# 2022 OLD TDF DAM SAFETY INSPECTION REPORT

MYRA FALLS MINE LTD.
A TRAFIGURA COMPANY
CAMPBELL RIVER, BC

PROJECT NO.: NX14001B4.3
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# EXECUTIVE SUMMARY

The following report presents the 2022 annual Dam Safety Inspection (DSI) for the Old Tailings Disposal Facility (TDF) at the Myra Falls Mine. Myra Falls Mine Ltd. (MFM), A Trafigura Company, owns and operates the mine.

This report has been prepared by WSP E&I Canada Limited (WSP)[1] in accordance with requirements of the British Columbia Ministry of Energy, Mines and Low Carbon Innovation (EMLI). The list below provides the information to be included in the executive summary for facilities that impound water or saturated tailings as required by the Health Safety and Reclamation Code Guidance Document (EMLI, 2016).

**a) <u>Summary of Facility Description:</u>**

The Old TDF is classified as a High consequence tailings dam in the post-operation, transition phase of its lifecycle. Construction of the dam started in the early 1980s based on designs created by Knight Piésold Ltd. The dam was built using upstream methods by hydraulically placing conventional cyclone overflow (fine) tailings from the outer embankment berm. The outer embankment was constructed of till and waste rock with an overall downstream slope of about 4H:1V. Cyclone underflow (coarse) tailings were used for mine backfill or hydraulically placed in an adjacent cell at the west end of the Old TDF, where the Old TDF Surge Pond is now located. In the late 1990s, Klohn-Crippen Consultants Ltd., (Klohn) was retained to assume the role of geotechnical engineering consultant for the TDF. Klohn identified that the tailings were susceptible to liquefaction, so between 1999 and 2013 a seismic upgrade berm was built around the outside of the outer embankment to improve the stability.

In the early 2000s it was determined that the Old TDF's outer embankment had reached its practical elevation limit. Two new internal cells were constructed on the tailings surface at a suitable setback from the outer embankment (Klohn 2001). Soon after construction of the new cells, the mine constructed a Paste Plant to produced thickened paste tailings. The two cells were then combined to form the Amalgamated Paste Area (APA), and the combined perimeter cell berm was designated the APA Berm (formerly called the Paste Berm). The APA Berm is constructed of well-graded waste rock with some coarse tailings sand inclusions in various areas. The APA reached its final elevation of 344 m in 2006.

WSP[2] has fulfilled the role of geotechnical engineering consultant and Engineer of Record (EOR) for the TDFs at Myra Falls Mine since 2006. WSP has designed and implemented several significant upgrades to the Old TDF:

- A review of the APA Berm indicated that it would deform significantly during a seismic event. WSP included a conceptual seismic stabilization plan for the APA berm in preliminary closure plans in 2011 and produced a detailed design of a toe berm in 2016. The toe berm was constructed in 2017.

[1] "Effective September 21, 2022, Wood Environment & Infrastructure Solutions Canada Limited is now operating as WSP E&I Canada Limited. No other aspects of our legal entity, contractual terms or capabilities have changed in relation to this report submission."

[2] Including predecessor companies: Wood E&I from AMEC Earth & Environmental from 2006 to 2011 and AMEC Environment & Infrastructure from 2011 to 2014, each respectively a Division of AMEC Americas Limited, and Amec Foster Wheeler Environment and Infrastructure from 2014 to 2017).

- A review of the hydrology of the Old TDF indicated that the existing Lower Lynx Diversion Ditch (LLDD) was significantly undersized with respect to the Inflow Design Flood (IDF) from the upland terrain. A design for upgrade of the LLDD was prepared in 2015 and implemented in 2015/2016.
- The Old TDF Closure Phase 1 design (Wood, 2018b and WSP, 2022) is the first phase of implementation of the Old TDF Closure Cover Permit-Level design (Amec Foster Wheeler, 2016g).

**b) Summary of Key Hazards:**

The key hazards to the Old TDF, some of which are inherited from legacy designs, are:

- Tailings with high susceptibility to earthquake-induced liquefaction (APA berm, which is partly constructed on tailings).
- High seismic hazard.
- High intensity precipitation or prolonged periods of precipitation. Snowmelt from higher elevations of the catchments area.
- Mountainous terrain above the facilities with associated terrain stability hazards including rock falls and debris flows.
- Waste rock dumps on slopes above the facilities that have been assessed as having factors of safety below recommended targets.
- Sulphide-rich potentially acid-generating (PAG) mine waste and tailings, and associated metal leaching and acid rock drainage impacted surface water and groundwater (not within WSP's scope).

**c) Dam Classification:**

The Old TDF is classified as a High Consequence dam in accordance with Table 2-1 of the Canadian Dam Association (CDA) Dam Safety Guidelines (2013). The classification is primarily because of the potential environmental consequences associated with release of tailings and mine waste into the hypothetical breach inundation area, which were interpreted by others to constitute a "significant loss or deterioration of important fish habitat".

Further details are available in Section 2.4.

**d) Summary of Significant Changes:**

Construction of Phase 1 of the Old TDF Closure Cover design was completed between June and August 2022. (WSP, 2023a) The Phase 1 construction areas were limited to the portion of the outer slope of the Old TDF that drains to Myra Creek. A summary of the construction works is listed below, while a detailed summary is included in Section 8.

- Lower Portions of the new surface drainage Channels 1, 2A, and 3 from the edge of the Outer Embankment Berm (OEB) road at the top of the 6H:1V slope to the Myra Creek; and
- Grading (constructing drainage swales) of the main bench of the Seismic Upgrade Berm (SUB) sloping towards the surface drainage channels and towards the existing Old TDF Surge Pond spillway.
- Place growth media and hydroseeding the newly constructed drainage swales on the SUB.
- Addressing erosion, downstream slope of the SUB.

- Waste rock removal from Waste Rock Dump 6 (WRD6) to provide materials for dam construction.

**e) Significant Changes in Instrumentation and/or Visual monitoring records:**

Performance of the Old TDF is assessed by visual inspections and monitoring instrumentation. Instrumentation includes piezometers for measuring pore water pressures, survey monuments for monitoring settlement and displacement and slope inclinometers (SI's) for measuring internal deformation. The following changes to the instrumentation system occurred in 2022:

- An Instrumentation Review was conducted by WSP in 2022 for the Old TDF. Recommendations were based on the review of the onsite monitoring system for the piezometers on the Old TDF. It was suggested that MFM carry out a 1) Instrumentation review for closure status 2) Monitoring System Upgrade/Design (WSP, 2023d).
- The Old TDF surface deformation monuments have not been reinstated. A more robust method for firmly attaching the monuments to the dam surface is currently being investigated by MFM

A detailed discussion of the instrumentation monitoring results is provided in Section 7. Old TDF vibrating wire piezometers (VWP) generally followed previously observed trends with no new maximums recorded in 2022.

The following visual inspections were carried out as part of routine surveillance activities:

- Fifty-two (52) weekly inspections of Old TDF were reported to have been carried out by MFM personnel.
- Four (4) quarterly inspections were carried out by the Engineer of Record or delegate (WSP).

Visual monitoring indicates the Old TDF dam continues to perform satisfactorily. Additional details regarding visual inspections are discussed in Section 6.

**f) Significant changes to dam stability and/or surface water control:**

No changes occurred in 2022 which would change the established surface water flow, infiltration, and discharge patterns for the area of the Old TDF.

**g) Summary of Review of the Operation, Maintenance and Surveillance (OMS) Manual:**

The OMS Manual was updated by MFM in March 2022 and reviewed by WSP in September 2022.

**h) Summary of Review of the Emergency Preparedness and Response Plan (EPRP):**

A general overview of the EPRP can be found in Appendix E of the OMS Manual. The EPRP section was reviewed and updated in March 2022.

**i) Scheduled date for the next formal Dam Safety Review (DSR) in accordance with the Health, Safety and Reclamation Code for Mines in British Columbia (EMLI 2022) and the CDA Dam Safety Guidelines (CDA 2013):**

A DSR should be carried out at minimum frequency of every 5 years as per EMLI 2021. The recent DSR was carried out in 2020 by Thurber Engineering Ltd. and was submitted to EMLI in March 2021 to meet regulatory requirements. The 2020 DSR recommendations are presented in Thurber (2021).

Formal DSRs were completed in 2013 by Robertson Geotechnical Consulting Ltd. (RGC) and in June 2016 by Tierra Group International Ltd. (Tierra). These reviews were completed at a higher frequency than the minimum frequency recommended by EMLI (2021) or the CDA guidelines (2013).

**j) Summary of recommendations**

A summary tracking the status of open recommendations as well as those closed in 2022 is provided in Section 10.

| STRUCTURE | TRACKING NUMBER | DEFICIENCY OR NON-CONFORMANCE | REGULATORY REQUIREMENT OR OMS REFERENCE | RECOMMENDED ACTION | PRIORITY (1) | RECOMMENDED DEADLINE/STATUS |
|---|---|---|---|---|---|---|
| Old TDF | 2022-01 | Consider measures to prevent deposition of sediments from the Paste Plant area in the Surge Pond. | | Divert the flow away from the surge pond or install erosion and sediment control measures along the flow path. | 3 | 2023 Q3 |
| Old TDF | 2022-02 | Surge Pond - Dissolution of lower portion of the vertical grating. | | Grating on both decants needs to be replaced due to acidic dissolution of lower portion of the vertical grating. | 3 | 2023 Q3 |
| Old TDF | 2022-03 | East strip partially blocked by sediments from Zim pro line discharge, preventing flow from the east abutment to the spillway culverts. | | The sediments should be removed to allow unobstructed flow from the east abutment to the spillway culverts. | 3 | 2023 Q1 |
| Old TDF | 2022-04 | The geotextile/geomembrane over the buried lock blocks in the spillway is damaged, likely by grading or snow clearing activities. | | The geomembrane should be repaired prior to the onset of the 2022/2023 wet season. | 3 | 2023 Q1 |

Priority levels are defined by EMLI (2022) as follows:

Priority Level 1. A high probability or actual dam safety issues considered immediately dangerous to life, health or the environment, or a significant risk of regulatory enforcement.

Priority Level 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.

Priority Level 3. Single occurrences of deficiencies or non-conformances that [alone] would not be expected to result in dam safety issues.

Priority Level 4. Best Management Practice – further improvements are necessary to meet industry best practices or reduce potential risks.

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# 1 INTRODUCTION

This Dam Safety Inspection report (DSI) summarizes the operations, maintenance, and surveillance of the Old Tailings Disposal Facility (TDF) at Myra Falls Mine during 2022. The Old TDF is a horseshoe-shaped impoundment on the north floodplain of Myra Creek and is the original terrestrial tailings facility at MFM. Drawing 010701 shows the location of the Old TDF. Myra Falls Mine Ltd. (MFM), A Trafigura Group Company, owns and operates the mine. This report has been prepared by WSP E&I Canada Limited (WSP), in accordance with requirements of Section 10.5.3 of the Health, Safety, and Reclamation Code for Mines in British Columbia (EMLI, 2016).

## 1.1 SCOPE OF REPORT

Regulatory reporting requirements for annual DSI reports require that the report addresses the calendar year and be submitted no later than 31 March of the following year. The scope of this report addresses the period spanning 1 January through 31 December 2022, which is referred to as the "reporting period". Information presented is based on observations made during site visits, analysis of instrumentation and monitoring data, reviews of construction activities and correspondence. The report generally does not address changes or conditions after the end of the reporting period.

Construction activities undertaken and completed in 2022 with regards to the Old TDF for which WSP provided designs and monitoring are documented under separate cover in the 2022 Construction Record Report (WSP, 2023a). A summary of construction activities related to the TDFs is provided in Section 8.0 of this report.

## 1.2 ANNUAL REPORTING REQUIREMENTS

This report has been prepared in accordance with requirements of British Columbia Ministry of Energy, Mines and Low Carbon Innovation (EMLI) presented in the November 2022 revision of the "Health Safety and Reclamation Code for Mines in BC" (HSRC) and the July 2016 "Guidance Document – Health, Safety and Reclamation Code (HSRC) for Mines in British Columbia" (HSRC Guidance Document).

The numbered items required for the Annual DSI by Section 4.2 of the HSRC Guidance Document are found in the following sections of this report.

1. Executive Summary – precedes the Table of Contents.
2. Facility Description –Section 2 (also see Section 8 for summary of construction).
3. Identification of Engineer of Record (EOR) and TSF Qualified Person – Section 1.3
4. Updated plan and representative cross sections – drawings appended to the end of the report.
5. Site Photographs – Appendix A.
6. Review of Climate Data – Section 3
7. Water balance review and reconciliation – Section 5.
8. Freeboard and storage availability (in excess of the design flood) – Section 4.
9. Water discharge system, volumes, and quality – Section 5.

10. Seepage occurrence and water quality – Section 5.

11. Surface water control and surface erosion – Section 5.

12. Instrumentation Review – Section 7 and Appendix B1 and B2.

13. Recommendations – Section 10.

## 1.3 ENGINEER OF RECORD AND TDF QUALIFIED PERSON

Roles and responsibilities of the Engineer of Record (EoR) and TDF Qualified Person for the tailings disposal facilities at the Myra Falls Mine are defined in the HSRC Guidance Document (EMLI 2022). During 2022, the EoR role was held by Dixie Ann Simon, P.Eng. from January to July 2022 and by Manuel Monroy, Ph.D., P.Eng. from August to December. Dixie Ann Simon is the current EoR.

**Table 1-1: Responsible Persons**

| FUNCTION | NAME | COMPANY | CONTACT INFORMATION |
|---|---|---|---|
| Engineer of Record (EoR) | Dixie Ann Simon, P.Eng. | WSP E&I Canada Ltd. | dixieann.simon@wsp.com<br>250-643-3410 |
| TDF Qualified Person | Nicole Pesonen | Myra Falls Mine Ltd. | nicole.pesonen@myrafallsmine.com<br>250-202-9468 |

# 2 BACKGROUND AND FACILITY DESIGN

## 2.1 ELEVATION DATUM AND COORDINATE SYSTEM

The global coordinate system used for surface works at the mine is the North American Datum of 1983 (NAD 83) with coordinates projected to Universal Transverse Mercator (UTM) Zone 10 and the geodetic datum is Canadian Geodetic Vertical Datum (CGVD) 1928 and hybrid geoid model HTv2_0.

Before 2016 a local grid coordinate system (Mine Grid) was used for the site; where older data is referenced it has been converted from Mine Grid to UTM. Mine Grid distances are in meters but bearing and elevations are adjusted. Mine Grid north is on a bearing of approximately 48° relative to true north. Mine datum elevations are adjusted upwards by 3,047.518 m so that all values remain positive to the bottom of the underground mine. Mine datum and geodetic elevations do not overlap. The lowest topographic point near site is the surface of Buttle Lake at approximately geodetic elevation 222.5 m (Mine Grid elevation 3,270 m), whereas the highest point near site is Mt. Myra at geodetic elevation 1,810 m (Mine Grid elevation 4,857.5 m).

## 2.2 HISTORICAL DEVELOPMENT

The MFM is an underground polymetallic base metal mine, located within Strathcona-Westmin Provincial Park, approximately 60 kilometres southwest of Campbell River, British Columbia. Prospecting began in the early 1900s, with the first industrial mine production in the 1960s and the development of the Lynx open pit. Most surface mining operations terminated around 1975, after which the underground development of the Lynx and H-W ore bodies commenced. During this period, the cyclone segregated sand fraction of the tailings was used as backfill in decommissioned underground workings, and the fine fraction of the tailings was deposited directly in the south end of Buttle Lake. In the early 1980s the provincial government prohibited further tailings deposition to Buttle Lake due to concerns over water quality, resulting in the design and construction of the Old TDF. The Old TDF operated as the primary TDF between 1984 and 2008, with final deposition in 2011.

Additional details on the design and operation of the Old TDF are presented in Section 2.3.

## 2.3 CONSTRUCTION SUMMARY

The Old TDF was designed by Knight Piésold Ltd. with a modified-centreline (upstream) constructed tailings dam in the early 1980s. Conventional cyclone overflow tailings in the Old TDF were hydraulically placed from the outer embankment, which was raised periodically by filling with till and waste rock on top of the upstream side of the previous berm and over the edge of the uncompacted tailings beach, achieving an overall dam slope of about 4H:1V. The Old TDF included two primary deposition cells: Area I and Area II.

Further investigations and stability analysis in the mid-1990s by Knight Piésold Ltd. and Klohn-Crippen Consultants Ltd. (Klohn), determined that the tailings had a high susceptibility to liquefaction, and therefore the Old TDF had a high probability of failure during strong seismic ground motion. Klohn was retained to design a seismic upgrade for the Old TDF and assume the role of geotechnical engineering consultant for the TDF. The Seismic Upgrade Berm was built between 1999 and 2013 to buttress the outer embankment.

In the early 2000s Klohn determined that the Old TDF's outer embankment had reached its practical elevation limit. Two new internal cells were constructed on the tailings surface at a suitable setback from the outer embankment (Klohn, 2001a). Soon after construction of the new cells, the mine constructed a Paste Plant to produced thickened paste tailings. The two cells were then combined to form the Amalgamated Paste Area (APA), and the combined perimeter cell berm was designated the APA Berm (formerly called the Paste Berm). The APA Berm is constructed of well-graded waste rock with some coarse tailings sand inclusions in various areas.

WSP has fulfilled the role of geotechnical engineering consultant for the TDFs at Myra Falls Mine since 2006. WSP has designed and implemented several significant upgrades to the Old TDF:

- A review of the APA Berm indicated that it would deform significantly during a seismic event. WSP included a conceptual seismic stabilization plan for the APA berm in preliminary closure plans in 2011 and produced a detailed design of a toe berm in 2016. The toe berm was constructed in 2017.
- A review of the hydrology of the Old TDF indicated that the existing Lower Lynx Diversion Ditch (LLDD) was significantly undersized with respect to the Inflow Design Flood (IDF) from the upland terrain. A design for upgrade of the LLDD was prepared in 2015 and implemented in 2015/2016.
- A review of the surface water hydrology of the Old TDF indicated that existing drainage structures within the facility were not sufficiently sized to convey the IDF from within the facility. A design for new decants, new culvert crossings under the Operations Spillway, a new lined channel in the West Strip, and a new Surge Pond were prepared in 2015 and implemented in 2015/2016.
- The Old TDF Closure Phase 1 design (Wood 2018b and WSP 2022) is the first phase of implementation of the Old TDF Closure Cover Permit-Level design (Amec Foster Wheeler, 2016g).

The Old TDF is currently in the "Transition" phase of its lifecycle (between Operations and Closure-Active Care) as defined by the CDA mining dams bulletin (CDA, 2019). A permit level closure cover design was prepared by WSP in December 2016 (Amec Foster Wheeler, 2016f), and a detailed design for Phase 1 of the work was prepared in 2018 and 2022 (Wood, 2018b and WSP, 2022). In 2022 between 22 June 2022 and 24 August 2022 MFM completed Phase 1 construction, detailed below. (WSP, 2023a).

## 2.4 DAM CLASSIFICATION

The Old TDF is assessed as having a High consequence classification relative to criteria outlined in Table 2-1 of the CDA guidelines (CDA, 2013), based primarily to the potential environmental consequences associated with release of tailings and mine waste into the hypothetical breach inundation area, which are interpreted by MFM to constitute a "significant loss or deterioration of important fish habitat". This consequence classification was confirmed by MFM upon the completion of a dam breach assessment (WSP, 2022).

## 2.5 KEY DESIGN CRITERIA

Key design criteria for the Old TDF are summarized in Table 2-1 below.

**Table 2-1: Old TDF Design Criteria**

| ASPECT | ORIGINAL DESIGN CRITERIA | UPDATED CRITERIA[1] |
|---|---|---|
| Environmental Design Flood (EDF) | Based on 24-hour storm event.<br>Assume diversion functions.<br><br>1/200 AEP, 24-hour storm event. | Based on 24-hour storm event.<br>Assume diversion functions.<br><br>1/200 AEP, 24-hour storm event. |

| ASPECT | ORIGINAL DESIGN CRITERIA | UPDATED CRITERIA[1] |
|---|---|---|
| Inflow Design Flood | Based on 24-hour storm event<br>Assume diversion failure.<br>Operations and Closure:<br>1/1000 AEP, 24-hour storm event | Based on 24-hour storm event<br>Applies to both diversions and impoundment.<br>Operations, Transition, Closure-Active Care[2]:<br>1/3 between 1/1000 AEP and Probable Maximum Flood (PMF)<br>Closure-Passive Care:<br>2/3 between 1/1000 AEP and PMF |
| Flood storage and freeboard | Operations:<br>Dry in normal conditions.<br>Flood attenuation through storage<br>Spillway flow if diversion ditch breaches<br>Spillway flow if Environmental Design Flood exceeded.<br>Minimum 0.5 m freeboard<br>Closure:<br>Dry cover, no flood storage or freeboard. | Operations, Transition:<br>Dry in normal conditions.<br>Minimize water storage.<br>Spillway flow if EDF exceeded.<br>Minimum 1.0 m freeboard up to IDF Closure-Active Care and Closure-Passive Care:<br>Dry cover, no flood storage or freeboard. |
| Dam Stability (static) | Short term or temporary: FoS[3] ≥ 1.3<br>Long term, steady state: FoS ≥ 1.5 | Short term or temporary: FoS ≥ 1.3<br>Long term, steady state: FoS ≥ 1.5 |
| Dam stability (post-seismic) | Operations and Closure:<br>Based on 50% of Maximum Credible Earthquake, PGA = 0.30 g<br>M7.5 intraplate earthquake<br>Post-seismic FoS ≥ 1.1 | Operations, Transition, Closure-Active Care[2]:<br>1/2475 AEP, 0.55 g<br>M9.0 subduction earthquake<br>Closure-Passive Care:<br>1/2 between 1/2475 and 1/10000 AEP, 0.63 g<br>M9.0 subduction earthquake<br>Post-seismic FoS ≥ 1.2, post-earthquake |

**Note(s):**

1. Updated criteria are derived from the updated CDA Guidelines and Mining Dams Bulletin (CDA 2013, 2014), revised EMLI requirements for 1.0 m minimum freeboard, MOE requirements for the EDF magnitude, and the updated seismic hazard assessment (Amec Foster Wheeler 2016b).
2. CDA Mining Dams Bulletin (CDA 2014) recommends that the higher "Closure – Passive Care" standards should be considered where it is anticipated that the "Closure – Active Care" configuration is expected to last decades or centuries if there are not sufficient resources on hand to address emergencies stemming from extreme floods or major earthquakes.
3. FoS: Factor of Safety.
4. Seismic design criteria are to be applied to normal wet-season operating water level conditions, and conversely hydrotechnical design criteria are to be applied in static conditions. The hydrotechnical and seismic design criteria constitute separate extreme loading conditions as defined in Section 5.0 of the CDA geotechnical bulletin (CDA 2007).

# 3 CLIMATE REVIEW

## 3.1 PRECIPITATION

Monthly precipitation totals and extremes are presented in Table 3-1 and Figure 3-1. Annual precipitation totals are summarized on Figure 3-2. Based on data collected between 1979 and 2022, the site has an average annual precipitation of 2,622 mm. The total annual precipitation recorded in 2022 was less than average with 1,562 mm and was made up of 1,330 mm rain and 232 mm of snow water equivalent. It should be noted that snowfall values are estimated using recorded snow depth, with the assumption that snow density is equal to 10% of water density.

**Table 3-1: Monthly and Historical Precipitation**

| MONTH | MONTHLY TOTAL PRECIPITATION (mm) | |
|---|---|---|
| | HISTORICAL AVERAGE [1] | 2022 |
| January | 368 | 291 |
| February | 261 | 137 |
| March | 251 | 174 |
| April | 155 | 180 |
| May | 96 | 2 |
| June | 63 | 34 |
| July | 43 | 12 |
| August | 57 | 15 |
| September | 124 | 22 |
| October | 337 | 197 |
| November | 477 | 152 |
| December | 391 | 348 |
| **Total** | **2622** | **1564** |

**Note(s):**

1. Historical precipitation data was obtained from MFM from the former Powerhouse weather station from 1979 to 2014, from the Paste Plant weather station from 2015 to 2020 and the Camp weather station onwards.
2. Snow depth data was manually checked for erroneous values (large spike in snow depth). When one was observed, the hourly data for the day was calculated after the erroneous value was removed.

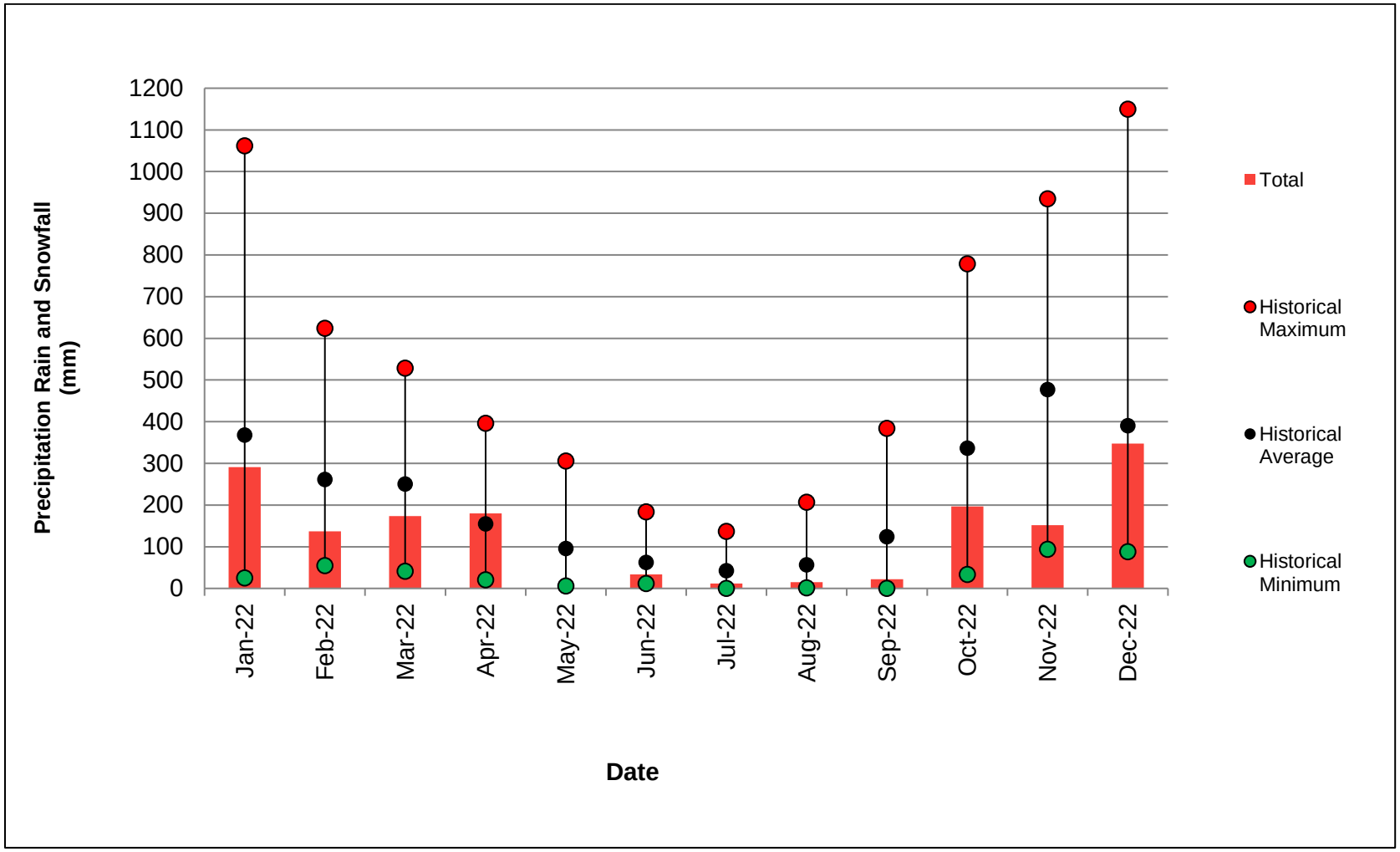



**Figure 3-1: Monthly Precipitation Data**

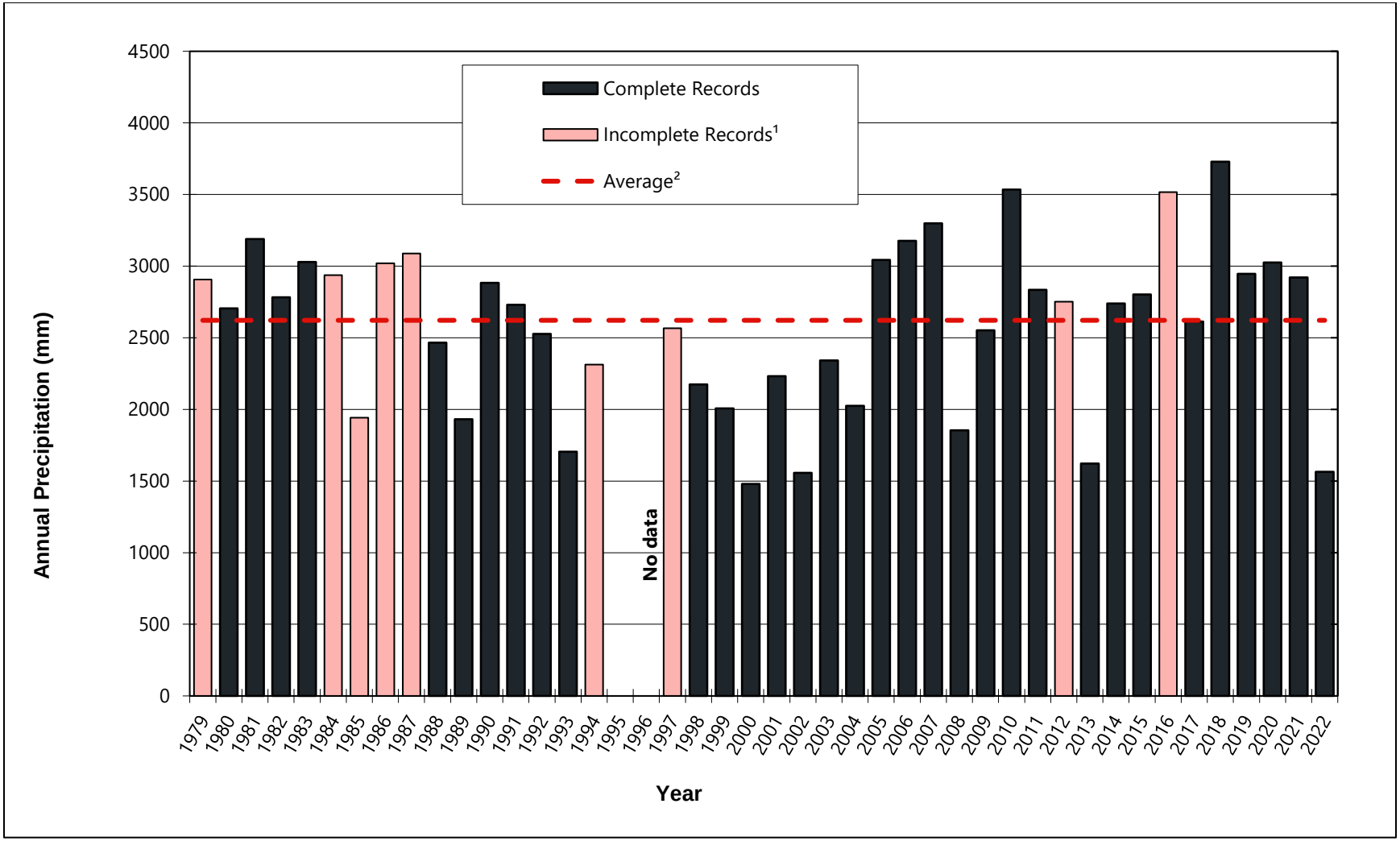



**Figure 3-2: Annual Total Precipitation 1979-2022**

## 3.2 TEMPERATURE

Monthly average temperature extremes for 2022 were recorded at the Camp weather station and are compared to the historical data (2012 to 2022) in Table 3-2.

**Table 3-2: Monthly Temperatures**

| MONTH | HISTORICAL AVERAGES (°C) [1] | | | 2022 AVERAGES (°C) [1] | | |
|---|---|---|---|---|---|---|
| | DAILY MINIMUM | DAILY AVERAGE | DAILY MAXIMUM | DAILY MINIMUM | DAILY AVERAGE | DAILY MAXIMUM |
| January | -1.0 | 0.7 | 3.1 | -2.6 | -0.8 | 1.2 |
| February | -1.2 | 1.2 | 5.3 | -2.3 | 0.2 | 5.0 |
| March | 0.2 | 3.6 | 8.7 | -0.1 | 3.0 | 8.3 |
| April | 2.4 | 6.8 | 12.7 | 0.0 | 3.4 | 8.3 |
| May | 6.8 | 12.5 | 19.2 | 3.0 | 8.0 | 13.6 |
| June | 9.7 | 15.2 | 21.6 | 8.1 | 13.4 | 19.6 |
| July | 12.8 | 19.0 | 26.1 | 12.4 | 18.9 | 26.3 |
| August | 13.4 | 19.3 | 26.5 | 14.1 | 20.6 | 28.9 |
| September | 9.8 | 14.3 | 20.5 | 9.8 | 15.9 | 24.3 |
| October | 5.4 | 8.5 | 13.0 | 6.7 | 11.0 | 18.2 |
| November | 1.0 | 3.0 | 5.7 | -1.5 | 0.2 | 2.4 |
| December | -1.7 | 0.0 | 2.0 | -4.3 | -2.4 | -0.5 |

**Note(s):**

1. Historical temperature data was obtained from MFM from the former Powerhouse weather station from 1979 to 2014, from the Paste Plant weather station from 2015 to 2020 and the Camp weather station onwards.

2. Values shown are averages of the recorded daily average, daily maximum, and daily minimum temperatures.

# 4 TAILINGS MANAGEMENT

To upgrade various infrastructures on site, MFM went into care and maintenance in June 2015 when milling operations and tailings production discontinued. Tailings deposited prior to 2015 were produced using a hydro cyclone process to separate the mill tailings stream into fine and coarse tailings. The tailings stream was typically separated into approximately 55% coarse tailings and 45% fine tailings by dry mass. The fine tailings were then thickened at the Paste Plant and deposited in the TDFs; however, coarse tailings were used as underground backfill with the excess stockpiled in the Reclaimed Sand Area (now the site of the Surge Pond) or used for construction. Tailings deposition in the Old TDF ceased in 2011. Details on how coarse and fine tailings were processed and stored are available in the 2016 DSI (Amec Foster Wheeler 2017c).

In 2018 MFM restarted mining operations and tailings were produced and deposited (in the Lynx TDF) in September and December of that year when mill commissioning tests were being conducted. Production started again in 2019 and tailings were produced and deposited. The tailings management process at MFM changed during the upgrades, these changes included a change to the use of unfractionated tailings for underground backfill. Surface tailings deposition strategy was amended as well to use unfractionated tailings paste or cake. The upgraded Paste Plant which facilitated the change is similar in design and function to the prior configuration and includes a gravity thickener, vacuum filters, mix tanks, and positive displacement pumps.

## 4.1 OLD TDF TAILINGS MANAGEMENT

The Old TDF is in the Transition phase of its lifecycle (between Operations and Closure). The volume of tailings placed in the facility since 2009 is insignificant. The APA Berm is at its final elevation of approximately 344.0 m and has not been raised since May 2006. The tailings inside the APA Berm are at the maximum storage elevation of 342.0 m.

Survey data indicates the APA Berm is not subject to significant ongoing settlement or deformation; however, the sloping paste surface of the APA continues to be gradually eroded by surface runoff. The LiDAR survey of July 2015 indicated the erosion gullies were up to about 2 m deep and 6 m wide. An unmanned aerial vehicle (UAV) survey of January 2018 indicated the size of the gullies has increased to about 8 m wide. The erosion appears to have stabilized based on observations during site visits, conversations with MFM personnel and recent surveys.

The eroded material is ultimately deposited in low-gradient areas along the upstream side of the APA Berm, reducing the overall flood storage in the APA. Although storage has been reduced, the 1/200-year EDF can still be stored without overtopping of the Old TDF spillway. The reduced storage capacity results in higher water levels in the APA and subsequently higher flows to the Surge Pond through the East and West Decants. The Surge Pond spillway will not become active at flows less than the EDF.

Grading work required to re-establish APA's design EDF (1/1000-year) water levels and to mitigate erosion of the paste going forward was completed during the 2022 Phase 1 Closure construction (WSP, 2022a). The EDF storage criteria is 1/200.

# 5 WATER MANAGEMENT

The mine's water management system has two main purposes:

1. Divert non-contact water around the surface workings, waste rock dumps, and tailings facilities and convey the water directly into Myra Creek.
2. Capture contact water including surface runoff and pumped water from mine-affected areas and convey it to the water treatment system for release to Myra Creek.

The water management system consists of a series of diversion ditches located upslope of the mine area, storage areas within the tailings facilities, various pumping systems, decant structures, and a series of treatment ponds. MFM monitors the treated water for water quality.

The following sections provide a brief description on the configuration and performance of the pertinent aspects of the water management system. For a detailed account of water quality monitoring results and objectives, refer to MFM's annual reports: "Myra Falls Mine -2022 Reclamation Report for Mines Act Permit M-26" (RGC, 2023a) and "2022 Surface Water and Groundwater Monitoring Report, Nyrstar Myra Falls" (RGC, 2023b) submitted to MOE.

For a detailed account of site water balance under peak demand, see WSP's previous water management report (AMEC, 2008a). The site-wide water balance was updated in 2020 by RGC as part of the Site-Wide Geochemical Model Update.

## 5.1 NON-CONTACT WATER

The main diversion ditch system consists of three ditches and is located on the north side of the valley and collects non-contact runoff water from the three primary drainage areas upslope from the mine site. These are highlighted on Drawing 010707. The three ditches which make up the main diversion ditch system are:

3. Arnica Diversion Ditch: flows east to west above the Lynx TDF into Arnica Creek.
4. Upper Lynx Diversion Ditch (ULDD): flows from west to east above the Lynx TDF and into a natural unnamed stream, locally referred to as "Cascade Reach".
5. Lower Lynx Diversion Ditch (LLDD): diverts Cascade Reach and runoff from the hillside above the Old TDF from west to east along the north upstream edge of the Old TDF and into Myra Creek downstream of the Pumphouse 4 Bridge.

Formal inspections of the diversion ditch system are typically carried out on a quarterly basis, and more frequently during and immediately after significant storm events. As required, inspection and maintenance of the LLDD is carried out during MFM's weekly inspections as per the OMS Manuel with any unusual observations, if any, reported to WSP. Typical maintenance activities carried out by MFM for the diversion ditch system have included removal of fallen trees, rocks or debris from the ditches, and minor repairs to the LLDD lining. WSP Inspection reports are included in Appendix C.

Observations for the Arnica Diversion and Upper Lynx Diversion are detailed in the 2022 Lynx TDF DSI report (WSP, 2023e).

### 5.1.1 LOWER LYNX DIVERSION

MFM completed repairs of the damage to the liner in 2019. No further damage was observed during WSP's 2022 inspections.

MFM inspected the LLDD regularly during 2022. Their reports and photographs document that it was functioning as intended through the reporting period.

### 5.1.2 SEISMIC UPGRADE BERM

The original design intent for water management of the Old TDF Seismic Upgrade Berm (SUB) area is for distributed runoff over the clean fill cover directly into Myra Creek.

Following the completion of the Seismic Upgrade Berm in 2013 there have been some observed areas of ponded water on the relatively flat surface of its main bench. The Seismic Upgrade design assumes that the buttress remains unsaturated. Ponding water on top of the buttress potentially increases local infiltration and could reduce stability conditions, and therefore potentially represents a departure from the design. The 2013 Construction As-built Report recommended grading the surface of the SUB at a minimum of 2% towards Myra Creek to reduce ponding. WSP proposed a regrading design in the Old TDF Closure Cover Phase 1 Detailed Design (Wood, 2018b and WSP, 2022). The proposed regrading was completed in 2022 and directs surface runoff from the 6:1 slope and main bench areas through a central drainage swale towards the main drainage channels, which conveys surface water down to Myra Creek. (WSP, 2023a).

## 5.2 CONTACT WATER

The Old TDF receives water from the following sources:

- Release of porewater from within the tailings mass during long-term consolidation.
- Precipitation on the impoundment area.
- Groundwater flux into the facility.
- Discharge from the LLDD sub-drainage system.
- Discharge from the Diversion Ditch Springs Drain (DDSD)

The release of water due to the long-term consolidation of the tailings in the APA and the Strip is considered negligible in the current surface water balance (as the consolidation of these areas is functionally complete with respect to measurable settlements). Precipitation is, therefore, the largest source of water to the Old TDF (about 1 million $m^3$ per year) and the influx of groundwater is an important secondary source (about 5 to 10 L/s or 160, 000 $m^3$ per year of additional flow to the sub-surface) (RGC, 2014b). Shallow groundwater flows are significant with respect to the contaminant load balance for this area of the site. Shallow flows also affect surface water management when it flows to the Strip Area at the toe of the east abutment of the APA Berm.

The LLDD subdrain system drains water to the north side of the APA where it then flows across the tailings surface to either the east or west decant. The total volume of water reporting to the tailings surface from these drains is not known. The drains have typically been observed to be dry since installation in 2016, except during peak runoff events where three of the drains have been noted to flow "full", estimated to be on the order of 20 L/s each.

The Diversion Ditch Springs Drain (DDSD) was constructed in August 2016 to capture and convey seepage water from a large spring at the APA Berm east abutment. Described further in Section 5.2.3.

Water leaves the Old TDF by surface drainage and subsurface drainage into the underlying aquifer. The Inner and Outer Drains collect sufficient groundwater to capture most of the subsurface geochemical load. Some groundwater bypasses the drains and flows down the valley in the underlying aquifer. Groundwater flows in the Inner and Outer Drains report to the treatment system via Pumphouse 4. Further discussion of flows to groundwater and the Old TDF under-drains is provided in RGC (2014a) and was incorporated into the Interim Site-Wide Closure and Reclamation Plan that was submitted in July 2014 (RGC, 2014c).

The current water management system is designed to convey flows from the various internal catchments to the Surge Pond up to the IDF. Flows from the Surge Pond up to 1/1000 AEP are routed to the treatment system. Flows more than 1/1000 AEP, up to the IDF, would be discharged to Myra Creek through the Surge Pond Emergency Spillway.

Key water management issues encountered in the Old TDF during the reporting period are discussed in the sections that follow.

### 5.2.1 AMALGAMATED PASTE AREA

The APA is configured as an internal impoundment cell containing a paste stack that slopes downward at about 5% from WRD 6 to the APA berm. New decants were constructed in 2016 in the impoundment's southeast and southwest corners. Approximately the western two-thirds of the surface drain to the West Decant at the southwest corner, from which it is routed through a pipeline to the Surge Pond. The eastern third of the surface drains to the East Decant, from which it is routed through a pipeline to the East Strip area. A single pond will form between the decants across the length of the APA during peak runoff events or in the event that the decants have reduced functionality or become blocked.

The old decant structure was the single means of passive drainage in operational conditions until 2016 when the East and West Decants were constructed. It is located near the new West Decant, and previously conveyed water through a pipeline directly to the treatment system inlet ditch. The portion of the old decant pipeline passing below the APA berm was to be decommissioned by grouting in 2017; however, equipment failures during the grouting operation resulted in only the downstream end of the section being grouted, as described in the 2017 DSI (Amec Foster Wheeler, 2018b). The upstream end of the pipe and the decant tower remain unfilled. Further work has been recommended to complete decommissioning of the old decant.

A shallow pond is typically present in the southeast corner of the APA during the wet season and has been associated with seepage at the toe of the APA Berm. The APA Buttress project included measures for reducing the permeability of the upstream face of the APA Berm, providing additional filtration on the downstream face, and included a continuous drainage layer from the East Decant to the east abutment. The drainage layer includes 3 outlets and discharge of seepage from the outlets is generally observed during the wet season.

### 5.2.2 TDF STRIP AND OLD TDF SURGE POND

Water levels in the Strip Area were generally at normal levels during the reporting period. During the WSP inspection in October 2021, minor bubbling was observed within the Strip, approximately 5 m east of the APA spillway. The cause of the bubbling is unknown but is thought to be through a buried pipe reportedly present in the area that was damaged during maintenance activities. Monitoring of the area by MFM continued throughout

2021 with no increase in activity being reported. During WSP's 14 January 2022 inspections the bubbling was no longer observed to be present. MFM inspections also supported this as no bubbling in the area was noted by MFM in 2022.

Contact water flows west from the East Strip, through 3 parallel culverts below the APA Operations Spillway, and through the geomembrane-lined West Strip Channel into the Old TDF Surge Pond. In 2022 WSP identified that the East Strip is full of sediments from the discharge of the Zim Pro line. The sediments prevent the free flow of water from the east abutment. The sediments should be removed as stated in the 2022 recommendations summary table in Section 10.2.

The Surge Pond is lined with high density polyethylene (HDPE) geomembrane to reduce the infiltration of water through the tailings and into the underlying aquifer. The design includes an underdrainage system below the liner to reduce the potential for liner uplift when the pond is empty. Discharge from the subdrain outlet piping has not been observed to date.

The design for the Surge Pond assumes a normal operating water depth of about 2.5 m to promote sedimentation in order to reduce the volume of eroded tailings or other sediments reporting to the treatment system. The pond has approximately 1 m of freeboard below the lip of the spillway during normal operations. A concrete decant tower is located at the west end of the Surge Pond. The tower has a large orifice to control flow during normal operations and has a low-level outlet (LLO) gate valve that can be opened to lower water levels to within 0.5 m of the bottom of the deepest part of the pond for maintenance or inspection.

Operating the pond at the design water level provides the intended degree of surge attenuation and optimizes sedimentation within the Surge Pond. Operating the pond drawn down to the LLO greatly increases the potential surge attenuation capacity until the upper orifice becomes active. A which time an open LLO results in increased flow and high sediment loading to Super Pond. Reportedly, operating with the LLO open has resulted in non-compliance. As such, the Surge Pond is operated with the LLO closed. Both management strategies (LLO open or normally closed) are safe from a dam management perspective.

A field review in summer 2018 identified that the LLO gate valve had been severely damaged by corrosion. The corrosion damage has eroded the seating surfaces of the valve body and gate and prevents full closing of the valve. A stainless-steel plate was suspended over the LLO on the outside face of the decant tower as a temporary measure until a new valve can be installed. The plate was mostly effective, and the pond operated at or near design normal operating water levels throughout the reporting period.

### 5.2.3 DIVERSION DITCH SPRING DRAIN

The Diversion Ditch Springs Drain (DDSD) was constructed in August 2016 to capture and convey seepage water from a large spring at the APA Berm east abutment. The seepage water is thought to originate as overflow from the valley sidewall within the natural talus adjacent to the Old TDF. Flow from the spring has only been observed during periods of intense peak runoff. The DDSD consists of a high permeability capture and conveyance zone upstream of the APA Berm which discharges to the east end of the East Strip. The high permeability zone is isolated from the adjacent APA tailings and APA Berm fills by a filter sequence and was constructed using non-PAG materials to reduce the potential for water contamination within the drain.

MFM inspections reported that the DDSD functioned as intended. During a 14 January 2022, WSP inspection it was noted that the DDSS had low discharge.

## 5.3 OTHER CONTACT WATER MANAGEMENT

In other areas of the mine site where runoff, seepage, and other flows are potentially impacted by acid rock drainage (ARD), these flows are collected in various sumps and ditches and directed to the water treatment system. Located within the vicinity of the Old TDF, these areas include waste rock dumps, haul roads, and the dam shells. Flows are directed to the treatment system by a combination of ditching, pumping and decants.

## 5.4 WATER TREATMENT

The water treatment system is based on mitigation of low pH water to reduce the solubility of dissolved metals. Lime is added in mixing tanks at the inlet of the treatment system at the head of the Super Pond which is the primary settling pond on site. From the Super Pond the treated water flows through six additional polishing ponds to improve water clarity. The locations of the Super Pond and the Polishing Ponds are shown on Drawing 010702. The various aspects of the water treatment system are inspected monthly by MFM personnel. The details of the operation and performance of the water treatment system including water management inspection reports by MFM are summarized in MFM's annual reports to EMLI and MOE for 2021 (MFM, 2022) (Robertson GeoConsultants Inc., 2022). This DSI does not report on dam safety conditions for the water treatment system ponds. WSP prepared a 2022 DSI report for the Super Pond and the Polishing Ponds under a separate cover (WSP, 2023c). A dam safety review for the ponds was conducted in 2020. (Wood, 2021e).

# 6 DAM INSPECTIONS

Dam safety inspections at MFM are carried as per the OMS Manual and are conducted by WSP and MFM throughout the year. This section provides a summary of the dam safety inspections performed during 2022 at MFM.

## 6.1 INSPECTIONS BY MFM

Visual inspections of the Old TDF are carried out as part of ongoing monitoring activities. Inspections are routinely conducted or event-driven, following flooding or an earthquake. Routine TDF inspections were carried out weekly by MFM during most of the year and monthly if the site is covered in snow. The LLDD is inspected weekly with the upper diversions inspected quarterly.

Inspection reports were completed with the inclusion of photographs. With respect to the Old TDF, the reviews were based on visual inspection of the following:

- The Old TDF APA, Strip, and Surge Pond areas for the extent and clarity of ponded water and the function of the decant in each area.
- The Old TDF APA Berm, OEB, and Seismic Upgrade for surface erosion, settlement, depressions, cracks, bulges, and signs of seepage.
- The diversion ditch for flow rate, obstructions (slumps, fallen trees, etc.), and damage to lined areas.
- Any other anomalies or changes for any of the above structures.

MFM reported fifty-two (52) inspections between 07 January and 30 December 2022. Forty-four (44) of the inspections were documented with a written report and photographs. Five (5) of the inspections were documented with reports only. Three (3) were documented with photos only. MFM inspections are not always completed on weeks when WSP is performing their inspections however, in general, the observations in MFM inspection reports are consistent with those made by WSP during quarterly inspections.

## 6.2 INSPECTIONS BY WSP

The EOR or designate inspected the Old TDF, and diversion ditch systems on a quarterly basis during the reporting period as outlined in the OMS. Conditions are observed in and around the facilities, with emphasis on water management, dam stability, and seepage conditions. WSP personnel met with MFM staff during the inspection site visits to discuss any concerns relating to the facility operation. WSP carried out four (4) inspections in 2022. Dam inspection summaries are presented in Appendix C. Where applicable, the outstanding actions are referenced to the recommendation's summary in Sections 10.1 and 10.2 of this report.

# 7 INSTRUMENTATION MONITORING RESULTS

Instrumentation for monitoring performance of the Old TDF includes piezometers for measuring pore water pressures, deformation monuments for tracking dam deformation and slope inclinometers (SI's) for measuring internal deformation as well as deformation in the foundation materials. This section presents a summary of the instrumentation network and the observed data. A summary of the instrumentation status is provided in Appendix B1 while Appendix B2 provides, a summary of VWP and SI instrumentation data for 2022.

Data is received and reviewed by WSP typically on a quarterly basis or as needed. Monitoring data includes:

- Rainfall and temperature records (refer to Section 3).
- Vibrating wire piezometer readings.
- Deformation monument surveys.

WSP also carries out surveys of the slope inclinometers three times per year, typically in Q2, Q3 and Q4.

WSP carries out periodic instrumentation data review (on a quarterly basis at a minimum) and communicates the findings of the data review with MFM through emails or oral discussions. The data reviews are summarized in Appendix B.

The piezometers and weather station are connected to an automated network. The automated network records data at frequencies varying between hourly and daily for various piezometers. The maximum readings for each week of the monitoring period were processed for review.

Some individual components of the automated network have occasionally malfunctioned resulting in some of the data recordings not being completed per the schedule outlined in the OMS. The extent of missing data and its causes are summarized within the annual DSI report. Causes of data loss are varied but mainly stem from solar charging and power supply issues. Progressive steps have been implemented to troubleshoot the system, improve its reliability, and reduce the occurrence of missed data records.

## 7.1 PIEZOMETERS

The Old TDF piezometer network comprises:

- VWPs under the outer embankment berm and in the upper tailings beach along instrumentation planes A and C (data collected in Hut A and Hut C).
- VWPs located below the base of the APA Berm (data collected in Hut B).
- VWPs in the APA Berm fill, foundation tailings and soils, divided between instrumentation Planes 1 through 6.
- VWPs in the paste tailings, in the southeast corner of the APA.
- VWPs at the base, southeast slope toe and east slope crest of the Old TDF Surge Pond.
- TDF Surge Pond, installed during the 2016 Surge Pond East Slope Site Investigation.

The configuration of the Old TDF piezometer network is shown in plan and profile on the attached Drawings 010702, 010703, 010704, 010705 and 010707. Most of the piezometers monitor porewater pressures within the tailings except for two (2) VWPs that were installed in the underlying foundation soils.

Thresholds for the Old TDF piezometers were developed in 2016 based on limit equilibrium stability models (Amec Foster Wheeler, 2017a). Four threshold levels were established for each piezometer based on changes to static and post seismic FoS within the model relative to varying porewater pressures. The stability model is based on groundwater pressure assumptions that average general spatial trends seen in the monitoring data; however, some of the piezometers typically report trends that vary from the general trend. For this reason, some of the piezometers routinely exceed their respective thresholds. A review of the stability models to refine the thresholds was carried out in 2021 to improve the pore pressure monitoring. Thresholds updated in 2021 are included in the 2022 piezometer data table which is presented in Appendix B. Thresholds were not updated in 2022.

Thresholds are developed in relation to each piezometer; however, most of the piezometers on a plane would need to meet or exceed the threshold level in order to develop the associated reduction in FoS. WSP reviews the exceedances in detail on a quarterly basis. Individual exceedances are not considered as dam safety issues provided the monitoring data falls within prior patterns, given that the generalized spatial model was developed on the basis of the overall dataset.

Pore pressures recorded during the reporting period generally showed similar seasonal trends consistent with previous years. Pressures have been relatively higher in winter with readings decreasing towards summer and fall seasons. The lower pressure readings have typically occurred in August to September. The 2022 pressure readings were within the thresholds that were updated in 2021.

In October 2022, WSP conducted an instrumentation review which included a field review of the VWP network for the Old TDF (WSP, 2023d). A summary of the review is provided below.

- Data logger in HW office building (HW Hub) is the base station for the RF401 network and acts as a L900 RSTAR Hub for the RSTAR network of the Old TDF.
- In 2018, Hut B (previously a Campbell Scientific data station) was replaced by DT2040, a 20 VWP channel RST branded data logger.
- Hut A and Hut C are the original CS Data logger stations that appear to have been in use for an extended period. Some modular components that make up the data station are dated and have not been manufactured for several years. The functionality and accuracy of these components was not assessed during this review, but they appeared to be functional.
- Hut A has a direct line of sight with the HW Hub.
- Hut C does not have a direct line of sight with HW Hub, and communication issues have been recently reported.
- During review of the Old TDF monitoring system, it was confirmed that two previously identified VWP sensors were functional and have not been connected to the monitoring network. (VWP 21715 and VWP 36972).

## 7.2 DEFORMATION MONUMENTS

Deformation monuments are installed on the crest of key embankments of the Old TDF to monitor horizontal and vertical movements. Monuments are installed on the APA Berm, Outer Embankment Berm and the outer crest of the Seismic Upgrade Berm as shown on Drawing 010707.

Survey of the deformation monuments were not completed in 2020 and 2021 because of the poor condition of monuments as identified in 2018. The monuments could be easily moved by hand with only very slight force applied. The survey methodology includes resection and accordingly the observed deformations are interpreted to be an error with surveying related to unstable prism mountings. MFM is currently evaluating options for a more robust method of securing the deformation monuments to the dam structure, to get better coupling of the prism to the ground surface. In 2022 MFM carried out two (2) surveys of the deformation monuments pertaining to the Old TDF were carried out by MFM in 2022. WSP did not analyse the data from these surveys because of general l to lack of data and the unreliability of the monuments.

## 7.3 SLOPE INCLINOMETERS

Two (2) slope inclinometer casings are installed in the Outer Embankment Berm of the Old TDF and identified as BH15-32 and BH15-35. Profile surveys of the casings were performed in August and March 2022. Significant displacements were not observed. A summary is presented below:

- BH15-32 – Two surveys were conducted on 22 March 2022 and 31 August 2022. Shearing-type deformation was not observed.
- BH15-35 – This SI is no longer functional.

Cumulative displacement plot for BH15-32 which includes the two readings done in 2022 is shown in Appendix B2-2.

# 8 SUMMARY OF 2022 CONSTRUCTION

A summary of construction activities on the Old TDF prior to 2022 is provided in Section 2.3. Details of 2022 construction activities are provided in the 2022 Construction Record Report (WSP, 2023a). An overview of construction activities is provided below.

WSP was retained by MFM to update and amend the Old TDF Closure Phase 1 Detailed Design document prepared in 2018 (Wood, 2018b). The 2018 detailed design was based off the Old TDF Closure Permit Design Report (Amec Foster Wheeler, 2016g). The Phase 1 construction activities in 2022 included the following:

1. Excavation and construction of the lower portions of new surface drainage Channels 1, 2A, and 3 on the Seismic Upgrade Berm;
2. Grading of the main bench of the SUB and construction of swales to promote drainage toward new constructed channels 1, 2A and 3.

WSP provided Engineer of Record, Design Engineer and construction monitoring and geotechnical laboratory services. This comprised of preparing construction drawings and specifications, providing field review, monitoring construction, and conducting geotechnical quality control and quality assurance. Construction and construction management along with procurement services were carried out by MFM. Survey control was provided by Mifflin Surveys Ltd. of Campbell River, BC. WSP personnel were on site full time during earthworks performed for the 2022 Old TDF Closure Cover Phase 1.

# 9 REVIEW OF OPERATION DOCUMENTS

## 9.1 OPERATION, MAINTENANCE AND SURVEILLANCE (OMS) MANUAL

The OMS Manual was reviewed and updated by MFM in March 2022. WSP provided comments on the update in September 2022. The OMS Manual includes dam safety requirements for the Old TDF facilities.

## 9.2 EMERGENCY PREPAREDNESS AND RESPONSE PLAN (EPRP)

MFM Emergency Procedures indicate that once an emergency has been declared, the site will execute established response practices and procedures. These form the core of the Emergency Management Program, comprised of these separate manuals: the Emergency Preparedness Plan, the Emergency Response Plan, the Emergency Communications Plan, the Environmental Emergency Response Plan, the Tailings Facility Emergency Response Plan and Mine Shutdown Emergency Procedures.

These documents provide the detailed action plans and the notification procedures and should be the primary source of response protocols in the event of an emergency.  A summary of the Emergency Management Program and associated plans is provided in Appendix E of the OMS Manual. The EPRP was reviewed and updated by MFM in March 2022.

WSP did not reviewed these documents during 2022.

## 9.3 DAM SAFETY REVIEW (DSR)

A DSR should be carried out at minimum frequency of every 5 years as per EMLI 2022. The most recent DSR for the tailings facilities was carried out in 2020 by Thurber Engineering Ltd. and was submitted to EMLI in March 2021 to meet regulatory requirements.

Formal DSRs were completed for both tailings facilities in 2013 by Robertson Geotechnical Consulting Ltd. (RGC) and in June 2016 by Tierra Group International Ltd. (Tierra). These reviews were completed at a higher frequency than the minimum frequency recommended by EMLI (2021) or the CDA guidelines (2013). A summary tracking the status of open recommendations as well as those closed in 2022 is provided in Section 10.1.

# 10 SUMMARY OF RECOMMENDATIONS

## 10.1 PREVIOUS RECOMMENDATIONS

Outstanding DSR and DSI recommendations at the time of the 2021 Dam Safety Inspection Report are provided in Table 10-1. The table indicates what action has been taken with respect to the recommendations and the status of each item in terms of priority from both dam safety and mine management/planning perspectives.

Recommendations that were indicated in the previous report as completed have been omitted from the table. A complete table of recommendations is provided Appendix D.

## Table 10-1: Summary of Previous Recommendations

| STRUCTURE | TRACKING NUMBER | PREVIOUS RECOMMENDATION | UPDATE | STATUS/PRIORITY[1] |
|---|---|---|---|---|
| **2013 OLD TDF DSR (RGC 2014A)** | | | | |
| Old TDF | 2013-19 | Expedite closure planning and construction of approved closure works. | Permit-level closure cover design developed in 2016 by Amec Foster Wheeler (2016s). This design was not approved and is scheduled to be revised/resubmitted for permitting in 2021/2022.<br>Old TDF Closure Phase 1 was partially completed in 2022. | In Progress<br>Priority 4 |
| **2014-Q3 DSI REPORT (AMEC 2014B)** | | | | |
| Old TDF | 2014-03 | Measures should be taken to mitigate erosion of the paste stack in the APA. Implementation of a simple waste rock cover is likely the most practical option. | The springs along the top of the paste stack were collected in a surface ditch. The ditch was filled over as part of the LLDD project. Re-establishing it was included in the project specification but has not been completed.<br>Additional work was carried out in this area in 2018, including cover of some areas with construction wastes.<br>A detailed design for the east half of the LLDD collector and the cover subdrain in the APA was developed. (Wood 2018b)<br>Revisions to this design were completed in 2022; however, construction is scheduled for 2024. | In Progress<br>Priority 4 |
| **2015 DSI REPORT (AMEC FOSTER WHEELER 2016D)** | | | | |
| Old TDF | 2015-04 | Install freeboard indicators in the east and west Strip and Old TDF Surge Pond (no longer applicable to West strip). | MFM is in the process of adding freeboard indicators to most ponds/sumps/impoundments at the site.<br>MFM compares and records impoundment level to culverts in the East strip. This may continue until a standard staff gauge can be installed. | In Progress, only one staff gauge installation remaining.<br>Priority 4 |

| STRUCTURE | TRACKING NUMBER | PREVIOUS RECOMMENDATION | UPDATE | STATUS/PRIORITY[1] |
|---|---|---|---|---|
| **2018 DSI REPORT (WOOD, 2019D)** | | | | |
| All | 2018-06 | 1. Carry out detailed review of instrumentation data logger wiring.<br>2. Create a wiring diagram and operation manual for each instrumentation hut.<br>3. Prepare updated scripts for all data loggers which are consistent in functionality an appropriate to the hardware. | 1. Schematic review completed by Wood and MFM.<br>2. In Progress<br>3. Not complete. | In Progress<br>Priority 2 |
| Old TDF | 2018-10 | Establish a more robust method to attach survey deformation monuments to dam surface. | Design is complete, installation is in progress. | In Progress<br>Priority 2 |
| Old TDF | 2018-12 | New corrosion resistant gate valve purchased in Q3. Install the new gate valve when conditions allow. | In Progress. | In Progress<br>Priority 4 |
| Old TDF | 2018-15 | Conduct a formal risk assessment to inform the detailed closure design, in the vicinity of the west decant, and determine if the old, partially grouted (2017) decant can be left in place (through closure and beyond) or if it must be abandoned. | To be completed during detailed closure planning. | Incomplete<br>Priority 4 |
| **2020 DSR REPORT (THURBER, 2021)** | | | | |
| Old TDF | 2020-03T | In addition to any internal training initiatives completed by NMF, the EOR should oversee informal "refresher" training sessions with monitoring and surveillance staff every 2 to 3 years to reinforce the objectives of monitoring activities and how they relate to specific failure modes. | | In Progress<br>Priority 4 |

| STRUCTURE | TRACKING NUMBER | PREVIOUS RECOMMENDATION | UPDATE | STATUS/PRIORITY[1] |
|---|---|---|---|---|
| Old TDF | 2020-05T | It is recommended that the AFW 2016 seismic hazard values be reviewed following the release of the 6th Generation GSC seismic hazard model (expected later in 2021). We understand that the GSC model will incorporate updated GMPEs and assumes an increased frequency for CSZ earthquakes. The recurrence rates and GMPEs used in AFW's 2016 seismic assessment were developed prior to 2012 and may require updating based on recent research. | WSP has recommended to MFM that this update to the seismic hazard evaluation be completed in 2023. | Incomplete<br>Priority 4 |
| **2020 DSI REPORT (WOOD, 2021D)** | | | | |
| Surge Pond | 2020-03 | Erosion of sides slopes of Lower Strip and south slope of Surge Pond.<br>Provide erosion protection. | To be completed during 2022. | Incomplete<br>Priority 3 |
| Old TDF | 2020-04 | Instrument cables are exposed and subject to damage.<br>Bury or protect instrument cables. | To be completed during 2022. | Incomplete<br>Priority 3 |
| **2021 DSI REPORT (WOOD, 2022)** | | | | |
| Old TDF | 2021-02 | Old TDF instrument Upgrades – The existing instrument network primarily was intended for monitoring pore pressures during construction and operation of the Old TDF There are not instruments in the foundation or in the tailings directly above the foundation. Instruments on some planes are sparse. | The existing instrument network should be evaluated with consideration given to long-term closure monitoring. Evaluate the existing network, assess coverage, and develop a plan for upgrading the monitoring system. Assess need to replace the lost SI and/or install additional SIs. | Plan to complete by Q4 2023, installation after reclamation.<br>Priority 3 |

| STRUCTURE | TRACKING NUMBER | PREVIOUS RECOMMENDATION | UPDATE | STATUS/PRIORITY[1] |
|---|---|---|---|---|
| Old TDF/Surge Pond | 2021-03 | Sediments have encroached around the Surge Pond west decant. | Sediments should be removed from the Surge Pond. | Q3 2022<br>Priority 4 |
| Old TDF | 2021-04 | A portion of the vertical grates have been dissolved due to rust at the Old TDF decant inlet. | Replacement of grates on Old TDF decants as needed for safety concerns or to prevent debris from entering the decant. | Q3 2022<br>Priority 3 |
| Old TDF | 2021-05 | Accumulation of sediments around the Old TDF APA decants and, in and around the spillway culverts. | During the dry season, remove sediments that have accumulated. | Q3 2022<br>Priority 4 |

Priority levels are defined by EMLI (2022) as follows:

Priority Level 1. A high probability or actual dam safety issues considered immediately dangerous to life, health or the environment, or a significant risk of regulatory enforcement.

Priority Level 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.

Priority Level 3. Single occurrences of deficiencies or non-conformances that [alone] would not be expected to result in dam safety issues.

Priority Level 4. Best Management Practice – further improvements are necessary to meet industry best practices or reduce potential risks.

## 10.2 NEW RECOMMENDATIONS FROM 2022

Table 10-2 below summarizes WSP's recommendations with respect to the operations, maintenance, and surveillance of the tailings dams and associated structures based on engineering work carried out in 2022.

Priority levels from 1 to 4 are defined by EMLI (2022) as follows:

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

## Table 10-2: New Recommendations 2022

| STRUCTURE | TRACKING NUMBER | DEFICIENCY OR NON-CONFORMANCE | REGULATORY REQUIREMENT OR OMS REFERENCE | RECOMMENDED ACTION | PRIORITY [1] | RECOMMENDED DEADLINE/STATUS |
|---|---|---|---|---|---|---|
| Old TDF | 2022-01 | Consider measures to prevent deposition of sediments from the Paste Plant area in the Surge Pond. | | Divert the flow away from the surge pond or install erosion and sediment control measures along the flow path. | 3 | 2023 Q3 |
| Old TDF | 2022-02 | Surge Pond - Dissolution of lower portion of the vertical grating. | | Grating on both decants needs to be replaced due to acidic dissolution of lower portion of the vertical grating. | 3 | 2023 Q3 |
| Old TDF | 2022-03 | East strip partially blocked by sediments from Zim pro line discharge, preventing flow from the east abutment to the spillway culverts. | | The sediments should be removed to allow unobstructed flow from the east abutment to the spillway culverts. | 3 | 2023 Q1 |
| Old TDF | 2022-04 | The geotextile/geomembrane over the buried lock blocks in the spillway is damaged, likely by grading or snow clearing activities. | | The geomembrane should be repaired prior to the onset of the 2022/2023 wet season. | 3 | 2023 Q1 |

# 11 CLOSURE

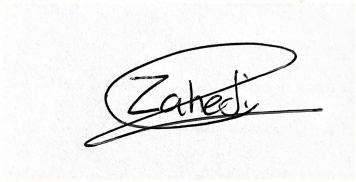
This report is subject to the limitations stated in Section 13.

This report has been prepared for the exclusive use of Myra Falls Mine Ltd., for the specific application described herein. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibility of such third parties. WSP Environment & Infrastructure Solutions accepts no responsibility for damages suffered by any third party as a result of decisions made or actions based on this report.

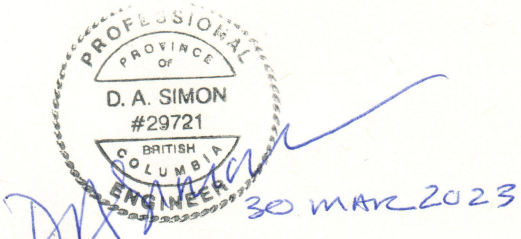
Yours sincerely,

**WSP E&I Canada Limited**

**Prepared by:**

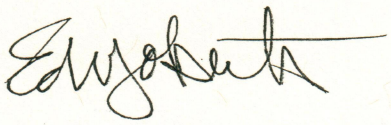


Amir Zahedi, EIT.
Mining Geotechnical Engineer in Training




Dixie Ann Simon, P.Eng.
Principal Geotechnical Engineer

**Reviewed by:**



Ed McRoberts, Ph.D., P.Eng.
Principal Geotechnical Engineer

**EGBC Permit to Practice No. 1004452**

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# 13 LIMITATIONS

1. The work performed in the preparation of this report and the conclusions presented are subject to the following:
    a) The contract between WSP and the Client, including any subsequent written amendment or Change Order duly signed by the parties (hereinafter together referred as the "Contract");
    b) Any and all time, budgetary, access and/or site disturbance, risk management preferences, constraints or restrictions as described in the contract, in this report, or in any subsequent communication sent by WSP to the Client in connection to the Contract; and
    c) The limitations stated herein.
2. **Standard of care:** WSP has prepared this report in a manner consistent with the level of skill and are ordinarily exercised by reputable members of WSP's profession, practicing in the same or similar locality at the time of performance, and subject to the time limits and physical constraints applicable to the scope of work, and terms and conditions for this assignment. No other warranty, guaranty, or representation, expressed or implied, is made or intended in this report, or in any other communication (oral or written) related to this project. The same are specifically disclaimed, including the implied warranties of merchantability and fitness for a particular purpose.
3. **Limited locations:** The information contained in this report is restricted to the site and structures evaluated by WSP and to the topics specifically discussed in it, and is not applicable to any other aspects, areas, or locations.
4. **Information utilized:** The information, conclusions and estimates contained in this report are based exclusively on: i) information available at the time of preparation, ii) the accuracy and completeness of data supplied by the Client or by third parties as instructed by the Client, and iii) the assumptions, conditions, and qualifications/limitations set forth in this report.
5. **Accuracy of information:** No attempt has been made to verify the accuracy of any information provided by the Client or third parties, except as specifically stated in this report (hereinafter "Supplied Data"). WSP cannot be held responsible for any loss or damage, of either contractual or extra-contractual nature, resulting from conclusions that are based upon reliance on the Supplied Data.
6. **Report interpretation:** This report must be read and interpreted in its entirety, as some sections could be inaccurately interpreted when taken individually or out-of-context. The contents of this report are based upon the conditions known and information provided as of the date of preparation. The text of the final version of this report supersedes any other previous versions produced by WSP.
7. **No legal representations:** WSP makes no representations whatsoever concerning the legal significance of its findings, or as to other legal matters touched on in this report, including but not limited to, ownership of any property, or the application of any law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to interpretation and change. Such interpretations and regulatory changes should be reviewed with legal counsel.
8. **Decrease in property value:** WSP shall not be responsible for any decrease, real or perceived, of the property or site's value or failure to complete a transaction, as a consequence of the information contained in this report.
9. **No third-party reliance:** This report is for the sole use of the party to whom it is addressed unless expressly stated otherwise in the report or Contract. Any use or reproduction which any third party makes of the report, in whole or in part, or any reliance thereon or decisions made based on any information or conclusions in the report is the sole responsibility of such third party. WSP does not represent or warrant the accuracy, completeness, merchantability, fitness for purpose or usefulness of this document, or any information contained in this document, for use or consideration by any third party. WSP accepts no responsibility whatsoever for damages or loss of any nature or kind suffered by any such third party as a result of actions taken or not taken or decisions made in reliance on this report or anything set out therein. including without limitation, any indirect, special, incidental, punitive, or consequential loss, liability or damage of any kind.
10. **Assumptions:** Where design recommendations are given in this report, they apply only if the project contemplated by the Client is constructed substantially in accordance with the details stated in this report. It is the sole responsibility of the Client to provide to WSP changes made in the project, including but not limited to, details in the design, conditions, engineering, or construction that could in any manner whatsoever impact the validity of the recommendations made in the report. WSP shall be entitled to additional compensation from Client to review and assess the effect of such changes to the project.
11. **Time dependence:** If the project contemplated by the Client is not undertaken within a period of 18 months following the submission of this report, or within the time frame understood by WSP to be contemplated by the Client at the

commencement of WSP's assignment, and/or, if any changes are made, for example, to the elevation, design or nature of any development on the site, its size and configuration, the location of any development on the site and its orientation, the use of the site, performance criteria and the location of any physical infrastructure, the conclusions and recommendations presented herein should not be considered valid unless the impact of the said changes is evaluated by WSP, and the conclusions of the report are amended or are validated in writing accordingly.

Advancements in the practice of geotechnical engineering, engineering geology and hydrogeology and changes in applicable regulations, standards, codes or criteria could impact the contents of the report, in which case, a supplementary report may be required. The requirements for such a review remain the sole responsibility of the Client or their agents.

WSP will not be liable to update or revise the report to take into account any events or emergent circumstances or facts occurring or becoming apparent after the date of the report.

12. **Limitations of visual inspections:** Where conclusions and recommendations are given based on a visual inspection conducted by WSP, they relate only to the natural or man-made structures, slopes, etc. inspected at the time the site visit was performed. These conclusions cannot and are not extended to include those portions of the site or structures, which were not reasonably available, in WSP's opinion, for direct observation.
13. **Limitations of site investigations:** Site exploration identifies specific subsurface conditions only at those points from which samples have been taken and only at the time of the site investigation. Site investigation programs are a professional estimate of the scope of investigation required to provide a general profile of subsurface conditions.

    The data derived from the site investigation program and subsequent laboratory testing are interpreted by trained personnel and extrapolated across the site to form an inferred geological representation and an engineering opinion is rendered about overall subsurface conditions and their likely behaviour with regard to the proposed development. Despite this investigation, conditions between and beyond the borehole/test hole locations may differ from those encountered at the borehole/test hole locations and the actual conditions at the site might differ from those inferred to exist, since no subsurface exploration program, no matter how comprehensive, can reveal all subsurface details and anomalies.

    Final sub-surface/bore/profile logs are developed by geotechnical engineers based upon their interpretation of field logs and laboratory evaluation of field samples. Customarily, only the final bore/profile logs are included in geotechnical engineering reports.

    Bedrock, soil properties and groundwater conditions can be significantly altered by environmental remediation and/or construction activities such as the use of heavy equipment or machinery, excavation, blasting, pile-driving or draining or other activities conducted either directly on site or on adjacent terrain. These properties can also be indirectly affected by exposure to unfavorable natural events or weather conditions, including freezing, drought, precipitation and snowmelt.

    During construction, excavation is frequently undertaken which exposes the actual subsurface and groundwater conditions between and beyond the test locations, which may differ from those encountered at the test locations. It is recommended that WSP be retained during construction to confirm that the subsurface conditions throughout the site do not deviate materially from those encountered at the test locations, that construction work has no negative impact on the geotechnical aspects of the design, to adjust recommendations in accordance with conditions as additional site information is gained, and to deal quickly with geotechnical considerations if they arise.

    Interpretations and recommendations presented herein may not be valid if an adequate level of review or inspection by WSP is not provided during construction.

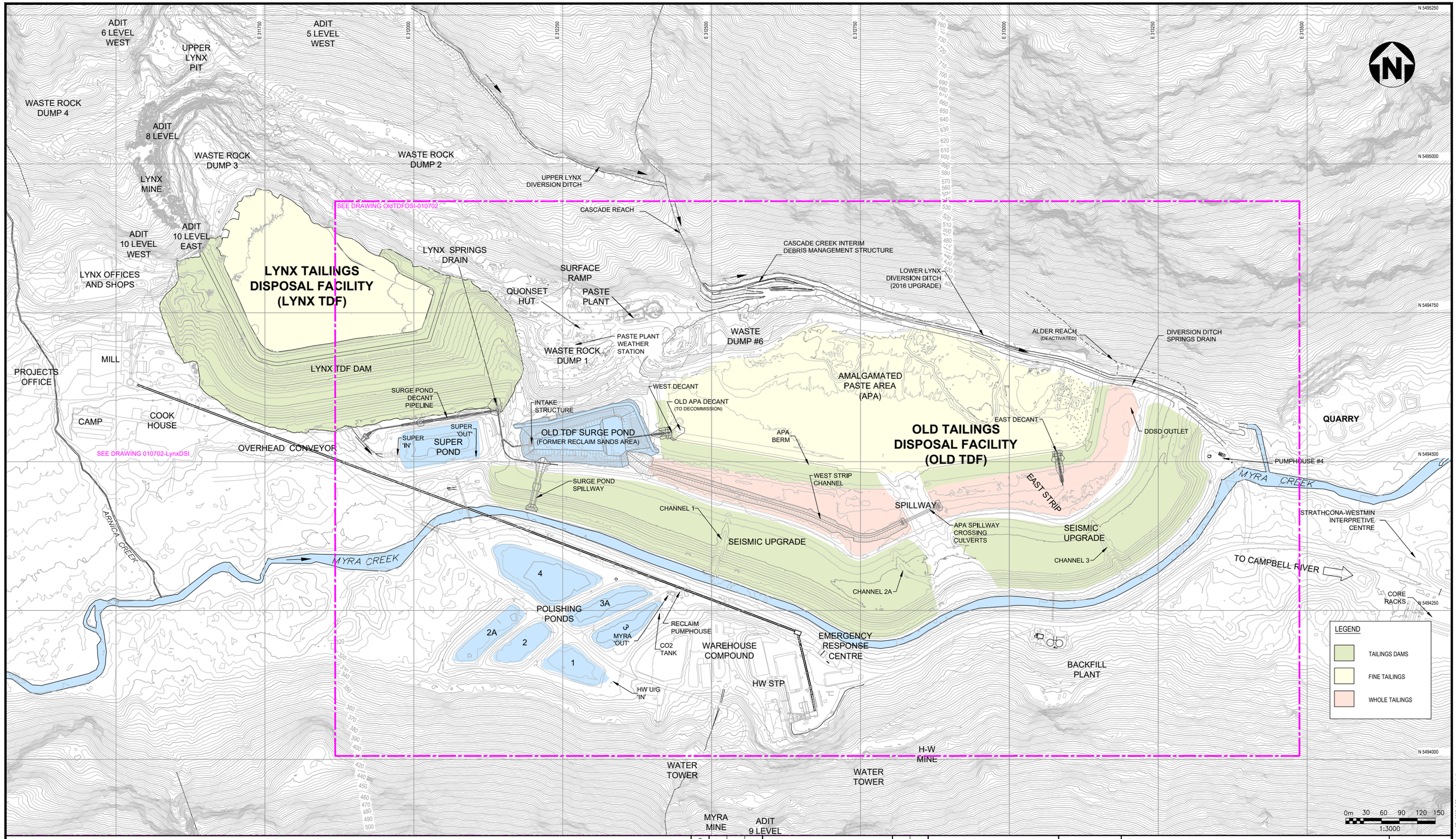
14. **Factors that may affect construction methods, costs and scheduling:** The performance of rock and soil materials during construction is greatly influenced by the means and methods of construction. Where comments are made relating to possible methods of construction, construction costs, construction techniques, sequencing, equipment or scheduling, they are intended only for the guidance of the project design professionals, and those responsible for construction monitoring. The number of test holes may not be sufficient to determine the local underground conditions between test locations that may affect construction costs, construction techniques, sequencing, equipment, scheduling, operational planning, etc.

    Any contractors bidding on or undertaking the works should draw their own conclusions as to how the subsurface and groundwater conditions may affect their work, based on their own investigations and interpretations of the factual soil data, groundwater observations, and other factual information.

15. **Groundwater and Dewatering:** WSP will accept no responsibility for the effects of drainage and/or dewatering measures if WSP has not been specifically consulted and involved in the design and monitoring of the drainage and/or dewatering system.
16. **Environmental and Hazardous Materials Aspects:** Unless otherwise stated, the information contained in this report in no way reflects on the environmental aspects of this project, since this aspect is beyond the Scope of Work and the Contract. Unless expressly included in the Scope of Work, this report specifically excludes the identification or interpretation of environmental conditions such as contamination, hazardous materials, wild life conditions, rare plants or archeology conditions that may affect use or design at the site. This report specifically excludes the investigation, detection, prevention or assessment of conditions that can contribute to moisture, mould or other microbial contaminant growth and/or other moisture related deterioration, such as corrosion, decay, rot in buildings or their surroundings. Any statements in this report or on the boring logs regarding odours, colours, and unusual or suspicious items or conditions are strictly for informational purposes.
17. **Sample Disposal:** WSP will dispose of all uncontaminated soil and rock samples after 30 days following the release of the final geotechnical report. Should the Client request that the samples be retained for a longer time, the Client will be billed for such storage at an agreed upon rate. Contaminated samples of soil, rock or groundwater are the property of the Client, and the Client will be responsible for the proper disposal of these samples, unless previously arranged for with WSP or a third party.

**WSP E&I Canada Limited**

# Drawings




NOTES:

1. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH WOOD ENVIRONMENT & INFRASTRUCTURE REPORT NO. NX14001B4 "2022 DAM SAFETY INSPECTION REPORT, MYRA FALLS MINE TAILINGS STORAGE FACILITY", DATED MARCH 31, 2023.
2. SURFACE SHOWN IS A COMPILATION OF 2015 LIDAR AND TOPOGRAPHY DERIVED FROM UNMANNED AERIAL VEHICLE (UAV) PHOTOGRAMMETRY DATED APRIL 2019, NOVEMBER 2019, OCTOBER 2020, NOVEMBER 2021 AND AS-BUILT SURVEY DATA FROM 2015 TO 2022 PROVIDED BY THE CLIENT.
3. CONTOUR INTERVAL: 10 m.
4. SURVEY IS REFERENCED TO HORIZONTAL DATUM NAD83(CSRS)3.0.0BC.1.NVI. VERTICAL DATUM IS CGVD28.
5. COORDINATES ARE PROJECTED IN UTM ZONE 10.
6. ALL DIMENSIONS ARE IN METRES AND ELEVATIONS ARE IN METRES UNLESS OTHERWISE NOTED. ELEVATIONS REPRESENT FINISHED GRADE ELEVATIONS UNLESS OTHERWISE NOTED.
7. FINISHED GROUND TOPOGRAPHY FOR AMALGAMATED PASTE AREA (APA), TDF STRIP AND WASTE ROCK DUMP #6 AREAS REFERS TO AMEC FOSTER WHEELER ENVIRONMENT & INFRASTRUCTURE REPORT NO. NX14001K.3 "MYRA FALLS MINE OLD TDF CLOSURE COVER PERMIT LEVEL DESIGN" DATED 23 DECEMBER 2016. ADJUSTMENTS WERE MADE TO DRAINAGE CHANNELS 1, 2A AND 3 AND THE EAST STRIP CHANNEL AS PART OF PHASE 1 DETAILED DESIGN. HOWEVER, THE DESIGN OUTSIDE OF PHASE 1 BATTERY LIMITS REMAINS PRELIMINARY AND IS SUBJECT TO CHANGE DURING DETAILED ENGINEERING FOR THE NEXT CLOSURE PHASE(S).

| REV | D | M | Y | ISSUE / REVISION DESCRIPTION | ENG. | APPR. |
|---|---|---|---|---|---|---|
| 6 | | | | | | |
| 5 | | | | | | |
| 4 | 28 | 02 | 2023 | ISSUED FOR DOCUMENTATION | LF | DS |
| 3 | 28 | 02 | 2022 | ISSUED FOR DOCUMENTATION | JC | DS |
| 2 | 31 | 03 | 2021 | ISSUED FOR DOCUMENTATION | LF/ET | DS |
| 1 | 31 | 03 | 2020 | ISSUED FOR DOCUMENTATION | LF/JC | BEW |
| A | 31 | 03 | 2019 | ISSUED FOR DOCUMENTATION | AER | DHG |

CLIENT: Myra Falls Mine — A Trafigura Group Company

wsp

DRAWN BY: KL/BB
CHECKED BY: LF
DATUM: NAD83
PROJECTION: UTM ZONE 10
SCALE: AS SHOWN

PROJECT: MYRA FALLS LYNX TAILINGS DISPOSAL FACILITY
2022 DAM SAFETY INSPECTION

TITLE: GENERAL SITE ARRANGEMENT PLAN

DATE: FEBRUARY 2023
PROJECT NO: NX14001B4.3.601
REV. NO: E
FIG NO: OLDTDFDSI-010701

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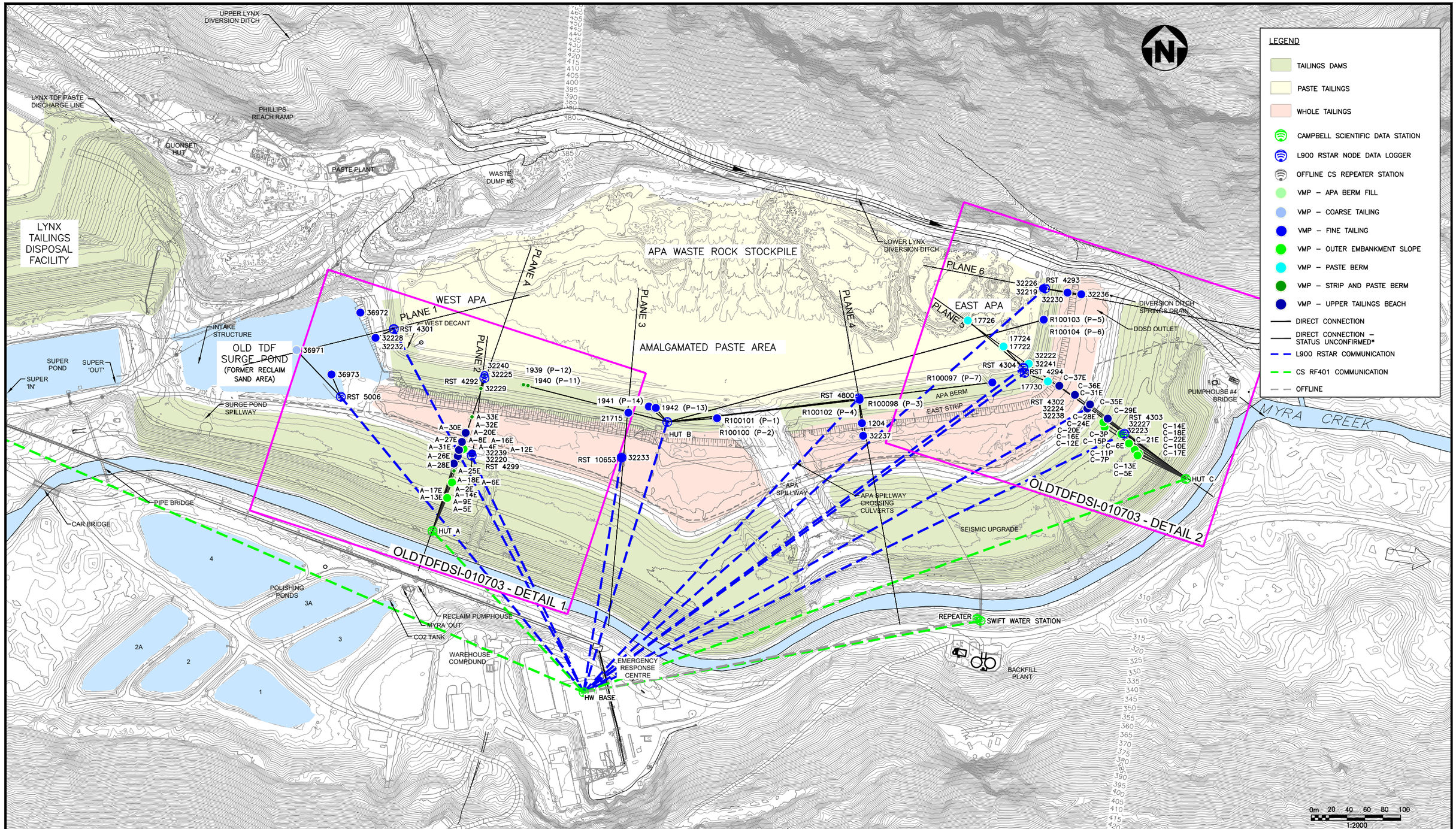



NOTES:
1. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH WSP ENVIRONMENT & INFRASTRUCTURE REPORT NO. NX14001B4 "2022 DAM SAFETY INSPECTION REPORT, MYRA FALLS MINE OLD TAILINGS STORAGE FACILIY", DATED MARCH 31, 2023.
2. SURFACE SHOWN IS A COMPILATION OF 2015 LIDAR AND TOPOGRAPHY DERIVED FROM UNMANNED AERIAL VEHICLE (UAV) PHOTOGRAMMETRY DATED APRIL 2019, NOVEMBER 2019, OCTOBER 2020, NOVEMBER 2021 AND AS-BUILT SURFACE SHOWN IS TOPOGRAPHY DERIVED FROM UAV PHOTOGRAMMETRY DATED SEPTEMBER 2022. PROVIDED BY THE CLIENT.
3. CONTOUR INTERVALS ARE 1.0 m.

| REV | D | M | Y | ISSUE / REVISION DESCRIPTION | ENG. | APPR. |
|---|---|---|---|---|---|---|
| 6 | | | | | | |
| 5 | | | | | | |
| 4 | 28 | 02 | 2023 | ISSUED FOR DOCUMENTATION | LF | DS |
| 3 | 28 | 02 | 2022 | ISSUED FOR DOCUMENTATION | JC | DS |
| 2 | 31 | 03 | 2021 | ISSUED FOR DOCUMENTATION | LF/ET | DS |
| 1 | 31 | 03 | 2020 | ISSUED FOR DOCUMENTATION | LF/JC | BEW |
| 0 | 31 | 03 | 2019 | ISSUED FOR DOCUMENTATION | AER | DHG |

CLIENT: Myra Falls Mine — A Trafigura Group Company

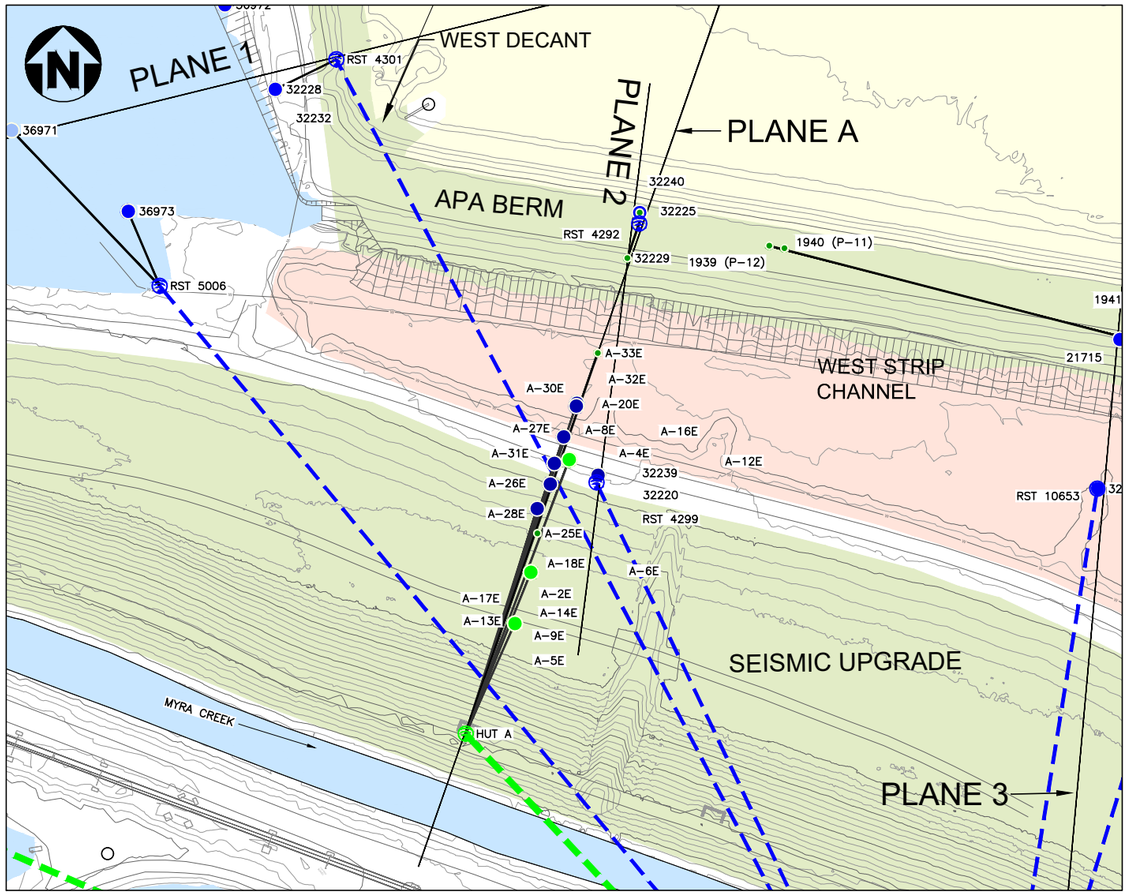
DRAWN BY: KL/BB
CHECKED BY: DP
DATUM: NAD83
PROJECTION: UTM ZONE 10
SCALE: AS SHOWN

PROJECT: MYRA FALLS OLD TAILINGS DISPOSAL FACILITY 2022 DAM SAFETY INSPECTION

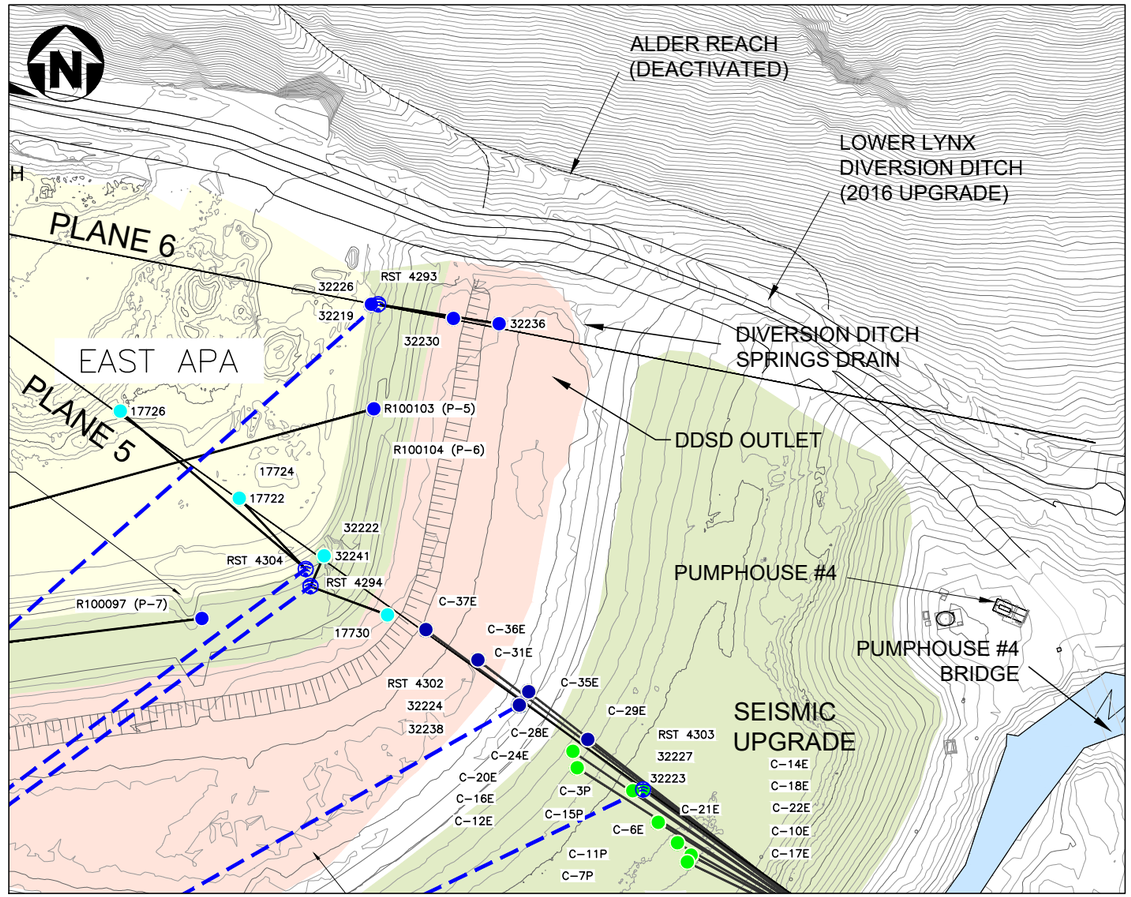
TITLE: OLD TAILINGS DISPOSAL FACILITY INSTRUMENTATION PIEZOMETERS

DATE: FEBRUARY 2023
PROJECT NO: NX14001B4.3.601
REV. NO: E
FIG NO: OLDTDFDSI-010702

P:\CAD\GA\OldTDFDSI-010702.dwg – 702 – Mar. 30, 2023 2:04pm – kevin.lin




DETAIL 1
INSTRUMENT PLANES 1 & 2




DETAIL 2
INSTRUMENT PLANES 5 & 6

0m 10 20 30 40 50
1:1000

NOTES:
1. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH WSP ENVIRONMENT & INFRASTRUCTURE REPORT NO. NX14001B4 "2022 DAM SAFETY INSPECTION REPORT, MYRA FALLS MINE OLD TAILINGS STORAGE FACILIY", DATED MARCH 31, 2023.
2. SURFACE SHOWN IS A COMPILATION OF 2015 LIDAR AND TOPOGRAPHY DERIVED FROM UNMANNED AERIAL VEHICLE (UAV) PHOTOGRAMMETRY DATED APRIL 2019, NOVEMBER 2019, OCTOBER 2020, NOVEMBER 2021 AND AS-BUILT SURFACE SHOWN IS TOPOGRAPHY DERIVED FROM UAV PHOTOGRAMMETRY DATED SEPTEMBER 2022. PROVIDED BY THE CLIENT.
3. CONTOUR INTERVALS ARE 1.0 m.

| REV | D | M | Y | ISSUE / REVISION DESCRIPTION | ENG. | APPR. |
|---|---|---|---|---|---|---|
| 5 | | | | | | |
| 4 | | | | | | |
| 3 | 28 | 02 | 2023 | ISSUED FOR DOCUMENTATION | LF | DS |
| 2 | 28 | 02 | 2022 | ISSUED FOR DOCUMENTATION | JC | DS |
| 1 | 31 | 03 | 2021 | ISSUED FOR DOCUMENTATION | LF/ET | DS |
| 0 | 31 | 03 | 2020 | ISSUED FOR DOCUMENTATION | LF/JC | BEW |
| A | 31 | 03 | 2019 | ISSUED FOR DOCUMENTATION | AER | DHG |

CLIENT: Myra Falls Mine — A Trafigura Group Company

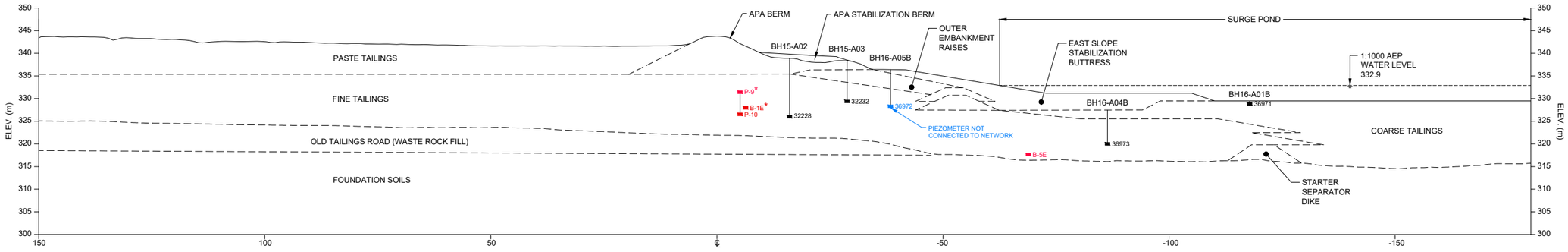
DRAWN BY: KL/BB
CHECKED BY: DHG
DATUM: NAD83
PROJECTION: UTM ZONE 10
SCALE: AS SHOWN

PROJECT: MYRA FALLS OLD TAILINGS DISPOSAL FACILITY
2022 DAM SAFETY INSPECTION

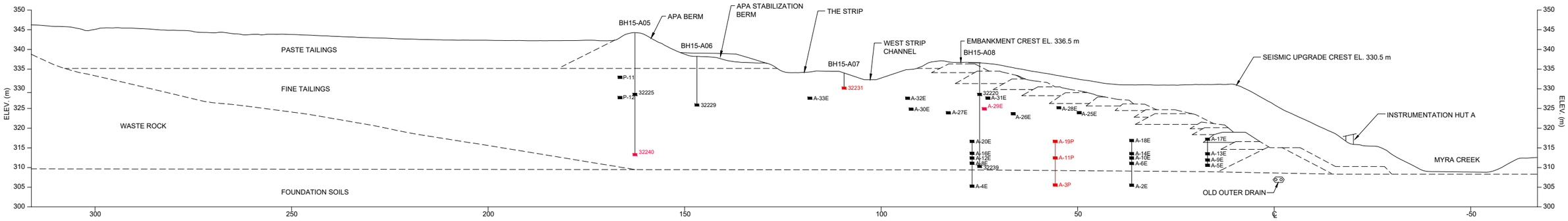
TITLE: OLD TAILINGS DISPOSAL FACILITY
INSTRUMENTATION - PIEZOMETERS
DETAILS 1 & 2

DATE: FEBRUARY 2023
PROJECT NO: NX14001B4.3.601
REV. NO: E
FIG NO: OldTDFDSI-010703

P:\CAD\GA\OldTDFDSI-010703.dwg – 703 – Mar. 30, 2023 2:07pm – kevin.lin




SECTION 1 / 703 INSTRUMENTATION PLANE 1
STA. 1+252




SECTION A / 703 INSTRUMENTATION PLANE A (PLANE 2)
STA. 0+355

NOTES:
1. SECTION A ADOPTED FROM KLOHN CRIPPEN BERGER, PROJECT No. M07632 A52, DRAWING No. D-52304, REV. B DATED MARCH 31, 2006.
2. ORIGINAL GROUND SURFACE TOPOGRAPHY DEVELOPED FROM KNIGHT AND PIESOLD DRAWING 1287.046, DATED 31 MAY 1983.
3. INSIDE MATERIAL ZONE BOUNDARIES, SECTION LOCATIONS AND ORIENTATIONS ARE APPROXIMATE.
4. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH WSP ENVIRONMENT & INFRASTRUCTURE REPORT NO. NX14001B4 "2022 DAM SAFETY INSPECTION REPORT, MYRA FALLS MINE OLD TAILINGS STORAGE FACILITY", DATED MARCH 31, 2023.
5. SURFACE SHOWN IS A COMPILATION OF 2015 LIDAR AND TOPOGRAPHY DERIVED FROM UNMANNED AERIAL VEHICLE (UAV) PHOTOGRAMMETRY DATED APRIL 2019, NOVEMBER 2019, OCTOBER 2020, NOVEMBER 2021 AND AS-BUILT SURVEY DATA FROM 2015 TO 2022 PROVIDED BY THE CLIENT.
6. OLD MINE GRID ELEVATIONS CAN BE FOUND BY ADDING 3047.518 m TO THE ELEVATIONS SHOWN.

LEGEND:
- A-20E PIEZOMETER (DATA NOT AVAILABLE)
- A-19P PIEZOMETER (FUNCTIONAL)
- A-20E PIEZOMETER (REMOVED FROM MONITORING PROGRAM)

| REV | D | M | Y | ISSUE / REVISION DESCRIPTION | ENG. | APPR. |
|---|---|---|---|---|---|---|
| F | | | | | | |
| E | 28 | 02 | 2023 | ISSUED FOR DOCUMENTATION | LF | DS |
| D | 28 | 02 | 2022 | ISSUED FOR DOCUMENTATION | JC | DS |
| C | 31 | 03 | 2021 | ISSUED FOR DOCUMENTATION | LF/ET | DS |
| B | 31 | 03 | 2020 | ISSUED FOR DOCUMENTATION | LF/JC | BEW |
| A | 31 | 03 | 2019 | ISSUED FOR DOCUMENTATION | AER | DHG |

CLIENT: Myra Falls Mine, A Trafigura Group Company

DRAWN BY: KL/BB
CHECKED BY: LF
DATUM: NAD83
PROJECTION: UTM ZONE 10
SCALE: AS SHOWN

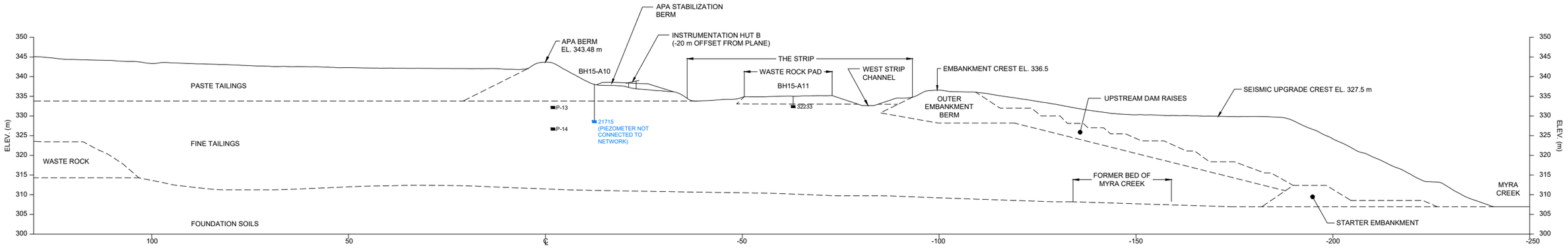
PROJECT: MYRA FALLS OLD TAILINGS DISPOSAL FACILITY
2022 DAM SAFETY INSPECTION

TITLE: OLD TAILINGS DISPOSAL FACILITY
INSTRUMENTATION
PLANES 1 & 2

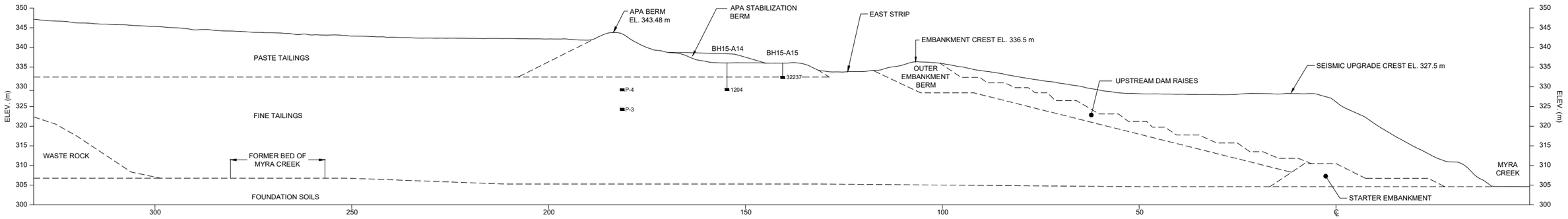
DATE: FEBRUARY 2023
PROJECT NO: NX14001B4.3.601
REV. NO: E
FIG NO: OldTDFDSI-010704

0m 5 10 15 20 25
1:500

P:\CAD\CIV\OldTDFDSI-010704.dwg – 704 – Mar. 27, 2023 5:05pm – kevin.lin




SECTION 3 / 703 INSTRUMENTATION PLANE 3




SECTION 4 / 703 INSTRUMENTATION PLANE 4
STA. 0+900

NOTES:
1. SECTION A ADOPTED FROM KLOHN CRIPPEN BERGER, PROJECT No. M07632 A52, DRAWING No. D-52304, REV. B DATED MARCH 31, 2006.
2. ORIGINAL GROUND SURFACE TOPOGRAPHY DEVELOPED FROM KNIGHT AND PIESOLD DRAWING 1287.046, DATED 31 MAY 1983.
3. INSIDE MATERIAL ZONE BOUNDARIES, SECTION LOCATIONS AND ORIENTATIONS ARE APPROXIMATE.
4. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH WSP ENVIRONMENT & INFRASTRUCTURE REPORT NO. NX14001B4 "2022 DAM SAFETY INSPECTION REPORT, MYRA FALLS MINE OLD TAILINGS STORAGE FACILITY", DATED MARCH 31, 2023.
5. SURFACE SHOWN IS A COMPILATION OF 2015 LIDAR AND TOPOGRAPHY DERIVED FROM UNMANNED AERIAL VEHICLE (UAV) PHOTOGRAMMETRY DATED APRIL 2019, NOVEMBER 2019, OCTOBER 2020, NOVEMBER 2021 AND AS-BUILT SURVEY DATA FROM 2015 TO 2022 PROVIDED BY THE CLIENT FROM

0m 5 10 15 20 25
1:500

LEGEND:
- A-20E PIEZOMETER (DATA NOT AVAILABLE)
- A-19P PIEZOMETER (FUNCTIONAL)
- A-20E PIEZOMETER (REMOVED FROM MONITORING PROGRAM)

| REV | D | M | Y | ISSUE / REVISION DESCRIPTION | ENG. | APPR. |
|---|---|---|---|---|---|---|
| G | | | | | | |
| F | | | | | | |
| E | 28 | 02 | 2023 | ISSUED FOR DOCUMENTATION | LF | DS |
| D | 28 | 02 | 2022 | ISSUED FOR DOCUMENTATION | JC | DS |
| C | 31 | 03 | 2021 | ISSUED FOR DOCUMENTATION | LF/ET | DS |
| B | 31 | 03 | 2020 | ISSUED FOR DOCUMENTATION | LF/JC | BEW |
| A | 31 | 03 | 2019 | ISSUED FOR DOCUMENTATION | AER | DHG |

CLIENT: Myra Falls Mine, A Trafigura Group Company

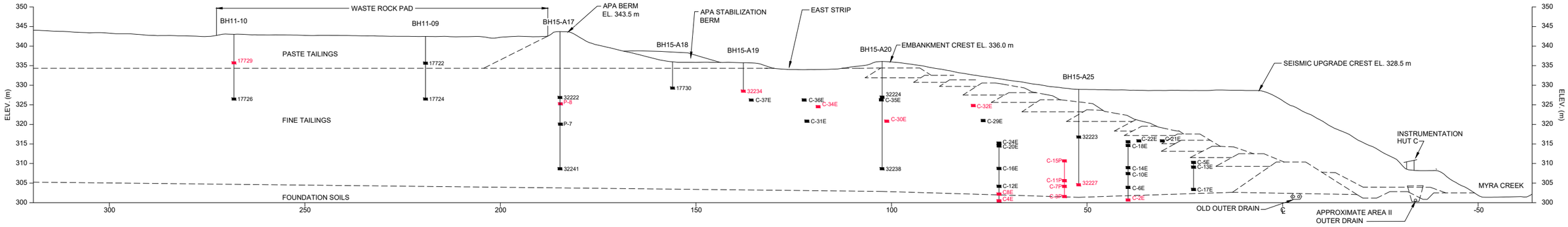
DRAWN BY: KL/BB
CHECKED BY: LF
DATUM: NAD83
PROJECTION: UTM ZONE 10
SCALE: AS SHOWN

PROJECT: MYRA FALLS OLD TAILINGS DISPOSAL FACILITY
2022 DAM SAFETY INSPECTION

TITLE: OLD TAILINGS DISPOSAL FACILITY
INSTRUMENTATION
PLANES 3 & 4

DATE: FEBRUARY 2023
PROJECT NO: NX14001B4.3.601
REV. NO: E
FIG NO: OldTDFDSI-010705

P:\CAD\CIV\OldTDFDSI-010705.dwg – 705 – Mar. 27, 2023 5:05pm – kevin.lin




SECTION 5 / 703 — INSTRUMENTATION PLANE 5 / PLANE C
STA. 1+252




SECTION 6 / 703 — INSTRUMENTATION PLANE 6
STA. 1+428

NOTES:
1. SECTION A ADOPTED FROM KLOHN CRIPPEN BERGER, PROJECT No. M07632 A52, DRAWING No. D-52304, REV. B DATED MARCH 31, 2006.
2. ORIGINAL GROUND SURFACE TOPOGRAPHY DEVELOPED FROM KNIGHT AND PIESOLD DRAWING 1287.046, DATED 31 MAY 1983.
3. INSIDE MATERIAL ZONE BOUNDARIES, SECTION LOCATIONS AND ORIENTATIONS ARE APPROXIMATE.
4. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH WSP ENVIRONMENT & INFRASTRUCTURE REPORT NO. NX14001B4 "2022 DAM SAFETY INSPECTION REPORT, MYRA FALLS MINE OLD TAILINGS STORAGE FACILITY", DATED MARCH 31, 2023.
5. SURFACE SHOWN IS A COMPILATION OF 2015 LIDAR AND TOPOGRAPHY DERIVED FROM UNMANNED AERIAL VEHICLE (UAV) PHOTOGRAMMETRY DATED APRIL 2019, NOVEMBER 2019, OCTOBER 2020, NOVEMBER 2021 AND AS-BUILT SURVEY DATA FROM 2015 TO 2022 PROVIDED BY THE CLIENT FROM

0m 10 20 30 40
1 : 1000

LEGEND:

| | |
|---|---|
| A-20E | PIEZOMETER (DATA NOT AVAILABLE) |
| A-19P | PIEZOMETER (FUNCTIONAL) |
| A-20E | PIEZOMETER (REMOVED FROM MONITORING PROGRAM) |

| REV | D | M | Y | ISSUE / REVISION DESCRIPTION | ENG. | APPR. |
|---|---|---|---|---|---|---|
| G | | | | | | |
| F | | | | | | |
| E | 28 | 02 | 2023 | ISSUED FOR DOCUMENTATION | LF | DS |
| D | 28 | 02 | 2022 | ISSUED FOR DOCUMENTATION | JC | DS |
| C | 31 | 03 | 2021 | ISSUED FOR DOCUMENTATION | LF/ET | DS |
| B | 31 | 03 | 2020 | ISSUED FOR DOCUMENTATION | LF/JC | BEW |
| A | 31 | 03 | 2019 | ISSUED FOR DOCUMENTATION | AER | DHG |

CLIENT: Myra Falls Mine — A Trafigura Group Company

wsp

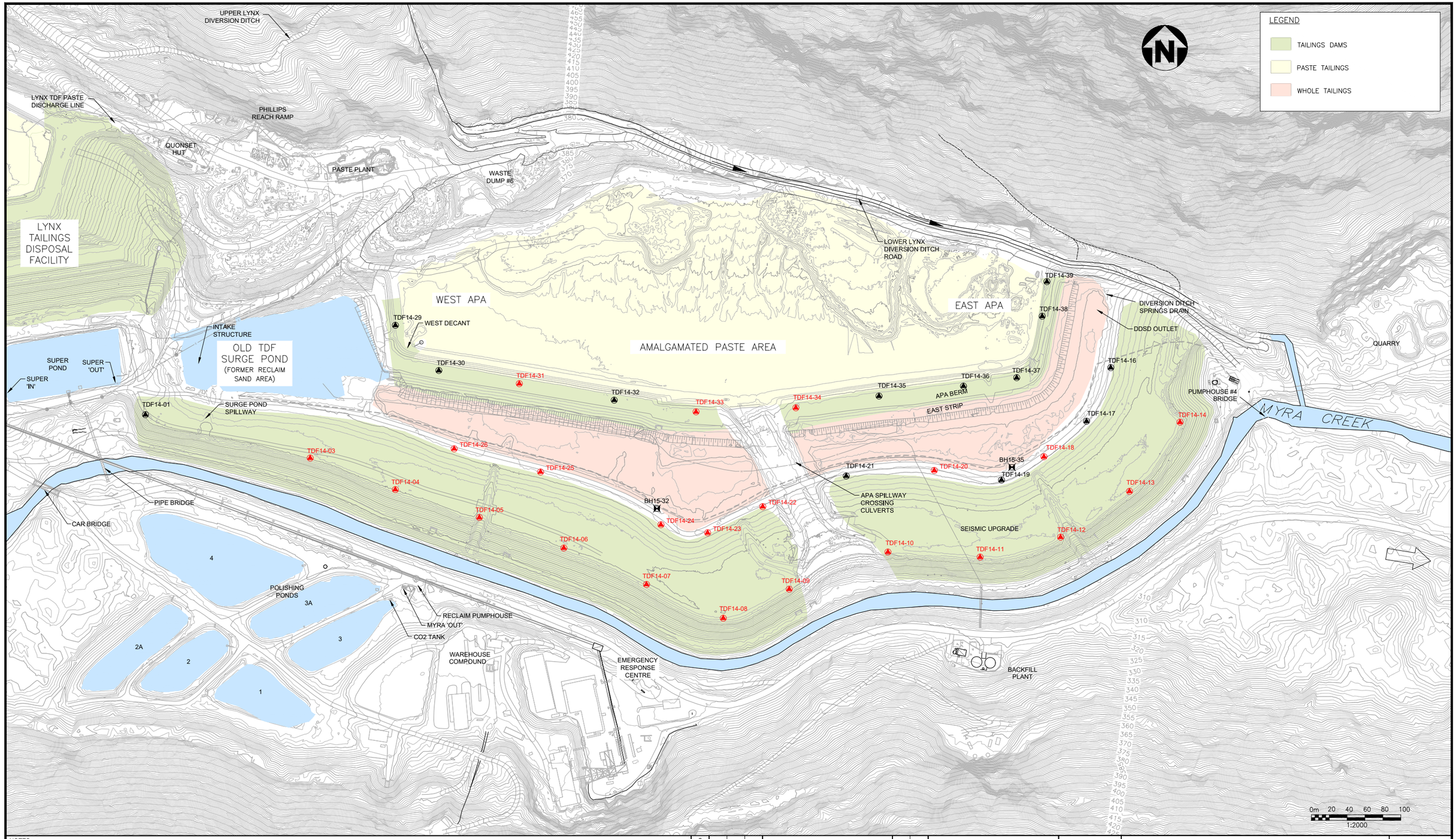
DRAWN BY: KL/BB
CHECKED BY: LF
DATUM: NAD83
PROJECTION: UTM ZONE 10
SCALE: AS SHOWN

PROJECT: MYRA FALLS OLD TAILINGS DISPOSAL FACILITY
2022 DAM SAFETY INSPECTION

TITLE: OLD TAILINGS DISPOSAL FACILITY
INSTRUMENTATION
PLANES 5 & 6

DATE: FEBRUARY 2023
PROJECT NO: NX14001B4.3.601
REV. NO: E
FIG NO: OldTDFDSI-010706

P:\CAD\CIV\OldTDFDSI-010706.dwg – 706 – Mar. 27, 2023 5:05pm – kevin.lin




NOTES:
1. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH WSP ENVIRONMENT & INFRASTRUCTURE REPORT NO. NX14001B4 "2022 DAM SAFETY INSPECTION REPORT, MYRA FALLS MINE OLD TAILINGS STORAGE FACILIY", DATED MARCH 31, 2023.
2. SURFACE SHOWN IS A COMPILATION OF 2015 LIDAR AND TOPOGRAPHY DERIVED FROM UNMANNED AERIAL VEHICLE (UAV) PHOTOGRAMMETRY DATED APRIL 2019, NOVEMBER 2019, OCTOBER 2020, NOVEMBER 2021 AND AS-BUILT SURFACE SHOWN IS TOPOGRAPHY DERIVED FROM UAV PHOTOGRAMMETRY DATED SEPTEMBER 2022. PROVIDED BY THE CLIENT.
3. CONTOUR INTERVALS ARE 1.0 m.

LEGEND:

TDF14-04 ▲ ACTIVE SURFACE MOVEMENT MONUMENT

TDF14-04 ▲ SURVEY MONUMENTS REMOVED DURING CONSTRUCTION OR NO READINGS IN 2022

BH15-35 ⋈ SLOPE INCLINOMETER

| REV | D | M | Y | ISSUE / REVISION DESCRIPTION | ENG. | APPR. |
|---|---|---|---|---|---|---|
| G | | | | | | |
| F | | | | | | |
| E | 28 | 02 | 2023 | ISSUED FOR DOCUMENTATION | LF | DS |
| D | 28 | 02 | 2022 | ISSUED FOR DOCUMENTATION | JC | DS |
| C | 31 | 03 | 2021 | ISSUED FOR DOCUMENTATION | LF/ET | DS |
| B | 31 | 03 | 2020 | ISSUED FOR DOCUMENTATION | LF/JC | BEW |
| A | 31 | 03 | 2019 | ISSUED FOR DOCUMENTATION | AER | DHG |

CLIENT: Myra Falls Mine — A Trafigura Group Company

wsp

DRAWN BY: KL/BB
CHECKED BY: LF
DATUM: NAD83
PROJECTION: UTM ZONE 10
SCALE: AS SHOWN

PROJECT: MYRA FALLS OLD TAILINGS DISPOSAL FACILITY
2022 DAM SAFETY INSPECTION

TITLE: OLD TAILINGS DISPOSAL FACILITY
INSTRUMENTATION
MONUMENTS AND INCLINOMETERS

DATE: FEBRUARY 2023
PROJECT NO: NX14001B4.3.601
REV. NO: E
FIG NO: OldTDFDSI-010707

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# Appendix A

## Photographs

Photo 1: Old TDF Seismic Upgrade Berm downstream slope . (January 14, 2022)

Photo 2: Old TDF Seismic Upgrade Berm downstream slope. (January 14, 2022)

Photo 3: Old TDF Seismic Upgrade Berm downstream slope. (January 14, 2022)

Photo 4: Old TDF Seismic Upgrade Berm downstream slope. (January 14, 2022)

Photo 5: Old TDF Springs Drain Outlet. (January 14, 2022)

Photo 6: Surge Pond looking east. Sediments from paste plant run off to the left of the control structure seen in photo 6. (March 23, 2022)

Photo 7: Surge Pond looking north-east. (March 23, 2022)

Photo 8: Erosion gullies observed on downstream of SUB to be addressed in 2022 Closure Phase 1 Construction. (March 22, 2022)

Photo 9: East Decant structure. Grating decant needs to be replaced due to acidic dissolution of lower portion of the vertical grating. (March 23, 2022)

Photo 10: Geotextile/geomembrane over the buried lock blocks in the APA spillway observed to be damaged. (March 22, 2022)

Photo 11: Overview of Old TDF looking South. Storage area at back end of Old TDF also shown. (July 26, 2022)

Photo 12: East strip of Old TDF filled with tailings from Zim Pro line, looking west. (July 26, 2022)

Photo 13: East decant structure with approximately half of the bottom 2 cm's of the vertical grating bars being dissolved. (July 26, 2022)


Photo 14: Old TDF looking southeast. (October 5, 2022)


Photo 15: East Strip of the Old TDF continues to be filled with tailings. Tailings should be removed prior to onset of wet weather. (October 5, 2022)


Photo 16: Hydroseeding was recently implemented along the berms of the Old TDF. Photo looking southwest. (October 5, 2022)

Photo 17: The West Strip of the Old TDF was filled with tailings obstructing the flow capacity of the spillway culvert pipes. (October 5, 2022)

Photo 18: Old TDF Channel 1 looking downstream. Channel constructed in 2022.


Photo 19: Surge Pond looking northwest. (October 5, 2022)


Photo 20: Surge Pond looking northeast. No unusual performance was observed.

# Appendix B

## Instrumentation Status & Data

# Vibrating Wire Piezometers
# Operational Status

| Piezometer Number | Tip Elevation Geodetic (m) | Thermistor Status | Transducer Status | Piezometer Status |
|---|---|---|---|---|
| **Old TDF - Plane 1** | | | | |
| 32228 | 331.4 | OK | OK | OK, functioning |
| 32232 | 329.4 | OK | OK | OK, functioning |
| 36971 | 325.7 | OK | OK | OK, functioning |
| 36972 | 328.0 | OK | OK | Cables severed June 2017. Signal measured in cables October 2022. Need to splice and reconnect to datalogger. Removed from monitoring program currently. |
| 36973 | 319.7 | OK | OK | OK, functioning |
| **Old TDF - Plane A** | | | | |
| ATM | - | - | OK | Occasional false readings. Only used if Lynx Hut and Hut C barometer data missing. |
| A-0E | 308.7 | - | - | Destroyed August 1999 |
| A-1E | 304.8 | - | - | Not functioning as of 16 August 2019, Removed from monitoring program. |
| A-2E | 305.4 | OK | OK | OK, functioning |
| A-4E | 305.2 | OK | OK | OK, functioning |
| A-5E | 310.4 | OK | OK | OK, functioning |
| A-6E | 310.9 | OK | OK | OK, functioning |
| A-8E | 311.0 | OK | OK | OK, functioning |
| A-9E | 311.7 | - | OK | Thermistor not functioning |
| A-10E | 312.3 | OK | OK | OK, functioning |
| A-12E | 312.4 | OK | OK | OK, functioning |
| A-13E | 313.4 | OK | OK | OK, functioning |
| A-14E | 313.4 | - | OK | Thermistor not functioning |
| A-16E | 313.6 | - | OK | Thermistor not functioning |
| A-17E | 317.0 | OK | OK | OK, functioning |
| A-18E | 316.7 | OK | OK | OK, functioning |
| A-20E | 316.6 | OK | OK | OK, functioning |
| A-25E | 323.9 | OK | OK | OK, functioning |
| A-26E | 323.7 | OK | OK | OK, functioning |
| A-27E | 323.9 | OK | OK | OK, functioning |
| A-28E | 325.1 | - | OK | Thermistor not functioning |
| A-29E | 324.9 | - | - | Not functioning, Removed from monitoring program. |
| A-30E | 324.8 | OK | OK | OK, functioning |
| A-31E | 327.8 | OK | OK | OK, functioning |
| A-32E | 327.7 | OK | OK | OK, functioning |
| A-33E | 327.5 | OK | OK | OK, functioning |
| **Old TDF - Plane 2** | | | | |
| 32225 | 328.6 | OK | OK | OK, functioning |
| 32240 | 313.3 | OK | OK | OK, functioning |
| 32229 | 325.9 | OK | OK | OK, functioning |
| 32231 | 330.2 | Unknown | Unknown | Cables severed July 2016. Signal measured in cables May 2018. No Signal measured in cables October 2022. Removed from monitoring program currently. |
| 32220 | 328.6 | OK | OK | OK, functioning |
| 32239 | 310.3 | OK | OK | OK, functioning |

# Vibrating Wire Piezometers
# Operational Status

| Piezometer Number | Tip Elevation Geodetic (m) | Thermistor Status | Transducer Status | Piezometer Status |
|---|---|---|---|---|
| **Old TDF - Plane 3** | | | | |
| 21715 | 329.3 | OK | OK | Cables were never connected to a logger. Signal measured in cables Oct 2022. Need to reconnect to datalogger. |
| 32233 | 332.3 | OK | OK | OK, functioning |
| **Old TDF - Plane 4** | | | | |
| 1204 | 329.3 | OK | OK | OK, functioning |
| 32237 | 332.4 | OK | OK | OK, functioning |
| **Old TDF - Plane 5** | | | | |
| 32222 | 326.6 | OK | OK | OK. Data logger has recorded occasional false readings signal since July 2017. |
| 32241 | 308.7 | OK | OK | OK. Data logger has recorded occasional false readings signal since July 2017. |
| 17730 | 329.3 | OK | OK | OK. Data logger has recorded occasional false readings signal since July 2017. |
| 32234 | 328.5 | - | - | Not functioning. Removed from program May 2018. |
| 32224 | 327.0 | OK | OK | OK, functioning |
| 32238 | 308.7 | OK | OK | OK, functioning |
| 32223 | 316.8 | OK | OK | OK, functioning |
| 32227 | 304.6 | OK | OK | OK, functioning |
| **Old TDF - Plane C** | | | | |
| ATM | - | OK | OK | OK, functioning |
| C-2E | 300.5 | OK | OK | Not functioning. Removed from monitoring program |
| C-4E | 300.1 | OK | - | Not functioning. Removed from monitoring program |
| C-5E | 310.1 | - | OK | Thermistor not functioning |
| C-6E | 303.7 | - | OK | Thermistor not functioning |
| C-8E | 302.5 | - | - | Not functioning. Removed from monitoring program |
| C-10E | 307.3 | - | OK | Thermistor not functioning |
| C-12E | 305.5 | - | OK | Thermistor not functioning |
| C-13E | 308.9 | OK | OK | OK, functioning |
| C-14E | 308.7 | - | OK | Thermistor not functioning |
| C-16E | 308.7 | - | OK | Thermistor not functioning |
| C-17E | 303.1 | OK | OK | OK, functioning |
| C-18E | 314.5 | OK | OK | OK, functioning |
| C-20E | 314.5 | OK | OK | OK, functioning |
| C-21E | 315.6 | OK | OK | OK, functioning |
| C-22E | 315.4 | OK | OK | OK, functioning |
| C-24E | 315.2 | - | OK | Thermistor not functioning |
| C-29E | 322.3 | OK | OK | OK, functioning |
| C-30E | 322.0 | OK | - | Not functioning. Removed from monitoring program |
| C-31E | 322.0 | OK | OK | OK, functioning |
| C-32E | 324.8 | - | - | Not functioning. Removed from monitoring program |
| C-34E | 324.7 | - | - | Not functioning. Removed from monitoring program |
| C-35E | 326.7 | OK | OK | OK, functioning |
| C-36E | 326.6 | OK | OK | OK, functioning |
| C-37E | 326.6 | OK | OK | OK, functioning |
| 17722 | 335.4 | OK | OK | OK, functioning |
| 17724 | 326.2 | OK | OK | OK, functioning |
| 17726 | 326.3 | OK | OK | OK, functioning |
| 17729 | 335.4 | - | - | Not functioning. Removed from monitoring program |

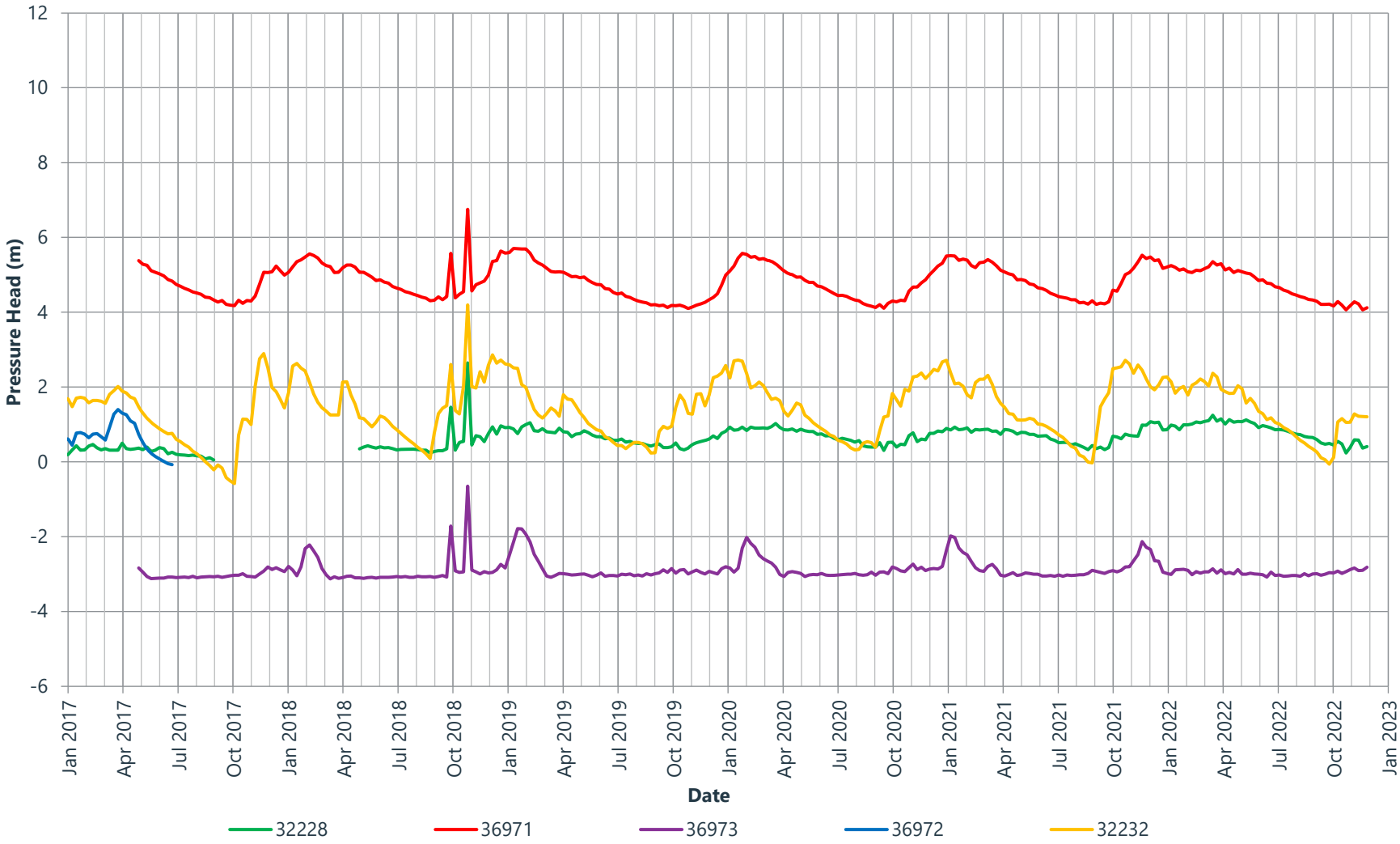
# Vibrating Wire Piezometers
# Operational Status

| Piezometer Number | Tip Elevation Geodetic (m) | Thermistor Status | Transducer Status | Piezometer Status |
|---|---|---|---|---|
| **Old TDF - Plane 6** | | | | |
| 32219 | 335.2 | OK | OK | OK, functioning |
| 32226 | 330.6 | OK | OK | OK, functioning |
| 32230 | 328.8 | OK | OK | OK, functioning |
| 32236 | 330.4 | OK | OK | OK, functioning |
| **Old TDF - APA Berm** | | | | |
| B-1E | 328.0 | - | - | Not functioning. Cut off at ground May 2018. |
| B-5E | 317.6 | - | - | Not functioning. Cut off at ground May 2018. |
| P-1 | 324.4 | OK | OK | OK, functioning |
| P-2 | 329.4 | OK | OK | OK, functioning |
| P-3 | 324.3 | OK | OK | OK, functioning |
| P-4 | 329.3 | OK | OK | OK, functioning |
| P-5 | 325.1 | OK | OK | OK, functioning |
| P-6 | 329.4 | OK | OK | OK, functioning |
| P-7 | 319.8 | OK | OK | OK, functioning |
| P-8 | 325.0 | - | - | Not functioning after August 2011. Cut off at ground May 2018 |
| P-9 | 331.4 | - | - | Not functioning. Cable was not found May 2018, assume it was previously cut off. |
| P-10 | 326.9 | - | - | Not functioning after September 2017. Cut off at ground May 2018. |
| P-11 | 332.6 | OK | OK | OK, functioning |
| P-12 | 326.5 | OK | OK | OK, functioning |
| P-13 | 332.2 | OK | OK | OK, functioning |
| P-14 | 326.7 | OK | OK | OK, functioning |

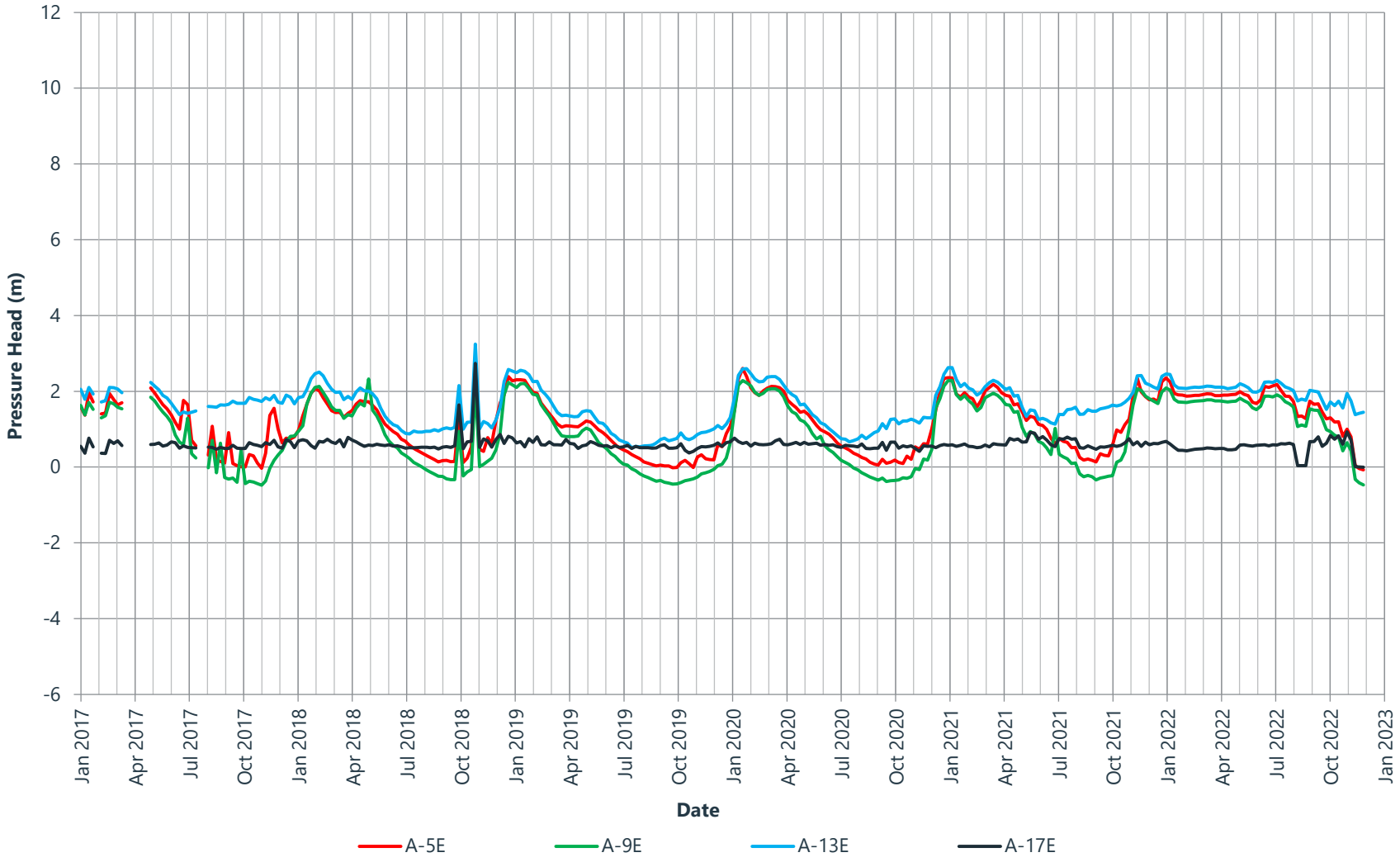
# Appendix B2-1

# Old TDF VWP Data

| Table/Figure/Drawing No. | Title |
|---|---|
| Figure 1 | Old TDF Piezometer Records – Plane 1 |
| Figure 2 | Old TDF Piezometer Records – Plane A Outer Embankment Slope, Location 1 |
| Figure 3 | Old TDF Piezometer Records – Plane A Outer Embankment Slope, Location 2 |
| Figure 4 | Old TDF Piezometer Records – Plane A Outer Embankment Slope, Location 3 |
| Figure 5 | Old TDF Piezometer Records – Plane A Upper Tailings Beach |
| Figure 6 | Old TDF Piezometer Records – Plane A Strip and Paste Berm |
| Figure 7 | Old TDF Piezometer Records – Plane 3 and Plane 3/4 |
| Figure 8 | Old TDF Piezometer Records – Plane 4 |
| Figure 9 | Old TDF Piezometer Records – Plane 5 Outer embankment Slope, Location 1 |
| Figure 10 | Old TDF Piezometer Records – Plane 5 Outer Embankment Slope, Location 2 and Lower Tailings |
| Figure 11 | Old TDF Piezometer Records – Plane 5 Outer Embankment Slope, Location 3 |
| Figure 12 | Old TDF Piezometer Records – Plane 5 Upper Tailings Beach |
| Figure 13 | Old TDF Piezometer Records – Plane 5 Paste Berm and Upstream Tailings |
| Figure 14 | Old TDF Piezometer Records – Plane 5/6 and Plane 6 |




| | | | | | |
|---|---|---|---|---|---|
| wsp | PROJECT: Myra Falls DSI Report | | | | |
| CLIENT: Myra Falls Mine, A Trafigura Group Company | TITLE: Old TDF Piezometer Records - Plane 1<br>32228, 36971, 36973, 36972, 32232 | | | | |
| | DATE: December 2022 | JOB No.: NX140001 | FILE: Reporting\Piezo_OldTDF_2022_Dec_new_threshold.xlsx | FIGURE No.: 1 | REV.: 0 |

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|---|---|---|---|---|---|
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| | TITLE: Old TDF Piezometer Records - Plane A Outer Embankment Slope, Location 1 A-5E, A-9E, A-13E, A-17E | | | | |
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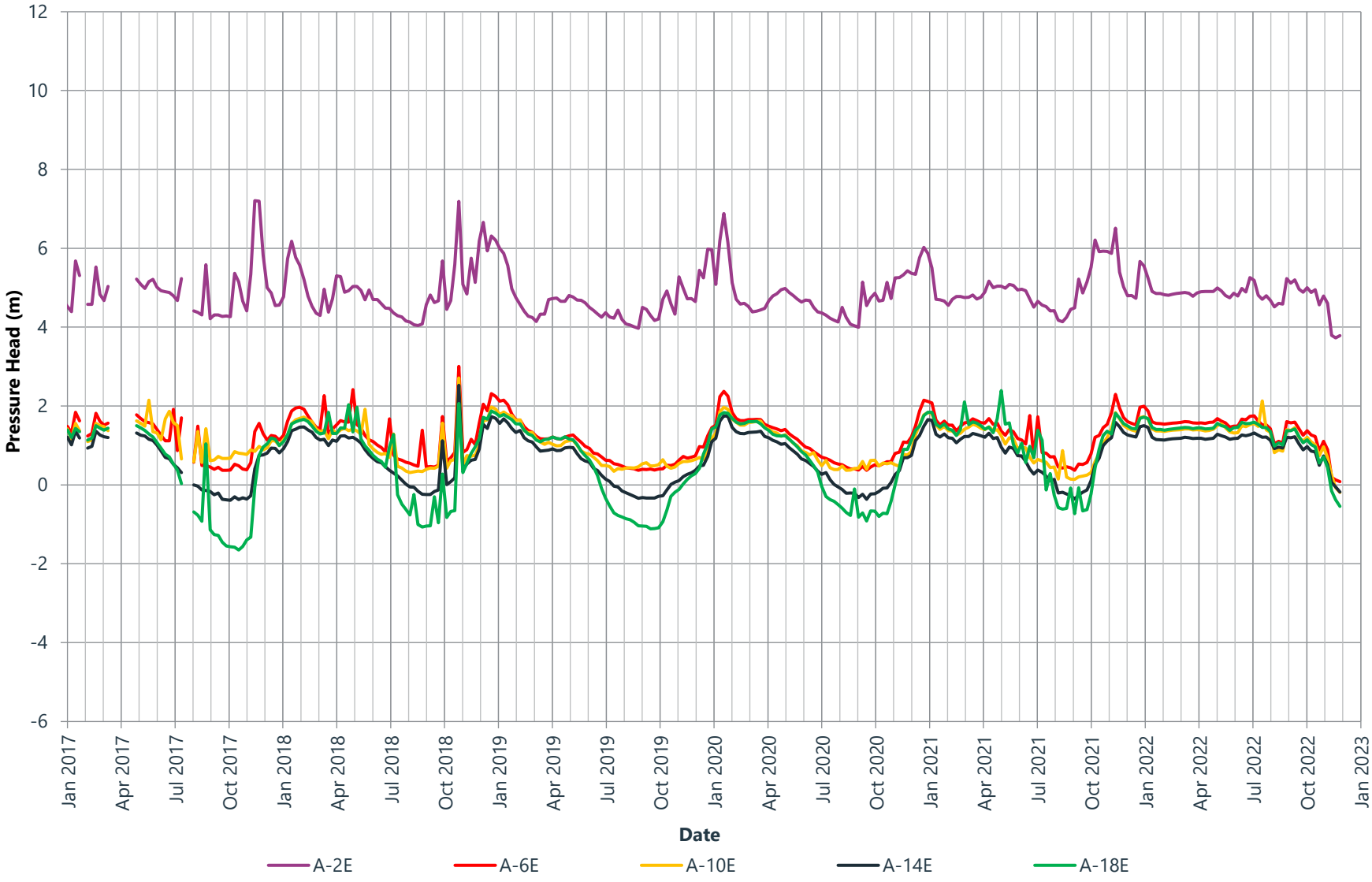


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|---|---|---|---|---|---|
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| | TITLE: Old TDF Piezometer Records - Plane A Outer Embankment Slope, Location 2 A-2E, A-6E, A-10E, A-14E, A-18E | | | | |
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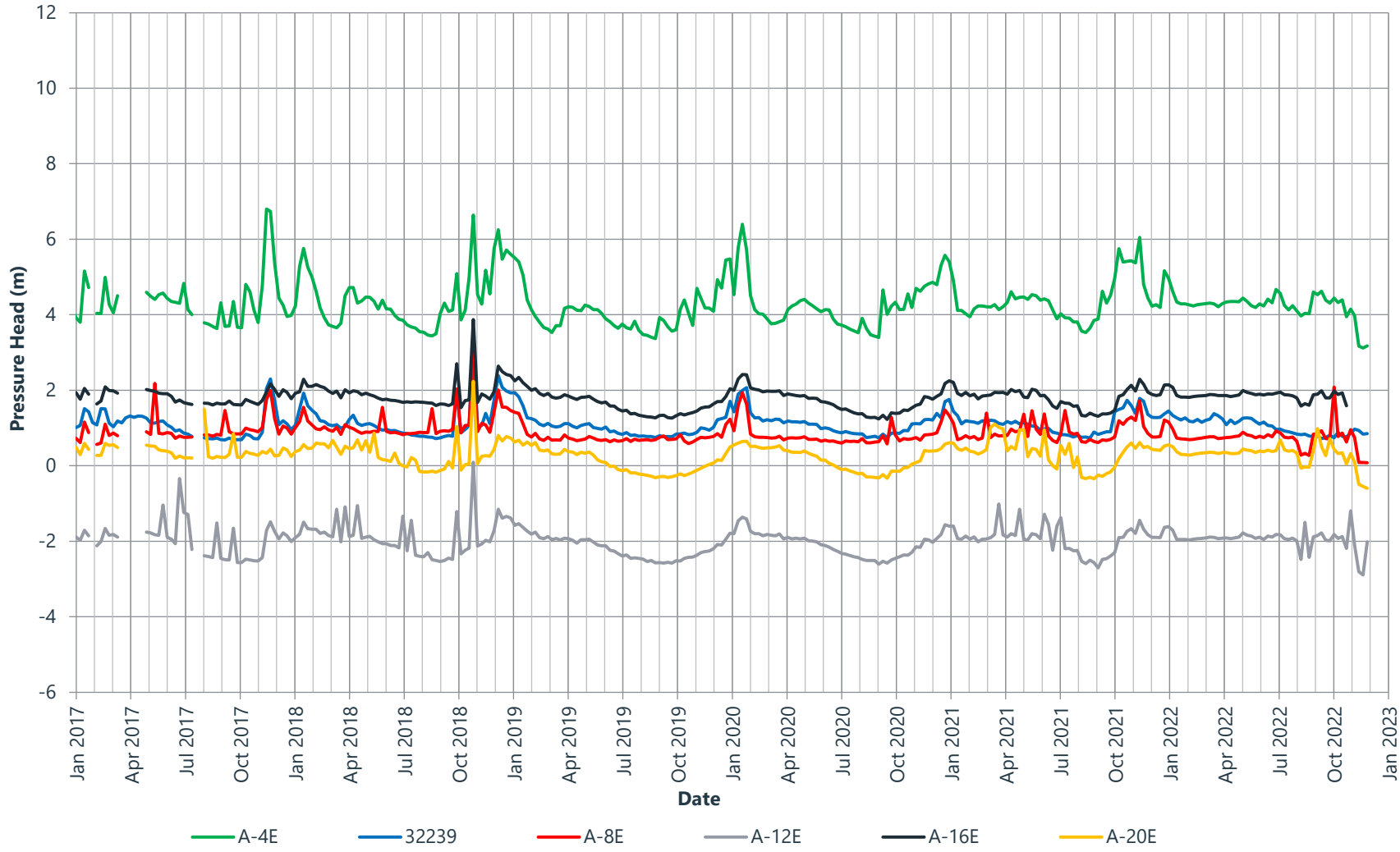


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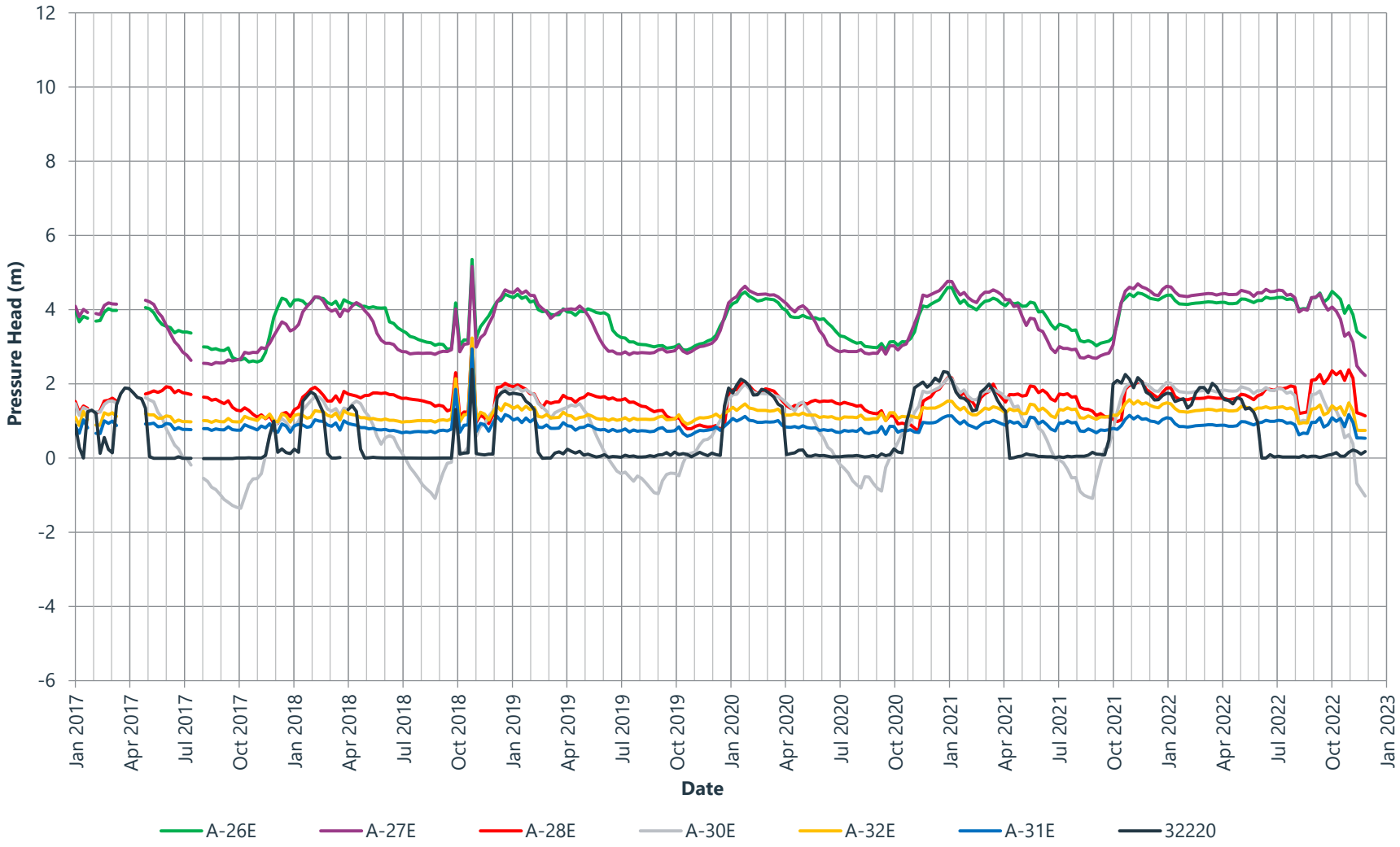
|---|---|---|---|---|---|
| CLIENT: Myra Falls Mine, A Trafigura Group Company | PROJECT: Myra Falls DSI Report | | | | |
| | TITLE: Old TDF Piezometer Records - Plane A Outer Embankment Slope, Location 3 A-4E, 32239, A-8E, A-12E, A-16E, A-20E | | | | |
| | DATE: December 2022 | JOB No.: NX140001 | FILE: Reporting Piezo_OldTDF_2022_Dec_new_threshold.xlsx | FIGURE No.: 4 | REV.: 0 |




CLIENT: Myra Falls Mine
A Trafigura Group Company

PROJECT: Myra Falls DSI Report

TITLE: Old TDF Piezometer Records - Plane A
Upper Tailings Beach
A-26E, A-27E, A-28E, A-30E, A-31E, A-32E, 32220

| DATE: | JOB No.: | FILE: | FIGURE No.: | REV. |
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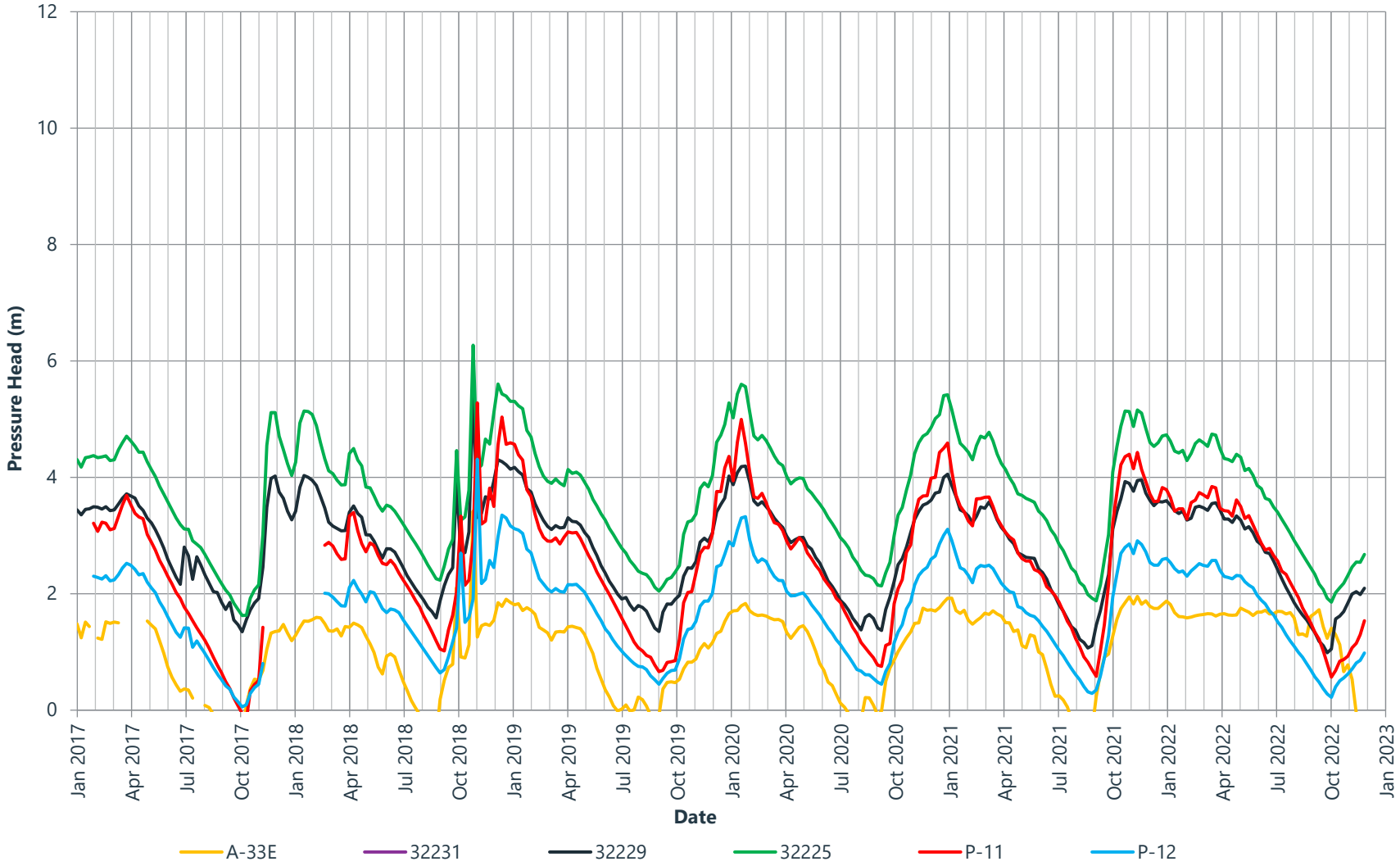


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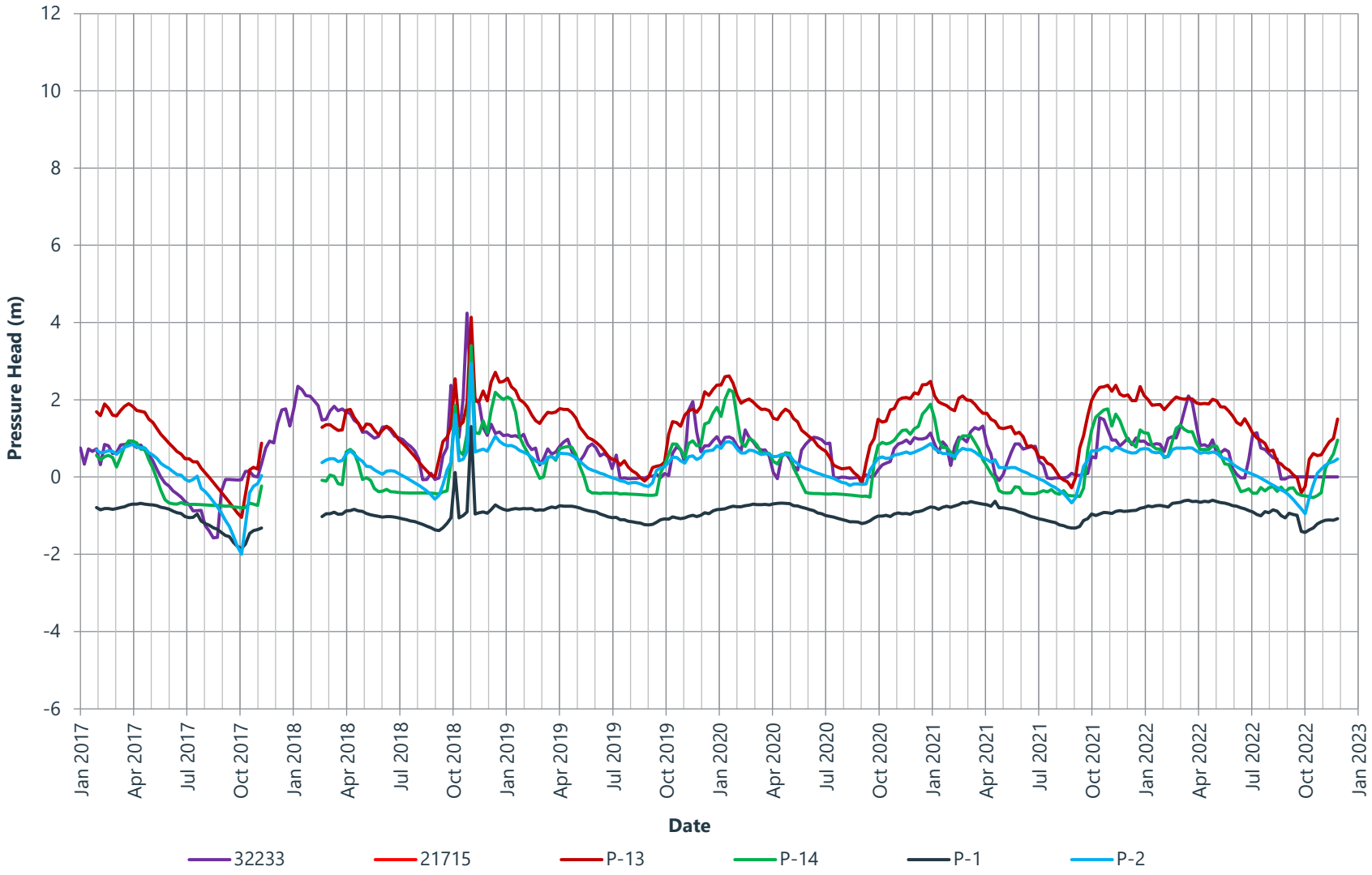
|---|---|---|---|---|---|
| CLIENT: Myra Falls Mine | PROJECT: Myra Falls DSI Report | | | | |
| | TITLE: Old TDF Piezometer Records - Plane A<br>Strip and Paste Berm<br>A33-E, 32231, 32229, 32225, P-11, P-12 | | | | |
| | DATE: December 2022 | JOB No.: NX140001 | FILE: Reporting Piezo_OldTDF_2022_Dec_new_threshold.xlsx | FIGURE No.: 6 | REV.: 0 |

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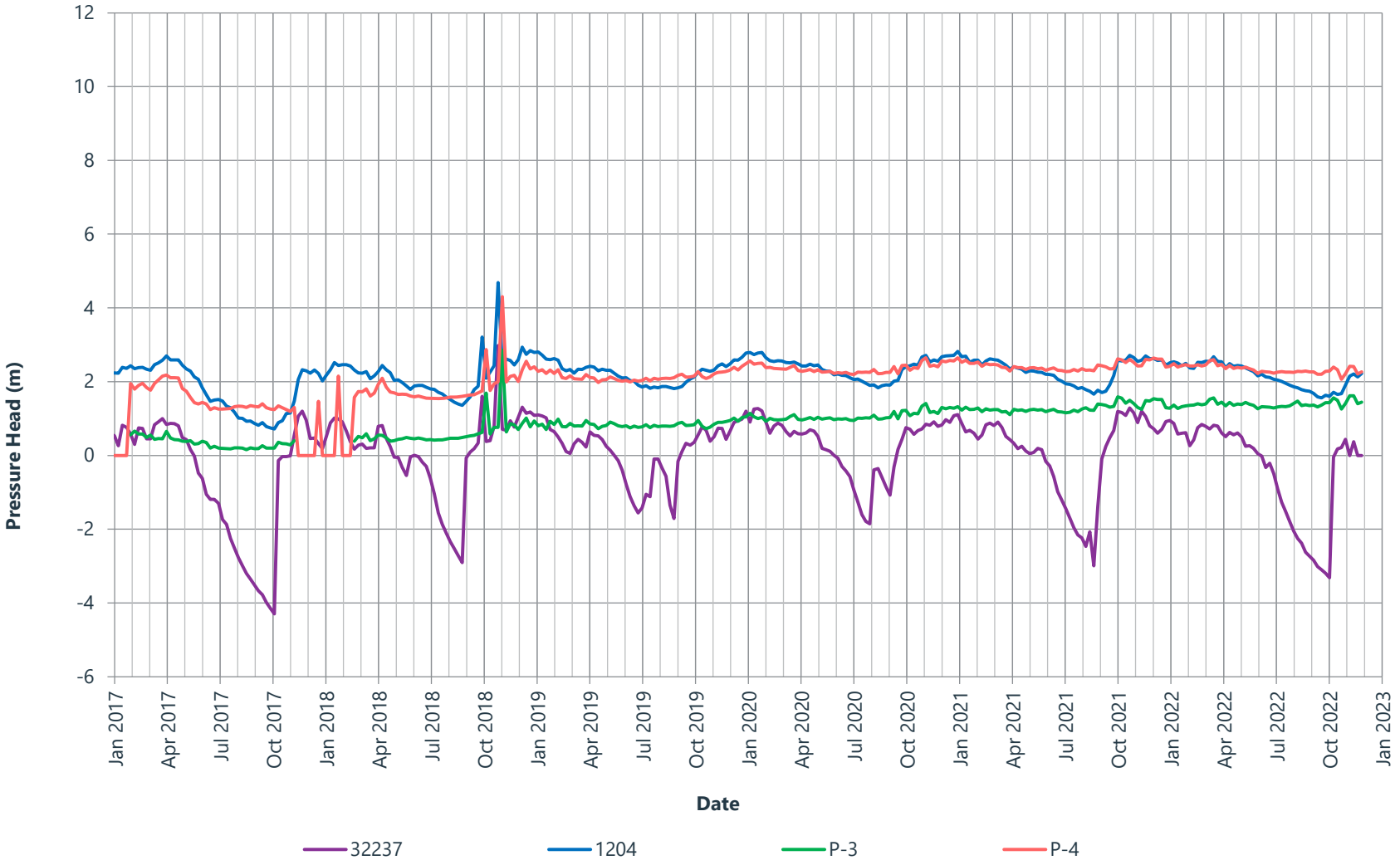
| CLIENT: Myra Falls Mine, A Hudbay Group Company | PROJECT: Myra Falls DSI Report | | | | |
| | TITLE: Old TDF Piezometer Records Plane 3 (32233, 21715, P-13, P-14) and Plane 3/4 (P-1, P-2) | | | | |
| | DATE: December 2022 | JOB No.: NX140001 | FILE: Reporting Piezo_OldTDF_2022_Dec_new_threshold.xlsx | FIGURE No.: 7 | REV. 0 |

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|---|---|---|---|---|---|
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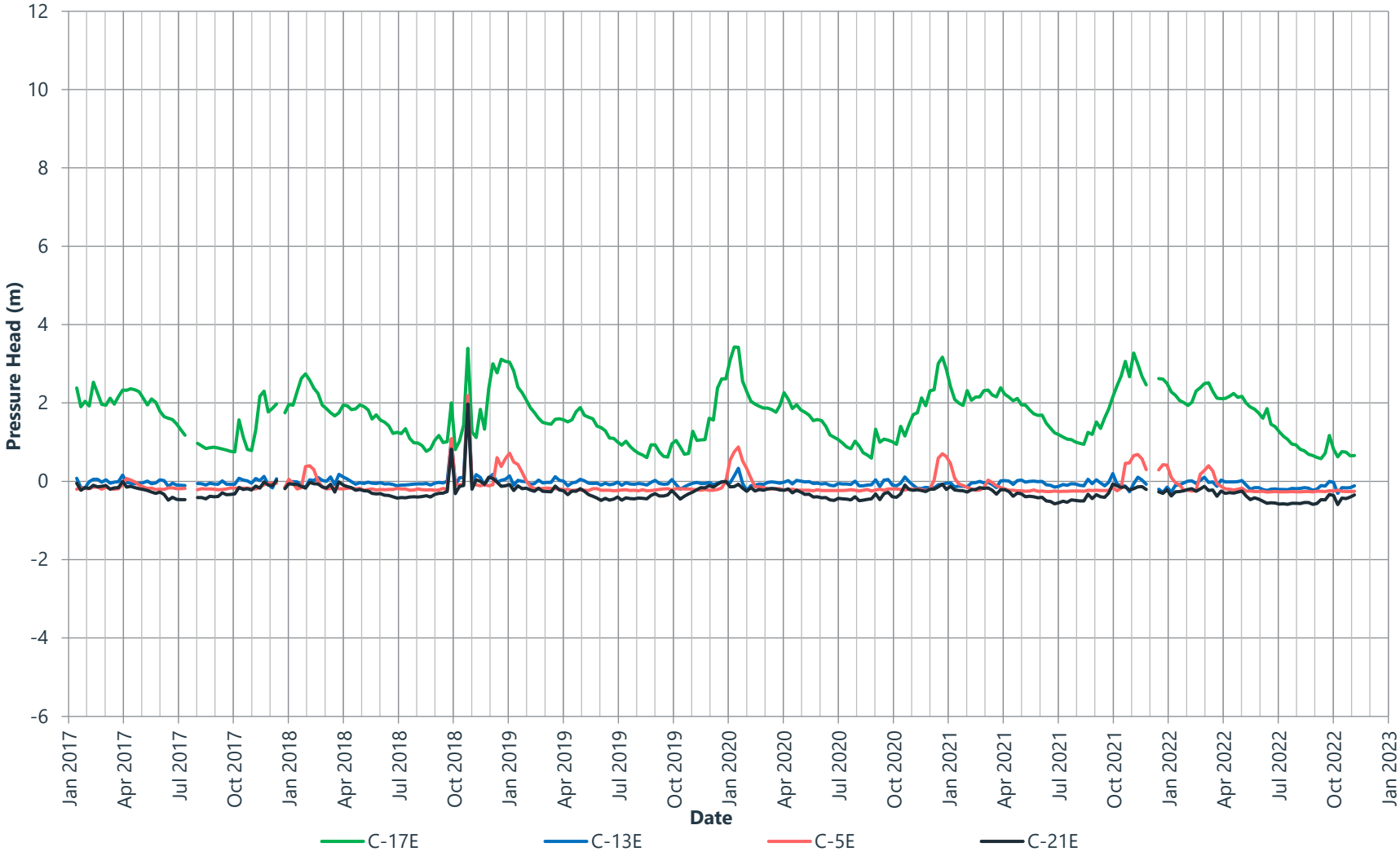
| | TITLE: Old TDF Piezometer Records - Plane 4 32237, 1204, P-3, P-4 | | | | |
| | DATE: December 2022 | JOB No.: NX140001 | FILE: Reporting Piezo_OldTDF_2022_Dec_new_threshold.xlsx | FIGURE No.: 8 | REV. 0 |

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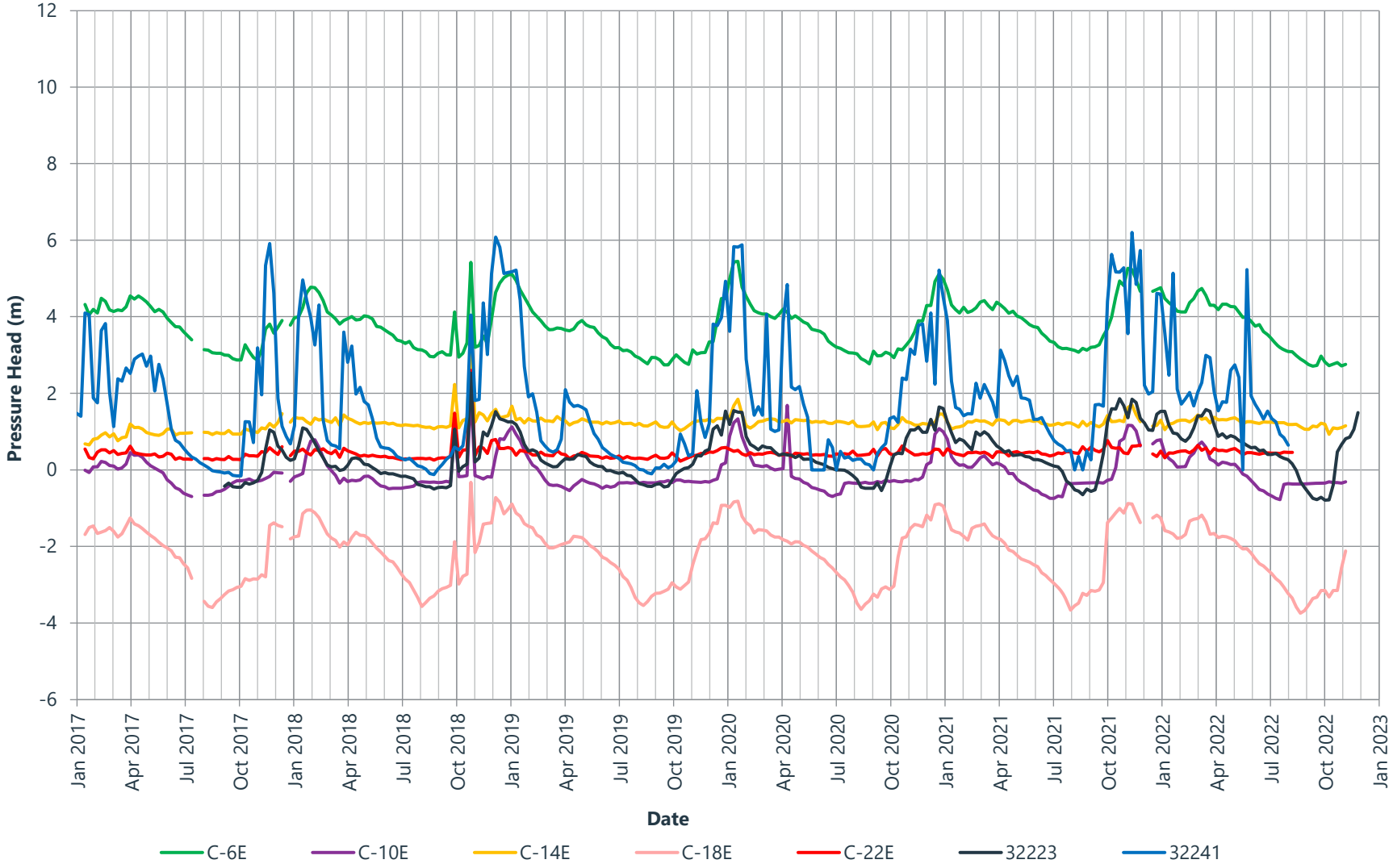
|---|---|---|---|---|---|
| CLIENT: Myra Falls Mine, A Trafigura Group Company | PROJECT: Myra Falls DSI Report | | | | |
| | TITLE: Old TDF Piezometer Records - Plane 5 Outer Embankment Slope, Location 1 C-5E, C-13E, C-17E, C-21E | | | | |
| | DATE: December 2022 | JOB No.: NX140001 | FILE: Reporting Piezo_OldTDF_2022_Dec_new_threshold.xlsx | FIGURE No.: 9 | REV.: 0 |




wsp

CLIENT: Myra Falls Mine
A Trafigura Group Company

| | |
|---|---|
| PROJECT: | Myra Falls DSI Report |
| TITLE: | Old TDF VWP Records - Plane 5, Outer Embankment Slope, Location 2 and Lower Tailings<br>C-6E, C-10E, C-14E, C-18E, C-22E, 32223, 32241 |

| DATE: | JOB No.: | FILE: | FIGURE No.: | REV. |
|---|---|---|---|---|
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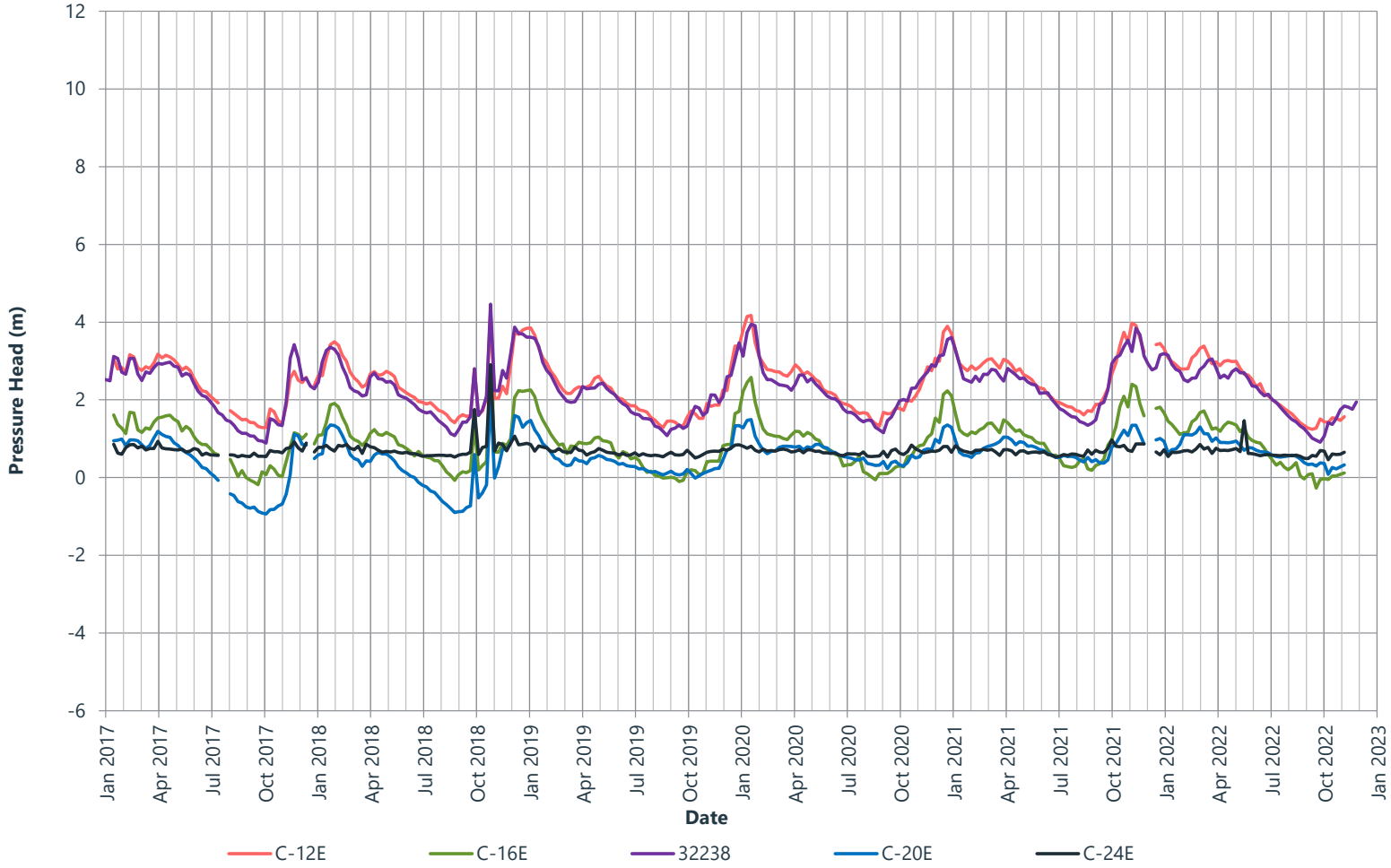


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|---|---|---|---|---|---|
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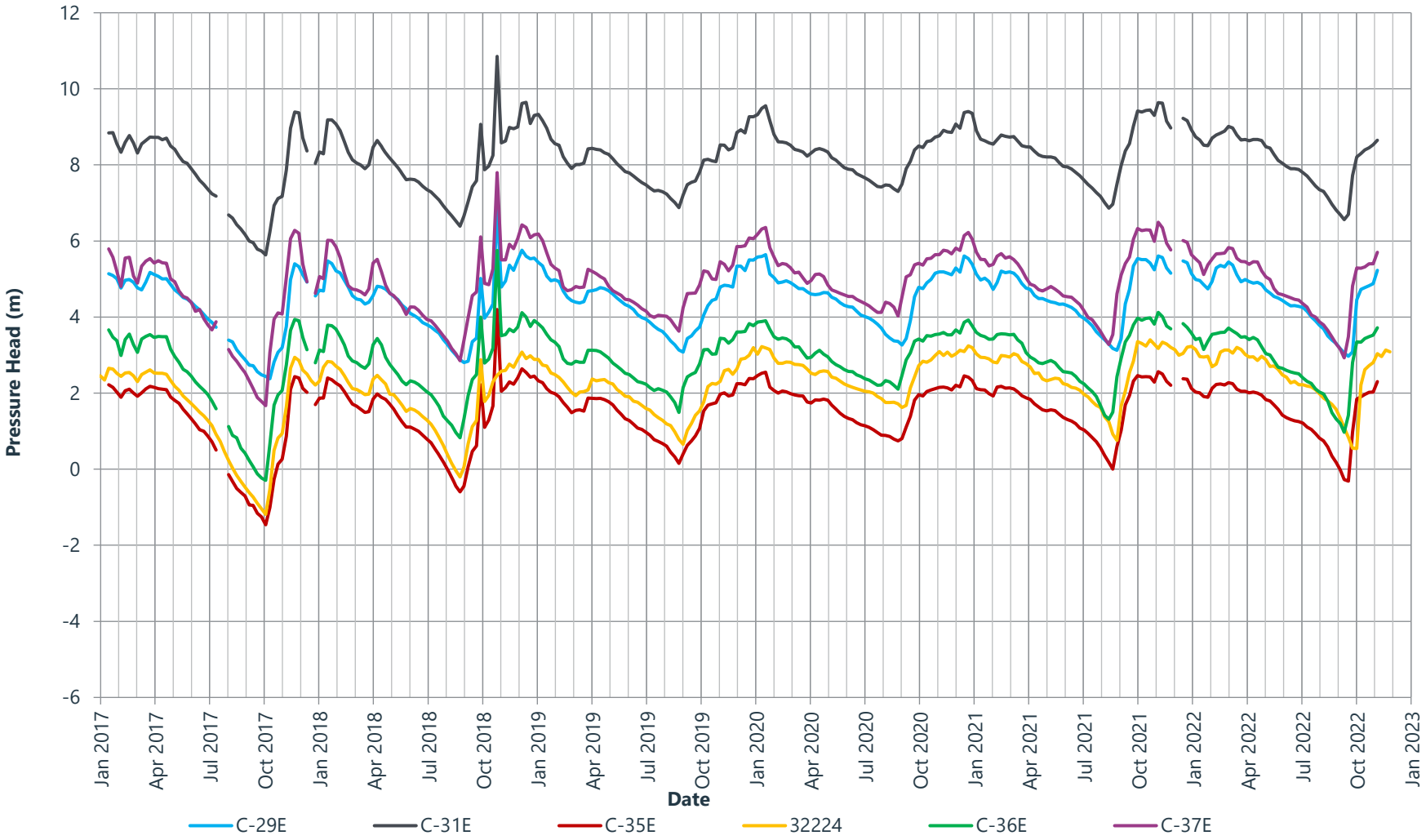
| | TITLE: Old TDF Piezometer Records - Plane 5 Outer Embankment Slope, Location 3 C-12E, C-16E, 32238, C-20E, C-24E | | | | |
| | DATE: December 2022 | JOB No.: NX140001 | FILE: Reporting Piezo_OldTDF_2022_Dec_new_threshold.xlsx | FIGURE No.: 11 | REV.: 0 |

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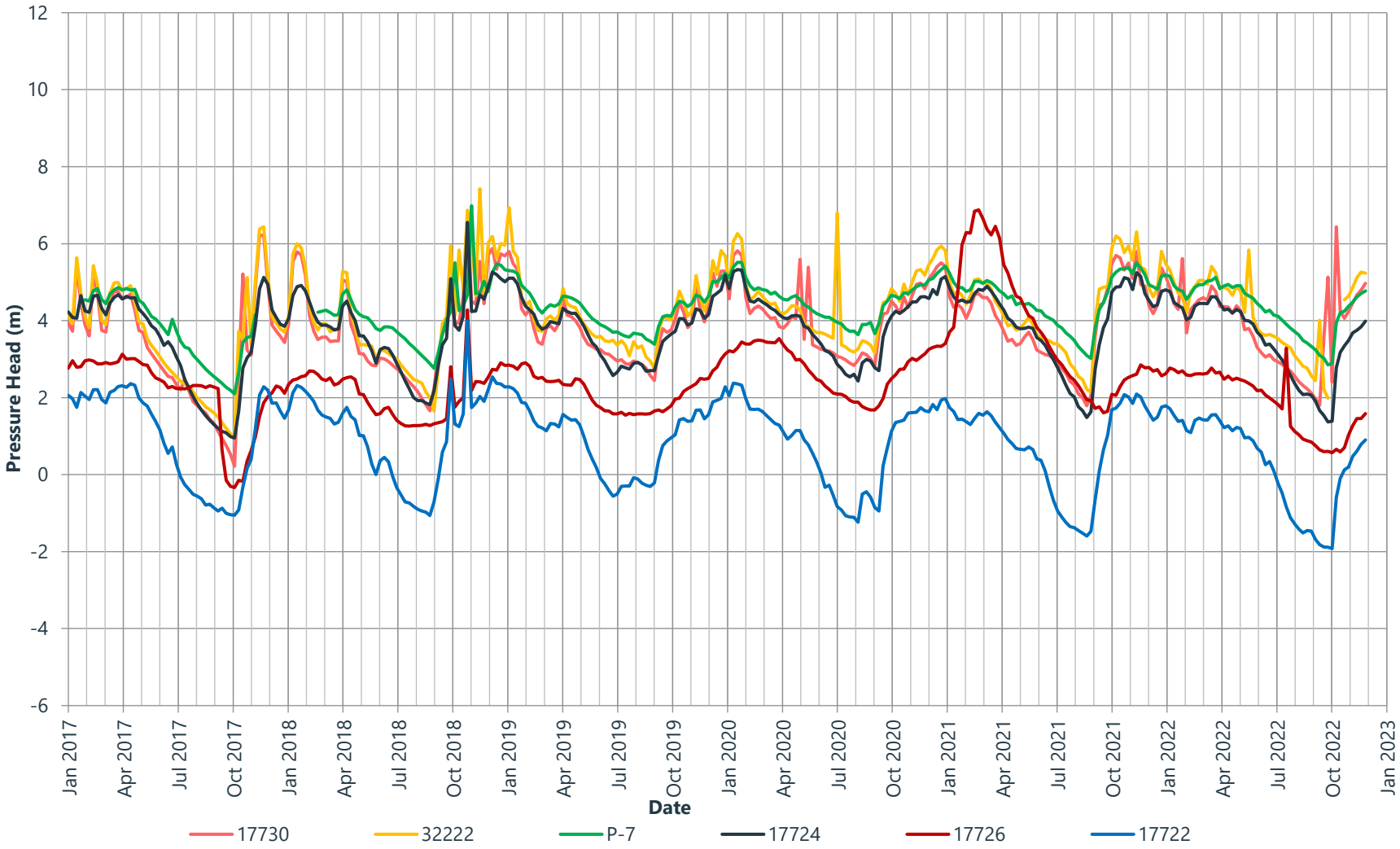
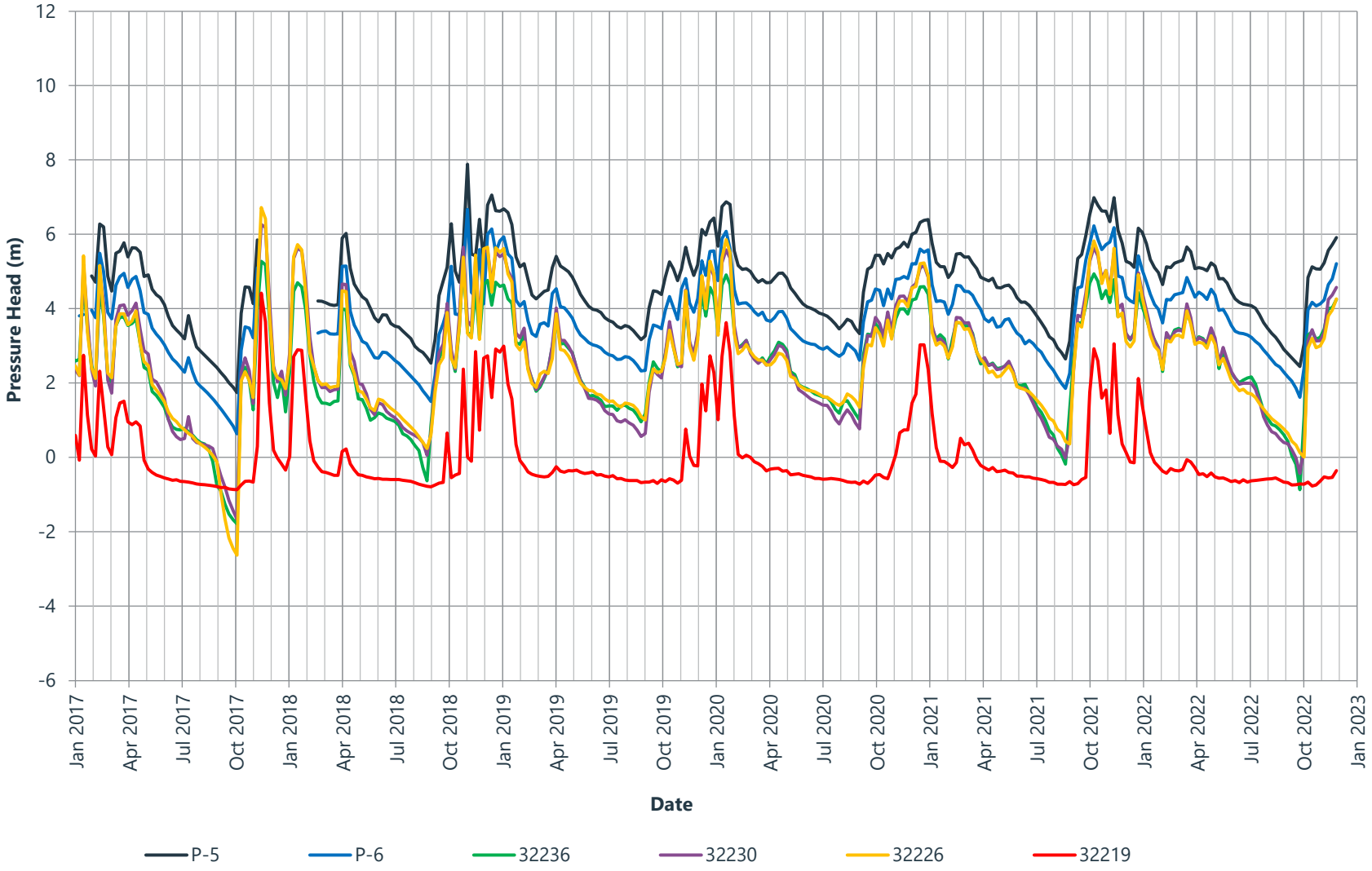
|---|---|---|---|---|---|
| CLIENT: Myra Falls Mine, A Hudbay Group Company | PROJECT: Myra Falls DSI Report | | | | |
| | TITLE: Old TDF Piezometer Records - Plane 5<br>Upper Tailings Beach<br>C29E, C-31E, C-35E, 32224, C-36E, C-37E, 32234 | | | | |
| | DATE: December 2022 | JOB No.: NX140001 | FILE: Reporting Piezo_OldTDF_2022_Dec_new_threshold.xlsx | FIGURE No.: 12 | REV.: 0 |




| | | | | | |
|---|---|---|---|---|---|
| CLIENT: Myra Falls Mine, A Trafigura Group Company | PROJECT: Myra Falls DSI Report | | | | |
| | TITLE: Old TDF Piezometer Records - Plane 5<br>Paste Berm and Upstream Tailings<br>17730, 32222, P-7, 17724, 17726, 17722 | | | | |
| | DATE: December 2022 | JOB No.: NX140001 | FILE: Reporting Piezo_OldTDF_2022_Dec_new_threshold.xlsx | FIGURE No.: 13 | REV.: 0 |




| | | | | | |
|---|---|---|---|---|---|
| CLIENT: Myra Falls Mine, A Trafigura Group Company | PROJECT: Myra Falls DSI Report | | | | |
| | TITLE: Old TDF Piezometer Records<br>Plane 5/6 (P-5, P-6) and<br>Plane 6 (32236, 32230, 32226, 32219) | | | | |
| | DATE: December 2022 | JOB No.: NX140001 | FILE: Reporting Piezo_OldTDF_2022_Dec_new_threshold.xlsx | FIGURE No.: 14 | REV.: 0 |

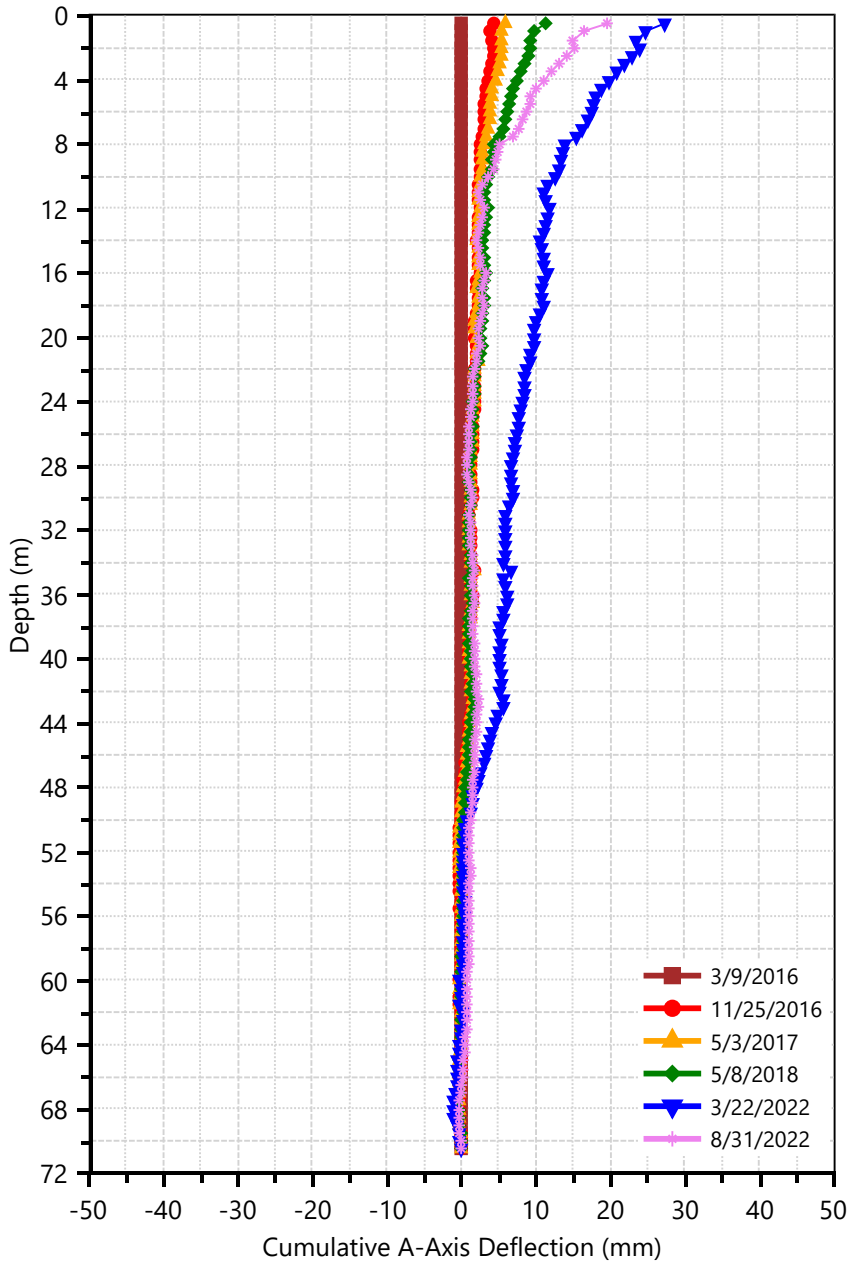
# Appendix B2-2

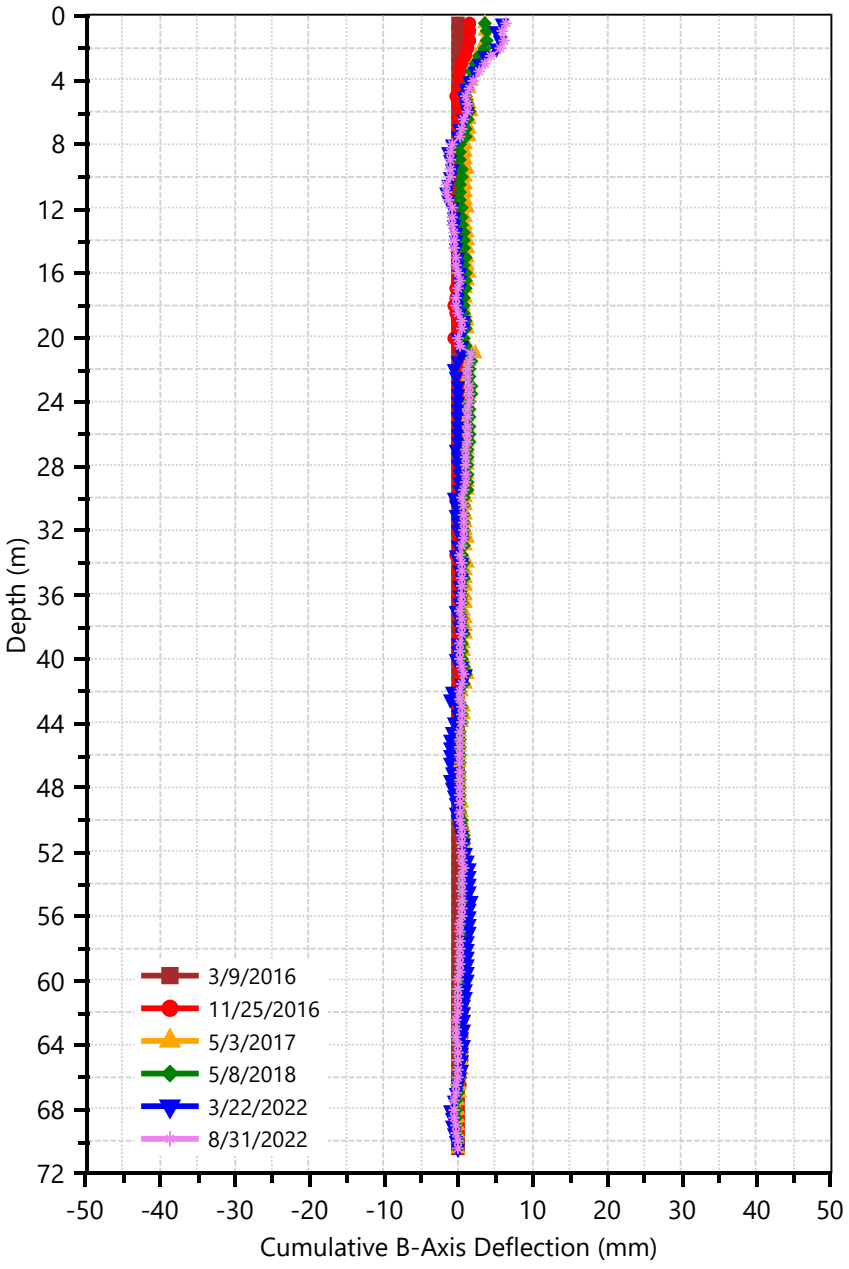
# Old TDF Slope Inclinometer Data

| Figure No. | Title |
|---|---|
| Figure 1 | Cumulative Displacement – BH15-32 |
| Figure 2 | Resultant Displacement – BH15-32 |
| Figure 3 | Incremental Displacement – BH15-32 |

Initial Reading: 9-Mar-2016
Correction: Bias Shift

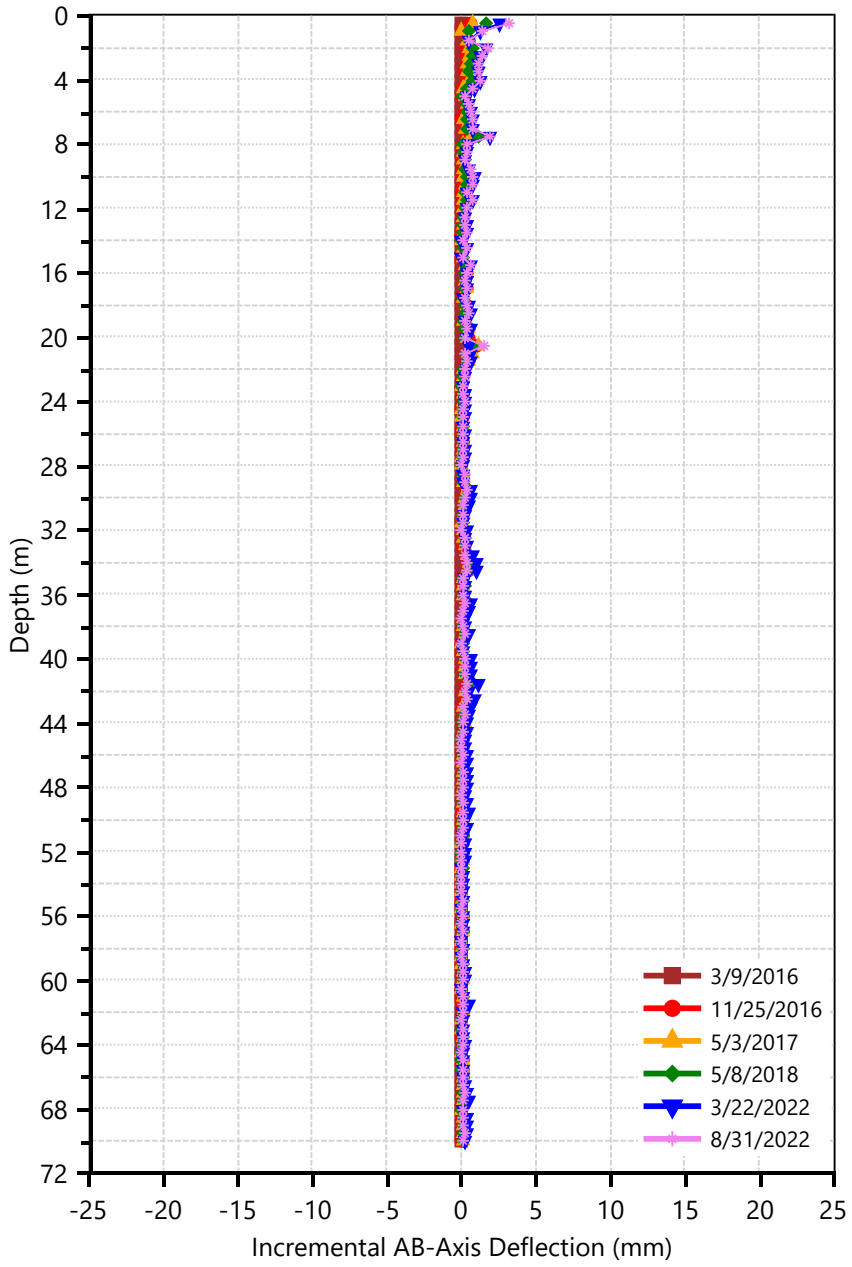
# Myra Falls BH15-32
# Cumulative Displacement
# (March 2016 - August 2022)

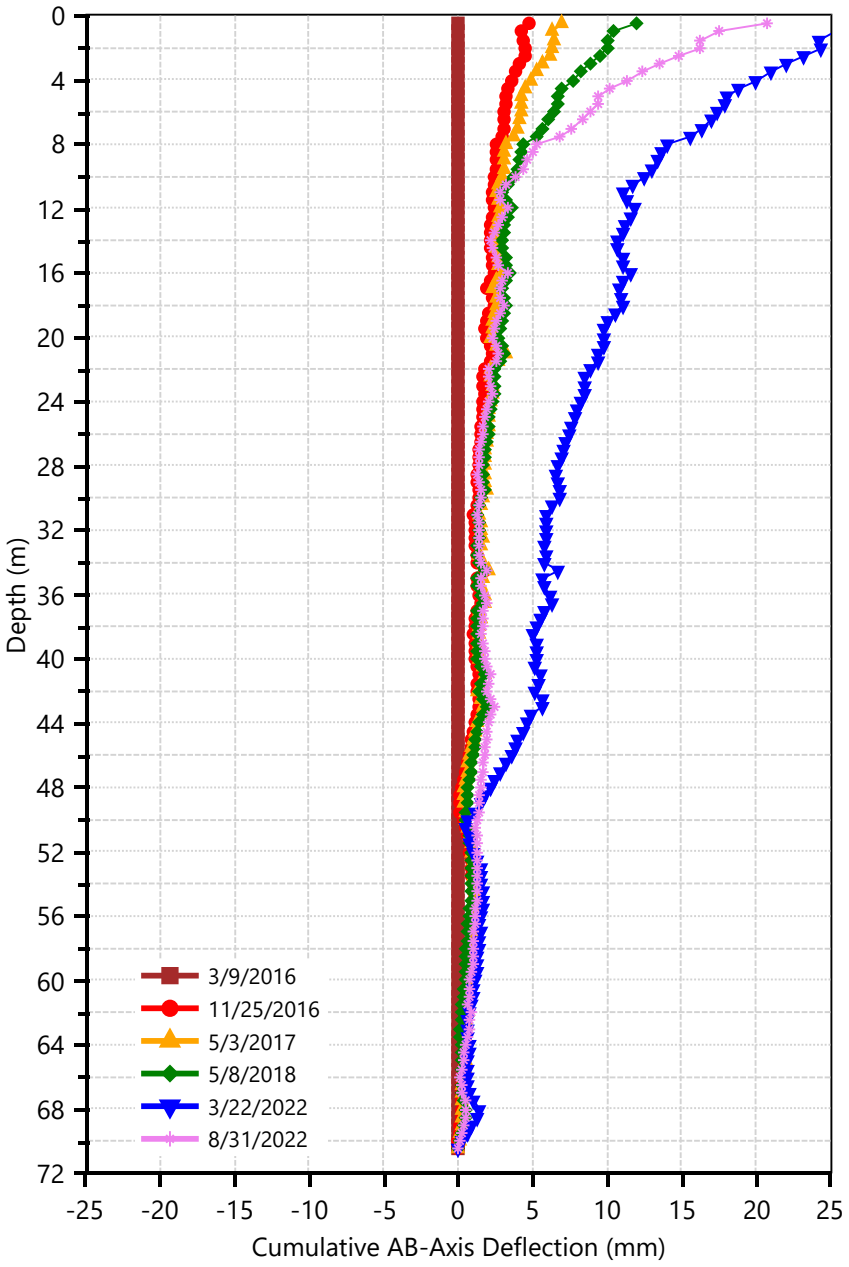


Initial Reading: 9-Mar-2016
Correction: Bias Shift

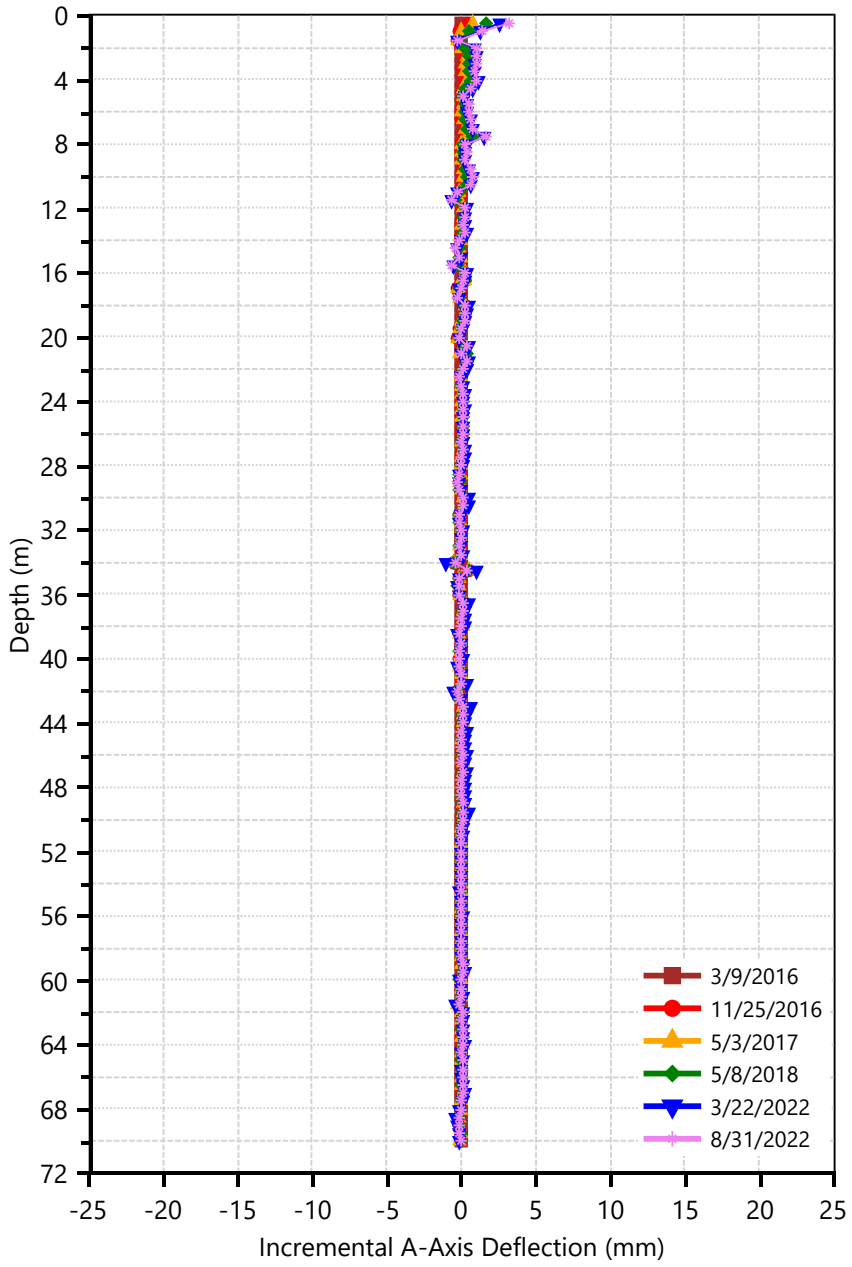
# Myra Falls BH15-32
# Resultant Displacement
# (March 2016 - August 2022)

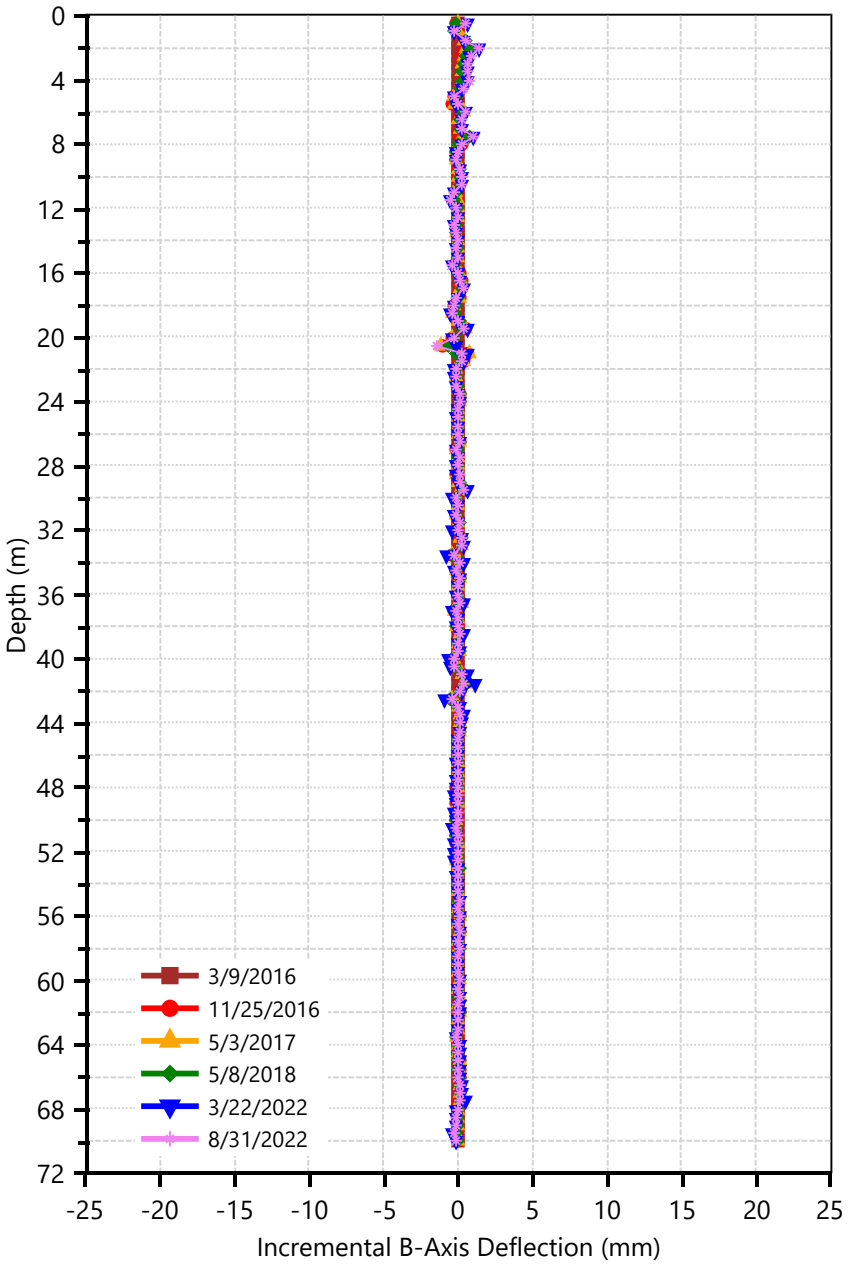


Initial Reading: 9-Mar-2016
Correction: Bias Shift

# Myra Falls BH15-32
# Incremental Displacement
# (March 2016 - August 2022)



# Appendix C

## WSP Inspections

Wood Environment & Infrastructure Solutions,
a Division of Wood Canada Limited
4385 Boban Drive
Nanaimo, BC V9T 5V9
Canada

T: 250.758.1887

# Myra Falls Mine
# Quarterly Site Visit Report

| | | | |
|---|---|---|---|
| Date of Field Review: | 14 January 2022 | Date of Memo: | 11 March 2022 |
| File No.: | NX14001B4 | Client: | Myra Falls Mine Ltd. (MFM) |
| Engineer: | Eric Thiesburger, P.Eng. | To: | Nicole Pesonen |
| With: | Josh Fry | Cc: | Dixie Ann Simon, P.Eng. |
| Weather: | Cold & snowy: wintery conditions. | | |

## Summary

The Old TDF and Lynx TDF are reviewed by Wood Environment & Infrastructure, Wood Canada Limited (Wood) on a regular basis as part of the engineering reconnaissance of the tailing facilities. Wood notes conditions in and around the facilities during the review, with emphasis on water management, dam stability, and seepage conditions. This review was completed to support the regulatory requirement for annual review of the Facilities by the Engineer of Record or their designate.

The action items and recommendations summarized above are highlighted with bold text below. This inspection was carried out on 14 January 2022. The recommendations herein are based on Wood's observation of surface conditions at the time of the field review and are subject to revision upon the availability of new information.

Action items and recommendations from this site visit are:

1. Lynx TDF:
    a. Continue pumping the pond water to a practical minimum in the TSF on a routine basis.
    b. Collect pond water level readings using the staff gauge on a daily basis.
    c. MFM shall make effort to complete the 10L portal plug work as soon as practical and complete the dam construction at the west abutment.
    d. Monitor for erosion of the downstream face resulting from concentrated flows off the crest through the safety berm punch-outs.
2. Surge Pond:
    a. Consider measures to prevent sedimentation such as re-diversion to another area or excavating sediment traps (i.e., bell holes) along the concentrated portion of the flow path from the Paste Plant area.
3. Old TDF
    a. Grating on both decants needs to be replaced due to acidic dissolution of lower portion of the vertical grating.
    b. Although not clearly visible due to snow cover, the erosion of Seismic Upgrade berm cover is a condition that should be prevented from occurring in the future and the eroded material should be reinstated to return the Non-Acid Generating fill type cover to its original design thickness and extents.
4. LLDD:

a. Remove debris (trees and cobble sized rocks) when safe to do so.
b. Numerous anchor bolts are no longer flush to the concrete blankets. Observe for any further deterioration or damage.

5. Water Treatment Ponds:
    a. Enhanced surveillance of the Pond 2A spring seeps: During the weekly inspections, note conditions, such as flow rates, extents, water levels and any signs of turbidity. MFM has had water chemistry testing done to help locate the source. Results pending engineering analysis.
    b. Rip rap on the WTP berm (adjacent to the conveyor): Fir and hemlock trees have begun to establish in some areas of the berm. These should be removed to stop root penetration and proliferation.

---

## Observations

### Old TDF

- Erosion of the south side of the West Strip channel; riling and erosion up to several inches in depth is present around the outlet of the channel.
- Instrumentation huts:
    - Hut A was inspected, and no issues noted, inside the hut was dry and all cables legibly marked.
    - Hut B was not located.
    - Hut C is not a hut; rather, the cable box is attached at around 1.5 m above ground to a steel pole. A solar panel attached to a steel pole lying flat on the ground was observed to be partially buried in snow.
- Bubbling to the east of the APA Spillway within the East Strip Channel was observed to be no longer present
- Two LLDD underdrains observed to be flowing very slowly (dripping.)
- DDSS has a low discharge flow
- Ponding observed on a large portion of the easternmost area of the East Strip

The downstream shells of the APA berm and Seismic Upgrade berms showed no signs of solids migration.

### Lynx TDF

(Upstream, Crest and Abutment)

- Pumping was ongoing at the time of site visit. MFM has increased to pumping capacity with 12" pipe on a diesel pump locate near west abutment. The pumping appeared to be effective on limiting the pond in the area near west abutment and exposing a large area of tailings beach (~70% of impoundment). The practice pumping the pond water to a practical minimum should continue.
- The staff gauge is located near the pump station near west abutment. The top of staff gauge reads an elevation of 363.68 according to MFM. The pond level was estimated about El. 362.7 m at the time of site visit. Pond water level readings using the staff gauge should be collected on a daily basis.
- The upstream bench is estimated to be 0.5 to 2.5 m above tailings or pond. The bench appeared to be in good condition with minor ponding on the surface following recent rainfall events.
- Tailings discharge was ongoing with a spigot close to east abutment. Tailings beach elevations were higher on the east and south sides of impoundment. MFM should rotate the spigot along the upstream side of the bench to make more even tailings beaches, which will improve storage management and upstream stability during next upstream bench raise construction.

- The crest of Lynx Dam was generally in good condition, with muddy conditions, minor ponding and vehicle rutting on the road surfacing material. MFM indicated the crest had been re-graded a few times to maintain trafficable.
- A safety berm was constructed on the downstream side of crest. Some slots were cut to allow drainage to the downstream side. Local regrading to divert runoff to the slots may be useful to allow efficient discharge.
- Instrumentation including survey prisms and slope inclinometers were observed on the crest during the site visit.
- The WRD1 Zone J filter was raised by 5 m in 2021 and the crest width was estimated between 11 and 14 m. The slope face of the WRD 1 Zone J was in good condition. Minor crest sloughing and cracking was observed at the upstream limit of the crest near the dam, i.e. adjacent to the ramp to upstream bench. This sloughing and cracking should be monitored during routine dam inspections, and may be repaired at the next dam raise construction or if conditions deteriorate.
- The dam was not tied in with the bedrock at the west abutment as the 10L portal has not been plugged and sealed, which was delayed according to MFM. Water was flowing out of the portal and diverted to the downstream side of the dam at the time of the site visit. MFM shall make effort to complete the 10L portal work as soon as practical, and complete the dam tie-in construction at the west abutment.
- The operation spillway was clear and unobstructed.

(Downstream and Additional Downstream Raise)

- Downstream slopes of the Lynx Dam are in good condition. No seepage or wet spots observed on the downstream dam face and toe.
- The downstream additional raise was completed at South Arm and West Arm, to elevations of about 346 to 347 m. Minor ponding and rutting was present at the bench. No signs of instability were observed.

**Lynx TDF Closure Cover Trial**

- Closure cover trial area was at a portion of additional downstream raise at the South Arm. Runoff erosions were observed on the till cover material. Finer particles were washed downslope and accumulated at the toe area.

**Lynx Springs Drain**

- Springs drain was flowing clear and culvert to sump box was functioning.

**Diversion Ditches**

- The Lower Lynx Diversion Ditch was flowing unimpeded.
    - Several cobbles and tree branches noted within the channel. This is common and MFM regularly removes debris.

**Surge Pond**

- Sediments transported by surface water runoff are depositing in the north-west corner of the Surge Pond. The runoff originates over a substantial (relative to the Surge Pond) sub-catchment, likely extending as far north as the Paste Plant.
- Decant is unimpeded.
- Water has a clear flow path to the decant.

**Super Pond**

- Overflow discharging normally to the WTPs.

- No signs of instability on crest of downstream shell. No solids migration, deflection, or heave visible in vicinity of the DS toe.
- 25-sump area around collar unflooded, appears functional.

### Polishing Ponds

- Artesian conditions were observed along an approximately 8-meter section of the Pond 2A dam downstream toe/Pond 4 shoreline. Numerous spring seeps were located both along the dam toe (sub ariel) and the Pond 4 pond bottom (sub aqueous.)
- Water levels were above the normal operating range (based on observing water level on the staff gauge) in Pond 4, all other Ponds were in the normal operation range.
- Myra Out and decant structures on all of the Ponds appeared to be operating normally.
- Rip rap on the WTP berm (adjacent to the conveyor) was snow covered. The snow was not very deep and individual boulders were apparent. No deterioration or damage was observed.

# Photographs

Photo 1a: Old TDF outer embankment

Photo 1b: Old TDF outer embankment

Photo 1c: Old TDF outer embankment

Photo 1d: Old TDF outer embankment

Photo 1e: Old TDF east end of the east strip.  Note ponded water and flow from the LLDD underdrain (bottom left)

Photo 1f: Old TDF showing snow covered APA

Photo 2a: LLDD

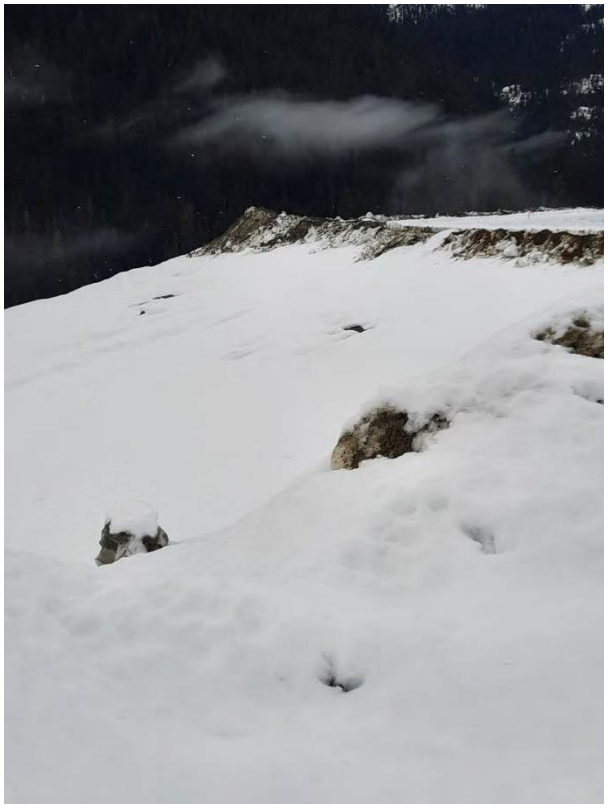


Photo 3a: Lynx TDF 4:1 slope

Photo 3b: Lynx TDF showing WRD1 filter and discharge of raw tails to the west of the filter

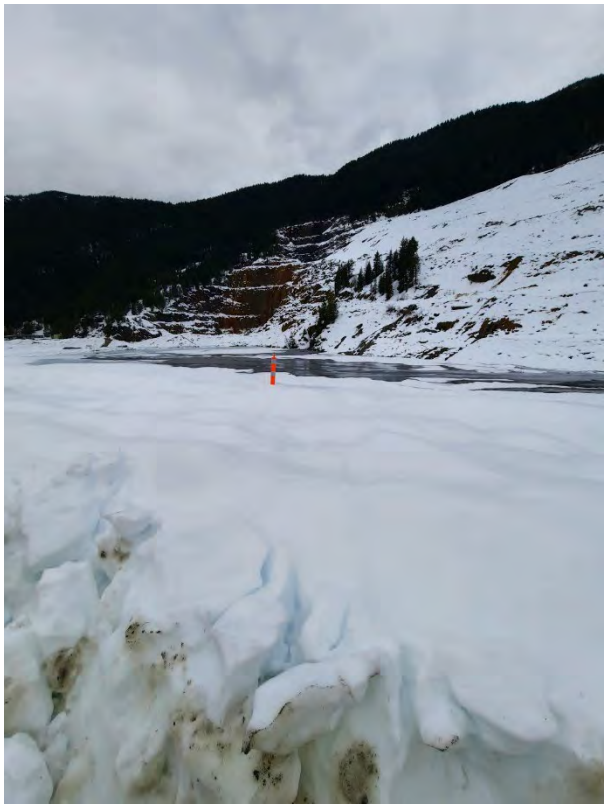


Photo 3c: Lynx TDF beach and pool

Photo 3d: Lynx TDF dam crest and upstream bench

Photo 3e: Lynx TDF dam crest showing well maintained running surface with minimal pooling

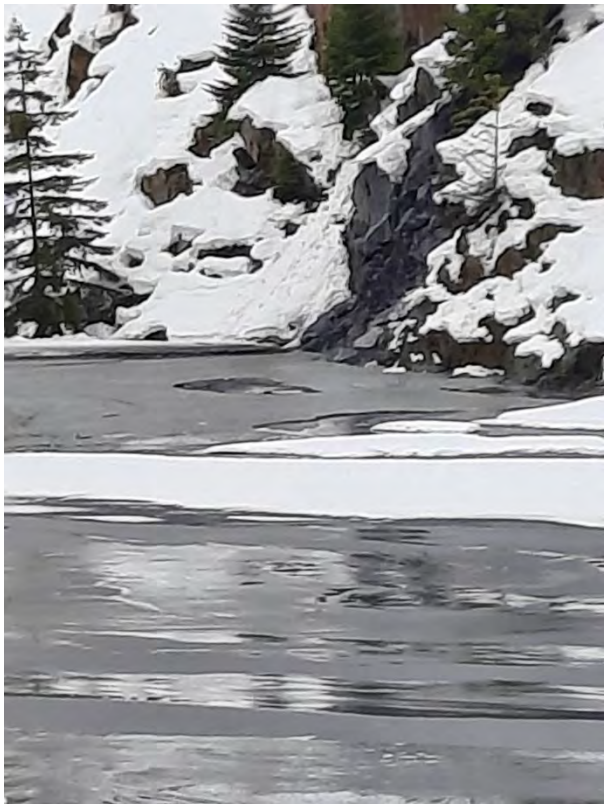


Photo 3f: Lynx TDF discharge of raw tails

Photo 3g: Lynx TDF reclaim pool

Photo 3h: Lynx TDF south-west portion of downstream dam shell

Photo 4a: WTP 3A, silt curtain installed

Photo 4b: WTP 2A, staff gauge

Photo 4c: Crest between WTPs

Photo 4d: dredge dry-docked S-E corner of WTP2A

Photo 4e: WTP 2 staff gauge

Photo 4f: WTP1

Photo 4g: WTP1 staff gauge

Photo 4h: WTP1

Photo 4i: WTP2A

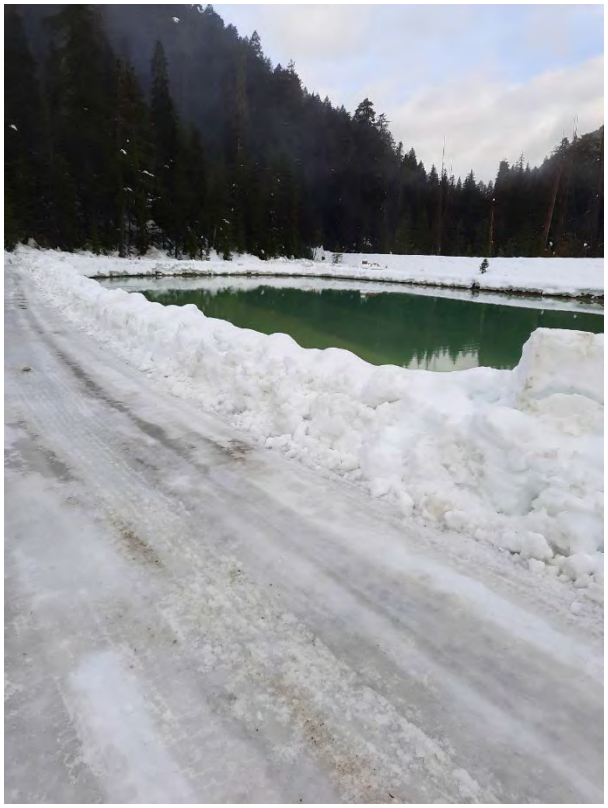


Photo 4j: WTP 2A

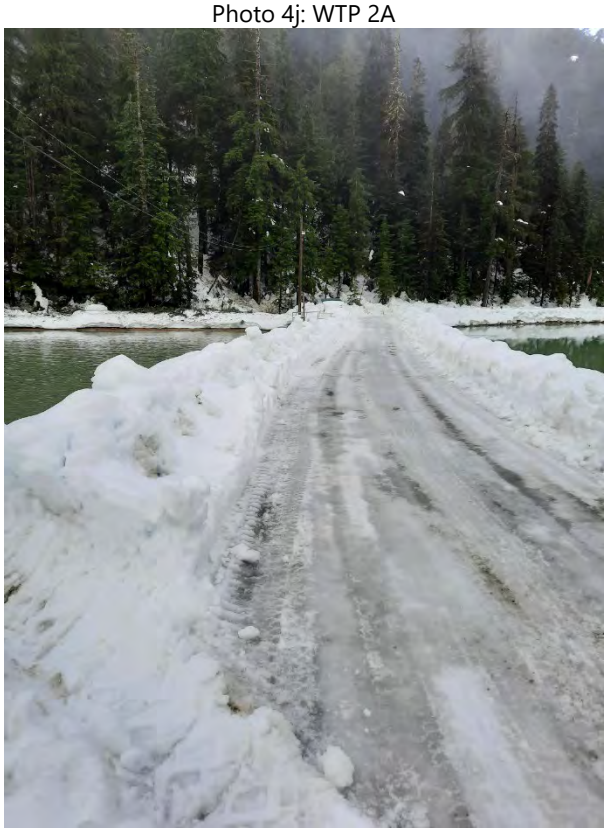


Photo 4k: Crest between WTP2 and WTP2A

Photo 4l: Crest between WTP3 and WTP3A

Photo 4m: WTP 3A

Photo 4n: WTP3A staff gauge

Photo 5a: Super Pond

Photo 5b: Super Pond In

Photo 5c: Super Pond out

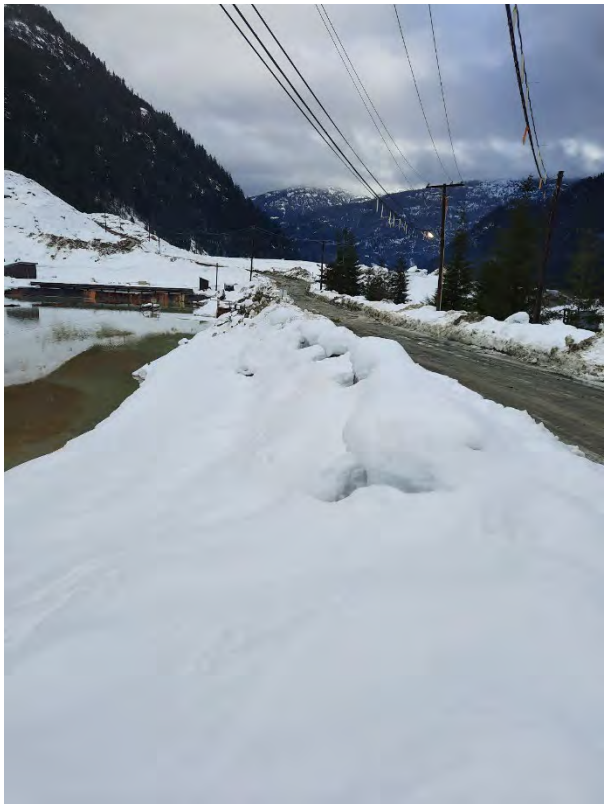


Photo 5d: Super Pond crest

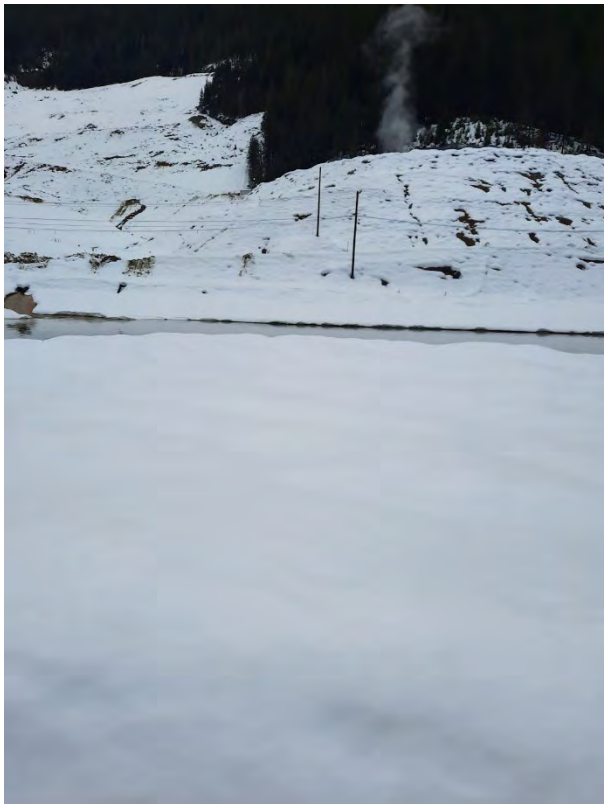


Photo 6a: Surge Pond

Photo 6b: SurgePond west decant

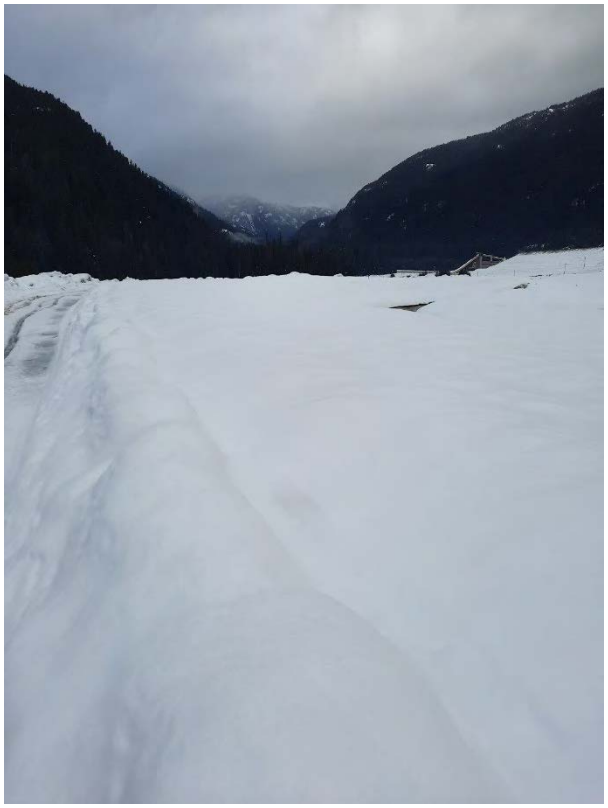


Photo 6c: Old TDF west strip channel

Photo 6d: Old TDF east end of the west strip, APA spillway and WRD6

Photo 6e: Old TDF west end of the east strip, APA berm,  APA spillway & APA spillway culvert crossings

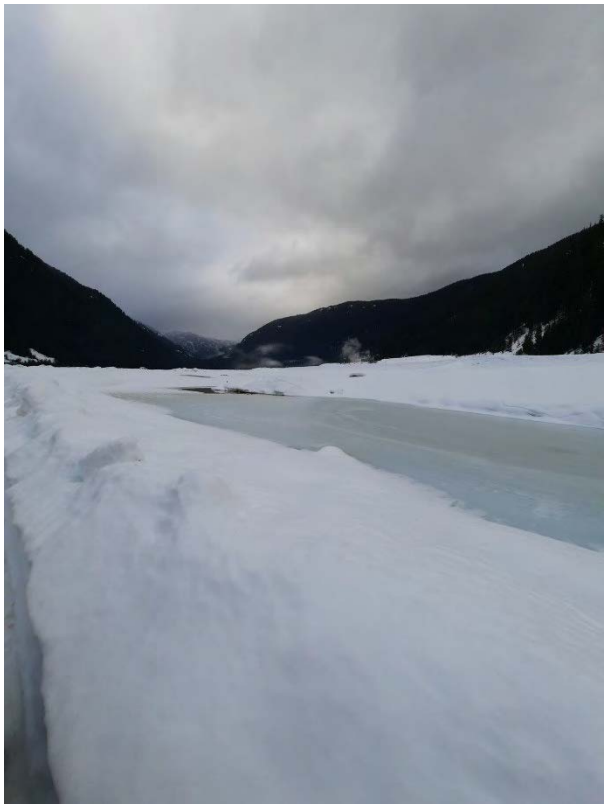


Photo 6f: Old TDF west end of the east strip and APA berm

Photo 6f: Old TDF east strip and APA berm

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# Myra Falls Mine
# Quarterly Site Visit Report

| | | | |
|---|---|---|---|
| Date of Site Visit: | 22, 23 March 2022 | Date of Memo: | 25 March 2022 |
| File No.: | NX14001B4 | Client: | Myra Falls Mine Ltd. (MFM) |
| Engineer: | Dixie Ann Simon, P.Eng. | To: | Nicole Pesonen |
| With: | Joshua Fry | Cc: | |
| Weather: | Cloudy and rain | | |

## Summary

The Old TDF and Lynx TDF are reviewed by Wood Environment & Infrastructure (Wood) on a quarterly basis as part of the engineering reconnaissance of the tailings facilities. Wood notes conditions in and around the facilities during the reviews, with emphasis on water management, dam stability, and seepage conditions.

This site visit was carried out on 22 and 23 March 2022 and included Lynx and Old TDF and the Water Treatment Ponds including Super Pond and Polishing Ponds. The Lower Lynx Diversion Ditch was observed during this review. The inspection was conducted by Ms. Dixie Ann Simon, P.Eng.

Overall, no evidence of cracks, subsidence, or other indicators of instability of the Old TDF, Lynx TDF and Water Treatment Ponds ponds was observed.

The recommendations herein are based on Wood's observation of surface conditions at the time of the field inspection and are subject to revision upon the availability of new information

Action items and recommendations from this site visit are:

1. Several VWPs installed in Lynx foundation materials are either not reporting or have ceased to function. The VWP data at this time is very limited and insufficient to assess the performance of the structure. The Lynx VWPs was briefly checked during Wood's 19 May CRAB site visit and all connections appeared to be in place. MFM suggested that this was a likely a transmission or upload issue. The VWP coverage should be assessed and additional VWPs installed or nonfunctioning VWPs replaced during the summer/fall of 2022.

Action items remaining from the **January 2022** site visit are:

1. Lynx TDF: MFM shall make effort to complete the 10L portal plug work as soon as practical and complete the dam construction at the west abutment.
2. Surge Pond: Consider measures to prevent sedimentation such as re-diversion to another area or excavating sediment traps (i.e., bell holes) along the concentrated portion of the flow path from the Paste Plant area.
3. Old TDF: Grating on both decants needs to be replaced due to acidic dissolution of lower portion of the vertical grating.

## Observations

### Old TDF

- Snow cover prevented observation of the majority of the areas on the Seismic Upgrade Berm (SUB) where gully erosion is occurring. Wood understands that the gully erosion will be addressed during 2022 construction season when Phase 1 of the Old TDF closure is completed.
- The visible portions of the SUB appeared to be in satisfactory condition.
- The APA berm also appeared to be in satisfactory condition.
- The East Strip was essentially dammed by sediments near the Zim Pro discharge line.
- The sediments should be removed to allow unobstructed flow from the east abutment to the spillway culverts. This was discussed with MFM at the time of the site visit.
- Wood understands the Zim Pro line will be moved to a flat area to the north of the West Strip.
- The West Strip was in satisfactory condition; however, erosion on the south slope near the Surge Pond is on-going.
- Minor flow was observed from some of the drains along the DD road.
- A sheen was observed on the water below the fuel tanks in the construction equipment/laydown area. This was brought to the attention of MFM staff at the time of the site visit.
- The geotextile/geomembrane over the buried lock blocks in the spillway is damaged, likely by grading or snow clearing activities. This was discussed with MFM at the time of the site visit. The geomembrane should be repaired prior to the onset of the 2022/2023 wet season.
- The tailings were at the level of the decant structures. EDF (1/200 year event) storage is likely adequate as the decants/spillway were designed for the 1/1000 year event. This was mentioned to MFM at the time of the site visit.

### Lynx TDF

- The unsupported upstream height near the pumps exceeds the recommended height of less than one meter. We understand that there are safety concerns with respect to rock fall as well as some infrastructure and pond water depth constraints that complicate moving the barge towards the back of the TSF. MFM is aware of this.
- The area of Panel 15 drain was flooded at the time of the site visit. This is the drain where the vertical PVC pipe was installed last year. The purpose of the PVC pipe was to monitor for the presence of water in the drain so that the need to further assess the need for the drain as historical observations indicate that the drain does not produce water. The area around the pipe should be graded so that surface water is directed away from the PVC pipe. We will need to discuss how to better monitor the Panel 15 drain.
- There was little change in the closure cover trials. Some sparse vegetation was observed; however, it was not possible to tell if it was new growth or last year's growth that had not yet turned brown. Dean will be on site towards the middle/end of June to assess the closure cover trials.

### Lynx Springs Drain

- Lynx Springs drain discharge was observed to be clear.

### Diversion Ditches

- The concrete cloth along the crest of the Lower Lynx Diversion Ditch was observed. The damage is likely the result of grading and/or snow removal in this area. The damage should be repaired, and measure put in place to minimize the potential for further damage.
- Debris was not observed.

## Surge Pond

- The Surge Pond is essentially serving as a sedimentation pond for runoff from the Paste Plant area. A large 'delta' has developed in the northwest corner. It extends to the decant structure and the surface of the sediments is near the invert of the decant. The sediment should be removed.
- The replacement valve was observed lying near the decant structure access ramp. Wood understands that the valve will be installed after the end of the wet season.
- Wood understands that the Surge Pond is not operated as designed. It is operated to minimize sediment reaching Super Pond.

## Polishing Ponds

- No significant observations; all ponds in Green zone.
- No seepage observed at the Pond 4 seepage area.

# Photographs

Photo 1: Overview of the Lynx TDF taken from lookout point in Upper Lynx Pit. (March 22, 2022)

Photo 2: Lynx open pit walls north of Lynx TDF. (March 22, 2022)

Photo 3: West end of Lynx TDF, looking east towards area of pump and staff gauge. (March 22, 2022)

Photo 4: North-west corner of Lynx TDF. (March 22, 2022)

Photo 5: Lynx TDF, looking east with tailings pond covering about 2/3rd of the tailings surface. (March 22, 2022)

Photo 6: Lynx TDF staff gauge. (March 22, 2022)

Photo 7: South-east corner of Lynx TDF, looking west. Crest Elevation at 373.5m. Active tailings deposition was observed from a spigot located at the east end of the TDF. (March 22, 2022)

Photo 8: Lynx TDF Downstream toe area of the Closure Cover Trials. Some erosion observed in the Cover Trial area. (March 23, 2022)

Photo 9: Lower Lynx Diversion Ditch. No unusual performance observed. (March 22, 2022)

Photo 10: Lower Lynx Diversion Ditch damage to concrete cloth observed. (March 22, 2022)

Photo 11: East Strip was essentially dammed by sediments near the Zim Pro discharge line. (March 22, 2022)

Photo 12: Erosion gullies observed on downstream of SUB to be addressed in 2022 Closure Phase 1 Construction. (March 22, 2022)

Photo 13: West end of the Lower Lynx Diversion Ditch at the location of the interim debris retaining net. (March 22, 2022)

Photo 14: Surge Pond looking east. No unusual performance was observed. (March 23, 2022)

Photo 15: Surge Pond looking north-east. (March 23, 2022)

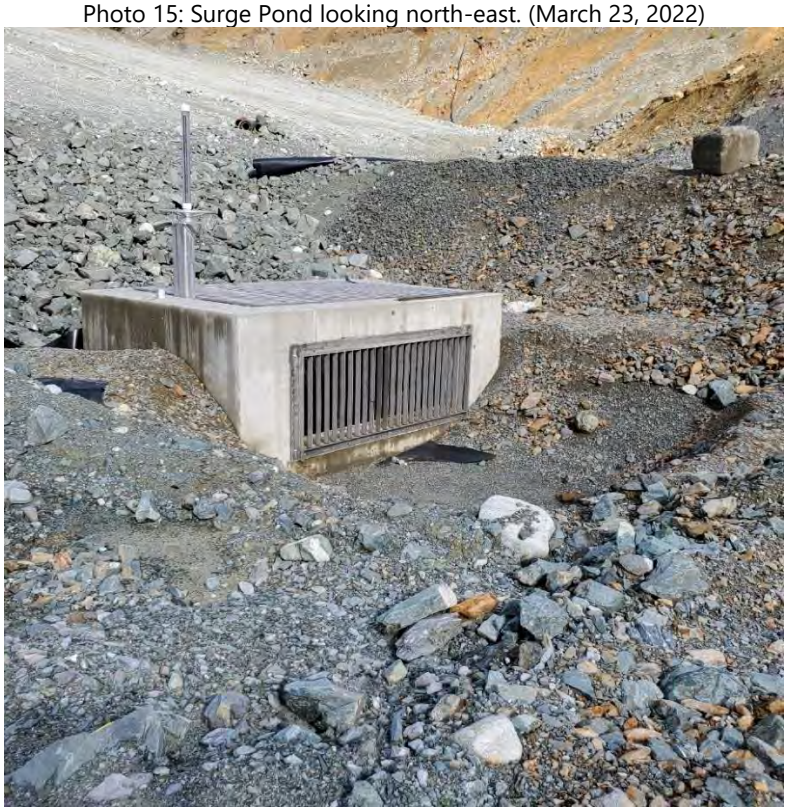

Photo 16: Temporary Lynx Spring Drain Sump. Functioning as intended with discharge observed to be clear. (March 23, 2022)

Photo 17: East Decant structure. Grating decant needs to be replaced due to acidic dissolution of lower portion of the vertical grating. (March 23, 2022)

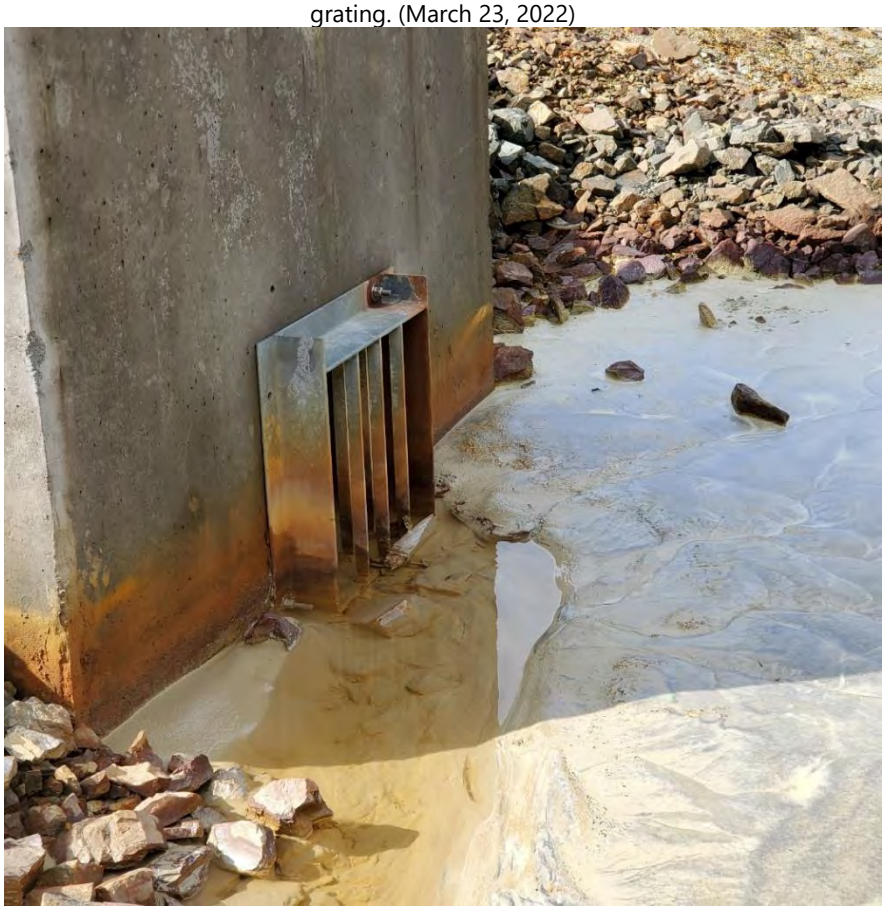

Photo 18: Grating decant needs to be replaced due to acidic dissolution of lower portion of the vertical grating. (March 23, 2022)

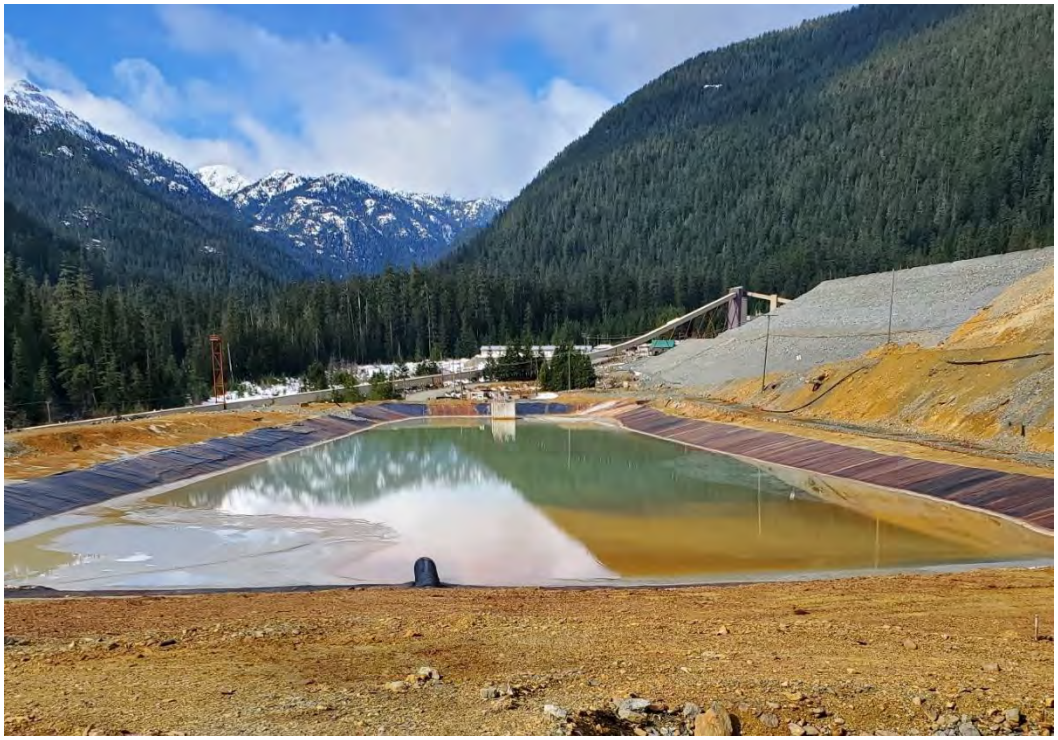

Photo 19: Super Pond at time of site inspection, no unusual performances observed. (March 23, 2022)

Photo 20: Geotextile/geomembrane over the buried lock blocks in the APA spillway observed to be damaged. (March 22, 2022)

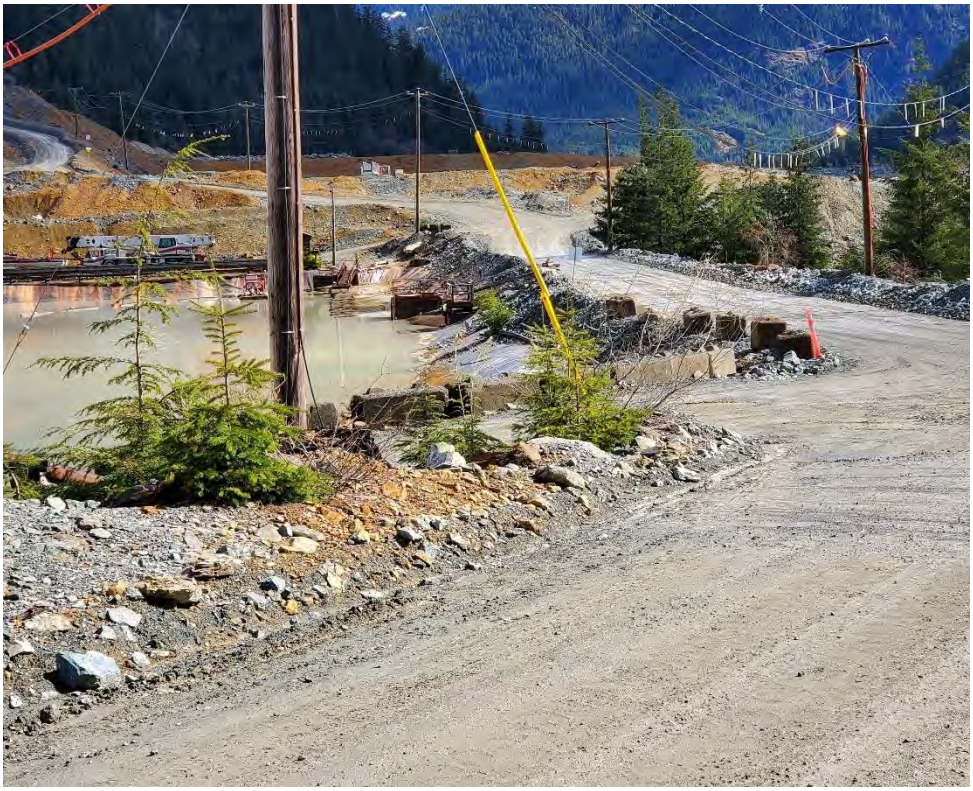

Photo 21: Super Pond Road looking Northeast towards the Old TDF. (March 23, 2022)

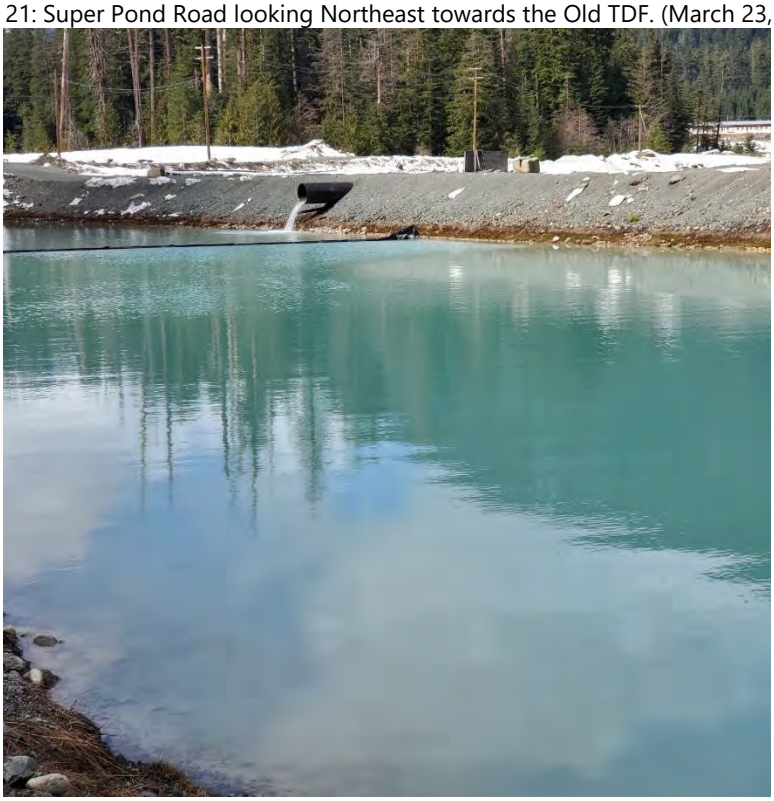

Photo 22: Polishing Pond 3A looking West. No unusual performance observed. (March 23, 2022)

Photo 23: Polishing Pond 3A staff gauge in green zone. (March 23, 2022)

Photo 24: Crest between Polishing Pond 3A and Polishing Pond 4. No unusual performance observed. (March 23, 2022)

Photo 25: Polishing Pond 2A staff gauge in green zone. (March 23, 2022)

Photo 26: Polishing Pond 2A looking South. No unusual performance observed. (March 23, 2022)

Photo 27: Road between Polishing Pond 4 and Polishing Pond 2 looking East. (March 23, 2022)

Photo 28: Staff gauge of Polishing Pond 2 in green zone. (March 23, 2022)

Photo 29: Polishing Pond 1 looking East. (March 23, 2022)

Photo 30: Staff gauge of Polishing Pond 1. (March 23, 2022)

Photo 31: Polishing Pond 1 looking Southeast. (March 23, 2022)

Photo 32: Polishing Pond 3 observed to be empty with staff gauge in green zone. (March 23, 2022)

Photo 33: Area of the closure cover trials, sparse vegetation observed. (March 23, 2022)

Photo 34: Gully erosion observed on downstream end of Seismic Upgrade Berm of the Old TDF, gully erosion to be addressed during Phase 1 Closure of Old TDF in 2022 construction season (March 23, 2022)

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# Myra Falls Mine
# Quarterly Site Visit Report

| | | | |
|---|---|---|---|
| Date of Field Review: | 26, 27 July 2022 | Date of Memo: | 18 August 2022 |
| File No.: | NX14001B4 | Client: | Myra Falls Mine Ltd. (MFM) |
| Engineer: | Dixie Ann Simon, P.Eng.; Manuel Monroy, P.Eng. | To: | Nicole Pesonen |
| With: | Joshua Fry | Cc: | |
| Weather: | Sunny and warm | | |

## Summary

The Old TDF and Lynx TDF are inspected by Wood Environment & Infrastructure (Wood) on a quarterly basis as part of the engineering reconnaissance of the tailings facilities. Wood notes conditions in and around the facilities during the reviews, with emphasis on water management, dam stability, and seepage conditions.

This site visit was carried out on 26 and 27 July 2022 and included Lynx and Old TDF and the Water Treatment Ponds including Super Pond and Polishing Ponds. The Lower Lynx Diversion Ditch was observed during this review. The inspection was conducted by Ms. Dixie Ann Simon, P.Eng. and Dr. Manuel Monroy, P.Eng. The site visit was partly undertaken with members of the Independent Review Board (ITRB) as part of the 2022 ITRB meeting held on site. The purpose of the site visit was to observe the tailings deposition operation and the condition of the tailings storage facilities (Old TDF, Lynx TDF and associated ponds). The site visit was also used to introduce Dr. Monroy to the Myra Falls tailings operation team, the ITRB members and to announce the change of EOR for the tailings facility from Ms. Simon to Dr. Monroy. The retirement and partial involvement in the project of Ms. Simon was also announced.

Overall, no evidence of cracks, subsidences or other indicators of instability of the Old TDF, Lynx TDF and seepage ponds was observed.

Action items and recommendations from this site visit are:

1. Rusted amalgamated paste area (APA) decant grates:
    a. West decant: the bottom 2-3 cm of the vertical grating bars has been dissolved leaving a 2-3 cm gap at the bottom of the decant inlet.
    b. East decant: the grate has degraded in a similar manner with approximately half of the bottom 2 cm's of the vertical grating bars being dissolved.
2. Periodic cleaning and grading are recommended in the vicinity of the orifices of the East and West Decant Pipe Drop structures.

Action items remaining from the **March 2022** site visit are:

1. The East Strip is full of sediments from the discharge of the ZimPro line. The sediments prevent the free flow of water from the east abutment. The sediments should be removed prior the start of the 2022/2023 wet season.

2. Sediments in the Surge Pond should be removed prior to the 2022/2023 wet season. The geotextile/geomembrane over the buried lock blocks in the spillway is damaged, likely by grading or snow clearing activities. The geomembrane should be repaired prior to the onset of the 2022/2023 wet season.
3. The VWP coverage should be assessed and additional VWPs installed or nonfunctioning VWPs replaced during the summer/fall of 2022.

---

## Observations

### Old TDF

- Approximately 1 to 1.5 m (height above the APA surface) of mine rock stockpile east of WRD6 remains on the northern portion of the APA.
- The APA was mostly dry and gullied on the exposed portion.
- No flows into the west decant and east decant were observable.
- No signs of instability observed at APA berm and outer embankment berm.
- The Surge Pond water is flowing clear into Super Pond In.
- No sign of piping around spillway.
- The East Strip was essentially dammed by sediments near the Zim Pro discharge line. The sediments should be removed to allow unobstructed flow from the east abutment to the spillway culverts. This was discussed with MFM at the time of the site visit. Wood understands the Zim Pro line will be moved to a flat area to the north of the West Strip.
- The West Strip was in satisfactory condition; however, erosion on the south slope near the Surge Pond is on-going.

### Lynx TDF

- The staff gauge is submerged and, the pond covers approximately 1/4 of the TSF.
- Sinkhole is not visible.
- Slurry tailings deposition was occurring at the time of the inspection at the back of the TSF or from the north end of the TSF.
- No seepage or wet spots observed along the downstream dam face.
- No dam raise construction activities during the site visit.
- Spillway was clear and unimpeded.

### Lynx Springs Drain

- Lynx Springs drain flowing clear and culvert to sump box functioning.

### Diversion Ditches

- LLDD is flowing at low levels, water is clear.
- Did not observe any new damage to the concrete cloth liner.
- ULDD not inspected.

### Super Pond

- No unusual performance was observed for the Super Pond

### Polishing Ponds

- Water level was below caution level on the staff gauges in all six ponds.
- Decant inlets are all clear.
- Water discharge at Myra Out flowing clean.

The recommendations herein are based on Wood's observation of surface conditions at the time of the field inspection and are subject to revision upon the availability of new information.

This report has been prepared for the exclusive use of Myra Falls Mine Ltd. for specific application to the area described within this report. Any use which a third party makes of this report or any reliance on or decisions made based on it are the responsibility of such third parties. Wood accepts no responsibility for damages suffered by any third party as a result of decisions made or actions based on this report. It has been prepared in accordance with generally accepted engineering practices. No other warranty, express or implied, is made.

# Photographs

Photo 1: Lynx TDF

Photo 2: Waste Rock dump area in the northeast corner of the Lynx TDF

Photo 3: Super Pond at time of site inspection.

Photo 4: Waste rock stockpile at the back end of Old TDF

Photo 5: Storage area at the back end of Old TDF

Photo 6: Geomembrane and geotextile liner along the spillway of Old TDF

Photo 7: Liner system of the Old TDF spillway

Photo 8: Polishing ponds under normal operating conditions

Photo 9: Polishing ponds under normal operating conditions

Photo 10: East Strip of the Old TDF filled with tailings from Zim Pro line

Photo 11: East corner of Old TDF with a small pond and tailings inside the East Strip

Photo 12: East Strip looking towards the west

Photo 13: East decant structure with approximately half of the bottom 2 cm's of the vertical grating bars being dissolved.

# MEMO

| | |
|---|---|
| **TO:** | Nicole Pesonen (Environment & Community Engagement Manager) |
| **COMPANY:** | Myra Falls Mine Ltd. (MFM) |
| **FROM:** | Manuel Monroy, Ph.D, P.Eng., Jason Chen, P.Eng. |
| **DATE:** | 18 November 2022 |
| **CC:** | |
| **PROJECT NO.:** | NX14001B4 |
| **SUBJECT:** | Dam Safety Inspection Report - Oct 5, 2022 |

## 1 INTRODUCTION

On October 5th, 2022 a dam safety inspection was carried by WSP E&I Canada Limited (WSP)[1] that included review of the Lynx Tailings Disposal Facility (TDF), the Old TDF and the Water Treatment Ponds including Super Pond and Polishing Ponds. The Lower Lynx Diversion Ditch was also inspected during this review. The inspection was conducted by Dr. Manuel Monroy, P.Eng and Mr. Jason Chen of the Vancouver WSP office. The inspection is part of a series of quarterly site visits carried out on a yearly basis as part of the engineering reconnaissance of the tailings facilities at the Myra Falls Mine. The weather during the inspection was sunny and warm.

WSP conducts visual inspections of the locations of key components of the tailings facilities systems to the extend possible given the natural conditions of the terrain. Emphasis is given during the site inspections on aspects such as water management, dam stability, and seepage conditions and controls.

Overall, no evidence of cracks, daylighting seepage, subsidence or other indicators of local or global instability of the Old TDF, Lynx TDF and Water Treatment Ponds were observed during the dam safety inspections. Beach was present along the upstream dam face covering about 50% of the Lynx TDF impoundment.

This technical memorandum presents a series of actions items and recommendations to MFM that arose during the October 2022 inspection. An annotated photographic record is also included for additional reference.

## 2 FINDINGS AND RECOMMENDATIONS FROM THE DAM SAFETY INSPECTION

### Lynx TDF

The Lynx TDF is a centreline constructed, rockfill embankment dam. The dam was raised seven times, most recently in 2021 and 2022. The current crest is at approximately elevation 373.5 m. The ultimate design crest height is planned to be elevation 382.5 m, about 9 m above the current crest. The TDF has a U-shaped, where the south and west sides of the embankment are sloped at 2H:1V and the east side is at 4H:1V. The upstream buttress is sloped at 2H:1V.

Photographs 1 to 8 show the state of the Lynx TDF during the October 2022 site inspection. The following was noted during the October 2022 site inspection:

- The historical sinkhole observed since 2012 in the paste surface near the north corner of the Lynx TDF was not visible.

[1] **"Effective September 21, 2022, Wood Environment & Infrastructure Solutions Canada Limited is operating as WSP E&I Canada Limited. No other aspects of our legal entity, contractual terms or capabilities have changed in relation to this report submission."**

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wsp.com

- Tailings deposition was occurring at the time of the inspection at the back of the TSF or from the north end of the TSF.
- No seepage or wet spots observed along the downstream dam face.
- No dam-raise construction activities during the site visit.
- Spillway was clear and unimpeded.

## Lynx Springs Drain

- Lynx Springs drain flowing clear and culvert to sump box functioning.

Action items and recommendations from this inspection (Lynx TDF and Lynx Springs Drain) are:

The 10 Level East Portal in the Lynx TDF West Abutment shows ongoing drainage flows from the portal. This portal needs to be plugged and sealed before next dam raise construction to El. 376.5 m. See Photo 8.

## Old TDF

Photographs 9 to 14 show the condition of the Old TDF during the October 2022 site inspection.

- Similar to previous inspection, the Amalgamated Paste Area (APA) was mostly dry and gullied on the exposed portion.
- No flows into the west decant and east decant were observable at the time of the inspection.
- No signs of instability observed at APA berm and outer embankment berm.
- No sign of piping around spillway.

Action items and recommendations from this inspection (Old TDF) are:

- Rusted amalgamated paste area (APA) decant grates:

    a. West decant: the bottom 2-3 cm of the vertical grating bars has been dissolved leaving a 2-3 cm gap at the bottom of the decant inlet.

    b. East decant: the grate has degraded in a similar manner with approximately half of the bottom 2 cm's of the vertical grating bars being dissolved.

- Periodic cleaning and grading are recommended in the vicinity of the orifices of the East and West Decant Pipe Drop structures.
- The East Strip continues to be obstructed by tailings. The tailings should be removed to allow unobstructed flow from the east abutment to the spillway culverts. This was discussed with MFM at the time of the site visit. See Photographs 11, 12 and 13.
- The West Strip of the Old TDF was filled with tailings obstructing the flow capacity of the spillway culvert pipes. See Photographs 11, 12 and 13.

## Surge Pond

- The Surge Pond water was flowing clear into Super Pond In.
- No unusual performance was observed for the Surge Pond

Photographs 15 to 16 show the state of the Surge Pond during the October 2022 site inspection.

## Super Pond

- No unusual performance was observed for the Super Pond

Photographs 17 to 21 show the condition of the Super Pond during the October 2022 site inspection.

### Diversion Ditches

- Lower Lynx Diversion Ditch (LLDD) was flowing at low levels, water was clear.
- No observed damage to the concrete cloth liner.
- Upper Lynx Diversion Ditch (ULDD) not inspected.

Photographs 22 to 23 show the condition of the LLDD during the October 2022 site inspection.

### Polishing Ponds

Photographs 24 to 37 show the condition of the polishing ponds during the October 2022 site inspection.

- Water level was below caution level on the staff gauges in all six ponds,
- Decant inlets are all clear.
- Water discharge at Myra Out was clean.

Action items and recommendations from this inspection (Ponds and Diversion Ditches) are:

- No unusual performance was observed. The lateral containment of the south end of the Polishing Pond 1 needs to be assessed against design flows. See Photograph 30.

## 3 CLOSURE

The recommendations herein are based on WSP's observation of surface conditions at the time of the field inspection and are subject to revision upon the availability of new information.

This report has been prepared for the exclusive use of Myra Falls Mine Ltd. for specific application to the area described within this report. Any use which a third party makes of this report or any reliance on or decisions made based on it are the responsibility of such third parties. WSP accepts no responsibility for damages suffered by any third party as a result of decisions made or actions based on this report. It has been prepared in accordance with generally accepted engineering practices. No other warranty, express or implied, is made.

## Photographs


Photo 1: Lynx TDF looking East. Active tailings deposition was observed from a spigot located at the east end of the TDF


Photo 2: Lynx TDF looking northwest. Crest elevation is at 373.5 m.

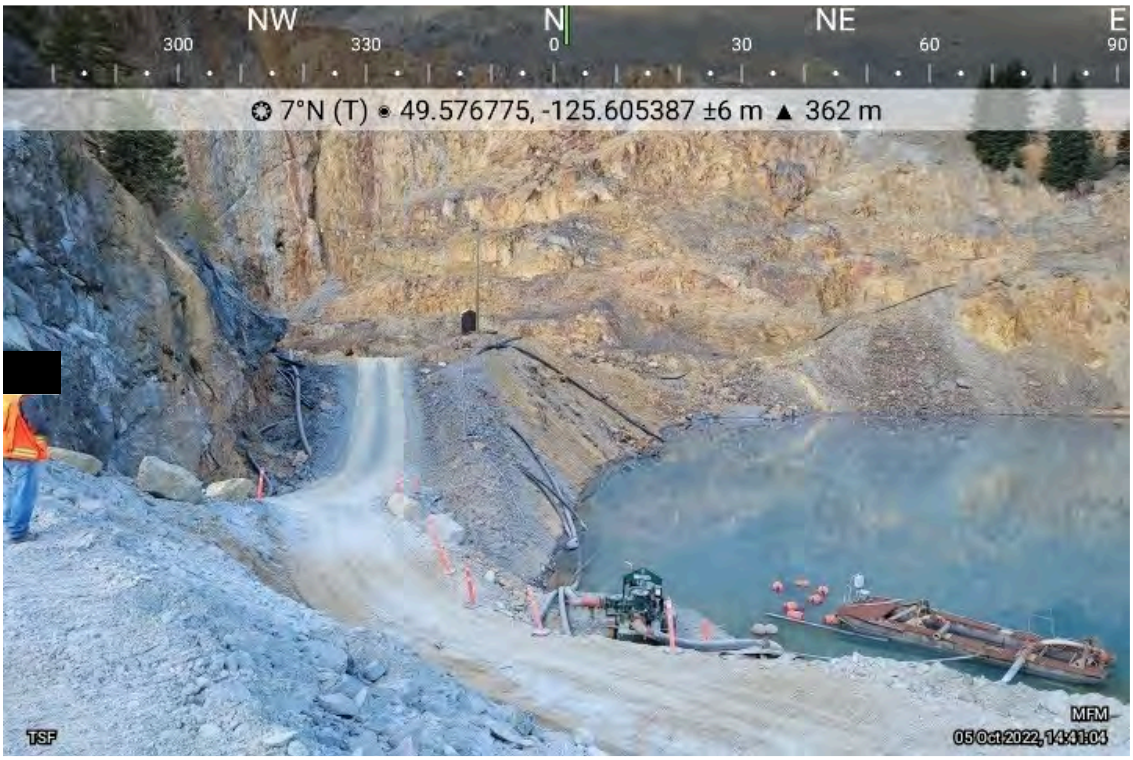


Photo 3: Tailings pond at the north end (back) of the Lynx TDF.


Photo 4: Lynx TDF looking southeast with the boundary of the tailings pond at the west end of the TDF covering about 2/3 of the tailings surface.


Photo 5: Lynx TDF spillway looking downstream to the mill and camp sites. Riprap was stable with no evidence of deterioration or segregation of sizes. Riprap stones are angular to subangular.


Photo 6: Lynx TDF WRD1 J Zone Crest, looking northwest.


Photo 7: Lynx TDF East Abutment at WRD1, looking southeast.


Photo 8: Lynx TDF West Abutment showing 10 Level East Portal, looking north. Ongoing drainage flows from the portal. The portal is to be plugged and sealed before next dam raise construction.


Photo 9: Old TDF looking southeast.


Photo 10: Hydroseeding was recently implemented along the berms of the Old TDF. This photo is looking towards the southwest.


Photo 11: East Strip of the Old TDF continues to be filled with tailings. This conduit needs removal of tailings before the wintertime.

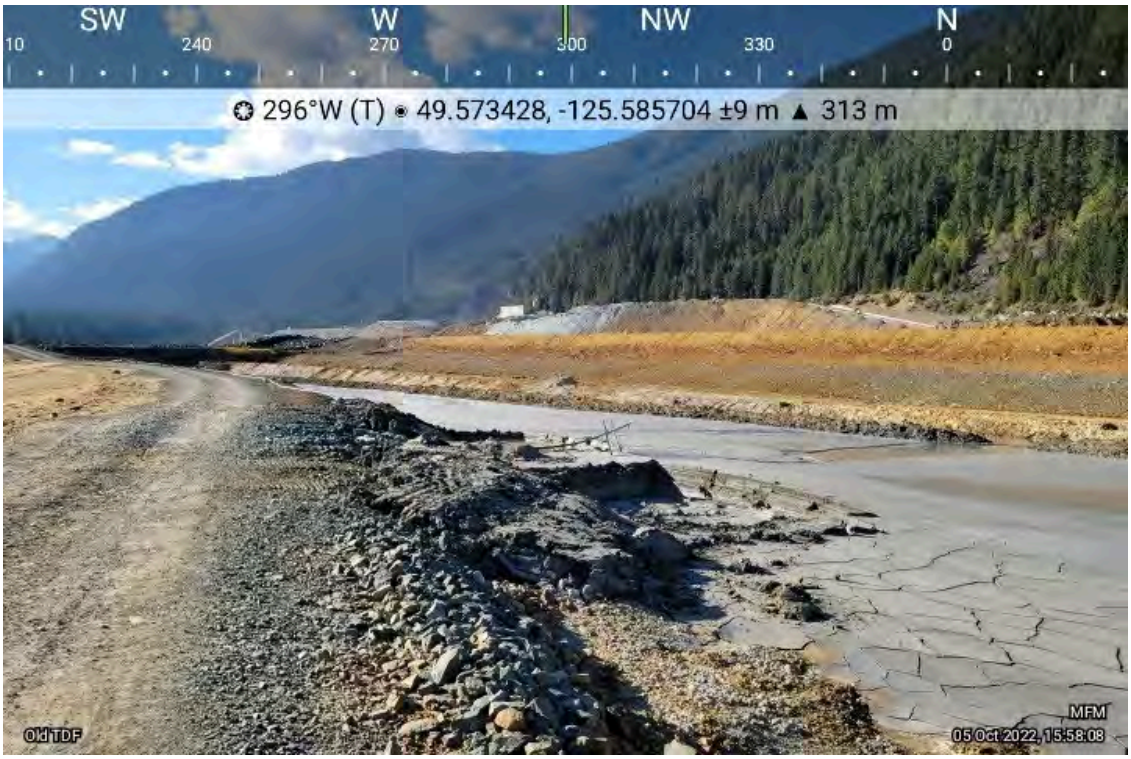


Photo 12: East Strip of the Old TDF continues to be filled with tailings. This conduit needs removal of tailings before the wintertime.


Photo 13: The West Strip of the Old TDF was filled with tailings obstructing the flow capacity of the spillway culvert pipes. This condition needs immediate attention before the wintertime.


Photo 14: Old TDF Channel 1 looking downstream. The riprap is stable and in good condition.


Photo 15: Surge Pond looking northeast. No unusual performance was observed.


Photo 16: Surge Pond looking northwest. No unusual performance was observed.


Photo 17: Super Pond looking northeast. No unusual performance was observed.


Photo 18: Super Pond looking northwest. No unusual performance was observed.


Photo 19: Super Pond looking at the downstream slope and the crest of the south retention berm of Super Pond. No unusual performance was observed.


Photo 20: Super Pond looking upstream to the top of the pond and the berm that separates Super Pond from the downstream toe of Lynx TDF. No unusual performance was observed.


Photo 21: Super Pond looking downstream from the downstream bench (El. 343 m) of Lynx TDF


Photo 22: West end of the Lower Lynx Diversion Ditch at the location of the interim debris retaining net

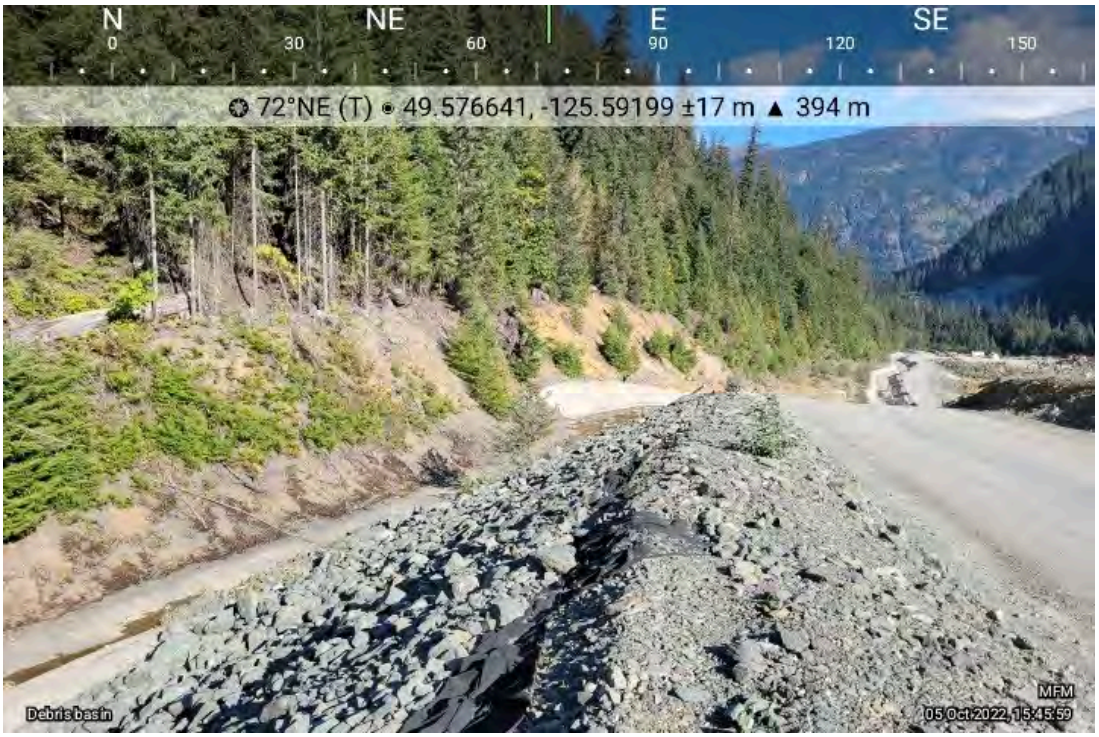


Photo 23: Lower Lynx Diversion Ditch with minimal flow. No unusual performance was observed.


Photo 24: Polishing Pond 4. No unusual performance was observed.


Photo 25: Polishing Pond 4. No unusual performance was observed.


Photo 26: Crossing between Polishing Pond 4 and Polishing Pond 2. No unusual performance was observed.

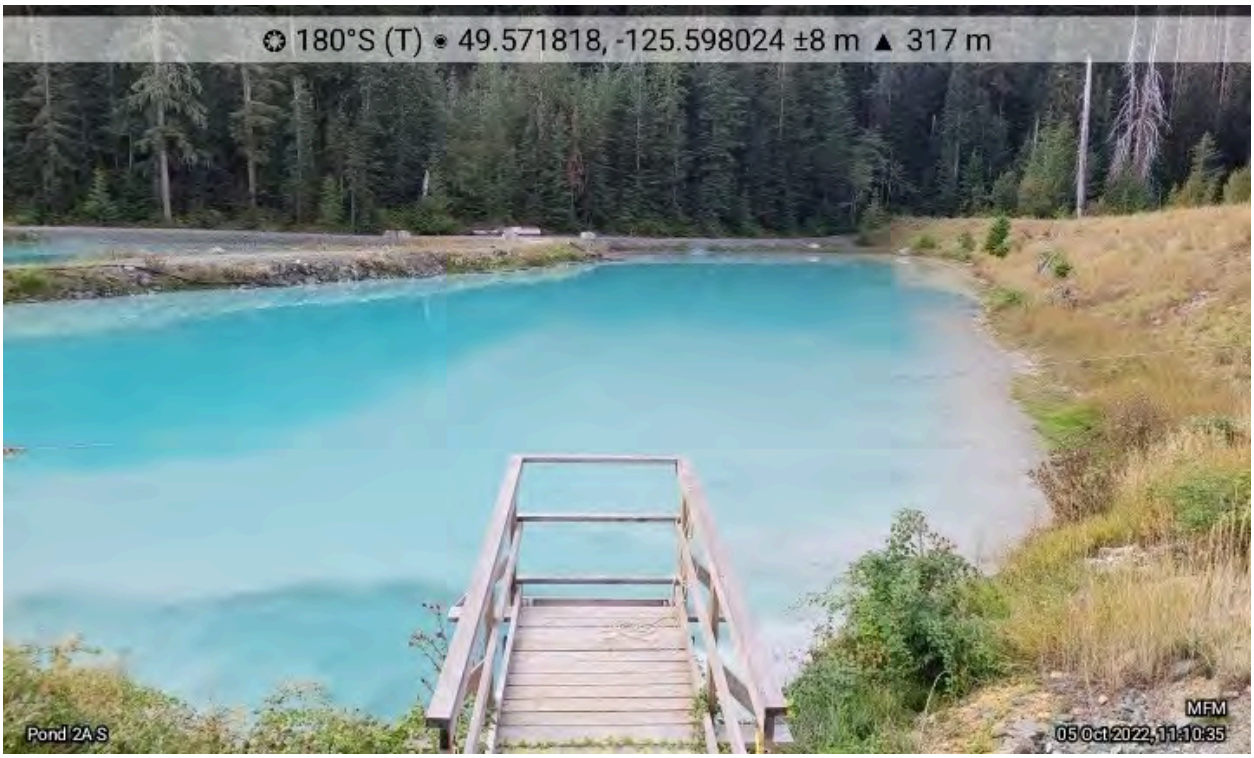


Photo 27: Polishing Pond 2A looking South. No unusual performance was observed.

Photo 28: Polishing Pond 2A looking West. No unusual performance was observed.

Photo 29: Polishing Pond 2 looking East. No unusual performance was observed.

Photo 30: Polishing Pond 1 looking East. No unusual performance was observed. The lateral containment of the south end needs to be assessed against design flows.

Photo 31: Middle berm between Polishing Pond 2 and 1 looking Southwest. No unusual performance was observed.

Photo 32: Polishing Pond 1 inflow looking East. No unusual performance was observed.

Photo 33: Polishing Pond 3A looking North. No unusual performance was observed.

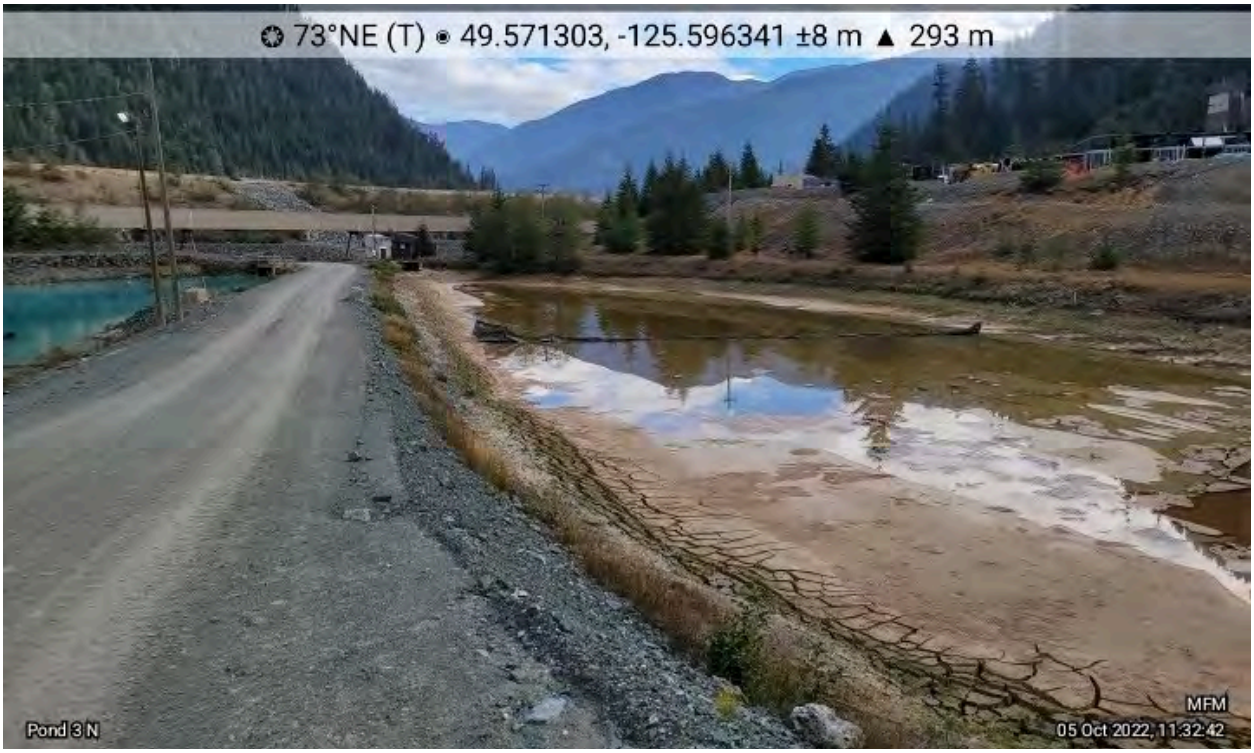

Photo 34: Polishing Pond 3 looking North. Observed to be empty

Photo 35: Polishing Pond 3 looking South. Observed to be empty.

Photo 36: Polishing Pond 4 looking West. No unusual performance was observed.

Photo 37: Middle berm between Polishing Ponds 4 and 3 looking Southwest. No unusual performance was observed.

# Appendix D

## All Recommendations

# All OLD TDF DSI Recommendations

| Structure | Tracking Number | Previous Recommendation | Update | Status/Priority |
|---|---|---|---|---|
| **2013 Dam Status Report (AMEC 2014a)** | | | | |
| Old TDF | 2013-11 | Additional grading should be undertaken on any remaining areas of the main bench of the Old TDF Seismic Upgrade Berm where water continues to pond. Surface water should be redirected such that erosion on the slope of the Seismic berm is minimized. | Ponded water continued to be observed on the seismic upgrade berm in 2018.<br>Berm regrading began during Winter 2018/2019. Relatively minor water ponding observed in 2019 and 2020.<br>Additional grading is detailed in the Old TDF Closure Phase 1 detailed design (Wood 2018b). | Complete |
| **2013 OLD TDF DSR (RGC 2014a)** | | | | |
| Old TDF | 2013-19 | Expedite closure planning and construction of approved closure works. | Permit-level closure cover design developed in 2016 by Amec Foster Wheeler (2016s). This design was not approved and is scheduled to be revised/resubmitted for permitting in 2021/2022.<br>Old TDF Closure Phase 1 detailed design was prepared in 2018 by Wood (Wood 2018b). | In Progress<br>Priority 4 |
| **2014-Q3 DSI Report (AMEC 2014b)** | | | | |
| Old TDF | 2014-03 | Measures should be taken to mitigate erosion of the paste stack in the APA. Implementation of a simple waste rock cover is likely the most practical option. | The springs along the top of the paste stack were collected in a surface ditch. The ditch was filled over as part of the LLDD project. Re-establishing it was included in the project specification but has not been completed.<br>Additional work was carried out in this area in 2018, including cover of some areas with construction wastes.<br>A detailed design for the east half of the LLDD collector and the cover subdrain in the APA was developed. (Wood 2018b)<br>Revisions to this design are currently underway by Wood in 2022. | In Progress<br>Priority 4 |
| Old TDF & Lynx TDF | 2014-11 | Connect all piezometers to an automated logging system. Implement real-time networking and internet access to the system to improve the timely availability and use of data. | Instrumentation is connected to an automated logging system. Internet access via Environmental Team's SharePoint is in real-time and has been available for about a year. | Complete<br>Priority 2 |
| **2015 DSI Report (Amec Foster Wheeler 2016d)** | | | | |
| Old TDF & Lynx TDF | 2015-01 | Where possible, adopt updated design criteria derived from CDA guidelines and EMPR/MOE requirements. | Completed for Lynx TDF and for Old TDF upslope and internal water management. Outstanding for Myra Creek at the toe of the Old TDF (see Recommendation 2016-10). | Complete<br>Priority 2 |
| Old TDF | 2015-04 | Install freeboard indicators in the east and west Strip and Old TDF Surge Pond (no longer applicable to West strip). | Nyrstar is in the process of adding freeboard indicators to most ponds/sumps/impoundments at the site.<br>Nyrstar compares and records impoundment level to culverts in the East strip. This may continue until a standard staff gauge can be installed. | In Progress, only one staff gauge installation remaining<br>Priority 4 |

# All OLD TDF DSI Recommendations

| Structure | Tracking Number | Previous Recommendation | Update | Status/Priority |
|---|---|---|---|---|
| **2016 DSI Report (Amec Foster Wheeler 2017c)** | | | | |
| All | 2016-01 | Some OMS Manual Holders do not have a current registered hard copy of the document. | The OMS manual was updated in March 2019 and April 2020 and distributed electronically to manual holders.<br>Hard copies were distributed to manual holders on site. | Complete<br>Priority 3 |
| All | 2016-02 | Data loggers run out of battery power in the winter, resulting in loss of critical weather and/or piezometer monitoring information. | Work to improve the battery reliability in Lynx Hut and the Weather Station was completed in May 2018 by an external contractor. This work did not follow manufacturer's set up instructions and resulted in additional loss of data from Lynx Hut and the Weather Station.<br>Repairs were made by Wood in Q1-2019 and the system is being monitored for performance.<br>The weather station was relocated in 2020 and is now connected to the site electrical grid, with solar batteries installed for back-up power use only. | Complete<br>Priority 3 |
| All | 2016-05 | Lynx TDF does not currently have a defined piezometer threshold framework or instrumentation-based alarm system. | Thresholds were created for the Lynx TDF Piezometers. A memorandum documenting this work and the new thresholds is provided in Appendix E. | Complete<br>Priority 3 |
| Old TDF, Super Pond, Polishing Ponds | 2016-10 | Myra Creek channel designed for 1/1000 AEP, which is less than current CDA guidance. Identified during the 2016 DSR. | Myra Creek Channel riprap and hydraulic capacity were reviewed based on an IDF value of 2/3 between the 1/1000 AEP and the PMF.<br>Review published in "Myra Creek Hydrology Study and Riprap Assessment" (Wood 2019a). | Complete<br>Priority 2 |
| **2017 DSI Report (Amec Foster Wheeler, 2018c)** | | | | |
| Old TDF | 2017-01 | Complete grouting and decommissioning of west decant pipe in advance of Old TDF closure to reduce long term risks of piping. Complete before the tower is plugged with tailings. | Superseded by Recommendation 2018-15. | Superseded<br>Priority 3 |
| All | 2017-02 | Assess piezometers for functionality. EOR to evaluate spatial piezometer coverage. Replace or repair broken piezometers that are missing from essential monitoring areas. | Three VWP were installed at the Lynx starter dam foundation through the downstream shell during the 2019 site investigation. (Tracking number 2017-05) | Complete<br>Priority 3 |
| Old TDF | 2017-06 | Review internal staff availability to complete quarterly surveys. If required contract external surveyors. | | Closed<br>Refer to 2018-10 |

# All OLD TDF DSI Recommendations

| Structure | Tracking Number | Previous Recommendation | Update | Status/Priority |
|---|---|---|---|---|
| **2018 DSI Report (Wood, 2019d)** | | | | |
| Old TDF/ Treatment Ponds | 2018-05 | Myra Creek hydrology and riprap assessment was carried out for the updated IDF (Closure-Passive Care). The assessment identified limitations and/or inaccuracies with respect to the current flow measurements in Myra Creek.<br><br>Recommendations from the assessment:<br>1. Install flow gauge,<br>2. Post event inspections,<br>3. Revise riprap on north bank,<br>4. Remove non-flexible vegetation,<br>5. Semi-quantitative risk assessment of high flows (Wood 2019a). | 1. Complete: New flow gauge installed at Road Bridge, and a second station was installed at the red pipe bridge along with updated Myra Creek rating curve.<br>2. Complete: To be performed by MFM and/or Wood staff as required or requested.<br>3. Complete: To be incorporated in the final closure plan.<br>4. Complete.<br>5. Completed in September 2021 | Complete |
| All | 2018-06 | 1. Carry out detailed review of instrumentation data logger wiring.<br>2. Create a wiring diagram and operation manual for each instrumentation hut.<br>3. Prepare updated scripts for all data loggers which are consistent in functionality an appropriate to the hardware. | 1. Schematic review complete by Wood and Nyrstar.<br>2. Not complete.<br>3. Not complete. | In progress<br><br>Priority 2 |
| All | 2018-07 | Assess flood impacts to infrastructure adjacent to Myra Creek including buildings and bridges. Update Emergency Response Plan. | Complete | Complete<br><br>Priority 2 |
| Old TDF | 2018-08 | Conduct a preliminary formal risk assessment to determine the most appropriate course of action with respect to design standards and emergency management for the Old TDF. | Complete (July 2020) | Complete<br><br>Priority 2 |
| Old TDF | 2018-09 | Refine Old TDF trigger thresholds to reduce false triggers. | In Progress | Incomplete<br><br>Priority 2 |
| Old TDF | 2018-10 | Establish a more robust method to attach survey deformation monuments to dam surface. | Design is complete, installation is in progress | In Progress<br><br>Priority 2 |
| Old TDF | 2018-11 | Review location and size of stockpiles for conformance with the stockpiling guidance. Reference the stockpiling guidance (Amec Foster Wheeler, 2017d) during future material handling planning. | Complete | Complete<br><br>Priority 4 |

# All OLD TDF DSI Recommendations

| Structure | Tracking Number | Previous Recommendation | Update | Status/Priority |
|---|---|---|---|---|
| Old TDF | 2018-12 | New corrosion resistant gate valve purchased in Q3. Install the new gate valve when conditions allow. | In Progress | In Progress<br>Priority 4 |
| Old TDF | 2018-14 | Review waste storage practices to ensure untreatable waste effluent is not introduced into the Old TDF water collection system. Remove potentially buoyant debris from areas that may become inundated in a flood. | Complete | Complete<br>Priority 4 |
| Old TDF | 2018-15 | Conduct a formal risk assessment to inform the detailed closure design, in the vicinity of the west decant, and determine if the old, partially grouted (2017) decant can be left in place (through closure and beyond) or if it must be abandoned. | To be completed during detailed closure planning | Incomplete<br>Priority 4 |
| **2020 DSR Report (Thurber, 2021)** | | | | |
| Old TDF | 2020-01T | In light of the newly stockpiled materials in the APA, along with ongoing erosion of the upper paste tailings, a flood conveyance and storage capacity review should be completed for the APA and Strip area to determine whether modifications are required. It is understood an assessment is currently underway. | WSP conducted an assessment of the storage for the APA to:<br>1. Estimate the APA storage excavation volumes required to keep the Surge Pond freeboard similar to the initial design.<br>2. Provide recommendations for shutting down of pumping flows to the Surge Pond during storm events.<br>3. Assess the maximum allowable thickness of waste rock placed in the APA. | Complete<br>Priority 4 |
| Old TDF | 2020-02T | Minor updates/revisions to the OMS Manual are recommended, including:<br>• Provide consistent information in the OMS Manual and the Field Manual.<br>• Emergency contact information needs to be updated.<br>• Photos in Appendix C should be reviewed and updated as necessary.<br>• The list of supporting documents list in Appendix F needs updating. | Updates to the OMS manual were completed by MFM and reviewed by WSP in both 2021 and 2022. | Complete<br>Priority 4 |
| Old TDF | 2020-03T | In addition to any internal training initiatives completed by NMF, the EOR should oversee informal "refresher" training sessions with monitoring and surveillance staff every 2 to 3 years to reinforce the objectives of monitoring activities and how they relate to specific failure modes. | | In Progress<br>Priority 4 |
| Old TDF | 2020-04T | With respect to the risk assessment completed in 2020, clarification should be provided regarding the justification for reducing consequence ratings for some of the "current risk" scenarios, compared to the corresponding "inherent risk" scenarios. | | Complete<br>Priority 4 |

# All OLD TDF DSI Recommendations

| Structure | Tracking Number | Previous Recommendation | Update | Status/Priority |
|---|---|---|---|---|
| Old TDF | 2020-05T | It is recommended that the AFW 2016 seismic hazard values be reviewed following the release of the 6th Generation GSC seismic hazard model (expected later in 2021). We understand that the GSC model will incorporate updated GMPEs and assumes an increased frequency for CSZ earthquakes. The recurrence rates and GMPEs used in AFW's 2016 seismic assessment were developed prior to 2012 and may require updating based on recent research. | WSP has recommended to MFM that this update to the seismic hazard evaluation be completed in 2023. | Incomplete<br><br>Priority 4 |
| **2020 DSI Report (Wood, 2021d)** | | | | |
| Old TDF | 2020-01 | Stockpiling of waste on APA surface encroaching on East Decant. Stockpiling in areas on APA surface without prior approval of EoR. | Stockpiling practice halted. | Complete/ Q2 2021<br>Priority 2 |
| Old TDF/Surge Pond | 2020-02 | Loss of EDF storage by erosion of tailings from upper APA surface to the lower APA surface may lead to overtopping of the Surge Pond spillway in the EDF. | Complete. | Complete<br>Priority 2 |
| Surge Pond | 2020-03 | Erosion of sides slopes of Lower Strip and south slope of Surge Pond | Provide erosion protection. | Q2 2022<br>Priority 3 |
| Old TDF | 2020-04 | Instrument cables are exposed and subject to damage. | Bury or protect instrument cables. | Q2 2021<br>Priority 3 |
| General | 2020-05 | OMS Manual not updated after 368.5 m raise 2020. OMS Manual should be updated yearly. | MFM updated the manual in March 2021. | Complete |
| **2021 DSI Report (Wood, 2022)** | | | | |
| Old TDF | 2021-01 | Erosion of seismic upgrade berm by concentrated surface water runoff. | Complete Phase 1 of the Reclamation/Closure plan and direct surface water runoff to the spillways for controlled discharge down the seismic berm slope. | Complete |
| Old TDF | 2021-02 | Old TDF instrument Upgrades – The existing instrument network primarily was intended for monitoring pore pressures during construction and operation of the Old TDF There are not instruments in the foundation or in the tailings directly above the foundation. Instruments on some planes are sparse. | The existing instrument network should be evaluated with consideration given to long-term closure monitoring. Evaluate the existing network, assess coverage and develop a plan for upgrading the monitoring system. Assess need to replace the lost SI and/or install additional SIs. | Plan to complete by Q4 2023; installation after reclamation.<br>Priority 3 |
| Old TDF/Surge Pond | 2021-03 | Sediments have encroached around the Surge Pond west decant. | Sediments should be removed from the Surge Pond. | Q3 2022 |
| Old TDF | 2021-04 | A portion of the vertical grates have been dissolved due to rust at the Old TDF decant inlet. | Replacement of grates on Old TDF decants as needed for safety concerns or to prevent debris from entering the decant. | Q3 2022 |
| Old TDF | 2021-05 | Accumulation of sediments around the Old TDF APA decants and, in and around the spillway culverts. | During the dry season, remove sediments that have accumulated. | Q3 2022 |

# All OLD TDF DSI Recommendations

| Structure | Tracking Number | Previous Recommendation | Update | Status/Priority |
|---|---|---|---|---|
| **2022 DSI Report** | | | | |
| Old TDF | 2022-01 | Consider measures to prevent deposition of sediments from the Paste Plant area in the Surge Pond. | Divert the flow away from the surge pond or install erosion and sediment control measures along the flow path. | Q3 2023 Priority 3 |
| Old TDF | 2022-02 | Surge Pond - Dissolution of lower portion of the vertical grating. | Grating on both decants needs to be replaced due to acidic dissolution of lower portion of the vertical grating. | Q3 2023 Priority 3 |
| Old TDF | 2022-03 | East strip partially blocked by sediments from Zim pro line discharge, preventing flow from the east abutment to the spillway culverts. | The sediments should be removed to allow unobstructed flow from the east abutment to the spillway culverts. | Q1 2023 Priority 3 |
| Old TDF | 2022-04 | The geotextile/geomembrane over the buried lock blocks in the spillway is damaged, likely by grading or snow clearing activities. | The geomembrane should be repaired prior to the onset of the 2022/2023 wet season. | Q1 2023 Priority 3 |