Klohn Crippen Berger

Teck Highland Valley Copper Partnership

2022 Annual Facility Performance Report

Trojan Tailings Storage Facility

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March 2023

Klohn Crippen Berger

March 13, 2023

Teck Highland Valley Copper Partnership
PO Box 1500
Logan Lake, British Columbia
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Mr. Bryan Bale, P.Eng.
Chief Engineer, Tailings

Dear Mr. Bale:

2022 Annual Facility Performance Report
Trojan Tailings Storage Facility

We are pleased to submit the final Trojan Tailings Storage Facility 2022 Annual Facility Performance Report. The review period for this document is from October 2021 through September 2022.

Yours truly,

KLOHN CRIPPEN BERGER LTD.

Rick Friedel, P.Eng.
Engineer of Record, Representative
Senior Geotechnical Engineer, Principal

RF/NS:cd/jc

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Teck Highland Valley Copper Partnership

2022 Annual Facility Performance Report

Trojan Tailings Storage Facility

EXECUTIVE SUMMARY

Klohn Crippen Berger Ltd. (KCB) was engaged by Teck Highland Valley Copper Partnership (HVC) to complete the 2022 Annual Facility Performance Report (AFPR) of the Trojan Tailings Storage Facility (TSF). The review period of this AFPR is from October 2021 through September 2022.

The Trojan TSF is located on the Highland Valley Copper Mine Site (HVC Mine Site) 4 km north of the operating Highland Mill. This facility was built in 1973, operated until 1989, and was subsequently reclaimed. The Trojan TSF is maintained by HVC and is considered to be in the Closure – Active Care Phase based on the Canadian Dam Association definition[1].

The Trojan TSF Structures

This review covers the following structures that comprise the Trojan TSF:

- Trojan Dam – comprises a rockfill starter dam, which is approximately half the height of the dam. Above the starter dam, the dam was raised in an upstream manner with cycloned sand.
- R4 Seepage Pond – located downstream from Trojan Dam, this facility collects seepage from the toe of the Trojan Dam.
- Lower Trojan Pond – this facility collects local runoff and outflows from the R3 Seepage Pond (Bethlehem No. 1 TSF) and from the R4 Seepage Pond.

The Trojan TSF has been inactive for more than 30 years. The surface of the dam has been reclaimed, and the pond level has been lowered. No significant dam safety incidents occurred at the facility during operations or since reclamation. In the current configuration, the piezometric levels and gradients through the tailings and starter dam fill are lower than during operations, which increases the factor of safety against slope failure and internal erosion.

During the review period, the following key roles, according to the definitions in the Health Safety and Reclamation Code for Mines in B.C. (HSRC[2]), were filled as follows:

- Mr. Bryan Bale, P.Eng. (HVC Chief Engineer – Tailings), acted in the role of TSF qualified person (QP); and
- Mr. Rick Friedel, P.Eng., was the engineer of record (EoR), as a representative of KCB.

Activity During the Review Period

During the review period, the Trojan TSF was maintained within the design basis and conditions assumed for the approved design.

[1]CDA. 2019. "Technical Bulletin – Application of Dam Safety Guidelines to Mining Dams." 2014 ed. Updated 2019.
[2] EMLCI. 2021b. "Health, Safety and Reclamation Code for Mines in British Columbia, Revised." February.

Other than routine maintenance activities, as defined in the Operations, Maintenance and Surveillance (OMS) Manual[3], there were no major repairs or construction activities completed during the review period.

November Regional Flooding

In November 2021, a combination of rainfall and early season snowmelt led to significant regional flooding and damage to public and private infrastructure, which impacted communities near the HVC Mine Site. The magnitude of the event was less at the HVC Mine Site and had no effect on the Trojan TSF. Regardless, HVC responded as they would have during any event-driven flood on site, which included increased frequency of inspections, pond level monitoring, and reporting.

The Trojan TSF is designed to manage the Probable Maximum Flood (PMF) event, which is significantly greater than the regional flooding that occurred in November 2021.

Governance and Surveillance

The OMS Manual, including the Emergency Preparedness and Response Plan (EPRP), was reviewed and updated during the review period and is suitable for the facility. The Trojan TSF surveillance program, described in the OMS Manual, is appropriate for an inactive, reclaimed tailings facility.

During the review period, routine surveillance activities were completed as per the OMS Manual. This included addressing recommendations from the 2021 AFPR.

The most recent dam safety review (DSR) of the Trojan TSF was completed in 2018. The only outstanding recommendation from the DSR pertains to Lower Trojan Pond flood routing, which is discussed below and captured by LTD-2017-01 in Table 1. The next DSR is scheduled for 2023 to meet the requirements of the HSRC.

Trojan TSF Performance

The facility performance during the review period was consistent with historic performance; no issues of dam safety concern or unacceptable performance were identified. As the facility is inactive, changes in the conditions at the facility throughout the year, or on an annual basis, are primarily driven by variations in climate. KCB made the following key observations regarding the performance of the Trojan TSF during the review period:

- Existing design and management controls are in place and are performing as intended based on measured performance.
- All piezometers are measuring levels below those assumed in design analyses and are consistent with acceptable performance. KCB recommended that HVC investigate whether a piezometer (P86-1) is plugged. The instrument has shown a moderate rise (1.1 m) since 2019, which is not consistent with recent investigations or other piezometers in the area.

[3] HVC. 2022. “Bethlehem and Trojan Tailings Storage Facility Operation, Maintenance and Surveillance (OMS) Manual.” June.

- Horizontal deformation trends are consistent with expected performance based on survey monuments.
- Visual inspections by the HVC dam inspector, the EoR, and others working in the area did not identify any indications of unacceptable behaviour at the dam.
- Pond levels and seasonal fluctuation were similar to historic trends, but the typical pond rise that occurs during freshet extended later in the year than typical due to the above-average rains in June and July.
- The peak measured pond level was 6.5 m below the dam crest, 1.8 m below the spillway invert, and separated from the dam crest by a tailings beach more than 200 m wide. This is consistent with expected conditions and well above the minimum required in design.

Design Basis and Failure Mode Reviews

A review by HVC and KCB concluded there had been no significant change to conditions (e.g., infrastructure, land use) downstream of the Trojan TSF during the review period.

HVC and KCB reviewed the current IDF and earthquake design ground motion (EDGM) for each of the Trojan TSF facilities to confirm they meet or exceed the equivalent requirements under the HSRC.

Potential failure modes for the Trojan TSF were also reviewed by HVC and KCB during the review period based on available information and existing controls. The review concluded that potential failure modes are being managed appropriately.

At the request of HVC, the AFPR does not include any reference to a consequence classification for the Trojan TSF facilities. Consequence classification is not part of HVC's tailings management governance and stewardship because there are components of that system that do not align with HVC's safety culture. HVC's internal governance has been developed to meet or exceed requirements under the HSRC.

Flood Routing

Flood-routing assessments for both the Trojan TSF and R4 Seepage Pond were updated during the review period, based on the most recent site-wide hydrology. The analysis confirmed that the R4 Seepage Pond can route the 100-year return period flood, which meets the IDF requirements under the HSRC, and the Trojan TSF can route the PMF, which exceeds the IDF requirements under the HSRC.

Based on flood routing, the Lower Trojan Pond requires additional flood management upgrades to route the IDF requirements under the HSRC (100-year return period). Since the most recent upgrade was completed (~32 years ago), the Lower Trojan Pond has managed flood and freshet events without a reported overtopping concern. This includes a 66 mm rainfall event during May 2011, which is equivalent in magnitude to a 100-year return period (rain only) event.

HVC have discussed decommissioning requirements with regulators which would remove any flood-related hazards, as well as providing other benefits. HVC maintains remote monitoring of the Lower

Trojan Pond level to notify them if pond level thresholds, defined in the OMS Manual, are exceed so additional controls can be implemented (e.g., increasing monitoring, deploying pumps).

Recommendations

Dam safety recommendations identified during past AFPRs, and their current status, are summarized in Table 1. During the review period, two of three AFPR recommendations were closed (Table 1, shown in *italics*) and one of the outstanding recommendations from the 2018 DSR was also closed. The only outstanding recommendation from previous AFPRs and the DSR pertain to flood routing at the Lower Trojan Pond.

Five new recommendations were identified during the 2022 AFPR (Table 2). None represents a dam safety concern at the facility. Two are related to reducing uncertainty related to design controls. One is related to documenting a modification to minimum beach widths under PMF flood conditions. The remaining two are related to good practice activities related to surveillance.

Table 1 Previous AFPR Recommendations Related to Facility Performance – Status Update

ID No.	Performance Area	Recommended Action	Priority[1]	Deadline (Status)
Trojan Dam				
TD-2021-01	*Maintenance*	*Complete a test to confirm whether P86-3 is plugged and, if so, remove it from routine monitoring and report it as defunct.*	*3*	*CLOSED*
TD-2021-02	*Governance*	*Prioritize inclusion of the piezometers installed in 2019 into routine monitoring activities, as per the OMS Manual, to obtain full value from the existing instrumentation.*	*3*	*CLOSED*
Lower Trojan Dam				
LTD-2017-01	Flood Management	Complete appropriate upgrade works to allow the Lower Trojan Pond to safely pass IDF with adequate freeboard, including decommissioning of the spillway pipe.	2	2022 (Open; HVC is discussing decommissioning requirements with the regulator)

Notes:
1. Recommendation priority guidelines, specified by HVC and assigned by KCB:
   Priority 1: A high probability or actual dam safety issue considered immediately dangerous to life, health ,or the environment, or a significant risk of regulatory enforcement.
   Priority 2: If not corrected, could likely result in dam safety issues leading to injury, environmental impact, or significant regulatory enforcement, or a repetitive deficiency that demonstrates a systematic breakdown of procedures.
   Priority 3: Single occurrences of deficiencies or non-conformances that alone would not be expected to result in dam safety issues.
   Priority 4: Best Management Practice – Further improvements are necessary to meet industry best practices or reduce potential risks.

Table 2 2022 AFPR Recommendations Related to Facility Performance

ID No.	Performance Area	Recommended Action	Priority[1]	Deadline (Status)
Trojan Dam				
TD-2022-01	Site Investigation	Complete investigations and install piezometers below the downstream slope, near the west abutment, as a direct measure to confirm key design assumption.	3	Q1 2024
TD-2022-02	Governance	Complete a review of available historic records to confirm whether any information is present that would help reduce remaining uncertainty related to decommissioning the culvert below the starter dam.	4	Q1 2024
TD-2022-03	Design Review	Complete a review of the technical basis for minimum beach width performance criteria under peak PMF flood level based on existing condition.	3	Q4 2023
TD-2022-04	Maintenance	Investigate whether P86-1 and P95-4 (piezometers installed in cycloned sand beach) are plugged.	4	Q4 2023
R4 Seepage Pond				
R4-2022-01	Governance	Add the inspection frequency to the OMS Manual with the first one to be completed by end of 2024.	4	Q4 2023

Notes: Refer to Table 1 notes.

TABLE OF CONTENTS

EXECUTIVE SUMMARY I
CLARIFICATIONS REGARDING THIS REPORT IX
1 INTRODUCTION 1
2 FACILITY DESCRIPTION 3
3 ACTIVITIES DURING THE REVIEW PERIOD 7
4 WATER MANAGEMENT 8
4.1 Overview 8
4.2 Climate 8
4.3 Water Balance 11
4.4 Flood Management 13
5 REVIEW OF MONITORING RECORDS AND DOCUMENTS 15
5.1 Monitoring Plan 15
5.2 Pond Levels and Freeboard 17
5.3 Piezometers 18
5.4 Survey Monuments 20
5.5 Inclinometers 20
5.6 Seepage Weir Flows 21
5.7 Water Quality 21
6 VISUAL OBSERVATIONS AND PHOTOGRAPHS 22
7 ASSESSMENT OF DAM SAFETY 23
7.1 Review of Potential Downstream Consequences 23
7.2 Failure Mode Review 23
7.2.1 Trojan Dam 23
7.2.2 R4 Seepage Pond 25
7.2.3 Lower Trojan Pond 25
7.3 Status of 2018 Dam Safety Review (DSR) Recommendations 25
7.4 Emergency Preparedness and Response Plan (EPRP) 26
8 SUMMARY 27
9 CLOSING 29
REFERENCES 30

TABLE OF CONTENTS
(continued)

List of Tables

Table 1.1 Trojan TSF Retaining Structures 1
Table 2.1 Summary of Approximate Dam Geometry 4
Table 4.1 Monthly Precipitation for the Review Period (Oct. 2021 to Sept. 2022) 9
Table 4.2 Inflow Design Flood Requirements for the Trojan TSF and Supplementary Structures 14
Table 5.1 Surveillance Requirements from the OMS Manual (HVC 2022) and Activities Completed During the Review Period 16
Table 5.2 Trojan TSF Change in Pond Level 17
Table 5.3 Minimum Freeboard at the Trojan TSF, R4 Seepage Pond, and Lower Trojan Pond 18
Table 8.1 Previous Recommendations Related to Facility Performance – Status Update 27
Table 8.2 2022 AFPR Recommendations Related to Facility Performance 28

List of In-Text Figures

Figure 2.1 Typical Cross Section of the Trojan Dam 5
Figure 2.2 Typical Cross Section of the R4 Seepage Pond Dam (KC 2005) 6
Figure 2.3 Typical Cross Section of the Lower Trojan Dam (KC 2005) 6
Figure 4.1 Monthly Precipitation 10
Figure 4.2 Temperature Records and Measured Snowpack Between January and June 2022 11
Figure 4.3 Trojan Pond Volumes – 2017 to 2022 12
Figure 4.4 Beach Width at Peak PMF 24-Hour Flood Level 13
Figure 5.1 Trojan Pond Water Elevations – 2017 to 2022 17

List of Figures

Figure 1 Mine Site – Plan
Figure 2 Trojan Tailings Storage Facility – Overview
Figure 3 Trojan Dam – Plan
Figure 4 R4 Seepage Pond Dam – Plan
Figure 5 Lower Trojan Dam – Plan
Figure 6 Flow Schematic for Bethlehem No. 1 and Trojan Tailings Storage Facilities
Figure 7 Trojan Dam Piezometric Data Years 2009 to 2022 – Impoundment
Figure 8 Trojan Dam Piezometric Data Years 2009 to 2022 – Crest
Figure 9 Trojan Dam Piezometric Data Years 2009 to 2022 – Downstream Slope

TABLE OF CONTENTS
(continued)

Figure 10 Trojan Dam Survey Monument Readings
Figure 11 Inclinometer Displacement Profile – IB16-2
Figure 12 Trojan Dam Instrumentation Sections A and B
Figure 13 R4 Seepage Pond Weir Flows
Figure 14 Lower Trojan Dam Weir Flows

List of Appendices

Appendix I Annual Facility Performance Report – Site Visit Checklist, Observations, and Photographs

CLARIFICATIONS REGARDING THIS REPORT

This report is an instrument of service of Klohn Crippen Berger (KCB). The report has been prepared for the use of Teck highland Valley Copper Partnership (Client) for the specific application to the 2022 Dam Safety Support Project, and may be published or disclosed by the Client to the BC Ministry of Energy, Mines, and Low Carbon Innovation.

KCB has prepared this report in a manner consistent with the level of care, skill and diligence ordinarily provided by members of the same profession for projects of a similar nature at the time and place the services were rendered; however, the use of this report will be at the user's sole risk absolutely and in all respects, and KCB makes no warranty, express or implied. This report may not be relied upon by any person other than the Client or BC Ministry of Energy, Mines, and Low Carbon Innovation without KCB's written consent.

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

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

1 INTRODUCTION

Klohn Crippen Berger Ltd. (KCB) was engaged by Teck Highland Valley Copper Partnership (HVC) to complete the 2022 Annual Facility Performance Report (AFPR) for the Trojan Tailings Storage Facility (TSF). The AFPR review period is from October 2021 through September 2022.

The Trojan TSF is located on the Highland Valley Copper Mine Site (HVC Mine Site); refer to Figure 1. This facility was built in 1973 and operated until 1989 as part of the now inactive Bethlehem Mine; it has subsequently been reclaimed. Table 1.1 summarizes the Trojan TSF structures and their functions. Refer to Figure 2 for the Trojan TSF layout.

Table 1.1 Trojan TSF Retaining Structures

Structure	Function
Trojan Dam	Cross-valley dam that retains tailings in the Trojan TSF
R4 Seepage Pond Dam	Collects local runoff and seepage from the Trojan Dam
Lower Trojan Dam	Collects local surface runoff and flows from the R4 Seepage Pond and R3 Seepage Pond

HVC continues ongoing surveillance of the Trojan TSF, including instrumentation monitoring, environmental sampling, visual inspections, and maintenance activities. Under this level of site presence, the Trojan TSF is considered to be in the Closure – Active Care Phase based on the Canadian Dam Association definitions (CDA 2019).

During the review period, Mr. Bryan Bale, P.Eng. (HVC Chief Engineer – Tailings), acted in the role of the TSF qualified person (QP), and Mr. Rick Friedel, P.Eng., was the engineer of record (EoR), as a representative of KCB. These roles are consistent with the definitions in the Health, Safety and Reclamation Code for Mines in British Columbia (HSRC) (EMCLI 2021b).

The Annual Facility Performance Report scope of work consisted of:

- site visit to observe the physical conditions of the various containment facilities;
- review of surveillance data for the review period, provided by HVC;
- review of climate and water balance data for the site;
- review of the Operations, Maintenance and Surveillance (OMS) Manual and Emergency Preparedness and Response Plan (EPRP) to confirm they are appropriate for the existing facility; and
- review of construction activities completed at the site during the review period, if any.

The AFPR site visit to the Trojan TSF was completed by KCB representatives Mr. Friedel (EoR) and Ms. Cheryl Torres, Civil Consultant, on July 14, 2022. Mr. Aaron Sangha, P.Eng. (HVC Senior Dam Safety Engineer), also participated in the inspection.

The Bethlehem Mine, including the Trojan TSF, was operated under Permit M-11 issued by the Ministry of Energy, Mines and Petroleum Resources (EMPR) in January 1970. In July 1998, the mining permits for the Highmont Mine, the Lornex Mine, and the Bethlehem Mine were amalgamated under the M-11 Permit (EMPR 2019). The most recent version of the permit was issued in 2021 (EMLCI 2021a).

The water discharge quantity and quality from the Trojan TSF are regulated under Permit PE-376 (MECCS 2022). Other pertinent permits include water licences C1311299 (BC 2014), and C114183 (BC 2002).

2 FACILITY DESCRIPTION

The HVC Mine Site is located near Logan Lake, approximately 45 km south of Kamloops, in the British Columbia Interior. The Trojan TSF is located 4 km north of the operating Highland Mill, immediately west of the Bethlehem TSF; refer to Figures 1 and 2. The facility was operated from 1973 to 1989 and contains an estimated 26 Mm^3 of tailings (HVC 2022). Under existing conditions, a pond is present on the upstream (north) side of the impoundment, separated from the dam crest by the vegetated tailings beach. Layouts of the structures are shown on Figure 3 to Figure 5. Typical geometry and key dimensions of the dam are summarized in Table 2.1, and summaries of the structures are as follows:

Trojan Dam

- The Trojan Dam (Figure 2.1) comprises a pervious rockfill starter dam, which was completed in 1981 to El. 1414 m, that is underlain by a drainage layer to maintain low piezometric and saturation levels in the upstream cycloned sand beach. The upstream slope of the starter dam has a sand-and-gravel filter zone to prevent the finer tailings particles from being washed through the dam with seepage (KL 1982). These zones are separated by a finer rockfill transition zone for filter compatibility.
- Above the starter dam, the crest was raised in an upstream manner with cycloned sand spigotted from the beach. The design specified minimum beach widths under normal operating (150 m) and temporary flood (100 m) conditions, measured from the downstream edge of the crest (KL 1987). Under existing conditions, at a normal range of pond levels, the minimum beach width is more than 200 m along the crest.
- The beach was extended along the west side of the impoundment to keep the pond farther away from this segment of the dam, where the starter dam is not present, to avoid saturated tailings layers from extending below the downstream slope.
- The minimum beach widths and pervious starter dam were, and continue to be, effective controls in maintaining low piezometric levels in the cycloned sand beach near the dam.
- A 24 in. culvert pipe, 250 m to 300 m long, was buried below the starter dam to divert flows from the original Trojan Creek during starter dam construction. The upstream 15 m of the culvert pipe were plugged with concrete prior to tailings deposition in the impoundment, but the rest of the pipe was left open (KL 1984). The upstream end of the pipe is more than 150 m (horizontal) away from the pond under normal operations.
- After operations, an open-channel spillway (invert El. 1435.5 m) was constructed to route flood flows around the west abutment, discharging downstream of the dam toe.

R4 Seepage Pond

- The R4 Seepage Pond is located immediately downstream of the Trojan Dam (Figure 4) and collects seepage from the underdrain and local surface runoff from the two collection ditches that run along the dam toe.

- The dam was built in 1984 and is composed of compacted glacial till fill on a glacial till foundation, with a cut-off trench and a 300 mm thick layer of waste rock on the upstream slope for erosion protection (refer to Figure 2.2).
- Discharge is through a 300 mm diameter Low-Level Outlet (LLO) with a control valve downstream of the dam and a 100 mm diameter overflow pipe embedded in the dam near the left abutment. Flows from both pipes report to Lower Trojan Pond.
- An open-channel spillway is located near the west abutment.

Lower Trojan Pond

- The Lower Trojan Pond is approximately 1.1 km downstream of the R4 Seepage Pond (Figure 5) and collects local surface runoff and flows from the R4 Seepage Pond and R3 Seepage Pond (at the toe of Bethlehem Dam No. 1). The Lower Trojan Dam (LTD) was constructed in 1989; no as-built records are available. Figure 2.3 is a typical cross-section based on KC (2005).
- Discharge is through a diversion pipeline (a 460 mm diameter culvert pipe is buried through the dam near the left abutment) with a control valve downstream of the dam. Flow is discharged to the same channel that conveys flow from the Trojan Diversion.
- An open-channel spillway is located near the west abutment; a spillway pipe (810 mm diameter) is buried through the dam near the west abutment.

Trojan Diversion

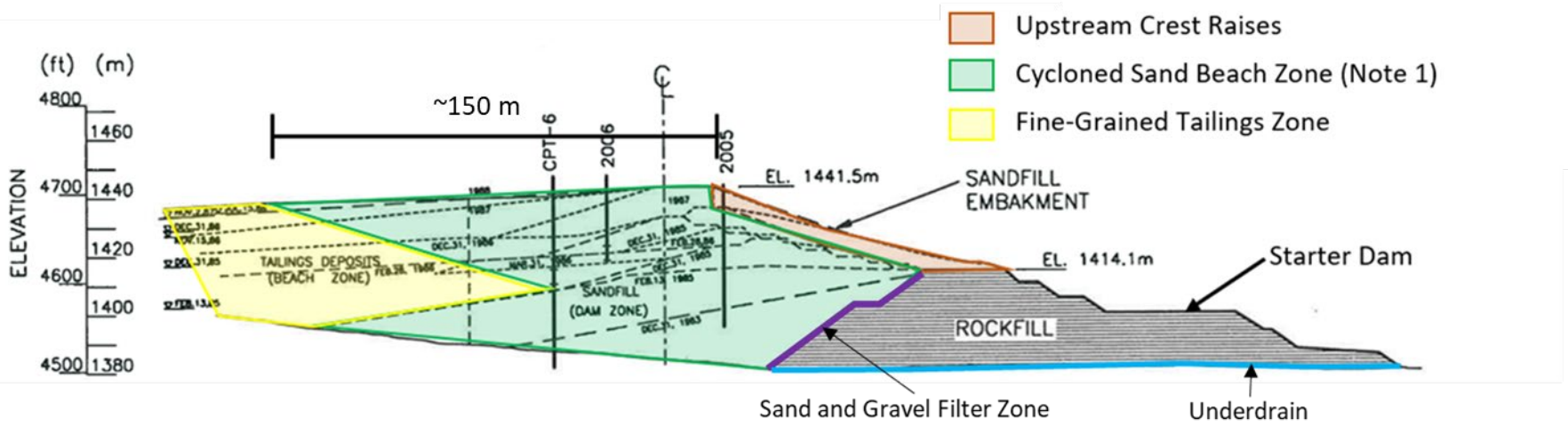
- The Trojan Diversion is an open channel constructed around the northwestern perimeter of the Trojan TSF (Figure 3), which intercepts runoff from the upslope catchment and diverts the flow away from the impoundment.
- Northwest of the impoundment, the open-channel portion of the Trojan Diversion transitions to a pipeline that ultimately discharges into Witches Brook.

Table 2.1 Summary of Approximate Dam Geometry

Dam	Trojan Dam	R4 Seepage Pond Dam	Lower Trojan Dam
Length (m)	1500.0	100.0	100.0
Minimum Crest Elevation (m)	1440.0	1365.0	1296.5
Minimum Crest Width (m)	39.0	5.0	5.0
Maximum Height[2] (m)	70.0	3.0	4.0
Upstream Slope	1.5H:1V (rockfill starter dam design)	2.5H:1V	1.75H:1V[3]
Downstream Slope	3.7H:1V (overall)	2H:1V	2H:1V
Construction Method	Rockfill starter dam with upstream cycloned sand crest raises	Single raise dam with cutoff trench	Single raise dam

Notes:
1. Dimensions are estimated from 2014 LiDAR data unless otherwise noted.
2. Height is measured as the vertical distance between the downstream toe and the crest.
3. KC (2005) indicates an upstream slope of 1.75H:1V based on a November 2004 measurement.

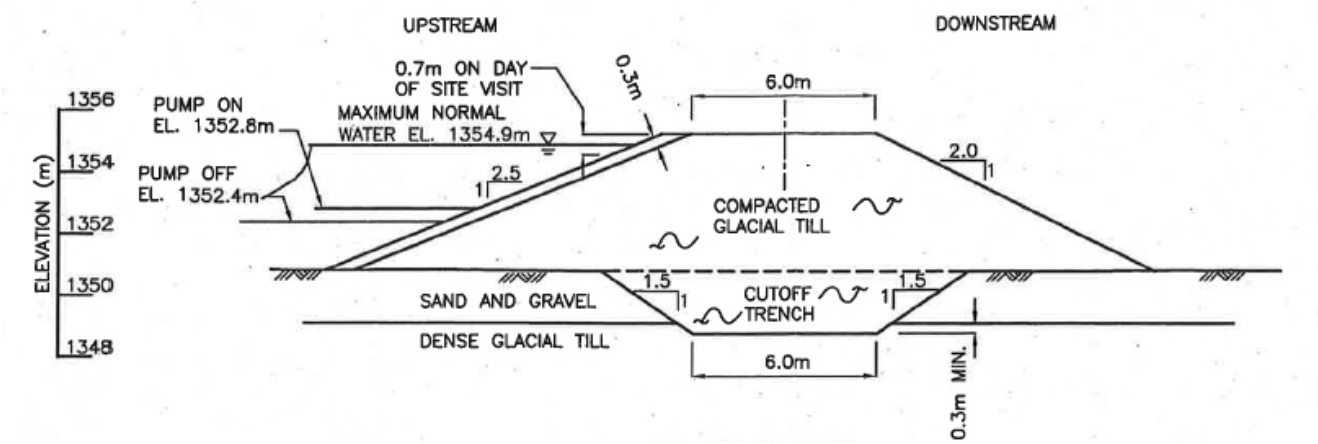
Figure 2.1 Typical Cross Section of the Trojan Dam



Notes

1. Upstream extent of the cycloned sand zone is based on the beach placed prior to early 1985 (i.e., when tailings slimes started being discharged upstream of the beach) and an assumed minimum beach width of 150 m subsequently.
2. Elevations in feet and metres include a change in datum, which is why they do not directly correlate if units are converted.

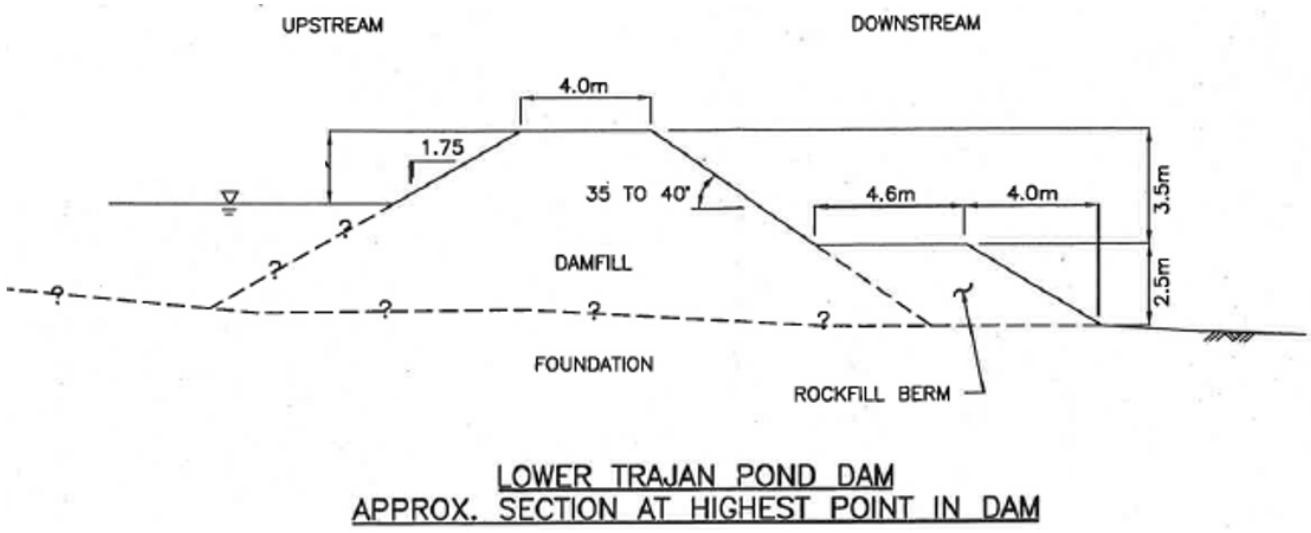
Figure 2.2 Typical Cross Section of the R4 Seepage Pond Dam (KC 2005)



Note:

1. The elevations noted here are in a different datum from Table 2.1.

Figure 2.3 Typical Cross Section of the Lower Trojan Dam (KC 2005)



3 ACTIVITIES DURING THE REVIEW PERIOD

During the review period, the Trojan TSF was maintained within the design basis and specified operational conditions of the approved design. There were no significant remedial or construction activities required or completed during the review period.

Routine maintenance activities, as defined in the OMS Manual (HVC 2022), that were completed included clearing vegetation from the upstream face of the LTD and debris from outlets at the Lower Trojan Pond and R4 Seepage Pond; this was observed during the site visit (Section 6).

4 WATER MANAGEMENT

4.1 Overview

The flow schematic for the Trojan TSF and the nearby Bethlehem TSF is shown in Figure 6.

Under normal conditions, there are no surface discharges from the Trojan TSF. Evaporation of the pond surface and seepage are sufficient to offset inflows on an annual basis. There has been no pond discharge through the spillway since it was constructed in 1996. The Trojan TSF water balance is passive (i.e., no active management by HVC), except for the Trojan Diversion, which intercepts runoff from the upstream catchment. HVC diverts water from the diversion, via valve-controlled outlets, into the Trojan TSF. The amount of the water diverted into the impoundment is managed by the HVC Environment department based on balancing pond level and downstream water supply requirements.

4.2 Climate

HVC provided KCB with climate data from the L-L Dam Weather Station for the review period. KCB corrected the climate data for the Highmont/Bethlehem and Trojan areas using the adjustment factors provided in Golder (2021). HVC communicated to KCB that the L-L Weather Station stopped recording data in early August 2022 due to equipment failure (Table 4.1). HVC also maintains a climate station at Shula Flats that can be used, similar to the L-L Dam Weather Station, to reflect climate conditions at the Trojan TSF.

In addition, KCB reviewed the climate data from the Kamloops Pratt Road Weather Station[4] (Environment Canada Station No. 116C8P0, El. 729.0 m, 58 km to the east) to review and compare precipitation trends against the L-L Dam Weather Station data.

Table 4.1 summarizes the monthly precipitation during the review period from the reference climate stations, as well as the monthly average values, also corrected based on Highmont/Bethlehem and Trojan area factors from Golder (2021), for comparison. The monthly precipitation record for the review period is shown on Figure 4.1. Overall observations regarding precipitation trends are as follows:

- For months that had >95% of daily readings, four of the 10 months reported above-average precipitation: October and November 2021, and June and July 2022. June measured the highest precipitation (75.5 mm), which was also the largest increment above the historic average (67%).
- Precipitation from December 2021 to May 2022 was 33% below the historic average; the lowest rain in magnitude and relative to historic averages was during March and April 2022. As will be discussed later, this was also the period when snowmelt occurred, and the low precipitation during this period impacted the intensity of freshet.

[4] The Kamloops Pratt Road Weather Station was used for comparison rather than the Kamloops Airport Station (El. 345.3 m, 44 km away in the NE direction) because the elevation is closer to that of the L-L Dam Weather Station and climate is sensitive to elevation.

KCB also reviewed the available rainfall data for storm events and notes the following:

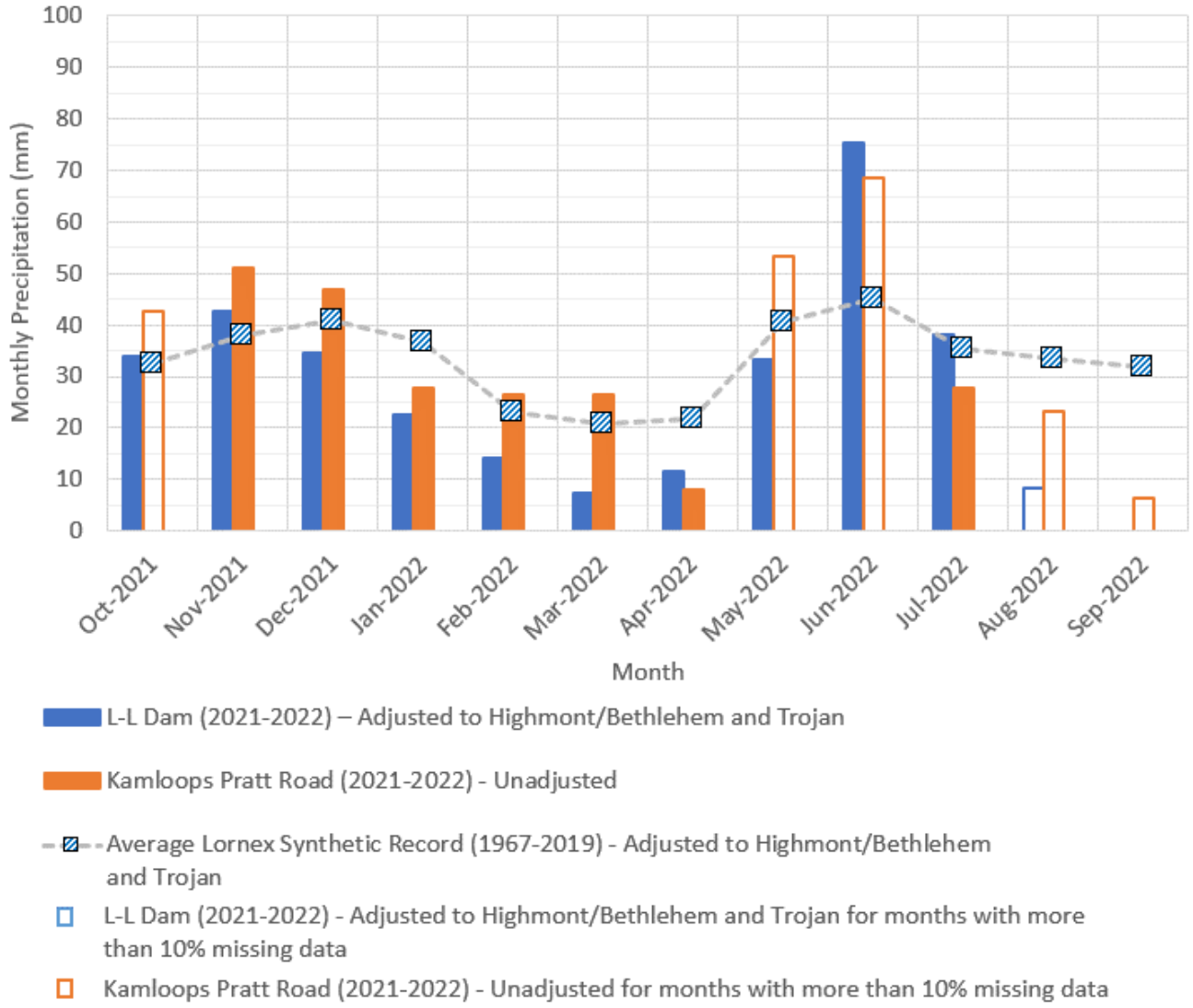
- All rainfall storm events during the review period were less than the 10-year return period event: 40 mm in 24 hours (Golder 2021). The largest 24-hour rainfall events measured at the L-L Dam Weather Station during the review period were 23.9 mm on November 15, 2021; 20.4 mm on July 3, 2022; and 15.5 mm on June 14, 2022.
- In November 2021, a combination of rainfall and early season snowmelt led to significant regional flooding and damage to public and private infrastructure, which impacted communities closest to the HVC Mine Site. Based on the L-L Dam Weather Station, the magnitude of the event was less than a 10-year return period at the HVC Mine Site.

Table 4.1 Monthly Precipitation for the Review Period (Oct. 2021 to Sept. 2022)

Month	Availability of Data (%)		Precipitation (mm)		
	L-L Dam Weather Station	Kamloops Pratt Road Weather Station[1]	L-L Dam Weather Station Data (Corrected)[2]	Kamloops Pratt Road Weather Station[1]	Historic Monthly Average Climate Values (Corrected)[2,3]
Oct 2021	100	81	33.9	42.6	32.4
Nov 2021	100	100	42.6	51.2	37.8
Dec 2021	100	100	34.7	47.0	41.0
Jan 2022	100	100	22.5	27.8	36.5
Feb 2022	100	100	14.1	26.6	23.1
Mar 2022	100	100	7.4	26.6	20.9
Apr 2022	100	100	11.6	7.9	21.8
May 2022	100	71	33.2	53.4	40.5
Jun 2022	100	83	75.5	68.6	45.2
Jul 2022	98	100	38.3	27.8	35.3
Aug 2022	24	83	*8.3*	23.2	33.5
Sept 2022	0	77	*No readings*	6.4	31.7
Annual Total	–	–	322.1	409.1	399.8

Notes:
1. Environment Canada Station No. 116C8P0, El. 729.0 m, 58 km to the east.
2. Precipitation data has been corrected based on Highmont/Bethlehem and Trojan area adjustment factors provided in Golder (2021).
3. Historic monthly averages are based on the Lornex synthetic climate record and converted based on Highmont/Bethlehem and Trojan area adjustment factors provided in Golder (2021).

Figure 4.1 Monthly Precipitation

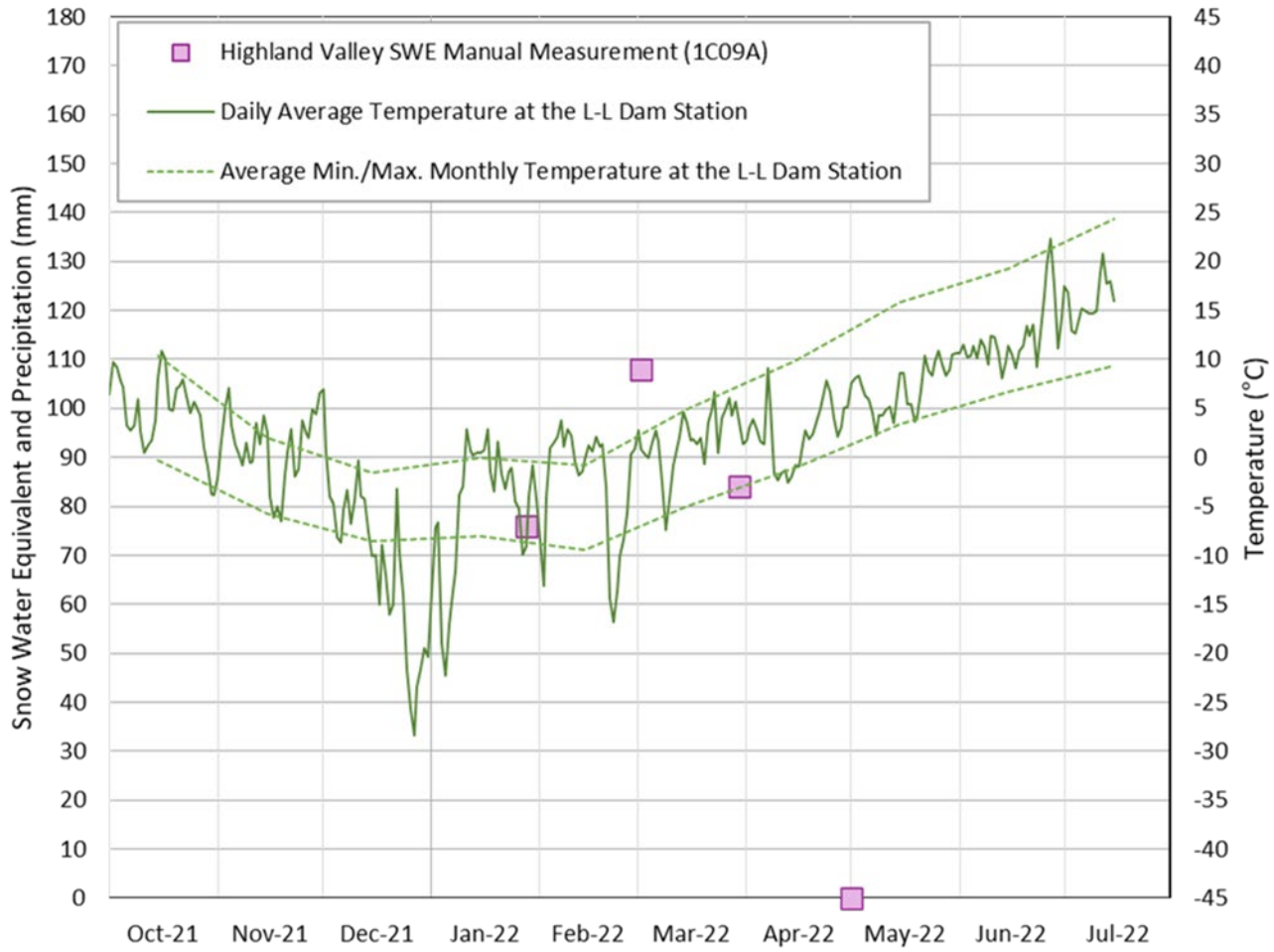


Seasonal snowpack depth is not measured at the L-L Dam Weather Station. Instead, HVC monitors snowpack with monthly measurements at the Highland Valley Snow Survey Station (Station No. 1C09A). Snowpack measurements were made from January through May and are reported on Figure 4.2 in snow-water equivalent (SWE) along with temperature data from the L-L Dam Weather Station from October 2021 to July 2022. The following observations are inferred from these data:

- The daily temperatures recorded between January and June 2022 are generally within the historic monthly average records based on Golder (2021), with some notable cold periods prior to March 2022.
- Snowpack melt started in March, but the majority of melt occurred during April, with all snow gone by May 1. This is consistent with the historic warming period and the forecast snowmelt pattern used in the HVC site-wide water balance, based on Golder (2020).

- Consistent with historic observations, temperature, not rain, is the primary factor that drove snowmelt during the review period. Snowmelt started in March, when daily temperatures started to rise and were consistently above 0°C, and had completed by the end of April. During that same period, precipitation was less than 50% of historic averages (Table 4.1).

Figure 4.2 Temperature Records and Measured Snowpack Between January and June 2022

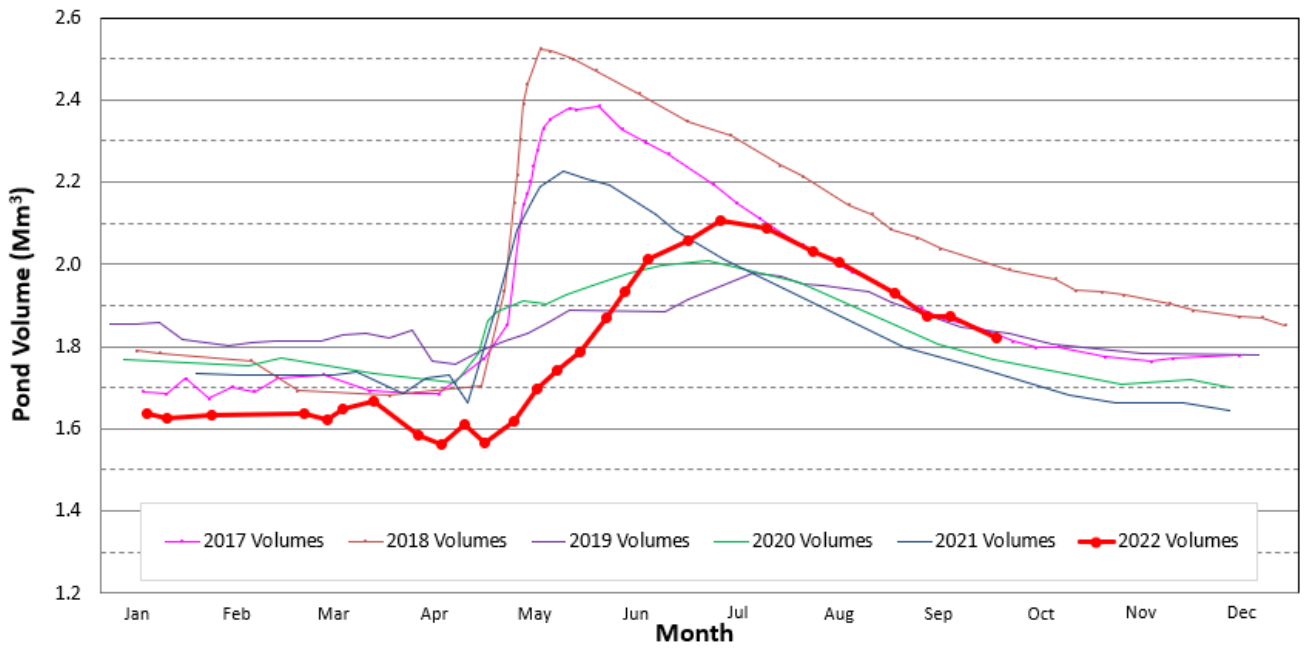


Notes:
1. SWE is manually measured at the Highland Valley snow pillow station (1C09A), typically once per month.
2. Daily average temperature data at the L-L Dam Weather Station for 2022 was provided by HVC.
3. The average maximum and minimum monthly temperatures at the L-L Dam Weather Station were developed by Golder (2021).

4.3 Water Balance

Figure 4.3 plots the Trojan Pond volume, estimated based on pond level and bathymetric survey data, from 2017 through 2022. Under existing conditions, the pond volume follows a typical seasonal pattern primarily driven by freshet. On an annual basis, the pond volume is maintained within a similar range and stays below the spillway invert with no surface discharges. The pond volume during the review period was consistent with established trends and expected response based on climate; i.e., freshet rise extended later in the year driven by high precipitation in June and July. Refer to the further discussion of pond levels in Section 5.2.

Figure 4.3 Trojan Pond Volumes – 2017 to 2022



4.4 Flood Management

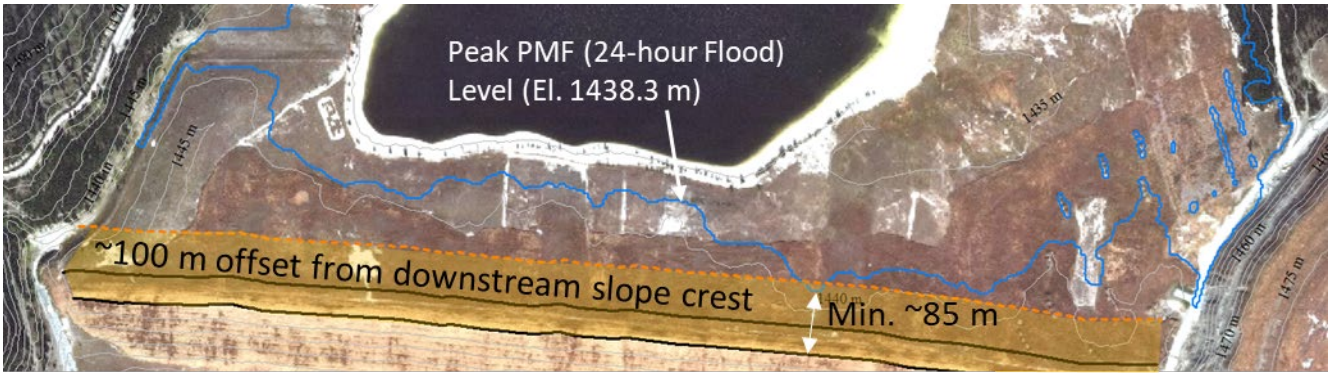
The Trojan TSF flood management structures are summarized in Table 4.2, along with the applicable design criteria and flood characteristics. The results of flood-routing analysis at each structure are discussed below.

Trojan TSF and R4 Seepage Pond

Flood-routing analyses for both the Trojan TSF and the R4 Seepage Pond (KCB 2022) concluded the following:

- The Trojan TSF spillway can route, with adequate freeboard, the PMF (24-hour) flood event, which is greater than the IDF (Table 4.2) required under the HSRC (EMCLI 2021b).
- With one exception, the minimum beach width at peak flood level during the spillway design event (PMF 24-hour) exceeds the 100 m minimum requirement specified in the design (KL 1987). Over a ~40 m segment the beach width is between 85 m to 100 m, as shown on Figure 4.4. KCB considers this acceptable and has recommended a review to confirm minimum beach width performance criteria for the existing condition; refer to Section 7.2.1 for further discussion.
- The R4 Seepage Pond can safely route, with adequate freeboard, the IDF (Table 4.2) required under the HSRC (EMCLI 2021b).

Figure 4.4 Beach Width at Peak PMF 24-Hour Flood Level



Lower Trojan Dam

Based on flood routing (KCB 2019), refer to Table 4.2, the Lower Trojan Pond requires additional flood management upgrades to route the IDF requirements (100-year return period) under the HSRC (EMLCI 2021b). HVC prefers to decommission the facility as that removes any flood-related hazards, as well as providing other benefits. HVC have discussed decommissioning requirements with regulators.

Regarding the flood-routing capacity and management for the existing conditions, KCB notes the following:

- The facility has managed flood and freshet events without a reported overtopping concern since the most recent upgrade (~32 years). This includes a 66 mm rainfall event during May 2011, which is equivalent in magnitude to a 100-year return period (rain only) event. In addition, the above-average freshet events during 2017 and 2018 were managed without engaging the spillway and maintaining freeboard greater than the minimum required (0.5 m).
- Starting in 2017, HVC implemented remote monitoring of the Lower Trojan Pond level with threshold levels defined in the OMS Manual (HVC 2022) that, if exceeded, send out an automated notification to HVC personnel and trigger actions to manage flood scenarios such as increased monitoring and deploying pumps to increase discharge capacity.

Table 4.2 Inflow Design Flood Requirements for the Trojan TSF and Supplementary Structures

Facility	Outfall Type	Inflow Design Flood[1]	Spillway Design Event[2]	Peak Design Flood Level	Peak Design Outflow
Trojan TSF	Open channel	2/3 between 1,000-year and PMF	PMF 24-hour	1438.3 m	33.2 m^3/s
R4 Seepage Pond	Open channel	100-year	100-year 24-hour	1364.7 m	0.4 m^3/s
Lower Trojan Pond	Open channel and pipe	100-year	100-year 24-hour	Note 3	

Notes:
1. The IDF events meet the requirements under the HSRC (EMLCI 2021b) as discussed in KCB (2022).
2. Spillway design events were reviewed based on the most recent flood routing (KCB 2022).
3. The Lower Trojan Pond cannot route the IDF, and HVC is pursuing approval to decommission the facility as a water-retaining structure as discussed in Section 4.4.

5 REVIEW OF MONITORING RECORDS AND DOCUMENTS

5.1 Monitoring Plan

The OMS Manual (HVC 2022) was updated and reissued during the review period. This was a routine update to the document and included revisions to align with the most recent industry guidance documents (MAC 2019), updating emergency contact information and modifying the surveillance program to reflect changes agreed upon with the EoR.

The Trojan TSF surveillance program, described in the OMS Manual (HVC 2022), is appropriate for an inactive, reclaimed tailings facility and includes the following activities: visual inspections; measured behaviour from piezometers, pond level readings, survey monuments, and an inclinometer installed at the facility; and a Trigger-Action-Response Plan (TARP). Surveillance information is reviewed by HVC, including the TSF QP.

Surveillance activities and frequencies, specified in the OMS Manual (HVC 2022), are summarized in Table 5.1. Surveillance records provided to KCB by HVC, and reviewed by the EoR, demonstrate that OMS Manual (HVC 2022) requirements were met during the review period. In addition, HVC addressed the two AFPR recommendations raised in 2021 (Table 8.1):

- HVC read the piezometers installed in 2019 as part of the routine monitoring; this addresses the 2021 AFPR recommendation TD-2021-02 (Table 8.1). In addition, these instruments were added to the OMS Manual (HVC 2022) during the recent update.
- HVC confirmed that standpipe piezometer P86-3 is blocked (6 m below ground) and has removed it from routine surveillance activities and reporting.

HVC added routine condition assessments of the R4 Seepage Pond and Lower Trojan Pond outlet pipes to the surveillance program. These are to be completed every five years, but HVC has not defined the date of the first condition assessment. KCB supports this addition and recommends the first inspection be completed prior to the end of 2024 and the timing be added to the OMS Manual (HVC 2022).

Table 5.1 Surveillance Requirements from the OMS Manual (HVC 2022) and Activities Completed During the Review Period

Surveillance Activity	Facility	Minimum Frequency[1]	Responsibility	Documentation	Frequency Compliance	Notes for the Review Period
Inspections						
Routine Visual Inspection[1]	Trojan Dam	Monthly	HVC	HVC inspection reports (reviewed by KCB)	Yes	
	LTD and R4 Seepage Pond	Quarterly	HVC		Yes	
Event-Driven Inspection	All	Event-Driven[2]	HVC		N/A	None triggered based on the OMS Manual, but HVC did complete during a November 2021 regional flood event.
AFPR	All	Annually	KCB		Yes	
Dam Safety Review (DSR)	All	Every 5 years	HVC	Report	N/A	Next DSR is due in 2023.
Instrumentation Monitoring						
Piezometers	Trojan Dam	Monthly (when accessible)	HVC	HVC instrument plots and GeoExplorer	Yes	
Inclinometers	Trojan Dam	Twice per year (min. 5 months between readings)	HVC		Yes	Inclinometer was read twice during 2022, but only one reading (March 2022) falls within the review period.
Seepage Flow	Trojan Dam	Monthly	HVC	Electronic record of weir measurements	Yes	Readings were collected as per the OMS Manual. Preliminary readings are available as discussed in Section 5.6.
	LTD	Monthly	HVC		Yes	
Pond Level	Trojan Dam	Monthly	HVC	Pond level survey database	Yes	
	R4 Seepage Pond / Lower Trojan Pond	Monthly	HVC	GeoExplorer and HVC visual inspection sheets	Yes	Automated readings collected by transducer and visual readings based on staff gauge.
Surveys						
Survey Monuments	Trojan Dam	Annually	HVC	AFPR report by KCB	Yes	Carried out on June, 2022.
Pipe Condition Assessment	All Seepage Ponds (with outlet piping)	Every 5 years	HVC	HVC internal report (reviewed by KCB as part of AFPR)	N/A	This was added to the surveillance program in 2022. HVC to establish the date of the first condition assessment.

Notes:
1. Visual inspections include pond level measurements and observations for evidence of unusual conditions (e.g., settlement, sinkholes, slope sloughing, erosion, seepage, piping, etc.).
2. HVC staff are to complete an event-driven inspection in response to one of the following events: earthquake greater than magnitude 5 within 100 km of the site or any earthquake felt at site, or rainfall event greater than the 10-year, 24-hour duration storm: 39.9 mm (Golder 2021).
3. When accessible, typically outside of winter.

5.2 Pond Levels and Freeboard

The Trojan Pond level was surveyed at least monthly, with 30 total readings during the review period. The pond level was measured at least twice during most months, with more frequent readings between March and June, when pond levels were rising during freshet. There was no discharge through the Trojan TSF spillway during the review period.

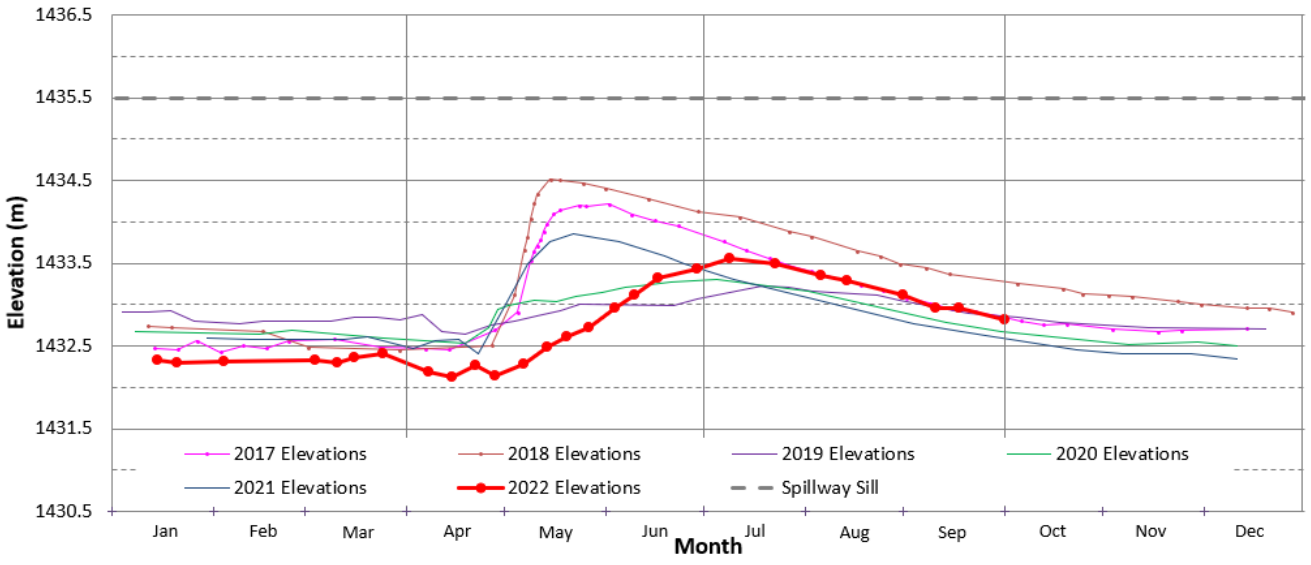
The peak pond level during the review period was less than the previous year (–0.3 m), but the pond level at the end of the review period was higher (0.3 m); refer to Figure 5.1 and Table 5.2. Both of these are consistent with climate observations (Section 4.2), which suggests that limited rain during snowmelt (March and April) contributed to a mild freshet, but above-average rains in June and July resulted in seasonal pond rise extending later into the year and an overall net increase in pond volume over the past year. However, as shown on Figure 5.1, pond levels at the end of the review period are within the typical range for the existing conditions.

Table 5.2 Trojan TSF Change in Pond Level

Annual Change	Change in Pond Level 2021 to 2022	Range of Annual Pond Level Change 2017 to 2022
Peak Pond	–0.3 m	–1.3 m to 0.5 m
Pond at End of Review Period [1]	0.3 m	–0.5 m to 0.5 m

Notes:
1. Pond levels at the end of September of each year.

Figure 5.1 Trojan Pond Water Elevations – 2017 to 2022



The minimum freeboard measured during the review period at the Trojan Pond and the downstream seepage ponds are summarized in Table 5.3 and meet minimum requirements for flood and non-flood conditions.

Table 5.3 Minimum Freeboard at the Trojan TSF, R4 Seepage Pond, and Lower Trojan Pond

Facility	Minimum Freeboard (m)[1]		
	Flood Freeboard Required (During IDF)	Normal Freeboard Required (During Non-Flood Conditions)	Observed During the Review Period[2]
Trojan TSF	0.20	0.20	6.50
R4 Seepage Pond	0.50 [3]	0.25	0.80
Lower Trojan Pond	0.50 [3]	-	1.10

Notes:
1. Refers to the minimum vertical distance between the dam crest and the pond level; based on KCB (2022).
2. Based on the maximum recorded pond elevation during the review period.
3. Freeboard target of 0.5 m has been adopted by HVC, which is greater than the minimum required freeboard to accommodate wave run-up (0.43 m for the R4 Seepage Pond, and 0.4 m for the Lower Trojan Dam).

5.3 Piezometers

At the end of the review period, 14 piezometers were active in the Trojan TSF (Figure 3): eight standpipes and six vibrating wire piezometers (VWPs). During the review period, HVC reviewed each instrument and removed those confirmed to be reporting information not representative of actual conditions (e.g., plugged) from the surveillance plan.

The current suite of instruments is considered sufficient to monitor piezometric levels in the cycloned sand beach, which are a key design control. However, KCB recommends additional investigations and piezometer installations in the downstream slope near the west abutment to add monitoring points in the key performance area as discussed below.

Piezometers have measured relatively consistent trends and values, some for more than 10 years, and are well below levels assumed in the design analysis. Therefore, Notification Level thresholds have been defined that, if exceeded, identify to HVC and the EoR of a change in pattern or typical level, but an exceedance does not represent a performance concern. Threshold values have not been set for the four piezometers that were added into routine monitoring during the review period. These will be defined and included in the OMS Manual after 18 months of data has been collected. No changes to existing threshold values were proposed for the 2022 OMS Manual update.

Piezometric elevations measured by active piezometers are plotted on Figures 7 to 9. September 2022 piezometric elevations are plotted on typical sections through the Trojan Dam, along with the surface assumed in stability analyses (Figure 12).

A summary of key observations for piezometric readings during the review period are as follows:

- One Notification Level threshold exceedance was measured during the review period:
  - P86-1 (tip El. 1407.65 m, tailings beach upstream of the dam crest) exceeded the threshold value (El. 1409.6 m) by 0.1 m in July 2022. This piezometer has measured a gradual ~1.1 m rise in piezometric level since 2019. It is a minor response, and this piezometric level, if representative, is below the crest of the starter dam and does not represent a performance concern.

- A 2019 CPT (SCPT-19-3) was completed through the cycloned sand beach to original ground (El. 1407 m), near P86-1. The SCPT measured no dynamic or hydrostatic pore pressure, which suggests the cycloned sand is unsaturated at this location. This observation conflicts with the measured response at P86-1. P86-1 was previously suspected of being plugged. KCB recommends HVC investigate to confirm whether this instrument is potentially plugged (e.g., dip the casing with a probing rod to check for an obstruction). If a plug is present, the slow rate of rise measured since 2019 could be related to water ponding in the casing, above the plug, and not representative of actual piezometric conditions at that location.

- Cycloned Sand (Impoundment and Near Crest) (Figure 7 and Figure 8): Piezometric readings and trends during the review period were consistent with readings over the past 12 years.
  - As shown on Figure 12, piezometric levels are showing drain down from the pond through the cycloned sand beach. P95-4 continues to show drain down from the falling head test completed in 2015 and remains above the piezometric level measured in other nearby piezometers. Such a prolonged drain down period suggests the piezometer casing may be plugged. Similar to P86-1, KCB recommends HVC also investigate this instrument to confirm whether this is the case.
  - Piezometric levels in the cycloned sand beach support that the pervious starter dam and underdrain continue to act as an effective drain for the beach based on:
    - no piezometers are showing a rising trend over time; and
    - below the crest, piezometric levels are well below the starter dam crest and, in the centre of the valley (Section A, Figure 12), are more than 10 m below the levels measured during operations.
  - As discussed in Section 2, a key design assumption is that continuous layers of saturated cycloned sand do not extend below the downstream slope towards the toe near the west abutment where the starter dam is not present. Two cone penetration tests (CPTs) completed adjacent to TRJ-VWP19-04 and TRJ-VWP19-05 in 2019 measured no pore pressure in the cycloned sand beach approximately 50 m upstream of the crest, which supports this assumption. Piezometers TRJ-VWP19-04 and TRJ-VWP19-05 were installed to monitor changes over time; during the review period, conditions remained consistent, suggesting there was no migration of seepage or saturation towards the downstream toe from the pond over the period.
  - Piezometric readings and CPTs completed in the cycloned sand beach show that the majority of the cycloned sand beach near the crest is unsaturated and there is very low piezometric levels just above the foundation. This information can be used to infer that cycloned sand below the tailings are unsaturated as assumed in design. However, to reduce uncertainty with this inference and other design assumptions in this area, KCB recommends HVC complete site investigations and install piezometers (a minimum of two) below the downstream slope, near the west abutment (Figure 3).

- Starter Dam Fill (Figure 8): Piezometers installed in sand-and-gravel fill zones of the starter dam (TB-PS-04/P13-3 and TB-PS-03/P13-4) measure low piezometric levels (Figure 8). This also supports that the starter dam continues to act as an effective drain for the cycloned sand beach.
- Starter Dam Foundation (Figure 9): Piezometers installed in the glacial till foundation at the starter dam upstream toe, near the low point of the valley, and beneath the downstream slope, measured low piezometric heads with little variance throughout the year.
  - VWP16-2A is interpreted as undergoing a prolonged equilibration after installation. Readings during the review period suggest it is reaching a steady level.

5.4 Survey Monuments

Survey of the monuments at the Trojan TSF are plotted on Figure 10. In November 2019, HVC changed to a GPS Real-Time Kinematic (RTK) method to survey the monuments. The horizontal surveys plotted on Figure 10 are for the RTK method only, based on the initial RTK survey location. However, a continuous record of settlement has been maintained on Figure 11.

The RTK surveys have shown an improvement (i.e., less variance between readings) over the previous method with respect to northing/easting, but show higher variance in elevation. This pattern is evident when reviewing readings since 2020 (Figure 10). Based on the 2022 surveys, all monuments, except for TD-2A, are indicating uplift relative to 2021. This is interpreted to be related to the measurement method as this behaviour is not consistent with historic performance nor was there any activity in the area which would explain this response. HVC and KCB agree the accuracy in elevation observed with the previous survey method should be restored. HVC has been collecting INSAR data since January 2021 as part of a site-wide trial. The information will be reviewed as a potential alternative method for monitoring deformation at the Trojan TSF during 2023.

During the review period, there were no threshold value exceedances, and the survey locations from the review period were within the cluster of previous readings and showing no deformation trend. approximately 34 mm of settlement was measured at TD-2A since the 2021 survey. However, no horizontal movement was measured, and very little settlement has been measured at this location previously. This is interpreted to be related to the accuracy of the survey method. The overall magnitude of settlement to date is not impacting freeboard (Section 5.2) or other aspects of performance.

5.5 Inclinometers

A single inclinometer (IB16-2) is installed at the Trojan Dam. IB16-2 was read twice during 2022, as per the OMS Manual (HVC 2022), but only one reading (March) was taken during the review period. No significant deformations in the downstream direction have been observed (Figure 11).

5.6 Seepage Weir Flows

Seepage flows measured at weirs installed downstream of the Trojan TSF are plotted on Figure 14 and Figure 15. The number and relative locations of the active weirs are listed below:

- two weirs (TB-R4-FS-01 and TB-R4-FS-02), located immediately upstream of the R4 Seepage Pond, measure flow from the collection ditch along the Trojan Dam toe; and
- one weir (TB-LT-FS-01), located downstream of the Lower Trojan Pond, measures a combination of outflow from the Lower Trojan Pond and the Trojan Diversion.

Flows at each weir, converted from weir flow depths recorded by a data logger, are consistent with 2021 trends and within the recent flow rates with one exception. During July 2022, flow rate measured at TB-R4-FS-02 was elevated due to temporary pumping of flow from R3 Seepage Pond to R4 Seepage Pond that was measured by the weir. Flow readings at TB-R4-FS-01 during winter, from December 2021 to April 2022, were deemed as unusable following quality control review.

Visual inspections did not observe turbid flow or other unsatisfactory conditions. The highest seepage flow at the Lower Trojan weir (TB-LT-FS-01) is within the typical range for freshet.

5.7 Water Quality

HVC's Water Quality Monitoring and Reporting Plan, approved under the PE-376 effluent permit (MECCS 2022), specifies minimum water-quality sampling requirements at the HVC Mine Site, including downstream of the Trojan TSF. Water-sampling activities and results during the review period are reported in HVC's annual water-quality monitoring report, prepared by an appropriately qualified professional. The annual water-quality monitoring report was being prepared at the time of writing this AFPR and will be submitted to the Ministry of Environment and Climate Change Strategy and Ministry of Mines prior to March 31, 2023. This report, when available, should be referred to for monitoring data and a discussion of the results. HVC has confirmed that the water-quality monitoring requirements, related to the Trojan TSF, were met during the review period.

With regards to the design of the Trojan TSF, there were no surface discharges from the impoundment, and the primary controls related to seepage (i.e., tailings beach, downstream collection ditch and ponds, Trojan Diversion) were in place and performing consistent with design expectations during the review period.

6 VISUAL OBSERVATIONS AND PHOTOGRAPHS

The AFPR site visit checklists, observations, and photographs are included in Appendix I, with key observations summarized as follows:

Trojan TSF (Appendix I-A)

- The facility was in good physical condition with no significant visual change or issues of concern observed.
- Seasonal vegetation growth in the Trojan TSF spillway channel upstream of the bedrock chute is primarily grass and small bushes, with no large debris or trees present. HVC provided photographs to show this was cleared as part of routine maintenance following the site visit.
- Based on the available survey of the culvert below the starter dam, the outlet is buried by the existing dam slope and could not be visually identified during the site visit. This may have occurred during reclamation, which included regrading the dam slope. Regardless, there was no evidence of potential issues of concern observed in area (e.g., sinkholes or turbid seepage).

R4 Seepage Pond (Appendix I-B)

- The facility was in good physical condition with no significant visual change or issues of concern observed.
- The LLO valve could not be hand turned. The need to close the valve is not a critical control for the structure, but HVC may want to fix the valve for routine operations.
- Trees are present at the inlet of the spillway; HVC plans to remove these trees as part of routine maintenance following the site visit.

Lower Trojan Pond (Appendix I-C)

- The dam was in good physical condition with no significant visual change or issues of concern observed. Issues noted with flood-routing capacity are discussed in Section 4.4.
- Trees and significant vegetation (grass and bushes) are present at the spillway inlet and along the channel; the vegetation will be removed as part of routine maintenance.
- The facility comprises two basins, referred to as the upper and lower basins. The upper basin comprises several smaller connected areas where water ponds. There was active flow from the upper basin to the lower basin at the time of the site visit.
- The debris boom is in good condition. During the site visit, HVC cleared vegetation accumulated on the LLO intake as a routine maintenance task. Subsequent to the site visit, HVC repositioned the debris boom to protect the intake of the LLO, which is also a routine task under the OMS Manual (HVC 2022).

7 ASSESSMENT OF DAM SAFETY

7.1 Review of Potential Downstream Consequences

Conditions and land use downstream of all tailings and water-retaining structures were reviewed by HVC and KCB during the review period as part of the failure mode review (Section 7.2), and no significant changes were identified.

HVC and KCB reviewed the current IDF and earthquake design ground motion (EDGM) for each of the Trojan TSF facilities to confirm they meet or exceed the equivalent requirements under the HSRC (EMLCI 2021b), which defines such requirements based on a consequence classification.

At the request of HVC, the AFPR does not include any reference to a consequence classification for the Trojan TSF facilities. Consequence classification is not part of HVC's tailings management governance and stewardship because there are components of that system that do not align with HVC's safety culture, where any fatality represents an unacceptable consequence. HVC's internal governance has been developed to align with the GISTM (2020) requirements and to meet or exceed requirements under the HSRC (EMLCI 2021b).

7.2 Failure Mode Review

HVC's stated long-term goal for their TSFs is to reach landform status, with all potential failure modes that could result in catastrophic release of tailings and/or water being either reduced to non-credible or managed to ALARP (i.e., as low as reasonably practicable) under appropriate loading conditions. KCB fully supports this goal, which is also consistent with the GISTM (2020).

Potential failure modes for the Trojan TSF were reviewed by HVC and KCB during the review period based on currently available information and existing controls. The review concluded that potential failure modes are being managed appropriately.

Design and operational controls in place to manage potential failure modes are summarized below, along with their status at the end of the review period.

7.2.1 Trojan Dam

Overtopping:

The spillway design flood (PMF) is greater than the minimum IDF (Table 4.2) recommended under the HSRC (EMLCI 2021b) and is an effective control to prevent overtopping. In addition, under existing conditions, the following additional controls and factors significantly reduce the potential for overtopping:

- Freeboard: The Trojan TSF has maintained a freeboard greater than 5.5 m under normal and freshet conditions. Even under peak PMF flood level, the minimum freeboard between the pond and the low point of the perimeter crest would be 1.5 m. This exceeds the minimum freeboard of 0.2 m required to accommodate wave run-up and wind (Table 5.3).

- Beach width: Under normal conditions, the minimum beach width is more than 200 m along the crest. At the peak flood level during the PMF (24-hour), the beach width meets or exceeds the minimum design requirement (100 m) along the crest except for an approximately 40 m segment where the minimum beach width is 85 m. A beach width less than 100 m would be present for less than 12 hours as the flood passes though the spillway, and the freeboard relative to the crest in that area is approximately 2.7 m.
  - KCB believes that the beach condition predicted by flood routing (KCB 2022) does not have a significant impact on the overall risk of the Trojan TSF and does not offset the impact to the reclamation cover if the beach surface were modified. However, KCB recommends the technical basis around the minimum beach width requirements for the existing condition, at the peak PMF flood level, be reviewed with HVC. Prepare a document which summarizes this review and documents any modification to the minimum beach requirement.

Slope Stability:

The current condition of the dam meets design factor of safety (FoS) criteria for global slip surfaces that would result in an uncontrolled release of tailings under static (FoS $\geq$ 1.5) and post-earthquake (FoS $\geq$ 1.2) loading (KCB 2020). The tailings are retained by a drained sandy tailings beach and embankment, which is supported by a compacted rockfill starter dam with underdrains and is founded on competent glacial till.

There were multiple layers of control included in the design and operation of the Trojan TSF to prevent structural failure of the dam. These included measures to reduce the likelihood of saturated, fine-grained tailings being deposited below the crest or downstream slope and having a pervious rockfill starter dam to provide underdrainage for the cycloned sand beach. CPTs through the beach area and ongoing piezometric monitoring demonstrate that these were successful, and the as-built condition of the facility is consistent with design assumptions. The inclinometer installed through the downstream slope does not show any horizontal movement through the dam shell or foundation.

Internal Erosion Through the Dam Fill:

The primary controls for managing internal erosion through the dam are a wide tailings beach that reduces the piezometric levels and seepage gradients near the dam, and the filter zones on the upstream slope of the starter dam.

Measured performance (i.e., piezometers) and visual observations during the review period are consistent with historic performance and demonstrate that these controls have been successful at preventing the progress of internal erosion.

Internal Erosion Related to the Buried Culvert Pipe:

The upstream 15 m of the culvert pipe buried below the starter dam (Section 2) were plugged with concrete prior to tailings deposition in the impoundment. No turbid seepage or other indicators of material being washed through the culvert have been observed under existing conditions or during

operations, when seepage gradients and piezometric levels were higher than existing. However, limited records of the decommissioning and condition of the outlet have been found in the annual review, design, and other record documents. KCB recommends HVC review historic records to confirm whether any information is available that would help reduce remaining uncertainty related to the culvert. Such information may not exist, but it warrants a review of available records and aerial images to confirm.

7.2.2 R4 Seepage Pond

Overtopping:

The design flood for the emergency spillway (100-year return period) meets the IDF requirements under the HSRC (EMLCI 2021b). The spillway has the capacity to route events larger than the IDF.

Slope Stability:

The current condition of the dam meets the design FoS criteria for global slip surfaces that would result in an uncontrolled release of water under static (FoS $\geq$ 1.5) and post-earthquake (FoS $\geq$ 1.2) loading (KCB 2021).

7.2.3 Lower Trojan Pond

Overtopping:

An outlet pipe and spillway are in place to route flood events. Flood management upgrades are required to route the IDF (100-year return period) (KCB 2019). Refer to Section 4.4 for information on the flood capacity of the existing condition, controls implemented by HVC to manage flood conditions, and the plan to resolve recommendations related to flood management.

7.3 Status of 2018 Dam Safety Review (DSR) Recommendations

The most recent DSR of the Trojan TSF and supplementary structures was completed by SRK Consulting (SRK) in 2018 (SRK 2019). The report concluded the facility is well-managed with a high level of technical stewardship and appropriate operating procedures. The credible failure modes are understood and effectively controlled.

The DSR included 16 recommendations related to dam safety for the Trojan TSF and seepage ponds. During the review period, one of the remaining two recommendations was addressed by preparing a consolidated summary of the facility history and key reference documents. The only outstanding recommendation from the DSR is related to flood-routing capacity at the Lower Trojan Pond, which is also covered by the AFPR recommendation LTD-2017-01 (Table 8.1) and is discussed in Section 4.4.

7.4 Emergency Preparedness and Response Plan (EPRP)

The Trojan TSF EPRP forms a part of the OMS Manual (HVC 2022), which was reviewed and revised during the review period. The revision included updating procedures and contacts based on current side-wide emergency plans. The EPRP is appropriate for the existing structure and includes a list of preventative actions that can be taken in response to potential unusual or emergency conditions.

On October 26, 2022, participants from HVC's operation team (including site management), including a representative designated by the HVC QP, and the EoR participated in a simulated exercise to test the TSF mine emergency response plans.

8 SUMMARY

Based on the review of measured performance and observations summarized herein, KCB concludes that the Trojan TSF performed as expected, was maintained within design requirements, and operated in accordance with the OMS Manual (HVC 2022) from October 2021 through September 2022.

The status of dam safety recommendations identified during past AFPRs are summarized in Table 8.1. During the review period, two of the three AFPR recommendations and one of the outstanding recommendations from the 2018 DSR (SRK 2019) were closed. HVC is advancing plans to address the remaining recommendations pertaining to flood routing at the Lower Trojan Pond.

Five new recommendations were identified during the 2022 AFPR (Table 8.2). None represents an imminent dam safety concern at the facility. Two are related to reducing uncertainty related to design controls. One is related to documenting a modification to minimum beach widths under PMF flood conditions. The remaining two are related to good practice activities related to surveillance.

Table 8.1 Previous Recommendations Related to Facility Performance – Status Update

ID No.	Performance Area	Recommended Action	Priority[1]	Deadline (Status)
Trojan Dam				
TD-2021-01	*Maintenance*	*Complete a test to confirm whether P86-3 is plugged and, if so, remove it from routine monitoring and report it as defunct.*	*3*	*CLOSED*
TD-2021-02	*Governance*	*Prioritize inclusion of the piezometers installed in 2019 into routine monitoring activities, as per the OMS Manual, to obtain full value from the existing instrumentation.*	*3*	*CLOSED*
Lower Trojan Dam				
LTD-2017-01	Flood Management	Complete appropriate upgrade works to allow the Lower Trojan Pond to safely pass IDF with adequate freeboard, including decommissioning of the spillway pipe.	2	2022 (Open; HVC is discussing decommissioning requirements with the regulator)

Notes:
1. Recommendation priority guidelines, specified by HVC and assigned by KCB:
   Priority 1: A high probability or actual dam safety issue considered immediately dangerous to life, health, or the environment, or a significant risk of regulatory enforcement.
   Priority 2: If not corrected, could likely result in dam safety issues leading to injury, environmental impact, or significant regulatory enforcement, or a repetitive deficiency that demonstrates a systematic breakdown of procedures.
   Priority 3: Single occurrences of deficiencies or non-conformances that alone would not be expected to result in dam safety issues.
   Priority 4: Best Management Practice – Further improvements are necessary to meet industry best practices or reduce potential risks.
2. No outstanding recommendations for the R4 Seepage Pond.

Table 8.2 2022 AFPR Recommendations Related to Facility Performance

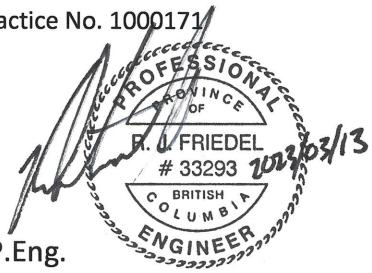
ID No.	Performance Area	Recommended Action	Priority[1]	Deadline (Status)
Trojan Dam				
TD-2022-01	Site Investigation	Complete investigations and install piezometers below the downstream slope, near the west abutment, as a direct measure to confirm key design assumption.	3	Q1 2024
TD-2022-02	Governance	Complete a review of available historic records to confirm whether any information is present that would help reduce remaining uncertainty related to decommissioning the culvert below the starter dam.	4	Q1 2024
TD-2022-03	Design Review	Complete a review of the technical basis for minimum beach width performance criteria under peak PMF flood level based on existing condition.	3	Q4 2023
TD-2022-04	Maintenance	Investigate whether P86-1 and P95-4 (piezometers installed in cycloned sand beach) are plugged.	4	Q4 2023
R4 Seepage Pond				
R4-2022-01	Governance	Add the inspection frequency to the OMS Manual with the first one to be completed by end of 2024.	4	Q4 2023

Notes: Refer to Table 8.1 notes.

9 CLOSING

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

KLOHN CRIPPEN BERGER LTD.
B.C Permit to Practice No. 1000171



Rick Friedel, P.Eng.
Engineer of Record, Designated Representative
Senior Geotechnical Engineer, Principal

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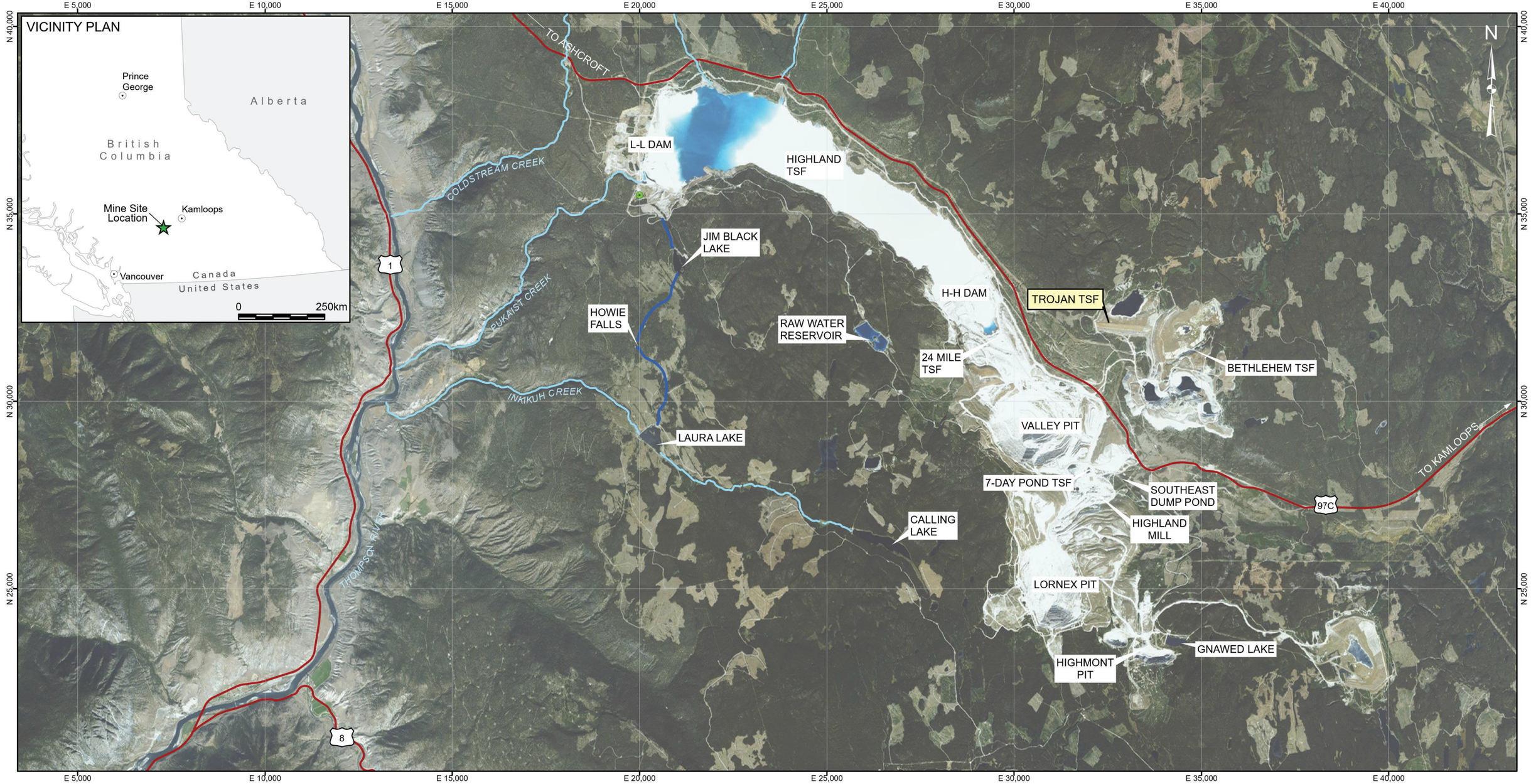
FIGURES

Figure 1	Mine Site – Plan
Figure 2	Trojan Tailings Storage Facility – Overview
Figure 3	Trojan Dam – Plan
Figure 4	R4 Seepage Pond Dam – Plan
Figure 5	Lower Trojan Dam – Plan
Figure 6	Flow Schematic for Bethlehem No. 1 and Trojan Tailings Storage Facilities
Figure 7	Trojan Dam Piezometric Data Years 2009 to 2022 – Impoundment
Figure 8	Trojan Dam Piezometric Data Years 2009 to 2022 – Crest
Figure 9	Trojan Dam Piezometric Data Years 2009 to 2022 – Downstream Slope
Figure 10	Trojan Dam Survey Monument Readings
Figure 11	Inclinometer Displacement Profile – IB16-2
Figure 12	Trojan Dam Instrumentation Sections A and B
Figure 13	R4 Seepage Pond Weir Flows
Figure 14	Lower Trojan Dam Weir Flows



LEGEND

- L-L DAM WEATHER STATION
- CREEK/RIVER
- HIGHWAY
- INKIKUH DIVERSION

NOTES:

1. PROJECTION: HVC MINE GRID.
2. TSF = TAILINGS STORAGE FACILITY.
3. HIGHWAY AND CREEK DATA FROM THE GOVERNMENT OF CANADA (CANVEC).
4. IMAGERY FROM ESRI.

NOT FOR CONSTRUCTION

SCALE 0 5km

TO BE READ WITH KLOHN CRIPPEN BERGER REPORT DATED: MARCH 2023

CLIENT: Highland Valley Copper / Teck

PROJECT: TROJAN TAILINGS STORAGE FACILITY
2022 ANNUAL FACILITY PERFORMANCE REPORT

TITLE: MINE SITE PLAN

Klohn Crippen Berger

SCALE	PROJECT No.	FIG No.
AS SHOWN	M02341C42	1

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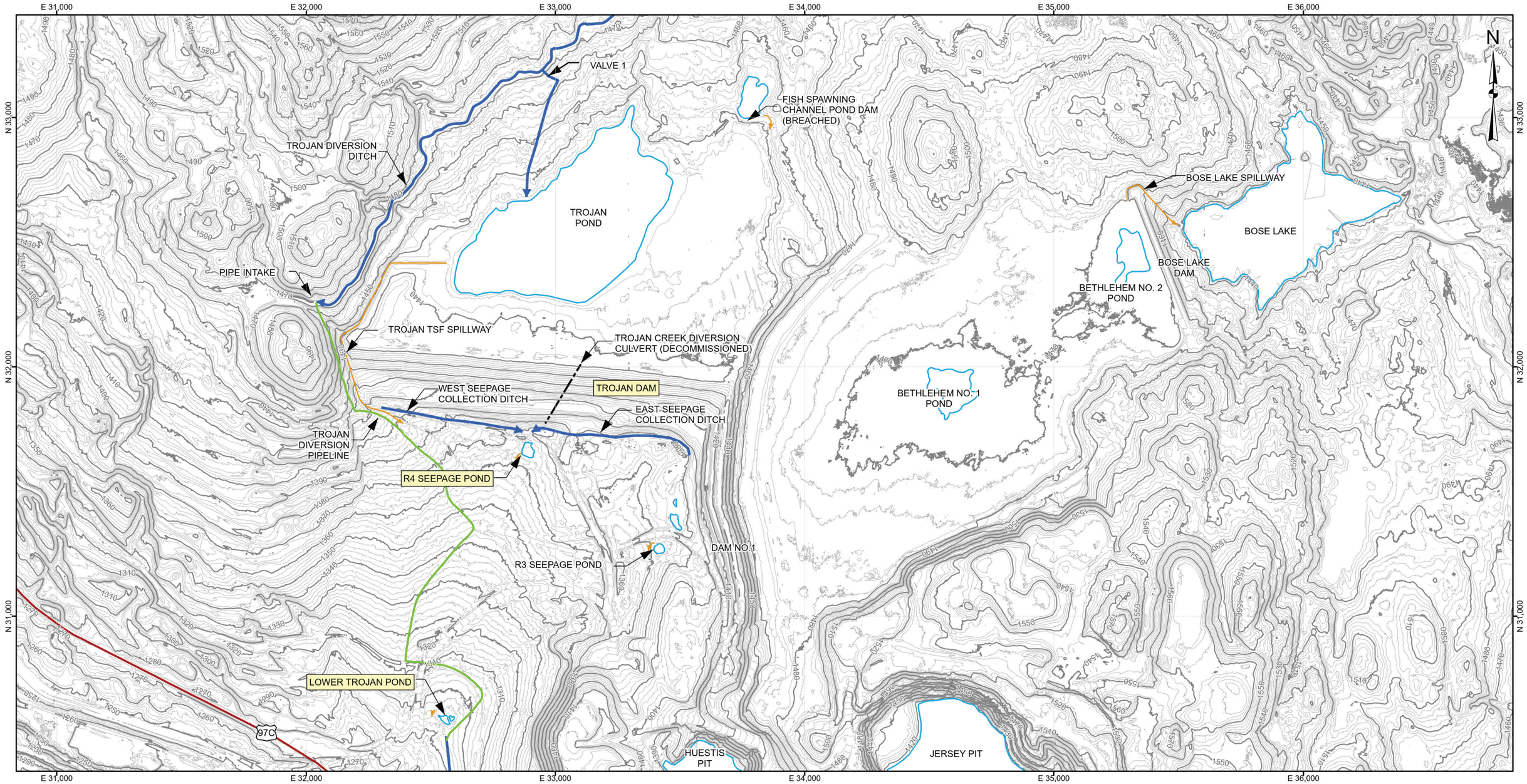

LEGEND

- SPILLWAY
- DITCH
- ABOVE GROUND PIPELINE
- BURIED CULVERT
- HIGHWAY
- WATERBODY

NOTES:

1. PROJECTION: HVC MINE GRID.
2. TSF = TAILINGS STORAGE FACILITY.
3. TOPOGRAPHY FROM HVC, LIDAR FLOWN ON AUGUST 23, 2014.
4. TAILINGS AND SEEPAGE POND EXTENTS BASED ON IMAGERY FROM SEPTEMBER, 2016.

NOT FOR CONSTRUCTION

SCALE 0 500 m

TO BE READ WITH KLOHN CRIPPEN BERGER REPORT DATED: MARCH 2023

CLIENT: Highland Valley Copper / Teck

PROJECT: TROJAN TAILINGS STORAGE FACILITY
2022 ANNUAL FACILITY PERFORMANCE REPORT

TITLE: TROJAN TAILINGS STORAGE FACILITY OVERVIEW

Klohn Crippen Berger

SCALE	PROJECT No.	FIG No.
AS SHOWN	M02341C42	2

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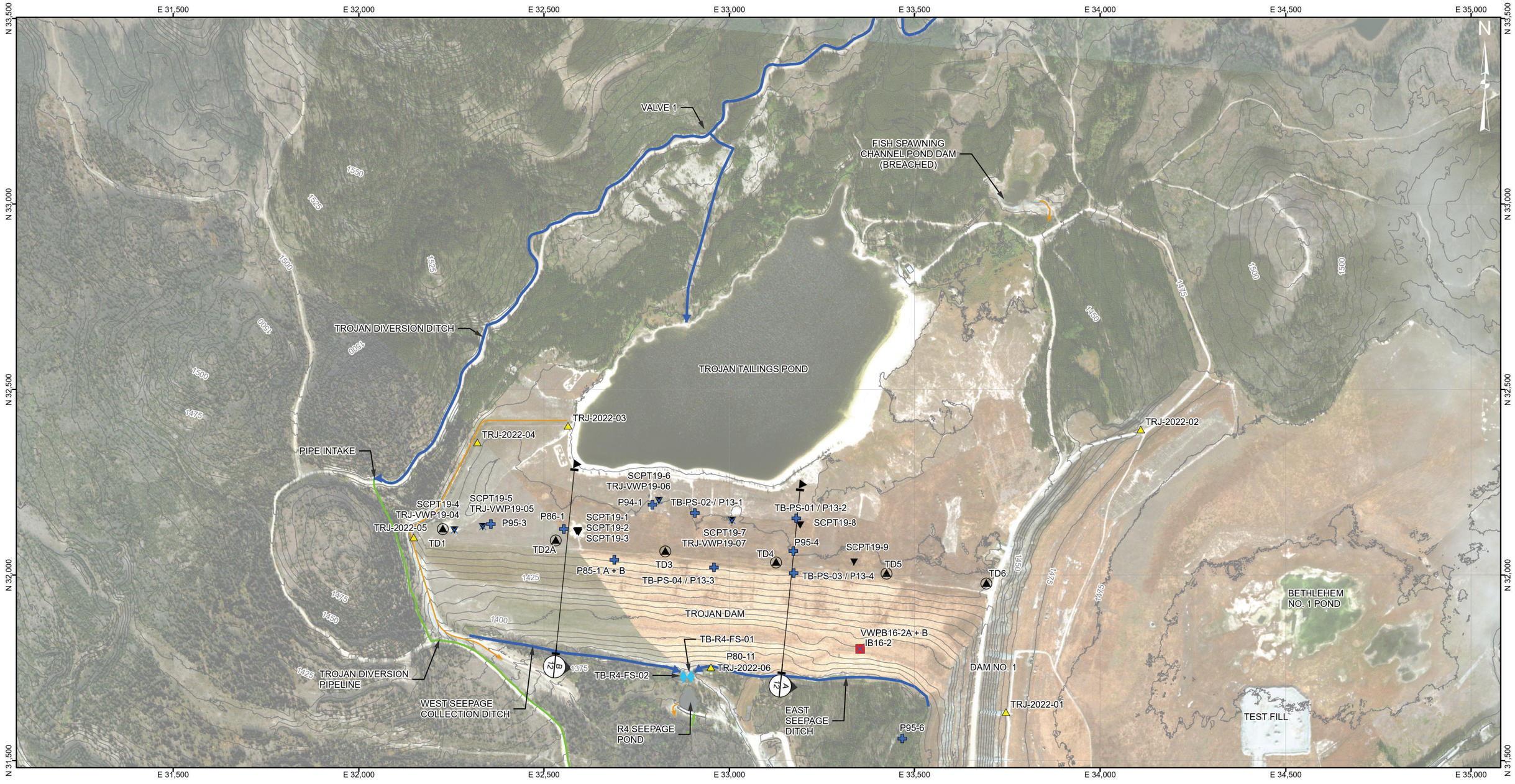

LEGEND

- WAYPOINT (TRJ-2022-xx)

ACTIVE INSTRUMENT

- ELECTRONIC PIEZOMETER (VWP)
- STANDPIPE PIEZOMETER
- MANUAL INCLINOMETER
- CONE PENETRATION TEST (2019)
- WEIR
- SURVEY MONUMENT
- DITCH
- ABOVE GROUND PIPELINE
- SPILLWAY

NOTES:

1. PROJECTION: HVC MINE GRID.
2. IMAGERY FROM HVC OBTAINED SEPTEMBER, 2020, AND OCTOBER, 2021, SUPPLEMENTED WITH IMAGERY FROM ESRI.
3. TOPOGRAPHY FROM HVC, LIDAR FLOWN ON AUGUST 23, 2014.

NOT FOR CONSTRUCTION

TO BE READ WITH KLOHN CRIPPEN BERGER REPORT DATED: MARCH 2023

SCALE 0 250m

CLIENT: Highland Valley Copper / Teck

PROJECT: TROJAN TAILINGS STORAGE FACILITY
2022 ANNUAL FACILITY PERFORMANCE REPORT

TITLE: TROJAN DAM
PLAN

Klohn Crippen Berger

SCALE	PROJECT No.	FIG No.
AS SHOWN	M02341C42	3

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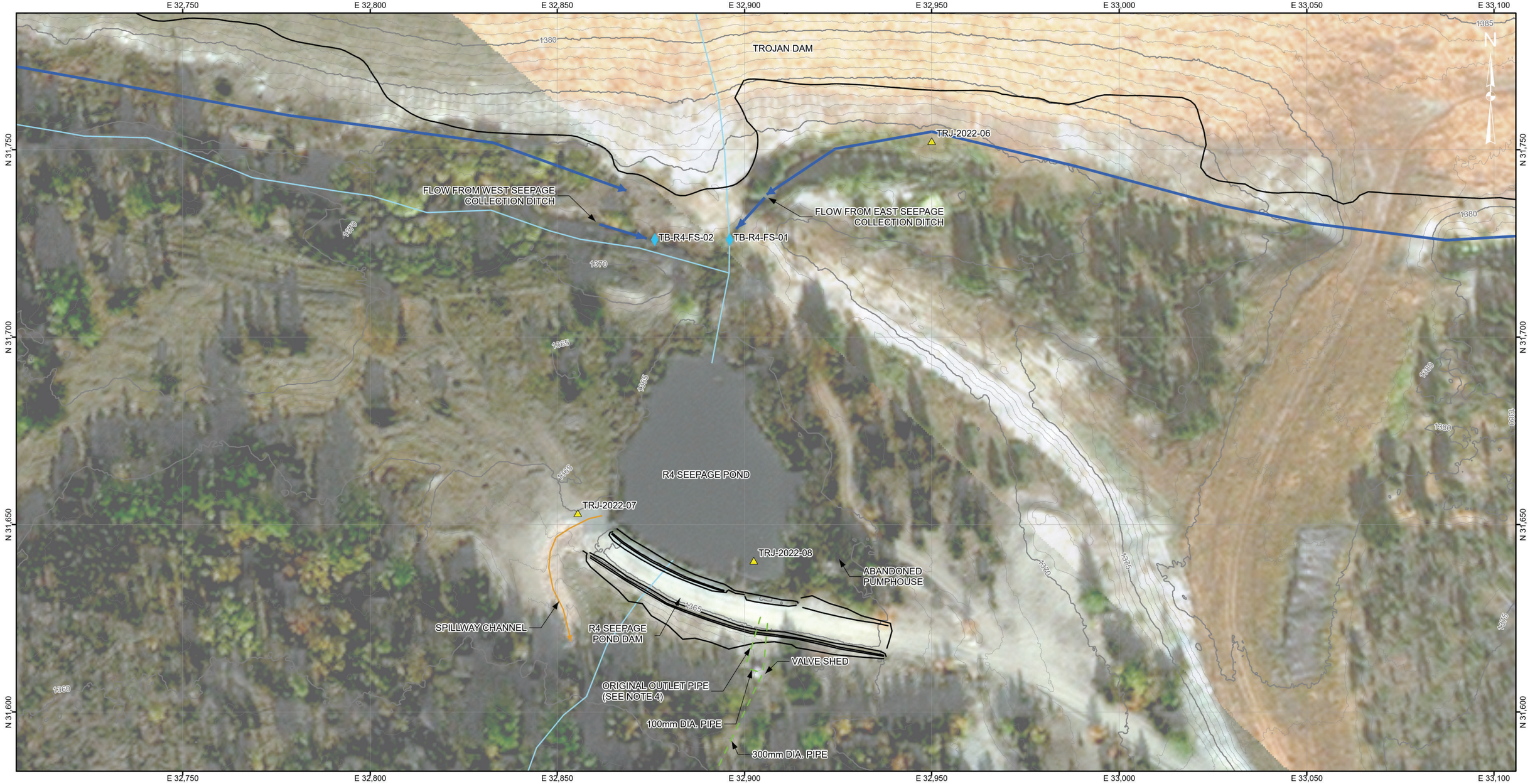

LEGEND

- WAYPOINT (TRJ-2022-xx)
- WEIR
- DITCH
- BURIED PIPE
- SPILLWAY
- DAM

NOTES:

1. PROJECTION: HVC MINE GRID.
2. IMAGERY OBTAINED SEPTEMBER, 2020 AND OCTOBER, 2021.
3. TOPOGRAPHY FROM HVC, LIDAR FLOWN ON AUGUST 23, 2014.
4. THE STATUS OF THE ORIGINAL OUTLET PIPE IS UNKNOWN.
5. LOCATIONS OF BURIED PIPES ARE APPROXIMATE.

NOT FOR CONSTRUCTION

SCALE 0 50m

TO BE READ WITH KLOHN CRIPPEN BERGER REPORT DATED: MARCH 2023

CLIENT: Highland Valley Copper / Teck

Klohn Crippen Berger

PROJECT: TROJAN TAILINGS STORAGE FACILITY
2022 ANNUAL FACILITY PERFORMANCE REPORT

TITLE: R4 SEEPAGE POND DAM
PLAN

SCALE	PROJECT No.	FIG No.
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LEGEND

- WAYPOINT (TRJ-2022-xx)
- WEIR
- SPILLWAY
- DITCH
- ABOVE GROUND PIPELINE
- BURIED PIPE

NOTES:

1. PROJECTION: HVC MINE GRID.
2. IMAGERY OBTAINED OCTOBER, 2021.
3. TOPOGRAPHY FROM HVC, LIDAR FLOWN ON AUGUST 23, 2014.
4. LOCATIONS OF BURIED PIPES ARE APPROXIMATE.

NOT FOR CONSTRUCTION

SCALE 0 25m

TO BE READ WITH KLOHN CRIPPEN BERGER REPORT DATED: MARCH 2023

CLIENT: Highland Valley Copper / Teck

PROJECT: TROJAN TAILINGS STORAGE FACILITY
2022 ANNUAL FACILITY PERFORMANCE REPORT

TITLE: LOWER TROJAN DAM
PLAN

Klohn Crippen Berger

SCALE	PROJECT No.	FIG No.
AS SHOWN	M02341C42	5

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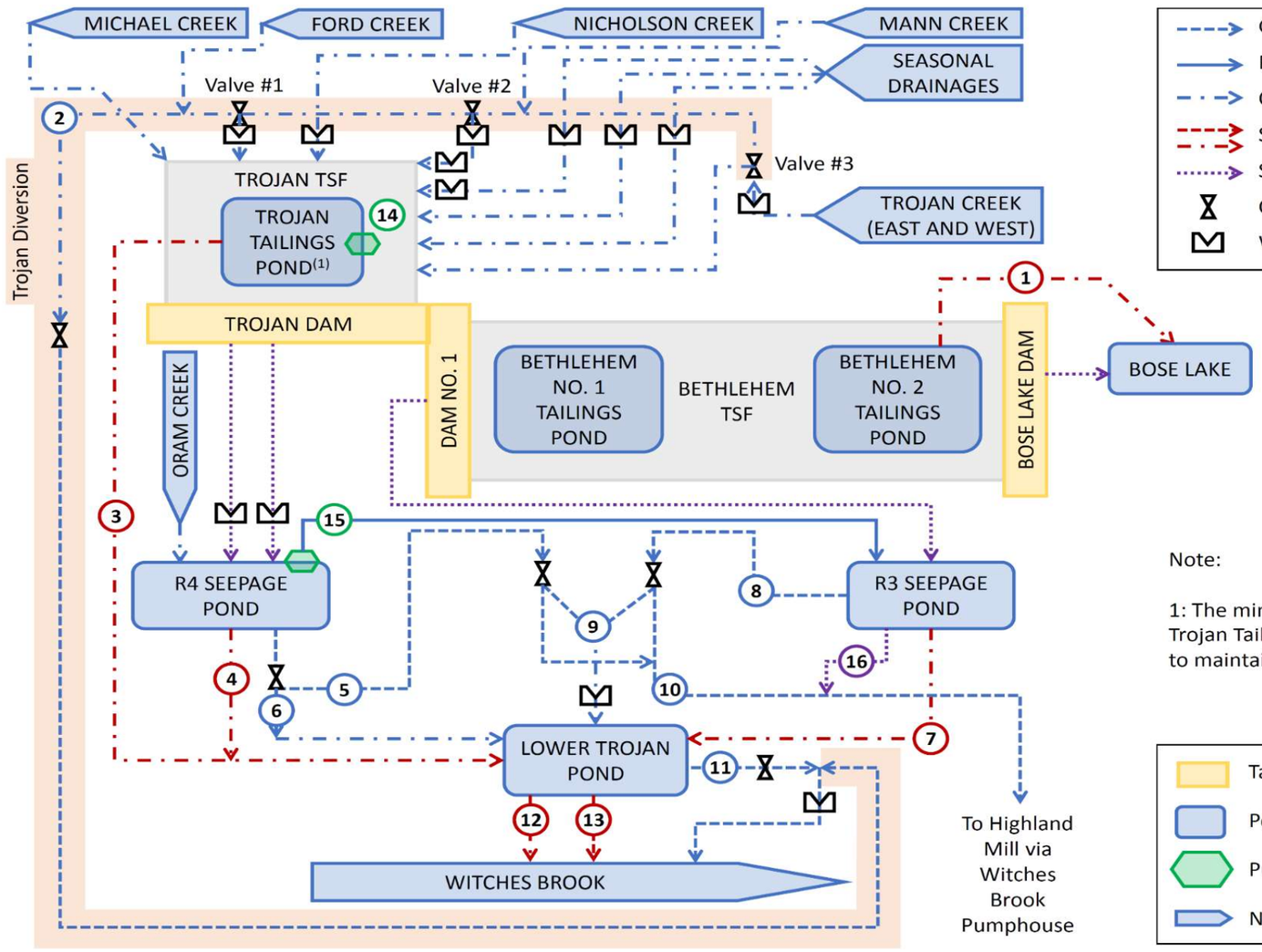

Gravity pipe flow
Pumped pipe flow
Open channel flow
Spillway
Seepage flow
Control valve
Weir

Note:

1: The minimum water level in Trojan Tailings Pond is 1432.1m to maintain fish habitat.

Tailings dam
Pond
Pump(s)
Natural watercourse

No.	Name	Description	Status
1	Bose Lake Spillway	3 m wide channel with concrete sill founded in tailings (3 m wide, vegetated) and natural ground (3 m, riprap-lined)	Operational
2	Trojan Diversion	6.5 km long series of channels, culverts, and pipelines	Operational
3	Trojan Spillway	957 m open channel founded in tailings (5 m wide, vegetated), natural ground (3 m, riprap-lined) and bedrock (3 m)	Operational
4	R4 Spillway	2 m wide riprap-lined channel	Operational
5	R4 Low-Level Outlet	300 mm dia. HDPE pipe with U/S and D/S control valves and intake trash rack	Operational
6	R4 Overflow	100 mm dia. HDPE pipe with U/S control valve	Operational
7	R3 Spillway	2 m wide riprap-lined channel	Operational
8	R3 Low-Level Outlet	460 mm dia. HDPE pipeline with D/S control valve	Operational
9	R3/R4 Seepage to Lower Trojan Pond	Open channel from Valve Box to Lower Trojan Pond	Operational
10	R3/R4 Seepage to Northern Collection Line	10" dia. buried steel pipeline	Operational
11	LTP Low-Level Outlet	460 mm dia. HDPE pipe with valve and intake trash rack	Operational
12	LTP Spillway	7 m wide channel	Operational
13	LTP Overflow	810 mm dia. HDPE pipe	Operational
14	Trojan Pump	Pump for Trojan Tailings Pond	Non-operational
15	R4 Pump to R3 Pond	Steel pipe from R4 Pumphouse discharge to R3 Pond	Non-operational
16	R3 Overland Collector	8"-12" HDPE pipe collecting surface water	Operational

NOT FOR CONSTRUCTION

TO BE READ WITH KLOHN CRIPPEN BERGER REPORT DATED: MARCH 2023

CLIENT: Highland Valley Copper / Teck

Klohn Crippen Berger

PROJECT: TROJAN TAILINGS STORAGE FACILITY
2022 ANNUAL FACILITY PERFORMANCE REPORT

TITLE: FLOW SCHEMATIC FOR BETHLEHEM NO. 1 AND TROJAN TAILINGS STORAGE FACILITIES

SCALE	PROJECT No.	FIG. No.
NTS	M02341C42	6

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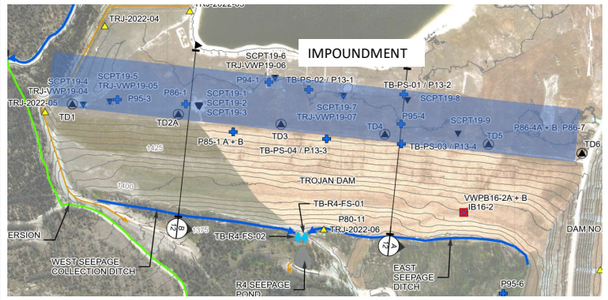
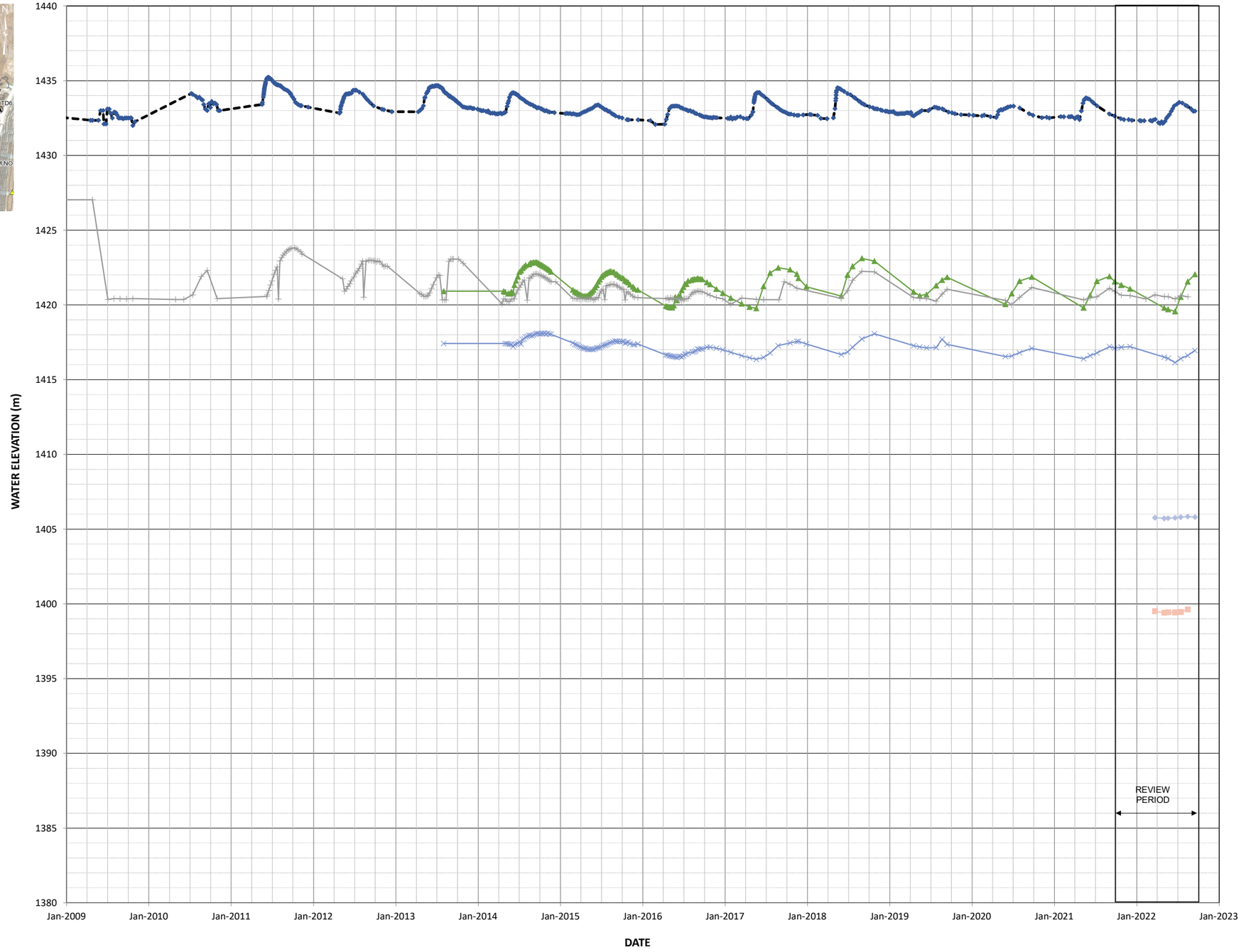


LEGEND:

- TB-PS-02/P13-1 (TIP EL. 1409.5 m, CYCLONED SAND)
- TB-PS-01/P13-2 (TIP EL. 1413.0 m, CYCLONED SAND)
- P94-1 (TIP EL. UNKNOWN m, CYCLONE SAND)
- TRJ-VWP19-06 (TIP EL. 1405.7 m, CYCLONED SAND)
- TRJ-VWP19-07 (TIP EL. 1394.6 m, CYCLONED SAND)
- TROJAN POND LEVEL

PIEZOMETER ID	2022 Notification Level Threshold Value (m)
TB-PS-02/P13-1	1423.4
TB-PS-01/P13-2	1418.6
P94-1	1423.6
TRJ-VWP19-06	NOTE 1
TRJ-VWP19-07	NOTE 1



NOTES:

1. THRESHOLDS WILL BE ESTABLISHED FOR TRJ-VWP19-06 AND TRJ-VWP19-07 AFTER A MINIMUM OF 18 MONTHS OF DATA HAS BEEN COLLECTED SO THAT EXPECTED CONDITIONS ARE ESTABLISHED.
2. SECTIONS A AND B ARE SHOWN ON FIGURE 12.

NOT FOR CONSTRUCTION

TO BE READ WITH KLOHN CRIPPEN BERGER REPORT DATED: MARCH 2023

CLIENT: Highland Valley Copper / Teck

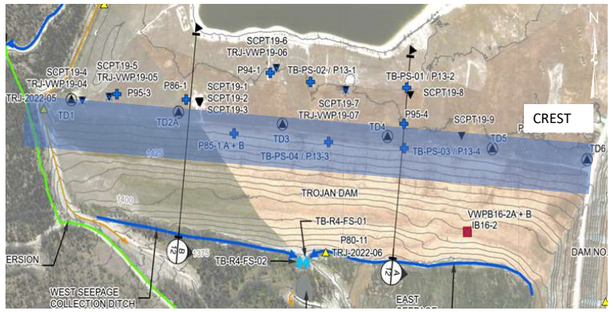
Klohn Crippen Berger

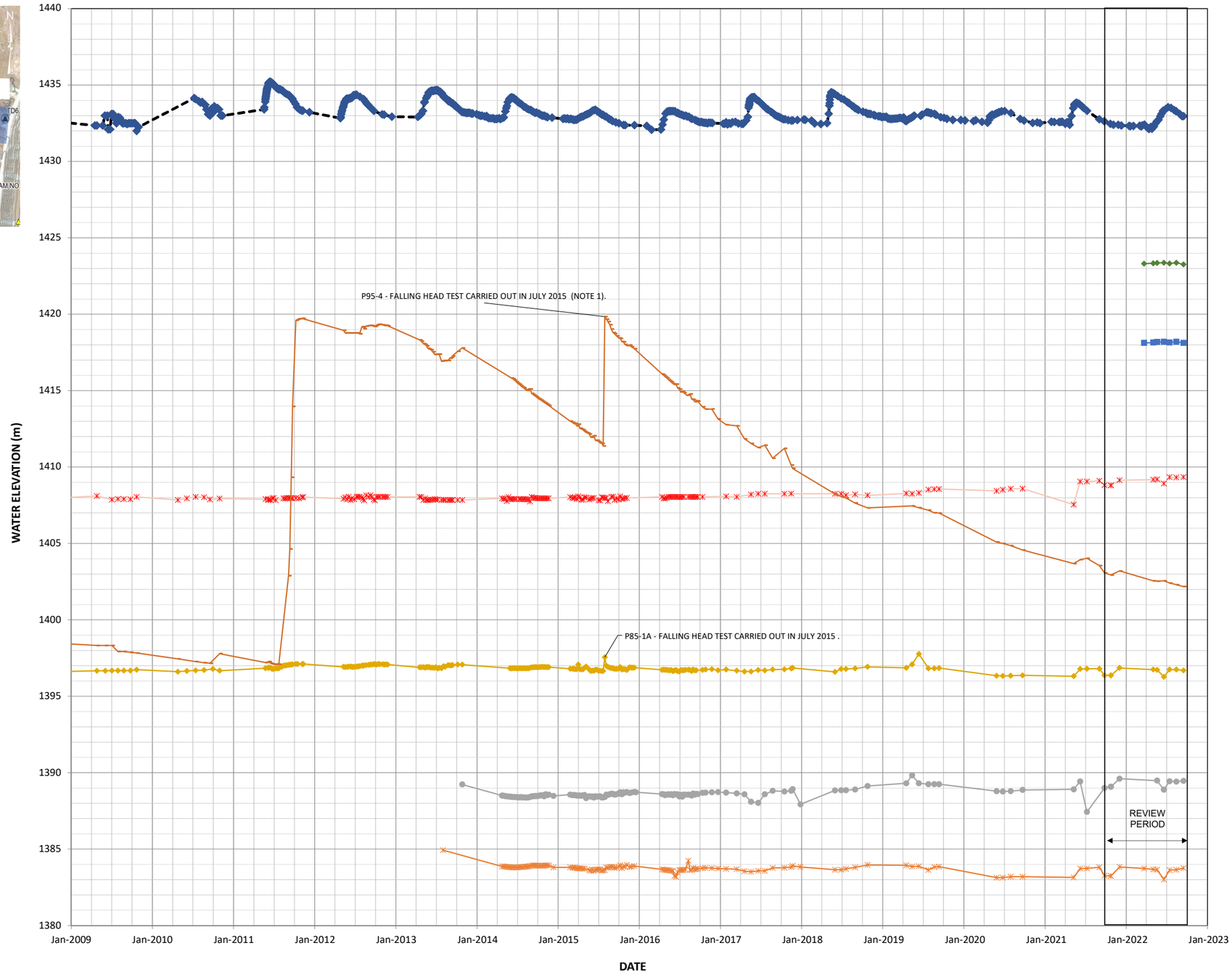
PROJECT: TROJAN TAILINGS STORAGE FACILITY
2022 ANNUAL FACILITY PERFORMANCE REPORT

TITLE: TROJAN DAM PIEZOMETRIC DATA
YEARS 2009 TO 2022
IMPOUNDMENT

PROJECT No. M02341C42

FIG No. 7





LEGEND:

- P85-1A (TIP EL. 1388.1 m, FOUNDATION)
- P86-1 (TIP EL. 1407.7 m, CYCLONED SAND)
- P95-4 (TIP EL. 1389.1 m, CYCLONED SAND)
- TB-PS-04/P13-3 (TIP EL. 1376.2 m, SAND AND GRAVEL)
- TB-PS-03/P13-4 (TIP EL. 1376.6 m, GLACIAL TILL)
- TRJ-VWP19-04 (TIP EL. 1422.2 m, CYCLONED SAND)
- TRJ-VWP19-05 (TIP EL. 1418.0 m, CYCLONED SAND)
- TROJAN POND LEVEL

PIEZOMETER ID	2022 NOTIFICATION LEVEL THRESHOLD VALUE (m)
P85-1A	1399.2
P86-1	1409.6
P95-4	NOTE 1
TB-PS-04/P13-3	1385.4
TB-PS-03/P13-4	1390.5
TRJ-VWP19-04	NOTE 2
TRJ-VWP19-05	NOTE 2

NOTES:

1. P95-4 IS STILL EQUILIBRATING FROM 2015 FALLING HEAD TEST SO NO THRESHOLD HAS BEEN APPLIED. ONCE IT EQUILIBRATES THE INSTRUMENT WILL BE REVIEWED TO CONFIRM WHETHER IT PROVIDES VALUE AND SHOULD BE RETAINED AS SUCH A LONG DRAINAGE PERIOD IS NOT A EXPECTED FOR CYCLONED SAND PIEZOMETER.
2. THRESHOLDS WILL BE ESTABLISHED FOR TRJ-VWP19-04 AND TRJ-VWP19-05 AFTER A MINIMUM OF 18 MONTHS OF DATA HAS BEEN COLLECTED SO THAT EXPECTED CONDITIONS ARE ESTABLISHED.

NOT FOR CONSTRUCTION

TO BE READ WITH KLOHN CRIPPEN BERGER REPORT DATED: MARCH 2023

CLIENT: Highland Valley Copper / Teck

Klohn Crippen Berger

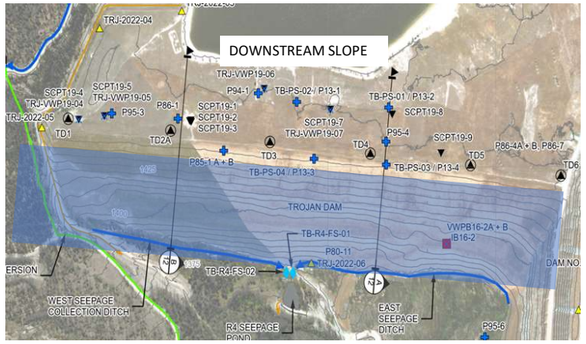
PROJECT: TROJAN TAILINGS STORAGE FACILITY
2022 ANNUAL FACILITY PERFORMANCE REPORT

TITLE: TROJAN DAM PIEZOMETRIC DATA
YEARS 2009 TO 2022
CREST

PROJECT No. M02341C42

FIG No. 8

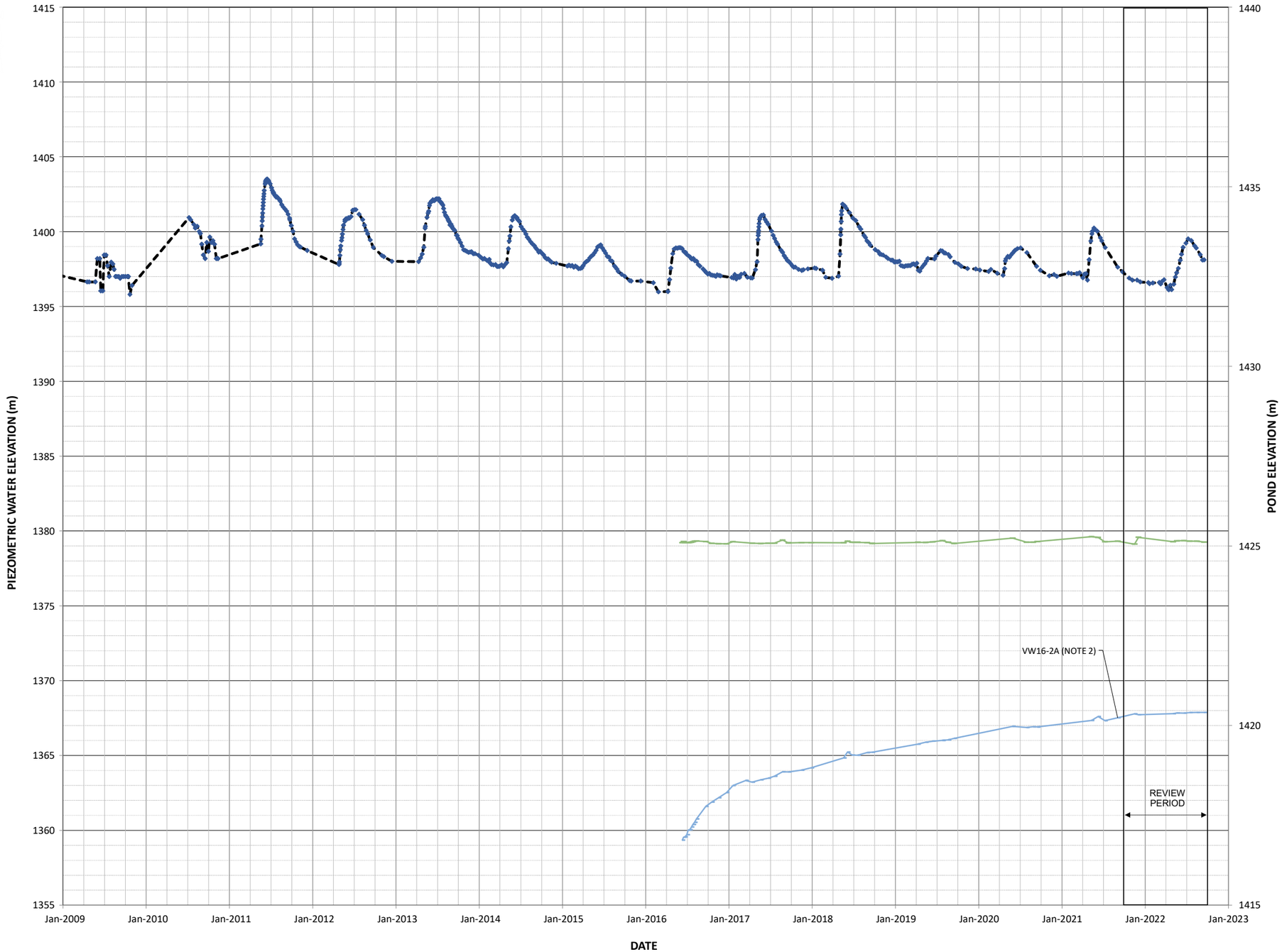
January 13, 2023
\\vrt.klohn.com\Proj\Data\MVCR\M02341C42-HVC-2022 AFPR\700 Deliverables\700 Working\Trojan\Figures\Do Not Issue - For PFD (Fig6)\[211129 - FIG 6- PFD.xlsx]PFD



LEGEND:

- VW16-2A (TIP EL. 1321.9 m, GLACIAL SEDIMENTS / DEBRIS) (NOTE 1)
- VW16-2B (TIP EL. 1373.4 m, GLACIAL TILL) (NOTE 1)
- TROJAN POND LEVEL

PIEZOMETER ID	2022 NOTIFICATION LEVEL THRESHOLD VALUE (m)
VW16-2A	1368.1
VW16-2B	1380.1



NOTES:

1. VW16-2A and 2B STOPPED RECORDING BAROMETRIC PRESSURE AND TEMPERATURE. THE LAST BAROMETRIC PRESSURE AND TEMPERATURE RECORDED WERE USED TO OBTAIN THE WATER ELEVATION.
2. WATER LEVEL IS STILL EQUILIBRATING AFTER INSTALLATION

NOT FOR CONSTRUCTION

TO BE READ WITH KLOHN CRIPPEN BERGER REPORT DATED: MARCH 2023

CLIENT: Highland Valley Copper / Teck

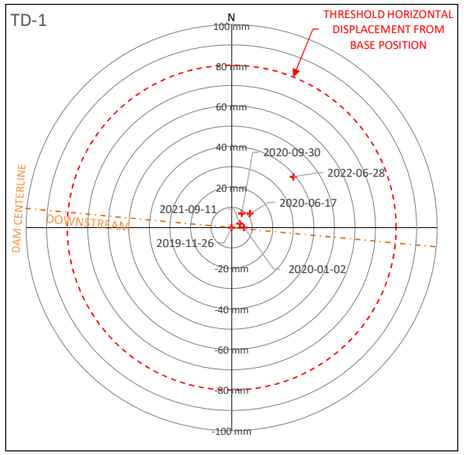
Klohn Crippen Berger

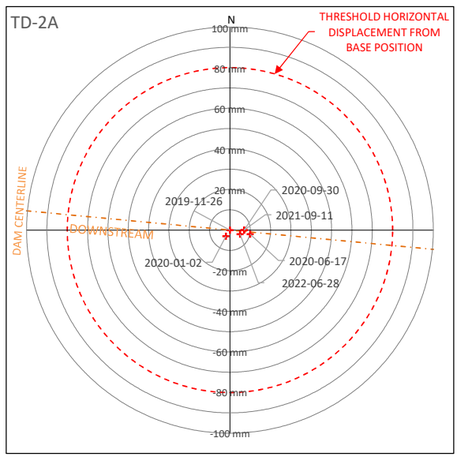
PROJECT: TROJAN TAILINGS STORAGE FACILITY
2022 ANNUAL FACILITY PERFORMANCE REPORT

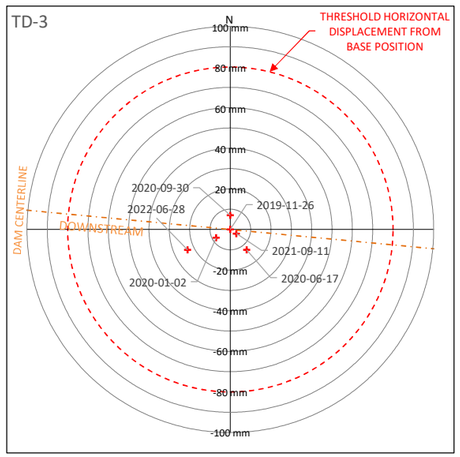
TITLE: TROJAN DAM PIEZOMETRIC DATA
YEARS 2009 TO 2022
DOWNSTREAM SLOPE

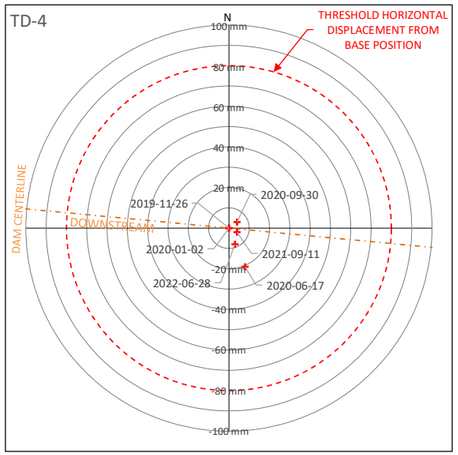
PROJECT No. M02341C42

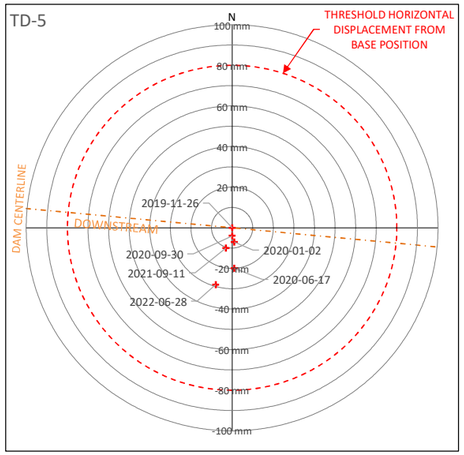
FIG No. 9







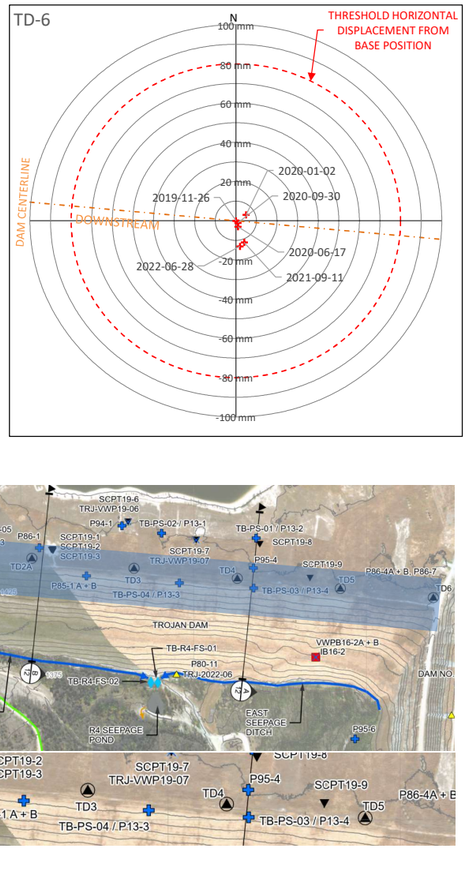




MONUMENT ID	TOTAL STATION SURVEY METHOD THRESHOLDS		
	HORIZONTAL DISPLACEMENT FROM ORIGINAL POSITION (mm)	INCREMENTAL SETTLEMENT BETWEEN READINGS (mm)	TOTAL SETTLEMENT (mm)
TD1	80	20	50
TD2A			50
TD3			100
TD4			100
TD5			75
TD6			75

LEGEND:

- TD-1
- TD-2/TD2A
- TD-3
- TD-4
- TD-5
- TD-6



GENERAL NOTES:

1. SURVEY METHOD SWITCHED FROM TOTAL STATION TO GPS RTK ON NOVEMBER 26, 2019.
2. HORIZONTAL DISPLACEMENT PRIOR TO NOVEMBER 2019 NOT SHOWN. HORIZONTAL DISPLACEMENT BASELINES SET TO NOVEMBER 26, 2019 GPS RTK SURVEY READINGS.
3. REFER TO FIGURE 3 FOR MONUMENT LOCATIONS IN PLAN VIEW.
4. TD-1 RELOCATED AFTER OCTOBER 2001.
5. TD-1 2009 READING (NOT SHOWN IN PLAN PLOT) LOCATED 297 mm FROM INITIAL 1998 READING . READING WAS REVIEWED AND FOUND MORE LIKELY RELATED TO SURVEY ERROR THAN DISPLACEMENT.
6. 2021 SETTLEMENT PLOTTED BY ADDING INCREMENTAL DISPLACEMENT BETWEEN GPS RTK SURVEY READINGS TO CUMULATIVE TOTAL DISPLACEMNENT ON OCTOBER 9, 2019. THIS ASSUMES NO SETTLEMENT OCCURED BETWEEN OCTOBER 9 AND NOVEMBER 12, 2019.

NOT FOR CONSTRUCTION

TO BE READ WITH KLOHN CRIPPEN BERGER REPORT DATED: MARCH 2023

CLIENT: Highland Valley Copper / Teck

Klohn Crippen Berger

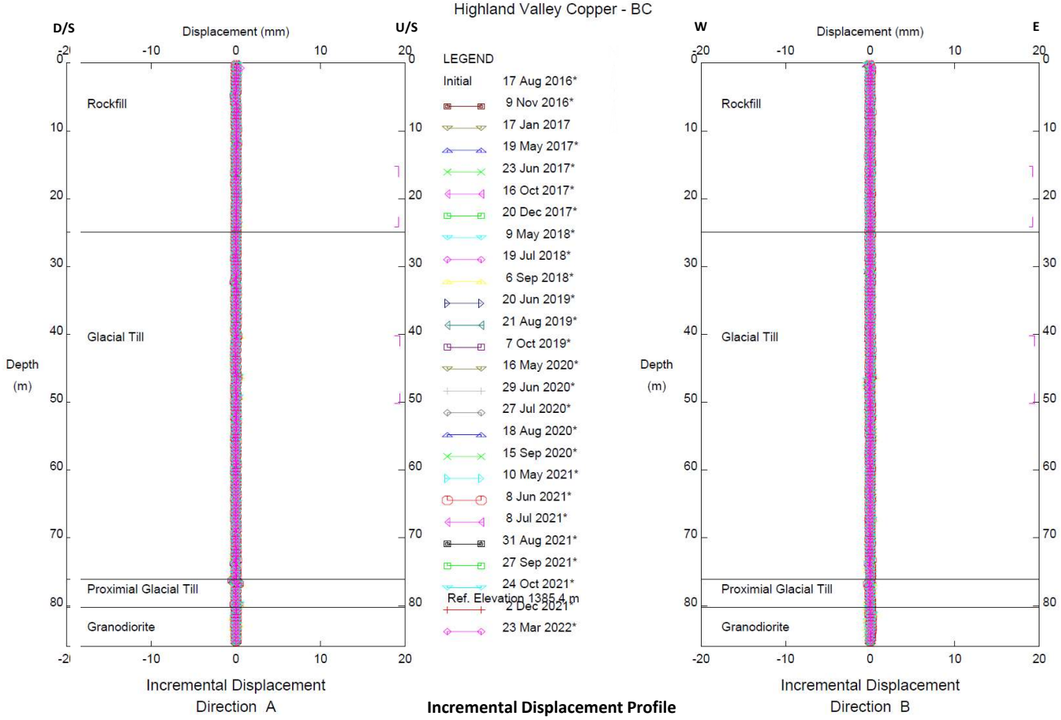
PROJECT: TROJAN TAILINGS STORAGE FACILITY
2022 ANNUAL FACILITY PERFORMANCE REPORT

TITLE: TROJAN DAM
SURVEY MONUMENT READINGS

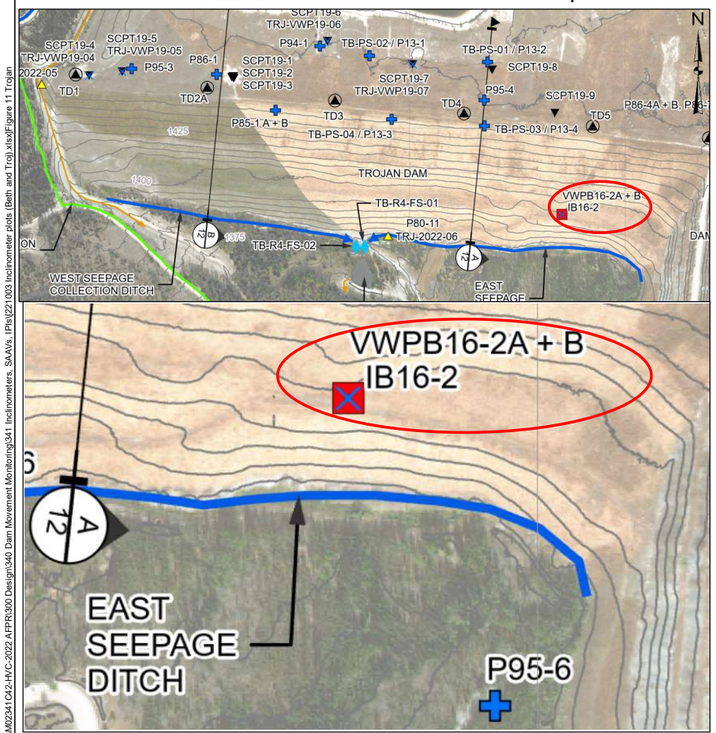
M02341C42

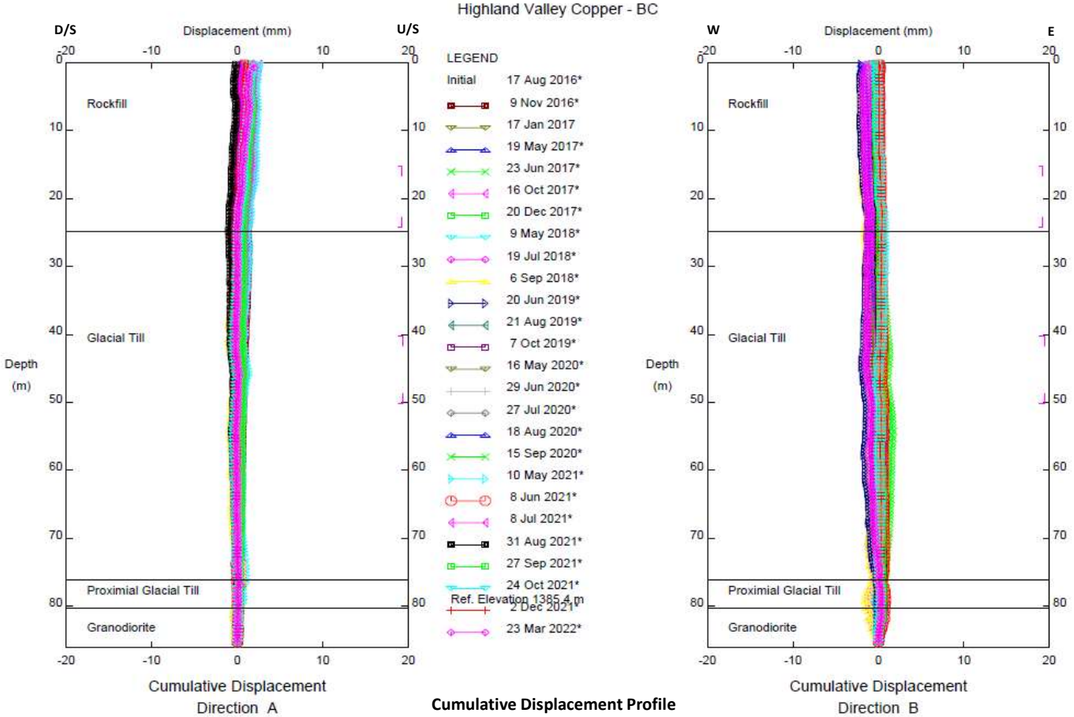
FIG No. 10

January 13, 2023
\\int.klohn.com\Proj\Data\M\VCR\M02341C42-HVC-2022 AFPR\300 Design\340 Dam Movement Monitoring\343 Survey Monuments\Trojan\[220908 TrojanDamMonitoring.xlsm]Fig 10

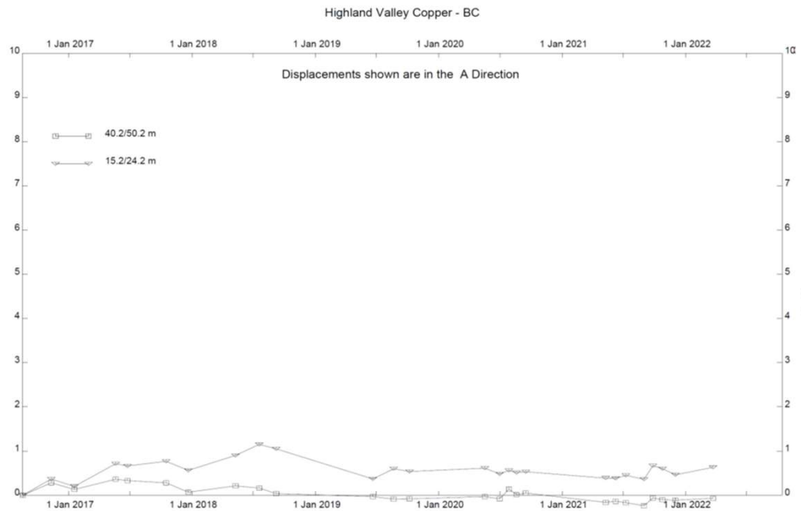


Incremental Displacement Profile

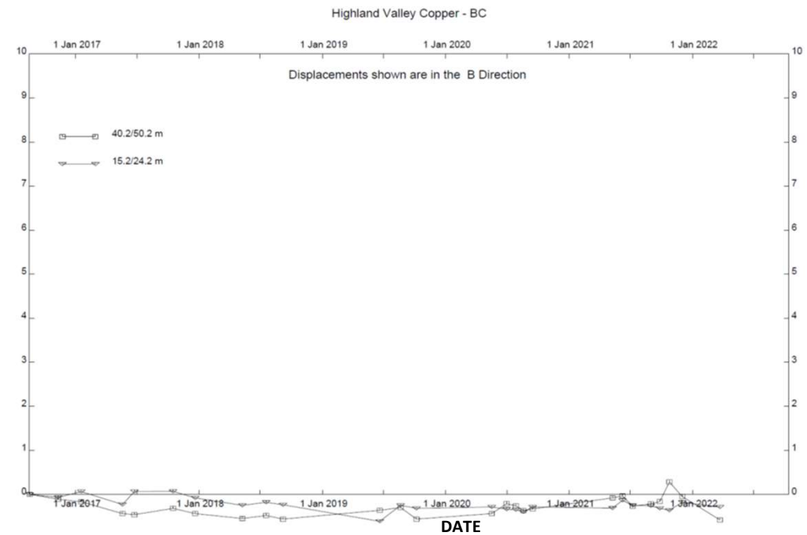




Cumulative Displacement Profile



CUMULATIVE DISPLACEMENT PROFILE VS. TIME IN THE "A" DIRECTION



CUMULATIVE DISPLACEMENT PROFILE VS. TIME IN THE "B" DIRECTION

NOTES:

1. IB16-2 was installed on April 29, 2016.
2. Reel/Probe Serial Number for the initial reading: DR15020000/DP06580000.

NOT FOR CONSTRUCTION

TO BE READ WITH KLOHN CRIPPEN BERGER REPORT DATED: MARCH 2023

CLIENT: Highland Valley Copper / Teck

Klohn Crippen Berger

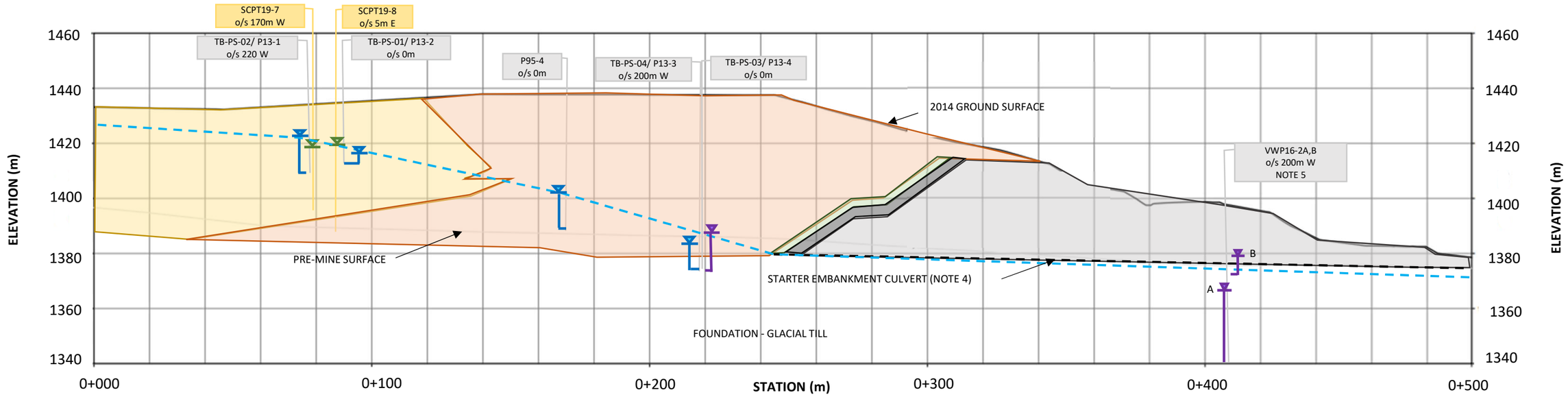
PROJECT: TROJAN TAILINGS STORAGE FACILITY
2022 ANNUAL FACILITY PERFORMANCE REPORT

TITLE: TROJAN DAM
INCLINOMETER DISPLACEMENT PROFILE
IB16-2

PROJECT No. M02341C42

FIG No. 11

January 13, 2023
\\int.klohn.com\ProgData\MVCR\M02341C42-HVC-2022 AFPR\300 Design\340 Dam Movement Monitoring\341 Inclinometers, SAAVs, IPIs\[221003 Inclinometer plots (Beth and Trot).xlsx]Figure 11 Trojan



SECTION A 3 TROJAN DAM

SECTION B 3 TROJAN DAM

NOTES:

1. THE LOCATIONS OF THE INSTRUMENTS OFF THE SECTION ARE APPROXIMATE.
2. DATUM WAS CHANGED FROM MINE GRID TO GCS WGS84 IN 2016.
3. INTERNAL GEOMETRY OF THE TROJAN EMBANKMENT WAS DELINIATED USING DRAWINGS FOUND IN THE FINAL DESIGN REPORT (KL 1987)
4. THERE IS A 24" CULVERT, 250 m TO 300 m LONG (MATERIAL UNKNOWN), BURIED BELOW THE STARTER DAM WHICH WAS USED TO DIVERT CREEK FLOWS DURING STARTER DAM CONSTRUCTION. THE UPSTREAM 15 m OF THE CULVERT WERE PLUGGED WITH CONCRETE PRIOR TO TAILINGS DEPOSITION IN THE IMPOUNDMENT BUT THE REST OF THE PIPE WAS LEFT OPEN.
5. VW16-2A TIP EL. IS 1321.9 m, VW16-2B TIP EL. IS 1373.4 m.

LEGEND

- TAILINGS
- CYCLONE SAND
- SAND AND GRAVEL FILTER
- SELECT ROCKFILL
- STARTER DAM ROCK FILL
- WATER ELEVATION AT FOUNDATION PIEZOMETER (AUG. 2022)
- WATER ELEVATION AT CYCLONE SAND OR FILL PIEZOMETER (AUG. 2022)
- ELEVATION OF PIEZOMETRIC SURFACE FROM CPT IN CYCLONE SAND
- DRY PIEZOMETER / CPT
- INFERRED PIEZOMETRIC LINE - EXISITING

NOT FOR CONSTRUCTION

TO BE READ WITH KLOHN CRIPPEN BERGER REPORT DATED: MARCH 2022

CLIENT: Highland Valley Copper / Teck

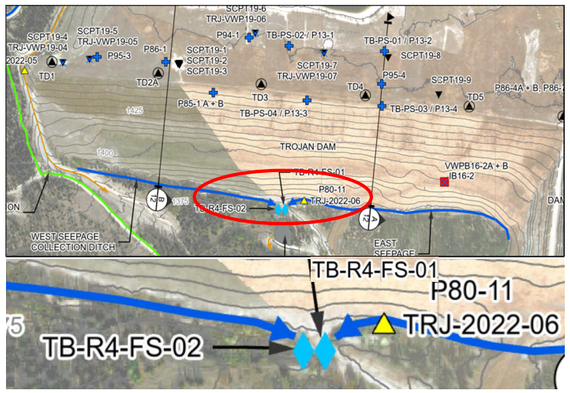
PROJECT: TROJAN TAILINGS STORAGE FACILITY
2022 ANNUAL FACILITY PERFORMANCE REPORT

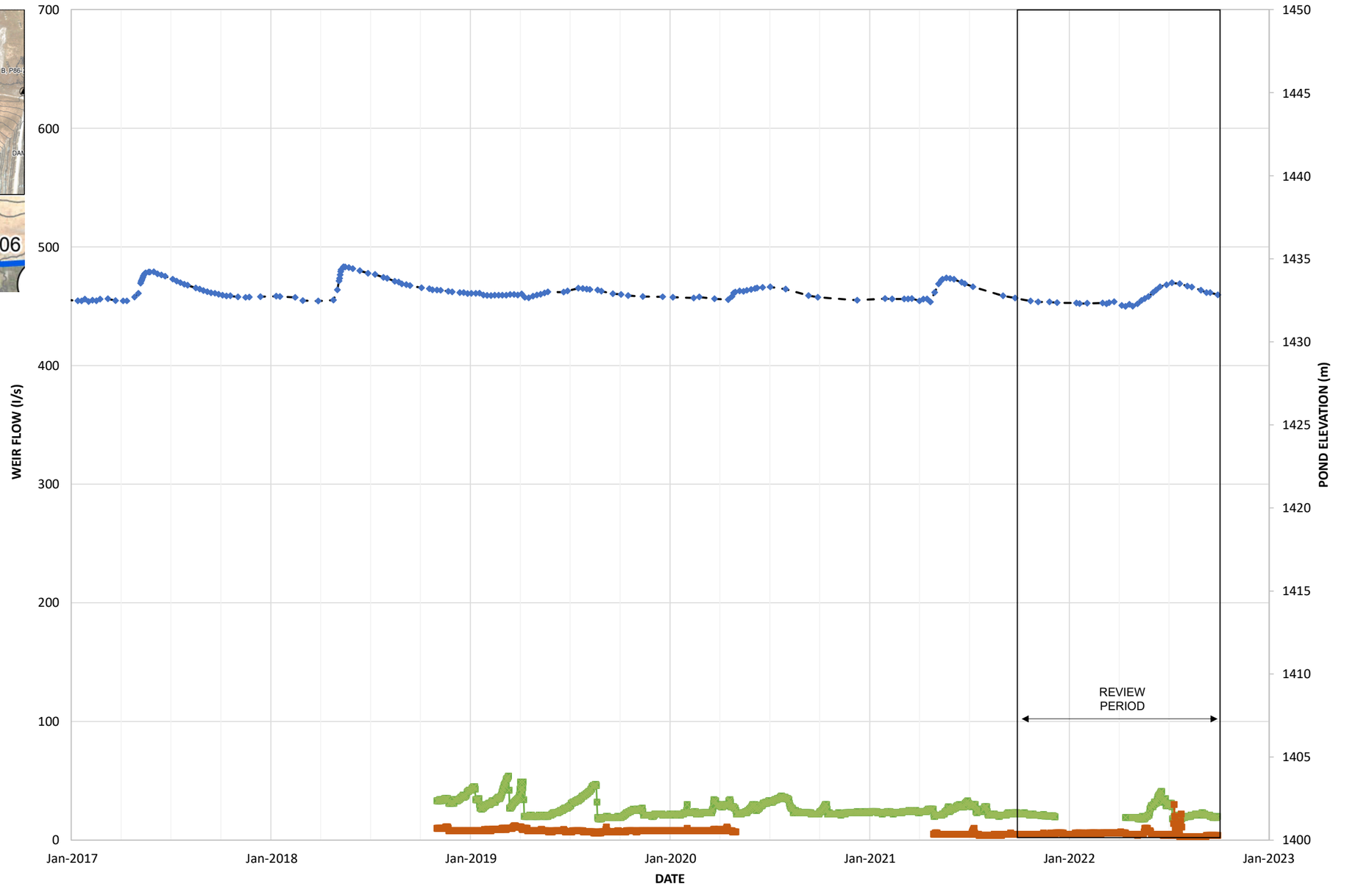
TITLE: TROJAN DAM - INSTRUMENTATION SECTIONS A AND B

Klohn Crippen Berger

SCALE	PROJECT No.	FIG. No.
NTS	M02341C42	12

FILE PATH: \\NT.KLOHN.COM\PROJDATA\MV\CR\M02341C42-HVC-2022 AFPR\300 DESIGN\330 INSTRUMENTATION SECTIONS\TROJAN DAM SECTIONS\230104 FIGURE H-8.XLSX - 2023-01-13 13:23





LEGEND:

- TB-R4-FS-01 - FLOW
- TB-R4-FS-02 - FLOW
- TROJAN POND LEVEL

NOTES

1. PRELIMINARY FLOWS ARE CHECKED ANNUALLY BASED ON ANNUAL WEIR CALIBRATION VERIFICATION.
2. WEIR FLOW PLOTTED ON PRIMARY (LEFT) AXIS, TROJAN POND ELEVATION PLOTTED ON SECONDARY (RIGHT) AXIS

NOT FOR CONSTRUCTION

TO BE READ WITH KLOHN CRIPPEN BERGER REPORT DATED: MARCH 2023

CLIENT: Highland Valley Copper / Teck

Klohn Crippen Berger

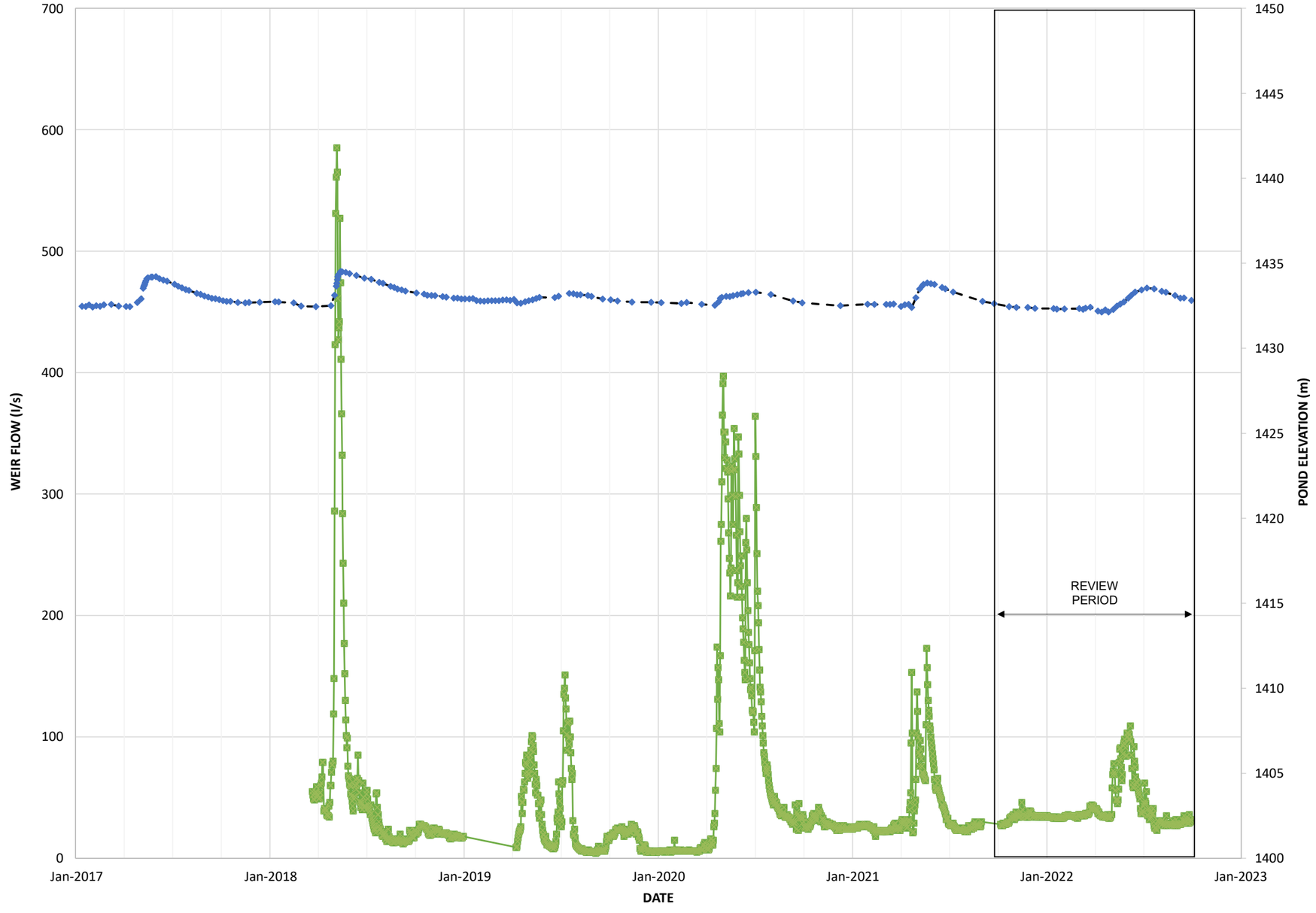
PROJECT: TROJAN TAILINGS STORAGE FACILITY
2022 ANNUAL FACILITY PERFORMANCE REPORT

TITLE: R4 SEEPAGE POND WEIR FLOWS

PROJECT No. M02341C42

FIG No. 13

January 27, 2023
\\int.klohn.com\Proj\Data\M\VCR\M02341C42-HVC-2022 AFPR\300 Design\950 Seepage Data\[230127 Master Sheet_LEGACY.xlsx]TRJ Fig 14 - R4



LEGEND:

- TB-LT-FS-01 - FLOW
- TROJAN POND LEVEL

NOTES:

1. PRELIMINARY FLOWS ARE CHECKED ANNUALLY BASED ON ANNUAL WEIR CALIBRATION VERIFICATION.
2. WEIR FLOW PLOTTED ON PRIMARY (LEFT) AXIS, TROJAN POND ELEVATION PLOTTED ON SECONDARY (RIGHT) AXIS

NOT FOR CONSTRUCTION

TO BE READ WITH KLOHN CRIPPEN BERGER REPORT DATED: March 2023

CLIENT: Highland Valley Copper / Teck

Klohn Crippen Berger

PROJECT: TROJAN TAILINGS STORAGE FACILITY
2022 ANNUAL FACILITY PERFORMANCE REPORT

TITLE: LOWER TROJAN DAM
WEIR FLOWS

PROJECT No. M02341C42

FIG No. 14

January 27, 2023
\\Int.klohn.com\ProjData\MVCRIM\02341C42-HVC-2022 AFPR\300 Design\350 Seepage Data\230127 Master Sheet_LEGACY.xlsx]TRJ Fig 14 - R4

APPENDIX I

Annual Facility Performance Report
Site Visit Checklists, Observations, and Photographs

APPENDIX I-A

Trojan Dam

Site Visit Checklist, Observations, and Photographs

Appendix I-A
Site Visit Checklist, Observations and Photographs
Trojan Dam

SITE VISIT CHECKLIST

Facility:	Trojan Dam	**Inspection Date:**	July 14, 2022
Consequence Classification:	Very High		
Weather:	Sunny	**Inspector(s):**	Rick Friedel, P.Eng. Cheryl Torres
Freeboard (pond level to dam crest):	7.45 m, based on the July 8th, 2022 pond survey.		

Outlet Condition Survey

Description	Outlet Controls?	Was it Flowing?	Flow rate
Spillway Channel	N/A	☐ Yes ☒ No	N/A

Are the following components of your dam in ***SATISFACTORY CONDITION***?

(check one if applicable)

EMBANKMENT	Yes/No	SPILLWAY	Yes/No
U/S Beach	☒ Yes ☐ No	Debris Boom	☒ Yes ☐ No
Crest	☒ Yes ☐ No	Entrance	☒ Yes ☐ No
D/S Slope	☒ Yes ☐ No	Channel	☒ Yes ☐ No
D/S Toe	☒ Yes ☐ No	Channel Slopes	☒ Yes ☐ No
Drains	☒ Yes ☐ No		

Were any of the following ***POTENTIAL PROBLEM INDICATORS*** found?

INDICATOR	EMBANKMENT	SPILLWAY
Piping	☐ Yes ☒ No	☐ Yes ☒ No
Sinkholes	☐ Yes ☒ No	☐ Yes ☒ No
Seepage	☐ Yes ☒ No	☐ Yes ☒ No
External Erosion	☐ Yes ☒ No	☐ Yes ☒ No
Cracks	☐ Yes ☒ No	☐ Yes ☒ No
Settlement	☐ Yes ☒ No	☐ Yes ☒ No
Sloughing/Slides	☐ Yes ☒ No	☐ Yes ☒ No
Animal Activity	☐ Yes ☒ No	☐ Yes ☒ No
Excessive Growth	☐ Yes ☒ No	☐ Yes ☒ No
Excessive Debris	☐ Yes ☒ No	☐ Yes ☒ No

List and describe any deficiencies (all deficiencies require assessment and/or repair):

- No dam safety deficiencies were observed.
- Vegetation growth in spillway channel upstream of bedrock chute which was observed during the AFPR site visit includes seasonal growth. HVC scrubbed the bushes and cut the grass along the base of the spillway channel as part of routine maintenance after the site visit.

SITE VISIT OBSERVATIONS

Crest

Crest was observed to be in good physical condition with no indication of erosion or deterioration. Local low points (<1 m) and "hummocky" surface were observed. These features are believed to be related to both tailings deposition and grading for land reclamation. Freeboard is uncompromised by these features.

Left Abutment

There was no observation of excessive scour damage or visual evidence that road has been cut down, impacting freeboard and minimum beach width under peak flood.

Right Abutment

The right abutment was observed to be in good physical condition with no sign of deterioration or erosion. Spillway channel is excavated through bedrock and Glacial Till material, parallel to the dam abutment.

No notable visual change to surface erosion area near crest, at most western portion of the crest, initially referenced during 2018 Annual Facility Performance Review.

Downstream Slope

Downstream slope is well vegetated with grass and has no observed locations of concern or signs of adverse displacement (Photo I-A-1).

Toe Collection Ditches

Extensive vegetation was observed along the toe which provides a measure of erosion protection. Clear and turbidity-free seepage flow was observed through ditches and weirs. Weirs were observed to be in good condition with no sign of obstructions in either toe collection ditches.

Our limited inspection indicated that the outlet of the culvert below the starter dam is buried by existing dam slope and is likely covered during reclamation. Regardless, no evidence of potential issues of concern were observed in area (e.g., sinkholes or turbid seepage).

Seepage

No seepage was observed from the dam face, but seepage flow from underdrain was reporting to toe ditch. This observation is consistent with historical performance and design intent.

Tailings Beach and Pond

No issues of concern were observed during the site vise. Elevation of the vegetated portion of the beach is approximately 2 m above the reservoir level (Photo I-A-2 to Photo I-A-4).

There was no indication of recent high-water levels where the pond has encroached into spillway approach channel or onto reclaimed beach surface (Photo I-A-3 and Photo I-A-4).

Spillway Inlet and Approach Channel

The debris boom was observed to be secured in place, with no obstructions present besides minor vegetation. Spillway inlet was observed to be in good condition with no signs of deterioration (Photo I-A-4 and Photo I-A-5).

Spillway Channel

Following the first bend in the channel, the vegetated Glacial Till channel transitions to a bedrock excavated channel at the right abutment of the dam (Photo I-A-6). At the time of the site visit, grass and bushes were observed to have covered the base of the spillway channel.

- HVC provided photographs taken after the site visit showing that they had scrubbed the bushes and cut the grass along the base of the channel as part of routine maintenance.

Spillway channel riprap increases in size as the channel grade steepens towards the outfall. No major obstructions or deterioration were observed along the channel (Photo I-A-7).

No notable change to the surface erosion scour at the riprap section of Trojan Dam spillway. The scour was initially observed during 2018 Annual Facility Performance Review. No active seepage faces, or new erosion features were observed.

Trojan Diversion

Not visited during 2022 AFPR site visit.

SITE VISIT PHOTOGRAPHS

LEGEND:

- TRJ = Trojan Tailings Facility
- TRJ-2022-## refers to 2022 AFPR waypoint shown on Figure 3
- All photographs taken during inspection on July 14, 2022

Photo I-A-1 Overview of Trojan Tailings Pond and Trojan Dam downstream slopes from the Bethlehem Dam crest. No observations of visible erosion or scour (TRJ-2022-01)

Photo I-A-2 Overview of Trojan Tailings Pond and tailings beach (TRJ-2022-02)

Photo I-A-3 Overview of Trojan Tailings Pond and vegetation-free perimeter beach (TRJ-2022-03)

Photo I-A-4 View of Trojan spillway inlet. KCB observed that the approach channel was clear and debris boom was secured (TRJ-2022-03)

Photo I-A-5 View of Trojan spillway approach channel looking downstream (TRJ-2022-03)

Photo I-A-6 Upper segment of spillway downstream of approach channel, looking toward southwest (top) and looking toward northeast (bottom). HVC provided a photograph to show that vegetation was cleared after site visit. (TRJ-2022-04)

Photo I-A-7 Overview of spillway channel downstream of rock chute, near transition to riprap segment, looking toward south (top) and looking north (bottom). (TRJ-2022-05)

Photo I-A-8 Place where outlet of culvert below starter dam should be located. Culvert outlet was not seen which suggests it is now buried, likely during reclamation. No issues of concern were observed in area. (TRJ-2022-06)

APPENDIX I-B

R4 Seepage Pond Dam

Site Visit Checklist, Observations, and Photographs

Appendix I-B
Site Visit Checklist, Observations and Photographs
R4 Seepage Pond Dam

SITE VISIT CHECKLIST

Facility:	Trojan R4 Seepage Pond Dam	**Inspection Date:**	July 14, 2022
Weather:	Sunny	**Inspector(s):**	Rick Friedel, P.Eng. Cheryl Torres
Freeboard (pond level to dam crest):	0.95 m, based on maximum water elevations on July 8th from GeoExplorer		

Outlet Condition Survey

Description	Outlet Controls?	Was it flowing?	Flow rate	Visual Review?	Testing / Detailed Inspection?
Low Level Outlet	☒ Yes ☐ No	☒ Yes ☐ No	Not estimated	☒ Yes ☐ No	☐ Yes ☒ No
Spillway Channel	☐ Yes ☒ No	☐ Yes ☒ No	None	☒ Yes ☐ No	N/A
Original Outlet Pipe	N/A	☐ Yes ☒ No	N/A	☐ Yes ☒ No	☐ Yes ☒ No

Are the following components in ***SATISFACTORY CONDITION***?
(check one if applicable)

EMBANKMENT	Yes/No	LOW LEVEL OUTLET	Yes/No	SPILLWAY CHANNEL	Yes/No
U/S Slope	☒ Yes ☐ No	Outlet Pipe	☒ Yes ☐ No	Entrance	☒ Yes ☐ No
Crest	☒ Yes ☐ No	Outlet Channel	☒ Yes ☐ No	Channel	☒ Yes ☐ No
D/S Slope	☒ Yes ☐ No	Outlet Controls	☒ Yes ☐ No	Channel Slopes	☒ Yes ☐ No
D/S Toe	☒ Yes ☐ No				

ORIGINAL OUTLET PIPE	Yes/No
Entrance	☒ Yes ☐ No
Pipe	☒ Yes ☐ No

Were any of the following ***POTENTIAL PROBLEM INDICATORS*** found?

INDICATOR	EMBANKMENT	LOW LEVEL OUTLET	SPILLWAY CHANNEL
Piping	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No
Sinkholes	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No
Seepage	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No
Erosion	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No
Cracks	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No
Settlement	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No
Sloughing/Slides	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No
Animal Activity	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No
Excessive Growth	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No
Excessive Debris	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No

List and describe any deficiencies:
- No dam safety deficiencies were observed.

SITE VISIT OBSERVATIONS

Crest

No observed signs of deterioration, lateral movement, or cracking (Photo I-B-1).

Left and Right Abutments

Little vegetation at abutments. No signs of deterioration observed.

Downstream Slope

Tall grass and vegetation observed. No signs of deterioration or erosion (Photo I-B-2).

Pond

During site visit, the pond water level was observed to be approximately >0.5 m below the spillway invert which is typical for this time of the year (Photo I-B-3 and Photo I-B-5).

Spillway

No observed signs of recent flow, channel erosion, or deterioration. Minor vegetation present in the spillway inlet which is not a concern at this time (Photo I-B-3).

Low-level Outlet

Inlet was clear of major debris and log-boom in place (Photo I-B-5). The valve cannot be hand turned. The need to close the valve is not a critical control for the structure but HVC may want to fix the valve for routine operations.

Seepage

No observed signs of seepage during inspection.

SITE VISIT PHOTOGRAPHS

LEGEND:

- TRJ = Trojan Tailings Facility
- TRJ-2022-## refers to 2022 Annual Facility Performance Report (AFPR) waypoint shown on Figure 4
- All photographs taken during inspection on July 22, 2022

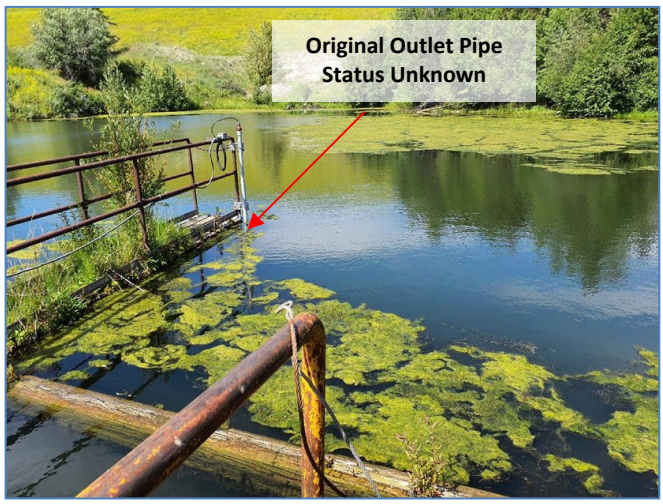
Photo I-B-1 Overview of R4 Seepage Pond Dam crest and downstream slope looking towards left abutment (TRJ-2022-07)

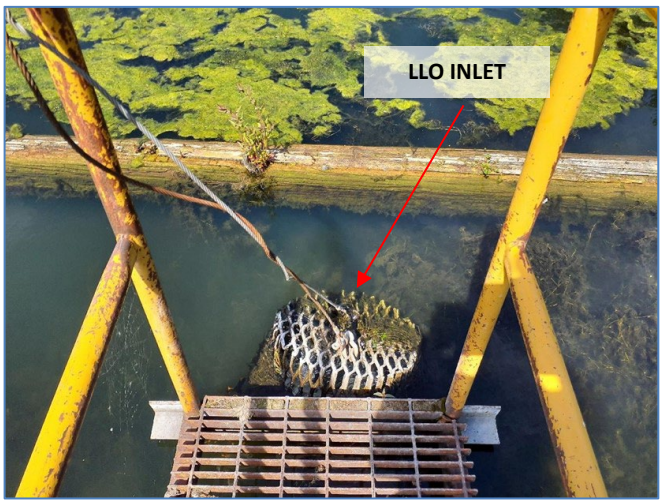
Photo I-B-2 Overview of downstream slope looking towards left abutment (TRJ-2022-07)

Photo I-B-3 Overview of pond and spillway inlet which has vegetation debris that will be removed during routine maintenance (TRJ-2022-07)

Photo I-B-4 Spillway Channel downstream of crest. Seasonal growth (grass) in present in the channel but is downstream of inlet and does not impact peak pond level in the reservoir (TRJ-2022-07)

Photo I-B-5 Overview of the pond and LLO inlet which had minor debris that was cleared during inspection (TRJ-2022-08)





APPENDIX I-C

Lower Trojan Dam
Site Visit Checklist, Observations, and Photographs

Appendix I-C
Site Visit Checklist, Observations and Photographs
Lower Trojan Dam

SITE VISIT CHECKLIST

Facility:	Lower Trojan Dm	**Inspection Date:**	July 14, 2022
Weather:	Sunny	**Inspector(s):**	Rick Friedel, P.Eng. Cheryl Torres
Freeboard (pond level to dam crest):	1.35 m, based on maximum water elevations on July 14th GeoExplorer		

Outlet Condition Survey

Description	Outlet Controls?	Was it flowing?	Flow rate	Visual Review?	Testing / Detailed Inspection?
460 mm HDPE Outlet to Weir	☒ Yes ☐ No	☒ Yes ☐ No	Not Estimated	☒ Yes ☐ No	☐ Yes ☒ No
200 mm HDPE Low Level Outlet	N/A	N/A	Decommissioned	N/A	N/A
810 mm HDPE Spillway Pipe	☐ Yes ☒ No	☐ Yes ☒ No	N/A	☒ Yes ☐ No	N/A
Spillway Channel	N/A	☐ Yes ☒ No	N/A	☒ Yes ☐ No	N/A

Are the following components in ***SATISFACTORY CONDITION***?
(check one if applicable)

EMBANKMENT	Yes/No	OUTLET TO WEIR	Yes/No	LOW LEVEL OUTLET	Yes/No
U/S Slope	☒ Yes ☐ No	Outlet Pipe	☒ Yes ☐ No	Outlet Pipe	☒ Yes ☐ No
Crest	☒ Yes ☐ No	Outlet Channel	☒ Yes ☐ No	Outlet Channel	☒ Yes ☐ No
D/S Slope	☒ Yes ☐ No	Outlet Controls	☒ Yes ☐ No	Outlet Controls	☒ Yes ☐ No
D/S Toe	☒ Yes ☐ No				

SPILLWAY PIPE	Yes/No	SPILLWAY CHANNEL	Yes/No
Entrance	☒ Yes ☐ No	Entrance	☒ Yes ☐ No
Pipe	☒ Yes ☐ No	Channel	☒ Yes ☐ No
		Channel Slopes	☒ Yes ☐ No

Were any of the following ***POTENTIAL PROBLEM INDICATORS*** found?

INDICATOR	EMBANKMENT	LOW LEVEL OUTLET (Decommissioned)	OUTLET TO WEIR
Piping	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No
Sinkholes	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No
Seepage	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No
Erosion	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No
Cracks	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No
Settlement	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No
Sloughing/Slides	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No
Animal Activity	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No
Excessive Growth	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No
Excessive Debris	☐ Yes ☒ No	☐ Yes ☒ No	☒ Yes ☐ No

INDICATOR	SPILLWAY PIPE	SPILLWAY CHANNEL
Piping	☐ Yes ☒ No	☐ Yes ☒ No
Sinkholes	☐ Yes ☒ No	☐ Yes ☒ No
Seepage	☐ Yes ☒ No	☐ Yes ☒ No
Erosion	☐ Yes ☒ No	☐ Yes ☒ No
Cracks	☐ Yes ☒ No	☐ Yes ☒ No
Settlement	☐ Yes ☒ No	☐ Yes ☒ No
Sloughing/Slides	☐ Yes ☒ No	☐ Yes ☒ No
Animal Activity	☐ Yes ☒ No	☐ Yes ☒ No
Excessive Growth	☐ Yes ☒ No	☐ Yes ☒ No
Excessive Debris	☐ Yes ☒ No	☐ Yes ☒ No

List and describe any deficiencies:

- No dam safety deficiencies observed.

SITE VISIT OBSERVATIONS

Crest

Crest is uneven and rises towards the spillway (Photo I-C-1). No visible sign of distress or concern. More than 80% of the crest surface was covered with short bushes and grass. No signs of erosion, deterioration, or cracking were observed.

Left and Right Abutment

Good physical condition. There was no sign of concentrated or progressing erosion observed.

Downstream Slope

Good physical condition. Approx. 10% of the slope near the downstream toe was covered with vegetation (Photo I-C-2). No signs of erosion or deterioration were observed. HDPE spillway pipe does not have a defined channel or means of toe erosion protection. However, no signs of toe erosion or scour were observed (Photo I-C-3).

Impoundment and Pond

Pond level >0.5 m below the invert of spillway pipe which is typical for this time of the year. Basin is heavily vegetated (Photo I-C-1 and Photo I-C-5).

Spillway

No observed signs of recent flow, channel erosion, or deterioration were observed (Photo I-C-7). At the time of the site visit, there was dense seasonal grass and bushes growth over the base of the spillway channel and at inlet. HVC advised that the vegetation was cleared after site visit as part of routine maintenance.

Low-level Outlet

Debris boom is in good condition but required repositioning as it was not protecting intake of Low-level Outlet (LLO). Vegetation accumulated on LLO intake will be cleared as part of routine maintenance. Low-level outlet valve can be hand turned.

Seepage

None observed.

SITE VISIT PHOTOGRAPHS

LEGEND:

- TRJ = Trojan Tailings Facility.
- TRJ-2022-## refers to 2022 Annual Facility Performance Report (AFPR) waypoint shown on Figure 5.
- All photographs taken during inspection on July 14, 2022.

Photo I-C-1 Overview of Lower Trojan Dam crest from right abutment. Crest is uneven and appears to be sloped (rises from left abutment to right abutment) (TRJ-2022-09)

Photo I-C-2 View of downstream slope. The outlet of decommissioned Low-level Outlet pipe is visible in the left photo (TRJ-2022-11)

Photo I-C-3 View of downstream slope and outlet of spillway overflow pipe through the dam (TRJ-2022-10)

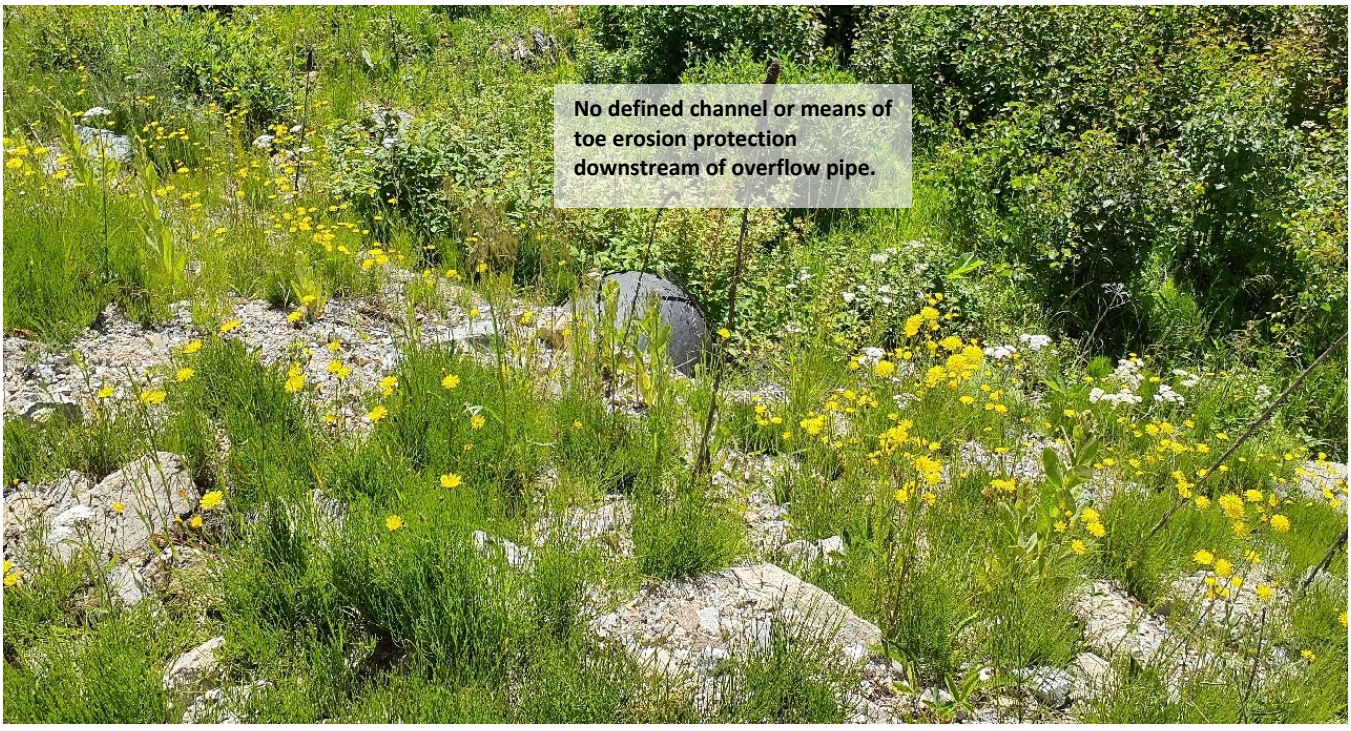


Photo I-C-4 **Upstream slope near right abutment with spillway overflow pipe through the dam. Heavy vegetation was observed in front of the pipe inlet. HVC scrubbed the bushes and cut the grass in front of the pipe inlet after 2022 AFPR site visit (TRJ-2022-10)**

Photo I-C-5 **View of solar panel for remote pond level monitoring. Remote monitoring has been effective to trigger inspections when pond levels rise (TRJ-2022-13)**

Photo I-C-6 **View of spillway channel inlet. Inlet channel was observed to densely covered with vegetation. HVC report that vegetation along the inlet of the spillway channel and inlet were cleared after site visit (TRJ-2022-09)**

Photo I-C-7 **Spillway channel looking toward south. Channel is observed to be >98% vegetated. HVC report that vegetation along the inlet of the spillway channel and inlet were cleared after site visit. (TRJ-2022-09)**

Photo I-C-8 **Low-Level Outlet inlet. During the site visit HVC cleared vegetation accumulated on the LLO intake as a routine maintenance task. Subsequent to the site visit, HVC repositioned the debris boom so it was protecting the intake of LLO which is also a routine task. (TRJ-2022-12)**