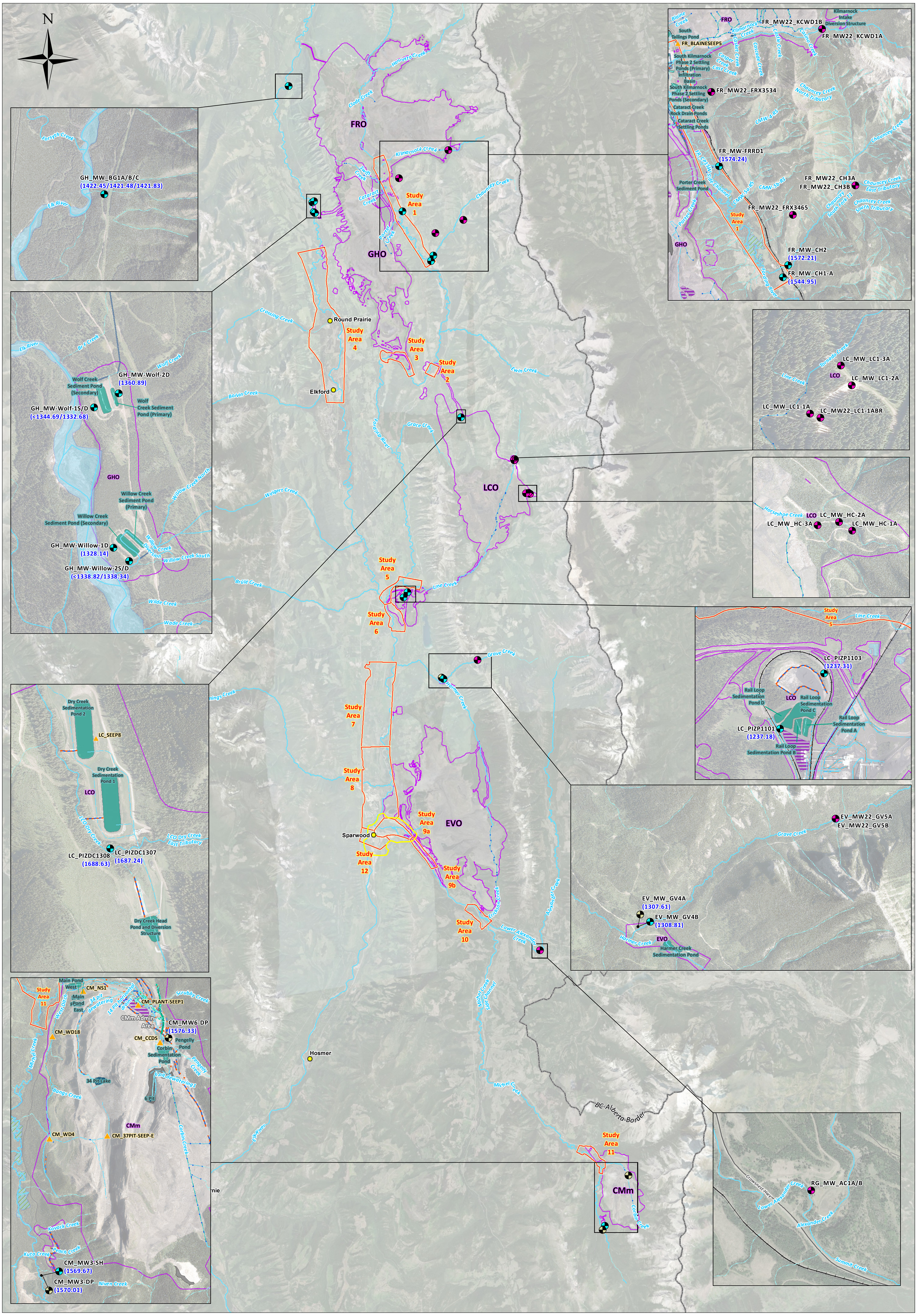
				Dissolved Metals																														
Sample Location	Sample ID	Sample Date (yyyy mm dd)	Hardness mg/L	Aluminum µg/L	Antimony µg/L	Arsenic µg/L	Barium µg/L	Beryllium µg/L	Bismuth µg/L	Boron µg/L	Cadmium µg/L	Calcium mg/L	Chromium µg/L	Cobalt µg/L	Copper µg/L	Iron µg/L	Lead µg/L	Lithium µg/L	Magnesium mg/L	Manganese µg/L	Mercury µg/L	Molybdenum µg/L	Nickel µg/L	Potassium mg/L	Selenium µg/L	Silver µg/L	Sodium mg/L	Strontium µg/L	Thallium µg/L	Tin µg/L	Titanium µg/L	Uranium µg/L	Vanadium µg/L	Zinc µg/L
BC Standard																																		
CSR Aquatic Life (AW)[a]			n/a	n/a	90	50	10,000	1.5	n/a	12,000	0.5-4[b]	n/a	10[d]	40	20-90	n/a	40-160[b]	n/a	n/a	n/a	0.25	10,000	250-1,500[b]	n/a	20	0.5-15[b]	n/a	n/a	3	n/a	1,000	85	n/a	75-2,400[b]
CSR Irrigation Watering (IW)			n/a	5,000	n/a	100	n/a	100	n/a	500	5	n/a	5[d]	50	200	5,000	200	2,500	n/a	200	1	10	200	n/a	20	n/a	n/a	n/a	n/a	n/a	n/a	10	100	1,000-5,000[c]
CSR Livestock Watering (LW)			n/a	5,000	n/a	25	n/a	100	n/a	5,000	80	1,000	50[d]	1,000	300	n/a	100	5,000	n/a	n/a	2	50	1,000	n/a	30	n/a	n/a	n/a	n/a	n/a	n/a	200	100	2,000
CSR Drinking Water (DW)			n/a	9,500	6	10	1,000	8	n/a	5,000	5	n/a	50[d]	20[e]	1,500	6,500	10	8	n/a	1,500	1	250	80	n/a	10	20	200	2,500	n/a	2,500	n/a	20	20	3,000
Health-based Value (HBV)[f]			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1,200	n/a	n/a	n/a	2,400	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Upgradient of Study Area 11 (CMm)																																		
CM_MW6-DP	CM_MW6-DP_WG_2022-05-19_N	2022 05 19	34.3	6.7	< 0.10	0.51	325	< 0.020	< 0.050	309	< 0.0050	9.41	< 0.10	< 0.10	< 0.20	233	< 0.050	375	2.63	48.4	< 0.0050	2.64	0.87	1.77	< 0.050	< 0.010	285	1,030	< 0.010	< 0.10	< 0.30	0.682	< 0.50	< 1.0
	CM_NNP_WG_2022-05-19_N	Duplicate	34.8	7.4	< 0.10	0.52	354	< 0.020	< 0.050	299	< 0.0050	9.44	< 0.10	< 0.10	< 0.20	241	< 0.050	379	2.74	50.7	< 0.0050	3.50	0.87	1.81	0.098	< 0.010	300	1,050	< 0.010	< 0.10	< 0.30	0.664	< 0.50	1.1
	QA/QC RPD%		1	10	*	2	9	*	*	3	*	0	*	*	*	3	*	1	4	5	*	28	*	2	*	*	5	2	*	*	*	3	*	*
	CM_MW6-DP_WG_2022-07-01_N	2022 07 21	31.9	4.6	< 0.10	0.87	328	< 0.020	< 0.050	290	< 0.0050	8.71	< 0.10	< 0.10	< 0.20	77	< 0.050	514	2.47	78.9	< 0.0050	1.96	0.57	1.99	1.33	< 0.010	343	1,040	< 0.010	< 0.10	< 0.30	0.334	< 0.50	< 1.0
	CM_MW6-DP_WG_2022-10-01_N	2022 10 20	32.6	7.6	< 0.10	0.73	325	< 0.020	< 0.050	286	< 0.0050	8.79	< 0.10	0.14	0.57	12	< 0.050	469	2.58	70.9	< 0.0050	1.54	2.12	1.89	< 0.050	< 0.010	317	1,020	< 0.010	< 0.10	< 0.30	0.334	< 0.50	3.3
Blanks																																		
Field Blanks																																		
FR_MW_FRRD1	FR_MW_MC10B_WG_2022_03_04_NP	2022 03 04	< 0.50	< 1.0	< 0.10	< 0.10	< 0.10	< 0.020	< 0.050	< 10	< 0.0050	< 0.050	< 0.10	< 0.10	< 0.20	< 10	< 0.050	< 1.0	< 0.0050	< 0.10	< 0.0050	3.81	< 0.50	< 0.050	< 0.050	< 0.010	< 0.050	< 0.20	< 0.010	< 0.10	< 0.30	< 0.010	< 0.50	< 1.0
LC_PIZP1101	WG_Q1-2022_013_MT3	2022 03 11	< 0.50	-	-	-	-	-	-	-	-	< 0.050	-	-	-	-	-	-	< 0.0050	-	< 0.0050	-	-	< 0.050	-	-	< 0.050	-	-	-	-	-	-	-
CM_MW6-DP	CM_NNT_WG_2022-05-19_N	2022 05 19	< 0.50	< 1.0	< 0.10	< 0.10	< 0.10	< 0.020	< 0.050	< 10	< 0.0050	< 0.050	< 0.10	< 0.10	< 0.20	< 10	< 0.050	< 1.0	< 0.0050	< 0.10	< 0.0050	< 0.050	< 0.50	< 0.050	< 0.050	< 0.010	< 0.050	< 0.20	< 0.010	< 0.10	< 0.30	< 0.010	< 0.50	< 1.0
FR_MW-CH1-A	FR_MW_MC10B_WG_2022_06_06_NP	2022 06 06	< 0.50	< 1.0	< 0.10	< 0.10	< 0.10	< 0.020	< 0.050	< 10	< 0.0050	< 0.050	< 0.10	< 0.10	< 0.20	< 10	< 0.050	< 1.0	< 0.0050	< 0.10	< 0.0050	< 0.050	< 0.50	< 0.050	< 0.050	< 0.010	< 0.050	< 0.20	< 0.010	< 0.10	< 0.30	< 0.010	< 0.50	< 1.0
FR_MW_FRRD1	FR_MW_MC10B_WG_2022_08_16_NP	2022 08 16	< 0.50	1.4	< 0.10	< 0.10	0.80	< 0.020	< 0.050	< 10	< 0.0050	< 0.050	< 0.10	< 0.10	< 0.20	< 10	< 0.050	< 1.0	< 0.0050	< 0.10	< 0.0050	< 0.050	< 0.50	< 0.050	< 0.050	< 0.010	< 0.050	< 0.20	< 0.010	< 0.10	< 0.30	< 0.010	< 0.50	< 1.0
LC_PIZDC1307	LC_MT1_WG_Q4_2022_NP1	2022 10 26	< 0.50	< 1.0	< 0.10	< 0.10	< 0.10	< 0.020	< 0.050	< 10	< 0.0050	< 0.050	< 0.10	< 0.10	< 0.20	< 10	< 0.050	< 1.0	< 0.0050	< 0.10	< 0.0050	< 0.050	< 0.50	< 0.050	< 0.050	< 0.010	< 0.050	< 0.20	< 0.010	< 0.10	< 0.30	< 0.010	< 0.50	1.2
FR_MW_FRRD1	FR_MW_MC10B_WG_2022_11_02_NP	2022 11 02	< 0.50	< 1.0	< 0.10	< 0.10	0.22	< 0.020	< 0.050	< 10	< 0.0050	< 0.050	< 0.10	< 0.10	0.21	< 10	< 0.050	< 1.0	0.0081	< 0.10	< 0.0050	< 0.050	< 0.50	< 0.050	< 0.050	< 0.010	0.254	< 0.20	< 0.010	< 0.10	< 0.30	< 0.010	< 0.50	< 1.0
Trip Blanks																																		
	CM_TRP_WS_2022-02-01_N	2022 03 03	< 0.50	< 1.0	< 0.10	< 0.10	< 0.10	< 0.020	< 0.050	< 10	< 0.0050	< 0.050	< 0.10	< 0.10	< 0.20	< 10	< 0.050	< 1.0	< 0.0050	< 0.10	< 0.0050	3.98	< 0.50	< 0.050	< 0.050	< 0.010	< 0.050	< 0.20	< 0.010	< 0.10	< 0.30	< 0.010	< 0.50	< 1.0
	FR_MW_MC10C_WG_2022_03_04_NP	2022 03 04	< 0.50	1.4	< 0.10	< 0.10	< 0.10	< 0.020	< 0.050	< 10	< 0.0050	< 0.050	< 0.10	< 0.10	< 0.20	< 10	< 0.050	< 1.0	< 0.0050	< 0.10	-	4.85	< 0.50	< 0.050	< 0.050	< 0.010	< 0.050	< 0.20	< 0.010	< 0.10	< 0.30	< 0.010	< 0.50	< 1.0
	WG_Q2-2022_012_RD2	2022 05 20	< 0.50	-	-	-	-	-	-	-	-	< 0.050	-	-	-	-	-	-	< 0.0050	-	-	-	-	< 0.050	-	-	< 0.050	-	-	-	-	-	-	-
	FR_MW_MC10C_WG_2022_06_06_NP	2022 06 06	< 0.50	< 1.0	< 0.10	< 0.10	< 0.10	< 0.020	< 0.050	< 10	< 0.0050	< 0.050	< 0.10	< 0.10	< 0.20	< 10	< 0.050	< 1.0	< 0.0050	< 0.10	< 0.0050	< 0.050	< 0.50	< 0.050	< 0.050	< 0.010	< 0.050	< 0.20	< 0.010	< 0.10	< 0.30	< 0.010	< 0.50	< 1.0
	FR_MW_MC10C_WG_2022_08_16_NP	2022 08 16	< 0.50	< 1.0	< 0.10	< 0.10	< 0.10	< 0.020	< 0.050	< 10	< 0.0050	< 0.050	< 0.10	< 0.10	< 0.20	< 10	< 0.050	< 1.0	< 0.0050	< 0.10	< 0.0050	< 0.050	< 0.50	< 0.050	< 0.050	< 0.010	< 0.050	< 0.20	< 0.010	< 0.10	< 0.30	< 0.010	< 0.50	< 1.0

All terms defined within the body of SNC-Lavalin's report.
< Denotes concentration less than indicated detection limit.
- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

[a] Standard to protect freshwater aquatic life.
[b] Standard varies with Hardness.
[c] Standard varies with pH.
[d] Individual standards exist for Cr +3 and Cr +6. Reported value represents more stringent standard.
[e] Interim BC MoE Regional Background Estimate (Protocol 9 Determining Background Groundwater Quality).
[f] Ramboll calculated health-based values for these two parameters based on toxicity values (tolerable daily intakes; TDI) and drinking water allocation factors (DW AFs), documented in Appendix IV.

BOLD	Concentration greater than CSR Aquatic Life (AW) standard
ITALIC	Concentration greater than CSR Irrigation Watering (IW) standard
UNDERLINE	Concentration greater than CSR Livestock Watering (LW) standard
SHADED	Concentration greater than CSR Drinking Water (DW) standard

Drawings



Legend

Groundwater Stations
- Bedrock
- Unconsolidated
- Monitoring wells to be considered for inclusion

Surface Water Stations
- Seep

Site Features
- Highway/Arterial
- Secondary Road
- Rails
- BC-Alberta Border
- BC Communities
- Study Areas
- Tailings/Settling /Sediment Pond
- Waste Water Pond
- End-Pit Lake
- Pit
- Stockpiles
- Sparwood Area
- Mine Permitted Areas

Water Features
- Stream + Stream Ditch
- Intermittent + Indefinite Stream
- Subsurface
- Ditch
- Potable Waterline
- Rock Drain
- Water Pipeline
- Bypass/Diversion Channel
- Island
- Lake/River Bed
- Wetted Area/Wetland

1344.69 Water level (masl) measured in Q4 2022
< : Groundwater elevation below bottom of screen.

Notes:
1. Original in colour.
2. Numerical scale reflects full-size print. Print scaling will distort this scale, however scale bar will remain accurate.
3. Intended for illustration purposes, accuracy has not been verified for construction or navigation purposes.
4. Locations of overlapping wells have been adjusted for clarity.
5. The nomenclature for ponds may not accurately reflect that in the various effluent discharge permits.

References:
1. Information provided by Teck Coal Limited.
2. Service Layer Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

0 1.5 3 6 9 12 km

PROJECT LOCATION:
Elk Valley, BC

CLIENT NAME:
Teck Coal Limited

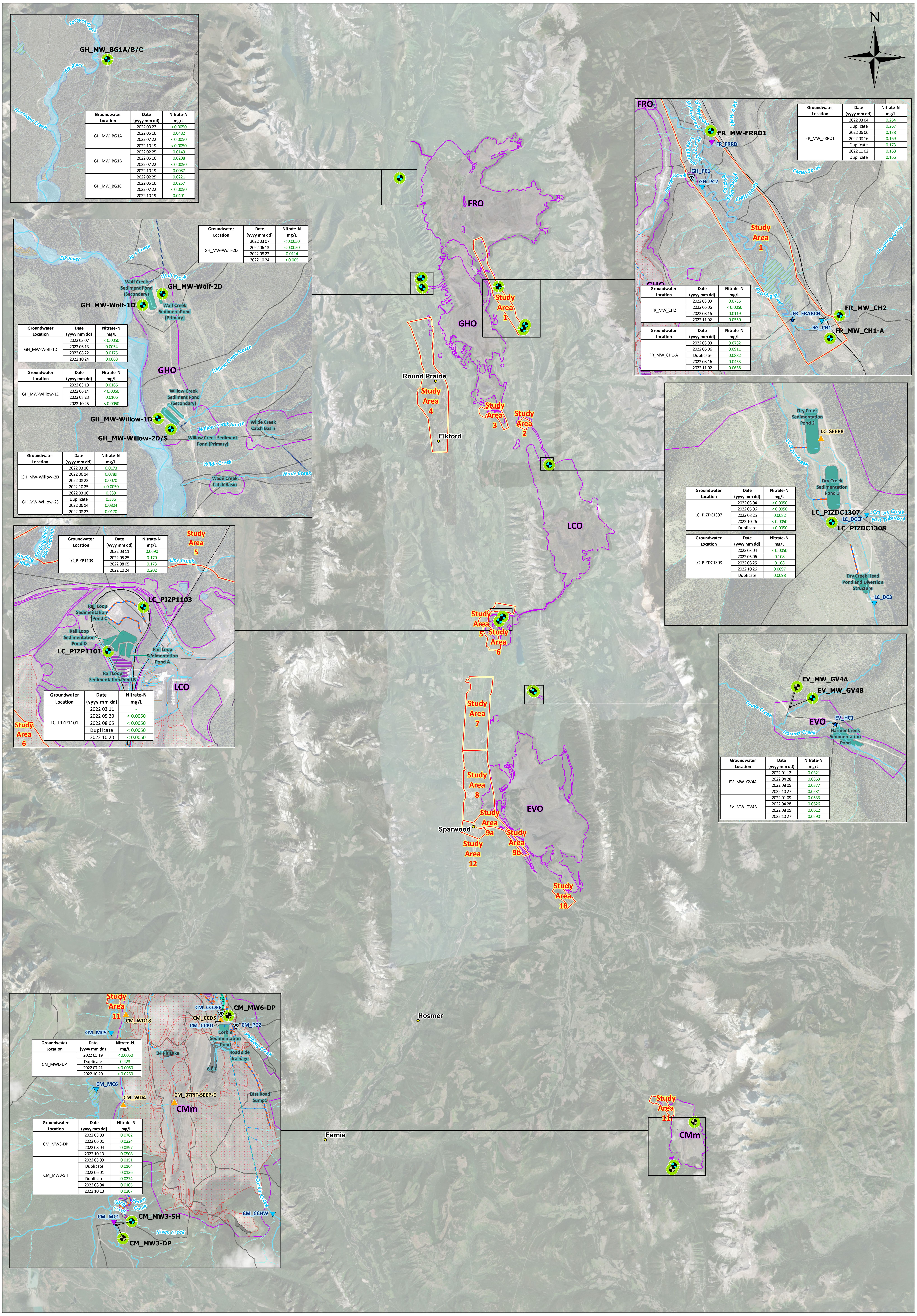
SNC · LAVALIN

Sample Location Plan - Background

CHK'D: MB	DATE: 2023-03-17	SCALE: 1:130,000	Ref Num:
BY: CW	COORD SYS: NAD 1983 UTM Zone 11N		DRAWING BG-01

Project Path: \\Sli4395\projects\Current Projects\Teck Coal Ltd\GISCAD\Exports\635544_SSGMP_RGMP_AnnualReport_2022

MXD Path: \\Sli4395\projects\Current Projects\Teck Coal Ltd\GISCAD\GIS\Map Series\635544_2022_RGMPSSGMP_AnnRpt\635544-LocPlan_Bkg.mxd



Groundwater Location	Date (yyyy mm dd)	Nitrate-N mg/L
GH_MW_BG1A	2022 03 22	< 0.0050
	2022 05 16	0.0482
	2022 07 22	< 0.0050
	2022 10 19	< 0.0050
GH_MW_BG1B	2022 02 25	0.0149
	2022 05 16	0.0208
	2022 07 22	< 0.0050
	2022 10 19	0.0087
GH_MW_BG1C	2022 02 25	0.0221
	2022 05 16	0.0257
	2022 07 22	< 0.0050
	2022 10 19	0.0401

Groundwater Location	Date (yyyy mm dd)	Nitrate-N mg/L
GH_MW-Wolf-2D	2022 03 07	< 0.0050
	2022 06 13	< 0.0050
	2022 08 22	0.0114
	2022 10 24	< 0.005

Groundwater Location	Date (yyyy mm dd)	Nitrate-N mg/L
GH_MW-Wolf-1D	2022 03 07	< 0.0050
	2022 06 13	0.0054
	2022 08 22	0.0175
	2022 10 24	0.0068

Groundwater Location	Date (yyyy mm dd)	Nitrate-N mg/L
GH_MW-Willow-1D	2022 03 10	0.0166
	2022 06 14	< 0.0050
	2022 08 23	0.0106
	2022 10 25	< 0.0050

Groundwater Location	Date (yyyy mm dd)	Nitrate-N mg/L
GH_MW-Willow-2D	2022 03 10	0.0173
	2022 06 14	0.0789
	2022 08 23	0.0070
	2022 10 25	< 0.0050
GH_MW-Willow-2S	2022 03 10	0.339
	Duplicate	0.336
	2022 06 14	0.0804
	2022 08 23	0.0170

Groundwater Location	Date (yyyy mm dd)	Nitrate-N mg/L
FR_MW_FRRD1	2022 03 04	0.264
	Duplicate	0.267
	2022 06 06	0.138
	2022 08 16	0.169
	Duplicate	0.173
	2022 11 02	0.168
	Duplicate	0.166

Groundwater Location	Date (yyyy mm dd)	Nitrate-N mg/L
FR_MW_CH2	2022 03 03	0.0735
	2022 06 06	< 0.0050
	2022 08 16	0.0119
	2022 11 02	0.0550

Groundwater Location	Date (yyyy mm dd)	Nitrate-N mg/L
FR_MW_CH1-A	2022 03 03	0.0732
	2022 06 06	0.0911
	Duplicate	0.0682
	2022 08 16	0.0453
	2022 11 02	0.0658

Groundwater Location	Date (yyyy mm dd)	Nitrate-N mg/L
LC_PIZDC1307	2022 03 04	< 0.0050
	2022 05 06	< 0.0050
	2022 08 25	0.0082
	2022 10 26	< 0.0050
	Duplicate	< 0.0050

Groundwater Location	Date (yyyy mm dd)	Nitrate-N mg/L
LC_PIZDC1308	2022 03 04	< 0.0050
	2022 05 06	0.108
	2022 08 25	0.108
	2022 10 26	0.0097
	Duplicate	0.0098

Groundwater Location	Date (yyyy mm dd)	Nitrate-N mg/L
LC_PIZP1103	2022 03 11	0.0690
	2022 05 25	0.170
	2022 08 05	0.173
	2022 10 24	0.202

Groundwater Location	Date (yyyy mm dd)	Nitrate-N mg/L
LC_PIZP1101	2022 03 11	-
	2022 05 20	< 0.0050
	2022 08 05	< 0.0050
	Duplicate	< 0.0050
	2022 10 20	< 0.0050

Groundwater Location	Date (yyyy mm dd)	Nitrate-N mg/L
EV_MW_GV4A	2022 01 12	0.0321
	2022 04 28	0.0353
	2022 08 05	0.0377
	2022 10 27	0.0531
EV_MW_GV4B	2022 01 09	0.0533
	2022 04 28	0.0626
	2022 08 05	0.0612
	2022 10 27	0.0590

Groundwater Location	Date (yyyy mm dd)	Nitrate-N mg/L
CM_MW6-DP	2022 05 19	< 0.0050
	Duplicate	0.423
	2022 07 21	< 0.0050
	2022 10 20	< 0.0250

Groundwater Location	Date (yyyy mm dd)	Nitrate-N mg/L
CM_MW3-DP	2022 03 03	0.0762
	2022 06 01	0.0324
	2022 08 04	0.0397
	2022 10 13	0.0508
CM_MW3-SH	2022 03 03	0.0151
	Duplicate	0.0164
	2022 06 01	0.0136
	Duplicate	0.0274
	2022 08 04	0.0105
	2022 10 13	0.0207

Legend

Groundwater Stations[4]
- Bedrock
- Unconsolidated

Surface Water Stations
- Compliance Point
- Order Station
- Order Station and Compliance Point
- Receiving Environment
- Authorized Discharge
- Monitoring
- Monitoring (Retired)
- Hydrometric stations
- Seep

Site Features
- Highway/Arterial
- Secondary Road
- Rails
- Study Areas
- Tailings/Settling/Sediment Pond
- Waste Water Pond
- End-Pit Lake
- Pit
- Stockpiles
- Waste Dump (Spoils)
- Watersheds
- Mine Permitted Areas

Water Features
- Stream + Stream Ditch
- Intermittent + Indefinite Stream
- Subsurface
- Ditch
- Potable Waterline
- Rock Drain
- Water Pipeline
- Bypass/Diversion Channel
- Island
- Lake/River Bed
- Wetted Area/Wetland

Q4 Q1
Q3 Q2

symbol locations have been adjusted relative to well locations for visibility

Green below the applicable screening criteria

Blue above the applicable screening criteria

Grey no sample collected

Primary Screening Criteria	Nitrate-N mg/L
CSR Aquatic Life	400
CSR Irrigation Watering	n/a
CSR Livestock Watering	100
CSR Drinking Water	10

Notes:
1. Original in colour at paper size ANSI C (17x22 in).
2. Numerical scale reflects full-size print. Print scaling will distort this scale; however, scale bar will remain accurate.
3. Intended for illustration purposes. Accuracy has not been verified for construction or navigation.
4. Locations of overlapping wells have been adjusted for clarity.
5. Nitrate-N = Nitrate Nitrogen
6. The nomenclature for ponds may not accurately reflect that in the various effluent discharge permits.

References:
1. Data provided by Teck Coal Limited
2. Service Layer Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

0 2.5 5 10 15 km

PROJECT LOCATION: Elk Valley, BC

CLIENT NAME: Teck Coal Limited

SNC·LAVALIN

Spatial Distribution of Nitrate Nitrogen in Groundwater - Background

CHK'D: MB | DATE: 2023-03-17 | SCALE: 1:150,000 | REF NUM: | REV: 0

BY: CW | COORD SYS: NAD 1983 UTM Zone 11N

DRAWING BG-02

MXD Path: \\Sli4395\projects\Current Projects\Teck Coal Ltd\GISCAD\GIS\Map Series\635544_2022_RGMPSSGMP_AnnRpt\635544-SpatialDist_N_Bkg.mxd

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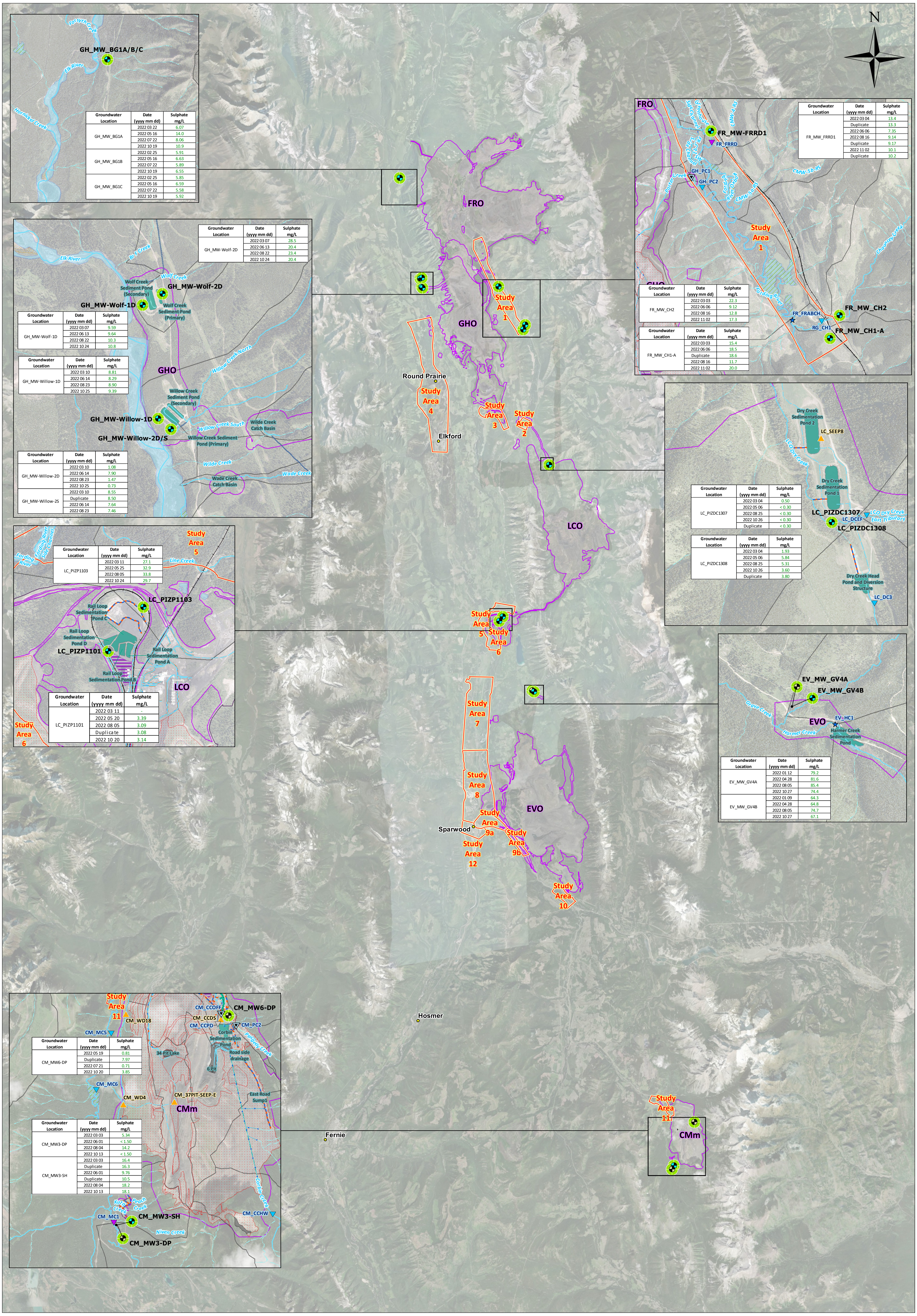


Groundwater Location	Date (yyyy mm dd)	Sulphate mg/L
GH_MW_BG1A	2022 03 22	6.07
	2022 05 16	14.0
	2022 07 22	8.06
	2022 10 19	10.9
GH_MW_BG1B	2022 02 25	5.91
	2022 05 16	6.63
	2022 07 22	5.89
	2022 10 19	6.55
GH_MW_BG1C	2022 02 25	5.85
	2022 05 16	6.59
	2022 07 22	5.58
	2022 10 19	5.92

Groundwater Location	Date (yyyy mm dd)	Sulphate mg/L
FR_MW_FRRD1	2022 03 04	13.4
	Duplicate	13.3
	2022 06 06	7.35
	2022 08 16	9.14
	Duplicate	9.17
	2022 11 02	10.1
	Duplicate	10.2

Groundwater Location	Date (yyyy mm dd)	Sulphate mg/L
FR_MW_CH2	2022 03 03	22.3
	2022 06 06	9.12
	2022 08 16	12.8
	2022 11 02	17.3

Groundwater Location	Date (yyyy mm dd)	Sulphate mg/L
FR_MW_CH1-A	2022 03 03	15.4
	2022 06 06	18.5
	Duplicate	18.6
	2022 08 16	11.7
	2022 11 02	20.0

Groundwater Location	Date (yyyy mm dd)	Sulphate mg/L
GH_MW-Wolf-2D	2022 03 07	28.5
	2022 06 13	20.4
	2022 08 22	23.4
	2022 10 24	20.4

Groundwater Location	Date (yyyy mm dd)	Sulphate mg/L
GH_MW-Wolf-1D	2022 03 07	9.59
	2022 06 13	9.64
	2022 08 22	10.3
	2022 10 24	10.8

Groundwater Location	Date (yyyy mm dd)	Sulphate mg/L
GH_MW-Willow-1D	2022 03 10	8.81
	2022 06 14	8.29
	2022 08 23	8.90
	2022 10 25	9.39

Groundwater Location	Date (yyyy mm dd)	Sulphate mg/L
GH_MW-Willow-2D	2022 03 10	1.06
	2022 06 14	7.90
	2022 08 23	1.47
	2022 10 25	0.73
GH_MW-Willow-2S	2022 03 10	8.55
	Duplicate	8.50
	2022 06 14	7.64
	2022 08 23	7.46

Groundwater Location	Date (yyyy mm dd)	Sulphate mg/L
LC_PIZDC1307	2022 03 04	0.50
	2022 05 06	< 0.30
	2022 08 25	< 0.30
	2022 10 26	< 0.30
	Duplicate	< 0.30

Groundwater Location	Date (yyyy mm dd)	Sulphate mg/L
LC_PIZDC1308	2022 03 04	1.93
	2022 05 06	5.84
	2022 08 25	5.31
	2022 10 26	3.60
	Duplicate	3.80

Groundwater Location	Date (yyyy mm dd)	Sulphate mg/L
LC_PIZP1103	2022 03 11	27.1
	2022 05 25	32.9
	2022 08 05	33.8
	2022 10 24	29.7

Groundwater Location	Date (yyyy mm dd)	Sulphate mg/L
LC_PIZP1101	2022 03 11	-
	2022 05 20	3.39
	2022 08 05	3.09
	Duplicate	3.08
	2022 10 20	3.14

Groundwater Location	Date (yyyy mm dd)	Sulphate mg/L
EV_MW_GV4A	2022 01 12	79.2
	2022 04 28	81.6
	2022 08 05	85.4
	2022 10 27	74.4
EV_MW_GV4B	2022 01 09	64.3
	2022 04 28	64.8
	2022 08 05	74.7
	2022 10 27	67.1

Groundwater Location	Date (yyyy mm dd)	Sulphate mg/L
CM_MW6-DP	2022 05 19	0.81
	Duplicate	7.97
	2022 07 21	0.71
	2022 10 20	3.85

Groundwater Location	Date (yyyy mm dd)	Sulphate mg/L
CM_MW3-DP	2022 03 03	5.34
	2022 06 01	< 1.50
	2022 08 04	14.2
	2022 10 13	< 1.50
CM_MW3-SH	2022 03 03	16.4
	Duplicate	16.3
	2022 06 01	9.76
	Duplicate	10.5
	2022 08 04	18.2
	2022 10 13	18.1

Legend

Groundwater Stations[4]
- Bedrock
- Unconsolidated

Surface Water Stations
- Compliance Point
- Order Station
- Order Station and Compliance Point
- Receiving Environment
- Authorized Discharge
- Monitoring
- Monitoring (Retired)
- Hydrometric stations
- Seep

Site Features
- Highway/Arterial
- Secondary Road
- Rails
- Study Areas
- Tailings/Settling/Sediment Pond
- Waste Water Pond
- End-Pit Lake
- Pit
- Stockpiles
- Waste Dump (Spoils)
- Watersheds
- Mine Permitted Areas

Water Features
- Stream + Stream Ditch
- Intermittent + Indefinite Stream
- Subsurface
- Ditch
- Potable Waterline
- Rock Drain
- Water Pipeline
- Bypass/Diversion Channel
- Island
- Lake/River Bed
- Wetted Area/Wetland

Q4 Q1
Q3 Q2

symbol locations have been adjusted relative to well locations for visibility

Green below the applicable screening criteria

Blue above the applicable screening criteria

Grey no sample collected

Primary Screening Criteria	Sulphate mg/L
CSR Aquatic Life	1,280-4,290
CSR Irrigation Watering	n/a
CSR Livestock Watering	1,000
CSR Drinking Water	500

Notes:
1. Original in colour at paper size ANSI C (17x22 in).
2. Numerical scale reflects full-size print. Print scaling will distort this scale; however, scale bar will remain accurate.
3. Intended for illustration purposes. Accuracy has not been verified for construction or navigation.
4. Locations of overlapping wells have been adjusted for clarity.
5. The nomenclature for ponds may not accurately reflect that in the various effluent discharge permits.

References:
1. Data provided by Teck Coal Limited
2. Service Layer Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

0 2.5 5 10 15 km

PROJECT LOCATION: Elk Valley, BC

CLIENT NAME: Teck Coal Limited

SNC·LAVALIN

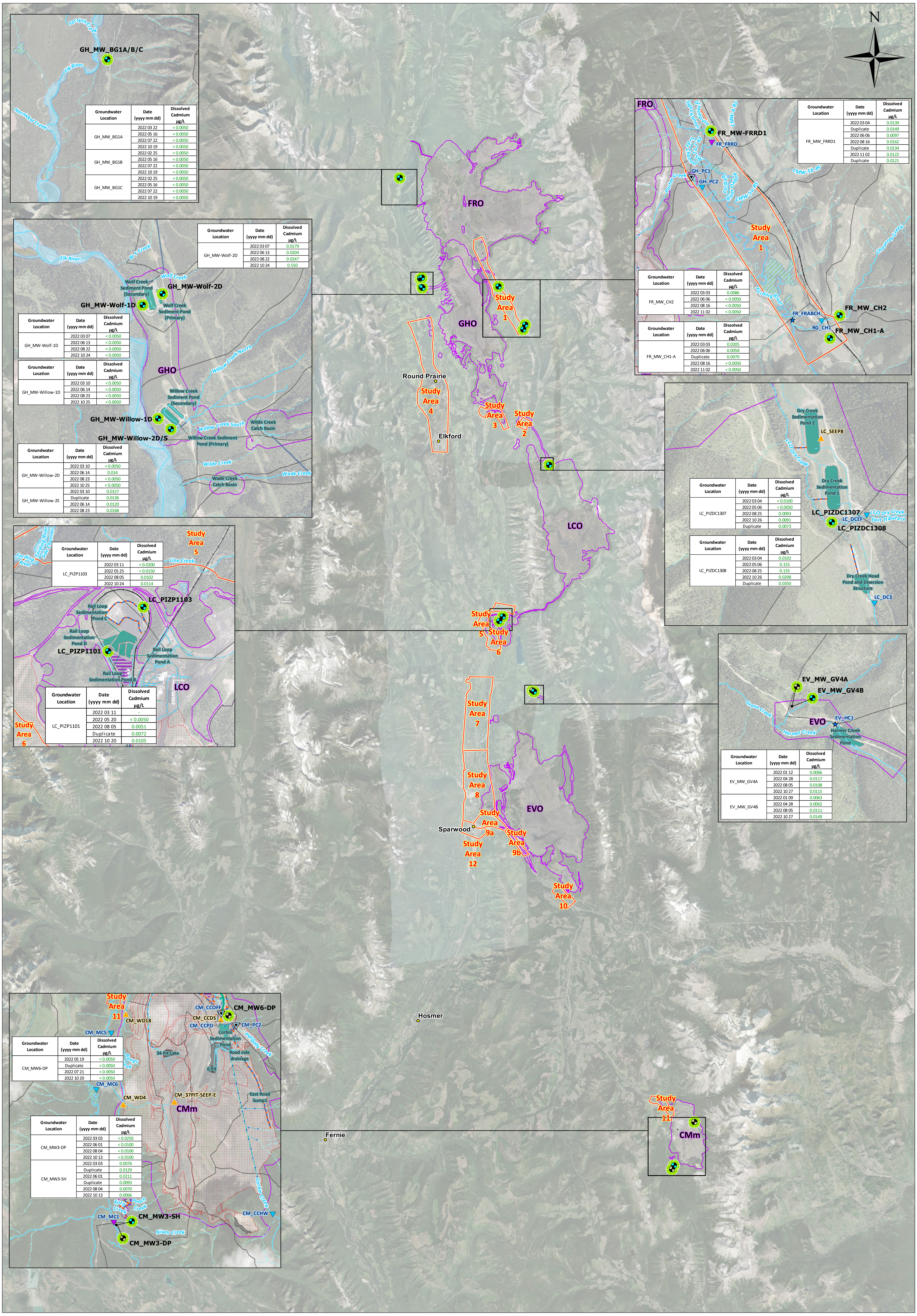
Spatial Distribution of Sulphate in Groundwater - Background

CHK'D: MB | DATE: 2023-03-17 | SCALE: 1:150,000 | REF NUM: | REV: 0

BY: CW | COORD SYS: NAD 1983 UTM Zone 11N | DRAWING BG-03

MXD Path: \\Sli4395\projects\Current Projects\Teck Coal Ltd\GISCAD\GIS\Map Series\635544_2022_RGMPSSGMP_AnnRpt\635544-SpatialDist_SO4_Bkg.mxd

Project Path: \\Sli4395\projects\Current Projects\Teck Coal Ltd\GISCAD\Exports\635544_SSGMP_RGMP_AnnualReport_2022



Groundwater Location	Date (yyyy mm dd)	Dissolved Cadmium µg/L
GH_MW_BG1A	2022 03 22	< 0.0050
	2022 05 16	< 0.0050
	2022 07 22	< 0.0050
	2022 10 19	< 0.0050
GH_MW_BG1B	2022 02 25	< 0.0050
	2022 05 16	< 0.0050
	2022 07 22	< 0.0050
	2022 10 19	< 0.0050
GH_MW_BG1C	2022 02 25	< 0.0050
	2022 05 16	< 0.0050
	2022 07 22	< 0.0050
	2022 10 19	< 0.0050

Groundwater Location	Date (yyyy mm dd)	Dissolved Cadmium µg/L
GH_MW-Wolf-2D	2022 03 07	0.0179
	2022 06 13	0.0204
	2022 08 22	0.0247
	2022 10 24	0.550

Groundwater Location	Date (yyyy mm dd)	Dissolved Cadmium µg/L
GH_MW-Wolf-1D	2022 03 07	< 0.0050
	2022 06 13	< 0.0050
	2022 08 22	< 0.0050
	2022 10 24	< 0.0050

Groundwater Location	Date (yyyy mm dd)	Dissolved Cadmium µg/L
GH_MW-Willow-1D	2022 03 10	< 0.0050
	2022 06 14	< 0.0050
	2022 08 23	< 0.0050
	2022 10 25	< 0.0050

Groundwater Location	Date (yyyy mm dd)	Dissolved Cadmium µg/L
GH_MW-Willow-2D	2022 03 10	< 0.0050
	2022 06 14	0.014
	2022 08 23	< 0.0050
	2022 10 25	< 0.0050
GH_MW-Willow-2S	2022 03 10	0.0157
	Duplicate	0.0136
	2022 06 14	0.0120
	2022 08 23	0.0168

Groundwater Location	Date (yyyy mm dd)	Dissolved Cadmium µg/L
FR_MW_FRRD1	2022 03 04	0.0139
	Duplicate	0.0149
	2022 06 06	0.0097
	2022 08 16	0.0162
	Duplicate	0.0134
	2022 11 02	0.0122
	Duplicate	0.0121

Groundwater Location	Date (yyyy mm dd)	Dissolved Cadmium µg/L
FR_MW_CH2	2022 03 03	0.0086
	2022 06 06	< 0.0050
	2022 08 16	< 0.0050
	2022 11 02	< 0.0050

Groundwater Location	Date (yyyy mm dd)	Dissolved Cadmium µg/L
FR_MW_CH1-A	2022 03 03	0.0205
	2022 06 06	0.0058
	Duplicate	0.0070
	2022 08 16	< 0.0050
	2022 11 02	< 0.0050

Groundwater Location	Date (yyyy mm dd)	Dissolved Cadmium µg/L
LC_PIZDC1307	2022 03 04	< 0.0100
	2022 05 06	< 0.0050
	2022 08 25	0.0093
	2022 10 26	0.0091
	Duplicate	0.0073

Groundwater Location	Date (yyyy mm dd)	Dissolved Cadmium µg/L
LC_PIZDC1308	2022 03 04	0.0192
	2022 05 06	0.155
	2022 08 25	0.135
	2022 10 26	0.0298
	Duplicate	0.0350

Groundwater Location	Date (yyyy mm dd)	Dissolved Cadmium µg/L
LC_PIZP1103	2022 03 11	< 0.0200
	2022 05 25	< 0.0150
	2022 08 05	0.0102
	2022 10 24	0.0114

Groundwater Location	Date (yyyy mm dd)	Dissolved Cadmium µg/L
LC_PIZP1101	2022 03 11	-
	2022 05 20	< 0.0050
	2022 08 05	0.0051
	Duplicate	0.0072
	2022 10 20	0.0105

Groundwater Location	Date (yyyy mm dd)	Dissolved Cadmium µg/L
EV_MW_GV4A	2022 01 12	0.0066
	2022 04 28	0.0117
	2022 08 05	0.0108
	2022 10 27	0.0115
EV_MW_GV4B	2022 01 09	0.0063
	2022 04 28	0.0062
	2022 08 05	0.0111
	2022 10 27	0.0149

Groundwater Location	Date (yyyy mm dd)	Dissolved Cadmium µg/L
CM_MW6-DP	2022 05 19	< 0.0050
	Duplicate	< 0.0050
	2022 07 21	< 0.0050
	2022 10 20	< 0.0050

Groundwater Location	Date (yyyy mm dd)	Dissolved Cadmium µg/L
CM_MW3-DP	2022 03 03	< 0.0250
	2022 06 01	< 0.0100
	2022 08 04	< 0.0100
	2022 10 13	< 0.0100
CM_MW3-SH	2022 03 03	0.0076
	Duplicate	0.0129
	2022 06 01	0.0211
	Duplicate	0.0093
	2022 08 04	0.0070
	2022 10 13	0.0066

Legend

Groundwater Stations[4]
- Bedrock
- Unconsolidated

Surface Water Stations
- Compliance Point
- Order Station
- Order Station and Compliance Point
- Receiving Environment
- Authorized Discharge
- Monitoring
- Monitoring (Retired)
- Hydrometric stations
- Seep

Site Features
- Highway/Arterial
- Secondary Road
- Rails
- Study Areas
- Tailings/Settling/Sediment Pond
- Waste Water Pond
- End-Pit Lake
- Pit
- Stockpiles
- Waste Dump (Spoils)
- Watersheds
- Mine Permitted Areas

Water Features
- Stream + Stream Ditch
- Intermittent + Indefinite Stream
- Subsurface
- Ditch
- Potable Waterline
- Rock Drain
- Water Pipeline
- Bypass/Diversion Channel
- Island
- Lake/River Bed
- Wetted Area/Wetland

Q4	Q1
Q3	Q2

symbol locations have been adjusted relative to well locations for visibility

Green below the applicable screening criteria

Blue above the applicable screening criteria

Grey no sample collected

^ Dissolved phase of the parameter is shown in the spatial plot.

Primary Screening Criteria	Cadmium^ µg/L
CSR Aquatic Life	0.5-4
CSR Irrigation Watering	5
CSR Livestock Watering	80
CSR Drinking Water	5

Notes:
1. Original in colour at paper size ANSI C (17x22 in).
2. Numerical scale reflects full-size print. Print scaling will distort this scale; however, scale bar will remain accurate.
3. Intended for illustration purposes. Accuracy has not been verified for construction or navigation.
4. Locations of overlapping wells have been adjusted for clarity.
5. The nomenclature for ponds may not accurately reflect that in the various effluent discharge permits.

References:
1. Data provided by Teck Coal Limited
2. Service Layer Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

0 2.5 5 10 15 km

PROJECT LOCATION: Elk Valley, BC

CLIENT NAME: Teck Coal Limited

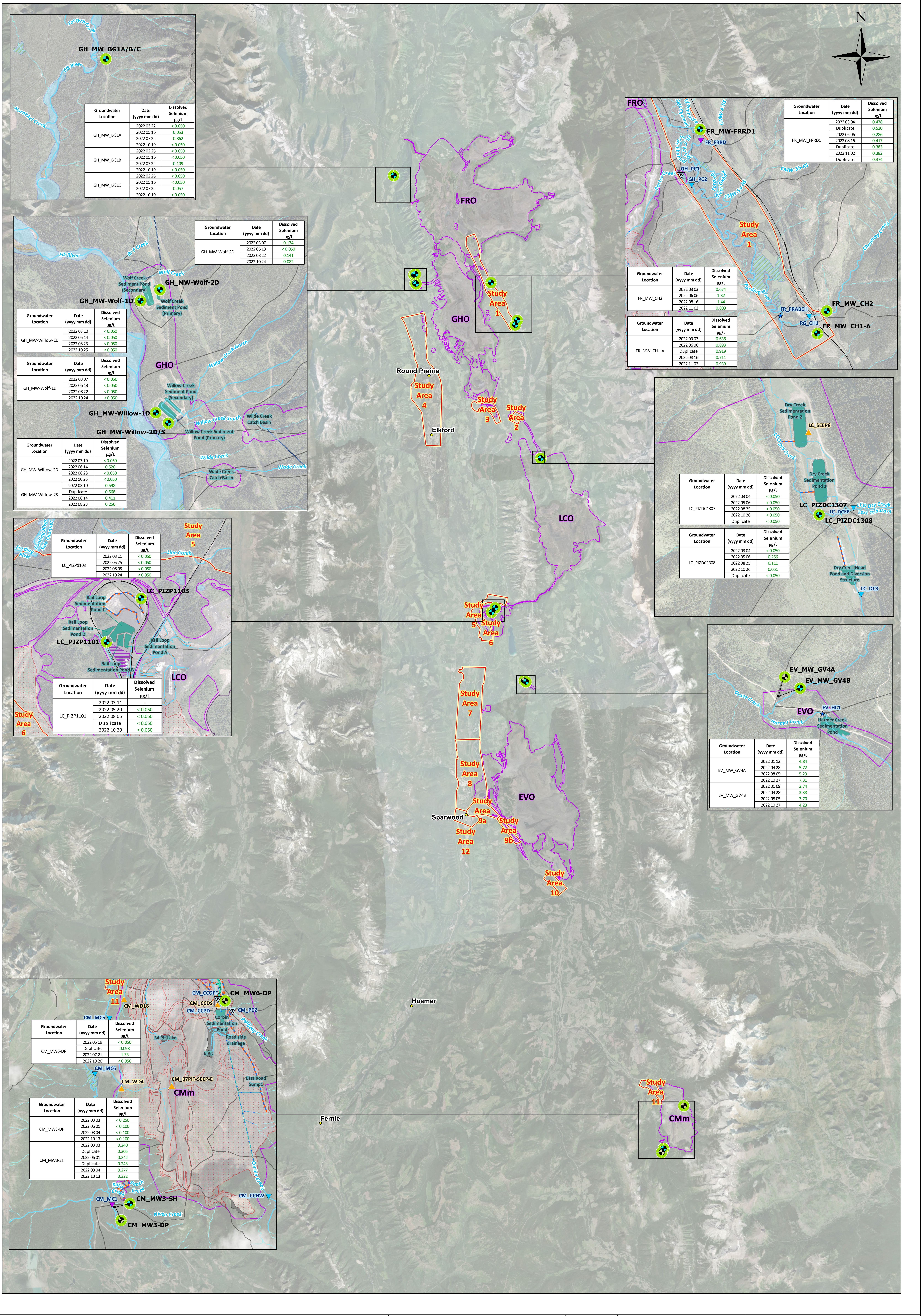
SNC · LAVALIN

Spatial Distribution of Dissolved Cadmium in Groundwater - Background

CHK'D: MB	DATE: 2023-03-17	SCALE: 1:150,000	REF NUM:	REV: 0
BY: CW	COORD SYS: NAD 1983 UTM Zone 11N		DRAWING BG-04	

MXD Path: \\Sli4395\projects\Current Projects\Teck Coal Ltd\GISCAD\GIS\Map Series\635544_2022_RGMPSSGMP_AnnRpt\635544-SpatialDist_Cd_Bkg.mxd

Project Path: \\Sli4395\projects\Current Projects\Teck Coal Ltd\GISCAD\Exports\635544_SSGMP_RGMP_AnnualReport_2022



Groundwater Location	Date (yyyy mm dd)	Dissolved Selenium µg/L
GH_MW_BG1A	2022 03 22	< 0.050
	2022 05 16	0.053
	2022 07 22	0.862
	2022 10 19	< 0.050
GH_MW_BG1B	2022 02 25	< 0.050
	2022 05 16	< 0.050
	2022 07 22	0.109
	2022 10 19	< 0.050
GH_MW_BG1C	2022 02 25	< 0.050
	2022 05 16	< 0.050
	2022 07 22	0.057
	2022 10 19	< 0.050

Groundwater Location	Date (yyyy mm dd)	Dissolved Selenium µg/L
GH_MW-Wolf-2D	2022 03 07	0.174
	2022 06 13	< 0.050
	2022 08 22	0.141
	2022 10 24	0.082

Groundwater Location	Date (yyyy mm dd)	Dissolved Selenium µg/L
GH_MW-Willow-1D	2022 03 10	< 0.050
	2022 06 14	< 0.050
	2022 08 23	< 0.050
	2022 10 25	< 0.050

Groundwater Location	Date (yyyy mm dd)	Dissolved Selenium µg/L
GH_MW-Wolf-1D	2022 03 07	< 0.050
	2022 06 13	< 0.050
	2022 08 22	< 0.050
	2022 10 24	< 0.050

Groundwater Location	Date (yyyy mm dd)	Dissolved Selenium µg/L
GH_MW-Willow-2D	2022 03 10	< 0.050
	2022 06 14	0.520
	2022 08 23	< 0.050
	2022 10 25	< 0.050
GH_MW-Willow-2S	2022 03 10	0.598
	Duplicate	0.568
	2022 06 14	0.411
	2022 08 23	0.256

Groundwater Location	Date (yyyy mm dd)	Dissolved Selenium µg/L
FR_MW_FRRD1	2022 03 04	0.478
	Duplicate	0.520
	2022 06 06	0.286
	2022 08 16	0.417
	Duplicate	0.383
	2022 11 02	0.382
	Duplicate	0.374

Groundwater Location	Date (yyyy mm dd)	Dissolved Selenium µg/L
FR_MW_CH2	2022 03 03	0.674
	2022 06 06	1.32
	2022 08 16	1.44
	2022 11 02	0.809

Groundwater Location	Date (yyyy mm dd)	Dissolved Selenium µg/L
FR_MW_CH1-A	2022 03 03	0.636
	2022 06 06	0.893
	Duplicate	0.919
	2022 08 16	0.711
	2022 11 02	0.939

Groundwater Location	Date (yyyy mm dd)	Dissolved Selenium µg/L
LC_PIZDC1307	2022 03 04	< 0.050
	2022 05 06	< 0.050
	2022 08 25	< 0.050
	2022 10 26	< 0.050
	Duplicate	< 0.050

Groundwater Location	Date (yyyy mm dd)	Dissolved Selenium µg/L
LC_PIZDC1308	2022 03 04	< 0.050
	2022 05 06	0.256
	2022 08 25	0.111
	2022 10 26	0.051
	Duplicate	< 0.050

Groundwater Location	Date (yyyy mm dd)	Dissolved Selenium µg/L
LC_PIZP1103	2022 03 11	< 0.050
	2022 05 25	< 0.050
	2022 08 05	< 0.050
	2022 10 24	< 0.050

Groundwater Location	Date (yyyy mm dd)	Dissolved Selenium µg/L
LC_PIZP1101	2022 03 11	-
	2022 05 20	< 0.050
	2022 08 05	< 0.050
	Duplicate	< 0.050
	2022 10 20	< 0.050

Groundwater Location	Date (yyyy mm dd)	Dissolved Selenium µg/L
EV_MW_GV4A	2022 01 12	4.84
	2022 04 28	5.72
	2022 08 05	5.23
	2022 10 27	7.31
EV_MW_GV4B	2022 01 09	3.74
	2022 04 28	3.38
	2022 08 05	3.70
	2022 10 27	4.23

Groundwater Location	Date (yyyy mm dd)	Dissolved Selenium µg/L
CM_MW6-DP	2022 05 19	< 0.050
	Duplicate	0.098
	2022 07 21	1.33
	2022 10 20	< 0.050

Groundwater Location	Date (yyyy mm dd)	Dissolved Selenium µg/L
CM_MW3-DP	2022 03 03	< 0.250
	2022 06 01	< 0.100
	2022 08 04	< 0.100
	2022 10 13	< 0.100
CM_MW3-SH	2022 03 03	0.240
	Duplicate	0.305
	2022 06 01	0.242
	Duplicate	0.243
	2022 08 04	0.277
	2022 10 13	0.322

Legend

Groundwater Stations[4]
- Bedrock
- Unconsolidated

Surface Water Stations
- Compliance Point
- Order Station
- Order Station and Compliance Point
- Receiving Environment
- Authorized Discharge
- Monitoring
- Monitoring (Retired)
- Hydrometric stations
- Seep

Site Features
- Highway/Arterial
- Secondary Road
- Rails
- Study Areas
- Tailings/Settling/Sediment Pond
- Waste Water Pond
- End-Pit Lake
- Pit
- Stockpiles
- Waste Dump (Spoils)
- Watersheds
- Mine Permitted Areas

Water Features
- Stream + Stream Ditch
- Intermittent + Indefinite Stream
- Subsurface
- Ditch
- Potable Waterline
- Rock Drain
- Water Pipeline
- Bypass/Diversion Channel
- Island
- Lake/River Bed
- Wetted Area/Wetland

Q4	Q1
Q3	Q2

symbol locations have been adjusted relative to well locations for visibility

Green below the applicable screening criteria

Blue above the applicable screening criteria

Grey no sample collected

^ Dissolved phase of the parameter is shown in the spatial plot.

Primary Screening Criteria	Selenium^ µg/L
CSR Aquatic Life	20
CSR Irrigation Watering	20
CSR Livestock Watering	30
CSR Drinking Water	10

Notes:
1. Original in colour at paper size ANSI C (17x22 in).
2. Numerical scale reflects full-size print. Print scaling will distort this scale; however, scale bar will remain accurate.
3. Intended for illustration purposes. Accuracy has not been verified for construction or navigation.
4. Locations of overlapping wells have been adjusted for clarity.
5. The nomenclature for ponds may not accurately reflect that in the various effluent discharge permits.

References:
1. Data provided by Teck Coal Limited
2. Service Layer Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

0 2.5 5 10 15 km

PROJECT LOCATION: Elk Valley, BC

CLIENT NAME: Teck Coal Limited

SNC·LAVALIN

Spatial Distribution of Dissolved Selenium in Groundwater - Background

CHK'D: MB	DATE: 2023-03-17	SCALE: 1:150,000	REF NUM: REV: 0
BY: CW	COORD SYS: NAD 1983 UTM Zone 11N		DRAWING BG-05

MXD Path: \\Sli4395\projects\Current Projects\Teck Coal Ltd\GISCAD\GIS\Map Series\635544_2022_RGMPSSGMP_AnnRpt\635544-SpatialDist_Se_Bkg.mxd

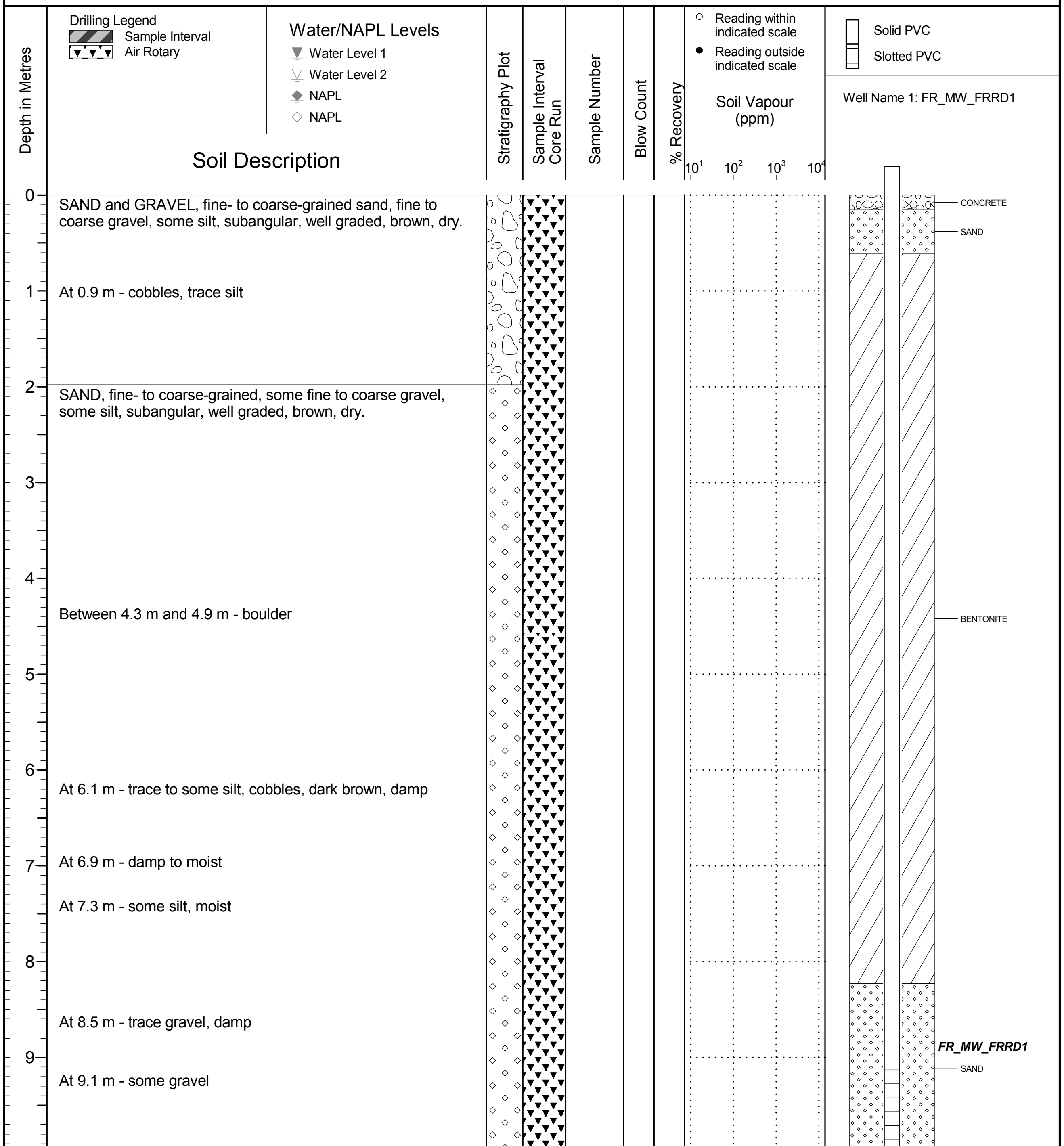
Project Path: \\Sli4395\projects\Current Projects\Teck Coal Ltd\GISCAD\Exports\635544_SSGMP_RGMP_AnnualReport_2022

Attachment I

Borehole Logs

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : FR_BH_FRRD1**
	Location **Regional Groundwater Monitoring**	PAGE 1 OF 2

Drilling Contractor	Owen's Drilling	Date Monitored	n/a	Project Number:	657269
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1581.026	Borehole Logged By:	IPC
Borehole Dia. (m)	0.17	Top of Casing Elev. (m)	1581.955	Date Drilled:	2019 01 31
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5556128.232	Easting: 653883.845	Log Typed By:	VL



NOTES

QA/QC: BH 2019 04 01 Print Date:2019-09-26

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : FR_BH_FRRD1**
	Location **Regional Groundwater Monitoring**	PAGE 2 OF 2

Drilling Contractor	Owen's Drilling	Date Monitored	n/a
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1581.026
Borehole Dia. (m)	0.17	Top of Casing Elev. (m)	1581.955
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5556128.232	Easting: 653883.845

Project Number:	657269
Borehole Logged By:	IPC
Date Drilled:	2019 01 31
Log Typed By:	VL

Drilling Legend: Sample Interval; Air Rotary

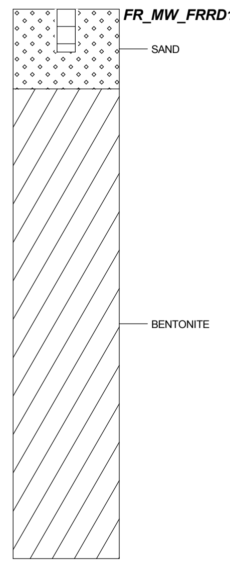
Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: FR_MW_FRRD1

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
10	SAND, fine- to coarse-grained, some fine to coarse gravel, some silt, subangular, well graded, brown, dry. *(continued)* At 10.1 m - no cobbles, trace gravel						
11	Between 11.0 m and 11.3 m - cobbles						
	SAND and GRAVEL, fine- to coarse-grained sand, fine to coarse gravel, some silt, well graded, moist.						
12	BEDROCK, siltstone, grey.						
14.6	Bottom of hole at 14.6 m.						



NOTES

QA/QC: BH 2019 04 01 Print Date:2019-09-26

SNC•LAVALIN	Client **Teck Coal Limited**	**Borehole No. : FR_BH_CH1**
	Location **Regional Groundwater Monitoring**	PAGE 1 OF 5

Drilling Contractor	Owen's Drilling	Date Monitored	n/a	Project Number:	657269
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1562.013	Borehole Logged By:	IPC
Borehole Dia. (m)	0.17	Top of Casing Elev. (m)	1562.940 1562.983	Date Drilled:	2019 01 30
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5552549.191	Easting: 655940.085	Log Typed By:	VL

Drilling Legend: Sample Interval; Air Rotary

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

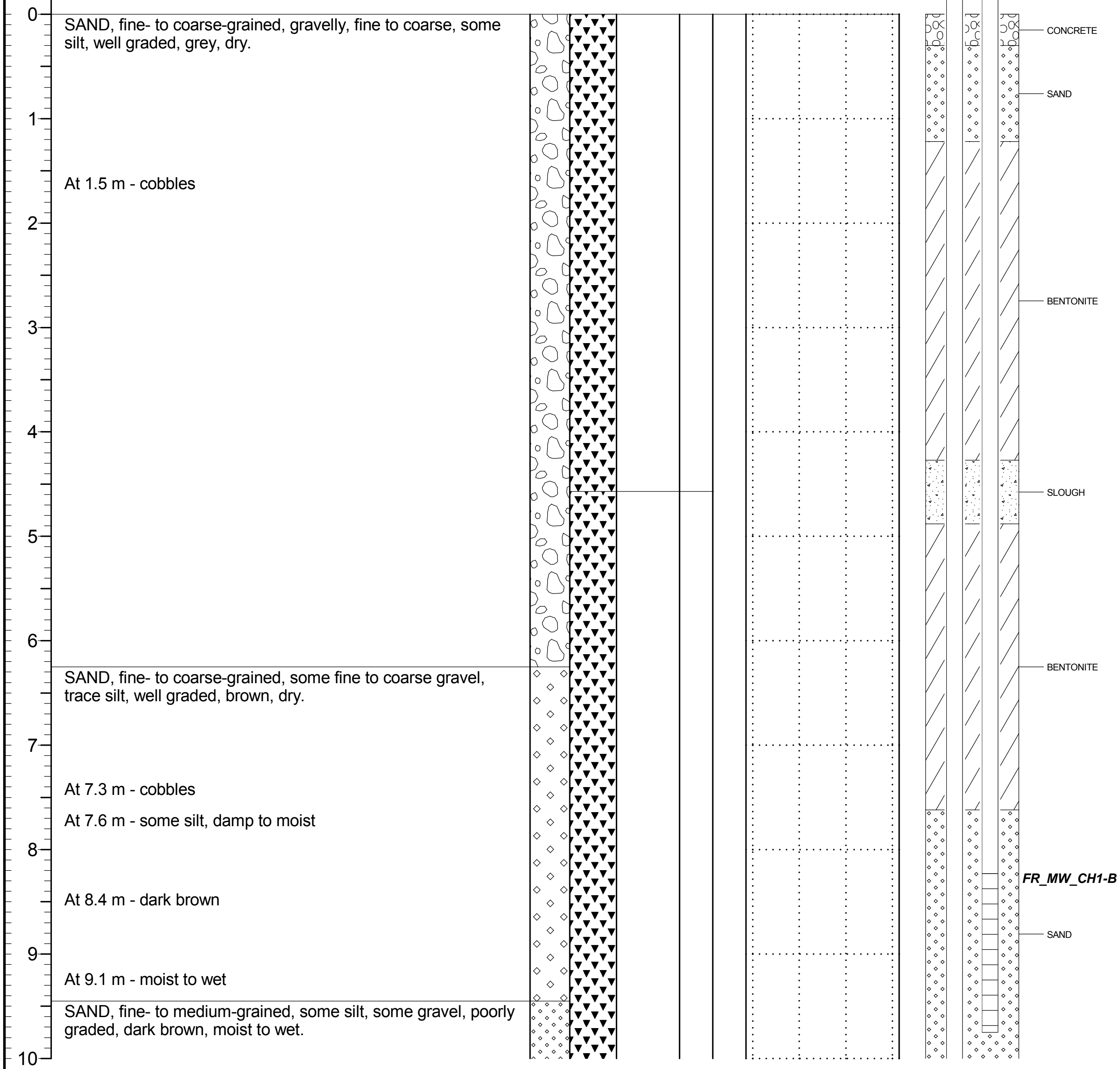
Columns: Depth in Metres | Soil Description | Stratigraphy Plot | Sample Interval Core Run | Sample Number | Blow Count | % Recovery | Soil Vapour (ppm) (10^1, 10^2, 10^3, 10^4)

○ Reading within indicated scale; ● Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: FR_MW_CH1-A
Well Name 2: FR_MW_CH1-B

Depth (m)	Soil Description
0	SAND, fine- to coarse-grained, gravelly, fine to coarse, some silt, well graded, grey, dry.
	At 1.5 m - cobbles
6.3	SAND, fine- to coarse-grained, some fine to coarse gravel, trace silt, well graded, brown, dry.
	At 7.3 m - cobbles
	At 7.6 m - some silt, damp to moist
	At 8.4 m - dark brown
	At 9.1 m - moist to wet
9.4	SAND, fine- to medium-grained, some silt, some gravel, poorly graded, dark brown, moist to wet.



NOTES

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : FR_BH_CH1**
	Location **Regional Groundwater Monitoring**	PAGE 2 OF 5

Drilling Contractor	Owen's Drilling	Date Monitored	n/a	Project Number:	657269
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1562.013	Borehole Logged By:	IPC
Borehole Dia. (m)	0.17	Top of Casing Elev. (m)	1562.940 1562.983	Date Drilled:	2019 01 30
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5552549.191	Easting: 655940.085	Log Typed By:	VL

Drilling Legend: Sample Interval; Air Rotary

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: FR_MW_CH1-A
Well Name 2: FR_MW_CH1-B

Depth in Metres | Soil Description | Stratigraphy Plot | Sample Interval Core Run | Sample Number | Blow Count | % Recovery | Soil Vapour (ppm) 10^1 10^2 10^3 10^4

Depth (m)	Soil Description
10	SAND, fine- to medium-grained, some silt, some gravel, poorly graded, dark brown, moist to wet. *(continued)*
	At 10.4 m - trace gravel
	At 10.7 m - some silt to silty, trace fine gravel, wet
	At 12.3 m - silty
	At 17.5 m - some gravel
	SAND, fine- to coarse-grained, some fine to coarse gravel, some silt, well graded, dark brown, wet.
20	

Depth scale: 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

Well construction: SAND; BENTONITE

NOTES

QA/QC: BH 2019 04 01 Print Date:2019-09-26

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : FR_BH_CH1**
	Location **Regional Groundwater Monitoring**	PAGE 3 OF 5

Drilling Contractor	Owen's Drilling	Date Monitored	n/a	Project Number:	657269
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1562.013	Borehole Logged By:	IPC
Borehole Dia. (m)	0.17	Top of Casing Elev. (m)	1562.940 1562.983	Date Drilled:	2019 01 30
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5552549.191	Easting: 655940.085	Log Typed By:	VL

Drilling Legend: Sample Interval; Air Rotary

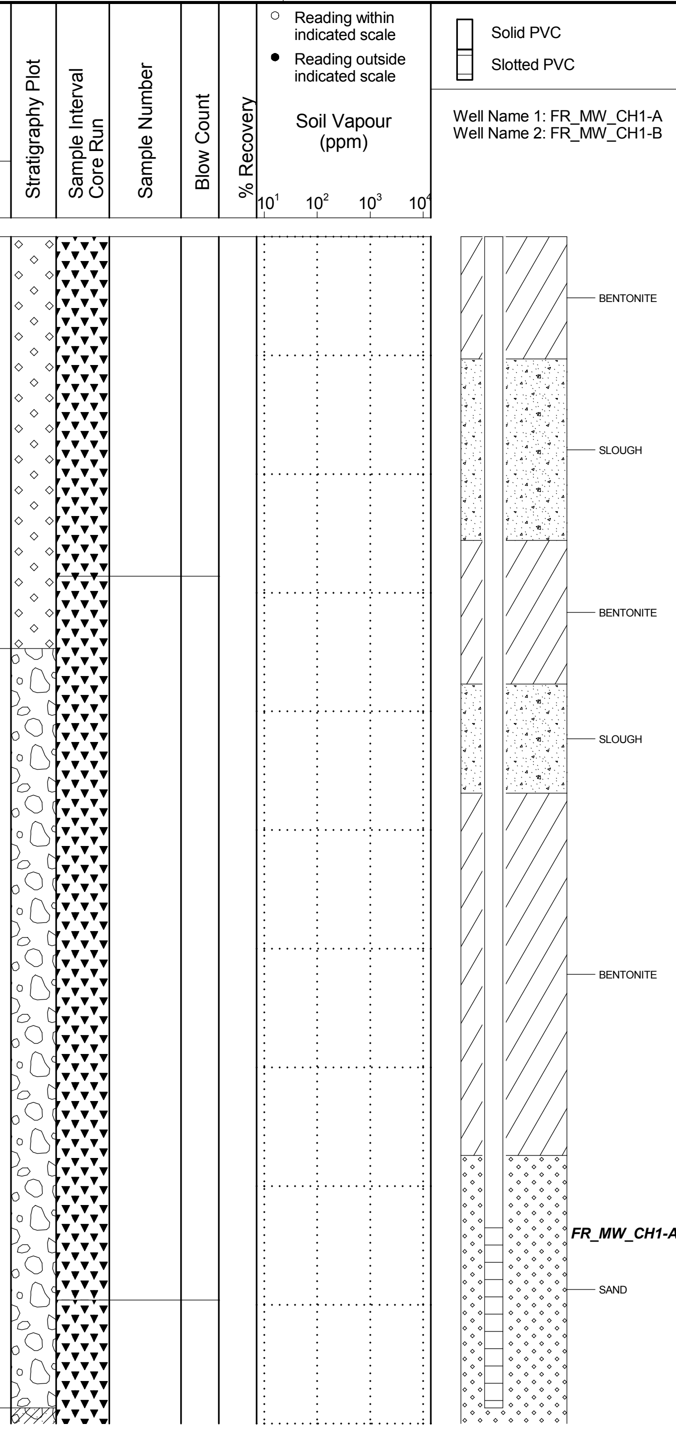
Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: FR_MW_CH1-A
Well Name 2: FR_MW_CH1-B

Depth in Metres	Soil Description
20	SAND, fine- to coarse-grained, some fine to coarse gravel, some silt, well graded, dark brown, wet. *(continued)*
	At 20.7 m - trace gravel to gravelly
23.5	GRAVEL, fine to coarse, some fine- to coarse-grained sand, some silt, well graded, brown, wet.
	At 26.2 m - trace sand
	At 28.0 m - some sand
	At 29.0 m - cobbles
30	



NOTES

SNC-LAVALIN	Client **Teck Coal Limited**	**Borehole No. : FR_BH_CH1**
	Location **Regional Groundwater Monitoring**	PAGE 4 OF 5

Drilling Contractor	Owen's Drilling	Date Monitored	n/a	Project Number:	657269
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1562.013	Borehole Logged By:	IPC
Borehole Dia. (m)	0.17	Top of Casing Elev. (m)	1562.940 1562.983	Date Drilled:	2019 01 30
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5552549.191	Easting: 655940.085	Log Typed By:	VL

Drilling Legend: Sample Interval; Air Rotary

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: FR_MW_CH1-A
Well Name 2: FR_MW_CH1-B

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4	Well
30	SILT and CLAY (TILL), gravelly, sandy, dark brown, wet. *(continued)*							SAND
31–38								BENTONITE
38.4	BEDROCK, siltstone, light grey.							
40								

NOTES

QA/QC: BH 2019 04 01 Print Date:2019-09-26

SNC·LAVALIN

Client **Teck Coal Limited**	**Borehole No. : FR_BH_CH1**
Location **Regional Groundwater Monitoring**	

Drilling Contractor	Owen's Drilling	Date Monitored	n/a	Project Number:	657269
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1562.013	Borehole Logged By:	IPC
Borehole Dia. (m)	0.17	Top of Casing Elev. (m)	1562.940 1562.983	Date Drilled:	2019 01 30
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5552549.191	Easting: 655940.085	Log Typed By:	VL

Drilling Legend: Sample Interval; Air Rotary

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Soil Vapour (ppm): ○ Reading within indicated scale; ● Reading outside indicated scale; scale 10^1 10^2 10^3 10^4

Solid PVC; Slotted PVC

Well Name 1: FR_MW_CH1-A
Well Name 2: FR_MW_CH1-B

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm)	Well
40	BEDROCK, siltstone, light grey. *(continued)*		Air Rotary					BENTONITE
41.2	Bottom of hole at 41.2 m.							

Depth scale: 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50

NOTES

QA/QC: BH 2019 04 01 Print Date:2019-09-26

FINAL

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : FR_BH_CH2**
	Location **Regional Groundwater Monitoring**	PAGE 1 OF 2

Drilling Contractor	Owen's Drilling	Date Monitored	2020 10 08	Project Number:	631283
Drilling Method	Odex	Ground Surface Elev. (m)	1573.385	Borehole Logged By:	MTB
Borehole Dia. (m)	0.13	Top of Casing Elev. (m)	1574.071	Date Drilled:	2020 08 17
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5552944.466	Easting: 656107.213	Log Typed By:	AS

Drilling Legend: Sample Interval; Odex

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Soil Vapour (ppm): ○ Reading within indicated scale; ● Reading outside indicated scale. Scale: 10^1, 10^2, 10^3, 10^4

Well legend: Solid PVC; Slotted PVC

Well Name 1: FR_MW_CH2

Depth in Metres	Soil Description	Sample Number
0 – 0.45	SAND, fine grained, brown, loose, damp, organics.	
0.45 – 1.55	SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, subrounded to subangular, some silt, brown, loose, wet. At 1.2 m - wet.	CH2-01
1.55 – 3.4	GRAVEL, fine to coarse, subangular to angular, some sand, fine to coarse grained, some silt, brown, loose, wet.	CH2-02
3.4 – 4.9	SILTY SAND, fine to coarse grained, trace gravel, fine, subrounded, dark brown, medium dense, moist. At 4.3 m - boulder, dark grey, siltstone, water in cuttings.	CH2-03
4.9 – 10	BEDROCK, dark grey, siltstone, water in cuttings. At 5.5 m - dry. At 7.6 m - water seeped into casing.	CH2-04, CH2-05

Well construction (FR_MW_CH2): BENTONITE; SAND; BENTONITE

NOTES
Bolded sample denotes sample analyzed.
*Denotes blind field duplicate.

QA/QC: LLH 2020 10 19 Print Date:2020-12-02

FINAL

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : FR_BH_CH2**
	Location **Regional Groundwater Monitoring**	PAGE 2 OF 2

Drilling Contractor	Owen's Drilling	Date Monitored	2020 10 08	Project Number:	631283
Drilling Method	Odex	Ground Surface Elev. (m)	1573.385	Borehole Logged By:	MTB
Borehole Dia. (m)	0.13	Top of Casing Elev. (m)	1574.071	Date Drilled:	2020 08 17
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5552944.466	Easting: 656107.213	Log Typed By:	AS

Drilling Legend
- Sample Interval
- Odex

Water/NAPL Levels
- Water Level 1
- Water Level 2
- NAPL
- NAPL

- Reading within indicated scale
- Reading outside indicated scale

- Solid PVC
- Slotted PVC

Well Name 1: FR_MW_CH2

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4	Well
10	BEDROCK, dark grey, siltstone, water in cuttings. *(continued)*							BENTONITE
10.7	Bottom of hole at 10.7 m.							

Depth scale: 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

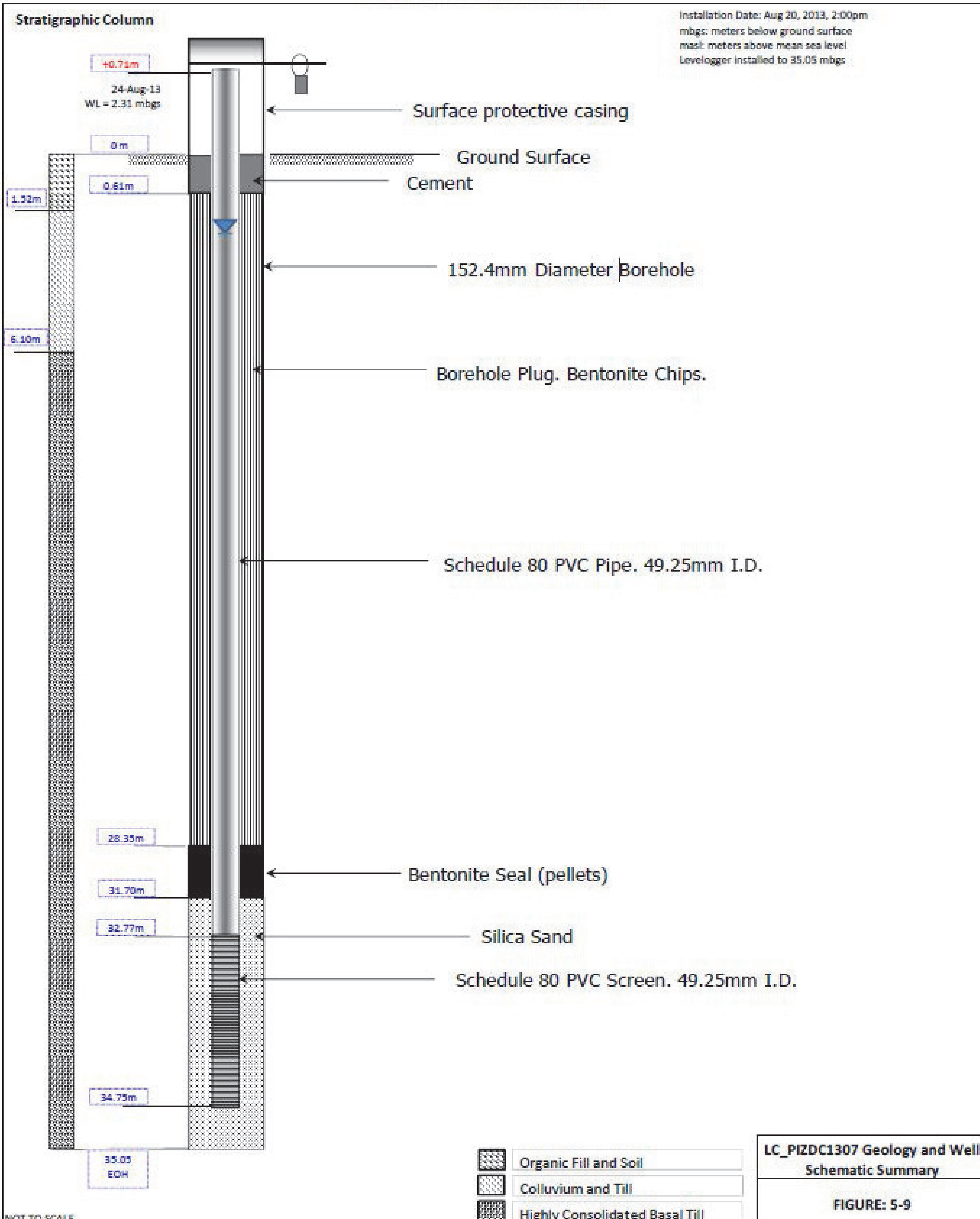
NOTES
Bolded sample denotes sample analyzed.
*Denotes blind field duplicate.

QA/QC: LLH 2020 10 19 Print Date:2020-12-02

MONITORING WELL

Borehole: LC_PIZDC1307 **Location:** 5541229.683N, 658168.846E - 1690.506 masl

DRY CREEK PROJECT - 13-1345-0010



LC_PIZDC1307 Geology and Well Schematic Summary

FIGURE: 5-9

PROJECT No.: 13-1345-0010

RECORD OF MONITORING WELL: LC_PIZDC1307

LOCATION: See Location Plan

BORING DATE: August 19, 2013

DATUM: UTM Zone 11 (Nad 83)

N: 5541229.978 E: 658168.873

Elev = 1690.51 masl

Boring method: Sonic Rig - SR152, Boart LongYear Group

Stickup= 0.71 m

DEPTH (m)	DESCRIPTION	ELEV. / DEPTH (m)	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface	1690.50	
0	FILL	0.00	Cement
	ORGANIC SOIL, black	1689.74 / 0.76	
	GRAVEL and SAND, sub-angular to angular (up to 100 mm in diameter), some silt, w<PL, compact to dense	1689.13 / 1.37	*WL=2.31 mbgs 24 Aug 2013
	SILTY GRAVEL, sub-rounded to sub-angular (up to 50 mm in diameter), some sand, trace clay, w~PL, wet, compact	1687.15 / 3.35	Bentonite Plug
	SILTY GRAVEL, angular to sub-angular, some sand, trace clay, local cobbles, w~PL, moist, very dense	1684.41 / 6.10	
	GRAVELY SILT, sub-rounded to sub-angular, trace sand, trace clay, w~PL, wet, very dense	1681.97 / 8.53	
10			

Column headings: SOIL PROFILE (DESCRIPTION, STRATA PLOT, ELEV. DEPTH (m)); SAMPLES (NUMBER, TYPE, BLOWS/0.3m); DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20, 40, 60, 80); SHEAR STRENGTH Cu, kPa nat V. + Q - ● rem V. ⊕ U - O (10, 20, 30, 40); HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6}, 10^{-5}, 10^{-4}, 10^{-3}); WATER CONTENT PERCENT Wp ⊢—O^W—⊣ Wl (10, 20, 30, 40); ADDITIONAL LAB. TESTING

CONTINUED NEXT PAGE

DEPTH SCALE 1 : 50

Golder Associates

LOGGED: RT

CHECKED:

PROJECT No.: 13-1345-0010

RECORD OF MONITORING WELL: LC_PIZDC1307

LOCATION: See Location Plan

BORING DATE: August 19, 2013

DATUM: UTM Zone 11 (Nad 83)

N: 5541229.978 E: 658168.873

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	ELEV. / DEPTH (m)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
10	Sonic Rig - SR152 / Boart LongYear Group	GRAVELY SILT, sub-rounded to sub-angular, trace sand, trace clay, w~PL, wet, very dense *(continued)*			
12		--- w<PL, moist to dry below 12.2 m			
13.72		SILTY GRAVEL, sub-rounded to sub-angular, some sand, trace clay, w<PL, moist, dense	1676.79 / 13.72		
15					Bentonite Plug
17		--- Gravel is sub-angular to angular, w~PL, wet below 16.8 m			
18		--- Gravel is sub-rounded to sub-angular, moist to locally dry, loose below 18.3 m			
19.81			1670.69 / 19.81		
20					

Column headings: SAMPLES (NUMBER, TYPE, BLOWS/0.3m); DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20, 40, 60, 80); SHEAR STRENGTH Cu, kPa (nat V. + Q - ●; rem V. ⊕ U - ○) (10, 20, 30, 40); HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6}, 10^{-5}, 10^{-4}, 10^{-3}); WATER CONTENT PERCENT (Wp, W, Wl) (10, 20, 30, 40); STRATA PLOT.

CONTINUED NEXT PAGE

DRAFT

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: RT
CHECKED:

PROJECT No.: 13-1345-0010

RECORD OF MONITORING WELL: LC_PIZDC1307

LOCATION: See Location Plan

BORING DATE: August 19, 2013

DATUM: UTM Zone 11 (Nad 83)

N: 5541229.978 E: 658168.873

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE – DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES – NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20, 40, 60, 80); SHEAR STRENGTH Cu, kPa nat V. + Q - ● rem V. ⊕ U - O (10, 20, 30, 40)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6}, 10^{-5}, 10^{-4}, 10^{-3}); WATER CONTENT PERCENT Wp —O W— Wl (10, 20, 30, 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
20	Sonic Rig - SR152 / Boart LongYear Group	SANDY SILT, some sub-rounded to sub-angular gravel, localized sub-rounded to sub-angular cobbles (up to 150 mm in diameter), brown to dark brown, w~PL, moist, compact to dense, stiff *(continued)*									
23		SANDY GRAVEL, sub-angular to angular (up to 100 mm in diameter), some silt, light brown to grey, w<PL, dry, very loose		1667.34 / 23.16							
		SANDY SILT, some sub-rounded to sub-angular gravel, localized sub-rounded to sub-angular cobbles (up to 100 mm in diameter), brown to dark brown, w~PL, moist, very dense, stiff		1667.04 / 23.47							Bentonite Plug
26		SILT, some sand, some sub-rounded to sub-angular gravel (<30 mm in diameter), brown to dark brown, w~PL, wet, compact to dense, firm		1664.60 / 25.91							
29											Bentonite Seal
30		*CONTINUED NEXT PAGE*									

DEPTH SCALE 1 : 50

Golder Associates

LOGGED: RT

CHECKED:

PROJECT No.: 13-1345-0010

RECORD OF MONITORING WELL: LC_PIZDC1307

LOCATION: See Location Plan

BORING DATE: August 19, 2013

DATUM: UTM Zone 11 (Nad 83)

N: 5541229.978 E: 658168.873

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m / SHEAR STRENGTH Cu, kPa	HYDRAULIC CONDUCTIVITY, k, cm/s / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
30	Sonic Rig - SR152, Boart LongYear Group									
		SILTY GRAVEL, sub-rounded to sub-angular (<50 mm in diameter), localized clay, w<PL, dry, very dense, hard --- Localized zones of increased clay, very dry	1660.33 30.18							Bentonite Seal
31										
32		SILT, some sand, some sub-angular to angular gravel, localized boulders, dark brown, w<PL, moist, dense	1658.50 32.00							10/20 Colorado Silica Sand
33										
34										Slotted Screen Section
35		End of MONITORING WELL. Notes: WL= water level. masl = metres above sea level. * WL measured while LC_PIZDC1309 was flowing at surface. mbgs= metres below ground surface.	1655.45 35.05							
36										
37										
38										
39										
40										

Dynamic penetration scale: 20 40 60 80; Shear strength: nat V. + Q - ●, rem V. ⊕ U - ○; scale 10 20 30 40

Hydraulic conductivity scale: 10^{-6} 10^{-5} 10^{-4} 10^{-3}; Water content: Wp ⊢—○W—⊣ Wl; scale 10 20 30 40

DEPTH SCALE 1 : 50

Golder Associates

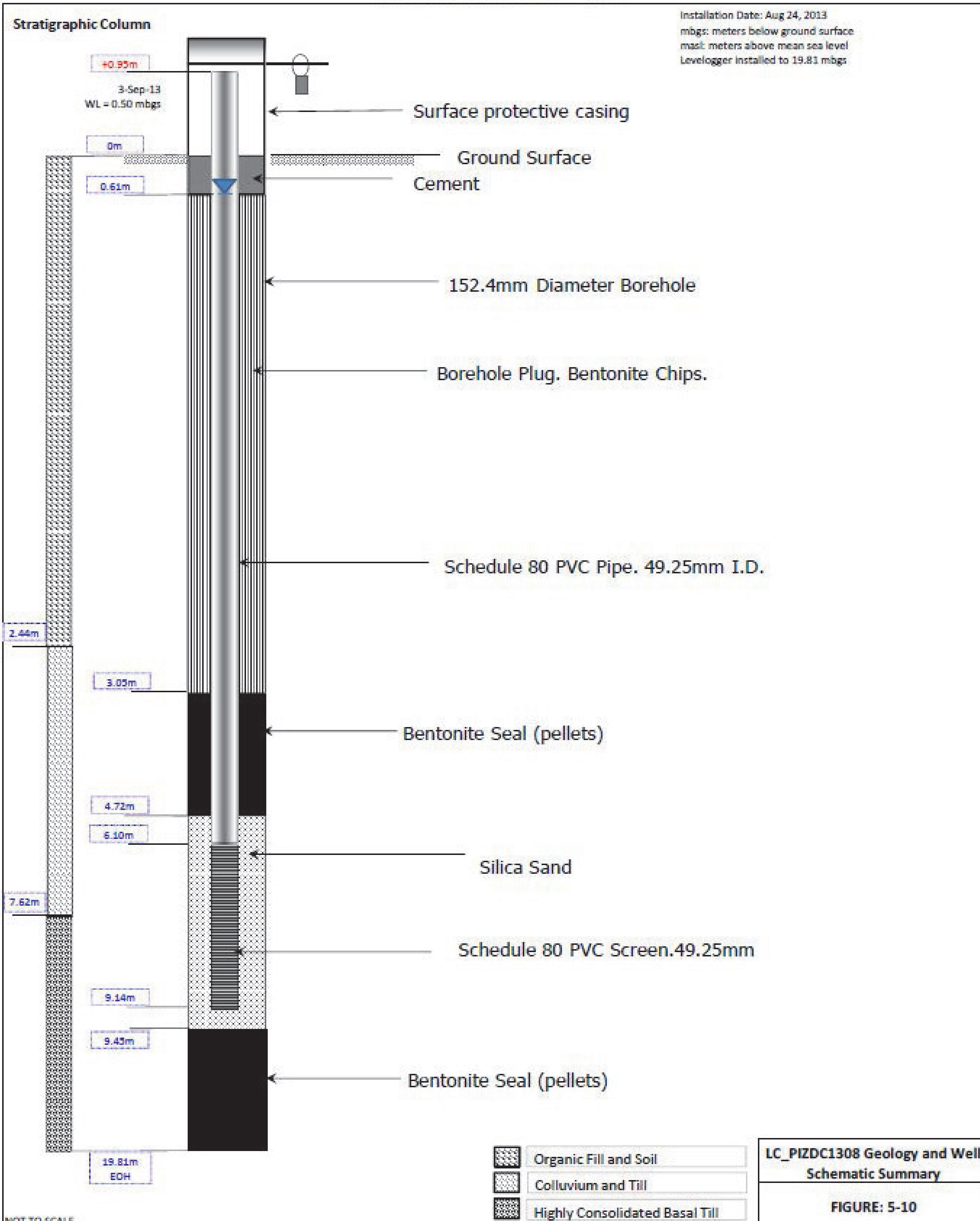
LOGGED: RT

CHECKED:

MONITORING WELL

Borehole: LC_PIZDC1308 **Location:** 5541232.170N, 658167.863E - 1690.424 masl

DRY CREEK PROJECT - 13-1345-0010



LC_PIZDC1308 Geology and Well Schematic Summary

FIGURE: 5-10

DATA ENTRY: VI

PROJECT No.: 13-1345-0010

RECORD OF MONITORING WELL: LC_PIZDC1308

SHEET 1 OF 2

LOCATION: See Location Plan

N: 5541232.317 E: 658167.9

BORING DATE: August 21, 2013

DATUM: UTM Zone 11 (Nad 83)
Elev = 1690.42 masl

Column headings: DEPTH SCALE METRES | BORING METHOD | SOIL PROFILE (DESCRIPTION, STRATA PLOT, ELEV. DEPTH (m)) | SAMPLES (NUMBER, TYPE, BLOWS/0.3m) | DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20, 40, 60, 80); SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○) (10, 20, 30, 40) | HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6}, 10^{-5}, 10^{-4}, 10^{-3}); WATER CONTENT PERCENT (Wp, W, Wl) (10, 20, 30, 40) | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION

Boring method: Sonic Rig - SR152, Boart LongYear Group

Description	Elev. / Depth (m)
Ground Surface	1690.42
FILL	0.00
ORGANIC SOIL, black	1689.65 / 0.76
SANDY GRAVEL, sub-angular to angular (up to 100 mm in diameter), some silt, w<PL, dry, very loose	1688.59 / 1.83
SILTY GRAVEL, sub-rounded to sub-angular (up to 50 mm in diameter), some sand, trace clay, w~PL, wet, loose	1688.28 / 2.13
SILTY GRAVEL, angular to sub-angular, some sand, trace clay, local cobbles, w~PL, moist to wet, compact --- Localized dry loose gravel zone (looks like pad fill material, fresh, dry, powdery, likely sloughed into hole) from 5.5 to 5.8 m --- Localized dry loose gravel zone (looks like pad fill material, fresh, dry, powdery, likely sloughed into hole) from 6.6 to 6.7 m	1685.84 / 4.57
GRAVELY SILT, sub-rounded to sub-angular, trace sand, trace clay, w~PL, wet, dense to very dense --- Decrease in gravel and clay content below 8.5 m	1682.80 / 7.62

Piezometer installation: Stickup= 0.95 m; Cement; *WL=0.50 mbgs 24 Aug 2013; Bentonite Plug; Bentonite Seal; 10/20 Colorado Silica Sand; Slotted Screen Section; Bentonite Seal

Depth scale: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

DRAFT

CONTINUED NEXT PAGE

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: RT
CHECKED:

PROJECT No.: 13-1345-0010

RECORD OF MONITORING WELL: LC_PIZDC1308

LOCATION: See Location Plan

N: 5541232.317 E: 658167.9

BORING DATE: August 21, 2013

DATUM: UTM Zone 11 (Nad 83)

BORING METHOD: Sonic Rig - SR152, Boart LongYear Group

DEPTH SCALE METRES	DESCRIPTION	ELEV. / DEPTH (m)	PIEZOMETER OR STANDPIPE INSTALLATION
10	GRAVELY SILT, sub-rounded to sub-angular, trace sand, trace clay, w~PL, wet, dense to very dense *(continued)*		
12	GRAVELY SILT, sub-rounded to sub-angular, trace sand, trace clay, local cobbles, w<PL, moist, very dense	1678.22 / 12.19	
13.72	GRAVELY SILT, sub-rounded to sub-angular, some sand, trace clay, brown to dark brown, w<PL, moist, very dense	1676.70 / 13.72	Bentonite Seal
16.76	SILTY GRAVEL, sub-angular to angular, some sand, trace clay, w~PL, moist, dense	1673.65 / 16.76	
19.81	End of MONITORING WELL.	1670.60 / 19.81	

Column headers also printed (no data entered): SAMPLES (NUMBER, TYPE, BLOWS/0.3m); DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20, 40, 60, 80); SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○; 10, 20, 30, 40); HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6}, 10^{-5}, 10^{-4}, 10^{-3}); WATER CONTENT PERCENT (Wp, W, Wl; 10, 20, 30, 40); ADDITIONAL LAB. TESTING; STRATA PLOT.

Notes:
WL= water level.
masl = metres above sea level.
* WL measured while LC_PIZDC1309 was flowing at surface.
mbgs= metres below ground surface.

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: RT
CHECKED:

FINAL

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : GH_BH_BG1A**
	Location **Regional Groundwater Monitoring**	PAGE 1 OF 8

Drilling Contractor	Owen's Drilling	Date Monitored	n/a	Project Number:	635544
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1448.626	Borehole Logged By:	GG
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1449.508	Date Drilled:	2020 11 06
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5565171.060	Easting: 645669.946	Log Typed By:	VL

Drilling Legend
Sample Interval
Air Rotary

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name 1: GH_MW_BG1A

Depth in Metres | Soil Description | Stratigraphy Plot | Sample Interval Core Run | Sample Number | Blow Count | % Recovery | Soil Vapour (ppm) 10^1 10^2 10^3 10^4

Depth (m)	Soil Description
0	SILT and SAND, fine to medium grained sand, trace gravel, dark brown, soft, damp.
~1.5	SILT, some sand, fine grained, trace to some gravel, brown, dense, low plasticity, dry.
~7.6	SAND, fine to coarse grained, trace silt, trace gravel, brown, medium dense, dry.
~9.1	SILT, some sand, fine grained, trace gravel, fine to coarse, subrounded, trace clay, brown, dense, low plasticity, damp.

Depth scale: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

SAND

BENTONITE

NOTES

FINAL

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : GH_BH_BG1A**
	Location **Regional Groundwater Monitoring**	PAGE 2 OF 8

Drilling Contractor	Owen's Drilling	Date Monitored	n/a	Project Number:	635544
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1448.626	Borehole Logged By:	GG
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1449.508	Date Drilled:	2020 11 06
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5565171.060	Easting: 645669.946	Log Typed By:	VL

Drilling Legend: Sample Interval; Air Rotary

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: GH_MW_BG1A

Soil Vapour (ppm): 10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Well
10	SILT, some sand, fine grained, trace gravel, fine to coarse, subrounded, trace clay, brown, dense, low plasticity, damp. *(continued)*						
12	Below 12.2 m - no clay, no plasticity.						
15							BENTONITE
17	Below 16.8 m - some gravel, fine to coarse, subangular to subrounded.						
20							

NOTES

LH 2021 02 22 Print Date:2021-02-22

FINAL

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : GH_BH_BG1A**
	Location **Regional Groundwater Monitoring**	PAGE 3 OF 8

Drilling Contractor	Owen's Drilling	Date Monitored	n/a	Project Number:	635544
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1448.626	Borehole Logged By:	GG
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1449.508	Date Drilled:	2020 11 06
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5565171.060	Easting: 645669.946	Log Typed By:	VL

Drilling Legend: Sample Interval; Air Rotary

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

○ Reading within indicated scale; ● Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: GH_MW_BG1A

Soil Vapour (ppm): 10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Well
20	SILT, some sand, fine grained, trace gravel, fine to coarse, subrounded, trace clay, brown, dense, low plasticity, damp. *(continued)*						
24.7	SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, subangular to subrounded, brown, dense, moist.						BENTONITE
27.4	GRAVELLY SAND, fine to coarse grained sand, fine gravel, subangular to subrounded, trace silt, brown, dense, wet.						

Depth scale: 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30

NOTES

LH 2021 02 22 Print Date:2021-02-22

FINAL

SNC-LAVALIN	Client **Teck Coal Limited**	**Borehole No. : GH_BH_BG1A**
	Location **Regional Groundwater Monitoring**	

Drilling Contractor	Owen's Drilling	Date Monitored	n/a	Project Number:	635544
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1448.626	Borehole Logged By:	GG
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1449.508	Date Drilled:	2020 11 06
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5565171.060	Easting: 645669.946	Log Typed By:	VL

Drilling Legend: Sample Interval; Air Rotary

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: GH_MW_BG1A

Soil Vapour (ppm): 10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery
30	GRAVELLY SAND, fine to coarse grained sand, fine gravel, subangular to subrounded, trace silt, brown, dense, wet. *(continued)*					
33.2	SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, subangular to rounded, brown, dense, wet. Below 33.5 m - some silt to silty.					
36.6	Below 36.6 m - trace silt, medium to coarse grained sand.					
39.6	GRAVEL, fine to coarse, subangular to subrounded, some silt, trace sand, fine to coarse grained, brown, dense, wet.					
40						

BENTONITE

NOTES

LH 2021 02 22 Print Date:2021-02-22

FINAL

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : GH_BH_BG1A**
	Location **Regional Groundwater Monitoring**	PAGE 5 OF 8

Drilling Contractor Owen's Drilling	Date Monitored n/a	Project Number:	635544
Drilling Method Dual Rotary	Ground Surface Elev. (m) 1448.626	Borehole Logged By:	GG
Borehole Dia. (m) 0.15	Top of Casing Elev. (m) 1449.508	Date Drilled:	2020 11 06
Pipe/Slotted Pipe Dia. (m) 0.05/0.05	Northing: 5565171.060 Easting: 645669.946	Log Typed By:	VL

Drilling Legend: Sample Interval; Air Rotary

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: GH_MW_BG1A

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4	Well
40	GRAVEL, fine to coarse, subangular to subrounded, some silt, trace sand, fine to coarse grained, brown, dense, wet. *(continued)*							
44.8	SILT and GRAVEL, fine to coarse gravel, angular to subrounded, some sand, fine to coarse grained, brown, dense, wet.							BENTONITE
46	SILT, trace sand, fine to coarse grained, brown, dense, wet.							

Depth scale: 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50

NOTES

LH 2021 02 22 Print Date:2021-02-22

FINAL

SNC-LAVALIN	Client **Teck Coal Limited**	**Borehole No. : GH_BH_BG1A**
	Location **Regional Groundwater Monitoring**	PAGE 6 OF 8

Drilling Contractor	Owen's Drilling	Date Monitored	n/a	Project Number:	635544
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1448.626	Borehole Logged By:	GG
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1449.508	Date Drilled:	2020 11 06
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5565171.060	Easting: 645669.946	Log Typed By:	VL

Drilling Legend: Sample Interval; Air Rotary

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: GH_MW_BG1A

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4	Well
50	SILT, trace sand, fine to coarse grained, brown, dense, wet. *(continued)*							
51	Below 51.2 m - trace gravel, fine, subrounded.							
52								
53								
54								
55								BENTONITE
56								
57								
58								
59								
60								

NOTES

FINAL

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : GH_BH_BG1A**
	Location **Regional Groundwater Monitoring**	PAGE 7 OF 8

Drilling Contractor	Owen's Drilling	Date Monitored	n/a	Project Number:	635544
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1448.626	Borehole Logged By:	GG
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1449.508	Date Drilled:	2020 11 06
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5565171.060	Easting: 645669.946	Log Typed By:	VL

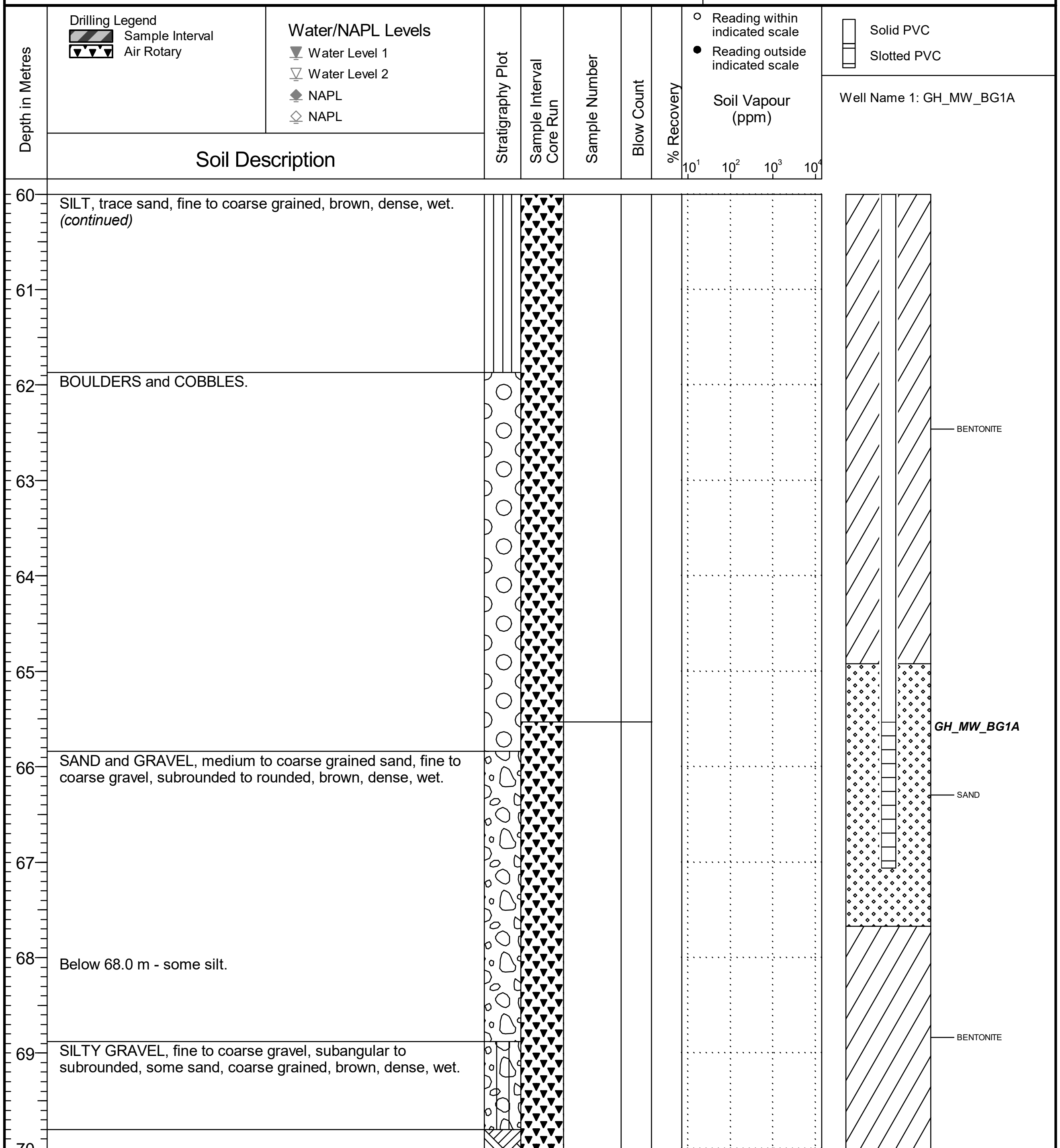
Drilling Legend: Sample Interval; Air Rotary

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: GH_MW_BG1A



NOTES

LH 2021 02 22 Print Date:2021-02-22

FINAL

SNC-LAVALIN	Client **Teck Coal Limited**	**Borehole No. : GH_BH_BG1A**
	Location **Regional Groundwater Monitoring**	PAGE 8 OF 8

Drilling Contractor	Owen's Drilling	Date Monitored	n/a	Project Number:	635544
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1448.626	Borehole Logged By:	GG
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1449.508	Date Drilled:	2020 11 06
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5565171.060	Easting: 645669.946	Log Typed By:	VL

Drilling Legend: Sample Interval; Air Rotary

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

○ Reading within indicated scale; ● Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: GH_MW_BG1A

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4	Well
70–71.6	BEDROCK, siltstone, dark grey with beige weathering, weathered, compentent, soft, white calcite secondary minerals on fracture surfaces. *(continued)*		Air Rotary					BENTONITE
71.6	Bottom of hole at 71.6 m.							

Depth scale: 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80

NOTES

FINAL

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : GH_BH_BG1B**
	Location **Regional Groundwater Monitoring**	PAGE 1 OF 5

Drilling Contractor	Owen's Drilling	Date Monitored	2020 09 29	Project Number:	631283
Drilling Method	Odex	Ground Surface Elev. (m)	1448.707	Borehole Logged By:	MTB
Borehole Dia. (m)	0.13	Top of Casing Elev. (m)	1449.693	Date Drilled:	2020 09 25
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5565168.100	Easting: 645663.688	Log Typed By:	AS

Drilling Legend: Sample Interval; Odex

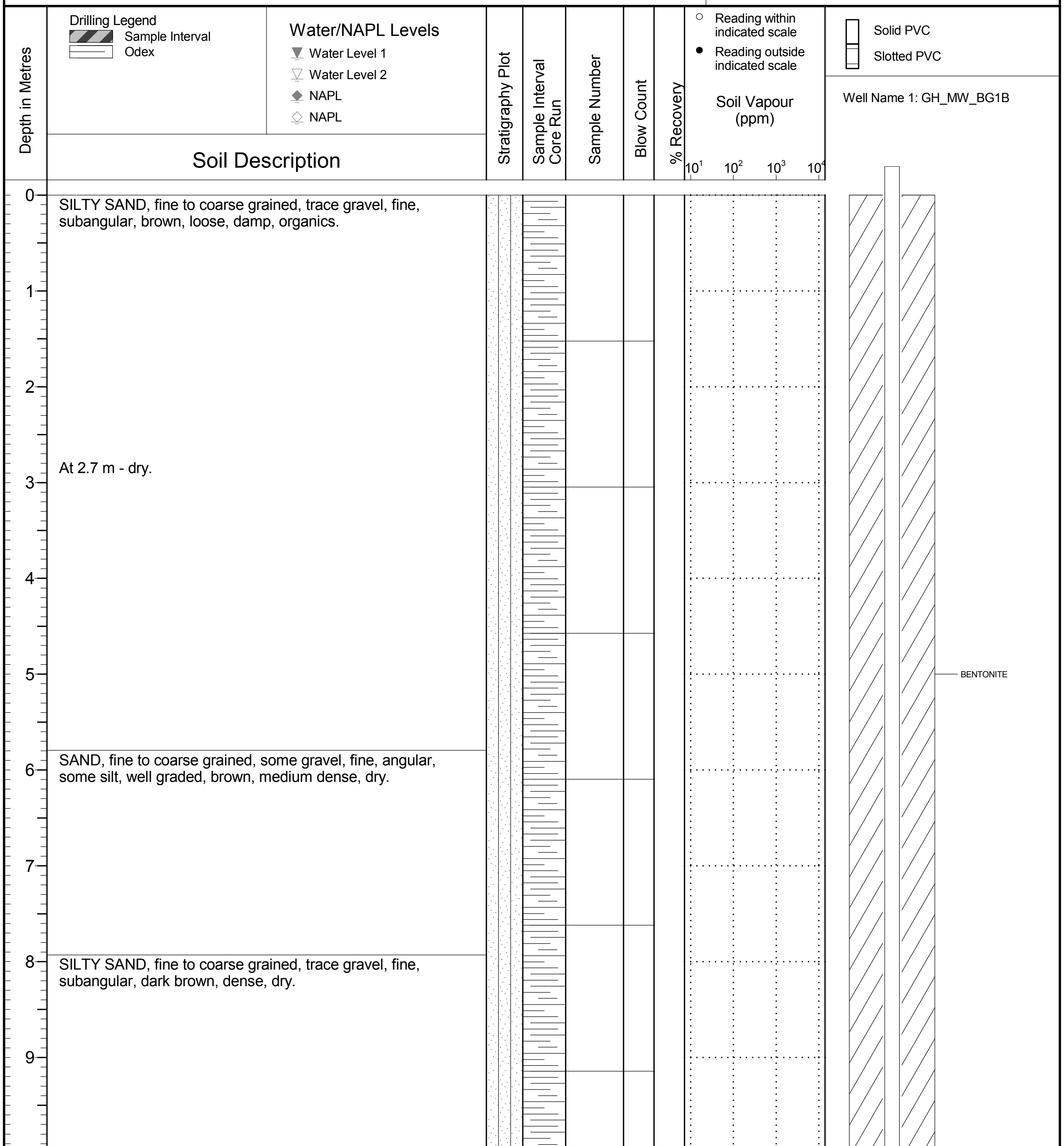
Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: GH_MW_BG1B

Depth in Metres	Soil Description
0	SILTY SAND, fine to coarse grained, trace gravel, fine, subangular, brown, loose, damp, organics.
2.7	At 2.7 m - dry.
5.8	SAND, fine to coarse grained, some gravel, fine, angular, some silt, well graded, brown, medium dense, dry.
7.9	SILTY SAND, fine to coarse grained, trace gravel, fine, subangular, dark brown, dense, dry.



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QA/QC: LLH 2020 10 19 Print Date:2020-12-02

FINAL

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : GH_BH_BG1B**
	Location **Regional Groundwater Monitoring**	PAGE 2 OF 5

Drilling Contractor	Owen's Drilling	Date Monitored	2020 09 29	Project Number:	631283
Drilling Method	Odex	Ground Surface Elev. (m)	1448.707	Borehole Logged By:	MTB
Borehole Dia. (m)	0.13	Top of Casing Elev. (m)	1449.693	Date Drilled:	2020 09 25
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5565168.100	Easting: 645663.688	Log Typed By:	AS

Drilling Legend: Sample Interval; Odex

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: GH_MW_BG1B

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4	Well
10	SILTY SAND, fine to coarse grained, trace gravel, fine, subangular, dark brown, dense, dry. *(continued)*							
15								BENTONITE
18	At 18.0 m - some gravel.							
19.5	At 19.5 m - trace gravel.							
20								

NOTES

QA/QC: LLH 2020 10 19 Print Date:2020-12-02

FINAL

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : GH_BH_BG1B**
	Location **Regional Groundwater Monitoring**	PAGE 3 OF 5

Drilling Contractor	Owen's Drilling	Date Monitored	2020 09 29	Project Number:	631283
Drilling Method	Odex	Ground Surface Elev. (m)	1448.707	Borehole Logged By:	MTB
Borehole Dia. (m)	0.13	Top of Casing Elev. (m)	1449.693	Date Drilled:	2020 09 25
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5565168.100	Easting: 645663.688	Log Typed By:	AS

Drilling Legend: Sample Interval; Odex

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: GH_MW_BG1B

Soil Vapour (ppm): 10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Well
20	SILTY SAND, fine to coarse grained, trace gravel, fine, subangular, dark brown, dense, dry. *(continued)*						
22.25	SAND and SILT, fine grained sand, trace gravel, subangular, dark brown, dense, dry.						
24.7	SAND, fine to coarse grained, some gravel, fine, subangular to subrounded, some silt, well graded, brown, medium dense, dry.						BENTONITE
25.9	SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, subrounded, some silt, well graded, dark brown, medium dense, damp.						
30							

NOTES

QA/QC: LLH 2020 10 19 Print Date:2020-12-02

FINAL

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : GH_BH_BG1B**
	Location **Regional Groundwater Monitoring**	PAGE 4 OF 5

Drilling Contractor	Owen's Drilling	Date Monitored	2020 09 29	Project Number:	631283
Drilling Method	Odex	Ground Surface Elev. (m)	1448.707	Borehole Logged By:	MTB
Borehole Dia. (m)	0.13	Top of Casing Elev. (m)	1449.693	Date Drilled:	2020 09 25
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5565168.100	Easting: 645663.688	Log Typed By:	AS

Drilling Legend: Sample Interval; Odex

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: GH_MW_BG1B

Depth in Metres | Soil Description | Stratigraphy Plot | Sample Interval Core Run | Sample Number | Blow Count | % Recovery | Soil Vapour (ppm) 10^1 10^2 10^3 10^4

Depth in Metres	Soil Description
30	SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, subrounded, some silt, well graded, dark brown, medium dense, damp. *(continued)*
31	
32	
33	
34	
34.5	SILTY, SANDY GRAVEL, fine to coarse gravel, angular to subangular, fine to coarse grained sand, well graded, brown, medium dense, wet.
35	
36	At 36.3 m - wet.
37	
38	
39	
40	

BENTONITE

NOTES

QA/QC: LLH 2020 10 19 Print Date:2020-12-02

FINAL

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : GH_BH_BG1B**
	Location **Regional Groundwater Monitoring**	PAGE 5 OF 5

Drilling Contractor	Owen's Drilling	Date Monitored	2020 09 29	Project Number:	631283
Drilling Method	Odex	Ground Surface Elev. (m)	1448.707	Borehole Logged By:	MTB
Borehole Dia. (m)	0.13	Top of Casing Elev. (m)	1449.693	Date Drilled:	2020 09 25
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5565168.100	Easting: 645663.688	Log Typed By:	AS

Drilling Legend
- Sample Interval
- Odex

Water/NAPL Levels
- Water Level 1
- Water Level 2
- NAPL
- NAPL

Reading within indicated scale
Reading outside indicated scale

Soil Vapour (ppm): 10^1 10^2 10^3 10^4

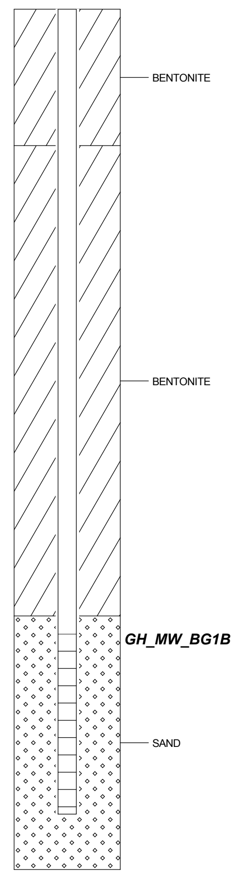
Solid PVC
Slotted PVC

Well Name 1: GH_MW_BG1B

Columns: Depth in Metres | Soil Description | Stratigraphy Plot | Sample Interval Core Run | Sample Number | Blow Count | % Recovery | Soil Vapour (ppm)

Depth (m)	Soil Description
40 – 42	SILT and GRAVEL, fine to coarse gravel, subangular to angular, some sand, fine to coarse grained, brown, dense, firm, wet.
42 – 47.2	SILTY SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, angular to subangular, well graded, brown, dense, wet.
47.2	Bottom of hole at 47.2 m.

Depth scale: 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50



NOTES

QA/QC: LLH 2020 10 19 Print Date:2020-12-02

FINAL

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : GH_BH_BG1C**
	Location **Regional Groundwater Monitoring**	PAGE 1 OF 4

Drilling Contractor	Owen's Drilling	Date Monitored	2020 09 29	Project Number:	631283
Drilling Method	Odex	Ground Surface Elev. (m)	1448.484	Borehole Logged By:	MTB
Borehole Dia. (m)	0.13	Top of Casing Elev. (m)	1449.343	Date Drilled:	2020 09 24
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5565164.723	Easting: 645663.041	Log Typed By:	AS

Drilling Legend: Sample Interval; Odex

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

○ Reading within indicated scale; ● Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: GH_MW_BG1C

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
0	SILTY SAND, fine to coarse grained sand, trace gravel, fine, subangular, brown, loose, damp, organics.						
2.7	At 2.7 m - dry.						
5.8	SAND, fine to coarse grained, some gravel, fine, angular, some silt, well graded, brown, medium dense, dry.						
7.9	SILTY SAND, fine to coarse grained sand, trace gravel, fine subangular, dark brown, dense, dry.						

BENTONITE

NOTES

QA/QC: LLH 2020 10 19 Print Date:2020-12-02

FINAL

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : GH_BH_BG1C**
	Location **Regional Groundwater Monitoring**	PAGE 2 OF 4

Drilling Contractor	Owen's Drilling	Date Monitored	2020 09 29	Project Number:	631283
Drilling Method	Odex	Ground Surface Elev. (m)	1448.484	Borehole Logged By:	MTB
Borehole Dia. (m)	0.13	Top of Casing Elev. (m)	1449.343	Date Drilled:	2020 09 24
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5565164.723	Easting: 645663.041	Log Typed By:	AS

Drilling Legend: Sample Interval; Odex

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: GH_MW_BG1C

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
10	SILTY SAND, fine to coarse grained sand, trace gravel, fine subangular, dark brown, dense, dry. *(continued)*						
18	At 18.0 m - some gravel.						
19.5	At 19.5 m - trace gravel.						
20							

BENTONITE

NOTES

QA/QC: LLH 2020 10 19 Print Date:2020-12-02

FINAL

SNC-LAVALIN	Client: **Teck Coal Limited**	**Borehole No. : GH_BH_BG1C**
	Location: **Regional Groundwater Monitoring**	

Drilling Contractor	Owen's Drilling	Date Monitored	2020 09 29	Project Number:	631283
Drilling Method	Odex	Ground Surface Elev. (m)	1448.484	Borehole Logged By:	MTB
Borehole Dia. (m)	0.13	Top of Casing Elev. (m)	1449.343	Date Drilled:	2020 09 24
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5565164.723	Easting: 645663.041	Log Typed By:	AS

Drilling Legend: Sample Interval; Odex

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

○ Reading within indicated scale; ● Reading outside indicated scale

Soil Vapour (ppm): 10^1 10^2 10^3 10^4

Solid PVC; Slotted PVC

Well Name 1: GH_MW_BG1C

Depth in Metres	Soil Description
20.0	SILTY SAND, fine to coarse grained sand, trace gravel, fine subangular, dark brown, dense, dry. *(continued)*
~22.3	SAND and SILT, fine grained sand, trace gravel, subangular, dark brown, dense, dry.
~24.7	SAND, fine to coarse grained, some gravel, fine, subangular to subrounded, some silt, well graded, brown, medium dense, dry.
~25.9	SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, subrounded, some silt, well graded, dark brown, medium dense, damp.
~28.7	SILTY SAND, fine to coarse grained sand, some gravel, fine, subrounded, well graded, dark brown, damp.

Depth scale: 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30

BENTONITE

NOTES

FINAL

SNC-LAVALIN	Client **Teck Coal Limited**	**Borehole No. : GH_BH_BG1C**
	Location **Regional Groundwater Monitoring**	

Drilling Contractor	Owen's Drilling	Date Monitored	2020 09 29	Project Number:	631283
Drilling Method	Odex	Ground Surface Elev. (m)	1448.484	Borehole Logged By:	MTB
Borehole Dia. (m)	0.13	Top of Casing Elev. (m)	1449.343	Date Drilled:	2020 09 24
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5565164.723	Easting: 645663.041	Log Typed By:	AS

Drilling Legend: Sample Interval; Odex

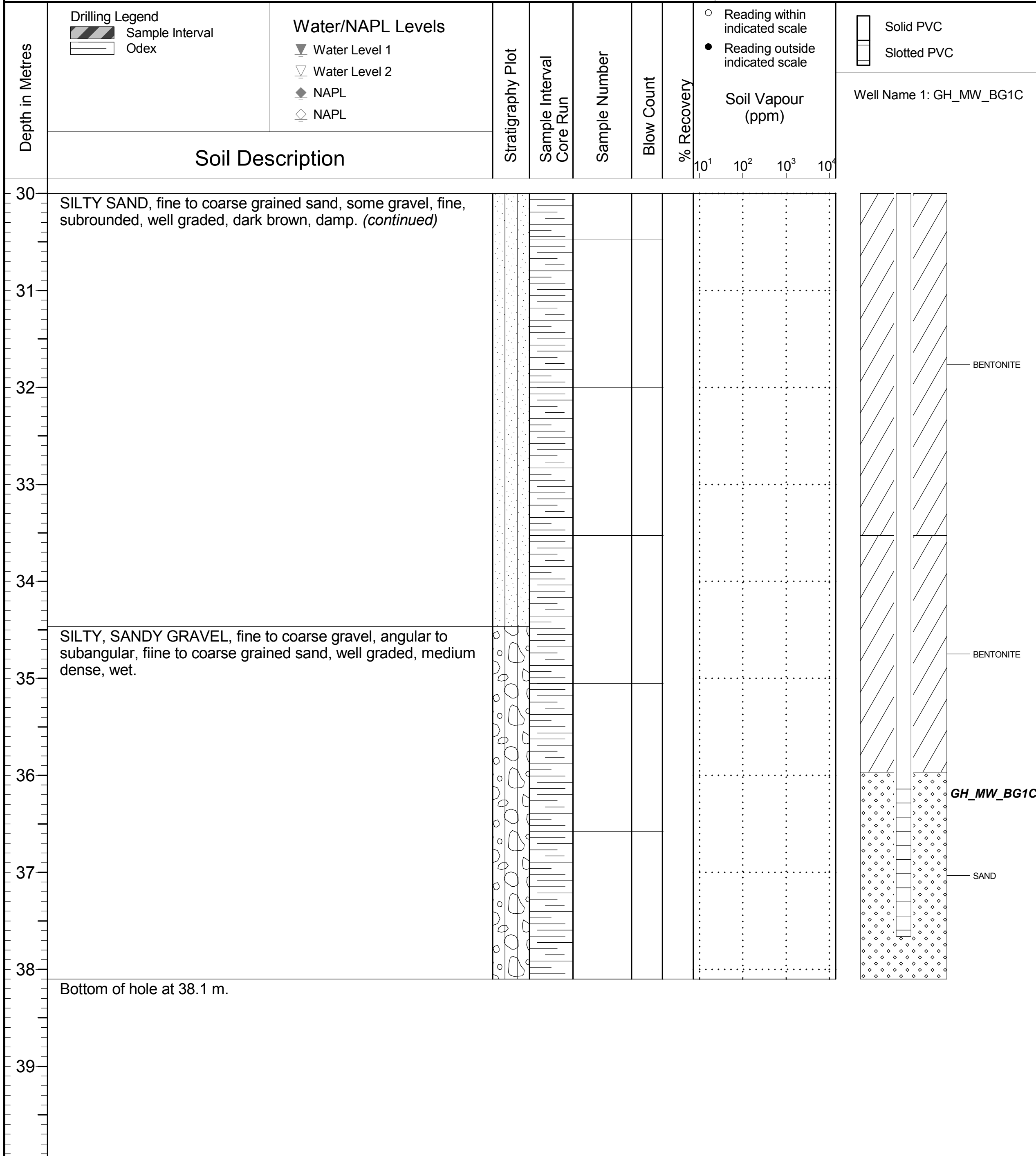
Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: GH_MW_BG1C

Depth in Metres	Soil Description
30	SILTY SAND, fine to coarse grained sand, some gravel, fine, subrounded, well graded, dark brown, damp. *(continued)*
34.5	SILTY, SANDY GRAVEL, fine to coarse gravel, angular to subangular, fiine to coarse grained sand, well graded, medium dense, wet.
38.1	Bottom of hole at 38.1 m.



NOTES

QA/QC: LLH 2020 10 19 Print Date:2020-12-02

SNC-LAVALIN	Client **Teck Coal Limited**	**Borehole No. : GH_BH-Willow-1**
	Location **Greenhills Operations Willow Pond**	PAGE 1 OF 4

Drilling Contractor	Owen's Drilling	Date Monitored	2018 12 07	Project Number:	658004
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1345.524	Borehole Logged By:	MCA/AMH
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1346.420 1346.423	Date Drilled:	2018 11 20
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5556081.040	Easting: 647474.898	Log Typed By:	VL

Drilling Legend
Sample Interval
Auger Flight

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name 1: GH_MW-Willow-1S
Well Name 2: GH_MW-Willow-1D

Depth in Metres | Soil Description | Stratigraphy Plot | Sample Interval Core Run | Sample Number | Blow Count | % Recovery | Soil Vapour (ppm) 10^1 10^2 10^3 10^4

0 – SAND, fine to medium grained, silty, some gravel to gravelly, fine to coarse, cobbles present, subrounded, well graded, brown to light brown, medium dense, dry.

At 1.8 m - brown

3 – SAND and GRAVEL, fine to medium grained sand, fine to coarse gravel, silty, cobbles present, subrounded to subangular, well graded, dark brown, medium dense, damp.

4.5 – SILT, sandy, fine grained, some gravel, fine to coarse, subrounded, dark brown, soft, damp.
At 4.9 m - damp to dry

8.2 – SAND and GRAVEL, fine to medium grained sand, fine to coarse gravel, some silt to silty, subrounded, well graded, dark brown, dense, damp, some fine gravel with evidence of oxidation/weathering.

0 1 2 3 4 5 6 7 8 9 10

BENTONITE

NOTES
Water level 1 and first top of casing elevation is for GH_MW-Willow-1S. Water level 2 and second top of casing elevation is for GH_MW-Willow-1D.

SNC·LAVALIN	Client: **Teck Coal Limited**	**Borehole No. : GH_BH-Willow-1**
	Location: **Greenhills Operations Willow Pond**	

Drilling Contractor	Owen's Drilling	Date Monitored	2018 12 07	Project Number:	658004
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1345.524	Borehole Logged By:	MCA/AMH
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1346.420 1346.423	Date Drilled:	2018 11 20
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5556081.040	Easting: 647474.898	Log Typed By:	VL

Drilling Legend: Sample Interval; Auger Flight

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

○ Reading within indicated scale; ● Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: GH_MW-Willow-1S
Well Name 2: GH_MW-Willow-1D

Columns: Depth in Metres | Soil Description | Stratigraphy Plot | Sample Interval Core Run | Sample Number | Blow Count | % Recovery | Soil Vapour (ppm) 10^1 10^2 10^3 10^4

Depth (m)	Soil Description
10	SAND and GRAVEL, fine to medium grained sand, fine to coarse gravel, some silt to silty, subrounded, well graded, dark brown, dense, damp, some fine gravel with evidence of oxidation/weathering. *(continued)* At 10.7 m - increased gravel, moist to wet
13	At 13.0 m - damp to dry
15.5	SAND, silty, fine grained, trace fine to coarse gravel, poorly graded, brown, dense, dry.
20	

Well construction labels: BENTONITE; *GH_MW-Willow-1S*; SAND; BENTONITE/SLOUGH

NOTES
Water level 1 and first top of casing elevation is for GH_MW-Willow-1S. Water level 2 and second top of casing elevation is for GH_MW-Willow-1D.

QA: MCA 2019 01 14 Print Date:2019-12-04

SNC-LAVALIN	Client **Teck Coal Limited**	**Borehole No. : GH_BH-Willow-1**
	Location **Greenhills Operations Willow Pond**	PAGE 3 OF 4

Drilling Contractor	Owen's Drilling	Date Monitored	2018 12 07	Project Number:	658004
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1345.524	Borehole Logged By:	MCA/AMH
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1346.420 1346.423	Date Drilled:	2018 11 20
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5556081.040	Easting: 647474.898	Log Typed By:	VL

Drilling Legend: Sample Interval; Auger Flight

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: GH_MW-Willow-1S
Well Name 2: GH_MW-Willow-1D

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
20	SAND and GRAVEL, fine grained sand, fine to coarse gravel, silty, subrounded, poorly graded, brown, dense, dry. *(continued)*						
22.3	SILT, sandy, fine grained, trace fine to coarse gravel, subrounded, poorly graded, firm, dry.						
25.6	SAND and GRAVEL, fine grained sand, fine to coarse gravel, silty, subrounded, poorly graded, brown, dense, dry.						
27.1	At 27.1 m - increased gravel						
30							

BENTONITE/SLOUGH

NOTES
Water level 1 and first top of casing elevation is for GH_MW-Willow-1S. Water level 2 and second top of casing elevation is for GH_MW-Willow-1D.

QA: MCA 2019 01 14 Print Date:2019-12-04

Drilling Contractor	Owen's Drilling	Date Monitored	2018 12 07	Project Number:	658004
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1345.524	Borehole Logged By:	MCA/AMH
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1346.420 1346.423	Date Drilled:	2018 11 20
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5556081.040	Easting: 647474.898	Log Typed By:	VL

Drilling Legend: Sample Interval; Auger Flight

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Soil Vapour (ppm): ○ Reading within indicated scale; ● Reading outside indicated scale; scale 10^1 10^2 10^3 10^4

Solid PVC; Slotted PVC

Well Name 1: GH_MW-Willow-1S
Well Name 2: GH_MW-Willow-1D

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm)	Well
30	SAND and GRAVEL, fine grained sand, fine to coarse gravel, silty, subrounded, poorly graded, brown, dense, dry. *(continued)*							BENTONITE/SLOUGH
34								BENTONITE
35	SAND and GRAVEL, fine grained sand, fine to coarse gravel, some silt, rounded to subrounded, poorly graded, dense, moist to wet.							***GH_MW-Willow-1D*** SAND
37.5	BEDROCK, fine grained, grey to dark grey, moderately weathered.							
37.8	Bottom of hole at 37.8 m.							

NOTES
Water level 1 and first top of casing elevation is for GH_MW-Willow-1S.
Water level 2 and second top of casing elevation is for GH_MW-Willow-1D.

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : GH_BH-Willow-2**
	Location **Greenhills Operations Willow Pond**	PAGE 1 OF 3

Drilling Contractor	Owen's Drilling	Date Monitored	2018 12 06	Project Number:	658004
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1346.840	Borehole Logged By:	MCA/AMH
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1347.701 1347.695	Date Drilled:	2018 11 19
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5556014.905	Easting: 647553.228	Log Typed By:	VL

Drilling Legend: Sample Interval; Auger Flight

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

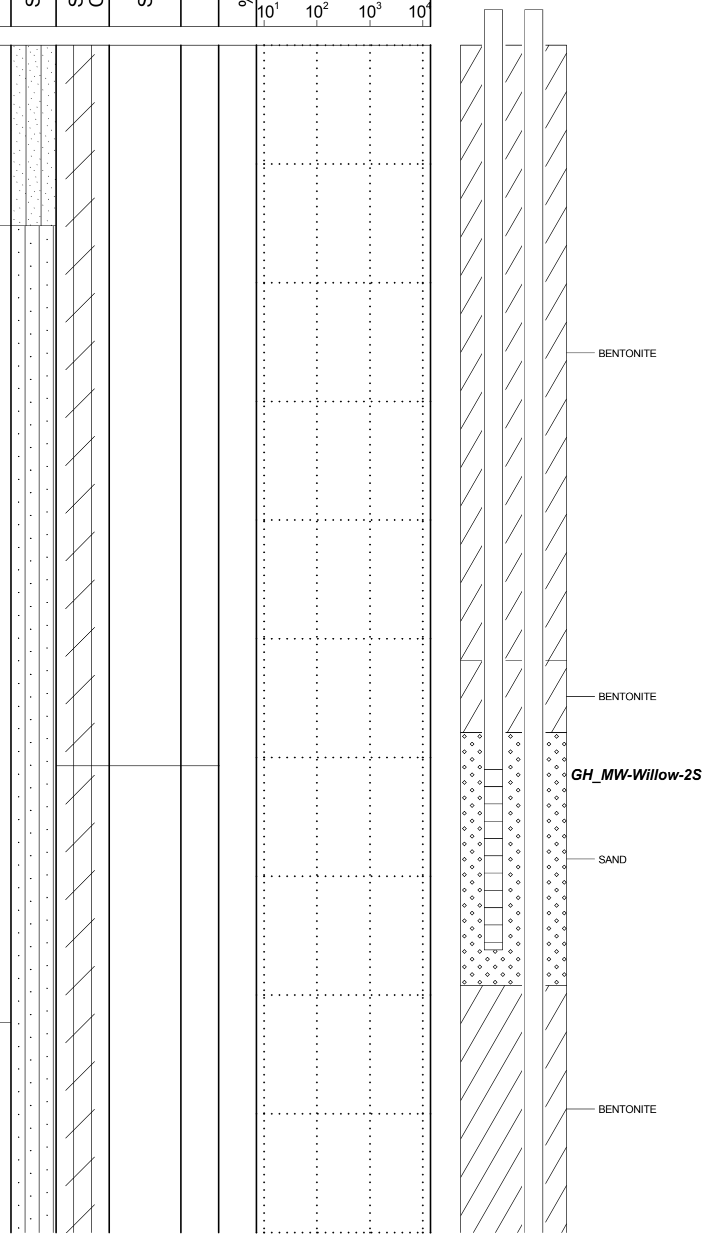
○ Reading within indicated scale; ● Reading outside indicated scale

Soil Vapour (ppm)

Solid PVC; Slotted PVC

Well Name 1: GH_MW-Willow-2S
Well Name 2: GH_MW-Willow-2D

Depth in Metres	Soil Description
0	SAND, fine to medium grained, silty, some gravel to gravelly, fine to coarse, cobbles present, subrounded, well graded, brown to light brown, medium dense, dry.
1.5	SAND, fine grained, silty, some fine to coarse gravel, cobbles present, subrounded, poorly graded, light brown, loose, dry.
3.7	At 3.7 m - dark brown, medium dense, damp to wet
5.8	At 5.8 m - increased silt
6.1	At 6.1 m - gravelly, moist to wet
8.2	SAND, fine grained, silty, some to trace fine to coarse gravel, cobbles present, poorly graded, damp.



NOTES
Water level 1 and first top of casing elevation is for GH_MW-Willow-2S.
Water level 2 and second top of casing elevation is for GH_MW-Willow-2D.

QA: MCA 2019 01 14 Print Date:2019-12-04

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : GH_BH-Willow-2**
	Location **Greenhills Operations Willow Pond**	PAGE 2 OF 3

Drilling Contractor	Owen's Drilling	Date Monitored	2018 12 06	Project Number:	658004
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1346.840	Borehole Logged By:	MCA/AMH
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1347.701 1347.695	Date Drilled:	2018 11 19
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5556014.905	Easting: 647553.228	Log Typed By:	VL

Drilling Legend: Sample Interval; Auger Flight

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

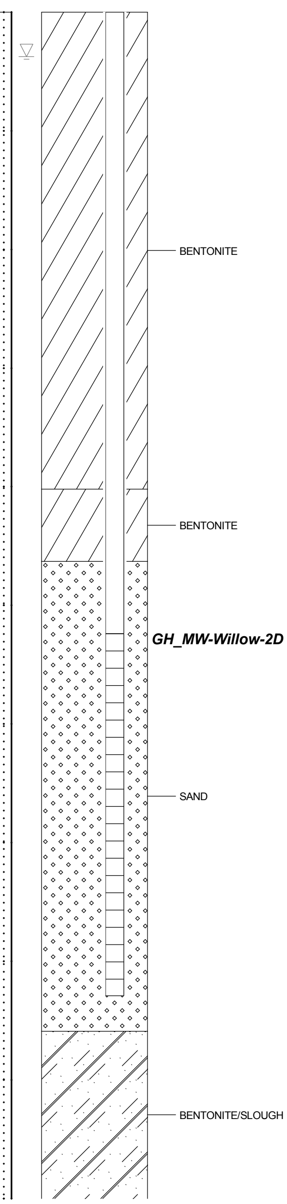
Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: GH_MW-Willow-2S
Well Name 2: GH_MW-Willow-2D

Columns: Depth in Metres | Soil Description | Stratigraphy Plot | Sample Interval Core Run | Sample Number | Blow Count | % Recovery | Soil Vapour (ppm) 10^1 10^2 10^3 10^4

Depth (m)	Soil Description
10	SAND, fine grained, silty, some to trace fine to coarse gravel, cobbles present, poorly graded, damp. *(continued)*
11.3	At 11.3 m - increased gravel and cobbles
12.5	SAND, fine grained, some silt, some to trace gravel, fine to coarse, subrounded to subangular, poorly graded, brown, damp.
15.2	SAND and GRAVEL, fine to medium grained sand, fine to coarse gravel, silty, cobbles present, subrounded, well graded, brown, moist to wet.
18.3	SILT, some sand to sandy, fine grained, trace gravel, fine to coarse, subrounded, dark brown to black, damp to dry.
19.4	At 19.4 m - sandy, gravelly
20	



NOTES
Water level 1 and first top of casing elevation is for GH_MW-Willow-2S.
Water level 2 and second top of casing elevation is for GH_MW-Willow-2D.

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : GH_BH-Willow-2**
	Location **Greenhills Operations Willow Pond**	PAGE 3 OF 3

Drilling Contractor	Owen's Drilling	Date Monitored	2018 12 06	Project Number:	658004
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1346.840	Borehole Logged By:	MCA/AMH
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1347.701 1347.695	Date Drilled:	2018 11 19
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5556014.905	Easting: 647553.228	Log Typed By:	VL

Drilling Legend
- Sample Interval
- Auger Flight

Water/NAPL Levels
- Water Level 1
- Water Level 2
- NAPL
- NAPL

- Reading within indicated scale
- Reading outside indicated scale

- Solid PVC
- Slotted PVC

Well Name 1: GH_MW-Willow-2S
Well Name 2: GH_MW-Willow-2D

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4	Well
20	SILT, some sand to sandy, fine grained, trace gravel, fine to coarse, subrounded, dark brown to black, damp to dry. *(continued)*							BENTONITE/SLOUGH
	BEDROCK, fine grained, grey to dark grey, moderately weathered.							
22	Bottom of hole at 22.0 m.							

Depth scale: 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30

NOTES
Water level 1 and first top of casing elevation is for GH_MW-Willow-2S. Water level 2 and second top of casing elevation is for GH_MW-Willow-2D.

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : GH_BH-Wolf-1**
	Location **Greenhills Operations Wolf Pond**	PAGE 1 OF 4

Drilling Contractor	Owen's Drilling	Date Monitored	2018 12 06	Project Number:	658004
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1357.176	Borehole Logged By:	MCA/AMH
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1358.139 1358.133	Date Drilled:	2018 11 17
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5556786.610	Easting: 647377.660	Log Typed By:	VL

Drilling Legend: Sample Interval; Auger Flight

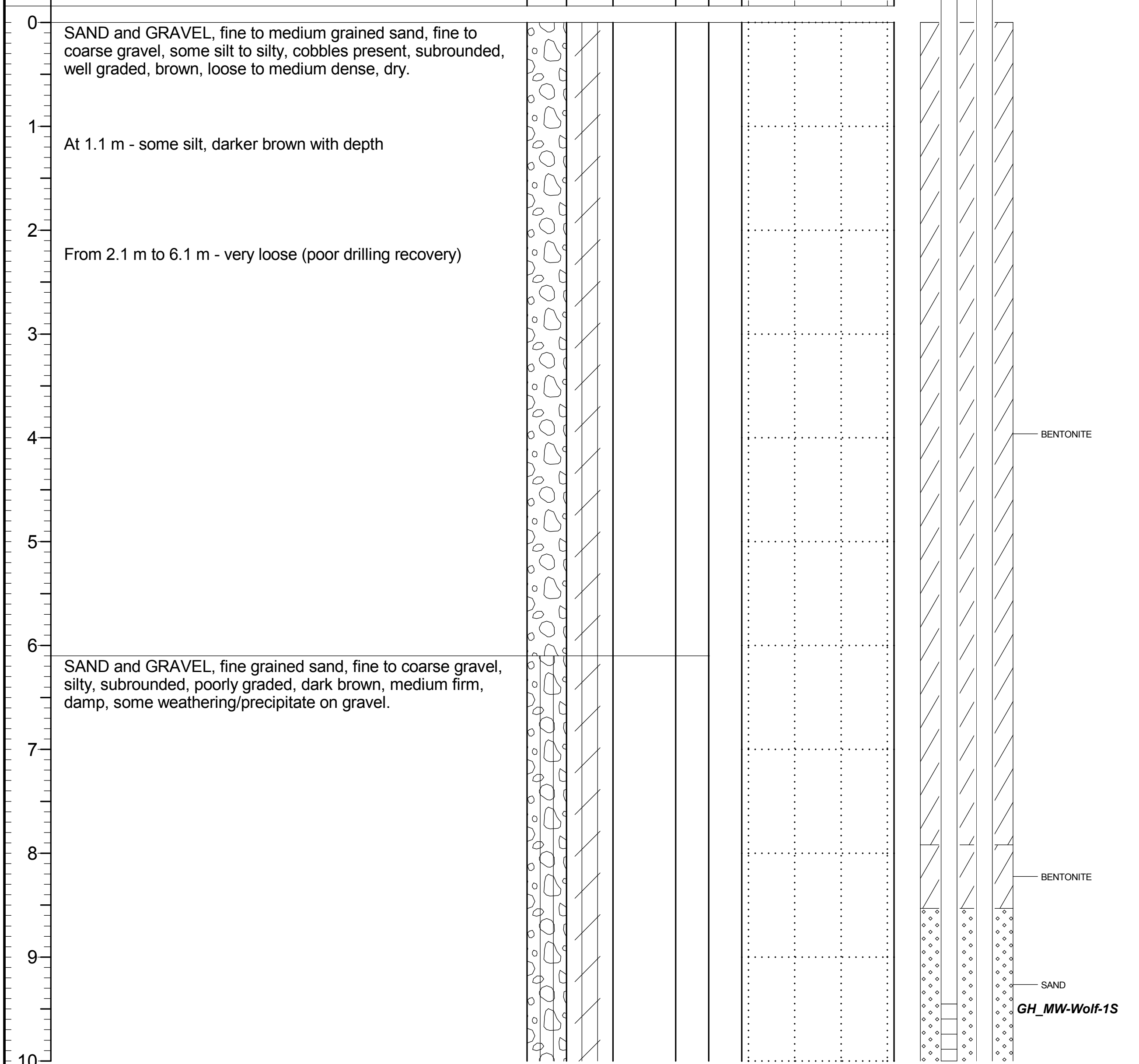
Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Depth in Metres | Soil Description | Stratigraphy Plot | Sample Interval Core Run | Sample Number | Blow Count | % Recovery | Soil Vapour (ppm) 10^1 10^2 10^3 10^4

○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: GH_MW-Wolf-1S
Well Name 2: GH_MW-Wolf-1D



Depth (m)	Soil Description
0	SAND and GRAVEL, fine to medium grained sand, fine to coarse gravel, some silt to silty, cobbles present, subrounded, well graded, brown, loose to medium dense, dry.
1.1	At 1.1 m - some silt, darker brown with depth
2.1	From 2.1 m to 6.1 m - very loose (poor drilling recovery)
6.1	SAND and GRAVEL, fine grained sand, fine to coarse gravel, silty, subrounded, poorly graded, dark brown, medium firm, damp, some weathering/precipitate on gravel.

NOTES
Water level 1 and first top of casing elevation is for GH_MW-Wolf-1S.
Water level 2 and second top of casing elevation is for GH_MW-Wolf-1D.

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : GH_BH-Wolf-1**
	Location **Greenhills Operations Wolf Pond**	PAGE 2 OF 4

Drilling Contractor	Owen's Drilling	Date Monitored	2018 12 06	Project Number:	658004
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1357.176	Borehole Logged By:	MCA/AMH
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1358.139 1358.133	Date Drilled:	2018 11 17
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5556786.610	Easting: 647377.660	Log Typed By:	VL

Drilling Legend: Sample Interval; Auger Flight

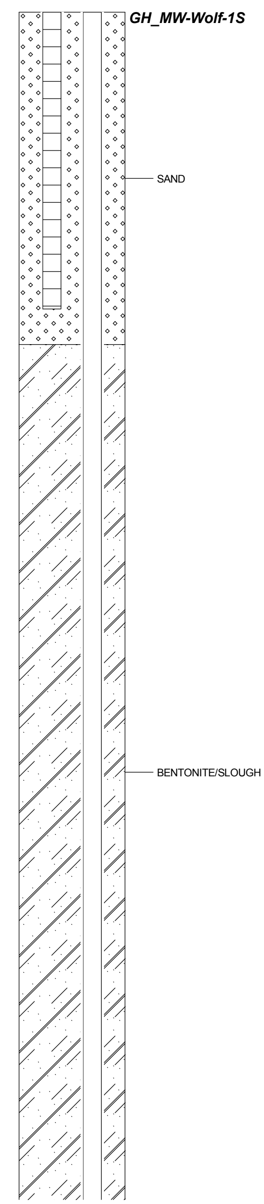
Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: GH_MW-Wolf-1S
Well Name 2: GH_MW-Wolf-1D

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
10	SAND and GRAVEL, fine grained sand, fine to coarse gravel, silty, subrounded, poorly graded, dark brown, medium firm, damp, some weathering/precipitate on gravel. *(continued)*						
11							
12	At 11.9 m - moist to wet						
	At 12.5 m - damp						
13							
14	At 13.7 m - increase in gravel content						
	GRAVEL and SAND, fine to coarse gravel, fine grained sand, silty, cobbles present, poorly graded, dark brown, medium dense, damp.						
15							
	At 15.4 m - some silt						
16							
17	SAND and GRAVEL, fine to medium grained sand, fine to coarse gravel, cobbles present, subrounded, dark brown, medium dense, damp.						
18							
19							
20	At 19.8 m - trace silt, dry						



NOTES
Water level 1 and first top of casing elevation is for GH_MW-Wolf-1S.
Water level 2 and second top of casing elevation is for GH_MW-Wolf-1D.

QA: MCA 2019 01 14 Print Date:2019-12-04

SNC·LAVALIN

Client	Borehole No. : GH_BH-Wolf-1
Teck Coal Limited	
Location	PAGE 3 OF 4
Greenhills Operations Wolf Pond	

Drilling Contractor	Owen's Drilling	Date Monitored	2018 12 06	Project Number:	658004
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1357.176	Borehole Logged By:	MCA/AMH
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1358.139 1358.133	Date Drilled:	2018 11 17
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5556786.610	Easting: 647377.660	Log Typed By:	VL

Drilling Legend: Sample Interval; Auger Flight

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

○ Reading within indicated scale; ● Reading outside indicated scale

Soil Vapour (ppm): 10^1 10^2 10^3 10^4

Solid PVC; Slotted PVC

Well Name 1: GH_MW-Wolf-1S
Well Name 2: GH_MW-Wolf-1D

Columns: Depth in Metres | Soil Description | Stratigraphy Plot | Sample Interval Core Run | Sample Number | Blow Count | % Recovery | Soil Vapour (ppm)

Depth in Metres	Soil Description
20	SAND, fine grained, some gravel to gravelly, fine to coarse, silty, subrounded, poorly graded, brown, dense, dry to damp.
23	SILT, sandy, fine grained, some to trace gravel, fine to coarse, subrounded, brown, firm, dry.
26	GRAVEL and SAND, fine to coarse gravel, fine grained sand, silty, cobbles present, poorly graded, medium dense, dry.
27.3	At 27.3 m - increased silt
	SAND, fine grained, silty, some gravel, subrounded, poorly graded, brown, dense, dry.
30	

Well annotations: BENTONITE/SLOUGH; BENTONITE

NOTES
Water level 1 and first top of casing elevation is for GH_MW-Wolf-1S.
Water level 2 and second top of casing elevation is for GH_MW-Wolf-1D.

QA: MCA 2019 01 14 Print Date:2019-12-04

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : GH_BH-Wolf-1**
	Location **Greenhills Operations Wolf Pond**	PAGE 4 OF 4

Drilling Contractor	Owen's Drilling	Date Monitored	2018 12 06	Project Number:	658004
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1357.176	Borehole Logged By:	MCA/AMH
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1358.139 1358.133	Date Drilled:	2018 11 17
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5556786.610	Easting: 647377.660	Log Typed By:	VL

Drilling Legend: Sample Interval; Auger Flight

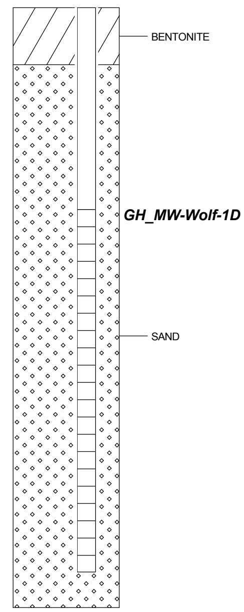
Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: GH_MW-Wolf-1S
Well Name 2: GH_MW-Wolf-1D

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
30	SAND, fine grained, silty, some gravel, subrounded, poorly graded, brown, dense, dry. *(continued)*						
33.5	SAND, fine grained, silty, some gravel, subrounded, poorly graded, dark brown to black, dense, damp.						
34.2	BEDROCK, fine grained, grey to dark grey, moderately weathered.						
35.1	Bottom of hole at 35.1 m.						



NOTES
Water level 1 and first top of casing elevation is for GH_MW-Wolf-1S.
Water level 2 and second top of casing elevation is for GH_MW-Wolf-1D.

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : GH_BH-Wolf-2**
	Location **Greenhills Operations Wolf Pond**	PAGE 1 OF 2

Drilling Contractor	Owen's Drilling	Date Monitored	2018 12 06	Project Number:	658004
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1376.512	Borehole Logged By:	MCA
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1377.477 1377.467	Date Drilled:	2018 11 18
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5556856.625	Easting: 647501.035	Log Typed By:	VL

Drilling Legend
- Sample Interval
- Auger Flight

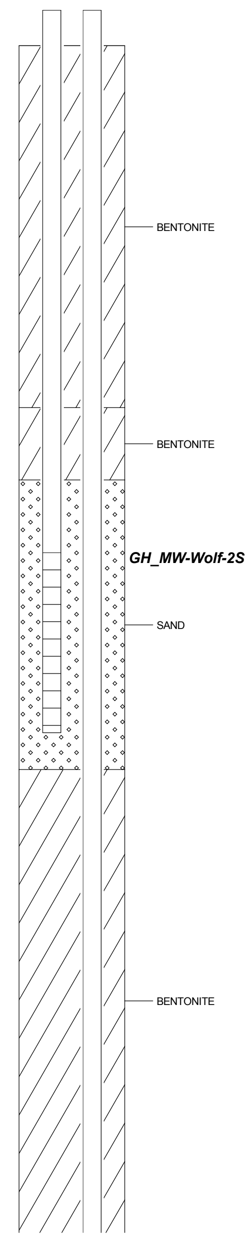
Water/NAPL Levels
- Water Level 1
- Water Level 2
- NAPL
- NAPL

- ○ Reading within indicated scale
- ● Reading outside indicated scale

- Solid PVC
- Slotted PVC

Well Name 1: GH_MW-Wolf-2S
Well Name 2: GH_MW-Wolf-2D

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
0	SAND and GRAVEL, fine to medium grained sand, fine to coarse gravel, some silt to silty, cobbles present, subrounded, well graded, brown, loose to medium dense, dry. From 0.6 m to 1.5 m - boulder						
1.5	SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, cobbles and rock debris present, silty, subrounded to subangular, dark brown, dense, damp.						
2.4	From 2.4 m to 10.7 m - no recovery						



NOTES
Water level 1 and first top of casing elevation is for GH_MW-Wolf-2S.
Water level 2 and second top of casing elevation is for GH_MW-Wolf-2D.

Client: **Teck Coal Limited**

Location: **Greenhills Operations Wolf Pond**

Borehole No. : GH_BH-Wolf-2

Drilling Contractor	Owen's Drilling	Date Monitored	2018 12 06	Project Number:	658004
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1376.512	Borehole Logged By:	MCA
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1377.477 1377.467	Date Drilled:	2018 11 18
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5556856.625	Easting: 647501.035	Log Typed By:	VL

Drilling Legend: Sample Interval; Auger Flight

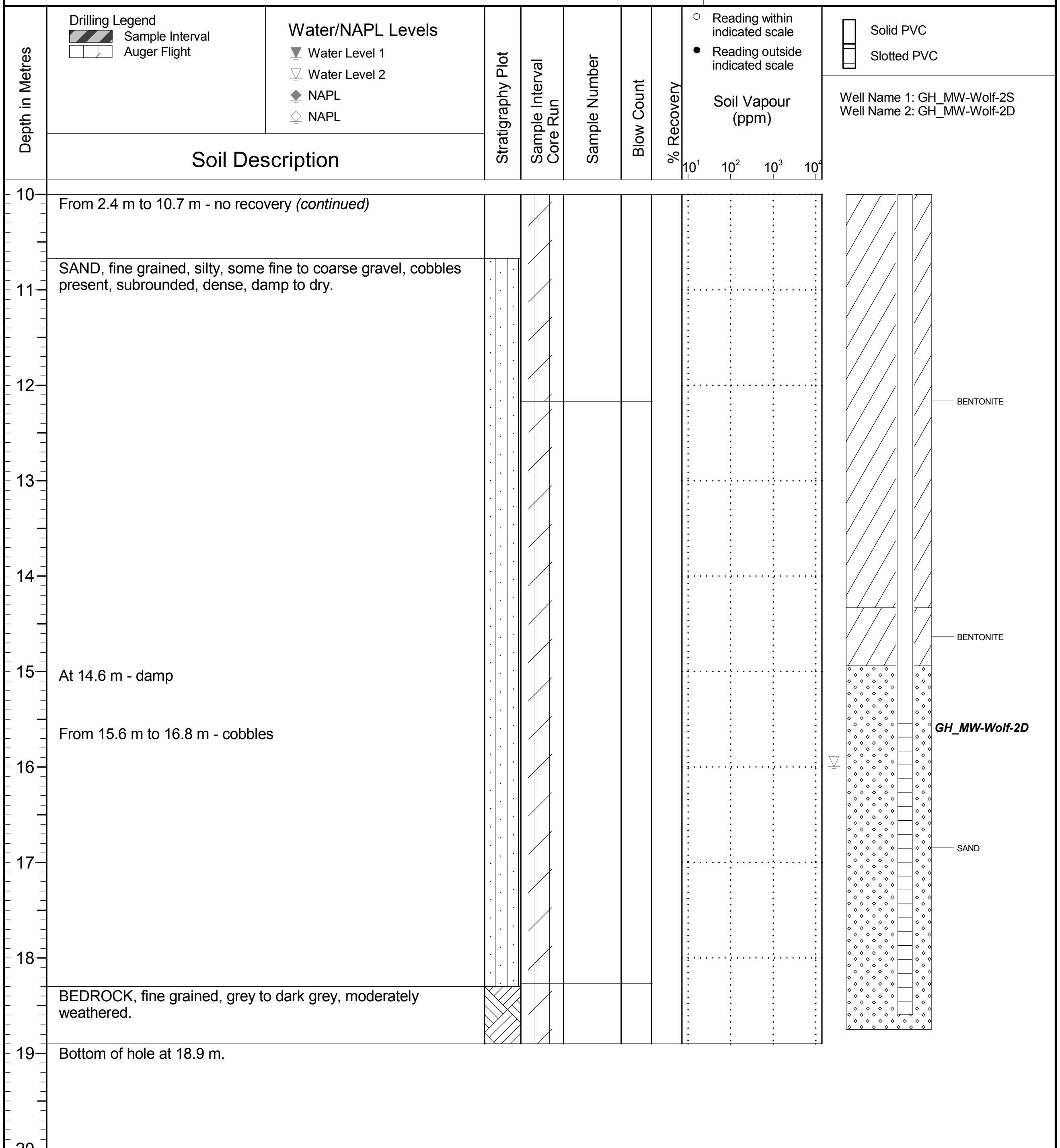
Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Soil Vapour (ppm): ○ Reading within indicated scale; ● Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: GH_MW-Wolf-2S
Well Name 2: GH_MW-Wolf-2D

Depth in Metres	Soil Description
10	From 2.4 m to 10.7 m - no recovery *(continued)*
	SAND, fine grained, silty, some fine to coarse gravel, cobbles present, subrounded, dense, damp to dry.
	At 14.6 m - damp
	From 15.6 m to 16.8 m - cobbles
	BEDROCK, fine grained, grey to dark grey, moderately weathered.
19	Bottom of hole at 18.9 m.



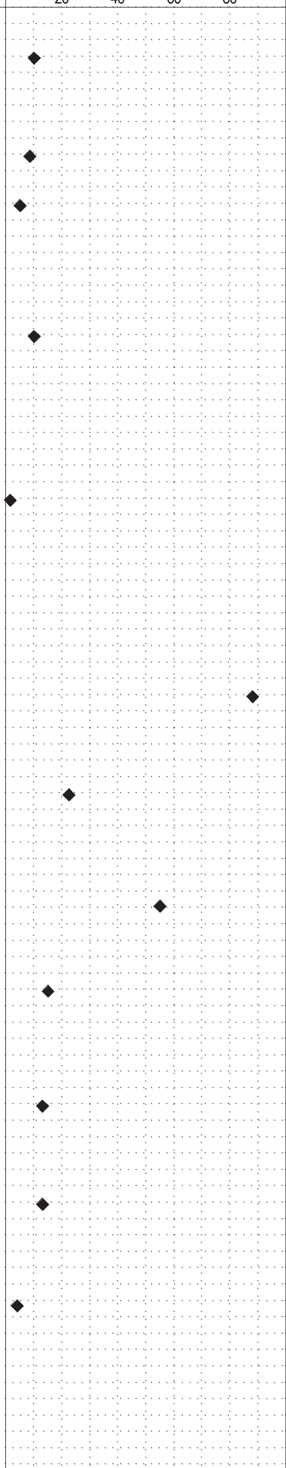
NOTES
Water level 1 and first top of casing elevation is for GH_MW-Wolf-2S.
Water level 2 and second top of casing elevation is for GH_MW-Wolf-2D.

CLIENT: Teck Coal Ltd.	PROJECT: GW Assessment - Effluent Ponds	BOREHOLE NO: **MW11(P)-03**
DRILLER: JR Drilling	LOCATION: Teck - LCO	PROJECT NO: BX06169
DRILL/METHOD: DR-12/Air Rotary	BOREHOLE LOCATION: Refer to site plan	ELEVATION: 1263.49 m

SAMPLE TYPE: Shelby Tube, No Recovery, SPT Test (N), Grab Sample, Split-Pen

BACKFILL TYPE: Bentonite, Pea Gravel, Slough, Grout, Drill Cuttings, Sand

Column headings: Depth (m) | ◆ GASTECH VAPOUR ◆ 200 400 600 800; ■ STANDARD PEN (N) ■ 20 40 60 80; PLASTIC M.C. LIQUID 20 40 60 80 | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE NO | SPT (N) | WELL INSTALLATION | OTHER TESTS COMMENTS | ELEVATION (m)



Depth (m)	SOIL DESCRIPTION
0 – 14	**CLAY**, some silt, some sand, trace organics, very soft, medium plastic, medium brown, moist
14 – 18.2	**GRAVEL**, some sand, some fines, compact, medium brown, moist
18.2 – 21.3	**SAND**, silty, some gravel, some cobbles, compact, grey, damp
21.3 – 29	**SILT**, sandy, some gravel, some cobbles, firm, grey, moist
29 – 30.6	**SAND & GRAVEL**, some fines, dense, medium brown, moist to wet
30.6 – 38.7	**SILT**, clayey, sandy, some gravel, some cobbles, medium brown, moist
38.7 – 41.2	**BEDROCK**
41.2	**END OF BOREHOLE AT 41.2 m** Borehole wet upon completion. Monitoring well installed.

OTHER TESTS / COMMENTS:

Top of casing (TOC) elevation is 1264.53 mASL.
Stick-up = 1.04 m.

Depth to water was 27.81 m below TOC on 23 November 2011. Groundwater elevation was 1236.72 m ASL.

The 150 mm steel casing terminates at 31.1 m.

A 50 mm Schedule 40 slotted PVC screen installed from 35.1 m to 38.1 m.

K = 7.4 x 10^{-8}m/s

Depth (m): 0–45; ELEVATION (m): 1263–1219

CLIENT: Teck Coal Ltd.	PROJECT: GW Assessment - Effluent Ponds	BOREHOLE NO: **MW11(P)-01**
DRILLER: JR Drilling	LOCATION: Teck - LCO	PROJECT NO: BX06169
DRILL/METHOD: DR-12/ Air Rotary	BOREHOLE LOCATION: Refer to site plan	ELEVATION: 1266.06 m

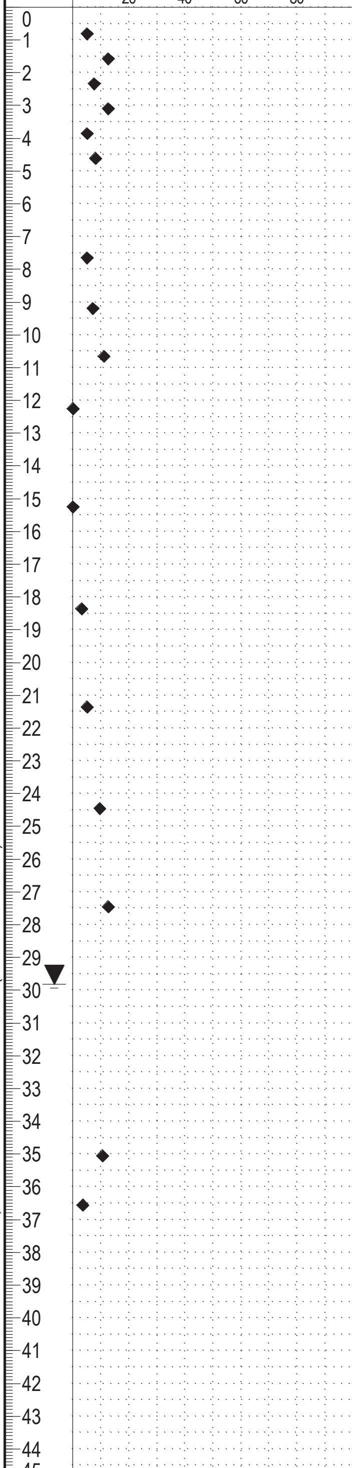
SAMPLE TYPE: Shelby Tube | No Recovery | SPT Test (N) | Grab Sample | Split-Pen | Core

BACKFILL TYPE: Bentonite | Pea Gravel | Slough | Grout | Drill Cuttings | Sand

◆ GASTECH VAPOUR ◆ 200 400 600 800

■ STANDARD PEN (N) ■ 20 40 60 80

PLASTIC M.C. LIQUID 20 40 60 80



Depth (m)	SOIL DESCRIPTION	SAMPLE NO	OTHER TESTS COMMENTS	ELEVATION (m)
0–2.3	**SAND**, silty, some gravel, trace clay, loose, compact, medium brown, dry -gravelly	1, 2, 3	Top of casing (TOC) elevation is 1267.06 mASL. Stick-up = 1.0 m.	1265, 1264
2.3–6	**SILT**, sandy, some cobbles, some gravel, compact, grey brown, damp	4, 5, 6		1263, 1262, 1261, 1260
6–9	**SILTY SAND**, some gravel, compact, medium brown, dry	7		1259, 1258, 1257
9–33.5	**SILT** , some cobbles, trace FG sand, firm, medium brown, damp -damp (≈20 m) -dry (≈21 m) -damp (≈28 m)	8, 9, 10, 11, 12, 13, 14, 15	Depth to groundwater was 30.81 m from TOC 23 November 2011 (1236.25 mASL). 150 mm steel casing installed from surface to 33.5 m.	1256 … 1233
33.5–35.3	**SAND AND GRAVEL**, dense, brown grey, moist (sub-rounded gravel)			1232
35.3–41.2	**CG SAND**, some gravel, dense, brown grey, wet (sub rounded to sub angular) -wet (≈39.5 m)	16, 17	A 50 mm Schedule 40 slotted PVC screen was installed from 37.5 m to 40.5 m. $K = 7.4 \times 10^{-4}$ m/s	1231 … 1225
41.2	**END OF HOLE AT 41.2 m** Borehole wet at completion. Monitoring well installed.			1224, 1223, 1222

AMEC Environment & Infrastructure
Medicine Hat, Alberta

LOGGED BY: RH	COMPLETION DEPTH: 40.50 m
REVIEWED BY: LH	COMPLETION DATE: 11/15/11

FINAL

SNC-LAVALIN	Client **Teck Coal Limited**	**Borehole No. : EV_BH_GV4A**
	Location **Regional Groundwater Monitoring**	PAGE 1 OF 2

Drilling Contractor	Owen's Drilling	Date Monitored	2020 08 31	Project Number:	631283
Drilling Method	Odex	Ground Surface Elev. (m)	1310.661	Borehole Logged By:	MTB
Borehole Dia. (m)	0.13	Top of Casing Elev. (m)	1311.532	Date Drilled:	2020 08 09
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5522317.465	Easting: 656664.666	Log Typed By:	AS

Drilling Legend: Sample Interval; Odex

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Soil Vapour (ppm): ○ Reading within indicated scale; ● Reading outside indicated scale; scale 10^1, 10^2, 10^3, 10^4

Solid PVC; Slotted PVC

Well Name 1: EV_MW_GV4A

Depth in Metres	Soil Description	Sample Number
0	SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, subangular, some silt, well graded, brown, loose, moist, organics.	GV4A-01
1	At 1.07 m - wet.	
2	SILTY, GRAVELLY SAND, fine to coarse grained, fine gravel, subangular, well graded, brown, medium dense, moist.	GV4A-02
3–4		GV4A-03
4	Below 4.0 m - some clay, loose, wet.	GV4A-04
6–7		GV4A-05
7	SAND, fine to coarse grained, trace silt, trace gravel, subrounded, light brown, medium dense, dry.	
7.3	SILT and SAND, fine to coarse grained sand, some gravel, fine, subangular, some clay, well graded, light brown, medium dense, wet.	
8.2	SAND, fine to coarse grained, some gravel, fine, angular, trace clay, well graded, light brown, dense, wet.	GV4A-06
10		GV4A-07

Well annotations: BENTONITE (at ~1.5 m), BENTONITE (at ~4.5 m), BENTONITE (at ~8 m)

NOTES
Bolded sample denotes sample analyzed.
* Denotes blind field duplicate.

FINAL

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : EV_BH_GV4A**
	Location **Regional Groundwater Monitoring**	PAGE 2 OF 2

Drilling Contractor	Owen's Drilling	Date Monitored	2020 08 31	Project Number:	631283
Drilling Method	Odex	Ground Surface Elev. (m)	1310.661	Borehole Logged By:	MTB
Borehole Dia. (m)	0.13	Top of Casing Elev. (m)	1311.532	Date Drilled:	2020 08 09
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5522317.465	Easting: 656664.666	Log Typed By:	AS

Drilling Legend: Sample Interval; Odex

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

○ Reading within indicated scale; ● Reading outside indicated scale

Soil Vapour (ppm): 10^1, 10^2, 10^3, 10^4

Solid PVC; Slotted PVC

Well Name 1: EV_MW_GV4A

Depth in Metres	Soil Description	Sample Number	Well
10–11	SAND, fine to coarse grained, some gravel, fine, angular, trace clay, well graded, light brown, dense, wet. *(continued)*		BENTONITE
11–12.5	SILTY SAND, fine to coarse grained sand, some clay, trace gravel, fine to coarse, angular, containing cobbles, well graded, light brown, dense, wet.	GV4A-08	BENTONITE
12.5–13.4	SILT and SAND, fine grained sand, some clay, containing cobbles, light brown, very dense, wet.	GV4A-09	BENTONITE
13.4–16.8	BEDROCK, light brown, sandstone, fine grained.	GV4A-10	*EV_MW_GV4A* SAND
	At 15.0 m - some grey rock chips, fine grained.	GV4A-11	BENTONITE
16.8	Bottom of hole at 16.8 m.		

NOTES
Bolded sample denotes sample analyzed.
* Denotes blind field duplicate.

QA/QC: LLH 2020 10 19 Print Date:2020-12-02

FINAL

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : EV_BH_GV4B**
	Location **Regional Groundwater Monitoring**	PAGE 1 OF 1

Drilling Contractor	Owen's Drilling	Date Monitored	2020 09 30	Project Number:	631283
Drilling Method	Odex	Ground Surface Elev. (m)	1310.636	Borehole Logged By:	MTB
Borehole Dia. (m)	0.13	Top of Casing Elev. (m)	1311.661	Date Drilled:	2020 08 10
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5522318.467	Easting: 656662.164	Log Typed By:	AS

Drilling Legend: Sample Interval; Odex

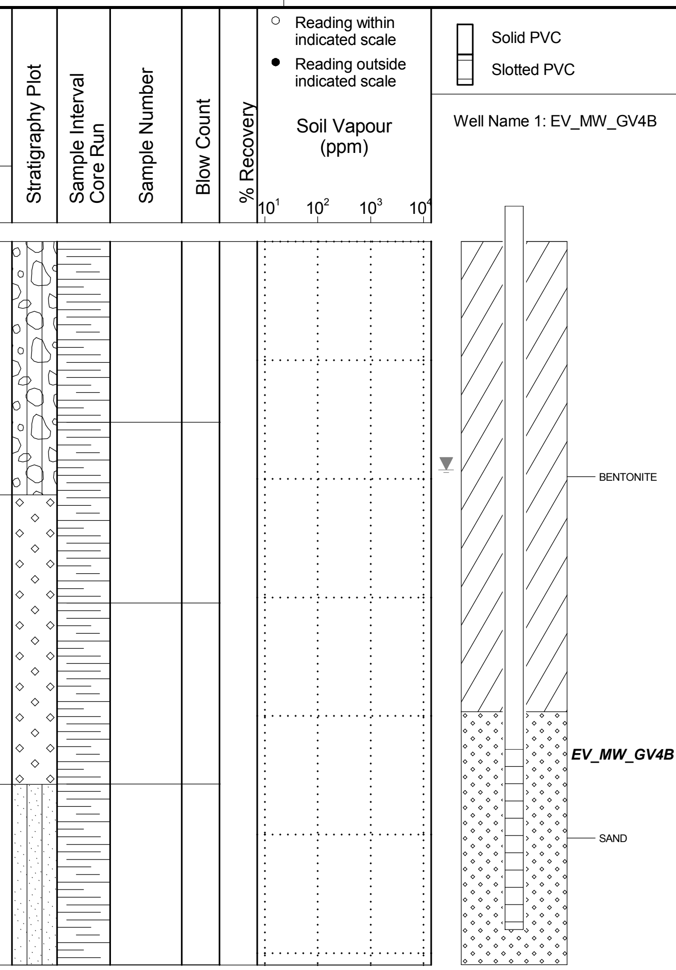
Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: EV_MW_GV4B

Depth in Metres	Soil Description
0	SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, subangular, some silt, well graded, brown, loose.
1	At 1.07 m - wet.
2	GRAVELLY SAND, fine to coarse grained, fine gravel, subangular, well graded, brown, medium dense, moist.
4.5	SILTY, GRAVELLY SAND, fine to coarse grained sand, fine to coarse gravel, subangular, some clay, well graded, brown, loose, wet.
6.1	Bottom of hole at 6.1 m.



NOTES

srk consulting

Teck

HOLE ID:	**MW-3**	COORDINATES:	668230 E 5482814 N
LOCATION:	CMO	DATUM:	UTM Zone 11
PROJECT NO:	1CT017.098	GROUND ELEV (masl):	1573.4
DRILLING CONTRACTOR:	AquaPro Drilling Ltd.	COLLAR DIP:	-90
		EOH ELEV. (masl):	1545.97
DRILLING TYPE:	Air Rotary	TOTAL DEPTH (mbgs):	27.43
LOGGED BY:	LC	STICKUP HEIGHT (magl):	0.81
BORING DATE:	8/11/2015 to 8/12/2015	CASING STICKUP (magl):	0.81

PROJECT: Phase 1 Groundwater Monitoring

CLIENT: Teck Coal Ltd. - CMO

AREA: **Michel Creek**

Lithological Symbol

CL-Clay, LO-Loam, SI-Silt, SA-Sand, GV-Gravel, SS-Sandstone, ST-Siltstone

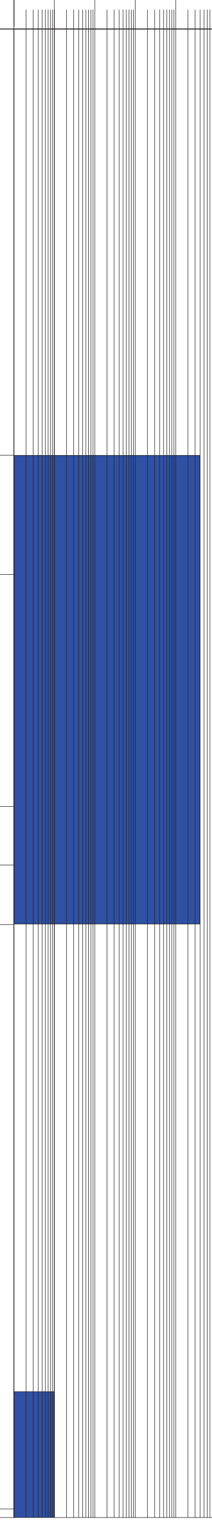
Hydraulic Conductivity (m/s)

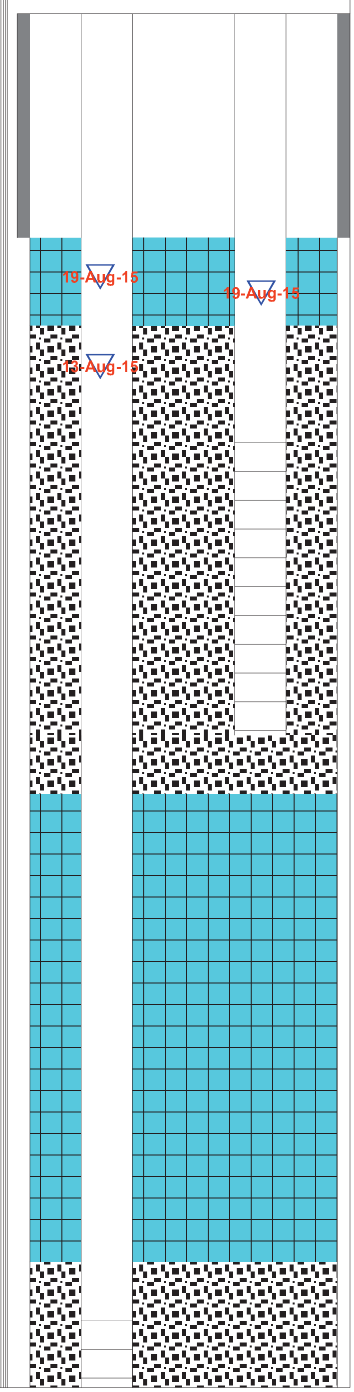
1E-8, 1E-7, 1E-6, 1E-5, 0.0001, 0.001

Well Installation

Sand, Screen, PVC, Pellets, Cave, Chips, Chips/Backfill, Backfill, Casing

Depth (m)	Lithology Description	Drilling Notes and Additional Comments
-2		
0	Clay and gravel (CL-CH); Some sand. Very dark grayish brown, gap graded, wet, sub-rounded, medium-plasticity, cohesive.	
2	Gravel and sand (GM); Some silt. Dark brown, well graded, moist, sub-rounded, non-plastic, non-cohesive.	Drilling slow, going through clay with cobbles/gravel, clay quite firm
4	Clay and gravel (CH); Some sand. Very dark grayish brown, gap graded, moist, sub-rounded, high-plasticity, cohesive.	Fines cohesive, but not whole sample
6	Gravel and silt (GM); Very dark grayish brown, gap graded, dry, sub-rounded, non-plastic, non-cohesive.	Hit bedrock, very dry and dusty
8	Siltstone bedrock; Black, dry.	
10		
12		





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Teck

HOLE ID:	**MW-3**	COORDINATES:	668230 E 5482814 N
LOCATION:	CMO	DATUM:	UTM Zone 11
PROJECT NO:	1CT017.098	GROUND ELEV (masl):	1573.4
DRILLING CONTRACTOR:	AquaPro Drilling Ltd.	COLLAR DIP:	-90
		EOH ELEV. (masl):	1545.97
DRILLING TYPE:	Air Rotary	TOTAL DEPTH (mbgs):	27.43
LOGGED BY:	LC	STICKUP HEIGHT (magl):	0.81
BORING DATE:	8/11/2015 to 8/12/2015	CASING STICKUP (magl):	0.81

PROJECT: Phase 1 Groundwater Monitoring

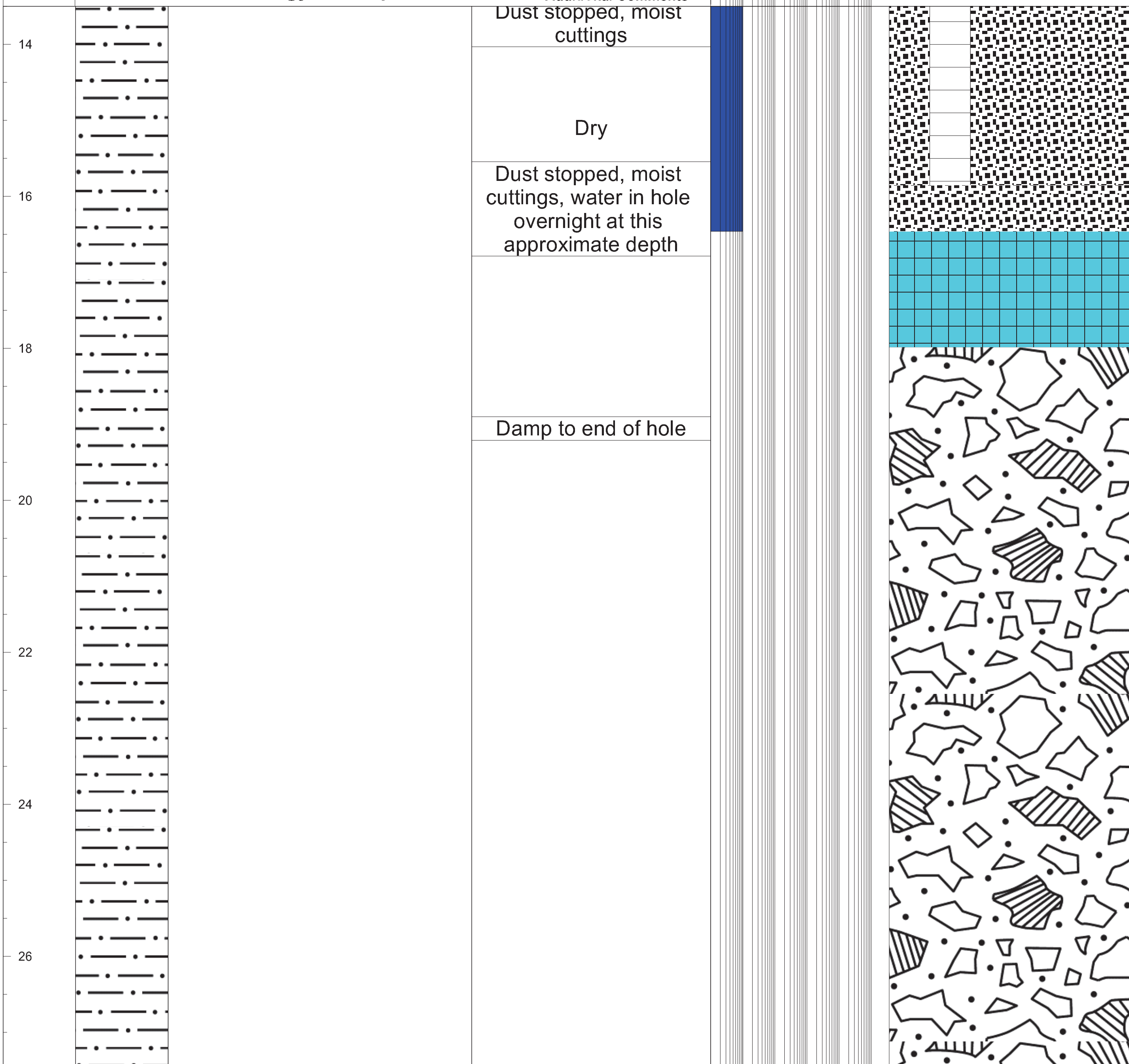
CLIENT: Teck Coal Ltd. - CMO

AREA: **Michel Creek**

Lithological Symbol: CL-Clay, SA-Sand, SS-Sandstone, LO-Loam, GV-Gravel, ST-Siltstone, SI-Silt

Hydraulic Conductivity (m/s): 1E-8, 1E-7, 1E-6, 1E-5, 0.0001, 0.001

Well Installation: Sand, Chips, Screen, Chips/Backfill, PVC, Backfill, Pellets, Casing, Cave



Depth (m)	Lithology Description	Drilling Notes and Additional Comments
14		Dust stopped, moist cuttings
15		Dry
16		Dust stopped, moist cuttings, water in hole overnight at this approximate depth
18–19		Damp to end of hole
20–27		

srk consulting

Teck

HOLE ID:	**CM_MW6**	COORDINATES:	670117.9 E 5486463.5 N
LOCATION:	CMO	DATUM:	UTM Zone 11
PROJECT NO:	1CT017.114	GROUND ELEV (masl):	1579.66
DRILLING CONTRACTOR:	AquaPro Drilling Ltd.	COLLAR DIP:	-90
		EOH ELEV. (masl):	1478.30336
DRILLING TYPE:	Air Rotary	TOTAL DEPTH (mbgs):	41.69664
LOGGED BY:	EH/KK	STICKUP HEIGHT (magl):	0.83/0.83
BORING DATE:	4/26/2016 to 4/27/2016	CASING STICKUP (magl):	0.88

PROJECT: Phase 2 Groundwater Monitoring

CLIENT: Teck Coal Ltd. - CMO

AREA: **Corbin Dam**

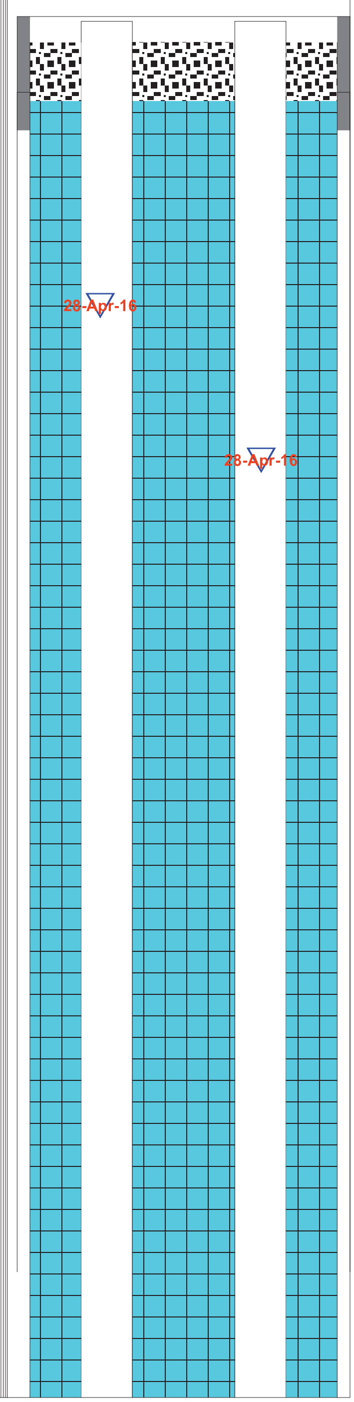
Lithological Symbol: CL-Clay, CO-Coal, SI-Silt, SA-Sand, GV-Gravel, SS-Sandstone, ST-Siltstone, BO-Boulders

Hydraulic Conductivity (m/s): 1E-8, 1E-7, 1E-6, 1E-5, 0.0001, 0.001

Well Installation: Sand, Cable, VWP, Screen, PVC, Pellets, Chips, Cave, Casing, Grout

Depth (m)	Lithology Description	Drilling Notes and Additional Comments
-1 to 0		
0 to 4.5	Sand - Till (SW); Some gravel, little silt, trace clay. Dark brown, moist, sub-rounded to sub-angular, low plastic, cohesive fi	
~2.5		Lots of boulders and cobbles. Colour changes to dark yellowish brown, becomes drier.
4.5 onward	Sand - Till (SW); Some gravel, little silt, trace clay. Dark brown, wet, sub-rounded to sub-angular, low plastic, cohesive fine	
~5.5		Hit water. Increased boulders and cobbles.
~9.5		Changes colour to very dark grey.

Depth scale: -1, 1, 3, 5, 7, 9, 11, 13



srk consulting

Teck

HOLE ID:	CM_MW6	COORDINATES:	670117.9 E 5486463.5 N
LOCATION:	CMO	DATUM:	UTM Zone 11
PROJECT NO:	1CT017.114	GROUND ELEV (masl):	1579.66
DRILLING CONTRACTOR:	AquaPro Drilling Ltd.	COLLAR DIP:	-90
		EOH ELEV. (masl):	1478.30336
DRILLING TYPE:	Air Rotary	TOTAL DEPTH (mbgs):	41.69664
PROJECT:	Phase 2 Groundwater Monitoring	LOGGED BY:	EH/KK
STICKUP HEIGHT (magl):	0.83/0.83	CLIENT:	Teck Coal Ltd. - CMO
BORING DATE:	4/26/2016 to 4/27/2016	CASING STICKUP (magl):	0.88
AREA:	Corbin Dam		

Depth (m)

Lithological Symbol

CL-Clay, SA-Sand, ST-Siltstone, CO-Coal, GV-Gravel, BO-Boulders, SI-Silt, SS-Sandstone

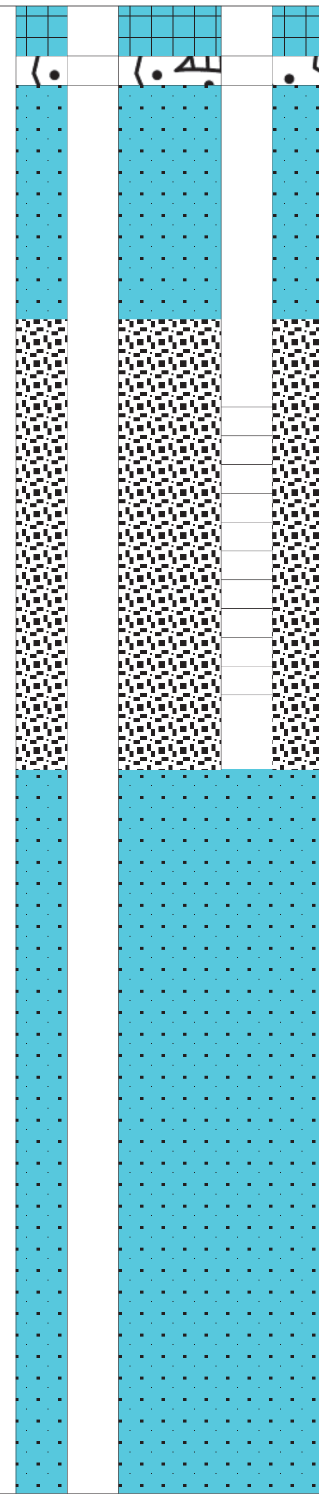
Hydraulic Conductivity (m/s): 1E-8, 1E-7, 1E-6, 1E-5, 0.0001, 0.001

Well Installation

Sand, Pellets, Cable, Chips, VWP, Cave, Screen, Casing, PVC, Grout

Depth (m)	Lithology Description	Drilling Notes and Additional Comments
~14.9		Strong sulfur smell.
~18.2		Bit plugging slightly, had to start drilling with water.
22.6	Siltstone bedrock; Dark grey, dry.	Casing shoe chirping and higher pitch to bit, chips are consistent. Bedrock interpreted to be here. Chips go dry.

Depth scale: 15, 17, 19, 21, 23, 25, 27, 29



srk consulting

Teck

HOLE ID:	CM_MW6	COORDINATES:	670117.9 E 5486463.5 N
LOCATION:	CMO	DATUM:	UTM Zone 11
PROJECT NO:	1CT017.114	GROUND ELEV (masl):	1579.66
DRILLING CONTRACTOR:	AquaPro Drilling Ltd.	COLLAR DIP:	-90
		EOH ELEV. (masl):	1478.30336
DRILLING TYPE:	Air Rotary	TOTAL DEPTH (mbgs):	41.69664
LOGGED BY:	EH/KK	STICKUP HEIGHT (magl):	0.83/0.83
BORING DATE:	4/26/2016 to 4/27/2016	CASING STICKUP (magl):	0.88

PROJECT: Phase 2 Groundwater Monitoring

CLIENT: Teck Coal Ltd. - CMO

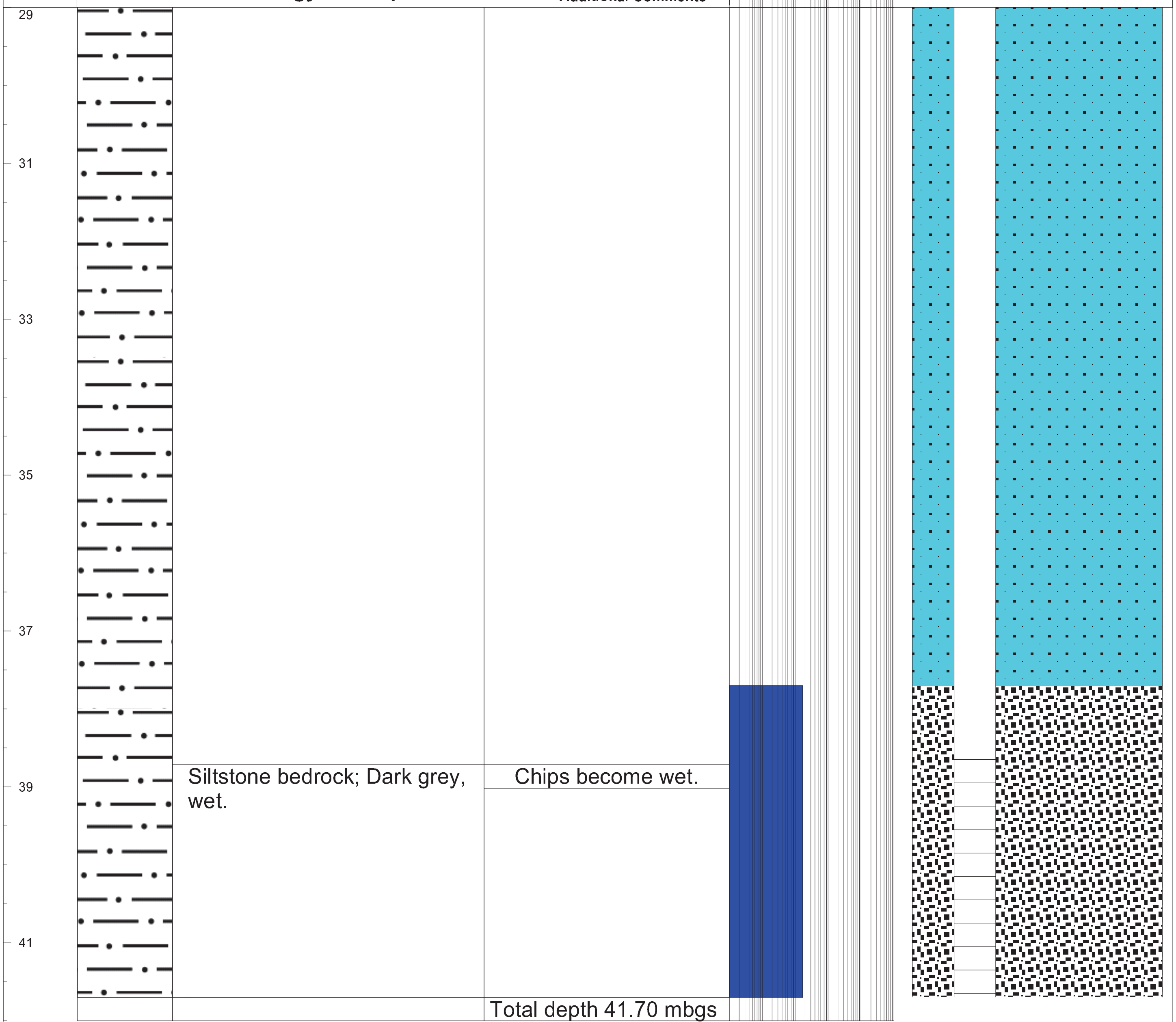
AREA: **Corbin Dam**

Lithological Symbol: CL-Clay, CO-Coal, SI-Silt, SA-Sand, GV-Gravel, SS-Sandstone, ST-Siltstone, BO-Boulders

Hydraulic Conductivity (m/s): 1E-8, 1E-7, 1E-6, 1E-5, 0.0001, 0.001

Well Installation: Sand, Cable, VWP, Screen, PVC, Pellets, Chips, Cave, Casing, Grout

Depth (m)	**Lithology Description**	**Drilling Notes and Additional Comments**
29–38.9		
38.9	Siltstone bedrock; Dark grey, wet.	Chips become wet.
41.70		Total depth 41.70 mbgs - drilling ceased as depth target reached.



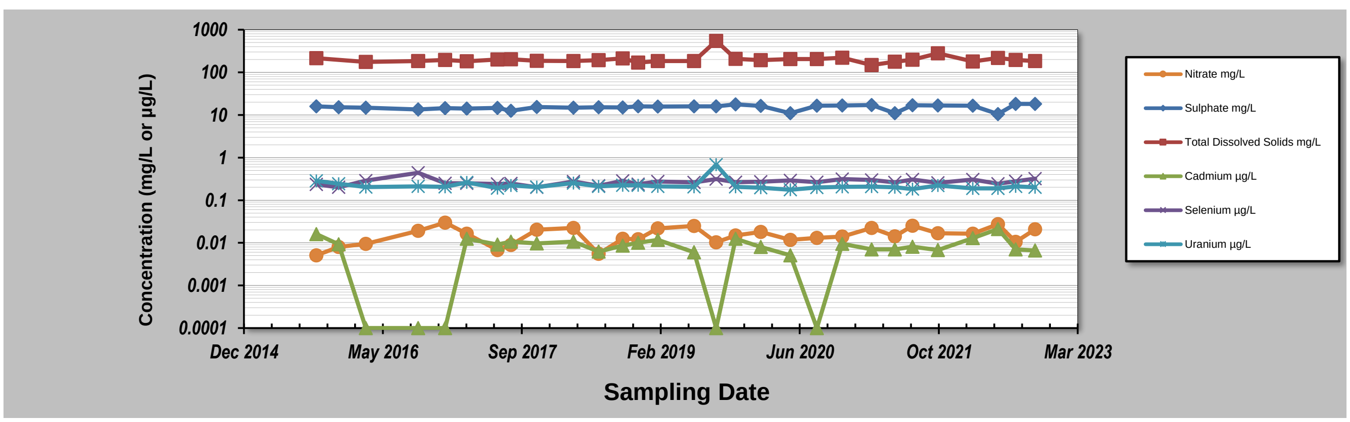
Attachment II

Mann-Kendall Analyses

GSI MANN-KENDALL TOOLKIT

Evaluation Date:	03-Feb-23	Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - Background	Location	CM_MW3-SH
Conducted By:	MS	Reviewed By:	MG

Sampling Event	Sampling Date	Nitrate	Sulphate	Total Dissolved Solids	Cadmium	Selenium	Uranium	
	units	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	
		CONCENTRATION						
1	14-Sep-15	0.0051	16.00	214	0.0159	0.236	0.283	
2	3-Dec-15	0.0080	15.10		0.0092	0.201	0.243	
3	10-Mar-16	0.0094	14.80	175	0.0001	0.288	0.204	
4	14-Sep-16	0.0191	13.40	185	0.0001	0.440	0.210	
5	20-Dec-16	0.0298	14.40	195	0.0001	0.250	0.207	
6	8-Mar-17	0.0164	14.20	182	0.0124	0.249	0.261	
7	26-Jun-17	0.0068	14.70	201	0.0091	0.240	0.192	
8	14-Aug-17	0.0089	12.50	203	0.0107	0.246	0.222	
9	15-Nov-17	0.0203	15.40	186	0.0097	0.202	0.203	
10	27-Mar-18	0.0223	14.80	183	0.0106	0.275	0.253	
11	25-Jun-18	0.0055	15.10	192	0.0062	0.219	0.211	
12	20-Sep-18	0.0124	14.90	212	0.0086	0.286	0.225	
13	15-Nov-18	0.0122	15.90	169	0.0100	0.239	0.225	
14	24-Jan-19	0.0217	15.80	184	0.0117	0.273	0.211	
15	4-Jun-19	0.0249	16.00	185	0.0060	0.263	0.205	
16	22-Aug-19	0.0103	15.90	547	0.0001	0.313	0.682	
17	31-Oct-19	0.0148	17.70	208	0.0124	0.266	0.207	
18	30-Jan-20	0.0180	16.30	192	0.0080	0.272	0.197	
19	15-May-20	0.0117	11.00	206	0.0051	0.290	0.176	
20	19-Aug-20	0.0131	16.50	205	0.0001	0.264	0.198	
21	18-Nov-20	0.0141	16.70	219	0.0095	0.312	0.206	
22	4-Mar-21	0.0223	17.10	148	0.0070	0.297	0.208	
23	26-May-21	0.0142	11.00	177	0.0070	0.260	0.200	
24	29-Jul-21	0.0253	16.80	197	0.0081	0.306	0.183	
25	28-Oct-21	0.0167	16.70	280	0.0068	0.254	0.220	
26	3-Mar-22	0.0164	16.40	179	0.0129	0.305	0.189	
27	1-Jun-22	0.0274	10.50	218	0.0211	0.243	0.190	
28	4-Aug-22	0.0105	18.20	195	0.0070	0.277	0.211	
29	13-Oct-22	0.0207	18.10	185	0.0066	0.322	0.2	
30								
Coefficient of Variation:		0.42	0.13	0.34	0.61	0.17	0.40	
Mann-Kendall Statistic (S):		110	162	35	-12	118	-132	
Confidence Factor:		98.0%	99.9%	74.8%	58.1%	98.6%	99.3%	
Concentration Trend:		Increasing	Increasing	No Trend	Stable	Increasing	Decreasing	

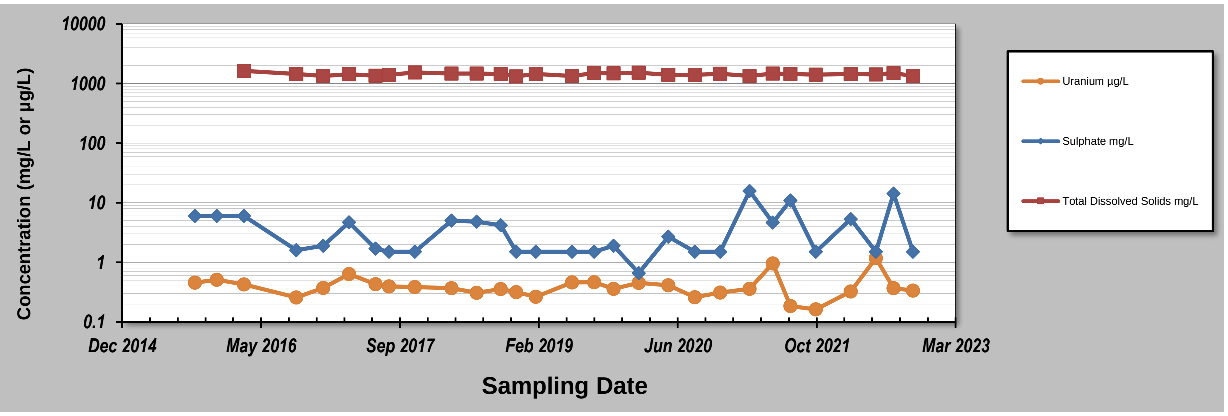


Notes:
1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT

Evaluation Date:	02-Feb-23	Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - Background	Location	CM_MW3-DP
Conducted By:	EM/MS	Reviewed By:	MG

Sampling Event	Sampling Date	Uranium (µg/L)	Sulphate (mg/L)	Total Dissolved Solids (mg/L)				
		CONCENTRATION						
1	15-Sep-15	0.457	6.00					
2	3-Dec-15	0.510	6.00					
3	10-Mar-16	0.426	6.00	1630				
4	14-Sep-16	0.258	1.60	1450				
5	20-Dec-16	0.372	1.90	1340				
6	23-Mar-17	0.636	4.70	1430				
7	26-Jun-17	0.431	1.70	1350				
8	14-Aug-17	0.395	1.50	1400				
9	15-Nov-17	0.385	1.50	1540				
10	27-Mar-18	0.370	5.00	1470				
11	25-Jun-18	0.309	4.80	1470				
12	20-Sep-18	0.356	4.20	1450				
13	15-Nov-18	0.316	1.50	1320				
14	24-Jan-19	0.264	1.50	1450				
15	4-Jun-19	0.461	1.50	1340				
16	22-Aug-19	0.463	1.50	1500				
17	31-Oct-19	0.358	1.90	1480				
18	30-Jan-20	0.454	0.66	1520				
19	15-May-20	0.411	2.70	1400				
20	19-Aug-20	0.259	1.50	1400				
21	18-Nov-20	0.312	1.50	1460				
22	4-Mar-21	0.358	15.70	1340				
23	26-May-21	0.960	4.64	1470				
24	29-Jul-21	0.184	10.90	1440				
25	28-Oct-21	0.162	1.50	1410				
26	3-Mar-22	0.324	5.34	1440				
27	1-Jun-22	1.180	1.50	1420				
28	4-Aug-22	0.368	14.20	1500				
29	13-Oct-22	0.336	1.50	1340				
30								
Coefficient of Variation:		0.50	0.97	0.05				
Mann-Kendall Statistic (S):		-81	-49	-24				
Confidence Factor:		93.3%	81.4%	68.3%				
Concentration Trend:		Prob. Decreasing	Stable	Stable				



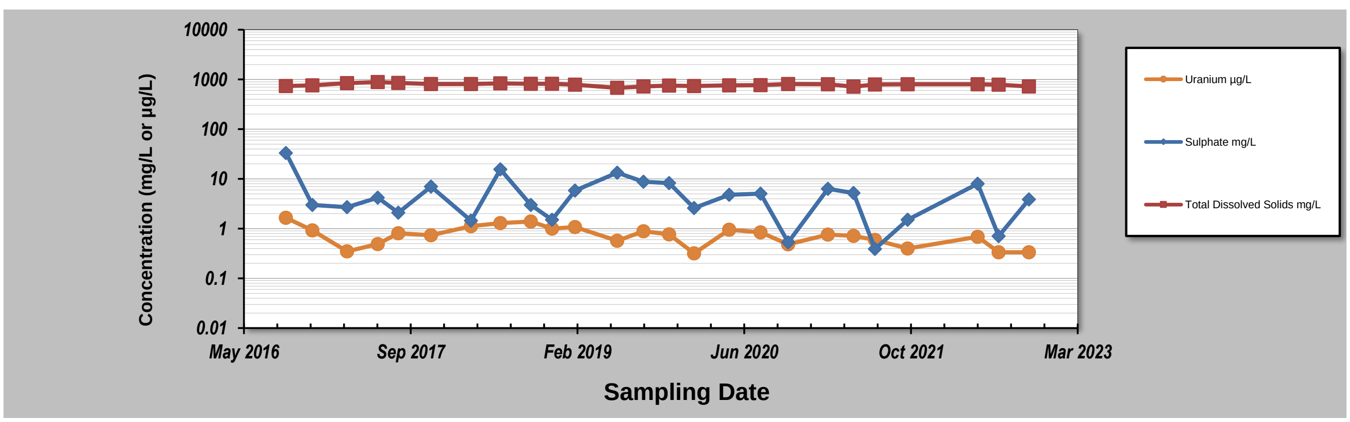
Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT

Evaluation Date:	03-Feb-23		Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - Background		Location	CM_MW6-DP
Conducted By:	MS		Reviewed By:	MG

Sampling Event	Sampling Date	Uranium (µg/L)	Sulphate (mg/L)	Total Dissolved Solids (mg/L)				
		CONCENTRATION						
1	13-Sep-16	1.6500	33.30	740				
2	1-Dec-16	0.9200	3.00	760				
3	15-Mar-17	0.3500	2.70	838				
4	15-Jun-17	0.4890	4.20	888				
5	16-Aug-17	0.8080	2.09	847				
6	22-Nov-17	0.7370	7.00	808				
7	22-Mar-18	1.1200	1.44	807				
8	18-Jun-18	1.2900	15.60	830				
9	17-Sep-18	1.3900	3.00	820				
10	20-Nov-18	1.0000	1.50	817				
11	28-Jan-19	1.0700	5.80	786				
12	3-Jun-19	0.5710	13.30	676				
13	21-Aug-19	0.8860	8.77	725				
14	6-Nov-19	0.7660	8.22	756				
15	20-Jan-20	0.3170	2.60	736				
16	4-May-20	0.9490	4.80	760				
17	6-Aug-20	0.8410	5.02	770				
18	28-Oct-20	0.4830	0.53	808				
19	24-Feb-21	0.7590	6.32	798				
20	12-May-21	0.7120	5.20	713				
21	15-Jul-21	0.5930	0.39	796				
22	21-Oct-21	0.3990	1.50	798				
23	19-May-22	0.6820	7.97	803				
24	21-Jul-22	0.3340	0.71	780				
25	20-Oct-22	0.3340	3.85	725				
26								
27								
28								
29								
30								
	Coefficient of Variation:	0.45	1.15	0.06				
	Mann-Kendall Statistic (S):	-119	-46	-76				
	Confidence Factor:	99.8%	85.2%	96.0%				
	Concentration Trend:	Decreasing	No Trend	Decreasing				

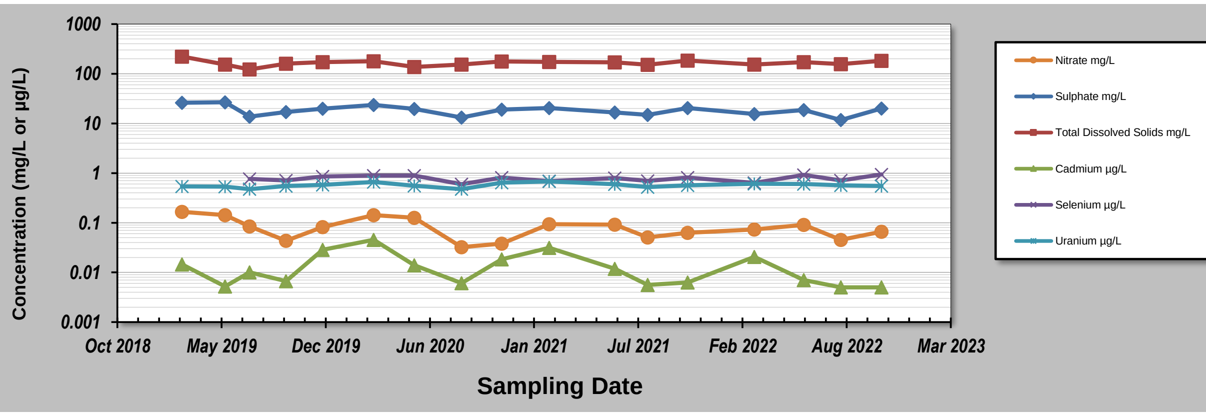


Notes:
1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT

Evaluation Date:	02-Feb-23	Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - Background	Location	FR_MW_CH1-A
Conducted By:	EM/MS	Reviewed By:	MG

Sampling Event	Sampling Date	Nitrate (mg/L)	Sulphate (mg/L)	Total Dissolved Solids (mg/L)	Cadmium (µg/L)	Selenium (µg/L)	Uranium (µg/L)	
		CONCENTRATION						
1	28-Feb-19	0.1660	26.10	222	0.0146		0.538	
2	22-May-19	0.1430	26.70	154	0.0052		0.532	
3	8-Jul-19	0.0848	13.70	122	0.0100	0.767	0.475	
4	16-Sep-19	0.0434	17.00	159	0.0067	0.714	0.548	
5	25-Nov-19	0.0821	19.70	171	0.0285	0.851	0.577	
6	2-Mar-20	0.1420	23.60	179	0.0454	0.894	0.663	
7	19-May-20	0.1260	19.60	137	0.0139	0.893	0.557	
8	18-Aug-20	0.0323	13.10	153	0.0061	0.597	0.475	
9	3-Nov-20	0.0381	18.90	177	0.0184	0.81	0.639	
10	2-Feb-21	0.0935	20.50	174	0.0314	0.689	0.679	
11	8-Jun-21	0.0914	16.60	169	0.0118	0.791	0.595	
12	10-Aug-21	0.0508	14.90	152	0.0056	0.694	0.525	
13	26-Oct-21	0.0629	20.40	184	0.0063	0.815	0.565	
14	3-Mar-22	0.0732	15.40	153	0.0205	0.636	0.609	
15	6-Jun-22	0.0911	18.60	172	0.0070	0.919	0.600	
16	16-Aug-22	0.0453	11.70	157	0.0050	0.711	0.570	
17	2-Nov-22	0.0658	20.00	183	0.0050	0.939	0.552	
18								
19								
20								
Coefficient of Variation:		0.47	0.23	0.13	0.81	0.14	0.10	
Mann-Kendall Statistic (S):		-42	-36	13	-31	7	29	
Confidence Factor:		95.4%	92.4%	68.7%	89.0%	61.5%	87.4%	
Concentration Trend:		Decreasing	Prob. Decreasing	No Trend	Stable	No Trend	No Trend	



Notes:

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2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
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GSI MANN-KENDALL TOOLKIT

Evaluation Date:	03-Feb-23	Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - Background	Location	FR_MW_CH2
Conducted By:	MS	Reviewed By:	MG

Sampling Event	Sampling Date	Nitrate (mg/L)	Sulphate (mg/L)	Total Dissolved Solids (mg/L)	Uranium (µg/L)	Selenium (µg/L)		
		CONCENTRATION						
1	2-Sep-20	0.0460	17.40	191	1.1500	1.170		
2	2-Nov-20	0.0682	21.50	207	0.9120	0.837		
3	2-Feb-21	0.1140	27.80	180	0.8660	0.793		
4	7-Jun-21	0.0167	11.30	161	0.9480	0.651		
5	10-Aug-21	0.0349	17.00	183	0.8830	0.544		
6	26-Oct-21	0.0469	20.30	203	0.6350	0.656		
7	3-Mar-22	0.0735	22.30	194	0.6400	0.674		
8	6-Jun-22	0.0050	9.12	224	0.8530	1.320		
9	16-Aug-22	0.0119	12.80	209	0.8610	1.440		
10	2-Nov-22	0.0550	17.30	220	0.5610	0.809		
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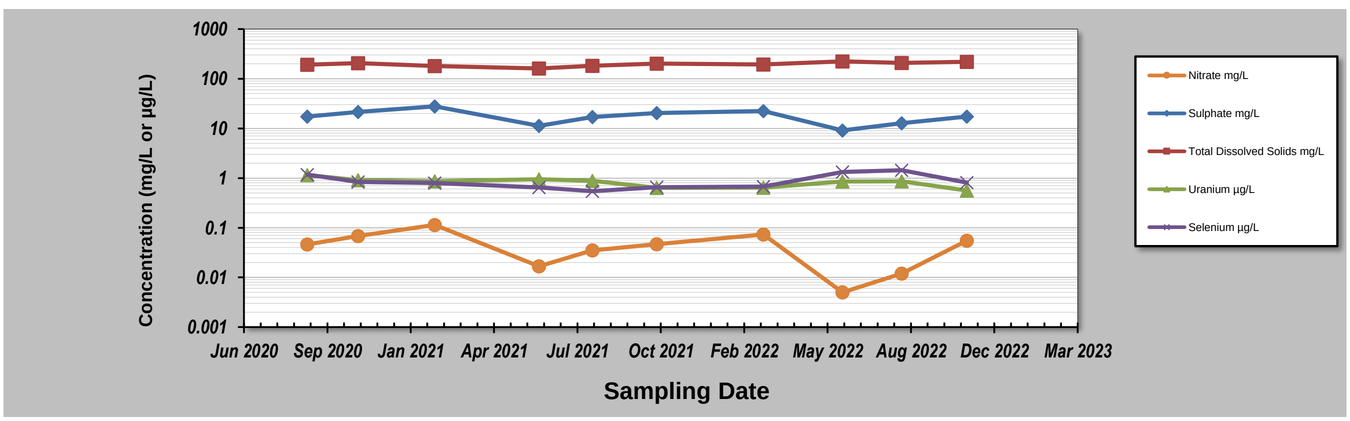
Coefficient of Variation:		0.70	0.32	0.10	0.21	0.35		
Mann-Kendall Statistic (S):		-7	-9	21	-27	5		
Confidence Factor:		70.0%	75.8%	96.4%	99.2%	63.6%		
Concentration Trend:		Stable	Stable	Increasing	Decreasing	No Trend		

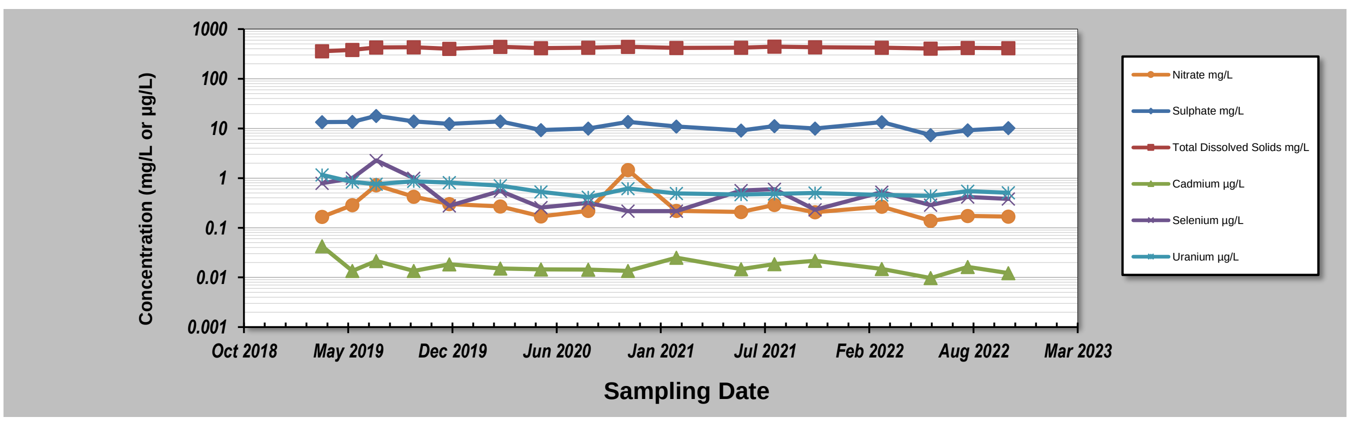


Notes:
1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT

Evaluation Date:	03-Feb-23	Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - Background	Location	FR_MW_FRRD1
Conducted By:	MS	Reviewed By:	MG

Sampling Event	Sampling Date	Nitrate (mg/L)	Sulphate (mg/L)	Total Dissolved Solids (mg/L)	Cadmium (µg/L)	Selenium (µg/L)	Uranium (µg/L)	
		CONCENTRATION						
1	26-Mar-19	0.1660	13.40	357	0.0424	0.790	1.160	
2	23-May-19	0.2860	13.50	383	0.0135	0.995	0.840	
3	8-Jul-19	0.7160	17.90	428	0.0214	2.270	0.754	
4	18-Sep-19	0.4230	13.80	433	0.0135	0.994	0.867	
5	25-Nov-19	0.3020	12.30	402	0.0184	0.278	0.808	
6	2-Mar-20	0.2690	13.80	441	0.0151	0.552	0.703	
7	19-May-20	0.1700	9.32	414	0.0146	0.256	0.529	
8	18-Aug-20	0.2180	9.96	424	0.0144	0.315	0.413	
9	2-Nov-20	1.4500	13.50	441	0.0135	0.216	0.614	
10	3-Feb-21	0.2190	10.90	417	0.0249	0.216	0.489	
11	7-Jun-21	0.2070	9.09	421	0.0147	0.560	0.466	
12	10-Aug-21	0.2880	11.20	443	0.0186	0.598	0.482	
13	27-Oct-21	0.2060	10.00	430	0.0216	0.230	0.502	
14	4-Mar-22	0.2670	13.40	423	0.0149	0.520	0.459	
15	6-Jun-22	0.1380	7.35	405	0.0097	0.286	0.439	
16	16-Aug-22	0.1730	9.17	419	0.0162	0.417	0.544	
17	2-Nov-22	0.1680	10.20	414	0.0122	0.382	0.507	
18								
19								
20								
Coefficient of Variation:		0.95	0.22	0.05	0.42	0.87	0.33	
Mann-Kendall Statistic (S):		-48	-59	14	-21	-41	-76	
Confidence Factor:		97.4%	99.2%	70.1%	79.2%	95.0%	99.9%	
Concentration Trend:		Decreasing	Decreasing	No Trend	Stable	Prob. Decreasing	Decreasing	



Notes:

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2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT

Evaluation Date:	03-Feb-23		Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - Background		Location	EV_MW_GV4A
Conducted By:	MS		Reviewed By:	MG

Sampling Event	Sampling Date	Nitrate (mg/L)	Sulphate (mg/L)	Total Dissolved Solids (mg/L)	Uranium (µg/L)	Selenium (µg/L)		
		CONCENTRATION						
1	31-Aug-20	0.0351	110.00	475	2.710	5.400		
2	14-Dec-20	0.0160	105.00	435	2.540	4.590		
3	21-Mar-21	0.0316	112.00	400	2.900	4.200		
4	20-May-21	0.0624	106.00	406	2.990	4.280		
5	30-Jul-21	0.0210	128.00	474	6.040	3.270		
6	18-Aug-21	0.0384	99.10	499	4.970	3.420		
7	17-Oct-21	0.0303	89.40	398	5.750	4.900		
8	12-Jan-22	0.0321	79.20	367	5.650	4.840		
9	28-Apr-22	0.0353	81.60	401	5.040	5.720		
10	5-Aug-22	0.0377	85.40	410	3.710	5.230		
11	27-Oct-22	0.0531	74.40	354	2.740	7.310		
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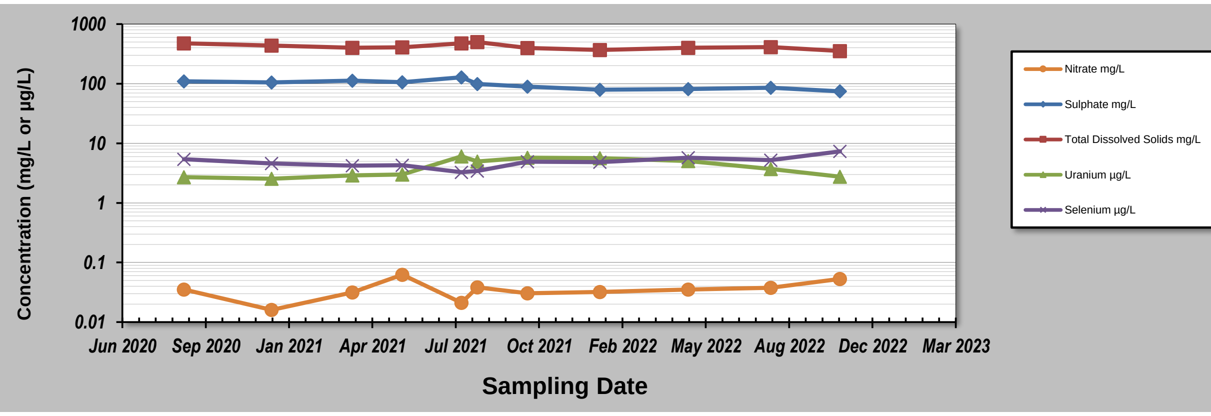
20								
	Coefficient of Variation:	0.36	0.17	0.11	0.34	0.23		
	Mann-Kendall Statistic (S):	19	-35	-21	13	19		
	Confidence Factor:	91.8%	99.7%	94.0%	82.1%	91.8%		
	Concentration Trend:	Prob. Increasing	Decreasing	Prob. Decreasing	No Trend	Prob. Increasing		



Notes:

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GSI MANN-KENDALL TOOLKIT

Evaluation Date:	03-Feb-23	Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - Background	Location	EV_MW_GV4B
Conducted By:	MS	Reviewed By:	MG

Sampling Event	Sampling Date	Nitrate (mg/L)	Sulphate (mg/L)	Total Dissolved Solids (mg/L)	Cadmium (µg/L)	Selenium (µg/L)	Uranium (µg/L)	
		CONCENTRATION						
1	30-Sep-20	0.0470	58.90	330	0.0097	3.720	1.470	
2	12-Dec-20	0.0435	58.40	343	0.0080	3.610	1.380	
3	14-Dec-20	0.0404	58.70	345	0.0057	3.610	1.360	
4	21-Mar-21	0.2750	62.00	302	0.0073	3.700	1.380	
5	20-May-21	0.1890	70.50	343	0.0085	3.760	1.430	
6	30-Jul-21	0.0629	65.80	338	0.0121	3.840	1.310	
7	18-Aug-21	0.0536	62.40	369	0.0082	3.540	1.240	
8	17-Oct-21	0.0521	65.90	345	0.0119	4.050	1.410	
9	9-Jan-22	0.0533	64.30	348	0.0063	3.740	1.310	
10	28-Apr-22	0.0626	64.80	339	0.0062	3.380	1.310	
11	5-Aug-22	0.0612	74.70	379	0.0111	3.700	1.410	
12	27-Oct-22	0.0590	67.10	324	0.0149	4.230	1.410	
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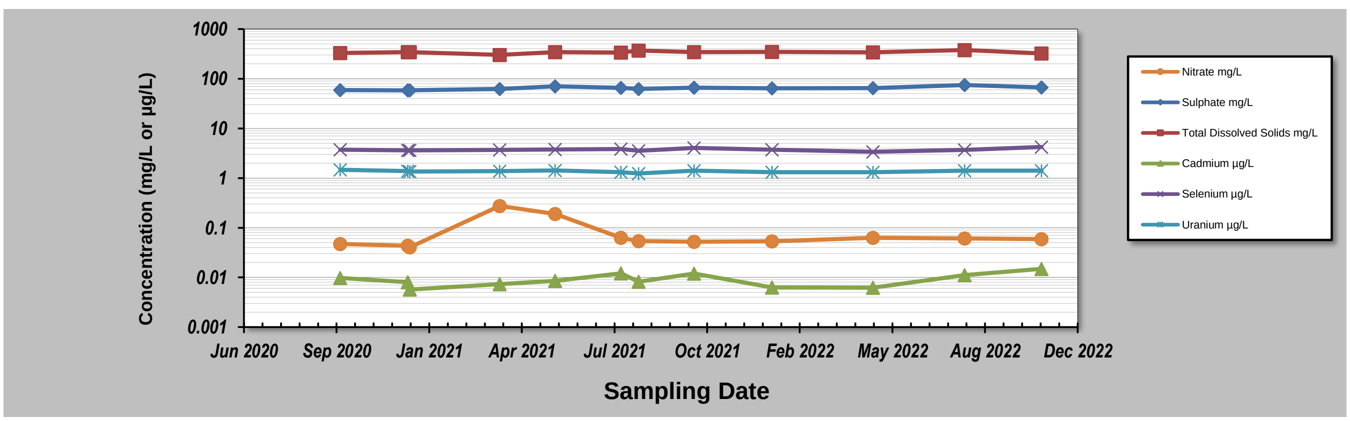
Coefficient of Variation:		0.87	0.08	0.06	0.31	0.06	0.05	
Mann-Kendall Statistic (S):		8	38	14	12	12	-9	
Confidence Factor:		68.1%	99.6%	81.0%	77.0%	77.0%	70.4%	
Concentration Trend:		No Trend	Increasing	No Trend	No Trend	No Trend	Stable	



Notes:

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3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT

Evaluation Date:	03-Feb-23	Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - Background	Location	GH_MW_BG1A
Conducted By:	MS	Reviewed By:	MG

Sampling Event	Sampling Date	Sulphate	Total Dissolved Solids	Selenium	Uranium	Cobalt		
	units	mg/L	mg/L	µg/L	µg/L	µg/L		
		CONCENTRATION						
1	8-Nov-20	16.60	363	5.520	4.460	0.620		
2	26-Mar-21	32.40	345	0.067	2.290	0.460		
3	30-Apr-21	23.30	338	0.050	2.260	0.550		
4	15-Sep-21	23.30	342	0.328	1.970	0.370		
5	19-Nov-21	6.51	308	0.050	1.390	0.410		
6	22-Mar-22	6.07	285	0.050	1.200	0.330		
7	16-May-22	14.00	300	0.053	1.280	0.410		
8	22-Jul-22	8.06	342	0.862	1.160	0.390		
9	19-Oct-22	10.90	272	0.050	0.938	0.330		
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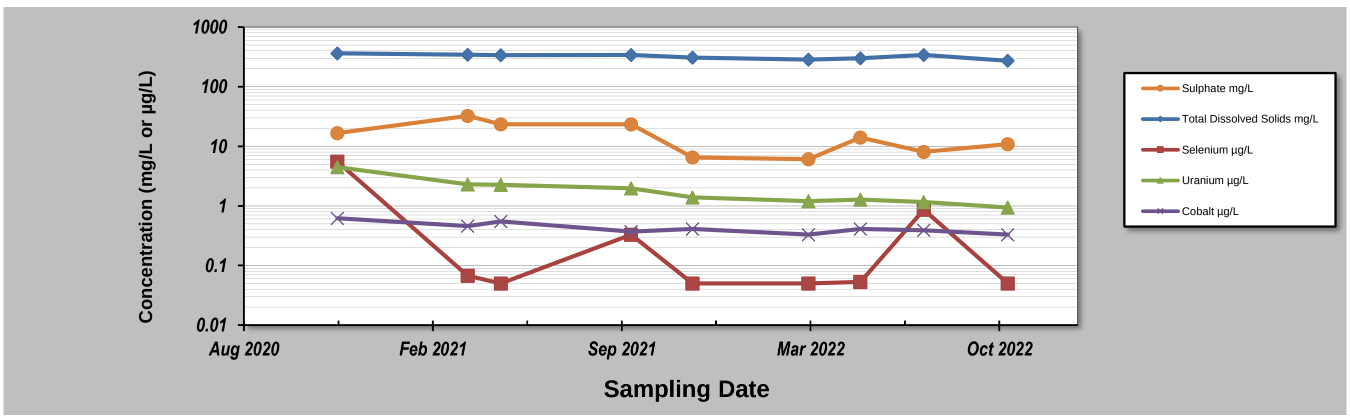
	Coefficient of Variation:	0.58	0.10	2.30	0.58	0.23		
	Mann-Kendall Statistic (S):	-15	-23	-8	-34	-22		
	Confidence Factor:	92.5%	99.1%	76.2%	>99.9%	98.8%		
	Concentration Trend:	Prob. Decreasing	Decreasing	No Trend	Decreasing	Decreasing		



Notes:

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GSI MANN-KENDALL TOOLKIT

Evaluation Date:	03-Feb-23	Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - Background	Location	GH_MW_BG1B
Conducted By:	MS	Reviewed By:	MG

Sampling Event	Sampling Date	Uranium (µg/L)	Sulphate (mg/L)	Total Dissolved Solids (mg/L)				
		CONCENTRATION						
1	29-Sep-20	0.722	25.40	329				
2	10-Dec-20	0.292	9.83	278				
3	27-Jan-21	0.345	10.90	294				
4	30-Apr-21	0.218	4.70	289				
5	22-Sep-21	0.392	9.11	296				
6	19-Nov-21	0.352	7.59	304				
7	25-Feb-22	0.205	5.91	285				
8	16-May-22	0.241	6.63	264				
9	22-Jul-22	0.286	5.89	320				
10	19-Oct-22	0.324	6.55	228				
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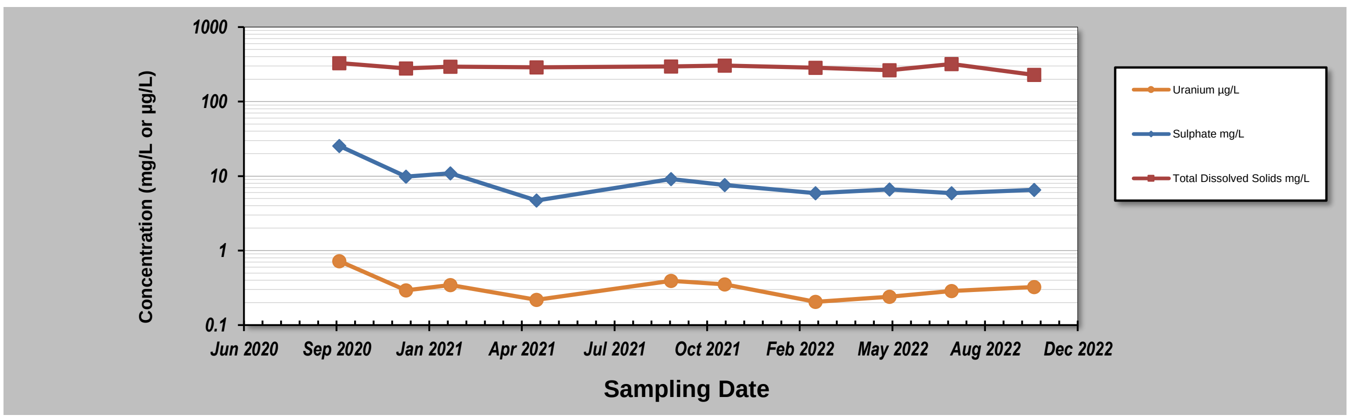
Coefficient of Variation:		0.44	0.65	0.10				
Mann-Kendall Statistic (S):		-11	-25	-11				
Confidence Factor:		81.0%	98.6%	81.0%				
Concentration Trend:		Stable	Decreasing	Stable				



Notes:

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3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT

Evaluation Date:	03-Feb-23	Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - Background	Location	GH_MW_BG1C
Conducted By:	MS	Reviewed By:	MG

Sampling Event	Sampling Date	Nitrate	Sulphate	Total Dissolved Solids	Uranium	Cobalt		
	units	mg/L	mg/L	mg/L	µg/L	µg/L		
		CONCENTRATION						
1	29-Sep-20	0.0068	45.50	353	1.670	1.72		
2	10-Dec-20	0.0050	16.00	299	0.871	1.76		
3	27-Jan-21	0.0050	10.30	300	0.729	1.83		
4	30-Apr-21	0.0050	7.50	313	0.620	1.82		
5	22-Sep-21	0.0081	7.20	290	0.502	1.89		
6	19-Nov-21	0.0050	6.26	287	0.552	1.8		
7	25-Feb-22	0.0221	5.85	284	0.671	1.69		
8	16-May-22	0.0257	6.59	272	0.732	1.81		
9	22-Jul-22	0.0050	5.58	324	0.794	1.81		
10	19-Oct-22	0.0401	5.92	264	0.642	1.73		
11								
12								
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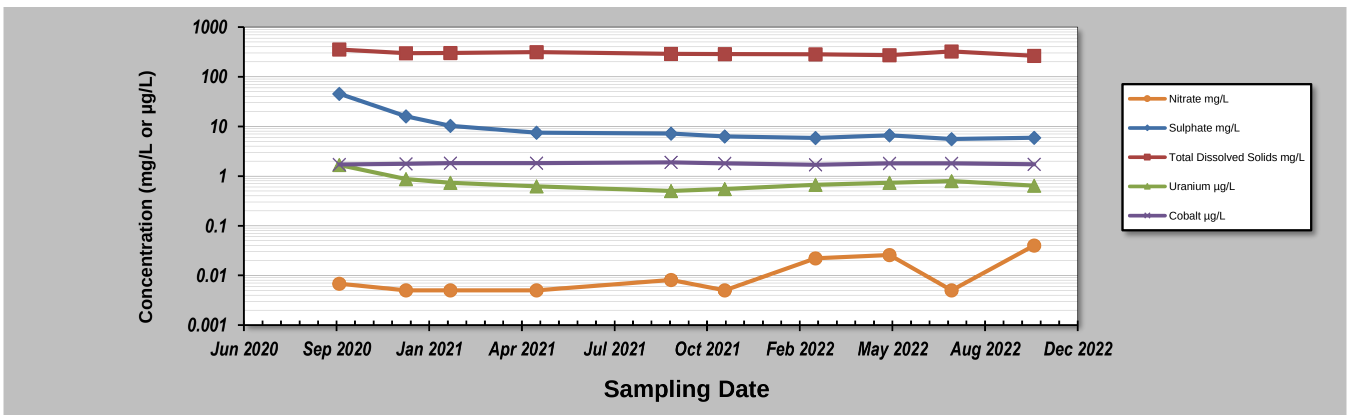
20								
	Coefficient of Variation:	0.96	1.05	0.09	0.43	0.03		
	Mann-Kendall Statistic (S):	17	-37	-25	-9	-2		
	Confidence Factor:	92.2%	>99.9%	98.6%	75.8%	53.5%		
	Concentration Trend:	Prob. Increasing	Decreasing	Decreasing	Stable	Stable		



Notes:

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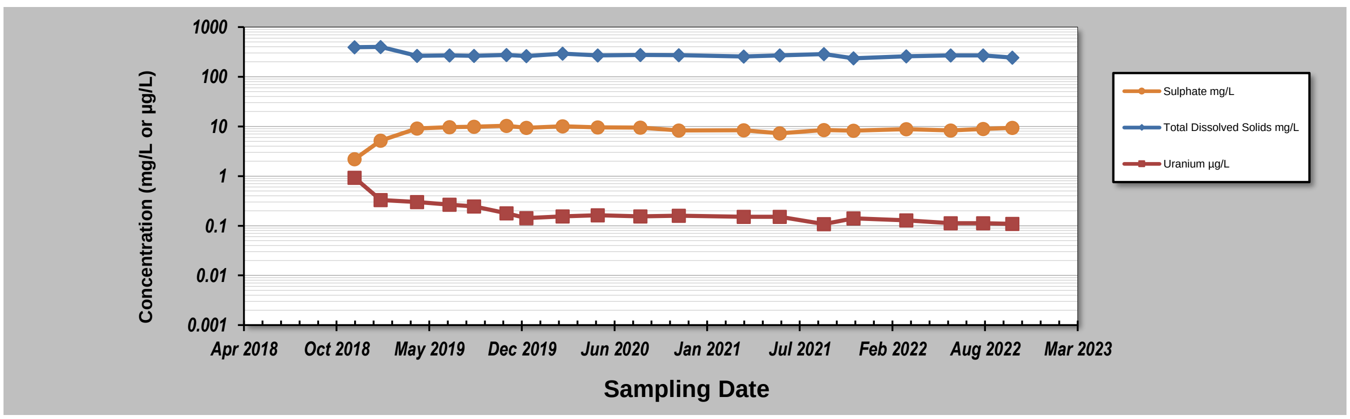
GSI MANN-KENDALL TOOLKIT

Evaluation Date:	14-Jan-23	Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - Background	Location	GH_MW-Willow-1D
Conducted By:	EM	Reviewed By:	MG

Sampling Event	Sampling Date	Sulphate (mg/L)	Total Dissolved Solids (mg/L)	Uranium (µg/L)				
		CONCENTRATION						
1	5-Dec-18	2.19	395	0.923				
2	30-Jan-19	5.17	399	0.328				
3	19-Apr-19	9.09	265	0.302				
4	28-Jun-19	9.71	268	0.267				
5	20-Aug-19	9.89	264	0.246				
6	29-Oct-19	10.30	275	0.178				
7	11-Dec-19	9.40	260	0.143				
8	27-Feb-20	10.10	291	0.154				
9	13-May-20	9.56	268	0.162				
10	13-Aug-20	9.51	275	0.155				
11	4-Nov-20	8.25	272	0.159				
12	24-Mar-21	8.41	256	0.151				
13	10-Jun-21	7.22	269	0.151				
14	13-Sep-21	8.50	285	0.108				
15	16-Nov-21	8.23	235	0.141				
16	10-Mar-22	8.81	259	0.128				
17	14-Jun-22	8.29	268	0.113				
18	23-Aug-22	8.90	268	0.113				
19	25-Oct-22	9.39	243	0.109				
20								
Coefficient of Variation:		0.23	0.15	0.87				
Mann-Kendall Statistic (S):		-13	-56	-139				
Confidence Factor:		66.1%	97.3%	>99.9%				
Concentration Trend:		Stable	Decreasing	Decreasing				



Notes:

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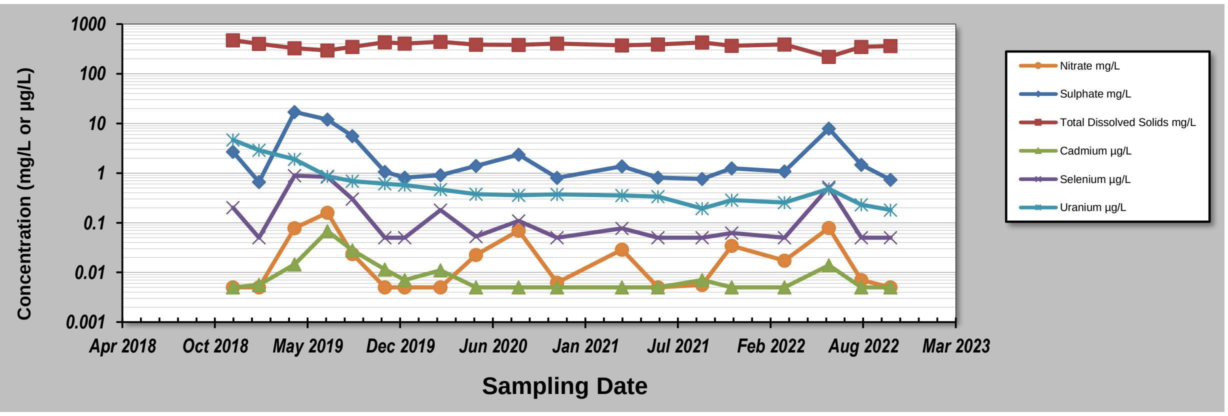
GSI MANN-KENDALL TOOLKIT

Evaluation Date:	03-Feb-23	Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - Background	Location	GH_MW-Willow-2D
Conducted By:	MS	Reviewed By:	MG

Sampling Event	Sampling Date	Nitrate (mg/L)	Sulphate (mg/L)	Total Dissolved Solids (mg/L)	Cadmium (µg/L)	Selenium (µg/L)	Uranium (µg/L)	
		CONCENTRATION						
1	5-Dec-18	0.0050	2.68	472	0.0050	0.202	4.650	
2	30-Jan-19	0.0050	0.66	401	0.0056	0.050	2.890	
3	17-Apr-19	0.0778	17.00	326	0.0146	0.888	1.900	
4	27-Jun-19	0.1590	12.00	294	0.0677	0.835	0.862	
5	20-Aug-19	0.0234	5.55	347	0.0279	0.301	0.686	
6	29-Oct-19	0.0050	1.06	433	0.0115	0.050	0.610	
7	11-Dec-19	0.0050	0.81	407	0.0070	0.050	0.575	
8	26-Feb-20	0.0050	0.91	442	0.0110	0.181	0.465	
9	13-May-20	0.0226	1.40	387	0.0050	0.053	0.375	
10	13-Aug-20	0.0697	2.35	383	0.0050	0.109	0.358	
11	4-Nov-20	0.0062	0.80	404	0.0050	0.050	0.373	
12	24-Mar-21	0.0287	1.37	375	0.0050	0.077	0.354	
13	10-Jun-21	0.0050	0.81	390	0.0050	0.050	0.337	
14	13-Sep-21	0.0056	0.76	427	0.0070	0.050	0.194	
15	16-Nov-21	0.0342	1.25	365	0.0050	0.062	0.287	
16	10-Mar-22	0.0173	1.08	391	0.0050	0.050	0.254	
17	14-Jun-22	0.0789	7.90	219	0.0140	0.520	0.481	
18	23-Aug-22	0.0070	1.47	347	0.0050	0.050	0.230	
19	25-Oct-22	0.0050	0.73	361	0.0050	0.050	0.181	
20								
Coefficient of Variation:		1.35	1.40	0.15	1.30	1.36	1.35	
Mann-Kendall Statistic (S):		10	-34	-38	-53	-51	-145	
Confidence Factor:		62.2%	87.4%	90.1%	96.6%	96.0%	>99.9%	
Concentration Trend:		No Trend	No Trend	Prob. Decreasing	Decreasing	Decreasing	Decreasing	



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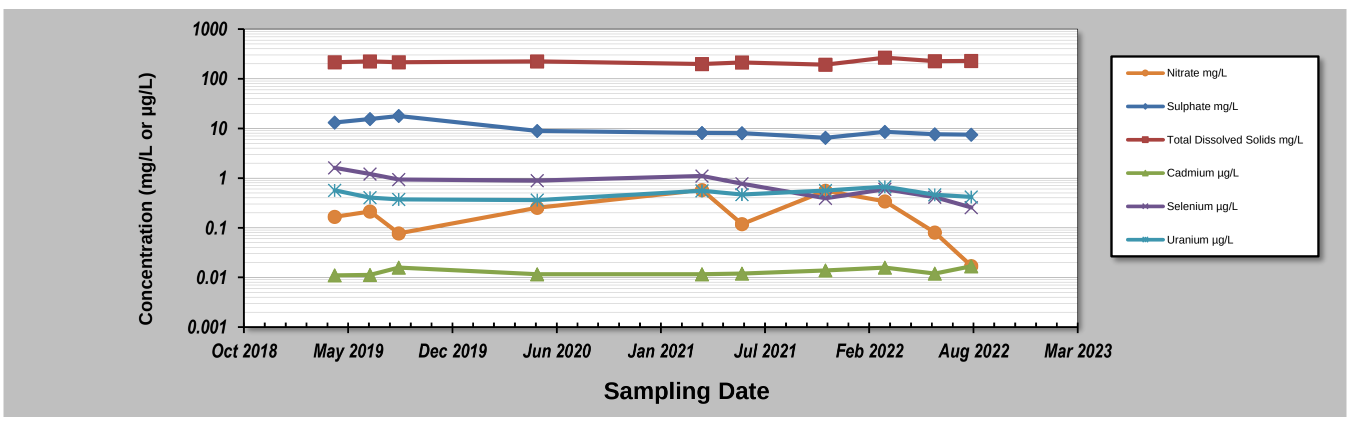
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT

Evaluation Date:	03-Feb-23	Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - Background	Location	GH_MW-Willow-2S
Conducted By:	MS	Reviewed By:	MG

Sampling Event	Sampling Date	Nitrate	Sulphate	Total Dissolved Solids	Cadmium	Selenium	Uranium	
	units	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	
		CONCENTRATION						
1	19-Apr-19	0.1660	13.10	215	0.0110	1.610	0.565	
2	26-Jun-19	0.2120	15.50	224	0.0112	1.210	0.403	
3	20-Aug-19	0.0771	17.80	215	0.0157	0.940	0.371	
4	12-May-20	0.2530	8.86	224	0.0116	0.893	0.360	
5	24-Mar-21	0.5750	8.15	198	0.0116	1.100	0.554	
6	9-Jun-21	0.1190	8.01	212	0.0120	0.774	0.468	
7	16-Nov-21	0.5550	6.48	192	0.0138	0.391	0.559	
8	10-Mar-22	0.3390	8.55	266	0.0157	0.598	0.671	
9	14-Jun-22	0.0804	7.64	226	0.0120	0.411	0.462	
10	23-Aug-22	0.0170	7.46	229	0.0168	0.256	0.418	
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.82	0.38	0.09	0.17	0.51	0.21	
Mann-Kendall Statistic (S):		-5	-29	9	28	-37	3	
Confidence Factor:		63.6%	99.5%	75.8%	99.4%	>99.9%	56.9%	
Concentration Trend:		Stable	Decreasing	No Trend	Increasing	Decreasing	No Trend	



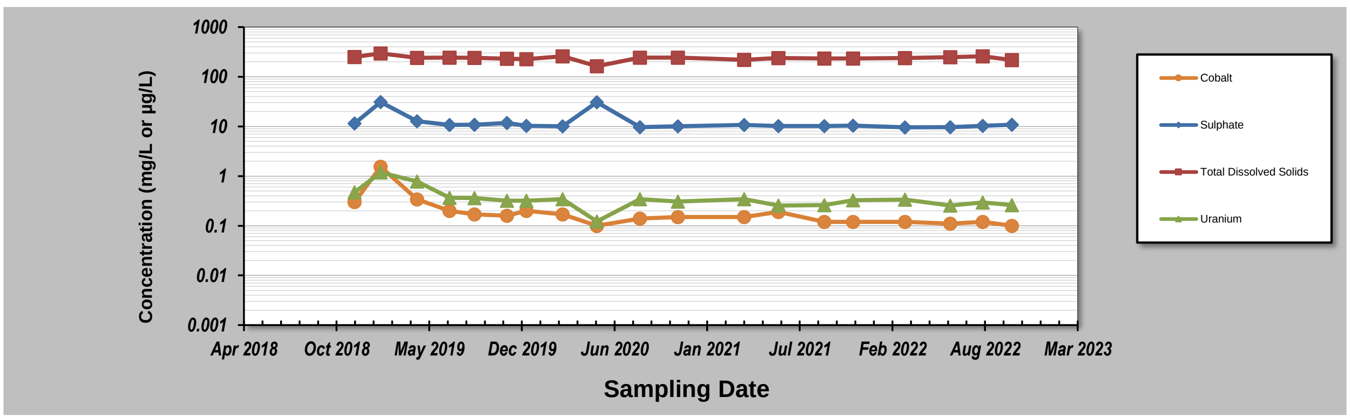
Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT

Evaluation Date:	03-Feb-23	Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - Background	Location	GH_MW-Wolf-1D
Conducted By:	MS	Reviewed By:	MG

Sampling Event	Sampling Date	Cobalt (µg/L)	Sulphate (mg/L)	Total Dissolved Solids (mg/L)	Uranium (µg/L)			
		CONCENTRATION						
1	5-Dec-18	0.300	11.50	251	0.472			
2	30-Jan-19	1.540	30.90	295	1.180			
3	19-Apr-19	0.340	12.70	241	0.782			
4	28-Jun-19	0.200	10.70	242	0.367			
5	21-Aug-19	0.170	10.80	241	0.361			
6	30-Oct-19	0.160	11.70	231	0.321			
7	11-Dec-19	0.200	10.30	226	0.321			
8	27-Feb-20	0.170	10.10	259	0.343			
9	11-May-20	0.100	30.80	163	0.122			
10	12-Aug-20	0.140	9.67	242	0.342			
11	2-Nov-20	0.150	10.10	244	0.307			
12	25-Mar-21	0.150	10.70	220	0.343			
13	7-Jun-21	0.190	10.20	238	0.255			
14	14-Sep-21	0.120	10.20	233	0.260			
15	15-Nov-21	0.120	10.40	234	0.326			
16	7-Mar-22	0.120	9.59	238	0.337			
17	13-Jun-22	0.110	9.64	248	0.256			
18	22-Aug-22	0.120	10.30	257	0.294			
19	24-Oct-22	0.100	10.80	218	0.260			
20								
Coefficient of Variation:		1.36	0.51	0.10	0.61			
Mann-Kendall Statistic (S):		-115	-66	-30	-92			
Confidence Factor:		>99.9%	98.9%	84.3%	100.0%			
Concentration Trend:		Decreasing	Decreasing	Stable	Decreasing			



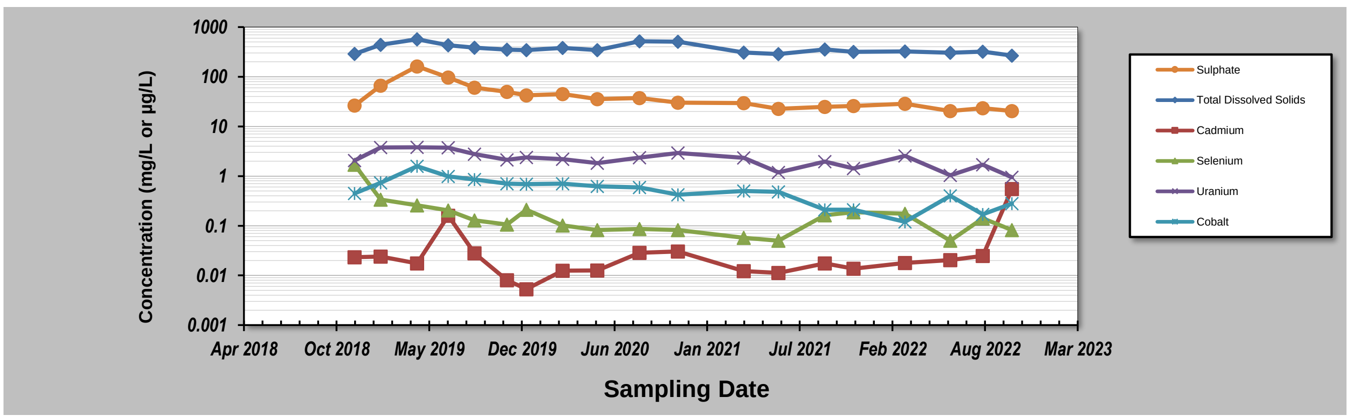
Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT

Evaluation Date:	03-Feb-23	**Job ID:**	635544
Facility Name:	Teck Coal Regional Groundwater - Background	**Location**	GH_MW-Wolf-2D
Conducted By:	MS	**Reviewed By:**	MG

Sampling Event	Sampling Date	Sulphate	Total Dissolved Solids	Cadmium	Selenium	Uranium	Cobalt	
	units	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	
		CONCENTRATION						
1	5-Dec-18	26.40	288	0.0232	1.690	2.050	0.450	
2	30-Jan-19	66.10	442	0.0241	0.337	3.770	0.730	
3	19-Apr-19	162.00	568	0.0174	0.258	3.800	1.580	
4	25-Jun-19	96.80	431	0.1590	0.204	3.720	0.990	
5	21-Aug-19	60.40	384	0.0280	0.129	2.780	0.850	
6	30-Oct-19	49.60	351	0.0080	0.106	2.130	0.700	
7	11-Dec-19	42.40	345	0.0053	0.210	2.380	0.690	
8	27-Feb-20	44.80	380	0.0125	0.102	2.190	0.700	
9	12-May-20	35.50	344	0.0126	0.082	1.820	0.620	
10	11-Aug-20	37.20	518	0.0285	0.086	2.360	0.590	
11	2-Nov-20	30.00	508	0.0305	0.082	2.920	0.420	
12	24-Mar-21	29.40	306	0.0122	0.057	2.320	0.500	
13	7-Jun-21	22.60	287	0.0112	0.050	1.180	0.480	
14	15-Sep-21	24.80	353	0.0175	0.162	1.960	0.210	
15	16-Nov-21	25.70	318	0.0136	0.187	1.420	0.210	
16	7-Mar-22	28.50	323	0.0179	0.174	2.560	0.120	
17	13-Jun-22	20.40	303	0.0204	0.050	1.040	0.400	
18	22-Aug-22	23.40	320	0.0247	0.141	1.700	0.170	
19	24-Oct-22	20.40	267	0.5500	0.082	0.945	0.280	
20								
	Coefficient of Variation:	0.77	0.23	2.33	1.65	0.38	0.61	
	Mann-Kendall Statistic (S):	-122	-75	21	-83	-89	-119	
	Confidence Factor:	>99.9%	99.6%	75.5%	99.8%	99.9%	>99.9%	
	Concentration Trend:	Decreasing	Decreasing	No Trend	Decreasing	Decreasing	Decreasing	



Notes:

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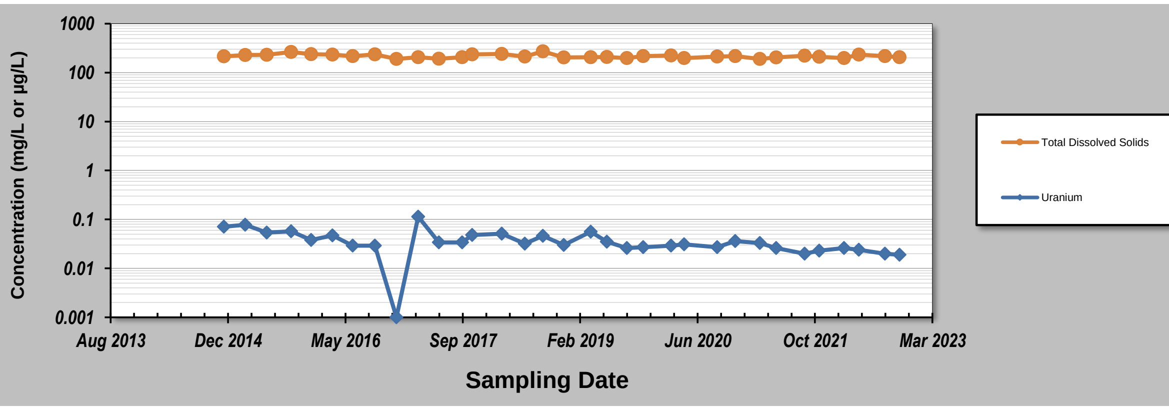
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water* , 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT

Evaluation Date:	03-Feb-23	Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - Background	Location	LC_PIZDC1307
Conducted By:	MS	Reviewed By:	MG

Sampling Event	Sampling Date	Total Dissolved Solids (mg/L)	Uranium (µg/L)					
		CONCENTRATION						
1	9-Dec-14	215	0.071					
2	10-Mar-15	228	0.078					
3	10-Jun-15	231	0.054					
4	22-Sep-15	263	0.057					
5	16-Dec-15	237	0.038					
6	16-Mar-16	233	0.047					
7	10-Jun-16	217	0.029					
8	13-Sep-16	235	0.029					
9	13-Dec-16	190	0.001					
10	16-Mar-17	206	0.114					
11	12-Jun-17	192	0.034					
12	19-Sep-17	207	0.034					
13	1-Nov-17	235	0.048					
14	7-Mar-18	240	0.051					
15	13-Jun-18	212	0.032					
16	29-Aug-18	271	0.046					
17	26-Nov-18	205	0.030					
18	21-Mar-19	207	0.056					
19	29-May-19	209	0.035					
20	22-Aug-19	198	0.026					
21	30-Oct-19	216	0.027					
22	26-Feb-20	225	0.029					
23	22-Apr-20	197	0.031					
24	9-Sep-20	212	0.027					
25	25-Nov-20	218	0.036					
26	10-Mar-21	191	0.033					
27	19-May-21	205	0.026					
28	17-Sep-21	222	0.020					
29	18-Nov-21	211	0.023					
30	4-Mar-22	198	0.026					
31	6-May-22	234	0.024					
32	25-Aug-22	216	0.020					
33	26-Oct-22	207	0.019					
34								
35								
Coefficient of Variation:		0.09	0.55					
Mann-Kendall Statistic (S):		-98	-287					
Confidence Factor:		93.3%	>99.9%					
Concentration Trend:		Prob. Decreasing	Decreasing					

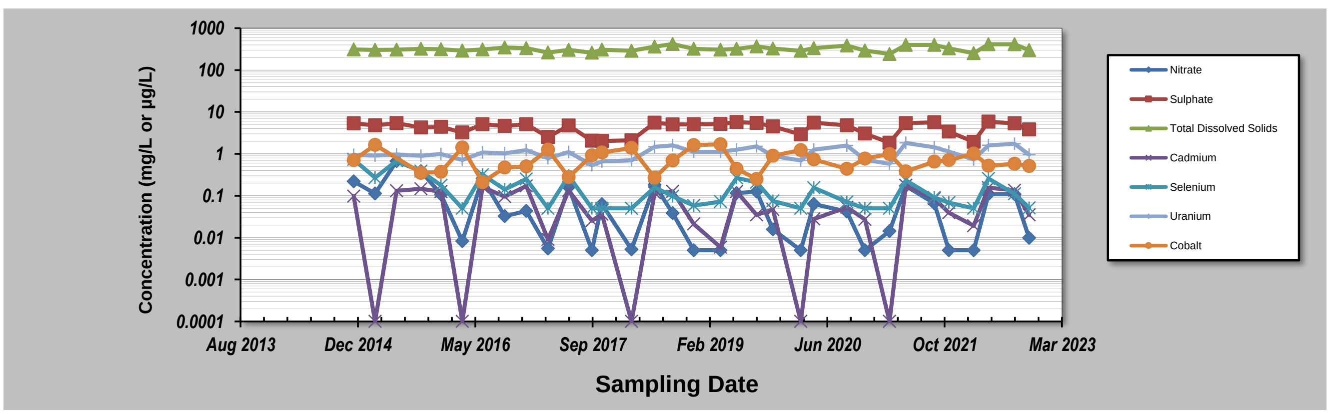


Notes:
1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT

Evaluation Date:	Cadmium	Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - Background	Location	LC_PIZDC1308
Conducted By:	MS	Reviewed By:	MG

Sampling Event	Sampling Date	Nitrate (mg/L)	Sulphate (mg/L)	Total Dissolved Solids (mg/L)	Cadmium (µg/L)	Selenium (µg/L)	Uranium (µg/L)	Cobalt (µg/L)
		CONCENTRATION						
1	9-Dec-14	0.2190	5.30	310	0.0970	0.730	0.940	0.705
2	10-Mar-15	0.1120	4.78	302	0.0001	0.270	0.915	1.640
3	10-Jun-15	0.6670	5.38	307	0.1320	0.686	0.967	
4	22-Sep-15	0.3840	4.24	322	0.1460	0.383	0.898	0.350
5	16-Dec-15	0.1070	4.41	312	0.1250	0.177	0.995	0.370
6	16-Mar-16	0.0082	3.23	293	0.0001	0.050	0.715	1.420
7	10-Jun-16	0.2580	5.11	308	0.1610	0.317	1.080	0.210
8	13-Sep-16	0.0326	4.60	343	0.0950	0.141	1.030	0.470
9	13-Dec-16	0.0432	5.09	333	0.1700	0.250	1.230	0.500
10	16-Mar-17	0.0055	2.50	261	0.0091	0.050	0.789	1.260
11	12-Jun-17	0.1590	4.74	301	0.1330	0.301	1.100	0.280
12	19-Sep-17	0.0050	2.06	258	0.0253	0.050	0.537	0.920
13	1-Nov-17	0.0627	2.02	304	0.0361	0.050	0.660	1.070
14	7-Mar-18	0.0052	2.10	289	0.0001	0.050	0.703	1.380
15	13-Jun-18	0.1810	5.53	363	0.1160	0.160	1.470	0.270
16	29-Aug-18	0.0383	5.00	417	0.1270	0.098	1.590	0.690
17	27-Nov-18	0.0050	5.10	322	0.0211	0.058	1.120	1.610
18	21-Mar-19	0.0050	5.13	305	0.0059	0.072	1.110	1.690
19	29-May-19	0.1150	5.74	322	0.1260	0.266	1.250	0.440
20	22-Aug-19	0.1260	5.47	365	0.0351	0.210	1.510	0.250
21	30-Oct-19	0.0156	4.52	324	0.0469	0.075	0.887	0.900
22	26-Feb-20	0.0050	2.90	289	0.0001	0.050	0.688	1.230
23	22-Apr-20	0.0636	5.54	334	0.0279	0.156	1.250	0.730
24	9-Sep-20	0.0417	4.77	382	0.0533	0.071	1.580	0.440
25	25-Nov-20	0.0050	3.04	290	0.0272	0.050	0.729	0.770
26	10-Mar-21	0.0143	1.84	242	0.0001	0.050	0.577	0.990
27	19-May-21	0.1710	5.41	396	0.1780	0.232	1.810	0.380
28	17-Sep-21	0.0656	5.64	396	0.0854	0.091	1.440	0.650
29	18-Nov-21	0.0050	3.39	328	0.0392	0.068	1.130	0.710
30	4-Mar-22	0.0050	1.93	252	0.0192	0.050	0.730	1.010
31	6-May-22	0.1080	5.84	412	0.1550	0.256	1.590	0.520
32	25-Aug-22	0.1080	5.31	411	0.1350	0.111	1.740	0.580
33	26-Oct-22	0.0098	3.80	299	0.0350	0.051	0.958	0.510
34								
35								
Coefficient of Variation:		1.42	0.31	0.14	0.84	0.98	0.32	0.56
Mann-Kendall Statistic (S):		-134	22	91	-26	-148	126	-7
Confidence Factor:		98.1%	62.7%	91.8%	65.0%	98.9%	97.4%	53.9%
Concentration Trend:		Decreasing	No Trend	Prob. Increasing	Stable	Decreasing	Increasing	Stable



Notes:

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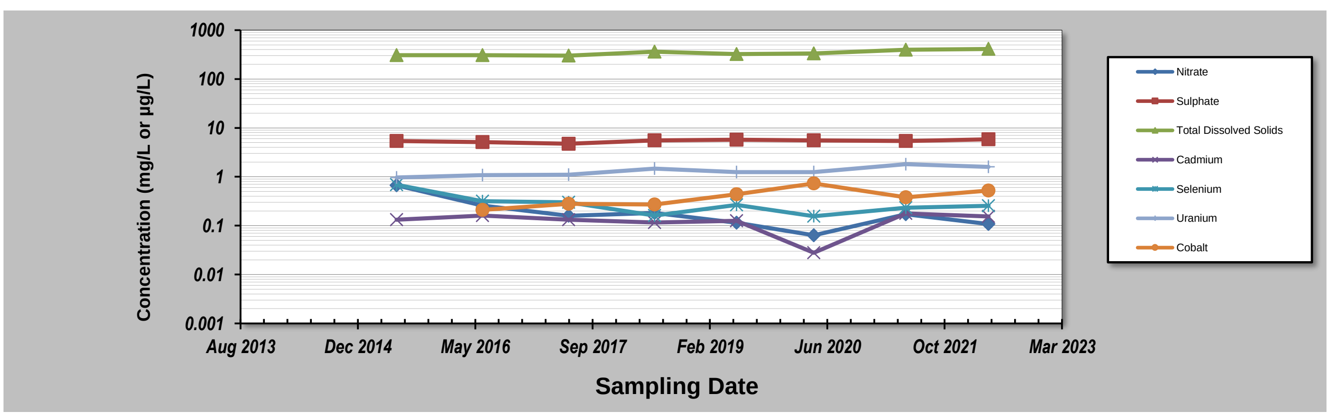
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT

Evaluation Date:	03-Feb-23	Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - Background	Location	LC_PIZDC1308
Conducted By:	MS	Reviewed By:	MG

Sampling Event	Sampling Date	Nitrate (mg/L)	Sulphate (mg/L)	Total Dissolved Solids (mg/L)	Cadmium (µg/L)	Selenium (µg/L)	Uranium (µg/L)	Cobalt (µg/L)
		CONCENTRATION						
1	9-Dec-14							
2	10-Mar-15							
3	10-Jun-15	0.6670	5.38	307	0.1320	0.686	0.967	
4	22-Sep-15							
5	16-Dec-15							
6	16-Mar-16							
7	10-Jun-16	0.2580	5.11	308	0.1610	0.317	1.080	0.210
8	13-Sep-16							
9	13-Dec-16							
10	16-Mar-17							
11	12-Jun-17	0.1590	4.74	301	0.1330	0.301	1.100	0.280
12	19-Sep-17							
13	1-Nov-17							
14	7-Mar-18							
15	13-Jun-18	0.1810	5.53	363	0.1160	0.160	1.470	0.270
16	29-Aug-18							
17	27-Nov-18							
18	21-Mar-19							
19	29-May-19	0.1150	5.74	322	0.1260	0.266	1.250	0.440
20	22-Aug-19							
21	30-Oct-19							
22	26-Feb-20							
23	22-Apr-20	0.0636	5.54	334	0.0279	0.156	1.250	0.730
24	9-Sep-20							
25	25-Nov-20							
26	10-Mar-21							
27	19-May-21	0.1710	5.41	396	0.1780	0.232	1.810	0.380
28	17-Sep-21							
29	18-Nov-21							
30	4-Mar-22							
31	6-May-22	0.1080	5.84	412	0.1550	0.256	1.590	0.520
32	25-Aug-22							
33	26-Oct-22							
34								
35								
	Coefficient of Variation:	0.89	0.06	0.12	0.35	0.57	0.22	0.44
	Mann-Kendall Statistic (S):	-18	14	20	0	-16	21	13
	Confidence Factor:	98.4%	94.6%	99.3%	45.2%	96.9%	99.6%	96.5%
	Concentration Trend:	Decreasing	Prob. Increasing	Increasing	Stable	Decreasing	Increasing	Increasing



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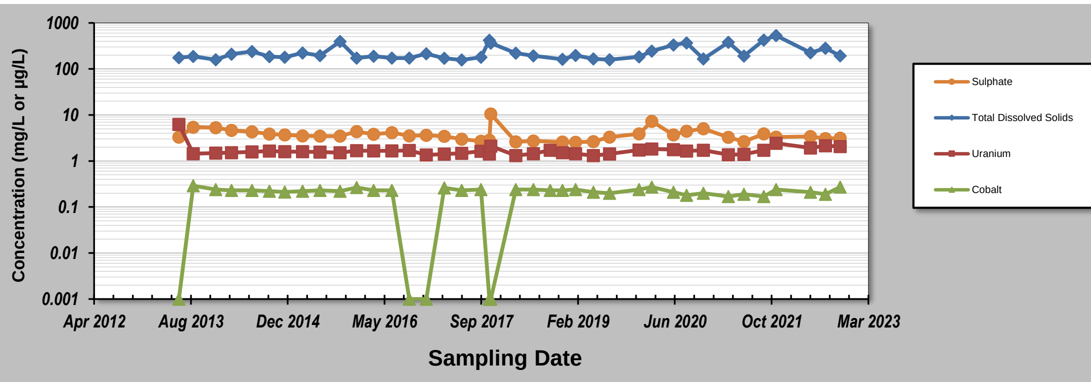
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT

Evaluation Date:	17-Mar-23	Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - Background	Location	LC_PIZP1101
Conducted By:	MS	Reviewed By:	MG

Sampling Event	Sampling Date	Sulphate	Total Dissolved Solids	Uranium	Cobalt			
	units	mg/L	mg/L	µg/L	µg/L			
		CONCENTRATION						
1	13-Jun-13	3.29	176	6.240	0.001			
2	26-Aug-13	5.41	187	1.440	0.290			
3	20-Dec-13	5.29	159	1.490	0.240			
4	12-Mar-14	4.65	209	1.520	0.230			
5	26-Jun-14	4.31	240	1.580	0.230			
6	24-Sep-14	3.86	185	1.640	0.220			
7	12-Dec-14	3.70	179	1.600	0.213			
8	14-Mar-15	3.50	224	1.600	0.220			
9	12-Jun-15	3.49	196	1.570	0.230			
10	24-Sep-15	3.49	395	1.520	0.220			
11	18-Dec-15	4.35	173	1.680	0.265			
12	15-Mar-16	3.83	189	1.670	0.230			
13	17-Jun-16	4.14	173	1.660	0.230			
14	15-Sep-16	3.50	173	1.690	0.001			
15	12-Dec-16	3.62	213	1.360	0.001			
16	15-Mar-17	3.44	171	1.410	0.260			
17	13-Jun-17	2.97	157	1.470	0.230			
18	21-Sep-17	2.70	179	1.630	0.240			
19	3-Nov-17	2.84	419	1.430	0.001			
20	10-Nov-17	10.50	363	2.110	0.001			
21	20-Mar-18	2.61	220	1.320	0.240			
22	19-Jun-18	2.71	193	1.440	0.240			
23	13-Sep-18			1.710	0.230			
24	16-Nov-18	2.58	162	1.520	0.230			
25	22-Jan-19	2.56	197	1.440	0.240			
26	25-Apr-19	2.64	165	1.310	0.210			
27	17-Jul-19	3.30	159	1.420	0.200			
28	16-Dec-19	3.88	183	1.740	0.240			
29	20-Feb-20	7.30	244	1.830	0.270			
30	11-Jun-20	3.68	334	1.770	0.210			
31	18-Aug-20	4.44	370	1.650	0.180			
32	13-Nov-20	5.05	165	1.710	0.200			
33	22-Mar-21	3.26	380	1.370	0.170			
34	10-Jun-21	2.63	192	1.400	0.190			
35	21-Sep-21	3.91	424	1.720	0.170			
36	23-Nov-21	3.31	533	2.430	0.240			
37	11-Mar-22							
38	20-May-22	3.39	226	1.910	0.210			
39	5-Aug-22	3.09	281	2.150	0.190			
40	20-Oct-22	3.14	193	2.060	0.270			
	Coefficient of Variation:	0.38	0.40	0.44	0.41			
	Mann-Kendall Statistic (S):	-181	142	129	-70			
	Confidence Factor:	98.9%	96.2%	93.9%	79.7%			
	Concentration Trend:	Decreasing	Increasing	Prob. Increasing	Stable			



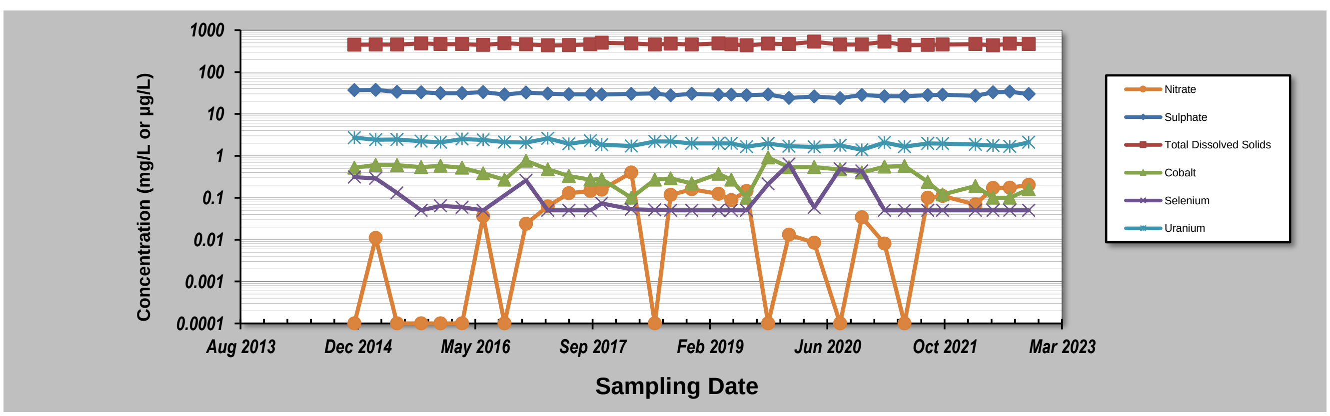
Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT

Evaluation Date:	03-Feb-23	Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - Background	Location	LC_PIZP1103
Conducted By:	MS	Reviewed By:	MG

Sampling Event	Sampling Date	Nitrate (mg/L)	Sulphate (mg/L)	Total Dissolved Solids (mg/L)	Cobalt (ug/L)	Selenium (µg/L)	Uranium (µg/L)	
		CONCENTRATION						
1	12-Dec-14	0.0001	36.70	448	0.519	0.310	2.710	
2	13-Mar-15	0.0110	37.50	453	0.609	0.290	2.430	
3	12-Jun-15	0.0001	33.50	452	0.600	0.130	2.450	
4	23-Sep-15	0.0001	32.90	480	0.540	0.050	2.220	
5	14-Dec-15	0.0001	31.20	463	0.580	0.064	2.090	
6	15-Mar-16	0.0001	31.10	467	0.520	0.059	2.510	
7	13-Jun-16	0.0360	33.00	442	0.380	0.050	2.390	
8	12-Sep-16	0.0001	29.20	488	0.270	0.051	2.130	
9	12-Dec-16	0.0239	32.20	461	0.760	0.260	2.080	
10	15-Mar-17	0.0620	30.50	431	0.480	0.050	2.590	
11	13-Jun-17	0.1280	29.30	438	0.330	0.050	1.940	
12	13-Sep-17	0.1440	29.40	459	0.270	0.050	2.270	
13	31-Oct-17	0.1560	29.00	498	0.280	0.073	1.850	
14	6-Mar-18	0.3990	30.10	481	0.100	0.053	1.710	
15	14-Jun-18	0.0001	31.00	451	0.270	0.051	2.200	
16	21-Aug-18	0.1160	27.80	478	0.290	0.050	2.210	
17	19-Nov-18	0.1590	30.00	452	0.220	0.050	1.980	
18	13-Mar-19	0.1240	28.80	480	0.370	0.050	1.980	
19	6-May-19	0.0878	28.70	460	0.270	0.050	1.990	
20	10-Jul-19	0.1440	27.90	430	0.100	0.050	1.650	
21	10-Oct-19	0.0001	29.10	478	0.910	0.211	1.960	
22	7-Jan-20	0.0131	23.90	462	0.530	0.639	1.690	
23	23-Apr-20	0.0084	26.10	528	0.540	0.058	1.630	
24	12-Aug-20	0.0001	23.80	456	0.470	0.487	1.780	
25	12-Nov-20	0.0340	28.50	455	0.400	0.434	1.390	
26	17-Feb-21	0.0080	26.40	528	0.550	0.050	2.070	
27	13-May-21	0.0001	26.40	438	0.570	0.050	1.650	
28	20-Aug-21	0.0999	28.10	444	0.240	0.050	1.970	
29	22-Oct-21	0.1100	28.70	453	0.120	0.050	1.950	
30	11-Mar-22	0.0690	27.10	462	0.190	0.050	1.860	
31	25-May-22	0.1700	32.90	434	0.100	0.050	1.760	
32	5-Aug-22	0.1730	33.80	473	0.100	0.050	1.680	
33	24-Oct-22	0.2020	29.70	464	0.160	0.050	2.100	
34								
35								
Coefficient of Variation:		1.18	0.10	0.05	0.53	1.20	0.15	
Mann-Kendall Statistic (S):		156	-247	7	-185	-133	-274	
Confidence Factor:		99.2%	>99.9%	53.7%	99.8%	98.5%	>99.9%	
Concentration Trend:		Increasing	Decreasing	No Trend	Decreasing	Decreasing	Decreasing	



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT

Evaluation Date:	03-Feb-23	Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - Background	Location	RG_MW_AC1A
Conducted By:	MS	Reviewed By:	MG

Sampling Event	Sampling Date	Nitrate	Sulphate	Total Dissolved Solids	Cobalt	Selenium	Uranium	
	units	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	
		CONCENTRATION						
1	1-Oct-21	0.0618	47.50	245	0.1600	0.553	0.386	
2	31-Jan-22	0.0085	38.50	230	0.1300	0.137	0.396	
3	29-Apr-22	0.0050	35.60	214	0.1200	0.082	0.514	
4	18-Aug-22	0.0050	32.70	220	0.1400	0.050	0.617	
5	24-Oct-22	0.0066	34.90	263	0.1900	0.050	0.736	
6	9-Dec-22	0.0050	34.70	214	0.2100	0.064	0.823	
7								
8								
9								
10								
11								
12								
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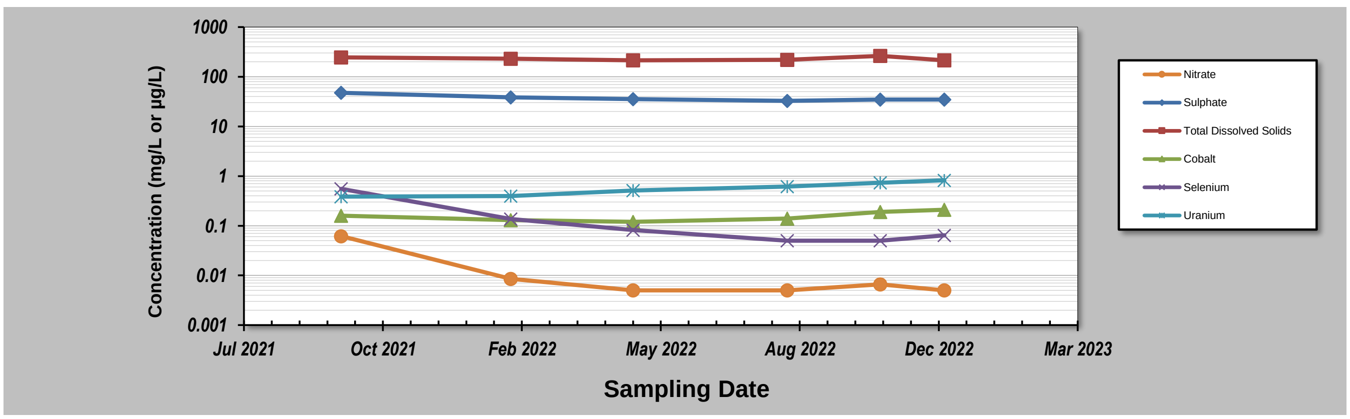
17								
18								
19								
20								
	Coefficient of Variation:	1.49	0.14	0.08	0.22	1.26	0.31	
	Mann-Kendall Statistic (S):	-8	-11	-4	7	-10	15	
	Confidence Factor:	89.8%	97.2%	70.3%	86.4%	95.2%	99.9%	
	Concentration Trend:	No Trend	Decreasing	Stable	No Trend	Decreasing	Increasing	



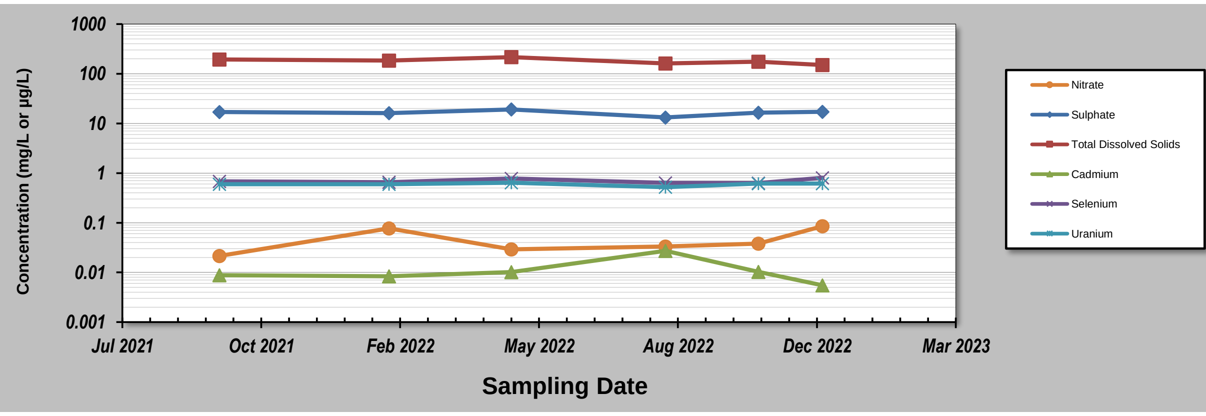
Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water* , 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT

Evaluation Date:	03-Feb-23	Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - Background	Location	RG_MW_AC1B
Conducted By:	MS	Reviewed By:	MG

Sampling Event	Sampling Date	Nitrate	Sulphate	Total Dissolved Solids	Cadmium	Selenium	Uranium	
	units	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	
		CONCENTRATION						
1	1-Oct-21	0.0215	16.90	193	0.0088	0.679	0.594	
2	31-Jan-22	0.0770	16.10	184	0.0084	0.657	0.595	
3	29-Apr-22	0.0291	19.10	216	0.0102	0.781	0.640	
4	18-Aug-22	0.0332	13.20	162	0.0272	0.634	0.520	
5	24-Oct-22	0.0379	16.50	175	0.0103	0.630	0.617	
6	9-Dec-22	0.0853	17.10	150	0.0055	0.803	0.616	
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.57	0.12	0.13	0.66	0.11	0.07	
Mann-Kendall Statistic (S):		9	1	-9	1	-1	3	
Confidence Factor:		93.2%	50.0%	93.2%	50.0%	50.0%	64.0%	
Concentration Trend:		Prob. Increasing	No Trend	Prob. Decreasing	No Trend	Stable	No Trend	



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

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Appendix V

Fording River Operations 2022 SSGMP and RGMP Annual Report

- Figures
- Tables
- Drawings
- Attachments
    - I. Borehole Logs
    - II. Block Diagrams
    - III. Mann-Kendall Analyses
    - IV. Thermal Survey of the Upper Fording River for Groundwater Signals

1 Fording River Operations SSGMP and RGMP Report

1.1 Overview

This report presents the results for the 2022 Fording River Operations (FRO) Site-Specific Groundwater Monitoring Program (SSGMP) and the 2022 Regional Groundwater Monitoring Program (RGMP) Study Area 1. The basis for the SSGMP and RGMP is the conceptual site model (CSM) presented in the approved 2018 SSGMP Update (SNC-Lavalin, 2019), the 2020 RGMP Update (SNC-Lavalin, 2020; approved in March 2023) and the 2021 SSGMP Update (SNC-Lavalin, 2021a; awaiting approval). The CSMs include descriptions of the physical setting, hydrology, geology, mine-related features, physical hydrogeology, and chemical hydrogeology, and present detailed analysis and interpretation of groundwater flow patterns, groundwater geochemistry, groundwater – surface water interactions and potential sources and transport pathways of order constituents (OC) in groundwater to the main stem valley bottom at FRO.

The Fording River is one of two main tributaries of the Elk River and is the principal water course in the vicinity of FRO. It flows through the mine site in a generally north to south orientation before joining the Elk River 30 km downstream of FRO near Line Creek Operations (LCO). A number of mine-influenced tributaries flow into the Fording River within the FRO permitted boundaries and Study Area 1 including, from north to south, Henretta Creek, Clode Creek, Lake Mountain Creek, Kilmarnock Creek, Swift Creek, and Porter Creek (Drawings FR-01 and FR-02). Cataract Creek was diverted to Swift Creek in August of 2019. Surface water drainage from Kilmarnock Creek, Swift Creek, and Cataract Creek is currently being treated by the FRO-South Active Water Treatment Facility (FRO-S AWTF), which began operating in forward flow in December 2021. Several other tributaries unaffected by mining activities also join the Fording River within the Study Area 1 boundary, including tributaries from Castle Mountain and Chauncey Creek (Drawing FR-02).

A number of sedimentation/settling ponds are present throughout the area, as shown on Drawings FR-01 and FR-02. There are also several tailings facilities (including North Tailings Pond [NTP], South Tailings Pond [STP], and the Turnbull South Pit Tailings Storage Facility [TSP TSF]), actively mined pits, backfilled pits, and waste stockpiles contained within the mine permitted boundaries (Drawings FR-01 and FR-02).

Groundwater in the tributary watersheds is monitored by the FRO SSGMP through wells installed either in the tributary watersheds or in the Fording River Valley bottom, while the valley bottom of the Fording River downstream of mining activities is monitored by the RGMP. The FRO SSGMP covers three watersheds: Henretta Creek, the Fording River Valley, and Swift Creek (Drawings FR-01 and FR-02; Diagrams FR-01 to FR-03 in Attachment II).

Study Area 1 of the RGMP is downgradient of the STP and encompasses the Fording River Valley bottom between the STP and Chauncey Creek (Drawing FR-02; Block Diagrams FR-02 and FR-03 in Attachment II). The area includes the South Kilmarnock Settling Ponds and receives drainage from the Kilmarnock Creek, Swift Creek, Cataract Creek (diverted to Swift Creek in 2019), Porter Creek, and Chauncey Creek watersheds. This area was identified for study because it is the focal point for most upland and tributary valley groundwater flow to the Fording River Valley bottom near the FRO and Greenhills Operations (GHO) mine-permitted boundaries.

Surficial geology at FRO is shown on Drawing 5 of the main report and is characteristic of a post-glacial Cordilleran mountain setting (SNC-Lavalin, 2020). Upland areas are dominated by colluvial veneers and blankets with exposed bedrock in higher peaks. Lower mountain slopes and valley flanks are predominantly till with thick colluvial deposits (e.g., talus piles) in some of the steeper valleys. Fluvial and glaciofluvial deposits, with minor till and colluvium, fill the valley-bottom of the Fording River and the Kilmarnock and Henretta creeks. Lacustrine layers of finer grained sediments are also locally present within the valley-bottom aquifers. Locally, the upper 1 to 2 m of boreholes from the Fording River Valley-bottom comprise organic and fine- to medium-grained sediment deposited in a floodplain environment. Anthropogenic materials (waste rock and tailings) are also present within backfilled pits, tailings storage facilities, and as spoils within the uplands and valley-bottoms.

Bedrock geology and key structural features at FRO are shown on Drawing 2 of the main report. Bedrock at FRO is predominantly Carboniferous (Mississippian) to Lower Cretaceous carbonate and siliciclastic sedimentary rock. There are two major north-trending synclines present at FRO - the Alexander Creek and Greenhills synclines. The Erickson fault runs along the base of the Greenhills range west of the Fording River and terminates south of the Fording River and Henretta Creek confluence. The coal-bearing Kootenay Group (Mist Mountain Fm) hosts economic coal seams and is the dominant formation at FRO in the center of the Greenhills Creek (west) and Alexander Creek (east) Synclines, east of the Erickson Fault. The Mist Mountain Fm is underlain by the Moose Mountain Member of the Morrissey Fm, and overlain by the Elk Fm, which caps select ridges at FRO (Kaiser, 1980). The Fernie Fm and the Spray River Group underlie the Kootenay Group and outcrop on the western limb of the syncline near the Fording River Valley-bottom in north-trending beds along the east side of the Erickson Fault. The formations also outcrop along the eastern boundary of the site, and eastern limb of the syncline, in the High Rock Range. The Blairmore Group and Rocky Mountain Supergroup outcrop north and south of the site, respectively. The Rundle Group underlies the Rocky Mountain Supergroup and is composed of limestones that are more resistive to erosion. The Rundle Group limestones form the high alpine peaks and ridges above Cataract Creek and Porter Creek to the west of FRO, as well as the upper catchments of the east to west flowing tributaries of the Fording River east of FRO (i.e., Henretta, Kilmarnock and Chauncey creeks). Carbonate deposits of the Rundle Group have been identified to potentially exhibit karstic features that could influence groundwater flow near the site; however, the Rundle Group deposits do not subcrop within FRO operational areas or Study Area 1.

1.2 Groundwater Monitoring Locations

The 2022 groundwater programs were sampled in accordance with the approved 2018 FRO SSGMP Update (SNC-Lavalin, 2019) and approved 2020 RGMP Update (SNC-Lavalin, 2020). The 2021 SSGMP Update report (SNC-Lavalin, 2021a) has yet to be approved. However, monitoring wells recommended to be added to the FRO SSGMP (FR_MW_NTPSE and FR_MW18-02) and RGMP (RG_MW_FR10A/B/C) in the 2021 SSGMP Update have been incorporated into the respective programs since 2021. Similarly, monitoring wells recommended to be added to the programs in the 2021 Annual Report (SNC-Lavalin, 2022a) have been incorporated into the respective programs for 2022. These include monitoring wells RG_MW_FR8A/B/C added to the RGMP and monitoring wells RG_MW_FR1A/B/C added to both the FRO SSGMP and RGMP. Monitoring wells RG_MW_FR7A/B were also recommended to be added to the RGMP in the 2021 Annual report; however, they were not incorporated into the program for 2022 since they were located within an ephemeral channel and there were concerns regarding the integrity of the well seals. The wells were decommissioned and replaced with RG_MW22_FR12C/D in Q4 of 2022 as part of the Mass Balance Investigation.

The wells included in Study Area 1 of the RGMP and the FRO SSGMP are presented in Tables 1 and 2 of the Main Report, respectively, along with the rationale for their inclusion in the respective programs. Including the wells added to the program in the 2021 SSGMP Update and 2021 Annual Report, the FRO SSGMP consists of 29 monitoring wells and two supply wells at 19 monitoring locations within the Fording River, Henretta Creek, and Swift Creek watersheds. There are 13 wells included in the RGMP within Study Area 1 at six locations (including those added in the 2021 SSGMP Update and 2021 Annual Report), six of which (FR_09-01-A/B, FR_GH_WELL4, and RG_MW_FR1A/B/C) are also included in the FRO SSGMP.

Additional well details are provided in Table FR-01 and on borehole logs in Attachment I; however, borehole logs for the six supply wells that comprise the FR_POTWELLS are not available. These supply wells were installed in the late 1970's. Monitoring well locations are shown on Drawings FR-01 and FR-02 and on the Block Diagrams in Attachment II (Diagrams FR-01 to FR-03). Groundwater elevations and inferred flow directions are shown on Drawings FR-03 and FR-04. The local geological setting is shown on the cross-sections- included on Drawings FR-05 to FR-12. It is noted the cross-sections were based on available information at the time of the last SSGMP Update (2021), with the exception of sections FC-FC' and FD-FD' (Drawings FR-07 and FR-08) which have been updated with select boreholes drilled in 2022. All cross-sections will be re-evaluated with consideration for boreholes completed since 2021 for the 2024 SSGMP Update.

1.3 Program Modifications

A summary of modifications to the groundwater monitoring programs in 2022 is provided in Table A below. Program modifications include any significant change to either the RGMP and/or SSGMP programs going forward compared to what was completed in previous years, such as the addition or removal of wells or changes in sampling frequency. Deviations from the program terms of reference are detailed in Appendix XII.

Table A: FRO SSGMP and Study Area 1 Program Modifications

#	Well ID	Program	Q[a]	Modification	Reason
1	FR_HMW2	SSGMP	1-4	Not sampled or monitored except for manual measurement in Q1.	Equipment lodged in well. Well was decommissioned and replaced in Q1 of 2023.
2	RG_MW_FR1-A/B/C	SSGMP/RGMP	1-4	Monitoring well added to the SSGMP and RGMP.	Recommendation in the 2021 Annual Report.
3	RG_MW_FR8-A/B/C	RGMP	1-4	Monitoring well added to the RGMP.	Recommendation in the 2021 Annual Report.

Notes:
[a] Q denotes Quarter (Q1, Q2, Q3, Q4).

1.4 Summary of 2022 Field Activities

Table B summarizes the field activities that took place in 2022, in addition to the quarterly SSGMP and RGMP monitoring and sampling.

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Table B: Summary of 2022 FRO SSGMP and Study Area 1 Field Activities

#	Location	Q[a]	Field Activity	Rationale
1	Henretta Creek	2022 Q3	Drilled and installed a bedrock monitoring well (FR_MW22_HC1_1A) west of Henretta Lake.	Recommendations in the 2021 SSGMP Update Report and 2021 Annual Report to investigate potential down-valley transport pathway. The recommendation was for a clustered pair in unconsolidated material and bedrock; however, only a bedrock well was installed. The unconsolidated material was unsaturated at this location.
2	Henretta Creek	2022 Q3	Attempted to retrieve tubing stuck in FR_HMW2.	Recommendation in the 2021 Annual Report. The tubing could not be retrieved, and the well was decommissioned and replaced in Q1 of 2023.
3	Henretta Creek	2022 Q4	Hydraulic conductivity testing of FR_HMW1S.	Recommendation in the 2021 Annual Report as there is no hydraulic conductivity estimate at this well.
4	Henretta Creek	2023 Q1	Decommissioned FR_HMW2; Drilled and installed clustered monitoring wells in waste rock (FR_MW23_HMW2_V2) and underlying bedrock (FR_MW23_HMW2_BR).	Recommendation in the 2021 Annual Report. FR_MW23_HMW2_V2 replaces FR_HMW2.
5	Potable Wells Area	2022 Q3	Drilled and installed clustered monitoring wells in the potable wells area. Phase I drilling included seven wells at three locations (FR_MW22_POTW1A/B/C, FR_MW22_POTW2A/B, and FR_MW22_POTW3A/B).	Recommendations in the 2021 SSGMP Update Report and 2021 Annual Report to investigate hydraulic connection between the FRO potable wells and Fording River.
6	Potable Wells Area	2022 Q4	Drilled and installed monitoring wells and drive-point piezometers in the potable wells area. Phase II drilling included nine wells at six locations (FR_MW22_POTW4A/B, FR_MW22_POTW5, FR_MW22_POTW6A/B, FR_MW22_POTW7, FR_MW22_POTW8A/B, and FR_MW22_POTW9) and four drive-point piezometers (FR_DP22_POTW1 to FR_DP22_POTW4).	Recommendations in the 2021 SSGMP Update Report and 2021 Annual Report to investigate hydraulic connection between the FRO potable wells and Fording River.
7	Fish Creek Pond	2022 Q3	Drilled and installed clustered monitoring well and vibrating wire piezometer (VWP) in the Fish Creek Pond area (FR_MW22_FC1_1A/B).	Recommendations in the 2021 SSGMP Update Report and 2021 Annual Report to investigate groundwater quality in the Fording River valley-bottom between the potable wells area and Clode Creek Ponds area. A VWP was installed at FR_MW22_FC1_1A due to artesian conditions.

Table B (Cont'd): Summary of 2022 FRO SSGMP and Study Area 1 Field Activities

#	Location	Q[a]	Field Activity	Rationale
8	Clode Creek	2022 Q3	Drilled and installed replacement monitoring well in the Clode Creek Ponds area (FR_MW22_CB-X3A/B and FR_MW22_CB-1C).	Replacement wells for FR_CB-3A/B (impacted by construction activities of new infrastructure in the area) and FR_CB-1C (well integrity was compromised). Requested to be completed by Teck.
9	Clode Creek	2022 Q3	Drilled and installed clustered monitoring wells west of the Clode Creek ponds (FR_MW22_CB-7A/B/C).	Recommendation in the 2021 Annual Report to investigate potential transport pathway between the Clode Creek ponds and Fording River beneath the West Exfiltration Ditch.
10	Clode Creek	2022 Q3	Drilled and installed clustered monitoring wells south of Clode Creek ponds (FR_MW22_GCMW-6A/B).	Investigate potential transport pathways between the Clode Creek ponds and Fording River in the southern direction, as well as between the Clode Creek watershed and Fording River in the western direction. Requested to be completed by Teck as a commitment from the FRO-North Saturated Rock Fill (FRO-N SRF) Phase 2 application.
11	Kilmarnock Creek	2022 Q3	Drilled and installed clustered monitoring wells in the Upper Kilmarnock Creek watershed (FR_MW22_KCDW1A/B).	Recommendation in the 2021 Annual Report to investigate groundwater quality upgradient of mining operations local to FRO.
12	Regional Groundwater Discharge Zone	2022 Q4	Decommissioned monitoring wells RG_MW_FR7A/B and replaced them with RG_MW22_FR12A/B/C/D.	Monitoring wells RG_MW_FR7A/B were located within an ephemeral channel and there were concerns regarding the integrity of the well seals. Monitoring wells RG_MW22_FR12C/D were installed to replace them, while monitoring wells RG_MW22_FR12A/B were installed to monitor conditions in the deep unconsolidated materials and bedrock. This work was completed as part of the MBI program.

Notes:

[a] Q denotes Quarter (Q1, Q2, Q3, Q4).

1.5 Henretta Creek Valley Watershed

A summary of 2022 groundwater monitoring and sampling results for the Henretta Creek Valley watershed is presented in Table C with references to supporting information (Drawings, Figures, Tables, and Appendices).

Table C: Summary of 2022 Groundwater Monitoring and Sampling Results for Henretta Creek Valley

Hydrogeological Information		Description	Reference
Monitoring Locations	Relevant FRO SSGMP	**Upstream**: FR_HMW5 **Henretta Spoils**: FR_HMW2 (hydrostatic and groundwater quality data could not be collected in 2022 due to well inaccessibility from lodged downhole equipment) **Henretta Backfilled Pits**: FR_HMW1S/D, FR_HMW3	Table FR-01 Drawing FR-01
	Relevant Monitoring Wells for Evaluation[a]	FR_MW-HC1A/B, FR_MW-HC2A/B, FR_MW-HC3A/B, FR_MW22_HC1_1A, FR_MW23_HMW2_V2, FR_MW23_HMW2_BR	
	Relevant Surface Water Monitoring Stations[b]	FR_HC1, FR_HC3	
	Relevant Seep Monitoring Locations[b]	FR_HENSEEP3	
Physical Hydrogeology	Groundwater Elevation Trends	• **Upstream:** – Groundwater elevations fluctuated seasonally by 0.6 m, with lows in early spring (April) and highs in June. These fluctuations were consistent with those observed in previous years. • **Henretta Spoils**: – Continuous water level data from FR_HMW2 in 2022 was not available because the logger was irretrievable. FR_HMW2 is completed in spoils on the valley flank and water levels recorded by the data logger in previous years have fluctuated on the order of 0.5 m annually. Discrepancies between manual and datalogger measurements in previous years are likely the result of a 30 m long piece of Waterra tubing that was lost down FR_HMW2 in 2017. • **Henretta Backfilled Pits**: – Minimum water levels were measured in February at FR_HMW1S and in March at FR_HMW1D, while peak water levels occurred in early June at both wells. Seasonal water level fluctuations in 2022 were 0.9 m and 0.8 m at FR_HMW1S and FR_HMW1D, respectively. Continuous water level data at FR_HMW1D between July 2020 and March 2022 are not available due to a malfunctioning datalogger, which was replaced in Q1 of 2022. Water levels at FR_HMW3 fluctuated by 1.4 m in 2022, with minimum water levels in March and peak water levels in June.	Figure FR-01 Table FR-02 Drawing FR-03
	Hydraulic Gradients and Flow Direction	• Vertical Hydraulic Gradient: – FR_HMW1S/D –0.001 m/m (Q3 and Q4) upward, and 0.003 m/m (Q2) downward. The hydraulic heads were equal in Q1 with no resulting vertical gradient. • Lateral Hydraulic Gradient: – The lateral gradient between monitoring wells completed within the spoils (FR_HMW2) and backfilled pits (FR_HMW1S/D and FR_HMW-3) in Q1 was 0.05 m/m, directed SW towards Henretta Lake.	
Chemistry	2022 SSGMP/RGMP Order Constituents Results	• **Upstream:** – Concentrations greater than primary screening criteria: ▪ Dissolved Selenium – exceeded primary criteria in Q3. • **Henretta Spoils:** – Samples could not be collected from FR_HMW2 in 2022 (as indicated above). However, concentrations of dissolved selenium, nitrate-N, and sulphate have exceeded the primary screening criteria (and secondary screening criteria in the case of dissolved selenium) in every sample collected historically from this location. • **Henretta Backfilled Pits:** – Concentrations greater than primary screening criteria: ▪ Dissolved Selenium – FR_HMW1S (primary and secondary screening criteria, all samples), FR_HMW3 (primary screening criteria for all samples and secondary screening criteria in Q2, Q3, and Q4), and FR_HMW1D (primary screening criteria, Q2). ▪ Nitrate-N and Sulphate – FR_HMW1S (all samples), FR_HMW1D (all samples), FR_HMW3 (nitrate-N in Q2 and Q3). • All other OC concentrations were less than the primary screening criteria in 2022.	Table D Figures FR-02 to FR-05 Tables FR-03 to FR-05 Drawings FR-13 to FR-16
	Non-Order Mine-Related and Naturally Occurring Constituents[c]	• Concentrations Greater than Primary Screening Criteria – Non-Order Mining Related Constituents: – Uranium – All samples collected from FR_HMW1S/D. • Concentrations Greater than Primary Screening Criteria – Naturally Occurring Constituents: – Lithium – All samples collected from all wells; and – Manganese – All samples collected from FR_HMW1S/D. • All other non-order mining related and naturally occurring constituents were less than primary screening criteria.	Tables FR-03 and FR-04

Table C (Cont'd): Summary of 2022 Groundwater Monitoring and Sampling Results for Henretta Creek Valley

Hydrogeological Information		Description	Reference
Chemistry (Cont'd)	Mann-Kendall Trend Analysis	• **Upstream:** – Increasing trends were identified for sulphate and dissolved selenium. • **Henretta Spoils:** – Mann-Kendall analyses were not completed since no samples were collected in 2022. An increasing trend was identified for dissolved selenium in 2021. • **Henretta Backfilled Pits:** – Increasing trends were identified for sulphate at FR_HMW1S/D and FR_HMW3, for dissolved selenium at FR_HMW1S and FR_HMW3, and for dissolved cadmium at FR_HMW1D. The dissolved cadmium concentrations at FR_HMW1D remain low and less than the primary screening criteria. • Results of all other Mann-Kendall analyses were either decreasing, stable, or non-trending.	Table E Attachment III

Notes:

[a] – Relevant monitoring wells from other programs are those in the area that are under evaluation for potential inclusion in the SSGMP and/or RGMP.

[b] – Relevant surface water stations and seep monitoring locations are as determined in the 2021 SSGMP Update (SNC-Lavalin, 2021a), and represent a sub-set of the surface water and seepage monitoring locations present at FRO and within Study Area 1.

[c] – Non-order mine-related and naturally occurring constituents based on the background assessment (BGA) completed for the 2020 RGMP Update (SNC-Lavalin, 2020).

A summary of OC compared to primary screening criteria for the wells in the Henretta Creek Valley is presented below in Table D.

Table D: FRO – Summary of OC compared to Primary Screening Criteria in the Henretta Creek Valley

Parameter [1,2,3] / Well ID	Nitrate-N (mg/L)				Sulphate (mg/L)				Dissolved Cadmium (µg/L)				Dissolved Selenium (µg/L)			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Upstream of Henretta Spoils and Backfilled Pits																
FR_HMW5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13.4	-
Henretta Spoils																
FR_HMW2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Henretta Backfilled Pits																
FR_HMW1S	108	98.9	93.5	94.1	1,800	1,790	1,690	1,740	-	-	-	-	***244***	***279***	***273***	***228***
FR_HMW1D	97.7	102	94.6	103	1,870	1,840	1,790	1,880	-	-	-	-	-	14.9	-	-
FR_HMW3	-	13.2	10.3	-	-	-	-	-	-	-	-	-	***66.2***	***117***	***85.1***	***98.7***
CSR AW	400				1,280 – 4,290[4]				0.5 – 4[4]				20			
CSR IW	n/a				n/a				5				20			
CSR LW	100				1,000				80				30			
CSR DW	10				500				5				10			

Notes:

[1] Primary screening criteria: CSR standards for **Aquatic Life (AW)**, Drinking Water (DW), Livestock (LW) and *Irrigation (IW)*.

[2] '–' denotes result is below primary screening criteria.

[3] Where a duplicate was collected, or if more than one sample was collected in a quarter, the higher concentration is provided.

[4] Standard varies with hardness.

'NS' denotes sample not collected.

Mann-Kendall trend analyses were completed for OC for wells the Henretta Creek Valley with seven or more sampling events and are summarized in Table E.

Table E: FRO – Summary of Mann-Kendall Trend Analysis for OC in the Henretta Creek Valley

Well ID \ Parameter[1]	Nitrate-N	Sulphate	Dissolved Cadmium	Dissolved Selenium
Upstream of Henretta Spoils and Backfilled Pits				
FR_HMW5	-	Increasing	-	Increasing
Henretta Spoils				
FR_HMW2	N/A	N/A	N/A	N/A
Henretta Backfilled Pits				
FR_HMW1S	***Decreasing***	***Increasing***	Decreasing	***Increasing***
FR_HMW1D	***Decreasing***	***Increasing***	Increasing	***Decreasing***
FR_HMW3	***Decreasing***	Increasing	Probably Decreasing	***Increasing***

Notes:

[1] Where OC were measured above primary screening criteria in 2022, the trend result is ***italics***. Where increasing trends are noted, the cell is shaded yellow. Where the OC were measured above secondary screening criteria for selenium during at least one event in 2022, the result is ***shaded and italics***. Where increasing trends are noted, the cell is shaded yellow.

'-' denotes trend analysis was not completed as concentrations of parameter have consistently been less than, or marginally greater than the detection limit.

1.5.1 Discussion

The SSGMP monitoring network within the Henretta Creek watershed consists of one well screened within native gravel in a location inferred to be upgradient of spoils (FR_HMW5) at the time of installation, and four wells completed within source areas, including three completed within backfilled pits (FR_HMW1S/D and FR_HMW3) and one completed within spoils (FR_HMW2). Monitoring wells completed within the spoils and backfilled pits are expected to show mine-influence and were installed to monitor water quality from source areas.

Upstream of Henretta Spoils and Backfilled Pits

The concentration of dissolved selenium in the sample collected from FR_HMW5 (screened in gravel between 7.3 and 10.4 m below ground surface [bgs]) in Q3 was greater than the primary screening criteria. Selenium concentrations at this location have historically been less than the primary screening criteria except for one sample collected in Q2 of 2017. Concentrations of all other parameters in all samples collected from FR_HMW5 in 2022 were less than the primary screening criteria, except for dissolved lithium. Aside from the selenium concentration in Q3, the concentrations of sulphate and selenium in 2022 were consistent with those in recent years and elevated compared to historical results between 2012 and 2016 (Figures FR-02 and FR-03). Mann-Kendall trend analyses also indicated increasing trends for sulphate and dissolved selenium (Table E; Attachment III).

Monitoring well FR_HMW5 was installed to evaluate groundwater quality upstream of mining activities in Henretta Creek Valley. However, increasing concentrations of sulphate and dissolved selenium have been noted for several years. Concentrations of OC at nearby surface water station FR_HC3 were low and representative of natural waters (Figures FR-02 to FR-05). Dissolved selenium concentrations in groundwater at FR_HMW5 were higher than those in surface water at nearby station FR_HC3 (Figure FR-02). While sulphate concentrations in surface water at FR_HC3 were similar to those in groundwater at FR_HMW5, they have not exhibited similar seasonality and do not appear to be increasing as the groundwater concentrations have (Figure FR-03). Therefore, the source of the increasing selenium and sulphate concentrations at FR_HMW5 has been inferred to originate from spoils rather than infiltration from Henretta Creek.

Monitoring well FR_HMW5 has been considered mine-impacted since May 2016 and therefore, this well has been removed from the background monitoring well network (SNC-Lavalin, 2020). Installing a new background well in the Upper Fording River Valley was attempted in 2020 but could not be completed due to access limitations.

Henretta Spoils

Monitoring well FR_HMW2 was installed at the base of the spoil (between 43.3 to 46.3 mbgs) to monitor upland groundwater elevated in OC north of the Henretta reclaimed channel. Concentrations of OC have historically been elevated in this well as it is located in a source area. Samples could not be collected from this well in 2022 due to lodged monitoring equipment stuck at 9 m below the top of the casing, creating an obstruction for the bladder and/or geosub pumps used to sample. This well was decommissioned and replaced with FR_MW23_HMW2_V2 in Q1 2023, with an adjacent well installed in bedrock (FR_MW23_HMW2_BR).

Henretta Backfilled Pits

Monitoring wells FR_HMW1S and FR_HMW1D were installed in backfilled pits (between 29.9 and 32.9 mbgs and between 51.2 and 54.3 mbgs, respectively) between Henretta Creek and the spoils to the north. Dissolved selenium concentrations at FR_HMW1S were elevated in 2022 (228 to 279 µg/L) and the concentrations in Q2 and Q3 were the highest since monitoring began in 2012 (Figure FR-02). The Mann-Kendall analysis also indicated an increasing trend for dissolved selenium at this well. Dissolved selenium concentrations at FR_HMW1D in 2022 ranged from 4.98 to 14.9 µg/L, similar to recent years and generally lower than historical results between 2013 and 2018 (Figure FR-02). The Mann-Kendall statistical analyses for dissolved selenium at FR_HMW1D indicated a decreasing trend (Table E; Attachment III).

Sulphate concentrations at FR_HMW1D were higher than at FR_HMW1S in each quarter in 2022 by between 50 to 140 mg/L, similar to previous years. Although the sulphate concentrations were lower in 2022 compared to 2021, there is an overall increasing trend at both wells as indicated by both the temporal plot (Figure FR-03) and the Mann-Kendall analyses (Table E; Attachment III). Mann-Kendall analyses of nitrate-N concentrations indicated decreasing trends at both wells (Table E; Attachment III), and the concentrations detected in 2022 were the lowest reported to date at each well. The decreasing trends in nitrate-N concentrations may be attributed to nitrate source depletion in the spoil, which has been noted at other spoils across the valley (Teck, 2018).

Monitoring well FR_HMW3 (screened between 16.7 and 19.7 mbgs) monitors groundwater in backfilled pits in the eastern portion of the former South Henretta Pit. Dissolved selenium concentrations at FR_HMW3 in 2022 ranged from 64.4 to 117 µg/L, with the highest results in Q2 and Q4, which were the highest concentrations reported to date (Figure FR-02). The Mann-Kendall analysis and temporal plot indicated an increasing trend in dissolved selenium concentrations (Figure FR-02). Sulphate concentrations ranged between 263 to 435 mg/L and were generally higher in 2022 than in recent years (Figure FR-03), with an increasing trend indicated by the Mann-Kendall analysis (Table E; Attachment III). Sulphate concentrations generally displayed similar seasonality as observed in surface water at FR_HC1, although concentrations were typically higher in groundwater (Figure FR-03). Nitrate-N concentrations ranged from 8.26 to 13.2 mg/L in 2022, and the Mann-Kendall analysis indicated a decreasing trend. The nitrate-N concentrations at FR_HMW3 in 2022 were within established historical ranges (Figure FR-04) and have been lower since Q2 of 2017 compared to the first two years of results. The decrease in concentrations may be attributed to nitrate-N depletion at the source.

Mine-Influence and Transport Pathways in Henretta Creek Valley

Figure FR-05 shows the ratios of Se:SO_4 (S) for groundwater in the Henretta Creek Valley and surface water at FR_HC1 in 2022, as well as the historical ratios between 2011 and 2016 at surface water station FR_HC2 (no longer monitored). The Se:SO_4 (S) ratios plotted on Figure FR-05 indicated shallow groundwater in the backfilled pits at FR_HMW1S have been influenced by spoils (as expected in the source area), while deeper groundwater in the backfilled pits at FR_HMW1D is likely undergoing attenuation by microbial reduction.

The Se:SO_4 (S) ratios in surface water at FR_HC1 and FR_HC2 plot along the mixing line between natural and mine-influenced waters, with more natural influence during freshet and more mine-influence during low flow periods. The ratios of groundwater at FR_HMW3 (completed in the backfilled pits) and the Q3 sample from FR_HMW5 (upgradient of the spoils) also plot along this mixing line, with more mining influence in groundwater at FR_HMW3 and more natural water influence at FR_HMW5. The remainder of the samples collected from FR_HMW5 in 2022 plot along the border of zones representative of non-contact water for bedrock and unconsolidated material, indicating minimal mine-influence in these samples. Surface water collected from upstream Henretta Creek monitoring stations FR_HC3 also plots in the area representative of natural waters.

OC concentrations in Henretta Creek increased between upstream surface monitoring station FR_HC3 and discontinued monitoring station FR_HC2 (Figures FR-02 to FR-04), located upstream of Henretta Lake. Elevated OC concentrations at FR_HENSEEP3 (dissolved selenium between 437 and 517 µg/L in 2022), located at the base on Henretta spoil upgradient of Henretta Lake, suggest that it may be a source of OC upstream of FR_HC2.

OC concentrations at downstream surface water station FR_HC1 were generally lower than concentrations measured at monitoring wells FR_HMW1S/D, FR_HMW2 and FR_HMW3, and have been historically similar to concentrations measured at surface water station FR_HC2 upstream of Henretta Lake (Figures FR-02 to FR-04). This suggests there has been minimal loading to Henretta Creek from groundwater around the backfilled pits despite inferred groundwater flow from source areas to Henretta Lake (Drawing FR-03). There may be mine-influenced groundwater discharge at the base of Henretta Lake causing stratification of OC in the water column, with higher concentrations at depth. Alternatively, it may be that groundwater from the backfilled pits bypasses Henretta Lake and flows toward the Fording River Valley (SNC-Lavalin, 2019). Additional drilling was completed downgradient of Henretta Lake in 2022 and surface water samples were collected from Henretta Lake in vertical profiles in 2021 and 2022 to investigate these scenarios.

1.6 Fording River Valley Watershed and Study Area 1

The ensuing results and discussion of the Fording River Valley Watershed and Study Area 1 have been structured according to the following geographical areas:

Upgradient of the STP Area:

- Turnbull Bridge Spoil and Potable Wells Area;
- Clode Creek Ponds;
- Downgradient of Lake Mountain Creek; and
- NTP.

Study Area 1:

- Downgradient of the STP and Kilmarnock Area;
- South Kilmarnock Phase 2 Secondary Settling Pond (SKP2) and Greenhouse Areas; and
- Regional Groundwater Discharge Zone to Compliance Point (FR_FRABCH).

A summary of 2022 groundwater monitoring and sampling results for the Fording River Valley Watershed and Study Area 1 is presented in Table F with references to supporting information (Drawings, Figures, Tables, and Appendices).

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Table F: Summary of 2022 Groundwater Monitoring and Sampling Results for Fording River Valley Watershed and Study Area 1

Hydrogeological Information		Description	Reference
Upgradient of South Tailings Pond			
Monitoring Locations	Relevant FRO SSGMP Wells	**Turnbull Bridge Spoil**: FR_TBSSMW-1, FR_TBSSMW-2 **Potable Wells Area**: FR_POTWELLS **Clode Creek Ponds**: FR_GCMW-1B, FR_GCMW-2 **Downgradient of Lake Mountain Creek**: FR_MW-1B **NTP**: FR_MW_NTPSE	Table FR-01 Drawings FR-01, FR-02
	Relevant Monitoring Wells for Evaluation[a]	FR_MW-TB1A/B, FR_MW-TB2A/B/C, FR_MW-TB3A/B/C, FR_MW-TB5A/B, FR_MW-TB6A/B, FR_MW-TB8A/B, FR_MW-TB9A/B, FR_MW22_TBSTSF1A/B/C, FR_MW22_POTW1A/B/C, FR_MW22_POTW2A/B, FR_MW22_POTW3A/B, FR_MW22_POTW4A/B, FR_MW22_POTW5, FR_MW22_POTW6A/B, FR_MW22_POTW7, FR_MW22_POTW8A/B, FR_MW22_POTW9, FR_MW22_FC1_1A/B, FR_MW22_CB-7A/B/C FR_LMA-1, FR_LMA-2, FR_LMA-3, FR_GCMW-3A/B/C, FR_GCMW-4A/B/C, FR_GCMW-5A/B/C, FR_MW22_GCMW-6A/B, FR_MW-EC1A/B, FR_MW-EC2A/B, FR_MW-EC3A/B, FR_MW-EC4A/B	
	Relevant Surface Water Monitoring Stations[b]	FR_FR1, FR_FRNTP, FR_FR2, FR_CC1	
	Relevant Seep Monitoring Locations[b]	FR_CCSEEPE1, FR_CCSEEPSE5	
Physical Hydrogeology	Groundwater Elevation Trends	• **Turnbull Bridge Spoil:** – Groundwater elevations fluctuated seasonally by 1.5 m at FR_TBSSMW-1 and by 1.4 m at FR_TBSSMW-2, with lows in March and highs in June. • **Clode Creek Ponds:** – Groundwater levels at monitoring well FR_GCMW-2 fluctuated seasonally by 0.3 m, with peak water levels in June and lowest water levels in March and October. Groundwater levels at monitoring well FR_GCMW-1B peaked in June and were lowest in March with a seasonal fluctuation of 0.4 m, excluding a 0.5 m drop for several hours on September 14 that may be associated with construction work in the area at the time. The water levels in the adjacent Clode Creek Secondary Settling Pond dropped in September, which was attributed to construction activities (the Clode Ponds discharge channel was reconstructed between September and November, during which time the ponds bypassed the channel and discharged directly to the Fording River, which lowered levels in the ponds). Groundwater levels in the area are inferred to be moderated by the ponds. • **Downgradient of Lake Mountain Creek:** – Groundwater elevations at FR_MW-1B fluctuated seasonally by 1.2 m, with highs in June and lows in late April. Continuous water level data has been correlated with discharge in the Fording River at FR_FRNTP, indicating a hydraulic connection between the river and aquifer at this location. • **NTP:** – Groundwater elevations at FR_MW_NTPSE fluctuated by 0.6 m with peak water levels in June and lows in September, although continuous data between June 9, 2021 and March 29, 2022 were not available as the well was not recommended to be added to the SSGMP until Q4.	Figures FR-06, FR-07, FR-09, FR-10 Table FR-02 Drawing FR-03
	Hydraulic Gradients and Flow Direction	• Vertical Hydraulic Gradient: – Turnbull Bridge Spoil – FR_TBSSMW-1 and FR_TBSSMW-2 – 0.02 to 0.03 m/m downward. – Clode Creek Ponds – FR_GCMW-1B and FR_GCMW-2 – 0.02 to 0.1 m/m downward. • Lateral Hydraulic Gradient: – Monitoring wells included in the SSGMP upgradient of the STP are located linearly along the Fording River; therefore, the spatial distribution is insufficient for triangulation of groundwater elevations. However, the groundwater flow direction in the Fording River valley-bottom has been inferred to be south following the Fording River Valley.	
	Groundwater Withdrawals	• **Potable Wells Area:** – The average cumulative daily pumping rate from the six supply wells was 127 m^3/hr (cubic metres per hour) in 2022, ranging between 30 and 183 m^3/hr.	Figure FR-08

Table F (Cont'd): Summary of 2022 Groundwater Monitoring and Sampling Results for Fording River Valley Watershed and Study Area 1

<table>
<tr><th colspan="2">Hydrogeological Information</th><th>Description</th><th>Reference</th></tr>
<tr><td colspan="4">Upgradient of South Tailings Pond (Cont'd)</td></tr>
<tr><td rowspan="3">Chemistry</td><td>2022 SSGMP/RGMP Order Constituents Results</td><td>• Turnbull Bridge Spoil:
– Concentrations greater than primary screening criteria:
▪ Dissolved Selenium –FR_TBSSMW-2 (Q1 to Q4).
• Potable Wells Area:
– Concentrations greater than primary screening criteria:
▪ Dissolved Selenium – FR_POTWELLS (Q1, Q3, Q4).
• Clode Creek Ponds:
– Concentrations greater than primary screening criteria:
▪ Dissolved Selenium – shallow well FR_GCMW-2 (primary and secondary screening criteria, Q1 to Q4).
▪ Nitrate-N –FR_GCMW-2 (Q1 to Q4).
▪ Sulphate –FR_GCMW-2 (Q1, Q3, Q4).
• Downgradient of Lake Mountain Creek:
– Concentrations greater than primary screening criteria:
▪ Dissolved Selenium – FR_MW-1B (Q1 to Q4).
▪ Nitrate-N – FR_MW-1B (Q1, Q3, Q4).
• All other OC concentrations were less than the primary screening criteria in 2022.</td><td>Table G
Figures FR-11 to FR-14
Tables FR-03 to FR-05
Drawings FR-13 to FR-16</td></tr>
<tr><td>Non-Order Mine-Related and Naturally Occurring Constituents[c]</td><td>• Concentrations Greater than Primary Screening Criteria – Non-Order Mining Related Constituents:
– None[d].
• Concentrations Greater than Primary Screening Criteria – Naturally Occurring Constituents:
– Lithium – All samples collected from all wells, except those from FR_POTWELLS in Q2 and Q3.
– Fluoride – FR_GCMW-1B (Q1 to Q4).
– Barium – FR_TBSSMW-1 (Q1 to Q4).
– Molybdenum – FR_TBSSMW-1 and FR_GCMW-1B (Q1 to Q4).
– Manganese – FR_GCMW-1B (Q1) and FR_MW_NTPSE (Q1 to Q4).
• The concentrations were consistent with historic results.
• The elevated manganese concentrations at FR_MW_NTPSE are inferred to be due to reductive dissolution of minerals caused by the presence of the NTP, which is located immediately upgradient.
• All other non-order mining related and naturally occurring constituents were less than primary screening criteria.</td><td>Tables FR-03 and FR-04</td></tr>
<tr><td>Mann-Kendall Trend Analysis</td><td>• Turnbull Bridge Spoil:
– Concentrations of dissolved selenium and sulphate at FR_TBSSMW-2 are probably increasing.
• Potable Wells Area:
– Concentrations of dissolved selenium and sulphate are probably increasing.
• Clode Creek Ponds:
– Increasing trends were identified for sulphate and dissolved cadmium, while a probably increasing trend was identified for nitrate at FR_GCMW-2.
• Downstream of Lake Mountain Creek:
– Increasing trends were identified for nitrate-N, sulphate, and dissolved selenium at FR_MW-1B.
• NTP:
– An increasing trend was identified for nitrate-N.
• Results of all other Mann-Kendall analyses were either decreasing, stable, or non-trending.</td><td>Table H
Attachment III</td></tr>
</table>

Table F (Cont'd): Summary of 2022 Groundwater Monitoring and Sampling Results for Fording River Valley Watershed and Study Area 1

Hydrogeological Information		Description	Reference
Downgradient of the STP and Kilmarnock Creek Area			
Monitoring Locations	Relevant FRO SSGMP	**Downgradient of the STP:** FR_09-04-A/B **Kilmarnock Creek Alluvial Fan:** FR-KB-1, FR-KB-2, FR-KB-3A/B	Table FR-01 Drawings FR-01 and FR-02
	Relevant Monitoring Wells for Evaluation[a]	FR_09-03-A/B, FR_BH-03-16, FR_BH-04-16, FR_KB-10MW, FR_KB-11MW, FR_KB-12PW, FR_KB-13A/B, FR_KB-14MW, FR_KB-15MW, FR_KB-16MW, FR_KB-17MW, FR_KB-18MW, FR_KB-19MW, FR_KB-20MW, FR_MW22_KCWD1A/B	
	Relevant Surface Water Monitoring Stations[b]	FR_FR2, FR_FRNTP, FR_KC1, FR_KC_DS_TOE	
	Relevant Seep Monitoring Locations[b]	FR_BLAINESEEP5, FR_STPWSEEP, FR_STPSWSEEP	
Physical Hydrogeology	Groundwater Elevation Trends	• **Downgradient of the STP**: – Groundwater elevations varied little seasonally adjacent to the STP at monitoring wells FR_09-04A and FR_09-04B, with seasonal fluctuations of 0.1 m at each. The presence of the STP has been inferred to moderate water levels at these wells. • **Kilmarnock Creek Alluvial Fan**: – Seasonal changes in groundwater elevations in the four wells located in the Kilmarnock alluvial fan varied between 2.1 m (at FR_KB-2) to 4.4 m (at FR_KB-3B), with highest water levels in late June and the lowest in late February and early March.	Figures FR-15 and FR-16 Table FR-02 Drawing FR-04
	Hydraulic Gradients and Flow Direction	• Vertical Hydraulic Gradient: – Downgradient of the STP – FR_09-04-A/B – 0.06 to 0.09 m/m downward. – Kilmarnock Creek Alluvial Fan – FR_KB-3A/B – 0.02 m/m downward for all events. • Lateral Hydraulic Gradient: – Groundwater flow in the Kilmarnock Creek area was directed towards the southwest under a lateral gradient of 0.09 m/m in Q4 of 2022 (calculated between wells FR_KB-1, FR_KB-2, and FR_KB-3B), which dissipated across the alluvial fan to 0.01 m/m (calculated between monitoring wells FR_09-04-A, FR_KB-3B, and FR_09-01-A), directed south. These observations were consistent with previous results.	
Chemistry	2022 SSGMP/RGMP Order Constituents Results	• **Downgradient of the STP**: – Concentrations of OC were less than the primary screening criteria. • **Kilmarnock Creek Alluvial Fan**: – Concentrations greater than primary screening criteria: ▪ Dissolved Selenium – greater than the primary and secondary screening criteria in all samples from all wells. ▪ Nitrate-N – greater than the primary screening criteria in all samples from all wells. ▪ Sulphate – FR_KB-1 (Q1 to Q4), FR_KB-2 (Q1, Q3, Q4), FR_KB-3A (Q1, Q3, Q4), FR_KB-3B (Q1 to Q4). • All other OC concentrations were less than the primary screening criteria in 2022.	Table G Figures FR-17 to FR-20 Tables FR-03 to FR-05 Drawings FR-17 to FR-20
	Non-Order Mine-Related and Naturally Occurring Constituents[c]	• Concentrations Greater than Primary Screening Criteria – Non-Order Mining Related Constituents: – Nitrite-N – FR_KB-3A (Q2). – Uranium – FR_KB-1 (Q1 and Q4), FR_KB-2 (Q1, Q3, Q4), FR_KB-3B (Q2, Q4). • Concentrations Greater than Primary Screening Criteria – Naturally-Occurring Constituents: – Lithium – All samples collected from all wells. – Manganese – FR_09-04-A/B (Q1 to Q4). • The concentrations were consistent with historic results. • The elevated dissolved manganese concentrations at FR_09-04-A/B are inferred to be a result of the reductive dissolution of soil minerals due to the presence of the STP, located immediately upgradient of these wells. • All other non-order mining-related and naturally occurring constituents were less than primary screening criteria.	Tables FR-03 and FR-04

Table F (Cont'd): Summary of 2022 Groundwater Monitoring and Sampling Results for Fording River Valley Watershed and Study Area 1

Hydrogeological Information		Description	Reference
Downgradient of the STP and Kilmarnock Creek Area (Cont'd)			
Chemistry (Cont'd)	Mann-Kendall Trend Analysis	• **Kilmarnock Creek Alluvial Fan**: – Increasing trends were identified for dissolved cadmium at FR_KB-1, FR_KB-2, and FR_KB-3A, for dissolved selenium at FR_KB-1, FR_KB-2, and FR_KB-3B, and for sulphate at FR_KB-3B. – Concentrations of nitrate were probably increasing at FR_KB-1 and FR_KB-3A/B. – Concentrations of sulphate were probably increasing at FR_KB-1, FR_KB-2, and FR_KB-3A. – Concentrations of dissolved selenium were probably increasing at FR_KB-3A. • Results of all other Mann-Kendall analyses were either decreasing, stable, or non-trending.	Table H Attachment III
South Kilmarnock Phase 2 Secondary Settling Pond (SKP2) and Greenhouse Areas			
Monitoring Locations	Relevant FRO SSGMP/RGMP Wells (Study Area 1)	**SKP2 Area:** FR_MW-SK1A/B, FR_09-01-A/B, FR_09-02A/B **Greenhouse Area:** FR_GH_WELL4, RG_MW_FR1A/B/C	Table FR-01 Drawings FR-01 and FR-02
	Relevant Monitoring Wells for Evaluation[a]	RG_MW_FR2A/B, RG_MW_FR3A/B	
	Relevant Surface Water Monitoring Stations[b]	FR_FR2, FR_FRNTP, FR_FRCP1, FR_FRRD, FR_KC1, FR_KC_DS_TOE	
	Relevant Seep Monitoring Locations[b]	n/a	
Physical Hydrogeology	Groundwater Elevation Trends	• **SKP2 Area**: – Groundwater elevations at FR_09-01-A/B and FR_09-02-A/B fluctuated seasonally by 6.2 m (at FR_09-01-B and FR_09-02-B) to 6.4 m (FR_09-01-A and FR_09-02-A), with the highest groundwater elevations recorded in June and the lowest elevations measured in February and March. – Groundwater elevations fluctuated seasonally by 7.1 m at FR_MW-SK1A with highs in June and lows in March. Continuous data at FR_MW-SK1B are only available in May and June due to suspected logger malfunction. Groundwater elevations from the manual measurements at FR_SK1B fluctuated by 4.4 m. – FR_MW-09-01-A/B, FR_MW-09-02-A/B and FR_MW-SK1A/B are downgradient or cross-gradient from the unlined South Kilmarnock Phase 2 Secondary Settling Pond. • **Greenhouse Area**: – Groundwater elevations at RG_MW_FR1A/B/C fluctuated seasonally by 2.7 m (RG_MW_FR1A) to 3.2 m (RG_MW_FR1C) with highs in June and lows in February and March. Data beyond July 2022 were lost due to a corrupt hard drive.	Figures FR-21 and FR-22 Table FR-02 Drawing FR-04
	Hydraulic Gradients and Flow Direction	• Vertical Hydraulic Gradient: – **SKP2 Area:** ▪ FR_09-01-A/B – 0.04 m/m upward in Q1; 0.06 m/m downward in Q2 to Q4. The upward gradient in Q1 was the first time an upward gradient has been observed in this location since monitoring began in 2015 and is suspected to be due to erroneous field measurements. ▪ FR_09-02-A/B – 0.06 to 0.1 m/m downward. ▪ FR_MW-SK1A/B – 0.01 to 0.03 m/m upward. – **Greenhouse Area**: ▪ RG_MW_FR1A/B – 0.07 to 0.09 m/m downward. ▪ RG_MW_FR1B/C – 0.05 to 0.07 m/m downward. • Lateral Hydraulic Gradient: – Groundwater flow between the SKP2 and Greenhouse areas was inferred to be down-valley (south) at a gradient calculated to be 0.008 m/m in Q4 (calculated between FR_09-01-A, FR_09-02-A, and RG_MW_FR1C).	
	Groundwater Withdrawals	• **Greenhouse Area**: – Pumping rates for the four Greenhouse Wells (FR_GH_WELL1 to FR_GH_WELL4) in 2022 are not available. However, it has been reported that the Greenhouse Wells are pumped only intermittently at low volumes between January and October. During these months, well FR_GHWELL4 pumps approximately 3.6 m^3/d while the remaining wells pump approximately 0.9 m^3/d on three days per week (SNC-Lavalin, 2019a). The combined extraction between January and October is therefore approximately 3.6 to 6.3 m^3/d, or 2.5 to 4.5 L/min.	SNC-Lavalin, 2019 SNC-Lavalin, 2021c

Table F (Cont'd): Summary of 2022 Groundwater Monitoring and Sampling Results for Fording River Valley Watershed and Study Area 1

<table>
<tr><th colspan="2">Hydrogeological Information</th><th>Description</th><th>Reference</th></tr>
<tr><td colspan="4">South Kilmarnock Phase 2 Secondary Settling Pond (SKP2) and Greenhouse Areas (Cont'd)</td></tr>
<tr><td rowspan="3">Chemistry</td><td>2022 SSGMP/RGMP Order Constituents Results</td><td>• SKP2 Area:
– Concentrations greater than primary screening criteria:
▪ Dissolved Selenium – FR_MW-SK1A (primary and secondary screening criteria in Q2 to Q4 (no sample was collected in Q1)), FR_MW-SK1B (primary screening criteria in Q1 to Q4), FR_09-01A (primary screening and secondary criteria in Q1 to Q4), FR_09-01B (primary screening criteria in Q1 to Q4 and secondary screening criteria in Q2, Q3 and Q4), FR_09-02A (primary screening criteria in Q1 to Q4 and secondary screening criteria in Q3), FR_09-02B (primary screening criteria in Q1 to Q4 and secondary screening criteria in Q2 and Q3).
▪ Nitrate-N – FR_09-01-A/B (Q1 to Q4), FR_09-02-A/B (Q1 to Q4), FR_MW-SK1A (Q2 to Q4 (no sample was collected in Q1)), and FR_MW-SK1B (Q2 to Q4).
▪ Sulphate – FR_09-01-A (Q1).
• Greenhouse Area:
– Concentrations greater than primary screening criteria:
▪ Dissolved Selenium – FR_GH_WELL4 (primary screening criteria in Q1 to Q4 and secondary screening criteria in Q2), RG_MW_FR1A/B/C (primary screening and secondary criteria in Q1 to Q4).
▪ Nitrate-N – FR_GH_WELL4 (Q1 to Q3), RG_MW_FR1A/B/C (Q1 to Q4).
• All other OC concentrations were less than the primary screening criteria in 2022.</td><td>Table G
Figures FR-23 to FR-26
Tables FR-03 to FR-05
Drawings FR-17 to FR-20</td></tr>
<tr><td>Non-Order Mine-Related and Naturally Occurring Constituents[c]</td><td>• Concentrations Greater than Primary Screening Criteria – Non-Order Mining Related Constituents:
– Nitrite-N – FR_GH_WELL4 (Q1 and Q4).
• Concentrations Greater than Primary Screening Criteria – Naturally Occurring Constituents:
– Lithium – All samples collected from all wells.
– Manganese – FR_MW-SK1B (Q1 to Q4).
• The concentrations are generally consistent with historic results, except for nitrite-N results at FR_GH_WELL4 (discussed below in Section 1.6.1.2).
• Elevated dissolved manganese concentrations at FR_MW-SK1B are inferred to be due to reducing conditions (field measured dissolved oxygen (DO) values ranging from 0.16 to 0.43 mg/L except for a spurious measurement of 6.45 mg/L in Q1, which is inconsistent with historical results) and naturally occurring due to limited interaction with the atmosphere (screened 65.5 to 67.0 mbgs, just above bedrock) and upward gradients.
• All other non-order mining related and naturally occurring constituents were less than primary screening criteria.</td><td>Tables FR-03 and FR-04</td></tr>
<tr><td>Mann-Kendall Trend Analysis</td><td>• SKP2 Area:
– Increasing trends were identified for dissolved selenium at FR_09-01-A/B, FR_09-02-A/B, and FR_MW-SK1B.
– Increasing trends were identified for sulphate at FR_09-01-A, FR_09-02-A/B, and FR_MW-SK1B, while the sulphate concentrations at FR_09-01-B were probably increasing.
– An increasing trend was identified for nitrate-N at FR_MW-SK1B while the nitrate-N concentrations at FR_09-02-A/B were probably increasing.
– An increasing trend was identified for dissolved cadmium at FR_MW-SK1B. The dissolved cadmium concentrations remain low and less than the primary screening criteria.
• Greenhouse Area:
– Concentrations of dissolved selenium at RG_MW_FR1C were probably increasing.
• Results of all other Mann-Kendall analyses were either decreasing, stable, or non-trending.</td><td>Table H
Attachment III</td></tr>
</table>

Table F (Cont'd): Summary of 2022 Groundwater Monitoring and Sampling Results for Fording River Valley Watershed and Study Area 1

Hydrogeological Information		Description	Reference
Regional Groundwater Discharge Zone to Compliance Point (FR_FRABCH)			
Monitoring Locations	Relevant /RGMP Wells (Study Area 1)	**Regional Groundwater Discharge Zone**: RG_MW_FR8A/B/C **Porter Creek Area**: GH_MW-PC[e] **Compliance Point (FR_FRABCH):** RG_MW_FR10A/B/C	Table FR-01 Drawing FR-02
	Relevant Monitoring Wells for Evaluation[a]	RG_MW_FR4A/B, RG_MW_FR5A/B/C, RG_MW_FR6A/B, FR_MW_FR7A/B, RG_MW22_FR12A/B/C/D, RG_MW22_FR13A/B/C, RG_MW22_FR14A/B/C	
	Relevant Surface Water Monitoring Stations[b]	FR_FRCP1, FR_FRABCH, FR_FRRD	
	Relevant Seep Monitoring Locations[b]	GH_SEEP_12	
Physical Hydrogeology	Groundwater Elevation Trends	• **Regional Groundwater discharge Zone**: – Continuous data are not available at monitoring wells RG_MW_FR8A/B/C. Manually measured groundwater levels fluctuated seasonally by 0.3 m (at RG_MW_FR8A and RG_MW_FR8B) to 0.4 m (at RG_MW_FR8C), with highs in Q2 and lows in Q1. • **Porter Creek**: – Groundwater elevations fluctuated seasonally by 0.8 m with highs in June and lows in December. • **Compliance Point (FR_FRABCH)**: – Groundwater elevations at RG_MW_FR10A/B/C fluctuated seasonally by 3.4 m (RG_MW_FR10C) to 5.2 m (RG_MW_FR10A and RG_MW_FR10B) with highs in June and lows in February and March.	Figures FR-27 and FR-28 Table FR-02 Drawing FR-04
	Hydraulic Gradients and Flow Direction	• Vertical Hydraulic Gradient: – **Regional Groundwater Discharge Zone**: ▪ RG_MW_FR8A/B – 0.08 to 0.09 m/m upward. ▪ RG_MW_FR8B/C – 0.005 to 0.007 m/m upward. – **Compliance Point (FR_FRABCH):** ▪ RG_MW_FR10A/B – 0.003 to 0.01 m/m upward. ▪ RG_MW_FR1B/C – 0.1 to 0.2 m/m downward. • Lateral Hydraulic Gradient: – Groundwater flow between the Regional Groundwater Discharge Zone and the compliance point was inferred to be down-valley (south) at a gradient calculated to be 0.004 m/m in Q4 (calculated between RG_MW_FR7B, RG_MW_FR8B, and FR_MW_FR10B).	
Chemistry	2022 SSGMP/RGMP Order Constituents Results	• **Regional Groundwater Discharge Zone**: – Concentrations greater than primary screening criteria: ▪ Dissolved Selenium – RG_MW_FR8A (primary screening criteria in Q1), RG_MW_FR8B (primary and secondary screening criteria in Q1 to Q4), and RG_MW_FR8C (primary screening criteria in Q1 to Q4 and secondary screening criteria in Q1 and Q4). ▪ Nitrate-N – RG_MW_FR8B (Q1 to Q4), RG_MW_FR8C (Q1 and Q4). ▪ Sulphate – RG_MW_FR8A (Q1, Q3, and Q4). • **Porter Creek**: – Concentrations greater than primary screening criteria: ▪ Dissolved Selenium – GH_MW-PC (primary screening criteria in Q1 to Q4 and secondary screening criteria in Q4). • **Compliance Point (FR_FRABCH)**: – Concentrations greater than primary screening criteria: ▪ Dissolved Selenium – RG_MW_FR10B (primary screening criteria in Q1 to Q4). • All other OC concentrations were less than the primary screening criteria in 2022.	Table G Figures FR-29 to FR-32 Tables FR-03 to FR-05 Drawings FR-17 to FR-20

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Table F (Cont'd): Summary of 2022 Groundwater Monitoring and Sampling Results for Fording River Valley Watershed and Study Area 1

Hydrogeological Information		Description	Reference
Regional Groundwater Discharge Zone to Compliance Point (FR_FRABCH) (Cont'd)			
Chemistry (Cont'd)	Non-Order Mine-Related and Naturally Occurring Constituents[c]	• Concentrations Greater than Primary Screening Criteria – Non-Order Mining Related Constituents: − Uranium – RG_MW_FR8A (Q1 and Q2). • Concentrations Greater than Primary Screening Criteria – Naturally Occurring Constituents: − Lithium – RG_MW_FR8A/B/C (Q1 to Q4), GH_MW-PC (Q4), RG_MW_FR10A/B (Q1, Q2, and Q3). − Manganese – RG_MW_FR8A (Q2), RG_MW_FR10A (Q1 to Q4), RG_MW_FR10C (Q1 to Q4). − Molybdenum – RG_MW_FR8A (Q2), RG_MW_FR10A (Q1, Q2, Q3). • The concentrations are consistent with historic results. • All other non-order mining related and naturally occurring constituents were less than primary screening criteria.	Tables FR-03 and FR-04
	Mann-Kendall Trend Analysis	• **Regional Groundwater Discharge Zone**: − Increasing trends were identified for dissolved selenium and sulphate at RG_MW_FR8B. − Concentrations of sulphate at RG_MW_FR8A and of nitrate at RG_MW_FR8B were probably increasing. • **Compliance Point (FR_FRABCH):** − An increasing trend was identified for sulphate at RG_MW_FR10A. • Results of all other Mann-Kendall analyses were either decreasing, stable, or non-trending.	Table H Attachment III

Notes:
[a] – Relevant monitoring wells from other programs are those in the area that are under evaluation for potential inclusion in the SSGMP and/or RGMP.
[b] – Relevant surface water stations and seep monitoring locations are as determined in the 2021 SSGMP Update (SNC-Lavalin, 2021a), and represent a sub-set of the surface water and seepage monitoring locations present at FRO and within Study Area 1.
[c] – Non-order mine-related and naturally occurring constituents based on the background assessment (BGA) completed for the 2020 RGMP Update (SNC-Lavalin, 2020).
[d] – The concentrations of iron at FR_MW_NTPSE were greater than the primary screening criteria in Q1 to Q4. Iron was not included in the BGA completed for the 2020 RGMP Update and is therefore not defined as a non-order mining-related constituent or a natural occurring constituent.
[e] – GH_MW-PC is also part of the GHO SSGMP (Appendix VI).

A summary of OC compared to primary screening criteria for the wells located in the Fording River Valley watershed and Study Area 1 is presented below in Table G.

Table G: FRO – Summary of OC Compared to Primary Screening Criteria in Fording River Valley Watershed and Study Area 1

Parameter[1,2] / Well ID	Nitrate-N (mg/L)				Sulphate (mg/L)				Dissolved Cadmium (µg/L)				Dissolved Selenium (µg/L)			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Upgradient of South Tailings Pond																
FR_TBSSMW-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
FR_TBSSMW-2	-	-	-	-	-	-	-	-	-	-	-	-	***38.8***	***40.2***	19.7	***27.9***
FR_POTWELLS	-	-	-	-	-	-	-	-	-	-	-	-	***25.6***	-	***21.1***	***24.2***
FR_GCMW-1B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
FR_GCMW-2	86.2	43.9	63.2	65.4	719	-	601	644	-	-	-	-	***126***	***107***	***121***	***144***
FR_MW-1B	27.6	-	18.1	23.0	-	-	-	-	-	-	-	-	***71.0***	***35.2***	***64.8***	***74.3***
FR_MW_NTPSE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Study Area 1: Downgradient of the STP and Kilmarnock Creek Area																
FR_09-04-A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
FR_09-04-B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
FR_KB-1	114	64.0	85.0	102	893	540	718	917	-	-	-	-	***419***	***285***	***369***	***435***
FR_KB-2	120	56.8	81.4	102	972	-	676	887	-	-	-	-	***378***	***254***	***381***	***381***
FR_KB-3A	66.8	21.4	75.9	76.2	545	-	605	658	-	-	-	-	***251***	***296***	***329***	***247***
FR_KB-3B	85.7	101	72.6	84.3	651	765	599	719	-	-	-	-	***286***	***364***	***322***	***290***
Study Area 1: SKP2 and Greenhouse Areas																
FR_MW-SK1A	N/S	43.9	33.1	40.3	N/S	-	-	-	N/S	-	-	-	N/S	***144***	***144***	***164***
FR_MW-SK1B	-	11.3	12.2	11.5	-	-	-	-	-	-	-	-	11.5	12.7	15.1	14.2
FR_09-01-A	39.0	30.8	17.6	29.5	527	-	-	-	-	-	-	-	***125***	***118***	***86.9***	***135***
FR_09-01-B	24.8	27.4	21.0	23.2	-	-	-	-	-	-	-	-	***74.3***	***85.8***	***93.2***	***108***

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Table G (Cont'd): FRO – Summary of OC Compared to Primary Screening Criteria in Fording River Watershed and Study Area 1

Parameter[1,2] / Well ID	Nitrate-N (mg/L)				Sulphate (mg/L)				Dissolved Cadmium (µg/L)				Dissolved Selenium (µg/L)			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Study Area 1: SKP2 and Greenhouse Areas (Cont'd)																
FR_09-02-A	25.9	25.0	18.0	22.1	-	-	-	-	-	-	-	-	***77.8***	***76.3***	***88.8***	***82.2***
FR_09-02-B	22.2	26.9	20.9	18.5	-	-	-	-	-	-	-	-	***65.8***	***85.8***	***91.8***	***74.4***
FR_GH_WELL4	11.5	41.0	13.0	-	-	-	-	-	-	-	-	-	***76.0***	***145***	***54.0***	***29.6***
RG_MW_FR1A	41.8	41.6	14.8	19.8	-	-	-	-	-	-	-	-	***124***	***164***	***96.8***	***116***
RG_MW_FR1B	41.5	47.9	34.6	25.0	-	-	-	-	-	-	-	-	***124***	***191***	***143***	***162***
RG_MW_FR1C	41.9	40.0	20.6	27.7	-	-	-	-	-	-	-	-	***122***	***149***	***99.0***	***152***
Study Area 1: Regional Groundwater Discharge Zone to Compliance Point (FR_FRABCH)																
RG_MW_FR8A	-	-	-	-	508	-	535	529	-	-	-	-	-	-	-	***23.9***
RG_MW_FR8B	31.9	31.9	30.5	33.6	-	-	-	-	-	-	-	-	***142***	***120***	***134***	***164***
RG_MW_FR8C	29.0	-	-	24.8	-	-	-	-	-	-	-	-	***128***	19.0	***22.6***	***126***
GH_MW-PC	-	-	-	-	-	-	-	-	-	-	-	-	***65.8***	***74.2***	***70.8***	***95.6***
RG_MW_FR10A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RG_MW_FR10B	-	-	-	-	-	-	-	-	-	-	-	-	***33.1***	***28.4***	13.9	***20.8***
RG_MW_FR10C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CSR AW	400				1,280 – 4,290[4]				0.5 – 4[4]				20			
CSR IW	n/a				n/a				5				20			
CSR LW	100				1,000				80				30			
CSR DW	10				500				5				10			

Notes:

[1] Primary screening criteria: CSR standards for **Aquatic Life (AW)**, Drinking Water (DW), Livestock (LW) and *Irrigation (IW)*.

[2] '–' denotes result is below primary screening criteria.

[3] Where a duplicate was collected, or if more than one sample was collected in a quarter, the higher concentration is provided.

[4] Standard varies with hardness.

'NS' denotes sample not collected.

Mann-Kendall trend analyses were completed for OC from wells in the Fording River Valley and Study Area 1 with seven or more sampling events and summarized in Table H (Appendix XI).

Table H: FRO – Summary of Mann-Kendall Trend Analysis for OC in Fording River Valley Watershed and Study Area 1

Well ID / Parameter[1]	Nitrate-N	Sulphate	Dissolved Cadmium	Dissolved Selenium
Upgradient of South Tailings Pond (STP)				
FR_TBSSMW-1	-	Stable	-	-
FR_TBSSMW-2	Probably Increasing	No Trend	-	***Probably Increasing***
FR_POTWELLS	Decreasing	Probably Increasing	-	***Probably Increasing***
FR_GCMW-1B	Decreasing	Decreasing	No Trend	Decreasing
FR_GCMW-2	***Probably Increasing***	***Increasing***	Increasing	***Stable***
FR_MW-1B	***Increasing***	Increasing	-	***Increasing***
FR_MW_NTPSE	Increasing	Probably Decreasing	-	No Trend
Study Area 1: Downgradient of the STP and Kilmarnock Creek Area				
FR_09-04-A	No Trend	Decreasing	Stable	Decreasing
FR_09-04-B	No Trend	Decreasing	Probably Decreasing	No Trend
FR_KB-1	***Probably Increasing***	***Probably Increasing***	Increasing	***Increasing***
FR_KB-2	***No Trend***	***Probably Increasing***	Increasing	***Increasing***
FR_KB-3A	***Probably Increasing***	***Probably Increasing***	Increasing	***Probably Increasing***
FR_KB-3B	***Probably Increasing***	***Increasing***	No Trend	***Increasing***
Study Area 1: SKP2 and Greenhouse Areas				
FR_MW-SK1A	***No Trend***	No Trend	No Trend	***No Trend***
FR_MW-SK1B	***Increasing***	Increasing	Increasing	***Increasing***
FR_09-01-A	***Stable***	***Increasing***	No Trend	***Increasing***
FR_09-01-B	***No Trend***	Probably Increasing	Stable	***Increasing***
FR_09-02-A	***Probably Increasing***	Increasing	Decreasing	***Increasing***
FR_09-02-B	***Probably Increasing***	Increasing	Decreasing	***Increasing***
FR_GH_WELL4	***Stable***	No Trend	Stable	***No Trend***
RG_MW_FR1A	***No Trend***	No Trend	Stable	***No Trend***
RG_MW_FR1B	***Stable***	No Trend	Stable	***No Trend***
RG_MW_FR1C	***No Trend***	No Trend	No Trend	***Probably Increasing***

Table H (Cont'd'): FRO – Summary of Mann-Kendall Trend Analysis for OC in Fording River Valley Watershed and Study Area 1

Well ID \ Parameter[1]	Nitrate-N	Sulphate	Dissolved Cadmium	Dissolved Selenium
Study Area 1: Regional Groundwater Discharge Zone to Compliance Point (FR_FRABCH)				
RG_MW_FR8A	Stable	***Probably Increasing***	Stable	No Trend
RG_MW_FR8B	***Probably Increasing***	Increasing	Stable	***Increasing***
RG_MW_FR8C	***Stable***	No Trend	Stable	***No Trend***
GH_MW-PC	Decreasing	Decreasing	No Trend	***No Trend***
RG_MW_FR10A	No Trend	Increasing	-	No Trend
RG_MW_FR10B	Decreasing	Stable	-	***Stable***
RG_MW_FR10C	Decreasing	Decreasing	-	Decreasing

Notes:

[1] Where OC were measured above primary screening criteria in 2022, the trend result is ***italics***. Where increasing trends are noted, the cell is shaded yellow. Where the OC were measured above secondary screening criteria for selenium during at least one event in 2022, the result is ***shaded and italics***. Where increasing trends are noted, the cell is shaded yellow.

'-' denotes trend analysis was not completed as concentrations of parameter have consistently been less than, or marginally greater than, the detection limit.

1.6.1 Discussion

1.6.1.1 Upgradient of South Tailings Pond

Turnbull Bridge Spoil and Potable Wells Area

Monitoring wells FR_TBSSMW-1 and FR_TBSSMW-2 were installed in 2017 downgradient of the Henretta Creek and the Fording River confluence and were included in the SSGMP beginning in 2019 (Drawing FR-01). The wells are located in the Fording River Valley bottom adjacent to the Turnbull Spoil and downgradient of Henretta Valley.

Dissolved selenium concentrations in shallow well FR_TBSSMW-2 (screened in gravel between 6.8 to 8.3 mbgs) were greater than the applicable primary screening criteria, ranging from 19.7 to 40.2 µg/L in 2022, and reflect surface water concentrations and seasonal variation in the Fording River at downgradient surface water monitoring station FR_FR1 (Figure FR-11). Sulphate (102 to 240 mg/L in 2022) and nitrate-N (2.0 to 6.0 mg/L in 2022) concentrations at this well were also similar to those measured in the Fording River (FR_FR1; Figures FR-12 and -13), providing further evidence of a surface water-groundwater interaction at this location. Concentrations of nitrate-N, sulphate, and dissolved selenium at FR_TBSSMW-2 in 2022 were greater than compared to previously reported, with the highest concentrations in 2022 matching or exceeding historical maximums (Figures FR-11 to FR-13). Mann-Kendall trend analyses indicated concentrations of nitrate-N and dissolved selenium are probably increasing (Table H; Attachment III). Increasing OC concentrations in groundwater may reflect increasing concentrations in Fording River surface water, considering the similarity in water chemistry noted above.

Deeper well FR_TBSSMW-1 (screened in silty sand and gravel just above bedrock between 20.9 to 22.4 mbgs) had OC concentrations less than the primary screening criteria and, in some cases, less than the detection limit (Figures FR-11 to FR-13; Tables FR-03 and FR-04). Therefore, minimal surface water influence on groundwater quality is inferred at FR_TBSSMW-1.

The plot of Se:SO_4 (S) ratios in monitoring wells and surface water north of the STP further supports the interpretation above. Both surface water at FR_FR1 and groundwater at FR_TBSSMW-2 plot along the mixing line between natural and mine-influenced waters, while groundwater from FR_TBSSMW-1 is interpreted to be naturally sourced (Figure FR-14). Concentrations of molybdenum greater than the primary screening criteria at FR_TBSSMW1 were therefore inferred to be natural. Although molybdenum may be a mine-related constituent related to antiscalant dosing (Azimuth, 2021), no antiscalant dosing occurs upgradient of FR_TBSSMW-1. In addition, molybdenum is considered naturally elevated in the Elk Valley, based on a background water quality assessment by (SNC-Lavalin, 2020).

Lithium concentrations were greater than the primary criteria for all 2022 samples collected from all wells located Upgradient of the South Tailings Pond, except for those collected from FR_POTWELLS in Q2 and Q3 (Table FR-04). Naturally elevated lithium concentrations have been reported throughout the valley, including in wells inferred to be unaffected by mining operations (Appendix IV). The elevated lithium concentrations at monitoring well FR_TBSSMW-1 are attributed to bedrock mineralogy influencing groundwater quality since this well is non-mine influenced (Figure FR-14).

An additional 16 monitoring wells (at 7 locations) have recently been installed downgradient of the Turnbull Bridge Spoil farther down-valley than FR_TBSSMW-1 and FR_TBSSMW-2 to investigate potential loading to the Fording River Valley bottom aquifer from the spoil (Drawing FR-01). Further monitoring and evaluation of data from these monitoring wells is on-going.

Farther downstream, groundwater quality is also monitored in the Fording River Valley bottom downgradient of the Turnbull Bridge Spoil and Henretta Valley at the FR_POTWELLS production wells. Water quality at this monitoring location is an aggregate of water collected from the well field and determining constituent concentrations and water levels at individual supply wells is not possible as there is insufficient space around the wellheads to install transducers. Dissolved selenium concentrations in FR_POTWELLS ranged between 8.24 and 25.6 µg/L in 2022 and were similar to concentrations measured in previous years (Figure FR-11). Dissolved selenium, sulphate, and nitrate-N concentrations in FR_POTWELLS also closely followed seasonal variations and concentrations measured in the Fording River at FR_FR1, similar to FR_TBSSMW-2 (Figures FR-11 to FR-13). The Se:SO_4 (S) ratios of FR_POTWELLS groundwater also plot along the mixing line between natural waters and mine-influenced- waters along with surface water at FR_FR1 (Figure FR-14). The Mann-Kendall analyses indicated concentrations of sulphate and dissolved selenium at the FR_POTWELLS have been probably increasing (Table H; Attachment III), which may also reflect increasing concentrations in Fording River surface water, as mentioned above.

The similarity in magnitude and seasonal variation of dissolved selenium concentrations, as well as the similarities in Se:SO_4 (S) ratios, in shallow groundwater wells FR_TBSSMW-2 and FR_POTWELLS and surface water in the Fording River at FR_FR1 suggests a connection between surface water and shallow groundwater. Hence, the dominant transport pathway for OC is likely via surface water. This is supported by drying surveys completed in support of the FRO Local Aquatic Effects Monitoring Program (LAEMP), which have identified a drying reach of the Fording River immediately upgradient of the FR_POTWELLS area between October and April that occasionally extends further south adjacent to the FR_POTWELLS (Minnow and Lotic; 2020; 2021). Additional drilling near the FR_POTWELLS was completed in two phases in 2022 to investigate hydraulic connections between the Fording River and FR_POTWELLS. The program included sixteen additional monitoring wells at nine locations, as well as the installation of four drive-point piezometers.

Clode Creek Ponds

Monitoring wells FR_GCMW-1B and FR_GCMW-2 were installed in 2017 adjacent to the Clode Settling Ponds and added to the SSGMP in 2019 (Drawing FR-01). These wells monitor groundwater quality directly downgradient of the Clode Creek Settling Ponds, which receives mine-influenced drainage from the Clode Creek watershed and will receive treated effluent from the FRO-North Saturated Rock Fill (FRO_N SRF) in the future. Dissolved selenium, sulphate, and nitrate-N concentrations in deeper well FR_GCMW-1B (screened 14.4 to 15.9 mbgs) were less than primary screening criteria and have remained low after initially higher concentrations in 2017 and 2018, and the Mann-Kendall analyses indicated decreasing trends for each (Figures FR-11 to FR-13; Table H; Attachment III). OC concentrations in groundwater at FR_GCMW-1B were less than those measured in Fording River surface water at upstream and downstream monitoring locations FR_FR1 and FR_FR2, respectively, as well as less than the concentrations measured in the adjacent Clode Settling Ponds (FR_CC1).

In contrast, shallow well FR_GCMW-2 (screened 7.6 to 9.1 mbgs) has dissolved selenium, sulphate, and nitrate-N concentrations greater than the primary screening criteria and several orders of magnitude greater than groundwater in FR_GCMW-1B (Figures FR-11 to FR-13). OC concentrations in FR_GCMW-2 were also greater than surface water in the Fording River (FR_FR1 and FR_FR2; Figures FR-11 to FR-13) but similar to and slightly less than concentrations in the Clode Settling Ponds (FR_CC1). Dissolved selenium concentrations in 2022 (107 to 144 µg/L) were consistent with historical results (Figure FR-11) and the Mann-Kendall analysis indicated concentrations have been stable (Table H; Attachment III). The concentrations of nitrate-N (43.9 to 86.2 mg/L) and sulphate (472 to 719 mg/L) in 2022 were greater than historical results (Figures FR-12 and FR-13), and the Mann-Kendall analyses indicated probably increasing and increasing trends, respectively (Table H; Attachment III). The increasing trends in groundwater are inferred to reflect increasing concentrations in the ponds as indicated by surface water station FR_CC1 (Figures FR-11 to FR-13).

Selenium to sulphate ratios of groundwater at FR_GCMW-1B and FR_GCMW-2 and surface water of the Clode Settling ponds are plotted on Figure FR-14. The Se:SO_4 (S) ratios indicated surface water in the Clode Settling Ponds (FR_CC1) and shallow groundwater at FR_GCMW-2 have been mine-influenced, while deeper groundwater at FR_GCMW-1B represent natural waters (Figure FR-14). There was also a significant difference in major ion chemistry between wells FR_GCMW-1B and FR_GCMW-2, with significantly higher bicarbonate and sodium and significantly lower sulphate and magnesium in FR_GCMW-1B than FR_GCMW-2 (Tables FR-03 and FR-04). It was inferred from the above that OC are low or absent at the depth in the valley-bottom aquifer and that groundwater at FR_GCMW-1B is naturally sourced, while shallow groundwater at FR_GCMW-2 is influenced by seepage from the Clode Settling ponds. OC that were detected in early groundwater samples at FR_GCMW-1B may be attributed to a stronger downward vertical gradient in 2018 (Figure FR-07). The reason for this is unclear but it may have been a historic recharge event associated with higher-than-average runoff in 2017 and 2018, as seen in the FR_FRNTP hydrograph (Figure FR-09). Alternatively, the elevated early OC concentrations may be an artefact of drilling activities.

Lithium concentrations greater than the primary screening criteria at FR_GCMW-1B are inferred to be naturally sourced since the well is not mine-influenced (Figure FR-14). Molybdenum concentrations greater than the primary screening criteria at FR_GCMW-1B were similarly concluded to be naturally sourced considering the evidence outlined above and because antiscalant dosing does not occur upgradient of this location.

Additional monitoring wells were recently installed near the Clode Creek Settling ponds (Drawing FR-01) to:

- Investigate water quality north of the ponds;
- Investigate potential pathway between the ponds and the Fording River beneath the West Exfiltration Ditch;
- Investigate a potential bedrock pathway from the E4 pit to the Fording River Valley bottom; and
- Investigate a potential gradient reversal from the Fording River to Lake Mountain Pit during mining operations (Drawing FR-01).

Further monitoring and evaluation of data from these monitoring wells is on-going.

Downgradient of Lake Mountain Creek

Farther downgradient, well FR_MW-1B monitors groundwater in the Fording River Valley bottom from upgradient spoils, Turnbull Pit, Clode Creek, and the Lake Mountain Settling Ponds (Drawing FR-01). This shallow well (screened 5.2 to 8.2 mbgs) yielded dissolved selenium and nitrate-N concentrations greater than the primary screening criteria (Tables FR-03 and FR-04; Figures FR-11 to FR-13). OC concentrations were generally higher in 2022 than previous years, with the highest concentrations in 2022 exceeding historical maximums (Figures FR-11 to FR-13), and the Mann-Kendall analyses indicated increasing trends in each OC concentrations (Table H; Attachment III). These increasing concentrations may be a result of corresponding increasing concentrations in the Fording River, since OC concentrations at FR_MW-1B have been of similar magnitude and follow seasonal variation in the Fording River at FR_FR2 (Figures FR-11 to FR-13). The Se:SO_4 (S) ratios of both the groundwater samples collected at FR_MW-1B and the surface water samples collected at FR_FR2 in 2022 plot along the mixing line between natural and mine-influenced waters. This suggests this well is hydraulically connected to the Fording River and is influenced by surface water.

Eight monitoring wells were recently installed down-valley from FR_MW-1B near the Eagle Ponds in 2021 to investigate potential seepage from the ponds (Drawing FR-01). Further monitoring and evaluation of data from these monitoring wells is on-going.

North Tailings Pond

Monitoring well FR_NTPSE was installed in 2018 and recommended to be added to the SSGMP in the 2021 SSGMP Update (SNC-Lavalin, 2021a). FR_NTPSE is screened in sand and gravel (9.2 to 10.1 mbgs) and monitors potential seepage from the NTP, located immediately upgradient. Concentrations of OC in 2022 were consistent with historical results, and the dissolved selenium and nitrate-N concentrations were very low compared to sulphate (Figures FR-11 to FR-13). Mann-Kendall trend analyses indicated the nitrate-N concentrations have been increasing (Table H; Attachment III). However, the concentrations were low and the 2022 concentrations were 17 to 195 times less than the most stringent primary screening criteria (CSR DW) of 10 mg/L (Table FR-03; Figure FR-13). The Se:SO_4 (S) ratios suggested selenium and nitrate-N at this location are being attenuated by microbial reduction (Figure FR-14). Selenium and nitrate-N attenuation in groundwater is expected in tailings ponds and underlying aquifers due to reduction caused by the consumption of oxygen (SRK Consulting Inc. (SRK), 2018). Selenium attenuation is expected to initiate as soon as nitrate-N begins to reduce via denitrification (SRK, 2018). Anoxic conditions associated with the presence of the NTP (evidenced by the low field measured DO and oxidation-reduction potential (ORP) are also likely causing the elevated concentrations of iron and manganese at FR_NTPSE through reductive dissolution of iron and manganese oxyhydroxides.

1.6.1.2 Study Area 1

Downgradient of the South Tailings Pond and Kilmarnock Creek Area

FR_09-04-A and FR_09-04-B are shallow monitoring wells (screened between 1.14 and 4.66 mbgs and between 5.10 and 6.62 mbgs, respectively) installed directly downgradient of the STP to monitor seepage from the STP to the valley-bottom aquifer (Drawing FR-02). Dissolved selenium and nitrate-N concentrations in these wells remain low and below the primary screening criteria (Tables FR-03 and FR-04; Figures FR-17 and FR-19). Mann--Kendall analyses indicated: a decreasing trend in dissolved selenium at FR_09-04-A and no trend at FR_09-04-B; no trends in nitrate-N at either well; and decreasing trends in sulphate at both wells (Table H; Attachment III). Selenium and nitrate concentrations in samples collected from these wells in 2022 were similar to those historically reported, except for 2019, when concentrations temporarily increased by up to one order of magnitude. Field-measured concentrations of DO at these wells have been consistently low, which likely reflects reducing conditions within the STP and underlying aquifer where OC are inferred to be attenuated by microbial reduction, which is supported by the Se:SO4 (S) ratios (Figure FR-20). Elevated concentrations of manganese are also inferred to be the result of mineral dissolution caused by the reducing conditions within and beneath the STP.

Monitoring wells FR_KB-1, FR_KB-2, and FR_KB-3A/B were installed in 2018 as part of the FRO-S AWTF investigations and incorporated into the SSGMP in 2019 (Drawing FR-02). The wells are completed in the Kilmarnock alluvial fan and monitor groundwater quality in the alluvial sediments where numerous flow accretion studies completed between 2018 and 2022 have shown Kilmarnock Creek loses to ground (Kerr Wood Leidal Consulting Engineering (KWL), 2018a; 2018b; 2019a; 2019b; 2019c; 2021a; 2021b; 2022a; 2022b). Well FR_KB-1 is screened 5.2 to 8.2 mbgs in silty gravel, sand, and bedrock; FR_KB-2 is screened 13.1 to 16.2 mbgs in silty sand and bedrock; FR_KB-3A is screened 35.4 to 38.4 mbgs in sand above bedrock; and FR_KB-3B is screened 18.3 to 21.3 mbgs in sand. Dissolved selenium and nitrate-N concentrations were greater than primary screening criteria in each well in each quarter (Tables FR-03 and FR-04 and Figures FR-17 and FR-19). Sulphate concentrations were also greater than the primary screening criteria in all samples collected from all wells except for the samples collected from FR_KB-2 and FR_KB-3A in Q2 (Table FR-03 and Figure FR-18). Concentrations of dissolved selenium, sulphate, and nitrate-N at each of these wells were elevated in 2022 compared to historical results, with the maximum concentration of each constituent at all wells in 2022 exceeding the historical range (Figures FR-17 to FR-19). The Mann-Kendall analyses indicated concentrations of all OC are increasing or probably increasing at all wells, except for nitrate-N at FR_KB-2 and dissolved cadmium at FR_KB-3B (Table H; Attachment III). The Se:SO_4 (S) ratios indicated Kilmarnock Creek surface water and all groundwater within the alluvial fan has been influenced by the spoils deposited in the Kilmarnock Creek valley (Figure FR-20).

Dissolved selenium (247 to 435 µg/L), nitrate-N (21.4 to 120 mg/L), and sulphate (424 to 972 mg/L) concentrations in wells FR_KB-1, FR_KB-2, and FR_KB-3A/B were the highest amongst any wells in the SSGMP or RGMP network within the Fording River Valley (i.e., excluding Henretta Creek and Swift Creek watersheds; Tables FR-03 to FR-05). Groundwater quality in the Kilmarnock alluvial fan reflects the untreated water quality in the Kilmarnock Creek watershed, which is a source of mine-related constituents to the Fording River Valley bottom in Study Area 1.

Increasing concentrations in groundwater in the alluvial fan may be a result of activating the Kilmarnock Clean Water Diversion (KCWD) in late 2021, which diverts non-mine-influenced water that would have diluted concentrations in discharge at the toe of the spoil. Increasing OC concentrations in discharge at the toe of the spoil may in turn affect groundwater quality in the alluvial fan, as Kilmarnock Creek loses to ground. The FRO-S AWTF was commissioned in Q4 of 2021 along with the KCWD. Although groundwater concentrations of OC in the proximal area of the alluvial fan may increase due to the KCWD, groundwater quality downgradient of where Kilmarnock Creek infiltrates to ground below the KCWD and treatment outlet may improve in time as loading to the aquifer is reduced.

Untreated water quality in Kilmarnock Creek is reflected by the concentrations at FR_KC_DS_TOE and FR_KC1 prior to October 2021. OC concentrations at FR_KC1 since Q4 of 2021 reflect water quality of the KCWD, except between May and July of 2022 (Figures FR-17 to FR-19). During this time, untreated water was reporting to FR_KC1 as the volume of water during freshet exceeded the capacity of the treatment intake, and the FRO_S AWTF was not at full capacity as it was undergoing commissioning (Teck, personal communication, March 3, 2023).

Eleven additional wells were recently installed in 2021 in the Kilmarnock Creek alluvial fan to improve the understanding of bypass of the FRO-S AWTF intake and the extent of fluvial gravel channel deposits in the area. Further monitoring and evaluation of data from these monitoring wells is on-going.

SKP2 and Greenhouse Areas

Monitoring wells FR_MW_SK1A/B were installed adjacent to the SKP2 pond in late 2018 and incorporated into the SSGMP in 2019 (Drawing FR-02). The wells are located along an inferred down-valley transport pathway between the Kilmarnock Creek alluvial fan and the Greenhouse Side Channel (Diagram FR-02 of Attachment II) and were installed to confirm the presence of this pathway and monitor groundwater quality along it, delineate the vertical extent of the aquifer, and increase lateral coverage in the southern area at FRO.

In shallow well FR_MW-SK1A (screened 15.0 to 16.5 mbgs in sand and gravel), concentrations of dissolved selenium and nitrate-N were greater than the primary screening criteria (Tables FR-03 and FR-04). Concentrations of dissolved selenium (144 to 164 µg/L), nitrate-N (33.1 to 43.9 mg/L), and sulphate (390 to 433 mg/L) were similar to previous years (Figures FR-23 to FR-25), and the Mann-Kendall analyses indicated no trend for any OC concentrations (Table H; Attachment III). The OC concentrations at this location were lower than those in the Kilmarnock Creek alluvial fan but generally higher than those in monitoring wells located downgradient along the same inferred pathway in the Greenhouse Area (Figures FR-23 to FR-25). The Se:SO_4 (S) ratios show that shallow groundwater at FR_MW-SK1A is mine-influenced and similar to untreated water in Kilmarnock Creek (Figure FR-26).

Dissolved selenium and nitrate concentrations were significantly lower in deep well FR_MW-SK1B (screened 65.5 to 67.0 mbgs in sand and gravel above bedrock) than those of shallow well FR_MW-SK1A. However, concentrations of nitrate-N in Q2, Q3, and Q4 and of dissolved selenium in all samples collected in 2022 were greater than the primary screening criteria (Table FR-04), and the Mann-Kendall analyses (Table H; Attachment III) and temporal plots (Figures FR-23 to FR-25) indicated all OC concentrations have been increasing. The Se:SO_4 (S) ratios suggest the deep groundwater at FR_MW-SK1B appears to have mixed mining and natural sources and have undergone some microbial reduction (Figure FR-26). Field measured DO concentrations at this location have been less than 1 mg/L in all events since 2019, except for in Q1 of 2022 (Table FR-03), supporting the presence of conditions conducive to microbial reduction. The Se:SO_4 (S) ratios and increasing OC concentrations suggest that mine-influenced waters may extend to the base of the aquifer in this area and that the mine-influence is increasing at depth. The influence is likely vertically stratified with more impacted, Kilmarnock-influenced waters near surface and less impacted waters of unknown mine-influence at depth. Upward vertical gradients at FR_MW-SK1A/B preclude downward migration at this location and are an indication that the source is not direct from above.

Monitoring wells FR_09-01-A (screened between 3.8 and 6.9 mbgs) and FR_09-01-B (screened between 17.2 and 18.7 mbgs) are located south of SKP2 pond along an inferred transport pathway between the Kilmarnock Creek alluvial fan and the Fording River (Drawing FR-02; Diagram FR-02 of Attachment II). Monitoring wells FR_09-02-A (screened between 8.3 and 11.4 mbgs) and FR_09-02-B (screened between 20.8 and 22.3 mbgs) are also located south of SKP2, west of FR_09-01-A/B and closer to the Fording River. The Se:SO_4 (S) ratios indicated all four wells have been mine-influenced (Figure FR-26). Dissolved selenium concentrations were greater than the primary screening criteria in all four wells in all quarters in 2022 (Table FR-04). Dissolved selenium concentrations at FR_09-01-A/B and FR_09-02-A/B in 2022 (65.8 to 135 µg/L) were similar to recent years but generally, higher than historical values between 2013 and 2019 (Figure FR-23), and the Mann-Kendall results for dissolved selenium indicated increasing trends in all four wells (Table H; Attachment III). Nitrate-N concentrations in both nested well pairs were also greater than the primary screening criteria in all samples collected in 2022 (Table FR-03). The nitrate-N concentrations in 2022 (17.9 to 39.0 mg/L) were also within the range of historical results. The Mann-Kendall analyses indicated nitrate-N concentrations have been probably increasing at FR_09-02-A/B (Table H; Attachment III). Sulphate concentrations were less than the primary screening criteria in all samples, except the sample collected from FR_09-01-A in Q1 (527 mg/L; Table FR-03). The sulphate concentrations in the samples collected FR_09-01-A in Q1 and from FR_09-01-B and in FR_09-02-B Q2 were the highest since monitoring began, and the Mann-Kendall results indicated sulphate concentrations have been increasing or probably increasing at all four wells (Table H; Attachment III).

Monitoring wells FR_09-01-A/B are inferred to be influenced by Kilmarnock Creek based on OC concentrations that are consistently higher than in Fording River surface water at FR_FR2 (Figures FR-23 to 25), reflecting their locations along an inferred pathway between the Kilmarnock Creek alluvial fan and Fording River. In contrast, OC concentrations and seasonality in FR_09-02-A/B have been generally more reflective of concentrations in the Fording River (FR_FR2), except during Q2 at FR_09-02-B and select other quarters in recent years at FR_09-02-A, when OC concentrations are typically higher than those measured in the Fording River. Wells FR_09-02-A/B are inferred to be both seasonally influenced by Kilmarnock Creek as water in the SKP2 infiltrates to ground, and by the adjacent Fording River which is losing between the STP and the confluence with the Greenhouse Side Channel (SNC-Lavalin, 2022b). Aside from FR_09-02-A/B, there are no other monitoring wells currently in the SSGMP or RGMP along an inferred transport pathway from the Fording River to a zone of regionally significant groundwater discharge, although numerous recently installed wells along the inferred pathway now exist for consideration going forward. The zone of regionally significant groundwater discharge at Fording, referred to as the Regional Groundwater Discharge Zone, is inferred to consist of the Greenhouse Side Channel, Side Channel 2 (temporarily connected to the Fording River main stem at periods of high flow), and the Fording River main stem between the confluence with the Greenhouse Side Channel and the confluence with the Fording River Oxbow Channel (SNC-Lavalin, 2022b; Drawing FR-04; Diagram FR-02 of Attachment II).

Concentrations of molybdenum in monitoring wells FR_09-2-A/B ranged from 0.959 to 1.71 µg/L, approximately 6 to 10 times lower than the most conservative primary screening criteria (CSR IW of 10 µg/L). Monitoring wells FR_09-02-A/B are the nearest wells inferred to be downgradient of antiscalant dosing that occurs at FR_SCOUT, and the low concentrations are an indication that antiscaling is not causing elevated molybdenum concentrations in downgradient groundwater.

In the area of the Greenhouse supply wells, supply well FR_GH_WELL4 (screened between 25.9 to 29.0 mbgs) and monitoring wells RG_MW_FR1A/B/C (screened between 25.5 to 27.0, 15.8 to 17.3, and 6.2 to 9.3 mbgs, respectively) are inferred to be located along the same pathway between the Kilmarnock Creek alluvial fan and the Greenhouse Side Channel as FR_MW-SK1A (Drawing FR-02; Diagram FR-02 of Attachment II). The Se:SO_4 (S) ratios indicate that each of the four wells are mine-influenced (Figure FR-26). Dissolved selenium and nitrate-N concentrations were greater than the primary screening criteria in all quarters at all wells in the Greenhouse Area in 2022, except for the nitrate-N concentrations at FR_GH_WELL4 in Q2 (Tables FR-03 and FR-04; Drawings FR-17 and FR-20). Dissolved selenium and nitrate-N concentrations in 2022 were generally lower at FR_GH_WELL4 than historical concentrations, while the remaining OC concentrations were similar to historical results at all wells (Figures FR-23 to 25). The dissolved selenium and nitrate-N concentrations at FR_GH_WELL4 in 2022 were also significantly lower than those at RG_MW_FR1A, which is screened at a similar depth interval, after having similar concentrations in previous sampling events (Figures FR-23 and FR-25). The lower concentrations at FR_GH_WELL4 compared to RG_MW_FR1A may be an indication that FR_GH_WELL4 is screened within a preferential flow pathway, where influence of the FRO-S AWTF and KCWD has appeared earlier. There is less vertical stratification in the concentrations of dissolved selenium and nitrate-N at RG_MW_FR1A/B/C than there is upgradient at FR_MW_SK1A/B. However, deep well FR_MW_SK1B in the SKP2 Area is significantly deeper than deep well RG_MW_FR1A in the Greenhouse Area. The Mann-

Kendall analyses indicated dissolved selenium concentrations at RG_MW_FR1C have been probably increasing; however, the monitoring period is relatively short (since Q4 of 2020) and continued monitoring is needed to confirm the validity of this trend in the long-term. No other trends were identified for the wells in the Greenhouse area.

Nitrite-N concentrations at FR_GH_WELL4 in Q1 (3.23 mg/L) and Q4 (1.99 mg/L) were greater than the CSR AW and DW primary screening criteria (Table FR-03), and were the highest concentrations detected since monitoring began. Nitrite-N concentrations at FR_GH_WELL4 have previously exceeded the CSR AW standards on occasion, but not the CSR DW standards. The cause of the elevated nitrite-N concentrations in 2022 is unknown, although concentrations were also elevated upgradient in the Kilmarnock alluvial fan at monitoring well FR_KB-3A in Q2 (8.86 mg/L; Table FR-03).

It is noted that concentrations of OC at some locations downgradient of the FRO-S AWTF and KCWD outlets, particularly shallow wells FR_MW_SK1A and FR_09-01-A in the SKP2 Area and FR_GH_WELL4 in the Greenhouse Area, were generally lower in 2022 than in 2021. These lower concentrations may be related to commissioning of the FRO-S AWTF and KCWD in late 2021, although continued monitoring is needed to determine whether this is the case.

An additional forty-three (43) monitoring wells were installed between the Kilmarnock Creek alluvial fan and the Greenhouse Side Channel in 2022 to support understanding of mine influenced water transport along the Fording River valley. An additional eleven monitoring wells were installed between the Greenhouse Area and the Regional Groundwater Discharge Zone in 2020 in support of the MBI. These wells will be evaluated for potential inclusion in the monitoring programs.

Regional Groundwater Discharge Zone to Compliance Point (FR_FRABCH)

Monitoring wells RG_MW_FR8A/B/C (screened between 37.2 to 38.7, 16.5 to 18.0, and 5.1 to 6.6 mbgs, respectively) were installed in 2020 in support of the MBI and added to the RGMP in 2022 (Drawing FR-02). They are located near the Regional Groundwater Discharge Zone, which is an area of regionally significant groundwater discharge, where mine-influenced water, inferred to be sourced from Kilmarnock Creek and the Fording River, re-emerges at surface (Diagram FR-02 of Attachment II; SNC-Lavalin, 2022b). Water influenced by Kilmarnock Creek in the Regional Groundwater Discharge Zone is inferred to be more pronounced in the Greenhouse Side Channel and on the eastern side of the valley. Water influenced by Fording River discharge is inferred to be more pronounced in Side Channel 2 and on the western side of the valley (Diagram FR-02 of Attachment II; SNC-Lavalin, 2022b). Hydraulic gradients between the shallow and intermediate wells and between the intermediate and deep wells at RG_MW_FR8A/B/C are upward (Table FR-02 and Figure FR-22), reflecting their location near the Regional Groundwater Discharge Zone.

Dissolved selenium (120 to 164 µg/L) and nitrate-N (30.5 to 33.6 mg/L) concentrations in intermediate well RG_MW_FR8B were greater than the primary and secondary screening criteria in all quarters and similar to (but slightly lower than) the concentrations observed upgradient at FR_MW_SK1A and RG_MW_FR1A/B/C (Tables FR-03 and FR-04). Dissolved selenium concentrations (19.0 to 128 µg/L) at shallow well RG_MW_FR8C were greater than the primary screening criteria in all quarters, while the nitrate-N concentrations (29.0 and 24.8 mg/L) were greater than the primary screening criteria in Q1 and Q4, respectively (Tables FR-03 and FR-04). Dissolved selenium and nitrate-N concentrations at RG_MW_FR8C were similar to those at intermediate well RG_MW_FR8B in Q1 and Q4 but were significantly lower in Q2 and Q3 (Tables FR-03 and FR-04; Figures FR-29 and FR-31), which may reflect dilution by recharge during and after freshet. The Se:SO_4 (S) ratios indicated groundwater at both shallow and intermediate wells RG_MW_FR8C and RG_MW_FR8B is mine-influenced (Figure FR-32). Dissolved selenium and nitrate-N concentrations at RG_MW_FR8B were higher than those in Fording River surface water at FR_FRCP1, FR_FRRD, or FR_FRABCH (Figures FR-29 and FR-31), suggesting that the source of mine influence at this depth is Kilmarnock Creek. The Mann-Kendall trend analyses indicated dissolved selenium, sulphate, and nitrate-N concentrations were either increasing or probably increasing (Table H; Attachment III); however, the analyses were limited to data collected since 2020 and therefore additional monitoring is needed to determine the validity of the trends in the long-term.

Dissolved selenium (4.04 to 23.9 µg/L) and nitrate-N (0.198 to 2.25 mg/L) concentrations were lower in deep well RG_MW_FR8A than in the shallow and intermediate wells, while sulphate concentrations (483 to 535 mg/L) were higher (Tables FR-03 and FR-04; Figures FR-29 to FR-31). The dissolved selenium concentration in Q1 and sulphate concentrations in Q1, Q3, and Q4 were greater than the primary screening criteria (Tables FR-03 and FR-04). The Mann-Kendall trend analyses indicated sulphate concentrations have been probably increasing (Table H; Attachment III). however, the analyses were limited to data collected since 2020 and therefore additional monitoring is needed to determine the validity of this trend in the long-term. The Se:SO_4 (S) ratios indicated that deep groundwater at RG_MW_FR8A is representative of mine-influenced water that has undergone microbial reduction (Figure FR-32), which is supported by the low field-measured DO concentrations (Figure FR-03).

Porter Creek is a mine-influenced tributary of the Fording River that flows through a rock drain beneath the spoil in the upper catchment and at surface along the valley flanks to unlined Porter Pond, where it may lose to ground in the Fording River Valley. Data from monitoring well GH_MW-PC and Porter Creek surface water (GH_PC1) is presented herein on associated figures, drawings, and tables since GH_MW-PC is part of the RGMP and provides information pertaining to the influence of Porter Creek on groundwater quality in Study Area 1. Further discussion and interpretation specific to the Porter Creek catchment wells (including GH_MW-PC and GHO SSGMP wells GH_MW_PC4A/B) is presented in Appendix VI.

GH_MW-PC is a shallow well (screened between 3.5 to 6.5 mbgs across the contact between unconsolidated material and bedrock) located north of the Porter Pond (Figure FR-02). Concentrations of dissolved selenium in 2022 (65.8 to 95.6 µg/L) were greater than the primary screening criteria in all samples (Table FR-04). Concentrations of dissolved selenium, sulphate, and nitrate-N are similar to those measured at the outlet of Porter Pond (GH_PC1) and followed similar seasonal trends, which suggests connectivity between groundwater and surface water (Figures FR-29 to FR-31). The Se:SO_4 (S) ratios indicated both groundwater at GH_MW-PC and surface water in Porter Pond (GH_PC1) have been mine-influenced (Figure FR-32). The Mann-Kendall analyses indicated decreasing trends in nitrate-N and sulphate (Table H; Attachment III).

Monitoring wells RG_MW_FR10A (screened between 30.1 and 31.6 mbgs), RG_MW_FR10B (screened between 16.5 to 18.0 mbgs), and RG_MW_FR10C (screened between 4.2 to 5.8 mbgs) were installed in support of the MBI program in April 2021 and were recommended to be included in the RGMP in the 2021 SSGMP Update to monitor groundwater near the water quality compliance point at FR_FRABCH (SNC-Lavalin, 2021a).

Concentrations of dissolved selenium, sulphate, and nitrate-N in shallow well RG_MW_FR10C and deep well RG_MW_FR10A were low compared to surface water at FR_FRABCH, and less than the primary screening criteria (Tables FR-03 and FR-04; Figures FR-29 to FR-31). Mann-Kendall analyses indicated that concentrations of dissolved selenium, sulphate, and nitrate-N have been decreasing (Table H; Attachment III), although the analyses were based on limited data (since Q4 of 2020). The Se:SO_4 (S) ratios suggested the shallow groundwater samples collected from RG_MW_FR10C in Q1 to Q3 exhibit minimal mine-influence (e.g., mixed mine-influence and naturally sourced waters) that have undergone some microbial reduction (Figure FR-32). The well is located in a wetted, lowland area, screened in sand and gravel underlying organic silty soils (Drawing FR-09). Field-measured parameters indicated reducing conditions (DO range of 0.2 to 2.2 mg/L), and the vertical gradients between RG_MW_FR10C and RG_MW_FR10B were downward (Table FR-02). Therefore, the shallow groundwater may represent mine-influenced water from upgradient and/or recharged by the Fording River that has undergone microbial reduction, as well as mixing with natural waters from precipitation, wetlands, and groundwater in the Chauncey Creek alluvial fan. Concentrations of dissolved manganese at RG_MW-FR10C were attributed to reductive dissolution.

The Se:SO_4 (S) ratios suggest that deep groundwater at RG_MW_FR10A is either naturally sourced or represents mixed waters that have undergone microbial reduction. However, considering RG_MW_FR10A is partially completed within bedrock (Drawing FR-09) and that the vertical gradients between RG_MW-FR10A/B were upward (Table FR-02), deep groundwater is likely naturally sourced. It is also inferred that manganese and molybdenum are naturally elevated as this well is located 7 kilometers downgradient of the antiscalant dosing that occurs at FR_SCOUT. As mentioned above, concentrations immediately downgradient of the antiscalant dosing at FR_09-02-A/B are up to 25 times lower than in deep well RG_MW-FR10A. The Mann-Kendall analyses indicated sulphate concentrations have been increasing (Table H; Attachment III); however, the analyses were based on limited data (since Q4 of 2020) and therefore, additional monitoring is needed to determine long-term trend validity.

Concentrations of dissolved selenium at intermediate well RG_MW-FR10B, screened in the sand and gravel valley bottom aquifer, ranged from 13.9 to 33.1 µg/L and were greater than the primary screening criteria in each sample collected in 2022 (Table FR-04). The Se:SO_4 (S) ratios indicated groundwater at this depth is mine-influenced (Figure FR-32), and the source is inferred to be upgradient mine-influenced tributaries and the Fording River over the losing reaches upstream. Concentrations were lower than those in groundwater upgradient in the Kilmarnock Creek alluvial fan, SKP2, Greenhouse, and Regional Groundwater Discharge Zone areas (Tables FR-03 and FR-04). The low concentrations may reflect a combination of mass loss in the Regional Groundwater Discharge Zone to surface water, as well as mixing with recharging water along the flowpath and within the Chauncey Creek alluvial fan.

A thermal survey of the Fording River valley between the Regional Groundwater Discharge Zone and the compliance point at FR_FRABCH was recently completed using an unmanned aerial vehicle (UAV) to identify zones of groundwater discharge along this reach with better spatial resolution. The survey was completed in September of 2022 and the summary report completed by GeoProcess Research Associates (GeoProcess) is included as Attachment IV (GeoProcess, 2023). The report will be reviewed to assess whether it can advance the local conceptual model, and to evaluate the potential for using the method elsewhere in the Elk Valley.

1.7 Swift Creek Watershed

A summary of 2022 groundwater monitoring and sampling results for the Swift Creek watershed is presented in Table I with references to supporting information (Drawings, Figures, Tables, and Appendices).

Table I: Summary of 2022 Groundwater Monitoring and Sampling Results for Swift Creek Watershed

Hydrogeological Information		Description	Reference
Monitoring Locations	Relevant FRO SSGMP	FR_MW18-02	Table FR-01 Drawing FR-02
	Relevant Monitoring Wells for Evaluation[a]	FR_MW20-01S/D, FR_MW20-02S/D, FR_MW20-03S/D, FR_MW22_CC1A/B, FR_MW22_CC2A/B/C, FR_MW22_CC3A/B	
	Relevant Surface Water Monitoring Stations[b]	GH_SC1H, FR_SCOUT, GH_CC1	
	Relevant Seep Monitoring Locations[b]	FR_SCRDSSEEP1	
Physical Hydrogeology	Groundwater Elevation Trends	• Groundwater elevations exhibited minimal seasonality and fluctuated by 0.2 m in 2022. The groundwater elevations were inferred to be affected by the Primary Swift Creek Sediment Pond.	Figure FR-33 Table FR-02 Drawing FR-04
	Hydraulic Gradients and Flow Direction	• The SSGMP network in the Swift Creek watershed currently consists of a single monitoring well. Without other monitoring wells, there are insufficient data for assessing vertical and lateral gradients. However, the lateral gradient has been inferred to the east-northeast, towards the Fording River Valley bottom.	
Chemistry	2022 SSGMP/RGMP Order Constituents Results	• Dissolved Selenium – greater than the primary and secondary screening criteria in each sample. • Nitrate-N and Sulphate – greater than the primary screening criteria in each sample.	Table J Figures FR-34 to FR-37 Tables FR-03 to FR-05 Drawings FR-17 to FR-20
	Non-Order Mine-Related and Naturally Occurring Constituents[c]	• Concentrations Greater than Primary Screening Criteria – Non-Order Mining Related Constituents: − Uranium – FR_MW18-02 (Q4). • Concentrations Greater than Primary Screening Criteria – Naturally Occurring Constituents: − Lithium – FR_MW18-02 (Q1 to Q4). • All other constituents were less than primary screening criteria.	Tables FR-03 and FR-04
	Mann-Kendall Trend Analysis	• Concentrations of nitrate-N were probably increasing. • Results of all other Mann-Kendall analyses were either decreasing, stable, or non-trending.	Table K Attachment III

Notes:
[a] – Relevant monitoring wells from other programs are those in the area that are under evaluation for potential inclusion in the SSGMP and/or RGMP.
[b] – Relevant surface water stations and seep monitoring locations are as determined in the 2021 SSGMP Update (SNC-Lavalin, 2021a), and represent a sub-set of the surface water and seepage monitoring locations present at FRO and within Study Area 1.
[c] – Non-order mine-related and naturally occurring constituents based on the background assessment (BGA) completed for the 2020 RGMP Update (SNC-Lavalin, 2020).

A summary of OC compared to primary screening criteria for the wells in the Swift Creek watershed is presented below in Table J.

Table J: FRO – Summary of OC compared to Primary Groundwater Screening Criteria in the Swift Creek Watershed

Parameter[1,2,3] / Well ID	Nitrate-N (mg/L)				Sulphate (mg/L)				Dissolved Cadmium (µg/L)				Dissolved Selenium (µg/L)			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
FR_MW18-02	18.4	18.9	19.4	31.7	1,310	1,310	1,150	1,580	-	-	-	-	***314***	***252***	***208***	***449***
CSR AW	400				1,280 – 4,290[4]				0.5 – 4[4]				20			
CSR IW	n/a				n/a				5				20			
CSR LW	100				1,000				80				30			
CSR DW	10				500				5				10			

Notes:

[1] Primary screening criteria: CSR standards for **Aquatic Life (AW)**, Drinking Water (DW), Livestock (LW) and *Irrigation (IW)*.

[2] '–' denotes result is below primary screening criteria.

[3] Where a duplicate was collected, or if more than one sample was collected in a quarter, the higher concentration is provided.

[4] Standard varies with hardness.

'NS' denotes sample not collected.

Mann-Kendall trend analyses were completed for OC for wells the Swift Creek watershed with seven or more sampling events and are summarized in Table K.

Table K: FRO – Summary of Mann-Kendall Trend Analysis for OC in the Swift Creek Watershed

Well ID \ Parameter[1]	Nitrate-N	Sulphate	Dissolved Cadmium	Dissolved Selenium
FR_MW18-02	***Probably Increasing***	***No Trend***	Stable	***Stable***

Notes:

[1] Where OC were measured above primary screening criteria in 2022, the trend result is ***italics***. Where increasing trends are noted, the cell is shaded yellow. Where the OC were measured above secondary screening criteria for selenium during at least one event in 2022, the result is ***shaded and italics***. Where increasing trends are noted, the cell is shaded yellow.

'-' denotes trend analysis was not completed as concentrations of parameter have consistently been less than, or marginally greater than the detection limit.

1.7.1 Discussion

Monitoring well FR_MW18-02 was installed in 2018 and recommended to be added to the SSGMP in the 2021 SSGMP Update to monitor the potential loading of OC to the Fording River Valley bottom from the Swift Creek sediment ponds (SNC-Lavalin, 2021a). It is screened between 3.6 and 5.1 mbgs and completed within till or fill comprising re-worked till (e.g., native till-like material that has been re-located and used as fill material). The well was selected over other wells recently installed near the ponds (FR_MW20-01S/D, FR_MW20-02S/D, FR_MW20-03S/D) due to higher concentrations in the groundwater sample collected in December 2020, the only available data at the time. Concentrations of dissolved selenium (208 to 449 µg/L), nitrate-N (18.4 to 31.7 mg/L), and sulphate (1,150 to 1,580 mg/L) exceeded primary screening criteria in 2022 (Tables FR-03 and FR-04), and the concentrations of each in Q4 were the highest reported to date (since 2020; Figures FR-34 to FR-36), and the Mann-Kendall analyses indicated nitrate-N concentrations were probably increasing (Table K; Attachment III). The dissolved selenium was also the highest amongst any wells included in the SSGMP or RGMP, while the sulphate concentrations were higher than all except for wells screened in source areas in Henretta Creek (Tables FR-03 and FR-04).

The dissolved selenium and nitrate-N concentrations in groundwater were lower than in the Primary Swift Creek Sediment Pond (GH_SC1H), while the sulphate concentrations were similar (Figures FR-34 to 36). The dissolved selenium and nitrate-N concentrations in groundwater were higher than in surface water at the outlet to the Fording River (FR_SCOUT) between March and July and lower after August (Figures FR-34 to 36). The Se:SO_4 (S) ratios indicate the groundwater is influenced by spoils, similar to the surface water in the ponds and outlet (Figure FR-37).

The monitoring results indicated there is likely infiltration from the ponds to groundwater, which is supported by the water levels (the elevations in the adjacent Primary Sediment Ponds are generally 3 m higher than those at FR_MW18-02). A study was recently completed to quantify seepage losses from the pond toward the Fording River, which indicated seepage was minimal (a total of 8 m^3/d from the Primary and Secondary Ponds) and the groundwater pathway within the unconsolidated materials between the ponds and Fording River valley was likely discontinuous based on several lines of evidence (SNC-Lavalin, 2022c). The monitoring wells recently installed in the area as part of the seepage study will be evaluated for potential inclusion in the SSGMP for the 2024 SSGMP Update report.

The Swift Creek sediment ponds also receive mine-influenced drainage from the Cataract Creek watershed due to a diversion completed in August 2019.

2 Recommendations

New recommendations, evolving from the FRO 2022 SSGMP and the RGMP data review and assessment, are presented in Table L. Appendix II of the main report outlines recommendations related to FRO from the 2020 Annual Report (SNC-Lavalin, 2021b), the 2021 SSGMP Update Report (SNC-Lavalin, 2021a), and the 2021 Annual Report (SNC-Lavalin, 2022a). Previous recommendations that have been initiated but not completed are provided in Table M.

Table L: Summary of New Recommendations for FRO SSGMPs and RGMP Study Area 1

Program	Recommendation	Rationale
Site-Specific Groundwater Monitoring Programs		
FRO SSGMP	Monitoring wells FR_MW23_HMW2_V2 and bedrock well FR_MW23_HMW2_BR in Henretta Creek should be added to the FRO SSGMP.	Monitoring well FR_MW23_HMW2_V2 is a replacement for decommissioned well FR_HMW2, which was part of the approved SSGMP. Monitoring well FR_MW23_HMW2_BR addresses a gap in the lack of groundwater data in bedrock in the Henretta Creek watershed.
	Monitoring wells FR_MW22_KCWD1A/B should be added to the FRO SSGMP as background wells and if feasible sampled semi annually in Q2 and Q4.	There are no suitable wells to monitor groundwater quality upgradient of mining operations local to FRO since mining influence at FR_HMW5 has been observed. Wells FR_MW22_KCWD1A/B can address this gap.
	Review wells installed in 2022 in the TSP TSF area, potable wells area, and Fish Creek pond area.	Numerous monitoring wells were installed in 2022 to advance other programs. The data should be reviewed for the 2024 SSGMP Update Report or when sufficient data to identify wells for potential inclusion in the SSGMP.
	Consideration should be given to incorporate more bedrock wells into the FRO SSGMP.	There are currently no wells included in the FRO SSGMP screened entirely in bedrock. Monitoring wells FR_MW23_HMW2_BR and FR_MW22_KCWD1A have been recommended to be added to the program going forward as mentioned above. Recently installed bedrock wells at FRO in the TSP TSF, potable wells, Clode Creek, and Lake Mountain areas will be considered going forward.
Regional Groundwater Monitoring Program		
Study Area 1	Monitoring wells RG_MW22_FR12A/B/C/D should be added to the RGMP.	Monitoring wells RG_MW_FR7A/B were recommended to be added to the RGMP in the 2021 annual report. However, these wells were decommissioned in 2022 because they were located in an ephemeral channel and the well seal integrity was in question and replaced with monitoring wells RG_MW22_FR12A/B. Monitoring wells RG_MW22_FR12A/B/C/D will monitor groundwater quality in the Regional Groundwater Discharge Zone at three depths within valley-bottom sediments, as well as in bedrock.

Table L (Cont'd): Summary of New Recommendations for FRO SSGMPs and RGMP Study Area 1

Program	Recommendation	Rationale
Regional Groundwater Monitoring Program (Cont'd)		
Study Area 1 (Cont'd)	Add monitoring wells GH_MW-PC4A/B to the FRO RGMP.	These wells were added to the GHO SSGMP to investigate a potential transport between Porter Creek and the Fording River valley bottom. Since the Porter Creek watershed drains to the Fording River and is part of Study Area 1, they should also be added to the RGMP.
	Consideration should be given to incorporate more bedrock wells into Study Area 1 of the RGMP.	There are currently no wells included in the RGMP Study Area 1 screened entirely in bedrock. Monitoring wells GH_MW-PC4A and RG_MW22_FR12A have been recommended to be added to the program going forward as mentioned above. Other recently installed bedrock wells in Study Area 1 will be considered going forward.

Table M: Summary of Outstanding Recommendations for FRO SSGMP and RGMP Study Area 1

Program	Recommendation	Rationale
Site-Specific Groundwater Monitoring Programs		
FRO SSGMP	Review findings of the ongoing investigation, once completed, to understand potential stratification of OC in Henretta Lake.	To address the gap in understanding of whether loading to Henretta Lake from groundwater in source areas occurs at depth.
	Historic monitoring wells FR_BH-03-16, FR_BH-04-16, and FR_09-03-A/B south of the STP should be re-developed, and if feasible, monitored and sampled quarterly for a period of one year.	These historic wells have been sampled infrequently since installation. They were located in 2022 and found to be in good condition. Sampling of FR_09-03-A/B is recommended to assess whether attenuation of OC observed elsewhere downgradient of the STP is also observed at this location to determine whether similar conditions exist along the length of the southern extent of the STP. Sampling of FR_BH-03-16 and FR_BH-04-16 is recommended to determine whether OC identified in the one sampling event (completed in 2017) are sourced from Kilmarnock Creek or the STP. These are gaps that were identified in the 2021 SSGMP Update report. Prior to sampling, it is recommended the wells be further developed and a downhole camera be deployed to determine well completion details, since borehole logs are not available.
	Review monitoring wells installed in 2021 in the Henretta Creek Valley, Turnbull Bridge Spoil area, Clode Creek area, Lake Mountain Creek area, Eagle pond area, Kilmarnock Creek area, Swift Creek and Cataract Creek Sediment Pond areas, for potential inclusion in the SSGMP once interpretation of the data have been published.	Numerous monitoring wells were installed in 2021 to advance other programs. The data should be reviewed for the 2024 SSGMP Update Report to identify wells for potential inclusion in the SSGMP.

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Table M (Cont'd): Summary of Outstanding Recommendations for FRO SSGMP and RGMP Study Area 1

Program	Recommendation	Rationale
Regional Groundwater Monitoring Program		
Study Area 1	Review monitoring wells installed in Study Area 1 between 2020 and 2022.	Numerous monitoring wells were installed in Study Area 1 between 2020 and 2022 to advance other programs. The data should be reviewed when sufficient data are available to identify wells for potential inclusion in the RGMP.

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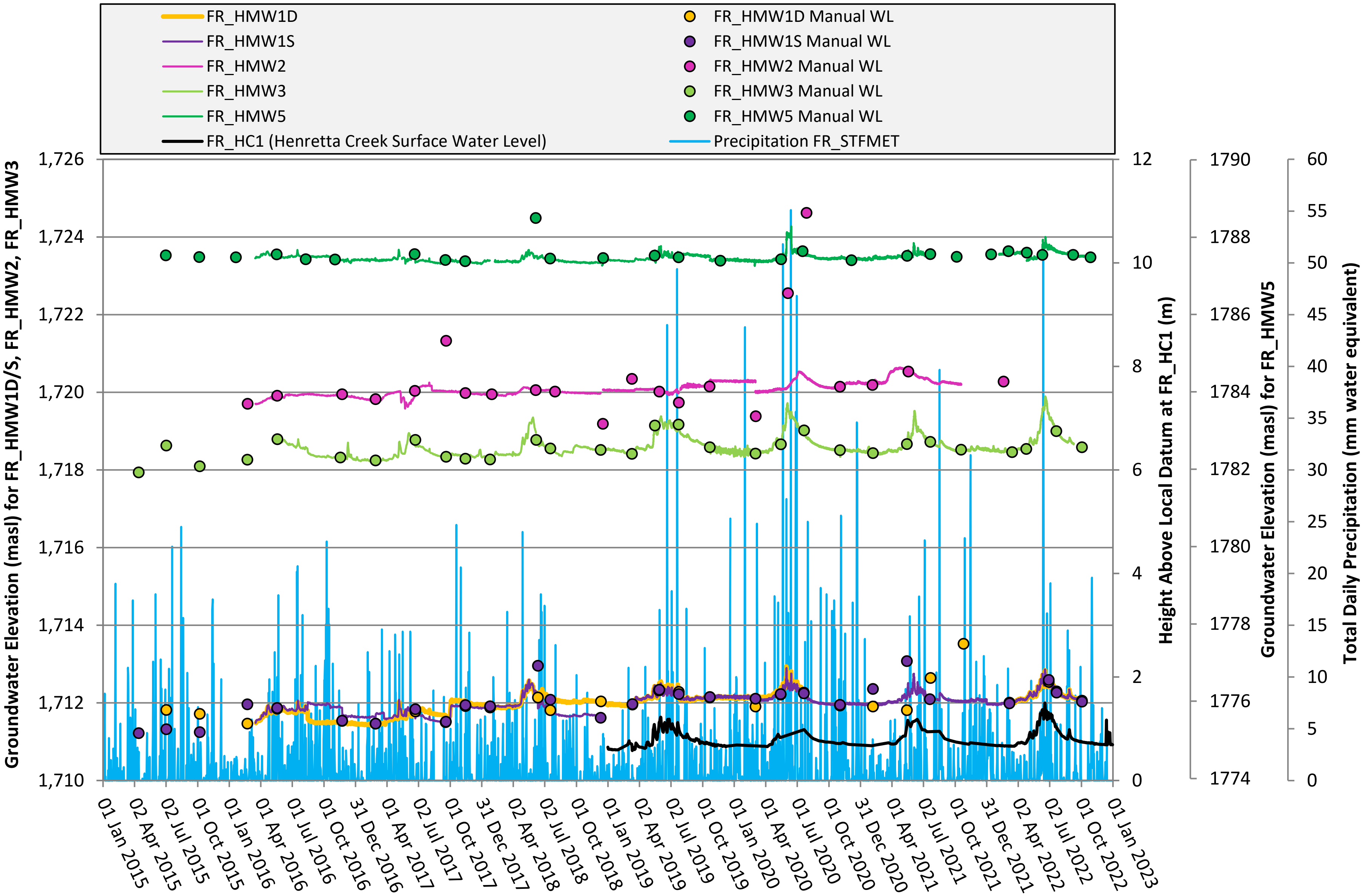
Figures

Figure FR-01: Henretta Creek Valley - Hydrograph



Notes: Discrepancy between manual water level measurements and datalogger data; Water levels for FR_HMW1D/S, FR_HMW2 and FR_HMW3 were taken daily after May 2016 as opposed to hourly measurements prior to February 2016; Continuous water level data was compensated using barologger installed at STPSW Baro; Continuous stage data for FR_HC1 in 2022 are preliminary.

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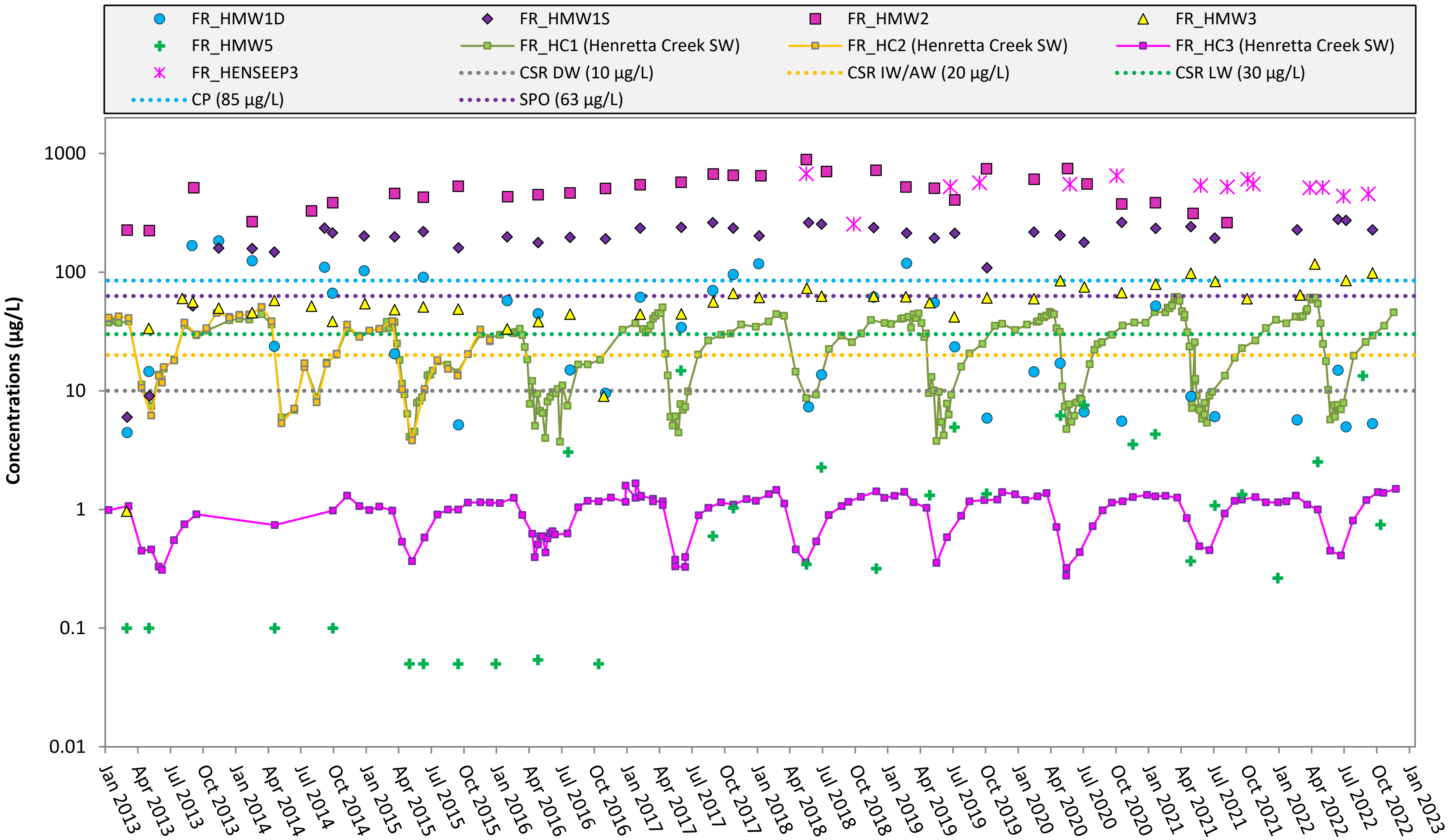
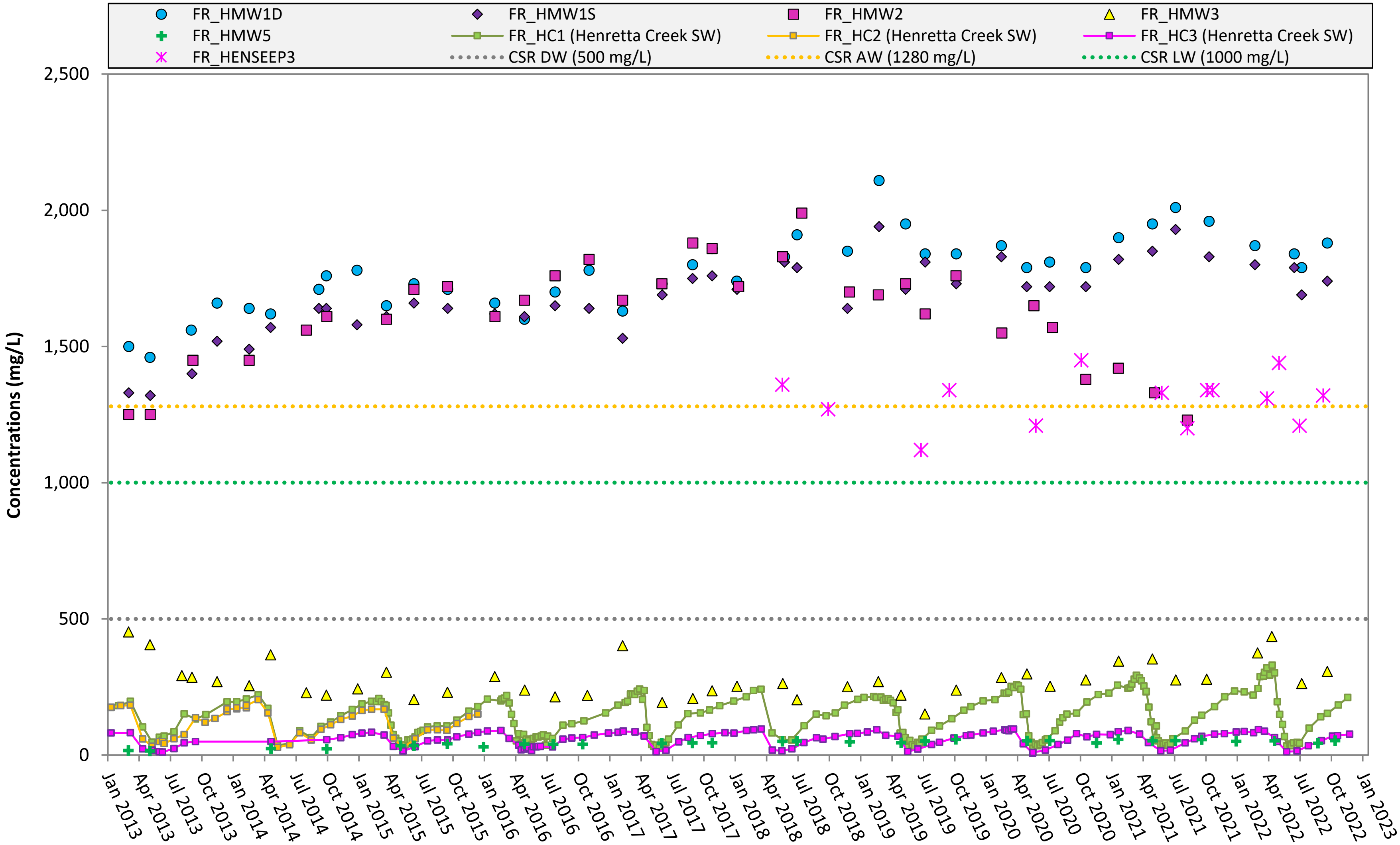
QAQC: CMH

Figure FR-02: Henretta Creek Valley - Dissolved Selenium



Note: For concentrations measured below the method detection limit, the method detection limit (0.05 µg/L) was utilized for plotting purposes. Logarithmic scale has been applied on distribution of concentrations relative to applicable screening criteria.

Figure FR-03: Henretta Creek Valley - Sulphate



Note: For concentrations measured below the method detection limit, the method detection limit (0.3 mg/L) was utilized for plotting purposes. Logarithmic scale has been applied on distribution of concentrations relative to applicable screening criteria.

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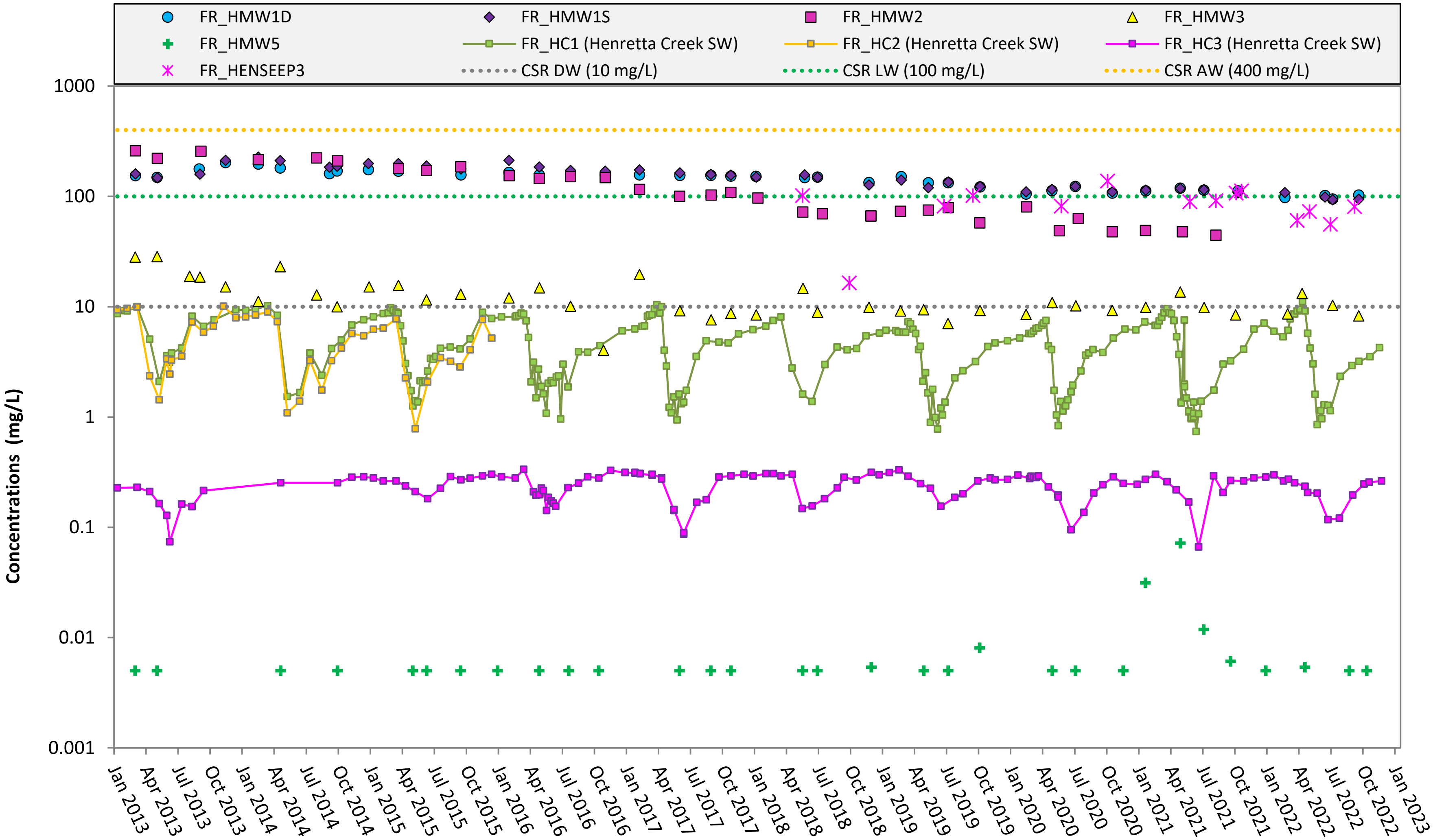
QAQC: CMH

Figure FR-04: Henretta Creek Valley - Nitrate-N



Note: For concentrations measured below the method detection limit, the method detection limit (0.005 mg/L) was utilized for plotting purposes. Logarithmic scale has been applied on distribution of concentrations relative to applicable screening criteria.

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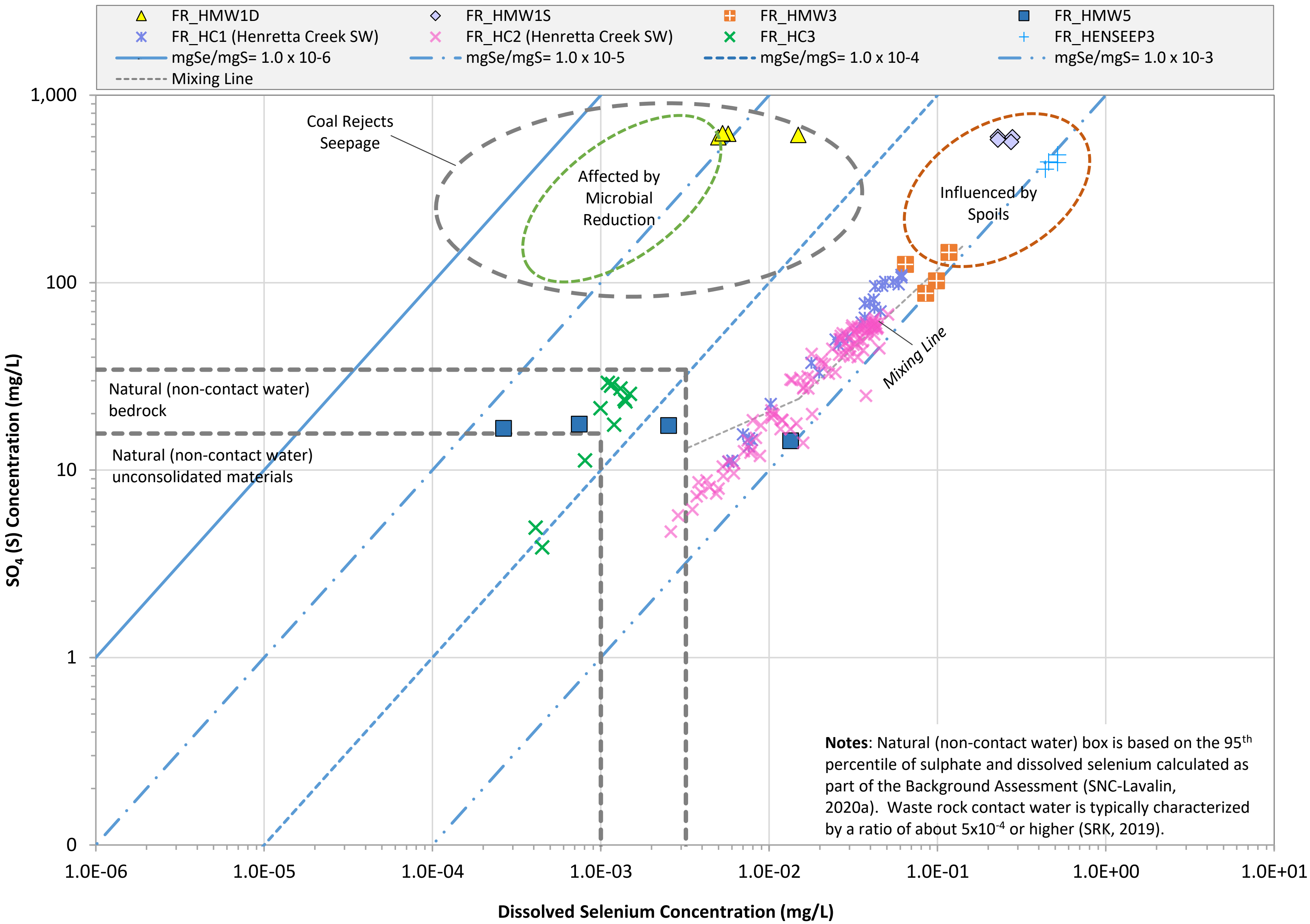
QAQC: CMH

Figure FR-05: Henretta Creek Valley - Se:SO_4 (S)



Notes: Natural (non-contact water) box is based on the 95th percentile of sulphate and dissolved selenium calculated as part of the Background Assessment (SNC-Lavalin, 2020a). Waste rock contact water is typically characterized by a ratio of about 5×10^{-4} or higher (SRK, 2019).

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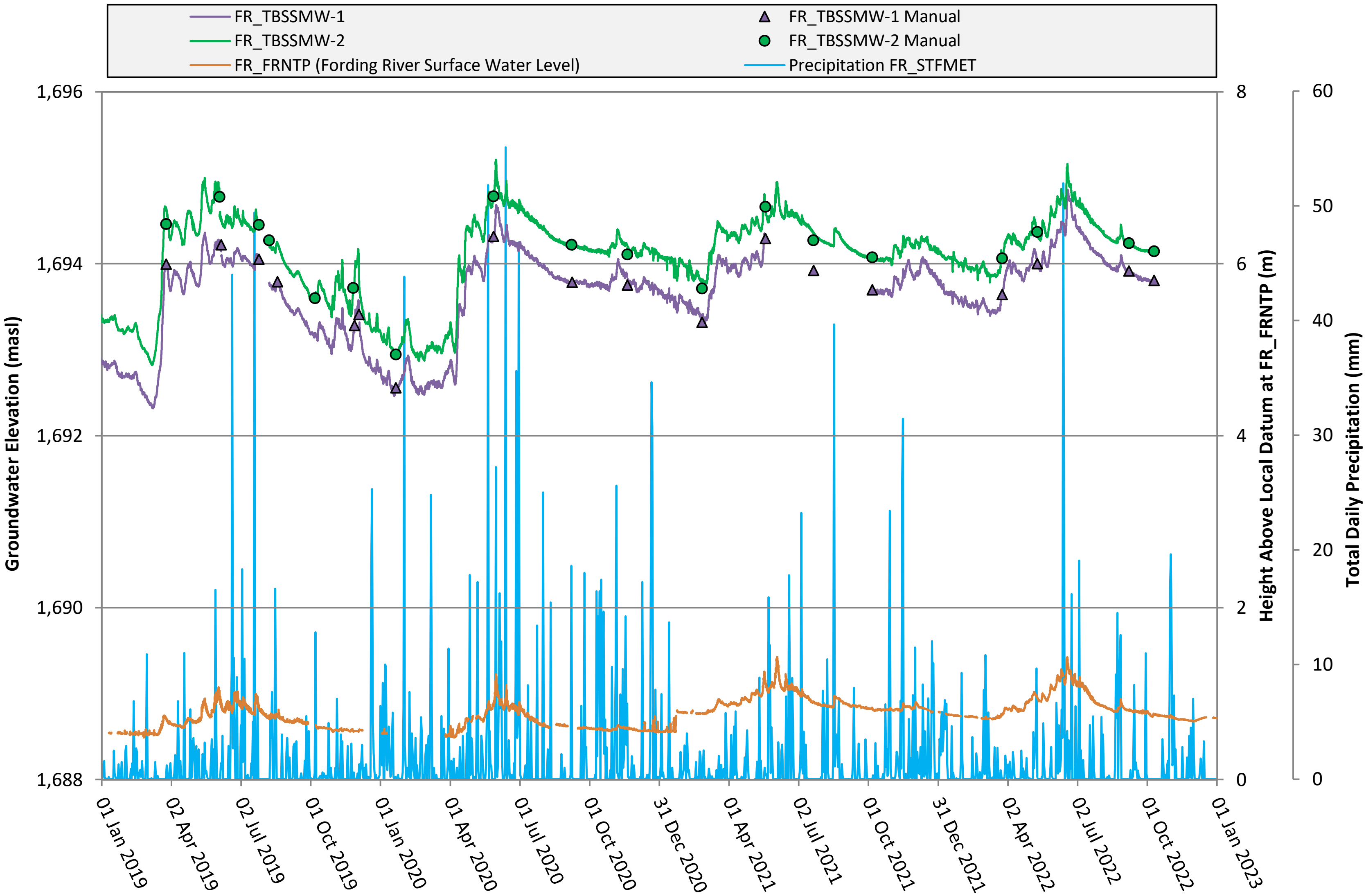
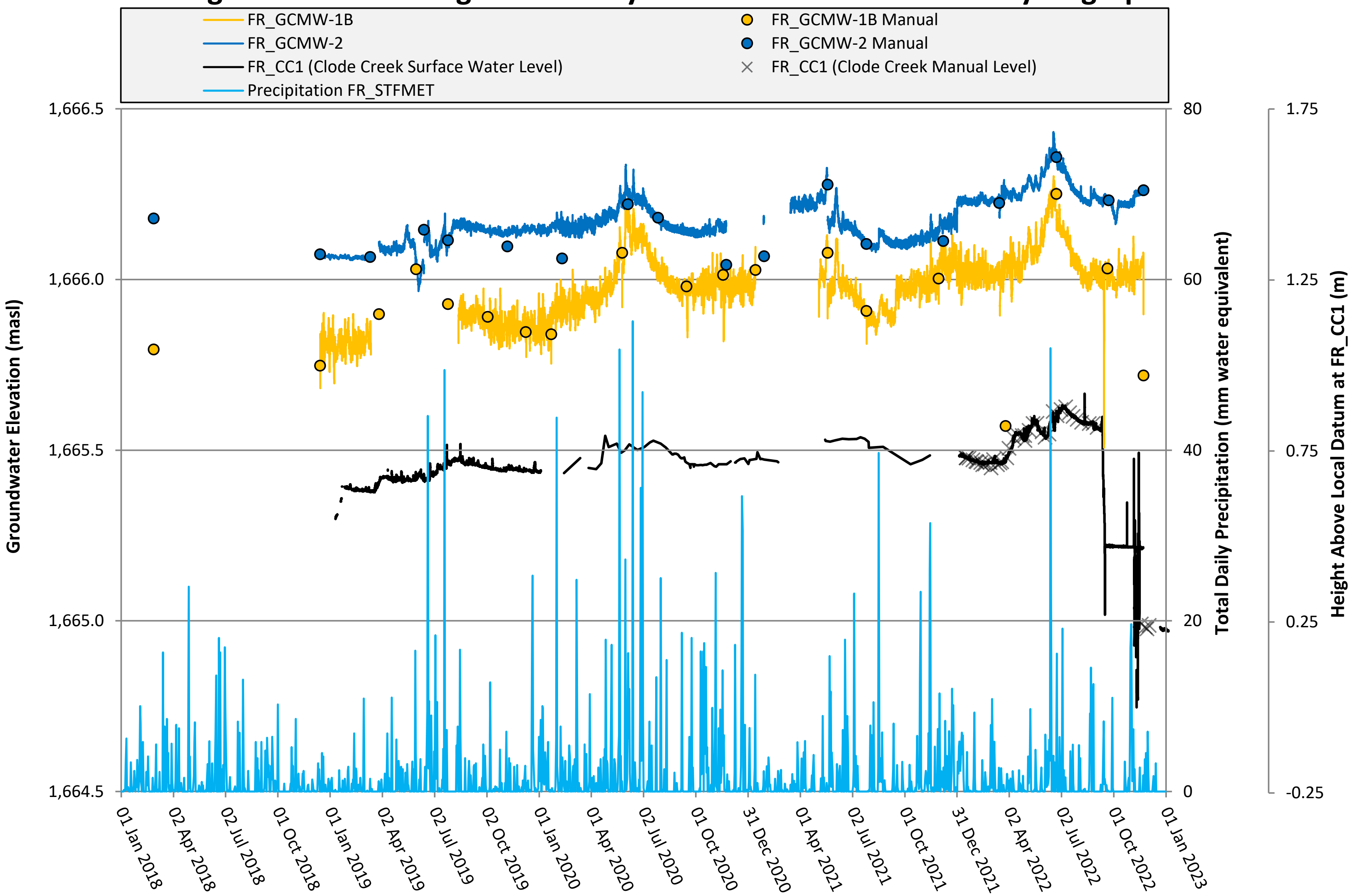
635544 / 2023-03-24
QAQC: CMH

Figure FR-06: Fording River Valley Near Turnbull Bridge Spoil - Hydrograph



Notes: Continuous water level data was compensated using barologger installed at STPSW Baro; FR_FRNTP staff gauge damaged in 2020 and the offset between 2021 and historical data is due to the difference in elevation between the old and new staff gauges.

Figure FR-07: Fording River Valley Near Clode Creek Ponds - Hydrograph



Note: Select data points were removed in winter months where values were not considered to be representative of actual conditions; Continuous water level data was compensated using barologger installed at STPSW Baro and Weather Station FR_STFMET; Continuous stage data for FR_CC1 in 2022 are preliminary; Decline at FR_CC1 attributed to water diversion during channel reconstruction Sept.-Nov. 2022.

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Figure FR-08: Pumping Rates for FR_POTWELLS

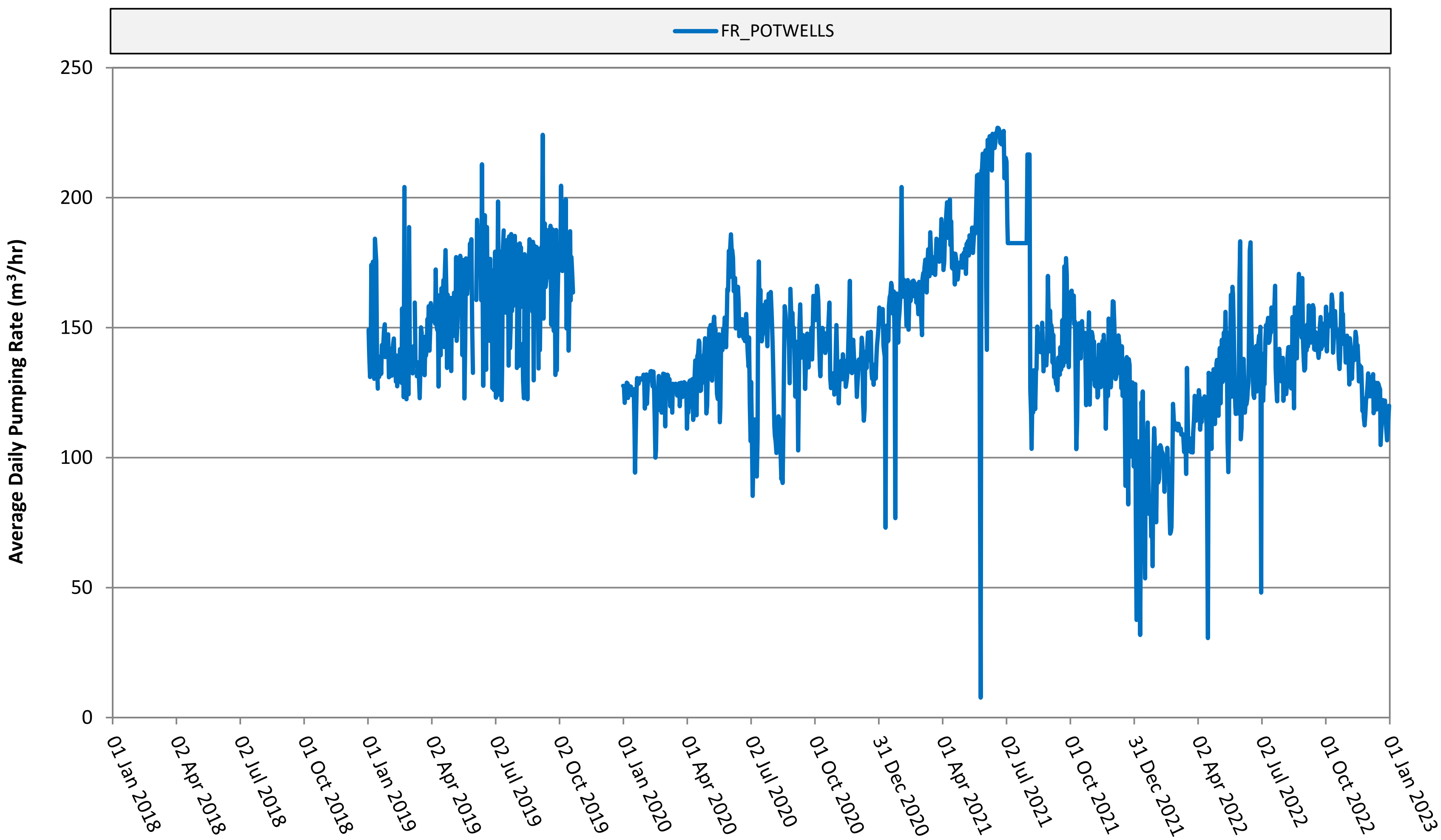
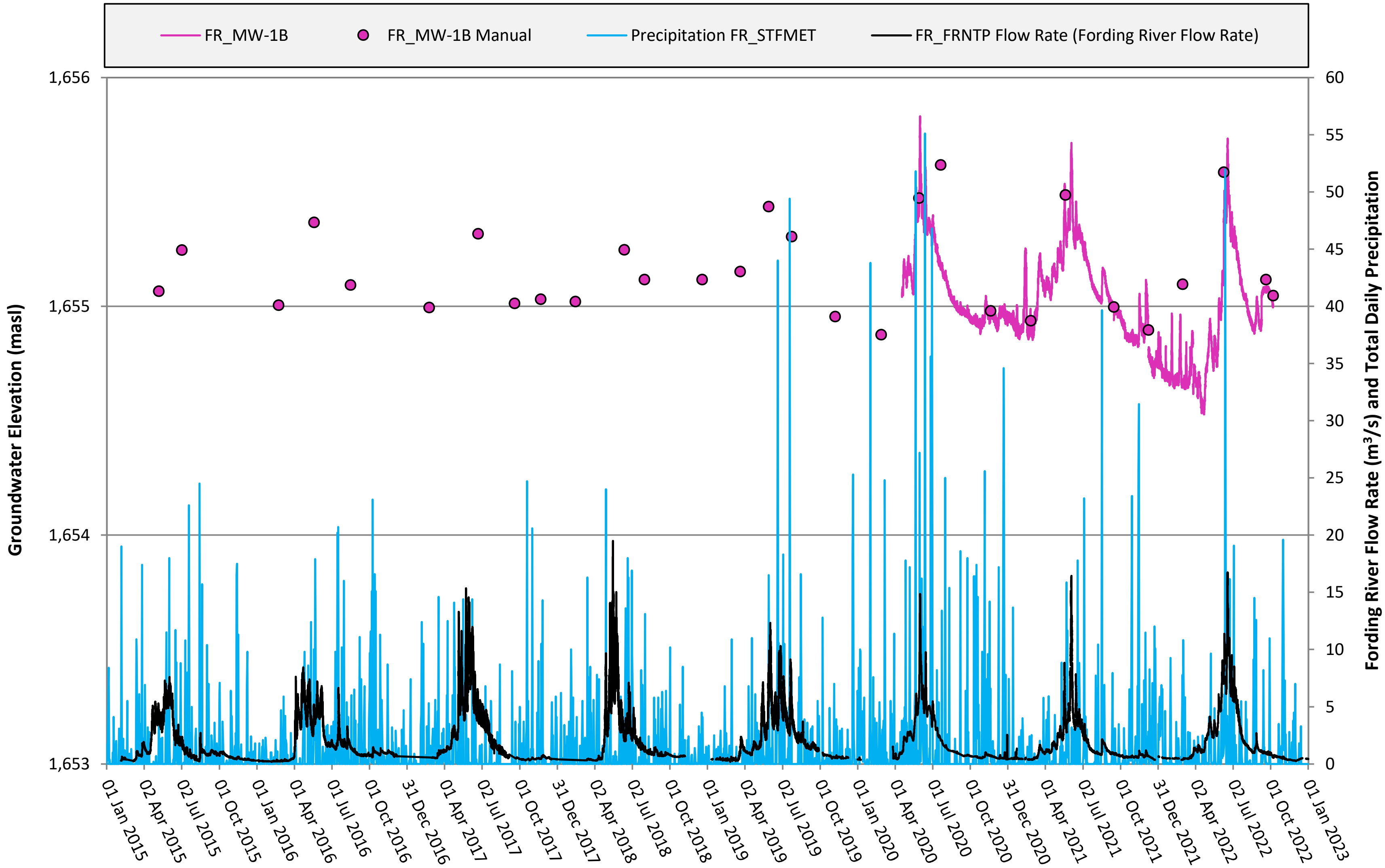


Figure FR-09: Fording River Valley Downstream of Lake Mountain Creek - Hydrograph



Note: Select data points were removed in winter months where values were not considered to be representative of actual conditions; Continuous water level data was compensated using barologger installed at STPSW Baro and weather station FR_STFMET.

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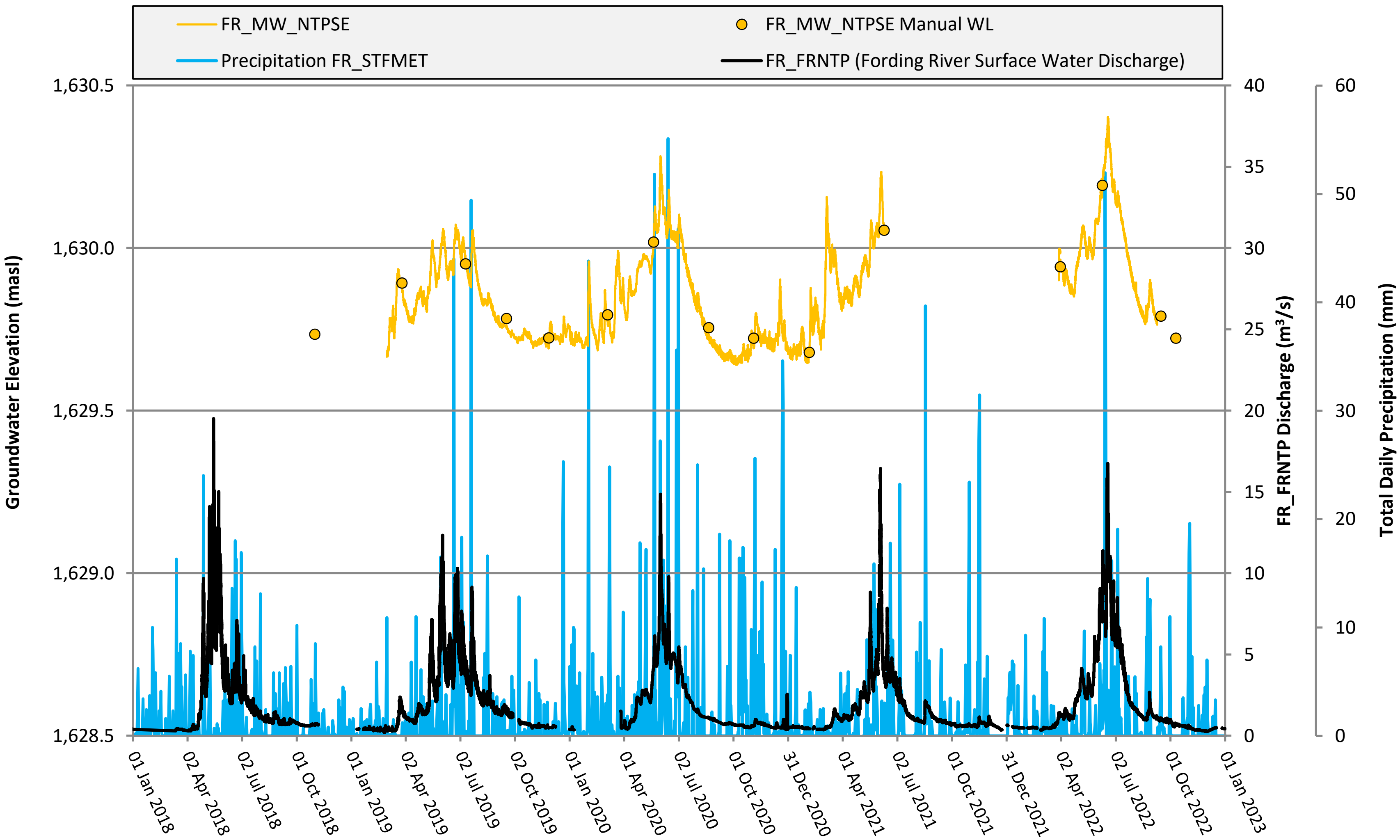
QAQC: CMH

Figure 10: Fording River Valley Southeast of NTP - Hydrograph



Note: Select data points were removed in winter months where values were not considered to be representative of actual conditions; Continuous water level data was compensated using barologger STFMET-Baro and FR_STFMET; Logger not deployed between June 2021 to March 2022 at FR_MW_NTPSE.

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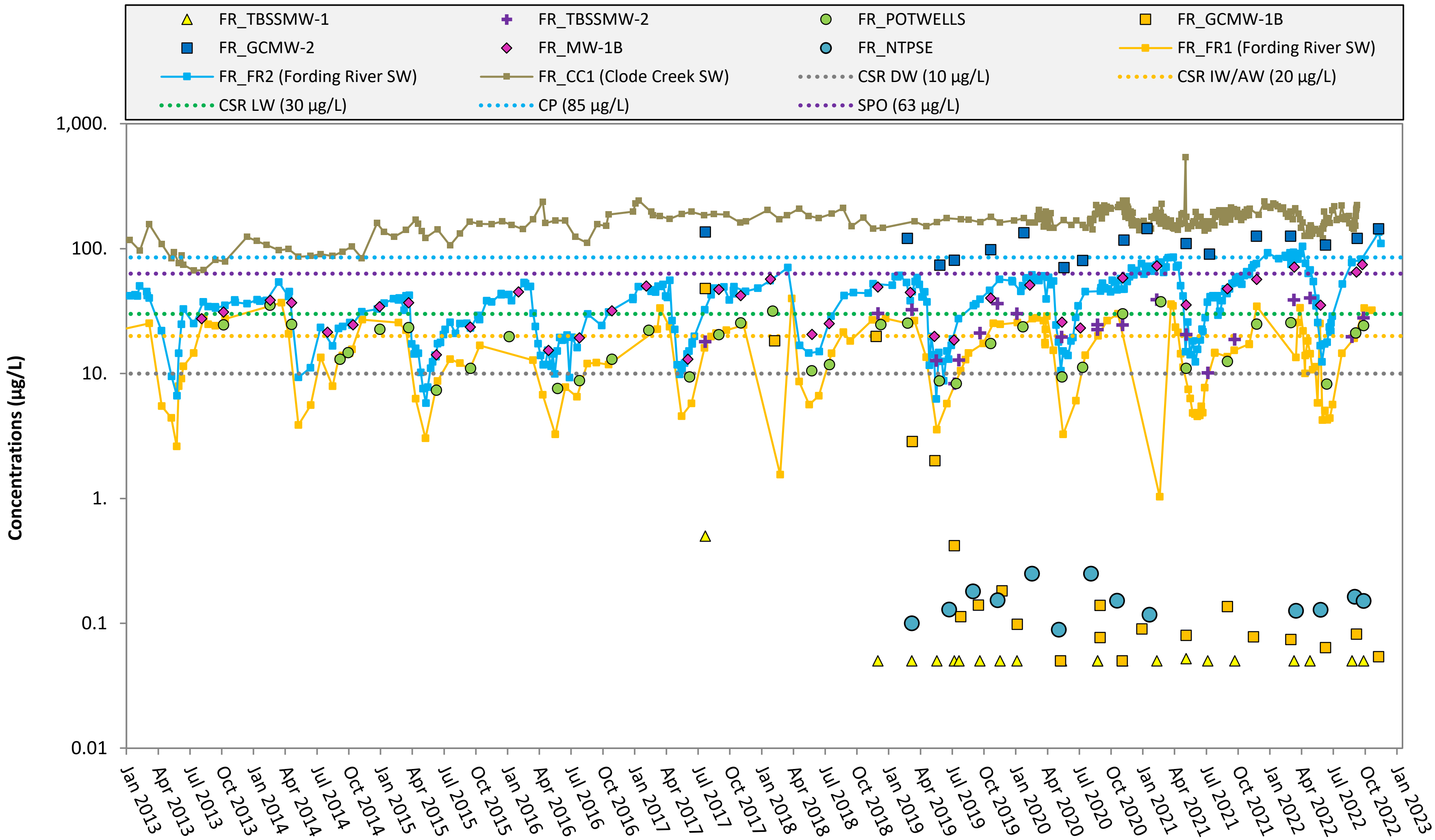
QAQC: CMH

Figure FR-11: Fording River Valley North of STP - Dissolved Selenium



Note: For concentrations measured below the method detection limit, the method detection limit (0.05 µg/L) was utilized for plotting purposes. Logarithmic scale has been applied on distribution of concentrations relative to applicable screening criteria.

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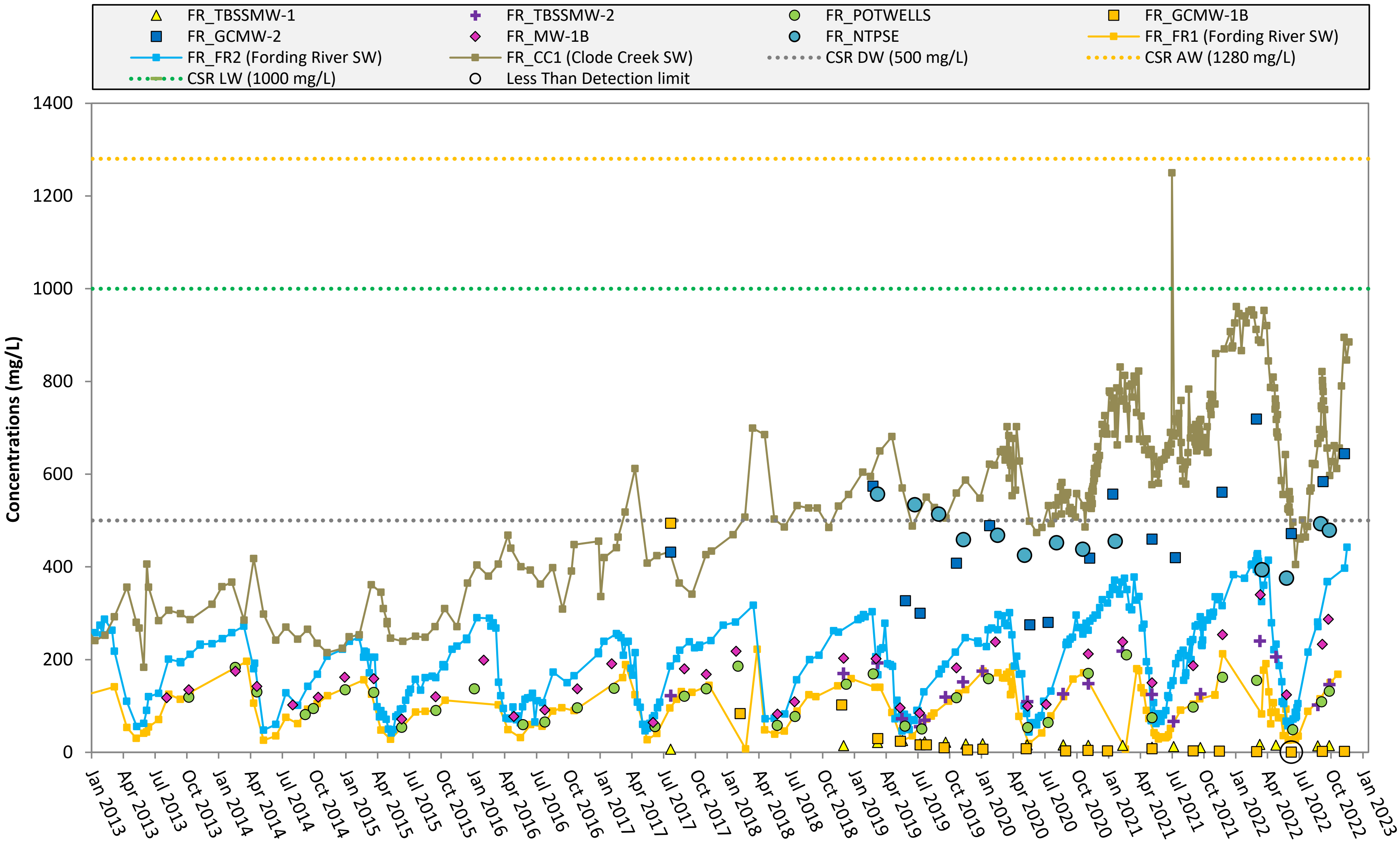
QAQC: CMH

Figure FR-12: Fording River Valley North of STP - Sulphate



Note: For concentrations measured below the method detection limit, the method detection limit (0.3 mg/L) was utilized for plotting purposes. Logarithmic scale has been applied on distribution of concentrations relative to applicable screening criteria.

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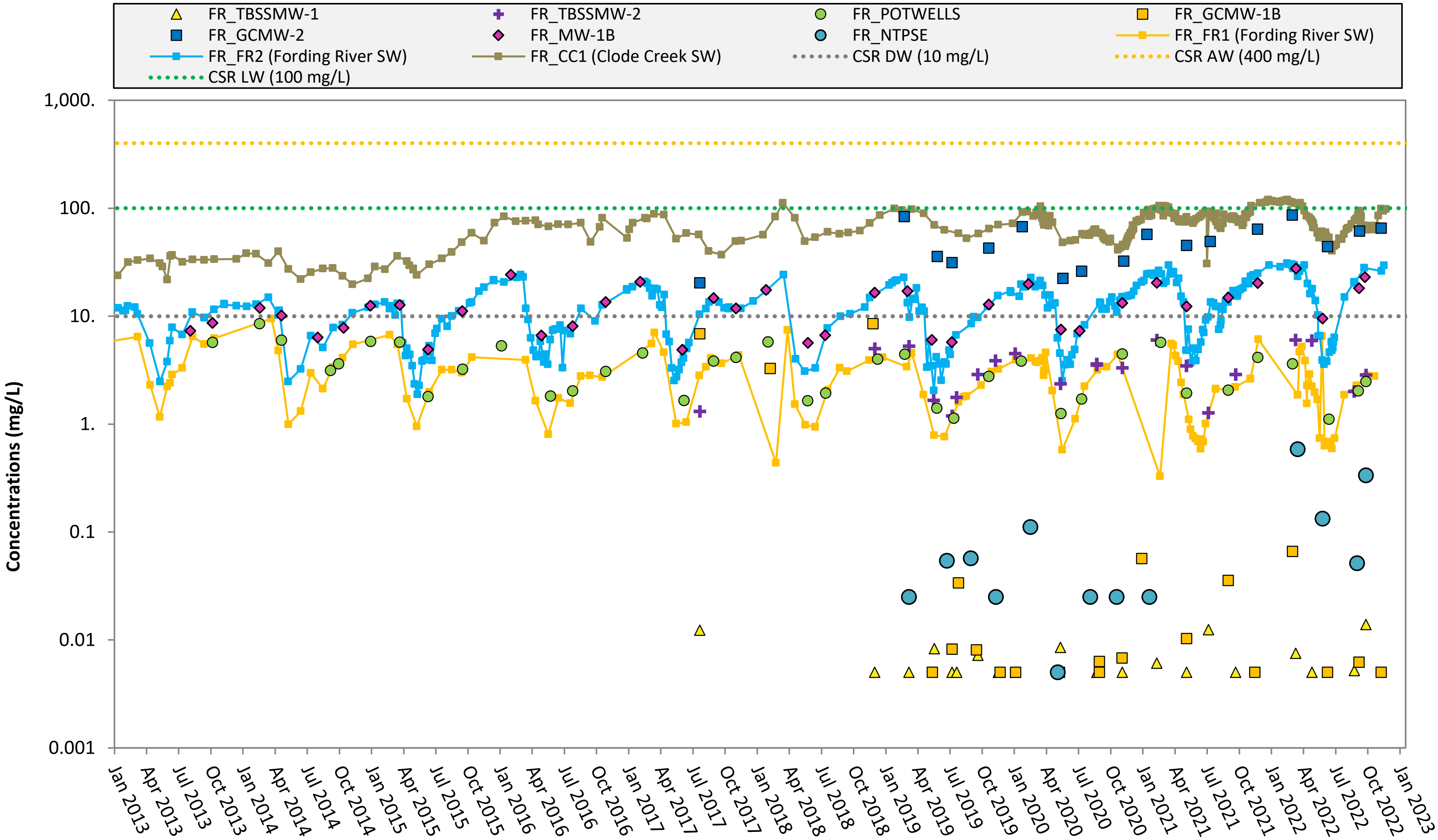
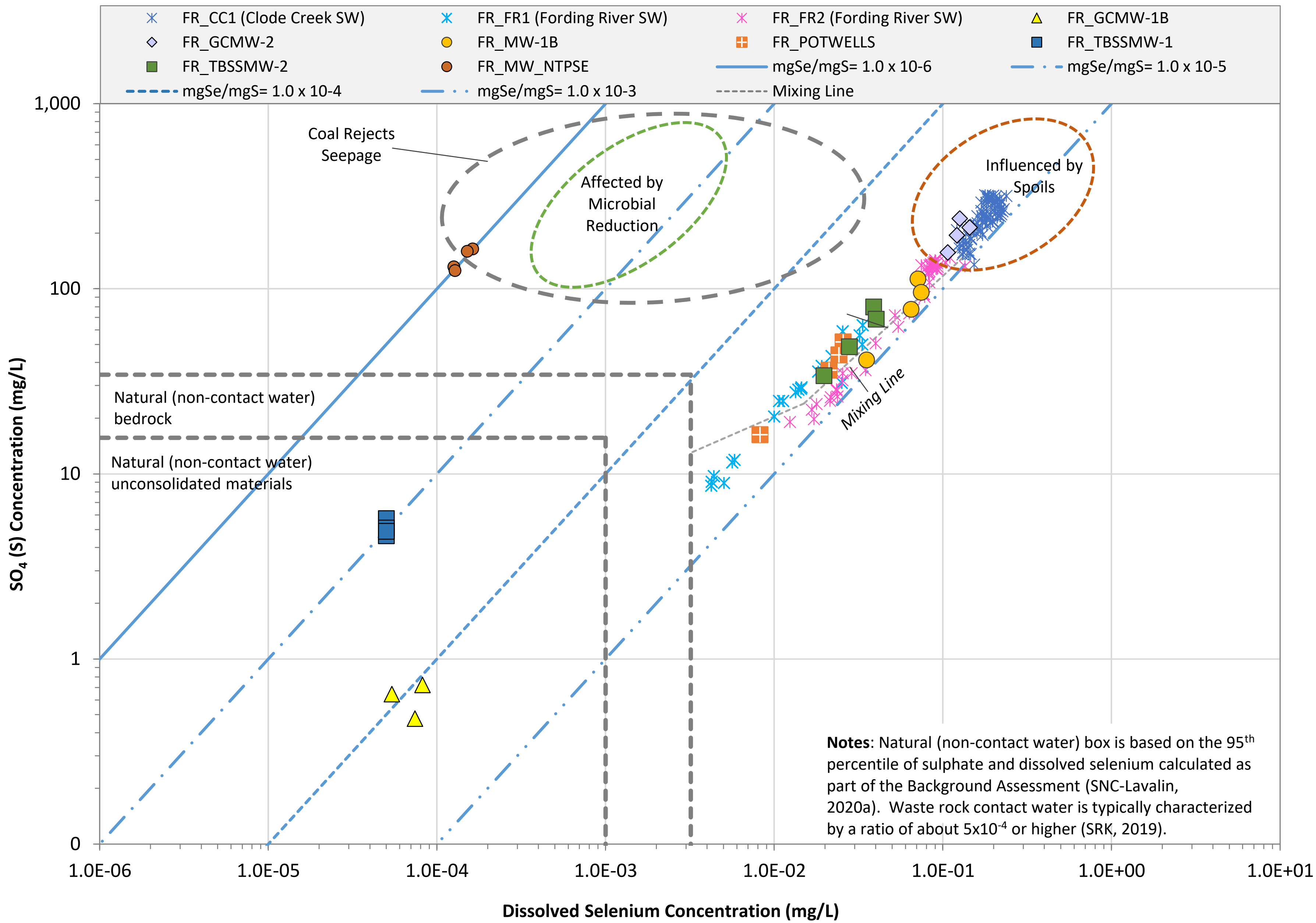
QAQC: CMH

Figure FR-13: Fording River Valley North of STP - Nitrate-N



Note: For concentrations measured below the method detection limit, the method detection limit (0.005 mg/L) was utilized for plotting purposes. Logarithmic scale has been applied on distribution of concentrations relative to applicable screening criteria.

Figure FR-14: Fording River Valley North of STP - Se:SO_4 (S)



Notes: Natural (non-contact water) box is based on the 95th percentile of sulphate and dissolved selenium calculated as part of the Background Assessment (SNC-Lavalin, 2020a). Waste rock contact water is typically characterized by a ratio of about 5×10^{-4} or higher (SRK, 2019).

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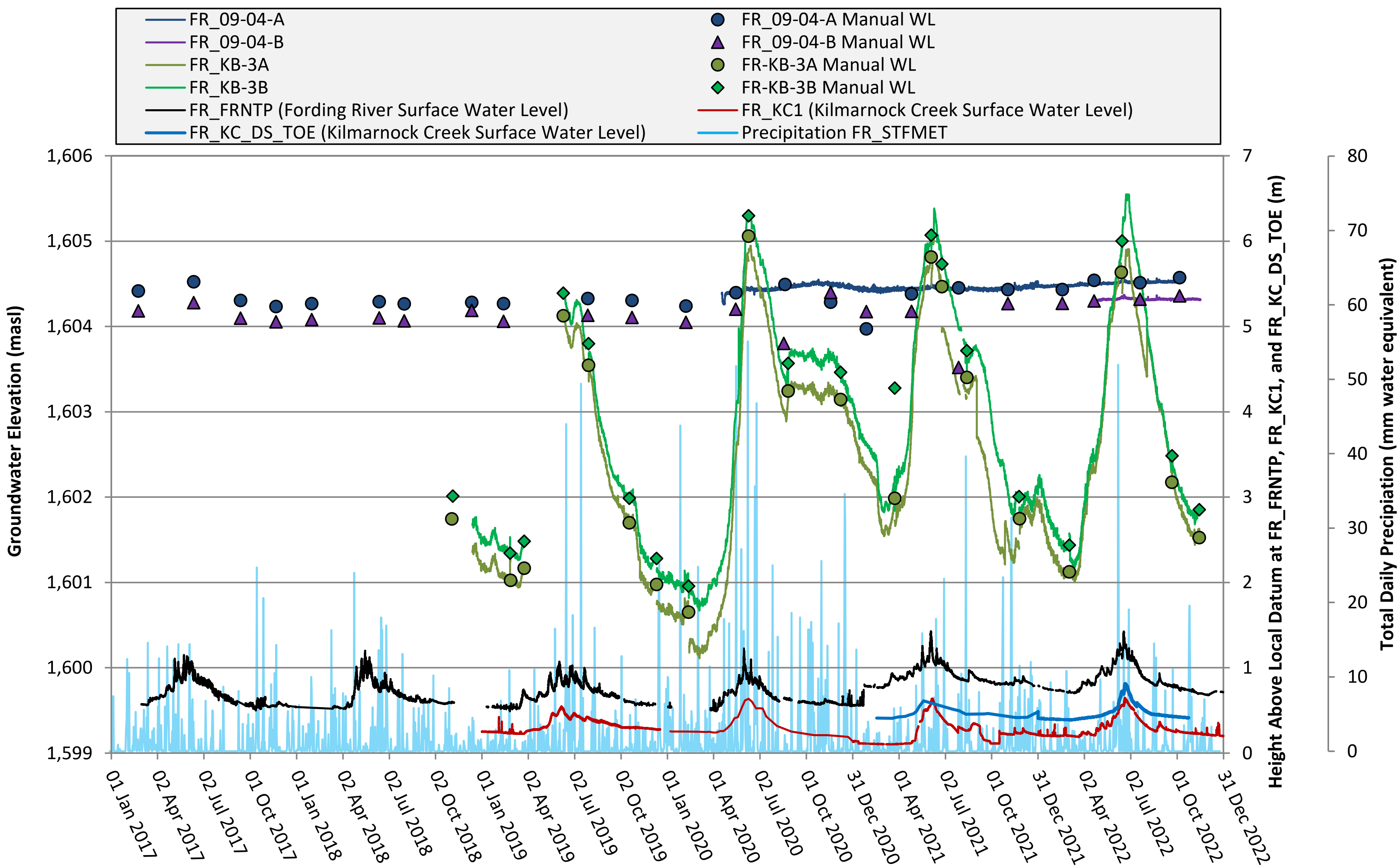
QAQC: CMH

Figure FR-15: Fording River Valley Downgradient of STP - Hydrograph



Note: Select data points were removed in winter months where values were not considered to be representative of actual conditions; Continuous water level data compensated using barologger installed at STPSW Baro and weather station FR_STFMET; FR_FRNTP staff gauge damaged in 2020 and the offset between 2021 and historical data is due to the difference in elevation between the old and new staff gauges. Continuous stage data for FR_KC1 and FR_KC_DS_TOE in 2022 are preliminary.

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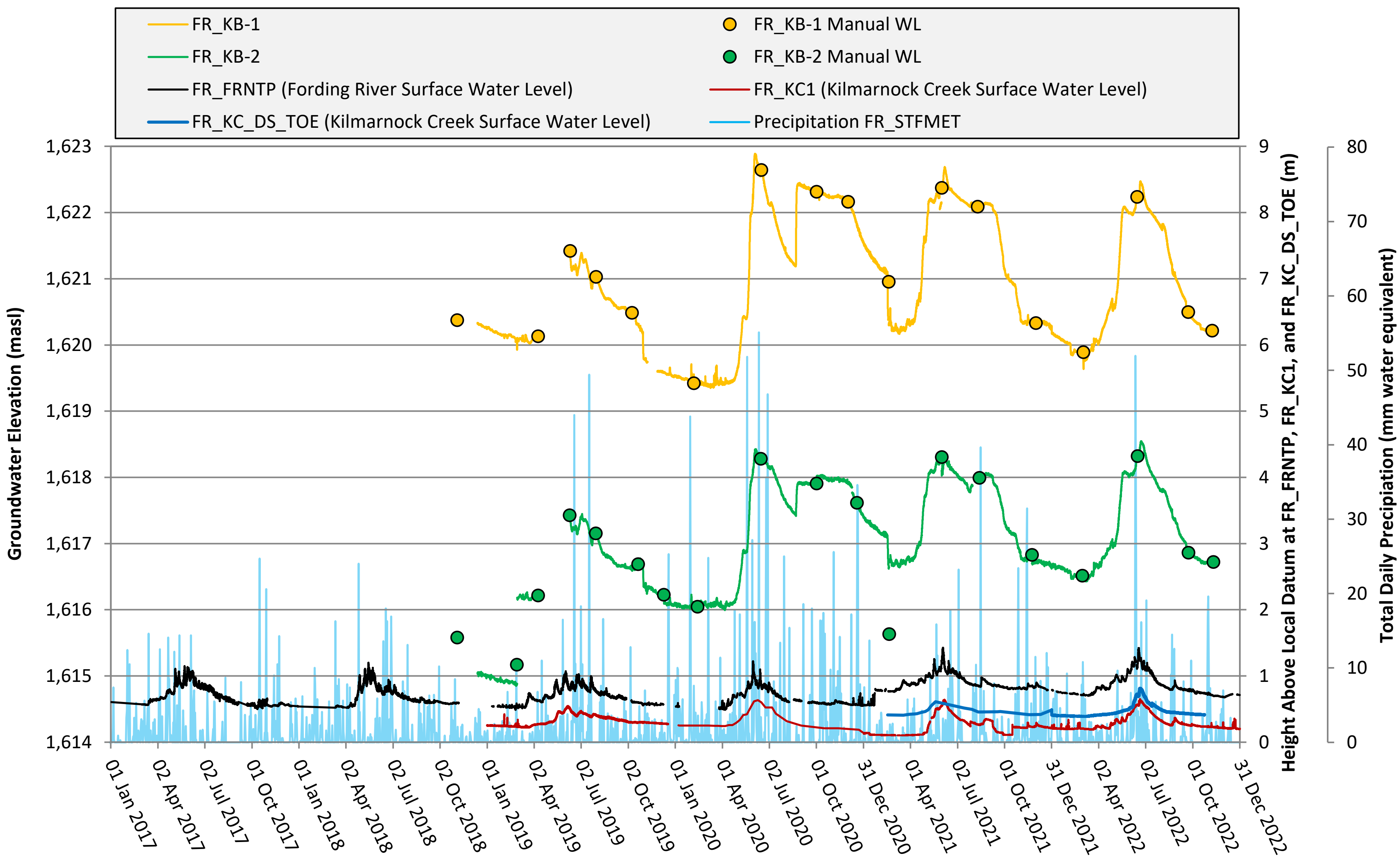
QAQC: CMH

Figure FR-16 Fording River Valley South of STP (Kilmarnock Area) - Hydrograph



Note: Select data points were removed in winter months where values were not considered to be representative of actual conditions. Continuous water level data was compensated using barologger installed at STPSW Baro. The FR_FRNTP staff gauge was damaged in 2020 and the offset between 2021 and historical data is due to the difference in elevation between the old and new staff gauges. Continuous stage data for FR_KC1 and FR_KC_DS_TOE in 2022 are preliminary.

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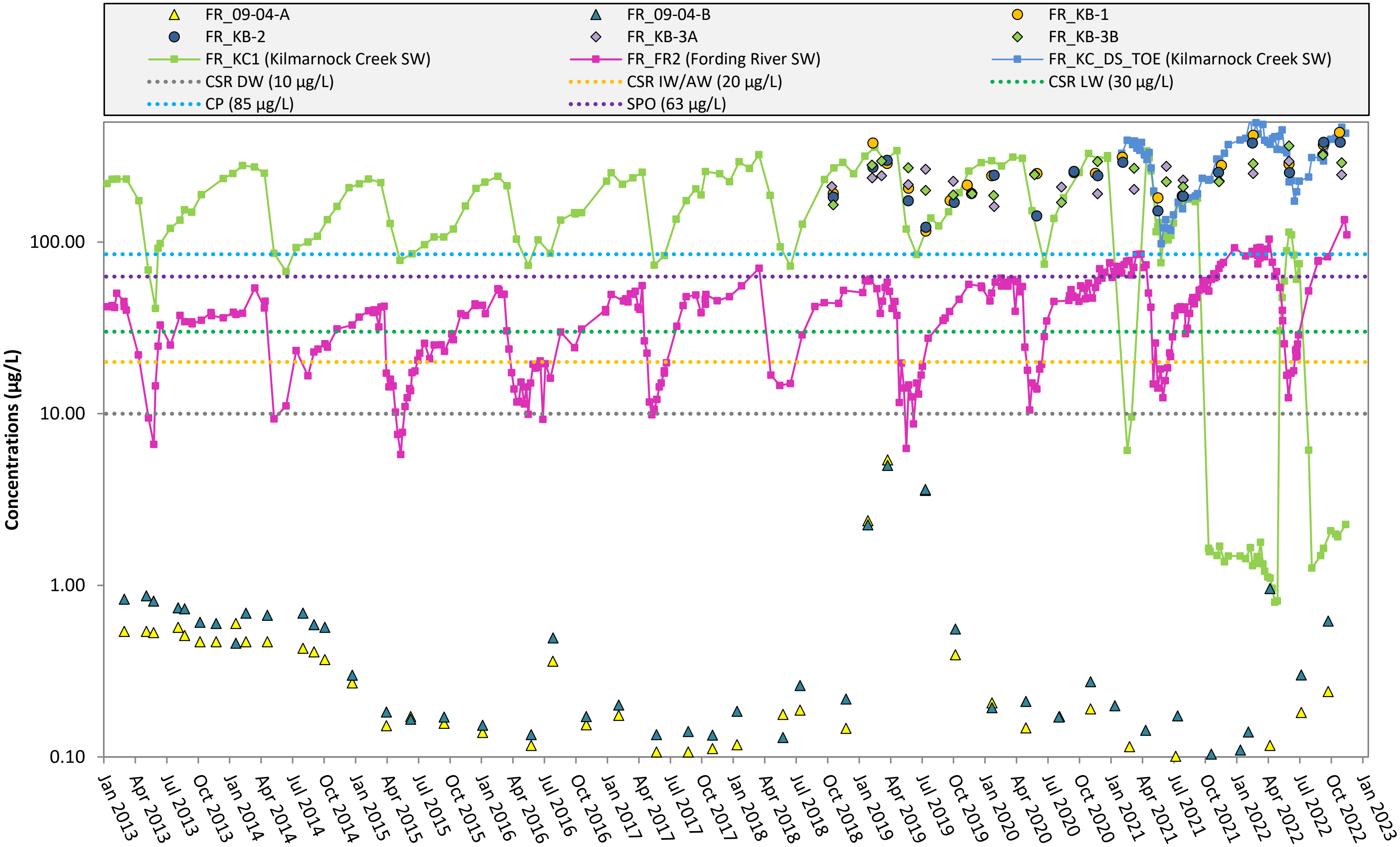
QAQC: CMH

Figure FR-17: Fording River Valley South of STP (Kilmarnock Area) - Dissolved Selenium



Note: For concentrations measured below the method detection limit, the method detection limit (0.05 µg/L) was utilized for plotting purposes. Logarithmic scale has been applied on distribution of concentrations relative to applicable screening criteria.

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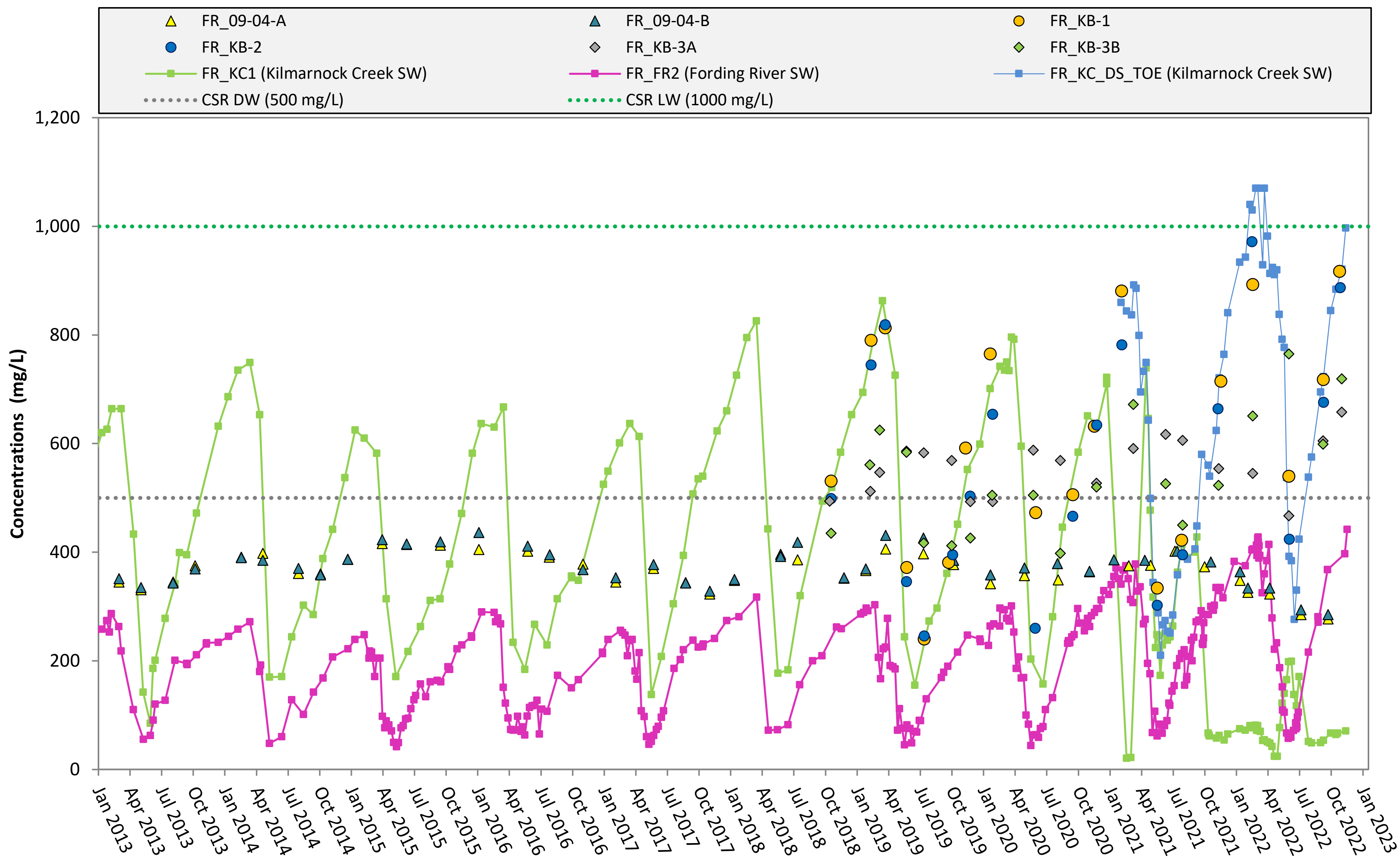
QAQC: CMH

Figure FR-18: Fording River Valley South of STP (Kilmarnock Area) - Sulphate



Note: For concentrations measured below the method detection limit, the method detection limit (0.3 mg/L) was utilized for plotting purposes.

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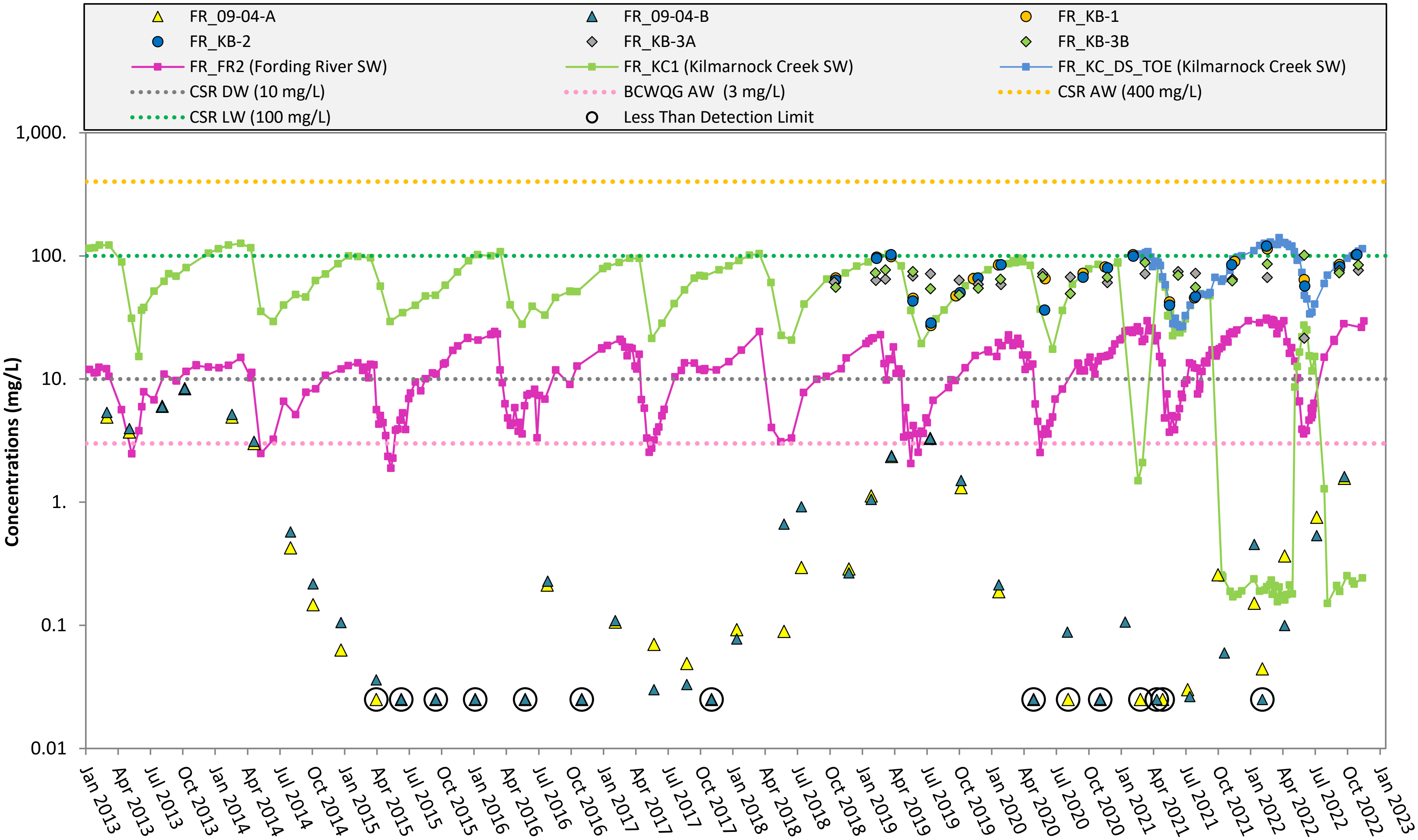
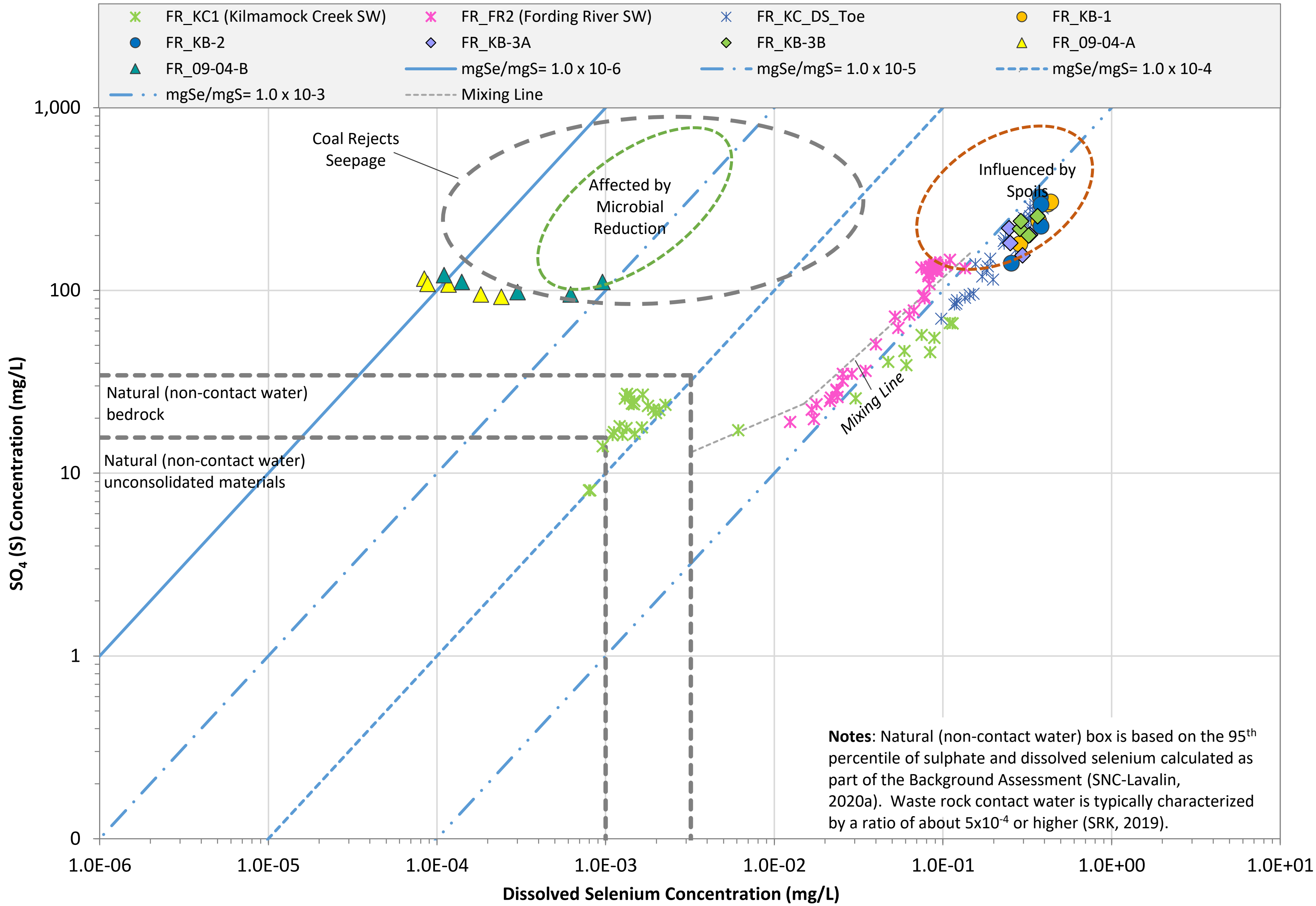
QAQC: CMH

Figure FR-19: Fording River Valley South of STP (Kilmarnock Area) - Nitrate-N



Note: For concentrations measured below the method detection limit, the method detection limit (0.005 mg/L) was utilized for plotting purposes. Logarithmic scale has been applied on distribution of concentrations relative to applicable screening criteria.

Figure FR-20: Fording River Valley South of STP (Kilmarnock Area) - Se:SO_4 (S)



Notes: Natural (non-contact water) box is based on the 95th percentile of sulphate and dissolved selenium calculated as part of the Background Assessment (SNC-Lavalin, 2020a). Waste rock contact water is typically characterized by a ratio of about 5×10^{-4} or higher (SRK, 2019).

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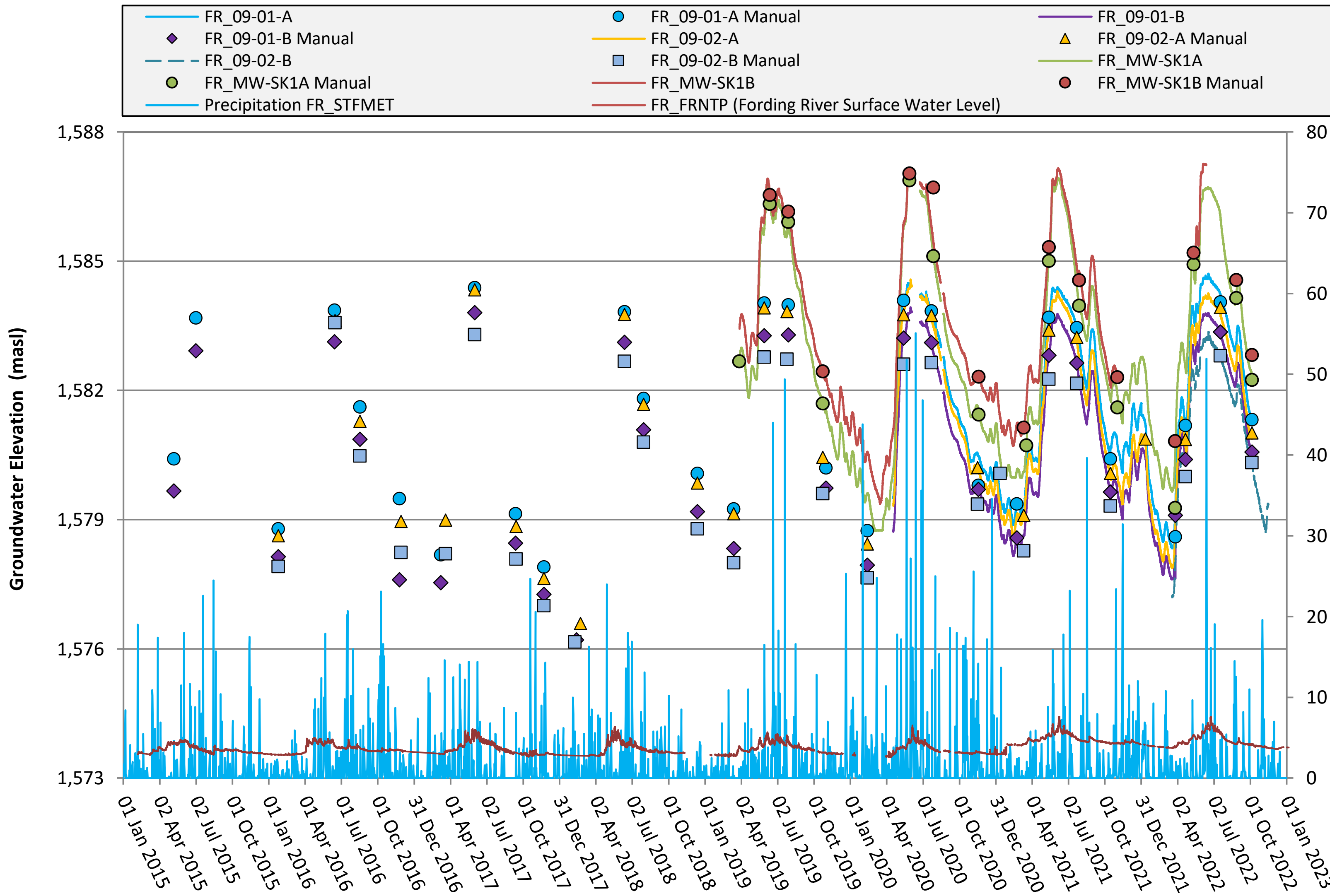
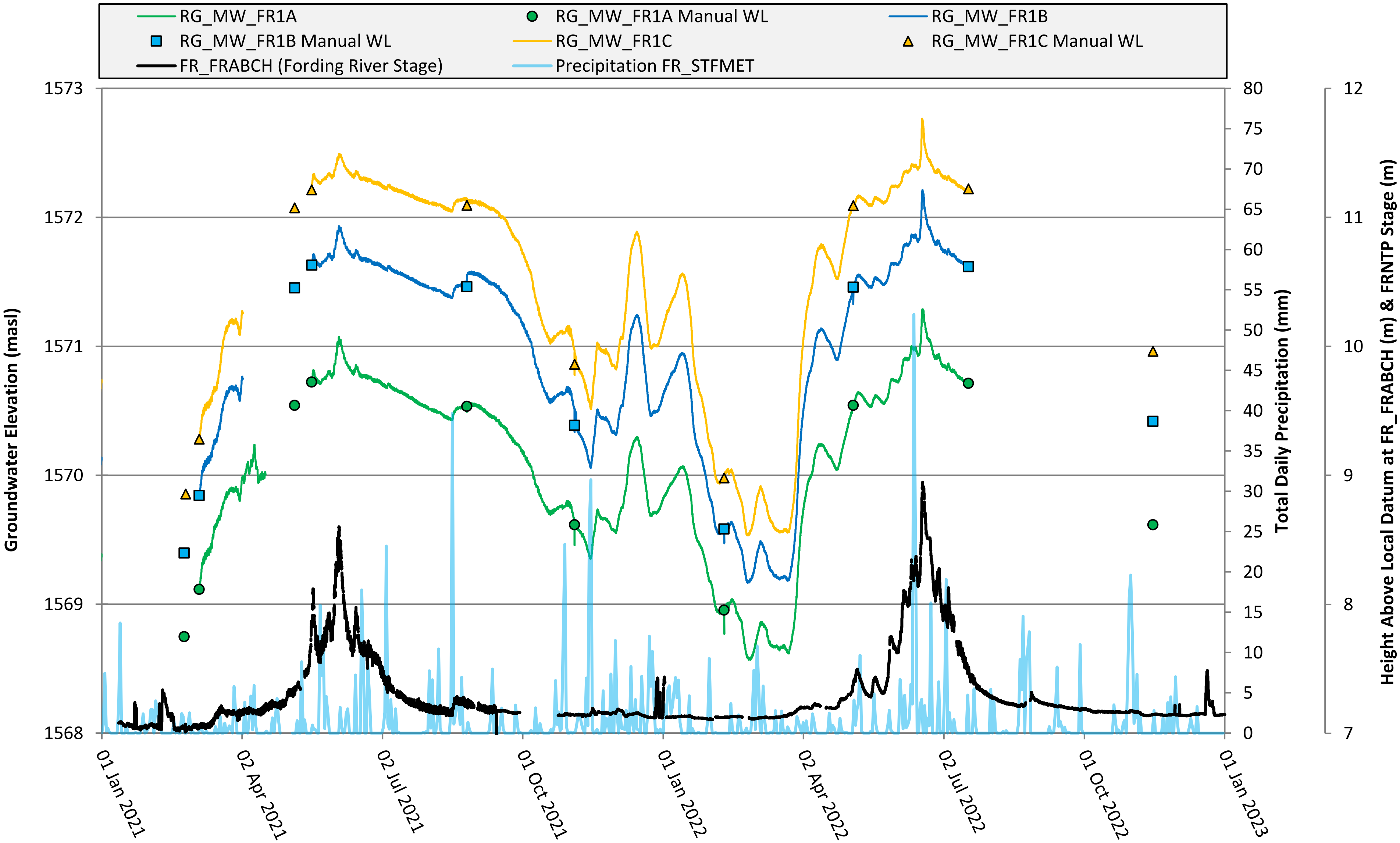
QAQC: CMH

Figure FR-21: Fording River Valley SKP2 Area - Hydrograph



Note: Continuous water level data compensated using weather station FR_STFMET barometric data; The FR_FRNTP staff gauge was damaged in 2020 and the offset between 2021 and historical data is due to the difference in elevation between the old and new staff gauges; Logger at FR_MW-SK1B stopped working Q4 2021, May-June 2022 data are an estimate (the data are tied to an estimated manual measurement since there are no manual measurements that correspond to the May-June data. The manual measurement was estimated based on the difference in elevation at FR_MW-SK1A on May 12 2022 (the nearest manual measurement at FR_MW-SK1B to the continuous May-June data) and May 15 (the date when continuous data at FR_MW-SK1B become available).

Figure FR-22: Fording River Valley Greenhouse Area - Hydrograph



Note: Continuous water level data compensated using barologger FR_STPSW-Baro and weather station FR-STFMET; Continuous stage data for FR_FRABCH in 2022 are preliminary; Logger data beyond July 2022 was lost due to corrupt hard drive.

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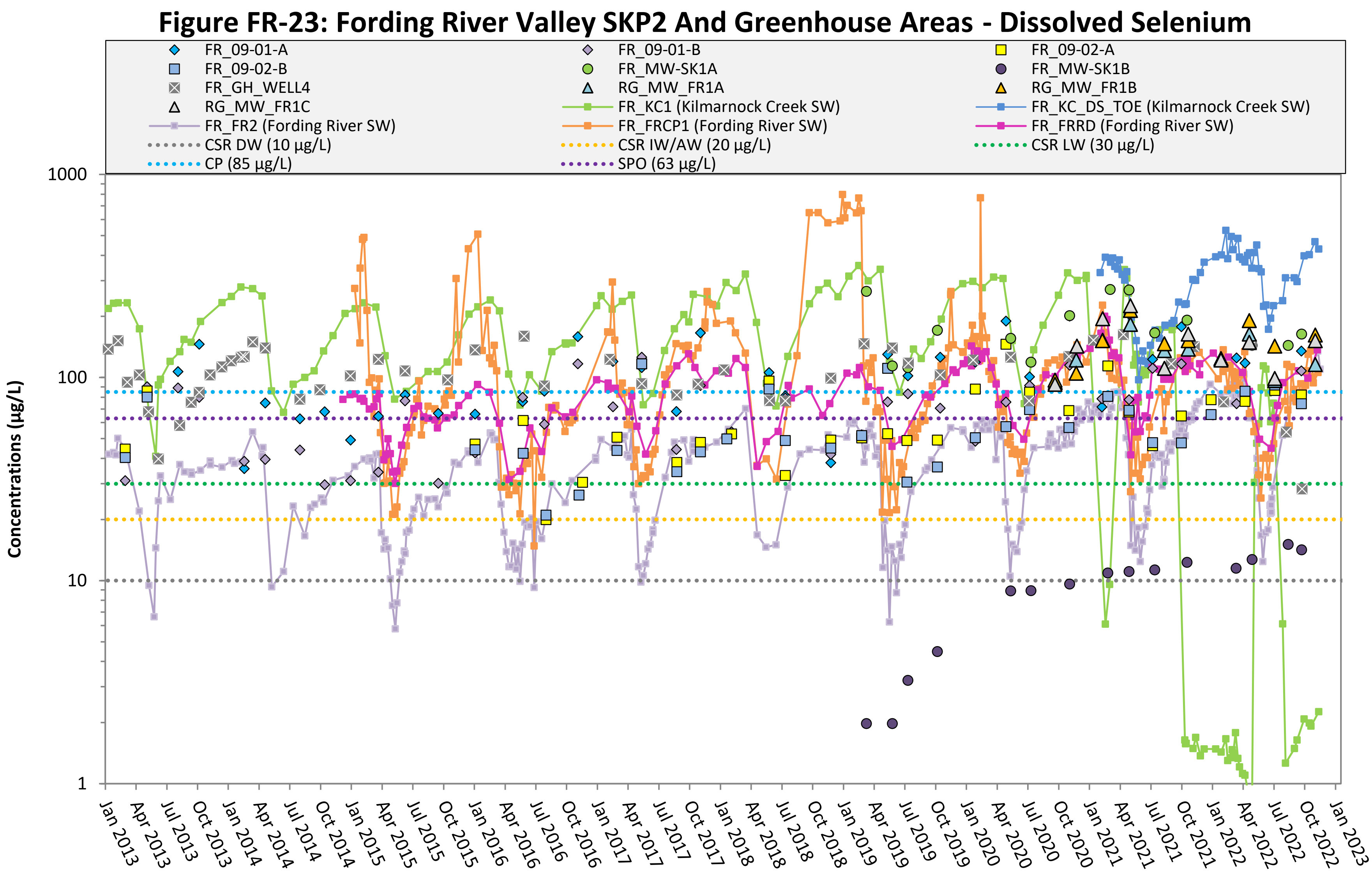

Note: For concentrations measured below the method detection limit, the method detection limit (0.05 µg/L) was utilized for plotting purposes. Logarithmic scale has been applied on distribution of concentrations relative to applicable screening criteria.

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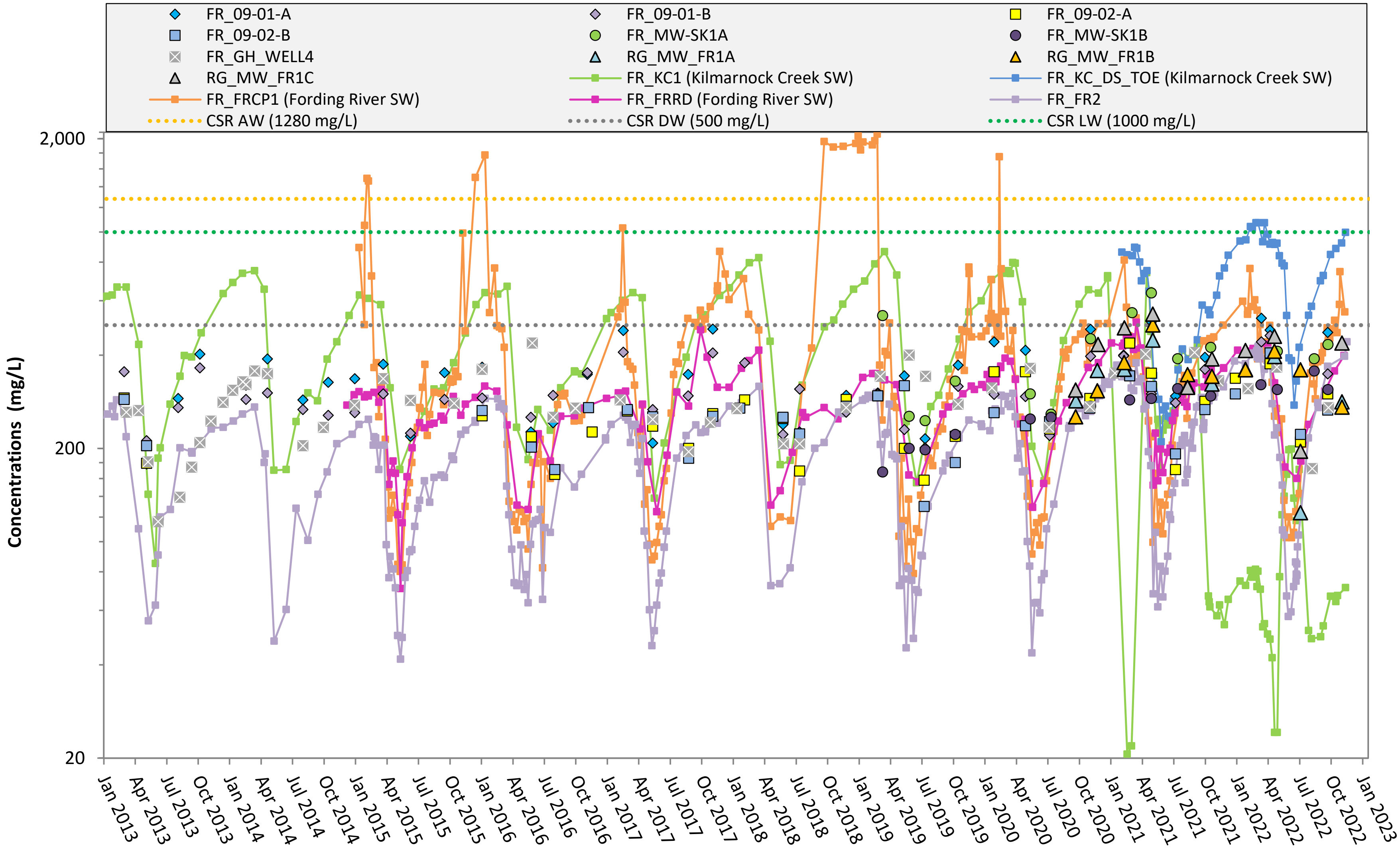
QAQC: CMH

Figure FR-24: Fording River Valley SKP2 And Greenhouse Areas - Sulphate



Note: For concentrations measured below the method detection limit, the method detection limit (0.3 mg/L) was utilized for plotting purposes. Logarithmic scale has been applied on distribution of concentrations relative to applicable screening criteria.

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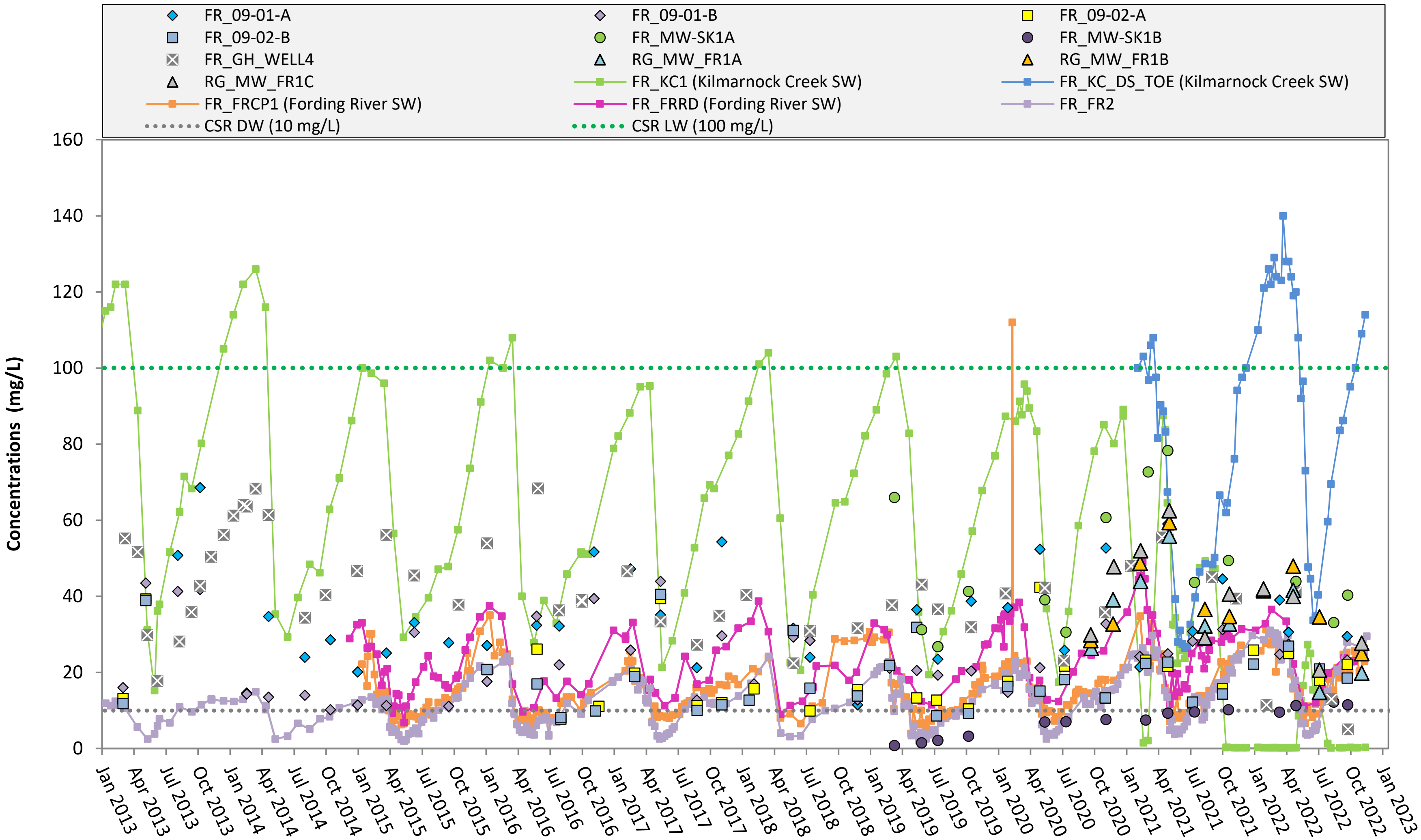
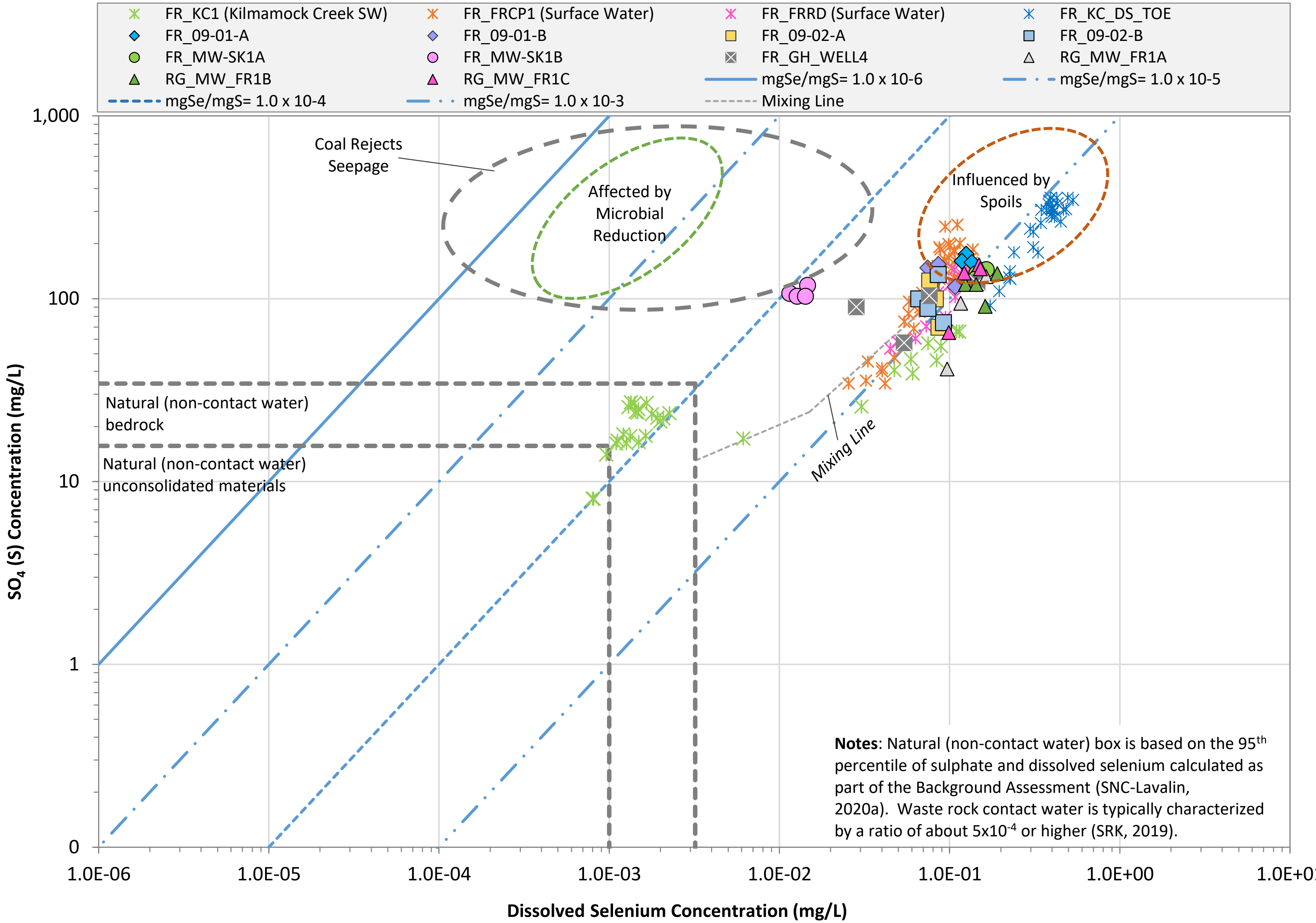
QAQC: CMH

Figure FR-25: Fording River Valley SKP2 And Greenhouse Areas - Nitrate-N



Note: For concentrations measured below the method detection limit, the method detection limit (0.005 mg/L) was utilized for plotting purposes. The 2021 edition included erroneous data for station FR_KC_DS_TOE, which has been corrected here.

Figure FR-26: Fording River Valley SKP2 And Greenhouse Areas - Se:SO4 (S)



Notes: Natural (non-contact water) box is based on the 95th percentile of sulphate and dissolved selenium calculated as part of the Background Assessment (SNC-Lavalin, 2020a). Waste rock contact water is typically characterized by a ratio of about 5×10^{-4} or higher (SRK, 2019).

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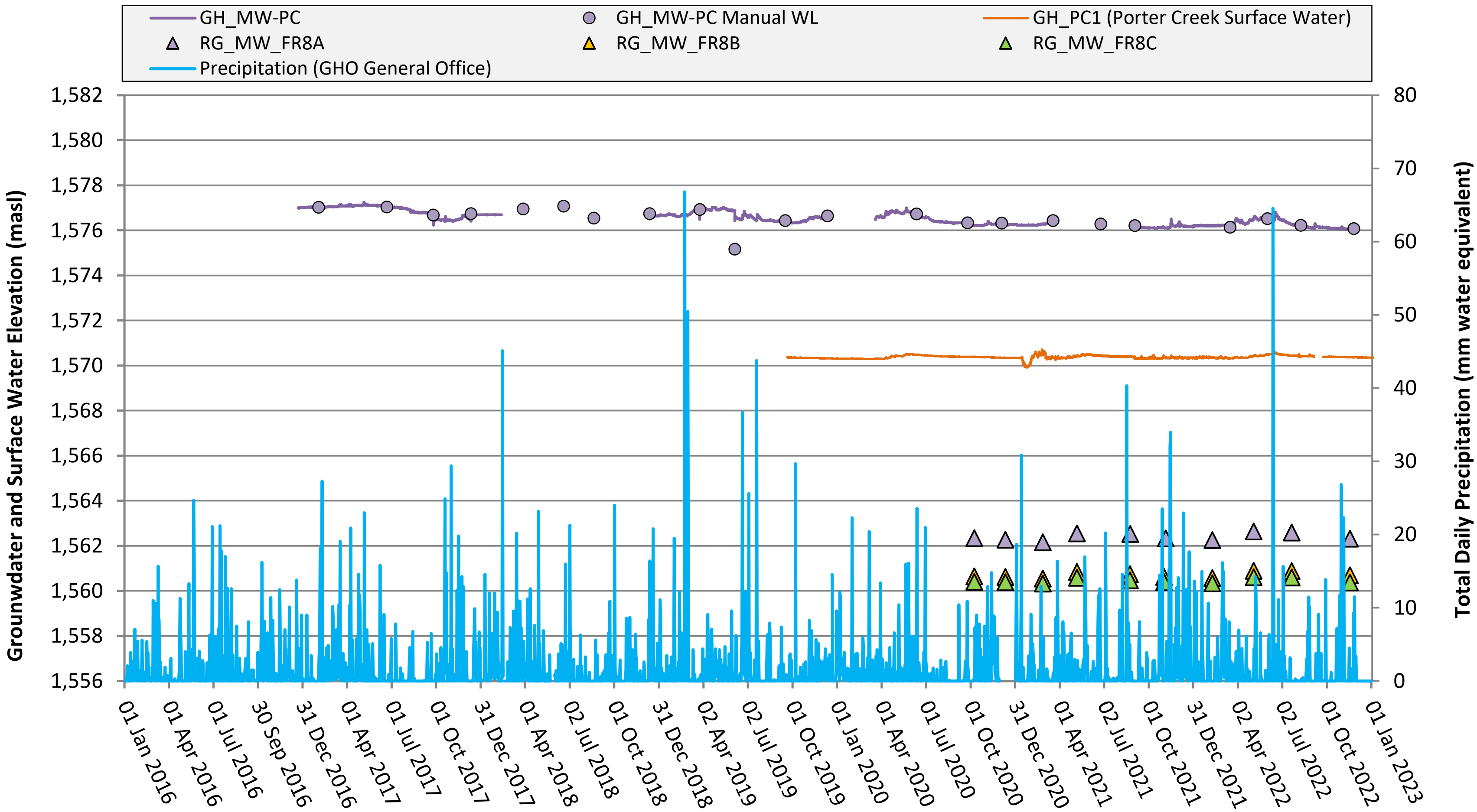
Figure FR-27: Fording River Valley Near Regional Groundwater Discharge Zone and Porter Creek - Hydrograph



Note: Data was removed where suspected datalogger removal occured; Precipitation data recorded on February 8, 17 and 18, 2018 have been removed as the data is inferred to be anomalous; Continuos water level data was compensated using barologger GH_MW-PC BARO and weather station FR_STFMET; GH_PC1 surface data sensor elevation estimated based on 1m LiDAR contours.

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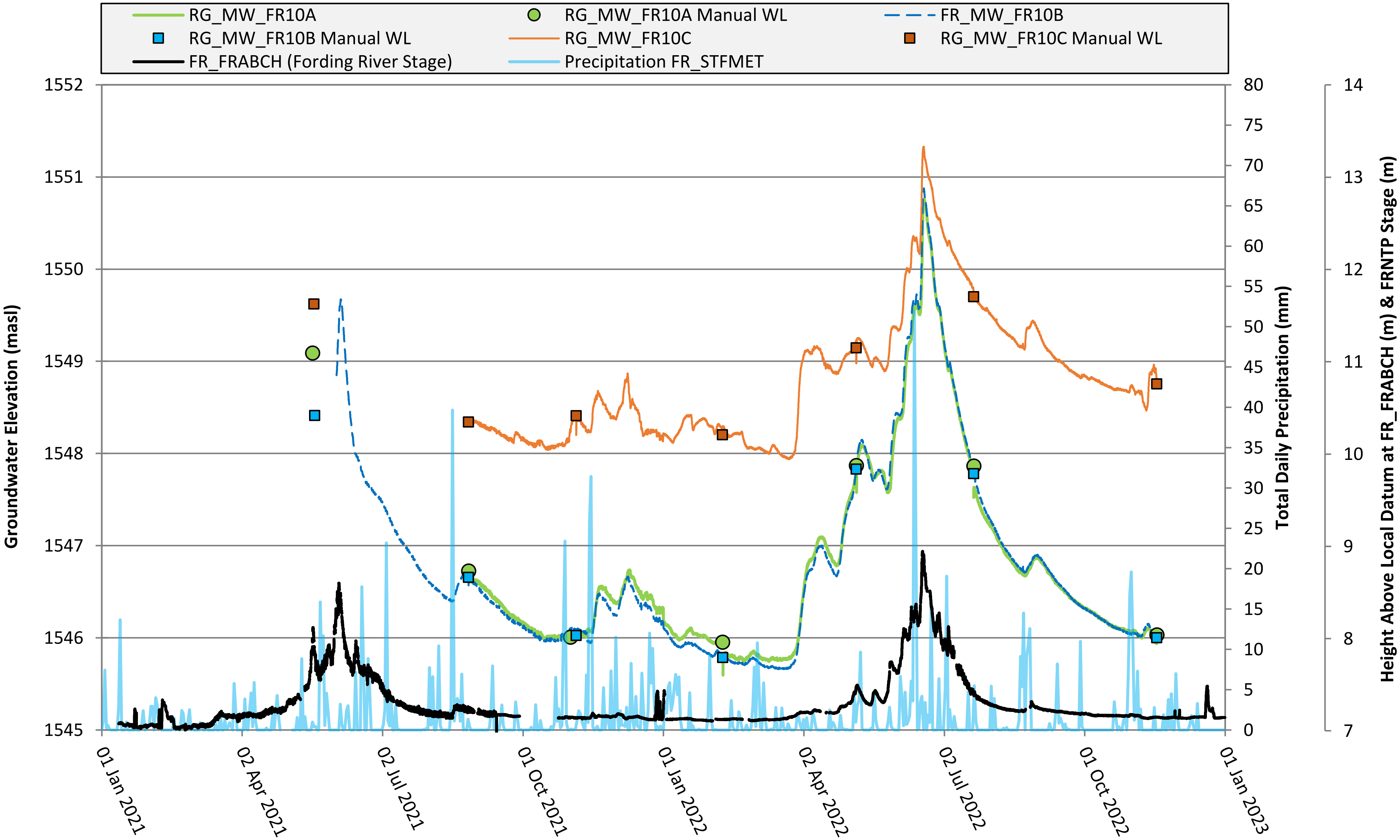
Figure FR-28: Fording River Valley Compliance Point (FR_FRABCH) - Hydrograph



Note: Continuous water level data compensated using barologger FR_STPSW-Baro and weather station FR-STFMET; Continuous stage data for FR_FRABCH in 2022 are preliminary.

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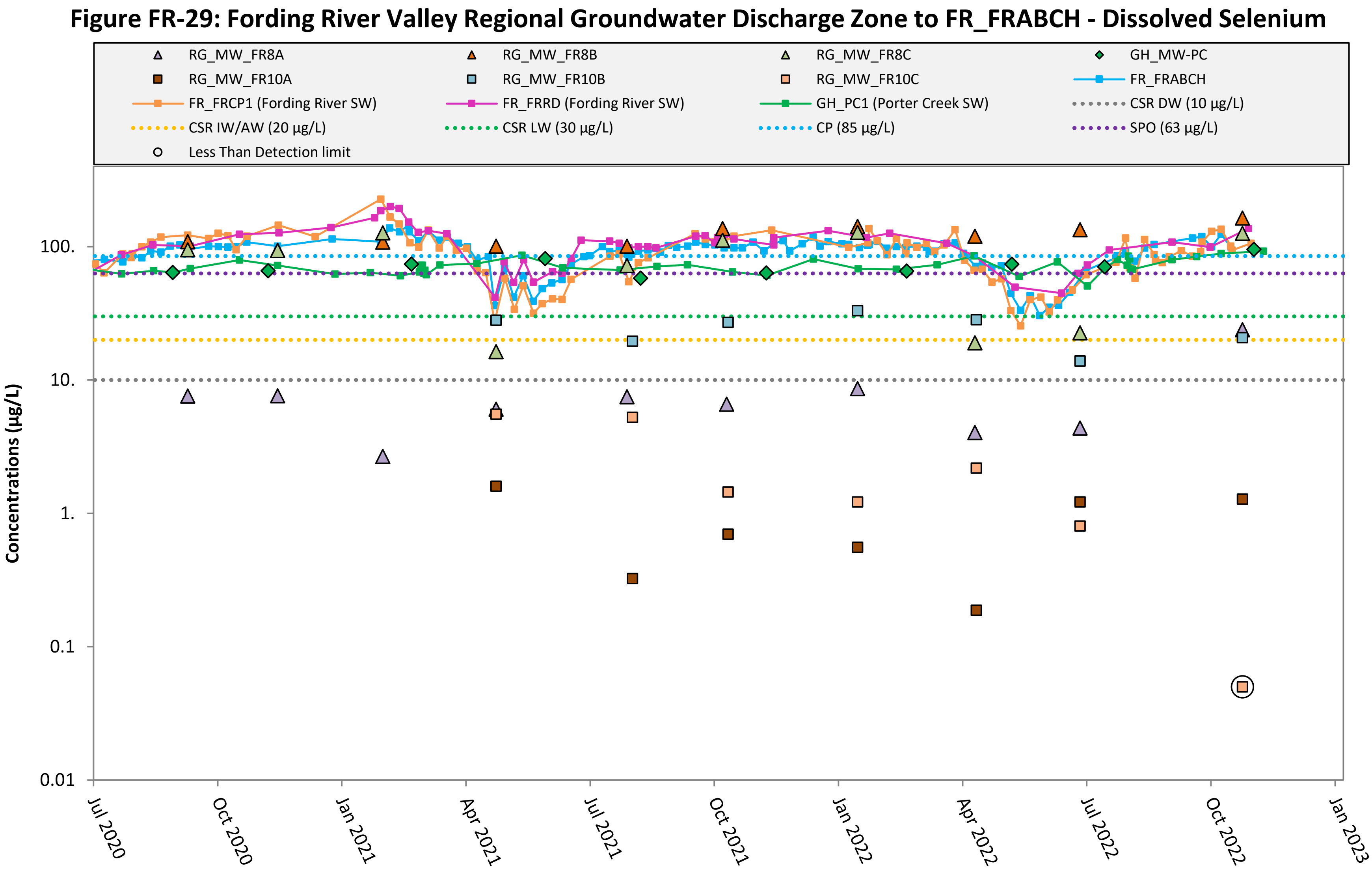

Note: For concentrations measured below the method detection limit, the method detection limit (0.05 µg/L) was utilized for plotting purposes. Logarithmic scale has been applied on distribution of concentrations relative to applicable screening criteria.

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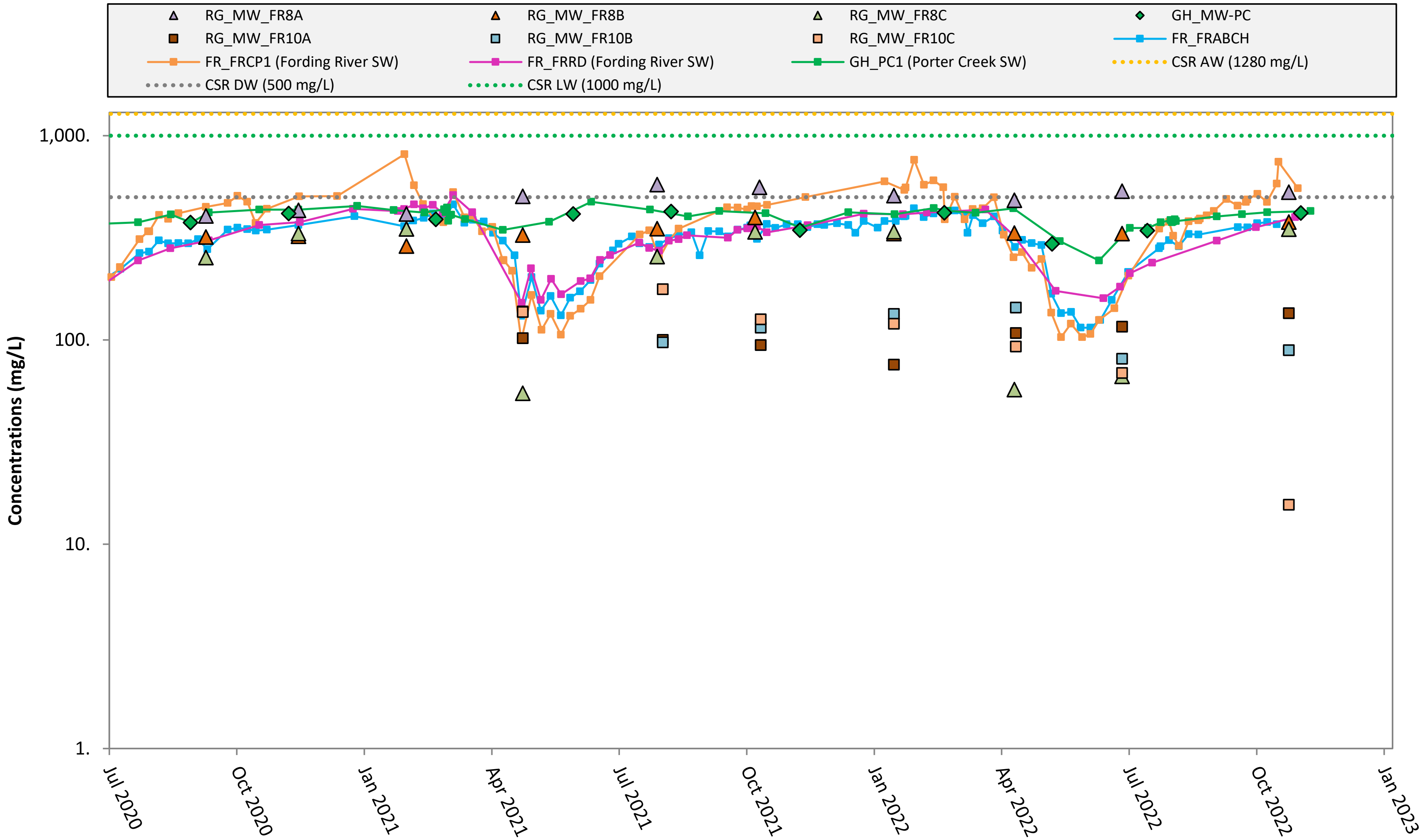
Figure FR-30: Fording River Valley Regional Groundwater Discharge Zone to FR_FRABCH - Sulphate



Note: For concentrations measured below the method detection limit, the method detection limit (0.3 mg/L) was utilized for plotting purposes. Logarithmic scale has been applied on distribution of concentrations relative to applicable screening criteria.

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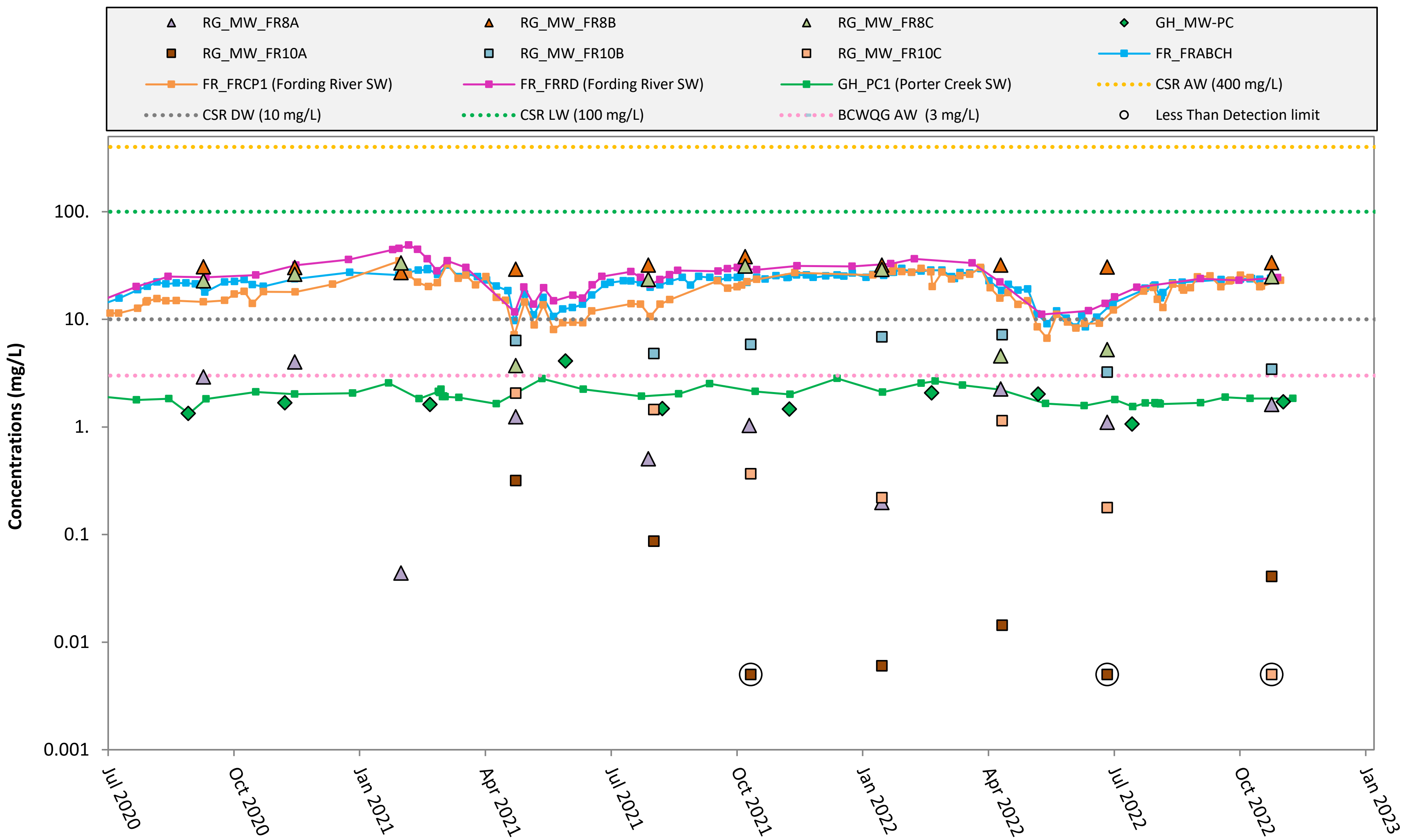
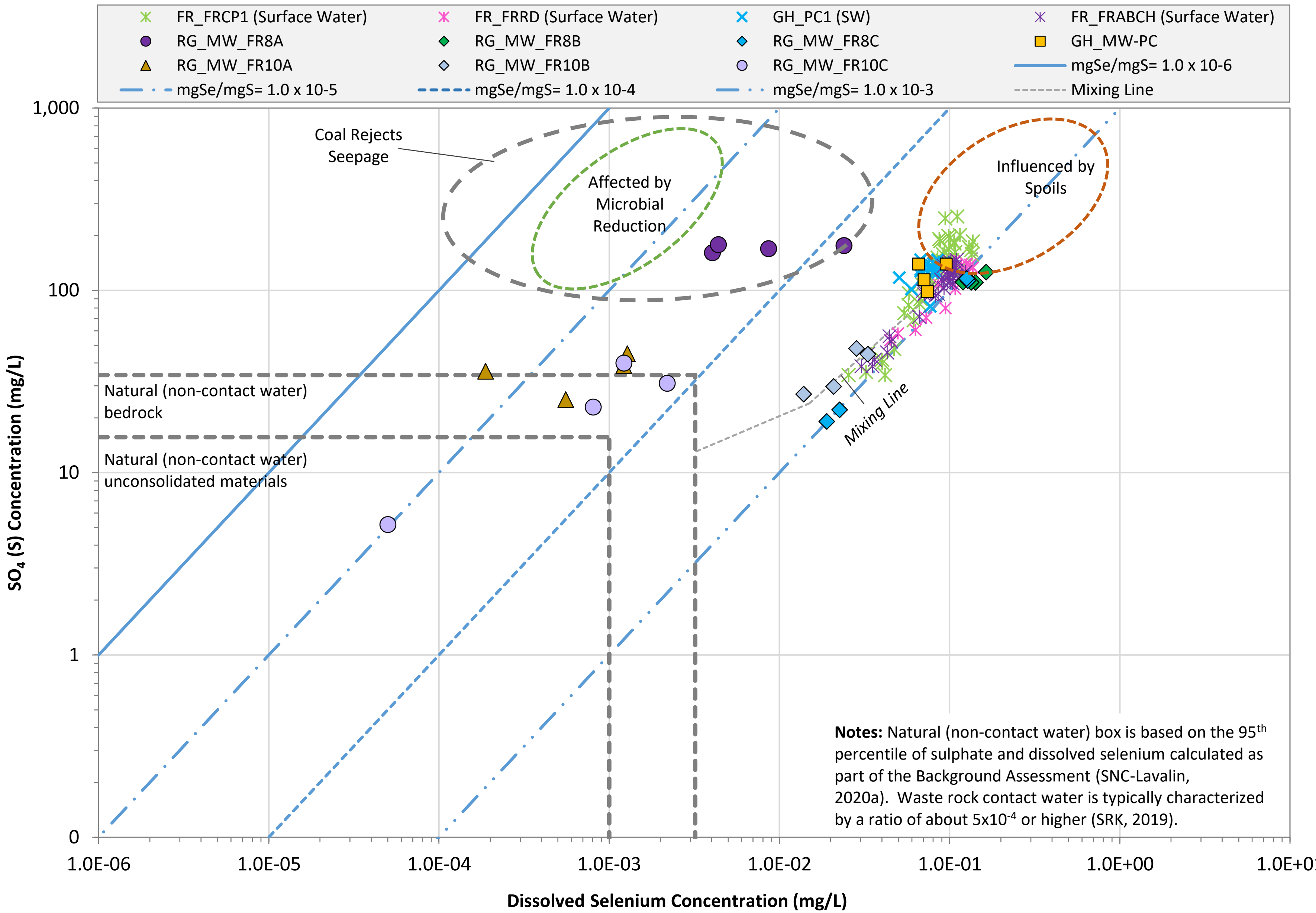
Figure FR-31: Fording River Valley Regional Groundwater Discharge Zone to FR_FRABCH - Nitrate-N



Note: For concentrations measured below the method detection limit, the method detection limit (0.005 mg/L) was utilized for plotting purposes. Logarithmic scale has been applied on distribution of concentrations relative to applicable screening criteria.

Figure FR-32: Fording River Valley Regional Groundwater Discharge Zone to FR_FRABCH - Se:SO4 (S)



Notes: Natural (non-contact water) box is based on the 95th percentile of sulphate and dissolved selenium calculated as part of the Background Assessment (SNC-Lavalin, 2020a). Waste rock contact water is typically characterized by a ratio of about $5x10^{-4}$ or higher (SRK, 2019).

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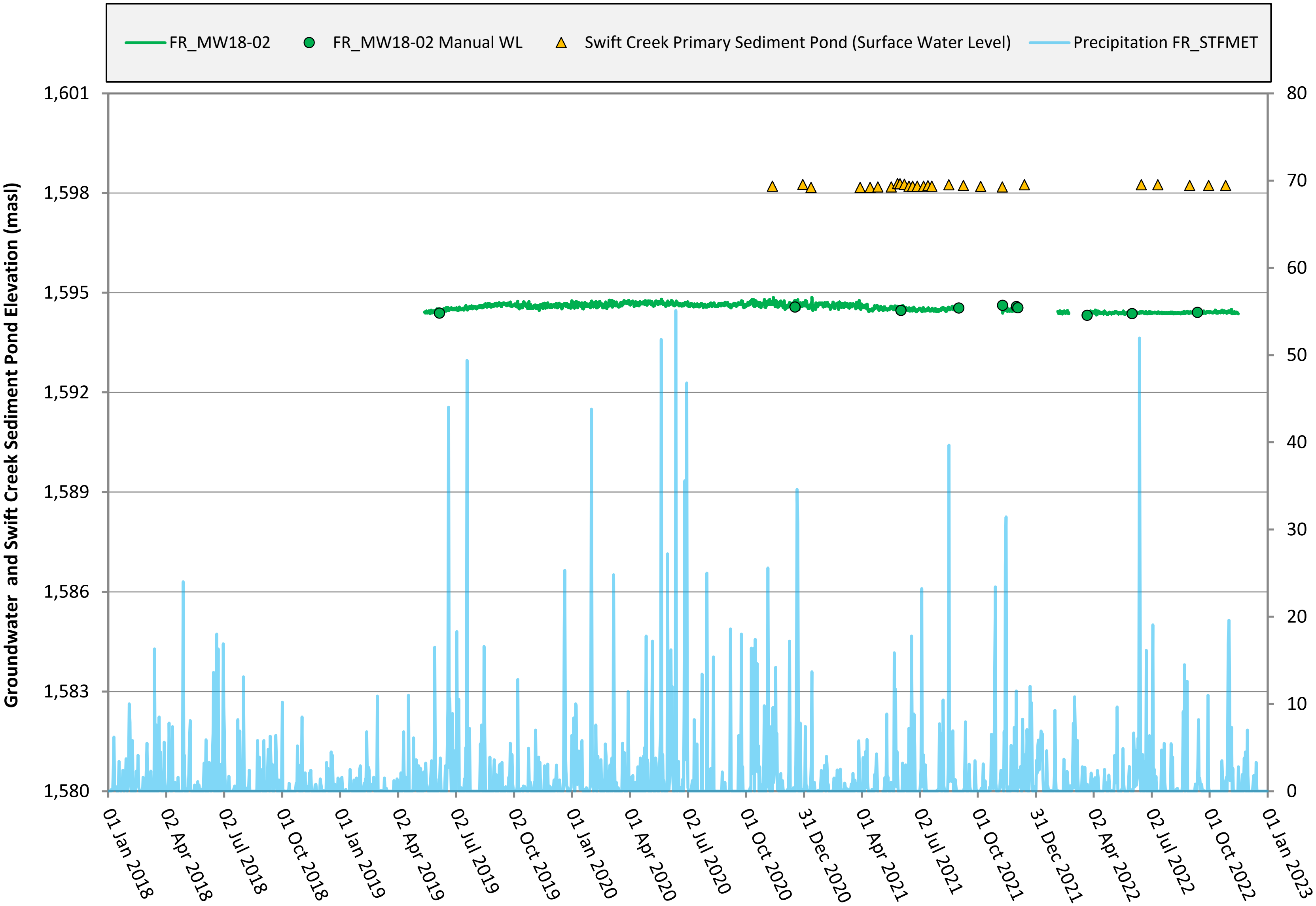
Figure FR-33: Swift Creek Watershed - Hydrograph



Note: Continuous water level data compensated using barologger FR_MW18-02-Baro and weather station FR-STFMET; Pond water levels are preliminary.

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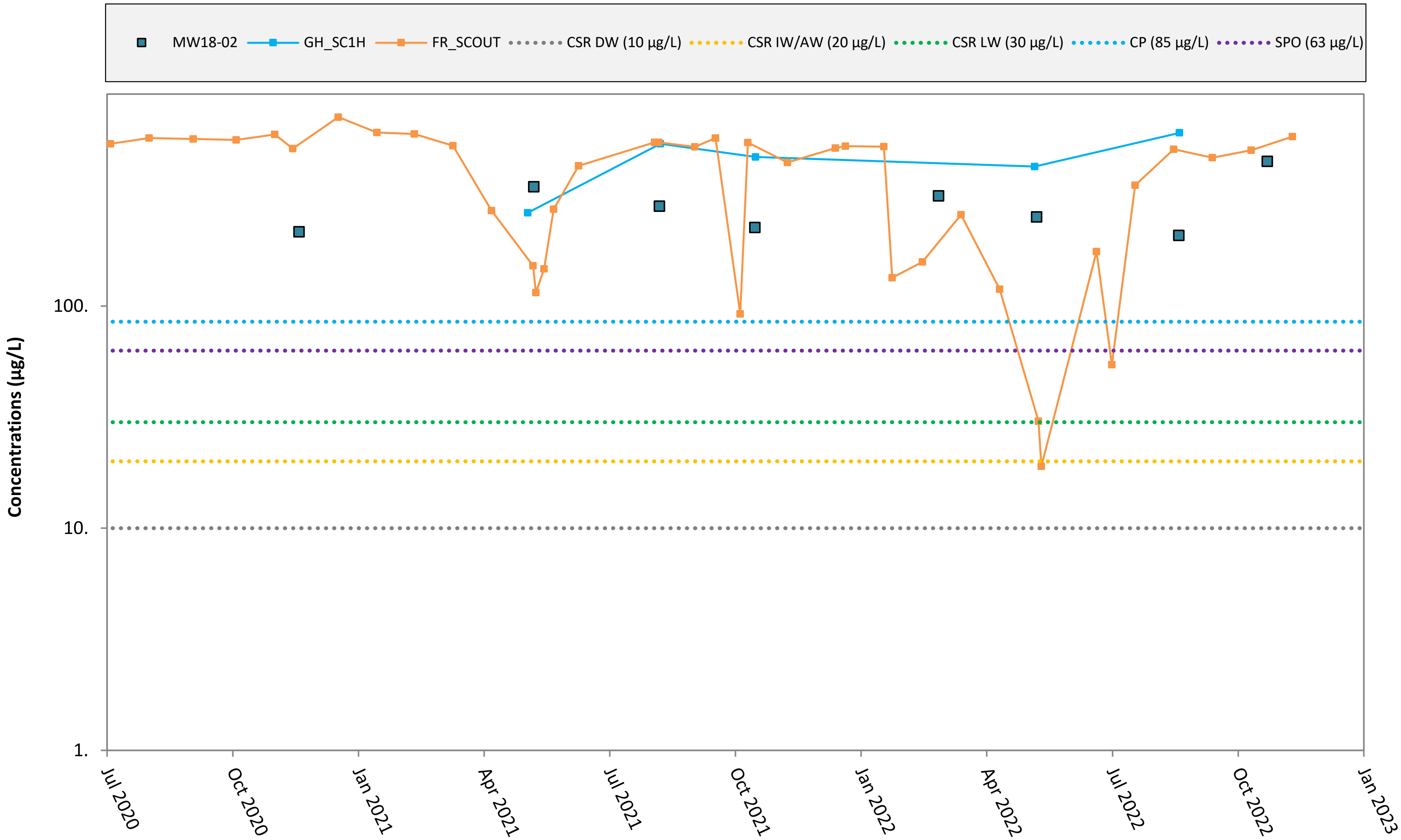
Figure FR-34: Swift Creek Watershed - Dissolved Selenium



Note: For concentrations measured below the method detection limit, the method detection limit (0.05 µg/L) was utilized for plotting purposes. Logarithmic scale has been applied on distribution of concentrations relative to applicable screening criteria.

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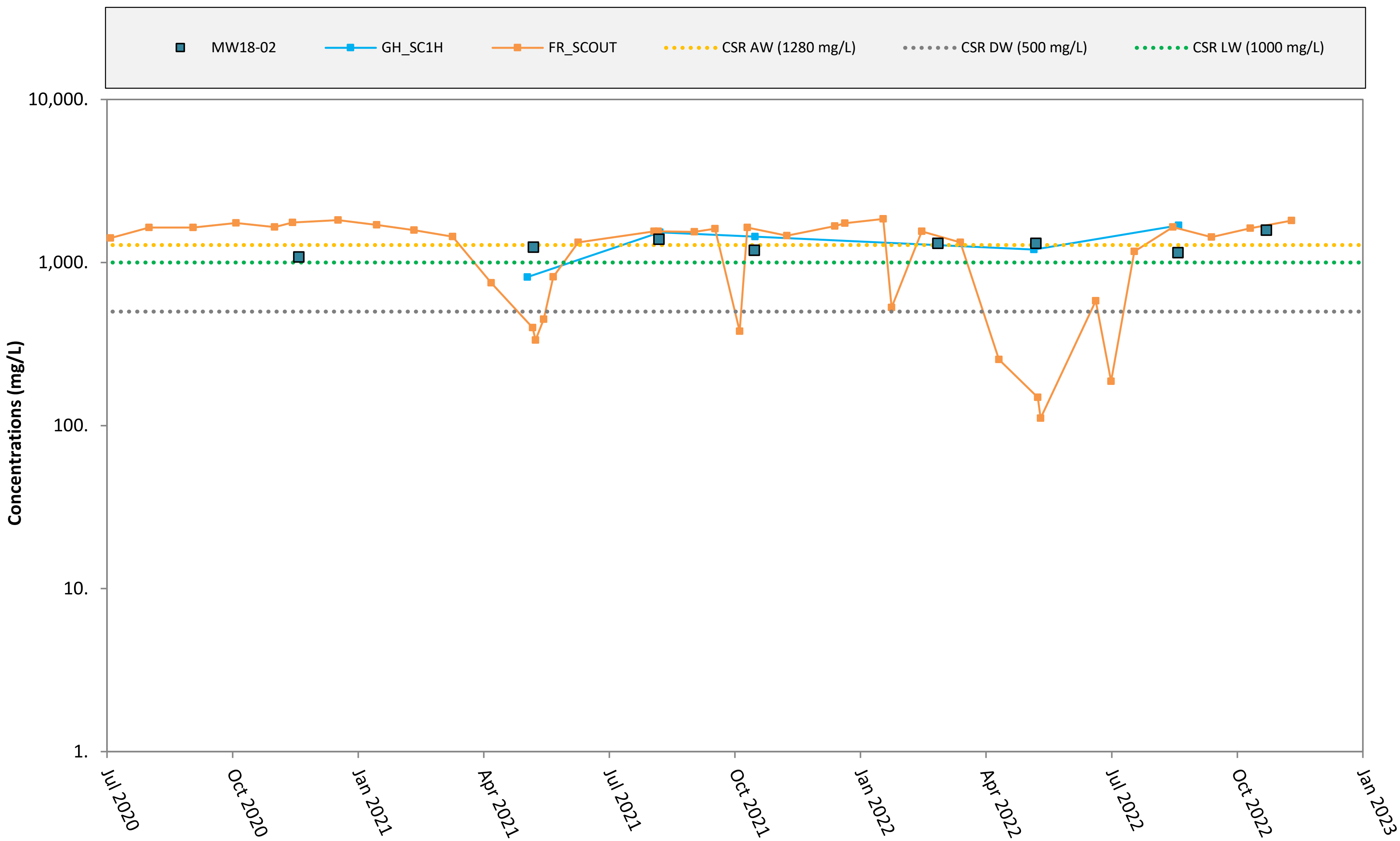
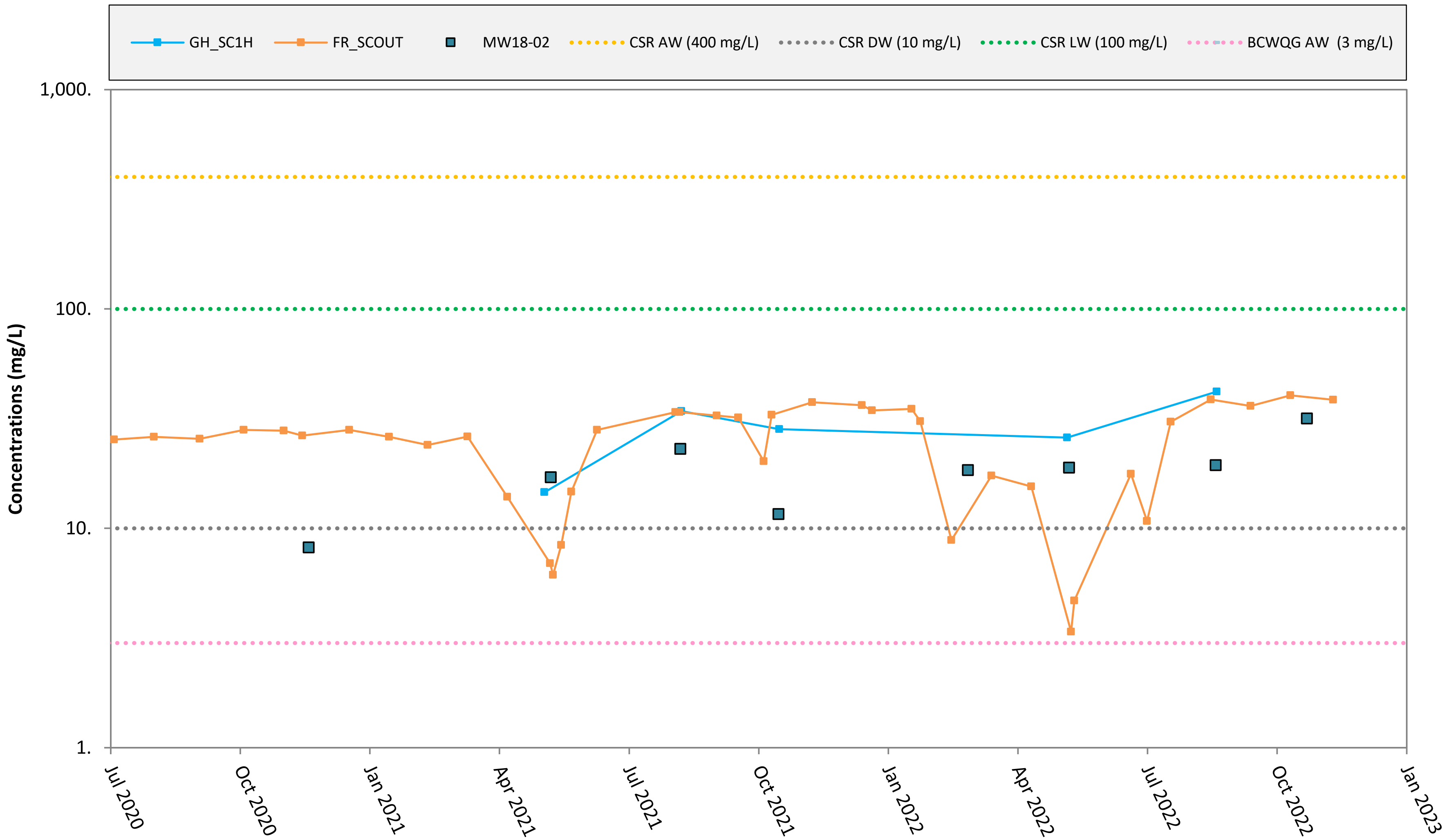
QAQC: CMH

Figure FR-35: Swift Creek Watershed - Sulphate



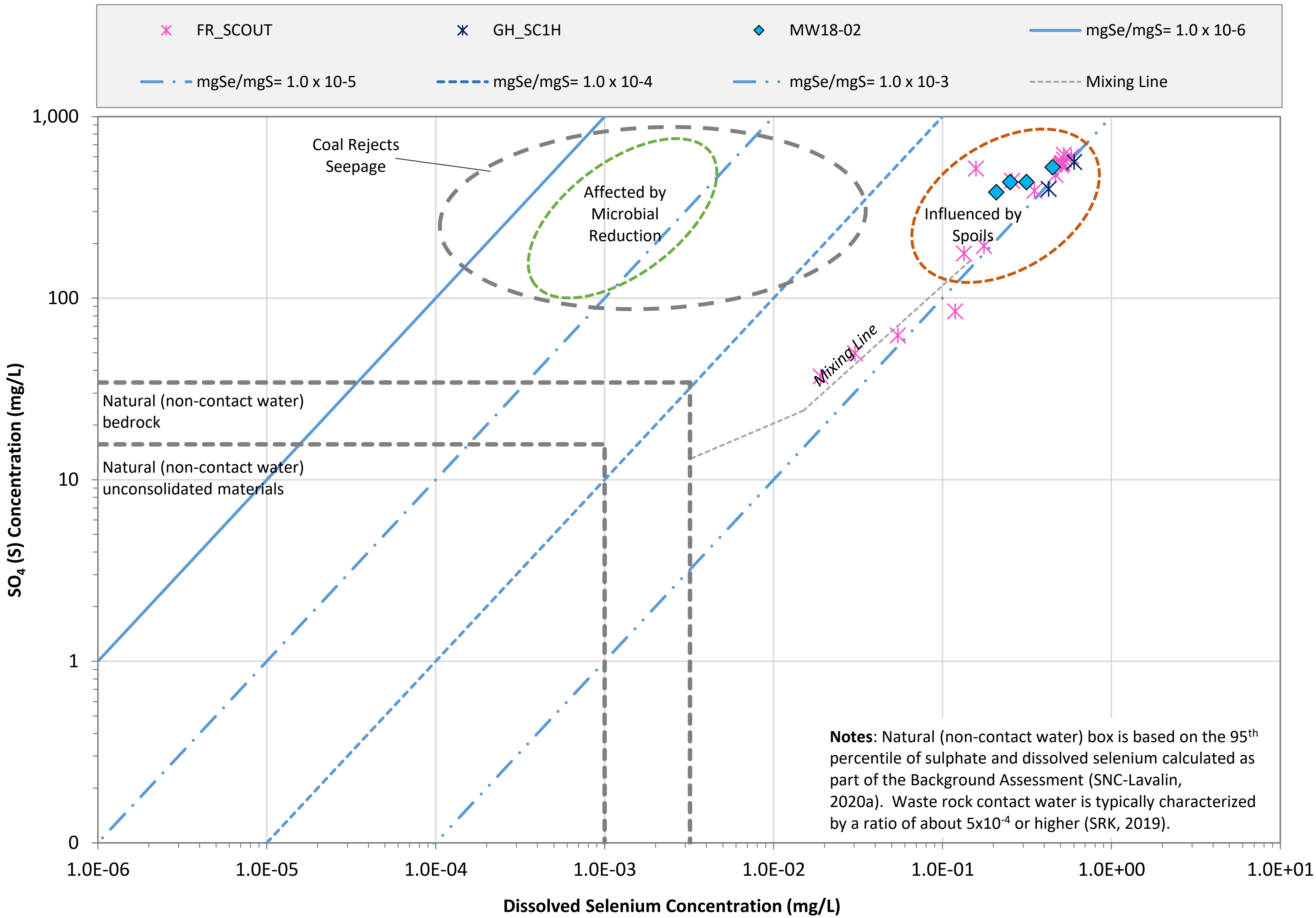
Note: For concentrations measured below the method detection limit, the method detection limit (0.3 mg/L) was utilized for plotting purposes. Logarithmic scale has been applied on distribution of concentrations relative to applicable screening criteria.

Figure FR-36: Swift Creek Watershed - Nitrate-N



Note: For concentrations measured below the method detection limit, the method detection limit (0.005 mg/L) was utilized for plotting purposes. Logarithmic scale has been applied on distribution of concentrations relative to applicable screening criteria.

Figure FR-37: Swift Creek Watershed - Se:SO4 (S)



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QAQC: CMH

Tables

TABLE FR-01: Summary of Well Installation Details and Hydrogeological Information (FRO)

Area	Well ID	Monitoring Program[a]	Well Type	Monitoring Type[i]	Sampling Frequency		Logs (Y/N)	Coordinates (UTM NAD 83)		Ground Elevation	TOC Elevation	Stick Up Height	Drilled Depth	Well Diameter	Top of Screen Depth	Bottom of Screen Depth	Screened Formation	Depth to Bedrock	Hydraulic Conductivity
					Approved[j]	Recommended[k]		Easting	Northing	masl	masl	m	mbgs	mm	mbgs	mbgs		mbgs	m/s
Henretta Creek	FR_HMW1D	SSGMP	Monitoring	WL, S	Q1, Q2, Q3, Q4	Q1, Q2, Q3, Q4	Y	652437	5566516	1726.33	1727.11	0.78	54.3	51	51.2	54.3	Gravel (Backfill) / Coal / Bedrock	53.9	1.0E-04
	FR_HMW1S	SSGMP	Monitoring	WL, S	Q1, Q2, Q3, Q4	Q1, Q2, Q3, Q4	Y	652443	5566517	1726.60	1727.36	0.76	33.5	51	29.9	32.9	Gravel (Backfill)	33.5	-
	FR_HMW2	SSGMP	Monitoring	WL, S	Q1, Q2, Q3, Q4	Q1, Q2, Q3, Q4	Y	652667	5566633	1764.33	1765.09	0.76	48.8	51	43.3	46.3	Spoils	47.7	3.0E-03
	FR_HMW3	SSGMP	Monitoring	WL, S	Q1, Q2, Q3, Q4	Q1, Q2, Q3, Q4	Y	652809	5566542	1725.41	1726.12	0.72	22.6	51	16.7	19.7	Silty Gravel (Backfill)	22.6	7.0E-04
	FR_HMW5[d]	SSGMP	Monitoring	WL, S	Q1, Q2, Q3, Q4	Q1, Q2, Q3, Q4	Y	655475	5567515	1788.68	1789.05	0.38	12.6	51	7.3	10.4	Gravel	10.7	8.0E-03 9.0E-05
Fording River Valley	FR_TBSSMW-1	SSGMP	Monitoring	WL, S	Q1, Q2, Q3, Q4	Q1, Q2, Q3, Q4	Y	651603	5565869	1698.39	1699.34	0.96	25.5	51	20.9	22.4	Silty Gravel with sand, containing cobbles and boulders	22.5	1.0E-05
	FR_TBSSMW-2	SSGMP	Monitoring	WL, S	Q1, Q2, Q3, Q4	Q1, Q2, Q3, Q4	Y	651605	5565866	1698.44	1699.34	0.90	9.0	51	6.8	8.3	Gravel with sand	-	1.5E-03
	FR_POTWELLS[b]	SSGMP	Supply	S	Q1, Q2, Q3, Q4	Q1, Q2, Q3, Q4	N	651153	5565124	1684.33	1684.71	0.38	-	-	-	-	-	-	-
	FR_GCMW-1B	SSGMP	Monitoring	WL, S	Q1, Q2, Q3, Q4	Q1, Q2, Q3, Q4	Y	650966	5563998	1671.84	1672.71	0.87	24.1	51	14.4	15.9	Cobbles and Boulders with a silty gravel matrix	21.0	1.6E-06
	FR_GCMW-2	SSGMP	Monitoring	WL, S	Q1, Q2, Q3, Q4	Q1, Q2, Q3, Q4	Y	650965	5564000	1671.86	1672.73	0.87	11.0	51	7.6	9.1	Sandy Gravel	-	3.0E-04
	FR_MW-1B	SSGMP	Monitoring	WL, S	Q1, Q2, Q3, Q4	Q1, Q2, Q3, Q4	Y	650963	5563101	1656.74	1657.24	0.49	8.2	51	5.2	8.2	Clay / Bedrock	7.3	4.0E-04
	FR_MW_NTPSE	SSGMP[e]	Monitoring	WL, S	-	Q1, Q2, Q3, Q4	Y	650855	5561252	1637.82	1638.82	1.00	12.5	51	9.2	10.1	Fine to coarse sand, gravel, trace silt	11.4	4.8E-05
	FR_09-04-A	SSGMP	Monitoring	WL, S	Q1, Q2, Q3, Q4	Q1, Q2, Q3, Q4	Y	652032	5560001	1605.81	1606.43	0.62	5.0	51	1.1	4.7	Sandy Gravel	-	3.0E-03
	FR_09-04-B	SSGMP	Monitoring	WL, S	Q1, Q2, Q3, Q4	Q1, Q2, Q3, Q4	Y	652034	5560001	1605.90	1606.37	0.47	7.0	51	5.1	6.6	Gravel	6.5	9.6E-05
	FR_KB-1	SSGMP	Monitoring	WL, S	Q1, Q2, Q3, Q4	Q1, Q2, Q3, Q4	Y	652722	5559851	1623.99	1624.67	0.68	8.2	51	5.2	8.2	Silty Gravel/Gravel Sand/Bedrock	8.2	3.0E-04
	FR_KB-2	SSGMP	Monitoring	WL, S	Q1, Q2, Q3, Q4	Q1, Q2, Q3, Q4	Y	652743	5559721	1627.05	1627.93	0.88	16.8	51	13.1	16.2	Silty Sand/bedrock	15.5	6.0E-06
	FR_KB-3A	SSGMP	Monitoring	WL, S	Q1, Q2, Q3, Q4	Q1, Q2, Q3, Q4	Y	652600	5559641	1617.51	1618.39	0.88	41.5	51	35.4	38.4	Sand	39.3	3.0E-04
	FR_KB-3B	SSGMP	Monitoring	WL, S	Q1, Q2, Q3, Q4	Q1, Q2, Q3, Q4	Y	652597	5559641	1617.53	1618.36	0.83	21.3	51	18.3	21.3	Sand	-	3.0E-04
	FR_MW-SK1A	SSGMP	Monitoring	WL, S	Q1, Q2, Q3, Q4	Q1, Q2, Q3, Q4	Y	652681	5558637	1587.84	1588.87	1.03	16.8	51	15.0	16.5	Sand and Gravel	-	9.3E-04
	FR_MW-SK1B	SSGMP	Monitoring	WL, S	Q1, Q2, Q3, Q4	Q1, Q2, Q3, Q4	Y	652681	5558635	1587.84	1588.79	0.95	69.3	51	65.5	67.0	Sand and Gravel, Silty	68.0	4.4E-05
	FR_09-01-A	SSGMP, RGMP	Monitoring	WL, S	Q1, Q2, Q3, Q4	Q1, Q2, Q3, Q4	Y	652598	5558334	1584.78	1585.54	0.76	8.4	51	3.8	6.9	Sandy Gravel	-	1.0E-03
	FR_09-01-B	SSGMP, RGMP	Monitoring	WL, S	Q1, Q2, Q3, Q4	Q1, Q2, Q3, Q4	Y	652597	5558333	1584.70	1585.40	0.70	29.0	51	17.2	18.7	Gravel	-	1.5E-04

Notes:

a: SSGMP denotes FRO Site-Specific Groundwater Monitoring Program; RGMP denotes Regional Groundwater Monitoring Program.
b: FR_POTWELLS consists of six wells (FR_PW91, FR_PW92, FR_PW93, FR_PW94, FR_PW95, FR_PW96). Details for for FR_PW91 are provided above.
c: As a recommendation of the hydrogeological assessment, monitoring of a dedicated well from FR_GHHW (FR_GH_WELL4) began in Q4 2017. Details for FR_GH_WELL4 are provided above.
d: Analytical data prior to May 2016 were used as part of the RGMP Background Assessment; however, since May 2016 this well appears to be impacted and has been included as part of the FRO Site-specific monitoring.
e: Well recommended to be added to the SSGMP in the 2021 SSGMP Update but has not yet been approved.
f: Well recommended to be added to the RGMP in the 2021 SSGMP Update but has not yet been approved.
g: Well recommended to be added to the SSGMP and RGMP in the 2021 Annual Report but has not yet been approved.
h: Well recommended to be added to the RGMP in the 2021 Annual Report but has not yet been approved.
i: GH_MW-PC within GHO mine-permitted area and part of GHO SSGMP.
j: 2018 SSGMP Update Report (approved BC ENV March 2020) and 2020 RGMP Update Report (Approved BC ENV February 2023).
k: 2019, 2020, and 2021 SSGMP Annual Reports; 2021 SSGMP Update Report.
masl denotes metres above sea level.
mbgs denotes metres below ground surface.
TOC denotes top of pipe casing.
"-" denotes data not available.

TABLE FR-01: Summary of Well Installation Details and Hydrogeological Information (FRO)

Area	Well ID	Monitoring Program[a]	Well Type	Monitoring Type[i]	Sampling Frequency		Logs (Y/N)	Coordinates (UTM NAD 83)		Ground Elevation	TOC Elevation	Stick Up Height	Drilled Depth	Well Diameter	Top of Screen Depth	Bottom of Screen Depth	Screened Formation	Depth to Bedrock	Hydraulic Conductivity
					Approved[j]	Recommended[k]		Easting	Northing	masl	masl	m	mbgs	mm	mbgs	mbgs		mbgs	m/s
Fording River Vally	FR_09-02-A	SSGMP	Monitoring	WL, S	Q1, Q2, Q3, Q4	Q1, Q2, Q3, Q4	Y	652477	5558266	1585.31	1586.07	0.76	11.5	51	8.3	11.4	Sandy Gravel	-	1.0E-03
	FR_09-02-B	SSGMP	Monitoring	WL, S	Q1, Q2, Q3, Q4	Q1, Q2, Q3, Q4	Y	652477	5558267	1585.32	1586.04	0.72	30.0	51	20.8	22.3	Gravel	-	9.9E-05
	FR_GH_WELL4[c]	SSGMP, RGMP	Supply	WL, S	Q1, Q2, Q3, Q4	Q1, Q2, Q3, Q4	Y	653150	5557336	1576.73	1577.12	0.40	29.0	-	25.9	29.0	Sand and Gravel	-	-
	RG_MW_FR1A	SSGMP, RGMP[g]	Monitoring	WL, S	-	Q1, Q2, Q3, Q4	Y	653155	5557252	1574.85	1575.44	0.59	33.5	50.0	25.5	27.0	Sand	-	9.3E-05
	RG_MW_FR1B	SSGMP, RGMP[g]	Monitoring	WL, S	-	Q1, Q2, Q3, Q4	Y	653157	5557251	1574.86	1575.68	0.82	71.9	50.0	15.8	17.3	Sand and Gravel	-	4.3E-04
	RG_MW_FR1C	SSGMP, RGMP[g]	Monitoring	WL, S	-	Q1, Q2, Q3, Q4	Y	653156	5557249	1574.85	1575.41	0.56	11.0	50.0	6.2	9.3	Sand and Gravel	-	-
	RG_MW_FR8A	RGMP[h]	Monitoring	WL, S	-	Q1, Q2, Q3, Q4	Y	653883	5555682	1562.17	1562.64	0.47	47.9	50.0	37.2	38.7	Sand and Gravel	-	7.2E-04
	RG_MW_FR8B	RGMP[h]	Monitoring	WL, S	-	Q1, Q2, Q3, Q4	Y	653882	5555681	1562.23	1562.89	0.66	19.8	50.0	16.5	18.0	Sand and Gravel	-	3.1E-04
	RG_MW_FR8C	RGMP[h]	Monitoring	WL, S	-	Q1, Q2, Q3, Q4	Y	653883	5555684	1562.16	1562.88	0.72	7.6	50.0	5.1	6.6	Sand and Gravel	-	6.5E-04
	GH_MW-PC[i]	SSGMP, RGMP	Monitoring	WL, S	Q1, Q2, Q3, Q4	Q1, Q2, Q3, Q4	Y	653483	5555356	1579.74	1580.94	1.20	45.0	51	3.5	6.5	Gravel and Cobbles	5.5	6.3E-07
	RG_MW_FR10A	RGMP[f]	Monitoring	WL, S	-	Q1, Q2, Q3, Q4	Y	655324	5552812	1551.37	1552.66	1.29	33.2	50	30.1	31.6	Till/Bedrock	30.2	-
	RG_MW_FR10B	RGMP[f]	Monitoring	WL, S	-	Q1, Q2, Q3, Q4	Y	655323	5552813	1551.30	1552.55	1.25	18.0	50	16.5	18.0	Sand and Gravel	-	-
	RG_MW_FR10C	RGMP[f]	Monitoring	WL, S	-	Q1, Q2, Q3, Q4	Y	655323	5552814	1551.30	1552.58	1.28	6.4	50	4.2	5.8	Sand and Gravel	-	-
Swift Creek	FR_MW18-02	SSGMP[e]	Monitoring	WL, S	-	Q1, Q2, Q3, Q4	Y	652259.03	5558163.6	1601.22	1602.37	1.14	7.6	-	3.6	5.1	Clay and Silt with Sand	4.9	2.4E-07

Notes:

a: SSGMP denotes FRO Site-Specific Groundwater Monitoring Program; RGMP denotes Regional Groundwater Monitoring Program.
b: FR_POTWELLS consists of six wells (FR_PW91, FR_PW92, FR_PW93, FR_PW94, FR_PW95, FR_PW96). Details for for FR_PW91 are provided above.
c: As a recommendation of the hydrogeological assessment, monitoring of a dedicated well from FR_GHHW (FR_GH_WELL4) began in Q4 2017. Details for FR_GH_WELL4 are provided above.
d: Analytical data prior to May 2016 were used as part of the RGMP Background Assessment; however, since May 2016 this well appears to be impacted and has been included as part of the FRO Site-specific monitoring.
e: Well recommended to be added to the SSGMP in the 2021 SSGMP Update but has not yet been approved.
f: Well recommended to be added to the RGMP in the 2021 SSGMP Update but has not yet been approved.
g: Well recommended to be added to the SSGMP and RGMP in the 2021 Annual Report but has not yet been approved.
h: Well recommended to be added to the RGMP in the 2021 Annual Report but has not yet been approved.
i: GH_MW-PC within GHO mine-permitted area and part of GHO SSGMP.
j: 2018 SSGMP Update Report (approved BC ENV March 2020) and 2020 RGMP Update Report (Approved BC ENV February 2023).
k: 2019, 2020, and 2021 SSGMP Annual Reports; 2021 SSGMP Update Report.
masl denotes metres above sea level.
mbgs denotes metres below ground surface.
TOC denotes top of pipe casing.
"-" denotes data not available.

TABLE FR-02: Summary of Groundwater Levels and Sampling Information (FRO)

Area	Well ID	Ground Elevation	TOC Elevation	Stick Up Height	Date of Static Water Level Measurement	Depth to Water	Potentiometric Elevation	Well Pairs	Calculated Vertical Gradient		Continuous Water Level Monitoring	Purging / Sampling Methodology
		masl	masl	m	yyyy-mm-dd	mbtoc	masl		m/m	Direction	Quarter	
Henretta Creek	FR_HMW1D	1726.33	1727.11	0.78	2022-03-07	15.12	1711.99	FR_HMW1D and FR_HMW1S	0.000	Upward	Yes	Waterra
					2022-06-29	14.57	1712.54		-0.003	Downward		
					2022-07-21	14.81	1712.30		0.001	Upward		
					2022-10-03	15.05	1712.06		0.001	Upward		
	FR_HMW1S	1726.60	1727.36	0.757	2022-03-07	15.37	1711.99	-	-	-	Yes	Waterra
					2022-06-29	14.77	1712.59					
					2022-07-21	15.09	1712.27					
					2022-10-03	15.32	1712.04					
	FR_HMW2	1764.33	1765.09	0.76	2022-02-18	44.81	1720.28	-	-	-	Yes	Waterra
					2022-06-27	-	-					
	FR_HMW3	1725.41	1726.12	0.72	2022-03-15	7.67	1718.46	-	-	-	Yes	Waterra
					2022-04-25	7.58	1718.54					
					2022-07-21	6.13	1719.99					
					2022-10-03	7.54	1718.58					
	FR_HMW5	1788.68	1789.05	0.38	2022-01-12	1.50	1787.56	-	-	-	Yes	Waterra
					2022-04-25	1.41	1787.64					Peristaltic
					2022-09-06	1.51	1787.54					
					2022-10-26	1.57	1787.48					
Fording River Valley	FR_TBSSMW-1	1698.39	1699.34	0.96	2022-03-25	5.70	1693.64	FR_TBSSMW-1 and FR_TBSSMW-2	-0.030	Downward	Yes	Peristaltic
					2022-05-10	5.34	1694.00		-0.026	Downward		
					2022-09-07	5.43	1693.92		-0.023	Downward		
					2022-10-10	5.54	1693.81		-0.024	Downward		
	FR_TBSSMW-2	1698.44	1699.34	0.90	2022-03-25	5.28	1694.06	-	-	-	Yes	Peristaltic
					2022-05-10	4.98	1694.37					
					2022-09-07	5.11	1694.24					
					2022-10-10	5.20	1694.14					
	FR_POTWELLS	1684.33	1684.71	0.38	2022-03-16	-	-	-	-	-	-	Tap
	FR_GCMW-1B	1671.84	1672.71	0.867	2022-03-16	7.14	1665.57	FR_GCMW-1B and FR_GCMW-2	-0.096	Downward	Yes	Peristaltic
					2022-06-23	6.46	1666.25		-0.016	Downward		
					2022-09-20	6.68	1666.03		-0.030	Downward		
					2022-11-22	6.99	1665.72		-0.080	Downward		
	FR_GCMW-2	1671.86	1672.73	0.873	2022-03-15	6.51	1666.22	-	-	-	Yes	Peristaltic
					2022-06-23	6.38	1666.36					
					2022-09-22	6.50	1666.23					
					2022-11-22	6.47	1666.26					
	FR_MW-1B	1656.74	1657.24	0.493	2022-03-26	2.14	1655.10	-	-	-	Yes	Peristaltic
					2022-06-06	1.65	1655.59					
					2022-09-20	2.12	1655.12					
					2022-10-07	2.19	1655.05					
	FR_MW_NTPSE	1637.82	1638.82	1.00	2022-03-31	8.88	1629.94	-	-	-	Yes	Waterra
					2022-06-29	8.63	1630.19					
					2022-09-15	9.03	1629.79					
					2022-10-10	9.10	1629.72					

Notes:
a: Artesian flow. Water level made equal to casing elevation.
TOC denotes top of pipe casing.
masl denotes metres above sea level.
mbtoc denotes metres below top of casing.
"-" denotes data not available.
Quarter is represented as Q1, Q2, Q3, Q4.

TABLE FR-02: Summary of Groundwater Levels and Sampling Information (FRO)

Area	Well ID	Ground Elevation	TOC Elevation	Stick Up Height	Date of Static Water Level Measurement	Depth to Water	Potentiometric Elevation	Well Pairs	Calculated Vertical Gradient		Continuous Water Level Monitoring	Purging / Sampling Methodology
		masl	masl	m	yyyy-mm-dd	mbtoc	masl		m/m	Direction	Quarter	
Fording River Valley	FR_09-04-A	1605.81	1606.43	0.62	2022-02-17	2.00	1604.43	FR_09-04-A and FR_09-04-B	-0.059	Downward	Yes	Peristaltic
					2022-04-21	1.89	1604.54		-0.086	Downward		
					2022-07-20	1.92	1604.51		-0.069	Downward		
					2022-10-06	1.86	1604.57		-0.075	Downward		
	FR_09-04-B	1605.90	1606.37	0.47	2022-02-17	2.10	1604.27	-	-	-	Yes	Peristaltic
					2022-04-21	2.07	1604.30					
					2022-07-20	2.05	1604.32					
					2022-10-06	2.01	1604.36					
	FR_KB-1	1623.99	1624.67	0.68	2022-03-03	4.77	1619.89	-	-	-	Yes	Peristaltic
					2022-06-15	2.43	1622.24					
					2022-09-22	4.17	1620.50					
					2022-11-08	4.45	1620.22					
	FR_KB-2	1627.05	1627.93	0.88	2022-03-01	11.41	1616.52	-	-	-	Yes	Bladder
					2022-06-16	9.61	1618.32					
					2022-09-23	11.07	1616.86					
					2022-11-10	11.21	1616.72					
	FR_KB-3A	1617.51	1618.39	0.88	2022-03-03	17.24	1601.14	FR_KB-3A and FR_KB-3B	-0.017	Downward	Yes	Bladder
					2022-06-13	13.75	1604.64		-0.021	Downward		
					2022-09-21	16.21	1602.18		-0.018	Downward		
					2022-11-14	16.86	1601.53		-0.019	Downward		
	FR_KB-3B	1617.53	1618.36	0.83	2022-03-03	16.93	1601.44	-	-	-	Yes	Bladder
					2022-06-15	13.36	1605.00					
					2022-09-21	15.88	1602.48					
					2022-11-14	16.51	1601.85					
	FR_MW-SK1A	1587.84	1588.87	1.03	2022-03-26	9.60	1579.27	FR_MW-SK1A and FR_MW-SK1B	0.031	Upward	Yes	Peristaltic
					2022-05-12	3.95	1584.92		0.005	Upward		
					2022-08-27	4.73	1584.14		0.008	Upward		
					2022-10-05	6.63	1582.24		0.012	Upward		
	FR_MW-SK1B	1587.84	1588.79	0.95	2022-03-26	7.97	1580.82	-	-	-	Yes	Peristaltic
					2022-05-12	3.60	1585.20					
					2022-08-27	4.23	1584.56					
					2022-10-05	5.97	1582.82					
	FR_09-01-A	1584.78	1585.54	0.76	2022-03-27	6.94	1578.60	FR_MW-09-01-A and FR_MW-09-01-B	0.043	Upward	Yes	Waterra
					2022-04-21	4.36	1581.18		-0.062	Downward		
					2022-07-18	1.49	1584.05		-0.055	Downward		Peristaltic
					2022-10-05	4.22	1581.32		-0.060	Downward		
	FR_09-01-B	1584.70	1585.40	0.70	2022-03-27	6.30	1579.10	-	-	-	Yes	Waterra
					2022-04-21	5.00	1580.40					
					2022-07-18	2.04	1583.36					
					2022-10-05	4.83	1580.57					

Notes:
a: Artesian flow. Water level made equal to casing elevation.
TOC denotes top of pipe casing.
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"-" denotes data not available.
Quarter is represented as Q1, Q2, Q3, Q4.

TABLE FR-02: Summary of Groundwater Levels and Sampling Information (FRO)

Area	Well ID	Ground Elevation	TOC Elevation	Stick Up Height	Date of Static Water Level Measurement	Depth to Water	Potentiometric Elevation	Well Pairs	Calculated Vertical Gradient		Continuous Water Level Monitoring	Purging / Sampling Methodology
		masl	masl	m	yyyy-mm-dd	mbtoc	masl		m/m	Direction	Quarter	
Fording River Valley	FR_09-02-A	1585.31	1586.07	0.76	2022-01-11	5.20	1580.87	FR_MW-09-02-A and FR_MW-09-02-B	-0.068	Downward	Yes	Waterra
					2022-04-21	5.21	1580.86		-0.074	Downward		
					2022-07-18	2.15	1583.92		-0.095	Downward		
					2022-10-05	5.06	1581.01		-0.058	Downward		
	FR_09-02-B	1585.32	1586.04	0.72	2022-01-11	5.97	1580.07	-	-	-	Yes	Waterra
					2022-04-21	6.04	1580.00					
					2022-07-18	3.23	1582.81					
					2022-10-05	5.71	1580.33					
	RG_MW_FR1A	1574.85	1575.44	0.59	2022-02-09	6.49	1568.95	RG_MW_FR1A and RG_MW_FR1B	-0.065	Downward	Yes	Peristaltic
					2022-05-04	4.90	1570.54		-0.094	Downward		
					2022-07-18	4.73	1570.71		-0.093	Downward		
					2022-11-15	5.83	1569.62		-0.083	Downward		
	RG_MW_FR1B	1574.86	1575.68	0.82	2022-02-09	6.10	1569.58	RG_MW_FR1B and RG_MW_FR1C	-0.045	Downward	Yes	Peristaltic
					2022-05-04	4.22	1571.46		-0.072	Downward		
					2022-07-18	4.06	1571.62		-0.069	Downward		
					2022-11-15	5.26	1570.42		-0.062	Downward		
	RG_MW_FR1C	1574.85	1575.41	0.56	2022-02-09	5.43	1569.98	-	-	-	Yes	Peristaltic
					2022-05-04	3.32	1572.09					
					2022-07-18	3.19	1572.22					
					2022-11-15	4.45	1570.96					
	RG_MW_FR8A	1562.17	1562.64	0.47	2022-02-08	0.38	1562.26	RG_MW_FR8A and RG_MW_FR8B	0.081	Upward	-	Peristaltic
					2022-05-04	Artesian[a]	1562.64		0.085	Upward		
					2022-07-21	0.05	1562.59		0.083	Upward		
					2022-11-17	0.33	1562.31		0.078	Upward		
	RG_MW_FR8B	1562.23	1562.89	0.66	2022-02-08	2.32	1560.57	RG_MW_FR8B and RG_MW_FR8C	0.005	Upward	-	Peristaltic
					2022-05-04	2.01	1560.89		0.006	Upward		
					2022-07-21	2.02	1560.87		0.006	Upward		
					2022-11-17	2.20	1560.69		0.007	Upward		
	RG_MW_FR8C	1562.16	1562.88	0.72	2022-02-08	2.55	1560.34	-	-	-	-	Peristaltic
					2022-05-04	2.27	1560.61					
					2022-07-21	2.29	1560.59					
					2022-11-17	2.51	1560.38					
	GH_MW-PC	1579.74	1580.94	1.202	2022-03-16	4.80	1576.14	-	-	-	Yes	Bladder
					2022-06-01	4.42	1576.52					
					2022-08-08	4.78	1576.16					
					2022-11-25	4.86	1576.08					

Notes:
a: Artesian flow. Water level made equal to casing elevation.
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"-" denotes data not available.
Quarter is represented as Q1, Q2, Q3, Q4.

TABLE FR-02: Summary of Groundwater Levels and Sampling Information (FRO)

Area	Well ID	Ground Elevation	TOC Elevation	Stick Up Height	Date of Static Water Level Measurement	Depth to Water	Potentiometric Elevation	Well Pairs	Calculated Vertical Gradient		Continuous Water Level Monitoring	Purging / Sampling Methodology
		masl	masl	m	yyyy-mm-dd	mbtoc	masl		m/m	Direction	Quarter	
Fording River Valley	RG_MW_FR10A	1551.37	1552.66	1.29	2022-02-08	6.71	1545.96	RG_MW_FR10A and RG_MW_FR10B	0.012	Upward	Yes	Bladder
					2022-05-06	4.79	1547.87		0.003	Upward		
					2022-07-21	4.80	1547.87		0.006	Upward		Peristaltic
					2022-11-17	6.63	1546.03		0.003	Upward		
	RG_MW_FR10B	1551.30	1552.55	1.25	2022-02-08	6.76	1545.79	RG_MW_FR10B and RG_MW_FR10C	-0.197	Downward	Yes	Peristaltic
					2022-05-06	4.72	1547.83		-0.107	Downward		
					2022-07-21	4.77	1547.78		-0.206	Downward		
					2022-11-17	6.55	1546.00		-0.225	Downward		
	RG_MW_FR10C	1551.30	1552.58	1.28	2022-02-08	4.38	1548.20	-	-	-	Yes	Peristaltic
					2022-05-06	3.43	1549.15					
					2022-07-21	2.28	1550.30					
					2022-11-17	3.83	1548.75					
Swift Creek	FR_MW18-02	1601.22	1602.37	1.14	2022-03-22	5.49	1596.88	-	-	-	Yes	Peristaltic
					2022-06-01	5.44	1596.93					
					2022-09-12	5.40	1596.97					
					2022-11-15	5.54	1596.83					

Notes:
a: Artesian flow. Water level made equal to casing elevation.
TOC denotes top of pipe casing.
masl denotes metres above sea level.
mbtoc denotes metres below top of casing.
"-" denotes data not available.
Quarter is represented as Q1, Q2, Q3, Q4.

TABLE FR-03: Summary of Analytical Results Compared to Primary Screening Criteria for Dissolved Organics, Nutrient and Organics in Groundwater (FRO)

Sample Location	Sample ID	Sample Date	Field Parameters					Physical Parameters						Dissolved Inorganics								Nutrients						Organics	
			Field Temperature	pH (field)	Dissolved Oxygen	Field Conductivity	Field ORP	pH	Hardness	Conductivity	Total Suspended Solids	Total Dissolved Solids	Turbidity	Total Alkalinity	Bicarbonate	Carbonate	Hydroxide	Bromide	Chloride	Fluoride	Sulphate	Ammonia Nitrogen	Nitrate Nitrogen	Nitrite Nitrogen	Kjeldahl Nitrogen-N	Ortho-Phosphate	Phosphorus, Total	Total Organic Carbon	Dissolved Organic Carbon
Location	ID	(yyyy mm dd)	C	pH	mg/L	µS/cm	mV	pH	mg/L	µS/cm	mg/L	mg/L	ntu	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
BC Standard																													
CSR Aquatic Life (AW)[a]			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1,500	2-3[b]	1,280-4,290[b]	1.31-18.5[c]	400	0.2-2[d]	n/a	n/a	n/a	n/a	n/a
CSR Irrigation Watering (IW)			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	100	1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
CSR Livestock Watering (LW)			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	600	1	1,000	n/a	100	10	n/a	n/a	n/a	n/a	n/a
CSR Drinking Water (DW)			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	250	1.5	500	n/a	10	1	n/a	n/a	n/a	n/a	n/a
Henretta Creek																													
FR_HMW1D	FR_HMW1D_QTR_2022-01-04_N	2022 03 07	3.6	7.42	4.04	3,940	205.5	7.39	2,640	3,690	2.2	3,580	1.08	496	605	< 1.0	< 1.0	< 0.250	2.13	0.164	1,870	0.0164	97.7	0.0319	0.069	0.0054	0.0053	1.00	0.80
	FR_HMW1D_QTR_2022-04-01_N	2022 06 29	4.3	6.8	3.01	3,793	168.7	7.30	2,780	3,790	29.5	3,850	10.3	467	570	< 1.0	< 1.0	< 0.500	1.98	< 0.200	1,840	0.0087	102	0.0496	< 0.050	< 0.0010	0.0261	1.81	1.35
	FR_HMW1D_QTR_2022-07-01_N	2022 07 21	5.6	6.72	2.91	3,547	174.5	7.25	2,480	3,620	3.2	3,860	0.61	492	600	< 1.0	< 1.0	< 0.250	1.97	0.162	1,790	0.0092	94.6	0.0208	0.303	0.0013	0.0051	1.26	1.24
	FR_HMW1D_QTR_2022-10-01_N	2022 10 03	6.7	6.76	0.22	4,110	185.7	7.66	2,580	3,260	6.8	3,720	0.50	480	585	< 1.0	< 1.0	< 0.500	2.95	0.258	1,880	0.0138	103	0.0650	< 0.050	0.0011	0.0023	0.96	0.90
FR_HMW1S	FR_HMW1S_QTR_2022-01-04_N	2022 03 07	3.5	7.68	3.67	3,848	207.1	7.48	2,540	3,560	1.2	3,490	0.10	415	507	< 1.0	< 1.0	< 0.250	1.92	0.191	1,800	0.555	108	< 0.0050	0.517	0.0023	0.0024	0.81	0.78
	FR_DC2_QTR_2022-01-04_N	Duplicate	-	-	-	-	-	7.42	2,550	3,570	2.0	3,420	< 0.10	413	503	< 1.0	< 1.0	< 0.250	1.84	0.192	1,780	0.543	107	< 0.0050	0.513	< 0.0010	< 0.0020	0.68	0.79
	QA/QC RPD%		-	-	-	-	-	1	0	0	*	2	*	0	1	*	*	*	4	1	1	2	1	*	1	*	*	*	*
	FR_HMW1S_QTR_2022-04-01_N	2022 06 29	4.5	6.73	4.45	3,644	174.6	7.33	2,530	3,570	4.8	3,660	1.68	406	496	< 1.0	< 1.0	< 0.250	1.68	0.204	1,790	0.480	98.9	0.0132	< 0.050	< 0.0010	0.0048	1.05	1.24
	FR_HMW1S_QTR_2022-07-01_N	2022 07 21	13.2	7.03	3.43	3,868	203.0	7.22	2,300	3,440	7.5	3,480	3.15	405	494	< 1.0	< 1.0	< 0.250	1.78	0.198	1,690	0.546	93.3	< 0.0050	0.740	< 0.0010	0.0030	1.42	2.53
	FR_DC2_QTR_2022-07-01_N	Duplicate	-	-	-	-	-	7.19	2,260	3,450	4.0	3,770	2.84	417	508	< 1.0	< 1.0	< 0.250	1.65	0.201	1,690	0.485	93.5	< 0.0050	0.744	< 0.0010	0.0034	0.78	0.75
	QA/QC RPD%		-	-	-	-	-	0	2	0	*	8	10	3	3	*	*	*	8	2	0	12	0	*	1	*	*	*	*
	FR_HMW1S_QTR_2022-10-01_N	2022 10 03	5.2	6.84	3.35	3,816	187.8	7.60	2,520	3,090	3.4	3,490	0.14	435	530	< 1.0	< 1.0	< 0.250	2.72	0.274	1,740	0.534	94.1	0.0105	0.199	< 0.0010	< 0.0020	0.73	0.73
FR_HMW3	FR_HMW3_QTR_2022-01-04_N	2022 03 15	3.3	7.29	2.84	1,038	101.9	7.68	485	1,030	1.1	761	0.56	237	289	< 1.0	< 1.0	< 0.250	4.53	0.177	375	0.0899	8.60	0.0074	0.686	0.0028	0.0071	0.60	< 0.50
	FR_DC3_QTR_2022-01-04_N	Duplicate	-	-	-	-	-	7.71	491	1,030	2.5	731	1.53	238	290	< 1.0	< 1.0	< 0.250	1.41	0.178	370	0.137	8.52	0.0094	0.774	0.0012	0.0074	0.54	< 0.50
	QA/QC RPD%		-	-	-	-	-	0	1	0	*	4	93	0	0	*	*	*	105	1	1	42	1	24	12	*	*	*	*
	FR_HMW3_QTR_2022-04-01_N	2022 04 25	3.2	7.17	2.95	1,170	75.7	8.01	662	1,110	1.9	832	0.64	219	267	< 1.0	< 1.0	< 0.250	0.54	0.203	435	0.0403	13.2	0.0122	0.252	0.0051	0.0060	0.96	1.40
	FR_HMW3_QTR_2022-07-01_N	2022 07 21	6.5	7.47	2.65	909	157.6	7.15	467	850	4.4	675	2.45	196	240	< 1.0	< 1.0	< 0.050	0.30	0.245	263	0.0218	10.3	0.0036	0.350	0.0050	0.0092	1.90	1.52
	FR_HMW3_QTR_2022-10-01_N	2022 10 03	6.4	7.28	0.89	1,034	169.6	8.04	564	894	2.5	688	0.52	221	269	< 1.0	< 1.0	< 0.250	< 0.50	0.268	307	0.0449	8.26	0.0116	0.320	0.0026	0.0069	< 0.50	< 0.50
	FR_DC1_QTR_2022-10-01_N	Duplicate	-	-	-	-	-	8.04	556	891	2.2	693	0.94	214	261	< 1.0	< 1.0	< 0.250	< 0.50	0.268	312	0.0476	8.45	0.0106	0.348	0.0030	0.0094	< 0.50	< 0.50
	QA/QC RPD%		-	-	-	-	-	0	1	0	*	1	58	3	3	*	*	*	*	0	2	6	2	9	8	*	*	*	*
FR_HMW5	FR_HMW5_QTR_2022-01-04_N	2022 01 12	3.0	8.02	1.74	383.8	-232.2	8.35	169	367	1.9	211	0.28	154	188	3.2	< 1.0	< 0.050	0.79	0.440	50.2	0.0641	< 0.0050	< 0.0010	0.098	0.0146	0.0149	< 0.50	< 0.50
	FR_HMW5_QTR_2022-04-01_N	2022 05 03	3.1	8.24	0.05	377.8	-299.8	8.17	172	343	< 1.0	233	0.10	145	177	< 1.0	< 1.0	< 0.050	0.86	0.474	52.0	0.0605	0.0054	< 0.0010	0.070	0.0154	0.0180	< 0.50	1.60
	FR_HMW5_QTR_2022-07-01_N	2022 09 06	4.5	8.13	0.89	387	-335.4	8.27	166	353	15.0	207	6.01	155	189	< 1.0	< 1.0	< 0.050	0.92	0.518	43.0	0.0632	< 0.0050	< 0.0010	0.088	0.0180	0.0157	0.84	1.04
	FR_HMW5_QTR_2022-10-01_N	2022 10 26	3.7	8.00	0.27	366.9	-221.1	8.03	178	342	1.1	235	1.20	139	170	< 1.0	< 1.0	< 0.050	0.48	0.440	52.9	0.0515	< 0.0050	< 0.0010	0.076	0.0151	0.0161	< 0.50	< 0.50
Fording River Valley																													
FR_TBSSMW-1	FR_TBSSMW-1_QTR_2022-01-04_N	2022 03 25	3.0	8.28	0.11	165.7	-171.4	8.15	138	315	1.6	164	1.04	174	212	< 1.0	< 1.0	< 0.050	0.35	0.418	17.2	2.80	0.0075	< 0.0010	2.98	< 0.0010	0.0055	0.62	0.50
	FR_TBSSMW-1_QTR_2022-04-01_N	2022 05 10	3.9	8.23	0.26	338	-191.8	8.26	132	320	6.5	173	4.12	172	210	< 1.0	< 1.0	< 0.050	0.30	0.369	15.3	3.23	< 0.0050	< 0.0010	3.14	< 0.0010	0.0096	0.54	1.43
	FR_TBSSMW-1_QTR_2022-07-01_N	2022 09 07	8.1	8.06	0.12	349.9	-199.2	8.08	145	325	7.0	180	5.65	185	225	< 1.0	< 1.0	< 0.050	0.28	0.370	13.9	3.00	0.0052	0.0022	0.121	< 0.0010	0.0092	< 0.50	1.51
	FR_TBSSMW-1_QTR_2022-10-01_N	2022 10 10	7.7	8.06	0.35	208.0	-149.5	8.20	146	326	4.5	162	3.49	191	232	< 1.0	< 1.0	< 0.050	0.32	0.374	14.7	3.11	0.0139	< 0.0010	2.88	< 0.0010	0.0072	0.72	0.92
FR_TBSSMW-2	FR_TBSSMW-2_QTR_2022-01-04_N	2022 03 25	1.6	7.83	10.60	786	67.5	8.03	414	734	< 1.0	520	< 0.10	153	186	< 1.0	< 1.0	< 0.050	0.39	0.217	240	0.0123	6.00	< 0.0010	0.192	< 0.0010	0.0028	< 0.50	1.30
	FR_TBSSMW-2_QTR_2022-04-01_N	2022 05 10	3.1	7.7	9.85	770	91.9	8.10	424	719	< 1.0	505	0.16	158	192	< 1.0	< 1.0	< 0.050	0.28	0.184	206	< 0.0050	5.94	< 0.0010	< 0.050	< 0.0010	0.0022	0.69	1.39
	FR_TBSSMW-2_QTR_2022-07-01_N	2022 09 07	9.9	7.71	7.58	472	120.6	7.76	232	441	< 1.0	315	0.15	150	182	< 1.0	< 1.0	< 0.050	0.18	0.233	102	< 0.0050	2.00	< 0.0010	2.75	< 0.0010	0.0024	< 0.50	< 0.50
	FR_TBSSMW-2_QTR_2022-10-01_N	2022 10 10	8.0	7.65	8.34	5.57	188.5	8.00	304	522	< 1.0	356	< 0.10	146	178	< 1.0	< 1.0	< 0.050	0.25	0.224	146	< 0.0050	2.85	< 0.0010	0.212	< 0.0010	< 0.0020	< 0.50	0.52
FR_POTWELLS	FR_POTWELLS_QTR_2022-01-04_N	2022 03 16	2.7	7.91	12.79	576	176.9	7.96	322	561	< 1.0	347	< 0.10	160	195	< 1.0	< 1.0	< 0.050	0.28	0.159	155	< 0.0050	3.61	< 0.0010	0.329	0.0015	< 0.0020	< 0.50	< 0.50
	FR_POTWELLS_QTR_2022-04-01_N	2022 06 27	8.4	7.59	12.07	323.9	230.3	8.09	174	330	< 1.0	198	0.22	122	148	< 1.0	< 1.0	< 0.050	0.11	0.161	48.9	< 0.0050	1.11	< 0.0010	0.095	< 0.0010	0.0024	1.29	1.31
	FR_POTWELLS_QTR_2022-07-01_N	2022 09 18	9	7.73	9.8	592	165.9	8.12	241	453	< 1.0	278	0.34	145	177	< 1.0	< 1.0	< 0.050	0.19	0.218	109	< 0.0050	2.03	< 0.0010	0.286	0.0033	0.0025	< 0.50	< 0.50
	FR_POTWELLS_QTR_2022-10-01_N	2022 10 10	8.9	7.83	11.99	376.0	136.0	7.98	289	497	< 1.0	329	0.37	138	169	< 1.0	< 1.0	< 0.050	0.26	0.214	132	< 0.0050	2.48	< 0.0010	0.146	< 0.0010	0.0020	< 0.50	1.02

All terms defined within the body of SNC-Lavalin's report.
< Denotes concentration less than indicated detection limit.
\- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

[a] Standard to protect freshwater aquatic life.
[b] Standard varies with Hardness.
[c] Standard varies with pH and Temperature. Temperature assumed 10C.
[d] Standard varies with Chloride.
[e] Sample ID renamed by SNC-Lavalin due to duplication with another sample in Teck Coal database.

BOLD	Concentration greater than CSR Aquatic Life (AW) standard
ITALIC	Concentration greater than CSR Irrigation Watering (IW) standard
UNDERLINE	Concentration greater than CSR Livestock Watering (LW) standard
SHADED	Concentration greater than CSR Drinking Water (DW) standard

TABLE FR-03: Summary of Analytical Results Compared to Primary Screening Criteria for Dissolved Organics, Nutrient and Organics in Groundwater (FRO)

			Field Parameters					Physical Parameters						Dissolved Inorganics								Nutrients						Organics	
Sample Location	Sample ID	Sample Date (yyyy mm dd)	Field Temperature C	pH (field) pH	Dissolved Oxygen mg/L	Field Conductivity µS/cm	Field ORP mV	pH pH	Hardness mg/L	Conductivity µS/cm	Total Suspended Solids mg/L	Total Dissolved Solids mg/L	Turbidity ntu	Total Alkalinity mg/L	Bicarbonate mg/L	Carbonate mg/L	Hydroxide mg/L	Bromide mg/L	Chloride mg/L	Fluoride mg/L	Sulphate mg/L	Ammonia Nitrogen mg/L	Nitrate Nitrogen mg/L	Nitrite Nitrogen mg/L	Kjeldahl Nitrogen-N mg/L	Ortho-Phosphate mg/L	Phosphorus, Total mg/L	Total Organic Carbon mg/L	Dissolved Organic Carbon mg/L
BC Standard																													
CSR Aquatic Life (AW)[a]			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1,500	2-3[b]	1,280-4,290[b]	1.31-18.5[c]	400	0.2-2[d]	n/a	n/a	n/a	n/a	n/a
CSR Irrigation Watering (IW)			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	100	1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
CSR Livestock Watering (LW)			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	600	1	1,000	n/a	100	10	n/a	n/a	n/a	n/a	n/a
CSR Drinking Water (DW)			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	250	1.5	500	n/a	10	1	n/a	n/a	n/a	n/a	n/a
Fording River Valley																													
FR_GCMW-1B	FR_GCMW-1B_2022-03-16	2022 03 16	3.03	8.52	0.51	798.7	-145.7	8.36	73.2	738	4.4	442	7.02	413	492	5.9	< 1.0	0.092	16.5	*1.27*	1.43	0.0930	0.0659	0.0024	0.393	0.0052	0.0224	7.61	7.30
	FR_DC1_2022-03-16	Duplicate	-	-	-	-	-	8.38	73.2	733	4.1	450	7.38	417	496	6.2	< 1.0	0.087	16.3	*1.26*	1.00	0.0889	0.0080	0.0011	0.364	0.0060	0.0242	8.39	8.06
	QA/QC RPD%		-	-	-	-	-	0	0	1	*	2	5	1	1	5	*	*	1	1	*	5	*	*	8	14	8	10	10
	FR_GCMW-1B_2022-06-23	2022 06 23	9.92	8.28	0.32	809	-160	8.80	74.7	754	1.6	454	6.38	412	464	19.2	< 1.0	0.094	14.7	*1.31*	0.30	0.101	< 0.0050	< 0.0010	0.342	0.0040	0.0197	7.85	9.05
	FR_GCMW-1B_2022-09-20-N	2022 09 20	14.33	8.50	0.38	703	-142.3	8.54	77.3	727	3.3	464	6.48	413	473	15.1	< 1.0	0.108	14.2	*1.34*	2.17	0.113	0.0062	< 0.0010	0.548	0.0029	0.0229	9.96	10.2
	FR_GCMW-1B_2022-11-22	2022 11 22	3.94	8.46	0.52	877.0	-112.4	8.70	43.7	870	3.5	517	9.19	463	516	24.0	< 1.0	0.132	24.9	*1.66*	1.94	0.285	< 0.0050	< 0.0010	0.427	0.0230	0.0494	4.20	3.99
FR_GCMW-2	FR_GCMW-2_2022-03-15	2022 03 15	3.53	7.34	0.69	2,178.7	59.0	7.72	1,190	2,000	47.0	1,570	24.8	215	262	< 1.0	< 1.0	< 0.250	3.45	0.144	719	< 0.0050	86.2	0.0299	< 0.050	< 0.0010	0.0532	1.61	< 0.50
	FR_GCMW-2_2022-06-23	2022 06 23	8.17	7.12	2.80	1,591	80.4	8.11	797	1,450	3.1	1,200	1.57	196	240	< 1.0	< 1.0	< 0.250	1.78	0.185	472	< 0.0050	43.9	< 0.0050	< 0.050	< 0.0010	0.0063	< 0.50	0.94
	FR_GCMW-2_QTR_2022-09-22-N	2022 09 22	10.00	7.42	0.28	1,763	37.0	8.15	1,060	1,740	3.7	1,360	0.43	272	332	< 1.0	< 1.0	< 0.250	2.34	0.272	584	0.0173	61.3	0.0219	< 0.050	< 0.0010	0.0040	< 0.50	< 0.50
	FR_DC2_2022-09-22	Duplicate	-	-	-	-	-	8.17	1,060	1,730	1.8	1,290	0.47	266	325	< 1.0	< 1.0	< 0.250	2.38	0.241	601	0.0151	63.2	0.0259	< 0.050	< 0.0010	0.0048	< 0.50	< 0.50
	QA/QC RPD%		-	-	-	-	-	0	0	1	*	5	*	2	2	*	*	*	2	12	3	*	3	17	*	*	*	*	*
	FR_GCMW-2_2022-11-22	2022 11 22	6.81	7.27	0.29	1,875.60	37.1	8.02	1,160	1,800	8.1	1,330	5.19	250	304	< 1.0	< 1.0	< 0.250	2.80	0.232	644	< 0.0050	65.2	0.0166	< 0.050	< 0.0010	0.0072	< 0.50	< 0.50
	FR_DC1_2022-11-22	Duplicate	-	-	-	-	-	8.05	1,140	1,810	9.1	1,410	5.21	127	189	< 1.0	< 1.0	< 0.250	2.65	0.220	640	< 0.0050	65.4	0.0239	< 0.050	< 0.0010	0.0079	< 0.50	< 0.50
	QA/QC RPD%		-	-	-	-	-	0	2	1	12	6	0	65	47	*	*	*	6	5	1	*	0	36	*	*	*	*	*
FR_MW-1B	FR_MW-1B_QTR_2022-01-04_N	2022 03 26	2.8	7.71	7.82	1,022	151.8	7.98	585	1,040	1.2	742	0.66	188	229	< 1.0	< 1.0	< 0.250	1.60	0.147	340	0.0054	27.6	< 0.0050	0.318	0.0016	0.0067	0.63	0.72
	FR_MW-1B_QTR_2022-04-01_N	2022 06 09	4.4	7.70	7.71	665	151.8	8.19	337	641	6.6	437	2.87	168	199	3.0	< 1.0	< 0.050	0.50	0.125	124	< 0.0050	9.51	< 0.0010	0.232	0.0014	0.0057	1.47	1.27
	FR_MW-1B_QTR_2022-07-01_N	2022 09 20	7.1	7.46	6.22	914	199.2	8.17	443	834	2.1	632	1.36	184	224	< 1.0	< 1.0	< 0.050	0.72	0.175	233	< 0.0050	18.1	< 0.0010	0.402	< 0.0010	0.0065	1.12	0.91
	FR_MW-1B_QTR_2022-10-01_N	2022 10 07	8.1	7.45	6.63	968	150.6	8.03	533	919	1.2	653	0.72	203	247	< 1.0	< 1.0	< 0.250	0.94	0.147	287	0.0196	23.0	0.0241	0.410	< 0.0010	0.0032	0.79	1.10
FR_MW_NTPSE	FR_MW_NTPSE_QTR_2022-01-04_N	2022 03 31	7.4	7.16	2.04	1,752	-76.2	7.26	1,050	1,680	841	1,230	677	693	845	< 1.0	< 1.0	< 0.250	5.26	< 0.100	394	0.747	0.583	0.0126	1.06	< 0.0010	1.60	8.08	5.93
	FR_MW_NTPSE_QTR_2022-04-01_N	2022 06 09	10.0	7.11	2.76	1,839	-57.9	8.06	1,080	1,630	342	1,340	334	602	734	< 1.0	< 1.0	< 0.250	4.26	< 0.100	376	0.683	0.133	< 0.0050	0.919	< 0.0010	0.435	9.20	4.78
	FR_MW_NTPSE_QTR_2022-09-01_N	2022 09 15	10.0	6.98	0.48	1,877	-101.4	7.54	1,160	1,660	197	1,290	323	724	883	< 1.0	< 1.0	< 0.250	5.14	0.112	493	0.799	0.0513	0.0058	0.892	0.0011	0.0365	9.02	5.77
	FR_DC2_QTR-2022-07-01_N[e]	Duplicate	-	-	-	-	-	7.86	1,040	1,650	208	1,250	334	652	795	< 1.0	< 1.0	< 0.250	5.18	0.130	486	0.810	0.120	0.0059	0.964	< 0.0010	0.253	11.2	5.43
	QA/QC RPD%		-	-	-	-	-	4	11	1	5	3	3	10	10	*	*	*	1	15	1	1	80	2	8	*	150	22	6
	FR_MW_NTPSE_QTR_2022-10-01_N	2022 10 10	8.1	7.02	2.24	1,833	-75.5	7.44	1,140	1,650	154	1,270	318	668	815	< 1.0	< 1.0	< 0.250	5.00	0.126	479	0.781	0.334	< 0.0050	0.861	< 0.0010	0.0386	5.74	4.54
FR_09-04-A	FR_09-04-A_QTR_2022-01-04_N	2022 02 17	8.2	7.11	0.30	1,204	125.2	7.71	665	1,160	1.7	809	< 0.10	389	474	< 1.0	< 1.0	< 0.250	11.4	0.313	326	0.0211	0.0442	< 0.0050	0.058	0.0029	< 0.0020	0.72	0.68
	FR_09-04-A_QTR_2022-04-01_N	2022 04 21	8.6	7.11	0.11	1,275	122.3	8.00	637	1,140	< 1.0	818	< 0.10	402	490	< 1.0	< 1.0	< 0.250	8.11	0.333	323	0.0212	0.365	< 0.0050	0.072	0.0014	0.0032	0.59	0.62
	FR_DC3_QTR_2022-04-01_N	Duplicate	-	-	-	-	-	7.90	674	1,140	< 1.0	796	< 0.10	392	478	< 1.0	< 1.0	< 0.250	9.06	0.339	326	0.0124	0.366	< 0.0050	< 0.050	< 0.0010	0.0043	0.63	0.63
	QA/QC RPD%		-	-	-	-	-	1	6	0	*	3	*	3	2	*	*	*	11	2	1	*	0	*	*	*	*	*	*
	FR_09-04-A_QTR_2022-07-01_N	2022 07 20	10.6	7.26	0.01	1,144	141.1	7.39	655	1,080	< 1.0	841	0.45	410	500	< 1.0	< 1.0	< 0.250	7.48	0.325	285	< 0.0050	0.752	< 0.0050	0.063	< 0.0010	< 0.0020	< 0.50	< 0.50
	FR_09-04-A_QTR_2022-10-01_N	2022 10 06	10.2	7.02	0.26	1,089	169.0	7.89	742	1,020	1.4	738	0.18	367	447	< 1.0	< 1.0	< 0.250	7.09	0.318	277	< 0.0050	1.56	0.0067	0.150	< 0.0010	0.0030	< 0.50	< 0.50
FR_09-04-B	FR_09-04-B_QTR_2022-01-04_N	2022 02 17	8.5	6.72	0.38	1,224	185.6	7.72	660	1,180	< 1.0	863	< 0.10	383	467	< 1.0	< 1.0	< 0.250	8.00	0.285	334	0.0122	< 0.0250	0.0150	< 0.050	0.0027	< 0.0020	0.63	0.61
	FR_DC1_QTR_2022-01-04_N	Duplicate	-	-	-	-	-	7.70	655	1,160	< 1.0	814	< 0.10	368	449	< 1.0	< 1.0	< 0.250	8.06	0.307	324	0.0236	0.0749	0.0162	0.061	0.0030	0.0030	< 0.50	< 0.50
	QA/QC RPD%		-	-	-	-	-	0	1	2	*	6	*	4	4	*	*	*	1	7	3	*	*	8	*	*	*	*	*
	FR_09-04-B_QTR_2022-04-01_N	2022 04 21	8.7	7.11	0.17	1,290	116.2	7.92	646	1,150	1.4	836	0.20	389	474	< 1.0	< 1.0	< 0.250	8.52	0.317	334	0.0065	0.0995	< 0.0050	< 0.050	0.0022	0.0041	0.60	0.83
	FR_09-04-B_QTR_2022-07-01_N	2022 07 20	12.5	7.06	3.00	1,191	257.8	7.42	634	1,100	1.6	835	< 0.10	420	512	< 1.0	< 1.0	< 0.250	7.71	0.285	294	< 0.0050	0.533	< 0.0050	< 0.050	< 0.0010	< 0.0020	< 0.50	< 0.50
	FR_09-04-B_QTR_2022-10-01_N	2022 10 06	9.6	7.0	0.28	918	171.6	7.83	742	1,040	< 1.0	752	0.11	398	485	< 1.0	< 1.0	< 0.250	7.37	0.306	285	< 0.0050	1.61	0.0293	0.104	< 0.0010	0.0027	< 0.50	< 0.50

All terms defined within the body of SNC-Lavalin's report.
< Denotes concentration less than indicated detection limit.
\- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

[a] Standard to protect freshwater aquatic life.
[b] Standard varies with Hardness.
[c] Standard varies with pH and Temperature. Temperature assumed 10C.
[d] Standard varies with Chloride.
[e] Sample ID renamed by SNC-Lavalin due to duplication with another sample in Teck Coal database.

BOLD	Concentration greater than CSR Aquatic Life (AW) standard
ITALIC	Concentration greater than CSR Irrigation Watering (IW) standard
UNDERLINE	Concentration greater than CSR Livestock Watering (LW) standard
SHADED	Concentration greater than CSR Drinking Water (DW) standard

TABLE FR-03: Summary of Analytical Results Compared to Primary Screening Criteria for Dissolved Organics, Nutrient and Organics in Groundwater (FRO)

			Field Parameters					Physical Parameters						Dissolved Inorganics								Nutrients						Organics	
Sample Location	Sample ID	Sample Date (yyyy mm dd)	Field Temperature C	pH (field) pH	Dissolved Oxygen mg/L	Field Conductivity µS/cm	Field ORP mV	pH pH	Hardness mg/L	Conductivity µS/cm	Total Suspended Solids mg/L	Total Dissolved Solids mg/L	Turbidity ntu	Total Alkalinity mg/L	Bicarbonate mg/L	Carbonate mg/L	Hydroxide mg/L	Bromide mg/L	Chloride mg/L	Fluoride mg/L	Sulphate mg/L	Ammonia Nitrogen mg/L	Nitrate Nitrogen mg/L	Nitrite Nitrogen mg/L	Kjeldahl Nitrogen-N mg/L	Ortho-Phosphate mg/L	Phosphorus, Total mg/L	Total Organic Carbon mg/L	Dissolved Organic Carbon mg/L
BC Standard																													
CSR Aquatic Life (AW)[a]			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1,500	2-3[b]	1,280-4,290[b]	1.31-18.5[c]	400	0.2-2[d]	n/a	n/a	n/a	n/a	n/a
CSR Irrigation Watering (IW)			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	100	1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
CSR Livestock Watering (LW)			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	600	1	1,000	n/a	100	10	n/a	n/a	n/a	n/a	n/a
CSR Drinking Water (DW)			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	250	1.5	500	n/a	10	1	n/a	n/a	n/a	n/a	n/a
Fording River Valley																													
FR_KB-1	FR_KB-1_WG_2022-02_NP	2022 03 03	5.04	7.27	8.20	2,956.6	81.5	7.32	2,020	2,780	< 1.0	2,250	< 0.10	459	560	< 1.0	< 1.0	< 0.250	3.18	0.125	887	< 0.0050	112	0.0058	< 0.050	0.0021	0.0037	0.74	0.79
	FR_DC2_WG_2022-02_NP	Duplicate	5.04	7.27	8.20	2,957	81.50	7.35	1,940	2,790	1.5	2,410	< 0.10	465	568	< 1.0	< 1.0	< 0.250	1.82	0.118	893	< 0.0050	114	< 0.0050	< 0.050	0.0021	0.0057	0.69	0.77
	QA/QC RPD%		*	*	*	*	*	0	4	0	*	7	*	1	1	*	*	*	54	6	1	*	2	*	*	*	*	*	*
	FR_KB-1A_WG_2022-06_NP	2022 06 15	4.7	7.13	8.19	1,048	196.2	7.96	1,000	1,710	< 1.0	1,430	1.32	343	418	< 1.0	< 1.0	< 0.250	1.09	0.208	540	< 0.0050	64.0	< 0.0050	< 0.050	0.0012	0.0045	0.71	0.89
	FR_KB-1A_WG_QTR_KCWD_2022-09-22_NP	2022 09 22	5.0	7.24	8.08	1,283	121.6	7.73	1,380	2,200	10.5	1,950	2.68	492	601	< 1.0	< 1.0	< 0.250	1.38	0.177	718	< 0.0050	85.0	< 0.0050	< 0.050	< 0.0010	< 0.0020	< 0.50	1.92
	FR_KB-1_WG_QTR_KCWD_2022-11-08_NP	2022 11 08	3.3	7.39	9.32	1,636	150.0	7.96	1,680	2,650	2.0	2,260	0.33	525	641	< 1.0	< 1.0	< 0.250	1.68	0.165	917	< 0.0050	102	0.0224	< 0.050	< 0.0010	0.0037	< 0.50	0.81
FR_KB-2	FR_KB-2_WG_2022-02_NP	2022 03 01	3.22	7.15	8.84	3,127.8	88.4	7.61	1,820	2,750	3.6	2,300	0.48	437	533	< 1.0	< 1.0	< 0.250	1.58	0.117	972	< 0.0050	120	0.0068	< 0.050	0.0014	0.0027	0.64	0.58
	FR_KB-2A_WG_2022-06_NP	2022 06 16	6.2	7.04	7.55	1,067	228.3	7.97	970	1,720	1.3	1,380	0.13	368	448	< 1.0	< 1.0	< 0.250	1.00	0.123	424	< 0.0050	56.8	< 0.0050	< 0.050	< 0.0010	< 0.0020	0.83	0.82
	FR_KB-2A_WG_QTR_KCWD_2022-09-23_NP	2022 09 23	5.2	7.12	6.80	1,256	-	7.47	1,420	2,150	1.2	1,860	0.17	513	626	< 1.0	< 1.0	< 0.250	1.32	0.169	676	< 0.0050	81.4	< 0.0050	< 0.050	< 0.0010	0.0022	< 0.50	< 0.50
	FR_KB-2_WG_QTR_KCWD_2022-11-10_NP	2022 11 10	3.2	7.20	6.95	1,597	89.6	7.57	1,660	2,530	1.3	1,880	0.11	508	620	< 1.0	< 1.0	< 0.250	1.67	0.151	887	< 0.0050	102	< 0.0050	< 0.050	< 0.0010	< 0.0020	0.73	0.77
FR_KB-3A	FR_KB-3A_WG_2022-02_NP	2022 03 03	3.55	7.24	4.45	2,052.4	73.8	7.59	1,300	1,950	1.6	1,490	0.19	402	490	< 1.0	< 1.0	< 0.250	1.87	< 0.100	545	< 0.0050	66.8	0.0131	< 0.050	< 0.0010	0.0024	0.68	0.51
	FR_KB-3A_WG_2022-06_NP	2022 06 15	2.5	7.08	5.00	1,252	167.5	7.91	1,280	1,460	37.8	1,140	22.2	392	478	< 1.0	< 1.0	1.90	5.35	0.135	467	< 0.0050	21.4	**8.86**	< 0.050	< 0.0010	< 0.0020	1.72	0.78
	FR_KB-3A_WG_QTR_KCWD_2022-09-21_NP	2022 09 21	6.2	7.15	4.48	1,174	124.8	7.59	1,300	1,990	< 1.0	1,760	< 0.10	414	505	< 1.0	< 1.0	< 0.250	1.58	< 0.100	605	< 0.0050	75.9	0.0174	< 0.050	< 0.0010	< 0.0020	< 0.50	0.91
	FR_KB-3A_WG_QTR_KCWD_2022-11-14_NP	2022 11 14	2.6	7.23	3.88	1,060	185.6	8.08	1,320	1,700	< 1.0	1,680	0.14	410	501	< 1.0	< 1.0	< 0.250	2.07	< 0.100	658	0.0102	76.2	0.0656	< 0.050	< 0.0010	0.0021	< 0.50	< 0.50
FR_KB-3B	FR_KB-3B_WG_2022-02_NP	2022 03 03	3.50	7.18	7.07	2,389.8	85.9	7.25	1,410	2,220	4.8	1,740	2.16	421	514	< 1.0	< 1.0	< 0.250	1.54	< 0.100	651	< 0.0050	85.7	< 0.0050	< 0.050	< 0.0010	0.0053	0.64	0.67
	FR_KB-3B_WG_2022-06_NP	2022 06 15	4.4	7.02	7.30	1,473	180.2	7.64	1,410	2,340	2.5	2,080	2.29	390	476	< 1.0	< 1.0	< 0.250	1.67	< 0.100	765	< 0.0050	101	0.0408	< 0.050	< 0.0010	0.0041	0.71	0.62
	FR_KB-3B_WG_QTR_KCWD_2022-09-21_NP	2022 09 21	6.0	7.27	6.00	1,158	120.1	7.62	1,200	1,950	1.9	1,660	1.99	452	551	< 1.0	< 1.0	< 0.250	1.31	0.108	599	< 0.0050	72.6	< 0.0050	< 0.050	< 0.0010	0.0037	< 0.50	< 0.50
	FR_KB-3B_WG_QTR_KCWD_2022-11-14_NP	2022 11 14	3.2	7.26	5.86	1,159	176.3	7.74	1,420	2,220	< 1.0	1,870	1.39	430	524	< 1.0	< 1.0	< 0.250	1.42	0.110	719	< 0.0050	84.3	< 0.0050	< 0.050	< 0.0010	0.0022	< 0.50	< 0.50
FR_MW-SK1A	FR_MW-SK1A_QTR_2022-04-01_N	2022 05 12	5.0	7.24	9.82	1,513	279.4	8.00	850	1,440	< 1.0	1,070	< 0.10	273	333	< 1.0	< 1.0	< 0.250	3.71	0.103	412	< 0.0050	43.9	< 0.0050	< 0.050	< 0.0010	0.0034	< 0.50	1.61
	FR_MW-SK1A_QTR_2022-07-01_N	2022 08 27	9.6	7.21	5.87	1,367	181.5	8.12	814	1,310	1.4	1,020	0.12	312	380	< 1.0	< 1.0	< 0.250	4.72	0.132	390	< 0.0050	33.1	< 0.0050	< 0.050	0.0017	0.0030	< 0.50	0.61
	FR_MW_SK1A_QTR_2022-10-05_N	2022 10 05	8.5	7.13	6.31	1,711	185.1	7.88	1,100	1,450	2.9	1,210	0.21	372	453	< 1.0	< 1.0	< 0.250	6.14	0.106	433	< 0.0050	40.3	< 0.0050	< 0.050	< 0.0010	0.0041	< 0.50	< 0.50
FR_MW-SK1B	FR_MW-SK1B_QTR_2022-01-04_N	2022 03 26	5.0	7.49	6.45	1,075	133.0	7.94	610	1,030	1.7	729	1.07	290	354	< 1.0	< 1.0	< 0.250	4.94	0.121	321	0.0061	9.56	0.382	0.355	0.0018	0.0054	< 0.50	1.11
	FR_MW-SK1B_QTR_2022-04-01_N	2022 05 12	5.3	7.3	0.16	1,140	202.7	8.01	632	1,080	< 1.0	812	0.11	287	350	< 1.0	< 1.0	< 0.250	4.39	< 0.100	310	< 0.0050	11.3	0.0636	12.4	< 0.0010	0.0039	< 0.50	< 0.50
	FR_MW-SK1B_QTR_2022-07-01_N	2022 08 27	10.1	7.39	0.43	11.26	162.9	8.04	689	1,100	1.4	746	0.37	306	374	< 1.0	< 1.0	< 0.250	4.79	< 0.100	356	< 0.0050	12.1	0.129	< 0.050	< 0.0010	0.0025	0.72	1.46
	FR_DC3_QTR_2022-07-01_N	Duplicate	-	-	-	-	-	8.06	685	1,090	1.8	773	0.20	282	344	< 1.0	< 1.0	< 0.250	4.61	< 0.100	356	< 0.0050	12.2	0.107	0.338	0.0010	< 0.0020	< 0.50	< 0.50
	QA/QC RPD%		-	-	-	-	-	0	1	1	*	4	*	8	8	*	*	*	4	*	0	*	1	19	*	*	*	*	*
	FR_MW_SK1B_QTR_2022-10-01_N	2022 10 05	8.4	7.26	0.23	1,105	136.4	7.99	742	1,040	1.6	816	0.23	288	351	< 1.0	< 1.0	< 0.250	4.26	0.104	310	< 0.0050	11.5	0.112	0.115	< 0.0010	0.0068	< 0.50	< 0.50
FR_09-01-A	FR_09-01-A_QTR_2022-01-04_N	2022 03 27	4.5	7.20	8.82	820	164.8	7.81	948	1,550	< 1.0	1,250	< 0.10	305	372	< 1.0	< 1.0	< 0.250	6.71	0.132	527	0.0152	39.0	< 0.0050	< 0.050	< 0.0010	0.0024	< 0.50	< 0.50
	FR_09-01-A_QTR_2022-04-01_N	2022 04 21	3.1	7.23	8.68	1,696	155.9	7.94	858	1,490	< 1.0	1,160	0.28	344	420	< 1.0	< 1.0	< 0.250	8.63	0.138	482	< 0.0050	30.6	< 0.0050	< 0.050	< 0.0010	0.0033	< 0.50	< 0.50
	FR_DC2_QTR_2022-04-01_N	Duplicate	-	-	-	-	-	7.93	916	1,490	1.2	1,150	< 0.10	339	414	< 1.0	< 1.0	< 0.250	8.63	0.137	484	0.0340	30.8	< 0.0050	< 0.050	< 0.0010	0.0055	< 0.50	< 0.50
	QA/QC RPD%		-	-	-	-	-	0	7	0	*	1	*	1	1	*	*	*	0	1	0	*	1	*	*	*	*	*	*
	FR_09-01-A_QTR_2022-07-01_N	2022 07 18	7.1	7.40	9.83	951	270.9	7.96	531	903	< 1.0	666	< 0.10	266	324	< 1.0	< 1.0	< 0.050	2.52	0.258	215	< 0.0050	17.6	< 0.0010	0.450	< 0.0010	0.0023	< 0.50	< 0.50
	FR_09-01-A_QTR_2022-10-01_N	2022 10 05	9.8	7.18	6.06	1,502	135.1	8.10	956	1,390	< 1.0	1,140	0.17	355	433	< 1.0	< 1.0	< 0.250	10.8	0.153	474	< 0.0050	29.5	< 0.0050	< 0.050	0.0011	< 0.0020	< 0.50	< 0.50
FR_09-01-B	FR_09-01-B_QTR_2022-01-04_N	2022 03 27	5.8	7.24	8.12	1,444	167.0	7.72	804	1,340	< 1.0	1,020	0.13	317	387	< 1.0	< 1.0	< 0.250	6.05	0.164	442	< 0.0050	24.8	< 0.0050	< 0.050	< 0.0010	0.0026	< 0.50	< 0.50
	FR_09-01-B_QTR_2022-04-01_N	2022 04 21	4.5	7.19	7.72	1,575	154.4	8.01	754	1,420	23.9	1,090	3.63	333	406	< 1.0	< 1.0	< 0.250	7.11	0.152	463	0.0168	27.4	< 0.0050	< 0.050	< 0.0010	0.0099	< 0.50	< 0.50
	FR_09-01-B_QTR_2022-07-01_N	2022 07 18	5.8	7.33	10.11	1,018	184.1	7.83	518	882	2.1	676	1.16	244	297	< 1.0	< 1.0	< 0.050	1.34	0.200	214	< 0.0050	21.0	< 0.0010	0.419	< 0.0010	0.0028	< 0.50	< 0.50
	FR_09-01-B_QTR_2022-10-01_N	2022 10 05	9.1	7.28	6.82	1,321	179.7	8.07	736	1,120	< 1.0	913	0.33	315	384	< 1.0	< 1.0	< 0.250	3.86	0.190	348	< 0.0050	23.2	< 0.0050	< 0.050	< 0.0010	< 0.0020	< 0.50	< 0.50

All terms defined within the body of SNC-Lavalin's report.
< Denotes concentration less than indicated detection limit.
\- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

BOLD	Concentration greater than CSR Aquatic Life (AW) standard
ITALIC	Concentration greater than CSR Irrigation Watering (IW) standard
UNDERLINE	Concentration greater than CSR Livestock Watering (LW) standard
SHADED	Concentration greater than CSR Drinking Water (DW) standard

[a] Standard to protect freshwater aquatic life.
[b] Standard varies with Hardness.
[c] Standard varies with pH and Temperature. Temperature assumed 10C.
[d] Standard varies with Chloride.
[e] Sample ID renamed by SNC-Lavalin due to duplication with another sample in Teck Coal database.

TABLE FR-03: Summary of Analytical Results Compared to Primary Screening Criteria for Dissolved Organics, Nutrient and Organics in Groundwater (FRO)

			Field Parameters					Physical Parameters						Dissolved Inorganics								Nutrients						Organics	
Sample Location	Sample ID	Sample Date (yyyy mm dd)	Field Temperature C	pH (field) pH	Dissolved Oxygen mg/L	Field Conductivity µS/cm	Field ORP mV	pH pH	Hardness mg/L	Conductivity µS/cm	Total Suspended Solids mg/L	Total Dissolved Solids mg/L	Turbidity ntu	Total Alkalinity mg/L	Bicarbonate mg/L	Carbonate mg/L	Hydroxide mg/L	Bromide mg/L	Chloride mg/L	Fluoride mg/L	Sulphate mg/L	Ammonia Nitrogen mg/L	Nitrate Nitrogen mg/L	Nitrite Nitrogen mg/L	Kjeldahl Nitrogen-N mg/L	Ortho-Phosphate mg/L	Phosphorus, Total mg/L	Total Organic Carbon mg/L	Dissolved Organic Carbon mg/L
BC Standard																													
CSR Aquatic Life (AW)[a]			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1,500	2-3[b]	1,280-4,290[b]	1.31-18.5[c]	400	0.2-2[d]	n/a	n/a	n/a	n/a	n/a
CSR Irrigation Watering (IW)			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	100	1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
CSR Livestock Watering (LW)			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	600	1	1,000	n/a	100	10	n/a	n/a	n/a	n/a	n/a
CSR Drinking Water (DW)			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	250	1.5	500	n/a	10	1	n/a	n/a	n/a	n/a	n/a
Fording River Valley																													
FR_09-02-A	FR_09-02-A_QTR_2022-01-04_N	2022 01 11	3.9	7.64	10.86	1,203	193.6	8.03	621	1,130	5.4	874	2.81	211	258	< 1.0	< 1.0	< 0.250	2.04	0.114	337	0.0425	25.9	< 0.0050	< 0.050	< 0.0010	0.0177	< 0.50	< 0.50
	FR_09-02-A_QTR_2022-04-01_N	2022 04 21	1.7	7.71	11.26	1,280	145.2	8.15	650	1,130	11.0	844	2.16	202	246	< 1.0	< 1.0	< 0.250	2.09	0.162	375	< 0.0050	25.0	< 0.0050	< 0.050	< 0.0010	0.0078	0.78	0.89
	FR_09-02-A_QTR_2022-07-01_N	2022 07 18	7.3	7.58	9.72	1,011	185.3	8.01	530	901	21.7	657	19.5	282	344	< 1.0	< 1.0	< 0.050	1.98	0.208	210	< 0.0050	17.9	0.0020	0.408	< 0.0010	0.116	< 0.50	< 0.50
	FR_DC1_QTR_2022-07-01_N	Duplicate	-	-	-	-	-	8.01	530	906	10.3	655	2.21	269	329	< 1.0	< 1.0	< 0.050	1.98	0.207	211	< 0.0050	18.0	0.0018	0.098	< 0.0010	0.0125	< 0.50	< 0.50
	QA/QC RPD%		-	-	-	-	-	0	0	1	71	0	159	5	4	*	*	*	0	0	0	*	1	*	*	*	161	*	*
	FR_09-02-A_QTR_2022-10-01_N	2022 10 05	13.3	7.62	7.13	1,103	166.3	8.14	582	934	75.0	723	49.6	204	248	< 1.0	< 1.0	< 0.250	1.79	0.175	300	< 0.0050	22.1	< 0.0050	< 0.050	0.0011	1.18	< 0.50	< 0.50
	FR_DC2_QTR_2022-10-01_N	Duplicate	-	-	-	-	-	8.12	568	934	16.2	707	6.30	199	243	< 1.0	< 1.0	< 0.250	1.75	0.173	297	< 0.0050	22.0	< 0.0050	< 0.050	< 0.0010	0.0128	< 0.50	< 0.50
	QA/QC RPD%		-	-	-	-	-	0	2	0	129	2	155	2	2	*	*	*	2	1	1	*	0	*	*	*	196	*	*
FR_09-02-B	FR_09-02-B_QTR_2022-01-04_N	2022 01 11	6.6	7.4	10.08	11.25	196.3	8.12	574	1,050	< 1.0	749	0.51	217	264	< 1.0	< 1.0	< 0.250	1.97	0.117	300	0.0264	22.2	< 0.0050	1.08	< 0.0010	0.0056	< 0.50	< 0.50
	FR_09-02-B_QTR_2022-04-01_N	2022 04 21	2.3	7.57	40.96	661	148	8.07	617	1,180	2.8	806	0.27	221	269	< 1.0	< 1.0	< 0.250	2.45	0.156	407	< 0.0050	26.9	< 0.0050	< 0.050	0.0010	0.0034	< 0.50	< 0.50
	FR_DC1_QTR_2022-04-01_N	Duplicate	-	-	-	-	-	8.12	703	1,170	2.4	892	0.34	208	253	< 1.0	< 1.0	< 0.250	3.73	0.161	407	< 0.0050	26.4	< 0.0050	< 0.050	< 0.0010	0.0049	< 0.50	< 0.50
	QA/QC RPD%		-	-	-	-	-	1	13	1	*	10	*	6	6	*	*	*	41	3	0	*	2	*	*	*	*	*	*
	FR_09-02-B_QTR_2022-07-01_N	2022 07 18	5.7	7.43	9.46	982	312.5	7.91	551	946	2.2	690	0.42	273	333	< 1.0	< 1.0	< 0.050	1.60	0.182	222	< 0.0050	20.9	0.0024	0.296	< 0.0010	0.0100	< 0.50	< 0.50
	FR_09-02-B_QTR_2022-10-01_N	2022 10 05	10.8	7.52	7.05	1,007	176.7	8.17	534	882	3.5	646	0.25	234	285	< 1.0	< 1.0	< 0.250	1.84	0.180	266	< 0.0050	18.5	< 0.0050	< 0.050	0.0011	< 0.0020	< 0.50	< 0.50
FR_GH_WELL4	FR_GH_WELL4_QTR_2022-01-04_N	2022 02 17	9.8	7.39	1.43	1,131	-64.8	7.92	582	1,080	5.1	765	19.1	278	339	< 1.0	< 1.0	< 0.250	1.93	0.110	312	2.27	11.5	**3.23**	2.79	< 0.0010	0.0036	4.87	4.58
	FR_GH_WELL4_QTR_2022-04-01_N	2022 05 11	6.3	7.3	6.44	1,403	79.6	7.87	757	1,340	2.0	1,050	1.54	307	375	< 1.0	< 1.0	< 0.250	3.80	< 0.100	366	0.0066	41.0	0.0129	< 0.050	< 0.0010	< 0.0020	0.60	1.56
	FR_GH_WELL4_QTR_2022-07-01_N	2022 08 21	17.9	7.35	2.22	822	52.8	7.79	401	783	1.2	592	2.34	246	300	< 1.0	< 1.0	< 0.050	3.68	0.118	172	0.166	13.0	0.0699	0.714	< 0.0010	< 0.0020	1.32	1.09
	FR_GH_WELL4_QTR_2022-10-01_N	2022 10 07	20.5	7.41	0.50	684	82.3	8.07	549	885	4.4	618	18.8	292	356	< 1.0	< 1.0	< 0.250	3.30	< 0.100	271	1.60	5.05	**1.95**	2.16	0.0019	0.0034	5.53	5.02
	FR_DC3_QTR_2022-10-01_N	Duplicate	-	-	-	-	-	8.07	542	906	3.0	595	17.9	303	369	< 1.0	< 1.0	< 0.250	3.37	< 0.100	271	1.58	5.38	**1.99**	2.04	0.0016	< 0.0020	5.61	8.08
	QA/QC RPD%		-	-	-	-	-	0	1	2	*	4	5	4	4	*	*	*	2	*	0	1	6	2	6	*	*	1	47
RG_MW_FR1A	RG_MW_FR1A_WG_2022_02_09_NP	2022 02 09	5.1	7.19	9.89	1,428	29.0	7.88	748	1,330	26.8	1,000	18.1	308	376	< 2.0	< 2.0	< 0.250	3.72	0.139	360	< 0.0050	41.8	< 0.0050	< 0.050	0.0021	0.0366	1.24	0.61
	RG_MW_FR1A_WG_2022_05_04_NP	2022 05 04	5.5	7.29	7.96	1,469	222.7	7.79	917	1,420	11.4	1,030	2.47	316	385	< 2.0	< 2.0	< 0.250	3.12	< 0.100	396	< 0.0050	41.6	< 0.0050	< 0.050	0.0030	0.0092	< 0.50	< 0.50
	RG_MW_MC10A_WG_2022_05_04_NP	Duplicate	5.5	7.29	7.96	1,469	222.7	7.75	826	1,430	8.2	1,020	3.08	321	391	< 2.0	< 2.0	< 0.250	3.19	< 0.100	396	< 0.0050	41.6	0.0120	< 0.050	0.0032	0.0098	< 0.50	< 0.50
	QA/QC RPD%		*	*	*	*	*	1	10	1	33	1	22	2	2	*	*	*	2	*	0	*	0	*	*	*	*	*	*
	RG_MW_FR1A_WG_2022_07_18_NP	2022 07 18	5.3	7.44	9.6	994	100.6	7.91	505	926	7.1	720	3.89	258	314	< 1.0	< 1.0	< 0.050	0.90	0.095	124	< 0.0050	14.8	0.0019	2.03	0.0028	0.0095	0.77	0.77
	RG_MW_FR1A_WG_2022_11_15_NP	2022 11 15	6.0	7.37	8.1	1,036	191.0	8.19	515	990	5.9	780	3.31	264	323	< 2.0	< 2.0	< 0.250	10.2	0.130	283	< 0.0050	19.8	< 0.0050	1.99	< 0.0010	0.0060	< 0.50	< 0.50
RG_MW_FR1B	RG_MW_FR1B_WG_2022_02_09_NP	2022 02 09	5.4	7.17	6.74	1,268	128.2	7.87	812	1,380	< 1.0	985	0.13	343	419	< 2.0	< 2.0	< 0.250	1.94	0.283	359	< 0.0050	41.5	< 0.0050	< 0.050	0.0012	0.0028	< 0.50	1.09
	RG_MW_FR1B_WG_2022_05_04_NP	2022 05 04	5.0	7.43	6.7	1,551	90.3	7.71	963	1,520	3.1	1,110	< 0.10	321	392	< 2.0	< 2.0	< 0.250	2.35	< 0.100	412	0.0062	47.9	< 0.0050	< 0.050	0.0021	0.0029	< 0.50	< 0.50
	RG_MW_FR1B_WG_2022_07_18_NP	2022 07 18	5.7	7.19	7.7	1,211	77.5	7.87	714	1,270	1.7	1,060	< 0.10	300	366	< 1.0	< 1.0	< 0.250	3.57	0.124	359	< 0.0050	34.6	< 0.0050	0.876	0.0012	< 0.0020	< 0.50	< 0.50
	RG_MW_FR1B_WG_2022_11_15_NP	2022 11 15	6.1	7.68	8.45	1,038	92.4	8.26	543	1,020	3.4	783	0.45	294	358	< 2.0	< 2.0	< 0.250	3.66	0.134	272	< 0.0050	25.0	< 0.0050	1.26	< 0.0010	< 0.0020	< 0.50	< 0.50
RG_MW_FR1C	RG_MW_FR1C_WG_2022_02_09_NP	2022 02 09	4.8	7.27	9.15	1,388	248.6	8.00	837	1,430	< 1.0	1,080	< 0.10	320	390	< 2.0	< 2.0	< 0.250	2.77	0.308	414	< 0.0050	41.9	< 0.0050	< 0.050	0.0024	0.0031	< 0.50	0.85
	RG_MW_FR1C_WG_2022_05_04_NP	2022 05 04	3.9	7.42	10.37	1,570	182.5	7.75	896	1,510	1.6	1,170	< 0.10	318	388	< 2.0	< 2.0	< 0.250	6.25	< 0.100	460	< 0.0050	40.0	< 0.0050	< 0.050	0.0035	0.0040	< 0.50	< 0.50
	RG_MW_FR1C_WG_2022_07_18_NP	2022 07 18	6.3	7.34	6.8	825	72.5	7.93	470	862	< 1.0	666	< 0.10	268	326	< 1.0	< 1.0	< 0.050	0.92	0.164	196	< 0.0050	20.6	< 0.0010	1.56	0.0027	0.0030	< 0.50	< 0.50
	RG_MW_MC10A_WG_2022_07_18_NP	Duplicate	-	-	-	-	-	7.97	459	873	1.1	657	< 0.10	259	316	< 1.0	< 1.0	< 0.050	0.89	0.161	192	< 0.0050	20.3	< 0.0010	0.764	< 0.0010	0.0024	< 0.50	< 0.50
	QA/QC RPD%		-	-	-	-	-	1	2	1	*	1	*	3	3	*	*	*	3	2	2	*	1	*	69	*	*	*	*
	RG_MW_FR1C_WG_2022_11_15_NP	2022 11 15	6.4	7.57	10.11	1,384	105.6	8.23	786	1,340	3.0	1,110	0.39	326	398	< 2.0	< 2.0	< 0.250	19.8	0.168	438	< 0.0050	27.7	0.0057	1.22	< 0.0010	0.0044	< 0.50	< 0.50

All terms defined within the body of SNC-Lavalin's report.
< Denotes concentration less than indicated detection limit.
\- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

[a] Standard to protect freshwater aquatic life.
[b] Standard varies with Hardness.
[c] Standard varies with pH and Temperature. Temperature assumed 10C.
[d] Standard varies with Chloride.
[e] Sample ID renamed by SNC-Lavalin due to duplication with another sample in Teck Coal database.

BOLD	Concentration greater than CSR Aquatic Life (AW) standard
ITALIC	Concentration greater than CSR Irrigation Watering (IW) standard
UNDERLINE	Concentration greater than CSR Livestock Watering (LW) standard
SHADED	Concentration greater than CSR Drinking Water (DW) standard

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QAQC: CMH 2023 03 23

TABLE FR-03: Summary of Analytical Results Compared to Primary Screening Criteria for Dissolved Organics, Nutrient and Organics in Groundwater (FRO)

			Field Parameters					Physical Parameters						Dissolved Inorganics								Nutrients						Organics	
Sample Location	Sample ID	Sample Date (yyyy mm dd)	Field Temperature C	pH (field) pH	Dissolved Oxygen mg/L	Field Conductivity µS/cm	Field ORP mV	pH pH	Hardness mg/L	Conductivity µS/cm	Total Suspended Solids mg/L	Total Dissolved Solids mg/L	Turbidity ntu	Total Alkalinity mg/L	Bicarbonate mg/L	Carbonate mg/L	Hydroxide mg/L	Bromide mg/L	Chloride mg/L	Fluoride mg/L	Sulphate mg/L	Ammonia Nitrogen mg/L	Nitrate Nitrogen mg/L	Nitrite Nitrogen mg/L	Kjeldahl Nitrogen-N mg/L	Ortho-Phosphate mg/L	Phosphorus, Total mg/L	Total Organic Carbon mg/L	Dissolved Organic Carbon mg/L
BC Standard																													
CSR Aquatic Life (AW)[a]			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1,500	2-3[b]	1,280-4,290[b]	1.31-18.5[c]	400	0.2-2[d]	n/a	n/a	n/a	n/a	n/a
CSR Irrigation Watering (IW)			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	100	1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
CSR Livestock Watering (LW)			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	600	1	1,000	n/a	100	10	n/a	n/a	n/a	n/a	n/a
CSR Drinking Water (DW)			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	250	1.5	500	n/a	10	1	n/a	n/a	n/a	n/a	n/a
Fording River Valley																													
RG_MW_FR8A	RG_MW_FR8A_WG_2022_02_08_NP	2022 02 08	3.5	7.17	0.95	1,070	162.7	7.94	735	1,250	32.9	1,040	26.4	284	346	< 2.0	< 2.0	< 0.250	2.92	0.142	508	0.0056	0.198	0.0057	0.050	< 0.0010	0.0322	0.82	< 0.50
	RG_MW_FR8A_WG_2022_05_05_NP	2022 05 05	4.9	7.19	0.1	1,276	-178.8	7.90	755	1,230	55.6	1,020	14.0	274	334	< 2.0	< 2.0	< 0.250	2.54	< 0.100	483	0.0084	2.25	0.0116	0.259	< 0.0010	0.116	< 0.50	< 0.50
	RG_MW_FR8A_WG_2022_07_21_NP	2022 07 21	8.2	7.15	1.2	1,053	78.9	7.52	764	1,260	191	1,040	120	300	365	< 2.0	< 2.0	< 0.250	3.26	< 0.100	535	0.0172	1.10	0.0127	1.22	0.0013	0.251	2.77	1.41
	RG_MW_FR8A_WG_2022_11_17_NP	2022 11 17	3.4	7.33	1.45	1,321	164.4	7.94	716	1,220	19.2	965	14.9	303	370	< 2.0	< 2.0	< 0.250	3.13	< 0.100	529	0.0223	1.61	0.0569	< 0.500	0.0010	0.0176	1.75	< 0.50
RG_MW_FR8B	RG_MW_FR8B_WG_2022_02_08_NP	2022 02 08	3.7	7.55	4.75	1,279	-51.1	7.89	696	1,230	7.6	910	7.16	281	342	< 2.0	< 2.0	< 0.250	2.66	0.148	332	< 0.0050	31.9	< 0.0050	< 0.050	< 0.0010	0.0116	< 0.50	< 0.50
	RG_MW_FR8B_WG_2022_05_05_NP	2022 05 05	3.9	7.08	4.92	1,275	260.7	7.90	725	1,250	10.2	928	5.35	281	343	< 2.0	< 2.0	< 0.250	2.89	< 0.100	333	< 0.0050	31.9	< 0.0050	< 0.050	< 0.0010	0.0097	0.93	< 0.50
	RG_MW_FR8B_WG_2022_07_21_NP	2022 07 21	6.4	7.33	3.9	1,246	15.1	7.57	704	1,220	5.9	987	5.10	321	392	< 2.0	< 2.0	< 0.250	2.65	< 0.100	332	< 0.0050	30.5	< 0.0050	1.52	< 0.0010	0.0041	0.92	1.58
	RG_MW_FR8B_WG_2022_11_17_NP	2022 11 17	4.1	7.69	7.08	1,335	53.9	7.99	702	1,210	21.4	920	9.25	288	351	< 2.0	< 2.0	< 0.250	3.42	< 0.100	378	< 0.0050	33.6	< 0.0050	0.516	< 0.0010	0.0202	0.74	< 0.50
RG_MW_FR8C	RG_MW_FR8C_WG_2022_02_08_NP	2022 02 08	3.9	7.82	6.77	1,225	-52.6	8.22	670	1,190	< 1.0	872	< 0.10	268	327	< 2.0	< 2.0	< 0.250	3.31	0.145	339	< 0.0050	29.0	< 0.0050	< 0.050	0.0096	0.0093	0.53	0.58
	RG_MW_FR8C_WG_2022_05_05_NP	2022 05 05	2.5	7.52	9.57	1,275	428.8	247.0	8.15	220	421	< 1.0	298	< 0.10	149	182	< 2.0	< 2.0	< 0.050	1.77	0.104	57.2	< 0.0050	4.55	< 0.0010	0.301	0.0063	0.0080	1.50	1.88
	RG_MW_FR8C_WG_2022_07_21_NP	2022 07 21	5.1	7.61	7.7	356.7	70.5	7.86	219	426	< 1.0	295	0.12	195	238	< 2.0	< 2.0	< 0.050	2.14	0.121	66.3	< 0.0050	5.22	< 0.0010	1.05	0.0108	0.0094	2.48	2.27
	RG_MW_FR8C_WG_2022_11_17_NP	2022 11 17	4.8	7.57	9.3	1,145	200.3	8.18	604	1,100	1.1	806	0.32	274	334	< 2.0	< 2.0	< 0.250	9.95	0.110	348	< 0.0050	24.8	< 0.0050	1.56	0.0077	0.0081	< 0.50	0.56
GH_MW-PC	GH_MW-PC_WG_2022-03-16_NP	2022 03 16	2.4	7.30	10.16	1,065	226.3	7.98	632	1,030	9.0	812	5.27	212	258	< 1.0	< 1.0	< 0.250	2.19	0.267	419	< 0.0050	2.07	< 0.0050	0.186	0.0067	0.0137	0.74	1.07
	GH_MW-PC_WG_2022-04-04_NP	2022 06 01	4.7	7.43	7.4	885	-11.3	8.03	487	854	22.3	624	15.7	217	265	< 1.0	< 1.0	< 0.050	0.80	0.378	295	0.442	2.02	< 0.0010	0.589	0.0039	0.0320	2.19	2.16
	GH_MW-PC_WG_2022-07-04_NP	2022 08 08	8.3	7.22	7.31	1,014	156.1	8.35	563	973	77.3	756	47.8	236	275	6.6	< 1.0	< 0.050	0.52	0.359	343	< 0.0050	1.06	0.0013	0.163	0.0028	0.0872	3.05	2.44
	GH_MW-PC_WG_2022-10-03_NP	2022 11 25	4.0	7.36	10.28	1,051	195.1	8.27	603	1,000	48.2	838	24.2	227	272	2.6	< 1.0	< 0.250	1.14	0.350	418	< 0.0050	1.71	< 0.0050	< 0.500	0.0026	0.0468	1.65	1.06
RG_MW_FR10A	RG_MW_FR10A_WG_2022_02_08_NP	2022 02 08	-	-	-	-	-	8.21	233	551	694	389	525	267	326	< 2.0	< 2.0	< 0.050	2.43	0.306	75.6	0.222	0.0060	< 0.0010	0.908	< 0.0010	0.803	15.4	2.58
	RG_MW_FR10A_WG_2022_05_06_NP	2022 05 06	4.0	7.55	0.6	554	68.1	7.98	259	548	93.2	332	42.2	206	251	< 2.0	< 2.0	< 0.050	2.06	0.251	108	0.0964	0.0143	0.0199	0.238	0.0039	0.127	0.86	0.77
	RG_MW_FR10A_WG_2022_07_21_NP	2022 07 21	17.8	7.45	0.3	471.2	86.8	7.82	258	560	3.3	376	5.00	227	277	< 2.0	< 2.0	< 0.050	1.93	0.246	116	0.0795	< 0.0050	< 0.0010	1.21	< 0.0010	0.0172	1.80	3.67
	RG_MW_FR10A_WG_2022_11_17_NP	2022 11 17	3.2	7.76	1.13	603.1	173.1	8.27	293	579	10.2	372	8.21	215	262	< 2.0	< 2.0	< 0.050	1.34	0.184	135	0.0718	0.0408	0.0050	< 0.500	< 0.0010	0.0135	0.61	0.56
RG_MW_FR10B	RG_MW_FR10B_WG_2022_02_08_NP	2022 02 08	3.0	7.31	4.89	601	2.8	8.16	366	689	4.9	467	6.24	251	306	< 2.0	< 2.0	< 0.050	1.33	0.101	134	< 0.0050	6.85	0.0022	< 0.050	0.0031	0.0127	< 0.50	< 0.50
	RG_MW_FR10B_WG_2022_05_06_NP	2022 05 06	4.1	7.40	3.4	701	198.2	8.03	386	690	< 1.0	493	2.29	240	292	< 2.0	< 2.0	< 0.050	1.30	0.096	144	< 0.0050	7.17	0.0021	< 0.050	0.0034	0.0061	< 0.50	< 0.50
	RG_MW_FR10B_WG_2022_07_21_NP	2022 07 21	9.8	7.40	5.0	455.4	91.3	7.72	283	550	3.9	374	2.84	275	336	< 2.0	< 2.0	< 0.050	0.91	0.107	81.0	< 0.0050	3.23	0.0035	0.636	< 0.0010	0.0053	1.43	1.87
	RG_MW_FR10B_WG_2022_11_17_NP	2022 11 17	2.4	7.86	8.4	573.8	120.6	8.24	294	547	1.6	360	1.09	224	274	< 2.0	< 2.0	< 0.050	0.91	0.103	89.2	< 0.0050	3.43	< 0.0010	< 0.500	< 0.0010	0.0026	< 0.50	< 0.50
RG_MW_FR10C	RG_MW_FR10C_WG_2022_02_08_NP	2022 02 08	3.5	7.38	2.08	505	-12.4	8.20	301	572	2.2	351	3.44	210	256	< 2.0	< 2.0	< 0.050	0.66	0.139	120	< 0.0050	0.220	0.0058	< 0.050	< 0.0010	0.0039	< 0.50	< 0.50
	RG_MW_MC10A_WG_2022_02_08_NP	Duplicate	3.5	7.38	2.08	505.0	-12.4	8.23	299	570	1.7	401	3.47	222	270	< 2.0	< 2.0	< 0.050	0.64	0.124	121	0.0059	0.216	0.0058	< 0.050	< 0.0010	0.0041	< 0.50	< 0.50
	QA/QC RPD%		*	*	*	*	*	0	1	0	*	13	1	6	5	*	*	*	3	11	1	*	2	0	*	*	*	*	*
	RG_MW_FR10C_WG_2022_05_06_NP	2022 05 06	4.6	7.47	0.2	511.4	-116.1	8.11	281	506	3.1	332	2.14	202	247	< 2.0	< 2.0	< 0.050	0.60	0.136	92.8	0.0088	1.14	0.0167	0.196	< 0.0010	0.0038	< 0.50	< 0.50
	RG_MW_FR10C_WG_2022_07_21_NP	2022 07 21	8.9	7.44	1.2	464.0	-20.7	7.76	240	468	3.6	326	2.54	237	290	< 2.0	< 2.0	< 0.050	0.43	0.144	68.9	< 0.0050	0.178	0.0061	< 0.500	< 0.0010	0.0037	1.34	1.29
	RG_MW_MC10A_WG_2022_07_21_NP	Duplicate	-	-	-	-	-	7.78	247	463	1.2	312	2.29	213	260	< 2.0	< 2.0	< 0.050	0.44	0.144	67.7	0.0193	0.176	0.0060	< 0.500	< 0.0010	0.0038	1.19	1.46
	QA/QC RPD%		-	-	-	-	-	0	3	1	*	4	10	11	11	*	*	*	*	0	2	*	1	2	*	*	*	*	*
	RG_MW_FR10C_WG_2022_11_17_NP	2022 11 17	2.3	7.81	2.2	359.8	116.9	8.25	186	342	3.8	209	6.46	199	243	< 2.0	< 2.0	< 0.050	0.15	0.153	15.6	< 0.0050	< 0.0050	< 0.0010	< 0.500	< 0.0010	0.0035	< 0.50	< 0.50
	RG_MW_MC10A_WG_2022_11_17_NP	Duplicate	-	7.81	-	-	-	8.24	177	344	3.0	192	6.46	200	244	< 2.0	< 2.0	< 0.050	0.15	0.152	15.6	0.0059	< 0.0050	< 0.0010	< 0.500	< 0.0010	0.0060	< 0.50	< 0.50
	QA/QC RPD%		-	*	-	-	-	0	5	1	*	8	0	1	0	*	*	*	*	1	0	*	*	*	*	*	*	*	*

All terms defined within the body of SNC-Lavalin's report.
< Denotes concentration less than indicated detection limit.
- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

[a] Standard to protect freshwater aquatic life.
[b] Standard varies with Hardness.
[c] Standard varies with pH and Temperature. Temperature assumed 10C.
[d] Standard varies with Chloride.
[e] Sample ID renamed by SNC-Lavalin due to duplication with another sample in Teck Coal database.

BOLD	Concentration greater than CSR Aquatic Life (AW) standard
ITALIC	Concentration greater than CSR Irrigation Watering (IW) standard
UNDERLINE	Concentration greater than CSR Livestock Watering (LW) standard
SHADED	Concentration greater than CSR Drinking Water (DW) standard

TABLE FR-03: Summary of Analytical Results Compared to Primary Screening Criteria for Dissolved Organics, Nutrient and Organics in Groundwater (FRO)

			Field Parameters					Physical Parameters						Dissolved Inorganics								Nutrients						Organics	
Sample Location	Sample ID	Sample Date (yyyy mm dd)	Field Temperature C	pH (field) pH	Dissolved Oxygen mg/L	Field Conductivity µS/cm	Field ORP mV	pH pH	Hardness mg/L	Conductivity µS/cm	Total Suspended Solids mg/L	Total Dissolved Solids mg/L	Turbidity ntu	Total Alkalinity mg/L	Bicarbonate mg/L	Carbonate mg/L	Hydroxide mg/L	Bromide mg/L	Chloride mg/L	Fluoride mg/L	Sulphate mg/L	Ammonia Nitrogen mg/L	Nitrate Nitrogen mg/L	Nitrite Nitrogen mg/L	Kjeldahl Nitrogen-N mg/L	Ortho-Phosphate mg/L	Phosphorus, Total mg/L	Total Organic Carbon mg/L	Dissolved Organic Carbon mg/L
BC Standard																													
CSR Aquatic Life (AW)[a]			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1,500	2-3[b]	1,280-4,290[b]	1.31-18.5[c]	400	0.2-2[d]	n/a	n/a	n/a	n/a	n/a
CSR Irrigation Watering (IW)			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	100	1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
CSR Livestock Watering (LW)			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	600	1	1,000	n/a	100	10	n/a	n/a	n/a	n/a	n/a
CSR Drinking Water (DW)			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	250	1.5	500	n/a	10	1	n/a	n/a	n/a	n/a	n/a
Swift Creek																													
FR_MW18-02	FR_MW18-02_WG_2022-03-22	2022 03 22	5.1	7.24	1.75	2,443	149.3	7.93	1,630	2,330	3.5	2,160	0.48	318	388	< 1.0	< 1.0	< 0.250	4.85	0.137	1,310	0.0102	18.4	0.0153	0.288	0.0019	0.0053	2.29	2.75
	FR_MW18-02_WG_2022-05-30_NP	2022 06 01	10.1	7.23	2.42	2,472	98.1	7.92	1,430	2,190	2.1	2,000	< 0.10	316	386	< 1.0	< 1.0	< 0.250	4.69	0.121	1,310	< 0.0050	18.9	< 0.0050	0.088	< 0.0010	0.0051	2.53	4.55
	FR_MW18-02_WG_2022-09-12_N	2022 09 12	9.9	7.10	3.36	2,322	212.7	7.95	1,350	2,240	1.8	1,930	0.19	352	430	< 1.0	< 1.0	< 0.250	4.84	0.137	1,150	0.0079	19.4	< 0.0050	0.467	0.0015	0.0051	3.21	3.53
	FR_MW18-02_WG_2022-11-14_N	2022 11 15	4.4	7.08	2.32	2,704	104.6	8.19	1,920	2,600	1.7	3,020	0.15	446	544	< 1.0	< 1.0	< 0.250	3.78	0.141	1,580	< 0.0050	31.7	0.0071	0.322	< 0.0010	0.0026	1.65	1.95
Blanks																													
Field Blanks																													
FR_09-04-B	FR_FLD1_WG_2022	2022 01 25	-	-	-	-	-	5.50	< 0.50	< 2.0	< 1.0	< 10	< 0.10	< 1.0	< 1.0	< 1.0	< 1.0	< 0.050	< 0.10	< 0.020	< 0.30	< 0.0050	< 0.0050	< 0.0010	-	< 0.0010	< 0.0020	-	< 0.50
RG_MW_FR1C	RG_MW_MC10B_WG_2022_02_09_NP	2022 02 09	-	-	-	-	-	5.10	< 0.50	< 2.0	< 1.0	< 10	< 0.10	< 2.0	< 2.0	< 2.0	< 2.0	< 0.050	< 0.10	< 0.020	< 0.30	< 0.0050	< 0.0050	< 0.0010	< 0.050	< 0.0010	< 0.0020	< 0.50	< 0.50
FR_KB-1A	FR_FLD2_WG_2022-02_NP	2022 03 03	-	-	-	-	-	5.42	< 0.50	< 2.0	< 1.0	< 10	< 0.10	< 1.0	< 1.0	< 1.0	< 1.0	< 0.050	< 0.10	< 0.020	< 0.30	< 0.0050	< 0.0050	< 0.0010	< 0.050	< 0.0010	< 0.0020	< 0.50	< 0.50
FR_HMW3	FR_FLD_QTR_2022-01-04_N	2022 03 15	-	-	-	-	-	5.33	< 0.50	< 2.0	< 1.0	< 10	< 0.10	< 1.0	< 1.0	< 1.0	< 1.0	< 0.050	< 0.10	< 0.020	< 0.30	< 0.0050	< 0.0050	< 0.0010	0.054	< 0.0010	< 0.0020	< 0.50	< 0.50
FR_GCMW-1B	FR_FLD1_2022-03-16	2022 03 16	-	-	-	-	-	5.12	< 0.50	< 2.0	< 1.0	< 10	< 0.10	< 1.0	< 1.0	< 1.0	< 1.0	< 0.050	< 0.10	< 0.020	< 0.30	< 0.0050	< 0.0050	< 0.0010	< 0.050	< 0.0010	< 0.0020	< 0.50	< 0.50
FR_09-01-B	FR_FLD_QTR_2022-04-01_N	2022 04 21	-	-	-	-	-	5.23	< 0.50	< 2.0	< 1.0	< 10	< 0.10	< 1.0	< 1.0	< 1.0	< 1.0	< 0.050	< 0.10	< 0.020	< 0.30	< 0.0050	< 0.0050	< 0.0010	< 0.050	< 0.0010	0.0029	< 0.50	< 0.50
RG_MW_FR10B	RG_MW_MC10B_WG_2022_05_06_NP	2022 05 06	-	-	-	-	-	5.61	< 0.60	< 2.0	< 1.0	< 10	< 0.10	< 2.0	< 2.0	< 2.0	< 2.0	< 0.050	< 0.10	< 0.020	< 0.30	< 0.0050	< 0.0050	< 0.0010	< 0.050	0.0012	< 0.0020	< 0.50	< 0.50
FR_MW18-02	FR_MW_MC10B_WG_2022-05-30_NP	2022 06 01	-	-	-	-	-	5.32	< 0.50	< 2.0	< 1.0	< 10	< 0.10	< 1.0	< 1.0	< 1.0	< 1.0	< 0.050	< 0.10	< 0.020	< 0.30	< 0.0050	< 0.0050	< 0.0010	< 0.050	< 0.0010	< 0.0020	< 0.50	< 0.50
RG_MW_FR10C	RG_MW_MC10B_WG_2022_07_21_NP	2022 07 21	-	-	-	-	-	5.08	< 0.60	< 2.0	< 1.0	< 10	< 0.10	< 2.0	< 2.0	< 2.0	< 2.0	< 0.050	< 0.10	< 0.020	< 0.30	< 0.0050	< 0.0050	< 0.0010	< 0.050	< 0.0010	< 0.0020	< 0.50	< 0.50
FR_GCMW-2	FR_FLD2_2022-09-22	2022 09 22	-	-	-	-	-	5.39	< 0.50	< 2.0	< 1.0	< 10	< 0.10	< 1.0	< 1.0	< 1.0	< 1.0	< 0.050	< 0.10	< 0.020	< 0.30	< 0.0050	< 0.0050	< 0.0010	< 0.050	< 0.0010	< 0.0020	< 0.50	< 0.50
FR_09-01-A	FR_FLD_QTR_2022-10-01_N	2022 10 05	-	-	-	-	-	5.72	< 0.50	< 2.0	< 1.0	< 10	< 0.10	< 1.0	< 1.0	< 1.0	< 1.0	< 0.050	< 0.10	< 0.020	< 0.30	< 0.0050	< 0.0050	< 0.0010	< 0.050	< 0.0010	< 0.0020	< 0.50	< 0.50
RG_MW_FR10C	RG_MW_MC10B_WG_2022_11_17_NP	2022 11 17	-	-	-	-	-	5.51	< 0.60	< 2.0	< 1.0	< 10	< 0.10	< 2.0	< 2.0	< 2.0	< 2.0	< 0.050	< 0.10	< 0.020	< 0.30	< 0.0050	< 0.0050	< 0.0010	< 0.050	< 0.0010	< 0.0020	< 0.50	< 0.50
FR_GCMW-2	FR_FLD1_2022-11-22	2022 11 22	-	-	-	-	-	5.56	< 0.50	< 2.0	< 1.0	< 10	< 0.10	< 1.0	< 1.0	< 1.0	< 1.0	< 0.050	< 0.10	< 0.020	< 0.30	< 0.0050	< 0.0050	< 0.0010	< 0.050	< 0.0010	< 0.0020	< 0.50	< 0.50
Trip Blanks																													
	RG_MW_MC10C_WG_2022_02_09_NP	2022 02 09	-	-	-	-	-	5.03	< 0.50	< 2.0	< 1.0	< 10	< 0.10	< 2.0	< 2.0	< 2.0	< 2.0	< 0.050	< 0.10	< 0.020	< 0.30	< 0.0050	< 0.0050	< 0.0010	< 0.050	< 0.0010	< 0.0020	< 0.50	< 0.50
	FR_TRP_QTR_2022-01-04_N	2022 02 17	-	-	-	-	-	4.85	< 0.50	6.6	< 1.0	< 10	< 0.10	< 1.0	< 1.0	< 1.0	< 1.0	< 0.050	0.63	< 0.020	< 0.30	0.0336	0.0104	< 0.0010	< 0.050	< 0.0010	< 0.0020	< 0.50	< 0.50
	FR_TRP1_WG_2022-02_NP	2022 03 03	-	-	-	-	-	5.37	< 0.50	< 2.0	< 1.0	< 10	< 0.10	< 1.0	< 1.0	< 1.0	< 1.0	< 0.050	< 0.10	< 0.020	< 0.30	< 0.0050	< 0.0050	< 0.0010	< 0.050	< 0.0010	< 0.0020	< 0.50	-
	FR_TRP_QTR_2022-04-01_N	2022 04 21	-	-	-	-	-	5.04	< 0.50	< 2.0	< 1.0	< 10	< 0.10	< 1.0	< 1.0	< 1.0	< 1.0	< 0.050	< 0.10	< 0.020	< 0.30	0.0100	< 0.0050	< 0.0010	0.080	< 0.0010	< 0.0020	< 0.50	< 0.50
	FR_TRP_WEK_2022-04-25_N	2022 04 25	-	-	-	-	-	5.46	< 0.50	< 2.0	< 1.0	< 10	< 0.10	< 1.0	< 1.0	< 1.0	< 1.0	< 0.050	< 0.10	< 0.020	< 0.30	< 0.0050	< 0.0050	< 0.0010	< 0.050	< 0.0010	< 0.0020	< 0.50	-
	RG_MW_MC10C_WG_2022_05_06_NP	2022 05 06	-	-	-	-	-	5.66	< 0.60	< 2.0	< 1.0	< 10	< 0.10	< 2.0	< 2.0	< 2.0	< 2.0	< 0.050	< 0.10	< 0.020	< 0.30	< 0.0050	< 0.0050	< 0.0010	< 0.050	< 0.0010	< 0.0020	1.80	1.16
	FR_TRP_WEK_2022-05-09_N	2022 05 12	-	-	-	-	-	5.76	< 0.50	< 2.0	< 1.0	< 10	< 0.10	< 1.0	< 1.0	< 1.0	< 1.0	< 0.050	< 0.10	< 0.020	< 0.30	< 0.0050	< 0.0050	< 0.0010	< 0.050	< 0.0010	< 0.0020	< 0.50	-
	FR_MW_MC10C_WG_2022-05-30_NP	2022 06 01	-	-	-	-	-	5.37	< 0.50	< 2.0	< 1.0	< 10	< 0.10	< 1.0	< 1.0	< 1.0	< 1.0	< 0.050	< 0.10	< 0.020	< 0.30	< 0.0050	< 0.0050	< 0.0010	< 0.050	< 0.0010	< 0.0020	< 0.50	-
	FR_MW_MC10C_WG_2022_06_06_NP	2022 06 06	-	-	-	-	-	5.57	< 0.50	< 2.0	< 1.7	< 10	< 0.10	< 2.0	< 2.0	< 2.0	< 2.0	< 0.050	< 0.10	< 0.020	< 0.30	< 0.0050	< 0.0050	< 0.0010	< 0.050	< 0.0010	< 0.0020	< 0.50	< 0.50
	RG_MW_MC10C_WG_2022_07_21_NP	2022 07 21	-	-	-	-	-	5.65	< 0.60	< 2.0	< 1.0	< 10	< 0.10	< 2.0	< 2.0	< 2.0	< 2.0	< 0.050	< 0.10	< 0.020	< 0.30	< 0.0050	< 0.0050	< 0.0010	< 0.050	< 0.0010	< 0.0020	< 0.50	< 0.50
	FR_TRP_QTR_2022-07-01_N	2022 09 15	-	-	-	-	-	5.48	< 0.50	< 2.0	< 1.0	< 10	< 0.10	< 1.0	< 1.0	< 1.0	< 1.0	< 0.050	< 0.10	< 0.020	< 0.30	< 0.0050	< 0.0050	< 0.0010	< 0.050	< 0.0010	< 0.0020	< 0.50	< 0.50
	RG_MW_MC10C_WG_2022_11_17_NP	2022 11 17	-	-	-	-	-	5.44	< 0.60	< 2.0	< 1.0	< 10	< 0.10	< 2.0	< 2.0	< 2.0	< 2.0	< 0.050	< 0.10	< 0.020	< 0.30	< 0.0050	< 0.0050	< 0.0010	< 0.050	< 0.0010	< 0.0020	< 0.50	< 0.50

All terms defined within the body of SNC-Lavalin's report.
< Denotes concentration less than indicated detection limit.
\- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

[a] Standard to protect freshwater aquatic life.
[b] Standard varies with Hardness.
[c] Standard varies with pH and Temperature. Temperature assumed 10C.
[d] Standard varies with Chloride.
[e] Sample ID renamed by SNC-Lavalin due to duplication with another sample in Teck Coal database.

BOLD	Concentration greater than CSR Aquatic Life (AW) standard
ITALIC	Concentration greater than CSR Irrigation Watering (IW) standard
UNDERLINE	Concentration greater than CSR Livestock Watering (LW) standard
SHADED	Concentration greater than CSR Drinking Water (DW) standard

TABLE FR-04: Summary of Analytical Results Compared to Primary Screening Criteria for Dissolved Metals in Groundwater (FRO)

Sample Location	Sample ID	Sample Date (yyyy mm dd)	Hardness mg/L	Aluminum µg/L	Antimony µg/L	Arsenic µg/L	Barium µg/L	Beryllium µg/L	Bismuth µg/L	Boron µg/L	Cadmium µg/L	Calcium mg/L	Chromium µg/L	Cobalt µg/L	Copper µg/L	Iron µg/L	Lead µg/L	Lithium µg/L	Magnesium mg/L	Manganese µg/L	Mercury µg/L	Molybdenum µg/L	Nickel µg/L	Potassium mg/L	Selenium µg/L	Silver µg/L	Sodium mg/L	Strontium µg/L	Thallium µg/L	Tin µg/L	Titanium µg/L	Uranium µg/L	Vanadium µg/L	Zinc[f] µg/L
			Dissolved Metals																															
BC Standard																																		
CSR Aquatic Life (AW)[a]			n/a	n/a	90	50	10,000	1.5	n/a	12,000	0.5-4[b]	n/a	10[d]	40	20-90[b]	n/a	40-160[b]	n/a	n/a	n/a	0.25	10,000	250-1,500[b]	n/a	20	0.5-15[b]	n/a	n/a	3	n/a	1,000	85	n/a	75-2,400[b]
CSR Irrigation Watering (IW)			n/a	5,000	n/a	100	n/a	100	n/a	500	5	n/a	5[d]	50	200	5,000	200	2,500	n/a	200	1	10	200	n/a	20	n/a	n/a	n/a	n/a	n/a	n/a	10	100	1,000-5,000[c]
CSR Livestock Watering (LW)			n/a	5,000	n/a	25	n/a	100	n/a	5,000	80	1,000	50[d]	1,000	300	n/a	100	5,000	n/a	n/a	2	50	1,000	n/a	30	n/a	n/a	n/a	n/a	n/a	n/a	200	100	2,000
CSR Drinking Water (DW)			n/a	9,500	6	10	1,000	8	n/a	5,000	5	n/a	50[d]	20[e]	1,500	6,500	10	8	n/a	1,500	1	250	80	n/a	10	20	200	2,500	n/a	2,500	n/a	20	20	3,000
Health-based Value (HBV)[g]			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1,200	n/a	n/a	n/a	2,400	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Henretta Creek																																		
FR_HMW1D	FR_HMW1D_QTR_2022-01-04_N	2022 03 07	2,640	2.0	0.39	< 0.20	13.4	< 0.040	< 0.100	51	0.0705	574	< 0.20	4.56	3.39	< 20	< 0.100	91.6	292	*740*	< 0.0050	0.664	29.5	6.30	5.71	< 0.020	2.24	322	< 0.020	< 0.20	< 0.60	*13.5*	< 1.00	11.2
	FR_HMW1D_QTR_2022-04-01_N	2022 06 29	2,780	< 2.0	0.42	< 0.20	11.4	< 0.040	< 0.100	52	0.102	591	< 0.20	4.95	0.64	< 20	< 0.100	101	316	*816*	< 0.0050	0.712	30.2	6.36	14.9	< 0.020	2.34	365	< 0.020	< 0.20	< 0.60	*11.8*	< 1.00	9.2
	FR_HMW1D_QTR_2022-07-01_N	2022 07 21	2,480	< 5.0	< 0.50	< 0.50	15.5	< 0.100	< 0.250	50	0.107	514	< 0.50	4.68	2.03	< 50	< 0.250	86.5	290	*822*	< 0.0050	0.636	29.5	6.02	4.98	< 0.050	2.26	317	< 0.050	< 0.50	< 1.50	*13.2*	< 2.50	10.4
	FR_HMW1D_QTR_2022-10-01_N	2022 10 03	2,580	< 2.0	0.34	< 0.20	9.58	< 0.040	< 0.100	44	0.107	577	< 0.20	4.29	< 0.40	< 20	< 0.100	79.1	278	*734*	< 0.0050	0.607	25.7	5.43	5.29	< 0.020	1.99	300	< 0.020	< 0.20	< 0.60	*10.9*	< 1.00	6.6
FR_HMW1S	FR_HMW1S_QTR_2022-01-04_N	2022 03 07	2,540	2.6	0.34	< 0.20	12.3	< 0.040	< 0.100	45	0.101	530	< 0.20	3.70	3.51	< 20	< 0.100	92.7	296	*313*	< 0.0050	0.975	38.3	7.12	***228***	< 0.020	4.24	297	0.028	< 0.20	< 0.60	*13.5*	< 1.00	11.4
	FR_DC2_QTR_2022-01-04_N	Duplicate	2,550	2.1	0.35	< 0.20	9.88	< 0.040	< 0.100	46	0.111	535	< 0.20	3.77	1.53	< 20	< 0.100	94.5	296	*314*	< 0.0050	0.996	38.9	7.12	***244***	< 0.020	4.21	310	0.030	< 0.20	< 0.60	*13.6*	< 1.00	9.5
	QA/QC RPD%		0	*	*	*	22	*	*	*	9	1	*	2	79	*	*	2	0	0	*	2	2	0	7	*	1	4	*	*	*	1	*	18
	FR_HMW1S_QTR_2022-04-01_N	2022 06 29	2,530	< 2.0	0.32	< 0.20	10.3	< 0.040	< 0.100	43	0.101	516	< 0.20	3.50	0.93	< 20	< 0.100	112	302	*319*	< 0.0050	1.18	37.0	7.03	***279***	< 0.020	32.3	354	0.026	< 0.20	< 0.60	*11.0*	< 1.00	5.7
	FR_HMW1S_QTR_2022-07-01_N	2022 07 21	2,300	< 2.0	0.31	< 0.20	9.66	< 0.040	< 0.100	44	0.113	471	< 0.20	3.44	0.46	< 20	< 0.100	96.2	274	*313*	< 0.0050	1.05	37.5	6.92	***273***	< 0.020	17.3	302	0.031	< 0.20	< 0.60	*12.4*	< 1.00	5.9
	FR_DC2_QTR_2022-07-01_N	Duplicate	2,260	< 2.0	0.30	< 0.20	9.46	< 0.040	< 0.100	42	0.110	458	< 0.20	3.36	0.50	< 20	< 0.100	89.5	270	*309*	< 0.0050	1.01	37.0	6.89	***272***	< 0.020	17.3	298	0.030	< 0.20	< 0.60	*12.1*	< 1.00	5.1
	QA/QC RPD%		2	*	*	*	2	*	*	*	3	3	*	2	*	*	*	7	1	1	*	4	1	0	0	*	0	1	*	*	*	2	*	15
	FR_HMW1S_QTR_2022-10-01_N	2022 10 03	2,520	< 2.0	0.31	< 0.20	8.61	< 0.040	< 0.100	43	0.0907	541	< 0.20	3.54	< 0.40	< 20	< 0.100	84.8	284	*310*	< 0.0050	0.890	34.9	6.28	***228***	< 0.020	3.17	265	0.026	< 0.20	< 0.60	*10.7*	< 1.00	3.1
FR_HMW3	FR_HMW3_QTR_2022-01-04_N	2022 03 15	485	< 1.0	0.14	< 0.10	36.4	< 0.020	< 0.050	16	0.0553	112	< 0.10	0.21	0.50	40	< 0.050	29.6	49.9	160	< 0.0050	0.707	1.64	2.16	***64.4***	< 0.010	1.34	125	0.014	< 0.10	< 0.30	2.20	< 0.50	3.6
	FR_DC3_QTR_2022-01-04_N	Duplicate	491	1.3	0.15	< 0.10	35.7	< 0.020	< 0.050	15	0.0658	113	< 0.10	0.19	0.48	34	< 0.050	28.1	50.8	148	< 0.0050	0.722	1.65	2.02	***66.2***	< 0.010	1.29	131	0.012	< 0.10	< 0.30	2.18	< 0.50	3.8
	QA/QC RPD%		1	*	*	*	2	*	*	*	17	1	*	*	*	*	*	5	2	8	*	2	*	7	3	*	4	5	*	*	*	1	*	*
	FR_HMW3_QTR_2022-04-01_N	2022 04 25	662	1.4	0.15	< 0.10	41.5	< 0.020	< 0.050	16	0.0568	152	< 0.10	0.11	0.20	< 10	< 0.050	33.9	68.5	122	< 0.0050	0.851	1.83	2.10	***117***	< 0.010	1.14	167	0.013	< 0.10	< 0.30	2.70	< 0.50	1.7
	FR_HMW3_QTR_2022-07-01_N	2022 07 21	467	1.1	0.20	< 0.10	29.1	< 0.020	< 0.050	15	0.0284	104	< 0.10	< 0.10	0.94	< 10	< 0.050	31.2	50.4	23.1	< 0.0050	0.891	1.09	1.84	***85.1***	< 0.010	0.994	108	0.010	< 0.10	< 0.30	2.11	< 0.50	4.3
	FR_HMW3_QTR_2022-10-01_N	2022 10 03	564	< 1.0	0.20	0.10	34.7	< 0.020	< 0.050	19	0.0336	135	< 0.10	< 0.10	0.44	< 10	< 0.050	32.8	55.0	44.6	< 0.0050	0.860	1.10	1.96	***98.7***	< 0.010	1.10	122	0.012	< 0.10	< 0.30	2.13	< 0.50	3.2
	FR_DC1_QTR_2022-10-01_N	Duplicate	556	< 1.0	0.21	< 0.10	33.9	< 0.020	< 0.050	19	0.0355	134	< 0.10	< 0.10	0.42	< 10	< 0.050	33.0	53.7	45.1	< 0.0050	0.844	1.03	1.92	***94.4***	< 0.010	1.11	120	0.012	< 0.10	< 0.30	2.07	< 0.50	3.1
	QA/QC RPD%		1	*	*	*	2	*	*	*	5	1	*	*	*	*	*	1	2	1	*	2	*	2	4	*	1	2	*	*	*	3	*	*
FR_HMW5	FR_HMW5_QTR_2022-01-04_N	2022 01 12	169	4.5	< 0.10	< 0.10	193	< 0.020	< 0.050	36	< 0.0050	37.3	< 0.10	< 0.10	< 0.20	< 10	< 0.050	146	18.4	44.7	< 0.0050	< 0.050	< 0.50	0.707	0.264	< 0.010	8.91	382	< 0.010	< 0.10	< 0.30	0.014	< 0.50	< 1.0
	FR_HMW5_QTR_2022-04-01_N	2022 05 03	172	6.6	< 0.10	< 0.10	204	< 0.020	< 0.050	35	< 0.0050	40.0	< 0.10	< 0.10	< 0.20	< 10	< 0.050	146	17.4	46.8	< 0.0050	< 0.050	< 0.50	0.794	2.52	< 0.010	8.46	386	< 0.010	< 0.10	< 0.30	0.014	< 0.50	< 1.0
	FR_HMW5_QTR_2022-07-01_N	2022 09 06	166	3.6	< 0.10	< 0.10	204	< 0.020	< 0.050	42	< 0.0050	37.9	< 0.10	< 0.10	< 0.20	< 10	< 0.050	177	17.4	42.3	< 0.0050	< 0.050	< 0.50	0.680	13.4	< 0.010	10.2	371	< 0.010	0.10	< 0.30	0.011	< 0.50	2.4
	FR_HMW5_QTR_2022-10-01_N	2022 10 26	178	3.7	< 0.10	< 0.10	198	< 0.020	< 0.050	31	< 0.0050	40.8	< 0.10	< 0.10	< 0.20	10	< 0.050	130	18.6	53.3	< 0.0050	< 0.050	< 0.50	0.653	0.744	< 0.010	4.43	365	< 0.010	< 0.10	< 0.30	0.016	< 0.50	< 1.0
Fording River Valley																																		
FR_TBSSMW-1	FR_TBSSMW-1_QTR_2022-01-04_N	2022 03 25	138	7.0	< 0.10	1.27	2,120	< 0.020	< 0.050	10	< 0.0050	10.9	< 0.10	< 0.10	0.24	287	< 0.050	191	26.9	30.5	< 0.0050	*15.1*	< 0.50	5.98	< 0.050	< 0.010	11.0	197	< 0.010	< 0.10	< 0.30	0.077	< 0.50	1.5
	FR_TBSSMW-1_QTR_2022-04-01_N	2022 05 10	132	1.9	< 0.10	1.14	2,320	< 0.020	< 0.050	15	< 0.0050	11.8	< 0.50	< 0.10	< 0.20	344	< 0.050	206	24.8	37.2	< 0.0050	*15.2*	< 0.50	5.83	< 0.050	< 0.010	10.9	221	< 0.010	< 0.10	< 0.30	0.133	< 0.50	1.8
	FR_TBSSMW-1_QTR_2022-07-01_N	2022 09 07	145	1.5	< 0.10	1.25	2,670	< 0.020	< 0.050	19	< 0.0050	11.9	< 0.10	< 0.10	< 0.20	368	< 0.050	231	27.9	40.6	< 0.0050	*12.8*	< 0.50	6.47	< 0.050	< 0.010	10.8	201	< 0.010	< 0.10	< 0.30	0.125	< 0.50	1.4
	FR_TBSSMW-1_QTR_2022-10-01_N	2022 10 10	146	2.7	< 0.10	1.16	2,790	< 0.020	< 0.050	18	< 0.0050	13.4	< 0.10	< 0.10	< 0.20	361	< 0.050	210	27.3	42.9	< 0.0050	*14.2*	< 0.50	6.31	< 0.050	< 0.010	10.8	236	< 0.010	< 0.10	< 0.30	0.114	< 0.50	1.1
FR_TBSSMW-2	FR_TBSSMW-2_QTR_2022-01-04_N	2022 03 25	414	1.2	< 0.10	< 0.10	89.8	< 0.020	< 0.050	< 10	0.0119	98.3	0.12	< 0.10	0.26	< 10	< 0.050	14.0	40.9	0.13	< 0.0050	0.807	< 0.50	0.802	***38.8***	< 0.010	0.852	156	< 0.010	< 0.10	< 0.30	1.59	< 0.50	< 1.0
	FR_TBSSMW-2_QTR_2022-04-01_N	2022 05 10	424	< 1.0	< 0.10	< 0.10	95.6	< 0.020	< 0.050	< 10	0.0174	102	< 0.50	< 0.10	0.30	< 10	< 0.050	14.5	41.2	0.15	< 0.0050	0.921	0.51	0.975	***40.2***	< 0.010	0.893	177	< 0.010	< 0.10	< 0.30	1.79	< 0.50	1.0
	FR_TBSSMW-2_QTR_2022-07-01_N	2022 09 07	232	< 1.0	< 0.10	0.10	62.6	< 0.020	< 0.050	< 10	0.0132	54.8	0.10	< 0.10	0.66	< 10	< 0.050	8.5	23.0	< 0.10	< 0.0050	0.768	< 0.50	0.868	19.7	< 0.010	0.598	90.7	< 0.010	< 0.10	< 0.30	0.881	< 0.50	2.9
	FR_TBSSMW-2_QTR_2022-10-01_N	2022 10 10	304	1.3	< 0.10	< 0.10	77.5	< 0.020	< 0.050	< 10	0.0202	73.8	0.13	< 0.10	1.02	< 10	< 0.050	11.1	29.2	< 0.10	< 0.0050	0.943	< 0.50	0.864	***27.9***	< 0.010	0.691	124	< 0.010	< 0.10	< 0.30	1.04	< 0.50	1.6
FR_POTWELLS	FR_POTWELLS_QTR_2022-01-04_N	2022 03 16	322	1.3	< 0.10	< 0.10	63.7	< 0.020	< 0.050	< 10	0.0095	81.6	< 0.10	< 0.10	0.50	< 10	< 0.050	8.2	28.7	0.25	< 0.0050	0.618	< 0.50	0.609	***25.6***	< 0.010	0.683	141	< 0.010	< 0.10	< 0.30	1.14	< 0.50	4.2
	FR_POTWELLS_QTR_2022-04-01_N	2022 06 27	174	2.0	< 0.10	< 0.10	42.3	< 0.020	< 0.050	< 10	< 0.0050	43.5	< 0.10	< 0.10	8.13	< 10	0.627	5.4	16.0	0.11	< 0.0050	0.696	< 0.50	0.557	8.24	< 0.010	0.520	76.8	< 0.010	< 0.10	< 0.30	0.661	< 0.50	12.5
	FR_POTWELLS_QTR_2022-07-01_N	2022 09 18	241	< 1.0	< 0.10	< 0.10	63.8	< 0.020	< 0.050	< 10	0.0101	60.6	< 0.10	< 0.10	4.48	< 10	0.479	8.0	21.7	0.14	< 0.0050	0.739	< 0.50	0.708	***21.1***	< 0.010	0.612	113	< 0.010	< 0.10	< 0.30	0.880	< 0.50	8.7
	FR_POTWELLS_QTR_2022-10-01_N	2022 10 10	289	1.2	< 0.10	< 0.10	71.4	< 0.020	< 0.050	< 10	0.0113	71.8	0.14	< 0.10	1.60	< 10	0.165	9.8	26.7	0.12	< 0.0050	0.772	< 0.50	0.750	***24.2***	< 0.010	0.720	128	< 0.010	< 0.10	< 0.30	0.955	< 0.50	6.1

All terms defined within the body of SNC-Lavalin's report.
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n/a Denotes no applicable standard/guideline.
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BOLD Concentration greater than CSR Aquatic Life (AW) standard
ITALIC Concentration greater than CSR Irrigation Watering (IW) standard
UNDERLINE Concentration greater than CSR Livestock Watering (LW) standard
SHADED Concentration greater than CSR Drinking Water (DW) standard

[a] Standard to protect freshwater aquatic life.
[b] Standard varies with Hardness.
[c] Standard varies with pH.
[d] Individual standards exist for Cr +3 and Cr +6. Reported value represents more stringent standard.
[e] Interim BC MoE Regional Background Estimate (Protocol 9 Determining Background Groundwater Quality).
[f] There is no Zinc standard specified for H > 400; therefore, the standard for H=300-<400 is applied as a conservative comparison.
[g] Ramboll calculated health-based values for these two parameters based on toxicity values (tolerable daily intakes; TDI) and drinking water allocation factors (DW AFs), documented in Appendix IV.
[h] Sample ID renamed by SNC-Lavalin due to duplication with another sample in Teck Coal database.

TABLE FR-04: Summary of Analytical Results Compared to Primary Screening Criteria for Dissolved Metals in Groundwater (FRO)

			Dissolved Metals																															
Sample Location	Sample ID	Sample Date (yyyy mm dd)	Hardness mg/L	Aluminum µg/L	Antimony µg/L	Arsenic µg/L	Barium µg/L	Beryllium µg/L	Bismuth µg/L	Boron µg/L	Cadmium µg/L	Calcium mg/L	Chromium µg/L	Cobalt µg/L	Copper µg/L	Iron µg/L	Lead µg/L	Lithium µg/L	Magnesium mg/L	Manganese µg/L	Mercury µg/L	Molybdenum µg/L	Nickel µg/L	Potassium mg/L	Selenium µg/L	Silver µg/L	Sodium mg/L	Strontium µg/L	Thallium µg/L	Tin µg/L	Titanium µg/L	Uranium µg/L	Vanadium µg/L	Zinc[f] µg/L
BC Standard																																		
CSR Aquatic Life (AW)[a]			n/a	n/a	90	50	10,000	1.5	n/a	12,000	0.5-4[b]	n/a	10[d]	40	20-90[b]	n/a	40-160[b]	n/a	n/a	n/a	0.25	10,000	250-1,500[b]	n/a	20	0.5-15[b]	n/a	n/a	3	n/a	1,000	85	n/a	75-2,400[b]
CSR Irrigation Watering (IW)			n/a	5,000	n/a	100	n/a	100	n/a	500	5	n/a	5[d]	50	200	5,000	200	2,500	n/a	200	1	10	200	n/a	20	n/a	n/a	n/a	n/a	n/a	n/a	10	100	1,000-5,000[c]
CSR Livestock Watering (LW)			n/a	5,000	n/a	25	n/a	100	n/a	5,000	80	1,000	50[d]	1,000	300	n/a	100	5,000	n/a	n/a	2	50	1,000	n/a	30	n/a	n/a	n/a	n/a	n/a	n/a	200	100	2,000
CSR Drinking Water (DW)			n/a	9,500	6	10	1,000	8	n/a	5,000	5	n/a	50[d]	20[e]	1,500	6,500	10	8	n/a	1,500	1	250	80	n/a	10	20	200	2,500	n/a	2,500	n/a	20	20	3,000
Health-based Value (HBV)[g]			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1,200	n/a	n/a	n/a	2,400	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Fording River Valley																																		
FR_GCMW-1B	FR_GCMW-1B_2022-03-16	2022 03 16	73.2	8.0	< 0.10	2.03	178	< 0.020	< 0.050	82	0.0187	20.2	< 0.10	0.16	15.7	193	< 0.050	117	5.54	*202*	< 0.0050	*41.4*	6.55	1.43	0.074	< 0.010	156	125	< 0.010	< 0.10	< 0.30	0.243	< 0.50	< 1.0
	FR_DC1_2022-03-16	Duplicate	73.2	8.0	< 0.10	2.08	177	< 0.020	< 0.050	77	0.0168	19.9	< 0.10	0.17	< 0.20	163	< 0.050	119	5.70	*206*	< 0.0050	*41.1*	1.27	1.46	0.065	< 0.010	159	123	< 0.010	< 0.10	< 0.30	0.252	< 0.50	< 1.0
	QA/QC RPD%		0	0	*	2	1	*	*	6	*	1	*	*	*	17	*	2	3	2	*	1	*	2	*	*	2	2	*	*	*	4	*	*
	FR_GCMW-1B_2022-06-23	2022 06 23	74.7	7.4	< 0.10	1.89	184	< 0.020	< 0.050	65	< 0.0100	20.4	< 0.10	0.17	< 0.20	214	< 0.050	87.9	5.77	184	< 0.0050	*40.8*	1.21	1.45	0.064	< 0.010	154	123	< 0.010	< 0.10	< 0.30	0.242	< 0.50	< 1.0
	FR_GCMW-1B_2022-09-20-N	2022 09 20	77.3	13.9	< 0.10	2.18	191	< 0.020	< 0.050	68	0.0077	21.0	< 0.10	0.18	6.61	237	0.432	77.8	6.04	185	< 0.0050	*40.5*	1.74	1.62	0.082	< 0.010	159	127	< 0.010	0.30	< 0.30	0.216	< 0.50	1.1
	FR_GCMW-1B_2022-11-22	2022 11 22	43.7	8.3	< 0.10	2.14	117	< 0.020	< 0.050	219	0.0100	12.3	< 0.10	< 0.10	< 0.20	52	< 0.050	307	3.16	101	< 0.0050	*35.6*	< 0.50	1.20	0.054	< 0.010	180	77.9	< 0.010	< 0.10	< 0.30	0.280	< 0.50	< 1.0
FR_GCMW-2	FR_GCMW-2_2022-03-15	2022 03 15	1,190	< 5.0	< 0.50	< 0.50	42.3	< 0.100	< 0.250	< 50	0.103	252	< 0.50	< 0.50	< 1.00	< 50	< 0.250	321	137	26.9	< 0.0050	1.50	3.19	4.42	***126***	< 0.050	11.6	393	< 0.050	< 0.50	< 1.50	8.74	< 2.50	< 5.0
	FR_GCMW-2_2022-06-23	2022 06 23	797	2.0	0.38	< 0.10	44.7	< 0.020	< 0.050	20	0.0515	174	< 0.10	< 0.10	< 0.20	< 10	< 0.050	197	88.1	0.14	< 0.0050	1.89	2.36	3.90	***107***	< 0.010	6.57	275	< 0.010	< 0.10	< 0.30	7.03	< 0.50	1.4
	FR_GCMW-2_QTR_2022-09-22-N	2022 09 22	1,060	6.9	0.47	0.12	56.5	< 0.020	< 0.050	33	0.0820	233	< 0.10	< 0.10	< 0.20	< 10	< 0.050	321	117	5.50	< 0.0050	2.42	3.59	5.69	***121***	< 0.010	10.7	372	0.013	< 0.10	< 0.30	*10.5*	< 0.50	1.6
	FR_DC2_2022-09-22	Duplicate	1,060	5.3	0.46	< 0.10	54.8	< 0.020	< 0.050	31	0.0923	233	< 0.10	< 0.10	0.26	< 10	< 0.050	324	115	5.44	< 0.0050	2.36	3.64	5.64	***119***	< 0.010	10.4	370	0.013	< 0.10	< 0.30	*10.5*	< 0.50	1.8
	QA/QC RPD%		0	26	*	*	3	*	*	*	12	0	*	*	*	*	*	1	2	1	*	3	1	1	2	*	3	1	*	*	*	0	*	*
	FR_GCMW-2_2022-11-22	2022 11 22	1,160	2.5	0.40	0.13	47.8	< 0.020	< 0.050	27	0.111	254	< 0.10	< 0.10	< 0.20	< 10	< 0.050	288	127	23.5	< 0.0050	2.56	3.63	4.91	***144***	< 0.010	10.3	361	0.018	< 0.10	< 0.30	9.76	< 0.50	2.1
	FR_DC1_2022-11-22	Duplicate	1,140	2.7	0.40	0.11	48.6	< 0.020	< 0.050	26	0.0885	252	< 0.10	< 0.10	< 0.20	< 10	< 0.050	283	125	23.5	< 0.0050	2.40	3.73	4.94	***144***	< 0.010	10.1	364	0.016	< 0.10	< 0.30	*10.1*	< 0.50	2.0
	QA/QC RPD%		2	*	*	*	2	*	*	*	23	1	*	*	*	*	*	2	2	0	*	6	3	1	0	*	2	1	*	*	*	3	*	*
FR_MW-1B	FR_MW-1B_QTR_2022-01-04_N	2022 03 26	585	1.2	0.24	< 0.10	168	< 0.020	< 0.050	< 10	0.0197	138	< 0.10	< 0.10	0.23	< 10	< 0.050	55.9	58.4	0.15	< 0.0050	0.963	< 0.50	1.41	***71.0***	< 0.010	2.79	215	< 0.010	< 0.10	< 0.30	3.04	< 0.50	1.5
	FR_MW-1B_QTR_2022-04-01_N	2022 06 09	337	1.8	0.25	< 0.10	97.0	< 0.020	< 0.050	< 10	0.0107	82.8	0.11	< 0.10	0.49	< 10	< 0.050	31.6	31.6	0.12	< 0.0050	1.01	< 0.50	1.23	***35.2***	< 0.010	1.61	130	< 0.010	< 0.10	< 0.30	1.74	< 0.50	< 1.0
	FR_MW-1B_QTR_2022-07-01_N	2022 09 20	443	< 1.0	0.19	< 0.10	153	< 0.020	< 0.050	< 10	0.0214	104	< 0.10	< 0.10	1.93	< 10	0.058	40.4	44.5	< 0.10	< 0.0050	1.14	< 0.50	1.55	***64.8***	< 0.010	2.18	181	< 0.010	< 0.10	< 0.30	2.44	< 0.50	2.0
	FR_MW-1B_QTR_2022-10-01_N	2022 10 07	533	1.5	0.19	< 0.10	154	< 0.020	< 0.050	10	0.0259	130	0.11	< 0.10	0.44	< 10	< 0.050	59.4	50.7	< 0.10	< 0.0050	1.02	< 0.50	1.68	***74.3***	< 0.010	2.86	216	< 0.010	< 0.10	< 0.30	2.76	< 0.50	< 1.0
FR_MW_NTPSE	FR_MW_NTPSE_QTR_2022-01-04_N	2022 03 31	1,050	4.7	< 0.10	3.05	117	< 0.020	< 0.050	10	< 0.0050	221	0.10	1.57	< 0.20	*25,000*	< 0.050	26.6	122	*3,270*	< 0.0050	2.19	7.99	2.39	0.126	< 0.010	7.36	282	0.032	< 0.10	< 0.30	1.12	0.74	2.0
	FR_MW_NTPSE_QTR_2022-04-01_N	2022 06 09	1,080	3.0	< 0.10	3.05	113	< 0.020	< 0.050	10	< 0.0050	223	0.12	1.46	< 0.20	*24,900*	< 0.050	29.7	126	*3,160*	< 0.0050	2.25	6.98	2.48	0.128	< 0.010	7.06	284	0.028	< 0.10	< 0.30	1.07	0.60	1.7
	FR_MW_NTPSE_QTR_2022-09-01_N	2022 09 15	1,160	1.4	< 0.10	3.05	121	< 0.020	< 0.050	14	0.0056	237	0.11	1.72	< 0.20	*25,400*	< 0.050	30.2	137	*3,550*	< 0.0050	2.15	8.03	2.29	0.163	< 0.010	7.54	306	0.052	< 0.10	< 0.30	1.00	< 0.50	3.1
	FR_DC2_QTR-2022-07-01_N[h]	Duplicate	1,040	5.0	< 0.10	3.12	119	< 0.020	< 0.050	< 10	0.0052	188	0.12	1.78	< 0.20	*25,800*	< 0.050	24.2	139	*3,610*	< 0.0050	1.73	8.16	2.33	0.138	< 0.010	7.67	246	0.039	< 0.10	< 0.30	0.808	< 0.50	3.2
	QA/QC RPD%		11	*	*	2	2	*	*	*	*	23	*	3	*	2	*	22	1	2	*	22	2	2	*	*	2	22	*	*	*	21	*	*
	FR_MW_NTPSE_QTR_2022-10-01_N	2022 10 10	1,140	2.4	< 0.10	2.93	111	< 0.020	< 0.050	11	< 0.0050	236	< 0.10	1.46	< 0.20	*26,200*	< 0.050	33.0	134	*3,230*	< 0.0050	2.20	6.98	2.36	0.151	< 0.010	7.36	294	0.024	< 0.10	< 0.30	0.996	< 0.50	2.4
FR_09-04-A	FR_09-04-A_QTR_2022-01-04_N	2022 02 17	665	< 1.0	< 0.10	< 0.10	87.8	< 0.020	< 0.050	32	0.615	141	< 0.10	0.61	< 0.20	< 10	< 0.050	95.7	76.0	*1,250*	< 0.0050	2.07	7.05	5.23	0.088	< 0.010	7.38	228	0.067	< 0.10	< 0.30	6.29	< 0.50	2.5
	FR_09-04-A_QTR_2022-04-01_N	2022 04 21	637	2.2	< 0.10	< 0.10	83.1	< 0.020	< 0.050	28	0.590	130	< 0.10	0.59	0.64	< 10	< 0.050	79.1	75.8	*1,230*	< 0.0050	1.96	6.96	5.20	0.117	< 0.010	7.06	212	0.053	< 0.10	< 0.30	5.98	< 0.50	3.3
	FR_DC3_QTR_2022-04-01_N	Duplicate	674	1.4	0.11	< 0.10	85.6	< 0.020	< 0.050	31	0.588	141	< 0.10	0.60	0.74	< 10	< 0.050	91.2	78.3	*1,260*	< 0.0050	2.09	7.10	5.28	0.103	< 0.010	7.41	227	0.061	< 0.10	< 0.30	6.53	< 0.50	3.6
	QA/QC RPD%		6	*	*	*	3	*	*	*	0	8	*	2	*	*	*	14	3	2	*	6	2	2	*	*	5	7	14	*	*	9	*	*
	FR_09-04-A_QTR_2022-07-01_N	2022 07 20	655	< 1.0	0.12	< 0.10	80.8	< 0.020	< 0.050	30	0.524	140	< 0.10	0.52	0.23	< 10	< 0.050	92.5	74.1	*1,240*	< 0.0050	2.18	6.44	4.82	0.182	< 0.010	6.68	218	0.060	< 0.10	< 0.30	6.45	< 0.50	2.1
	FR_09-04-A_QTR_2022-10-01_N	2022 10 06	742	< 1.0	0.11	< 0.10	96.6	< 0.020	< 0.050	31	0.547	160	< 0.10	0.54	1.65	< 10	< 0.050	95.3	83.3	*1,210*	< 0.0050	2.62	6.70	4.92	0.241	< 0.010	7.20	233	0.056	< 0.10	< 0.30	6.82	< 0.50	5.3
FR_09-04-B	FR_09-04-B_QTR_2022-01-04_N	2022 02 17	660	1.2	0.11	< 0.10	93.1	< 0.020	< 0.050	30	0.584	139	< 0.10	0.57	2.16	< 10	< 0.050	92.7	76.0	*1,330*	< 0.0050	1.87	7.25	5.20	0.140	< 0.010	7.52	231	0.066	< 0.10	< 0.30	5.94	< 0.50	3.2
	FR_DC1_QTR_2022-01-04_N	Duplicate	655	1.6	< 0.10	< 0.10	89.9	< 0.020	< 0.050	31	0.604	138	< 0.10	0.62	< 0.20	< 10	< 0.050	91.8	75.5	*1,270*	< 0.0050	2.04	6.94	5.29	0.074	< 0.010	7.49	224	0.060	< 0.10	< 0.30	6.21	< 0.50	2.8
	QA/QC RPD%		1	*	*	*	3	*	*	*	3	1	*	8	*	*	*	1	1	5	*	9	4	2	*	*	0	3	10	*	*	4	*	*
	FR_09-04-B_QTR_2022-04-01_N	2022 04 21	646	2.6	0.66	0.74	80.6	0.054	0.513	29	0.608	135	0.17	0.66	1.28	< 10	0.303	76.5	75.1	*1,250*	< 0.0050	1.94	7.25	4.95	0.957	0.056	6.85	208	0.603	0.32	< 0.30	5.56	< 0.50	4.3
	FR_09-04-B_QTR_2022-07-01_N	2022 07 20	634	< 1.0	0.12	< 0.10	78.9	< 0.020	< 0.050	28	0.502	134	< 0.10	0.44	0.58	< 10	< 0.050	82.4	72.7	*1,220*	< 0.0050	1.93	6.24	4.57	0.301	< 0.010	6.58	218	0.054	< 0.10	< 0.30	5.89	< 0.50	2.2
	FR_09-04-B_QTR_2022-10-01_N	2022 10 06	742	< 1.0	0.12	< 0.10	87.9	< 0.020	< 0.050	29	0.518	159	< 0.10	0.51	0.28	< 10	< 0.050	87.8	83.8	*1,170*	< 0.0050	2.10	6.83	5.16	0.620	< 0.010	7.41	221	0.057	< 0.10	< 0.30	6.27	< 0.50	2.4

All terms defined within the body of SNC-Lavalin's report.
< Denotes concentration less than indicated detection limit.
\- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

BOLD	Concentration greater than CSR Aquatic Life (AW) standard
ITALIC	Concentration greater than CSR Irrigation Watering (IW) standard
UNDERLINE	Concentration greater than CSR Livestock Watering (LW) standard
SHADED	Concentration greater than CSR Drinking Water (DW) standard

[a] Standard to protect freshwater aquatic life.
[b] Standard varies with Hardness.
[c] Standard varies with pH.
[d] Individual standards exist for Cr +3 and Cr +6. Reported value represents more stringent standard.
[e] Interim BC MoE Regional Background Estimate (Protocol 9 Determining Background Groundwater Quality).
[f] There is no Zinc standard specified for H > 400; therefore, the standard for H=300-<400 is applied as a conservative comparison.
[g] Ramboll calculated health-based values for these two parameters based on toxicity values (tolerable daily intakes; TDI) and drinking water allocation factors (DW AFs), documented in Appendix IV.
[h] Sample ID renamed by SNC-Lavalin due to duplication with another sample in Teck Coal database.

TABLE FR-04: Summary of Analytical Results Compared to Primary Screening Criteria for Dissolved Metals in Groundwater (FRO)

				Dissolved Metals																														
Sample Location	Sample ID	Sample Date (yyyy mm dd)	Hardness mg/L	Aluminum µg/L	Antimony µg/L	Arsenic µg/L	Barium µg/L	Beryllium µg/L	Bismuth µg/L	Boron µg/L	Cadmium µg/L	Calcium mg/L	Chromium µg/L	Cobalt µg/L	Copper µg/L	Iron µg/L	Lead µg/L	Lithium µg/L	Magnesium mg/L	Manganese µg/L	Mercury µg/L	Molybdenum µg/L	Nickel µg/L	Potassium mg/L	Selenium µg/L	Silver µg/L	Sodium mg/L	Strontium µg/L	Thallium µg/L	Tin µg/L	Titanium µg/L	Uranium µg/L	Vanadium µg/L	Zinc[f] µg/L
BC Standard																																		
CSR Aquatic Life (AW)[a]			n/a	n/a	90	50	10,000	1.5	n/a	12,000	0.5-4[b]	n/a	10[d]	40	20-90[b]	n/a	40-160[b]	n/a	n/a	n/a	0.25	10,000	250-1,500[b]	n/a	20	0.5-15[b]	n/a	n/a	3	n/a	1,000	85	n/a	75-2,400[b]
CSR Irrigation Watering (IW)			n/a	5,000	n/a	100	n/a	100	n/a	500	5	n/a	5[d]	50	200	5,000	200	2,500	n/a	200	1	10	200	n/a	20	n/a	n/a	n/a	n/a	n/a	n/a	10	100	1,000-5,000[c]
CSR Livestock Watering (LW)			n/a	5,000	n/a	25	n/a	100	n/a	5,000	80	1,000	50[d]	1,000	300	n/a	100	5,000	n/a	n/a	2	50	1,000	n/a	30	n/a	n/a	n/a	n/a	n/a	n/a	200	100	2,000
CSR Drinking Water (DW)			n/a	9,500	6	10	1,000	8	n/a	5,000	5	n/a	50[d]	20[e]	1,500	6,500	10	8	n/a	1,500	1	250	80	n/a	10	20	200	2,500	n/a	2,500	n/a	20	20	3,000
Health-based Value (HBV)[g]			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1,200	n/a	n/a	n/a	2,400	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Fording River Valley																																		
FR_KB-1	FR_KB-1_WG_2022-02_NP	2022 03 03	2,020	5.3	0.47	< 0.20	51.8	< 0.040	< 0.100	38	0.664	433	< 0.20	< 0.20	< 0.40	< 20	< 0.100	224	227	< 0.20	-	1.44	36.0	5.80	***418***	< 0.020	10.6	372	0.022	< 0.20	0.81	*17.1*	< 1.00	13.8
	FR_DC2_WG_2022-02_NP	Duplicate	1,940	2.1	0.44	< 0.20	55.8	< 0.040	< 0.100	35	0.686	424	< 0.20	< 0.20	< 0.40	< 20	< 0.100	214	213	< 0.20	-	1.46	36.6	5.87	***419***	< 0.020	10.2	360	< 0.020	< 0.20	< 0.60	*16.4*	< 1.00	13.1
	QA/QC RPD%		4	*	*	*	7	*	*	*	3	2	*	*	*	*	*	5	6	*	-	1	2	1	0	*	4	3	*	*	*	4	*	5
	FR_KB-1A_WG_2022-06_NP	2022 06 15	1,000	1.2	0.46	< 0.10	28.0	< 0.020	< 0.050	29	0.593	221	0.23	< 0.10	0.27	< 10	< 0.050	138	109	< 0.10	< 0.0050	1.84	27.2	4.39	***285***	< 0.010	6.72	209	0.017	< 0.10	< 0.30	*10.1*	< 0.50	14.3
	FR_KB-1A_WG_QTR_KCWD_2022-09-22_NP	2022 09 22	1,380	< 2.0	0.58	< 0.20	46.4	< 0.040	< 0.100	30	0.838	303	< 0.20	< 0.20	< 0.40	< 20	< 0.100	264	152	< 0.20	< 0.0050	1.55	37.2	5.18	***369***	< 0.020	11.1	311	0.028	< 0.20	< 0.60	*11.9*	< 1.00	16.6
	FR_KB-1_WG_QTR_KCWD_2022-11-08_NP	2022 11 08	1,680	2.3	0.50	< 0.20	44.9	< 0.040	0.103	26	0.733	364	< 0.20	< 0.20	< 0.40	< 20	< 0.100	196	187	< 0.20	< 0.0050	1.59	38.1	5.32	***435***	< 0.020	10.6	322	< 0.020	< 0.20	< 0.60	*15.2*	< 1.00	15.5
FR_KB-2	FR_KB-2_WG_2022-02_NP	2022 03 01	1,820	2.1	0.38	< 0.20	72.4	< 0.040	< 0.100	30	0.240	431	< 0.20	< 0.20	< 0.40	< 20	< 0.100	207	180	< 0.20	-	1.44	11.4	5.18	***378***	< 0.020	8.71	372	< 0.020	< 0.20	< 0.60	*15.0*	< 1.00	5.8
	FR_KB-2A_WG_2022-06_NP	2022 06 16	970	< 1.0	0.37	< 0.10	39.0	< 0.020	< 0.050	26	0.162	225	< 0.10	< 0.10	0.21	14	< 0.050	155	99.0	0.14	< 0.0050	1.18	7.92	4.36	***254***	< 0.010	7.19	192	< 0.010	< 0.10	< 0.30	8.23	< 0.50	4.4
	FR_KB-2A_WG_QTR_KCWD_2022-09-23_NP	2022 09 23	1,420	< 2.0	0.49	< 0.20	66.6	< 0.040	< 0.100	29	0.247	308	< 0.20	< 0.20	< 0.40	< 20	< 0.100	241	159	< 0.20	< 0.0050	1.48	11.8	5.25	***381***	< 0.020	10.5	318	< 0.020	< 0.20	< 0.60	*12.6*	< 1.00	6.9
	FR_KB-2_WG_QTR_KCWD_2022-11-10_NP	2022 11 10	1,660	< 2.0	0.41	< 0.20	57.9	< 0.040	< 0.100	29	0.272	375	< 0.20	< 0.20	< 0.40	< 20	< 0.100	204	177	< 0.20	< 0.0050	1.40	12.2	4.95	***381***	< 0.020	10.2	311	< 0.020	< 0.20	< 0.60	*14.8*	< 1.00	5.8
FR_KB-3A	FR_KB-3A_WG_2022-02_NP	2022 03 03	1,300	< 1.0	< 0.10	< 0.10	55.3	< 0.020	< 0.050	20	0.0366	313	0.14	0.53	< 0.20	< 10	< 0.050	56.9	127	0.36	-	0.268	0.79	2.11	***251***	< 0.010	5.24	317	< 0.010	< 0.10	< 0.30	6.42	< 0.50	< 1.0
	FR_KB-3A_WG_2022-06_NP	2022 06 15	1,280	< 1.0	< 0.10	< 0.10	59.0	< 0.020	< 0.050	17	0.0316	306	< 0.10	0.44	0.48	< 10	< 0.050	51.8	125	0.71	< 0.0050	0.264	< 0.50	2.22	***296***	< 0.010	5.54	343	< 0.010	< 0.10	< 0.30	6.56	< 0.50	< 1.0
	FR_KB-3A_WG_QTR_KCWD_2022-09-21_NP	2022 09 21	1,300	< 2.0	< 0.20	< 0.20	62.1	< 0.040	< 0.100	< 20	0.0443	311	< 0.20	0.45	< 0.40	< 20	< 0.100	62.0	126	0.37	< 0.0050	0.323	< 1.00	2.16	***329***	< 0.020	5.51	387	< 0.020	< 0.20	< 0.60	6.88	< 1.00	< 2.0
	FR_KB-3A_WG_QTR_KCWD_2022-11-14_NP	2022 11 14	1,320	< 2.0	0.20	< 0.20	48.6	< 0.040	< 0.100	< 20	0.0372	333	< 0.20	0.38	< 0.40	< 20	< 0.100	48.8	120	1.06	< 0.0050	0.354	< 1.00	1.94	***247***	< 0.020	4.98	337	< 0.020	< 0.20	< 0.60	7.16	< 1.00	< 2.0
FR_KB-3B	FR_KB-3B_WG_2022-02_NP	2022 03 03	1,410	< 2.0	< 0.20	< 0.20	66.2	< 0.040	< 0.100	23	0.0280	323	< 0.20	< 0.20	< 0.40	< 20	< 0.100	115	147	< 0.20	-	0.367	< 1.00	3.10	***286***	< 0.020	6.09	281	< 0.020	< 0.20	< 0.60	9.67	< 1.00	< 2.0
	FR_KB-3B_WG_2022-06_NP	2022 06 15	1,410	1.1	0.14	< 0.10	64.8	< 0.020	< 0.050	20	0.0372	321	< 0.10	< 0.10	2.31	< 10	0.107	119	147	0.58	< 0.0050	0.463	< 0.50	3.60	***364***	< 0.010	7.56	315	< 0.010	< 0.10	< 0.30	*10.6*	< 0.50	3.3
	FR_KB-3B_WG_QTR_KCWD_2022-09-21_NP	2022 09 21	1,200	< 2.0	< 0.20	< 0.20	62.2	< 0.040	< 0.100	21	0.0448	272	< 0.20	< 0.20	< 0.40	< 20	< 0.100	123	126	< 0.20	< 0.0050	0.481	< 1.00	3.24	***322***	< 0.020	6.31	291	< 0.020	< 0.20	< 0.60	9.23	< 1.00	< 2.0
	FR_KB-3B_WG_QTR_KCWD_2022-11-14_NP	2022 11 14	1,420	< 2.0	< 0.20	< 0.20	55.0	< 0.040	< 0.100	21	0.0155	345	< 0.20	< 0.20	< 0.40	< 20	< 0.100	117	135	< 0.20	< 0.0050	0.421	< 1.00	2.98	***290***	< 0.020	6.37	298	< 0.020	< 0.20	< 0.60	*10.4*	< 1.00	< 2.0
FR_MW-SK1A	FR_MW-SK1A_QTR_2022-04-01_N	2022 05 12	850	< 1.0	0.20	< 0.10	56.5	< 0.020	< 0.050	18	0.0297	196	< 0.10	< 0.10	0.31	< 10	< 0.050	82.8	87.7	0.14	< 0.0050	0.854	< 0.50	3.19	***144***	< 0.010	4.87	197	< 0.010	< 0.10	< 0.30	6.16	< 0.50	1.2
	FR_MW-SK1A_QTR_2022-07-01_N	2022 08 27	814	1.2	0.25	< 0.10	90.8	< 0.020	< 0.050	22	0.0354	190	0.13	< 0.10	2.45	< 10	0.069	75.1	82.6	1.19	< 0.0050	1.44	< 0.50	3.19	***144***	< 0.010	6.11	195	< 0.010	< 0.10	< 0.30	5.74	< 0.50	1.2
	FR_MW_SK1A_QTR_2022-10-05_N	2022 10 05	1,100	< 1.0	0.18	< 0.10	79.3	< 0.020	< 0.050	19	0.0336	262	0.12	0.10	0.27	< 10	< 0.050	78.0	108	2.20	< 0.0050	1.01	0.56	2.84	***164***	< 0.010	6.40	255	< 0.010	< 0.10	< 0.30	6.28	< 0.50	< 1.0
FR_MW-SK1B	FR_MW-SK1B_QTR_2022-01-04_N	2022 03 26	610	1.4	0.41	< 0.10	33.0	< 0.020	< 0.050	14	0.0335	161	< 0.10	1.28	< 0.20	< 10	< 0.050	12.0	50.5	*577*	< 0.0050	0.379	4.59	1.20	11.5	0.019	4.73	257	0.022	< 0.10	< 0.30	5.05	< 0.50	4.1
	FR_MW-SK1B_QTR_2022-04-01_N	2022 05 12	632	1.2	0.42	0.11	32.6	< 0.020	< 0.050	16	0.0466	169	< 0.10	1.26	< 0.20	< 10	< 0.050	12.6	51.1	*604*	< 0.0050	0.433	4.45	1.29	12.7	< 0.010	4.37	268	0.023	< 0.10	< 0.30	5.31	< 0.50	2.2
	FR_MW-SK1B_QTR_2022-07-01_N	2022 08 27	689	1.3	0.42	0.11	34.0	< 0.020	< 0.050	14	0.0444	177	< 0.10	1.47	< 0.20	< 10	< 0.050	14.4	60.0	*726*	< 0.0050	0.396	5.37	1.37	14.6	< 0.010	5.46	277	0.025	< 0.10	< 0.30	5.81	< 0.50	3.9
	FR_DC3_QTR_2022-07-01_N	Duplicate	685	1.3	0.42	0.10	32.6	< 0.020	< 0.050	14	0.0441	182	< 0.10	1.37	< 0.20	< 10	< 0.050	14.4	56.1	*678*	< 0.0050	0.425	5.08	1.28	15.1	< 0.010	5.14	277	0.024	< 0.10	< 0.30	5.83	< 0.50	3.5
	QA/QC RPD%		1	*	*	*	4	*	*	*	1	3	*	7	*	*	*	0	7	7	*	7	6	7	3	*	6	0	*	*	*	0	*	*
	FR_MW_SK1B_QTR_2022-10-01_N	2022 10 05	742	< 1.0	0.42	0.11	33.9	< 0.020	< 0.050	14	0.0392	202	< 0.10	1.41	0.36	< 10	< 0.050	11.8	57.8	*651*	< 0.0050	0.460	5.40	1.34	14.2	< 0.010	4.63	295	0.025	< 0.10	< 0.30	5.84	< 0.50	3.8
FR_09-01-A	FR_09-01-A_QTR_2022-01-04_N	2022 03 27	948	< 1.0	0.20	< 0.10	109	< 0.020	< 0.050	21	0.0543	208	< 0.10	0.15	< 0.20	< 10	< 0.050	92.8	104	< 0.10	< 0.0050	0.570	1.35	3.50	***125***	< 0.010	6.03	254	< 0.010	< 0.10	< 0.30	6.01	< 0.50	< 1.0
	FR_09-01-A_QTR_2022-04-01_N	2022 04 21	858	1.2	0.22	< 0.10	84.0	< 0.020	< 0.050	20	0.0439	195	0.10	0.15	1.59	< 10	< 0.050	93.2	90.2	0.11	< 0.0050	0.679	1.50	3.33	***118***	< 0.010	5.83	234	< 0.010	< 0.10	< 0.30	6.60	< 0.50	4.3
	FR_DC2_QTR_2022-04-01_N	Duplicate	916	1.2	0.21	< 0.10	95.5	< 0.020	< 0.050	21	0.0495	206	0.12	0.17	0.90	< 10	< 0.050	94.1	97.6	< 0.10	< 0.0050	0.653	1.60	3.63	***116***	< 0.010	6.36	242	< 0.010	< 0.10	< 0.30	6.92	< 0.50	2.8
	QA/QC RPD%		7	*	*	*	13	*	*	*	12	5	*	*	*	*	*	1	8	*	*	4	*	9	2	*	9	3	*	*	*	5	*	*
	FR_09-01-A_QTR_2022-07-01_N	2022 07 18	531	1.1	0.26	< 0.10	48.7	< 0.020	< 0.050	14	0.0208	118	< 0.10	< 0.10	0.52	< 10	< 0.050	59.0	57.3	< 0.10	< 0.0050	1.75	< 0.50	2.55	***86.9***	< 0.010	3.26	130	< 0.010	< 0.10	< 0.30	5.49	< 0.50	1.5
	FR_09-01-A_QTR_2022-10-01_N	2022 10 05	956	1.1	0.27	< 0.10	106	< 0.020	< 0.050	25	0.0508	208	0.10	< 0.10	1.57	< 10	< 0.050	99.7	106	< 0.10	< 0.0050	1.90	1.01	3.47	***135***	< 0.010	8.58	236	< 0.010	< 0.10	< 0.30	5.78	< 0.50	1.3
FR_09-01-B	FR_09-01-B_QTR_2022-01-04_N	2022 03 27	804	< 1.0	0.12	< 0.10	133	< 0.020	< 0.050	21	0.0386	178	0.12	0.21	< 0.20	< 10	< 0.050	82.3	87.4	< 0.10	< 0.0050	0.654	1.35	3.26	***74.3***	< 0.010	5.24	226	< 0.010	< 0.10	< 0.30	4.63	< 0.50	< 1.0
	FR_09-01-B_QTR_2022-04-01_N	2022 04 21	754	< 1.0	0.12	< 0.10	103	< 0.020	< 0.050	19	0.0313	171	< 0.10	0.18	1.06	< 10	< 0.050	71.4	79.3	0.12	< 0.0050	0.593	1.23	3.08	***85.8***	< 0.010	5.05	229	< 0.010	< 0.10	< 0.30	4.67	< 0.50	2.1
	FR_09-01-B_QTR_2022-07-01_N	2022 07 18	518	< 1.0	0.10	< 0.10	74.0	< 0.020	< 0.050	15	0.0147	114	< 0.10	< 0.10	< 0.20	< 10	< 0.050	67.6	56.8	< 0.10	< 0.0050	0.736	< 0.50	2.65	***93.2***	< 0.010	3.54	148	< 0.010	< 0.10	< 0.30	3.57	< 0.50	< 1.0
	FR_09-01-B_QTR_2022-10-01_N	2022 10 05	736	< 1.0	0.14	< 0.10	113	< 0.020	< 0.050	20	0.0340	164	0.11	0.12	< 0.20	< 10	< 0.050	77.2	79.2	< 0.10	< 0.0050	0.921	0.82	3.32	***108***	< 0.010	5.20	207	< 0.010	< 0.10	< 0.30	4.96	< 0.50	< 1.0

All terms defined within the body of SNC-Lavalin's report.
< Denotes concentration less than indicated detection limit.
\- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

BOLD	Concentration greater than CSR Aquatic Life (AW) standard
ITALIC	Concentration greater than CSR Irrigation Watering (IW) standard
UNDERLINE	Concentration greater than CSR Livestock Watering (LW) standard
SHADED	Concentration greater than CSR Drinking Water (DW) standard

[a] Standard to protect freshwater aquatic life.
[b] Standard varies with Hardness.
[c] Standard varies with pH.
[d] Individual standards exist for Cr +3 and Cr +6. Reported value represents more stringent standard.
[e] Interim BC MoE Regional Background Estimate (Protocol 9 Determining Background Groundwater Quality).
[f] There is no Zinc standard specified for H > 400; therefore, the standard for H=300-<400 is applied as a conservative comparison.
[g] Ramboll calculated health-based values for these two parameters based on toxicity values (tolerable daily intakes; TDI) and drinking water allocation factors (DW AFs), documented in Appendix IV.
[h] Sample ID renamed by SNC-Lavalin due to duplication with another sample in Teck Coal database.

TABLE FR-04: Summary of Analytical Results Compared to Primary Screening Criteria for Dissolved Metals in Groundwater (FRO)

Sample Location	Sample ID	Sample Date (yyyy mm dd)	Hardness mg/L	Dissolved Metals Aluminum µg/L	Antimony µg/L	Arsenic µg/L	Barium µg/L	Beryllium µg/L	Bismuth µg/L	Boron µg/L	Cadmium µg/L	Calcium mg/L	Chromium µg/L	Cobalt µg/L	Copper µg/L	Iron µg/L	Lead µg/L	Lithium µg/L	Magnesium mg/L	Manganese µg/L	Mercury µg/L	Molybdenum µg/L	Nickel µg/L	Potassium mg/L	Selenium µg/L	Silver µg/L	Sodium mg/L	Strontium µg/L	Thallium µg/L	Tin µg/L	Titanium µg/L	Uranium µg/L	Vanadium µg/L	Zinc[f] µg/L
BC Standard																																		
CSR Aquatic Life (AW)[a]			n/a	n/a	90	50	10,000	1.5	n/a	12,000	0.5-4[b]	n/a	10[d]	40	20-90[b]	n/a	40-160[b]	n/a	n/a	n/a	0.25	10,000	250-1,500[b]	n/a	20	0.5-15[b]	n/a	n/a	3	n/a	1,000	85	n/a	75-2,400[b]
CSR Irrigation Watering (IW)			n/a	5,000	n/a	100	n/a	100	n/a	500	5	n/a	5[d]	50	200	5,000	200	2,500	n/a	200	1	10	200	n/a	20	n/a	n/a	n/a	n/a	n/a	n/a	10	100	1,000-5,000[c]
CSR Livestock Watering (LW)			n/a	5,000	n/a	25	n/a	100	n/a	5,000	80	1,000	50[d]	1,000	300	n/a	100	5,000	n/a	n/a	2	50	1,000	n/a	30	n/a	n/a	n/a	n/a	n/a	n/a	200	100	2,000
CSR Drinking Water (DW)			n/a	9,500	6	10	1,000	8	n/a	5,000	5	n/a	50[d]	20[e]	1,500	6,500	10	8	n/a	1,500	1	250	80	n/a	10	20	200	2,500	n/a	2,500	n/a	20	20	3,000
Health-based Value (HBV)[g]			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1,200	n/a	n/a	n/a	2,400	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Fording River Valley																																		
FR_09-02-A	FR_09-02-A_QTR_2022-01-04_N	2022 01 11	621	1.2	0.19	0.14	147	< 0.020	< 0.050	< 10	0.0246	135	0.12	< 0.10	0.40	< 10	< 0.050	50.2	69.0	< 0.10	< 0.0050	1.41	< 0.50	2.08	***77.8***	< 0.010	3.21	196	< 0.010	< 0.10	< 0.30	3.66	< 0.50	< 1.0
	FR_09-02-A_QTR_2022-04-01_N	2022 04 21	650	1.3	0.14	< 0.10	113	< 0.020	< 0.050	< 10	0.0216	144	< 0.10	< 0.10	0.98	< 10	< 0.050	48.2	70.5	0.16	< 0.0050	1.52	< 0.50	1.67	***76.3***	< 0.010	3.12	175	< 0.010	< 0.10	< 0.30	3.19	< 0.50	2.7
	FR_09-02-A_QTR_2022-07-01_N	2022 07 18	530	< 1.0	0.21	< 0.10	119	< 0.020	< 0.050	12	0.0186	118	< 0.10	< 0.10	< 0.20	< 10	< 0.050	58.7	57.1	< 0.10	< 0.0050	1.71	< 0.50	2.08	***86.3***	< 0.010	3.04	166	< 0.010	< 0.10	< 0.30	4.37	< 0.50	< 1.0
	FR_DC1_QTR_2022-07-01_N	Duplicate	530	1.3	0.22	< 0.10	115	< 0.020	< 0.050	12	0.0134	115	< 0.10	< 0.10	0.23	< 10	< 0.050	59.2	59.1	< 0.10	< 0.0050	1.69	< 0.50	2.15	***88.8***	< 0.010	3.19	162	< 0.010	< 0.10	< 0.30	4.36	< 0.50	< 1.0
	QA/QC RPD%		0	*	*	*	3	*	*	*	*	3	*	*	*	*	*	1	3	*	*	1	*	3	3	*	5	2	*	*	*	0	*	*
	FR_09-02-A_QTR_2022-10-01_N	2022 10 05	582	< 1.0	0.25	0.12	164	< 0.020	< 0.050	20	0.0433	131	0.14	< 0.10	1.30	< 10	< 0.050	55.1	61.8	< 0.10	< 0.0050	1.32	< 0.50	2.88	***82.2***	< 0.010	2.97	179	< 0.010	< 0.10	< 0.30	2.65	< 0.50	1.6
	FR_DC2_QTR_2022-10-01_N	Duplicate	568	1.4	0.25	< 0.10	155	< 0.020	< 0.050	20	0.0265	130	< 0.10	< 0.10	< 0.20	< 10	< 0.050	54.7	59.2	< 0.10	< 0.0050	1.23	< 0.50	2.76	***80.5***	< 0.010	2.83	177	< 0.010	< 0.10	< 0.30	2.59	< 0.50	< 1.0
	QA/QC RPD%		2	*	*	*	6	*	*	*	48	1	*	*	*	*	*	1	4	*	*	7	*	4	2	*	5	1	*	*	*	2	*	*
FR_09-02-B	FR_09-02-B_QTR_2022-01-04_N	2022 01 11	574	1.2	0.12	0.13	174	< 0.020	< 0.050	13	0.0215	128	< 0.10	< 0.10	0.39	< 10	< 0.050	50.0	61.9	< 0.10	< 0.0050	1.07	< 0.50	2.18	***65.8***	< 0.010	3.13	206	< 0.010	< 0.10	< 0.30	3.31	< 0.50	< 1.0
	FR_09-02-B_QTR_2022-04-01_N	2022 04 21	617	1.9	< 0.10	< 0.10	154	< 0.020	< 0.050	< 10	0.0209	140	0.19	< 0.10	0.99	< 10	< 0.050	46.9	64.9	0.13	< 0.0050	0.972	< 0.50	2.24	***85.7***	< 0.010	3.37	213	< 0.010	< 0.10	< 0.30	2.89	< 0.50	2.5
	FR_DC1_QTR_2022-04-01_N	Duplicate	703	< 1.0	0.11	< 0.10	180	< 0.020	< 0.050	< 10	0.0203	161	0.12	< 0.10	0.60	< 10	< 0.050	58.4	73.1	< 0.10	< 0.0050	0.959	< 0.50	2.25	***85.8***	< 0.010	3.86	253	< 0.010	< 0.10	< 0.30	3.50	< 0.50	1.9
	QA/QC RPD%		13	*	*	*	16	*	*	*	*	14	*	*	*	*	*	22	12	*	*	1	*	0	0	*	14	17	*	*	*	19	*	*
	FR_09-02-B_QTR_2022-07-01_N	2022 07 18	551	< 1.0	0.12	< 0.10	138	< 0.020	< 0.050	11	0.0130	120	< 0.10	< 0.10	< 0.20	< 10	< 0.050	66.2	61.1	< 0.10	< 0.0050	0.995	< 0.50	1.97	***91.8***	< 0.010	3.62	190	< 0.010	< 0.10	< 0.30	3.30	< 0.50	< 1.0
	FR_09-02-B_QTR_2022-10-01_N	2022 10 05	534	< 1.0	0.15	< 0.10	154	< 0.020	< 0.050	16	0.0234	121	0.10	< 0.10	0.23	< 10	< 0.050	59.2	56.3	< 0.10	< 0.0050	0.993	< 0.50	2.26	***74.4***	< 0.010	3.24	188	< 0.010	< 0.10	< 0.30	2.66	< 0.50	< 1.0
FR_GH_WELL4	FR_GH_WELL4_QTR_2022-01-04_N	2022 02 17	582	1.4	< 0.10	< 0.10	47.4	< 0.020	< 0.050	13	0.0286	122	< 0.10	0.17	0.77	736	< 0.050	38.8	67.4	66.3	< 0.0050	0.597	0.64	1.69	***76.0***	< 0.010	3.40	166	< 0.010	< 0.10	< 0.30	2.28	< 0.50	33.5
	FR_GH_WELL4_QTR_2022-04-01_N	2022 05 11	757	< 1.0	< 0.10	< 0.10	75.1	< 0.020	< 0.050	12	0.0319	182	0.22	< 0.10	0.75	220	< 0.050	42.6	73.4	15.8	< 0.0050	0.351	< 0.50	1.81	***145***	< 0.010	3.70	222	< 0.010	< 0.10	< 0.30	4.28	< 0.50	26.6
	FR_GH_WELL4_QTR_2022-07-01_N	2022 08 21	401	< 1.0	< 0.10	< 0.10	56.1	< 0.020	< 0.050	10	0.0302	89.3	< 0.10	< 0.10	3.35	16	< 0.050	33.7	43.2	12.8	< 0.0050	0.311	< 0.50	1.46	***54.0***	< 0.010	2.93	116	< 0.010	< 0.10	< 0.30	2.22	< 0.50	40.3
	FR_GH_WELL4_QTR_2022-10-01_N	2022 10 07	549	< 1.0	< 0.10	< 0.10	52.9	< 0.020	< 0.050	14	0.0127	117	< 0.10	0.20	1.32	205	< 0.050	37.9	62.4	79.9	< 0.0050	0.324	0.60	1.69	***28.3***	< 0.010	3.26	143	< 0.010	< 0.10	< 0.30	1.67	< 0.50	23.2
	FR_DC3_QTR_2022-10-01_N	Duplicate	542	< 1.0	< 0.10	< 0.10	51.6	< 0.020	< 0.050	12	0.0118	114	< 0.10	0.17	1.01	275	< 0.050	38.8	62.5	75.8	< 0.0050	0.350	0.57	1.63	***29.6***	< 0.010	3.42	143	< 0.010	< 0.10	< 0.30	1.68	< 0.50	26.2
	QA/QC RPD%		1	*	*	*	2	*	*	*	*	3	*	*	27	29	*	2	0	5	*	8	*	4	4	*	5	0	*	*	*	1	*	12
RG_MW_FR1A	RG_MW_FR1A_WG_2022_02_09_NP	2022 02 09	748	28.7	< 0.50	< 0.50	74.2	< 0.100	< 0.250	< 50	0.0348	170	< 0.50	< 0.50	< 1.00	< 50	< 0.250	46.4	78.7	2.24	< 0.0050	0.400	< 2.50	1.47	***124***	< 0.050	3.60	226	< 0.050	< 0.50	< 1.50	4.10	< 2.50	< 5.0
	RG_MW_FR1A_WG_2022_05_04_NP	2022 05 04	917	2.5	< 0.10	< 0.10	79.2	< 0.020	< 0.050	16	0.0386	218	< 0.50	< 0.10	< 0.20	< 10	< 0.050	62.4	90.6	0.16	< 0.0050	0.566	< 0.50	1.97	***164***	< 0.010	4.23	260	< 0.010	< 0.10	< 0.30	5.25	< 0.50	< 1.0
	RG_MW_MC10A_WG_2022_05_04_NP	Duplicate	826	1.9	< 0.10	< 0.10	76.0	< 0.020	< 0.050	14	0.0313	192	< 0.50	< 0.10	< 0.20	< 10	< 0.050	54.3	84.3	0.20	< 0.0050	0.500	< 0.50	1.86	***150***	< 0.010	4.00	227	< 0.010	< 0.10	< 0.30	4.59	< 0.50	< 1.0
	QA/QC RPD%		10	*	*	*	4	*	*	*	21	13	*	*	*	*	*	14	7	*	*	12	*	6	9	*	6	14	*	*	*	13	*	*
	RG_MW_FR1A_WG_2022_07_18_NP	2022 07 18	505	5.4	0.21	< 0.10	61.0	< 0.020	< 0.050	20	0.0255	113	< 0.50	< 0.10	0.42	< 10	0.074	71.4	54.1	0.22	< 0.0050	0.810	< 0.50	2.69	***96.8***	< 0.010	4.12	124	< 0.010	< 0.10	< 0.30	3.52	< 0.50	< 1.0
	RG_MW_FR1A_WG_2022_11_15_NP	2022 11 15	515	2.0	0.14	< 0.10	56.1	< 0.020	< 0.050	13	0.0284	113	0.12	< 0.10	< 0.20	< 10	< 0.050	44.7	56.5	0.19	< 0.0050	0.504	< 0.50	1.65	***116***	< 0.010	4.64	148	< 0.010	< 0.10	< 0.30	3.55	< 0.50	< 1.0
RG_MW_FR1B	RG_MW_FR1B_WG_2022_02_09_NP	2022 02 09	812	< 5.0	< 0.50	< 0.50	66.7	< 0.100	< 0.250	< 50	0.0398	184	< 0.50	< 0.50	< 1.00	< 50	< 0.250	73.5	85.6	< 0.50	< 0.0050	0.340	< 2.50	2.65	***124***	< 0.050	4.45	178	< 0.050	< 0.50	< 1.50	4.92	< 2.50	< 5.0
	RG_MW_FR1B_WG_2022_05_04_NP	2022 05 04	963	< 1.0	< 0.10	< 0.10	75.5	< 0.020	< 0.050	19	0.0438	225	< 0.50	< 0.10	0.41	< 10	< 0.050	76.6	97.4	< 0.10	< 0.0050	0.302	< 0.50	2.99	***191***	< 0.010	4.60	216	< 0.010	< 0.10	< 0.30	5.83	< 0.50	< 1.0
	RG_MW_FR1B_WG_2022_07_18_NP	2022 07 18	714	< 1.0	< 0.10	< 0.10	56.9	< 0.020	< 0.050	17	0.0285	160	< 0.50	< 0.10	0.64	< 10	< 0.050	67.0	76.4	< 0.10	< 0.0050	0.267	< 0.50	2.66	***143***	< 0.010	4.13	163	< 0.010	< 0.10	< 0.30	4.37	< 0.50	< 1.0
	RG_MW_FR1B_WG_2022_11_15_NP	2022 11 15	543	< 1.0	< 0.10	< 0.10	44.8	< 0.020	< 0.050	14	0.0296	118	< 0.10	< 0.10	< 0.20	< 10	< 0.050	54.5	60.3	0.21	< 0.0050	0.305	< 0.50	2.15	***162***	< 0.010	3.92	124	< 0.010	0.11	< 0.30	3.43	< 0.50	< 1.0
RG_MW_FR1C	RG_MW_FR1C_WG_2022_02_09_NP	2022 02 09	837	< 5.0	< 0.50	< 0.50	87.6	< 0.100	< 0.250	< 50	0.0498	186	< 0.50	< 0.50	< 1.00	< 50	< 0.250	94.8	90.4	< 0.50	< 0.0050	5.36	< 2.50	3.10	***122***	< 0.050	4.45	191	< 0.050	< 0.50	< 1.50	5.73	< 2.50	< 5.0
	RG_MW_FR1C_WG_2022_05_04_NP	2022 05 04	896	< 1.0	0.13	< 0.10	81.0	< 0.020	< 0.050	17	0.0446	202	< 0.50	< 0.10	< 0.20	< 10	< 0.050	80.8	95.2	< 0.10	< 0.0050	0.773	0.51	3.07	***149***	< 0.010	4.67	194	< 0.010	< 0.10	< 0.30	5.66	< 0.50	1.1
	RG_MW_FR1C_WG_2022_07_18_NP	2022 07 18	470	< 1.0	0.13	< 0.10	55.4	< 0.020	< 0.050	21	0.0209	105	< 0.50	< 0.10	0.21	< 10	< 0.050	68.1	50.4	< 0.10	< 0.0050	0.827	< 0.50	2.73	***99.0***	< 0.010	3.68	114	< 0.010	< 0.10	< 0.30	3.39	< 0.50	< 1.0
	RG_MW_MC10A_WG_2022_07_18_NP	Duplicate	459	< 1.0	0.13	< 0.10	57.3	< 0.020	< 0.050	19	0.0214	101	< 0.50	< 0.10	< 0.20	< 10	< 0.050	65.0	50.2	< 0.10	< 0.0050	0.805	< 0.50	2.73	***97.1***	< 0.010	3.64	110	< 0.010	< 0.10	< 0.30	3.33	< 0.50	< 1.0
	QA/QC RPD%		2	*	*	*	3	*	*	*	*	4	*	*	*	*	*	5	0	*	*	3	*	0	2	*	1	4	*	*	*	2	*	*
	RG_MW_FR1C_WG_2022_11_15_NP	2022 11 15	786	< 1.0	0.16	< 0.10	94.6	< 0.020	< 0.050	20	0.0489	172	0.14	< 0.10	0.30	< 10	< 0.050	81.5	86.6	0.11	< 0.0050	0.968	0.54	3.98	***152***	< 0.010	11.0	192	< 0.010	< 0.10	< 0.30	6.68	< 0.50	1.9

All terms defined within the body of SNC-Lavalin's report.
< Denotes concentration less than indicated detection limit.
\- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

BOLD	Concentration greater than CSR Aquatic Life (AW) standard
ITALIC	Concentration greater than CSR Irrigation Watering (IW) standard
UNDERLINE	Concentration greater than CSR Livestock Watering (LW) standard
SHADED	Concentration greater than CSR Drinking Water (DW) standard

[a] Standard to protect freshwater aquatic life.
[b] Standard varies with Hardness.
[c] Standard varies with pH.
[d] Individual standards exist for Cr +3 and Cr +6. Reported value represents more stringent standard.
[e] Interim BC MoE Regional Background Estimate (Protocol 9 Determining Background Groundwater Quality).
[f] There is no Zinc standard specified for H > 400; therefore, the standard for H=300-<400 is applied as a conservative comparison.
[g] Ramboll calculated health-based values for these two parameters based on toxicity values (tolerable daily intakes; TDI) and drinking water allocation factors (DW AFs), documented in Appendix IV.
[h] Sample ID renamed by SNC-Lavalin due to duplication with another sample in Teck Coal database.

TABLE FR-04: Summary of Analytical Results Compared to Primary Screening Criteria for Dissolved Metals in Groundwater (FRO)

Sample Location	Sample ID	Sample Date	Hardness	Dissolved Metals																														
		(yyyy mm dd)	Hardness mg/L	Aluminum µg/L	Antimony µg/L	Arsenic µg/L	Barium µg/L	Beryllium µg/L	Bismuth µg/L	Boron µg/L	Cadmium µg/L	Calcium mg/L	Chromium µg/L	Cobalt µg/L	Copper µg/L	Iron µg/L	Lead µg/L	Lithium µg/L	Magnesium mg/L	Manganese µg/L	Mercury µg/L	Molybdenum µg/L	Nickel µg/L	Potassium mg/L	Selenium µg/L	Silver µg/L	Sodium mg/L	Strontium µg/L	Thallium µg/L	Tin µg/L	Titanium µg/L	Uranium µg/L	Vanadium µg/L	Zinc[f] µg/L
BC Standard																																		
CSR Aquatic Life (AW)[a]			n/a	n/a	90	50	10,000	1.5	n/a	12,000	0.5-4[b]	n/a	10[d]	40	20-90[b]	n/a	40-160[b]	n/a	n/a	n/a	0.25	10,000	250-1,500[b]	n/a	20	0.5-15[b]	n/a	n/a	3	n/a	1,000	85	n/a	75-2,400[b]
CSR Irrigation Watering (IW)			n/a	5,000	n/a	100	n/a	100	n/a	500	5	n/a	5[d]	50	200	5,000	200	2,500	n/a	200	1	10	200	n/a	20	n/a	n/a	n/a	n/a	n/a	n/a	10	100	1,000-5,000[c]
CSR Livestock Watering (LW)			n/a	5,000	n/a	25	n/a	100	n/a	5,000	80	1,000	50[d]	1,000	300	n/a	100	5,000	n/a	n/a	2	50	1,000	n/a	30	n/a	n/a	n/a	n/a	n/a	n/a	200	100	2,000
CSR Drinking Water (DW)			n/a	9,500	6	10	1,000	8	n/a	5,000	5	n/a	50[d]	20[e]	1,500	6,500	10	8	n/a	1,500	1	250	80	n/a	10	20	200	2,500	n/a	2,500	n/a	20	20	3,000
Health-based Value (HBV)[g]			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1,200	n/a	n/a	n/a	2,400	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Fording River Valley																																		
RG_MW_FR8A	RG_MW_FR8A_WG_2022_02_08_NP	2022 02 08	735	< 1.0	1.16	0.12	29.7	< 0.020	< 0.050	11	0.0325	180	< 0.10	0.22	< 0.20	14	< 0.050	24.8	69.4	197	< 0.0050	8.48	5.83	1.11	8.63	< 0.010	3.79	236	< 0.010	< 0.10	< 0.30	*11.6*	< 0.50	29.7
	RG_MW_FR8A_WG_2022_05_05_NP	2022 05 05	755	< 1.0	1.97	0.15	32.2	< 0.020	< 0.050	13	0.0100	182	< 0.50	0.23	< 0.20	43	< 0.050	26.3	73.0	*206*	< 0.0050	*23.7*	6.01	1.19	4.04	< 0.010	4.15	230	< 0.010	< 0.10	< 0.30	*11.8*	< 0.50	21.2
	RG_MW_FR8A_WG_2022_07_21_NP	2022 07 21	764	< 1.0	0.88	0.11	30.9	< 0.020	< 0.050	12	< 0.0050	191	< 0.50	0.19	< 0.20	65	< 0.050	32.4	69.7	193	< 0.0050	6.62	5.17	1.19	4.37	< 0.010	4.14	252	< 0.010	< 0.10	< 0.30	9.83	< 0.50	14.9
	RG_MW_FR8A_WG_2022_11_17_NP	2022 11 17	716	< 1.0	1.04	< 0.10	28.6	< 0.020	< 0.050	11	0.0257	173	< 0.10	0.26	< 0.20	< 10	< 0.050	27.3	68.9	178	< 0.0050	6.06	6.45	1.24	***23.9***	< 0.010	4.09	234	< 0.010	< 0.10	< 0.30	9.56	< 0.50	37.1
RG_MW_FR8B	RG_MW_FR8B_WG_2022_02_08_NP	2022 02 08	696	< 1.0	< 0.10	< 0.10	72.0	< 0.020	< 0.050	11	0.0296	162	0.11	0.10	< 0.20	< 10	< 0.050	33.2	70.8	0.50	< 0.0050	4.60	< 0.50	1.18	***142***	< 0.010	3.66	229	< 0.010	< 0.10	< 0.30	2.20	< 0.50	< 1.0
	RG_MW_FR8B_WG_2022_05_05_NP	2022 05 05	725	< 1.0	< 0.10	< 0.10	73.3	< 0.020	< 0.050	11	0.0258	172	< 0.50	< 0.10	< 0.20	< 10	< 0.050	30.1	71.7	0.29	< 0.0050	0.242	< 0.50	1.22	***120***	< 0.010	3.63	228	< 0.010	< 0.10	< 0.30	2.18	< 0.50	< 1.0
	RG_MW_FR8B_WG_2022_07_21_NP	2022 07 21	704	< 1.0	< 0.10	< 0.10	72.5	< 0.020	< 0.050	10	0.0249	163	< 0.50	< 0.10	0.64	< 10	< 0.050	37.2	72.2	0.27	< 0.0050	0.231	< 0.50	1.31	***134***	< 0.010	3.78	237	< 0.010	< 0.10	< 0.30	2.48	< 0.50	< 1.0
	RG_MW_FR8B_WG_2022_11_17_NP	2022 11 17	702	< 1.0	< 0.10	< 0.10	63.3	< 0.020	< 0.050	10	0.0331	164	0.18	< 0.10	< 0.20	< 10	< 0.050	36.3	71.1	0.39	< 0.0050	0.207	< 0.50	1.30	***164***	< 0.010	3.86	231	< 0.010	< 0.10	< 0.30	2.46	< 0.50	< 1.0
RG_MW_FR8C	RG_MW_FR8C_WG_2022_02_08_NP	2022 02 08	670	< 1.0	< 0.10	0.10	278	< 0.020	< 0.050	< 10	0.0465	152	0.14	< 0.10	< 0.20	< 10	< 0.050	41.2	70.6	< 0.10	< 0.0050	0.654	< 0.50	1.69	***128***	< 0.010	3.96	214	< 0.010	< 0.10	< 0.30	3.19	< 0.50	< 1.0
	RG_MW_FR8C_WG_2022_05_05_NP	2022 05 05	220	< 1.0	< 0.10	0.10	87.1	< 0.020	< 0.050	< 10	0.0119	50.6	< 0.50	< 0.10	0.24	< 10	< 0.050	17.0	22.8	< 0.10	< 0.0050	0.628	< 0.50	0.925	19.0	< 0.010	1.88	67.2	< 0.010	< 0.10	< 0.30	0.945	< 0.50	< 1.0
	RG_MW_FR8C_WG_2022_07_21_NP	2022 07 21	219	< 1.0	0.11	0.10	90.3	< 0.020	< 0.050	< 10	0.0170	51.8	< 0.50	< 0.10	0.26	< 10	< 0.050	19.4	21.8	< 0.10	< 0.0050	0.640	< 0.50	0.985	***22.6***	< 0.010	1.80	74.7	< 0.010	< 0.10	< 0.30	0.915	< 0.50	< 1.0
	RG_MW_FR8C_WG_2022_11_17_NP	2022 11 17	604	< 1.0	0.10	< 0.10	249	< 0.020	< 0.050	< 10	0.0394	136	0.12	< 0.10	< 0.20	< 10	< 0.050	41.4	64.1	< 0.10	< 0.0050	0.569	< 0.50	1.82	***126***	< 0.010	4.92	194	< 0.010	< 0.10	< 0.30	2.83	< 0.50	< 1.0
GH_MW-PC	GH_MW-PC_WG_2022-03-16_NP	2022 03 16	632	< 1.0	< 0.10	0.21	72.6	< 0.020	< 0.050	< 10	0.0365	116	0.29	< 0.10	34.9	< 10	< 0.050	7.0	83.2	0.63	< 0.0050	2.69	1.20	0.996	***65.8***	< 0.010	0.875	148	< 0.010	< 0.10	< 0.30	4.48	< 0.50	5.7
	GH_MW-PC_WG_2022-04-04_NP	2022 06 01	487	2.3	< 0.10	0.14	78.2	< 0.020	< 0.050	< 10	0.0311	89.5	0.75	< 0.10	2.67	< 10	< 0.050	6.6	64.1	0.27	< 0.0050	2.65	0.69	0.877	***74.2***	< 0.010	0.952	120	< 0.010	< 0.10	< 0.30	4.35	< 0.50	2.2
	GH_MW-PC_WG_2022-07-04_NP	2022 08 08	563	1.3	< 0.10	0.19	107	< 0.020	< 0.050	< 10	0.0486	108	0.18	< 0.10	1.75	< 10	< 0.050	7.2	71.2	0.23	< 0.0050	2.65	0.56	1.13	***70.8***	< 0.010	0.944	129	< 0.010	< 0.10	< 0.30	4.94	< 0.50	2.5
	GH_MW-PC_WG_2022-10-03_NP	2022 11 25	603	1.8	< 0.10	0.15	103	< 0.020	< 0.050	< 10	0.0368	116	0.49	< 0.10	3.54	< 10	< 0.050	8.3	76.0	0.42	< 0.0050	2.42	0.91	1.10	***95.6***	< 0.010	0.848	152	< 0.010	< 0.10	< 0.30	3.97	< 0.50	3.6
RG_MW_FR10A	RG_MW_FR10A_WG_2022_02_08_NP	2022 02 08	233	52.5	< 0.10	2.52	188	< 0.020	< 0.050	31	0.0106	55.3	0.16	0.80	< 0.20	648	< 0.050	17.6	23.1	*768*	< 0.0050	*21.1*	1.28	3.55	0.556	< 0.010	23.2	417	< 0.010	0.13	1.80	1.10	0.89	< 1.0
	RG_MW_FR10A_WG_2022_05_06_NP	2022 05 06	259	1.1	0.18	0.52	114	< 0.020	< 0.050	17	< 0.0050	67.6	< 0.50	0.32	< 0.20	46	< 0.050	9.8	22.0	*570*	< 0.0050	*11.0*	1.22	1.90	0.188	< 0.010	17.1	226	< 0.010	< 0.10	< 0.30	0.923	< 0.50	6.2
	RG_MW_FR10A_WG_2022_07_21_NP	2022 07 21	258	7.8	< 0.10	1.22	137	< 0.020	< 0.050	16	0.0060	66.4	< 0.50	0.47	< 0.20	256	0.142	12.6	22.4	*664*	< 0.0050	*11.6*	1.04	2.04	1.22	< 0.010	21.1	253	< 0.010	0.16	< 0.30	0.915	< 0.50	< 1.0
	RG_MW_FR10A_WG_2022_11_17_NP	2022 11 17	293	< 1.0	< 0.10	0.42	144	< 0.020	< 0.050	11	< 0.0050	79.5	< 0.10	0.32	< 0.20	21	< 0.050	7.4	23.0	*822*	< 0.0050	5.03	0.79	1.43	1.28	< 0.010	10.0	223	< 0.010	< 0.10	< 0.30	0.864	< 0.50	< 1.0
RG_MW_FR10B	RG_MW_FR10B_WG_2022_02_08_NP	2022 02 08	366	2.0	< 0.10	0.16	142	< 0.020	< 0.050	15	0.0126	91.8	0.15	< 0.10	0.40	< 10	< 0.050	8.3	33.2	0.94	< 0.0050	6.89	< 0.50	1.13	***33.1***	< 0.010	3.42	187	< 0.010	< 0.10	< 0.30	0.754	< 0.50	< 1.0
	RG_MW_FR10B_WG_2022_05_06_NP	2022 05 06	386	< 1.0	< 0.10	0.13	146	< 0.020	< 0.050	14	0.0090	99.5	< 0.50	< 0.10	< 0.20	10	< 0.050	8.4	33.3	0.49	< 0.0050	0.744	< 0.50	1.02	***28.4***	< 0.010	3.11	186	< 0.010	< 0.10	< 0.30	0.802	< 0.50	< 1.0
	RG_MW_FR10B_WG_2022_07_21_NP	2022 07 21	283	2.5	< 0.10	< 0.10	126	< 0.020	< 0.050	11	0.0122	71.6	< 0.50	< 0.10	0.22	< 10	< 0.050	8.4	25.3	3.73	< 0.0050	1.07	< 0.50	0.877	13.9	< 0.010	4.14	162	< 0.010	< 0.10	< 0.30	0.662	< 0.50	< 1.0
	RG_MW_FR10B_WG_2022_11_17_NP	2022 11 17	294	1.0	< 0.10	0.10	125	< 0.020	< 0.050	13	0.0141	75.7	0.18	< 0.10	< 0.20	< 10	< 0.050	7.7	25.6	0.28	< 0.0050	0.730	< 0.50	0.904	***20.8***	< 0.010	2.88	152	< 0.010	< 0.10	< 0.30	0.629	< 0.50	< 1.0
RG_MW_FR10C	RG_MW_FR10C_WG_2022_02_08_NP	2022 02 08	301	1.1	< 0.10	0.28	73.5	< 0.020	< 0.050	< 10	0.0076	91.2	< 0.10	0.17	0.20	295	< 0.050	3.2	17.7	*684*	< 0.0050	5.15	0.66	0.759	1.22	< 0.010	1.44	144	< 0.010	< 0.10	< 0.30	2.00	< 0.50	< 1.0
	RG_MW_MC10A_WG_2022_02_08_NP	Duplicate	299	< 1.0	< 0.10	0.28	72.8	< 0.020	< 0.050	< 10	0.0066	89.9	< 0.10	0.19	< 0.20	322	< 0.050	3.1	18.0	*688*	< 0.0050	4.42	0.63	0.760	1.23	< 0.010	1.45	145	< 0.010	< 0.10	< 0.30	2.01	< 0.50	< 1.0
	QA/QC RPD%		1	*	*	*	1	*	*	*	*	1	*	*	*	9	*	*	2	1	*	15	*	0	1	*	1	1	*	*	*	0	*	*
	RG_MW_FR10C_WG_2022_05_06_NP	2022 05 06	281	< 1.0	< 0.10	0.12	67.0	< 0.020	< 0.050	< 10	0.0079	87.1	< 0.50	0.14	< 0.20	106	< 0.050	2.6	15.5	*523*	< 0.0050	0.525	< 0.50	0.789	2.19	< 0.010	1.23	127	< 0.010	< 0.10	< 0.30	1.80	< 0.50	< 1.0
	RG_MW_FR10C_WG_2022_07_21_NP	2022 07 21	240	< 1.0	< 0.10	0.11	57.5	< 0.020	< 0.050	< 10	0.0091	73.2	< 0.50	0.11	0.64	82	< 0.050	3.8	13.8	*431*	< 0.0050	0.657	< 0.50	0.722	0.804	< 0.010	3.70	121	< 0.010	< 0.10	< 0.30	2.32	< 0.50	< 1.0
	RG_MW_MC10A_WG_2022_07_21_NP	Duplicate	247	< 1.0	< 0.10	0.13	61.1	< 0.020	< 0.050	< 10	0.0089	75.5	< 0.50	0.12	< 0.20	82	< 0.050	3.9	14.3	*439*	< 0.0050	0.675	< 0.50	0.734	0.922	< 0.010	3.88	122	< 0.010	< 0.10	< 0.30	2.35	< 0.50	< 1.0
	QA/QC RPD%		3	*	*	*	6	*	*	*	*	3	*	*	*	0	*	*	4	2	*	3	*	2	14	*	5	1	*	*	*	1	*	*
	RG_MW_FR10C_WG_2022_11_17_NP	2022 11 17	186	< 1.0	< 0.10	0.36	48.9	< 0.020	< 0.050	< 10	< 0.0050	56.2	< 0.10	0.11	< 0.20	236	< 0.050	2.8	11.1	*431*	< 0.0050	0.522	< 0.50	0.670	0.050	< 0.010	0.992	91.6	< 0.010	< 0.10	< 0.30	1.37	< 0.50	< 1.0
	RG_MW_MC10A_WG_2022_11_17_NP	Duplicate	177	1.0	< 0.10	0.35	49.5	< 0.020	< 0.050	< 10	< 0.0050	52.5	< 0.10	0.11	< 0.20	227	< 0.050	2.4	11.2	*429*	< 0.0050	0.462	< 0.50	0.667	< 0.050	< 0.010	0.979	83.7	< 0.010	< 0.10	< 0.30	1.28	< 0.50	< 1.0
	QA/QC RPD%		5	*	*	*	1	*	*	*	*	7	*	*	*	4	*	*	1	0	*	12	*	0	*	*	1	9	*	*	*	7	*	*

All terms defined within the body of SNC-Lavalin's report.
< Denotes concentration less than indicated detection limit.
- Denotes analysis not conducted.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

BOLD	Concentration greater than CSR Aquatic Life (AW) standard
ITALIC	Concentration greater than CSR Irrigation Watering (IW) standard
UNDERLINE	Concentration greater than CSR Livestock Watering (LW) standard
SHADED	Concentration greater than CSR Drinking Water (DW) standard

[a] Standard to protect freshwater aquatic life.
[b] Standard varies with Hardness.
[c] Standard varies with pH.
[d] Individual standards exist for Cr +3 and Cr +6. Reported value represents more stringent standard.
[e] Interim BC MoE Regional Background Estimate (Protocol 9 Determining Background Groundwater Quality).
[f] There is no Zinc standard specified for H > 400; therefore, the standard for H=300-<400 is applied as a conservative comparison.
[g] Ramboll calculated health-based values for these two parameters based on toxicity values (tolerable daily intakes; TDI) and drinking water allocation factors (DW AFs), documented in Appendix IV.
[h] Sample ID renamed by SNC-Lavalin due to duplication with another sample in Teck Coal database.

TABLE FR-04: Summary of Analytical Results Compared to Primary Screening Criteria for Dissolved Metals in Groundwater (FRO)

Sample Location	Sample ID	Sample Date (yyyy mm dd)	Hardness mg/L	Aluminum µg/L	Antimony µg/L	Arsenic µg/L	Barium µg/L	Beryllium µg/L	Bismuth µg/L	Boron µg/L	Cadmium µg/L	Calcium mg/L	Chromium µg/L	Cobalt µg/L	Copper µg/L	Iron µg/L	Lead µg/L	Lithium µg/L	Magnesium mg/L	Manganese µg/L	Mercury µg/L	Molybdenum µg/L	Nickel µg/L	Potassium mg/L	Selenium µg/L	Silver µg/L	Sodium mg/L	Strontium µg/L	Thallium µg/L	Tin µg/L	Titanium µg/L	Uranium µg/L	Vanadium µg/L	Zinc[f] µg/L
				Dissolved Metals																														
BC Standard																																		
CSR Aquatic Life (AW)[a]			n/a	n/a	90	50	10,000	1.5	n/a	12,000	0.5-4[b]	n/a	10[d]	40	20-90[b]	n/a	40-160[b]	n/a	n/a	n/a	0.25	10,000	250-1,500[b]	n/a	20	0.5-15[b]	n/a	n/a	3	n/a	1,000	85	n/a	75-2,400[b]
CSR Irrigation Watering (IW)			n/a	5,000	n/a	100	n/a	100	n/a	500	5	n/a	5[d]	50	200	5,000	200	2,500	n/a	200	1	10	200	n/a	20	n/a	n/a	n/a	n/a	n/a	n/a	10	100	1,000-5,000[c]
CSR Livestock Watering (LW)			n/a	5,000	n/a	25	n/a	100	n/a	5,000	80	1,000	50[d]	1,000	300	n/a	100	5,000	n/a	n/a	2	50	1,000	n/a	30	n/a	n/a	n/a	n/a	n/a	n/a	200	100	2,000
CSR Drinking Water (DW)			n/a	9,500	6	10	1,000	8	n/a	5,000	5	n/a	50[d]	20[e]	1,500	6,500	10	8	n/a	1,500	1	250	80	n/a	10	20	200	2,500	n/a	2,500	n/a	20	20	3,000
Health-based Value (HBV)[g]			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1,200	n/a	n/a	n/a	2,400	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Swift Creek																																		
FR_MW18-02	FR_MW18-02_WG_2022-03-22	2022 03 22	1,630	2.4	< 0.20	< 0.20	19.4	< 0.040	< 0.100	< 20	0.0317	325	< 0.20	< 0.20	< 0.40	< 20	< 0.100	34.1	198	44.4	< 0.0050	1.39	< 1.00	2.26	***314***	< 0.020	7.98	206	0.091	< 0.20	< 0.60	8.22	< 1.00	2.8
	FR_MW18-02_WG_2022-05-30_NP	2022 06 01	1,430	2.7	< 0.20	< 0.20	23.3	< 0.040	< 0.100	< 20	0.0257	298	< 0.20	< 0.20	1.08	< 20	< 0.100	30.0	166	10.2	< 0.0050	1.51	< 1.00	2.57	***252***	< 0.020	9.66	189	0.080	< 0.20	< 0.60	7.21	< 1.00	2.4
	FR_MW18-02_WG_2022-09-12_N	2022 09 12	1,350	2.9	0.22	0.28	37.8	< 0.040	< 0.100	< 20	0.0295	280	< 0.20	< 0.20	1.81	< 20	< 0.100	39.0	158	5.67	< 0.0050	1.84	< 1.00	3.44	***208***	< 0.020	19.8	197	0.101	< 0.20	< 0.60	6.84	< 1.00	2.7
	FR_MW18-02_WG_2022-11-14_N	2022 11 15	1,920	< 2.0	< 0.20	< 0.20	25.9	< 0.040	< 0.100	< 20	0.0517	376	< 0.20	< 0.20	< 0.40	< 20	< 0.100	56.8	238	10.6	< 0.0050	1.70	1.10	2.56	***449***	< 0.020	6.51	235	0.146	< 0.20	< 0.60	*11.1*	< 1.00	3.0
Blanks																																		
Field Blanks																																		
FR_09-04-B	FR_FLD1_WG_2022	2022 01 25	< 0.50	< 1.0	< 0.10	< 0.10	< 0.10	< 0.020	< 0.050	< 10	< 0.0050	< 0.050	< 0.10	< 0.10	< 0.20	< 10	< 0.050	< 1.0	< 0.0050	< 0.10	< 0.0050	< 0.050	< 0.50	< 0.050	< 0.050	< 0.010	< 0.050	< 0.20	< 0.010	< 0.10	< 0.30	< 0.010	< 0.50	< 1.0
RG_MW_FR1C	RG_MW_MC10B_WG_2022_02_09_NP	2022 02 09	< 0.50	< 1.0	< 0.10	< 0.10	< 0.10	< 0.020	< 0.050	< 10	< 0.0050	< 0.050	< 0.10	< 0.10	0.22	< 10	< 0.050	< 1.0	< 0.0050	< 0.10	< 0.0050	< 0.050	< 0.50	< 0.050	< 0.050	< 0.010	< 0.050	< 0.20	< 0.010	< 0.10	< 0.30	< 0.010	< 0.50	< 1.0
FR_KB-1	FR_FLD2_WG_2022-02_NP	2022 03 03	< 0.50	1.2	< 0.10	< 0.10	< 0.10	< 0.020	< 0.050	< 10	< 0.0050	< 0.050	< 0.10	< 0.10	< 0.20	< 10	< 0.050	< 1.0	< 0.0050	< 0.10	-	< 0.050	< 0.50	< 0.050	< 0.050	< 0.010	< 0.050	< 0.20	< 0.010	< 0.10	< 0.30	< 0.010	< 0.50	< 1.0
FR_HMW3	FR_FLD_QTR_2022-01-04_N	2022 03 15	< 0.50	< 1.0	< 0.10	< 0.10	0.21	< 0.020	< 0.050	< 10	< 0.0050	< 0.050	< 0.10	< 0.10	< 0.20	< 10	< 0.050	< 1.0	0.0056	< 0.10	< 0.0050	< 0.050	< 0.50	< 0.050	< 0.050	< 0.010	< 0.050	< 0.20	< 0.010	< 0.10	< 0.30	< 0.010	< 0.50	< 1.0
FR_GCMW-1B	FR_FLD1_2022-03-16	2022 03 16	< 0.50	< 1.0	< 0.10	< 0.10	< 0.10	< 0.020	< 0.050	< 10	< 0.0050	< 0.050	< 0.10	< 0.10	< 0.20	< 10	< 0.050	< 1.0	< 0.0050	< 0.10	< 0.0050	< 0.050	< 0.50	< 0.050	< 0.050	< 0.010	< 0.050	< 0.20	< 0.010	< 0.10	< 0.30	< 0.010	< 0.50	< 1.0
FR_09-01-B	FR_FLD_QTR_2022-04-01_N	2022 04 21	< 0.50	1.6	< 0.10	< 0.10	0.25	< 0.020	< 0.050	< 10	< 0.0050	< 0.050	< 0.10	< 0.10	< 0.20	< 10	< 0.050	< 1.0	< 0.0050	< 0.10	< 0.0050	< 0.050	< 0.50	< 0.050	< 0.050	< 0.010	< 0.050	< 0.20	< 0.010	< 0.10	< 0.30	< 0.010	< 0.50	1.9
RG_MW_FR10B	RG_MW_MC10B_WG_2022_05_06_NP	2022 05 06	< 0.60	< 1.0	< 0.10	< 0.10	< 0.10	< 0.020	< 0.050	< 10	< 0.0050	< 0.050	< 0.50	< 0.10	< 0.20	< 10	< 0.050	< 1.0	< 0.100	< 0.10	< 0.0050	< 0.050	< 0.50	< 0.100	< 0.050	< 0.010	< 0.050	< 0.20	< 0.010	< 0.10	< 0.30	< 0.010	< 0.50	< 1.0
FR_MW18-02	FR_MW_MC10B_WG_2022-05-30_NP	2022 06 01	< 0.50	< 1.0	< 0.10	< 0.10	< 0.10	< 0.020	< 0.050	< 10	< 0.0050	< 0.050	< 0.10	< 0.10	< 0.20	< 10	< 0.050	< 1.0	< 0.0050	< 0.10	< 0.0050	< 0.050	< 0.50	< 0.050	< 0.050	< 0.010	< 0.050	< 0.20	< 0.010	< 0.10	< 0.30	< 0.010	< 0.50	< 1.0
RG_MW_FR10C	RG_MW_MC10B_WG_2022_07_21_NP	2022 07 21	< 0.60	< 1.0	< 0.10	< 0.10	< 0.10	< 0.020	< 0.050	< 10	< 0.0050	< 0.050	< 0.50	< 0.10	< 0.20	< 10	< 0.050	< 1.0	< 0.100	< 0.10	< 0.0050	< 0.050	< 0.50	< 0.100	< 0.050	< 0.010	< 0.050	< 0.20	< 0.010	< 0.10	< 0.30	< 0.010	< 0.50	< 1.0
FR_GCMW-2	FR_FLD2_2022-09-22	2022 09 22	< 0.50	< 1.0	< 0.10	< 0.10	< 0.10	< 0.020	< 0.050	< 10	< 0.0050	< 0.050	< 0.10	< 0.10	< 0.20	< 10	< 0.050	< 1.0	< 0.0050	< 0.10	< 0.0050	< 0.050	< 0.50	< 0.050	< 0.050	< 0.010	< 0.050	< 0.20	< 0.010	< 0.10	< 0.30	< 0.010	< 0.50	< 1.0
FR_09-01-A	FR_FLD_QTR_2022-10-01_N	2022 10 05	< 0.50	< 1.0	< 0.10	< 0.10	< 0.10	< 0.020	< 0.050	< 10	< 0.0050	< 0.050	< 0.10	< 0.10	< 0.20	< 10	< 0.050	< 1.0	< 0.0050	< 0.10	< 0.0050	< 0.050	< 0.50	< 0.050	< 0.050	< 0.010	< 0.050	< 0.20	< 0.010	< 0.10	< 0.30	< 0.010	< 0.50	< 1.0
RG_MW_FR10C	RG_MW_MC10B_WG_2022_11_17_NP	2022 11 17	< 0.60	< 1.0	< 0.10	< 0.10	0.20	< 0.020	< 0.050	< 10	< 0.0050	< 0.050	< 0.10	< 0.10	< 0.20	< 10	< 0.050	< 1.0	< 0.100	< 0.10	< 0.0050	< 0.050	< 0.50	< 0.100	< 0.050	< 0.010	< 0.050	< 0.20	< 0.010	< 0.10	< 0.30	< 0.010	< 0.50	< 1.0
FR_GCMW-2	FR_FLD1_2022-11-22	2022 11 22	< 0.50	< 1.0	< 0.10	< 0.10	< 0.10	< 0.020	< 0.050	< 10	< 0.0050	< 0.050	< 0.10	< 0.10	< 0.20	< 10	< 0.050	< 1.0	< 0.0050	< 0.10	< 0.0050	< 0.050	< 0.50	< 0.050	< 0.050	< 0.010	< 0.050	< 0.20	< 0.010	< 0.10	< 0.30	< 0.010	< 0.50	< 1.0
Trip Blanks																																		
	RG_MW_MC10C_WG_2022_02_09_NP	2022 02 09	< 0.50	< 1.0	< 0.10	< 0.10	< 0.10	< 0.020	< 0.050	< 10	< 0.0050	< 0.050	< 0.10	< 0.10	< 0.20	< 10	< 0.050	< 1.0	< 0.0050	< 0.10	< 0.0050	3.98	< 0.50	< 0.050	< 0.050	< 0.010	< 0.050	< 0.20	< 0.010	< 0.10	< 0.30	< 0.010	< 0.50	< 1.0
	FR_TRP_QTR_2022-01-04_N	2022 02 17	< 0.50	2.3	< 0.10	< 0.10	0.79	< 0.020	< 0.050	< 10	< 0.0050	0.106	< 0.10	< 0.10	< 0.20	< 10	< 0.050	< 1.0	< 0.0050	< 0.10	< 0.0050	0.053	< 0.50	< 0.050	< 0.050	< 0.010	< 0.050	< 0.20	< 0.010	< 0.10	< 0.30	< 0.010	< 0.50	< 1.0
	FR_TRP1_WG_2022-02_NP	2022 03 03	< 0.50	< 1.0	< 0.10	< 0.10	< 0.10	< 0.020	< 0.050	< 10	< 0.0050	< 0.050	< 0.10	< 0.10	< 0.20	< 10	< 0.050	< 1.0	< 0.0050	< 0.10	-	< 0.050	< 0.50	< 0.050	< 0.050	< 0.010	< 0.050	< 0.20	< 0.010	< 0.10	< 0.30	< 0.010	< 0.50	< 1.0
	FR_TRP_QTR_2022-04-01_N	2022 04 21	< 0.50	< 1.0	< 0.10	< 0.10	< 0.10	< 0.020	< 0.050	< 10	< 0.0050	< 0.050	< 0.10	< 0.10	< 0.20	< 10	< 0.050	< 1.0	< 0.0050	< 0.10	< 0.0050	< 0.050	< 0.50	< 0.050	< 0.050	< 0.010	< 0.050	< 0.20	< 0.010	< 0.10	< 0.30	< 0.010	< 0.50	< 1.0
	FR_TRP_WEK_2022-04-25_N	2022 04 25	< 0.50	-	-	-	-	-	-	-	-	< 0.050	-	-	-	-	-	-	< 0.0050	-	-	-	-	< 0.050	-	-	< 0.050	-	-	-	-	-	-	-
	RG_MW_MC10C_WG_2022_05_06_NP	2022 05 06	< 0.60	< 1.0	< 0.10	< 0.10	< 0.10	< 0.020	< 0.050	< 10	< 0.0050	< 0.050	< 0.50	< 0.10	< 0.20	< 10	< 0.050	< 1.0	< 0.100	< 0.10	< 0.0050	< 0.050	< 0.50	< 0.100	< 0.050	< 0.010	< 0.050	< 0.20	< 0.010	< 0.10	< 0.30	< 0.010	< 0.50	< 1.0
	FR_TRP_WEK_2022-05-09_N	2022 05 12	< 0.50	-	-	-	-	-	-	-	-	< 0.050	-	-	-	-	-	-	< 0.0050	-	-	-	-	< 0.050	-	-	< 0.050	-	-	-	-	-	-	-
	FR_MW_MC10C_WG_2022-05-30_NP	2022 06 01	< 0.50	-	-	-	-	-	-	-	-	< 0.050	-	-	-	-	-	-	< 0.0050	-	-	-	-	< 0.050	-	-	< 0.050	-	-	-	-	-	-	-
	FR_MW_MC10C_WG_2022_06_06_NP	2022 06 06	< 0.50	< 1.0	< 0.10	< 0.10	< 0.10	< 0.020	< 0.050	< 10	< 0.0050	< 0.050	< 0.10	< 0.10	< 0.20	< 10	< 0.050	< 1.0	< 0.0050	< 0.10	< 0.0050	< 0.050	< 0.50	< 0.050	< 0.050	< 0.010	< 0.050	< 0.20	< 0.010	< 0.10	< 0.30	< 0.010	< 0.50	< 1.0
	RG_MW_MC10C_WG_2022_07_21_NP	2022 07 21	< 0.60	< 1.0	< 0.10	< 0.10	< 0.10	< 0.020	< 0.050	< 10	< 0.0050	< 0.050	< 0.50	< 0.10	< 0.20	< 10	< 0.050	< 1.0	< 0.100	< 0.10	< 0.0050	< 0.050	< 0.50	< 0.100	< 0.050	< 0.010	< 0.050	< 0.20	< 0.010	< 0.10	< 0.30	< 0.010	< 0.50	< 1.0
	FR_TRP_QTR_2022-07-01_N	2022 09 15	< 0.50	< 1.0	< 0.10	< 0.10	< 0.10	< 0.020	< 0.050	< 10	< 0.0050	< 0.050	< 0.10	< 0.10	< 0.20	< 10	< 0.050	< 1.0	< 0.0050	< 0.10	< 0.0050	< 0.050	< 0.50	< 0.050	< 0.050	< 0.010	< 0.050	< 0.20	< 0.010	< 0.10	< 0.30	< 0.010	< 0.50	< 1.0
	RG_MW_MC10C_WG_2022_11_17_NP	2022 11 17	< 0.60	< 1.0	< 0.10	< 0.10	< 0.10	< 0.020	< 0.050	< 10	< 0.0050	< 0.050	< 0.10	< 0.10	< 0.20	< 10	< 0.050	< 1.0	< 0.100	< 0.10	< 0.0050	< 0.050	< 0.50	< 0.100	< 0.050	< 0.010	< 0.050	< 0.20	< 0.010	< 0.10	< 0.30	< 0.010	< 0.50	< 1.0

All terms defined within the body of SNC-Lavalin's report.

< Denotes concentration less than indicated detection limit.

\- Denotes analysis not conducted.

n/a Denotes no applicable standard/guideline.

QA/QC RPD Denotes quality assurance/quality control relative percent difference

* RPDs are not calculated where one or more concentrations are less than five times RDL.

RDL Denotes reported detection limit.

BOLD	Concentration greater than CSR Aquatic Life (AW) standard
ITALIC	Concentration greater than CSR Irrigation Watering (IW) standard
UNDERLINE	Concentration greater than CSR Livestock Watering (LW) standard
SHADED	Concentration greater than CSR Drinking Water (DW) standard

[a] Standard to protect freshwater aquatic life.

[b] Standard varies with Hardness.

[c] Standard varies with pH.

[d] Individual standards exist for Cr +3 and Cr +6. Reported value represents more stringent standard.

[e] Interim BC MoE Regional Background Estimate (Protocol 9 Determining Background Groundwater Quality).

[f] There is no Zinc standard specified for H > 400; therefore, the standard for H=300-<400 is applied as a conservative comparison.

[g] Ramboll calculated health-based values for these two parameters based on toxicity values (tolerable daily intakes; TDI) and drinking water allocation factors (DW AFs), documented in Appendix IV.

[h] Sample ID renamed by SNC-Lavalin due to duplication with another sample in Teck Coal database.

TABLE FR-05: Summary of Analytical Results Compared to Secondary Screening Criteria for Selenium (FRO)

Sample Location	Sample ID	Sample Date (yyyy mm dd)	SPO/Compliance Point	Selenium µg/L
Groundwater Quality Benchmarks				
SPO			Fording River [GH_FR1 (0200378)]	63
Compliance Point			Fording River [FR_FRABCH (EMS E223753)]	85
Henretta Creek				
FR_HMW1D	FR_HMW1D_QTR_2022-04-01_N	2022 06 29	FR_FRABCH (EMS E223753)	14.9
FR_HMW1S	FR_HMW1S_QTR_2022-01-04_N	2022 03 07	FR_FRABCH (EMS E223753)	228
	FR_DC2_QTR_2022-01-04_N	Duplicate	FR_FRABCH (EMS E223753)	244
	QA/QC RPD%			7
	FR_HMW1S_QTR_2022-04-01_N	2022 06 29	FR_FRABCH (EMS E223753)	279
	FR_HMW1S_QTR_2022-07-01_N	2022 07 21	FR_FRABCH (EMS E223753)	273
	FR_DC2_QTR_2022-07-01_N	Duplicate	FR_FRABCH (EMS E223753)	272
	QA/QC RPD%			0
	FR_HMW1S_QTR_2022-10-01_N	2022 10 03	FR_FRABCH (EMS E223753)	228
FR_HMW3	FR_HMW3_QTR_2022-01-04_N	2022 03 15	FR_FRABCH (EMS E223753)	64.4
	FR_DC3_QTR_2022-01-04_N	Duplicate	FR_FRABCH (EMS E223753)	66.2
	QA/QC RPD%			3
	FR_HMW3_QTR_2022-04-01_N	2022 04 25	FR_FRABCH (EMS E223753)	117
	FR_HMW3_QTR_2022-07-01_N	2022 07 21	FR_FRABCH (EMS E223753)	85.1
	FR_HMW3_QTR_2022-10-01_N	2022 10 03	FR_FRABCH (EMS E223753)	98.7
	FR_DC1_QTR_2022-10-01_N	Duplicate	FR_FRABCH (EMS E223753)	94.4
	QA/QC RPD%			4
FR_HMW5	FR_HMW5_QTR_2022-07-01_N	2022 09 06	FR_FRABCH (EMS E223753)	13.4
Fording River Valley				
FR_TBSSMW-2	FR_TBSSMW-2_QTR_2022-01-04_N	2022 03 25	FR_FRABCH (EMS E223753)	38.8
	FR_TBSSMW-2_QTR_2022-04-01_N	2022 05 10	FR_FRABCH (EMS E223753)	40.2
	FR_TBSSMW-2_QTR_2022-07-01_N	2022 09 07	FR_FRABCH (EMS E223753)	19.7
	FR_TBSSMW-2_QTR_2022-10-01_N	2022 10 10	FR_FRABCH (EMS E223753)	27.9
FR_POTWELLS	FR_POTWELLS_QTR_2022-01-04_N	2022 03 16	FR_FRABCH (EMS E223753)	25.6
	FR_POTWELLS_QTR_2022-07-01_N	2022 09 18	FR_FRABCH (EMS E223753)	21.1
	FR_POTWELLS_QTR_2022-10-01_N	2022 10 10	FR_FRABCH (EMS E223753)	24.2
FR_GCMW-2	FR_GCMW-2_2022-03-15	2022 03 15	FR_FRABCH (EMS E223753)	126
	FR_GCMW-2_2022-06-23	2022 06 23	FR_FRABCH (EMS E223753)	107
	FR_GCMW-2_QTR_2022-09-22-N	2022 09 22	FR_FRABCH (EMS E223753)	121
	FR_DC2_2022-09-22	Duplicate	FR_FRABCH (EMS E223753)	119
	QA/QC RPD%			2
	FR_GCMW-2_2022-11-22	2022 11 22	FR_FRABCH (EMS E223753)	144
	FR_DC1_2022-11-22	Duplicate	FR_FRABCH (EMS E223753)	144
	QA/QC RPD%			0
FR_MW-1B	FR_MW-1B_QTR_2022-01-04_N	2022 03 26	FR_FRABCH (EMS E223753)	71
	FR_MW-1B_QTR_2022-04-01_N	2022 06 09	FR_FRABCH (EMS E223753)	35.2
	FR_MW-1B_QTR_2022-07-01_N	2022 09 20	FR_FRABCH (EMS E223753)	64.8
	FR_MW-1B_QTR_2022-10-01_N	2022 10 07	FR_FRABCH (EMS E223753)	74.3
FR_KB-1	FR_KB-1_WG_2022-02_NP	2022 03 03	FR_FRABCH (EMS E223753)	418
	FR_DC2_WG_2022-02_NP	Duplicate	FR_FRABCH (EMS E223753)	419
	QA/QC RPD%			0
	FR_KB-1A_WG_2022-06_NP	2022 06 15	FR_FRABCH (EMS E223753)	285
	FR_KB-1A_WG_QTR_KCWD_2022-09-22_NP	2022 09 22	FR_FRABCH (EMS E223753)	369
	FR_KB-1_WG_QTR_KCWD_2022-11-08_NP	2022 11 08	FR_FRABCH (EMS E223753)	435
FR_KB-2	FR_KB-2_WG_2022-02_NP	2022 03 01	FR_FRABCH (EMS E223753)	378
	FR_KB-2A_WG_2022-06_NP	2022 06 16	FR_FRABCH (EMS E223753)	254
	FR_KB-2A_WG_QTR_KCWD_2022-09-23_NP	2022 09 23	FR_FRABCH (EMS E223753)	381
	FR_KB-2_WG_QTR_KCWD_2022-11-10_NP	2022 11 10	FR_FRABCH (EMS E223753)	381
FR_KB-3A	FR_KB-3A_WG_2022-02_NP	2022 03 03	FR_FRABCH (EMS E223753)	251
	FR_KB-3A_WG_2022-06_NP	2022 06 15	FR_FRABCH (EMS E223753)	296
	FR_KB-3A_WG_QTR_KCWD_2022-09-21_NP	2022 09 21	FR_FRABCH (EMS E223753)	329
	FR_KB-3A_WG_QTR_KCWD_2022-11-14_NP	2022 11 14	FR_FRABCH (EMS E223753)	247
FR_KB-3B	FR_KB-3B_WG_2022-02_NP	2022 03 03	FR_FRABCH (EMS E223753)	286
	FR_KB-3B_WG_2022-06_NP	2022 06 15	FR_FRABCH (EMS E223753)	364
	FR_KB-3B_WG_QTR_KCWD_2022-09-21_NP	2022 09 21	FR_FRABCH (EMS E223753)	322
	FR_KB-3B_WG_QTR_KCWD_2022-11-14_NP	2022 11 14	FR_FRABCH (EMS E223753)	290
FR_MW-SK1A	FR_MW-SK1A_QTR_2022-04-01_N	2022 05 12	FR_FRABCH (EMS E223753)	144
	FR_MW-SK1A_QTR_2022-07-01_N	2022 08 27	FR_FRABCH (EMS E223753)	144
	FR_MW_SK1A_QTR_2022-10-05_N	2022 10 05	FR_FRABCH (EMS E223753)	164
FR_09-01-A	FR_09-01-A_QTR_2022-01-04_N	2022 03 27	FR_FRABCH (EMS E223753)	125
	FR_09-01-A_QTR_2022-04-01_N	2022 04 21	FR_FRABCH (EMS E223753)	118
	FR_DC2_QTR_2022-04-01_N	Duplicate	FR_FRABCH (EMS E223753)	116
	QA/QC RPD%			2
	FR_09-01-A_QTR_2022-07-01_N	2022 07 18	FR_FRABCH (EMS E223753)	86.9
	FR_09-01-A_QTR_2022-10-01_N	2022 10 05	FR_FRABCH (EMS E223753)	135
FR_09-01-B	FR_09-01-B_QTR_2022-01-04_N	2022 03 27	FR_FRABCH (EMS E223753)	74.3
	FR_09-01-B_QTR_2022-04-01_N	2022 04 21	FR_FRABCH (EMS E223753)	85.8
	FR_09-01-B_QTR_2022-07-01_N	2022 07 18	FR_FRABCH (EMS E223753)	93.2
	FR_09-01-B_QTR_2022-10-01_N	2022 10 05	FR_FRABCH (EMS E223753)	108
FR_09-02-A	FR_09-02-A_QTR_2022-01-04_N	2022 01 11	FR_FRABCH (EMS E223753)	77.8
	FR_09-02-A_QTR_2022-04-01_N	2022 04 21	FR_FRABCH (EMS E223753)	76.3
	FR_09-02-A_QTR_2022-07-01_N	2022 07 18	FR_FRABCH (EMS E223753)	86.3
	FR_DC1_QTR_2022-07-01_N	Duplicate	FR_FRABCH (EMS E223753)	88.8
	QA/QC RPD%			3
	FR_09-02-A_QTR_2022-10-01_N	2022 10 05	FR_FRABCH (EMS E223753)	82.2
	FR_DC2_QTR_2022-10-01_N	Duplicate	FR_FRABCH (EMS E223753)	80.5
	QA/QC RPD%			2
FR_09-02-B	FR_09-02-B_QTR_2022-01-04_N	2022 01 11	FR_FRABCH (EMS E223753)	65.8
	FR_09-02-B_QTR_2022-04-01_N	2022 04 21	FR_FRABCH (EMS E223753)	85.7
	FR_DC1_QTR_2022-04-01_N	Duplicate	FR_FRABCH (EMS E223753)	85.8
	QA/QC RPD%			0
	FR_09-02-B_QTR_2022-07-01_N	2022 07 18	FR_FRABCH (EMS E223753)	91.8
	FR_09-02-B_QTR_2022-10-01_N	2022 10 05	FR_FRABCH (EMS E223753)	74.4
FR_GH_WELL4	FR_GH_WELL4_QTR_2022-01-04_N	2022 02 17	FR_FRABCH (EMS E223753)	76.0
	FR_GH_WELL4_QTR_2022-04-01_N	2022 05 11	FR_FRABCH (EMS E223753)	145
	FR_GH_WELL4_QTR_2022-07-01_N	2022 08 21	FR_FRABCH (EMS E223753)	54.0
	FR_GH_WELL4_QTR_2022-10-01_N	2022 10 07	FR_FRABCH (EMS E223753)	28.3
	FR_DC3_QTR_2022-10-01_N	Duplicate	FR_FRABCH (EMS E223753)	29.6
	QA/QC RPD%			4

All terms defined within the body of SNC-Lavalin's report.
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

SHADED Concentration greater than SPO by Area/Compliance Point by Area

TABLE FR-05: Summary of Analytical Results Compared to Secondary Screening Criteria for Selenium (FRO)

Sample Location	Sample ID	Sample Date (yyyy mm dd)	SPO/Compliance Point	Selenium µg/L
Groundwater Quality Benchmarks				
SPO			Fording River [GH_FR1 (0200378)]	63
Compliance Point			Fording River [FR_FRABCH (EMS E223753)]	85
Fording River Valley				
RG_MW_FR1A	RG_MW_FR1A_WG_2022_02_09_NP	2022 02 09	FR_FRABCH (EMS E223753)	124
	RG_MW_FR1A_WG_2022_05_04_NP	2022 05 04	FR_FRABCH (EMS E223753)	164
	RG_MW_MC10A_WG_2022_05_04_NP	Duplicate	FR_FRABCH (EMS E223753)	150
	QA/QC RPD%			9
	RG_MW_FR1A_WG_2022_07_18_NP	2022 07 18	FR_FRABCH (EMS E223753)	96.8
	RG_MW_FR1A_WG_2022_11_15_NP	2022 11 15	FR_FRABCH (EMS E223753)	116
RG_MW_FR1B	RG_MW_FR1B_WG_2022_02_09_NP	2022 02 09	FR_FRABCH (EMS E223753)	124
	RG_MW_FR1B_WG_2022_05_04_NP	2022 05 04	FR_FRABCH (EMS E223753)	191
	RG_MW_FR1B_WG_2022_07_18_NP	2022 07 18	FR_FRABCH (EMS E223753)	143
	RG_MW_FR1B_WG_2022_11_15_NP	2022 11 15	FR_FRABCH (EMS E223753)	162
RG_MW_FR1C	RG_MW_FR1C_WG_2022_02_09_NP	2022 02 09	FR_FRABCH (EMS E223753)	122
	RG_MW_FR1C_WG_2022_05_04_NP	2022 05 04	FR_FRABCH (EMS E223753)	149
	RG_MW_FR1C_WG_2022_07_18_NP	2022 07 18	FR_FRABCH (EMS E223753)	99.0
	RG_MW_MC10A_WG_2022_07_18_NP	Duplicate	FR_FRABCH (EMS E223753)	97.1
	QA/QC RPD%			2
	RG_MW_FR1C_WG_2022_11_15_NP	2022 11 15	FR_FRABCH (EMS E223753)	152
RG_MW_FR8A	RG_MW_FR8A_WG_2022_11_17_NP	2022 11 17	FR_FRABCH (EMS E223753)	23.9
RG_MW_FR8B	RG_MW_FR8B_WG_2022_02_08_NP	2022 02 08	FR_FRABCH (EMS E223753)	142
	RG_MW_FR8B_WG_2022_05_05_NP	2022 05 05	FR_FRABCH (EMS E223753)	120
	RG_MW_FR8B_WG_2022_07_21_NP	2022 07 21	FR_FRABCH (EMS E223753)	134
	RG_MW_FR8B_WG_2022_11_17_NP	2022 11 17	FR_FRABCH (EMS E223753)	164
RG_MW_FR8C	RG_MW_FR8C_WG_2022_02_08_NP	2022 02 08	FR_FRABCH (EMS E223753)	128
	RG_MW_FR8C_WG_2022_05_05_NP	2022 05 05	FR_FRABCH (EMS E223753)	19.0
	RG_MW_FR8C_WG_2022_07_21_NP	2022 07 21	FR_FRABCH (EMS E223753)	22.6
	RG_MW_FR8C_WG_2022_11_17_NP	2022 11 17	FR_FRABCH (EMS E223753)	126
GH_MW-PC	GH_MW-PC_WG_2022-03-16_NP	2022 03 16	FR_FRABCH (EMS E223753)	65.8
	GH_MW-PC_WG_2022-04-04_NP	2022 06 01	FR_FRABCH (EMS E223753)	74.2
	GH_MW-PC_WG_2022-07-04_NP	2022 08 08	FR_FRABCH (EMS E223753)	70.8
	GH_MW-PC_WG_2022-10-03_NP	2022 11 25	FR_FRABCH (EMS E223753)	95.6
RG_MW_FR10B	RG_MW_FR10B_WG_2022_02_08_NP	2022 02 08	FR_FRABCH (EMS E223753)	33.1
	RG_MW_FR10B_WG_2022_05_06_NP	2022 05 06	FR_FRABCH (EMS E223753)	28.4
	RG_MW_FR10B_WG_2022_07_21_NP	2022 07 21	FR_FRABCH (EMS E223753)	13.9
	RG_MW_FR10B_WG_2022_11_17_NP	2022 11 17	FR_FRABCH (EMS E223753)	20.8
Swift Creek				
FR_MW18-02	FR_MW18-02_WG_2022-03-22	2022 03 22	FR_FRABCH (EMS E223753)	314
	FR_MW18-02_WG_2022-05-30_NP	2022 06 01	FR_FRABCH (EMS E223753)	252
	FR_MW18-02_WG_2022-09-12_N	2022 09 12	FR_FRABCH (EMS E223753)	208
	FR_MW18-02_WG_2022-11-14_N	2022 11 15	FR_FRABCH (EMS E223753)	449

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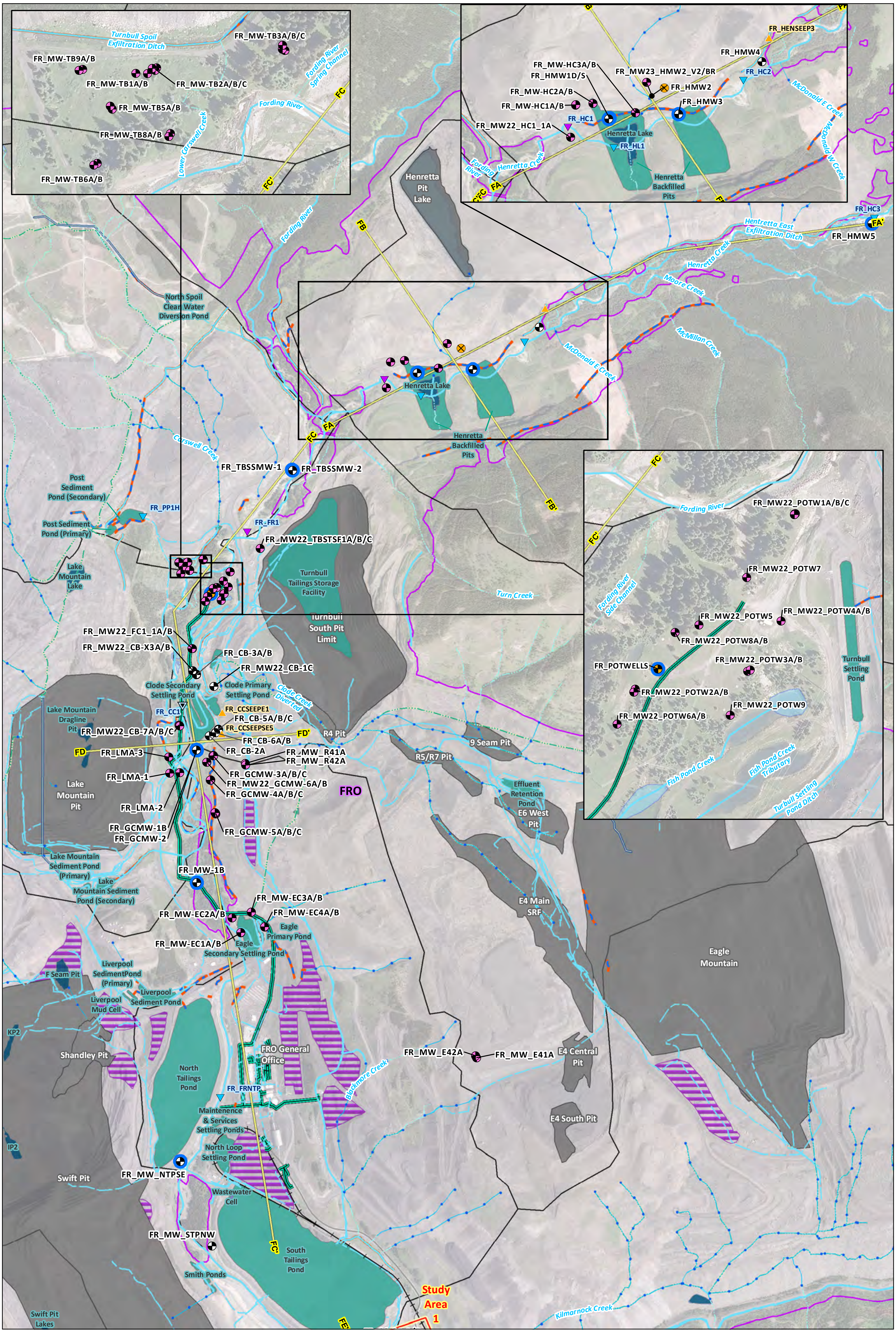
n/a Denotes no applicable standard/guideline.
QA/QC RPD Denotes quality assurance/quality control relative percent difference
* RPDs are not calculated where one or more concentrations are less than five times RDL.
RDL Denotes reported detection limit.

SHADED	Concentration greater than SPO by Area/Compliance Point by Area

Drawings



Legend

Groundwater Stations
- Monitoring Well
- Supply Well
- Well included in the SSGMP
- Decommissioned Well
- Monitoring Wells to be considered for inclusion

Surface Water Stations
- Receiving Environment
- Authorized Discharge
- Monitoring
- Seep

Site Features
- Secondary Road
- Rails
- Geological Cross Section
- Study Areas
- Tailings/Settling /Sediment Pond
- Waste Water Pond
- End-Pit Lake
- Pit
- Stockpiles
- Watersheds

- Mine Permitted Areas

Water Features
- Stream + Stream Ditch
- Intermittent + Indefinite Stream
- Subsurface
- Ditch
- Potable Waterline
- Rock Drain
- Water Pipeline
- Bypass/Diversion Channel

- Lake/River Bed
- Wetted Area/Wetland (Based on 1:25000 Scale)

Notes:
1. Original in colour.
2. Numerical scale reflects full-size print. Print scaling will distort this scale, however scale bar will remain accurate.
3. Intended for illustration purposes, accuracy has not been verified for construction or navigation purposes.
4. The nomenclature for ponds may not accurately reflect that in the various effluent discharge permits.

References:
1. Information provided by Teck Coal Limited.

0 0.2 0.4 0.8 1.2 km

PROJECT LOCATION: Elk Valley, BC

CLIENT NAME: Teck Coal Limited

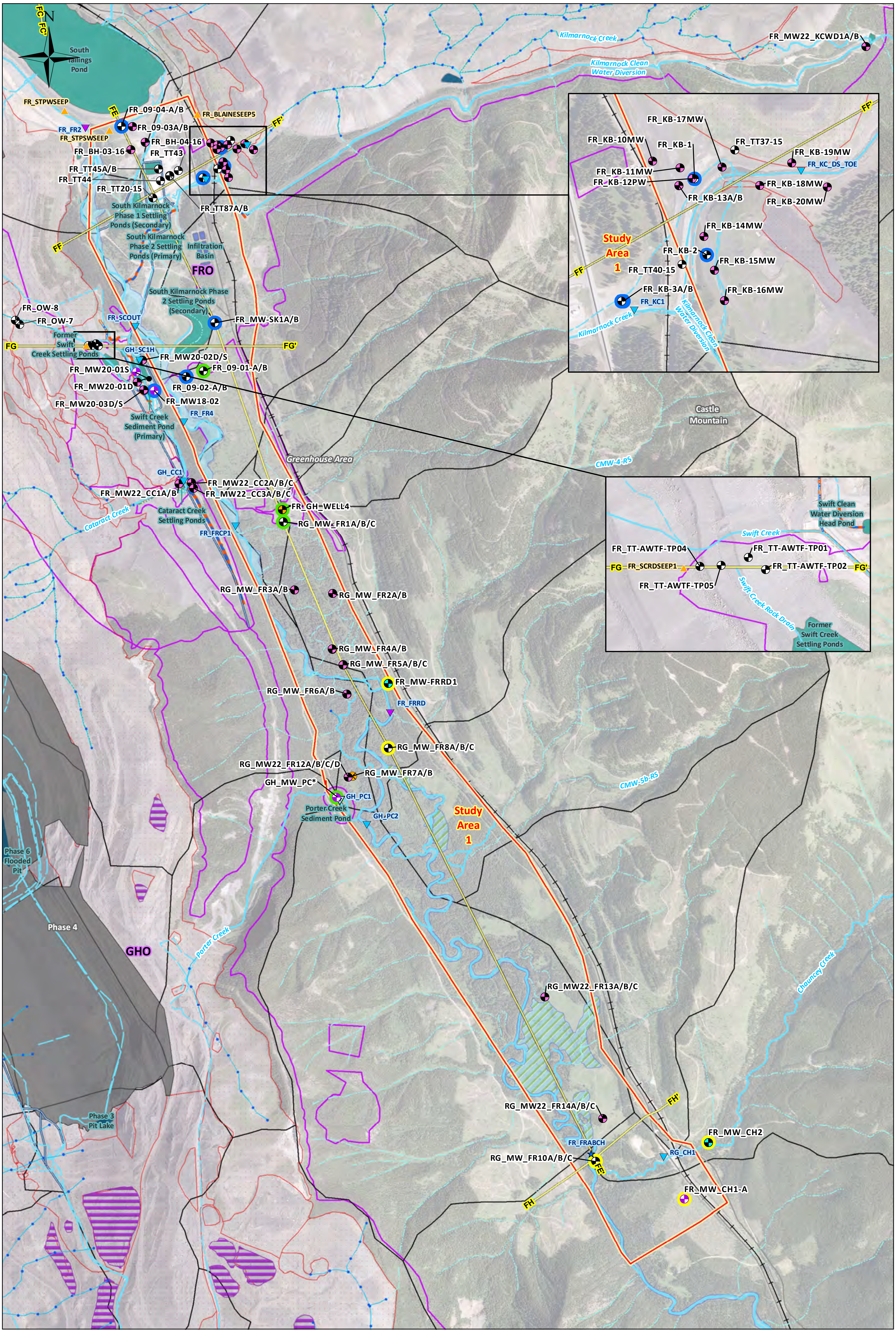
SNC·LAVALIN

Fording River Operations (North) - Sample Location Plan

CHK'D: CH	DATE: 2023-03-21	SCALE: 1:25,000	Ref Num:
BY: CW	COORD SYS: NAD 1983 UTM Zone 11N		**DRAWING FR-01**

MXD Path: \\Sli4395\projects\Current Projects\Teck Coal Ltd\GISCAD\GIS\Map Series\635544_2022_RGMPSSGMP_AnnRpt\635544-LocPlan_FRO_N.mxd

Project Path: \\Sli4395\projects\Current Projects\Teck Coal Ltd\GISCAD\Exports\635544_SSGMP_RGMP_AnnualReport_2022



Legend

Groundwater Stations
- Monitoring Well
- Background Monitoring Well
- Supply Well
- Decommissioned Well
- Well included in the RGMP
- Well included in the SSGMP
- Well included in both the RGMP and the SSGMP
- Monitoring Wells to be considered for inclusion
- Barologgers associated the SSGMP/RGMP

Surface Water Stations
- Compliance Point
- Receiving Environment
- Authorized Discharge
- Monitoring
- Seep

Site Features
- Secondary Road
- Rails
- Geological Cross Section
- Study Areas
- Tailings/Settling/ Sediment Pond
- Waste Water Pond
- End-Pit Lake
- Pit
- Stockpiles
- Waste Dump (Spoils)
- Watersheds
- Mine Permitted Areas

Water Features
- Stream + Stream Ditch
- Intermittent + Indefinite Stream
- Subsurface
- Ditch
- Rock Drain
- Water Pipeline
- Bypass/Diversion Channel
- Lake/River Bed
- Wetted Area/Wetland (Based on 1:26000 Scale)

Notes:
1. Original in colour.
2. Numerical scale reflects full-size print. Print scaling will distort this scale, however scale bar will remain accurate.
3. Intended for illustration purposes, accuracy has not been verified for construction or navigation purposes.
4. The nomenclature for ponds may not accurately reflect that in the various effluent discharge permits.

* Well part of GHO SSGMP.

References:
1. Information provided by Teck Coal Limited.

0 125 250 500 750 1,000 Meters

PROJECT LOCATION: Elk Valley, BC

CLIENT NAME: Teck Coal Limited

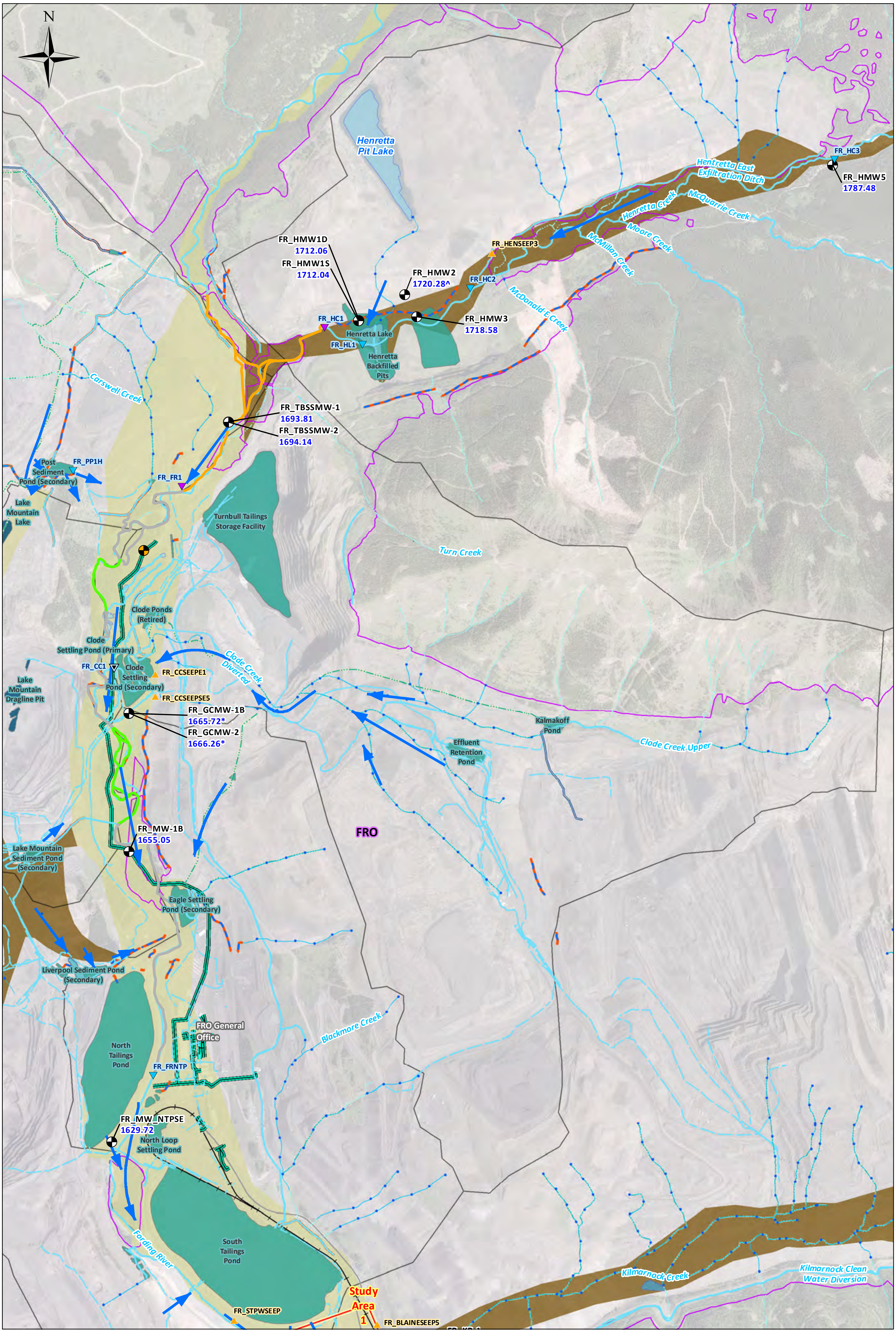
SNC·LAVALIN

Fording River Operations (South) - Sample Location Plan

CHK'D: CH	DATE: 2023-03-23	SCALE: 1:26,000	Ref Num:
BY: CW	COORD SYS: NAD 1983 UTM Zone 11N		DRAWING FR-02

MXD Path: \\Sli4395\projects\Current Projects\Teck Coal Ltd\GISCAD\GIS\Map Series\635544_2022_RGMPSSGMP_AnnRpt\635544-LocPlan_FRO_S.mxd

Project Path: \\Sli4395\projects\Current Projects\Teck Coal Ltd\GISCAD\Exports\635544_SSGMP_RGMP_AnnualReport_2022



Legend

Groundwater Stations
- Monitoring Well
- Supply Well

Surface Water Stations
- Receiving Environment
- Authorized Discharge
- Monitoring
- Seep

Flow Status
- Gaining
- Losing
- No Change
- Not Available/ Insufficient Information

Site Features
- Secondary Road
- Rails

- Interpreted GW flow direction
- Study Areas
- Tailings/Settling/ Sediment Pond
- Waste Water Pond
- End-Pit Lake
- Watersheds
- Mine Permitted Areas

- Interpreted Tributary Valley-bottom Extent
- Interpreted Main Valley-bottom Extent

Water Features
- Stream + Stream Ditch
- Intermittent + Indefinite Stream
- Subsurface
- Ditch

- Potable Waterline
- Rock Drain
- Water Pipeline
- Bypass/Diversion Channel
- Lake/River Bed

1143.80 Water level (masl) measured in October 2022
1538.70^ Water level (masl) measured in February 2022
1538.70* Water level (masl) measured in November 2022

Notes:
1. Original in colour.
2. Numerical scale reflects full-size print. Print scaling will distort this scale, however scale bar will remain accurate.
3. Intended for illustration purposes, accuracy has not been verified for construction or navigation purposes.
4. Stations used to assess flow status are not shown on the map. Readers are referred to report references.
5. Flow accretion studies completion dates:
- Fording River: September 2019 (Golder Associates Ltd.)
6. The nomenclature for ponds may not accurately reflect that in the various effluent discharge permits.

References:
1. Information provided by Teck Coal Limited.

0 125 250 500 750 Meters

PROJECT LOCATION: Elk Valley, BC

CLIENT NAME: Teck Coal Limited

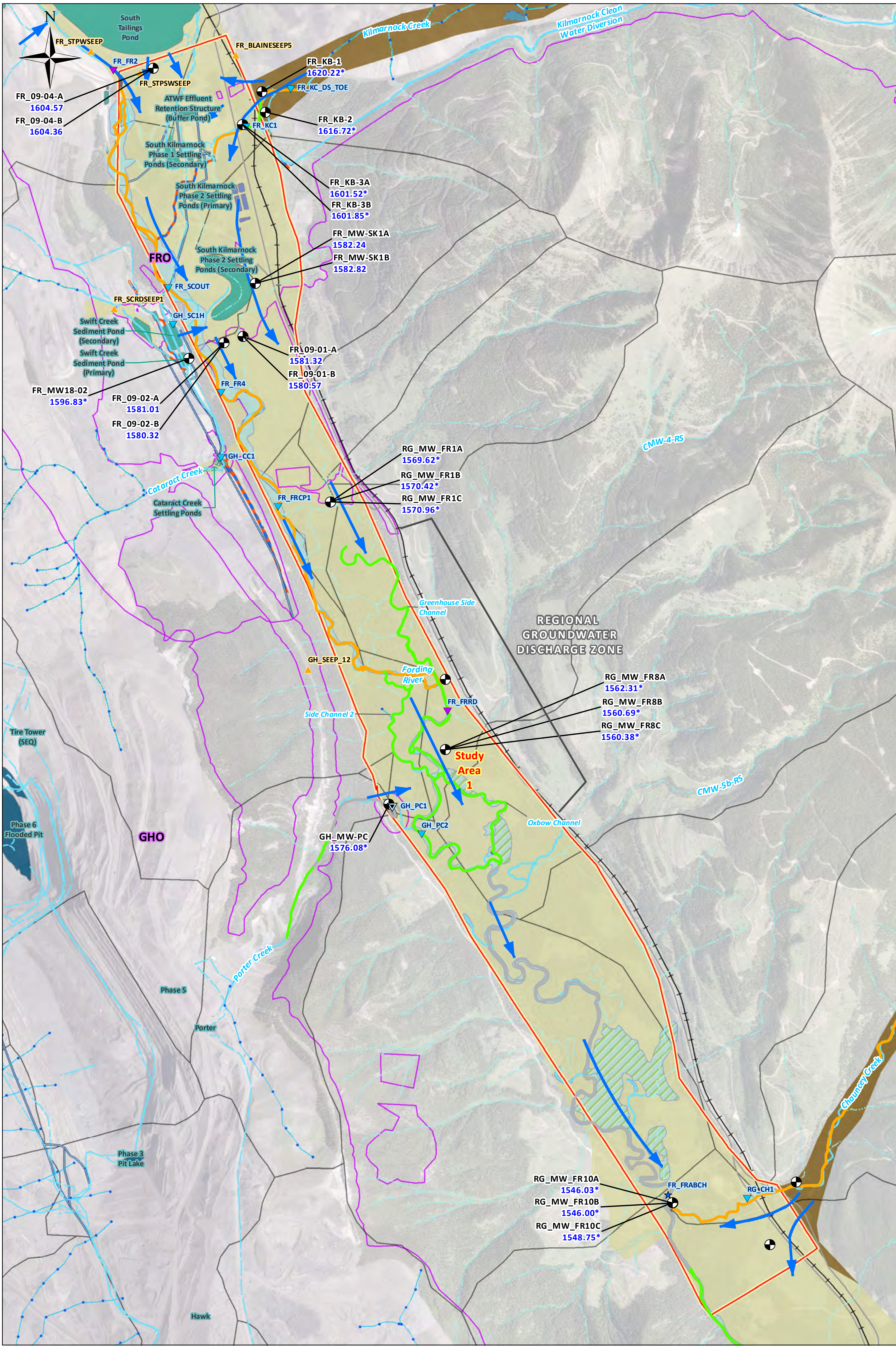
SNC·LAVALIN

Fording River Operations Groundwater Elevations from Q4 2022 and Inferred Groundwater Flow Direction (North)

CHK'D: CH	DATE: 2023-03-10	SCALE: 1:24,000	Ref Num:
BY: CW	COORD SYS: NAD 1983 UTM Zone 11N		DRAWING FR-03

MXD Path: \\Sli4395\projects\Current Projects\Teck Coal Ltd\GISCAD\GIS\Map Series\635544_2022_RGMPSSGMP_AnnRpt\635544-GWElev_FRO_N.mxd

Project Path: \\Sli4395\projects\Current Projects\Teck Coal Ltd\GISCAD\Exports\635544_SSGMP_RGMP_AnnualReport_2022



Legend

Groundwater Stations
- Monitoring Well

Surface Water Stations
- Compliance Point
- Receiving Environment
- Authorized Discharge
- Monitoring
- Seep

Flow Status
- Gaining
- Losing
- No Change
- Not Available/ Insufficient Information

Site Features
- Secondary Road
- Rails

- Interpreted GW flow direction
- Study Areas
- Tailings/Settling/ Sediment Pond
- Waste Water Pond
- End-Pit Lake
- Watersheds
- Mine Permitted Areas
- Interpreted Tributary Valley-bottom Extent
- Interpreted Main Valley-bottom Extent

Water Features
- Stream + Stream Ditch
- Intermittent + Indefinite Stream
- Subsurface
- Ditch
- Rock Drain
- Water Pipeline
- Bypass/Diversion Channel
- Lake/River Bed
- Wetted Area/Wetland (Based on 1:24000 Scale)

1143.80 Water level (masl) measured in October 2022

1538.70* Water level (masl) measured in November 2022

Notes:
1. Original in colour.
2. Numerical scale reflects full-size print. Print scaling will distort this scale, however scale bar will remain accurate.
3. Intended for illustration purposes, accuracy has not been verified for construction or navigation purposes.
4. Stations used to assess flow status are not shown on the map. Readers are referred to report references.
5. Flow accretion studies completion date:
- Kilmarnock Creek: May 2019 (Golder)
- Chauncey Creek: November 2020 (SNC-Lavalin)
- Porter Creek: June/August 2021 (SNC-Lavalin)
- Flow status of Fording River and side channels is a synthesis of numerous studies completed in support of the MBI by SNC-Lavalin in 2019, 2020, and 2021.
6. The nomenclature for ponds may not accurately reflect that in the various effluent discharge permits.

References:
1. Information provided by Teck Coal Limited.

0 125 250 500 750 1,000 Meters

PROJECT LOCATION: Elk Valley, BC

CLIENT NAME: Teck Coal Limited

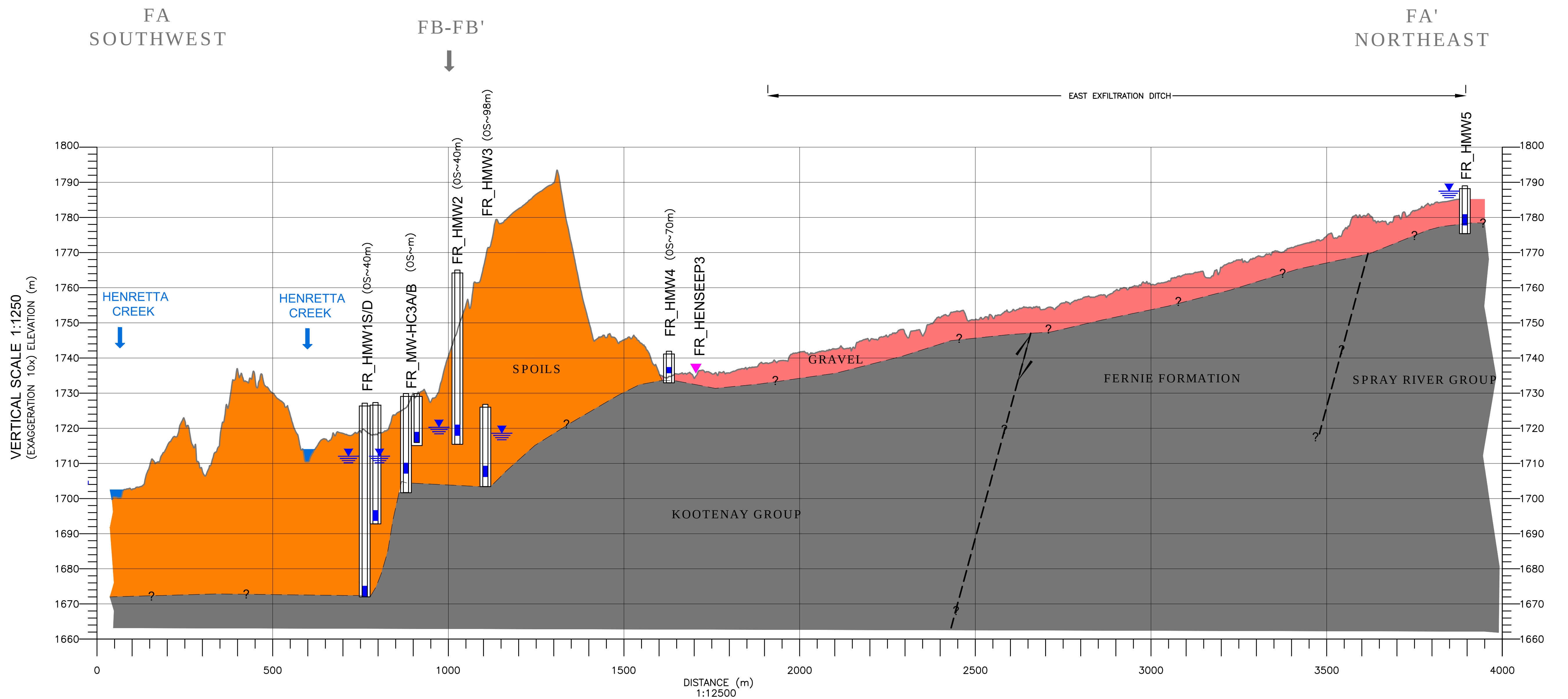
SNC·LAVALIN

Fording River Operations Groundwater Elevations from Q4 2022 and Inferred Groundwater Flow Direction (South)

CHK'D: CH	DATE: 2023-03-10	SCALE: 1:24,000	Ref Num:
BY: CW	COORD SYS: NAD 1983 UTM Zone 11N		**DRAWING FR-04**

MXD Path: \\Sli4395\projects\Current Projects\Teck Coal Ltd\GISCAD\GIS\Map Series\635544_2022_RGMPSSGMP_AnnRpt\635544-GWElev_FRO_S.mxd

Project Path: \\Sli4395\projects\Current Projects\Teck Coal Ltd\GISCAD\Exports\635544_SSGMP_RGMP_AnnualReport_2022

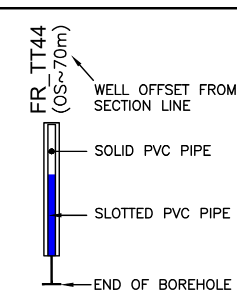


LEGEND

- SPOILS
- GRAVEL (FLUVIAL)
- BEDROCK

BOREHOLE LEGEND

- INFERRED STRATIGRAPHIC BOUNDARY
- GROUNDWATER ELEVATION (2022 Q4)
- NORMAL FAULT
- SEEP LOCATION



NOTES

1. THE CROSS SECTION DEPICTED IS BASED ON INTERPRETATION OF LIMITED GEOLOGICAL DATA. ACTUAL GEOLOGICAL CONDITIONS MAY BE DIFFERENT FROM THOSE INTERPRETED.
2. INFORMATION PRESENTED IS WITHIN 25m OF SECTION LINE UNLESS INDICATED OTHERWISE ON DRAWING.
3. ORIGINAL DRAWING IN COLOUR.
4. WATER LEVEL FROM HMW2 IS FROM Q1.

REFERENCE DRAWINGS

DWG. NO.	DATE	DESCRIPTION
–	–	–

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
1	2023–03–22	ISSUED TO CLIENT	AJK	CH
0	2022–03–14	ISSUED TO CLIENT	AJK	CH

CLIENT NAME: TECK COAL LIMITED
–

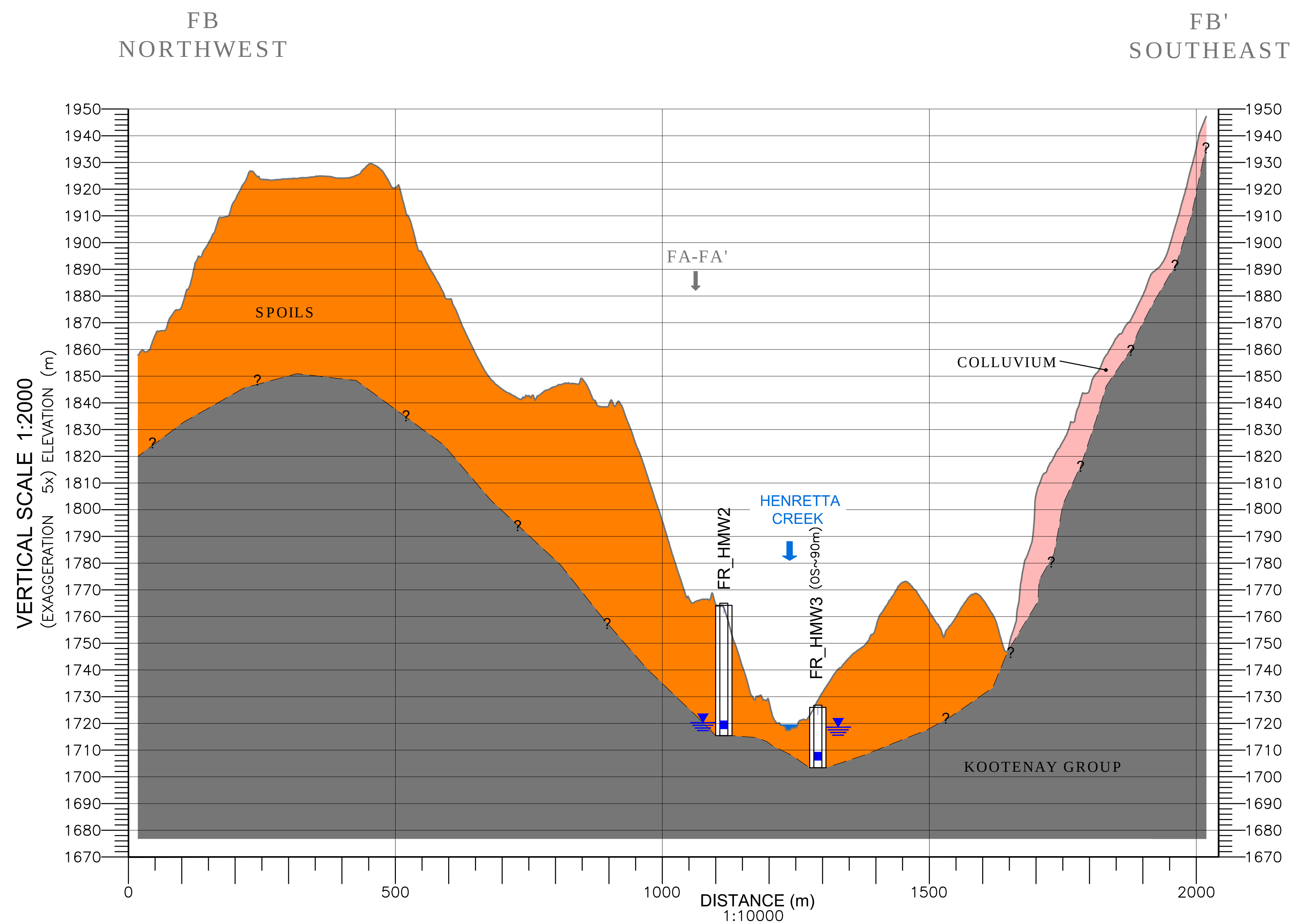
PROJECT LOCATION: FORDING RIVER OPERATIONS
ELK VALLEY, BC

SNC·LAVALIN

TITLE: FORDING RIVER OPERATIONS - INFERRED GEOLOGICAL CROSS SECTION FA-FA'

DWN BY: AJK	SCALE: AS SHOWN	DATE: 2020–02–10	DWG No: REV.: 1
CHK'D: KMC	PLOT: 20230322.0821	CADFILE: 635544–X2R20	DRAWING FR-05

PATH: \\SLI4395\PROJECTS\CURRENT PROJECTS\TECK COAL LTD\SPO\635544\4.0 EXECUTION\4.5 GIS AND DRAWINGS\CAD\635544–X2R20.DWG



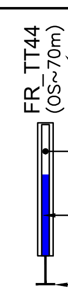
LEGEND

	SPOILS
	GRAVEL (COLLUVIUM)
	BEDROCK

BOREHOLE LEGEND

— — — — INFERRED STRATIGRAPHIC BOUNDARY

GROUNDWATER ELEVATION (2022 Q4)



NOTES

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2. INFORMATION PRESENTED IS WITHIN 25m OF SECTION LINE UNLESS INDICATED OTHERWISE ON DRAWING.
3. ORIGINAL DRAWING IN COLOUR.
4. WATER LEVEL FROM HMW2 IS FROM Q1.

REFERENCE DRAWINGS

DWG. NO.	DATE	DESCRIPTION
–	–	–

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
1	2023-03-22	ISSUED TO CLIENT	AJK	CH
0	2022-03-14	ISSUED TO CLIENT	AJK	CH

CLIENT NAME:
TECK COAL LIMITED
–

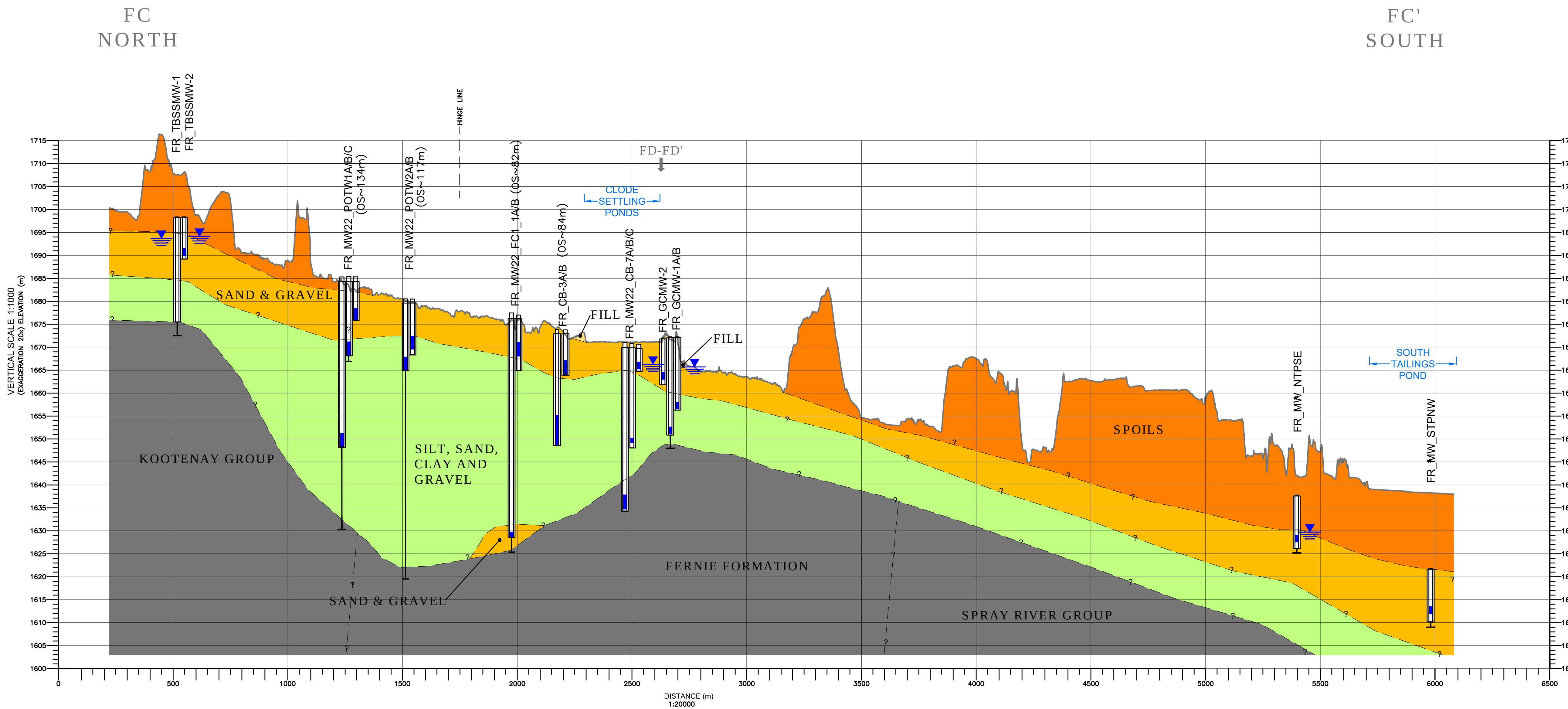
PROJECT LOCATION:
FORDING RIVER OPERATIONS
ELK VALLEY, BC

SNC·LAVALIN

TITLE:
FORDING RIVER OPERATIONS -
INFERRED GEOLOGICAL CROSS SECTION FB-FB'

DWN BY: AJK	SCALE: AS SHOWN	DATE: 2020-02-10	DWG No: REV.: 1
CHK'D: KMC	PLOT: 20230322.0822	CADFILE: 635544-X2R20	DRAWING FR-06

PATH: \\SLI4395\PROJECTS\CURRENT PROJECTS\TECK COAL LTD\SPO\635544\4.0 EXECUTION\4.5 GIS AND DRAWINGS\CAD\635544-X2R20.DWG

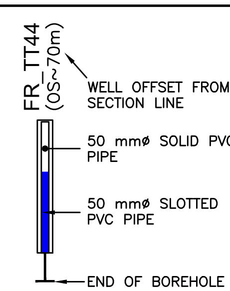


LEGEND

- SPOILS
- FILL
- SAND & GRAVEL
- SILT, CLAY,SAND, GRAVEL
- BEDROCK

BOREHOLE LEGEND

- — — — INFERRED STRATIGRAPHIC BOUNDARY
- GROUNDWATER ELEVATION (2022 Q4)



NOTES

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2. INFORMATION PRESENTED IS WITHIN 25m OF SECTION LINE UNLESS INDICATED OTHERWISE ON DRAWING.
3. ORIGINAL DRAWING IN COLOUR.

REFERENCE DRAWINGS

–	–	–
DWG. NO.	DATE	DESCRIPTION

REVISIONS

1	2023–03–09	ISSUED TO CLIENT	AJK	CH
0	2022–03–14	ISSUED TO CLIENT	AJK	CH
REV.	DATE	DESCRIPTION	BY	CHK

CLIENT NAME:
TECK COAL LIMITED
–

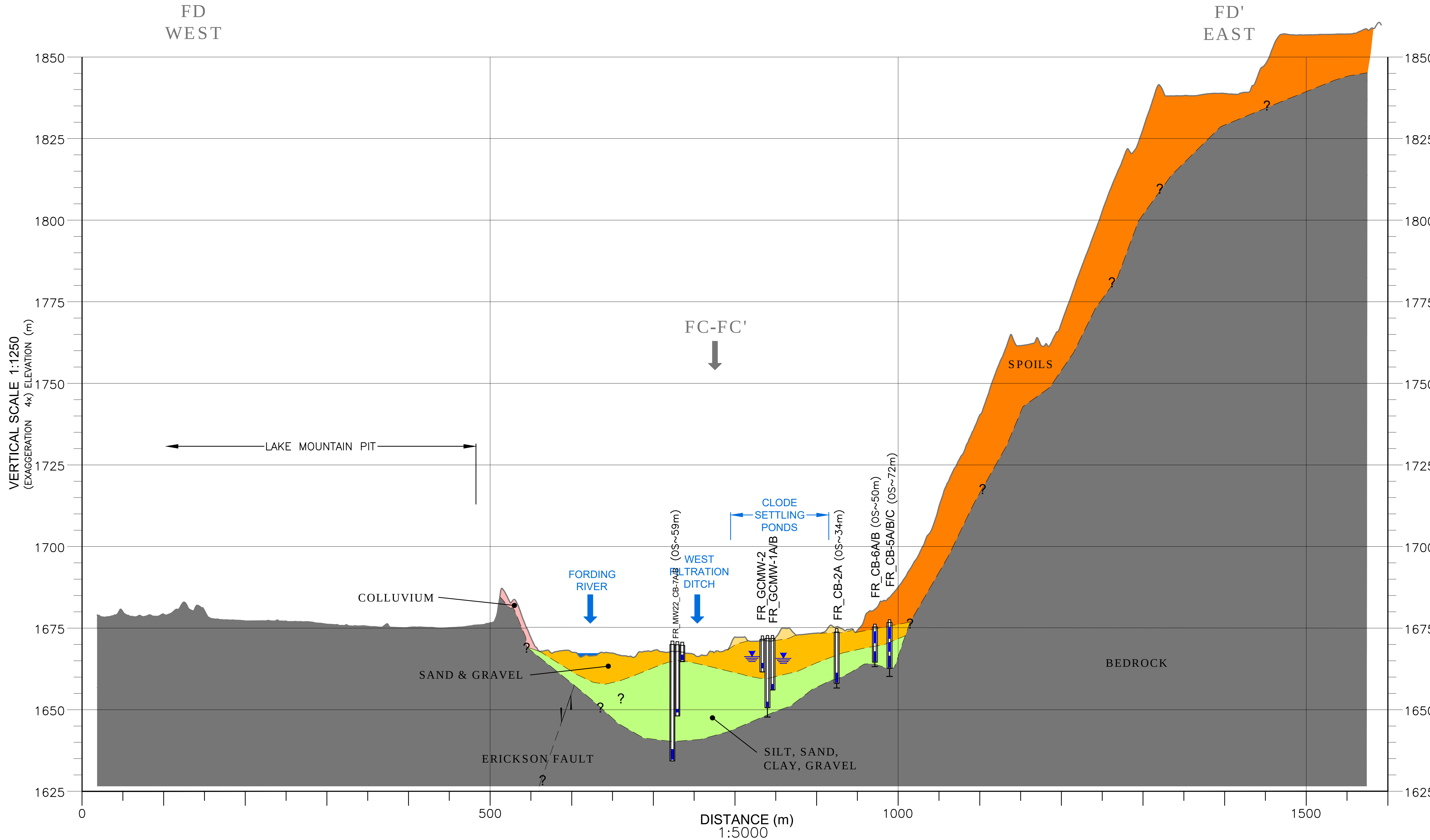
PROJECT LOCATION:
FORDING RIVER OPERATIONS
ELK VALLEY, BC

SNC·LAVALIN

TITLE:
FORDING RIVER OPERATIONS -
INFERRED GEOLOGICAL CROSS SECTION FC-FC'

DWN BY: AJK	SCALE: AS SHOWN	DATE: 2020–02–10	DWG No: REV.: 1
CHK'D: KMC	PLOT: 20230322.0828	CADFILE: 635544–X2R20	DRAWING FR-07

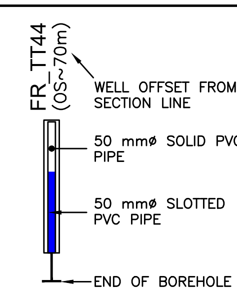
PATH: \\SLI4395\PROJECTS\CURRENT PROJECTS\TECK COAL LTD\SPO\635544\4.0 EXECUTION\4.5 GIS AND DRAWINGS\CAD\635544–X2R20.DWG



LEGEND

- SPOILS
- COLLUVIUM
- FILL
- SAND & GRAVEL
- SILT, CLAY, SAND, GRAVEL
- BEDROCK
- INFERRED STRATIGRAPHIC BOUNDARY
- GROUNDWATER ELEVATION (2022 Q4)

BOREHOLE LEGEND



NOTES

1. THE CROSS SECTION DEPICTED IS BASED ON INTERPRETATION OF LIMITED GEOLOGICAL DATA. ACTUAL GEOLOGICAL CONDITIONS MAY BE DIFFERENT FROM THOSE INTERPRETED.
2. INFORMATION PRESENTED IS WITHIN 25m OF SECTION LINE UNLESS INDICATED OTHERWISE ON DRAWING.
3. ORIGINAL DRAWING IN COLOUR.

REFERENCE DRAWINGS

DWG. NO.	DATE	DESCRIPTION
–	–	–

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
1	2023–03–22	ISSUED TO CLIENT	AJK	CH
0	2022–03–14	ISSUED TO CLIENT	AJK	CH

CLIENT NAME: TECK COAL LIMITED
–

PROJECT LOCATION: FORDING RIVER OPERATIONS
ELK VALLEY, BC

SNC·LAVALIN

TITLE: FORDING RIVER OPERATIONS - INFERRED GEOLOGICAL CROSS SECTION FD-FD'

DWN BY: AJK	SCALE: AS SHOWN	DATE: 2020–02–10	DWG No: DRAWING FR-08 REV.: 1
CHK'D: KMC	PLOT: 20230322.0828	CADFILE: 635544–X2R20	

PATH: \\SLI4395\PROJECTS\CURRENT PROJECTS\TECK COAL LTD\SPO\635544\4.0 EXECUTION\4.5 GIS AND DRAWINGS\CAD\635544–X2R20.DWG

LEGEND

- SAND
- SILT
- SAND & GRAVEL
- MIXED CLAYS (SILTY CLAY/GRAVELLY CLAY)
- TILL
- BEDROCK
- INFERRED STRATIGRAPHIC BOUNDARY
- GROUNDWATER ELEVATION (2022 Q4)
- SEEP
- FR_TT44 (OS (~20m)) WELL OFFSET FROM SECTION LINE
- SOLID PIPE
- SLOTTED PIPE
- END OF BOREHOLE

NOTES

1. THE CROSS SECTION DEPICTED IS BASED ON INTERPRETATION OF LIMITED GEOLOGICAL DATA. ACTUAL GEOLOGICAL CONDITIONS MAY BE DIFFERENT FROM THOSE INTERPRETED.
2. INFORMATION PRESENTED IS WITHIN 25m OF SECTION LINE UNLESS INDICATED OTHERWISE ON DRAWING.
3. ORIGINAL DRAWING IN COLOUR.
4. MONITORING WELLS FR_09-03A/B ARE LOCATED ADJACENT TO FR_09-04A/B. INSTALLATION DETAILS AND BEDROCK CONTACT DEPICTED ON THE CROSS-SECTION REPRESENT FR_09-03A/B.

REFERENCE DRAWINGS

No.	DATE	DESCRIPTION
–	–	–

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
1	2023-03-22	ISSUED TO CLIENT	AJK	CH
0	2022-03-14	ISSUED TO CLIENT	AJK	CH

CLIENT NAME: TECK COAL LIMITED
–

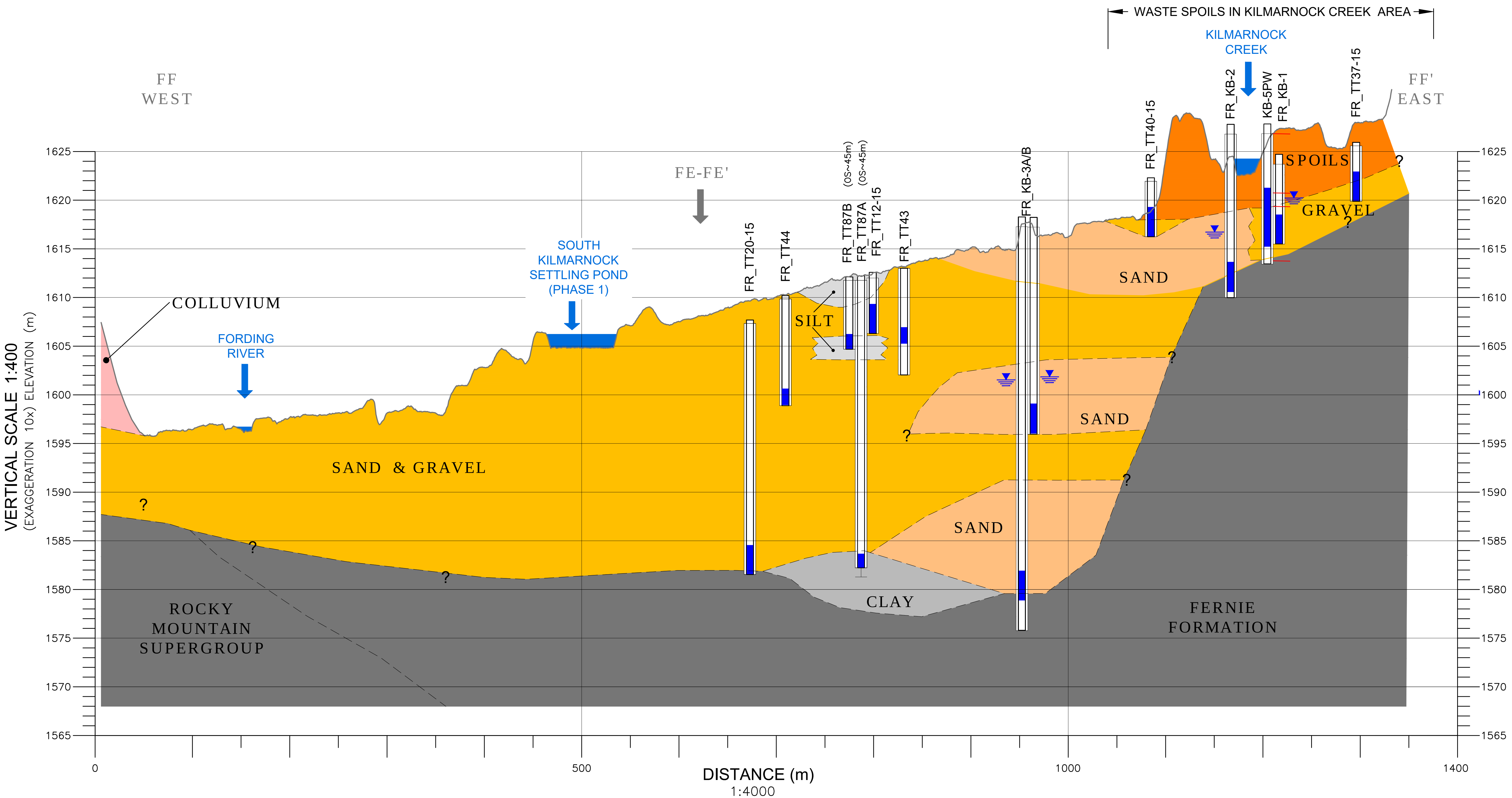
PROJECT LOCATION: ELK VALLEY, BC

SNC·LAVALIN

TITLE: FORDING RIVER OPERATIONS
INFERRED GEOLOGICAL CROSS SECTION FE-FE'

DWN BY: AJK	SCALE: AS SHOWN	DATE: 2020-05-14	DWG No: REV.: 1
CHK'D: CH	PLOT: 20230322.0829	CADFILE:635544-X2R20	DRAWING FR-09

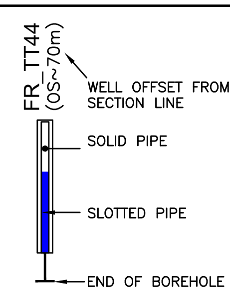
PATH: \\SLI4395\PROJECTS\CURRENT PROJECTS\TECK COAL LTD\SPO\635544\4.0 EXECUTION\4.5 GIS AND DRAWINGS\CAD\635544-X2R20.DWG



LEGEND

- SPOILS
- COLLUVIUM
- SAND & GRAVEL
- SAND
- SILT
- CLAY
- BEDROCK
- INFERRED STRATIGRAPHIC BOUNDARY
- GROUNDWATER ELEVATION (2022 Q4)

BOREHOLE LEGEND



NOTES

1. THE CROSS SECTION DEPICTED IS BASED ON INTERPRETATION OF LIMITED GEOLOGICAL DATA. ACTUAL GEOLOGICAL CONDITIONS MAY BE DIFFERENT FROM THOSE INTERPRETED.
2. INFORMATION PRESENTED IS WITHIN 25m OF SECTION LINE UNLESS INDICATED OTHERWISE ON DRAWING.
3. ORIGINAL DRAWING IN COLOUR.

REFERENCE DRAWINGS

DWG. NO.	DATE	DESCRIPTION
–	–	–

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
1	2023–03–22	ISSUED TO CLIENT	AJK	CH
0	2022–03–14	ISSUED TO CLIENT	AJK	CH

CLIENT NAME:
TECK COAL LIMITED
–

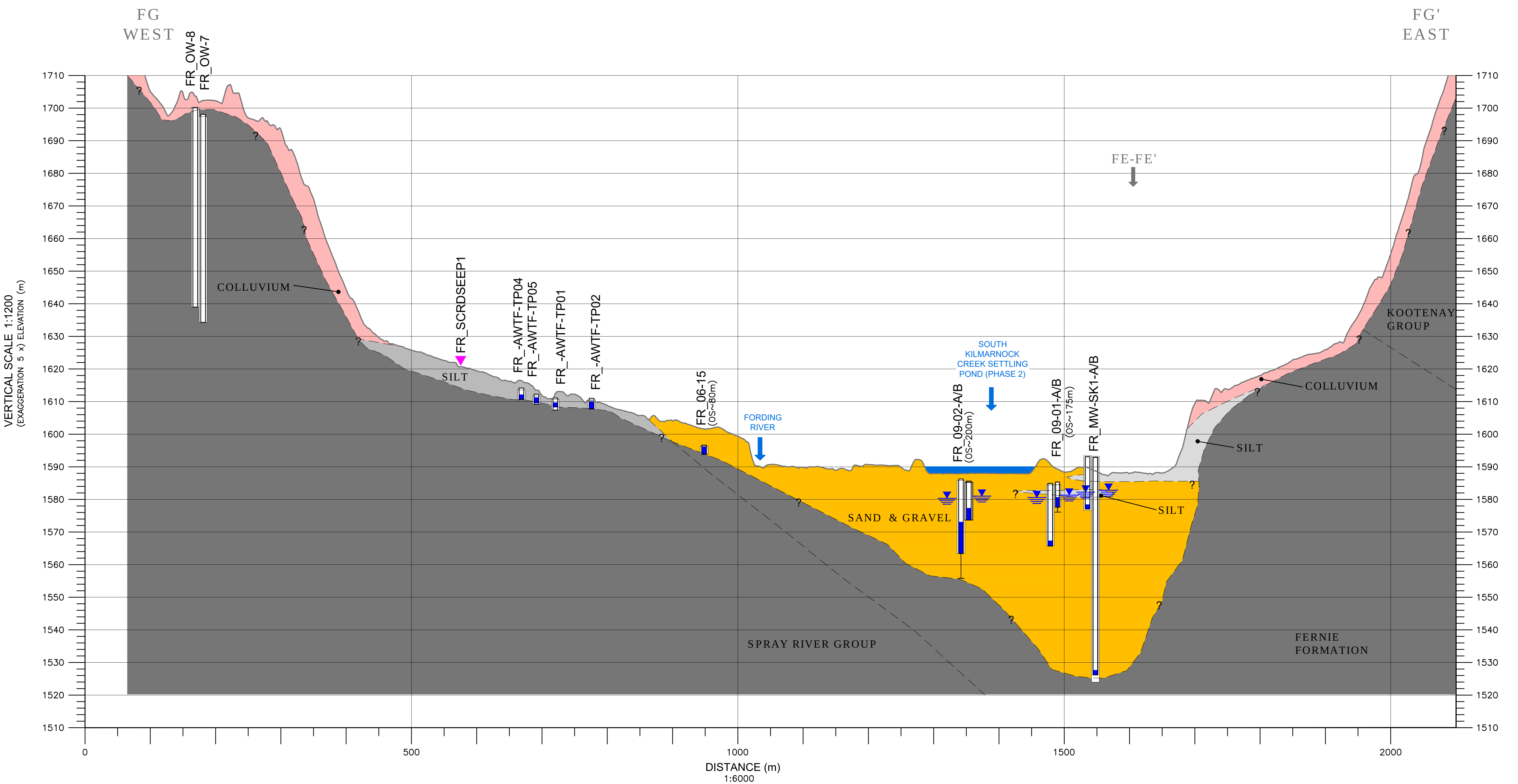
PROJECT LOCATION:
FORDING RIVER OPERATIONS
ELK VALLEY, BC

SNC·LAVALIN

TITLE:
FORDING RIVER OPERATIONS
INFERRED GEOLOGICAL CROSS SECTION FF-FF'

DWN BY: AJK	SCALE: AS SHOWN	DATE: 2020–02–10	DWG No: REV.: 0
CHK'D: KMC	PLOT: 20230322.0830	CADFILE: 635544–X2R20	DRAWING FR-10

PATH: \\SLI4395\PROJECTS\CURRENT PROJECTS\TECK COAL LTD\SPO\635544\4.0 EXECUTION\4.5 GIS AND DRAWINGS\CAD\635544–X2R20.DWG



LEGEND

- COLLUVIUM
- SAND & GRAVEL
- SILT
- BEDROCK
- INFERRED STRATIGRAPHIC BOUNDARY
- SEEP
- GROUNDWATER ELEVATION (2022 Q4)

BOREHOLE LEGEND

FR_TT44 (OS~70m) — WELL OFFSET FROM SECTION LINE

SOLID PIPE

SLOTTED PIPE

END OF BOREHOLE

NOTES

1. THE CROSS SECTION DEPICTED IS BASED ON INTERPRETATION OF LIMITED GEOLOGICAL DATA. ACTUAL GEOLOGICAL CONDITIONS MAY BE DIFFERENT FROM THOSE INTERPRETED.
2. INFORMATION PRESENTED IS WITHIN 25m OF SECTION LINE UNLESS INDICATED OTHERWISE ON DRAWING.
3. ORIGINAL DRAWING IN COLOUR.

REFERENCE DRAWINGS

DWG. NO.	DATE	DESCRIPTION
–	–	–

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
1	2023-03-22	ISSUED TO CLIENT	AJK	CH
0	2022-03-14	ISSUED TO CLIENT	AJK	CH

CLIENT NAME: TECK COAL LIMITED
–

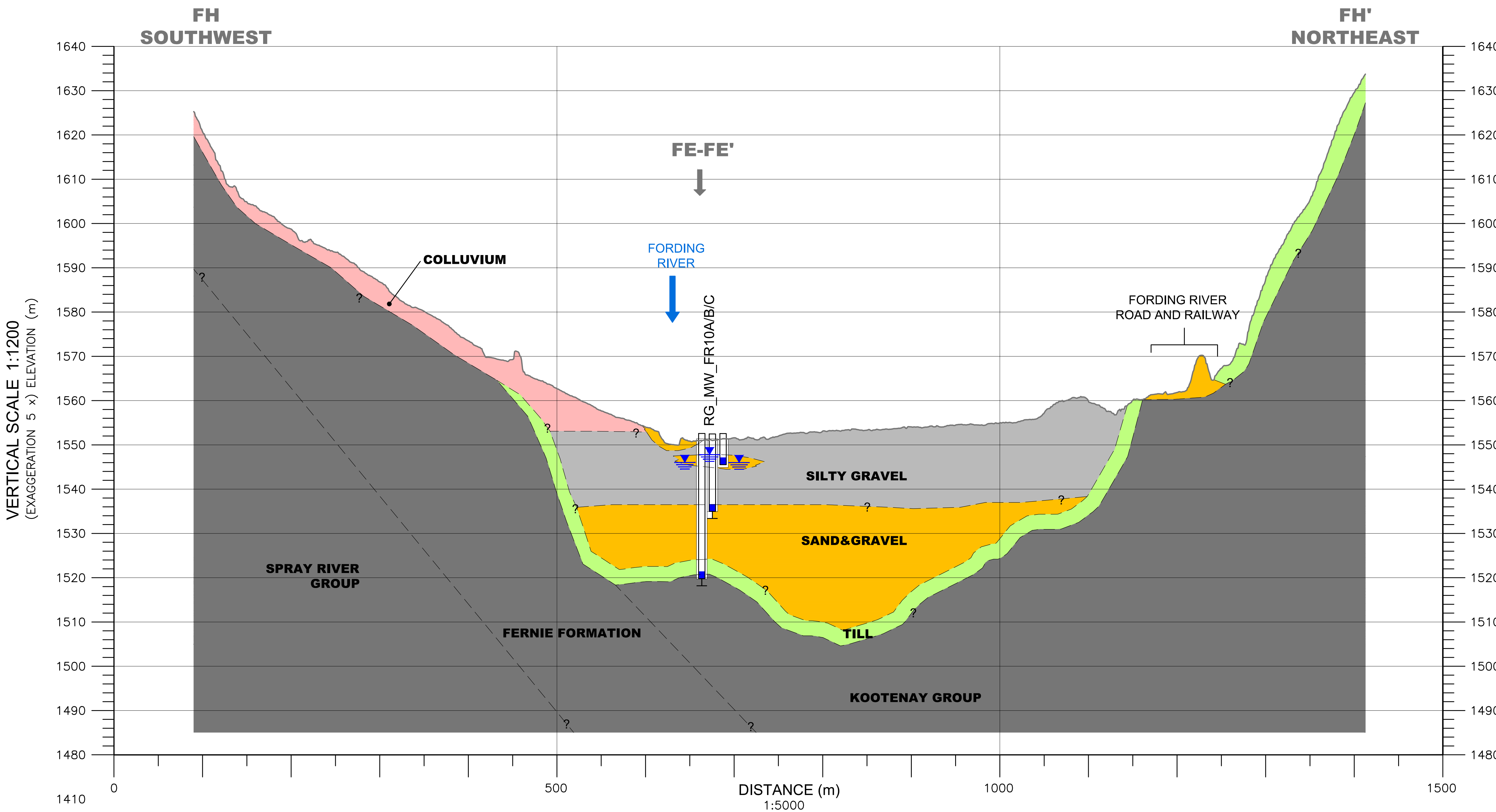
PROJECT LOCATION: FORDING RIVER OPERATIONS
ELK VALLEY, BC

SNC·LAVALIN

TITLE: FORDING RIVER OPERATIONS
INFERRED GEOLOGICAL CROSS SECTION FG-FG'

DWN BY: AJK	SCALE: AS SHOWN	DATE: 2020-02-10	DWG No:	REV.: 1
CHK'D: KMC	PLOT: 20230322.0830	CADFILE: 635544-X2R20	DRAWING FR-11	

PATH: \\SLI4395\PROJECTS\CURRENT PROJECTS\TECK COAL LTD\SPO\635544\4.0 EXECUTION\4.5 GIS AND DRAWINGS\CAD\635544-X2R20.DWG



LEGEND

- COLLUVIUM
- SAND & GRAVEL
- SILTY GRAVEL
- TILL
- BEDROCK

BOREHOLE LEGEND

- INFERRED STRATIGRAPHIC BOUNDARY
- SEEP
- GROUNDWATER ELEVATION (2022 Q4)

FR_TT44 (OS~70m) — WELL OFFSET FROM SECTION LINE

SOLID PIPE

SLOTTED PIPE

END OF BOREHOLE

NOTES

1. THE CROSS SECTION DEPICTED IS BASED ON INTERPRETATION OF LIMITED GEOLOGICAL DATA. ACTUAL GEOLOGICAL CONDITIONS MAY BE DIFFERENT FROM THOSE INTERPRETED.
2. INFORMATION PRESENTED IS WITHIN 25m OF SECTION LINE UNLESS INDICATED OTHERWISE ON DRAWING.
3. ORIGINAL DRAWING IN COLOUR.

REFERENCE DRAWINGS

DWG. NO.	DATE	DESCRIPTION
–	–	–

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
1	2023-03-22	ISSUED TO CLIENT	AJK	CH
0	2022-03-14	ISSUED TO CLIENT	AJK	CH

CLIENT NAME: TECK COAL LIMITED

–

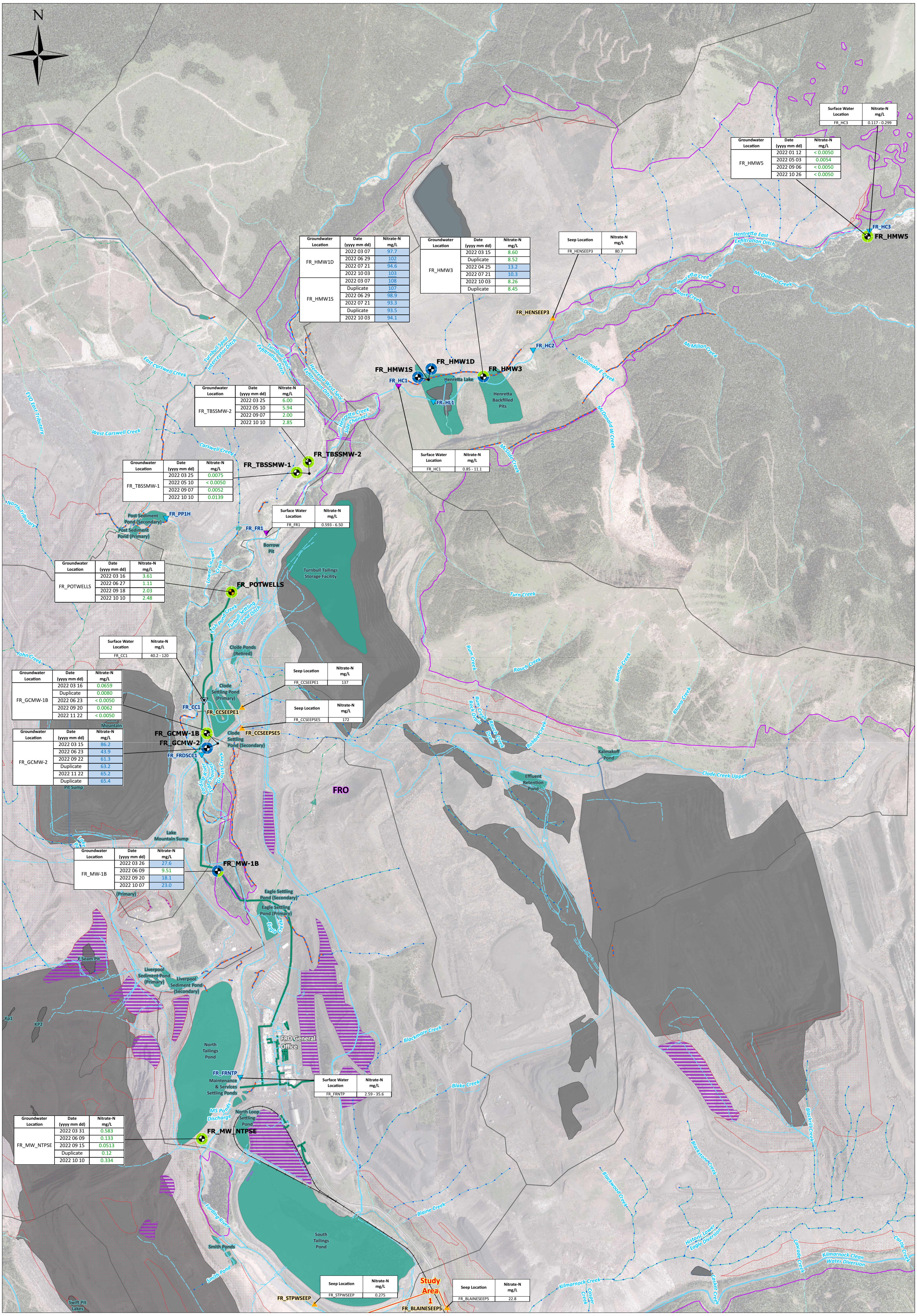
PROJECT LOCATION: FORDING RIVER OPERATIONS
ELK VALLEY, BC

SNC·LAVALIN

TITLE: FORDING RIVER OPERATIONS
INFERRED GEOLOGICAL CROSS SECTION FH-FH'

DWN BY: AJK	SCALE: AS SHOWN	DATE: 2020–02–10	DWG No: REV.: 1
CHK'D: KMC	PLOT: 20230322.0831	CADFILE: 635544–X2R20	DRAWING FR-12

PATH: \\SLI4395\PROJECTS\CURRENT PROJECTS\TECK COAL LTD\SPO\635544\4.0 EXECUTION\4.5 GIS AND DRAWINGS\CAD\635544–X2R20.DWG



Groundwater Location	Date (yyyy mm dd)	Nitrate-N mg/L
FR_HMW5	2022 01 12	< 0.0050
	2022 05 03	0.0054
	2022 09 06	< 0.0050
	2022 10 26	< 0.0050

Surface Water Location	Nitrate-N mg/L
FR_HC3	0.117 - 0.299

Groundwater Location	Date (yyyy mm dd)	Nitrate-N mg/L
FR_HMW1D	2022 03 07	97.7
	2022 06 29	102
	2022 07 21	94.6
	2022 10 03	103
FR_HMW1S	2022 03 07	108
	Duplicate	107
	2022 06 29	98.9
	2022 07 21	93.3
	Duplicate	93.5
	2022 10 03	94.1

Groundwater Location	Date (yyyy mm dd)	Nitrate-N mg/L
FR_HMW3	2022 03 15	8.60
	Duplicate	8.52
	2022 04 25	13.2
	2022 07 21	10.3
	2022 10 03	8.26
	Duplicate	8.45

Seep Location	Nitrate-N mg/L
FR_HENSEEP3	80.7

Groundwater Location	Date (yyyy mm dd)	Nitrate-N mg/L
FR_TBSSMW-2	2022 03 25	6.00
	2022 05 10	5.94
	2022 09 07	2.00
	2022 10 10	2.85

Surface Water Location	Nitrate-N mg/L
FR_HC1	0.85 - 11.1

Groundwater Location	Date (yyyy mm dd)	Nitrate-N mg/L
FR_TBSSMW-1	2022 03 25	0.0075
	2022 05 10	< 0.0050
	2022 09 07	0.0052
	2022 10 10	0.0139

Surface Water Location	Nitrate-N mg/L
FR_FR1	0.593 - 6.50

Groundwater Location	Date (yyyy mm dd)	Nitrate-N mg/L
FR_POTWELLS	2022 03 16	3.61
	2022 06 27	1.11
	2022 09 18	2.03
	2022 10 10	2.48

Surface Water Location	Nitrate-N mg/L
FR_CC1	40.2 - 120

Groundwater Location	Date (yyyy mm dd)	Nitrate-N mg/L
FR_GCMW-1B	2022 03 16	0.0659
	Duplicate	0.0080
	2022 06 23	< 0.0050
	2022 09 20	0.0062
	2022 11 22	< 0.0050

Seep Location	Nitrate-N mg/L
FR_CCSEEPE1	137

Seep Location	Nitrate-N mg/L
FR_CCSEEPSE5	172

Groundwater Location	Date (yyyy mm dd)	Nitrate-N mg/L
FR_GCMW-2	2022 03 15	86.2
	2022 06 23	43.9
	2022 09 22	61.3
	Duplicate	63.2
	2022 11 22	65.2
	Duplicate	65.4

Groundwater Location	Date (yyyy mm dd)	Nitrate-N mg/L
FR_MW-1B	2022 03 26	27.6
	2022 06 09	9.51
	2022 09 20	18.1
	2022 10 07	23.0

Surface Water Location	Nitrate-N mg/L
FR_FRNTP	2.59 - 35.6

Groundwater Location	Date (yyyy mm dd)	Nitrate-N mg/L
FR_MW_NTPSE	2022 03 31	0.583
	2022 06 09	0.133
	2022 09 15	0.0513
	Duplicate	0.12
	2022 10 10	0.334

Seep Location	Nitrate-N mg/L
FR_STPWSEEP	0.275

Seep Location	Nitrate-N mg/L
FR_BLAINESEEP5	22.8

Legend

Groundwater Stations[4]
- Monitoring Well
- Supply

Surface Water Stations
- Receiving Environment
- Authorized Discharge
- Monitoring
- Seep

Site Features
- Secondary Road
- Rails
- Study Areas
- Tailings/Settling/Sediment Pond
- Waste Water Pond
- End-Pit Lake
- Pit
- Stockpiles
- Waste Dump (Spoils)
- Watersheds
- Mine Permitted Areas

Water Features
- Stream + Stream Ditch
- Intermittent + Indefinite Stream
- Subsurface
- Ditch
- Potable Waterline
- Rock Drain
- Water Pipeline
- Bypass/Diversion Channel
- Lake/River Bed
- Wetted Area/Wetland (Based on 1:12500 Scale)

Q4 Q1
Q3 Q2

symbol locations have been adjusted relative to well locations for visibility

Green below the applicable screening criteria

Blue above the applicable screening criteria

Grey no sample collected

Primary Screening Criteria	Nitrate-N mg/L
CSR Aquatic Life	400
CSR Irrigation Watering	n/a
CSR Livestock Watering	100
CSR Drinking Water	10

Notes:
1. Original in colour at paper size ANSI C (17x22 in).
2. Numerical scale reflects full-size print. Print scaling will distort this scale; however, scale bar will remain accurate.
3. Intended for illustration purposes. Accuracy has not been verified for construction or navigation.
4. Locations of overlapping wells have been adjusted for clarity.
5. Nitrate-N = Nitrate Nitrogen
6. The nomenclature for ponds may not accurately reflect that in the various effluent discharge permits.

References:
1. Data provided by Teck Coal Limited

0 0.25 0.5 1 km

PROJECT LOCATION:
Elk Valley, BC

CLIENT NAME:
Teck Coal Limited

SNC·LAVALIN

Fording River Operations - Spatial Distribution of Nitrate Nitrogen in Groundwater (North)

CHK'D: CH

BY: CW

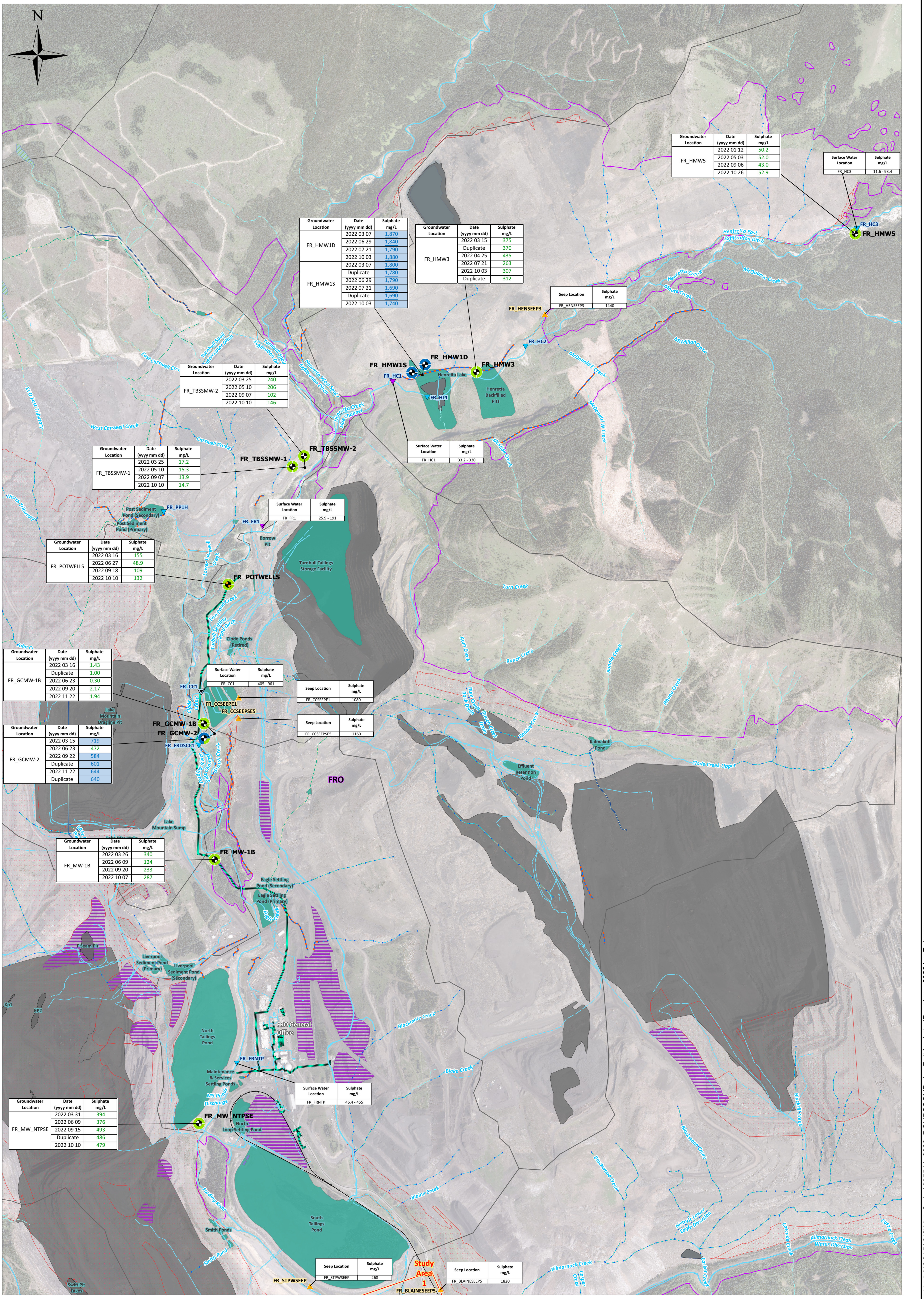
DATE: 2023-03-09 SCALE: 1:12,500

COORD SYS: NAD 1983 UTM Zone 11N

REF NUM:
DRAWING FR-13

MXD Path: \\Sli4395\projects\Current Projects\Teck Coal Ltd\GISCAD\GIS\Map Series\635544_2022_RGMPSSGMP_AnnRpt\AnalyticalDrawings_2022AnnRpt.aprx

Project Path: \\Sli4395\projects\Current Projects\Teck Coal Ltd\GISCAD\Exports\635544_SSGMP_RGMP_AnnualReport_2022



Groundwater Location	Date (yyyy mm dd)	Sulphate mg/L
FR_HMW5	2022 01 12	50.2
	2022 05 03	52.0
	2022 09 06	43.0
	2022 10 26	52.9

Surface Water Location	Sulphate mg/L
FR_HC3	11.6 - 93.4

Groundwater Location	Date (yyyy mm dd)	Sulphate mg/L
FR_HMW1D	2022 03 07	1,870
	2022 06 29	1,840
	2022 07 21	1,790
	2022 10 03	1,880
FR_HMW1S	2022 03 07	1,800
	Duplicate	1,780
	2022 06 29	1,790
	2022 07 21	1,690
	Duplicate	1,690
	2022 10 03	1,740

Groundwater Location	Date (yyyy mm dd)	Sulphate mg/L
FR_HMW3	2022 03 15	375
	Duplicate	370
	2022 04 25	435
	2022 07 21	263
	2022 10 03	307
	Duplicate	312

Seep Location	Sulphate mg/L
FR_HENSEEP3	1440

Groundwater Location	Date (yyyy mm dd)	Sulphate mg/L
FR_TBSSMW-2	2022 03 25	240
	2022 05 10	206
	2022 09 07	102
	2022 10 10	146

Surface Water Location	Sulphate mg/L
FR_HC1	33.2 - 330

Groundwater Location	Date (yyyy mm dd)	Sulphate mg/L
FR_TBSSMW-1	2022 03 25	17.2
	2022 05 10	15.3
	2022 09 07	13.9
	2022 10 10	14.7

Surface Water Location	Sulphate mg/L
FR_FR1	25.9 - 191

Groundwater Location	Date (yyyy mm dd)	Sulphate mg/L
FR_POTWELLS	2022 03 16	155
	2022 06 27	48.9
	2022 09 18	109
	2022 10 10	132

Groundwater Location	Date (yyyy mm dd)	Sulphate mg/L
FR_GCMW-1B	2022 03 16	1.43
	Duplicate	1.00
	2022 06 23	0.30
	2022 09 20	2.17
	2022 11 22	1.94

Surface Water Location	Sulphate mg/L
FR_CC1	405 - 961

Seep Location	Sulphate mg/L
FR_CCSEEPE1	1080

Seep Location	Sulphate mg/L
FR_CCSEEPSE5	1160

Groundwater Location	Date (yyyy mm dd)	Sulphate mg/L
FR_GCMW-2	2022 03 15	719
	2022 06 23	472
	2022 09 22	584
	Duplicate	601
	2022 11 22	644
	Duplicate	640

Groundwater Location	Date (yyyy mm dd)	Sulphate mg/L
FR_MW-1B	2022 03 26	340
	2022 06 09	124
	2022 09 20	233
	2022 10 07	287

Surface Water Location	Sulphate mg/L
FR_FRNTP	46.4 - 455

Groundwater Location	Date (yyyy mm dd)	Sulphate mg/L
FR_MW_NTPSE	2022 03 31	394
	2022 06 09	376
	2022 09 15	493
	Duplicate	486
	2022 10 10	479

Seep Location	Sulphate mg/L
FR_STPWSEEP	268

Seep Location	Sulphate mg/L
FR_BLAINESEEP5	1820

Legend

Groundwater Stations[4]
- Monitoring Well
- Supply

Surface Water Stations
- Receiving Environment
- Authorized Discharge
- Monitoring
- Seep

Site Features
- Secondary Road
- Rails
- Study Areas
- Tailings/Settling/Sediment Pond
- Waste Water Pond
- End-Pit Lake
- Pit
- Stockpiles
- Waste Dump (Spoils)
- Watersheds
- Mine Permitted Areas

Water Features
- Stream + Stream Ditch
- Intermittent + Indefinite Stream
- Subsurface
- Ditch
- Potable Waterline
- Rock Drain
- Water Pipeline
- Bypass/Diversion Channel
- Lake/River Bed
- Wetted Area/Wetland (Based on 1:12500 Scale)

Q4 Q1
Q3 Q2

symbol locations have been adjusted relative to well locations for visibility

Green below the applicable screening criteria

Blue above the applicable screening criteria

Grey no sample collected

Primary Screening Criteria	Sulphate mg/L
CSR Aquatic Life	1,280-4,290
CSR Irrigation Watering	n/a
CSR Livestock Watering	1,000
CSR Drinking Water	500

Notes:
1. Original in colour at paper size ANSI C (17x22 in).
2. Numerical scale reflects full-size print. Print scaling will distort this scale; however, scale bar will remain accurate.
3. Intended for illustration purposes. Accuracy has not been verified for construction or navigation.
4. Locations of overlapping wells have been adjusted for clarity.
5. The nomenclature for ponds may not accurately reflect that in the various effluent discharge permits.

References:
1. Data provided by Teck Coal Limited

0 0.25 0.5 1 km

PROJECT LOCATION: Elk Valley, BC

CLIENT NAME: Teck Coal Limited

SNC·LAVALIN

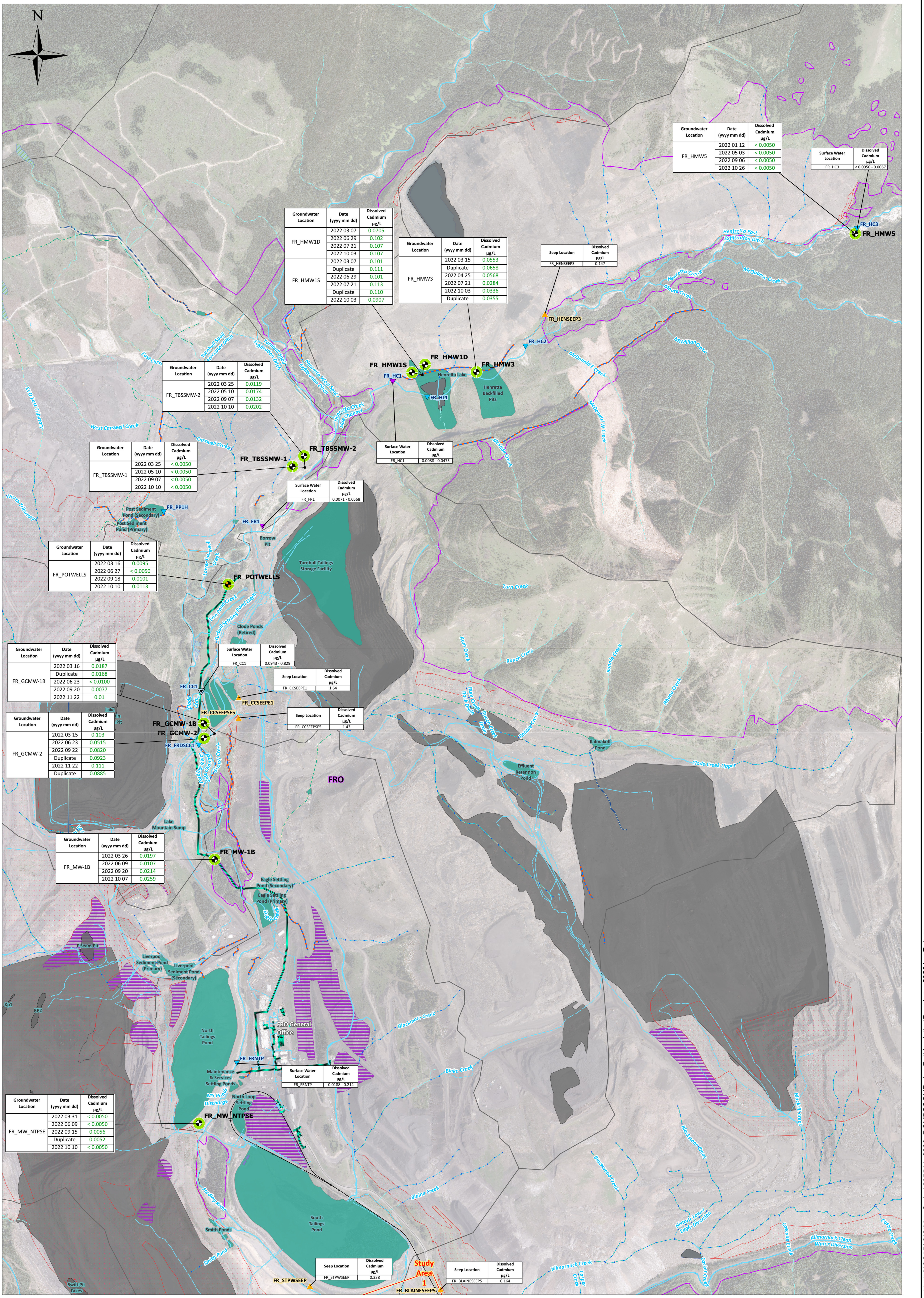
Fording River Operations - Spatial Distribution of Sulphate in Groundwater (North)

CHK'D: CH | DATE: 2023-03-09 | SCALE: 1:12,500 | REF NUM:

BY: CW | COORD SYS: NAD 1983 UTM Zone 11N | DRAWING FR-14

MXD Path: \\Sli4395\projects\Current Projects\Teck Coal Ltd\GISCAD\GIS\Map Series\635544_2022_RGMPSSGMP_AnnRpt\AnalyticalDrawings_2022AnnRpt.aprx

Project Path: \\Sli4395\projects\Current Projects\Teck Coal Ltd\GISCAD\Exports\635544_SSGMP_RGMP_AnnualReport_2022



Groundwater Location	Date (yyyy mm dd)	Dissolved Cadmium µg/L
FR_HMW5	2022 01 12	< 0.0050
	2022 05 03	< 0.0050
	2022 09 06	< 0.0050
	2022 10 26	< 0.0050

Surface Water Location	Dissolved Cadmium µg/L
FR_HC3	< 0.0050 - 0.0067

Groundwater Location	Date (yyyy mm dd)	Dissolved Cadmium µg/L
FR_HMW1D	2022 03 07	0.0705
	2022 06 29	0.102
	2022 07 21	0.107
	2022 10 03	0.107
FR_HMW1S	2022 03 07	0.101
	Duplicate	0.111
	2022 06 29	0.101
	2022 07 21	0.113
	Duplicate	0.110
	2022 10 03	0.0907

Groundwater Location	Date (yyyy mm dd)	Dissolved Cadmium µg/L
FR_HMW3	2022 03 15	0.0553
	Duplicate	0.0658
	2022 04 25	0.0568
	2022 07 21	0.0284
	2022 10 03	0.0336
	Duplicate	0.0355

Seep Location	Dissolved Cadmium µg/L
FR_HENSEEP3	0.147

Groundwater Location	Date (yyyy mm dd)	Dissolved Cadmium µg/L
FR_TBSSMW-2	2022 03 25	0.0119
	2022 05 10	0.0174
	2022 09 07	0.0132
	2022 10 10	0.0202

Surface Water Location	Dissolved Cadmium µg/L
FR_HC1	0.0088 - 0.0475

Groundwater Location	Date (yyyy mm dd)	Dissolved Cadmium µg/L
FR_TBSSMW-1	2022 03 25	< 0.0050
	2022 05 10	< 0.0050
	2022 09 07	< 0.0050
	2022 10 10	< 0.0050

Surface Water Location	Dissolved Cadmium µg/L
FR_FR1	0.0071 - 0.0568

Groundwater Location	Date (yyyy mm dd)	Dissolved Cadmium µg/L
FR_POTWELLS	2022 03 16	0.0095
	2022 06 27	< 0.0050
	2022 09 18	0.0101
	2022 10 10	0.0113

Groundwater Location	Date (yyyy mm dd)	Dissolved Cadmium µg/L
FR_GCMW-1B	2022 03 16	0.0187
	Duplicate	0.0168
	2022 06 23	< 0.0100
	2022 09 20	0.0077
	2022 11 22	0.01

Surface Water Location	Dissolved Cadmium µg/L
FR_CC1	0.0943 - 0.829

Seep Location	Dissolved Cadmium µg/L
FR_CCSEEPE1	1.64

Seep Location	Dissolved Cadmium µg/L
FR_CCSEEPSE5	1.43

Groundwater Location	Date (yyyy mm dd)	Dissolved Cadmium µg/L
FR_GCMW-2	2022 03 15	0.103
	2022 06 23	0.0515
	2022 09 22	0.0820
	Duplicate	0.0923
	2022 11 22	0.111
	Duplicate	0.0885

Groundwater Location	Date (yyyy mm dd)	Dissolved Cadmium µg/L
FR_MW-1B	2022 03 26	0.0197
	2022 06 09	0.0107
	2022 09 20	0.0214
	2022 10 07	0.0259

Surface Water Location	Dissolved Cadmium µg/L
FR_FRNTP	0.0188 - 0.214

Groundwater Location	Date (yyyy mm dd)	Dissolved Cadmium µg/L
FR_MW_NTPSE	2022 03 31	< 0.0050
	2022 06 09	< 0.0050
	2022 09 15	0.0056
	Duplicate	0.0052
	2022 10 10	< 0.0050

Seep Location	Dissolved Cadmium µg/L
FR_STPWSEEP	0.338

Seep Location	Dissolved Cadmium µg/L
FR_BLAINESEEP5	0.164

Legend

Groundwater Stations[4]
- Monitoring Well
- Supply

Surface Water Stations
- Receiving Environment
- Authorized Discharge
- Monitoring
- Seep

Site Features
- Secondary Road
- Rails
- Study Areas
- Tailings/Settling/Sediment Pond
- Waste Water Pond
- End-Pit Lake
- Pit
- Stockpiles
- Waste Dump (Spoils)
- Watersheds
- Mine Permitted Areas

Water Features
- Stream + Stream Ditch
- Intermittent + Indefinite Stream
- Subsurface
- Ditch
- Potable Waterline
- Rock Drain
- Water Pipeline
- Bypass/Diversion Channel
- Lake/River Bed
- Wetted Area/Wetland (Based on 1:12500 Scale)

Q4	Q1
Q3	Q2

symbol locations have been adjusted relative to well locations for visibility

Green below the applicable screening criteria

Blue above the applicable screening criteria

Grey no sample collected

^ Dissolved phase of the parameter is shown in the spatial plot.

Primary Screening Criteria	Cadmium^ µg/L
CSR Aquatic Life	0.5-4
CSR Irrigation Watering	5
CSR Livestock Watering	80
CSR Drinking Water	5

Notes:
1. Original in colour at paper size ANSI C (17x22 in).
2. Numerical scale reflects full-size print. Print scaling will distort this scale; however, scale bar will remain accurate.
3. Intended for illustration purposes. Accuracy has not been verified for construction or navigation.
4. Locations of overlapping wells have been adjusted for clarity.
5. The nomenclature for ponds may not accurately reflect that in the various effluent discharge permits.

References:
1. Data provided by Teck Coal Limited

0 0.25 0.5 1 km

PROJECT LOCATION: Elk Valley, BC

CLIENT NAME: Teck Coal Limited

SNC·LAVALIN

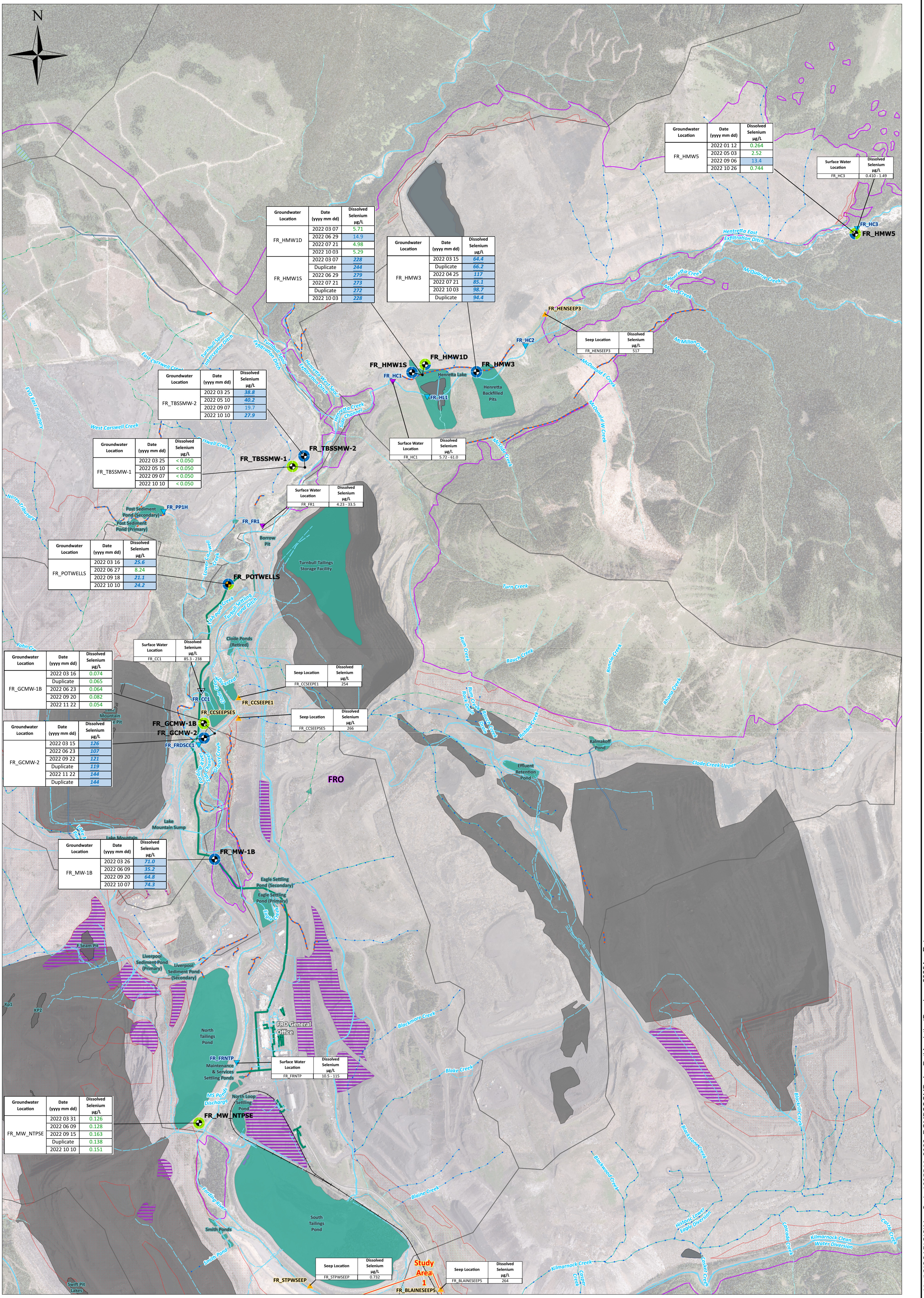
Fording River Operations - Spatial Distribution of Dissolved Cadmium in Groundwater (North)

CHK'D: CH | DATE: 2023-03-09 | SCALE: 1:12,500 | REF NUM: DRAWING FR-15

BY: CW | COORD SYS: NAD 1983 UTM Zone 11N

MXD Path: \\Sli4395\projects\Current Projects\Teck Coal Ltd\GISCAD\GIS\Map Series\635544_2022_RGMPSSGMP_AnnRpt\AnalyticalDrawings_2022AnnRpt.aprx

Project Path: \\Sli4395\projects\Current Projects\Teck Coal Ltd\GISCAD\Exports\635544_SSGMP_RGMP_AnnualReport_2022



Groundwater Location	Date (yyyy mm dd)	Dissolved Selenium µg/L
FR_HMW5	2022 01 12	0.264
	2022 05 03	2.52
	2022 09 06	13.4
	2022 10 26	0.744

Surface Water Location	Dissolved Selenium µg/L
FR_HC3	0.410 - 1.49

Groundwater Location	Date (yyyy mm dd)	Dissolved Selenium µg/L
FR_HMW1D	2022 03 07	5.71
	2022 06 29	14.9
	2022 07 21	4.98
	2022 10 03	5.29
FR_HMW1S	2022 03 07	228
	Duplicate	244
	2022 06 29	279
	2022 07 21	273
	Duplicate	272
	2022 10 03	228

Groundwater Location	Date (yyyy mm dd)	Dissolved Selenium µg/L
FR_HMW3	2022 03 15	64.4
	Duplicate	66.2
	2022 04 25	117
	2022 07 21	85.1
	2022 10 03	98.7
	Duplicate	94.4

Seep Location	Dissolved Selenium µg/L
FR_HENSEEP3	517

Groundwater Location	Date (yyyy mm dd)	Dissolved Selenium µg/L
FR_TBSSMW-2	2022 03 25	38.8
	2022 05 10	40.2
	2022 09 07	19.7
	2022 10 10	27.9

Surface Water Location	Dissolved Selenium µg/L
FR_HC1	5.72 - 61.0

Groundwater Location	Date (yyyy mm dd)	Dissolved Selenium µg/L
FR_TBSSMW-1	2022 03 25	<0.050
	2022 05 10	<0.050
	2022 09 07	<0.050
	2022 10 10	<0.050

Surface Water Location	Dissolved Selenium µg/L
FR_FR1	4.23 - 33.5

Groundwater Location	Date (yyyy mm dd)	Dissolved Selenium µg/L
FR_POTWELLS	2022 03 16	25.6
	2022 06 27	8.24
	2022 09 18	21.1
	2022 10 10	24.2

Surface Water Location	Dissolved Selenium µg/L
FR_CC1	85.3 - 238

Seep Location	Dissolved Selenium µg/L
FR_CCSEEPE1	254

Groundwater Location	Date (yyyy mm dd)	Dissolved Selenium µg/L
FR_GCMW-1B	2022 03 16	0.074
	Duplicate	0.065
	2022 06 23	0.064
	2022 09 20	0.082
	2022 11 22	0.054

Seep Location	Dissolved Selenium µg/L
FR_CCSEEPSE5	266

Groundwater Location	Date (yyyy mm dd)	Dissolved Selenium µg/L
FR_GCMW-2	2022 03 15	126
	2022 06 23	107
	2022 09 22	121
	Duplicate	119
	2022 11 22	144
	Duplicate	144

Groundwater Location	Date (yyyy mm dd)	Dissolved Selenium µg/L
FR_MW-1B	2022 03 26	71.0
	2022 06 09	35.2
	2022 09 20	64.8
	2022 10 07	74.3

Surface Water Location	Dissolved Selenium µg/L
FR_FRNTP	10.5 - 115

Groundwater Location	Date (yyyy mm dd)	Dissolved Selenium µg/L
FR_MW_NTPSE	2022 03 31	0.126
	2022 06 09	0.128
	2022 09 15	0.163
	Duplicate	0.138
	2022 10 10	0.151

Seep Location	Dissolved Selenium µg/L
FR_STPWSEEP	0.732

Seep Location	Dissolved Selenium µg/L
FR_BLAINESEEP5	264

Legend

Groundwater Stations[4]
- Monitoring Well
- Supply

Surface Water Stations
- Receiving Environment
- Authorized Discharge
- Monitoring
- Seep

Site Features
- Secondary Road
- Rails
- Study Areas
- Tailings/Settling/Sediment Pond
- Waste Water Pond
- End-Pit Lake
- Pit
- Stockpiles
- Waste Dump (Spoils)
- Watersheds
- Mine Permitted Areas

Water Features
- Stream + Stream Ditch
- Intermittent + Indefinite Stream
- Subsurface
- Ditch
- Potable Waterline
- Rock Drain
- Water Pipeline
- Bypass/Diversion Channel
- Lake/River Bed
- Wetted Area/Wetland (Based on 1:12500 Scale)

Q4 Q1
Q3 Q2

symbol locations have been adjusted relative to well locations for visibility

Green below the applicable screening criteria

Blue above the applicable screening criteria

Grey no sample collected

^ Dissolved phase of the parameter is shown in the spatial plot.

Primary Screening Criteria	Selenium^ µg/L
CSR Aquatic Life	20
CSR Irrigation Watering	20
CSR Livestock Watering	30
CSR Drinking Water	10

Notes:
1. Original in colour at paper size ANSI C (17x22 in).
2. Numerical scale reflects full-size print. Print scaling will distort this scale; however, scale bar will remain accurate.
3. Intended for illustration purposes. Accuracy has not been verified for construction or navigation.
4. Locations of overlapping wells have been adjusted for clarity.
5. The nomenclature for ponds may not accurately reflect that in the various effluent discharge permits.

References:
1. Data provided by Teck Coal Limited

0 0.25 0.5 1 km

PROJECT LOCATION: Elk Valley, BC

CLIENT NAME: Teck Coal Limited

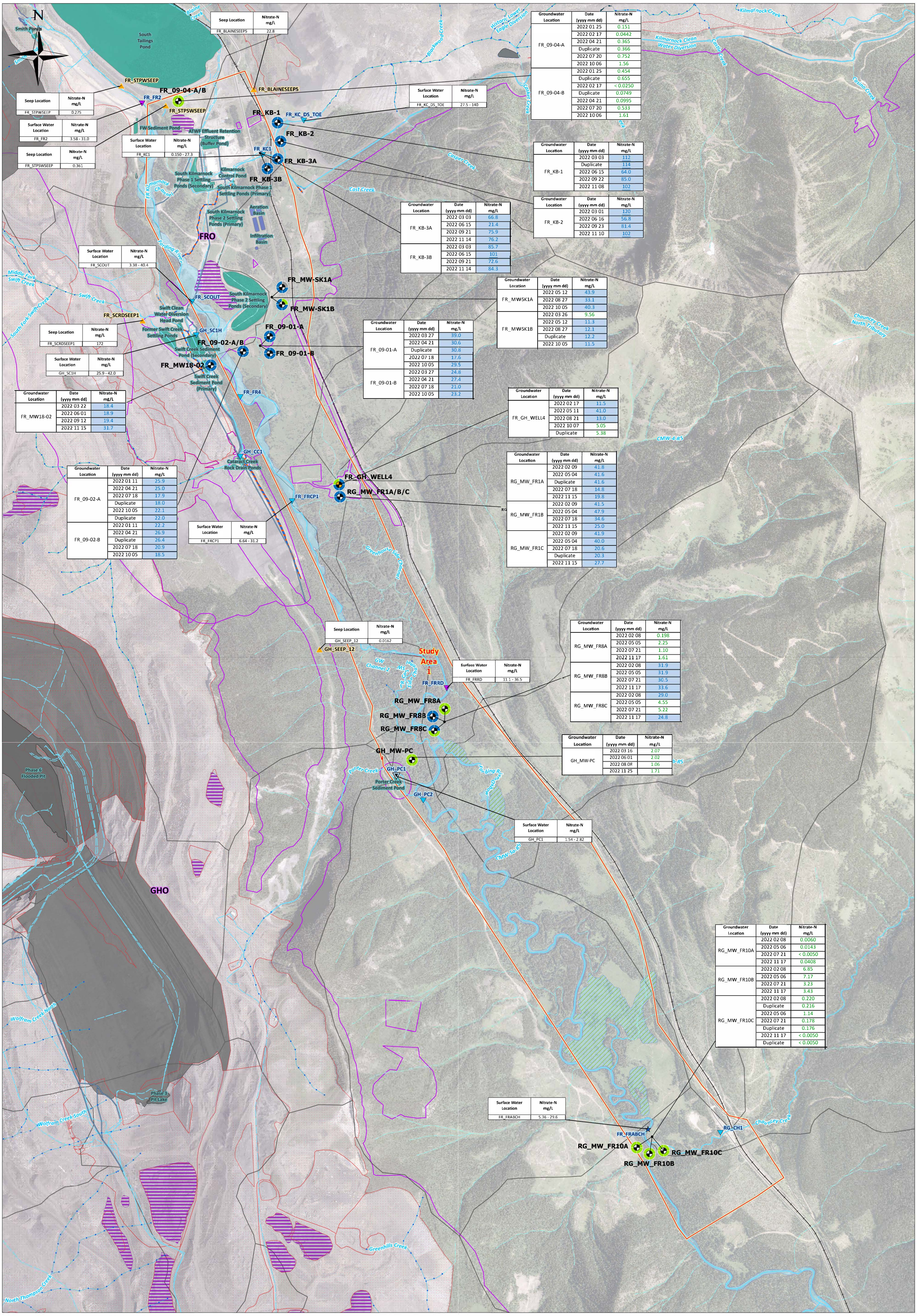
SNC·LAVALIN

Fording River Operations - Spatial Distribution of Dissolved Selenium in Groundwater (North)

CHK'D: CH	DATE: 2023-03-09	SCALE: 1:12,500	REF NUM: DRAWING FR-16
BY: CW	COORD SYS: NAD 1983 UTM Zone 11N		

MXD Path: \\Sli4395\projects\Current Projects\Teck Coal Ltd\GISCAD\GIS\Map Series\635544_2022_RGMPSSGMP_AnnRpt\AnalyticalDrawings_2022AnnRpt.aprx

Project Path: \\Sli4395\projects\Current Projects\Teck Coal Ltd\GISCAD\Exports\635544_SSGMP_RGMP_AnnualReport_2022



Seep Location	Nitrate-N mg/L
FR_BLAINESEEP5	22.8

Seep Location	Nitrate-N mg/L
FR_STPWSEEP	0.275

Surface Water Location	Nitrate-N mg/L
FR_FR2	3.58 - 31.0

Seep Location	Nitrate-N mg/L
FR_STPSWSEEP	0.361

Surface Water Location	Nitrate-N mg/L
FR_KC1	0.150 - 27.3

Surface Water Location	Nitrate-N mg/L
FR_KC_DS_TOE	27.5 - 140

Groundwater Location	Date (yyyy mm dd)	Nitrate-N mg/L
FR_09-04-A	2022 01 25	0.151
	2022 02 17	0.0442
	2022 04 21	0.365
	Duplicate	0.366
	2022 07 20	0.752
	2022 10 06	1.56
FR_09-04-B	2022 01 25	0.454
	Duplicate	0.655
	2022 02 17	< 0.0250
	Duplicate	0.0749
	2022 04 21	0.0995
	2022 07 20	0.533
	2022 10 06	1.61

Groundwater Location	Date (yyyy mm dd)	Nitrate-N mg/L
FR_KB-1	2022 03 03	112
	Duplicate	114
	2022 06 15	64.0
	2022 09 22	85.0
	2022 11 08	102

Groundwater Location	Date (yyyy mm dd)	Nitrate-N mg/L
FR_KB-2	2022 03 01	120
	2022 06 16	56.8
	2022 09 23	81.4
	2022 11 10	102

Groundwater Location	Date (yyyy mm dd)	Nitrate-N mg/L
FR_KB-3A	2022 03 03	66.8
	2022 06 15	21.4
	2022 09 21	75.9
	2022 11 14	76.2
FR_KB-3B	2022 03 03	85.7
	2022 06 15	101
	2022 09 21	72.6
	2022 11 14	84.3

Surface Water Location	Nitrate-N mg/L
FR_SCOUT	3.38 - 40.4

Groundwater Location	Date (yyyy mm dd)	Nitrate-N mg/L
FR_MWSK1A	2022 05 12	43.9
	2022 08 27	33.1
	2022 10 05	40.3
FR_MWSK1B	2022 03 26	9.56
	2022 05 12	11.3
	2022 08 27	12.1
	Duplicate	12.2
	2022 10 05	11.5

Seep Location	Nitrate-N mg/L
FR_SCRDSEEP1	172

Surface Water Location	Nitrate-N mg/L
GH_SC1H	25.9 - 42.0

Groundwater Location	Date (yyyy mm dd)	Nitrate-N mg/L
FR_09-01-A	2022 03 27	39.0
	2022 04 21	30.6
	Duplicate	30.8
	2022 07 18	17.6
	2022 10 05	29.5
FR_09-01-B	2022 03 27	24.8
	2022 04 21	27.4
	2022 07 18	21.0
	2022 10 05	23.2

Groundwater Location	Date (yyyy mm dd)	Nitrate-N mg/L
FR_MW18-02	2022 03 22	18.4
	2022 06 01	18.9
	2022 09 12	19.4
	2022 11 15	31.7

Groundwater Location	Date (yyyy mm dd)	Nitrate-N mg/L
FR_GH_WELL4	2022 02 17	11.5
	2022 05 11	41.0
	2022 08 21	13.0
	2022 10 07	5.05
	Duplicate	5.38

Groundwater Location	Date (yyyy mm dd)	Nitrate-N mg/L
FR_09-02-A	2022 01 11	25.9
	2022 04 21	25.0
	2022 07 18	17.9
	Duplicate	18.0
	2022 10 05	22.1
	Duplicate	22.0
FR_09-02-B	2022 01 11	22.2
	2022 04 21	26.9
	Duplicate	26.4
	2022 07 18	20.9
	2022 10 05	18.5

Surface Water Location	Nitrate-N mg/L
FR_FRCP1	6.64 - 31.2

Groundwater Location	Date (yyyy mm dd)	Nitrate-N mg/L
RG_MW_FR1A	2022 02 09	41.8
	2022 05 04	41.6
	Duplicate	41.6
	2022 07 18	14.8
	2022 11 15	19.8
RG_MW_FR1B	2022 02 09	41.5
	2022 05 04	47.9
	2022 07 18	34.6
	2022 11 15	25.0
RG_MW_FR1C	2022 02 09	41.9
	2022 05 04	40.0
	2022 07 18	20.6
	Duplicate	20.3
	2022 11 15	27.7

Seep Location	Nitrate-N mg/L
GH_SEEP_12	0.0162

Surface Water Location	Nitrate-N mg/L
FR_FRRD	11.1 - 36.5

Groundwater Location	Date (yyyy mm dd)	Nitrate-N mg/L
RG_MW_FR8A	2022 02 08	0.198
	2022 05 05	2.25
	2022 07 21	1.10
	2022 11 17	1.61
RG_MW_FR8B	2022 02 08	31.9
	2022 05 05	31.9
	2022 07 21	30.5
	2022 11 17	33.6
RG_MW_FR8C	2022 02 08	29.0
	2022 05 05	4.55
	2022 07 21	5.22
	2022 11 17	24.8

Groundwater Location	Date (yyyy mm dd)	Nitrate-N mg/L
GH_MW-PC	2022 03 16	2.07
	2022 06 01	2.02
	2022 08 08	1.06
	2022 11 25	1.71

Surface Water Location	Nitrate-N mg/L
GH_PC1	1.54 - 2.82

Groundwater Location	Date (yyyy mm dd)	Nitrate-N mg/L
RG_MW_FR10A	2022 02 08	0.0060
	2022 05 06	0.0143
	2022 07 21	< 0.0050
	2022 11 17	0.0408
RG_MW_FR10B	2022 02 08	6.85
	2022 05 06	7.17
	2022 07 21	3.23
	2022 11 17	3.43
RG_MW_FR10C	2022 02 08	0.220
	Duplicate	0.216
	2022 05 06	1.14
	2022 07 21	0.178
	Duplicate	0.176
	2022 11 17	< 0.0050
	Duplicate	< 0.0050

Surface Water Location	Nitrate-N mg/L
FR_FRABCH	5.36 - 29.6

Legend

Groundwater Stations[4]
- Monitoring Well
- Supply

Surface Water Stations
- Compliance Point
- Receiving Environment
- Authorized Discharge
- Monitoring
- Seep

Site Features
- Secondary Road
- Rails
- Study Areas
- Tailings/Settling/Sediment Pond
- Waste Water Pond
- End-Pit Lake
- Pit
- Stockpiles
- Waste Dump (Spoils)
- Watersheds
- Mine Permitted Areas

Water Features
- Stream + Stream Ditch
- Intermittent + Indefinite Stream
- Subsurface
- Ditch
- Rock Drain
- Water Pipeline
- Bypass/Diversion Channel
- Lake/River Bed
- Wetted Area/Wetland (Based on 1:12500 Scale)

Q4 Q1
Q3 Q2

symbol locations have been adjusted relative to well locations for visibility

Green below the applicable screening criteria

Blue above the applicable screening criteria

Grey no sample collected

Primary Screening Criteria	Nitrate-N mg/L
CSR Aquatic Life	400
CSR Irrigation Watering	n/a
CSR Livestock Watering	100
CSR Drinking Water	10

Notes:
1. Original in colour at paper size ANSI C (17x22 in).
2. Numerical scale reflects full-size print. Print scaling will distort this scale; however, scale bar will remain accurate.
3. Intended for illustration purposes. Accuracy has not been verified for construction or navigation.
4. Locations of overlapping wells have been adjusted for clarity.
5. Nitrate-N = Nitrate Nitrogen
6. The nomenclature for ponds may not accurately reflect that in the various effluent discharge permits.

References:
1. Data provided by Teck Coal Limited

0 0.25 0.5 1 km

PROJECT LOCATION: Elk Valley, BC

CLIENT NAME: Teck Coal Limited

SNC·LAVALIN

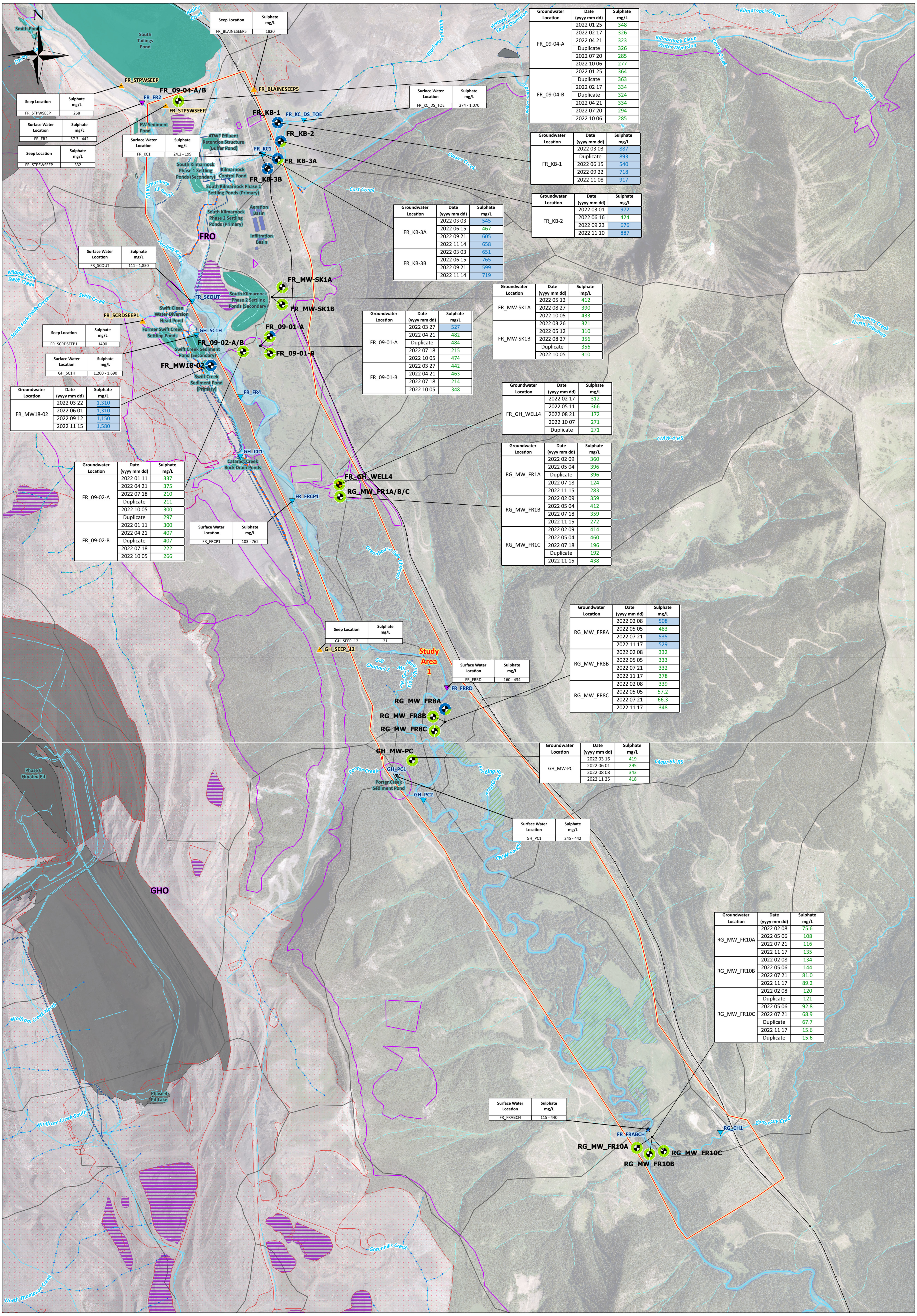
Fording River Operations - Spatial Distribution of Nitrate Nitrogen in Groundwater (South)

CHK'D: CH | DATE: 2023-03-09 | SCALE: 1:12,500 | REF NUM:

BY: CW | COORD SYS: NAD 1983 UTM Zone 11N | DRAWING FR-17

MXD Path: \\Sli4395\projects\Current Projects\Teck Coal Ltd\GISCAD\GIS\Map Series\635544_2022_RGMPSSGMP_AnnRpt\AnalyticalDrawings_2022AnnRpt.aprx

Project Path: \\Sli4395\projects\Current Projects\Teck Coal Ltd\GISCAD\Exports\635544_SSGMP_RGMP_AnnualReport_2022



Seep Location	Sulphate mg/L
FR_BLAINESEEP5	1820

Seep Location	Sulphate mg/L
FR_STPWSEEP	268

Surface Water Location	Sulphate mg/L
FR_FR2	57.3 - 442

Seep Location	Sulphate mg/L
FR_STPSWSEEP	332

Surface Water Location	Sulphate mg/L
FR_KC1	24.2 - 199

Surface Water Location	Sulphate mg/L
FR_KC_DS_TOE	274 - 1,070

Groundwater Location	Date (yyyy mm dd)	Sulphate mg/L
FR_09-04-A	2022 01 25	348
	2022 02 17	326
	2022 04 21	323
	Duplicate	326
	2022 07 20	285
	2022 10 06	277
FR_09-04-B	2022 01 25	364
	Duplicate	363
	2022 02 17	334
	Duplicate	324
	2022 04 21	334
	2022 07 20	294
	2022 10 06	285

Groundwater Location	Date (yyyy mm dd)	Sulphate mg/L
FR_KB-1	2022 03 03	887 (blue)
	Duplicate	893 (blue)
	2022 06 15	540 (blue)
	2022 09 22	718 (blue)
	2022 11 08	917 (blue)

Groundwater Location	Date (yyyy mm dd)	Sulphate mg/L
FR_KB-2	2022 03 01	972 (blue)
	2022 06 16	424
	2022 09 23	676 (blue)
	2022 11 10	887 (blue)

Groundwater Location	Date (yyyy mm dd)	Sulphate mg/L
FR_KB-3A	2022 03 03	545 (blue)
	2022 06 15	467
	2022 09 21	605 (blue)
	2022 11 14	658 (blue)
FR_KB-3B	2022 03 03	651 (blue)
	2022 06 15	765 (blue)
	2022 09 21	599 (blue)
	2022 11 14	719 (blue)

Surface Water Location	Sulphate mg/L
FR_SCOUT	111 - 1,850

Groundwater Location	Date (yyyy mm dd)	Sulphate mg/L
FR_MW-SK1A	2022 05 12	412
	2022 08 27	390
	2022 10 05	433
FR_MW-SK1B	2022 03 26	321
	2022 05 12	310
	2022 08 27	356
	Duplicate	356
	2022 10 05	310

Seep Location	Sulphate mg/L
FR_SCRDSEEP1	1490

Surface Water Location	Sulphate mg/L
GH_SC1H	1,200 - 1,690

Groundwater Location	Date (yyyy mm dd)	Sulphate mg/L
FR_09-01-A	2022 03 27	527 (blue)
	2022 04 21	482
	Duplicate	484
	2022 07 18	215
	2022 10 05	474
FR_09-01-B	2022 03 27	442
	2022 04 21	463
	2022 07 18	214
	2022 10 05	348

Groundwater Location	Date (yyyy mm dd)	Sulphate mg/L
FR_MW18-02	2022 03 22	1,310 (blue)
	2022 06 01	1,310 (blue)
	2022 09 12	1,150 (blue)
	2022 11 15	1,580 (blue)

Groundwater Location	Date (yyyy mm dd)	Sulphate mg/L
FR_GH_WELL4	2022 02 17	312
	2022 05 11	366
	2022 08 21	172
	2022 10 07	271
	Duplicate	271

Groundwater Location	Date (yyyy mm dd)	Sulphate mg/L
RG_MW_FR1A	2022 02 09	360
	2022 05 04	396
	Duplicate	396
	2022 07 18	124
	2022 11 15	283
RG_MW_FR1B	2022 02 09	359
	2022 05 04	412
	2022 07 18	359
	2022 11 15	272
RG_MW_FR1C	2022 02 09	414
	2022 05 04	460
	2022 07 18	196
	Duplicate	192
	2022 11 15	438

Groundwater Location	Date (yyyy mm dd)	Sulphate mg/L
FR_09-02-A	2022 01 11	337
	2022 04 21	375
	2022 07 18	210
	Duplicate	211
	2022 10 05	300
	Duplicate	297
FR_09-02-B	2022 01 11	300
	2022 04 21	407
	Duplicate	407
	2022 07 18	222
	2022 10 05	266

Surface Water Location	Sulphate mg/L
FR_FRCP1	103 - 762

Groundwater Location	Date (yyyy mm dd)	Sulphate mg/L
RG_MW_FR8A	2022 02 08	508 (blue)
	2022 05 05	483
	2022 07 21	535 (blue)
	2022 11 17	529 (blue)
RG_MW_FR8B	2022 02 08	332
	2022 05 05	333
	2022 07 21	332
	2022 11 17	378
RG_MW_FR8C	2022 02 08	339
	2022 05 05	57.2
	2022 07 21	66.3
	2022 11 17	348

Seep Location	Sulphate mg/L
GH_SEEP_12	21

Surface Water Location	Sulphate mg/L
FR_FRRD	160 - 434

Groundwater Location	Date (yyyy mm dd)	Sulphate mg/L
GH_MW-PC	2022 03 16	419
	2022 06 01	295
	2022 08 08	343
	2022 11 25	418

Surface Water Location	Sulphate mg/L
GH_PC1	245 - 442

Groundwater Location	Date (yyyy mm dd)	Sulphate mg/L
RG_MW_FR10A	2022 02 08	75.6
	2022 05 06	108
	2022 07 21	116
	2022 11 17	135
RG_MW_FR10B	2022 02 08	134
	2022 05 06	144
	2022 07 21	81.0
	2022 11 17	89.2
RG_MW_FR10C	2022 02 08	120
	Duplicate	121
	2022 05 06	92.8
	2022 07 21	68.9
	Duplicate	67.7
	2022 11 17	15.6
	Duplicate	15.6

Surface Water Location	Sulphate mg/L
FR_FRABCH	115 - 440

Legend

Groundwater Stations[4]
- Monitoring Well
- Supply

Surface Water Stations
- Compliance Point
- Receiving Environment
- Authorized Discharge
- Monitoring
- Seep

Site Features
- Secondary Road
- Rails
- Study Areas
- Tailings/Settling/Sediment Pond
- Waste Water Pond
- End-Pit Lake
- Pit
- Stockpiles
- Waste Dump (Spoils)
- Watersheds
- Mine Permitted Areas

Water Features
- Stream + Stream Ditch
- Intermittent + Indefinite Stream
- Subsurface
- Ditch
- Rock Drain
- Water Pipeline
- Bypass/Diversion Channel
- Lake/River Bed
- Wetted Area/Wetland (Based on 1:12500 Scale)

Q4 Q1
Q3 Q2

symbol locations have been adjusted relative to well locations for visibility

Green below the applicable screening criteria

Blue above the applicable screening criteria

Grey no sample collected

Primary Screening Criteria	Sulphate mg/L
CSR Aquatic Life	1,280-4,290
CSR Irrigation Watering	n/a
CSR Livestock Watering	1,000
CSR Drinking Water	500

Notes:
1. Original in colour at paper size ANSI C (17x22 in).
2. Numerical scale reflects full-size print. Print scaling will distort this scale; however, scale bar will remain accurate.
3. Intended for illustration purposes. Accuracy has not been verified for construction or navigation.
4. Locations of overlapping wells have been adjusted for clarity.
5. The nomenclature for ponds may not accurately reflect that in the various effluent discharge permits.

References:
1. Data provided by Teck Coal Limited

0 0.25 0.5 1 km

PROJECT LOCATION: Elk Valley, BC

CLIENT NAME: Teck Coal Limited

SNC·LAVALIN

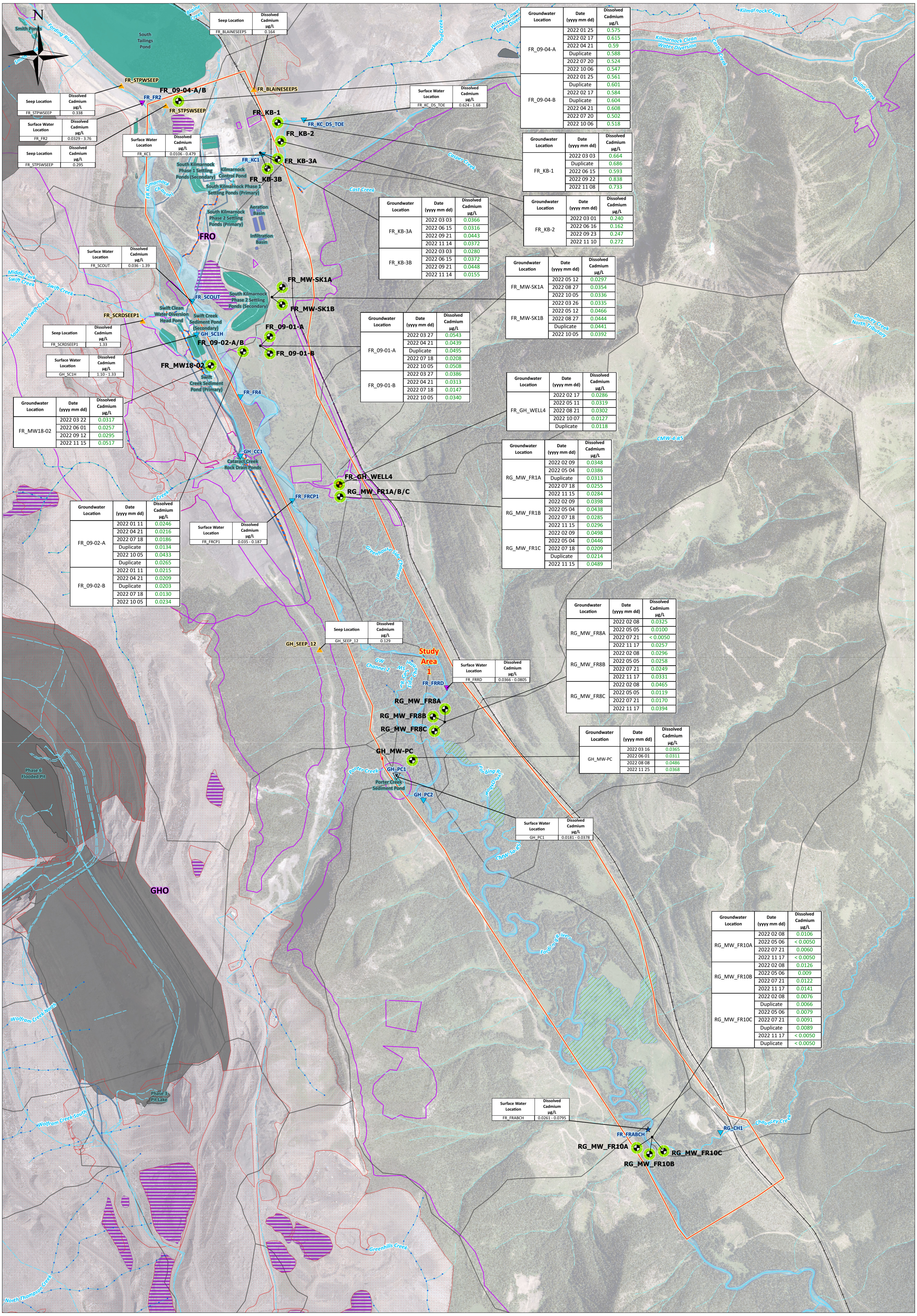
Fording River Operations - Spatial Distribution of Sulphate in Groundwater (South)

CHK'D: CH | DATE: 2023-03-09 | SCALE: 1:12,500 | REF NUM: DRAWING FR-18

BY: CW | COORD SYS: NAD 1983 UTM Zone 11N

MXD Path: \\Sli4395\projects\Current Projects\Teck Coal Ltd\GISCAD\GIS\Map Series\635544_2022_RGMPSSGMP_AnnRpt\AnalyticalDrawings_2022AnnRpt.aprx

Project Path: \\Sli4395\projects\Current Projects\Teck Coal Ltd\GISCAD\Exports\635544_SSGMP_RGMP_AnnualReport_2022



Seep Location	Dissolved Cadmium µg/L
FR_BLAINESEEP5	0.164

Seep Location	Dissolved Cadmium µg/L
FR_STPWSEEP	0.338

Surface Water Location	Dissolved Cadmium µg/L
FR_FR2	0.0329 - 3.76

Seep Location	Dissolved Cadmium µg/L
FR_STPSWSEEP	0.295

Surface Water Location	Dissolved Cadmium µg/L
FR_KC1	0.0106 - 0.479

Surface Water Location	Dissolved Cadmium µg/L
FR_KC_DS_TOE	0.624 - 1.68

Groundwater Location	Date (yyyy mm dd)	Dissolved Cadmium µg/L
FR_09-04-A	2022 01 25	0.575
	2022 02 17	0.615
	2022 04 21	0.59
	Duplicate	0.588
	2022 07 20	0.524
	2022 10 06	0.547
FR_09-04-B	2022 01 25	0.561
	Duplicate	0.601
	2022 02 17	0.584
	Duplicate	0.604
	2022 04 21	0.608
	2022 07 20	0.502
	2022 10 06	0.518

Groundwater Location	Date (yyyy mm dd)	Dissolved Cadmium µg/L
FR_KB-1	2022 03 03	0.664
	Duplicate	0.686
	2022 06 15	0.593
	2022 09 22	0.838
	2022 11 08	0.733

Groundwater Location	Date (yyyy mm dd)	Dissolved Cadmium µg/L
FR_KB-3A	2022 03 03	0.0366
	2022 06 15	0.0316
	2022 09 21	0.0443
	2022 11 14	0.0372
FR_KB-3B	2022 03 03	0.0280
	2022 06 15	0.0372
	2022 09 21	0.0448
	2022 11 14	0.0155

Groundwater Location	Date (yyyy mm dd)	Dissolved Cadmium µg/L
FR_KB-2	2022 03 01	0.240
	2022 06 16	0.162
	2022 09 23	0.247
	2022 11 10	0.272

Surface Water Location	Dissolved Cadmium µg/L
FR_SCOUT	0.036 - 1.39

Groundwater Location	Date (yyyy mm dd)	Dissolved Cadmium µg/L
FR_MW-SK1A	2022 05 12	0.0297
	2022 08 27	0.0354
	2022 10 05	0.0336
FR_MW-SK1B	2022 03 26	0.0335
	2022 05 12	0.0466
	2022 08 27	0.0444
	Duplicate	0.0441
	2022 10 05	0.0392

Seep Location	Dissolved Cadmium µg/L
FR_SCRDSEEP1	1.33

Groundwater Location	Date (yyyy mm dd)	Dissolved Cadmium µg/L
FR_09-01-A	2022 03 27	0.0543
	2022 04 21	0.0439
	Duplicate	0.0495
	2022 07 18	0.0208
	2022 10 05	0.0508
FR_09-01-B	2022 03 27	0.0386
	2022 04 21	0.0313
	2022 07 18	0.0147
	2022 10 05	0.0340

Surface Water Location	Dissolved Cadmium µg/L
GH_SC1H	1.10 - 1.33

Groundwater Location	Date (yyyy mm dd)	Dissolved Cadmium µg/L
FR_GH_WELL4	2022 02 17	0.0286
	2022 05 11	0.0319
	2022 08 21	0.0302
	2022 10 07	0.0127
	Duplicate	0.0118

Groundwater Location	Date (yyyy mm dd)	Dissolved Cadmium µg/L
FR_MW18-02	2022 03 22	0.0317
	2022 06 01	0.0257
	2022 09 12	0.0295
	2022 11 15	0.0517

Groundwater Location	Date (yyyy mm dd)	Dissolved Cadmium µg/L
RG_MW_FR1A	2022 02 09	0.0348
	2022 05 04	0.0386
	Duplicate	0.0313
	2022 07 18	0.0255
	2022 11 15	0.0284
RG_MW_FR1B	2022 02 09	0.0398
	2022 05 04	0.0438
	2022 07 18	0.0285
	2022 11 15	0.0296
RG_MW_FR1C	2022 02 09	0.0498
	2022 05 04	0.0446
	2022 07 18	0.0209
	Duplicate	0.0214
	2022 11 15	0.0489

Groundwater Location	Date (yyyy mm dd)	Dissolved Cadmium µg/L
FR_09-02-A	2022 01 11	0.0246
	2022 04 21	0.0216
	2022 07 18	0.0186
	Duplicate	0.0134
	2022 10 05	0.0433
	Duplicate	0.0265
FR_09-02-B	2022 01 11	0.0215
	2022 04 21	0.0209
	Duplicate	0.0203
	2022 07 18	0.0130
	2022 10 05	0.0234

Surface Water Location	Dissolved Cadmium µg/L
FR_FRCP1	0.035 - 0.187

Groundwater Location	Date (yyyy mm dd)	Dissolved Cadmium µg/L
RG_MW_FR8A	2022 02 08	0.0325
	2022 05 05	0.0100
	2022 07 21	< 0.0050
	2022 11 17	0.0257
RG_MW_FR8B	2022 02 08	0.0296
	2022 05 05	0.0258
	2022 07 21	0.0249
	2022 11 17	0.0331
RG_MW_FR8C	2022 02 08	0.0465
	2022 05 05	0.0119
	2022 07 21	0.0170
	2022 11 17	0.0394

Seep Location	Dissolved Cadmium µg/L
GH_SEEP_12	0.129

Surface Water Location	Dissolved Cadmium µg/L
FR_FRRD	0.0366 - 0.0805

Groundwater Location	Date (yyyy mm dd)	Dissolved Cadmium µg/L
GH_MW-PC	2022 03 16	0.0365
	2022 06 01	0.0311
	2022 08 08	0.0486
	2022 11 25	0.0368

Surface Water Location	Dissolved Cadmium µg/L
GH_PC1	0.0181 - 0.0378

Groundwater Location	Date (yyyy mm dd)	Dissolved Cadmium µg/L
RG_MW_FR10A	2022 02 08	0.0106
	2022 05 06	< 0.0050
	2022 07 21	0.0060
	2022 11 17	< 0.0050
RG_MW_FR10B	2022 02 08	0.0126
	2022 05 06	0.009
	2022 07 21	0.0122
	2022 11 17	0.0141
RG_MW_FR10C	2022 02 08	0.0076
	Duplicate	0.0066
	2022 05 06	0.0079
	2022 07 21	0.0091
	Duplicate	0.0089
	2022 11 17	< 0.0050
	Duplicate	< 0.0050

Surface Water Location	Dissolved Cadmium µg/L
FR_FRABCH	0.0261 - 0.0795

Legend

Groundwater Stations[4]
- Monitoring Well
- Supply

Surface Water Stations
- Compliance Point
- Receiving Environment
- Authorized Discharge
- Monitoring
- Seep

Site Features
- Secondary Road
- Rails
- Study Areas
- Tailings/Settling/Sediment Pond
- Waste Water Pond
- End-Pit Lake
- Pit
- Stockpiles
- Waste Dump (Spoils)
- Watersheds
- Mine Permitted Areas

Water Features
- Stream + Stream Ditch
- Intermittent + Indefinite Stream
- Subsurface
- Ditch
- Rock Drain
- Water Pipeline
- Bypass/Diversion Channel
- Lake/River Bed
- Wetted Area/Wetland (Based on 1:12500 Scale)

Q4 Q1
Q3 Q2

symbol locations have been adjusted relative to well locations for visibility

Green below the applicable screening criteria

Blue above the applicable screening criteria

Grey no sample collected

^ Dissolved phase of the parameter is shown in the spatial plot.

Primary Screening Criteria	Cadmium^ µg/L
CSR Aquatic Life	0.5-4
CSR Irrigation Watering	5
CSR Livestock Watering	80
CSR Drinking Water	5

Notes:
1. Original in colour at paper size ANSI C (17x22 in).
2. Numerical scale reflects full-size print. Print scaling will distort this scale; however, scale bar will remain accurate.
3. Intended for illustration purposes. Accuracy has not been verified for construction or navigation.
4. Locations of overlapping wells have been adjusted for clarity.
5. The nomenclature for ponds may not accurately reflect that in the various effluent discharge permits.

References:
1. Data provided by Teck Coal Limited

0 0.25 0.5 1 km

PROJECT LOCATION:
Elk Valley, BC

CLIENT NAME:
Teck Coal Limited

SNC·LAVALIN

Fording River Operations - Spatial Distribution of Dissolved Cadmium in Groundwater (South)

CHK'D: CH | DATE: 2023-03-09 | SCALE: 1:12,500

BY: CW | COORD SYS: NAD 1983 UTM Zone 11N

REF NUM: **DRAWING FR-19**

MXD Path: \\Sli4395\projects\Current Projects\Teck Coal Ltd\GISCAD\GIS\Map Series\635544_2022_RGMPSSGMP_AnnRpt\AnalyticalDrawings_2022AnnRpt.aprx

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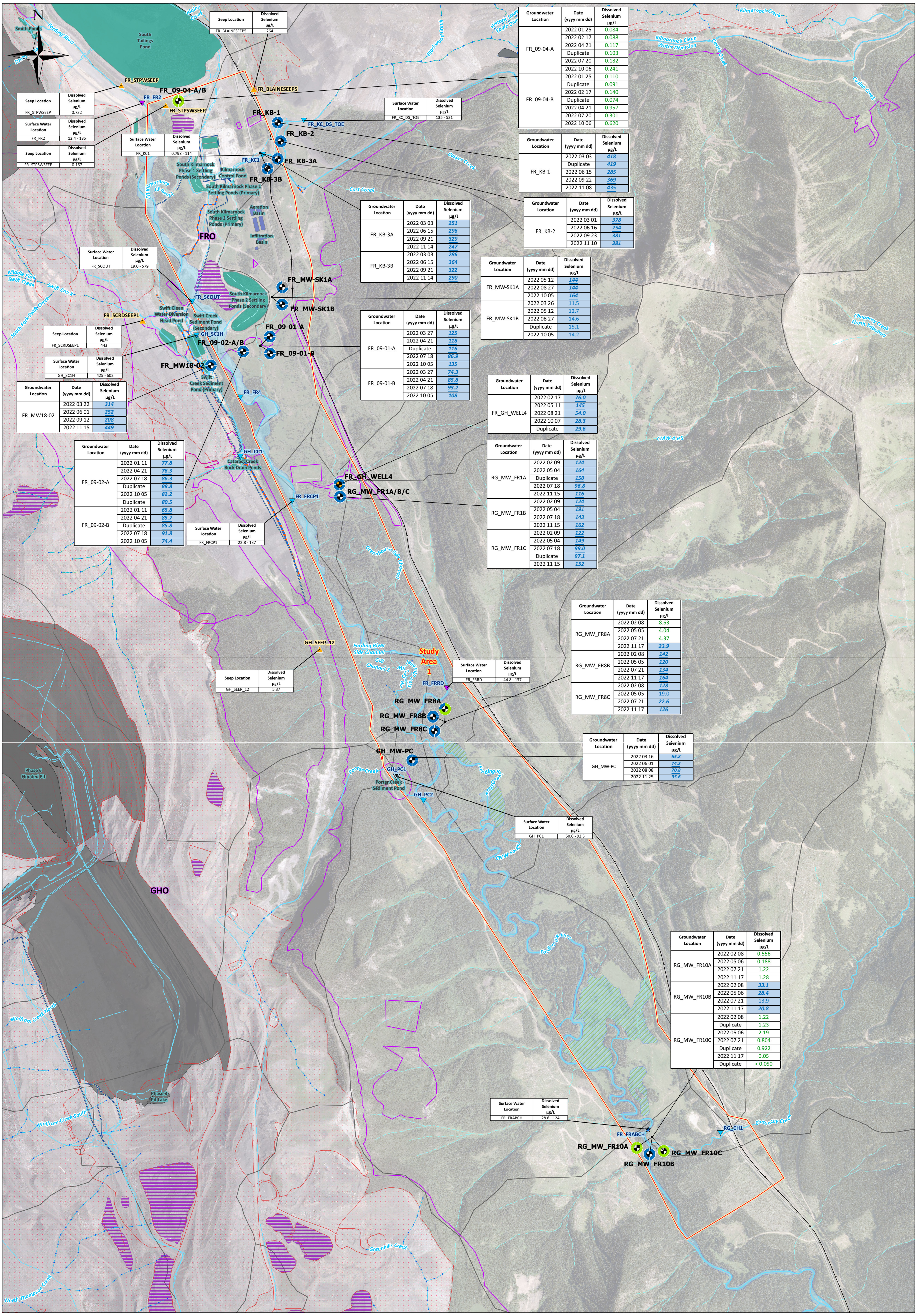

Seep Location	Dissolved Selenium µg/L
FR_BLAINESEEP5	264

Seep Location	Dissolved Selenium µg/L
FR_STPWSEEP	0.732

Surface Water Location	Dissolved Selenium µg/L
FR_FR2	12.4 - 135

Seep Location	Dissolved Selenium µg/L
FR_STPSWSEEP	0.167

Surface Water Location	Dissolved Selenium µg/L
FR_KC1	0.798 - 114

Surface Water Location	Dissolved Selenium µg/L
FR_KC_DS_TOE	135 - 531

Groundwater Location	Date (yyyy mm dd)	Dissolved Selenium µg/L
FR_09-04-A	2022 01 25	0.084
	2022 02 17	0.088
	2022 04 21	0.117
	Duplicate	0.103
	2022 07 20	0.182
	2022 10 06	0.241
FR_09-04-B	2022 01 25	0.110
	Duplicate	0.091
	2022 02 17	0.140
	Duplicate	0.074
	2022 04 21	0.957
	2022 07 20	0.301
	2022 10 06	0.620

Groundwater Location	Date (yyyy mm dd)	Dissolved Selenium µg/L
FR_KB-1	2022 03 03	418
	Duplicate	419
	2022 06 15	285
	2022 09 22	369
	2022 11 08	435

Groundwater Location	Date (yyyy mm dd)	Dissolved Selenium µg/L
FR_KB-3A	2022 03 03	251
	2022 06 15	296
	2022 09 21	329
	2022 11 14	247
FR_KB-3B	2022 03 03	286
	2022 06 15	364
	2022 09 21	322
	2022 11 14	290

Groundwater Location	Date (yyyy mm dd)	Dissolved Selenium µg/L
FR_KB-2	2022 03 01	378
	2022 06 16	254
	2022 09 23	381
	2022 11 10	381

Surface Water Location	Dissolved Selenium µg/L
FR_SCOUT	19.0 - 579

Groundwater Location	Date (yyyy mm dd)	Dissolved Selenium µg/L
FR_MW-SK1A	2022 05 12	144
	2022 08 27	144
	2022 10 05	164
FR_MW-SK1B	2022 03 26	11.5
	2022 05 12	12.7
	2022 08 27	14.6
	Duplicate	15.1
	2022 10 05	14.2

Seep Location	Dissolved Selenium µg/L
FR_SCRDSEEP1	443

Surface Water Location	Dissolved Selenium µg/L
GH_SC1H	425 - 602

Groundwater Location	Date (yyyy mm dd)	Dissolved Selenium µg/L
FR_09-01-A	2022 03 27	125
	2022 04 21	118
	Duplicate	116
	2022 07 18	86.9
	2022 10 05	135
FR_09-01-B	2022 03 27	74.3
	2022 04 21	85.8
	2022 07 18	93.2
	2022 10 05	108

Groundwater Location	Date (yyyy mm dd)	Dissolved Selenium µg/L
FR_MW18-02	2022 03 22	314
	2022 06 01	252
	2022 09 12	208
	2022 11 15	449

Groundwater Location	Date (yyyy mm dd)	Dissolved Selenium µg/L
FR_GH_WELL4	2022 02 17	76.0
	2022 05 11	145
	2022 08 21	54.0
	2022 10 07	28.3
	Duplicate	29.6

Groundwater Location	Date (yyyy mm dd)	Dissolved Selenium µg/L
FR_09-02-A	2022 01 11	77.8
	2022 04 21	76.3
	2022 07 18	86.3
	Duplicate	88.8
	2022 10 05	82.2
	Duplicate	80.5
FR_09-02-B	2022 01 11	65.8
	2022 04 21	85.7
	Duplicate	85.8
	2022 07 18	91.8
	2022 10 05	74.4

Groundwater Location	Date (yyyy mm dd)	Dissolved Selenium µg/L
RG_MW_FR1A	2022 02 09	124
	2022 05 04	164
	Duplicate	150
	2022 07 18	96.8
	2022 11 15	116
RG_MW_FR1B	2022 02 09	124
	2022 05 04	191
	2022 07 18	143
	2022 11 15	162
RG_MW_FR1C	2022 02 09	122
	2022 05 04	149
	2022 07 18	99.0
	Duplicate	97.1
	2022 11 15	152

Surface Water Location	Dissolved Selenium µg/L
FR_FRCP1	22.8 - 137

Groundwater Location	Date (yyyy mm dd)	Dissolved Selenium µg/L
RG_MW_FR8A	2022 02 08	8.63
	2022 05 05	4.04
	2022 07 21	4.37
	2022 11 17	23.9
RG_MW_FR8B	2022 02 08	142
	2022 05 05	120
	2022 07 21	134
	2022 11 17	164
RG_MW_FR8C	2022 02 08	128
	2022 05 05	19.0
	2022 07 21	22.6
	2022 11 17	126

Seep Location	Dissolved Selenium µg/L
GH_SEEP_12	5.37

Surface Water Location	Dissolved Selenium µg/L
FR_FRRD	44.8 - 137

Groundwater Location	Date (yyyy mm dd)	Dissolved Selenium µg/L
GH_MW-PC	2022 03 16	65.8
	2022 06 01	74.2
	2022 08 08	70.8
	2022 11 25	95.6

Surface Water Location	Dissolved Selenium µg/L
GH_PC1	50.6 - 92.5

Groundwater Location	Date (yyyy mm dd)	Dissolved Selenium µg/L
RG_MW_FR10A	2022 02 08	0.556
	2022 05 06	0.188
	2022 07 21	1.22
	2022 11 17	1.28
RG_MW_FR10B	2022 02 08	33.1
	2022 05 06	28.4
	2022 07 21	13.9
	2022 11 17	20.8
RG_MW_FR10C	2022 02 08	1.22
	Duplicate	1.23
	2022 05 06	2.19
	2022 07 21	0.804
	Duplicate	0.922
	2022 11 17	0.05
	Duplicate	< 0.050

Surface Water Location	Dissolved Selenium µg/L
FR_FRABCH	28.6 - 124

Legend

Groundwater Stations[4]
- Monitoring Well
- Supply

Surface Water Stations
- Compliance Point
- Receiving Environment
- Authorized Discharge
- Monitoring
- Seep

Site Features
- Secondary Road
- Rails
- Study Areas
- Tailings/Settling/Sediment Pond
- Waste Water Pond
- End-Pit Lake
- Pit
- Stockpiles
- Waste Dump (Spoils)
- Watersheds
- Mine Permitted Areas

Water Features
- Stream + Stream Ditch
- Intermittent + Indefinite Stream
- Subsurface
- Ditch
- Rock Drain
- Water Pipeline
- Bypass/Diversion Channel
- Lake/River Bed
- Wetted Area/Wetland (Based on 1:12500 Scale)

Q4 Q1 Q3 Q2

symbol locations have been adjusted relative to well locations for visibility

Green below the applicable screening criteria

Blue above the applicable screening criteria

Grey no sample collected

^ Dissolved phase of the parameter is shown in the spatial plot.

Primary Screening Criteria	Selenium^ µg/L
CSR Aquatic Life	20
CSR Irrigation Watering	20
CSR Livestock Watering	30
CSR Drinking Water	10

Notes:
1. Original in colour at paper size ANSI C (17x22 in).
2. Numerical scale reflects full-size print. Print scaling will distort this scale; however, scale bar will remain accurate.
3. Intended for illustration purposes. Accuracy has not been verified for construction or navigation.
4. Locations of overlapping wells have been adjusted for clarity.
5. The nomenclature for ponds may not accurately reflect that in the various effluent discharge permits.

References:
1. Data provided by Teck Coal Limited

0 0.25 0.5 1 km

PROJECT LOCATION:
Elk Valley, BC

CLIENT NAME:
Teck Coal Limited

SNC · LAVALIN

Fording River Operations - Spatial Distribution of Dissolved Selenium in Groundwater (South)

CHK'D: CH | DATE: 2023-03-09 | SCALE: 1:12,500 | REF NUM:
BY: CW | COORD SYS: NAD 1983 UTM Zone 11N | DRAWING FR-20

MXD Path: \\Sli4395\projects\Current Projects\Teck Coal Ltd\GISCAD\GIS\Map Series\635544_2022_RGMPSSGMP_AnnRpt\AnalyticalDrawings_2022AnnRpt.aprx

Project Path: \\Sli4395\projects\Current Projects\Teck Coal Ltd\GISCAD\Exports\635544_SSGMP_RGMP_AnnualReport_2022

Attachment I

Borehole Logs

DATA ENTRY: VI

PROJECT No.: 11.1348.0020.2000

RECORD OF BOREHOLE: GA-HMW1D

LOCATION: See Location Plan

N: 652437 E: 5566516

BORING DATE: August 10, 2011

DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLE NUMBER	SAMPLE TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (nat V. + Q - ●; rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT Wp ⊢—○W—⊣ Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	Barber Rig H24 Air Rotary; BECK Drilling & Environmental Services Ltd.	Ground Surface		1732.20							
		Very loose, non-plastic, non-cohesive, dry to slightly damp, grey to black, variable grain size, mainly coarse grain to cobbles WASTE ROCK, covered in clay and sand matrix, black to dark brown, slightly cohesive with silt.		0.00							
2.5					1	GRAB					
8					2	GRAB					
10.7		Very hard layer, no returns		1721.50 / 10.70							
12					3	GRAB					
12.5		COAL LENS		1719.70 / 12.50							
12.8		Very hard layer, no returns		1719.40							
13.1		Increase in matrix material, fine to coarse grained and cobble sized clay returns		13.10							
14					4	GRAB					
14.6				1717.60 / 14.60							13 Aug 2011 ∇
15											

CONTINUED NEXT PAGE

DEPTH SCALE
1 : 75

Golder Associates

LOGGED: TC
CHECKED: JW

BOREHOLE - EXPANDED ADD. LAB TESTING 11.1348.0020_2000 BH LOGS.GPJ CALGARY.GDT 12/15/11

PROJECT No.: 11.1348.0020.2000

RECORD OF BOREHOLE: GA-HMW1D

SHEET 2 OF 4

LOCATION: See Location Plan

N: 652437 E: 5566516

BORING DATE: August 10, 2011

DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa nat V. + Q - ● rem V. ⊕ U - ○ (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT Wp ⊢—○W—⊣ Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
15	Barber Rig H24 Air Rotary; BECK Drilling & Environmental Services Ltd.	Very loose, non-plastic, non-cohesive, dry to slightly damp, grey to black, variable grain size, mainly coarse grained to cobbles WASTE ROCK, covered in clay and sand matrix, black to dark brown, slightly cohesive with silt *(continued)*									
17					5	GRAB					
19		--- Moisture content increases from 19.0 to 20.1 m									
20		Hard layer, no returns		1712.10 20.10							
22		Very loose, non-plastic, non-cohesive, dry to slightly damp, grey to black, variable grain size, mainly coarse grained to cobbles WASTE ROCK, covered in clay and sand matrix, black to dark brown, slightly cohesive with silt		1710.30 21.90	6	GRAB					
23		Massive, grey, very coarse grained to cobble sized, angular to sub-rounded GRAVEL		1709.30 22.90							
24		Soft, plastic, cohesive, brown CLAY, little returns		1707.80 24.40							
27					7	GRAB					
30				1702.30	8	GRAB					

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DEPTH SCALE
1 : 75

Golder Associates

LOGGED: TC
CHECKED: JW

DATA ENTRY: VI

PROJECT No.: 11.1348.0020.2000

RECORD OF BOREHOLE: GA-HMW1D

SHEET 3 OF 4

LOCATION: See Location Plan

N: 652437 E: 5566516

BORING DATE: August 10, 2011

DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa nat V. + Q - ● rem V. ⊕ U - O (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT Wp ⊢ OW ⊣ Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
30	Barber Rig H24 Air Rotary; BECK Drilling & Environmental Services Ltd.	Massive, grey, very loose grained to cobble sized GRAVEL, angular to sub-rounded *(continued)*		29.90							
33				1698.70	8	GRAB					
		Hard layer, no returns		33.50							
36				1695.60							
37		Massive, grey, very loose grained to cobble sized GRAVEL, angular to sub-rounded		36.60							
41					9	GRAB					
45											

CONTINUED NEXT PAGE

DEPTH SCALE
1 : 75

Golder Associates

LOGGED: TC
CHECKED: JW

DATA ENTRY: VI

PROJECT No.: 11.1348.0020.2000

RECORD OF BOREHOLE: GA-HMW1D

LOCATION: See Location Plan

N: 652437 E: 5566516

BORING DATE: August 10, 2011

DATUM: Geodetic

BORING METHOD: Barber Rig H24 Air Rotary; BECK Drilling & Environmental Services Ltd.

DEPTH SCALE METRES	SOIL PROFILE DESCRIPTION	ELEV. DEPTH (m)	SAMPLE NUMBER	TYPE	BLOWS/0.3m
45	Massive, grey, very loose grained to cobble sized GRAVEL, angular to sub-rounded *(continued)*				
48.5			10	GRAB	
52	Black, broken COAL	1680.10 52.10			
52.5			11	GRAB	
53	Massive, grey, very loose grained to cobble sized GRAVEL, angular to sub-rounded	1679.20 53.00	12	GRAB	
54	Massive, grey BEDROCK	1678.30 53.90	13	GRAB	
	End of BOREHOLE.	1677.90 54.30			

Depth scale: 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m: 20 40 60 80
SHEAR STRENGTH Cu, kPa: nat V. + Q - ● rem V. ⊕ U - O: 20 40 60 80
HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}
WATER CONTENT PERCENT Wp —O W— Wl: 10 20 30 40
ADDITIONAL LAB. TESTING
PIEZOMETER OR STANDPIPE INSTALLATION

BOREHOLE - EXPANDED ADD. LAB TESTING 11.1348.0020_2000 BH LOGS.GPJ CALGARY.GDT 12/15/11

DEPTH SCALE
1 : 75

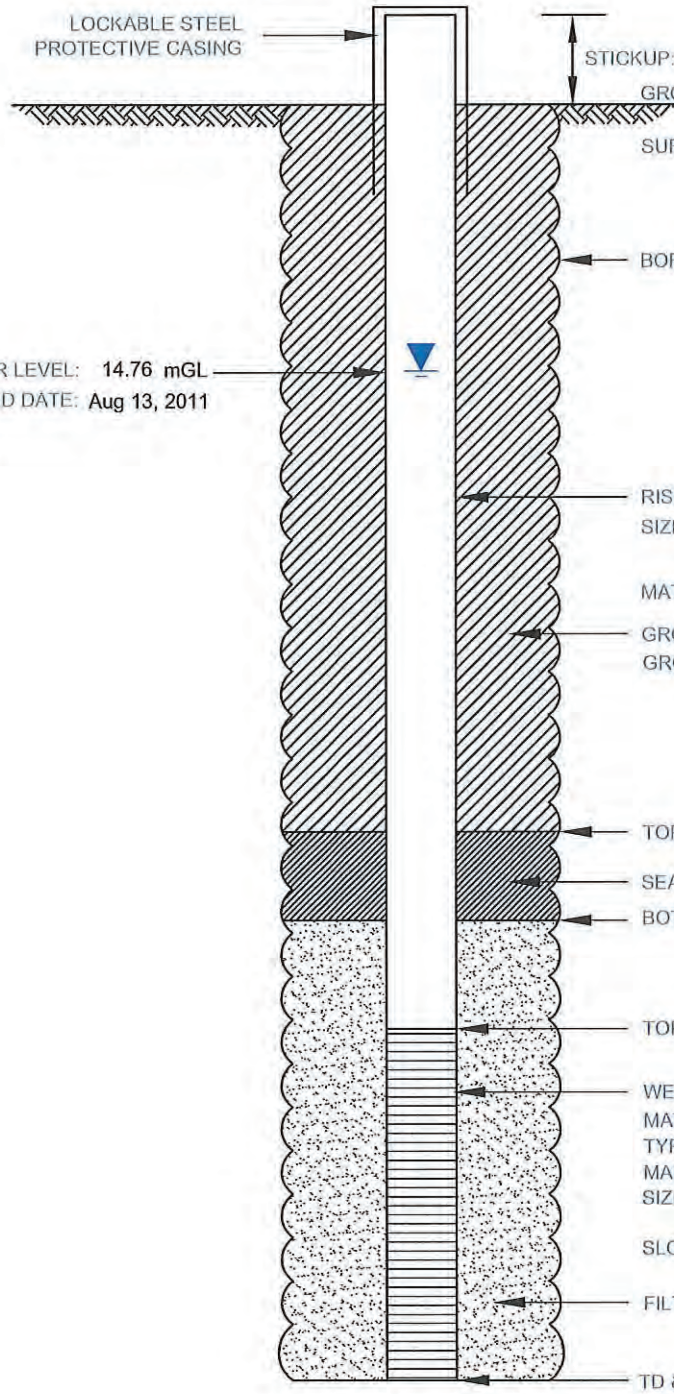
Golder Associates

LOGGED: TC
CHECKED: JW

MONITORING WELL CONSTRUCTION DETAILS

Short Well ID H1D	Well Owner: Teck Coal Fording River Operations Well Name: GA-HMW1D	Spud Date: Aug 10, 2011 Project Short Title: Teck Coal FRO - Henretta Project Number: 11.1348.0020-1000-2000 Site Geologist: T.Crowell
Drilling Method: Air Rotary	Development: Method: Air Lift	Duration: 1.25 Hours

SCHEMATIC ONLY–NOT TO SCALE



NOTES:
1. masl – metres above sea level
2. mGL – metres below ground level
3. TD – Total Depth

Golder Associates

PROJECT No.: 11.1348.0020.2000

RECORD OF BOREHOLE: GA-HMW1S

LOCATION: See Location Plan

BORING DATE: August 11, 2011

DATUM: Geodetic

N: 652441 E: 5566518

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa nat V. + Q - ● rem V. ⊕ U - ○ (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT Wp ⊢ ○W ⊣ Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	Barber Rig H24 Air Rotary / BECK Drilling & Environmental Services Ltd.	Ground Surface		1732.30							
		Samples are not logged		0.00							
2					1	GRAB					
7					2	GRAB					
12					3	GRAB					
15											

CONTINUED NEXT PAGE

DEPTH SCALE
1 : 75

Golder Associates

LOGGED: TC
CHECKED: JW

PROJECT No.: 11.1348.0020.2000

RECORD OF BOREHOLE: GA-HMW1S

LOCATION: See Location Plan

N: 652441 E: 5566518

BORING DATE: August 11, 2011

DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa nat V. + Q - ● rem V. ⊕ U - ○ (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT Wp ⊢ ○W ⊣ Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
15	Barber Rig H24 Air Rotary; BECK Drilling & Environmental Services Ltd.	Samples are not logged *(continued)*									▽ 13 Aug 2011
18					4	GRAB					
21.30		Very loose, non-plastic, non-cohesive, dry to slightly damp, grey to black, coarse grained to cobbles sized, WASTE ROCK, covered in clay and sand matrix, matrix is black, slightly cohesive, silty		1711.00 / 21.30							
24					5	GRAB					
27.40		Massive, grey, very coarse grained to cobble sized GRAVEL, angular to sub-rounded		1704.90 / 27.40							
29					6	GRAB					
30											

CONTINUED NEXT PAGE

DEPTH SCALE

1 : 75

Golder Associates

LOGGED: TC

CHECKED: JW

PROJECT No.: 11.1348.0020.2000

RECORD OF BOREHOLE: GA-HMW1S

LOCATION: See Location Plan

N: 652441 E: 5566518

BORING DATE: August 11, 2011

DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa nat V. + Q - ● rem V. ⊕ U - O (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT Wp ⊢ W ⊣ Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
30	Barber Rig H24 Air Rotary; BECK Drilling & Environmental Services Ltd.	Massive, grey, very coarse grained to cobble sized GRAVEL, angular to sub-rounded *(continued)* --- Gravel is very large in size (inches across)									
31											
32					6	GRAB					
33				1698.80 33.50							
34		BEDROCK End of BOREHOLE.									
35											
36											
37											
38											
39											
40											
41											
42											
43											
44											
45											

DEPTH SCALE

1 : 75

Golder Associates

LOGGED: TC

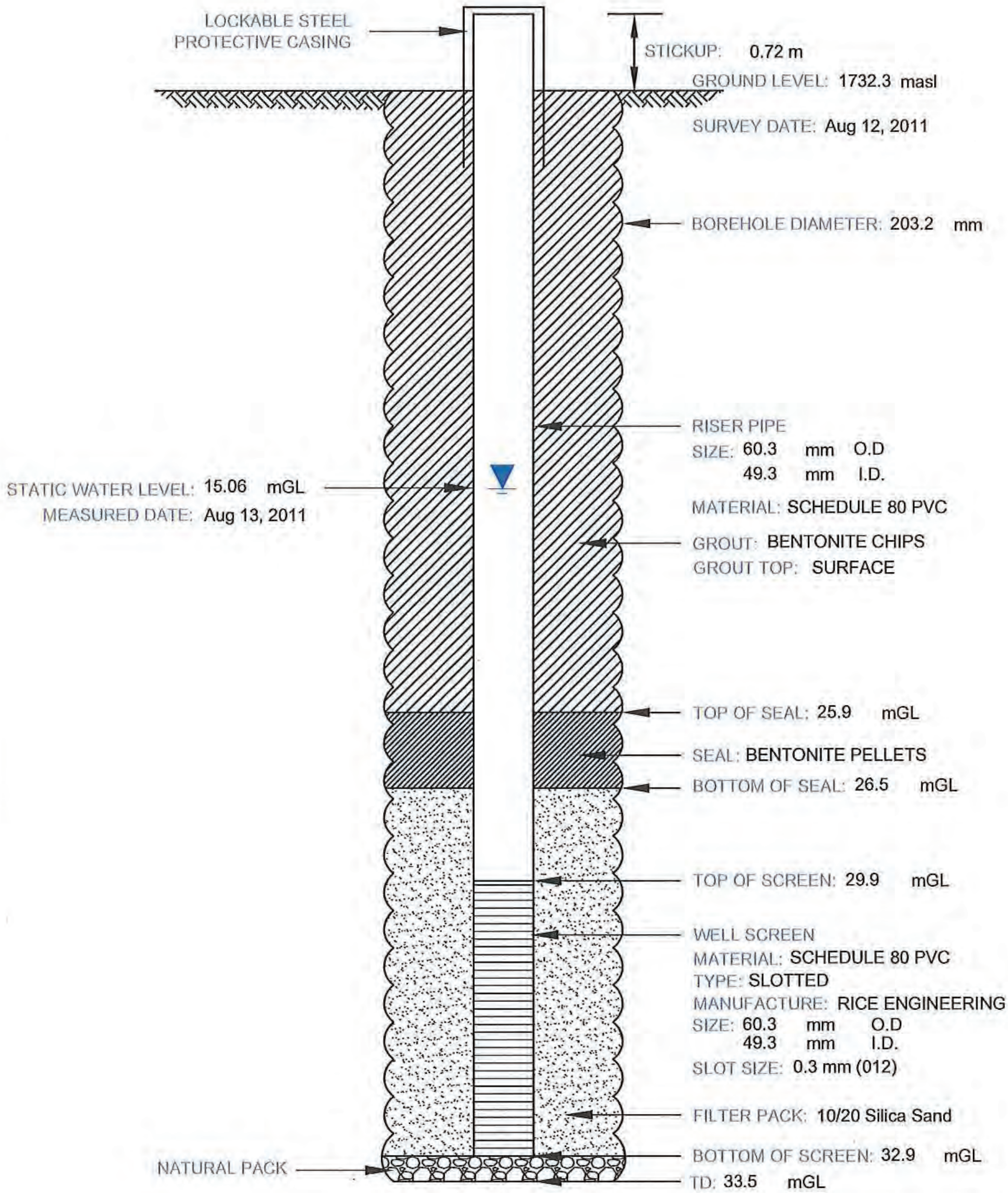
CHECKED: JW

MONITORING WELL CONSTRUCTION DETAILS

Short Well ID		
H1S	Well Owner: Teck Coal Fording River Operations Well Name: GA-HMW1S	Spud Date: Aug 11, 2011 Project Short Title: Teck Coal FRO - Henretta Project Number: 11.1348.0020-1000-2000 Site Geologist: T.Crowell

Drilling Method:	Development:	
Air Rotary	Method: Air Lift	Duration: 1.25 Hours

SCHEMATIC ONLY–NOT TO SCALE



NOTES:
1. masl – metres above sea level
2. mGL – metres below ground level
3. TD – Total Depth

Golder Associates

PROJECT No.: 11.1348.0020.2000

RECORD OF BOREHOLE: GA-HMW2

LOCATION: See Location Plan
N: 652666 E: 5566634

BORING DATE: August 09, 2011

DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa nat V. + Q - ● rem V. ⊕ U - O (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT Wp ⊢ OW ⊣ Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	Barber Rig H24 Air Rotary; BECK Drilling & Environmental Services Ltd.	Ground Surface		1767.30							
		Compacted road materials									
		Dry, grey to black, angular, coarse grained to cobble sized SPOILS, covered in clay and sand matrix, cohesive to plastic, dark brown to black, silty		0.30							
2.5					1	GRAB					
7.5					2	GRAB					
12.5					3	GRAB					
15		*CONTINUED NEXT PAGE*									

CONTINUED NEXT PAGE

DEPTH SCALE
1 : 75

Golder Associates

LOGGED: TC
CHECKED: JW

DATA ENTRY: VI

PROJECT No.: 11.1348.0020.2000

RECORD OF BOREHOLE: GA-HMW2

LOCATION: See Location Plan

N: 652666 E: 5566634

BORING DATE: August 09, 2011

DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (20 40 60 80) nat V. + Q - ● rem V. ⊕ U - ○	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT Wp ⊢ ○W ⊣ Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
15	Barber Rig H24 Air Rotary; BECK Drilling & Environmental Services Ltd.	Dry, grey to black, angular, coarse grained to cobble sized SPOILS, covered in clay and sand matrix, cohesive to plastic, dark brown to black, silty *(continued)*									
17.5					4	GRAB					
22.5					5	GRAB					
27					6	GRAB					
27.40		Black, broken COAL LENS		1739.90 27.40							
28.90		Dry, grey to black, angular, coarse grained to cobble sized SPOILS, covered in clay and sand matrix, cohesive to plastic dark brown to black, silty		1738.40 28.90							
29.5					7	GRAB					
30											

CONTINUED NEXT PAGE

DEPTH SCALE
1 : 75

Golder Associates

LOGGED: TC
CHECKED: JW

PROJECT No.: 11.1348.0020.2000

RECORD OF BOREHOLE: GA-HMW2

LOCATION: See Location Plan

N: 652666 E: 5566634

BORING DATE: August 09, 2011

DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE DESCRIPTION	ELEV. DEPTH (m)	SAMPLES NUMBER	TYPE	BLOWS/0.3m	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
30	Barber Rig H24 Air Rotary / BECK Drilling & Environmental Services Ltd.							
30.48		Dry, grey to black, angular, coarse grained to cobble sized SPOILS, covered in clay and sand matrix, cohesive to plastic dark brown to black, silty, smaller fragments	1736.82 / 30.48	8	GRAB			
32.00		Dry, grey to black, angular, coarse grained to cobble sized SPOILS, covered in clay and sand matrix, cohesive to plastic dark brown to black, silty	1734.40 / 32.00	9	GRAB			
				10	GRAB			
43.50		COAL LENS	1723.80 / 43.50	11	GRAB			13 Aug 2011 ∇
45								

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m: 20 40 60 80
SHEAR STRENGTH Cu, kPa: nat V. + Q - ● rem V. ⊕ U - O: 20 40 60 80
HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}
WATER CONTENT PERCENT Wp —O W— Wl: 10 20 30 40

CONTINUED NEXT PAGE

DEPTH SCALE

1 : 75

Golder Associates

LOGGED: TC

CHECKED: JW

PROJECT No.: 11.1348.0020.2000

RECORD OF BOREHOLE: GA-HMW2

SHEET 4 OF 4

LOCATION: See Location Plan

N: 652666 E: 5566634

BORING DATE: August 09, 2011

DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa nat V. + Q - ● rem V. ⊕ U - O (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT Wp ⊢—⊖W—⊣ Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
45	Barber Rig H24 Air Rotary; BECK Drilling & Environmental Services Ltd.	COAL LENS *(continued)*									
46					11	GRAB'					
47				1719.60							
		BEDROCK, clay fragments trending into grey massive sample		47.70							
48				1718.60	12	GRAB'					
		End of BOREHOLE.		48.70							
49											
50											
51											
52											
53											
54											
55											
56											
57											
58											
59											
60											

DEPTH SCALE

1 : 75

Golder Associates

LOGGED: TC

CHECKED: JW

DATA ENTRY: VI

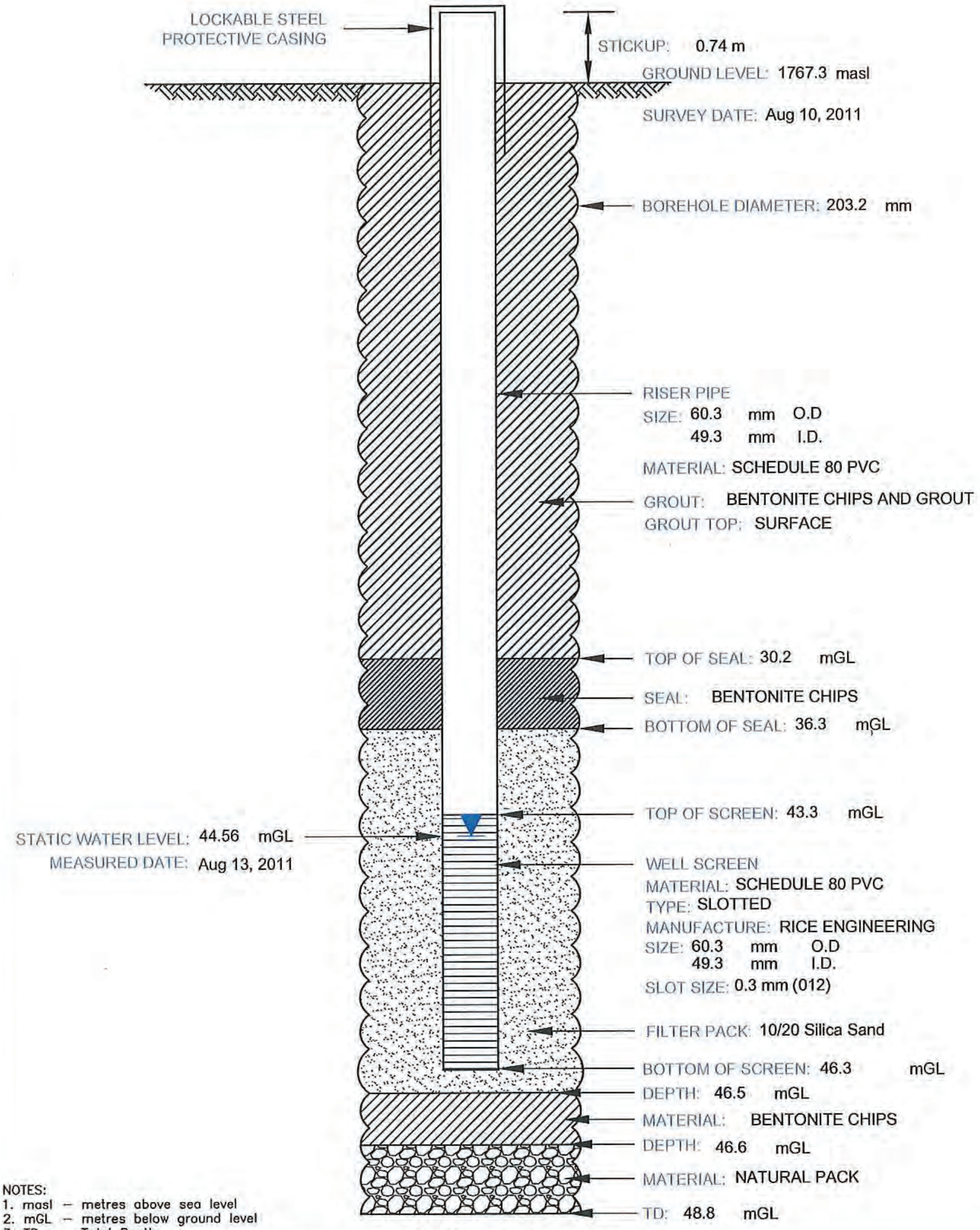
BOREHOLE - EXPANDED ADD. LAB TESTING 11.1348.0020_2000 BH LOGS.GPJ CALGARY.GDT 12/15/11

MONITORING WELL CONSTRUCTION DETAILS

Short Well ID		
H2	Well Owner: Teck Coal Fording River Operations Well Name: GA-HMW2	Spud Date: Aug 9, 2011 Project Short Title: Teck Coal FRO - Henretta Project Number: 11.1348.0020-1000-2000 Site Geologist: T.Crowell

Drilling Method:	Development:
Air Rotary	Method: Waterra Tubing Duration: 1 Hour

SCHEMATIC ONLY--NOT TO SCALE



NOTES:
1. masl – metres above sea level
2. mGL – metres below ground level
3. TD – Total Depth

Golder Associates

DATA ENTRY: VI

PROJECT No.: 11.1348.0020.2000

RECORD OF BOREHOLE: GA-HMW3

SHEET 1 OF 2

LOCATION: See Location Plan

N: 652810 E: 5566540

BORING DATE: August 12, 2011

DATUM: Geodetic

Boring method: Barber Rig H24 Air Rotary — BECK Drilling & Environmental Services Ltd.

DEPTH SCALE METRES	DESCRIPTION	ELEV. DEPTH (m)	SAMPLE NUMBER	TYPE	PIEZOMETER OR STANDPIPE INSTALLATION
0	Ground Surface	1728.20			
	Compacted road materials				
	Brown and grey, cobble size WASTE ROCK with sandy clay matrix, rock is sub-rounded to subangular, matrix is soft, damp, non-plastic, cohesive, silty, with some very fine grains	0.30			
3			1	GRAB	
6	Hard layer, ROP low, no returns	1722.40 / 5.80			
	Brown and grey, cobble size WASTE ROCK with sandy clay matrix, rock is sub-rounded to subangular, matrix is soft, dry, non-plastic, cohesive, silty, with some very fine grains	1721.80 / 6.40			
7					13 Aug 2011 ∇
9			2	GRAB	
12	Wet, white to grey and brown, cobble size to very coarse grained, round to sub-angular GRAVEL, brown clay matrix, silty	1716.00 / 12.20			
13			3	GRAB	
15					

Column headings also printed: STRATA PLOT; BLOWS/0.3m; DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20, 40, 60, 80); SHEAR STRENGTH Cu, kPa nat V. + Q - ● rem V. ⊕ U - O (20, 40, 60, 80); HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6}, 10^{-5}, 10^{-4}, 10^{-3}); WATER CONTENT PERCENT Wp —O W— Wl (10, 20, 30, 40); ADDITIONAL LAB. TESTING.

CONTINUED NEXT PAGE

BOREHOLE - EXPANDED ADD. LAB TESTING 11.1348.0020_2000 BH LOGS.GPJ CALGARY.GDT 12/15/11

DEPTH SCALE
1 : 75

Golder Associates

LOGGED: TC
CHECKED: JW

DATA ENTRY: VI

PROJECT No.: 11.1348.0020.2000

RECORD OF BOREHOLE: GA-HMW3

SHEET 2 OF 2

LOCATION: See Location Plan

N: 652810 E: 5566540

BORING DATE: August 12, 2011

DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa nat V. + Q - ● rem V. ⊕ U - O (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT Wp ⊢ ⊖W ⊣ Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
15	Barber Rig H24 Air Rotary; BECK Drilling & Environmental Services Ltd.	Wet, white to grey and brown, cobble size to very coarse grained, round to sub-angular GRAVEL, brown clay matrix, silty *(continued)*									
16					3	GRAB					
17											
18											
19					4	GRAB					
20											
21											
22					5	GRAB					
		Massive, grey BEDROCK, small drill-broken fragments		1705.60 / 22.60							
		End of BOREHOLE.									
23											
24											
25											
26											
27											
28											
29											
30											

DEPTH SCALE

1 : 75

Golder Associates

LOGGED: TC

CHECKED: JW

BOREHOLE - EXPANDED ADD. LAB TESTING 11.1348.0020_2000 BH LOGS.GPJ CALGARY.GDT 12/15/11

MONITORING WELL CONSTRUCTION DETAILS

Short Well ID: H3

Well Owner: Teck Coal Fording River Operations

Well Name: GA-HMW3

Spud Date: Aug 12, 2011

Project Short Title: Teck Coal FRO - Henretta

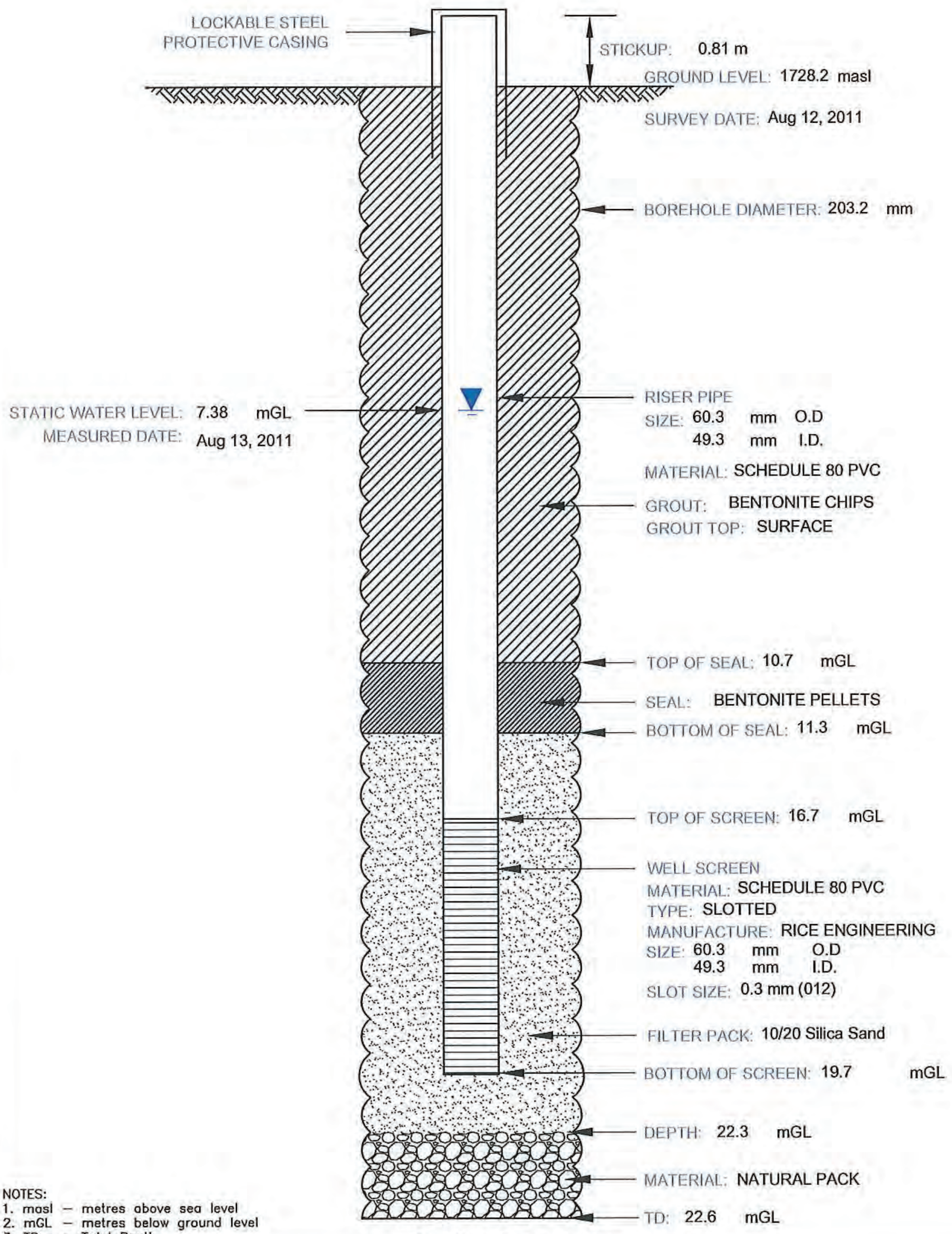
Project Number: 11.1348.0020-1000-2000

Site Geologist: T.Crowell

Drilling Method: Air Rotary

Development: Method: Air Lift Duration: 1 Hour

SCHEMATIC ONLY–NOT TO SCALE



NOTES:
1. masl – metres above sea level
2. mGL – metres below ground level
3. TD – Total Depth

Golder Associates

DATA ENTRY: VI

PROJECT No.: 11.1348.0020.2000

RECORD OF BOREHOLE: GA-HMW5

SHEET 1 OF 1

LOCATION: See Location Plan

N: 655476 E: 5567514

BORING DATE: August 09, 2011

DATUM: Geodetic

Boring method: Barber Rig H24 Air Rotary; BECK Drilling & Environmental Services Ltd.

Depth (m)	Description	Strata Plot	Elev. / Depth (m)	Sample Number	Type	Piezometer or Standpipe Installation
0	Ground Surface		1785.20			
0	Very loose, non-plastic, dry, grey to brown, loose grained to cobble size GRAVEL, non-cohesive with some medium grained, angular to subangular, (with little matrix) (ALLUVIUM)	Gravel	0.00			
~1.5				1	GRAB	13 Aug 2011 ∇
~4	--- Soft, low plasticity, damp, non-cohesive, with more grey CLAY					
~4.8				2	GRAB	
6.70	Hard layer, angular fragments, low returns GRAVEL		1778.50			
6.90	Very loose, low plasticity, damp, grey to brown, loose grained to cobble size GRAVEL, non-cohesive with some medium grained, angular to subangular (with little matrix) (ALLUVIUM)	Gravel	6.90			
~7.8				3	GRAB	
~9.2	--- Clay becomes dark brown, damp, cohesive and very dense					
~9.8				4	GRAB	
10.70	Very loose fragments (drill cut-up), wet, massive, light to dark grey, angular BEDROCK	Bedrock	1774.50 / 10.70			
~11.7				5	GRAB	
12.80	End of BOREHOLE.		1772.40 / 12.80			

Column headings also printed (no data recorded): DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20, 40, 60, 80); SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - O; 20, 40, 60, 80); HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6}, 10^{-5}, 10^{-4}, 10^{-3}); WATER CONTENT PERCENT (Wp —O^W— Wl; 10, 20, 30, 40); BLOWS/0.3m; ADDITIONAL LAB. TESTING.

DEPTH SCALE 1 : 75

Golder Associates

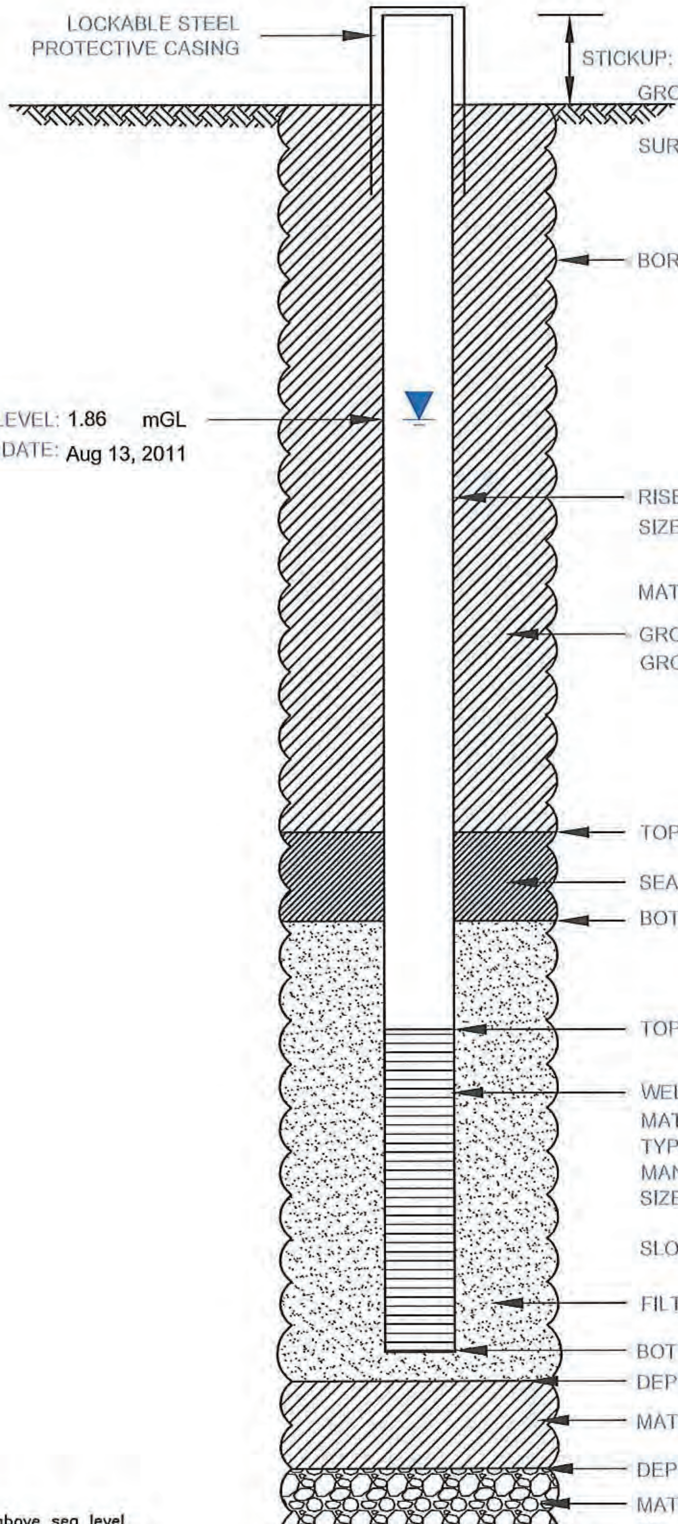
LOGGED: TC

CHECKED: JW

MONITORING WELL CONSTRUCTION DETAILS

Short Well ID H5	Well Owner: Teck Coal Fording River Operations Well Name: GA-HMW5	Spud Date: Aug 9, 2011 Project Short Title: Teck Coal FRO - Henretta Project Number: 11.1348.0020-1000-2000 Site Geologist: T.Crowell
Drilling Method: Air Rotary	Development: Method: Air Lift	Duration: 1.75 Hours

SCHEMATIC ONLY—NOT TO SCALE



NOTES:
1. masl – metres above sea level
2. mGL – metres below ground level
3. TD – Total Depth

Golder Associates

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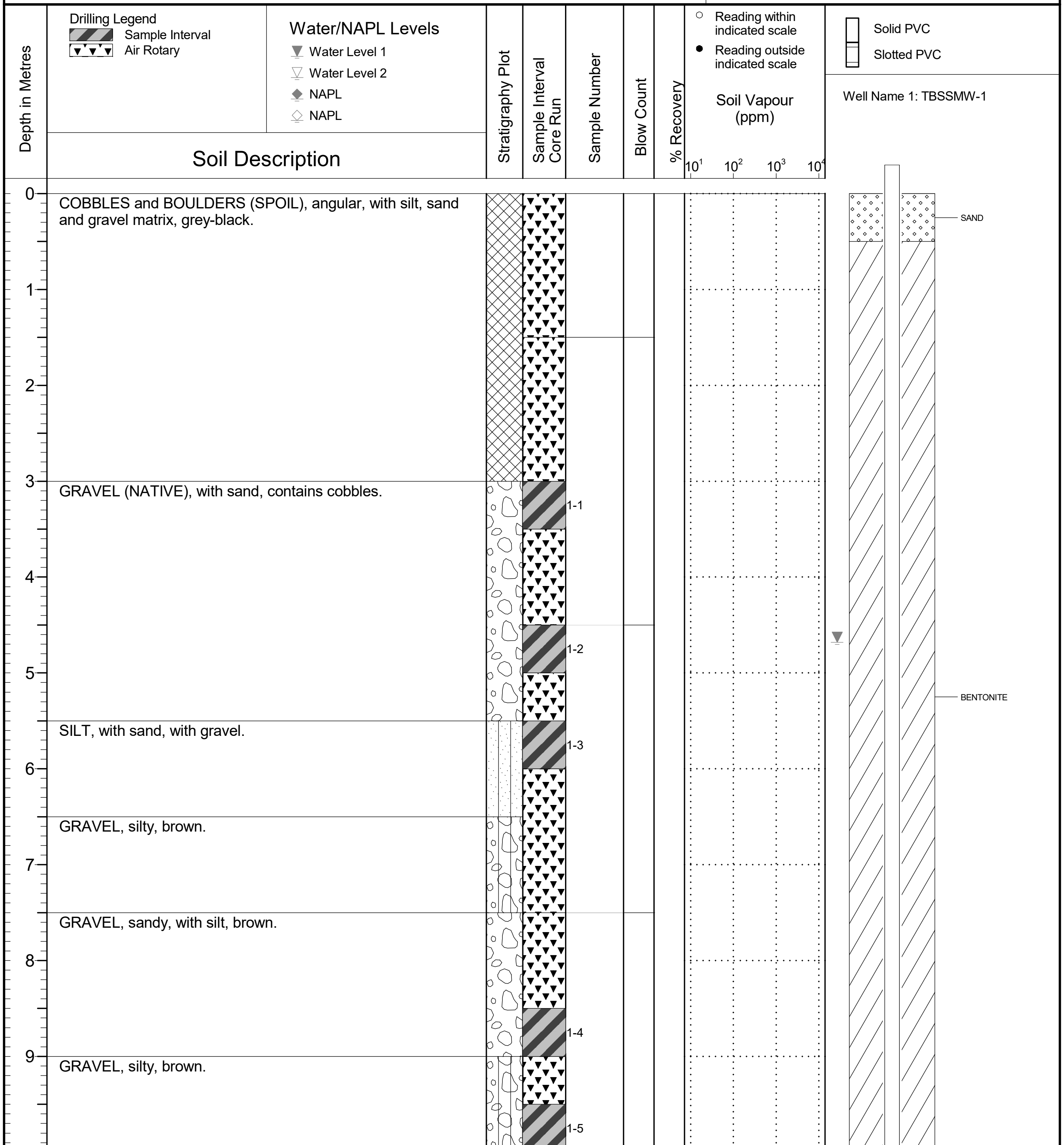
FINAL

SNC·LAVALIN

Client	Borehole No. : FR_TBSSMW-1
Teck Coal Limited	
Location	PAGE 1 OF 3
Turnbull, Elkford, BC	

Drilling Contractor	Foraco International SA	Date Monitored	2017 08 08	Project Number:	648811
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1697.039	Borehole Logged By:	SC
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1697.969	Date Drilled:	2017 08 02
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5565868.179	Easting: 651603.747	Log Typed By:	VL

Depth (m)	Soil Description	Sample Number
0	COBBLES and BOULDERS (SPOIL), angular, with silt, sand and gravel matrix, grey-black.	
3	GRAVEL (NATIVE), with sand, contains cobbles.	1-1, 1-2
5.5	SILT, with sand, with gravel.	1-3
6.5	GRAVEL, silty, brown.	
7.5	GRAVEL, sandy, with silt, brown.	1-4
9	GRAVEL, silty, brown.	1-5



NOTES
150 mm steel casing to 5.0 m.
Bolded sample denotes sample analyzed.

SC 2017 09 19 Print Date:2017-12-19

FINAL

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : FR_TBSSMW-1**
	Location **Turnbull, Elkford, BC**	PAGE 2 OF 3

Drilling Contractor	Foraco International SA	Date Monitored	2017 08 08	Project Number:	648811
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1697.039	Borehole Logged By:	SC
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1697.969	Date Drilled:	2017 08 02
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5565868.179	Easting: 651603.747	Log Typed By:	VL

Drilling Legend: Sample Interval; Air Rotary

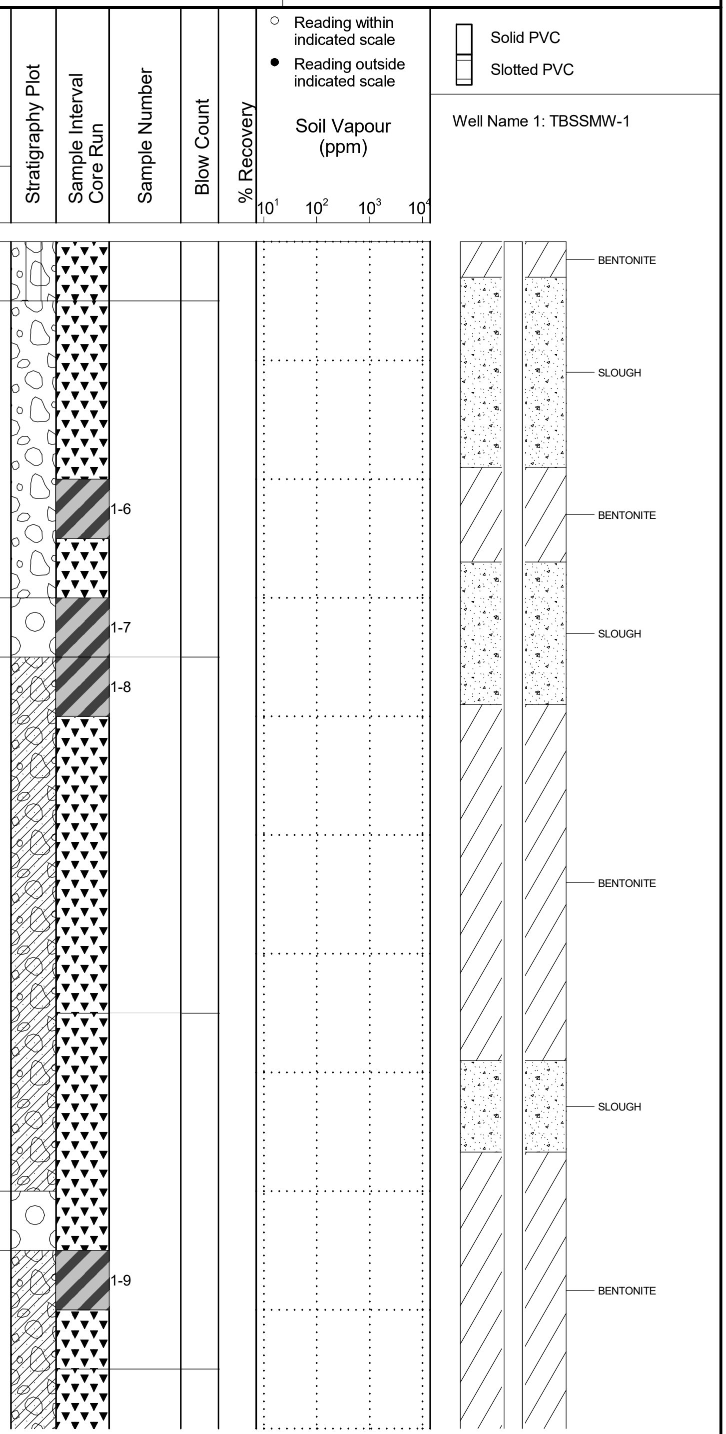
Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: TBSSMW-1

Depth in Metres	Soil Description	Sample Number
10	GRAVEL, silty, brown. *(continued)*	
10.5	GRAVEL, with silt, contains cobbles, brown.	
12		1-6
13	BOULDER, grey-black.	1-7
13.5	GRAVEL (TILL), silty, with sand, contains cobbles and boulders, dense, brown.	1-8
18	BOULDER.	
18.5	GRAVEL (TILL), silty, with sand, contains cobbles and boulders, dense, brown.	1-9



NOTES
150 mm steel casing to 5.0 m.
Bolded sample denotes sample analyzed.

SC 2017 09 19 Print Date:2017-12-19

FINAL

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : FR_TBSSMW-1**
	Location **Turnbull, Elkford, BC**	PAGE 3 OF 3

Drilling Contractor	Foraco International SA	Date Monitored	2017 08 08	Project Number:	648811
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1697.039	Borehole Logged By:	SC
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1697.969	Date Drilled:	2017 08 02
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5565868.179	Easting: 651603.747	Log Typed By:	VL

Drilling Legend: Sample Interval; Air Rotary

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: TBSSMW-1

Depth in Metres	Soil Description	Sample Number
20	GRAVEL (TILL), silty, with sand, contains cobbles and boulders, dense, brown. *(continued)*	1-10
22	GRAVEL, sandy.	1-11
22.5	BEDROCK, fresh, SILT/SANDSTONE, grey to black.	1-12, 1-13
25.5	Bottom of hole at 25.5 m.	

Columns: Stratigraphy Plot; Sample Interval Core Run; Sample Number; Blow Count; % Recovery; Soil Vapour (ppm) (10^1, 10^2, 10^3, 10^4)

Well: BENTONITE; TBSSMW-1; SAND; BENTONITE

NOTES
150 mm steel casing to 5.0 m.
Bolded sample denotes sample analyzed.

SC 2017 09 19 Print Date:2017-12-19

FINAL

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : FR_TBSSMW-2**
	Location **Turnbull, Elkford, BC**	PAGE 1 OF 1

Drilling Contractor	Foraco International SA	Date Monitored	2017 08 08	Project Number:	648811
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1697.026	Borehole Logged By:	RSW
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1697.949	Date Drilled:	2017 08 03
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5565866.323	Easting: 651604.803	Log Typed By:	VL

Drilling Legend: Sample Interval; Air Rotary

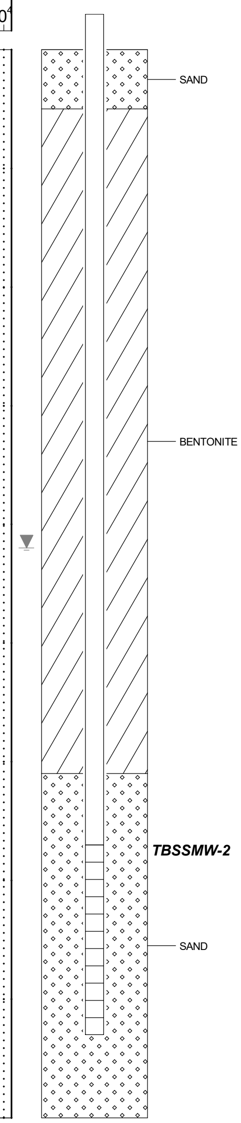
Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Soil Vapour (ppm): ○ Reading within indicated scale; ● Reading outside indicated scale; scale 10^1 10^2 10^3 10^4

Well legend: Solid PVC; Slotted PVC

Well Name 1: TBSSMW-2

Depth in Metres	Soil Description
0	COBBLES and BOULDERS (SPOIL), angular, with silt, sand and gravel matrix, grey-black.
3	GRAVEL (NATIVE), with sand, vari-coloured, contains cobbles.
8.2	GRAVEL (NATIVE), with sand, with silt, contains cobbles.
9	Bottom of hole at 9.0 m.



NOTES
150 mm steel casing to 4.6 m.
Bolded sample denotes sample analyzed.

SC 2017 09 19 Print Date:2017-12-19

FINAL

SNC • LAVALIN	Client **Teck Coal Limited**	**Borehole No. : FR_GCMW-1A/B**
	Location **Turnbull, Elkford, BC**	PAGE 1 OF 3

Drilling Contractor	Foraco International SA	Date Monitored	2017 08 08	Project Number:	648811
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1670.643	Borehole Logged By:	SC
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1671.355 1671.293	Date Drilled:	2017 08 01
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5564000.572	Easting: 650964.694	Log Typed By:	VL

Drilling Legend
- Sample Interval
- Air Rotary

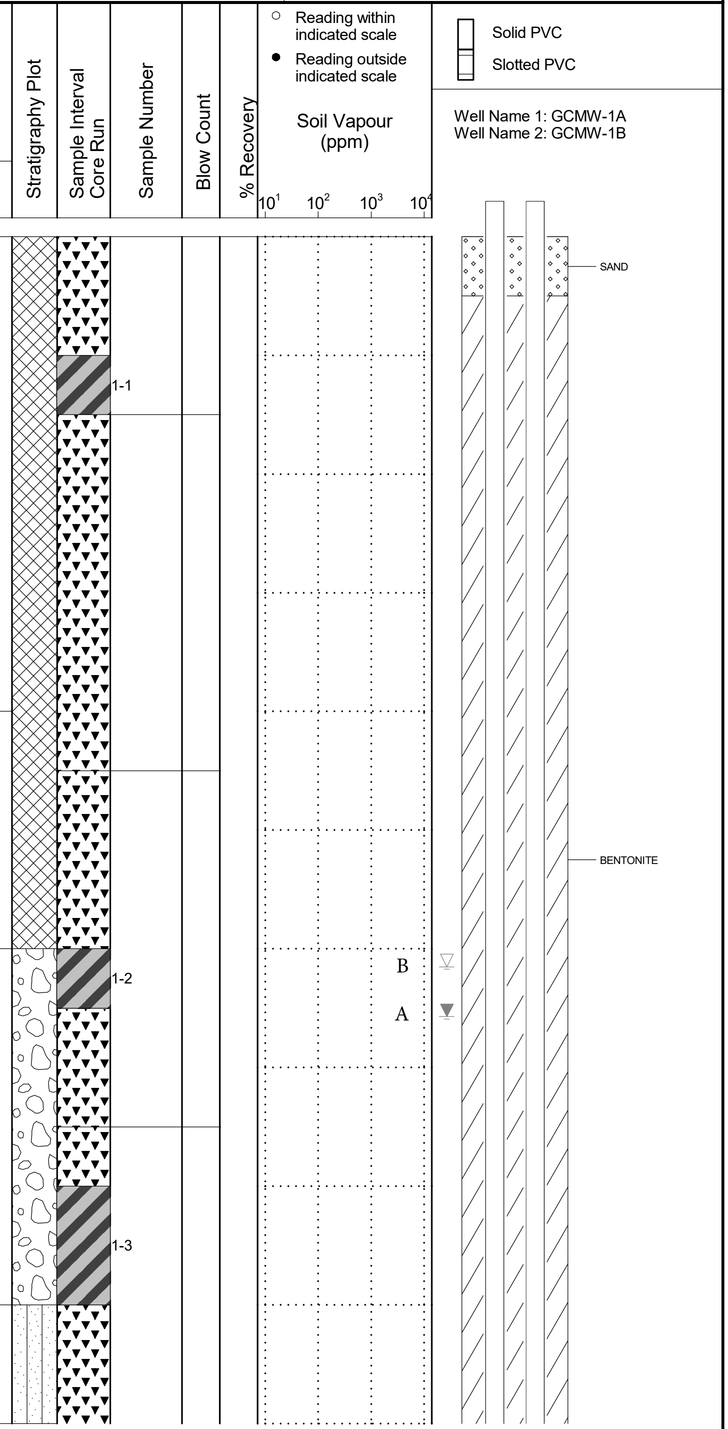
Water/NAPL Levels
- Water Level 1
- Water Level 2
- NAPL
- NAPL

- Reading within indicated scale
- Reading outside indicated scale

- Solid PVC
- Slotted PVC

Well Name 1: GCMW-1A
Well Name 2: GCMW-1B

Depth in Metres	Soil Description
0	GRAVEL (SPOIL), silty, with sand, contains cobbles and boulders, grey-black.
4	GRAVEL (FILL), silty, with sand, contains cobbles and boulders, brown.
6	GRAVEL (NATIVE), subrounded, with silt, with sand, contains cobbles, brown.
9	SAND (NATIVE), silty, brown.
10	



NOTES
150 mm steel casing to 10.5 m.
Bolded sample denotes sample analyzed.

SC 2017 09 19 Print Date:2017-12-19

FINAL

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : FR_GCMW-1A/B**
	Location **Turnbull, Elkford, BC**	PAGE 2 OF 3

Drilling Contractor	Foraco International SA	Date Monitored	2017 08 08	Project Number:	648811
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1670.643	Borehole Logged By:	SC
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1671.355 1671.293	Date Drilled:	2017 08 01
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5564000.572	Easting: 650964.694	Log Typed By:	VL

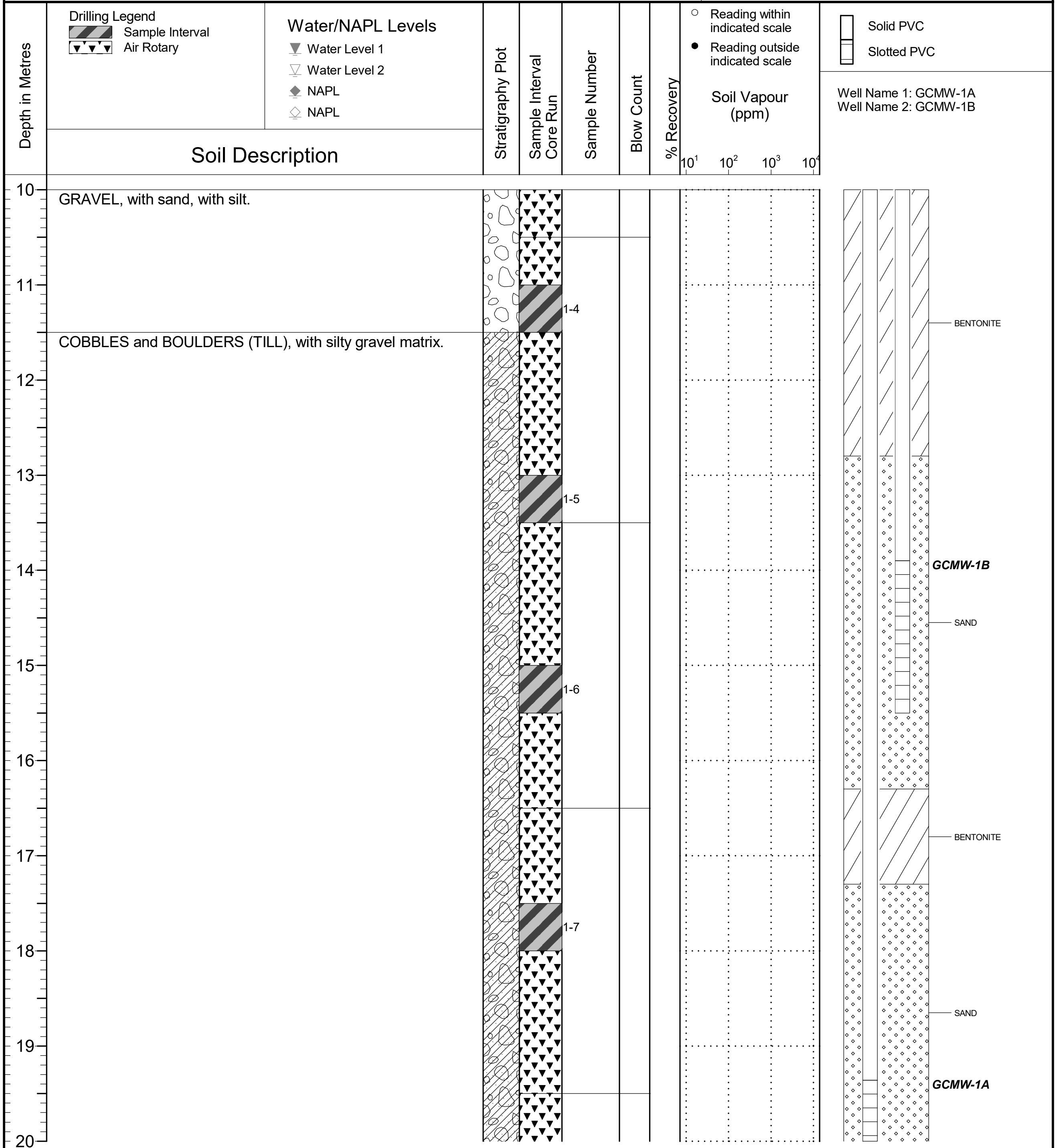
Drilling Legend: Sample Interval; Air Rotary

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: GCMW-1A
Well Name 2: GCMW-1B



NOTES
150 mm steel casing to 10.5 m.
Bolded sample denotes sample analyzed.

SC 2017 09 19 Print Date:2017-12-19

FINAL

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : FR_GCMW-1A/B**
	Location **Turnbull, Elkford, BC**	PAGE 3 OF 3

Drilling Contractor	Foraco International SA	Date Monitored	2017 08 08	Project Number:	648811
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1670.643	Borehole Logged By:	SC
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1671.355 1671.293	Date Drilled:	2017 08 01
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5564000.572	Easting: 650964.694	Log Typed By:	VL

Drilling Legend: Sample Interval; Air Rotary

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

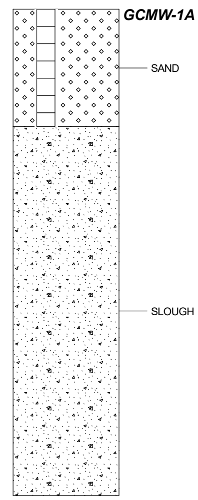
Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: GCMW-1A
Well Name 2: GCMW-1B

Soil Vapour (ppm): 10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Sample Number
20–21	COBBLES and BOULDERS (TILL), with silty gravel matrix. *(continued)*	
21–24.1	BEDROCK, fresh, SILT/SANDSTONE, grey to black.	1-8
24.1	Bottom of hole at 24.1 m.	



NOTES
150 mm steel casing to 10.5 m.
Bolded sample denotes sample analyzed.

FINAL

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : FR_GCMW-2**
	Location **Turnbull, Elkford, BC**	PAGE 1 OF 2

Drilling Contractor	Foraco International SA	Date Monitored	2017 08 08	Project Number:	648811
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1670.444	Borehole Logged By:	RSW
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1671.342	Date Drilled:	2017 08 02
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5563998.165	Easting: 650966.068	Log Typed By:	VL

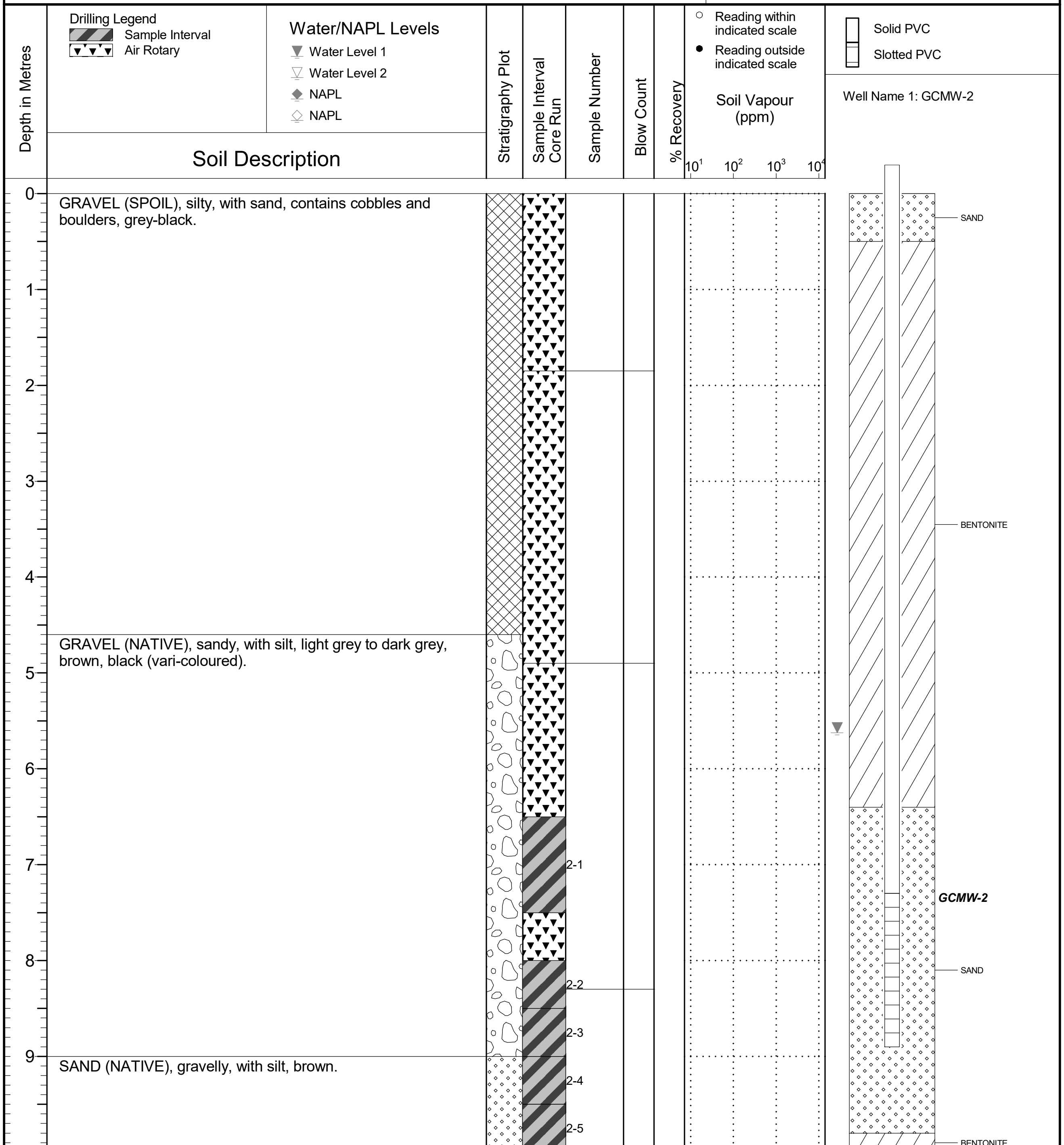
Drilling Legend: Sample Interval; Air Rotary

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: GCMW-2



NOTES
150 mm steel casing to 4.9 m.
Bolded sample denotes sample analyzed.

FINAL

SNC-LAVALIN	Client **Teck Coal Limited**	**Borehole No. : FR_GCMW-2**
	Location **Turnbull, Elkford, BC**	PAGE 2 OF 2

Drilling Contractor	Foraco International SA	Date Monitored	2017 08 08	Project Number:	648811
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1670.444	Borehole Logged By:	RSW
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1671.342	Date Drilled:	2017 08 02
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5563998.165	Easting: 650966.068	Log Typed By:	VL

Drilling Legend: Sample Interval; Air Rotary

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Soil Vapour (ppm): Reading within indicated scale; Reading outside indicated scale (10^1, 10^2, 10^3, 10^4)

Solid PVC; Slotted PVC

Well Name 1: GCMW-2

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm)	Well
10	SAND (NATIVE), gravelly, with silt, brown. *(continued)*			2-6				BENTONITE
11	Bottom of hole at 11.0 m.							

NOTES
150 mm steel casing to 4.9 m.
Bolded sample denotes sample analyzed.

SC 2017 09 19 Print Date:2017-12-19

PROJECT No.: 09-1349-1007.3102

RECORD OF BOREHOLE: GA-MW-1B

SHEET 1 OF 1

LOCATION: See Location Plan

BORING DATE: September 08, 2010

DATUM: UTM Zone 11 (Nad 83)

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa nat V. + Q - ● rem V. ⊕ U - O (10 20 30 40)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT Wp ⊢—O W—⊣ Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		Ground Surface									
0	Becker Hammer / Beck Drilling and Environmental Services Ltd.	Soil Materials		0.0							
1		Soil Materials with light grey gravel		0.9							
2		Loose, dry, dark brown, coarse-grained GRAVEL AND COBBLES, unconsolidated (TILL)		1.8							
5		Loose to dense, wet, dark brown, non-plastic CLAY, large gravel grain-size (TILL)		5.5							
6		Soft, dry, light to medium, brown, weakly plastic, MUDSTONE		6.4							
7		Hard, dry, black, very fine-grained SHALE, no fractures or planes		7.3							
8		End of BOREHOLE.		8.2							

DRAFT

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: TC

CHECKED:

DATA ENTRY: KJM

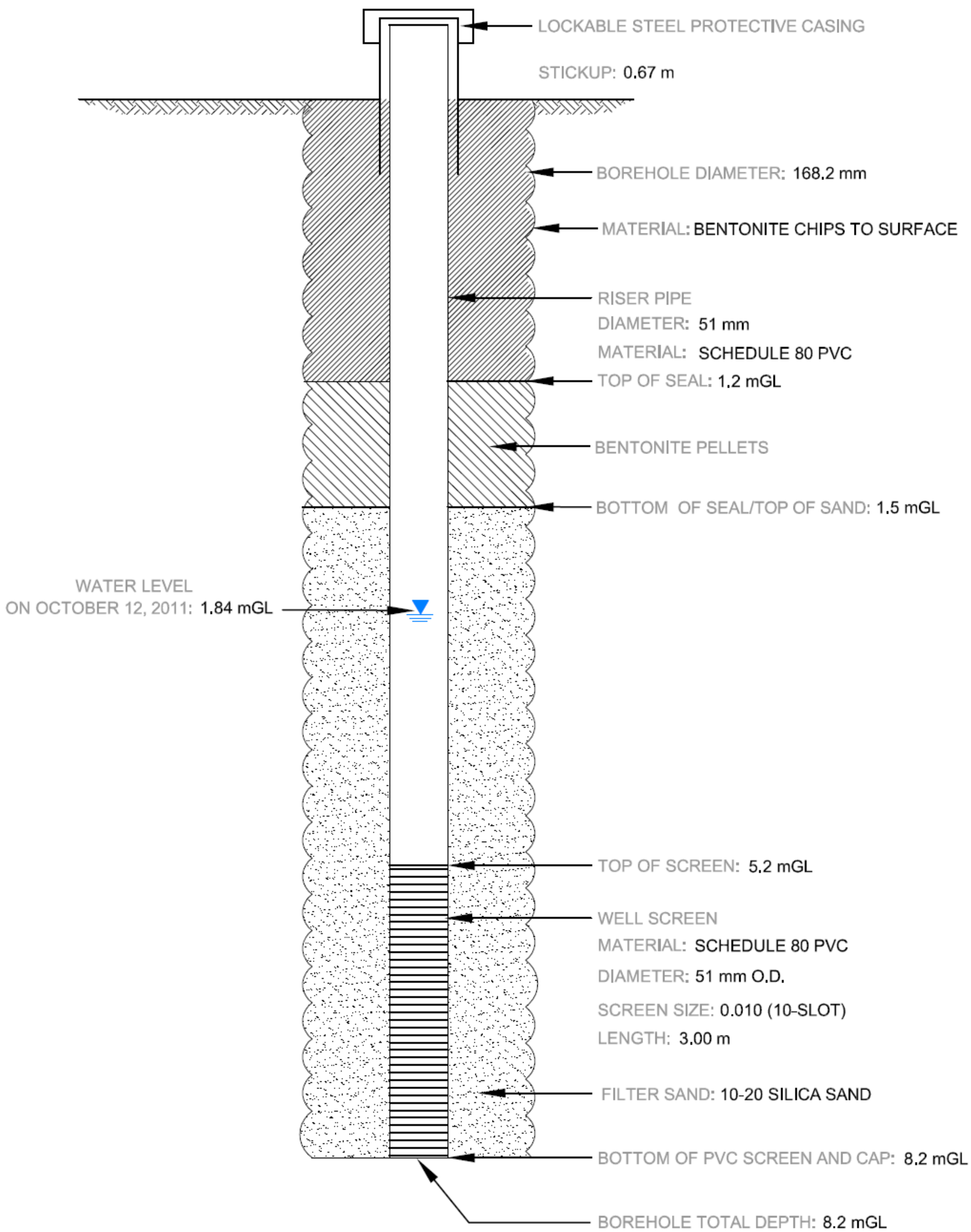
BOREHOLE 09-1349-1007.3102_LOGS.GPJ CALGARY.GDT 06/21/11

MONITORING WELL CONSTRUCTION DETAILS

Short Well ID	Well Owner: Teck Coal - Fording River Operations	
GA-MW-1B		Date: 08 Sept. 2010 Project Short Title: FORDING RIVER Project Number: 0913491007 Site Geologist: Tim Crowell

Drilling Method:	Development:
Becker Hammer	Method: Bailer

SCHEMATIC ONLY-NOT TO SCALE
ALL DEPTHS AND VALVES ARE ESTIMATE



NOTES:
1. masl - metres above sea level
2. mGL - metres below ground level

FINAL

SNC-LAVALIN	Client **Teck Coal Ltd.**	**Borehole No. : FR_BH_NTPSE**
	Location **Fording River Operations, Elkford, BC**	PAGE 1 OF 2

Drilling Contractor	Owen's Drilling	Date Monitored	2018 09 24	Project Number:	656139
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1635.398	Borehole Logged By:	BH
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1636.398	Date Drilled:	2018 09 26
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5561252.280	Easting: 650855.432	Log Typed By:	VL

Drilling Legend: Sample Interval; Auger Flight

Water/ Levels: Water Level 1; Water Level 2

Soil Vapour (ppm): ○ Reading within indicated scale; ● Reading outside indicated scale; scale 10^1, 10^2, 10^3, 10^4

Solid PVC; Slotted PVC

Well Name 1: FR_MW_NTPSE

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm)	Well
0	SAND and GRAVEL (FILL), fine to coarse grained, fine to coarse subangular to angular gravel (up to 60 mm), silty, black, loose to medium dense, coarse coal rejects.							BENTONITE
7	At 7.0 m - moist to wet							
7.3	SILT, GRAVEL and ORGANICS, fine to coarse subrounded gravel (up to 15 mm), some sand, fine to coarse grained, non-plastic, black, soft, moist to wet, woody debris.							Water Level 1 (~8.1 m)
9.1	SAND and GRAVEL, fine to coarse grained sand, fine to coarse angular gravel (up to 20 mm cuttings), trace silt, brown-grey, dense, wet.							FR_MW_NTPSE; SAND

NOTES

QA/QC: BH 2018 12 04 Print Date:2020-04-29

FINAL

SNC·LAVALIN	Client **Teck Coal Ltd.**	**Borehole No. : FR_BH_NTPSE**
	Location **Fording River Operations, Elkford, BC**	PAGE 2 OF 2

Drilling Contractor	Owen's Drilling	Date Monitored	2018 09 24	Project Number:	656139
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1635.398	Borehole Logged By:	BH
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1636.398	Date Drilled:	2018 09 26
Pipe/Slotted Pipe Dia. (m)	none/none	Northing: 5561252.280	Easting: 650855.432	Log Typed By:	VL

Drilling Legend: Sample Interval; Auger Flight

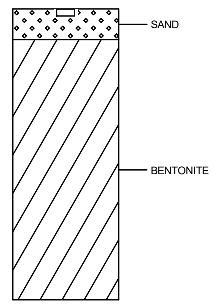
Water/ Levels: Water Level 1; Water Level 2

Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: FR_MW_NTPSE

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
10	SAND, fine to coarse grained, some fine angular gravel (up to 5 mm), silty, medium dense, dark grey, moist.						
11	SAND and GRAVEL, fine to coarse grained sand, fine subangular to angular gravel (up to 10 mm), silty, grey, dense.						
12	BEDROCK, siltstone, dark grey, fresh, weak. Between 11.4 m and 11.5 m - wet						
	Bottom of hole at 12.5 m.						



13 14 15 16 17 18 19 20

NOTES

QA/QC: BH 2018 12 04 Print Date:2020-04-29

PROJECT No.: 09-1324-1039

RECORD OF MONITORING WELL: 09-04A

SHEET 1 OF 1

LOCATION: South Taillings Pond - West (non-channel)

BORING DATE: October 16, 2009

DATUM: Local

BORING METHOD: Barber Rig - DR-24 - 9" Hole Diameter; Beck Drilling and Environmental Services Ltd.

DEPTH (m)	SOIL PROFILE DESCRIPTION	ELEV. (m)	DEPTH (m)	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface	1605.0		Stickup =0.91 m
0	Silty SAND, some gravel, medium grain sand, loose, slightly moist, dark brown		0.0	Bentonite; Slough; Bentonite
1.5	Sandy GRAVEL, trace silt, medium gravel, loose, moist, medium brown --- Coarse to medium gravel from 2.5 to 3.0 m --- Very moist from 3.5 to 4.0 m	1603.5	1.5	Slotted Section; Slough
5.0	End of MONITORING WELL.	1600.0	5.0	

Other column headings: SAMPLES (NUMBER, TYPE, BLOWS/0.3m); DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20, 40, 60, 80); SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○; 10, 20, 30, 40); HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6}, 10^{-5}, 10^{-4}, 10^{-3}); WATER CONTENT PERCENT (Wp, W, Wl; 10, 20, 30, 40); ADDITIONAL LAB. TESTING; STRATA PLOT.

Depth scale (m): 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20

DEPTH SCALE
1 : 100

Golder Associates

LOGGED: EA
CHECKED: MB

PROJECT No.: 09-1324-1039

RECORD OF MONITORING WELL: 09-04B

LOCATION: South Taillings Pond - West (non-channel)

BORING DATE: October 15, 2009

DATUM: Local

Boring method: Barber Rig - DR-24 - 9" Hole Diameter; Beck Drilling and Environmental Services Ltd.

DEPTH SCALE METRES	DESCRIPTION	ELEV. / DEPTH (m)	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface	1605.0	Stickup =0.64 m
0	Silty SAND, some gravel, medium grain sand, loose, slightly moist, dark brown	0.0	Bentonite
	Sandy GRAVEL, trace silt, medium gravel, loose, moist, medium brown --- Coarse to medium gravel from 2.5 to 3.0 m --- Very moist from 3.5 to 4.0 m	1603.5 / 1.5	Slough; Bentonite; Granular Filter
	GRAVEL, medium to coarse gravel, loose, saturated, light grey to brown	1599.5 / 5.5	Slotted Section
6	Sandy GRAVEL, loose, saturated, medium brown	1599.0 / 6.0	
	BEDROCK, loose, dark grey	1598.5 / 6.5	Slough
	End of MONITORING WELL.	1598.0 / 7.0	

Column headings: SAMPLES (NUMBER, TYPE, BLOWS/0.3m); DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20, 40, 60, 80); SHEAR STRENGTH Cu, kPa (nat V. + Q - ●; rem V. ⊕ U - ○) (10, 20, 30, 40); HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6}, 10^{-5}, 10^{-4}, 10^{-3}); WATER CONTENT PERCENT (Wp, W, Wl) (10, 20, 30, 40); ADDITIONAL LAB. TESTING; STRATA PLOT.

Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20

DEPTH SCALE

1 : 100

Golder Associates

LOGGED: EA

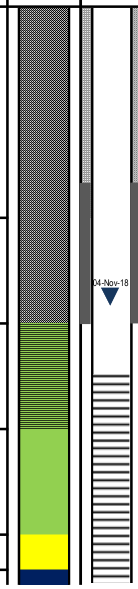
CHECKED: MB

Teck

WELL ID: FR-KB-1A

Depth (mGL)	Lithological Description
0	0-3.0mGL: **SPOILS** (SM) SILTY SAND
1	
2	
3	3.0-4.6mGL: **SPOILS** (GM) SILTY GRAVEL
4	4.6-6.1mGL: **(GM) SILTY GRAVEL** Water from discharge hose during welding of 15-20' section
5	
6	6.1-7.6mGL: **(GW) GRAVEL**
7	7.6-8.2mGL: **(SW) SAND**
	TD @ 8.2mGL: **BEDROCK** - grey shale (Fernie Fm)

Lithology | Well



Geophysical Logs

Legend
Fill/Spoil
Clay
Silty-Clay
Clayey Silt
Clayey Sand
Sand
Silty Gravel
Sand & Gravel
Gravel
Bedrock

Teck

WELL ID: FR-KB-2A

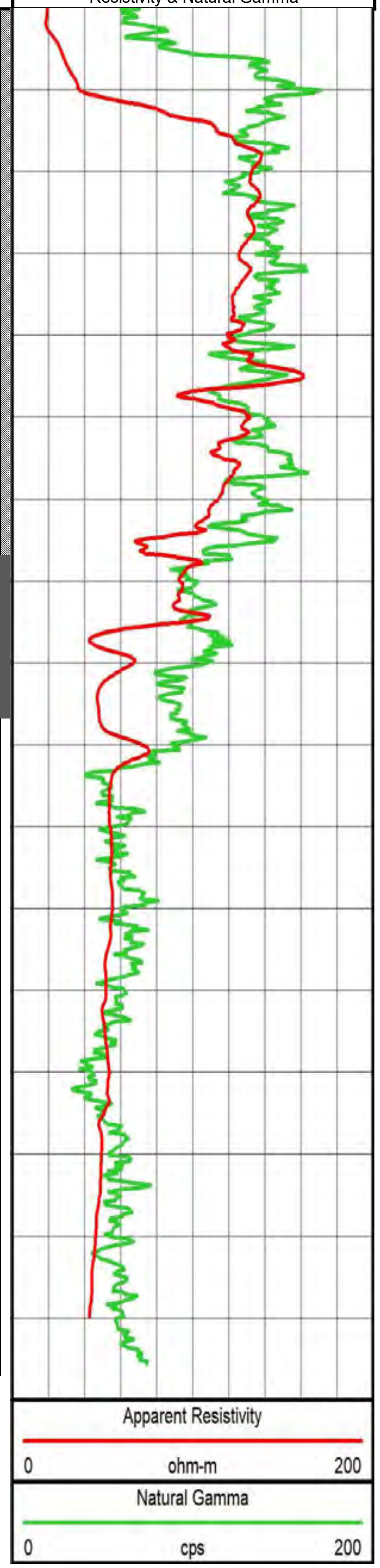
Depth (mGL)	Lithological Description	Lithology	Well
0–6.7	0-6.7mGL: **SPOILS** - Dark grey to black, angular, coaly and dry.	Fill/Spoil	
6.7–12.2	6.7-12.2mGL: **(SW) SAND**, sub-angular to sub-rounded, silt - fine gravels grey-brown, dry; producing water from discharge line @8.5mGL	Sand	04-Nov-18
12.2–13.7	12.2-13.7mGL: **(SW) SAND**, sub-angular to sub-rounded, fine to coarse sand brown, moist.	Sand	
13.7–15.5	13.7-15.5mGL: **(SM) SILTY SAND**, sub-angular to sub-rounded, silt to fine gravels brown, moist.	Silty Sand	
15.5–16.8	15.5 -16.8mGL: **BEDROCK** - Dark grey shale (Fernie Fm)	Bedrock	

Depth scale (mGL): 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16

TD @16.8mGL

Geophysical Logs

Resistivity & Natural Gamma



Legend	
Fill/Spoil	
Clay	
Silty-Clay	
Clayey Silt	
Silty Sand	
Sand	
Silty Gravel	
Sand & Gravel	
Gravel	
Bedrock	

Teck

WELL ID: FR-KB-3A

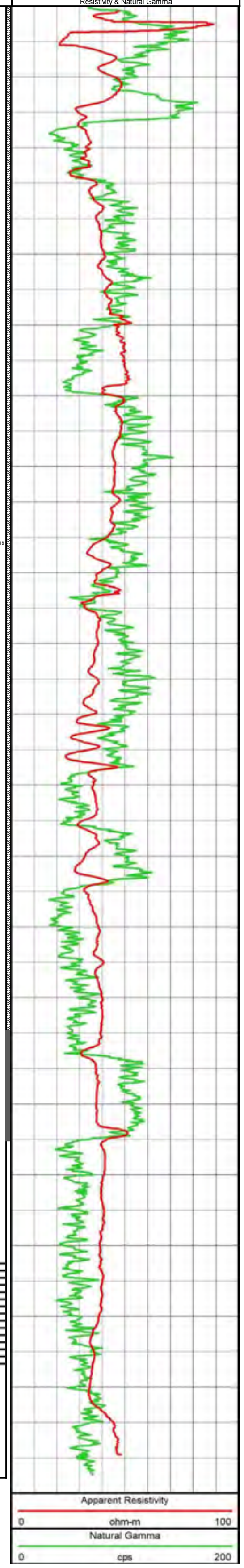
Depth (mGL)	Lithological Description
0–1.5	0-1.5mGL: **(MH) CLAYEY SILT**, angular fine gravels, some organics, dark brown, dry
1.5–6.1	1.5-6.1mGL: **(GW) GRAVEL**, angular med sands to fine gravels, brown grey, dry
6.1–9.1	6.1- 9.1mGL: **(GM) SILTY GRAVEL**, angular to sub angular, silt to fine gravels, brown grey, dry to slight moisture
9.1–12.2	9.1-12.2mGL: **(GM) SILTY GRAVEL**, angular to sub angular, silt to fine gravels, brown grey, dry to slight moisture. Less coarse gravels than above, and then at 35' material is coarser again.
12.2–13.7	12.2-13.7mGL: **(GW) GRAVEL**, sub angular to sub rounded, med sands to fine gravels, dark brown, moist.
13.7–22.9	13.7-22.9mGL: **(SW) SAND**, sub angular to sub rounded, fine sands to fine gravels, dark brown, moist.
22.9–25.9	22.9-25.9mGL: **(SW) SAND AND GRAVEL** sub angular to sub rounded, med sands to fine gravels, dark brown, moist; water coming out of discarge at 24.4mGL
25.9–27.4	25.9-27.4mGL: **(GW) GRAVEL** sub angular to sub rounded, med sands to fine gravels, dark brown, wet.
27.4–29.0	27.4-29.0mGL: **(SW) SAND** sub angular to sub rounded, silt to coarse sands, dark brown, wet.
29.0–30.5	29.0-30.5mGL: (GW) **GRAVEL** sub angular to sub rounded, med sands to fine gravels, dark brown, wet.
30.5–32	30.5-32mGL: **(SW) SAND** sub angular to sub rounded, fine to coarse sands, dark brown-grey, wet.
32–38.1	32-38.1mGL: **(SW) SAND** sub angular to sub rounded, fine sand to fine gravels, dark brown-grey, wet.
38.1–39.3	38.1-39.3mGL: **(SW) SAND** sub angular to sub rounded, fine to coarse sand, dark brown-grey, multicoloured, wet. Much smaller size fractions than above
39.3–41.5	39.3-41.5mGL: **BEDROCK** - Dark grey shale (Fernie Formation)

TD @41.5mGL

Lithology | Well: 03-Nov-18

Geophysical Logs

Resistivity & Natural Gamma



Legend	
Fill/Spoil	
Clay	
Silty-Clay	
Clayey Silt	
Clayey Sand	
Sand	
Silty Gravel	
Sand & Gravel	
Gravel	
Bedrock	

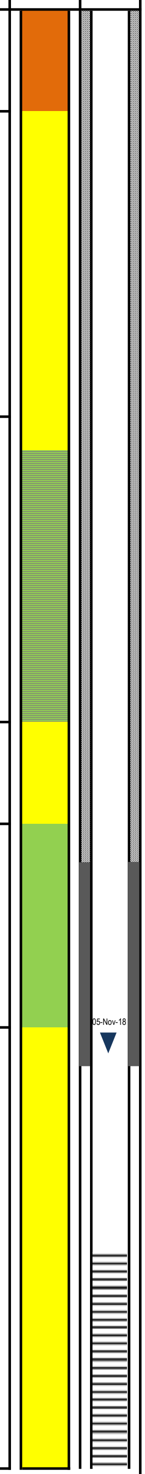
Teck

WELL ID: FR-KB-3B

Depth (mGL)	Lithological Description
0 – 1.5	0 - 1.5mGL: **(MH) CLAYEY SILT**
1.5 – 6.1	1.5 - 6.1mGL: **(SW) SAND**
6.1 – 10.7	6.1 - 10.7mGL: **(GM) SILTY GRAVEL;** Water from discharge hose @ 10.1mGL
10.7 – 12.2	10.7 - 12.2mGL - **(SW) SAND**
12.2 – 15.2	12.2 - 15.2mGL: **(GW) GRAVEL**
15.2 – 21.3	15.2 - 21.3mGL: **(SW) SAND**
	TD @ 21.3mGL

Depth scale (mGL): 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21

Lithology | Well



Legend	
Fill/Spoil	
Clay	
Silty-Clay	
Clayey Silt	
Clayey Sand	
Sand	
Silty Gravel	
Sand & Gravel	
Gravel	
Bedrock	

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : FR_BH-SK1A**
	Location **Regional Groundwater Monitoring**	PAGE 1 OF 2

Drilling Contractor	JR Drilling	Date Monitored	2019 03 28	Project Number:	631283
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1586.479	Borehole Logged By:	MCA
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1587.429	Date Drilled:	2018 12 21
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5558635.101	Easting: 652680.685	Log Typed By:	VL

Drilling Legend: Sample Interval; Air Rotary

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Soil Vapour (ppm): ○ Reading within indicated scale; ● Reading outside indicated scale; scale 10^1, 10^2, 10^3, 10^4

Solid PVC; Slotted PVC

Well Name 1: FR_MW-SK1A

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery
0	SAND, fine to medium grained, silty, some fine to coarse gravel, contains cobbles, subrounded, brown, medium dense, damp.					
1.2	SILT, sandy, fine grained sand, trace fine gravel, subangular to subrounded, dark brown to black, medium firm, damp.					
2.4	SAND and GRAVEL, fine to medium grained sand, fine to coarse gravel, silty, contains cobbles, subangular to subrounded, brown, loose to medium dense, damp.					
3.7	At 3.7 m - increased gravel with depth					
4.6	SILT, sandy, fine to medium grained, trace fine to coarse gravel, trace cobbles, dark brown, soft, damp.					
6.7	SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, silty, some cobbles, subangular to subrounded, brown, dense, damp to moist.					
7.8	At 7.8 m - increased moisture with depth					
8.5	Between 8.5 m and 9.1 m - saturated					
8.7	At 8.7 m - increased gravel with depth					

BENTONITE/SLOUGH

NOTES

SNC-LAVALIN	Client **Teck Coal Limited**	**Borehole No. : FR_BH-SK1A**
	Location **Regional Groundwater Monitoring**	PAGE 2 OF 2

Drilling Contractor	JR Drilling	Date Monitored	2019 03 28	Project Number:	631283
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1586.479	Borehole Logged By:	MCA
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1587.429	Date Drilled:	2018 12 21
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5558635.101	Easting: 652680.685	Log Typed By:	VL

Drilling Legend: Sample Interval; Air Rotary

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: FR_MW-SK1A

Columns: Depth in Metres | Soil Description | Stratigraphy Plot | Sample Interval Core Run | Sample Number | Blow Count | % Recovery | Soil Vapour (ppm) 10^1 10^2 10^3 10^4

Depth in Metres	Soil Description
10	SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, silty, some cobbles, subangular to subrounded, brown, dense, damp to moist. *(continued)* At 10.7 m - saturated
12.2	SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, some silt, subangular to subrounded, brown, medium dense to loose, saturated. At 12.3 m - decreased silt with depth. At 14.9 m - trace silt, loose, saturated
16.8	Bottom of hole at 16.8 m.

Depth scale: 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

Well construction: BENTONITE/SLOUGH; BENTONITE; ***FR_MW-SK1A***; SAND

NOTES

SNC · LAVALIN

Client	Borehole No. : FR_BH-SK1B
Teck Coal Limited	
Location **Regional Groundwater Monitoring**	

Drilling Contractor	JR Drilling	Date Monitored	2019 03 28	Project Number:	631283
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1586.478	Borehole Logged By:	MCA
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1587.540	Date Drilled:	2018 12 18
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5558637.329	Easting: 652680.728	Log Typed By:	VL

Drilling Legend
Sample Interval
Air Rotary

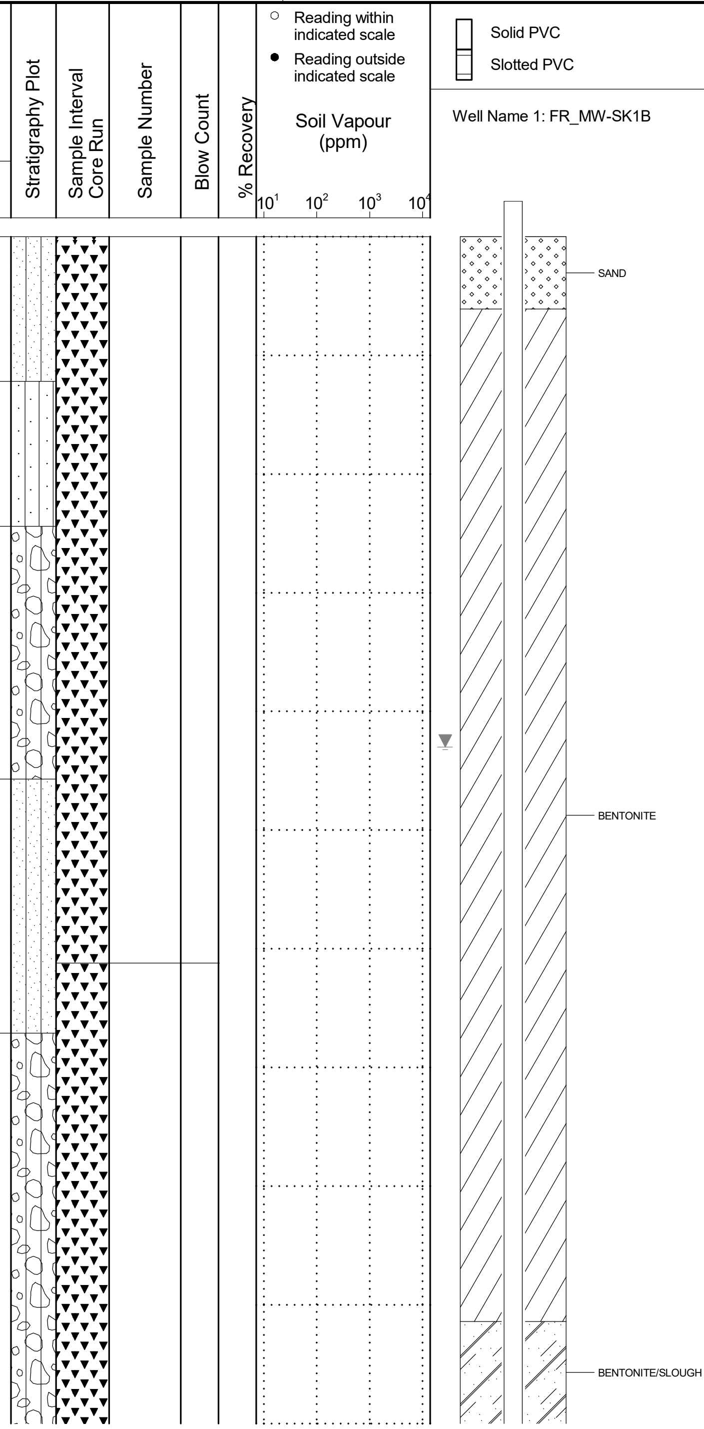
Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name 1: FR_MW-SK1B

Depth in Metres	Soil Description
0	SAND, fine to medium grained, silty, some fine to coarse gravel, contains cobbles, subrounded, brown, medium dense, damp.
1	SILT, sandy, fine grained sand, trace fine gravel, subangular to subrounded, dark brown to black, medium firm, damp.
2	SAND and GRAVEL, fine to medium grained sand, fine to coarse gravel, silty, contains cobbles, subangular to subrounded, brown, loose to medium dense, damp.
3	At 3.7 m - increased gravel with depth
4	SILT, sandy, fine to medium grained, trace fine to coarse gravel, trace cobbles, dark brown, soft, damp.
5	
6	SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, silty, some cobbles, subangular to subrounded, brown, dense, damp to moist.
7	At 7.8 m - increased moisture with depth
8	At 8.7 m - increased gravel with depth
9	
10	



NOTES

SNC-LAVALIN	Client: **Teck Coal Limited**	**Borehole No. : FR_BH-SK1B**
	Location: **Regional Groundwater Monitoring**	

Drilling Contractor	JR Drilling	Date Monitored	2019 03 28	Project Number:	631283
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1586.478	Borehole Logged By:	MCA
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1587.540	Date Drilled:	2018 12 18
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5558637.329	Easting: 652680.728	Log Typed By:	VL

Drilling Legend: Sample Interval; Air Rotary

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Columns: Depth in Metres; Soil Description; Stratigraphy Plot; Sample Interval Core Run; Sample Number; Blow Count; % Recovery; Soil Vapour (ppm) (10^1, 10^2, 10^3, 10^4)

Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: FR_MW-SK1B

Depth (m)	Soil Description
10.0–12.2	SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, silty, some cobbles, subangular to subrounded, brown, dense, damp to moist. *(continued)* At 10.7 m - saturated
12.2–16.2	SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, some silt, subangular to subrounded, brown, medium dense to loose, saturated. At 12.3 m - decreased silt with depth
16.2–17.7	SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, silty, subrounded, poorly graded, brown, medium dense, loose, saturated.
17.7–20	SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, contains cobbles, trace silt, subangular to subrounded, trace rounded, poorly graded, brown, dense, saturated.

Well construction (15 m): BENTONITE/SLOUGH

NOTES

SNC-LAVALIN	Client **Teck Coal Limited**	**Borehole No. : FR_BH-SK1B**
	Location **Regional Groundwater Monitoring**	

Drilling Contractor	JR Drilling	Date Monitored	2019 03 28	Project Number:	631283
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1586.478	Borehole Logged By:	MCA
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1587.540	Date Drilled:	2018 12 18
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5558637.329	Easting: 652680.728	Log Typed By:	VL

Drilling Legend: Sample Interval; Air Rotary

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

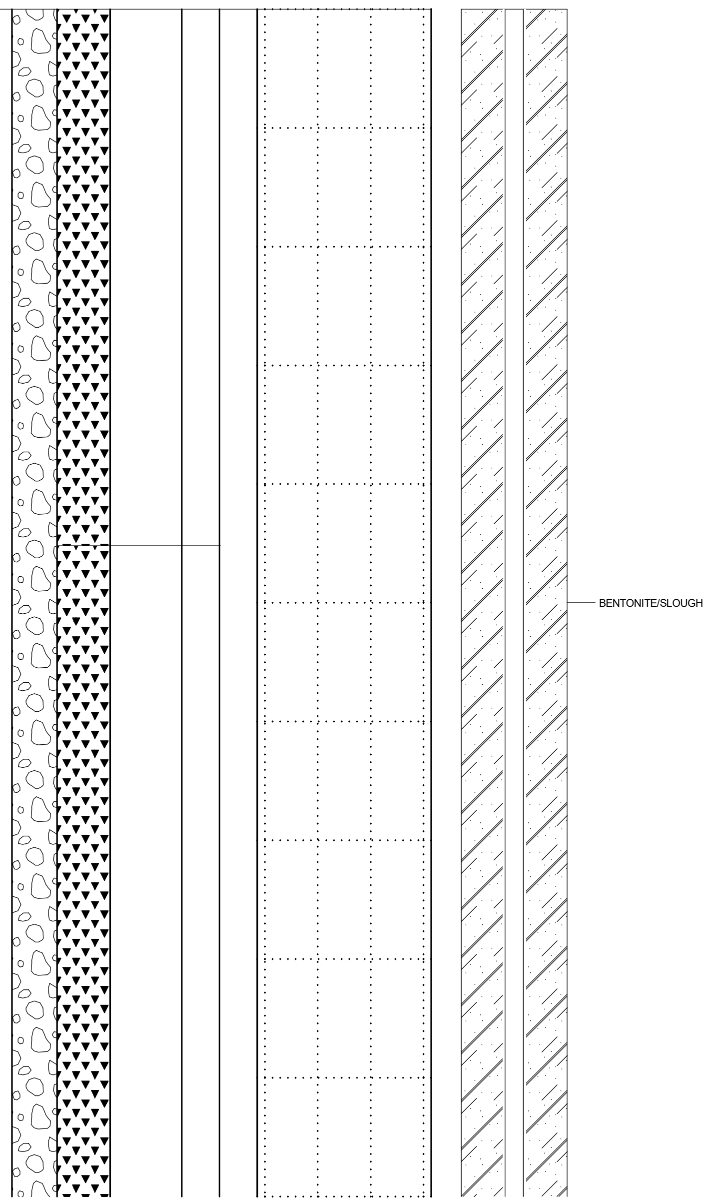
Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: FR_MW-SK1B

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
20	At 20.0 m - decreased silt, increased coarse gravels with depth SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, contains cobbles, trace silt, subangular to subrounded, trace rounded, poorly graded, brown, dense, saturated. *(continued)*						
25.3	At 25.3 m - increased fine to coarse gravel, moderately graded						

Depth scale: 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30



NOTES

Drilling Contractor	JR Drilling	Date Monitored	2019 03 28	Project Number:	631283
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1586.478	Borehole Logged By:	MCA
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1587.540	Date Drilled:	2018 12 18
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5558637.329	Easting: 652680.728	Log Typed By:	VL

Drilling Legend
Sample Interval
Air Rotary

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

Reading within indicated scale
Reading outside indicated scale

Soil Vapour (ppm)
10^1 10^2 10^3 10^4

Solid PVC
Slotted PVC

Well Name 1: FR_MW-SK1B

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery
30	SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, contains cobbles, trace silt, subangular to subrounded, trace rounded, poorly graded, brown, dense, saturated. *(continued)*					
31	At 30.1 m - subrounded, medium dense					
37.5	SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, silty, contains cobbles, subrounded, moderately to poorly graded, brown, medium dense, saturated.					
40						

BENTONITE/SLOUGH

NOTES

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : FR_BH-SK1B**
	Location **Regional Groundwater Monitoring**	PAGE 5 OF 7

Drilling Contractor	JR Drilling	Date Monitored	2019 03 28	Project Number:	631283
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1586.478	Borehole Logged By:	MCA
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1587.540	Date Drilled:	2018 12 18
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5558637.329	Easting: 652680.728	Log Typed By:	VL

Drilling Legend: Sample Interval; Air Rotary

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name 1: FR_MW-SK1B

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
40	SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, silty, contains cobbles, subrounded, moderately to poorly graded, brown, medium dense, saturated. *(continued)*						
49	At 48.9 m - increased silt with depth						

Depth scale: 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50

BENTONITE/SLOUGH

NOTES

SNC · LAVALIN

Drilling Contractor	JR Drilling	Date Monitored	2019 03 28	Project Number:	631283
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1586.478	Borehole Logged By:	MCA
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1587.540	Date Drilled:	2018 12 18
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5558637.329	Easting: 652680.728	Log Typed By:	VL

Drilling Legend: Sample Interval; Air Rotary

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: FR_MW-SK1B

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4	Well
50	SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, silty, contains cobbles, subrounded, moderately to poorly graded, brown, medium dense, saturated. *(continued)*							
51								
52								
53								
54								
55	At 55.0 m - subrounded to subangular, some rounded, no cobbles, moderately graded, dense							BENTONITE/SLOUGH
56								
57								
58								
59								
60								

NOTES

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : FR_BH-SK1B**
	Location **Regional Groundwater Monitoring**	

Drilling Contractor	JR Drilling	Date Monitored	2019 03 28	Project Number:	631283
Drilling Method	Dual Rotary	Ground Surface Elev. (m)	1586.478	Borehole Logged By:	MCA
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1587.540	Date Drilled:	2018 12 18
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5558637.329	Easting: 652680.728	Log Typed By:	VL

Drilling Legend: Sample Interval; Air Rotary

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

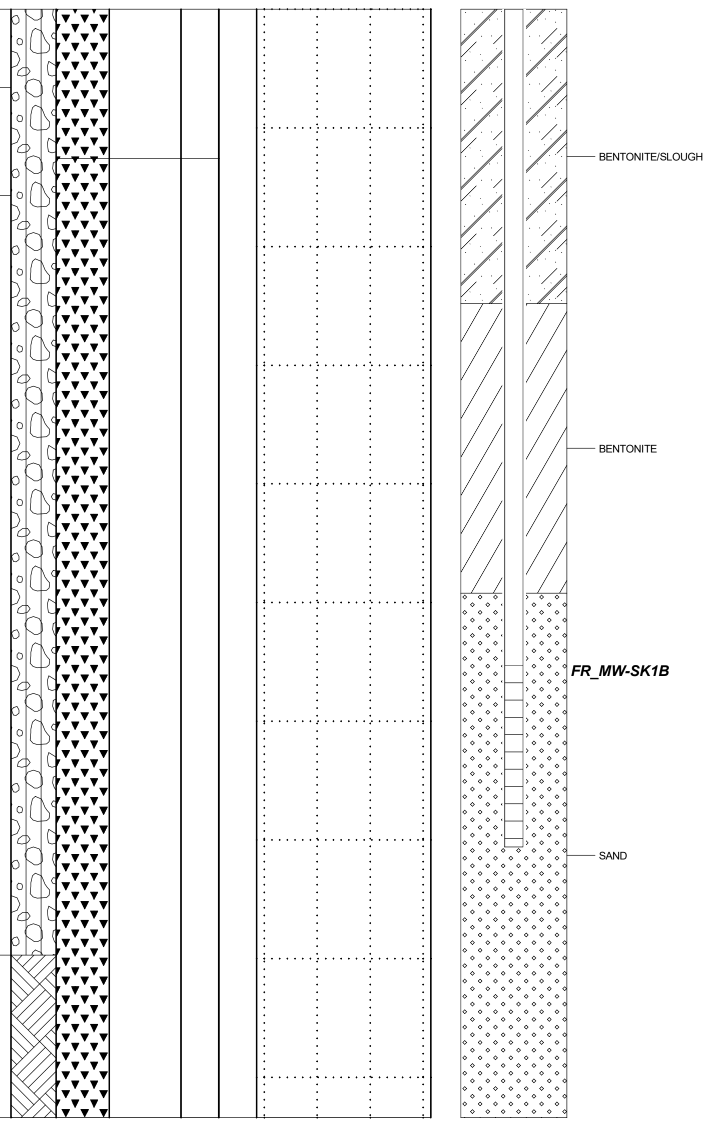
Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: FR_MW-SK1B

Depth in Metres	Soil Description
60	SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, silty, contains cobbles, subrounded, moderately to poorly graded, brown, medium dense, saturated. *(continued)*
	GRAVEL, silty, possible boulders, subangular to angular, brown, dense, moist to wet.
61	
	SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, silty, subrounded, moderately graded, brown medium dense, saturated.
62	
63	
64	
65	
66	
67	
68	BEDROCK, fine grained siltstone/shale-like, dark grey/black, appears weathered (soft).
69	
	Bottom of hole at 69.3 m.
70	

Columns: Stratigraphy Plot; Sample Interval Core Run; Sample Number; Blow Count; % Recovery; Soil Vapour (ppm) 10^1 10^2 10^3 10^4



NOTES

PROJECT No.: 09-1324-1039

RECORD OF MONITORING WELL: 09-01A

LOCATION: East of Old Stream Bed Kilmarnock Alluvium

BORING DATE: October 14, 2009

DATUM: Local

BORING METHOD: Barber Rig - DR-24 - 9" Hole Diameter; Beck Drilling and Environmental Services Ltd.

DESCRIPTION	ELEV. / DEPTH (m)	PIEZOMETER OR STANDPIPE INSTALLATION
Ground Surface	1584.1	Stickup =0.85 m
Silty SAND, trace gravel, loose, dry, light brown	0.0	
Sandy GRAVEL, trace silt, loose, moist, medium brown	1583.6 / 0.5	Bentonite
Clayey SILT, some sand and gravel, soft, low to medium plasticity, moist, medium brown	1582.1 / 2.0	
Sandy GRAVEL, loose, moist, medium brown	1581.6 / 2.5	Granular Filter; Slotted Section; Oct. 16, 2009 ▽; Slough
End of MONITORING WELL.	1575.7 / 8.4	

Column headings: DEPTH SCALE METRES; BORING METHOD; SOIL PROFILE (DESCRIPTION, STRATA PLOT, ELEV., DEPTH (m)); SAMPLES (NUMBER, TYPE, BLOWS/0.3m); DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20, 40, 60, 80); SHEAR STRENGTH Cu, kPa nat V. + Q - ● rem V. ⊕ U - ○ (10, 20, 30, 40); HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6}, 10^{-5}, 10^{-4}, 10^{-3}); WATER CONTENT PERCENT Wp ⊢—○W—⊣ Wl (10, 20, 30, 40); ADDITIONAL LAB. TESTING; PIEZOMETER OR STANDPIPE INSTALLATION

Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20

DEPTH SCALE

1 : 100

Golder Associates

LOGGED: EA

CHECKED: MB

PROJECT No.: 09-1324-1039

RECORD OF MONITORING WELL: 09-01B

SHEET 1 OF 2

LOCATION: East of Old Stream Bed Kilmarnock Alluvium

BORING DATE: October 14, 2009

DATUM: Local

Column headings: DEPTH SCALE METRES | BORING METHOD | SOIL PROFILE (DESCRIPTION, STRATA PLOT, ELEV. DEPTH (m)) | SAMPLES (NUMBER, TYPE, BLOWS/0.3m) | DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20, 40, 60, 80); SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○; 10, 20, 30, 40) | HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6}, 10^{-5}, 10^{-4}, 10^{-3}); WATER CONTENT PERCENT (Wp, W, Wl; 10, 20, 30, 40) | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION

Boring method: Barber Rig - DR-24 - 9" Hole Diameter; Beck Drilling and Environmental Services Ltd.

Depth scale (m)	Description	Elev. / Depth (m)	Piezometer or Standpipe Installation
	Ground Surface	1584.1	Stickup =0.76 m
0	Silty SAND, trace gravel, loose, dry, light brown	0.0	
	Sandy GRAVEL, trace silt, loose, moist, medium brown	1583.6 / 0.5	
2	Clayey SILT, some sand and gravel, soft, low to medium plasticity, moist, medium brown	1582.1 / 2.0	
	Sandy GRAVEL, loose, moist, medium brown	1581.6 / 2.5	Bentonite
4			
6			
			Oct 16, 2009 ∇
8			
10	Coarse GRAVEL, trace sand, loose, saturated, grey to medium brown	1574.1 / 10.0	Slough
12	--- Some silty sand from 12.5 to 13.0 m		
14			
16			Bentonite
			Slotted Section
18	--- Medium to coarse gravel, light grey to brown from 18.0 to 23.0 m		
			Slough
20			

CONTINUED NEXT PAGE

DEPTH SCALE

1 : 100

Golder Associates

LOGGED: EA

CHECKED: MB

PROJECT No.: 09-1324-1039

RECORD OF MONITORING WELL: 09-01B

LOCATION: East of Old Stream Bed Kilmarnock Alluvium

BORING DATE: October 14, 2009

DATUM: Local

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa nat V. + Q - ● rem V. ⊕ U - ○ (10 20 30 40)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT Wp —○W— Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
20	Barber Rig - DR-24 - 9" Hole Diameter; Beck Drilling and Environmental Services Ltd.	Coarse GRAVEL, trace sand, loose, saturated, grey to medium brown *(continued)*									
22											
24											Slough
26											
28		--- Silty sand, saturated, medium brown from 28.5 to 29.0 m		1555.1 / 29.0							
		End of MONITORING WELL.									
30											
32											
34											
36											
38											
40											

DEPTH SCALE

1 : 100

Golder Associates

LOGGED: EA

CHECKED: MB

RECORD OF MONITORING WELL: 09-02A

PROJECT No.: 09-1324-1039

LOCATION: West of Old Stream Bed Kilmarnock Alluvium

BORING DATE: October 15, 2009

SHEET 1 OF 1

DATUM: Local

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	ELEV. / DEPTH (m)	PIEZOMETER OR STANDPIPE INSTALLATION
		Ground Surface	1584.7	Stickup =0.82 m
0	Barber Rig - DR-24 - 9" Hole Diameter; Beck Drilling and Environmental Services Ltd.	Sandy GRAVEL, coarse gravel, medium grain sand, loose, slightly moist, medium grown	0.0	
		--- Increasing sand content from 1.0 to 1.5 m		
2				Bentonite
		--- Decreasing sand content from 3.0 to 3.5 m		
4		--- Moist, some silt from 4.5 to 5.0 m		
				Slough
6		--- Trace silt from 6.5 yo 7.0 m		
				Bentonite
				Oct. 16, 2009 ▽
8		--- Coarse to medium gravel, increasing moisture content at 8.0 m		
10				Slotted Section
			1573.2	Slough
		End of MONITORING WELL.	11.5	
12				
14				
16				
18				
20				

SAMPLES (NUMBER, TYPE, BLOWS/0.3m): none recorded

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m: 20 40 60 80

SHEAR STRENGTH Cu, kPa: nat V. + Q - ● rem V. ⊕ U - ○ : 10 20 30 40

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp ⊢—○W—⊣ Wl : 10 20 30 40

ADDITIONAL LAB. TESTING

DEPTH SCALE
1 : 100

Golder Associates

LOGGED: EA
CHECKED: MB

DATA ENTRY: KJM

BOREHOLE 09-1324-1039_LOGS.GPJ CALGARY.GDT 1/11/16

PROJECT No.: 09-1324-1039

RECORD OF MONITORING WELL: 09-02B

LOCATION: West of Old Stream Bed Kilmarnock Alluvium

BORING DATE: October 15, 2009

DATUM: Local

BORING METHOD: Barber Rig - DR-24 - 9" Hole Diameter; Beck Drilling and Environmental Services Ltd.

DEPTH SCALE METRES	DESCRIPTION	ELEV. / DEPTH (m)	PIEZOMETER OR STANDPIPE INSTALLATION
	Ground Surface	1584.7	Stickup =0.67 m
0	Sandy GRAVEL, coarse gravel, medium grain sand, loose, slightly moist, medium brown	0.0	
	--- Increasing sand content from 1.0 to 1.5 m		
	--- Decreasing sand content from 3.0 to 3.5 m		
4			Bentonite
	--- Moist, some silt from 4.5 to 5.0 m		
	--- Trace silt from 6.5 to 7.0 m		
8	--- Coarse to medium gravel, increasing moisture content at 8.0 m		Oct 16, 2009 (water level)
			Slough
	GRAVEL, trace sand, coarse to medium gravel, loose, saturated, light grey to brown	1573.2 / 11.5	
12			Bentonite
	Sandy GRAVEL, trace silt, medium to coarse gravel, medium grain sand, loose, saturated, medium brown	1572.2 / 12.5	
	GRAVEL, trace sand, coarse gravel, loose, saturated, light grey to brown	1571.7 / 13.0	
20			

Column headings: SOIL PROFILE (DESCRIPTION, STRATA PLOT, ELEV. DEPTH (m)); SAMPLES (NUMBER, TYPE, BLOWS/0.3m); DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20, 40, 60, 80); SHEAR STRENGTH Cu, kPa nat V. + Q - ● rem V. ⊕ U - ○ (10, 20, 30, 40); HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6}, 10^{-5}, 10^{-4}, 10^{-3}); WATER CONTENT PERCENT Wp W Wl (10, 20, 30, 40); ADDITIONAL LAB. TESTING; PIEZOMETER OR STANDPIPE INSTALLATION

CONTINUED NEXT PAGE

DEPTH SCALE 1 : 100

Golder Associates

LOGGED: EA
CHECKED: MB

PROJECT No.: 09-1324-1039

RECORD OF MONITORING WELL: 09-02B

LOCATION: West of Old Stream Bed Kilmarnock Alluvium

BORING DATE: October 15, 2009

DATUM: Local

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m / SHEAR STRENGTH Cu, kPa	HYDRAULIC CONDUCTIVITY, k, cm/s / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
20	Barber Rig - DR-24 - 9" Hole Diameter; Beck Drilling and Environmental Services Ltd.										
		Sandy GRAVEL, some silt, coarse gravel, loose, saturated, medium brown		1564.2 20.5							
		GRAVEL, trace sand, medium to coarse gravel, loose, saturated, light grey to brown		1563.7 21.0							Slotted Section
22											Sand
24											
26											Slough
28											
30		End of MONITORING WELL.		1554.7 30.0							
32											
34											
36											
38											
40											

Legend: Dynamic penetration scale 20, 40, 60, 80; Shear strength: nat V. + Q - ●, rem V. ⊕ U - ○, scale 10, 20, 30, 40; Hydraulic conductivity 10^{-6}, 10^{-5}, 10^{-4}, 10^{-3}; Water content: Wp ├──○W──┤ Wl, scale 10, 20, 30, 40.

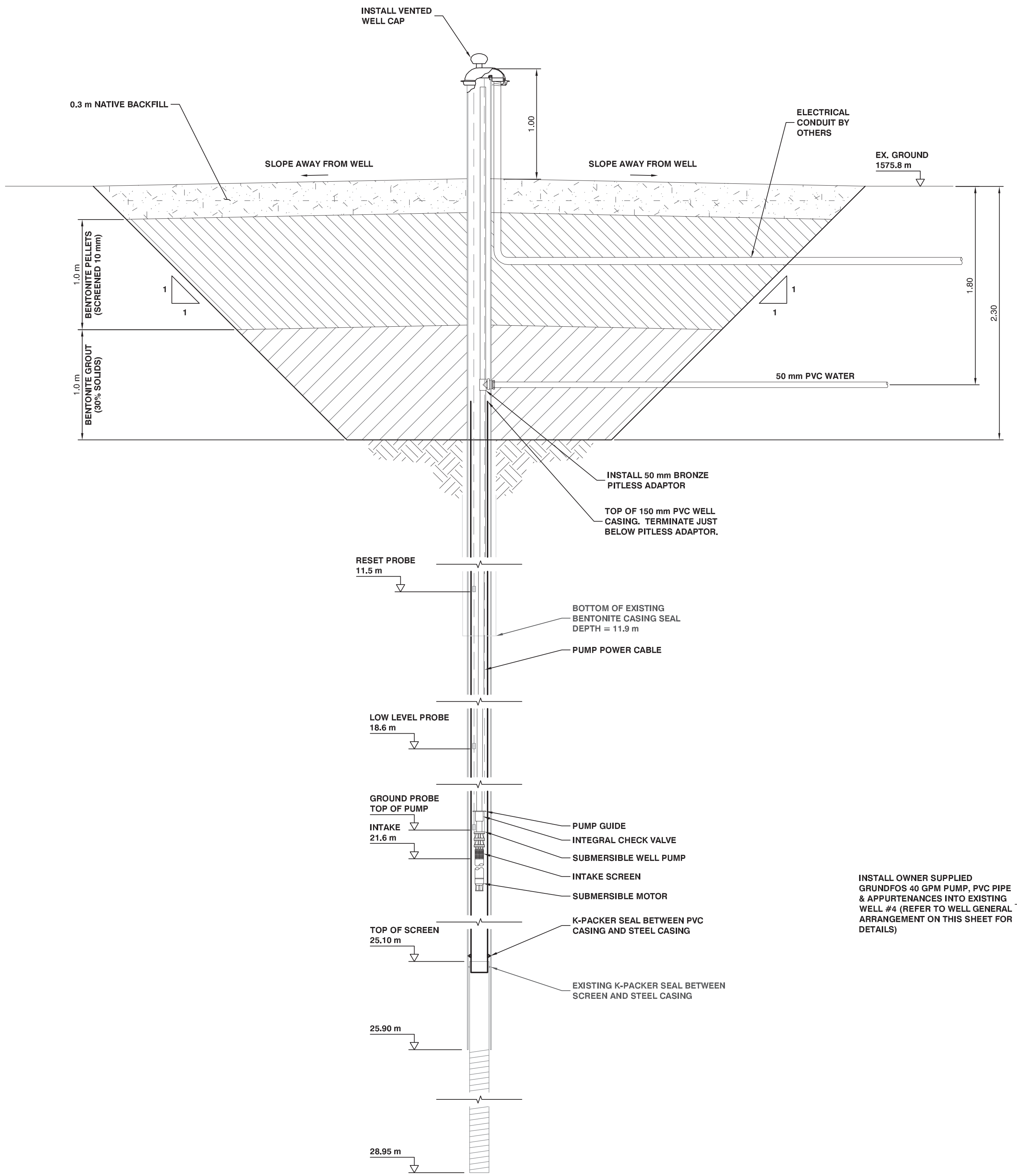
DEPTH SCALE

1 : 100

Golder Associates

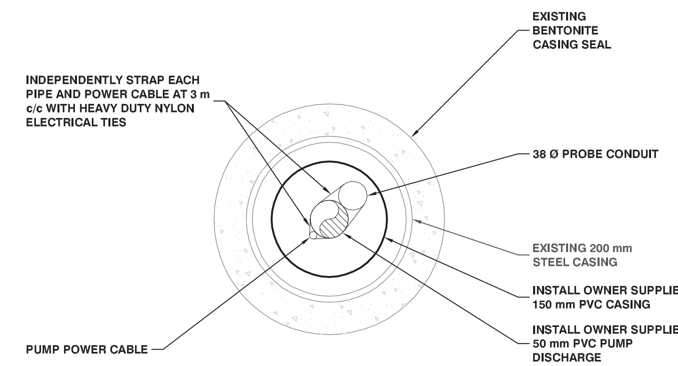
LOGGED: EA

CHECKED: MB



WELL GENERAL ARRANGEMENT

Scale: 1:25



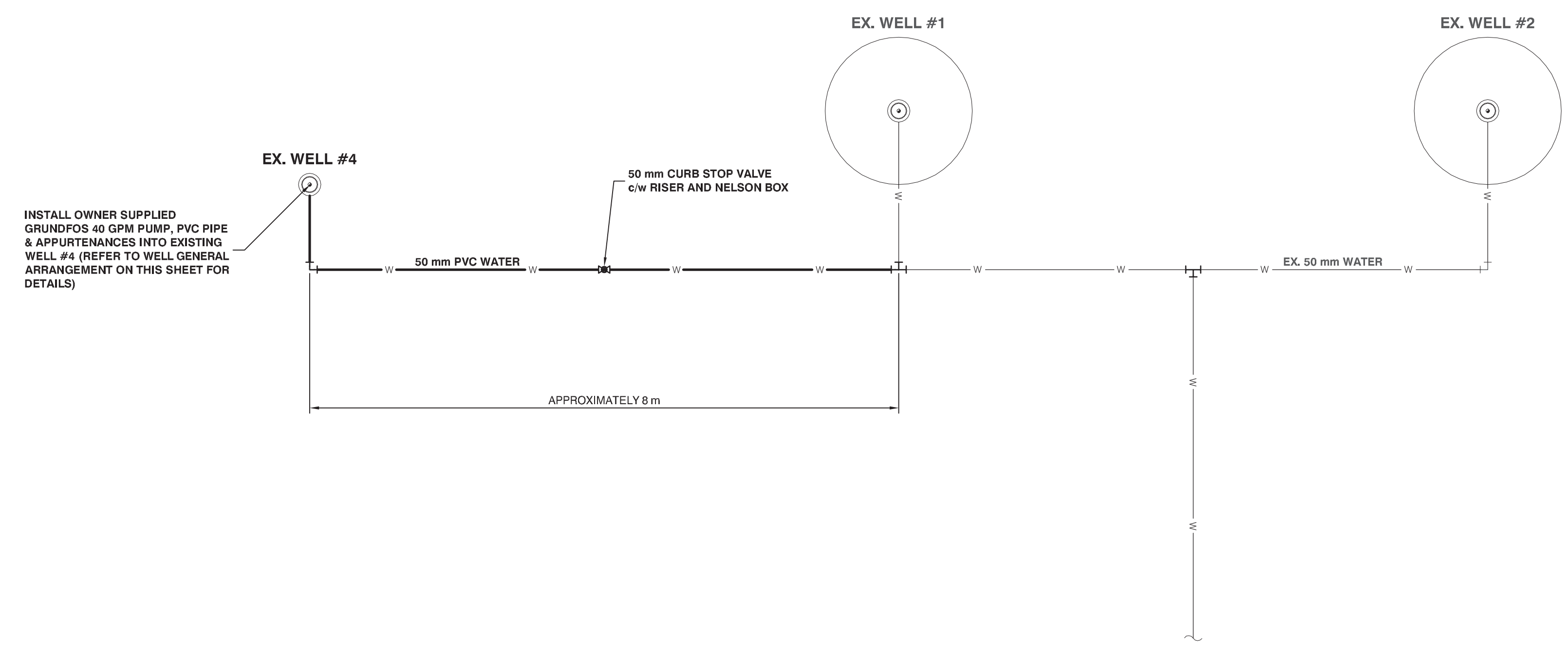
TYPICAL WELL SECTION

Scale: 1:5

SUMMARY OF WELL LOG				
ELEVATION (m GEODETIC)		DEPTH BELOW GROUND (m)		DESCRIPTION OF MATERIAL
FROM	TO	FROM	TO	
1575.8	1572.8	0	3	BROWN ORGANIC SAND, SILT & CLAY (MOIST)
1572.8	1563.6	3	12.2	BROWN SAND w/ PLASTIC CLAY & SILT (MOIST/WET)
1563.6	1560.6	12.2	15.2	BROWN FINE TO MED. GRAIN SAND (WATER BEARING)
1560.6	1557.5	15.2	18.3	BROWN MED. TO COARSE GRAIN SAND (WATER BEARING)
1557.5	1554.5	18.3	21.3	BROWN MED. TO COARSE GRAIN SAND (MOIST, NO FLOW)
1554.5	1551.4	21.3	24.4	BROWN SAND w/ SOME GRAVEL, WATER BEARING (GOOD YIELD)
1551.4	1548.4	24.4	27.4	BROWN SAND, WATER BEARING (GOOD YIELD)
1548.4	1546.85	27.4	28.95	BROWN SAND w/ SOME GRAVEL, WATER BEARING (GOOD YIELD)

NOTES:

1. WELL DISCHARGE PIPNG TO BE FULLY RESTRAINED (EVERY JOINT) BETWEEN PITLESS ADAPTER UNIT AND SUPPLYMAIN.
2. ALL PIPING TO HAVE 1.8m COVER FOR FROST PROTECTION.



PLAN

Scale: 1:50

AT FULL SIZE THIS BAR MEASURES 100mm. ALL SCALES REFERENCED TO FULL SIZE.

SAVED 2013-01-11 12:06:50 PM
O:\0000-0099\008-172\500-Drawings\008-172 Well Design.dwg

ISSUED INFORMATION

Issued for	Issue	Date	Issued By
Reference			
Approvals			
Tender	T0	JAN.11/13	MHF
Permits			
Construction			
Record Drawings			

REVISION INFORMATION

Rev. No.	Date	Designed	Drawn	Checked	Description of Revision	Rev. No.	Date	Designed	Drawn	Checked	Description of Revision
0	JAN.11/13	MHF	MRM		ISSUED FOR TENDER						

Seal

KERR WOOD LEIDAL
consulting engineers

FORDING RIVER OPERATIONS
GREEN HOUSE WATER SUPPLY
WELL #4

KWL Project No.: 008-172 Scale: AS SHOWN
Sheet: 1 of 1 Rev. No.: 0
Client: TECH COAL LTD.

SW1
Drawing Number

FINAL

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : RG_BH_FR1A**
	Location **Regional Groundwater Monitoring**	PAGE 1 OF 4

Drilling Contractor	Mud Bay Drilling Co. Ltd.	Date Monitored	2020 10 08	Project Number:	631283
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	1574.852	Borehole Logged By:	MM
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1575.435	Date Drilled:	2020 09 23
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5557251.937	Easting: 653154.895	Log Typed By:	VL

Drilling Legend: Sample Interval; Vibrasonic

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Soil Vapour (ppm): ○ Reading within indicated scale; ● Reading outside indicated scale; scale 10^1, 10^2, 10^3, 10^4

Solid PVC; Slotted PVC

Well Name 1: RG_MW_FR1A

Depth in Metres	Soil Description	% Recovery	Well
0	SANDY SILT, fine grained sand, brown, soft, damp, contains organic material.	60	SAND
1.2	SILTY SAND, fine to coarse grained sand, trace gravel, fine, angular, dark brown, soft, moist. At 1.8 m - wet.		
2.4	GRAVEL, fine to coarse, subrounded, some sand, fine to coarse grained, trace silt, containing cobbles (60-100mm), well graded, brown, loose, wet.		
3.0		40	
5.2			BENTONITE
6.1		80	
9.1		80	

Depth scale: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

NOTES

QA/QC: LLH 2020 10 20 Print Date:2020-12-02

FINAL

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : RG_BH_FR1A**
	Location **Regional Groundwater Monitoring**	PAGE 2 OF 4

Drilling Contractor	Mud Bay Drilling Co. Ltd.	Date Monitored	2020 10 08	Project Number:	631283
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	1574.852	Borehole Logged By:	MM
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1575.435	Date Drilled:	2020 09 23
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5557251.937	Easting: 653154.895	Log Typed By:	VL

Drilling Legend: Sample Interval; Vibrasonic

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: RG_MW_FR1A

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
10	GRAVEL, fine to coarse, subrounded, some sand, fine to coarse grained, trace silt, containing cobbles (60-100mm), well graded, brown, loose, wet. *(continued)*						
12.2						80	
14	CLAYEY SAND, fine to coarse grained sand, some gravel, fine, subrounded, well graded, dark grey, loose, wet.						
15.2	At 15.2 m - dark brown-orange mottling.					80	
15.5	SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, subrounded, containing cobbles (<100 mm), well graded, brown, loose, wet.						
17.4	At 17.4 m - less sand, trace silt, trace clay.						
18.3						90	
20							

Well: BENTONITE (at 15 m)

NOTES

QA/QC: LLH 2020 10 20 Print Date:2020-12-02

FINAL

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : RG_BH_FR1A**
	Location **Regional Groundwater Monitoring**	PAGE 3 OF 4

Drilling Contractor: Mud Bay Drilling Co. Ltd.	Date Monitored: 2020 10 08	Project Number:	631283
Drilling Method: Vibratory Sonic	Ground Surface Elev. (m): 1574.852	Borehole Logged By:	MM
Borehole Dia. (m): 0.15	Top of Casing Elev. (m): 1575.435	Date Drilled:	2020 09 23
Pipe/Slotted Pipe Dia. (m): 0.05/0.05	Northing: 5557251.937 Easting: 653154.895	Log Typed By:	VL

Drilling Legend: Sample Interval; Vibrasonic

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

○ Reading within indicated scale; ● Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: RG_MW_FR1A

Depth in Metres	Soil Description	% Recovery	Well
20	SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, subrounded, containing cobbles (<100 mm), well graded, brown, loose, wet. *(continued)*		
	At 20.7 m - some silt.		
21	At 21.3 m - trace silt.	90	
22–24			BENTONITE
24		100	
	At 24.7 m - no silt, grey.		
25	SAND, medium to coarse grained, trace gravel, subrounded, poorly graded, dark grey, loose, wet.		RG_MW_FR1A; SAND
27	At 27.1 m - medium dense.	100	
28	SAND, fine grained, trace silt, poorly graded, dark grey-brown with black mottling.		BENTONITE
29	SILTY SAND, fine grained sand, trace clay, well graded, dark grey, medium dense, low plasticity, wet.		
30			

Column headings: Stratigraphy Plot; Sample Interval Core Run; Sample Number; Blow Count; % Recovery; Soil Vapour (ppm) 10^1 10^2 10^3 10^4

NOTES

QA/QC: LLH 2020 10 20 Print Date:2020-12-02

FINAL

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : RG_BH_FR1A**
	Location **Regional Groundwater Monitoring**	PAGE 4 OF 4

Drilling Contractor	Mud Bay Drilling Co. Ltd.	Date Monitored	2020 10 08	Project Number:	631283
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	1574.852	Borehole Logged By:	MM
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1575.435	Date Drilled:	2020 09 23
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5557251.937	Easting: 653154.895	Log Typed By:	VL

Drilling Legend: Sample Interval; Vibrasonic

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

○ Reading within indicated scale; ● Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: RG_MW_FR1A

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
30	SILTY SAND, fine grained sand, trace clay, well graded, dark grey, medium dense, low plasticity, wet. *(continued)*						
	SILT, some clay, trace sand, fine grained, medium dense, moist.					20	
33.5	Bottom of hole at 33.5 m.						

Depth scale: 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40

BENTONITE

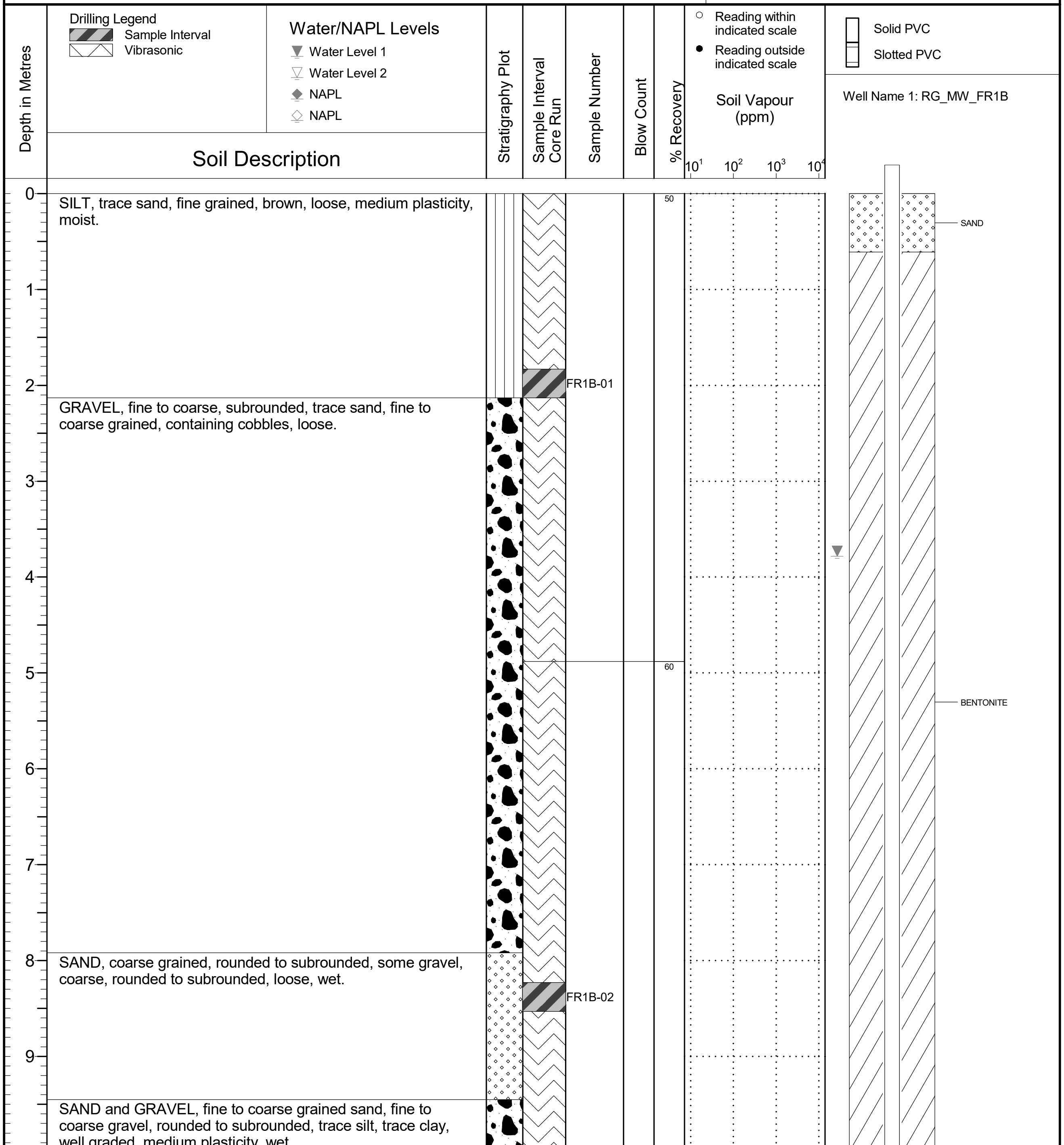
NOTES

QA/QC: LLH 2020 10 20 Print Date:2020-12-02

FINAL

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : RG_BH_FR1B**
	Location **Regional Groundwater Monitoring**	PAGE 1 OF 8

Drilling Contractor	Mud Bay Drilling Co. Ltd.	Date Monitored	2020 10 08	Project Number:	631283
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	1574.855	Borehole Logged By:	AH
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1575.677	Date Drilled:	2020 08 26
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5557251.235	Easting: 653156.931	Log Typed By:	VL



NOTES
Bolded sample denotes sample analyzed.

QA/QC: LLH 2020 10 20 Print Date:2020-12-02

FINAL

SNC • LAVALIN

Client: **Teck Coal Limited**	**Borehole No. : RG_BH_FR1B**
Location: **Regional Groundwater Monitoring**	PAGE 2 OF 8

Drilling Contractor	Mud Bay Drilling Co. Ltd.	Date Monitored	2020 10 08	Project Number:	631283
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	1574.855	Borehole Logged By:	AH
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1575.677	Date Drilled:	2020 08 26
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5557251.235	Easting: 653156.931	Log Typed By:	VL

Drilling Legend: Sample Interval; Vibrasonic

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Soil Vapour (ppm): ○ Reading within indicated scale; ● Reading outside indicated scale; scale 10^1 10^2 10^3 10^4

Solid PVC; Slotted PVC

Well Name 1: RG_MW_FR1B

Depth in Metres	Soil Description	Sample Number	% Recovery
10.0	SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, rounded to subrounded, trace silt, trace clay, well graded, medium plasticity, wet. *(continued)*	FR1B-03	75
13.1	CLAYEY GRAVEL, fine gravel, rounded to subrounded, trace sand, coarse grained, black, dense, medium plasticity, damp.	FR1B-04	
14.9	SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, rounded to subrounded, trace silt, trace clay, well graded, brown, loose, wet.	FR1B-05	80
17.1	Below 17.1 m - medium to coarse grained sand, containing cobbles, dark brown-grey.	FR1B-06	

Well construction: BENTONITE; SAND; ***RG_MW_FR1B***; BENTONITE

NOTES
Bolded sample denotes sample analyzed.

QA/QC: LLH 2020 10 20 Print Date:2020-12-02

FINAL

SNC-LAVALIN	Client **Teck Coal Limited**	**Borehole No. : RG_BH_FR1B**
	Location **Regional Groundwater Monitoring**	

Drilling Contractor	Mud Bay Drilling Co. Ltd.	Date Monitored	2020 10 08	Project Number:	631283
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	1574.855	Borehole Logged By:	AH
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1575.677	Date Drilled:	2020 08 26
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5557251.235	Easting: 653156.931	Log Typed By:	VL

Drilling Legend: Sample Interval; Vibrasonic

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: RG_MW_FR1B

Depth in Metres	Soil Description	Sample Number	% Recovery
20	SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, rounded to subrounded, trace silt, trace clay, well graded, brown, loose, wet. *(continued)*		
22.5	CLAYEY GRAVEL, fine to coarse gravel, subrounded, trace sand, fine grained, poorly graded, grey, very dense, damp.	FR1B-07	80
23.8	SAND and GRAVEL, coarse grained sand, fine to coarse gravel, rounded to subrounded, trace silt, well graded, grey-brown, loose, wet.		
25.6	SAND, coarse grained, some gravel, fine, grey, loose, wet.	FR1B-08	80
27.8	SAND, fine grained, trace silt, grey, medium dense, wet. At 28.0 m - small piece of coal.	FR1B-09	0

Soil Vapour (ppm): 10^1 10^2 10^3 10^4

BENTONITE

NOTES
Bolded sample denotes sample analyzed.

QA/QC: LLH 2020 10 20 Print Date:2020-12-02

FINAL

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : RG_BH_FR1B**
	Location **Regional Groundwater Monitoring**	PAGE 4 OF 8

Drilling Contractor	Mud Bay Drilling Co. Ltd.	Date Monitored	2020 10 08	Project Number:	631283
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	1574.855	Borehole Logged By:	AH
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1575.677	Date Drilled:	2020 08 26
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5557251.235	Easting: 653156.931	Log Typed By:	VL

Drilling Legend: Sample Interval; Vibrasonic

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Soil Vapour (ppm): ○ Reading within indicated scale; ● Reading outside indicated scale; scale 10^1, 10^2, 10^3, 10^4

Solid PVC; Slotted PVC

Well Name 1: RG_MW_FR1B

Depth in Metres	Soil Description	Sample Number	% Recovery	Well
30	SAND, fine grained, trace silt, grey, medium dense, wet. *(continued)*			
31–32		FR1B-10		
32.3	SILTY CLAY, some sand, fine grained, dark brown-grey, loose, medium to high plasticity, wet.		100	
35		FR1B-11 FR1B-12*		BENTONITE
36.7	CLAY, trace silt, dark brown-grey, loose, high plasticity, wet.			
38		FR1B-13		
40				

NOTES
Bolded sample denotes sample analyzed.

QA/QC: LLH 2020 10 20 Print Date:2020-12-02

FINAL

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : RG_BH_FR1B**
	Location **Regional Groundwater Monitoring**	PAGE 5 OF 8

Drilling Contractor	Mud Bay Drilling Co. Ltd.	Date Monitored	2020 10 08	Project Number:	631283
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	1574.855	Borehole Logged By:	AH
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1575.677	Date Drilled:	2020 08 26
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5557251.235	Easting: 653156.931	Log Typed By:	VL

Drilling Legend: Sample Interval; Vibrasonic

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Soil Vapour (ppm): ○ Reading within indicated scale; ● Reading outside indicated scale; scale 10^1 10^2 10^3 10^4

Solid PVC; Slotted PVC

Well Name 1: RG_MW_FR1B

Depth in Metres	Soil Description	Sample Number	% Recovery	Well
40	Below 39.9 m - medium dense. CLAY, trace silt, dark brown-grey, loose, high plasticity, wet. *(continued)*			
41		FR1B-14	80	
	Below 41.5 m - dark grey, medium dense.			
44		FR1B-15		
45				BENTONITE
45.7	GRAVEL, fine to coarse, rounded to subrounded, trace clay, containing cobbles, well graded, loose, wet.			
47		FR1B-16	50	
49	Below 48.9 m - some sand, fine to medium grained.			
50				

NOTES
Bolded sample denotes sample analyzed.

FINAL

SNC-LAVALIN	Client **Teck Coal Limited**	**Borehole No. : RG_BH_FR1B**
	Location **Regional Groundwater Monitoring**	

Drilling Contractor	Mud Bay Drilling Co. Ltd.	Date Monitored	2020 10 08	Project Number:	631283
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	1574.855	Borehole Logged By:	AH
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1575.677	Date Drilled:	2020 08 26
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5557251.235	Easting: 653156.931	Log Typed By:	VL

Drilling Legend: Sample Interval; Vibrasonic

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Reading within indicated scale; Reading outside indicated scale

Soil Vapour (ppm): 10^1, 10^2, 10^3, 10^4

Solid PVC; Slotted PVC

Well Name 1: RG_MW_FR1B

Soil Description (Depth in Metres)

- 50.0–51.2: GRAVEL, fine to coarse, rounded to subrounded, trace clay, containing cobbles, well graded, loose, wet. *(continued)*
- 51.2–55.2: SAND, fine to medium grained, trace gravel, fine, loose, wet.
- 55.2–57.3: GRAVEL, fine to coarse, rounded to subrounded, trace sand, coarse grained, trace silt, brown, loose, wet.
- 57.3–58.8: SILT, trace sand, fine grained, brown, medium dense, low plasticity, wet.
- 58.8–60.0: SANDY SILT, fine grained sand, dark grey-black, medium dense, low plasticity, wet.

Samples: FR1B-17 (% Recovery 50); FR1B-18 (% Recovery 50); FR1B-19; FR1B-20 (% Recovery 50)

Well annotation: BENTONITE (at 55 m)

NOTES
Bolded sample denotes sample analyzed.

FINAL

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : RG_BH_FR1B**
	Location **Regional Groundwater Monitoring**	

Drilling Contractor	Mud Bay Drilling Co. Ltd.	Date Monitored	2020 10 08	Project Number:	631283
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	1574.855	Borehole Logged By:	AH
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1575.677	Date Drilled:	2020 08 26
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5557251.235	Easting: 653156.931	Log Typed By:	VL

Drilling Legend: Sample Interval; Vibrasonic

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Reading within indicated scale; Reading outside indicated scale

Soil Vapour (ppm): 10^1 10^2 10^3 10^4

Solid PVC; Slotted PVC

Well Name 1: RG_MW_FR1B

Depth in Metres	Soil Description	Sample Number	% Recovery	Well
60–63.4	SANDY SILT, fine grained sand, dark grey-black, medium dense, low plasticity, wet. *(continued)* At 61.0 m - dark grey.	FR1B-21, FR1B-22*		
63.4–64.6	SILTY SAND, fine to coarse grained sand, dark grey, medium dense, low plasticity, wet, containing black pieces of coal/shale.			
64.6–68.3	SAND and GRAVEL, fine to coarse grained sand, fine gravel, rounded to subrounded, some silt.	FR1B-23	100	BENTONITE
68.3–70	SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, subrounded, some silt, some clay, poorly graded, dense, damp.	FR1B-24, FR1B-25*	100	

NOTES
Bolded sample denotes sample analyzed.

QA/QC: LLH 2020 10 20 Print Date:2020-12-02

FINAL

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : RG_BH_FR1B**
	Location **Regional Groundwater Monitoring**	PAGE 8 OF 8

Drilling Contractor	Mud Bay Drilling Co. Ltd.	Date Monitored	2020 10 08	Project Number:	631283
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	1574.855	Borehole Logged By:	AH
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1575.677	Date Drilled:	2020 08 26
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5557251.235	Easting: 653156.931	Log Typed By:	VL

Drilling Legend: Sample Interval; Vibrasonic

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

○ Reading within indicated scale; ● Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: RG_MW_FR1B

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
70	SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, subrounded, some silt, some clay, poorly graded, dense, damp. *(continued)*						
72	Bottom of hole at 71.9 m.						

Depth scale: 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80

BENTONITE

NOTES
Bolded sample denotes sample analyzed.

FINAL

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : RG_BH_FR1C**
	Location **Regional Groundwater Monitoring**	PAGE 1 OF 2

Drilling Contractor	Mud Bay Drilling Co. Ltd.	Date Monitored	2020 10 08	Project Number:	631283
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	1574.848	Borehole Logged By:	AH
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1575.412	Date Drilled:	2020 08 28
Pipe/Slotted Pipe Dia. (m)	0.10/0.10	Northing: 5557249.325	Easting: 653156.498	Log Typed By:	VL

Drilling Legend: Sample Interval; Vibrasonic

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: RG_MW_FR1C

Soil Vapour (ppm): 10^1 10^2 10^3 10^4

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery
0	SANDY SILT, fine grained sand, dark brown, loose, low plasticity, damp, containing organic material.					30
1.5	GRAVEL, fine to coarse, rounded to subrounded, some sand, fine to coarse grained, some silt, brown, loose, damp.					
5	GRAVEL, fine to coarse, rounded to subrounded, containing cobbles (80 mm), some sand, coarse grained, trace silt, brown with orange mottling, loose, wet. Below 6.1 m - trace sand, fine to coarse grained, well graded, brown-grey.					50
8.5	SAND, coarse grained, rounded to subrounded, some gravel, coarse, rounded to subrounded, loose, wet.					

Well construction labels: BENTONITE; RG_MW_FR1C; SAND; BENTONITE

NOTES

FINAL

SNC-LAVALIN	Client **Teck Coal Limited**	**Borehole No. : RG_BH_FR1C**
	Location **Regional Groundwater Monitoring**	PAGE 2 OF 2

Drilling Contractor	Mud Bay Drilling Co. Ltd.	Date Monitored	2020 10 08	Project Number:	631283
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	1574.848	Borehole Logged By:	AH
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1575.412	Date Drilled:	2020 08 28
Pipe/Slotted Pipe Dia. (m)	0.10/0.10	Northing: 5557249.325	Easting: 653156.498	Log Typed By:	VL

Drilling Legend: Sample Interval; Vibrasonic

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: RG_MW_FR1C

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4	Well
10	SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, rounded to subrounded, trace silt, loose, wet. *(continued)*							BENTONITE
11	Bottom of hole at 11.0 m.							

12
13
14
15
16
17
18
19
20

NOTES

QA/QC: LLH 2020 10 20 Print Date:2020-12-02

FINAL

SNC-LAVALIN	Client **Teck Coal Limited**	**Borehole No. : RG_BH_FR8A**
	Location **Regional Groundwater Monitoring**	PAGE 1 OF 5

Drilling Contractor	Mud Bay Drilling Co. Ltd.	Date Monitored	2020 10 08	Project Number:	631283
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	1562.171	Borehole Logged By:	MM
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1562.638	Date Drilled:	2020 09 24
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5555682.868	Easting: 653883.051	Log Typed By:	VL

Drilling Legend: Sample Interval; Vibrasonic

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: RG_MW_FR8A

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
0	SILTY SAND, fine grained sand, brown, loose, wet at surface (rain), contains organic material.					50	
1	Between 0.9 m and 1.2 m - damp.						
	SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, subrounded to subangular, well graded, brown, loose, damp.						
2							
	At 2.4 m - wet.			FR8A-01			
3	GRAVEL, fine to coarse, well graded, trace sand, coarse grained, poorly graded, trace silt, containing cobbles (70-90 mm), brown, loose, wet.					40	
4							
5				FR8A-02			
6						60	
7	SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, trace silt, well graded, dark brown, loose, wet.						
8				FR8A-03			
	Between 8.5 m and 9.1 m - more coarse gravel, containing cobbles.						
9	SILTY SAND, fine to coarse grained sand, trace gravel, coarse, trace clay, containing cobbles (60-100 mm), poorly graded, dark brown to grey, medium dense, low plasticity, wet.					90	
	At 9.8 m - less silt, more coarse grained sand, loose.						
10							

Well construction: SAND; BENTONITE

NOTES
Bolded sample denotes sample analyzed.

QA/QC: LLH 2020 10 20 Print Date:2020-12-02

FINAL

SNC·LAVALIN

Client	Borehole No. : RG_BH_FR8A
Teck Coal Limited	
Location	PAGE 2 OF 5
Regional Groundwater Monitoring	

Drilling Contractor	Mud Bay Drilling Co. Ltd.	Date Monitored	2020 10 08	Project Number:	631283
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	1562.171	Borehole Logged By:	MM
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1562.638	Date Drilled:	2020 09 24
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5555682.868	Easting: 653883.051	Log Typed By:	VL

Drilling Legend: Sample Interval; Vibrasonic

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Soil Vapour (ppm): ○ Reading within indicated scale; ● Reading outside indicated scale; scale 10^1, 10^2, 10^3, 10^4

Solid PVC; Slotted PVC

Well Name 1: RG_MW_FR8A

Depth in Metres	Soil Description	Sample Number	% Recovery	Well
10	SILTY SAND, fine to coarse grained sand, trace gravel, coarse, trace clay, containing cobbles (60-100 mm), poorly graded, dark brown to grey, medium dense, low plasticity, wet. *(continued)*			
11.2–11.5		FR8A-04		
12	SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, subrounded, well graded, grey, medium dense, wet.		80	
14.3–14.6		FR8A-05		
15			100	BENTONITE
16	GRAVELLY SAND, fine to coarse grained sand, fine to coarse gravel, subrounded, well graded, brown-grey, loose, wet.			
17.4	At 17.4 m - black mottling.			
18.3			80	
18.6	At 18.6 m - orange mottling.			
19	SILTY SAND, fine grained sand, poorly graded, grey, firm, wet.	FR8A-06		
19.8	Between 19.8 and 20.1 m - medium grained sand.			
20				

NOTES
Bolded sample denotes sample analyzed.

QA/QC: LLH 2020 10 20 Print Date:2020-12-02

FINAL

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : RG_BH_FR8A**
	Location **Regional Groundwater Monitoring**	PAGE 3 OF 5

Drilling Contractor	Mud Bay Drilling Co. Ltd.	Date Monitored	2020 10 08	Project Number:	631283
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	1562.171	Borehole Logged By:	MM
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1562.638	Date Drilled:	2020 09 24
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5555682.868	Easting: 653883.051	Log Typed By:	VL

Drilling Legend: Sample Interval; Vibrasonic

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: RG_MW_FR8A

Depth in Metres	Soil Description	Sample Number	% Recovery
20	SILTY SAND, fine grained sand, poorly graded, grey, firm, wet. *(continued)* Between 20.1 m and 20.4 - black mottling. Between 20.7 and 21.6 m - medium and coarse grained sand.	FR8A-07	110
23	Between 23.2 m and 23.5 m - medium to coarse grained sand.	FR8A-08	0
27.5			100
27.7	SILTY CLAY, grey-brown, firm, medium plasticity, wet. At 28.3 m - less silt.		
30		FR8A-09	

Soil Vapour (ppm): 10^1 10^2 10^3 10^4

Well: BENTONITE (to 25 m and below)

NOTES
Bolded sample denotes sample analyzed.

QA/QC: LLH 2020 10 20 Print Date:2020-12-02

FINAL

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : RG_BH_FR8A**
	Location **Regional Groundwater Monitoring**	PAGE 4 OF 5

Drilling Contractor	Mud Bay Drilling Co. Ltd.	Date Monitored	2020 10 08	Project Number:	631283
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	1562.171	Borehole Logged By:	MM
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1562.638	Date Drilled:	2020 09 24
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5555682.868	Easting: 653883.051	Log Typed By:	VL

Drilling Legend: Sample Interval; Vibrasonic

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: RG_MW_FR8A

Depth in Metres	Soil Description	Sample Number	% Recovery	Well
30	At 29.9 m - seams of medium grained sand, black, sulfur odour. SILTY CLAY, grey-brown, firm, medium plasticity, wet. *(continued)*	FR8A-09		
	SAND, coarse grained, trace to some clay, poorly graded, dark grey, loose, low plasticity, wet.		80	
31.4	CLAYEY GRAVEL, fine to coarse gravel, subrounded, some sand, coarse grained, well graded, grey, loose, low plasticity, wet.			
33		FR8A-10		BENTONITE
	Between 33.2 m and 33.5 m - clay, very dense, damp, no inclusions.		60	
	At 34.4 m - cobbles (up to 120 mm), no gravel.			
35.4	SANDY GRAVEL, fine to coarse gravel, subrounded, fine to coarse grained sand, containing cobbles (80-120 mm), well graded, grey-brown, loose, wet.			
36		FR8A-11	70	
37				RG_MW_FR8A; SAND
39.3	CLAYEY GRAVEL, fine to coarse gravel, subrounded, containing cobbles (60-100 mm), well graded, brown-grey, stiff, low plasticity, damp.		70	BENTONITE
40				

Soil Vapour (ppm): 10^1 10^2 10^3 10^4

NOTES
Bolded sample denotes sample analyzed.

QA/QC: LLH 2020 10 20 Print Date:2020-12-02

FINAL

SNC·LAVALIN	Client: **Teck Coal Limited**	**Borehole No. : RG_BH_FR8A**
	Location: **Regional Groundwater Monitoring**	PAGE 5 OF 5

Drilling Contractor	Mud Bay Drilling Co. Ltd.	Date Monitored	2020 10 08	Project Number:	631283
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	1562.171	Borehole Logged By:	MM
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1562.638	Date Drilled:	2020 09 24
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5555682.868	Easting: 653883.051	Log Typed By:	VL

Drilling Legend: Sample Interval; Vibrasonic

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Soil Vapour (ppm): ○ Reading within indicated scale; ● Reading outside indicated scale; scale 10^1, 10^2, 10^3, 10^4

Solid PVC; Slotted PVC

Well Name 1: RG_MW_FR8A

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery
40	CLAYEY GRAVEL, fine to coarse gravel, subrounded, containing cobbles (60-100 mm), well graded, brown-grey, stiff, low plasticity, damp. *(continued)*					
41	Between 41.1 m and 47.9 m - within unit stratified damp to dry/hard and damp/stiff alternating layers.					
42	Between 41.8 m and 42.1 m - some sand, coarse grained.					
43						150
45						80
46						100
48	Bottom of hole at 47.9 m.					

Depth scale: 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50

BENTONITE

NOTES
Bolded sample denotes sample analyzed.

QA/QC: LLH 2020 10 20 Print Date:2020-12-02

FINAL

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : RG_BH_FR8B**
	Location **Regional Groundwater Monitoring**	PAGE 1 OF 2

Drilling Contractor	Mud Bay Drilling Co. Ltd.	Date Monitored	2020 10 08	Project Number:	631283
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	1562.234	Borehole Logged By:	MM
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1562.890	Date Drilled:	2020 09 25
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5555681.987	Easting: 653882.667	Log Typed By:	VL

Drilling Legend: Sample Interval; Vibrasonic

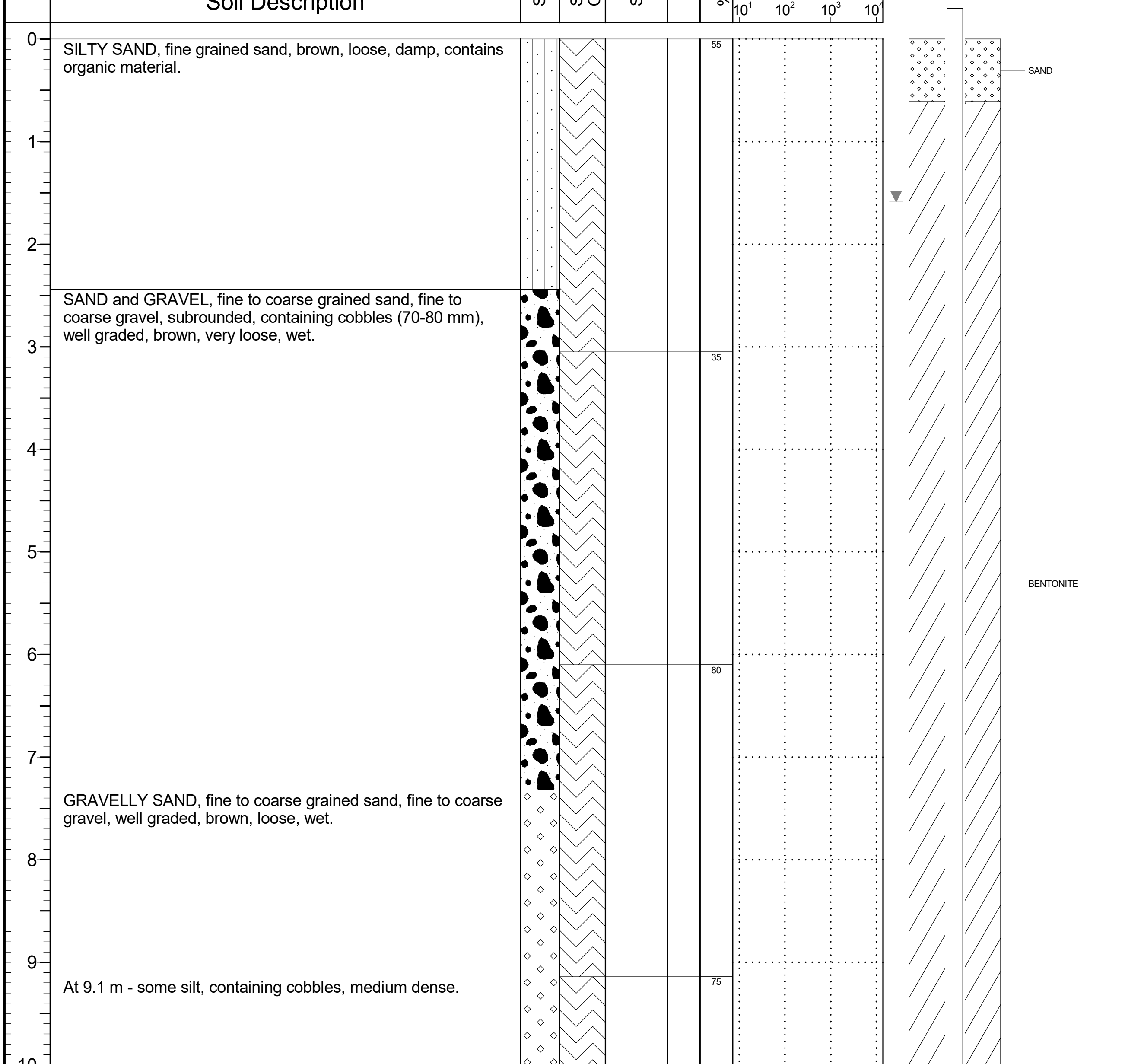
Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: RG_MW_FR8B

Depth in Metres	Soil Description	% Recovery
0 – 2.45	SILTY SAND, fine grained sand, brown, loose, damp, contains organic material.	55
2.45 – 7.35	SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, subrounded, containing cobbles (70-80 mm), well graded, brown, very loose, wet.	35 (from 3.05); 80 (from 6.1)
7.35 – 10	GRAVELLY SAND, fine to coarse grained sand, fine to coarse gravel, well graded, brown, loose, wet.	
	At 9.1 m - some silt, containing cobbles, medium dense.	75 (from 9.15)



NOTES

QA/QC: LLH 2020 10 20 Print Date:2020-12-02

FINAL

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : RG_BH_FR8B**
	Location **Regional Groundwater Monitoring**	PAGE 2 OF 2

Drilling Contractor	Mud Bay Drilling Co. Ltd.	Date Monitored	2020 10 08	Project Number:	631283
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	1562.234	Borehole Logged By:	MM
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1562.890	Date Drilled:	2020 09 25
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5555681.987	Easting: 653882.667	Log Typed By:	VL

Drilling Legend
- Sample Interval
- Vibrasonic

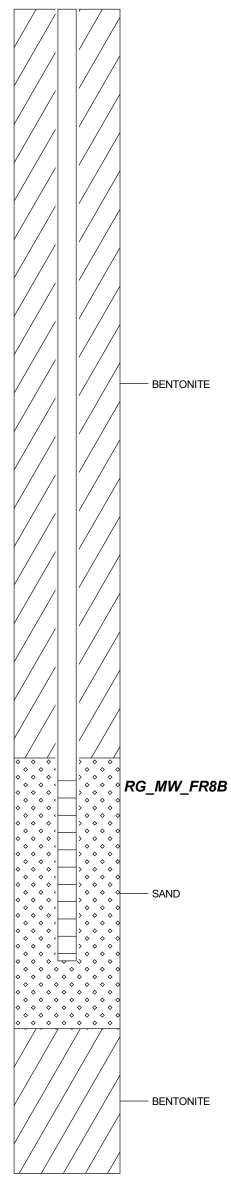
Water/NAPL Levels
- Water Level 1
- Water Level 2
- NAPL
- NAPL

- ○ Reading within indicated scale
- ● Reading outside indicated scale

- Solid PVC
- Slotted PVC

Well Name 1: RG_MW_FR8B

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
10	SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, subrounded, some silt, well graded, grey, non-plastic, wet, black mottling of fine grains.						
12						90	
12.5	Between 12.5 m and 13.0 m - interlayer of gravel.						
15						95	
18	SAND, fine to coarse grained, well graded, grey, medium dense, wet.					100	
18.6	Between 18.6 m and 18.9 m - fine grained sand with black mottling, some silt.						
19.2	At 19.2 m - orange and black mottling.						
19.2	SILTY SAND, fine grained sand, poorly graded, grey, medium dense, non-plastic, wet.						
19.8	Bottom of hole at 19.8 m.						



NOTES

QA/QC: LLH 2020 10 20 Print Date:2020-12-02

FINAL

SNC·LAVALIN

Client: **Teck Coal Limited**	**Borehole No. : RG_BH_FR8C**
Location: **Regional Groundwater Monitoring**	PAGE 1 OF 1

Drilling Contractor	Mud Bay Drilling Co. Ltd.	Date Monitored	2020 10 08	Project Number:	631283
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	1562.164	Borehole Logged By:	MM
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1562.879	Date Drilled:	2020 09 26
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5555684.406	Easting: 653883.614	Log Typed By:	VL

Drilling Legend: Sample Interval; Vibrasonic

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

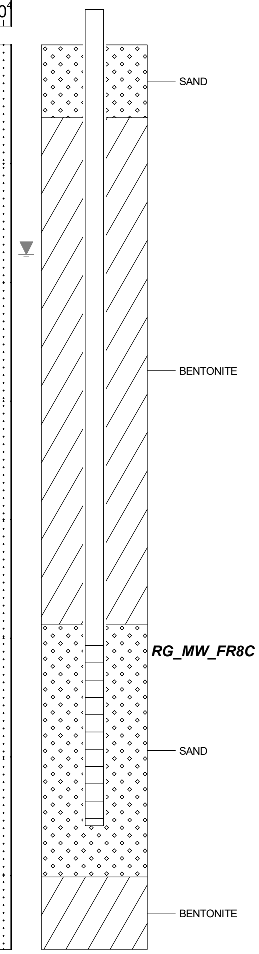
○ Reading within indicated scale
● Reading outside indicated scale

Soil Vapour (ppm): 10^1 10^2 10^3 10^4

Solid PVC; Slotted PVC

Well Name 1: RG_MW_FR8C

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery
0	SILTY SAND, fine grained sand, containing gravel, brown, loose, dry, contains wood (tree root).					45
1.8	SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, containing cobbles, well graded, brown-grey, loose, non-plastic, wet.					
3.0						40
7.0	Between 7.0 m and 7.3 m - layer of silty sand, fine grained, grey, medium dense.					
7.6	Bottom of hole at 7.6 m.					



NOTES

QA/QC: LLH 2020 10 20 Print Date:2020-12-02

Log of Monitoring Well: GH_MW-PC

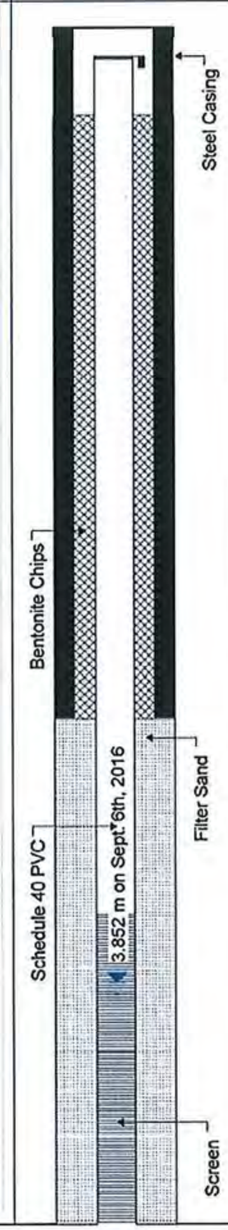
HEMMERA

Project Name/No: 577-016.07
Client: Teck Coal Greenhills Operation
Date Drilled: September 2nd, 2016
Site Location: Elkford, BC

Drilling Company: JR Drilling
Drilling Method: Dual Rotary
Logged by: TK

Sheet: 1 of 8

SUBSURFACE PROFILE			SAMPLE						Backfill details
Depth (ft / m)	Symbol	Description	Depth/Elev (m)	Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)	
0		Ground Surface	0.00						
0 – 3 ft (0 – 1 m)		**TOPSOIL** TOPSOIL, brown, fine to medium silty sand with fine sub-angular gravel and rootlets	0.00						
3 – 16 ft (1 – 5 m)		**COBBLES and GRAVEL** COBBLES and GRAVEL, with silt and sand, pulverized from drilling. Groundwater encountered at approximately 4.5 mbgs	-1.00 1.00						



Well location: Porter Creek
Depth to water level (TOC): 3.852
Date of water level: September 6th, 2016
Borehole diameter: 15.24

Well casing diameter: 50.8mm
Well casing material: Schedule 40 PVC
Well screen slot size: 0.25mm
Well screen interval (bgs): 3.5-6.5

Depth of well (TOC): 7.601
Well Elevation (TOC): -
Ground Elevation: -

Log of Monitoring Well: GH_MW-PC

HEMMERA

Project Name/No: 577-016.07

Drilling Company: JR Drilling

Client: Teck Coal Greenhills Operation

Drilling Method: Dual Rotary

Date Drilled: September 2nd, 2016

Logged by: TK

Site Location: Elkford, BC

SUBSURFACE PROFILE			SAMPLE						
Depth	Symbol	Description	Depth/Elev (m)	Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)	Backfill details
17–18									
18–36 (ft) / 6–11 (m)		**BEDROCK** BEDROCK (likely limestone), pulverized silt to fine/medium sub-angular/sub-rounded gravel size particles, crystalline, very hard, dry	-5.50 5.50						

Depth scale: 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36 (ft); 6, 7, 8, 9, 10, 11 (m)

Well location: Porter Creek

Well casing diameter: 50.8mm

Depth of well (TOC): 7.601

Depth to water level (TOC): 3.852

Well casing material: Schedule 40 PVC

Well Elevation (TOC): -

Date of water level: September 6th, 2016

Well screen slot size: 0.25mm

Ground Elevation: -

Borehole diameter: 15.24

Well screen interval (bgs): 3.5-6.5

Log of Monitoring Well: GH_MW-PC

HEMMERA

Project Name/No: 577-016.07

Client: Teck Coal Greenhills Operation

Date Drilled: September 2nd, 2016

Site Location: Elkford, BC

Drilling Company: JR Drilling

Drilling Method: Dual Rotary

Logged by: TK

Sheet: 3 of 8

SUBSURFACE PROFILE			SAMPLE						
Depth	Symbol	Description	Depth/Elev (m)	Sample ID	Analysed Y,N	Sample Type	Vapour ppm 0 250 500	LEL % 0 50 100	Backfill details
37 – 56 (ft); 12 – 17 (m)									

Well location: Porter Creek

Depth to water level (TOC): 3.852

Date of water level: September 6th, 2016

Borehole diameter: 15.24

Well casing diameter: 50.8mm

Well casing material: Schedule 40 PVC

Well screen slot size: 0.25mm

Well screen interval (bgs): 3.5-6.5

Depth of well (TOC): 7.601

Well Elevation (TOC): -

Ground Elevation: -

Log of Monitoring Well: GH_MW-PC

HEMMERA

Project Name/No: 577-016.07

Client: Teck Coal Greenhills Operation

Date Drilled: September 2nd, 2016

Site Location: Elkford, BC

Drilling Company: JR Drilling

Drilling Method: Dual Rotary

Logged by: TK

SUBSURFACE PROFILE			SAMPLE						
Depth	Symbol	Description	Depth/Elev (m)	Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)	Backfill details
57–76 (ft); 18, 19, 20, 21, 22, 23 (m)									

Well location: Porter Creek

Depth to water level (TOC): 3.852

Date of water level: September 6th, 2016

Borehole diameter: 15.24

Well casing diameter: 50.8mm

Well casing material: Schedule 40 PVC

Well screen slot size: 0.25mm

Well screen interval (bgs): 3.5-6.5

Depth of well (TOC): 7.601

Well Elevation (TOC): -

Ground Elevation: -

Log of Monitoring Well: GH_MW-PC

HEMMERA

Project Name/No: 577-016.07

Client: Teck Coal Greenhills Operation

Date Drilled: September 2nd, 2016

Site Location: Elkford, BC

Drilling Company: JR Drilling

Drilling Method: Dual Rotary

Logged by: TK

SUBSURFACE PROFILE			SAMPLE						
Depth	Symbol	Description	Depth/Elev (m)	Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)	Backfill details
77									
78									
79 (24)		Small fracture encountered at 24 mbgs but was not found to have enough water to conduct a flow test							
80									
81									
82 (25)									
83									
84									
85 (26)									
86									
87									
88 (27)									
89									
90		From 27.5 mbgs drilling was noted to be smoother/easier; no observable change was identified in rock chips							
91									
92 (28)									
93									
94									
95 (29)									
96									

Well location: Porter Creek

Depth to water level (TOC): 3.852

Date of water level: September 6th, 2016

Borehole diameter: 15.24

Well casing diameter: 50.8mm

Well casing material: Schedule 40 PVC

Well screen slot size: 0.25mm

Well screen interval (bgs): 3.5-6.5

Depth of well (TOC): 7.601

Well Elevation (TOC): -

Ground Elevation: -

Log of Monitoring Well: GH_MW-PC

HEMMERA

Project Name/No: 577-016.07
Client: Teck Coal Greenhills Operation
Date Drilled: September 2nd, 2016
Site Location: Elkford, BC

Drilling Company: JR Drilling
Drilling Method: Dual Rotary
Logged by: TK

SUBSURFACE PROFILE			SAMPLE						
Depth	Symbol	Description	Depth/Elev (m)	Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)	Backfill details
97									
98									
30									
99									
00									
01									
31									
02									
03									
04									
05									
32									
06									
07									
08									
33									
09									
10									
11									
34									
12									
13									
14									
35									
15									
16									

Well location: Porter Creek
Depth to water level (TOC): 3.852
Date of water level: September 6th, 2016
Borehole diameter: 15.24

Well casing diameter: 50.8mm
Well casing material: Schedule 40 PVC
Well screen slot size: 0.25mm
Well screen interval (bgs): 3.5-6.5

Depth of well (TOC): 7.601
Well Elevation (TOC): -
Ground Elevation: -

Log of Monitoring Well: GH_MW-PC

HEMMERA

Project Name/No: 577-016.07
Client: Teck Coal Greenhills Operation
Date Drilled: September 2nd, 2016
Site Location: Elkford, BC

Drilling Company: JR Drilling
Drilling Method: Dual Rotary
Logged by: TK

SUBSURFACE PROFILE			SAMPLE						
Depth	Symbol	Description	Depth/Elev (m)	Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)	Backfill details
17–36 (m); 36–41 (ft)									

Well location: Porter Creek
Depth to water level (TOC): 3.852
Date of water level: September 6th, 2016
Borehole diameter: 15.24

Well casing diameter: 50.8mm
Well casing material: Schedule 40 PVC
Well screen slot size: 0.25mm
Well screen interval (bgs): 3.5-6.5

Depth of well (TOC): 7.601
Well Elevation (TOC): -
Ground Elevation: -

Log of Monitoring Well: GH_MW-PC

HEMMERA

Project Name/No: 577-016.07
Client: Teck Coal Greenhills Operation
Date Drilled: September 2nd, 2016
Site Location: Elkford, BC

Drilling Company: JR Drilling
Drilling Method: Dual Rotary
Logged by: TK

SUBSURFACE PROFILE			SAMPLE						
Depth	Symbol	Description	Depth/Elev (m)	Sample ID	Analysed Y,N	Sample Type	Vapour ppm 0 250 500	LEL % 0 50 100	Backfill details
37–47 (ft); 42–45 (m)									
48		End of Log	-45.00 45.00						
49–56 (ft); 46–47 (m)									

Well location: Porter Creek
Depth to water level (TOC): 3.852
Date of water level: September 6th, 2016
Borehole diameter: 15.24

Well casing diameter: 50.8mm
Well casing material: Schedule 40 PVC
Well screen slot size: 0.25mm
Well screen interval (bgs): 3.5-6.5

Depth of well (TOC): 7.601
Well Elevation (TOC): -
Ground Elevation: -

SNC·LAVALIN

Client	Borehole No. : RG_BH_FR10A
Client **Teck Coal Limited**	**Borehole No. : RG_BH_FR10A**
Location **Regional Groundwater Monitoring**	PAGE 1 OF 4

Drilling Contractor	Mud Bay Drilling Co. Ltd.	Date Monitored	2021 05 06	Project Number:	666653
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	1551.374	Borehole Logged By:	MM/GG
Borehole Dia. (m)	0.10	Top of Casing Elev. (m)	1552.660	Date Drilled:	2021 04 21
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5552811.914	Easting: 655324.144	Log Typed By:	VL

Drilling Legend
Sample Interval
Vibrasonic

Water/NAPL Levels
Water Level 1
Water Level 2
NAPL
NAPL

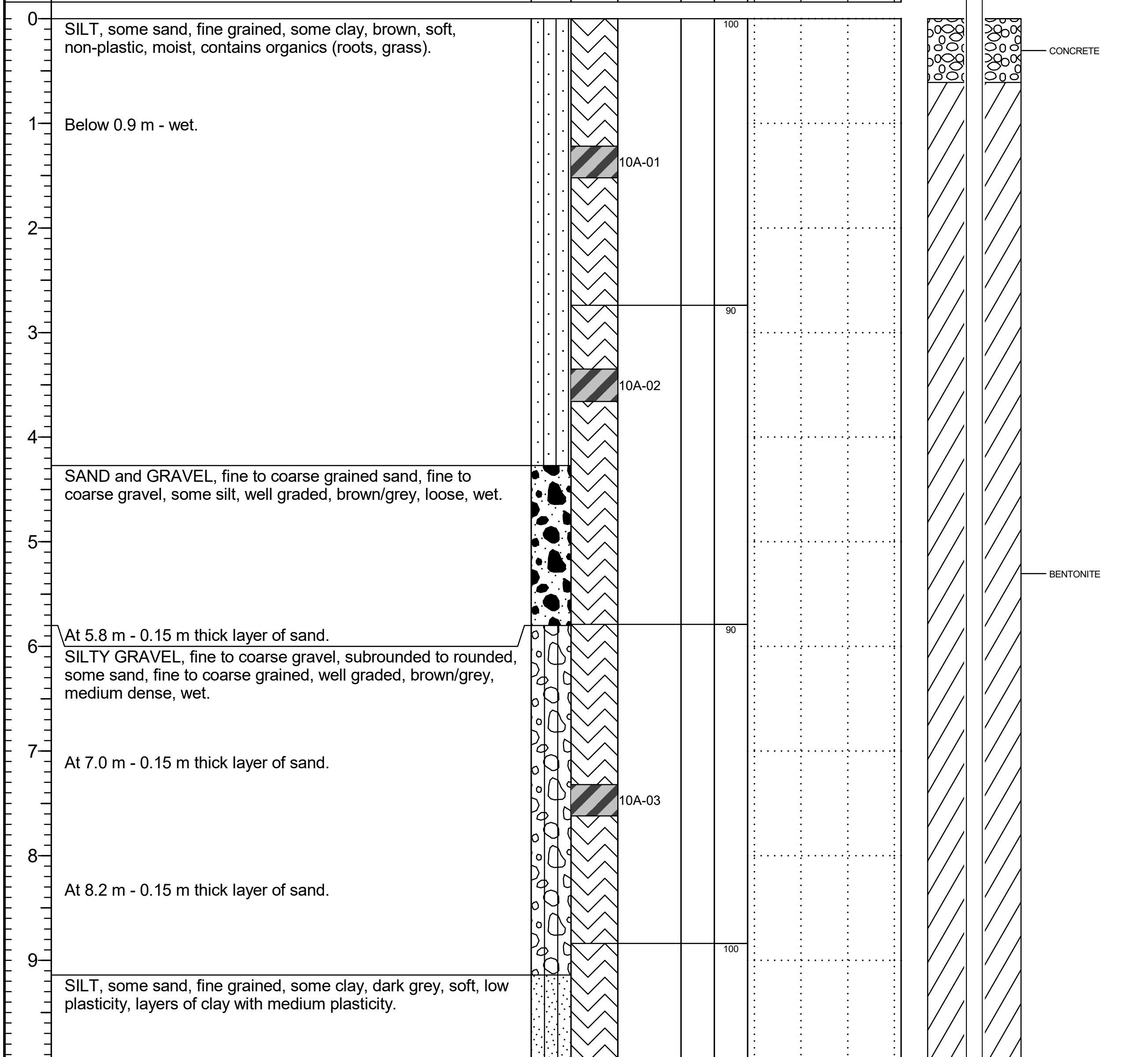
Reading within indicated scale
Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name 1: RG_MW_FR10A

Depth in Metres | Soil Description | Stratigraphy Plot | Sample Interval Core Run | Sample Number | Blow Count | % Recovery | Soil Vapour (ppm)

Depth (m)	Soil Description
0	SILT, some sand, fine grained, some clay, brown, soft, non-plastic, moist, contains organics (roots, grass).
1	Below 0.9 m - wet.
4.3	SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, some silt, well graded, brown/grey, loose, wet.
5.8	At 5.8 m - 0.15 m thick layer of sand.
6.0	SILTY GRAVEL, fine to coarse gravel, subrounded to rounded, some sand, fine to coarse grained, well graded, brown/grey, medium dense, wet.
7.0	At 7.0 m - 0.15 m thick layer of sand.
8.2	At 8.2 m - 0.15 m thick layer of sand.
9.1	SILT, some sand, fine grained, some clay, dark grey, soft, low plasticity, layers of clay with medium plasticity.



NOTES
Bolded sample denotes sample analyzed.

QA/QC: LLH 2021 05 19 Print Date:2021-09-14

SNC-LAVALIN	Client **Teck Coal Limited**	**Borehole No. : RG_BH_FR10A**
	Location **Regional Groundwater Monitoring**	PAGE 2 OF 4

Drilling Contractor	Mud Bay Drilling Co. Ltd.	Date Monitored	2021 05 06	Project Number:	666653
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	1551.374	Borehole Logged By:	MM/GG
Borehole Dia. (m)	0.10	Top of Casing Elev. (m)	1552.660	Date Drilled:	2021 04 21
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5552811.914	Easting: 655324.144	Log Typed By:	VL

Drilling Legend: Sample Interval; Vibrasonic

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: RG_MW_FR10A

Depth in Metres	Soil Description	Sample Number	% Recovery
10	SILT, some sand, fine grained, some clay, dark grey, soft, low plasticity, layers of clay with medium plasticity. *(continued)*	10A-04	
11.6	SILTY GRAVEL, fine to coarse gravel, subangular, some sand, fine to coarse grained, containing cobbles (70-120 mm), brown, dense, non-plastic, wet.		50
14		10A-05	
15	SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, angular to subrounded, some silt, containing cobbles, brown, loose, wet.		10
18	Between 18.0 m and 21.0 m - limited recovery, washed gravel and cobbles returned.		10

Soil Vapour (ppm): 10^1 10^2 10^3 10^4

BENTONITE

NOTES
Bolded sample denotes sample analyzed.

QA/QC: LLH 2021 05 19 Print Date:2021-09-14

SNC-LAVALIN	Client **Teck Coal Limited**	**Borehole No. : RG_BH_FR10A**
	Location **Regional Groundwater Monitoring**	PAGE 3 OF 4

Drilling Contractor	Mud Bay Drilling Co. Ltd.	Date Monitored	2021 05 06	Project Number:	666653
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	1551.374	Borehole Logged By:	MM/GG
Borehole Dia. (m)	0.10	Top of Casing Elev. (m)	1552.660	Date Drilled:	2021 04 21
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5552811.914	Easting: 655324.144	Log Typed By:	VL

Drilling Legend: Sample Interval; Vibrasonic

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: RG_MW_FR10A

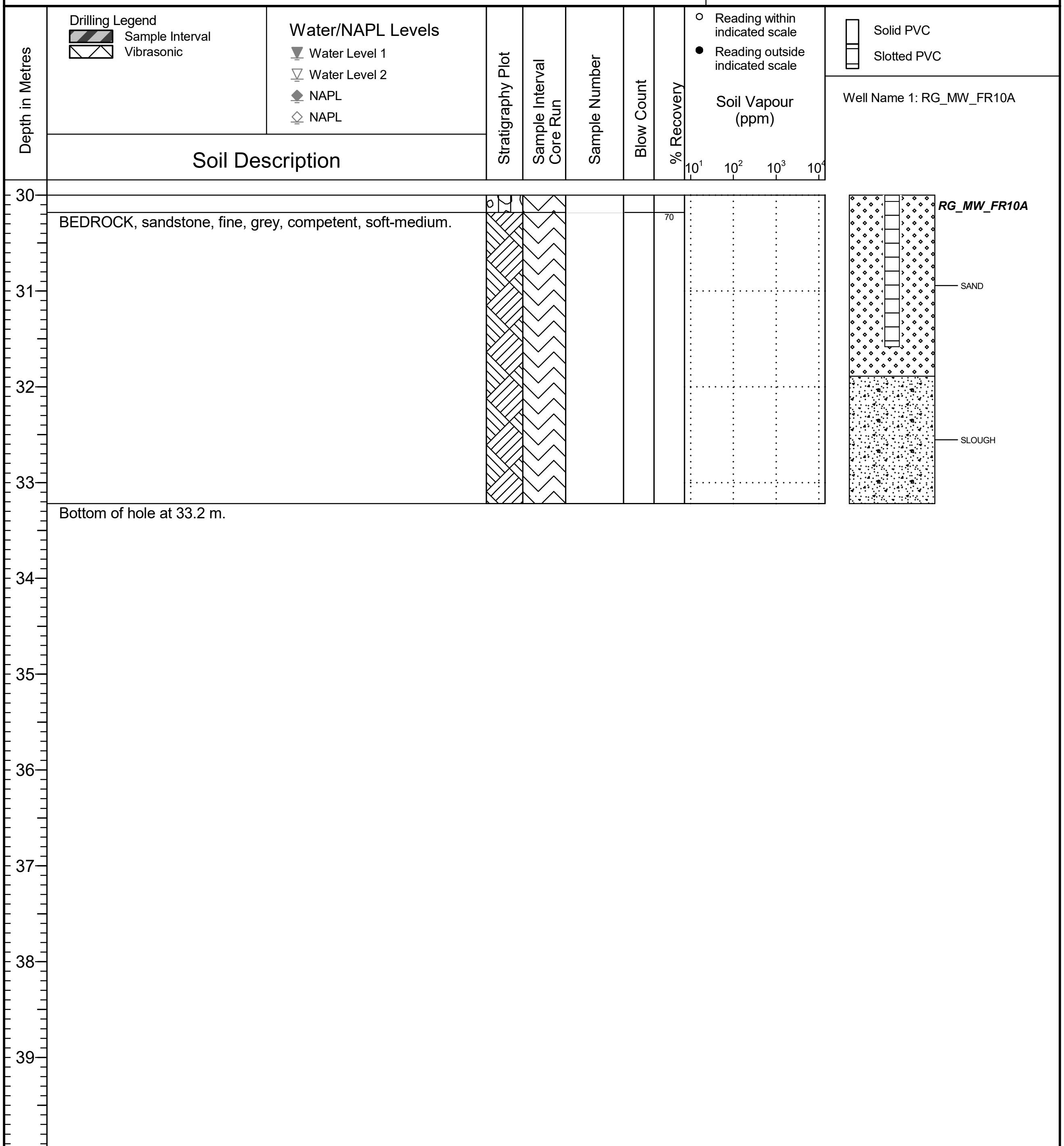
Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4	Well
20	SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, angular to subrounded, some silt, containing cobbles, brown, loose, wet. *(continued)*							
21	Between 21.0 m and 24.1 m - limited recovery, washed gravel and cobbles, sand, medium to coarse grained.					10		
24	Between 24.1 m and 27.1 m - no recovery.					0		
25								BENTONITE
27	At 27.1 m - subangular, grey, medium dense.			10A-06				
27.4	SILT, some gravel, fine to coarse, angular, trace sand, dark grey, dense, non-plastic, damp.							
30								SAND

NOTES
Bolded sample denotes sample analyzed.

QA/QC: LLH 2021 05 19 Print Date:2021-09-14

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : RG_BH_FR10A**
	Location **Regional Groundwater Monitoring**	PAGE 4 OF 4

Drilling Contractor	Mud Bay Drilling Co. Ltd.	Date Monitored	2021 05 06	Project Number:	666653
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	1551.374	Borehole Logged By:	MM/GG
Borehole Dia. (m)	0.10	Top of Casing Elev. (m)	1552.660	Date Drilled:	2021 04 21
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5552811.914	Easting: 655324.144	Log Typed By:	VL



NOTES
Bolded sample denotes sample analyzed.

QA/QC: LLH 2021 05 19 Print Date:2021-09-14

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : RG_BH_FR10B**
	Location **Regional Groundwater Monitoring**	PAGE 1 OF 2

Drilling Contractor	Mud Bay Drilling Co. Ltd.	Date Monitored	2021 05 06	Project Number:	666653
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	1551.296	Borehole Logged By:	GG
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1552.549	Date Drilled:	2021 04 22
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5552813.242	Easting: 655323.432	Log Typed By:	VL

Drilling Legend: Sample Interval; Vibrasonic

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: RG_MW_FR10B

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
0	SILT, some sand, fine grained, trace clay, dark brown, soft, non-plastic, moist, contains organics (roots).					100	
1	Below 0.9 m - wet.						
3						70	
4	Below 3.7 m - some gravel, fine to coarse, subrounded, very soft/loose.						
	SAND and GRAVEL, fine to coarse grained sand, fine gravel, subrounded to rounded, some silt, brown, loose, wet.						
6	SILTY GRAVEL, fine to coarse gravel, subrounded to rounded, some sand, fine to coarse grained, well graded, brown/grey, medium dense, wet.					90	
9	SILT, some sand, fine grained, some clay, dark grey, soft, low plasticity, layers of clay with medium plasticity.					100	
10							

Well: CONCRETE; BENTONITE

NOTES

QA/QC: LLH 2021 05 19 Print Date:2021-09-14

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : RG_BH_FR10B**
	Location **Regional Groundwater Monitoring**	PAGE 2 OF 2

Drilling Contractor	Mud Bay Drilling Co. Ltd.	Date Monitored	2021 05 06	Project Number:	666653
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	1551.296	Borehole Logged By:	GG
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1552.549	Date Drilled:	2021 04 22
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5552813.242	Easting: 655323.432	Log Typed By:	VL

Drilling Legend: Sample Interval; Vibrasonic

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

○ Reading within indicated scale
● Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: RG_MW_FR10B

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
10	SILT, some sand, fine grained, some clay, dark grey, soft, low plasticity, layers of clay with medium plasticity. *(continued)*						
11.3	SILTY GRAVEL, fine to coarse gravel, subangular to subrounded, some sand, fine to coarse grained, containing cobbles, dark brown, medium dense, wet.					80	
15	SAND and GRAVEL, fine to coarse grained sand, fine to coarse gravel, angular to subrounded, some silt, containing cobbles, brown, loose, wet.					20	
18	Bottom of hole at 18.0 m.						

Depth scale: 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

Well construction: BENTONITE; RG_MW_FR10B; SAND

NOTES

QA/QC: LLH 2021 05 19 Print Date:2021-09-14

SNC·LAVALIN	Client **Teck Coal Limited**	**Borehole No. : RG_BH_FR10C**
	Location **Regional Groundwater Monitoring**	PAGE 1 OF 1

Drilling Contractor	Mud Bay Drilling Co. Ltd.	Date Monitored	2021 05 06	Project Number:	666653
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	1551.296	Borehole Logged By:	MM
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	1552.583	Date Drilled:	2021 04 22
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 5552814.132	Easting: 655322.955	Log Typed By:	VL

Drilling Legend: Sample Interval; Vibrasonic

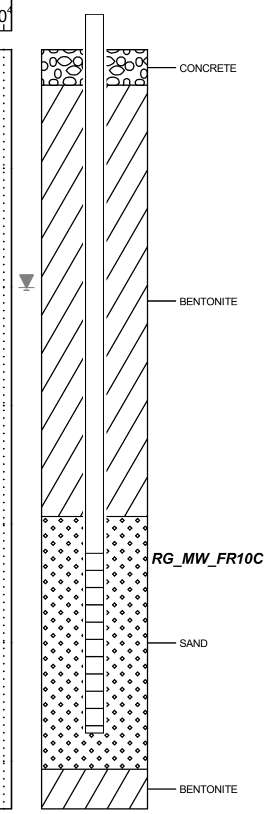
Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: RG_MW_FR10C

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
0	SILT, some sand, fine grained, trace clay, brown, soft, non-plastic, moist, contains organics.					75	
4.3	SAND and GRAVEL, fine to coarse grained sand, fine gravel, subrounded to rounded, some silt, brown, loose, wet.						
6.4	Bottom of hole at 6.4 m.						



NOTES

QA/QC: LLH 2021 05 19 Print Date:2021-09-14

wood.

TEL: FAX:

BOREHOLE NO: **MW18-02**

PROJECT NO: CW231201

CLIENT: Teck Fording River Operations	CONTRACTOR: Val's Drilling Ltd.
PROJECT NAME: Teck FRO-SP2 Swift- Primary & Secondary Ponds	DRILL RIG: Mobile B54
PROJECT LOCATION: Elkford BC	DRILL METHOD / DIA.: Odex (Air Rotary) / 6.25"

NORTHING: 5558163.4	DATUM: NAD 83 UTM Zone 11	GROUND ELEV.: *not surveyed*
EASTING: 652258.9	STICKUP HEIGHT: 1.14 m	CASING ELEV.: 1599.81 m

SAMPLE TYPES: Shelby Tube, No Recovery, SPT Test (N), Grab Sample, Split-Pen, Core

BACKFILL TYPES: Bentonite, Pea Gravel, Slough, Grout, Drill Cuttings, Sand

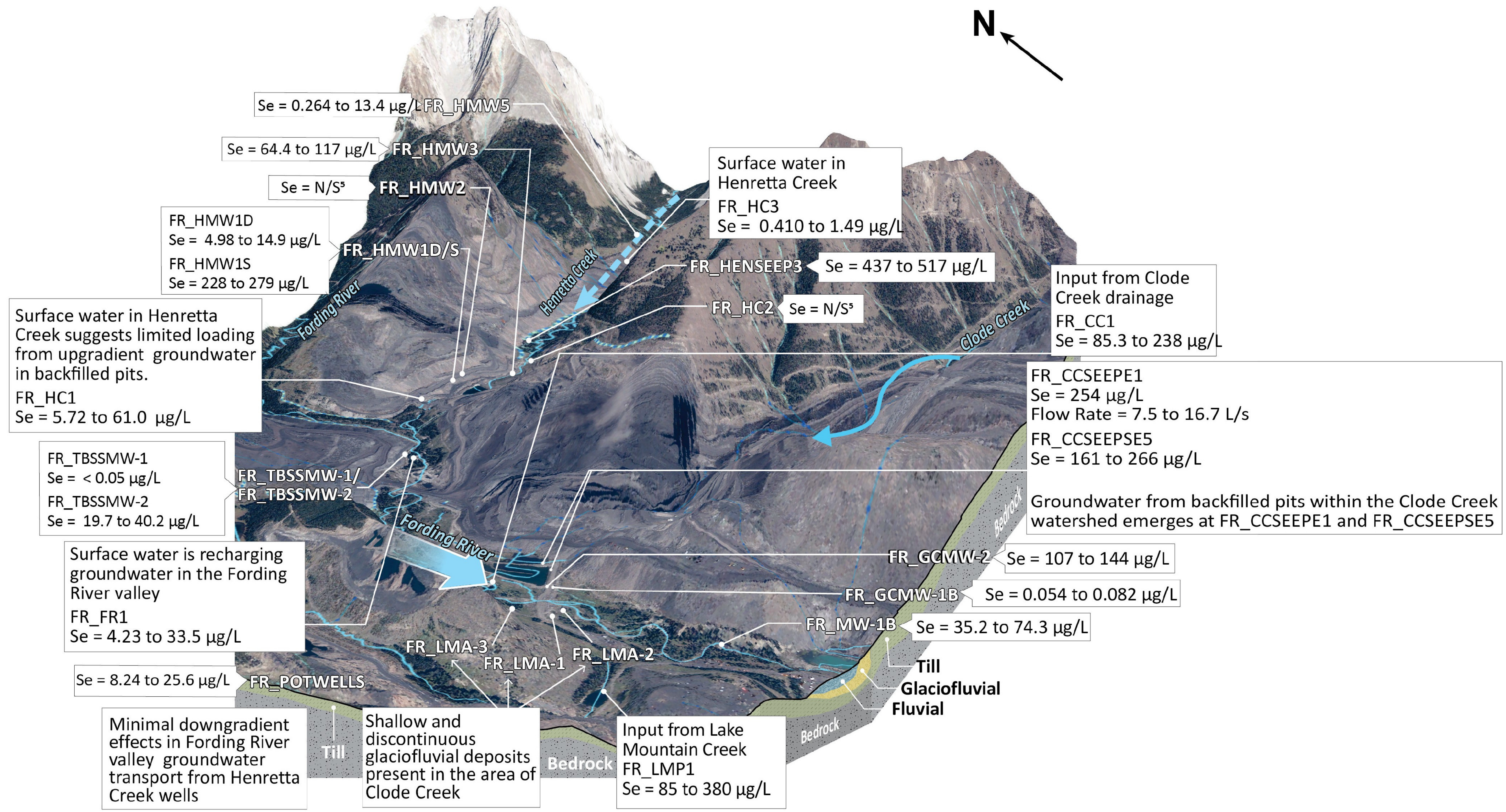
Depth (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	INSTALLATION OR BACKFILL DETAILS / NOTES
0 – 1.52 m		CLAY and Silt with some fine Sand and minor Gravel (CL/ML), low plasticity, dry, brown			Stick Up; Grout/cement; Bentonite
1.52 – 2.74 m		CLAY and GRAVEL, with some Silt (GC-CL), low plasticity, dry, brown			Fines blown out of sample bucket. Soil description accounted for blown out fines.
2.74 – 4.88 m		CLAY and SILT (low plasticity) with some fine Sand and Gravel (angular - 20%) (GC/GM), damp, dark brown			Sand; Screen
4.88 – 7.62 m		BEDROCK			Bentonite chips hydrated; Switched to 3.25" drill bit for rock.

End of Borehole @ 7.62m

ENTERED BY: JD	COMPLETION DEPTH: 7.6 m
LOGGED BY: JD	DRILL DATE: 01-Nov-2018
REVIEWED BY:	

Attachment II

Block Diagrams



Flow Legend

Main Stem Down-Valley Groundwater

Upland or Tributary Groundwater

Surface Water

NOTES:
1. Original in colour.
2. All concentrations and flow rates shown are for range observed in 2022 unless otherwise stated.
3. Subsurface geology is not to scale.
4. Vertical exaggeration 2x for topographic profile.
5. Not sampled in 2022.

References:
1. Graphics from Brick Tudor Studios, LLC.
2. Bedrock geology derived from Monahan, 2000, BC Government.

Revisions:
0 - CW - 2023-02-14 - DRAFT - CH
1 - CW - 2023-03-21 - FINAL - CH

CLIENT: Teck Coal Limited

PROJECT LOCATION: Elk Valley, BC

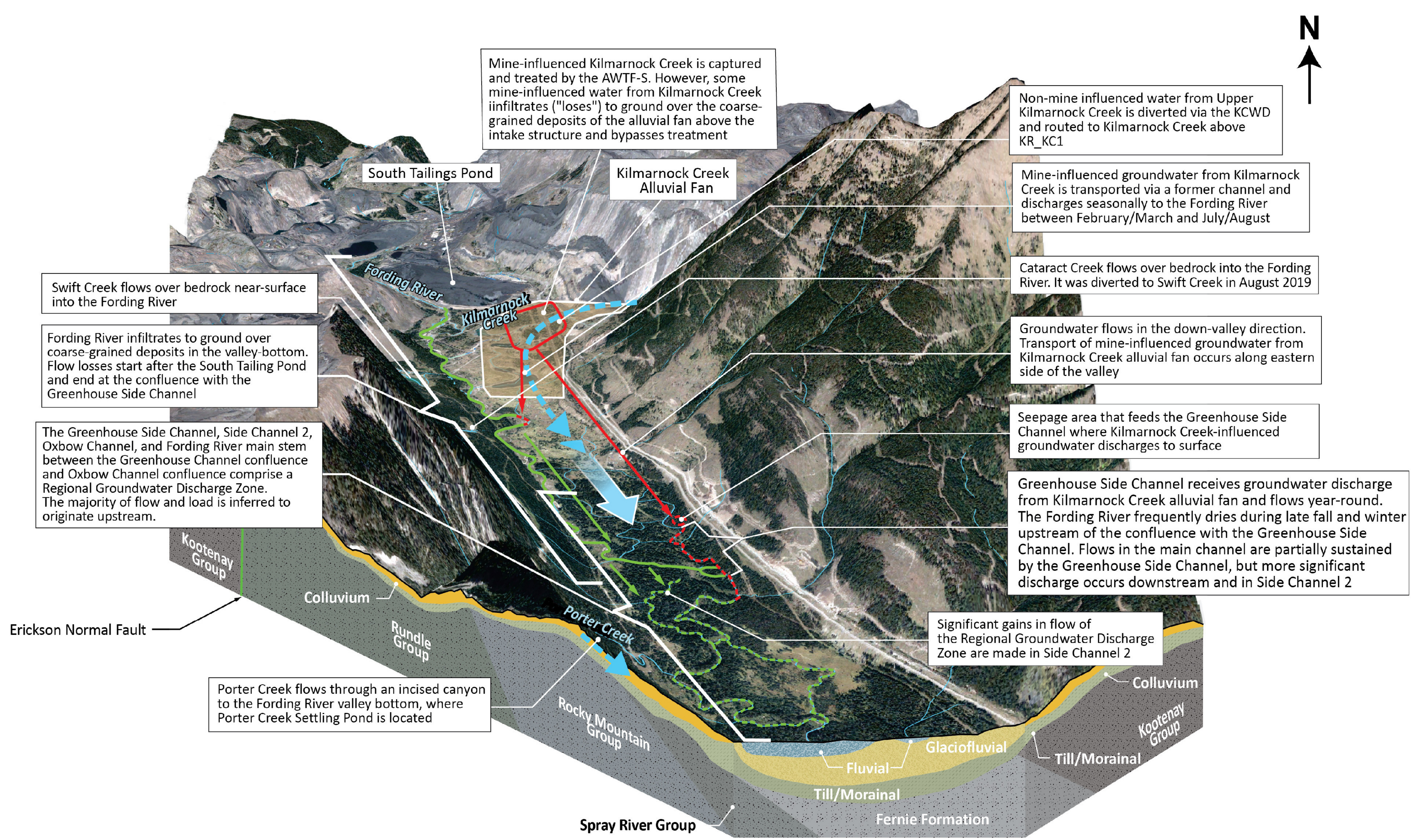
SNC·LAVALIN

Block Diagram Showing 3D Conceptual Hydrogeology and Transport Pathways of Order Constituents at FRO - Lower Fording River and Henretta Creek

BY: CW	SCALE:	DATE: 2023-02-16	REF No: **DIAGRAM FR-01**
CHK'D: CH	Proj Coord Sys:		

MXD Path: \\Sli4395\projects\Current Projects\Teck Coal Ltd\GISCAD\GIS\Map Series\635544_2022_RGMPSSGMP_AnnRpt\635544-BlockDiagram_FR01.mxd

Project Path: \\Sli4395\projects\Current Projects\Teck Coal Ltd\GISCAD\Exports\635544_SSGMP_RGMP_AnnualReport_2021



Flow Legend

- Main Stem Down-Valley Groundwater
- Upland or Tributary Groundwater
- Inferred Transport Pathway of Kilmarnock-Influenced Groundwater
- Inferred Transport Pathway of Fording-Influenced Groundwater
- Kilmarnock Creek Recharge Zone
- Kilmarnock Creek Discharge Zone
- Fording River Recharge Zone
- Fording River Discharge Zone

NOTES:
1. Original in colour.
2. Subsurface geology is not to scale.
3. Vertical exaggeration 2x for topographic profile.
4. Groundwater transport pathways are conceptual only.

References:
1. Graphics from Brick Tudor Studios, LLC.
2. Bedrock geology derived from Monahan, 2000, BC Government.

Revisions:
0 - CW - 2023-02-14 - DRAFT - CH
1 - CW - 2023-03-21 - FINAL - CH

CLIENT: Teck Coal Limited

PROJECT LOCATION: Elk Valley, BC

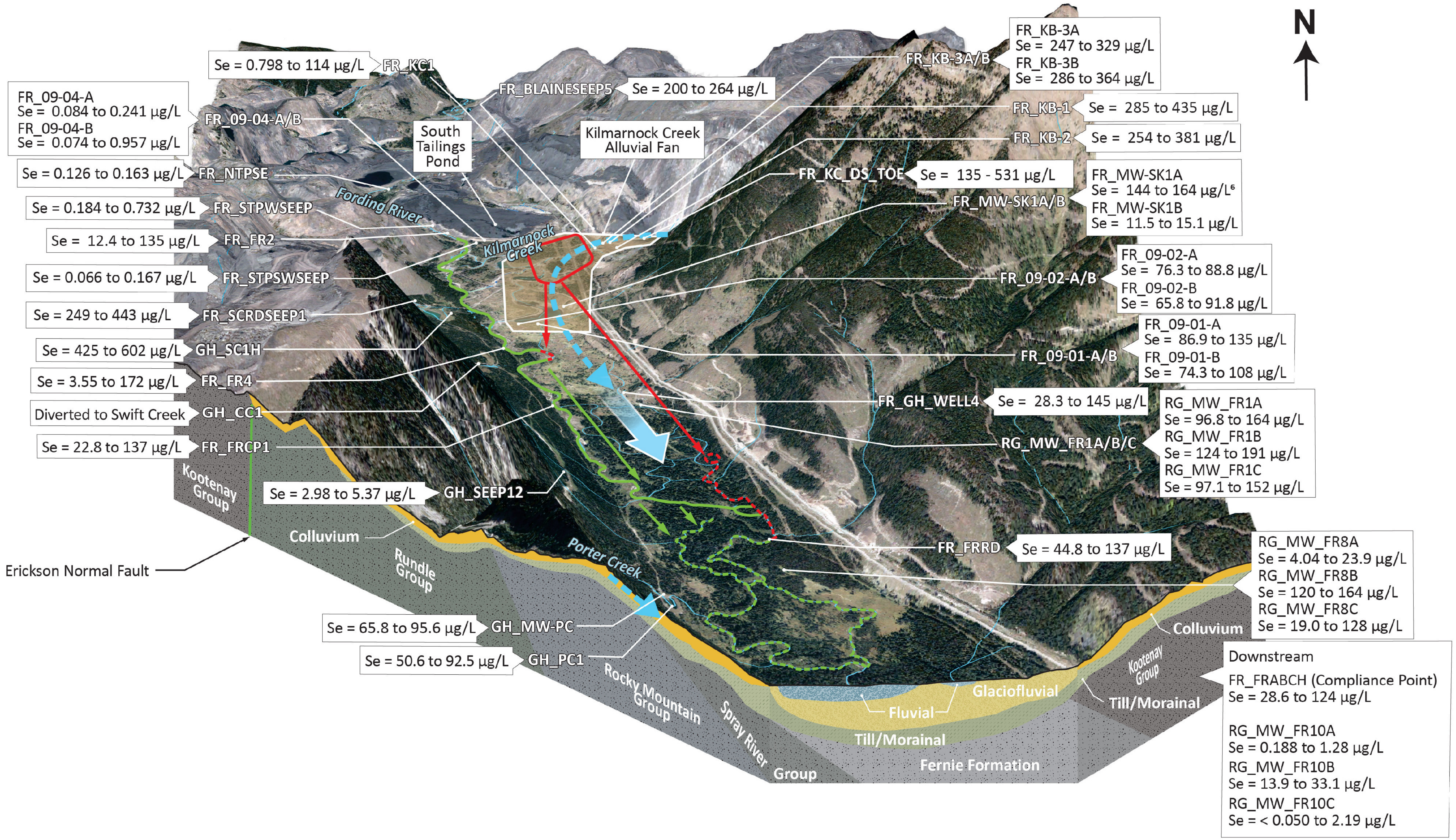
SNC·LAVALIN

Block Diagram Showing 3D Conceptual Hydrogeology and Transport Pathways at FRO - Lower Fording River and Study Area 1

BY: CW	SCALE:	DATE: 2023-03-10	REF No: **DIAGRAM FR-02**
CHK'D: CH	Proj Coord Sys:		

Project Path: \\Sli4395\projects\Current Projects\Teck Coal Ltd\GISCAD\Exports\635544_SSGMP_RGMP_AnnualReport_2021

MXD Path: \\Sli4395\projects\Current Projects\Teck Coal Ltd\GISCAD\GIS\Map Series\635544_2022_RGMPSSGMP_AmRpt\635544-BlockDiagram_FR02.mxd



Flow Legend

- Main Stem Down-Valley Groundwater
- Upland or Tributary Groundwater
- Inferred Transport Pathway of Kilmarnock-Influenced Groundwater
- Inferred Transport Pathway of Fording-Influenced Groundwater
- Kilmarnock Creek Recharge Zone
- Kilmarnock Creek Discharge Zone
- Fording River Recharge Zone
- Fording River Discharge Zone

NOTES:
1. Original in colour.
2. All concentrations shown are for 2022 minimum and maximum unless otherwise stated.
3. Subsurface geology is not to scale.
4. Vertical exaggeration 2x for topographic profile.
5. Groundwater transport pathways are conceptual only.
6. Not sampled in Q1 2022.

References:
1. Graphics from Brick Tudor Studios, LLC.
2. Bedrock geology derived from Monahan, 2000, BC Government.

Revisions:
0 - CW - 2023-02-14 - DRAFT - CH
1 - CW - 2023-03-21 - FINAL - CH

CLIENT: Teck Coal Limited

PROJECT LOCATION: Elk Valley, BC

SNC·LAVALIN

Block Diagram Showing 3D Conceptual Hydrogeology and Transpor Pathways of Order Constituents at FRO - Fording River, Porter Creek, and Study Area 1

BY: CW	SCALE:	DATE: 2023-03-10	REF No:
CHK'D: CH	Proj Coord Sys:		**DIAGRAM FR-03**

MXD Path: \\Sli4395\projects\Current Projects\Teck Coal Ltd\GISCAD\GIS\Map Series\635544_2022_RGMPSSGMP_AmRpt\635544-BlockDiagram_FR03.mxd

Project Path: \\Sli4395\projects\Current Projects\Teck Coal Ltd\GISCAD\Exports\635544_SSGMP_RGMP_AnnualReport_2021

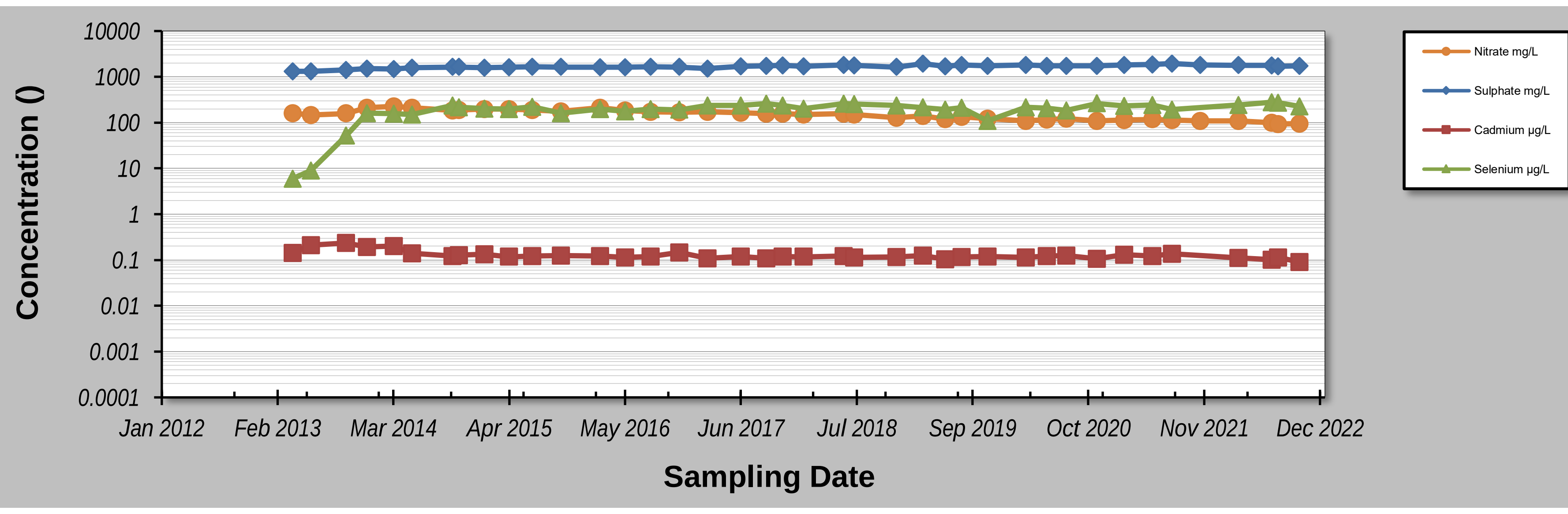
Attachment III

Mann-Kendall Analyses

GSI MANN-KENDALL TOOLKIT

Evaluation Date:	**05-Jan-23**	Job ID:	**635544**
Facility Name:	**Teck Coal Regional Groundwater - FRO**	Location	**FR_HMW1S**
Conducted By:	**MF**	Reviewed By:	**CMH**

Sampling Event	Sampling Date	Nitrate	Sulphate	Cadmium	Selenium				
	units	mg/L	mg/L	µg/L	µg/L				
		FR_HMW1S CONCENTRATION							
1	28-Mar-13	160	1330	0.144	6				
2	29-May-13	147	1320	0.213	9.1				
3	27-Sep-13	159	1400	0.235	51.9				
4	9-Dec-13	212	1520	0.192	160				
5	12-Mar-14	227	1490	0.203	158				
6	13-May-14	211	1570	0.141	149				
7	30-Sep-14	184	1640	0.121	236				
8	22-Oct-14	188	1640	0.128	215				
9	19-Jan-15	199	1580	0.134	202				
10	14-Apr-15	199	1610	0.118	199				
11	3-Jul-15	189	1660	0.121	220				
12	9-Oct-15	177	1640	0.124	161				
13	22-Feb-16	212	1620	0.122	199				
14	18-May-16	185	1610	0.113	178				
15	15-Aug-16	172	1650	0.120	197				
16	22-Nov-16	169	1640	0.147	191				
17	27-Feb-17	174	1530	0.109	236				
18	22-Jun-17	163	1690	0.120	239				
19	18-Sep-17	158	1750	0.109	262				
20	14-Nov-17	156	1760	0.119	236				
21	25-Jan-18	150	1710	0.118	203				
22	12-Jun-18	157	1810	0.121	262				
23	18-Jul-18	149	1790	0.114	255				
24	11-Dec-18	127	1640	0.117	238				
25	13-Mar-19	141	1940	0.125	214				
26	29-May-19	120	1710	0.103	194				
27	25-Jul-19	135	1810	0.117	213				
28	23-Oct-19	123	1730	0.119	109				
29	2-Mar-20	110	1830	0.113	218				
30	14-May-20	116	1720	0.122	205				
31	20-Jul-20	123	1720	0.126	184				
32	2-Nov-20	110	1720	0.107	263				
33	5-Feb-21	114	1820	0.131	234				
34	14-May-21	118	1850	0.123	242				
35	20-Jul-21	115	1930	0.137	194				
36	25-Oct-21	108	1830						
37	7-Mar-22	108	1800	0.111	244				
38	29-Jun-22	99	1790	0.101	279				
39	21-Jul-22	94	1690	0.113	273				
40	3-Oct-22	94	1740	0.091	228				
41									
42									
43									
44									
45									
46									
	Coefficient of Variation:	**0.25**	**0.08**	**0.24**	**0.32**				
	Mann-Kendall Statistic (S):	**-595**	**493**	**-317**	**313**				
	Confidence Factor:	**>99.9%**	**>99.9%**	**>99.9%**	**>99.9%**				
	Concentration Trend:	Decreasing	Increasing	Decreasing	Increasing				



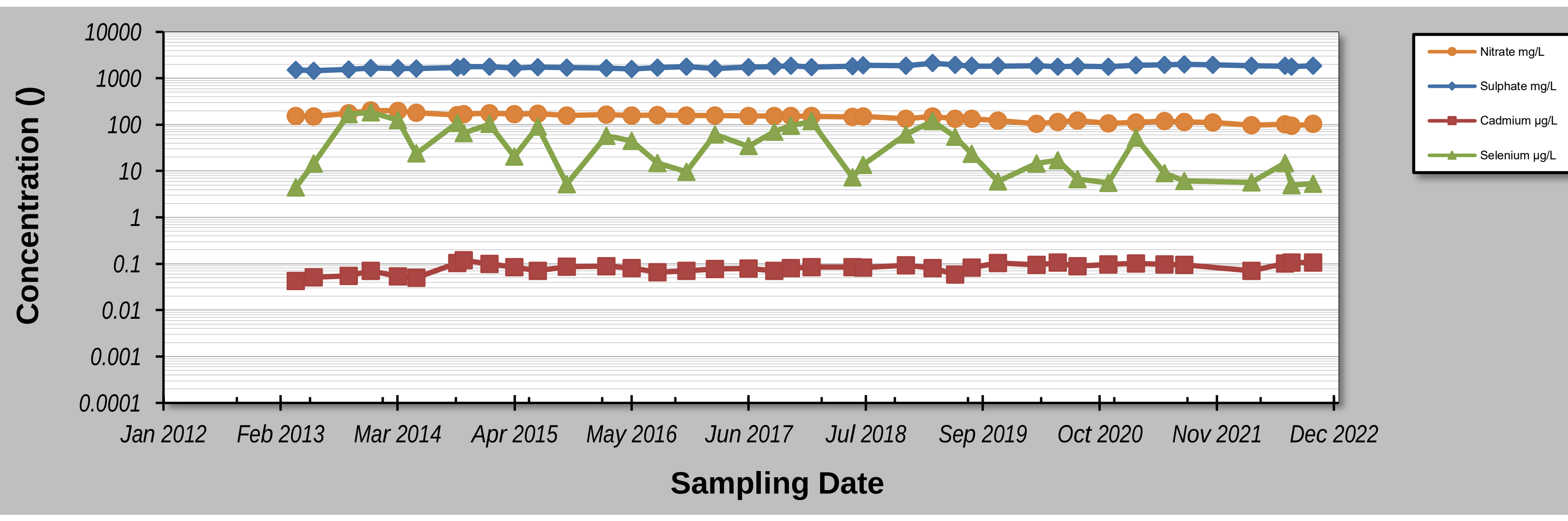
Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT

Evaluation Date:	05-Jan-23	Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - FRO	Location	FR_HMW1D
Conducted By:	MF	Reviewed By:	CMH

Sampling Event	Sampling Date	Nitrate (mg/L)	Sulphate (mg/L)	Cadmium (µg/L)	Selenium (µg/L)				
		FR_HMW1D CONCENTRATION							
1	28-Mar-13	154	1500	0.043	4.5				
2	28-May-13	149	1460	0.051	14.6				
3	25-Sep-13	177	1560	0.055	168				
4	9-Dec-13	203	1660	0.070	184				
5	12-Mar-14	197	1640	0.053	125				
6	13-May-14	181	1620	0.050	24				
7	30-Sep-14	161	1710	0.103	110				
8	22-Oct-14	170	1760	0.118	67				
9	19-Jan-15	175	1780	0.100	103				
10	14-Apr-15	169	1650	0.085	21				
11	3-Jul-15	172	1730	0.071	90.7				
12	9-Oct-15	157	1710	0.087	5.2				
13	22-Feb-16	165	1660	0.088	57.5				
14	18-May-16	157	1600	0.080	44.8				
15	15-Aug-16	160	1700	0.066	15				
16	22-Nov-16	156	1780	0.071	10				
17	27-Feb-17	157	1630	0.077	61.5				
18	22-Jun-17	155	1730	0.0790	34.3				
19	18-Sep-17	155	1800	0.071	70.1				
20	14-Nov-17	153	1860	0.081	95.6				
21	24-Jan-18	152	1740	0.084	118				
22	12-Jun-18	148	1830	0.085	7				
23	18-Jul-18	150	1910	0.082	13.7				
24	11-Dec-18	134	1850	0.093	61.7				
25	13-Mar-19	151	2110	0.0800	119				
26	29-May-19	133	1950	0.059	55				
27	25-Jul-19	133	1840	0.082	23.5				
28	23-Oct-19	122	1840	0.104	5.9				
29	2-Mar-20	105	1870	0.095	14.5				
30	14-May-20	113	1790	0.105	17.1				
31	20-Jul-20	123	1810	0.088	6.7				
32	2-Nov-20	107	1790	0.097	5.56				
33	5-Feb-21	112	1900	0.101	52				
34	14-May-21	119	1950	0.097	9.0				
35	20-Jul-21	114	2010	0.0946	6.08				
36	25-Oct-21	112	1960						
37	7-Mar-22	98	1870	0.0705	5.71				
38	29-Jun-22	102.0	1840	0.1020	15				
39	21-Jul-22	95	1790	0.107	5				
40	3-Oct-22	103.0	1880	0.107	5.29				
41									
42									
43									
44									
45									
46									
Coefficient of Variation:		0.20	0.08	0.22	1.03				
Mann-Kendall Statistic (S):		-618	472	325	-281				
Confidence Factor:		>99.9%	>99.9%	>99.9%	>99.9%				
Concentration Trend:		Decreasing	Increasing	Increasing	Decreasing				

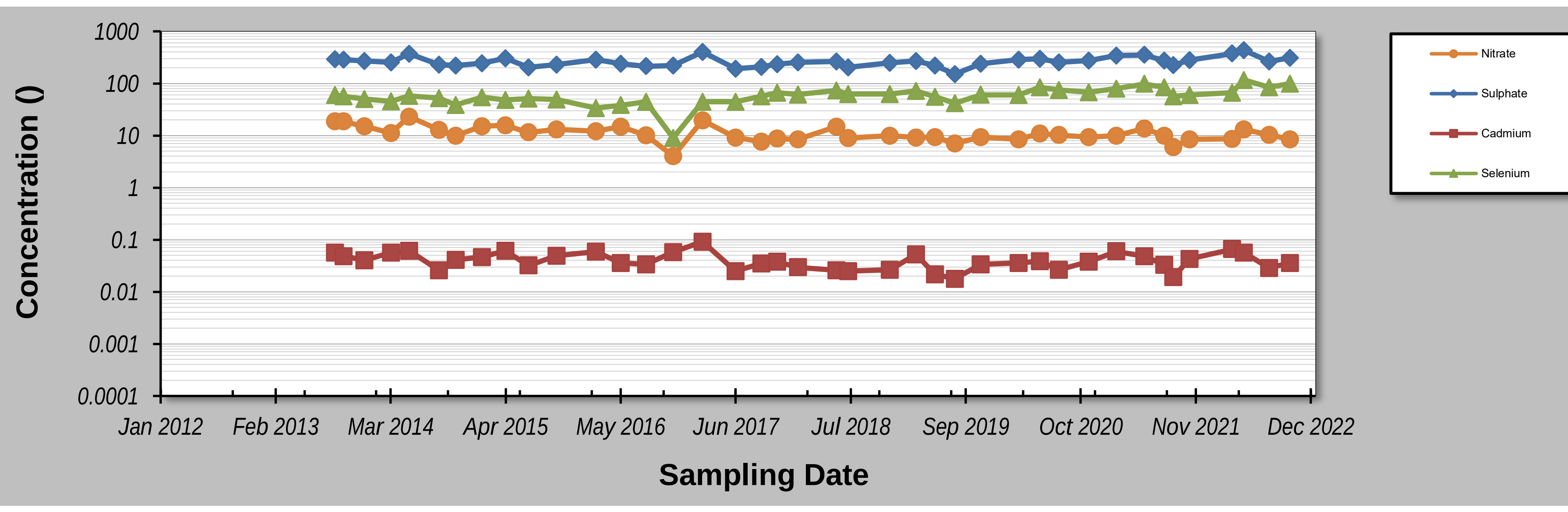


Notes:
1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT

Evaluation Date:	05-Jan-23	Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - FRO	Location	FR_HMW3
Conducted By:	MF	Reviewed By:	CMH

Sampling Event	Sampling Date	Nitrate (mg/L)	Sulphate (mg/L)	Cadmium (µg/L)	Selenium (µg/L)				
		FR_HMW3 CONCENTRATION							
1	29-Aug-13	18.9	292	0.057	60				
2	27-Sep-13	18.6	286	0.048	56				
3	9-Dec-13	15.1	270	0.040	50				
4	12-Mar-14	11.2	255	0.057	46				
5	13-May-14	23.1	368	0.061	58				
6	25-Aug-14	12.8	229	0.026	52				
7	22-Oct-14	10.0	220	0.041	39				
8	21-Jan-15	15.1	243	0.046	54				
9	14-Apr-15	15.6	304	0.062	48				
10	3-Jul-15	11.5	204	0.032	51				
11	8-Oct-15	13.0	231	0.050	49				
12	22-Feb-16	12.0	288	0.059	33				
13	19-May-16	14.8	239	0.036	38				
14	15-Aug-16	10.1	214	0.034	44				
15	17-Nov-16	4.0	219	0.058	9				
16	27-Feb-17	19.6	402	0.092	44				
17	22-Jun-17	9.2	193	0.025	45				
18	19-Sep-17	7.6	208	0.035	56				
19	14-Nov-17	8.7	236	0.038	66				
20	25-Jan-18	8.4	253	0.030	61				
21	7-Jun-18	14.7	263	0.026	74				
22	18-Jul-18	8.9	203	0.025	63				
23	11-Dec-18	9.9	251	0.026	63				
24	11-Mar-19	9.1	270	0.052	71				
25	16-May-19	9.4	220	0.022	56				
26	24-Jul-19	7.0	151	0.018	42				
27	23-Oct-19	9.3	240	0.034	61				
28	2-Mar-20	8.5	285	0.035	60				
29	15-May-20	10.9	298	0.039	85				
30	21-Jul-20	10.2	253	0.026	75				
31	2-Nov-20	9.3	276	0.038	67				
32	5-Feb-21	9.9	345	0.060	79				
33	14-May-21	13.6	353	0.048	98				
34	21-Jul-21	9.8	276	0.033	84				
35	23-Aug-21	6.0	227	0.019	57				
36	18-Oct-21	8.4	279	0.043	60				
37	15-Mar-22	8.6	375	0.066	66				
38	25-Apr-22	13.2	435	0.057	117				
39	21-Jul-22	10.3	263	0.028	85				
40	3-Oct-22	8.5	312	0.036	99				
41									
42									
43									
44									
45									
46									
	Coefficient of Variation:	0.36	0.22	0.38	0.33				
	Mann-Kendall Statistic (S):	-187	176	-120	366				
	Confidence Factor:	99.3%	98.9%	91.7%	>99.9%				
	Concentration Trend:	Decreasing	Increasing	Prob. Decreasing	Increasing				



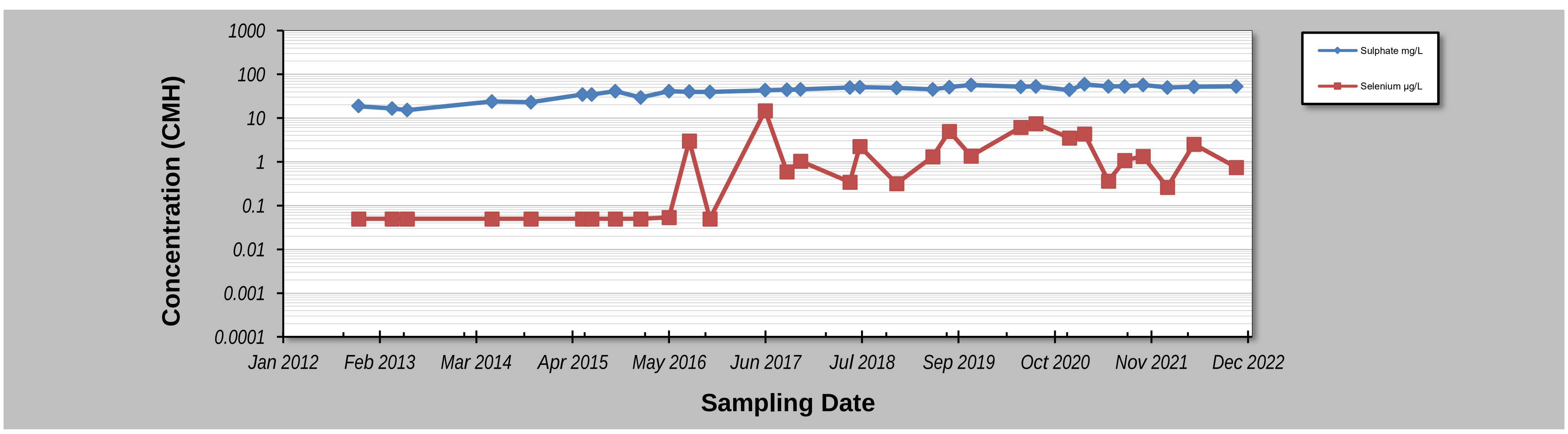
Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water* , 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT

Evaluation Date:	05-Jan-23	Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - FRO	Location	FR_HMW5
Conducted By:	MF	Reviewed By:	CMH

Sampling Event	Sampling Date	Sulphate (mg/L)	Selenium (µg/L)						
		FR_HMW5 CONCENTRATION							
1	8-Nov-12	18.80	0.050						
2	27-Mar-13	16.70	0.050						
3	28-May-13	15.20	0.050						
4	14-May-14	24.00	0.050						
5	23-Oct-14	22.90	0.050						
6	25-May-15	34.80	0.050						
7	3-Jul-15	34.50	0.050						
8	8-Oct-15	41.20	0.050						
9	21-Jan-16	29.80	0.050						
10	18-May-16	41.00	0.054						
11	10-Aug-16	40.00	3.040						
12	3-Nov-16	39.80	0.050						
13	21-Jun-17	43.20	14.800						
14	18-Sep-17	44.50	0.595						
15	14-Nov-17	45.40	1.030						
16	6-Jun-18	50.30	0.345						
17	18-Jul-18	51.40	2.270						
18	18-Dec-18	48.70	0.318						
19	16-May-19	45.20	1.320						
20	24-Jul-19	51.10	4.950						
21	22-Oct-19	57.40	1.360						
22	15-May-20	52.30	6.210						
23	16-Jul-20	53.10	7.550						
24	3-Dec-20	44.10	3.530						
25	4-Feb-21	59.00	4.320						
26	14-May-21	52.60	0.367						
27	20-Jul-21	53.30	1.080						
28	4-Oct-21	56.90	1.340						
29	12-Jan-22	50.20	0.264						
30	3-May-22	52.00	2.520						
31	26-Oct-22	52.90	0.744						
32									
33									
34									
35									
41									
42									
43									
44									
45									
46									
Coefficient of Variation:		0.29	1.65						
Mann-Kendall Statistic (S):		341	210						
Confidence Factor:		>99.9%	>99.9%						
Concentration Trend:		Increasing	Increasing						

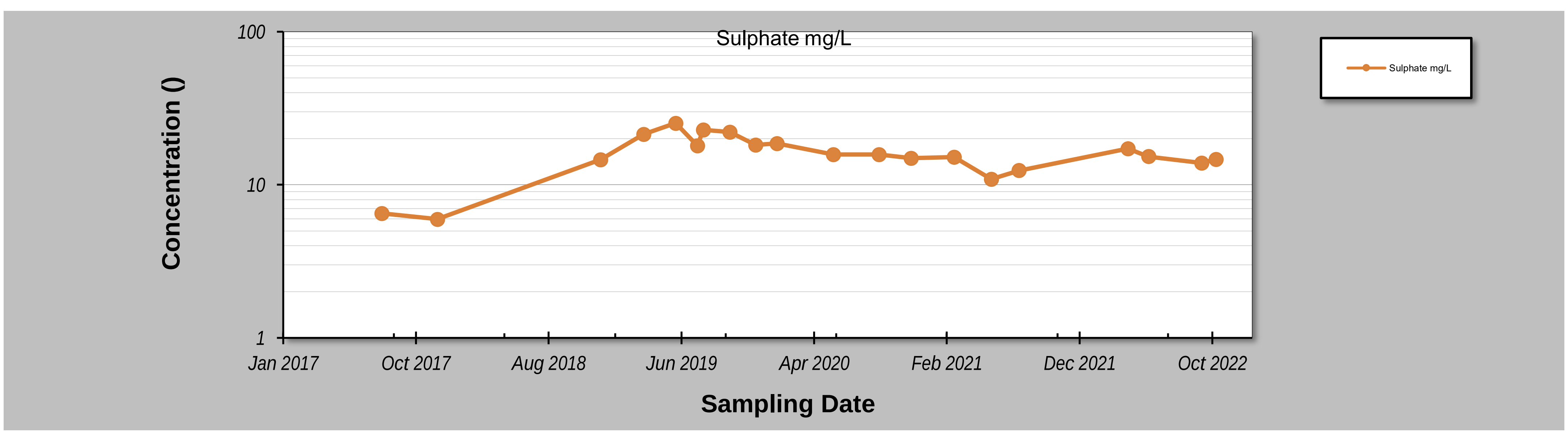


Notes:
1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT

Evaluation Date:	05-Jan-23	Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - FRO	Location	FR_TBSSMW-1
Conducted By:	MF	Reviewed By:	CMH

Sampling Event	Sampling Date	FR_TBSSMW-1 CONCENTRATION							
	Parameter	Sulphate							
	units	mg/L							
1	11-Aug-17	6.50							
2	15-Dec-17	5.97							
3	19-Dec-18	14.60							
4	26-Mar-19	21.40							
5	6-Jun-19	25.30							
6	26-Jul-19	18.00							
7	8-Aug-19	22.90							
8	7-Oct-19	22.10							
9	4-Dec-19	18.20							
10	21-Jan-20	18.60							
11	28-May-20	15.80							
12	8-Sep-20	15.80							
13	19-Nov-20	14.90							
14	25-Feb-21	15.20							
15	20-May-21	10.90							
16	21-Jul-21	12.40							
17	25-Mar-22	17.20							
18	10-May-22	15.30							
19	7-Sep-22	13.90							
20	10-Oct-22	14.70							
21									
22									
23									
24									
25									
41									
42									
43									
44									
45									
46									
	Coefficient of Variation:	0.31							
	Mann-Kendall Statistic (S):	-39							
	Confidence Factor:	89.0%							
	Concentration Trend:	Stable							



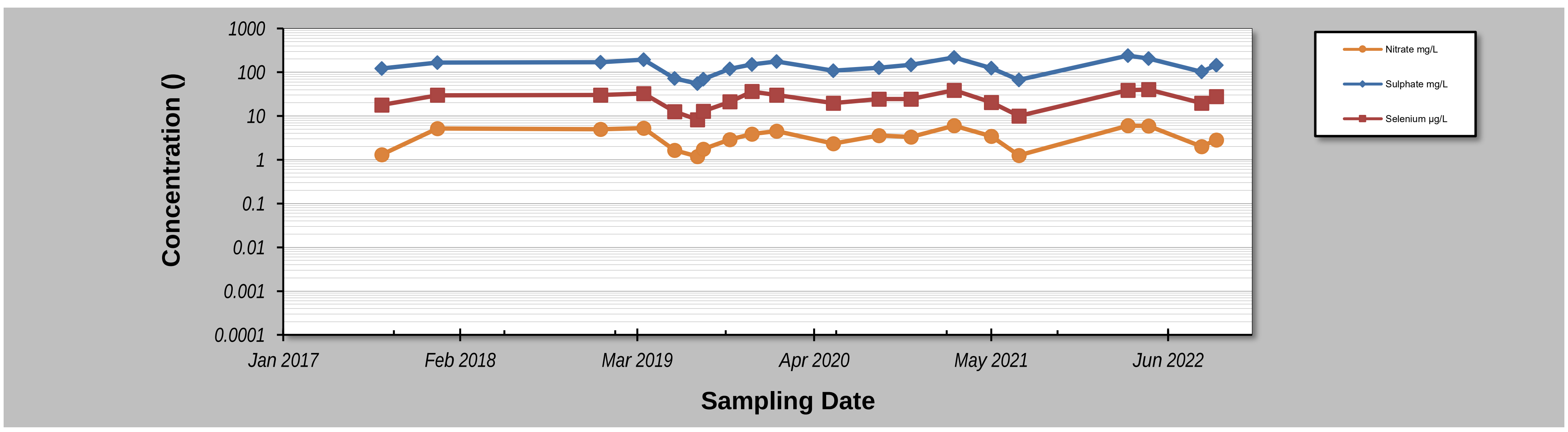
Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water* , 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT

Evaluation Date:	05-Jan-23	Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - FRO	Location	FR_TBSSMW-2
Conducted By:	MF	Reviewed By:	CMH

Sampling Event	Sampling Date	Nitrate	Sulphate	Selenium					
Parameter units		mg/L	mg/L	µg/L					
		FR_TBSSMW-2 CONCENTRATION							
1	11-Aug-17	1.3200	122.00	18.000					
2	15-Dec-17	5.2000	166.00	29.900					
3	19-Dec-18	4.9800	170.00	30.300					
4	26-Mar-19	5.2500	193.00	32.400					
5	4-Jun-19	1.6600	72.40	12.700					
6	26-Jul-19	1.1900	55.00	8.280					
7	8-Aug-19	1.7600	69.40	12.800					
8	7-Oct-19	2.8800	119.00	21.100					
9	26-Nov-19	3.8600	152.00	36.300					
10	21-Jan-20	4.4900	175.00	30.200					
11	28-May-20	2.3500	109.00	19.600					
12	8-Sep-20	3.6000	126.00	24.600					
13	19-Nov-20	3.3200	148.00	24.500					
14	25-Feb-21	6.0000	218.00	39.000					
15	20-May-21	3.4600	125.00	20.500					
16	21-Jul-21	1.2700	66.90	10.100					
17	6-Oct-21	2.88	126	18.7					
18	25-Mar-22	6.0000	240.00	38.800					
19	10-May-22	5.9400	206.00	40.200					
20	7-Sep-22	2.0000	102.00	19.700					
21	10-Oct-22	2.8500	146.00	27.900					
22									
23									
24									
25									
41									
42									
43									
44									
45									
46									
Coefficient of Variation:		0.48	0.38	0.40					
Mann-Kendall Statistic (S):		29	30	42					
Confidence Factor:		91.6%	82.4%	90.7%					
Concentration Trend:		Prob. Increasing	No Trend	Prob. Increasing					



Notes:

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2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT

Evaluation Date:	05-Jan-23	Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - FRO	Location	FR_POTWELLS
Conducted By:	MF	Reviewed By:	CMH

Sampling Event	Sampling Date	Nitrate	Sulphate	Selenium					
	units	mg/L	mg/L	µg/L					
		FR_POTWELLS CONCENTRATION							
1	24-May-11	3.6600	68.40	10.100					
2	20-Jun-11	2.3000	44.60	6.290					
3	27-Jun-11	1.9600	40.20	5.690					
4	18-Jul-11	1.7600	41.30	5.970					
5	31-Oct-13	5.7000	119.00	24.500					
6	13-Mar-14	8.4800	183.00	35.300					
7	14-May-14	5.9900	130.00	24.800					
8	30-Sep-14	3.1400	81.60	13.000					
9	23-Oct-14	3.6200	94.60	14.700					
10	22-Jan-15	5.8400	135.00	22.600					
11	14-Apr-15	5.7400	129.00	23.300					
12	3-Jul-15	1.8000	53.90	7.340					
13	9-Oct-15	3.2100	90.40	11.000					
14	27-Jan-16	5.2900	137.00	19.700					
15	14-Jun-16	1.8200	59.70	7.600					
16	16-Aug-16	2.0300	65.20	8.780					
17	17-Nov-16	3.0700	96.10	13.000					
18	2-Mar-17	4.5500	138.00	22.200					
19	27-Jun-17	1.6500	55.30	9.400					
20	19-Sep-17	3.8200	121.00	20.500					
21	21-Nov-17	4.1500	137.00	25.400					
22	20-Feb-18	5.7500	186.00	31.600					
23	12-Jun-18	1.6400	58.10	10.500					
24	2-Aug-18	1.9300	77.20	11.800					
25	27-Dec-18	3.9900	147.00	24.600					
26	14-Mar-19	4.4400	169.00	25.400					
27	13-Jun-19	1.4000	56.50	8.730					
28	31-Jul-19	1.1300	50.20	8.320					
29	7-Nov-19	2.7700	118.00	17.400					
30	7-Feb-20	3.8300	159.00	23.700					
31	29-May-20	1.2500	53.40	9.370					
32	27-Jul-20	1.7000	64.50	11.200					
33	19-Nov-20	4.4600	170.00	30.000					
34	8-Mar-21	5.6900	210.00	37.600					
35	20-May-21	1.9300	74.60	11.000					
36	15-Sep-21	2.0600	97.60	12.500					
37	8-Dec-21	4.1500	162.00	24.900					
38	16-Mar-22	3.6100	155.00	25.600					
39	27-Jun-22	1.1100	48.90	8.240					
40	18-Sep-22	2.0300	109.00	21.100					
41									
42									
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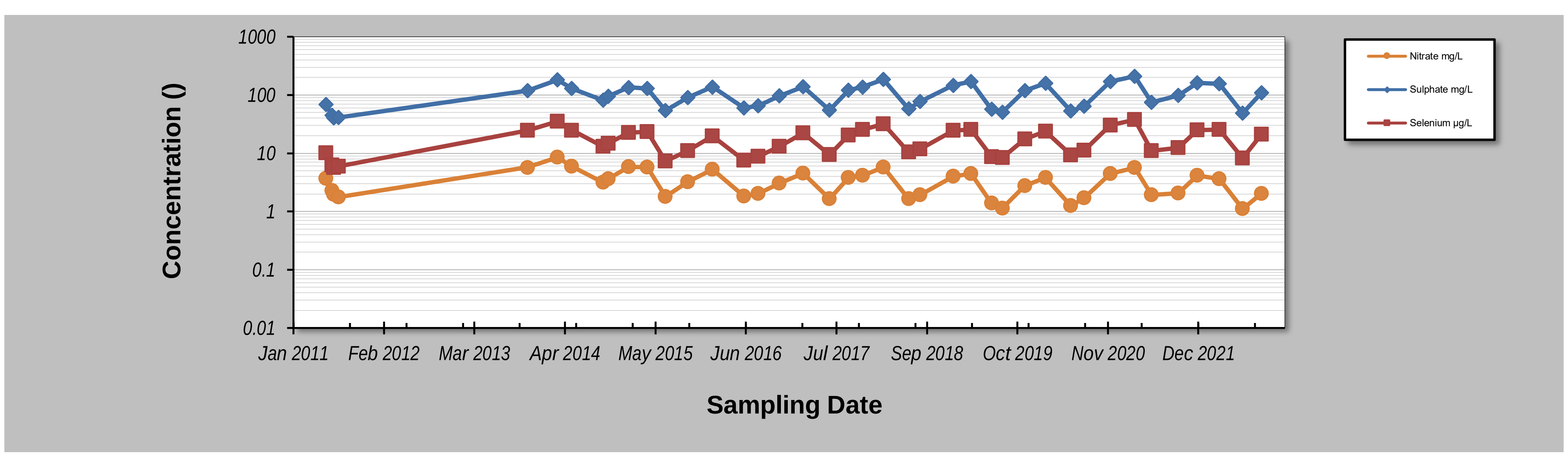
53									
54									
55									
Coefficient of Variation:		0.52	0.45	0.51					
Mann-Kendall Statistic (S):		-145	127	127					
Confidence Factor:		95.3%	92.9%	92.9%					
Concentration Trend:		Decreasing	Prob. Increasing	Prob. Increasing					



Notes:

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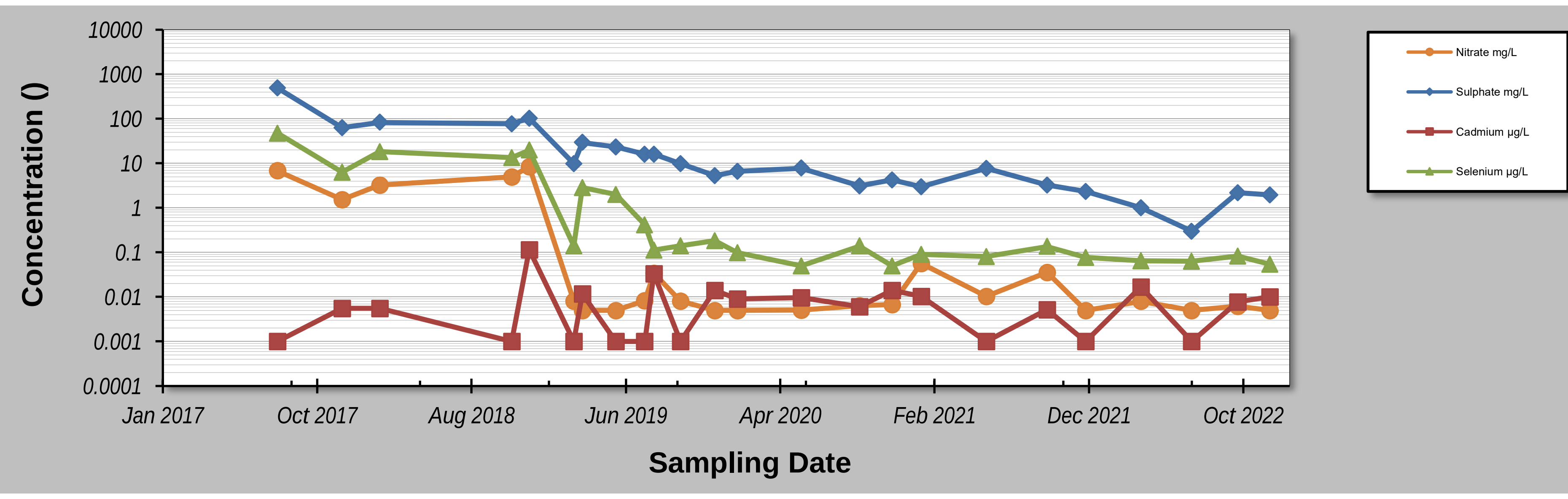
GSI MANN-KENDALL TOOLKIT

Evaluation Date:	05-Jan-23	Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - FRO	Location	FR_GCMW-1B
Conducted By:	MF	Reviewed By:	CMH

Sampling Event	Sampling Date	Nitrate (mg/L)	Sulphate (mg/L)	Cadmium (µg/L)	Selenium (µg/L)				
		FR_GCMW-1B CONCENTRATION							
1	11-Aug-17	6.84	494	0.0010	47.9				
2	15-Dec-17	1.53	63.3	0.0056	6.39				
3	26-Feb-18	3.27	83.5	0.0055	18.3				
4	9-Nov-18	4.98	78	0.0010	13.4				
5	14-Dec-18	8.500	102	0.1150	19.8				
6	10-Mar-19	0.0081	9.91	0.0010	0.14				
7	27-Mar-19	0.005	29.5	0.0119	2.85				
8	31-May-19	0.005	23.6	0.0010	2				
9	26-Jul-19	0.0082	16	0.0010	0.419				
10	13-Aug-19	0.0338	15.9	0.0334	0.113				
11	3-Oct-19	0.0081	9.91	0.0010	0.14				
12	9-Dec-19	0.005	5.25	0.0141	0.182				
13	22-Jan-20	0.005	6.58	0.0090	0.098				
14	25-May-20	0.0051	7.82	0.0097	0.05				
15	15-Sep-20	0.0063	3.09	0.0061	0.139				
16	18-Nov-20	0.0068	4.26	0.0141	0.05				
17	13-Jan-21	0.0566	2.98	0.0104	0.09				
18	20-May-21	0.0103	7.80	0.0010	0.08				
19	15-Sep-21	0.0355	3.24	0.0052	0.136				
20	29-Nov-21	0.005	2.32	0.0010	0.078				
21	16-Mar-22	0.008	1.00	0.0168	0.065				
22	23-Jun-22	0.005	0.30	0.0010	0.064				
23	20-Sep-22	0.006	2.17	0.0077	0.082				
24	22-Nov-22	0.0050	1.9400	0.01	0.054				
25									
41									
42									
43									
44									
45									
46									
Coefficient of Variation:		2.25	2.49	1.96	2.32				
Mann-Kendall Statistic (S):		-96	-227	21	-196				
Confidence Factor:		99.1%	>99.9%	68.9%	>99.9%				
Concentration Trend:		Decreasing	Decreasing	No Trend	Decreasing				



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GSI MANN-KENDALL TOOLKIT

Evaluation Date:	**05-Jan-23**	Job ID:	**635544**
Facility Name:	**Teck Coal Regional Groundwater - FRO**	Location	**FR_GCMW-2**
Conducted By:	**MF**	Reviewed By:	**CMH**

Sampling Event	Sampling Date	Nitrate	Sulphate	Cadmium	Selenium
	Parameter units	mg/L	mg/L	µg/L	µg/L
		FR_GCMW-2 CONCENTRATION			
1	11-Aug-17	20.3	432	0.0340	136
2	14-Dec-17	48.2	416	0.0626	136
3	14-Feb-18	63.2	511	0.0536	181
4	14-Dec-18	55.6	459	0.0535	129
5	13-Mar-19	83.5	574	0.0634	121
6	14-Jun-19	35.7	327	0.0471	73.8
7	26-Jul-19	31.3	300	0.0412	80.6
8	7-Nov-19	42.7	408	0.0541	97.9
9	10-Feb-20	68.3	501	0.0688	137
10	10-Feb-20	68.3	501	0.0688	137
11	4-Jun-20	22.4	275	0.0344	70.4
12	27-Jul-20	26	280	0.0415	80.5
13	23-Nov-20	32.2	419	0.0466	117
14	28-Jan-21	57.2	557	0.0625	145
15	20-May-21	45.2	460	0.0576	110
16	26-Jul-21	49.1	426	0.0580	93.9
17	25-Nov-21	58.7	524	0.0494	115
18	7-Dec-21	64	561	0.0667	126
19	15-Mar-22	86.2	719	0.1030	126
20	23-Jun-22	43.9	472	0.0515	107
21	22-Sep-22	63.2	601	0.0923	119
22	22-Nov-22	65.4	644	0.1110	144
23					
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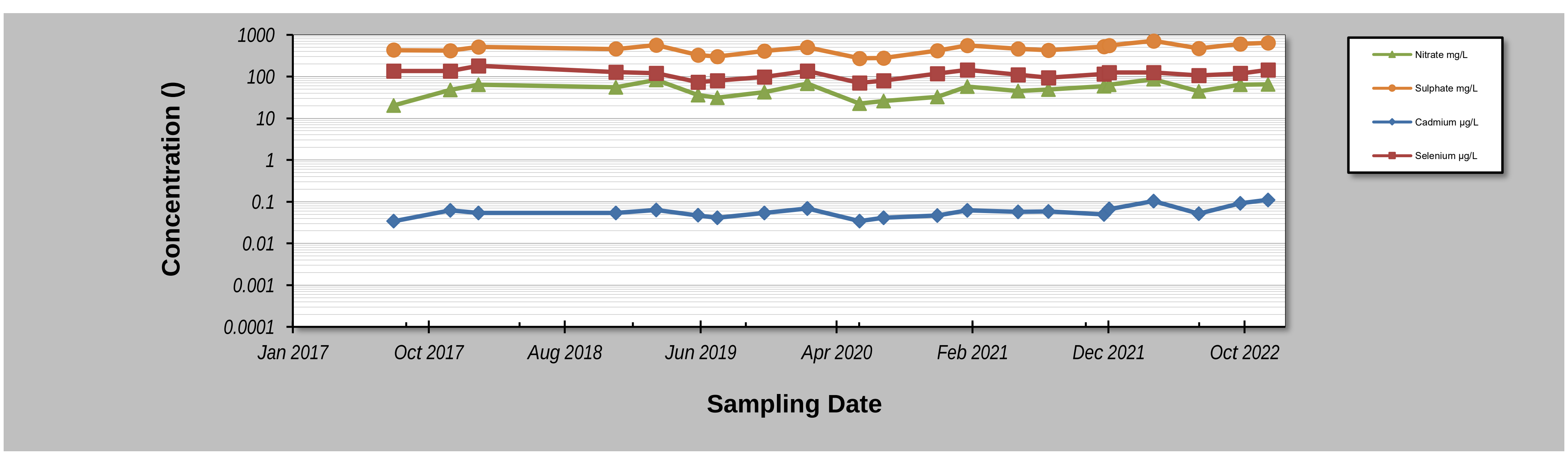
55					
	Coefficient of Variation:	0.36	0.24	0.33	0.23
	Mann-Kendall Statistic (S):	55	80	74	-10
	Confidence Factor:	93.6%	98.8%	98.1%	59.9%
	Concentration Trend:	Prob. Increasing	Increasing	Increasing	Stable



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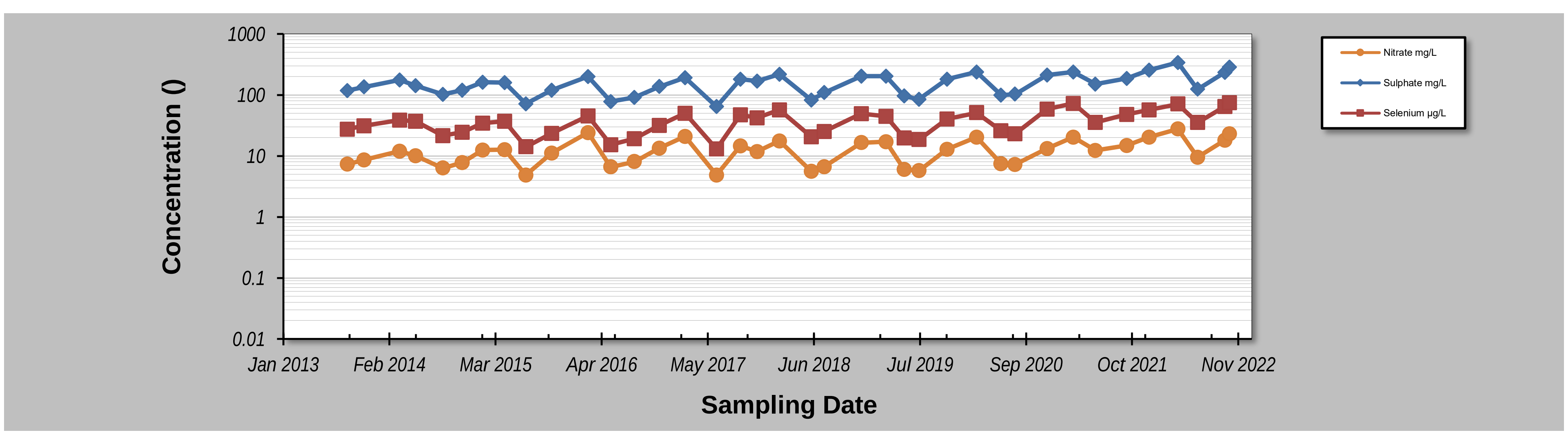
GSI MANN-KENDALL TOOLKIT

Evaluation Date: **05-Jan-23**
Facility Name: **Teck Coal Regional Groundwater - FRO**
Conducted By: **MF**

Job ID: **635544**
Location: **FR_MW-1B**
Reviewed By: **CMH**

Sampling Event	Sampling Date	Nitrate (mg/L)	Sulphate (mg/L)	Selenium (µg/L)					
		FR_MW-1B CONCENTRATION							
1	29-Aug-13	7.3000	118.00	27.500					
2	31-Oct-13	8.6400	135.00	31.000					
3	14-Mar-14	11.9000	175.00	38.600					
4	14-May-14	10.1000	142.00	36.800					
5	25-Aug-14	6.3300	102.00	21.400					
6	6-Nov-14	7.7600	119.00	24.500					
7	21-Jan-15	12.5000	162.00	34.300					
8	14-Apr-15	12.7000	159.00	36.800					
9	3-Jul-15	4.8900	71.80	14.100					
10	8-Oct-15	11.1000	120.00	23.500					
11	23-Feb-16	24.2000	199.00	45.000					
12	19-May-16	6.6100	77.40	15.300					
13	16-Aug-16	8.0800	91.40	19.300					
14	17-Nov-16	13.5000	137.00	31.700					
15	23-Feb-17	20.8000	191.00	50.200					
16	22-Jun-17	4.8700	64.20	13.000					
17	19-Sep-17	14.7000	180.00	47.100					
18	21-Nov-17	11.8000	168.00	42.000					
19	14-Feb-18	17.5000	218.00	57.000					
20	13-Jun-18	5.6400	82.50	20.600					
21	1-Aug-18	6.6500	109.00	25.100					
22	19-Dec-18	16.5000	203.00	49.300					
23	22-Mar-19	17.0000	202.00	44.600					
24	30-May-19	6.0100	95.90	19.800					
25	25-Jul-19	5.7300	84.50	18.500					
26	7-Nov-19	12.8000	182.00	40.100					
27	27-Feb-20	20.4000	239.00	51.100					
28	29-May-20	7.4900	99.50	25.800					
29	21-Jul-20	7.2900	103.00	23.100					
30	19-Nov-20	13.2000	212.00	58.200					
31	25-Feb-21	20.3000	238.00	72.600					
32	20-May-21	12.3000	150.00	35.400					
33	15-Sep-21	14.8000	187.00	47.800					
34	8-Dec-21	20.2000	254.00	56.600					
35	26-Mar-22	27.6000	340.00	71.000					
36	9-Jun-22	9.5100	124.00	35.200					
37	20-Sep-22	18.1000	233.00	64.800					
38	7-Oct-22	23.0000	287.00	74.300					
39									
40									
41									
42									
43									
44									
45									
46									
Coefficient of Variation:		0.48	0.41	0.45					
Mann-Kendall Statistic (S):		197	229	236					
Confidence Factor:		99.3%	99.8%	99.9%					
Concentration Trend:		Increasing	Increasing	Increasing					



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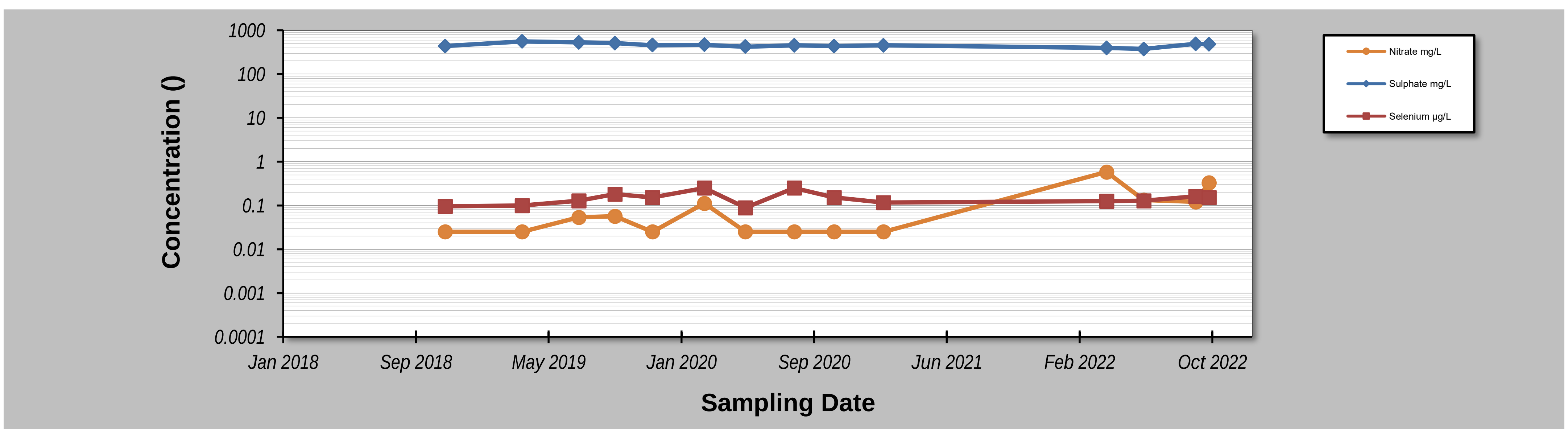
GSI MANN-KENDALL TOOLKIT

Evaluation Date:	05-Jan-23	Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - FRO	Location	FR_MW_NTPSE
Conducted By:	MF	Reviewed By:	CMH

Sampling Event	Sampling Date	Nitrate	Sulphate	Selenium						
	units	mg/L	mg/L	µg/L						
		FR_MW_NTPSE CONCENTRATION								
1	1-Nov-18	0.0250	441.00	0.096						
2	26-Mar-19	0.0250	557.00	0.100						
3	11-Jul-19	0.0540	534.00	0.129						
4	17-Sep-19	0.0570	514.00	0.180						
5	27-Nov-19	0.0250	459.00	0.153						
6	4-Mar-20	0.1110	468.00	0.250						
7	20-May-20	0.0250	425.00	0.089						
8	20-Aug-20	0.0250	452.00	0.250						
9	3-Nov-20	0.0250	438.00	0.152						
10	4-Feb-21	0.0250	455.00	0.117						
11	31-Mar-22	0.5830	394.00	0.126						
12	9-Jun-22	0.1330	376.00	0.128						
13	15-Sep-22	0.1200	493.00	0.163						
14	10-Oct-22	0.3340	479.00	0.151						
15										
16										
17										
18										
19										
20										
41										
42										
43										
44										
45										
46										
	Coefficient of Variation:	1.43	0.11	0.34						
	Mann-Kendall Statistic (S):	34	-29	14						
	Confidence Factor:	96.5%	93.7%	75.8%						
	Concentration Trend:	Increasing	Prob. Decreasing	No Trend						



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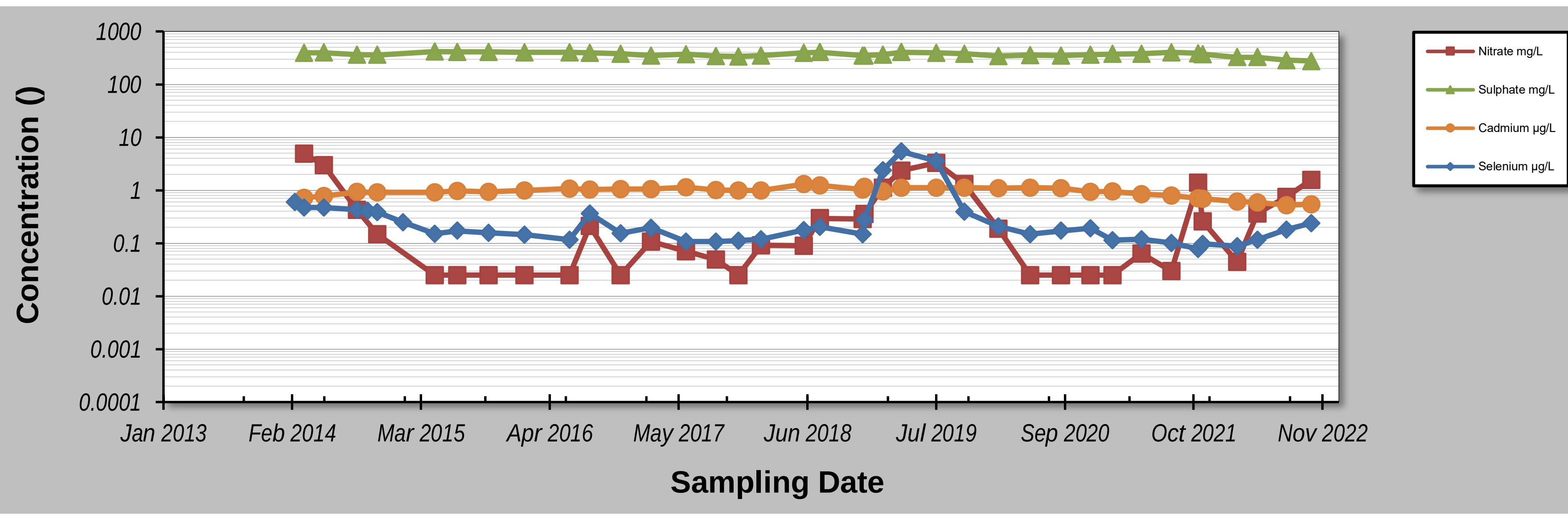
GSI MANN-KENDALL TOOLKIT

Evaluation Date:	05-Jan-23	Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - FRO	Location	FR_09-04-A
Conducted By:	MF	Reviewed By:	CMH

Sampling Event	Sampling Date	Nitrate (mg/L)	Sulphate (mg/L)	Cadmium (µg/L)	Selenium (µg/L)				
		FR_09-04-A CONCENTRATION							
1	12-Feb-14				0.6				
2	13-Mar-14	4.9	391	0.715	0.47				
3	14-May-14	2.99	398	0.776	0.47				
4	25-Aug-14	0.424	361	0.923	0.43				
5	26-Sep-14				0.41				
6	27-Oct-14	0.147	360	0.917	0.39				
7	14-Jan-15				0.25				
8	23-Apr-15	0.025	416	0.913	0.152				
9	2-Jul-15	0.025	414	0.975	0.172				
10	7-Oct-15	0.025	413	0.933	0.157				
11	26-Jan-16	0.025	405	0.991	0.146				
12	15-Jun-16	0.025	402	1.07	0.117				
13	16-Aug-16	0.212	391	1.04	0.361				
14	21-Nov-16	0.025	378	1.05	0.154				
15	23-Feb-17	0.108	347	1.05	0.197				
16	12-Jun-17	0.07	370	1.13	0.107				
17	12-Sep-17	0.049	344	1.01	0.107				
18	21-Nov-17	0.025	337	0.985	0.112				
19	31-Jan-18	0.0921	348	0.986	0.118				
20	13-Jun-18	0.089	396	1.30	0.177				
21	1-Aug-18	0.295	406	1.23	0.204				
22	12-Dec-18	0.286	352	1.04	0.147				
23	18-Dec-18	0.356	352	1.16	0.274				
24	13-Feb-19	1.12	366	0.955	2.38				
25	11-Apr-19	2.35	406	1.11	5.38				
26	29-Jul-19	3.29	397	1.11	3.57				
27	24-Oct-19	1.31	377	1.12	0.395				
28	7-Feb-20	0.187	342	1.09	0.207				
29	15-May-20	0.025	357	1.11	0.148				
30	20-Aug-20	0.025	349	1.10	0.172				
31	18-Nov-20	0.025	364	0.936	0.191				
32	27-Jan-21	0.025	375	0.95	0.115				
33	26-Apr-21	0.0642	379	0.84	0.118				
34	28-Jul-21	0.03	402	0.802	0.101				
35	19-Oct-21	1.38	387	0.71	0.078				
36	2-Nov-21	0.257	373	0.686	0.098				
37	17-Feb-22	0.0442	326	0.615	0.088				
38	21-Apr-22	0.366	326	0.59	0.117				
39	20-Jul-22	0.752	285	0.524	0.182				
40	6-Oct-22	1.56	277	0.547	0.241				
41									
42									
43									
44									
45									
46									
	44762.52778	1.77	0.09	0.20	2.11				
	44840.50694	79	-217	-95	-243				
	Confidence Factor:	84.5%	99.8%	89.0%	99.8%				
	Concentration Trend:	No Trend	Decreasing	Stable	Decreasing				



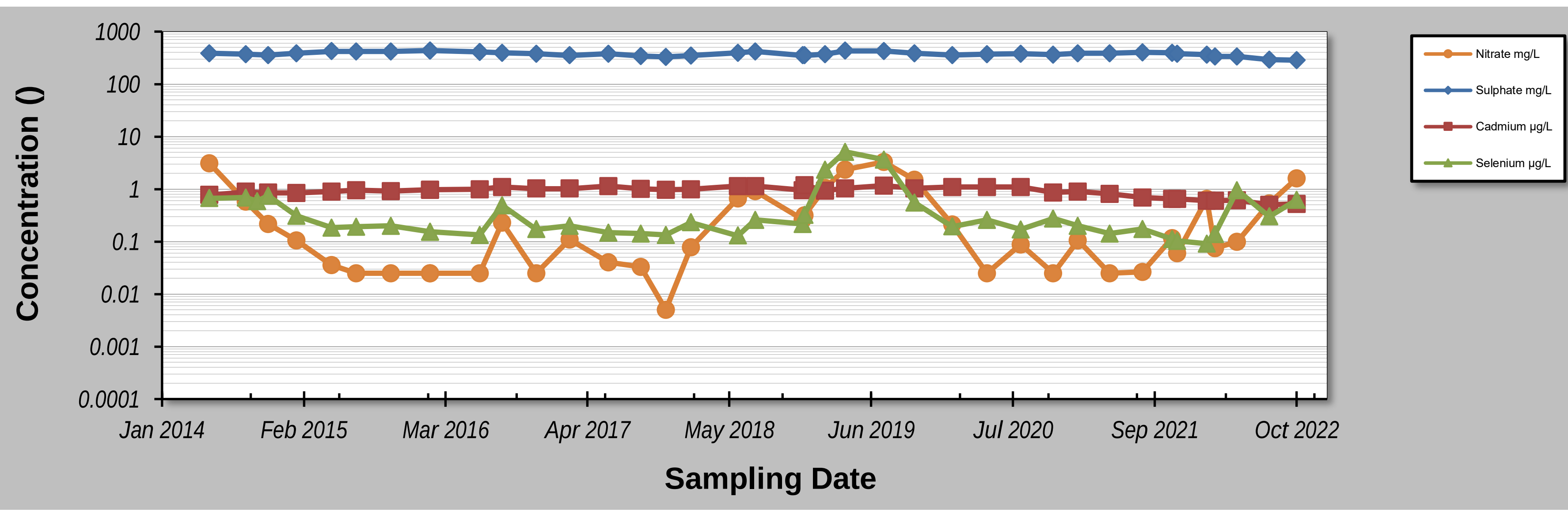
Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT

Evaluation Date:	05-Jan-23	Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - FRO	Location	FR_09-04-B
Conducted By:	MF	Reviewed By:	CMH

Sampling Event	Sampling Date	Nitrate (mg/L)	Sulphate (mg/L)	Cadmium (µg/L)	Selenium (µg/L)				
		FR_09-04-B CONCENTRATION							
1	14-May-14	3.120	385	0.772	0.67				
2	25-Aug-14	0.573	370	0.888	0.69				
3	26-Sep-14				0.59				
4	27-Oct-14	0.217	358	0.853	0.75				
5	14-Jan-15	0.105	387	0.849	0.31				
6	23-Apr-15	0.036	423	0.894	0.183				
7	2-Jul-15	0.025	416	0.946	0.191				
8	7-Oct-15	0.025	419	0.922	0.201				
9	26-Jan-16	0.025	436	0.966	0.154				
10	26-Jan-16	0.025	436	0.966	0.154				
11	15-Jun-16	0.025	411	0.992	0.135				
12	17-Aug-16	0.228	395	1.09	0.494				
13	21-Nov-16	0.025	376	1.02	0.172				
14	23-Feb-17	0.109	353	1.02	0.201				
15	12-Jun-17	0.040	378	1.13	0.147				
16	12-Sep-17	0.033	343	1.01	0.141				
17	21-Nov-17	0.005	328	0.977	0.134				
18	31-Jan-18	0.078	350	0.99	0.232				
19	13-Jun-18	0.664	392	1.15	0.13				
20	1-Aug-18	0.915	418	1.14	0.261				
21	12-Dec-18	0.266	353	0.957	0.218				
22	18-Dec-18	0.318	353	1.18	0.322				
23	13-Feb-19	1.050	369	0.931	2.32				
24	11-Apr-19	2.360	431	1.03	5.13				
25	29-Jul-19	3.290	426	1.16	3.62				
26	24-Oct-19	1.500	385	1.04	0.557				
27	7-Feb-20	0.213	358	1.10	0.194				
28	15-May-20	0.025	371	1.09	0.259				
29	18-Aug-20	0.088	379	1.10	0.171				
30	18-Nov-20	0.025	365	0.867	0.275				
31	27-Jan-21	0.106	386	0.901	0.199				
32	26-Apr-21	0.025	385	0.804	0.143				
33	28-Jul-21	0.0264	402	0.688	0.174				
34	19-Oct-21	0.117	394	0.656	0.112				
35	2-Nov-21	0.0595	382	0.647	0.104				
36	25-Jan-22	0.655	363	0.601	0.091				
37	17-Feb-22	0.0749	334	0.604	0.140				
38	21-Apr-22	0.0995	334	0.608	0.957				
39	20-Jul-22	0.533	294	0.502	0.301				
40	6-Oct-22	1.610	285	0.518	0.620				
41									
42									
43									
44									
45									
46									
Coefficient of Variation:		1.72	0.09	0.21	1.80				
Mann-Kendall Statistic (S):		89	-190	-117	-104				
Confidence Factor:		85.5%	99.0%	91.9%	88.4%				
Concentration Trend:		No Trend	Decreasing	Prob. Decreasing	No Trend				



Notes:

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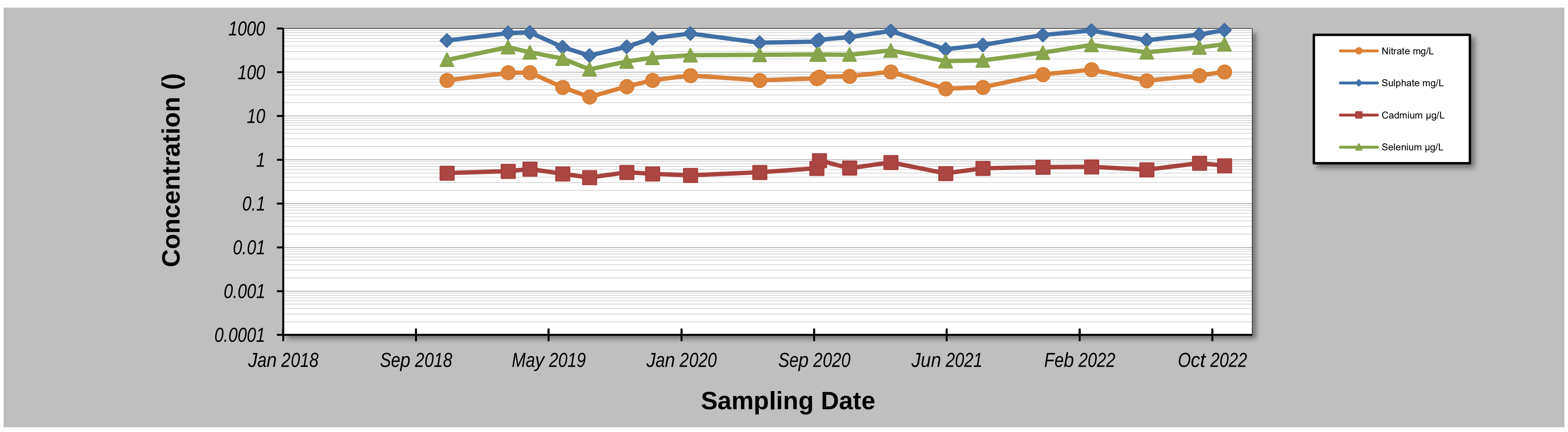
GSI MANN-KENDALL TOOLKIT

Evaluation Date:	05-Jan-23	Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - FRO	Location	FR_KB-1
Conducted By:	MF	Reviewed By:	CMH

Sampling Event	Sampling Date	Nitrate	Sulphate	Cadmium	Selenium				
Parameter units		mg/L	mg/L	µg/L	µg/L				
		FR_KB-1 CONCENTRATION							
1	5-Nov-18	66	531	0.497	192				
2	28-Feb-19	97.5	790	0.547	378				
3	10-Apr-19	98.3	813	0.611	287				
4	11-Jun-19	45.1	372	0.476	206				
5	31-Jul-19	27.2	240	0.392	116				
6	9-Oct-19	47.3	381	0.514	175				
7	27-Nov-19	65.1	592	0.476	215				
8	6-Feb-20	84.3	765	0.439	244				
9	16-Jun-20	65.1	473	0.516	251				
10	1-Oct-20	72.1	506	0.645	254				
11	6-Oct-20	78	554	0.969	254				
12	2-Dec-20	81.1	632	0.646	252				
13	18-Feb-21	102	881	0.875	312				
14	1-Jun-21	42.2	334	0.486	181				
15	10-Aug-21	45.6	422	0.636	186				
16	1-Dec-21	89.6	715	0.684	280				
17	3-Mar-22	114	893	0.686	419				
18	15-Jun-22	64	540	0.593	285				
19	22-Sep-22	85	718	0.838	369				
20	8-Nov-22	102.0	917	0.7330	435				
21									
22									
23									
24									
25									
41									
42									
43									
44									
45									
46									
Coefficient of Variation:		0.32	0.33	0.25	0.32				
Mann-Kendall Statistic (S):		44	48	83	75				
Confidence Factor:		91.8%	93.6%	99.7%	99.3%				
Concentration Trend:		Prob. Increasing	Prob. Increasing	Increasing	Increasing				



Notes:
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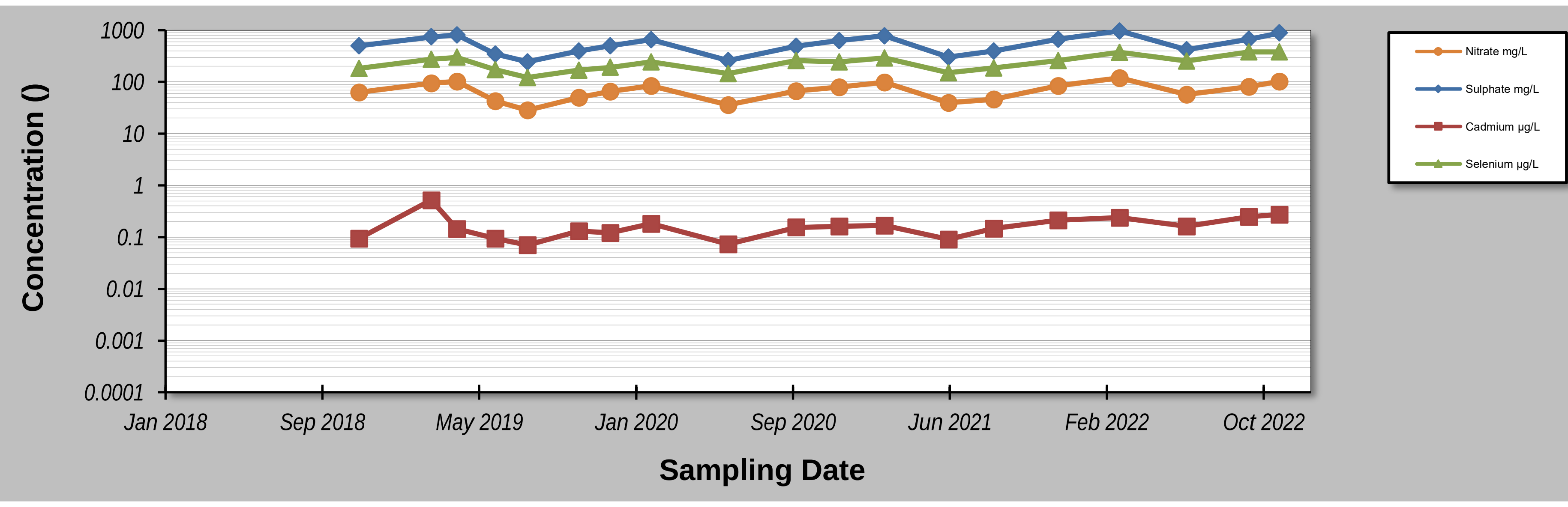
GSI MANN-KENDALL TOOLKIT

Evaluation Date:	05-Jan-23	Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - FRO	Location	FR_KB-2
Conducted By:	MF	Reviewed By:	CMH

Sampling Event	Sampling Date	Nitrate (mg/L)	Sulphate (mg/L)	Cadmium (µg/L)	Selenium (µg/L)				
		FR_KB-2A CONCENTRATION							
1	5-Nov-18	63.5	499	0.094	183				
2	28-Feb-19	95.2	745	0.521	273				
3	10-Apr-19	102.0	819	0.145	300				
4	10-Jun-19	42.9	346	0.0934	174				
5	31-Jul-19	28.4	246	0.070	122				
6	21-Oct-19	50.2	395	0.131	170				
7	10-Dec-19	66.0	503	0.121	192				
8	13-Feb-20	84.7	654	0.183	245				
9	15-Jun-20	36.2	260	0.0736	145				
10	1-Oct-20	66.9	488	0.154	258				
11	9-Dec-20	79.7	634	0.161	244				
12	19-Feb-21	99.3	782	0.169	292				
13	1-Jun-21	39.8	302	0.0904	152				
14	13-Aug-21	46.6	395	0.146	185				
15	23-Nov-21	84.8	664	0.211	258				
16	1-Mar-22	120.0	972	0.240	378				
17	16-Jun-22	56.8	424	0.162	254				
18	23-Sep-22	81.4	676	0.247	381				
19	10-Nov-22	102.0	887	0.272	381				
20									
41									
42									
43									
44									
45									
46									
Coefficient of Variation:		0.37	0.39	0.59	0.33				
Mann-Kendall Statistic (S):		36	38	69	59				
Confidence Factor:		88.8%	90.1%	99.2%	97.9%				
Concentration Trend:		No Trend	Prob. Increasing	Increasing	Increasing				



Notes:

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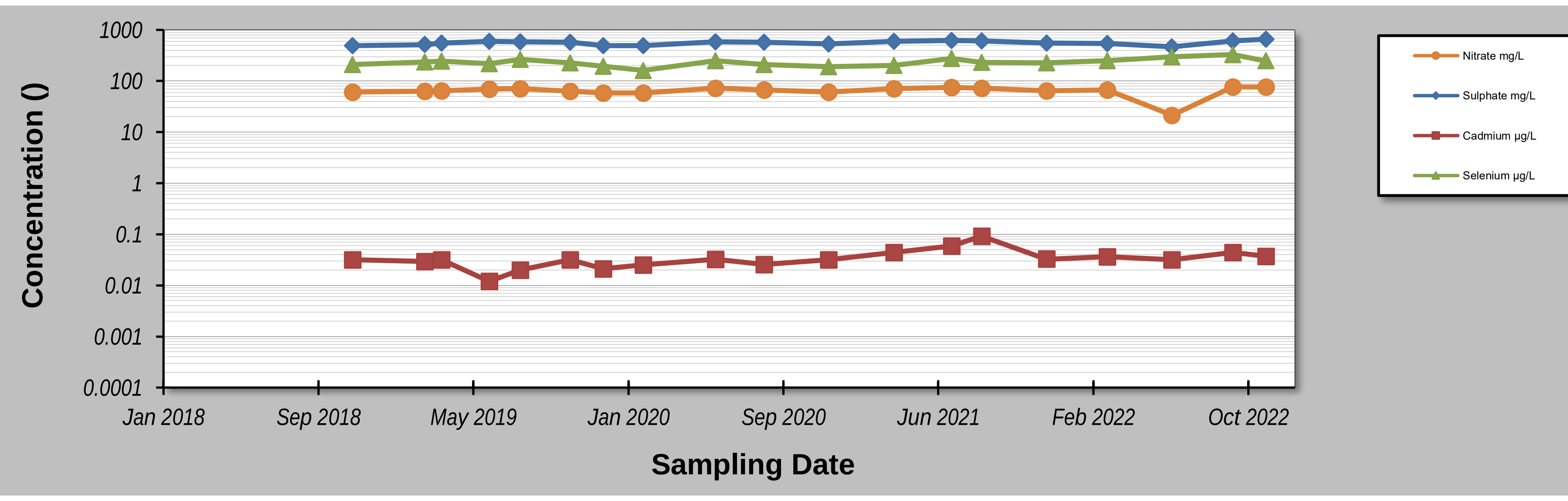
GSI MANN-KENDALL TOOLKIT

Evaluation Date:	05-Jan-23	Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - FRO	Location	FR_KB-3A
Conducted By:	MF	Reviewed By:	CMH

Sampling Event	Sampling Date	Nitrate	Sulphate	Cadmium	Selenium				
	Parameter	Nitrate	Sulphate	Cadmium	Selenium				
	units	mg/L	mg/L	µg/L	µg/L				
		FR_KB-3A CONCENTRATION							
1	1-Nov-18	61.1	494	0.0317	211				
2	26-Feb-19	63.5	516	0.0296	237				
3	25-Mar-19	64.7	547	0.0316	244				
4	10-Jun-19	69.2	593	0.0120	216				
5	30-Jul-19	71.4	583	0.0199	266				
6	18-Oct-19	63.3	569	0.0317	226				
7	11-Dec-19	58.6	493	0.0210	194				
8	13-Feb-20	58.3	493	0.0250	161				
9	9-Jun-20	71.6	588	0.0321	249				
10	26-Aug-20	67.2	569	0.0257	209				
11	8-Dec-20	60.7	527	0.0317	191				
12	24-Mar-21	71.4	591	0.0440	203				
13	25-Jun-21	74.6	617	0.0587	276				
14	13-Aug-21	72.2	606	0.0919	230				
15	25-Nov-21	64.5	554	0.0327	227				
16	3-Mar-22	66.8	545	0.0366	251				
17	15-Jun-22	21.4	467	0.0316	296				
18	21-Sep-22	75.9	605	0.0443	329				
19	14-Nov-22	76.2	658	0.0372	247				
20									
41									
42									
43									
44									
45									
46									
	Coefficient of Variation:	0.18	0.09	0.48	0.17				
	Mann-Kendall Statistic (S):	48	43	81	47				
	Confidence Factor:	95.0%	92.8%	99.8%	94.6%				
	Concentration Trend:	Prob. Increasing	Prob. Increasing	Increasing	Prob. Increasing				



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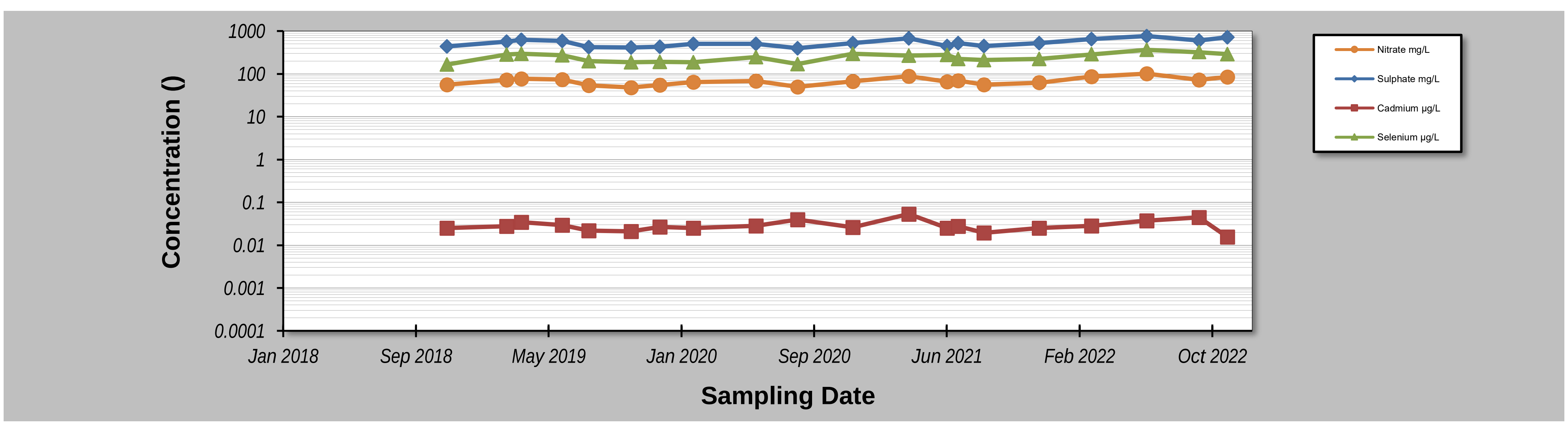
GSI MANN-KENDALL TOOLKIT

Evaluation Date:	05-Jan-23	Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - FRO	Location	FR_KB-3B
Conducted By:	MF	Reviewed By:	CMH

Sampling Event	Sampling Date	Nitrate	Sulphate	Cadmium	Selenium				
	units	mg/L	mg/L	µg/L	µg/L				
		FR_KB-3B CONCENTRATION							
1	5-Nov-18	55.5	435	0.0250	165				
2	25-Feb-19	72.9	561	0.0275	281				
3	25-Mar-19	76.7	625	0.0343	297				
4	10-Jun-19	74.4	584	0.0296	271				
5	30-Jul-19	54.0	417	0.0217	200				
6	18-Oct-19	48.2	412	0.0209	188				
7	11-Dec-19	54.5	430	0.0265	191				
8	12-Feb-20	64.5	505	0.0250	187				
9	9-Jun-20	67.8	505	0.0282	247				
10	26-Aug-20	49.3	398	0.0394	170				
11	8-Dec-20	67.1	520	0.0259	295				
12	24-Mar-21	88.0	672	0.0534	269				
13	4-Jun-21	65.8	445	0.0250	278				
14	25-Jun-21	69.4	526	0.0278	225				
15	13-Aug-21	55.6	450	0.0195	210				
16	24-Nov-21	62.4	523	0.0250	225				
17	3-Mar-22	85.7	651	0.0280	286				
18	15-Jun-22	101.0	765	0.0372	364				
19	21-Sep-22	72.6	599	0.0448	322				
20	14-Nov-22	84.3	719	0.0155	290				
21									
22									
23									
24									
25									
41									
42									
43									
44									
45									
46									
Coefficient of Variation:		0.20	0.20	0.31	0.22				
Mann-Kendall Statistic (S):		50	65	8	55				
Confidence Factor:		94.4%	98.2%	58.9%	96.0%				
Concentration Trend:		Prob. Increasing	Increasing	No Trend	Increasing				



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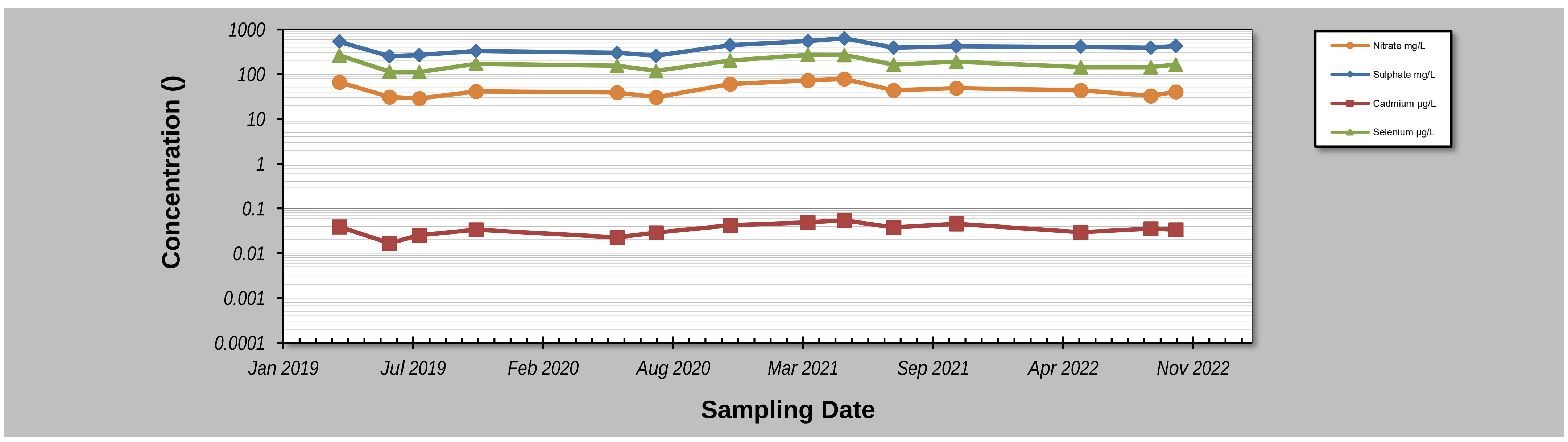
GSI MANN-KENDALL TOOLKIT

Evaluation Date:	05-Jan-23	Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - FRO	Location	FR_MW_SK1A
Conducted By:	MF	Reviewed By:	CMH

Sampling Event	Sampling Date	Nitrate	Sulphate	Cadmium	Selenium				
	Parameter units	mg/L	mg/L	µg/L	µg/L				
		FR_MW_SK1A CONCENTRATION							
1	28-Mar-19	66.0	537	0.0392	266				
2	13-Jun-19	31.2	254	0.0168	114				
3	29-Jul-19	28.7	268	0.0254	112				
4	24-Oct-19	41.3	330	0.0336	171				
5	28-May-20	39.1	300	0.0228	156				
6	27-Jul-20	30.6	258	0.0287	119				
7	18-Nov-20	60.7	452	0.0421	202				
8	18-Mar-21	72.7	549	0.0494	272				
9	13-May-21	78.3	636	0.0544	270				
10	28-Jul-21	43.7	390	0.0375	166				
11	1-Nov-21	49.4	424	0.0453	192				
12	12-May-22	43.9	412	0.0297	144				
13	27-Aug-22	33.1	390	0.0354	144				
14	5-Oct-22	40.3	433	0.0336	164				
15									
16									
17									
18									
19									
20									
41									
42									
43									
44									
45									
46									
	Coefficient of Variation:	0.34	0.29	0.29	0.32				
	Mann-Kendall Statistic (S):	9	24	22	4				
	Confidence Factor:	66.6%	89.4%	87.2%	56.4%				
	Concentration Trend:	No Trend	No Trend	No Trend	No Trend				



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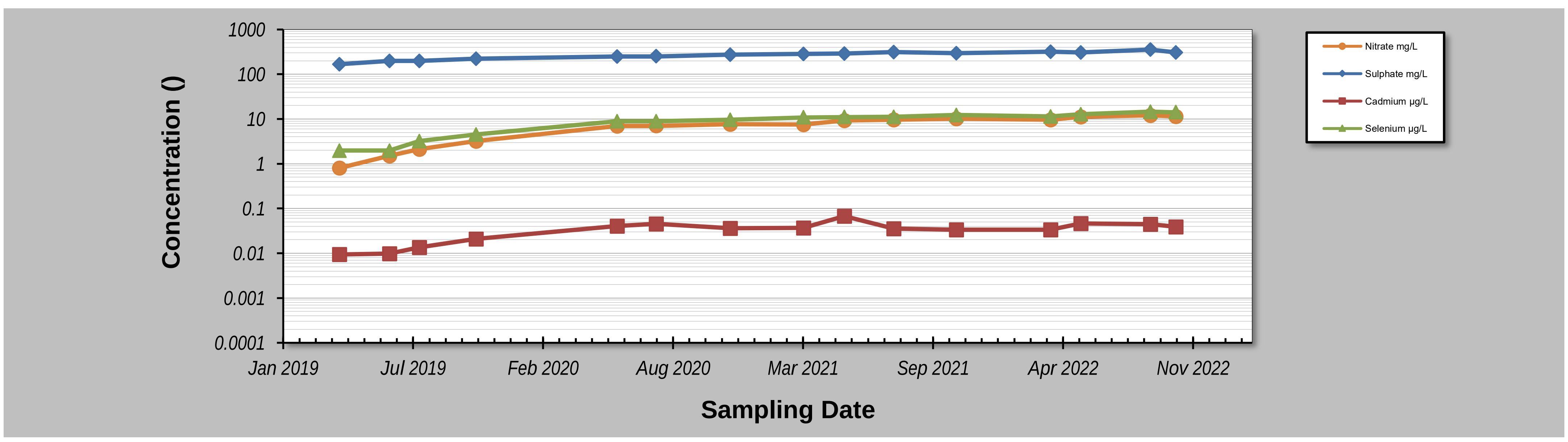
GSI MANN-KENDALL TOOLKIT

Evaluation Date:	**05-Jan-23**	Job ID:	**635544**
Facility Name:	**Teck Coal Regional Groundwater - FRO**	Location	**FR_MW_SK1B**
Conducted By:	**MF**	Reviewed By:	**CMH**

Sampling Event	Sampling Date	Nitrate (mg/L)	Sulphate (mg/L)	Cadmium (µg/L)	Selenium (µg/L)				
		FR_MW_SK1B CONCENTRATION							
1	28-Mar-19	0.805	168	0.0094	1.98				
2	13-Jun-19	1.52	200	0.0099	1.98				
3	29-Jul-19	2.11	198	0.0135	3.23				
4	24-Oct-19	3.23	222	0.021	4.48				
5	28-May-20	6.97	249	0.0409	8.9				
6	27-Jul-20	7.05	252	0.0456	8.93				
7	18-Nov-20	7.63	274	0.0360	9.62				
8	11-Mar-21	7.49	287	0.0371	10.9				
9	13-May-21	9.27	292	0.0676	11.1				
10	28-Jul-21	9.61	312	0.0354	11.3				
11	1-Nov-21	10.2	295	0.0339	12.3				
12	26-Mar-22	9.56	321	0.0335	11.5				
13	12-May-22	11.3	310	0.0466	12.7				
14	27-Aug-22	12.1	356	0.0444	14.6				
15	5-Oct-22	11.5	310	0.0392	14.2				
16									
17									
18									
19									
20									
41									
42									
43									
44									
45									
46									
Coefficient of Variation:		**0.51**	**0.20**	**0.45**	**0.46**				
Mann-Kendall Statistic (S):		**97**	**90**	**43**	**100**				
Confidence Factor:		**>99.9%**	**>99.9%**	**98.2%**	**>99.9%**				
Concentration Trend:		Increasing	Increasing	Increasing	Increasing				



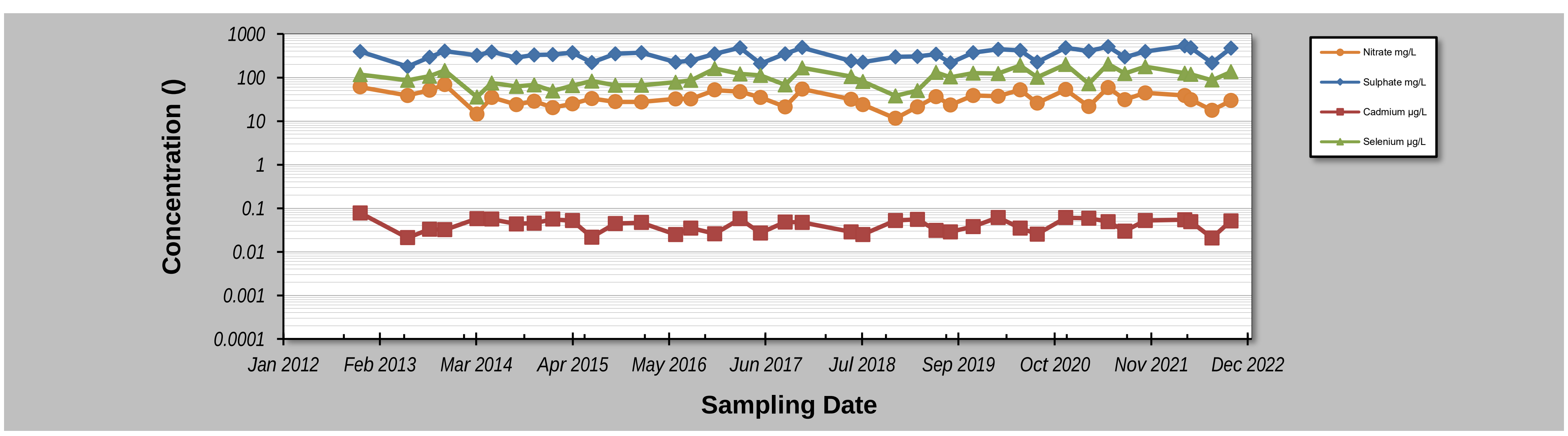
Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT

Evaluation Date:	**05-Jan-23**	Job ID:	**635544**
Facility Name:	**Teck Coal Regional Groundwater - FRO**	Location	**FR_09-01-A**
Conducted By:	**MF**	Reviewed By:	**CMH**

Sampling Event	Sampling Date	Nitrate	Sulphate	Cadmium	Selenium				
Parameter units		mg/L	mg/L	µg/L	µg/L				
		FR_09-01-A CONCENTRATION							
1	14-Nov-12	60.6	395	0.0780	116				
2	30-May-13	38.9	178	0.0210	85.5				
3	29-Aug-13	50.8	290	0.0330	107				
4	31-Oct-13	68.6	403	0.0320	146				
5	13-Mar-14	14.6	320	0.0580	35.6				
6	14-May-14	34.7	389	0.0560	75				
7	25-Aug-14	24.0	287	0.0440	62.7				
8	6-Nov-14	28.6	327	0.0450	68				
9	22-Jan-15	20.2	337	0.0560	49.3				
10	14-Apr-15	25.1	374	0.0517	64.5				
11	2-Jul-15	33.1	219	0.0217	82.2				
12	8-Oct-15	27.8	351	0.0447	66.6				
13	25-Jan-16	27.6	374	0.0468	66.3				
14	14-Jun-16	32.4	226	0.0250	77.5				
15	17-Aug-16	32.2	242	0.0348	85.7				
16	24-Nov-16	51.7	347	0.0257	159				
17	8-Mar-17	47.2	481	0.0571	120				
18	1-Jun-17	35.1	208	0.0269	112				
19	12-Sep-17	21.2	347	0.0478	68.1				
20	22-Nov-17	54.3	486	0.0471	166				
21	13-Jun-18	31.6	239	0.0286	106				
22	31-Jul-18	24.0	226	0.0251	81.2				
23	13-Dec-18	11.5	297	0.0525	38.1				
24	14-Mar-19	21.3	302	0.0553	50.5				
25	30-May-19	36.5	343	0.0310	130				
26	29-Jul-19	23.5	215	0.0284	102				
27	1-Nov-19	38.7	371	0.0377	126				
28	13-Feb-20	37.2	442	0.0612	123				
29	14-May-20	52.4	415	0.0349	190				
30	23-Jul-20	25.8	224	0.0254	101				
31	18-Nov-20	52.7	485	0.0607	201				
32	22-Feb-21	21.6	400	0.0586	71.6				
33	13-May-21	59.0	513	0.0489	205				
34	22-Jul-21	30.8	295	0.0299	123				
35	15-Oct-21	44.6	394	0.0523	178				
36	27-Mar-22	39.0	527	0.0543	125				
37	21-Apr-22	30.8	484	0.0495	118				
38	18-Jul-22	17.6	215	0.0208	86.9				
39	5-Oct-22	29.5	474	0.0508	135				
40									
41									
42									
43									
44									
45									
46									
Coefficient of Variation:		0.39	0.28	0.33	0.42				
Mann-Kendall Statistic (S):		-19	141	28	238				
Confidence Factor:		58.6%	95.5%	62.8%	99.8%				
Concentration Trend:		Stable	Increasing	No Trend	Increasing				



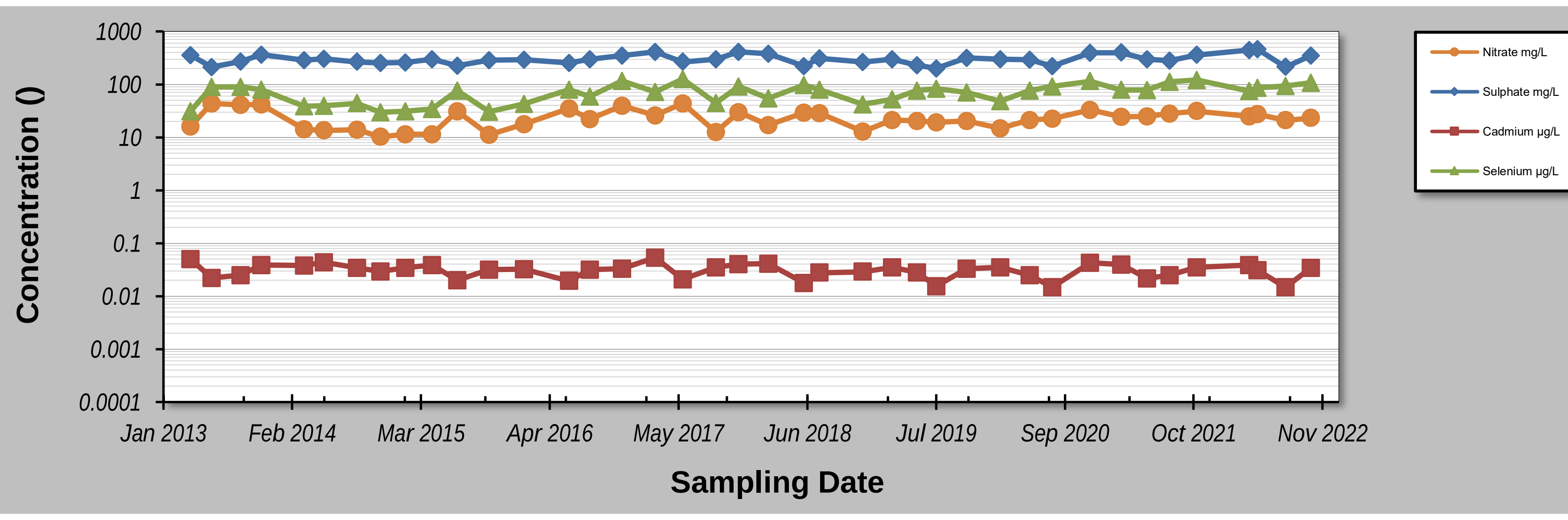
Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT

Evaluation Date:	05-Jan-23	Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - FRO	Location	FR_09-01-B
Conducted By:	MF	Reviewed By:	CMH

Sampling Event	Sampling Date	Nitrate (mg/L)	Sulphate (mg/L)	Cadmium (µg/L)	Selenium (µg/L)				
		FR_09-01-B CONCENTRATION							
1	26-Mar-13	16.0	354	0.050	31.1				
2	30-May-13	43.5	212	0.022	90.2				
3	29-Aug-13	41.3	271	0.025	89.0				
4	31-Oct-13	41.8	364	0.039	79.9				
5	13-Mar-14	14.3	288	0.038	38.7				
6	14-May-14	13.5	302	0.044	39.5				
7	25-Aug-14	14.0	267	0.034	44.0				
8	6-Nov-14	10.2	256	0.029	29.7				
9	22-Jan-15	11.4	261	0.034	31.1				
10	14-Apr-15	11.3	300	0.039	34.2				
11	2-Jul-15	30.8	227	0.0199	76.8				
12	8-Oct-15	11.1	288	0.0314	30.2				
13	25-Jan-16	17.6	291	0.0325	42.6				
14	14-Jun-16	34.8	252	0.0194	79.9				
15	17-Aug-16	22.0	297	0.0316	58.9				
16	24-Nov-16	39.4	351	0.0328	117.0				
17	8-Mar-17	25.9	409	0.0536	71.8				
18	1-Jun-17	43.9	267	0.0209	126.0				
19	12-Sep-17	12.7	296	0.035	44.2				
20	22-Nov-17	29.6	407	0.0402	91.5				
21	22-Feb-18	17.0	378	0.0414	54.1				
22	13-Jun-18	29.3	222	0.0177	97.1				
23	31-Jul-18	28.4	311	0.0278	79.4				
24	13-Dec-18	12.8	262	0.0289	41.8				
25	14-Mar-19	21.1	300	0.0351	52.2				
26	30-May-19	20.5	230	0.028	76.0				
27	29-Jul-19	19.3	201	0.0153	83.2				
28	1-Nov-19	20.4	317	0.0327	70.7				
29	13-Feb-20	14.8	299	0.0350	48.6				
30	14-May-20	21.2	294	0.0247	75.7				
31	23-Jul-20	22.6	220	0.0149	91.4				
32	18-Nov-20	32.8	397	0.0430	115.0				
33	22-Feb-21	24.2	398	0.0393	78.7				
34	13-May-21	24.9	300	0.0218	77.8				
35	22-Jul-21	28.2	281	0.0251	111.0				
36	15-Oct-21	31.3	360	0.0348	121.0				
37	27-Mar-22	24.8	442	0.0386	74.3				
38	21-Apr-22	27.4	463	0.0313	85.8				
39	18-Jul-22	21.0	214	0.0147	93.2				
40	5-Oct-22	23.2	348	0.0340	108.0				
41									
42									
43									
44									
45									
46									
Coefficient of Variation:		0.40	0.22	0.30	0.39				
Mann-Kendall Statistic (S):		80	119	-99	268				
Confidence Factor:		82.0%	91.5%	87.3%	99.9%				
Concentration Trend:		No Trend	Prob. Increasing	Stable	Increasing				



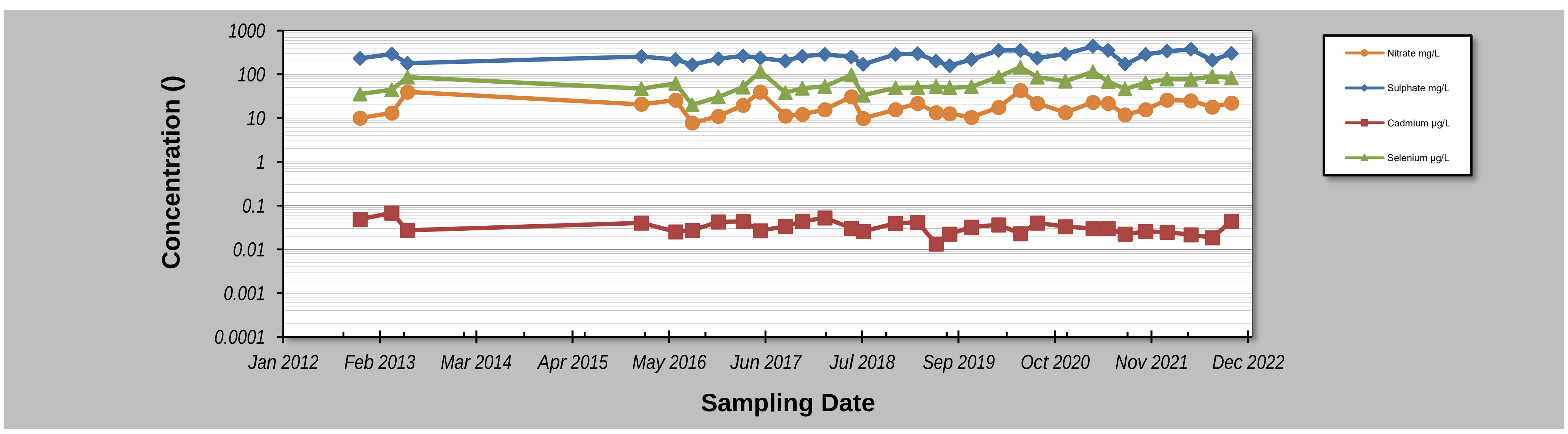
Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT

Evaluation Date:	**05-Jan-23**	Job ID:	**635544**
Facility Name:	**Teck Coal Regional Groundwater - FRO**	Location	**FR_09-02-A**
Conducted By:	**MF**	Reviewed By:	**CMH**

Sampling Event	Sampling Date	Nitrate (mg/L)	Sulphate (mg/L)	Cadmium (µg/L)	Selenium (µg/L)				
		FR_09-02-A CONCENTRATION							
1	14-Nov-12	10.1	229	0.0490	35.2				
2	26-Mar-13	13.1	291	0.0680	44.5				
3	30-May-13	39.3	179	0.0270	85.9				
4	25-Jan-16	20.7	255	0.0400	47.1				
5	15-Jun-16	26.1	218	0.0253	61.5				
6	22-Aug-16	7.7	165	0.0272	20.0				
7	8-Dec-16	11.1	226	0.0424	30.5				
8	20-Mar-17	19.8	264	0.0431	50.8				
9	1-Jun-17	39.4	236	0.0268	117				
10	13-Sep-17	11.3	200	0.0337	38.2				
11	22-Nov-17	12.1	259	0.0434	47.9				
12	22-Feb-18	15.7	287	0.0528	52.8				
13	13-Jun-18	31.0	250	0.0304	96.3				
14	31-Jul-18	9.9	169	0.0257	33.0				
15	13-Dec-18	15.5	288	0.0394	49.2				
16	14-Mar-19	21.9	296	0.0414	50.4				
17	30-May-19	13.3	200	0.0134	52.9				
18	26-Jul-19	12.7	158	0.0225	49.5				
19	24-Oct-19	10.4	219	0.0326	52.4				
20	13-Feb-20	17.7	354	0.0363	87.7				
21	14-May-20	42.4	354	0.0228	146.0				
22	23-Jul-20	21.7	235	0.0402	85.5				
23	16-Nov-20	13.3	290	0.0328	68.9				
24	11-Mar-21	23.2	438	0.0302	114.0				
25	13-May-21	21.6	350	0.0302	67.8				
26	22-Jul-21	12.0	171	0.0222	46.2				
27	15-Oct-21	15.7	284	0.0255	64.7				
28	11-Jan-22	25.9	337	0.0246	77.8				
29	21-Apr-22	25.0	375	0.0216	76.3				
30	18-Jul-22	18.0	211	0.0186	88.8				
31	5-Oct-22	22.1	300	0.0433	82.2				
32									
33									
34									
35									
41									
42									
43									
44									
45									
46									
Coefficient of Variation:		0.47	0.26	0.34	0.43				
Mann-Kendall Statistic (S):		79	127	-152	171				
Confidence Factor:		90.7%	98.4%	99.6%	99.8%				
Concentration Trend:		Prob. Increasing	Increasing	Decreasing	Increasing				



Notes:

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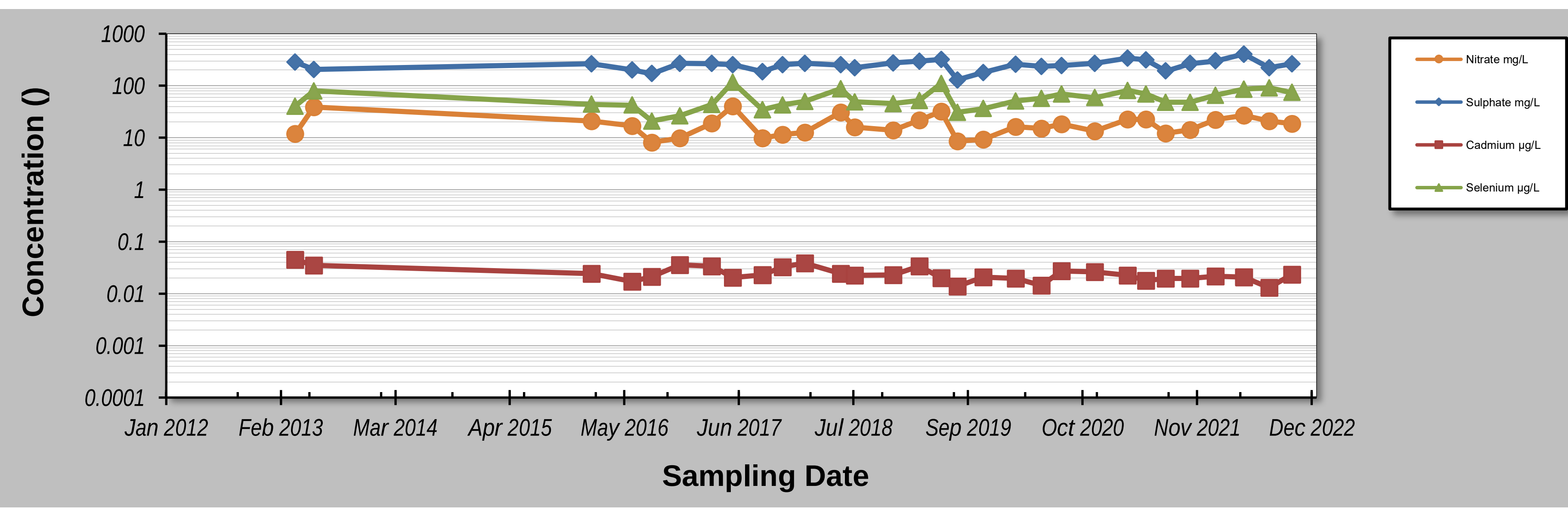
GSI MANN-KENDALL TOOLKIT

Evaluation Date:	**05-Jan-23**	Job ID:	**635544**
Facility Name:	**Teck Coal Regional Groundwater - FRO**	Location	**FR_09-02-B**
Conducted By:	**MF**	Reviewed By:	**CMH**

Sampling Event	Sampling Date	Nitrate (mg/L)	Sulphate (mg/L)	Cadmium (µg/L)	Selenium (µg/L)				
		FR_09-02-B CONCENTRATION							
1	26-Mar-13	11.8	288	0.0450	40.4				
2	30-May-13	38.9	204	0.0350	80.2				
3	25-Jan-16	20.8	265	0.0242	44.1				
4	15-Jun-16	17	202	0.0170	42.4				
5	22-Aug-16	8.15	171	0.0211	21.0				
6	28-Nov-16	9.87	271	0.0355	26.4				
7	20-Mar-17	18.9	267	0.0335	43.8				
8	1-Jun-17	40.5	253	0.0205	117.0				
9	13-Sep-17	9.9	186	0.0230	34.4				
10	13-Sep-17	9.9	186	0.0230	34.4				
11	22-Nov-17	11.5	254	0.0326	43.1				
12	8-Feb-18	12.7	270	0.0387	49.9				
13	13-Jun-18	31	252	0.0243	87.8				
14	31-Jul-18	15.9	223	0.0225	49.0				
15	13-Dec-18	13.8	274	0.0228	45.0				
16	14-Mar-19	21.8	296	0.0334	51.8				
17	30-May-19	31.9	319	0.0200	111.0				
18	26-Jul-19	8.56	130	0.0137	30.6				
19	24-Oct-19	9.24	180	0.0207	36.3				
20	13-Feb-20	16.3	261	0.0197	50.6				
21	14-May-20	15.1	237	0.0143	57.3				
22	23-Jul-20	18.1	244	0.0270	69.5				
23	16-Nov-20	13.3	270	0.0262	58.9				
24	11-Mar-21	22.4	343	0.0224	80.8				
25	13-May-21	22.7	317	0.0179	69.1				
26	22-Jul-21	12.2	192	0.0196	47.8				
27	15-Oct-21	14.3	267	0.0197	47.7				
28	11-Jan-22	22.2	300	0.0215	65.8				
29	21-Apr-22	26.9	407	0.0209	85.7				
30	21-Apr-22	26.9	407	0.0209	85.7				
31	18-Jul-22	20.9	222	0.0130	91.8				
32	5-Oct-22	18.5	266	0.0234	74.4				
33									
34									
35									
41									
42									
43									
44									
45									
46									
Coefficient of Variation:		**0.46**	**0.24**	**0.31**	**0.41**				
Mann-Kendall Statistic (S):		**90**	**108**	**-171**	**194**				
Confidence Factor:		**92.5%**	**95.9%**	**99.8%**	**99.9%**				
Concentration Trend:		Prob. Increasing	Increasing	Decreasing	Increasing				



Notes:
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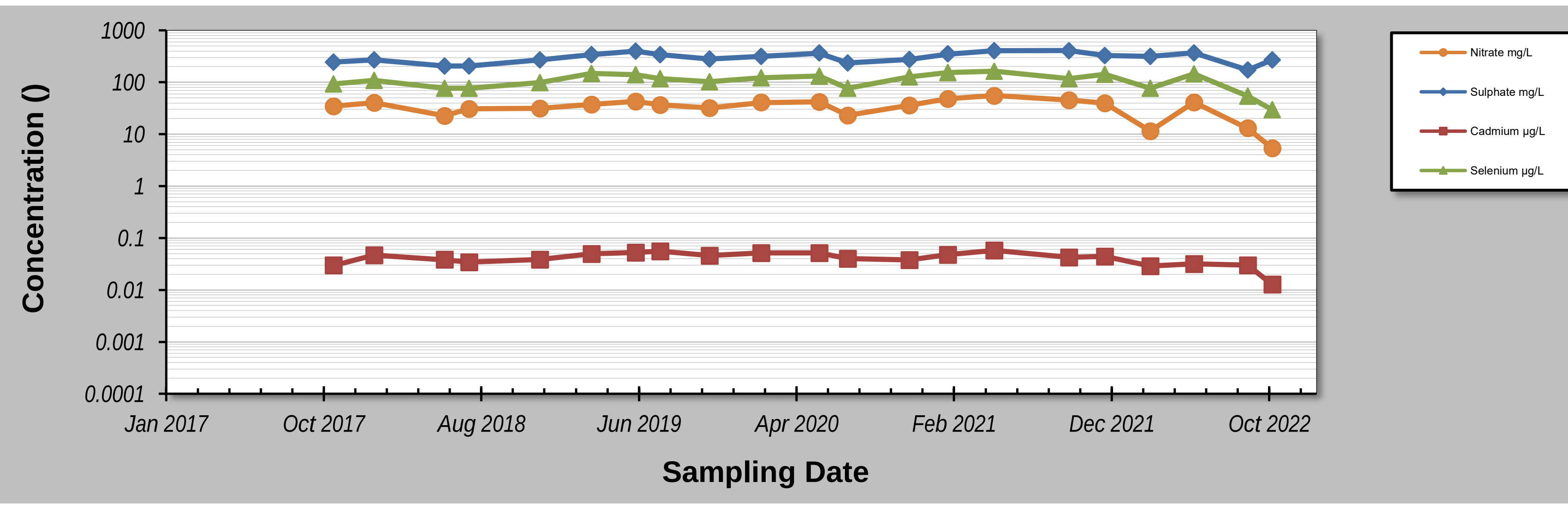
GSI MANN-KENDALL TOOLKIT

Evaluation Date:	05-Jan-23	Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - FRO	Location	FR_GH_WELL4
Conducted By:	MF	Reviewed By:	CMH

Sampling Event	Sampling Date	Nitrate (mg/L)	Sulphate (mg/L)	Cadmium (µg/L)	Selenium (µg/L)				
		FR_GH_WELL4 CONCENTRATION							
1	15-Nov-17	34.9	243	0.030	93				
2	31-Jan-18	40.4	269	0.047	109				
3	14-Jun-18	22.4	207	0.038	77				
4	31-Jul-18	30.9	207	0.034	77				
5	13-Dec-18	31.6	271	0.039	99				
6	21-Mar-19	37.7	342	0.050	147				
7	13-Jun-19	43.1	400	0.053	140				
8	30-Jul-19	36.7	342	0.056	118				
9	1-Nov-19	31.9	278	0.046	103				
10	7-Feb-20	40.8	314	0.051	122				
11	28-May-20	42.2	364	0.051	132				
12	21-Jul-20	23.1	234	0.040	77				
13	16-Nov-20	35.8	273	0.038	127				
14	28-Jan-21	48.0	350	0.048	153				
15	26-Apr-21	55.5	403	0.058	163				
16	15-Sep-21	45.0	408	0.043	117				
17	22-Nov-21	39.4	330	0.044	142				
18	17-Feb-22	11.5	312	0.029	76				
19	11-May-22	41.0	366	0.032	145				
20	21-Aug-22	13.0	172	0.030	54				
21	7-Oct-22	5.4	271	0.013	30				
22									
23									
24									
25									
41									
42									
43									
44									
45									
46									
Coefficient of Variation:		0.37	0.22	0.27	0.32				
Mann-Kendall Statistic (S):		-5	9	-36	9				
Confidence Factor:		55.9%	61.7%	85.3%	59.5%				
Concentration Trend:		Stable	No Trend	Stable	No Trend				



Notes:

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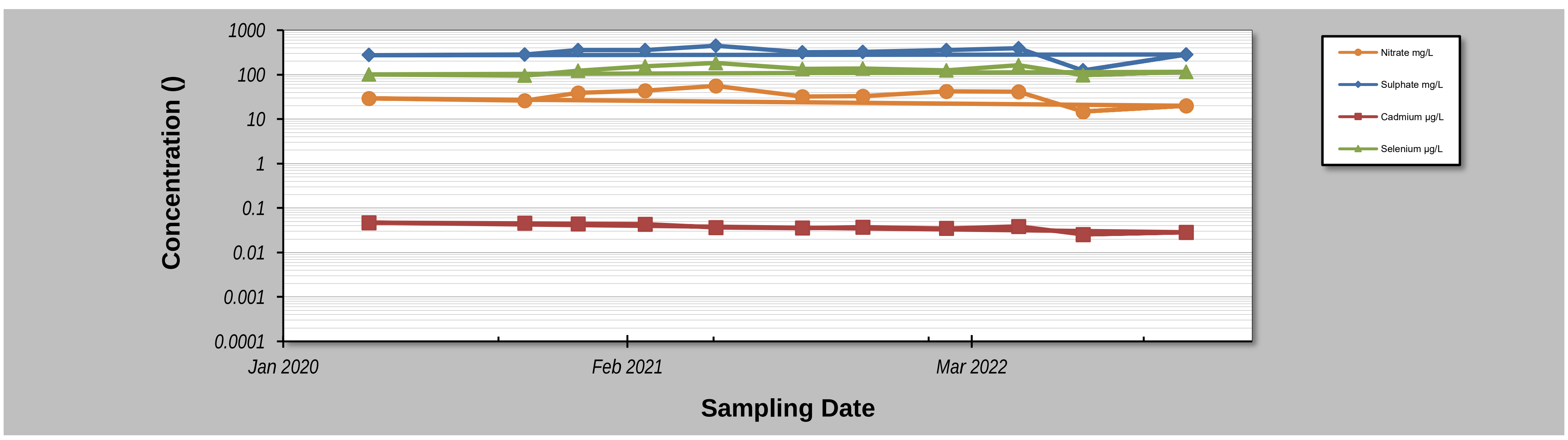
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT

Evaluation Date:	05-Jan-23	Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - FRO	Location	RG_MW_FR1A
Conducted By:	MF	Reviewed By:	CMH

Sampling Event	Sampling Date	Nitrate	Sulphate	Cadmium	Selenium				
	units	mg/L	mg/L	µg/L	µg/L				
		RG_MW_FR1A CONCENTRATION							
1	18-Jul-22	14.8	124	0.0255	96.8				
2	15-Nov-22	19.8	283	0.0284	116				
3	9-Apr-20	29.4	276	0.0469	101				
4	7-Oct-20	26.3	285	0.0455	94.7				
5	8-Dec-20	39.1	357	0.0440	122				
6	24-Feb-21	43.9	360	0.0433	153				
7	17-May-21	55.8	447	0.0365	183				
8	26-Aug-21	32.2	317	0.0355	136				
9	4-Nov-21	32.7	323	0.0369	138				
10	9-Feb-22	41.8	360	0.0348	124				
11	4-May-22	41.6	396	0.0386	164				
12	18-Jul-22	14.8	124	0.0255	96.8				
13	15-Nov-22	19.8	283	0.0284	116				
14									
15									
16									
17									
18									
19									
20									
41									
42									
43									
44									
45									
46									
	Coefficient of Variation:	0.39	0.31	0.21	0.22				
	Mann-Kendall Statistic (S):	14	21	-22	18				
	Confidence Factor:	78.2%	88.6%	89.8%	84.7%				
	Concentration Trend:	No Trend	No Trend	Stable	No Trend				



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water* , 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT

Evaluation Date:	05-Jan-23	Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - FRO	Location	RG_MW_FR1B
Conducted By:	MF	Reviewed By:	CMH

Sampling Event	Sampling Date	Nitrate	Sulphate	Cadmium	Selenium				
	units	mg/L	mg/L	µg/L	µg/L				
		RG_MW_FR1B CONCENTRATION							
1	6-Oct-20	28.4	253	0.0262	97.1				
2	8-Dec-20	32.7	307	0.042	105				
3	23-Feb-21	48.7	379	0.047	152				
4	17-May-21	59.4	501	0.0598	214				
5	26-Aug-21	36.6	346	0.0346	147				
6	4-Nov-21	35.2	343	0.0348	159				
7	9-Feb-22	41.5	359	0.0398	124				
8	4-May-22	47.9	412	0.0438	191				
9	18-Jul-22	34.6	359	0.0285	143				
10	15-Nov-22	25.0	272	0.0296	162				
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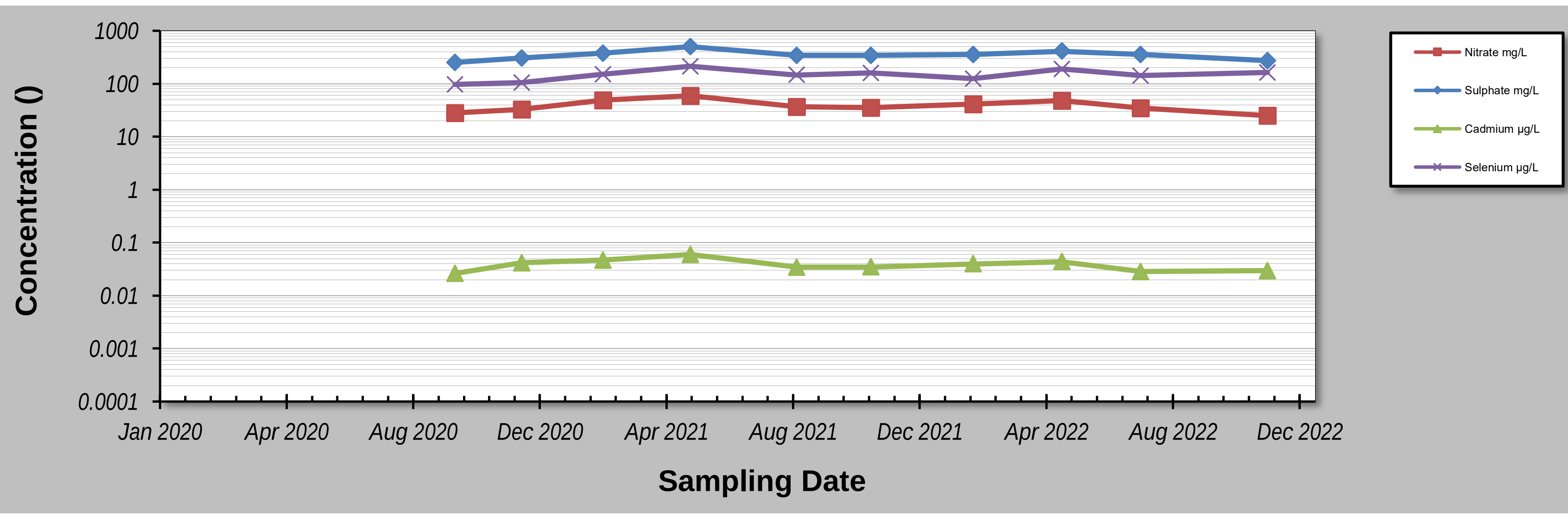
	44762.52778	0.27	0.20	0.26	0.24				
	44840.50694	-3	6	-5	15				
	Confidence Factor:	56.9%	66.8%	63.6%	89.2%				
	Concentration Trend:	Stable	No Trend	Stable	No Trend				



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water* , 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT

Evaluation Date:	05-Jan-23	Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - FRO	Location	RG_MW_FR1C
Conducted By:	MF	Reviewed By:	CMH

Sampling Event	Sampling Date	Nitrate (mg/L)	Sulphate (mg/L)	Cadmium (µg/L)	Selenium (µg/L)				
		RG_MW_FR1C CONCENTRATION							
1	2-Oct-20	29	311	0.0441	98.2				
2	3-Oct-20	29.1	322	0.0416	97.2				
3	4-Oct-20	29.1	321	0.0414	87.3				
4	6-Oct-20	29.9	309	0.0436	92.6				
5	10-Dec-20	47.8	433	0.0590	143				
6	24-Feb-21	52	490	0.0603	195				
7	17-May-21	62.9	547	0.0559	226				
8	26-Aug-21	29.5	316	0.0419	111				
9	4-Nov-21	40.6	389	0.0474	164				
10	9-Feb-22	41.9	414	0.0498	122				
11	4-May-22	40	460	0.0446	149				
12	18-Jul-22	20.6	196	0.0214	99				
13	15-Nov-22	27.7	438	0.0489	152				
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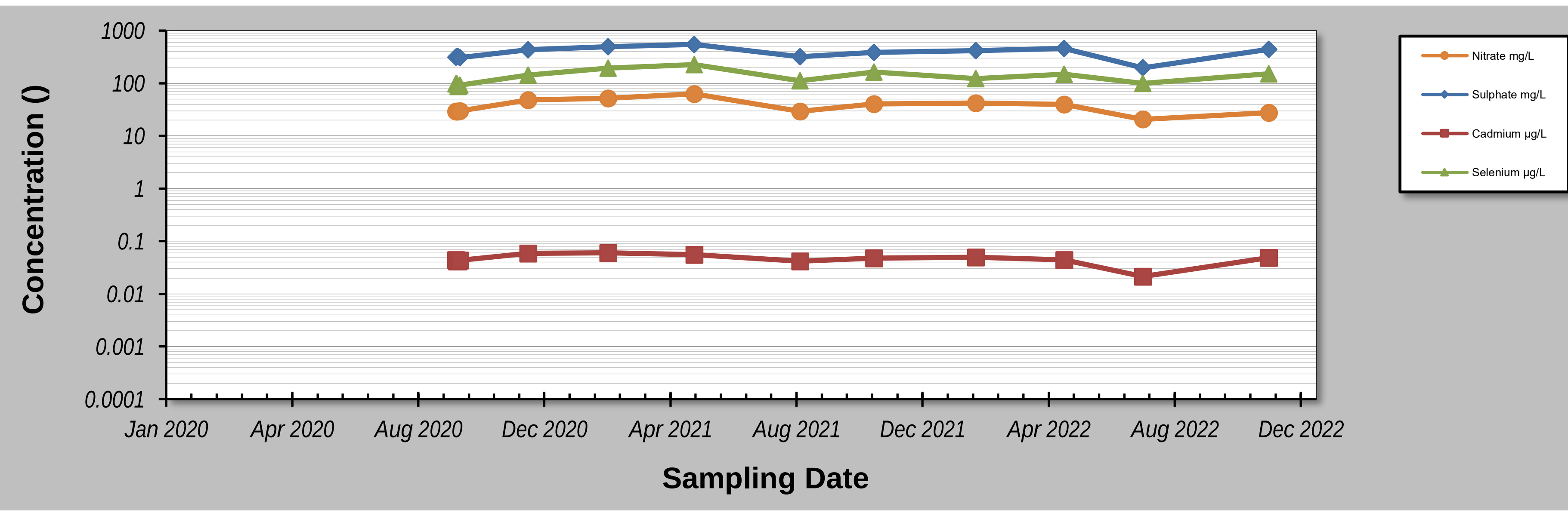
Coefficient of Variation:		0.32	0.25	0.21	0.32				
Mann-Kendall Statistic (S):		3	16	4	24				
Confidence Factor:		54.8%	81.6%	57.1%	91.8%				
Concentration Trend:		No Trend	No Trend	No Trend	Prob. Increasing				



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT

Evaluation Date:	**05-Jan-23**	Job ID:	**635544**
Facility Name:	**Teck Coal Regional Groundwater - FRO**	Location	**RG_MW_FR8A**
Conducted By:	**MF**	Reviewed By:	**CMH**

Sampling Event	Sampling Date	Nitrate	Sulphate	Cadmium	Selenium				
	Parameter units	mg/L	mg/L	µg/L	µg/L				
		RG_MW_FR8A CONCENTRATION							
1	5-Oct-20	2.91	405	0.0163	7.59				
2	10-Dec-20	4	431	0.051	7.63				
3	25-Feb-21	0.0438	414	0.0215	2.68				
4	19-May-21	1.24	504	0.0217	6.06				
5	23-Aug-21	0.504	576	0.0366	7.49				
6	4-Nov-21	1.03	559	0.0309	6.60				
7	8-Feb-22	0.198	508	0.0325	8.63				
8	5-May-22	2.25	483	0.01	4.04				
9	21-Jul-22	1.10	535	0.005	4.37				
10	17-Nov-22	1.61	529	0.0257	23.9				
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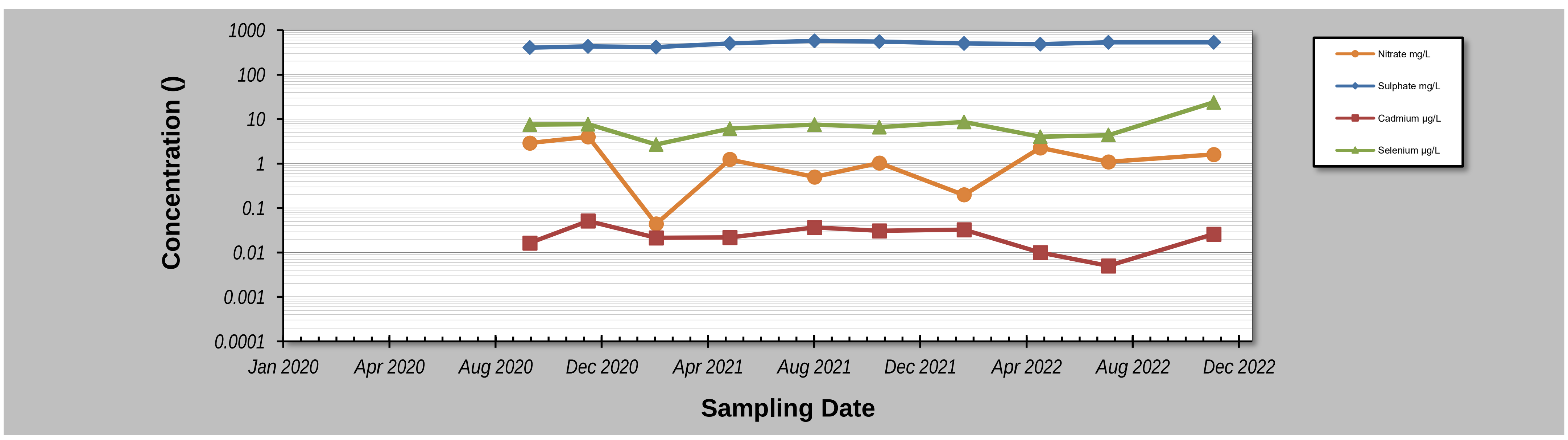
Coefficient of Variation:		**0.84**	**0.12**	**0.54**	**0.75**				
Mann-Kendall Statistic (S):		**-3**	**19**	**-7**	**3**				
Confidence Factor:		**56.9%**	**94.6%**	**70.0%**	**56.9%**				
Concentration Trend:		Stable	Prob. Increasing	Stable	No Trend				



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water* , 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT

Evaluation Date:	**05-Jan-23**	Job ID:	**635544**
Facility Name:	**Teck Coal Regional Groundwater - FRO**	Location	**RG_MW_FR8B**
Conducted By:	**MF**	Reviewed By:	**CMH**

	Parameter	**Nitrate**	**Sulphate**	**Cadmium**	**Selenium**				
	units	mg/L	mg/L	µg/L	µg/L				
Sampling Event	**Sampling Date**	RG_MW_FR8B CONCENTRATION							
1	5-Oct-20	30.7	319	0.051	109.0				
2	10-Dec-20	30.3	322	0.025	94.0				
3	25-Feb-21	27.1	288	0.045	108.0				
4	19-May-21	29.1	326	0.025	101.0				
5	23-Aug-21	31.8	350	0.025	101.0				
6	1-Nov-21	38.1	398	0.032	137.0				
7	8-Feb-22	31.9	332	0.030	142.0				
8	5-May-22	31.9	333	0.026	120.0				
9	21-Jul-22	30.5	332	0.025	134.0				
10	17-Nov-22	33.6	378	0.033	164.0				
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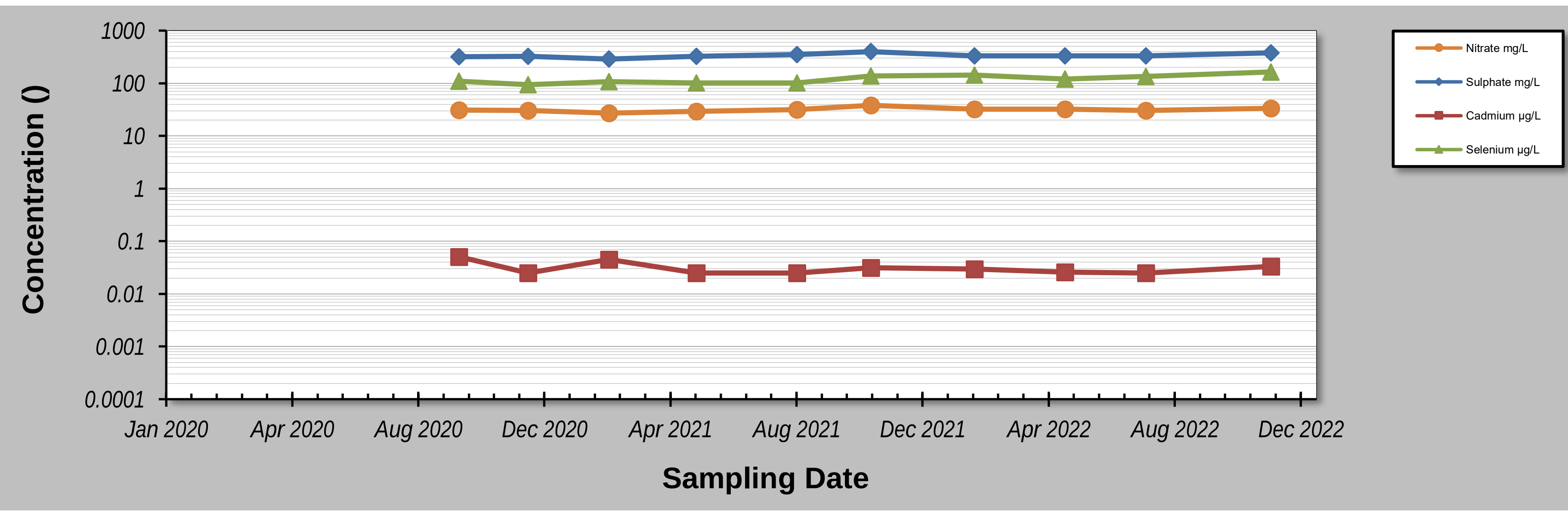
	Coefficient of Variation:	**0.09**	**0.09**	**0.29**	**0.19**				
	Mann-Kendall Statistic (S):	**18**	**24**	**-8**	**24**				
	Confidence Factor:	**93.4%**	**98.2%**	**72.9%**	**98.2%**				
	Concentration Trend:	Prob. Increasing	Increasing	Stable	Increasing				



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water* , 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT

Evaluation Date:	05-Jan-23	Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - FRO	Location	RG_MW_FR8C
Conducted By:	MF	Reviewed By:	CMH

Sampling Event	Sampling Date	Nitrate	Sulphate	Cadmium	Selenium				
	units	mg/L	mg/L	µg/L	µg/L				
		RG_MW_FR8C CONCENTRATION							
1	5-Oct-20	22.7	253	0.0429	94.8				
2	10-Dec-20	26.2	332	0.0700	93.5				
3	25-Feb-21	33.3	349	0.0565	127.0				
4	19-May-21	3.7	55	0.0111	16.3				
5	23-Aug-21	24.0	258	0.0314	72.1				
6	1-Nov-21	31.2	338	0.0502	112.0				
7	8-Feb-22	29.0	339	0.0465	128.0				
8	5-May-22	4.6	57	0.0119	19.0				
9	21-Jul-22	5.2	66	0.0170	23				
10	17-Nov-22	24.8	348	0.0394	126.0				
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12									
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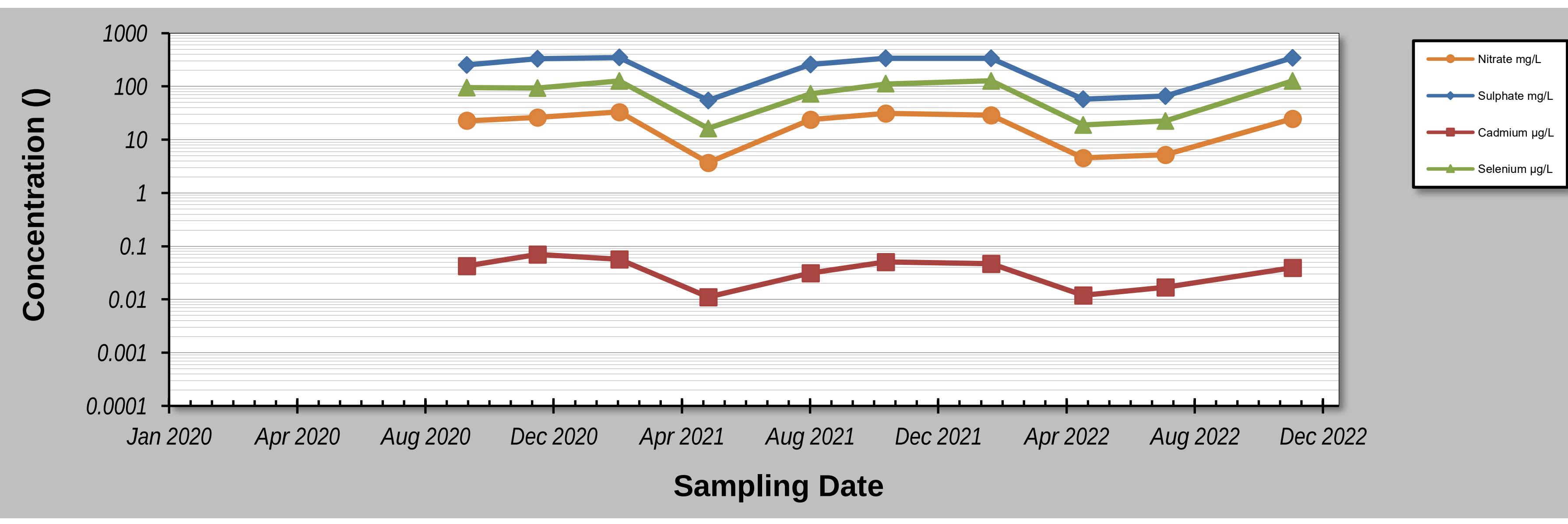
Coefficient of Variation:		0.56	0.54	0.52	0.57				
Mann-Kendall Statistic (S):		-3	5	-13	1				
Confidence Factor:		56.9%	63.6%	85.4%	50.0%				
Concentration Trend:		Stable	No Trend	Stable	No Trend				



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water* , 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT

Evaluation Date:	**15-Jan-23**	Job ID:	**688847**
Facility Name:	**Teck Coal Regional Groundwater - GHO**	Location	**GH_MW-PC**
Conducted By:	**MF**	Reviewed By:	

Sampling Event	Sampling Date	Nitrate (mg/L)	Sulphate (mg/L)	Cadmium (µg/L)	Selenium (µg/L)				
		GH_MW-PC CONCENTRATION							
1	5-Sep-16	2.85	485	0.0276	58.2				
2	17-Nov-16	2.52	366	0.0500	58.4				
3	2-Feb-17	2.66	385	0.0292	88.1				
4	22-Jun-17	2.61	442	0.0397	83.7				
5	25-Sep-17	2.03	456	0.0503	69.3				
6	11-Dec-17	2.36	440	0.0481	68.1				
7	28-Mar-18	1.94	417	0.0350	61.3				
8	19-Jun-18	2.49	481	0.0280	84.0				
9	20-Aug-18	1.56	423	0.0536	65.9				
10	12-Dec-18	2.14	430	0.0353	70.3				
11	25-Mar-19	1.82	386	0.0296	60.0				
12	5-Jun-19	2.37	452	0.0417	83.3				
13	16-Sep-19	1.76	440	0.0450	76.4				
14	12-Dec-19	1.99	407	0.0372	80.5				
15	19-Mar-20	1.84	448	0.0468	61.5				
16	11-Jun-20	1.74	334	0.0340	81.2				
17	24-Sep-20	1.33	375	0.0480	64.2				
18	3-Dec-20	1.67	416	0.0360	66.1				
19	18-Mar-21	1.61	389	0.0368	74.0				
20	24-Jun-21	4.09	413	0.0379	81.4				
21	2-Sep-21	1.48	425	0.0430	58.0				
22	3-Dec-21	1.46	345	0.0410	63.7				
23	16-Mar-22	2.07	419	0.0365	65.8				
24	1-Jun-22	2.02	295	0.0311	74.2				
25	8-Aug-22	1.06	343	0.0486	70.8				
26	25-Nov-22	1.71	418	0.0368	95.6				
27									
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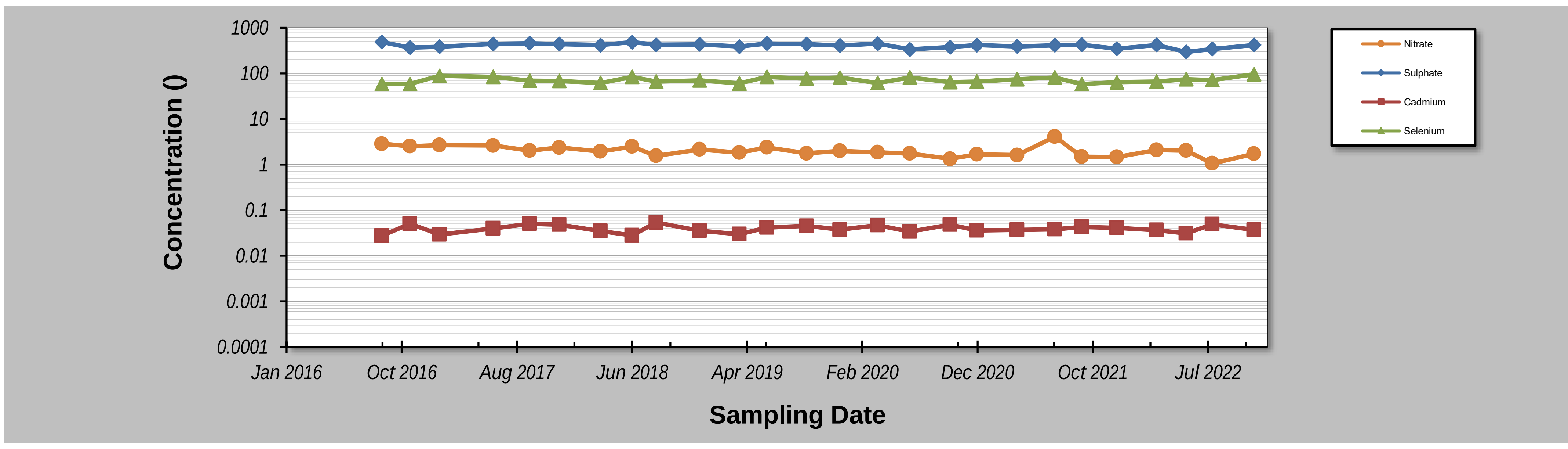
Coefficient of Variation:		**0.30**	**0.11**	**0.19**	**0.15**				
Mann-Kendall Statistic (S):		**-161**	**-104**	**14**	**23**				
Confidence Factor:		**>99.9%**	**98.9%**	**61.2%**	**68.4%**				
Concentration Trend:		Decreasing	Decreasing	No Trend	No Trend				



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT

Evaluation Date:	**05-Jan-23**	Job ID:	**635544**
Facility Name:	**Teck Coal Regional Groundwater - FRO**	Location	**RG_MW_FR10A**
Conducted By:	**MF**	Reviewed By:	**CMH**

Sampling Event	Sampling Date	Nitrate	Sulphate	Selenium					
	units	mg/L	mg/L	µg/L					
		RG_MW_FR10A CONCENTRATION							
1	19-May-21	0.3160	102.00	1.600					
2	27-Aug-21	0.0867	100.00	0.325					
3	5-Nov-21	0.0050	94.40	0.700					
4	8-Feb-22	0.0060	75.60	0.556					
5	6-May-22	0.0143	108.00	0.188					
6	21-Jul-22	0.0050	116.00	1.220					
7	17-Nov-22	0.0408	135.00	1.280					
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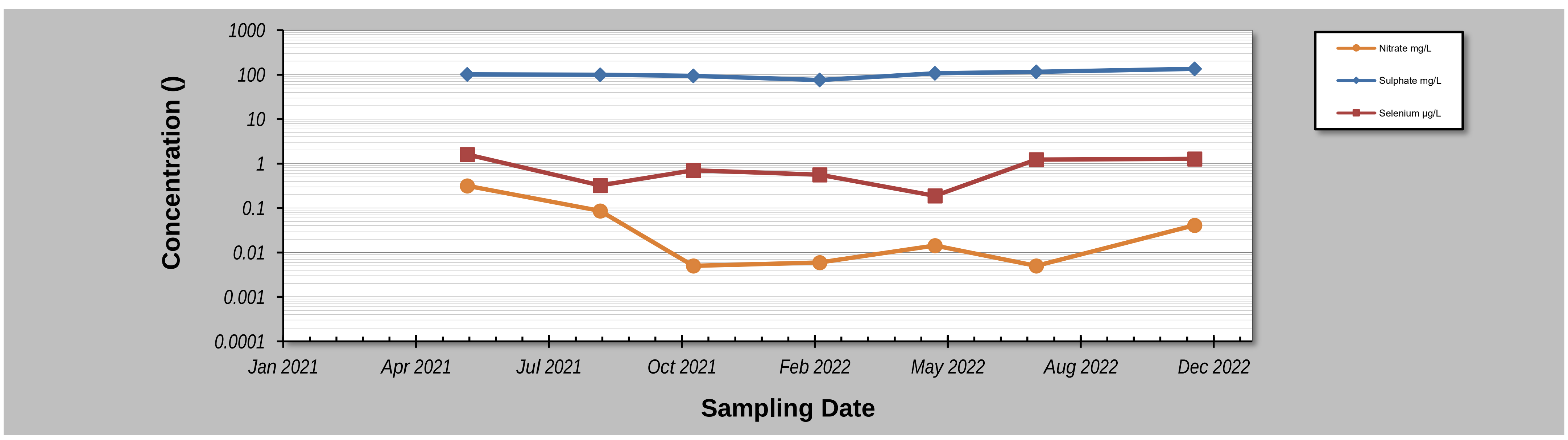
	Coefficient of Variation:	**6.87**	**0.17**	**0.64**					
	Mann-Kendall Statistic (S):	**2**	**6**	**1**					
	Confidence Factor:	**62.5%**	**95.8%**	**50.0%**					
	Concentration Trend:	No Trend	Increasing	No Trend					



Notes:

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2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT

Evaluation Date:	05-Jan-23	Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - FRO	Location	RG_MW_FR10B
Conducted By:	MF	Reviewed By:	CMH

Sampling Event	Sampling Date	Nitrate (mg/L)	Sulphate (mg/L)	Selenium (µg/L)					
		RG_MW_FR10B CONCENTRATION							
1	19-May-21	6.3500	138.00	28.100					
2	27-Aug-21	4.7900	97.30	19.600					
3	5-Nov-21	5.8300	115.00	27.100					
4	8-Feb-22	6.8500	134.00	33.100					
5	6-May-22	7.1700	144.00	28.400					
6	21-Jul-22	3.2300	81.00	13.900					
7	17-Nov-22	3.4300	89.20	20.800					
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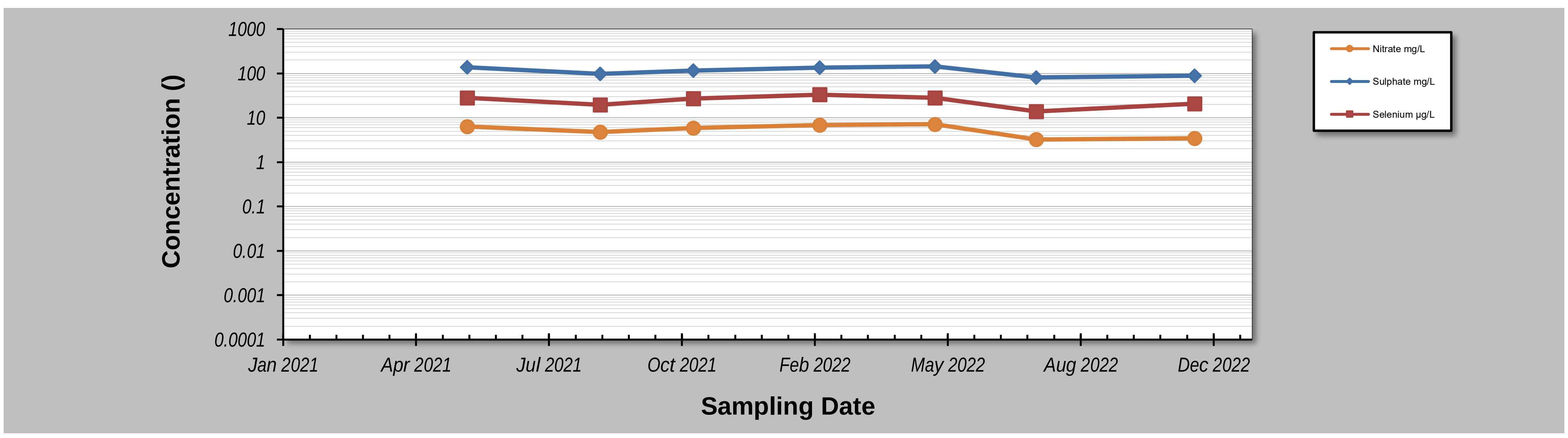
Coefficient of Variation:		0.30	0.22	0.27					
Mann-Kendall Statistic (S):		-3	-5	-3					
Confidence Factor:			71.9%	61.4%					
Concentration Trend:		Decreasing	Stable	Stable					



Notes:

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2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water* , 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT

Evaluation Date:	05-Jan-23	Job ID:	635544
Facility Name:	Teck Coal Regional Groundwater - FRO	Location	RG_MW_FR10C
Conducted By:	MF	Reviewed By:	CMH

Sampling Event	Sampling Date	Nitrate (mg/L)	Sulphate (mg/L)	Selenium (µg/L)					
		RG_MW_FR10C CONCENTRATION							
1	19-May-21	2.0900	137.00	5.750					
2	27-Aug-21	1.4500	177.00	5.250					
3	5-Nov-21	0.4200	158.00	1.450					
4	8-Feb-22	0.2200	121.00	1.230					
5	6-May-22	1.1400	92.80	2.190					
6	21-Jul-22	0.1780	68.90	0.922					
7	17-Nov-22	0.0050	15.60	0.050					
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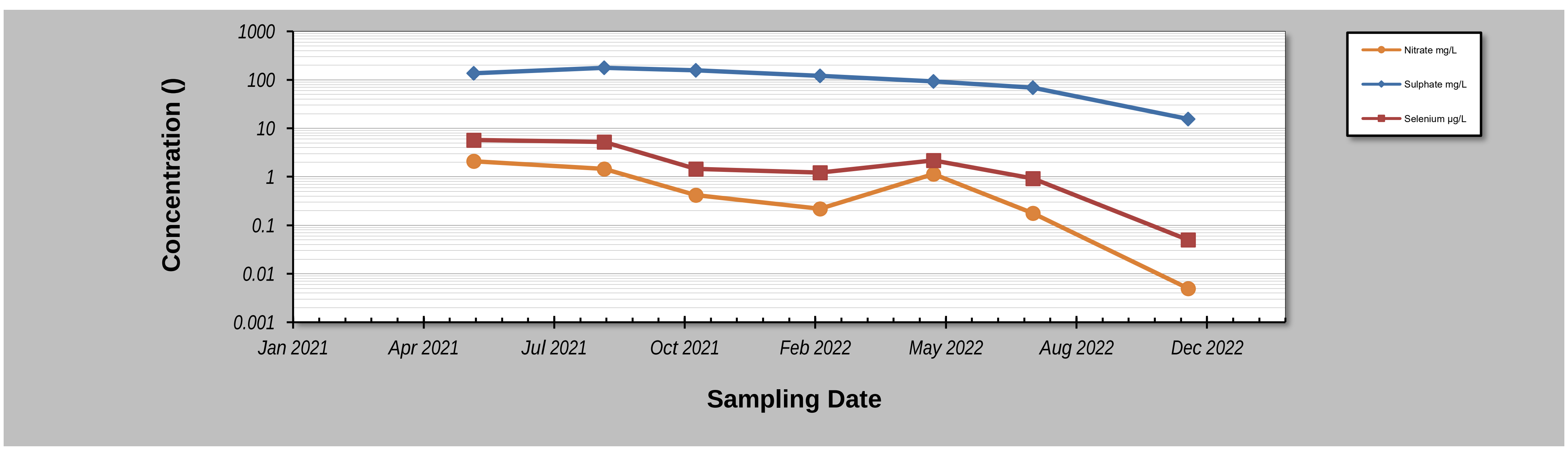
52									
53									
54									
55									
Coefficient of Variation:		1.00	0.51	0.92					
Mann-Kendall Statistic (S):		-17	-17	-17					
Confidence Factor:		99.5%	99.5%	99.5%					
Concentration Trend:		Decreasing	Decreasing	Decreasing					



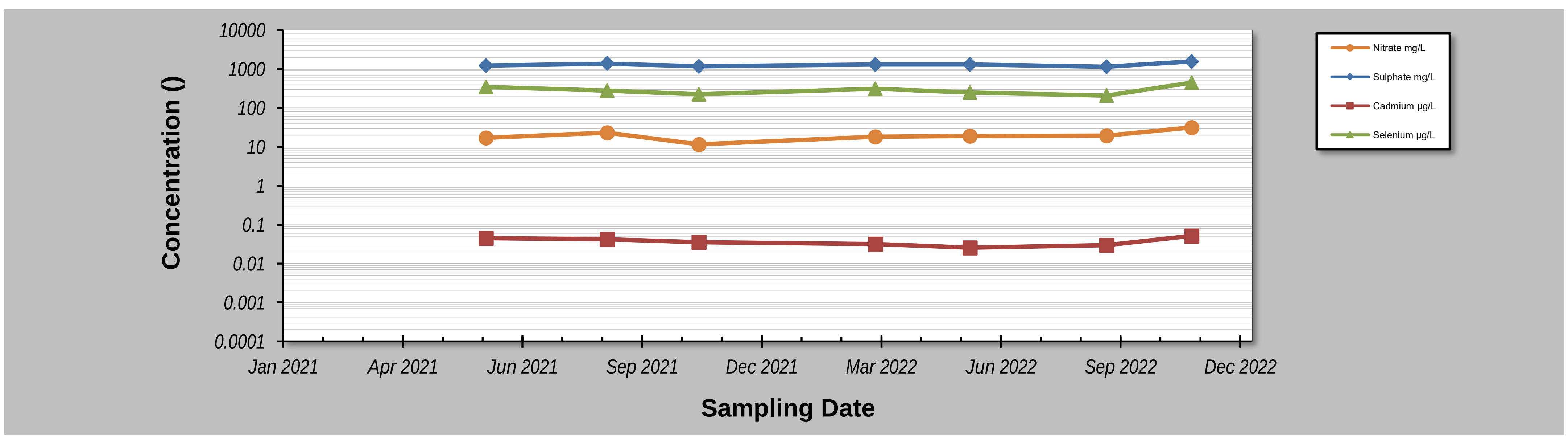
Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT

Evaluation Date:	**05-Jan-23**	Job ID:	**635544**
Facility Name:	**Teck Coal Regional Groundwater - FRO**	Location	**FR_MW18-02**
Conducted By:	**MF**	Reviewed By:	**CMH**

	Parameter	Nitrate	Sulphate	Cadmium	Selenium				
	units	mg/L	mg/L	µg/L	µg/L				
Sampling Event	Sampling Date	FR_MW18-02 CONCENTRATION							
1	2-Jun-21	17.1	1240	0.0446	345				
2	1-Sep-21	23.0	1390	0.0424	282				
3	9-Nov-21	11.6	1190	0.0352	226				
4	22-Mar-22	18.4	1310	0.0317	314				
5	1-Jun-22	18.9	1310	0.0257	252				
6	12-Sep-22	19.4	1150	0.0295	208				
7	15-Nov-22	31.7	1580	0.0517	449				
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
41									
42									
43									
44									
45									
46									
Coefficient of Variation:		**0.31**	**0.11**	**0.25**	**0.28**				
Mann-Kendall Statistic (S):		**11**	**2**	**-7**	**-3**				
Confidence Factor:		**93.2%**	**55.7%**	**80.9%**	**61.4%**				
Concentration Trend:		Prob. Increasing	No Trend	Stable	Stable				



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water* , 41(3):355-367, 2003.

Attachment IV

Thermal Survey of the Upper Fording River for Groundwater Signals

SUMMARY REPORT

March 16, 2023

Cam Jaeger,
Regional Groundwater Lead
Teck Resources Limited

Re: Summary of Findings - Final
Thermal Survey of the Upper Fording River for Groundwater Signals – Pilot Project

1. Introduction and Context

GeoProcess Research Associates Inc. (GeoProcess), with support from SkyPapi Aerial Services (SpyPapi), completed a thermal survey by unmanned aerial vehicle (UAV) of a reach of the Upper Fording River (UFR) and its floodplain (from FR_FRRDDS to compliance point FR_FRABCH)). This work was undertaken as a pilot project to test emerging technology in the overlapping areas of radiometric, photogrammetry and aerial imagery data capture by UAV. GeoProcess previously collected high-resolution orthoimagery and photogrammetry data focused on the UFR valley corridor, to inform the ongoing Fish Recovery Project (including for hydraulic modelling purposes). This work produced excellent results that have been used for a variety of studies and designs. A thermal camera was also tested as part of that previous work, but was not the main objective of that survey. The results, however, were not conclusive with regards to establishing noteworthy groundwater temperature potentials.

Subsequently, it was determined that there was value in deploying a thermal imagery camera mounted on a UAV to specifically measure radiometric emissivity (and, by extrapolation, temperature) of the river's surface water and floodplain areas to identify groundwater exfiltration areas or trends. A smaller, higher resolution area was selected for this investigation and in the subject of this project. Imagery was taken of this area the reviewed for signals that may represent surface expressions of groundwater. This memo provides a summary of the methods used to analyze the data, includes raw data attachments and provides an overall interpretation of the findings, lessons learned and recommended next steps.

2. Methods

A representative reach of the UFR (Map 1) was selected for the survey. While originally planned for mid-summer, due to the timing of the authorization and the necessary time for mobilization, the work was completed on Sept 26-27th, 2022. Air temperatures for the study period ranged from 0°C in the morning to

PO Box 65506 Dundas
DUNDAS, ON, L9H 6Y6
905.466.6721
www.geoprocessresearch.com

a maximum afternoon temperature of approximately 24 ºC. Weather both days comprised of full sun and light winds. Two staff were assigned to this work: one pilot and one biologist having expertise in water temperature investigations for fish habitat studies. The following describes the daily workflow:

1. Mission planning and launch/landing zone identification (in the days prior).
2. Arrive after first light and conduct a field-level hazard assessment
3. Calibrate thermal sensors to manual water temperature measurements
4. Conduct a reconnaissance flight to assess the overall area and look for hazards.
5. Conduct thermal mapping flight. During each mission, the pilot was responsible for control of the UAV and the second staff member for confirming visual line of sight and securing the flight operation zone (spotting hazards).
6. Obtaining manual measurements of the water temperature and checking against the real-time temperatures being reported from the sensor.
7. Complete the mapping mission, demobilize and move to the next launch point.
8. Repeat until completion
9. Post-processing (see below)

The following are the specifications for the equipment used:

- Drone and camera model Autel EVO 640T (25 mm focal length, 12 mm field of view)
- Manual Measurements - Long (~1 m) probe for measuring the temperature at and below the water surface
- Handheld thermal sensor (gun style) for precise measurements of surface water temperatures

Post-Processing steps included the following:

- Reviewed approximately 2000 exported thermal images to screen out and/or correct (using manual calibration measurements) obvious outliers where recorded temperatures were influenced by outside factors (e.g. high reflectivity, deep shadows, etc). This work was performed using the manufacturer's (FLIR) processing software.
- Identify areas of interest (or anomalies) concerning potential groundwater expression, or indications of false positives in anomalous areas. Flag each area and identify it on a map. The output includes a single page summary report for each flagged site, including:
    - thermal map (and legend) showing all temperatures in the area
    - RGB image
    - spot thermal transects, reporting max, min and average temperatures.
    - narrow band map showing only a range of prospective groundwater temperatures, ranging between 2º to8º C.
    - coordinate of the site
    - histogram showing the distribution of temperatures within the site

- Compile a thermal mosaic image of the UFR (Map 3) and its main branches and tributaries in the study area
- Compile a digital data package for Teck.

3. Findings and Recommendations

The following are the primary findings and recommendations resulting from the thermal UAV surface and groundwater investigation pilot project:

- The analysis did not produce conclusive evidence of the presence or absence of groundwater sources. Signals of potential groundwater expression were noted, but thermal 'noise' confounded the results. Noise, in this context, refers to temperature readings that are affected by the angle of the sun and the reflectivity of different materials. In this case, the full sun conditions, combined with the relatively low surface water temperatures, resulted in difficulty identifying subtle temperature nuances between ground and surface water. The surface water temperature at this time of the year (late September) is low, typically having ranged between 5-10 degrees Celsius during this study. This was generally less than a 10 degrees difference as compared to the presumed groundwater temperature, making differentiation between the two regimes difficult. Often, the best times for minimizing noise from thermal radiance (i.e. early morning and late afternoon) coincided with the lowest surface water temperatures, further confounding the identification of clear signals from groundwater expressions.
- The manual temperature measurements indicated that, at this time of year in the study area, the surface water temperatures did not differ significantly from temperatures lower in the water column. Water temperatures generally ranged between 5ºC to 7ºC in the morning and increased to approximately 10ºC to 12ºC in the afternoon. This finding applies to most morphologies within the UFR in the study area, but not to deeper pools because depths greater than approximately 1.0 m were not measured.
- Notwithstanding the challenges and concerns noted above, several locations were identified as having good candidate groundwater signals, to be explored further by way of cross-referencing against measured areas of surface groundwater expression. These are displayed on the accompanying map (Map 2). Higher likelihood sites are differentiated by red symbols (labelled as 'priority' sites), and are listed and described below:

Site	Description
0029	Confluence of greenhouse side channel branches resulting in thermal gradient
0047	Seasonally inundated branch (currently vegetated) showing potential GW expression
0060	Decrease in surface water temperature coinciding with greenhouse side channel branch convergence
0080	Decrease in surface water temperature coinciding with greenhouse side channel branch convergence
0097	Temperature differential possibly cause by mixing at greenhouse side channel branch confluence

0123	Temperature differential possibly cause by mixing at greenhouse side channel branch confluence
0193	Temperature differential possibly cause by mixing at greenhouse side channel branch confluence
0205/0209	Relatively strong signal of potential groundwater, near west valley limit ~500 m north of Porter Creek
0267	Temperature differential possibly cause by mixing at greenhouse side channel branch confluence
0309	Relatively strong signal from east river bank, small side channel visible
0334	Thermal gradient and mixing visible across large pool at unstable meander. Possibly due to solar exposure
0442	Temperature differential possibly cause by mixing at greenhouse side channel branch confluence
0599	Relatively strong signal from west river bank at pool location. Consistently cool temps around bend (including in shallows) - possible thermal influence
0942	Warmer temperatures around bend, possibly due to shallow water conditions from dense LWD
1089/1104	Thermal gradients observed at confluence with Chauncey Creek, indicative of mixing
1300	Small surface water features in meadow, possible GW seepage zone

- The survey results did a good job of showing surface water mixing, where smaller (and warmer) tributaries mixed with the main branch of the UFR, with temperature differentials being generally discernable. This information would be useful for habitat mapping at key times of the year when thermal conditions drive life stage activity (i.e. juvenile rearing in shallower warmer waters).

Concerning further study, the results indicated that night flights during the mid-summer will likely yield the best results, if there is a desire to follow up on this trial with an additional survey. This will allow time for subsidence of the thermal resonance, meaning that sun-induced reflectivity and heating will have subsided, and the ground and water temperatures will have normalized. This thermal baseline, combined with the highest seasonal difference between ground and surface water temperatures, should result in optimal conditions for the UFR Valley.

We are happy to discuss the findings of this pilot study at your convenience. For any additional questions, please don't hesitate to contact Jeff Hirvonen at 416-452-5037 or by email at jhirvonen@geoprocess.com

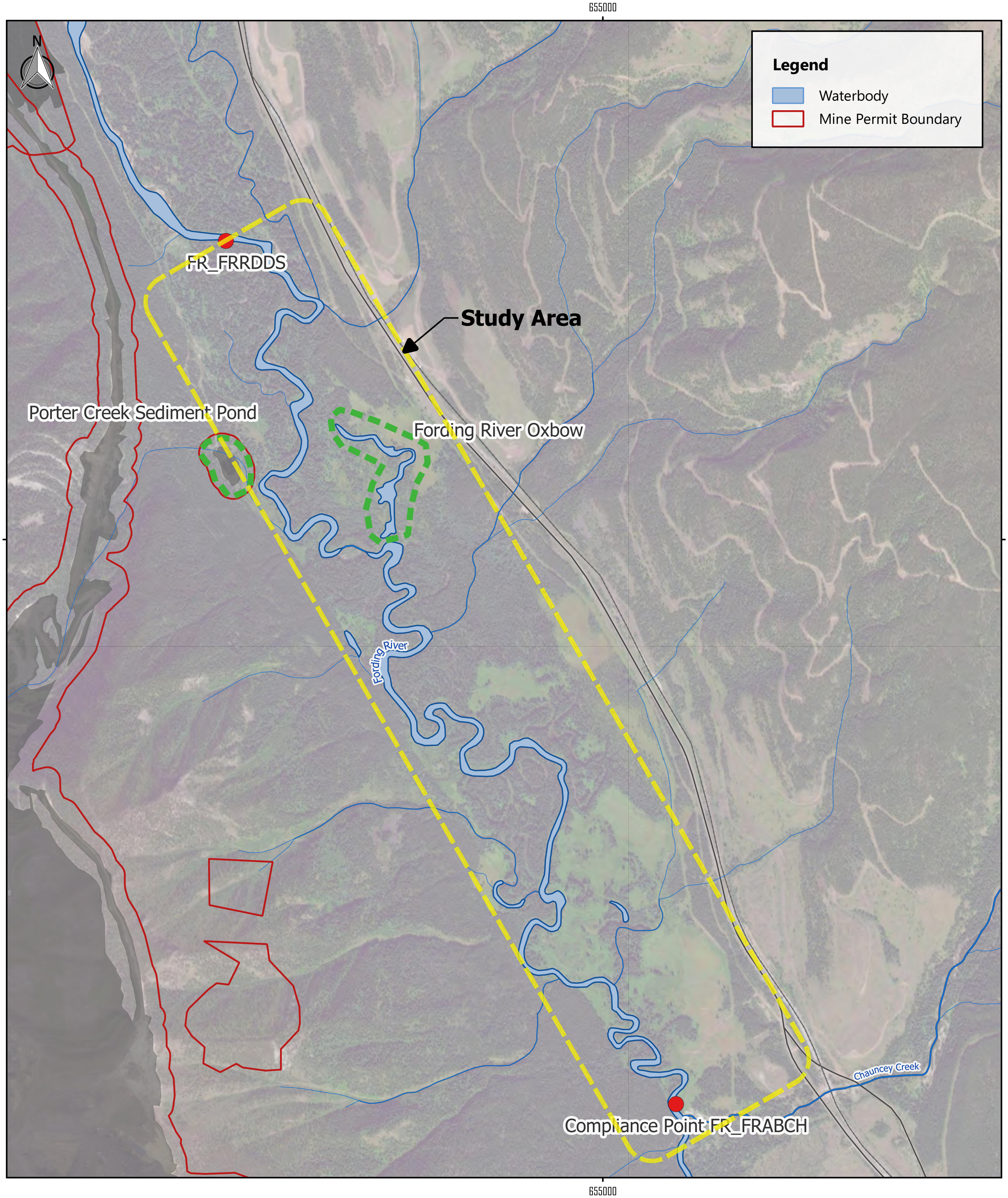
Regards,

GEOPROCESS RESEARCH ASSOCIATES INC

Jeff Hirvonen, MASc.
Principal

Ken Glasbergen, MSc.
Principal

Maps



GeoProcess RESEARCH ASSOCIATES

0 0.25 0.5 km

NAD83(CSRS) / UTM zone 11N (EPSG:2955)

Notes:

Map 1.

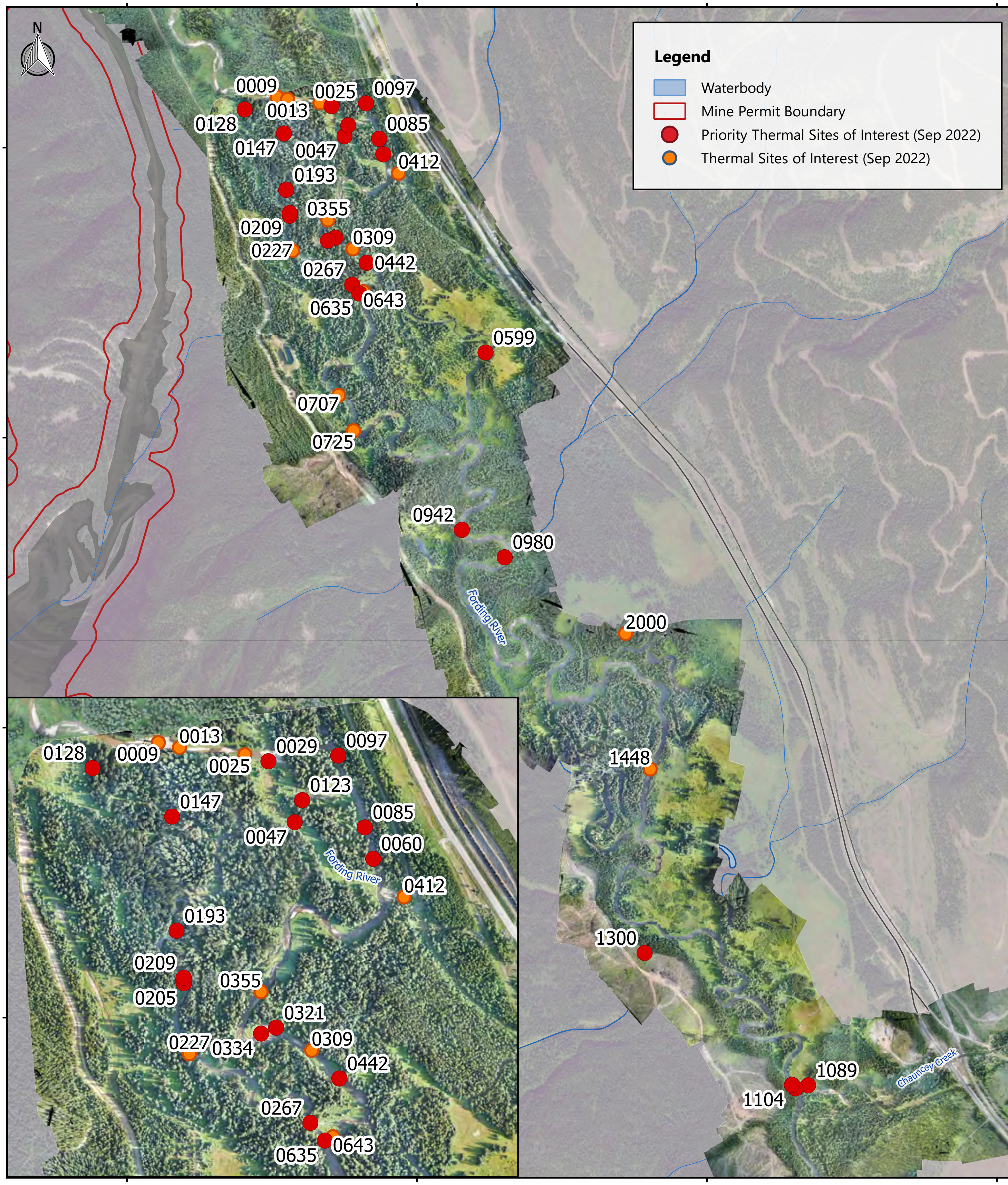
Study Area for the
Fording River Thermal Survey

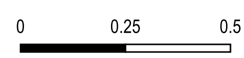
Thermal Study by UAV Pilot Project

TECK COAL LIMITED

CREATED BY:	JPH, AM	PROJECT NO.:	P2022-683
CHECKED BY:		DATE:	Mar 20, 2023

G:\Shared drives\Projects-2022\P2022-683 FRO Thermal Imagery Pilot\GIS\Project\Teck Thermal.qgz





GeoProcess RESEARCH ASSOCIATES

CREATED BY:	JPH, AM	PROJECT NO.:	P2022-683
CHECKED BY:		DATE:	Mar 20, 2023

Notes:

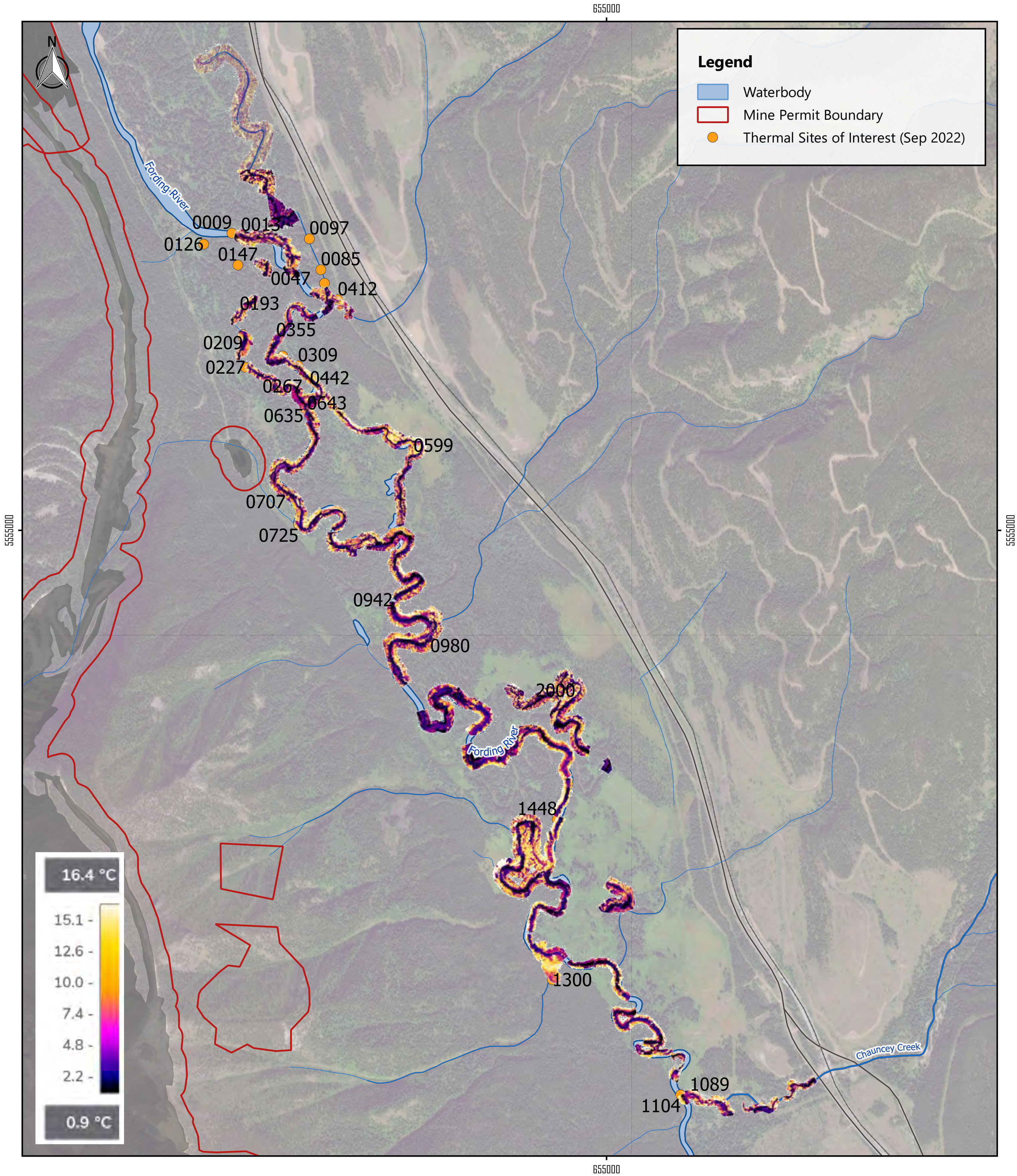
Map 2.

Flagged Sites of Interest
Fording River Thermal Survey

Thermal Study by UAV Pilot Project

TECK COAL LIMITED

G:\Shared drives\Projects-2022\P2022-683 FRO Thermal Imagery Pilot\GIS\Project\Teck Thermal.qgz



GeoProcess RESEARCH ASSOCIATES

0 0.25 0.5 km

NAD83(CSRS) / UTM zone 11N (EPSG:2955)

Notes:

Map 3.

Thermal Mosaic

Thermal Study by UAV Pilot Project

TECK COAL LIMITED

CREATED BY:	JPH	PROJECT NO.:	P2022-683
CHECKED BY:		DATE:	Nov 28, 2022

G:\Shared drives\Projects-2022\P2022-683 FRO Thermal Imagery Pilot\GIS\Project\Teck Thermal.qgz

Appendix A

Thermal Areas of Interest (Site Reports)

Teck Thermal Imagery
Groundwater Pilot Project - Report

Data collected Sept 25-26, 2022

Parameters

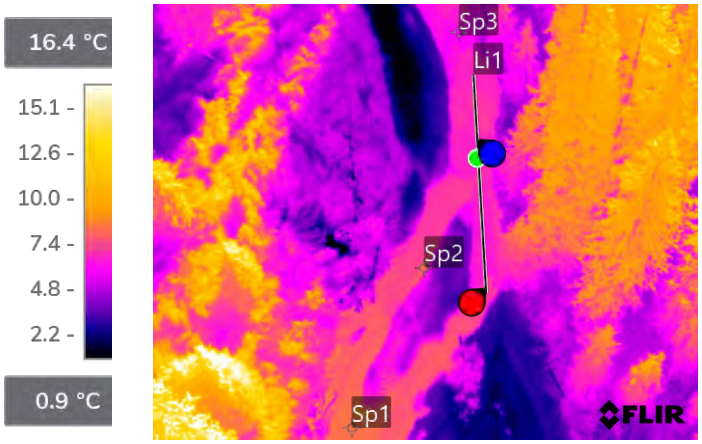
Emissivity	0.98
Distance	35.00 m
Reflected temp.	5.0-12.0 °C
Atmospheric temp.	4.0-23.5 °C
Relative humidity	68.0%
Ext. optics temp.	20.0 °C
Ext. optics trans.	1.00
Reference temp.	12.0 °C

Camera information

Camera model	DUAL 640T
Lens	FOL25
Camera serial	1237-0912
Filter	None
Range max.	1150.0 °C
Range min.	-40.0 °C
Field of view	12mm

Teck Thermal Imagery
Groundwater Pilot Project - Report

IRX_0009_FLIR.jpg



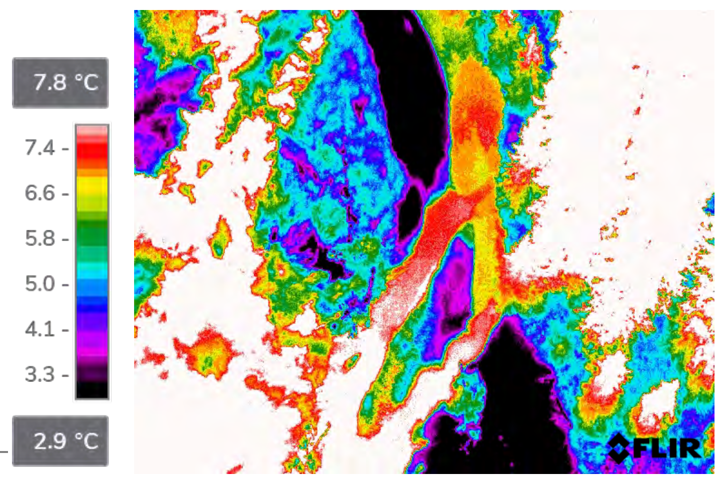
Measurements:

Sp1	8.8 °C
Sp2	9.2 °C
Sp3	6.4 °C
Li1	
Max	7.9 °C
Avg	7.1 °C
Min	6.7 °C

Comment:

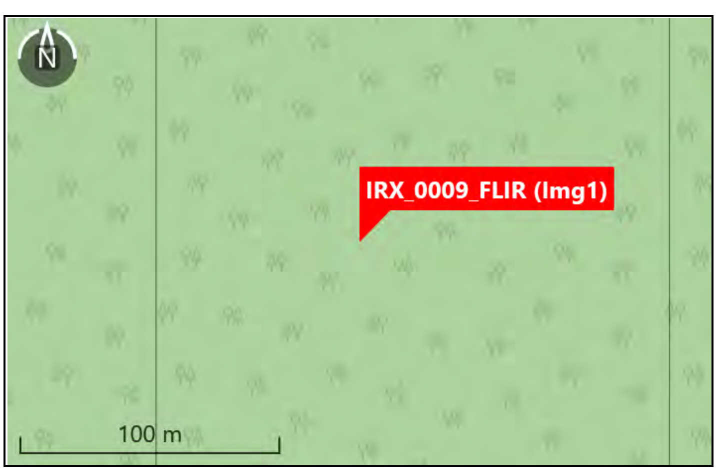
Temperature anomaly Sp1 and Sp3 observations caused by solar reflectance.

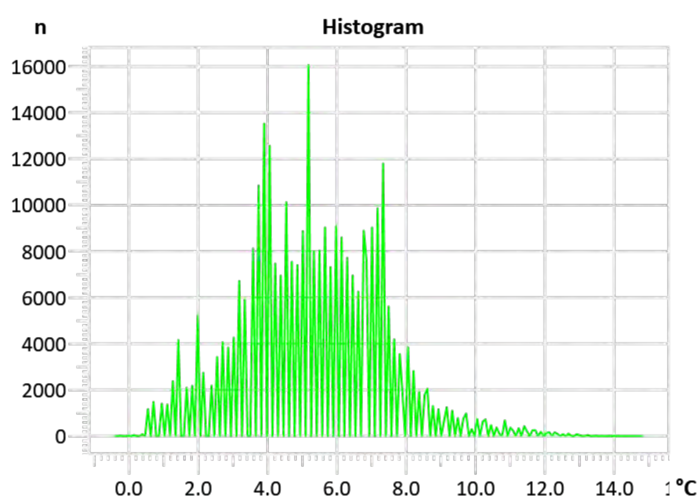
Narrow band 2-8 deg C



Geolocation

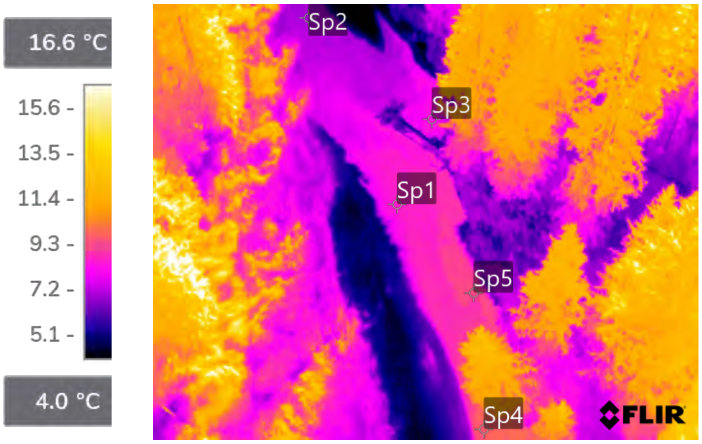
Coordinates	**50°08'16.5"N 114°51'06.0"W**
Compass degrees	





Teck Thermal Imagery
Groundwater Pilot Project - Report

IRX_0013_FLIR.jpg



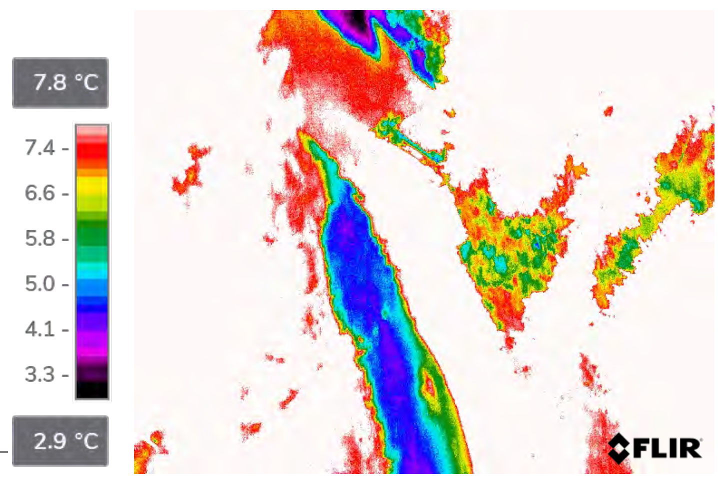
Measurements:

Sp1	8.8 °C
Sp2	7.1 °C
Sp3	8.3 °C
Sp4	10.0 °C
Sp5	9.6 °C

Comment:

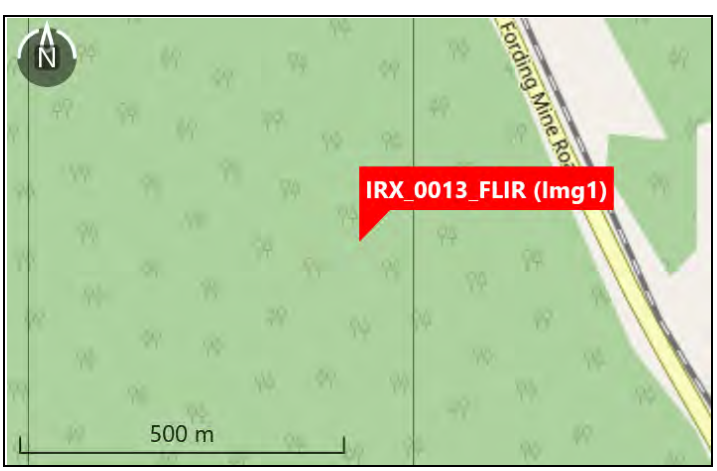
Temperature anomaly Sp1 and Sp2 observations caused by solar reflectance.

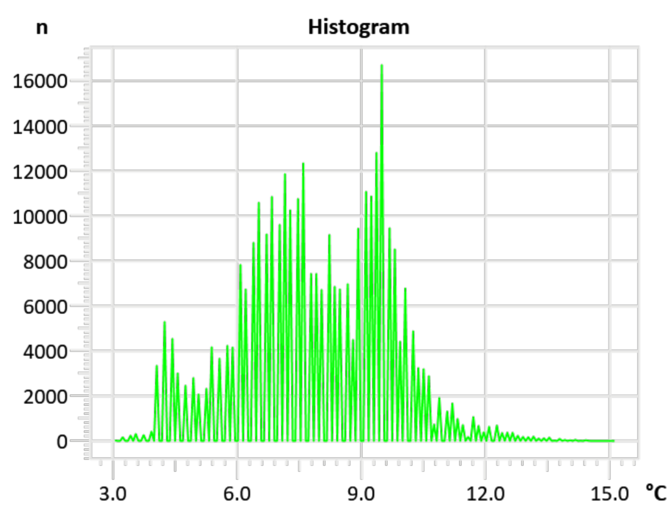
Narrow band 2-8 deg C



Geolocation

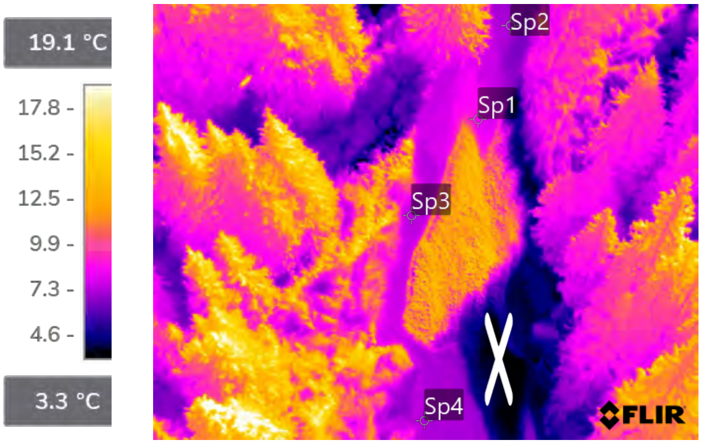
Coordinates	[50°08'16.2"N 114°51'04.2"W]()
Compass degrees	





Teck Thermal Imagery
Groundwater Pilot Project - Report

IRX_0017_FLIR.jpg



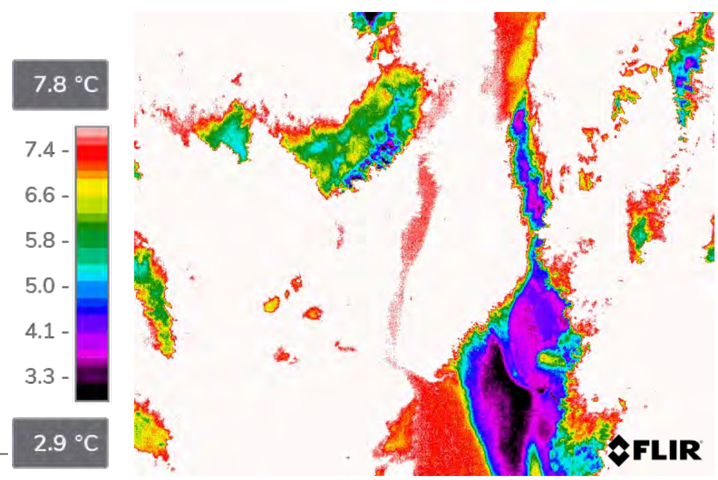
Measurements:

Sp1	8.8 °C
Sp2	7.5 °C
Sp3	7.7 °C
Sp4	7.7 °C

Comment:

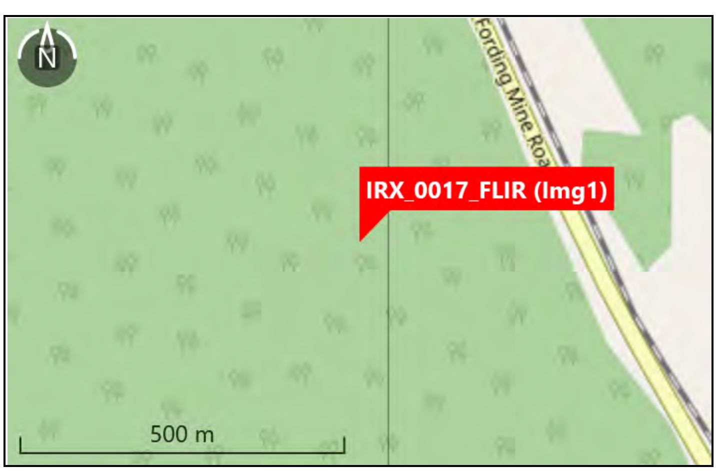
Temperature anomaly X shadow: to further investigate possible underground water.

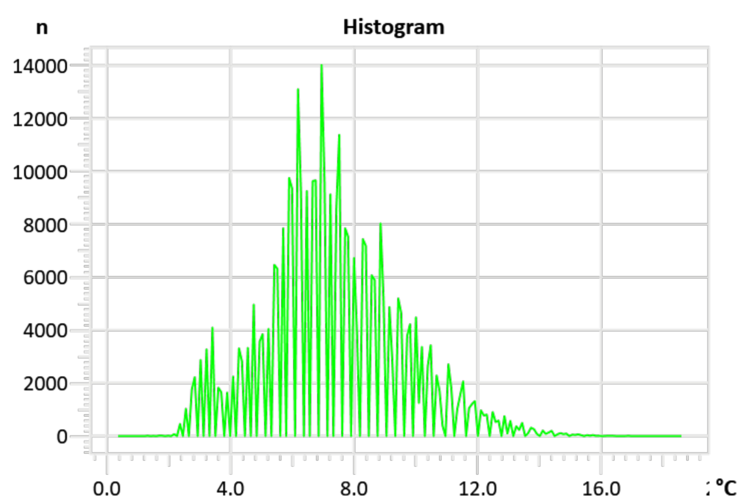
Narrow band 2-8 deg C



Geolocation

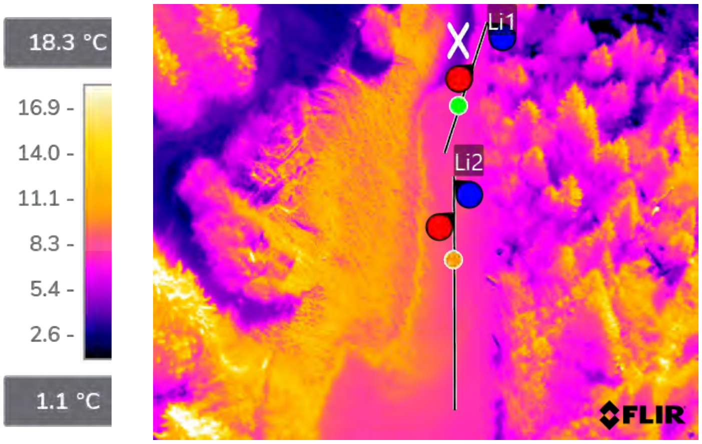
Coordinates	**50°08'15.9"N 114°51'02.3"W**
Compass degrees	





Teck Thermal Imagery
Groundwater Pilot Project - Report

IRX_0025_FLIR.jpg



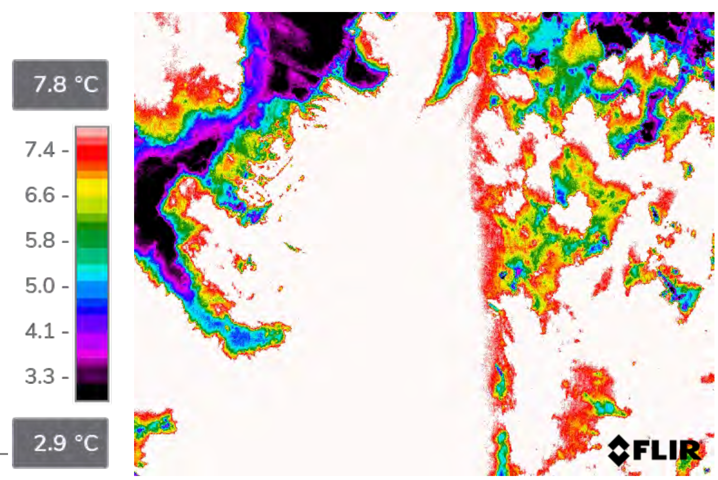
Measurements:

Li1	
Max	8.6 °C
Avg	8.0 °C
Min	7.3 °C
Li2	
Max	9.2 °C
Avg	8.8 °C
Min	8.6 °C

Comment:

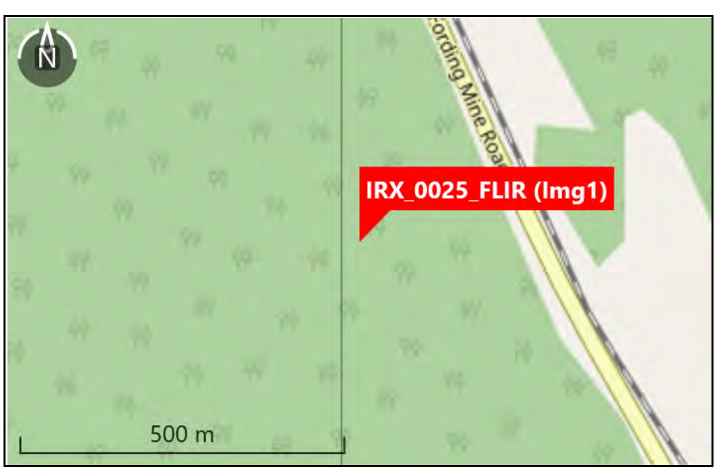
Shallow water mixing at Li1/2.

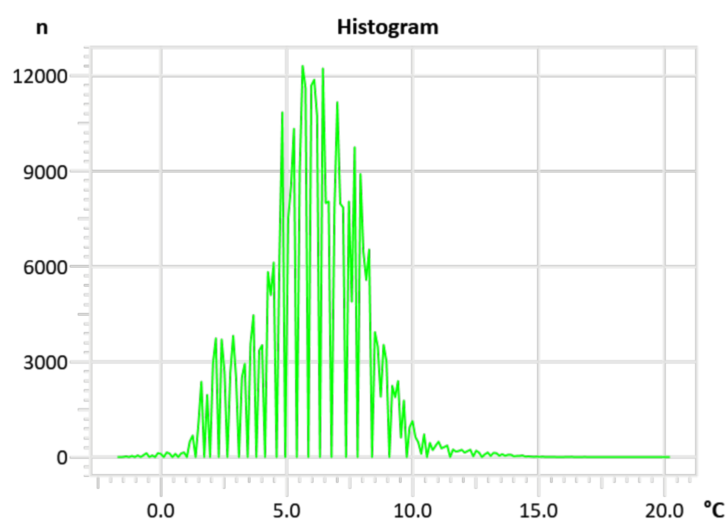
Narrow band 2-8 deg C



Geolocation

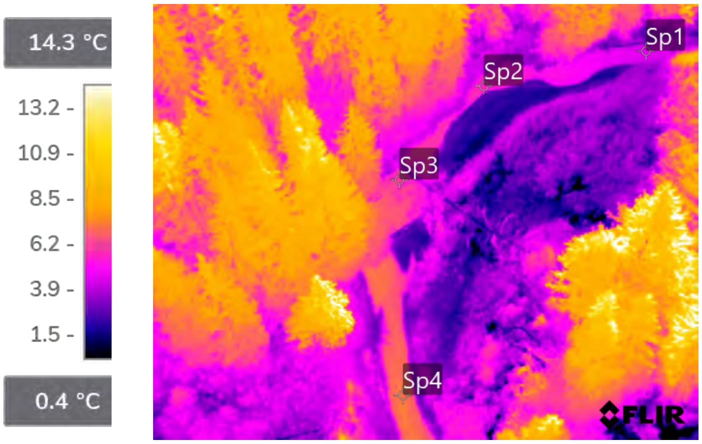
Coordinates	<u>**50°08'15.7"N 114°50'58.6"W**</u>
Compass degrees	





Teck Thermal Imagery
Groundwater Pilot Project - Report

IRX_0029_FLIR.jpg



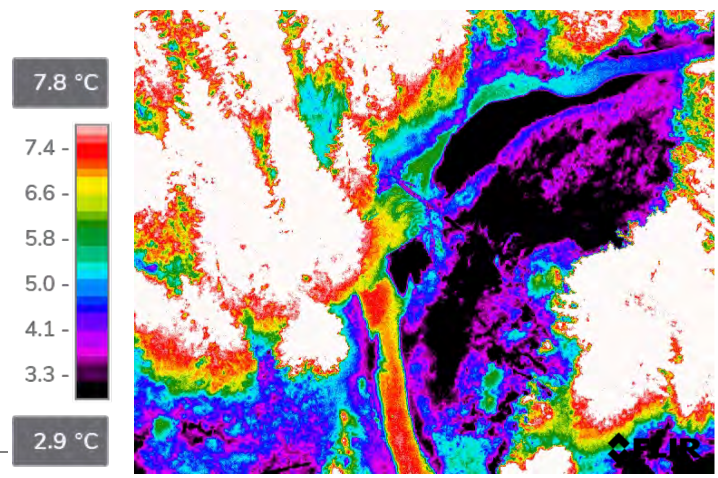
Measurements:

Sp1	4.9 °C
Sp2	6.0 °C
Sp3	6.4 °C
Sp4	7.3 °C

Comment:

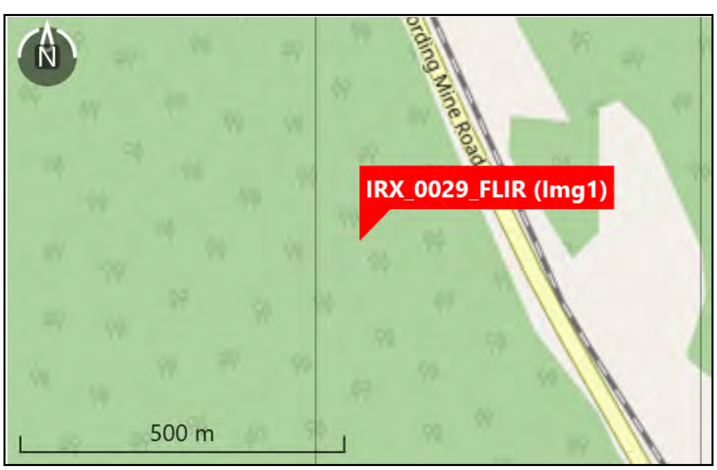
Temperature anomaly Sp1: to be further investigated.

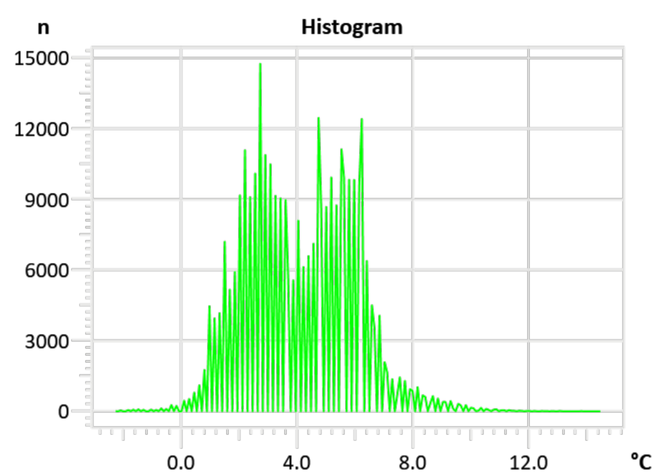
Narrow band 2-8 deg C



Geolocation

Coordinates	**50°08'15.3"N 114°50'56.6"W**
Compass degrees	

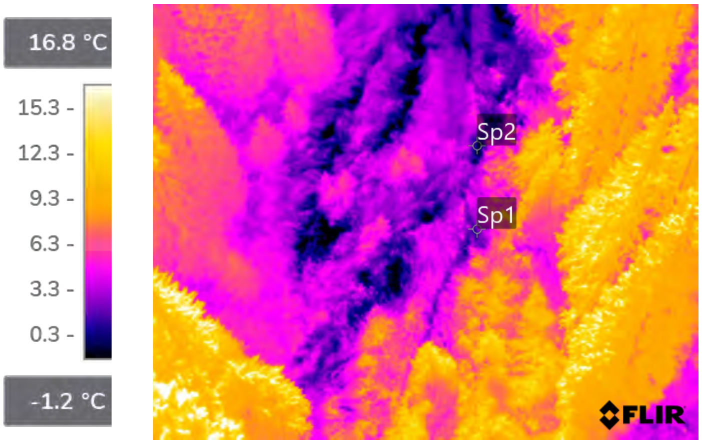




GeoProcess Research Associates

Teck Thermal Imagery
Groundwater Pilot Project - Report

IRX_0047_FLIR.jpg



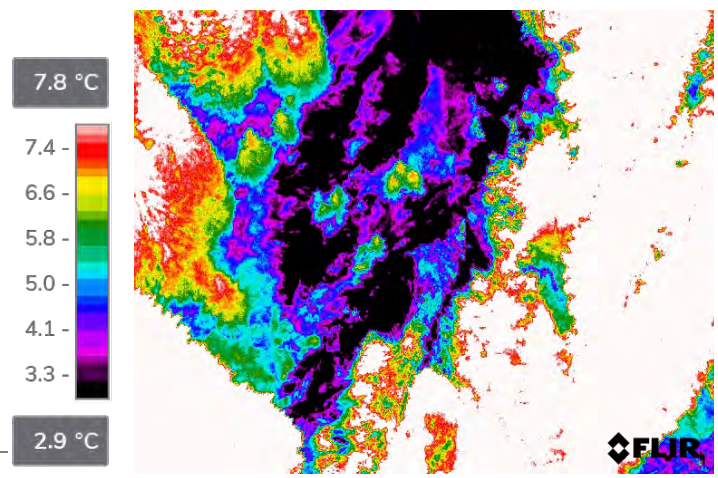
Measurements:

Sp1	2.8 °C
Sp2	-0.1 °C

Comment:

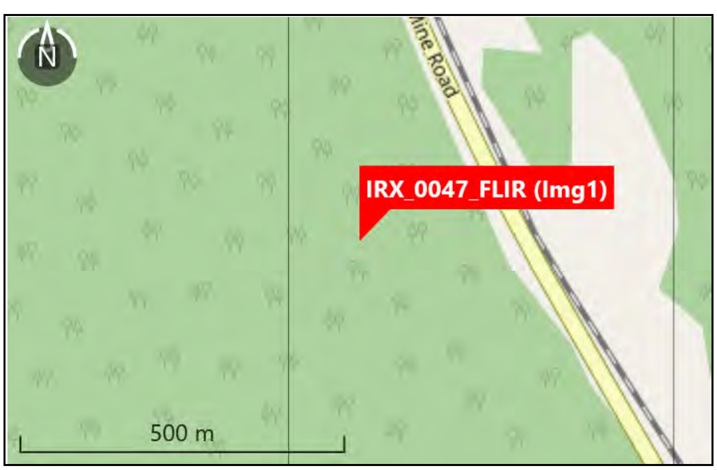
Temperature anomaly Sp1 and Sp2 observations were caused by possible moisture under the grassy surface.

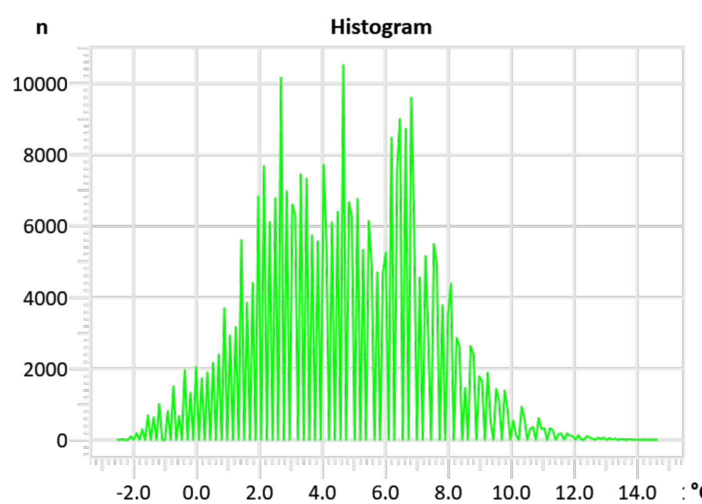
Narrow band 2-8 deg C



Geolocation

Coordinates	<u>**50°08'11.9"N 114°50'54.5"W**</u>
Compass degrees	

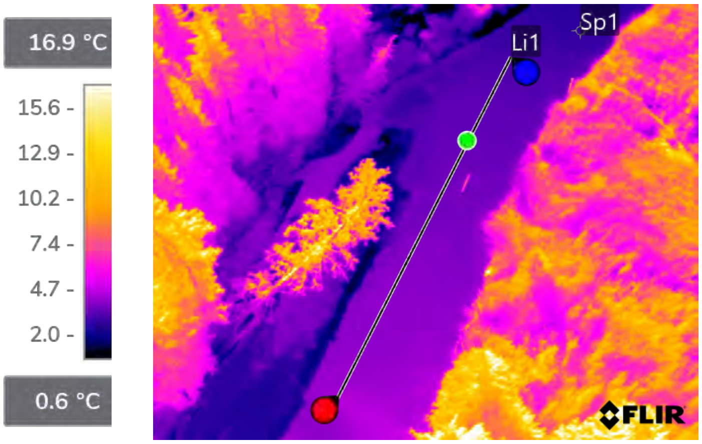




GeoProcess
RESEARCH ASSOCIATES

Teck Thermal Imagery
Groundwater Pilot Project - Report

IRX_0060_FLIR.jpg



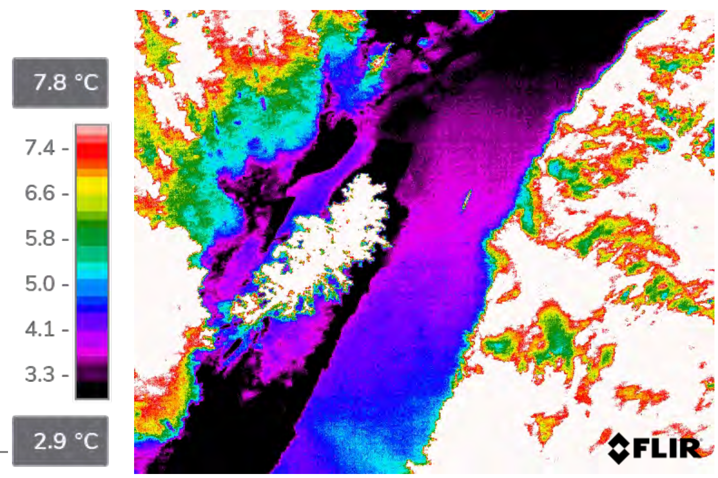
Measurements:

Sp1	3.0 °C
Li1	
Max	5.3 °C
Avg	4.2 °C
Min	3.3 °C

Comment:

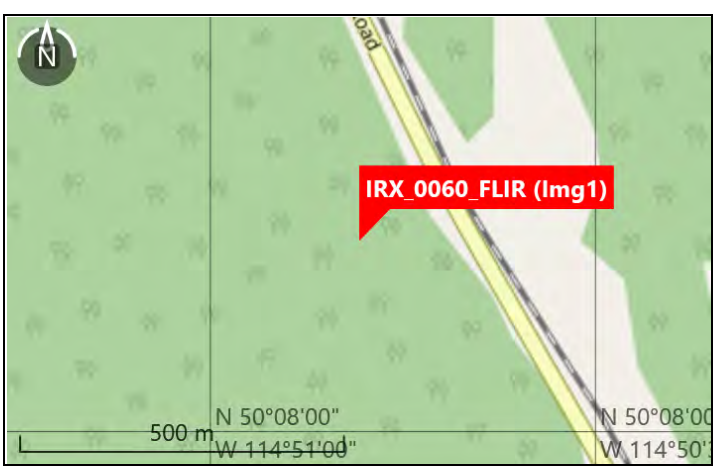
Temperature anomaly Sp1 and Li2 cooler water observed: To be inspected.

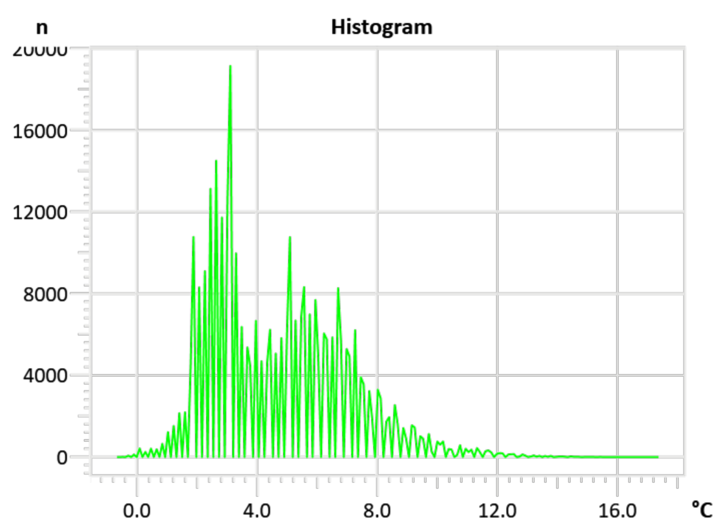
Narrow band 2-8 deg C



Geolocation

Coordinates	50°8'9.75"N 114°50'47.85"W
Compass degrees	





Teck Thermal Imagery
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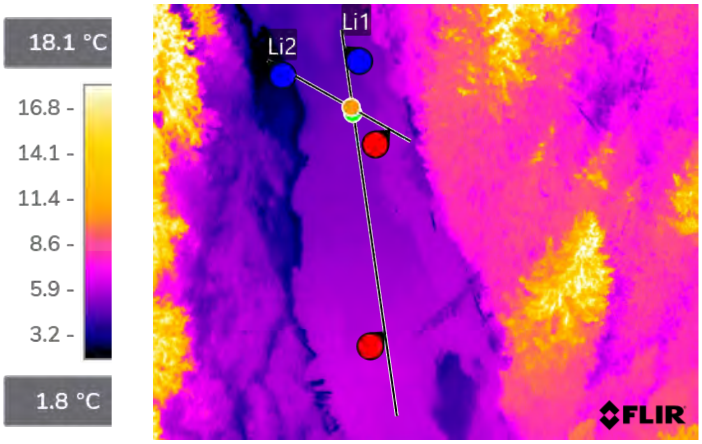
IRX_0085_FLIR.jpg



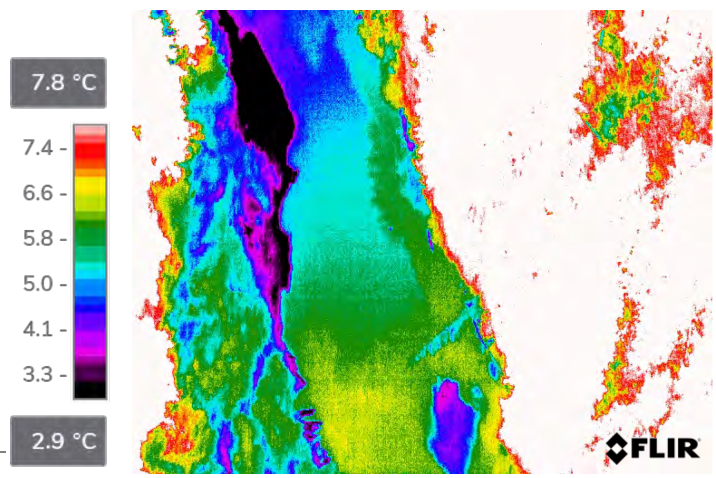
Measurements:

Li1	
Max	6.7 °C
Avg	5.8 °C
Min	4.4 °C
Li2	
Max	6.2 °C

Comment:

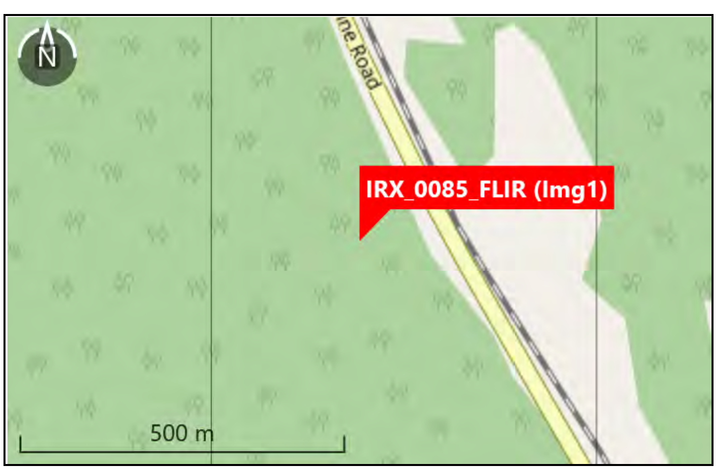
Temperature anomaly Li1 and Li2 observations caused possibly by solar reflectance: To be investigated.

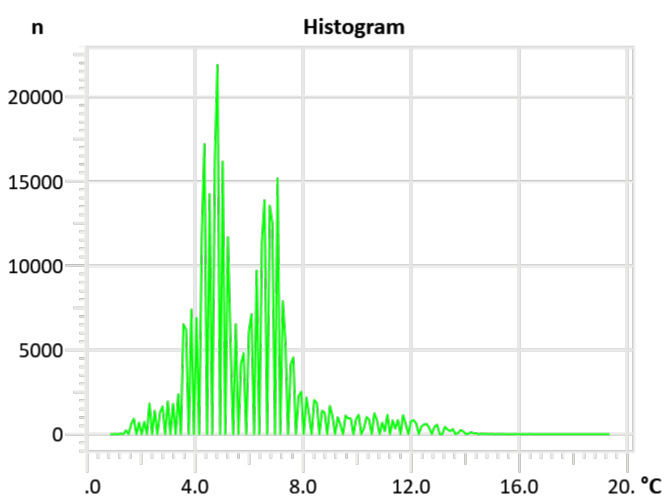
Narrow band 2-8 deg C



Geolocation

Coordinates	<u>**50°08'11.5"N 114°50'48.5"W**</u>
Compass degrees	





Teck Thermal Imagery
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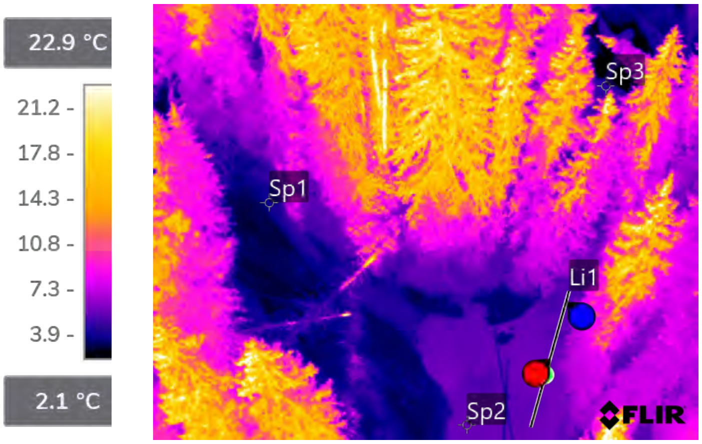
IRX_0097_FLIR.jpg



Measurements:

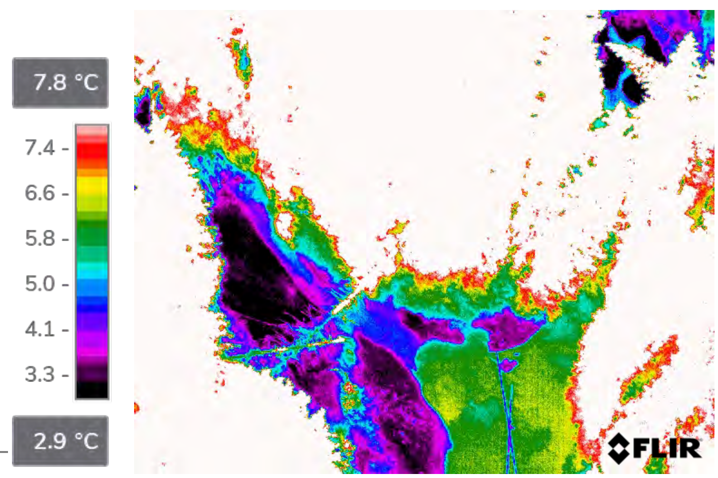
Sp1	4.4 °C
Sp2	6.2 °C
Sp3	5.1 °C
Li1	
Max	6.7 °C
Avg	6.3 °C
Min	5.8 °C

50°08'15.5"N 114°50'50.6"W

Comment:

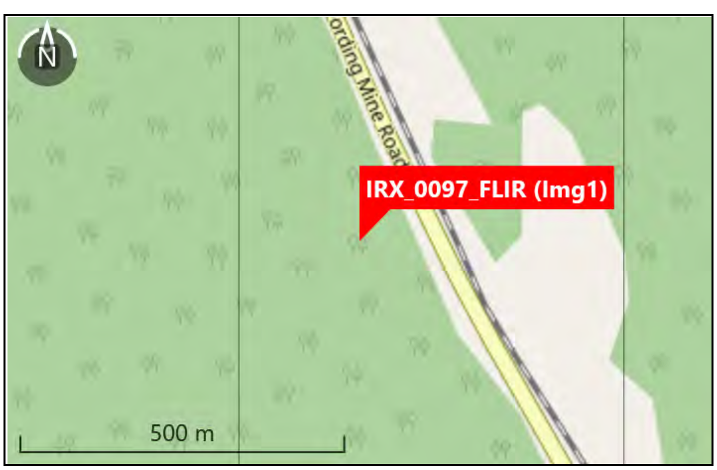
Temperature anomaly Sp1 and Li observations possibly caused water mixing: To be investigated further.

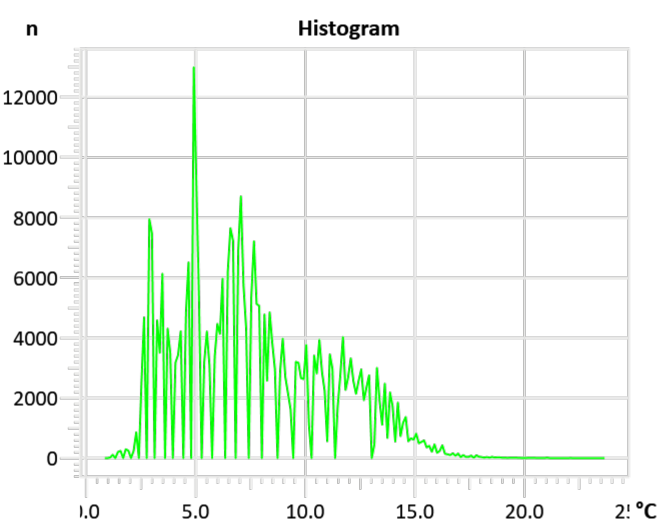
Narrow band 2-8 deg C



Geolocation

Coordinates	**50°08'15.5"N 114°50'50.6"W**
Compass degrees	





Teck Thermal Imagery
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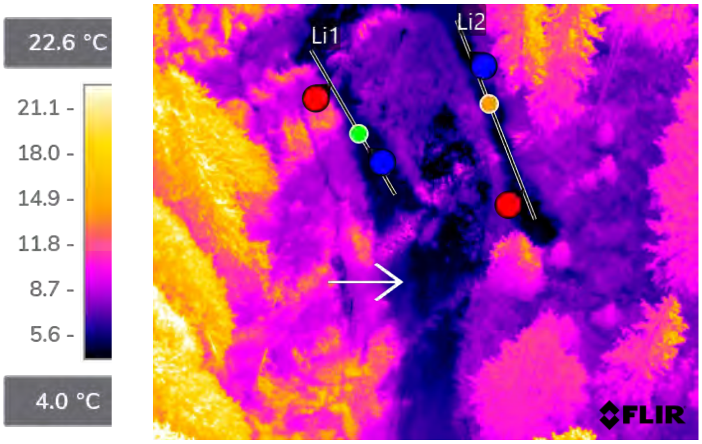
IRX_0123_FLIR.jpg



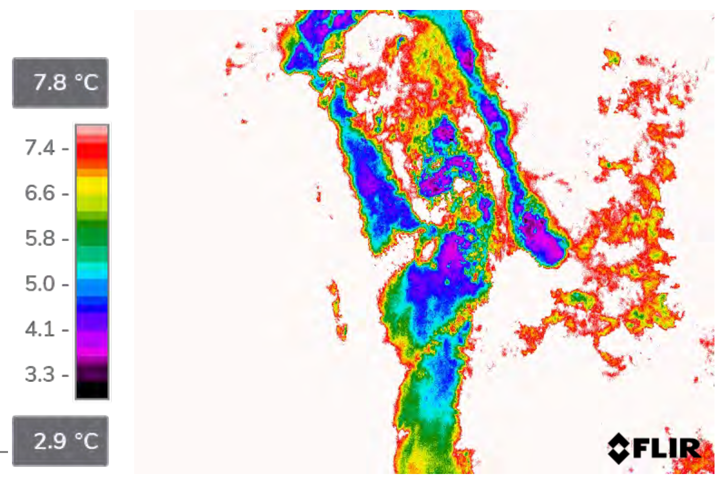
Measurements:

Li1	
Max	8.1 °C
Avg	5.2 °C
Min	4.2 °C
Li2	
Max	6.7 °C
Avg	4.8 °C
Min	3.5 °C

Comment:

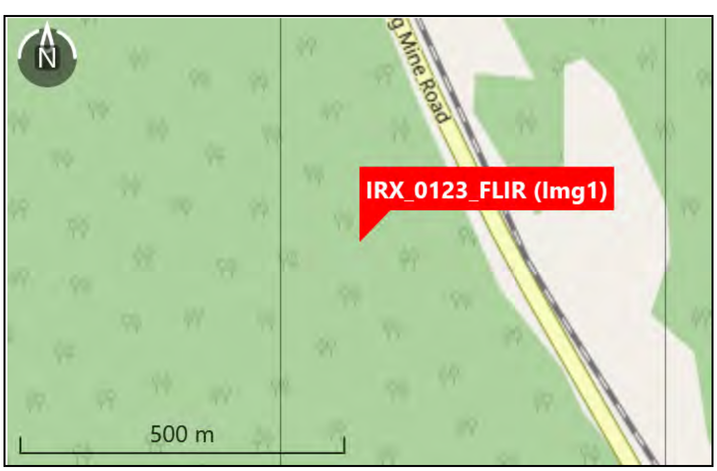
Temperature anomaly Li1 and Li2 observations caused by water mixing: To be further investigated at -> mark.

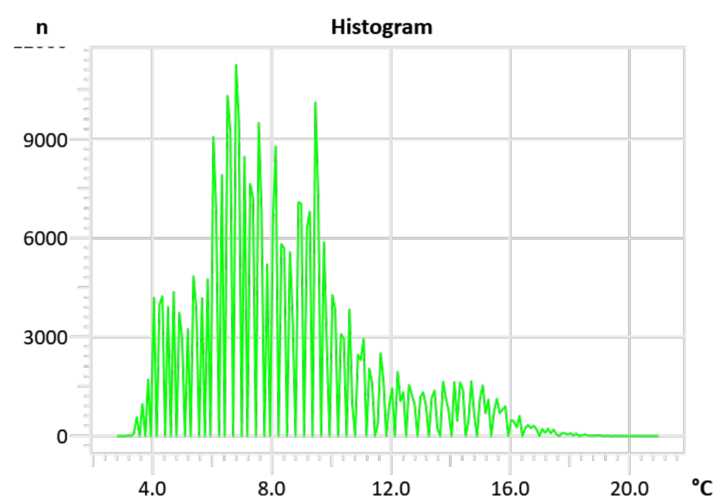
Narrow band 2-8 deg C



Geolocation

Coordinates	**50°08'13.1"N 114°50'53.8"W**
Compass degrees	





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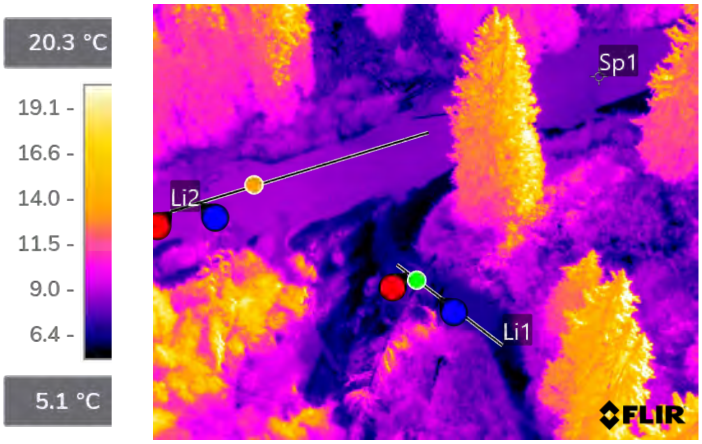
IRX_0126_FLIR.jpg



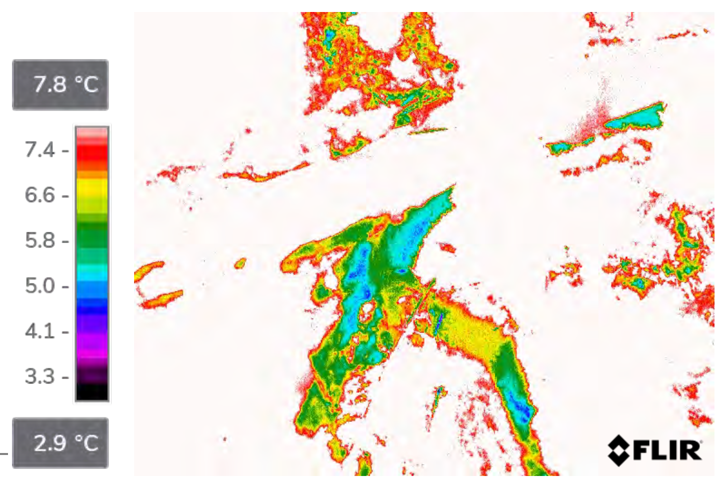
Measurements:

Sp1	8.1 °C
Li1	
Max	8.1 °C
Avg	6.8 °C
Min	4.4 °C
Li2	
Max	9.2 °C
Avg	8.8 °C
Min	8.1 °C

Comment:

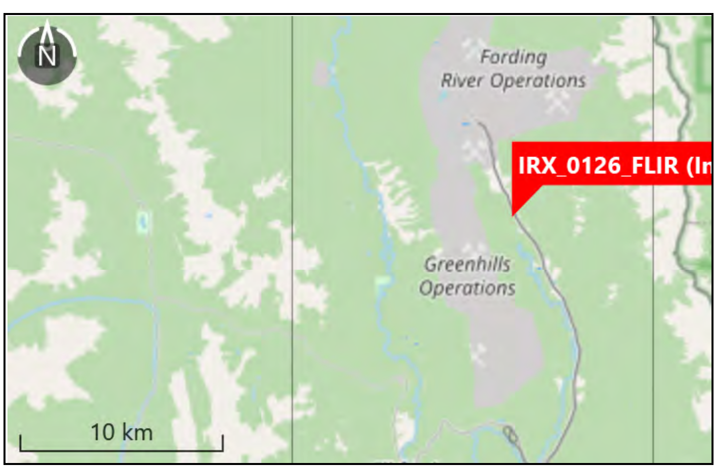
Temperature anomaly Sp1 and Sp2 observations caused by solar reflectance.

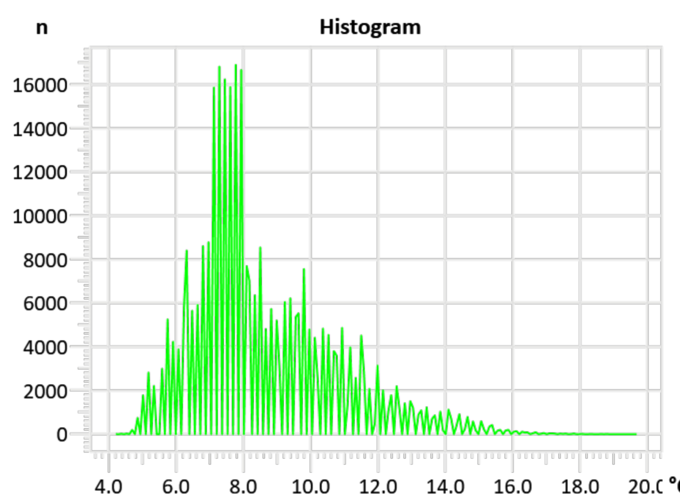
Narrow band 2-8 deg C



Geolocation

Coordinates	**50°08'16.0"N 114°51'03.3"W**
Compass degrees	





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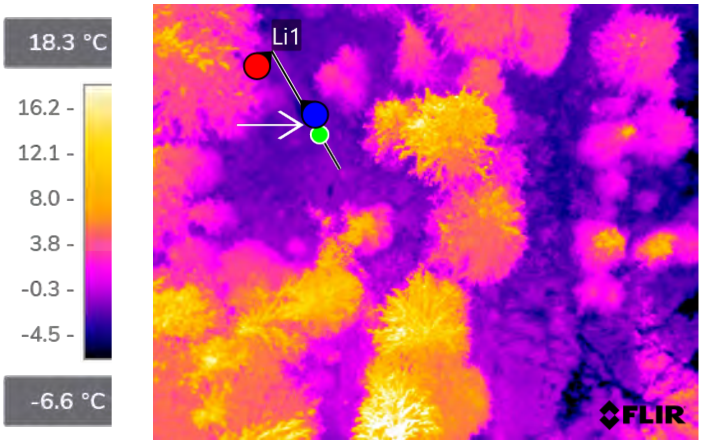
IRX_0128_FLIR.jpg



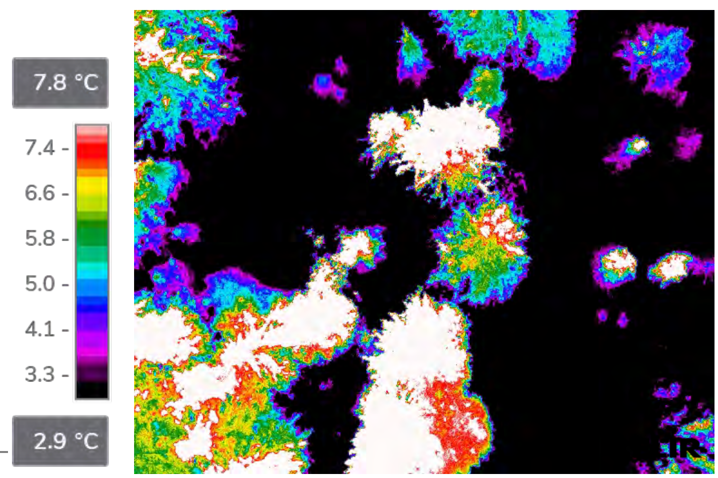
Measurements:

Li1	
Max	0.1 °C
Avg	-0.5 °C
Min	-1.7 °C

Comment:

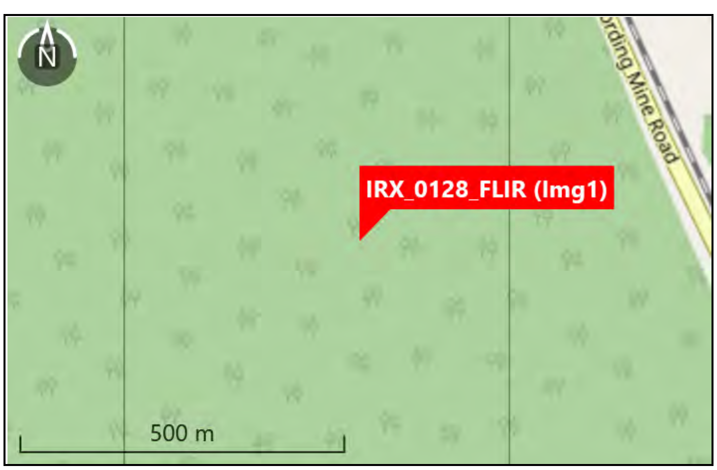
Temperature anomaly Li1 suspected underground water: To be further inspected.

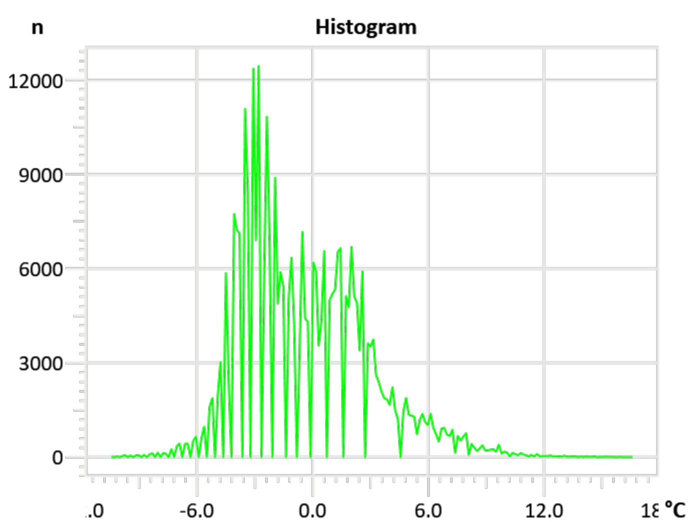
Narrow band 2-8 deg C



Geolocation

Coordinates	**50°08'15.2"N 114°51'11.7"W**
Compass degrees	





GeoProcess
RESEARCH ASSOCIATES

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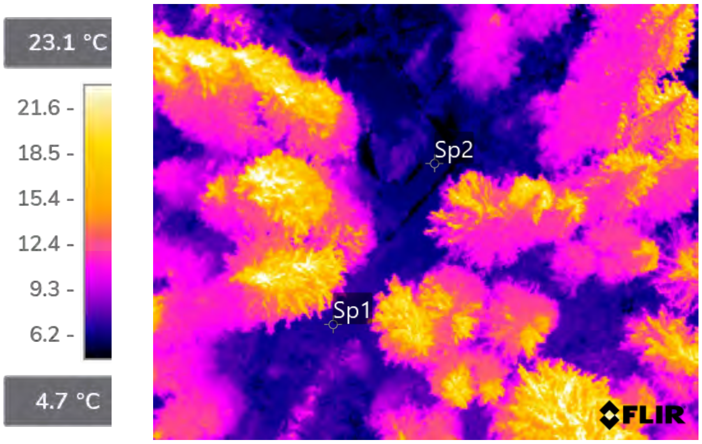
Groundwater Pilot Project - Report

IRX_0147_FLIR.jpg



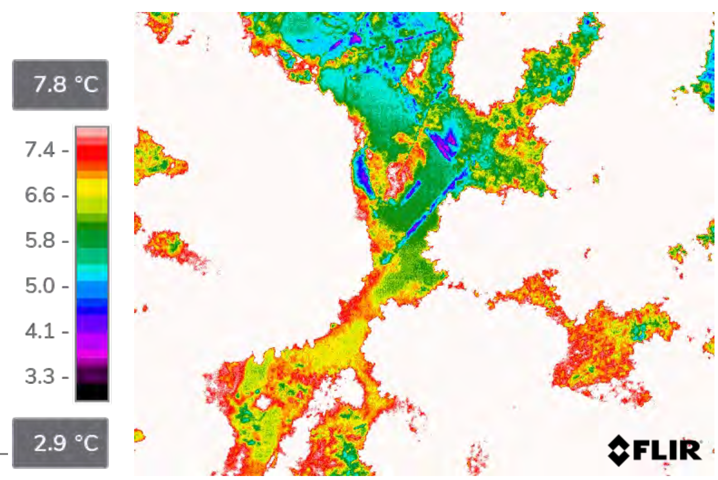
Measurements:

Sp1	6.9 °C
Sp2	6.0 °C

Comment:

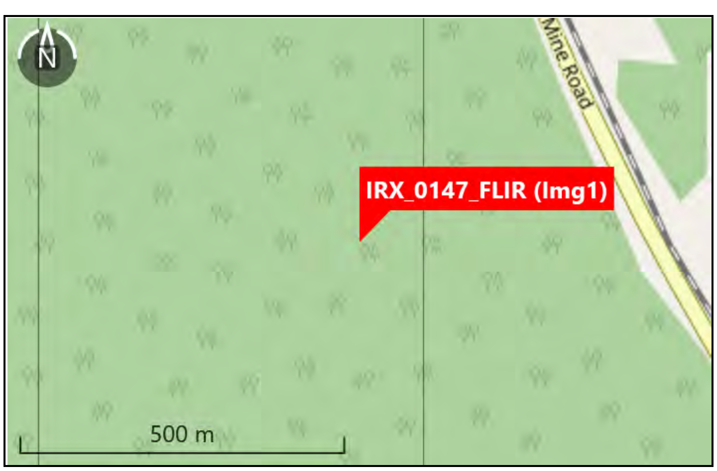
Temperature anomalies Sp1 and Sp2 observations are mostly caused by solar reflectance.

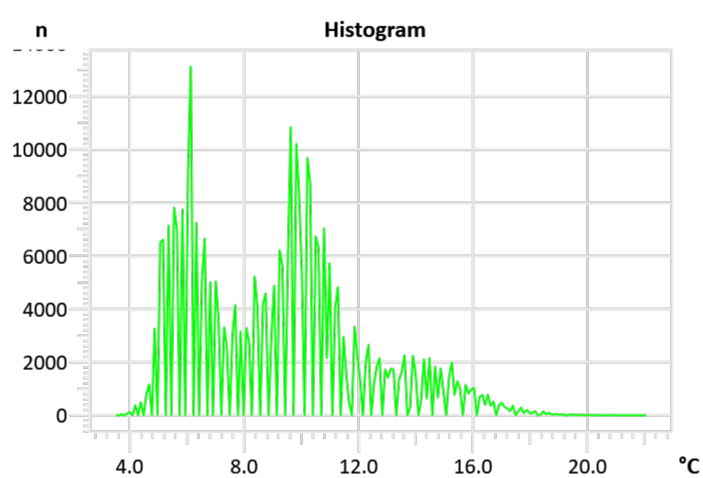
Narrow band 2-8 deg C



Geolocation

Coordinates	**50°08'16.0"N 114°51'03.3"W**
Compass degrees	





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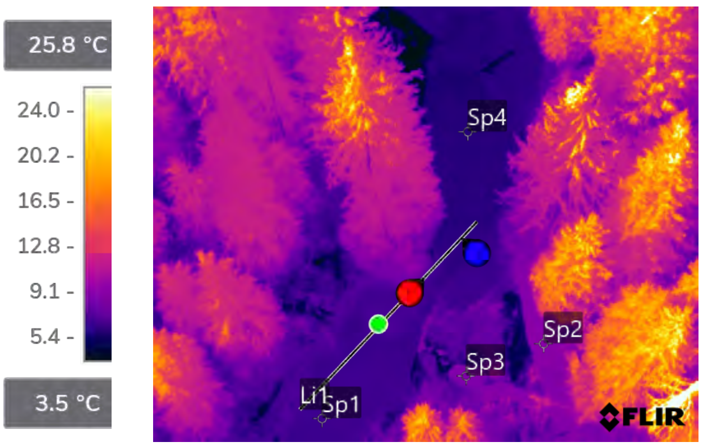
Groundwater Pilot Project - Report

IRX_0193_FLIR.jpg



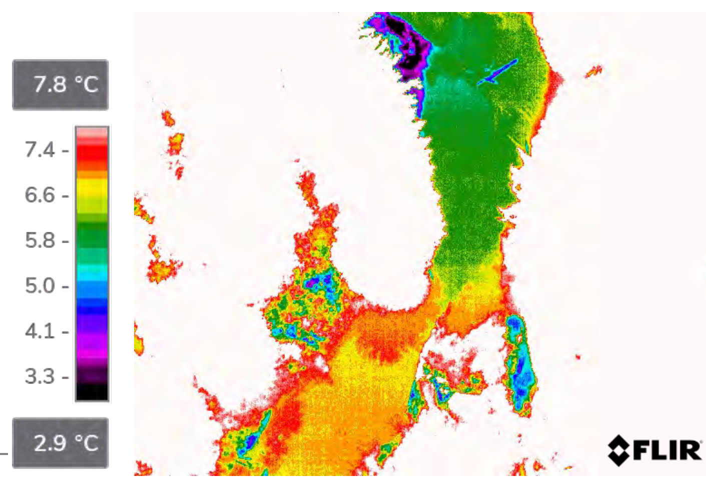
Measurements:

Sp1	7.1 °C
Sp2	10.0 °C
Sp3	9.4 °C
Sp4	6.2 °C
Li1	
Max	7.9 °C
Avg	7.0 °C
Min	6.0 °C

Comment:

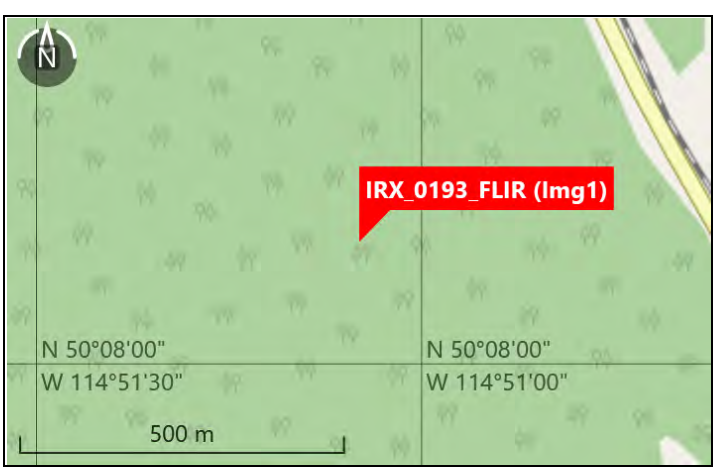
Temperature anomaly Sp2 observations caused by observed warmer water: To be investigated.

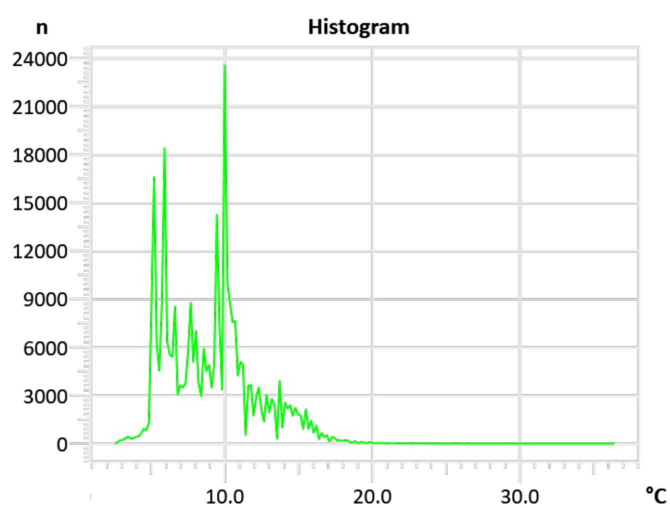
Narrow band 2-8 deg C



Geolocation

Coordinates	**50°08'06.1"N 114°51'04.9"W**
Compass degrees	





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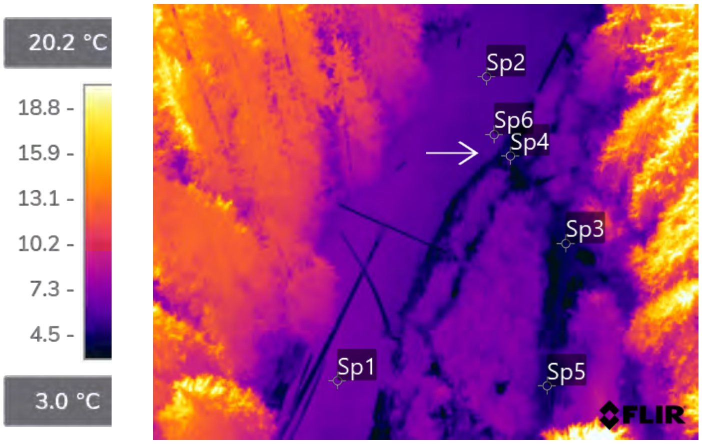
IRX_0205_FLIR.jpg



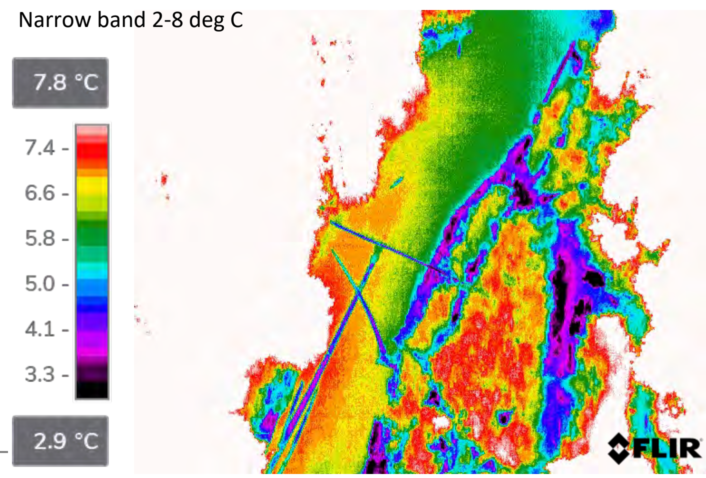
Measurements:

Sp1	7.1 °C
Sp2	6.4 °C
Sp3	4.0 °C
Sp4	4.2 °C
Sp5	4.4 °C
Sp6	6.2 °C

Comment:

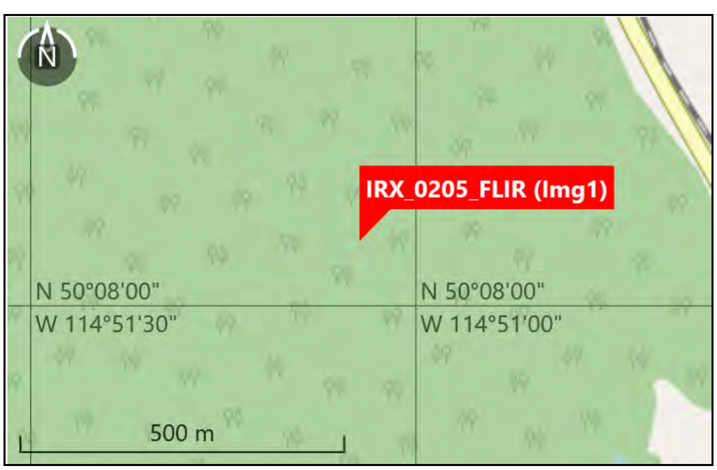
Temperature anomaly observations caused by colder than usual water temps. Sp3 and Sp5 suspect underground water source: to be further investigated.

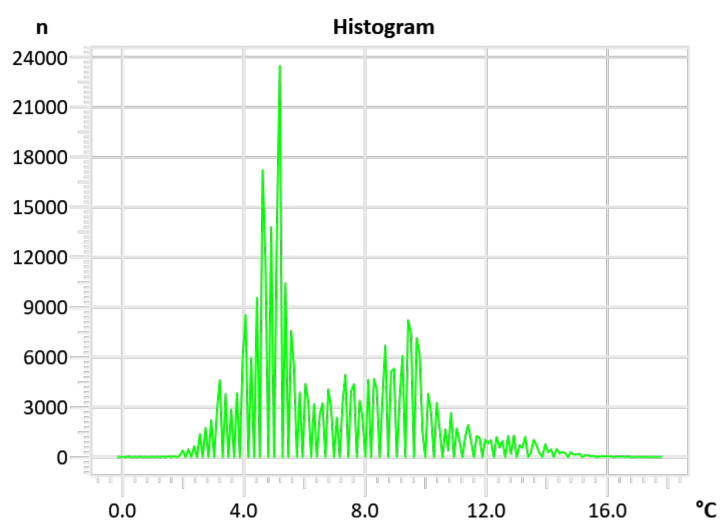
Narrow band 2-8 deg C



Geolocation

Coordinates	**50°08'03.2"N 114°51'04.4"W**
Compass degrees	





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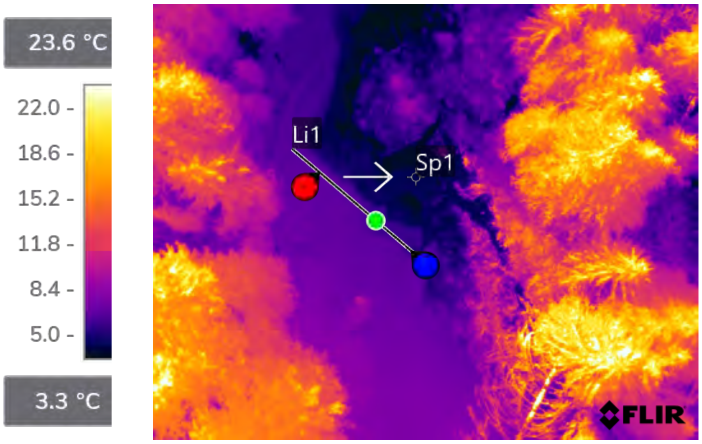
Groundwater Pilot Project - Report

IRX_0209_FLIR.jpg



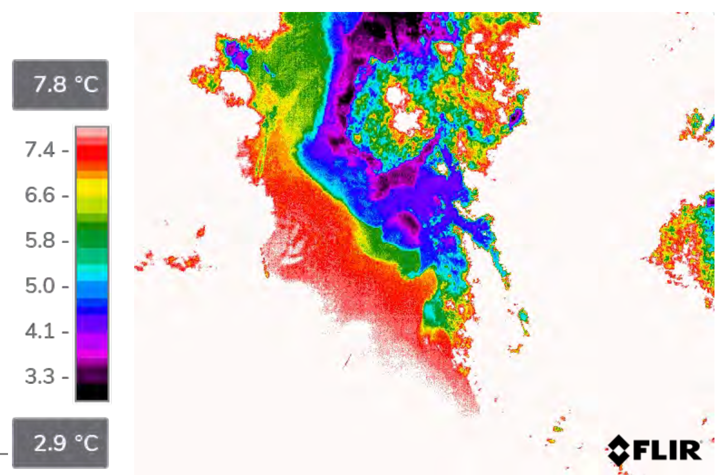
Measurements:

Sp1	4.4 °C
Li1	
Max	7.7 °C
Avg	6.9 °C
Min	5.5 °C

Comment:

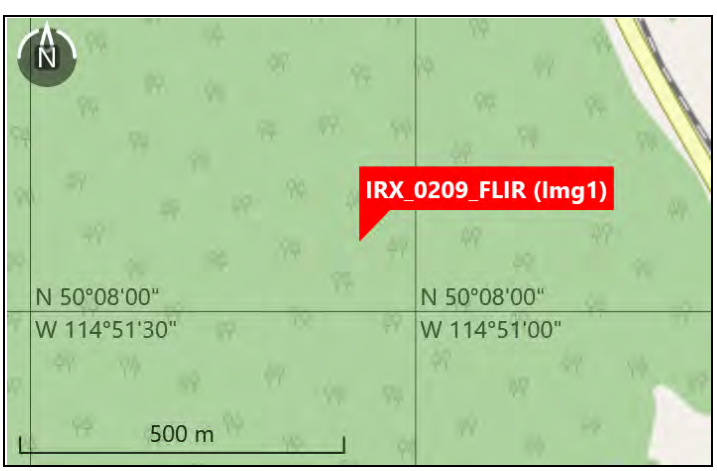
Temperature anomaly at Sp1 cool water observation. Possible underground water: To be investigated.

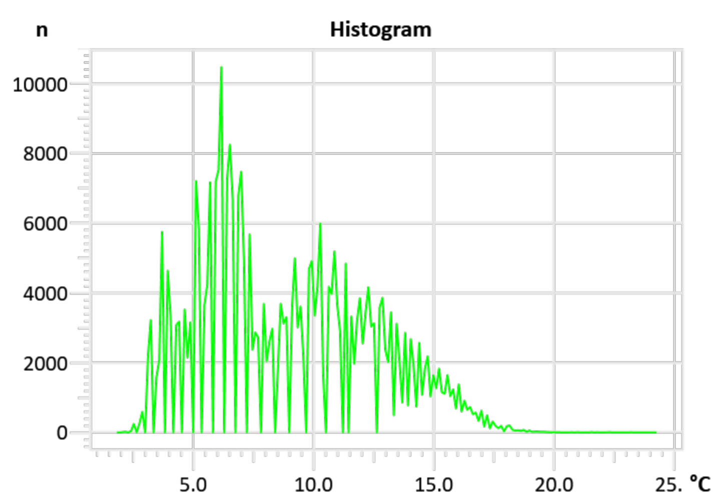
Narrow band 2-8 deg C



Geolocation

Coordinates	**50°08'03.5"N 114°51'04.4"W**
Compass degrees	





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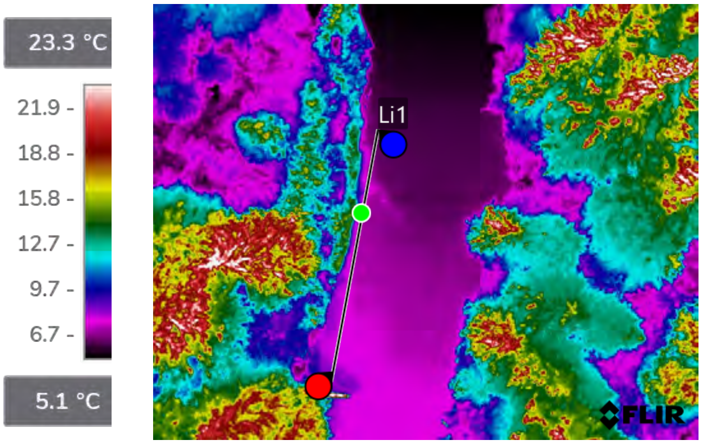
IRX_0227_FLIR.jpg



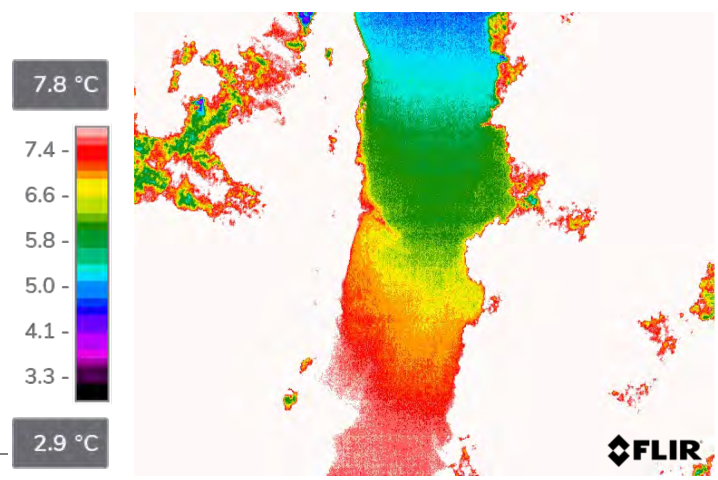
Measurements:

Li1	
Max	9.1 °C
Avg	7.5 °C
Min	6.2 °C

Comment:

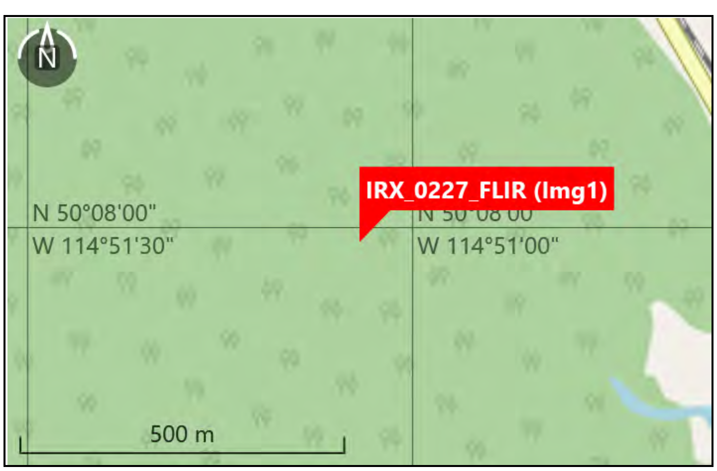
Temperature anomaly Sp1 and Sp2 observations caused by solar reflectance.

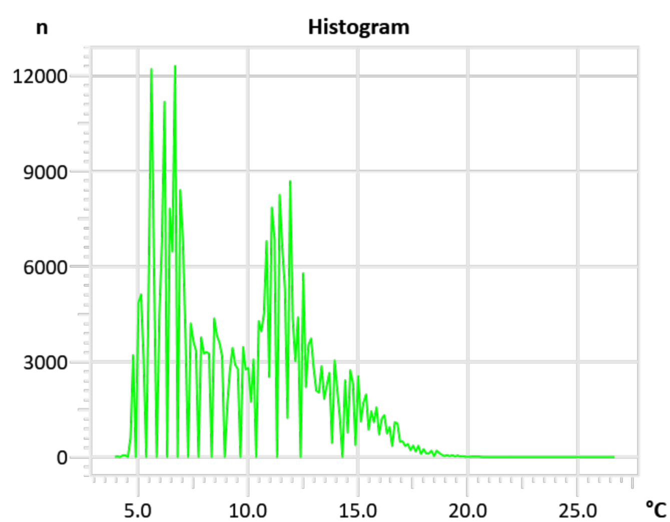
Narrow band 2-8 deg C



Geolocation

Coordinates	50°07'59.3"N 114°51'04.1"W
Compass degrees	





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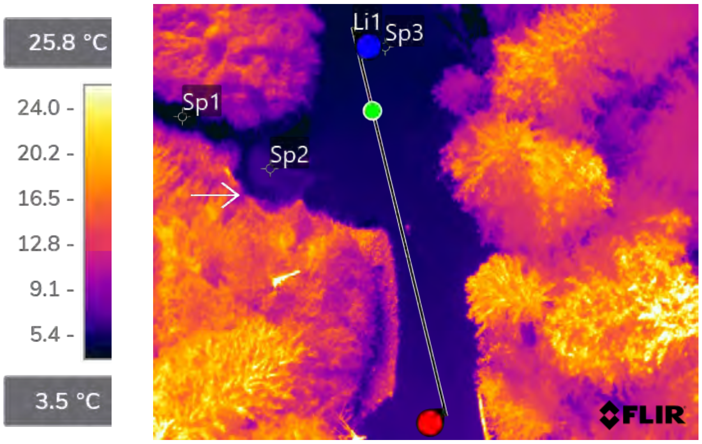
Groundwater Pilot Project - Report

IRX_0267_FLIR.jpg

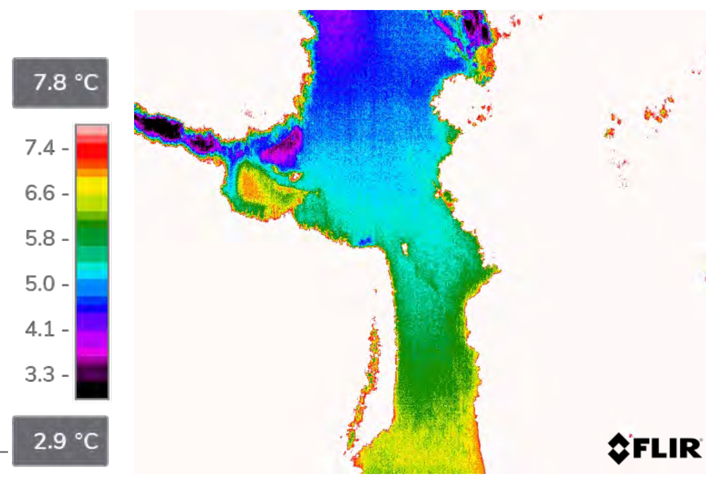


Measurements:

Sp1	2.3 °C
Sp2	6.9 °C
Sp3	4.9 °C
Li1	
Max	6.9 °C
Avg	5.6 °C
Min	4.2 °C

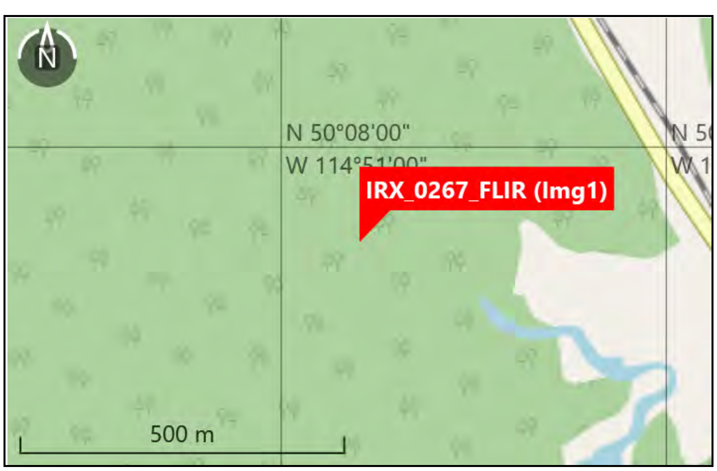
Comment:

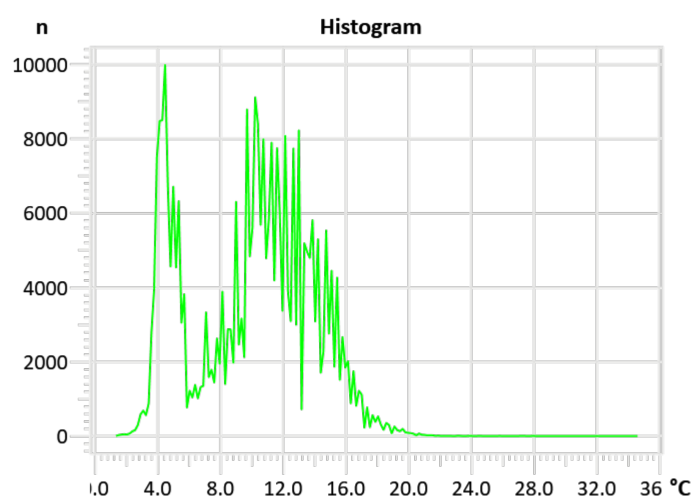
Temperature anomaly Sp1 and Sp2 observations caused by larger water temp differences: To be investigated further.



Geolocation

Coordinates	<u>**50°07'55.3"N 114°50'53.9"W**</u>
Compass degrees	





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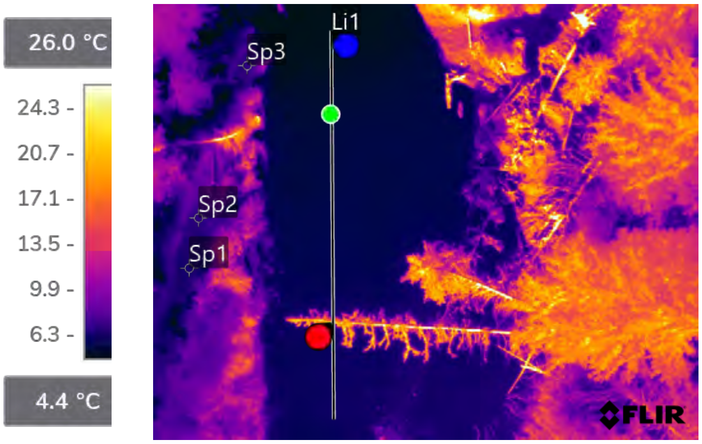
IRX_0309_FLIR.jpg

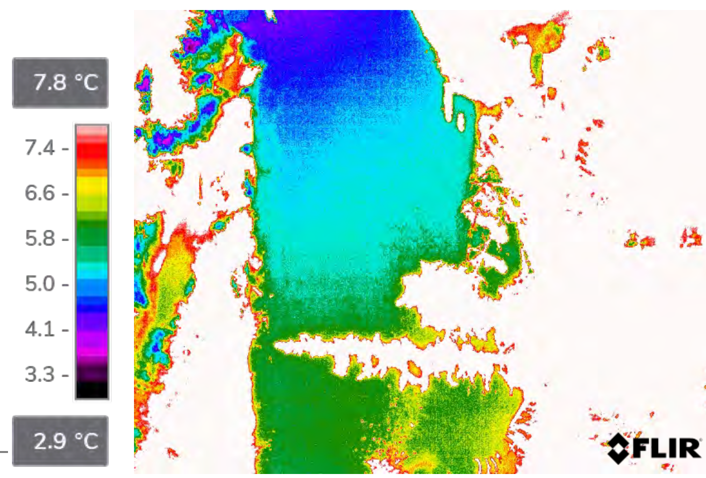


Measurements:

Sp1	6.4 °C
Sp2	7.3 °C
Sp3	7.3 °C
Li1	
Max	27.5 °C
Avg	5.9 °C
Min	4.4 °C

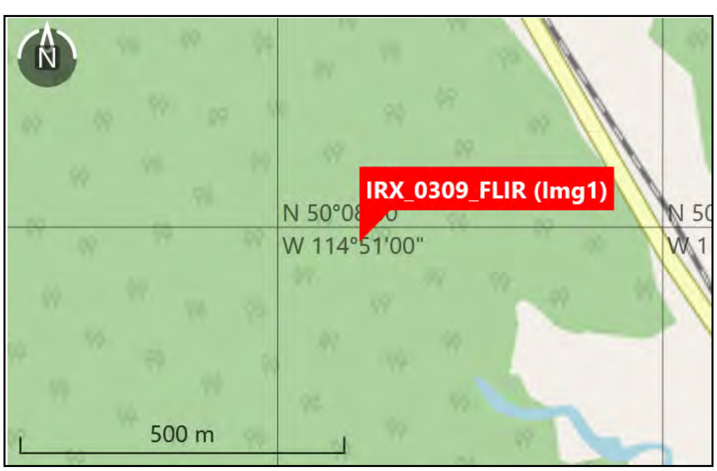
Comment:

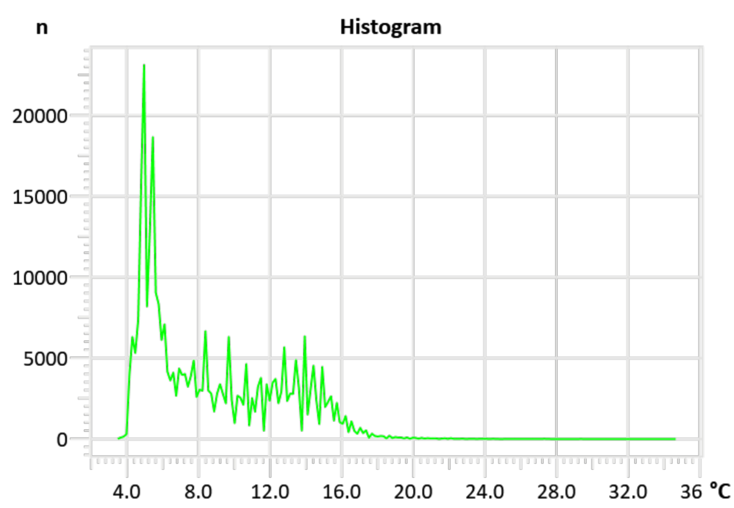
Temperature anomaly Sp1, Sp2, and Sp3 observations caused by possible underground water mixing.



Geolocation

Coordinates	50°07'59.3"N 114°50'53.6"W
Compass degrees	





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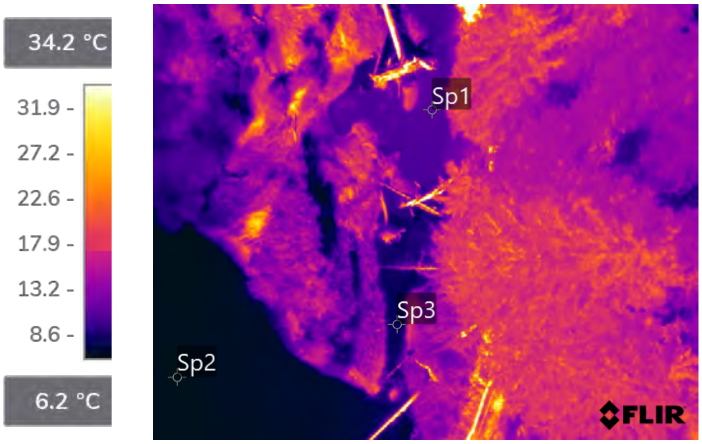
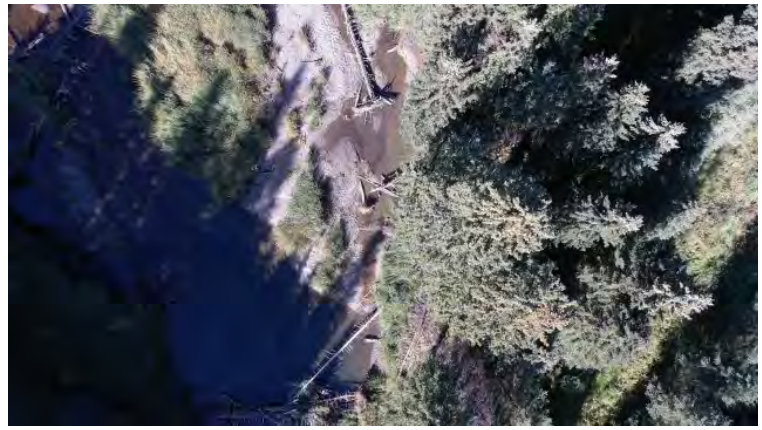
IRX_0321_FLIR.jpg



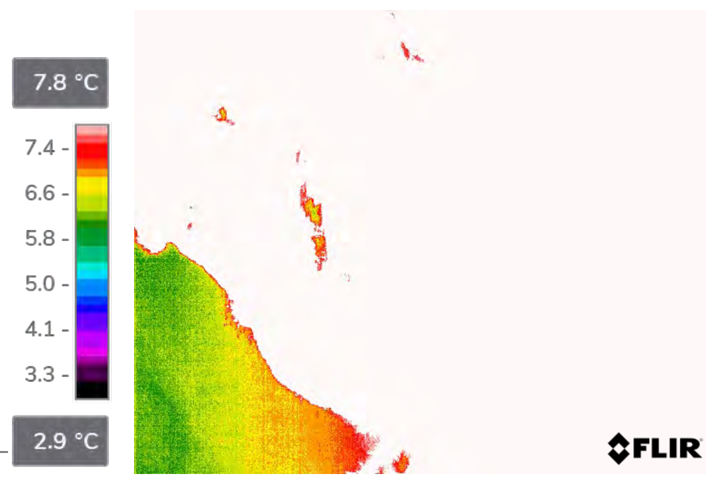


Measurements:

Sp1	11.9 °C
Sp2	6.4 °C
Sp3	8.5 °C

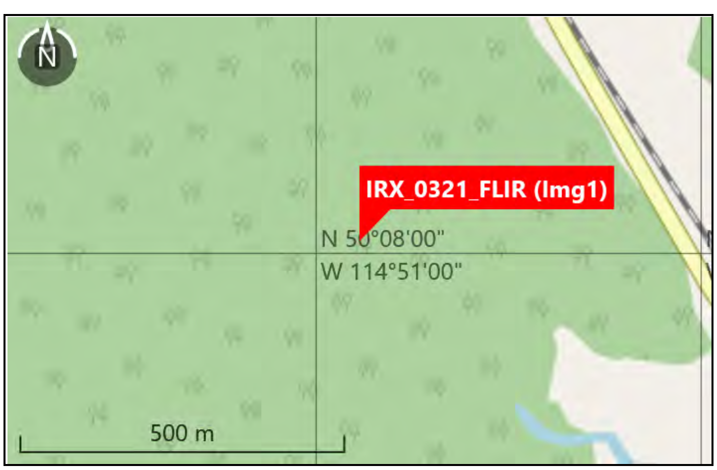
Comment:

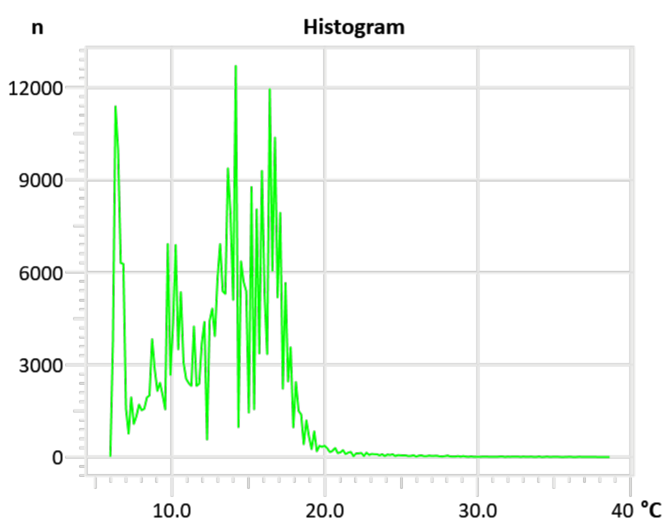
Temperature anomalies Sp1 and Sp2 observations were caused by solar reflectance and water depth. Sp3 is to be investigated for underground water.



Geolocation

Coordinates	50°08'00.6"N 114°50'56.6"W
Compass degrees	





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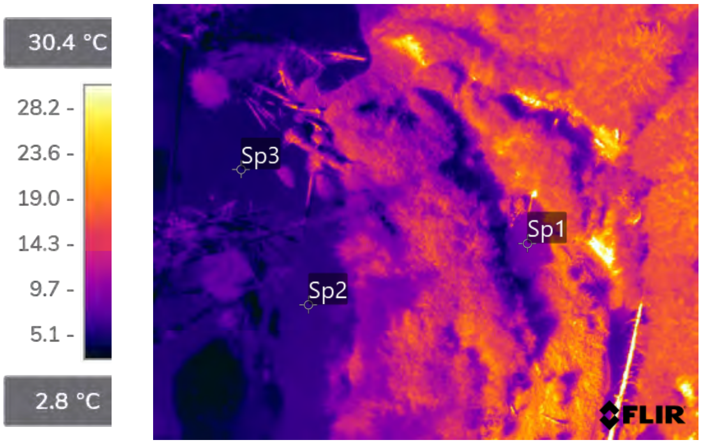
IRX_0334_FLIR.jpg

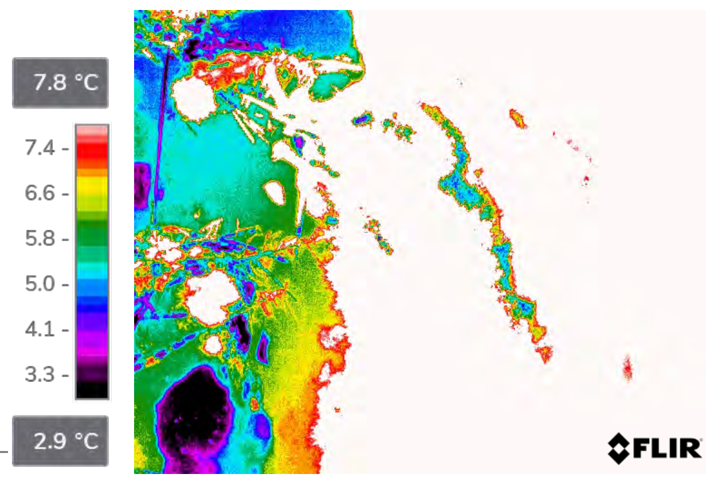


Measurements:

Sp1	10.3 °C
Sp2	6.4 °C
Sp3	5.5 °C

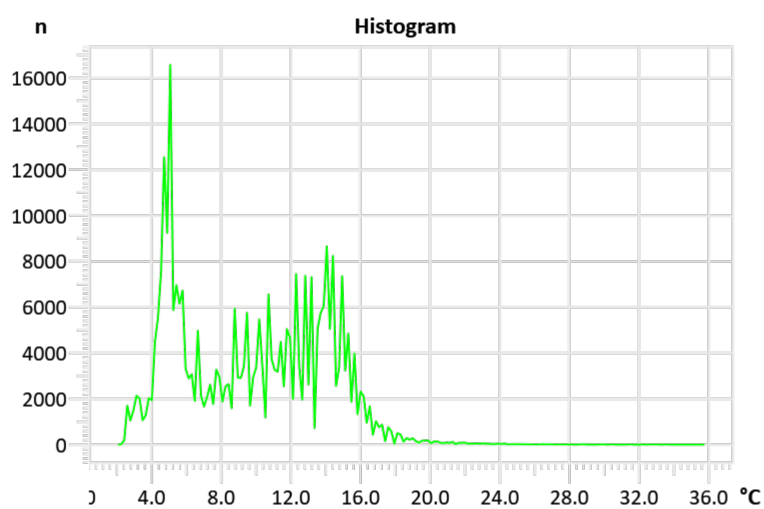
Comment:

Temperature anomaly Sp3 observations caused by water mixing and pooling: To be investigated further.



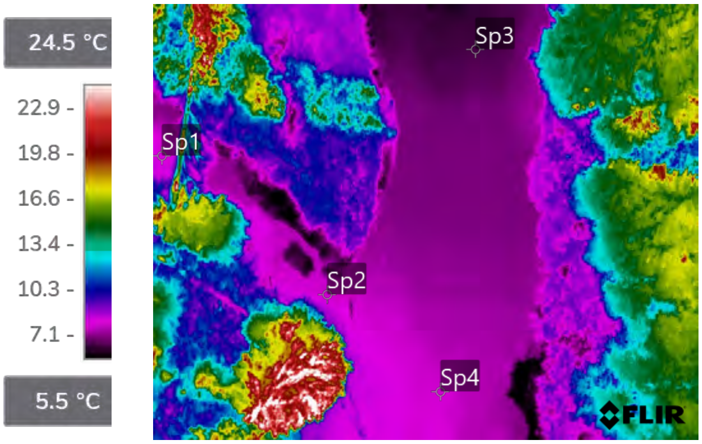
Geolocation

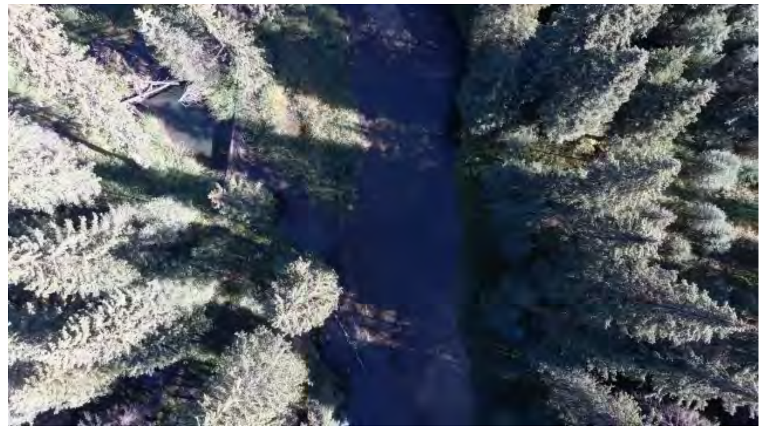
Coordinates	<u>**50°08'00.3"N 114°50'57.9"W**</u>
Compass degrees	



Teck Thermal Imagery
Groundwater Pilot Project - Report

IRX_0355_FLIR.jpg



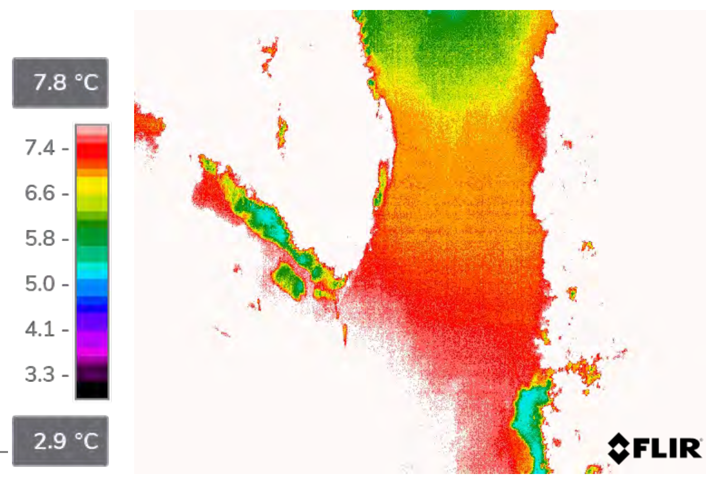


Measurements:

Sp1	8.5 °C
Sp2	8.1 °C
Sp3	6.4 °C
Sp4	8.1 °C

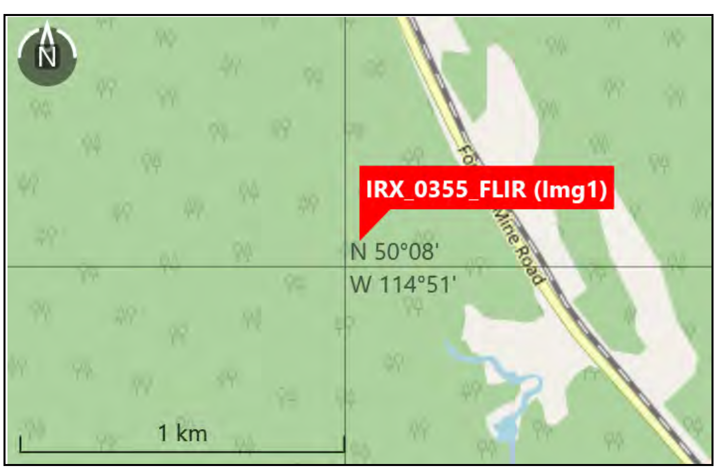
Comment:

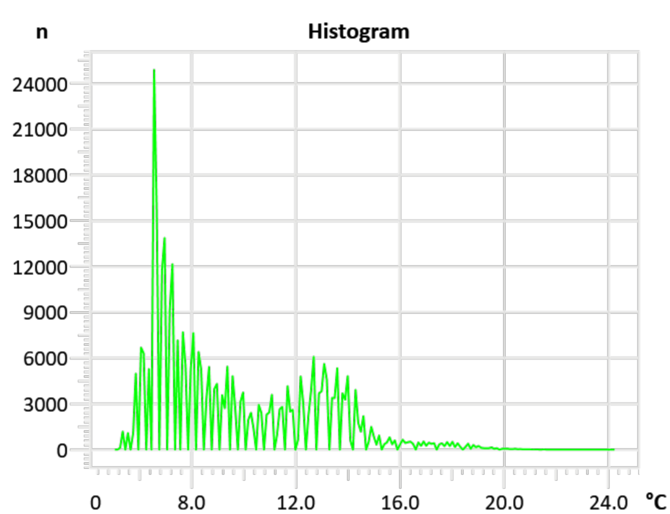
Temperature anomaly Sp1 and Sp2 observations caused by solar reflectance.



Geolocation

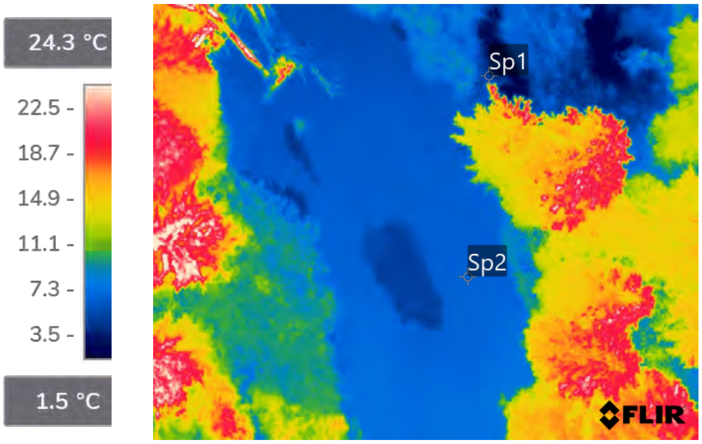
Coordinates	**50°08'02.6"N 114°50'57.8"W**
Compass degrees	

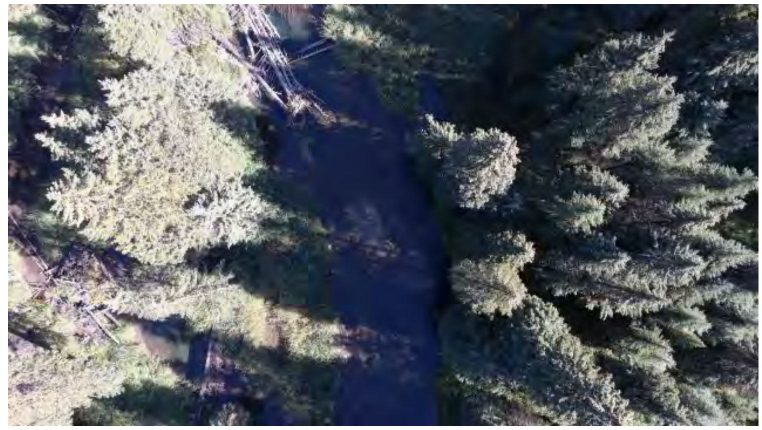




Teck Thermal Imagery
Groundwater Pilot Project - Report

IRX_0358_FLIR.jpg



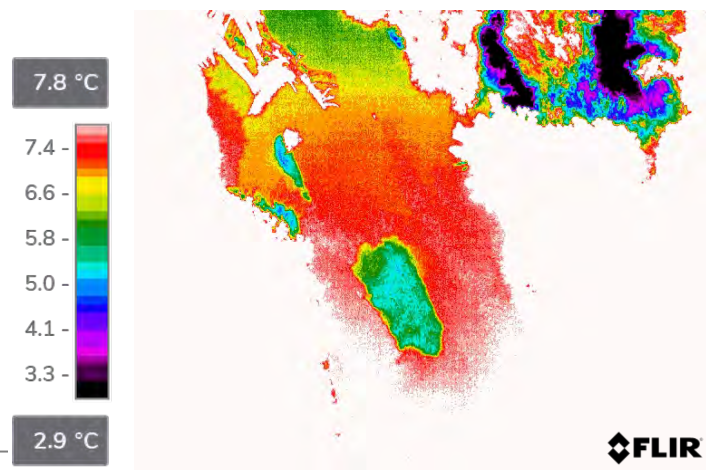


Measurements:

Sp1	5.5 °C
Sp2	7.9 °C

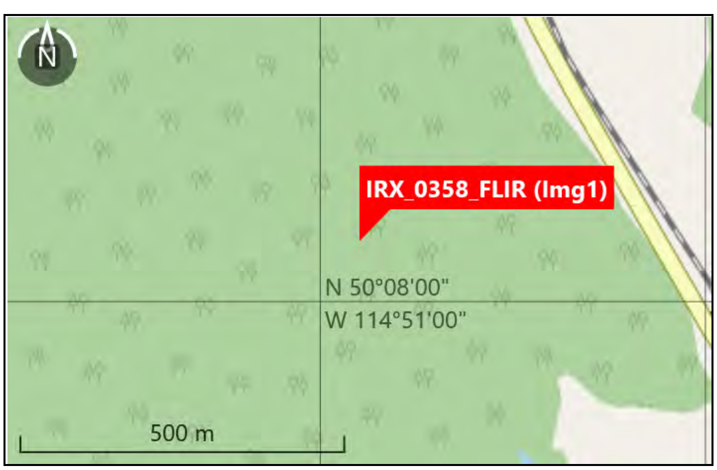
Comment:

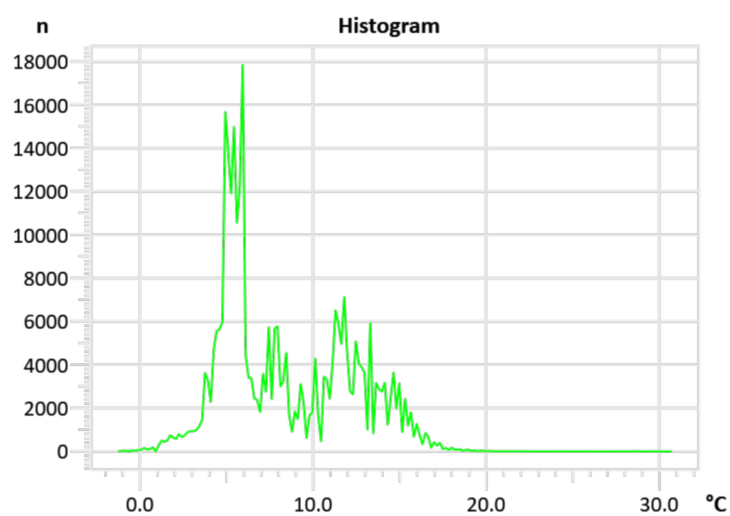
Temperature anomaly Sp1 and Sp2 observations caused by possible underground water source. To be further investigated.



Geolocation

Coordinates	**50°08'03.0"N 114°50'56.9"W**
Compass degrees	





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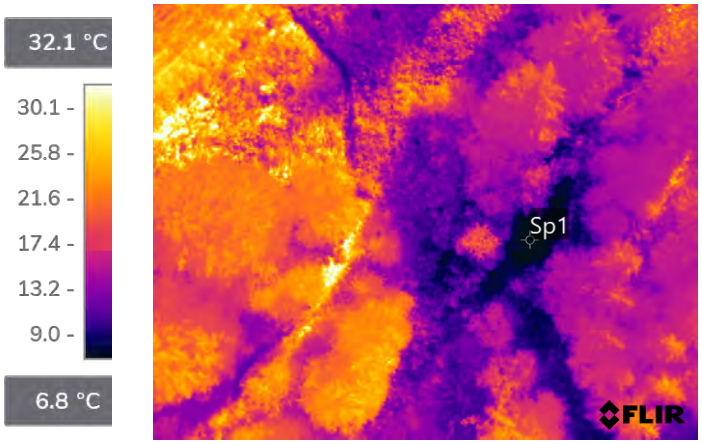
IRX_0412_FLIR.jpg



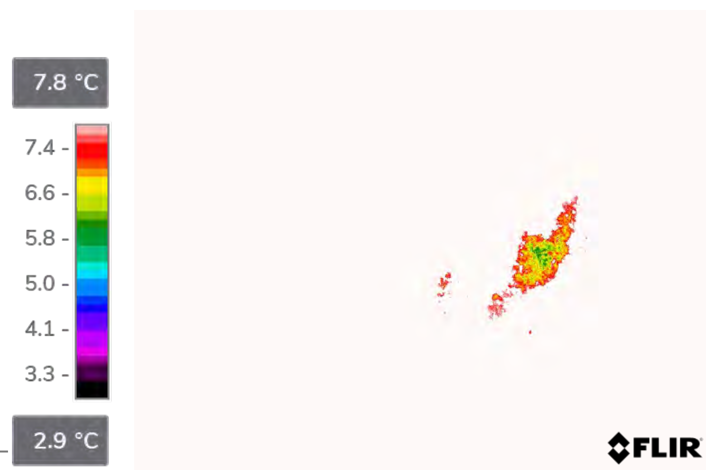
Measurements:

Sp1	6.8 °C

Comment:

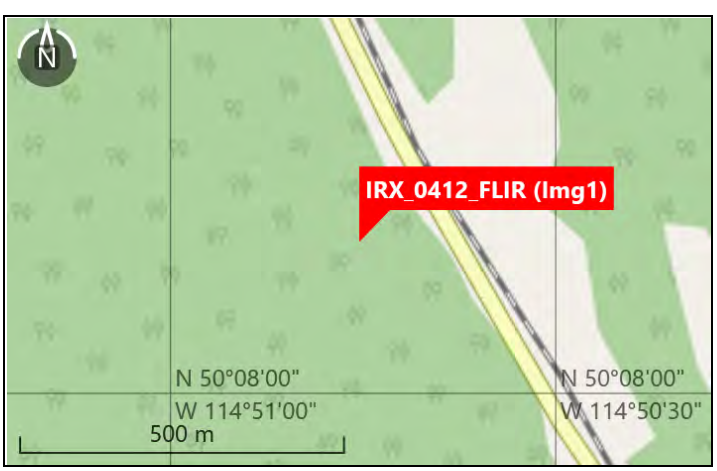
Temperature anomaly Sp1: Possible underground water source.

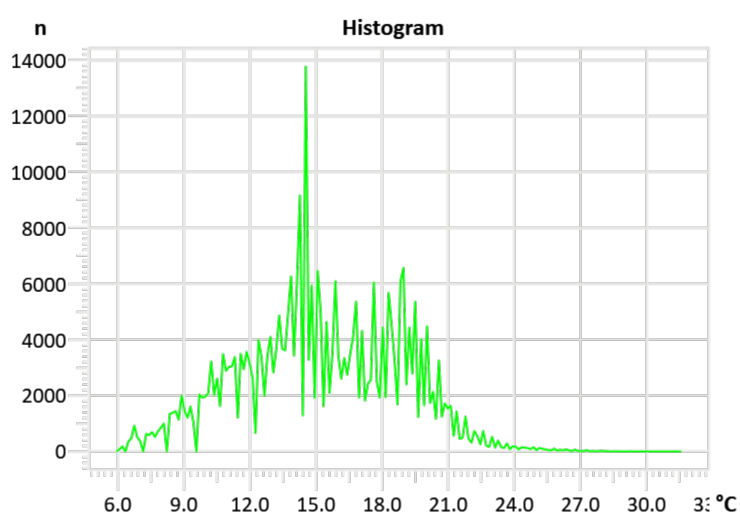
Narrow band 2-8 deg C



Geolocation

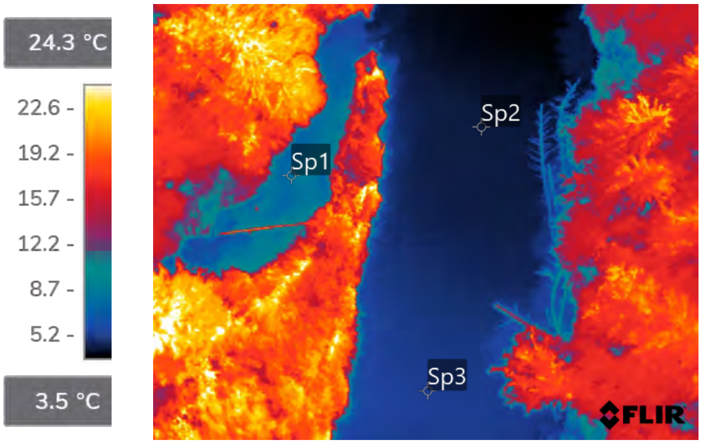
Coordinates	50°08'07.6"N 114°50'45.3"W
Compass degrees	





Teck Thermal Imagery
Groundwater Pilot Project - Report

IRX_0442_FLIR.jpg



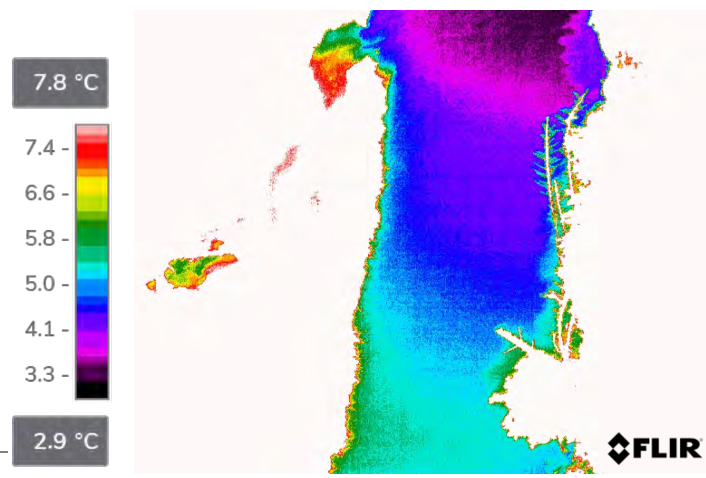
Measurements:

Sp1	8.5 °C
Sp2	4.4 °C
Sp3	5.5 °C

Comment:

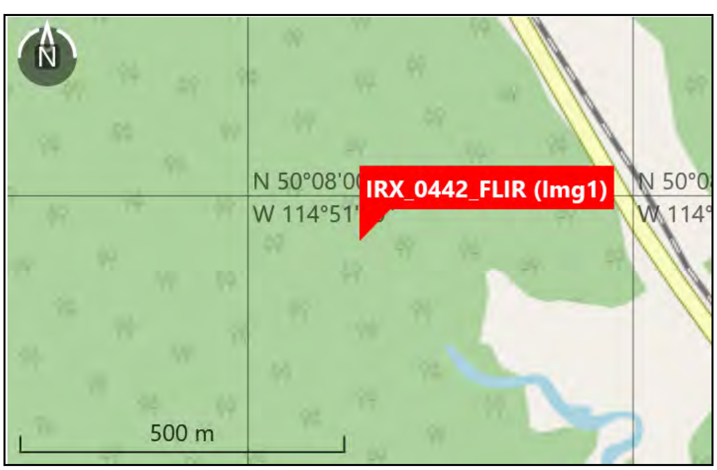
Temperature anomaly Sp1 and Sp3 observations caused by water mixing.

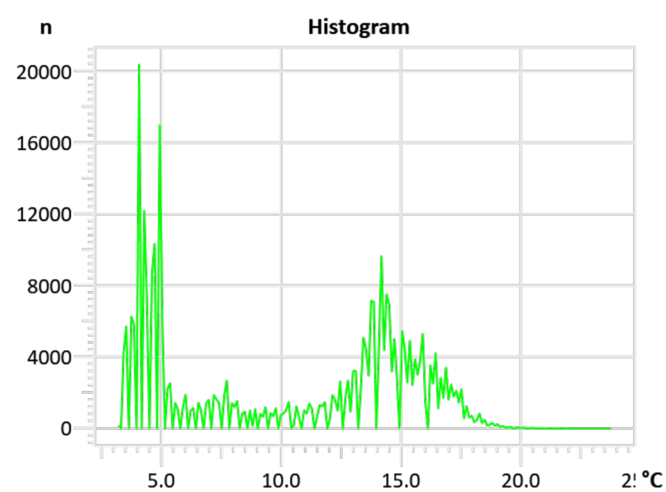
Narrow band 2-8 deg C



Geolocation

Coordinates	<u>**50°07'57.7"N 114°50'51.3"W**</u>
Compass degrees	





Teck Thermal Imagery
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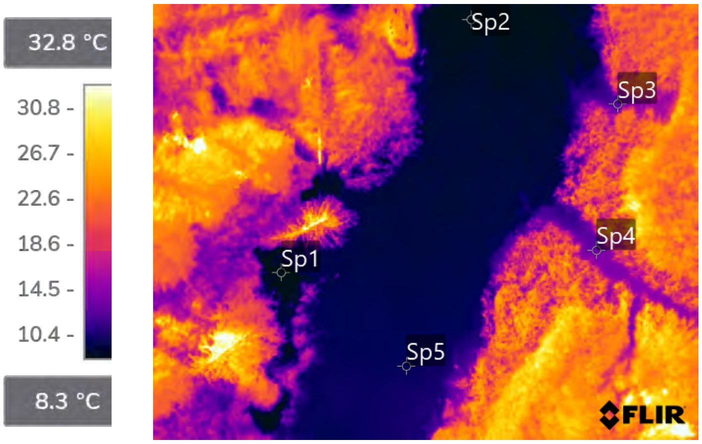
IRX_0599_FLIR.jpg

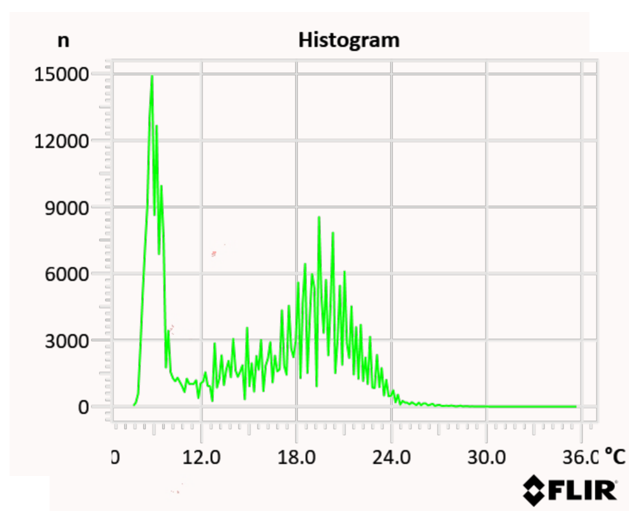


Measurements:

Sp1	8.3 °C
Sp2	8.5 °C
Sp3	13.4 °C
Sp4	14.5 °C
Sp5	10.2 °C

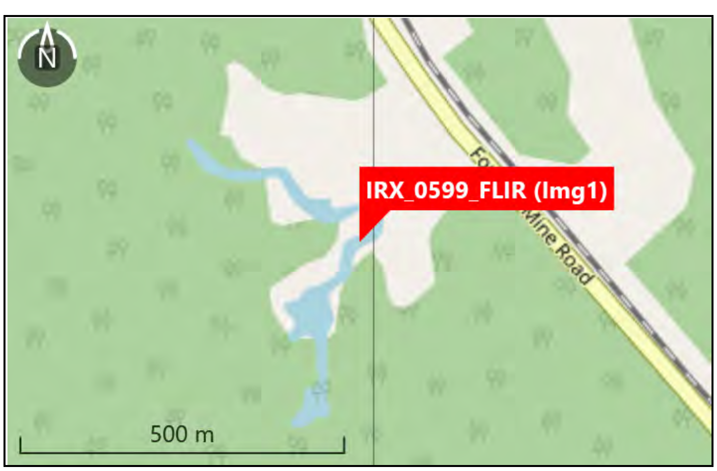
Comment:

Temperature anomaly at sampled points due to water mixing and depth in the main branch: To be investigated further.



Geolocation

Coordinates	**50°07'47.3"N 114°50'31.1"W**
Compass degrees	



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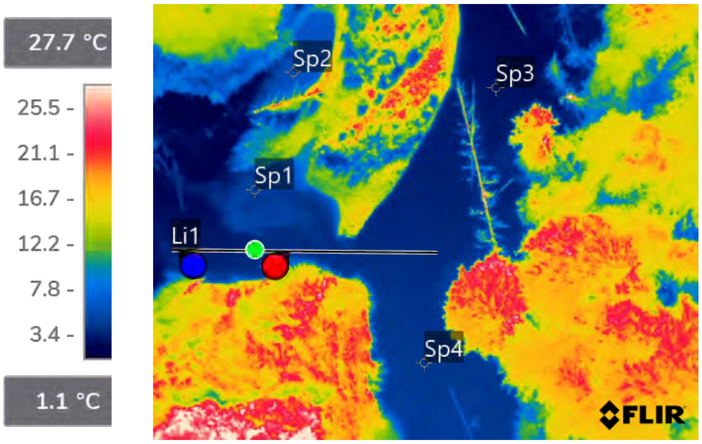
IRX_0635_FLIR.jpg



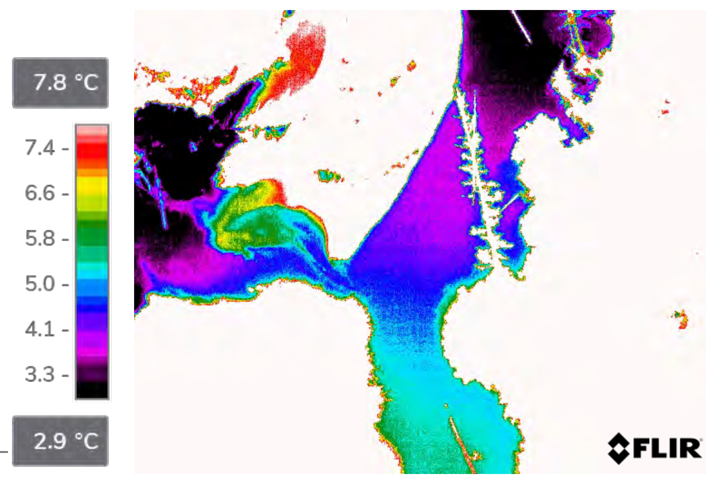
Measurements:

Sp1	6.2 °C
Sp2	7.3 °C
Sp3	3.3 °C
Sp4	5.1 °C
Li1	
Max	5.1 °C
Avg	4.3 °C
Min	3.3 °C

Comment:

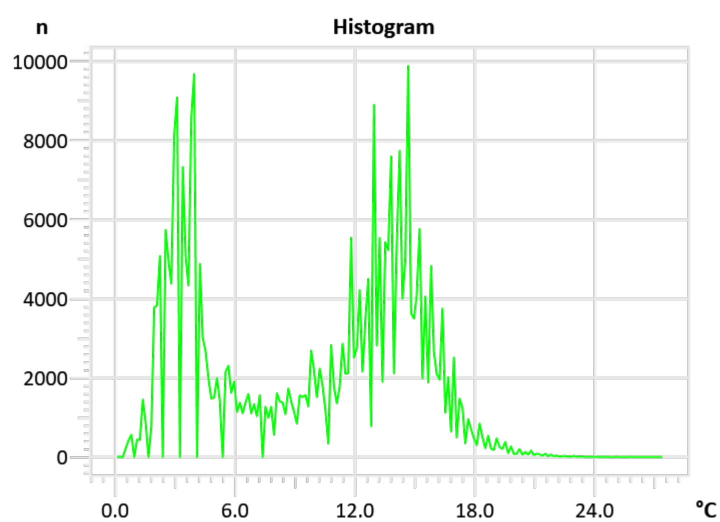
Temperature anomaly Sp1 and Sp2 observations caused by solar reflectance.

Narrow band 2-8 deg C



Geolocation

Coordinates	<u>**50°07'54.3"N 114°50'52.7"W**</u>
Compass degrees	



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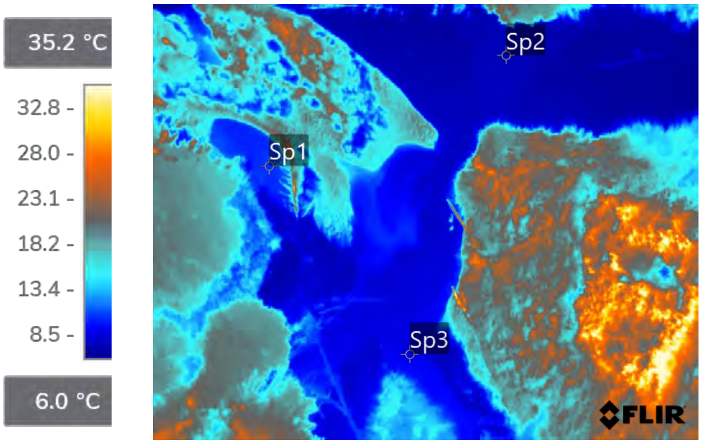
Groundwater Pilot Project - Report

IRX_0643_FLIR.jpg



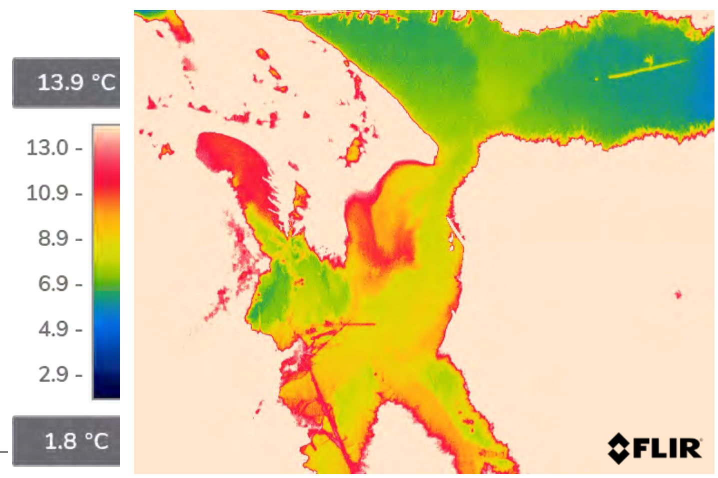
Measurements:

Sp1	11.3 °C
Sp2	7.5 °C
Sp3	9.6 °C

50°07'54.5"N 114°50'52.0"W

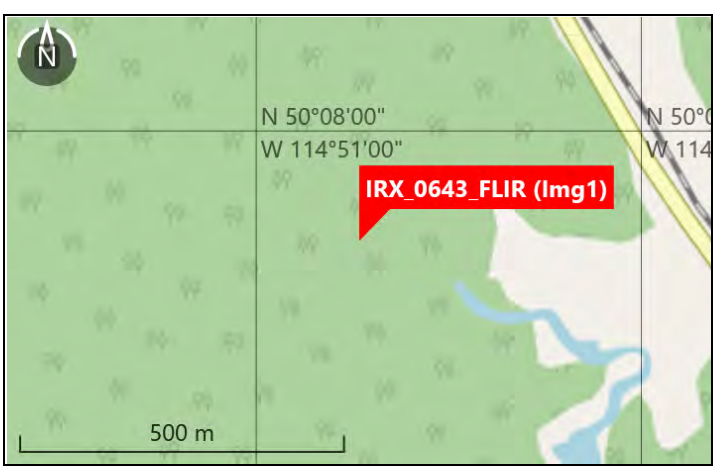
Comment:

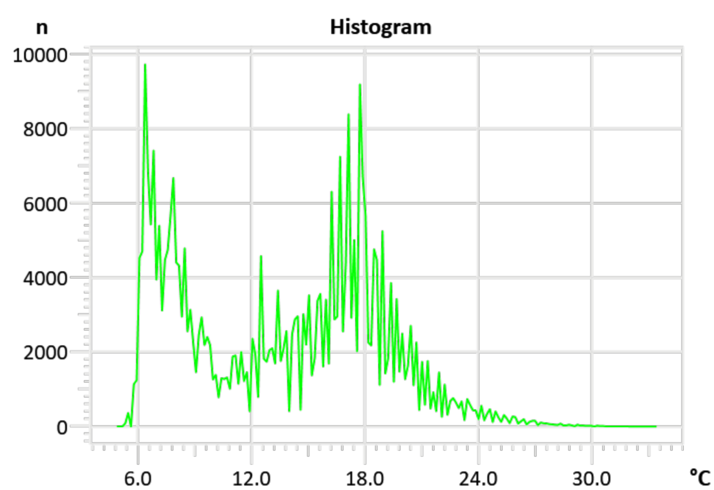
Temperature anomaly Sp1 and Sp2 observations caused by water mixing.



Geolocation

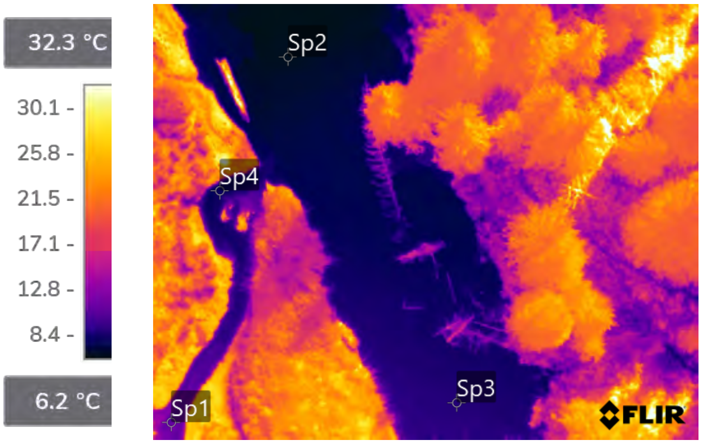
Coordinates	**50°07'54.5"N 114°50'52.0"W**
Compass degrees	





Teck Thermal Imagery
Groundwater Pilot Project - Report

IRX_0707_FLIR.jpg

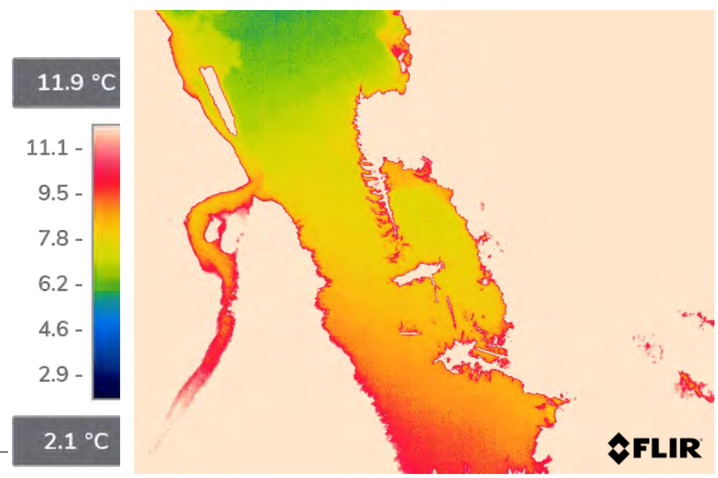


Measurements:

Sp1	11.9 °C
Sp2	6.7 °C
Sp3	9.4 °C
Sp4	8.3 °C

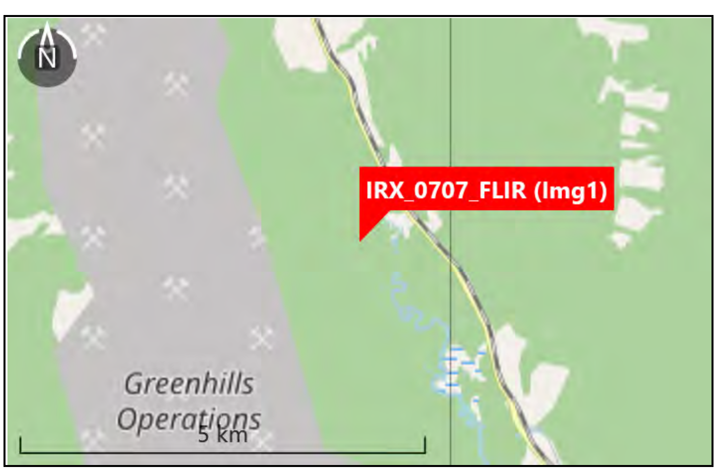
Comment:

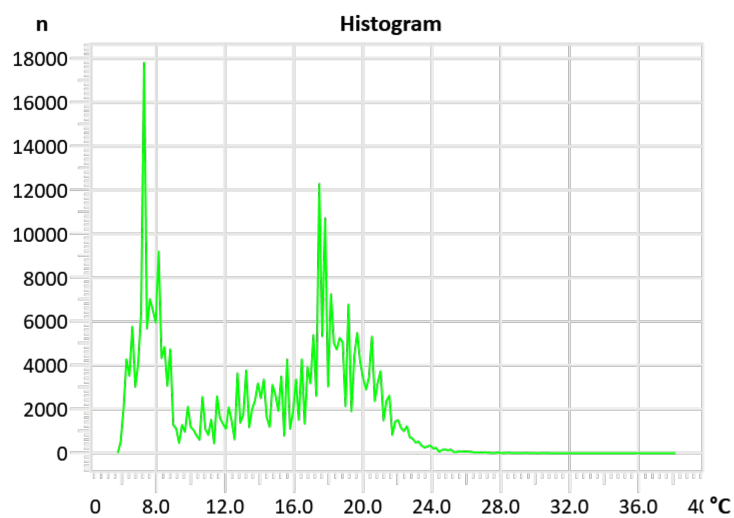
Temperature anomaly Sp1 and Sp2 observations caused by solar reflectance.



Geolocation

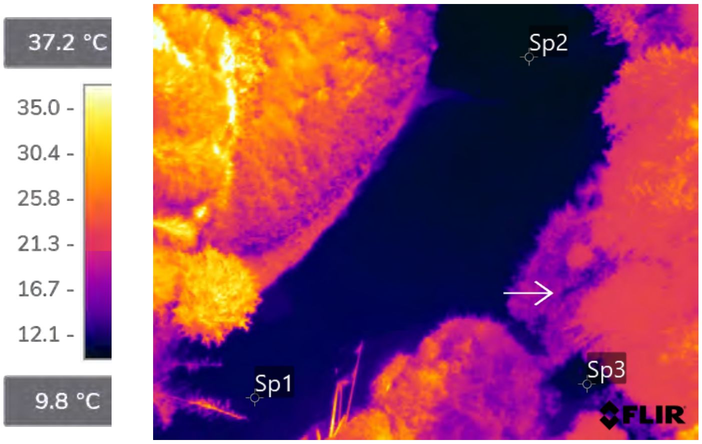
Coordinates	50°07'43.0"N 114°50'56.8"W
Compass degrees	





Teck Thermal Imagery
Groundwater Pilot Project - Report

IRX_0725_FLIR.jpg

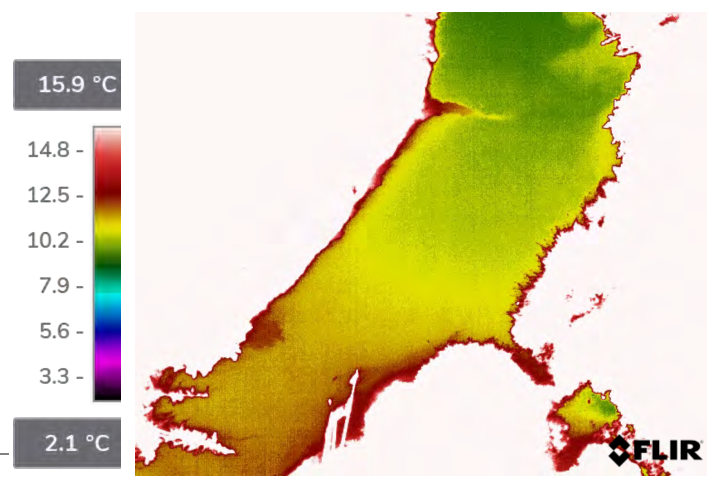


Measurements:

Sp1	11.7 °C
Sp2	10.0 °C
Sp3	11.1 °C

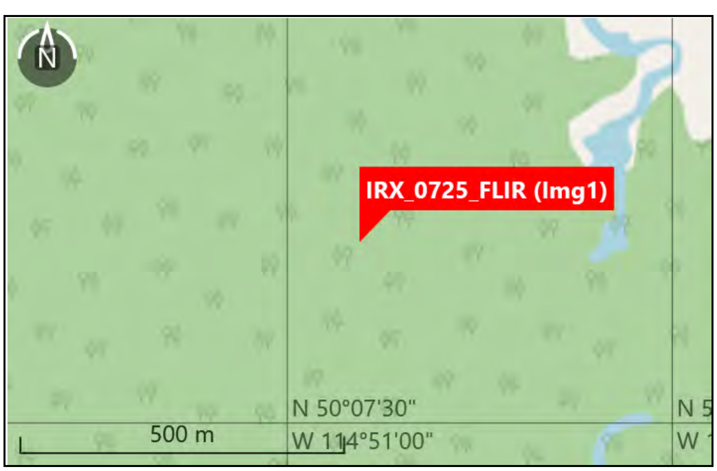
Comment:

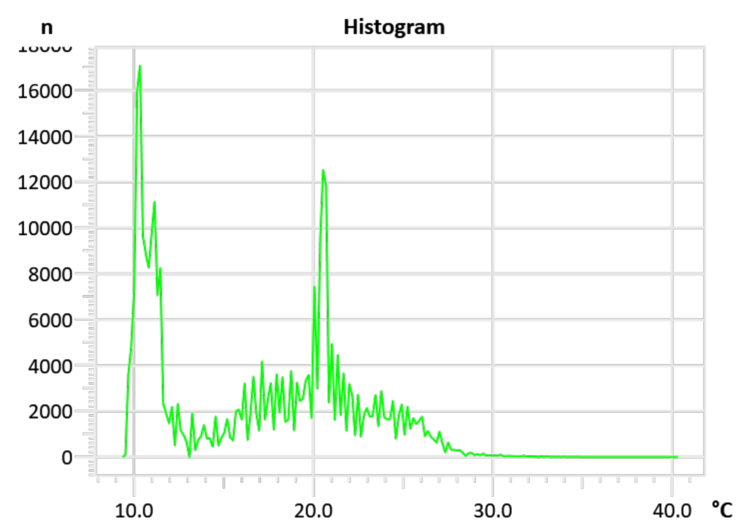
Temperature anomaly at the marker observations caused by possible underground water: To be investigated further.



Geolocation

Coordinates	<u>**50°07'39.0"N 114°50'54.4"W**</u>
Compass degrees	





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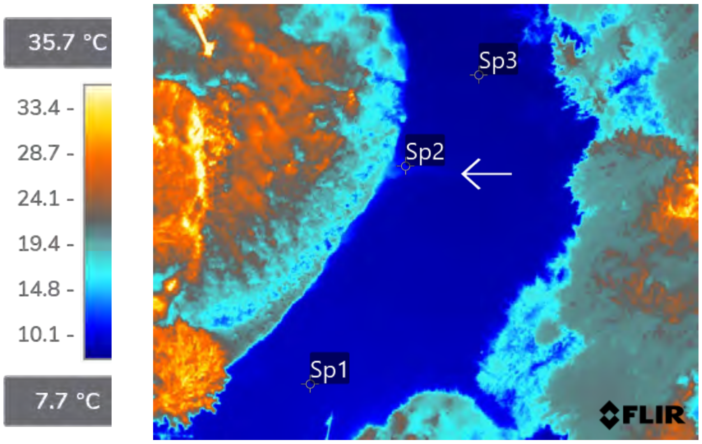
IRX_0726_FLIR.jpg

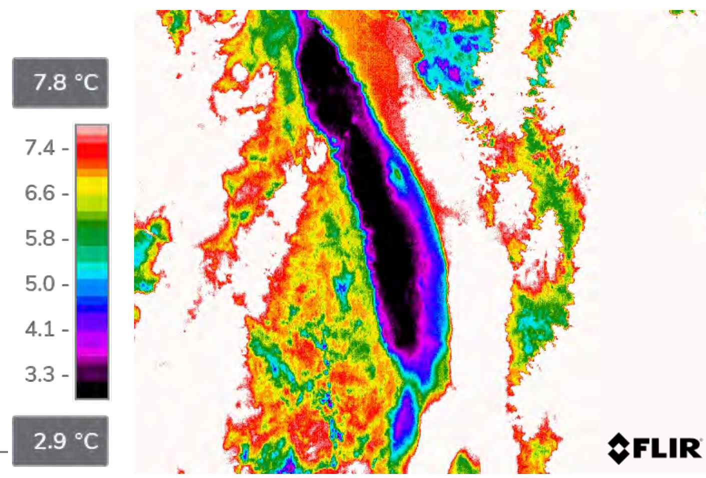


Measurements:

Sp1	9.8 °C
Sp2	11.1 °C
Sp3	8.1 °C

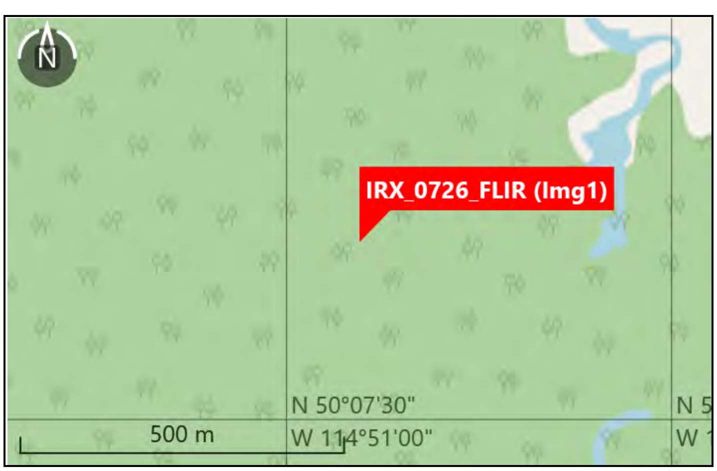
Comment:

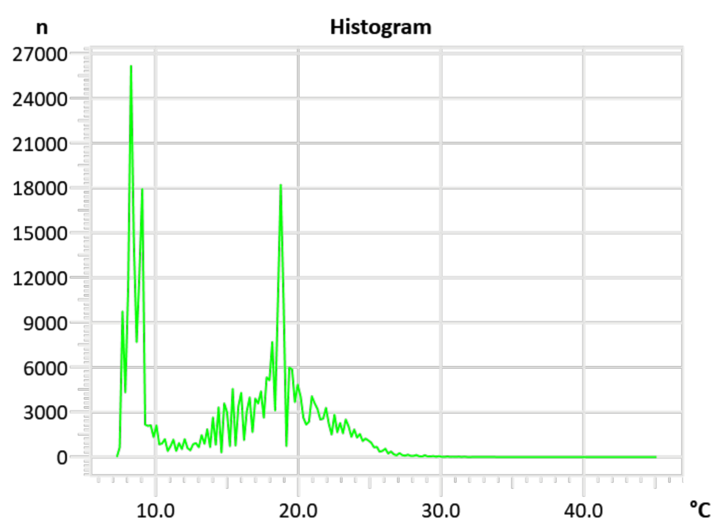
Temperature anomaly Sp2 observations caused by possible underground water.



Geolocation

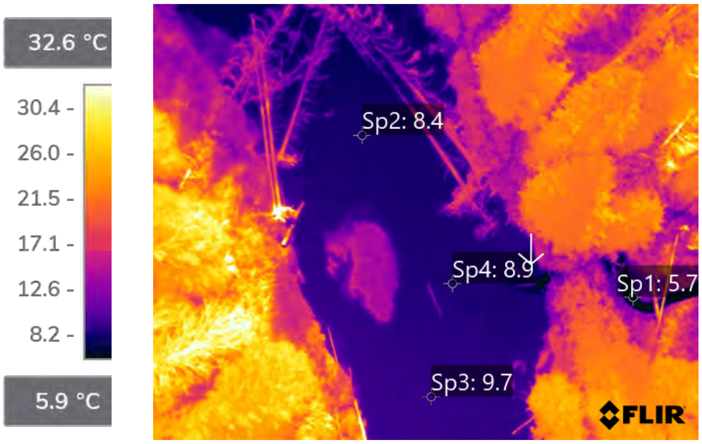
Coordinates	**50°07'38.9"N 114°50'54.3"W**
Compass degrees	





Teck Thermal Imagery
Groundwater Pilot Project - Report

IRX_0942_FLIR.jpg



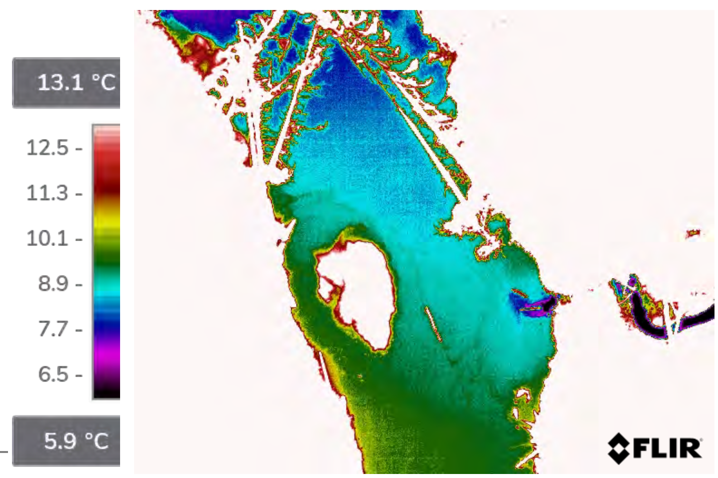
Measurements:

Sp1	5.7 °C
Sp2	8.4 °C
Sp3	9.7 °C
Sp4	8.9 °C

Comment:

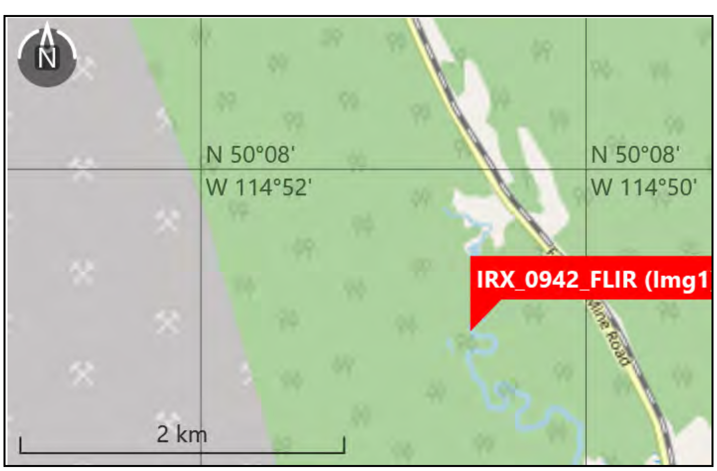
Temperature anomaly at Sp1 observations caused by solar reflectance and the side channel inflow: To investigate further.

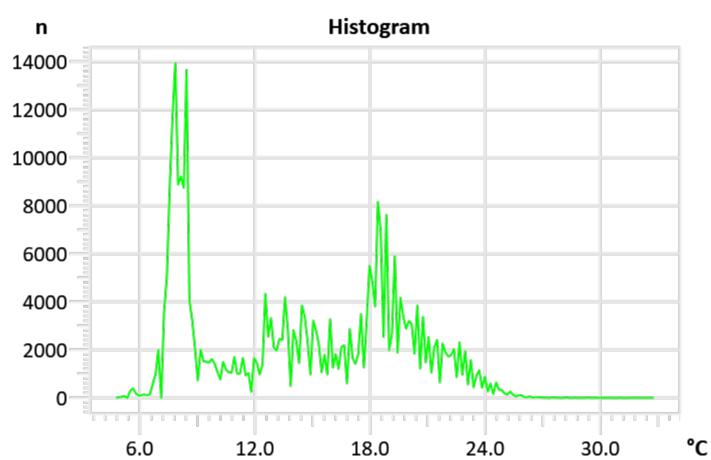
Narrow band 2-8 deg C



Geolocation

Coordinates	<u>**50°07'27.6"N 114°50'36.1"W**</u>
Compass degrees	





Teck Thermal Imagery
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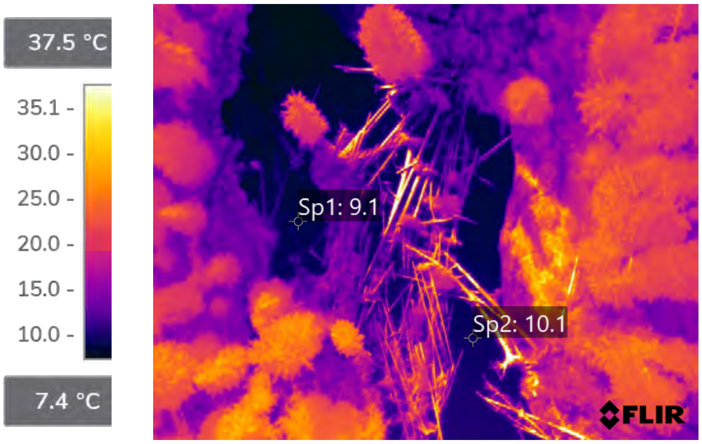
IRX_0980_FLIR.jpg



Measurements:

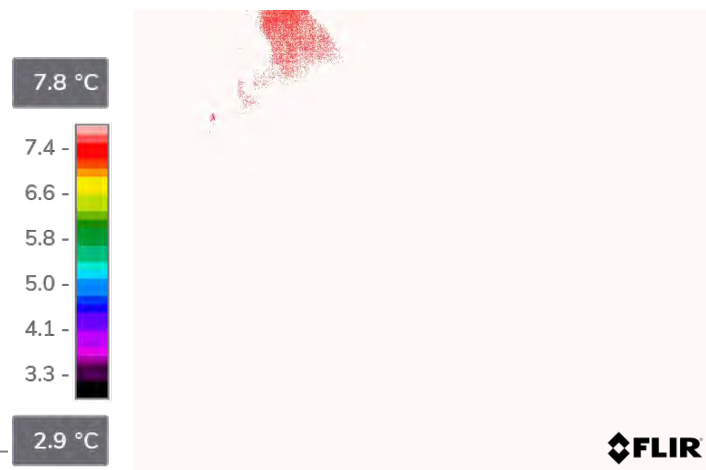
Sp1	9.1 °C
Sp2	10.1 °C

50°07'24.4"N 114°50'28.8"W

Comment:

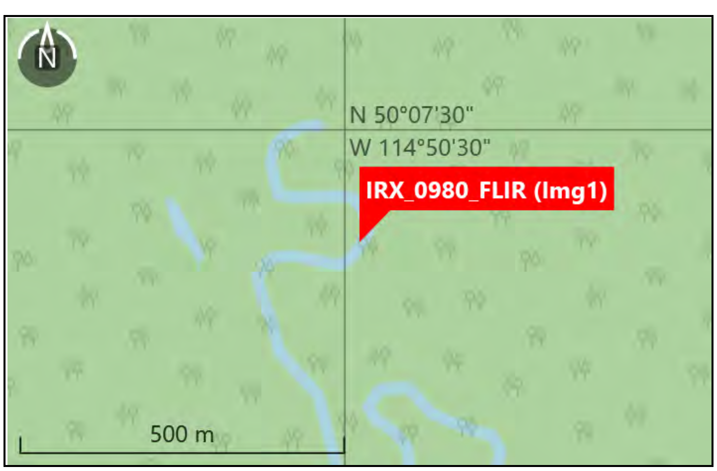
Temperature anomaly Sp1 and Sp2 observations caused by solar reflectance.

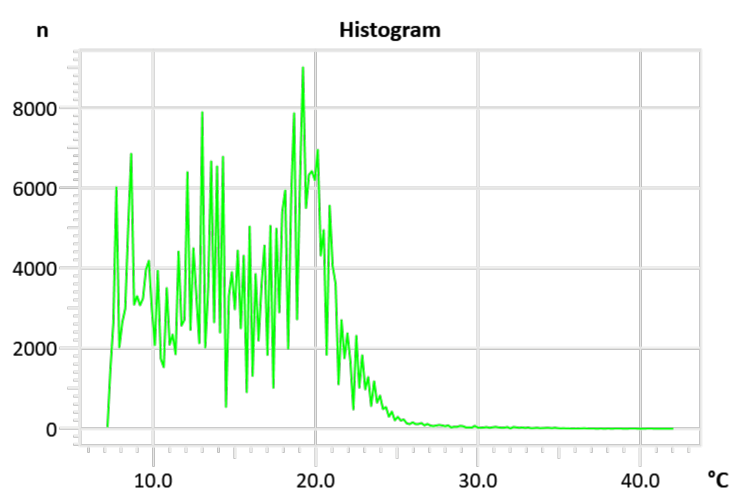
Narrow band 2-8 deg C



Geolocation

Coordinates	50°07'24.4"N 114°50'28.8"W
Compass degrees	





Teck Thermal Imagery
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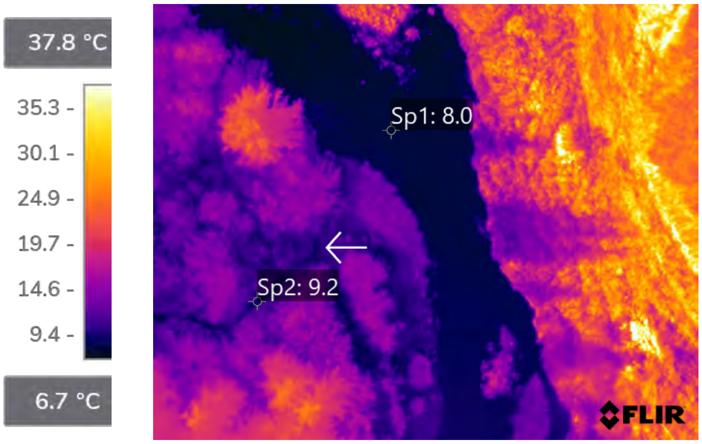
IRX_1089_FLIR.jpg

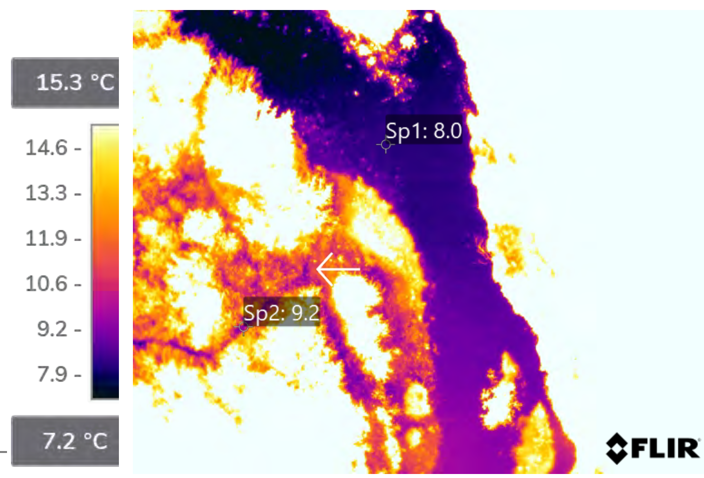


Measurements:

Sp1	8.0 °C
Sp2	9.2 °C

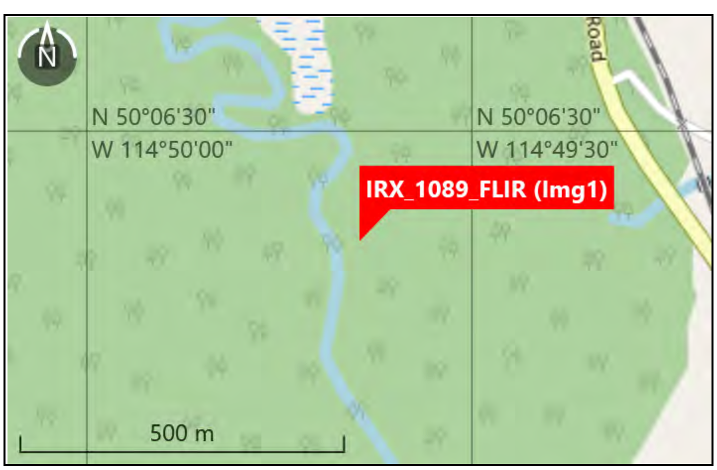
Comment:

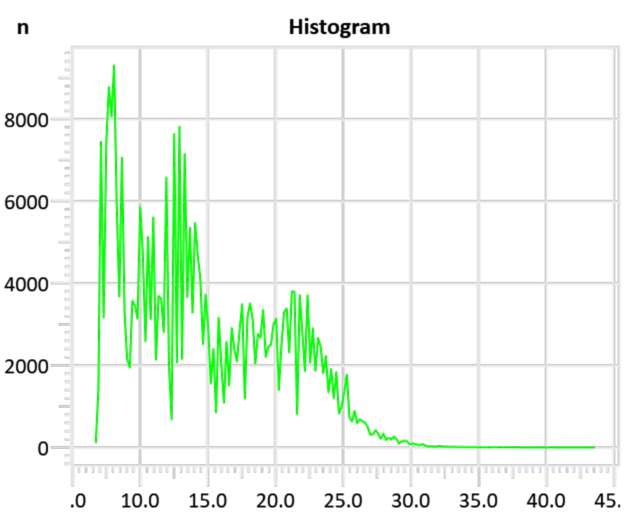
Temperature anomaly Sp1 and Sp2 observations caused by solar reflectance: Possible underground water at arrow marker: To be investigated further.



Geolocation

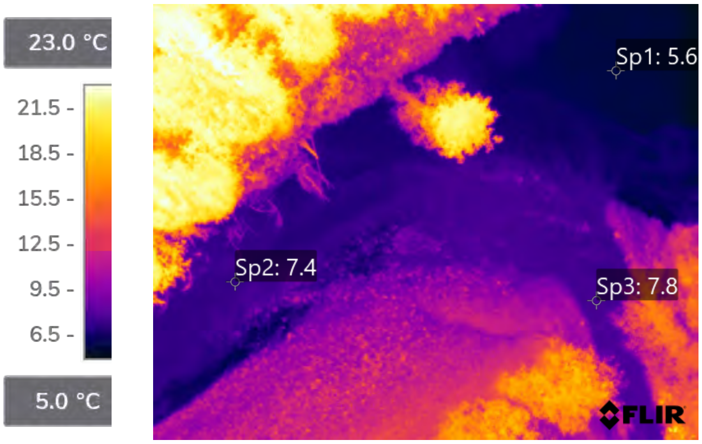
Coordinates	<u>**50°06'24.5"N 114°49'38.8"W**</u>
Compass degrees	





Teck Thermal Imagery
Groundwater Pilot Project - Report

IRX_1096_FLIR.jpg



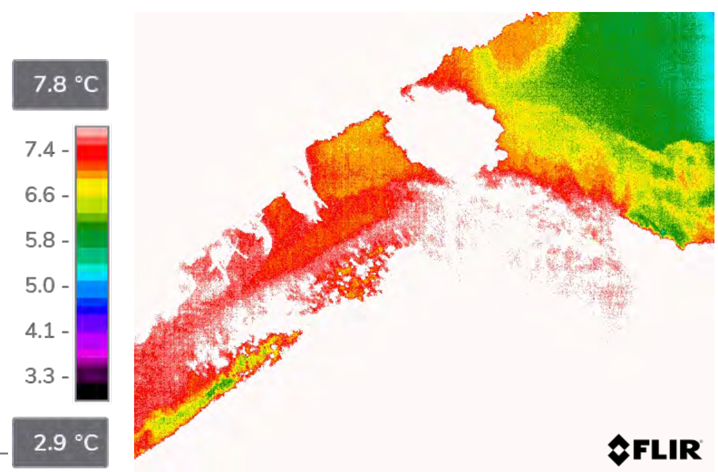
Measurements:

Sp1	5.6 °C
Sp2	7.4 °C
Sp3	7.8 °C

Comment:

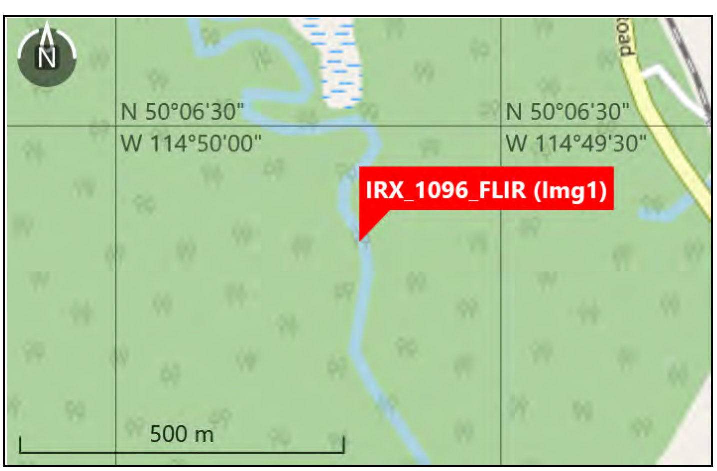
Temperature anomalies at Sp1 and Sp2 observations caused water mixing and depth variance.

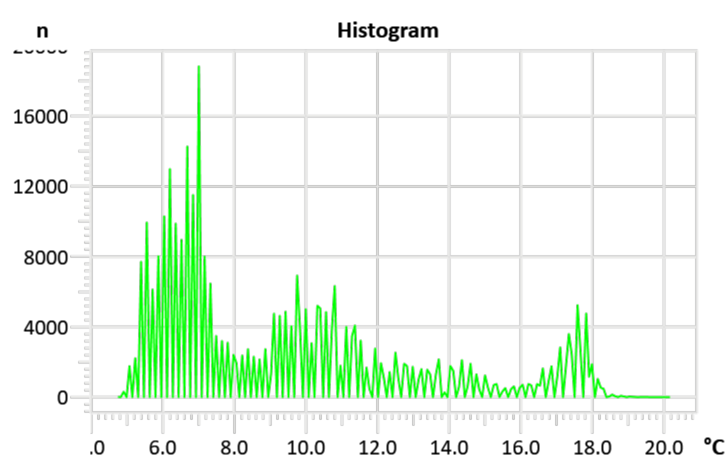
Narrow band 2-8 deg C



Geolocation

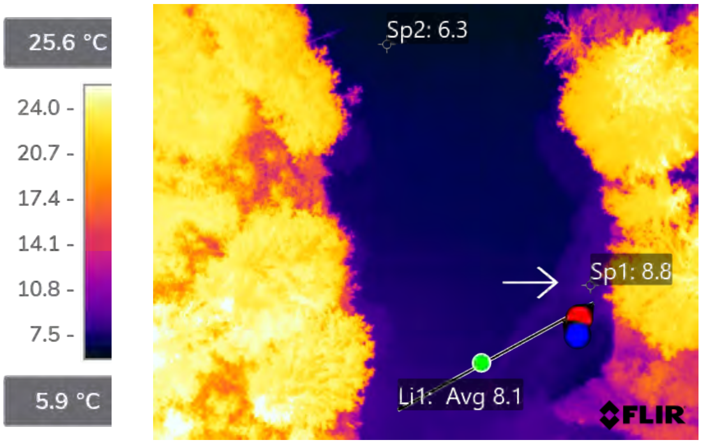
Coordinates	**50°06'24.2"N 114°49'41.0"W**
Compass degrees	





Teck Thermal Imagery
Groundwater Pilot Project - Report

IRX_1104_FLIR.jpg



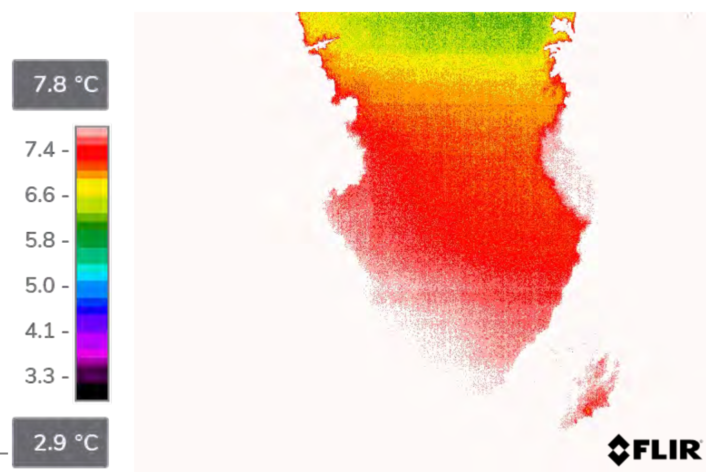
Measurements:

Sp1	8.8 °C
Sp2	6.3 °C
Li1	
Max	8.8 °C
Avg	8.1 °C
Min	7.6 °C

Comment:

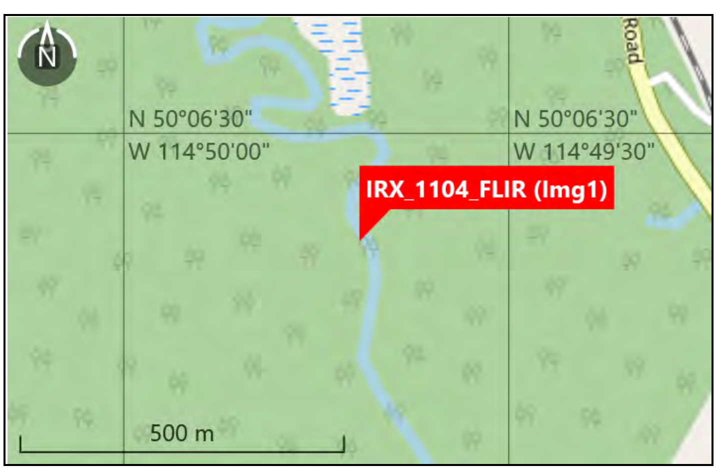
Temperature anomaly at Sp1, with possible solar reflectance: To be investigated further for possible underground water.

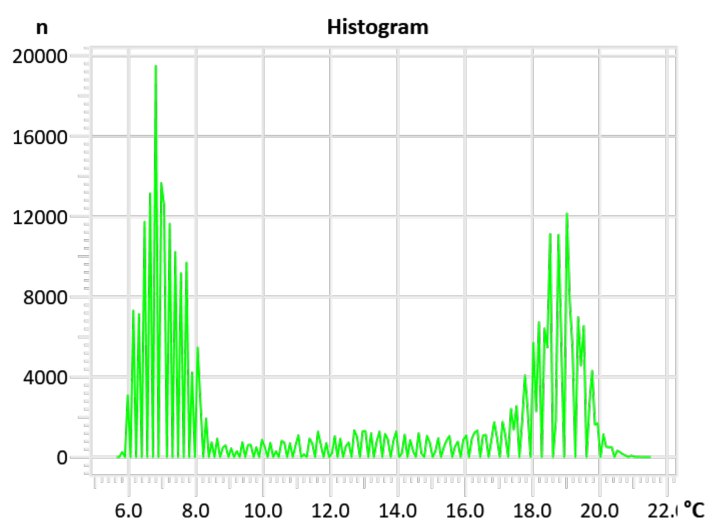
Narrow band 2-8 deg C



Geolocation

Coordinates	**50°06'24.6"N 114°49'41.6"W**
Compass degrees	





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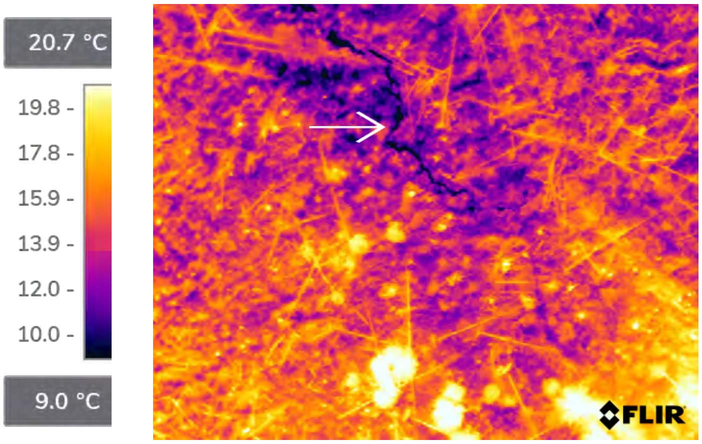
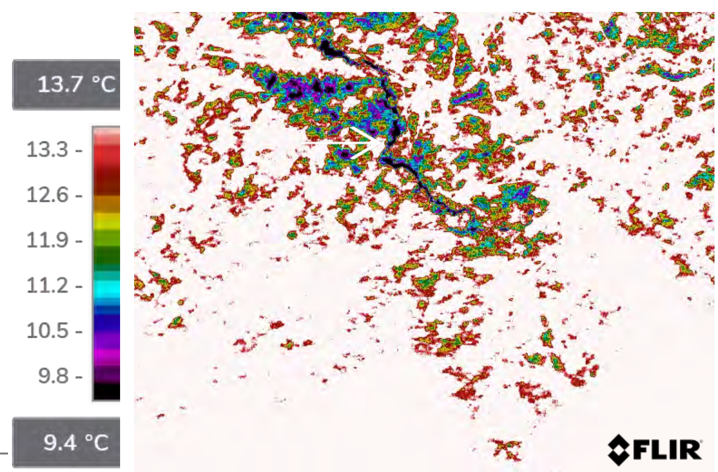
IRX_1300_FLIR.jpg



Measurements:

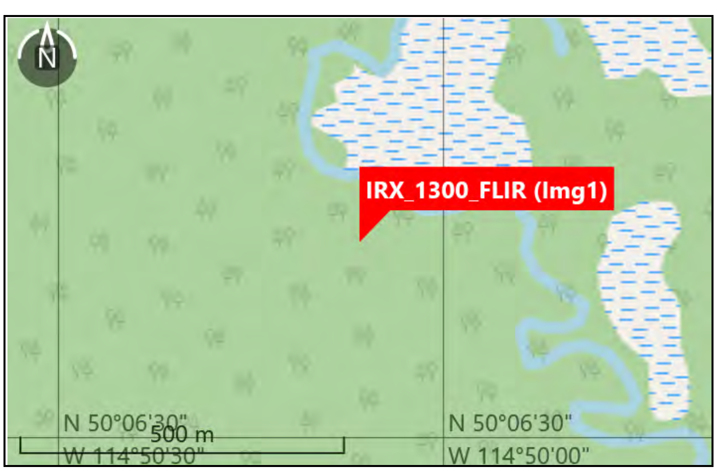
Comment:

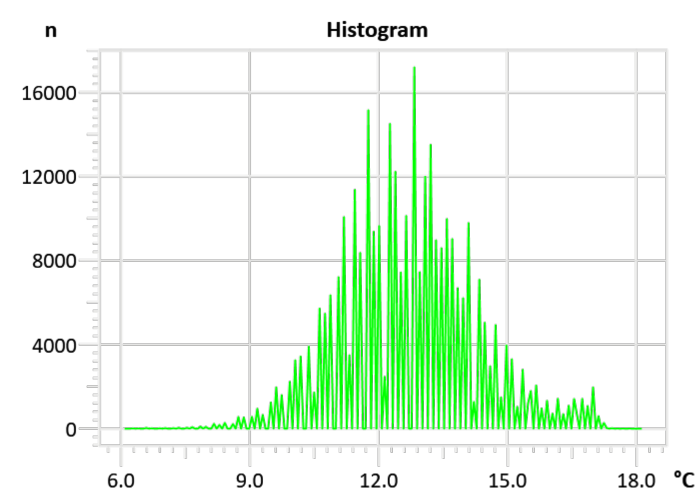
Possible stream or water source at arrow marker.



Geolocation

Coordinates	**50°06'39.8"N 114°50'06.5"W**
Compass degrees	





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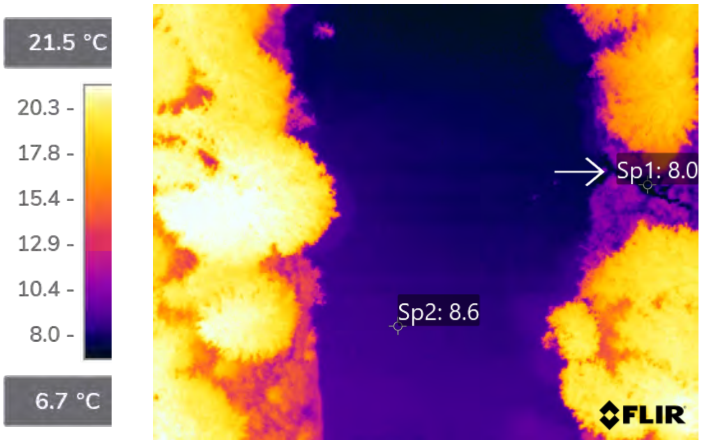
IRX_1448_FLIR.jpg

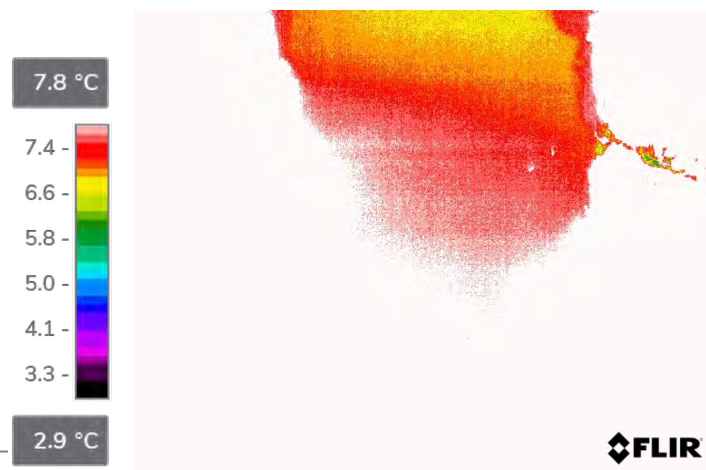


Measurements:

Sp1	8.0 °C
Sp2	8.6 °C

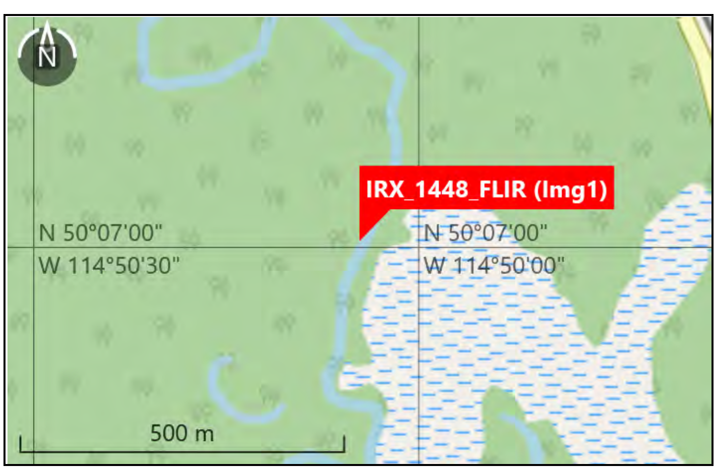
Comment:

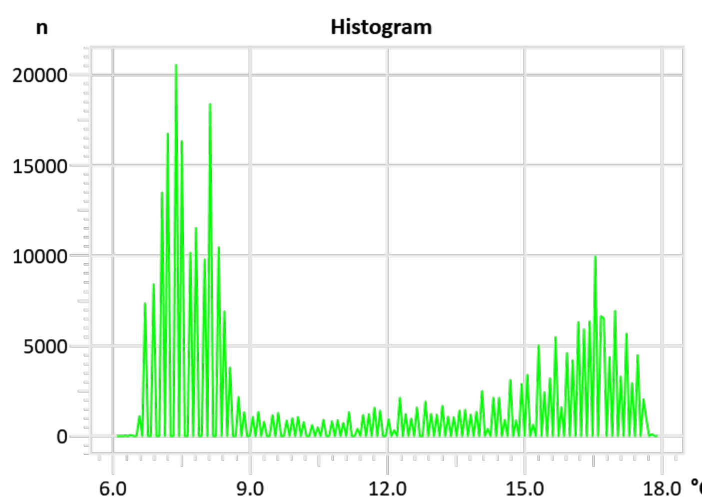
Temperature anomaly Sp1 and Sp2 observations caused by solar reflectance. Possible underground water at arrow point.



Geolocation

Coordinates	50°07'00.3"N 114°50'04.6"W
Compass degrees	





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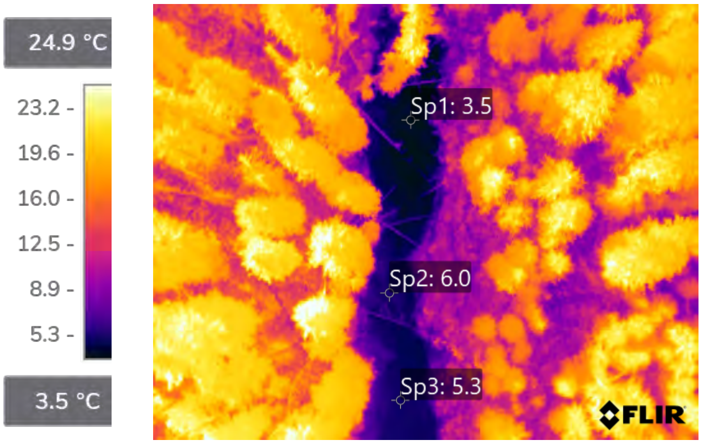
IRX_2000_FLIR.jpg



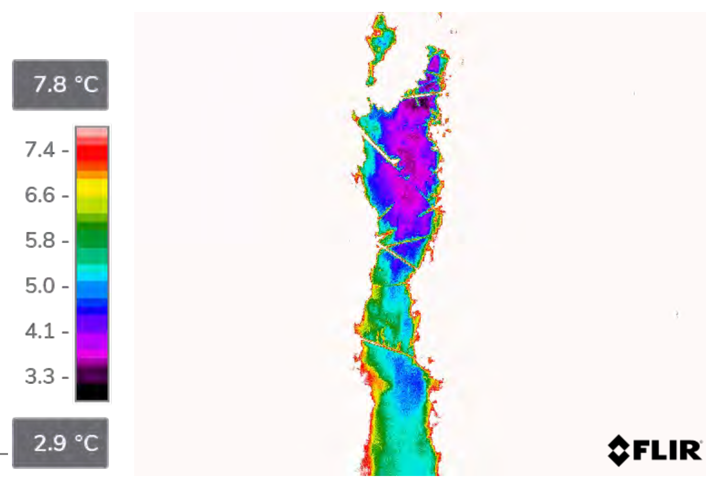
Measurements:

Sp1	3.5 °C
Sp2	6.0 °C
Sp3	5.3 °C

50°07'15.5"N 114°50'08.2"W

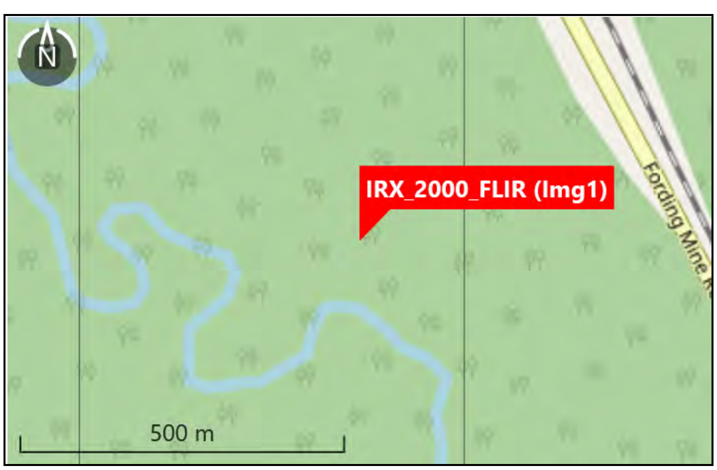
Comment:

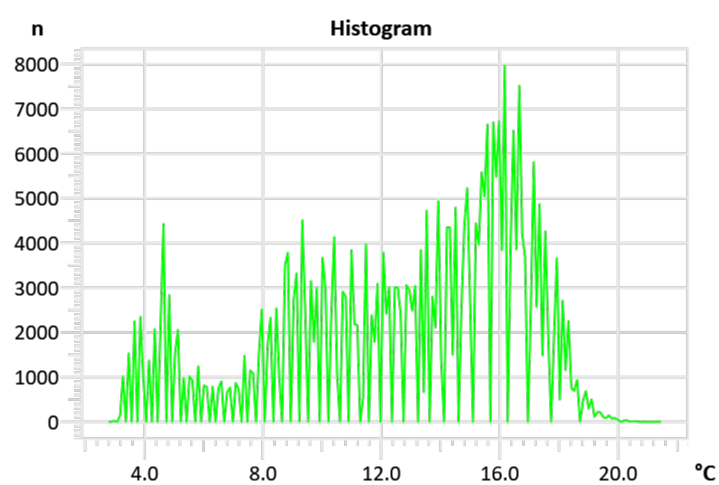
Temperature anomalies at Sp1 and Sp2 observations caused water mixing and temperature differential: To be investigated further.



Geolocation

Coordinates	**50°07'15.5"N 114°50'08.2"W**
Compass degrees	





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