

**REPORT**

# 2021 Annual Facility Performance Review

## *Swift South Spoil Co-management Facilities*

Submitted to:

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## Executive Summary

This report presents the 2021 annual facility performance review (AFPR) of the Swift South Spoil co-management facilities (CMFs) at the Teck Coal Limited, Fording River Operations (FRO) mine site.

The 2020/2021 reporting period is the inaugural reporting period for the Swift South Spoil CMFs. Construction and operation of the CMFs began on 15 April 2021 and is scheduled for completion in 2022. The reporting period for the data review is from the start of construction through 31 August 2021.

### Annual Facility Performance Review Summary

Based on the information provided by FRO (including construction reporting), Golder's site visit in September 2021, and several construction supervision site visits occurring between April and August 2021, construction and operation of the Swift South Spoil CMFs generally aligns with the design report and design deviations have been assessed and meet the overall intention of the design. There were no observations of instability. There are no deficiencies that require immediate action.

### Summary of Facility Description

FRO has re-commenced mining of the Swift Pit (Figure 1), which requires tailings historically placed within the existing 2 Pit-3 Pit (2P-3P) tailings storage area (TSA) to be removed as those areas are being re-mined. Excavated tailings from 3 Pit North (3PN) are being relocated from 3PN within Swift Pit to the permitted Swift South Spoil on the west side of the Fording River, approximately 3 km southwest of the FRO Processing Plant (Figure 1).

Materials being mined from 3PN and transported to the Swift South Spoil CMFs are a combination of tailings and waste rock that has had tailings migrate into the void space during initial placement. Tailings are being blended with waste rock prior to transportation to the Swift South Spoil CMFs, in a ratio that allows clast to clast interaction of the waste rock, which dictates the strength characteristics of the facility. Tailings and waste rock are excavated and transported to designated locations within the Swift South Spoils (Figure 1) and are placed in the spoils in lifts up to 15 m high in a bottom up construction sequence. The CMFs are being progressively encapsulated by waste rock spoil.

### Summary of Hazards

A risk assessment of the Swift South Spoil CMFs was completed as part of the design process, which confirmed that there are no credible catastrophic modes of flow failure if the facilities are constructed as designed. Non-catastrophic non-flow hazards (external erosion, single bench failure modes, fines migration) exist and are controlled through mitigation measures and standard operating procedures.

### Consequence of Failure

The design approach selected for the Swift South Spoil CMFs meets or exceeds standards in the Global Industry Standard on Tailings Management and the HSRC. This included use of 'Extreme' loading and engineering design such that there are no catastrophic credible failure modes for the Swift South Spoil CMFs. Using this design philosophy, inclusion of the CMFs within the Swift South Spoil will not change the overall stability of the Swift South Spoil, evaluated in Golder (2018b, 2021b).

## **Operations, Maintenance, and Surveillance Manual**

Golder has reviewed a draft revision of the operations, maintenance, and surveillance (OMS) manual (Teck 2021a). Teck has reported they have recently prepared a final revision of the OMS manual which Golder will review in 2022.

## **Emergency Response and Preparedness Plans**

The emergency response plan for the Swift South Spoil CMFs is covered under the same plans as the Swift South Spoil, which are the Fording River Operations Emergency Response Procedure (Teck 2022) and the Fording River Operations Dumping Procedures (Teck 2021e).

## **Facility Performance Review Priority Recommended Actions**

There is one lower priority (category 3) and no higher priority (category 1 or 2) recommended actions.



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Record of Site Photographs

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Site Inspection Form

### **APPENDIX C**

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## 1.0 INTRODUCTION

### 1.1 Purpose, Scope of Work, and Method

Golder Associates Ltd. (Golder) has completed this annual facility performance review (AFPR) for the co-management facilities (CMFs) within the existing Swift South Spoil at Teck Coal Limited's (Teck) Fording River Operations (FRO) site. The CMFs are tailings storage facilities (TSFs) that do not retain water or slurry tailings and do not change the overall strength behaviour of the spoils.

The 2020/2021 reporting period is the inaugural reporting period for the Swift South Spoil CMFs. Following design by Golder (Golder 2021a,b) construction and operation of the CMFs began on 15 April 2021 and is scheduled for completion in 2022. The reporting period for the data review is from 1 September 2020 through 31 August 2021, but most information starts at the onset of construction.

The 2021 annual inspection report was prepared based on a site visit carried out on 1 September 2021, discussion with Teck staff, review of data provided by Teck, and several construction supervision site visits undertaken between April and August 2021 (detailed in Section 5.4).

Photographs of the Swift South Spoil CMFs from the site inspection are presented in Appendix A, and a summary of the observations is included in Appendix B.

All coordinates presented in this report are in Universal Transverse Mercator (UTM) with elevations referenced to the Elk Valley Elevation Datum unless otherwise noted.

This report is to be read in conjunction with the Study Limitations provided at the end of the report.

### 1.2 Regulatory Requirements

Though the Swift South Spoil CMFs are better described as a spoil than a traditional impounding TSF, Teck requested that this annual inspection report be prepared in consideration of Part 10.5.3 of the Health, Safety and Reclamation Code (HSRC) for Mines in British Columbia (EMLI 2021), which specifies the minimum inspection frequency for TSFs. It is understood that this report will be submitted by Teck to the Chief Inspector of Mines.

The guidelines for annual inspection reports provided in the HSRC Guidance Document (Ministry of Energy and Mines 2016, Section 4.2) were followed where applicable during the preparation of this report.

## 2.0 BACKGROUND

### 2.1 Site History

The FRO site is an active open pit coal mine located near Elkford, BC. Teck operates and maintains tailings storage and settling pond facilities at the site. The facilities under assessment are the Swift South Spoil CMFs. The locations of these facilities at the FRO site are shown in Figure 1.

### 2.2 Swift South Spoil Co-management Facilities Design

As part of Swift Pit mining (Figure 1), historical tailings placed within the existing 2 Pit-3 Pit (2P-3P) Tailings Storage Area (TSA) are being removed as part of re-mining activities. Excavated tailings from 3 Pit North (3PN), sometimes referred to as legacy tailings, are being relocated from 3PN within Swift Pit to the permitted Swift South Spoil on the west side of the Fording River, approximately 3 km southwest of the FRO Processing Plant (Figure 1).

Materials being mined from 3PN and transported to the Swift South Spoil CMFs are a combination of tailings, and tailings blended with waste rock. The 3PN tailings are mostly non-plastic to low-plastic, sandy silt- to silt-sized coal fines (also described as subaerial tailings in situ). Some tailings in 3PN have migrated into the void spaces of the waste rock, forming a mixture defined by a waste rock matrix (also described as sub-terrestrial in situ blended waste rock and tailings).

Subaerial tailings are blended with waste rock prior to transportation to the Swift South Spoil CMFs, in a ratio that allows clast to clast interaction of the waste rock, which dictates the strength characteristics of the facility.

The process for blending the tailings and waste rock is to mine tailings from 3PN and free dump them onto freshly blasted waste rock from the Swift Pit. Tailings and waste rock are then mined together and transported to the Swift South Spoil CMFs. Mixing occurs at three points in the process: when the tailings are excavated at the face, during transportation, and during dumping at the CMFs. Sub-terrestrial materials are being transported directly to the Swift South Spoil CMFs and placed. Tailings are placed in the spoils in lifts up to 15 m high in a bottom up construction sequence. The CMFs are being progressively encapsulated by waste rock spoil.

#### 2.2.1 Design Documentation

The design for the Swift South Spoil CMFs is documented in the following design reports.

**Basis of design and design criteria for new South Spoil CMFs (Golder 2021a)**—presents the basis of design and design criteria, regulations, standards and guidelines, and consequences of failure assessment for the Swift South Spoil CMFs.

**South Spoil CMFs design report (Golder 2021b)**—presents the detailed design, site and material characterization, design assessments, geotechnical risk review, design controls, construction requirements, and design drawings for the CMFs. Design drawings are provided in Appendix C.

The design approach selected for the Swift South Spoil CMFs meets or exceeds standards in the Global Industry Standard on Tailings Management (GISTM, Global tailings review 2020) and the HSRC. The design approach included use of 'Extreme' loading and engineering design, irrespective of considerations of the minor failure consequences possible, such that there are no catastrophic credible flow failure modes for the Swift South Spoil CMFs. Using this design philosophy, inclusion of the CMFs within the Swift South Spoil will not change the overall stability of the spoil, evaluated in Golder (2018b, 2021b).

## 2.2.2 Facility Geometries

The Swift South Spoil CMFs are being constructed in two areas within the existing Swift South Spoil, a northern area near the Swift Settlement Ponds at a base elevation of 1,660 m and a southern area near the Cataract Settlement Ponds at a base elevation of 1,740 m (Appendix C, Drawing 4). The Swift South Spoil CMFs are designed to integrate with the Swift South Spoil as it develops and to be immediately covered by waste rock spoil once completed.

At its ultimate configuration, the Swift South Spoil CMF northern area will be 1.0 km long as measured along the centreline, and the width will be 0.2 km. The minimum elevation is 1,660 m and the maximum elevation is to be confirmed. The final footprint of the northern area will be approximately 330,000 m<sup>2</sup>. A typical section of the northern area is shown in Appendix C, Drawing 4.

At its ultimate configuration, the length of the Swift South Spoil CMF southern area will be 0.9 km as measured along centreline, and the width is 0.4 km. The minimum elevation is 1,740 m and the maximum elevation is to be confirmed. The final footprint of the southern area will be approximately 380,000 m<sup>2</sup>. A typical section of the southern area is shown in Appendix C, Drawing 5.

## 2.2.3 Description of Material Types

The Swift South Spoil CMFs are being constructed/operated using relocated tailings and waste rock materials from 3 Pit North (3PN) (Figure 1). The materials being used are detailed in this section.

### 2.2.3.1 Waste Rock

Waste rock includes freshly blasted rock from the Swift Pit or rehandled waste rock from the vicinity of 3PN. Waste rock gradation varies from large boulders to sand-sized particles, with minor components of finer particles. Waste rock does not include waste rock that has tailings infiltration, also known as sub-terrestrial tailings.

The Swift South Spoil is comprised of waste rock and this material is not restricted to within the CMFs. Generally, waste rock is being used as a mixing material for the tailings or as spot fill to improve geotechnical conditions or trafficability.

### 2.2.3.2 In Situ Blended Waste Rock and Tailings (sub-terrestrial)

The in situ blended waste rock and tailings (sub-terrestrial tailings) are from the 3PN area and were developed by tailings migrating into the void space within the waste rock during tailings deposition in 3 Pit South (3PS).

### 2.2.3.3 Tailings

Tailings from 3PN are being relocated to the Swift South Spoil CMFs. The tailings are sometimes referred to as subaerial tailings. Tailings are comprised of sand, silt, and clay-sized particles generally less than 1 mm in diameter. Tailings are being blended with waste rock (Section 2.2.3.4) prior to placement in the CMFs; the facilities generally do not store unblended tailings.

### 2.2.3.4 Mixed Waste Rock and Tailings

Tailings are being mixed with waste rock within the Swift Pit to achieve a ratio where there is clast-to-clast interaction of the waste rock, creating a material that is very similar to the sub-terrestrial.

### 2.2.3.5 Domestic Waste

A portion of the rehandled waste rock (approximately 360,000 m<sup>3</sup>) containing approximately 5-15% domestic waste (approximately 18,000 – 54,000 m<sup>3</sup>) was placed within the CMFs. The volume of domestic waste placed is approximately 0.1% - 0.3% of the total volume placed within the Swift South Spoil CMFs within the reporting period. Section 3.3 includes additional volume details. Domestic waste was not specified as an approved material to be placed within the CMF boundaries.

## 2.2.4 Foundation Conditions

The CMFs are being constructed within the Swift South Spoil on top of existing waste rock spoil. Thus, the foundation of the CMFs will be entirely haul equipment trafficked waste rock of the Swift South Spoil. The waste rock from FRO mining typically consists of blasted sandstone, siltstone, and mudstone with some coal fragments. The material particle size consists predominantly of boulders and cobbles with some gravel and sand.

The foundations beneath the Swift South Spoil have been characterized through the following investigations:

- A geotechnical investigation was carried out in 2011 including test pits and Becker boreholes. The results of the investigation were reported in Golder (2013).
- A test pit investigation program was carried out by Teck personnel in October 2014 to support the design and construction of the Swift Settlement Ponds. Golder personnel were not present during this investigation, but soil samples were sent to Golder's laboratory for geotechnical testing. Teck (2015) presents a summary of the test pit logs and laboratory testing results.
- A test pit investigation was conducted by Amec Foster Wheeler in 2015 to support the water management plan for the Swift Project (Amec Foster Wheeler 2015). Teck provided the results of the investigation to Golder as background information to the Swift South Spoils geotechnical assessment (Golder 2018b).
- Golder conducted a geotechnical investigation in 2017 on the west side of the Fording River, approximately 1 km north of the Swift South Spoil CMFs. The investigation included test pits, boreholes, and laboratory testing to support the proposed widening of the Fording River floodplain west of the South Tailings Pond (Golder 2018a).

Materials beneath the Swift South Spoil at the sites of the CMFs and/or the properties governing their behaviour may vary spatially. In general, the foundation soil below the Swift South Spoil consists of a topsoil layer (largely stripped) over till that is a clay-silt-sand-gravel mixture with cobbles and boulders. Fractured sedimentary bedrock underlies the till. The foundation stratigraphy in the Swift South Spoil is summarized in Table 1.

**Table 1: Generalized Foundation Stratigraphy**

Layer	Description	Typical Depth to Top of Layer (mbgl)	Thickness (m)
Topsoil	Silty sandy topsoil	0	0 to 0.6
Till	Gravelly sandy silty clay with some cobbles and boulders	0.1 to 0.6	0.3 to >6.3
Bedrock	Fractured sedimentary rocks	0.5 to >6.5	-

mbgl = metres below ground level.

Prior to Swift South Spoil development, Teck stripped foundation topsoil within footprints of the spoil on all ground surfaces with slope angles less than 26°. These areas comprise the toe of the Swift South Spoil and control the overall stability. Soft soils within the former Swift settling pond were also removed prior to placement of waste rock. The excavation of these materials exceeded the foundation improvement requirements outlined in the Swift South Spoil geotechnical assessment (Golder 2018b).



### 2.2.5 Water Management

Due to the CMFs encapsulation within the Swift South Spoil, the catchment of the CMFs will be the surface footprint of the CMFs and will receive infiltration through the waste rock of the Swift South Spoil. Water management including surface water diversions and rock drains have been designed by others for the Swift South Spoil.

Historically, surface water in the catchment has been managed by the Swift Clean Water Diversion, which diverts non-contact water upstream of the mining area. The Cataract Creek Rock Drain and Swift Creek Rock Drain currently concentrate flows in the catchment, each discharging into its own respective primary collection pond, as shown in Figure 1. Water is conveyed from each collection pond to the Swift Creek Sediment Ponds via high-density polyethylene (HDPE) pipelines. Engineered structure rock drains have been designed to pass the 1-in-200-year flood.

Surface water in the undisturbed area of the catchment above the southern end of Swift Pit is collected by the Swift Creek Clean Water Diversion. This diversion system conveys non-contact surface water across the Swift South Spoil in an HDPE pipeline to a small energy dissipation pond adjacent to the Swift Creek Sediment Ponds.

All water from the Swift Creek Clean Water Diversion and the Swift Creek Sediment Ponds is combined downstream and is discharged into the Fording River via a saw-toothed weir (Teck 2020a). Water quality is monitored and reported under separate cover. The water management structures are shown in Figure 1.

## 2.3 Site Seismicity

The site is located in an area of relatively low seismicity for BC. Golder developed a site-specific seismic hazard model for the FRO site based on historical seismicity and a review of geological and paleoseismological features (Golder 2016). Golder's model includes four area sources from the 5th Generation Seismic Hazard Model and nine faults and fault segments mapped in northwest Montana. The 5th Generation Seismic Hazard Model was developed by Natural Resources Canada for use in the 2015 National Building Code of Canada.

Probabilistic analysis results from site-specific hazard model are listed in Table 2. All site-specific peak ground acceleration values were evaluated for a soil Site Class C as described in the 2010 National Building Code of Canada (NRCC 2010).

**Table 2: Fording River Operations Site Seismic Hazard Values**

Exceedance Probability	Return Period (years)	Peak Ground Acceleration (g)
40% in 50 years	100	0.020
10% in 50 years	475	0.063
5% in 50 years	1,000	0.097
2% in 50 years	2,475	0.158
1% in 50 years	5,000	0.222
½% in 50 years	10,000	0.300

Note:

For firm ground site class “C,” very dense soil and soft rock foundation, as defined by 2010 National Building Code of Canada (NRCC 2010).

Return periods are not exact representations of annual exceedance probabilities; rounding per Canadian Dam Association guidelines (CDA 2013, 2019) is shown.

FRO site coordinates: 50.202°N, –114.876°W.

## 2.4 Key Personnel

The Engineer of Record (EoR) for the Swift South Spoil CMFs, as of 15 April 2021 (the beginning of construction), is Julia Steele, P.Eng., an employee of Golder.

The Responsible Tailings Facility Engineer (RTFE) for the Swift South Spoil CMFs is James Campbell, P.Eng., who is an employee of Teck. James Campbell became the RTFE for the Swift South Spoil CMFs on 15 April 2021.

## 2.5 Quantifiable Performance Objectives

The design intent of the Swift South Spoil CMFs is that they do not change the geotechnical behaviour of the Swift South Spoil; therefore, the existing Swift South Spoil QPOs are adequate, unless there is a significant deviation from design during construction that changes the behaviour of the spoil. The works completed during the reporting period have been confirmed as meeting the design intent.

## 3.0 CONSTRUCTION, OPERATIONS, AND MAINTENANCE

Construction and operation of the Swift South Spoil CMFs commenced on 15 April 2021 and is scheduled to be completed in 2022.

### 3.1 Inspections

The following inspections were completed during the reporting period:

- Golder supervised the first two weeks of CMF construction (14–27 April 2021).
- Golder undertook supervision of construction and observations (8–10 June 2021).
- Golder undertook a site visit to observe construction when a change in legacy material moisture content was encountered on 9 August 2021.
- Supervisor inspections were undertaken by shift supervisors during each 12 h shift during construction. This was not strictly adhered to through construction.
- Weekly geotechnical inspection were undertaken by Teck from the week ending 29 April 2021 to the week ending 4 September 2021.

### 3.2 Design Deviations

Design deviations during construction have been documented by Teck and, as they have not compromised the original design intent, they have been approved by the EoR. These will be captured in the construction record reporting and are summarized as follows:

- **Design amendment (one) to South Spoil CMFs (Golder 2021c)**—presents updated stability analysis and facility layout limits for the northern CMF in the Swift South Spoil. This design amendment meets the design intent of the facility.
- **Design amendment (two) for miscoded tailings placed in South Spoil CMFs (Golder 2021d)**—presents stability analysis and documentation for 70 loads of tailings (approximately 9,200 m<sup>3</sup>) that were not mixed with waste rock prior to placement within the Swift South Spoil CMFs on 20 June 2021. This design amendment meets the design intent of the facility.
- **Design amendment (three) for overdump at South Spoil CMFs (Golder 2021e)**—presents additional stability analysis and documentation for 364 loads of mixed tailings and waste rock (approximately 88,000 m<sup>3</sup>) that were placed outside of the design limits on the 1,740 m lift at the northern Swift South Spoil CMF between 20 and 24 August 2021. This design amendment meets the design intent of the facility.

A portion of the rehandled waste rock containing approximately 5-15% domestic waste was placed within the Swift South Spoil CMFs. The volume of domestic waste placed is approximately 0.1% - 0.3% of the total volume placed within the Swift South Spoil CMFs within the reporting period. Domestic waste was not specified as an approved material to be placed within the CMF boundaries. The areas used for placing this material are reported to have followed Teck FRO's process for domestic waste disposal areas under the Waste Management Plan framework. The impact of this design deviation is not yet resolved. An environmental compliance and impact statement, or similar, for the placement of domestic waste within the CMFs should be prepared by Teck and included as a design deviation in the construction record report.

### 3.3 Volumes Placed

Material placed within the South Spoil CMFs during the reporting period are detailed in Table 3 and Table 4.

**Table 3: Volumes of Placed Material by Reported Material Type**

Material Type	Northern CMF (m <sup>3</sup> )	Southern CMF (m <sup>3</sup> )	Total (m <sup>3</sup> )
Mixed tailings and waste rock	2,667,125	1,866,532	4,543,657
Blended tailings and waste rock (sub-terrestrial)	579,062	132,757	711,819
Rehandled waste rock	3,169,451	338,404	3,507,855
Rehandled waste rock with domestic waste <sup>(a)</sup>	361,150	0	361,150
Waste rock	5,394,417	1,243,817	6,638,234
<b>Total Material Placed</b>			<b>15,762,715</b>

Source: Teck 2021d.

(a) Domestic waste was taken to the Swift South Spoil CMFs and was placed into Teck specified locations throughout construction. Domestic waste was typically rehandle waste rock with 5–15% domestic landfill, wood, tires, etc. The areas used for placing this material are reported to have followed Teck FRO's process for domestic waste disposal areas under the Waste Management Plan framework.

CMF = co-management facility.

**Table 4: Estimated Percentage of Placed Material by Material Type**

Material Type	Northern CMF (m <sup>3</sup> )	Southern CMF (m <sup>3</sup> )	Total (m <sup>3</sup> )
<b>Tailings</b> (estimated 20% from Mixed tailings and waste rock and Blended tailings and waste rock)	4.1%	2.5%	6.7%
<b>Rehandled waste rock</b> (100% as direct reported and estimated 90% of Rehanded with domestic waste)	22.2%	2.1%	24.3%
<b>Waste Rock</b> (100% direct reported and estimated 80% from Mixed and Blended tailings and waste rock)	50.7%	18.0%	68.8%
<b>Domestic waste<sup>(a)</sup></b> (assumed 10% of Rehanded with domestic waste)	0.2%	0.0%	0.2%
<b>Total Material Placed</b>			<b>100.0%</b>

(a) Domestic waste was reported as 5% - 15% of the reported portion of rehandle waste rock that contained domestic waste which results in 0.1% to 0.3% of the total volume. Domestic waste was taken to the Swift South Spoil CMFs and was placed into Teck specified locations throughout construction. The areas used for placing this material are reported to have followed Teck FRO's process for domestic waste disposal areas under the Waste Management Plan framework.

## 4.0 REVIEW OF CLIMATIC DATA

Three local climate monitoring stations exist at FRO: waste water treatment plant, A Spoil, and Brownie Spoil. Records were available from the waste treatment plant and Brownie Spoil weather stations during the reporting period from 1 September 2020 to 31 August 2021. Only limited precipitation data were available for the A Spoil station; it has therefore been excluded from the climate data review.

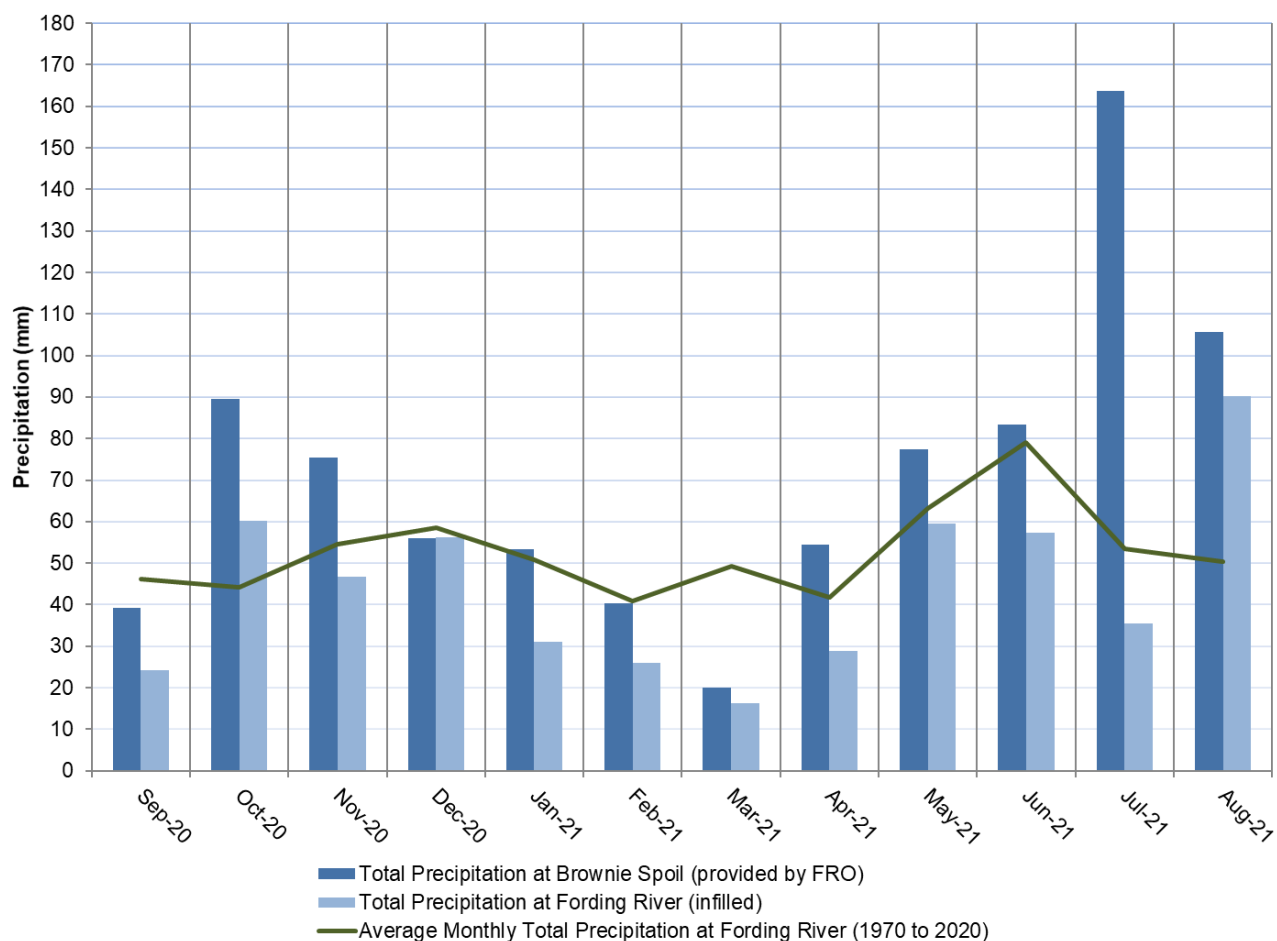
The Fording River Cominco station is the closest regional Environment and Climate Change Canada station to the FRO site; however, the station has not published precipitation data since 2017. The waste water treatment plant station has been used as the main precipitation station for the Fording River Cominco infilling gap process since December 2013 and now makes up the majority of the dataset. As a result, a new combined dataset, hereafter referred to as the Fording River (infilled) dataset, has been used for the climate review. The waste water treatment plant station precipitation data were used over the majority of the reporting period with the exception of 28 April to 4 May 2021 (inclusive), where missing data were infilled with data from the Sparwood CS regional station.

The total precipitation recorded at the Fording River (infilled) and Brownie Spoil stations over the reporting period is shown in Table 4 with their monthly total precipitation presented in Chart 1. For comparison purposes, the long-term (1970 to 2020) average monthly precipitation at FRO (from the Fording River Cominco infilled dataset) is also presented in Chart 1. The long-term (1970 to 2020) average annual precipitation at the mine site is estimated to be 632 mm.

Note that data presented in Table 4 and Chart 1 for the Fording River (infilled) and Brownie Spoil stations are raw data; no adjustments for station elevation or undercatch were made.

**Table 5: Total Precipitation from 1 September 2020 to 31 August 2021**

Weather Station	Total Precipitation (mm)
Fording River (infilled)	532
Brownie Spoil	858



**Chart 1: Monthly Precipitation Data from 1 September 2020 to 31 August 2021**

The precipitation data in Table 4 indicate the annual precipitation used for the Fording River (infilled) dataset from 1 September 2020 to 31 August 2021 was lower than the long-term average of 632 mm, whereas the corresponding annual precipitation received at the Brownie Spoil weather station was higher than the long-term annual average. A similar observation could be made from Chart 1, where the total monthly precipitation data used in the Fording River (infilled) dataset were lower than the long-term average and the total monthly precipitation data recorded at the Brownie Spoil weather station were generally at or higher than the long-term average except for the following time periods:

- October 2020 and August 2021, when the total monthly precipitation data recorded at the stations used to infill the Fording River (infilled) were higher than the long-term average
- September 2020, December 2020, and March 2021, when the total monthly precipitation data recorded at the Brownie Spoil weather station were lower than the long-term average

Freshet typically starts in April to May at FRO with higher runoff flow events expected during those months as a result of combined rainfall and snowmelt.

No facility performance issues were noted associated with precipitation during the reporting period.

## 5.0 SWIFT SOUTH SPOIL CO-MANAGEMENT FACILITIES SAFETY ASSESSMENT

This section presents the safety assessment for the Swift South Spoil CMFs based on the observations and data review for each of the failure modes that are most relevant to this type of facility.

### 5.1 Site Visit

A site inspection was carried out on 1 September 2021 by Julia Steele, P.Eng., and Sophie Bainbridge, of Golder. Julia Steele and Sophie Bainbridge were accompanied by Ross Roseingrave, P.Eng., Senior Engineering Supervisor, and Katie Goguen, EIT, of Teck. The temperature during the visit was approximately 17°C and the weather was partially overcast. A close-out meeting was held and attended by Ross Roseingrave, James Campbell, and Katie Goguen, of Teck.

Appendix A presents a summary of photographs of the CMFs from the site inspection. The location, direction, and number for each photograph are noted in Figure 2.

The following are items of note from the site visit:

- Based on visual inspections collected on site, the Swift South Spoil CMFs appeared safe with no deficiencies that require immediate action (Photograph A-1).
- The platforms of the constructed lifts were in good condition with relatively flat surface and no observed cracking (Photographs A-2 and A-3).
- Water was ponding on the compacted surface of the Swift South Spoil CMFs. This was observed to be relatively unchanged over the three-day site visit despite no precipitation (Photograph A-4).
- Domestic waste was observed in the 1,740 lift of the southern CMF (Photograph A-5).
- Construction of the northern Swift South Spoil CMF facility was occurring at the 1,740 lift. Construction was proceeding in accordance with design. (Photograph A-6).

A summary of the observations from the site visit is included in the inspection report in Appendix B.

### 5.2 Background Information

Teck provided the following information for this AFPR:

- 2020 FRO site LiDAR topographic data and orthophoto
- records of routine visual inspections by qualified Teck geotechnical personnel
- site climate data from 1 September 2020 to 31 August 2021

### 5.3 Consequences of Failure

Teck has advised that they are aligned with the most conservative interpretation of the GISTM (Global Tailings Review 2020) which, in turn, is consistent with their safety culture. This facility was designed adopting the maximum credible loads and therefore meets the loading criteria defined in GISTM as well as the HSRC. Adopting this approach meets or exceeds any regulatory requirements, aligns with Teck's goal to eliminate any risk for loss of life, and is consistent with the new GISTM. This approach is consistent with industry-leading best practices.



## 5.4 Review of Operational Documentation

### 5.4.1 Operations, Maintenance, and Surveillance Manual

Golder has reviewed a draft revision of the operations, maintenance, and surveillance (OMS) manual (Teck 2021a). Teck has reported they have recently prepared a final revision of the OMS manual which Golder will reviewed in 2022.

### 5.4.2 Emergency Preparedness and Response Plans

The emergency response planning for the Swift South Spoil CMFs is covered under the same plans as the Swift South Spoil, which are:

- **Fording River Operations Emergency Response Procedure (Teck 2022)** – provides Fording River Operation's staff with guidance in the preparation for and response to, emergency situations. The procedure identified the responsibilities and duties of management.
- **Fording River Operations Dumping Procedures (Teck 2021e)** – identifies procedures for excessive berm or ground settlement and emergency signalling procedures.

## 5.5 Assessment of Facility Safety Relative to Potential Catastrophic Failure Modes

Based on the risk assessment for the facility (Golder 2021b), there are no catastrophic credible hazards or failure modes for the Swift South Spoil CMFs. The assessments completed to support this conclusion are summarized in the design report (Golder 2021b).

The construction and performance of the Swift South Spoil CMFs aligns with recommendations from the design reports, except for the placement of domestic waste within the footprints. No potential catastrophic failure modes have been identified based on the construction and operation activities.

## 5.6 Assessment of Facility Safety Relative to Potential Hazards

Potential failure modes associated with the Swift South Spoil CMFs were identified during the risk analysis undertaken as part of the detailed design for the facility (Golder 2021b). Based on the risk assessment, the following non-catastrophic hazards are considered in the assessment of performance compared to the design expectations.

### 5.6.1 Local Instability

The risk review for the Swift South Spoil CMFs (Golder 2021b) identified two potential non-catastrophic instability scenarios:

- single-bench failure through Swift South Spoil's waste rock material leading to exposure of CMF material and erosion of material.
- local failure of CMF lift during construction whereby failure of a lift during construction due to a potential localized weak zones leads to risk to the construction crew.

### **Design Basis and Existing Controls**

Design limits were developed for the Swift South Spoil CMFs (Golder 2021b) that locate the CMFs far enough back from the spoil face (50 m) to avoid the potential for the CMF to be exposed in the event of a single-bench failure of the Swift South Spoil. These design limits are used in the Carlson placement system so that individual loads are tracked with respect to placement boundaries.

A safe work management plan was developed for the excavation and relocation of tailings (Teck 2021b) and placement of the mixed tailings and waste rock follows the Teck FRO waste dump management standard practices and procedures (Teck 2020b). The risk of a local failure is managed by the safe work procedures outlined in these documents.

### **Observed Performance**

Weekly construction reporting by Teck that reconciles load material type and placement location shows that placement within the development limits has been mostly in compliance with the Golder (2021b) design limits. The construction deviations from design were checked by Golder and meet the overall design intent (Section 3.2).

No localized failures have been observed during construction. Localized soft zones that have created issues for haul truck trafficability have been managed through placement of additional waste rock, as and when required. These observed zones of softness do not present a risk to facility safety.

## **5.6.2 Internal Erosion / Fines Migration**

Internal erosion does not present a catastrophic hazard to facility safety. The in situ blended waste rock and tailings material (sub-terrestrial) being excavated from 3PN was created by tailings migrating through the void space of in situ waste rock. This observed behaviour of fines migration through the waste rock confirms tailings are not filter compatible with waste rock and there is potential for the tailings of the CMFs to migrate under sufficient gradient.

### **Design Basis and Existing Controls**

One of the design considerations for the CMFs is to mitigate the loss of fines to prevent potential impact to any vulnerable receiving body. Analysis was undertaken to assess the potential for fines migration from the CMFs under the anticipated as-constructed conditions (Golder 2021b). The design infiltration loading was based on the 1:100 steady-state wet year, as recommended by Golder.

The results of the fines migration assessment for the CMFs indicate the following:

- There will be an initial fines migration when material is first placed.
- For a homogenous block of mixed tailings and waste rock fines migration is expected to be minor.
- For zones of tailings within layers of waste rock seasonal fines migration is expected.

### **Observed Performance**

No seepage was observed at the time of inspection. The generated total suspended solids (TSS) is expected to be captured in the Swift and Cataract Settlement Ponds.

## 6.0 SUMMARY AND RECOMMENDATIONS

### 6.1 Summary of Activities

The Swift South Spoil CMFs were being constructed during 2021. Activities completed during the reporting period include the following:

- Development of a detailed design for the Swift South Spoil CMFs (Golder 2021a).
- Development of a draft OMS manual for the facilities (Teck 2021a).
- Placement of approximately 15.8 Mm<sup>3</sup> of legacy tailings and waste rock within the facility layout limits, including 4.5 Mm<sup>3</sup> of mixed tailings and waste rock (at a 1 tailings to 5 waste rock mix ratio) and 0.7 Mm<sup>3</sup> of sub-terrestrial material.
- An inspection program consisting of weekly geotechnical inspections, supervisor inspections undertaken each shift, and three Golder construction supervision inspections; weekly construction reports were produced by Teck and reconciled with survey data.
- Documentation of design changes and deficiencies.

### 6.2 Summary of Climate, Storage, and Water Quality

The climate data during the reporting period indicate the annual precipitation used for the Fording River (infilled) dataset was lower than the long-term annual average, whereas the annual precipitation received at the Brownie Spoil weather station was higher than the long-term annual average. No facility performance issues were noted associated with precipitation during the reporting period.

### 6.3 Summary of Performance

The Swift South Spoil CMFs at FRO were observed to be in good condition at the time of the 2021 AFPR site inspection and construction and performance were consistent with the design intent.

### 6.4 Consequence of Failure

The design adopts the maximum credible loads and therefore meets or exceeds the criteria for minimum design loadings specified by the GISTM and HSRC.

### 6.5 Current Recommended Actions

Based on the information by Teck (including construction reporting), Golder's site visit in September 2021, and several construction supervision site visits between April and August 2021, the construction of the Swift South Spoil CMFs appears to align with the design report and approved design deviations (Golder 2021c, d, e) with no observations of instability.

Golder's recommended actions are summarized in Table 5.

**Table 6: 2021 Annual Swift South Spoil Co-management Facilities Review Recommended Actions**

ID Number	Deficiency or Non-conformance	Applicable Regulation or Guideline	Recommended Action	Priority	Recommended Timing for the Action
2021-01	Unapproved material placed in CMFs	n/a	Assess and document the impact of deviation due to unapproved domestic waste placement in the southern Swift South Spoil CMF.	3	Q3 2022

HSRC = Health, Safety and Reclamation Code; CMF = co-management facility

Priority	Description
1	A high probability or actual dam safety issue considered immediately dangerous to life, health or the environment, or a significant risk of regulatory enforcement.
2	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.
3	Single occurrences of deficiencies or non-conformances that alone would not be expected to result in dam safety issues.
4	Best Management Practice – Further improvements are necessary to meet industry best practices or reduce potential risks.

Source: HSRC Guidance Document, Section 4.2 (Ministry of Energy and Mines 2016).

## 7.0 CLOSURE

The reader is referred to the Study Limitations section, which follows the text and forms an integral part of this report.

We trust that this report meets your present requirements. If you have any questions or additional requirements, please contact the undersigned.

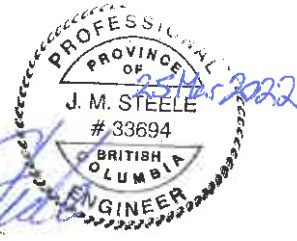
**Golder Associates Ltd.**



Sophie Bainbridge  
*Senior Geotechnical Specialist*



Julia Steele, M.Eng., P.Eng.  
*Senior Principal Geotechnical Engineer*



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[https://golderassociates.sharepoint.com/sites/142564/project files/6 deliverables/issued/2021-256-r-rev0-south spill cmf annual inspection/21456080-2021-256-r-rev0-500 south spill cmf annual insp 25mar\\_22.docx](https://golderassociates.sharepoint.com/sites/142564/project%20files/6%20deliverables/issued/2021-256-r-rev0-south%20spill%20cmf%20annual%20inspection/21456080-2021-256-r-rev0-500%20south%20spill%20cmf%20annual%20insp%2025mar_22.docx)

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## STUDY LIMITATIONS

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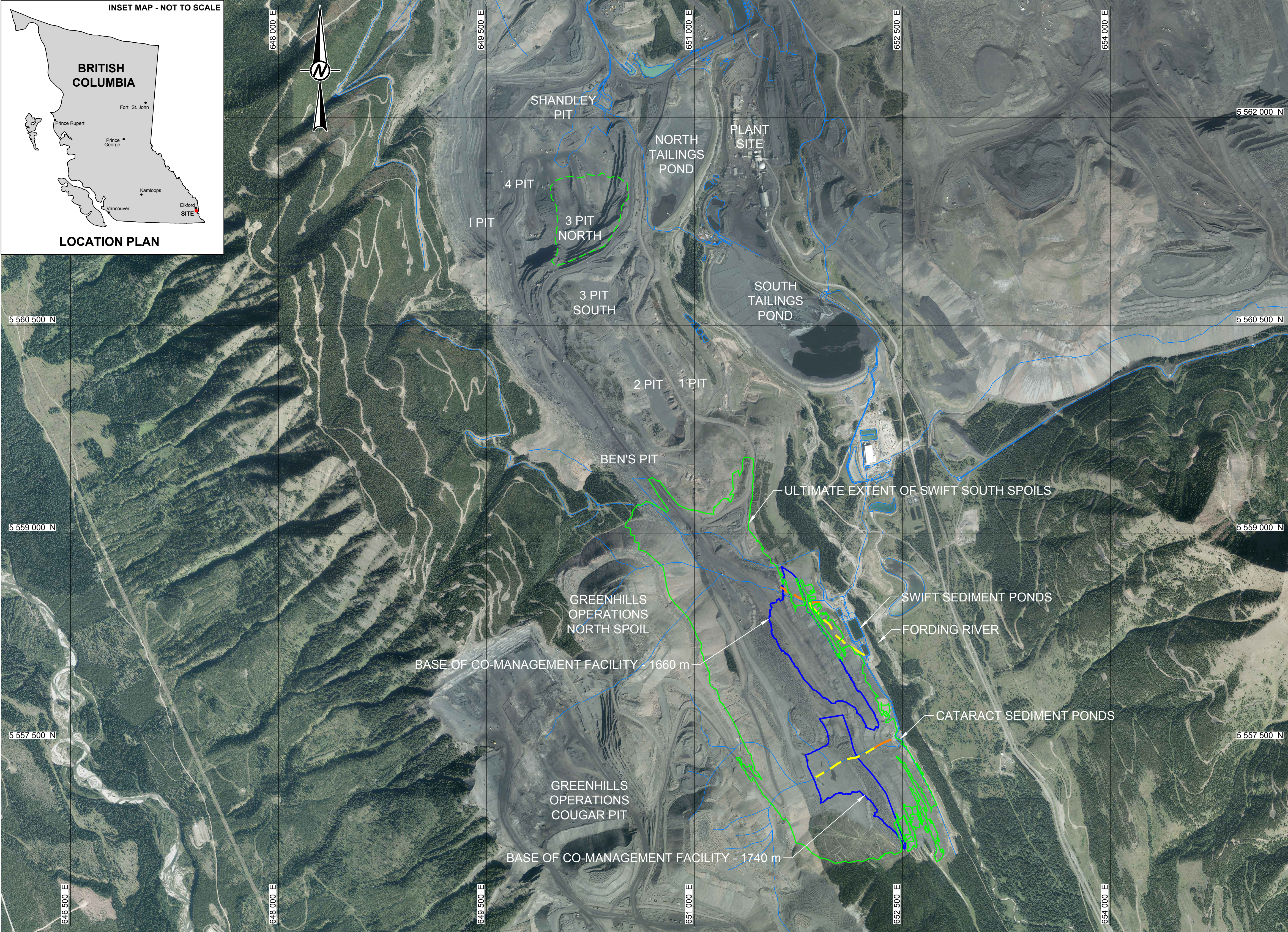
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**LEGEND**

- WATER MANAGEMENT (SEE REFERENCE 2)
- ULTIMATE SOUTH SPOIL FINAL DESIGN (SEE REFERENCE 4)
- NATURAL WATERCOURSE ROCK DRAINS (APPROXIMATE) (SEE REFERENCE 3)
- ENGINEERED STRUCTURE ROCK DRAINS (APPROXIMATE) (SEE REFERENCE 3)

**NOTES**

- ALL UNITS ARE SHOWN IN METRES UNLESS NOTED OTHERWISE.
- COORDINATES ARE IN NAD 83 UTM ZONE 11, ELEVATIONS ARE REFERENCED TO THE ELK VALLEY ELEVATION DATUM.
- AS-BUILT SURVEY OF CMF CONSTRUCTED TO DATE NOT SHOWN ON THIS FIGURE.

**REFERENCES**

- 2021 AERIAL PHOTO PROVIDED BY TECK COAL LIMITED FORDING RIVER OPERATIONS, RECEIVED: 12 OCTOBER 2021, DATES FLOWN: 22 JULY 2021.
- WATER MANAGEMENT FEATURES PROVIDED BY TECK COAL LIMITED, FORDING RIVER OPERATIONS, RECEIVED: 28 JANUARY 2021, FILE NAME: "WMIlines\_012020.DXF".
- ENGINEERED STRUCTURE ROCK DRAINS AND NATURAL WATERCOURSE ROCK DRAINS DIGITIZED FROM FIGURE SWIFT NORTH ENGINEERED STRUCTURE & NATURAL WATERCOURSE ROCK DRAIN LOCATIONS PROVIDED BY TECK, RECEIVED: NOVEMBER 20, 2020.
- ULTIMATE SOUTH SPOIL FINAL DESIGN PROVIDED BY TECK COAL LIMITED, FORDING RIVER OPERATIONS, RECEIVED: 16 SEPTEMBER 2021, FILE NAME: "SWF S Merged Surf Sep15.dxf".

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TECK COAL LIMITED  
FORDING RIVER OPERATIONS  
ELKFORD, B.C.

CONSULTANT



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DESIGNED	S.BAINBRIDGE
PREPARED	M.HEAL
REVIEWED	S.BAINBRIDGE
APPROVED	J.STEELE

PROJECT  
FORDING RIVER OPERATIONS  
SOUTH SPOIL CO-MANAGEMENT FACILITIES  
2021 ANNUAL FACILITY PERFORMANCE REVIEW

TITLE  
**OVERALL SITE PLAN**

PROJECT NO.	PHASE/TASK/DOC	REV.	FIGURE
21456080	500/502/2021-256	0	1

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LEGEND

WATER MANAGEMENT (SEE REFERENCE 2)

ULTIMATE SOUTH SPOIL FINAL DESIGN (SEE REFERENCE 4)

#

- NOTES
1.

ALL UNITS ARE SHOWN IN METRES UNLESS NOTED OTHERWISE.
2.

COORDINATES ARE IN NAD 83 UTM ZONE 11, ELEVATIONS ARE REFERENCED TO THE ELK VALLEY ELEVATION DATUM.
3.

AS-BUILT SURVEY OF CMF CONSTRUCTED TO DATE NOT SHOWN ON THIS FIGURE.

- REFERENCES
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2021 LIDAR AND AERIAL PHOTO PROVIDED BY TECK COAL LIMITED FORDING RIVER OPERATIONS, RECEIVED: 12 OCTOBER 2021, DATES FLOWN: 22 JULY 2021.
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WATER MANAGEMENT FEATURES PROVIDED BY TECK COAL LIMITED, FORDING RIVER OPERATIONS, RECEIVED: 28 JANUARY 2021, FILE NAME: "WMlines\_012020.DXF".
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ENGINEERED STRUCTURE ROCK DRAINS AND NATURAL WATERCOURSE ROCK DRAINS DIGITIZED FROM FIGURE SWIFT NORTH ENGINEERED STRUCTURE & NATURAL WATERCOURSE ROCK DRAIN LOCATIONS PROVIDED BY TECK, RECEIVED: NOVEMBER 20, 2020.
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ELKFORD, B.C.

CONSULTANT



YYYY-MM-DD	2022-03-22
DESIGNED	S.BAINBRIDGE
PREPARED	M.HEAL
REVIEWED	S.BAINBRIDGE
APPROVED	J.STEELE

PROJECT  
FORDING RIVER OPERATIONS  
SOUTH SPOIL CO-MANAGEMENT FACILITIES  
2021 ANNUAL FACILITY PERFORMANCE REVIEW

TITLE  
PHOTOGRAPH LOCATION PLAN

PROJECT NO.	PHASE/TASK/DOC	REV.	FIGURE
21456080	500/502/2021-256	0	2

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**APPENDIX A**

# Record of Site Photographs

## 2021 Annual Facility Performance Review for Swift South Spoil Co-management Facilities

### PHOTOGRAPH A-1

1 September 2021



Swift South Spoil containing CMFs, overview, looking west.

## 2021 Annual Facility Performance Review for Swift South Spoil Co-management Facilities

### PHOTOGRAPH A-2

1 September 2021



Advancing face of the 1,740 m lift of the southern Swift South Spoil CMF, looking southeast.



## 2021 Annual Facility Performance Review for Swift South Spoil Co-management Facilities

### PHOTOGRAPH A-3

1 September 2021



Advancing face of the 1,740 m lift of the southern Swift South Spoil CMF, looking south. The surface of both the northern and southern CMFs looked similar.

## 2021 Annual Facility Performance Review for Swift South Spoil Co-management Facilities

### PHOTOGRAPH A-4

1 September 2021



Ponding water on 1,770 m lift of the southern Swift South Spoil CMF. This ponding was largely unchanged for three days with no rain. Looking northeast.



## 2021 Annual Facility Performance Review for Swift South Spoil Co-management Facilities

### PHOTOGRAPH A-5

1 September 2021



Surface of the 1,740 m lift of the southern Swift South Spoil CMF, showing domestic waste incorporated into the placed CMF material. Looking northeast.



## 2021 Annual Facility Performance Review for Swift South Spoil Co-management Facilities

### PHOTOGRAPH A-6

1 September 2021



Haul truck dumping off the 1,740 m lift onto the 1,710 m lift on the northern Swift South Spoil CMF, looking west. The northern CMF was being actively constructed at the time of the site visit.

**APPENDIX B**

# Site Inspection Form

Client:	Teck Coal Limited	By:	Sophie Bainbridge and Julia Steele, P.Eng.
Project:	FRO 2021 Annual Facility Performance Report	Date:	1 September 2021
Location:	Swift South Spoil		

GENERAL INFORMATION			
Facility Type:		Swift South Spoil Co-management Facilities	
Weather Conditions:	Partially overcast	Temp:	17 degrees

INSPECTION ITEM	PHOTO	OBSERVATIONS, COMMENTS & OTHER DATA
1. Platform Conditions		
1.1 Crest Elevation	A-2, A-3	Material was being placed on the 1,740 m lift of the northern CMF (maximum crest height of 1,755 m). Material had been placed to a maximum crest height of 1,770 m on the southern CMF and no placement was occurring at the time of the site visit.
1.2 Placed Material	A-5	Blended waste rock and tailings, sub-terrestrial, rehandle, and waste rock. Domestic waste has also been placed. Not approved under design. Teck to document approval and environmental impact.
1.3 Construction Method (top down/bottom up)	-	Bottom up, in 15 m lifts.
1.4 Surface Cracking	-	No surface cracking was observed or reported.
1.5 Unexpected Settlement	-	No unexpected settlement was observed or reported.
1.6 Lateral Movement	-	No lateral movement was observed or reported.
1.7 Other Unusual Conditions	A-4	Ponding water was observed on the 1,770 m lift of the southern Swift South Spoil CMF. This water was observed to have been ponding unchanged for three days.
2. Slope Face		
2.1 Slope Angle	A-2	37 deg. Overall interlift at 2 horizontal:1 vertical
2.2 Signs of Erosion	-	No signs of erosion were observed or reported. The facility is encapsulated after construction of each lift.
2.3 Signs of Movement (Deformation)	-	No signs of movement were observed or reported.
2.4 Cracks	-	No signs of cracking were observed or reported.
2.5 Other Unusual Conditions	-	NA
3. Toe		
3.1 Slope Angle	A-2	37 deg. Overall interlift at 2 horizontal:1 vertical
3.2 Signs of Erosion	-	No signs of erosion were observed or reported. The facility is encapsulated after construction of each lift.
3.3 Signs of Movement (Deformation)	-	No signs of movement were observed or reported.
3.4 Cracks	-	No signs of cracking were observed or reported.
3.5 Seepage or Wet Areas	-	No signs of seepage were observed or reported.
3.6 Vegetation Growth	-	No vegetation growth was observed or reported.
3.7 Other Unusual Conditions	-	NA
Advancement Pattern	A-2	An even and consistent advancing face was observed.
6. Material Ratio		
6.1 Mix ratio	-	1-part tailings to 5-parts waste rock.
6.2 Mix method	-	In pit mixing of tailings and waste rock prior to transportation to CMF.
6.3 Tailings segregation	-	No tailings segregation was observed or reported.
7. Documentation		
7.1 Operation, Maintenance and Surveillance (OMS) Manual 7.1.1 OMS Manual exists	-	Yes
7.1.2 OMS Plan reflects current spoil conditions	-	Draft revision reviewed; Final revision requires Golder review.
7.1.3 Date of last revision	-	9 April 2021 (draft).
8.2 Emergency Preparedness Plan (EPP) 8.2.1 EPP Exists	-	The emergency response plan for the Swift South Spoil CMFs is covered under the same plans as the Swift South Spoil.
8.2.2 EPP Reflects Current Conditions	-	Yes
8.2.3 Date of Last Revision	-	Fording River Operations Emergency Response Procedure (28 February 2022), Fording River Operations Dumping Procedures (15 October 2021).
Inspector's Signature	Date: 1 September 2021	Julia Steele, P.Eng.

**APPENDIX C**

# Design Drawings



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# TECK COAL LIMITED

## FORDING RIVER OPERATIONS

### SOUTH SPOILS CO-MANAGEMENT FACILITIES

### DETAILED DESIGN DRAWINGS



DRAWING LIST				
DRAWING No.	DRAWING TITLE	REVISION No.	PURPOSE OF ISSUE	DATE OF ISSUE
01	TITLE SHEET AND DRAWING INDEX	1	ISSUED FOR CONSTRUCTION	2021-06-11
02	SITE PLAN	1	ISSUED FOR CONSTRUCTION	2021-06-11
03	APPROVED AREA FOR CO-MANAGEMENT FACILITIES CONSTRUCTION	1	ISSUED FOR CONSTRUCTION	2021-06-11
04	SOUTH SPOIL - CO-MANAGEMENT FACILITIES CROSS-SECTIONS (1 OF 3)	1	ISSUED FOR CONSTRUCTION	2021-06-11
05	SOUTH SPOIL - CO-MANAGEMENT FACILITIES CROSS-SECTIONS (2 OF 3)	1	ISSUED FOR CONSTRUCTION	2021-06-11
06	SOUTH SPOIL - CO-MANAGEMENT FACILITIES CROSS-SECTIONS (3 OF 3)	1	ISSUED FOR CONSTRUCTION	2021-06-11

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0	2021-04-12	ISSUED FOR CONSTRUCTION	S.B.	T.A.K.	S.B.	J.M.S.	
REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED	

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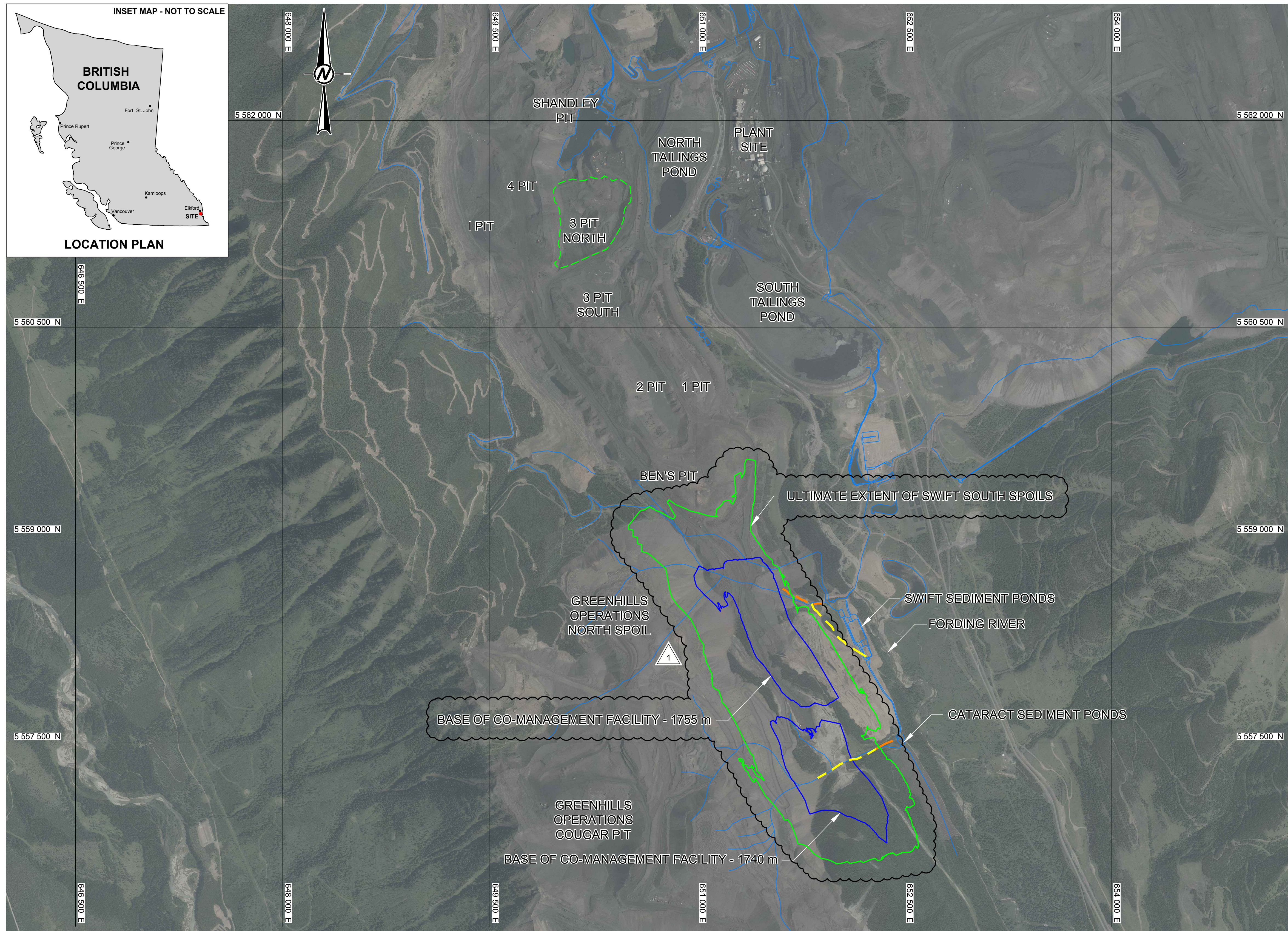
PROJECT  
FORDING RIVER OPERATIONS  
SOUTH SPOILS CO-MANAGEMENT FACILITIES  
DETAILED DESIGN DRAWINGS

TITLE  
**TITLE SHEET AND DRAWING INDEX**

PROJECT NO.	PHASE/TASK/DOC.	REV.	01 of 06	DRAWING
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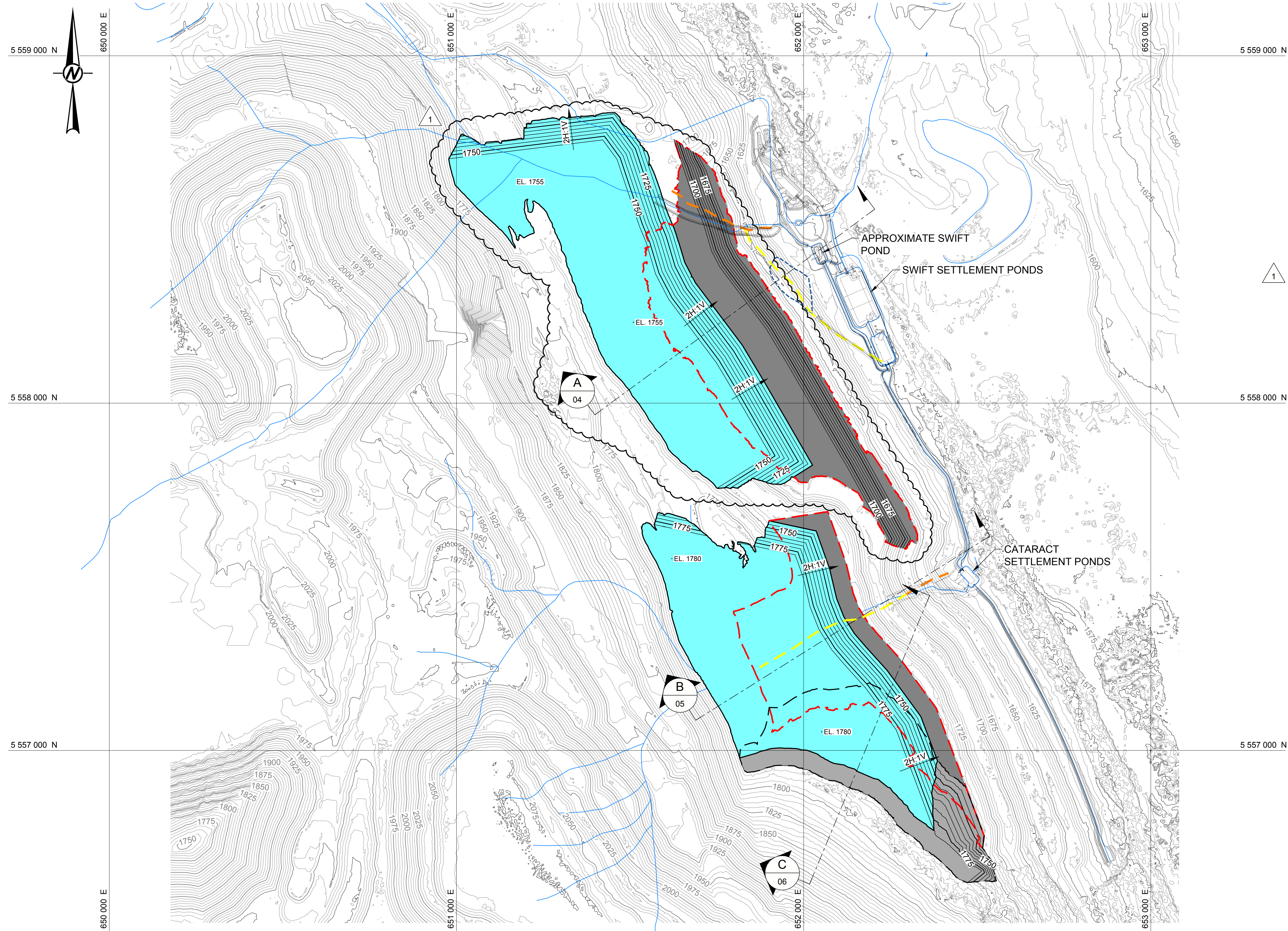
25 mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D







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**LEGEND**

- EXISTING GROUND CONTOURS (SEE REFERENCE 1)
- PROPOSED CO-MANAGEMENT FACILITIES CONTOURS
- WATER MANAGEMENT (SEE REFERENCE 4)
- NATURAL WATERCOURSE ROCK DRAINS (APPROXIMATE) (SEE REFERENCE 5)
- ENGINEERED STRUCTURE ROCK DRAINS (APPROXIMATE) (SEE REFERENCE 5)
- 1710 m AND 1740 m CONSTRUCTION PLATFORMS (SEE REFERENCE 2 AND 3)
- CO-MANAGEMENT FACILITIES - 1755 m LIFT AND 1740 m LIFT
- WASTE ROCK OFFSET FROM ORIGINAL GROUND

- NOTES**
- ALL UNITS ARE SHOWN IN METRES UNLESS NOTED OTHERWISE.
  - COORDINATES ARE IN NAD83 UTM ZONE 11, ELEVATIONS ARE REFERENCED TO THE ELK VALLEY ELEVATION DATUM.
  - CONTOUR INTERVALS ARE 5 m MINOR INTERVALS AND 25 m MAJOR INTERVALS.

- REFERENCES**
- 2021 APRIL TOPOGRAPHY PROVIDED BY TECK COAL LIMITED, FORDING RIVER OPERATIONS, RECEIVED: 28 APRIL 2021, FILE NAME: "210423 TOPO.dxf".
  - SPOIL LIFT (1710 m) BASED OFF OF THE ULTIMATE SOUTH SPOIL FINAL DESIGN PROVIDED BY TECK COAL LIMITED, FORDING RIVER OPERATIONS, RECEIVED: 27 APRIL 2021, FILE NAME: "SETSTH\_01Dec20\_Final SURF.dxf".
  - SPOIL LIFT (1740 m) PROVIDED BY TECK COAL LIMITED, FORDING RIVER OPERATIONS, RECEIVED: 08 JANUARY 2021, FILE NAME: "SWF S 1740 Interim RevC (LINES).dxf".
  - WATER MANAGEMENT FEATURES PROVIDED BY TECK COAL LIMITED, FORDING RIVER OPERATIONS, RECEIVED: 28 JANUARY 2021, FILE NAME: "WMIlines\_012020.DXF".
  - ENGINEERED STRUCTURE ROCK DRAINS AND NATURAL WATERCOURSE ROCK DRAINS DIGITIZED FROM FIGURE SWIFT NORTH ENGINEERED STRUCTURE & NATURAL WATERCOURSE ROCK DRAIN LOCATIONS PROVIDED BY TECK, RECEIVED: NOVEMBER 20, 2020.

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0 200 400  
1:6,000 METRES

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SOUTH SPOILS CO-MANAGEMENT FACILITIES  
DETAILED DESIGN DRAWINGS

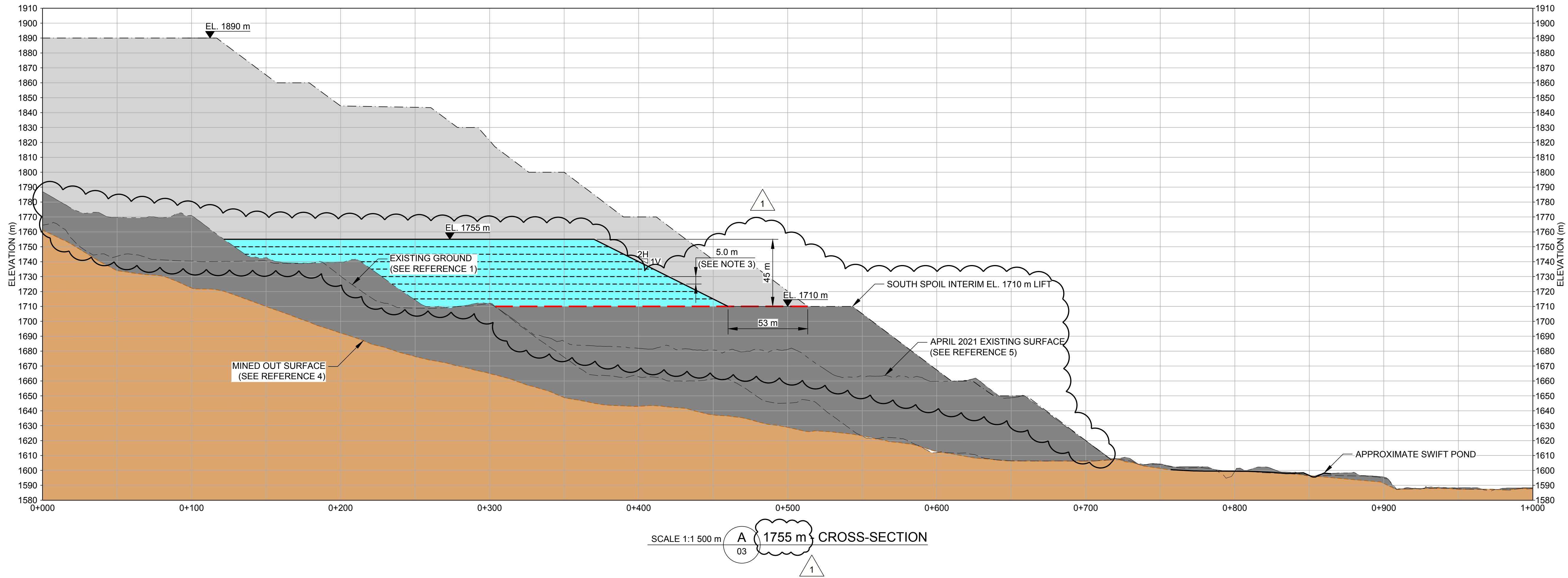
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**APPROVED AREA FOR CO-MANAGEMENT FACILITIES  
CONSTRUCTION**

PROJECT NO.	PHASE/TASK/DOC.	REV.	03 of 06	DRAWING
19127181	8100/8107/2021-028	1		<b>03</b>

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LEGEND

- EXISTING GROUND (SEE REFERENCE 1)
- APRIL 2021 EXISTING SURFACE (SEE REFERENCE 5)
- 1710 m CONSTRUCTION PLATFORM (SEE REFERENCE 2)
- ULTIMATE SOUTH SPOILS FINAL DESIGN (SEE REFERENCE 3)
- MINED OUT SURFACE (SEE REFERENCE 4)
- NATURAL GROUND
- FUTURE WASTE ROCK TO BE PLACED
- EXISTING WASTE ROCK
- CO-MANAGEMENT FACILITY (1755 m)

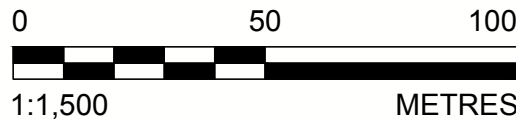
NOTES

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- 5 m TYPICAL. INCREASED LIFT THICKNESSES OF UP TO 15 m MAY BE ALLOWABLE PENDING DISCUSSION WITH AND APPROVAL BY EOR.

REFERENCES

- 2020 TOPOGRAPHY PROVIDED BY TECK COAL LIMITED, FORDING RIVER OPERATIONS, FLOWN: 15-26 JULY 2020, RECEIVED: 01 DECEMBER 2020.
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- 2021 APRIL TOPOGRAPHY PROVIDED BY TECK COAL LIMITED, FORDING RIVER OPERATIONS, RECEIVED: 28 APRIL 2021, FILENAME: "210423 TOPO.dxf".

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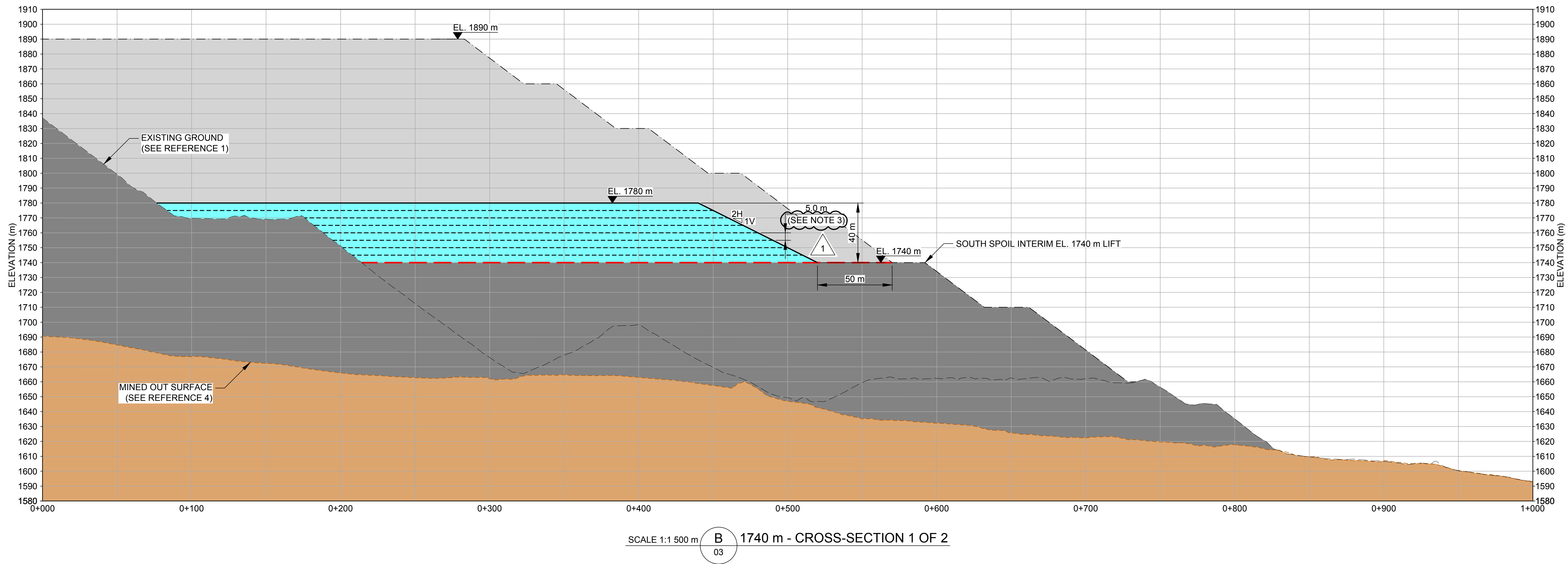
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SOUTH SPOILS CO-MANAGEMENT FACILITIES  
DETAILED DESIGN DRAWINGS

TITLE  
SOUTH SPOIL - CO-MANAGEMENT FACILITIES  
CROSS-SECTIONS (1 OF 3)

PROJECT NO.	PHASE/TASK/DOC.	REV.	04 of 06	DRAWING
19127181	8100/8107/2021-028	1		04

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LEGEND

- EXISTING GROUND (SEE REFERENCE 1)
- 1740 m CONSTRUCTION PLATFORM (SEE REFERENCE 2)
- ULTIMATE SOUTH SPOILS FINAL DESIGN (SEE REFERENCE 3)
- MINED OUT SURFACE (SEE REFERENCE 4)
- NATURAL GROUND
- FUTURE WASTE ROCK TO BE PLACED
- EXISTING WASTE ROCK
- CO-MANAGEMENT FACILITY - 1740 m

NOTES

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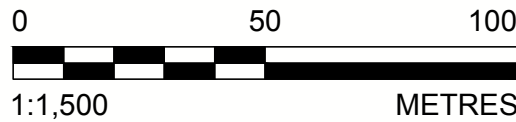
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PROJECT  
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SOUTH SPOILS CO-MANAGEMENT FACILITIES  
DETAILED DESIGN DRAWINGS

TITLE  
SOUTH SPOIL - CO-MANAGEMENT FACILITIES  
CROSS-SECTIONS (2 OF 3)

PROJECT NO. 19127181 PHASE/TASK/DOC. 8100/8107/2021-028 REV. 1 05 of 06 DRAWING 05

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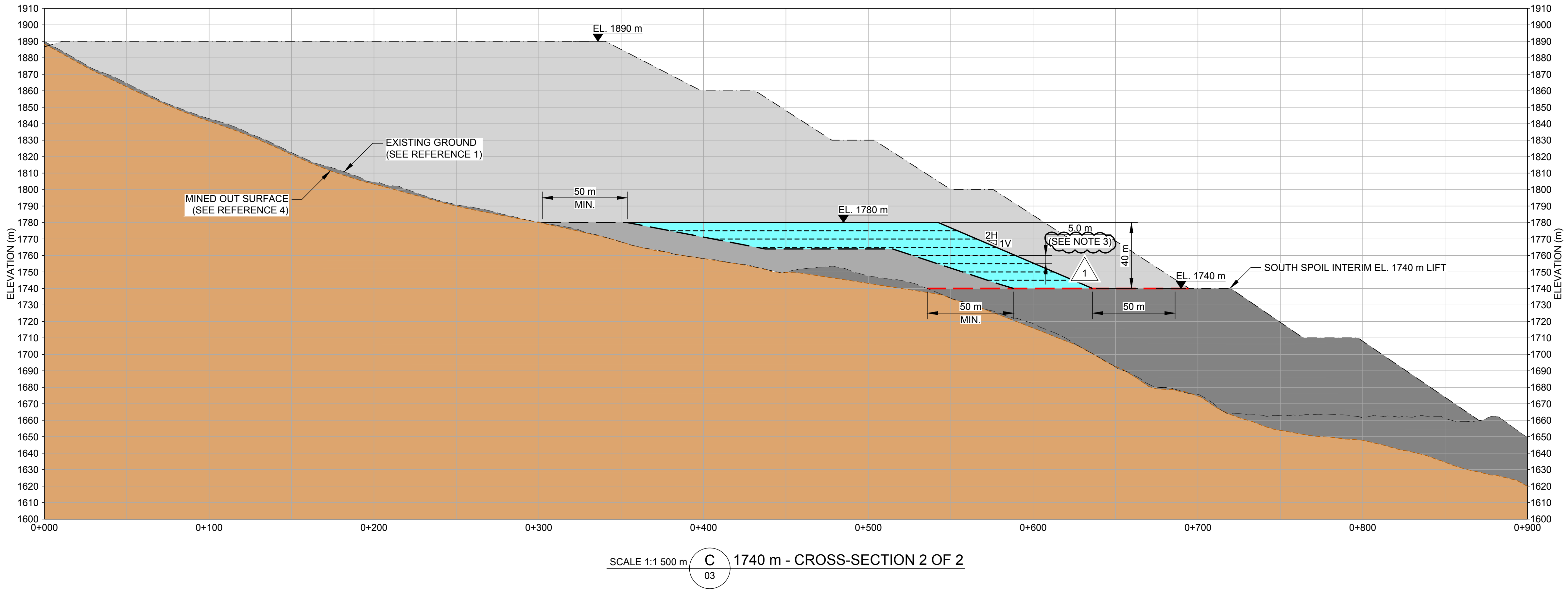


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SCALE 1:1 500 m **C** 1740 m - CROSS-SECTION 2 OF 2  
03

LEGEND

- EXISTING GROUND (SEE REFERENCE 1)
- - - 1740 m CONSTRUCTION PLATFORM (SEE REFERENCE 2)
- . - . - . ULTIMATE SOUTH SPOILS FINAL DESIGN (SEE REFERENCE 3)
- - - - - MINED OUT SURFACE (SEE REFERENCE 4)
- NATURAL GROUND
- FUTURE WASTE ROCK TO BE PLACED
- WASTE ROCK OFFSET FROM ORIGINAL GROUND
- EXISTING WASTE ROCK
- CO-MANAGEMENT FACILITY - 1740 m

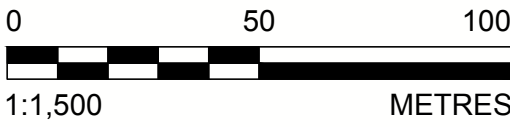
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SOUTH SPOILS CO-MANAGEMENT FACILITIES  
DETAILED DESIGN DRAWINGS

TITLE  
**SOUTH SPOIL - CO-MANAGEMENT FACILITIES  
CROSS-SECTIONS (3 OF 3)**

1	2021-06-11	ISSUED FOR CONSTRUCTION	S.B.	J.S.H.	N.E.C.	J.M.S.
0	2021-04-12	ISSUED FOR CONSTRUCTION	S.B.	T.A.K.	S.B.	J.M.S.
REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED

PROJECT NO.	PHASE/TASK/DOC.	REV.	06 of 06	DRAWING
19127181	8100/8107/2021-028	1		<b>06</b>

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