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**REPORT**

# 2021 Annual Facility Performance Report for 2 Pit and 3 Pit Tailings Storage Area

*Teck Coal Limited, Fording River Operations*

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# Distribution List

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# Executive Summary

This report presents the 2021 annual facility performance report (AFPR) for the 2 Pit and 3 Pit Tailings Storage Area (2P-3P TSA) at the Teck Coal Limited, Fording River Operations (FRO) mine site, located near Elkford, British Columbia. The reporting period for the data review is from 1 September 2020 through 31 August 2021, unless otherwise noted.

## Annual Inspection Performance Summary

Based on the visual observations during the 25 May 2021 site visit, the 2P-3P facility appeared safe with no deficiencies requiring immediate actions.

## Summary of Facility Description

The 2P-3P TSA includes the tailings storage portion and an in-pit pond (Shandley Pit) within the previously mined-out area on the west side of the FRO site. The mined-out area includes 2 Pit, 3 Pit, and Shandley Pit.

Tailings from the North Tailings Pond and South Tailings Pond were dredged seasonally then deposited into the 2P-3P TSA over a number of years between 1995 and 2015. Tailings discharged into this area have filled the open space of 2 Pit and 3 Pit, as well as voids in the waste rock both within the pits and to the east of the 2 Pit and 3 Pit areas. The lower portions of the tailings are contained within the pits, while the upper portions of the tailings are contained to the west by the highwall and to the east, south, and north by waste rock. While the majority of the tailings are impounded by the waste rock, a portion of the tailings has migrated conically within the voids of the waste rock and is contained within the waste rock. FRO does not plan to resume deposition of dredged tailings into the 2P-3P TSA.

The waste rock spoils and the 3PS Embankment along the east side therefore act as a dam to prevent the uncontrolled flow of tailings slurry from reaching downstream receivers, namely the Fording River and the North Tailings Pond.

No dredged tailings have been deposited in the 2P-3P TSA since 2015, and the water level within the 3PN tailings deposit has continued to drain down as a result of mining in Swift Pit and dewatering from Shandley Pit. FRO began mining out tailings from 3PN in 2021.

## Summary of Key Hazards

Based on a screening level assessment, there is no credible catastrophic failure mode for this TSA. The only potential credible failure mode for the 2P-3P TSA is instability (both static and seismic). A stability assessment for the 2P-3P TSA confirmed stability requirements are meeting the design criteria (Golder 2017b). With no plans to resume deposition of dredged tailings into the 2P-3P TSA, this potential credible failure mode is considered to be minimal.

The hazards and credible failure modes for the 2P-3P TSA are to be reviewed and revised as necessary, considering the mining plans to remove the tailings from the TSA as part of Swift Pit mining.

## Consequence of Failure

The 2P-3P TSA consequence of failure is Low, considering the guidelines for consequence classification in Section 3.4 of the HSRC Guidance Document (Ministry of Energy and Mines 2016). As detailed in Section 5.3 of this report, this classification approach is not aligned with Teck's approach to safety. The 2P-3P TSA design has met or exceeded the requirements for such classification.

## Summary of Significant Changes, Changes to Instrumentation, Stability, and Surface Water Control

There were no significant changes in visual monitoring records, embankment stability, or surface water control for 2P and 3PS since the 2020 annual inspection for this facility. Throughout the reporting period, tailings from 3PN and waste rock in the 3 Pit Causeway were excavated and transported to co-management facilities within the existing Swift South Spoils. The 3PN embankment has been removed as part of the 2021 Swift Pit mining and 3PN tailings removal activities. The integrity of the TSA and containment of the tailings has not been affected, remains stable and is behaving as expected. FRO is preparing plans to mine out the tailings in 2P, 3PN, 3PS, and Shandley Pit to facilitate the continued advancement of Swift Pit mining.

Excavation of the 3 Pit Causeway spoil began in Q4 of 2020 as part of the beginning of Swift Phase 1 mining activities. FRO completed a physical stability assessment of the Causeway to confirm physical stability throughout and at the end of excavation (FRO 2021).

Dewatering of the Shandley Pit pond to support excavation of tailings and for Swift Pit mining was carried out in 2021.

## Operation, Maintenance, and Surveillance Manual

FRO last completed an update of the operation, maintenance, and surveillance (OMS) manual for the 2P-3P TSA on 27 May 2020 (FRO 2020a). A review of this version of the OMS manual was completed by Golder as part of this AFPR. An update to the OMS manual is currently in progress.

## Emergency Response and Preparedness Plans

FRO last completed an update of the emergency response plan (ERP) for the tailings facilities at FRO in May 2020 (EP.009.R1; FRO 2020b).

The current emergency preparedness plan for tailings facilities is EP.008.R2 dated 25 May 2020 (FRO 2020c).

FRO completed an internal tabletop ERP testing exercise on 14 May 2021. Mr. John Cunning and Ms. Clara Lee of Golder participated in the 2021 testing of the ERP.

## Dam Safety Review

A dam safety review was completed in 2019 by a third-party consultant (SNC-Lavalin 2020). The dam safety review did not identify any issues of concern associated with the 2P-3P TSA.

Assuming the facility remains a regulated tailings facility, the next DSR should be initiated in 2024 based on the current regulatory requirements.

## Status of Previous and New Recommended Actions

There are no outstanding recommendations from the 2020 annual report and no new recommended actions from the 2021 AFPR.

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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 report (AFPR) for the 2 Pit and 3 Pit Tailings Storage Area (2P-3P TSA) at the Teck Coal Limited, Fording River Operations (FRO) site, located near Elkford, BC. The reporting period for the data review is from 1 September 2020 through 31 August 2021, unless otherwise noted.

Annual reporting for the 2P-3P TSA was started in 2014 by FRO (2015a) and has continued since 2015 by Golder. The 2021 AFPR was prepared based on a site visit carried out by Golder on 25 May 2021, discussions with FRO staff, and a review of data from FRO. This report presents the following and was prepared with consideration of the Teck Resources Limited *Guideline for Tailings and Water Retaining Structures* (Teck 2019):

- A summary of the site conditions and background information for the facility.
- A summary of the construction, operating, and/or maintenance activities for the reporting period.
- Dam consequence of failure classification and review of required documentation.
- Site photographs and records of facility inspection.
- Review of potential hazards and failure modes, design basis, and facility performance.
- Recommended actions.

Photographs of the 2P-3P TSA from the site inspection are presented in Appendix A, and a summary of the observations for the 3 Pit South (3PS) embankment is included in the inspection report in Appendix B.

FRO switched coordinate systems on 25 October 2016 from FRO Mine Grid to Universal Transverse Mercator (UTM) with elevations referenced to the Elk Valley Elevation Datum. All coordinates presented in this report are in UTM with elevations referenced to the Elk Valley Elevation Datum unless otherwise noted.

The previous annual inspection for this facility was carried out in August 2020 and is reported in the 2020 annual report (Golder 2021a).

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

## 1.2 Regulatory Requirements

### 1.2.1 BC Health, Safety and Reclamation Code

This AFPR was prepared in accordance with Part 10.5.3 of the Health, Safety and Reclamation Code (HSRC) for Mines in British Columbia (EMLI 2021), which sets out the frequency for inspection of tailings storage facilities and associated dams. It is understood that this report will be submitted by FRO to the Chief Inspector of Mines.

The guidelines for annual 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.

### 1.2.2 Permits and Licences

Specific sections and amendments to the permits concerning the 2P-3P TSA are as follows:

- Permit C-3 Amendment to permit approving work system – South Tailings Pond Tailings Dredging Project. Issued by the Ministry of Energy, Mines and Petroleum Resources. 27 April 1995.

# 2.0 BACKGROUND

## 2.1 Fording River Operations Tailings Storage

The FRO site is an open pit coal mine located near Elkford, BC, which currently has two tailings pond facilities on site along the Fording River: the North Tailings Pond (NTP) and South Tailings Pond (STP). FRO currently has two permitted destinations for in-pit tailings storage: the 2P-3P TSA and the Turnbull Tailings Storage Facility. These pits, combined with their associated ponds, pumps, and pipeline infrastructure, constitute the in-pit tailings management systems that are in place at FRO. The Turnbull Tailings Storage Facility is the only active in-pit tailings facility at this time; dredging operations to the 2P-3P TSA ceased in October 2015. FRO continues to deposit tailings into the STP and since 2016 has transferred tailings from the STP to the Turnbull Tailings Storage Facility via dredging operations.

There are currently no plans to return to discharging dredged tailings to the inactive 2P-3P TSA. The three pits and surrounding spoils that form the 2P-3P TSA are part of previous mining developments located on the west side of the Fording River, in an area now known as Swift. Starting in 2020, as part of the current Swift Pit mine plan, FRO removed waste rock from the 3 Pit North (3PN) area and in 2021 began removing tailings (sub-aerial tailings) and in situ blended waste rock and tailings (sub-terrestrial tailings) from 3PN area, which are currently being transported to co-management facilities within the existing Swift South Spoils. The site plan is shown in Figure 1 and the general arrangement of the pits is shown in Figure 2 and Figure 3.

Shandley Pit is located at the north end of the 2P-3P TSA and is hydraulically connected to the 2P-3P TSA.

The 2P-3P TSA is composed of tailings that have been deposited into mined-out pits surrounded by waste rock spoils on the east and highwalls and in-pit spoils on the west.

## 2.2 Overview of Design, Construction, and Previous Operation

### 2.2.1 Description of Tailings Facility

The 2P-3P TSA includes the tailings storage portion and an in-pit pond (Shandley Pit) within the previously mined-out area on the west side of the FRO site. The mined-out area includes 2 Pit, 3 Pit, and Shandley Pit.

Prior to about 1995, mining of the north–south striking coal seams in the 2 Pit and 3 Pit areas resulted in a bedrock highwall on the west side and waste rock spoils around the mined-out pits on the east side. An access road constructed of waste rock spoil, the 3 Pit causeway, was advanced through 3 Pit and separated the area into 3PS and 3PN. Tailings and water flowed through the voids of the waste rock in the 3 Pit causeway from 3PS to 3PN. Mining of pits higher in elevation above the 2 Pit, 3 Pit, and Shandley Pit areas resulted in some waste rock spoils being placed over the west highwall of these pits. As part of Swift Phase 1 mining, tailings within 3PN and part of the 3 Pit causeway adjacent to 3PN are being excavated, with the intent of removing all tailings from 3PN to allow for continued mining in this area.

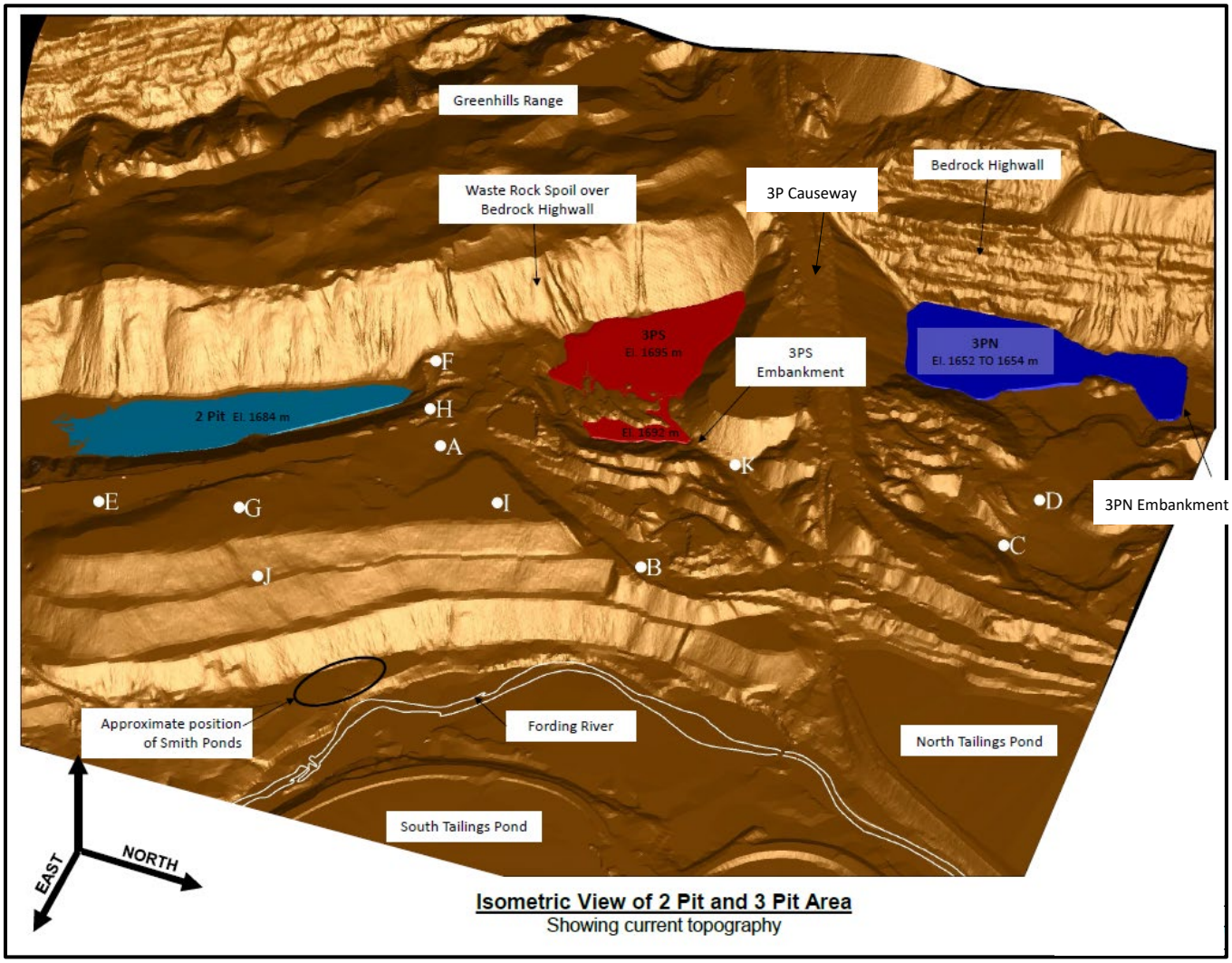
Dredged tailings were deposited into either 2 Pit or 3PS seasonally over a number of years between 1995 and 2015. During active dredging discharge, the excess dredge tailings slurry water flows south to north from the discharge location and reports to Shandley Pit. In 2005, dredging to 2 Pit was discontinued due to tailings migration from 2 Pit to the Smith Ponds. Dredging discharge continued to 3PS until 2015. The tailings deposit in 3PN is due to tailings migration from dredging discharge to 3PS, as planned.

Tailings discharged into the 2 Pit and 3 Pit areas have filled the remaining open space of 2 Pit and 3 Pit, as well as voids in the waste rock spoils both within the pits and to the east of the 2 Pit and 3 Pit areas. The lower portions of the tailings are contained within the pits, while the upper portions of the tailings are contained on the west by the highwall and on the east, south, and north by waste rock within the waste rock spoils. While the majority of the tailings are impounded by the waste rock spoils, a portion of the tailings has migrated conically within the voids of the waste rock (also referred to as sub-terrestrial tailings). Within the waste rock spoils, the in situ blended waste rock and tailings are less hydraulically conductive than the waste rock with open void space.

The 2 Pit and 3 Pit portion of the facility can be described in two parts, based on elevation and confinement of tailings:

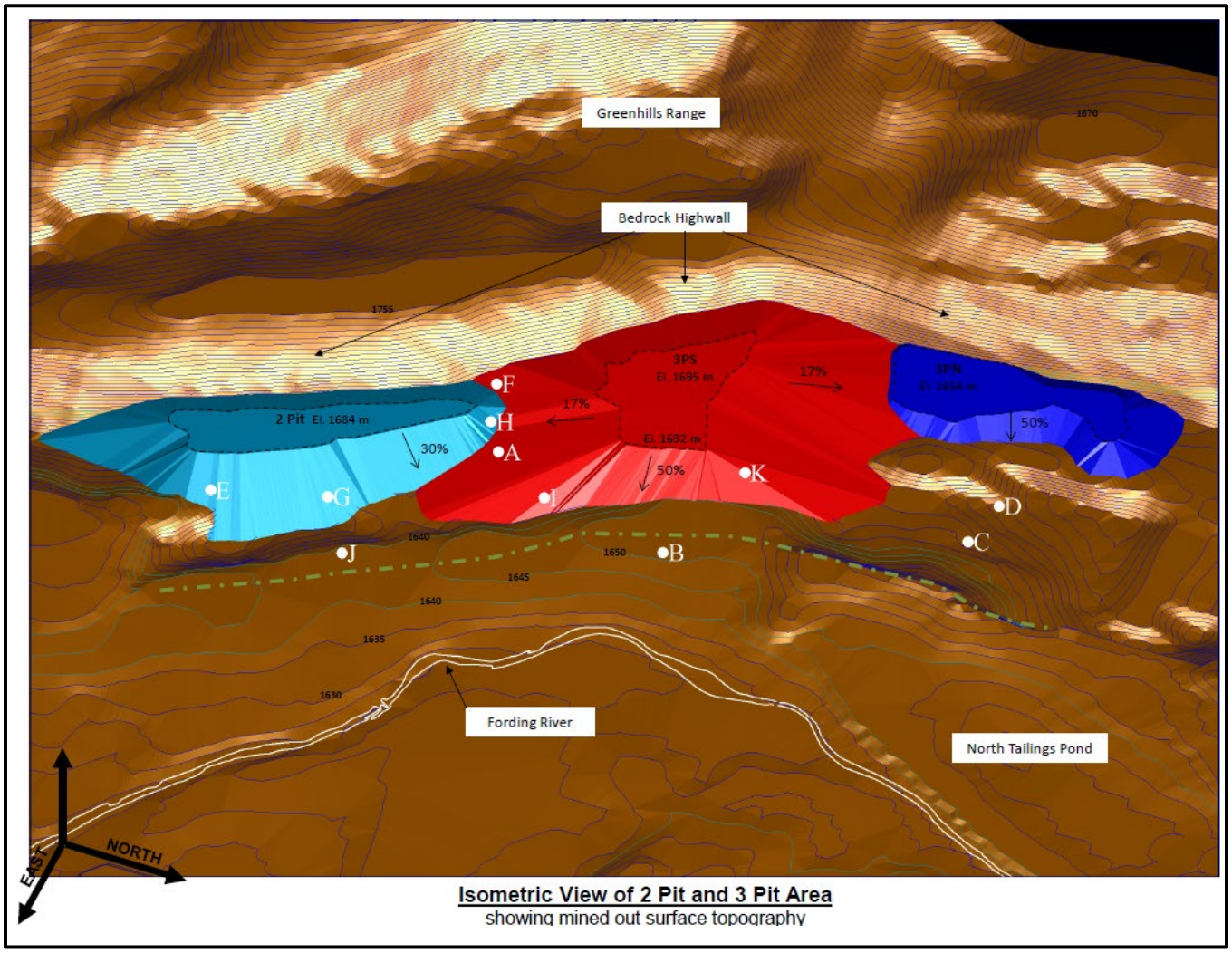
- The lower portion is an in-pit tailings facility. The walls of the mined-out pits act as in situ pillars that contain tailings, waste rock, in situ blended waste rock and tailings, water within the tailings void spaces, and ponded water in Shandley Pit. Tailings within the lower portion are assumed to be saturated. The lower portion is located below the low point elevation in the bedrock ridge to the east of the facility (approximate elev. 1,645 m; low point near 2 Pit).
- The upper portion of the facility is composed of stacked tailings (referred to as “dry stack” in the HSRC). Tailings within the upper portion are expected to be unsaturated; however, recent sampling of these materials has indicated zones of tailings with high moisture content (Golder 2020a,b). The spread of the stacked tailings to the west is prevented by the highwall of the mined-out pits and limited to the east, north, and south by waste rock spoils, where the spoils along the east side act as retention embankments. During active dredging, tailings can migrate through the waste rock voids, but the spread of the tailings is slowed by the conductivity of the waste rock, resulting in a truncated cone deposit of tailings within the waste rock voids (i.e., in situ blended waste rock and tailings). When active dredging deposition is not occurring, the tailings migration through the voids stops.

Illustrations 1 and 2 show the tailings deposition with and without the waste rock to demonstrate the truncated cone deposition and interaction with the mined-out surface. Note that the tailings elevations shown reflect the understood conditions in 2014, prior to additional dredging to 3PS in 2015 and removal of tailings and waste rock from 3PN in 2021.




Note: Dated 2014; elevations are in FRO (Fording River Operations) Mine Grid.

**Illustration 1: Isometric View of 2 Pit and 3 Pit Area Showing Tailings (in Light Blue, Red, and Blue), Topography (in Brown), and Monitoring Wells A to K (Not Monitored Since 2015 due to Cease in 2P-3P Dredging Operations), Prior to Swift Phase 1 Mining Activities**




Note: Dated 2014; elevations are in FRO Mine Grid. Approximate bedrock ridge crest is shown in green dashed line. The waste rock dumps shown in Illustration 1 have been removed from this illustration to show the mined-out surface.

**Illustration 2: Isometric View of 2 Pit and 3 Pit Showing Tailings (in Light Blue, Red, and Blue) and Monitoring Wells A to K (Not Monitored Since 2015) over Mined-out Surface, Prior to Swift Phase 1 Mining Activities**

### 2.2.2 Dam Safety Review

A dam safety review (DSR) was conducted for the 2P-3P TSA by a third-party consultant in 2019 (SNC-Lavalin 2020). The DSR did not identify any issues associated with the physical integrity of 2P-3P TSA which coincides with Golder's own conclusions in more detailed work.

### 2.2.3 Description of Water Flow

During active dredging, subsurface water flow through the 2P-3P TSA is understood to be from south to north but is expected to be controlled and altered by the in situ blended waste rock and tailings surfaces within the waste rock.

When active dredging is not occurring, water drains through the tailings deposit down to an elevation controlled by the local groundwater table. Surface water is observed to rapidly infiltrate both the waste rock and tailings surface. Surface water is not observed to collect in either 2 Pit or 3 Pit under non-dredging conditions.

Shandley Pit has the lowest mined-out elevation in the TSA and currently contains an in-pit pond. As part of dewatering for mining of the Swift project, FRO pumps water from the Shandley Pit pond to the Liverpool Water Management Facility and to the STP as makeup water for the plant when needed. Lowering the Shandley Pit pond elevation will have a drawdown effect on the groundwater table in the area.

### 2.2.4 Historical Operations

The history of dredging from the STP and NTP to the 2P-3P TSA is summarized in Table 1.

**Table 1: History of Dredging to 2 Pit and 3 Pit**

| Year | Dry Metric Tonnes | From | To | Reference |
|---|---|---|---|---|
| 1995 | 226,484 | STP | 2 Pit | FCL 1995 |
| 1996 | 567,241 | STP | 2 Pit | FCL 1997 |
| 1997 | 725,135 | STP | 2 Pit | FCL 1998 |
| 1998 | 964,994 | STP | 2 Pit | FCL 1999 |
| 1999 | 0 | n/a | n/a | n/a |
| 2000 | 691,552 | STP | 3PS | FCL 2001 |
| 2001 | 893,119 | NTP | 3PS | FCL 2002 |
| 2002 | 827,068 | NTP | 2 Pit | FCL 2003 |
| 2003 | 994,748 | STP | 2 Pit | Muller 2011, pers. comm. |
| 2004 | 81,630 | STP | 2 Pit | FCL 2006a |
| 2005 | 0 | n/a | n/a | FCL 2006b |
| 2006 | 0 | n/a | n/a | n/a |
| 2007 | 930,082 | STP | 3PS | FCL 2008 |
| 2008 | 934,405 | STP | 3PS | Muller 2011, pers. comm. |
| 2009 | 0 | n/a | n/a | n/a |
| 2010 | 0 | n/a | n/a | n/a |
| 2011 | 0 | n/a | n/a | n/a |
| 2012 | 0 | n/a | n/a | n/a |
| 2013 | 0 | n/a | n/a | n/a |
| 2014 | 542,500 | STP | 3PS | FRO 2015a |
| 2015 | 451,302 | STP | 3PS | FRO 2015b |
| **TOTAL Dry Metric Tonnes** | **8,830,260** | | | |

STP = South Tailings Pond; NTP = North Tailings Pond; n/a = not applicable; 3PS = 3 Pit South.

### 2.2.5 Design and Construction of 2 Pit and 3 Pit Tailings Storage Area Components

#### *2.2.5.1 Pits and Waste Rock Spoils*

The development of 2 Pit, 3 Pit, and Shandley Pit is a result of mining the north–south striking coal seams within this area in the 1980s. At the time, the pits were referred to as the Greenhills K seam pit or the Greenhills K-Pit (Golder 1981).

The pits were excavated down into bedrock, which resulted in a bedrock highwall on the west side and a bedrock ridge on the east side separating the mined-out pits from the Fording River. The approximate crest of the bedrock ridge from the mined-out surface is shown in Figure 3. Waste rock spoils are located within and along the east side of the pits and cover some areas of the highwall. The spoils along the east side provide partial containment of the tailings above the bedrock ridge, although tailings migration into the void space of the waste rock occurred. The waste rock spoils were not designed and constructed for the containment of tailings. The footwalls of the pits are located beneath the waste rock spoils and provide containment for a large portion of the in situ blended waste rock and tailings within the pit.

The mined-out surface was surveyed and is assumed to represent the approximate bedrock surface. In 2008, FRO provided the mined-out surface in the file “Mout contours GH.dxf,” which is shown in Figure 4.

The 3 Pit causeway is constructed of waste rock spoil; water and tailings were known to flow through the structure from 3PS to 3PN. This was acceptable and consistent with expectations for the facility.

#### 2.2.5.2 3 Pit North Embankment

FRO constructed the 3PN Embankment in 2008 to a height of 2 m at centreline, elev. 1,653.4 m (reported as elev. 1,653.9 m FRO Mine Grid in FRO 2014a), and in 2014 raised it by about 4 m at centreline to crest elev. 1,657.2 m (reported as elev. 1,657.7 m FRO Mine Grid in FRO 2014b) based on designs provided by Golder (2008, 2014).

The 3PN Embankment was an internal filtering berm, not a retention embankment. It separated 3PN on its upstream side from Shandley Pit on its downstream side. The 3PN embankment has been removed as part of the 2021 Swift Pit mining and 3PN tailings removal. As a result of mining activities within the Swift Pit, the former 3PN embankment is no longer a part of this inspection.

#### 2.2.5.3 3 Pit South Embankment

The 3PS Embankment was constructed in 2008 to a height of approximately 4 m (elev. 1,695.7 m) and a length of about 30 m across a low point between two areas of waste rock spoils located on the northeast corner of 3PS. The 2008 construction was completed by FRO personnel (FRO 2014a).

The foundation under the 3PS Embankment consists of in situ blended waste rock and tailings overlying bedrock (Golder 2017b). Based on the 3PS mined-out surface in Figure 4, the top of bedrock is at elev. 1,610 to 1,625 m in the area of the embankment.

Seepage through the existing waste rock spoils around and below the 3PS Embankment as a result of the discharge of dredged tailings to 3PS was expected to continue to occur due to the expected high hydraulic conductivity of the adjacent waste spoils. Material for the construction of the 3PS Embankment was therefore not required to meet any low permeability requirements (Golder 2008). Potential seepage from the 3PS Embankment is directed to the NTP.

The 3PS Embankment was last raised in 2015 (Golder 2015a,b) to approximately crest elev. 1,697.5 m so that the recommended minimum 0.5 m freeboard would be maintained between the top of the 3PS Embankment and the tailings elevation at the upstream toe of the 3PS Embankment (Golder 2014).

Table 2 summarizes the design geometry for the 3PS Embankment. A section of the 3PS Embankment is shown in Figure 5.

**Table 2: 3 Pit South Embankment Geometry**

| Item | Design Value |
|---|---|
| Upstream slope | 1.5H:1V |
| Crest width | 6.0 m |
| Maximum height | 5.8 m |
| Crest elevation (minimum) | 1,697.25 m |
| Downstream slope | 1.5H:1V |
| Length | ~30 m |

Note: Elevations reported in Elk Valley Elevation Datum.

FRO = Fording River Operations.

#### *2.2.5.4 Historical Instrumentation*

The historical instrumentation in the TSA was focused on tracking groundwater elevations and tailings migration through the waste rock during active discharge of dredged tailings into the 2P-3P TSA. The last monitoring well readings were taken in October 2015. No new monitoring well data have been recorded since there has been no active dredging to the 2P-3P TSA since October 2015.

Ten standpipe monitoring wells, marked A through J, were installed within the waste rock spoils to the east of the 2P-3P TSA between November 2001 and May 2004, and one additional monitoring well (K) was installed in 2014. Most of the monitoring wells extend into the underlying bedrock. Monitoring well locations are shown in Figure 3.

It was observed during the 2019 site inspection that monitoring well K was buried by materials stockpiled by FRO downstream of the 3PS Embankment. This instrument does not require replacement as no dredging is occurring or planned to occur. The remaining 10 monitoring wells should be protected so they will be available if dredging resumes. However, FRO does not report any proposed future dredging to the 2P-3P TSA.

### 2.2.6 Site Seismicity

The site is located in an area of relatively low seismicity in 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 the site-specific hazard model are listed in Table 3. 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) as this represents Golder's understanding of the general foundation conditions at the embankment locations.

**Table 3: 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 |

Notes:

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 (CDA 2013, 2019) is shown.

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

HSRC Section 10.1.8 (EMLI 2021) recommends a seismic event with a return period of 1 in 2,475 years as the minimum seismic design criteria.

## 2.3 Key Personnel

The Engineer of Record (EoR) for the 2P-3P TSA is John Cunning, P.Eng., an employee of Golder Associates Ltd.

The Responsible Tailings Facility Engineer (RTFE) for the 2P-3P TSA is James Campbell, P.Eng., Senior Tailings Engineer, who is an employee of Teck. Mr. James Campbell became the RTFE for the 2P-3P TSA on 4 May 2021.

The EoR and RTFE roles are carried out in accordance with the expectations of the Global Industry Standard on Tailings Management (GISTM, GTR 2020).

## 2.4 Quantifiable Performance Objectives

Quantifiable performance objectives (QPOs) have been established with consideration of the relative risk of the credible failure modes for the facility. Monthly visual inspections are considered adequate to monitor facility conditions, including perimeter slopes and monitoring for any ponded water on tailings surfaces. This is based on the drained condition of the tailings surface and on the flood routing and flood capacity assessment presented in Golder (2017a). FRO has established QPOs for the piezometers installed in the 3 Pit Causeway which are monitored as part of Swift Pit mining activities.

For the 2P-3P TSA, QPOs are required during active dredging to monitor tailings migration and deposition. These QPOs are included in the current operation, maintenance, and surveillance (OMS) manual (FRO 2020a) and would only be required to be followed during active dredging.

# 3.0 OPERATIONS AND CONSTRUCTION DURING THE 2020/2021 REPORTING PERIOD

The 2P-3P TSA was inspected by qualified FRO tailings personnel once per month during the reporting period. The EoR has reviewed the FRO personnel inspection reports as part of this annual review.

No dredged tailings were deposited in the 2P-3P TSA during the reporting period. There was no required maintenance at the 2P-3P TSA over the reporting period.

## 3.1 Excavation of 3 Pit Causeway and Supporting Investigation

Excavation of the 3 Pit Causeway spoil began in Q4 of 2020 as part of Swift Phase 1 mining activities. FRO completed a geotechnical stability assessment of the Causeway to confirm geotechnical stability throughout and at the end of excavation (FRO 2021). To support this stability analysis, three reverse circulation drillholes (PZF21-01, PZF21-09, and PZF21-10) were completed on the 3 Pit Causeway with two sets of nested VW piezometers installed in drillholes PZF21-01 and PZF21-10. The piezometer at PZF21-09 was damaged during installation and rendered inoperable. The 2021 borehole locations are shown in Figure 3. The stability assessment has been updated throughout excavation by FRO to confirm mining excavations at Swift Pit could safely continue. The minimum factors of safety were maintained throughout excavation. The drilling results and stability assessment were reviewed with the EoR. The FRO geotechnical team has a monitoring plan in place for 3 Pit Causeway to support Swift Pit mining activities in this area.

## 3.2 Excavation of 3 Pit North Tailings

Beginning in April 2021, FRO began mining excavations to remove tailings and in situ blended waste rock and tailings from 3PN. Excavated tailings and in situ blended waste rock and tailings are currently being transported to co-management facilities within the existing Swift South Spoils (Golder 2021b). As a result of the mining activities, the 3PN embankment was removed and its previous location is now an active haul road. Thereby, the 3PN embankment is no longer a part of the 2P-3P AFPR.

FRO carried out 16 CPTs at 3PN in October 2020 and an additional 7 CPTs in May 2021 within the 3PN tailings deposit to support the 3PN tailings removal project (ConeTec 2020, 2021). Golder prepared an updated bearing capacity assessment for 3PN tailings considering the additional 2020 and 2021 CPT data (Golder 2021c). FRO mine planners coordinated with the EoR team on safe work procedures throughout the reporting period around excavation of tailings from 3PN. By November 2021, FRO had safely excavated and transported approximately one million tonnes of tailings to the co-management facilities within the Swift South Spoils.

# 4.0 REVIEW OF CLIMATE DATA AND WATER BALANCE

## 4.1 Climatic Review

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 of 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 4: Total Precipitation from 1 September 2020 to 31 August 2021**

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

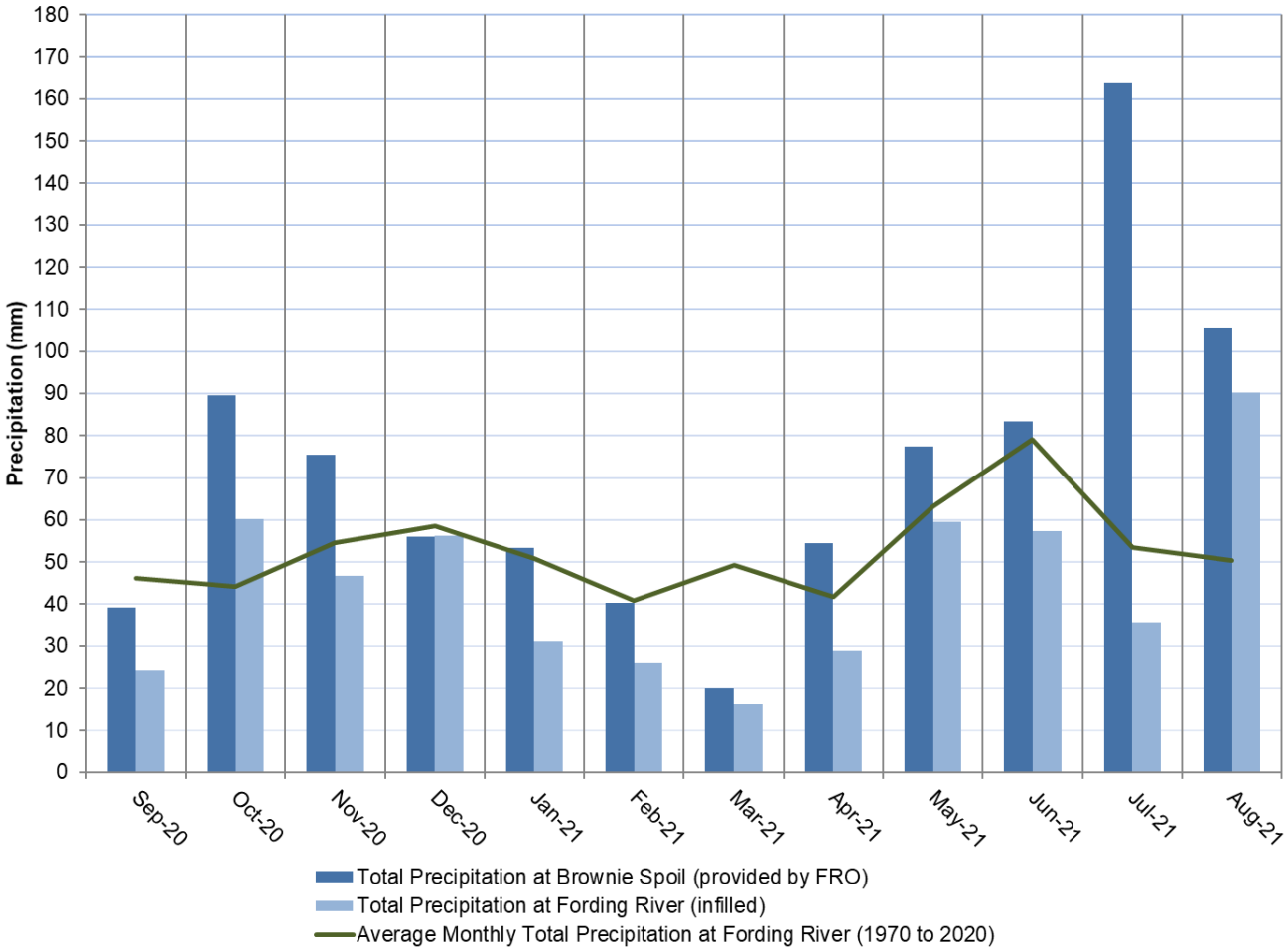



**Chart 1: Monthly Precipitation Data from 1 September 2020 to 31 August 2021**

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 where 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 where 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.

## 4.2 Water Balance

The water balance for the 2P-3P TSA from 1 September 2020 to 31 August 2021 is summarized in Table 5 using climate inputs from the Fording River (infilled) dataset.

**Table 5: 2 Pit and 3 Pit Tailings Storage Area Water Balance – 1 September 2020 to 31 August 2021**

| IN | Annual Volume ($m^3$) | OUT | Annual Volume ($m^3$) | Total Inventory Change ($m^3$) |
|---|---|---|---|---|
| Surface water runoff and precipitation | 386,500 | Evaporation and seepage loss | 386,500 | |
| **Sum** | **386,500** | **Sum** | **386,500** | **0** |

There was no dredging to the 2P-3P TSA during the reporting period. The water balance assumes inflows from surface runoff and direct precipitation are equal to the outflows from evaporation and seepage losses, as the facility does not store any free water. This is consistent with the observed dry surface conditions during each monthly inspection through the reporting period. The water balance for the 2P-3P TSA does not raise any concerns and appears to reflect the observed conditions.

No facility performance issues were noted associated with the precipitation observed on site or considering the water balance during the reporting period.

# 5.0 2 PIT AND 3 PIT TAILINGS STORAGE AREA SAFETY ASSESSMENT

This section presents the facility safety assessment for the 2P-3P TSA based on the observations and data review for each of the failure modes that are most relevant to this facility.

## 5.1 Site Visit

A site inspection was carried out on 25 May 2021 by Mr. John Cunning, P.Eng., and Ms. Clara Lee, P.Eng., of Golder. Mr. Cunning and Ms. Lee were accompanied by Mr. Patrick Lea, P.Eng., tailings engineer, Mr. James Campbell, P.Eng., Qualified Professional, and Ms. Katie Goguen, tailings EIT, of FRO. The temperature during the visit was approximately 8°C and the weather was rainy to overcast.

Appendix A presents a summary of photographs of the 2P-3P TSA 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:

- FRO has continued with the mine plan for Swift Pit, which commenced by establishing a working bench above the 3PN tailings in late 2020. Tailings removal from 3PN was underway at the time of the inspection.
- FRO completed one drillhole in March 2021 (PZF21-01) on the Causeway and installed a set of VW piezometers in support of the tailings removal project at 3PN. An additional two drillholes were completed following the inspection in June 2021 with additional VW piezometers installed at PZF21-10. FRO is monitoring the water levels at these two locations.
- Vehicle access to 2P and 3PS was not available at the time of the inspection. Vehicle access should be re-established.
- A viewpoint to the 3PS embankment should be established to facilitate regular inspections.

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

There was no dredging to the 2P-3P TSA over the reporting period. No data were collected from the monitoring wells, which are only monitored during dredging, as discussed in Section 2.4.

## 5.2 Review of Background Information

FRO provided the following information for this inspection:

- FRO site 2021 LiDAR topographic data and orthophoto
- records of routine visual inspections by FRO qualified personnel
- pond water levels at Shandley Pit
- site climate data from 1 September 2020 to 31 August 2021
- vibrating wire piezometer data

## 5.3 Consequence of Failure

Teck has advised that they are aligned with the most conservative interpretation of the Global Industry Standard on Tailings Management (GISTM, GTR 2020) 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 as it is non-conservative. Instead, they will adopt the extreme consequence case design loading for any facility with a credible flow failure mode. For facilities without a credible failure mode in terms of a life safety issue, where extreme loadings are not used Teck will reduce credible risks to As Low As Reasonably Practicable (ALARP). This consequence case applies for both earthquake and flood scenarios for all tailings facilities, consistent with the GISTM (GTR 2020). Adopting this approach meets or exceeds regulatory requirements, aligns with Teck's goal to eliminate any risk for loss of life, and is consistent with the new GISTM (GTR 2020). This approach is consistent with industry-leading best practices and has an added benefit of providing accurate narratives to communities about the safety of tailings facilities that could impact them and who share Teck's approach of one life lost is one too many to be at risk.

The 2P-3P TSA consequence of failure is Low, considering the guidelines for consequence classification in Section 3.4 of the HSRC Guidance Document (Ministry of Energy and Mines 2016). This classification approach is not aligned with Teck's approach to safety. The 2P-3P TSA design has met or exceeded the requirements for such classification.

## 5.4 Review of Operational Documents

### 5.4.1 Operation, Maintenance, and Surveillance Manual

The OMS manual for the 2P-3P TSA is Version 2020-04, dated 27 May 2020 (FRO 2020b). A review of this version of the OMS manual was completed by Golder as part of this AFPR. An update to the OMS manual is currently in progress.

### 5.4.2 Emergency Preparedness and Response Plans

FRO last completed an update to the emergency response plan (ERP) for the tailings facilities at FRO in May 2020 (EP.009.R1; FRO 2020b).

The current emergency preparedness plan for tailings facilities is dated 25 May 2020 (EP.008.R2; FRO 2020c).

FRO completed an internal tabletop ERP testing exercise on 14 May 2021. Mr. John Cunning and Ms. Clara Lee of Golder participated in the 2021 testing of the ERP.

### 5.4.3 Dam Safety Review

A DSR, as defined in Section 10.5.4 in the HSRC (EMLI 2021), was completed in 2019 by a third-party consultant (SNC-Lavalin 2020). The DSR did not identify any issues associated with the 2P-3P TSA, which aligns with Golder's evaluations inclusive of this current AFPR as documented herein.

Assuming the facility remains a regulated tailings facility, the next DSR should be initiated in 2024 based on the current regulatory requirements.

## 5.5 Review of Potential Hazards and Failure Modes, Design Basis, and Facility Performance

Potential hazards and failure modes were reviewed as part of this AFPR and are summarized in Table 6. The performance of the 2P-3P TSA relative to each failure mode is discussed in the following sections.

**Table 6: Assessment of Facility Safety Relative to Potential Failure Modes**

| Potential Failure Mode | Observations/Data | Comments |
|---|---|---|
| Internal erosion (suffusion and piping) | Impounding layer that defines the lower (in-pit) portion of the TSA is bedrock, and facility does not store water. | This failure mode is non-credible. |
| Overtopping | No stored water observed. | The inflow design flood can be contained within the TSA (Golder 2017a). This failure mode is non-credible. |
| Instability | No evident embankment instability. | A stability assessment was completed considering the 3PS embankment and adjacent waste rock spoils of the 2P-3P TSA (Golder 2017b) indicating stability meets design criteria. |

TSA = tailings storage area; 3PS = 3 Pit South.

The hazards and credible failure modes for the TSA are to be reviewed and revised as necessary, considering the mining plans to remove the tailings and tailings mixed with waste rock from the TSA as part of Swift Pit mining.

### 5.5.1 Internal Erosion (Suffusion and Piping)/Tailings Migration

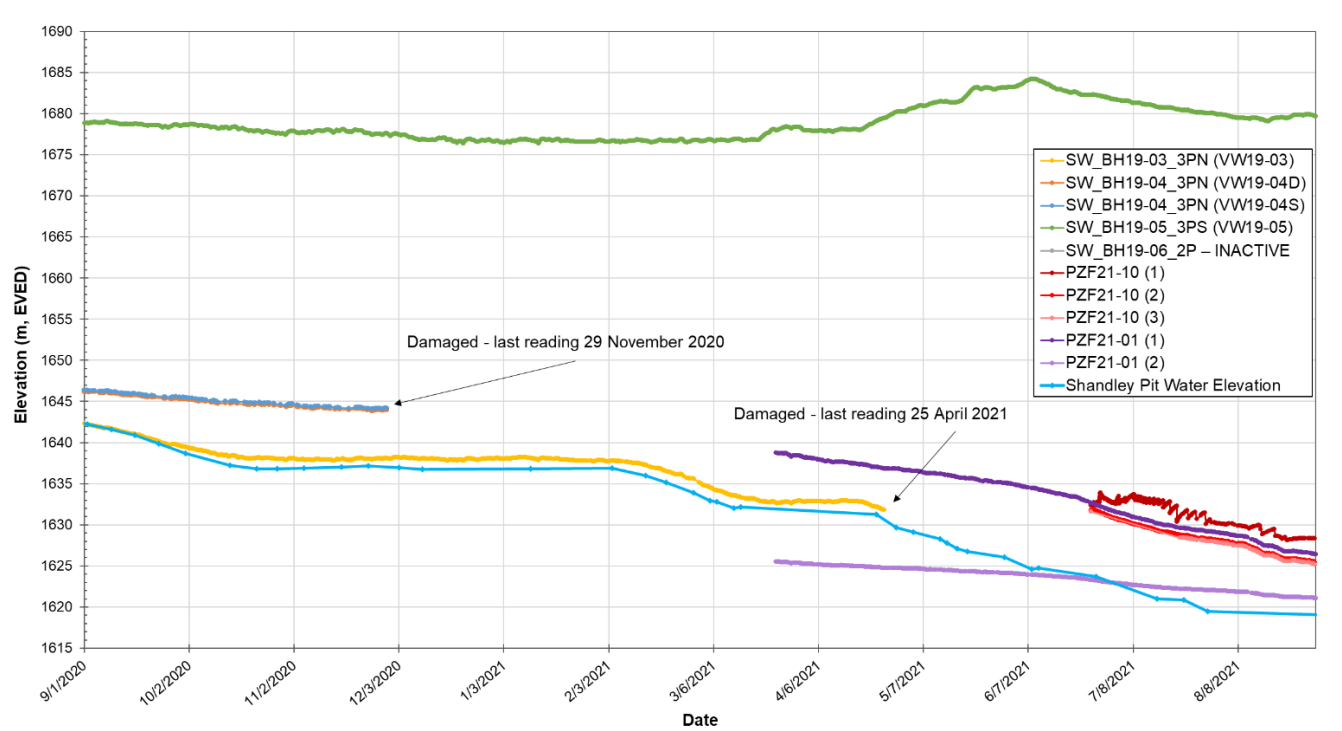
Internal instability of an embankment can be caused by materials migrating out of the embankment, leaving voids. This generally happens with materials that do not have filter compatibility; that is, the fines fraction of one material can migrate into or through the voids of the adjacent material under a sufficient hydraulic gradient. Piping is induced by regressive erosion of particles toward an outside environment until a continuous pipe is formed. Suffusion is the migration of soil particles through the soil matrix.

#### *Design Basis*

The impounding layer that defines the lower (in-pit) portion of the 2P-3P TSA is bedrock, and failure by internal erosion or tailings migration is not a credible failure mode.

The upper (stacked tailings) portion of the 2P-3P TSA was not intended to contain surface water or achieve filter compatibility. Data collected during the 2019 investigation (Golder 2020b) indicated drained conditions (no local groundwater table) in 2P and 3PS. Piezometric data from the vibrating wire piezometer installed during the 2019 investigation in 3PS have indicated a local groundwater table based on readings starting in March 2021. This may be a result of surface runoff and groundwater from the area. FRO should continue to monitor data collected from VW19-05 (shown as SW_BH19-05_3PS) in 3PS.

In 3PN, pore water pressure in the tailings was observed to fluctuate in response to water level in Shandley Pit. Piezometric data for the reporting period are shown in Chart 2, along with the Shandley Pit water elevation and piezometers installed in 2021 in the 3 Pit Causeway for comparison. The 2019 instruments installed in 3PN were damaged during the reporting period and are no longer required as a result of the tailings removal project in 3PN.




Note: Elevations reported in Elk Valley Elevation Datum.

**Chart 2: 3PN and 3PS Vibrating Wire Piezometer Groundwater Elevations and Shandley Pit Water Elevation from 1 September 2020 to 31 August 2021**

Migration of tailings into the waste rock is known to occur during active dredging. This is not a stability concern, as the tailings fill the voids in the waste rock and increase grain-to-grain contact in the material. During dredging, migration of tailings to unintended receptors is a failure mode due to the environmental impact.

Tailings migration during dredging was monitored in wells A through K. The wells were used to monitor groundwater elevations and, in some wells, the rise of tailings solids in waste spoils during dredging discharge. Critical tailings elevations are included in the current 2P-3P OMS manual (FRO 2020a) as per Golder recommendations (Golder 2008, 2014).

## *Observed Performance*

In 2004, while tailings were being deposited to 2 Pit, tailings began reporting to the Smith Ponds, which are located above the Fording River (FCL 2006a). In response, dredging to 2 Pit was suspended indefinitely.

Migration of tailings to unintended receptors while not actively discharging dredged tailings to the TSA is not a concern; therefore, well monitoring was not required in 2021. Comparison of well monitoring against QPOs was not required for 2021. Well monitoring last occurred in October 2015 during dredging to the 2P-3P TSA.

Surface water reporting to the 2P-3P TSA is observed to rapidly infiltrate both the waste rock and tailings surface, and the migration of tailings as a result of runoff or significant flood event is considered a low risk.

During the 25 May 2021 inspection, dry tailings were noted (Photo A-3 in Appendix A) in the 3PS observation pit, which was dug in 2016. Ponding water was noted at the base of the pit from rain and surface runoff during the inspection. The 3PS water elevation was noted as having no water or being dry on the FRO monthly inspection sheets throughout the reporting period.

No zones of subsidence or sinkholes were identified or observed during the reporting period that would indicate voids due to either suffusion or piping.

### 5.5.2 Overtopping

#### *Design Basis*

A technical memorandum evaluating disposal of tailings into 3PS (Golder 2014) recommended that 0.5 m of freeboard for the tailings elevation be maintained at the 3PS Embankment to allow for potential settlement of the embankment. This was used during active dredging operations.

An assessment of flood routing and flood storage capacity for the 2P-3P TSA has been completed (Golder 2017a). This assessment meets the HSRC design criteria for Low to High consequence tailings facilities of 72-hour duration inflow design flood equal to 1/3 between the 1-in-1,000-year event and the probable maximum flood event. The assessment resulted in the following conclusions:

- For 2 Pit, the net inflow volume is fully contained within the pit, with an expectation of seepage into the surrounding waste rock and toward Shandley Pit.
- For 3PS, the net inflow volume is fully contained within the pit, with an expectation of seepage into the surrounding waste rock including transmission of seepage through the 3 Pit causeway into 3PN.
- For 3PN, the net inflow volume exceeds the capacity of 3PN. However, the overflow from 3PN will flow into Shandley Pit, which has the capacity to contain the overflow.
- For Shandley Pit, the net inflow volume (including the 3PN overflow) is fully contained within the pit.

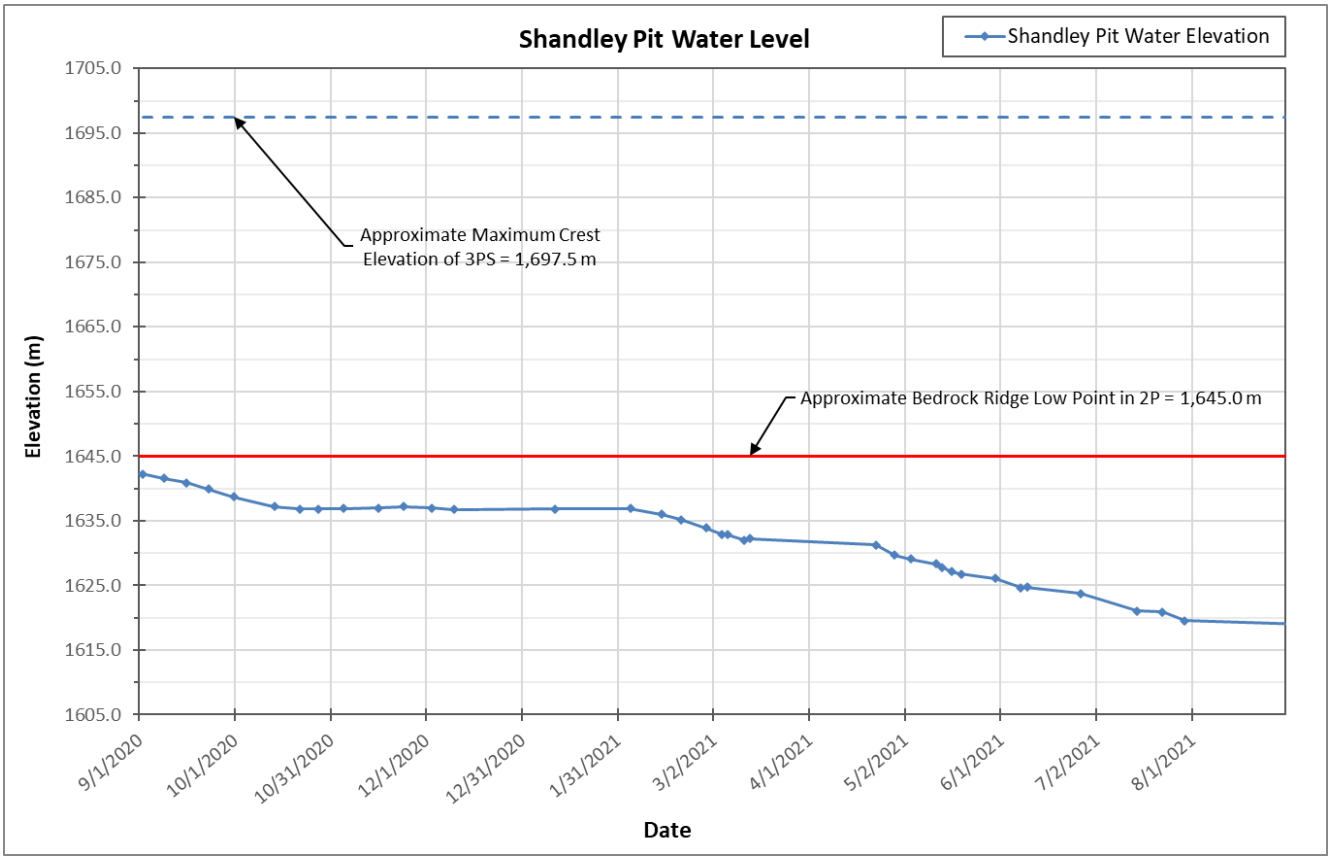
Per the assessment, the High consequence inflow design flood can be contained within the 2P-3P TSA. Therefore, overtopping is not a credible failure mode.

#### *Observed Performance*

The 2P-3P TSA is not intended to store water because it is expected that water will migrate through the subsurface north to Shandley Pit or east toward the Fording River. The 3PN water level is no longer being monitored due to removal of tailings and in situ blended waste rock and tailings as per active mining operations from the Swift Pit. Overtopping was not a concern during the reporting period and the facility managed inflows as intended.

Monthly visual inspections of the 2P-3P TSA confirmed a dry tailings surface at 2 Pit and 3PS, and the minimum 0.5 m of freeboard at the 3PS Embankment was maintained. These visual inspections are considered adequate to monitor for overtopping, based on the typical drained condition of the tailings surface and on the flood routing and flood capacity assessment (Golder 2017a). More frequent monitoring and quantitative measurements of water would be necessary if ponding is noted on the tailings surface.

As discussed in Section 2.1, 2 Pit, 3 Pit, and Shandley Pit are hydraulically connected. Water is observed to generally migrate north to Shandley Pit. As no tailings deposition has been occurring in the last few years, the water levels in Shandley Pit are dictated by the local groundwater table and are managed by pumping. Dewatering of Shandley Pit to facilitate mining and dewatering of 3PS tailings in advance of excavation began in July 2020 and continued throughout the reporting period. Shandley Pit water levels from 1 September 2020 to 31 August 2021 are shown in Chart 3.




Note: Pond elevations reported in Elk Valley Elevation Datum.

**Chart 3: Shandley Pit Water Elevation from 1 September 2020 to 31 August 2021**

### 5.5.3 Instability

#### *Design Basis*

Instability of the 3PS Embankment and the waste rock spoils which provide partial containment of tailings throughout the 2P-3P TSA is a credible failure mode. A stability assessment of the 2P-3P TSA to confirm the 3PS Embankment and the adjacent waste rock spoils met the design criteria was completed by Golder (2017b).

FRO completed a stability analysis of the 3 Pit Causeway to support the 3PN tailings removal project (FRO 2021). The results were reviewed with the EoR and indicated that mining the 3 Pit Causeway and adjacent 3PN tailings meet the minimum requirements with adequate management of the subsurface water conditions.

### *Observed Performance*

No evidence of embankment instability, such as excessive erosion, cracking, or deformation, was observed during the annual inspection or in the FRO inspection reports.

Regular inspections of the 3 Pit Causeway and review of piezometric conditions relative to triggers established in the analyses carried out by FRO (FRO 2021), should continue to support Swift Pit mining operations in this area and be documented for the 2P-3P TSA.

## 5.6 Review of Previous Deficiencies and Non-conformances

The deficiencies and non-conformances that were noted in the 2020 annual report (Golder 2021a) are outlined in Table 7. Completed and retracted actions are shown with grey shading. No incomplete actions have been brought forward to the 2021 AFPR recommendations.

**Table 7: Status of 2020 Recommended Actions for 2 Pit and 3 Pit Tailings Storage Area**

| ID Number | Deficiency or Non-conformance | Recommended Action | Status as of March 2022 |
|---|---|---|---|
| 2019-02 | No inundation or dam breach completed. | Complete inundation study prior to additional dredging. | **Retracted** – Documented in 2P-3P TSA OMS manual (FRO 2020a).<br>Based upon the GISTM, this would not be required as there are no credible catastrophic flow failure modes. |
| 2020-01 | Impact of tailings and waste rock excavation on stability of 3 Pit causeway needs to be assessed. | Conduct geotechnical drilling to determine the foundation of the 3 Pit causeway and carry out slope stability analysis during the various stages of planned excavation of 3 Pit North tailings as part of the Swift Pit mining. | **Complete.** |

OMS = operation, maintenance, and surveillance; FRO = Fording River Operations; GISTM = Global Industry Standard on Tailings Management.

# 6.0 SUMMARY OF 2021 AFPR

## Summary of Activities

No maintenance was required at the facility. The 2P-3P TSA was inspected once per month by qualified FRO tailings personnel.

A few notable activities were observed during the reporting period:

- There was ongoing removal of tailings and in situ blended waste rock and tailings from 3PN.
- 3PN embankment is no longer being inspected as a result of tailings removal activities in 3PN.
- All piezometers except for VW19-05 from the 2019 investigation program (Golder 2020b) have been damaged and are no longer active and reporting data in real time as a result of the tailings removal project at 3PN. These instruments do not need to be replaced.
- No data have been received for piezometer VW19-06 in 2 Pit because the datalogger wire was destroyed by wildlife and should be repaired.
- FRO carried out a total of 23 CPTs in 3PN during the reporting period to better understand the tailings thickness and depth to waste rock in support of the tailings removal project at 3PN (ConeTec 2020, 2021).
- FRO installed piezometers in the 3 Pit Causeway and continues to monitor as part of Swift mining activities in this area.

## Climate and Water Balance

The climate data during the reporting period indicate the annual precipitation received at the waste water treatment plant 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 the precipitation observed on site or considering the water balance during the reporting period.

## Performance and Changes

No significant changes in condition were noted in 2P and 3PS based on visual monitoring records, embankment stability, and surface water control. FRO is currently mining out the tailings and in situ blended waste rock and tailings in 3PN as part of the Swift project, which is expected to continue into early 2022.

# 7.0 RECOMMENDATIONS, CURRENT DEFICIENCIES, AND NON-CONFORMANCES

There are no outstanding recommendations from 2020 and no new recommended actions from the 2021 AFPR.

## 8.0 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.**

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CM/JCC/hp/sd



https://golderassociates.sharepoint.com/sites/142564/project files/6 deliverables/issued/2021-191-r-rev0-200-2p-3p tsa afpr report/21456080-2021-191-r-rev0-200-2p-3p tsa annual inspection fro 23mar_22.docx

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# STUDY LIMITATIONS

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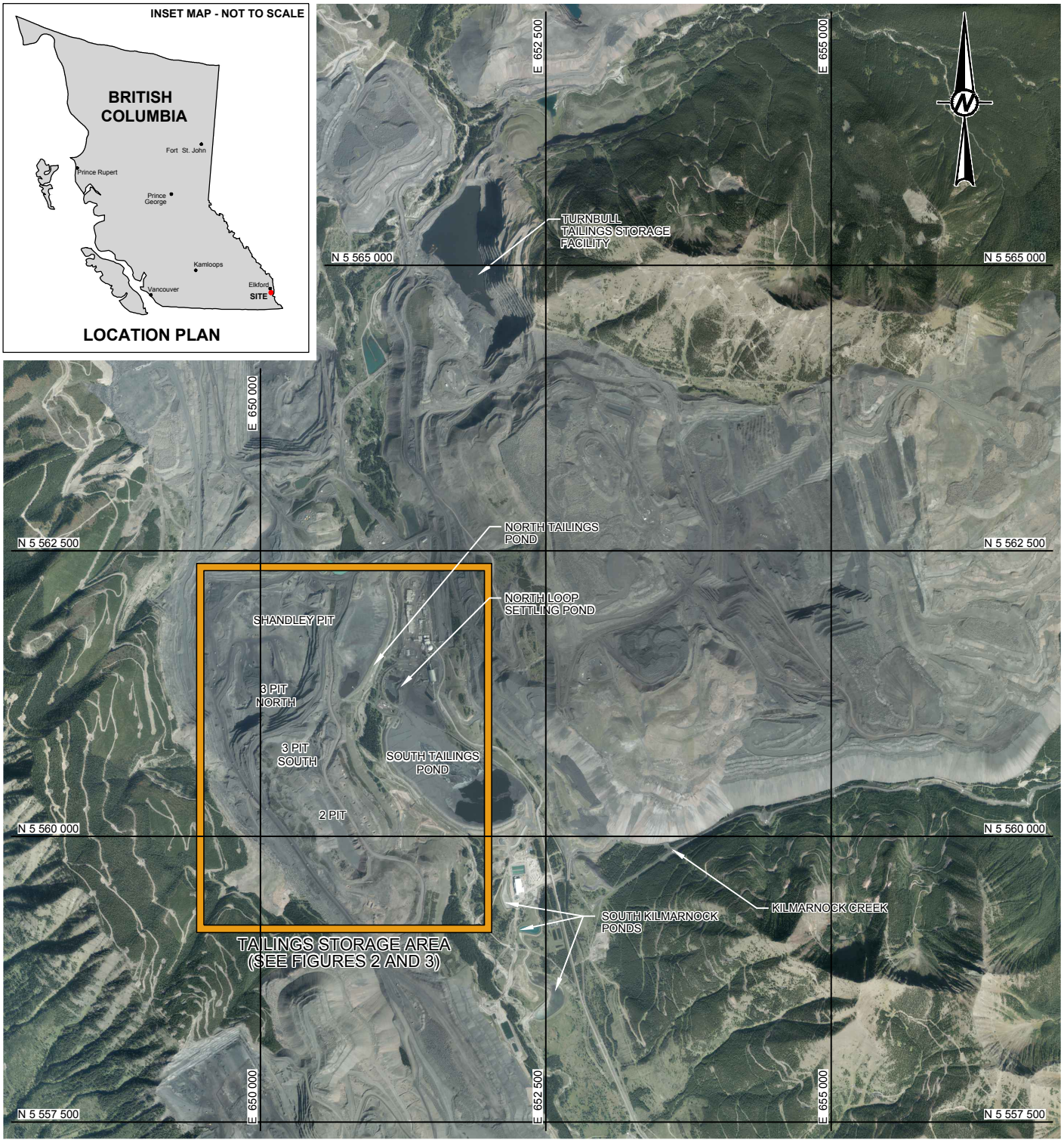
# FIGURES




**REFERENCE**

1. 2021 AERIAL PHOTO PROVIDED BY TECK COAL LIMITED, RECEIVED: 12 OCTOBER 2021, DATES FLOWN: 22 JULY 2021.

**NOTES**

1. ALL UNITS ARE SHOWN IN METRES UNLESS NOTED OTHERWISE.
2. COORDINATES ARE IN UTM ZONE 11, ELEVATIONS ARE REFERENCED TO ELK VALLEY ELEVATION DATUM.



0 1,000 2,000
1:50,000 METRES

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

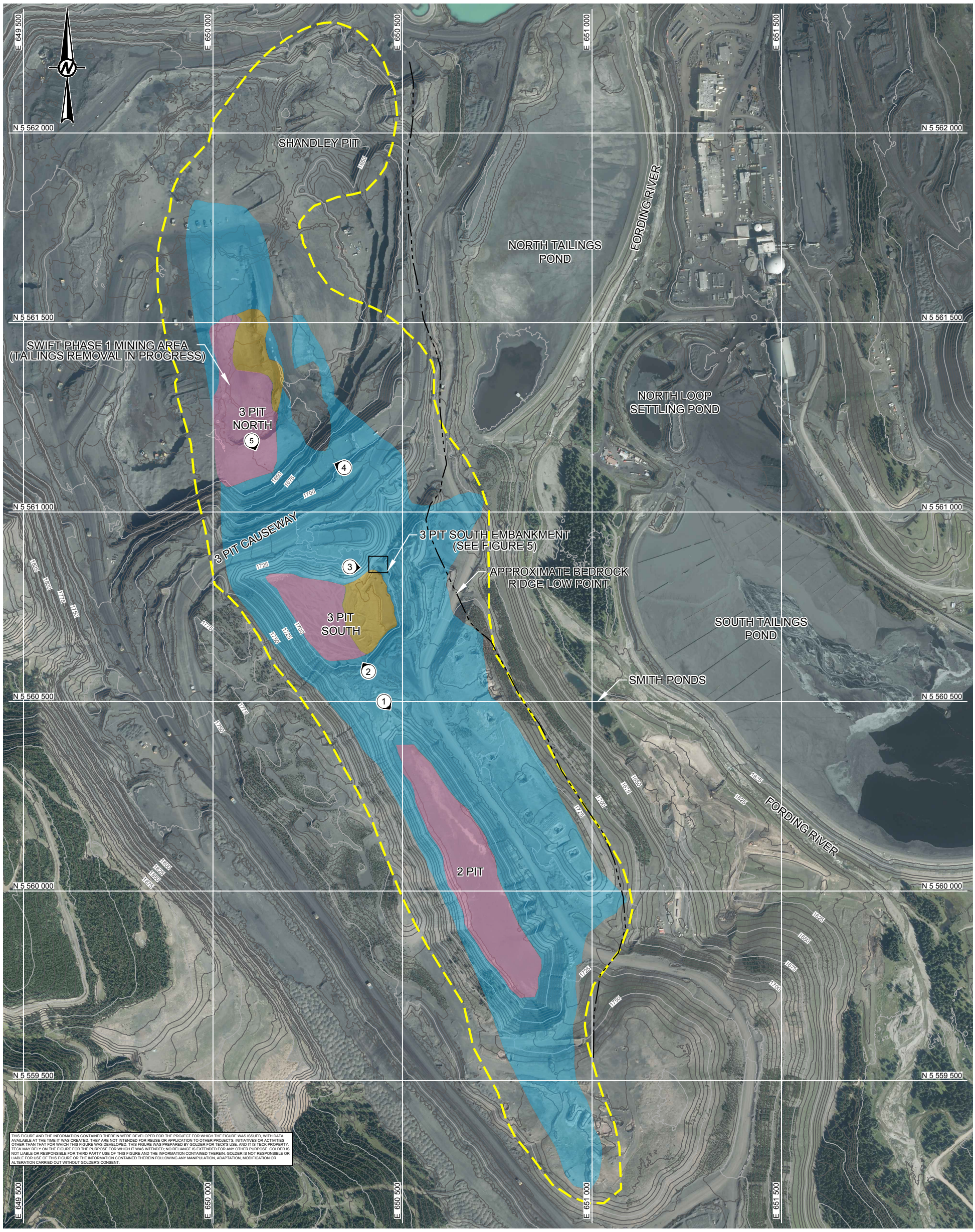
PROJECT
2021 ANNUAL FACILITY PERFORMANCE REPORT FOR 2 PIT AND 3 PIT TAILINGS STORAGE AREA

CONSULTANT
GOLDER
MEMBER OF WSP

| | |
|---|---|
| YYYY-MM-DD | 2022-03-15 |
| DESIGNED | N.CARRIERE |
| PREPARED | M.HEAL |
| REVIEWED | C.McGRATH |
| APPROVED | J.CUNNING |

TITLE
**FORDING RIVER OPERATIONS SITE PLAN**

| PROJECT NO. | PHASE/TASK/DOC. | REV. | FIGURE |
|---|---|---|---|
| 21456080 | 200/206/2021-191 | 0 | 1 |






**LEGEND**

- TOPOGRAPHIC CONTOURS
- APPROXIMATE CREST OF BEDROCK RIDGE FROM MINED OUT SURFACE
- APPROXIMATE TAILINGS STORAGE AREA
- APPROXIMATE BOUNDARY OF IN-PIT COAL TAILINGS AS OF 2011
- APPROXIMATE BOUNDARY OF ADDITIONAL IN-PIT COAL TAILINGS AS OF 2016
- APPROXIMATE BOUNDARY OF THE ESTIMATED EXTEND OF COAL TALINGS MIXED WITH WASTE ROCK AS 2011
- (#) 2021 SITE INSPECTION PHOTOGRAPH LOCATION

**NOTES**

1. ALL UNITS ARE SHOWN IN METRES UNLESS NOTED OTHERWISE.
2. COORDINATES ARE IN UTM ZONE 11, ELEVATIONS ARE REFERENCED TO ELK VALLEY ELEVATION DATUM.
3. TOPOGRAPHIC CONTOURS SHOWN AT 5 m MINOR AND 25 m MAJOR INTERVAL.

**REFERENCES**

1. 2021 LIDAR TOPOGRAPHY AND AERIAL PHOTO PROVIDED BY TECK COAL LIMITED, RECEIVED: 12 OCTOBER 2021, DATES FLOWN: 22 JULY 2021.
2. COAL TAILIINGS (Subaerial Tailings.dxf) AND WASTE ROCK MIXED WITH COAL TAILINGS (Subterrestrial Tailings.dxf) PROVIDED BY TECK COAL LIMITED FORDING RIVER OPERATIONS, DATED: FEBRUARY 2011.

0 250 500
1:10,000 METRES

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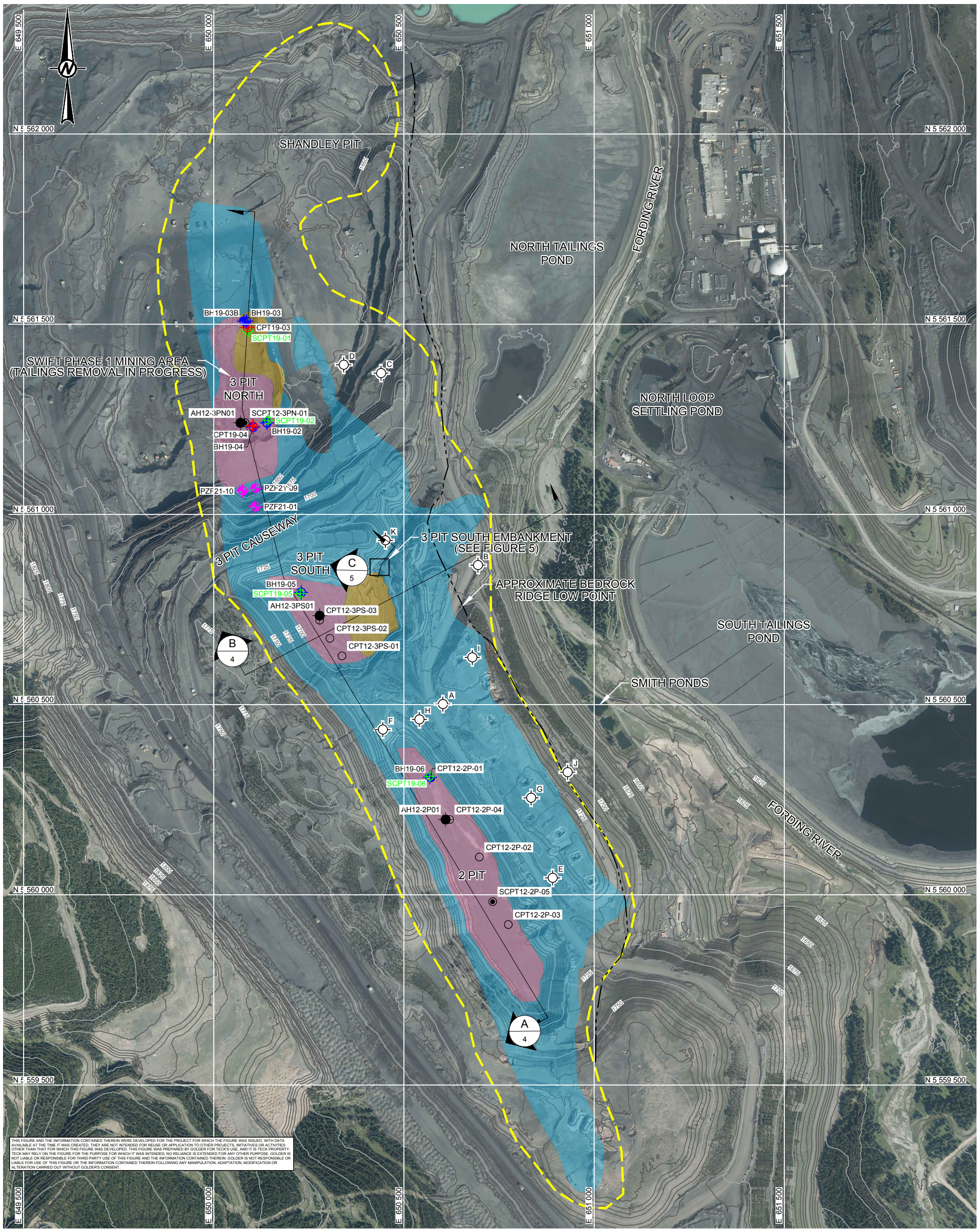
| APPROVED | J.CUNNING |

PROJECT
2021 ANNUAL FACILITY PERFORMANCE REPORT FOR 2 PIT AND 3 PIT TAILINGS STORAGE AREA

TITLE
**2021 SITE INSPECTION PHOTOGRAPH LOCATIONS**

| PROJECT NO. | PHASE/TASK/DOC. | REV. | FIGURE |
|---|---|---|---|
| 21456080 | 200/206/2021-191 | 0 | 2 |

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B
25 mm
0




**LEGEND**

- TOPOGRAPHIC CONTOURS
- APPROXIMATE CREST OF BEDROCK RIDGE FROM MINED OUT SURFACE
- APPROXIMATE TAILINGS STORAGE AREA
- APPROXIMATE BOUNDARY OF IN-PIT COAL TAILINGS AS OF 2011
- APPROXIMATE BOUNDARY OF ADDITIONAL IN-PIT COAL TAILINGS AS OF 2016
- APPROXIMATE BOUNDARY OF THE ESTIMATED EXTEND OF COAL TALINGS MIXED WITH WASTE ROCK AS 2011
- SONIC BOREHOLE (2019)
- REVERSE CIRCULATION DRILLHOLES (2021)
- CONE PENETRATION TEST (2019)
- SEISMIC CONE PENETRATION TEST (2019)
- MONITORING WELL
- AUGER HOLE (2012)
- CONE PENETRATION TEST HOLE (2012)
- SEISMIC CONE PENETRATION TEST HOLE (2012)

**NOTES**

1. ALL UNITS ARE SHOWN IN METRES UNLESS NOTED OTHERWISE.
2. COORDINATES ARE IN UTM ZONE 11, ELEVATIONS ARE REFERENCED TO ELK VALLEY ELEVATION DATUM.
3. TOPOGRAPHIC CONTOURS SHOWN AT 5 m MINOR AND 25 m MAJOR INTERVAL.
4. MONITORING WELL LOCATIONS WERE PROVIDED BY TECK COAL LIMITED FORDING RIVER OPERATIONS IN FRO MINE GRID AND WERE ADJUSTED TO UTM BY GOLDER.

0 250 500
1:10,000 METRES

**REFERENCES**

1. 2021 LIDAR TOPOGRAPHY AND AERIAL PHOTO PROVIDED BY TECK COAL LIMITED, RECEIVED: 12 OCTOBER 2021, DATES FLOWN: 22 JULY 2021.
2. 2021 REVERSE CIRCULATION DRILL HOLES FROM FORDING RIVER OPERATIONS REPORT "SWIFT CAUSEWAY SPOIL - GEOTECHNICAL STABILITY ASSESSMENT." DATED 21 SEPTEMBER 2021.
3. 2019 SONIC, CPT AND SCPT HOLES PROVIDED BY TECK COAL LIMITED, FORDING RIVER OPERATIONS. SURVEYED ON 1 SEPTEMBER 2019. RECEIVED ON 9 SEPTEMBER 2019.
4. COAL TAILIINGS (Subaerial Tailings.dxf) AND WASTE ROCK MIXED WITH COAL TAILINGS (Subterrestrial Tailings.dxf) PROVIDED BY TECK COAL LIMITED FORDING RIVER OPERATIONS, DATED: FEBRUARY 2011.
5. 2012 AUGER HOLE AND CPT LOCATIONS FROM GOLDER PROJECT NO. 11-1426-0002/8000. GOLDER DOC. NO. 2012-176 REV.0 DATED 7 SEPTEMBER 2012.

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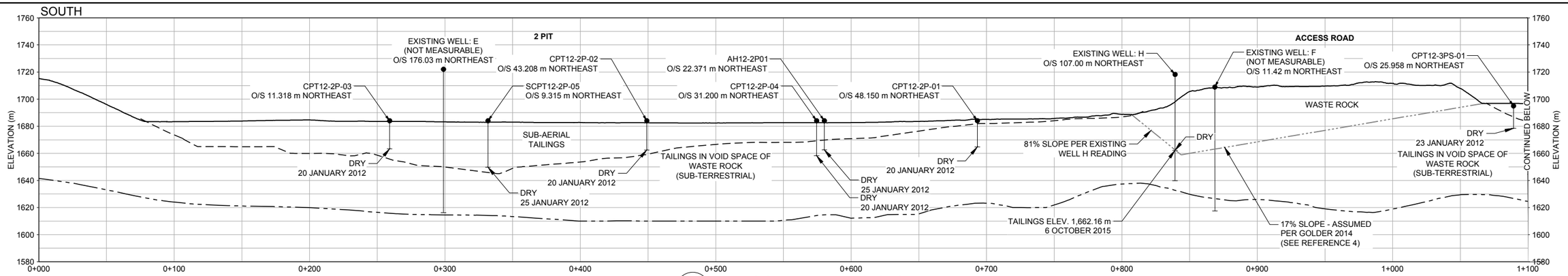
| PREPARED | M.HEAL |
| REVIEWED | C.McGRATH |
| APPROVED | J.CUNNING |

PROJECT
2021 ANNUAL FACILITY PERFORMANCE REPORT FOR 2 PIT AND 3 PIT TAILINGS STORAGE AREA

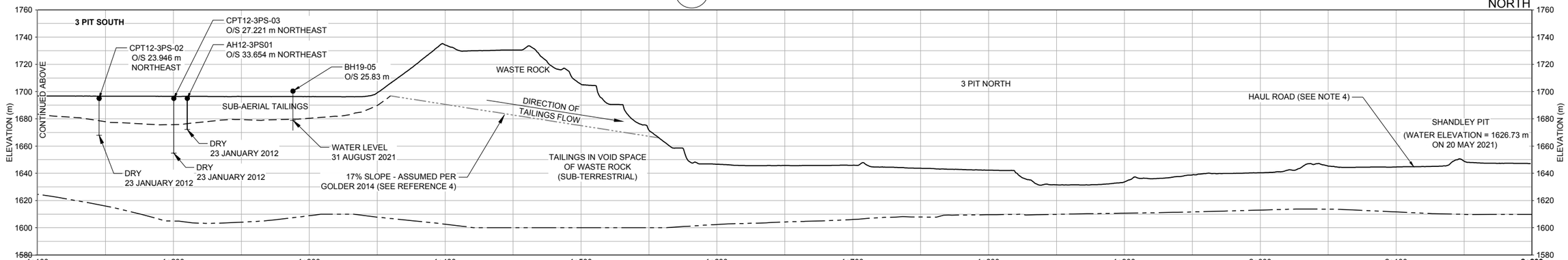
TITLE
**DETAIL PLAN AND CROSS-SECTION LOCATIONS**

| PROJECT NO. | PHASE/TASK/DOC. | REV. | FIGURE |
|---|---|---|---|
| 21456080 | 200/206/2021-191 | 0 | 3 |

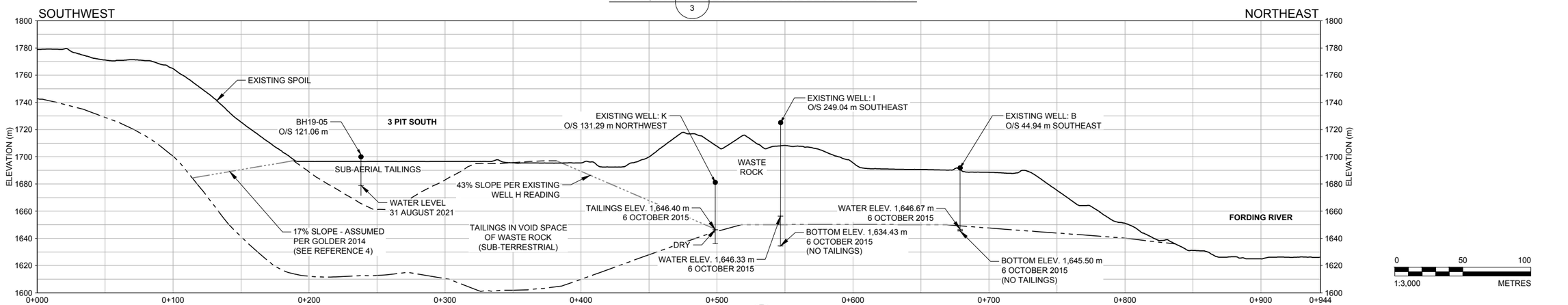
IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B
25 mm
0




SCALE 1:3,000 m — A/3 — 2 PIT TO SHANDLEY PIT - SECTION




SCALE 1:3,000 m — A/3 — 2 PIT TO SHANDLEY PIT - SECTION




SCALE 1:3,000 m — B/3 — 3 PIT SOUTH THROUGH FORDING RIVER - SECTION

**LEGEND**

- 2021 GROUND SURFACE (SEE REFERENCE 1)
- 3PS MINED OUT SURFACE (SEE REFERENCE 2)
- SURFACE OF SPOIL BENEATH TAILINGS (SEE REFERENCE 3)
- CPT/AH/WELL LOCATION (SEE REFERENCES 5, 6, 7 AND 8)

**NOTES**

1. ALL UNITS ARE SHOWN IN METRES UNLESS NOTED OTHERWISE.
2. MONITORING WELL DATA WAS LAST COLLECTED IN 2015 IN FRO MINE GRID ELEVATION AND 2012 TEST HOLE DATA COLLECTED IN FRO MINE GRID ELEVATION WERE ADJUSTED TO THE ELK VALLEY ELEVATION DATUM BY SUBTRACTING 0.454 m AS PER AIRBORNE IMAGING (2017).
3. SURFACE OF SPOIL BENEATH TAILINGS MAY BE LOWER THAN SHOWN IN PROVIDED SURFACE (REFERENCE 3) BASED ON CPT INVESTIGATION LOCATION RESULTS.
4. AS A RESULT OF 3PN MINING (REMOVAL OF SUB-AERIAL AND SUB-TERRESTRIAL TAILINGS) THAT BEGIN IN 2021, THE 3 PIT NORTH EMBANKMENT HAS BEEN REMOVED.

**REFERENCES**


1. 2021 LIDAR TOPOGRAPHY PROVIDED BY TECK COAL LIMITED, RECEIVED: 12 OCTOBER 2021, DATES FLOWN: 22 JULY 2021.
2. 3PS MINED OUT SURFACE CREATED USING CONTOURS PROVIDED BY TECK COAL LIMITED FORDING RIVER OPERATIONS. FOR ORIGINAL REPORT INFORMATION, REFER TO JOB NUMBER: "08-1427-0098/2000", DATED: 11 SEPTEMBER 2008.
3. SPOIL SURFACE CREATED USING CONTOURS PROVIDED BY TECK COAL LIMITED FORDING RIVER OPERATIONS IN 2008.
4. GOLDER. 2014. *TAILINGS DISPOSAL INTO 3 PIT SOUTH.*
5. CPT AND AUGER HOLE ELEVATIONS TAKEN FROM TECHNICAL MEMORANDUM, REFERENCE NO. 1414270098-2014-529-TM-Rev1-5000 DATED: 5 JUNE 2014
6. AUGER HOLE AND CPT LOCATIONS TAKEN FROM REPORT PREPARED FOR TECK COAL LTD. DOCUMENT NUMBER 2012-176 DATED: 7 SEPTEMBER 2012.
7. COORDINATES FOR MONITORING WELLS A-J PROVIDED BY TECK COAL LIMITED FORDING RIVER OPERATIONS ON 21 JANUARY 2014.
8. COORDINATES FOR MONITORING WELL H PROVIDED BY TECK COAL LIMITED FORDING RIVER OPERATIONS ON 12 MARCH 2014.

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| APPROVED | J.CUNNING |

PROJECT
2021 ANNUAL FACILITY PERFORMANCE REPORT FOR 2 PIT AND 3 PIT TAILINGS STORAGE AREA

TITLE
**CROSS-SECTIONS A AND B**

| PROJECT NO. | PHASE/TASK/DOC. | REV. | FIGURE |
|---|---|---|---|
| 21456080 | 200/206/2021-191 | 0 | 4 |

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0 — 25 mm

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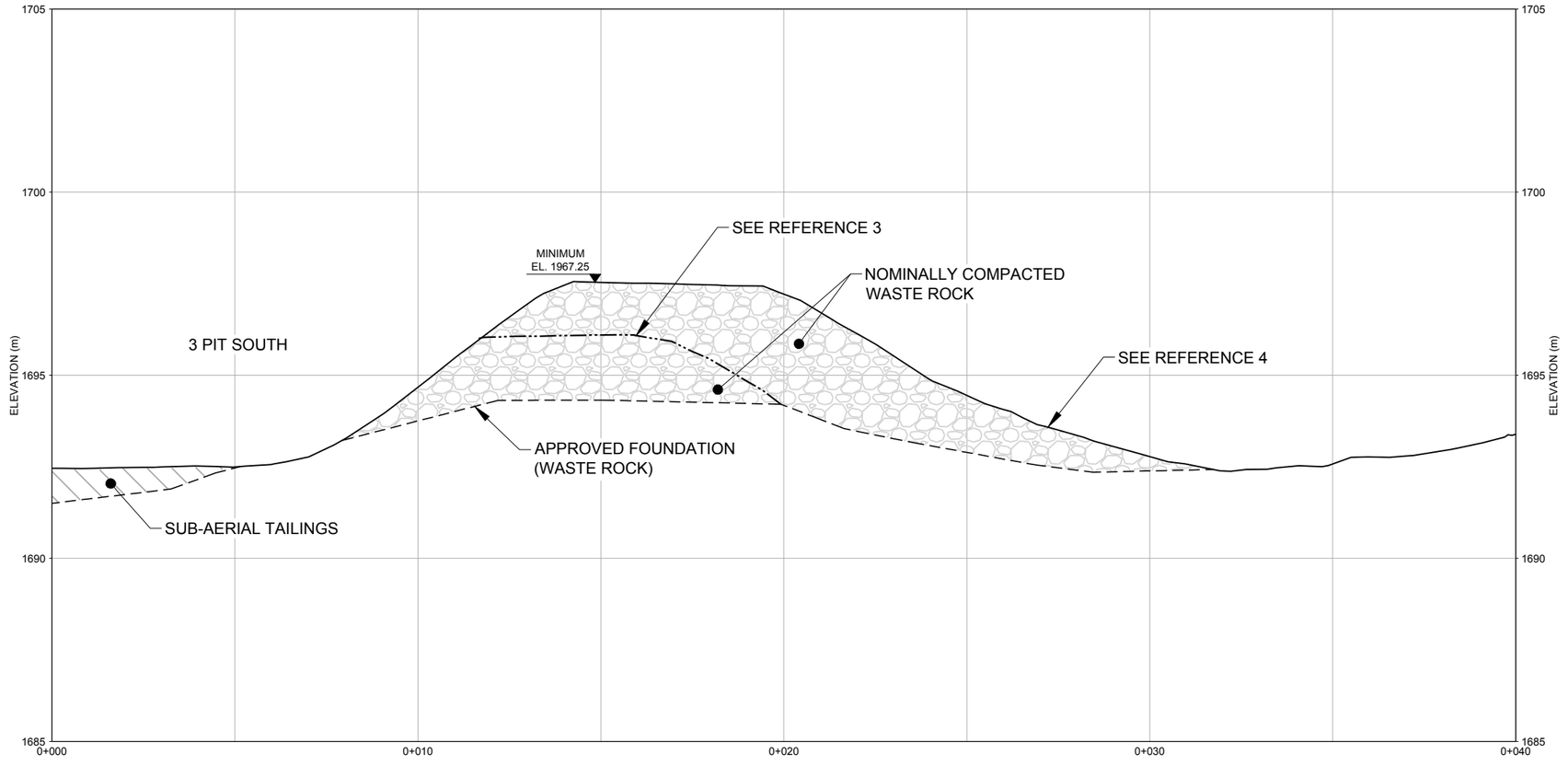


SCALE 1:150 m

C
3

## 3 PIT SOUTH EMBANKMENT

0 2.5 5

1:150 METRES



**LEGEND**

- 2021 GROUND SURFACE (SEE REFERENCE 1)
- SPOIL SURFACE (SEE REFERENCE 2)
- 2008 EMBANKMENT CONSTRUCTION

**NOTE**

1. ALL UNITS ARE SHOWN IN METRES UNLESS NOTED OTHERWISE.
2. COORDINATES ARE IN UTM ZONE 11, ELEVATIONS ARE REFERENCED TO THE ELK VALLEY ELEVATION DATUM.

**REFERENCES**

1. 2021 LIDAR TOPOGRAPHY AND AERIAL PHOTO PROVIDED BY TECK COAL LIMITED, RECEIVED: 12 OCTOBER 2021, DATES FLOWN: 22 JULY 2021.
2. SPOIL SURFACE CREATED USING CONTOURS PROVIDED BY TECK COAL LIMITED FORDING RIVER OPERATIONS IN 2008.
3. FRO 2014b. *SUMMARY OF 2008 CONSTRUCTION IN 3 PIT SOUTH AND 3 PIT NORTH.*
4. GOLDER. 2015b. *3 PIT SOUTH BERM RAISE CONSTRUCTION SUMMARY.*

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|---|---|
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| DESIGNED | N.CARRIERE |
| PREPARED | M.HEAL |
| REVIEWED | C.McGRATH |
| APPROVED | J.CUNNING |

PROJECT
2021 ANNUAL FACILITY PERFORMANCE REPORT FOR 2 PIT AND 3 PIT TAILINGS STORAGE AREA

TITLE
**3 PIT SOUTH EMBANKMENT SECTION**

| PROJECT NO. | PHASE/TASK/DOC. | REV. | FIGURE |
|---|---|---|---|
| 21456080 | 200/206/2021-191 | 0 | 5 |

**APPENDIX A**

# Site Photographs

## PHOTOGRAPH A-1

25 May 2021

2 Pit Overview, Looking Southeast

## PHOTOGRAPH A-2

25 May 2021


3 Pit South Overview, Looking North

## PHOTOGRAPH A-3

**25 May 2021**


3 Pit South Desiccated Tailings Surface and Moist Conditions (from Rain) Observed in Test Pit Upstream of 3 Pit South Embankment, 3 Pit South Embankment Crest, Upstream, and Downstream Slope, Looking Southeast

## PHOTOGRAPH A-4

**25 May 2021**

3 Pit North and Swift Pit Mining Overview Including Mining out of Tailings and Tailings Mixed with Waste Rock, Looking Northwest

## PHOTOGRAPH A-5

25 May 2021


Working Surface of the Tailings Excavation in 3 Pit North. Tailing and Tailings Mixed with Waste Rock are Being Mined Out Below the 3 Pit Causeway, Looking Southeast

**APPENDIX B**

# 2P-3P Tailings Storage Area Inspection Report

| | | | |
|---|---|---|---|
| **Client:** | **Teck Coal Limited,<br>Fording River Operations** | **By:** | **Clara Lee, P.Eng.** |
| **Project:** | **21456080 FRO Tailings Facilities<br>2021 Annual Facility Performance Review** | **Date:** | **25 May 2021** |
| **Location:** | **3 Pit South Embankment, low point of 2 Pit and 3 Pit Storage Area** | **Reviewed by:** | **John Cunning, P.Eng.** |

| General Information | | | |
|---|---|---|---|
| **Dam Type:** | Waste Rock Fill | | |
| **Weather Conditions:** | Light rain/overcast, windy | **Temp:** | 8°C |

| Inspection Item | Observations/Data | Photo | Comments & Other Data |
|---|---|---|---|
| **1.0 DAM CREST** | | | |
| 1.1 Crest Elevation | Elev. 1,697.25 m<br>(minimum for<br>3PS Embankment) | 3 | Confirmed by 2021 LiDAR survey data, crest has settled to lower than design. |
| 1.2 Reservoir Level/ Freeboard | Dry Tailings Surface<br><br>**Tailings:**<br>Elev. 1,693 m<br>(against 3PS Embankment) | 2, 3 | Confirmed by 2021 LiDAR survey data. |
| 1.3 Surface Cracking | None | | |
| 1.4 Unexpected Settlement | None | | |
| 1.5 Lateral Movement | None | | |
| 1.6 Other Unusual Conditions | None | | |
| **2.0 UPSTREAM SLOPE** | | | |
| 2.1 Slope angle | 1.5H:1V | 3 | |
| 2.2 Signs of Erosion | None | | |
| 2.3 Signs of Movement (Deformation) | None | | |
| 2.4 Cracks | None | | |
| 2.5 Face Liner Condition<br>(if applicable) | Not applicable | | |
| 2.6 Other Unusual Conditions | None | | |
| **3.0 DOWNSTREAM SLOPE** | | | |
| 3.1 Slope Angle | 1.0 to 1.5H:1V | 3 | |
| 3.2 Signs of Erosion | None | | |
| 3.3 Signs of Movement (Deformation) | None | | |
| 3.4 Cracks | None | | |
| 3.5 Seepage or Wet Areas | None | | |
| 3.6 Vegetation Growth | None | | |
| **4.0 DOWNSTREAM TOE AREA** | | | |
| 4.1 Seepage from Dam | None | | |
| 4.2 Signs of Erosion | None | | |
| 4.3 Signs of Turbidity in Seepage Water | None | | |

| Inspection Item | Observations/Data | Photo | Comments & Other Data |
|---|---|---|---|
| 4.4 Discoloration/Staining | None | | |
| 4.5 Outlet Operating Problem (if applicable) | N/A | | |
| 4.6 Other Unusual Conditions | Runaway lane is above parts of the downstream toe | | |
| **5.0 ABUTMENTS** | | | |
| 5.1 Seepage at Contact Zone (Abutment/Embankment) | None | | |
| 5.2 Signs of Erosion | None | | |
| 5.3 Excessive Vegetation | None | | |
| 5.4 Presence of Rodent Burrows | None | | |
| 5.5 Other Unusual Conditions | None | | |
| **6.0 RESERVOIR** | | | |
| 6.1 Stability of Slopes | Good | | |
| 6.2 Distance to Nearest Slide (if applicable) | Waste rock spoils to east, highwall to west | | |
| 6.3 Estimate of Slide Volume (if applicable) | Undetermined | | |
| 6.4 Floating Debris | None | | |
| 6.5 Other Unusual Conditions | None | | |
| **7.0 EMERGENCY SPILLWAY/ OUTLET STRUCTURE** | None | | |
| **8.0 INSTRUMENTATION** | Vibrating wire piezometer in 3PS | | In 3PS: VW19-05. |
| **9.0 DOCUMENTATION** | | | |
| 9.1 Operation, Maintenance and Surveillance (OMS) Manual<br>9.1.1OMS Manual Exists | Yes | | 2 Pit – 3 Pit Tailings Storage Area Operation, Maintenance and Surveillance Manual. |
| 9.1.2 OMS Manual Reflects Current Dam Conditions | Yes | | |
| 9.1.3 Date of Last Revision | 27 May 2020 | | Version R4. |
| 9.2 Emergency Response Plan (ERP)<br>9.2.1ERP Exists | Yes | | 2P-3P TSA included in site tailings facilities ERP. (EP.009.R1). (FRO 2020b). |
| 9.2.2 ERP Reflects Current Conditions | Yes | | |
| 9.2.3Date of Last Revision | 25 May 2020 | | |
| **10. NOTES**<br>• 3PS embankment crest and upstream tailings are both settling, slightly lower in elevation compared to previous annual surveys, no dam safety concerns with this minor settlement.<br>• No ponding upstream of 3PS embankment, water table not observed in the test pit in the upstream tailings beach during this inspection or through out last year based on FRO monthly inspections. | | | |
| **Inspectors:** | John Cunning, P.Eng.<br>Clara Lee, P.Eng. | **Date:** | 25 May 2021 |


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