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

Regional Groundwater Monitoring Program

Fording River Operations

Greenhills Operations

Line Creek Operations

Elkview Operations

Coal Mountain mine

Teck Coal Limited

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Executive Summary

At the request of Teck Coal Limited (Teck), SNC-Lavalin Inc. (SNC-Lavalin) has completed the reporting requirements for the 2022 Annual Site-Specific Groundwater Monitoring Program (SSGMP) for Fording River Operations (FRO), Greenhills Operations (GHO), Line Creek Operations (LCO), Elkview Operations (EVO), Coal Mountain mine (CMm, previously identified as Coal Mountain Operations [CMO] and now in care and maintenance), and the Regional Groundwater Monitoring Program (RGMP). Teck's Operations are in southeastern British Columbia's Elk Valley. The reports were completed based on requirements outlined in Permit 107517 Conditions 9.4 and 8.2.2.1 issued by the Ministry of Environment & Climate Change Strategy (ENV).

In 2022, quarterly groundwater monitoring and sampling events were completed for wells specified in the 2020 RGMP Update, 2018 SSGMP Update, and the 2021 SSGMP Update. The 2020 RGMP Update was approved on March 20, 2023, the 2018 SSGMP Update was approved in March 2020, and the 2021 SSGMP Update is awaiting ENV's approval. Quarterly manual and/or continuous groundwater level measurements were collected for monitoring wells, where applicable. Groundwater samples for these programs were analyzed for parameters on the respective analyte lists. Any modifications to the programs were not expected to negatively impact the overall quality or interpretation of the data.

Groundwater quality data were compared to applicable primary and secondary screening criteria focussing on the mine-related "order constituents" (OC) which are nitrate as nitrogen (nitrate-N), sulphate, dissolved cadmium, and dissolved selenium. These OCs are considered to be the main indicators of mine-influence on groundwater quality based on the 2014 Elk Valley Water Quality Plan. Other mine-related constituents above applicable criteria were also discussed. Discussion of trends as well as interpretation of water levels and selected parameters are presented by Operation. To assess groundwater and surface water interaction and increase understanding of constituent's transport pathways, groundwater chemistry was compared to chemistry at nearby surface water stations.

The objective of the 2022 SSGMP and RGMP annual report was to fulfill the reporting requirements outlined in Permit 107517 (as amended on December 19, 2022) and the overall objectives of groundwater monitoring in the RGMP and SSGMP as outlined in the aforementioned Updates. This report summarizes the results from the 2022 quarterly groundwater monitoring and sampling activities completed at FRO, GHO, LCO, EVO, and CMm as well as various regional and background monitoring locations. The following sections summarize the 2022 groundwater monitoring and sampling results by Operation.

Background Groundwater Monitoring Summary

Twenty-one monitoring wells in 14 locations (five wells are part of a nested or clustered series) were monitored and sampled in 2022, as part of the background monitoring network that was initially developed in the 2020 RGMP Update. Evaluation of the background network continues, in consultation with the Groundwater Working Group (GWG). Teck is continually adding monitoring wells to the background network and monitoring of the current network is ongoing. An update to the 2020 Background Assessment (BGA) is planned for the 2023 RGMP Update.

A summary of notable results is provided below.

Upgradient of Study Area 4 (GHO)

At GH_MW_BG1A/B/C, a higher concentration of 5.52 µg/L of dissolved selenium was previously measured in the groundwater from GH_MW_BC1A; however, in 2022, dissolved selenium ranged from non-detect (detection limit of 0.050 µg/L) to 0.862 µg/L. Therefore, the elevated concentration measured in 2020 appears anomalous and possibly related to the first sampling event after monitoring well installation.

Upgradient of Study Area 7 (EVO)

Dissolved selenium concentrations at EV_MW_GV4A and EV_MW_GV4B were the highest reported to date. 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-SO_4(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 were based on 95th percentile concentrations obtained from background wells. Therefore, continued monitoring should occur in conjunction with isotopic sampling to assess the groundwater provenance. Once provenance is established, EV_MW_GV4A/B will be re-evaluated for suitability in the background monitoring network.

Upgradient of Study Area 11 (CMm)

CM_MW3-SH and CM_MW3-DP are both located in the Michel Creek Watershed, while CM_MW6-DP is located in the Corbin Creek Watershed. In 2022, OC concentrations remained at least one order of magnitude below primary screening criteria at all wells. However, the Mann-Kendall trend analysis indicated that nitrate, sulphate, and dissolved selenium have been increasing at CM_MW3-SH. All other constituents of interest (CI) were stable, had decreasing trends, or had no trend at CM_MW3-SH/DP and CM_MW6-DP. At this time, the monitoring wells selected for background monitoring and sampling are considered appropriate; however, trend analysis will be continued annually to understand changes as additional monitoring data are collected.

FRO SSGMP and RGMP Summary

Twenty-nine wells, including twenty-seven monitoring wells and two supply wells at nineteen locations (nine clustered), were monitored and sampled for the 2022 FRO SSGMP. Six wells included in the SSGMP were also monitored and sampled as part of the RGMP within Study Area 1, while seven additional wells in Study Area 1 are included in the RGMP only. The SSGMP and RGMP monitoring at FRO has been divided into three primary watersheds consisting of Henretta Creek, Swift Creek, and the Fording River. Wells located in the Henretta Creek and Swift Creek watersheds monitor groundwater from mine-influence sources located within the watersheds, while wells located along the Fording River valley bottom monitor groundwater constituents transported along the valley bottom as well as from upland tributary catchments.

Henretta Creek Watershed

In the Henretta Creek Valley, the concentration of dissolved selenium at monitoring well FR_HMW5 was greater than the primary screening criteria for the first time since 2017. This well was installed in an area initially inferred to be upgradient of mining influence as a background well. However, there has been evidence of mine-influence at FR_HMW5 since 2016 and the Mann-Kendall trend analyses indicated increasing trends for sulphate and dissolved selenium. Monitoring wells FR_HMW1S/D and FR_HMW3 are located within source areas down-valley from FR_HMW5 and monitor groundwater quality within the

Henretta backfilled pits. Groundwater analytical results indicated OC concentrations (nitrate-N, sulphate, and dissolved selenium) were greater than the primary screening criteria and that these areas continue to be a source of loading to groundwater in the Henretta Creek valley bottom. Trend analyses indicated sulphate concentrations have been increasing at all three wells, while dissolved selenium concentrations have been increasing at FR_HMW1S and FR_HMW3. Nitrate-N concentrations have been decreasing at all three wells, which is attributed to a depletion of the source, while the dissolved selenium concentrations at FR_HMW1D have also been decreasing. The concentrations of OC in 2022 were generally similar to recent years, although the concentrations of selenium at FR_HMW1S and FR_HMW3 were higher than the historical range in two samples at each well. Samples were unable to be collected from FR_HMW2 in 2022 due to lodged monitoring equipment that could not be retrieved. This well was decommissioned and replaced in Q1 of 2023.

Fording River Watershed and Study Area 1

In the Fording River valley upgradient of the South Tailings Pond (STP), shallow monitoring wells FR_TBSSMW-2 and FR_MW-1B are inferred to be influenced by interaction with surface water in the Fording River, while FR_GCMW-2 is influenced by surface water in the Clode Creek Settling Ponds. Each of these three wells had OC concentrations (dissolved selenium, sulphate, and/or nitrate-N) greater than primary screening criteria, indicating there is mine-influence and transport of OC in the shallow aquifer. Concentrations of OC were also greater than primary screening criteria at the FR_POTWELLS supply wells and the water chemistry suggests a possible hydraulic connection between these locations and the Fording River. Increasing trends of select OC in these wells have been inferred to reflect increasing concentrations in surface water (Fording River and Clode Creek Settling Ponds). Deeper monitoring wells FR_TBSSMW-1 and FR_GCMW-1B had OC concentrations less than primary screening criteria and the Se:SO_4(S) ratios were indicative naturally-sourced waters.

Concentrations of OC at monitoring wells FR_NTPSE and FR_09-04-A/B, located directly downgradient of the North Tailings Pond (NTP) and STP, respectively, were less than primary screening criteria. There is continued evidence of selenium attenuation by microbial reduction near and within the NTP/STP, based on the Se:SO_4(S) ratios at these locations.

In the Kilmarnock alluvial fan area (monitored by FR_KB-1, FR_KB-2, and FR_KB-3A/B), groundwater OC concentrations were greater than primary screening criteria and the highest amongst all wells included in the SSGMP or RGMP in 2022, within the Fording River valley. 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. The Mann-Kendall analyses indicated all OC concentrations OC are increasing or probably increasing at all wells, except for nitrate-N at FR_KB-2 and dissolved cadmium at FR_KB-3B (no trends identified). The elevated concentrations of OC in the Kilmarnock Creek alluvial fan in 2022 may be related to the commissioning of the Kilmarnock Clean Water Diversion (KCWD) in Q4 of 2021, which diverts non-mine-influenced water that would have diluted concentrations in discharge at the toe of the spoil. Mine-influenced Kilmarnock Creek loses to ground over the Kilmarnock alluvial fan and mine-influenced groundwater has been identified downgradient of the fan.

In the South Kilmarnock Phase 2 Secondary Settling Pond (SKP2) and Greenhouse areas, OC concentrations exceeded primary screening criteria at monitoring wells FR_MW-SK1A, FR_09-01-A/B, FR_09-02-A/B, FR_GH_WELL4, and RG_MW_FR1A/B/C. OC concentrations were comparatively low at deep well FR_MW-SK1B, although the concentrations of dissolved selenium and nitrate-N were greater than primary screening criteria and the trend analyses indicated all OC concentrations are increasing. The increasing OC concentrations and selenium to sulphate ratios suggest there is mine-influenced groundwater extending to the base of the aquifer in this area, although the well depth and upward gradients indicated the source is not directly from above. OC concentrations at shallow well FR_MW-SK1A were similar to previous years, and the Mann-Kendall analyses indicated no trend for any OC concentrations.

Monitoring wells FR_09-01-A/B are inferred to be along a pathway between the Kilmarnock Creek alluvial fan and Fording River, while monitoring wells FR_09-02-A/B are inferred to be both seasonally influenced by Kilmarnock Creek as well as from SKP2 water infiltrating to ground and by the adjacent Fording River which loses over this reach. Dissolved selenium and sulphate concentrations were generally elevated at these wells in 2022 compared to historical results, and the trend analyses indicated the concentrations of both are increasing or probably increasing.

Monitoring wells FR_GH_WELL4 and RG_MW_FR1A/B/C are located along an inferred transport pathway between the Kilmarnock Creek alluvial fan and the Greenhouse Side Channel. 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. No trends were identified in this area except for probably increasing concentrations of dissolved selenium at RG_MW_FR1C. However, the monitoring period at RG_MW_FR1A/B/C is relatively short (since Q4 of 2020) and continued monitoring is needed to confirm this trend in the long-term. OC concentrations at RG_MW_FR1A were generally elevated in comparison to those at FR_GH_WELL4, despite being located nearby and screened at a similar depth interval. There is less vertical stratification in the concentrations of dissolved selenium and nitrate-N at RG_MW_FR1A/B/C than at FR_MW_SK1A/B, inferred to be located upgradient along the same pathway, although deep well FR_MW_SK1B in the SKP2 Area is significantly deeper than deep well RG_MW_FR1A in the Greenhouse Area. Concentrations of OC at some locations downgradient of the FRO-S AWTF and KCWD outlets were generally lower in 2022 than in 2021, particularly at shallow wells FR_MW_SK1A and FR_09-01-A in the SKP2 Area and FR_GH_WELL4 in the Greenhouse Area.

Monitoring wells RG_MW_FR8A/B/C are located in the vicinity of the Regional Groundwater Discharge Zone, and the vertical hydraulic gradients at this well cluster are upward. Dissolved selenium and nitrate-N concentrations at intermediate well RG_MW_FR8B were greater than the primary screening criteria in 2022, and the source is inferred to be Kilmarnock Creek based on comparison to surface water quality. Dissolved selenium and nitrate-N concentrations were also greater than the primary screening criteria in the samples collected from shallow well RG_MW_FR8C (except for nitrate-N in Q2 and Q3). The concentrations of OC in shallow well RG_MW_FR8C were similar to those in intermediate well RG_MW_FR8B in Q1 and Q4 and much lower in Q2 and Q3, which may reflect dilution by recharge during and after freshet. Dissolved selenium and nitrate-N concentrations in deep well RG_MW_FR8A are lower than those in the shallow and intermediate wells, while the sulphate concentrations are higher. The dissolved selenium concentration in Q1 and sulphate concentrations in Q1, Q3, and Q4 were greater than the primary screening criteria. The Se:SO_4 (S) ratios indicated that groundwater at all depths was mine-influenced, but that groundwater at the greatest depth has undergone microbial reduction. The Mann-Kendall trend analyses indicated dissolved selenium, sulphate, and nitrate-N concentrations were either increasing or probably increasing at RG_MW_FR8B, while the concentrations of sulphate at RG_MW_FR8A were probably increasing. However, the monitoring period at RG_MW_FR8A/B/C is also relatively short and continued monitoring is needed to confirm these trends in the long-term.

In the Porter Creek area, concentrations of dissolved selenium at monitoring well GH_MW-PC were greater than the primary screening criteria in each quarter in 2022. The concentrations of OC at monitoring well GH_MW-PC are similar to those measured at the outlet of Porter Pond and followed similar seasonal trends, which suggests connectivity between groundwater and surface water.

In the vicinity of the compliance point at FR_FRABCH, the concentrations of dissolved selenium at intermediate well RG_MW-FR10B were greater than the primary screening criteria in each sample collected in 2022. The Se:SO_4 (S) ratios indicated groundwater at this depth is mine-influenced and the source is inferred to be upgradient mine-influenced tributaries and the Fording River over the losing reaches upstream. However, the concentrations of OC at RG_MW-FR10B are lower than in upgradient valley-bottom groundwater, which 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 flow path and within the Chauncey Creek alluvial fan.

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. The Mann-Kendall analyses indicated that concentrations of dissolved selenium, sulphate, and nitrate-N at RG_MW_FR10C are decreasing, although further monitoring is needed to confirm the validity of these trends in the long-term due to a relatively short monitoring period. The Se:SO_4 (S) ratios suggest that groundwater at shallow well RG_MW_FR10C is mine-influenced and has undergone microbial reduction, while 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 and that the vertical gradients between the deep and intermediate wells are upward, the deep groundwater is inferred to be naturally sourced.

Swift Creek Watershed

Concentrations of OC in groundwater downgradient of the Swift Creek Primary Sediment Pond were greater than primary screening criteria, and the source is inferred to be seepage from the pond. Concentrations of dissolved selenium, nitrate-N, and sulphate in Q4 of 2022 exceeded the historical range, and the Mann-Kendall analyses indicated nitrate-N concentrations were probably increasing. The dissolved selenium concentrations were 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. Seepage from the Swift Creek sediment ponds is currently being evaluated.

The Swift Creek Sediment Ponds also receive mine-influenced drainage from the Cataract Creek watershed due to a diversion completed in 2019. Seepage from both the Swift Creek and Cataract Creek Sediment Ponds was recently investigated to evaluate potential loading to the Fording River valley bottom.

GHO SSGMP and Relevant RGMP Study Area Summary

Twenty-six monitoring wells in seventeen locations, and five supply wells were monitored and sampled for the 2022 GHO SSGMP and RGMP. The GHO summary provided below is split into the three primary surface drainage areas: Porter Creek; Greenhills Creek and Study Area 3; and the Elk River Valley and Study Area 4.

Porter Creek Watershed and Study Area 1

In 2022, dissolved selenium was greater than primary and secondary screening criteria at GH_MW-PC in all four quarters; no exceedances were observed in well GH_MW_PC4A, which is completed in bedrock. Well GH_MW_PC4B was dry in all quarters and therefore, no water quality samples were collected (Table GH-02 in the Annual Groundwater Monitoring Report, Appendix VI).

Mine-influenced groundwater at GH_MW PC was inferred to be primarily from Porter Creek surface water recharging groundwater. Flow and load accretion study results indicated flow and load increase in the upper part of Porter Creek, as well as seepage of mine-influenced groundwater in Porter Creek about 500 m upstream from the sediment pond (Drawing GH-02 in the Annual Groundwater Monitoring Report, Appendix VI; SNC Lavalin, 2022d). Source assessment of the seepage and associated groundwater flow path is ongoing.

Greenhills Creek Watershed and Study Area 3

Monitoring wells in this watershed are GH_MW-GHC-1A/B, GH_MW-GHC-4A/B, GH_MW-TD and GH_MW-RLP-2. Supply wells GH_POTW09, GH_POTW17, GH_POTW10 and GH_POTW15 are installed downgradient or cross-gradient of the Greenhills Settling Pond, within the Greenhills Creek alluvial fan and glaciofluvial channel deposits along the Fording River valley bottom. A nested well pair (RG_MW_FR11A/B) was installed in September 2021 near Josephine Falls to assess the potential groundwater pathway from the Fording River valley bottom to the Elk River watershed in this general area. Groundwater quality in this watershed was interpreted to be influenced by the Site A and B Rejects, Hawk and East Spoils, Site D/E Rejects, the Rail Loop Pond, and clean coal storage.

Groundwater downgradient of the Site A Rejects (GH_MW-GHC-1A/B) has consistently had concentrations of dissolved selenium below primary screening criteria. Similar to previous years, GH_MW-GHC-1B exceeded primary screening criteria for sulphate in all quarters of 2022. Mann-Kendall analyses indicated an increasing trend in nitrate-N at GH_MW_GHC-1B and a probably increasing trend in sulphate at GH_MW_GHC-1A; both trends had not been previously identified.

Clustered well pair GH_MW_GHC-4A/B was installed to monitor mining influence from waste rock sources (Hawk and East spoils) in groundwater in the Greenhills Creek alluvial sediments and bedrock on approach to the Fording River valley bottom. GH_MW_GHC-4A, which screened in bedrock, is monitored for water levels only, in accordance with the 2021 SSGMP Update. In 2022, dissolved selenium concentrations at GH_MW_GHC-4B exceeded primary and secondary screening criteria in all four quarters. These dissolved selenium concentrations were interpreted to originate from waste rock influence, which was inferred to be sourced from contact with the Hawk and East spoils and infiltration from Greenhills Creek. The rest of the OC were below primary screening criteria, except for sulphate in Q4.

Monitoring well GH_MW-TD is in the upland area downgradient and south of the TSF and the Site D/E Rejects and is inferred to intercept a deeper groundwater flow system. The well is artesian and is completed at the base of a thick (35 m) layer of till, in materials consistent with the transitional zone between a dense till and siltstone. Concentrations below primary screening criteria were measured for all OC parameters at this well for all quarters. The low dissolved oxygen and oxidation-reduction potential, alongside elevated manganese concentrations, indicate reducing conditions have been present at GH_MW-TD, and there is potential for nitrate-N and selenium attenuation in the deeper groundwater south of the TSF.

Monitoring well GH_MW_RLP_2 was installed adjacent to the Rail Loop sediment pond (Rail Loop Pond) in December 2020, and was screened from 3.5 to 5 mbgs, to target the shallow water-bearing zone. All OC were below the primary screening criteria in all four quarters; however, influence from the CCR has been interpreted. Sources of mining influence in the Rail Loop Area potentially include the Rail Loop Pond and clean coal storage.

Supply wells GH_POTW09, GH_POTW10, GH_POTW15 and GH_POTW17 are screened in glaciofluvial channel deposits along the Fording River valley bottom and the Greenhills Creek alluvial fan. The average daily withdrawal rates for these wells were 914 m^3/day for GH_POTW09, 93 m^3/day for GH_POTW10, 297 m^3/day for GH_POTW15 and 35 m^3/day for GH_POTW17. Two dissolved selenium exceedances were observed in 2022: one at GH_POTW09 in Q2 and one at GH_POTW17 in Q1. No other OC exceedances were observed in 2022. Mann-Kendall analyses identified a probably increasing trend in dissolved selenium at GH_POTW17, which has not been identified previously. Consistent with historical results, Mann-Kendall trend analyses indicated dissolved selenium concentrations at GH_POTW09 and GH_POTW10 have been increasing. GH_POTW09 also had an increasing trend in sulphate, and an increasing trend in sulphate was identified at GH_POTW15 for the first time. The primary sources of mine-influenced water in the valley bottom deposits around the supply wells are the losing reach of Greenhills Creek, just north of Greenhills Pond, where the alluvial deposits are unconfined, infiltration from Greenhills Pond, and CCR and TSF seepage. The losing reach(es) of the Fording River may also be a potential source.

Clustered monitoring well pair RG_MW_FR11A/B was installed near Josephine Falls to assess a potential groundwater pathway from the Fording River valley bottom to the Elk River watershed along mapped glaciofluvial sediments. The wells were installed just north of the Fording River in bedrock, which was encountered at 3.3 mbgs (1496.7 masl). Based on the approximate elevation of the Fording River (1478 masl based on LiDAR imagery), and groundwater elevations at RG_MW_FR11A/B, there has been no groundwater flowpath from the Fording River valley to the Elk River Valley in this area. Concentrations of OC in 2022 were below the primary screening criteria and were interpreted to be natural non-contact water based on groundwater chemistry results (Figure GH-17).

Elk River Valley and Study Area 4

Wells installed along the GHO mine permitted boundary in the Elk River Valley are used to monitor potential effects on groundwater quality resulting from surface water infiltration, including tributaries originating within the permitted boundary. Thirteen monitoring wells are monitored and sampled in and downgradient of the Mickelson, Leask, Wolfram, and Thompson creek drainages. Three wells (one supply well and two monitoring wells) are monitored and sampled further downgradient in the Elk River Valley downgradient of GHO near the Town of Elkford.

Dissolved selenium primary screening criteria exceedances were observed in all four quarters at wells RG_MW_LC3A/B, RG_MW_LCWC1, RG_MW_WC2A/B, and GH_MW-ERSC-1. Well GH_MW-MC-2D had one dissolved selenium exceedance in Q2 and GH_MW-MW-3 exceeded in Q2 to Q4. Monitoring well GH_MW-MW-2 had dissolved selenium exceedances in Q1 and Q2 and was decommissioned in Q3. Most of these wells also had exceedances of nitrate-N and sulphate for part of the year. Mann-Kendall trend analyses indicated increasing or probably increasing trends in dissolved selenium that were not identified previously at RG_MW_LC3A and RG_MW-WC2A/B. Nitrate-N, sulphate, and dissolved selenium concentrations have been increasing at GH_MW-ERSC-1, which was consistent with previously-reported data.

The source of mine-influenced water in wells RG_MW_LC3A/B is infiltration of Leask Creek surface water into the ground upstream of the ponds, and infiltration from the pond. The source of OC in wells RG_MW_LCWC1 and RG_MW_WC2A/B is infiltration of Leask and Wolfram creeks surface water into the ground upstream of the ponds, and infiltration from the ponds. At GH_GA-MW-3, the source of mine-influenced water is interpreted to be the losing reach of Thompson Creek downgradient of GH_TC3, with some potential influence from Leask and Wolfram creeks. The Elk River Side Channel (ERSC) is also likely a source of mine-influenced water via infiltration of water that originates upstream from Wolfram and Thompson creeks. At well RG_MW-MC-2D, it is not certain whether dissolved selenium is sourced from a longer groundwater flow path with long residence time (natural) or if it is mine-influenced, as a result from mixing from different groundwater sources. Investigation into the groundwater flowpath at this well is ongoing.

The source of mine-influenced water at GH_MW_ERSC-1 has been interpreted to be primarily Thompson Creek surface water. Some possible influence from Leask and Wolfram creeks and ponds has been inferred. Infiltration from of mine-influenced water transported via down valley groundwater flow from Wolfram and Thompson creeks in the ERSC may also be a source.

Further downgradient of GHO, monitoring wells GH_MW_EF1A/B and Elkford municipal supply well RG_DW-01-03 were below primary screening criteria for mining-related constituents. Based on Mann-Kendall trend analysis, nitrate-N, sulphate and dissolved selenium concentrations have been increasing at RG_DW-01-03. The source of mining-influenced water at RG_DW-01-03 is a subject of ongoing investigation and study under Teck's Regional Groundwater Flow Bypass, Bedrock, and Interbasin Flow Study.

LCO SSGMP and Relevant RGMP Study Area Summary

Thirty-five monitoring wells in 25 locations (9 clusters and one nested) were monitored and sampled for the 2022 GWMP, SSGMP, and RGMP. Thirteen wells are from the approved 2018 SSGMP Update, 18 additional wells are recommended in the 2021 SSGMP Update, and four regional wells are from the recently approved 2020 RGMP Update. The LCO GWMP/SSGMP and RGMP focuses on monitoring groundwater quality in three geographic areas: Phase II Dry Creek; Phase I Line Creek Operations; and the Process Plant area. The RGMP Study Area 2 is located next to the northern extent of Phase II while Study Area 5 and Study Area 6 are adjacent to the Process Plant.

LCO Phase II Upper and Lower LCO Dry Creek Watershed (Study Area 2)

Phase II is in the LCO Dry Creek watershed, which includes a narrow valley that drains to the north and discharges to the Fording River, southeast and upstream of GHO. In the headwaters of the watershed, some former stream features are buried by waste rock and now act as rock drains. The Dry Creek Management System is constructed in the upper portion of the valley near the confluence of Dry Creek East Tributary and LCO Dry Creek. Monitoring results from eight wells at five locations (includes three well clusters) were used to evaluate groundwater conditions. Monitoring results from five surface water stations were also considered.

In Upper LCO Dry Creek, groundwater elevations have historically been the highest during freshet and variations in vertical gradients seasonally occur. Seasonal flowing artesian conditions occurred at one well (LC_PIZDC1306). All concentrations of OCs were less than primary screening criteria. Non-OC concentrations above primary screening criteria included molybdenum, barium, and lithium which may be associated with background conditions. An increasing nitrate trend (LC_PIZDC1306) and a probably increasing cadmium trend (LC_PIZDC0901) were noted but at concentrations below primary screening criteria. Groundwater quality is generally consistent with non-contact waters with the exception of potential mixing of mine-influenced waters from waste rock at LC_PIZDC1306. LC_PIZDC1306 is a shallow well adjacent to a pond diversion structure near the headwaters of LCO Dry Creek.

In Lower LCO Dry Creek, a well cluster consisting of two wells has been installed near the valley outlet. The shallow well (RG_MW_DC1B) is screened in the alluvial deposits, while the deeper well (RG_MW_DC1A) is screened below a confining unit. Similar to 2021, flowing artesian conditions were observed at RG_MW_DC1A. The concentration of OCs at these wells were one to two orders of magnitude lower compared to surface water quality in LCO Dry Creek as measured at LC_LC1. Mine influence is not suspected in groundwater in this area given the low OC concentrations and analytical results below primary screening criteria.

LCO Phase I Line Creek

Phase I includes the upper portion of Line Creek watershed to the end of the canyon before Line Creek valley outlets to the main stem valleys (Fording and Elk River valley bottoms). Mining works include waste rock and coal spoils stockpiles, active pits, end-pit lakes, and water management infrastructure (e.g., rock drains, settling ponds, water treatment facilities). Some former stream features are buried by waste rock and act as rock drains. The West Line Creek Active Water Treatment Facility (WLC AWTF) residual landfill is also located in Phase I. Monitoring results from 18 wells in 12 locations (includes 5 well clusters and 1 nested well) were used to evaluate groundwater quality. Six surface water stations and one seep were also considered in the groundwater assessment.

For the Centre Line Creek (North & South) and West Line Creek sub-areas, groundwater from several wells had OC concentrations of nitrate, sulphate and selenium greater than the primary screening criteria. Selenium concentrations also exceeded secondary screening criteria at several wells. Increasing trends for concentrations of nitrate (LC_PIZ1206C), sulphate (LC_MW20_02A, LC_PIZ1206C, LC_PIZ1211N), cadmium (LC_PIZ1211N), and selenium (LC_PIZ1206C) trends were noted. Groundwater quality at these wells was indicative of mine-influenced waters from waste rock spoils. Groundwater also had concentrations greater than primary screening criteria for lithium, manganese, and molybdenum which may be associated with background conditions. Mine-related influences were not suspected at three wells (LC_MW20_03, LC_PIZ1207A, LC_PIZ1210C) in this area.

Within the Lower Line Creek subarea, a combination of landfill and upgradient mine activities may be influencing groundwater quality. Selenium was the only OC with concentrations greater than primary screening criteria with some secondary screening exceedances at WL_MW-15-02-B and LC_MW_CP1A/B. Increasing trends for concentrations of sulphate (WL-MW-15-04B), cadmium (WL-MW-15-02A), and selenium (WL_MW-15-02B) were noted. Barium, lithium, and manganese concentrations greater than primary screening criteria may be associated with background conditions. Groundwater from WL_MW-15-02-B had other parameters (chloride, arsenic, and iron) not associated with non-order mining-related or naturally occurring constituents with concentrations greater than primary screening criteria. Groundwater conditions at the most downgradient well cluster (LC_MW_CP1A/B) indicated upward vertical gradients in 2022 consistent with gaining reach interpretations from flow accretion studies and different mine-influence mixing compared to surface water station LC_LCDSSLCC.

Process Plant and Elk Valley (Study Areas 5 and 6)

The Process Plant is located downgradient of Phase I on a bench along the eastern flank of the main stem valley bottom containing Fording River and Elk River. It includes the lower portion of Line Creek watershed, downgradient of the canyon where Line Creek flows over an alluvial fan and discharges into the Fording River. A small footprint of the permitted mine boundary overlaps with the lower extents of the Line Creek watershed. Mine works within this area include the process plant, CCR spoils and sedimentation ponds. RGMP Study Area 5 and 6 are adjacent to the Process Plant. Monitoring results from nine wells at eight locations (including one well cluster) were used to evaluate groundwater conditions. Only water level monitoring was conducted at three of these wells. Three surface water stations and three seeps were included in the groundwater assessment. Pumping rates from two water supply wells were also considered.

OC concentrations were less than primary screening criteria with the exception of one cadmium exceedance near the process plant facility (LC_PIZP1104) and three exceedances for selenium in shallow groundwater near the Elk River (LC_MW_ER4B). Increasing trends for concentrations of cadmium (LC_PIZP1104, LC_PIZP1105, LC_MW_ER4B), nitrate (LC_PIZP1103, LC_PIZP1105), sulphate (LC_PIZP1105), and selenium (LC_PIZP1104) were noted. Chloride, which is not associated with non-order mine-related or naturally occurring constituents, had concentrations greater than primary screening criteria during every sampling event in 2022 at LC_PIZP1104 and LC_PIZP1105. Several naturally occurring constituents were elevated compared to primary screening criteria at LC_PIZP1101 (fluoride) and LC_PIZP1104 (manganese) with concentrations above background levels. Groundwater level fluctuations in 2022 at well cluster LC_MW_ER4A/B located in Study Area 6 corresponded with changes to surface water levels at station EV_ER4 along the Elk River. Shallow groundwater at LC_MW_ER4B and surface water from EV_ER4 have similar selenium-sulphate ratios and appear to be influenced by mining activities.

EVO SSGMP and Relevant RGMP Study Area Summary

Forty-six monitoring wells in 26 locations (11 clustered), one domestic well and six groundwater supply wells were monitored and sampled for the 2022 EVO SSGMP and RGMP. The EVO summary is split up based on inferred groundwater flow to potential receptors as defined in the groundwater conceptual model: Grave/Harmer Creek and Elk River downstream of Grave Creek (Study Area 7), Elk River proximal to EVO (Study Area 8), Sparwood Area (Study Areas 9a and 12), Michel Creek downstream of Gate Creek and Bodie Creek (Study Area 9b), and Erickson Creek and Michel Creek downgradient of Erickson Creek (Study Area 10).

Grave/Harmer Creek Watershed and Elk River Downstream of Grave Creek Confluence (Study Area 7)

OC concentrations at all wells within this area were less than the primary screening criteria in 2022, except for dissolved selenium at both RG_DW_02-20 and RG_MW_WW in each quarter of 2022.

Clustered well pair EV_MW_GV4A/B was installed along Grave Creek before the confluence with Harmer Creek. Recent increasing OC concentrations have suggested there may be some influence from Harmer Reservoir/Harmer Creek. Dissolved selenium concentrations at EV_GC3gw (located near the confluence of Grave and Harmer Creeks) have exhibited an increasing trend. Concentrations have been below primary screening criteria. Continued monitoring and sampling is expected to provide further insight into groundwater-surface water interactions at Harmer and Grave creeks.

Additional monitoring wells were recently installed near the Dry Creek Sedimentation Pond (EV_MW_DC1 through EV_MW_DC7 and EV_PW_DC1) and near the Harmer Reservoir (EV_MW_HC1 through EV_MW_HC5). Dry Creek is expected to represent the main source of mine-influenced groundwater and surface water to the Grave Creek/Harmer Creek areas. Starting in 2023, monitoring wells EV_MW_DC1, EV_MW_DC2 and EV_MW_DC7 will be sampled to establish seasonal or other trends. After collecting and reviewing data for a full year from the Harmer Reservoir wells, the wells will be evaluated for potential inclusion in the EVO SSGMP network.

A bedrock well RG_MW_GCA was installed in Q3 2021 along Grave Creek prior to the confluence with the Elk River. Elevated turbidity was measured at the newly installed well RG_MW_GCA during sampling in all quarters of 2022 and the analytical results may not be representative of groundwater in bedrock in this area.

Study Area 7 is in the Elk River valley bottom where Harmer Creek flows into the Elk River. Loading of mine-influenced constituents to groundwater has been inferred to be primarily sourced from infiltration of Elk River surface water. Infiltration of surface water from the Elk River is considered a key influence on groundwater quality in this area.

Elk River Proximal to EVO (Study Area 8)

Groundwater from monitoring wells EV_BALgw, EV_LSgw, EV_GCgw and EV_OCgw, in tributary creek watersheds (Balmer, Lindsay, Goddard and Otto creeks) within the Elk River watershed contained OC concentrations below the screening criteria in 2022. Goddard Creek Sedimentation Pond had the highest surface water selenium concentrations in this area. The source of mine-influenced water has been interpreted to seepage through a known fault into a conveyor tunnel, which then channels flow into Goddard Creek and then to the valley bottom. Teck will be diverting flow from the conveyor tunnel for use as process water starting in the spring of 2023.

Monitoring well EV_MW_GC1B had sulphate concentrations similar to those measured at Goddard Creek. The Se:SO_4 (S) ratio for EV_MW_GC1B indicated groundwater has undergone selenium reduction. The proximity of the well to Goddard Creek Sedimentation Pond suggests it may have been locally influenced by mixing of seepage water from nearby upgradient CCR located to the east and northeast.

Groundwater at EV_OCgw, near Otto Creek and Lagoon D, contained concentrations of OC less than primary screening criteria and the selenium to sulphate ratio (Se:SO_4 (S)) indicated groundwater is not mine influenced. The monitoring well is located at the base of the unconfined aquifer and completed above bedrock. The major ion distribution of groundwater at EV_OCgw and surface water at Otto Creek and Lagoon D were all distinct from each other, indicating groundwater-surface water interaction between the creek and deep groundwater has been limited, and that groundwater seepage from Lagoon D has not affected groundwater quality.

Groundwater quality at RG_DW-03-10 (Sparwood Well 4), located west of the Elk River near Cummings Creek was less than primary screening criteria for all OC in 2022. The well is located on the opposite (west) side of the Elk River from EVO, which is expected to act as a groundwater divide. A groundwater transport pathway between potential sources at EVO to the supply well is unlikely, although the Elk River may recharge the underlying aquifer, which can represent a source of OC to groundwater. However, this influence may be reduced by aquifer recharge from Cummings Creek. Dissolved selenium concentrations have been stable at RG_DW-03-10 and remain an order of magnitude below the primary screening criteria.

Sparwood Area (Study Areas 9a and 12)

Of the wells installed at the base of Baldy Ridge, only EV_MW_AQ1 contained OC concentrations greater than primary screening criteria in Q1 2022, although the concentration remained below the primary screening criteria for the remainder of the year. This was the first occurrence of a selenium exceedance at this well since sampling was initiated in 2019. However, Mann-Kendall analysis indicated there has been no selenium concentration trend for this well (additional data may be needed to establish a trend). Flow from Baldy Ridge has been inferred to be the dominant process as opposed to down-valley flow along Michel Creek. This is further supported by muted to limited seasonal influence measured in these wells compared to wells installed along the Michel Creek aquifer. Although OC concentrations have typically been less than the primary screening criteria, concentrations of dissolved selenium at EV_MW_AQ1 were similar to concentrations in surface water near Aqueduct Creek, which flows from Baldy Ridge. Therefore, the main OC transport pathway from sources on Baldy Ridge to groundwater in the Sparwood Area valley-bottom aquifer has been inferred to be through surface water infiltration associated with Aqueduct Creek.

Upward gradients have been calculated in the triple nested well EV_MW_SPR1A/B/C and groundwater may be recharging surface water in this area. The Se:SO_4 (S) plot indicated mine-influenced groundwater at shallow well EV_MW_SPR1C and EV_MW_AQ1, which both plot in similar areas that also correspond with surface water at EV_SPR2 (i.e., Spring Creek).

Study Area 12 is in the Elk River valley bottom downgradient from the confluence of Michel Creek and Elk River and is also downgradient of Sparwood Ridge. Concentrations of dissolved selenium exceeded the primary screening criteria at RG_MW-03-04 (Q4), and EV_ER1gwS (Q4). The Se:SO_4 (S) ratio plot indicated groundwater quality in Study Area 12 has been mine-influenced. Groundwater Se:SO_4 (S) ratios at EV_MW_MC3, RG_MW-03-04 and RG_DW-03-04 plot more closely to that of Michel Creek surface water (i.e., EV_MC2) than the Elk River, indicating Michel Creek is influencing this water. Elk River surface water tends to have lower sulphate concentrations. Groundwater at EV_ER1gwS/D plot more closely with Elk River water (i.e., EV_ER1), which indicated the Elk River is a stronger influence.

Seasonal fluctuations of OC concentrations at RG_DW-03-04, RG_MW-03-04 and EV_ER1gwS were similar to those observed in surface water from the Elk River and Michel Creek. OC concentrations in deep well EV_ER1gwD also exhibited seasonal fluctuations prior to July 2019. However, fluctuations have since become more muted and concentrations have generally decreased. This may be due to cessation of sustained pumping at municipal groundwater supply well RG_DW 03 04.

Concentrations of OC at RG_MW-03-04 were relatively consistent with concentrations measured at RG_DW-03-04. In 2021 and 2022, dissolved selenium and nitrate-N concentrations at RG_MW-03-04 were generally lower than in previous years. There has not been enough historical data from RG_DW-03-04 to determine whether a similar trend exists at this location. The confining layer identified as clay at RG_DW-03-04 and silt and clay at RG_MW-03-04 has not been inferred to be fully continuous and the confined/semi-confined aquifer unit may interact with the shallow unconfined aquifer, as well as infiltrating surface water. The Se:SO_4 (S) plot shows groundwater at RG_MW-03-04 and RG_DW_03-04 plot more closely to that of Michel Creek surface water, which indicates Michel Creek is influencing this water. Conversely, groundwater at EV_ER1gwS/D plot more closely with Elk River water, which indicated the Elk River is a stronger influence at that location. Continued monitoring will increase understanding of post-pumping conditions in the aquifer.

Concentrations of dissolved selenium exceeded the primary screening criteria at EV_MW_MC3 (Q1 to Q3), located downgradient of Sparwood Ridge and upgradient of Study Area 12.

The major ion distribution at EV_MW_MC3 well has occasionally shifted from a calcium-bicarbonate-sulphate type water to a sodium bicarbonate type water with a lower dissolved oxygen concentration. When groundwater at EV_MW_MC3 is of sodium-bicarbonate type, dissolved selenium concentrations have remained below primary screening criteria. However, when the groundwater shifts to calcium-bicarbonate-sulphate water, dissolved selenium concentrations exceed the primary screening criteria. Groundwater Se:SO_4 (S) ratios in Q4 for EV_MW_MC3 falls on the mixing line and therefore, it is inferred to be mixing with a mine-influenced water source. The shift in water type and corresponding increases in dissolved selenium concentrations indicate there are two varying sources of groundwater that intercept this well, one of which (calcium-bicarbonate-sulphate type water with a higher dissolved oxygen concentration) having a stronger mine-influenced signature.

Seep EV_SPR1B is located near EV_MW_MC3 and had concentrations of dissolved selenium greater than primary screening criteria during Q2 sampling events since 2019. The major ion distribution at EV_SPR1B has not been consistent with the distribution at EV_MW_MC3, which suggests the source is related to groundwater that has flowed through the historical mine workings on Sparwood Ridge, located to the south of Michel Creek.

Michel Creek Downstream of Gate Creek and Bodie Creek (Study Area 9b)

In 2022, most of the groundwater samples from Gate Creek and Bodie Creek (EV_RCSgw, EV_MW_GT1B, EV_MW_BC2/3, EV_MW_BC1A/B, EV_BCgw) had concentrations of dissolved selenium greater than primary screening criteria in all quarterly samples. Sulphate concentrations exceeded the primary screening criteria at EV_RCSgw, EV_MW_GT1B, and EV_MW_BC1A/B in all quarters, as well as EV_MW_BC3 in three quarters. Concentrations of nitrate-N were greater than primary screening criteria at EV_MW_BC1A and EV_RCSgw in all quarters, along with EV_MW_BC1B in Q1/Q2 and EV_MW_GT1B (Q2 only). Of the wells in Gate Creek and Bodie Creek, only EV_MW_GT1A did not have any OC concentrations exceeding primary screening criteria in all quarters. Concentrations of OCs and trends were generally consistent with historical data.

The highest concentrations of sulphate, nitrate-N and dissolved selenium in 2022 were measured at EV_RCSgw, which appears to originate from a groundwater pathway of mine-influenced water and not resulting from surface water infiltration from Bodie or Gate creeks. However, the source remains uncertain. The source of elevated OC at EV_MW_GT1B, EV_MW_BC1A/B, and EV_MW_BC2/3 has been inferred to be surface water recharge to the valley-bottom aquifer. Concentrations of OC and the major ion distributions of groundwater were consistent with surface water in Bodie and Gate creeks, indicative that a hydraulic connection exists between the creeks and shallow groundwater. The relatively low sulphate and nitrate-N and consistent sulphate suggest deep groundwater at EV_MW_GT1A has not been mine-influenced.

Within the Michel Creek valley bottom further downgradient of Bodie and Gate Creeks and upgradient of the Sparwood Area (i.e., Study Area 9A), dissolved selenium concentrations were above primary screening criteria at shallow nested well EV_MW_MC2B and supply wells EV_HW1 and EV_BRgw in 2022. Concentrations of OC at these locations were higher compared to concentrations in Michel Creek (EV_MC2), indicating there is a groundwater pathway of OC in this area, inferred to extend from the Bodie and Gate Creek areas. OC concentrations were greater in shallow wells relative to those screened deeper in the aquifer. The loading of mine-influenced constituents to groundwater in the valley bottom of Michel Creek near EVO were inferred to primarily be sourced from infiltration of surface water and upland groundwater flow from Bodie and Gate creeks, followed by down-valley groundwater flow and infiltration along Michel Creek.

Erickson Creek and Michel Creek Downgradient of Erickson Creek (Study Area 10)

Groundwater from monitoring wells EV_WF_SW and EV_ECgw, in the Erickson Creek watershed, contained OC concentrations below screening criteria in 2022. There does not appear to be a strong hydraulic connection between groundwater at EV_ECgw and surface water in Erickson Creek and the main transport pathway of mine influence to the Michel Creek valley bottom has been inferred to occur through surface water. Decreases of dissolved selenium and nitrate-N concentrations in Erickson Creek surface water (EV_EC1) correspond with operating intervals of the Elkview Operations Saturated Rock Fill Phase 2 (EVO SRF P2) water treatment facility.

Concentrations of OC in groundwater samples from Michel Creek downstream of Erickson Creek remained less than primary screening criteria in 2022. Se:SO_4 (S) ratios at intermediate well EV_MW_SP1B indicated some mine influence in Q4 only; ratios at EV_MW_SP1A/C were more reflective of natural non-contact water. Because of limited data, influences on water quality at this location will continue to be evaluated as more data are collected.

CMm SSGMP and Relevant RGMP Study Area Summary

Nineteen monitoring wells (six nested locations and one clustered location) were monitored and sampled for the 2022 CMm SSGMP and RGMP. CMm can be divided into two primary watersheds: Corbin Creek valley; and Michel Creek valley including Study Area 11 of the RGMP.

Corbin Creek Watershed

Among the eight monitoring wells in the Corbin Creek Watershed, OC concentrations above primary screening criteria were limited to dissolved selenium (Q1) and sulphate (Q4) at CM_MW5-SH in 2022. The dissolved selenium and sulphate concentrations at CM_MW5-SH were inferred to be from surface water infiltration from Corbin Creek. Corbin Creek is sampled upstream of CM_MW5-SH at CM_CCOFF.

Michel Creek Watershed and Study Area 11

Among the eleven monitoring wells in the Michel Creek valley, OC concentrations above primary screening criteria were limited to sulphate at monitoring well CM_MW7-DP in all quarters. CM_MW7-DP is at mid-elevation within CMm in bedrock (sandstone interpreted to be Kootenay Group) directly below the spoil footprint 800 m upgradient of the Michel Creek valley bottom.

Study Area 11 is the focal point of groundwater flow at CMm along the Michel Creek valley bottom directly downgradient of the confluence of Michel and Corbin Creeks. OC concentrations were less than primary screening criteria for the five monitoring wells in Study Area 11 in 2022. Monitoring well CM_MW1-OB almost always had the highest OC concentrations of Study Area 11 monitoring wells (still below primary screening criteria) suggesting surface water infiltration from Corbin and Michel creeks into shallow groundwater. Concentrations of OC in Michel Creek surface water from MC_MC2 are almost always above all monitoring wells, which also suggests that the potential source of OC is from surface water.

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Acronyms

Acronym	Definition
Ammonia-N	Ammonia-Nitrogen
AMP	Adaptive Management Plan
AW	Aquatic Life Water Use
AWTF	Active Water Treatment Facility
AWTF-S	Active Water Treatment Facility-South Program
BC	British Columbia
BGA	Background Assessment
BCWQG	*British Columbia Approved Water Quality Guidelines*, includes Working Water Quality Guidelines for BC (BCWQG). British Columbia Ministry of Environment & Climate Change Strategy (ENV), updated 2021
BCSDWQG	British Columbia Source Drinking Water Quality Guidelines
BOD	Biological Oxygen Demand
CCR	Coarse Coal Rejects
CI	Constituents of interest
CMm	Coal Mountain mine
CMO	Coal Mountain Operations, now known as Coal Mountain mine (CMm)
COA	Certificates of Analysis
CL	Compliance Limit
CP	Compliance Point
COV	Coefficient of Variance
CSM	Conceptual Site Model
CSR	*Contaminated Sites Regulation* (CSR), B.C. Reg. 375/96, includes amendments up to B.C. Reg. 179/202, July 7, 2021
DL	Detection Limit
DO	Dissolved Oxygen
DW	Drinking Water Use
DW AF	Drinking Water Allocation Factor
EMA	*Environmental Management Act (EMA), B.C. Reg. 179/2021 / effective July 7, 2021.*
EMC	Environmental Monitoring Committee
EMLI	Ministry of Energy, Mines and Low Carbon Innovation (formerly known as The Ministry of Energy, Mines and Petroleum Resources [EMPR])
EMS	Environmental Monitoring Station
ENV	Ministry of Environment & Climate Change Strategy
ERX	East Refuse Expansion
EVO	Elkview Operations
EVWQP	Elk Valley Water Quality Plan
EWT	Early warning triggers
FLA	Flow and Load Accretion
Fm	Formation

Acronym	Definition
FRO	Fording River Operations
FRO-S AWTF	FRO-South Active Water Treatment Facility
FRX	Fording River Expansion
GHO	Greenhills Operations
GWG	Groundwater Working Group
GWMP	Groundwater Monitoring Program, Line Creek Mine Phase II
HBV	Health-based Value
ISGM	Integrated Surface Water-Groundwater Model
IHA	Interior Health Authority
IW	Irrigation Water Use
KCWD	Kilmarnock Clean Water Diversion
KNC	Ktunaxa Nation Council
KU	Key Uncertainty (part of the AMP)
LCO	Line Creek Operations
LW	Livestock Water Use
LAEMP	Local Aquatic Effects Monitoring Program
MF	Morrissey Formation
MK	Mann-Kendall
MQ	Management Questions under the Adaptive Management Plan
MU	Management Unit
MBI	Mass Balance Investigation
masl	Meters above sea level
mBGS or mbgs	Meters below ground surface
MoE	Ministry of Environment, now known as Ministry of Environment & Climate Change Strategy (ENV)
MF	Morrissey Formation
non-OC	non-Order Constituents
n	Number of Samples
Nitrate-N	Nitrate-Nitrogen
Nitrite-N	Nitrite-Nitrogen
NTP	North Tailings Pond
NS	No Sample
OC	Order Constituents
ORP	Oxidation Reduction Potential
PAG	Potentially Acid Generating
Q1, Q2, Q3, Q4	First, Second, Third, Fourth Quarter of the Year
QA/QC	Quality Assurance / Quality Control
RDWMP	Regional Drinking Water Monitoring Program
RGMP	Regional Groundwater Monitoring Program
RDL	Reported Detection Limit

Acronym	Definition
RDW	Regional Drinking Water Program
RPD	Relative Percent Difference
RSL	Regional Screening Level
RSMP	Regional Seep Monitoring Program
RWQM	Regional Water Quality Model
$Se:SO_4$ (S)	Selenium to sulphate (as sulphur)
S	Mann-Kendal Statistic
SKP2	South Kilmarnock Phase 2 Secondary Settling Pond
SP&P	Standard Practice and Procedures
SPO	Site Performance Objective
SRF	Saturated Rock Fill Water Treatment Facility
SRF P2	Saturated Rock Fill Phase 2
SRK	SRK Consulting Inc.
SRT	Seismic Refraction Tomography
SSGMP	Site-Specific Groundwater Monitoring Program
STP	South Tailings Pond
TBS	Turnbull Bridge Spoil
TDI	Tolerable Daily Intakes
TDS	Total Dissolved Solids
TG	Technical Guidance
TKN	Total Kjeldahl Nitrogen
TOR	Terms of Reference
TSF	Tailings Storage Facility
TSP TSF	Turnbull South Pit Tailings Storage Facility
TSS	Total Suspended Solids
UGHC	Upper Greenhills Creek
USEPA	United States Environmental Protection Agency
UTM	Universal Transverse Mercator
UU	Underlying Uncertainty
VWP	Vibrating Wire Piezometers
WLC	West Line Creek
WSC	Water Survey of Canada

1 Introduction

This report addresses the annual reporting requirements for the Site-Specific Groundwater Monitoring Programs (SSGMP) at Teck Coal Limited's (Teck) five coal mines as well as the Regional Groundwater Monitoring Program (RGMP) in southeastern British Columbia's Elk Valley, as outlined in *Environmental Management Act (EMA)* Permit 107517[1] issued by the British Columbia (BC) Ministry of Environment & Climate Change Strategy (ENV) and included in Appendix I. The five coal mines, from the north to the south, include Fording River Operations (FRO), Greenhills Operations (GHO), Line Creek Operations (LCO), Elkview Operations (EVO), and Coal Mountain mine ([CMm], previously identified as Coal Mountain Operations [CMO] and now in care and maintenance). Mine locations are provided in Drawing 1. The Elk River and associated tributary system flows north to south through the Elk Valley. The Fording River and Michel Creek represent the largest of the tributary catchments within the broader Elk River watershed. The Elk Valley includes the communities of Elkford, Sparwood, Hosmer, Fernie, and Elko, and is in the Ktunaxa First Nation traditional territory. The Ktunaxa First Nation is represented by the Ktunaxa Nation Council (KNC).

SNC-Lavalin Inc. (SNC-Lavalin) and Teck developed a RGMP to monitor groundwater in the valley bottoms for defined areas within Management Units (MU[s]) 1, 2, 3, 4 and relevant portions of 5 as described in the Permit 107517 and shown on Drawing 1. The bedrock, surficial geology and karst potential for the region are presented on Drawings 2 to 8. Surface water quality is collected at Order Stations that are specified in Permit 107517, which are shown on Drawing 9. The relevant Environmental Monitoring Station (EMS) identification numbers are presented on Drawings 10 to 14.

A SSGMP is required for each of Teck's five coal mines in the Elk Valley. The annual reports for the RGMP and SSGMPs for FRO, GHO, LCO, EVO, and CMm are presented herein.

1.1 Background and Regulatory Requirements

A RGMP for the Elk Valley and SSGMPs for each of Teck's five coal mines are required as conditions of Permit 107517, amended December 19, 2022 (Appendix I).

1.1.1 Regional Groundwater Monitoring Program

As per Ministry of Environment & Climate Change Strategy (ENV) Approval letter dated April 18, 2017, the RGMP was updated ("2017 RGMP Update") and submitted in September 2017 (SNC-Lavalin, 2017a). In the 2017 RGMP Update, the focus was to assess groundwater quality with respect to mine-related "constituents of interest" (CI). From the 2017 RGMP Update, CIs were defined as constituents identified in the *Environmental Management Act* (EMA) Permit 107517, and include dissolved selenium, dissolved cadmium, sulphate, and nitrate-N. Since 2017, various hydrogeological studies have been conducted and submitted to the Ministry and through the evolution of understanding the constituents, the term CI has been replaced with Order Constituents (OC) to better reflect the parameters evaluated within groundwater quality assessments (dissolved selenium, dissolved cadmium, sulphate, and nitrate-N). The 2017 RGMP Update was approved by ENV on February 19, 2020, and the approval was amended on July 9, 2020 (Appendix II).

[1] Permit 107517, amended December 19, 2022.

As per Permit 107517, the RGMP must be updated and submitted every three years, to be provided on September 30 for approval (Appendix I). On December 4, 2020 (with a Ministry approved deadline extension), the RGMP was updated and provided to ENV (SNC-Lavalin, 2020a). The 2020 RGMP Update redefined the CI to include existing OC parameters (dissolved selenium, dissolved cadmium, sulphate, and nitrate-N) and additional non-Order Constituents (non-OC; total dissolved solids [TDS], nitrite, dissolved antimony, cobalt, nickel, and uranium), which were defined in the Background Assessment (BGA). Molybdenum, while also naturally occurring in the Elk Valley, has been added to the non-Order mine-related constituents, as it was identified that it may potentially be a concern for groundwater quality. Molybdenum has been identified within the antiscalant products used for calcite treatment in specific locations (Azimuth, 2021) and therefore, the presence of molybdenum could indicate impacts to groundwater quality. It should be noted that the 2020 RGMP Update was recently approved by ENV on March 20, 2023, also included in Appendix II.

1.1.2 Site-Specific Groundwater Monitoring Programs

In October 2018, the SSGMPs for FRO, GHO, LCO, EVO, and CMm were also updated (SNC-Lavalin, 2018a, b, c; Golder Associates Ltd. [Golder], 2018; and SRK Consulting Inc. [SRK], 2018). ENV provided comments regarding the 2018 SSGMP Updates and revisions were made accordingly. The 2018 SSGMP Updates for FRO, GHO, LCO and EVO (SNC-Lavalin, 2019a, b, c; Golder, 2019a) were re-submitted to ENV in September 2019 and ENV provided approval on March 11, 2020 (Appendix II).

As per Permit 107517, the SSGMPs must be updated and submitted every three years, to be provided on October 31 for approval (Appendix I). As such, SSGMPs were subsequently updated 2021 (SSGMPs Update) and submitted to ENV in October 2021 (SNC-Lavalin, 2021a). The 2021 SSGMPs Update are with ENV for approval.

Table A, below, summarizes the submissions and activities that have taken place since submission of the 2017 RGMP Update.

Table A: Notable Submissions and Engagement Activities (since Submission of the 2017 RGMP)

Timeline	Activity
September 29, 2017	Submission of the 2017 RGMP Update report to ENV.
March 31, 2018	Submission of 2017 SSGMP Annual Reports to ENV for FRO, GHO, LCO, EVO, and CMO[1].
May 8 and 9, 2018	Groundwater Working Group (GWG) meeting to discuss groundwater in the Adaptive Management Plan (AMP), as well as GWG and Environmental Monitoring Committee (EMC) feedback on the 2017 RGMP.
May 16, 2018	Submission of the 2017 RGMP Annual Report to ENV.
October 31, 2018	2018 SSGMP Update Reports for FRO, GHO, LCO, EVO, and CMO[1] submitted to ENV.
December 21, 2018	Water Quality AMP for all Teck Coal Operations in the Elk Valley submitted to ENV.
March 31, 2019	2018 SSGMP Annual Reports for FRO, GHO, LCO, EVO and CMO[1] submitted to ENV.
April 2 to 9, 2019	Review and recommendations from ENV for the SSGMP Updates and 2017 SSGMPs for each operation.

Table A (Cont'd): Notable Submissions and Engagement Activities (since Submission of the 2017 RGMP)

Timeline	Activity
April 4, 2019	Amended Permit 107517 issued by ENV.
April 10 and 11, 2019	GWG meeting to discuss the groundwater Conceptual Site Model (CSM), RGMP progress update, and RGMP links to the AMP.
May 16, 2019	2018 RGMP Annual Report submitted to ENV.
July 25, 2019	GWG meeting to discuss data gaps in the RGMP and proposed schedule to fill those gaps. Discussion also included the progress on groundwater trigger development.
September 30, 2019	2018 SSGMP Update Reports for FRO, GHO, LCO and EVO re-submitted to ENV.
October 8, 2019	Submission of Draft Proposed September 2020 and post-September 2020 Well Drilling and Investigations Activities.
November 26 and 27, 2019	GWG meeting to discuss progress on groundwater trigger development, current program data gaps, and a proposed 2020 program work plan.
January 29, 2020	GWG meeting to discuss the Terms of Reference (TOR) and Prioritization Framework for the 2020 RGMP Update.
February 19, 2020	ENV conditional approval of the 2017 RGMP Update.
February 20, 2020	First Quarter (Q1) GWG meeting to discuss proposed RGMP drilling and Prioritization Framework.
March 11, 2020	Approval of the FRO, GHO, EVO, LCO, and CMO[1] 2018 SSGMP Updates.
March 31, 2020	Submission of the 2019 Combined Annual Report for the Elk Valley Regional and Site-Specific Groundwater Monitoring Programs.
July 7 and 8, 2020	Second Quarter (Q2) 2020 GWG Meeting to provide an update on field activities and groundwater trigger development. Also discussed prioritization framework and feedback on the 2019 Combined Annual Report.
July 9, 2020	An update of the 2017 RGMP Approval Letter issued by ENV on February 29, 2020, to amend Condition 2.6.
September 22, 2020	Third Quarter (Q3) 2020 GWG Meeting to provide updates for field program and cobalt and lithium in drinking water. Also provide an approach for understanding karst and bedrock flows, and to further discuss annual report comments.
September 25, 2020	Amended Permit 107517 issued by ENV.
October 22, 2020	Amended Permit 107517 issued by ENV.
November 12 and 13, 2020	Fourth Quarter (Q4) 2020 GWG Meeting to provide an update on lithium and cobalt in drinking water. Discuss preliminary findings for the 2020 RGMP Update, including an update on karst potential and the prioritization framework.
December 4, 2020	Submission of the 2020 RGMP Update (SNC-Lavalin, 2020a).
February 25, 2021	Q1 2021 GWG Meeting to provide an update on the RGMP Update recommendations and proposed program changes.
March 11, 2021	Amended Permit 107517 issued by ENV.
March 31, 2021	Submission of the 2020 Combined Annual Report for the Elk Valley Regional and Site-specific Groundwater Monitoring Programs.
May 31, 2021	Submission of the Sparwood Area Groundwater Study.
June 24, 2021	Q2 2021 GWG meeting to provide an update on SSGMP Update terms of reference and the RGMP and SSGMP drilling field program.

Table A (Cont'd): Notable Submissions and Engagement Activities (since Submission of the 2017 RGMP)

Timeline	Activity
July 22, 2021	Amended Permit 107517 issued by ENV.
July 31, 2021	2020 Adaptive Management Plan Annual Report for Teck Coal Operations in the Elk Valley submitted to ENV.
September 22, 2021	Q3 2021 GWG Meeting to provide an update on the SSGMP Update and the RGMP and SSGMP drilling program.
October 31, 2021	2021 SSGMP Update Reports for FRO, GHO, LCO, EVO, and CMm submitted to ENV.
November 24, 2021	Q4 2021 GWG Meeting to provide an update on the recommendations outlined in the SSGMP Update and the RGMP and SSGMP drilling program.
December 1, 2021	Amended Permit 107517 issued by ENV.
December 15, 2021	Water Quality Adaptive Management Plan for Teck Coal Operations in the Elk Valley – 2021 Update submitted to ENV.
February 16/17, 2021	Q1 2022 GWG Meeting to provide an update on RGMP Update recommendations, studies and deliverable updates, 2020 RWQM Update, and program update summaries.
March 31, 2022	Submission of the 2021 Combined Annual Report for the Elk Valley Regional and Site-specific Groundwater Monitoring Programs.
June 23/24, 2022	Q2 2022 GWG Meeting to provide an update on RGMP Update recommendations, studies, designs, MBI Update (Hypothesis 1 and 2), and program update summaries.
July 31, 2022	Water Quality Adaptive Management Plan for Teck Coal Operations in the Elk Valley – 2021 Annual Report.
September 28/29, 2022	Q3 2022 GWG Meeting to provide an update on the RGMP Update recommendations, studies and deliverable updates, and program update summaries.
December 13, 2022	Q4 2022 GWG Meeting to provide an update on the RGMP Update recommendations, studies and deliverable updates, and program update summaries.

Note:
[1] Currently referred to as Coal Mountain mine (CMm).

1.1.3 Line Creek Mine Phase II Ground Water Monitoring Program

The reporting requirements under Section 8.2.2.1 of the Amended Permit 107517 related to the groundwater monitoring program (GWMP) for Line Creek Mine Phase II are summarized in Section 1.9 Table E, and detailed in Appendix VII. The Phase II Mine Area Groundwater Monitoring Program Study Design for 2023 is appended in Appendix XV.

1.2 RGMP Purpose and Objectives

The RGMP currently monitors twelve areas, referred to as "Study Areas", to understand potential regional groundwater pathways of mine-related OCs (previously referred to as constituents of interest [CI]). These areas were defined based on identified receptors and source and transport pathway information from SSGMPs for the five operating mines in the Elk Valley (SNC-Lavalin, 2017).

Using the framework of the Elk Valley Water Quality Plan (EVWQP; Teck, 2014), Teck has developed three purpose statements and supporting objectives for the RGMP. These were developed in consultation with the GWG and presented in the 2017 RGMP Update (SNC-Lavalin, 2017).

The purpose statements and objectives that relate to each of the purpose statements are listed in Table B.

Table B: Purpose Statements and Objectives to Support Purpose Statements

Purpose Statements	Objective
Purpose 1: Using the framework of the EVWQP, the RGMP will be updated to monitor and evaluate potential quality effects to groundwater resources from mining activities to protect current groundwater users (initial focus) in the Elk Valley. Monitoring and evaluations will continue to inform management decisions that work towards protection of future groundwater users in the Elk Valley.	To identify the current receptors (i.e., drinking water, aquatic life, livestock watering and irrigation watering) and evaluate the potential for a complete transport pathway between source and receptors.
	To collect groundwater quality information from a monitoring network with appropriate locations to assess the presence of complete transport pathways (i.e., between source and receptors) for OC (which were previously referenced as CI).
	Evaluate groundwater quality information against established screening criteria to assess potential effects to identified users and evaluate temporal/spatial trends.
Purpose 2: Using the framework of the EVWQP, the RGMP will be updated to monitor and evaluate groundwater as a potential pathway for transport of mine-related constituents of interest, now referred to as OC, to surface water to support management decisions under the AMP.	To collect necessary groundwater information to support the refinement of surface water quality predictions.
	To evaluate the need to manage groundwater to meet surface water quality compliance.
Purpose 3: Using the framework of the EVWQP, the RGMP will be updated to evaluate and refine the CSM for source, transport and fate of mine-related CI, now referred to as OC, in groundwater in the Elk Valley.	To review and synthesize regional and site-specific groundwater monitoring data on a three-year timeframe to update and refine the Regional CSM.

1.3 Linkages between the SSGMPs and RGMP

The SSGMPs focus on identifying and monitoring possible sources of mine-related constituents in groundwater and transport pathways to groundwater in the valley bottom of the main stem rivers (i.e., Elk and Fording Rivers, Michel Creek). Most of the site-specific groundwater monitoring is within or proximal to mine operation permitted boundaries. The RGMP focuses on groundwater fate and transport in the valley bottom of the main stems, and how they relate to applicable receptors. Regional groundwater monitoring is completed both within and outside mine operation permitted boundaries. The RGMP also includes data from select locations in the Regional Drinking Water Monitoring Program (RDWMP).

1.4 Linkage to Adaptive Management Plan

As required in Permit 107517, Teck developed an Adaptive Management Plan (AMP) to support the implementation of the EVWQP to achieve water quality targets, ensure that human health and the environment are protected, and where necessary, restored, and to facilitate continuous improvement of water quality in the Elk Valley. The AMP was most recently updated in December 2021 (Teck, 2021b). Adaptive management is a systematic, rigorous approach to environmental management that maximizes learning about uncertainties while simultaneously striving to meet multiple management objectives and adapt management actions based on what is learned. The adaptive management framework comprises six stages: assess, design, implement, monitor, evaluate, and adjust. The AMP identifies six Management Questions (MQs) that are evaluated at regular intervals. Evaluating these MQs collectively articulates whether Teck is on track to meet the environmental objectives of the EVWQP.

Identifying and reducing environmental management uncertainty is a foundational aspect of adaptive management. Therefore, the AMP identifies key uncertainties (KUs) that, as reduced, fill gaps in current understanding to support the achievement of the EVWQP objectives.

The results presented in this report provide information relevant to five of the six MQs and many of the KUs identified in the AMP. Groundwater monitoring data, along with data collected from other programs, are needed for evaluating the answers to:

- *MQ 1 Will water quality limits and Site Performance Objectives (SPOs) be met for selenium, nitrate, sulphate and cadmium?*
- MQ 2 *Will the aquatic ecosystem be protected by meeting the long-term SPOs?*
- MQ 3 *Are the combinations of methods for controlling selenium, nitrate, sulphate and cadmium included in the implementation plan the most effective for meeting limits and SPOs?*
- MQ 5 *Does monitoring indicate that mine-related changes in aquatic ecosystem conditions are consistent with expectations?*
- MQ 6 *Is water quality being managed to be protective of human health?*

Results from this report will also be used to determine whether a groundwater trigger has been reached. Reaching a trigger may lead to an adjustment (Stage 6: Adjust) following the response framework. This is the main report for conveying groundwater trigger results under the AMP: annual groundwater monitoring results at drinking water wells (Section 2.1.4) and early warning triggers (Section 6.2.3.1).

Groundwater monitoring data assist in reducing the following KUs and underlying uncertainties (UUs):

- KU 1.2 *How will uncertainty in the Regional Water Quality Model (RWQM) be evaluated to assess future achievement of limits and SPOs?*
- KU 1.3 *Is groundwater sufficiently understood to support adequate representation in the RWQM?* (New KU in 2022)
  - *UU 1.3.1 What is the groundwater flow and load bypass at key regional monitoring locations (Order Stations/Compliance Points/Water Survey of Canada locations)?* (New UU in 2022)
  - UU 1.3.2 *Are surface water-groundwater interactions sufficiently characterized to incorporate flow and load exchange and transport through these pathways in the RWQM?* (New UU in 2022)
  - UU 1.3.3 *What is the potential for inter-basin flow and load groundwater transport to affect the flow and load balance in the RWQM?* (New UU in 2022)
  - UU 1.3.4 *What mechanisms are causing the reduction in mass observed between tributaries and at monitoring stations in the mainstems?* (Renumbered from previous UU 1.2.4)
  - UU 1.3.5 *What are the groundwater flow and load bypass at water management intake locations and is it necessary for groundwater to be managed at water management intake locations to achieve limits and SPOs?* (Consolidated from the previous KU 3.2 and UU 3.2.1)
- KU 6.1 *Is our understanding of local groundwater conditions for current and future drinking water use sufficient to minimize human exposure to constituents?*

- KU 6.2 *Is the spatial extent of mine-influenced groundwater sufficiently characterized to manage water quality in order to support meeting the environmental objectives of the EVWQP?*
- KU 6.3 *What are appropriate groundwater-related triggers and how can they be used?*

Progress on reducing these KUs and UUs, and associated learnings, are described in annual AMP reports. The RGMP Annual Report provides updates on MQ 1 and MQ 6. Groundwater monitoring results relevant to MQ 1 and 6, and KUs are discussed in Section 6.

Please refer to the 2021 AMP Update (Teck, 2021b) for more information on the adaptive management framework, including MQs, KUs, and continuous improvement; linkages between the AMP and other EVWQP programs; and AMP reporting. Progress on gaining new knowledge and reducing KUs is described in annual AMP reports (submitted July 31) and evaluating the answer to MQs are reported in MQ evaluation reports (various submission dates).

1.5 Linkage to Regional Seep Monitoring Program

As an outcome of a 2017 site inspection, Teck has implemented a Regional Seep Monitoring Program (RSMP). The initial phase of the RSMP (Phase 1) was initiated in 2018, and involved identification of seep locations, development of sampling procedures, and initial collection of samples. A second phase (Phase 2) was conducted in Q1 2019 and involved technical evaluation of seep water quality and quantity using the data collected in Phase 1. Based on the findings of Phase 2, a long-term RSMP was developed and implemented starting in Q2 2019 (Teck, 2018a, 2019; SRK, 2019a).

The objective of the monitoring program is to improve understanding of current and potential future source loading of mine-influenced water to the receiving environment through geochemical interpretation and evaluation of trends in seeps within or near mining operations in the Elk Valley. This understanding of loading can further support water management planning. Emphasis is placed on monitoring seeps downstream of spoils, coarse coal rejects (CCR), tailings, and open pits, particularly monitoring downstream of where the Morrissey Formation (generally located below the coal-bearing Mist Mountain Formation) is exposed by mining. This unit contains potentially acid generating (PAG) materials with the potential for water quality effects. The current long-term Elk Valley Regional Seep Monitoring Plan includes 90 seep monitoring stations around the five Elk Valley mine operations. Where possible, seeps are monitored semi-annually; during spring freshet (high flow) and late summer/fall lower flows. In 2022, 86 seeps were sampled during high flow and 76 seeps during low flow (SRK, 2023). Monitoring consists of collecting water quality samples, calcite presence identification, and flow measurements. The plan also provides a systematic approach to adding and removing seeps from the program based on monitoring results and evolving considerations around risk to aquatic health and receiving environment.

For the RGMP and SSGMP, select seeps in the monitoring program inform the interpretation of sources and flow paths to the main stem valley bottom groundwater. These seeps have been identified in the 2020 RGMP Update (SNC-Lavalin, 2020a), and further review of seeps in relation to potential sources was completed in the 2021 SSGMP Updates (SNC-Lavalin, 2021a). The 2022 Elk Valley Seep Monitoring annual report (SRK, 2023) provided the following summary:

- One seep at FRO was classified as potentially Morrissey Formation (MF) influenced (FR_FRVWSEEP3); however, has been pH neutral to date;
- One seep (FR_HENSSEEP1) at FRO has been classified as suboxic;
- One seep at GHO that has been categorized as possibly MF influenced (GH_E1); however, has been pH neutral to date;

- Several seeps downstream of the GHO CCR storage facility have been classified as potentially suboxic or suboxic, indicating possible suboxic zone with the CCR storage facility;
- No LCO seeps have been categorized as suboxic or possibly MF influenced;
- At EVO, two seeps (EV_SEEP_ERICKSON1, EV_SEEP_PLANT23) continue to be categorized as possibly MF influenced. To date, both seeps are pH neutral;
- All seeps at EVO, expect one (EV_SEEP_PLANT10), have been categorized as oxic;
- At CMm, one seep (CM_PLANT-SEEP1) is categorized as possibly MF influenced and is pH neutral to date;
- Two seeps (FR_SHNSEEP1 and FR_FSEAMWSEEP4) have been formally retired from the RSMP, after being covered with waste rock, and
- One new seep (CM_WD9-SOURCE) was identified at CMm.

1.6 RGMP Isotope Sampling Program

At the request of Teck Coal, SNC-Lavalin completed an isotope sampling program in 2021/22. The intent was to support the RGMP and further improve the Elk Valley water isotope dataset. A more robust isotopic dataset will help to advance understanding of groundwater flow paths and refine the Regional and Site-Specific hydrogeological CSMs. The RGMP isotope sampling program included collection of water samples for analysis of stable isotopes (δ^2H_{H2O} [deuterium] and $\delta^{18}O_{H2O}$) and radioactive isotope (tritium, ^3H).

Between October 2021 and January 2022, 108 isotope samples ($\delta^{18}O$, δ^2H, and tritium) were collected from groundwater, seep, surface water and precipitation from locations associated with FRO, GHO, LCO, EVO and CMO as well as from regional locations off the mine-permitted area. An interim update of the RGMP isotope sampling program was previously included in the 2021 SSGMP/RGMP annual report (SNC-Lavalin, 2022a). This data and subsequent further draft reporting has been generated and is currently under review. It is anticipated that once this report is finalized, the data will support further advancement of the Regional or Site-Specific hydrogeological CSMs. Further information and associated update will be provided as part of the upcoming 2023 RGMP Update, due in September 2023.

1.7 Summary of Other 2022 Projects

Table C, below, summarizes the non-SSGMP/RGMP projects undertaken in 2022 by Teck. They include both new and ongoing desktop studies, and field investigations, across the Elk Valley.

Table C: Summary of Other 2022 Projects

Project Title	Description/Scope	2022 Activity Details
Valley-Wide		
Mass Balance Investigation (MBI)	Ongoing multi-year field investigation targeted at understanding processes driving nitrate and selenium load losses within the Elk and Fording River watersheds.	Fording River Valley: • Seismic Refraction Tomography (SRT) survey completed. • Installation of eight new monitoring wells, aquifer testing, and sampling. • Evaluation and presentation of data. • Ongoing quarterly groundwater sampling at existing monitoring wells.
Integrated Surface Water-Groundwater Model (ISGM)	Development of an integrated 3D groundwater-surface water numerical model to increase the understanding of Teck's mining operations and water management practices on groundwater-surface water interactions and surface water flows in the Fording River Watershed above Josephine Falls. The model domain covers FRO, GHO and LCO.	Ongoing model development, with updates to regulators as required.
Uncertainty Reduction in Climate Forcing Functions	Desktop study to quantify the uncertainty within the source climate datasets as well as the generated model inputs, with the goal of informing the ISGM.	Climate data collection and QA/QC. Comparison of pooled station datasets. Testing of interpolation schemes. Generation of draft surfaces for discussion.
As-built Geodetic Survey	Completed a field survey of SSGMP/RGMP monitoring wells.	Conducted a geodetic survey of SSGMP/RGMP monitoring wells. The data is presented in report Tables CM-01, EV-01, GH-01, FR-01, and LC-01.
Regional Seep Monitoring Program (RSMP)	Ongoing field investigation of groundwater seeps to improve understanding of source loading and aid in water management planning.	Seeps were visited at least twice during 2022; during high flows (between March 15, 2022, and July 15, 2022) and low flows (between September 1, 2022, and December 31, 2022). In 2022, Teck Coal personnel sampled 86 seeps during high flow and 76 during low flow.
Regional Groundwater Flow Bypass, Bedrock, and Inter-basin Flow Study	Ongoing desktop study to identify uncertainty related to groundwater storage and 'bypass' of groundwater flow and load, plus potential inter-basin flow through preferential flow pathways.	Summarized the available information (geology, hydrogeology, geochemistry, well testing, hydrology) and report/present on findings and data gaps for 12 mainstem nodes.

Table C (Cont'd): Summary of Other 2022 Projects

Project Title	Description/Scope	2022 Activity Details
Fording River Operations		
Henretta Creek Area Hydrogeological Site Investigation	Completed a study to develop a conceptual hydrogeologic model for Henretta Creek, Henretta Lake, and the Fording River.	Ongoing groundwater (quarterly), seep and surface water monitoring. Presented the results in Q3 GWG meeting.
Turnbull Bridge Spoil (TBS) Hydrogeological Site Investigation	Completed a study to refine the existing conceptual hydrogeologic model to fill data gaps in selenium and nitrate load moving towards the Fording River valley.	Ongoing (quarterly) surface water, seep, and groundwater monitoring. Measured water level and chemistry of the exfiltration ditch. Presented the results in Q3 GWG meeting.
Clode Hydrogeological Investigation Field Report	Completed a field study to address data and hydrogeological characteristic gaps in the Clode catchment.	Reporting completed for the installation of 13 wells, borehole geophysical logging, groundwater sampling, and aquifer testing.
Hydrogeological Conceptual Model for the Upper Clode Creek Catchment	Completed a desktop study to develop a conceptual model specifically relating to options of the proposed Fording River North Saturated Rock Fill Phase 2 Project.	Completed numerical modelling of Clode catchment and Clode Pond area.
Hydrogeological Conceptual Model for the Lower Clode Creek Catchment and the Fording River Valley from Turnbull Tailings Storage Facility to Eagle Settling Ponds	Completed a desktop study to develop a conceptual model from Turnbull South Tailings Storage Facility (TSF) to the Eagle Settling Ponds.	Completed numerical modelling of Clode catchment and Clode Pond area (prior to completion of proposed wells in the area between E4 decant and R4). Ongoing monitoring of Eagle 4 characteristics in existing wells. Reporting completed for tracer test in Clode catchment to understand flow paths and travel times from E4 discharge injection wells through Clode catchment.
Clode Groundwater Bypass Estimate, FRO-N SRF Phase 2	Completed desktop study to estimate groundwater bypass for the intake at the Clode Primary Pond, which will collect water from the Clode Creek catchment.	Calculated the estimated bypass volumes for the upper and lower catchments.
Groundwater Modelling Report of the Clode Creek Catchment	Completed desktop numerical model in support of FRO-N saturated rock fill Phase 2 Project.	Groundwater flow and solute transport modelling was completed for both the upper (upland areas at higher elevation surrounding the FRO-N SRF) and lower (region between the R4 Pit and the Fording River) Clode Catchments.
Kilmarnock Clean Water Diversion Study	Ongoing field investigation to resolve uncertainty related to how operation of the Kilmarnock Clean Water Diversion influences the magnitude of mine contact water entering groundwater.	Completed post-diversion tracer tests. Ongoing data interpretation.

Table C (Cont'd): Summary of Other 2022 Projects

Project Title	Description/Scope	2022 Activity Details
Fording River Operations (Cont'd)		
Kilmarnock Groundwater Bypass	Ongoing field investigation to resolve the uncertainty related to the magnitude and seasonal fluctuation of groundwater load bypassing the FRO AWTF-S Kilmarnock Creek Intake.	Completed quarterly groundwater monitoring/sampling and surface water flow accretion.
Kilmarnock Groundwater Flow Model	To support water quality compliance in the Fording River, focused on the collection and return of Kilmarnock groundwater.	Ongoing 3D numerical groundwater flow model development. Incorporated 43 drillholes, aquifer testing, geophysics and tracer test data.
Swift Creek Sediment Ponds Seepage Study	Completed field and desktop project to resolve the uncertainty related to the magnitude of seepage from the Swift Creek Sediment Ponds towards the Fording River valley aquifer.	Confirmatory aquifer testing at four existing monitoring wells. Updated the CSM then calculated the seepage and flux via analytical and numerical methods. Completed a groundwater characterization and bypass report and submitted to the ENV and KNC. Ongoing quarterly groundwater sampling and seep survey.
Cataract Creek Sediment Pond Seepage Study	Ongoing field project to resolve the uncertainty related to the magnitude of seepage from the Cataract Creek Rock Drain Pond to the groundwater.	Installation of eight new monitoring wells, aquifer testing, sampling, and instrumentation with pressure transducers. Ongoing quarterly groundwater sampling and seep survey.
Fording River Travel Time Study	Completed field investigation to understand seasonal and temporal aspects of recirculation event travel times in the Fording River under four different flow conditions.	Collected tracer travel time data for monitoring points in the Fording River between FR_SCOUT and FR_FRABCH. Site-specific flow measurements and water quality samples were also collected at key monitoring points along the Fording River.
Groundwater Load between WELL4 and FR_FRABCH	To resolve the uncertainty related to the parameter of concern groundwater plume and load in the Fording River valley between well FR_GH_WELL4 and FR_FRABCH.	Completed a high resolution thermal from FR_GH_WELL4 and FR_FRABCH (Appendix V, Attachment IV). MBI: • Complete SRT surveys. Installed eight monitoring wells at three locations, sampled and conducted aquifer testing. Decommissioned and replaced RG_MW_FR7A/B. Quarterly groundwater samples collected from existing wells. FRO LAEMP: • Continued surface water sampling and continuous water level and temperature monitoring. Seasonal drying surveys conducted monthly between August and April to evaluate flow conditions along the Fording River.

Table C (Cont'd): Summary of Other 2022 Projects

Project Title	Description/Scope	2022 Activity Details
Fording River Operations (Cont'd)		
Tailings Storage Facility (TSF) Monitoring Wells Program	Characterize the area along the groundwater flow path from the TSF to inform a monitoring plan once the tailings elevation reaches a specific threshold.	Drilled and installed a cluster of three monitoring wells, conducted aquifer testing, and water quality sampling.
Fording River Extension		
Hydrogeology Existing Conditions Fording River Extension (FRX) Project	Ongoing baseline data collection.	Monitoring to characterize existing conditions in groundwater is in progress. The datasets will be combined with the regional datasets to develop a unified hydrogeological CSM for groundwater flow and groundwater-surface water interaction for the purpose of the assessment.
Greenhills Operations		
Groundwater Support, Greenhills Operations Cougar Phase 5 Project	Desktop review, gap analysis and field investigation in Porter Creek to investigate the source of mine-influenced groundwater seepage identified along Porter Creek and to investigate the potential of a groundwater pathway through karsting features or bedding surfaces through the Etherington Formation from GHO to the Fording River in the Porter Creek area.	Completed site reconnaissance, borehole drilling, downhole geophysical logging, installation of three monitoring wells, hydraulic conductivity testing and groundwater, surface water and seep sampling.
Groundwater Support, Greenhills Operations Cougar Phase 7-2 Project	Desktop study and field investigation characterize existing mining influence on groundwater and develop a conceptual site model (CSM). Development of a numerical groundwater flow model based on the CSM to quantify effect of the project.	Completed Groundwater Existing Conditions Report, Groundwater Numerical Model and Groundwater Assessment. Submission of the application to regulatory agencies.
GHC groundwater drilling investigation/East Spoil	Document hydrogeologic data collection and interpretation for groundwater-surface water interaction along Upper Greenhills Creek (UGHC).	Evaluated baseline data, estimated groundwater bypass and updated the CSM for the area.
Stream Reach Flow Allocations for Production Wells along the Fording River Valley Bottom	Completed a desktop study to support environmental flow needs assessment for groundwater licensing in RGMP Study Area 3.	Evaluated the potential quantity effect of production well pumping (potential groundwater diversion) on stream reaches FRUSGHC, LGHC, and FRUSET.

Table C (Cont'd): Summary of Other 2022 Projects

Project Title	Description/Scope	2022 Activity Details
Line Creek Operations		
Dry Creek Conveyance and Supplementation Project: Phase II Application	Ongoing application to obtain approvals to complete the remaining construction activities and for the commissioning, operation, and closure of the project (conveyance pipeline in LCO Dry Creek).	Submission of the application to regulatory agencies.
West Line Creek (WLC) 7-Day Pumping Test	Completed a field study to characterize the groundwater flow pathways and estimate groundwater flow that could potentially bypass intakes designed to capture surface water at the WLC AWTF intake location.	Conducted a 7-day pumping test at LC_PW20_04 with 16 observations wells. Both constant- and step-rate tests were performed over the 7 days.
Surface Water and Groundwater Investigation Summary, LCO ERX CCR Phase 2 Project	Ongoing field investigations to quantify potential impacts to Grave Lake and the surrounding areas from the ERX CCR.	Collected surface water, seep, and groundwater samples. Provided a summary at the Q3 GWG meeting.
Elkview Operations		
Erickson/Alexander Creek Water Balance Study. Michel Creek Flow and Load Balance Study	Ongoing desktop studies to reduce uncertainty in Erickson/Alexander Creeks water balance and Michel Creek load balance.	Updated the CSM, calculated the water balance for Erickson Creek, and calculated the load balance to Michel Creek. Provided quarterly updates to the GWG.
Balmer Mine Study	Completed desktop study to identify key mine and point source features with the potential to affect water quality in Michel Creek via Bodie Seep and Creek.	Records/information searches, interview with former personnel, evaluation of the available data, and report completion and submission to the GWG
EVO Cedar North In-pit Backfill Extension – Fault, Bedrock, & BRE Model Update Study	Ongoing field study to refine hydrogeological characterization of Fault F42 and estimate hydraulic conductivity of weathered bedrock between Cedar North, Elk River Valley bottom and Michel Creek, to inform the understanding of the transport of mine-influenced water towards these surface water bodies.	Investigations were conducted to characterize Fault F42 and weathered bedrock. Eight monitoring wells were drilled for the weathered bedrock assessment. For the Fault F42 assessment, drilled four boreholes, two of which were fitted with five vibrating wire piezometers (VWP) each, and two were fitted with Westbay® multilevel sampling/monitoring systems. Data from VWP was downloaded. Groundwater samples were collected, and hydraulic conductivity testing was conducted. Updates were provided to the GWG.
Harmer Facilities Relocation - BRE Administration and Maintenance Complex, Hydrogeology Investigation and Baseline	Ongoing field study to establish an understanding of local geology, hydrogeological properties, groundwater levels, and groundwater quality within and surrounding the new administration and maintenance complex footprint, plus review the hydrogeological conditions surrounding Natal Pit West.	Installation of six new monitoring wells, aquifer testing, sampling, and instrumentation with pressure transducers.

Table C (Cont'd): Summary of Other 2022 Projects

Project Title	Description/Scope	2022 Activity Details
Coal Mountain Mine		
Michel Creek Flow and Load Accretion (FLA) Study	Ongoing field project to quantify the flow and load accretion (FLA) along Michel Creek to inform the need and location for potential additional groundwater monitoring wells.	Quantify surface water flow and load in the main stem of Michel Creek, Andy Good Creek, and Corbin Creek to identify areas of gains and/or losses to/from groundwater and to assess seasonal variations in flow and load. Quantify surface flow and load at tributaries and seeps to quantify the relative contributions of surface flow and load to the main stem of Michel Creek and Corbin Creek.
34 Pit Hydrogeological Investigation	Ongoing field project to understand whether 34 Pit is suitable for use as a water treatment facility.	Completion of three seismic-reflection surface profiles. Installation of six monitoring wells both in the unconsolidated sediments and bedrock, and one vibrating wire piezometer. Aquifer response tests and sampling in the six new monitoring wells. Groundwater discharge survey.

1.8 ENV Approval Conditions and Previous Recommendations

The ENV approval letters for the 2017 RGMP, 2020 RGMP and the 2018 SSGMP updates are provided in Appendix II. The EMC is an advisory committee composed of an independent scientist and subject matter experts from ENV, KNC, Interior Health Authority (IHA), and The Ministry of Energy, Mines and Low Carbon Innovation (EMLI). Appendix II also includes recommendations from the 2020 RGMP Update (SNC-Lavalin, 2020a), 2021 SSGMP Update (SNC-Lavalin, 2021a), and 2021 Annual Report (SNC-Lavalin, 2022a).

1.9 Permit Requirements and Report Structure

The 2022 Annual Report for the Elk Valley Regional and Site-specific Groundwater Monitoring Programs (including the GWMP) has been prepared following the approved 2017 and 2020 RGMP Updates (SNC-Lavalin, 2017; 2020a), the approved 2018 SSGMP Updates (SNC-Lavalin, 2018a, b, c; Golder, 2019; SRK, 2018), and the annual groundwater reporting requirements listed in Permit 107517. Where possible, recommendations from the approved 2020 RGMP Update (SNC-Lavalin, 2020a) and the submitted 2021 SSGMP Update (SNC-Lavalin, 2021a) have also been included; however, it is noted that the 2021 SSGMP Update has not yet been approved by ENV. The structure and content of this report have incorporated past feedback from the GWG on previous reports. The 2022 Annual Report addresses the permit conditions as summarized in Table D and Table E.

The report presents the monitoring results nearest to the source areas (SSGMPs), followed by the nearest downgradient receiving environment (RGMP) Study Area. Monitoring under the RGMP generally overlaps with the SSGMPs, as monitoring is required at many locations under both an SSGMP and the RGMP. Where monitoring requirements overlap between an SSGMP and the RGMP, the results are presented in the respective SSGMP associated Appendix and further discussed in the regional RGMP context.

Table D: Summary of SSGMP and RGMP Permit Requirements and Report Sections

Description of Permit Requirement	Relevant Report Sections					
	Background Appendix IV	FRO; Study Area 1 Appendix V	GHO; Study Areas 1, 3 and 4 Appendix VI	LCO; Study Areas 2, 5 and 6 Appendix VII	EVO; Study Areas 7, 8, 9, 10, and 12 Appendix VIII	CMm; Study Area 11 Appendix IX
i. A map of monitoring locations with Environmental Monitoring Sites (EMS) and Permittee descriptors.	Drawing 10 to 13, Drawings BG-02 to -05	Drawing 10, Drawings FR-01 and FR-02	Drawing 11, Drawing GH-01	Drawing 12, Drawing LC-01	Drawing 13, Drawing EV-01	Drawing 14, Drawing CM-01
ii. Cross sections showing well installation details, stratigraphy, groundwater elevations, and inferred groundwater flow. Cross sections should be in the direction of groundwater flow and/or perpendicular to groundwater flow.	Drawing LC-03, Drawing LC-07, Drawing LC-10, Drawing EV-04, Drawing CM-05	Drawings FR-05 to -14	Drawings GH-04 to -14	Drawings LC-03 to -11	Drawings EV-04 to -13	Drawings CM-03 to -05
iii. Drawings showing locations and water quality data of groundwater sampling points.	Drawings BG-02 to -05	Drawings FR-01, FR-02, and FR-15 to -22	Drawings GH-01, GH-15 to -22	Drawings LC-01, LC-12 to -15	Drawings EV-01, EV-14 to -21	Drawings CM-01, CM-06 to -09
iv. A summary of program modifications relative to previous years and additional one-time activities, such as the installation of new monitoring wells.	Section 1.3 of Appendix IV; and Appendix II	Section 1.3 of Appendix V; and Appendix II	Section 1.4 of Appendix VI; and Appendix II	Section 1.3 of Appendix VII; and Appendix II	Section 1.3 of Appendix VIII; and; Appendix II	Section 1.3 of Appendix IX; and Appendix II
v. A summary of measured parameters, including appropriate graphs and comparison of results to Approved and Working Water Quality Guidelines, or other criteria and benchmarks as specified by the Director.	Section 1.5 of Appendix IV; Tables BG-03 and -04; Figures BG-01 to -10 x	Sections 1.5 to 1.7 of Appendix V; Tables FR-03 to -05; Figures FR-01 to -37	Section 1.6 to 1.8 of Appendix VI; Tables GH-03 to -05; Figures GH-01 to -51	Sections 1.5 to 1.7 of Appendix VII; Tables LC-03 to -05; Figures LC-01 to -23	Sections 1.4 to 1.8 of Appendix VIII; Tables EV-03 to -05; Figures EV-01 to -41	Sections 1.5 to 1.6 of Appendix IX; Tables CM-03 to -05 Figures CM-01 to -25
vi. If applicable, a summary of exceedances of screening benchmarks.	Section 1.5 of Appendix IV; and Appendix II	Sections 1.5 to 1.7 of Appendix V; Tables FR-03 to -05	Section 1.6 to 1.8 of Appendix VI; Tables GH-03 to -05	Sections 1.5 to 1.7 of Appendix VII; Tables LC-03 to -05	Sections 1.4 to 1.8 of Appendix VIII; Tables EV-03 to -05	Sections 1.5 to 1.6 of Appendix IX; Tables CM-03 to -05
vii. Evaluation and discussion of spatial patterns and temporal trends.	Section 1.5 of Appendix IV	Sections 1.5 to 1.7 of Appendix V	Sections 1.6 to 1.8 of Appendix VI	Sections 1.5 to 1.7 of Appendix VII	Sections 1.4 to 1.8 of Appendix VIII	Sections 1.5 to 1.6 of Appendix IX
viii. Evaluation and discussion of the correlation between the monitoring results of surface water and groundwater monitoring stations, where relevant, in terms of spatial distribution and temporal changes.	Section 1.5 of Appendix IV	Sections 1.5 to 1.7 of Appendix V; Drawings FR-15 to -22 Figures FR-01 to -37 Diagrams FR-01 to -03	Section 1.6 to 1.8 of Appendix VI; Drawings GH-15 to -22 Tables GH-03 to -05 Figures GH-01 to -51	Sections 1.5 to 1.7 of Appendix VII; Drawings LC-12 to -15 Figures LC-01 to -23 Diagrams LC-01 to -03	Sections 1.4 to 1.8 of Appendix VIII; Drawings EV-14 to -21 Figures EV-01 to -41 Diagrams EV-01 to -04	Sections 1.5 to 1.6 of Appendix IX Drawings CM-06 to -09 Figures CM-01 to -25 Diagram CM-01 to -02
ix. Relevant information from specific studies on surface water and groundwater to support the hydrogeological characterization.	Section 1.5 of Appendix IV	Sections 1.5 to 1.7 of Appendix V	Section 1.6 to 1.8 of Appendix VI	Sections 1.5 to 1.7 of Appendix VII	Sections 1.4 to 1.8 of Appendix VIII	Sections 1.5 to 1.6 of Appendix IX
x. A summary of all Quality Assurance and Quality Control (QA/QC) issues during the year.	Section 3 of main report and Appendix XIII	Section 3 of main report and Appendix XIII	Section 3 of main report and Appendix XIII	Section 3 of main report and Appendix XIII	Section 3 of main report and Appendix XIII	Section 3 of main report and Appendix XIII
xi. Recommendations for further study or measures to be taken.	See Executive Summary of main report or see Appendix IV	See Executive Summary of main report or see Appendix V	See Executive Summary of main report or see Appendix VI	See Executive Summary of main report or see Appendix VII	See Executive Summary of main report or see Appendix VIII	See Executive Summary of main report or see Appendix XI

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Table E: Summary of Line Creek Mine Phase II GWMP Permit Requirements[1] and Report Sections

Description of Permit Requirement, Section 8.2.2.1	Relevant Report Sections LCO Phase II Dry Creek; Study Area 2 Appendix VII
i. Characterize the groundwater resource (including water quality, quantity, flow characteristics, hydraulic conductivity of the affected aquifer(s), and relationship to surface water system).	Section 1.5 of Appendix VII; Tables LC-01 to -05; Drawings LC-01 to -03, 12 to -15; Figures LC-01 to -05; Diagram LC-01; Attachment III
ii. Identify (and if necessary, quantify) impacts to groundwater from mining-related activities.	Section 1.5 of Appendix VII
iii. Provide the information necessary to support the development and verification of water quality predictions for the mine site (as per Section 9.9 Water Quality Modelling). [2]	Tables LC-03 to -05; Attachment III

2 *Please see Appendix XV for the Groundwater Study Design for the LCO Phase II mine.*

2 Geochemical Screening and Interpretation Methodology

2.1 Groundwater Quality Screening Criteria

Groundwater quality data were screened against different criteria based on applicable receptors. A technically based screening process was described in both the 2020 RGMP Update (SNC-Lavalin, 2020a) and the 2021 SSGMP Update (SNC-Lavalin, 2021a). Primary and secondary screening criteria can be re-evaluated and adjusted based on the needs and requirements for other programs following the AMP.

2.1.1 Primary Screening Criteria

The primary screening criteria provide the main indicators for groundwater quality, and the approach is consistent with regulatory guidance, including Technical Guidance Document 6 (TG 6): *Assessment of Hydraulic Properties for Water Use Determination* (BC MOE, 2015) for EMA Applications and Technical Guidance Document 15 (TG 15): *Concentration Limits for the Protection of Aquatic Receiving Environments* (BC ENV, 2017). The primary screening process considers the following receptors:

- Human Health – groundwater for drinking water use (DW) for current and future consumption as a default, consistent with TG 6. Primary screening of groundwater data for protection of DW is compared to the applicable *Contaminated Sites Regulation* (CSR) for DW (BC ENV, 2021).
- Freshwater Aquatic Life – groundwater discharging to aquatic environments was listed as a default use, consistent with TG 6. Primary screening of groundwater data for protection of aquatic life is completed against CSR aquatic life (AW) standards. Consistent with TG 15, the *British Columbia Water Quality Guidelines* (BCWQG, BC ENV, 2021) were applied to any wells located within 10 m of the high-water mark.
- Irrigation and Livestock Watering – groundwater for livestock or irrigation watering use. This use is not described in TG 6; however, these uses were applied to be conservative as livestock and irrigation water supplies are sourced from groundwater wells in some locations. In addition, the EMC have indicated livestock watering use was an appropriate surrogate for wildlife watering. As such, livestock watering was applied as a default use. Primary screening of groundwater data protection of irrigation and livestock watering was compared to the CSR Irrigation (IW) and Livestock (LW) standards.

This screening process allows for comparison of water to uniform criteria for groundwater protection across the Elk Valley using the CSR standards, as well as the Approved and Working BCWQG, as applicable. The default uses, which consist of human health, freshwater aquatic life, irrigation watering, and livestock watering as a surrogate for wildlife, were applied across the entire valley.

According to Technical Guidance Document 15 (TG15; BC ENV, 2017), water from a groundwater well may be subject to the British Columbia (Approved and Working) Water Quality Guidelines (BCWQGs) if the groundwater well is within 10 m of the high-water mark of an aquatic receiving environment. An aquatic receiving environment is defined by Procedure 8 (BC ENV, 2021) as any surface water, watercourse, wetland, sediment or porewater containing aquatic life, and the 10 m distance is defined in TG15 as applicable to an area that is not a maintained watercourse.

SNC-Lavalin reviewed wells within ten meters of a high-water mark, based on water features provided by Teck and consistent with TG 15 described above. Monitoring wells LC_PIZDC1307, LC_PIZDC1308 (Drawing LC-02), EV_WF_SW (Drawing EV-02), and EV_OCgw (Drawing EV-02; SNC-Lavalin, 2017) are within 10 m of a high-water mark; however, LC_PIZDC1307 and LC_PIZDC1308 are installed beneath a fine-grained unit and are not inferred to be connected to surface water and EV_WF_SW is a deep well screened between 151.5 and 159.4 mBGS and has been installed in spoils. Results from monitoring wells EV_OCgw will be compared to BCWQG for freshwater aquatic life receptors. In 2022, field validation determined that monitoring wells RG_MW_DC1A/B and LC_MW_ER4A/B are located more than 10 m from an aquatic receiving environment (KWL, 2023; Appendix XII).

2.1.1.1 Proposed Groundwater Screening Criteria for Cobalt and Lithium

Ramboll completed a desktop literature review of analytical data for the Elk Valley. The intent of the study was to address MQ 6: "Is water quality being managed to be protective of human health?" focussing on KU 6.1: "Is our understanding of local groundwater conditions for current and future DW use sufficient to minimize human exposure to constituents?" (Ramboll, 2021).

As part of the study, Ramboll proposed health-based values (HBVs) to be used as primary screening criteria for lithium and cobalt as suitable national and provincial guidelines are not available for these parameters. Although DW standards for these two parameters are provided under British Columbia's CSR, cobalt was only recently adopted as a DW guideline and the intended use of these standards are for groundwater quality management (BC ENV, 2020). The CSR standards for both cobalt and lithium originate from the United States Environmental Protection Agency (USEPA) Regional Screening Level (RSL) database where provisional toxicity values that were not well supported were used during development, and incorporate very large uncertainty adjustments (Ramboll, 2021). Based on developed criteria, the daily doses of cobalt and lithium from background exposure (diet and other environmental sources) typically exceed the current CSR values. Therefore, exceedances of these values are not considered a meaningful indicator of potential for health risks from exposure to cobalt or lithium in DW (Ramboll, 2021).

Ramboll calculated HBVs for these two parameters based on toxicity values (tolerable daily intakes (TDI)) and drinking water allocation factors (DW AFs), as presented below in Table F and documented in the 2020 Annual Report (SNC-Lavalin, 2021b).

Table F: Calculated Health-based Values (Ramboll, 2021)

Constituent	TDI (mg/kg-day)	DW AF (unitless)	Health-based Value (mg/L)
Cobalt	0.03	0.8	1.2
Lithium	0.07	0.7	2.4

If approved, DW concentrations are expected to be screened against these proposed criteria for dissolved cobalt and lithium (1.2 mg/L and 2.4 mg/L, respectively) in addition to the CSR. However, it should be noted that lithium is not considered a mine-influenced parameter based on the BGA which is discussed in detail in Section 2.1.3.

The proposed HBVs are being presented in this Section in accordance with the commitment made in the Q3 and Q4 2020 GWG meetings to include screening criteria in the 2020 SSGMP/RGMP Annual report. Multiple engagements were conducted during the development of the proposed screening criteria with regulators and stakeholders and is expected to continue. The proposed HBVs may be updated as per comments from regulators in future reports. In consideration of the KNC's comments, the HBVs were not compared to monitoring data in this RGMP SSGMP Annual Report.

2.1.2 Secondary Screening

Groundwater analytical chemistry is compared to a secondary screening criterion for aquatic life when concentrations of dissolved selenium are above the primary screening criteria. The secondary screening criterion provides context for Teck's operational surface water quality requirements, as well as a technical-based framework for regional evaluation of groundwater to protect aquatic life in the Elk Valley. Surface water quality is collected at Order Stations that are specified in Permit 107517. Each surface water Order Station has an area-based Site Performance Objective (SPO) and each surface water Compliance Point (CP) has a Compliance Limit (CL) concentration, which is specified in Permit 107517. As these concentrations differ along the flow path of the main stem rivers, groundwater concentrations are compared to criteria from the nearest downstream surface water CP or SPO Order Station. A summary of relevant Order Stations is presented in Table G and on Drawing 9.

Table G: Secondary Groundwater Screening Criteria of Aquatic Life

Operation / Program[1]	Study Area (s)	SPO		CP	
		Surface Water Station (EMS ID)[2]	Selenium (µg/L)	Surface Water Station (EMS ID)[2]	Selenium (µg/L)
FRO	**Background, 1**	GH_FR1 (0200378)	63	FR_FRABCH (E223753)	85
				GH_FR1 (0200378)	63
GHO	**Background**	GH_ER1 (E206661)	19	GH_ERC (E300090)	15
	3	GH_FR1 (0200378)	63	GH_FR1 (0200378)	63
	4	GH_ER1 (E206661)	19	GH_ERC (E300090)	15
				-	-
LCO	**Background, 2**	GH_FR1 (0200378)	63	GH_FR1 (0200378)	63
	-	-	-	LC_LCDSSLCC (E297110)	50
	Background, 5	LC_LC5 (0200028)	51	-	-
		EV_ER4 (0200027)	23	-	-
	6	EV_ER4 (0200027)	23	-	-
EVO	**Background**	EV_ER1 (0200393)	19	-	-
		-	-	EV_MC2 (E300091)	20
	7, 8, 12	EV_ER1 (0200393)	19	-	-
	9	EV_ER1 (0200393)	19	-	-
	10	EV_ER1 (0200393)	19	EV_MC2 (E300091)	20
CMm	**Background**	EV_ER1 (0200393)	19	CM_MC2 (E258937)	19
	11	EV_ER1 (0200393)	19	CM_MC2 (E258937)	19
			19	EV_MC2 (E300091)	20
RDWMP	**4**	LC_LC5 (0200028)	51	-	-
	7, 8, 12	EV_ER1 (0200393)	19	-	-

Notes:

[1] Operation/Program refers to the Operation (FRO, GHO, LCO, EVO, CMm) or Program (RDWMP) that is responsible for carrying out the monitoring related to each Study Area.

[2] EMS: Environmental Monitoring Station.

'-' denotes no relevant Order Station or concentration.

2.1.3 Comparison to Background Concentrations

A BGA on concentrations of select constituents was completed to develop a list of mine-related constituents and to support groundwater trigger development (SNC-Lavalin, 2020a). The approach used for the BGA was a modification of BC CSR Protocol 9 (version 2)[3], with an additional assessment of outliers, seasonality and variability across well groupings (i.e., unconsolidated overburden background, bedrock background and mine-influenced). Details of the BGA are discussed in the 2020 RGMP Update (SNC-Lavalin, 2020a).

In addition to the OC (i.e., cadmium, nitrate as nitrogen [nitrate-N], selenium and sulphate), the constituents listed in Table H will be used for comparison to background concentrations as they were determined to be mine-related in groundwater. This list of CI may be further adjusted as additional temporal data is collected and additional background monitoring wells are added to improve the program's spatial dataset.

Table H: Mine-related Parameters in Groundwater for Comparison to Background

Parameter		
Antimony	Nickel	TDS
Cobalt	Nitrite-N	Uranium
Molybdenum*		

* Molybdenum has been added to the non-Order mine-related constituents as it is a component of antiscalants used for calcite treatment in specific locations.

The BGA in the 2020 RGMP Update (SNC-Lavalin, 2020a) also identified a number of reference locations for continued monitoring. Background concentrations for these select reference locations were compared to the concentrations developed in the BGA. Teck has received advice and input on the BGA and the monitoring wells within it, which are being considered, along with further supplementation of the background monitoring network and planned update in 2023.

2.1.4 Surface Water-to-Groundwater/Drinking Water Triggers (Surface Water Pathway Early Warning Triggers)

In support of MQ 6: "*Is water quality being managed to be protective of human health?"* and KU 6.3: "*What are appropriate groundwater-related triggers and how can they be used?*", Azimuth Consulting Group Inc. (Azimuth) developed groundwater triggers in 2020 that consider the surface water-groundwater relationship (Azimuth, 2021). The trigger development was conducted in consultation with the GWG and relates specifically to aquifers that may potentially be influenced by the infiltration of surface water elevated in mine-related constituents. The surface water locations presented in Table I were selected for surface water pathway early warning triggers.

[3] BC CSR Protocol 9 for Contaminated Sites: Establishing Local Background Concentrations in Groundwater. Version 2. February 1, 2021.

Table I: Surface Water Pathway Early Warning Triggers Monitoring Points and Rationale (Azimuth, 2021)

Monitoring Point	Rationale
GH_ERC (CP)	Upstream of Elkford municipal supply well in Study Area 4
GH_ER1 (Order Station)	
EV_ER4 (Order Station)	Upstream of DW wells in Study Area 7 and downstream of LCO
EV_ER1 (Order Station)	Downstream of all mining activity
CM_CC1 (Surface Water Monitoring Location)	Upstream of Corbin DW users, downstream of Coal Mountain
EV_MC2 (CP)	Downstream of CMm, some of EVO but upstream of Sparwood Municipal wells

For this report, analytical data from the surface water stations listed in Table I have been compared to trigger values, developed by Azimuth, based on primary screening criteria and Health Canada guidelines for DW (Health Canada, 2022). Trigger values for OC, based on the BGA, are presented in Table J and Table K, respectively. The 2022 analytical data for surface water stations list below will be used in the testing of the triggers developed by Azimuth. The results will be discussed in detail in Section 6.

Table J: Trigger Values as Screening Ratio for Order Constituents (Azimuth, 2021)

Station	Cadmium	Nitrate-N	Selenium	Sulphate
GH_ERC	2.503	5.16	5.70	264.2
GH_ER1	2.505	5.13	5.70	262.3
EV_ER4	2.506	6.39	-	286.0
EV_ER1	2.507	5.94	9.72	285.4
CM_CC1	2.524	8.01	-	-
EV_MC2	2.515	6.51	-	313.9

Note:
"-" denotes trigger value could not be computed as baseline median exceeded screening values.
Trigger values are unitless as either $\frac{mg/L}{mg/L}$ or $\frac{\mu g/L}{\mu g/L}$.

Table K: Trigger Values as Screening Ratio for non-Order Constituents (Azimuth, 2021)

Station	Antimony	Cobalt	Molyb-denum	Nickel	Nitrite-N	TDS	Uranium
GH_ERC	3.05	0.55	44.5	40.25	0.5005	350.5	10.40
GH_ER1	3.05	0.55	44.5	40.25	0.5005	342.0	10.38
EV_ER4	3.05	0.55	44.6	40.25	0.5005	389.5	10.55
EV_ER1	3.05	0.55	44.6	40.30	0.5006	387.3	10.54
CM_CC1	3.23	-	44.9	57.55	0.5160	-	12.61
EV_MC2	3.11	0.55	44.6	41.09	0.5010	438.1	10.63

Note:
"-" denotes trigger value could not be computed as baseline median exceeded screening values.
Trigger values are unitless as either $\frac{mg/L}{mg/L}$ or $\frac{\mu g/L}{\mu g/L}$.

Azimuth (2021) could not calculate trigger values for selenium at EV_ER4, CM_CC1 and EV_MC2, and for sulphate, cobalt, and TDS at CM_CC1 because the baseline median for these cases exceeded the applicable screening values.

2.1.5 Seep Screening Criteria

Seep analytical results were screened against the BCWQG for the protection of freshwater aquatic life as seeps are described in Technical Guidance on Contaminated Sites 15 (TG15) as surface water in aquatic receiving environments to assess potential impacts to the downstream environment (BC ENV, 2017; 2021). This is appropriate as the seeps are expected to report to surface water bodies, and applying the CSR DW, AW, LW, or IW is not deemed appropriate as they are strictly used for screening groundwater. The screening criteria for seep water is described in the 2022 RSMP (SRK, 2023; Appendix III).

2.2 Analytical Visual Representation

Where there is sufficient data, groundwater data has been presented on hydrographs and time-series plots for OC. Groundwater elevations and flow direction (where possible) are presented in the respective drawing sets for each Operation. Piper and Schoeller diagrams showing major ion distribution for select locations (if required) are also presented for each respective Operation. Selenium to sulphate (as sulphur) (Se: SO_4 (S)) ratio graphs have also been used as a diagnostic tool to assess relative mining influence, mixing and selenium attenuation processes such as microbial reduction (SRK, 2019b). Based on the distribution of concentrations, select graphs have been presented on a logarithmic scale. If available and where applicable, surface water levels, chemistry, and precipitation data from the nearest weather station have also been included in the visual representation.

2.3 Statistical Trend Analysis

Concentration trends for OC in groundwater were evaluated based on available historical analytical data using the Mann-Kendall analysis. Results from statistical tests display quantifiable patterns in geochemical concentrations over time; however, it is noted that this test is only a statistical test and should be used along with other lines of evidence to confirm patterns over time.

The Mann-Kendall statistical test is a non-parametric trend analysis test that identifies changes in environmental conditions (Gilbert, 1987). The analysis tests the null hypothesis of no trend against the alternative hypothesis of a significant trend. Sampling locations with less than seven sampling events were not selected for assessment. Where field duplicates were collected, the higher value was selected for analysis. Concentrations less than the Limit of Reporting (detection limit), also known as the Reported Detection Limit (RDL) were assigned the RDL concentration. In cases where the RDL has changed over time, concentrations below the RDL were assigned a value of 0.001. Where the sample size of a dataset exceeded 40 samples, the trend analysis was completed for the 40 most recent samples. Trend analysis was not completed for parameters where concentrations were consistently less than, or within five times the RDL. The analytical results were reviewed prior to completing trend analysis and any obvious outliers were removed from the dataset. In addition, where wells had not fully stabilized after installation, the early data for that well had been removed. Based on the Mann-Kendall trend analysis results, further analysis of seasonal trends for select locations and parameters may be warranted if there is a sufficient dataset (at least seven years of samples in the same season).

The analysis for each parameter is determined by calculating Mann-Kendall Statistic (S), the percent confidence of a significant trend, and the coefficient of variance (COV). The S value is calculated as the number of calculated positive differences minus the number of calculated negative differences; differences are calculated in a time-series by assuming an initial S value of 0 (e.g., no trend). If a data value in the time-series is higher than a value from earlier in the period, S increases by 1. Conversely, if a data value later in the time-series is lower than a value from earlier in the dataset, S decreases by 1. A high positive S is one indicator of an increasing trend, while a low negative is an indicator of a decreasing trend. The percent confidence of a significant trend is calculated using a Kendall probability table, which requires the S value of the test and the number of samples (n). The Kendall table identifies the probability of rejecting a null hypothesis (no trend) of a given level of significance. The confidence level is subsequently calculated by subtracting the probability from 1 (Newell et al., 2007). A COV value is the standard deviation divided by the average and presented as a percent. A COV less than 100% can be used to infer stability in groundwater concentrations, whereas a value above 100% indicates a non-stable trend and a greater degree of scatter. The process of determining a significant trend and stability is in Table L (Aziz et al., 2003).

'No trend' and 'stable' both indicate that neither an increasing nor a decreasing trend could be discerned within the specified confidence limit. However, a 'stable' result also signifies that data had minimal scatter (less than 100% COV), which further emphasizes that concentrations are relatively unchanging over time.

The analytical results are subject to a variety of influences affecting the analysis of trends and stability. Such factors include subtle variations in sample acquisition or laboratory techniques and disparities caused by seasonality and other natural cycles. Consequently, these factors should be considered when establishing and validating actual trends in aquifer conditions with any certainty.

Table L: Mann-Kendall Analysis Decision Matrix

S	Trend Confidence	Concentration Trend
S>0	> 95%	Increasing
S>0	90 – 95%	Probably Increasing
S>0	< 90%	No Trend
S≤0	< 90% and COV ≥ 100%	No Trend
S≤0	< 90% and COV < 100%	Stable
S<0	90 – 95%	Probably Decreasing
S<0	> 95%	Decreasing

Notes:
S – Mann-Kendall Statistic
COV – coefficient of variance

3 Summary of Quality Assurance/Quality Control (QA/QC) Assessment

Teck provided field and laboratory data relevant to the GWMP, SSGMPs and RGMP to SNC-Lavalin. In addition, data from several wells presented in this report were sampled by SNC-Lavalin in 2022. Analysis of the Quality Assurance/Quality Control (QA/QC) data was completed by SNC-Lavalin on a quarterly basis to proactively address potential issues. For wells sampled by Teck, SNC-Lavalin has relied on data and information provided by Teck in terms of completeness and accuracy. Interpretations and conclusions within this report are made with the assumption that data collection was completed in accordance with Permit 107517, the British Columbia Field Sampling Manual (BC MOE, 2013), and Teck's Standard Practice and Procedures (SP&P) or SNC-Lavalin's Preferred Operating Procedures.

The QA/QC assessment completed for the GWMP, SSGMPs, and RGMP reviewed shipping and handling issues, summarized results of relative percent differences (RPDs) from duplicate samples, summarized detections of analytes in field and trip blanks, and reviewed laboratory quality control reports. Additional QA/QC assessments, along with recommendations for corrective actions, are detailed in Appendix XIII. QA/QC results for RGMP wells within mine boundaries are presented within the discussion of their respective operations, while background wells outside of mine boundaries are presented in their own sections below and in Appendix XIII. In addition, select RDWMP wells are presented with the nearest Operation. Details of the methods and results of the QA/QC programs, including discussions regarding shipping and handling issues, elevated RPDs, analyte detection in field and trip blanks, and laboratory QA/QC results, are included in Appendix XIII. A summary of the QA/QC results for each Operation/Program are present in the sections below.

3.1 Background Monitoring Locations

The background monitoring network consisted of monitoring and sampling 21 wells. Results from nine background monitoring wells were included in each operations' SSGMP, and therefore, QA/QC results for these wells were also included in their respective operation sections. The QA/QC discussion herein is for the background network of the remaining 12 wells.

The field QA/QC program and laboratory QA/QC results for groundwater samples indicated the data collected were acceptable for use in this report. Calculated RPDs for all parameters in the duplicate samples were less than 50%. Hold times were met by the laboratory for all parameters. Detectable concentrations in trip and field blanks, which were greater than five times the Detection Limit (DL), were well less than the applicable primary screening criteria and did not affect data interpretation. The laboratory quality control reports were reviewed, and the data are considered reliable. Additional details are provided in Appendix XIII.

Field parameters (temperature, pH, dissolved oxygen, turbidity, and oxidation-reduction potential) were collected in 2022 for all wells, except for dissolved oxygen at several wells in Q4, due to a sensor error. Manual and/or continuous water levels were collected in 2022 in all quarters for all wells, except for GH_MW_BG1A, GH_MW_BG1B, and GH_MW_BG1C, which had loggers installed in Q2. The field QA/QC program and laboratory QA/QC results for groundwater samples indicated the data collected are acceptable for use in this report.

3.2 Fording River Operations

The field QA/QC program and laboratory QA/QC results for groundwater samples indicated the data collected were acceptable for use in this report. A total of 184 groundwater samples, 23 field duplicate samples, and 25 blank samples collected in 2022 were included in the FRO QA/QC assessment.

Calculated RPDs for all parameters in the 23 duplicate samples were less than 50%, except for dissolved cadmium, ammonia-N, nitrate-N and TKN in three sample/duplicate pairs. Hold time exceedances were reported for a limited number of orthophosphate, nitrate-N, nitrite-N, and turbidity samples; however, the concentrations were consistent with other historical results from those wells and did not affect data interpretation. The results reflect low variability for handling and sampling for the program.

The laboratory quality control reports were reviewed, and the data are considered reliable. Detectable concentrations of ammonia-N, nitrate-N, several dissolved metals in field and trip blanks were greater than five times the DL. However, concentrations of detectable parameters in the blanks were well less than the applicable primary screening criteria and therefore, data interpretation was not affected.

Field parameters, manual and/or continuous water levels were collected in 2022 for all wells; however, field measurements and continuous water level data from FR_HMW2 could not be obtained in 2022 due to equipment lodged in the well.

3.3 Greenhills Operations

The field QA/QC program and laboratory QA/QC results for groundwater samples indicated the data collected were acceptable for use in this report. A total of 125 groundwater samples,14 field duplicate samples, and 17 blank samples collected in 2022 were included in the GHO QA/QC assessment.

Calculated RPDs for all parameters in the 14 duplicate samples were less than 50% except for TSS, turbidity, dissolved bromide, nitrate-N, total and TKN. Hold times were met by the laboratory, except for alkalinity, bicarbonate, carbonate, hydroxide and nitrate-N in two batches. Detectable concentrations of ammonia-N and TKN in trip and field blanks were greater than five times the DL. Concentrations of ammonia-N and TKN in samples and blanks were far less than the applicable primary screening criteria and therefore, data interpretation was not affected.

The laboratory quality control reports identified several field-filtered samples with concentrations of dissolved parameters greater than total, but less than the primary screening criteria. No other issues were identified in the laboratory quality control reports. Field measurements and manual and/or continuous water levels were collected from select GHO wells in 2022 and data are considered reliable.

3.4 Line Creek Operations

A total of 118 groundwater samples, nine field duplicate samples, and ten blank samples were included in the 2022 LCO QA/QC assessment. The field QA/QC program and laboratory QA/QC results for groundwater samples indicated the data collected are acceptable for use in this report, except for the Q1 sample from LC_PIZP1101 (and it's duplicate) which was deemed by a Qualified Professional to be an unrepresentative sample from the targeted aquifer due to extremely high turbidity and therefore was excluded from the dataset.

Review of the sample and duplicate RPDs greater than 20% revealed data interpretation was not affected.

The laboratory quality control reports were reviewed, and the data are considered reliable. Detectable concentrations of parameters in blanks were less than five times the DLs except for ammonia-N, dissolved molybdenum, and dissolved zinc. However, concentrations were less than the applicable primary screening criteria and therefore, data interpretation was not affected.

In addition, the missing field turbidity measurements and single erroneous manual water level are not expected to impact the overall data interpretation. Additional details are provided in Appendix XIII.

3.5 Elkview Operations

The field QA/QC program and laboratory QA/QC results for groundwater samples indicated the data collected were acceptable for use in this report. A total of 195 groundwater samples, 17 field duplicate samples, and 30 blank samples collected in 2022 were included in the EVO QA/QC assessment.

The field QA/QC program and laboratory QA/QC results for groundwater samples indicated the data collected are acceptable for use in this report. Several parameters in three field duplicate samples had calculated RPDs greater than 50%; however, the parameters either do not have an applicable primary screening criteria or concentrations in samples were less than the applicable primary screening criteria. Therefore, the RPDs greater than acceptable levels were not considered to affect data interpretation, except for dissolved selenium and sulphate from the Q1 sample from EV_ER1gwS. Additional details about the Q1 sample from EV_ER1gwS is presented in Appendix XIII. Noted hold time exceedances were primarily for parameters that required re-analysis, with the exception of TSS and TDS at select wells, where analysis of these parameters were overlooked by the laboratory.

Select parameters were detected in 19 of the 30 trip and field blanks collected in 2022. Of the detectable parameters, concentrations of sodium in one field blank and ammonia-N in three trip blanks were greater than five times the DL. The concentrations of these parameters in samples and blanks were less than the applicable screening criteria or the parameter(s) did not have an applicable screening criterion. The detection of parameters in blanks did not affect data interpretation.

The laboratory quality control reports were reviewed, and the data are considered reliable.

Although continuous water levels could not be obtained from select monitoring wells, manual measurements were collected, and the 2022 data are considered reliable.

3.6 Coal Mountain mine

The field QA/QC program and laboratory QA/QC results for groundwater samples indicated the data collected were acceptable for use in this report. A total of 66 groundwater samples, nine field duplicate samples, and ten blank samples collected in 2022 were included in the CMm QA/QC assessment.

The field QA/QC program and laboratory QA/QC results for groundwater samples indicated the data collected are acceptable for the analyses conducted in this report. Calculated RPDs for the eight duplicate samples collected were less than 50% except for TSS, ortho-phosphate, nitrate-N, copper, and selenium in separate duplicate samples. Hold time exceedances were only identified for laboratory pH and ORP. The results reflect low variability for handling and sampling for the program.

The laboratory quality control reports were reviewed, and the data are considered reliable. Detectable concentrations of parameters in field blanks were less than five times the detection limits. Detectable concentrations of parameters in trip blanks were less than five times the detection limits, except for molybdenum in one trip blank. The concentrations of molybdenum in the blank did not exceed the applicable primary screening criteria, and therefore, did not affect data interpretation. Field measurements and manual and/or continuous water levels were collected from select CMm wells in 2022 and data are considered reliable.

4 Groundwater Monitoring

The 2022 groundwater monitoring locations were sampled in accordance with the approved 2020 RGMP Update and 2018 SSGMP Updates (SNC-Lavalin, 2017, 2018 a,b,c,d, 2019a,b,c; SRK, 2018a; Golder, 2019). Additional monitoring locations have also been included based on recommendations outlined in the 2021 SSGMP Updates; however, these locations are pending approval from ENV (SNC-Lavalin, 2021a). Additional monitoring locations have also been included based on recommendations outlined in the approved 2020 RGMP Update. The following table summarizes the number of groundwater monitoring locations, monitoring wells and supply wells sampled for each program (Table M, Table N, and Table O). Lists of monitoring wells relating to the RGMP and each SSGMP (CMm, EVO, FRO, GHO, LCO (including Phase II GWMP)) are also included as Tables 1 through 6, respectively. A total of 49 wells (7 FRO, 11 GHO, 6 LCO, 17 EVO, 8 CMm) are included in both programs.

Table M: Summary of RGMP Groundwater Monitoring Locations

Operation/ Program	Locations[a]	Monitoring Wells	Supply/Domestic Wells
RGMP	**63**	**83 (25 singles; 19 pairs; 6 triplets)**	**13 (12 supply; 1 domestic)**
• Background	14	21[b] (8 singles; 5 pairs; 1 triplets)	0
• FRO	6	12[c] (1 singles, 1 pair, 3 triplets)	1 (supply)
• GHO	12	9[d] (5 singles; 2 pairs)	5 (supply)
• LCO	5	8 (2 singles; 3 pairs)	0
• EVO	22	25 (8 singles; 6 pairs; 1 triplet)	7 (6 supply; 1 domestic)
• CMm	4	8 (1 single, 2 pairs, 1 triplet)	0

Notes:

Wells sampled as part of the Regional Drinking Water Program (RDWP) but included in the RGMP are grouped within the nearest Operation.

[a] Locations can have more than a single well (e.g.,: pairs or triplets at different screened depths (so-called well clusters)).

[b] Includes nine wells counted twice. Once in the Background Monitoring Report, and again in LCO (LC_PIZDC1307, LC_PIZDC1308, LC_PIZP1103, LC_PIZP1101), EVO (EV_MW_GV4A, EV_MW_GV4B), and CMm (CM_MW3-DP, CM_MW3-SH, CM_MW6-DP).

[c] Includes GH_MW-PC within GHO mine-permitted area and part of GHO SSGMP (counted twice on this table).

[d] Includes two single wells (GH_GA-MW-4 and GH_GA-MW-2) decommissioned in 2022.

Table N: Summary of SSGMP Groundwater Monitoring Locations

Operation/ Program	Locations[a]	Monitoring Wells	Supply/Domestic Wells
SSGMP	**74**	**101** (36 singles; 28 pairs; 3 triplets)	**7** (supply)
• FRO	20	28[b] (9 singles; 8 pairs; 1 triplets)	2 (supply)
• GHO	21	24[c] (10 singles; 7 pairs)	4 (supply)
• EVO	22	30[d] (13 singles; 7 pairs; 1 triplet)	1 (supply)
• CMm	11	19 (4 singles; 6 pairs; 1 triplets)	0

Notes:
Wells sampled as part of the Regional Drinking Water Program (RDWP) but included in the RGMP are grouped within the nearest Operation.
[a] Locations can have more than a single well (e.g.: pairs or triplets at different screened depths (so-called nested wells)).
[b] Includes GH_MW-PC within GHO mine-permitted area and part of GHO SSGMP (counted twice on this table).
[c] Includes two single wells (GH_GA-MW-4 and GH_GA-MW-2) decommissioned in 2022.
[d] Excludes one pair (EV_MCgwS and EV_MCgwD) decommissioned in 2022.

Table O: Summary of SSGMP and GWMP Groundwater Monitoring Locations

Operation/ Program	Monitoring Locations[a]	Monitoring Wells	Supply/Domestic Wells
LCO GWMP	5	8 (2 singles; 3 pairs)	0
LCO SSGMP	22	29 (15 singles; 7 pairs)	0

Notes:
[a] Locations can have more than a single monitoring well (e.g.,: pairs or triplets at different screened depths (so-called well clusters)).

A summary of potential sources of OC and possible transport pathways to groundwater were identified in the 2020 RGMP Updates and the 2021 SSGMP Updates (SNC-Lavalin, 2020; SNC-Lavalin, 2021a). Discussions in the report focus mainly on three of the OC (nitrate-N, sulphate, and dissolved selenium), as concentrations of dissolved cadmium were typically less than primary screening criteria and the RDL, or marginally above the RDL.

The results for the background groundwater monitoring, FRO, GHO, LCO (including Phase II GWMP), EVO and CMm and related RGMP Study Areas are presented in Appendices IV through IX, respectively. Results for wells sampled as part of the RDWMP are presented with the nearest Operation. Additional details including Universal Transverse Mercator (UTM) locations, elevations, well installation details, description of screened lithologies, and estimated hydraulic conductivities are provided in tables and borehole logs attached to each respective Operation Appendix.

The approved 2018 SSGMP and 2020 RGMP analyte lists and the field sampling methodologies including Teck's Best Management Practices are presented in Appendix X and XI, respectively. Certificate of Analyses (COAs) have been included for each Operation in Appendix XVI.

5 Groundwater-Surface Water Interactions in Management Unit 5

An assessment of potential surface water-groundwater interactions in MUs 1-5 was completed. Study Areas in MUs 1 to 4 are discussed above. Infiltration of the Elk River is interpreted to occur on the local-scale downstream of MU 4 based on results from the RDWMP (SNC-Lavalin, 2014). The degree to which surface water infiltration influences water quality in other downgradient MUs is variable and likely a function of a number of factors, including relative water levels in the river, its tributaries and the groundwater system, river morphology, river gradient, hydraulic properties of the streambed and valley bottom surficial deposits, distance from river and the degree of pumping from wells (SNC-Lavalin, 2017b). Where possible, Teck is currently monitoring private and municipal water wells in addition to surface water stations in MU 5. As there are no Teck related inputs of OC below MU4, it is inferred groundwater quality would likely be similar to, or better than that of Elk River surface water. Furthermore, Teck is undertaking a desktop study to better understand groundwater bypass at RWQM nodes in MUs 1 to 5, and the study findings and investigations are expected to be included in the 2023 RGMP Update and future annual report(s). Since surface water is the only transport pathway in this MU, the current monitoring programs are considered acceptable for understanding the degree of surface water groundwater interaction. Assessment of these data will be considered under the AMP and in future annual reports, as appropriate.

6 Summary of Results for AMP

The RGMP and/or SSGMPs are listed in the AMP as inputs to evaluations under MQs 1, 2, 3, 5, and 6. These programs collect data that either directly or indirectly support these MQs from these programs, or by informing the RWQM. The original 2020 RGMP Update (SNC-Lavalin, 2020a) provided updates to the following as part of Condition 2.6 of the July 9, 2020 ENV 2017 RGMP Update Approval Letter as follows:

- MQ 1: "*Will water quality limits and Site Performance Objectives (SPOs) be met for selenium, nitrate, sulphate and cadmium?*
- MQ 6: "*Is water quality being managed to be protective of human health?*"

In 2022, Teck adjusted some KUs and UUs related to groundwater. Existing groundwater UUs under MQ 1 and MQ 3 were consolidated under a new KU 1.3 and new UUs were added. These revisions are summarized in Figure A below.

Figure A: Summary of Changes to Groundwater-Related KUs and UUs Identified In the AMP

Groundwater KUs & UUs in 2021

KU 1.2. How will uncertainty in the Regional Water Quality Model be evaluated to assess future achievement of limits and SPOs?

- UU 1.2.2. Can the RWQM be improved in specific catchments where mitigation decisions are required and uncertainty is high?
- UU 1.2.3. How may selenium and sulphate release rates change over time?
- UU 1.2.4. What mechanisms are causing the reduction in mass observed between tributaries and at monitoring stations in the mainstems?
- UU 1.2.5. How do the nitrate source terms need to be adjusted to account for the loading from exchangeable ammonium (naturally present in the waste rock) in addition to the blasting residuals?

KU 3.2. What additional flow and groundwater information do we need to support water quality management?

UU 3.2.1. Is it necessary for water management structures (that collect surface water from mine-influenced water tributaries) to collect groundwater and / or be lined in order to achieve limits and SPOs?

2022 Groundwater KUs & UUs

KU 1.2. How will uncertainty in the Regional Water Quality Model be evaluated to assess future achievement of limits and SPOs?

- UU 1.2.2. Can the RWQM be improved in specific catchments where mitigation decisions are required and uncertainty is high?
- UU 1.2.3. How may selenium and sulphate release rates change over time?
- UU 1.2.4 How do the nitrate source terms need to be adjusted to account for the loading from exchangeable ammonium (naturally present in the waste rock) in addition to the blasting residuals?

KU 1.3. Is groundwater sufficiently understood to support appropriate representation in the RWQM?

- UU 1.3.1. What are the groundwater flow and load bypass at key regional monitoring locations (Order stations/compliance points/Water Survey of Canada locations)?
- UU 1.3.2. Are surface water – groundwater interactions sufficiently characterized to appropriately incorporate load and flow transport through these pathways in the RWQM?
- UU 1.3.3 What is the potential for inter-basin load transport to exist?
- UU 1.3.4. What mechanisms are causing the reduction in mass observed between tributaries and at monitoring stations in the mainstems?
- UU 1.3.5 What are the groundwater flow and load bypass at water management intake locations?

KUs/UUs changed | KUs/UUs re-numbered, unchanged | **New KU/UUs**

Activities to reduce KUs and UUs, and associated learnings, will be provided in the 2022 Annual AMP Report (in draft) to be submitted by July 31, 2023, and the 2023 RGMP Update.

A summary of updates and work progressed relating to the MQs listed above are provided below.

6.1 MQ 1 Update

6.1.1 UU 1.3.1

New UU 1.3.1, which asks, "What is the groundwater flow and load bypass at key regional monitoring locations (Order Stations/Compliance Points/Water Survey of Canada locations)?" is being addressed through the regional groundwater flow bypass, bedrock, and inter-basin flow study. The approach and findings of the study were presented to the GWG in Q2, Q3 and Q4 2022. A formal memo for this study is expected to be submitted to the GWG in 2023 and the progress of work included in the 2023 RGMP Update.

6.1.2 UU 1.3.2

New UU 1.3.2, which asks, "Are surface water-groundwater interactions sufficiently characterized to incorporate flow and load exchange and transport through these pathways in the RWQM?" is being addressed through the Integrated Surface Water Ground Model (ISGM). The ISGM model construction was progressed in 2022 in consultation with the ENV and KNC.

6.1.3 UU 1.3.3

New UU 1.3.3, which asks, "*What is the potential for inter-basin flow and load groundwater transport to affect the flow and load balance in the RWQM*?" will be informed by the regional groundwater bypass study, the ISGM model and the RGMP studies.

6.1.4 UU 1.3.4

Underlying Uncertainty 1.3.4: "*What mechanisms are causing the reduction in mass observed between tributaries and at monitoring stations in the mainstems?"* is addressed through several studies. The MBI began in 2019 to assess the nitrate-N and selenium load sinks in the Elk River and Fording River valleys, which will inform KU 1.3. The use of 'instream sinks' has been applied to account for the discrepancy between measured and modelled concentrations of selenium and nitrate-N (parameters indicative of mine-influence) in the RWQM. Without the sinks, the model over-predicts selenium and nitrate-N, whereas sulphate, which is typically considered to be a conservative constituent, is not over-predicted. The MBI has been investigating the effect of residence time in groundwater (Hypothesis 1) and biogeochemical removal mechanisms in groundwater (deep groundwater [Hypothesis 2a] and in hyporheic zones and ponds [Hypothesis 2b]). The MBI has also been investigating potential for high concentrations of naturally occurring sulphate in the Elk River Valley and potential role in the sulphate load balance. Areas of focus for the MBI have included: the Fording River downstream of FRO and upstream of GHO and LCO (Study Area 1), and the Elk River downstream of the GHO West Spoils (portion of Study Area 4). Information and understanding of groundwater conditions collected therein will be incorporated, as appropriate, into the RGMP. MBI field programs from 2019 to 2022 included: flow and load accretion studies, geophysical surveys, installation of hydrometric stations and surface water sampling, drive point investigations, drilling investigations, groundwater sampling and aquifer pumping tests. In October 2022, two interpretative reports (one for the Fording River Valley and one for the Upper Elk River Valley) were submitted to the ENV and KNC, presenting the findings of the MBI investigations to date. The Upper Elk River Valley investigation is considered relatively complete, and the Fording River Valley investigation had some uncertainties that the November-December 2022 drilling program were designed to address.

In addition to the MBI, groundwater bypass estimates for key surface water drainages were developed to be used as model inputs for the RWQM. The compilation included load balance analyses and flow bypass estimates focused on RWQM tributary nodes with the greatest OC load calibration errors. An update on characterization of RWQM nodes listed in Teck (2021c) as well as additional nodes where characterization work is ongoing is described below by Operation:

FRO

- **Clode Creek (FR_CC1):** Seepage from the Clode Creek Sediment Ponds has been investigated in support of the FRO-North Saturated Rock Fill (FRO-N SRF; Golder, 2021a). Monitoring wells FR_GCMW-1B and FR_GCMW-2 are located along an inferred pathway between the Clode Creek Secondary Sediment Pond and the Fording River and were added to the SSGMP in 2019 to address KU 1.3. Additional wells were also installed in 2022 (FR_MW22_BC-7A/B/C) to investigate the potential transport between the Clode Creek ponds and the Fording River and will be evaluated for potential inclusion in the FRO SSGMP when sufficient data are available to further reduce uncertainty.
- **Kilmarnock Creek (FR_KC1, FS_INF_K):** Groundwater bypass of the FR_KC1 and FRO-S AWTF intake has been the subject of extensive investigation for several years and is known to occur where Kilmarnock Creek loses water over the alluvial fan. Monitoring wells FR_KB-1, FR_KB-2, and FR_KB-3A/B were installed within the alluvial fan in 2018 and incorporated into the SSGMP in 2019 to address KU 1.3. An additional eleven monitoring wells (FR_KB-10MW, FR_KB-11MW, 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) were installed in 2021 as part of ongoing investigations to better understand the magnitude and fluctuation of groundwater volume and load bypassing the Kilmarnock Creek Intake (SNC-Lavalin, 2022b,c). Quarterly updates were provided to the GWG and a final assessment report was submitted to the ENV and KNC in December 2022. These wells will be evaluated for potential incorporation into the FRO SSGMP for the 2024 SSGMP Update to further reduce uncertainty.
- **Swift Creek and Cataract Creek (GH_SC1, GH_CC1):** Groundwater bypass of the FRO-S AWTF intake has been the subject of extensive investigation for the Swift Creek and Cataract Creek sediment ponds. Monitoring well FR_MW18-02 (Swift Creek) was incorporated into the SSGMP in 2021 to address KU 1.3. While reporting for Cataract Pond is ongoing, seepage estimates for the Swift Creek Sediment ponds were concluded to be minimal. Updates from these studies were provided to the GWG and a final assessment report for Swift Creek Sediment Ponds was submitted to the ENV and KNC in December 2022. The additional monitoring wells installed in support of the seepage studies may be considered for incorporation into the SSGMP if necessary when sufficient data are available.

GHO

- **Porter Creek (GH_PC1):** Nested monitoring wells GH_MW-PC4A/B were installed in 2021 to assess potential bypass in the Porter Creek alluvial fan. A flow and load accretion study was completed in 2021 in Porter Creek to assess surface water/groundwater interaction along Porter Creek. A groundwater study was conducted in this catchment in 2021 to inform potential mitigation related decisions (Teck, 2021a). Nested monitoring wells GH_MW-PC5A/B and well GH_MW-PC6 were installed in 2022 to investigate potential groundwater movement through bedrock and seepage along Porter Creek.
- **Greenhills Creek (GH_GH1):** Fourteen additional monitoring wells were installed along the GHO Fording River valley bottom area in 2021. Numerical groundwater modelling focused on this area was conducted in 2022, with reporting underway in early 2023. This modelling will further inform on constituent transport in the Greenhills Creek alluvium and the influence of GHO supply well pumping on instream flows in the lower reaches of Greenhills Creek in addition to the Fording River, and will be incorporated into the 2023 RGMP Update for Study Area 3.

- **Thompson Creek (GH_TC1):** The Upper Elk River Valley MBI investigation identified two groundwater flowpaths in the Elk River Valley bottom near GH_TC1: Flowpath 1 and Seasonal Flowpath 2. The travel time calculated for these two flowpaths was the same, and ranged from 0.6 to 9.6 years, with a geometric mean of 2.4 years. Additional details pertinent to reducing the uncertainty related to KU 1.3 for this station can be found in the Hydrogeological Interpretive Report for the Upper Elk River Valley (SNC-Lavalin, 2022b).

LCO

- **Lower Dry Creek, LCO Dry Creek by the Mouth (LC_DC1):** Losing conditions were measured in a flow accretion study over an inferred alluvial fan deposit (SNC-Lavalin, 2020a) near LC_DC1 and groundwater bypass of this station could potentially occur. New monitoring well cluster RG_MW_DC1A/B were installed in 2021 to reduce this uncertainty.
- **Line Creek (LC_LCDSSLCC):** Surface water and groundwater leaving the LCO Phase I site is funneled through the Line Creek canyon, but this surface water station appears to be within a gaining reach (Golder, 2021b) with discharge from groundwater occurring downstream of this station and prior to the canyon. Therefore, there is potential for groundwater bypass. Clustered wells LC_MW_CP1A/B were installed in 2021 to reduce this uncertainty.
- **West Line Creek (LC_WLC):** There is an existing AWTF in West Line Creek (WLC) and potential groundwater bypass of the existing intake is currently being studied to understand the magnitude of groundwater bypass at the intake location (Golder, 2021b). Monitoring wells have been installed (LC_MW_WLC-1A, LC_MW_WLC-2A, and LC_MW_WLC-3A) to better understand WLC aquifers. The geology at these new locations consisted of an incised bedrock valley, filled with glaciofluvial sands and gravels interbedded with glaciolacustrine clay lenses. A 7-day pumping test was conducted by Tetra Tech to assess aquifer parameters and to inform groundwater bypass. Reporting on this work is ongoing.
- **Elk River (EV_ER4):** Monitoring well pair LC_MW_ER4A/B were installed in late 2020 as part of the RGMP. Results from quarterly monitoring of this well pair indicated the shallow aquifer is transporting some load of OC from the Elk River, but the deep aquifer is not. New monitoring well pairs LC_MW_SRD1A/B and LC_MW_SRD2A/B were installed in 2021 to improve understanding of potential bypass from the ERX CCR.

EVO

- **EVO Dry Creek Sediment Pond Decant (EV_DC1):** EVO Dry Creek is a tributary of Harmer Creek. Wells EV_MW_DC1 through EV_MW_DC7 were installed near the Dry Creek Sediment Pond either in overburden or bedrock to better understand groundwater flow, groundwater quality and groundwater-surface water interactions and to assess the potential of infiltration occurring from the pond (Golder, 2021c; Golder 2021d; Lorax, 2019). Groundwater monitoring and sampling results from these wells will be reviewed and select wells may be added to the SSGMP to further reduce uncertainties.
- **Harmer Creek (EV_HC1):** Potential groundwater bypass through seepage losses at the Harmer Reservoir will be assessed through continued monitoring of nested wells EV_GV3gwS/EV_GV3gw and newly installed wells EV_MW_HC1 through EV_MW_HC5. Results from EC_MW_HC1 through EV_HW_MC5 will be reviewed and select wells may be added to the SSGMP. The network will ultimately reduce the uncertainty related to KU 1.3 for this station.

- **Erickson Creek at Mouth (EV_EC1) and Intake (EV_ECBridge):** There is uncertainty with regards to the groundwater flow component at the confluence of Erickson Creek and Michel Creek. Flow monitoring, water quality and flow accretion studies are helping to reduce this uncertainty. Groundwater and surface water components of flow were investigated at the Erickson Creek Intake to the EVO Saturated Rockfill Treatment Facility (SRF). Wells EV_MW_EC3A/B were installed in 2021 to investigate groundwater flow and quality in this area and whether mine-influenced groundwater is bypassing the intake. During drilling, significant hydrostatic pressures (above ground surface artesian conditions) were encountered, which prevented further wells from being installed. Surface and groundwater flow, groundwater quality measurements, and flow accretion studies are being done to gain an improved understanding of any groundwater that may bypass the intake and reduce uncertainty.
- A water and load balance for Erickson Creek and Michel Creek is also being conducted as part of Condition 4C3.4 in Permit 107517, which should address uncertainty related to surface water – groundwater interaction near EV_EC1 as well as EV_MC2 and EV_ER1. Reporting for this work is currently underway and expected to be complete in 2023.

CMm

- **Michel Creek (CM_MC2):** At CMm, all surface water and groundwater leaving the mine site is inferred to funnel through the Michel Creek valley bottom. To date, improving understanding to help inform MQ 1 at CMm has been addressed through flow and water quality measurements being collected along Michel Creek to understand loading of OCs along the west side of CMm. Monitoring wells were installed near CM_MC2 (near the confluence of Andy Good Creek and Michel Creek), and additional wells are to be installed in early 2023, and will further facilitate a better understanding of groundwater bypass leaving the general area of CMm. Flow and load accretion studies on Corbin Creek, Michel Creek, and Andy Good Creek was completed in 2022 (Appendix IX) and will help to further reduce uncertainty.

As appropriate, the above information will continue to be evaluated and incorporated into the subsequent RGMP and SSGMP reports, where possible.

In addition, Teck will be conducting a review of available groundwater information to identify data gaps related to potential bypass and aquifer storage at relevant main stem monitoring locations and Water Survey of Canada (WSC) stations. The steps for this were further clarified for input at GWG meetings. To track this, Teck will be adding new key/underlining uncertainty to the AMP under the appropriate management question to address how uncertainties related to potential bypass of mainstem nodes and delays related to aquifer storage could impact the RWQM calibration and future projections.

6.1.5 UU 1.3.5

There are currently a number of areas where groundwater studies are being conducted to support planned water quality management through AWTF or SRF to address UU 1.3.5: *“What are the groundwater flow and load bypass at water management intake locations?”*:

- **FRO-S AWTF:** Groundwater studies of Kilmarnock, Swift and Cataract Creek Sedimentation Ponds;
- **FRO-N SRF:** Groundwater studies at Clode, Liverpool and Post Ponds, Turnbull Bridge Spoils, Henretta Pit lake, and the backfilled pits and downgradient areas in Clode Creek catchment;
- **GHO Greenhills Creek and East Spoil:** Desktop assessment of subsurface bypass and related uncertainty for planning and design of future constituent load mitigation in Greenhills Creek;
- **LCO Line Creek including West Line Creek:** Groundwater studies of potential groundwater bypass of the existing intake are currently being undertaken to understand the magnitude of groundwater bypass at the intake location; and

- **EVO F2 SRF:** Groundwater studies of backfilled F2 pits and downgradient areas in Erickson Creek catchment.

Groundwater investigations related to each of these planned or potential mitigations are ongoing. Findings from these studies are anticipated to reduce UU 1.3.5, which is specifically related to whether groundwater should be collected and/or tributary lined to achieve limits and SPOs.

In 2021, Condition 4D2.4 AMP Studies was added under Permit 107517 ENV: "*The permittee must develop and implement the following studies under the AMP to resolve uncertainties regarding operation of the Kilmarnock Clean Water Diversion and the need for additional flow and groundwater information to support water quality management in FRO-S. The study designs must be submitted to the director and KNC by April 30, 2021. The permittee must provide quarterly updates to ENV and KNC on implementation of the work plans. This enhanced engagement will end when written notice is provided by the director.*"

ii. Uncertainty: Kilmarnock Creek Intake groundwater load bypass study. The study must resolve the uncertainty related to the magnitude and seasonal fluctuation of groundwater load bypassing the FRO-S AWTF Kilmarnock Creek Intake.

- The Kilmarnock Creek Intake Groundwater Bypass gap analysis and work plan was submitted to ENV and KNC in April 2021 (SNC-Lavalin, 2021c). A hydrogeological investigation progressed in 2021, designed to increase understanding of the magnitude and fluctuation of groundwater volume and load bypassing the Kilmarnock Creek Intake. Field investigations included drilling and monitoring well installation, geophysics (including borehole geophysics and electrical resistivity tomography (ERT)), a pumping test, flow and load accretion studies, and water quality sampling/monitoring. The 2022 investigation analysis and reporting (SNC-Lavalin, 2022b) addressed the following data gaps identified in the gap analysis and work plan (SNC-Lavalin, 2021c):
  - The extent of the fluvial gravel channel deposits, which comprise the preferential pathway for groundwater bypass;
  - The extent of the zone of groundwater bypass; and
  - Future changes to the hydrogeological conditions associated with the AWTF-S and Kilmarnock Clean Water Diversion (KCWD) infrastructure.

  However, in regards to the third gap, review of the limited data collected since activating the KCWD in mid-October 2021 indicates that dissolved concentrations could have changed within Study Area. Groundwater monitoring is ongoing monitoring to provide additional insight.

iii. Uncertainty: Fording River valley groundwater study. The study must resolve uncertainty related to the parameter of concern groundwater plume and load in the Fording River valley bottom between well FR_GH_WELL4 and FR_FRABCH.

- Hydrogeological conditions in the Fording River valley bottom between FR_GH_WELL4 and FR_FRABCH is an area of focus for the MBI. Interpretive hydrogeological reporting for the MBI was completed in Q4 of 2022. A separate deliverable is proposed to specifically address uncertainty 4D2.4iii. Teck is also assessing the use of additional active and passive investigation methods to address uncertainty and comments from the GWG.

Table P presents how the 2022 SSGMP and/or RGMP address and/or reduce UU 1.3.5 in select areas.

Table P: 2022 SSGMP and RGMP Activities Addressing UU 1.3.5

Location	Program Addressing UU 1.3.5	RGMP/SSGMP Monitoring Wells Sampled to Address UU 1.3.5
Kilmarnock Creek Alluvial Fan	FRO SSGMP and RGMP Study Area 1	**Within the alluvial fan:** FR_KB-1, FR_KB-2, FR_KB-3A/B, FR_MW-SK1A **Downgradient:** FR_09-01A/B, and FR_09-02A/B, FR_GH_WELL4, RG_MW_FR1A/B/C, RG_MW_FR8A/B/C, RG_MW_FR10A/B/C
Clode Creek and Turnbull Spoils	FRO SSGMP	FR_TBSSMW-1, FR_TBSSMW-2, FR_GCMW-1B, and FR_GCMW-2
Swift Creek	FRO SSGMP	FR_MW18-02
Erickson Creek	EVO SSGMP and RGMP Study Area 10	EV_WF_SW, EV_ECgw, and EC_MW_SP1A/B/C
West Line Creek	LCO SSGMP	LC_PIZ1206A, LC_PIZ1206C LC_PIZ1207A, LC_PIZ1207B, LC_PIZ1210B, LC_PIZ1210C, LC_PIZ1211N, and LC_PIZ1212

Groundwater monitoring and sampling will continue as part of the RGMP and SSGMPs. The SSGMP was updated in October 2021 for each operation and may have included additional monitoring locations from ongoing groundwater investigations to further reduce uncertainty related to UU 1.3.5.

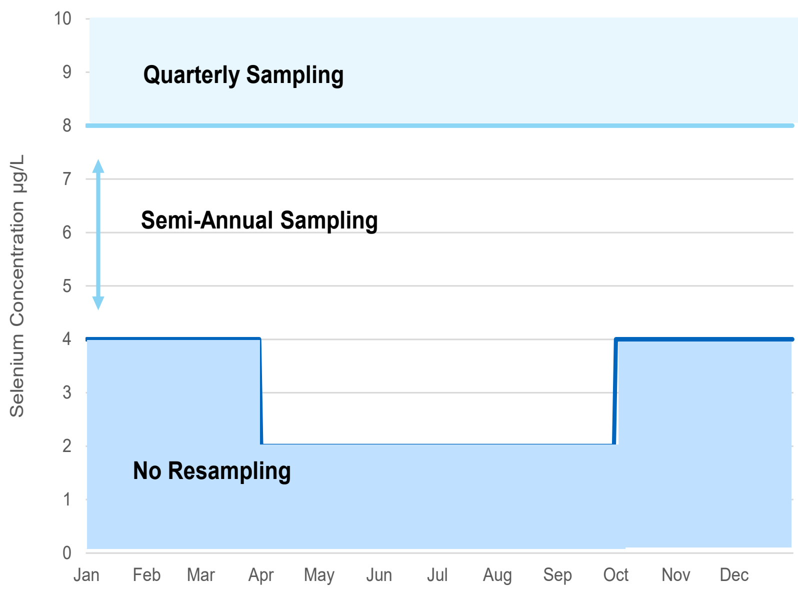
6.2 MQ 6 Update

MQ 6: *"Is water quality being managed to be protective of human health?"* specifically considers groundwater as it relates to human health. In 2022, a total of 176 monitoring wells (84 RGMP and 92 SSGMP) were monitored and sampled as part of the RGMP and SSGMPs. Results from the programs were generally consistent with previous years results. Monitoring will continue and gaps in knowledge will be filled under the RGMP and SSGMP. Additional groundwater monitoring locations are planned for installation in 2023 to increase the background monitoring network and to fill gaps identified in the RGMP in Study Areas 1, 2, 3, 5 and 7. Updates to the relevant KUs are discussed in detail in the 2020 RGMP Update and 2021 SSGMP Update and summarized below.

6.2.1 KU 6.1

KU 6.1: *"Is our understanding of local groundwater conditions for current and future drinking water use sufficient to minimize human exposure to constituents*?" relates to whether an understanding of groundwater is sufficient to minimize human exposure. In 2014, Teck initiated the RDWMP in the Elk Valley and monitors private and municipal wells, screening against the BC Source Drinking Water Quality Guidelines (BCSDWQG). Although participation in the program is optional, Teck undertakes significant public outreach activities to encourage landowners and well operators to join the RDWMP. Analytical results from private wells are typically confidential and therefore, not presented in the annual report; however, Teck has installed monitoring wells near some DW wells for which data is included in this report. In 2022, Teck sampled 57 DW wells for mine-related constituents. Sampling frequency was determined based on the usage and an understanding of historical water quality (Figure B).

Figure B: Monitoring Frequency for Regional Drinking Water Wells in the Elk Valley (Teck, 2014)



Note: Figure B shows the minimum sampling frequency, additional sampling is conducted on a case-by-case basis.

In 2022, the analytical results indicated that concentrations of selenium were greater than the BCSDWQG at 11 wells; three of the 11 wells also contained sulphate concentrations greater than the BCSDWQG. Water quality results were provided to the respective well users and mitigation measures such as delivery of potable water, installation of new well or the installation of a water treatment system, reverse osmosis system were applied, as appropriate.

All Study Areas contain valley bottom sediments that could function as aquifers for current or future DW use. An update by Study Area as they relate to this KU is provided below:

- In Study Area 1, groundwater quality generally does not meet primary screening criteria for DW. There are currently no DW receptors in Study Area 1 and therefore only future DW use is considered. From 2020 to 2022, 30 monitoring wells have been installed in Study Area 1 in support of the MBI, and 43 wells have been installed as part of the Kilmarnock Creek groundwater study. Both of these studies will reduce uncertainty related to KU 6.1. Several monitoring wells installed in support of the MBI have already been incorporated into the RGMP and/or SSGMP. The remaining monitoring wells are being monitored and sampled quarterly for the MBI program and will be evaluated for potential inclusion in the SSGMP and/or RGMP once sufficient data are available and interpretive reporting has been completed. However, given the lack of current groundwater usage and residential development in the Fording River valley, the potential for DW use in near future is considered very low. Treatment of mine-influenced water by the FRO-N SRF and FRO-S AWTF are expected to improve groundwater quality in Study Area 1 in the future.
- In Study Areas 2, groundwater quality was less than the primary screening criteria for OCs. The monitoring well network was expanded in 2021 with the construction of a monitoring well cluster in Study Area 2 (RG_MW_DC1A and RG_MW_DC1B), where LCO Dry Creek discharges to the Fording River. The objective of this work was to better understand the groundwater and surface water interactions of mapped permeable fluvial sediments (the LCO Dry Creek alluvial fan). Data is being collected as part of ongoing monitoring with results discussed in Appendix VII.

- In Study Areas 4, 7, 9, and 12, groundwater quality generally does not meet primary screening criteria for DW in some areas. The aquifers in these Study Areas are currently being used as a DW source, and private and municipal water wells that could potentially yield elevated levels of mine-related constituents, are monitored through the Teck RDWMP. In 2021, flow and load accretion studies were carried out on Michel Creek (south of EVO) to assist with interpreting losing zones of Michel Creek and its influence on groundwater quality in the aquifer in Study Areas 9 and 12. The results indicated active local groundwater-surface water interaction, with infiltration of surface water-to-groundwater being the primary pathway for OCs in the Gate Creek Pond area. Early warning triggers considering the surface water-groundwater relationship have also been developed by Azimuth (2021). These proposed triggers are discussed in more detail in Section 6.2.3, where they are compared to 2022 analytical data for select surface water stations.
- In Study Areas 6, groundwater quality was less than the primary screening criteria for OCs, except for dissolved selenium at LC_MW_ER4B. There are currently no DW receptors in Study Area 6 and therefore only future DW use is considered. In 2021, two well clusters: LC_MW_SRD1A/B and LC_MW_SRD2A/B were installed in Study Area 6 and will be assessed for inclusion to SSGMP for LCO.
- In Study Areas 8, 10, and 11, groundwater quality was less than the primary screening criteria for OC.
- Uncertainty relating to local groundwater conditions in Study Areas 3 and 5 have been addressed through the installation of new monitoring wells in these Study Areas, which is anticipated to reduce uncertainty related to KU 6.1. Summaries for both Study Areas are presented in the Executive Summary section of this report. Details for Study Area 3 are presented in Section 1.6 of Appendix VI GHO 2022 SSGMP and RGMP Report. Details for Study Area 5 are presented in Section 1.7.1.2 of Appendix VII LCO 2022 SSGMP and RGMP Report.

6.2.2 KU 6.2

KU 6.2 asks, *"Is the spatial extent of mine-influenced groundwater sufficiently characterized to manage water quality in order to support meeting the environmental objectives of the EVWQP?"* Study Areas 1 and 4 have a known groundwater pathway. Understanding of the spatial extent of elevated OC concentrations in these Study Areas have improved and have been investigated through the MBI Study. While the MBI is focused towards understanding groundwater as it relates to the uncertainties in the RWQM, the data collected is also anticipated to reduce the uncertainty as it relates to KU 6.2. Continued quarterly monitoring of existing MBI wells is planned for 2023, as part of the MBI. Remaining uncertainty related to KU 6.2 will be re-assessed after these studies have been completed.

At LCO, the valley bottom deposits downgradient of the mine site (RGMP Study Areas 5 and 6) could be used for future for DW purposes and aquifers in Study Area 7 are currently used for DW. There are gaps in understanding the surface water losses in the Line Creek alluvial fan, the effects of the CCR on the valley bottom aquifers downgradient of the Process Plant, and ultimately spatial extent of mine-influenced groundwater is not well understood. Data from the newly installed monitoring wells listed above will assist in filling these gaps, which is anticipated to reduce the uncertainty related to KU 6.1 and 6.2.

6.2.3 KU 6.3

KU 6.3 considers "*What are appropriate groundwater-related triggers and how can they be used?".* Groundwater triggers have been developed and additional options are being evaluated for implementation in monitoring programs. Trigger development has been conducted in consultation with the GWG. Two types of triggers are currently being evaluated for suitability, as they relate to transport pathway and receptor:

- Surface Water-to-Groundwater/Drinking Water Triggers (also referred to as Surface Water Pathway Early Warning Triggers) – triggers related to infiltration of surface water elevated in mine-related constituents to DW aquifers; and
- Groundwater-to-Drinking Water Triggers (also referred to as Groundwater Pathway Early Warning Triggers) – triggers related to transport of mine-related constituents through groundwater to DW aquifers, not related to surface water recharge.

An update on these triggers is provided below.

6.2.3.1 Surface Water Pathway Early Warning Triggers

Surface Water Pathway Early Warning Triggers were developed in 2020 and presented to the EMC at the Q2 2020 and Q3 2020 GWG meetings. The triggers were revised to incorporate additional GWG comments and re-submitted on November 23, 2021. The finalized triggers were included in the 2021 AMP Update (Teck, 2021b).

The approach taken to develop additional early warning triggers (EWTs) was to use the conceptual model for surface water-groundwater hydraulic connectivity to establish EWTs in surface water. A key outcome was to enable proactive identification of potential changes in constituent concentrations that may affect hydraulically connected downstream DW wells. In addition, the use of surface water was considered due to the availability of frequent, long-term data.

Azimuth prepared a memorandum (AMP Technical Memo MQ6-KU6.3-2021) describing proposed groundwater location and triggers associated with the surface water-to-groundwater pathway for the protection of DW users in identified populated areas of the Elk Valley downstream of Teck's operations (Azimuth, 2021). Surface water quality from six locations were analyzed as part of the assessment: GH_ERC, GH_ER1, EV_ER4, EV_ER1, CM_CC1, and EV_MC2 (shown on Drawing 9, Table I Section 2.1.4. The focus of the assessment was on mine-related OCs. Trigger values were developed by comparing monthly monitoring data from 2010 to 2016 (considered to be baseline) against applicable screening criteria.

Monthly mean values were calculated from the 2022 analytical dataset for the six surface water locations. Results were compared to the unitless calculated trigger values shown in Table J and Table K (within Section 2.1.4. Where concentrations were less than the analytical detection limit, the detection limit was used for calculation. Table Q presents the number of monthly means in 2022 greater than the established trigger criteria.

Table Q: 2022 Surface Water Results Exceeding Trigger Criteria

Station	GH_ERC	GH_ER1	EV_ER4	EV_ER1	CM_CC1	EV_MC2
Antimony	0	0	0	0	0	0
Cadmium	0	0	0	0	-	0
Colbalt	0	0	0	0	0	0
Molybdenum	0	0	0	0	0	0
Nickel	0	0	0	0	5	0
Nitrate-N	0	0	0	0	0	0
Nitrite-N	0	0	0	0	0	0
Selenium	0	0	-	10	-	-
Sulphate	0	0	0	0	-	0
TDS	0	0	1	0	0	1
Uranium	0	0	0	0	0	0

Notes:
"-" denotes trigger value could not be computed as baseline mean exceeded screening values.
Shaded values denote number of monthly mean greater than the trigger criteria.

Results for 2022 from the trigger assessment identified mean concentrations were less than the trigger criteria, with the exception of dissolved nickel at CM_CC1, dissolved selenium at EV_ER1, and TDS at EV_ER4 and EV_MC2. Dissolved selenium was greater than the trigger criteria of 5.70 µg/L at EV_ER1 (along the Elk River in Study Area 12) in every month in 2022, except in June and July, which was is generally similar with previous 2020 and 2021 observations (SNC-Lavalin, 2021b, 2022a). In 2022, the greatest monthly mean for selenium at EV_ER1 was measured in April, with a concentration of 16.49 µg/L. TDS was greater than the trigger criteria at EV_ER4 and EV_MC2 in December for both wells. Monthly mean concentrations of nickel at CM_CC1 exceed the trigger criteria for five months in 2022 (January, February, July, August, and September).

6.2.3.2 Groundwater Pathway Early Warning Triggers

Groundwater Pathway Early Warning Triggers continue to be under evaluation with respect to feasibility and implementation. At present, it is not certain how effective they will be since there is not enough information for evaluation. Groundwater conditions are constantly being refined/characterized in Study Areas where a groundwater transport pathway has been identified, which contributes to the difficulty of implementing triggers. Key to trigger development is the presence of sentry/sentinel wells with current concentrations less than DW standards and a suitably sufficient travel time for a response that can be actioned by the trigger. Preliminary review of the data has been undertaken with some initial observations. Once this review is complete, the results and report will be provided for review. This information will be included as part of the in the upcoming RGMP Update and subsequent Annual Reports.

It is anticipated that if triggers were to be developed for the groundwater pathway, they would not be applied regionally. Rather, they would be developed for select, localized areas such as the monitoring wells installed in DW aquifers. New wells are considered for installation in the Elkford that will be evaluated for suitability as sentry wells. The next steps for trigger development will be to analyze data from wells to understand whether triggers will be effective in achieving objectives through a defined response framework. A further update on groundwater trigger development will be provided in a future Annual Report, RGMP Update Report, and Adaptive Management Plan.

7 Conclusions

SNC-Lavalin has reviewed and compiled groundwater and surface water information available from the 2022 SSGMP and RGMP. The 2022 Annual Report has been written to meet the requirements outlined in Permit 107517 (amended December 19, 2022).

8 Recommendations

Recommendations identified in the SSGMP for FRO, GHO, LCO, EVO and CMm and the RGMP are presented in the tables below.

8.1 Background Monitoring Locations

Table R: Summary of New and Outstanding Recommendations - Background 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).
	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.
	It is recommended that RG_MW_AC1A/B should have pressure transducers installed.
	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.
	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.
	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.

8.2 Fording River Operations

Table S: Summary of New Recommendations - FRO SSGMPs and RGMP Study Area 1

Program	Recommendation	Rationale
Site-Specific Groundwater Monitoring Program		
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.

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

Program	Recommendation	Rationale
Site-Specific Groundwater Monitoring Program (Cont'd)		
FRO SSGMP (Cont'd)	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.
	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 T: Summary of Outstanding Recommendations - FRO SSGMP and RGMP Study Area 1

Program	Recommendation	Rationale
Site-Specific Groundwater Monitoring Program		
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.
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.

8.3 Greenhills Operations

Table U: Summary of New Recommendations - GHO SSGMP and RGMP

Program	Recommendation	Rationale
RGMP	Review new data collected under Regional Groundwater Flow Bypass, Bedrock, and Inter-basin Flow Study and incorporate relevant findings into 2023 RGMP Update to refine characterization of potential sources of OC at RG_DW-01-03	The source and dynamics of dissolved selenium concentrations at RG_DW-01-03 are not understood.
SSGMP	Install a pressure transducer in GH_MW-PC4A	Compare water levels in this monitoring well to those in nearby wells and Porter Pond.
SSGMP/RGMP	Reduce sampling at GH_MW-MC-1D to biannually	Historical data has established that OC concentrations are generally below the RDL. Sampling twice per year is sufficient monitoring for this well going forward.

Table V: Summary of Outstanding Recommendations - GHO RGMP

Program	Recommendation	Rationale
RGMP - Study Area 1	Review results of ongoing MBI and Porter Creek investigations to assess the potential groundwater transport of OC from the Porter Creek catchment.	Refine understanding of this flow and load input to Study Area 1.
RGMP - Study Area 3	Assess results from GHO Greenhills-Fording Aquifer Study drilling program to consider potential inclusion of the new monitoring wells in the GHO SSGMP.	Assess the potential groundwater bypass of GH_FR1 and consider replacement of the existing supply wells in the RGMP and GHO SSGMP with new monitoring given the supply wells may not be adequately monitoring this gap.
RGMP - Study Area 4	Assess results of isotope samples (^{18}O-H_2O, $^{2}HH_2O$, tritium and sulphate) at GH_MW-MC-2D and GH_MW-MC-1D. If results are inconclusive, further field investigation of the groundwater flow regime will be conducted.	Determine the source of elevated dissolved selenium at well GH_MW-MC-2D.
	Assess results from MBI investigation downgradient of Thompson Creek watershed to consider potential inclusion of new monitoring wells into SSGMP/RGMP.	Assess the potential groundwater bypass of GH_ERC.

8.4 Line Creek Operations

Table W: Summary of New Recommendations - LCO GWMP/SSGMP and RGMP Study Area 6

Area	Recommendation	Rationale
Groundwater Monitoring Program, Site-Specific Groundwater Monitoring Program		
LCO Phase II	Replace or repair artesian control measures at LC_PIZDC1306 and RG_MW_DC1A.	To control artesian flow, to prevent potential damage to well from freezing conditions, and obtain better continuous water level measurements.
Site-Specific Groundwater Monitoring Program		
Process Plant	Discontinue water level monitoring at LC_PIZP1003 as part of the monitoring program. Decommissioning of this well is recommended.	There is large diameter tubing in the well believed to be interfering with water level measurements. The large diameter tubing could be removed to facilitate water level measurements; however, LC_PIZP1001 is in the same general area with a similar screen interval. Water level monitoring is conducted at LC_PIZP1001 as part of the existing program.
	Investigate alternative sampling methods for LC_PIZP1105 such as a stainless-steel bailer.	Bladder pump installation attempted in 2022 was unsuccessful to address historically high turbidity levels at this well. Continued monitoring is recommended given concentrations of non-OC parameters.
Regional Groundwater Monitoring Program		
Study Area 6	A study was conducted to evaluate groundwater flow paths from the ERX CCR deposit towards Grave Lake as part of the ERX CCR Phase 2 Project (Teck, 2022). This study should be reviewed as part of the next RGMP Update.	To facilitate understanding of groundwater flow in this area.

Table X: Summary of Outstanding Recommendations - LCO GWMP/SSGMP and RGMP Study Areas 5 and 6

Program	Recommendation	Rationale
Groundwater Monitoring Program, Site-Specific Groundwater Monitoring Program		
Phase II	Quarterly monitoring of water levels at LC_PIZDC1306 and no water quality sampling as the OC concentrations are below primary screening levels, there is a relatively long period of record, and concentration trends are stable or decreasing based on a Mann-Kendall (MK) statistical analysis. This well is located in Upper LCO Creek, east of the Head Pond Diversion Structure.	Included in the 2021 SSGMP Update. Pending regulatory approval.

Table X (Cont'd): Summary of Outstanding Recommendations - LCO GWMP/SSGMP and RGMP Study Areas 5 and 6

Program	Recommendation	Rationale
Groundwater Monitoring Program, Site-Specific Groundwater Monitoring Program (Cont'd)		
Phase II (Cont'd)	Reduce sampling frequency to twice per year at LC_PIZDC1307 and LC_PIZDC1308 because OCs are less than primary screening levels, baseline chemistry data has been established and OC trends are stable or decreasing according to Mann-Kendall statistical analysis.	Included in the 2021 SSGMP Update. Pending regulatory approval.
Site-Specific Groundwater Monitoring Program		
Process Plant	Reduce manual water level measurement frequency to twice a year for the following wells: LC_PIZP1001; LC_PIZP1002; and LC_PIZP1003. Groundwater levels for these wells are only needed to augment interpretated groundwater flow direction at the Process Plant. Recommend continuous groundwater level monitoring of all three wells.	Included in the 2021 SSGMP Update. Pending regulatory approval. Pressure transducers have been installed in LC_PIZP1001 (2020) and LC_PIZP1002 (2022). A Solinst Levelogger could not be installed in LC_PIZP1003 due to insufficient space because of large diameter tubing in the well. Decommissioning of LC_PIZP1003 is recommended in 2022.
Process Plant (Cont'd)	Reduce monitoring to twice a year at LC_PIZP1101 and LC_PIZP1103 because OCs are less than primary screening levels, baseline data has been established (currently 5 years of data) and OC trends are generally stable or decreasing according to Mann-Kendall statistical analysis. An increasing nitrate trend was noted in 2022 but at concentrations below primary screening criteria.	Included in the 2021 SSGMP Update. Pending regulatory approval.
	Redevelop repaired well LC_PIZP1101 prior to next round of sampling and assess whether water quality is representative of the aquifer. Conduct new geodetic survey of ground surface and top of casing. Deploy protection measures to mitigate future damage.	Included in the 2022 Annual Report. Well repairs have been completed. Well development, survey, and deployment of protection measures are still pending.
Regional Groundwater Monitoring Program		
Study Areas 5/6	Teck has existing water supply wells near the top of the Line Creek alluvial fan. It may be possible that one or some of the existing water supply wells near LC_LC4 can provide supplemental information to facilitate characterization of groundwater - surface water interactions in the alluvial fan. Assess available relevant data for inclusion into the SSGMP and potentially validate through monitoring.	Included in the 2020 RGMP Update. In progress. Groundwater withdrawals from two pumping wells have been incorporated into the 2022 annual SSGMP report.

8.5 Elkview Operations

Table Y: Summary of New Recommendations - EVO SSGMP and RGMP

Program	Recommendation	Rationale
Site-Specific Groundwater Monitoring Program		
EVO SSGMP	Decommission RG_MW_GCA. Conduct a field reconnaissance of the area and identify a suitable location to install a replacement well.	Attempted development of the well twice, however turbidity continues to increase with each sampling event.
	Continue to collect quarterly water samples from Sparwood Ridge discharge points: EV_SPR5, EV_SPR2B, EV_SPR6, EV_SPR7, EV_SPR14, and EV_SPR17.	Evaluate influence of Sparwood Ridge on Michel Creek chemistry.
	Collect quarterly water samples at Bodie Seep in Study Area 9b.	Determine influence of Bodie Seep on Michel Creek chemistry. Bodie Seep may represent groundwater conditions within the former Balmer Mine North.
	Conduct hydraulic conductivity testing at EV_MW_BC2 and EV_MW_BC3.	The hydraulic conductivities of these two wells were previously estimated by Golder (2019a), however the result for EV_MW_BC3 was anomalously low (2 x 10-7 m/s), considering that it is screened in fine sand to fine gravel.

Table Z: Summary of Outstanding Recommendations - EVO SSGMP and RGMP Study Areas 7 and 10

Program	Recommendation	Rationale
Site-Specific Groundwater Monitoring Program		
EVO SSGMP	Survey surface water station at Goddard Creek (EV_GC2) to a geodetic datum[1].	Improved characterization of groundwater/surface water interaction.
	Results from the groundwater investigation planned for Lagoon D decommissioning should be reviewed[1].	Evaluate whether additional wells (including shallow groundwater near EV_OCgw) are recommended for this area and for inactive Lagoons A-C to evaluate shallow groundwater.
	Review results from investigation activities planned west of Cedar North Pit to Elk River and south to Michel Creek (Permit 107517 Condition 8.2.4) [1].	Assess possible transport pathways of mine-influenced groundwater within faults and fractures connecting to Cedar North Pit.
	Continue monitoring chemistry at EV_MW_MC3 and at nearby EV_SPR1B quarterly and review isotope results[1].	Further evaluate selenium sources at base of Sparwood Ridge near Michel Creek.
	Survey surface water station at Gate Creek (EV_GT1) to a geodetic datum[1].	Improved characterization of groundwater and surface water interactions.
	Review contaminant load study related to condition 4C3.4ii in Permit 107517[1].	Evaluate if a load imbalance along Michel Creek exists.
	Sample newly installed monitoring wells in Erickson Creek (EV_MW_EC3A/B) for at least two years. Assess analytical results in 2023 for potential inclusion in the SSGMP[1].	Additional upgradient monitoring points in Erickson Creek area.

Table Z (Cont'd): Summary of Outstanding Recommendations - EVO SSGMP and RGMP Study Areas 7 and 10

Program	Recommendation	Rationale
Site-Specific Groundwater Monitoring Program		
EVO SSGMP (Cont'd)	Sampling frequency at EV_BALgw, EV_LSgw, EV_OCgw, EV_GCgw, EV_MW_MC1A, EV_MW_MC2A, EV_MW_AQ1, EV_MW_AQ2, EV_MW_MC4, EV_MW_SPR1A, EV_MW_GT1A, and EV_BCgw should be reduced to semi-annual[1].	Based on low and/or stable OC concentrations.
	Remove monitoring well EV_WF_SW from the SSGMP[1].	The well is screened below 159 m of waste rock and concentrations of OC are less than the primary screening criteria. Groundwater at this well is under reducing conditions, selenium and nitrate concentrations are very low. Although it is in a source area, the well does not provide much information to better understand OC migration to receptors.
	Assess analytical results from the Harmer Reservoir wells in 2022 for potential inclusion in the SSGMP. Assess analytical results from the Dry Creek Sedimentation Pond wells in 2023 for potential inclusion in the SSGMP[1].	Improve understanding of groundwater/surface water interactions near Dry Creek Sedimentation Pond and the Harmer Reservoir.
Regional Groundwater Monitoring Program		
Study Area 7	Establish a new surface water monitoring location at Grave Creek near RG_MW_GCA to replace former EV_GV1 location[2].	Very difficult to access current surface water monitoring point.
Study Area 10	Consider establishing a new station in Michel Creek downgradient of Milligan Creek[2].	This additional location will help in the understanding of OC inputs to Michel Creek.

Year/Report Recommendation Made: [1] 2021 SSGMP Update. [2] 2021 Annual Report.

8.6 Coal Mountain mine

Table AA: Summary of New Recommendations – CMm SSGMP and RGMP

Program	Recommendation	Rationale
Site-Specific Groundwater Monitoring Program		
CMm SSGMP	Record depth to pressure transducer sensor at CM_MW4-SH/DP. Alternatively, obtain a manual measurement of the water levels above ground using an extension on the PVC riser during each sampling event at CM_MW4-SH/DP.	The specific elevation of the pressure transducer sensor is required to reconcile pressure readings into potentiometric surface elevations. Alternatively, a manually-obtained elevation of water levels above the casing, paired with a pressure sensor reading with the same time stamp, can also be used for reconciliation.

Table AA (Cont'd): Summary of New Recommendations – CMm SSGMP and RGMP

Program	Recommendation	Rationale
Site-Specific Groundwater Monitoring Program		
CMm SSGMP (Cont'd)	A review of bedrock groundwater flow pathways, particularly those flow paths between upgradient 34 Pit and spoils downslope towards Michel Creek, should be undertaken. The review should consider the 34 Pit Hydrogeological Study and evaluate CM_MW7-SH/DP to confirm the well completion details are appropriate to inform the SSGMP. The review should consider appropriate geographic locations for potential future investigations (such as along West Ditch Road). The review of available bedrock geology and hydrostratigraphy should also consider potential hydrostatic pressures, in order to reduce the possibility of encountering flowing artesian conditions.	Further development of CSM to improve characterization of hydrogeology at CMm and augment understanding of uppermost weathered and deeper bedrock groundwater flow pathways.
CMm SSGMP	Newly-completed monitoring wells drilled in 2023, near Corbin and the Andy Good and Michel creeks confluence, should be evaluated for inclusion within the SSGMP.	Further development of CSM to improve characterization of hydrogeology at CMm.

Table BB: Summary of Outstanding Recommendations – CMm SSGMP and RGMP Study Area 11

Program	Recommendation	Rationale
Site-Specific Groundwater Monitoring Program		
CMm SSGMP	Complete hydraulic conductivity testing at CM_MW4-SH and CM_MW8.	Recommendation in the 2021 SSGMP Annual Report. Hydraulic conductivity testing has not yet been conducted at CM_MW4-SH (due to irretrievable artesian well control plug) or CM_MW8 (due to unsuccessful attempt in 2022, due to downhole logistics associated with water and well depth).
	Establish continuous surface water level monitoring at CM_MC2.	Recommendation in the 2021 SSGMP Annual Report.
Regional Groundwater Monitoring Program		
Study Area 11	Assess the adequacy of the monitoring network, pending recommendations from the flow and load accretion study of Michel Creek, lower Corbin Creek, and lower Andy Good Creek. Complete hydraulic conductivity testing at monitoring wells, installed in January 2023, located near the confluence of Andy Good and Michel creeks.	A flow and load accretion study on lower Andy Good Creek was completed (Attachment IV). Once the network has been deemed adequate (or any identified deficiencies are resolved), hydraulic conductivity testing of monitoring wells be undertaken.

9 References

Azimuth Consulting Group Inc. (Azimuth) 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. November 2021.

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

British Columbia Ministry of Environment (BC MOE). 2015. Technical Guidance 6 on Contaminated Sites: Assessment of Hydraulic Properties for Water Use Determinations. Version 3.0 Draft 10. December 2015.

British Columbia Ministry of Environment & Climate Change Strategy (BC ENV). 2017. Technical Guidance 15 on Contaminated Sites. Concentration Limits for the Protection of Aquatic Receiving Environments. Version 2.0 November 1, 2017.

British Columbia Ministry of Environment & Climate Change Strategy (BC ENV). 2021. British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture. Summary Report. 2021.

British Columbia Ministry of Environment & Climate Change Strategy (BC ENV). 2020. British Columbia Source Drinking Water Quality Guidelines: Guideline Summary. Water Quality Guideline Series, WQG-01.

British Columbia Ministry of Environment & Climate Change Strategy (BC ENV). 2021. Contaminated Sites Regulation (CSR), B.C. Reg. 375/96, includes amendments up to B.C. Reg. 179/2021. July 7, 2021.

British Columbia Ministry of Environment (BC MOE), 2013. British Columbia Field Sampling Manual - For Continuous Monitoring and the Collection of Air, Air-Emission, Water, Wastewater, Soil, Sediment, and Biological Samples - 2013 Edition. Available from https://www2.gov.bc.ca/gov/content/environment/research-monitoring-reporting/monitoring/laboratory-standards-quality-assurance/bc-field-sampling-manual

Gilbert, R.O., 1987. Statistical Methods for Environmental Pollution Monitoring. New York: Van Norstrand Reinhold.

Golder Associates Ltd. (Golder). 2018. Line Creek Operations Site Specific Groundwater Monitoring Program 2018 Update. Prepared for Teck Coal Limited. October 31, 2018.

Golder Associates Ltd. (Golder). 2019. Line Creek Operations Site Specific Groundwater Monitoring Program 2018 Update. Prepared for Teck Coal Limited. September 30, 2019.

Golder Associates Ltd. (Golder). 2021a. Hydrogeological Study of the Clode Ponds. Report submitted to Teck Coal Limited. March 15, 2021.

Golder Associates Ltd. (Golder). 2021b. Teck Coal Line Creek Operations Water Treatment Plan Hydrogeological Baseline Data Collection Project. Prepared for Teck Coal Ltd. April 30, 2021.

Golder Associates Ltd. (Golder). 2021c. Teck Coal Elkview Operations Dry Creek Groundwater Bypass Study. 2021 Field Program Summary and Results. Report submitted to Teck Coal Limited. August 18, 2021.

Golder Associates Ltd. (Golder). 2021d. Dry Creek Project: Conceptual Groundwater Model and Bypass Estimations. Report submitted to Teck Coal Limited. December 2, 2021.

SNC·LAVALIN

Health Canada. 2022. Guidelines for Canadian Drinking Water Quality – Summary Table. Water and Air Quality Bureau, Healthy Environments and Consumer Safety Branch. September 2022.

Kerr Wood Leidal. (KWL). 2023. Highwater Mark Survey for Groundwater Monitoring Wells in the Elk Valley. Prepared for Teck Coal Limited. February 28, 2023.

Lorax Environmental Services Ltd. (Lorax). 2019. EVO Dry Creek and Harmer Creek Local Flow and Water Quality Investigation. Prepared for Teck Coal Ltd. June 4, 2019.

Newell, C.J., Aziz, J.J., and Vanderford. M. 2007. Monitoring and Remediation Optimization System (MAROS) Version 2.2: Appendix A.2: Statistical Trend Analysis Methods. Prepared by GSI Environmental Inc. February 2007.

Ramboll US Consulting Inc. (Ramboll). 2021. Interim Groundwater Screening Criteria for Cobalt and Lithium (Revision 1). Report prepared for Teck Coal Limited. November 2021.

SNC-Lavalin Inc. (SNC-Lavalin). 2014. Summary of Elk Valley Drinking Water Evaluation and Sampling Program. Prepared for Teck Coal Limited. June 25, 2014.

SNC-Lavalin Inc. (SNC-Lavalin). 2017. Regional Groundwater Monitoring Program Elk Valley, BC. Prepared for Teck Coal Limited. September 29, 2017.

SNC-Lavalin Inc. (SNC-Lavalin). 2018a. Fording River Operations Site Specific Groundwater Monitoring Program 2018 Update. Prepared for Teck Coal Limited. October 31, 2018.

SNC-Lavalin Inc. (SNC-Lavalin). 2018b. Greenhills Operations Site Specific Groundwater Monitoring Program 2018 Update. Prepared for Teck Coal Limited. October 31, 2018.

SNC-Lavalin Inc. (SNC-Lavalin). 2018c. Elkview Operations Site Specific Groundwater Monitoring Program 2018 Update. Prepared for Teck Coal Limited. October 31, 2018.

SNC-Lavalin Inc. (SNC-Lavalin). 2018d. 2017 Annual Report, Regional Groundwater Monitoring Program Elk Valley, BC. Prepared for Teck Coal Limited. May 16, 2018.

SNC-Lavalin Inc. (SNC-Lavalin). 2019a. Fording River Operations Site Specific Groundwater Monitoring Program 2018 Update. Prepared for Teck Coal Limited. September 30, 2019.

SNC-Lavalin Inc. (SNC-Lavalin). 2019b. Greenhills Operations Site Specific Groundwater Monitoring Program 2018 Update. Prepared for Teck Coal Limited. September 30, 2019.

SNC-Lavalin Inc. (SNC-Lavalin). 2019c. Elkview Operations Site Specific Groundwater Monitoring Program 2018 Update. Prepared for Teck Coal Limited. September 30, 2019.

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

SNC-Lavalin Inc. (SNC-Lavalin). 2020b. Elk River and Fording River Flow Accretion Studies, October 2019. Prepared for Teck Coal Limited. Memorandum. August 27, 2020.

SNC-Lavalin Inc. (SNC-Lavalin). 2021a. Site-Specific Groundwater Monitoring Program Updates. Report prepared for Teck Coal Limited. October 31, 2021.

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

SNC-Lavalin Inc. (SNC-Lavalin). 2021c. Kilmarnock Intake Groundwater Bypass Gap Analysis and Workplan. Report prepared for Teck Coal Limited. April 28, 2021.

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

SNC-Lavalin Inc. (SNC-Lavalin). 2022b Hydrogeology Interpretative Report – Elk River Valley, Mass Balance Investigation – Hypothesis 1. Report prepared for Teck Coal Limited. Dated September 20, 2022.

SNC-Lavalin Inc. (SNC-Lavalin). 2022c. Kilmarnock Creek Intake Groundwater Bypass Hydrogeological Investigation. Prepared for Teck Coal Limited. December 15, 2022.

SRK Consulting (Canada) Inc. (SRK). 2018. Coal Mountain Operations Site Specific Groundwater Monitoring Plan 2018 Update. Prepared for Teck Coal Limited SRK. Project No. 1CT017.199. October 31, 2018.

SRK Consulting (Canada) Inc. (SRK). 2019a. Regional Seeps Monitoring Plan: Phases 2 and 3. Report prepared for Teck Coal Limited. March 2019.

SRK Consulting (Canada) Inc. (SRK). 2019b. Evaluation of Main Stem Mass Reduction Mechanisms. Prepared for Teck Coal Limited. June, 2019.

SRK Consulting (Canada) Inc. (SRK). 2023. Elk Valley Seep Monitoring: 2022 Annual Report. Report prepared for Teck Coal Limited. March 2023.

Teck Coal Limited (Teck). 2014. Elk Valley Water Quality Plan (With Annexes). Submitted to the British Columbia Minister of Environment for approval on July 22, 2014.

Teck Coal Limited (Teck). 2018a. Regional Seep Monitoring Plan. May 2018.

Teck Coal Limited (Teck). 2018b. Water Quality Adaptive Management Plan for Teck Coal Operations in the Elk Valley. Report prepared by the Adaptive Management Consulting Team, Technical Consultants, and Teck Staff. December 2018.

Teck Coal Limited (Teck). 2019. Regional Seep Monitoring Plan – Phase 3. May 2019.

Teck Coal Limited (Teck). 2021a. Porter Creek Selenium Reduction Plan – Teck Coal, Greenhills Operations, BC. December 31, 2021.

Teck Coal Limited (Teck). 2021b. Water Quality Adaptive Management Plan for Teck Coal Operations in the Elk Valley – 2021 Update. December 15, 2021.

Teck Coal Limited (Teck). 2021c. 2020 Elk Valley Regional Water Quality Model Update – Annex B, Hydrology Modelling – Set-up, Calibration and Future Projections Report. Prepared with Assistance from Golder Associates Ltd. March 2021.

Teck Coal Limited (Teck) 2022. Line Creek Operations ERX CCR Phase 2 Project Joint Application. Prepared for The Ministry of Energy, Mines and Low Carbon Innovation and the Ministry of Environment and Climate Change Strategy. December 2022.

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Tables

TABLE 1: RGMP - Summary of Groundwater Monitoring Program Locations

Study Area	Watershed / Description	Well ID	Rationale
Background[a]	Fording River valley and tributaries	FR_MW_FRRD1	Representative of groundwater quality on flank of Fording River valley near Study Area 1.
		FR_MW_CH1-A	Representative of groundwater quality in Chauncey Creek tributary near Study Area 1.
		FR_MW_CH2	
	Dry Creek valley bottom	LC_PIZDC1307[d]	Representative of deep groundwater quality in the Dry Creek valley bottom upgradient of Study Area 2.
		LC_PIZDC1308[d]	
	Elk River valley bottom and tributaries	GH_MW_BG1A	Representative of groundwater in the Elk River valley bottom upgradient of Study Area 4.
		GH_MW_BG1B	
		GH_MW_BG1C	
		GH_MW-Willow-1D	Representative of groundwater quality in Willow Creek tributary on flank of Elk River valley near Study Area 4.
		GH_MW-Willow-2S	
		GH_MW-Willow-2D	
		GH_MW-Wolf-1S	Representative of groundwater quality in Wolf Creek tributary on flank of Elk River valley near Study Area 4.
		GH_MW-Wolf-1D	
		GH_MW-Wolf-2D	
	Elk River	LC_PIZP1101	Representative of deep groundwater quality near Study Area 6.
		LC_PIZP1103	
	Grave Creek upgradient of Harmer Creek	EV_MW_GV4A	Representative of groundwater in the Grave Creek valley bottom upgradient of Harmer Creek (Study Area 7).
		EV_MW_GV4B	
	Michel Creek	CM_MW3-DP	Representative of groundwater quality in the Michel Creek valley bottom (Study Area 11).
		CM_MW3-SH	
	Corbin Creek	CM_MW6-DP	Representative of groundwater quality in the Corbin Creek valley bottom (Study Area 11).

Notes:

a: Wells have been included based on the background assessment completed as part of the 2020 RGMP Update.

b: 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.

c: Monitoring well added to the RGMP Program as per the 2021 SSGMP Update.

d: Monitoring well added to the RGMP Program as per the 2020 RGMP Update.

e: Monitoring well installed in 2021 to support the relevant SSGMP and/or RGMP Program.

f: Monitoring well EV_RCSgw was formerly referred to as EV_RCgw.

g: EV_HW1 is also referred to as EV_HM1 and EV_Harmer Well in other sources.

h: Well decommisioned in 2022.

i: Monitoring well added to the SSGMP and RGMP as per the 2021 Annual Report.

j: Monitoring well added to the RGMP as per the 2021 Annual Report.

"-" denotes data not available.

TABLE 1: RGMP - Summary of Groundwater Monitoring Program Locations

Study Area	Watershed / Description	Well ID	Rationale
1	Fording River Valley - Kilmarnock Alluvial Fan and Greenhouse Area	FR_09-01-A	Monitor groundwater level, quality and additional inputs of mine-affected groundwater in valley-bottom sediments downgradient of the STP and South Kilmarnock Settling Ponds (i.e., Transport Pathway #2). Monitor mine-affected groundwater at southern extent of mine-permitted area.
		FR_09-01-B	
		RG_MW_FR1A[i]	Monitor mine-influenced groundwater downgradient of FRO (Transport Pathway #1).
		RG_MW_FR1B[i]	
		RG_MW_FR1C[i]	
		FR_GH_WELL4[b]	
	Fording River Valley - Porter Creek Drainage	GH_MW-PC	Monitor groundwater level, quality and surface water infiltration near the Porter Creek Sedimentation Pond associated with historical waste spoils in the Porter Creek drainage.
	Fording River Valley - Regional Groundwater Discharge Zone	RG_MW_FR8A[j]	Monitor mine-influenced groundwater downgradient of FRO in the vicinity of the Regional Groundwater Discharge Zone.
		RG_MW_FR8B[j]	
		RG_MW_FR8C[j]	
	Fording River Valley near Chauncey Creek	RG_MW_FR10A[c]	Monitor groundwater levels and quality downgradient of FRO in the vicinity of the compliance point at surface water station FR_FRABCH.
		RG_MW_FR10B[c]	
		RG_MW_FR10C[c]	
2	Phase II Lower LCO Dry Creek	RG_MW_DC1A[c]	Monitor infiltration through the Dry Creek alluvial fan in deeper groundwater.
		RG_MW_DC1B[c]	Monitor infiltration of mine-influenced surface water through the Dry Creek alluvial fan.
3	Fording River Valley - Greenhills Creek Alluvial Fan	GH_POTW09	Supply well which monitors groundwater quality in the Fording River valley-bottom aquifer relating to surface water infiltration from Rail Loop Pond.
		GH_POTW10	Supply wells which monitors surface water infiltration from Greenhills Creek and the Fording River aquifer near confluence of Greenhills Creek and Fording River. Monitors groundwater quality relating to down-valley groundwater flow in Fording River valley bottom.
		GH_POTW15	
		GH_POTW17	Supply well located in the Fording River Valley-Bottom aquifer below Greenhills Creek sedimentation pond that monitors groundwater quality relating to infiltration from Greenhills Creek and groundwater flow from upland areas at GHO.

Notes:

a: Wells have been included based on the background assessment completed as part of the 2020 RGMP Update.

b: 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.

c: Monitoring well added to the RGMP Program as per the 2021 SSGMP Update.

d: Monitoring well added to the RGMP Program as per the 2020 RGMP Update.

e: Monitoring well installed in 2021 to support the relevant SSGMP and/or RGMP Program.

f: Monitoring well EV_RCSgw was formerly referred to as EV_RCgw.

g: EV_HW1 is also referred to as EV_HM1 and EV_Harmer Well in other sources.

h: Well decommisioned in 2022.

i: Monitoring well added to the SSGMP and RGMP as per the 2021 Annual Report.

j: Monitoring well added to the RGMP as per the 2021 Annual Report.

"-" denotes data not available.

TABLE 1: RGMP - Summary of Groundwater Monitoring Program Locations

Study Area	Watershed / Description	Well ID	Rationale
4	Elk River Valley - Mickelson Drainage	GH_MW-MC-1D	Monitoring groundwater quality downgradient of Mickelson Creek and Sediment Pond. Monitor the groundwater systems to evaluate connectivity to surface water and shallow groundwater.
		GH_MW-MC-1S	
	Elk River Valley - Leask Drainage	GH_GA-MW-4[h]	Monitor groundwater quality downgradient from Leask Creek and Leask Pond.
	Elk River Valley - Wolfram Drainage	GH_GA-MW-2[h]	Monitor groundwater quality in the Wolfram Creek Drainage, downgradient of the Wolfram Ponds.
	Elk River Valley - Thompson Drainage	GH_GA-MW-3	Monitor groundwater quality downgradient of Thompson Creek and Lower Thompson Sediment Pond.
	Elk River Valley - Downgradient of Thompson Drainage	GH_MW-ERSC-1	Monitor groundwater level and quality in the Elk River valley bottom sediments downgradient of GHO. Monitor surface water infiltration from the Elk River side channel.
	Elk River valley bottom near Elkford	GH_MW_EF1A[d]	Monitor groundwater level and quality in the vicinity of drinking water aquifers #1056 and #1062.
		GH_MW_EF1B[d]	
		RG_DW-01-03 (Town Centre Well)	Monitor groundwater within Elk River valley-bottom sediment.
5/6	Elk River Valley	LC_MW_ER4A[d]	Monitors groundwater interactions with the Elk River valley bottom adjacent to EV_ER4.
		LC_MW_ER4B[d]	
7	Elk River Valley - Grave Creek / Harmer Creek	EV_GV3gw	The nearest upgradient well of Study Area 7, within the Grave Creek valley bottom. Monitor upland and tributary valley-bottom input from drainages to the northeast of EVO.
		RG_MW_GCA[e]	Monitor groundwater quality and levels along Grave Creek before confluence with Elk River within bedrock.
	Elk River Downstream of Grave Creek Confluence	RG_DW-02-20	Monitors potential down-valley groundwater flow from upgradient Study Area 6. Monitor surface water infiltration to the Elk River valley bottom.
		RG_MW_WW[d]	
8	Elk River Proximal to EVO	EV_LSgw	Monitor possible infiltration to groundwater near the valley bottom. Upland groundwater and surface water infiltration associated with Lindsay, Otto/Cossarini and Goddard creek drainages. Monitor possible recharge to groundwater from infiltration from tailings ponds and other discharge.
		EV_OCgw	
		EV_MW_GC1B[d]	
		RG_DW-03-10	Monitors groundwater withdrawals within Aquifer 1078.

Notes:

a: Wells have been included based on the background assessment completed as part of the 2020 RGMP Update.

b: 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.

c: Monitoring well added to the RGMP Program as per the 2021 SSGMP Update.

d: Monitoring well added to the RGMP Program as per the 2020 RGMP Update.

e: Monitoring well installed in 2021 to support the relevant SSGMP and/or RGMP Program.

f: Monitoring well EV_RCSgw was formerly referred to as EV_RCgw.

g: EV_HW1 is also referred to as EV_HM1 and EV_Harmer Well in other sources.

h: Well decommisioned in 2022.

i: Monitoring well added to the SSGMP and RGMP as per the 2021 Annual Report.

j: Monitoring well added to the RGMP as per the 2021 Annual Report.

"-" denotes data not available.

TABLE 1: RGMP - Summary of Groundwater Monitoring Program Locations

Study Area	Watershed / Description	Well ID	Rationale
9a	Sparwood Area - Michel Creek	EV_MW_SPR1C[d]	Monitor shallow groundwater level and quality downgradient of EV_MW_MC2-A. Monitors recharge to groundwater from infiltration of Michel Creek and upland groundwater.
		EV_MW_MCgwA[d]	Potential sentinel wells that monitor recharge to groundwater from infiltration of Michel Creek and down-valley groundwater quality.
		EV_MW_MCgwB[d]	
9b	Bodie and Gate Creek Area	EV_MW_GT1A[d]	Monitor shallow and deep groundwater quality from upland groundwater in the Bodie and Gate Creek drainages. Monitor surface water infiltration associated with Bodie and Gate creeks.
		EV_MW_GT1B	
		EV_MW_BC1A	
		EV_MW_BC1B	
		EV_RCSgw[f]	Monitor groundwater quality from upland groundwater in the Bodie and Gate Creek drainages. Monitor surface water infiltration associated with Bodie and Gate creeks. Monitors groundwater withdrawals from supply wells.
		EV_BCgw	
		EV_WH50gw	
	Michel Creek Downstream of Gate Creek and Bodie Creek	EV_BRgw	
		EV_HW1 (EV_HM1)[d,g]	Monitors groundwater withdrawals.
		EV_MW_MC2A[d]	Monitor down-valley groundwater level, quality and transport. Monitors potential recharge to groundwater from infiltration of Michel Creek.
		EV_MW_MC2B[d]	
10	Erickson Creek	EV_ECgw	Monitor groundwater quality and levels within valley fill sediments downgradient of Erickson Spoils.
		EV_MW_SP1A[d]	Monitors surface water infiltration from the South Pit Creek Decant Pond and groundwater interaction with Michel Creek.
		EV_MW_SP1B[d]	
		EV_MW_SP1C[d]	
11	Michel Creek	CM_MW1-OB	Monitor groundwater level and quality from upland groundwater and tributaries discharging into Michel Creek. Monitor groundwater flow through the Michel Creek valley bottom.
		CM_MW1-SH	
		CM_MW1-DP	
		CM_MW_AG1A[d]	Monitor recharge to the groundwater system from the CMO Loadout and Infiltration Ponds.
		CM_MW_AG1B[d]	
12	Sparwood Area - Elk River	EV_ER1gwS	Monitor groundwater quality down-valley of Michel Creek groundwater flow from Study Area 9, Elk River groundwater from Study Area 8, and confluence of Michel Creek and Elk River. Monitor groundwater interactions with Elk River and Michel Creek.
		EV_ER1gwD	
		RG_DW-03-04 (WTN 77913; TH99-2, Sparwood Well 3)	
		RG_MW-03-04[d]	

Notes:

a: Wells have been included based on the background assessment completed as part of the 2020 RGMP Update.

b: 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.

c: Monitoring well added to the RGMP Program as per the 2021 SSGMP Update.

d: Monitoring well added to the RGMP Program as per the 2020 RGMP Update.

e: Monitoring well installed in 2021 to support the relevant SSGMP and/or RGMP Program.

f: Monitoring well EV_RCSgw was formerly referred to as EV_RCgw.

g: EV_HW1 is also referred to as EV_HM1 and EV_Harmer Well in other sources.

h: Well decommisioned in 2022.

i: Monitoring well added to the SSGMP and RGMP as per the 2021 Annual Report.

j: Monitoring well added to the RGMP as per the 2021 Annual Report.

"-" denotes data not available.

TABLE 2: FRO SSGMP - Summary of Groundwater Monitoring Program Locations

Watershed/Sub-Area		Well ID	Rationale
Henretta Creek	Henretta Backfilled Pits and Spoils	FR_HMW1D	Monitor groundwater in backfilled pits between the Henretta reclaimed channel and the spoils to the north, downgradient of the discharge area for the Henretta Pit sump water. Monitor deep groundwater system high in Cl in backfilled pits and continue to evaluate connectivity to surface water and shallow groundwater.
Henretta Creek	Henretta Backfilled Pits and Spoils	FR_HMW1S	Monitor groundwater in backfilled pits between the Henretta reclaimed channel and the spoils to the north, downgradient of the discharge area for the Henretta Pit sump water. Monitor deep groundwater system high in Cl in backfilled pits and continue to evaluate connectivity to surface water and shallow groundwater.
Henretta Creek	Henretta Backfilled Pits and Spoils	FR_HMW2	Monitor upland groundwater high in Cl north of the Henretta reclaimed channel near the base of the spoil.
Henretta Creek	Henretta Backfilled Pits and Spoils	FR_HMW3	Monitor groundwater in backfilled pits in the eastern portion of the former South Henretta Pit. This well provides local-scale triangulation to assess groundwater flow direction near the pits.
Henretta Creek	Henretta Valley Bottom Upgradient	FR_HMW5[a]	Monitor reference groundwater conditions upgradient of mining impacts in Henretta valley bottom.
Fording River Valley	Upgradient of the NTP	FR_TBSSMW-1	Monitor groundwater and attenuation downgradient of Turnbull spoil and Henretta Valley and provide more understanding of groundwater-surface water interactions in Fording River valley bottom.
Fording River Valley	Upgradient of the NTP	FR_TBSSMW-2	Monitor groundwater and attenuation downgradient of Turnbull spoil and Henretta Valley and provide more understanding of groundwater-surface water interactions in Fording River valley bottom.
Fording River Valley	Upgradient of the NTP	FR_POTWELLS[b]	Monitor groundwater and attenuation downgradient of Henretta Valley and the Turnbull spoil.
Fording River Valley	Upgradient of the NTP	FR_GCMW-1B	Monitor groundwater quality downgradient of Clode Creek and Clode Settling Pond as several potential sources and transport pathways to groundwater were identified.
Fording River Valley	Upgradient of the NTP	FR_GCMW-2	Monitor groundwater quality downgradient of Clode Creek and Clode Settling Pond as several potential sources and transport pathways to groundwater were identified.
Fording River Valley	Upgradient of the NTP	FR_MW-1B	Monitor seepage from upgradient spoils, Turnbull Pit, and Clode Creek and Lake Mountain Pit Lake.
Fording River Valley	Downgradient of NTP	FR_MW_NTPSE[d]	Monitor groundwater in the valley bottom sediments downgradient of the NTP.
Fording River Valley	Directly downgradient of the STP	FR_09-04-A	Monitor groundwater quality in valley bottom sediments downgradient of the South Tailings Pond. Monitor seepage from the South Tailings Pond to overburden material immediately downgradient within the Fording River valley bottom.
Fording River Valley	Directly downgradient of the STP	FR_09-04-B	Monitor groundwater quality in valley bottom sediments downgradient of the South Tailings Pond. Monitor seepage from the South Tailings Pond to overburden material immediately downgradient within the Fording River valley bottom.
Fording River Valley	Kilmarnock Alluvial Fan and Study Area 1	FR-KB-1	Monitor mine-influenced groundwater quality and hydraulic gradients to the Kilmarnock Creek alluvial fan.
Fording River Valley	Kilmarnock Alluvial Fan and Study Area 1	FR-KB-2	Monitor mine-influenced groundwater quality and hydraulic gradients to the Kilmarnock Creek alluvial fan.
Fording River Valley	Kilmarnock Alluvial Fan and Study Area 1	FR-KB-3A	Monitor mine-influenced groundwater quality and hydraulic gradients to the Kilmarnock Creek alluvial fan.
Fording River Valley	Kilmarnock Alluvial Fan and Study Area 1	FR-KB-3B	Monitor mine-influenced groundwater quality and hydraulic gradients to the Kilmarnock Creek alluvial fan.
Fording River Valley	Kilmarnock Alluvial Fan and Study Area 1	FR_MW-SK1A	Monitor mine-influenced groundwater quality and hydraulic gradients downgradient of the Kilmarnock Creek alluvial fan and South Tailings Pond on the eastern side of the Fording River Valley.
Fording River Valley	Kilmarnock Alluvial Fan and Study Area 1	FR_MW-SK1B	Monitor mine-influenced groundwater quality and hydraulic gradients downgradient of the Kilmarnock Creek alluvial fan and South Tailings Pond on the eastern side of the Fording River Valley.

Notes:

a: 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 SSGMP.

b: FR_POTWELLS consists of six wells (FR_PW91, FR_PW92, FR_PW93, FR_PW94, FR_PW95, FR_PW96).

c: As a recommendation of the hydrogeological assessment, monitoring of a dedicated well from FR_GHHW (FR_GH_WELL4) began in Q4 2017.

d: Monitoring well added to the SSGMP Program as per the 2021 SSGMP Update.

e: Monitoring well added to the SSGMP and RGMP as per the 2021 Annual Report.

TABLE 2: FRO SSGMP - Summary of Groundwater Monitoring Program Locations

Watershed/Sub-Area		Well ID	Rationale
Fording River Valley	Kilmarnock Alluvial Fan and Study Area 1	FR_09-01-A	Monitor groundwater quality in valley bottom sediments downgradient of the South Tailings Pond and South Kilmarnock Settling Ponds. Monitor mine impact at the southern extent of the mine-permitted area. Monitor additional inputs to Fording River valley bottom sediments downgradient of the South Tailings Pond.
		FR_09-01-B	
		FR_09-02-A	Monitor groundwater quality in valley bottom sediments downgradient of the South Tailings Pond and South Kilmarnock Settling Ponds. Assess influence of losing Fording River to valley bottom sediments.
		FR_09-02-B	
		FR_GH_WELL4[c]	Monitor mine-influenced groundwater downgradient of the FRO mining operations.
		RG_MW_FR1A[e]	
		RG_MW_FR1B[e]	
		RG_MW_FR1C[e]	
Swift Creek	Swift Creek	FR_MW18-02[d]	Monitor groundwater quality in shallow groundwater downgradient-of and influenced-by the Swift Creek Sediment Ponds.

Notes:

a: 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 SSGMP.

b: FR_POTWELLS consists of six wells (FR_PW91, FR_PW92, FR_PW93, FR_PW94, FR_PW95, FR_PW96).

c: As a recommendation of the hydrogeological assessment, monitoring of a dedicated well from FR_GHHW (FR_GH_WELL4) began in Q4 2017.

d: Monitoring well added to the SSGMP Program as per the 2021 SSGMP Update.

e: Monitoring well added to the SSGMP and RGMP as per the 2021 Annual Report.

TABLE 3: GHO SSGMP - Summary of Groundwater Monitoring Program Locations

Watershed/Sub-Area		Well ID	Rationale
Fording River Valley	Porter Creek Drainage	GH_MW-PC	Monitor groundwater quality and surface water infiltration near the Porter sedimentation pond associated with historical waste spoils in the Porter Creek drainage.
		GH_MW-PC4A	Nested well pair to assess potential OC transport through the alluvial fan and bedrock to the mainstem of the Fording River.
		GH_MW-PC4B	
	Site A Rejects	GH_MW-GHC-1A	Nested well pair to monitor shallow and deep groundwater quality downgradient of Site A to E Coarse Coal Rejects (CCR), the coal process plant, and the overland conveyor.
		GH_MW-GHC-1B	
	East and Hawk Spoils	GH_MW_GHC_4A	Nested well pair to monitor mining influence from waste rock sources (Hawk and East spoils) in groundwater in the Greenhills Creek alluvial sediments and bedrock; Monitoring only (no sampling) for GH_MW_GHC-4A.
		GH_MW_GHC_4B	
	TSF and Site D/E Rejects	GH_MW-TD	Monitor groundwater quality downgradient of the TSF and Site D and E CCR.
	Rail Loop Area	GH_MW_RLP-2	Monitor shallow groundwater quality in the vicinity of the clean coal and dryer buildings/ponds and the rail loop/load out area.
	Greenhills Creek Alluvial Fan and Fording River Valley Bottom	GH_POTW09	Supply well located in the Greenhills Creek alluvial fan. Monitors groundwater quality relating to surface water infiltration from Greenhills Creek to the valley bottom.
		GH_POTW10	
		GH_POTW15	
		GH_POTW17	Supply well located in the Fording River valley-bottom aquifer near the rail loop area. Monitors groundwater quality relating to surface water infiltration from Greenhills Creek to the valley bottom.
		RG_MW_FR11A	Nested well pair to assess potential groundwater pathway from the Fording River valley bottom to the Elk River watershed along mapped glaciofluvial sediments.
		RG_MW_FR11B	
Elk River Valley	Mickelson Creek Drainage	GH_MW-MC-1D	Monitor groundwater quality near the Mickelson Creek sedimentation ponds. Monitor the groundwater system in the Mickelson drainage to evaluate connectivity to surface water and shallow groundwater.
		GH_MW-MC-1S	
		GH_MW-MC-2D	
		GH_MW-MC-2S	
	Leask Creek Drainage	GH_GA-MW-4[a]	Monitor groundwater in the valley bottom associated with waste spoils in Leask, Wolfram, and Thompson Creek drainages and sedimentation ponds at the base of each drainage system. Monitor the groundwater system to evaluate connectivity to surface water and shallow groundwater.
		RG_MW_LC3A	
		RG_MW_LC3B	
	Wolfram Creek Drainage	GH_GA-MW-2[a]	
		RG_MW_WC2A	
		RG_MW_WC2B	
		RG_MW_LCWC1	
	Thompson Creek and Downgradient of Thompson Creek Drainage	GH_GA-MW-3	
		GH_MW-ERSC-1	Monitor groundwater quality in the Elk River valley bottom sediments downgradient of GHO and to monitor surface water infiltration from the Elk River side channel.

Notes:

a: Monitoring well decommisioned in September 2022.

TABLE 4: LCO SSGMP - Summary of Groundwater Monitoring Program Locations

Watershed/Sub-Area		Well ID	Rationale
LCO Dry Creek	Upper Dry Creek	LC_PIZDC0901	Monitor water quality to detect for seepage near the Dry Creek Water Management System.
		LC_PIZDC1306	
		LC_PIZDC1307	
		LC_PIZDC1308	
		LC_PIZDC1404S	
		LC_PIZDC1404D	
Line Creek	Centre Line Creek (North)	LC_PIZM0903[a]	Monitor groundwater quality of the northern sub-watersheds.
	Center Line Creek (South)	LC_MW20_01[a]	Monitor shallow and deeper groundwater quality near Line Creek, upgradient of the confluence with WLC.
		LC_MW20_02A[a]	
		LC_MW20_02B[a]	
		LC_MW20_03[a]	
	West Line Creek	LC_PIZ1206A[a]	Monitor water quality in the perched alluvial aquifer within and immediately surrounding the WLC Spoils.
		LC_PIZ1210B[a]	Monitor water quality in the Basal Alluvial Aquifer within and immediately surrounding the WLC Spoils
		LC_PIZ1211N[a]	
		LC_PIZ1212[a]	
		LC_PIZ1206C[a]	Monitor water quality in bedrock within and immediately surrounding the WLC Spoils.
		LC_PIZ1207A[a]	
		LC_PIZ1207B[a]	
		LC_PIZ1210C[a]	
	Lower Line Creek to LC_LC4	WL_MW-15-02-A[a]	Monitor groundwater quality near the AWTF residual landfill – on a semi-annual basis.
		WL_MW-15-02-B[a]	
		WL_MW-15-04-B[a]	
		LC_MW_CP1A[a]	Monitor for deep groundwater bypass of surface water station LC_LCDSSLCC.
		LC_MW_CP1B[a]	Monitor shallow groundwater bypass of surface water station LC_LCDSSLCC.
Process Plant	East of the Process Plant at the former Gasoline Refuelling Area	LC_PIZP1001[b]	Monitor groundwater levels to augment interpreted flow direction at the Process Plant.
		LC_PIZP1003[b]	
	South of the Process Plant at the former Diesel Refuelling Area	LC_PIZP1002[b]	
	Process Plant Ponds	LC_PIZP1101	Monitor water quality downgradient of Process Plant ponds prior to the Elk River and Fording River confluence to detect seepage from Process Plant ponds.
		LC_PIZP1103	
		LC_PIZP1104	
		LC_PIZP1105	

Notes:

a: Monitoring well added to the SSGMP Program as per the 2021 SSGMP Update.

b: Monitored water levels only.

TABLE 5: EVO SSGMP - Summary of Groundwater Monitoring Program Locations

Watershed/Sub-Area		Well ID	Rationale
Elk River	Grave/Harmer Creek Watershed and Elk River Downstream of Grave Creek Confluence	EV_GV3gw	Monitor groundwater quality and levels within valley fill sediments downgradient of the EVO Cedar Spoils.
		EV_GV3gwS	
		EV_MW_GV4A	Monitor background groundwater conditions in Grave Creek valley bottom above Harmer Creek.
		EV_MW_GV4B	
		RG_MW_GCA[a]	Monitor groundwater quality and levels along Grave Creek before confluence with Elk River within bedrock.
	Elk River Proximal to EVO	EV_BALgw	Monitor groundwater quality and levels downgradient of spoils in Balmer Creek catchment.
		EV_GCgw	Monitor groundwater quality and levels in the valley sediments near Goddard Creek and adjacent to Lagoons B and C, and in the Goddard Marsh.
		EV_LSgw	Monitor groundwater quality and levels in valley fill sediments downgradient of spoils in upper Lindsay Creek.
		EV_OCgw	Monitor groundwater quality and levels in valley fill sediments near Otto Creek and Lagoon D.
		EV_MW_GC1B	Monitor possible infiltration to groundwater from Goddard Sedimentation Ponds.
Elk River and/or Michel Creek	Sparwood Area - Baldy and Sparwood Ridges	EV_MW_AQ1	Monitor groundwater quality and levels at the base of Baldy Ridge near Aqueduct Creek.
		EV_MW_AQ2	
		EV_MW_MC4	Monitor groundwater quality and levels at the base of Baldy Ridge near Aqueduct Creek.
		EV_MW_SPR1A	Monitor groundwater quality and levels along the Michel Creek valley bottom.
		EV_MW_SPR1B	
		EV_MW_SPR1C	
	Sparwood Area - Elk River and Sparwood Ridge	EV_MW_MC3	Monitor groundwater quality and levels in valley fill sediments near Michel Creek.
Michel Creek	Michel Creek Downstream of Gate Creek and Bodie Creek - Gate Creek and Bodie Creek	EV_MW_GT1A	Monitor groundwater quality and levels in valley fill sediments near Michel Creek down gradient of Bodie Creek, Bodie Sedimentation Pond, Gate Creek and Gate Creek Sedimentation Pond.
		EV_MW_GT1B	
		EV_MW_BC1A	
		EV_MW_BC1B	
		EV_RCSgw[b]	
		EV_BCgw	
		EV_MW_BC2	Groundwater quality from overburden and bedrock upgradient of Michel Creek.
		EV_MW_BC3	
	Michel Creek Downstream of Gate Creek and Bodie Creek - Michel Creek Valley Bottom	EV_MW_MC1A	Monitor groundwater quality and levels along the Michel Creek valley bottom.
		EV_MW_MC1B	
		EV_MW_MC2A	
		EV_MW_MC2B	
	Erickson Creek	EV_WF_SW	Monitor groundwater downgradient from the West Fork Tailings Facility (WFTF).
		EV_ECgw	Monitor groundwater quality and levels within valley fill sediments downgradient of Erickson Spoils.

Notes:

a: Monitoring wells installed in 2020 to support the SSGMP.

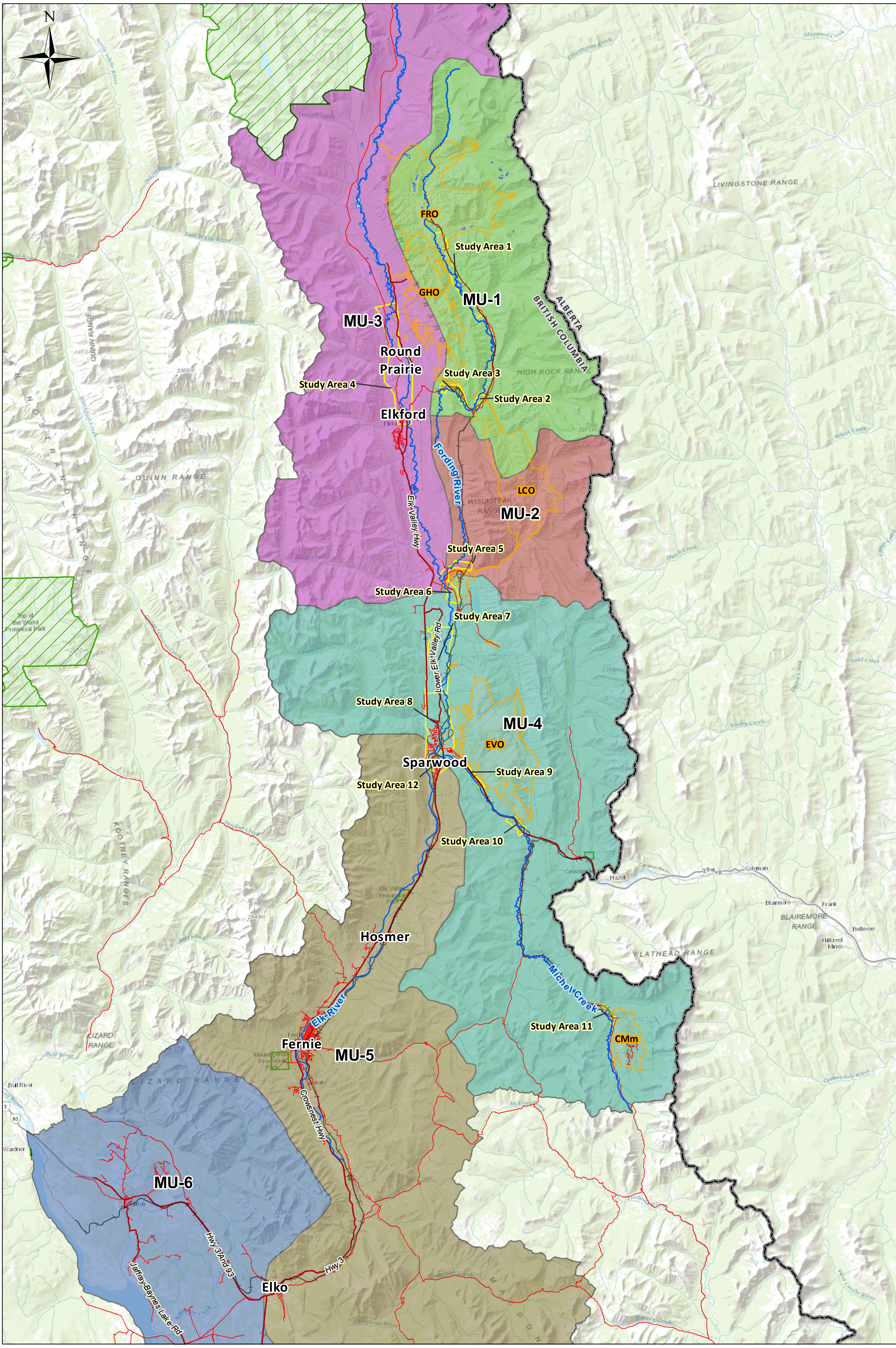
b: Monitoring well EV_RCSgw was formerly referred to as EV_RCgw.

TABLE 6: CMm SSGMP - Summary of Groundwater Monitoring Program Locations

Watershed/Sub-Area		Well ID	Rationale
Corbin Creek Valley	Corbin Creek valley bottom	CM_MW4-SH	Monitor groundwater quality in valley bottom (both wells screened in bedrock) downgradient of Main Interceptor Sedimentation Ponds. Nested well pair provides for measurement of vertical hydraulic gradient.
		CM_MW4-DP	
		CM_MW5-SH	Monitor groundwater quality in valley-bottom sediments and bedrock downgradient of 14 Pit, CMO spoils in Corbin Creek watershed, and North Ditch. Nested well pair provides for measurement of vertical hydraulic gradient and identification of potential sources of water quality in valley-bottom sediments and Corbin Creek. Deployed pressure transducers provide high-resolution temporal characterization of groundwater elevation and hydraulic gradient variability.
		CM_MW5-DP	
		CM_MW6-SH	Monitor groundwater quality in valley-bottom sediments and bedrock downgradient of Corbin Pond, which receives seepage from East Spoils, 34 Pit and 37 Pit via the Corbin Creek Rock Drain. Nested well pair provides for measurement of vertical hydraulic gradient and identification of potential sources of water quality in valley-bottom sediments and Corbin Creek.
		CM_MW6-DP	
		CM_MW9	Monitor groundwater quality in valley-bottom sediments downgradient of Main Interceptor Sedimentation Ponds.
Michel Creek Valley	Michel Creek valley bottom	CM_MW1-OB	Monitor groundwater in regional receiving environment downgradient of CMO. Well nest includes three screens, providing an indication of the potential vertical transport pathways affecting the groundwater as well as groundwater-surface water interaction with Michel Creek.
		CM_MW1-SH	
		CM_MW1-DP	
		CM_MW_AG1A	Downgradient wells characterizing groundwater level and quality nearby Andy Good Creek at two levels in unconsolidated materials.
		CM_MW_AG1B	
	Downgradient of CMm	CM_MW2-SH	Monitor groundwater quality in valley-bottom sediments downgradient of spoils and open pits within Michel Creek catchment and West Ditch. Monitor groundwater levels in valley-bottom sediments to provide indication of groundwater-surface water interaction along segment of Michel Creek adjacent to CMO.
	CMm west spoils	CM_MW7-SH	Monitor groundwater quality proximal to spoils and 34 Pit in Michel Creek catchment, providing an indication of potential constituent loads travelling to valley bottom through groundwater. Monitor groundwater levels proximal to 34 Pit.
		CM_MW7-DP	
		CM_MW8	Monitor groundwater quality proximal to spoils and 37 Pit in Michel Creek catchment, providing an indication of potential constituent loads travelling to valley bottom through groundwater. Monitor groundwater levels proximal to 37 Pit (water level understood to be controlled by connectivity through bedrock to 34 Pit) to provide an indication of flow directions around the open pit.
	Michel Creek valley bottom	CM_MW3-SH	Monitor groundwater quality and groundwater-surface water interaction in valley-bottom sediments upstream of CMO (reference wells).
		CM_MW3-DP	
	Mid-slope southwest of Middle Mountain CCR	CM_MW10	Monitor groundwater quality downgradient of Middle Mountain CCR along flow pathways expected to report to valley-bottom sediments along Michel Creek.

Drawings

1: Site Location and Management Units
2: Bedrock Geology – North
3: Bedrock Geology – Central
4: Bedrock Geology – South
5: Surficial Geology – North
6: Surficial Geology – Central
7: Surficial Geology – South
8: Karst Potential
9: Order Station Location Plan
10: FRO – Environmental Monitoring System, Monitoring Location Identification
11: GHO – Environmental Monitoring System, Monitoring Location Identification
12: LCO – Environmental Monitoring System, Monitoring Location Identification
13: EVO – Environmental Monitoring System, Monitoring Location Identification
14: CMm – Environmental Monitoring System, Monitoring Location Identification



Legend

- BC-Alberta Border
- Rails
- Highway/Arterial
- Secondary Road
- Rivers
- Study Areas
- Mine Permitted Areas
- Surface Water
- Provincial Park

Management Units

- MU-1
- MU-2
- MU-3
- MU-4
- MU-5
- MU-6

FRO - Fording River Operations
GHO - Greenhills Operations
LCO - Line Creek Operations
EVO - Elkview Operations
CMm - Coal Mountain mine

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.

References:
1. Data provided by Teck Coal Ltd.
2. Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

0 2.5 5 10 15 20 km

PROJECT LOCATION: Elk Valley, BC

CLIENT NAME: Teck Coal Limited

SNC·LAVALIN

Site Location and Management Units

CHK'D: RS	DATE: 2023-01-25	SCALE: 1:350,000	Ref Num:
BY: CW	COORD SYS: NAD 1983 UTM Zone 11N		DRAWING 1

MXD Path: \\Sli4395\projects\Current Projects\Teck Coal Ltd\GISCAD\GIS\Map Series\635544_2022_RGMPSSGMP_AnnRpt\635544-1-SiteLoc_MU.mxd

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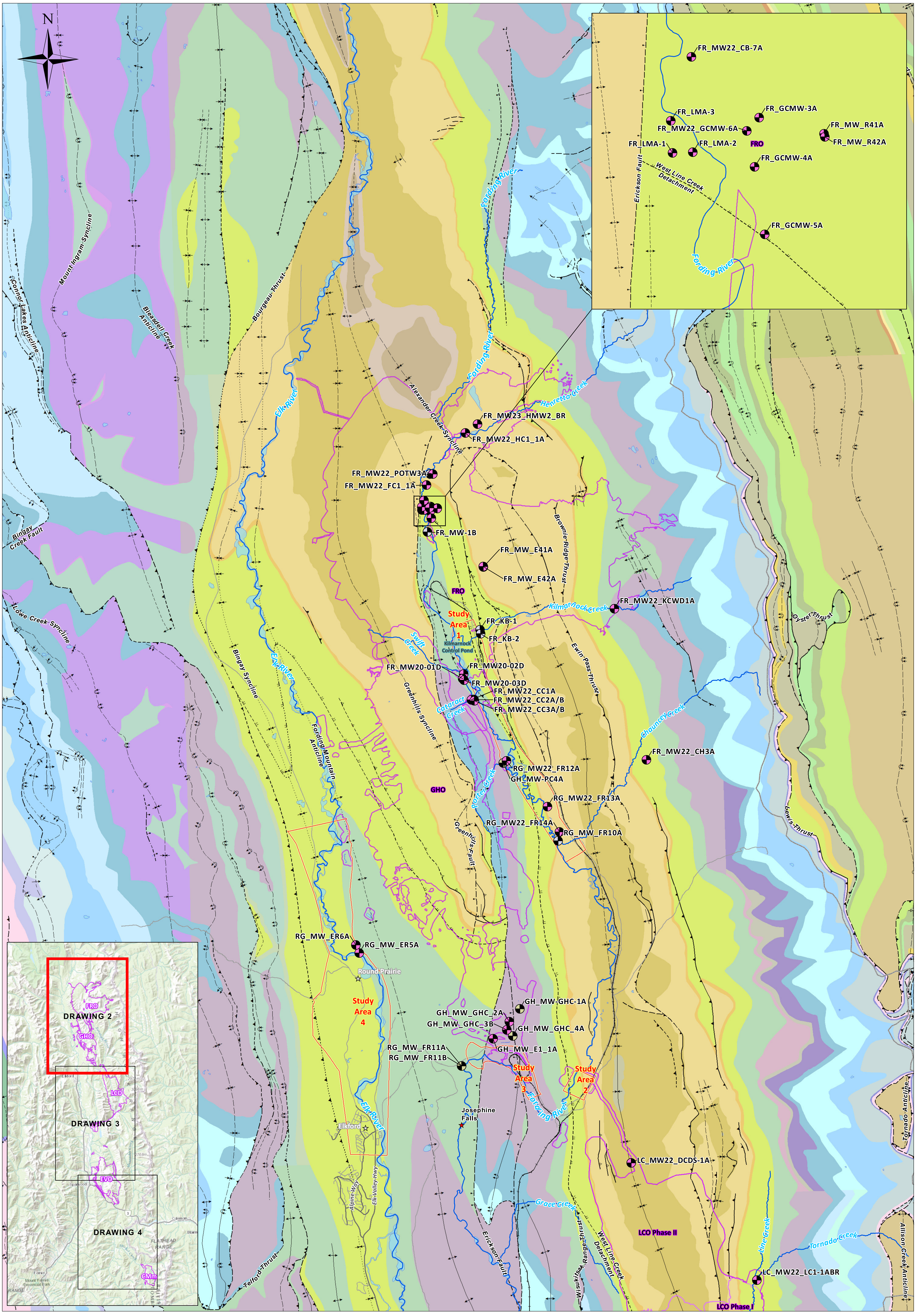


Legend

SSGMP and/or RGMP Well (Bedrock)
SSGMP and/or RGMP Well (Bedrock and Unconsolidated)
Monitoring wells to be considered for inclusion
BC-Alberta Border
Rails
Highway/Arterial
Secondary Road
Streams
Study Areas
Lake/River Bed
Tailings/Settling/Sediment Pond
Mine Permitted Areas

Geological Faults and Folds

Anticline
Anticline (Overturned)
Syncline
Syncline (Overturned)
Monocline (Anticlinal)
Generic Steep Dip Fault
Normal Fault
Thrust Fault
Back-thrust Fault
Detachment Fault

Fault/Fold Line Type

Defined
Approximate
Inferred
Concealed

Bedrock Geology

Ct-VBeR - Virgelle, Deadhorse Coulee, and Pakowki formations, and Belly River Group
Ct-BeR - Belly River Group
Ct-DP-100k - Deadhorse Coulee and Pakowki formations
Ct-V - Virgelle Formation
Ct-TC - Telegraph Creek Formation
Ct-Wp - Wapiabi Formation
Ct-WpT - Wapiabi and Telegraph Creek formations
Ct-C - Cardium Formation
Ct-Bs - Blackstone Formation
Ct-Bl - Blairmore Group
Ct-GBM-ud - Gladstone, Beaver Mines, and Mill Creek formations
Ct-CDG - Cadomin, Dalhousie, and Gladstone formations
JrCt-K-ud - Kootenay Group
Ct-E-100k - Elk Formation
JrCt-MM-100k - Mist Mountain Formation
Jr-Mo - Morrissey Formation
Jr-F-100k - Fernie Formation
Tr-SR - Spray River Group
Tr-W - Whitehorse Formation
Tr-SM - Sulphur Mountain Formation
PnPr-RM - Rocky Mountain Supergroup
Pr-I-100k - Ishbel Group
Pr-RC - Ranger Canyon Formation
PnPr-MJ-100k - Misty and Johnston Canyon formations
Pn-K - Kananaskis Formation
Pn-M - Misty Formation
Ms-Et - Etherington Formation
Ms-MH-cgm08 - Mount Head Formation
Ms-MH-OMC-ud - Opal, Marston, and Carnarvon members
Ms-MH-OC-ud - Opal and Carnarvon members
Ms-MH-SL-ud - Salter and Loomis members
Ms-Lv - Livingstone Formation
DvMs-EB - Exshaw and Banff formations
Ms-Bf - Banff Formation
Ms-Bf-u - Banff Formation, upper unit
DvMs-EB-l-ud - Exshaw and Banff (lower unit) formations
DvMs-Ex - Exshaw Formation
Dv-P-100k - Palliser Formation
Dv-Ss - Sassenach Formation
Dv-MPM - Maligne, Perdrix, and Mount Hawk formations

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. The general screen interval is noted in brackets if available.
5. The nomenclature for ponds may not accurately reflect that in the various effluent discharge permits.

References:
1. Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
2. Geology data source: Stockmal, G.S. and Fallas, K.M.(comp.), 2015. Geology, Chinook South, Alberta–British Columbia; Geological Survey of Canada, Open File 7476, 1 .zip file. doi:10.4095/297169

Revisions:
0 - CW- 2023-01-26 - DRAFT- MG
1 - CW - 2023-03-23 - FINAL - MG

0 0.5 1 2 3 4 km

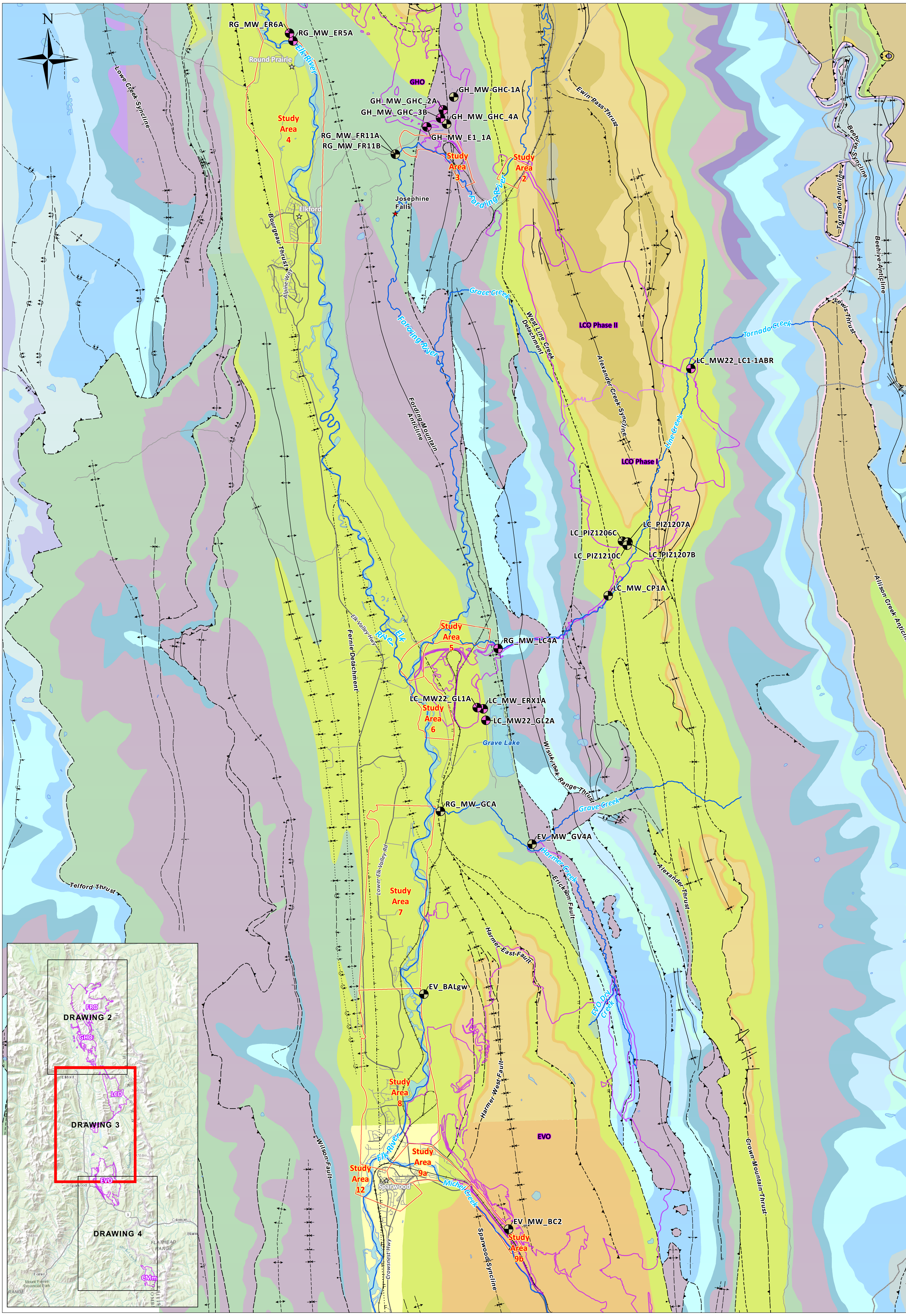
PROJECT LOCATION: Elk Valley, BC	
CLIENT NAME: Teck Coal Limited	SNC·LAVALIN

Bedrock Geology - North

CHK'D: MG	DATE: 2023-03-23	SCALE: 1:60,000	Ref Num:
BY: CW	COORD SYS: NAD 1983 UTM Zone 11N		DRAWING 2

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-BedrockGeologyAll.mxd



Legend

- SSGMP and/or RGMP Well (Bedrock)
- Monitoring wells to be considered for inclusion
- BC-Alberta Border
- Rails
- Highway/Arterial
- Secondary Road
- Streams
- Study Areas
- Lake/River Bed
- Mine Permitted Areas

Geological Faults and Folds

- Anticline
- Anticline (Overturned)
- Syncline
- Syncline (Overturned)
- Monocline (Anticlinal)
- Generic Steep Dip Fault
- Normal Fault
- Thrust Fault
- Back-thrust Fault
- Detachment Fault

Fault/Fold Line Type

- Defined
- Approximate
- Inferred
- Concealed

Bedrock Geology

- Qt-a - Alluvium, colluvium, and till
- Ct-VBeR - Virgelle, Deadhorse Coulee, and Pakowki formations, and Belly River Group
- Ct-WpT - Wapiabi and Telegraph Creek formations
- Ct-C - Cardium Formation
- Ct-Bs - Blackstone Formation
- Ct-Bl - Blairmore Group
- JrCt-K-ud - Kootenay Group
- Ct-E-100k - Elk Formation
- JrCt-MoMM - Morrissey and Mist Mountain formations
- JrCt-MM-100k - Mist Mountain Formation
- Jr-Mo - Morrissey Formation
- Jr-F-100k - Fernie Formation
- Tr-SR - Spray River Group
- Tr-W - Whitehorse Formation
- Tr-SM - Sulphur Mountain Formation
- PnPr-RM - Rocky Mountain Supergroup
- Pr-I-100k - Ishbel Group
- PnPr-MJ-100k - Misty and Johnston Canyon formations
- Pn-K - Kananaskis Formation
- Pn-M - Misty Formation
- Ms-Et - Etherington Formation
- Ms-MH-cgm08 - Mount Head Formation
- Ms-MH-OMC-ud - Opal, Marston, and Carnarvon members
- Ms-MH-OC-ud - Opal and Carnarvon members
- Ms-MH-SL-ud - Salter and Loomis members
- Ms-Lv - Livingstone Formation
- DvMs-EB - Exshaw and Banff formations
- Ms-Bf - Banff Formation
- Ms-Bf-u - Banff Formation, upper unit
- DvMs-EB-l-ud - Exshaw and Banff (lower unit) formations
- DvMs-Ex - Exshaw Formation
- Dv-P-100k - Palliser Formation

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. The general screen interval is noted in brackets if available.

References:

1 .Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
2 .Geology data source: Stockmal, G.S. and Fallas, K.M.(comp.), 2 0 1 6 Geology, Chinook South, Alberta–British Columbia; Geological Survey of Canada, Open File 7476, 1 .zip file. doi:10.4095/297169

Revisions:
0 - CW- 2023-01-26 - DRAFT- MG
1 - CW - 2023-03-23 - FINAL - MG

0 0.5 1 2 3 4 km

PROJECT LOCATION: Elk Valley, BC

CLIENT NAME: Teck Coal Limited

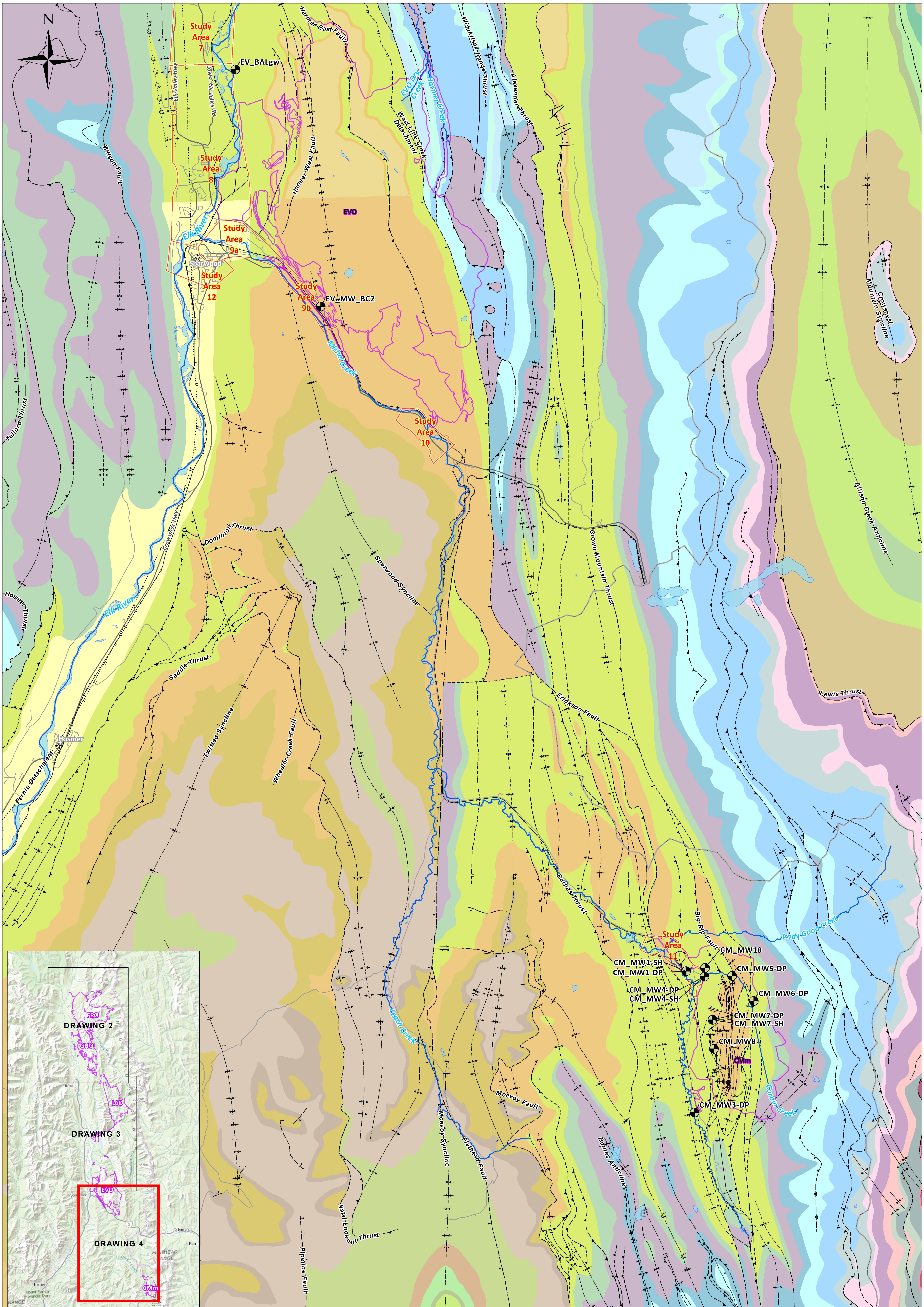
SNC·LAVALIN

Bedrock Geology - Central

CHK'D: MG	DATE: 2023-03-08	SCALE: 1:60,000	Ref Num:
BY: CW	COORD SYS: NAD 1983 UTM Zone 11N		DRAWING 3

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

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



Legend

- SSGMP and/or RGMP Well (Bedrock)
- BC-Alberta Border
- Rails
- Highway/Arterial
- Secondary Road
- Streams
- Study Areas
- Lake/River Bed
- Mine Permitted Areas

Geological Faults and Folds

- Anticline
- Anticline (Overturned)
- Syncline
- Syncline (Overturned)
- Monocline (Anticlinal)
- Generic Steep Dip Fault
- Normal Fault
- Thrust Fault
- Back-thrust Fault
- Detachment Fault

Fault/Fold Line Type

- Defined
- Approximate
- Inferred
- Concealed

Bedrock Geology

- Qt-a - Alluvium, colluvium, and till
- Ct-VBeR - Virgelle, Deadhorse Coulee, and Pakowki formations, and Belly River Group
- Ct-WpT - Wapiabi and Telegraph Creek formations
- Ct-BsC - Blackstone and Cardium formations
- Ct-C - Cardium Formation
- Ct-Bs - Blackstone Formation
- Ct-Cn-100k - Crowsnest Formation
- Ct-Bl - Blairmore Group
- Ct-MC-100k - Mill Creek Formation
- Ct-BM-100k - Beaver Mines Formation
- Ct-CDG - Cadomin, Dalhousie, and Gladstone formations
- Ct-Gl-comp - Gladstone Formation
- Ct-Cd - Cadomin Formation
- Ct-E-100k - Elk Formation
- JrCt-MoMM - Morrissey and Mist Mountain formations
- JrCt-MM-100k - Mist Mountain Formation
- Jr-Mo - Morrissey Formation
- Jr-F-100k - Fernie Formation
- Tr-SR - Spray River Group
- PnPr-RM - Rocky Mountain Supergroup
- Ms-Et - Etherington Formation
- Ms-MH-cgm08 - Mount Head Formation
- Ms-MH-OMC-ud - Opal, Marston, and Carnarvon members
- Ms-MH-SL-ud - Salter and Loomis members
- Ms-Lv - Livingstone Formation
- DvMs-EB - Exshaw and Banff formations
- Dv-P-100k - Palliser Formation
- Dv-FSA - Fairholme Group and Sassenach and Alexo formations
- Cm-FLGW - Flathead, Gordon, Elko, and Windsor Mountain formations
- Mp-Ph - Phillips Formation
- Mp-Ga-u - Gateway Formation, upper part
- Mp-Ga-l - Gateway Formation, lower part
- Mp-Sh-r - Sheppard Formation
- Mp-PL-d - Purcell Lava

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. The general screen interval is noted in brackets if available.

References:

1. Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
2. Geology data source: Stockmal, G.S. and Fallas, K.M.(comp.), 2015. Geology, Chinook South, Alberta–British Columbia; Geological Survey of Canada, Open File 7476, 1 .zip file. doi:10.4095/297169

Revisions:

0 - CW- 2023-01-26 - DRAFT- MG
1 - CW - 2023-03-23 - FINAL - MG

0 0.5 1 2 3 4 km

PROJECT LOCATION: Elk Valley, BC

CLIENT NAME: Teck Coal Limited

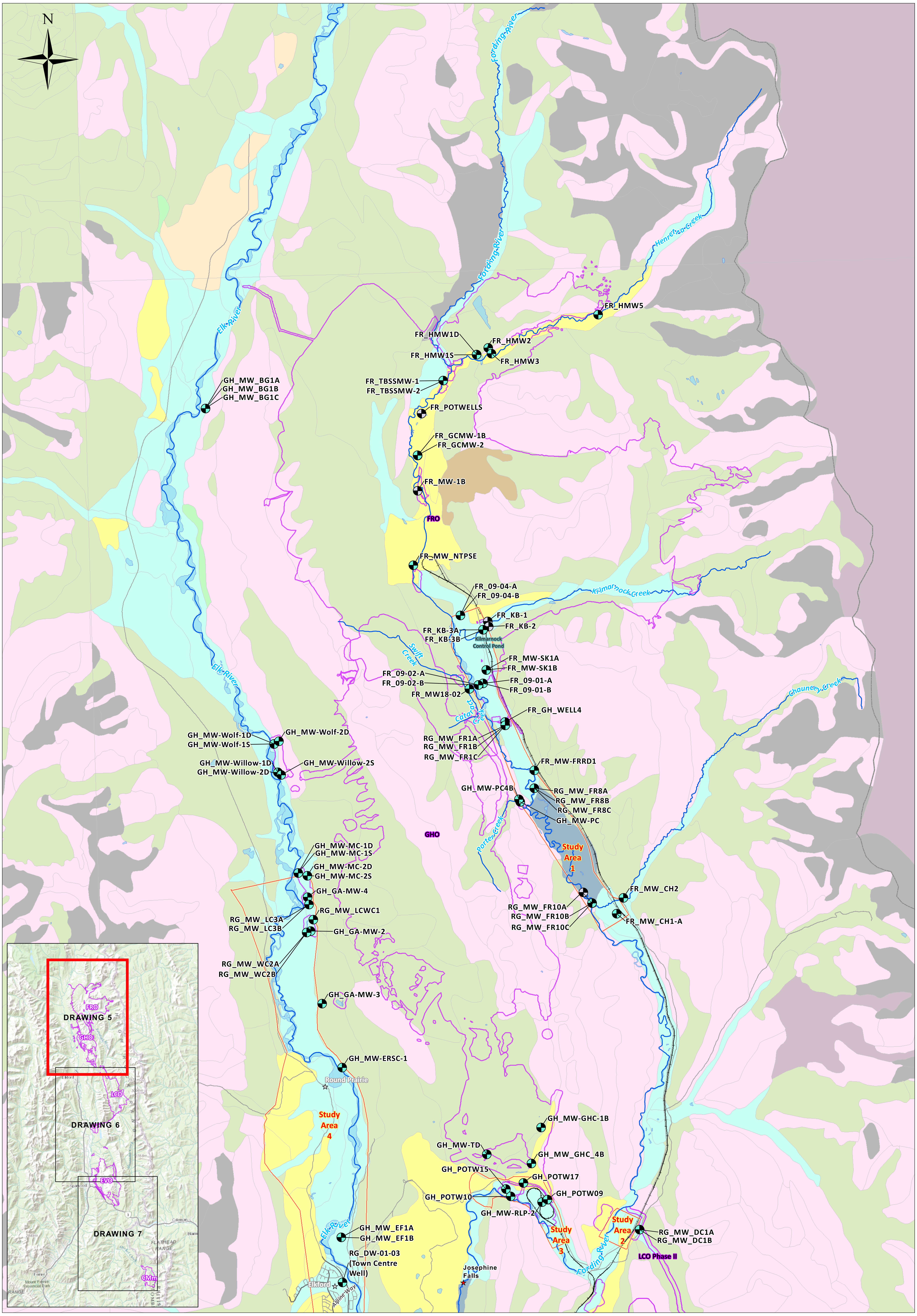
SNC·LAVALIN

Bedrock Geology - South

CHK'D: MG	DATE: 2023-03-09	SCALE: 1:60,000	Ref Num:
BY: CW	COORD SYS: NAD 1983 UTM Zone 11N		DRAWING 4

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-BedrockGeologyAll.mxd



Legend

- SSGMP and/or RGMP Well (Unconsolidated)
- SSGMP and/or RGMP Well (Bedrock and Unconsolidated)
- Streams
- BC-Alberta Border
- Rails
- Highway/Arterial
- Secondary Road
- Study Areas
- Mine Permitted Areas
- Lake/River Bed
- Tailings/Settling/ Sediment Pond

Surficial Unit[2]

- Anthropogenic Material
- Bedrock
- Colluvium
- Fluvial Material
- Glaciofluvial Material
- Lacustrian Material
- Morainal Material (Till)
- Not Classified
- Organic Material
- Undifferentiated Material

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. The general screen interval is noted in brackets if available.
5. POTWELLS not used to delineate spatial representation of surficial geology polygons.
6. The nomenclature for ponds may not accurately reflect that in the various effluent discharge permits.

References:
1. Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
2. Surficial geology data source: Ministry of Environment and Climate Change Strategy, Knowledge Management. Received on May 26, 2021 from the Province of British Columbia Open Data Portal (https://catalogue.data.gov.bc.ca/dataset/3f6280a0-11d6-430f-92c5-a4a66023e6a1)

0 0.5 1 2 3 km

PROJECT LOCATION: Elk Valley, BC

CLIENT NAME: Teck Coal Limited

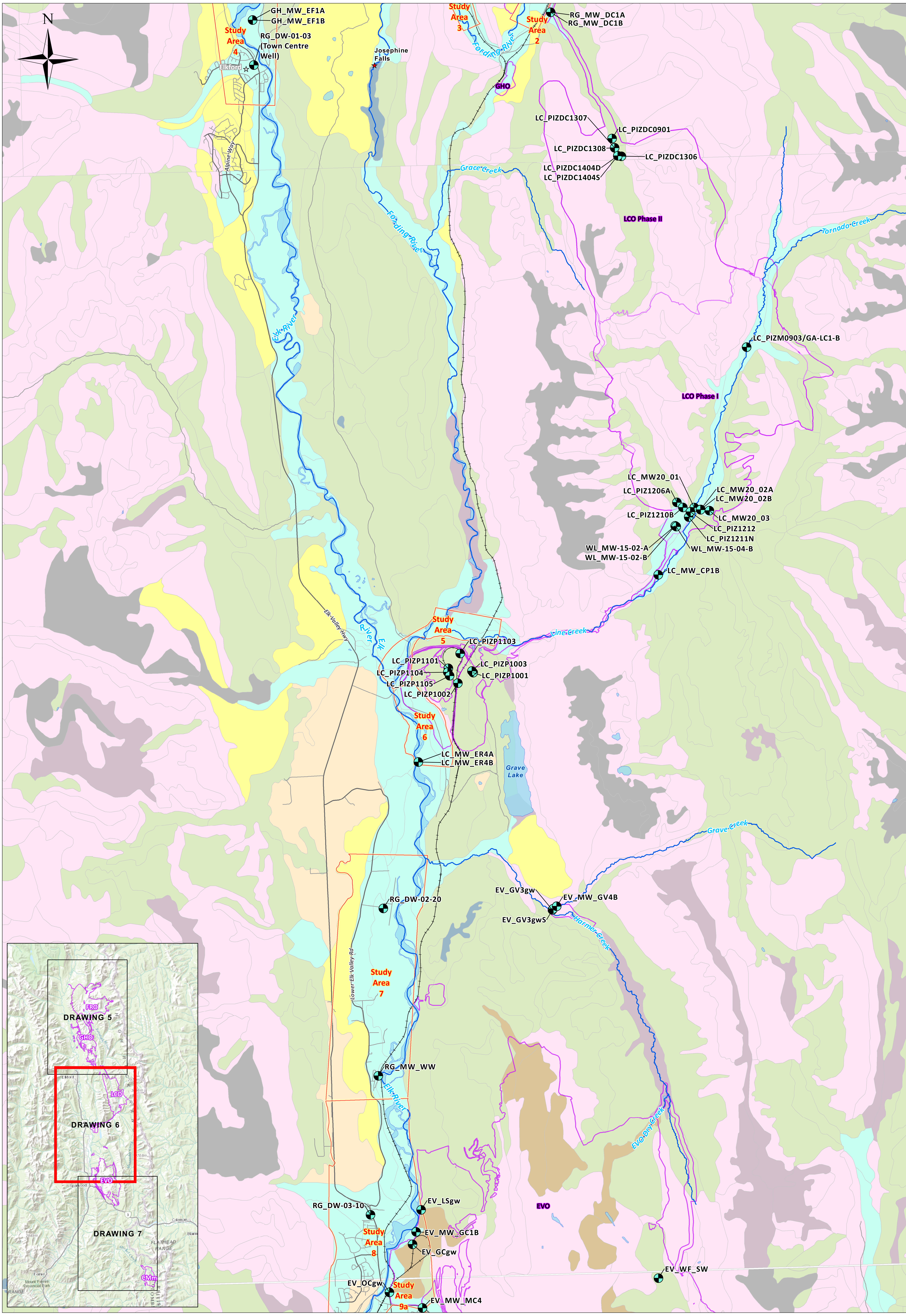
SNC · LAVALIN

Surficial Geology - North

CHK'D: MG	DATE: 2023-03-23	SCALE: 1:45,000	Ref Num:
BY: CW	COORD SYS: NAD 1983 UTM Zone 11N		DRAWING 5

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

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



Legend

- SSGMP and/or RGMP Well (Unconsolidated)
- Streams
- BC-Alberta Border
- Rails
- Highway/Arterial
- Secondary Road
- Study Areas
- Mine Permitted Areas
- Lake/River Bed

Surficial Unit[2]

- Anthropogenic Material
- Bedrock
- Colluvium
- Fluvial Material
- Glaciofluvial Material
- Lacustrian Material
- Morainal Material (Till)
- Not Classified
- Organic Material

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. The general screen interval is noted in brackets if available.
5. POTWELLS not used to delineate spatial representation of surficial geology polygons.

References:
1. Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

2. Surficial geology data source: Ministry of Environment and Climate Change Strategy, Knowledge Management. Received on May 26, 2021 from the Province of British Columbia Open Data Portal (https://catalogue.data.gov.bc.ca/dataset/3f6280a0-11d6-430f-92c5-a4a66023e6a1)

0 0.5 1 2 3 km

PROJECT LOCATION: Elk Valley, BC

CLIENT NAME: Teck Coal Limited

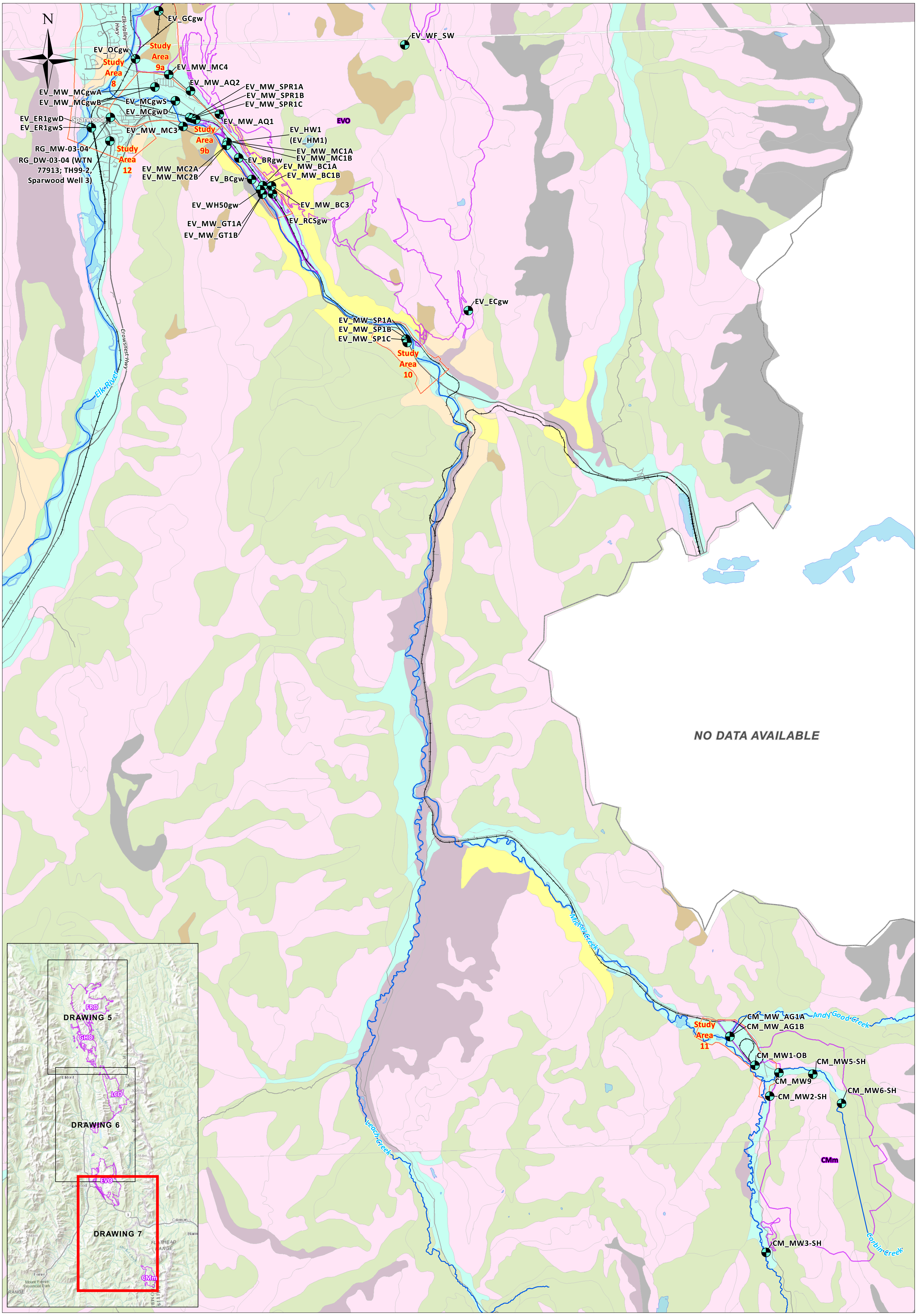
SNC·LAVALIN

Surficial Geology - Central

CHK'D: MG	DATE: 2023-03-08	SCALE: 1:45,000	Ref Num:
BY: CW	COORD SYS: NAD 1983 UTM Zone 11N		DRAWING 6

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

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



Legend

- SSGMP and/or RGMP Well (Unconsolidated)
- Streams
- BC-Alberta Border
- Rails
- Highway/Arterial
- Secondary Road
- Study Areas
- Mine Permitted Areas
- Lake/River Bed

Surficial Unit[2]

- Anthropogenic Material
- Bedrock
- Colluvium
- Fluvial Material
- Glaciofluvial Material
- Lacustrian Material
- Morainal Material (Till)
- Not Classified
- Undifferentiated Material

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. The general screen interval is noted in brackets if available.
5. POTWELLS not used to delineate spatial representation of surficial geology polygons.
6. The nomenclature for ponds may not accurately reflect that in the various effluent discharge permits.

References:
1. Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
2. Surficial geology data source: Ministry of Environment and Climate Change Strategy, Knowledge Management. Received on May 26, 2021 from the Province of British Columbia Open Data Portal (https://catalogue.data.gov.bc.ca/dataset/3f6280a0-11d6-430f-92c5-a4a66023e6a1)

0 0.5 1 2 3 km

PROJECT LOCATION: Elk Valley, BC

CLIENT NAME: Teck Coal Limited

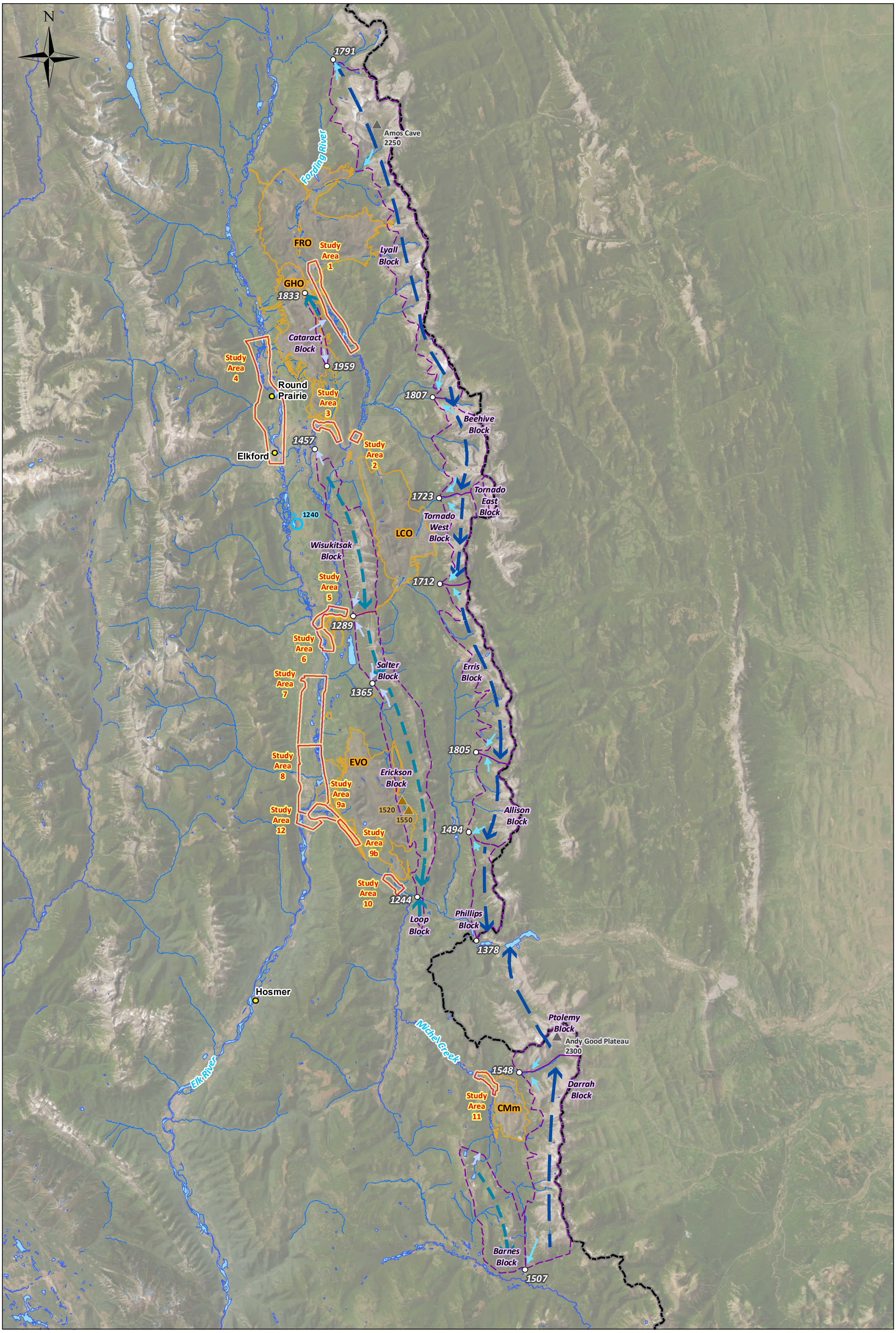
SNC · LAVALIN

Surficial Geology - South

CHK'D: MG	DATE: 2023-03-23	SCALE: 1:45,000	Ref Num:
BY: CW	COORD SYS: NAD 1983 UTM Zone 11N		DRAWING 7

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

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



Legend

- Fording Mtn. Warm Spring (masl)
- Inferred Primary Strike-Oriented Groundwater Flow Direction¹
- Inferred Secondary Strike-Oriented Groundwater Flow Direction¹
- Inferred Primary Strike-Oriented Groundwater Flow Direction²
- Inferred Secondary Strike-Oriented Groundwater Flow Direction²
- 1000 Lowest Elevations (masl) corresponding to a Karst Potential Block
- Amos Cave and Andy Good Plateau (masl)
- Cave Identified during bat habitat study (masl)
- Karst Potential Blocks
- Study Areas
- Water Features
- Rivers
- BC-Alberta Border

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.

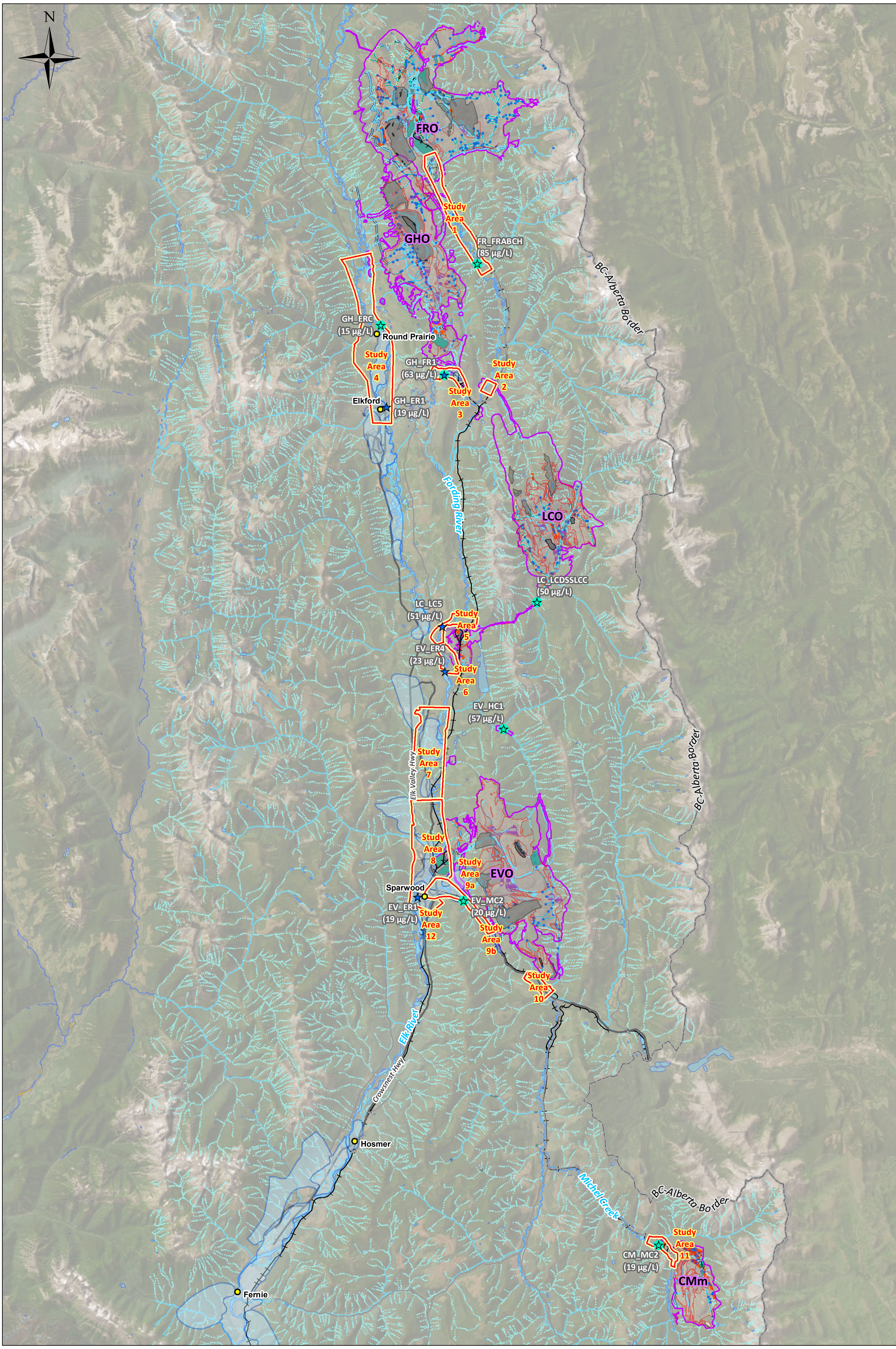
References:
1. Based on this assessment.
2. Based on Worthington, 1991.
3. Data provided by Teck Coal Limited.
4. Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

0 2 4 8 12 16 20 km

PROJECT LOCATION: Elk Valley, BC	SNC · LAVALIN
CLIENT NAME: Teck Coal Limited	
Karst Potential	
CHK'D: MG	DATE: 2023-03-08
BY: CW	COORD SYS: NAD 1983 UTM Zone 11N
SCALE: 1:330,000	Ref Num: **DRAWING 8**

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\635544-8-Karst Potential.mxd



Legend

- Compliance Point
- Order Station (Site Performance Objective)
- Compliance Point and Order Station (Site Performance Objective)

Site Features

- BC Communities
- Study Areas
- BC-Alberta Border
- Highway
- Secondary Road
- Rails
- Mapped Aquifers
- Tailings/Settling Pond
- Waste Water Pond
- End-Pit Lake
- Pit
- Stockpiles
- Waste Dump (Spoils)
- Mine Permitted Areas

Water Features

- Stream + Stream Ditch
- Intermittent + Indefinite Stream
- Subsurface
- Culvert
- Ditch
- Potable Waterline
- Rock Drain
- Water Pipeline
- Bypass/Diversion Channel
- Island
- Lake/River Bed
- Wetted Area/Wetland (Based on 1:250000 Scale)

(XX µg/L) Site Performance Objective Screening Criteria and Compliance Point Screening Criteria

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.

References:

1. Information 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

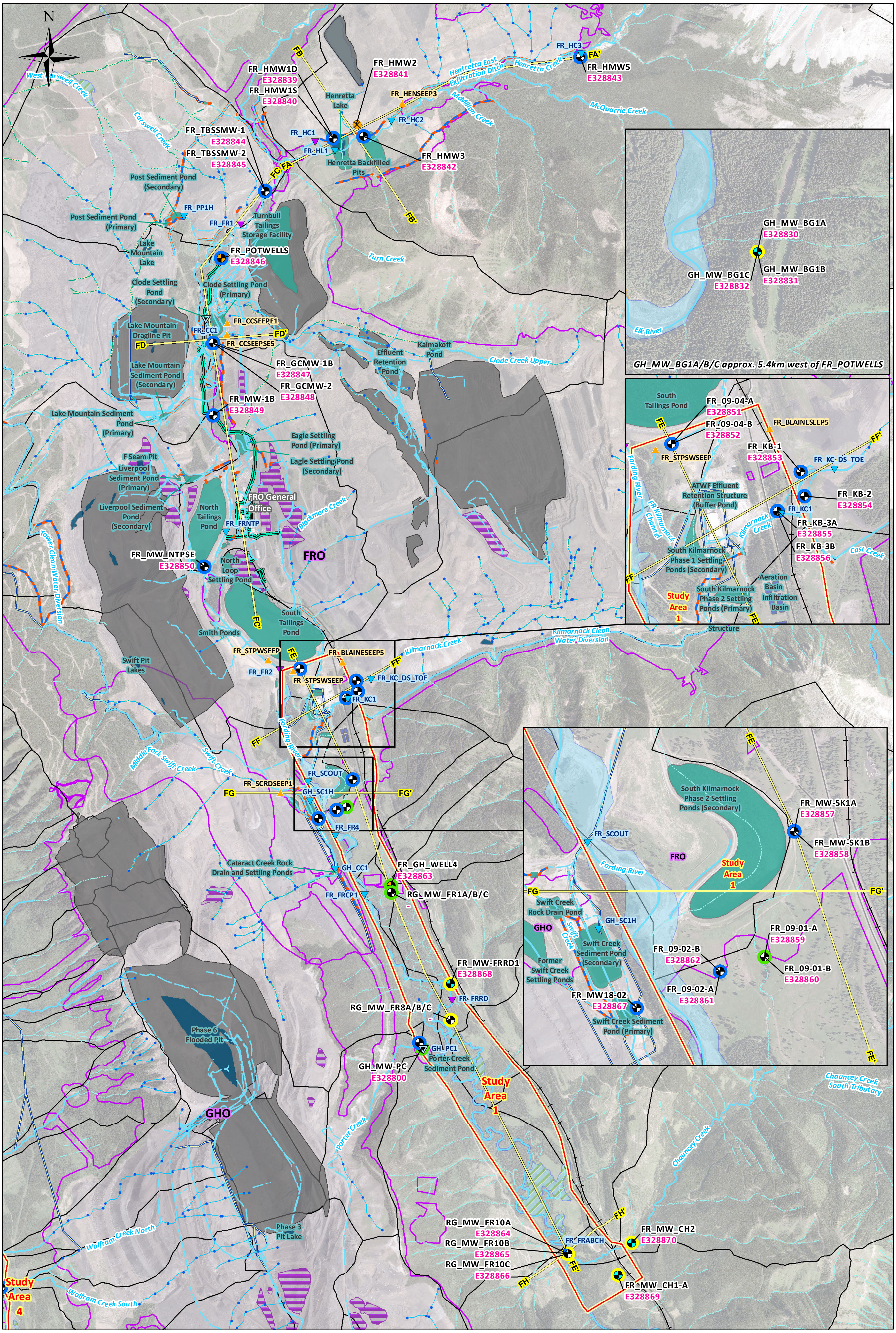
SNC·LAVALIN

Order Stations Location Plan

CHK'D: MG	DATE: 2023-03-24	SCALE: 1:250,000	Ref Num:
BY: CW	COORD SYS: NAD 1983 UTM Zone 11N		DRAWING 9

MXD Path: \\Sli4395\projects\Current Projects\Teck Coal Ltd\GISCAD\GIS\Map Series\635544_2022_RGMPSSGMP_AnnRpt\635544-9-OrderStn_LP.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
- Well included in the RGMP
- Well included in the SSGMP
- Well included in both the RGMP and the SSGMP

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
- 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 1:46000 Scale)

E328839 EMS ID

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 0.375 0.75 1.5 2.25 km

PROJECT LOCATION:
Elk Valley, BC

CLIENT NAME:
Teck Coal Limited

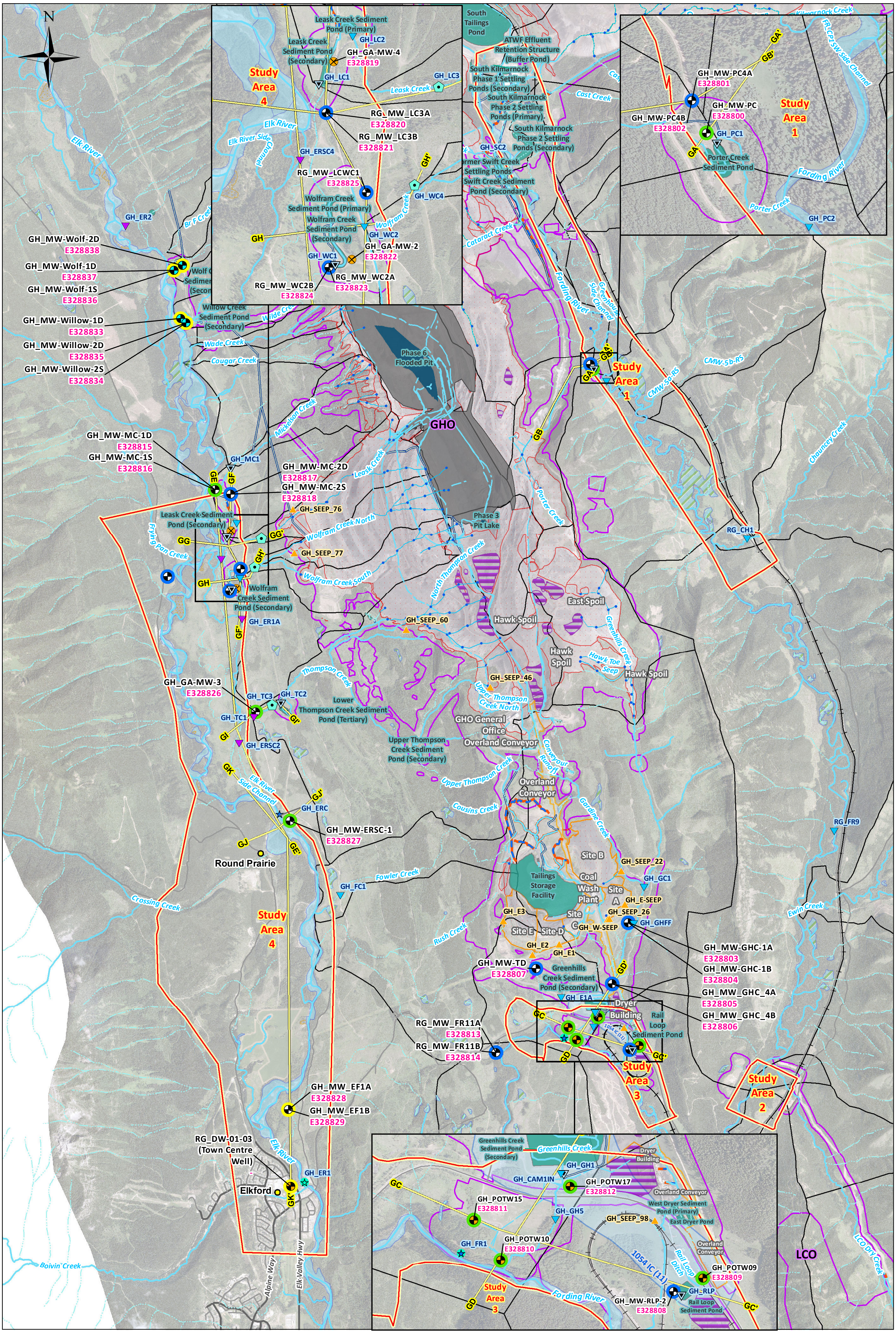
SNC • LAVALIN

Fording River Operations - Environmental Monitoring System, Monitoring Location Identification

CHK'D: CH	DATE: 2023-03-23	SCALE: 1:46,000	Ref Num:
BY: CW	COORD SYS: NAD 1983 UTM Zone 11N		DRAWING 10

MXD Path: \\Sli4395\projects\Current Projects\Teck Coal Ltd\GISCAD\GIS\Map Series\635544_2022_RGMPSSGMP_AnnRpt\635544-10-EMS_LP_FRO.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
- 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
- Decommissioned Well
- Groundwater Fed Pool
- Borehole

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

Site Features
- Highway/Arterial
- Secondary Road
- Rails
- Geological Cross Section
- Plant Site
- 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
- Mapped Aquifers
- Ditch
- Rock Drain
- Water Pipeline
- Bypass/Diversion Channel
- Island
- Lake/River Bed
- Wetted Area/Wetland (Based on 1:55000 Scale)

E328839 EMS ID

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 0.25 0.5 1 1.5 2 km

PROJECT LOCATION: Elk Valley, BC

CLIENT NAME: Teck Coal Limited

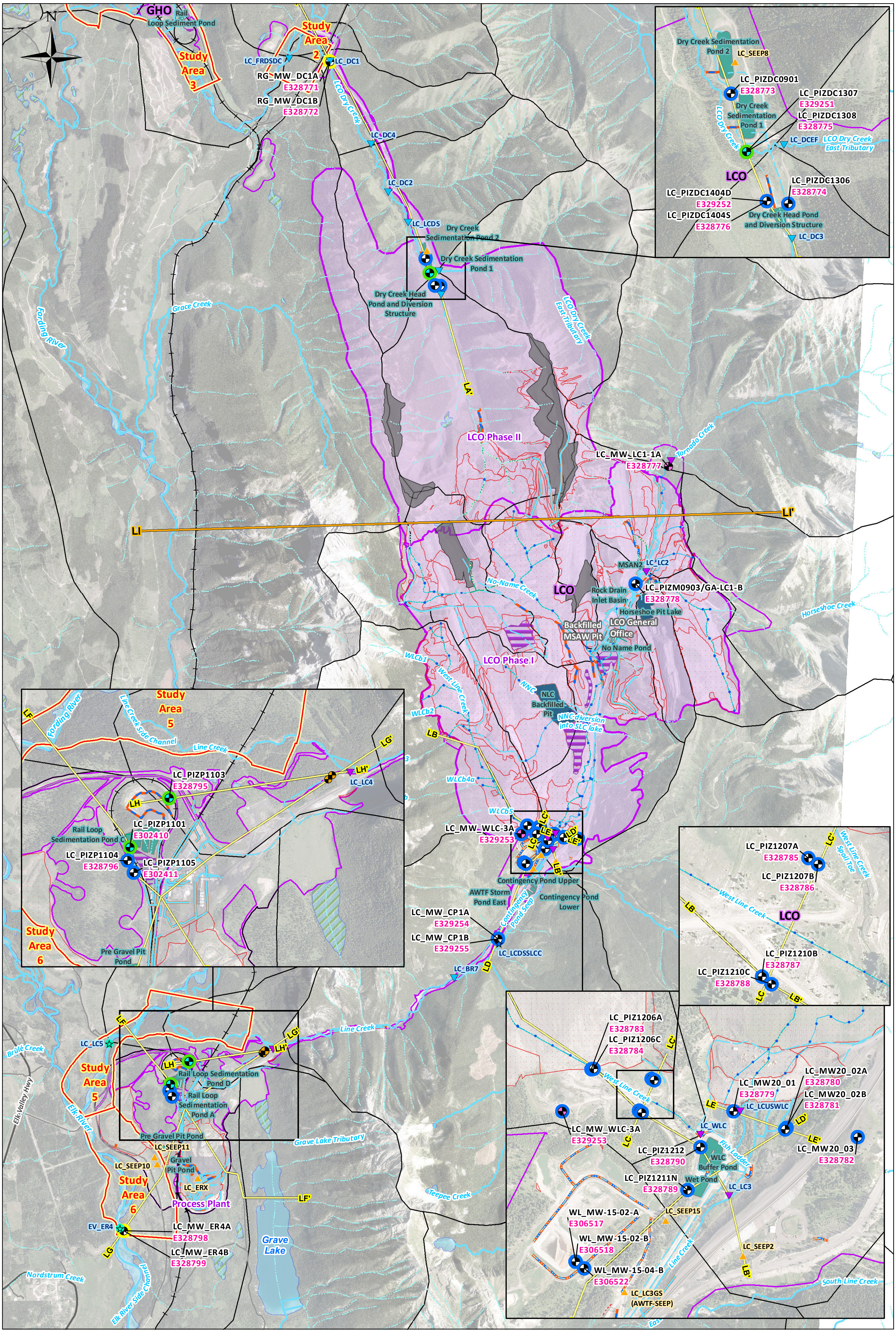
SNC·LAVALIN

Greenhills Operations - Environmental Monitoring System, Monitoring Location Identification

CHK'D: EC	DATE: 2023-03-23	SCALE: 1:55,000	Ref Num:
BY: CW	COORD SYS: NAD 1983 UTM Zone 11N		DRAWING 11

MXD Path: \\Sli4395\projects\Current Projects\Teck Coal Ltd\GISCAD\GIS\Map Series\635544_2022_RGMPSSGMP_AnnRpt\635544-11-EMS_LP_GHO.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
- 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
- Pumping Wells

Surface Water Stations
- Compliance Point
- Order Station
- Receiving Environment
- Monitoring
- Seep

Site Features
- Highway/Arterial
- Secondary Road
- Rails
- Geological Cross Section
- Bedrock Cross Section
- Study Areas

- Tailings/Settling/Sediment Pond
- End-Pit Lake
- Pit
- Stockpiles
- Waste Dump (Spoils)
- Watersheds
- Mine Permitted Areas
- LCO Phase 1 and 2

Water Features
- Stream + Stream Ditch
- Intermittent + Indefinite Stream
- Subsurface

- Ditch
- Rock Drain
- Water Pipeline
- Island
- Lake/River Bed
- Wetted Area/Wetland (Based on 1:60000 Scale)

E328839 EMS ID

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.
2. LCO Phase 1 and 2 boundaries provided by Teck Coal Limited.

0 0.5 1 2 3 km

PROJECT LOCATION: Elk Valley, BC

CLIENT NAME: Teck Coal Limited

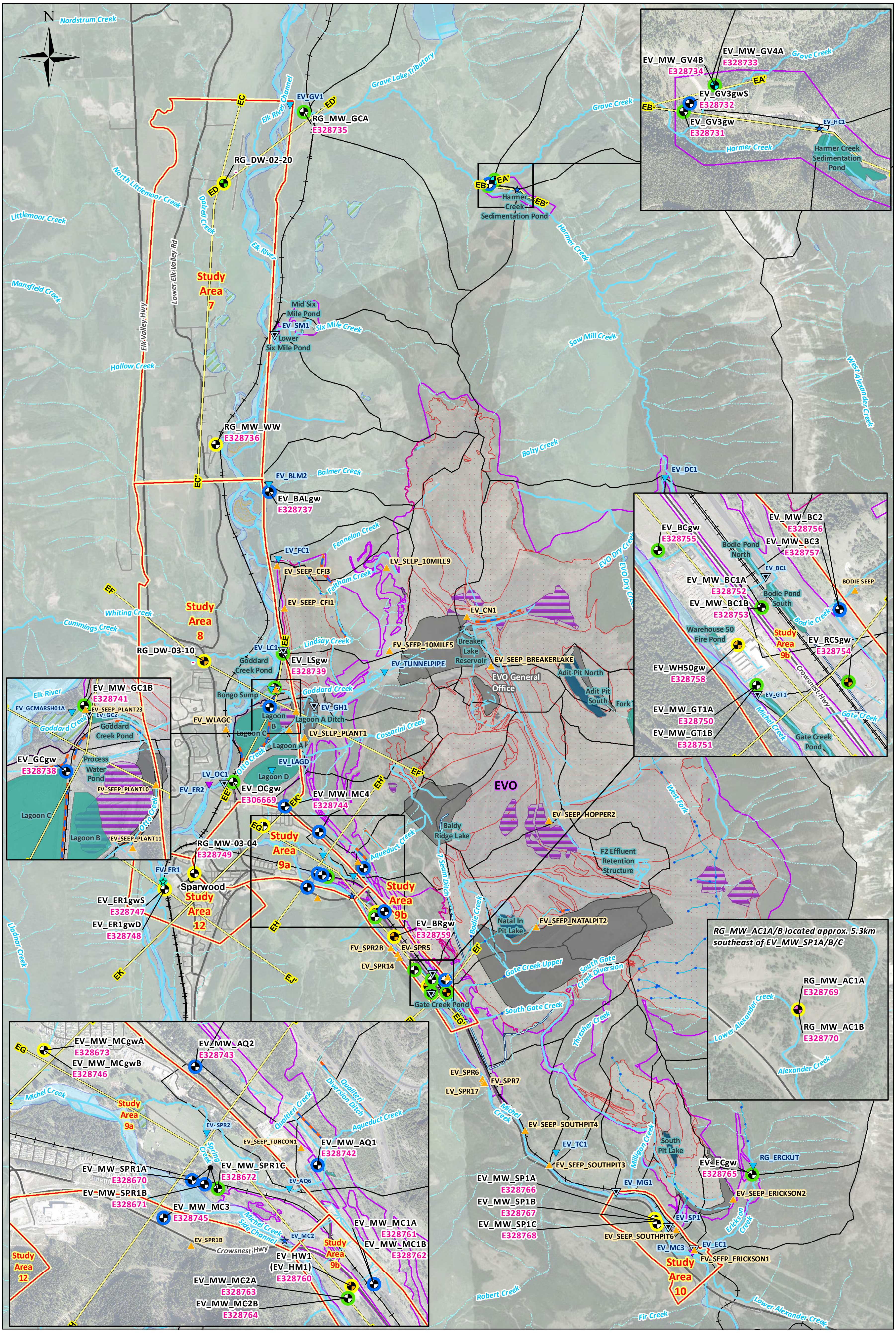
SNC·LAVALIN

Line Creek Operations - Environmental Monitoring System, Monitoring Location Identification

CHK'D: MG	DATE: 2023-03-16 SCALE: 1:60,000	Ref Num:
BY: CW	COORD SYS: NAD 1983 UTM Zone 11N	**DRAWING 12**

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-EMS_LP_LCO.mxd



Legend

Groundwater Stations
- Monitoring Well
- Background Monitoring Well
- Domestic Well
- Supply 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
- Decommissioned Well

Surface Water Stations
- Compliance Point
- Order Station
- Receiving Environment
- Authorized Discharge
- Monitoring
- Seep

Site Features
- Highway/Arterial
- 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
- Island
- Lake/River Bed
- Wetted Area/Wetland (Based on 1:60000 Scale)

E328839 EMS ID

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.

0 0.5 1 2 3 km

PROJECT LOCATION: Elk Valley, BC

CLIENT NAME: Teck Coal Limited

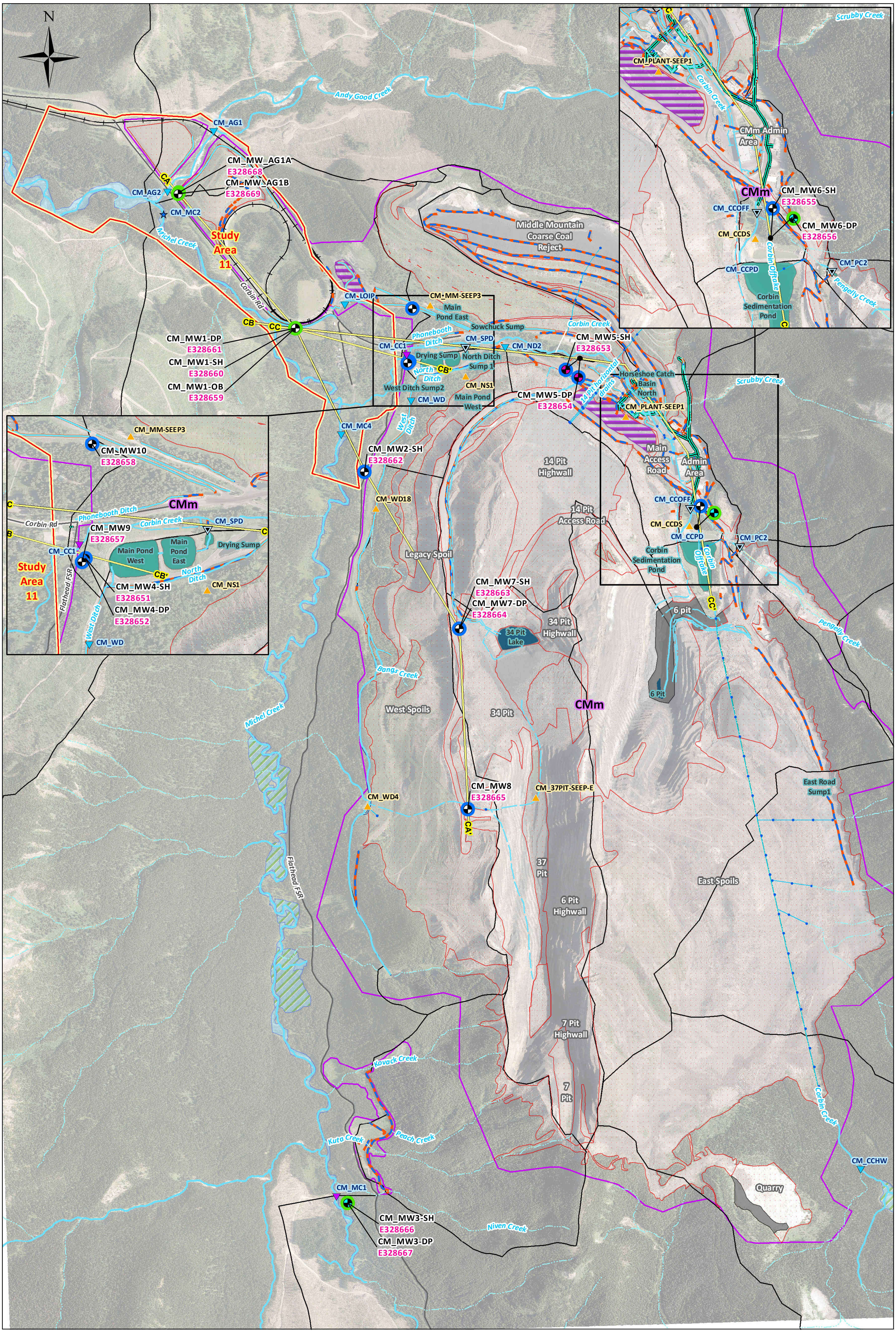
SNC·LAVALIN

Elkview Operations - Environmental Monitoring System, Monitoring Location Identification

CHK'D: DC	DATE: 2023-03-23	SCALE: 1:60,000	Ref Num:
BY: CW	COORD SYS: NAD 1983 UTM Zone 11N		DRAWING 13

MXD Path: \\Sli4395\projects\Current Projects\Teck Coal Ltd\GISCAD\GIS\Map Series\635544_2022_RGMPSSGMP_AnnRpt\635544-13-EMS_LP_EVO.mxd

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



Legend

Groundwater Stations[4]
- Monitoring Well
- Background Monitoring Well
- Well included in the SSGMP
- Well included in both the RGMP and the SSGMP
- Barologger installed at monitoring well

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
- 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 1:20000 Scale)

E328839 EMS ID

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.

0 0.1 0.2 0.4 0.6 0.8 1 km

PROJECT LOCATION: Elk Valley, BC

CLIENT NAME: Teck Coal Limited

SNC·LAVALIN

Coal Mountain Mine - Environmental Monitoring System, Monitoring Location Identification

CHK'D: MB	DATE: 2023-03-22	SCALE: 1:20,000	Ref Num:
BY: CW	COORD SYS: NAD 1983 UTM Zone 11N		DRAWING 14

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

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

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