

# 2024 Dam Safety Review

## HB Tailings Facility

Salmo, BC



PRESENTED TO  
**Regional District of Central Kootenay**

MAY 26, 2025  
ISSUED FOR USE (REVISION 01)  
704-ENG.DAMS03004-01

## EXECUTIVE SUMMARY

Tetra Tech Canada Inc. (Tetra Tech) was retained by the Regional District of Central Kootenay (RDCK) to undertake a Dam Safety Review (DSR) for HB Tailings Facility (HBTF), located in Salmo, British Columbia (BC). The HB Dam is an earthen embankment structure, specifically a zoned dam, with a maximum height of approximately 28 m and a crest length of 210 m. The original dam was constructed in 1955 using locally sourced materials and underwent two height increases during its operational period, first in 1974-75 and then again in 1977.

After the RDCK acquired the facility in 1998, an inspection by the BC Ministry of Energy and Mines led to a request for the site's decommissioning. The decommissioning process included the construction of an open channel spillway in bedrock at the west (right) abutment, a 10-meter-wide downstream toe berm (buttress structure) with a 1.5-meter-thick rock drain layer, and the placement of riprap on the upstream slope for erosion protection. The decommissioning was completed in 2005. The downstream toe berm, initially constructed in 2005, was further expanded in 2021 as part of the 2021-2022 Remediation and Closure Construction. In March 2024, SRK conducted a stability analysis and reviewed the piezometer trigger levels at the HBTF to reflect the post construction conditions.

The scope of this work includes completing an audit-type DSR, which involves a thorough, overarching, and critical review of the currency and adequacy of the dam's design basis, construction records, operational and maintenance documentation, and safety management system, including monitoring and surveillance protocols.

This audit-type DSR focuses on evaluating existing documentation and systems without conducting new analyses, modeling, or field investigations. Based on the documentation reviewed for this DSR, Tetra Tech concludes the following:

- The current consequence classification of 'Very High' for HB Dam is appropriate and are in accordance with the Mines Act and the Health, Safety and Reclamation Code (HSRC) in BC, as specified in the memorandum of understanding between the Ministry of Energy, Mines, and Low Carbon Innovation (EMLI), the Ministry of Environment (MoE), and the Ministry of Forests.
- The hydrotechnical analyses complies with current standard practices. The spillway can safely pass the Inflow Design Flood (IDF) with sufficient capacity.
- The most recent slope stability analysis completed in 2024 meets the minimum Factor of Safety (FOS) criteria for static and seismic loading conditions (assuming a large-scale deformation would not occur due to seismic liquefaction of the original dam fill).
- While the toe berm expansion enhanced the FOS under seismic conditions, the seismic shear strength and deformation behavior of the original dam fill is not well understood, and the risk of potential large-scale deformation should be further investigated.
- The revised piezometer trigger levels, completed in March 2024, reflects post-construction conditions, and the proposed interim piezometer triggers are reasonable which were subsequently incorporated into the Trigger Action Response Plan (TARP) in the updated OMS Manual.
- The OMS Manual was recently updated and is in satisfactory condition.

Based on the background review and the site inspection conducted, the tailing dam and appurtenant structures are reasonably safe; however, there is one dam safety deficiency and one non-conformance and some minor, but noteworthy, conditions that require ongoing monitoring, maintenance, or repair, with recommendations listed and prioritized in the following table. The table also includes suggested priorities of Low, Medium, High, or Very High, which correspond to response time of 5, 3, 1, and 0.5 years, respectively. The recommendations are sorted from highest to lowest priority, with the ID numbers reflecting order they appear in the report.

ID #	Existing Condition/Issue	Recommendation Report Section	Deficiency / Non-Conformance	Recommended Action	Priority
2024-DSR-01	The weekly site inspections were not regularly completed during the 2023 freshet period (Mid-March to Mid-April), in accordance with the OMS Manual. (Tetra Tech understands the water level tape was down for repairs during this period).	4.2	–	<ul style="list-style-type: none"> <li>Provide updated training on surveillance inspections annually before the freshet period and continue to conduct and document weekly site surveillance (visual inspections) during the freshet period, as outlined in the OMS Manual.</li> <li>Secure backups for key equipment to ensure continuous data collection (RDCK noted that an additional water level meter (manufactured by Heron Instruments) has been available since February 2024).</li> </ul>	High
2024-DSR-02	On January 11, 2023, the dam's performance was reported as 'abnormal' due to the formation of a pipe from the weir to the downstream side (with no flow passing over the weir). Despite the pipe not being repaired, the dam's performance was reported as 'normal' during the next routine inspection on February 16, 2023.	4.2	–	Review and revise the OMS Manual to: <ul style="list-style-type: none"> <li>establish a follow up procedure for any unusual site observations.</li> <li>add detailed description of any observed conditions in the site inspection report; and</li> <li>provide the OMS training for the site inspectors.</li> </ul>	High
2024-DSR-05	A series of surface erosion rills/gullies were noted along the east slope of the berm. Some gullies have been developed considerably near the east abutment of the dam. The downstream east slope of the extended berm is prone to surface erosion and sloughing.	5.2.4	–	Repair this area, develop a surface water management plan (e.g., establish vegetation, install drainage ditches, etc.), and implement mitigation measures to control the runoff water along the crest and downstream slope of the extended berm.	High
2024-DSR-08	The seismic shear strength and deformation behavior of the original dam fill is not well understood and there is a risk of potential large-scale deformation due to seismic liquefaction.	6.1.3.1	Deficiency	The shear strength and deformation behavior of the original dam fill should be further investigated to fully understand seismic liquefaction hazard. Conduct further investigation on the material properties and a post-seismic deformation analysis to evaluate their performance under seismic loading.	High
2024-DSR-09	No information regarding the survey hubs and seepage flow trigger levels was made available to Tetra Tech for review.	6.2	–	Establish survey hub and seepage flow trigger levels and incorporate them into the TARP in the next revision of the OMS Manual.	High
2024-DSR-10	It is understood that the current version of the OMS Manual has been updated (May 2024, Ver. 6.0) based on the HBTF Reclamation and Closure Construction Record (May 2023); however, the Emergency Preparedness and Response Plan (EPRP, February 2023) still needs to be updated based on the 2023 Construction Records.	7.3	–	Update the 2023 EPRP with reference to the HBTF Reclamation and Closure Construction Record (May 2023).	High
2024-DSR-13	The accuracy of the names and phone numbers of the downstream property owners cannot be confirmed.	7.4	–	The list of downstream property owners (no residents) should be called to confirm that the names and phone numbers are still current. The date of these calls should be added to the EPRP for future reference.	High
2024-DSR-14	Emergency levels have not been developed in the current version of EPRP.	7.4	–	Update the EPRP to incorporate the Five-Step Dam Emergency Plan (DEP) Process including the steps as outlined in the Instructions, Guide, and Templates for Preparing a Dam Emergency Plan in British Columbia (updated April 2024).	High
2024-DSR-03	No rock slope study/assessment was conducted along the western slope of the bedrock spillway. Major failure of the rock slope may fully/partially block the bedrock spillway and decrease its discharge capacity.	5.2.3	–	Perform a rock slope stability study/assessment of the western slope of the bedrock spillway.	Medium

ID #	Existing Condition/Issue	Recommendation Report Section	Deficiency / Non-Conformance	Recommended Action	Priority
2024-DSR-04	Several surface erosion rills/gullies were observed on the western slope (exposed till) of the spillway outlet channel. Major failure of this slope may fully/partially block the spillway outlet channel and decrease the spillway capacity.	5.2.3	–	Update inspection forms to ensure ongoing monitoring of this area for signs of excessive surface erosion or potential slope instability, and implement repairs if erosion exceeds acceptable levels or significant instability is detected.	Medium
2024-DSR-06	Surface eroded areas and tailings exposure were observed around the tailing impoundment area during the site inspection. Sparse vegetation was also found in some areas.	5.3	–	Repair the surface eroded areas and cover all tailing exposures with an approximate coverage of 30 cm and vegetation appropriately, as required.	Medium
2024-DSR-07	Water ponded areas were observed along the east side of the tailing impoundment area, north of the North Spur Channel. The low point areas and water ponding within these areas appear to be likely the result of the differential settlement.	5.3	–	Continue regular monitoring of the ponded areas in accordance with the OMS Manual and develop a plan to repair if needed.	Medium
2024-DSR-11	The current OMS Manual needs to be updated to meet the HSRC requirements.	7.3	Non-Conformance	<ul style="list-style-type: none"> <li>▪ Incorporate the recent changes in the HSRC regarding the AFPR, as well as revising the annual DSI to the AFPR and ensuring that its scope meets the requirements of the most recent HSRC revision.</li> <li>▪ Ensure that the AFPR includes an analysis and interpretation of the data collected during site surveillance, instrumentation monitoring, and other relevant.</li> <li>▪ Include an annual review of the OMS by a qualified TSF or dam professional, as applicable, and the EOR, with updates implemented as deemed appropriate by the EOR.</li> </ul>	Medium
2024-DSR-12	The previous version of the OMS Manual included a maintenance flowchart (Figure 7) that outlined the facility's maintenance process, responsibilities, documentation, and reporting protocol. It is noticed that this maintenance flowchart was missed in the current version (draft) of the OMS Manual.	7.3	–	Consider adding a maintenance flowchart in the next update of the OMS Manual.	Medium

# TABLE OF CONTENTS

<b>EXECUTIVE SUMMARY .....</b>	<b>1</b>
<b>1.0 INTRODUCTION.....</b>	<b>1</b>
1.1 General .....	1
1.2 Scope of Work .....	1
<b>2.0 APPLICABLE REGULATIONS AND GUIDELINES.....</b>	<b>2</b>
<b>3.0 FACILITY DESCRIPTION.....</b>	<b>3</b>
3.1 Geological Setting.....	4
3.2 Historical Climate Data .....	5
3.3 Site Seismicity.....	7
3.4 Tailings Dam.....	8
3.5 Dam Spillway .....	9
3.6 Tailings Impoundment Area.....	10
<b>4.0 BACKGROUND INFORMATION REVIEW.....</b>	<b>10</b>
4.1 Record Documents .....	10
4.2 Dam Owner Inspection Reports.....	12
4.3 Design Basis.....	18
4.4 Review of 2014 DSR .....	19
4.5 Instrumentation and Monitoring .....	20
4.6 Annual Formal Site Inspections .....	21
<b>5.0 SITE RECONNAISSANCE .....</b>	<b>21</b>
5.1 General .....	21
5.1.1 Access Road, Gates, and Signage.....	22
5.1.2 Tailing Area Slopes.....	22
5.2 HB Dam .....	22
5.2.1 Access Road, Gates, and Signage.....	22
5.2.2 Crest .....	22
5.2.3 Spillway.....	22
5.2.4 Downstream Toe Berm.....	23
5.2.5 Downstream Slope Face (Above the Toe Berm).....	23
5.3 Tailings Impoundment Area.....	24
5.4 Instrumentation & Monitoring.....	24
<b>6.0 DAM SAFETY REVIEW .....</b>	<b>25</b>
6.1 Geotechnical Aspects .....	26
6.1.1 Site Investigation .....	26
6.1.2 Material Strength Properties.....	27
6.1.3 Geotechnical Assessments .....	29
6.2 Instrumentation & Monitoring Data .....	32
6.3 Hydrotechnical Aspects .....	34

6.3.1	Watershed.....	34
6.3.2	Rainfall and Snow Data .....	35
6.3.3	Inflow Design Flood (IDF).....	36
6.3.4	Flood Routing through Spillway .....	37
6.3.5	Wind and Wave Analysis .....	38
6.4	Consequence Classification .....	38
6.4.1	Consequence Classification Criteria.....	38
6.4.2	Review of Consequence Classification .....	41
<b>7.0</b>	<b>DAM SAFETY MANAGEMENT SYSTEM REVIEW .....</b>	<b>42</b>
7.1	Dam Safety Principles Assessment.....	42
7.2	Owner Commitment to Dam Safety.....	47
7.3	Review of Operation, Maintenance, and Surveillance Manual.....	47
7.4	Review of Emergency Preparedness and Response Plan.....	49
<b>8.0</b>	<b>CONCLUSIONS AND RECOMMENDATIONS.....</b>	<b>49</b>
8.1	Background Review and Site Inspection .....	49
8.2	Dam Safety Analysis.....	50
8.2.1	Geotechnical Review .....	50
8.2.2	Hydrotechnical Review .....	50
8.2.3	Consequence Classification .....	50
8.3	Dam Safety Management System.....	50
8.4	Prioritized List of 2024 DSR Recommendations .....	51
<b>9.0</b>	<b>LIMITATIONS OF THE REPORT .....</b>	<b>54</b>
<b>10.0</b>	<b>CLOSURE.....</b>	<b>54</b>

## LIST OF TABLES IN TEXT

Table 1:	Physical Description of HBTF and Appurtenant Structures .....	3
Table 2:	Average Monthly Temperature (Normal 1991-2020) – ENR.....	5
Table 3:	Average Monthly Precipitation (Normal 1966-2024) – ENR .....	6
Table 4:	Peak Ground Acceleration Summary from PSHA.....	8
Table 5:	Record Documents .....	11
Table 6:	Summary of Weekly / Monthly Routine Site Inspections 2023 .....	12
Table 7:	Design Basis (Standards-Based Assessments, Closure-Passive Care Phase) .....	18
Table 8:	Summary of As-Built Piezometer Details .....	21
Table 9:	Measured Groundwater Levels in Standpipe Piezometers (May 14, 2024).....	25
Table 10:	A Summary of Previous Geotechnical Investigations and Testing .....	26
Table 11:	Summary of Recommended Material Properties for HB Dam .....	28
Table 12:	Stability Analysis Results along Section 4 (Central Section) – Before Upgrading .....	30
Table 13:	Stability Analysis Results – After Upgrading.....	30
Table 14:	Stability Analysis FOS Results – Drained (SRK, March 2024) .....	31
Table 15:	Stability Analysis FOS Results – Post Earthquake (SRK, March 2024) .....	31

Table 16: Summary of Piezometer Trigger Levels (SRK, March 2024).....	33
Table 17: Revised Piezometer Trigger Threshold Criteria (SRK, March 2024).....	34
Table 18: Rainfall Intensity-Frequency after Tetra Tech EBA (2014).....	35
Table 19: Rainfall Intensity-Frequency after RDCK (2020).....	36
Table 20: HB Dam Upstream Stage-Storage (Appendix C-5 of RDCK, 2020).....	37
Table 21: Consequence Classification Criteria (2024 HSRC).....	39
Table 22: Minimum Seismic and Flood Criteria – Annual Exceedance Probability.....	40
Table 23: CDA Minimum Factors of Safety for Slope Stability – Static Assessment.....	41
Table 24: CDA Minimum Factors of Safety for Slope Stability – Seismic Assessment.....	41
Table 25: Dam Safety Principles Assessment Results.....	44
Table 26: Suggested Priorities & Duration of Response.....	51
Table 27: Prioritized List of 2024 DSR Recommendations.....	52

## LIST OF FIGURES IN TEXT

Figure 1: Geological Setting of HBTF Area (provided by Below BC Geological Association).....	4
Figure 2: Monthly Average Mean Temperatures Over Past Two Years (July 2022 – June 2024).....	5
Figure 3: Monthly Total Precipitations Over Past Two Years (July 2022 – June 2024).....	6
Figure 4: Historical Seismic Events within HBTF Area 1985 - 2024 (Earthquake Database, NRC).....	7
Figure 5: Locations of Historical Boreholes and Test Pits (2019 Dam Zones Review by SRK).....	27
Figure 6: Water Level Fluctuations in Standpipe Piezometers (July 2022 – June 2024).....	32
Figure 7: Movements Recorded in Survey Hub Monitoring Points (2021-2022).....	33
Figure 8: Routed PMF Hydrograph (Appendix C-5 of RDCK, 2020).....	38

## APPENDICES

Appendix A	A.1: Site Location Plan
	A.2: General Arrangement of HB Tailing Facility
	A.3: General Arrangement of HB Dam
	A.4: Typical Cross-Section of HB Dam
Appendix B	DSR Assurance Statement
Appendix C	2023 Site Surveillance Reports
Appendix D	2024 Site Inspection Checklist and Selected Photographs
Appendix E	Closure Design Engineering Drawings for Closure of the HB Tailings Facility
Appendix F	Staff Questionnaire
Appendix G	Instrumentation and Monitoring
Appendix H	Tetra Tech’s Limitation on the Use of this Document

## ACRONYMS & ABBREVIATIONS

Acronyms/Abbreviations	Definition
AFPR	Annual Facility Performance Report
BC	British Columbia
CDA	Canadian Dam Association
CSR	Cyclic Stress Ratio
DEP	Dam Emergency Plan
DSMS	Dam Safety Management System
DSR	Dam Safety Review
ECCC	Environment and Climate Change Canada
EDGM	Earthquake Design Ground Motion
EMLI	Ministry of Energy, Mines and Low Carbon Innovation
ENR	Environment and Natural Resources
EOR	Engineer of Record
EPRP	Emergency Preparedness and Response Plan
FOS	Factor of Safety
HSRC	Health, Safety and Reclamation Code for Mines
ICOLD	International Commission on Large Dams
IDF	Inflow Design Flood
MAC	Mining Association of Canada
MASL	Metres Above Mean Sea Level
MCE	Maximum Credible Earthquake
MoE	Ministry of Environment
NBC	National Building Code of Canada
NOAA	US National Oceanic and Atmospheric Administration
NRC	Natural Resources Canada
OMS	Operation, Maintenance and Surveillance
PGA	Peak Ground Acceleration
PMF	Probable Maximum Flood
PMP	Probable Maximum Precipitation
PSHA	Probabilistic Seismic Hazard Assessment
QPOs	Quantifiable Performance Objectives
SPT	Standard Penetration Test
TSF	Tailing Storage Facility
USACE	U.S. Army Corps of Engineers
USBR	U.S. Department of the Interior, Bureau of Reclamation

## 1.0 INTRODUCTION

### 1.1 General

Tetra Tech Canada Inc. (Tetra Tech) was retained by the Regional District of Central Kootenay (RDCK) to undertake a Dam Safety Review (DSR) for HB Tailings Facility (HBTF), located in Salmo, British Columbia (BC). Appendix A presents the site location plan and general arrangement of the HBTF.

The HB Mine is a lead-zinc mine operated by Cominco Ltd. (now Teck Resources Ltd.) from 1955 to 1966 and from 1974 to 1978. The tailings facility for the mine is approximately 7 km south of Salmo, BC (Latitude: 49° 7'50.45"N, Longitude: 117° 15'2.18"W), and adjacent to the RDCK Central Landfill (now closed). The purpose of the tailings facility was to store by-products of ore processing and to prevent the fine tailings from escaping to the environment. The RDCK acquired the ownership of the tailings facility in 1998. The decommissioning of the facility commenced in 2005 and the original permit holder, Teck Resources Ltd., was released of all obligation of the facility in 2016.

The current facility infrastructure consists of the tailings dam (with its downstream toe berm), tailings impoundment/deposition area (including Tailings Surface Drainage Channels – TSDC), spillway, stilling basin, downstream channel (creek), access roads, instrumentation, and a small granite rock quarry located in the downstream west area. Since the completion of decommissioning work in 2005, there were some minor repairs in 2012, 2015, and 2016, and a significant construction activity that took place in 2021-2022. The RDCK implemented the closure construction works in 2021 and 2022, as elaborated in the 2021-22 Remediation and Closure Construction Record Report by SRK Consulting (SRK). The maintenance and repairs were completed during August 2023 to address the deficiencies identified in the 2021-2022 construction record report.

The purpose of the 2024 DSR is to determine if the design, construction, and current condition of the HBTF meets current dam safety standards of practice, and if not, to identify areas that require improvement. A DSR is a “snapshot in time” and the observations, conclusions, and recommendations provided are based on the review of the information provided and the site visit consultations and observations. Any significant change to site conditions may necessitate a review and update to the recommendations in this DSR. Recommendations in this report are identified by **Recom-2024-DSR-##** at the end of the sentence and summarized at the end of this report in Section 8.4.

The Canadian Dam Association (CDA) recommends that the same review engineer not carry out two consecutive dam safety reviews of the same dam, to avoid conflict of interest (CDA, 2013). Although EBA Engineering Consultants Ltd. (EBA, now Tetra Tech) completed the 2014 DSR, Tetra Tech has put together an independent team of engineers to complete this review who were not involved in the 2014 DSR.

### 1.2 Scope of Work

The scope of the DSR was established in accordance with the Mines Act (2023), Health, Safety and Reclamation Code for Mines in British Columbia (2024), and the Engineers and Geoscientists of British Columbia (EGBC) *Guideline for Legislated Dam Safety Reviews* (2023, Ver. 4.0) as well as the CDA *Dam Safety Guidelines* (2007, 2013 Edition) and the CDA *Technical Bulletin: Dam Safety Reviews* (2016).

The EGBC *Guideline for Legislated Dam Safety Reviews in BC* (2023) describes the methods to be utilized for a DSR for dams in the Province of BC depending on the complexity of the dam system, consequence classification, and the ongoing safety management of the dam. The scope that can be delivered may also be dictated by the availability of documentation and data about the dam, its design and construction, operational history, maintenance, and functional performance.

Based on Tetra Tech’s proposal submitted for this project, the scope of work includes undertaking an audit-type DSR for HBTF. According to the EGBC Guideline for *Legislated Dam Safety Reviews in BC (2023)*, the audit-type DSR is intended to be a thorough, overarching, and critical review of the currency and adequacy of the design basis, the design, construction, operation, and maintenance records, and safety management system, including monitoring and surveillance in place for a dam. It is the dam owner’s responsibility to contact the local BC Dam Safety Officer to confirm that an audit-type DSR is appropriate at this stage with future assessments/reviews to be completed in a suitably timely manner depending on the outcome of the DSR. Tetra Tech can be available for such discussions if needed.

An audit-type DSR assesses the available data and information about the dam, relative to up-to-date technical information and data, and established good practice. Moreover, the review focuses on the extent to which the understanding and interpretation of the dam design, and associated records and safety management system, are comprehensive and meet or exceed legislative requirements. Tetra Tech’s scope of work for this audit-type DSR included:

- **Task 1:** Project Management; including project kick-off meeting, progress tracking, and reporting.
- **Task 2:** Document Review; including documents gathering, review of historic information, drawings, and reports.
- **Task 3:** Site Inspection and Staff Interview; including prepare site inspection safety plan, prepare dam safety questionnaire, and conduct a site inspection and staff interview.
- **Task 4:** Dam Safety Management System Review; including dam safety principles assessment, review of the Operation, Maintenance, and Surveillance (OMS) Manual and the Emergency Preparedness and Response Plan (EPRP).
- **Task 5:** Dam Safety Review Reporting.

In addition, Tetra Tech reviewed the geotechnical and hydrotechnical aspects of the tailing dam and appurtenant structures. The focus of these tasks was to assess the safety of the tailing dam and recommended measures, if any, that RDCK is encouraged to implement as a result of the DSR.

## 2.0 APPLICABLE REGULATIONS AND GUIDELINES

Mining dams in BC are regulated under several laws and guidelines to ensure safety and environmental protection. The regulations and guidelines specify minimum requirements for general safety, operation, surveillance, emergency planning, activities occurring near a dam, documentation and record keeping. The minimum requirements are based on the Consequence Classification of the dam, which is determined by considering incremental consequences from a potential dam breach. Key regulations and guidelines referenced and consulted for this report include:

- **Ministry of Energy, Mines, and Low Carbon Innovation (EMLI):**
  - Mines Act (RSBC 1996, Chapter 293, Edition 2023).
  - Health, Safety and Reclamation Code for Mines in British Columbia (2024).
- **The Mining Association of Canada (MAC):**
  - Developing an Operation, Maintenance, and Surveillance Manual for Tailings and Water Management Facilities (2021).

- **BC Ministry of Forests:**
  - Downstream Consequence of Failure Classification Interpretation Guidelines (March 2017).
- **Engineers and Geoscientists of BC (EGBC):**
  - Professional Practice Guidelines for Legislated Dam Safety Reviews in BC (Ver. 4.0, 2023).
  - Professional Practice Guidelines for Site Characterization for Dam Foundations in BC (Ver. 1.2, 2016).
- **Canadian Dam Association (CDA):**
  - CDA Dam Safety Guidelines (2013).
  - CDA Technical Bulletin: Dam Safety Reviews (2016).
  - CDA Guidelines for Public Safety Around Dams (2011).
  - CDA Technical Bulletin: Application of Dam Safety Guidelines to Mining Dams (2014).
  - CDA Technical Bulletin: Tailings Dam Breach Analysis (2021).
  - CDA Technical Bulletin: Environmental Consequence Classification (2023).

These regulations and guidelines form a comprehensive framework aimed at ensuring the safe and environmentally responsible management of mining dams in BC. Tetra Tech provided a DSR Assurance Statement in Appendix B.

### 3.0 FACILITY DESCRIPTION

The HBTF is accessed via Airport Road, which connects to Emerald Road, a gravel road located north of the RDCK Central Landfill property. Figure A.1 in Appendix A provides a site location plan. Also, a general arrangement of the HBTF and tailing dam are provided in Figures A.2 and A.3, respectively. The following table (Table 1) summarizes the physical description of the HBTF and its appurtenant structures:

**Table 1: Physical Description of HBTF and Appurtenant Structures**

Item	Description
Year of Dam Construction:	Constructed between 1955 and 1967, with raises in 1975 and 1977
Purpose of Dam:	Tailings Storage
Year of Toe Berm Construction:	Constructed in 2005 and expanded in 2021
Dam Height (Maximum):	28 m
Type of Dam:	Zoned Earthfill Embankment
Dam Crest Length:	Approximately 210 m
Dam Crest Width:	Approximately 6 to 7 m
Dam Crest Elevation:	710.8 m
Overall Upstream Slope:	1.5H:1V
Overall Downstream Slope:	2.9H:1V
Impounded Tailings:	Approximately 6.3 million tonnes
Tailings Impoundment Area:	Approximately 26 ha

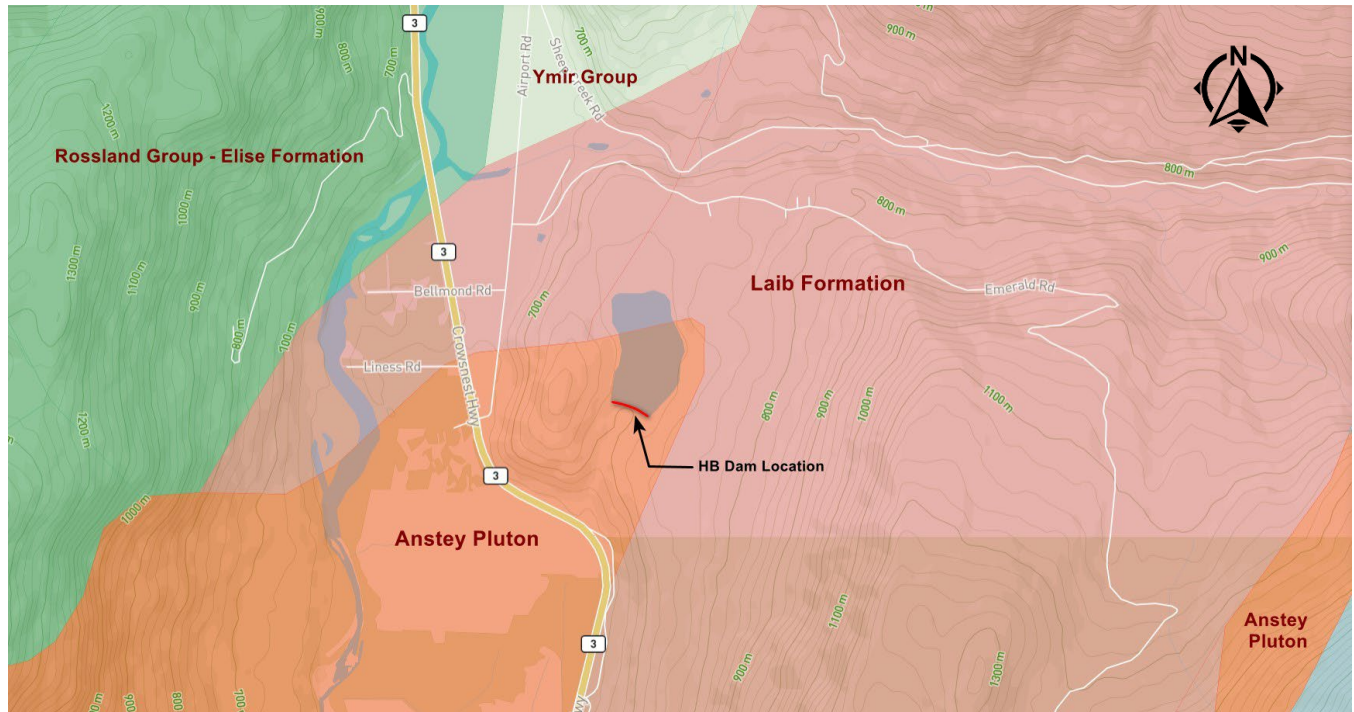
**Table 1: Physical Description of HBTF and Appurtenant Structures**

Item	Description
Tailings Deposition Period:	1955-1966 and 1974-1977
Contributing Watershed Area:	2.2 km <sup>2</sup>
Peak Spillway Discharge:	58 m <sup>3</sup> /s
Spillway Invert Elevation:	706 m
Inflow Design Flood (IDF):	70 m <sup>3</sup> /s
Consequence Classification:	Very High (confirmed by 2018 Dam Break Analysis – SRK 2018a)
Previous DSR	2014
Current DSR	2024, 10 years after previous DSR*

\* HSRC mandates a DSR every five years for dams classified as 'Significant' to 'Extreme' consequences; however, the RDCK has obtained several variances to defer the required DSR originally scheduled for 2019.

### 3.1 Geological Setting

Figure 1 displays the surficial geological setting of the HBTF area, extracted from the British Columbia geological interactive map provided by Below BC Geological Association (<https://bccga.com/>).



**Figure 1: Geological Setting of HBTF Area (provided by Below BC Geological Association)**

The HBTF is located in the Omenica Belt in south-central BC and sits on a foundation of two main geological features; Cretaceous-age Anstey Pluton and Laid Formation. Geological maps from the British Columbia Geological Survey (BC Digital Geology, 2019) indicate that the bedrock underlying most of the dam area is Anstey Pluton. It's

a granodiorite intrusive complex, essentially a large underground mass of cooled and hardened magma. Laid Formation sedimentary rock is nearby, bordering the Anstey Pluton, and comprises phyllite, argillite, and schist.

Historical information indicates that the bedrock is relatively shallow, around 5.5 meters below the surface and dips slightly south. The soil above the bedrock is primarily dense glaciolacustrine sandy silt and silty clay deposited by glacial lakes.

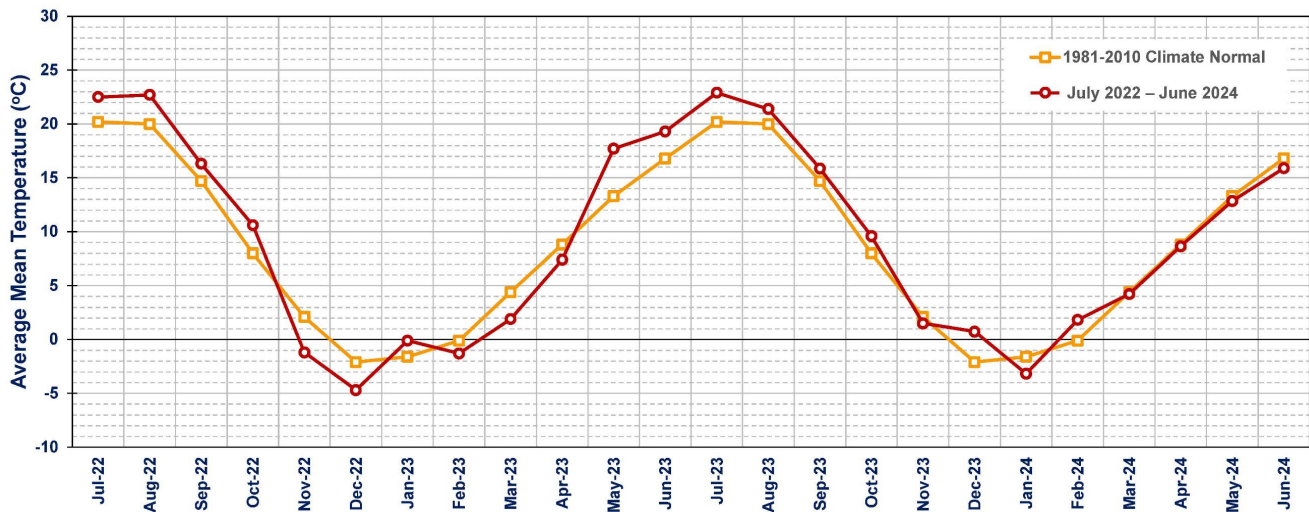
### 3.2 Historical Climate Data

According to the Environment and Natural Resources (ENR) historical data for Castlegar Airport, BC, near the HB Mine, the area experiences a mix of seasonal weather patterns typical of southeastern BC. Average temperatures range from -2.1°C in December to 20.2°C in July. Extreme temperatures can vary, with record lows in winter dropping to -30°C and summer highs reaching up to 35°C.

Table 2 provides the average monthly temperatures (normal 1991-2020) for the general area of HB Mine. Figure 2 compares these average monthly temperatures with the monthly average mean temperatures over the past two years, from July 2022 to June 2024.

**Table 2: Average Monthly Temperature (Normal 1991-2020) – ENR**

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temperature (°C)	-1.6	-0.1	4.4	8.8	13.3	16.8	20.2	20.0	14.7	8.0	2.1	-2.1



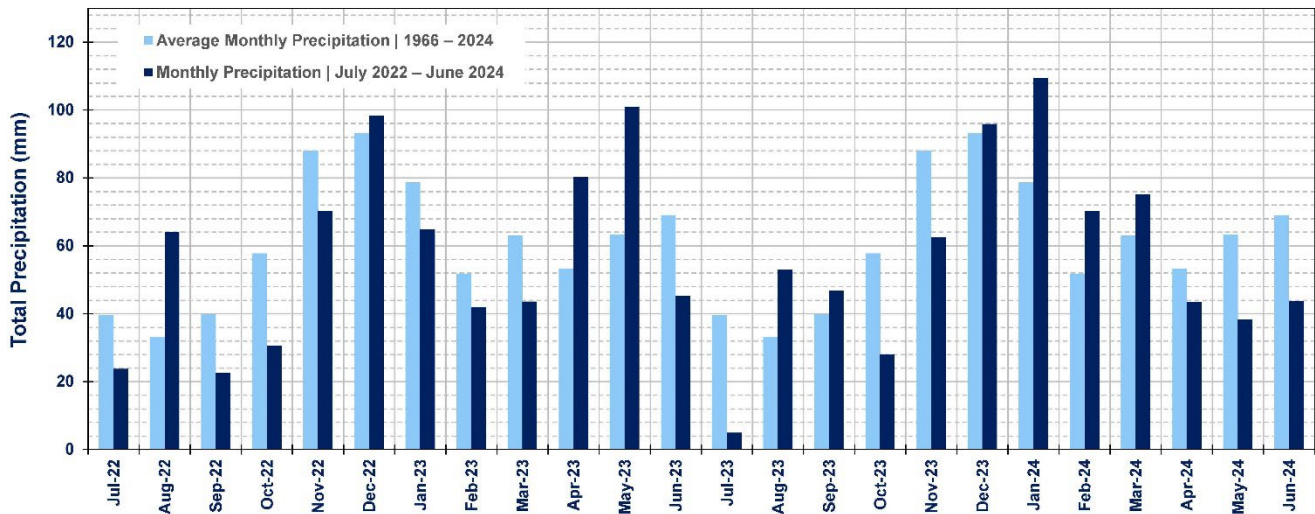
**Figure 2: Monthly Average Mean Temperatures Over Past Two Years (July 2022 – June 2024)**

Annual precipitation averages around 720 mm, with the wettest months being November and December. Snowfall is common in winter, with annual averages around 60 cm. Relative humidity levels remain relatively high throughout the year, averaging around 70-80%. Wind speeds are generally moderate, averaging 10-20 km/h, with occasional gusts during storms.

The average monthly precipitation data for the general area, extracted from ENR's historical records for the period from 1966 to 2024, is presented in Table 3. Figure 3 compares these average monthly precipitation values with the total monthly precipitation recorded over the past two years, from July 2022 to June 2024.

**Table 3: Average Monthly Precipitation (Normal 1966-2024) – ENR**

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Precipitation (mm)	78.6	51.8	62.9	53.3	63.3	68.9	39.6	33.2	39.9	57.8	87.9	93.1



**Figure 3: Monthly Total Precipitations Over Past Two Years (July 2022 – June 2024)**

A hydrological analysis for the HBTF site was conducted by SRK in 2019 to develop inputs to the hydraulic designs of the spillway and other conveyance structures at the facility. The hydrological analysis included a regional analysis utilizing data from 22 climate stations within a 150 km radius to establish a long-term synthetic record of air temperature, precipitation, wind speed, and snowmelt. Since meteorological parameters are not measured at the HBTF, the analysis incorporated available meteorological data — specifically over 10 years of precipitation and temperature records — from Environment and Climate Change Canada (ECCC) and the National Oceanic and Atmospheric Administration (NOAA) in the United States. Additionally, probabilistic climate change modelling was integrated into the analysis to account for potential climate change trends and their effects on the facility in the future.

The Castlegar Airport station, which has a nearly complete record of data, is the closest climate station to the HBTF. Any missing daily data from this station was supplemented with information from the Creston and Priest River stations. To correct the time series for the facility, a linear regression equation based on elevation was applied. This regression analysis indicated that the mean annual temperature at the HBTF site is 7.4 °C. The long-term time series from 1980 to 2017 for HBTF site was established by applying a correction factor to the daily temperature records from Castlegar Airport. This correction factor was optimized to ensure that the final mean annual temperature for the site remains at 7.4 °C.

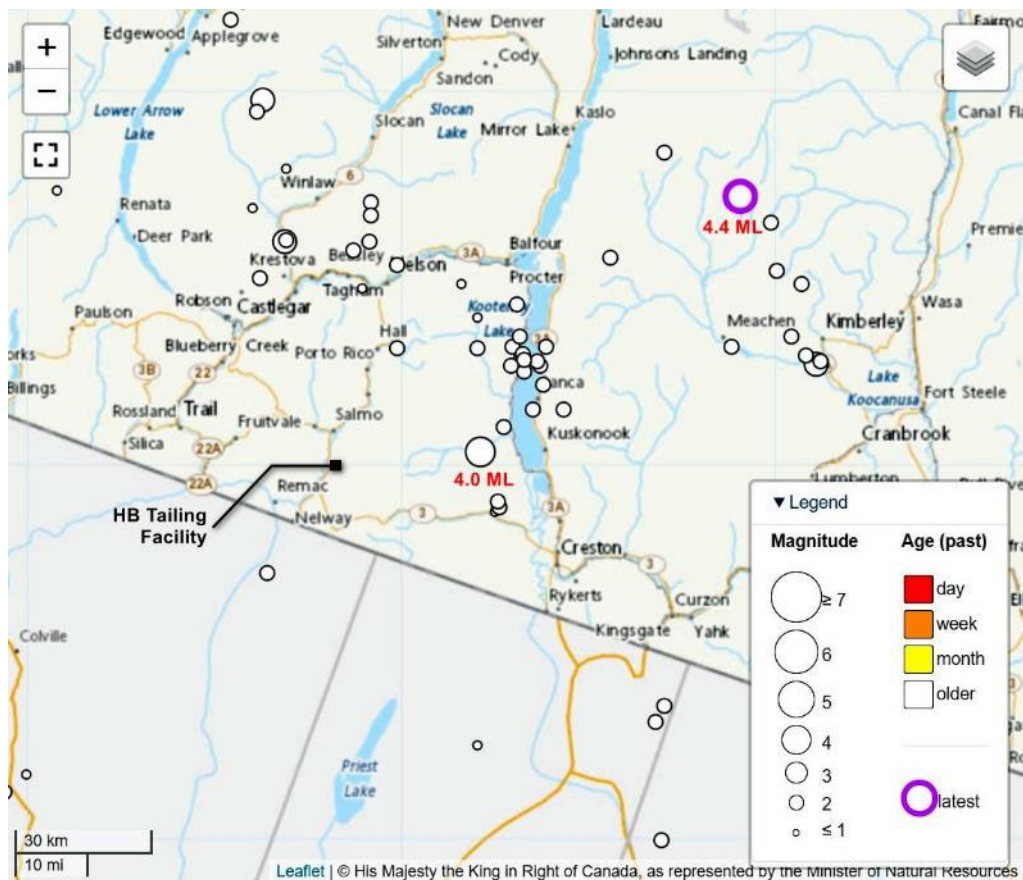
As part of the hydrological analysis, estimates of extreme precipitation events were prepared, including short-duration rainfall and maximum daily precipitation for return periods from the 1-in-2-year to the 1-in-200-year event, as well as the 24-hour Probable Maximum Precipitation (PMP). Available regional wind data from Environment

Canada is limited; therefore, a time series for daily wind speed gusts at the facility was developed using ERA Interim data, estimating a two-year wind gust period at 133 km/hr. An energy snowmelt model, validated with data from the nearby Redfish Mountain snow pillow station, was created to assess snowmelt contributions to peak flows, resulting in maximum daily snowmelt depths of 40 mm for return periods up to 100 years.

It is understood that the 2019 hydrological analysis results were reviewed and accepted by the province's hydrologists, forming a key component of the permit amendment application.

### 3.3 Site Seismicity

The historical seismic events within the facility area from 1985 to 2024 are illustrated in Figure 4. The seismic data provided by the Natural Resources Canada (NRC), Earthquake Database, shows that HBTF is located in a low seismic region. The latest and biggest earthquake, with a magnitude of 4.4 ML (local magnitude / Richter scale), occurred on February 5, 2023, approximately 35 km northwest of Kimberly, BC (approximately 106 km northeast of the facility). The closest earthquake with a magnitude of 4.0 ML, which was felt in Salmo, BC, occurred on August 6, 1985, approximately 32 km east of the facility. On March 31, 2020, a magnitude 6.5 earthquake occurred near Stanley, Idaho, approximately 580 km south of the facility, and was felt locally in Salmo.



Magnitude	< 2	2	3	4	5	$\ge 6$
Total	34	66	6	2	0	0

Figure 4: Historical Seismic Events within HBTF Area 1985 - 2024 (Earthquake Database, NRC)

A site-specific Probabilistic Seismic Hazard Assessment (PSHA) was undertaken for the HBTF (SRK, 2019b) to determine the design earthquake parameters corresponding to the 1 in 10,000- year return period event. The purpose of the assessment was to define the Maximum Design Earthquake (MDE) at the site for assessing HBTF under seismic loading conditions in support of the Closure-Passive Care phase.

The soil class beneath the dam site was assigned a Site Class D as per the 2020 National Building Code of Canada (NBC, 2020) definitions. The following table (Table 4) provides a summary of the Peak Ground Accelerations (PGA) values for the dam site determined by the seismic hazard assessment. The 84<sup>th</sup> percentile values for the 1 in 10,000-year event were adopted for the design earthquake.

**Table 4: Peak Ground Acceleration Summary from PSHA**

Site Class	Mean 10,000-year return period event	84 <sup>th</sup> percentile 10,000-year return period event
Site Class C	0.157 g	0.234 g
Site Class D	0.210 g	0.256 g

The assessment considered site amplification effects on earthquake ground motions from bedrock to the top layer, assigning a Site Class D (stiff soil) to the soil beneath the HB Dam based on the NBC (2020) definitions. This classification was derived from reviewing five boreholes near the dam (BGC Engineering Inc. [BGC] 2002 and Golder Associates Inc. [Golder] 1974), where the average standard penetration resistance (N60) ranged from 15 to 50. Subsequently, Site Class D was used in the liquefaction assessment (SRK 2018b) to identify the tailings and original dam fill as potentially susceptible to liquefaction. Additionally, a pseudo-static analysis was conducted using a horizontal seismic coefficient equal to half of the bedrock peak ground acceleration, representing 50% of the Site Class C PGA (SRK 2019b).

### 3.4 Tailings Dam

The HB Tailing Dam with an approximate maximum height of 28 m and a crest length of 210 m is an earthen embankment structure (zoned dam). The original dam was initially constructed in 1955 using locally borrowed material and raised two times during operations in 1974-75 and 1977. It is understood that an earth-filled timber crib retaining wall was constructed at the downstream toe. Based on the documents provided to Tetra Tech, there is no information regarding the removal of the timber crib retaining wall during subsequent dam raises. The wall's geometry, material properties, and location remain unknown; however, no concerns were reported during the historical inspections of this area.

In 1974, a filter blanket constructed with clean sand and gravel was added to the downstream slope, and the dam was subsequently raised by approximately 3 m (10 feet) in 1974–75. The 1975 dam height increase incorporated additional toe protection with gravel and waste rock at the abutments and toe to mitigate observed seepage. In 1977, the dam was raised one more time by approximately 1.5 m (5 feet) and a rock toe drain on the downstream toe was constructed. Golder was the designer and supervisor for both dam raising projects.

Following acquisition of the facility by RDCK in 1998 and inspection of the site by the BC Ministry of Energy and Mines, the site was requested to be decommissioned. BGC was retained to conduct the decommissioning project including investigations and engineering design (completed between 2000 and 2002). The decommissioning included an open channel spillway constructed in bedrock at the west (right) abutment, construction of a 10 m wide downstream toe berm (buttress structure) with a 1.5 m thick rock drain layer, and placement of riprap to the upstream slope as an erosion protection. The decommissioning was completed in 2005.

In 2012, a large slough occurred on the downstream slope (~40 m) from the west abutment, and subsequently two sinkholes were identified on the toe of the upstream face of the dam. During the sinkholes investigation, a 50 mm diameter standpipe believed to be a piezometer from Golder-73-BH-01 was discovered. The standpipe was removed, and the damaged area was repaired.

The downstream toe berm, constructed in 2005, was further expanded in 2021. Figure A.4 in Appendix A illustrates a typical cross-section of the dam and downstream toe berm.

During the first phase of operations from 1955 to 1966, the tailings pond level was controlled by two decant towers, with 600 mm steel pipes that discharged into the outlet creek. It is understood that three historical decant structures were used throughout the tailing facility operations, which appear to be either partially or completely filled during decommissioning. The East and West Decant towers were used between 1955 and 1977, and the East Abutment Decant structure was used between 1977 and 2005.

Based on the available background information, there is no significant detail on the decommissioning of the East and West Decants. The first indication of this is found in the 1981 Klohn Leonoff report drawings, which show that they were plugged with concrete. Based on the 2005 BGC construction records, the decommissioning of the West Decant appears to have been carried out similarly to the East Decant. Sandbags and a PVC pipe were placed through the steel culvert, likely followed by the addition of cement or grout from both the bottom and top ends.

A PVC pipe, confirmed to be a drainpipe<sup>1</sup> and not the West Decant outlet, was discovered during the 2005 construction. To mitigate potential internal erosion, a substantial amount of non-woven geotextile was wrapped around and over the pipe without extending it. This filter system is designed to accommodate minor erosion by allowing material to accumulate, eventually sealing itself off.

### 3.5 Dam Spillway

Surface water currently exits the facility through the spillway at the west (right) abutment. The dam spillway was originally constructed near the west abutment of the dam in 2005 as a part of the decommissioning works, which was further upgraded in 2021. The original spillway was approximately a 90 m long side channel excavated in bedrock (upper section, bedrock spillway) and approximately a 120 m riprap-lined outlet channel (lower section) with a trapezoidal section (bottom width of 3 m and side slopes of 2H:1V) and average slope of approximately 20%.

The original spillway has been upgraded to handle the PMF with a peak discharge of 58 m<sup>3</sup>/s. This spillway comprises two sections: the upper section, extending from Station 0+005 to 0+076, is located on bedrock and generally follows the preconstruction alignment, though it was realigned starting at approximately Station 0+050 to position the lower section, excavated in till, further from the dam. The upper section features a relatively flat longitudinal slope of 3%, a base width varying between 5 m and 8 m, and typical side slopes ranging from 0.25H:1V to 0.75H:1V. The lower section, from Station 0+076 to 0+220, is excavated in till and directs spillway flows down the western side of the valley toward the stilling basin with a slope of 19%, a base width of 5 m, and a 1.2 m thick riprap layer with a D<sub>50</sub> of 600 mm. This riprap is supported by a nonwoven geotextile layer that features a minimum overlap of 300 mm, arranged in a shingled manner downstream.

A stilling basin at the downstream end of the spillway outlet channel reduces the water's energy before it discharges into the downstream channel. Figure A.3 in Appendix A presents a plan view of the dam spillway at the downstream side.

<sup>1</sup> EOR confirmed this via an email from Trevor Podaima, who served as the BCG field engineer when the pipe was discovered.

## 3.6 Tailings Impoundment Area

The tailing impoundment area contains approximately 6.3 million tonnes of tailings that covers an approximate area of 26 ha. The tailings, which are impounded by the HB Dam, have an approximate maximum thickness of 20 metres near the south-central portion deposition area, immediately upstream of the dam. It is understood that the tailings were discharged from the northern end of the tailings deposition area, leading to grain size segregation during deposition. Coarse sand tailings accumulated at the northern end of the facility, while fine silt tailings settled at the southern end.

Historical borehole evidence indicates the presence of tree stumps and organic material beneath the tailings deposition area. Based on the findings from borehole investigation in 2002, the underlying soils consist primarily of silty sand, with some variations including silty sand and gravel with clay (BGC, 2002).

A tailings cover consisting of well-graded general fill with a nominal thickness of 0.3 m was placed over all areas of exposed tailings. The tailings cover system is designed to achieve several long-term key goals:

- **Minimize dust and erosion:** The tailings cover will prevent wind and water from blowing or washing away the tailings material.
- **Prevent contaminant migration:** The tailings cover acts as a barrier, stopping the spread of pollutants from the tailings.
- **Limit wildlife and plant contact:** The tailings cover protects plants and animals from directly interacting with the tailings.
- **Support vegetation growth:** The tailings cover creates a suitable environment for establishing a long-term plant cover.
- **Reclaim the land:** By promoting vegetation growth, the tailings cover helps restore the area for future use.

No water is expected to be impounded in the tailing impoundment area since the surface water exits the facility through the TSDC and a bedrock spillway at the west abutment. However, since the facility was never regraded before the cover installation, resulting in local high spots, water ponds in some areas as it cannot reach the drainage channels.

It is understood that following a sloughing on the upstream face of the dam in the summer of 2012, two sinkholes and one standpipe piezometer (50 mm in dia.) were identified at the interface with the tailings and HB Dam (see Drawing 04 in Appendix E for the location of the sinkholes). The standpipe was removed, and the sloughed area was repaired by installing a shear key at the toe of the damaged area and replacing the core material using locally sourced till. A coarse blast rock layer was also placed over the downstream face (west side) of the dam to protect the downstream slope. No sign/evidence of significant sloughing or sinkhole has been noted within this area since 2012.

## 4.0 BACKGROUND INFORMATION REVIEW

### 4.1 Record Documents

The record documents provided to Tetra Tech by RDCK to facilitate this DSR are summarized in Table 5, below.

**Table 5: Record Documents**

Document Name	Date of Issue	Author
2023 Dam Safety Inspection	March 2024	SRK Consulting (Canada)
HB Dam Instrumentation & Monitoring Data 2023-2024	2024	RDCK
2021-22 Remediation and Closure Construction Record Report	May 2023	SRK Consulting (Canada)
Piezometer Installation Scope of Work	March 2023	SRK Consulting (Canada)
Annual Reclamation Report for 2022 Mines Act Permit Number: M-218	March 2023	RDCK
2022 Dam Safety Inspection	March 2023	SRK Consulting (Canada)
Weekly / Monthly Routine Site Inspection Reports – HB Mine Tailings Storage Facility	Jan-Dec 2023	RDCK
Operation, Maintenance, and Surveillance (OMS) Manual (Ver. 6 – Draft)	May 2024	SRK Consulting (Canada)
Emergency Preparedness and Response Plan (EPRP) – Updated Ver. 6	February 2023	RDCK
Tailings Surface Drainage Channel Hydraulic Analysis	June 2022	SRK Consulting (Canada)
HB Site Revegetation (Memo)	May 2022	SRK Consulting (Canada)
2021 Dam Safety Inspection	March 2022	SRK Consulting (Canada)
2020 Dam Safety Inspection	February 2021	SRK Consulting (Canada)
2019 Dam Safety Inspection	February 2020	SRK Consulting (Canada)
Five Year Hydrogeological Assessment	March 2020	Wood Canada
HB Mine Tailings Facility Remediation and Closure Plan	August 2020	RDCK
Tailings Pond Backfill Placement Methodologies (Technical Memo)	August 2021	SRK Consulting (Canada)
Tailings Surface Drainage Channel Trial Excavation (Technical Memo)	July 2021	SRK Consulting (Canada)
Scoping level assessment of Potential Alternative Cover Placement Strategies (Technical Memo)	June 2021	SRK Consulting (Canada)
Probabilistic Seismic Hazard Assessment	2020	SRK Consulting (Canada)
HB Dam Stability Analysis Update (Memo)	January 2020	SRK Consulting (Canada)
HB Mine Tailings Facility – Remediation and Closure Cost Estimate – REV01	January 2020	SRK Consulting (Canada)
Prediction of Geochemical Performance of HB Tailings Under Proposed Remediation Conditions (Memo)	December 2019	SRK Consulting (Canada)
Test Pit Investigation – HB Mine Tailings Facility – 2017	December 2019	SRK Consulting (Canada)
HB Mine Tailings Dam Seepage Assessment (Memo)	December 2019	SRK Consulting (Canada)
HB Dam Erosion Protection Analysis (Memo)	December 2019	SRK Consulting (Canada)
HB Mine Tailings Dam Deformation Analysis (Memo)	December 2019	SRK Consulting (Canada)
Tailings Surface Drainage Channels (Memo)	December 2019	SRK Consulting (Canada)
HB Mine Tailings Facility Spillway Design (Memo)	December 2019	SRK Consulting (Canada)
HB Mine Tailings Facility Closure Design – Hydrological Analysis (Memo)	December 2019	SRK Consulting (Canada)
Review of HB Dam Zones and Geotechnical Properties (Memo)	December 2019	SRK Consulting (Canada)
HB Mine Tailings Facility - Cover Borrow Investigation (Memo)	December 2019	SRK Consulting (Canada)
HB Mine Tailings Facility – Water Quality Prediction Model	July 2019	SRK Consulting (Canada)
Prospective Human Health and Ecological Risk Assessment	July 2019	SLR Consulting Ltd.
Construction Environmental Management Plan	June 2019	SLR Consulting Ltd.
HB Mine Tailings Facility – Detailed Design Risk Assessment (Memo)	May 2019	SRK Consulting (Canada)

**Table 5: Record Documents**

Document Name	Date of Issue	Author
HB Mine Tailings Facility - Dam Break Analysis	September 2018	SRK Consulting (Canada)
HB Mine Tailings Facility Risk Assessment	July 2018	SRK Consulting (Canada)
Dam Safety Review of HB Mine Tailings Storage Facility	May 2014	Tetra Tech EBA
Assessment of Embankment Dam Sloughing	October 2012	Tetra Tech EBA
Embankment Dam Slough Response	October 2012	Tetra Tech EBA

Information gathered from the record documents listed in Table 5 above has been referenced throughout this report where it was used to support the assessments.

## 4.2 Dam Owner Inspection Reports

It is understood that RDCK typically conducts weekly / monthly site inspections for the facility. The purpose of the site inspections is to visually observe the conditions of the embankment dam, spillway, tailings impoundment area, and downstream area, and to collect instrumentation data. Based on the surveillance frequency outlined in the OMS Manual (Draft Version 6, Table 6.1), visual inspections should be conducted weekly during the freshet period (Mid-March to Mid-April) and monthly for the remainder of the year.

The RDCK’s weekly / monthly routine site inspection reports in 2023 were provided to Tetra Tech for review, which were included in Appendix C for reference. Table 6 includes a summary of site inspection notes reported during this period:

**Table 6: Summary of Weekly / Monthly Routine Site Inspections 2023**

Inspection Date	Type of Inspection	Inspection Notes
January 11, 2023	Routine Inspection	<ul style="list-style-type: none"> <li>▪ <b>Spillway:</b> Mostly snow covered. Flow noted in channel just upstream of spillway.</li> <li>▪ <b>Downstream Slope:</b> Pipe has formed weir to downstream side, so no flow is passing over weir. No evidence of upstream issues. Flow into weir is clear.</li> <li>▪ <b>Performance:</b> Abnormal – Due to pipe in weir, no dam safety concern.</li> </ul>
February 16, 2023	Routine Inspection	<ul style="list-style-type: none"> <li>▪ <b>Cover Channels:</b> Mostly snow covered but flow visible in some areas.</li> <li>▪ <b>Spillway:</b> snow covered.</li> <li>▪ <b>Downstream Slope:</b> Pipe not repaired yet.</li> <li>▪ <b>Wildlife:</b> Rabbit prints.</li> <li>▪ <b>Performance:</b> Normal – No notes.</li> </ul>
March 3, 2023	Routine Inspection	<ul style="list-style-type: none"> <li>▪ <b>Tailing Pond Backfill Area:</b> Poned water from heavy rains.</li> <li>▪ <b>Spillway:</b> Slough at lower end of spillway does not appear to have gotten larger.</li> <li>▪ <b>Downstream Slope:</b> Rilling still presents. Poor vegetation established. Measurement weir: 4.6 cm.</li> <li>▪ <b>East Abutment:</b> No seepage.</li> <li>▪ <b>Performance:</b> Normal – No notes.</li> </ul>
March 29, 2023	Routine Inspection	<ul style="list-style-type: none"> <li>▪ <b>Crest:</b> Minor ponding from snow melt.</li> <li>▪ <b>Downstream Slope:</b> Seepage weir piping under.</li> <li>▪ <b>Wildlife:</b> Elk scat on crest.</li> <li>▪ <b>Instrumentation:</b> Probe under repair.</li> </ul>

**Table 6: Summary of Weekly / Monthly Routine Site Inspections 2023**

Inspection Date	Type of Inspection	Inspection Notes
		<ul style="list-style-type: none"> <li>▪ <b>Performance:</b> Normal – No notes.</li> </ul>
April 13, 2023	Routine Inspection	<ul style="list-style-type: none"> <li>▪ <b>Tailing Pond Backfill Area:</b> Ponded water flowing into conveyance channels.</li> <li>▪ <b>Crest:</b> No Ponding.</li> <li>▪ <b>Cover Channels:</b> Some Minor erosion where channel liner connects to backfill area.</li> <li>▪ <b>Spillway:</b> Flow upstream of weir: mostly clear with minor cloudiness.</li> <li>▪ <b>Downstream Slope:</b> Piping under weir.</li> <li>▪ <b>Instrumentation:</b> P6 appears to be below threshold levels. Probe was acting a bit funny on this one.</li> <li>▪ <b>Performance:</b> Normal – No notes.</li> </ul>
April 26, 2023	Routine Inspection	<ul style="list-style-type: none"> <li>▪ <b>Tailing Pond Backfill Area:</b> Still minor ponding from recent rains. Some seed germinating.</li> <li>▪ <b>Cover Channels:</b> no addition riprap movement in spillway inlet after April 10th, event.</li> <li>▪ <b>Spillway:</b> Lower spillway slump in same condition as April 18 inspection.</li> <li>▪ <b>Downstream Slope:</b> No additional seed germination visible on toe berm. Erosion rilling still of issue. Still fence needs staples (staples jammed). Measurement weir: 4.7 cm. Weir repair seems to be functioning properly.</li> <li>▪ <b>Wildlife:</b> 2 fresh piles of bear scat, elk droppings, 1 deer.</li> <li>▪ <b>Performance:</b> Abnormal – Due to P1 trigger. P1 elevation was checked multiple times on site to confirm trigger level.</li> </ul>
May 10, 2023	Routine Inspection	<ul style="list-style-type: none"> <li>▪ <b>Downstream Slope:</b> Measurement weir: 7.0 cm.</li> <li>▪ <b>Wildlife:</b> Older bear scat. Grizzly bear tracks. Lots of deer track.</li> <li>▪ <b>Performance:</b> Normal – No notes.</li> </ul>
May 17, 2023	Visual Inspection	<ul style="list-style-type: none"> <li>▪ <b>Downstream Slope:</b> Measurement weir: 7.0 cm.</li> <li>▪ <b>Spillway:</b> Low flow, clear.</li> <li>▪ <b>Wildlife:</b> Bear prints and scat.</li> <li>▪ <b>Performance:</b> Normal – No notes.</li> </ul>
May 25, 2023	Routine Inspection	<ul style="list-style-type: none"> <li>▪ <b>Tailing Pond Backfill Area:</b> Minor amount of ponding in low spots – in same conditions as previous wet weather inspections.</li> <li>▪ <b>Crest:</b> No ponding.</li> <li>▪ <b>Cover Channels:</b> No changes within 100 m of spillway. Inspected “bubble” at south spur, also no changes.</li> <li>▪ <b>Spillway:</b> No obstructions. Logger tentatively scheduled for week of May 29 to standing dead trees near spillway entrance. Signs need to be installed on cliff face and edge outlining to hazard - signs are at RDCK office.</li> <li>▪ <b>Downstream Slope:</b> Poor vegetation establishment on toe berm. Slightly moist horizontal areas that run across toe berm establishing slightly better. Measurement weir: 5.3 cm.</li> <li>▪ <b>Wildlife:</b> 3 black bears observed on May 24, so inspection was halted. No bears on May 26. Elk, grizzly, and deer tracks noted. Many tadpoles visible in pooling water on TSF surface and in conveyance channels.</li> <li>▪ <b>Performance:</b> Normal – No notes.</li> </ul>
May 31, 2023	Routine Inspection	<ul style="list-style-type: none"> <li>▪ <b>Cover Channels:</b> Tadpoles in conveyance channels.</li> </ul>

**Table 6: Summary of Weekly / Monthly Routine Site Inspections 2023**

Inspection Date	Type of Inspection	Inspection Notes
		<ul style="list-style-type: none"> <li>▪ <b>Spillway:</b> Small increase in size of slump on south side of downstream portion of spillway suspected.</li> <li>▪ <b>Downstream Slope:</b> Measurement weir: 7.0 cm.</li> <li>▪ <b>Performance:</b> Normal – No notes.</li> </ul>
June 6, 2023	Routine Inspection	<ul style="list-style-type: none"> <li>▪ <b>Tailing Pond Backfill Area:</b> Poned areas drying up with hot weather. Tadpole strandings/mortality will likely occur.</li> <li>▪ <b>Crest:</b> No ponding.</li> <li>▪ <b>Cover Channels:</b> No changes within 100m of spillway. Inspected "bubble" at north spur, and noted suspected minor increase in size, but flows are still able to pass within channel. RDCK PM team working on RFQ for repair works for August.</li> <li>▪ <b>Spillway:</b> No obstructions. Logger was on site to fall tree leaning towards spillway inlet. Trees were dropped on tailings cover, and left as habitat. Signs need to be installed on cliff face and edge outlining to hazard - signs are at RDCK office. Slough at bottom end of rip rap portion of spillway is slightly larger than last inspection.</li> <li>▪ <b>Downstream Slope:</b> Poor vegetation establishment on toe berm. RDCK PM was on site to inspect poor establishment to initiate warranty item with contractor (~5% veg has established). Measurement weir: 4.9 cm.</li> <li>▪ <b>Wildlife:</b> 1 black bear observed. Elk, grizzly, and deer tracks noted. Many tadpoles still visible in pooling water on TSF surface and in conveyance channels.</li> <li>▪ <b>Performance:</b> Normal – No notes.</li> </ul>
June 15, 2023	Visual Inspection	<ul style="list-style-type: none"> <li>▪ <b>Cover Channels:</b> Huge # of tadpoles. Bear tracks.</li> <li>▪ <b>Spillway:</b> Clear flow.</li> <li>▪ <b>Performance:</b> Normal – No notes.</li> </ul>
June 21, 2023	Routine Inspection	<ul style="list-style-type: none"> <li>▪ <b>Tailing Pond Backfill Area:</b> Some ponded water from recent rain.</li> <li>▪ <b>Cover Channels:</b> Good amount of flow, clear.</li> <li>▪ <b>Spillway:</b> Lower spillway slump noted. No observed change in size.</li> <li>▪ <b>Downstream Slope:</b> Ruler of measuring weir was missing.</li> <li>▪ <b>Wildlife:</b> Tadpoles in conveyance channel.</li> <li>▪ <b>Performance:</b> Abnormal due to P1 being bellow trigger for Alert.</li> </ul>
June 29, 2023	Routine Inspection	<ul style="list-style-type: none"> <li>▪ <b>Spillway:</b> Subsidence area in lower spillway appear slightly larger than last inspection.</li> <li>▪ <b>Downstream Slope:</b> Surface rilling unchanged, slight increase in vegetation, silt fence needs repair. Measurement weir: 4.0 cm.</li> <li>▪ <b>East Abutment:</b> Lots of new horsetail next to blast area.</li> <li>▪ <b>Wildlife:</b> Tadpoles, little frogs.</li> <li>▪ <b>Performance:</b> Normal – No notes.</li> </ul>
July 19, 2023	Routine Inspection	<ul style="list-style-type: none"> <li>▪ <b>Downstream Slope:</b> Measurement weir: 7.5 cm.</li> <li>▪ <b>Wildlife:</b> Falcon, no more tadpoles.</li> <li>▪ <b>Performance:</b> Normal – No notes.</li> </ul>
July 24, 2023	Visual Inspection	<ul style="list-style-type: none"> <li>▪ <b>Spillway:</b> No flow.</li> <li>▪ <b>Performance:</b> Normal – No notes.</li> </ul>

**Table 6: Summary of Weekly / Monthly Routine Site Inspections 2023**

Inspection Date	Type of Inspection	Inspection Notes
August 2, 2023	Routine Inspection	<ul style="list-style-type: none"> <li>▪ <b>Cover Channels:</b> Completely dry.</li> <li>▪ <b>Downstream Slope:</b> Measurement weir: 6.2 cm.</li> <li>▪ <b>Wildlife:</b> Animal feces.</li> <li>▪ <b>General:</b> Noticed an abundance of plant growth.</li> <li>▪ <b>Performance:</b> Normal – No notes.</li> </ul>
August 9, 2023	Routine Inspection	<ul style="list-style-type: none"> <li>▪ <b>Cover Channels:</b> Dry</li> <li>▪ <b>Spillway:</b> Dry</li> <li>▪ <b>Downstream Slope:</b> Measurement weir: 5.2 cm.</li> <li>▪ <b>Performance:</b> Normal – No notes.</li> </ul>
August 23, 2023	Routine Inspection	<ul style="list-style-type: none"> <li>▪ <b>Spillway:</b> No water in spillway.</li> <li>▪ <b>Downstream Slope:</b> Very cloudy (water seepage). Measurement weir: 5.5 cm.</li> <li>▪ <b>Wildlife:</b> None</li> <li>▪ <b>General:</b> Ground is very soft due to recent rainfall.</li> <li>▪ <b>Performance:</b> Normal – No notes.</li> </ul>
August 30, 2023	Visual Inspection	<ul style="list-style-type: none"> <li>▪ <b>Spillway:</b> Cloudy flow due to hippo repairs at upstream conveyance channels.</li> <li>▪ <b>General:</b> EOR, Jeremy Boswell (ITRB) on site for inspection.</li> <li>▪ <b>Performance:</b> Normal – No notes.</li> </ul>
September 8, 2023	Visual Inspection	<ul style="list-style-type: none"> <li>▪ <b>Spillway:</b> No flow.</li> <li>▪ <b>Performance:</b> Normal – No notes.</li> </ul>
September 21, 2023	Visual Inspection	<ul style="list-style-type: none"> <li>▪ <b>Spillway:</b> No flow.</li> <li>▪ <b>Performance:</b> Normal – No notes.</li> </ul>
September 26, 2023	Routine Inspection	<ul style="list-style-type: none"> <li>▪ <b>Downstream Slope:</b> Sediment accumulations in weir pond, possibly burrowing amphib. Measurement weir: 5.5 cm.</li> <li>▪ <b>Performance:</b> Normal – No notes.</li> </ul>
October 11, 2023	Visual Inspection	<ul style="list-style-type: none"> <li>▪ <b>Spillway:</b> Flow at end of conveyance channel, but not visible in spillway rocks.</li> <li>▪ <b>Performance:</b> Normal – No notes.</li> </ul>
October 19, 2023	Visual Inspection	<ul style="list-style-type: none"> <li>▪ <b>Spillway:</b> Small amount of flow in conveyance channels.</li> <li>▪ <b>Performance:</b> Normal – No notes.</li> </ul>
November 1, 2023	Routine Inspection	<ul style="list-style-type: none"> <li>▪ <b>Spillway:</b> No flow.</li> <li>▪ <b>Downstream Slope:</b> Turbidity of flow upstream of weir: Clear, Measurement weir: 5.5 cm.</li> <li>▪ <b>Performance:</b> Normal – No notes.</li> </ul>
November 16, 2023	Routine Inspection	<ul style="list-style-type: none"> <li>▪ <b>Tailing Pond Backfill Area:</b> Small pockets of frozen water in backfilled area, but no different distribution than after other rainy periods.</li> <li>▪ <b>Crest:</b> Some minor rutting has formed on crest from recent crossings for WQ. Will have site operator address in spring.</li> <li>▪ <b>Cover Channel:</b> Small amount of flow in channels, that disappears under blast rock at start of spillway. Recent repairs areas look good.</li> <li>▪ <b>Spillway:</b> Flows relatively clear. NO flows observed after 5 feet from conveyance channel end. Turbidity of flow: Clear.</li> <li>▪ <b>Downstream Slope:</b> Weir is clear. Turbidity of flow upstream of weir: Clear, Measurement weir: 5.5 cm.</li> <li>▪ <b>West Abutment:</b> No seepage observed.</li> </ul>

**Table 6: Summary of Weekly / Monthly Routine Site Inspections 2023**

Inspection Date	Type of Inspection	Inspection Notes
		<ul style="list-style-type: none"> <li>▪ <b>East Abutment:</b> No seepage observed.</li> <li>▪ <b>Wildlife:</b> Coyote and deer tracks. Coyote scat.</li> <li>▪ <b>Performance:</b> Normal – No notes.</li> </ul>
November 21, 2023	Visual Inspection	<ul style="list-style-type: none"> <li>▪ <b>Upstream of Dam:</b> Still some minor ponding in place but appears the same as previous inspections.</li> <li>▪ <b>Crest:</b> Minor rutting is present that needs to be repaired in spring.</li> <li>▪ <b>Spillway:</b> Minor amount of flow present in conveyance channel, but visible in spillway. Turbidity: Clear.</li> <li>▪ <b>Downstream Slope:</b> Small amount of snow on downstream slope, no signs of active erosion (ground is frozen).</li> <li>▪ <b>Performance:</b> Normal – No notes.</li> </ul>
November 29, 2023	Routine Inspection	<ul style="list-style-type: none"> <li>▪ <b>Spillway:</b> No flow.</li> <li>▪ <b>Downstream Slope:</b> Turbidity of flow upstream of weir: Cloudy, Measurement weir: 7 cm.</li> <li>▪ <b>Wildlife:</b> None.</li> <li>▪ <b>Performance:</b> Normal – No notes.</li> </ul>
December 4, 2023	Visual Inspection	<ul style="list-style-type: none"> <li>▪ <b>Crest:</b> Minor rutting is present that needs to be repaired in spring.</li> <li>▪ <b>Spillway:</b> Flow, Turbidity: Clear.</li> <li>▪ <b>Performance:</b> Normal – No notes.</li> <li>▪ <b>Note:</b> Purpose of visit was to install flocculent in channels, including spillway inlet, and south spur source (till borrow). Large warming and heavy rain on snow event expected in next 48 hours.</li> </ul>
December 6, 2023	Visual Inspection	<ul style="list-style-type: none"> <li>▪ <b>Spillway:</b> Flows are very turbid and are non-compliant.</li> <li>▪ <b>Downstream Slope:</b> Areas of ponded water from large rain/melt event. No signs of active erosion (rilling/gullies). Ponded water is clear.</li> <li>▪ <b>Performance:</b> Normal – No notes.</li> <li>▪ <b>Note:</b> Normal inspection WRT dam safety items but turbid water coming from till borrow to spillway (not from dam area erosion) is still non-compliant for environmental requirements. Site rain gauge showed 54 mm of rain in previous 24 hours, plus several inches of snow melt. Flocculent deployed December 4, Environmental Monitor was on site December 5 to collect water quality samples. Requested other RDCK trained staff attend site this afternoon to complete full Routine Inspection, as per OMS event driven monitoring requirements.</li> </ul>

**Table 6: Summary of Weekly / Monthly Routine Site Inspections 2023**

Inspection Date	Type of Inspection	Inspection Notes
December 6, 2023	Routine Inspection	<ul style="list-style-type: none"> <li>▪ <b>Tailing Pond Backfill Area:</b> Heavy rain over past 24 hours ~50mm. Poned water and significant flow off backfill area into conveyance channels. No erosion noted. Most water on backfill low turbidity.</li> <li>▪ <b>Crest:</b> Minor ponding due to heavy rain.</li> <li>▪ <b>Cover Channel:</b> Heavy rain moving through channels. Turbidity noted. No bulging at former site. High turbidity from sub channel.</li> <li>▪ <b>Spillway:</b> No obstructions, strong flow, medium turbidity through spillway.</li> <li>▪ <b>Downstream Slope:</b> Some runneling on toe berm and adjacent land causing turbidity in weir pond. Water leaving from below toe berm less turbid. Measurement weir: 19 cm.</li> <li>▪ <b>West Abutment:</b> Surface flow from heavy rain. Low turbidity.</li> <li>▪ <b>East Abutment:</b> Surface flow, no erosion noted. Low turbidity.</li> <li>▪ <b>Wildlife:</b> Elk and deer tracks.</li> <li>▪ <b>Performance:</b> Abnormal – No notes.</li> </ul>
December 13, 2023	Routine Inspection	<ul style="list-style-type: none"> <li>▪ <b>Spillway:</b> There is flow, but slow.</li> <li>▪ <b>Downstream Slope:</b> Turbidity of flow: Clear.</li> <li>▪ <b>Performance:</b> Normal – No notes.</li> </ul>
December 20, 2023	Visual Inspection	<ul style="list-style-type: none"> <li>▪ <b>Crest:</b> Minor rutting to be repaired in spring.</li> <li>▪ <b>Spillway:</b> Flows are clear.</li> <li>▪ <b>Downstream Slope:</b> 50% snow cover on downstream slope. Measurement weir: 4.2 cm. Turbidity of flow: Clear.</li> <li>▪ <b>Wildlife:</b> None.</li> <li>▪ <b>Performance:</b> Normal – No notes.</li> <li>▪ <b>Note:</b> Could not complete full walk around - the landfill staff, who usually attend as a second person for safety reasons, were unexpectedly unable to support, and our compost operator had a site meeting and 3 loads to process, so due to safety concerns (wolf is again present on site) I was only able to inspect the spillway, dam crest and P1/P2. Everything in those areas looked good, and the spillway flows are clear.</li> </ul>

Based on review of the above routine/visual site inspection reports, Tetra Tech notes the following:

- The weekly site inspections were not regularly completed during the 2023 freshet period (Mid-March to Mid-April), in accordance with the OMS Manual. It is recommended conducting a site surveillance (visual inspection) in a weekly basis during the freshet period to meet the surveillance frequency as requested by the OMS Manual (**Recom-2024-DSR-01**).
- Appropriate site inspection forms are being used. Most inspection forms generally provided a good description of observed deficiencies, such as the condition of seepage weir at the downstream toe, spillway, tailing pond backfill area, downstream slope, etc., however, information provided in inspection reports occasionally contained unclear or conflicting information and/or data was missing. For instance:
  - The weekly/monthly routine site inspection reports did not indicate any surface erosion within the tailings impoundment area. It is understood that the tailings cover beyond the upstream beach area is inspected

annually, as per the OMS Manual, and is not included in the weekly inspection forms. However, major surface erosion in multiple locations was reported in the 2023 annual site inspection conducted by SRK. These surface erosions within the tailings impoundment area were observed by Tetra Tech as well during the site inspection.

- On January 11, 2023, the dam's performance was reported as 'abnormal' due to the formation of a pipe from the weir to the downstream side (with no flow passing over the weir). Despite the weir not being repaired, the dam's performance was reported as 'normal' during the next routine inspection on February 16, 2023. It is recommended to review and revise the OMS to establish a follow up procedure for site observations, add detailed description of any observed conditions in the site inspection report, and provide the OMS Manual training for the site inspectors (**Recom-2024-DSR-02**).
- Piezometric data was not recorded from March 3 to April 13, 2023, as the recording probe was under repair during that period. Notably, during the first two quarters of 2024, piezometer P1 exceeded its trigger level of 697.2 meters in late March and early April. To ensure continuous data collection, it is recommended to have an additional recording probe available as a backup. According to the RDCK, an additional water level meter (manufactured by Heron Instruments) has been available since February 2024.

### 4.3 Design Basis

As part of the 2014 DSR, a dam break analysis was performed by EBA including characterization of a hypothetical dam breach, flood wave routing, and inundation mapping. Based on the assessments conducted, EBA recommended to increase the dam consequence classification from 'Significant' to 'Very High'.

Table 7 compares the design criteria utilized in the 2020 closure design (RDCK, 2020) with the minimum design requirements for a 'Very High' consequence classification dam for 'Closure-Passive Care Phase', as recommended by the CDA Technical Bulletin: Application of Dam Safety Guidelines to Mining Dams (CDA, 2019), and described in the 2023 Dam Safety Inspection (DSI) report (SRK, 2024).

**Table 7: Design Basis (Standards-Based Assessments, Closure-Passive Care Phase)**

Inflow Design Flood (AEP)		
Minimum IDF (CDA 2019)	Probable Maximum Flood (PMF)	70 m <sup>3</sup> /s peak inflow during 24hr event that results in a peak spillway discharge of 58 m <sup>3</sup> /s.
Value used for design	PMF	
Seismic Event (AEP)		
Minimum seismic event (CDA 2019)	1:10,000 year or MCE	PGA = 0.256 g (Site Class D) (SRK 2017)
Value used for design	1:10,000 year (84 <sup>th</sup> Percentile)	
Slope Stability – Static		
Minimum FOS (CDA 2019)	1.5	
Minimum FOS used for design	1.5	
Slope Stability – Pseudo-Static		
Minimum FOS (CDA 2019)	1.0	
Minimum FOS used for design	1.0	

**Table 7: Design Basis (Standards-Based Assessments, Closure-Passive Care Phase)**

Slope Stability – Post-Earthquake		
Minimum FOS (CDA 2019)	1.2	Under post-earthquake conditions, it is assumed that the tailings and original dam fill (Zone 4, Figure 5) liquify. A higher target FOS criterion of 1.5 was adopted to ensure significant displacements will not occur. In 2024, SRK adopted a FOS of 1.3 to perform the post-earthquake stability analyses.
Minimum FOS used for design	1.5	
Freeboard		
Required Minimum freeboard	0.94 m	SRK (2019b) No pond is present under normal conditions.
Required Normal freeboard	n/a	

## 4.4 Review of 2014 DSR

The configuration of the dam and tailings volume have undergone significant changes since the previous DSR conducted in 2014. These alterations were particularly substantial during the extensive construction works carried out in 2021-2022. As a result, the current dam structure and tailings management system differ considerably from what was assessed in the 2014 DSR. A brief overview of the 2014 DSR is provided in this section. This review serves two purposes: firstly, to offer historical context and background information, and secondly, to illustrate the methodology and approach employed in the previous assessments. It should be noted that while this overview provides valuable insights into past conditions and practices, it should not be considered representative of the current dam configuration or safety status.

The previous DSR was completed for HBTF by EBA in 2014. As part of the 2014 DSR, a dam break analysis, including characterization of a hypothetical dam breach, flood wave routing, and inundation mapping was carried out. The US National Weather Service Breach Erosion Model (BREACH) was utilized to conduct the characterization of the dam breach and initial flood hydrograph, and evaluate breach opening, time of dam failure and the subsequent breach flow into the downstream creek. Using the available topographical data and aerial images, the total volume of tailings retained by the HB dam was estimated at approximately 1,618,000 m<sup>3</sup>, and the impounded water at approximately 200,000 m<sup>3</sup>; a total mixed volume of 1.8 million m<sup>3</sup> stored in the HB reservoir.

Based on the dam breach analysis, approximately 714,000 m<sup>3</sup> (39% of the total mixed volume) is estimated to be released in the event of a dam failure. It was also determined that the dam would breach to approximately 10.3 m lower than the bottom of the water pond, with a final breach width of 14.7 m, breach formation time of 0.18 hour, and a peak flow of 2,115 m<sup>3</sup>/sec. The dam breach inundation mapping indicates that a total area of approximately 0.73 km<sup>2</sup> would be impacted in the event of a dam breach, including the Crowsnest Highway.

The hydrotechnical assessment performed during the 2014 DSR showed that the HB Dam has enough available freeboard to meet the minimum requirement for the design flood considered and would not be overtopped by waves from a 1,000-year wind event under normal reservoir conditions.

A review of consequence classification was also conducted during the 2014 DSR to categorize the consequences of HB Dam failure in terms of loss of life, environmental and cultural losses, and infrastructure and economic losses. Based on the assessment of the three loss criteria, EBA recommended that the consequence classification rating of the HB Dam be increased to 'Very High'. The dam consequence classification was previously determined as 'Significant' by BGC in the 2002 DSR.

A failure modes assessment was also carried out for the HB Dam during the 2014 DSR. Based on the failure modes assessment, the plausible failure modes of the dam are overtopping, slope instability, post seismic upstream and downstream slope instability, and internal erosion through the embankment.

The steady state seepage analysis conducted in the 2014 DSR showed an estimated rate of the toe seepage at 21.02 m<sup>3</sup>/day/m for reservoir level of 108.0 m and 0.015 m<sup>3</sup>/day/m for reservoir level of 105.5 m (based on 2012 Datum). Per the 2014 DSR, the original dam design drawings were based on various assumed local datums. The 2014 seepage and slope stability analyses utilized the 2012 topographical survey (local datum), with the crest elevation recorded as 109.31 m. A slope stability analysis was also performed during the 2014 DSR, and the results indicated that the HB Dam meets the CDA Guidelines criteria for normal static and seismic loading conditions.

A simplified liquefaction triggering analyses was undertaken by EBA and the results indicated that the looser, coarser grained layers within the 1955 embankment fill have a susceptibility to soil liquefaction during the design 1 in 5000-year earthquake. Also, based on the internal erosion screening assessment, the HB dam is vulnerable to internal erosion based on zoning with the embankment materials likely to comprise silty sands and gravels with less than 30% fines that are extremely erodible. The 2014 DSR recommended to undertake a feasibility engineering study to assess various modifications that could be made to the embankment to reduce its vulnerability to internal erosion.

Health, Safety and Reclamation Code for Mines (HSRC) in British Columbia (revised April 2024), provided by the Ministry of Energy, Mines and Low Carbon Innovation (EMLI), requires a DSR every 5 years for dams classified as 'Significant' to 'Extreme' consequence. Tetra Tech understands that a deferral of the DSR was approved by EMLI, therefore, the next DSR is being conducted in 2024.

## 4.5 Instrumentation and Monitoring

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Instrumentation in the HBTF includes a total of five (5) standpipe piezometers (P1, P2, P3, P5, and P6, 20 mm PVC), twelve (12) survey hubs (H01 to H12, rebar embedded in concrete pillar) and two control points (CP-6785 and CP-6786), and one V-notch seepage weir installed at the downstream toe of the expanded berm. The piezometers P1, P2, and P3 were installed in 2000 and P5 and P6 in 2005. The piezometers P3, P5, and P6 were raised in 2021 during the toe berm construction. The control points and the survey hubs were installed in 2012 and 2021, respectively.

Additionally, several groundwater monitoring wells (PVC standpipe) have been installed within the tailings impoundment area. The 2023 annual DSI (SRK 2024) reported that the data recorded from the monitoring wells showed the groundwater levels remain higher compared to those recorded prior to the 2021-2022 remediation.

Figures A.3 and A.4 in Appendix A illustrates approximate location of the instrumentation along the downstream slope of the dam and toe berm. SRK reviewed and revised the as-built and trigger levels for the piezometers in March 2024 to reflect the post construction conditions. SRK proposed eight (8) additional piezometers (P7 to P14) to be installed and monitor the dam performance. Figure A.3 (Appendix A) also illustrates approximate location of the proposed additional piezometers. A summary of the existing as-built piezometer details is presented in Table 8. The 2024 SRK's review results on the piezometer triggers are discussed in Section 6.2 of this report.

**Table 8: Summary of As-Built Piezometer Details**

Piezometer ID	Location & Screened Unit	Ground Elev. (masl <sup>1</sup> )	Top of Pipe Elevation (m)	Casagrande Tip Elevation (m)	Depth to Tip (mBTOP <sup>2</sup> )
P1	Located at dam crest and screened in Till Foundation.	711.35	711.74	687.70	24.0
P2	Located at dam crest and screened in the Original Dam Fill (1955-1967).	711.35	711.74	698.20	13.5
P3	Located at near the dam toe and screened in native Glaciolacustrine Foundation.	692.41	693.03	673.40	19.6
P5	Located at dam toe berm crest and screened in the Filter Blanket (1974/75 & 1977).	700.99	701.83	691.40	10.4
P6	Located at dam toe berm crest and screened in the Stabilizing Berm (till) (1964-1967)	700.99	701.90	686.40	15.4

1) masl: metres above mean sea level  
2) mBTOP: meters below top of pipe

## 4.6 Annual Formal Site Inspections

The HSRC requires the owners of the 'Very High' consequence dams to conduct a formal site inspection annually. The annual site inspections were undertaken for the HBTF since 2019 by SRK. During the annual site inspection, the climate data, seismic events, water balance and freeboard, as well as monitoring and instrumentation, consequence classification, hazards and failure modes, OMS Manual and EPRP were reviewed.

## 5.0 SITE RECONNAISSANCE

### 5.1 General

A site inspection of the HBTF was performed by Amir R. Khoshboresh, P.Eng. and Puria Asiaban, P.Eng., of Tetra Tech on May 14, 2024. Alayne Hamilton and Amy Wilson of RDCK and Peter Mikes, P.Eng., of SRK accompanied the Tetra Tech's team during the site visit. Weather at the day of the inspection was sunny with an average temperature of about 19°C. The week prior to the inspection was sunny with no precipitation and an average temperature between 12°C and 22°C, as reported by Weather Underground (a commercial weather service provider) for Castlegar weather station, BC.

The site inspection focused on visually reviewing the existing conditions of the tailing dam, spillway, tailing area, and surrounding areas for evidence of instability, seepage, erosion, or natural hazards with respect to dam safety management practices.

Details of the features inspected are described in the subsections below and on the inspection forms in Appendix D. Additionally, selected photographs taken during the site inspection along with a short description are attached in Appendix D.

### 5.1.1 Access Road, Gates, and Signage

Access to the dam and tailings facility is via Airport Road (paved road), Emerald Road (gravel road), and then unnamed gravel roads through the RDCK Central Landfill property. A gate (main gate) is in place north of the RDCK Central Landfill to control access to the dam and tailings facility. There is another locked gate in the north that provides access to the Central Landfill and tailings facility area (see the site location plan in Figure A.1, Appendix A). A sign is in place at the main gate notifying the public of the area and restricting access to authorized personnel only.

The gravel access road up to the facility was in rough condition at the time of the site inspection with some fallen twigs or branches and debris covering portions of the road. RDCK staff indicated that the dam and tailings facility area are accessible round the year by the access road.

### 5.1.2 Tailing Area Slopes

The natural slopes surrounding the dam and tailing area are mainly forested and moderately sloped (see Photos 1, 3, and 8). No evidence of significant instability of the natural slopes was observed around the dam during the site inspection.

## 5.2 HB Dam

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### 5.2.1 Access Road, Gates, and Signage

The HB Dam crest is accessible by walking from the private access road, south of the Central Landfill area. There is a gate in place east of the dam crest that was opened at the time of the site visit. The gate was in poor condition and did not fully cover the dam crest pathway. Several warning signs located near the crest gate indicate the restricted area with no trespassing and warning for hazardous ground conditions exist in this area (see Photo D.1 in Appendix D). Access to the downstream berm from the left (east) abutment was restricted by a couple of concrete blocks (see Photo D.2). As per RDCK, no vandalism has been reported at HBTF over the past years. The signages meet the requirements of the BC Dam Safety Regulation.

### 5.2.2 Crest

The dam crest was found to be free of vegetation. Several minor uneven areas and low points, with depths of a few centimeters, were observed along the dam crest, mostly at the west side, above the 2012 blast rock repair area. Also, some rutting from vehicle traffic was observed along the dam crest (see Photos D.3 and D.4). No sign/evidence of active surface erosion or significant instabilities such as deformation, settlement, cracking, slumping, etc. was observed along the dam crest during the site inspection.

Several pieces of geotextile were observed to have been exposed at the west side of the crest (see Photo D.10). RDCK staff indicated that no animal activities along the dam crest were reported during the past 5 years. No significant surface erosion was noted at the dam crest and along the upstream & downstream edges. The dam crest appears to be in general good condition, and the condition is unchanged from the previous inspection in 2023.

### 5.2.3 Spillway

The spillway was retrofitted with replacement riprap in 2015. Flow with a few centimeters' depth was observed over the bedrock spillway inlet at the time of inspection. The Eastern crest of the bedrock spillway was protected by a series of boulders. The 2023 annual DSI (SRK, 2024) recommended placing additional barriers in this location to

prevent vehicles falling into the spillway. As per the RDCK, additional boulders were placed along the eastern crest of the bedrock spillway during the third quarter of 2024. Some vegetation is growing along the bedrock spillway that need to be removed as part of the vegetation removal plan (see Photos D.11 and D.13).

No sign/evidence of instability such as rockfall, rock sliding, etc. along the western slope (highwall) of the bedrock spillway was noted during the site inspection. It is understood from RDCK and Engineer of Record (EOR) that this area is visually inspected/monitored during the routine site inspections for any potential instability, however, no rock slope study/assessment was conducted for this area. Major failure of the rock slope may fully/partially block the bedrock spillway and decrease its discharge capacity. Considering the steep geometry of the bedrock spillway along the western slope and multiple joint sets observed along the rock slope (see Photo D.12), Tetra Tech recommends performing a rock slope stability study/assessment for this area (**Recom-2024-DSR-03**).

Several surface erosion rills/gullies were observed on the western slope (exposed till) of the spillway outlet channel. An erosion control blanket has been placed over the area that is sloughed (see Photo D.15). No seepage or sign of instability was observed within this area during the site inspection. Major failure of this slope may fully/partially block the spillway outlet channel and decrease the spillway capacity. Tetra Tech recommends continuing monitoring of this area for any exceeded surface erosion or potential slope instability (**Recom-2024-DSR-04**).

The bedrock spillway and overflow channel appear to be in general satisfactory condition.

#### 5.2.4 Downstream Toe Berm

The crest of the downstream toe berm was even and appears to be in general good condition. No sign/evidence of surface erosion or slope instability was observed along the crest of the downstream toe berm at the time of the site inspection.

It is understood that the downstream slope of the toe berm was reseeded in the Spring of 2023, however, vegetation growing within this area was limited and vegetation was not developed well especially along the east slope of the toe berm.

A sediment control fence was found near the downstream toe of the toe berm, above the v-notch weir. The sediment fence failed at some points and has been covered by sediment (see Photo D.16).

A series of surface erosion rills/gullies were noted along the east slope of the berm. Several gullies, approximately 1 m wide and 0.5 deep, have developed significantly near the east abutment of the dam (see Photos D.22, D.23, and D.24). The downstream east slope of the extended berm is prone to surface erosion and sloughing; therefore, Tetra Tech recommends repairing this area and developing a surface water management plan (e.g., development of vegetation, installation of a drainage ditch, etc.) to control the runoff water along the crest and downstream slope of the extended berm (**Recom-2024-DSR-05**).

#### 5.2.5 Downstream Slope Face (Above the Toe Berm)

Well established vegetation was observed throughout the downstream slope face above the toe berm. Tetra Tech understands that the west side of the downstream slope was repaired in 2012, and a layer of riprap has been placed over this area. It is also understood from RDCK that a vegetation removal plan is in place to control the vegetation along the downstream side. No sign/evidence of exceeding surface erosion, seepage, or significant instability was noted along the downstream slope of the dam. The downstream slope of the dam appears to be in general satisfactory condition (see Photos D.5 and D.6).

### 5.3 Tailings Impoundment Area

The upstream slope of the dam has been covered by deposited tailing material, a tailing cover of about 30 cm, and vegetation growing over it. Several surface eroded areas including water runoff erosion (Photo D.26) and tailings exposure (Photo D.27) were observed around the tailing cover perimeter during the site inspection. The tailing exposure in Photo D.27 resulted from a boil that occurred following construction activities in 2021-2022. In addition, sparse vegetation was found in some areas. Tetra Tech recommends repairing the surface eroded areas and covering all tailing exposures with an approximate coverage of 30 cm and vegetation appropriately (**Recom-2024-DSR-06**).

Shallow flowing water with a few centimeters' depth was present in the Main Channel as well as the South and North Spur Channels at the time of the site inspection. A turf reinforcement mat (erosion control blanket) has been placed throughout the bottom and slope of the channels, which appears to be in general good condition. Standing Water along with growing algae were found downstream of the South Spur Channel, near the South Spur Channel Energy Dissipation Structure. It apparently occurred due to excess vegetation within this portion of the channel (see Photos D.28 and D.30). Air bubbling was also observed in a water ponded area near the energy dissipation structure.

Grassy vegetation is growing along most areas of the channels (see Photos D.25, D.30, and D.33). It is understood that the flow estimates in the hydraulic model for the channels were based on the assumption of grassy vegetation lining the channels; however, the excessive vegetation can obstruct water flow, and the overtopped water flow in turn can cause surface erosion in the tailings cover. Therefore, it is required to be regularly monitored and controlled as part of a regular vegetation removal plan. It is noticed that there are several groundwater monitoring wells installed in the tailings impoundment area. More details about the monitoring wells are provided in subsection 5.4.

Water ponding areas were also observed mainly along the east side of the tailing impoundment area, north of the North Spur Channel. The depth of the water ponding appears to be shallow, however, the water depth in some areas seems to be more than 10 cm. The low point areas and water ponding within these areas appear to be likely the result of the differential settlement. The low points and the water ponding areas are not currently significant or immediate dam safety concerns as they are far enough from the embankment structure (more than 300 m). Tetra Tech recommends continuing regular monitoring of the water ponded areas as per OMS Manual and developing a plan to repair needed. (**Recom-2024-DSR-07**).

### 5.4 Instrumentation & Monitoring

During the site visit, the monitoring wells of MW-04-S-05 and MW-03-05 in the tailings impoundment area (north of the TSDC), were inspected. The pipe of the monitoring well MW-04-S-05 was damaged and found to be in flowing artesian condition (groundwater table above the ground surface - see Photos D.31 and D.32). The groundwater level in MW-03-05 was at an approximate depth of 30.5 cm below the top of the pipe.

The groundwater levels in the standpipe piezometers installed on the downstream face of the dam (P1 and P2) and downstream slope of the expended berm (P3, P5, and P6) were measured during the site inspection and is presented in Table 9, below.

**Table 9: Measured Groundwater Levels in Standpipe Piezometers (May 14, 2024)**

Standpipe Piezometer ID	Measured Groundwater Level (m)	Ground Elev. (masl)	Top of Pipe Elevation (m)	Historical Maximum Reading *	
				Measured Level (m)	Date
P1	697.04	711.35	711.74	697.86	July 6, 2012
P2	697.53	711.35	711.74	702.48	July 6, 2012
P3	684.47	692.41	693.03	687.25	May 11, 2011
P5	688.33	700.99	701.83	693.71	July 6, 2012
P6	686.94	700.99	701.90	694.91	July 6, 2012

\* Sourced from the 2023 annual DSI (available data since May 2010)

The piezometric data recorded during the site visit showed that none of the piezometers exceeded the trigger level at the time of the inspection.

A V-notch seepage weir situated at the downstream toe of the expanded berm measures the dam seepage flow rate manually. At the time of the site inspection, the seepage water at the downstream toe was clear with no turbidity, and the flow rate was estimated at 0.5 L/s, approximately (calculated based on 2 cm water head above the V-notch and notch angle of 30 degrees).

The dam seepage and the water from the spillway drain into the downstream channel/creek (a narrow valley) through the stilling basin at the right end side of the spillway, crossing a culvert under Nelson Nelway Highway (Highway 3) located approximately 500 m to the south of the facility, and flowing through a man-made ditch (~1200 m) to the Salmo River. Some logs and adult trees were observed along the inlet of the downstream channel (see Photo D.18). As per the RDCK, these natural features help protect against erosion and provide fish habitat in areas downstream of the stilling basin, which are considered fish-bearing.

According to RDCK staff, the water management at the Facility, including the Remediation and Closure Plan, hydrological analysis, and Water Quality Prediction Model, has been reviewed by the Ministry of Environment. It has been determined that a Waste Discharge Authorization for the flows from the Facility is not required at this time. The upcoming Water Quality Prediction Model update (March 2026) will be reviewed by the Ministry of Environment, and if water quality is found to have declined, discussions will be held regarding the requirement of a permit. A discharge permit was previously held by the Facility, but it was cancelled by the Ministry of Environment in the early 2000s. RDCK, as the current owner and Mines Act permit holder, was not notified of this cancellation.

## 6.0 DAM SAFETY REVIEW

The following subsections provide a dam safety audit review for various aspects of the facility. As part of this DSR, Tetra Tech developed a staff questionnaire form, which was completed by RDCK and is included in Appendix F.

## 6.1 Geotechnical Aspects

### 6.1.1 Site Investigation

Tetra Tech reviewed the available geotechnical analysis results and other relevant background information and summarized them in this section.

As discussed in Section 4.4, the configuration of the dam and tailings volume have significantly changed since the 2014 DSR, particularly during the 2021-2022 construction activities. Therefore, the geotechnical analyses and assessments conducted during the 2014 DSR are not presented in this section. Instead, the most recent analyses and assessments were reviewed.

A review of the dam zones and available geotechnical data at HBTF was carried out by SRK in December 2019 to provide recommendations for the material properties for use in stability analyses. Table 10 summarizes the historical geotechnical investigations and testing conducted at the tailings facility.

**Table 10: A Summary of Previous Geotechnical Investigations and Testing**

Report	Summary of Contents
Golder (1972)	<ul style="list-style-type: none"> <li>Laboratory testing consisted of one direct shear test on a representative sample of the embankment fill (Zone 5) that resulted in friction angle of 35.5° with no cohesion, and particle size distributions of representative samples from Zone 5 and Zone 6.</li> </ul>
Golder (1974)	<ul style="list-style-type: none"> <li>Three boreholes through the dam that included standard penetration testing.</li> <li>Gradation requirements for the Zone 7 filter blanket.</li> </ul>
Golder (1974)	<ul style="list-style-type: none"> <li>Five in-situ density tests and a Standard Proctor test on the Zone 7 filter blanket.</li> <li>Four in-situ density tests and a Standard Proctor test on 'till fill' (Zone 8 or 9).</li> </ul>
Golder (1975)	<ul style="list-style-type: none"> <li>Three in-situ density tests and a Standard Proctor test of the 'impermeable till' (Zone 9).</li> <li>Three particle size distributions of rock berm material placed in the area of Zone 3.</li> </ul>
Golder (1976)	<ul style="list-style-type: none"> <li>Three particle size distributions from the borrow area to the southeast of the HB Dam that is assumed to have been used as Zone 5 fill.</li> </ul>
BGC (2002)	<ul style="list-style-type: none"> <li>Two geotechnical boreholes were drilled through the dam with a hollow stem auger with Standard Penetration test completed at 1.5 m intervals with disturbed split spoon samples collected.</li> <li>Eight test pits were developed within the dam footprint and downstream of the dam.</li> <li>Laboratory testing was completed on representative soils: 18 particle size distribution, 5 Atterberg limits, and 6 moisture contents.</li> <li>Design gradation specifications are provided for toe berm rock drain and filter, and Upstream dam face erosion protection.</li> </ul>
BGC (2005)	<ul style="list-style-type: none"> <li>Three particle size distributions of the toe berm rock drain material.</li> </ul>
EBA (2012)	<ul style="list-style-type: none"> <li>Laboratory testing was completed on the sand and till materials used for the 2012 slough repairs, consisting of Standard Proctor tests of sand and till, six particle size distributions, one Atterberg limit.</li> </ul>
Tetra Tech EBA (2015)	<ul style="list-style-type: none"> <li>Rip-rap gradation specifications for the HB Dam spillway retrofit in 2015.</li> </ul>
Thurber (2016)	<ul style="list-style-type: none"> <li>Five test pits within the dam footprint, and two test pits to the south of the dam.</li> <li>Laboratory testing was completed on the following materials:                             <ul style="list-style-type: none"> <li>Zone 3 glaciolacustrine foundation material: two simple direct shear tests, one consolidation test, two Atterberg limit tests. The direct shear tests resulted in tangent friction angles of 34° and 36° with no cohesion.</li> <li>Zone 8 dam fill: One Standard Proctor test and two particle size distributions.</li> </ul> </li> </ul>

**Table 10: A Summary of Previous Geotechnical Investigations and Testing**

Report	Summary of Contents
	<ul style="list-style-type: none"> <li>Zone 9 dam fill: One particle size distribution.</li> <li>Zone 7 dam fill (filter): Three particle size distributions.</li> </ul>
SRK (2017)	<ul style="list-style-type: none"> <li>Six auger holes were drilled within the tailings impoundment.</li> <li>Laboratory testing was completed on the tailings: Nine particle size distributions, two specific gravity tests, two relative density tests, two consolidation tests, one consolidated undrained triaxial strength test resulting in a friction angle of 30° with zero cohesion.</li> </ul>
SRK (2018)	<ul style="list-style-type: none"> <li>Fifteen test pits excavated at two potential sand and gravel borrow sources, and six test pits excavated near the east abutment of the dam.</li> <li>Laboratory testing was completed on the following materials:                             <ul style="list-style-type: none"> <li>Sand and Gravel Borrow Source: 21 particle size distributions.</li> <li>Zone 2 till foundation material: Two particle size distributions.</li> <li>Zone 3 glaciolacustrine foundation material: Two simple direct shear tests, one consolidation test, one Atterberg Limit (non-plastic), and one specific gravity test. The direct shear tests resulted in tangent friction angles of 28° and 35° with no cohesion.</li> </ul> </li> </ul>

The location of historical boreholes and test pits from those investigations are illustrated in Figure 5.



**Figure 5: Locations of Historical Boreholes and Test Pits (2019 Dam Zones Review by SRK)**

### 6.1.2 Material Strength Properties

Based on the findings from historical geotechnical investigations, SRK recommended the material strength properties of the HB Dam for use in stability analyses of the tailing dam. Table 11 presents a summary of the zoning and material properties for the HB Dam recommended by SRK, 2019. Figure A.4 in Appendix A illustrates a typical cross-section along with zoning of the HB Dam.

**Table 11: Summary of Recommended Material Properties for HB Dam**

Zone #	Material	Bulk Density (kN/m <sup>3</sup> )	Strength Parameters		Comments/Basis of Parameter Selection
			Cohesion (kPa)	Friction Angle (°)	
1	Bedrock	26	Infinite Strength		
2	Native Till	20	0	36	<ul style="list-style-type: none"> <li>Density selected as the lowest value of the 9 in-situ density tests completed on the glacial till material.</li> <li>Friction angle selected based on direct shear test result of glacial till (Golder 1972).</li> </ul>
2	Native Glaciolacustrine	18.5	0	32 <sup>(2)</sup>	<ul style="list-style-type: none"> <li>Parameters selected based direct shear test results on undisturbed glaciolacustrine test results (Thurber 2016 and SRK 2018a) and empirical relationships with SPT blow count data.</li> </ul>
4	Tailings	18.3	0	30 <sup>(1)</sup>	<ul style="list-style-type: none"> <li>Bulk density selected based on the lowest measured density of the tailings (SRK 2017a).</li> <li>Friction angle based on CU triaxial test.</li> </ul>
5	Original Dam (1955-67)	19.0	0	28 <sup>(1)</sup>	<ul style="list-style-type: none"> <li>Density conservatively selected to be lower than the measured in-situ tests completed on the Zone 9 glacial till, while being higher than the minimum bulk density of the tailings.</li> <li>Friction angle estimated based on SPT data from BGC-BH-00-1 (Bowles 1977) and conservatively assumed that the weak area encountered in the borehole is present throughout the zone.</li> </ul>
6	Stabilizing Berm (1964-67)	21.3	0	36	Post 1964 Till fill zones <ul style="list-style-type: none"> <li>Density selected as the average of nine in-situ density tests completed on the Zone 9 material.</li> <li>Friction angle selected based direct shear test result of the glacial till material (Golder 1972).</li> </ul>
8	Common Fill				
9	Selected Impervious Fill				
12	Till Toe Berm				
7	Filter Blanket	20.7	0	38	<ul style="list-style-type: none"> <li>Density selected as the average of seven in-situ density tests completed on the Zone 7 material.</li> <li>Friction angle conservatively estimated based on SPT data according to Bowles (1977).</li> </ul>
10	Rock Toe Drain	20.7	0	38	<ul style="list-style-type: none"> <li>Conservatively estimated to have the same properties as the Zone 7 filter blanket.</li> </ul>
11	Rock Drain Zone	20.7	0	38	<ul style="list-style-type: none"> <li>Conservatively estimated to have the same properties as the Zone 7 filter blanket.</li> </ul>
13	Riprap				

Notes:

- Materials are likely to liquefy during the design earthquake (MCE). Liquefied strength ratios ( $s_{u(liq)} / \sigma'_{vo}$ ) of 0.10 and 0.04 are recommended for the Zone 5 Original Dam and Zone 4 Tailings, respectively.
- The four direct shear tests resulted in friction angles of 28, 34, 35, and 36 degrees. The 32° is slightly lower than the average based on lab testing (33°); however, because of the one lower friction angle (28°), future stability analyses should consider a sensitivity analysis.

### 6.1.3 Geotechnical Assessments

It is understood that an earth-filled timber crib retaining wall was constructed at the downstream toe of the dam during the early stages of operation. The dam's crest and the timber crib were periodically raised as necessary. In 1964, a section of the timber crib wall failed. The wall was then reconstructed 3 to 5 meters downstream, and several concrete and wooden pipe drains were installed. The exact design and composition of the crib wall remain uncertain. In December 2019, a deformation analysis was conducted by SRK to estimate potential settlements of the dam crest due to the deterioration of the wood in the crib wall. The deformation analysis highlighted the importance of widening the dam crest through the construction of the upstream till beach, which effectively reduced the settlement of the upstream side of the dam crest in contact with the supernatant water of the tailings. The calculated settlements on the upstream side of the crest were less than 1 cm, with the highest average settlement along the crest measuring 16 cm. SRK recommended considering the potential settlement of the dam crest due to timber crib rot when determining freeboard and incorporating the maximum expected settlement into the freeboard calculations. Further analysis was conducted by SRK in 2024, as discussed in Section 6.2 below.

In December 2019, SRK completed a seepage analysis for the HB Dam in support of the proposed upgrades to transition the HBTF to passive closure. The seepage analysis was conducted in two phases. The initial phase focused on developing a model of current conditions and assessing its sensitivity to different parameters. The subsequent phase predicted seepage rate and water table location for the proposed dam geometry. The modelled seepage rates were consistent in order of magnitude with measured seepage rates on-site for both the base case and hypothetical scenarios involving preferential flow paths through the foundation and upstream slope.

Observed water levels within the dam exceeded predictions based on best-estimate material properties. This discrepancy suggests that the permeability contrast between the dam fill and drains is lower than initially assumed. Modeling a less permeable Zone 10 rock drain appears to be a contributing factor. Seepage modeling under the proposed dam design, employing conservative boundary conditions, indicated a substantial decrease in water table levels and seepage rates. These results support the positive impact of lowering the spillway and constructing an upstream beach on seepage reduction.

SRK also completed a slope stability analysis for the HB Dam in January 2020 in support of the passive closure design for the HBTF. This was an update to the 2018 stability analysis. In this analysis, the post-seismic required minimum FOS was increased from 1.3 to 1.5, and the toe berm was expanded to meet the increased post-seismic minimum FOS. Additionally, a preliminary seismic deformation analysis and a sensitivity analysis on the assumed glaciolacustrine foundation layer thickness were performed. The material properties used in this analysis were based on those which were recommended by SRK in 2019 (see Table 11, above)

Critical failure surfaces identified under downstream pseudo-static and post-earthquake conditions necessitate raising the berm for enhanced post-earthquake stability and widening it down-valley to improve seismic resistance. The stability analysis results (see Table 12) for selected cross-sections confirmed the sufficiency of the proposed toe berm expansion in ensuring adequate FOS across the dam. While pseudo-static loading resulted in marginally stable condition (FOS of ~0.99), anticipated seismic deformations during the design earthquake were deemed negligible due to post-earthquake FOS values exceeding 1.5. Sensitivity analysis demonstrated that the dam maintains adequate FOS under worst-case pore pressures and glaciolacustrine material strengths. The 2020 slope stability analyses consequently revealed the necessity of expanding the downstream toe berm. The original dam fill is assumed to contain a liquefiable zone (Zone 5). While pseudo-static FOS estimates are required for regulatory requirements, current best practices discourage the use of pseudo-static analysis if liquefiable materials are present, which can experience rapid strength loss. Therefore, a post-seismic deformation assessment is required to be conducted.

The following tables (Table 12 and Table 13) present the stability analysis results before and after the upgraded dam geometry. Values in red are below the target design FOS.

**Table 12: Stability Analysis Results along Section 4 (Central Section) – Before Upgrading**

Condition	Water Conditions	Minimum CDA FOS	Calculated FOS
Long-term, drained	PFM	1.5	1.74
Pseudo-static conditions	PFM	1.0	0.90
Post-seismic conditions	PFM	1.2	1.12

**Table 13: Stability Analysis Results – After Upgrading**

Condition	Target FOS	Calculated Factors of Safety						
		Section 01	Section 02	Section 03	Section 04	Section 05	Section 06	Section 07
Long-term, drained	1.5	2.07	2.01	2.05	2.01	1.97	2.01	1.81
Short-term, construction	1.3	–	–	1.49	1.57	1.48	–	–
Pseudo-static	1.0	1.17	1.13	0.99	1.09	1.05	1.04	1.00
Post-earthquake	1.5	1.85	1.68	1.66	1.54	1.59	1.54	1.47

As part of the HBTF Closure Plan, SRK completed an erosion protection analysis on the downstream slope of the dam in December 2019 to assess its vulnerability to erosion and identify the need for supplementary erosion control measures during the closure process. A soil loss estimation analysis was employed to predict potential soil losses due to sheet and rill erosion over both short-term and long-term periods at the site. These estimated losses were then compared to established soil loss tolerance levels.

Results from the erosion protection assessment indicated a very low soil erosion classification for the downstream slope of the HB Dam provided sufficient grass cover is maintained. The estimated annual potential soil loss of 2.7 to 3.0 tonnes per hectare per year is lower than the accepted guidance value of 6 tonnes per hectare per year, which represents the maximum allowable soil loss without compromising long-term soil health. Based on these findings, no additional erosion control measures are necessary. The toe berm will slightly reduce potential soil loss by shortening the slope length at the dam's upper section. However, the analysis emphasized vegetation as the primary erosion control factor. To mitigate erosion risks in the short term, before vegetation establishes, protective measures such as hydroseeding, silt fencing, mulch, wood chips, or coconut matting were recommended to be implemented.

### 6.1.3.1 2024 Stability Analysis

In 2024, SRK conducted a preliminary slope stability analysis and revised the piezometer trigger levels based on the results of this analysis. During the 2024 stability analyses, numerous slope stability analysis scenarios were conducted using various combinations of water levels at P1/P2 and P5/P6 to calculate FOS values under drained (long-term steady state) and post-seismic loading conditions. According to SRK (2024), the material properties assumed in the 2024 stability analyses remained consistent with those used in SRK's 2020 analyses. However, the

model geometry was updated to reflect the 2022 dam as-built configuration. The stability analysis results for drained and post-seismic loading are presented in Table 14 and Table 15, respectively.

**Table 14: Stability Analysis FOS Results – Drained (SRK, March 2024)**

		P5/P6 Water Elevation (m)						
		692.3	693.3	694.3	695.3	696.3	697.3	698.3
P1/P2 Water Elevation (m)	697.5	1.77	1.75	1.73	1.71	1.68	1.66	-
	698.5	1.76	1.74	1.71	1.69	1.66	1.64	1.62
	699.5	1.74	1.72	1.7	1.68	1.65	1.63	1.61
	700.5	1.72	1.7	1.68	1.66	1.63	1.61	1.59
	701.5	1.7	1.68	1.66	1.63	1.61	1.59	1.57
	702.5	1.68	1.66	1.64	1.62	1.59	1.57	1.55
	703.5	1.66	1.64	1.62	1.6	1.57	1.55	1.53
	704.5	1.64	1.62	1.6	1.58	1.56	1.53	1.51

**Table 15: Stability Analysis FOS Results – Post Earthquake (SRK, March 2024)**

		P5/P6 Water Elevation (m)						
		692.3	693.3	694.3	695.3	696.3	697.3	698.3
P1/P2 Water Elevation (m)	697.5	1.32	1.30	1.29	1.27	1.25	1.24	-
	698.5	1.31	1.30	1.28	1.26	1.25	1.23	1.22
	699.5	1.31	1.29	1.28	1.26	1.24	1.23	1.22
	700.5	1.30	1.29	1.27	1.25	1.24	1.23	1.21
	701.5	1.30	1.29	1.26	1.25	1.23	1.22	1.20
	702.5	1.30	1.28	1.26	1.25	1.23	1.21	1.19
	703.5	1.29	1.27	1.26	1.24	1.23	1.20	1.19
	704.5	1.28	1.27	1.25	1.23	1.22	1.20	1.18

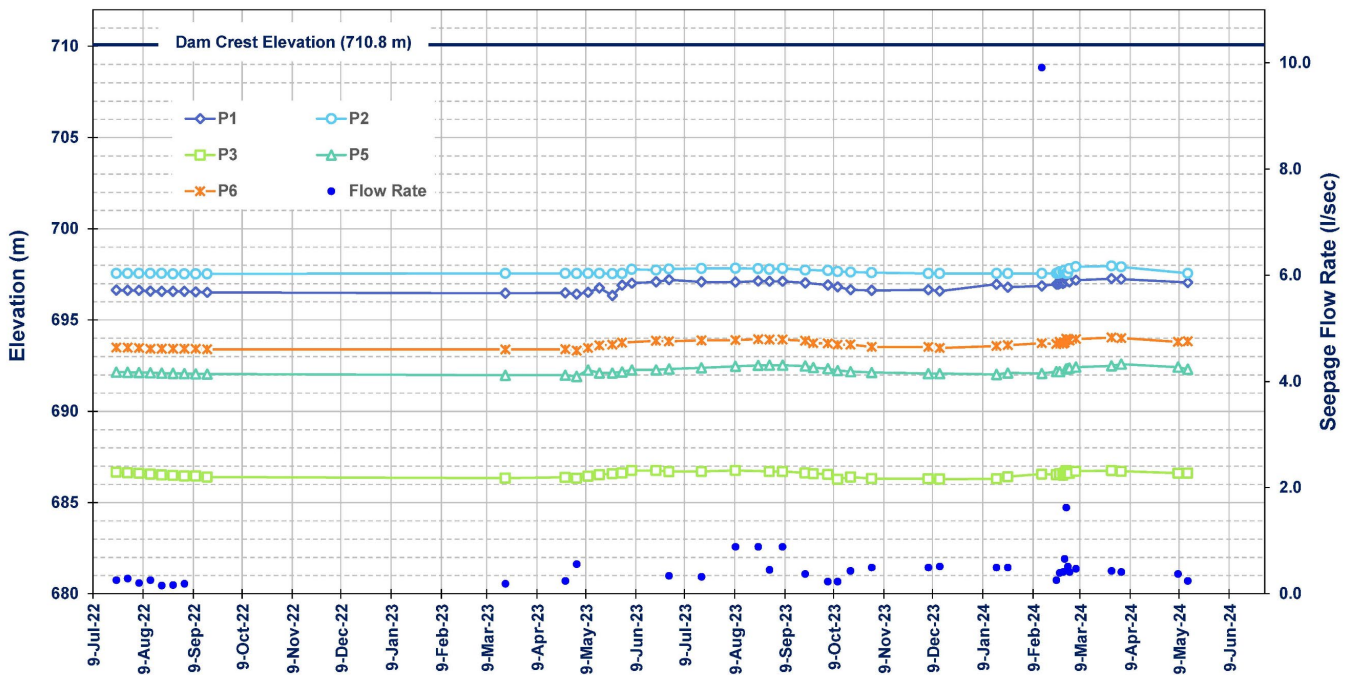
The stability analysis FOS results for drained loading conditions presented in Table 18 indicate that the calculated FOS values meet the target static FOS of 1.5 when water elevations are below 704.5 m at P1/P2 and 698.3 m at P5/P6. A comparison of the results from the 2024 drained and post-earthquake stability analyses reveals that the risk levels at HBTF are primarily controlled by the post-earthquake FOS values,

The criteria for minimum FOS for post-earthquake stability had been reduced to 1.3 in 2024 from 1.5 that was used for 2020 assessment. A relatively high FOS target was adopted to ensure significant deformation does not occur due to seismic loading. Tetra Tech agrees with the adoption of a lower FOS target but caution the use of FOS alone for post-seismic deformation control. The EOR informed that a liquefaction triggering assessment was recently completed (Tetra Tech did not review the report) which indicated liquefaction triggering for 1 in 5,000-year seismic

event using the mean PGA values from the probabilistic seismic hazard assessment. If original dam fill behaves in a strain softening manner (brittle), there is a risk of large-scale deformation of HB Dam due to liquefaction. The shear strength and deformation behavior of the original dam fill should be further investigated to fully understand seismic liquefaction hazard. Tetra Tech recommends re-evaluating the post-seismic stability of the HB Dam according to slope stability analysis method for contractive (liquefiable) soils outlined in ICOLD Bulletin 194: Tailings Dam Safety (**Recom-2024-DSR-08**).

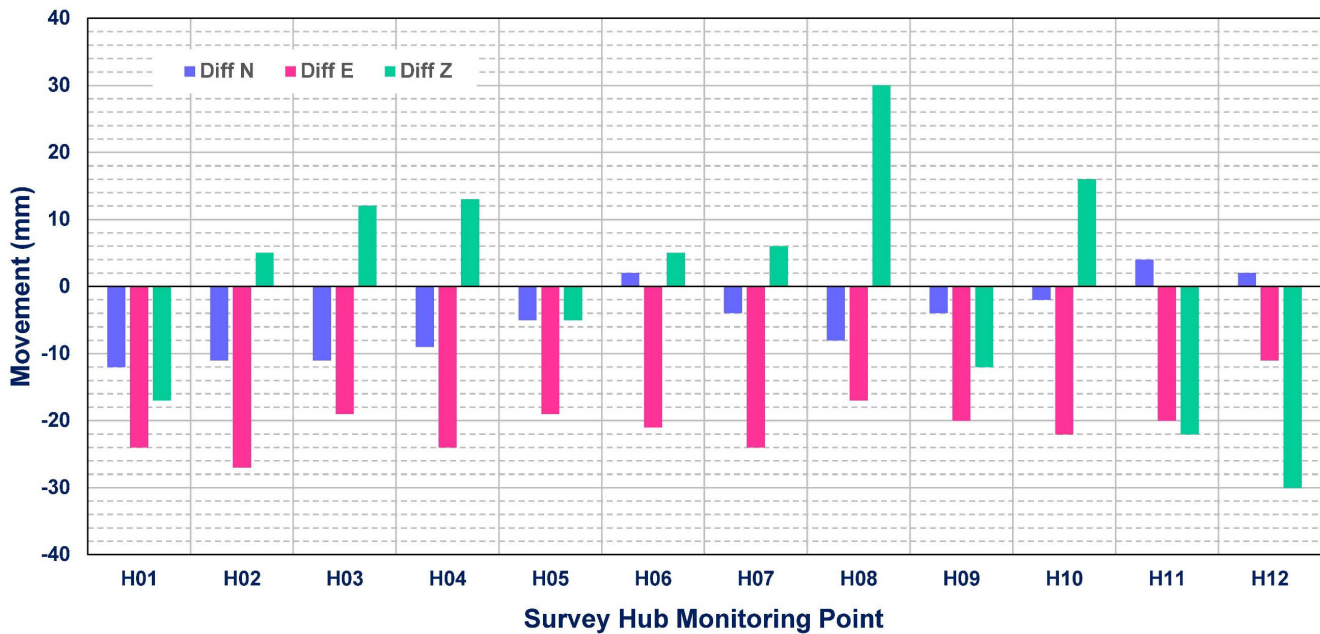
## 6.2 Instrumentation & Monitoring Data

Monitoring data collected from the standpipe piezometers and seepage weir over the past two years (July 2022 to June 2024) are presented in Figure 6. Based on the data recorded over the past two years, it appears that there is a direct relationship between the piezometric levels, and the flow rates recorded at the seepage weir. During this period, the highest flow rate was recorded on February 14, 2024, due to high precipitation event (53 mm in 24 hours). The water level fluctuations of piezometers together with the trigger level for each piezometer during the past two years are also provided in Appendix G, Figures E.1 to E.5. Based on the historical piezometric data during this period, Piezometer P1 was the only one to exceed its trigger level of 697.2 m in late July 2023, as well as in late March and early April 2024.



**Figure 6: Water Level Fluctuations in Standpipe Piezometers (July 2022 – June 2024)**

The movements of the survey hub monitoring points were measured in 2021 and 2022, and the results were reported in the 2023 annual DSI (SRK, 2024). The recorded data is graphically presented in Figure 7. According to SRK (2024), movements within  $\pm 100$  mm are considered normal. The highest movements were observed at survey hub H08 (+30 mm in the vertical direction) and H12 (-30 mm in the vertical direction). Figure A.4 in Appendix A illustrates the location of the survey hub monitoring points.



**Figure 7: Movements Recorded in Survey Hub Monitoring Points (2021-2022)**

The previous revision of the OMS Manual (2023) incorporated a TARP that utilized a single trigger threshold for each piezometer. These thresholds were established based on the anticipated water level ranges derived from historical performance data. In March 2024, SRK reviewed and revised the piezometer trigger levels at the HBTF to reflect the post construction conditions and provided the review results in a report titled "TARP Review – Interim Piezometer Triggers". The revised trigger thresholds were subsequently incorporated into the Trigger Action Response Plan (TARP) in the updated revision of the OMS Manual (Rev. 6.0, May 2024). A summary of revised piezometers trigger levels is presented in Table 16.

**Table 16: Summary of Piezometer Trigger Levels (SRK, March 2024)**

Piezometer ID	Piezometer Trigger Level (masl)			
	Green Acceptable Situation	Yellow Minor Risk Situation	Amber Moderate Risk Situation	Red High Risk Situation
P1	WLE <sup>1</sup> < 698.00	698.00 ≤ WLE < 702.50	WLE ≥ 702.50	N/A
P2	WLE < 698.50	698.50 ≤ WLE < 702.50	WLE ≥ 702.50	N/A
P3	WLE < 687.10	WLE ≥ 687.10	To Be Determined	To Be Determined
P5	WLE < 693.3	693.30 ≤ WLE < 697.30	WLE ≥ 697.30	N/A
P6	WLE < 694.60	694.60 ≤ WLE < 697.30	WLE ≥ 697.30	N/A

1) WLE: Water Level Elevation

SRK (2024) proposed the installation of eight (8) additional piezometers at the dam, downstream toe, and the tailings impoundment area to monitor dam performance. During the installation of these piezometers, an additional geotechnical investigation is being planned to be conducted to refine the inputs for the future stability analyses.

The revised piezometer trigger threshold criteria are presented in Table 17. The trigger level criteria are based on the MAC, Developing an OMS Manual for Tailings and Water Management Facilities, 2021 (Version 2.1). According to SRK (2024), the revised triggers are currently considered interim values, as a further stability analysis and TARP review will be completed after the additional piezometers are installed at HBTF.

**Table 17: Revised Piezometer Trigger Threshold Criteria (SRK, March 2024)**

Condition (Risk Level)	Threshold Criteria	Response Summary
Acceptable Situation (Green)	<ul style="list-style-type: none"> <li>Static FOS <math>\geq 1.5</math>; and</li> <li>Post-seismic FOS <math>\geq 1.3</math> within the past 3 months</li> </ul>	Normal operating conditions.
Minor Risk Situation (Yellow)	<ul style="list-style-type: none"> <li>Static FOS <math>\leq 1.5</math>; or</li> <li>Consistent Post-seismic FOS <math>\leq 1.3</math> for a period of 3 months</li> </ul>	Confirm reading; notify the EOR and TSF Qualified Person; Additional surveillance activities may be undertaken.
Moderate Risk Situation (Amber)	<ul style="list-style-type: none"> <li>Static FOS <math>\leq 1.3</math>; or</li> <li>Consistent Post-seismic FOS <math>\leq 1.2</math> for a period of 3 months</li> </ul>	In addition to the above, the RDCK Accountable Executive and Duty Officer to be notified; Additional investigations may be undertaken and mitigation plans developed.
High Risk Situation (Red)	<ul style="list-style-type: none"> <li>Static FOS <math>\leq 1.0</math></li> </ul>	Activate the Emergency Response Plan.

For greater consistency with the MAC OMS Guide (2021) and to avoid confusion, Tetra Tech suggests revising the moderate risk situation color from ‘Amber’ to ‘Orange’.

No information regarding the survey hubs and seepage flow trigger levels was made available to Tetra Tech for review. Given that deformations / displacements detected by the survey hubs and/or increase in seepage flow may be an internal erosion indicator, it is recommended to establish the survey hub and seepage flow trigger levels and incorporate them into the TARP in the next revision of the OMS Manual (**Recom-2024-DSR-09**). By integrating piezometer, displacement, and seepage flow trigger levels, dam operators can create a more comprehensive and effective monitoring system, ultimately enhancing the safety and stability of the dam.

## 6.3 Hydrotechnical Aspects

This section reviews hydrotechnical aspects of HB Dam information provided in the 2014 Dam Safety Review of HB Mine TSF (Tetra Tech EBA, 2014), 2018 Dam Break Analysis (SRK, 2018a), and HB Mine Tailings Facility Remediation and Closure Plan (RDCK, 2020).

### 6.3.1 Watershed

Tetra Tech EBA (2014) reports that that the HB Dam reservoir receives surface runoff from a 2 km<sup>2</sup> catchment area, of which 0.17 km<sup>2</sup> is occupied by the surface water pond. The median basin elevation of the watershed was determined to be approximately 940 m. The basin is generally characterized by steep slopes, medium brush, and forest cover.

### 6.3.2 Rainfall and Snow Data

Tetra Tech EBA (2014) used Castlegar Airport climate stations (Station No 1141455), within 38 km of HB Dam to assess precipitation patterns and amounts. A rainfall frequency analysis representing the site was performed using recorded hourly data for Castlegar Airport, with the longest period of record from year 1954 to 2013. The rainfall intensity-frequency results shown in Table 18 together with the separately-estimate 24-hour PMP.

**Table 18: Rainfall Intensity-Frequency after Tetra Tech EBA (2014)**

Return Period (Years)	24-Hour Rainfall (mm)
2	28.4
5	35.2
10	39.7
50	49.6
100	53.8
1,000	67.6
24-hour PMP	172.2

The 24-PMP was estimated by Tetra Tech EBA (2014) to be 172,2 mm based on the Hershfield method described in the Rainfall Frequency Atlas for Canada (Hogg and Carr, 1985).

Also, from Tetra Tech EBA (2014), average monthly snowpack data from two regional snow pillow stations within 115 km distance of the site showed that the regional average maximum snowpack depth of 116 cm, and average maximum snow water equivalent of 500 mm both occur in April. Snowmelt estimates were made using an equation from Gray (1973) to compute daily snowmelt depth based on daily precipitation and temperature. The daily snowmelt rate for a 1000-year event, estimated from the 1,000-year 24-hour rainfall and the average daily temperature from April to May, was 8.5 mm/day.

Different approaches were used in the RDCK (2020) to assess extreme precipitation events and snowmelt. A regional analysis was implemented that included data from 22 climate stations within 150 km to establish a long-term synthetic period of record for air temperature, precipitation, wind speed, and snowmelt. The regional precipitation database was used to estimate site rain intensity-duration-frequency statistics. The site 24-hour PMP was estimated using the Hershfield method same as Tetra Tech EBA (2014) but assessed with a multi-station regional perspective in addition to the single-station site-specific data. Estimated PMP was 202 mm using site-adjusted data, and 229 mm using the regional data.

Snowmelt was estimated using a daily energy balance model obtained online, described as “a subroutine in R (CRAN 2016) called SnowMelt from the library EcoHydrology (Walter et al. 2005).” The snowmelt model was validated using ten years of snow depth and SWE data from a nearby snow pillow station at Redfish Mountain (MENV Station 2D14P).

Rainfall intensity-frequency results and PMP from RDCK (2020) presented in Table 19 are before incorporation of probabilistic climate change modelling results to address future climate change effects.

**Table 19: Rainfall Intensity-Frequency after RDCK (2020)**

Return Period (Years)	24-Hour Rainfall (mm)
10	53
50	66
100	71
200	76
24-hour PMP	229

Estimated maximum daily snowmelt depths were computed for return periods ranging from 1 in 2-year to 1 in 100-year, with a 100 year daily snowmelt depth of 40 mm. The report did not provide statistics for SWE amounts that can be compared to the snowmelt estimates in Tetra Tech EBA (2014). According to RDCK (2020) climate change models forecast that by the year 2100, the mean annual air temperature would increase by +1.9% (degrees Kelvin), the mean annual precipitation would increase by 66 mm (+9%), mean annual wind speeds would increase by 1.9%, and 100-year maximum snowmelt would increase by 35%. The modelling resulted in a climate-change-adjusted 24-hour PMP of 250 mm.

Recent independent estimates of PMP amounts based on storm maximization and transposition techniques are available from the [Metportal data site for the 2020 BC Extreme Flood Study](#)<sup>2</sup>. Based on three sites in proximity to the project site at elevation 800 m, the sites 24-hour small-area PMP at the site is expected to be in the range of 117 mm (from transposition point 6746 at elevation 718 m) to 137 mm (from transposition point 6645 at elevation 1524 m).

Estimates of precipitation frequency quantiles and PMP from the RDCK (2020) are higher than from the 2014 DSR (Tetra Tech EBA, 2014), by factors of about 1.3 for both 100-year and PMP 24-hour durations. While both approaches provide credible estimates, Tetra Tech prefers the methodology that emphasizes the use of long periods data recorded in close proximity to the site per the 2014 DSR (Tetra Tech EBA, 2014) rather than the alternative regional analysis approach that relies on elevation-dependent relationships determined from relatively distant stations. A site 24-hour PMP estimate of 173 mm, based on the 2020 BC Extreme Flood Study which used a storm maximization methodology is considered to be more accurate than either of the lower PMP estimates from the prior studies that used a statistical approach.

### 6.3.3 Inflow Design Flood (IDF)

IDF is a function of dam consequence class. The 2014 DSR (Tetra Tech EBA, 2014), and current DSR (discussed in the next section) both classify the dam as “Very High” consequence rating, therefore, the IDF will be the PMF.

In DSR 2014 (Tetra Tech EBA, 2014), the peak inflow to the HB reservoir during the 1,000-year return period flood was determined to be 15.2 m<sup>3</sup>/s, and the PMF peak flow to the HB Dam reservoir was determined to be 51.5 m<sup>3</sup>/s. Therefore, IDF peak inflow is computed to be  $15.2 + \frac{2}{3}(51.5 - 15.2) = 39.3$  m<sup>3</sup>/s.

<sup>2</sup> [ri-metportal.shinyapps.io/bc\\_region/](https://ri-metportal.shinyapps.io/bc_region/) Full citation: DTN and MGS Engineering (2020). British Columbia Extreme Flood Project, MetPortal User’s Guide - Probable Maximum Precipitation and Precipitation-Frequency Analysis for British Columbia (Bulletin 2020-5-PMP/RPFA). Report prepared by DTN, LLC and MGS Engineering Consultants, Inc. for the British Columbia Ministry of Forests, Lands, Natural Resources Operations, and Rural Development. December 2020.

RDCK (2020) re-estimated the PMP, used to model the PMF, inflow with different methods and considered climate change. On that basis, PMF peak flow in year 2100 estimated to be 70 m<sup>3</sup>/s, which is significantly larger than previously accounted value of 51.5 m<sup>3</sup>/s. This can increase the IDF. However, results from the BC Extreme Flood Study suggest that the RDCK (2020) updated PMP and resulting PMF estimates may be too high.

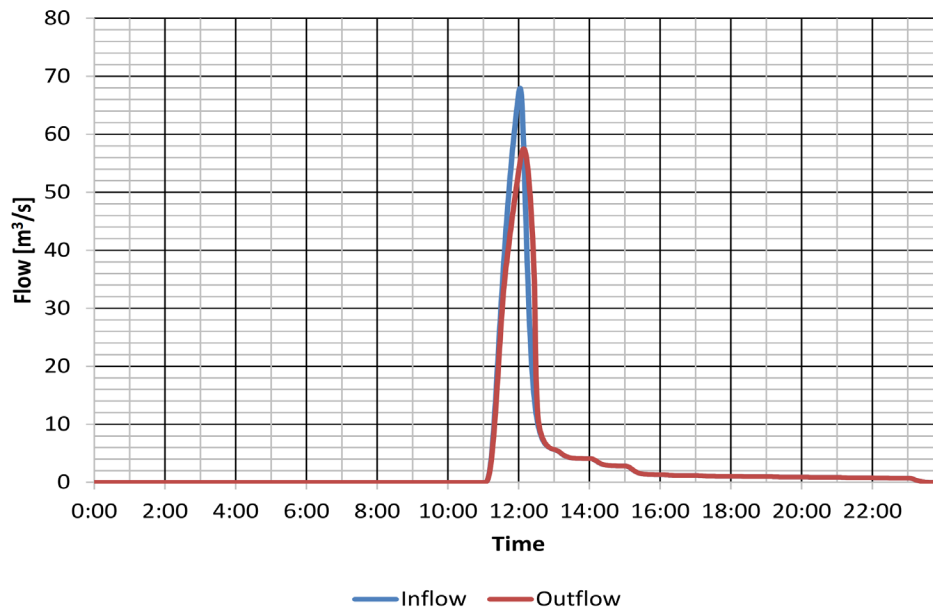
### 6.3.4 Flood Routing through Spillway

RDCK (2020) provided an upgraded spillway design, sized to convey the PMF. According to Remediation and Closure Construction Record Report (SRK Consulting (Canada), 2023a) it has now been constructed at the west abutment at an invert elevation of 705.8 m, which corresponds to an elevation that is 0.5 m below the top of the dam filter layer.

Spillway design and flood routing is explained in Appendix C-5 of RDCK (2020) HB Mine Tailings Facility Remediation and Closure Plan was reviewed. Table 20 shows the stage-storage upstream of the HB Dam and Figure 8 shows the result of flood routing.

**Table 20: HB Dam Upstream Stage-Storage (Appendix C-5 of RDCK, 2020)**

Elevation (m)	Depth above spillway invert (m)	Storage Volume (m <sup>3</sup> )
705.8 (spillway invert)	0.0	0
706.0	0.2	10
707.0	1.2	643
708.0	2.2	4,331
709.0	3.2	43,174
710.0	4.2	123,568
711.0 (dam crest)	5.2	250,000



**Figure 8: Routed PMF Hydrograph (Appendix C-5 of RDCK, 2020)**

The facility can convey the IDF magnitude of 70 m<sup>3</sup>/s (PMF) with a peak spillway discharge of 58 m<sup>3</sup>/s (RDCK, 2020). During the passage of this flood, maximum water level will be equal to 708.63 m.

### 6.3.5 Wind and Wave Analysis

As stated in previous section, maximum water level during passage of IDF will be 708.63 m. RDCK (2020) calculated wind set-up and wave run-up to be 0.04 m and 0.9 m respectively, for a windstorm event with frequency of 1 in 2 years. Details of this calculation is available in Appendix C-5 of RDCK (2020). Adding wind set-up and wave run-up to the maximum water level during passage of IDF yields a maximum elevation of 709.57, which is lower than dam crest elevation. Therefore, available freeboard is sufficient to safely pass the IDF.

## 6.4 Consequence Classification

### 6.4.1 Consequence Classification Criteria

The consequence classification of a dam is selected using the highest rating based on loss of life, economic and social losses, and environmental and cultural losses. The consequences are considered incrementally to those that would have occurred in the same event without failure of the dam. The CDA Guidelines (2013) define incremental consequence of failure as:

*“The incremental consequences or damage that a dam failure might inflict on upstream areas, downstream areas, or on the dam itself, over and above any losses or damage that may have occurred in the same event, or conditions had the dam not failed.”*

The HSRC for Mines in British Columbia (2024) has been updated since the 2014 DSR. Table 21 presents the consequence classification criteria in according to the 2024 HSRC.

**Table 21: Consequence Classification Criteria (2024 HSRC)**

Potential Losses				
Consequence of Potential TSF or Dam Failure Scenarios	Potential Loss of Life	Environment	Health, Social & Cultural	Infrastructure and Economics
<b>Low</b>	none	Minimal short- term loss of environmental values. No expected impact on livestock or fauna drinking water. Limited area of impact and restoration feasible in short term.	Minimal effects and disruption of business and livelihood. No measurable effects on human health. No disruption of heritage, recreation, community or cultural assets.	Low economic loss: area contains limited infrastructure or services.
<b>Significant</b>	none	Limited loss or deterioration of environmental values. Potential contamination of livestock or fauna water supply. Moderate area of impact and restoration possible.	Limited effects and disruption of business and livelihood. No measurable effects on human health. Limited loss of regional heritage, recreation, community or cultural assets.	Moderate economic loss: losses to recreational facilities, seasonal workplaces and infrequently used transportation routes.
<b>High</b>	1 - 10	Significant loss or deterioration of critical environmental values. Potential contamination of livestock or fauna water supply. Potential area of impact 5 km <sup>2</sup> to 20 km <sup>2</sup> . Restoration possible within a moderate time frame.	Many people affected by disruption of business, services or social dislocation. Significant loss of regional heritage, recreation, community or cultural assets. Potential for some short-term human health effects.	High economic loss: losses affecting infrastructure, public transportation, commercial facilities or employment. Moderate relocation costs and/or compensation to communities.
<b>Very High</b>	10 to 100	Major loss or deterioration of critical environmental values including rare and endangered species of high significance. Potential area of impact >20 km <sup>2</sup> . Restoration or compensation possible but very difficult and requires a moderate to long time frame.	A high number of people affected by disruption of business, services or social dislocation for more than one year. Significant loss of national heritage, recreation, or community facilities or cultural assets. Significant long-term human health effects.	Very high economic loss: losses affecting important infrastructure, services (e.g., highway, industrial facilities or storage facilities for dangerous substances) or employment. High relocation costs and/ or compensation to communities.
<b>Extreme</b>	> 100	Catastrophic loss of critical environmental values including rare and endangered species of high significance. Very large areas of potential impact. Restoration or compensation in kind impossible or requires a very long time.	A large number of people affected by disruption of business, services, or social dislocation for years. Significant national heritage or community facilities or cultural assets destroyed. Potential for Severe and/or long-term human health effects.	Extreme economic loss: losses affecting critical infrastructure or services (e.g., hospital, major industrial complex, major storage facilities for dangerous substances or employment. Very high relocation costs and/or compensation to communities and very high social readjustment costs.

The CDA Guidelines (2013) recommends that incremental losses from hypothetical failure should be evaluated for two scenarios:

1. Sunny-day (fair weather/normal operations) – sudden failure that may be caused by internal erosion, piping, earthquake, mis operation leading to overtopping, or another event.
2. Flood-induced – failure resulting from a natural flood of a greater magnitude than the dam can safely pass.

Typically, for earthfill dams, both overtopping and piping failure are considered when assigning a consequence classification. The simplest and most conservative procedures may be applied as a first approximation, and more detailed analysis can be conducted if necessary.

The Dam Consequence Classification is applied to establish guidelines for selecting design parameters, such as the IDF and the Earthquake Design Ground Motion (EDGM), and the standard of care expected of owners for the facility. The BC Dam Safety Regulation (2023) does not provide guidance on IDF and EDGM to use based on the Consequence Category. Accepted practice in Canada uses the CDA Dam Safety Guidelines (CDA, 2013) to determine the IDF and EDGM for a particular dam from its Consequence Category.

The recommended minimum seismic and flood criteria – annual exceedance probability – are presented in Table 22, according to the 2024 HSRC.

**Table 22: Minimum Seismic and Flood Criteria – Annual Exceedance Probability**

Failure Consequence Classification	Flood Criteria			Seismic Criteria		
	TSFs	Dams	Final Closure	TSFs	Dams	Final Closure
Low	1/3rd Between 1/1,000 and PMF	1/200	PMF	1/2,475	1/200	1/10,000 or MCE
Significant		between 1/200 and 1/1,000			between 1/200 and 1/1,000	
High	1/3rd Between 1/1,000 and PMF			1/2,475		
Very High	2/3 Between 1/1,000 and PMF			1/2 Between 1/2,475 and 1/10,000 or MCE		
Extreme	PMF			1/10,000 or MCE		

PMF: Probable Maximum Flood  
 MCE: Maximum Credible Earthquake

The CDA Guidelines 2023 recommends FOS to use for slope stability assessments (Table 23). FOS is the ratio of the forces resisting slope failure and the forces driving a slope failure. An embankment with an FOS of 1.0 is at equilibrium (the forces driving slope movement are approximately equal to the forces resisting slope movement) so is marginally stable and likely deforming. A FOS above 1.0 indicates the slope is stable.

**Table 23: CDA Minimum Factors of Safety for Slope Stability – Static Assessment**

Loading Condition	Minimum Factor of Safety	Slope
Long Term (steady state seepage, normal reservoir level)	1.5	Downstream
Full or partial rapid drawdown	1.2 – 1.3	Upstream slope where applicable

The CDA Guidelines also recommends minimum FOS for seismic assessment of both the upstream and downstream slopes as outlined in Table 24.

**Table 24: CDA Minimum Factors of Safety for Slope Stability – Seismic Assessment**

Loading Conditions	Minimum Factor of Safety	Slope
Seismic	1.0	Upstream and Downstream
Post-earthquake	1.2 – 1.3	Upstream and Downstream

The CDA Dam Safety Guidelines (2013) do not specify what proportion of the Peak Ground Acceleration (PGA) to consider as a horizontal seismic coefficient to represent the seismic load. It is standard practice to consider either a proportion of the full PGA for which an FOS of 1.0 in the pseudo-static analysis would represent an acceptable level of displacement or the full PGA value with an estimated magnitude of displacement that would occur if the pseudo-static analysis indicates an FOS less than 1.0. However, as discussed above, for the HB Tailings Dam, the pseudo-static analysis is not considered best practice, and a post-seismic deformation analysis is required.

## 6.4.2 Review of Consequence Classification

DSR 2014 (Tetra Tech EBA, 2014) classified the dam consequence as ‘Very high’, dictated by economic/social losses. Consequence classification is the function of three types of impacts: loss of life, environmental/cultural losses, and economic/social losses. Each impact is separately reviewed in the subsections below.

### 6.4.2.1 Potential Loss Of Life

DSR 2014 (Tetra Tech EBA, 2014) identified 1 residential property in the inundation zone of a potential HB tailings dam breach. Other than that private residential property, there is also part of Crowsnest Highway in the inundation zone. According to Census 2011, the average household size in Salmo, BC, was 2.2 persons, and 4 persons were assumed to be using the road at the breach (flood arrival) instance. This makes up 6.2 persons population at risk. The Brown and Graham (1988) method was used as a means to calculate loss of life as a fraction of population at risk. With the rationale that there is no permanent observer at the dam site, warning time was estimated less than 15 minutes. According to Brown and Graham (1988) when warning time is less than 15 minutes, loss of life is equal to half of population at risk, i.e. ~ 3 persons.

In this study, inundation area was scanned using most recent google satellite images and Alayne Hamilton of RDCK was consulted to understand any changes in population at risk. It is understood that there is still only one residence below the dam within the inundation zone, which has been uninhabited for many years. The infrastructure below the site (highway, Fortis power line, and Fortis high pressure gas line) has remained the same since the last review. Census 2021 confirms that the average household size in Salmo is 2.0 persons (0.2 persons less than 2011). Therefore, with considering 4 persons as transient population using the Crowsnest Highway, population at risk is 6.0 persons. Tetra Tech agrees with the assumption that was made in last DSR, i.e., because the dam site is

unmanned, warning time is less than 15 minutes that results in 50% fatality rate according to Brown and Graham (1988). This yields a potential loss of life of ~ 3.0 persons, which put the dam in “High” classification from a life loss point of view.

#### 6.4.2.2 Environmental losses

BC Species and Ecosystems Explorer of BC Ministry of Environment was used in this study, and it was found that similar to last DSR, there is no red<sup>3</sup> or blue<sup>4</sup> listed species situated in the inundation area. This means that in the event of dam breach, important fisheries or wildlife habitat loss will not take place. Also, any elements of critical cultural value were not identified in the potential inundation zone. Hence, dam classification from an environmental and cultural perspective remains “significant”, as previously outlined by DSR 2014 (Tetra Tech EBA, 2014).

CDA recently published new guideline for environmental consequence classification (Technical Bulletin: Revision of Consequence of Failure – Environmental Consequence Classification, 2023). The 2023 CDA outlines a detailed step by step process that considers ecological impact, intrinsic hazard of contents (tailings and fluid) and duration of impact (post-mitigation) due to dam breach.

#### 6.4.2.3 Infrastructure and Economics / Health, Social & Cultural losses

Crowsnest Pass Highway (BC 3) is located almost 600 m downstream of the dam. Previous inundation study shows in the event of dam breach, an approximate length of 1 km of the highway gets inundated. As per downstream consequence of failure classification interpretation guideline, issued by Ministry of Forests, Lands, and Natural Resources Operations of BC (2017), washout of primary and secondary highways due to dam breach grants assignment of “very high” classification to the dam. Therefore, HB is classified as “very high” from economic/social loss aspect.

Among all dam classification criteria, i.e., loss of life, environmental and cultural losses, and economic/social losses, the latter showed the most critical rating. HB Dam classification will remain ‘Very High’, therefore, the recommended design criteria for this classification include a flood “PMF”, and a seismic “1/10,000 or MCE”, according to the 2024 HSRC.

## 7.0 DAM SAFETY MANAGEMENT SYSTEM REVIEW

### 7.1 Dam Safety Principles Assessment

The core of a DSR is a review of the Dam Safety Management System (DSMS) according to the Dam Safety Principles presented in the CDA Guidelines. This is a high-level assessment, which focuses on what can be called the four pillars of a DSMS:

<sup>3</sup> Includes any native species or ecological communities that have, or are candidates for, Extirpated, Endangered, or Threatened status in British Columbia. Extirpated species no longer exist in the wild in British Columbia, but do occur elsewhere. Endangered species and ecological communities are facing imminent extirpation or extinction. Threatened species and ecological communities are likely to become endangered if limiting factors are not reversed. Not all Red-listed species or ecological communities will necessarily become formally designated. Placing species or ecological communities on these lists flags them as being at risk and requiring investigation.

<sup>4</sup> Includes any native species or ecological community considered to be of Special Concern (formerly Vulnerable) in British Columbia. Species or ecological communities of Special Concern have characteristics that make them particularly sensitive or vulnerable to human activities or natural events. Blue-listed species or ecological communities are at risk, but are not Extirpated, Endangered or Threatened.

- Owner Commitment to Dam Safety.
- Regular Dam Safety Reviews and Inspections.
- Effective Operation, Management, and Surveillance Protocols.
- Effective Emergency Preparedness Plans (EPP).

The Dam Safety Principles used in this assessment are presented in the CDA Guidelines (CDA, 2007). In general, there are five categories of dam safety principles listed as follows:

- Principle 1 – Dam Safety Management System (four sub-principles).
- Principle 2 – Operations, Maintenance, and Surveillance (five sub-principles).
- Principle 3 – Emergency Preparedness (four sub-principles).
- Principle 4 – Dam Safety Review (two sub-principles).
- Principle 5 – Analysis and Assessment (four sub-principles).

Table 25 lists the principles and sub-principles and indicates where HBTF conforms (C) with these principles or does not confirm (NC). If it is not clear, then it is indicated as unknown (UN). Based on the principles assessment results, HBTF is in conformance with the CDA's principles.

**Table 25: Dam Safety Principles Assessment Results**

Principle	Dam Safety Management System	C	NC	UN	Comment/Recommendation
1a	The public and the environment shall be protected from the effects of dam failure, as well as release of any or all of the retained fluids behind a dam, such that the risks are kept as low as reasonably practicable.	✓			HBTF was designed considering the 'Very High' consequence classification.
1b	The standard of care to be exercised in the management of dam safety shall be commensurate with the consequences of dam failure.	✓			Design of the dam and associated structures are in accordance with the current consequence classification.
1c	Due diligence shall be exercised at all stages of a dam's life cycle.	✓			Adequate instrumentation and surveillance program in place. The performance of the dam is regularly reviewed by EOR.
1d	A dam safety management system, incorporating policies, responsibilities, plans and procedures, documentation, training, and review and correction of deficiencies and nonconformances, shall be in place.	✓			The current OMS Manual (Ver. 5, 2023) is being updated. Draft Updated OMS Manual (Ver. 6, 2024) has been issued.
Principle	Operations, Maintenance, and Surveillance	C	NC	UN	Comment/Recommendation
2a	Requirements for the safe operation, maintenance, and surveillance of the dam shall be developed and documented with sufficient information in accordance with the impacts of operation and the consequences of dam failure.	✓			The current OMS manual is complete and covers all required components. However, there are improvements that should be made to the document to reflect ongoing changes and updates.
2b	Documented operating procedures for the dam and flow control equipment under normal, unusual, and emergency conditions shall be followed.	✓			The site is not currently an operating mine. However, a dam failure would have significant consequences based on the current consequence classification. The Quantifiable Performance Objectives (QPOs) currently measurable for the facility in its current closure-passive phase along with the available information are included in the Trigger and Action Response Plan.
2c	Documented maintenance procedures shall be followed to ensure that the dam remains in a safe and operational condition.	✓			Historical maintenance and maintenance procedures are documented in the OMS Manual and followed.
2d	Documented surveillance procedures shall be followed to provide early identification and to allow for timely mitigation of conditions that might affect dam safety.	✓			Surveillance procedures with instrumentation monitoring and alert levels are documented in the OMS Manual and followed.

**Table 25: Dam Safety Principles Assessment Results**

2e	Flow control equipment shall be tested and be capable of operating as required.	✓			The site is not currently an operating mine.
Principle	Emergency Preparedness	C	NC	UN	Comment/Recommendation
3a	An effective emergency management process shall be in place for the dam.	✓			EPRP document (Ver. 6, 2023) is in place.
3b	The emergency management process shall include emergency response procedures to guide the dam operator and site staff through the process of responding to an emergency at a dam.	✓			Included in the EPRP document.
3c	The emergency management process shall ensure that effective emergency preparedness procedures are in place for use by external response agencies with responsibilities for public safety within the floodplain.	✓			Included in the EPRP document.
3d	The emergency management process shall ensure that adequate staff training, plan testing, and plan updating are carried out.	✓			Training, testing, and updating requirements are included in the EPRP document.
Principle	Dam Safety Review	C	NC	UN	Comment/Recommendation
4a	A safety review of the dam ("Dam Safety Review") shall be carried out periodically.	✓			This is the 2024 DSR being completed at the appropriate time.
4b	A qualified registered professional engineer shall be responsible for the technical content, findings, and recommendations of the Dam Safety Review and report.	✓			A team of qualified professional engineers is preparing the 2024 DSR under the leadership of a qualified professional engineer. The RDCK and EOR will follow and implement the recommendations.
Principle	Analysis and Assessment	C	NC	UN	Comment/Recommendation
5a	The dam system and components under analysis shall be defined.	✓			They are defined adequate in the 2021-22 Remediation and Closure Construction Record Report and its attached analysis reports/memos.
5b	Hazards external and internal to the dam shall be defined.			✓	They are defined adequate in the Potential Failure Modes Analysis (PFMA) and risk register developed by SRK in 2018 and reviewed in the 2023 annual DSI. Additional geotechnical investigation is being planned to be conducted during the installation of the new piezometers (see section 6.2 above).

**Table 25: Dam Safety Principles Assessment Results**

					The PFMA and risk register need to be updated based on the findings from the geotechnical investigation, as well as re-evaluation of seismic deformation analysis (including liquefaction susceptibility).
5c	Failure modes, sequences, and combinations shall be identified for the dam.	✓			They are identified adequate in the PFMA report developed by SRK in 2018 and reviewed in the 2023 annual DSI.
5d	The dam shall safely retain the reservoir and any stored solids, and it shall pass flows as required for all applicable loading conditions.	✓			The site is not currently an operating mine. A spillway is in place that passes flows as required.

## 7.2 Owner Commitment to Dam Safety

RDCK has been showing its commitment to dam safety for the HBTF through developing and updating the following DSMS documents:

- OMS Manual
- EPRP
- Annual formal site inspections
- Weekly Visual and Monthly Routine inspections
- Commissioning the 2024 DSR

Tetra Tech reviewed all the DSMS documents provided by RDCK. The DSMS documents are generally adequate for HBTF with the following improvements.

According to the HSRC for 'Very High' consequence dam:

- Continue to conduct the annual formal site inspections;
- Review the OMS Manual annually by a qualified TSF or dam professional, as applicable, and the EOR, with updates implemented as deemed appropriate by the EOR;
- Review emergency contact information in EPRP annually and, if necessary, revise and submit revision to DSO;
- Continue to collect readings from instrumentation and analyze and interpret the readings annually (at least) or during the routine inspections as specified by OMS Manual;
- Ensure DSR is carried out every 10 years, and submit the DSR report to DSO; and
- Conduct weekly site surveillance during the freshet period (Mid-March to Mid-April), as requested by the OMS Manual.

The following sections outline some suggestions for improving the purpose and function of the DSMS documents.

## 7.3 Review of Operation, Maintenance, and Surveillance Manual

As defined by the CDA Dam Safety Guidelines 2007 (2013 Edition), an OMS Manual is a means to provide both experienced and new staff with the information they need to support the safe operation of a dam. Operation, maintenance, and surveillance of a dam include a number of activities and constraints defined to ensure that the dam is appropriately managed in a safe manner. The CDA Guidelines also request documentation of procedures and practices to ensure the safe operation of the dam under various conditions. Tailings dams pose unique operational and maintenance challenges due to their phased construction over the mine's lifespan. The Mining Association of Canada offers comprehensive guidelines on tailings management and dam operation, maintenance, and surveillance, providing essential guidance for the mining industry.

As part of the scope of this DSR, Tetra Tech reviewed the current revision (Version 6 - Draft) of the OMS Manual for the HBTF, issued in May 2024. The original version (Version 1) of the OMS Manual was initially prepared in July 2015 by RDCK. Version 6 is a major overhaul of the OMS Manual, aligning its structure with the 2021 MAC format. Key changes to content and procedures include:

- **Streamlined Content:** Site history and site conditions are now primarily located in Appendices B and C of the OMS Manual for conciseness.
- **Enhanced Governance:** Section 2 (OMS Governance) provides expanded details on roles, responsibilities, training, competency, succession, and transition planning.
- **Revised TARP:** The Trigger and Action Response Plan (TARP) is consolidated in Appendix E of the OMS Manual for easy reference. Instrumentation triggers have been updated, and the TARP now includes performance objectives for visual observations of the dam, cover, and drainage channels. Event-driven hydrometric triggers have also been adjusted to reflect post-2022 construction performance.
- **Expanded Maintenance:** Section 5 (Maintenance) offers more detailed descriptions of typical maintenance activities and introduces a maintenance activity tracker in Appendix G of the OMS Manual.
- **Modified Surveillance:** Section 5 (Surveillance) provides additional specifics on tailings cover and drainage channel surveillance. Weekly visual inspections of the dam and tailings pond are no longer mandated.
- **Aligned Inspection Forms:** Routine inspection forms have been updated to correspond with the revised TARP and instrumentation triggers.

Tetra Tech recommends including the following items in the current version of the OMS Manual to improve the dam safety management system:

- It is understood that the current version of the OMS Manual (May 2024, Ver. 6.0) has been updated based on the Reclamation and Closure Construction Record (May 2023). The current version of the EPRP (February 2023) needs to be updated based on the 2023 Construction Records (**Recom-2024-DSR-10**).
- The Surveillance Monitoring and Frequency in the current OMS Manual (Table 6.1) should be updated to incorporate the followings (**Recom-2024-DSR-11**):
  - According to the HSRC, an Annual Facility Performance Report (AFPR) must be completed for the Facility by the EOR. This annual report should include a review of potential dam failure modes and identify whether the consequences of potential failure scenarios remain appropriate. This annual review ensures that the classification of the tailing dam remains current and reflects any changes in conditions or potential failure consequences. Tetra Tech recommends updating the OMS Manual to incorporate the recent changes in the HSRC regarding the AFPR, as well as revising the annual DSI to the AFPR and ensuring that its scope meets the requirements of the latest HSRC revision.
  - Additionally, the annual review should include an analysis and interpretation of the data collected during site surveillance and instrumentation monitoring. The analysis and interpretation of instrumentation monitoring data involve reviewing any unusual behaviors (anomalies) exhibited by the instruments, discussing their potential causes (e.g., environmental factors, equipment malfunctions, or operational changes), providing practical solutions to address these issues (e.g., recalibrating instruments, adjusting operational procedures, or implementing new technologies), and recommending appropriate mitigation measures to ensure the reliability and accuracy of the monitoring system.
  - Update the OMS Manual to include an annual review of the OMS by a qualified Tailing Storage Facility (TSF) or dam professional, as applicable, or the EOR, with updates implemented as deemed appropriate by the EOR.
- The previous version of the OMS Manual included a maintenance flowchart (Figure 7) that outlined the facility's maintenance process, responsibilities, documentation, and reporting protocol. Tetra Tech has noticed that this maintenance flowchart was missed in the current version of the OMS Manual. It is recommended to consider adding a maintenance flowchart in the next update of the OMS Manual (**Recom-2024-DSR-12**).

## 7.4 Review of Emergency Preparedness and Response Plan

The main purpose of the EPRP is to ensure a prompt and effective response to emergencies that could arise from the Facility. This includes minimizing potential harm to human health, the environment, and property by outlining specific procedures and responsibilities. Key objectives of an EPRP typically include risk identification and assessment, emergency response procedures, communication plan, resource allocation, training and emergency drills, and recovery and rehabilitation.

As part of the scope of this DSR, Tetra Tech reviewed the current revision (Version 6) of the EPRP for the HBTF, updated in February 2023. The original version (Version 1) of the EPRP was initially prepared in November 2014 by RDCK and updated in December 2014 and March 2015. Tetra Tech recommends incorporating the following items into the EPRP to enhance the dam safety management system:

- The list of the downstream property owners (no residents) should be called to confirm that the names and phone numbers are still current. The date of these calls should be added into the EPRP for future reference (**Recom-2024-DSR-13**).
- Tetra Tech notes that the current EPRP identifies emergency response levels as Alert Level, Emergency Level, and Failure Level, however, emergency levels have not been developed in this document. Tetra Tech recommends updating the EPRP to incorporate the Five-Step Dam Emergency Plan (DEP) Process including the following steps as outlined in the Instructions, Guide, and Templates for Preparing a Dam Emergency Plan in British Columbia (updated April 2024) by the Ministry of Water, Land, and Resources Stewardship (**Recom-2024-DSR-14**):

**Step 1:** Event Detection

**Step 2:** Emergency Level Determination

Level 1: Unusual Event; Slowly Developing

Level 2: Potential Dam Failure Situation; Rapidly Developing

Level 3: Urgent; Dam Failure Appears to be Imminent or is in Progress

**Step 3:** Notification and Communication

**Step 4:** Expected Actions

**Step 5:** Termination and Follow-up

## 8.0 CONCLUSIONS AND RECOMMENDATIONS

### 8.1 Background Review and Site Inspection

Based on the background review and the site inspection conducted, the tailing dam and appurtenant structures are reasonably safe; however, there is one dam safety deficiency and some minor, but noteworthy, conditions that require ongoing monitoring, maintenance, or repair, with recommendations listed and prioritized in Table 27.

## 8.2 Dam Safety Analysis

### 8.2.1 Geotechnical Review

The following conclusions were made based on the review of geotechnical aspects of the HB Dam:

- The most recent slope stability analysis completed in 2024 meets the minimum FOS criteria for static and seismic loading conditions (assuming a large-scale deformation would not occur due to seismic liquefaction of the original dam fill).
- While the toe berm expansion enhanced the FOS under seismic conditions, the seismic shear strength and deformation behavior of the original dam fill is not well understood, therefore, further investigation into the material properties and the risk of potential large-scale deformation should be undertaken.
- The revised piezometer trigger levels, completed in March 2024, reflects post-construction conditions, and the proposed interim piezometer triggers are reasonable which were subsequently incorporated into the Trigger Action Response Plan (TARP) in the updated OMS Manual.
- While pseudo-static FOS estimates are required for regulatory requirements, current best practices discourage the use of pseudo-static analysis if liquefiable materials are present, which can experience rapid strength loss. Therefore, the use of pseudo-static analysis should be discontinued for HB Dam.
- In December 2019, SRK conducted a seismic deformation analysis to estimate potential dam crest settlements caused by timber crib wall deterioration. Calculated upstream crest settlements were minimal (less than 1 cm), but the highest average crest settlement reached 16 cm. SRK recommended to account for potential timber crib rot-induced settlements when determining freeboard, incorporating the maximum expected settlement into these calculations.

### 8.2.2 Hydrotechnical Review

- The hydrotechnical analyses complies with current standard practices. The spillway can safely pass the IDF with sufficient capacity with adequate freeboard. According to RDCK's response to Question No. 2.5 in the Staff Questionnaire (Appendix F), the minimum freeboard was updated following the remediation and closure activities in 2021/2022. Consequently, Tetra Tech understands that the settlement caused by timber crib rot was accounted for in updating the freeboard, as recommended by the 2019 SRK deformation analysis report.

### 8.2.3 Consequence Classification

- The current consequence classification of 'Very High' for HB Dam is appropriate and are in accordance with the Mines Act and the Health, Safety and Reclamation Code (HSRC) in BC, as specified in the memorandum of understanding between the Ministry of Energy, Mines, and Low Carbon Innovation (EMLI), the Ministry of Environment (MoE), and the Ministry of Forests.

## 8.3 Dam Safety Management System

The OMS Manual (Ver. 6, 2024 Draft) and EPRP (Ver.6, 2023) have been recently updated and both are in satisfactory condition. A few recommendations for improvement are included in Section 7.0.

## 8.4 Prioritized List of 2024 DSR Recommendations

Based on the applicable regulations and guidelines provided in Section 2.0 above, the dam safety deficiencies and non-conformances are defined as follows:

- **Dam Safety Deficiencies:** *An unacceptable dam performance condition has been confirmed, based on the CDA Guidelines, BC Dam Safety Regulations, or other specified safety standard.*
- **Dam Safety Non-Conformances:** *Established procedures, systems, and instructions are not being followed, or, they are inadequate or inappropriate, and should be revised.*

Based on the background review and the site inspection conducted, the tailing dam and appurtenant structures are reasonably safe; however, there is one dam safety deficiency and one non-conformance and some minor, but noteworthy, conditions that require ongoing monitoring, maintenance, or repair. Table 26 and Table 27 provide suggested priorities, response durations, and a prioritized list of recommendations to enhance dam performance, respectively.

**Table 26: Suggested Priorities & Duration of Response**

Priority	Duration of Response (Year)
Very High	0.5
High	1
Medium	3
Low	5

**Table 27: Prioritized List of 2024 DSR Recommendations**

ID #	Existing Condition/Issue	Recommendation Report Section	Deficiency / Non-Conformance	Recommended Action	Priority
2024-DSR-01	The weekly site inspections were not regularly completed during the 2023 freshet period (Mid-March to Mid-April), in accordance with the OMS Manual. (Tetra Tech understands the water level tape was down for repairs during this period).	4.2	–	<ul style="list-style-type: none"> <li>Provide updated training on surveillance inspections annually before the freshet period and continue to conduct and document weekly site surveillance (visual inspections) during the freshet period, as outlined in the OMS Manual.</li> <li>Secure backups for key equipment to ensure continuous data collection (RDCK noted that an additional water level meter (manufactured by Heron Instruments) has been available since February 2024).</li> </ul>	High
2024-DSR-02	On January 11, 2023, the dam's performance was reported as 'abnormal' due to the formation of a pipe from the weir to the downstream side (with no flow passing over the weir). Despite the pipe not being repaired, the dam's performance was reported as 'normal' during the next routine inspection on February 16, 2023.	4.2	–	<p>Review and revise the OMS Manual to:</p> <ul style="list-style-type: none"> <li>establish a follow up procedure for any unusual site observations.</li> <li>add detailed description of any observed conditions in the site inspection report; and</li> <li>provide the OMS training for the site inspectors.</li> </ul>	High
2024-DSR-03	No rock slope study/assessment was conducted along the western slope of the bedrock spillway. Major failure of the rock slope may fully/partially block the bedrock spillway and decrease its discharge capacity.	5.2.3	–	Perform a rock slope stability study/assessment of the western slope of the bedrock spillway.	Medium
2024-DSR-04	Several surface erosion rills/gullies were observed on the western slope (exposed till) of the spillway outlet channel. Major failure of this slope may fully/partially block the spillway outlet channel and decrease the spillway capacity.	5.2.3	–	Update inspection forms to ensure ongoing monitoring of this area for signs of excessive surface erosion or potential slope instability, and implement repairs if erosion exceeds acceptable levels or significant instability is detected.	Medium
2024-DSR-05	A series of surface erosion rills/gullies were noted along the east slope of the berm. Some gullies have been developed considerably near the east abutment of the dam. The downstream east slope of the extended berm is prone to surface erosion and sloughing.	5.2.4	–	Repair this area, develop a surface water management plan (e.g., establish vegetation, install drainage ditches, etc.), and implement mitigation measures to control the runoff water along the crest and downstream slope of the extended berm.	High
2024-DSR-06	Surface eroded areas and tailings exposure were observed around the tailing impoundment area during the site inspection. Sparse vegetation was also found in some areas.	5.3	–	Repair the surface eroded areas and cover all tailing exposures with an approximate coverage of 30 cm and vegetation appropriately, as required.	Medium
2024-DSR-07	Water ponded areas were observed along the east side of the tailing impoundment area, north of the North Spur Channel. The low point areas and water ponding within these areas appear to be likely the result of the differential settlement.	5.3	–	Continue regular monitoring of the ponded areas in accordance with the OMS Manual and develop a plan to repair if needed.	Medium
2024-DSR-08	The seismic shear strength and deformation behavior of the original dam fill is not well understood and there is a risk of potential large-scale deformation due to seismic liquefaction.	6.1.3.1	Deficiency	The shear strength and deformation behavior of the original dam fill should be further investigated to fully understand seismic liquefaction hazard. Conduct further investigation on the material properties and a post-seismic deformation analysis to evaluate their performance under seismic loading.	High
2024-DSR-09	No information regarding the survey hubs and seepage flow trigger levels was made available to Tetra Tech for review.	6.2	–	Establish survey hub and seepage flow trigger levels and incorporate them into the TARP in the next revision of the OMS Manual.	High

**Table 27: Prioritized List of 2024 DSR Recommendations**

ID #	Existing Condition/Issue	Recommendation Report Section	Deficiency / Non-Conformance	Recommended Action	Priority
2024-DSR-10	It is understood that the current version of the OMS Manual has been updated (May 2024, Ver. 6.0) based on the HBTF Reclamation and Closure Construction Record (May 2023); however, the Emergency Preparedness and Response Plan (EPRP, February 2023) still needs to be updated based on the 2023 Construction Records.	7.3	–	Update the 2023 EPRP with reference to the HBTF Reclamation and Closure Construction Record (May 2023).	High
2024-DSR-11	The current OMS Manual needs to be updated to meet the HSRC requirements.	7.3	Non-Conformance	<ul style="list-style-type: none"> <li>Incorporate the recent changes in the HSRC regarding the AFPR, as well as revising the annual DSI to the AFPR and ensuring that its scope meets the requirements of the most recent HSRC revision.</li> <li>Ensure that the AFPR includes an analysis and interpretation of the data collected during site surveillance, instrumentation monitoring, and other relevant.</li> <li>Include an annual review of the OMS by a qualified TSF or dam professional, as applicable, and the EOR, with updates implemented as deemed appropriate by the EOR.</li> </ul>	Medium
2024-DSR-12	The previous version of the OMS Manual included a maintenance flowchart (Figure 7) that outlined the facility's maintenance process, responsibilities, documentation, and reporting protocol. It is noticed that this maintenance flowchart was missed in the current version (draft) of the OMS Manual.	7.3	–	Consider adding a maintenance flowchart in the next update of the OMS Manual.	Medium
2024-DSR-13	The accuracy of the names and phone numbers of the downstream property owners cannot be confirmed.	7.4	–	The list of downstream property owners (no residents) should be called to confirm that the names and phone numbers are still current. The date of these calls should be added to the EPRP for future reference.	High
2024-DSR-14	Emergency levels have not been developed in the current version of EPRP.	7.4	–	Update the EPRP to incorporate the Five-Step Dam Emergency Plan (DEP) Process including the steps as outlined in the Instructions, Guide, and Templates for Preparing a Dam Emergency Plan in British Columbia (updated April 2024).	High


## 9.0 LIMITATIONS OF THE REPORT

This report and its contents are intended for the sole use of the Regional District of Central Kootenay (RDCK) and their agents. Tetra Tech Canada Inc. (Tetra Tech) does not accept any responsibility for the accuracy of any of the data, the analysis, or the recommendations contained or referenced in the report when the report is used or relied upon by any Party other than the RDCK, or for any Project other than the proposed development at the subject site. Any such unauthorized use of this report is at the sole risk of the user. Use of this document is subject to the Limitations on the Use of this Document attached in Appendix H or Contractual Terms and Conditions executed by both parties.

## 10.0 CLOSURE

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

Respectfully submitted,  
Tetra Tech Canada Inc.

  
*A. R. Khoshboresh*  
704-ENG.DAMS03004-01  
704-ENG.DAMS03004-01  
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*For geotechnical aspects only*

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/tak

**PERMIT TO PRACTICE  
TETRA TECH CANADA INC.  
PERMIT NUMBER: 1001972**

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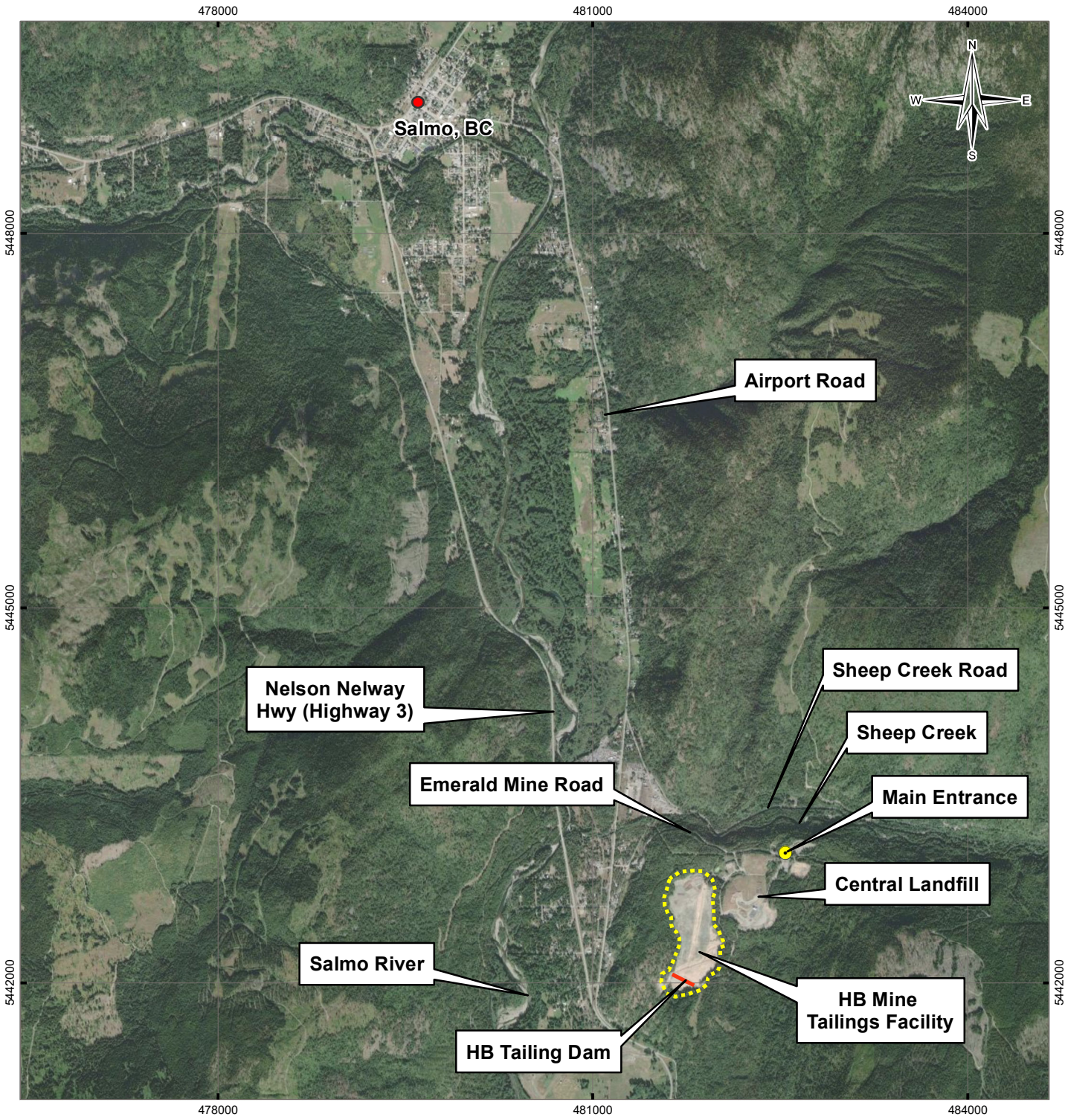
## APPENDIX A

**A.1: SITE LOCATION PLAN**

**A.2: GENERAL ARRANGEMENT OF HB TAILING FACILITY**

**A.3: GENERAL ARRANGEMENT OF HB DAM**

**A.4: TYPICAL CROSS-SECTION OF HB DAM**



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**LEGEND**

- - - - - HB Mine Tailing Facility
- HB Tailing Dam


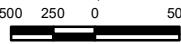

**NOTES**  
Base data source: ESRI Basemaps 2020



**STATUS**  
ISSUED FOR USE

**2024 DAM SAFETY REVIEW  
HB MINE TAILING FACILITY**

**Site Location**

<b>PROJECTION</b> UTM ZONE 11N	<b>DATUM</b> NAD83	<b>CLIENT</b> 
Scale: 1:45,000 500 250 0 500  Metres		
<b>FILE NO.</b> DAMS03004-01_HB_Mine_Site_Location_Figure1		
<b>OFFICE</b> Tl-VANC	<b>DWN</b> AV	<b>CKD</b> AV
<b>DATE</b> August 9, 2024	<b>APVD</b> AK	<b>REV</b> 0
<b>PROJECT NO.</b> ENG.DAMS03004-01		<b>CLIENT</b> 

**Figure A.1**

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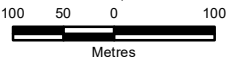


**LEGEND**

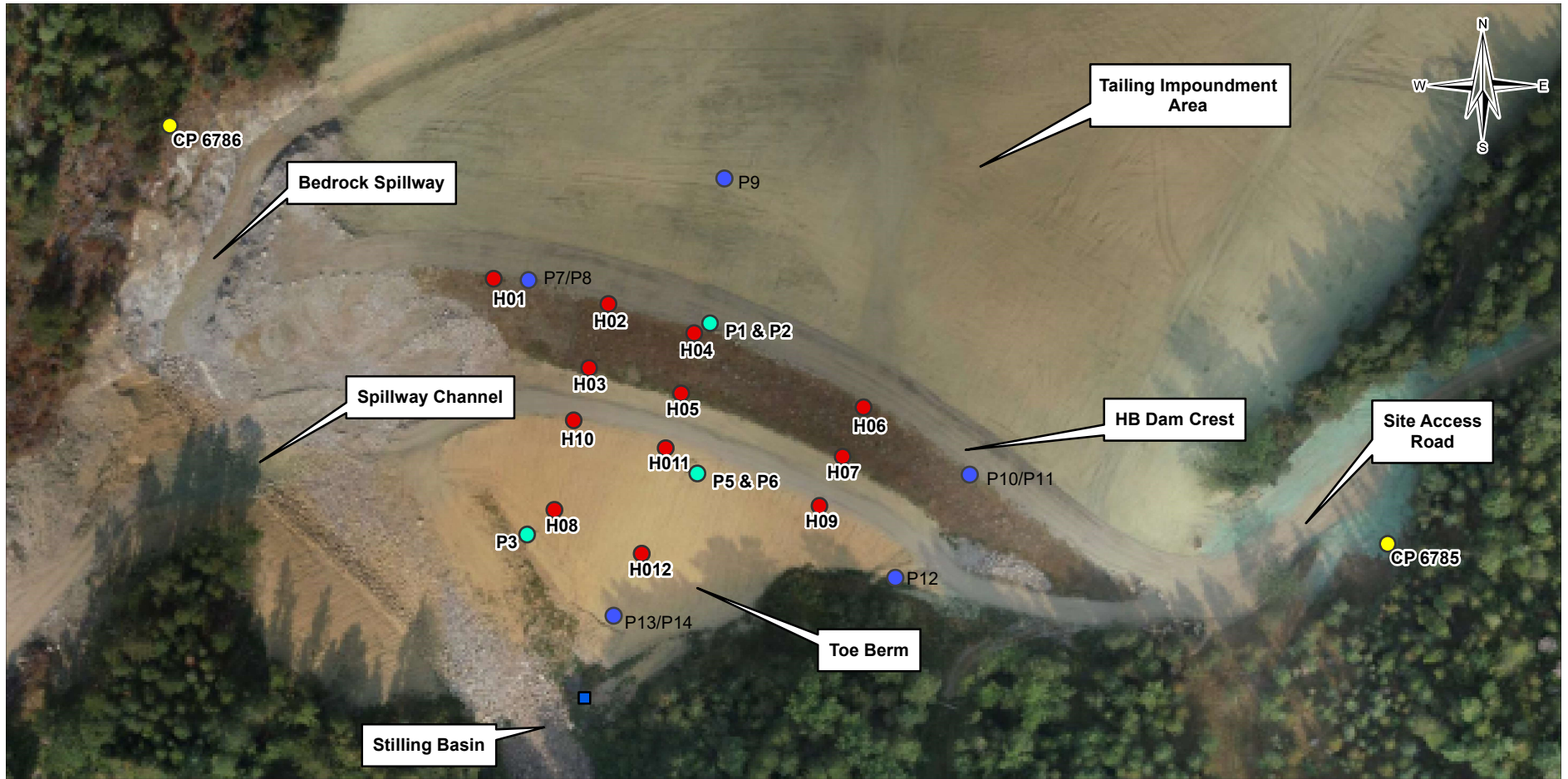
**NOTES**  
Base data source: ESRI Basemaps 2020

**2024 DAM SAFETY REVIEW  
HB MINE TAILING FACILITY**

**General Arrangement of HB Tailing Facility**

<b>PROJECTION</b> UTM ZONE 11N		<b>DATUM</b> NAD83		<b>CLIENT</b> 	
Scale: 1:7,500  Metres					
<b>FILE NO.</b> DAMS03004-01_HB_Mine_General_Arrangement2					
<b>OFFICE</b> Tl-VANC		<b>DWN</b> AV	<b>CKD</b> AV	<b>APVD</b> AK	<b>REV</b> 0
<b>DATE</b> August 9, 2024		<b>PROJECT NO.</b> ENG.DAMS03004-01			<b>Figure A.2</b>

**STATUS**  
ISSUED FOR USE

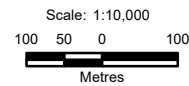


**LEGEND**

- Existing Standpipe Piezometer
- Proposed Piezometer (SRK, 2024)
- Survey Hubs
- Control Points
- V-Notch Seepage Weir

**NOTES**  
Base data source: ESRI Basemaps 2020

**STATUS**  
ISSUED FOR USE



**PROJECTION**  
UTM ZONE 11N

**DATUM**  
NAD83

**FILE NO.**  
DAMS03004-01\_HB\_Mine\_General\_Arrangement\_Figure3

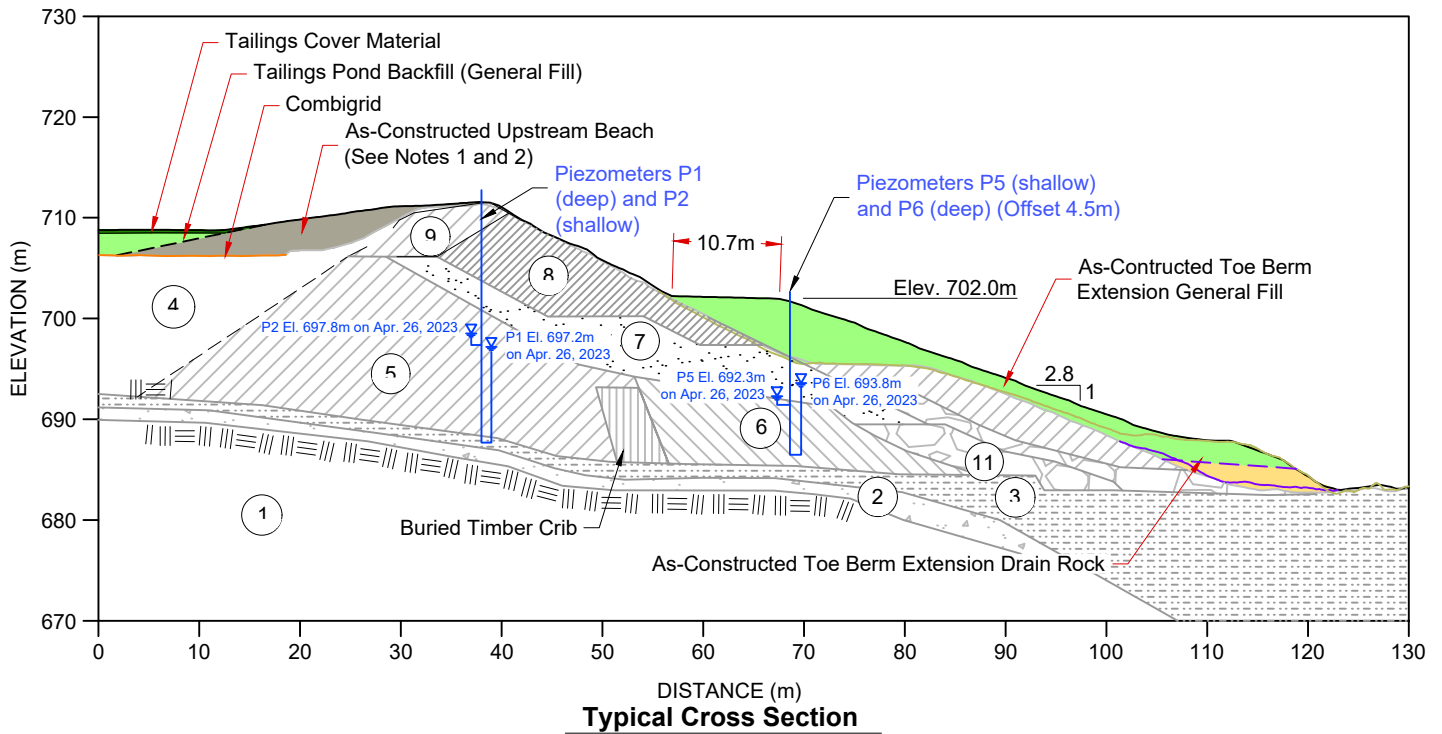
**CLIENT**

**2024 DAM SAFETY REVIEW  
HB MINE TAILING FACILITY**

**General Arrangement of HB Tailing Dam**

<b>OFFICE</b> TI-VANC	<b>DWN</b> AV	<b>CKD</b> AV	<b>APVD</b> AK	<b>REV</b> 0
<b>DATE</b> August 9, 2024	<b>PROJECT NO.</b> ENG.DAMS03004-01			

**Figure A.3**



**LEGEND**

**PRE-CONSTRUCTION MATERIALS**

- Geotextile
- [Zone 1 - Bedrock]
- [Zone 2 - Native Till]
- [Zone 3 - Native Glaciolacustrine]
- [Zone 4 - Tailings (1955 - 1978)]
- [Zone 5 - Original Dam (1955 - 1967)]
- [Zone 6 - Stabilizing Berm (1964 - 1967)]
- [Zone 7 - Filter Blanket (1974/75 and 1977)]
- [Zone 8 - Common Fill (1975 and 1977)]
- [Zone 9 - Select Impervious Fill (1975 and 1977)]
- [Zone 10 - Rock Toe Drain (1977)]
- [Zone 11 - Rock Drain (2005)]
- [Zone 12 - Till Toe Berm (2005)]
- [Zone 13 - Riprap (2005)]
- [Zone 14 - Repaired Filter Blanket (2012)]
- [Zone 15 - Repaired Till Fill (2012)]
- [Zone 16 - Coarse Rock Blanket and Shear Key (2012)]
- [Zone 17 - Weighted Filter (2016)]

**CONSTRUCTION MATERIALS**

- Combigrid
- Non-woven Geotextile
- General Fill
- Tailings Cover Material
- Toe Berm Drain Rock
- Upstream Beach Material

**NOTES**

ALL DIMENSIONS ARE SHOWN IN METRES, UNLESS OTHERWISE INDICATED. TYPICAL CROSS-SECTIONS & DETAILS ARE NOT TO SCALE.

CLIENT



2024 Dam Safety Review HB Mine Tailing Facility

Typical Cross-Section of HB Tailing Dam



PROJECT NO. ENG.DAMS03004-01	DWN AV	CKD AK	REV 0
OFFICE EDM	DATE August 08, 2024		

Figure A.4

STATUS  
ISSUED FOR USE

## APPENDIX B

### DSR ASSURANCE STATEMENT

# Dam Safety Review Assurance Statement

## for Dams Regulated under the Mines Act

### HB Mine Tailing Facility

Note: This statement is to be read and completed in conjunction with the current Professional Practice Guidelines – Legislated Dam Safety Reviews in British Columbia (Engineers and Geoscientists BC 2023) and is to be provided for Dam Safety Review Reports in accordance with permit conditions and the Health, Safety and Reclamation Code for Mines in British Columbia or the Dam Safety Regulation, B.C. Reg. 32/2023 as amended. Capitalized terms are defined in the Engineers and Geoscientists BC Guidelines. An assurance statement is required for each Dam that is assessed.

**Date:** May 26, 2025

**To:** The Dam Owner(s)

**Name:** Regional District of Central Kootenay (RDCK)

**Address:** Environmental Services, Box 590, 202 Lakeside Drive, Nelson, BC V1L 5R4

With reference to the permit conditions and the Health, Safety and Reclamation Code for Mines in British Columbia or the *Dam Safety Regulation*, B.C. Reg. 32/2023 as amended.

**For the Dam:**

**UTM (Location):** 481718.00 m E, 5442013.00 m N (Zone 11U)

**Located at (Description):** Approximately 7 km south of Salmo, BC

**Name of Dam or description:** HB Tailing Dam

**Dam function:** Tailing Storage

**Owned by:** RDCK

**Current Dam Consequence Classification is (check one):**

- Low
- Significant
- High
- Very High
- Extreme

I have signed, sealed, and dated the attached Dam Safety Review Report on the Dam in accordance with the Engineers and Geoscientists BC Guidelines, and have included a statement of qualifications as an individual or multidiscipline team lead in Appendix H of the Dam Safety Review Report. The above-referenced report must be read in conjunction with this statement. In preparing that report I have (check to the left of applicable items):

- 1. Collected and reviewed available and relevant background information, documentation, and data.
- 2. Reviewed the environmental objectives for the materials stored in the impoundment and related design requirements.
- 3. Understood the current Consequence Classification for the Dam, including performance expectations.
- 4. Undertaken an initial facility review.
- 5. Reviewed and assessed the Dam safety management obligations, systems, and procedures.
- 6. Inspected the physical condition of the Dam, impoundment area and relevant areas upstream and downstream of the facility.
- 7. Interviewed operations and maintenance personnel.
- 8. Interviewed the Engineer of Record.
- 9. Reviewed available maintenance and operating records, such as the Operation, Maintenance and Surveillance (OMS) Manual and the Dam Emergency Plan (DEP).
- 10. Confirmed proper functioning of Mine waste and water management systems and environmental control systems.
- 11. After the above, reviewed the appropriateness of the Consequence Classification, including the identification of required Dam safety criteria.
- 12. Carried out a Dam safety analysis based on the Consequence Classification in item 11 above.
- 13. Assessed facility performance and conformance with the design basis and operating criteria.
- 14. Identified, characterized, and determined the severity of Deficiencies in the safe operation of the Dam and Non-Conformances in the Dam safety management system.
- 15. Recommended actions to be taken in relation to Deficiencies and Non-Conformances if all or part of the Dam has been found to be “not safe”.
- 16. Prepared a Dam Safety Review Report for submittal to the Regulatory Authority by the Dam Owner and reviewed the report with the Dam Owner.
- 17. Reviewed the Dam Safety Review Report in compliance with Engineers and Geoscientists BC Bylaw Section 7.3.4.

Based on my Dam Safety Review, the current Dam Consequence Classification is (check one):

- Appropriate
- Should be reviewed and/or amended

I undertook the following type of Dam Safety Review (check one):

- Audit
- Targeted
- Comprehensive Detailed Design, Construction and Performance

I recommend the following type of Dam Safety Review as the subsequent review (check one):

- Audit
- Targeted
- Comprehensive Detailed Design, Construction and Performance

**Rationale:**

The facility is inactive, so no significant changes or major alterations to the tailings dam and associated structures are expected over the next five years. Regular surveillance, monitoring, and maintenance are being conducted to ensure the continued stability and safety of the facility. Therefore, an Audit type Dam Safety Review will be sufficient as the appropriate subsequent review. However, if additional work is completed due to Active/Passive Closure Plan, a Comprehensive Detailed Design, Construction and Performance type of Dam Safety Review will be required.

Where Established Good Practice (as captured in applicable guidance documents) differs from the regulatory requirements adopted by the Regulatory Authority, I have made the following distinction (check one):

- Where the regulatory requirements have not been met, I have made recommendations to achieve the regulatory requirements.
- Where the regulatory requirements have been met, I have made recommendations to improve the level of safety to comply with Established Good Practice.

I hereby give my assurance that, based on the attached Dam Safety Review Report, as of the date below (check one):

- The Dam **is Reasonably Safe, as defined in Section 3.1.2**, in that the Dam Safety Review did not reveal any Deficiencies or Non-Conformances in relation to the design, construction, maintenance, and operation of the Dam as set out in the attached Dam Safety Review Report.
- The Dam **is Reasonably Safe, as defined in Section 3.1.2**, but the Dam Safety Review did reveal Non-Conformances with the Health, Safety and Reclamation Code for Mines in British Columbia as set out in section(s) 6.1.3.1 and 7.3 of the attached Dam Safety Review Report.
- The Dam **will be Reasonably Safe, as defined in Section 3.1.2**, conditional on implementation of operational recommendations, captured in section(s) ..... of the attached Dam safety review report, to correct for the regulatory, procedural and operational Non- Conformances revealed by the Dam Safety Review.
- The Dam **is Reasonably Safe, as defined in Section 3.1.2**, but improvements can be made to comply with Established Good Practice as recommended in section(s) ..... of the attached Dam Safety Review Report.
- The Dam **is Not Safe** in that the Dam Safety Review revealed Deficiencies and/or Non-Conformances which require urgent action as set out in section(s) ..... of the attached Dam Safety Review Report.

*A. Khoshboresh*  
26 May 2015  
*For geotechnical aspects only*



Amir Khoshboresh, M.Eng., P.Eng.  
Senior Geotechnical Engineer

Dan Hajduković, Ph.D., P.Eng.  
Senior Water Resources Engineer

**Address:** Suite 1000, 10<sup>th</sup> FL., 885 Dunsmuir Street, Vancouver, B.C. V6C 1N5

**Telephone:** (604) 685-0275

**Name of Firm:** Tetra Tech Canada Inc.

**Permit to Practice Number:** 1001972

## APPENDIX C

### 2023 SITE SURVEILLANCE REPORTS



# ROUTINE INSPECTION FORM

HB MINE TAILINGS STORAGE FACILITY

PERMIT M-218

Page 1 of 2

Date: Jan 11, 2023 Name/Company: Alayna Hamilton / Rock  
 Time: 12:15 pm Weather: 0°C overcast

Supplies: Inspection form, clip board, keys, tape measure, camera, pencil/pen, flashlight, water level meter, safety vest

Facility Component	Satisfactory Condition?		Observations (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)
	Yes	No	
<b>Tailings Pond Backfill Area</b>			Note any disturbance / turbidity in pond Closely observe areas of suspect sinkholes
Erosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Ponded Water	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Crest</b>			Note any ponding on crest
Surface Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Slide/Slump	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Cover Channels</b>			Observe the channel areas immediately north of the Tailings Pond Backfill Area, particularly within 100 m of the spillway., note any changes
Erosion/ Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Liner Exposure	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Ponded Water	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Spillway</b>			Note any obstruction or excessive debris in spillway entrance/channel Note condition of temporary access road built over spillway, and two check dams.
Entrance	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<p><i>mostly snow covered</i></p> <p><i>Flow noted in channel just u/s of spillway</i></p> <p>Note turbidity of flow (circle which applies): <input checked="" type="radio"/> clear <input type="radio"/> cloudy</p>
Erosion/Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Channel Walls/Stilling Basin	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Flow?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	<i>yes</i>		
<b>Downstream Slope</b>			pipe has formed from weir to d/s side, so no flow is passing over weir, No evidence of us/ issues. Flow into weir is clear
Erosion/Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<p>Measurement Weir: _____ cm</p> <p>Note estimate of water bypassing weir <u>0</u> %</p> <p>Note turbidity of flow upstream of weir (circle which applies): <input checked="" type="radio"/> clear <input type="radio"/> cloudy</p>
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Toe Berm	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Seepage/Drainage	<input type="checkbox"/>	<input checked="" type="checkbox"/>	



# ROUTINE INSPECTION FORM

HB MINE TAILINGS STORAGE FACILITY

PERMIT M-218

Page 2 of 2

Facility Component	Satisfactory Condition? Yes No	Observation (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)																							
<b>West Abutment</b>		(abutment - where side of dam meets the spillway)																							
Erosion	<input checked="" type="checkbox"/> <input type="checkbox"/>																								
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/> <input type="checkbox"/>																								
Seepage/Drainage	<input checked="" type="checkbox"/> <input type="checkbox"/>	If seepage observed, note turbidity (circle which applies): clear cloudy																							
<b>East Abutment</b>		(abutment - where downstream side of dam meets the natural slope on east end - near parking end)																							
Erosion	<input checked="" type="checkbox"/> <input type="checkbox"/>	Note any observations of buttress, including: flow, turbidity - take pictures																							
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/> <input type="checkbox"/>																								
Seepage/Drainage	<input checked="" type="checkbox"/> <input type="checkbox"/>	If seepage observed, note turbidity (circle which applies): clear cloudy																							
<b>Wildlife</b>		Note any wildlife observed (species, number, sex, location, direction of travel, age (adult/juvenile))																							
<b>Instrumentation</b>		<table border="1"> <thead> <tr> <th></th> <th>Metres Below Top of Riser (mBTOR) (to cm)</th> <th>Alert Level Thresholds</th> <th>Measurement weir</th> </tr> </thead> <tbody> <tr> <td>P1</td> <td>15.25</td> <td>P1 &lt; 14.54 cm</td> <td rowspan="6"></td> </tr> <tr> <td>P2</td> <td>14.21</td> <td>P2 &lt; 12.84 cm</td> </tr> <tr> <td>P3</td> <td>6.58</td> <td>P3 &lt; 5.93 cm</td> </tr> <tr> <td>P5</td> <td>9.56</td> <td>P5 &lt; 8.53 cm</td> </tr> <tr> <td>P6</td> <td>8.43</td> <td>P6 &lt; 7.70 cm</td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table>		Metres Below Top of Riser (mBTOR) (to cm)	Alert Level Thresholds	Measurement weir	P1	15.25	P1 < 14.54 cm		P2	14.21	P2 < 12.84 cm	P3	6.58	P3 < 5.93 cm	P5	9.56	P5 < 8.53 cm	P6	8.43	P6 < 7.70 cm			
	Metres Below Top of Riser (mBTOR) (to cm)	Alert Level Thresholds	Measurement weir																						
P1	15.25	P1 < 14.54 cm																							
P2	14.21	P2 < 12.84 cm																							
P3	6.58	P3 < 5.93 cm																							
P5	9.56	P5 < 8.53 cm																							
P6	8.43	P6 < 7.70 cm																							
<b>Performance</b>		<input type="checkbox"/> normal → File with RDCK records. <input checked="" type="checkbox"/> abnormal → Advise RDCK: <b>Due to pipe in weir, no dam safety concern.</b> <ul style="list-style-type: none"> <li>- Alayne Hamilton (778) 317-1272</li> <li>- Amy Wilson (250) 352-8178 (t) / (250) 505-8146 (c)</li> <li>- Uli Wolf (250) 352-8168 (t) / (250) 505-3691 (c)</li> <li>- Peter Mikes, Engineer of Record, (250) 420-7296 (c) / (604) 601-8489 (t)</li> </ul> <p>Notify Ministry of Energy and Mines if unsafe dam conditions:  <ul style="list-style-type: none"> <li>- Jerrold Jewsbury (250)417-6007 (t) / (250)420-1860 (c)</li> </ul> <p>Notify Provincial Emergency Program if emergency event occurs:  <ul style="list-style-type: none"> <li>- 1-800-663-3456</li> </ul> </p></p>																							

Notes:

Signature:



# ROUTINE INSPECTION FORM

HB MINE TAILINGS STORAGE FACILITY

PERMIT M-218

Page 1 of 2

Date: Feb 16, 2023 Name/Company: Alayae Hamilton/RDCK

Time: 12:45 Weather: Mostly cloudy 0°C

Supplies: Inspection form, clip board, keys, tape measure, camera, pencil/pen, flashlight, water level meter, safety vest

Facility Component	Satisfactory Condition?		Observations (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)
	Yes	No	
<b>Tailings Pond Backfill Area</b>			Note any disturbance / turbidity in pond Closely observe areas of suspect sinkholes
Erosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Ponded Water	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Crest</b>			Note any ponding on crest
Surface Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Slide/Slump	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Cover Channels</b>			Observe the channel areas immediately north of the Tailings Pond Backfill Area, particularly within 100 m of the spillway., note any changes
Erosion/ Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>mostly snow covered but flow visible in some areas.</u>
Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Liner Exposure	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Ponded Water	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Spillway</b>			Note any obstruction or excessive debris in spillway entrance/channel Note condition of temporary access road built over spillway, and two check dams.
Entrance	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>snow covered</u>
Erosion/Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Channel Walls/Stilling Basin	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Flow?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
			Note turbidity of flow (circle which applies): <input checked="" type="radio"/> clear <input type="radio"/> cloudy
<b>Downstream Slope</b>			<u>pipe not repaired yet.</u>
Erosion/Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Measurement Weir: <u>Ø</u> cm Note estimate of water bypassing weir <u>0</u> % Note turbidity of flow upstream of weir (circle which applies): <input checked="" type="radio"/> clear <input type="radio"/> cloudy
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Toe Berm	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Seepage/Drainage	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

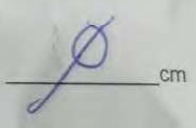


# ROUTINE INSPECTION FORM

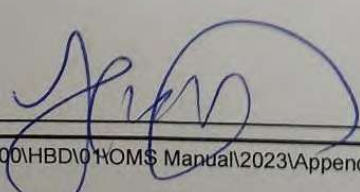
HB MINE TAILINGS STORAGE FACILITY

PERMIT M-218

Page 2 of 2

Facility Component	Satisfactory Condition?		Observation (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found) <i>(abutment - where side of dam meets the spillway)</i>
	Yes	No	
<b>West Abutment</b>			
Erosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Seepage/Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	If seepage observed, note turbidity (circle which applies): clear <input type="checkbox"/> cloudy <input type="checkbox"/>
<b>East Abutment</b>			<i>(abutment - where downstream side of dam meets the natural slope on east end - near parking end)</i>
Erosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note any observations of buttress, including: flow, turbidity - take pictures
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Seepage/Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	If seepage observed, note turbidity (circle which applies): clear <input type="checkbox"/> cloudy <input type="checkbox"/>
<b>Wildlife</b>	Note any wildlife observed (species, number, sex, location, direction of travel, age (adult/juvenile)) <i>Rabbit prints</i>		
<b>Instrumentation</b>			
P1	<u>15.01</u>	Metres Below Top of Riser (mBTOR) (to cm)	Alert Level Thresholds P1 < <u>14.54 cm</u>
P2	<u>14.21</u>	mBTOR	P2 < <u>12.84 cm</u>
P3	<u>6.50</u>	mBTOR	P3 < <u>5.93 cm</u>
P5	<u>9.72</u>	mBTOR	P5 < <u>8.53 cm</u>
P6	<u>8.30</u>	mBTOR	P6 < <u>7.70 cm</u>
			Measurement weir  cm
<b>Performance</b>	<input checked="" type="checkbox"/> normal → File with RDCK records. <input type="checkbox"/> abnormal → Advise RDCK: <ul style="list-style-type: none"> <li>- Alayne Hamilton (778) 317-1272</li> <li>- Amy Wilson (250) 352-8178 (t) / (250) 505-8146 (c)</li> <li>- Uli Wolf (250) 352-8168 (t) / (250) 505-3691 (c)</li> <li>- Peter Mikes, Engineer of Record, (250) 420-7296 (c) / (604) 601-8489 (t)</li> </ul> <p>Notify Ministry of Energy and Mines if unsafe dam conditions: - Jerrold Jewsbury (250)417-6007 (t) / (250)420-1860 (c)</p> <p>Notify Provincial Emergency Program if emergency event occurs: - 1-800-663-3456</p>		

Notes:

Signature: 



# ROUTINE INSPECTION FORM

HB MINE TAILINGS STORAGE FACILITY

PERMIT M-218

Page 1 of 2

Date: May 3, 2023 Name/Company: Alayno Rock  
 Time: 1:20pm Weather: Rain, 10°C

Supplies: Inspection form, clip board, keys, tape measure, camera, pencil/pen, flashlight, water level meter, safety vest

Facility Component	Satisfactory Condition?		Observations (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)
	Yes	No	
<b>Tailings Pond Backfill Area</b>			Note any disturbance / turbidity in pond Closely observe areas of suspect sinkholes
Erosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>No ponded water from heavy rains.</u>
Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Ponded Water	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<b>Crest</b>			Note any ponding on crest
Surface Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Slide/Slump	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Cover Channels</b>			Observe the channel areas immediately north of the Tailings Pond Backfill Area, particularly within 100 m of the spillway., note any changes
Erosion/ Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Liner Exposure	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Ponded Water	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Spillway</b>			Note any obstruction or excessive debris in spillway entrance/channel Note condition of temporary access road built over spillway, and two check dams.
Entrance	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>Slough at lower end of spillway does not appear to have gotten larger</u> Note turbidity of flow (circle which applies): <u>clear</u> cloudy
Erosion/Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Channel Walls/Stilling Basin	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Flow?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Downstream Slope</b>			Rilling still present poor vegetation establishment
Erosion/Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Measurement Weir: <u>46</u> cm Note estimate of water bypassing weir <u>0</u> % Note turbidity of flow upstream of weir (circle which applies): <u>clear</u> cloudy
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Toe Berm	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Seepage/Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	



# ROUTINE INSPECTION FORM

HB MINE TAILINGS STORAGE FACILITY

PERMIT M-218

Page 2 of 2

Facility Component	Satisfactory Condition?		Observation (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)																							
	Yes	No																								
<b>West Abutment</b>			(abutment - where side of dam meets the spillway)																							
Erosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>	If seepage observed, note turbidity (circle which applies): <u>clear</u> <del>cloudy</del>																							
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>																								
Seepage/Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>																								
<b>East Abutment</b>			(abutment - where downstream side of dam meets the natural slope on east end - near parking end) Note any observations of buttress, including: flow, turbidity - take pictures																							
Erosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>no seepage</i> If seepage observed, note turbidity (circle which applies): <del>clear</del> <input checked="" type="checkbox"/> Cloudy																							
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>																								
Seepage/Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>																								
<b>Wildlife</b>	Note any wildlife observed (species, number, sex, location, direction of travel, age (adult/juvenile))																									
<b>Instrumentation</b>			<table border="1"> <thead> <tr> <th></th> <th>Metres Below Top of Riser (mBTOR) (to cm)</th> <th>Alert Level Thresholds</th> <th>Measurement weir</th> </tr> </thead> <tbody> <tr> <td>P1</td> <td><u>14.67</u></td> <td>P1 &lt; <u>14.54</u> cm</td> <td rowspan="6"><u>4.6</u> cm</td> </tr> <tr> <td>P2</td> <td><u>13.93</u></td> <td>P2 &lt; <u>12.84</u> cm</td> </tr> <tr> <td>P3</td> <td><u>6.32</u></td> <td>P3 &lt; <u>5.93</u> cm</td> </tr> <tr> <td>P5</td> <td><u>9.44</u></td> <td>P5 &lt; <u>8.53</u> cm</td> </tr> <tr> <td>P6</td> <td><u>8.02</u></td> <td>P6 &lt; <u>7.70</u> cm</td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table>		Metres Below Top of Riser (mBTOR) (to cm)	Alert Level Thresholds	Measurement weir	P1	<u>14.67</u>	P1 < <u>14.54</u> cm	<u>4.6</u> cm	P2	<u>13.93</u>	P2 < <u>12.84</u> cm	P3	<u>6.32</u>	P3 < <u>5.93</u> cm	P5	<u>9.44</u>	P5 < <u>8.53</u> cm	P6	<u>8.02</u>	P6 < <u>7.70</u> cm			
	Metres Below Top of Riser (mBTOR) (to cm)	Alert Level Thresholds	Measurement weir																							
P1	<u>14.67</u>	P1 < <u>14.54</u> cm	<u>4.6</u> cm																							
P2	<u>13.93</u>	P2 < <u>12.84</u> cm																								
P3	<u>6.32</u>	P3 < <u>5.93</u> cm																								
P5	<u>9.44</u>	P5 < <u>8.53</u> cm																								
P6	<u>8.02</u>	P6 < <u>7.70</u> cm																								
<b>Performance</b>	<input checked="" type="checkbox"/> normal → File with RDCK records. <input type="checkbox"/> abnormal → Advise RDCK: <ul style="list-style-type: none"> <li>- Alayne Hamilton (778) 317-1272</li> <li>- Amy Wilson (250) 352-8178 (t) / (250) 505-8146 (c)</li> <li>- Uli Wolf (250) 352-8168 (t) / (250) 505-3691 (c)</li> <li>- Peter Mikes, Engineer of Record, (250) 420-7296 (c) / (604) 601-8489 (t)</li> </ul> <p>Notify Ministry of Energy and Mines if unsafe dam conditions: - Jerrold Jewsbury (250)417-6007 (t) / (250)420-1860 (c)</p> <p>Notify Provincial Emergency Program if emergency event occurs: - 1-800-663-3456</p>																									

Notes:

Signature: \_\_\_\_\_



# ROUTINE INSPECTION FORM

HB MINE TAILINGS STORAGE FACILITY

PERMIT M-218

Page 1 of 2

Date: March 29/2023 Name/Company: Matt Morrison / ENV

Time: 12:30 Weather: Sunny

Supplies: Inspection form, clip board, keys, tape measure, camera, pencil/pen, flashlight, water level meter, safety vest

Facility Component	Satisfactory Condition?		Observations (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)
	Yes	No	
<b>Tailings Pond Backfill Area</b>			Note any disturbance / turbidity in pond Closely observe areas of suspect sinkholes
Erosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Ponded Water	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Crest</b>			Note any ponding on crest
Surface Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Minor from snow melt
Slide/Slump	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Cover Channels</b>			Observe the channel areas immediately north of the Tailings Pond Backfill Area, particularly within 100 m of the spillway., note any changes
Erosion/ Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Liner Exposure	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Ponded Water	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Spillway</b>			Note any obstruction or excessive debris in spillway entrance/channel Note condition of temporary access road built over spillway, and two check dams.
Entrance	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Erosion/Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Channel Walls/Stilling Basin	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Flow?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note turbidity of flow (circle which applies): <u>clear</u> cloudy
<b>Downstream Slope</b>			Seepage weir piping under
Erosion/Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Toe Berm	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Seepage/Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Measurement Weir: _____ cm Note estimate of water bypassing weir <u>100</u> % Note turbidity of flow upstream of weir (circle which applies): <u>clear</u> cloudy



# ROUTINE INSPECTION FORM

HB MINE TAILINGS STORAGE FACILITY

PERMIT M-218

Page 2 of 2

Facility Component	Satisfactory Condition?		Observation (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)	
	Yes	No		
<b>West Abutment</b>			(abutment - where side of dam meets the spillway)	
Erosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
Seepage/Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	If seepage observed, note turbidity (circle which applies): clear cloudy	
<b>East Abutment</b>			(abutment - where downstream side of dam meets the natural slope on east end - near parking end)	
Erosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note any observations of buttress, including: flow, turbidity - take pictures	
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
Seepage/Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	If seepage observed, note turbidity (circle which applies): clear cloudy	
<b>Wildlife</b>	Note any wildlife observed (species, number, sex, location, direction of travel, age (adult/juvenile)) Elk scat on crest			
<b>Instrumentation</b>				
Diode under repair	P1 _____	Metres Below Top of Riser (mBTOR) (to cm)	Alert Level Thresholds	Measurement weir _____ cm
	P2 _____	mBTOR	P1 < 14.54 cm	
	P3 _____	mBTOR	P2 < 12.84 cm	
	P5 _____	mBTOR	P3 < 5.93 cm	
	P6 _____	mBTOR	P5 < 8.53 cm	
			P6 < 7.70 cm	
<b>Performance</b>	<input checked="" type="checkbox"/> normal → File with RDCK records. <input type="checkbox"/> abnormal → Advise RDCK: - Alayne Hamilton (778) 317-1272 - Amy Wilson (250) 352-8178 (t) / (250) 505-8146 (c) - Uli Wolf (250) 352-8168 (t) / (250) 505-3691 (c) - Peter Mikes, Engineer of Record, (250) 420-7296 (c) / (604) 601-8489 (t)  Notify Ministry of Energy and Mines if unsafe dam conditions: - Jerrold Jewsbury (250)417-6007 (t) / (250)420-1860 (c)  Notify Provincial Emergency Program if emergency event occurs: - 1-800-663-3456			

Notes:

Signature: M. Min



# ROUTINE INSPECTION FORM

HB MINE TAILINGS STORAGE FACILITY

PERMIT M-218

Page 1 of 2

Date:

April 13, 2023

Name/Company:

Matt Morrison / RDLK

Time:

13:00

Weather:

Mixed light rain

Supplies: Inspection form, clip board, keys, tape measure, camera, pencil/pen, flashlight, water level meter, safety vest

Facility Component	Satisfactory Condition?		Observations (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)
	Yes	No	
<b>Tailings Pond Backfill Area</b>			Note any disturbance / turbidity in pond Closely observe areas of suspected sinkholes
Erosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>	- Pounded water flowing into conveyance channels
Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Ponded Water	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Crest</b>			Note any ponding on crest
Surface Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	- No ponding
Side/Slump	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Cover Channels</b>			Observe the channel areas immediately north of the Tailings Pond Backfill Area, particularly within 100 ft of the spillway; note any changes
Erosion/Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	- some minor erosion where channel liner connects to backfill area
Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Liner Exposure	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Ponded Water	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Spillway</b>			Note any obstruction or excessive debris in spillway entrance/channel. Note condition of temporary access road built over spillway, and two check dams.
Entrance	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note turbidity of flow (circle which applies): <u>clear</u> <input type="checkbox"/> <u>cloudy</u> <input checked="" type="checkbox"/> - mostly clear with minor cloudiness
Erosion/Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Channel Walls/Stilling Basin	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Flow?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Downstream Slope</b>			- piping under weir
Erosion/Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Measurement Weir: _____ cm Note estimate of water bypassing weir: _____ % Note turbidity of flow upstream of weir (circle which applies): <u>clear</u> <input type="checkbox"/> <u>cloudy</u> <input checked="" type="checkbox"/>
Risk/Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Toe Berm	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Seepage/Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	



# ROUTINE INSPECTION FORM

HB MINE TAILINGS STORAGE FACILITY

PERMIT M-218

Page 2 of 3

Facility Component	Satisfactory Condition? Yes No	Observation (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)																
<b>West Abutment</b>		(abutment - where side of dam meets the spillway)																
Erosion	<input checked="" type="checkbox"/> <input type="checkbox"/>																	
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/> <input type="checkbox"/>																	
Seepage/Drainage	<input checked="" type="checkbox"/> <input type="checkbox"/>	If seepage observed, note turbidity (circle which applies): clear cloudy																
<b>East Abutment</b>		(abutment - where downstream side of dam meets the natural slope on east end - near parking area)																
Erosion	<input checked="" type="checkbox"/> <input type="checkbox"/>	Note any observations of buttress, including flow, turbidity - take pictures																
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/> <input type="checkbox"/>																	
Seepage/Drainage	<input checked="" type="checkbox"/> <input type="checkbox"/>	If seepage observed, note turbidity (circle which applies): clear cloudy																
<b>Wildlife</b>		Note any wildlife observed (species, number, sex, location, direction of travel, age (adult/juvenile)) None																
<b>Instrumentation</b>		<table border="1"> <thead> <tr> <th>Metres Below Top of River (mTOR) (to cm)</th> <th>Alert Level Thresholds</th> <th>Measurement well</th> </tr> </thead> <tbody> <tr> <td>P1 <u>14.74</u></td> <td>P1 &lt; 14.54 cm</td> <td rowspan="6">/ cm</td> </tr> <tr> <td>P2 <u>13.90</u></td> <td>P2 &lt; 12.64 cm</td> </tr> <tr> <td>P3 <u>6.27</u></td> <td>P3 &lt; 5.93 cm</td> </tr> <tr> <td>P4 <u>9.55</u></td> <td>P4 &lt; 8.53 cm</td> </tr> <tr> <td>P5 <u>6.87</u></td> <td>P5 &lt; 7.70 cm</td> </tr> <tr> <td></td> <td></td> </tr> </tbody> </table>	Metres Below Top of River (mTOR) (to cm)	Alert Level Thresholds	Measurement well	P1 <u>14.74</u>	P1 < 14.54 cm	/ cm	P2 <u>13.90</u>	P2 < 12.64 cm	P3 <u>6.27</u>	P3 < 5.93 cm	P4 <u>9.55</u>	P4 < 8.53 cm	P5 <u>6.87</u>	P5 < 7.70 cm		
Metres Below Top of River (mTOR) (to cm)	Alert Level Thresholds	Measurement well																
P1 <u>14.74</u>	P1 < 14.54 cm	/ cm																
P2 <u>13.90</u>	P2 < 12.64 cm																	
P3 <u>6.27</u>	P3 < 5.93 cm																	
P4 <u>9.55</u>	P4 < 8.53 cm																	
P5 <u>6.87</u>	P5 < 7.70 cm																	
<b>Performance</b>		<input checked="" type="checkbox"/> normal → File with ROCK records. <input type="checkbox"/> abnormal → Advise ROCK: <ul style="list-style-type: none"> <li>- Alysne Hamilton (778) 317-1272</li> <li>- Amy Wilson (250) 352-8176 (t) / (250) 505-8146 (c)</li> <li>- Uli Wolf (250) 352-8168 (t) / (250) 505-3691 (c)</li> <li>- Peder Mikes, Engineer of Record, (250) 420-7299 (t) / (504) 601-8485 (c)</li> </ul> <p>Notify Ministry of Energy and Mines if unsafe dam conditions:  <ul style="list-style-type: none"> <li>- Jermold Jewsbury (250) 417-9007 (t) / (250) 420-1860 (c)</li> </ul> <p>Notify Provincial Emergency Program if emergency event occurs:  <ul style="list-style-type: none"> <li>- 1-800-463-3456</li> </ul> </p></p>																

Notes: P6 appears to be below threshold levels. Probe was acting a bit funny on this one. Notified Alysne

Signature



# ROUTINE INSPECTION FORM

HB MINE TAILINGS STORAGE FACILITY

PERMIT M-218

Page 1 of 2

Date: Apr 26 / 2023 Name/Company: Alayne Hamilton / RDCK  
 Time: \_\_\_\_\_ Weather: Cloudy, 14°C

Supplies: *Inspection form, clip board, keys, tape measure, camera, pencil/pen, flashlight, water level meter, safety vest*

Facility Component	Satisfactory Condition?		Observations (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)	
	Yes	No		
<b>Tailings Pond Backfill Area</b>			Note any disturbance / turbidity in pond Closely observe areas of suspect sinkholes	
Erosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>Still minor ponding from recent rains. Some seed germinating.</i>	
Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
Ponded Water	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
<b>Crest</b>			Note any ponding on crest	
Surface Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
Slide/Slump	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
<b>Cover Channels</b>				Observe the channel areas immediately north of the Tailings Pond Backfill Area, particularly within 100 m of the spillway., note any changes
Erosion/ Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>		<i>no additional rip rap movement in spill way inlet after Apr. 10<sup>th</sup> event. Floc blocks still in place</i>
Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
Liner Exposure	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
Ponded Water	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
<b>Spillway</b>			Note any obstruction or excessive debris in spillway entrance/channel Note condition of temporary access road built over spillway, and two check dams.	
Entrance	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>Lower spill way slump in same condition as Apr 18 inspection</i>	
Erosion/Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
Channel Walls/Stilling Basin	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
Flow?	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
			Note turbidity of flow (circle which applies): <input checked="" type="radio"/> clear <input type="radio"/> cloudy	
<b>Downstream Slope</b>				
Erosion/Erosion Control	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<i>no additional seed germination visible on toe berm. Erosion filling still of issue. Silt fence needs staples (stapler jammed)</i>	
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
Toe Berm	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Seepage/Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
			Measurement Weir: <u>4.7*</u> cm Note estimate of water bypassing weir <u>0</u> % Note turbidity of flow upstream of weir (circle which applies): <input checked="" type="radio"/> clear <input type="radio"/> cloudy	

*\* Weir repair seems to be functioning properly*



# ROUTINE INSPECTION FORM

HB MINE TAILINGS STORAGE FACILITY

PERMIT M-218

Page 2 of 2

Facility Component	Satisfactory Condition? Yes No	Observation (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)																							
<b>West Abutment</b>		(abutment - where side of dam meets the spillway)																							
Erosion	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>																								
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/> <input type="checkbox"/>																								
Seepage/Drainage	<input checked="" type="checkbox"/> <input type="checkbox"/>	If seepage observed, note turbidity (circle which applies): clear cloudy																							
<b>East Abutment</b>		(abutment - where downstream side of dam meets the natural slope on east end - near parking end)																							
Erosion	<input checked="" type="checkbox"/> <input type="checkbox"/>	Note any observations of buttress, including: flow, turbidity - take pictures																							
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/> <input type="checkbox"/>																								
Seepage/Drainage	<input checked="" type="checkbox"/> <input type="checkbox"/>	If seepage observed, note turbidity (circle which applies): clear cloudy																							
<b>Wildlife</b>		Note any wildlife observed (species, number, sex, location, direction of travel, age (adult/juvenile)) 2 fresh piles of bear scat, elk droppings 1 deer																							
<b>Instrumentation</b>		<table border="1"> <thead> <tr> <th></th> <th>Metres Below Top of Riser (mBTOR) (to cm)</th> <th>Alert Level Thresholds</th> <th>Measurement weir</th> </tr> </thead> <tbody> <tr> <td>P1 <u>14.55</u></td> <td>mBTOR</td> <td>P1 &lt; 14.54 cm</td> <td rowspan="6"><u>4.7</u> cm</td> </tr> <tr> <td>P2 <u>13.96</u></td> <td>mBTOR</td> <td>P2 &lt; 12.84 cm</td> </tr> <tr> <td>P3 <u>6.33</u></td> <td>mBTOR</td> <td>P3 &lt; 5.93 cm</td> </tr> <tr> <td>P5 <u>9.5</u></td> <td>mBTOR</td> <td>P5 &lt; 8.53 cm</td> </tr> <tr> <td>P6 <u>8.07</u></td> <td>mBTOR</td> <td>P6 &lt; 7.70 cm</td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table>		Metres Below Top of Riser (mBTOR) (to cm)	Alert Level Thresholds	Measurement weir	P1 <u>14.55</u>	mBTOR	P1 < 14.54 cm	<u>4.7</u> cm	P2 <u>13.96</u>	mBTOR	P2 < 12.84 cm	P3 <u>6.33</u>	mBTOR	P3 < 5.93 cm	P5 <u>9.5</u>	mBTOR	P5 < 8.53 cm	P6 <u>8.07</u>	mBTOR	P6 < 7.70 cm			
	Metres Below Top of Riser (mBTOR) (to cm)	Alert Level Thresholds	Measurement weir																						
P1 <u>14.55</u>	mBTOR	P1 < 14.54 cm	<u>4.7</u> cm																						
P2 <u>13.96</u>	mBTOR	P2 < 12.84 cm																							
P3 <u>6.33</u>	mBTOR	P3 < 5.93 cm																							
P5 <u>9.5</u>	mBTOR	P5 < 8.53 cm																							
P6 <u>8.07</u>	mBTOR	P6 < 7.70 cm																							
<b>Performance</b>		<input type="checkbox"/> normal → File with RDCK records. <input checked="" type="checkbox"/> abnormal → Advise RDCK: <u>Due to P1 trigger</u> <ul style="list-style-type: none"> <li>- Alayne Hamilton (778) 317-1272</li> <li>- Amy Wilson (250) 352-8178 (t) / (250) 505-8146 (c)</li> <li>- Uli Wolf (250) 352-8188 (t) / (250) 505-3691 (c)</li> <li>- Peter Mikes, Engineer of Record, (250) 420-7296 (c) / (604) 601-8489 (t)</li> </ul> <p>Notify Ministry of Energy and Mines if unsafe dam conditions:</p> <ul style="list-style-type: none"> <li>- Jerrold Jewsbury (250)417-6007 (t) / (250)420-1860 (c)</li> </ul> <p>Notify Provincial Emergency Program if emergency event occurs:</p> <ul style="list-style-type: none"> <li>- 1-800-663-3456</li> </ul>																							

Notes: P1 elevation was checked multiple times on site to confirm trigger level

Signature:



# ROUTINE INSPECTION FORM

HB MINE TAILINGS STORAGE FACILITY

PERMIT M-218

Page 1 of 2

Date: May 10, 2023 Name/Company: Matt Morrison / RDCK  
 Time: 15:00 Weather: Mostly sunny

Supplies: Inspection form, clip board, keys, tape measure, camera, pencil/pen, flashlight, water level meter, safety vest

Facility Component	Satisfactory Condition?		Observations (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)
	Yes	No	
<b>Tailings Pond Backfill Area</b>			Note any disturbance / turbidity in pond Closely observe areas of suspect sinkholes
Erosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Ponded Water	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Crest</b>			Note any ponding on crest
Surface Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Slide/Slump	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Cover Channels</b>			Observe the channel areas immediately north of the Tailings Pond Backfill Area, particularly within 100 m of the spillway., note any changes
Erosion/ Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Liner Exposure	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Ponded Water	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Spillway</b>			Note any obstruction or excessive debris in spillway entrance/channel Note condition of temporary access road built over spillway, and two check dams.
Entrance	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Erosion/Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Channel Walls/Stilling Basin	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Flow?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note turbidity of flow (circle which applies): <u>clear</u> cloudy
<b>Downstream Slope</b>			
Erosion/Erosion Control	<input type="checkbox"/>	<input type="checkbox"/>	
Slide/Slump/Cracks/Settlement	<input type="checkbox"/>	<input type="checkbox"/>	
Toe Berm	<input type="checkbox"/>	<input type="checkbox"/>	
Seepage/Drainage	<input type="checkbox"/>	<input type="checkbox"/>	Measurement Weir: <u>7</u> cm Note estimate of water bypassing weir <u>0</u> % Note turbidity of flow upstream of weir (circle which applies): <u>clear</u> cloudy



# ROUTINE INSPECTION FORM

HB MINE TAILINGS STORAGE FACILITY

PERMIT M-218

Page 2 of 2

Facility Component	Satisfactory Condition? Yes No	Observation (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)																							
<b>West Abutment</b>		(abutment - where side of dam meets the spillway)																							
Erosion	<input checked="" type="checkbox"/> <input type="checkbox"/>	If seepage observed, note turbidity (circle which applies): clear cloudy																							
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/> <input type="checkbox"/>																								
Seepage/Drainage	<input checked="" type="checkbox"/> <input type="checkbox"/>																								
<b>East Abutment</b>		(abutment - where downstream side of dam meets the natural slope on east end - near parking end)																							
Erosion	<input checked="" type="checkbox"/> <input type="checkbox"/>	Note any observations of buttress, including: flow, turbidity - take pictures  If seepage observed, note turbidity (circle which applies): clear cloudy																							
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/> <input type="checkbox"/>																								
Seepage/Drainage	<input checked="" type="checkbox"/> <input type="checkbox"/>																								
<b>Wildlife</b>	Note any wildlife observed (species, number, sex, location, direction of travel, age (adult/juvenile)) • older bear scat. Grizzly bear tracks • lots of deer track																								
<b>Instrumentation</b>	<table border="1"> <thead> <tr> <th></th> <th>Metres Below Top of Riser (mBTOR) (to cm)</th> <th>Alert Level Thresholds</th> <th>Measurement weir</th> </tr> </thead> <tbody> <tr> <td>P1</td> <td>14.68</td> <td>P1 &lt; 14.54 cm</td> <td rowspan="6">7 cm</td> </tr> <tr> <td>P2</td> <td>13.92</td> <td>P2 &lt; 12.84 cm</td> </tr> <tr> <td>P3</td> <td>6.27</td> <td>P3 &lt; 5.93 cm</td> </tr> <tr> <td>P5</td> <td>9.36</td> <td>P5 &lt; 8.53 cm</td> </tr> <tr> <td>P6</td> <td>8.0</td> <td>P6 &lt; 7.70 cm</td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table>		Metres Below Top of Riser (mBTOR) (to cm)	Alert Level Thresholds	Measurement weir	P1	14.68	P1 < 14.54 cm	7 cm	P2	13.92	P2 < 12.84 cm	P3	6.27	P3 < 5.93 cm	P5	9.36	P5 < 8.53 cm	P6	8.0	P6 < 7.70 cm				
	Metres Below Top of Riser (mBTOR) (to cm)	Alert Level Thresholds	Measurement weir																						
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P2	13.92	P2 < 12.84 cm																							
P3	6.27	P3 < 5.93 cm																							
P5	9.36	P5 < 8.53 cm																							
P6	8.0	P6 < 7.70 cm																							
<b>Performance</b>	<input checked="" type="checkbox"/> normal → File with RDCK records. <input type="checkbox"/> abnormal → Advise RDCK: - Alayne Hamilton (778) 317-1272 - Amy Wilson (250) 352-8178 (t) / (250) 505-8146 (c) - Uli Wolf (250) 352-8168 (t) / (250) 505-3691 (c) - Peter Mikes, Engineer of Record, (250) 420-7296 (c) / (604) 601-8489 (t)  Notify Ministry of Energy and Mines if unsafe dam conditions: - Jerrold Jewsbury (250)417-6007 (t) / (250)420-1860 (c)  Notify Provincial Emergency Program if emergency event occurs: - 1-800-663-3456																								

Notes:

Signature: M. Main



# VISUAL INSPECTION FORM

HB MINE TAILINGS STORAGE FACILITY

PERMIT M-218

Page 1 of 1

Date: May 17 2023 Name/Company: RDCK  
 Time: 12 noon Weather: Sunny 25°

Supplies: Inspection form, clip board, keys, tape measure, camera, pencil/pen, flashlight, water level meter, safety vest

Facility Component	Satisfactory Condition?		Observations (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found) Note any signs of dam safety concerns, as well as erosion (rilling, gullies)
	Yes	No	
Upstream Beach	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Take picture
Crest	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note any ponding on crest
Conveyance Channels	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note any obstructions, issues with sediment accumulation, tears in turf reinforcement mat or geotextile.
Spillway	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note any obstruction or excessive debris in spillway entrance/channel
Downstream Slope	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note any erosion (rilling, gullies) on downstream slope or toe berm. (abutment - where side of dam meets the spillway)
West Abutment	<input checked="" type="checkbox"/>	<input type="checkbox"/>	If seepage/drainage is observed, note turbidity (circle which applies): clear cloudy (abutment - where downstream side of dam meets the natural slope on east end)
East Abutment	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note any observations of buttress, including: flow, turbidity - take pictures If seepage/drainage is observed, note turbidity (circle which applies): clear cloudy
Wildlife			Note any wildlife observed on site (prints, species, location, number, direction of travel) <u>Bear prints and scat</u>
Performance	<input checked="" type="checkbox"/> normal → File with RDCK records. <input type="checkbox"/> abnormal → Advise RDCK: - Alayne Hamilton (778)-317-1272 - Amy Wilson (250) 352-8178 (t) / (250) 505-8146 (c) - Uli Wolf (250) 352-8168 (t) / (250) 505-3691 (c) - Peter Mikes, Engineer of Record, (250) 420-7296 (c) / (604) 601-8489 (t) Notify Ministry of Energy and Mines if unsafe dam conditions: - Jerrold Jewsbury (t) (250) 417-6007 / (c) (250) 420-1860 Notify Provincial Emergency Program if emergency event occurs: - 1-800-663-3456		

Notes:

Signature: 



# ROUTINE INSPECTION FORM

HB MINE TAILINGS STORAGE FACILITY  
PERMIT M-218

Page 2 of 2

Facility Component	Satisfactory Condition?		Observation (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)	
	Yes	No		
<b>West Abutment</b>			(abutment - where side of dam meets the spillway)	
Erosion	<input type="checkbox"/>	<input type="checkbox"/>	If seepage observed, note turbidity (circle which applies): clear cloudy	
Slide/Slump/Cracks/Settlement	<input type="checkbox"/>	<input type="checkbox"/>		
Seepage/Drainage	<input type="checkbox"/>	<input type="checkbox"/>		
<b>East Abutment</b>			(abutment - where downstream side of dam meets the natural slope on east end - near parking end)	
Erosion	<input type="checkbox"/>	<input type="checkbox"/>	Note any observations of buttress, including: flow, turbidity - take pictures	
Slide/Slump/Cracks/Settlement	<input type="checkbox"/>	<input type="checkbox"/>		
Seepage/Drainage	<input type="checkbox"/>	<input type="checkbox"/>		
<b>Wildlife</b>	Note any wildlife observed (species, number, sex, location, direction of travel, age (adult/juvenile))			
<b>Instrumentation</b>	P1 <u>14.63</u> P2 <del>13.94</del> P3 <u>5.66</u> P5 <u>9.31</u> P6 <u>7.95</u>	Metres Below Top of Riser (mBTOR) (to cm) mBTOR mBTOR mBTOR mBTOR	Alert Level Thresholds P1 < <u>14.54 cm</u> P2 < <u>12.84 cm</u> P3 < <u>5.93 cm</u> P5 < <u>8.53 cm</u> P6 < <u>7.70 cm</u>	Measurement weir <u>7.0</u> cm
<b>Performance</b>	<input type="checkbox"/> normal → File with RDCK records. <input type="checkbox"/> abnormal → Advise RDCK: - Alayne Hamilton (778) 317-1272 - Amy Wilson (250) 352-8178 (t) / (250) 505-8146 (c) - Uli Wolf (250) 352-8168 (t) / (250) 505-3691 (c) - Peter Mikes, Engineer of Record, (250) 420-7296 (c) / (604) 601-8489 (t)  Notify Ministry of Energy and Mines if unsafe dam conditions: - Jerrold Jewsbury (250)417-6007 (t) / (250)420-1860 (c)  Notify Provincial Emergency Program if emergency event occurs: - 1-800-663-3456			

Notes:

Signature: \_\_\_\_\_



# ROUTINE INSPECTION FORM

HB MINE TAILINGS STORAGE FACILITY

PERMIT M-218

Page 1 of 2

**Date:** May 25, 2023 **Name/Company:** Alayne/James/Julia - RDCK

**Time:** \_\_\_\_\_ **Weather:** Light rain, 20C

*Supplies: Inspection form, clip board, keys, tape measure, camera, pencil/pen, flashlight, water level meter, safety vest*

Facility Component	Satisfactory Condition?		Observations (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)
	Yes	No	
<b>Tailings Pond Backfill Area</b>  Erosion Settlement Poned Water	<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Note any disturbance / turbidity in pond Closely observe areas of suspect sinkholes  Minor amount of ponding in low spots - in same conditions as previous wet weather inspections.
<b>Crest</b>  Surface Drainage Slide/Slump	<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Note any ponding on crest  No ponding
<b>Cover Channels</b>  Erosion/ Erosion Control Slump/Cracks/Settlement Liner Exposure Poned Water	<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Observe the channel areas immediately north of the Tailings Pond Backfill Area, particularly within 100 m of the spillway., note any changes  No changes within 100m of spillway. Inspected "bubble" at south spur, also no changes.
<b>Spillway</b>  Entrance Erosion/Erosion Control Channel Walls/Stilling Basin Flow?	<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Note any obstruction or excessive debris in spillway entrance/channel Note condition of temporary access road built over spillway, and two check dams.  No obstructions. Logger tentatively scheduled for week of May 29 to standing dead trees near spillway entrance. Signs need to be installed on cliff face and edge outlining to hazard - signs are at RDCK office.  Note turbidity of flow (circle which applies): <u>clear</u> cloudy
<b>Downstream Slope</b>  Erosion/Erosion Control Slide/Slump/Cracks/Settlement Toe Berm Seepage/Drainage	<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Poor vegetation establishment on toe berm. Slightly moist horizontal areas that run across toe berm establishing slightly better.  Measurement Weir: <u>5.3</u> cm Note estimate of water bypassing weir <u>0</u> % Note turbidity of flow upstream of weir (circle which applies): <u>clear</u> cloudy



# ROUTINE INSPECTION FORM

## HB MINE TAILINGS STORAGE FACILITY

### PERMIT M-218

Facility Component	Satisfactory Condition? Yes No		Observation (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)		
<b>West Abutment</b>			<i>(abutment - where side of dam meets the spillway)</i>		
Erosion	<input type="checkbox"/>	<input type="checkbox"/>	If seepage observed, note turbidity (circle which applies):    clear    cloudy		
Slide/Slump/Cracks/Settlement	<input type="checkbox"/>	<input type="checkbox"/>			
Seepage/Drainage	<input type="checkbox"/>	<input type="checkbox"/>			
<b>East Abutment</b>			<i>(abutment - where downstream side of dam meets the natural slope on east end – near parking end)</i>		
Erosion	<input type="checkbox"/>	<input type="checkbox"/>	Note any observations of buttress, including: flow, turbidity - take pictures  If seepage observed, note turbidity (circle which applies):    clear    cloudy		
Slide/Slump/Cracks/Settlement	<input type="checkbox"/>	<input type="checkbox"/>			
Seepage/Drainage	<input type="checkbox"/>	<input type="checkbox"/>			
<b>Wildlife</b>	<i>Note any wildlife observed (species, number, sex, location, direction of travel, age (adult/juvenile))</i> 3 black bears observed on May 24, so inspection was halted. No bears on May 26. Elk, grizzly, and deer tracks noted. Many tadpoles visible in pooling water on TSF surface and in conveyance channels.				
<b>Instrumentation</b>	P1 <u>14.64</u> P2 <u>13.98</u> P3 <u>6.32</u> P5 <u>9.30</u> P6 <u>7.97</u>	Metres Below Top of Riser (mBTOR) (to cm) mBTOR mBTOR mBTOR mBTOR	Alert Level Thresholds P1 <u>&lt; 14.54 cm</u> P2 <u>&lt; 12.84 cm</u> P3 <u>&lt; 5.93 cm</u> P5 <u>&lt; 8.53 cm</u> P6 <u>&lt; 7.70 cm</u>	Measurement weir  <u>5.3</u> cm	
<b>Performance</b>	<input checked="" type="checkbox"/> normal    →    File with RDCK records.  <input type="checkbox"/> abnormal    →    Advise RDCK: -    Alayne Hamilton (778) 317-1272 -    Amy Wilson (250) 352-8178 (t) / (250) 505-8146 (c) -    Uli Wolf (250) 352-8168 (t) / (250) 505-3691 (c) -    Peter Mikes, Engineer of Record, (250) 420-7296 (c) / (604) 601-8489 (t)  Notify Ministry of Energy and Mines if unsafe dam conditions: -    Jerrold Jewsbury (250)417-6007 (t) / (250)420-1860 (c)  Notify Provincial Emergency Program if emergency event occurs: -    1-800-663-3456				

Notes:

Signature: \_\_\_\_\_



# ROUTINE INSPECTION FORM

HB MINE TAILINGS STORAGE FACILITY

PERMIT M-218

Page 1 of 2

Date: May 31/2023 Name/Company: Matt Morrison / RDCK

Time: 14:00 Weather: Clear, ~20°C

Supplies: Inspection form, clip board, keys, tape measure, camera, pencil/pen, flashlight, water level meter, safety vest

Facility Component	Satisfactory Condition?		Observations (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)
	Yes	No	
<b>Tailings Pond Backfill Area</b>  Erosion Settlement Ponded Water	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Note any disturbance / turbidity in pond Closely observe areas of suspect sinkholes
<b>Crest</b>  Surface Drainage Slide/Slump	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	Note any ponding on crest
<b>Cover Channels</b>  Erosion/ Erosion Control Slump/Cracks/Settlement Liner Exposure Ponded Water	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Observe the channel areas immediately north of the Tailings Pond Backfill Area, particularly within 100 m of the spillway., note any changes <u>Tadpoles in conveyance channels</u>
<b>Spillway</b>  Entrance Erosion/Erosion Control Channel Walls/Stilling Basin Flow?	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Note any obstruction or excessive debris in spillway entrance/channel Note condition of temporary access road built over spillway, and two check dams. <u>Small increase in size of slump on south side of downstream portion of spillway suspected</u>  Note turbidity of flow (circle which applies): <u>clear</u> cloudy
<b>Downstream Slope</b>  Erosion/Erosion Control Slide/Slump/Cracks/Settlement Toe Berm Seepage/Drainage	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Measurement Weir: <u>7</u> cm Note estimate of water bypassing weir <u>0</u> % Note turbidity of flow upstream of weir (circle which applies): <u>clear</u> cloudy



# ROUTINE INSPECTION FORM

HB MINE TAILINGS STORAGE FACILITY

PERMIT M-218

Page 2 of 2

Facility Component	Satisfactory Condition?		Observation (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)	
	Yes	No		
<b>West Abutment</b>			(abutment - where side of dam meets the spillway)  If seepage observed, note turbidity (circle which applies): clear cloudy	
Erosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
Seepage/Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
<b>East Abutment</b>			(abutment - where downstream side of dam meets the natural slope on east end - near parking end) Note any observations of buttress, including: flow, turbidity - take pictures  If seepage observed, note turbidity (circle which applies): clear cloudy	
Erosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
Seepage/Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
<b>Wildlife</b>	Note any wildlife observed (species, number, sex, location, direction of travel, age (adult/juvenile))			
<b>Instrumentation</b>	P1 <u>14.64</u> P2 <u>13.93</u> P3 <u>6.32</u> P5 <u>9.30</u> P6 <u>7.97</u>	Metres Below Top of Riser (mBTOR) (to cm) mBTOR mBTOR mBTOR mBTOR	Alert Level Thresholds P1 < <u>14.54 cm</u> P2 < <u>12.84 cm</u> P3 < <u>5.93 cm</u> P5 < <u>8.53 cm</u> P6 < <u>7.70 cm</u>	Measurement weir  <u>7.0</u> cm
<b>Performance</b>	<input checked="" type="checkbox"/> normal → File with RDCK records. <input type="checkbox"/> abnormal → Advise RDCK: - Alayne Hamilton (778) 317-1272 - Amy Wilson (250) 352-8178 (t) / (250) 505-8146 (c) - Uli Wolf (250) 352-8168 (t) / (250) 505-3691 (c) - Peter Mikes, Engineer of Record, (250) 420-7296 (c) / (604) 601-8489 (t)  Notify Ministry of Energy and Mines if unsafe dam conditions: - Jerrold Jewsbury (250)417-6007 (t) / (250)420-1860 (c)  Notify Provincial Emergency Program if emergency event occurs: - 1-800-663-3456			

Notes:



# ROUTINE INSPECTION FORM

HB MINE TAILINGS STORAGE FACILITY

PERMIT M-218

Page 1 of 2

**Date:** June 6, 2023 **Name/Company:** Alayne/Nathan - RDCK

**Time:** \_\_\_\_\_ **Weather:** Sunny, 32C

*Supplies: Inspection form, clip board, keys, tape measure, camera, pencil/pen, flashlight, water level meter, safety vest*

Facility Component	Satisfactory Condition?		Observations (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)
	Yes	No	
<b>Tailings Pond Backfill Area</b>  Erosion Settlement Poned Water	<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Note any disturbance / turbidity in pond Closely observe areas of suspect sinkholes  Poned areas drying up with hot weather. Tadpole strandings/mortality will likely occur.
<b>Crest</b>  Surface Drainage Slide/Slump	<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Note any ponding on crest  No ponding
<b>Cover Channels</b>  Erosion/ Erosion Control Slump/Cracks/Settlement Liner Exposure Poned Water	<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Observe the channel areas immediately north of the Tailings Pond Backfill Area, particularly within 100 m of the spillway., note any changes  No changes within 100m of spillway. Inspected "bubble" at north spur, and noted suspected minor increase in size, but flows are still able to pass within channel. RDCK PM team working on RFQ for repair works for August.
<b>Spillway</b>  Entrance Erosion/Erosion Control Channel Walls/Stilling Basin Flow?	<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Note any obstruction or excessive debris in spillway entrance/channel Note condition of temporary access road built over spillway, and two check dams.  No obstructions. Logger was on site to fall tree leaning towards spillway inlet. Trees were dropped on tailings cover, and left as habitat. Signs need to be installed on cliff face and edge outlining to hazard - signs are at RDCK office.  Slough at bottom end of rip rap portion of spillway is slightly larger than last inspection.  Note turbidity of flow (circle which applies): <u>clear</u> cloudy
<b>Downstream Slope</b>  Erosion/Erosion Control Slide/Slump/Cracks/Settlement Toe Berm Seepage/Drainage	<input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Poor vegetation establishment on toe berm. RDCK PM was on site to inspect poor establishment to initiate warranty item with contractor (~5% veg has established).   Measurement Weir: <u>4.9</u> cm Note estimate of water bypassing weir <u>0</u> % Note turbidity of flow upstream of weir (circle which applies): <u>clear</u> cloudy



# ROUTINE INSPECTION FORM

## HB MINE TAILINGS STORAGE FACILITY

### PERMIT M-218

Facility Component	Satisfactory Condition?		Observation (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)		
	Yes	No			
<b>West Abutment</b>			<i>(abutment - where side of dam meets the spillway)</i>		
Erosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>			
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>			
Seepage/Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	If seepage observed, note turbidity (circle which applies): clear cloudy		
<b>East Abutment</b>			<i>(abutment - where downstream side of dam meets the natural slope on east end – near parking end)</i>		
Erosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note any observations of buttress, including: flow, turbidity - take pictures		
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>			
Seepage/Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	If seepage observed, note turbidity (circle which applies): clear cloudy		
<b>Wildlife</b>	<i>Note any wildlife observed (species, number, sex, location, direction of travel, age (adult/juvenile))</i> 1 black bear observed. Elk, grizzly, and deer tracks noted. Many tadpoles still visible in pooling water on TSF surface and in conveyance channels.				
<b>Instrumentation</b>			Metres Below Top of Riser (mBTOR) (to cm)	Alert Level Thresholds	Measurement weir
	P1	<u>14.72</u>		P1 <u>&lt; 14.54 cm</u>	<u>4.9</u> cm
	P2	<u>14.02</u>	mBTOR	P2 <u>&lt; 12.84 cm</u>	
	P3	<u>6.40</u>	mBTOR	P3 <u>&lt; 5.93 cm</u>	
	P5	<u>9.34</u>	mBTOR	P5 <u>&lt; 8.53 cm</u>	
	P6	<u>8.04</u>	mBTOR	P6 <u>&lt; 7.70 cm</u>	
<b>Performance</b>	<input checked="" type="checkbox"/> normal → File with RDCK records. <input type="checkbox"/> abnormal → Advise RDCK: - Alayne Hamilton (778) 317-1272 - Amy Wilson (250) 352-8178 (t) / (250) 505-8146 (c) - Uli Wolf (250) 352-8168 (t) / (250) 505-3691 (c) - Peter Mikes, Engineer of Record, (250) 420-7296 (c) / (604) 601-8489 (t)  Notify Ministry of Energy and Mines if unsafe dam conditions: - Jerrold Jewsbury (250)417-6007 (t) / (250)420-1860 (c)  Notify Provincial Emergency Program if emergency event occurs: - 1-800-663-3456				

Notes:

Signature: \_\_\_\_\_



# VISUAL INSPECTION FORM

HB MINE TAILINGS STORAGE FACILITY

PERMIT M-218


Page 1 of 1

Date: June 15, 2023 Name/Company: Alayne Hamilton RDCK  
 Time: 12:40 pm Weather: Partly Cloudy 25°C

Supplies: Inspection form, clip board, keys, tape measure, camera, pencil/pen, flashlight, water level meter, safety vest

Facility Component	Satisfactory Condition?		Observations (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)
	Yes	No	
Upstream of Dam	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note any ponding water near the dam or signs of erosion, take picture
Crest	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note any ponding on crest
Spillway	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note any obstruction or excessive debris in spillway channel, entrance and upstream channel within ~100 m of the spillway that causes water to pond or back-up.
Flow?	<input checked="" type="checkbox"/> yes	<input type="checkbox"/> no flow	Note turbidity (circle which applies): clear cloudy <u>clear</u>
Downstream Slope	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note any signs of active erosion, take picture
Performance	<input checked="" type="checkbox"/> normal → File with RDCK records. <input type="checkbox"/> abnormal → Advise RDCK: - Alayne Hamilton (778) 317-1272 - Amy Wilson (250) 352-8178 (t) / (250) 505-8146 (c) - Waste Emergency Line (250) 352-1501 (after hours) - Peter Mikes, Engineer of Record, (250) 420-7296 (c) / (604) 601-8489 (t) Notify Ministry of Energy and Mines if unsafe dam conditions: - Jerrold Jewsbury (t) (250) 417-6007 / (c) (250) 420-1860 Notify Provincial Emergency Program if emergency event occurs: - 1-800-663-3456		

Notes: large # of tadpoles  
Bear tracks

Signature: 



# ROUTINE INSPECTION FORM

HB MINE TAILINGS STORAGE FACILITY

PERMIT M-218

Page 1 of 2

Date: June 21/2023 Name/Company: Matt Morrison / RDCK  
 Time: 15:00 Weather: Mixed

Supplies: Inspection form, clip board, keys, tape measure, camera, pencil/pen, flashlight, water level meter, safety vest

Facility Component	Satisfactory Condition?		Observations (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)
	Yes	No	
<b>Tailings Pond Backfill Area</b>			Note any disturbance / turbidity in pond Closely observe areas of suspect sinkholes
Erosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>	◦ some ponded water from recent rain
Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Ponded Water	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Crest</b>			Note any ponding on crest
Surface Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Slide/Slump	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Cover Channels</b>			Observe the channel areas immediately north of the Tailings Pond Backfill Area, particularly within 100 m of the spillway., note any changes
Erosion/ Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	◦ Good amount of flow, ◦ Clear
Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Liner Exposure	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Ponded Water	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Spillway</b>			Note any obstruction or excessive debris in spillway entrance/channel Note condition of temporary access road built over spillway, and two check dams.
Entrance	<input checked="" type="checkbox"/>	<input type="checkbox"/>	◦ Lower spillway slump noted. No observed change in size
Erosion/Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Channel Walls/Stilling Basin	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Flow?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
			Note turbidity of flow (circle which applies): <u>clear</u> cloudy
<b>Downstream Slope</b>			◦ Ruler for measuring weir was missing.
Erosion/Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Toe Berm	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Seepage/Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
			Measurement Weir: <u>    </u> cm Note estimate of water bypassing weir <u>0</u> % Note turbidity of flow upstream of weir (circle which applies): <u>clear</u> cloudy



# ROUTINE INSPECTION FORM

HB MINE TAILINGS STORAGE FACILITY

PERMIT M-218

Page 2 of 2

Facility Component	Satisfactory Condition? Yes No	Observation (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)		
<b>West Abutment</b>		(abutment - where side of dam meets the spillway)		
Erosion	<input checked="" type="checkbox"/> <input type="checkbox"/>	If seepage observed, note turbidity (circle which applies): clear cloudy		
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/> <input type="checkbox"/>			
Seepage/Drainage	<input checked="" type="checkbox"/> <input type="checkbox"/>			
<b>East Abutment</b>		(abutment - where downstream side of dam meets the natural slope on east end - near parking end) Note any observations of buttress, including: flow, turbidity - take pictures		
Erosion	<input checked="" type="checkbox"/> <input type="checkbox"/>	If seepage observed, note turbidity (circle which applies): clear cloudy		
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/> <input type="checkbox"/>			
Seepage/Drainage	<input checked="" type="checkbox"/> <input type="checkbox"/>			
<b>Wildlife</b>	Note any wildlife observed (species, number, sex, location, direction of travel, age (adult/juvenile)) Tadpoles in conveyance channel.			
<b>Instrumentation</b>	P1 <u>14.10</u> P2 <u>13.85</u> P3 <u>6.44</u> P5 <u>9.43</u> P6 <u>8.17</u>	Metres Below Top of Riser (mBTOR) (to cm) mBTOR mBTOR mBTOR mBTOR	Alert Level Thresholds P1 < 14.54 cm P2 < 12.84 cm P3 < 5.93 cm P5 < 8.53 cm P6 < 7.70 cm	Measurement weir _____ cm
<b>Performance</b>	<input type="checkbox"/> normal → File with RDCK records. <input checked="" type="checkbox"/> abnormal → Advise RDCK: - Alayne Hamilton (778) 317-1272 - Amy Wilson (250) 352-8178 (t) / (250) 505-8146 (c) - Uli Wolf (250) 352-8168 (t) / (250) 505-3691 (c) - Peter Mikes, Engineer of Record, (250) 420-7296 (c) / (604) 601-8489 (t)  Notify Ministry of Energy and Mines if unsafe dam conditions: - Jerrold Jewsbury (250)417-6007 (t) / (250)420-1860 (c)  Notify Provincial Emergency Program if emergency event occurs: - 1-800-663-3456			

Notes: Abnormal due to P1 being below trigger for Alert.  
Informed Alayne Hamilton.



# ROUTINE INSPECTION FORM

HB MINE TAILINGS STORAGE FACILITY

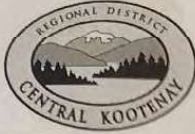
PERMIT M-218

Page 1 of 2

Date: June 29/23 Name/Company: Alayne Julia, ROCK  
 Time: 1:20 pm Weather: 30 degrees, partly cloudy

Supplies: Inspection form, clip board, keys, tape measure, camera, pencil/pen, flashlight, water level meter, safety vest

Facility Component	Satisfactory Condition?		Observations (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)
	Yes	No	
<b>Tailings Pond Backfill Area</b>			Note any disturbance / turbidity in pond Closely observe areas of suspect sinkholes
Erosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Ponded Water	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Crest</b>			Note any ponding on crest
Surface Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Slide/Slump	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Cover Channels</b>			Observe the channel areas immediately north of the Tailings Pond Backfill Area, particularly within 100 m of the spillway., note any changes
Erosion/ Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Liner Exposure	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Ponded Water	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Spillway</b>			Note any obstruction or excessive debris in spillway entrance/channel Note condition of temporary access road built over spillway, and two check dams.
Entrance	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Erosion/Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Subsidence area in lower spillway appears slightly larger than last inspection
Channel Walls/Stilling Basin	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Flow?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note turbidity of flow (circle which applies): <u>clear</u> cloudy
<b>Downstream Slope</b>			Surface rilling unchanged, Slight increase in vegetation - rift fence needs repair
Erosion/Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Toe Berm	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Seepage/Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
			Measurement Weir: <u>4.0</u> cm Note estimate of water bypassing weir <u>0</u> % Note turbidity of flow upstream of weir (circle which applies): <u>clear</u> cloudy



# ROUTINE INSPECTION FORM

## HB MINE TAILINGS STORAGE FACILITY

### PERMIT M-218

Facility Component	Satisfactory Condition? Yes No	Observation (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)
<b>West Abutment</b>		<i>(abutment - where side of dam meets the spillway)</i>
Erosion	<input checked="" type="checkbox"/> <input type="checkbox"/>	
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/> <input type="checkbox"/>	
Seepage/Drainage	<input checked="" type="checkbox"/> <input type="checkbox"/>	If seepage observed, note turbidity (circle which applies): <u>clear</u> <u>cloudy</u>
<b>East Abutment</b>		<i>(abutment - where downstream side of dam meets the natural slope on east end - near parking end)</i>
Erosion	<input checked="" type="checkbox"/> <input type="checkbox"/>	Note any observations of buttress, including: flow, turbidity - take pictures <i>lots of new horse tail next to blast rock area.</i>
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/> <input type="checkbox"/>	
Seepage/Drainage	<input checked="" type="checkbox"/> <input type="checkbox"/>	If seepage observed, note turbidity (circle which applies): <u>clear</u> <u>cloudy</u>

**Wildlife** *Note any wildlife observed (species, number, sex, location, direction of travel, age (adult/juvenile))*  
*Tadpoles, little frogs*

Instrumentation	Metres Below Top of Riser (mBTOR) (to cm)	Alert Level Thresholds	Measurement weir
P1	<u>14.84</u>	P1 < <u>14.54</u> cm	<u>4.0</u> cm
P2	<u>14.04</u>	P2 < <u>12.84</u> cm	
P3	<u>6.48</u>	P3 < <u>5.93</u> cm	
P5	<u>9.49</u>	P5 < <u>8.53</u> cm	
P6	<u>8.18</u>	P6 < <u>7.70</u> cm	

**Performance**

normal → File with RDCK records.

abnormal → Advise RDCK:

- Alayne Hamilton (778) 317-1272
- Amy Wilson (250) 352-8178 (t) / (250) 505-8146 (c)
- Uli Wolf (250) 352-8168 (t) / (250) 505-3691 (c)
- Peter Mikes, Engineer of Record, (250) 420-7296 (c) / (604) 601-8489 (t)

Notify Ministry of Energy and Mines if unsafe dam conditions:

- Jerrold Jewsbury (250)417-6007 (t) / (250)420-1860 (c)

Notify Provincial Emergency Program if emergency event occurs:

- 1-800-663-3456

Notes:

Signature: *[Handwritten Signature]*



# ROUTINE INSPECTION FORM

HB MINE TAILINGS STORAGE FACILITY

PERMIT M-218

Page 1 of 2

Date: July 19/23 Name/Company: RDCK, Julia  
 Time: 1:45pm Weather: Sunny, clear, hot

Supplies: Inspection form, clip board, keys, tape measure, camera, pencil/pen, flashlight, water level meter, safety vest

Facility Component	Satisfactory Condition?		Observations (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)
	Yes	No	
<b>Tailings Pond Backfill Area</b>			Note any disturbance / turbidity in pond Closely observe areas of suspect sinkholes
Erosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Ponded Water	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Crest</b>			Note any ponding on crest
Surface Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Slide/Slump	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Cover Channels</b>			Observe the channel areas immediately north of the Tailings Pond Backfill Area, particularly within 100 m of the spillway., note any changes
Erosion/ Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Liner Exposure	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Ponded Water	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Spillway</b>			Note any obstruction or excessive debris in spillway entrance/channel Note condition of temporary access road built over spillway, and two check dams.
Entrance	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Erosion/Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Channel Walls/Stilling Basin	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Flow?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note turbidity of flow (circle which applies): clear cloudy
<b>Downstream Slope</b>			
Erosion/Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Toe Berm	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Seepage/Drainage	<input type="checkbox"/>	<input type="checkbox"/>	Measurement Weir: <u>7.5</u> cm Note estimate of water bypassing weir <u>0</u> % Note turbidity of flow upstream of weir (circle which applies): <u>clear</u> cloudy



# ROUTINE INSPECTION FORM

## HB MINE TAILINGS STORAGE FACILITY

### PERMIT M-218

Facility Component	Satisfactory Condition? Yes No	Observation (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)
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<b>West Abutment</b>		(abutment - where side of dam meets the spillway)
Erosion	<input checked="" type="checkbox"/> <input type="checkbox"/>	
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/> <input type="checkbox"/>	
Seepage/Drainage	<input checked="" type="checkbox"/> <input type="checkbox"/>	If seepage observed, note turbidity (circle which applies): clear cloudy

<b>East Abutment</b>		(abutment - where downstream side of dam meets the natural slope on east end - near parking end)
Erosion	<input checked="" type="checkbox"/> <input type="checkbox"/>	Note any observations of buttress, including: flow, turbidity - take pictures
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/> <input type="checkbox"/>	
Seepage/Drainage	<input checked="" type="checkbox"/> <input type="checkbox"/>	If seepage observed, note turbidity (circle which applies): clear cloudy

<b>Wildlife</b>	Note any wildlife observed (species, number, sex, location, direction of travel, age (adult/juvenile))		
	<p>- Falcon</p> <p>- no more tad poles</p>		

Instrumentation	Alert Level Thresholds	Measurement weir
P1 <u>14.97</u>	P1 < 14.54 cm	<u>7.5</u> cm
P2 <u>14.10</u>	P2 < 12.84 cm	
P3 <u>6.75</u>	P3 < 5.93 cm	
P5 <u>9.59</u>	P5 < 8.53 cm	
P6 <u>8.26</u>	P6 < 7.70 cm	

<b>Performance</b>	<input checked="" type="checkbox"/> normal → File with RDCK records. <input type="checkbox"/> abnormal → Advise RDCK: <ul style="list-style-type: none"> <li>- Alayne Hamilton (778) 317-1272</li> <li>- Amy Wilson (250) 352-8178 (t) / (250) 505-8146 (c)</li> <li>- Uli Wolf (250) 352-8168 (t) / (250) 505-3691 (c)</li> <li>- Peter Mikes, Engineer of Record, (250) 420-7296 (c) / (604) 601-8489 (t)</li> </ul> <p>Notify Ministry of Energy and Mines if unsafe dam conditions:</p> <ul style="list-style-type: none"> <li>- Jerrold Jewsbury (250)417-6007 (t) / (250)420-1860 (c)</li> </ul> <p>Notify Provincial Emergency Program if emergency event occurs:</p> <ul style="list-style-type: none"> <li>- 1-800-663-3456</li> </ul>
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Notes:

Signature: *[Handwritten Signature]*



# VISUAL INSPECTION FORM

HB MINE TAILINGS STORAGE FACILITY  
PERMIT M-218

Date: July 24, 2023 Name/Company: Alayne/Rock  
Time: 3:10 PM Weather: Sunny 28°C

Supplies: *Inspection form, clip board, keys, tape measure, camera, pencil/pen, flashlight, water level meter, safety vest*

Facility Component	Satisfactory Condition?		Observations (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)
	Yes	No	
Upstream of Dam	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note any ponding water near the dam or signs of erosion, take picture
Crest	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note any ponding on crest
Spillway  Flow?    yes                      no flow	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note any obstruction or excessive debris in spillway channel, entrance and upstream channel within 100 m of the spillway that causes water to pond or back-up.  Note turbidity (circle which applies):    clear    cloudy
Downstream Slope	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note any signs of active erosion, take picture
Performance	<input checked="" type="checkbox"/> normal    → File with RDCK records.  <input type="checkbox"/> abnormal → Advise RDCK: <input type="checkbox"/> - Alayne Hamilton (778) 317-1272 <input type="checkbox"/> - Amy Wilson (250) 352-8178 (t) / (250) 505-8146 (c) - Waste Emergency Line (250) 352-1501 (after hours) - Peter Mikes, Engineer of Record, (250) 420-7296 (c) / (604) 601-8489 (t)  Notify Ministry of Energy and Mines if unsafe dam conditions: - Jerrold Jewsbury (t) (250) 417-6007 / (c) (250) 420-1860  Notify Provincial Emergency Program if emergency event occurs: - 1-800-663-3456		

Notes:

Signature: \_\_\_\_\_



# ROUTINE INSPECTION FORM

HB MINE TAILINGS STORAGE FACILITY

PERMIT M-218

Page 1 of 2

Date: Aug 2/23

Name/Company: RDCK, Julia

Time:

Weather: sunny, clear, hot

Supplies: Inspection form, clip board, keys, tape measure, camera, pencil/pen, flashlight, water level meter, safety vest

Facility Component	Satisfactory Condition?		Observations (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)
	Yes	No	
<b>Tailings Pond Backfill Area</b>			Note any disturbance / turbidity in pond Closely observe areas of suspect sinkholes
Erosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Ponded Water	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Crest</b>			Note any ponding on crest
Surface Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Slide/Slump	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Cover Channels</b>			Observe the channel areas immediately north of the Tailings Pond Backfill Area, particularly within 100 m of the spillway., note any changes
Erosion/ Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>completely dry.</u>
Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Liner Exposure	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Ponded Water	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Spillway</b>			Note any obstruction or excessive debris in spillway entrance/channel Note condition of temporary access road built over spillway, and two check dams.
Entrance	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Erosion/Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Channel Walls/Stilling Basin	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Flow?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note turbidity of flow (circle which applies): clear cloudy
<b>Downstream Slope</b>			
Erosion/Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Toe Berm	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Seepage/Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Measurement Weir: <u>6.2</u> cm Note estimate of water bypassing weir <u>0</u> % Note turbidity of flow upstream of weir (circle which applies): <u>clear</u> cloudy



# ROUTINE INSPECTION FORM

## HB MINE TAILINGS STORAGE FACILITY

### PERMIT M-218

Facility Component	Satisfactory Condition? Yes No	Observation (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)
<b>West Abutment</b>		(abutment - where side of dam meets the spillway)
Erosion	<input checked="" type="checkbox"/> <input type="checkbox"/>	
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/> <input type="checkbox"/>	
Seepage/Drainage	<input checked="" type="checkbox"/> <input type="checkbox"/>	If seepage observed, note turbidity (circle which applies): clear cloudy
<b>East Abutment</b>		(abutment - where downstream side of dam meets the natural slope on east end - near parking end)
Erosion	<input checked="" type="checkbox"/> <input type="checkbox"/>	Note any observations of buttress, including: flow, turbidity - take pictures
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/> <input type="checkbox"/>	
Seepage/Drainage	<input checked="" type="checkbox"/> <input type="checkbox"/>	If seepage observed, note turbidity (circle which applies): clear cloudy

**Wildlife** Note any wildlife observed (species, number, sex, location, direction of travel, age (adult/juvenile))

- Animal feces -

Instrumentation	Alert Level Thresholds	Measurement weir
P1 <u>15.00</u>	Metres Below Top of Riser (mBTOR) (to cm)	P1 < 14.54 cm
P2 <u>14.12</u>	mBTOR	P2 < 12.84 cm
P3 <u>6.64</u>	mBTOR	P3 < 5.93 cm
P5 <u>9.64</u>	mBTOR	P5 < 8.53 cm
P6 <u>8.27</u>	mBTOR	P6 < 7.70 cm

**Performance**

normal → File with RDCK records.

abnormal → Advise RDCK:

- Alayne Hamilton (778) 317-1272
- Amy Wilson (250) 352-8178 (t) / (250) 505-8146 (c)
- Uli Wolf (250) 352-8168 (t) / (250) 505-3691 (c)
- Peter Mikes, Engineer of Record, (250) 420-7296 (c) / (604) 601-8489 (t)

Notify Ministry of Energy and Mines if unsafe dam conditions:

- Jerrold Jewsbury (250)417-6007 (t) / (250)420-1860 (c)

Notify Provincial Emergency Program if emergency event occurs:

- 1-800-663-3456

Notes:

Noticed an abundance of plant growth



# ROUTINE INSPECTION FORM

HB MINE TAILINGS STORAGE FACILITY  
PERMIT M-21

Page 1 of 1

Date: August 9, 2023 Name/Company: Matt Morrison / RDCK

Time: 15:00 Weather: Mixed Sun / cloud ~23°C

Supplies: Inspection form, clip board, keys, tape measure, camera, pencil/pen, flashlight, water level meter, safety vest

Facility Component	Satisfactory Condition?		Observations (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)
	Yes	No	
<b>Tailings Pond Backfill Area</b>  Erosion Settlement Ponded Water	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Note any disturbance / turbidity in pond Closely observe areas of suspect sinkholes
<b>Crest</b>  Surface Drainage Slide/Slump	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	Note any ponding on crest
<b>Cover Channels</b>  Erosion/ Erosion Control Slump/Cracks/Settlement Liner Exposure Ponded Water	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Observe the channel areas immediately north of the Tailings Pond Backfill Area, particularly within 100 m of the spillway., note any changes  <u>dry</u>
<b>Spillway</b>  Entrance Erosion/Erosion Control Channel Walls/Stilling Basin Flow?	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Note any obstruction or excessive debris in spillway entrance/channel Note condition of temporary access road built over spillway, and two check dams.  <u>dry</u>  Note turbidity of flow (circle which applies): clear cloudy
<b>Downstream Slope</b>  Erosion/Erosion Control Slide/Slump/Cracks/Settlement Toe Berm Seepage/Drainage	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Measurement Weir: <u>5.2</u> cm Note estimate of water bypassing weir <u>0</u> % Note turbidity of flow upstream of weir (circle which applies): <u>clear</u> cloudy



# ROUTINE INSPECTION FORM

HB MINE TAILINGS STORAGE FACILITY

PERMIT M-218

Page 2 of 2

Facility Component	Satisfactory Condition?		Observation (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)
	Yes	No	
<b>West Abutment</b>			(abutment - where side of dam meets the spillway)
Erosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>	If seepage observed, note turbidity (circle which applies): clear cloudy
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Seepage/Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>East Abutment</b>			(abutment - where downstream side of dam meets the natural slope on east end - near parking end)
Erosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note any observations of buttress, including: flow, turbidity - take pictures
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Seepage/Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

**Wildlife** Note any wildlife observed (species, number, sex, location, direction of travel, age (adult/juvenile))

Instrumentation	Metres Below Top of Riser (mBTOR) (to cm)		Alert Level Thresholds	Measurement weir
	P1 <u>15.10</u>		P1 < 14.54 cm	<u>5.2</u> cm
P2 <u>14.13</u>	mBTOR	P2 < 12.84 cm		
P3 <u>6.63</u>	mBTOR	P3 < 5.93 cm		
P5 <u>9.65</u>	mBTOR	P5 < 8.53 cm		
P6 <u>8.25</u>	mBTOR	P6 < 7.70 cm		

**Performance**

normal → File with RDCK records.

abnormal → Advise RDCK:

- Alayne Hamilton (778) 317-1272
- Amy Wilson (250) 352-8178 (t) / (250) 505-8146 (c)
- Uli Wolf (250) 352-8168 (t) / (250) 505-3691 (c)
- Peter Mikes, Engineer of Record, (250) 420-7296 (c) / (604) 601-8489 (t)

Notify Ministry of Energy and Mines if unsafe dam conditions:

- Jerrold Jewsbury (250)417-6007 (t) / (250)420-1860 (c)

Notify Provincial Emergency Program if emergency event occurs:

- 1-800-663-3456

Notes:

Signature: M. M.



# ROUTINE INSPECTION FORM

HB MINE TAILINGS STORAGE FACILITY  
PERMIT M-218

Page 1 of 2

Date: Aug 23, 2023 Name/Company: Julia, ROCK  
 Time: 1:20 pm Weather: cool, wet, misty, sunny

Supplies: Inspection form, clip board, keys, tape measure, camera, pencil/pen, flashlight, water level meter, safety vest

Facility Component	Satisfactory Condition?		Observations (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found) Note any disturbance / turbidity in pond Closely observe areas of suspect sinkholes
	Yes	No	
<b>Tailings Pond Backfill Area</b>			
Erosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Ponded Water	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Crest</b>			Note any ponding on crest
Surface Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Slide/Slump	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Cover Channels</b>			Observe the channel areas immediately north of the Tailings Pond Backfill Area, particularly within 100 m of the spillway., note any changes
Erosion/ Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Liner Exposure	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Ponded Water	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Spillway</b>			Note any obstruction or excessive debris in spillway entrance/channel Note condition of temporary access road built over spillway, and two check dams.
Entrance	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>No water in spillway</i>
Erosion/Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Channel Walls/Stilling Basin	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Flow?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
			Note turbidity of flow (circle which applies): clear cloudy
<b>Downstream Slope</b>			
Erosion/Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Toe Berm	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Seepage/Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
			Measurement Weir: <u>5.5</u> cm Note estimate of water bypassing weir <u>0</u> % Note turbidity of flow upstream of weir (circle which applies): clear <u>cloudy</u>

*Very cloudy.*



# ROUTINE INSPECTION FORM

HB MINE TAILINGS STORAGE FACILITY

PERMIT M-218

Page 2 of 2

Facility Component	Satisfactory Condition?		Observation (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)
	Yes	No	
<b>West Abutment</b>			(abutment - where side of dam meets the spillway)
Erosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Seepage/Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	If seepage observed, note turbidity (circle which applies): clear cloudy
<b>East Abutment</b>			(abutment - where downstream side of dam meets the natural slope on east end - near parking end) Note any observations of buttress, including: flow, turbidity - take pictures
Erosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Seepage/Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	If seepage observed, note turbidity (circle which applies): clear cloudy

**Wildlife** Note any wildlife observed (species, number, sex, location, direction of travel, age (adult/juvenile))  
~~None~~ None.

Instrumentation	Metres Below Top of Riser (mBTOR) (to cm)	Alert Level Thresholds	Measurement weir
P1	15.13 cm	P1 < 14.54 cm	<del>5.5</del> 5.5 cm
P2	14.16 cm	P2 < 12.84 cm	
P3	6.71 cm	P3 < 5.93 cm	
P5	9.70	P5 < 8.53 cm	
P6	10.38 cm	P6 < 7.70 cm	

**Performance**

normal → File with RDCK records.

abnormal → Advise RDCK:

- Alayne Hamilton (778) 317-1272
- Amy Wilson (250) 352-8178 (t) / (250) 505-8146 (c)
- Uli Wolf (250) 352-8168 (t) / (250) 505-3691 (c)
- Peter Mikes, Engineer of Record, (250) 420-7296 (c) / (604) 601-8489 (t)

Notify Ministry of Energy and Mines if unsafe dam conditions:

- Jerrold Jewsbury (250)417-6007 (t) / (250)420-1860 (c)

Notify Provincial Emergency Program if emergency event occurs:

- 1-800-663-3456

Notes: ~~Ground is very soft due to recent rainfall.~~

- Ground is very soft due to recent rainfall.

Signature:



# VISUAL INSPECTION FORM

HB MINE TAILINGS STORAGE FACILITY

PERMIT M-218

Page 1 of 1

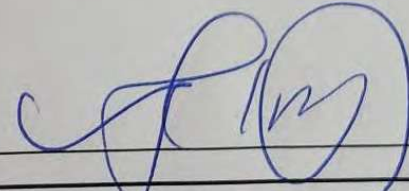
Date: Aug 30, 2023 Name/Company: Alayne RDCK

Time: 4:10 Pm Weather: RAIN 20C

Supplies: *Inspection form, clip board, keys, tape measure, camera, pencil/pen, flashlight, water level meter, safety vest*

Facility Component	Satisfactory Condition?		Observations (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)
	Yes	No	
Upstream of Dam	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note any ponding water near the dam or signs of erosion, take picture
Crest	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note any ponding on crest
Spillway	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note any obstruction or excessive debris in spillway channel, entrance and upstream channel within 100 m of the spillway that causes water to pond or back-up. <i>Cloudy due to hippo repairs at upstream conveyance channels</i>
Downstream Slope	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note any signs of active erosion, take picture
Performance	<input checked="" type="checkbox"/> normal → File with RDCK records. <input type="checkbox"/> abnormal → Advise RDCK: <ul style="list-style-type: none"> <li>- Alayne Hamilton (778) 317-1272</li> <li>- Amy Wilson (250) 352-8178 (t) / (250) 505-8146 (c)</li> <li>- Waste Emergency Line (250) 352-1501 (after hours)</li> <li>- Peter Mikes, Engineer of Record, (250) 420-7296 (c) / (604) 601-8489 (t)</li> </ul> Notify Ministry of Energy and Mines if unsafe dam conditions: - Jerrold Jewsbury (t) (250) 417-6007 / (c) (250) 420-1860 Notify Provincial Emergency Program if emergency event occurs: - 1-800-663-3456		

Notes: EOR & Jeremy Boswell (ITRB) on site for inspection

Signature: 





# VISUAL INSPECTION FORM

## HB MINE TAILINGS STORAGE FACILITY

### PERMIT M-218

Date: Sept 21, 2021 Name/Company: Alayne RDCK

Time: 3:40 Weather: Sunny 18°C

Supplies: *Inspection form, clip board, keys, tape measure, camera, pencil/pen, flashlight, water level meter, safety vest*

Facility Component	Satisfactory Condition?		Observations (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)
	Yes	No	
Upstream of Dam	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note any ponding water near the dam or signs of erosion, take picture
Crest	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note any ponding on crest
Spillway	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note any obstruction or excessive debris in spillway channel, entrance and upstream channel within ~100 m of the spillway that causes water to pond or back-up.
Flow?	yes <input type="checkbox"/>	no flow <input checked="" type="checkbox"/>	
Downstream Slope	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note any signs of active erosion, take picture

normal → File with RDCK records.

abnormal → Advise RDCK:

- Alayne Hamilton (778) 317-1272
- Amy Wilson (250) 352-8178 (t) / (250) 505-8146 (c)
- Waste Emergency Line (250) 352-1501 (after hours)
- Peter Mikes, Engineer of Record, (250) 420-7296 (c) / (604) 601-8489 (t)

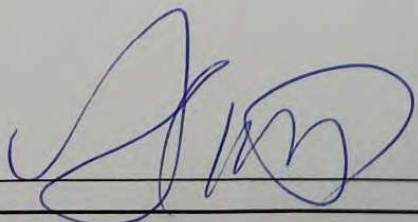
Notify Ministry of Energy and Mines if unsafe dam conditions:

- Jerrold Jewsbury (t) (250) 417-6007 / (c) (250) 420-1860

Notify Provincial Emergency Program if emergency event occurs:

- 1-800-663-3456

Notes:

Signature: 



# ROUTINE INSPECTION FORM

HB MINE TAILINGS STORAGE FACILITY

PERMIT M-218

Page 1 of 2

Date: Sept 26, 2022 Name/Company: Alayne / Cam RDEK  
 Time: 11:50 AM Weather: Sunny 18°C

Supplies: Inspection form, clip board, keys, tape measure, camera, pencil/pen, flashlight, water level meter, safety vest

Facility Component	Satisfactory Condition?		Observations (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)
	Yes	No	
<b>Tailings Pond Backfill Area</b>			Note any disturbance / turbidity in pond Closely observe areas of suspect sinkholes
Erosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Ponded Water	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Crest</b>			Note any ponding on crest
Surface Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Slide/Slump	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Cover Channels</b>			Observe the channel areas immediately north of the Tailings Pond Backfill Area, particularly within 100 m of the spillway., note any changes
Erosion/ Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Liner Exposure	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Ponded Water	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Spillway</b>			Note any obstruction or excessive debris in spillway entrance/channel Note condition of temporary access road built over spillway, and two check dams.
Entrance	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Erosion/Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Channel Walls/Stilling Basin	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Flow?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Note turbidity of flow (circle which applies): clear cloudy
<b>Downstream Slope</b>			Sediment accumulations in weir pond, possibly burrowing amphib.
Erosion/Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Toe Berm	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Seepage/Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
			Measurement Weir: <u>5.5</u> cm Note estimate of water bypassing weir <u>0</u> % Note turbidity of flow upstream of weir (circle which applies): <u>clear</u> cloudy



# ROUTINE INSPECTION FORM

HB MINE TAILINGS STORAGE FACILITY

PERMIT M-218

Page 2 of 2

Facility Component	Satisfactory Condition? Yes No	Observation (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)																							
<b>West Abutment</b>		(abutment - where side of dam meets the spillway)																							
Erosion	<input checked="" type="checkbox"/> <input type="checkbox"/>																								
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/> <input type="checkbox"/>																								
Seepage/Drainage	<input checked="" type="checkbox"/> <input type="checkbox"/>	If seepage observed, note turbidity (circle which applies): clear cloudy																							
<b>East Abutment</b>		(abutment - where downstream side of dam meets the natural slope on east end - near parking end)																							
Erosion	<input checked="" type="checkbox"/> <input type="checkbox"/>	Note any observations of buttress, including: flow, turbidity - take pictures																							
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/> <input type="checkbox"/>																								
Seepage/Drainage	<input checked="" type="checkbox"/> <input type="checkbox"/>	If seepage observed, note turbidity (circle which applies): clear cloudy																							
<b>Wildlife</b>		Note any wildlife observed (species, number, sex, location, direction of travel, age (adult/juvenile))																							
<b>Instrumentation</b>		<table border="1"> <thead> <tr> <th></th> <th>Metres Below Top of Riser (mBTOR) (to cm)</th> <th>Alert Level Thresholds</th> <th>Measurement weir</th> </tr> </thead> <tbody> <tr> <td>P1</td> <td>15.10</td> <td>P1 &lt; 14.54 cm</td> <td rowspan="6">5.5 cm</td> </tr> <tr> <td>P2</td> <td>14.21</td> <td>P2 &lt; 12.84 cm</td> </tr> <tr> <td>P3</td> <td>6.72</td> <td>P3 &lt; 5.93 cm</td> </tr> <tr> <td>P5</td> <td>9.76</td> <td>P5 &lt; 8.53 cm</td> </tr> <tr> <td>P6</td> <td>8.38</td> <td>P6 &lt; 7.70 cm</td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table>		Metres Below Top of Riser (mBTOR) (to cm)	Alert Level Thresholds	Measurement weir	P1	15.10	P1 < 14.54 cm	5.5 cm	P2	14.21	P2 < 12.84 cm	P3	6.72	P3 < 5.93 cm	P5	9.76	P5 < 8.53 cm	P6	8.38	P6 < 7.70 cm			
	Metres Below Top of Riser (mBTOR) (to cm)	Alert Level Thresholds	Measurement weir																						
P1	15.10	P1 < 14.54 cm	5.5 cm																						
P2	14.21	P2 < 12.84 cm																							
P3	6.72	P3 < 5.93 cm																							
P5	9.76	P5 < 8.53 cm																							
P6	8.38	P6 < 7.70 cm																							
<b>Performance</b>		<input checked="" type="checkbox"/> normal → File with RDCK records. <input type="checkbox"/> abnormal → Advise RDCK: - Alayne Hamilton (778) 317-1272 - Amy Wilson (250) 352-8178 (t) / (250) 505-8146 (c) - Uli Wolf (250) 352-8168 (t) / (250) 505-3691 (c) - Peter Mikes, Engineer of Record, (250) 420-7296 (c) / (604) 601-8489 (t)  Notify Ministry of Energy and Mines if unsafe dam conditions: - Jerrold Jewsbury (250)417-6007 (t) / (250)420-1860 (c)  Notify Provincial Emergency Program if emergency event occurs: - 1-800-663-3456																							

Notes:

Signature: \_\_\_\_\_



# VISUAL INSPECTION FORM

HB MINE TAILINGS STORAGE FACILITY

PERMIT M-218

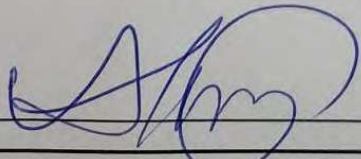
Page 1 of 1

Date: Oct 11, 2023 Name/Company: Alayne, Duty officers / RDCK  
Time: 9:25 AM Weather: Rain, 7°C

Supplies: Inspection form, clip board, keys, tape measure, camera, pencil/pen, flashlight, water level meter, safety vest

Facility Component	Satisfactory Condition?		Observations (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)
	Yes	No	
Upstream of Dam	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note any ponding water near the dam or signs of erosion, take picture
Crest	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note any ponding on crest
Spillway	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note any obstruction or excessive debris in spillway channel, entrance and upstream channel within ~100 m of the spillway that causes water to pond or back-up. <i>Flow at end of conveyance channel, but not visible in spillway rocks</i>
Downstream Slope	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note any signs of active erosion, take picture
Performance	<input checked="" type="checkbox"/> normal → File with RDCK records. <input type="checkbox"/> abnormal → Advise RDCK: - Alayne Hamilton (778) 317-1272 - Amy Wilson (250) 352-8178 (t) / (250) 505-8146 (c) - Waste Emergency Line (250) 352-1501 (after hours) - Peter Mikes, Engineer of Record, (250) 420-7296 (c) / (604) 601-8489 (t)  Notify Ministry of Energy and Mines if unsafe dam conditions: - Jerrold Jewsbury (t) (250) 417-6007 / (c) (250) 420-1860  Notify Provincial Emergency Program if emergency event occurs: - 1-800-663-3456		

Notes:

Signature: 



# VISUAL INSPECTION FORM

HB MINE TAILINGS STORAGE FACILITY

PERMIT M-218

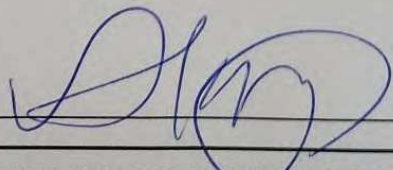
Page 1 of 1

Date: Oct 19, 2023 Name/Company: Alayne/Cam RDCK  
 Time: 11:50 AM Weather: Sunny 15°C

Supplies: *inspection form, clip board, keys, tape measure, camera, pencil/pen, flashlight, water level meter, safety vest*

Facility Component	Satisfactory Condition?		Observations (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)
	Yes	No	
Upstream of Dam	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note any ponding water near the dam or signs of erosion, take picture
Crest	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note any ponding on crest
Spillway	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note any obstruction or excessive debris in spillway channel, entrance and upstream channel within ~100 m of the spillway that causes water to pond or back-up. <i>Small amt of flow in convergence channels,</i>
Downstream Slope	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note any signs of active erosion, take picture
Performance	<input checked="" type="checkbox"/> normal → File with RDCK records. <input type="checkbox"/> abnormal → Advise RDCK: <ul style="list-style-type: none"> <li>- Alayne Hamilton (778) 317-1272</li> <li>- Amy Wilson (250) 352-8178 (t) / (250) 505-8146 (c)</li> <li>- Waste Emergency Line (250) 352-1501 (after hours)</li> <li>- Peter Mikes, Engineer of Record, (250) 420-7296 (c) / (604) 601-8489 (t)</li> </ul> Notify Ministry of Energy and Mines if unsafe dam conditions: - Jerrold Jewsbury (t) (250) 417-6007 / (c) (250) 420-1860  Notify Provincial Emergency Program if emergency event occurs: - 1-800-663-3456		

Notes:

Signature: 



# VISUAL INSPECTION FORM

HB MINE TAILINGS STORAGE FACILITY

PERMIT M-218

Page 1 of 1

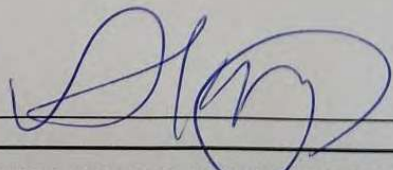
Date: Oct 19, 2023 Name/Company: Alayne/Cam RDCK

Time: 11:50 AM Weather: Sunny 15°C

Supplies: *inspection form, clip board, keys, tape measure, camera, pencil/pen, flashlight, water level meter, safety vest*

Facility Component	Satisfactory Condition?		Observations (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)
	Yes	No	
Upstream of Dam	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note any ponding water near the dam or signs of erosion, take picture
Crest	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note any ponding on crest
Spillway	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note any obstruction or excessive debris in spillway channel, entrance and upstream channel within ~100 m of the spillway that causes water to pond or back-up. <i>Small amt of flow in convergence channels,</i>
Downstream Slope	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note any signs of active erosion, take picture
Performance	<input checked="" type="checkbox"/> normal → File with RDCK records. <input type="checkbox"/> abnormal → Advise RDCK: <ul style="list-style-type: none"> <li>- Alayne Hamilton (778) 317-1272</li> <li>- Amy Wilson (250) 352-8178 (t) / (250) 505-8146 (c)</li> <li>- Waste Emergency Line (250) 352-1501 (after hours)</li> <li>- Peter Mikes, Engineer of Record, (250) 420-7296 (c) / (604) 601-8489 (t)</li> </ul> Notify Ministry of Energy and Mines if unsafe dam conditions: <ul style="list-style-type: none"> <li>- Jerrold Jewsbury (t) (250) 417-6007 / (c) (250) 420-1860</li> </ul> Notify Provincial Emergency Program if emergency event occurs: <ul style="list-style-type: none"> <li>- 1-800-663-3456</li> </ul>		

Notes:

Signature: 



# ROUTINE INSPECTION FORM

HB MINE TAILINGS STORAGE FACILITY

PERMIT M-218

Page 1 of 2

Date: Nov. 1/23 Name/Company: Matt Morrison / RDCK  
 Time: 14:30 Weather: ~7°C, Cloudy

Supplies: Inspection form, clip board, keys, tape measure, camera, pencil/pen, flashlight, water level meter, safety vest

Facility Component	Satisfactory Condition?		Observations (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)
	Yes	No	
<b>Tailings Pond Backfill Area</b>			Note any disturbance / turbidity in pond Closely observe areas of suspect sinkholes
Erosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Ponded Water	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Crest</b>			Note any ponding on crest
Surface Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Slide/Slump	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Cover Channels</b>			Observe the channel areas immediately north of the Tailings Pond Backfill Area, particularly within 100 m of the spillway., note any changes
Erosion/ Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Liner Exposure	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Ponded Water	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Spillway</b>			Note any obstruction or excessive debris in spillway entrance/channel Note condition of temporary access road built over spillway, and two check dams.
Entrance	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>No flow</u>
Erosion/Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Channel Walls/Stilling Basin	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Flow?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
			Note turbidity of flow (circle which applies): clear cloudy
<b>Downstream Slope</b>			
Erosion/Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Toe Berm	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Seepage/Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
			Measurement Weir: <u>5.5</u> cm Note estimate of water bypassing weir <u>0</u> % Note turbidity of flow upstream of weir (circle which applies): <u>cloudy</u> cloudy



# ROUTINE INSPECTION FORM

## HB MINE TAILINGS STORAGE FACILITY

### PERMIT M-218

Page 2 of 2

Facility Component	Satisfactory Condition?		Observation (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)
	Yes	No	
<b>West Abutment</b>			(abutment - where side of dam meets the spillway)
Erosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Seepage/Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	If seepage observed, note turbidity (circle which applies): clear cloudy
<b>East Abutment</b>			(abutment - where downstream side of dam meets the natural slope on east end - near parking end)
Erosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note any observations of buttress, including: flow, turbidity - take pictures
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Seepage/Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	If seepage observed, note turbidity (circle which applies): clear cloudy
<b>Wildlife</b>	Note any wildlife observed (species, number, sex, location, direction of travel, age (adult/juvenile))		
<b>Instrumentation</b>			
P1	<u>15.8</u>	Metres Below Top of Riser (mBTOR) (to cm)	Alert Level Thresholds P1 < 14.54 cm
P2	<u>0.4</u>	mBTOR	P2 < 12.84 cm
P3	<u>6.72</u>	mBTOR	P3 < 5.93 cm
P5	<u>9.80</u>	mBTOR	P5 < 8.53 cm
P6	<u>8.33</u>	mBTOR	P6 < 7.70 cm
			Measurement weir <u>5.5</u> cm
<b>Performance</b>	<input checked="" type="checkbox"/> normal → File with RDCK records. <input type="checkbox"/> abnormal → Advise RDCK: <ul style="list-style-type: none"> <li>- Alayne Hamilton (778) 317-1272</li> <li>- Amy Wilson (250) 352-8178 (t) / (250) 505-8146 (c)</li> <li>- Uli Wolf (250) 352-8168 (t) / (250) 505-3691 (c)</li> <li>- Peter Mikes, Engineer of Record, (250) 420-7296 (c) / (604) 601-8489 (t)</li> </ul> <p>Notify Ministry of Energy and Mines if unsafe dam conditions:  <ul style="list-style-type: none"> <li>- Jerrold Jewsbury (250)417-6007 (t) / (250)420-1860 (c)</li> </ul> </p> <p>Notify Provincial Emergency Program if emergency event occurs:  <ul style="list-style-type: none"> <li>- 1-800-663-3456</li> </ul> </p>		

Notes:

*M. Mc...*



# ROUTINE INSPECTION FORM

HB MINE TAILINGS STORAGE FACILITY

PERMIT M-218

Page 1 of 2

**Date:** Nov 16, 2023      **Name/Company:** Alayne/Cam RDCK  
**Time:** 12:45 PM      **Weather:** Sunny, 2C

*Supplies: Inspection form, clip board, keys, tape measure, camera, pencil/pen, flashlight, water level meter, safety vest*

Facility Component	Satisfactory Condition?		Observations (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)
	Yes	No	
<b>Tailings Pond Backfill Area</b>  Erosion Settlement Ponded Water	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Note any disturbance / turbidity in pond Closely observe areas of suspect sinkholes  Small pockets of frozen water in backfilled area, but no different distribution than after other rainy periods.
<b>Crest</b>  Surface Drainage Slide/Slump	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	Note any ponding on crest  Some minor rutting has formed on crest from recent crossings for WQ. Will have site operator address in spring.
<b>Cover Channels</b>  Erosion/ Erosion Control Slump/Cracks/Settlement Liner Exposure Ponded Water	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Observe the channel areas immediately north of the Tailings Pond Backfill Area, particularly within 100 m of the spillway., note any changes  Small amount of flow in channels, that disappears under blast rock at start of spillway. Recent repairs areas look good.
<b>Spillway</b>  Entrance Erosion/Erosion Control Channel Walls/Stilling Basin Flow?	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Note any obstruction or excessive debris in spillway entrance/channel Note condition of temporary access road built over spillway, and two check dams.  Flows relatively clear. NO flows observed after 5 feet from conveyance channel end.  Note turbidity of flow (circle which applies): <u>clear</u> cloudy
<b>Downstream Slope</b>  Erosion/Erosion Control Slide/Slump/Cracks/Settlement Toe Berm Seepage/Drainage	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Weir is clear.  Measurement Weir: <u>5.5</u> cm Note estimate of water bypassing weir <u>0</u> % Note turbidity of flow upstream of weir (circle which applies): <u>clear</u> cloudy



# ROUTINE INSPECTION FORM

## HB MINE TAILINGS STORAGE FACILITY

### PERMIT M-218

Facility Component	Satisfactory Condition? Yes No		Observation (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)		
<b>West Abutment</b>			<i>(abutment - where side of dam meets the spillway)</i>		
Erosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>	No seepage observed		
Slide/Slump/Cracks/ Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>			
Seepage/Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	If seepage observed, note turbidity (circle which applies): clear cloudy		
<b>East Abutment</b>			<i>(abutment - where downstream side of dam meets the natural slope on east end – near parking end)</i>		
Erosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>	No seepage observed		
Slide/Slump/Cracks/ Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>			
Seepage/Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	If seepage observed, note turbidity (circle which applies): clear cloudy		
<b>Wildlife</b>	Note any wildlife observed (species, number, sex, location, direction of travel, age (adult/juvenile)) coyote and deer tracks. Coyote scat.				
<b>Instrumentation</b>			Metres Below Top of Riser (mBTOR) (to cm)	Alert Level Thresholds	Measurement weir
	P1	14.96		P1	< 14.54 cm
	P2	14.21 empty	mBTOR	P2	< 12.84 cm
	P3	6.61	mBTOR	P3	< 5.93 cm
	P5	9.72	mBTOR	P5	< 8.53 cm
	P6	8.28	mBTOR	P6	< 7.70 cm
<b>Performance</b>	<input checked="" type="checkbox"/> normal → File with RDCK records. <input type="checkbox"/> abnormal → Advise RDCK: - Alayne Hamilton (778) 317-1272 - Amy Wilson (250) 352-8178 (t) / (250) 505-8146 (c) - Uli Wolf (250) 352-8168 (t) / (250) 505-3691 (c) - Peter Mikes, Engineer of Record, (250) 420-7296 (c) / (604) 601-8489 (t)  Notify Ministry of Energy and Mines if unsafe dam conditions: - Jerrold Jewsbury (250)417-6007 (t) / (250)420-1860 (c)  Notify Provincial Emergency Program if emergency event occurs: - 1-800-663-3456				

Notes: Ground is frozen. With longer term forecast, ground should remain frozen for some time.

Signature:



# VISUAL INSPECTION FORM

## HB MINE TAILINGS STORAGE FACILITY

### PERMIT M-218

**Date:** November 21, 2023 **Name/Company:** Alayne Hamilton  
**Time:** 8:26 AM **Weather:** -2C, mostly cloudy

*Supplies: Inspection form, clip board, keys, tape measure, camera, pencil/pen, flashlight, water level meter, safety vest*

Facility Component	Satisfactory Condition? Yes No	Observations (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)
<b>Upstream of Dam</b>	<input checked="" type="checkbox"/> <input type="checkbox"/>	Note any ponding water near the dam or signs of erosion, take picture  Still some minor ponding in place, but appears the same as previous inspections
<b>Crest</b>	<input checked="" type="checkbox"/> <input type="checkbox"/>	Note any ponding on crest  Minor rutting is present that needs to be repaired in spring
<b>Spillway</b>  <i>Flow?</i>	<input checked="" type="checkbox"/> <input type="checkbox"/> yes no flow	Note any obstruction or excessive debris in spillway channel, entrance and upstream channel within ~100 m of the spillway that causes water to pond or back-up.  Minor amount of flow present in conveyance channel, but visible in spillway  Note turbidity (circle which applies): <span style="border: 1px solid green; padding: 2px;">clear</span> cloudy
<b>Downstream Slope</b>	<input checked="" type="checkbox"/> <input type="checkbox"/>	Note any signs of active erosion, take picture  small amount of snow on d/s slope, no signs of active erosion (ground is frozen)
<b>Performance</b>	<p>X normal → File with RDCK records.</p> <p>abnormal → Advise RDCK:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> - Alayne Hamilton (778) 317-1272</li> <li><input type="checkbox"/> - Amy Wilson (250) 352-8178 (t) / (250) 505-8146 (c)</li> <li><input type="checkbox"/> - Waste Emergency Line (250) 352-1501 (after hours)</li> <li><input type="checkbox"/> - Peter Mikes, Engineer of Record, (250) 420-7296 (c) / (604) 601-8489 (t)</li> </ul> <p>Notify Ministry of Energy and Mines if unsafe dam conditions:</p> <ul style="list-style-type: none"> <li>- Jerrold Jewsbury (t) (250) 417-6007 / (c) (250) 420-1860</li> </ul> <p>Notify Provincial Emergency Program if emergency event occurs:</p> <ul style="list-style-type: none"> <li>- 1-800-663-3456</li> </ul>	

Notes:

Signature:



# ROUTINE INSPECTION FORM

HB MINE TAILINGS STORAGE FACILITY

PERMIT M-218

Page 1 of 2

Date: Nov 29 2023 Name/Company: RICK  
 Time: 1-2 pm Weather: cloudy cold

Supplies: Inspection form, clip board, keys, tape measure, camera, pencil/pen, flashlight, water level meter, safety vest

Facility Component	Satisfactory Condition?		Observations (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)
	Yes	No	
<b>Tailings Pond Backfill Area</b>			Note any disturbance / turbidity in pond Closely observe areas of suspect sinkholes
Erosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Ponded Water	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Crest</b>			Note any ponding on crest
Surface Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Slide/Slump	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Cover Channels</b>			Observe the channel areas immediately north of the Tailings Pond Backfill Area, particularly within 100 m of the spillway., note any changes
Erosion/ Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Liner Exposure	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Ponded Water	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Spillway</b>			Note any obstruction or excessive debris in spillway entrance/channel Note condition of temporary access road built over spillway, and two check dams.
Entrance	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Erosion/Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Channel Walls/Stilling Basin	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Flow?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note turbidity of flow (circle which applies): clear cloudy
	<u>No flow</u>		
<b>Downstream Slope</b>			
Erosion/Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Toe Berm	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Seepage/Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Measurement Weir: <u>7</u> cm Note estimate of water bypassing weir _____ % Note turbidity of flow upstream of weir (circle which applies) clear <u>cloudy</u>



# ROUTINE INSPECTION FORM

HB MINE TAILINGS STORAGE FACILITY

PERMIT M-218

Page 2 of 2

Facility Component	Satisfactory Condition?		Observation (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)	
	Yes	No		
<b>West Abutment</b>			(abutment - where side of dam meets the spillway)	
Erosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>	If seepage observed, note turbidity (circle which applies) clear cloudy	
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
Seepage/Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
<b>East Abutment</b>			(abutment - where downstream side of dam meets the natural slope on east end - near parking end)	
Erosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note any observations of buttress, including: flow, turbidity - take pictures	
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
Seepage/Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
<b>Wildlife</b>	Note any wildlife observed (species, number, sex, location, direction of travel, age (adult/juvenile))			
	NONE			
<b>Instrumentation</b>	P1 <u>14.90</u> P2 <u>14.21</u> P3 <u>6.6</u> P5 <u>9.74</u> P6 <u>8.22</u>	Metres Below Top of Riser (mBTOR) (to cm) mBTOR mBTOR mBTOR mBTOR	Alert Level Thresholds P1 < 14.54 cm P2 < 12.84 cm P3 < 5.93 cm P5 < 8.53 cm P6 < 7.70 cm	Measurement weir <u>7</u> cm
<b>Performance</b>	<input checked="" type="checkbox"/> normal → File with RDCK records. <input type="checkbox"/> abnormal → Advise RDCK: - Alayne Hamilton (778) 317-1272 - Amy Wilson (250) 352-8178 (t) / (250) 505-8146 (c) - Uli Wolf (250) 352-8168 (t) / (250) 505-3691 (c) - Peter Mikes, Engineer of Record, (250) 420-7296 (c) / (604) 601-8489 (t)  Notify Ministry of Energy and Mines if unsafe dam conditions: - Jerrold Jewsbury (250)417-6007 (t) / (250)420-1860 (c)  Notify Provincial Emergency Program if emergency event occurs: - 1-800-663-3456			

Notes:

Signature: \_\_\_\_\_



# VISUAL INSPECTION FORM

## HB MINE TAILINGS STORAGE FACILITY

### PERMIT M-218

**Date:** December 4, 2023      **Name/Company:** Alayne Hamilton  
**Time:** 12:35 PM      **Weather:** -3C, loudy

*Supplies: Inspection form, clip board, keys, tape measure, camera, pencil/pen, flashlight, water level meter, safety vest*

Facility Component	Satisfactory Condition? Yes No	Observations (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)
<b>Upstream of Dam</b>	<input checked="" type="checkbox"/> <input type="checkbox"/>	Note any ponding water near the dam or signs of erosion, take picture
<b>Crest</b>	<input checked="" type="checkbox"/> <input type="checkbox"/>	Note any ponding on crest Minor rutting is present that needs to be repaired in spring
<b>Spillway</b>  <i>Flow?</i>	<input checked="" type="checkbox"/> <input type="checkbox"/> yes                      no flow	Note any obstruction or excessive debris in spillway channel, entrance and upstream channel within ~100 m of the spillway that causes water to pond or back-up.  Note turbidity (circle which applies): <span style="background-color: #90EE90;">clear</span> cloudy
<b>Downstream Slope</b>	<input checked="" type="checkbox"/> <input type="checkbox"/>	Note any signs of active erosion, take picture
<b>Performance</b>	<p>X normal      → File with RDCK records.</p> <p>abnormal → Advise RDCK:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> - Alayne Hamilton (778) 317-1272</li> <li><input type="checkbox"/> - Amy Wilson (250) 352-8178 (t) / (250) 505-8146 (c)</li> <li><input type="checkbox"/> - Waste Emergency Line (250) 352-1501 (after hours)</li> <li><input type="checkbox"/> - Peter Mikes, Engineer of Record, (250) 420-7296 (c) / (604) 601-8489 (t)</li> </ul> <p>Notify Ministry of Energy and Mines if unsafe dam conditions:</p> <ul style="list-style-type: none"> <li>- Jerrold Jewsbury (t) (250) 417-6007 / (c) (250) 420-1860</li> </ul> <p>Notify Provincial Emergency Program if emergency event occurs:</p> <ul style="list-style-type: none"> <li>- 1-800-663-3456</li> </ul>	

**Notes:** Purpose of visit was to install flocculent in channels, including spillway inlet, and south spur source (till borrow). Large warming and heavy rain on snow event expected in next 48 hours.

Signature:



# VISUAL INSPECTION FORM

## HB MINE TAILINGS STORAGE FACILITY

### PERMIT M-218

**Date:** December 6, 2023      **Name/Company:** Alayne Hamilton  
**Time:** 9:08 AM      **Weather:** 7C, cloudy, with heavy rain on snow

*Supplies: Inspection form, clip board, keys, tape measure, camera, pencil/pen, flashlight, water level meter, safety vest*

Facility Component	Satisfactory Condition? Yes No	Observations (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)
<b>Upstream of Dam</b>	<input checked="" type="checkbox"/> <input type="checkbox"/>	Note any ponding water near the dam or signs of erosion, take picture
<b>Crest</b>	<input checked="" type="checkbox"/> <input type="checkbox"/>	Note any ponding on crest
<b>Spillway</b>  <i>Flow?</i>	<input checked="" type="checkbox"/> <input type="checkbox"/> yes                      no flow	Note any obstruction or excessive debris in spillway channel, entrance and upstream channel within ~100 m of the spillway that causes water to pond or back-up. Flows are very turbid, and are non-compliant.
<b>Downstream Slope</b>	<input checked="" type="checkbox"/> <input type="checkbox"/>	Note any signs of active erosion, take picture  Areas of ponded water from large rain/melt event. No signs of active erosion (rilling/gullies). Ponded water is clear.
<b>Performance</b>	<p>X normal → File with RDCK records.</p> <p>abnormal → Advise RDCK:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> - Alayne Hamilton (778) 317-1272</li> <li><input type="checkbox"/> - Amy Wilson (250) 352-8178 (t) / (250) 505-8146 (c)</li> <li>- Waste Emergency Line (250) 352-1501 (after hours)</li> <li>- Peter Mikes, Engineer of Record, (250) 420-7296 (c) / (604) 601-8489 (t)</li> </ul> <p>Notify Ministry of Energy and Mines if unsafe dam conditions:</p> <ul style="list-style-type: none"> <li>- Jerrold Jewsbury (t) (250) 417-6007 / (c) (250) 420-1860</li> </ul> <p>Notify Provincial Emergency Program if emergency event occurs:</p> <ul style="list-style-type: none"> <li>- 1-800-663-3456</li> </ul>	

**Notes:** Normal inspection WRT dam safety items but turbid water coming from till borrow to spillway (not from dam area erosion) is still non-compliant for environmental requirements. Site rain gauge showed 54 mm of rain in previous 24 hours, plus several inches of snow melt. Flocculent deployed December 4, Environmental Monitor was on site December 5 to collect water quality samples. Requested other RDCK trained staff attend site this the afternoon to complete full Routine Inspection, as per OMS event driven monitoring requirements.

Signature:



# ROUTINE INSPECTION FORM

HB MINE TAILINGS STORAGE FACILITY  
 PERMIT M-218  
 Page 1 of 2

Date: Dec 6, 2023 Name/Company: Matt Morrison / RDCK  
 Time: 13:30 Weather: Heavy - Mod rain

Supplies: *Inspection form, clip board, keys, tape measure, camera, pencil/pen, flashlight, water level meter, safety vest*

Facility Component	Satisfactory Condition?		Observations (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)
	Yes	No	
<b>Tailings Pond Backfill Area</b>			Note any disturbance / turbidity in pond Closely observe areas of suspect sinkholes
Erosion	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Heavy rain over past 24 hrs ~ 50 mm. Ponded water and significant flow off backfill area into conveyance channels. No erosion noted. Most water on backfill low turbidity
Settlement	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Ponded Water	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Crest</b>			Note any ponding on crest
Surface Drainage	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Minor ponding due to heavy rain
Slide/Slump	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
<b>Cover Channels</b>			Observe the channel areas immediately north of the Tailings Pond Backfill Area, particularly within 100 m of the spillway., note any changes
Erosion/ Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Heavy flow moving through channels. Turbidity noted - No bulging at former site. High turbidity from sub channel (name?)
Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Liner Exposure	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Ponded Water	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Spillway</b>			Note any obstruction or excessive debris in spillway entrance/channel Note condition of temporary access road built over spillway, and two check dams.
Entrance	<input checked="" type="checkbox"/>	<input type="checkbox"/>	No obstructions, strong flow, medium turbidity through spillway
Erosion/Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Channel Walls/Stilling Basin	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Flow?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
			Note turbidity of flow (circle which applies): clear <input checked="" type="radio"/> cloudy
<b>Downstream Slope</b>			Some runneling on toe berm and adjacent land causing turbidity in weir pond - Water leaving from below toe berm less turbid
Erosion/Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Measurement Weir: <u>19</u> cm Note estimate of water bypassing weir <u>0</u> % Note turbidity of flow upstream of weir (circle which applies): clear <input checked="" type="radio"/> cloudy
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Toe Berm	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Seepage/Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	



# ROUTINE INSPECTION FORM

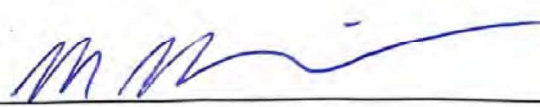
HB MINE TAILINGS STORAGE FACILITY

PERMIT M-218

Page 2 of 2

Facility Component	Satisfactory Condition? Yes No		Observation (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)	
<b>West Abutment</b>			(abutment - where side of dam meets the spillway)	
Erosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Surface flow from heavy rain. low turbidity	
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
Seepage/Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
<b>East Abutment</b>			(abutment - where downstream side of dam meets the natural slope on east end - near parking end)	
Erosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Surface flow, no erosion noted. Low turbidity	
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
Seepage/Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
If seepage observed, note turbidity (circle which applies): <input checked="" type="radio"/> clear <input type="radio"/> cloudy				
<b>Wildlife</b>	Note any wildlife observed (species, number, sex, location, direction of travel, age (adult/juvenile)) Elk and deer tracks			
<b>Instrumentation</b>	P1 <u>14.89</u>	Metres Below Top of Riser (mBTOR) (to cm)	Alert Level Thresholds	Measurement weir
	P2 <u>14.19</u>	mBTOR	P1 < <u>14.54 cm</u>	<u>19</u> cm
	P3 <u>6.47</u>	mBTOR	P2 < <u>12.84 cm</u>	
	P5 <u>9.75</u>	mBTOR	P3 < <u>5.93 cm</u>	
	P6 <u>8.17</u>	mBTOR	P5 < <u>8.53 cm</u>	
			P6 < <u>7.70 cm</u>	
<b>Performance</b>	<input type="checkbox"/> normal → File with RDCK records. <input checked="" type="checkbox"/> abnormal → Advise RDCK: <ul style="list-style-type: none"> <li>- Alayne Hamilton (778) 317-1272</li> <li>- Amy Wilson (250) 352-8178 (t) / (250) 505-8146 (c)</li> <li>- Uli Wolf (250) 352-8168 (t) / (250) 505-3691 (c)</li> <li>- Peter Mikes, Engineer of Record, (250) 420-7296 (c) / (604) 601-8489 (t)</li> </ul> Notify Ministry of Energy and Mines if unsafe dam conditions: <ul style="list-style-type: none"> <li>- Jerrold Jewsbury (250)417-6007 (t) / (250)420-1860 (c)</li> </ul> Notify Provincial Emergency Program if emergency event occurs: <ul style="list-style-type: none"> <li>- 1-800-663-3456</li> </ul>			

Notes:

Signature: 



# ROUTINE INSPECTION FORM

HB MINE TAILINGS STORAGE FACILITY

PERMIT M-218

Page 1 of 2

Date: Dec 13/23 1 PM

Name/Company: RDCK

Time:

Weather: CLOUDY COLD -1

Supplies: Inspection form, clip board, keys, tape measure, camera, pencil/pen, flashlight, water level meter, safety vest

Facility Component	Satisfactory Condition?		Observations (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)
	Yes	No	
<b>Tailings Pond Backfill Area</b>			Note any disturbance / turbidity in pond Closely observe areas of suspect sinkholes
Erosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Ponded Water	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Crest</b>			Note any ponding on crest
Surface Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Slide/Slump	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Cover Channels</b>			Observe the channel areas immediately north of the Tailings Pond Backfill Area, particularly within 100 m of the spillway., note any changes
Erosion/ Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Liner Exposure	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Ponded Water	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Spillway</b>			Note any obstruction or excessive debris in spillway entrance/channel Note condition of temporary access road built over spillway, and two check dams.
Entrance	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Erosion/Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Channel Walls/Stilling Basin	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Flow?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note turbidity of flow (circle which applies): <u>clear</u> cloudy <u>there is flow, but slow</u>
<b>Downstream Slope</b>			
Erosion/Erosion Control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Toe Berm	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Seepage/Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Measurement Weir: <u>4.2</u> cm Note estimate of water bypassing weir _____ % Note turbidity of flow upstream of weir (circle which applies): <u>clear</u> cloudy



# ROUTINE INSPECTION FORM

HB MINE TAILINGS STORAGE FACILITY

PERMIT M-218

Page 2 of 2

Facility Component	Satisfactory Condition?		Observation (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)	
	Yes	No		
<b>West Abutment</b>			(abutment - where side of dam meets the spillway)	
Erosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
Seepage/Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	If seepage observed, note turbidity (circle which applies): clear cloudy	
<b>East Abutment</b>			(abutment - where downstream side of dam meets the natural slope on east end - near parking end)	
Erosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Note any observations of buttress, including: flow, turbidity - take pictures	
Slide/Slump/Cracks/Settlement	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
Seepage/Drainage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	If seepage observed, note turbidity (circle which applies): clear cloudy	
<b>Wildlife</b>	Note any wildlife observed (species, number, sex, location, direction of travel, age (adult/juvenile)) <b>NONE</b>			
<b>Instrumentation</b>	P1 <u>14.79</u> P2 <u>14.20</u> P3 <u>6.50</u> P5 <u>9.64</u> P6 <u>8.22</u>	Metres Below Top of Riser (mBTOR) (to cm) mBTOR mBTOR mBTOR mBTOR	Alert Level Thresholds P1 < 14.54 cm P2 < 12.84 cm P3 < 5.93 cm P5 < 8.53 cm P6 < 7.70 cm	Measurement weir <u>4.2</u> cm
<b>Performance</b>	<input checked="" type="checkbox"/> normal → File with RDCK records. <input type="checkbox"/> abnormal → Advise RDCK: - Alayne Hamilton (778) 317-1272 - Amy Wilson (250) 352-8178 (t) / (250) 505-8146 (c) - Uli Wolf (250) 352-8168 (t) / (250) 505-3691 (c) - Peter Mikes, Engineer of Record, (250) 420-7296 (c) / (604) 601-8489 (t)  Notify Ministry of Energy and Mines if unsafe dam conditions: - Jerrold Jewsbury (250)417-6007 (t) / (250)420-1860 (c)  Notify Provincial Emergency Program if emergency event occurs: - 1-800-663-3456			

Notes:

Signature: 



# VISUAL INSPECTION FORM

## HB MINE TAILINGS STORAGE FACILITY

### PERMIT M-218

**Date:** December 20, 2023    **Name/Company:** Alayne Hamilton  
**Time:** 12:15 PM    **Weather:** 4C, cloudy, partial snow cover on ground

*Supplies: Inspection form, clip board, keys, tape measure, camera, pencil/pen, flashlight, water level meter, safety vest*

Facility Component	Satisfactory Condition? Yes    No	Observations (Picture # & description, Measurement, Sketch, Location, Comments on Deficiencies found)
<b>Upstream of Dam</b>	<input checked="" type="checkbox"/> <input type="checkbox"/>	Note any ponding water near the dam or signs of erosion, take picture
<b>Crest</b>	<input checked="" type="checkbox"/> <input type="checkbox"/>	Note any ponding on crest Minor rutting to be repaired in spring
<b>Spillway</b>	<input checked="" type="checkbox"/> <input type="checkbox"/>	Note any obstruction or excessive debris in spillway channel, entrance and upstream channel within ~100 m of the spillway that causes water to pond or back-up.
Flow?	yes                      no flow	Flows are clear
	Note turbidity (circle which applies): <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">clear</span> cloudy	
<b>Downstream Slope</b>	<input checked="" type="checkbox"/> <input type="checkbox"/>	Note any signs of active erosion, take picture  50% snow cover on d/s slope
<b>Performance</b>	<p>X normal    → File with RDCK records.</p> <p>abnormal → Advise RDCK:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> - Alayne Hamilton (778) 317-1272</li> <li><input type="checkbox"/> - Amy Wilson (250) 352-8178 (t) / (250) 505-8146 (c)</li> <li><input type="checkbox"/> - Waste Emergency Line (250) 352-1501 (after hours)</li> <li><input type="checkbox"/> - Peter Mikes, Engineer of Record, (250) 420-7296 (c) / (604) 601-8489 (t)</li> </ul> <p>Notify Ministry of Energy and Mines if unsafe dam conditions:</p> <ul style="list-style-type: none"> <li>- Jerrold Jewsbury (t) (250) 417-6007 / (c) (250) 420-1860</li> </ul> <p>Notify Provincial Emergency Program if emergency event occurs:</p> <ul style="list-style-type: none"> <li>- 1-800-663-3456</li> </ul>	

**Notes:**

Could not complete full walk around - the landfill staff, who usually attend as a second person for safety reasons, were unexpectedly unable to support, and our compost operator had a site meeting and 3 loads to process, so due to safety concerns (wolf is again present on site) I was only able to inspect the spillway, dam crest and P1/P2. Everything in those areas looked good, and the spillway flows are clear.

Signature:

## APPENDIX D

### 2024 SITE INSPECTION CHECKLIST AND SELECTED PHOTOGRAPHS

<b>Inspection Date:</b>	May 14, 2024
<b>Structure:</b>	HB Mine Tailing Facility
<b>Property:</b>	Regional District of Central Kootenay (RDCK)
<b>Consequence Classification:</b>	Very High
<b>Permits and Licenses:</b>	M-218 amended May 18, 2021
<b>Inspection Performed By:</b>	Amir R. Khoshboresh and Puria Asiaban of Tetra Tech, and accompanied by Alayne Hamilton and Amy Wilson of RDCK and Peter Mikes of SRK.

### Conditions at Time of Inspection

<b>Temperature (°C):</b>	19°C (Average)			
<b>Weather</b>	<b>Winds</b>	<b>Snow Cover</b>	<b>Pond</b>	<b>Wave Action</b>
<input checked="" type="checkbox"/> Sunny <input type="checkbox"/> Scattered Cloud <input type="checkbox"/> Overcast <input type="checkbox"/> Raining <input type="checkbox"/> Snowing	<input type="checkbox"/> None <input checked="" type="checkbox"/> Light <input type="checkbox"/> Moderate <input type="checkbox"/> High From:	<input checked="" type="checkbox"/> None <input type="checkbox"/> Slight <input type="checkbox"/> Heavy <input type="checkbox"/> Drifts <input type="checkbox"/> Melting	<input checked="" type="checkbox"/> None <input type="checkbox"/> Open Water <input type="checkbox"/> Partially Frozen <input type="checkbox"/> Frozen <input type="checkbox"/> High Turbidity	<input checked="" type="checkbox"/> None <input type="checkbox"/> Light <input type="checkbox"/> Moderate <input type="checkbox"/> High <input type="checkbox"/> Causing Erosion
<b>Description</b>	Bright sunny days			

### Structure Data

<b>Year of Construction</b>	Two downstream raises constructed during operations in 1975 and 1977	<b>Year of Toe Berm Construction</b>	Constructed in 2005 and expanded in 2021
<b>Type of Dam</b>	Zoned Earthfill Embankment	<b>Purpose of Dam</b>	
<b>Current Freeboard (m)</b>	No pond is present under normal conditions.	<b>Required Freeboard (m)</b>	0.94
<b>Max Dam Height (m)</b>	28 m	<b>Dam Crest Length</b>	Approximately 210 m
<b>Max Crest Width (m)</b>	Approximately 6 to 7 m	<b>Dam Crest Elevation</b>	710.8 m
<b>Slope Angle (U/S)</b>	1.5H:1V	<b>Slope Angle (D/S)</b>	2.9H:1V
<b>Impounded Tailings</b>	Approximately 6.3 million tonnes	<b>Tailings Impoundment Area</b>	Approximately 26 ha
<b>Tailings Deposition Period</b>	1955-1966 and 1974-1977	<b>Contributing Watershed Area</b>	2.2 km <sup>2</sup>
<b>Peak Spillway Discharge</b>	58 m <sup>3</sup> /s	<b>Inflow Design Flood (IDF)</b>	70 m <sup>3</sup> /s

#### Notes:

- The dam crest is in general good condition; just some rutting from vehicle traffic was observed.
- No sign/evidence of depression or sinkhole was noted along the interface with the tailing impoundment area.
- Some vegetation is growing along the bedrock spillway. Spillway appears to be in general good condition.
- Surface erosion rills/gullies were observed in multiple locations on the western slope the spillway outlet channel.
- Seepage water at the downstream toe was clear with no turbidity.
- Logs and boulders were observed along the inlet of the downstream creek that need to be removed.
- Multiple surface erosion rills and gullies were identified along the eastern slope of the expanded berm.
- The downstream eastern slope of the extended berm is prone to surface erosion and sloughing.
- Multiple surface eroded areas were observed around the tailing cover perimeter.
- Water ponding areas were observed in multiple locations within the tailing impoundment area.

OBSERVATIONS						
1.0 Dam Crest	Yes	No	NA	Condition *	Photo #	Comments
1.1 Evidence of Breach/Washout		X		S		
1.2 Lateral Movement		X		S	1& 3	No visual sign of lateral movement.
1.3 Evidence of Settlement/Cracking		X		S	1& 3	No visual sign of Settlement/Cracking
1.4 Shoulder Erosion/Reduced Width		X		S	1& 3	
1.6 Surface Condition (soft/rutted/rilled)	X			F	4	Some rutting from vehicle traffic was observed along the dam crest.
1.7 Vegetation		X		S	1& 3	
1.8 Animal Burrows		X		S		
1.9 Access	X			S	1	Accessible from the left abutment.
1.10 Other Unusual Conditions	X			F	10	Exposed geotextile was observed in multiple locations on the west side.
2.0 Downstream Slope (above Toe Berm)	Yes	No	NA	Condition	Photo #	Comments
2.1 Erosion Protection/Vegetation		X		S	5 & 6	In general good condition.
2.2 Evidence of Erosion		X		S	5 & 6	
2.3 Evidence of Slope Instability		X		-		
2.4 Evidence of Seepage or Piping		X		-		
2.5 Slope Visually Uniform (no bulging/settlement/movement)		X		-		
2.6 Animal Burrows		X		-	5 & 6	The slope is vegetated and unsuitable for visual inspection.
2.8 Buttress	X			S	5 & 6	Buttressed by the downstream toe berm.
1.10 Other Unusual Conditions		X		-		
3.0 Downstream Toe Berm	Yes	No	NA	Condition	Photo #	Comments
2.1 Erosion Protection/Vegetation	X			F	21 & 22	Sparse vegetation was noted in some areas.
2.2 Evidence of Erosion	X			F	22, 23, 24	Multiple surface erosion rills and gullies were identified.
2.3 Evidence of Slope Instability		X		-	21	
2.4 Evidence of Seepage or Piping		X		-		
2.5 Slope Visually Uniform (no bulging/settlement/movement)		X		-	21	

2.6	Animal Burrows		X		–		
2.8	Buttress		X		–		
1.10	Other Unusual Conditions		X		–		
<b>4.0</b>	<b>Downstream Dam Toe</b>	<b>Yes</b>	<b>No</b>	<b>NA</b>	<b>Condition</b>	<b>Photo #</b>	<b>Comments</b>
1.1	Toe Drain (seepage V-notch weir)	X			S	17	Seepage water at the downstream toe was clear with no turbidity
1.2	Ponded Water at Toe		X		S		
1.4	Animal Burrows		X		S		
1.10	Other Unusual Conditions	X			F	18	Logs and boulders were observed along the inlet of the downstream creek that need to be removed.
<b>5.0</b>	<b>Spillway</b>	<b>Yes</b>	<b>No</b>	<b>NA</b>	<b>Condition</b>	<b>Photo #</b>	<b>Comments</b>
2.1	Vegetation	X			S	11 & 13	Some vegetation is growing along the bedrock spillway.
2.2	Obstruction		X		S		
2.3	Evidence of Slope Instability		X		F	12	No study/assessment has not been conducted for the western slope of the bedrock spillway.
1.10	Other Unusual Conditions	X			F	15	Surface erosion rills/gullies were observed in multiple locations on the western slope the spillway outlet channel.
<b>6.0</b>	<b>Tailing Impoundment Area</b>	<b>Yes</b>	<b>No</b>	<b>NA</b>	<b>Condition</b>	<b>Photo #</b>	<b>Comments</b>
2.1	Vegetation	X			S	34	Some sparse vegetation was noted in some areas.
2.1	Tailing Cover	X			S		
2.2	Tailing Exposure	X			F	27	
2.3	Surface Erosion	X			F	26	Multiple surface eroded areas were noted around the tailing cover perimeter.
2.3	Water Ponding	X			S	28, 32, & 34	
1.10	Other Unusual Conditions	X			F	25, 30 & 33	Grassy vegetation is growing along most areas of the channels.
<b>7.0</b>	<b>Instrumentation</b>	<b>Yes</b>	<b>No</b>	<b>NA</b>	<b>Condition</b>	<b>Photo #</b>	<b>Comments</b>
2.1	Piezometer	X			S	19	5 standpipe piezometers along the downstream slope and toe berm were identified.
2.2	Survey Hub	X			S	19 & 20	12 survey hubs and 2 control points along the downstream slope and toe berm were identified.

2.3 V-Notch Weir	X			S	17	A V-notch weir on the downstream toe was identified.
2.3 Monitoring Wells	X			S	31 & 32	Several monitoring wells were identified within the Tailing Impoundment Area.
1.10 Other Unusual Conditions		X		–		

\*S: Satisfactory  
 F: Fair  
 P: Poor  
 U: Unsatisfactory



HB Mine Tailing Facility  
Salmo, BC  
May 14, 2024

**Photo D.1: General view of HB Tailing Dam, looking west. Warning signs located near the crest gate indicate the restricted area with no trespassing and warning for hazardous ground conditions exist in this area.**



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Salmo, BC  
May 14, 2024

**Photo D.2: General view of the downstream face of the dam and expanded berm from left (east) abutment, looking west. Access to the downstream berm from the left abutment was restricted by a couple of concrete blocks.**



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Salmo, BC  
May 14, 2024

**Photo D.3: View of the dam crest and tailings impoundment area, looking west. The dam crest was found to be mainly clean with no vegetation. The upstream slope of the dam has been covered by deposited tailing material, tailing cover, and vegetation growing over it.**

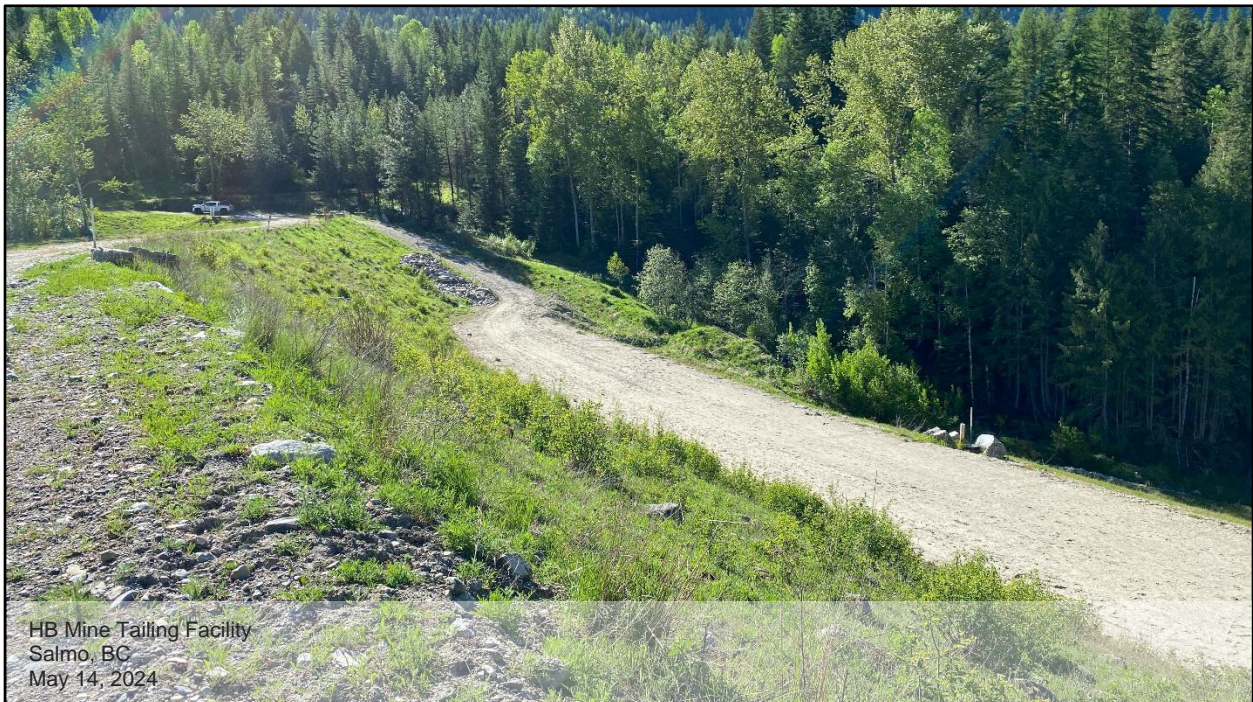


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Salmo, BC  
May 14, 2024

**Photo D.4: A close view of the dam crest. Some rutting from vehicle traffic was observed along the dam crest. The dam crest is in general good condition.**



**Photo D.5: View of downstream slope face of the dam and the crest of expanded toe berm, looking from the dam crest to west. Well established vegetation was found throughout the downstream slope face.**



**Photo D.6: View of downstream slope face of the dam and the crest of expanded toe berm, looking from the dam crest to east. The downstream slope of the dam appears to be in general good condition.**



**Photo D.7: General view of the tailing impoundment area, looking west. No sign/evidence of depression or sinkhole was noted along the interface with the tailing impoundment area.**



**Photo D.8: General view of the tailing impoundment area, looking east. Vegetation is growing throughout the area; however, sparse vegetation was found in some areas.**



**Photo D.9: View of the downstream slope west side, looking southwest. The west side of the downstream slope was repaired in 2012 and a layer of riprap has been placed over this area.**



**Photo D.10: A close view of the dam crest, west side. Exposed geotextile was observed in multiple locations on the west side.**



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May 14, 2024

**Photo D.11: View of the bedrock spillway inlet, looking south. Flow with a few centimeters' depth was observed over the bedrock spillway. Some vegetation is growing along the bedrock spillway.**



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May 14, 2024

**Photo D.12: View of the western slope of bedrock spillway. This area is visually inspected during the routine site inspections for any potential instability.**



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May 14, 2024

**Photo D.13: View of the south end of bedrock spillway, looking south. Vegetation is growing along the bedrock spillway that needs to be removed.**



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May 14, 2024

**Photo D.14: View of the spillway outlet channel, looking south. The spillway channel appears to be in general good condition.**



**Photo D.15: View of the western slope (exposed till) of the spillway outlet channel, looking west. Surface erosion rills/gullies were observed in multiple locations on the western slope the spillway outlet channel.**



**Photo D.16: View of the downstream slope of the expanded berm and toe of the dam, looking south. A sediment control fence was found near the downstream toe. The sediment fence failed at some points and has been covered by sedimented material.**



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May 14, 2024

**Photo D.17: View of the downstream toe, looking east. A seepage V-notch weir (yellow arrow) situated at the downstream toe of the expended berm measures the dam seepage flow rate manually. The seepage water at the downstream toe was clear with no turbidity.**



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May 14, 2024

**Photo D.18: View of the downstream creek, looking southwest. The seepage drains into the downstream creek (narrow valley). Logs and boulders were observed along the inlet of the downstream creek that need to be removed.**



**Photo D.19: View of the downstream slope of the expanded toe berm, looking south. Piezometers P5 and P6 (yellow arrow) and survey hub H11 (blue arrow) are located at the downstream slope of the expanded berm.**



**Photo D.20: A close view of the survey hub H11, located at the downstream slope of the expanded berm.**



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May 14, 2024

**Photo D.21: General view of the crest and downstream slope (west side) of the expanded berm, looking west. The crest of the downstream toe berm was even and appears to be in general good condition.**



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Salmo, BC  
May 14, 2024

**Photo D.22: View of the downstream slope (east side) of the expanded berm, looking east. Multiple surface erosion rills and gullies were identified along the eastern slope of the expanded berm.**



**Photo D.23: A close view of the downstream east slope of the expanded berm. The downstream eastern slope of the extended berm is prone to surface erosion and sloughing.**



**Photo D.24: A close view of the downstream east slope of the expanded berm. Gullies have been developed considerably near the east abutment of the dam.**



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May 14, 2024

**Photo D.25: General view of the tailing impoundment area and Main Channel, looking northeast. An erosion control blanket has been placed throughout the bottom and slope of the channels.**



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May 14, 2024

**Photo D.26: Multiple surface eroded areas with several centimeters of depth were observed around the tailing cover perimeter.**



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May 14, 2024

**Photo D.27: A close view of the tailings exposure around the tailing cover perimeter.**

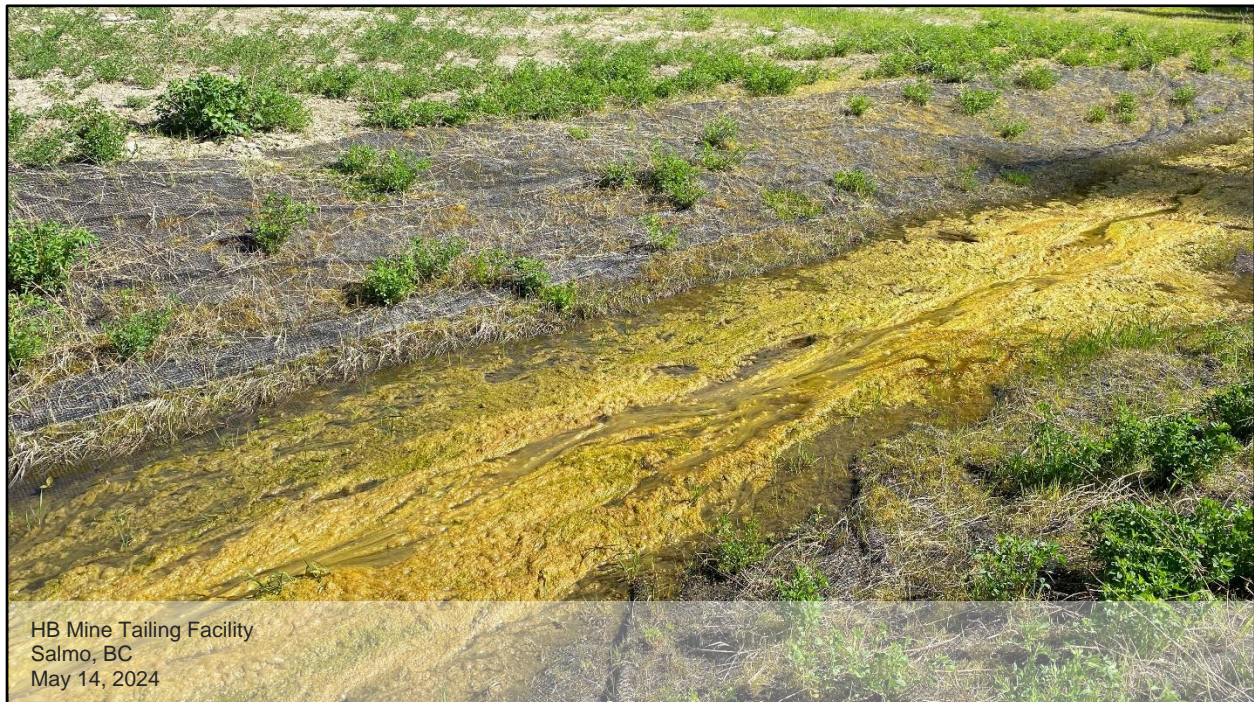


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May 14, 2024

**Photo D.28: General view of the tailing impoundment area, looking northwest. Water ponding and wetland areas were observed mainly along the east side of the tailing impoundment area.**



**Photo D.29: View of the South Spur Channel inlet and Energy Dissipation Structure (SSCED), looking east.**



**Photo D.30: Standing Water along with growing algae were found in the east portion of the South Spur Channel, near the SSCED. It apparently occurred due to excess vegetation within the eastern portion of the channel.**



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May 14, 2024

**Photo D.31: A close view of the monitoring well MW-04-S-05 located in the tailing impoundment area. The pipe of the monitoring well was broken and found to be in flowing artesian condition.**



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May 14, 2024

**Photo D.32: View of the tailing impoundment area, looking east. A water ponding area was found near the monitoring well MW-04-S-05 (yellow arrow).**



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Salmo, BC  
May 14, 2024

**Photo D.33: General view of the upstream side of the dam, tailing impoundment area, and Tailings Surface Drainage Channel (Main Channel), looking south. Grassy vegetation is growing along most areas of the channels that needs to be monitored and removed.**



HB Mine Tailing Facility  
Salmo, BC  
May 14, 2024

**Photo D.34: Water ponding within the west side of the tailing impoundment area, looking north.**

## APPENDIX E

### CLOSURE DESIGN ENGINEERING DRAWINGS FOR CLOSURE OF THE HB TAILINGS FACILITY



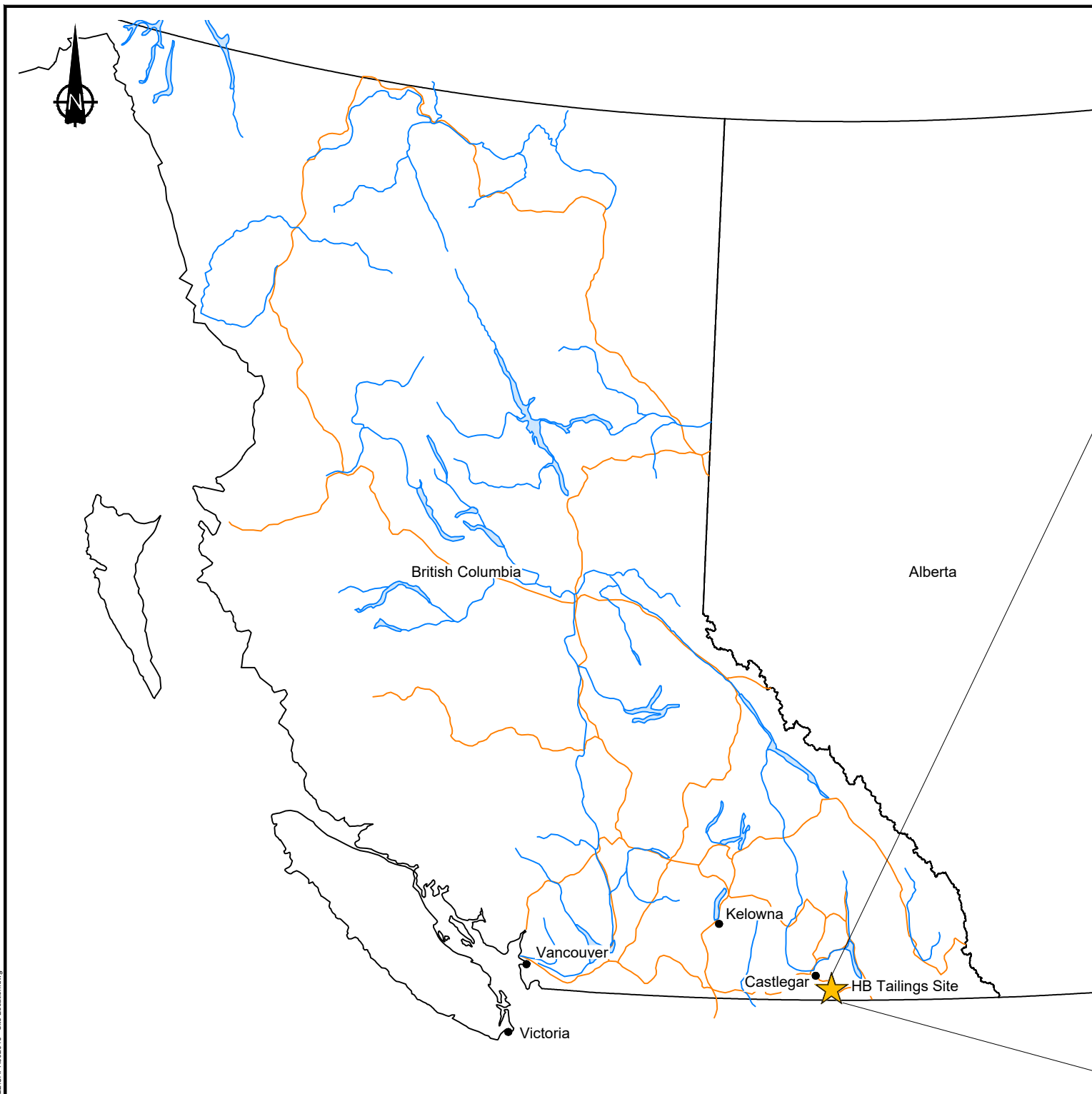
# Regional District of Central Kootenay

## Closure Design Engineering Drawings for the Closure of the HB Mine Tailings Facility

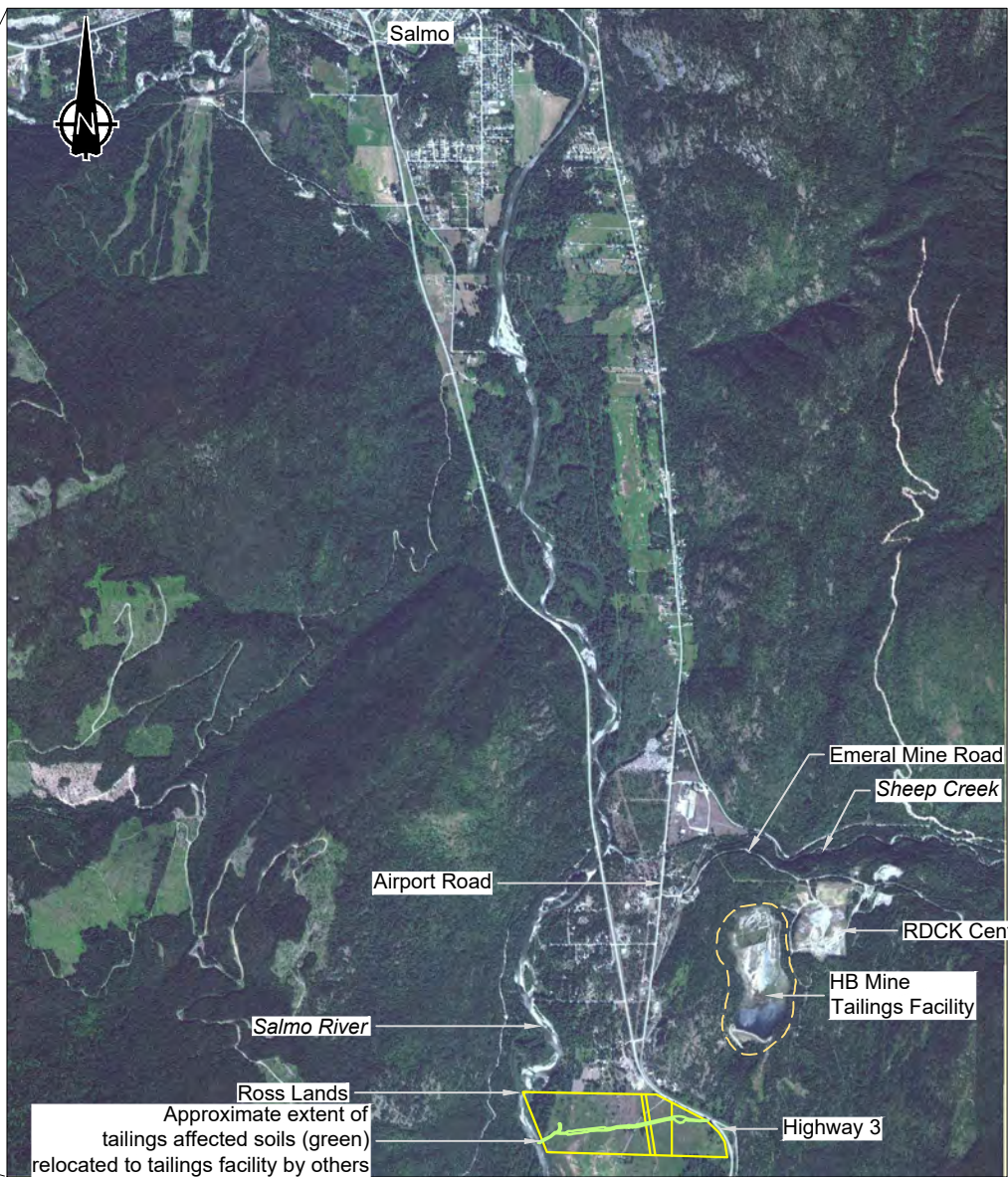
Drawing Number	Drawing Title	Issue	Date	Revision
1	Site Location	Record Drawing	March 13, 2023	3
2	Construction Specifications	Record Drawing	March 13, 2023	3
3	HB Mine Tailings Facility - Pre-Construction General Arrangement	Record Drawing	March 13, 2023	3
4	HB Dam - Pre-Construction General Arrangement	Record Drawing	March 13, 2023	3
5	HB Dam Pre-Construction Cross Sections	Record Drawing	March 13, 2023	3
6	HB Dam - Final Site Plan	Record Drawing	March 13, 2023	3
7	Toe Berm Expansion - Site Preparation Plan	Record Drawing	March 13, 2023	3
8	Upgraded Dam Final Contours	Record Drawing	March 13, 2023	3
9	HB Dam - Upgraded Dam Cross Sections (1 of 2)	Record Drawing	March 13, 2023	3
10	HB Dam - Upgraded Dam Cross Sections (2 of 2)	Record Drawing	March 13, 2023	3
11	Upgraded Spillway - Plan and Profile	Record Drawing	March 13, 2023	3
12	Upgraded Spillway - Cross Sections and Details	Record Drawing	March 13, 2023	3
13	Tailings Surface Drainage Channel Plan	Record Drawing	March 13, 2023	3
14	Tailings Surface Drainage Channel Profiles and Tailings Pond Backfill Section	Record Drawing	March 13, 2023	3
15	Tailings Surface Drainage Channel Energy Dissipation Structures	Record Drawing	March 13, 2023	3
16	Tailings Cover Plan	Issued for Construction	August 2022	2
17	Instrumentation and Monitoring Plan	Record Drawing	March 13, 2023	3
18	Instrumentation and TRM Details	Record Drawing	March 13, 2023	3
19	Borrow Area Plan View and Typical Sections	Record Drawing	March 13, 2023	3
20	Tailings Surface Drainage Channel Typical Sections	Record Drawings	March 13, 2023	3

**Disclaimer:**  
 The seal and signature of the undersigned on this drawing certifies that the design information contained in these drawings accurately reflects the original design and the material design changes made during construction that were brought to the undersigned's attention. These drawings are intended to incorporate addenda, change orders, and other material design changes, but not necessarily all site instructions. The undersigned does not warrant or guarantee, nor accept responsibility for, the accuracy or completeness of the as-constructed information supplied by others contained in these drawings, but does, by sealing and signing, certify that the as-constructed information, if accurate and complete, provides an as-constructed system which substantially complies in all material respects with the original design intent.





**Regional Map**  
0km 50 100 200 300



**Site Location**  
0m 500 1000 1500 2000

C:\Users\pmsr\OneDrive\Documents\SRK Consulting\ES273\_HB - Internal\040\_AutoCAD\Record Drawings\E\DY 2023\CAPR002046 - Site Location.dwg

REFERENCE DRAWINGS		REVISIONS									
DRAWING NO.	DRAWING TITLE	NO.	DESCRIPTION	CHKD	APPD	DATE	NO.	DESCRIPTION	CHKD	APPD	DATE
		3	Record Drawing	EL	PM	23/05/24	B	Issued for Review	PM	---	19/05/08
		2	Issued for Construction	PM	PM	22/08/02	A	Issued for Review	PM	---	18/12/05
							C	Issued for Remediation Plan	PM	AH	19/07/12
							D	Issued for Tender	MM	PM	19/10/23
							E	Issued for Permitting	PM	---	20/01/31
							F	Issued for Review	PM	---	20/06/30
							O	Issued for Construction	PM	PM	21/05/28
							1	Issued for Construction	PM	PM	22/07/13



**srk consulting**

DESIGN: PHM    DRAWN: TAH    REVIEWED: TPP  
 CHECKED: EML    APPROVED: PHM    DATE: May 24, 2023

FILE NAME: CAPR002046 - Site Location.dwg

**HB Mine Tailings Facility**

SRK JOB NO.: CAPR002046

Closure Design		
DRAWING TITLE: Site Location		
DRAWING NO. 01	SHEET 1 OF 20	REVISION NO. 3

**TABLE 1: FINAL QUANTITY ESTIMATES**

Feature	Material	Quantity
Spillway	Soil Excavation Volume (m³)	5,633
	Rock Excavation Volume (m³)	4,515
	Geotextile (m²)	2,000
	Riprap (m³)	2,137
Tailings Cover	Ross Landform volume (m³) (See Note 1)	35,800
	Tailings Pond Backfill (south of South Spur Channel) (m³)	65,324
	Tailings Cover Area (north of South Spur Channel) (m²) (See Note 2)	198,975
Tailings Surface Drainage Channels	Excavation Volume (m³)	5,900
	Geosynthetic Liner (m²)	8,054
	Combigrid (m²)	600
	Liner Protection Material (m³)	2,035
	Turf Reinforcement Mat (m²)	8,950
	Riprap (m³)	321
	Geotextile (m²)	371
Toe Berm Expansion	Vegetation clearing footprint (m²)	3,422
	Vegetation and soft soil removal footprint (m²)	416
	Toe Berm Drain Rock (m³)	2,290
	General Fill (m³)	9,094
	Geotextile (m²)	1,290
Upstream Beach	Removal of existing riprap (m³)	489
	Upstream Beach Material (m³)	4,797
Revegetation	Tailings Cover - Hydroseeding (m²)	108,088
	Tailings Cover - Broadcast Seeding (m²)	141,710
	Dam Area - Hydroseeding (m²)	8,698
	Borrow Area / Access Roads - Hydroseeding (m²)	56,053

**NOTES**

- Includes top cover volume, but not base cover volume.
- Tailings cover volume assumed an average thickness of 0.3m.

**GENERAL NOTES**

- All drawings should be read in conjunction with the latest technical specifications document ("Technical Specifications HB Mine Tailings Facility Closure and Remediation" prepared by SRK). The Engineer should be consulted to determine what the latest revision of the Technical Specifications is. Any items that are unclear to the contractor are to be brought to SRK's attention for clarification.
- The Owner is responsible to ensure all licenses, permits, and approvals are obtained prior to the start of construction.
- All dimensions in meters unless stated otherwise.
- The contractor shall comply with all local, provincial and federal laws that are pertinent to this work.
- All works are to be set-out prior to any excavation or fill placement to confirm the grades and elevations conform to the design requirements. All variances between site topography and construction drawings shall be brought to the attention of SRK.
- The location of debris, excavated waste material, and temporary stockpiles are to be approved by the RDCK. Materials in direct contact of the tailings are not to be relocated outside the tailings footprint.
- All materials used for construction must be non-acid generating, and non-metal leaching.
- Notes on this drawing apply to all other active drawings.

**SEDIMENT AND EROSION CONTROL**

- The contractor is responsible to develop and implement an erosion and sediment control plan.
- Erosion and sediment control measures are to be implemented prior to, and in conjunction with all clearing and grading activities.
- Erosion and sediment control measures should be inspected daily during construction to ensure proper performance.

**GEOTEXTILE**

- The toe berm geotextile is to consist of a Nilex 4510 non-woven geotextile, or equivalent that meets the product specifications provided in the Technical Specifications.
- The spillway geotextile is to consist of a Nilex 4516 non-woven geotextile, or an equivalent that meets the product specifications provided in the Technical Specifications.
- Any substitution of geotextile products are to be approved by the Engineer prior to installation.
- Geotextile is to be transported, sorted, and installed as per manufacturer's instructions.

**GEOSYNTHETIC LINER AND COMBIGRID**

- The geosynthetic liner for the tailings conveyance channels shall consist of a minimum 40mil geosynthetic liner that meets or exceeds the product specifications provided in the Technical Specifications.
- The combigrid is to consist of a Combigrid 40/40 Q1 GRK 4c produced by Naue America or equivalent.
- The geosynthetic liner is to be transported, sorted, and installed as per manufacturer's instructions.

**TURF REINFORCEMENT MAT**

- The turf reinforcement mat (TRM) is to consist of a Nilex C350 VMAX³ or equivalent, that meets or exceeds the product specifications provided in the Technical Specifications.
- Any substitution of TRM is to be approved by the Engineer prior to installation.
- The TRM is to be transported, sorted, and installed as per the manufacturer's requirements, and as detailed in the drawings and Technical Specifications.

**RIPRAP**

- All riprap shall consist of sound and durable angular quarry stone, that is resistant to weathering and water action without fractioning.
- All riprap shall meet the particle size requirements listed in Tables 2 and 3.
- The contractor shall verify and sort (as required) the riprap material to meet the design specified gradation.
- The riprap may be sourced from the designated quarry and spillway rock excavation, the upstream slope of the dam (where not in contact with tailings), and existing spillway.
- The contractor shall place riprap to the thickness and details as indicated in the Drawings. Riprap placement in channels should commence along the downstream channel invert first, then the toe of the slope and continue placement upslope and upstream.

**TOE BERM DRAIN ROCK**

- The drain rock shall consist of sound and durable angular quarry stone, be resistant to weathering and water action without fractioning.
- The drain rock shall meet the particle size requirements listed in Table 4.
- The contractor shall verify and sort (as required) the drain rock material to meet the design specified gradation.
- The drain rock may be sourced from the riprap in the spillway excavation or designated quarry, the existing spillway or upstream slope of the dam, or from an approved off-site source as approved by the Engineer.

**GENERAL FILL**

- General fill shall be well graded and free from organic debris, tailings, or other deleterious materials.
- The fill may be sourced from the spillway or dam excavations, one of the approved on-site borrow sources, or from an off-site source as approved by the Engineer.

**TAILINGS COVER MATERIAL**

- The tailings cover material shall consist of well-graded material source from the borrow areas or excavations, and shall be free of frozen soil, snow and ice.
- The cover material shall have a minimum fines content of 10% unless approved by the Engineer.
- The maximum allowable grain size for the cover material is 300mm. Boulders larger than the maximum diameter shall be removed at the source or scaled from the fill during placement and pushed away from the working area.

**LINER PROTECTION LAYER**

- The liner protection material shall be well-graded sand sourced from one of the approved on-site borrow sources or from an approved off-site source as approved by the Engineer.
- The material shall have a maximum fines content of 30% and a maximum particle size of 100mm.

**TABLE 2: SPILLWAY RIPRAP GRADATION REQUIREMENTS**

Characteristic Diameter (% Passing)	Diameter (mm)		
	Minimum	Recommended	Maximum
D <sub>15</sub>	160	200	300
D <sub>30</sub>	330	400	500
D <sub>50</sub>	500	600	700
D <sub>85</sub>	550	650	750
D <sub>100</sub>	750	900	1050

See Technical Specifications for full particle size distribution curves.

**TABLE 3: ENERGY DISSIPATION STRUCTURE RIPRAP GRADATION REQUIREMENTS**

Characteristic Diameter (% Passing)	Diameter (mm)		
	Minimum	Recommended	Maximum
D <sub>15</sub>	100	140	200
D <sub>30</sub>	200	270	350
D <sub>50</sub>	300	400	500
D <sub>85</sub>	350	450	550
D <sub>100</sub>	450	600	750

See Technical Specifications for full particle size distribution curves.

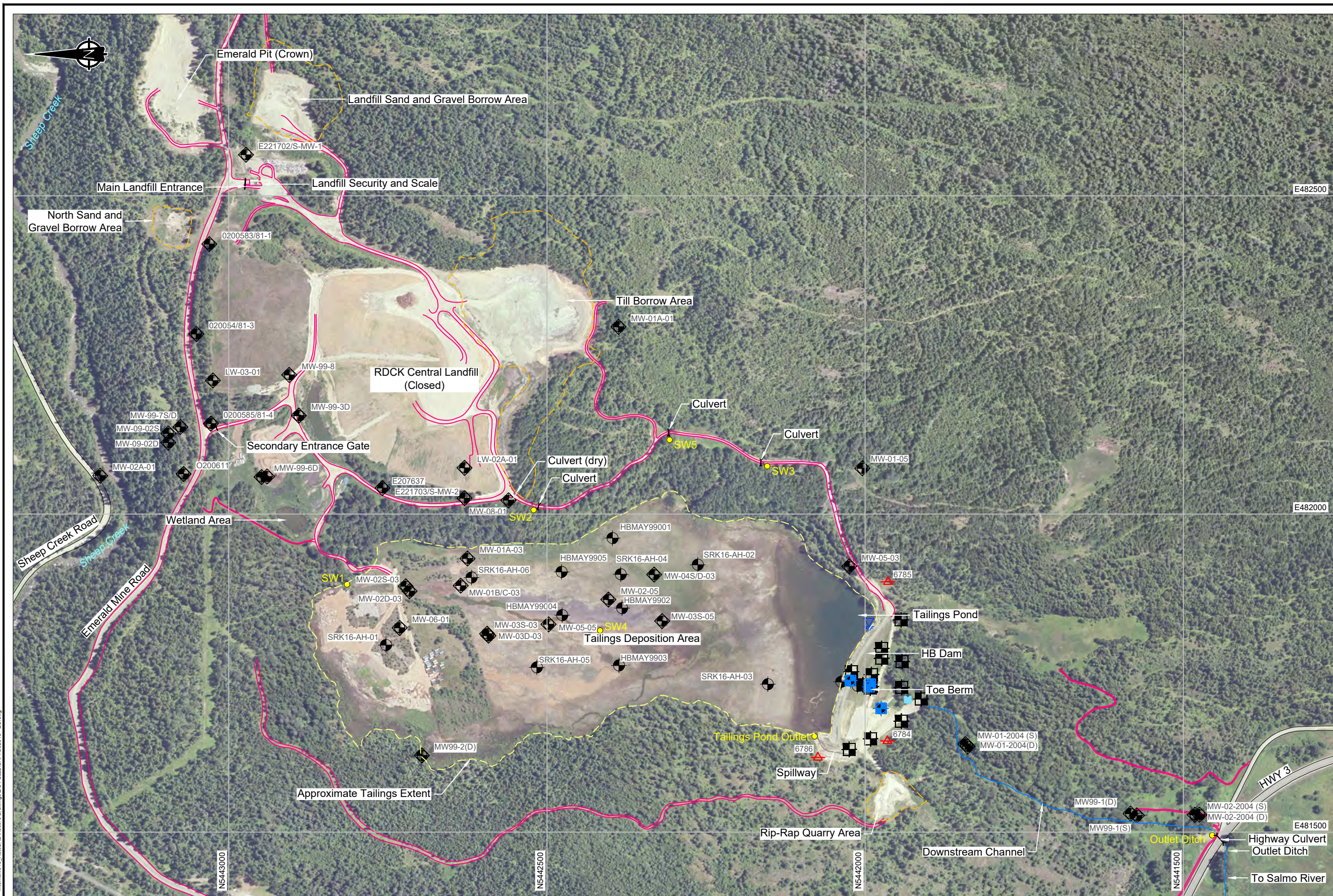
**TABLE 4: TOE BERM DRAIN ROCK GRADATION REQUIREMENTS**

Characteristic Diameter (% Passing)	Diameter (mm)		
	Minimum	Recommended	Maximum
D <sub>15</sub>	50	75	100
D <sub>30</sub>	30	90	135
D <sub>50</sub>	75	125	200
D <sub>85</sub>	125	200	250
D <sub>100</sub>	150	225	275

See Technical Specifications for full particle size distribution curves.

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						<p align="center"><b>Closure Design</b></p> <p align="center">DRAWING TITLE: <b>Construction Specifications</b></p>	
<p>DESIGN: PHM    DRAWN: TAH    REVIEWED: TPP</p> <p>CHECKED: EML    APPROVED: PHM    DATE: May 24, 2023</p>		<p align="center"><b>HB Mine Tailings Facility</b></p>		<p>DRAWING NO. <b>02</b></p>		<p>SHEET <b>2</b> OF 20</p>	
<p>REFERENCE DRAWINGS</p>		<p>REVISIONS</p>		<p>PROFESSIONAL ENGINEERS STAMP</p>		<p>SRK JOB NO.: CAPR002046</p>	
<p>DRAWING NO.    DRAWING TITLE    NO.    DESCRIPTION    CHKD    APPD    DATE</p>		<p>NO.    DESCRIPTION    CHKD    APPD    DATE</p>		<p>FILE NAME: CAPR002046 - Material Specs.dwg</p>		<p>REVISION NO. <b>3</b></p>	



**LEGEND**

- Control Point
- Borehole Location
- Monitoring Well Location
- Piezometer Location
- Surface Water Monitoring Location
- Test Pit Location
- Water Level Gauge
- Seepage Measurement Weir
- Existing Access Road
- Proposed Borrow Sources

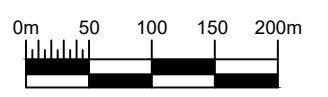
**NOTES**

1. All units are in meters unless otherwise specified.

**REFERENCES**

Control points surveyed by RDCK, July 2017. Imagery provided by RDCK, dated 2016.

Control Point Locations			
ID	Northing	Easting	Elevation (m)
6784	5441964.94	481643.28	701.75
6785	5441964.10	481893.43	719.17
6786	5442074.29	481617.38	721.79



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0	Issued for Construction	PM	PM	21/05/28					
F	Issued for Review	PM	---	20/06/30					
E	Issued for Permitting	PM	---	20/01/31					
D	Issued for Tender	MM	PM	19/10/23					
C	Issued for Remediation Plan	PM	AH	19/07/12					
B	Issued for Review	PM	---	19/05/09					
A	Issued for Review	PM	---	18/12/05					
3	Record Drawing	EL	PM	23/05/24					
2	Issued for Construction	PM	PM	22/08/02					



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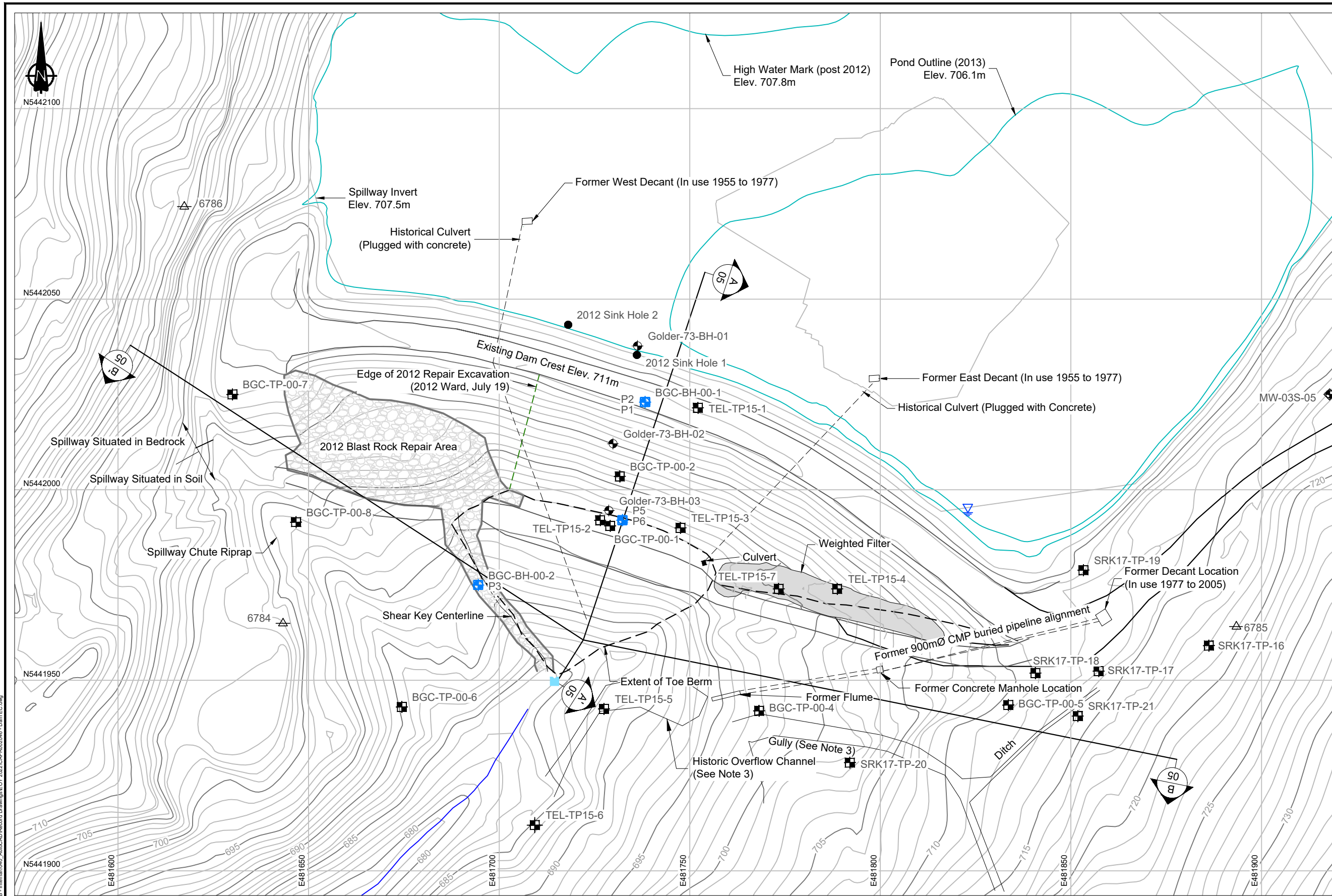
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FILE NAME: CAPR002046 - EC.dwg

**HB Mine Tailings Facility**

SRK JOB NO.: CAPR002046

Closure Design		
DRAWING TITLE: <b>HB Mine Tailings Facility - Pre-Construction General Arrangement</b>		
DRAWING NO. <b>03</b>	SHEET 3 OF 20	REVISION NO. <b>3</b>



**LEGEND**

- △ Control Point
- Borehole Location
- ⊕ Monitoring Well Location
- ⊕ Piezometer Location
- ⊕ Test Pit Location
- ▽ Water Level Gauge
- Seepage Measurement Weir
- Historical Dam Features
- ▨ 2012 Blast Rock Repair Area
- ▨ Riprap
- ▨ Weighted Filler

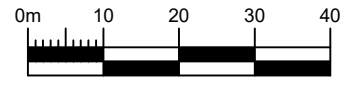
**NOTES**

- All units are in meters unless otherwise specified.
- Contours are shown at 1.0 m intervals.
- Historical decant and pipeline outfall features were digitized from "Drawing 4, Borehole and Testpit Locations" produced by BGC Engineering Inc, April 2005. Drawing number: 0268-001-08. The operating decant, Flume, and 900mmØ CMP were removed in 2005.
- Weighted filter extents digitized from "Left Buttress As-Constructed". Produced by Regional District of Central Kootenay Environmental Services, observed by Tetra Tech. Professional Engineer seal dated March 15, 2017.

**REFERENCES**

Control points surveyed by RDCK, July 2017.  
2016 site contours provided by the RDCK.

Control Point Locations			
ID	Northing	Easting	Elevation (m)
6784	5441964.94	481643.28	701.75
6785	5441964.10	481893.43	719.17
6786	5442074.29	481617.38	721.79



NO.	DESCRIPTION	CHKD	APPD	DATE	NO.	DESCRIPTION	CHKD	APPD	DATE
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D	Issued for Tender	MM	PM	19/10/23					
C	Issued for Remediation Plan	PM	AH	19/07/12					
B	Issued for Review	PM	PM	19/05/08					
A	Issued for Review	PM	PM	18/12/05					



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 CHECKED: EML    APPROVED: PHM    DATE: May 24, 2023

FILE NAME: CAPR002046 - Dam EC.dwg

**HB Mine Tailings Facility**

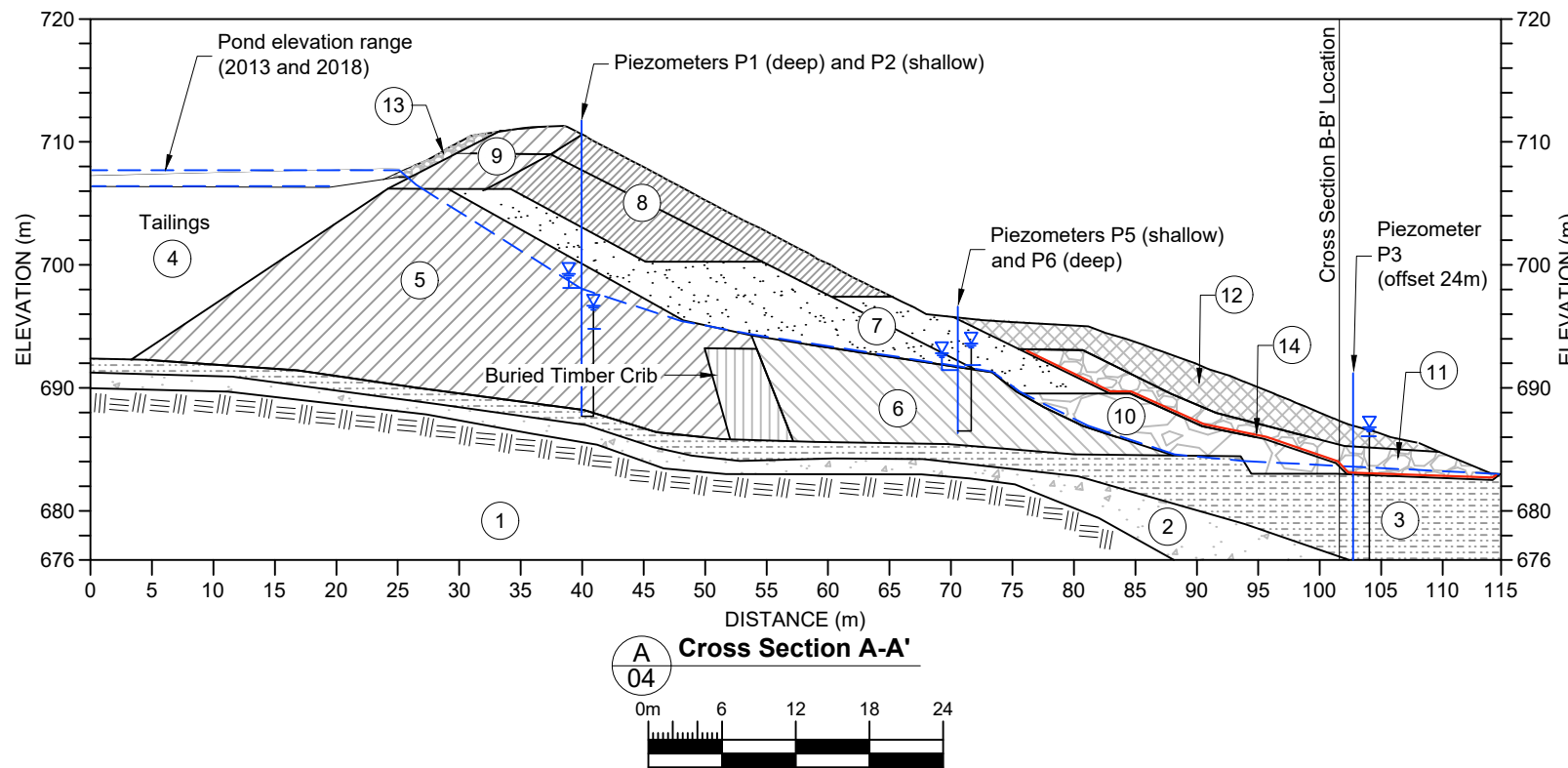
SRK JOB NO.: CAPR002046

**Closure Design**

DRAWING TITLE: **HB Dam - Pre-Construction General Arrangement**

DRAWING NO. **04**    SHEET 4 OF 20    REVISION NO. **3**

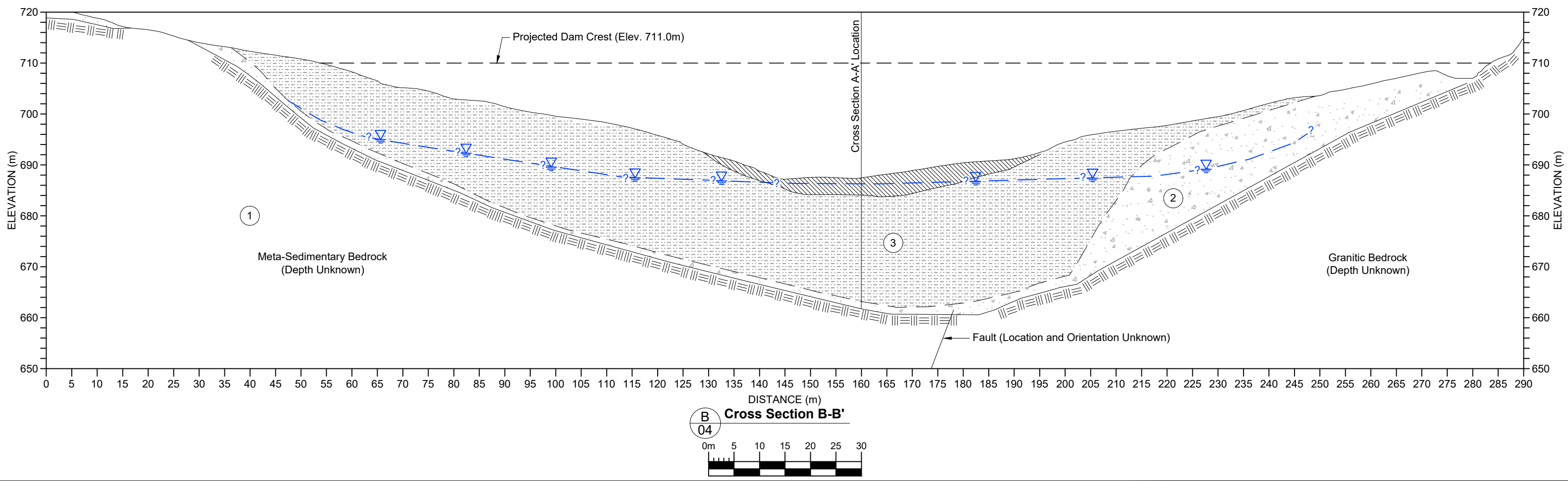
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**LEGEND**

- Zone 1 - Bedrock
- Zone 2 - Native Till
- Zone 3 - Native Glaciolacustrine
- Zone 4 - Tailings (1955 - 1978)
- Zone 5 - Original Dam (1955 - 1967)
- Zone 6 - Stabilizing Berm (1964 - 1967)
- Zone 7 - Filter Blanket (1974/75 and 1977)
- Zone 8 - Common Fill (1975 and 1977)
- Zone 9 - Select Impervious Fill (1975 and 1977)
- Zone 10 - Rock Toe Drain (1977)
- Zone 11 - Rock Drain (2005)
- Zone 12 - Till Toe Berm (2005)
- Zone 13 - Riprap (2005)
- Zone 14 - FII Filter (0.2m thick) (2005)
- Approximate Phreatic Surface
- Bedrock
- Organics and Fill

- NOTES**
- All units are in meters unless otherwise specified.
  - Locations of stratigraphic boundaries are interpreted based on limited surface and sub-surface observations, and on previous engineering reports by others that were provided by the owner. The location of all stratigraphic boundaries should be considered approximate and actual conditions may vary.
  - Cross section B-B' digitized from "Interpreted Valley Geologic Section" from BGC Engineering Inc. Project No. 0268-001-08, Drawing 6, Rev 1, dated April 2005.



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0	Issued for Construction	PM	PM	21/05/28					
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E	Issued for Permitting	PM	--	20/01/31					
D	Issued for Tender	MM	PM	19/10/23					
C	Issued for Remediation Plan	PM	AH	19/07/12					
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A	Issued for Review	PM	PM	18/12/05					



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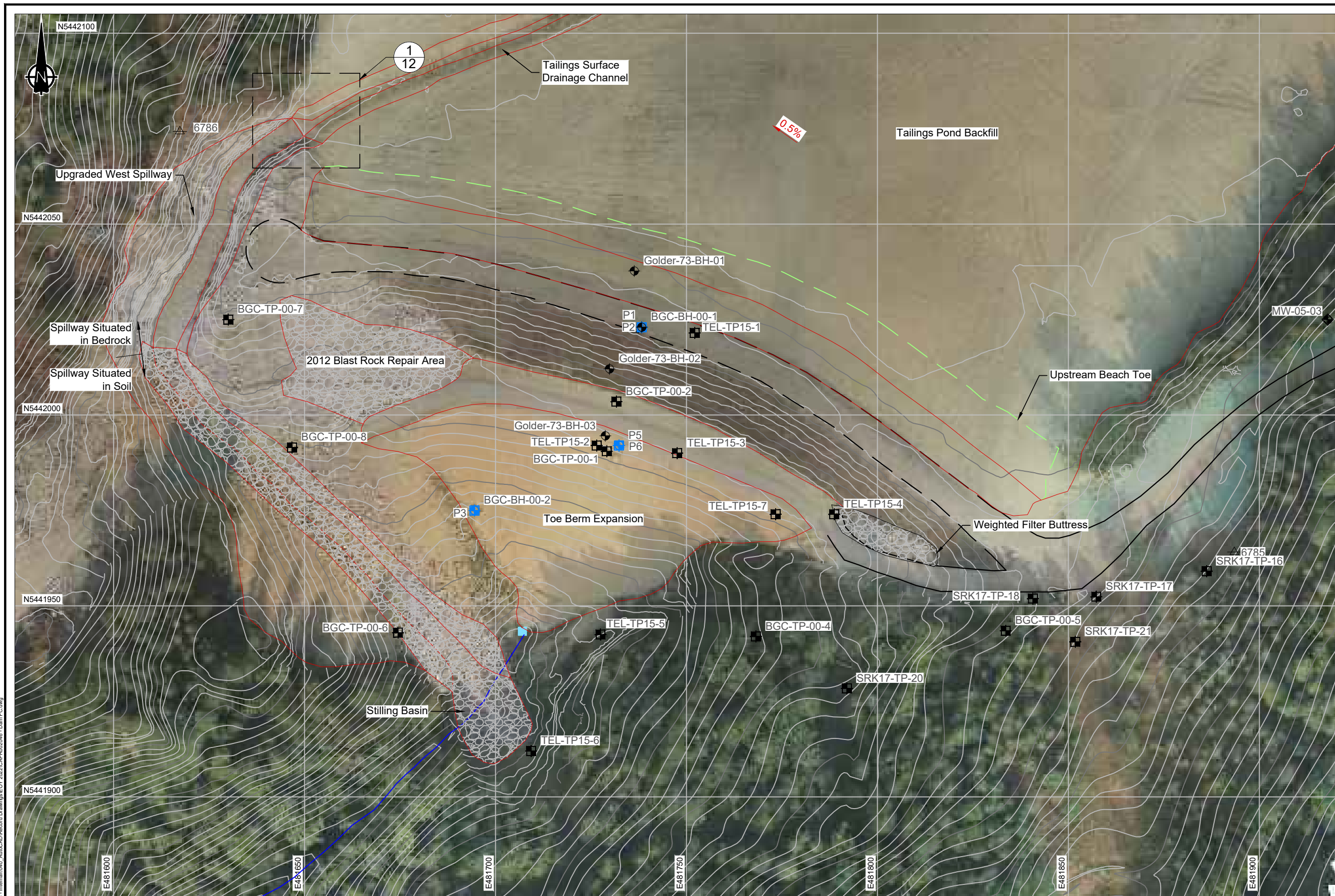
**HB Mine Tailings Facility**

SRK JOB NO.: CAPR002046

**Closure Design**

DRAWING TITLE:  
**HB Dam Pre-Construction Cross Sections**

DRAWING NO. **05**    SHEET 5 OF 20    REVISION NO. **3**



**LEGEND**

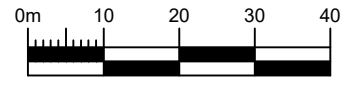
- Control Point
- Borehole Location
- Monitoring Well Location
- Piezometer Location
- Test Pit Location
- Seepage Measurement Weir
- Access Road
- Dam Crest
- Riprap
- Upstream Beach Extents
- As-Constructed Infrastructure

- NOTES**
1. All units are in meters unless otherwise specified.
  2. Contours are shown at 2.0 m intervals.

**REFERENCES**

Preconstruction topographical contour data was obtained from RDCK and is based on a 2016 aerial LiDAR survey.

As-built survey data was collected by Integrated Sustainability and is based on a drone LiDAR survey dated September 13, 2022.



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D	Issued for Tender	MM	PM	19/10/23										
C	Issued for Remediation Plan	PM	AH	19/07/12										
0268-001-08	BGC Engineering Inc.: Borehole and Testpit Locations. April 2005				3	Record Drawing	EL	PM	23/05/24	B	Issued for Review	PM		19/05/08
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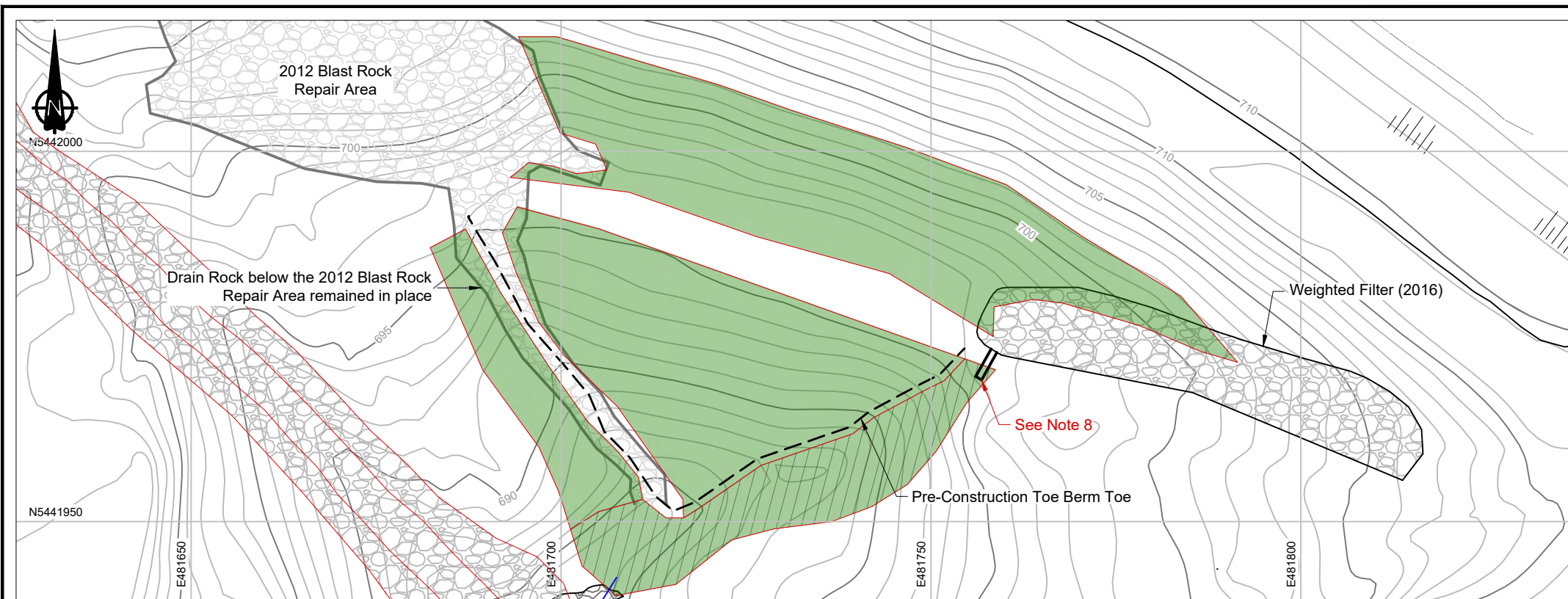
**HB Mine Tailings Facility**

SRK JOB NO.: CAPR002046

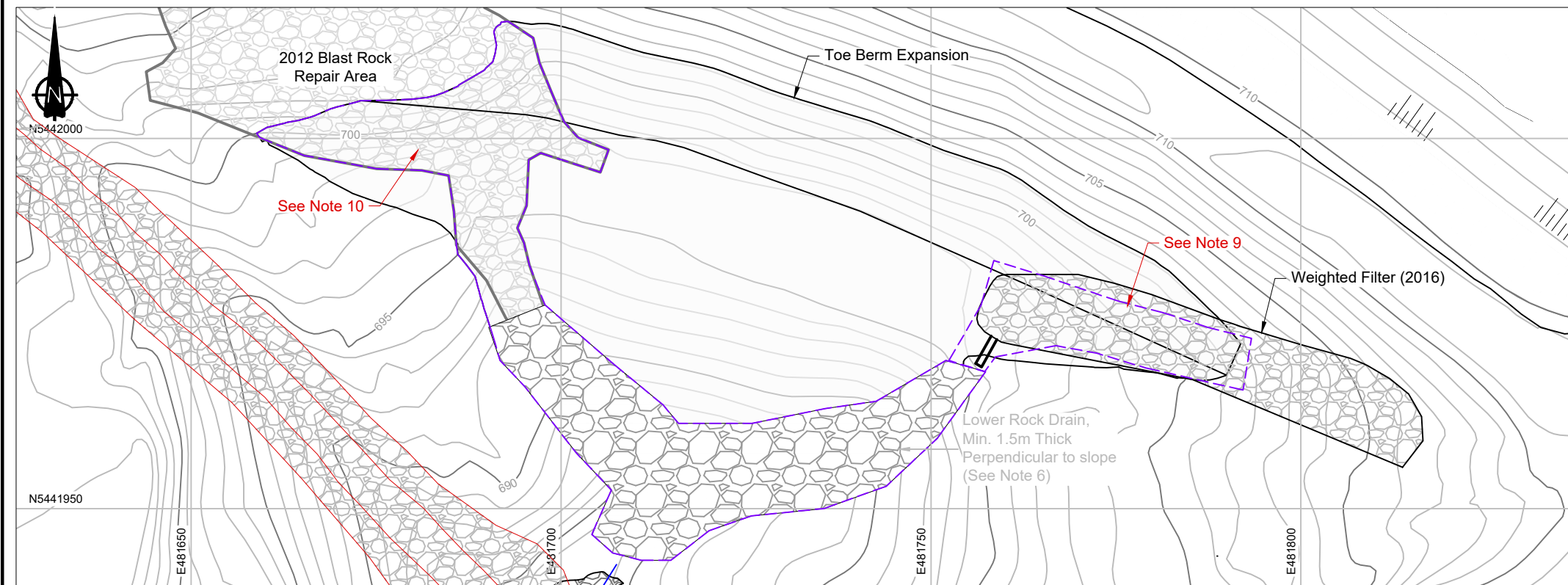
**Closure Design**

DRAWING TITLE: **HB Dam - Final Site Plan**

DRAWING NO.: **06**    SHEET: **6 OF 20**    REVISION NO.: **3**



**Toe Berm Site Preparation Plan**



**Toe Berm Drain Rock Placement Plan**

**LEGEND**

- Current Toe Berm Toe
- Extent of Replaced Road Surfacing
- 2012 Blast Rock Repair Area
- Vegetation Clearing
- Vegetation and Soft Soil Removed
- Drain Rock Placement
- Geotextile
- Riprap
- Toe Berm Expansion
- As-Constructed Infrastructure

**REFERENCES**

Preconstruction topographical contour data was obtained from RDCK and is based on a 2016 aerial LiDAR survey.  
As-built survey data was collected by Integrated Sustainability and is based on a drone LiDAR survey dated September 13, 2022.

**NOTES**

1. All units are in meters unless otherwise specified.
2. Contours are shown at 1.0 m intervals.
3. Toe berm foundation preparation: All vegetation is to be removed from the toe berm footprint. Soft organic overburden is to be excavated to a minimum depth of 1.0m or until competent dense material is exposed as directed by the Engineer.
4. The dam organic surface must be removed and the 2005 Toe Berm Rock Drain exposed before placing rock drain and fill materials.
5. The conditions of the 2005 Toe Berm Rock Drain are to be confirmed during construction.
6. The Rock Drain must be placed at least 1.5m thick perpendicular to the slope over the expanded to berm footprint and must tie into the 2005 Toe Berm.
7. Drain rock to consist of clean, well-graded, sound, durable angular rock that is free from deleterious material and meets the sizing requirements listed on Drawing 02.
8. Weighted filter culvert was excavated out with the excavation and filled with drain rock and covered with geotextile. See Field Change Notice #4 for further details.
9. The area of the weighted filter that is within the expanded Toe Berm surface was covered with a thin layer of drain rock to fill the voids at surface and was subsequently covered by a layer of geotextile prior to being covered by General Fill.
10. Area of the 2012 Blast Rock Repair Area within the expanded Toe Berm was covered by a layer of geotextile prior to being covered by General Fill.



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		2	Issued for Construction	PM	PM	22/08/02	A	Issued for Review	PM	PM	18/12/05

PROFESSIONAL ENGINEERS STAMP

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CHECKED: EML    APPROVED: PHM    DATE: May 24, 2023

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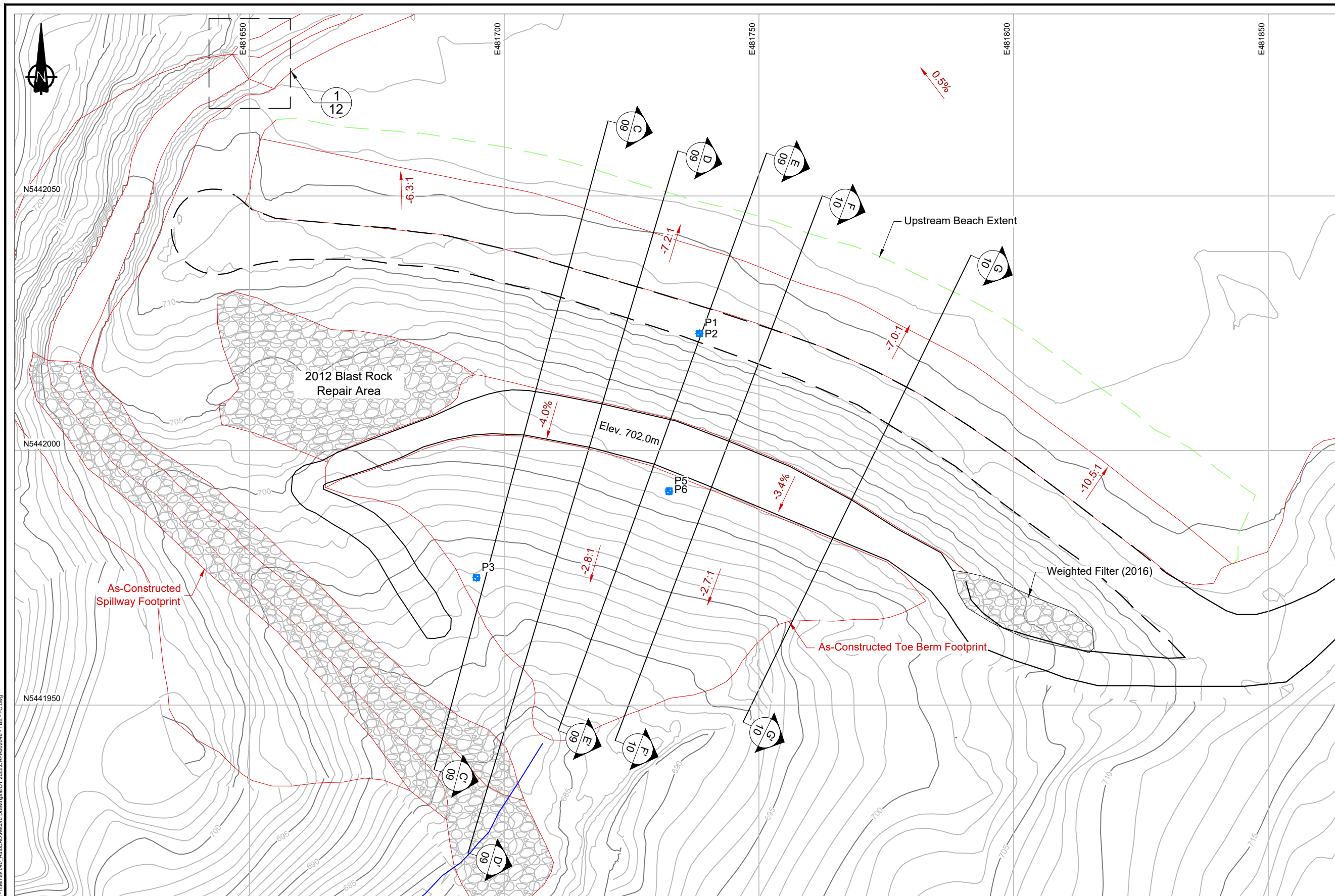
**HB Mine Tailings Facility**

PROVINCE OF ALBERTA  
CENTRAL KOOTENAI

**Closure Design**

DRAWING TITLE: Toe Berm Expansion - Site Preparation Plan

DRAWING NO. 07    SHEET 7 OF 20    REVISION NO. 3



**LEGEND**

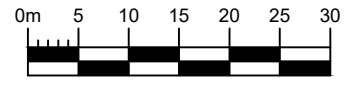
- Piezometer Location
- Dam Crest
- Access Road
- As-Constructed Footprints
- 2012 Blast Rock Repair Area
- Riprap
- Toe Berm Expansion

- NOTES**
- All units are in meters unless otherwise specified.
  - Contours are shown at 1.0 m intervals.
  - Toe berm general fill to be compacted in maximum lifts of 0.5m to 95% Standard Proctor.
  - Upstream beach fill consists of Till sourced from the Till Borrow Area.
  - Prior to toe berm general fill placement, a layer of geotextile is to be installed at all locations where the general fill will be placed directly over the drain rock layer.
  - The non-woven geotextile is to meet the specifications provided in the Technical Specifications.

**REFERENCES**

Preconstruction topographical contour data was obtained from RDCK and is based on a 2016 aerial LiDAR survey.

As-built survey data was collected by Integrated Sustainability and is based on a drone LiDAR survey dated September 13, 2022.



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NO.	DESCRIPTION	CHKD	APPD	DATE	NO.	DESCRIPTION	CHKD	APPD	DATE
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2	Issued for Construction	PM	PM	22/08/02					



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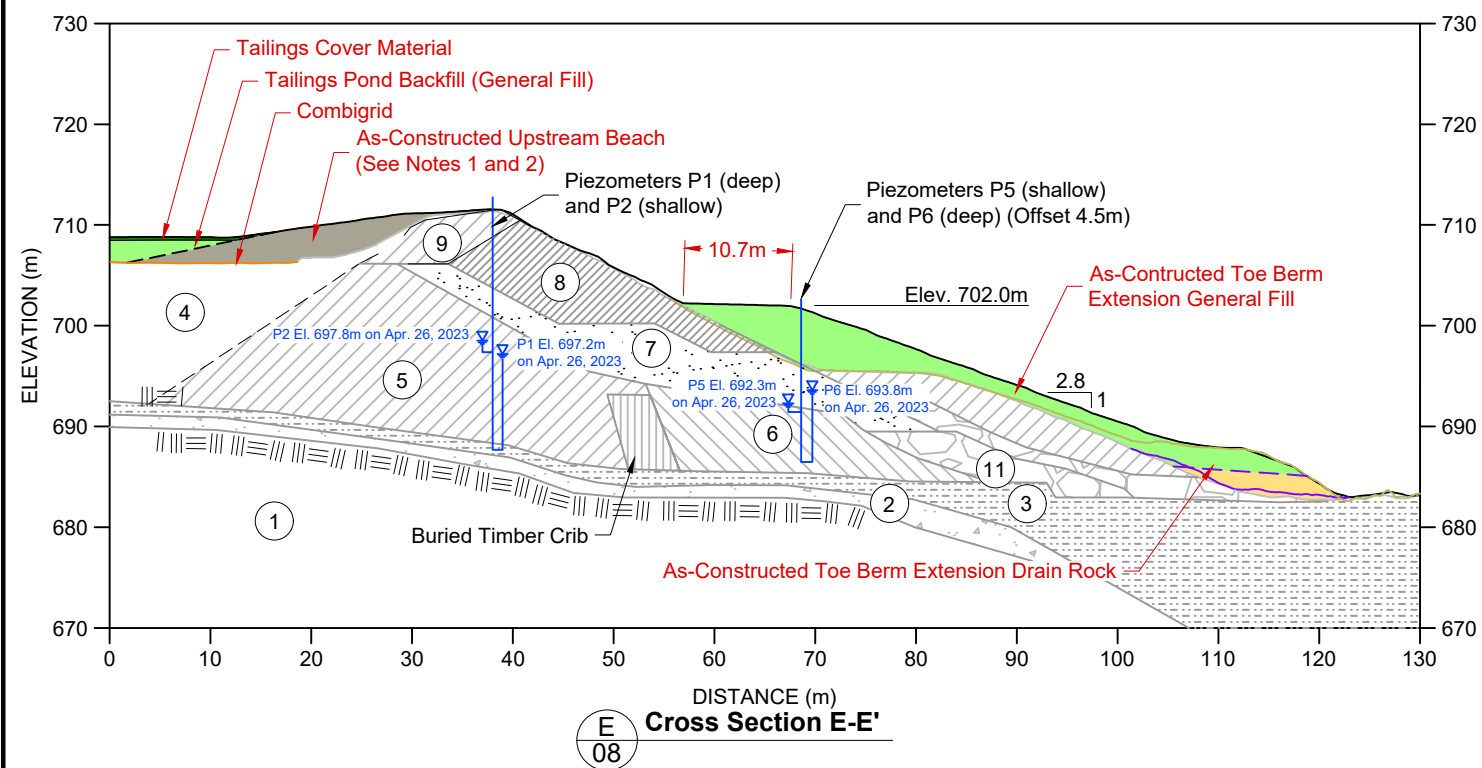
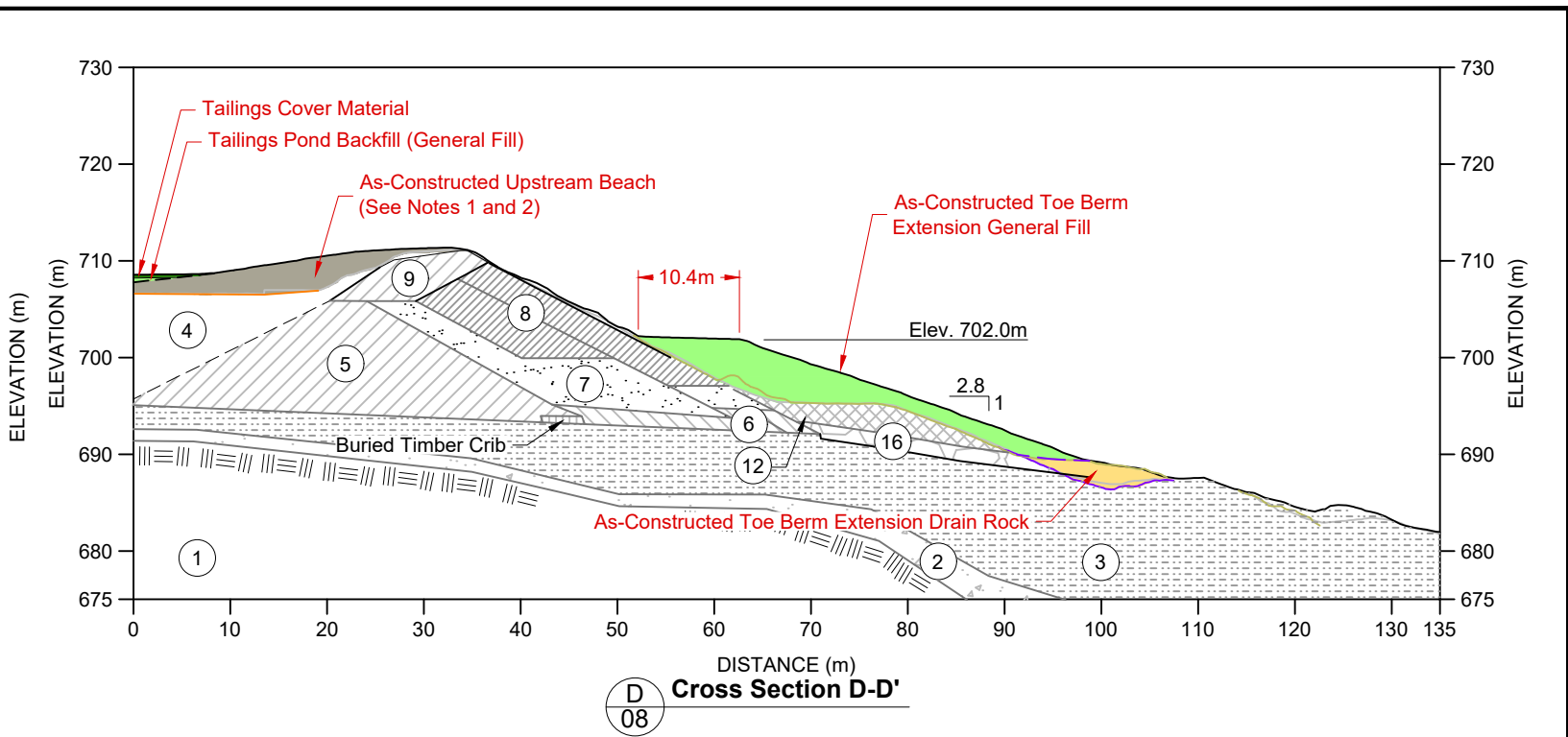
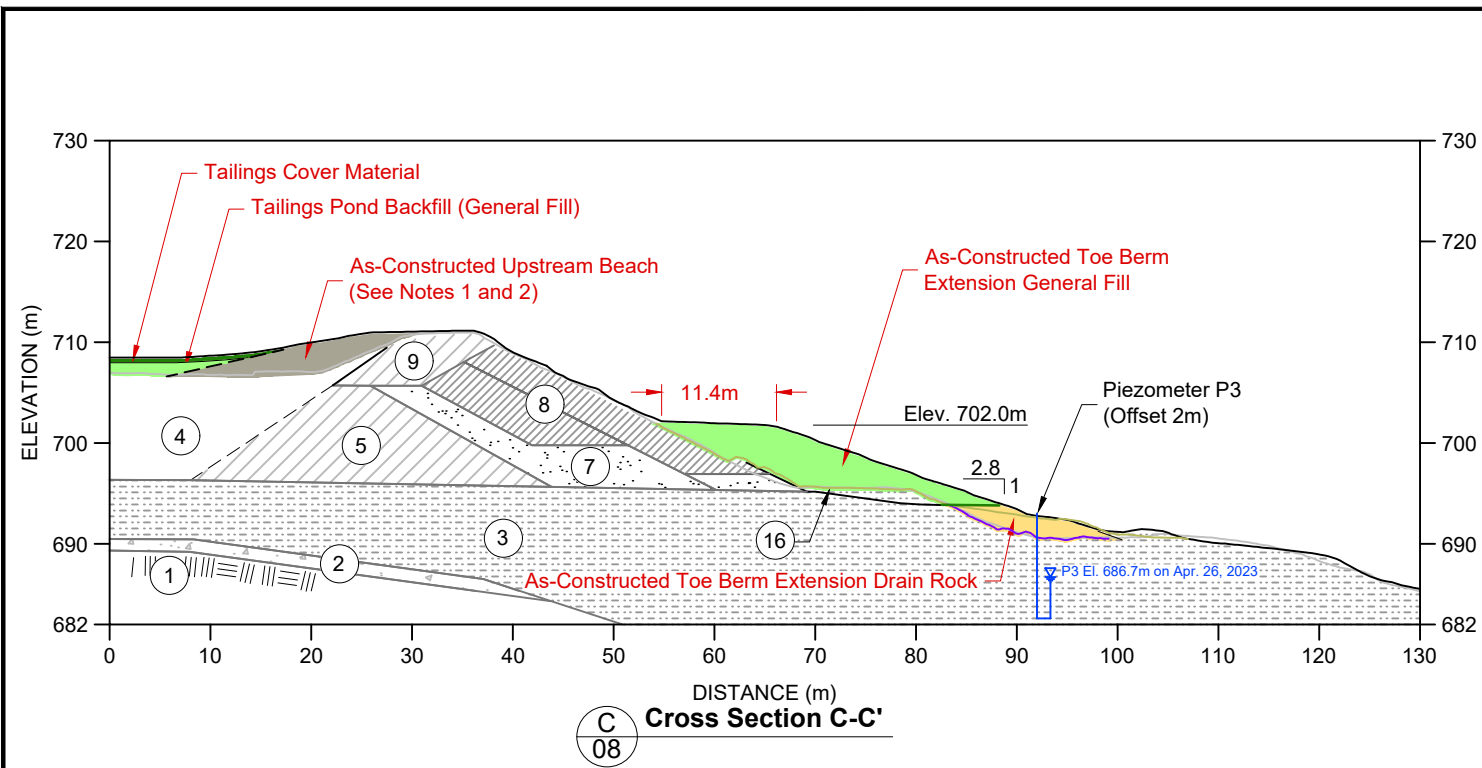
**HB Mine Tailings Facility**

SRK JOB NO.: CAPR002046

**Closure Design**

DRAWING TITLE: **Upgraded Dam Final Contours**

DRAWING NO. **08**    SHEET **8 OF 20**    REVISION NO. **3**



**LEGEND**

**PRE-CONSTRUCTION MATERIALS**

- Geotextile
- Zone 1 - Bedrock
- Zone 2 - Native Till
- Zone 3 - Native Glaciolacustrine
- Zone 4 - Tailings (1955 - 1978)
- Zone 5 - Original Dam (1955 - 1967)
- Zone 6 - Stabilizing Berm (1964 - 1967)
- Zone 7 - Filter Blanket (1974/75 and 1977)
- Zone 8 - Common Fill (1975 and 1977)
- Zone 9 - Select Impervious Fill (1975 and 1977)
- Zone 10 - Rock Toe Drain (1977)
- Zone 11 - Rock Drain (2005)
- Zone 12 - Till Toe Berm (2005)
- Zone 13 - Riprap (2005)
- Zone 14 - Repaired Filter Blanket (2012)
- Zone 15 - Repaired Till Fill (2012)
- Zone 16 - Coarse Rock Blanket and Shear Key (2012)
- Zone 17 - Weighted Filter (2016)

**CONSTRUCTION MATERIALS**

- Combigrid
- Non-woven Geotextile
- General Fill
- Tailings Cover Material
- Toe Berm Drain Rock
- Upstream Beach Material

**NOTES**

1. Riprap on the upstream slope of the dam was excavated and placed as tailings pond backfill in a manner that prevents voids and formation of preferential flow paths. Refer to Field Instruction #3 for further details.
2. Due to the low strength of the tailings within the Upstream Beach footprint, there was no lift thickness specification for the first lift of the Upstream Beach. The material was compacted under the weight of equipment only. Refer to Field Instruction #6 for further details.
3. Pre-construction berm crest surface to be graded to drain prior to rock drain placement.

**REFERENCES**

Pre-construction topographical contour data was obtained from RDCK and is based on a 2016 aerial LiDAR survey.  
 Dam sections compiled based on digitization of historical drawings and borehole logs as detailed in Appendix C-3 of the 2020 RCP (RDCK 2020).  
 As-built survey data was collected by Integrated Sustainability. The final surface is based on a drone LiDAR survey dated September 13, 2022. The toe berm excavation surface is based on a drone LiDAR survey dated August 28, 2021. The boundary between the drain rock and general fill is based on a drone LiDAR survey dated September 6, 2021.



NO.	DESCRIPTION	CHKD	APPD	DATE	NO.	DESCRIPTION	CHKD	APPD	DATE
1	Issued for Construction	PM	PM	22/07/13					
0	Issued for Construction	PM	PM	21/05/28					
F	Issued for Review	PM	---	20/06/30					
E	Issued for Permitting	PM	---	20/01/31					
D	Issued for Tender	MM	PM	19/10/23					
C	Issued for Remediation Plan	PM	AH	19/07/12					
B	Issued for Review	PM	---	19/05/08					
A	Issued for Review	PM	---	18/12/05					
3	Record Drawing	EL	PM	23/05/24					
2	Issued for Construction	PM	PM	22/08/02					



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DESIGN: PHM    DRAWN: TAH    REVIEWED: TPP  
 CHECKED: EML    APPROVED: PHM    DATE: May 24, 2023

FILE NAME: CAPR002046 - Stability Sections.dwg

**HB Mine Tailings Facility**

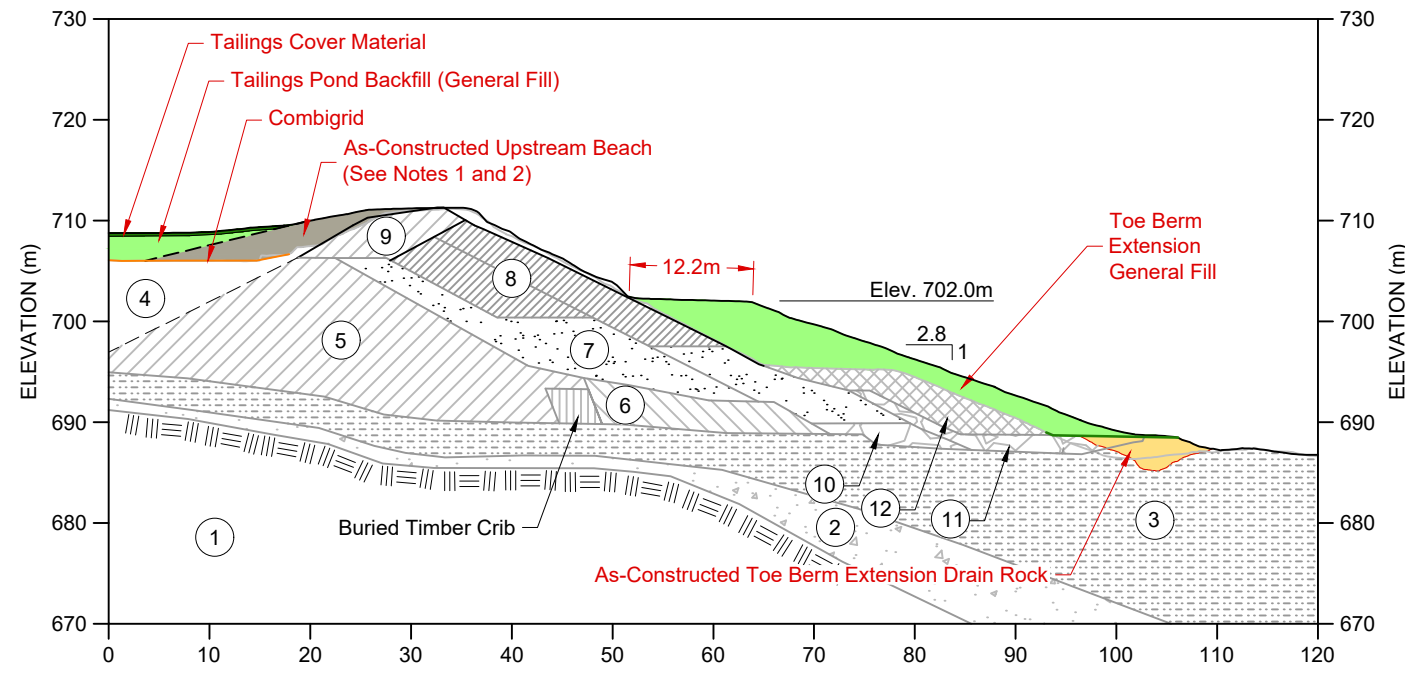
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**Closure Design**

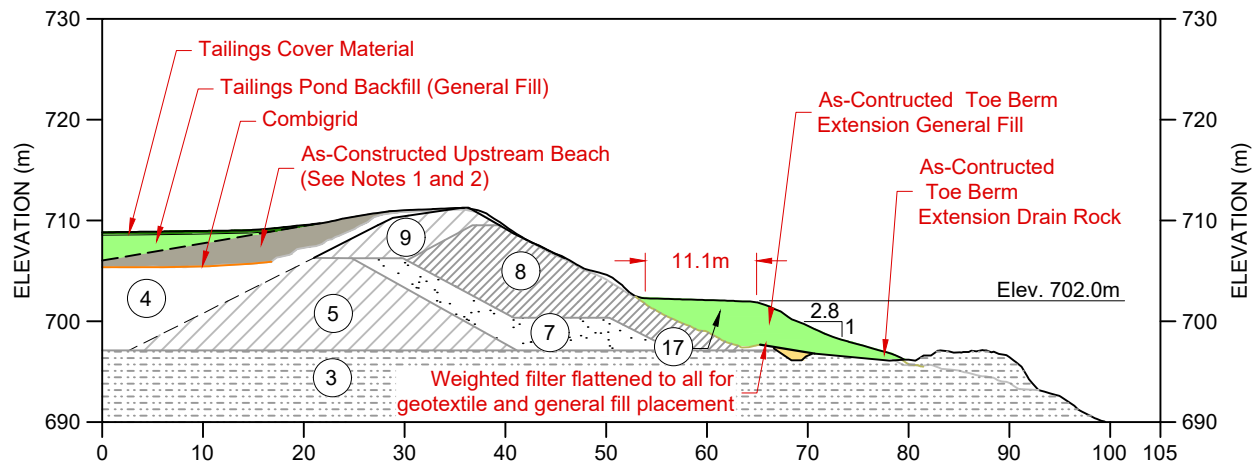
DRAWING TITLE:  
**HB Dam - Upgraded Dam Cross Section (1 of 2)**

DRAWING NO.: **09**    SHEET: 9 OF 20    REVISION NO.: **3**

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**F**  
08  
Cross Section F-F'



**G**  
08  
Cross Section G-G'

**LEGEND**

**PRE-CONSTRUCTION MATERIALS**

- Geotextile
- Zone 1 - Bedrock
- Zone 2 - Native Till
- Zone 3 - Native Glaciolacustrine
- Zone 4 - Tailings (1955 - 1978)
- Zone 5 - Original Dam (1955 - 1967)
- Zone 6 - Stabilizing Berm (1964 - 1967)
- Zone 7 - Filter Blanket (1974/75 and 1977)
- Zone 8 - Common Fill (1975 and 1977)
- Zone 9 - Select Impervious Fill (1975 and 1977)
- Zone 10 - Rock Toe Drain (1977)
- Zone 11 - Rock Drain (2005)
- Zone 12 - Till Toe Berm (2005)
- Zone 13 - Riprap (2005)
- Zone 14 - Repaired Filter Blanket (2012)
- Zone 15 - Repaired Till Fill (2012)
- Zone 16 - Coarse Rock Blanket and Shear Key (2012)
- Zone 17 - Weighted Filter (2016)

**CONSTRUCTION MATERIALS**

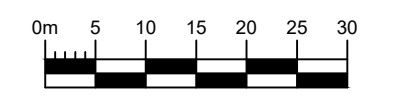
- Combigrid
- Non-woven Geotextile
- General Fill
- Tailings Cover Material
- Toe Berm Drain Rock
- Upstream Beach Material

**NOTES**

1. Riprap on the upstream slope of the dam was excavated and placed as tailings pond backfill in a manner that prevents voids and formation of preferential flow paths. Refer to Field Instruction #3 for further details.
2. Due to the low strength of the tailings within the Upstream Beach footprint, there was no lift thickness specification for the first lift of the Upstream Beach. The material was compacted under the weight of the equipment only. Refer to Field Instruction #6 for further details.
3. Pre-construction berm crest surface to be graded to drain prior to rock drain placement.
4. All soft soils and organics are to be excavated from the expanded toe berm footprint until competent dense soils are encountered, or to a depth of 1.0m below original ground surface. Should the excavation depth reach the full 1.0m, a layer of geotextile is to be placed at the base of the excavation prior to placement of the drain rock.
5. Geotextile was draped up the original toe berm slope by a minimum 0.5m. See Field Change Notice #4 for further details.

**REFERENCES**

Pre-construction topographical contour data was obtained from RDCK and is based on a 2016 aerial LiDAR survey. Dam sections compiled based on digitization of historical drawings and borehole logs as detailed in Appendix C-3 of the 2020 RCP (RDCK 2020). As-built survey data was collected by Integrated Sustainability. The final surface is based on a drone LiDAR survey dated September 13, 2022. The toe berm excavation surface is based on a drone LiDAR survey dated August 28, 2021. The boundary between the drain rock and general fill is based on a drone LiDAR survey dated September 6, 2021.



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0	Issued for Construction	PM	PM	21/05/28					
F	Issued for Review	PM	---	20/06/30					
E	Issued for Permitting	PM	---	20/01/31					
D	Issued for Tender	MM	PM	19/10/23					
C	Issued for Remediation Plan	PM	AH	19/07/12					
3	Record Drawing	EL	PM	23/05/24	B	Issued for Review	PM		19/05/08
2	Issued for Construction	PM	PM	22/08/02	A	Issued for Review	PM		18/12/05



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DESIGN: PHM DRAWN: TAH REVIEWED: TPP  
 CHECKED: EML APPROVED: PHM DATE: May 24, 2023

FILE NAME: CAPR002046 - Stability Sections.dwg

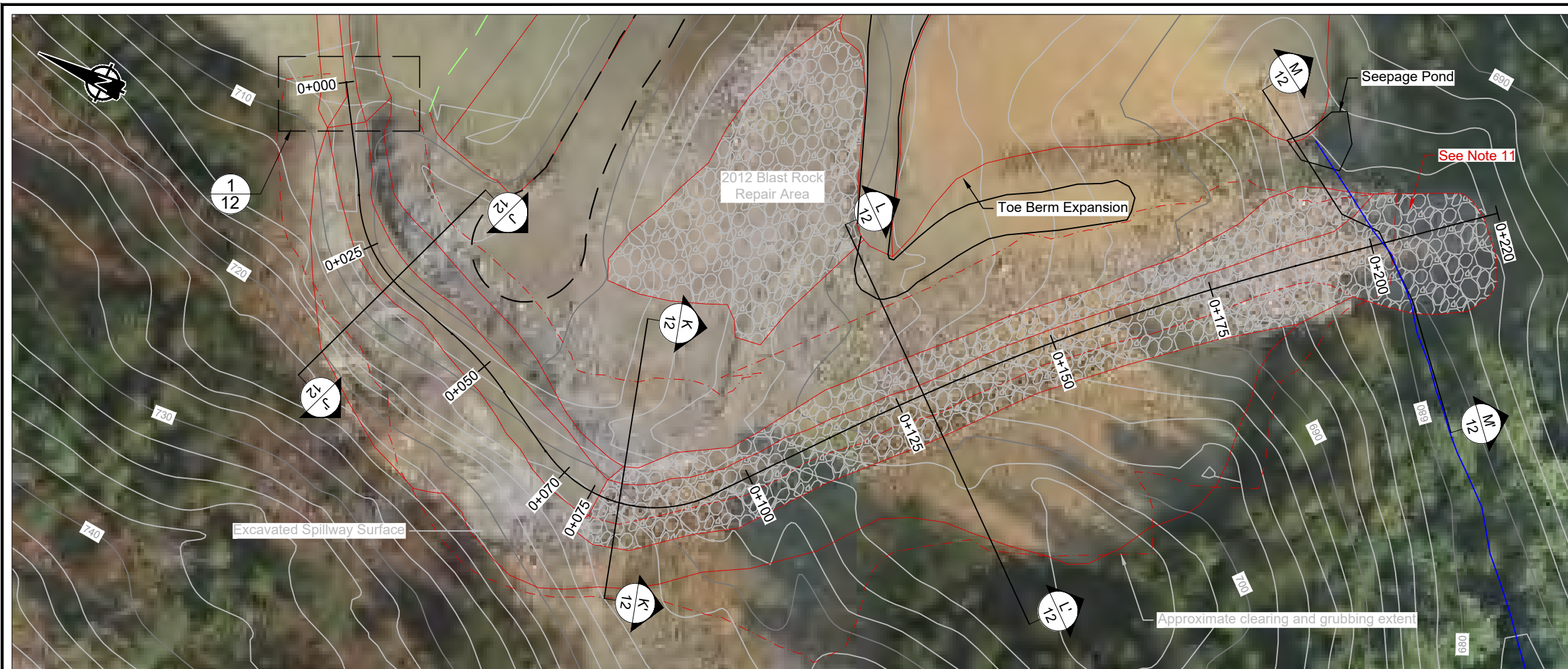
**HB Mine Tailings Facility**

SRK JOB NO.: CAPR002046

**Closure Design**

DRAWING TITLE:  
**HB Dam - Upgraded Dam Cross Section (2 of 2)**

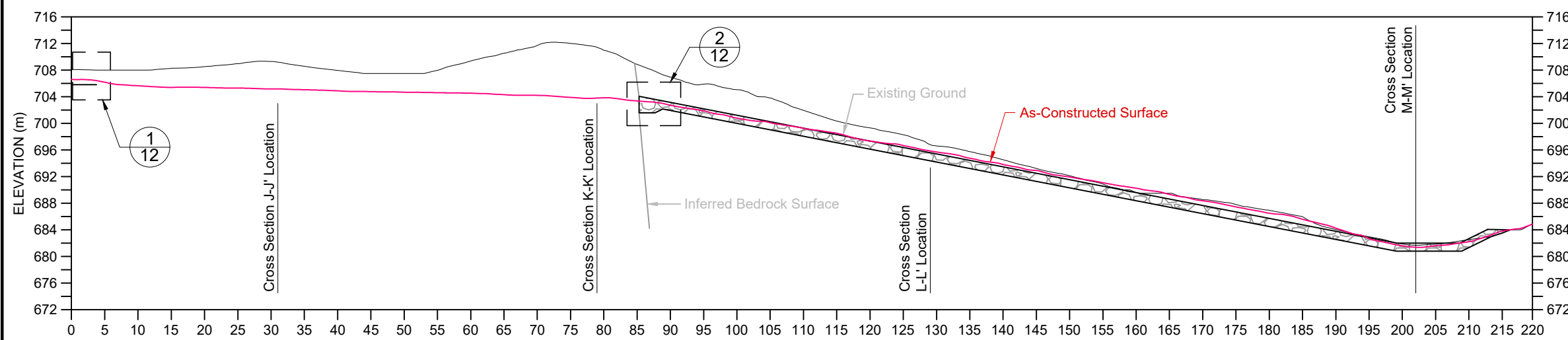
DRAWING NO. **10** SHEET **10 OF 20** REVISION NO. **3**



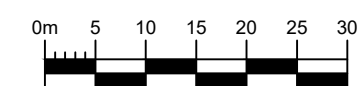
- LEGEND**
- As-Constructed Infrastructure
  - Site Access Road
  - Riprap
- NOTES**
- All units are in meters unless otherwise specified.
  - Contours are shown at 2.0 m intervals.
  - All dimensions in meters unless stated otherwise.
  - The contractor shall use controlled blasting methods to minimize damage to the abutment rock and to ensure the stability of the dam embankment.
  - A blast plan is to be submitted and approved by the Engineer and requires to be submitted to EMPR for approval a minimum 30 days prior to the planned start of blasting.
  - A blast monitoring station shall be placed on bedrock within 50m of the spillway at the dam centerline. Blast monitoring data, including the distance to the monitoring station, the vibration frequency, and peak particle velocity shall be reported to the Engineer following each blast.
  - The peak particle velocity must be kept below 2.5 cm/second.
  - Additional excavation may be required to remove rock deemed by the Engineer to be a potential future spillway blockage risk.
  - Spillway riprap to have a median particle size ( $D_{50}$ ) of 600mm and meet the material specifications provided in Drawing 02.
  - The geotextile is to meet the product specifications provided in the Technical Specifications.
  - Geotextile panels are to have a minimum 0.3m overlap, with the upstream panel placed over the downstream panel.
  - The upgraded spillway was tied into the existing stilling basin at STA 0+175. Additional riprap was placed on the north bank of the stilling basin to minimize flow velocity and for any floodwater that could backwater into the seepage monitoring weir area. Further details are provided in Field Instruction #10.

**REFERENCES**  
 Preconstruction topographical contour data was obtained from RDCK and is based on a 2016 aerial LiDAR survey.

**Spillway Plan**



**Spillway Profile**



C:\Users\srk\OneDrive\Documents\SRK Consulting\ES\2023\HB - Internal\046\_AutoCAD\Record Drawings\E\2023\CAPR002046 - Spillway.dwg

NO.	DESCRIPTION	CHKD.	APPD.	DATE	NO.	DESCRIPTION	CHKD.	APPD.	DATE
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0	Issued for Construction	PM	PM	21/05/28					
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B	Issued for Review	PM	PM	19/05/08					
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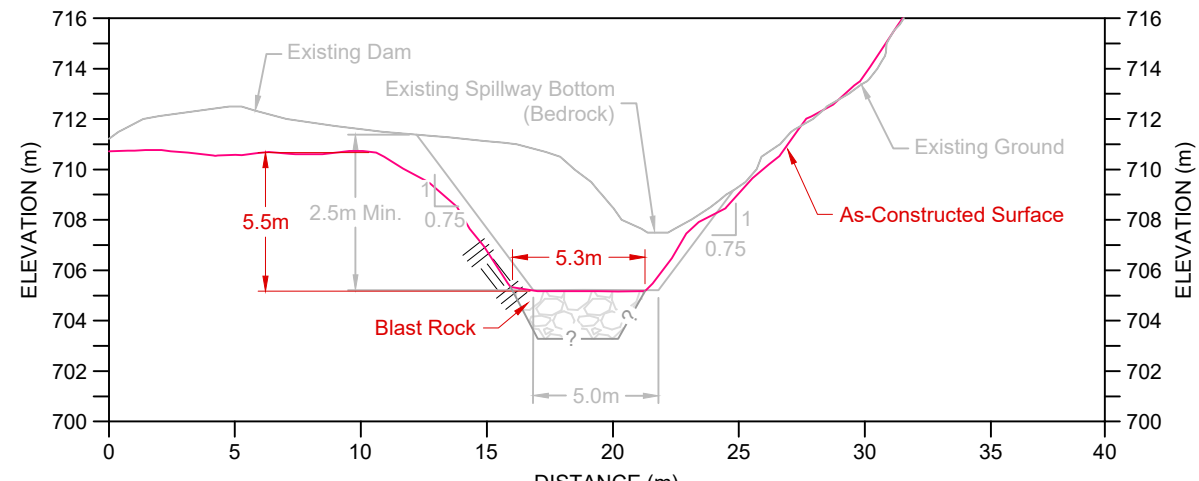
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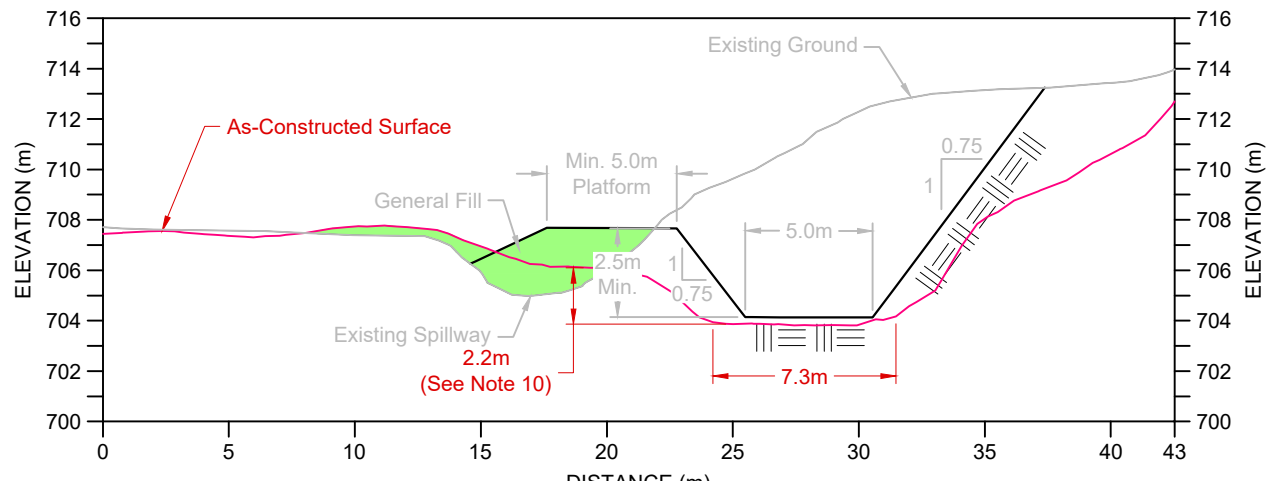
**HB Mine Tailings Facility**

SRK JOB NO.: CAPR002046

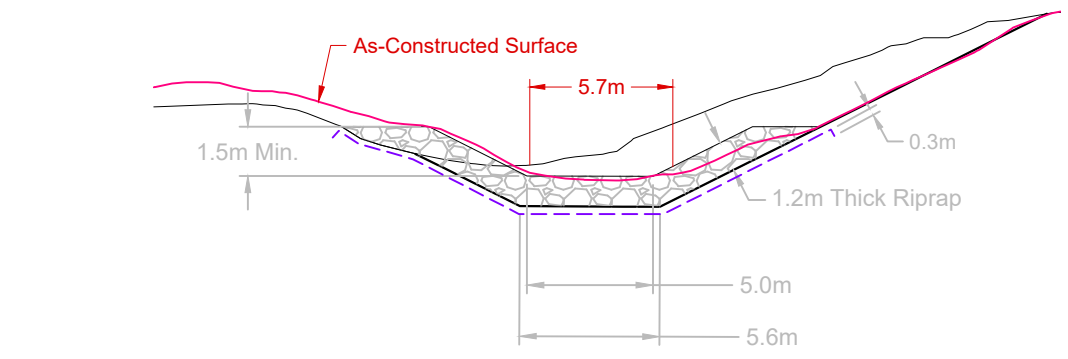
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DRAWING TITLE: Upgraded Spillway - Plan and Profile		
DRAWING NO. 11	SHEET 11 OF 20	REVISION NO. 3



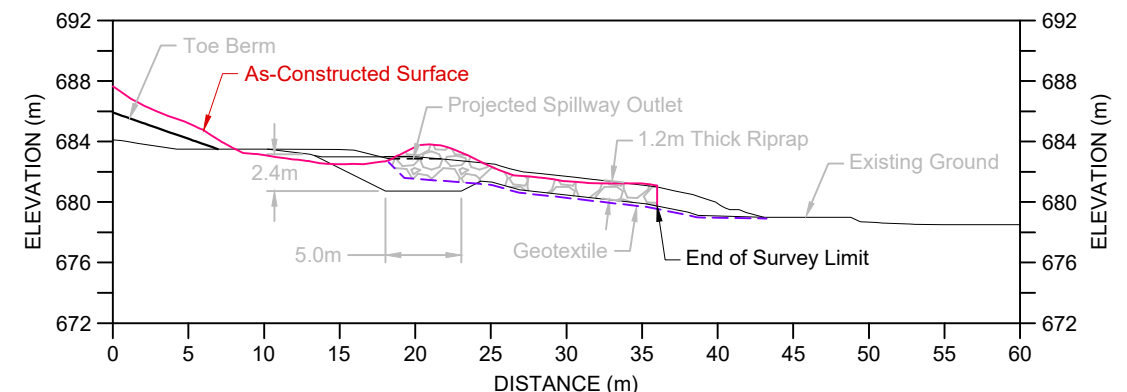
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11  
**Cross Section J-J'**  
0m 3 6 9 12



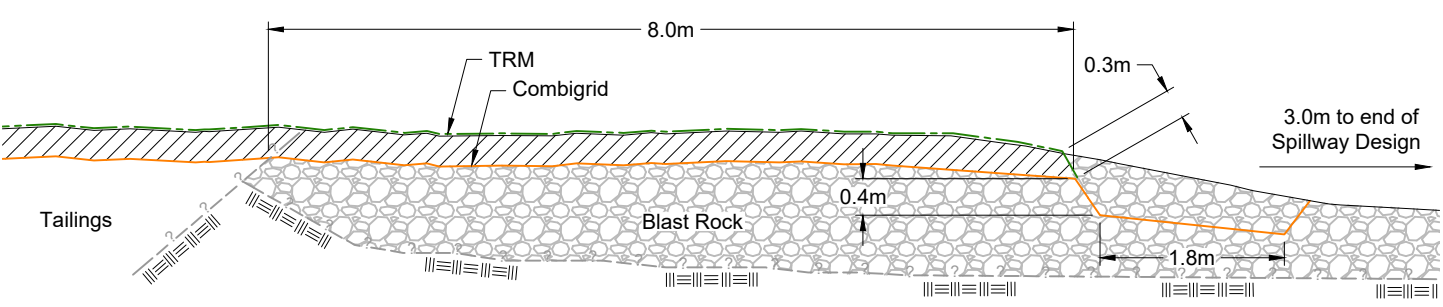
**K**  
11  
**Cross Section K-K'**  
0m 3 6 9 12



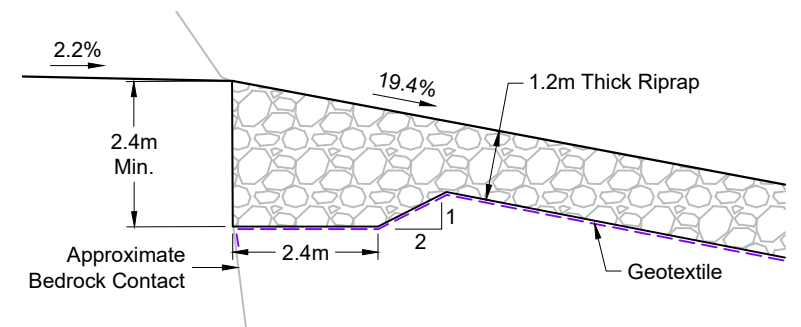
**L**  
11  
**Cross Section L-L'**  
0m 3 6 9 12



**M**  
11  
**Cross Section M-M'**  
0m 5 10 15 20



**1**  
06, 08, 11  
**Detail 1 - Spillway Inlet**  
0m 0.5 1.0 1.5 2.0 2.5 3.0



**2**  
11  
**Detail 2 - Riprap Tie-in**  
0m 0.5 1.0 1.5 2.0

**LEGEND**

- As-Constructed Surface
- Combigrig
- Geosynthetic Liner
- Geotextile
- Inferred Bedrock
- Turf Reinforcement Mat
- Blasted Rock
- General Fill
- Liner Protection Layer
- Tailings
- Till
- Riprap
- Bedrock

**NOTES**

1. All units are in meters unless otherwise specified.
2. Final spillway invert width: 5.0m.
3. Minimum depth of channel in rock: 2.5m
4. Side-slope in rock: 0.75H:1V
5. Side-slope in soil: 2H:1V
6. Allow a 1m 'bench' at rock/soil interface.
7. Riprap thickness measured perpendicular to slope.
8. Depth to bedrock to be confirmed prior to excavation between 0+070 and 0+100.
9. A HEC-RAS 2D hydraulic analysis was completed on the as-constructed spillway surface that determined the spillway can convey the Inflow Design Flood.

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NO.	DESCRIPTION	CHKD	APPD	DATE	NO.	DESCRIPTION	CHKD	APPD	DATE
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0	Issued for Construction	PM	PM	21/05/28					
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2	Issued for Construction	PM	PM	22/08/02					



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DESIGN: SP    DRAWN: TAH    REVIEWED: TPP  
 CHECKED: EML    APPROVED: PHM    DATE: May 24, 2023

FILE NAME: CAPR002046 - Spillway.dwg

**HB Mine Tailings Facility**

SRK JOB NO.: CAPR002046

**Closure Design**

DRAWING TITLE: **Upgraded Spillway - Cross Sections and Details**

DRAWING NO. **12**    SHEET **12 OF 20**    REVISION NO. **3**

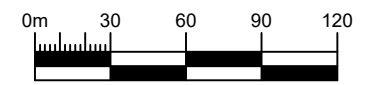


**LEGEND**

- Combigrid Extent
- Riprap
- Tailings Soil Cover
- Hydroseed Area
- Broadcast Seed Area
- As-Constructed Infrastructure

- NOTES**
1. All units are in meters unless otherwise specified.
  2. Contours are shown at 2.0 m intervals.
  3. Main Channel inlet field fit with the liner extending a minimum 2m upstream of the tailings.
  4. The tailings pond was backfilled with till, and Ross Soils. The top 0.3m of the tailings pond backfill consists of till sourced from the Till Borrow Area.
  5. No cover was placed in the RDCK stockpile area that was already covered with a layer of mulch / wood chips.
  6. A geocomposite layer consisting of a geogrid and a non-woven geotextile (Combigrid) was placed over the tailings within the Tailings Pond Backfill and Upstream Beach area to provide ground reinforcement and improve trafficability conditions to allow for backfill placement. For further details, see Field Change Notice #1.

**REFERENCES**  
 Preconstruction topographical contour data was obtained from RDCK and is based on a 2016 aerial LiDAR survey.



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NO.	DESCRIPTION	CHKD.	APP'D.	DATE	NO.	DESCRIPTION	CHKD.	APP'D.	DATE
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C	Issued for Remediation Plan	PM	AH	19/07/12					
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2	Issued for Construction	PM	PM	22/08/02					



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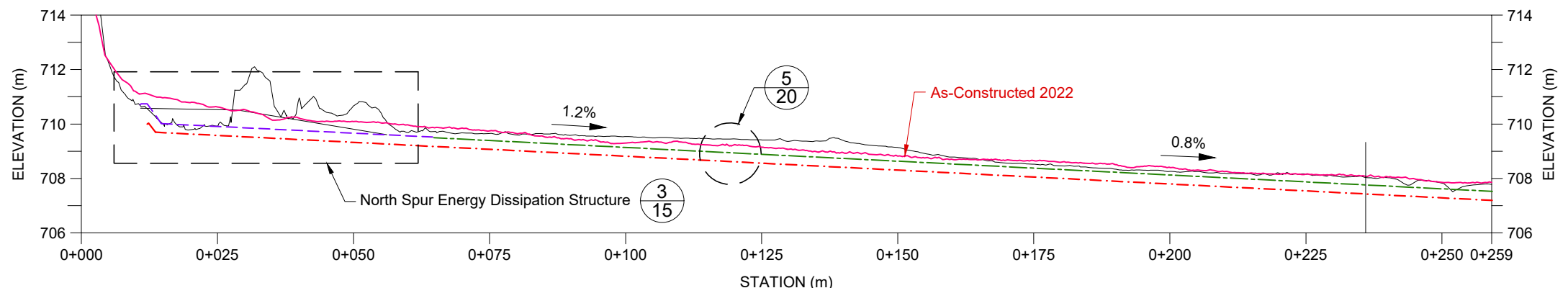
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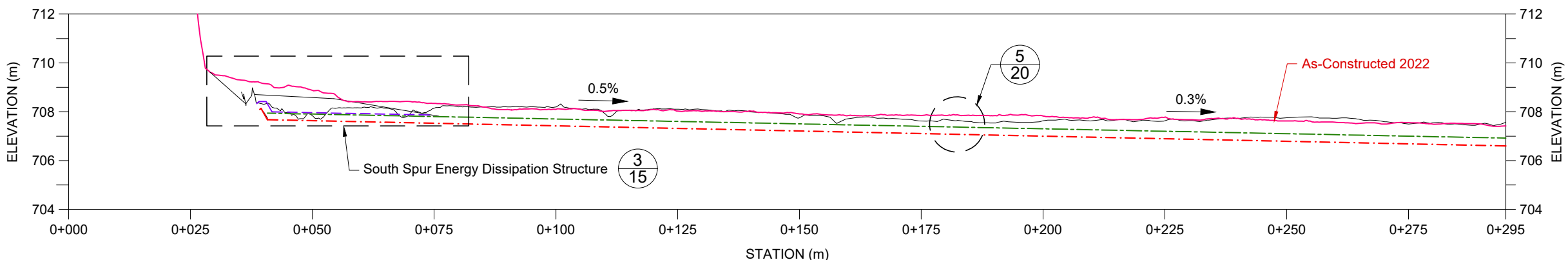
**HB Mine Tailings Facility**

SRK JOB NO.: CAPR002046

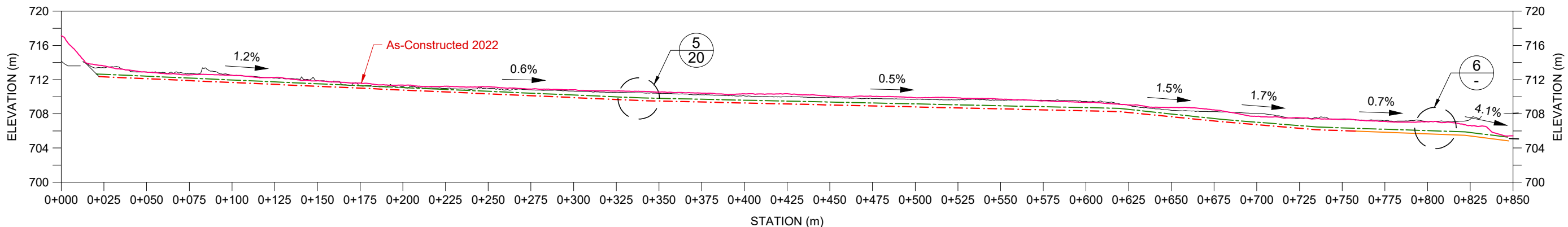
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DRAWING NO. 13	SHEET 13 OF 20	REVISION NO. 3



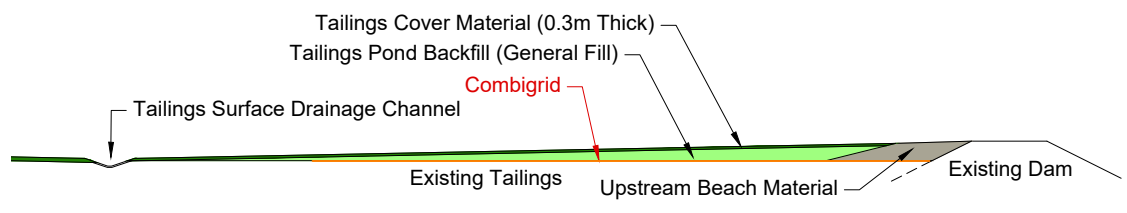
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13  
**North Spur Channel Profile**  
5X Vertical Exaggeration



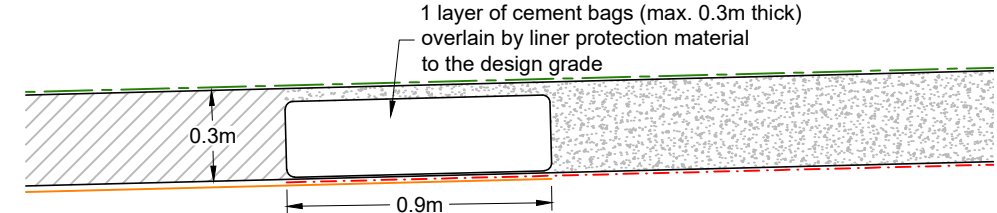
**O**  
13  
**South Spur Channel Profile**  
5X Vertical Exaggeration



**P**  
13  
**Main Channel Profile**  
5X Vertical Exaggeration



**Q**  
13  
**Typical Tailings Pond Backfill Section**



**6**  
-  
**Transition Between LLDPE and Combigrid**

**LEGEND**

As-Constructed Surface	Fill
Existing Ground (2021 Survey)	Liner Protection Material
Combigrid	Riprap
Geosynthetic Liner	Tailings Cover Material
Geotextile	Tailings Pond Backfill (General Fill)
Turf Reinforcement Mat	Upstream Beach

- NOTES**
- All units are in meters unless otherwise specified.
  - The channel grades may be adjusted to suit field conditions but shall not be less than 0.2% or greater than 3% in all cases unless approved by the Engineer.
  - Excavated tailings were disposed in the Tailings Pond Backfill area and covered with 0.3m of till sources from the Till Borrow Area.
  - The geosynthetic liner and turf reinforcement mat are to be installed as per manufacturers instructions and meet the product specifications provided in the Technical Specifications.
  - The riprap in the North and South Spur Energy Dissipation Structures have a median particle size (D50) of 400mm and meet the material specifications provided on Drawing 02.
  - The liner protection material is to consist of a well-graded sand that meets the specifications provided on Drawing 02.
  - Prior to Turf Reinforcement Mat (TRM) deployment, all subgrade surfaces shall be broadcast seeded and be free of sharp protruding rocks.
  - TRM panels shall have a minimum 0.15m overlap and follow the stapling patterns provided on Drawing 15.
  - The TRM panels are to be shingles such that the upstream panel is overtop of the downstream panel.
  - The Combigrid is to be deployed perpendicular to the channel with a minimum 0.3 m overlap, and shingled such that the upstream panel is overtop the downstream panel.

NO.	DESCRIPTION	CHKD	APPD	DATE	NO.	DESCRIPTION	CHKD	APPD	DATE
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B	Issued for Review	PM	PM	19/05/08					
A	Issued for Review	PM	PM	18/12/05					
3	Record Drawing	EL	PM	23/05/24					
2	Issued for Construction	PM	PM	22/08/02					



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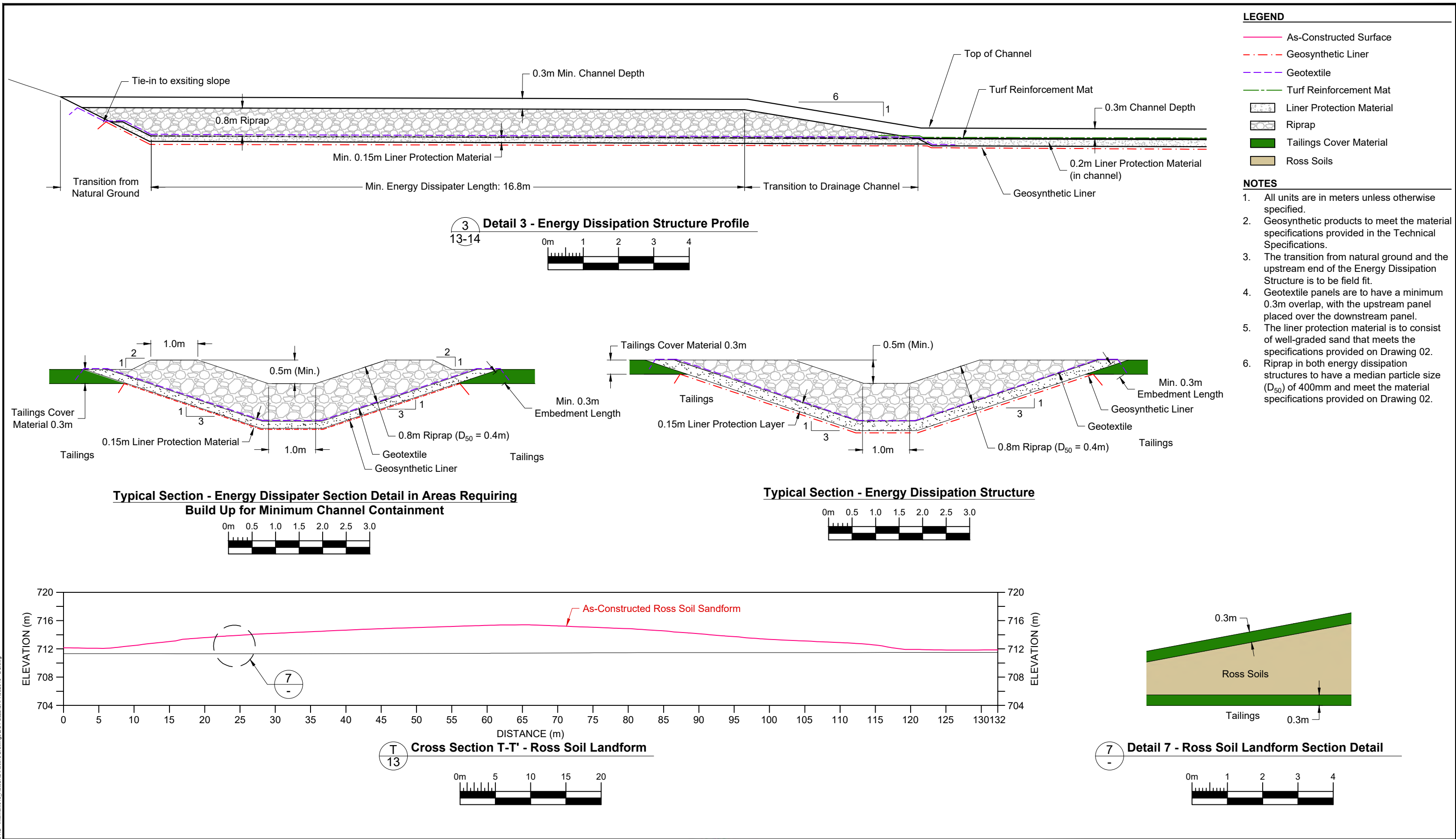
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**HB Mine Tailings Facility**

SRK JOB NO.: CAPR002046

<b>Closure Design</b>		
DRAWING TITLE: <b>Tailings Surface Drainage Channel Profiles and Tailings Pond Backfill Section</b>		
DRAWING NO. <b>14</b>	SHEET 14 OF 20	REVISION NO. <b>3</b>

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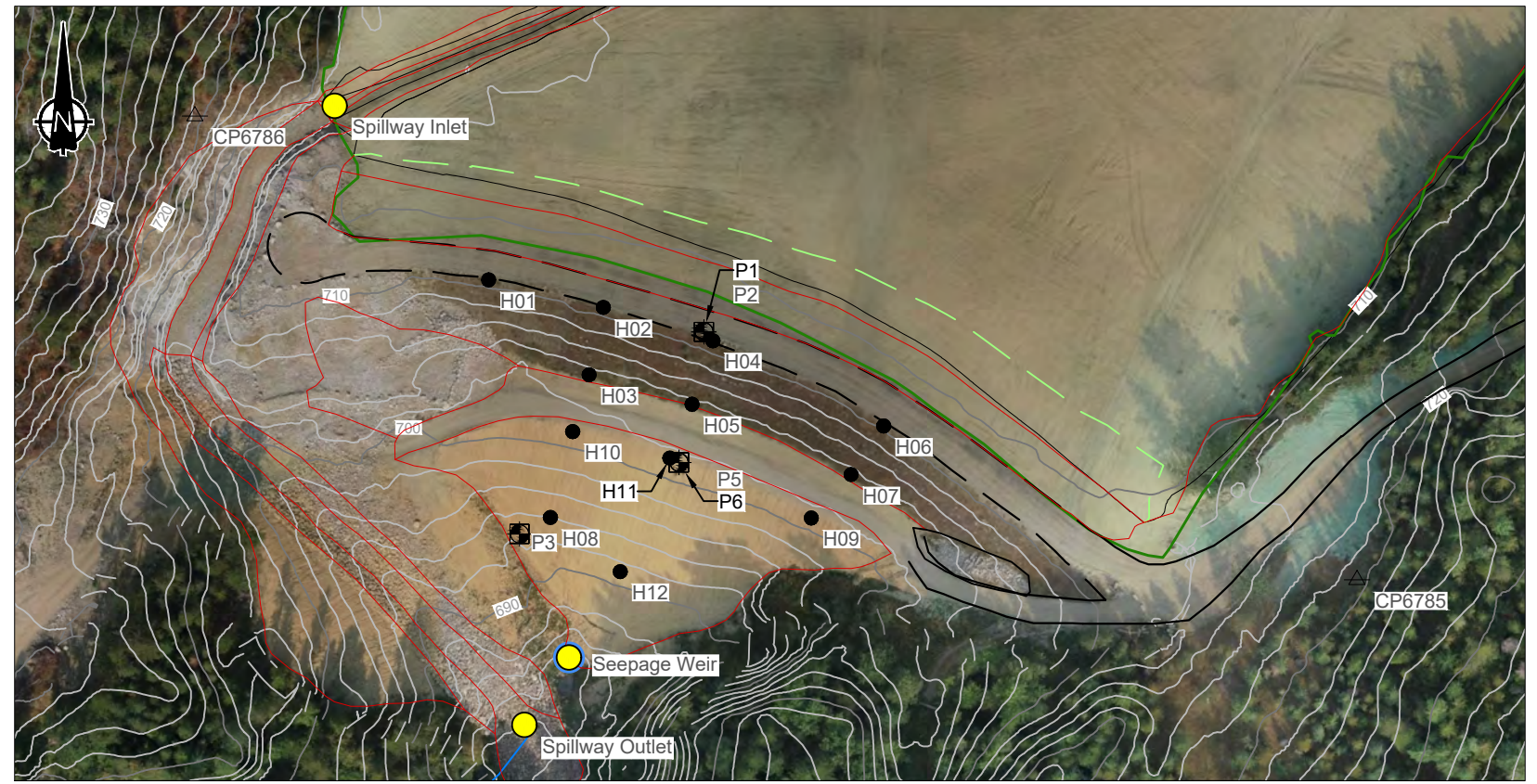
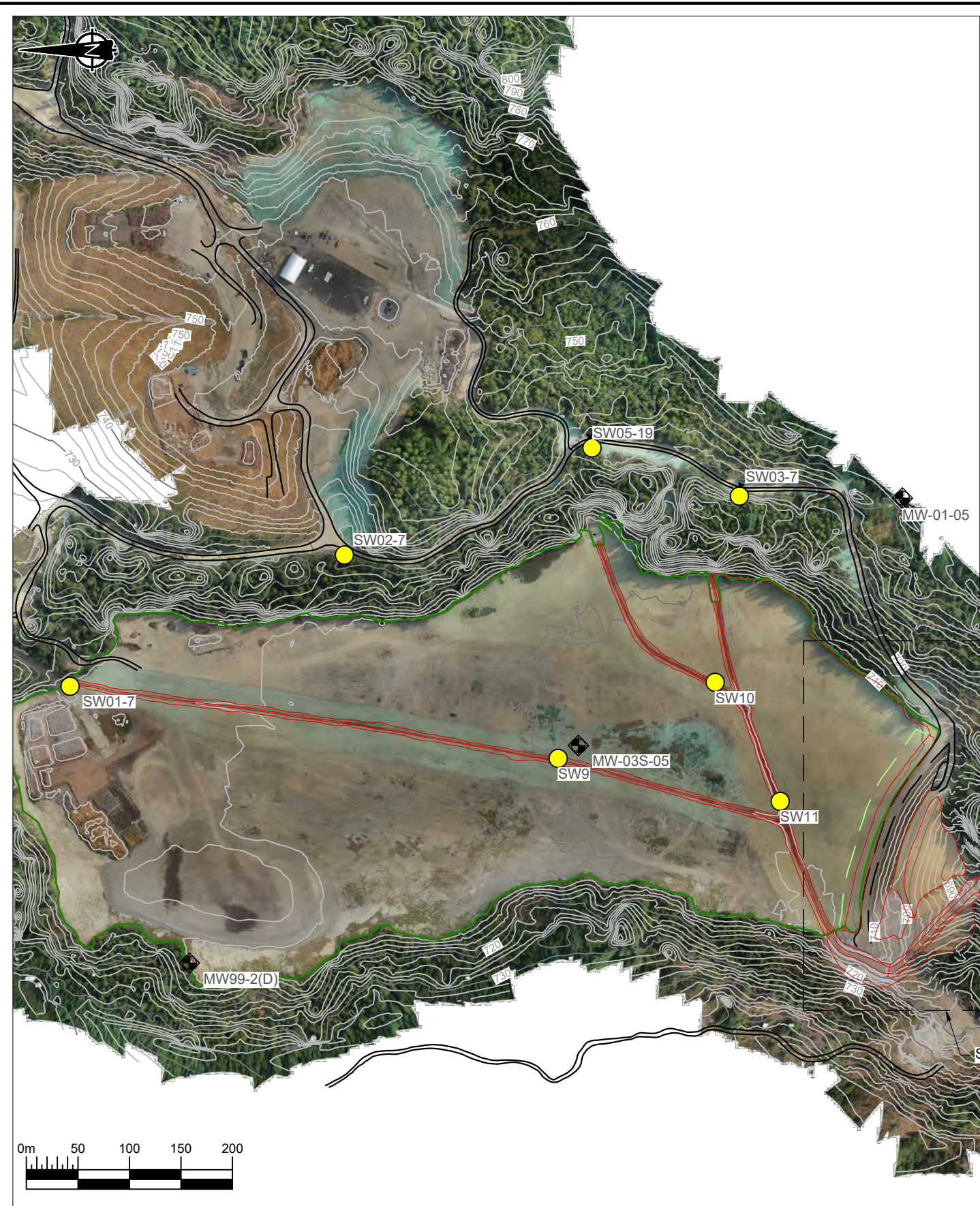
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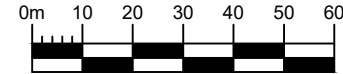
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DRAWING TITLE: Tailings Surface Drainage Channel Energy Dissipation Structures			DRAWING NO. 15		
SHEET 15 OF 20			REVISION NO. 3		

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**Dam Inset Map**



**LEGEND**

- Control Point
- Groundwater Monitoring Location
- Piezometer
- Seepage Measurement Weir
- Surface Water Monitoring Location
- Tailings Soil Cover
- As-Constructed Infrastructure

**NOTES**

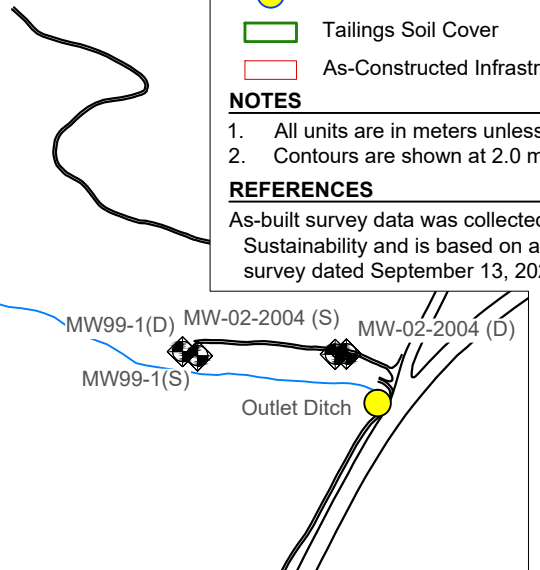
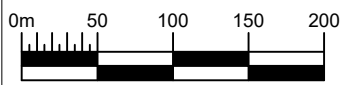
1. All units are in meters unless otherwise specified.
2. Contours are shown at 2.0 m intervals.

**REFERENCES**

As-built survey data was collected by Integrated Sustainability and is based on a drone LiDAR survey dated September 13, 2022.

Control Point Locations			
ID	Northing	Easting	Elevation (m)
CP6785	5441964.12	481893.44	719.32
CP6786	5442074.29	481617.38	722.00

Survey Hub Locations			
ID	Northing	Easting	Elevation (m)
H01	5442035.34	481687.12	710.78
H02	5442028.81	481714.39	710.97
H03	5442012.80	481711.01	702.87
H04	5442020.86	481740.42	711.15
H05	5442005.80	481735.46	703.02
H06	5442000.63	481780.99	710.33
H07	5441989.10	481773.25	702.99
H08	5441978.90	481701.82	694.06
H09	5441978.77	481763.80	701.57
H10	5441999.30	481707.12	701.55
H11	5441993.00	481730.16	701.69
H12	5441966.04	481718.41	691.23



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A	Issued for Review	PM	PM	18/12/05					
3	Record Drawing	EL	PM	23/03/13					
2	Issued for Construction	PM	PM	22/08/02					

**DRAFT**



HB Mine Tailings Facility

Closure Design

Instrumentation and Monitoring Plan

This drawing is uncontrolled when printed unless stamped and signed with original ink and recorded on a Distribution Register. See Disclaimer on Drawing 0

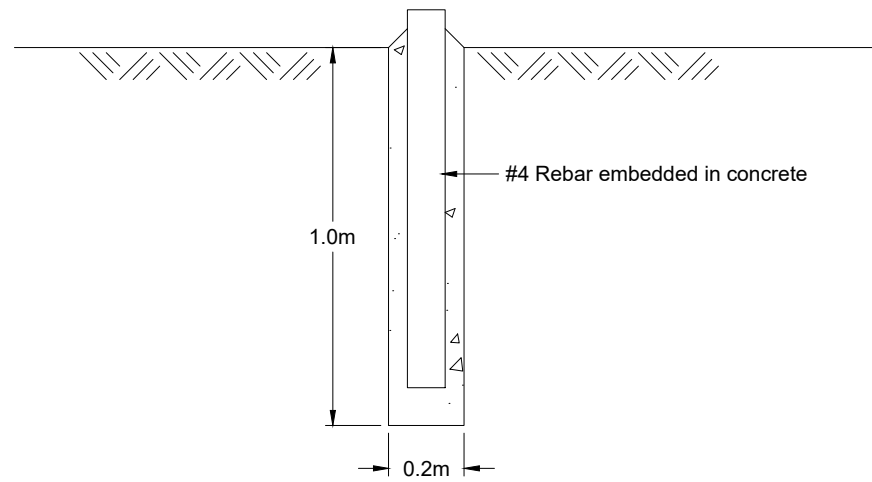
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SRK JOB NO.: CAPR002046

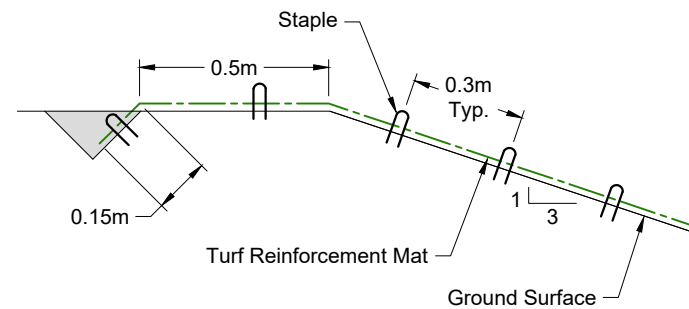
DRAWING NO. 17 SHEET 17 OF 20 REVISION NO. 3

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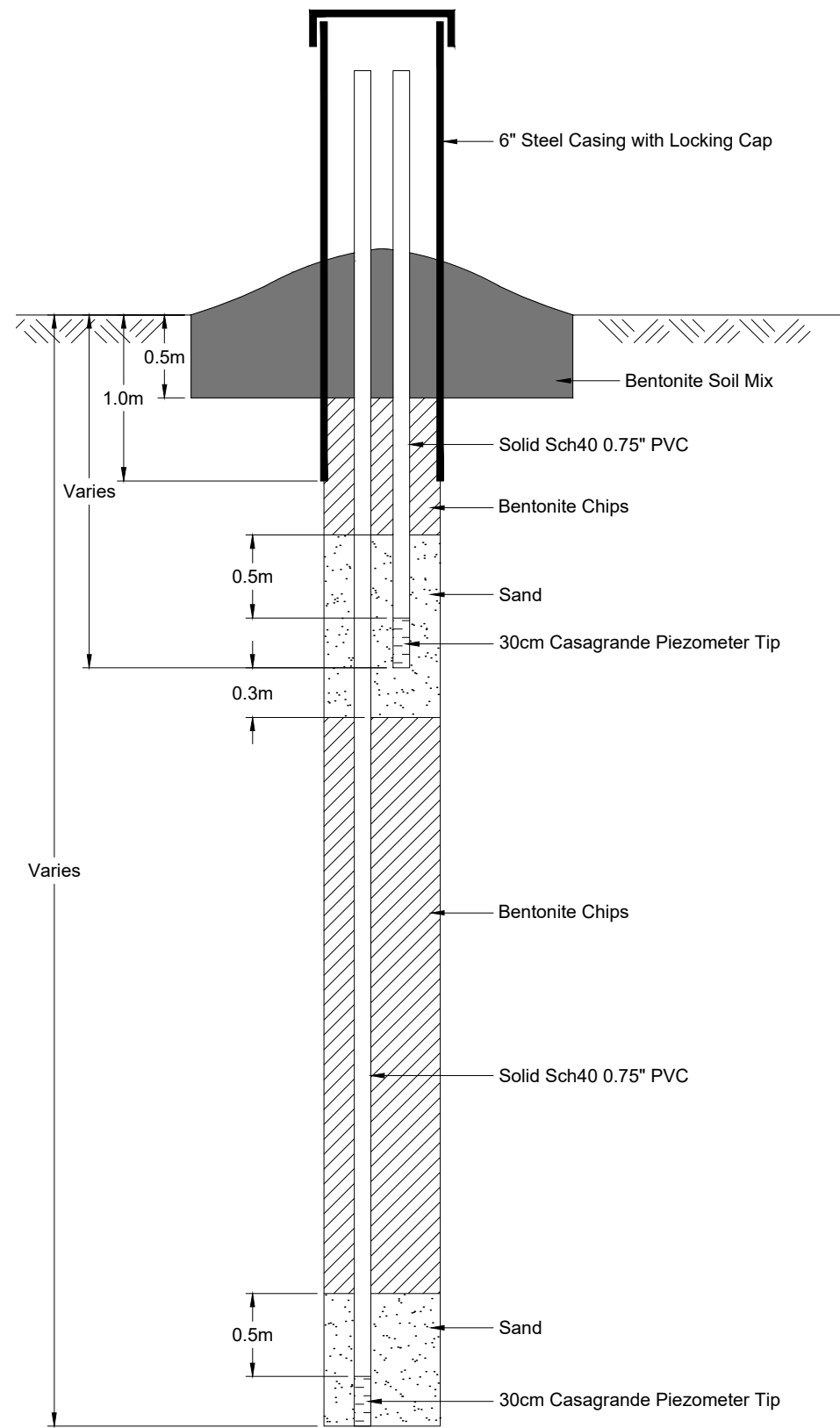
**Survey Hub Detail**

Not To Scale



**TRM Anchor Trench Detail**

Not To Scale



**Typical Piezometer Detail**

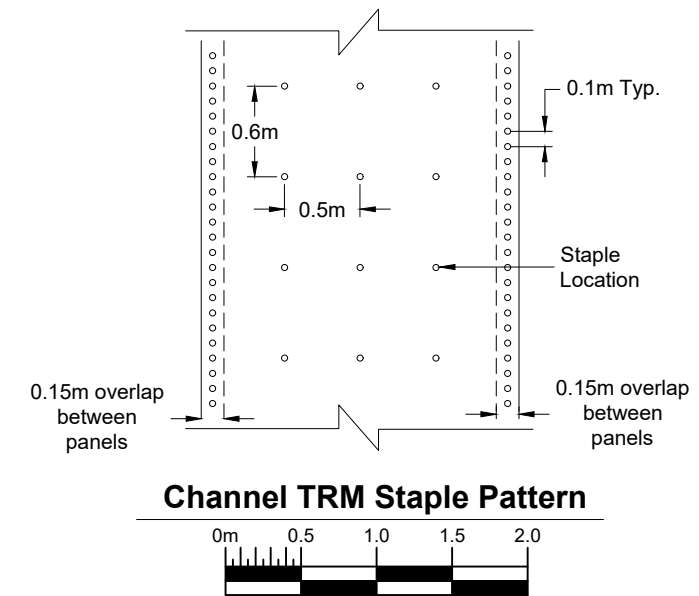
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**NOTES**

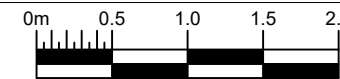
- Existing piezometers are to be preserved by extending the PVC pipe as required, or replaced if damaged. This detail provides typical details should the piezometer require to be replaced.
- Replacement piezometers are to be installed such that the base of the Casagrande piezometer pipes match the elevations provided in Table 1.
- If the piezometer locations require to be moved from current locations, the Casagrande pipe elevations are to be confirmed with the Engineer.

**TABLE 1**

Piezometer	Casagrande Pipe Bottom Elevation (m)
P1 and P2	687.74 and 698.24
P3	673.38
P5 and P6	691.40 and 696.45



**Channel TRM Staple Pattern**



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DESIGN: PHM    DRAWN: TAH    REVIEWED: TPP

CHECKED: EML    APPROVED: PHM    DATE: May 24, 2023

FILE NAME: CAPR002046 - Stability Sections.dwg

**HB Mine Tailings Facility**

SRK JOB NO.: CAPR002046

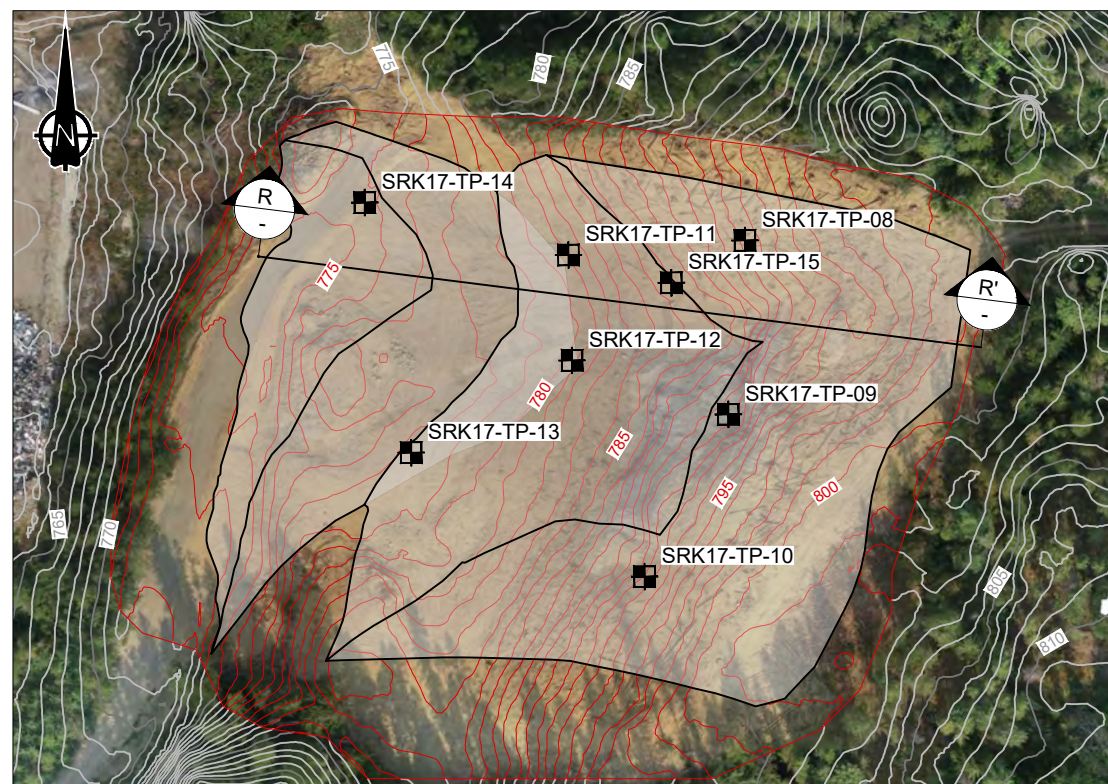
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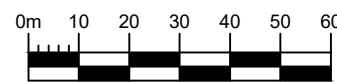
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18 OF 20

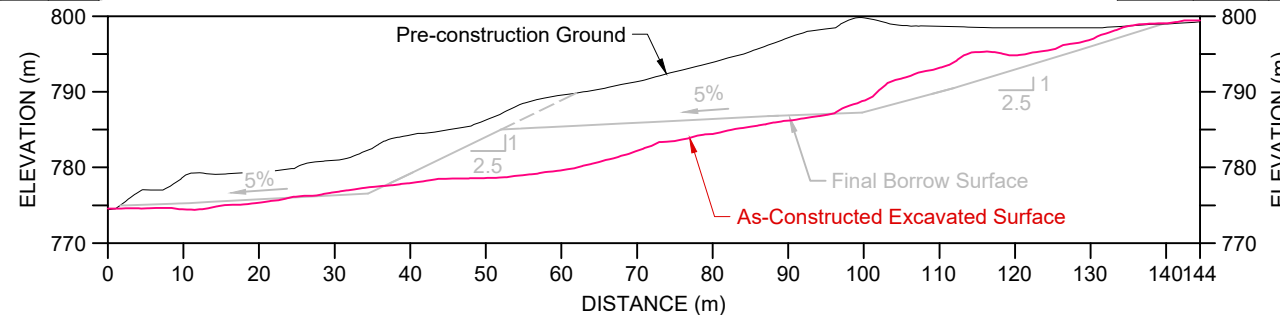
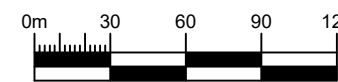
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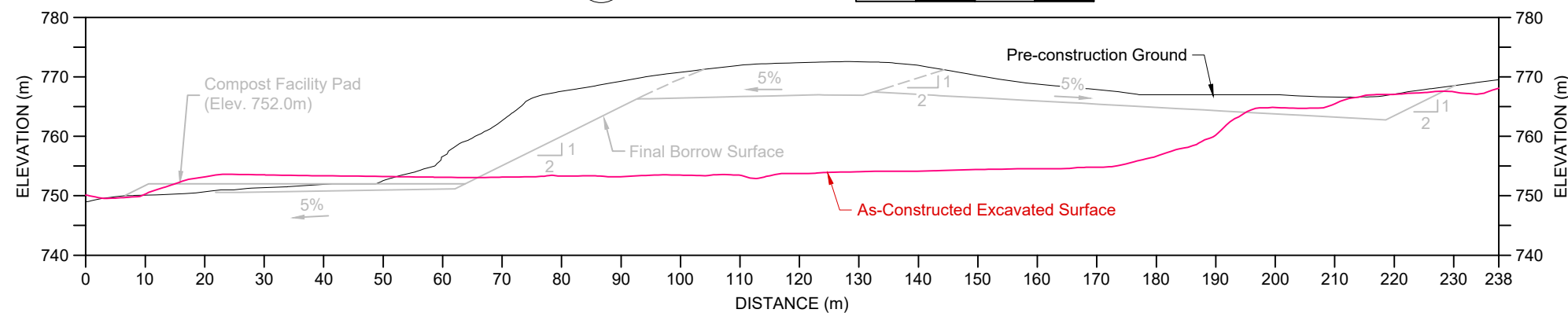
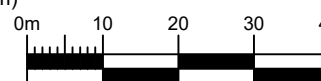
**Sand and Gravel Borrow Area**



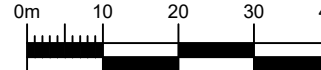
**Existing Borrow Area Expansion**



**R Cross Section R-R'**



**S Cross Section S-S'**



- LEGEND**
- Test Pit Location
  - As-Constructed Surface
  - RDCK Compost Facility (design by others)
- NOTES**
- All units are in meters unless otherwise specified.
  - Contours are shown at 1.0 m intervals, and are indicative of proposed excavation final contours.
  - Following completion of borrow excavation, all slopes are to be regraded to 2H:1V or shallower.
  - RDCK Compost Facility pad site grading completed in 2022.
- REFERENCES**
- As-built survey data was collected by Integrated Sustainability and is based on a drone LiDAR survey dated September 13, 2022.

C:\Users\srk\OneDrive\Documents\SRK\_Consulting\ES\2023\HB - Internal\046\_AutoCAD\Record Drawings\E\DY 2023\CAPR002046 - Borrow Areas.dwg

DRAWING NO.	DRAWING TITLE	NO.	DESCRIPTION	CHKD	APPD	DATE	NO.	DESCRIPTION	CHKD	APPD	DATE
							3	Record Drawing	EL	PM	23/05/24
							2	Issued for Construction	PM	PM	22/08/02
							1	Issued for Construction	PM	PM	22/07/13
							0	Issued for Construction	PM	PM	21/05/28
							F	Issued for Review	PM	--	20/06/30
							E	Issued for Permitting	PM	--	20/01/31
							A	Issued for Tender	MM	PM	19/10/23



**srk consulting**

DESIGN: PHM    DRAWN: TAH    REVIEWED: TPP  
 CHECKED: EML    APPROVED: PHM    DATE: May 24, 2023

FILE NAME: CAPR002046 - Borrow Areas.dwg

**HB Mine Tailings Facility**

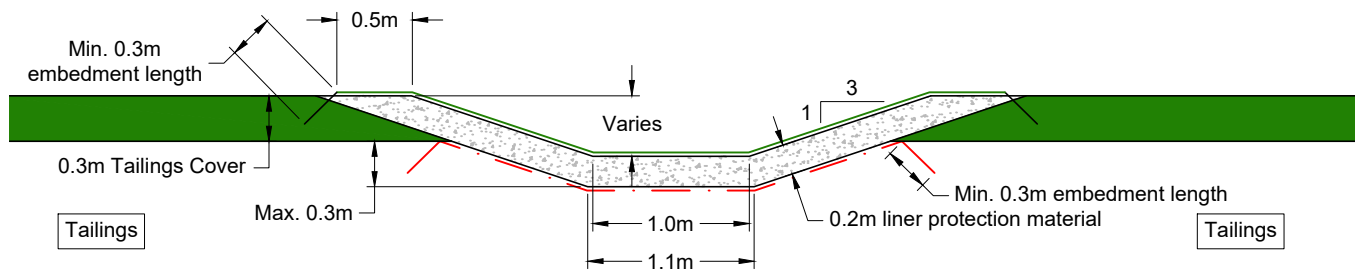
SRK JOB NO.: CAPR002046

**Closure Design**

DRAWING TITLE:  
**Borrow Area Plan View and Typical Sections**

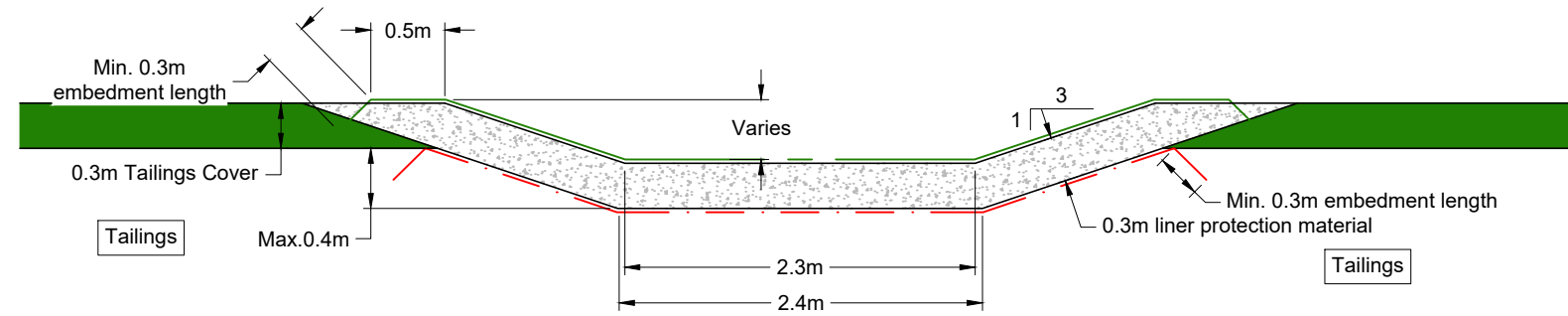
DRAWING NO.: **19**    SHEET: 19 OF 20    REVISION NO.: **3**

5/14 Typical Sections of the North and South Spur Channels and Main Channel  
Upstream of the Confluence with the Spur Channels

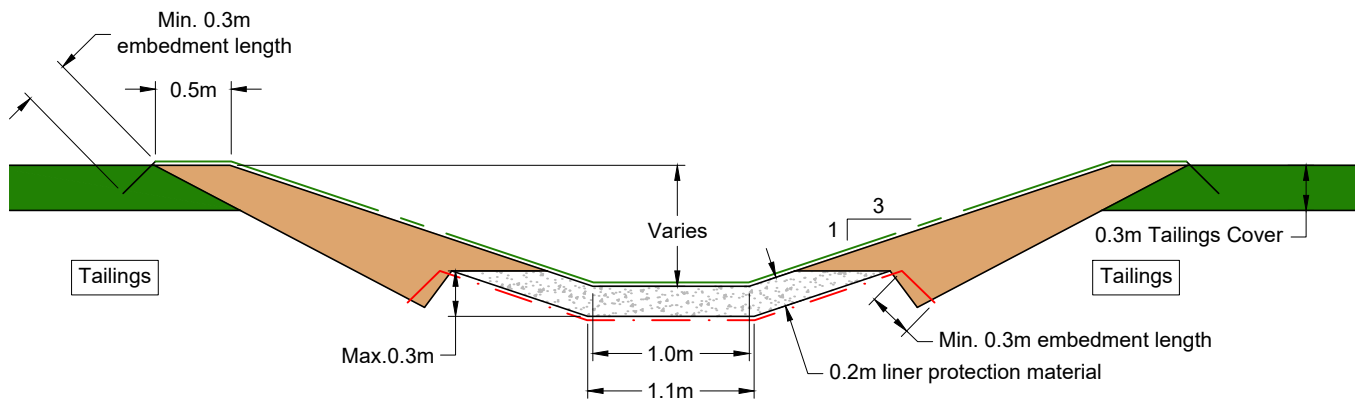


Case A - Tailings < 0.3m Deep

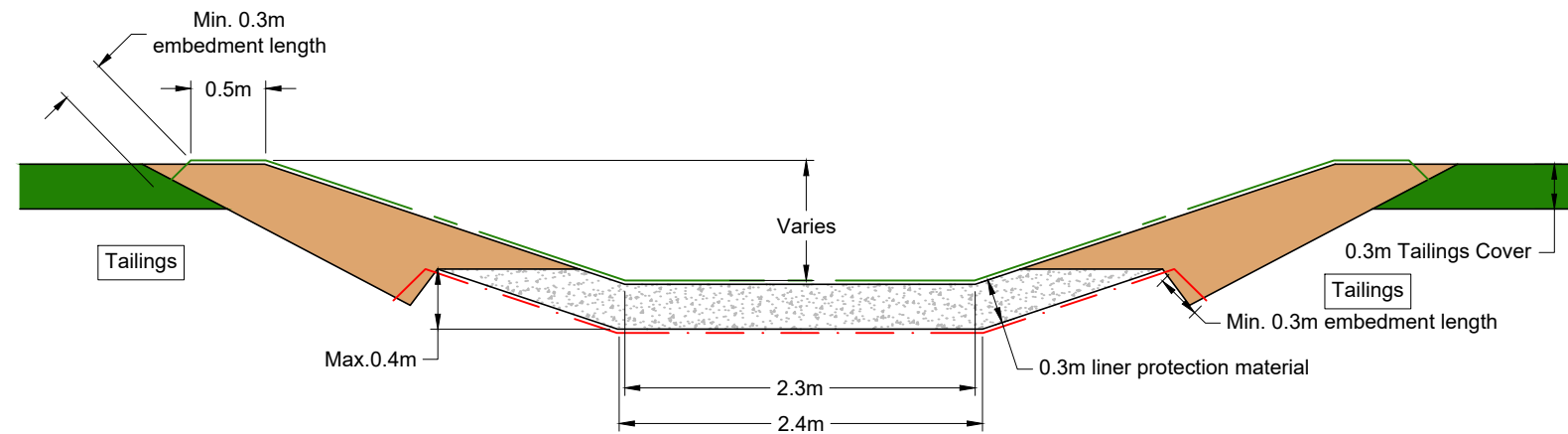
5/14 Typical Sections of Main Channel Downstream of the Confluence with the Spur Channels



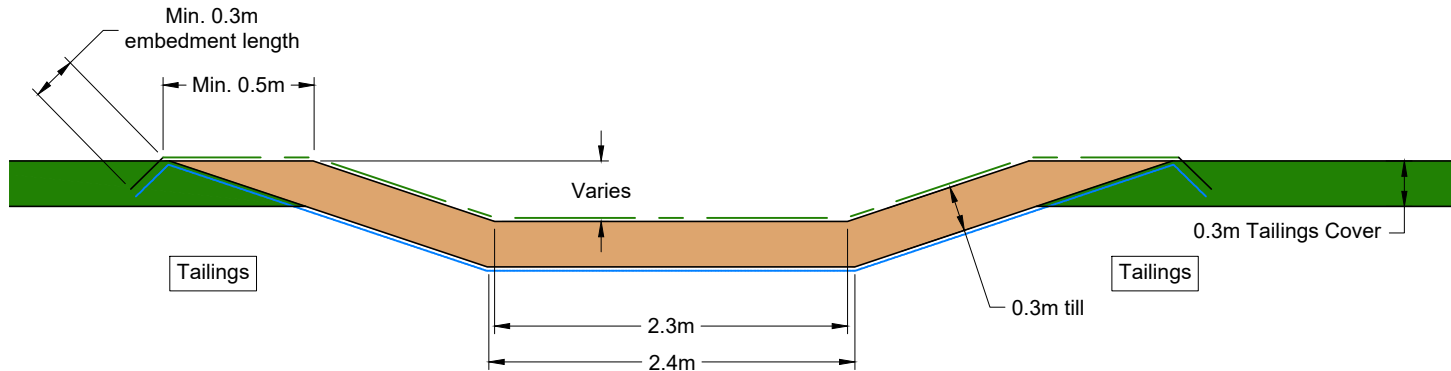
Case A - Tailings < 0.4m Deep



Case B - Tailings > 0.3m Deep



Case B - Tailings > 0.4m Deep



Typical Combigrid Section (Sta. 0+758 to Spillway)

LEGEND

- - - Geosynthetic Liner
- - - Turf Reinforcement Mat
- ▒ Liner Protection Material
- Tailings Cover Material
- Till

NOTES

1. All units are in meters unless otherwise specified.
2. Geosynthetic products to meet the material specifications provided in the Technical Specifications.
3. Geotextile and Combigrid panels are to have a minimum 0.3m overlap, with the upstream panel placed over the downstream panel.
4. The liner protection material is to consist of well-graded sand that meets the specifications provided on Drawing 02.



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DRAWING NO.	DRAWING TITLE	NO.	DESCRIPTION	CHKD	APPD	DATE	NO.	DESCRIPTION	CHKD	APPD	DATE
							3	Record Drawing	EL	PM	23/05/24
							2	Issued for Construction	PM	PM	22/08/02



**srk consulting**

DESIGN: PHM	DRAWN: TAH	REVIEWED: TPP
CHECKED: EML	APPROVED: PHM	DATE: May 24, 2023

FILE NAME: CAPR002046 - DC.dwg

**HB Mine Tailings Facility**

SRK JOB NO.: CAPR002046

**Closure Design**

DRAWING TITLE:  
**Tailings Surface Drainage Channel Typical Sections**

DRAWING NO.: **20**

SHEET: 20 OF 20

REVISION NO.: **3**

## APPENDIX F

### STAFF QUESTIONNAIRE

## Staff Questionnaire | HB Tailing Facility Dam Safety Review

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<b>Project Name:</b>	HB Tailing Facility Dam Safety Review	<b>Date:</b>	May 26, 2025
<b>Location:</b>	Salmo, British Columbia	<b>No. of Pages:</b>	19
<b>Structure Name:</b>	Dam and Associated Structures of HB Tailing Facility	<b>File No.:</b>	704-ENG.DAMS03004-01
<b>Facility Owner:</b>	Regional District of Central Kootenay	<b>Revision No.:</b>	00

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### 1.0 INTRODUCTION

This Staff Questionnaire is meant to support the Dam Safety Review (DSR) for the HB Tailings Facility (the Facility) located at Salmo, BC. Tetra Tech Inc. (Tetra Tech) prepared a detailed set of questions on different components of the dam safety management for tailing dam and associated structures to be answered by Regional District of Central Kootenay (RDCK) personnel who have oversight and responsibility of operations of the Facility.

Questions are generally organized under different aspects of the tailing dam and its appurtenant structures to meet the intent of a DSR process and may have some overlaps. Where a response to a question was either partly or completely covered by a previous question, reference can be made to the appropriate question number(s) while providing further elaboration if warranted or required to make the response complete. The responses will form part of the DSR report with a copy of the questionnaire and RDCK's responses in an appendix to the DSR report.

### 2.0 DEFINITIONS

The following list contains definitions of abbreviations used in this document that may be unfamiliar to the readers.

RDCK	Regional District of Central Kootenay
OMS	Operation, Maintenance, and Surveillance
EPRP	Emergency Preparedness and Response Plan
EOR	Engineer of Record
FOS	Factor of Safety
DSR	Dam Safety Review
DSI	Dam Safety Inspection
IGRB	Geotechnical Review Board

### 3.0 STAFF QUESTIONNAIRE

Que. No.	Question	Answer
<b>1. Dam Safety Management System</b>		
1.1	Who (name of person and title) is the current EOR? Who currently has the ultimate responsibility for the safety of the Facility and its related structures?	<p>Peter Mikes, P.Eng. Principal Consultant, SRK.</p> <p>The EOR holds the professional responsibility for the facility design, and is responsible for evaluating the adequacy of the as-built facility relative to the design as well as applicable standards, criteria, and guidelines.</p> <p>The Mine Manager (MM) is ultimately responsible for the safety of the TSF.</p>
1.2	Who (name of person and title) is responsible for the day-to-day oversight (monitoring, surveillance, and maintenance) of dam safety management at the Facility?	Alayne Hamilton, Environmental Projects Lead, TSF QP Coordinates the design, construction and overall management of the TSF along with the EOR as well as internal and external resources.
1.3	Who (name of person and title) is ultimately accountable to ensure that imminent or potential dam safety issues are addressed in a timely manner?	Amy Wilson, Resource Recovery Manager, MM
1.4	How are senior management and/or key personnel with ultimate accountability for dam safety kept informed of the status of dam safety issues at the Facility?	Update emails are sent to MM, department senior manager, environmental monitors, and other staff that complete routine/visual inspections after each dam inspection, with notes on items that warrant follow-up. General update reports are brought to the Board of Directors approximately twice per year. MM, and TSF QP reviews annual reports, including DSI, and other high priority reports prepared by EOR or other consultants.
1.5	Are the annual comprehensive inspections, documentations, and reporting for the Facility reviewed by senior management or executives?	They are reviewed by the MM, or alternate (Uli Wolf, General Manager). If priority items are identified during any inspection, meetings are held to discuss the issue and repair actions, and those items may be brought to the RDCK Board of Directors (see response to 1.7).

Que. No.	Question	Answer
1.6	What are the criteria for prioritizing the dam safety issues that should be addressed?	<p>The priority rankings the RDCK uses are based on the HSRC Guidance Document and are defined as follows:</p> <ol style="list-style-type: none"> <li>1. A high probability or actual dam safety issue considered immediately dangerous to life, health or the environment, or a significant regulatory concern.</li> <li>2. If not corrected, could likely result in dam safety issues leading to injury, environmental impact, or significant regulatory action; or a repetitive deficiency that demonstrates a systematic breakdown of procedures.</li> <li>3. Single occurrences of deficiencies or non-conformances that alone would not be expected to result in dam safety issues.</li> <li>4. Best Management Practice – further improvements are necessary to meet industry best practices or reduce potential risks.</li> </ol> <p>Prioritized items are outlined in the DSI (now Annual Facility Performance Report), which includes newly identified, completed, and outstanding prioritized issues.</p>
1.7	Is the decision-making process vetted by different levels of authority within RDCK?	<p>RDCK is developing a Delegated Authority Bylaw which includes the MM and TSF QP roles. For capital projects &gt;\$75k, decision making process comes from Board of Directors, then Senior Management, then Management as costs are lower. High priority dam safety items could fall under the Delegated Authority Bylaw. In the case of emergencies, these processes can be circumvented to immediately address any issues.</p>
1.8	Is there an organizational chart in the OMS Manual outlining lines of authority as well as roles and responsibilities? Does this chart include the names and contact information of the individuals occupying these roles?	<p>There is currently no org chart in the OMS, but there are clearly defined roles and responsibilities for each person, which includes names. Contact information for those positions is in the EPRP. An org chart will be added to the next OMS revision.</p>
1.9	Is there a list of existing deficiencies and non-conformances and a tracking system in place? If so, how often is it updated? Is this the main way to track deficiencies and non-conformances?	<p>Yes. It is currently updated annually as part of the DSI.</p>

Que. No.	Question	Answer
1.10	Are the performance tools and tracking measures audited regularly to confirm applicability and relevance? Who audits these?	Yes, the EOR.
1.11	How does RDCK intend to address any concerns or deficiencies noted during this dam safety review (in terms of prioritization, timeline, allocation of resources, etc.)?	<p>Staff would need to obtain Board direction at the draft report period for allocation of resources and additional funding, if the item is greater than \$75k or was not included in the approved Financial Plan.</p> <p>The RDCK will work to address concerns or deficiencies in a priority sequence, and will work through timelines and methodology with the EOR. The RDCK has limited internal staffing capacity, so if additional resources are needed to address issues in a timely manner, the Board would need to direct work plan adjustments, or the RDCK would need to bring on additional consultant support to assist.</p>
1.12	What specific actions have been undertaken at the Facility associated with public safety?	<p>The 2021/2022 works were completed to stabilize the dam and prevent tailings releases which is in an effort to improve public/environmental safety.</p> <p>Warning signs have been placed at both abutments, and downstream (d/s) of the dam. Boulder and jersey barrier walls were installed along the abutments. Trees were dropped across some offroad (ATV, snowmobile) access points to prevent public entry into the site. The EPRP is tested in some capacity each year (table top vs on site).</p>
1.13	Is there a staff training program for key individuals responsible for dam safety? How are the technical competencies evaluated? How are staff assessed? What department is responsible for tracking this training?	<p>There is not a formal training program specific to dam safety for MM or TSF QP.</p> <p>Staff have quarterly performance reviews.</p> <p>For staff that complete routine or visual inspections, the EOR developed a training presentation that staff had to attend or watch (recorded version). On site training is completed with new staff completing routine or visual inspections, with the TSF QP attending multiple inspections with the new person, until they show competence in completing the inspections on their own.</p>

Que. No.	Question	Answer
1.14	Does RDCK keep records of regular staff training? Is there an audit of how up to date the training is?	Yes, the HR department tracks completed formal training (emailed certificates etc); however, there is no audit of how up to date the certificates are.
1.15	Is there an Independent IGRB for the Facility? If so, how often does the IGRB meets? Is this a permanent group that will meet on a regular basis?	Yes, there is an ITRB. They meet internally several times a year based on referrals that need review, and with the RDCK (+/- the EOR) 1 or 2 times per year depending on scope of work for the year. This is a contracted semi-permanent group with contract expiry occurring in mid-2025, at which time the RDCK will need to consider issuing an RFP for those positions or using a direct award process to ensure knowledge of the group is retained through the active-care phase of closure. That decision will be made by the RDCK Board of Directors in early 2025.
<b>2. Operations, Maintenance, and Surveillance</b>		
2.1	Where are the OMS Manual and EPRP documents kept?	Hard copies at the site, in the RDCK head office at the front desk, in the MMs office, and at the RDCK Emergency Services office. Digital copies are also with the Province via email and MineSpace, with stakeholders, and with all RDCK staff involved in the facility.
2.2	How often are these documents reviewed, tested, or updated?	Annual updates (typically between March and June), or more frequently with major changes to the site. OMS and EPRP were updated fall 2022 on completion of construction and then spring 2023, and spring 2024. EPRP tests are completed annually. Usually it's a table top exercise but all duty officers and emergency services personnel were hosted at site in October 2023, and a facilitated full test scenario is planned for 2025 or 2026.
2.3	Who (name of person and title) is responsible for these documents to be updated and appropriately distributed?	Alayne Hamilton, Environmental Projects Lead, TSF QP
2.4	Do you have defined operating procedures for normal, unusual, flood, and/or emergency conditions at the Facility?	Yes - Normal, alert, emergency, and failure are outlined in the EPRP currently, which is in the process of being updated. The 2024 draft TARP in the OMS, which will be worked into the 2024 EPRP update, has stop light coloring system with acceptable (green), minor risk (yellow), moderate risk (orange) and high risk/emergency (red).

Que. No.	Question	Answer
2.5	Minimum freeboard criteria for the Facility provided in Table B of the OMS. Has the minimum freeboard been updated after the remediation and closure activities in 2021/2022?	Yes, the minimum freeboard was updated after construction was completed.
2.6	What are the procedures for inspecting the Facility after a major event such as flood, earthquake, or other situations with potential dam safety implications, unusual seepage, large and deep gullies, sloughing, etc.?	Complete a full routine dam inspection immediately after the event if post-seismic, or during and immediately after a flood event (forecast is monitored daily and precipitation triggers are in place) or any other situation that indicates a potential dam safety concern. The procedures for inspection with potential safety implications at the level described would be considered an emergency level within the EPRP, and the EPRP would be.
2.7	What are the triggers for invoking emergency procedures related to slumping, flood inflows, etc.? How are they monitored/measured?	<p>Pond level rises above the maximum operating level 709.5 m (less than 1.5 m freeboard), which would require a blockage in the spillway.</p> <p>New cracks continue to grow in length and width. (spraypaint or flagging to mark end points). Document and photograph.</p> <p>Headscarp (exposed area caused by a slump) on d/s face of dam. Document and photograph.</p> <p>Toe bulges are noted.</p> <p>Piezometer levels continue to rise.</p>
2.8	Routine maintenance is listed in Section 7.0 of the OMS Manual: Is there a maintenance reporting and tracking system in place?	A maintenance activity tracker is included in the OMS, and kept up to date throughout the year. If items are noted on the DSI, or any other inspection, it is included in the tracking table.

Que. No.	Question	Answer
2.9	Who (name of person and title) among the Facility staff are involved in surveillance activities?	<p>EOR (Peter Mikes, SRK Senior Principal Consultant) – annual inspections, site visits for needed repair works identified during surveillance activities.</p> <p>EOR (Peter Mikes, SRK Senior Principal Consultant), Amy Wilson (MM), Uli Wolf (Alternate MM), Alayne Hamilton (TSF QP) – review of inspection information and reports.</p> <p>Alayne Hamilton (TSF QP), Matt Morrison (Organics Coordinator), James Wilkinson (Lead Hand) – complete routine, visual, and event-driven inspections and receives/reviews inspection summaries.</p> <p>Dave Rowe (GIS Technician) – completes drone and hub surveys.</p> <p>Alayne Hamilton (TSF QP), Cam Rose (Compost Operator) – monitors site weather and forecasts.</p> <p>Environmental Monitoring (Ben Foulger, SLR Senior Environmental Scientist) – event driven environmental inspections.</p>
2.10	Inspections are listed in Section 8.1.1 of the OMS Manual: what is the frequency of visual inspections for the maintenance items? Specifically, are all the aspects inspected weekly? Who (name of person and title) completes these inspections, and how are they documented?	<p>2014-2019, visual inspections were completed by the site operator (Russ Archibald) which were document on a form, similar to the routine inspection form but without piezometer measurements. From 2020 to April 2024 routine inspections were completed by Alayne Hamilton (TSF QP), James Wilkinson (Lead Hand), Matt Morrison (Organics Coordinator) and Megan Deas (Resource Recovery Operations Supervisor) at a higher frequency than required in the OMS. Inspections are documented on forms that are included in the OMS appendices. The visual inspection requirement was dropped from the OMS in 2024.</p>

Que. No.	Question	Answer
2.11	Are you aware of any operational, maintenance, or surveillance issues on the Facility? Are you aware of any recurring issues on the Facility? If so, refer to the document that lists or describes these issues.	There are no operational issues. There are minor maintenance items that will be addressed in the fall of 2024, including clearing danger trees from along the site access road, and brushing the d/s face of the dam and the spillway. For surveillance, there have been several incorrect readings of the piezometers by some staff, which often requires that the TSF QP go out there immediately or the day after to confirm the reading. To correct this issue, the RDCK plans to install data loggers in the piezometers in 2025.
2.12	How often the site inspections are typically conducted at the Facility and by whom (name of person and title)?	Until spring 2024 (post-freshet) inspections were completed weekly, unless written approval was received from the MM or EOR to skip a week if conditions are favorable. Occasionally, during wet weather, inspections were completed more than once per week, due to precipitation triggers in the OMS. Routine inspections were completed more frequently than required due to trained staff being frequently available and on site, so additional piezometer readings were obtained when possible. In 2024, the inspection frequencies were updated to remove the visual inspection requirement, and reduce the routine inspections to once per month, except weekly during freshet or during a weather event. See response in 2.9 and 2.10 for names and positions of monitors.
2.13	Which areas/components are typically visited during the routine and annual site inspections?	Inspectors walk the same route each time, unless adding inspection of conveyance channels and energy dissipation structures which are further up TSF. Route includes starting at the E abutment, walking dam crest to W abutment, walking length of spillway from the inlet to the rip rap area, then down toe berm to seepage weir and stilling basin, back up to crest of toe berm, and walking to the E abutment to the parking area. The full downstream channel is walked once per year after freshet.
2.14	Has the annual formal site inspection been conducted for 2023?	Yes, in August 2023.

Que. No.	Question	Answer
2.15	Is the consequence classification of the dam redetermined annually as the minimum frequency of safety activities, as required by the Dam Safety Guidelines, Government of BC?	It is reviewed annually, but has been designated as no change since it was determined in 2014. The last Dam Break Analysis (DBA) (SRK 2018) included an analysis of a hypothetical failure of the preliminary design and concluded that the 'Very High' classification is appropriate.
<b>3. Emergency Management</b>		
3.1	When did RDCK last test its EPRP for the subject Facility, either as a desktop exercise or a full mock exercise? Is EPRP training provided to first responders?	<p>Last desktop test was December 2022 with the EOR, EM, RDCK Emergency Operations Center (EOC) staff, and RDCK management. A site tour with RDCK Emergency Program Personnel (duty officers, EOC directors, fire chiefs) was completed in October 2023 which involved discussing the response procedures on site, where materials are located, safe access/egress, zone without cell service, potential failure modes, locations to set up dewatering equipment (only action that can be completed without EOR direction).</p> <p>All RDCK staff that participate in the EOC, and therefore could be involved in the response, need to take Incident Command System Level 100, Emergency Operations Center Essentials, and a course specific to the section of the EOC that they will be working in.</p>
3.2	Overall, which site staff in the Facility are generally trained for the emergency response and emergency preparedness? Is testing the EPRP part of this training? Is someone trained on the emergency response procedures always available?	<p>Alayne Hamilton, Amy Wilson, and RDCK Emergency Program Personnel.</p> <p>The RDCK emergency management team (duty officers, EOC directors, fire chiefs) that would actually run the EOC in the event of an emergency are trained on site specific response procedures. The duty officers are on call 24/7. RDCK keeps a roster of other staff that are trained and available in the event of an EOC activation.</p>

Que. No.	Question	Answer
3.3	Has the EPRP been distributed to downstream stakeholders? Who are the major downstream stakeholders?	The EPRP has been distributed to MOTI staff, Ktunaxa Nation Council, Lower Similkameen Indian Band, Penticton Indian Band, Okanagan Nation Alliance, Shuswap Band, Upper Nicola Band, Okanagan Indian Band, the Ministry of Mines, and d/s property owners. Response procedures have been discussed with MOTI (shutting down the highway) but in the event of an emergency, that call would come through the RDCK's EOC team. There are no occupied residences in the inundation zone.
3.4	Has the emergency response system categorized emergencies into different levels (e.g. low, medium, high) to help prioritize resources and responses effectively?	The EPRP response flow chart (Figure 4.1) outlines call procedures and activations for an actual or suspected dam safety emergency. The EPRP currently has normal, alert, emergency and failure levels, but the EPRP is only activated for emergency and failure level events.
3.5	What communications systems are available if there is an emergency? Are there any warning systems in an emergency? How are the Facility personnel and downstream communities warned? Where is communication infrastructure located on site?	There is no communication system like sirens etc. MOTI and the d/s landowner (no occupied residence) would be contacted by phone. There is cell service in the majority of site. The RDCK has an app alert system for the emergency program that residents download to be notified of emergencies in their area. Residents that have registered their location as by the TSF would get a notification pushed to the cell phone, with details of the event.

Que. No.	Question	Answer
3.6	What is the chain of communication to be followed in the event of an emergency?	<p>In the event of an actual or suspected dam safety emergency, the situational observer will call the 24hr on-call duty officer. The Duty Officer briefs the EOC activation authority, and the EOC is activated. The EOC notifies Emergency Management and Climate Readiness BC of the actual or suspected dam safety emergency and obtains a task number for the event. The Duty Officer calls the EOR, TSF QP, MM, and Alternate MM, and subject matter experts, and can delegate additional call outs to incoming EOC staff. The Duty Officer initiates the on-site response following the incident command system. EOC staff will make call to Ministry of Mines Inspector and other contacts depending on severity. If there is an environmental component (tailings release), the Environmental Monitor and Ministry of Environment will be contacted.</p> <p>Depending on the type of emergency and the EOR directed repair actions, the EOC will take over making calls for pumps, equipment, materials, and contractors, security, food for responders, accommodations, etc. to initiate repairs.</p>
3.7	<p>Is there a list of all persons and agencies to be notified when a potential or imminent dam breach or flood emergency is declared?</p> <p>Are there any alternate contacts in event the primary is unavailable during an emergency?</p> <p>If a member of the public observes an emergency, how are they to notify staff?</p>	<p>Yes there is a contact list in the EPRP that is reviewed and updated annually. There are alternate contacts for EOR/SRK, RDCK staff, for materials suppliers (personal cell and business phone) with multiple companies listed. RDCK has an emergency hotline number in the event a member of the public observes the emergency. This phone number is posted on the RDCK's webpage and at the site entrance.</p>
3.8	How are stakeholders involved in developing the EPRP? How often do you meet with them to discuss, review, and test the plans?	<p>The EPRP is sent to First Nations annually, with a request to participate in the next test, but the RDCK has not had a response. Annually, the EPRP is shared with d/s stakeholders, EOC, ITRB and consultants – all are asked to provide feedback which is then worked into revisions.</p>

Que. No.	Question	Answer
3.9	Are there any measures in place to monitor forecasted/potential earthquakes, floods, or other extreme events? Is there a system established by which RDCK is notified of seismic activity in the area?	The TSF QP has Earthquake Alert app on a cell phone, set to notify of any magnitude 4 or above within 500 km of the site. There was an EQ felt locally in 2019 prior to the app system being in place. Weather (short and longterm forecast) is monitored daily through apps. If the forecast looks like the precipitation trigger could be exceeded, the environmental monitor is notified, and staff are tentatively scheduled to attend site for an inspection. Actual site precipitation is monitored by the compost facility operator via on site rain gauge, and a weather station.
3.10	How is the site accessed during an emergency? Is this information widely available? Does information about accessing the site cover darkness and extreme weather conditions?	There is a locked gate (all site staff and Duty Officers have keys), and only one trafficable route in/out of site. The EPRP doesn't specify night access or extreme weather but does outline the roads are best for 4x4 high-clearance vehicles. All Duty Officers have driven the route to the dam site.
3.11	What are the primary access and egress routes to be used by emergency response personnel? What options are available for emergency site access (including equipment access) should the primary access route become impassable?	There is only 1 route in/out for vehicles.
3.12	What is the EPRP timeline for first response?	There is no timeline outlined in the EPRP. The EPRP uses ICS principles. EOC expectations for staff on roster are that they will respond to the EOC in person in no more than 3 hours after the initial call. On call Duty Officers and fire personnel will be immediately available.
3.13	How often is the EPRP updated/revised?	Annually, if not more frequently (contact number updates etc).
<b>4. Instrumentations &amp; Monitoring</b>		
4.1	Are all existing instrumentations, including 5 piezometers, 12 survey hubs, and 1 seepage v-notch weir, functional currently?	Yes. They are all functioning. The hinge was broken on the P1/P2 piezometer casing but it has been repaired. The seepage weir require repair in 2023.

Que. No.	Question	Answer
4.2	How often are instruments read and recorded, and by whom?	Piezometers and weir are read at the frequency outlined in the OMS, which varies seasonally and dependent on weather or other factors (Earthquakes, other triggers), unless there is an exemption from the MM or EOR to skip a week if conditions are favorable. Survey hubs are meant to be annually (installed in 2022) but were not read in 2023 due to a scheduling communication error.
4.3	Have the piezometric readings been reported in tabular form and plotted on sections that show tip elevation, water level, and pond level at the time of reading?	They are reported in tabular form, that graphs the water level elevation vs time (single year on x axis) as compared to the trigger elevation. There are dam sections in the piezo data spreadsheet which show tip elevation, zone that is screened for each piezo, and approximate phreatic surface, but the section is not updated with each data point that is entered.
4.4	How often are the collected data analyzed and interpreted, and by whom?	At the frequency outlined in the OMS. The TSF QP reviews the data as soon as it is received. The data needs to be entered into the spreadsheet the same day as the inspection, and then the spreadsheet is shared with the MM or alternate, EOR, other staff that complete inspections, and the Environmental Monitor.
4.5	If an instrument cannot be read, what procedures are followed to verify if the instrument is damaged or otherwise unreliable?	We do not have any procedures in place for this. If a reading could not be obtained, the EOR would be notified, and further assessment and a solution would be discussed.
4.6	Are procedures and schedule for the reading of instruments and their replacement set by the EOR or alternatively by a qualified engineer?	The EOR sets the monitoring frequencies in the OMS. Replacement timelines have not been discussed.
4.7	Are there criteria established for the replacement of instruments that fail?	No.
4.8	Have the V-notch readings been reported in tabular form and plotted on sections that show volume of seepage and pond level at the time of reading?	V-notch weir readings are reported in tabular form, and graphed, but are not plotted on sections.

Que. No.	Question	Answer
4.9	Is there any instrument installed (e.g. a staff gauge) to measure the flow rate or water head over the spillway?	When the pond was still in place (prior to July 2021) there was a staff gauge in the pond that corresponded flow over the spillway. The data was graphed with the water level elevation vs time (single year), with the spillway inlet elevation and trigger level also graphed. Flow rate at the spillway inlet is measured quarterly using a Swoffer water velocity meter, using the transect method.
4.10	Have the survey hubs readings (horizontal and vertical displacements) been reported in tabular form and plotted on sections that show displacements and pond level at the time of reading? As well as the occurred extreme events?	They have not.
4.11	The 2022 DSI indicated that the instrumentation trigger levels will not result in dam instability but indicate that the levels are higher than expected (Yellow trigger for early warning to the EOR), and there is not a trigger associated with Orange (corrective action) or Red (emergency). What are the expectations for the Yellow trigger levels? How were the Yellow trigger levels established? What is the basis for selecting these trigger levels?	In Q1 2024, the EOR has developed a new trigger action response plan, which is now in the OMS and has green, yellow, orange and red triggers and actions. The expectation with the yellow trigger, if only a piezometer reading with no other signs of an actual or suspected dam safety emergency, was that the EOR was immediately notified, and the Duty Officers were notified that the trigger elevation was exceeded and to be on alert (no activation of EPRP, but just a notification). If there were other indications of an actual or suspected dam safety emergency, the EPRP would be activated. Triggers (old yellow only) were set on a stability analysis and FOS.
4.12	What FOSs were used to develop the trigger levels?	Post-seismic (1.5 2021/2022/2023, 1.2 in new draft TARP) and static (1.5)
4.13	What process is initiated if the trigger levels are exceeded?	See 4.11
4.14	How are the instruments protected against damage? What are the precautions to prevent instruments damage?	There are large boulders surrounding each piezometer, and a protective casing.
<b>5. Geotechnical Aspects</b>		

Que. No.	Question	Answer
5.1	The 2022 DSI report indicated that the dam crest was regraded with coarse material (crushed gravel) to repair the ruts along the dam crest. If the dam crest is regularly monitored for rutting and possible low-level areas?	Yes. It is visually assessed for settlement, and photographed from multiple locations (east abutment looking west, center point looking both directions, west abutment looking east) so that a comparison can be made if new settlement, ponding or ruts are noted. The RDCK has purchased a survey drone, and will be flying the site annually.
5.2	The 2022 DSI report indicated that no riprap is present on the side-slopes of the transition between the tailings cover drainage channels and the spillway and may be prone to erosion during flood events. If this area is monitored for erosion after flood events?	This was corrected in August 2023. A hydraulic analysis was completed to appropriately size the rip rap at the transition.
5.3	Has the slope stability analysis been assessed and updated for static and seismic loading conditions after the 2021 construction and the 2022 post-construction based on the as-constructed drawings? If so, have the calculated FOSs met the minimum FOS required by CDA Guidelines?	A stability analysis was completed in April 2024, which resulted in revised trigger levels being developed. The calculated FOS's for static and seismic loading meet the minimum FOS required by the Health, Safety and Reclamation Code and CDA guidelines.
5.4	Are the historical sloughed area and two sinkholes identified on the upstream face of the dam regularly monitored for any sign of depression? Has any depression been reported since 2012 when the sinkholes were found?	The slough area is visually assessed for signs of instability or new seepage. The upstream sinkholes were repaired in 2012. The former sinkholes were marked with a post in the ground, and the area was noted in the inspection form to be assessed. These were covered by the upstream beach in 2021/2022 construction and reference to the sinkholes was removed from the inspection forms.
5.5	Has any sign of cover erosion, tailings exposures, differential settlement, and water ponding been recently observed during the 2023/2024 routine inspections?	Most of the cover is not observed as part of the routine inspections. The upstream beach (tailings pond backfill) is monitored. There was minor initial settlement which ponds water during wet periods in this area that has remained unchanged. Monitoring procedures for these features are included in the 2024 revised OMS, and it will be completed by the EOR annually during the DSI inspection.

Que. No.	Question	Answer
5.6	The 2022 DSI indicated uplifted areas (water/air/tailing bubbles) in the channel liner formed immediately downstream of the riprap at the North and South Spur Channels as well as at the confluence of the Main Channel with the Spur Channels. Have the uplifted areas been recently inspected/monitored during the 2023/2024 routine site inspections? What remedial actions have been undertaken to address the uplifted areas?	There areas were repaired in August 2023. When the bubbles were popped at the start of repairs, it was air that escaped opposed to water or liquefied tailings. Recent monitoring indicates that the repairs have been successful and there is no additional air accumulating beneath the repair or surrounding liner areas.
5.7	Based on the previous site inspections, the crest and downstream slope of the expanded toe berm appear to be prone to surface erosion and surficial sloughing. What remedial actions have been conducted to avoid/reduce surface erosion and sloughing?	<p>Yes – there is a repair action recommended in the 2023 DSI, which includes digging a small swale across the road down to the term berm to direct surface flows away from the toe berm. This task is now completed.</p> <p>Getting vegetation to establish on the toe berm was difficult – it was hydroseeded in 2022, and then broadcast seeded twice in 2023. Spring 2024 inspection indicate increased vegetation establishment on the toe berm. The Facility’s Environmental Monitoring completes revegetation monitoring in late June. If recommendations are to apply more seed, the RDCK will implement that.</p>
5.8	The access road between the toe berm crest and the spillway shows signs of rutting from equipment trafficking, as per the 2020 DSI report. Has any resurfacing/repairing been undertaken in this area?	Yes. After the toe berm was raised in 2021, the road was resurfaced. It has since experienced some minor erosion channeling, which is on the site operators repair list for 2024.
5.9	What measures or devices are available to control the surface water flow in the dam crest and prevent overtopping? (internal drain, ditches, etc.)	Upstream beach directing water away from dam crest, swales on access roads, adequate freeboard, surface water conveyance channels, filter layer, grading of dam crest to slope upstream.
5.10	What management of vegetation occurs on the slopes of the embankment?	Brushing, seeding as needed. The brushing will be completed in 2024 after the bird nesting timing window is over. Seeding is completed on recommendation of the Environmental Monitoring, using the seed mix approved in the Mines Act permit.

Que. No.	Question	Answer
5.11	Have there been slumps or erosion on the slopes of the dam? Have there been any repairs or maintenance activities on the slopes?	Outside of the 2012 near failure event, there has been nothing of note. There is minor erosion rilling on the toe berm that occurred during extreme rain event prior to vegetation establishing. Through discussions with the environmental monitor, it was determined that track-packing and reseeding the slope would likely cause more damage, so only additional seed was applied. There was minor sloughing of the west side of the lower spillway (not on a slope of the dam) in April 2023, that was repaired in August 2023.
5.12	Has evidence of animal activity (burrows, blockages) been noted on or near the dam?	Yes. Pre-construction, there was some minor evidence of vole activity (small surficial burrows) near the east abutment (d/s slope) of the dam. Moth balls were placed near the burrows as a deterrent. After closure construction work there has been no evidence of burrowing animal activity on or near the dam. There is a colony of gophers at the nearby landfill (700 m away), so staff are monitoring for potential spread.
<b>6. Hydrotechnical Aspects</b>		
6.1	Are there any locations on the Facility where ponding water is an ongoing issue? How is ponding water addressed?	Yes, in the upstream beach area there are several small minor subsided areas that pond water. The recommendation from the EOR is that we wait until stability has been achieved, and then consider backfilling these.
6.2	Has erosion been observed in drainage channels present in the soil cover above the tailings?	No.

Que. No.	Question	Answer
6.3	What is the channel liners type and specifications?	The (trapezoidal) channels are lined with a smooth 40 mil LLDPE geosynthetic liner and covered with a sand protection layer that is overlain by turf-reinforcement matting (TRM). The objective of the TRM is to provide short-term erosion protection until vegetation is established in the channel. The channels were designed to convey the 1 in 200-year return period event with a typical 0.5 m base width, 3H:1V side slopes, and a minimum channel depth of 1.0 m. However, due to a higher-than expected water table within the tailings and to improve construction efficiency, the channel sizing was reduced to reduce the required excavation depth. A hydraulic analysis was undertaken to evaluate overland flow velocities for the smaller sized channels using typical excavation depths of 0.3 to 0.5 m.
6.4	Any of drainage channel liners out of alignment due to uplift?	Just the two locations by the energy dissipation structures on the east side of the tailings facility, but these bulges were successfully repaired in August 2023.
6.5	As per DSI 2022, no riprap is present on the side slopes of the transition between the tailings cover drainage channels and the spillway and may be prone to erosion during flood events. Has this been addressed?	See response to 5.2
6.6	What have been the most extreme conditions the operation has seen with respect to reservoir level and discharges? How frequently do extreme conditions occur?	The 2012 event was the most extreme. Freshet 2017 and 2018 had the highest measured reservoir levels. Since the pond was removed in 2021, there have been several “atmospheric river” events. Events in April 2023 (>50-75 mm in 24 hrs) and December 2023 (> 100 mm in 48 hrs) caused minor erosion damage to the site due to a lack of established vegetation after construction. The April event damaged a lower portion of the spillway which was repaired in August 2023. The site seems to experience one or two approximately 1:20 year rain events per year currently, with weather becoming increasingly extreme.

Que. No.	Question	Answer
6.7	What system is in place to monitor climatic conditions (i.e., rain gauge) that would alert the Facility personnel to increase monitoring frequency and/or enact unusual or flood scenario execution plans?	There is a rain gauge at the Compost Facility. The TSF QP monitors the short and long range forecasts to notify the EM, EOR and RDCK site staff if preparations should be made for additional inspections, if an event appears to be approaching. During a large event, radar feed is monitored to assess the severity of the impact at site. Rain gauge data is reported on as needed, to determine the exact precipitation amounts. Most often at site, rain on snow events are most problematic, so a weather station is currently being procured, and the draft OMS is being revised to address snow melt monitoring. The RDCK recently installed a weather station at the adjacent compost facility for more accurate weather information on site.
6.8	Has debris blockage ever occurred at the discharge facilities? If yes, when did the blockage occur? And what was the extent of the blockage?	No.
6.9	Has a hydraulic assessment been completed to determine the erosion protection requirements for the transition of coarse rock placed on the channel bottom to tie in the channel to the spillway, as recommended by the 2020 DSI?	Yes, it was completed in June 2023, and additional protection was added to that area in August 2023.
<b>7. Mechanical and Electrical Aspects</b>		
7.1	We understand that the Facility is a closed site; however, do you still need a power supply for the operation of any of its appurtenant structures? If so, is there a manual override, and what backup power sources are available in case of emergency?	There is no power to the facility. The closest power connection that the RDCK has access to is at the adjacent compost facility (780 m away from east abutment).
7.2	Are there any mechanical and/or electrical components still functional at this site?	No.
<b>8. Structural Aspects</b>		
8.1	Are there any concrete structures or components that convey or control flow, such as diversion swales/canals, culverts, etc.? If so, what is the inspection process for concrete structures?	There is one buried decant culvert that has been filled with concrete, as part of the 2005 closure works. It was previously inspected with the routine and visual inspections, but was buried when the toe berm was raised in 2021.

## APPENDIX G

### INSTRUMENTATION AND MONITORING

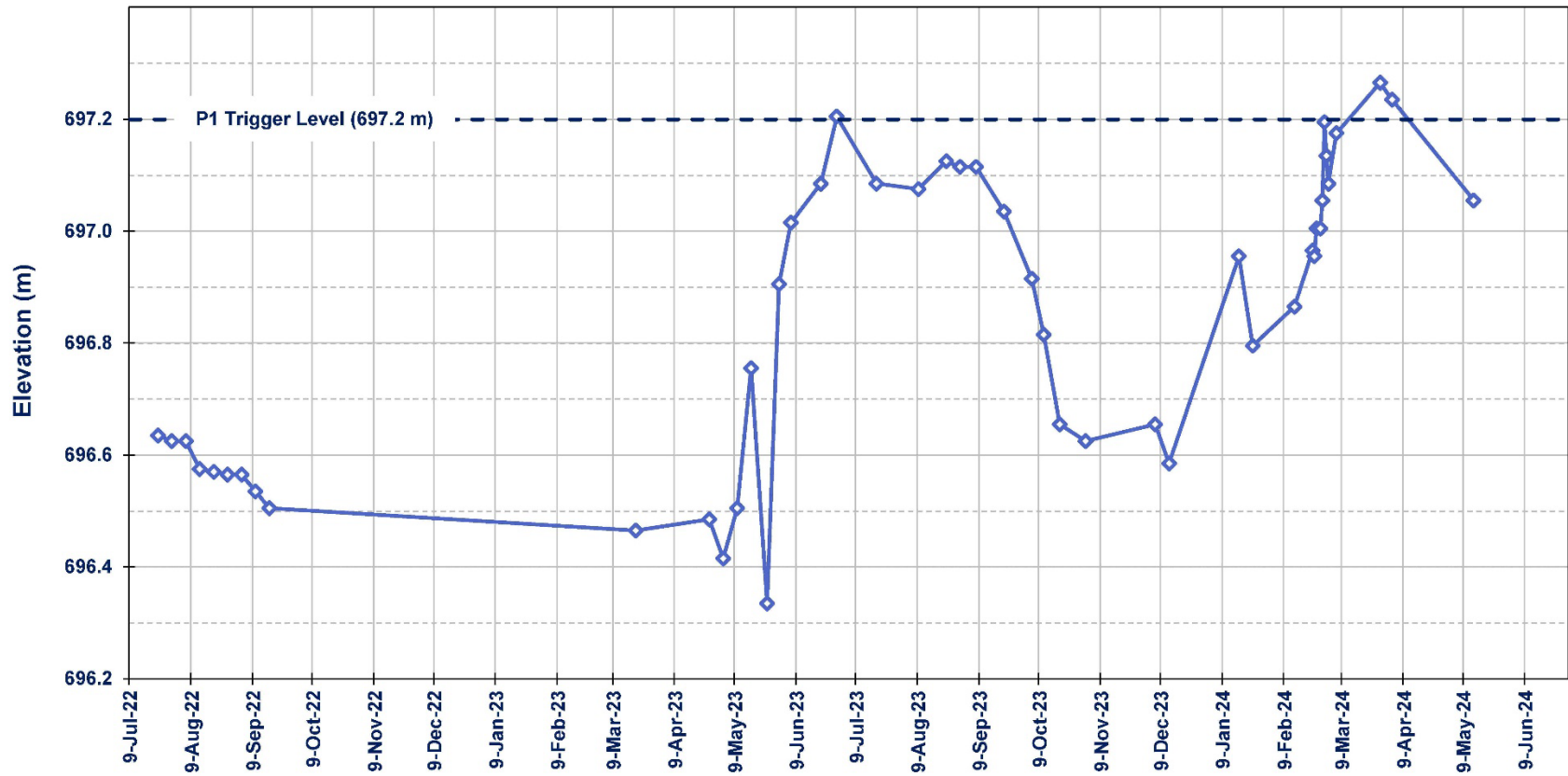


Figure G.1: Water Level Fluctuations in Piezometer P1 Over Past Two Years (July 2022 – June 2024)

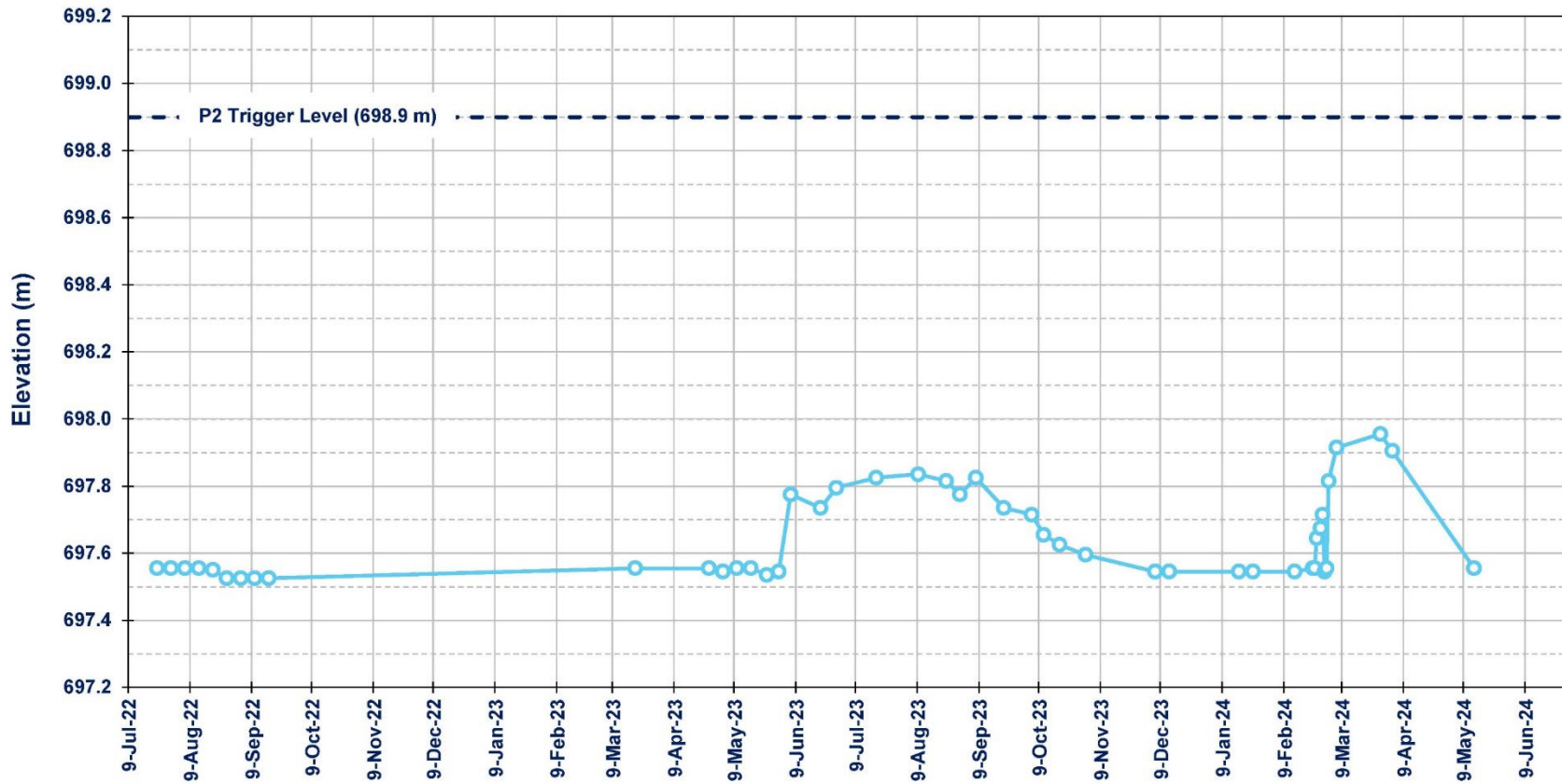


Figure G.2: Water Level Fluctuations in Piezometer P2 Over Past Two Years (July 2022 – June 2024)

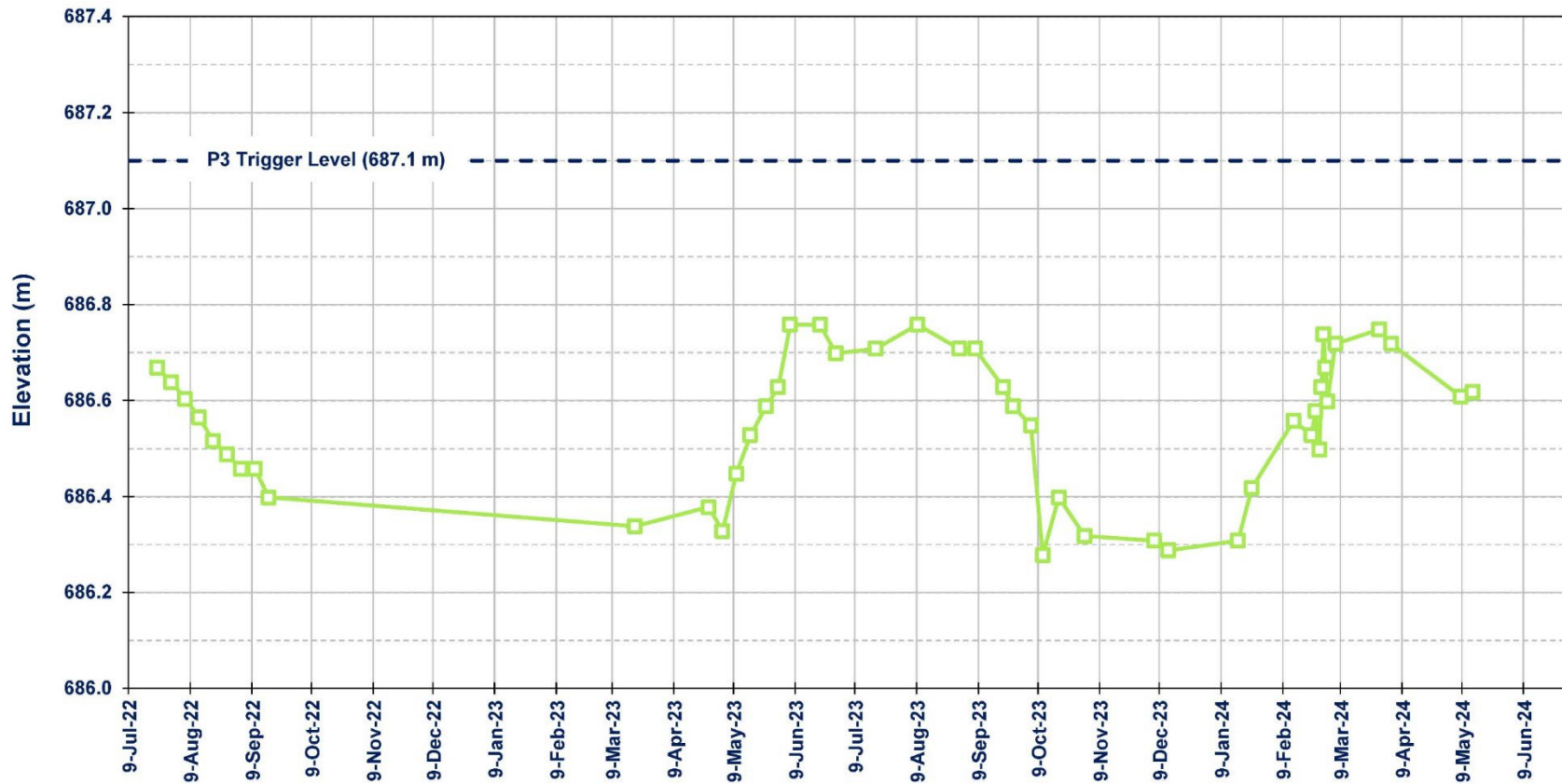


Figure G.3: Water Level Fluctuations in Piezometer P3 Over Past Two Years (July 2022 – June 2024)

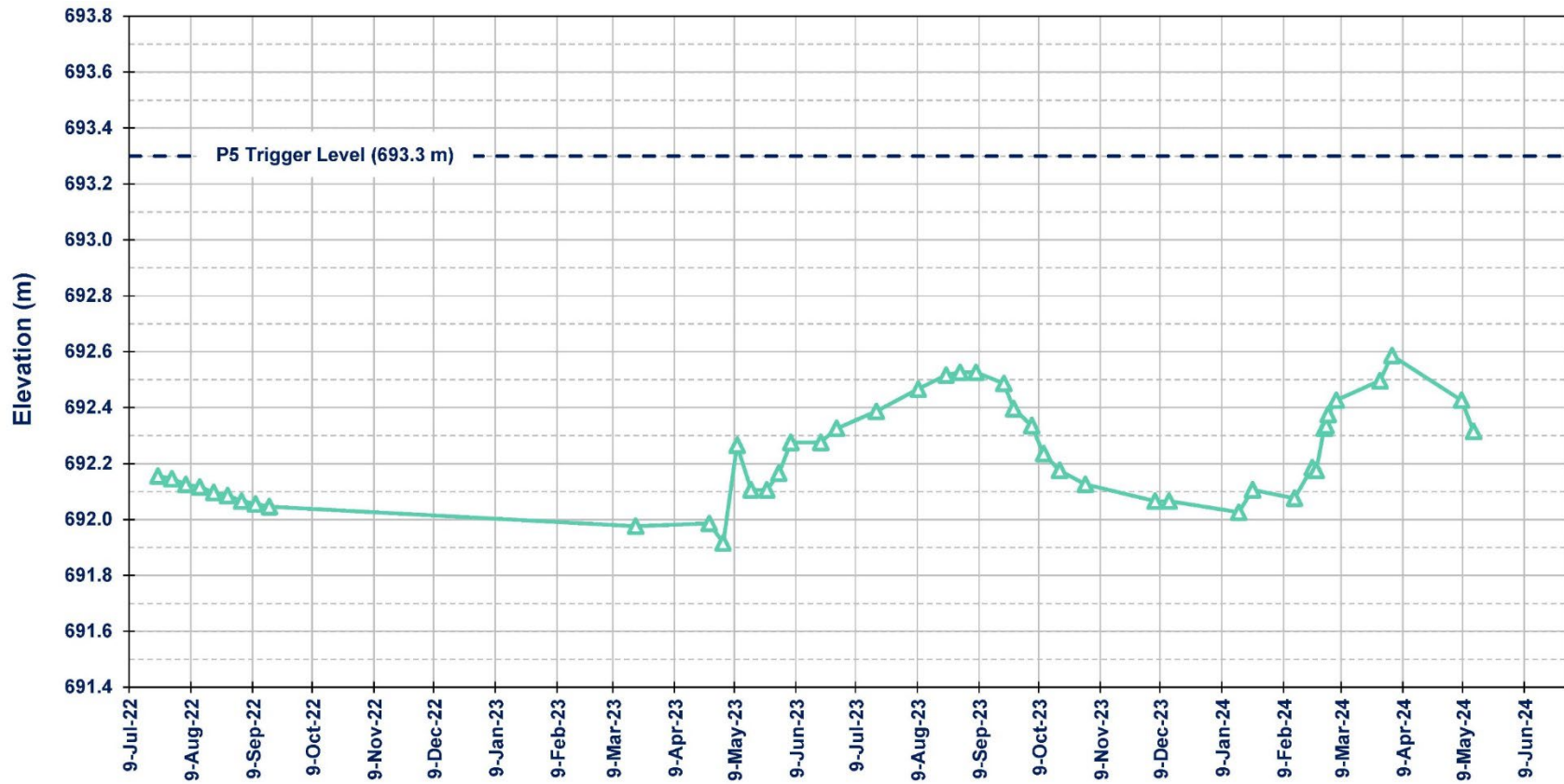


Figure G.4: Water Level Fluctuations in Piezometer P5 Over Past Two Years (July 2022 – June 2024)

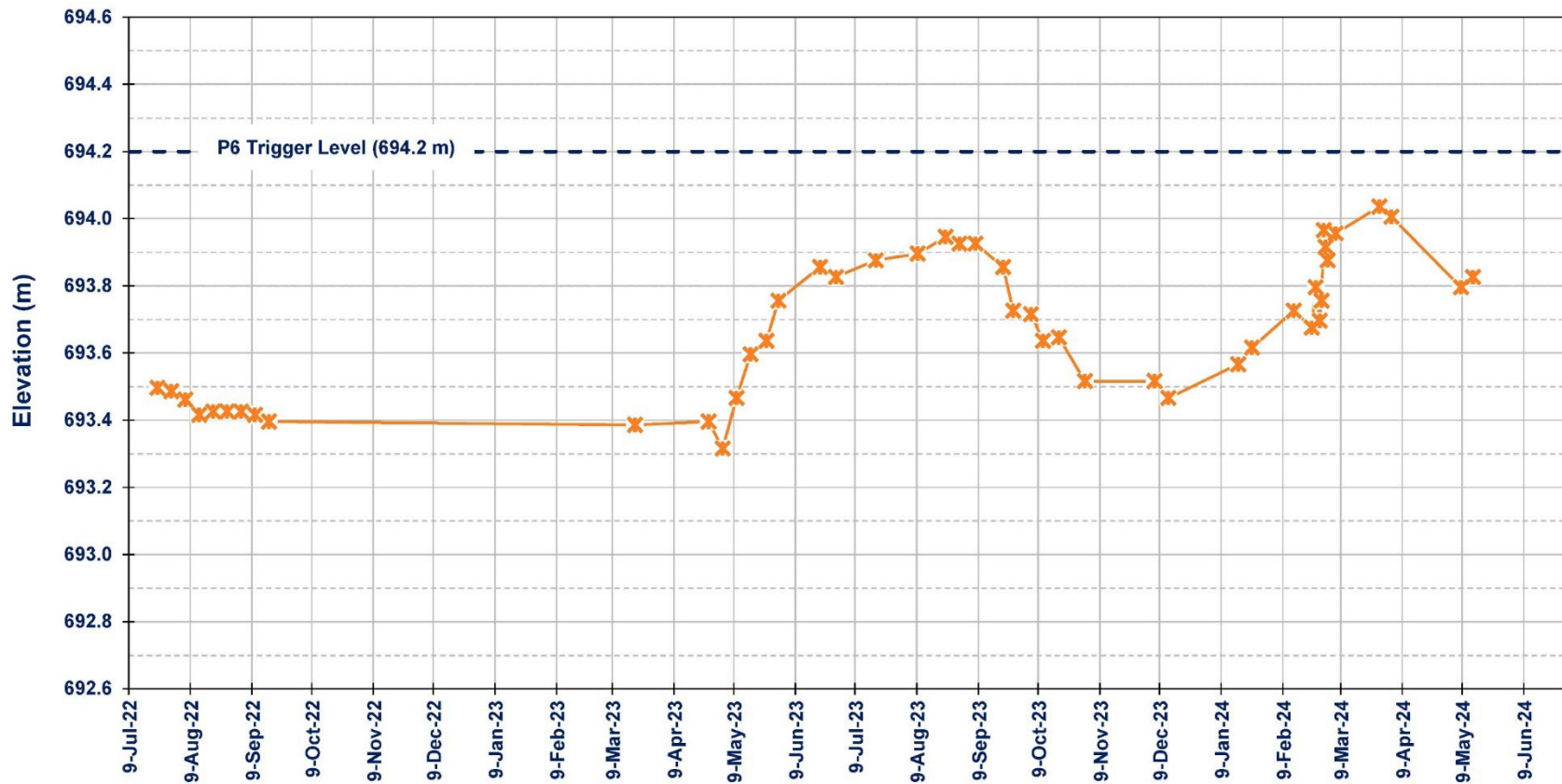


Figure G.5: Water Level Fluctuations in Piezometer P6 Over Past Two Years (July 2022 – June 2024)

## APPENDIX H

### TETRA TECH'S LIMITATION ON THE USE OF THIS DOCUMENT

# LIMITATIONS ON USE OF THIS DOCUMENT

## DAM SAFETY REVIEW REPORT

### 1.1 USE OF DOCUMENT AND OWNERSHIP

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### 1.3 STANDARD OF CARE

Services performed by TETRA TECH for the Professional Document have been conducted in accordance with the Contract, in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions in the jurisdiction in which the services are provided. The content of this report represents the best judgment of TETRA TECH based on the available information. The observations, conclusions, and recommendations developed for this report are deemed to be valid as of the date of the site inspection. If any conditions change (e.g., loading, reservoir level, etc.), however, the dam performance may be altered and a reassessment is required. No warranty or guarantee, express or implied, is made concerning the test results, comments, recommendations, or any other portion of the Professional Document.

If any error or omission is detected by the Client or an Authorized Party, the error or omission must be immediately brought to the attention of TETRA TECH.

### 1.4 DISCLOSURE OF INFORMATION BY CLIENT

The Client acknowledges that it has fully cooperated with TETRA TECH with respect to the provision of all available information on the past, present, and proposed conditions on the site, including historical information respecting the use of the site. The Client further acknowledges that in order for TETRA TECH to properly provide the services contracted for in the Contract, TETRA TECH has relied upon the Client with respect to both the full disclosure and accuracy of any such information.

### 1.5 INFORMATION PROVIDED TO TETRA TECH BY OTHERS

During the performance of the work and the preparation of this Professional Document, TETRA TECH may have relied on information provided by third parties other than the Client.

While TETRA TECH endeavours to verify the accuracy of such information, TETRA TECH accepts no responsibility for the accuracy or the reliability of such information even where inaccurate or unreliable information impacts any recommendations, design or other deliverables and causes the Client or an Authorized Party loss or damage.

### 1.6 GENERAL LIMITATIONS OF DOCUMENT

This Professional Document is based solely on the conditions presented and the data available to TETRA TECH at the time the data were collected in the field or gathered from available databases.

The Professional Document is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation from the site conditions present, or variation in assumed conditions which might form the basis of design or recommendations as outlined in this document, at or on the development proposed as of the date of the Professional Document requires a supplementary exploration, investigation, and assessment.

TETRA TECH is neither qualified to, nor is it making, any recommendations with respect to the purchase, sale, investment or development of the property, the decisions on which are the sole responsibility of the Client.

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### 1.7 ENVIRONMENTAL AND REGULATORY ISSUES

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Unless stipulated in the report, TETRA TECH has not been retained to explore, address or consider and has not explored, addressed or considered any environmental or regulatory issues associated with development on the subject site.

### 1.8 NATURE AND EXACTNESS OF SOIL AND ROCK DESCRIPTIONS

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Classification and identification of soils and rocks are based upon commonly accepted systems, methods and standards employed in professional geotechnical practice. This report contains descriptions of the systems and methods used. Where deviations from the system or method prevail, they are specifically mentioned.

Classification and identification of geological units are judgmental in nature as to both type and condition. TETRA TECH does not warrant conditions represented herein as exact, but infers accuracy only to the extent that is common in practice.

Where subsurface conditions encountered during development are different from those described in this report, qualified geotechnical personnel should revisit the site and review recommendations in light of the actual conditions encountered.

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### 1.9 APPLICABLE CODES, STANDARDS, GUIDELINES & BEST PRACTICE

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This document has been prepared based on the applicable codes, standards, guidelines or best practice as identified in the report. Some mandated codes, standards and guidelines (such as Canadian Dam Association's Dam Safety Guidelines, ASTM, AASHTO Bridge Design/Construction Codes, Canadian Highway Bridge Design Code, National/Provincial Building Codes) are routinely updated and corrections made. TETRA TECH cannot predict nor be held liable for any such future changes, amendments, errors or omissions in these documents that may have a bearing on the assessment, design or analyses included in this report.