



**THURBER ENGINEERING LTD.**

**LINE CREEK OPERATIONS  
TAILINGS STORAGE FACILITIES  
2022 ANNUAL FACILITY PERFORMANCE REPORT**

**Final Report**

**to**

**Teck Coal Limited**



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## EXECUTIVE SUMMARY

This report describes the results of the annual facility performance review in 2022 for the Tailings Storage Facilities (TSFs) at Line Creek Operations (LCO). Teck Coal Limited (Teck) retained Thurber Engineering Ltd. (Thurber) to prepare this 2022 Annual Facility Performance Report (AFPR) for the TSFs and covers the reporting period from October 2021 to August 2022. The AFPR site inspection was conducted on July 14, 2022, by Thurber and Teck personnel.

The objectives of this 2022 AFPR were to visually inspect the condition of the TSFs, and to evaluate the performance of the structures over the reporting period.

This 2022 AFPR includes the following facilities:

- East Refuse Extension (ERX) Coarse Coal Refuse (CCR) TSF.
- Pond Fines Dump (PFD) TSF.
- Rail Loop Ponds (RLP) TSF.

Based on the visual observations during the site inspection and the review of the information provided by Teck, two Priority 2 recommendations related to performance were identified as presented in the table below. There are no new Priority 1 recommendations for the TSFs.

The recommendations provided below are limited to the scope of the AFPR and should be considered preliminary and subject to confirmation, until a Dam Safety Review (DSR) is conducted for each of the TSFs.

Facility	ID #	Deficiency or Non-Conformance	Recommended Action	Priority <sup>1</sup>	Recommended Deadline
ERX	2022-AFPR-04	Standing water near the crest.	The surface water management plan should be reviewed/updated and fully implemented.	2	Q3 2023
Pond Fines Dump	2022-AFPR-04	Limited geotechnical characterization and engineering assessments	Develop a DBM for the facility and conduct engineering assessments to evaluate the risk of failure due to slope instability (e.g., piping, liquefaction, slope failure) of the facility.	2	Q3 2023



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## LIST OF ACRONYMS

AFPR	Annual Facility Performance Report
CCR	Coarse Coal Refuse
CDA	Canadian Dam Association
DSR	Dam Safety Review
ECCC	Environment & Climate Change Canada
EGBC	Engineers and Geoscientists of British Columbia
EMLI	Ministry of Energy, Mines and Low Carbon Innovation
ENV	Ministry of Environment and Climate Change Strategy (ENV)
EoR	Engineer of Record
EPP	Emergency Preparedness Plan
EPRP	Emergency Preparedness and Response Plan
ERP	Emergency Response Plan
ERX	East Refuse Extension
HSRC	Health, Safety and Reclamation Code for Mines in British Columbia
ICOLD	International Commission on Large Dams
IDF	Inflow Design Flood
LCO	Line Creek Operations
MERP	Mine Emergency Response Plan
MSA	Mine Services Area
OMS	Operations, Maintenance and Surveillance
PFD	Pond Fines Dump
QP	Qualified Professional
QPO	Quantifiable Performance Objectives
RTFE	Responsible Tailing Facility Engineer
RLP	Rail Loop Ponds
TARP	Trigger Action Response Plan
TSF	Tailings Storage Facility



## **1. INTRODUCTION**

This report describes the results of the annual facility performance review in 2022 for the Tailings Storage Facilities (TSFs) at Line Creek Operations (LCO). Teck Coal Limited (Teck) retained Thurber Engineering Ltd. (Thurber) to prepare this 2022 Annual Facility Performance Report (AFPR) as part of their duties as candidate Engineer of Record (EoR) for the TSFs, and covers the reporting period from October 2021 to August 2022. The AFPR site inspection was conducted on July 14, 2022, by Thurber and Teck personnel.

Mr. Randal Osicki (Thurber) is currently the candidate EoR for the three TSFs. As the candidate EoR, Randal Osicki is in the process of completing the required due diligence on behalf of Thurber to serve as EoR. The due diligence process is outside the General EoR Scope of Service for the TSFs and is covered in a separate scope of work and will be reported on separately.

The site inspection and this AFPR were completed in consideration of the BC Ministry of Energy, Mines and Low Carbon Innovation (EMLI) Health, Safety and Reclamation Code (HSRC) for Mines in British Columbia (Revised April 2021) Section 10.5.3 and Teck Resources Limited (Teck 2019) Guideline for Tailings and Water Retaining Structures.

The objectives of this 2022 AFPR were to visually inspect the conditions of the TSFs, and to evaluate the performance of the structures over the reporting period.

The 2022 TSFs AFPR includes the following facilities:

- East Refuse Extension (ERX) Coarse Coal Refuse (CCR) TSF
- Pond Fines Dump (PFD) TSF
- Rail Loop Ponds (RLP) TSF

The following report details the findings and recommendations of the 2022 inspection.

## **2. BACKGROUND AND FACILITY DESCRIPTION**

### **2.1 East Refuse Extension CCR**

#### **2.1.1 Facility Description**

The East Refuse Extension (ERX) CCR TSF is located south of the processing plant and east of CP Rail Lines as seen in Figure A3 in Appendix A. In the past, the ERX has been referred to by a variety of names throughout the existing documentation including the East Refuse Extension, East Dump, CCR Dump and CCR Storage.



The ERX is an active “dry stack” that is currently 30 m to 40 m in height. The ERX is approximately 700 m by 1400 m, consisting of a lower bench (~25 m to elevation 1285 m) and an upper bench (~15 m to elevation 1300 m). Coarse Coal Refuse (CCR) material from the Processing Plant refuse bin, transported to the facility by haul truck, is placed loosely on the benches for a period to dewater. The CCR is then spread in lifts using bulldozers in a “bottom up” construction method around the base of the facility. In other areas of the ERX the CCR is placed using the “dump short and push” method resulting in the CCR between the benches being placed at the angle of repose (~37°). A perimeter runout berm has been constructed along the southern extents of the C-129 mine permit boundary of the facility in the areas of active placement. There are also shallow drainage ditches along the toe of the active face to direct water away from the base of the CCR pile toward temporary infiltration sumps across the facility.

### **2.1.2 Brief History of Construction and Operation**

Design documents for the ERX TSF as well as pre-construction drilling data have been located and were reviewed as part of this 2022 AFPR. Construction of the ERX TSF began in 1999 and an approved expansion permit in 2007 resulted in the current ERX footprint. As of August 2022, the facility contained an estimated 18.2 Mm<sup>3</sup> of the permitted 22.0 Mm<sup>3</sup> CCR with approximately 200 m of southern expansion room remaining.

Teck is currently in the process of permitting an additional expansion, referred to as Phase 2, to increase the capacity of the ERX by 29.0 Mm<sup>3</sup> to a total of 51.0 Mm<sup>3</sup>. Tetra Tech was retained by Teck in 2019 to produce the design, stability analysis, and reclamation design as the geotechnical designer for Phase 2. As part of Phase 2, a series of Vibrating Wire Piezometers (VWP) were installed along the southern extent of the CCR pile in 2020. Additional VWPs were installed in June 2022 as part of the ERX Phase 2 geotechnical exploration program. All VWPs are monitored by Teck and data was provided as part of this 2022 AFPR.

### **2.1.3 Summary of Operation for the Reporting Period**

LCO are constructing the facility to the current permitted ERX design elevation of 1315 m. Throughout the reporting period, an estimated 1.852 MT of CCR, and 0.240 MT of breaker rock was placed in the southern section of the ERX. These totals estimate an average monthly placement rate of 0.165 MT of CCR and 0.021 MT of breaker rock.

The west runout berm and a small section of the south runout berm were constructed in 2021 using CCR material along the C-129 mine permit boundary. The remaining sections of the south runout berm were constructed in early 2022 using native material sourced from within the C-129





mine permit boundary. The berm is approximately 3 m in height and was bucket compacted. Silt fencing was also installed along the southern extent of the facility in the drainage area.

Pond fines (fine grained, coal rich material) from the Drying Pad near the Rail Loop Ponds (RLP) were excavated and placed in a cordoned off section in the centre of the ERX with the consent of Teck and the geotechnical designer. This was performed as part of a pilot program to demonstrate that pond fines can safely be transported across the rail tracks. The results of this pilot could potentially result in the Pond Fines Dump (PFD) no longer being required to provide pond fines storage capacity. Similarly wet hydro-vac material will also be deposited in the centre of the ERX facility, resulting in consolidated waste placement and reducing reliance on the other LCO facilities.

## **2.2 Pond Fines Dump**

### **2.2.1 Facility Description**

The Pond Fines Dump (PFD) is located south of the Processing Plant, west of the ERX CCR, and south of the Gravel Pit Ponds. The PFD outer slope geometry consists of an upper and lower bench which can be seen in Figure A4 in Appendix A. The PFD also borders some staked archaeological sites to the south, further restricting the boundaries of the TSF and limiting placement options.

During operations, pond fines excavated from the RLP are deposited in the PFD by haul truck at the crest of the valley (dump area). Deposited pond fines which have migrated down the valley have been contained by the topography of the valley side walls and a downstream decommissioned mine road (embankment area). This containment relies on and effectively classifies the decommissioned mine road as a tailings containment embankment approximately 10-15 m in height. There is a culvert through the decommissioned mine road for draining water from the valley. The discharge of the culvert is buried by eroded pond fines. A ditch along the upstream slope of the decommissioned mine road conveys surface runoff south to an infiltration sump.

No design or stability analyses have previously been performed for the PFD to date. An initial geotechnical assessment by Thurber is currently in progress.

### **2.2.2 Brief History of Construction and Operation**

Established in the late 1990s or early 2000s, the PFD is located in an approximately 100 m wide natural valley and overlays native soils. The footprint of the PFD was originally intended to serve



as a rock drain for an expansion of the historic CCR. After the initial placement of CCR material, pond fines were deposited in the PFD as part of the 2015 LCO Sediment Management Plan. Pond fines are deposited every 7 to 11 months in the facility during the excavation of Cell A and B of the Rail Loop Ponds (RLP).

In an estimate provided by Teck, 343,000 m<sup>3</sup> of pond fines have been deposited in the PFD TSF as of June 2022. This estimate is derived from estimates of the volume of material excavated from RLP A and B. Comparisons of recent cleanout volume estimates and the corresponding surveyed volumes deposited at the PFD indicates volumes in the PFD may be overestimated. A preliminary comparison of the pre-mining topography of the PFD and the 2022 LiDAR surface provided by Teck also indicates that 343,000 m<sup>3</sup> of material is likely an overestimate. Additional analysis incorporated with a better understanding of the construction history of the PFD will be required to obtain a more accurate material inventory from past depositions.

### **2.2.3 Summary of Operation for the Reporting Period**

The most recent deposition of pond fines at the PFD occurred in May 2022. Pond fines from Pond B of the RLP TSF were excavated and hauled to the PFD dump area. The pond fines material was a little wetter than typical as it had not undergone the regular two to four month drying period due to an incident at the RLP in early 2022 as described in Section 2.3.3.1.

Teck is not planning to deposit any additional material in the PFD following the May 2022 deposition until a design basis memorandum (DBM) and a deposition plan for the PFD has been established.

## **2.3 Rail Loop Ponds**

### **2.3.1 Facility Description**

The RLP TSF is located northwest of the Processing Plant and is contained within the rail load-out spur. Four ponds comprise the RLP TSF and are labeled Pond A, Pond B, Pond C, and Pond D. They are separated by internal dividing dykes which can be seen in Figure A5 in Appendix A. The Drying Pad is located immediately north of the ponds.

The RLP are designed to provide storage capacity for the outflow from the refuse thickener. Inflow from the thickener is diverted into either Pond A or Pond B through a discharge pipe protected by a boxed culvert on an alternating basis. Limited surface water runoff can also enter the south end of Pond A through a partially blocked culvert connected to a drainage ditch south of the RLP. Most of the entrained fine tailings settle in Pond A or Pond B and the process water flows into



Pond C through gated culverts. When Pond A or Pond B have reached the capacity limit for deposited solids the gated culverts are closed, and the inflow alternates to the other pond. The pond ideally drains and dries for two to four months, and once the material is deemed sufficiently dry, the solids are excavated, and are relocated to the Drying Pad or to another designated sediment disposal location outlined in the LCO Sediment Management Plan. Long term plans for pond fines storage will be reviewed as part of Teck's Long Term Pond Fines Management project which is currently underway. Once completed it should be reviewed by the EoR.

Ponds A and B are alternatively utilized, with deposition switching every five to seven months. In total, approximately 30,000 m<sup>3</sup> of pond fines are deposited from the plant every year. Every five years, Pond C undergoes a similar solids excavation to ensure sufficient storage capacity and recirculated water clarity in the pond is maintained. The process water is reclaimed from Pond C using a floating pump barge and is pumped back to the processing plant. The emergency overflow spillway between Pond C and Pond D has an invert 0.50 m below the lowest crest elevation. Pond D is not utilized during regular operations and has no other inflows. The water reclaim pump in Pond C is the sole outflow path for the RLP as there are no spillways or outlets along the perimeter embankments. The intermediate berms at the RLP are lower than the perimeter crests of the facility by design.

### **2.3.2 Brief History of Construction and Operation**

Ponds A, B, and C of the RLPs TSF were constructed in 1981 and Pond D was added at a later, unspecified date. Ponds A, B, and C were constructed by excavating approximately 4 m below the existing ground surface and constructing perimeter dykes up to 2.8 m high. In 2013 a dyke raise was conducted on Pond D, though the extent and dimensions of the raise remain unknown. The spillway connecting Pond C and Pond D was likely constructed in this timeframe. In 2014 the internal berm between Pond B and Pond C was relocated to increase the capacity of Pond C and to allow the process water to be reclaimed closer to the processing plant.

### **2.3.3 Summary of Operation for the Reporting Period**

#### **2.3.3.1 Pond B Overtopping Event (February 21, 2022)**

On Monday, February 21, 2022, at 12:30 p.m., Teck observed Pond A overtopping into Pond B and Pond B overtopping into Pond C. In response to rising levels in Pond C, Teck reduced inflow to Pond C by partially closing the Pond A/C gated culvert (see Section 5.3.2). This temporarily allowed the reclaim pump to lower the water level in Pond C. At the time, Pond B was full of pond



finer and was awaiting cleanout with the Pond B/C gated culvert closed. No monitoring or passive water level control exists for Pond A or B.

After the overtopping was observed, the Pond A/C gated culvert was restored to a fully opened state and the overtopping ceased.

An erosion gully of approximately 0.2 m by 0.2 m in cross section was noted between Ponds A and B, along the discharge pipe. No significant erosion was noted at the location of the overtopping between Pond B and C. As the Pond B/C gated culvert remained closed, the pond fines in Pond B were saturated and zero freeboard was maintained until the gated culvert was opened following the incident.

The following steps should be considered by Teck to repair the damage and prevent a similar event from occurring again:

- Repair the erosion gully between Ponds A and B.
- Consider constructing passive methods of excess flow conveyance between Ponds A, B, and C (spillways).
- Establish and actively monitor freeboard requirements for Ponds A and B.
- Prohibit the partial opening of the gate valves without a sufficient monitoring plan in place.
- Review the RLPs Standard Practices and Procedures PO.30 and OMS Manual and conduct updates to reflect deficiencies which resulting in the overtopping.

As there are no freeboard requirements for Pond A and Pond B specified in Permit PE-5353, a Non-Compliance Report was not required to be submitted by Teck under Permit PE-5353.

Following the overtopping, sandbags were placed across the erosion gully between Pond A and B along the box culvert containing the discharge pipe from the plant refuse thickener. As of this 2022 AFPR site inspection, no repairs had been made to the erosion gully between Pond A and Pond B. Repairs were scheduled to be completed in Q4 2022.

### **2.3.3.2 Pond B Cleanout (May 2022)**

The overtopping described in Section 2.3.3.1 resulted in the pond fines in Pond B becoming resaturated. Due to schedule constraints, the typical two to four month drying period was not exercised, which impacted both the volume and the observed strength of the material placed in the PFD. The pond fines in Pond B of the RLP were excavated and deposited in the PFD in May 2022 as noted in Section 2.2.3.



Additional excavation of pond fines in Pond C that had accumulated around the Pond A/C and Pond B/C outlets of the gated culverts was also conducted at this time.

#### **2.3.3.3 Pond C Stilling Well Clean Out (July 2022)**

On July 21, 2022, a clean out of sediment around the stilling well housing water level monitoring instruments in Pond C was completed. This was conducted to maintain hydrostatic equilibrium between the instruments in the stilling well and Pond C and is discussed in Section 5.3.5.

#### **2.3.3.4 Pond A Cleanout (September and October 2022)**

As described in Section 2.1.3, existing pond fines were hauled to the ERX from the Drying Pad (north of the RLP) to free up drying pad capacity. The pond fines in Pond A of the RLP were excavated and deposited on the Drying Pad in September and October 2022. This process is intended to be a return to the design intention with the Drying Pad serving as a temporary dewatering/drying location prior to the pond fines being hauled to a designated sediment disposal location.

### **3. CONSEQUENCES OF FAILURE**

Teck has advised that they are aligned with the most conservative interpretation of the Global Industry Standard on Tailings Management (GISTM) which, in turn, is consistent with their safety culture. Commensurately, Teck has advised that consequence classification is not a part of their tailings management governance and will instead adopt the extreme consequence case design loading for any facility with a credible flow failure mode. This consequence case applies for both earthquake and flood scenarios for all tailings facilities, consistent with the GISTM. Where this is not possible, Teck will reduce credible risks based on the As Low As Reasonably Practicable (ALARP) principle. This approach meets or exceeds regulatory requirements and is consistent with Teck's approach of one life lost is one too many to be at risk.

### **4. REVIEW OF CLIMATE DATA**

The climate data for LCO, provided by Teck, was obtained from two on-site weather stations. The Plant weather station is located 350 m northeast of the gatehouse, while the Mine Services Area (MSA) station is located north of the mine service station. Climate data from the Environment & Climate Change Canada (ECCC) Sparwood weather station have also been included to provide additional context. Records analyzed for this report include 15-minute interval recordings of temperature, precipitation, snow depth and wind speed. The relevant historical data for the



reporting period is summarized in Table 1 and Figure 1, and is provided as background to subsequent sections in this report.

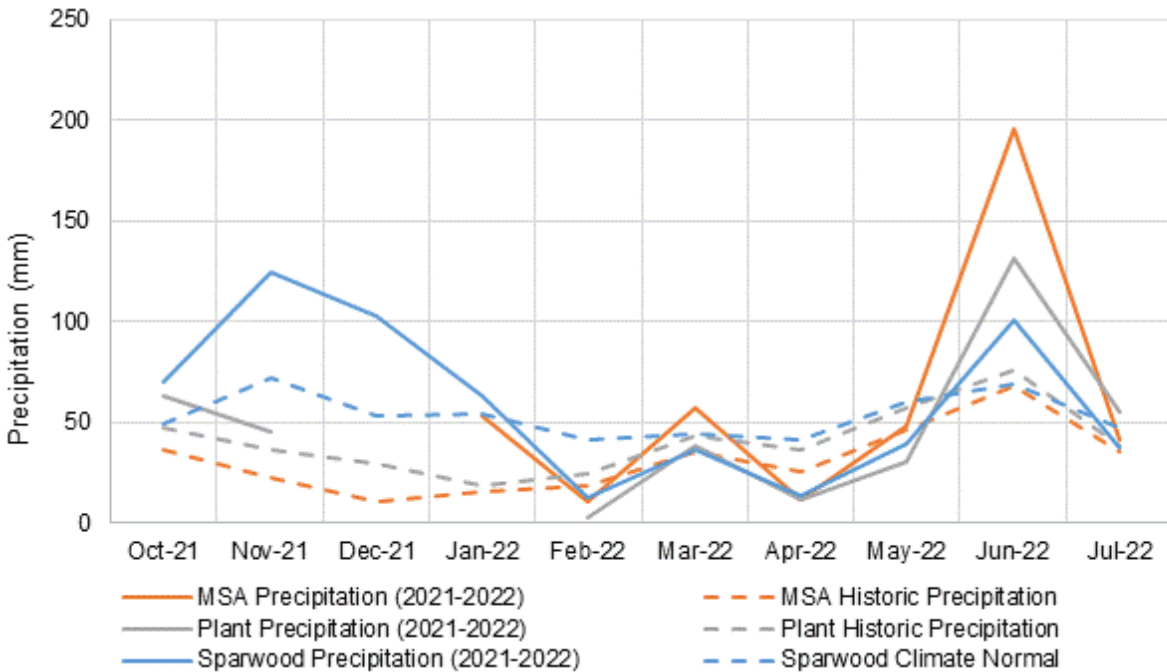
As noted in Table 1, both the MSA and the Plant weather stations experienced substantial data collection gaps during the reporting period. No cause for the gaps was provided with the data or in the 2021 KWL Hydrometric Report. Notes communicating the cause of data gap should be included with the data moving forward so that better continuous records of the conditions experienced by the TSFs can be maintained. Despite the data gaps, it is apparent that more precipitation was experienced by the facilities than the historic average over the reporting period. Concentrated rainfall in November and June (See Section 6) triggered event-based inspections by Teck. The November event was only partially captured by the stations. The triggered inspection indicated no safety concerns as a result of the event and adequate freeboard was observed.



**THURBER** Table 1. Precipitation Data from Teck MSA, Teck Plant, and ECCC Sparwood Weather Stations

Month	MSA Weather Station		Plant Weather Station		Sparwood Station	
	Precipitation	Historical Mean Precipitation (2011-2020)	Precipitation	Historical Mean Precipitation (2011-2020)	Precipitation	Climate Normal Precipitation (1981-2010)
	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)
Oct-2021	[Information Not Available] <sup>1</sup>	36.8	62.8	46.8	69.8	48.8
Nov-2021	[Information Not Available] <sup>1</sup>	22.9	45.0	36.4	124.4	72.1
Dec-2021	[Information Not Available] <sup>1</sup>	10.4	[Information Not Available] <sup>2</sup>	29.5	102.2	53.4
Jan-2022	53.0	15.6	[Information Not Available] <sup>2</sup>	18.6	62.9	53.9
Feb-2022	10.3	18.6	2.7	24.3	12.3	40.9
Mar-2022	57.2	35.6	38.8	43.1	36.8	44.2
Apr-2022	11.5	25.0	12.0	36.2	13.7	41.4
May-2022	48.0	46.2	30.5	56.7	39.3	60.4
Jun-2022	195.8	67.7	131.2	76.1	101.1	69.3
Jul-2022	41.2	35.0	54.8	38.5	37.3	46.8

1. Missing Data from October 1, 2021, to January 1, 2022. Partial data is included.
2. Missing data from November 20, 2021, to February 16, 2022. Partial data is included.



**Figure 1. Monthly Precipitation vs. Historic Precipitation**

The two Teck weather stations are at a higher elevation (MSA 1,590 masl, and Plant 1,280 masl) than the ECCC Sparwood station (1,138 masl) and have generally measured similar precipitation to the ECCC Sparwood station (except for November, March, and June). However, it is unknown if these differences are due to gauge differences (e.g., wind screens or not), location site conditions (e.g., wind screening due to surrounding tree cover) or a real difference in precipitation.

The MSA and Plant stations recorded similar trends through the reporting period indicating the phenomena behind the data divergences noted in the 2021 AFPR have either been addressed or did not occur this year. An update to the historic monthly mean values from the MSA and Plant weather stations (2011-2020) and the Sparwood weather station (2011-2020) by personnel familiar with the stations should be conducted to include data up to 2022. This effort would allow for consistent values to be reported across LCO projects and limit variation due to differing interpretations of the data.

The temperature data for the reporting period is displayed in Table 2 and plotted in Figure 2 for the MSA and Plant weather stations.



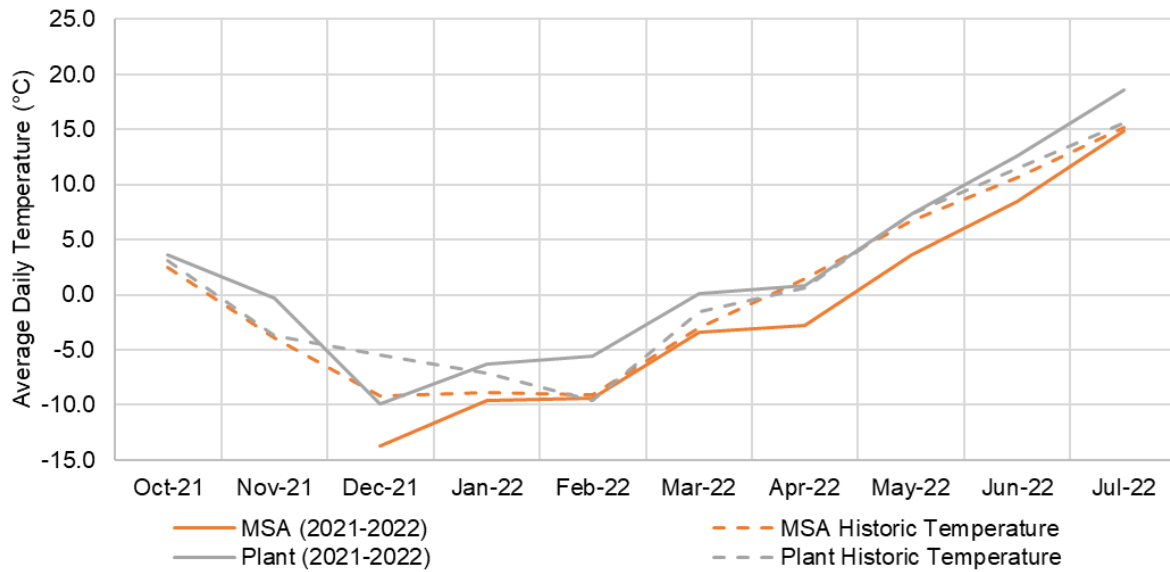


**Table 2. Temperature Data from Teck MSA and Teck Plant Weather Stations**

Month	Teck MSA Weather Station		Teck Plant Weather Station	
	Mean Temperature <sup>1</sup>	Historical Mean Temperature (2011-2020)	Mean Temperature	Historical Mean Temperature (2011-2020)
	(°C)	(°C)	(°C)	(°C)
Oct-2021	[Information Not Available] <sup>1</sup>	2.5	3.7	3.1
Nov-2021	[Information Not Available] <sup>1</sup>	-3.9	-0.3	-3.7
Dec-2021	-13.7 <sup>1</sup>	-9.2	-9.9	-5.5
Jan-2022	-9.6	-8.9	-6.3	-7.1
Feb-2022	-9.4	-9.1	-5.6	-9.6
Mar-2022	-3.4	-3.0	0.1	-1.6
Apr-2022	-2.8	1.4	0.8	0.7
May-2022	3.6	6.8	7.4	7.4
Jun-2022	8.5	10.6	12.6	11.5
Jul-2022	14.9	15.2	18.6	15.5

1. Missing Data from October 1, 2021, to December 3, 2021. Partial data is included.

The data indicates that the monthly average temperatures were typically slightly higher than the historical average. Similar to the precipitation data, the Plant and the MSA stations recorded similar trends in the temperature data indicating similar conditions were experienced at both locations.



**Figure 2. Average Historic Temperature and Average Current Temperature**

## 5. REVIEW OF INSTRUMENTATION MONITORING

### 5.1 East Refuse Extension CCR

The data provided by Teck from the existing instrumentation installed in the ERX CCR TSF was received by Thurber for the 2022 AFPR monitoring period. The status of each VWP is provided in Table 3 below.

**Table 3. ERX VWP Status**

VWP ID	Date of Last Reading	Status
VWP20-01A	2021-07-13	Instrument has been damaged. Replaced with LC_BH22_ERX6A on June 7, 2022.
VWP20-01B	2021-07-13	Instrument has been damaged. Replaced with LC_BH22_ERX6B on June 7, 2022.
VWP20-03	No Data	Inactive
VWP20-12	2022-04-20	Active
VWP20-13	2021-07-22	No reading at datalogger. Suspected wire damage.



**Table 3. ERX VWP Status**

VWP ID	Date of Last Reading	Status
VWP20-14	2022-07-31	Active
VWP21-01	2022-07-31	Active
LC_BH22-ERX3	Not Available	Installed June 3, 2022
LC_BH22-ERX4	Not Available	Installed June 4, 2022
LC_BH22-ERX5A	Not Available	Installed June 8, 2022
LC_BH22-ERX5B	Not Available	Installed June 8, 2022
LC_BH22-ERX6A	Not Available	Installed June 7, 2022
LC_BH22-ERX6B	Not Available	Installed June 7, 2022

Of the 13 VWPs installed, four are inactive or not functioning anymore, two of which have been replaced. Only two of the active VWPs are included in the current monitoring plan (see Section 7.2.1). It is understood that Teck and Tetra Tech are in the process of establishing a new monitoring plan in support of the Phase 2 Expansion Design and additional instrument installations are being completed. Once implemented, this monitoring plan should be reviewed by the EoR and incorporated into the Quantifiable Performance Objectives (QPOs) and Trigger Action Response Plan (TARP) for the ERX. The status and monitoring purpose of the instruments should be documented and included in future revisions of the OMS manuals for the TSFs.

## 5.2 Pond Fines Dump

Two VWPs (VWP20-09 and VWP20-10) were installed at the PFD. VWP20-09 was installed in the pond fines of the upper bench in the dump area and is non-functioning due to suspected wire damage on May 12, 2022, during the dumping of pond fines from the Pond B cleanout. Prior to being damaged VWP20-09 did not indicate a phreatic surface above the installation depth.

The second VWP (VWP20-10) was installed in the embankment area of the PFD on the upstream side of the decommissioned mine road. The instrument is currently active and periodically records a small pressure head (0.01 m to 0.15 m) above the installation depth. Based on this monitoring data, there has not been a buildup of excess pore-pressures within the decommissioned mine road over the current monitoring period.



## **5.3 Rail Loop Ponds**

### **5.3.1 Manual Freeboard Monitoring**

The freeboard requirement (max operating level) for Pond C of the RLP TSF specified in Permit PE-5353 as 1.0 m from the crest. The visual freeboard measurements collected for the Rail Loop Ponds during the reporting period are documented in the monthly inspection reports as specified in OMS Manual. The reports documented less than 1.0 m of freeboard during several inspections. The notes accompanying the measurements and conversations with Teck, indicate that some freeboard measurements recorded were measured from the spillway rather than the embankment crest which addressed some of the noted exceedances. The inspection reports indicated that adequate freeboard was not maintained for the entire reporting period which is corroborated by the monitoring data. Further discussion of these exceedances and the proper application of the term “freeboard” are included in Section 5.3.2 below.

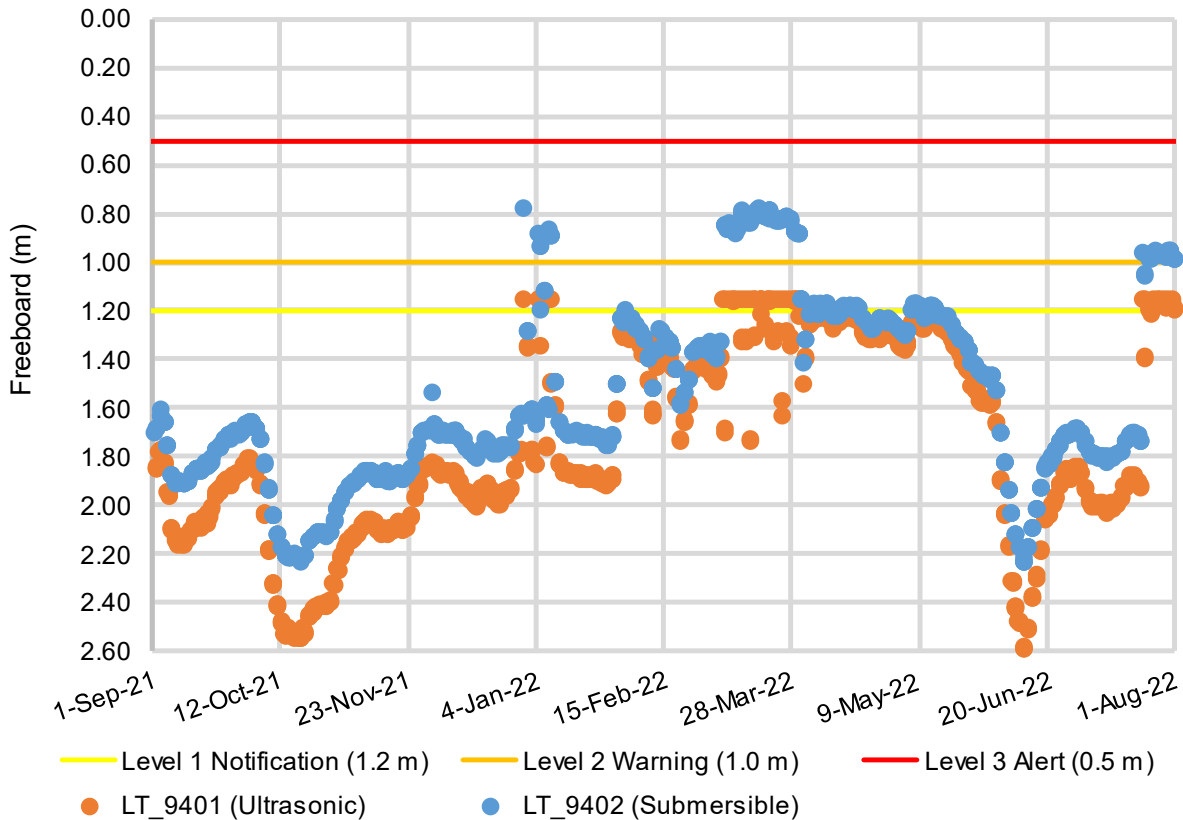
The two staff gauges in Pond C are located in the northeastern corner and against the concrete lock block retaining structure at the reclaim pump barge. Neither staff gauge is currently useable as the one in the northeastern corner is damaged and the one attached to the concrete retaining structure is submerged during critical high-water levels. The damaged staff gauge in the northeastern corner should be removed from the facility. The staff gauge on the concrete retaining wall near the stilling well should be replaced with one that extends to the top of the wall. The staff gauge should then be properly calibrated to provide an accurate measure of freeboard for Pond C.

### **5.3.2 Instrumentation Freeboard Monitoring**

There are no freeboard criteria for Ponds A, B or D and as such there are currently no level sensors or staff gauges to monitor water levels (see Section 2.3.1 for descriptions of pond utilizations). The water level of Pond C is measured by two real-time level monitoring instruments in the stilling well which include trigger alarms connected to the Plant Operations. The location of the instruments can be seen in Figure A5 in Appendix A.

Currently the instruments record a water level relative to the invert of the Pond C/D spillway rather than from the lowest crest elevation. Accordingly, the data from the instruments requires an adjustment of 0.5 m to correct for a proper freeboard measurement from the crest.

The instrument consists of two sensors, including LT\_9401 which is an ultrasonic sensor and LT\_9402 which is a submersible sensor. The data for the reporting period was analyzed by Thurber, adjusted to the proper definition of freeboard, and had outlier data from calibrations removed. The resulting data is presented in Figure 3.



**Figure 3. Pond C Freeboard Measurements from the Real Time Level Monitoring Sensor**

Teck has indicated that LT\_9401 (ultrasonic sensor) does not provide reliable readings when submerged and thus reading from periods of high-water levels should be discarded. No visual inspections verifying the periods when the sensor was submerged where available during this 2022 AFPR. As the ultrasonic sensor provides divergent data from the submersible sensor and does not provide reliable readings at levels when alarms will be triggered, its future utilization should be re-assessed as part of the RLPs monitoring plan, moving forward.

During the monitoring period, three documented freeboard incidents occurred at the RLP and are discussed below.

### 5.3.3 Freeboard Alarm (December 31, 2021, to January 8, 2022)

The RLP real-time level monitoring instrumentation in Pond C indicated a freeboard exceedance between December 31, 2021, and January 8, 2022. A buildup of surface ice had developed in the Ponds during a plant shutdown from December 27 to 31, 2021.



Upon visual inspection, Teck determined a buildup of ice around the stilling well and the obstruction of the nearby staff gauge limited Teck's ability to verify if a head difference between stilling well and Pond C was contributing to faulty freeboard readings. In addition to stilling well maintenance, the installation of bubblers or other preventive solutions should be considered to prevent freezing from impacting water level sensor readings in the future. The impacts of cold weather on the existing operating procedures should be reviewed and reflected in updates to the OMS Manual and SP&P PO.30.

#### **5.3.4 Freeboard Non-Compliance (March 7 to March 30, 2022)**

The RLP real-time level monitoring instrumentation in Pond C indicated a freeboard exceedance between March 7 and March 30, 2022. The exceedance occurred during an ice breakup and resulted in a minimum freeboard of 0.87 m being maintained during the exceedance. Similar solutions as recommended in Section 5.3.3 are again proposed to prevent a reoccurrence.

A Non-Compliance Report detailing the exceedance was submitted to the Ministry of Environment and Climate Change Strategy (ENV) by Teck, as specified in Permit PE-5353.

#### **5.3.5 Freeboard Non-Compliance (July 24, 2022)**

At the time of the 2022 AFPR site inspection (July 13 and 14, 2022), the water level in the stilling well was observed to be approximately 0.4 m lower than the actual water level in Pond C, thus indicating that hydrostatic equilibrium was not being maintained. Following the AFPR site inspection, a clean out of the stilling well was performed by Teck personnel. This clean out also included a calibration of the instrument. As seen in Figure 3, the freeboard reading dropped from 1.74 m to 1.07 m as a result, initiating a Level 1 freeboard notification. The calibration could account for the remaining 0.27 m discrepancy between the observed difference and the two instrument measurements. As the stilling well is the only source of real time monitoring of the RLP, it is essential that the accuracy of the measurements which trigger the freeboard alarms be maintained. Notes included with the data indicate Teck had noticed visible differences between the stilling well and Pond C water levels as early as March 2022 during the event described in Section 5.3.4 above. These differences were initially attributed to the impacts of ice rather than sediment Teck should review the maintenance and inspection policies in relation to the stilling well and develop procedures accordingly for operation in the event of compromised sensors. An extension to the existing staff gauge in Pond C near the stilling well should also be installed to help validate water levels in the case of future discrepancies.



Three days later on July 24, 2022, occasioned by a power failure, the plant dumped the thickener sediments into Pond B. This resulted in a freeboard of 0.95 m being recorded, which triggered a Level 2 Warning indicator that Pond C was operating above the maximum operating level of 1.0 m of freeboard. In accordance with the TARPs, an event-triggered facility inspection was conducted on July 25, 2022. During the inspection, Teck verified the freeboard reading and conducted monitoring until 1.0 m of freeboard was achieved (July 31, 2022).

A Non-Compliance Report detailing the exceedance was submitted to the ENV by Teck on July 25, 2022, as specified in Permit PE-5353.

## **6. REVIEW OF ROUTINE INSPECTIONS**

The monthly inspections of the TSFs are performed by qualified Teck LCO personnel as specified in the OMS manual. Additional event-based inspections are performed as specified by the TARP.

During the reporting period between October 2021 and August 2022, the TSFs were missing inspections for the month of October 2021. While not a safety issue in isolation, it is considered good practice that a facility be inspected at the frequency specified in the OMS manual. Subsequent inspections in November following the missing inspection yielded no safety concerns.

Event-based inspections were performed on all TSFs on November 15, 2021, and June 13, 2022, due to a ">35mm/24hr rain event, predicted within 3 days or less". Despite no TARP requiring an event-based inspection for the ERX and the PFD, inspections were conducted in conjunction with the RLP which had a TARP requirement. No dam safety concerns were identified during the November event-based inspections. The June event-based inspections identified the deficiency discussed in Section 6.1.1 highlighting the need for a TARP with event-driven inspection requirements to be established for the ERX and the PFD.

Event-based inspections were also conducted for the RLPs corresponding to the events described in Sections 2.3.3 and 5.3.

### **6.1 East Refuse Extension CCR**

The monthly inspections performed throughout the monitoring period for the ERX identified the following items of note:

- Washout gullies along the southern embankments of the ERX through the monitoring period prior to the event described in Section 6.1.1. Additional washout gullies were observed in the August monthly inspection following the event.



- Insufficient implementation of surface water runoff management was highlighted in the inspection reports. References to water ponding on the facility and near the crest were noted on several inspections and one inspection identified an erosion gully through the 1285 m bench, over the crest, to the 1270 m bench.
- Cracking along the south end of 1300 m bench was identified and began to be monitored during the reporting period. Teck has indicated some quantitative measurements of the crack were collected. Thurber did not receive or review any quantitative monitoring data in relation to the crack monitoring during this 2022 AFPR.

### **6.1.1 Washout Incidents**

The ERX experienced a heavy precipitation event on June 13<sup>th</sup>, 14<sup>th</sup>, and 17<sup>th</sup> which resulted in water ponding on the southern extents of the 1270 m bench near the crest. The pooled water began to flow through the free dumped material near the crest, forming two washout gullies. The gullies mobilized CCR downslope into debris fans of soft wet material with radii of approximately 10 m along the downstream toe. Finer CCR material was transported through the drainage corridors under the railway lines through a culvert. The fine CCR material overtopped the silt fencing in the area, traveled past the C-129 mine permit boundary and was deposited in a vegetated area approximately 100 m<sup>2</sup> in extent. Teck submitted non-compliance reports to EMLI and a spill report to Emergency Management BC (EMBC) following the incident on June 15, 2022.

Follow up actions are to be detailed in Teck's Annual Reclamation and Closure Plan and are not within the scope of this 2022 AFPR. Further information regarding the incident can be found in the relevant reports and will not be included in this 2022 AFPR.

### **6.2 Pond Fines Dump**

The monthly inspections performed throughout the monitoring period for the PFD identified the following items of note:

- No additional erosion was identified on the existing erosion gullies on the lower bench during the reporting period.
- Surface water continued to flow along the upstream ditch of the decommissioned mine road at the downstream toe of the PFD.
- Seepage continued to be noted on the downstream slope of the decommissioned mine road in the embankment area. Flow was observed through the culvert.





### **6.3 Rail Loop Ponds**

The monthly inspections performed throughout the monitoring period for the RLP identified the following items of note:

- Ponding and rutting along the crests of embankments were noted. Repairs were completed as part of regular maintenance as specified in the OMS.
- The Pond A/C and Pond B/C culverts were observed to be partially blocked by sediment. These blockages were cleared during cell cleanouts.
- Mature trees and vegetation in Ponds A, C and D were identified as potential blockage hazards for culverts.
- The erosion gully along the discharge pipe box between Pond A and Pond B was monitored following the events described in Section 2.3.3.1.
- The inspections in the spring of 2022 identified a head difference between Pond C and the stilling well containing the water level sensor instrumentation. This was rectified by a cleanout following the 2022 AFPR site inspection as described in Section 5.3.4.

## **7. FACILITY SAFETY MANAGEMENT ASSESSMENT**

### **7.1 Operational, Maintenance, and Surveillance Manuals**

The most recent updates to the OMS Manuals for the LCO TSFs were completed in 2022. Teck are currently in the process of developing a standardized OMS Manual for all coal TSFs. It is expected to be available later in 2023. The OMS Manuals will be updated using the new format. These updates may include but are not limited to incorporating updated structural geometry documents, specifying water level and freeboard monitoring protocols and establishing QPOs linked with corresponding TARPs.

### **7.2 Quantifiable Performance Objectives and Trigger Action Response Plans**

#### **7.2.1 East Refuse Extension CCR**

A simple set of QPOs and a TARP were developed for the ERX in January 2022. The QPOs utilize the VWPs installed in the southern extent of the ERX as well as visual observations as performance indicators. The QPOs for the TSF are as follows:

- Green = VWPs indicate a change in pore pressure of less than 10 kPa.
- Orange = VWPs indicate a change in pore pressure of 10 kPa to 45 kPa for Lift 1 or 10 kPa to 40 kPa for Lift 2.



- Red = VWP indicates a change in pore pressure of greater than 45 kPa for Lift 1 or 40 kPa for Lift 2.

The ERX CCR QPOs are limited in scope and coverage and appear to largely focus on monitoring the effects of construction activities along the southern extent of the ERX. A more holistic set of QPOs and TARP incorporating additional monitoring instruments, earthquake thresholds, and precipitation thresholds, are being developed for the ERX by the geotechnical designer for the Phase 2 expansion.

### **7.2.2 Pond Fines Dump**

There are currently no QPOs or TARP established for the PFD TSF. These should be developed to be facility specific and should correspond to the 2022 OMS updates.

### **7.2.3 Rail Loop Ponds**

The current TARP for the RLP, developed in 2019, contained QPO triggers including visual inspections, earthquake events, weather forecasts, storm events, and freeboard measurements. The current TARP considers “Max Operating Level” to be 1.0 m of freeboard. The QPOs for the TSFs are as follows:

- Level 1 Notification (yellow) = 0.2 m or less from Max Operating Level (water level rising).
- Level 2 Warning (orange) = less than 1.0 m freeboard (freeboard exceedance).
- Level 3 Alarm (red) = equal or less than 0.5 m from dam crest (water level critical).

The QPOs and the TARP for the RLP are generic and are largely a derivative of the QPOs and TARP developed for the Water Retention Structures (WRSs) at LCO. In subsequent updates, facility specific QPOs should be developed for the RLP. The associated TARP should also be updated to reference operational conditions, facility specific features, and a quantitative freeboard assessment of each facility, where possible.

It is recommended that clear freeboard definitions be included in all the TSF dam safety documents including OMS Manuals, QPOs, and TARP. The misapplication of freeboard should also be removed from instrument programming.

As the RLP main discharge and outlet flows are the piping connection to the plant and are thus dictated by operations, Teck should develop a series of diagrams detailing the instrumentation, piping layout, valve locations, and operation procedures to be included in the Operations, Maintenance and Surveillance (OMS) Manual updates.



### **7.3 Emergency Preparedness and Response Plans**

The TSFs do not have individual Emergency Preparedness and Response Plans (EPRPs) and are partially covered under the 2022 LCO Mine Emergency Response Plan (MERP). Facility specific EPRPs should be developed and updated to reflect regulatory changes and site conditions. The EPRPs should consist of a TSF specific Emergency Response Plans (ERP) and an Emergency Preparedness Plan (EPP). Teck intends to include TSF specific ERPs in the next update to the MERP.

### **7.4 Dam Safety Review**

Dam Safety Reviews (DSRs) have not been conducted for the TSFs to date. Since DSRs are to be conducted at 5-year intervals for the TSFs, Teck has indicated that DSRs for the facilities are being planned for 2024.

## **8. SUMMARY OF 2022 AFPR INSPECTION**

The 2022 AFPR site inspection was completed on July 14, 2022, by Randal Osicki, P.Eng. (Candidate EoR) and Mitchell Prince, P.Eng. of Thurber. James Campbell, P.Eng. (LCO QP) and other members from the Teck tailings and water group accompanied the Thurber personnel. The site inspection included visual inspections of the crests, toes, slopes, and appurtenant structures of the three TSFs.

With a few exceptions, the TSFs were observed to be in satisfactory condition at the time of the site inspection. Two Priority 2 recommendations are included in this 2022 AFPR. Appendix B contains selected photographs from the 2022 AFPR site inspection. Additional photos from a subsequent visit to the facilities on August 2, 2022, are also included to highlight key observations of this AFPR where required. The site inspection forms are included in Appendix C. Key visual observations from the field inspection are summarized individually for each of the structures in the following sections.

### **8.1 East Refuse Extension**

- Standing water was observed near the southern crest of the 1285 m bench (Photos 17 and 18). As stated in the water management plan, the TSF should be sufficiently graded so that drainage from freshly deposited CCR and precipitation runoff is directed away from the crests to prevent washout gullies.
- The location of the washout gullies described in Section 6.1.1 along the southern end of the lower bench was observed during the AFPR site inspection. The wet CCR material could be seen along the downstream toe at the runout locations (Photos 2, 12, 15, and

16). The strength and suitability of this material has been investigated by Tetra Tech as part of the Phase 2 expansion design.

- A crack was observed near the southern crest of the 1300 m bench. The crack was observed to have formed approximately 5 m from the crest of the bench and was up to 10 cm wide and 20 cm deep in some locations (Photos 27 and 28). This crack had previously been identified in the monthly inspection performed by Teck which noted that the crack was being monitored. No monitoring data associated with the crack was provided or reviewed as part of this 2022 AFPR. Crack monitoring procedures should be documented and formalized in the OMS Manual.
- Ponding water was observed along a section of the east toe (Photos 37 and 38). The surface water management should be modified to divert water away from the toe.
- A hydro-vac truck was observed dumping fine, weak, saturated material near the south crest of the upper bench (Photo 32). Following the AFPR site inspection, Teck dug a sump in the centre of the 1300 m bench and have designated it as the dumping location for all hydro-vac truck dumps.

## **8.2 Pond Fines Dump**

- Deposits of pond fines from the cleanout of the RLP Pond B cleanout in March 2022 were observed to have been dumped on the 1300 m bench. The pond fines were arrayed in standing dump piles and appeared to have dewatered since deposition (Photos 50 to 60). No post dump handling or compaction efforts were evident. It is recommended that no additional material be deposited in the PFD until a stability analysis and design are developed and approved by the EoR.
- Seepage and flow through the culvert were observed along the downstream slope of the decommissioned mine road at the base of the PFD (Photos 41 and 44). The seepage daylighted at the same elevation as the outlet culvert installed in the decommissioned road. As the decommissioned mine road is considered to be a tailings embankment the seepage should continue to be monitored and an assessment of the road materials susceptibility to internal erosion should be considered.
- No appreciable growth in the large erosion gullies in the CCR material were observed during the inspection (Photos 47 to 49). In addition, there was no accumulation of finer material at the base of PFD downstream from the erosion gullies. Teck repaired the erosion gullies by infilling and reshaping the slope in summer 2022. The repaired locations should be monitored to assess the effectiveness of the repairs.



### **8.3 Rail Loop Ponds**

- The erosion along the discharge pipe box between Pond A and Pond B resulting from the events described in Section 2.3.3.1 was observed (Photos 63 and 66). The erosion should be repaired, and consideration should be given to the installation of passive, erosion protected, flow conveyance (i.e., spillways) between the ponds. Repairs were scheduled to be completed in Q4 of 2022.
- The discharge pipe crossing of the Pond A/B internal berm limits equipment access to the berm to the northeast (Photos 62 and 63). If the discharge piping were to be relocated, equipment would have multiple point of access and egress along the berm to facilitate maintenance and response to emergencies.
- The water in the stilling well in Pond C which contains the water level sensor was observed to be approximately 0.40 m lower than the Pond C water elevation. This discrepancy resulted in lower water level readings being collected for Pond C during the reporting period. The stilling well should be cleaned out regularly and the water levels in the stilling well should be visually verified during monthly inspections.
- The staff gauge in the northeast of Pond C was observed to be bent and inoperative. It should be removed from the facility as it is no longer needed.
- There are no staff gauges in Pond A or Pond B. There are no current freeboard requirements for Pond A or Pond B, but recent events have demonstrated the need to provide accurate measurements of freeboard for the ponds. Staff gauges should be installed in accessible areas of the Ponds. Teck plans to install these staff gauges in Q4 2022.
- The riprap erosion protection installed at the Pond C/D spillway appeared to be undersized (Photos 74 and 75). An analysis of the adequacy of the spillway should be performed as part of a hydrotechnical analysis for the RLP to ensure that the flow can be safely conveyed over the spillway in the case of an emergency.
- Ponding water and upstream erosion were observed on the access road along the southwest of the RLP (Photos 69, 70, and 78). Regrading of the road should be conducted more regularly and the erosion on the Pond C upstream slope should be repaired, and erosion protection installed.

## **9. RECOMMENDATIONS**

### **9.1 Status of Outstanding Recommendations**

Teck has consolidated all outstanding recommendations from past reports into a master list called the Action Tracker. However, the previous AFPR recommendations for the RLPs have not been included in the Action Tracker. In addition, since DSRs have not been conducted on the TSFs,



the list of outstanding recommendations for the TSFs should be considered preliminary and subject to confirmation until DSRs are completed.

The Action Tracker will allow for the tracking of outstanding recommendations and documentation of completion. To maintain the effectiveness of the Action Tracker, similar outstanding recommendations should be combined to best reflect an agreement on the actions required, along with updated timelines of completion. Once the outstanding recommendations have been combined, their status will be updated in subsequent AFPRs.

## 9.2 2022 AFPR Recommendations

Based on visual observations from the site inspection and the subsequent review of the documents supplied by Teck during this 2022 AFPR, the following recommendations have been compiled for the TSFs as listed in Table 4. As noted, there are no new Priority Level 1 recommendations. There are two new Priority Level 2 recommendations for the TSFs.

**Table 4. Summary of 2022 AFPR Recommendations**

Facility	ID #	Deficiency or Non-Conformance	Recommended Action	Priority <sup>1</sup>	Recommended Deadline
All Facilities	2022-AFPR-01	No Dam Safety Review	Conduct a Dam Safety Review for each facility	3	Q1 2025
All Facilities	2022-AFPR-02	No facility specific EPRP, EPP, or ERP exist for the TSFs.	Develop and incorporate facility specific EPRP sections for each of the TSFs into the MERP.	3	Q4 2023
ERX	2022-AFPR-03	Limited QPOs and TARPs for the facility.	The geotechnical designer should develop a comprehensive set of QPOs and TARPs for the facility.	3	Q4 2023
ERX	2022-AFPR-04	Standing water near the crest.	The surface water management plan should be reviewed/updated and fully implemented.	2	Q3 2023



**Table 4. Summary of 2022 AFPR Recommendations**

Facility	ID #	Deficiency or Non-Conformance	Recommended Action	Priority <sup>1</sup>	Recommended Deadline
Pond Fines Dump	2022-AFPR-05	Limited geotechnical characterization and engineering assessments	Develop a DBM for the facility and conduct engineering assessments to evaluate the risk of failure due to slope instability (e.g., piping, liquefaction, slope failure) of the facility.	2	Q3 2023
Pond Fines Dump	2022-AFPR-06	No QPOs or TARPs exist for the PFD	Develop QPOs and TARPs for the PFD.	3	Q3 2023
Rail Loop Ponds	2022-AFPR-07	Freeboard definition is incorrectly applied within the facility documentation.	Clear freeboard definitions and standard practices should be specified in the OMS and TARP.	3	Q3 2023
Rail Loop Ponds	2022-AFPR-08	Improper operation of the Pond A and Pond B gated culverts resulted in an internal overtopping event.	Review and update the OMS Manual and Standard Practices and Procedures to clarify operating procedures for the RLP.	3	Q3 2023
Rail Loop Ponds	2022-AFPR-09	Water levels measured in the Pond C stilling well do not reflect the Pond C water levels, restricting the accuracy of freeboard monitoring and alarms.	Develop a plan for routine maintenance (clean outs) of the Pond C stilling well to maintain accurate water level readings. The staff gauge on the concrete retaining wall should be extended to the top of the wall.	3	Q4 2023
Rail Loop Ponds	2022-AFPR-10	The riprap erosion protection installed at the Pond C/D spillway appears to be undersized.	Conduct an assessment of the riprap present in the spillway to ensure that the flow can be safely conveyed over the spillway in the case of an emergency.	3	Q4 2023



**Table 4. Summary of 2022 AFPR Recommendations**

Facility	ID #	Deficiency or Non-Conformance	Recommended Action	Priority <sup>1</sup>	Recommended Deadline
Rail Loop Ponds	2022-AFPR-11	The freeboard requirements for the RLP are based on historical precedent only.	Conduct a hydrotechnical assessment for the RLP to establish freeboard requirements.	3	Q4 2023
Rail Loop Ponds	2022-AFPR-12	QPOs and TARP for the facility require updating.	Update the QPOs and TARP with facility specific values resulting from a hydrotechnical assessment.	4	Q2 2024

1. Priority Level 1: A high probability of an actual dam safety issue considered immediately dangerous to life, health or the environment, or a significant risk of regulatory enforcement.  
 Priority Level 2: An issue that, if not corrected, could likely result in dam safety issues leading to injury, environmental impact, or significant regulatory enforcement; or a repetitive deficiency that demonstrates a systematic breakdown of procedures.  
 Priority Level 3: Single occurrences of deficiencies or non-conformances that alone would not be expected to result in dam safety issues.  
 Priority Level 4: Leading Management Practice - further improvements are necessary to meet industry good practice or to reduce potential risks.

In addition to the recommendations listed above, maintenance activities and opportunities for continual improvement were noted and are listed below:

- 1) Additional VWPs should be installed at the ERX to replace damaged instruments and provide long term monitoring for the facility.
- 2) Crack and deformation monitoring procedures should be documented and formalized in the OMS Manual.
- 3) The coal refuse from the PFD partially obstructing the outlet from Lower Exfiltration Basin of the Gravel Pit Ponds System should be cleared out.
- 4) The construction of passive, erosion protected conveyance structures (i.e., spillways) between Ponds A, B, and C should be considered at the RLP.
- 5) The damaged staff gauge in the northeast corner of Pond C of the RLPs should be removed.
- 6) There are no freeboard requirements for Pond A or Pond B in the RLPs. Freeboard requirements should be established, and staff gauges should be installed in accessible areas of the ponds.





- 7) A review of the RLPs Standard Practices and Procedures PO.30 and OMS Manual should be conducted. Update the documents to reflect improvements made to the facility following the overtopping and freeboard exceedance events in 2021 and 2022.
- 8) The surface water management plan for the RLP should be reviewed and implemented as specified in the OMS Manual. The grading of the road should be conducted more regularly and the erosion gullies along the Pond C upstream slope should be repaired.

## **10. LIMITATIONS AND CONDITIONS**

This report has been prepared for the exclusive use of Teck Coal Limited and the applicable regulatory authorities for the specific application to the LCO TSF AFPR, and it may not be relied upon by any other party without Thurber's written consent.

The following limitations and conditions associated with this 2022 AFPR should be borne in mind in reading the report and in following the recommendations contained within:

- 1) Mr. Randal Osicki (Thurber) is the candidate EoR for the TSFs and is in the process of completing the required due diligence review. The EoR due diligence review is included under a separate and ongoing scope of work. This 2022 AFPR is thus not considered to have been completed by an established EoR.
- 2) Several previous reports, analyses, and data prepared by a variety of sources were reviewed during this 2022 AFPR. To assess the performance of the TSFs over the reporting period, the consulting team of Thurber and NHC have relied on work completed by others.
- 3) Thurber's understanding of the TSFs will continue to expand with time and the absence of items in this 2022 AFPR are not to be interpreted as an acceptance of current conditions.
- 4) The recommendations provided are limited to the scope of this 2022 AFPR. No DSRs have been conducted for the TSFs. As such, no outstanding formal recommendations falling under the scope of a DSR exist for the structure (example design review). Additional recommendations are expected to follow as part of a DSR.
- 5) An evaluation of the LCO facilities/structures with respect to the 2020 GISTM standards is beyond the scope of this 2022 AFPR.
- 6) The limitations and assumptions noted by others in the reviewed documents (sources of error, ranges of values and subjectivity of expert opinion) also apply to this 2022 AFPR.
- 7) The review findings and recommendations provided in this 2022 AFPR, pertain to the site conditions at the LCO TSFs and are not applicable to any other project or site location.



- 8) In order to accurately understand the findings and recommendations provided in this document, reference must be made to the entire document.



## 11. REFERENCES

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Tetra Tech Canada Inc. (Tetra Tech), 2021a. Line Creek Operations, East CCR Dump Tailings Storage Facility (ERX), Draft Consolidated Facility Report.

Tetra Tech Canada Inc. (Tetra Tech), 2021b. Line Creek Operations, Pond Fines Tailings Storage Facility, Draft Consolidated Facility Report.



Tetra Tech Canada Inc. (Tetra Tech), 2021c. Line Creek Operations, Rail Loop Ponds Tailings Storage Facility, Draft Consolidated Facility Report.



## STATEMENT OF LIMITATIONS AND CONDITIONS

### 1. STANDARD OF CARE

This Report has been prepared in accordance with generally accepted engineering or environmental consulting practices in the applicable jurisdiction. No other warranty, expressed or implied, is intended or made.

### 2. COMPLETE REPORT

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment are a part of the Report, which is of a summary nature and is not intended to stand alone without reference to the instructions given to Thurber by the Client, communications between Thurber and the Client, and any other reports, proposals or documents prepared by Thurber for the Client relative to the specific site described herein, all of which together constitute the Report.

IN ORDER TO PROPERLY UNDERSTAND THE SUGGESTIONS, RECOMMENDATIONS AND OPINIONS EXPRESSED HEREIN, REFERENCE MUST BE MADE TO THE WHOLE OF THE REPORT. THURBER IS NOT RESPONSIBLE FOR USE BY ANY PARTY OF PORTIONS OF THE REPORT WITHOUT REFERENCE TO THE WHOLE REPORT.

### 3. BASIS OF REPORT

The Report has been prepared for the specific site, development, design objectives and purposes that were described to Thurber by the Client. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the Report, subject to the limitations provided herein, are only valid to the extent that the Report expressly addresses proposed development, design objectives and purposes, and then only to the extent that there has been no material alteration to or variation from any of the said descriptions provided to Thurber, unless Thurber is specifically requested by the Client to review and revise the Report in light of such alteration or variation.

### 4. USE OF THE REPORT

The information and opinions expressed in the Report, or any document forming part of the Report, are for the sole benefit of the Client. NO OTHER PARTY MAY USE OR RELY UPON THE REPORT OR ANY PORTION THEREOF WITHOUT THURBER'S WRITTEN CONSENT AND SUCH USE SHALL BE ON SUCH TERMS AND CONDITIONS AS THURBER MAY EXPRESSLY APPROVE. Ownership in and copyright for the contents of the Report belong to Thurber. Any use which a third party makes of the Report, is the sole responsibility of such third party. Thurber accepts no responsibility whatsoever for damages suffered by any third party resulting from use of the Report without Thurber's express written permission.

### 5. INTERPRETATION OF THE REPORT

- a) Nature and Exactness of Soil and Contaminant Description: Classification and identification of soils, rocks, geological units, contaminant materials and quantities have been based on investigations performed in accordance with the standards set out in Paragraph 1. Classification and identification of these factors are judgmental in nature. Comprehensive sampling and testing programs implemented with the appropriate equipment by experienced personnel may fail to locate some conditions. All investigations utilizing the standards of Paragraph 1 will involve an inherent risk that some conditions will not be detected and all documents or records summarizing such investigations will be based on assumptions of what exists between the actual points sampled. Actual conditions may vary significantly between the points investigated and the Client and all other persons making use of such documents or records with our express written consent should be aware of this risk and the Report is delivered subject to the express condition that such risk is accepted by the Client and such other persons. Some conditions are subject to change over time and those making use of the Report should be aware of this possibility and understand that the Report only presents the conditions at the sampled points at the time of sampling. If special concerns exist, or the Client has special considerations or requirements, the Client should disclose them so that additional or special investigations may be undertaken which would not otherwise be within the scope of investigations made for the purposes of the Report.
- b) Reliance on Provided Information: The evaluation and conclusions contained in the Report have been prepared on the basis of conditions in evidence at the time of site inspections and on the basis of information provided to Thurber. Thurber has relied in good faith upon representations, information and instructions provided by the Client and others concerning the site. Accordingly, Thurber does not accept responsibility for any deficiency, misstatement or inaccuracy contained in the Report as a result of misstatements, omissions, misrepresentations, or fraudulent acts of the Client or other persons providing information relied on by Thurber. Thurber is entitled to rely on such representations, information and instructions and is not required to carry out investigations to determine the truth or accuracy of such representations, information and instructions.
- c) Design Services: The Report may form part of design and construction documents for information purposes even though it may have been issued prior to final design being completed. Thurber should be retained to review final design, project plans and related documents prior to construction to confirm that they are consistent with the intent of the Report. Any differences that may exist between the Report's recommendations and the final design detailed in the contract documents should be reported to Thurber immediately so that Thurber can address potential conflicts.
- d) Construction Services: During construction Thurber should be retained to provide field reviews. Field reviews consist of performing sufficient and timely observations of encountered conditions in order to confirm and document that the site conditions do not materially differ from those interpreted conditions considered in the preparation of the report. Adequate field reviews are necessary for Thurber to provide letters of assurance, in accordance with the requirements of many regulatory authorities.

### 6. RELEASE OF POLLUTANTS OR HAZARDOUS SUBSTANCES

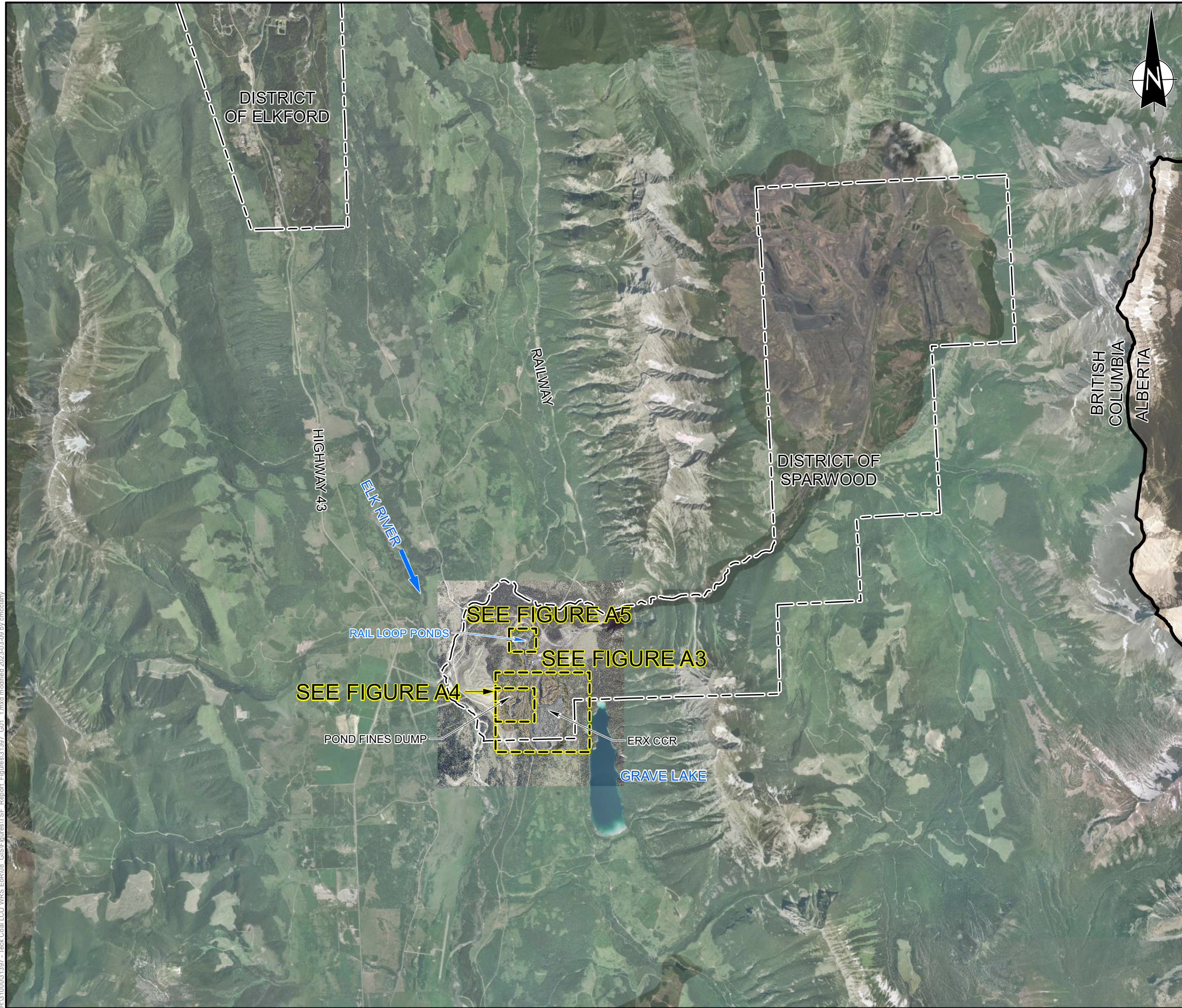
Geotechnical engineering and environmental consulting projects often have the potential to encounter pollutants or hazardous substances and the potential to cause the escape, release or dispersal of those substances. Thurber shall have no liability to the Client under any circumstances, for the escape, release or dispersal of pollutants or hazardous substances, unless such pollutants or hazardous substances have been specifically and accurately identified to Thurber by the Client prior to the commencement of Thurber's professional services.

### 7. INDEPENDENT JUDGEMENTS OF CLIENT

The information, interpretations and conclusions in the Report are based on Thurber's interpretation of conditions revealed through limited investigation conducted within a defined scope of services. Thurber does not accept responsibility for independent conclusions, interpretations, interpolations and/or decisions of the Client, or others who may come into possession of the Report, or any part thereof, which may be based on information contained in the Report. This restriction of liability includes but is not limited to decisions made to develop, purchase or sell land.



## APPENDIX A SITE PLANS



DISTRICT OF ELKFORD

RAILWAY

HIGHWAY 43

ELK RIVER

DISTRICT OF SPARWOOD

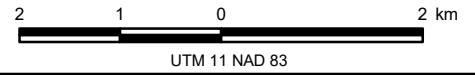
BRITISH COLUMBIA  
ALBERTA

SEE FIGURE A5  
SEE FIGURE A3  
SEE FIGURE A4  
RAIL LOOP PONDS  
POND FINES DUMP  
ERX CCR  
GRAVE LAKE



**NOTES:**

- 1 DRAWING MUST BE USED IN CONJUNCTION WITH THE ATTACHED REPORT REFERENCE 31397 DATED MARCH 2023 AND IS SUBJECT TO ANY LIMITATIONS DESCRIBED THEREIN.
- 2 AIR PHOTO FROM ESRI IMAGERY SERVICE (VARIOUS DATES, ACCESSED MARCH 2023), SUPPLIED BY CLIENT ON OCTOBER 25, 2022. DATED SEPTEMBER 19, 2022 AND SUPPLIED BY CLIENT ON AUGUST 15, 2022. DATED 2021.



**Teck**

TECK COAL LINE CREEK OPERATIONS TSF 2022 AFPR

LCO KEY PLAN

FIGURE A1

DRAWN BY	CMM
DESIGNED BY	MGP
APPROVED BY	JEB
SCALE	1:75,000
DATE	MARCH 20, 2023
FILE No.	31397_G01_1

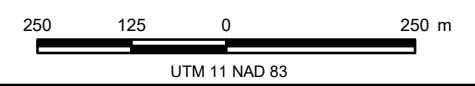


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TECK COAL LINE CREEK OPERATIONS TSF 2022 AFPR

**SITE OVERVIEW OF PLANT AREA**

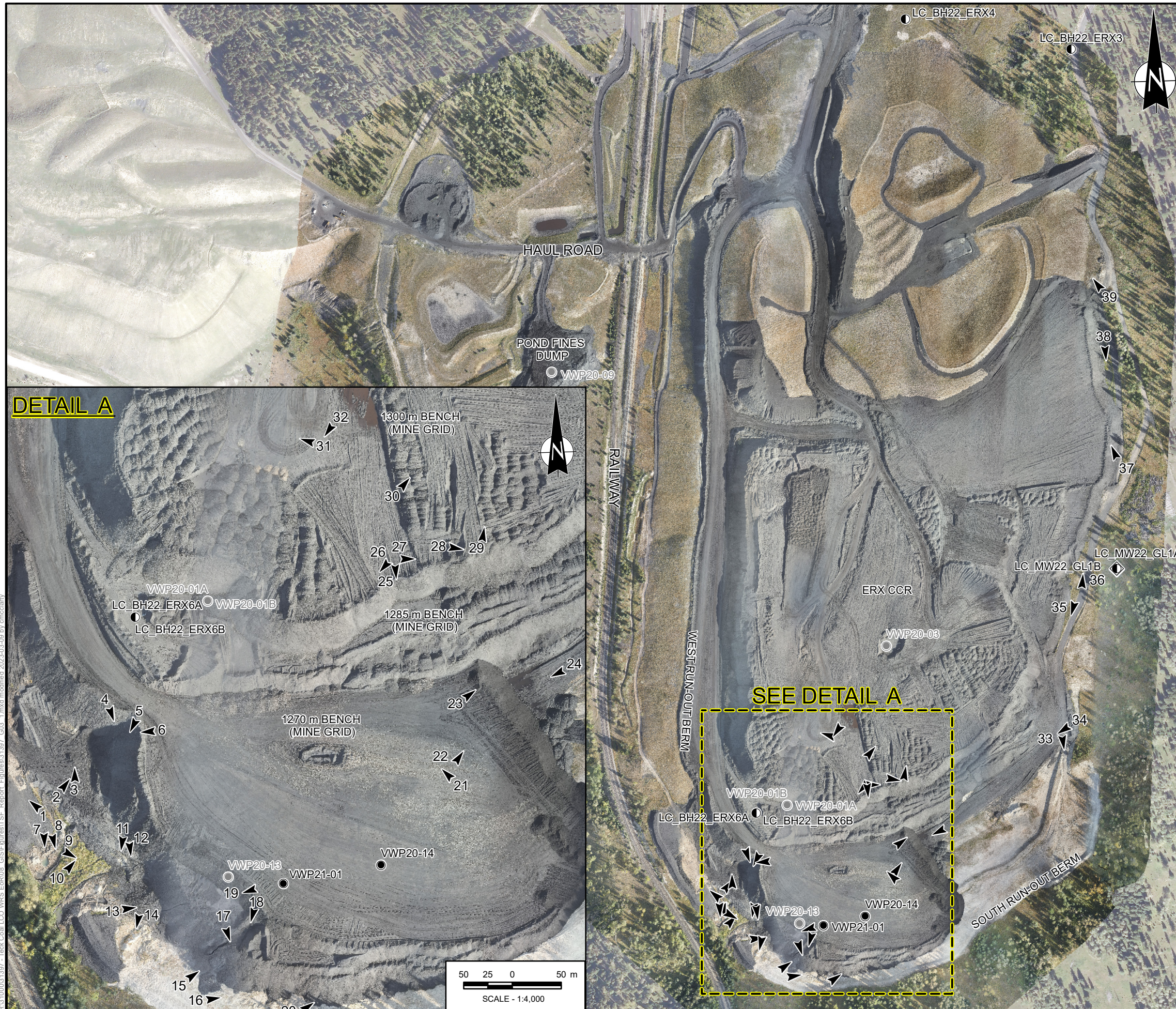
**FIGURE A2**

DRAWN BY	CMM
DESIGNED BY	MGP
APPROVED BY	JEB
SCALE	1:10,000
DATE	MARCH 20, 2023
FILE No.	31397_G02_1



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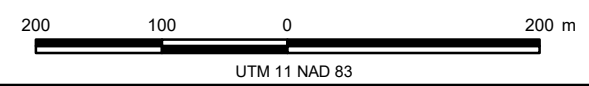




**LEGEND:**

PHOTO LOCATION AND DIRECTION (APPROXIMATE)	▲
MONITORING WELL	◊
BOREHOLE	●
VIBRATING WIRE PIEZOMETER	○
VIBRATING WIRE PIEZOMETER - INACTIVE	◐

- NOTES:**
- 1 DRAWING MUST BE USED IN CONJUNCTION WITH THE ATTACHED REPORT REFERENCE 31397 DATED MARCH 2023 AND IS SUBJECT TO ANY LIMITATIONS DESCRIBED THEREIN.
  - 2 AIR PHOTO SUPPLIED BY CLIENT ON OCTOBER 25, 2022, DATED SEPTEMBER 19, 2022 AND AUGUST 15, 2022, DATED 2021.
  - 3 VWP LOCATIONS FROM TETRA TECH JULY 5 2021, DRAFT EAST CCR DUMP TAILINGS STORAGE FACILITY (ERX) LINE CREEK OPERATIONS CONSOLIDATED FACILITY REPORT
  - 4 MONITORING WELL AND BOREHOLE LOCATIONS FROM TETRA TECH AUGUST 30 2022, ERX PH2 GEOTECHNICAL EXPLORATION AND NORTH END STABILITY ASSESSMENT TECK LINE CREEK OPERATIONS



**Teck**

TECK COAL LINE CREEK OPERATIONS TSF 2022 AFPR

**PHOTO LOCATION PLAN  
EAST REFUSE EXTENSION (ERX) CCR TSF**

FIGURE A3


DRAWN BY	CMM
DESIGNED BY	MGP
APPROVED BY	JEB
SCALE	1:6,000
DATE	MARCH 20, 2023
FILE No.	31397_G03_1





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**LEGEND:**

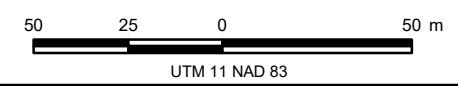
PHOTO LOCATION AND DIRECTION (APPROXIMATE) 

VIBRATING WIRE PIEZOMETER 

VIBRATING WIRE PIEZOMETER - INACTIVE 

**NOTES:**

- 1 DRAWING MUST BE USED IN CONJUNCTION WITH THE ATTACHED REPORT REFERENCE 31397 DATED MARCH 2023 AND IS SUBJECT TO ANY LIMITATIONS DESCRIBED THEREIN.
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- 3 VWP LOCATIONS FROM TETRA TECH JULY 5 2021, DRAFT EAST CCR DUMP TAILINGS STORAGE FACILITY (ERX) LINE CREEK OPERATIONS CONSOLIDATED FACILITY REPORT



**Teck**

TECK COAL LINE CREEK OPERATIONS TSF 2022 AFPR

**PHOTO LOCATION PLAN  
POND FINES DUMP TSF**

FIGURE A4


DRAWN BY	CMM
DESIGNED BY	MGP
APPROVED BY	JEB
SCALE	1:2,000
DATE	MARCH 20, 2023
FILE No.	31397_G04_1




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**LEGEND:**

PHOTO LOCATION AND DIRECTION (APPROXIMATE) 

DISCHARGE PIPING 

**NOTES:**

- 1 DRAWING MUST BE USED IN CONJUNCTION WITH THE ATTACHED REPORT REFERENCE 31397 DATED MARCH 2023 AND IS SUBJECT TO ANY LIMITATIONS DESCRIBED THEREIN.
- 2 AIR PHOTO SUPPLIED BY CLIENT ON OCTOBER 25, 2022, DATED SEPTEMBER 19, 2022 AND AUGUST 15, 2022, DATED 2021.

50    25    0    50 m  
UTM 11 NAD 83


**Teck**

**TECK COAL LINE CREEK OPERATIONS TSF 2022 AFPR**

**PHOTO LOCATION PLAN  
RAIL LOOP PONDS TSF**

**FIGURE A5**

DRAWN BY	CMM
DESIGNED BY	MGP
APPROVED BY	JEB
SCALE	1:2,000
DATE	MARCH 20, 2023
FILE No.	31397_G05_1



**THURBER ENGINEERING LTD.**

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## APPENDIX B SITE VISIT PHOTOGRAPHS



Teck LCO TSFs July 14, 2022

ERX CCR TSF



**Photo 1. West runout berm constructed out of CCR, looking northwest**

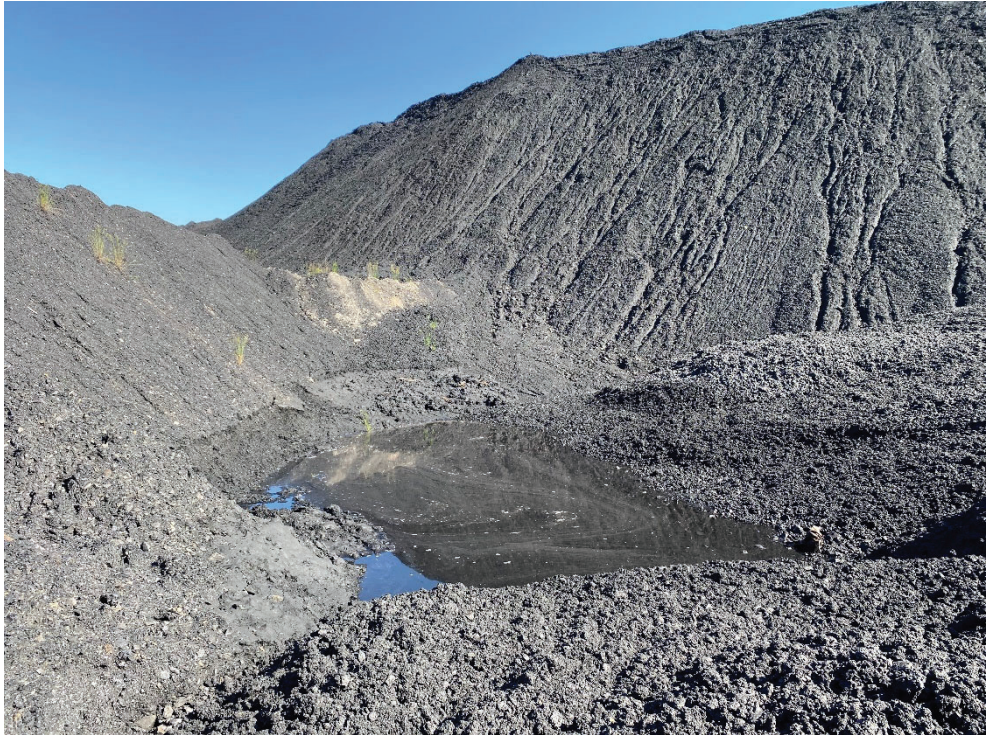


**Photo 2. June 17, 2022 washout event location, looking northeast**



Teck LCO TSFs July 14, 2022

ERX CCR TSF



**Photo 3. Soft CCR spoils from June 17, 2022 washout event, looking north**



**Photo 4. Crest of the 1270 m bench, looking east**



Teck LCO TSFs July 14, 2022

ERX CCR TSF



**Photo 5. South runout berm repaired with CCR, looking southwest**



**Photo 6. West runout berm constructed out of CCR, looking west**



**Photo 7. West runout berm constructed out of CCR, looking south**



**Photo 8. Silt fencing along downstream toe area, looking south**





**Photo 9. Silt fencing along downstream toe area, looking east**



**Photo 10. 1270 m bench downstream slope, looking northeast**



Teck LCO TSFs July 14, 2022

ERX CCR TSF



Photo 11. Drainage section in southern downstream area, looking southwest



Photo 12. Soft CCR spoils from June 17, 2022 washout event, looking south



**Photo 13. Downstream toe of the 1270 m bench, looking east**



**Photo 14. South runout berm section constructed of CCR, looking southwest**



**Photo 15. June 14, 2022 washout location, looking northeast**



**Photo 16. Soft CCR spoils at June 14, 2022 washout event, looking east**



**Photo 17. Water pooling near crest of the 1270 m bench, looking southeast**



**Photo 18. Water pooling near crest of the 1270 m bench, looking south**



Teck LCO TSFs July 14, 2022

ERX CCR TSF



Photo 19. Evidence of water pooling on the 1270 m bench, looking southwest



Photo 20. Downstream toe and south runout berm, looking east



Teck LCO TSFs July 14, 2022

ERX CCR TSF



Photo 21. Infiltration sump along toe of the 1285 m bench, looking northwest



Photo 22. Infiltration sump along toe of the 1285 m bench, looking northeast



**Photo 23. Ditching along toe of the 1285 m bench, looking northeast**



**Photo 24. Infiltration sump along toe of the 1285 m bench, looking southwest**





Teck LCO TSFs July 14, 2022

ERX CCR TSF



**Photo 25. CCR placement on the 1270 m bench, looking south**



**Photo 26. CCR placement on the 1270 m bench, looking southwest**



**Photo 27. Crack along the 1300 m bench crest, looking east**



**Photo 28. Crack along the 1300 m bench crest, looking east**



Teck LCO TSFs July 14, 2022

ERX CCR TSF



**Photo 29. CCR placed on the 1300 m bench, looking north**



**Photo 30. CCR placed on the 1300 m bench, looking northeast**



Teck LCO TSFs July 14, 2022

ERX CCR TSF



Photo 31. Leveled CCR placed on the 1300 m bench, looking west



Photo 32. Hydro-vac material being deposited near the crest of the 1300 m bench, looking southwest



**Photo 33. South runout berms constructed from native material, looking south**



**Photo 34. Downstream toe of the 1285 m bench, looking southwest**



Teck LCO TSFs July 14, 2022

ERX CCR TSF



**Photo 35. Downstream toe along eastern extents of the ERX, looking south**



**Photo 36. Downstream toe along eastern extents of the ERX, looking north**



Teck LCO TSFs July 14, 2022

ERX CCR TSF



Photo 37. Water pooling along the downstream toe along eastern extents of the ERX, looking north



Photo 38. Water pooling along the downstream toe along eastern extents of the ERX, looking south



Teck LCO TSFs July 14, 2022

ERX CCR TSF



**Photo 39. Boundary between progressively reclaimed section of the ERX and recently placed CCR, looking northwest**





Teck LCO TSFs July 14, 2022

Pond Fines Dump TSF



Photo 40. Ditch on upstream side of the abandoned mine access road, looking southeast



Photo 41. Downstream slope of the abandoned mine access road, looking southwest



Teck LCO TSFs July 14, 2022

Pond Fines Dump TSF



**Photo 42. Downstream slope of the abandoned mine access road, looking northwest**



**Photo 43. Downstream area of the Lower Bench, looking northeast**



**Photo 44. Downstream slope and culvert of the abandoned mine access road, looking south**



**Photo 45. Inlet to ditch on upstream side of the abandoned mine access road, looking southeast**



**Photo 46. Downstream slope of the Lower Bench, looking northeast**



**Photo 47. Erosion gullies in the downstream area of the Lower Bench, looking south**



Teck LCO TSFs July 14, 2022

Pond Fines Dump TSF



**Photo 48. Erosion gullies at the toe of the Lower Bench, looking south**



**Photo 49. Erosion gullies at the toe of the Lower Bench, looking southwest**



**Photo 50. Pond fines pile deposited on the Lower Bench, looking northeast**



**Photo 51. Pond fines deposited on the Upper Bench, looking southeast**



**Photo 52. Pond fines deposited along the Lower Exfiltration Basin downstream slope of the Upper Bench, looking southwest**



**Photo 53. Pond fines deposited on the Upper Bench, adjacent to the archeological sites, looking southwest**



**Photo 54. Pond fines deposited on the Upper Bench, adjacent to the archeological sites, looking south**



**Photo 55. Pond fines deposited on the Upper Bench, looking southeast**





Teck LCO TSFs July 14, 2022

Pond Fines Dump TSF



**Photo 56. Pond fines deposited on the Upper Bench, looking southwest**



**Photo 57. Pond fines deposited on the Upper Bench, looking south**



**Photo 58. Pond fines deposited on the Upper Bench, looking west**



**Photo 59. Pond fines deposited on the Upper Bench, looking south**



Teck LCO TSFs July 14, 2022

Pond Fines Dump TSF



**Photo 60. Pond fines deposited on the along the Upper Bench adjacent to the Lower Exfiltration Basin, looking south**



**Photo 61. Pond A awaiting cleanout of sediment, looking northwest**



**Photo 62. Pond A discharge spigot location, looking north**



**Photo 63. Box culvert containing discharge pipe between Pond A and Pond B, looking west**



**Photo 64. Pond B post sediment cleanout, looking north**



Teck LCO TSFs July 14, 2022

Rail Loop Ponds TSF



Photo 65. Thickener cleanout sediment deposited in Pond B, looking northwest



Photo 66. Pond B discharge spigot location, looking northwest



Teck LCO TSFs July 14, 2022

Rail Loop Ponds TSF



Photo 67. Reclaim pump and barge in Pond C, looking northwest



Photo 68. Stilling well containing water level sensors in Pond C, looking north



**Photo 69. Erosion along the upstream slope of the Pond C, looking northwest**



**Photo 70. Erosion along the upstream slope of the Pond C, looking northwest**





Teck LCO TSFs July 14, 2022

Rail Loop Ponds TSF



**Photo 71. Pond D upstream slopes, looking east**



**Photo 72. Old sediment deposits in the basin of Pond D, looking southeast**



**Photo 73. Old sediment deposits in the basin of Pond D, looking west**



**Photo 74. Pond C spillway downstream slope, looking southwest**



Teck LCO TSFs July 14, 2022

Rail Loop Ponds TSF



**Photo 75. Pond C spillway crest, looking north**



**Photo 76. Pond C embankment upstream slope, looking southwest**



Teck LCO TSFs July 14, 2022

Rail Loop Ponds TSF



Photo 77. Pond C basin, looking southeast



Photo 78. Erosion along the upstream slope of the Pond C, looking southwest



Teck LCO TSFs July 14, 2022

Rail Loop Ponds TSF



Photo 79. Pond C upstream slope, looking northwest



Photo 80. Pond A gated culvert outlet to Pond C, looking southwest



Teck LCO TSFs July 14, 2022

Rail Loop Ponds TSF



**Photo 81. Pond A gated culvert inlet, looking southeast**



**Photo 82. Sediment build up near the Pond B gated culvert outlet to Pond C, looking northwest**



## APPENDIX C INSPECTION FORMS

**LCO Tailings Storage Facility**

**Date:** July 14, 2022

<b>Structure:</b>	East Refuse Extension (ERX) CCR
<b>Property:</b>	Line Creek Operations (LCO)
<b>Purpose:</b>	CCR Storage
<b>Permits &amp; Licenses:</b>	EMLI: C-129; ENV: PE5353;
<b>Inspection Performed By:</b>	Randal Osicki M.Sc., P.Eng., EoR Candidate Mitchell Prince, P.Eng.

**Conditions at Time of Inspection**

<b>Temperature:</b>	24°C			
<b>Weather</b>	<b>Winds</b>	<b>Snow Cover</b>	<b>Pond</b>	<b>Wave Action</b>
<input checked="" type="checkbox"/> Sunny	<input checked="" type="checkbox"/> None	<input checked="" type="checkbox"/> None	<input checked="" type="checkbox"/> None	<input checked="" type="checkbox"/> None
<input type="checkbox"/> Scattered Cloud	<input type="checkbox"/> Light	<input type="checkbox"/> Slight	<input type="checkbox"/> Open Water	<input type="checkbox"/> Light
<input type="checkbox"/> Overcast	<input type="checkbox"/> Moderate	<input type="checkbox"/> Heavy	<input type="checkbox"/> Partially Frozen	<input type="checkbox"/> Moderate
<input type="checkbox"/> Raining	<input type="checkbox"/> High	<input type="checkbox"/> Drifts	<input type="checkbox"/> Frozen	<input type="checkbox"/> High
<input type="checkbox"/> Snowing	From:	<input type="checkbox"/> Melting	<input type="checkbox"/> High Turbidity	<input type="checkbox"/> Causing Erosion
<b>Comments:</b>				

**Structure Data (Dry Stack)**

<b>Max. Current Elev. (m)</b>	~1305 m	<b>Max. Permitted Elev. (m)</b>	1315 m
<b>Max. Slope Angle (Active Faces)</b>	37°	<b>Max. Slope Angle (Reclaimed Faces)</b>	26°

**Review of Surrounding Conditions** (incl. Changes since previous AFPR)

Upstream Conditions & Hazards	Downstream Conditions & Receptors
Runouts and erosion were noticed along the south of the facility. Adequate surface water management is not being maintained. Water is pooling near crest of the benches.	Archeological sites are present near the SW corner of the facility. The CP rail line is west of the facility beyond these archeological sites.

**Are the following in Satisfactory Condition?**

	Embankment				Channels		
	Yes	No	NA		Yes	No	NA
C Crest		X		D Ditches	X		
AF Active Spoil Faces		X		C Culverts	X		
RF Reclaimed Soil Faces	X			S Sumps	X		



**Problem Indicators - Are any of the following conditions apparent?**

Condition	Yes	No	unk	NA	Location(s)	Action?	Comments
<b>Structural Problems/ Instabilities</b>							
Cracking (Transverse/Longitudinal/Other)	X				Crest		1300 bench: 5 m from crest 10 cm wide and 20 cm deep.  Runouts along the south bench faces.  Ponding water at the crests of the bench. Ponding water at the toe along the south.
Settlement		X					
Sloughing, slides or sinkholes	X						
Surficial erosion or rutting		X					
Slopes not uniform	X						
Inadequate or deteriorated slope protection		X					
Bulging or hummocky surfaces		X					
Concerns with low areas		X					
Ponding water	X						
Undocumented earthworks		X					
Any other deformation / movement		X					
<b>Water Management</b>							
				X			
Concern with Current or Recent Water Level							
Channel/Spillway obstructions							
Channel/Spillway deterioration or instability							
Unusual Intensity of Flow in Spillway or Channels							
Inadequate outlet capacity							
<b>Seepage</b>							
Wet areas or Seepages Observed	X						Natural seepage near the toe of south bench slopes.
Signs of turbidity or sediment in flow		X					
Discoloration or Staining		X					
Concerns with Toe Drain Discharge		X					
Evidence of Soft Toe Condition		X					
Evidence of Boils		X					
<b>Control Elements / Components</b>							
Leaks in conveyance structures (Pipelines, Culverts)		X					
Insufficient access to site or critical components		X					
Ineffective restrictions to Public Access		X					
Inadequate signage		X					
<b>Other</b>							
Active Work at Time of Visit		X					
Additional Comments or Other Unusual Conditions:	One haul truck placing CCR on the 1300m bench in the south.						

**Instrument Review**

Instrument Type	Number of units	Functioning?		Brief Description of instruments including location & readings (if taken)
		Yes	No	
Staff Gauge	0	See note		Piezometers at south datalogger: 21-01 and 20-14 reading. No data from 20-13. Piezometer was likely damaged during construction.
Weirs & Flow Monitors	0			
Piezometers (VW)	5			
Piezometers (standpipe)	0			Piezometers at 1285m bench (20-01A/B) appear damaged due to animals chewing the splices. These instrument cables were scheduled to be extended to a reclaimed area.
Survey Monuments	0			
GPS Monitors	0			
SAA / Fiber Optic	0			
Inclinometers	0			
Accelerographs	0			
Settlement Cells	0			Piezometers at the 20-03 location were damaged and un-recoverable.
Settlement Plates	0			
Thermistors	0			
Monitoring Wells	0			
Other	0			

**Document Review**

Document	Available?			Date of current Rev.	Comments
	Yes	No	NA		
OMS Manual	X			March 2022	Require additional updates and additional information.
Emergency Preparedness Plan		X			
Emergency Response Plan	X			March 2022	ER.16 Emergency Response Plan is not a facility specific EPRP Tetra Tech Phase 2 Design report
Design & As-Built Reports	X			November 2022	
Dam Safety Review Report			X		
Risk Assessment	X			June 2022	Risk Assessment updated for Phase 2 Design
Other: DRAFT Consolidated Facility Report	X			2021	

### LCO Tailings Storage Facility

Date: July 14, 2022

<b>Structure:</b>	Pond Fines Dump (PFD)
<b>Property:</b>	Line Creek Operations (LCO)
<b>Purpose:</b>	Pond Fines Storage Stack
<b>Permits &amp; Licenses:</b>	EMLI: C-129; ENV: PE5353;
<b>Inspection Performed By:</b>	Randal Osicki M.Sc., P.Eng., EoR Candidate Mitchell Prince, P.Eng.

### Conditions at Time of Inspection

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<b>Weather</b>	<b>Winds</b>	<b>Snow Cover</b>	<b>Pond</b>	<b>Wave Action</b>
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<input type="checkbox"/> Scattered Cloud	<input type="checkbox"/> Light	<input type="checkbox"/> Slight	<input type="checkbox"/> Open Water	<input type="checkbox"/> Light
<input type="checkbox"/> Overcast	<input type="checkbox"/> Moderate	<input type="checkbox"/> Heavy	<input type="checkbox"/> Partially Frozen	<input type="checkbox"/> Moderate
<input type="checkbox"/> Raining	<input type="checkbox"/> High	<input type="checkbox"/> Drifts	<input type="checkbox"/> Frozen	<input type="checkbox"/> High
<input type="checkbox"/> Snowing	From:	<input type="checkbox"/> Melting	<input type="checkbox"/> High Turbidity	<input type="checkbox"/> Causing Erosion
<b>Comments:</b>	No construction activity during inspection. Last placement was May 2022.			

### Structure Data (Road Embankment at Toe of Pond Fines Dump)

<b>Current Freeboard (m)</b>	~1 m	<b>Required Freeboard (m)</b>	Undefined
<b>Current Max. Height (m)</b>	15 m	<b>Current Min. Crest Width (m)</b>	~4 m
<b>Slope Angle (u/s)</b>	1.5:1 (approx.)	<b>Slope Angle (d/s)</b>	1.5:1 (approx.)
<b>Impounded Volume (m<sup>3</sup>)</b>	~343,000 m <sup>3</sup>	<b>Impoundment Capacity (m<sup>3</sup>)</b>	Undefined

### Structure Data (Pond Fines Dump – CCR and Pond Fines dry stacked)

<b>Max. Current Elev. (m)</b>	1267 m	<b>Max. Permitted Elev. (m)</b>	Undefined
<b>Max. Slope Angle (Active Faces)</b>	2:1	<b>Max. Slope Angle (Reclaimed Faces)</b>	Undefined

### Review of Surrounding Conditions (incl. Changes since previous AFPR)

Dry Stack Conditions & Hazards	Embankment Conditions & Receptors
<p>The facility is not engineered and a stability analysis is planned to be completed in 2023. There is no Design Basis Memo or deposition design plan for the facility.</p> <p>Erosion gullies on the downstream of stack indicate erosion and migration of fines material downhill towards the road embankment have occurred in the past during heavy precipitation events.</p>	<p>The decommissioned mine road embankment at the toe is not engineered for containment. The culvert through the embankment is flowing clear, but the inlet of the culvert is buried beneath fine impounded material. There is seepage along the downstream slope of the embankment at the culvert elevation.</p> <p>If the dry stack area were to run out or erode it could further load the embankment.</p> <p>Known archaeological sites, natural vegetated areas, and the Elk River flood plain</p>

Are the following in Satisfactory Condition?

Embankment	Yes	No	NA
C Crest	X		
US U/S Slope	X		
DS D/S Slope	X		
T D/S Toe	X		
LA Left Abutment	X		
RA Right Abutment	X		

Channels	Yes	No	NA
I Inlet			X
O Outlet		X	
S Spillway			X
E Emergency Spillway			X
D Drains			X
IC Inlet Controls			X
OC Outlet Controls			X

Dry Stack	Yes	No	NA
C Crests	X		
SF Spoil Faces	X		
D Ditches			X
C Culverts	X		
S Sumps			X

Problem Indicators - Are any of the following conditions apparent?

Condition	Yes	No	unk	NA	Location(s)	Action?	Comments
<b>Structural Problems/ Instabilities</b>							
Cracking (Transverse/Longitudinal/Other)		X					Erosion gullies on downstream slope of the lower bench.  No slope protection in eroded area
Settlement		X					
Sloughing, slides or sinkholes		X					
Surficial erosion or rutting	X						
Slopes not uniform		X					
Inadequate or deteriorated slope protection	X						
Bulging or hummocky surfaces		X					
Concerns with low areas		X					
Ponding water		X					
Undocumented earthworks		X					
Any other deformation / movement		X					
<b>Water Management</b>							
Concern with Current or Recent Water Level		X					Upstream ditch of the mine road is acting as spillway for the facility. Outlet culvert buried on the upstream side. Flow still visible.
Channel/Spillway obstructions		X					
Channel/Spillway deterioration or instability		X					
Unusual Intensity of Flow in Spillway or Channels		X					
Inadequate outlet capacity		X					
<b>Seepage</b>							
Wet areas or Seepages Observed	X						Wet area at downstream slope of the decommissioned mine road embankment. Culvert flowing at steady rate with clear flow.
Signs of turbidity or sediment in flow		X					
Discoloration or Staining		X					
Concerns with Toe Drain Discharge		X					
Evidence of Soft Toe Condition		X					
Evidence of Boils		X					
<b>Vegetation/Animals/debris</b>							
Excessive Vegetation		X					
Vegetation Kills (evidence of contamination)		X					
Unusual Vegetation Growth Patterns		X					
Trees >1" diameter		X					

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Facility: PFD TSF

Date: July 14, 2022

Condition	Yes	No	unk	NA	Location(s)	Action?	Comments
Presence of animal burrows	X						Burrows in and around facility Droppings and footprints of ungulates in area. ~20 Ungulates spotted in GPP during inspection.
Beaver activity		X					
Signs of wildlife traffic across dam	X						
Unusual Accumulation of Debris/Logs		X					

## Control Elements / Components

Damaged or inoperable control structures		X					Road to facility from mine access road has a gate preventing public access.
Liner tears/deterioration				X			
Leaks in conveyance structures (Pipelines, Culverts)		X					
Insufficient access to site or critical components		X					
Ineffective restrictions to Public Access		X					
Inadequate signage		X					

## Other

Active Work at Time of Visit		X					
Additional Comments or Other Unusual Conditions:	Deposition on the upper bench during the May cleanout of the Rail Loop Ponds Pond B was evident.						

## Instrument Review

Instrument Type	Number of units	Functioning?		Brief Description of instruments including location & readings (if taken)
		Yes	No	
Staff Gauge	0		No	Piezometer in the was trenched away from the center of the facility but is no longer operational.
Weirs & Flow Monitors	0			
Piezometers (VW)	2			
Piezometers (standpipe)	0			
Survey Monuments	0			
GPS Monitors	0			
SAA / Fiber Optic	0			
Inclinometers	0			
Accelerographs	0			
Settlement Cells	0			
Settlement Plates	0			
Thermistors	0			
Monitoring Wells	0			
Other	0			

# Teck/Thurber - Annual Facility Performance Report

Facility: PFD TSF

Date: July 14, 2022

## Document Review

Document	Available?			Date of current Rev.	Comments
	Yes	No	NA		
OMS Manual	X			March 2022	Require additional updates and additional information.
Emergency Preparedness Plan		X			
Emergency Response Plan	X			March 2022	ER.16 Emergency Response Plan is not a facility specific EPRP.
Design & As-Built Reports		X		Planned 2023	
Dam Safety Review Report			X		Risk Assessment updated.
Risk Assessment	X			May 2022	
Other: DRAFT Consolidated Facility Report	X			2021	

**LCO Tailings Storage Facility**

**Date:** July 14, 2022

<b>Structure:</b>	Rail Loop Ponds (RLP)
<b>Property:</b>	Line Creek Operations (LCO)
<b>Purpose:</b>	Pond Fines Settlement
<b>Permits &amp; Licenses:</b>	EMLI: C-129; ENV: PE5353;
<b>Inspection Performed By:</b>	Randal Osicki M.Sc., P.Eng., EoR Candidate Mitchell Prince, P.Eng.

**Conditions at Time of Inspection**

<b>Temperature:</b>	24°C			
<b>Weather</b>	<b>Winds</b>	<b>Snow Cover</b>	<b>Pond</b>	<b>Wave Action</b>
<input checked="" type="checkbox"/> Sunny	<input checked="" type="checkbox"/> None	<input checked="" type="checkbox"/> None	<input type="checkbox"/> None	<input checked="" type="checkbox"/> None
<input type="checkbox"/> Scattered Cloud	<input type="checkbox"/> Light	<input type="checkbox"/> Slight	<input checked="" type="checkbox"/> Open Water	<input type="checkbox"/> Light
<input type="checkbox"/> Overcast	<input type="checkbox"/> Moderate	<input type="checkbox"/> Heavy	<input type="checkbox"/> Partially Frozen	<input type="checkbox"/> Moderate
<input type="checkbox"/> Raining	<input type="checkbox"/> High	<input type="checkbox"/> Drifts	<input type="checkbox"/> Frozen	<input type="checkbox"/> High
<input type="checkbox"/> Snowing	From:	<input type="checkbox"/> Melting	<input type="checkbox"/> High Turbidity	<input type="checkbox"/> Causing Erosion
<b>Comments:</b>	Pond B is receiving inflow at time of inspection. Pond A is full, offline, and awaiting cleanout in September 2022.			

**Structure Data (Conventional)**

<b>Current Freeboard (m)</b>	>1 m	<b>Required Freeboard (m)</b>	1 m (Permit 3535)
<b>Max. Dam Height (m)</b>	3 m	<b>Minimum Crest Width (m)</b>	~4 m
<b>Slope Angle (u/s)</b>	37° (approx.)	<b>Slope Angle (d/s)</b>	20° (approx.)
<b>Impounded Volume (m<sup>3</sup>)</b>	Undetermined	<b>Impoundment Capacity (m<sup>3</sup>)</b>	100,000 m <sup>3</sup>

**Review of Surrounding Conditions** (incl. Changes since previous AFPR)

<b>Upstream Conditions &amp; Hazards</b>	<b>Downstream Conditions &amp; Receptors</b>
Minimal catchment area beyond internal berm area. The drying pad to north is currently undergoing an excavation. Some minor erosion on upstream slopes from surface water runoff.	No downstream outlet. A culvert under the SW portion of the Rail Loop could potentially allow a spill to continue to the natural area outside the Rail Loop.

**Are the following in Satisfactory Condition?**

Embankment	Yes	No	NA
C Crest	X		
US U/S Slope	X		
DS D/S Slope	X		
T D/S Toe	X		
LA Left Abutment	X		
RA Right Abutment	X		

Channels	Yes	No	NA
I Inlet Pipe	X		X
O Outlet Pump	X		
CU Culverts	X		
E Emergency Spillway		X	
D Drains			X
IC Inlet Controls	X		
OC Outlet Controls	X		

Other	Yes	No	NA
R Reservoir	X		
RS Reservoir U/S Slopes	X		
ID Internal Dikes	X		
B Baffles			X
IN Instruments		X	

**Problem Indicators - Are any of the following conditions apparent?**

Condition	Yes	No	unk	NA	Location(s)	Action?	Comments
<b>Structural Problems/ Instabilities</b>							
Cracking (Transverse/Longitudinal/Other)		X					Erosion channel along the Pond A/B internal berm along the discharge pipe from overtopping requires repair  Surface erosion noted at point along the upstream slope of Pond C from surficial runoff from the road.
Settlement		X					
Sloughing, slides or sinkholes		X					
Surficial erosion or rutting	X				Pond A/B, Pond C perimeter		
Slopes not uniform		X					
Inadequate or deteriorated slope protection		X					
Bulging or hummocky surfaces		X					
Concerns with low areas		X					
Ponding water		X					
Undocumented earthworks		X					
Any other deformation / movement		X					
<b>Water Management</b>							
Concern with Current or Recent Water Level	X				Freeboard		Pond C freeboard management.
Channel/Spillway obstructions		X					
Channel/Spillway deterioration or instability		X					
Unusual Intensity of Flow in Spillway or Channels		X					
Inadequate outlet capacity		X					
<b>Seepage</b>							
Wet areas or Seepages Observed		X					
Signs of turbidity or sediment in flow		X					
Discoloration or Staining		X					
Concerns with Toe Drain Discharge		X					
Evidence of Soft Toe Condition		X					
Evidence of Boils		X					
<b>Vegetation/Animals/debris</b>							
Excessive Vegetation		X					Trees present in Pond D do not pose a risk to the system as they cannot obstruct and outlets or spillways. Trees in Pond A could block the outlet culvert.
Vegetation Kills (evidence of contamination)		X					
Unusual Vegetation Growth Patterns		X					
Trees >1" diameter	X				Pond D, Pond A		
Presence of animal burrows		X					
Beaver activity		X					
Signs of wildlife traffic across dam	X				Berms		
Unusual Accumulation of Debris/Logs		X					
<b>Control Elements / Components</b>							
Damaged or inoperable control structures		X					Current configuration of discharge pipe limits equipment access to the internal berms to one access point in the NE.
Liner tears/deterioration				X			
Leaks in conveyance structures (Pipelines, Culverts)		X					
Insufficient access to site or critical components	X				Pond A/B		



# Teck/Thurber - Annual Facility Performance Report

Facility: RLP TSF

Date: July 14, 2022

Condition	Yes	No	unk	NA	Location(s)	Action?	Comments
Ineffective restrictions to Public Access		X					
Inadequate signage		X					
<b>Other</b>							
Active Work at Time of Visit		N					
Additional Comments or Other Unusual Conditions:	Pond B is receiving inflow at time of inspection. Pond A is full, offline, and awaiting cleanout in September 2022. Drying pad excavation is schedule to begin soon after the site inspection.						

## Instrument Review

Instrument Type	Number of units	Functioning?		Brief Description of instruments including location & readings (if taken)
		Yes	No	
Staff Gauge	2		No	Pond C staff gauge in NE is inoperable and needs to be decommissioned or replaced. Staff gauge attached to the lock block wall should be relocated and extended to the top of the wall.  No flow monitoring at pond facility, but the processing plant monitors inflow and outflow from plant.  Ultrasonic and bubbler level monitoring at stilling well in Pond C. Water levels measured in the Pond C stilling well do not reflect the Pond C water levels (~0.4 m lower), restricting the accuracy of freeboard monitoring and alarms. The permeable barriers between Pond C and the stilling well should be cleanout frequently to maintain accurate readings.
Weirs & Flow Monitors	0			
Piezometers (VW)	0			
Piezometers (standpipe)	0			
Survey Monuments	0			
GPS Monitors	0			
SAA / Fiber Optic	0			
Inclinometers	0			
Accelerographs	0			
Settlement Cells	0			
Settlement Plates	0			
Thermistors	0			
Monitoring Wells	0			
Other	2	Yes		

## Document Review

Document	Available?			Date of current Rev.	Comments
	Yes	No	NA		
OMS Manual	X			March 2022	Updated in 2022.
Emergency Preparedness Plan			X		
Emergency Response Plan	X			March 2022	ER.16 Emergency Response Plan is not facility specific.
Design & As-Built Reports	X			June 2013	
Dam Safety Review Report			X		
Risk Assessment	X			2020	Risk Assessment to be updated in Q1 2023.
Other: Consolidated Facility Report SP&P PO.30	X			2021 2021	SP&P PO.30 requires updating.