Klohn Crippen Berger

Teck Metals Ltd.

Pine Point Mine Tailings Impoundment Area

2023 Annual Facility Performance Report

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December 2023

Klohn Crippen Berger

December 18, 2023

Teck Metals Ltd.
Kimberley Operations
Bag 2000
Kimberley, British Columbia
V1A 3E1

Ray Proulx
Pine Point Mine Site Manager

Dear Mr. Proulx:

Pine Point Mine Tailings Impoundment Area
2023 Annual Facility Performance Report

We are pleased to submit the 2023 Annual Facility Performance Report for the Pine Point Mine Tailings Impoundment Area.

Yours truly,

KLOHN CRIPPEN BERGER LTD.

Maggie Smith, P.Eng.
Project Manager

MS:dl

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Teck Metals Ltd.

Pine Point Mine Tailings Impoundment Area

2023 Annual Facility Performance Report

EXECUTIVE SUMMARY

Klohn Crippen Berger Ltd. (KCB) was engaged by Teck Metals Ltd. (Teck) to conduct the 2023 Annual Facility Performance Report (AFPR) for the Pine Point Mine Tailings Impoundment Area (TIA). This report was prepared to fulfill the requirement in the Water Licence MV2017L2-0007 (Part F, Cl.7) (valid to October 24, 2027) to conduct an annual geotechnical inspection and submit a report. The AFPR includes findings from the annual site visit, a review of the site instrumentation, and a review and update of the outstanding recommendations from the previous AFPR (KCB 2022). The AFPR includes a review of the available information from July 1, 2022 to October 1, 2023 (i.e., the reporting period).

The annual site visit was conducted on October 1, 2023. In attendance were: the Engineer of Record (EoR), Ms. Maggie Smith, P.Eng., as a representative of KCB; project engineer, Ms. Bee Fong Lim, E.I.T. (BC) of KCB; the Responsible Tailings Facility Engineer (RTFE), Dr. Silawat Jeeravipoolvarn, P.Eng., of Teck; and the Tailings Surveillance Officer, Mr. Clell Crook, C.E.T. of Maskwa Engineering Ltd. (Maskwa).

The AFPR was prepared in accordance with Teck's Guideline for Tailings and Water Retaining Structures (Teck 2019).

Summary of Facility Description

The Pine Point Mine was operated from 1964 to 1988 by Cominco. Cominco merged with Teck in 2001. Teck is no longer responsible for the open pits and underground workings, but it maintains the responsibility for the TIA. Since 1988, the TIA has been in the active-care phase of closure (Teck 2023).

The TIA covers approximately 700 ha and is contained on four sides by earth fill dykes (South Dyke, West Dyke, North Dyke and East Dyke) and natural topography. The dykes are up to 9 m high, measured from the crest to the downstream toe. The dykes are zoned earthfill embankments with a stiff clay and silt upstream core and a downstream shell of sand with varying amounts of gravel. Two concrete spillways are present in the North Dyke, one in the Main Pond and one in the Polishing Pond.

Water management for the TIA includes seasonal water treatment in a serpentine Polishing Pond. The Polishing Pond is located adjacent to the North Dyke and is separated from the Main Pond by the Internal Dyke.

Summary of Key Hazards

Teck, with support from KCB, conducted a credible catastrophic failure scenario assessment in April 2022. The assessment considered the three key failure scenarios for tailings facilities identified in the ICMM Good Practice Guide (ICMM 2021): overtopping, internal erosion and piping, and slope instability. Teck's definition of a "catastrophic" failure is one with a risk to life safety or irreversible impact to a rare or valued ecosystem, social, or cultural heritage element. The assessment concluded that there are no credible catastrophic failure scenarios for the TIA based on the available information and current understanding of the site.

The following is a summary of the controls in place at the TIA to manage the risks associated with the key failure scenarios for the facility. The overtopping and slope instability failure scenarios are credible (though non-catastrophic), while the internal erosion failure scenario is not credible for the current and historic loading conditions. Based on the observations above and the available information, Teck is managing the potential failure mechanisms for the TIA appropriately and is taking appropriate steps to address relevant data gaps.

Overtopping:

- The Main Pond Spillway and the Polishing Pond Spillway are designed to discharge to the downstream environment to manage the risk of overtopping the TIA dykes during storms up to and including the 1/1,000 year event (Golder 2022) while maintaining 0.5 m of freeboard.
- The TIA has capacity to manage up to the 1/100 year freshet below the spillway invert (Golder 2022).
- The operational controls to prevent overtopping at the TIA include annual seasonal water treatment campaigns, pond level predictions based on site-specific snow survey monitoring, and a trigger-action-response-plan (TARP) that identifies when to mobilize water treatment or request emergency decant based on pond level and the seven-day forecast. Site personnel measure the pond level during routine inspections, and remotely view the pond level daily via a web camera during and following freshet.

Internal Erosion and Piping:

- The Main Pond is adjacent to the North Dyke, and does not pond against the South Dyke, East Dyke, or West Dyke. The engineering controls to prevent internal erosion consist of constructing the dykes with fill materials that are internally stable under the current loading conditions and restricting the pond to the northern portion of the facility. The operational control to prevent internal erosion consists of actively managing the pond level through annual seasonal water treatment campaigns. The Main Pond water levels are currently lower than they were during operations. The TIA performed well during operations when the hydraulic gradients in the dykes were likely higher than the current conditions.
- The good performance of the TIA, with no change to the operating conditions of the Main Pond, indicates that the existing controls are adequate to prevent internal erosion and piping for the existing conditions in the facility.

Slope Instability:

- Mining operations ceased and the dykes were closed in 1988; since then, no signs of global instability have been observed or documented. The good performance of the TIA indicates the design and construction of the dykes are adequate to prevent slope instability at the TIA under the current loading conditions.
- A stability assessment of the TIA, completed as part of the 2014 DSR (SRK 2016), concluded the dykes met design criteria under static and pseudo-static loading conditions (1/2,475-yr event).

- The potential for toe erosion during flood routing to affect embankment stability should be evaluated, particularly at the spillway outlets and at the access road culvert located at the southwest corner of the facility.
- The operational controls to prevent slope instability at the TIA include actively managing the pond level, monitoring of the phreatic surface in the facility, and observing the condition of the dykes three times per year. Particular attention (daily monitoring) is paid to pond levels and piezometer data the during freshet when pond levels are highest. TARPs are in place to engage emergency discharge syphons should the pond levels exceed targets.
- The existing controls are adequate to manage the risk of slope instability for static and seismic loading (up to the 1/2,475-yr event). Based on Teck's tailings governance and risk assessment framework, the potential impacts of the 1/2,475-yr event would not be catastrophic to health and safety or to the environment, nor from a community relations, reputation, legal, or financial perspective.

Consequence Classification

The CDA Dam Safety Guidelines (CDA 2013) provide a dam classification scheme based on the potential consequences of a hypothetical failure that can be used to provide guidance on the standard of care expected of dam owners and designers. Consequence of a hypothetical failure is not related to the likelihood of a failure, but rather to the potential impact resulting from a failure if it did occur.

Teck provided the following statement regarding the consequence classification of the facility (email communication from Teck to KCB on August 24, 2023):

> *Teck is committed to the safe and environmentally responsible management of tailings facilities throughout the mining life cycle to minimize harm to the environment and protect the health and safety of our people and surrounding Communities of Interest. This commitment includes the implementation of the Global Industry Standard on Tailings Management (GISTM) and industry-leading guidelines established by the International Council on Mining and Metals (ICMM), the Mining Association of Canada (MAC) and Canadian Dam Association (CDA).*
>
> *For the purpose of assigning a dam classification, the consequences of potential failure modes are assessed as per the Canadian Dam Association (CDA) guidelines and the requirements of the jurisdictions in which we operate. The Global Industry Standard on Tailings Management (GISTM) bases consequence classification on credible failure modes only, which may result in a lower stated classification.*
>
> *As part of Teck's commitment to the safety of tailings facilities, Teck has adopted using extreme loading criteria for any new facilities with a credible catastrophic flow failure mode, regardless of consequence classification. Risk assessments are performed for all tailings facilities, with the objective of reducing risks to As Low As Reasonably Practicable (ALARP). In some cases, this results in further risk reduction beyond applicable regulatory requirements and is consistent with the GISTM and industry-leading best practice.*

The consequence classification was determined by Golder in 2017 (Teck 2017); the South and East Dykes are classified as “low”, and the North and West Dykes were classified as “significant” based on the following:

- there is no permanent population downstream of the dyke;
- a potential failure of the dykes could impact the local environment, with the possibility of minimal short-term loss or deterioration of wildlife habitat;
- there are no known areas of significance for cultural heritage downstream of the dykes;
- the economic impacts are expected to be recoverable.

The consequence classification was reviewed in 2023 by the RTFE and EoR, and since there have been no material changes to the TIA or the upstream and downstream conditions since the 2017 assessment, the RTFE and EoR recommend no change to the consequence classification of the dykes.

The selection of design criteria is informed based on a Significant classification for the facility.

Pond Management

The climate data for this reporting period indicates conditions at site were significantly drier than average in the summer of 2022 and in the spring and summer of 2023. The 2023 freshet period was atypical, resulting in a smaller Main Pond in 2023 because of several factors: unusually cold overnight lows in early April which caused the snow melt to start and stop, little precipitation in April, and increased infiltration during freshet caused by the longer than normal snow melt period.

Water accumulates in the Main Pond after freshet and pond levels are highest before the seasonal water treatment starts. The pond levels drop rapidly once water treatment starts and will continue to drop between the end of water treatment and winter due to ongoing seepage and evaporation.

2022 Water Treatment

Discharge of treated waters began on June 30, 2022 and was completed on August 15, 2022 once the pond level was drawn down to approximately El. 200.0 m. Teck reported that a total of 530,266 m^3 of water from the Main Pond was treated and discharged in 2022.

2023 Water Treatment

Discharge of treated waters began on July 23, 2023 and was terminated on August 13, 2023 when the Mine Emergency Response Plan (MERP) triggered an evacuation of the site due to wildfires near Hay River. Since the Main Pond water level had been drawn down to El. 200.4 m, water treatment was not restarted once the evacuation order was lifted. Teck reported that a total of 106,214 m^3 of water from the Main Pond was treated and discharged in 2023. Water treatment activities were carried out by Maskwa Engineering Ltd. (Maskwa) in 2023.

Instrumentation and Visual Monitoring

There was no construction or other significant changes to the TIA during the reporting period. The dykes were in good condition during the annual site visit by the EoR and no items of note were flagged by the Tailings Surveillance Officer during the Fall 2022 and Spring 2023 inspections.

None of the measured VWP readings indicate a trend of increasing pore pressures. Based on the available data, there were no significant changes in measured piezometric levels during the reporting period compared to the historic trends.

Two VWPs (PP-VWP-2018-04A and 04B) installed in the tailings and foundation below the tailings were decommissioned in April 2023 when the RTFE confirmed that the piezometers were no longer working. These VWPs do not need to be replaced since they do not provide critical monitoring for dam safety.

Operation, Maintenance and Surveillance Manual and Mine Emergency Response Plan

The Operation, Maintenance and Surveillance (OMS) Manual was last revised in March 2023 (Teck 2023) and is considered appropriate for the facility. The OMS Manual will be submitted to the MVLWB in 2024.

The MERP was last revised in March 2023 (Teck 2023).

The MERP was triggered twice during the reporting period due to the nearby wildfires. The MERP was activated, and staff on site were evacuated, between May 16 and May 20, 2023 and between August 13 and September 7, 2023. The wildfires were not near site but did impact access due to the evacuation of Hay River.

Dam Safety Review

SRK completed the last DSR on the TIA in 2014, with the site inspection conducted on July 8, 2014 (SRK 2016).

There are no requirements to complete a DSR for the TIA based on the relevant permits and licenses for the site; however, Teck complete DSRs at least once every ten years as part of their internal governance program for facilities that retain fluids and have a credible failure mode. The next DSR should be conducted in 2024 under this internal policy.

Summary of Recommendations

The observed performance of the TIA during the review period was consistent with past behavior and expected performance. The TIA appears to be in good condition and there are no major concerns related to the safety of the facility.

Dam safety recommendations identified during past AFPRs, and from the 2023 AFPR, are summarized in Table ES-1. The priority assigned to each recommendation are based on Teck's priority ratings, with all observations in Table ES-1 rated either a (3) or (4):

1. A high probability or actual TIA safety issue considered immediately dangerous to life, health or the environment, or a significant risk of regulatory enforcement.
2. If not corrected could likely result in TIA safety issues leading to injury, environmental impact or significant regulatory enforcement; or a repetitive deficiency that demonstrates a systematic breakdown of procedures.
3. Single occurrences of deficiencies or non-conformances that alone would not be expected to result in TIA safety issues.
4. Best Management Practice as a suggestion for continuous improvement towards industry best practices that could further reduce potential risks.

Table ES-1 Summary of Deficiencies and Recommendations

Structure	ID No.	Deficiency or Non Conformance	Applicable Regulation or OMS Manual Reference	Recommended Action	Priority	Recommended Deadline (Status)
Previous AFPR Recommendations Ongoing						
TIA Instrumentation	2019-02	Instrumentation installed in 2018 requires integration into OMS Manual procedures.	Cl. 4.2 and 4.3 of OMS Manual	Establish procedures for frequency of data acquisition and review. Establish baseline readings and levels for alert and emergency response, with corresponding update of OMS Manual.	4	*Partially Completed* Frequency of data acquisition and review and baseline readings completed. *Remaining Action:* Q1 2024 Confirm notification and trigger levels for instrumentation and update the OMS.
TIA	2020-03	Freeboard limits require update for 2019 storage curve, 2020 climate assessment, review of design criteria, and evaluation of spillway.	Cl. 2.7.3.2.3 of OMS Manual	Review flood storage capacity, water handling practices, determine capacity of spillway and update freeboard limits. Incorporate these changes in the OMS Manual.	3	*Completed*
TIA Instrumentation	*2021-01*	*VWP anomalous readings. PP-VWP-2018-02A PP-VWP-2018-02B PP-VWP-2018-05 PP-VWP-2018-08 PP-VWP-2018-09 PP-VWP-2020-11A*	*None*	*Troubleshoot VWP calibration / data acquisition and data reduction. Assess the importance of these instruments for TIA surveillance and repair, replace or decommission faulty or damaged instruments where necessary.*	*4*	*Completed*
TIA	2021-03	Previous stability assessments were based on limited site characterization data.	None	Update stability assessments and review filter compatibility for the dykes based on the 2018 and 2020 site investigation data.	4	Stability modeling: Q2 2024 Internal erosion assessment: Q2 2024
Main Pond Spillway, Polishing Pond Spillway	*2021-05*	*The spillways are vulnerable to blockage by woody debris.*	*None*	*Develop a plan to manage debris in the pond and add to the OMS Manual.*	*3*	*Completed*

Structure	ID No.	Deficiency or Non Conformance	Applicable Regulation or OMS Manual Reference	Recommended Action	Priority	Recommended Deadline (Status)
TIA Instrumentation	*2021-06*	*The remote camera system for monitoring the staff gauge is vulnerable to water damage during high pond levels.*	*None*	*Relocate the remote camera system to above the high-water level of the Main Pond.*	*4*	*Completed*
North Dyke	*2022-01*	*No documentation of the riprap placed during the reporting period.*	*Section 5.7 of OMS Manual*	*Prepare a record document of the North Dyke riprap placement.*	*4*	*Completed*
Main Pond	*2022-02*	*Updated TARP (2022) is not included in the current OMS Manual.*	*Cl. 2.7.3.2.3 of OMS Manual*	*Incorporate the updated TARP into the OMS Manual.*	*3*	*Completed*
TIA Instrumentation	*2022-03*	*VWP datalogger reliability.*	*Cl. 4.2 and 4.3 of OMS Manual*	*Include a review of the status of the VWP dataloggers prior to freshet and replace batteries, as needed. Include this as regular maintenance in the OMS Manual.*	*4*	*Completed*
South Dyke	2022-04	The culvert at the southwest corner of the TIA inspected during the site visit may not have been accounted for in the flood routing assessment.	None	Evaluate the potential for toe erosion during flood routing at the southwest access road culvert.	4	Q1 2024
2023 AFPR Recommendations						
North Dyke	2023-01	None	None	Include in the OMS Manual that the EoR performs an inspection of the North Dyke upstream slope at a low water level every three years.	4	Q4 2024

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CLARIFICATIONS REGARDING THIS REPORT

This report is an instrument of service of Klohn Crippen Berger Ltd.(KCB). The report has been prepared for the exclusive use of Teck Metals Ltd. (Client) and the applicable regulatory authorities for the specific application to the 2023 Annual Facility Performance Report of the Pine Point Mine Tailings Impoundment Area, and it may not be relied upon by any other party without KCB's written consent.

KCB has prepared this report in a manner consistent with the level of care, skill and diligence ordinarily provided by members of the same profession for projects of a similar nature at the time and place the services were rendered. KCB makes no warranty, express or implied.

Use of or reliance upon this instrument of service by the Client is subject to the following conditions:

1. The report is to be read in full, with sections or parts of the report relied upon in the context of the whole report.
2. The Executive Summary is a selection of key elements of the report. It does not include details needed for the proper application of the findings and recommendations in the report.
3. The observations, findings and conclusions in this report are based on observed factual data and conditions that existed at the time of the work and should not be relied upon to precisely represent conditions at any other time.
4. The report is based on information provided to KCB by the Client or by other parties on behalf of the client (Client-supplied information). KCB has not verified the correctness or accuracy of such information and makes no representations regarding its correctness or accuracy. KCB shall not be responsible to the Client for the consequences of any error or omission contained in Client-supplied information.
5. KCB should be consulted regarding the interpretation or application of the findings and recommendations in the report.
6. This report is electronically signed and sealed and its electronic form is considered the original. A printed version of the original can be relied upon as a true copy when supplied by the author or when printed from its original electronic file.

1 INTRODUCTION

1.1 General

Klohn Crippen Berger Ltd. (KCB) was engaged by Teck Metals Ltd. (Teck) to conduct the 2023 Annual Facility Performance Report (AFPR) for the Pine Point Mine Tailings Impoundment Area (TIA). This report was prepared to fulfill the requirement in the Water Licence MV2017L2-0007 (Part F, Cl.7) (valid to October 24, 2027) to conduct an annual geotechnical inspection and submit a report. The AFPR includes findings from the annual site visit, a review of the site instrumentation, and a review and update of the outstanding recommendations from the previous AFPR. The AFPR includes a review of the available information from July 1, 2022 to October 1, 2023 (i.e., the reporting period).

The annual site visit was conducted on October 1, 2023. In attendance were:

- Engineer of Record (EoR), Ms. Maggie Smith, P.Eng., as a representative of KCB;
- Project engineer, Ms. Bee Fong Lim, E.I.T. (BC) of KCB;
- Responsible Tailings Facility Engineer (RTFE), Dr. Silawat Jeeravipoolvarn, P.Eng., of Teck; and
- Tailings Surveillance Officer, Mr. Clell Crook, C.E.T. of Maskwa Engineering Ltd. (Maskwa).

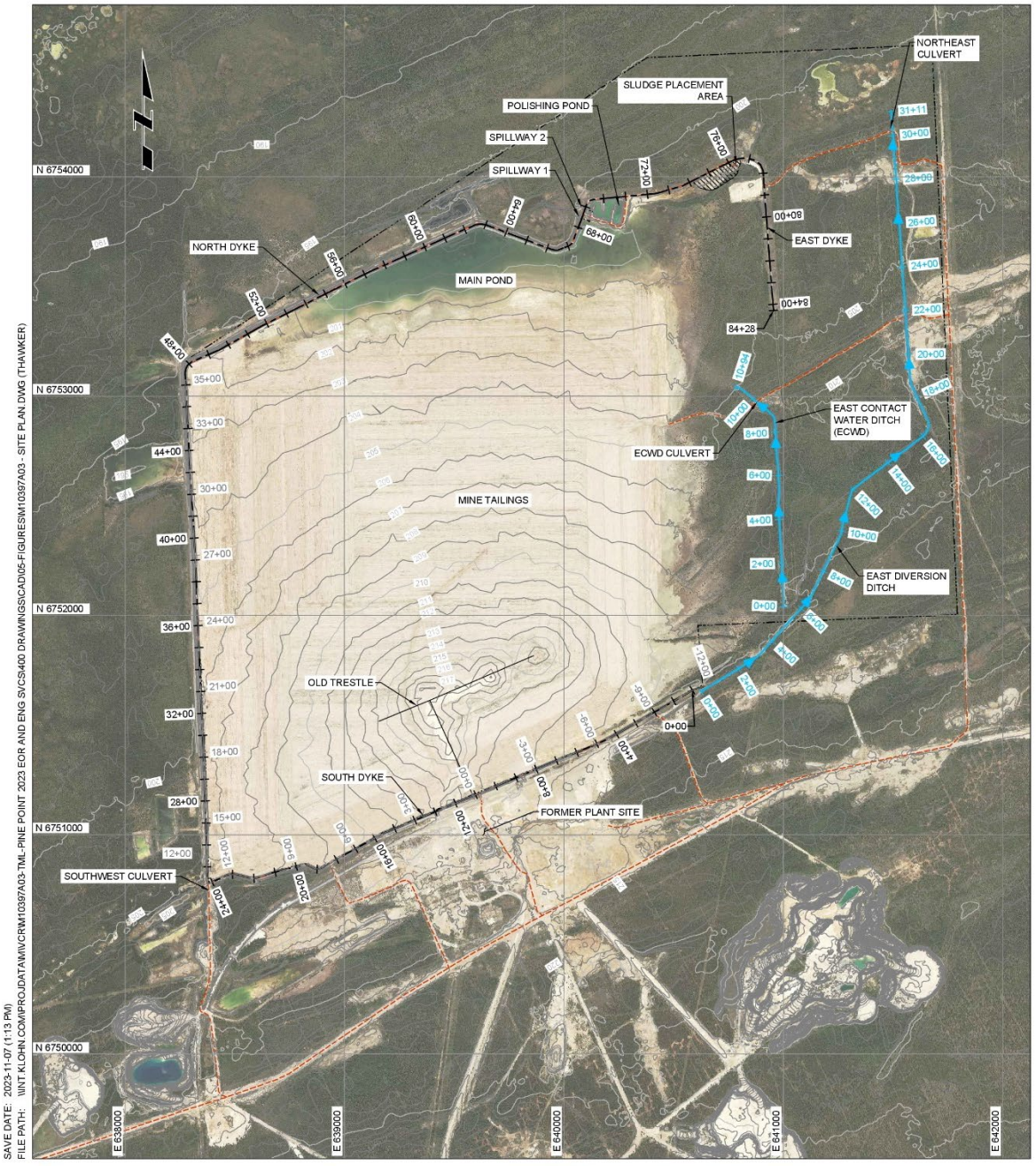
This report was prepared in accordance with Teck's Guideline for Tailings and Water Retaining Structures (Teck 2019).

1.2 Facility Description

The TIA is approximately 75 km east of Hay River and 6.5 km south of Great Slave Lake in the Northwest Territories. The TIA is approximately 200 meters above sea level (masl) and occupies terrain that gently slopes northwest towards the lake at slopes generally less than 1%.

The TIA covers approximately 700 ha and is contained on four sides by earthfill dykes and natural topography. The South Dyke and the East Dyke terminate in existing topography on the east side of the TIA. A site plan and the general arrangement of the TIA are presented in Figure 1.1. Figure 1.2 shows the typical dyke cross section.

Figure 1.1 Site Plan and General Arrangement



SITE PLAN
SCALE A

LEGEND

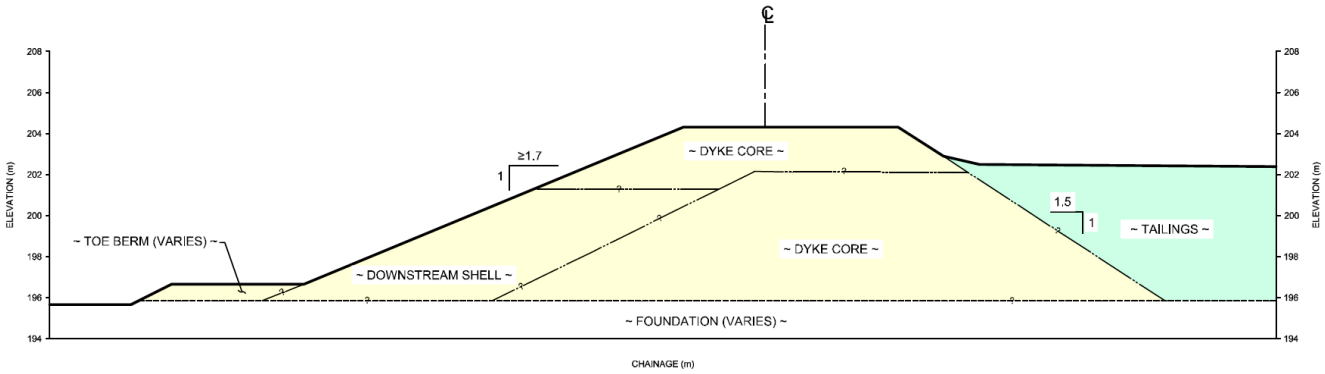
- PINE POINT MINE SURFACE LEASE BOUNDARY
- TAILINGS IMPOUNDMENT AREA ACCESS ROAD
- 215 MAJOR CONTOUR (5m INTERVAL)
- MINOR CONTOUR (1m INTERVAL)
- 0+00 DYKE CREST ALIGNMENT (PRE-2022 STATIONING) (NOTE 5)
- 2+00 DYKE CREST ALIGNMENT (POST-2022 STATIONING) (NOTE 4)
- 2+00 DITCH ALIGNMENT

NOTES

1. ALL UNITS AND ELEVATIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.
2. COORDINATE GRID PROJECTION UTM ZONE 11, NAD83.
3. TOPOGRAPHIC AND BATHYMETRIC SURVEY DATA FROM COMPILED DATASET BY BARR ENGINEERING AND ENVIRONMENTAL SCIENCE CANADA LTD. (BARR) BASED ON SURVEYS PROVIDED BY TECK METALS LTD. FILE NAME: EXISTING GROUND_FULL_2023.xml 2023 TECK PINE POINT SURVEY INFORMATION_REV B
4. DYKE CREST ALIGNMENT (POST-2022 STATIONING) AND DITCH ALIGNMENTS BASED ON BARR SITE FIGURE. FILE NAME: 6106100108_BASE_C3D_EXISTING_2023.dwg
5. DYKE CREST ALIGNMENT (PRE-2022 STATIONING) AND TRESTLE LOCATION DIGITIZED FROM FIGURE IN TECK OPERATION, MAINTENANCE AND SURVEILLANCE MANUAL (REVISION V006) TAILINGS IMPOUNDMENT INSPECTION FORM.
6. FIGURE PREPARED BY KCB FOR SITE TEAMS TO USE AS REFERENCE FOR DYKE AND DITCH STATIONING AND FOR SITE NOMENCLATURE.

SCALE A 0 500 m

Figure 1.2 Typical Dyke Cross Section



The Pine Point Mine was operated from 1964 to 1988 by Cominco. Cominco merged with Teck in 2001. Teck is no longer responsible for the open pits and underground workings, but it maintains the responsibility of the TIA. The TIA was constructed in 1965 and operated up to 1988. Since 1988, the TIA has been in the active-care phase of closure (Teck 2023). The original dyke was designed and constructed in the mid-1960s, and the last three raises were completed in 1976, 1981, and 1987. The dykes are zoned earthfill embankments constructed of a stiff clay and silt upstream core and a downstream shell of sand with varying amounts of gravel from trace to gravelly. The key facility information is listed in Table 1.1.

Water management for the TIA includes annual seasonal water treatment in the serpentine Polishing Pond. The Polishing Pond is located adjacent to the North Dyke and separated from the Main Pond by the Internal Dyke. A culvert passes through the Internal Dyke and is fitted with a gate valve to control the flow into the Polishing Pond.

There are two concrete spillways are present in the North Dyke: Main Pond Spillway and Polishing Pond Spillway. Both spillways allow impounded water to discharge through the North Dyke into the downstream environment. The spillways are reinforced concrete channels, which passively release water from the TIA when the pond level rises above El. 202.5 m. The Main Pond Spillway is typically dry and treated water is conveyed via siphons through the Polishing Pond Spillway during the annual water treatment campaigns.

Table 1.1 Key Facility Information

Item	Description
TIA Containment Dykes	South Dyke; West Dyke; North Dyke; East Dyke
Embankment Type	Zoned earthfill: clay and silt core with downstream shell of sand (trace gravel to gravelly), and a sand and gravel toe berm along portions of the West Dyke and North Dyke
Foundation	<table><tr><th>Unit</th><th>Description</th></tr><tr><td>Peat and Organic Soils</td><td>Peat and Organic Soils</td></tr><tr><td>Upper Sand and Gravel</td><td>GRAVEL and sand, some silt to SAND and silt, some gravel</td></tr><tr><td>Lacustrine Unit</td><td>CLAY to CLAY and sand, trace gravel</td></tr><tr><td>Lower Sand and Gravel</td><td>Sandy GRAVEL to SAND, some silt, trace gravel</td></tr><tr><td>Glaciolacustrine Unit</td><td>Sandy CLAY</td></tr><tr><td>Glacial Till</td><td>Silty CLAY and sand, trace gravel</td></tr><tr><td>Bedrock</td><td>Siltstone and limestone</td></tr></table>
Construction Method	Staged construction, downstream raises
Operation	1965 to 1988 Tailings were deposited from a central discharge area using a trestle system for the distribution pipeline and discharge points.
Maximum Dyke Height	9 m (crest to downstream toe)
Crest Elevation	Minimum crest elevation of 203.5 m (North Dyke) Maximum crest elevation of 214.5 m (South Dyke)
Spillway Invert Elevation	202.5 m, elevation of the top of the concrete sill
Crest Length	8.8 km
Slopes	Upstream: 1.5H : 1V Downstream: >1.7H : 1V
Surface Area	700 ha
Mass of Tailings Stored	50 to 60 million tonnes
Main Pond Maximum Volume	1.7 Mm^3 measured to the spillway invert (top of the concrete sill)
Environmental Design Flood (EDF)	50-year freshet
Inflow Design Flood (IDF)	1,000-year return period, 72-hour summer storm
Water Licence Freeboard	1.0 m between the normal operating water level range and the dyke crest
Minimum Freeboard	0.5 m between the top of the routed flood and the dyke crest

1.3 Construction History

The chronology of significant design and construction activities is as follows:

- The original dyke configuration was constructed in 1965. There are no documents that outline or detail the original design and construction of the TIA dykes.
- There are no documents that outline or detail dyke raises prior to 1976.
- In 1976, the North Dyke and West Dyke were raised by 2.1 m, and the East Dyke was raised and extended.

- In 1981, the West Dyke was raised by up to 3 m.
- In 1987, the South Dyke, West Dyke, and North Dyke were raised with an earthfill cap in the order of about 0.15 m to 1.0 m.
- In 1988, the mine was closed and approximately 0.15 m of gravel was placed as a cover on the tailings surface in 1990 and 1991.
- In 2008, the North Dyke was widened (to about 7.3 m) and 6-inch minus gravel was placed along about 750 m of the upstream face of the North Dyke.
- In 2012, reinforced concrete headwalls were constructed in the Main Pond Spillway and the Polishing Pond Spillway.
- In 2018 and 2021, armouring rock was placed on the upstream side of the North Dyke.

2 SITE ACTIVITIES - JULY 2022 TO OCTOBER 2023

The TIA is in the active-care phase of closure. Teck continues to manage the water level in the Main Pond by treating water in the Polishing Pond. Scheduled inspections occur as per the permit requirements, and event-driven inspections and maintenance work are carried out on an as-required basis. Routine inspection and monitoring requirements, and triggers for event-driven inspections, are presented in the Operation, Maintenance and Surveillance (OMS) Manual (Teck 2023).

The Mine Emergency Response Plan (MERP) was triggered twice during the reporting period due to the nearby wildfires. The MERP was activated, and site evacuated, between May 16 and May 20, 2023 and between August 13 and September 7, 2023. The wildfires were not near site but did impact access due to the evacuation of Hay River.

The following inspections were carried out during the reporting period:

- Fall 2022 Inspection: October 19, 2022 by the Tailings Surveillance Officer;
- Freshet/Spring 2023 Inspection: June 8, 2023 by the Tailings Surveillance Officer; and
- AFPR Site Visit: October 1, 2023 by the EoR, RTFE and Tailings Surveillance Officer.

Additional site visits were performed as follows:

- Several site visits occurred in October 2022 by the Tailings Surveillance Officer and Carter Industries for the following activities:
  - Installed silt fencing and coconut mats at the north end of the West Dyke;
  - Installed staff gauges and remote access-cameras;
  - Relocated the wood debris identified in the 2022 AFPR;
  - Conducted troubleshooting on the TIA instrumentation;
  - Removed vegetation on the dykes;
  - Installed a piezometer at the Polishing Pond; and
  - Surveyed the armouring rock on the upstream slope of the North Dyke.
- April 25, 2023 by the Tailings Surveillance Officer to replace the batteries on the TIA instrumentation.
- June 27 to June 29, 2023 by the Tailings Surveillance Officer, RTFE and Mr. Mike Louws of KCB to collect survey information to support a refined flood routing study.

Water treatment activities were performed as follows:

- Discharge of treated waters began on June 30, 2022 and was completed on August 15, 2022 once the pond level was drawn down to approximately El. 200.0 m. Teck reported that a total of 530,266 m^3 of water from the Main Pond was treated and discharged in 2022.

- Discharge of treated waters began on July 23, 2023 and was terminated on August 13, 2023 when the MERP triggered an evacuation of site. Since the Main Pond water level had been drawn down to El. 200.4 m, water treatment was not restarted once the evacuation order was lifted. Teck reported that a total of 106,214 m^3 of water from the Main Pond was treated and discharged in 2022. Water treatment activities were carried out by Maskwa in 2023.

The Main Pond Trigger-Action-Response-Plan (TARP) was initiated in April 2023 once the final snowpack survey was completed and the pond water-level forecast predicted that the Main Pond water level would exceed El. 201.1 m. Pond level was monitored daily with the remote camera system and the weather forecast was monitored daily by the RTFE April 10, 2023 through May 24, 2023. The RTFE continued weekly monitoring of the pond level and weather forecast until September 1, 2023 when the pond level was below El. 200.3 m.

3 CLIMATE DATA, WATER BALANCE, AND POND MANAGEMENT – JULY 2022 TO OCTOBER 2023

3.1 Climate Data

Site-specific average monthly temperatures and precipitation were developed from regional climate datasets using records from 1953 to 2020 as part of water balance modelling work (Barr 2021). The site specific data are shown in Figure 3.1 alongside the temperature and precipitation data measured on site during the reporting period (email from Barr to KCB on November 9, 2023).

The climate data indicates that monthly average temperatures during the reporting period were slightly warmer than the average temperature for site, other than January 2023 which was approximately 8^{o}C above average (Figure 3.1). Conditions at site were also significantly drier than average in the summer of 2022 and again drier than average in the spring and summer of 2023.

The 2023 freshet period was atypical because there were:

- Unusually cold overnight lows in early April which caused the snow melt to start and stop;
- little precipitation in April; and
- increased infiltration during freshet caused by the longer snow melt period.

3.2 Water Balance

The Draft TIA water balance and water quality model was prepared in GoldSim (Barr 2021). The water balance uses direct precipitation on the pond, calculated runoff from the catchment area, and subtracts measured discharge to estimate total losses. Estimated losses include evaporation and seepage losses. The water balance model was calibrated to pond level measurements, to water treatment discharge rates, and to the emergency decant event in May 2018.

The water balance model is used to predict the Main Pond water level prior to freshet based on snowpack survey data. The pond level predictions, the measured pond levels, and the measured water treatment discharge rates for the 2022 and 2023 seasons are shown in Figure 3.2. There was very good agreement between the 2022 pond level predictions and the measured water levels. The water balance model overpredicted the pond levels in 2023 due to the unusual 2023 freshet conditions listed in Section 3.1.

Figure 3.1 Monthly Average Air Temperature and Total Precipitation

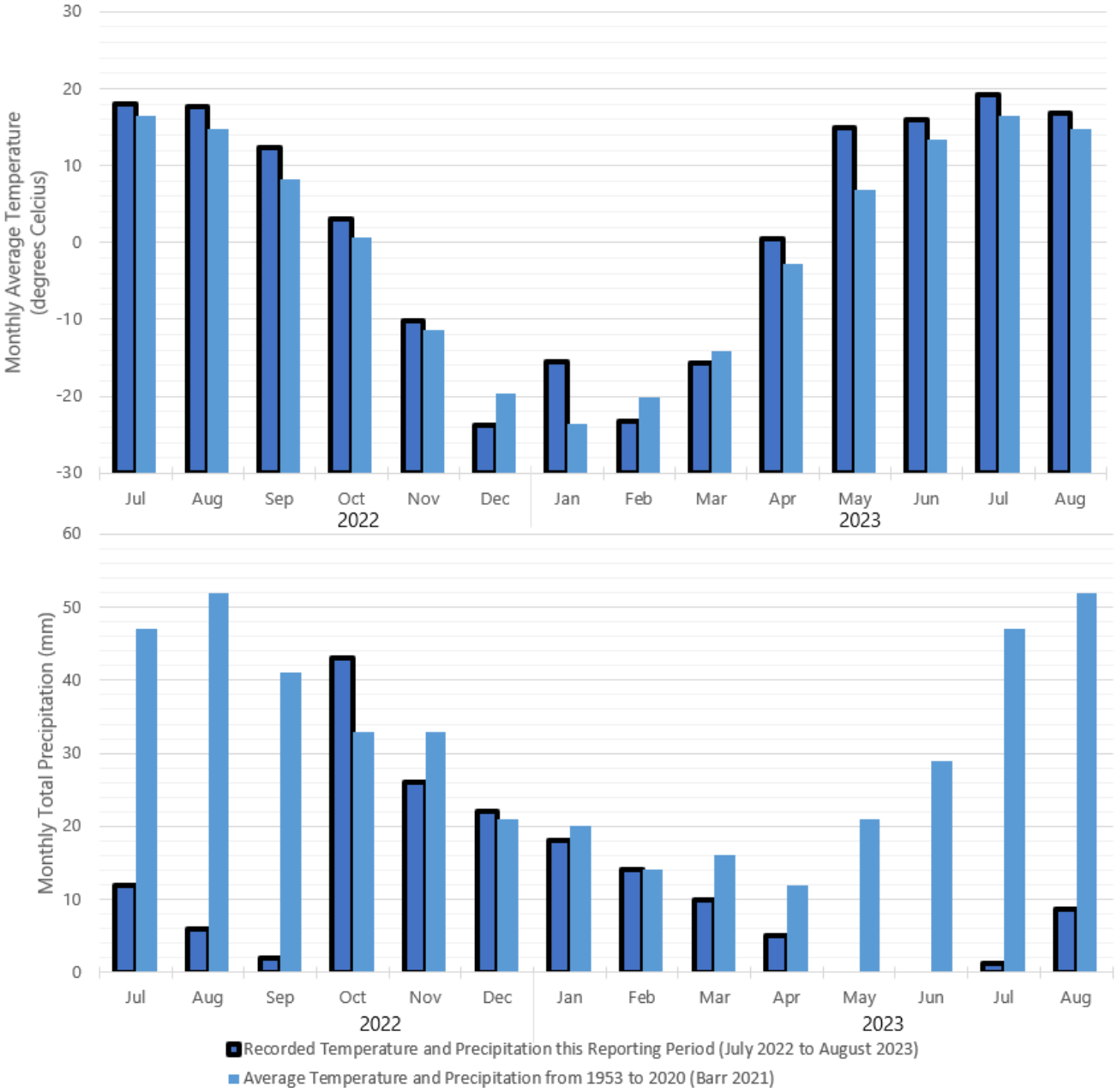
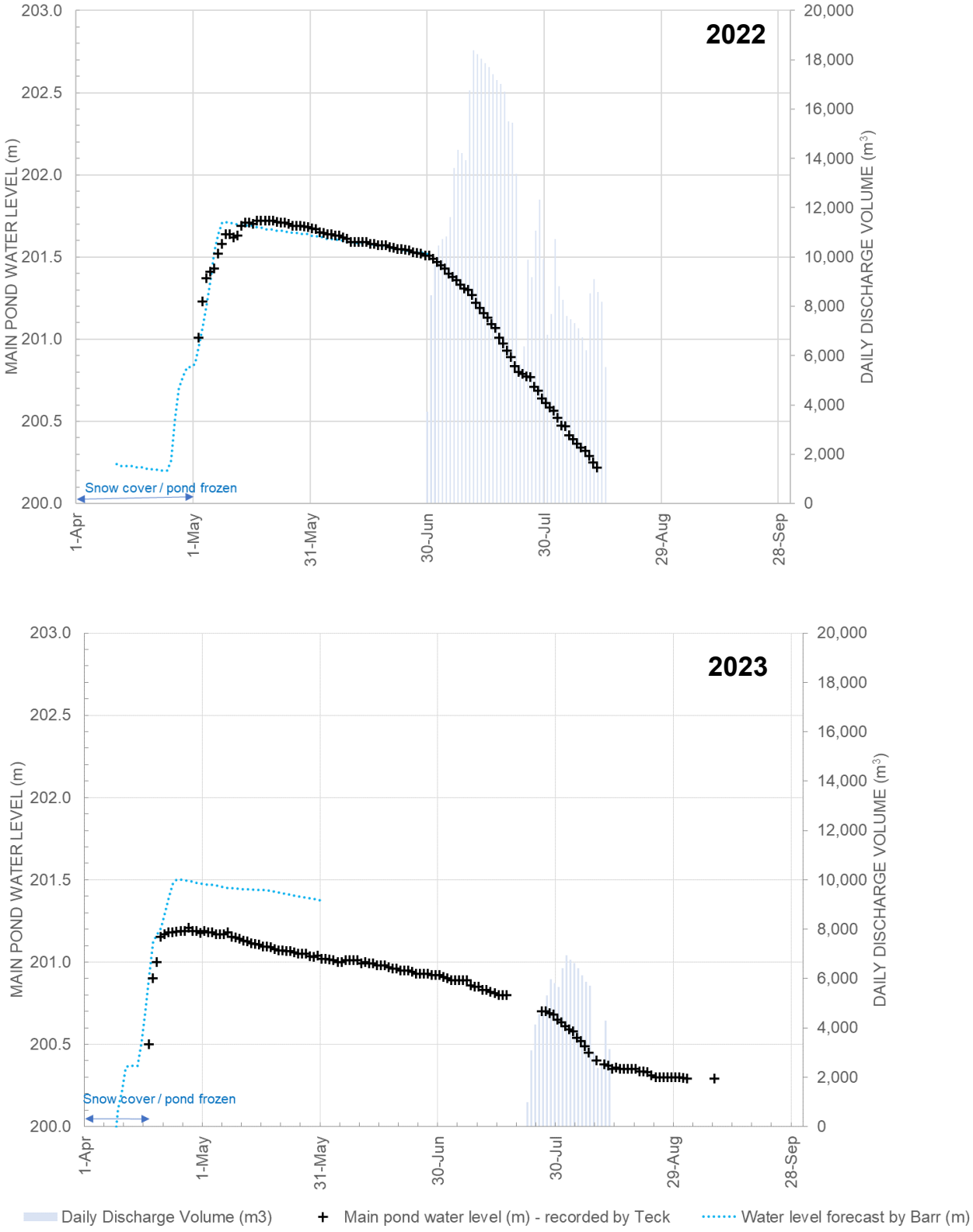


Figure 3.2 2022 and 2023 Measured Main Pond Water Levels and Discharge Rates



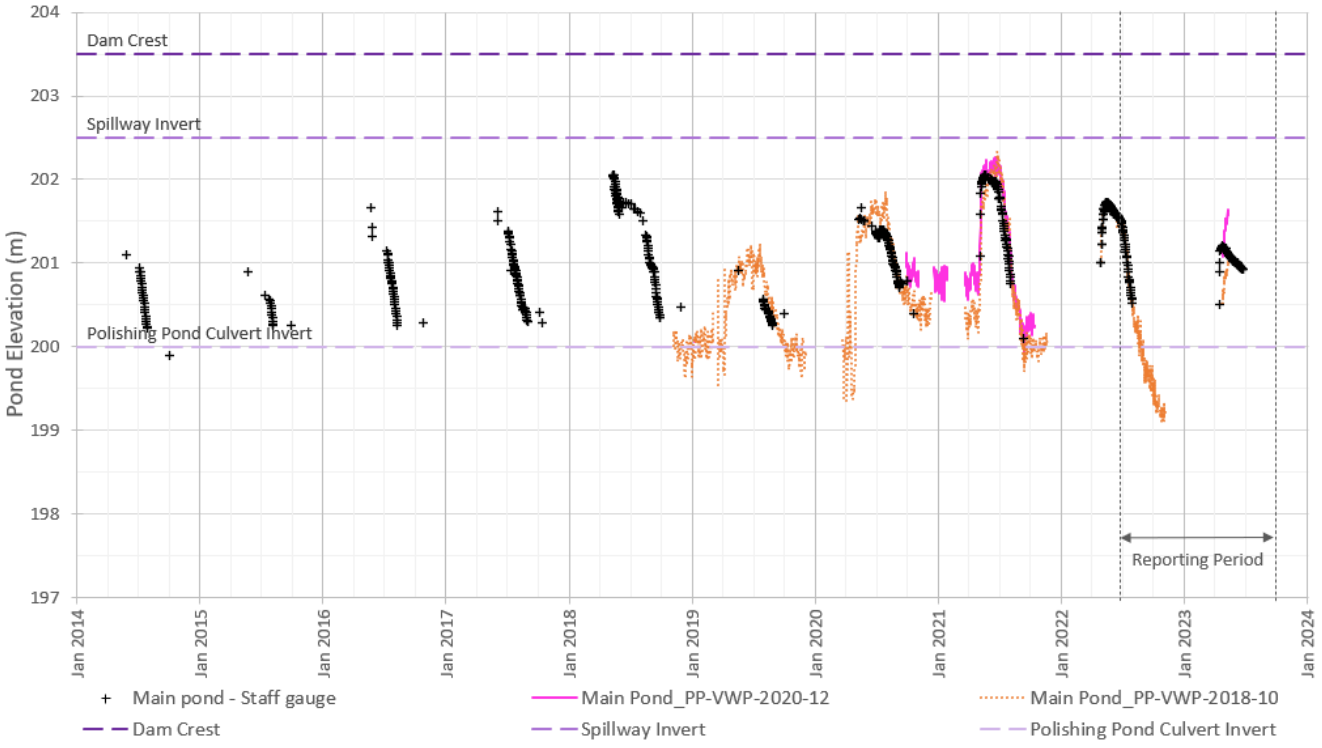
3.3 Water Management and Pond Management

Water accumulates in the Main Pond after freshet and pond levels are highest before the seasonal water treatment starts. The pond levels drops rapidly during water treatment and will continue to drop between the end of water treatment and winter due to ongoing seepage and evaporation.

In recent years, the pond level has fluctuated between approximately El. 202.0 m and El. 199.5 m (Figure 3.3). During the reporting period, the Main Pond water levels followed the seasonal trend and the maximum pond level was El. 201.2 m. The Main Pond water level was lower during spring 2023 than in previous years due to the unusual freshet conditions discussed in Section 3.1. The piezometer which measures pond level (PP-VWP-2018-10) was active longer into the winter than in previous years, explaining the lower than typical fall reading of El. 199.2 m.

The Water Licence freeboard limit (1.0 m) was maintained throughout the reporting period.

Figure 3.3 Main Pond Water Level Over the Last 10 Years



4 SURVEILLANCE - JULY 2022 TO OCTOBER 2023

4.1 Overview

The TIA surveillance program, as described in the OMS Manual (Teck 2023), is summarized in Table 4.1. The surveillance program is appropriate for the TIA under existing conditions given the long performance history of the facility, adequacy of instrumentation coverage, active seasonal water treatment and spillway capacity.

Table 4.1 Summary of Surveillance Program (from Table 6.1 in the OMS Manual)

Surveillance Type/Task	Surveillance Method and Activity	Frequency	Responsible Person	OMS Manual Compliance Met?
Freeboard	Staff gauge and remote camera	Manual readings of the staff gauge each time the site is visited Daily readings captured by the remote camera	Tailings Surveillance Officer (manual staff gauge reading) RTFE (remote camera)	Yes
	Vibrating wire piezometers	Continuous remote measurements	RTFE	Yes
Erosion at Discharge Points	Visual inspection	Daily inspection during discharge activities	Supervisor Water Treatment and Monitoring	Yes
Dyke Stability	Vibrating wire piezometers	Data reviewed quarterly	RTFE	Yes
Climate Data	Climate station	Continuous remote measurements	Teck Site Manager	Yes
	Seven day rainfall forecast	Per TARP requirement	RTFE	Yes
Snowpack	Manual snowpack measurements	As determined by the Environmental/Closure Consultants – typically in Jan, Feb, March	Environmental Compliance / Closure Consultants / Contractor (Barr)	Yes
Survey	Bathymetric survey	Every 10 years (min.)	RTFE	Yes (survey not required until 2030)
Overall Dam Integrity	Routine visual inspections	Twice per year: after freshet and fall	Tailings Surveillance Officer	Yes
	Routine visual inspections	Once per year	EoR	Yes
	Data analysis	Annually	EoR	Yes
	Dam Safety Review	Once every 10 years	External Geotechnical Consultant	Yes (DSR not required until 2024)
	Special visual inspections	Event driven	Tailings Surveillance Officer	Yes (none required)
Environmental Compliance	Not included in this AFPR Reported by Teck in the Annual Water Licence Report (separately) to Mackenzie Valley Land and Water Board			

4.2 Routine Monitoring

4.2.1 Fall 2022 and Spring 2023 Routine Inspections

There were no issues of concern noted during the routine inspections. Inspection reports were provided by the Tailings Surveillance Officer for review by the RTFE and the EoR.

4.2.2 AFPR Site Visit Observations

The following is a summary of the key observations made during the AFPR site visit by the EoR at the South Dyke, West Dyke and North Dyke. The East Dyke was not visited during the site visit, but was included in the fall inspection completed two weeks later. The weather was cloudy with periods of light rain during the site visit and the temperature was approximately 10°C. There was light rain in the evenings or overnight for the couple of days before the site visit.

The AFPR site visit inspection form and selected photographs from the site visit are included in Appendix I.

Key Observations at the South Dyke, West Dyke, and North Dyke

- **Main Pond**: Water level at El. 200.25 m.
- **Crest**: Good condition. No signs of cracking, settlement, sinkholes, erosion requiring maintenance, excessive vegetation, or animal activity.
- **Downstream Slopes and Toe**: Good condition. No signs of erosion requiring maintenance, slope instability, or seepage.
  - Erosion rills are present on many of the downstream slopes. The rilling is a surficial feature that is not a dam safety concern. The rilling has not retrogressed into the dyke crests and does not require maintenance at this time.
  - The silt fencing and coconut mats installed on the West Dyke in fall 2022 to prevent release of fines appear to be performing as intended.
  - The water levels in the permanent ponds downstream of the dykes (Sta. 1+00, 20+00, 44+00, 47+50, 62+00) were lower than normal, indicating dry conditions. Where ponded water was present near the toe of the dykes, it was clear.
- **Upstream Slope**: Good condition. No signs of slope instability.
  - Evidence of surface water flow along the surface of the tailings next to portions of the West Dyke's upstream slope.
  - The AFPR site visit included walking the length of the upstream slope of the North Dyke to observe the performance of the erosion protection (Appendix II). A small, wave-cut erosion scarp less than 30 cm high was observed along some portions of the North Dyke upstream slope. However, since the erosion scarp appears to be a surficial feature in a sand and gravel material, maintenance is not required at this time. KCB recommends that an inspection of the North Dyke upstream slope be conducted by the EoR every three years at a low-water level. This inspection should include walking the length of the upstream slope of the North Dyke along the low-water level.

- **Spillways:** Good condition. No signs of erosion, cracking, or obstructions.
- **Polishing Pond:** Active erosion in the top 1 m of Finger Dyke 3 (westernmost dyke). Wave-cut erosion of the internal slope of the North Dyke within the Polishing Pond; however, the elevation of the erosion is below the natural ground downstream of the North Dyke toe and therefore is not a concern for dam safety.

4.2.3 Instrumentation (Piezometers)

There are 18 working vibrating wire piezometers (VWP) in the TIA: three in the tailings, four in the dyke fill, eight in the foundation, two in the Main Pond and one in the Polishing Pond. Refer to Appendix III for the available instrumentation data.

Two VWPs (PP-VWP-2018-04A and 04B) installed in the tailings and foundation below the tailings were decommissioned in April 2023 when the RTFE confirmed that the piezometers were no longer working. These VWPs do not need to be replaced since they do not provide critical monitoring for dam safety.

None of the measured piezometer readings indicate a trend of increasing pore pressures within the dykes, tailings or foundation. The RTFE reviewed the piezometer data quarterly to confirm that the VWPs are working and that the readings were consistent with historic readings. There were no items of note during the RTFE reviews.

There are currently no alert level thresholds associated with the TIA VWPs. The “maximum normal piezometer reading” for each VWP and the phreatic surface which results in calculated Factors of Safety (FoS) of 1.3 and 1.1 at each VWP (KCB 2023a). This information can be used to select notification and trigger levels for the instrumentation.

Table 4.2 Summary of Piezometer Readings during the Reporting Period

VWP ID	Monitored Unit	VWP Tip El. (m)	Maximum Reading during the Reporting Period [1] (m)	Date of Maximum Reading
PP-VWP-2018-01A	Upper Sand and Gravel	199.4	205.3	2022-10-27
PP-VWP-2018-01B	Tailings	200.7	206.3	2022-10-27
PP-VWP-2018-02A	Upper Sand and Gravel	203.0	205.5	2022-10-13
PP-VWP-2018-02B	Tailings	204.5	205.2	2022-10-01
PP-VWP-2018-03A	Lower Sand and Gravel	192.9	203.1	2022-07-18
PP-VWP-2018-03B	Lacustrine Unit	197.3	203.2	2022-07-18
PP-VWP-2018-03C	Tailings	198.8	203.2	2022-10-27
PP-VWP-2018-05	Lacustrine Unit	191.6	196.1	2022-06-16
PP-VWP-2018-06	Lower Sand and Gravel	196.4	199.5	2023-05-15
PP-VWP-2018-07	Dyke Fill	195.2	195.1	2022-07-09
PP-VWP-2018-08	Dyke Fill	200.5	200.3	2023-09-10
PP-VWP-2018-09	Dyke Fill	198.4	199.6	2023-07-09
PP-VWP-2018-10	Main Pond	199.6	201.7	2022-06-01
PP-VWP-2020-11A	Dyke Fill	198.9	201.0	2022-07-06
PP-VWP-2020-11B	Lower Sand and Gravel	194.3	198.6	2022-06-16
PP-VWP-2020-11C	Glacial Till	182.2	197.6	2022-06-16
PP-VWP-2020-12	Main Pond	197.7	201.6	2023-05-15
PP-VWP-2022-14	Polishing Pond	199.0	201.1	2023-05-17

Note:
1. Reporting period is from July 2022 to October 2023.

4.3 Event Driven Monitoring

Event driven inspections are required following a seismic event or following a storm equal to or greater than the 1 in 10-year storm.

There were no seismic events or storm events requiring an event driven inspection during the reporting period.

5 TAILINGS FACILITY SAFETY ASSESSMENT

5.1 Design Basis Review

The design basis criteria selected for flood and earthquake loading is consistent with the CDA Dam Safety Guidelines (CDA 2013) guidelines (Teck 2023). A summary design basis report was finalized in 2023 (KCB 2023b). .

5.2 Dam Safety Review

SRK completed a dam safety review (DSR) on the TIA in 2014, with the site visit conducted on July 8, 2014 (SRK 2016).

There are no requirements to complete a DSR for the TIA based on the relevant permits and licenses for the site; however, Teck completes DSRs at least once every 10 years as part of their internal governance program for facilities that retain fluids and have a credible failure mode. The next DSR should be conducted in 2024 under this internal policy.

5.3 Failure Modes Review

The TIA risk register was reviewed by Teck and KCB in November 2022. There were no changes to the key hazards and the existing controls were adequate to manage the potential failure scenarios. The risk register is reviewed annually by the EoR and RTFE and updated as required.

Teck, with support from KCB, conducted a credible catastrophic failure scenario assessment in April 2022. The assessment considered the three key failure scenarios for tailings facilities identified in the ICMM Good Practice Guide (ICMM 2021): overtopping, internal erosion and piping, and slope instability. Teck's definition of a "catastrophic" failure scenario is one with a risk to life safety or irreversible impact to a rare or valued ecosystem, social or cultural heritage element. The assessment concluded that, based on the available information and current understanding of the site, there are no credible "catastrophic" failure scenarios for the TIA.

The following is a summary of the controls in place at the TIA to manage the risks associated with the key failure scenarios for the facility. The overtopping and slope instability failure scenarios are credible (though non-catastrophic), while the internal erosion failure scenario is not credible for the current and historic loading conditions. Based on the observations above and the available information, Teck is managing the potential failure mechanisms for the TIA appropriately and is taking appropriate steps to address relevant data gaps.

Overtopping:

- The Main Pond Spillway and the Polishing Pond Spillway are designed to discharge to the downstream environment to manage the risk of overtopping the TIA dykes during storms up to and including the 1/1,000 year event (Golder 2022) while maintaining the minimum freeboard of 0.5 m.

- The TIA has capacity to manage up to the 1/100 year freshet below the spillway invert (Golder 2022).
- The operational controls to prevent overtopping at the TIA include annual seasonal water treatment campaigns, pond level predictions based on site-specific snow survey monitoring, and a TARP that identifies when to mobilize water treatment or request emergency decant based on pond level and the seven-day forecast. Site personnel measure the pond level during routine inspections, and remotely view the pond level daily via a web camera during and following freshet.

Internal Erosion and Piping:

- The Main Pond is adjacent to the North Dyke, and does not pond against the South Dyke, East Dyke, or West Dyke. The engineering controls to prevent internal erosion consist of constructing the dykes with fill materials that are internally stable under the current loading conditions and restricting the pond to the northern portion of the facility. The operational control to prevent internal erosion consists of active management of the pond level through annual water treatment campaigns.
- The Main Pond water levels are currently lower than they were during operations. The TIA performed well during operations when the hydraulic gradients in the dykes were likely higher than the current conditions.
- The good performance of the TIA, with no change to the operating conditions of the Main Pond, indicates that the existing controls are adequate to prevent internal erosion and piping for the existing conditions in the facility.

Slope Instability:

- Mining operations ceased and the dykes were closed in 1988; since then, no signs of global instability have been observed or documented. The good performance of the TIA indicates the design and construction of the dykes are adequate to prevent slope instability at the TIA under the current loading conditions.
- A stability assessment of the TIA, completed as part of the 2014 DSR (SRK 2016) concluded the dykes met design criteria under static and pseudo-static (1/2,475 year event) loading conditions.
- The 2014 slope stability analyses used a design PGA value, based on the 2010 NBCC seismic hazard calculator, of 0.019 g for the 1/1,000 year event and 0.036 g for the 1/2,475 year event (SRK 2016). That analysis concluded that failure scenarios triggered by earthquakes are effectively managed for the TIA. These design PGA values are greater than those recommended by the 2015 NBCC update (NRC 2015).
- Visual observations indicate there are no significant erosion features on the crest or slopes of the dykes. The minor erosion rills observed on some of the dykes are very common for this type of facility and are not expected to rapidly develop into erosion gullies that could threaten the stability of the dykes. The upstream slope of the North Dyke is in contact with the Main Pond, and the slope is protected from erosion by armouring rock.

- The potential for toe erosion during flood routing to affect embankment stability should be evaluated, particularly at the spillway outlets and at the access road culvert located at the southwest corner of the facility.
- The operational controls to prevent slope instability at the TIA include actively managing the pond level, monitoring of the phreatic surface in the facility, and observing the condition of the dyke three times per year. Particular attention (daily monitoring) is paid to pond levels and piezometer data the during freshet when pond levels are highest. TARPs are in place to engage emergency discharge syphons should the pond levels exceed targets.
- The existing controls are adequate to manage the risk of slope instability for static and seismic loading (up to the 1/2,475-yr event).

Based on the above, the key hazards related to the TIA and the three potential failure scenarios are being managed effectively, and the TIA is not seen as having the potential for a catastrophic flow failure in its current configuration under design flood and earthquake loading.

5.4 Upstream and Downstream Conditions Review

There have been no significant changes in the upstream or downstream conditions since mine closure construction was completed in 1991. There is no infrastructure located upstream or downstream of the TIA.

5.5 Consequence Classification

The CDA Dam Safety Guidelines (CDA 2013) provide a dam classification scheme based on the potential consequences of a hypothetical failure that can be used to provide guidance on the standard of care expected of dam owners and designers. Consequence of a hypothetical failure is not related to the likelihood of a failure, but rather the potential impact resulting from a failure if it did occur.

Teck provided the following statement regarding the consequence classification of the facility (email communication from Teck to KCB on August 24, 2023):

> *Teck is committed to the safe and environmentally responsible management of tailings facilities throughout the mining life cycle to minimize harm to the environment and protect the health and safety of our people and surrounding Communities of Interest. This commitment includes the implementation of the Global Industry Standard on Tailings Management (GISTM) and industry-leading guidelines established by the International Council on Mining and Metals (ICMM), the Mining Association of Canada (MAC) and Canadian Dam Association (CDA).*
>
> *For the purpose of assigning a dam classification, the consequences of potential failure modes are assessed as per the Canadian Dam Association (CDA) guidelines and the requirements of the jurisdictions in which we operate. The Global Industry Standard on Tailings Management (GISTM) bases consequence classification on credible failure modes only, which may result in a lower stated classification.*

As part of Teck's commitment to the safety of tailings facilities, Teck has adopted using extreme loading criteria for any new facilities with a credible catastrophic flow failure mode, regardless of consequence classification. Risk assessments are performed for all tailings facilities, with the objective of reducing risks to As Low As Reasonably Practicable (ALARP). In some cases, this results in further risk reduction beyond applicable regulatory requirements and is consistent with the GISTM and industry-leading best practice.

The downstream potential consequence of the TIA was assessed by Golder (Teck 2017) based on CDA Dam Safety Guidelines (CDA 2013) is as follows:

- There is no permanent population downstream of the dykes. The loss of life associated with a potential failure of the dykes would be "low to none" based on the temporary population downstream (comprising mine exploration personnel, water treatment personnel, or occasional site visitors).
- A potential failure of the dykes could impact the local environment, with the possibility of minimal short-term loss or deterioration of wildlife habitat. The South and East Dykes do not retain water, and therefore the impact to the environment is expected to be less than the North and West Dykes. Therefore, the impact to the environment from a failure of the South and East Dykes would likely be "low", and the impact from a failure of the North and West Dykes could be "low" to "significant".
- There are no known areas of significance for cultural heritage downstream of the dykes.
- A potential failure of the dykes would not impact infrastructure and would have minimal economic losses.

The consequence classification was reviewed in 2023 by the RTFE and EoR, and since there have been no material changes to the TIA or the upstream and downstream conditions since the 2017 assessment, the RTFE and EoR recommend no change to the consequence classification of the dykes.

The selection of design criteria is informed based on a Significant classification for the facility.

5.6 Physical Performance

5.6.1 Geotechnical

The TIA has performed adequately and there is no record of deformations since operations ceased in 1988. No signs of global instability were observed during the annual site visit. As noted in Section 4.2, there were no unusual conditions observed during the review period, and instrumentation readings were consistent with historic trends and expected behaviour.

5.6.2 Hydrotechnical

The hydrotechnical performance of the facility during the review period was consistent with historic trends and expectations. As noted in Section 3, there were no pond level exceedances or unusual conditions observed during the review period.

5.7 Operational Performance

The TIA has been closed for about 35 years and, as indicated in Section 2, the only operational requirement is for Teck to continue annual water treatment. Water treatment was conducted, consistent with the OMS Manual, during the reporting period.

5.8 Document Review

The OMS Manual was revised in March 2023 (Teck 2023) and is considered appropriate for the facility. Teck has indicated that the OMS Manual will be submitted to the MVLWB in 2024. The Mine Emergency Response Plan (MERP) was revised in March 2023 (Teck 2023). The Pine Point MERP was tested March 8, 2022. These documents are reviewed annually and updated as required.

6 SUMMARY AND RECOMMENDATIONS

The observed performance of the TIA during the review period was consistent with past behavior and expected performance. The TIA appears to be in good condition and there are no major concerns related to the safety of the facility.

Dam safety recommendations identified during past AFPRs, and from the 2023 AFPR, are summarized in Table 6.1. The priority assigned to each recommendation are based on Teck's priority ratings, with all observations in Table ES-1 rated either a (3) or (4):

1. A high probability or actual TIA safety issue considered immediately dangerous to life, health or the environment, or a significant risk of regulatory enforcement.
2. If not corrected could likely result in TIA safety issues leading to injury, environmental impact or significant regulatory enforcement; or a repetitive deficiency that demonstrates a systematic breakdown of procedures.
3. Single occurrences of deficiencies or non-conformances that alone would not be expected to result in TIA safety issues.
4. Best Management Practice as a suggestion for continuous improvement towards industry best practices that could further reduce potential risks.

Table 6.1 Summary of Deficiencies and Recommendations

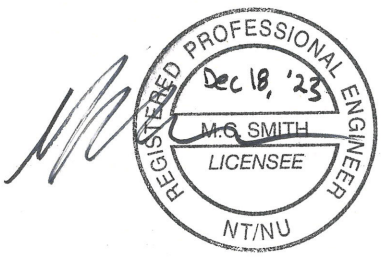
Structure	ID No.	Deficiency or Non Conformance	Applicable Regulation or OMS Manual Reference	Recommended Action	Priority	Recommended Deadline (Status)
Previous AFPR Recommendations Ongoing						
TIA Instrumentation	2019-02	Instrumentation installed in 2018 requires integration into OMS Manual procedures.	Cl. 4.2 and 4.3 of OMS Manual	Establish procedures for frequency of data acquisition and review. Establish baseline readings and levels for alert and emergency response, with corresponding update of OMS Manual.	4	*Partially Completed* Frequency of data acquisition and review and baseline readings completed. *Remaining Action:* Q1 2024 Confirm notification and trigger levels for instrumentation and update the OMS.
TIA	2020-03	Freeboard limits require update for 2019 storage curve, 2020 climate assessment, review of design criteria, and evaluation of spillway.	Cl. 2.7.3.2.3 of OMS Manual	Review flood storage capacity, water handling practices, determine capacity of spillway and update freeboard limits. Incorporate these changes in the OMS Manual.	3	*Completed*
TIA Instrumentation	*2021-01*	*VWP anomalous readings. PP-VWP-2018-02A PP-VWP-2018-02B PP-VWP-2018-05 PP-VWP-2018-08 PP-VWP-2018-09 PP-VWP-2020-11A*	*None*	*Troubleshoot VWP calibration / data acquisition and data reduction. Assess the importance of these instruments for TIA surveillance and repair, replace or decommission faulty or damaged instruments where necessary.*	*4*	*Completed*
TIA	2021-03	Previous stability assessments were based on limited site characterization data.	None	Update stability assessments and review filter compatibility for the dykes based on the 2018 and 2020 site investigation data.	4	Stability modeling: Q2 2024 Internal erosion assessment: Q2 2024
Main Pond Spillway, Polishing Pond Spillway	*2021-05*	*The spillways are vulnerable to blockage by woody debris.*	*None*	*Develop a plan to manage debris in the pond and add to the OMS Manual.*	*3*	*Completed*

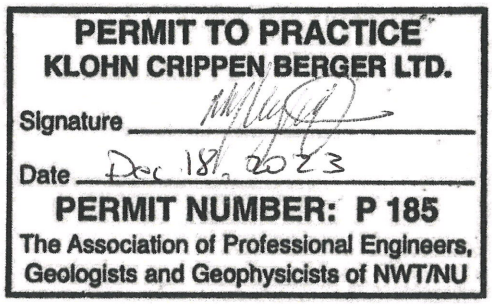
Structure	ID No.	Deficiency or Non Conformance	Applicable Regulation or OMS Manual Reference	Recommended Action	Priority	Recommended Deadline (Status)
TIA Instrumentation	*2021-06*	*The remote camera system for monitoring the staff gauge is vulnerable to water damage during high pond levels.*	*None*	*Relocate the remote camera system to above the high-water level of the Main Pond.*	*4*	*Completed*
North Dyke	*2022-01*	*No documentation of the riprap placed during the reporting period.*	*Section 5.7 of OMS Manual*	*Prepare a record document of the North Dyke riprap placement.*	*4*	*Completed*
Main Pond	*2022-02*	*Updated TARP (2022) is not included in the current OMS Manual.*	*Cl. 2.7.3.2.3 of OMS Manual*	*Incorporate the updated TARP into the OMS Manual.*	*3*	*Completed*
TIA Instrumentation	*2022-03*	*VWP datalogger reliability.*	*Cl. 4.2 and 4.3 of OMS Manual*	*Include a review of the status of the VWP dataloggers prior to freshet and replace batteries, as needed. Include this as regular maintenance in the OMS Manual.*	*4*	*Completed*
South Dyke	2022-04	The culvert at the southwest corner of the TIA inspected during the site visit may not have been accounted for in the flood routing assessment.	None	Evaluate the potential for toe erosion during flood routing at the southwest access road culvert.	4	Q1 2024
2023 AFPR Recommendations						
North Dyke	2023-01	None	None	Include in the OMS Manual that the EoR performs an inspection of the North Dyke upstream slope at a low water level every three years.	4	Q4 2024

7 CLOSING

We would like to thank you for the opportunity to work on this assignment. Should you have any questions, please contact the undersigned.

KLOHN CRIPPEN BERGER LTD.





Maggie Smith, P.Eng.
Geotechnical Engineer

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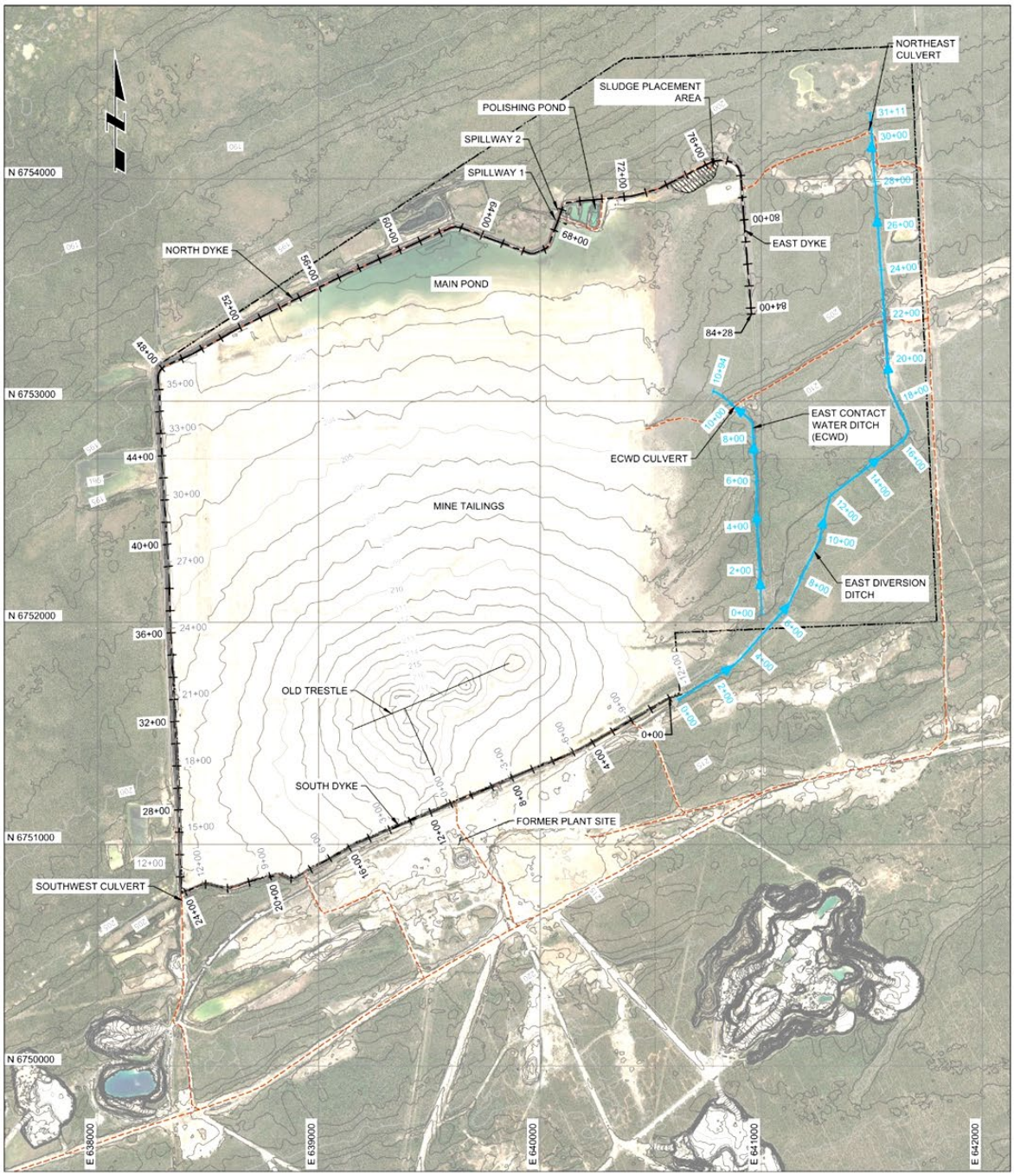
APPENDIX I

AFPR Site Visit Form and Photographs

Appendix I
AFPR Site Visit Form and Photographs

Date: October 1, 2023		Inspected By: Maggie Smith P.Eng., and Bee Fong Lim of KCB
Weather: Windy, approximately 10°C. Raining for about 2 hours (10am to noon), sunny in the afternoon.		
Tailings Pond Information:		
Pond Elevation: 200.25 m		
Crest Elevation: 203.50 m		Freeboard: 3.25 m
Dyke Inspection Check List (✓ = checked and no problems; x = not checked)		
Check: Upstream Slope of Dyke, Crest and Downstream Slope of Dyke		
South Dyke	**Checked**	**Comment**
Ponded Water	✓	Permanent ponds at the downstream toe of the South Dyke were drier than typical (Photo I-4).
Erosion	✓	Rills on downstream slope have not extended onto the crest and do not require maintenance at this time (Photo I-1).
Settlement/Depressions	✓	None observed.
Cracks/Movement	✓	None observed.
Debris	✓	None requiring clearing.
Vegetation	✓	No vegetation large enough to require clearing. (Photo I-4)
Other – (photos)		
Notes:		South Dyke in good condition, no areas of concern or recommendations for maintenance.
West Dyke	**Checked**	**Comment**
Ponded Water	✓	None. Low water levels in the permanent pond at the downstream toe of the West Dyke.
Erosion	✓	Silt fencing and coconut mats installed in October 2022 appear to be performing as intended (Photo I-10, I-11). Evidence of surface water runoff channelized on the tailings surface along portions of the upstream toe of the West Dyke (Photo I-6).
Settlement/Depressions	✓	None observed.
Cracks/Movement	✓	None observed.
Debris	✓	None observed.
Vegetation	✓	None requiring clearing.
Other – (photos)		
Notes:		West Dyke in good condition, no areas of concern or recommendations for maintenance.

North Dyke	Checked	Comment
Ponded Water	✓	Ponding water downstream of the North Dyke is clear. Western limit of the Main Pond during the inspection was at approx. 55+00.
Erosion	✓	None observed.
Settlement/Depressions	✓	None observed.
Sinkholes	✓	None observed.
Cracks/Movement	✓	None observed.
Debris	✓	None observed.
Vegetation	✓	None requiring clearing.
Main Pond Spillway	✓	Spillway in good condition. Pond level below the spillway invert and no evidence of flow in the spillway during the reporting period. No visible flow in the ponded water at the spillway outlet (Photo I-16).
Polishing Pond Spillway	✓	Spillway in good condition. No evidence of erosion due to discharge of the treated waters (discharge through syphons installed over the spillway). Visible flow in the clear waters downstream of the spillway outlet (Photo I-23).
Other – (photos)	✓	<u>Polishing Pond Finger Dykes</u> No active sloughing at Finger Dyke 1 (Photo I-17). Finger Dyke 2 has vertical slopes in upper 1 m, no evidence of active erosion (Photo I-18). Active erosion at Finger Dyke 3 (Photo I-19). Wave cut erosion on the upstream slope at North Dyke in the Polishing Pond is below the ground level at the downstream toe.
Notes:		
East Dyke – Not inspected		
Ponded Water	x	N/A.
Erosion	x	N/A.
Settlement/Depressions	x	N/A.
Sinkholes	x	N/A.
Cracks/Movement	x	N/A.
Debris	x	N/A.
Vegetation	x	N/A.
Other – (photos)	x	N/A.
Notes:		
Other Areas		
Notes:		Northeast Culvert at East Diversion Ditch clear (Photo I-24).



SITE PLAN
SCALE A

LEGEND

- PINE POINT MINE SURFACE LEASE BOUNDARY
- TAILINGS IMPOUNDMENT AREA ACCESS ROAD
- 215 MAJOR CONTOUR (5m INTERVAL)
- MINOR CONTOUR (1m INTERVAL)
- 0+00 DYKE CREST ALIGNMENT (PRE-2022 STATIONING) (NOTE 5)
- 2+00 DYKE CREST ALIGNMENT (POST-2022 STATIONING) (NOTE 4)
- 2+00 DITCH ALIGNMENT

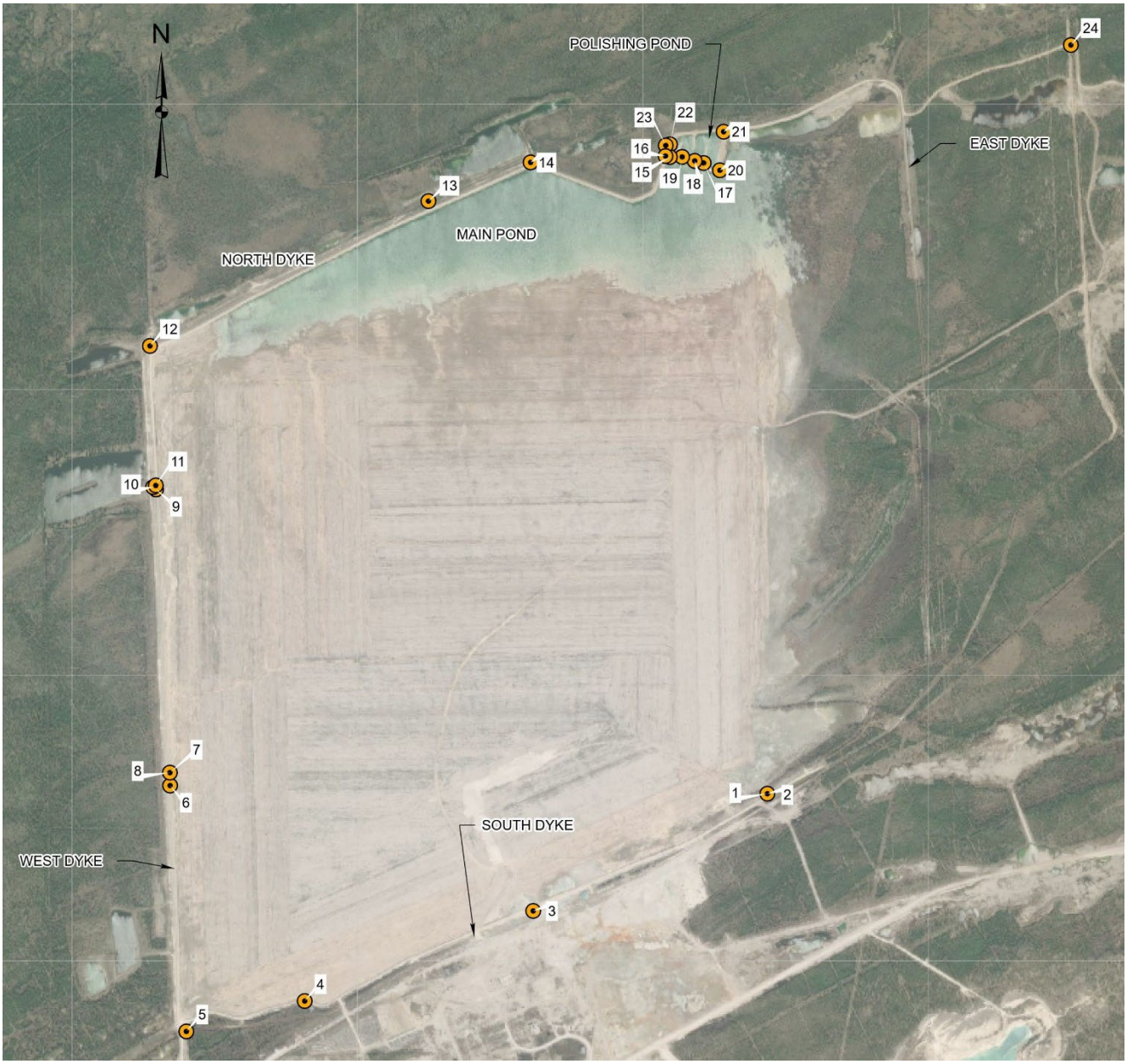
NOTES

1. ALL UNITS AND ELEVATIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.
2. COORDINATE GRID PROJECTION UTM ZONE 11, NAD83.
3. TOPOGRAPHIC AND BATHYMETRIC SURVEY DATA FROM COMPILED DATASET BY BARR ENGINEERING AND ENVIRONMENTAL SCIENCE CANADA LTD. (BARR) BASED ON SURVEYS PROVIDED BY TECK METALS LTD. FILE NAME: EXISTING GROUND_FULL_2023.xml 2023 TECK PINE POINT SURVEY INFORMATION_REV B
4. DYKE CREST ALIGNMENT (POST-2022 STATIONING) AND DITCH ALIGNMENTS BASED ON BARR SITE FIGURE. FILE NAME: 6106100108_BASE_C3D_EXISTING_2023.dwg
5. DYKE CREST ALIGNMENT (PRE-2022 STATIONING) AND TRESTLE LOCATION DIGITIZED FROM FIGURE IN TECK OPERATION, MAINTENANCE AND SURVEILLANCE MANUAL (REVISION V006) TAILINGS IMPOUNDMENT INSPECTION FORM.
6. FIGURE PREPARED BY KCB FOR SITE TEAMS TO USE AS REFERENCE FOR DYKE AND DITCH STATIONING AND FOR SITE NOMENCLATURE.

SCALE A 0 500 m

AFPR Site Visit Photographs

Figure I-1 Inspection Observation/Photo Locations



South Dyke

Photo I-1 South Dyke – looking west, rills on upstream slope (Location 1)

Photo I-2 South Dyke – looking southwest, South Dyke toe, dry where typically have ponded water (Location 2)

Photo I-3 South Dyke – looking west, rills on downstream slope (Location 3)

Photo I-4 South Dyke – looking southeast, ponds at the downstream toe drier than typical (Location 4)

Photo I-5 South Dyke – looking east, view upstream from southwest access road culvert inlet (Location 5)

West Dyke

Photo I-6 West Dyke – looking east, surface water runoff on tailings surface channelized along upstream slope (Location 6)

Photo I-7 West Dyke – looking north, downstream slope (Location 7)

Photo I-8 West Dyke – looking south, downstream slope (Location 8)

Photo I-9 West Dyke – looking north, downstream slope (Location 9)

Photo I-10 West Dyke – looking west, downstream slope with silt, low water levels in pond (Location 10)

Photo I-11 West Dyke – looking south, downstream slope and coconut matting installed October 2022 (Location 11)

North Dyke

Photo I-12 North Dyke – looking east, downstream slope (Location 12)

Photo I-13 North Dyke – looking north, clear ponded water downstream from dyke (Location 13)

Photo I-14 North Dyke – looking west, downstream slope (Location 14)

East Dyke

Note: East Dyke not inspected.

Main Pond Spillway

Photo I-15 Main Pond Spillway – looking north, spillway inlet (Location 15)

Photo I-16 Main Pond Spillway – looking north, spillway outlet (Location 16)

Polishing Pond

Photo I-17 Polishing Pond – looking northeast, Finger Dyke 1 (Location 17)

Photo I-18 Polishing Pond – looking northeast, Finger Dyke 2 (Location 18)

Photo I-19 Polishing Pond – looking north, Finger Dyke 3, active erosion near crest (Location 19)

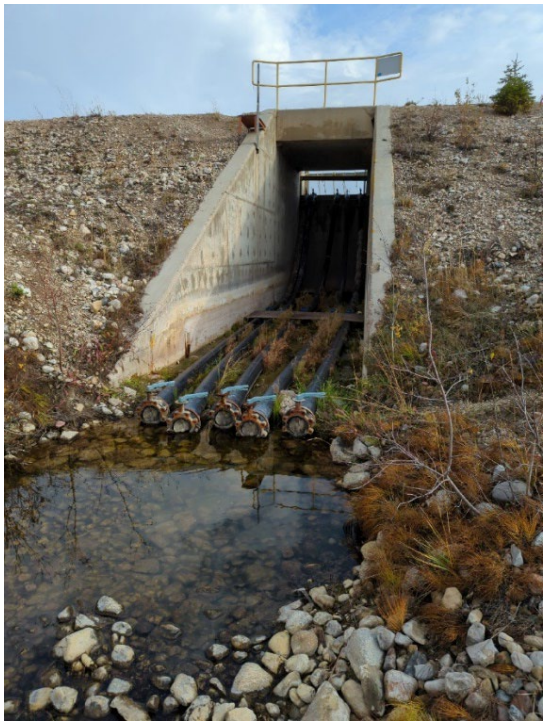
Photo I-20 Polishing Pond – looking south, culvert inlet (Location 20)

Photo I-21 Polishing Pond – looking north, upstream slope at the North Dyke (Location 21)

Polishing Pond Spillway

Photo I-22 Polishing Pond Spillway – looking south, spillway inlet (Location 22)

Photo I-23 Polishing Pond Spillway – looking south, spillway outlet, syphons not active, clear flow downstream at the spillway outlet (Location 23)



East Contact Water Ditch

Note: East Contact Water Ditch not inspected.

East Diversion Ditch

Photo I-24 Northeast Culvert – looking north (Location 24)

APPENDIX II

North Dyke Upstream Slope – Observed Performance

Appendix II
North Dyke Upstream Slope – Observed Performance

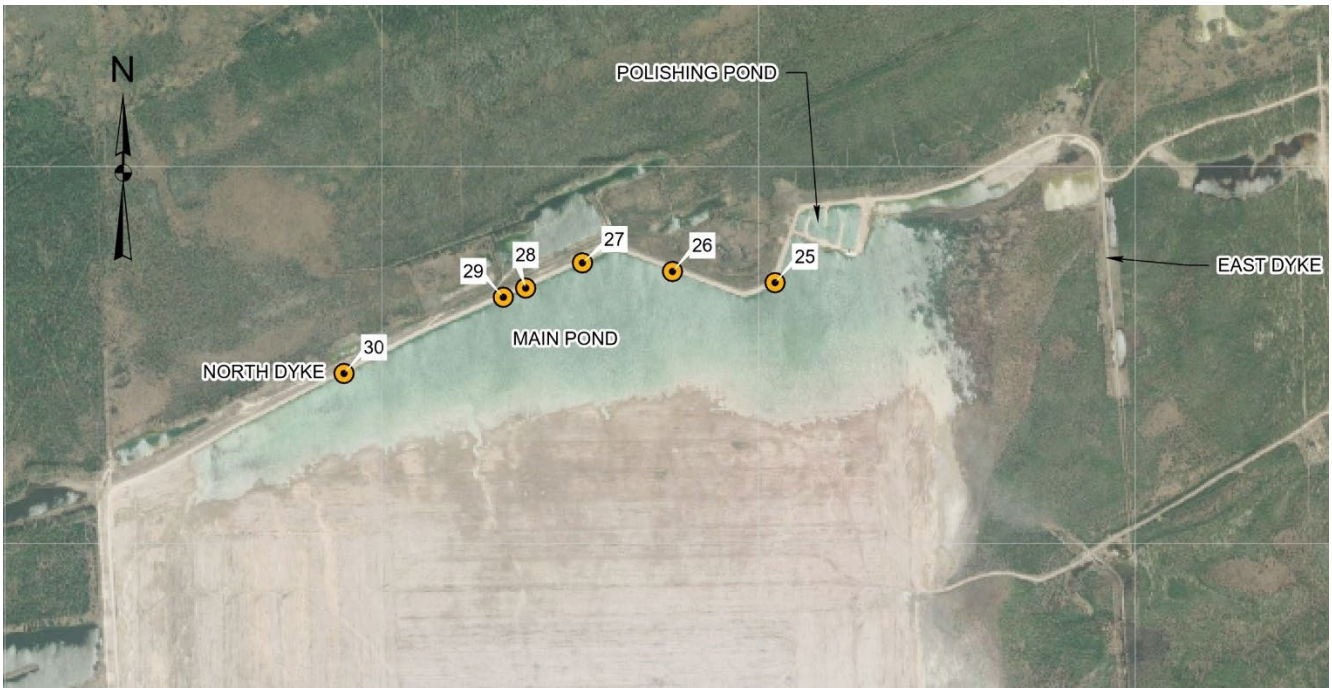
The AFPR site visit included Ms. Maggie Smith, P.Eng., and Mr. Silawat Jeeravipoolvarn, P.Eng., walking the length of the upstream slope of the North Dyke to observe the performance of the erosion protection. The site visit was conducted at a low Main Pond water level (El. 200.25 m) and the goal was to observe if there is any wave-cut erosion that poses a risk to the North Dyke below the level of the slope armouring rock placed in 2018 and 2021.

The North Dyke upstream slope was observed to be in good condition. There are some areas with a vertical erosion scarp on the face of the dyke (example in Photo II-5), however the scarp was less than 30 cm high and appeared to be only in a surficial sand and gravel material and not in the dyke core. Therefore, no maintenance of this slope is required at this time.

KBC recommends that similar inspections occur every three years considering the site-history of erosion of this slope.

Selected photographs taken during the inspection are provided below.

Figure II-1 Photo Locations



North Dyke Upstream Slope

Photo II-1 North Dyke – looking west (Location 25)

Photo II-2 North Dyke – looking west (Location 26)

Photo II-3 North Dyke – looking west (Location 27)

Photo II-4 North Dyke – looking east (Location 28)

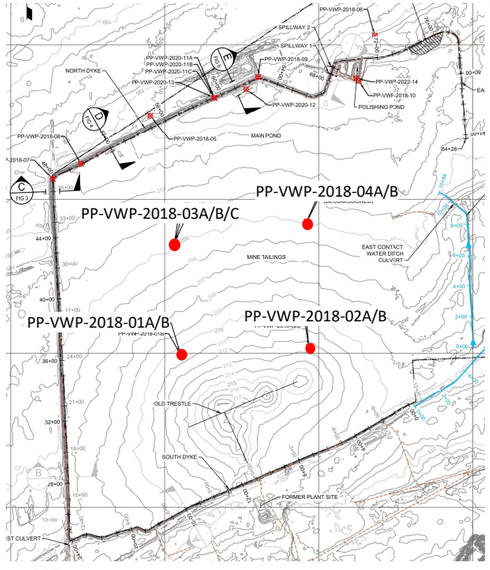
Photo II-5 North Dyke – looking east (Location 29)

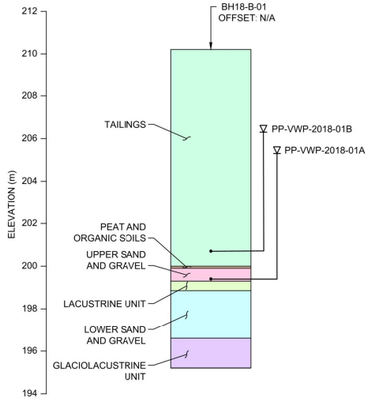
Photo II-6 North Dyke – looking west (Location 30)

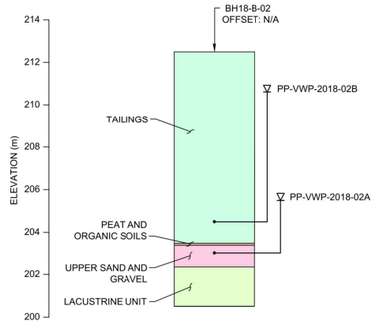
APPENDIX III

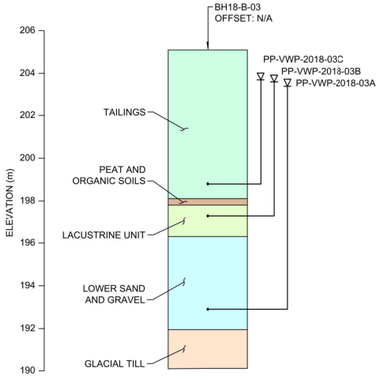
Piezometer Data

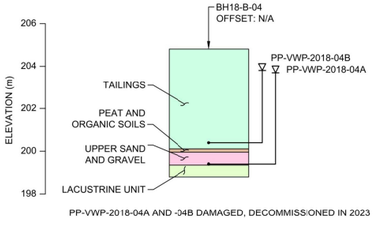
Figure III-1 PP-VWP-2018-01A/B, -02A/B, -03A/B/C, -04A/B











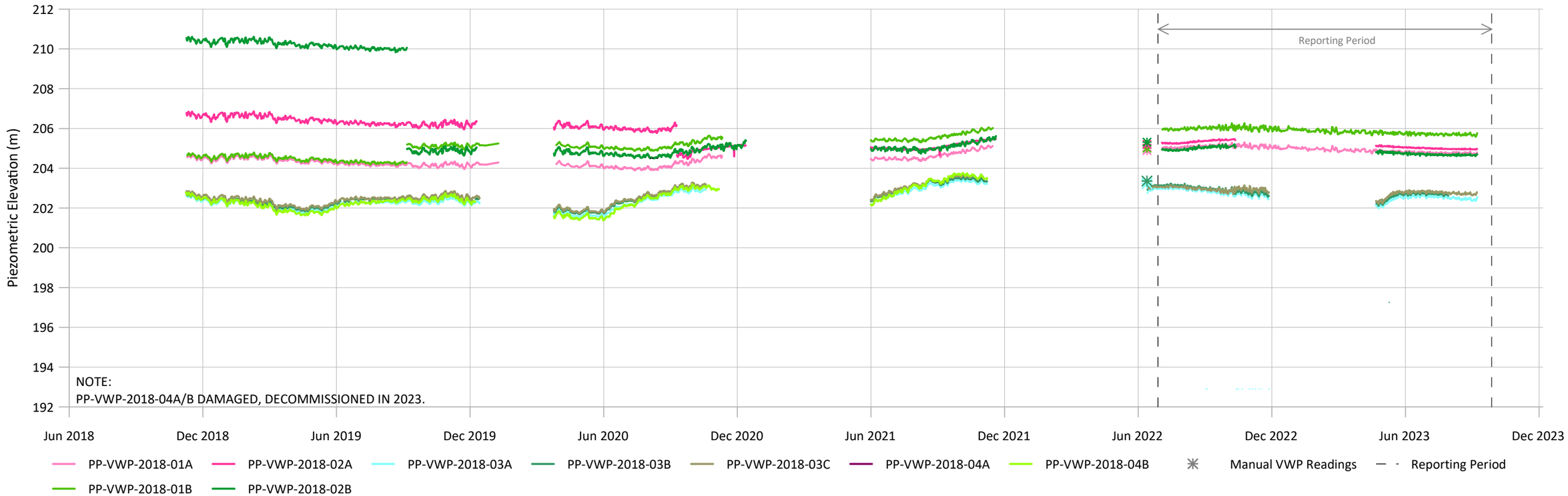
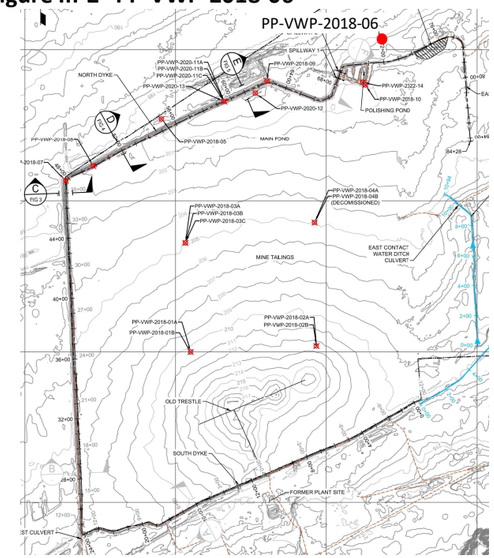
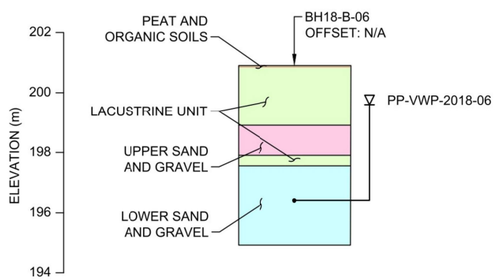


Figure III-2 PP-VWP-2018-06





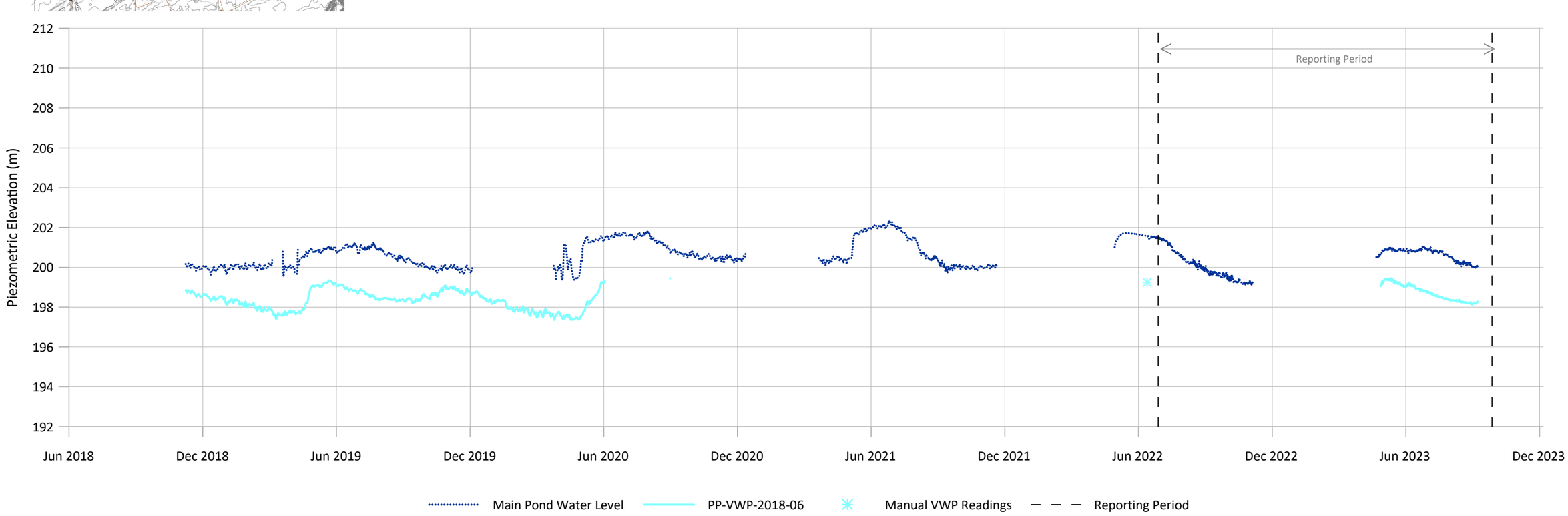
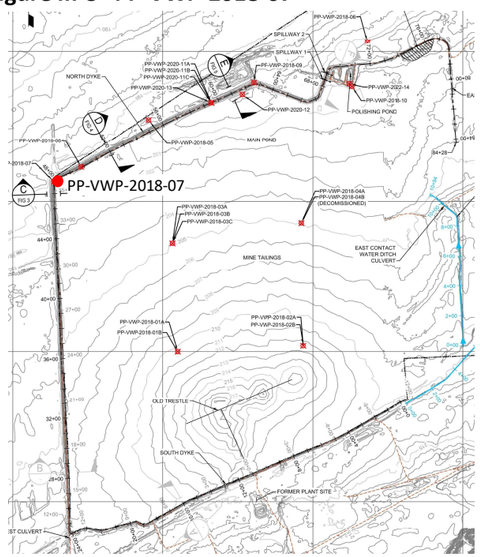
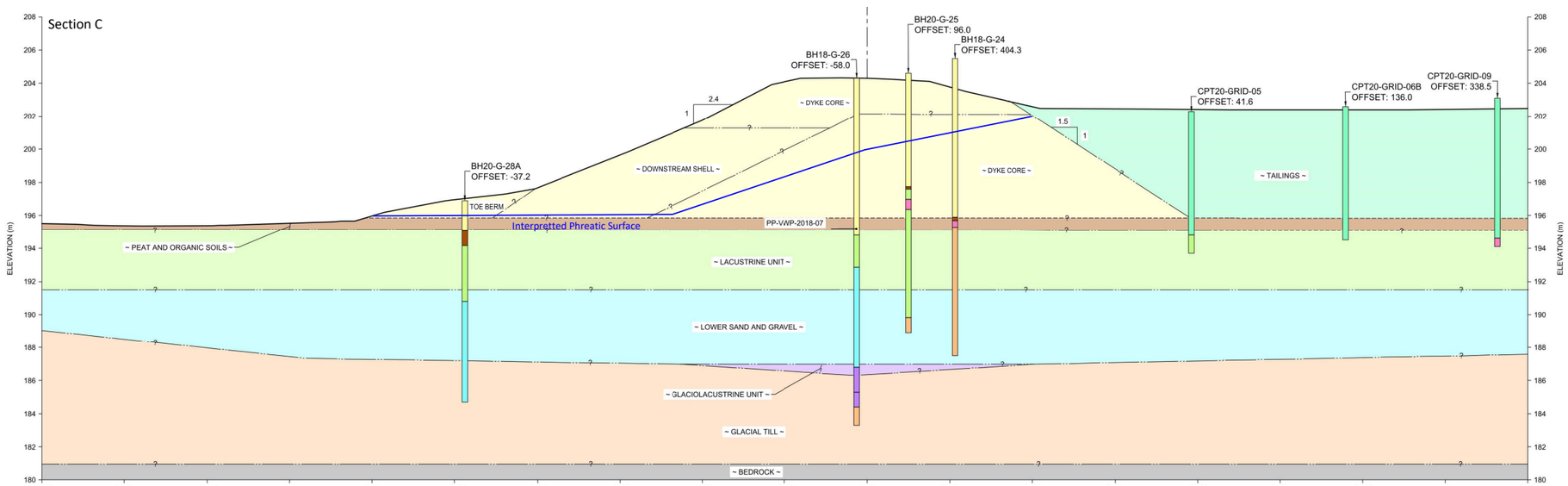


Figure III-3 PP-VWP-2018-07





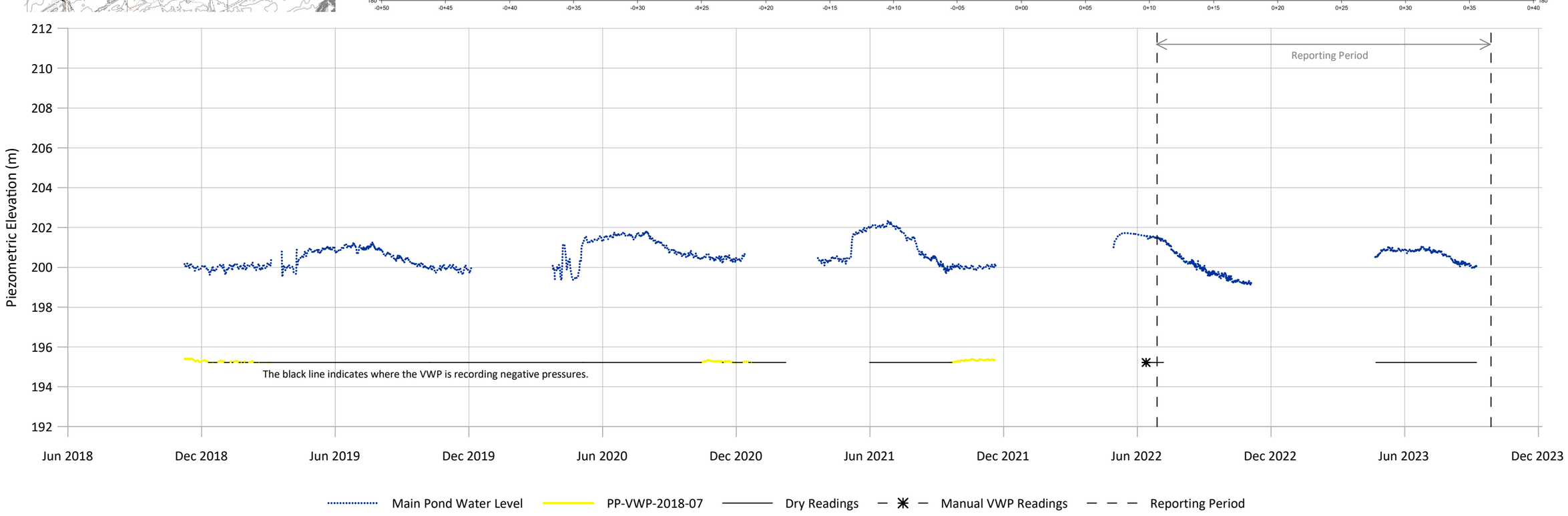
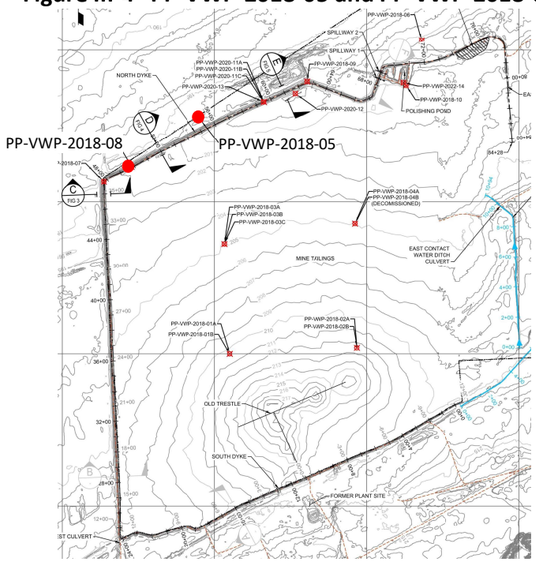


Figure III-4 PP-VWP-2018-05 and PP-VWP-2018-08



Note: PP-VWP-2018-08, all historic and current readings indicate the VWP is dry.

Figure III-5 PP-VWP-2018-09 and PP-VWP-2020-11A/B/C