Klohn Crippen Berger

Teck Highland Valley Copper Partnership

2023 Annual Facility Performance Report

Highmont Tailings Storage Facility

M02341C62.730

March 2024

March 27, 2024

Teck Highland Valley Copper Partnership
PO Box 1500
Logan Lake, British Columbia
V0K 1W0

Mr. Carl Diederichs, P.Eng.
Superintendent, Geotechnical

Dear Mr. Diederichs:

2023 Annual Facility Performance Report
Highmont Tailings Storage Facility

We are pleased to submit the final Highmont Tailings Storage Facility 2023 Annual Facility Performance Report. The review period for this document is from October 2022 through September 2023.

Yours truly,

KLOHN CRIPPEN BERGER LTD.

Pablo Urrutia, P.Eng.
Engineer of Record, Representative
Senior Geotechnical Engineer

PU/CT:cd

Klohn Crippen Berger Ltd.
500 - 2955 Virtual Way ▪ Vancouver BC V5M 4X6 ▪ Canada
t 604.669.3800 ▪ f 604.669.3835 ▪ www.klohn.com

Teck Highland Valley Copper Partnership

2023 Annual Facility Performance Report

Highmont Tailings Storage Facility

EXECUTIVE SUMMARY

Klohn Crippen Berger Ltd. (KCB) was engaged by Teck Highland Valley Copper Partnership (HVC) to complete the 2023 Annual Facility Performance Report (AFPR) of the Highmont Tailings Storage Facility (TSF). The review period of this AFPR is from October 2022 to September 2023.

The Highmont TSF is at the Highland Valley Copper Mine Site (HVC Mine Site), 8 km southeast of the Highland Mill. This facility was built in 1980 and operated until 1984. After operations, the facility was reclaimed and is maintained by HVC. It is considered to be in the Closure – Active Care Phase based on the Canadian Dam Association definition[1].

The Highmont TSF Structures

The review covers the following structures that comprise the Highmont TSF:

- North Dam, East Dam, and South Dam – composed of glacial till starter dams that were raised with rockfill by the centerline method. Filter zones separate retained tailings and rockfill above the starter dam crests.
- Seepage recovery ponds (S1 Pond, S2 Pond, S3 Pond, S5 Pond, and S8 Pond) – ponds downstream of the Highmont TSF that collect mine-affected water for reclaim back to the impoundment with no off-site discharge. The seepage ponds are confined by dams composed of compacted glacial till with a drainage blanket downstream of a seepage cut-off.

The Highmont TSF has been inactive for more than 35 years. Relative to conditions during operations, the downstream slopes of the dams have been regraded to a shallower angle (~2.3H:1V to 2.5H:1V), and the pond level is lowered. No significant dam safety incidents occurred at the facility during operations or since reclamation. In the current configuration, along with a shallower downstream slope, the piezometric levels and gradients through the tailings and dam fill are lower than during operation, which increased the factor of safety against slope failure and internal erosion.

During the review period, Mr. Pablo Urrutia, P.Eng., was the Engineer of Record (EoR), as a representative of KCB. In April 2023, the TSF Qualified Person (QP) role transitioned from Mr. Bryan Bale, P.Eng. to Mr. Carl Diederichs, P.Eng. (Superintendent, Geotechnical). These roles are consistent with the definitions in the Health Safety and Reclamation Code for Mines in B.C. (HSRC[2]).

Activity During the Review Period

During the review period, the Highmont TSF was maintained within the design basis and conditions assumed in the design.

[1]CDA. 2019. "Technical Bulletin – Application of Dam Safety Guidelines to Mining Dams." 2014 ed. Updated 2019.
[2] EMLI. 2022. "Health, Safety and Reclamation Code for Mines in British Columbia, Revised." February.

HVC conducted the following maintenance and construction activities during the review period:

- Routine maintenance activities, as defined in the Operations, Maintenance and Surveillance (OMS) Manual[3].
- The access road at the toe of the North Dam was regraded to address AFPR recommendation HD-2017-01 (Table 1). At the time of writing this report, some work remains outstanding and thus, the recommendation remains open.
- The S2 Pond spillway channel was cleared and the original channel section established. This addresses AFPR recommendation S2-2019-01.
- The S5 Pond berm crest was regraded to El 1452.2 m in October 2022. This addresses AFPR recommendation S5-2018-02 (Table 1).
- HVC installed a culvert to control the clear seepage daylighting at the access ramp between the South Dam and S3 Pond, redirecting water previously ponding in this area to the S5 Pond catchment. This activity was completed outside of the review period (i.e., December 2023) but is mentioned herein as it addresses an observation made in the 2022 AFPR.

Governance and Surveillance

The OMS Manual, including the Emergency Preparedness and Response Plan (EPRP), is suitable for the facility. A routine update to the OMS Manual was prepared and issued in 2024. The 2022 version of the OMS Manual was current during the review period and is used as the reference document for this AFPR.

The Highmont 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.

HVC commissioned a Dam Safety Review (DSR) of the Highmont TSF during 2023, which meets the five-year DSR frequency required under the HSRC. The DSR report was being finalized during the preparation of this report and is due for submission to the Ministry of Energy, Mines and Low Carbon Innovation (EMLI) prior to the end of March 2024. An action plan to address any recommendations will be prepared by HVC and the EoR, and reported in the next AFPR. The next DSR is scheduled to be initiated in 2028 (five-year frequency).

Highmont TSF Performance

The facility performance during the review period was consistent with historic performance; no dam safety issues or instances of 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 Highmont TSF during the review period:

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

- 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.
- There are no continuous horizontal deformation trends, which is consistent with expected performance based on design and previous monitoring.
- Observations made 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, primarily driven by snowmelt.
- The peak measured pond level was 6.4 m below the dam crest, and separated from the dam crest by a tailings beach more than 300 m wide. This is consistent with expected conditions and well above the minimum required in design.

Design Basis and Failure Mode Reviews

The Canadian Dam Association (CDA) Dam Safety Guidelines[4] provide a dam classification scheme based on the potential consequences of a hypothetical failure that can be used to provide guidance on the standard of care expected of dam owners and designers. The consequence classification is not related to the likelihood of a failure, but rather to the potential impact resulting from a failure if it did occur.

A “High” consequence category, as defined by CDA (2019), has been assigned to the Highmont TSF. During the review period there have been no material changes to the facility, or to the upstream or downstream conditions, that support a modification to the consequence category.

The spillway design flood and earthquake design ground motion (EDGM) for the Highmont TSF meet or exceed the equivalent requirements under the HSRC[5].

Potential failure modes for the Highmont 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.

Recommendations

Dam safety recommendations identified during past AFPRs, and their current status, are summarized in Table 1. During the review period, two of the three recommendations from previous AFPRs were closed (shown in *italics*) and one of the two outstanding recommendations from the DSR (S5-001) was also closed. The outstanding DSR recommendation (HD-008) is captured by AFPR recommendation HD-2017-01 and pertains to the regrading of the toe road downstream of the North Dam. HVC started this work in Q4 2023.

[4] CDA. 2013. “Dam Safety Guidelines 2007 (Revised 2013)”.
[5] EMLI. 2022. “Health, Safety and Reclamation Code for Mines in British Columbia, Revised”. November.

Two new recommendations were identified (Table 2) during the 2023 AFPR. One was to clear the Highmont TSF spillway culverts, downstream of the dam, that were partially obstructed during the road regrading work. If a major flow goes through the culverts before they are cleared, water would back up at the toe of the dam and would not affect the water levels in the impoundment. Additionally, the road profile is built to overtop and redirect water to the spillway, if needed. The second is to update the OMS Manual with changes introduced by the revisions to the PE-376 permit issued during the review period.

Table 1 Previous Recommendations Related to Facility Performance – Status Update

ID No.	Performance Area	Recommended Action	Priority[1]	Deadline (Status)
HD-2017-01	Flood Management	HVC should modify the spillway channel to pass the peak spillway design outflow beneath the access road or regrade the road surface so that water that flows over the road will report to the downstream spillway channel.	3	Q4 2020 (Open – HVC started works in Q4 2023 based on 2022 flood routing)
S2-2019-01	*Flood Management*	*S2 Pond spillway channel profile has been changed due to the temporary access over the channel. Original channel profile/capacity should be restored.*	*3*	*Q1 2020 (Closed)*
S5-2018-02	*Flood Management*	*To accommodate the temporary blocking of the S5 Pond spillway during freshet, raise the dam crest so that the IDF (100-year 72-hour duration) can be stored within the reservoir, assuming no pumping is required. (Take into consideration, HD-2018-02)*	*2*	*Q3 2021 (Closed)*

Notes:
1. Recommendation priority guidelines, specified by Teck 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 2023 Recommendations Related to Facility Performance

ID No.	Applicable Reg. or OMS Reference	Recommended Action	Priority[1]	Recommended Deadline
Highmont TSF				
HD-2023-01	Maintenance	The Highmont Spillway culverts crossing the S2 Pond road, at the toe of the North Dam, are partially blocked due to the road regrading works. Culverts should be cleared.	3	Q3 2024
HD-2023-02	OMS Manual	Update OMS Manual with changes introduced by the PE-376 changes.	3	Q1 2025

Note: Refer to Table 1 notes.

TABLE OF CONTENTS

TABLE OF CONTENTS
(continued)

List of Tables

List of Figures (In text)

TABLE OF CONTENTS
(continued)

List of Figures

List of Appendices

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 2023 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 2023 Annual Facility Performance Report (AFPR) for the Highmont Tailings Storage Facility (TSF). The AFPR review period is from October 2022 through September 2023.

The Highmont TSF is on the Highland Valley Copper Mine Site (HVC Mine Site); refer to Figure 1. This facility was built in 1980 and operated until 1984 as part of the now inactive Highmont Mine; it has subsequently been reclaimed. Table 1.1 summarizes the Highmont TSF structures and their functions. Refer to Figure 2 for the Highmont TSF layout.

Table 1.1 Highmont TSF Structures

Facility	Structure	Function
Highmont TSF	North Dam	Retain tailings around perimeter of the impoundment
	East Dam	
	South Dam	
Highmont Seepage Recovery Ponds	S1 Pond Dam	Stores seepage from Highmont TSF downstream of the North Dam
	S2 Pond Dam	Stores seepage from Highmont TSF downstream of the North Dam
	S3 Pond Dam	Stores seepage from Highmont TSF downstream of the South Dam
	S5 Pond Dam	Stores seepage from Highmont TSF downstream of the East Dam
	S8 Pond Dam	Stores seepage from Highmont TSF downstream of the North Dam

HVC continues ongoing surveillance of the Highmont TSF including instrumentation monitoring, environmental sampling, visual inspections and maintenance activities. Under this level of site presence, the Highmont 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. Pablo Urrutia, P.Eng., was the Engineer of Record (EoR) as a representative of KCB. In April 2023, the TSF Qualified Person (QP) role transitioned from Mr. Bryan Bale, P.Eng. to Mr. Carl Diederichs, P.Eng. (Superintendent, Geotechnical). These roles are consistent with the definitions in the Health, Safety and Reclamation Code for Mines in British Columbia (HSRC) (EMLI 2022).

The AFPR scope of work consisted of:

- a 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 facility; and
- review of construction activities completed at the site during the review period, if any.

The AFPR site visit to the Highmont TSF was completed by KCB representatives Mr. Pablo Urrutia (EoR), P.Eng., and Ms. Cheryl Torres, P.Eng. on September 28, 2023. During the site visit, the weather was sunny and clear.

The Highmont Mine, including the Highmont TSF, was operated under Permit M-11 (EMLI 2022). The permit was originally 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.

The water discharge quantity and quality from the Highmont TSF are regulated under Permit PE-376 (MECCS 2023).

2 FACILITY DESCRIPTION

The HVC Mine Site is near Logan Lake, approximately 45 km south of Kamloops, in the British Columbia Interior. The Highmont TSF is 8 km southeast of the operating Highland Mill; refer to Figure 1. The facility was operated from 1980 to 1984 and stores an estimated 27.5 Mm^3 of tailings. Under existing conditions, a pond is continuously present in the impoundment, albeit of reduced size relative to operations. The layout of the Highmont TSF is shown on Figure 2 to Figure 5, with typical geometry and dimensions of the dams summarized in Table 2.1. The Highmont TSF structures include:

North Dam, South Dam, and East Dam

- The Highmont TSF retaining dams comprise compacted glacial till starter dams that are founded on competent granodiorite bedrock or glacial till and glaciofluvial sand and gravel outwash deposits overlying shallow bedrock (refer to Figure 2.1).
- Above the starter dams, the crests were raised following the centreline method with upstream filter zones that separated the tailings and downstream rockfill. The dams were designed and built with 1.5H:1V downstream slopes, which were later shallowed as part of reclamation (approximately 2.3H:1V to 2.5H:1V).
- Under existing conditions, at the normal range of pond levels, the minimum beach width is more than 290 m along the East Dam crest, more than 360 m along North Dam crest, and more than 370 m along the South Dam crest.

Highmont TSF Spillway

- An open channel spillway is located at the left abutment of the North Dam. The spillway starts as a 640 m-long approach channel excavated in tailings to a lock-block control sill, then crosses under the dam crest access road via twin HDPE culverts leading to a channel excavated through rock.
- A slide gate (the Highmont Spillway Flow Control Structure) regulates flow in the channel downstream of the dam crest access road. The slide gate can be opened and closed with a manually operated crank.
- Approximately 120 m downstream of the slide gate, there is a sump excavated in the spillway channel, connected to an 18” HDPE diversion pipe (S1 Diversion Pipeline), that can direct flows to the S1 Pond. Flows passing the S1 Diversion Pipeline continue along the spillway channel, which discharges downstream of the S2 Pond and eventually to Witches Brook. As discussed in Section 4.1, the 2023 update to the PE-376 permit modified the allowed discharge conditions from the spillway.

Seepage Recovery Ponds

- There are currently five seepage recovery ponds located around the perimeter of the Highmont TSF to collect seepage from the TSF and runoff from the local area: S1 Pond, S2 Pond, S3 Pond, S5 Pond, and S8 Pond. The S4 Pond and S9 Pond were decommissioned by breaching at the end of their operational life.

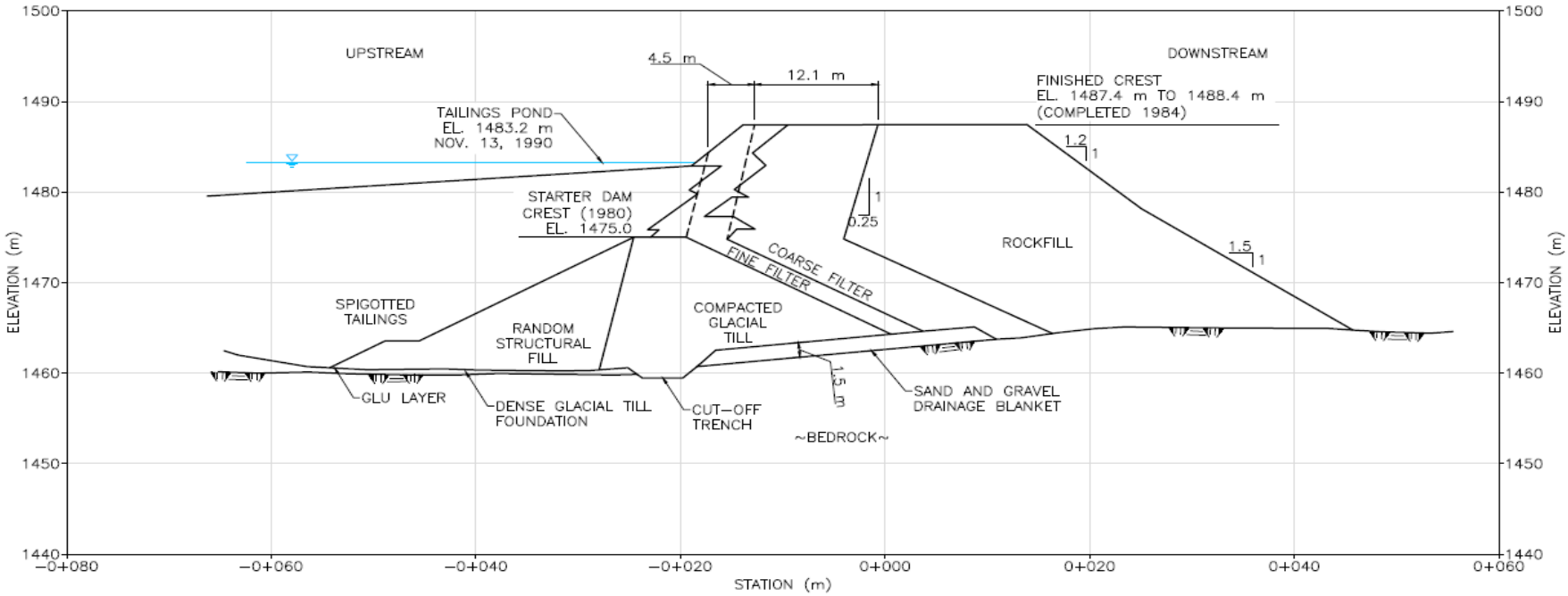
- The retaining dam for each pond was constructed of compacted glacial till with a seepage cut-off trench, sand and gravel drainage layer below the downstream slope, and erosion blanket on the upstream and downstream slopes. The dams are founded on glacial till (refer to Figure 2.3 and Figure 2.4).
- Water from the seepage recovery ponds is diverted to the Highland Mill for reclaim via the S1 Pond. Details of pumping operations, pipelines, and other water management structures in these ponds are discussed in Section 4.1.

Table 2.1 Summary of Approximate Dam Geometry

Dam	Dam Raise Construction Method	Crest Elevation (m) [1]	Maximum Height (m) [2]	Crest Length (m)	Minimum Crest Width (m)	Downstream Slope	Upstream Slope
Highmont Dams							
North Dam	Centreline	1487	35	1200	30	2.5H:1V	n/a
East Dam	Centreline	1487	30	1200	15	2.3H:1V	n/a
South Dam	Centreline	1487	35	1300	9	2.3H:1V	n/a
Seepage Recovery Pond Dams							
S1 Pond Dam	n/a	1445	9.1	60	10	2H:1V [3]	3H:1V
S2 Pond Dam	n/a	1459	4	140	4	2.2H:1V [3]	3H:1V
S3 Pond Dam	n/a	1459	3.4	150	4	3H:1V	3H:1V
S5 Pond Dam	n/a	1452.2	6.3	340	3	1.7H:1V [4]	3H:1V
S8 Pond Dam	n/a	1452	5	120	9	2H:1V	Unknown

Notes:
1. Dimensions are estimated from 2014 LiDAR data unless otherwise noted.
2. Height measured as the vertical distance between downstream toe and crest.
3. The downstream slope is steeper than the 2.5H:1V in the design report (KL 1980a); however, as per KCB (2015b), the existing condition of the dams meet design FOS criteria, required by HSRC, for global slip surfaces that would result in an uncontrolled release of the reservoir (Section 7.2.3).
4. The downstream slope is steeper than the 2.5H:1V in the design report (KL 1980a); however, the S5 Pond Dam has performed well since the most recent raise in 2015, with no reported observations of structural instability (e.g., cracking, slumping) that is expected for a structure comprised of compacted fill founded on glacial till.

Figure 2.1 Typical Design Cross Section of Highmont TSF North Dam (KC 1996) – Prior to Resloping



Note: KCB (1996) divided the North Dam into Northwest and Northeast dams, hence the "Northeast Dam" label in Figure 2.1.

Figure 2.2 Typical Schematic Cross Section of Existing Highmont TSF North Dam – After Resloping

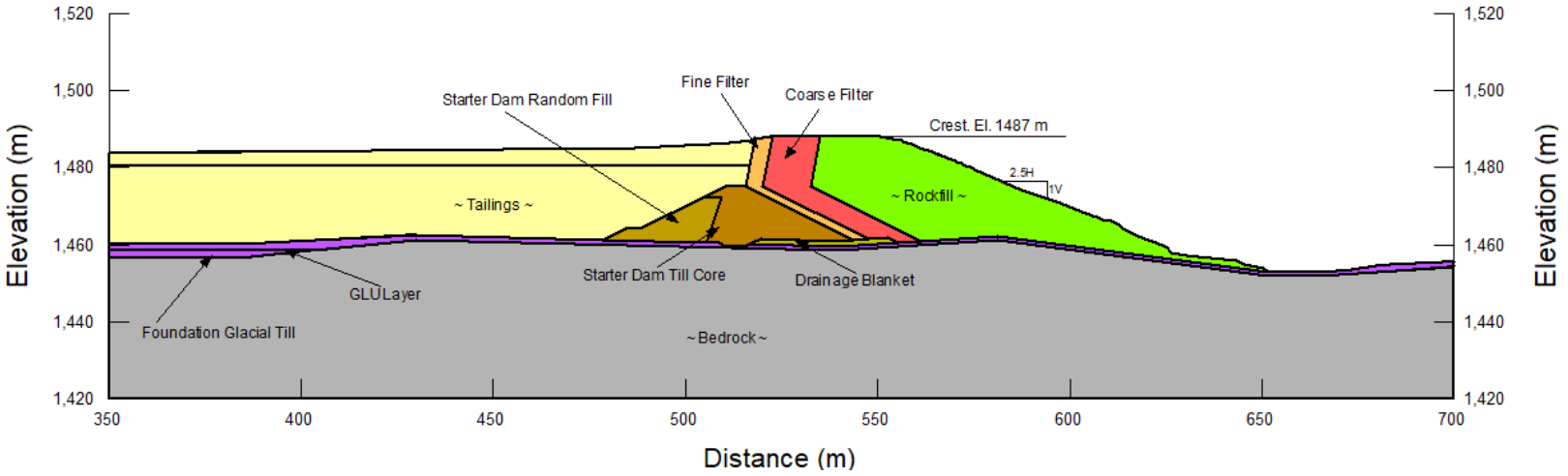


Figure 2.3 Typical Cross Section of S1 Pond Dam (KL 1980b)

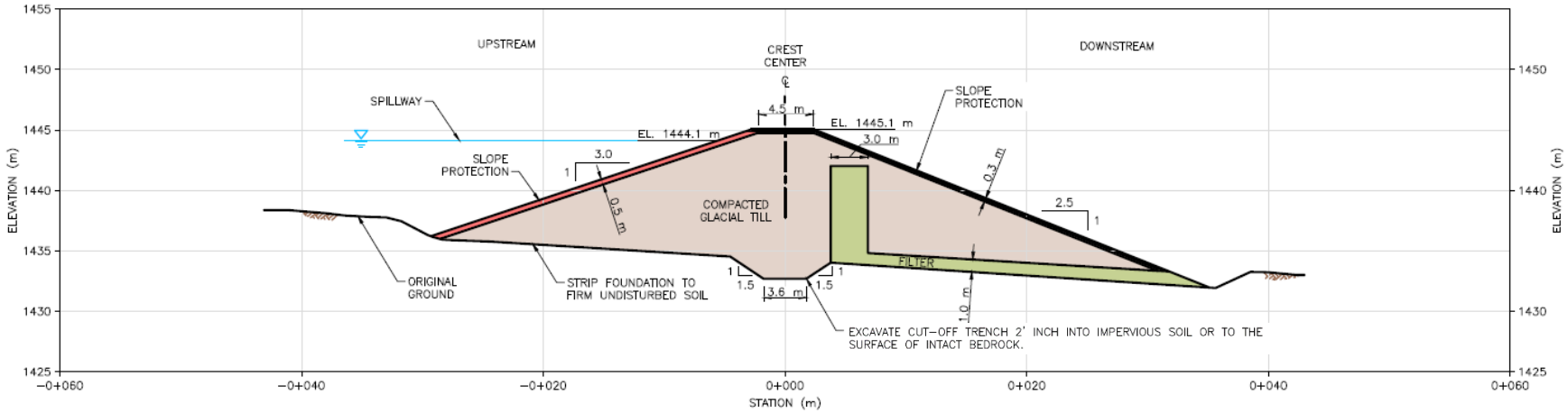
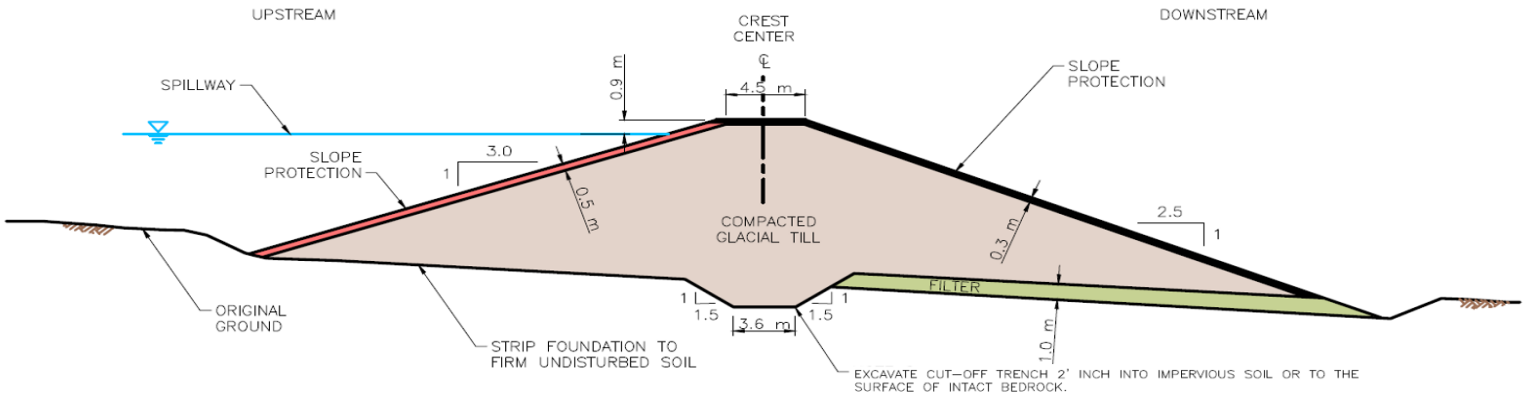


Figure 2.4 Typical Cross Section of Retaining Dam at S2 Pond, S3 Pond and S5 Pond (KL 1980b)



3 ACTIVITIES DURING REVIEW PERIOD

During the review period, the Highmont TSF was maintained within the design basis and specified operational conditions of the approved design.

The following maintenance and construction activities were carried out by HVC during the review period:

- In October 2023, HVC regraded the profile of the toe access road, downstream of the North Dam, to relocate the road's low spot to be aligned with the Highmont TSF spillway. This activity was completed to address AFPR recommendation HD-2017-01 (Table 8.1).
  - The regrading was recommended so if the culverts cannot pass the spillway flow, water will backup and overflow the road at a location where the water will report back into the spillway channel, as intended in the design.
  - HVC submitted a survey of the revised road profile to KCB for review after the work was completed. KCB identified further regrading work was required to meet the objective and close the recommendation. The recommendation will be closed when that follow-up work is completed.
- The profile of the S2 Pond spillway channel was restored to its original shape, restoring the capacity of the channel. This activity addresses AFPR recommendation S2-2019-01 (Table 8.1).
- In October 2022, the S5 Pond berm crest was levelled to a consistent El. 1452.2 m. Prior to this, the crest level varied between El. 1451.2 m and El. 1452.2 m. This activity addresses AFPR recommendation S5-2018-02 (Table 8.1).
- Routine maintenance activities, as defined in the OMS Manual (HVC 2022), were carried out, including vegetation removal from spillways.
- A revision to permit that regulates water discharge quantity and quality from the Highmont TSF (Permit PE-376) was issued in July 2023 (MECCS 2023). Under the revised permit, the allowance to discharge through the spillway to the environment if flows were greater than 860 m^3/h was removed. HVC is reviewing the impact of this change on operations.

In addition, HVC installed a culvert at the access ramp between the South Dam and the S3 Pond to control the clear seepage daylighting in the and area first observed in 2022 (KCB 2023). The culvert will help redirect water, previously ponding at the ramp, to the S5 Pond catchment. This activity was completed outside of the review period (i.e., December 2023) but is mentioned herein as it addresses an observation made in the 2022 AFPR (KCB 2023) and is relevant to the discussion in Section 5.5.

4 WATER MANAGEMENT

4.1 Overview

The flow schematic for Highmont TSF is shown on Figure 6.

Under normal conditions, there are no surface discharges from the Highmont TSF directly to the environment. Mill water reclaim (through the S1 Pond), evaporation, and entrainment are the major sources of water loss. Inflows to the seepage recovery ponds are stored and/or directed to the Highmont TSF or the S1 Pond (Figure 6).

As discussed in Section 2, a slide gate in the Highmont TSF spillway is operated to seasonally store water in the impoundment as required. A bypass is installed in the Highmont TSF spillway to direct flows less than 860 m^3/h to S1 Pond (HVC 2022). Prior to the revised PE-376 permit being issued in July 2023 (MECCS 2023), flows greater than 860 m^3/h through the spillway were permitted to be discharged to the environment; however, this allowance was removed from the updated permit. HVC is reviewing the impact of this change on operations.

Annual climate fluctuations have the greatest influence on the Highmont TSF pond volume changes. Pond volumes are typically decreasing except during freshet (Section 4.3). The magnitude of freshet typically has the greatest impact on annual pond volume change.

4.2 Climate

HVC provided climate data from the Shula Weather Station[6] for the review period (October 2022 to September 2023) to KCB. The station is in the base of the Witches Brook drainage, approximately 7.1 km north of the Highmont TSF at El. 1208 m.

In recent AFPRs, climate reviews for the Highmont TSF have been made based on data from the L-L Weather Station located near the Highland TSF. However, the Shula Weather Station was upgraded in March 2022 with new equipment (e.g., sensors, modem, power supplies) and is now used as the reference station for the Highmont TSF climate review. The Historical Average Lornex Synthetic Record data (Golder 2021) was used for comparison to average climate trends at the HVC Mine Site. For a comparison to regional trends, the climate data for the review period from the Kamloops Pratt Road Weather Station (Environment and Climate Change Canada station 116C8P0), approximately 60 km north-east of the Shula Station at El. 729 m, was used.

Table 4.1 summarizes the monthly precipitation during the review period for the referenced climate stations and data sets. Due to the differences in elevation between the Highmont Area and the weather stations, the Historical Average Lornex Synthetic Record data and the Shula Weather Station data have been adjusted based on the Highmont Area temperature and precipitation adjustment factors provided in the site-wide Surface Water Quantity Existing Conditions report (Golder 2021).

[6] The data provided was raw data, and HVC have advised that the routine quality assurance/quality control review has not been completed at the time of this assessment.

The monthly precipitation record for the reporting period is shown on Figure 4.1. Overall observations regarding precipitation trends at the Highmont TSF during the review period are:

- Precipitation followed a similar monthly precipitation pattern to the Lornex historical averages and Kamloops Pratt Road weather station, but annual precipitation was 9% below the historical average.
- Precipitation at the site was 50% or less of the historical average value during October, January, March, and April. November, February, and June recorded precipitation was more than 15% above the historical average. This precipitation trend is consistent with values measured at the Kamloops Pratt Road weather station.

Observations related to high-precipitation storm events based on the Shula Weather Station data for the review period are as follows:

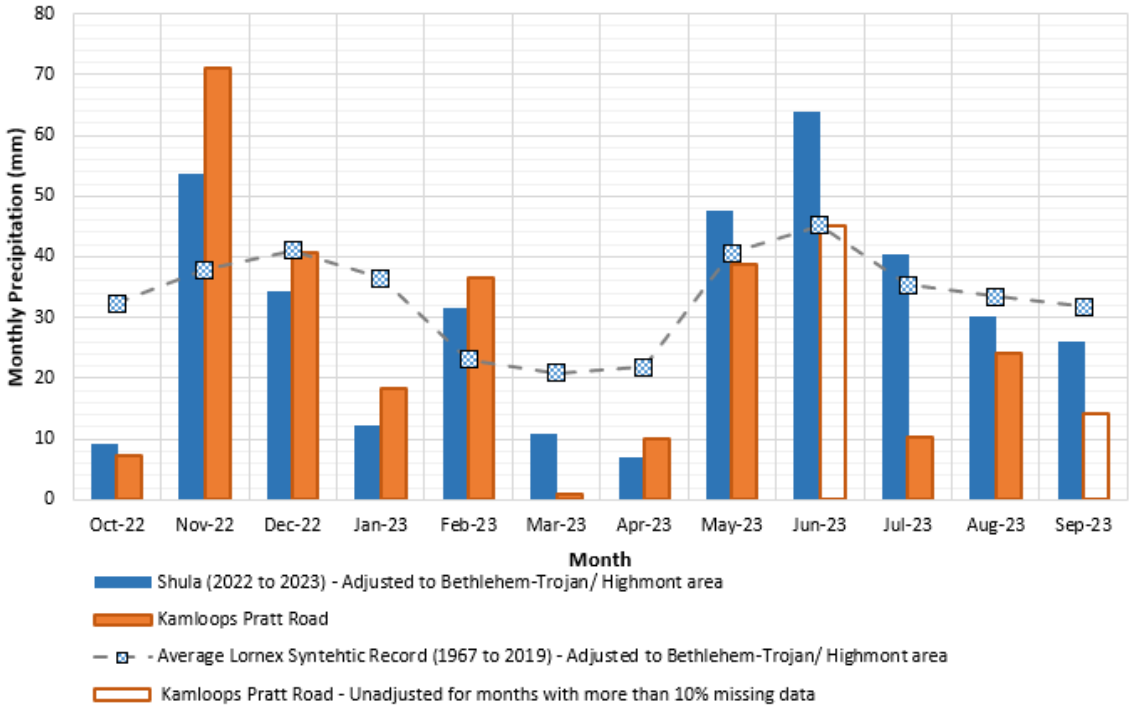
- No rainfall events greater than the 10-year return period annual rainfall event (40 mm in 24 hours (Golder 2021)) were recorded during the review period.
- The three largest recorded precipitation events occurred on June 19, 2023 (20.0 mm); July 12, 2023 (23.4 mm); and August 31, 2023 (21.6 mm):
  - A simultaneous flow increase was observed in the flow data from Guichon Creek above Tunkwa Lake Diversion flow station (ID: 08LG056) following the largest precipitation event on July 12th. The flow station is approximately 15 km north-west of the Shula Weather Station.

Table 4.1 Monthly Precipitation for the Review Period (October 2022 to September 2023)

Month	Availability of Data (%)		Precipitation (mm)		
	Shula Weather Station	Kamloops Pratt Road Weather Station	Shula Weather Station Data (Corrected)(1)	Historical Average Lornex Synthetic Record (Corrected)(1)	Kamloops Pratt Road Weather Station
Oct 2022	100	100	9	32	7
Nov 2022	100	100	53	38	71
Dec 2022	100	100	34	41	41
Jan 2023	100	100	12	37	18
Feb 2023	100	93	32	23	37
Mar 2023	100	100	11	21	1
Apr 2023	100	100	7	22	10
May 2023	100	94	47	41	39
Jun 2023	100	80	64	45	45
Jul 2023	100	100	40	35	10
Aug 2023	100	100	30	33	24
Sep 2023	100	63	26	32	14
Review Period Total	–	–	365	400	318

Note:
1. Monthly precipitation recorded at the Shula Weather Station and Historical Average Lornex Synthetic Record were corrected based on adjustment factors to the Highmont TSF provided in Golder (2021).

Figure 4.1 Monthly Precipitation Summary: October 2022 to May 2023



Seasonal snowpack depth is not measured at the Shula Weather Station. Instead, HVC monitors snowpack with monthly measurements at the Highland Valley Snow Survey Station (Station No. 1C09A). Table 4.2 summarizes historical snowpack averages and the snowpack measurements during the review period in snow-water equivalent (SWE). Snowpack measurements, in SWE, are also plotted on Figure 4.2 along with temperature data from the Shula Weather Station. Based on this information, KCB notes that:

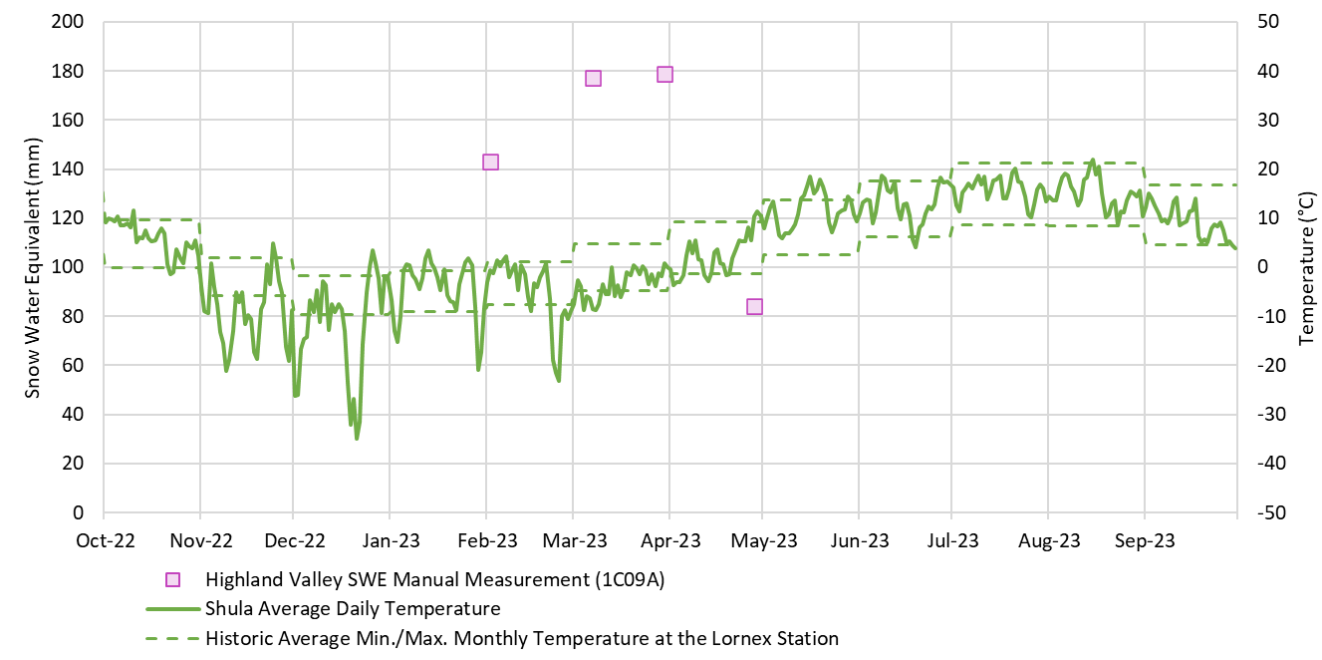
- The daily temperatures recorded at the Shula Weather Station between October 2022 and September 2023 are generally within the historic climate normals from the Lornex Climate Station (1981 to 2010); however, there are some colder than average periods (of short-duration) recorded from November to March.
- All snowpack measurements were above historic climate normals, with the maximum measured snowpack over the review period (179 mm) approximately equivalent to a 10-year return period snowpack (169 mm) as reported by Golder (2020).
- Snowmelt began in April and continued into June. This is consistent with the snowmelt trends presented in the Spring Extreme Events and Wind Analysis report (Golder 2020) and coincides with measured temperatures that did not rise consistently above freezing until early April.
- Consistent with previous site observations, temperature, not precipitation, is the primary factor that drove snowmelt during the review period. Snowmelt began in April when precipitation was only 32% of the historic average.

Table 4.2 Historical Snowpack Averages and 2023 Snowpack Depths (mm SWE)

Survey Period	Years of Record[1]	Historic Average Snowpack Depth (mm SWE)	2023 Snowpack Depth[2] (mm SWE)	Percent Change Relative to Historic Average
January 1st	11	50	Not Surveyed	N/A
February 1st	33	83	143	+72%
March 1st	62	94	177	+87%
April 1st	60	102	179	+75%
May 1st	60	29	84	+187%
May 15th	25	2	Not Surveyed	N/A
June 1st	8	0	Not Surveyed	N/A

Notes:
1. Data prior to 1966 were not included as the station was moved to its current location in 1965.
2. Measured at the Highland Valley Snow Survey Station (1C09A) near the Highmont TSF.

Figure 4.2 Measured Temperature and Snowpack: October 2022 to May 2023



Notes:
1. Measured at the Highland Valley Snow Survey Station (1C09A) near the Highmont TSF.
2. Daily average temperature data at the Shula Weather Station provided by HVC.
3. The historic Lornex Climate Station minimum and monthly temperature averages from 1981 to 2010 are from ECCC Climate Normals (2023) and are presented as representative of the Shula Weather Station area.

4.3 Water Balance

Under existing conditions, the Highmont TSF water balance is largely driven by climate (Section 4.2) outflows through the Highmont Spillway, which is controlled by the spillway's slide gate, and pump-back water from the seepage recovery ponds. Other outflows from the facility are evaporation and seepage.

During the review period, there were no surface water discharges from the Highmont TSF directly to the environment. As discussed in Section 2, flow discharged from the Highmont TSF flow was diverted to the S1 Pond.

Bathymetric surveys of the pond areas within the impoundment are not available to estimate pond volume. However, pond level can be used to infer change in pond volume as the facility is inactive with no active deposition. Based on a review of the pond levels, the Highmont TSF pond volume remained consistent with previous years during the review period. Refer to Section 5.2 for a discussion of pond levels during the review period.

4.4 Flood Management

The flood management structures at the Highmont TSF are summarized in Table 4.3, along with the applicable design criteria and flood characteristics.

Flood routing for the Highmont TSF and seepage recovery ponds was updated in 2022 (KCB 2022b) based on the most recent hydrology (Golder 2021). The conclusions from the study, as well as additional discussion regarding each structure, are:

- The Highmont TSF spillway can route, with adequate flood freeboard, the PMF (24-hour) flood event, which is greater than the inflow design flood (IDF) (Table 4.3) required under the HSRC (EMCLI 2022).
- The S1 Pond, S2 Pond, S5 Pond, and S8 Pond can safely manage, with adequate freeboard, the respective inflow design flood (IDF):
  - As shown in Table 4.3, the S5 Pond relies on pumping from the Pumping Sub-cell to manage the IDF. The S5 Pond spillway has been blocked at the intake of its two overflow pipes, by HVC, to prevent discharge to the environment. This was the assumed condition in the 2022 flood routing (KCB 2022b).
- The S3 Pond can safely manage, with adequate freeboard, the IDF based on the operating conditions stated in the OMS Manual (HVC 2022):
  - a pump trigger set to El. 1456.5 m; and
  - a total pumping rate capacity of 50 L/s.

There were no surface discharges from the Highmont TSF spillway during the review period. Performance of the Highmont TSF relative to flood management is discussed in Section 5.

Table 4.3 Inflow Design Flood Requirements for Highmont TSF and Seepage Recovery Ponds

Facility	Primary Outfall Type	Inflow Design Flood[1]	Spillway Design Event[2]	Peak Design Flood Level (m)[2]	Required Pumping Rate[2]
Highmont TSF	Open channel	1/3 between 1000-yr and PMF	24-hour PMF (Spring ROS = 310 mm)	1483.1	-
S1 Pond	Open channel to pipe	Between 100-yr and 1000-yr	100-yr, 24-hour (Spring ROS = 116.7 mm)	1444.0	25 L/s (To Highmont TSF)
S2 Pond	Open channel	Between 100-yr and 1000-yr	100-yr, 24-hour (Spring ROS = 116.7 mm)	1458.3	10 L/s (To S8 Pond)
S3 Pond	Reclaim Pumping to Highmont TSF	1/3 between 1000-yr and PMF	1/3 between 1000-yr and PMF, 72-hour (Spring ROS = ~321 mm)	1459.3	50 L/s (To Highmont TSF)
S5 Pond	Reclaim Pumping to Highmont TSF	Between 100-yr and 1000-yr	100-yr, 72-hour (Spring ROS = 116.7 mm)	1451.7	100 L/s (To Highmont TSF)
S8 Pond	Pipe Outlet	100-yr	100-yr, 72-hour (Spring ROS = 116.7 mm)	1451.3	10 L/s (To S1 Pond)

Notes:
1. The IDF events meet the requirements under the HSRC (EMLI 2022) as discussed in KCB (2022b).
2. Per KCB (2022b).

5 REVIEW OF MONITORING RECORDS AND DOCUMENTS

5.1 Monitoring Plan Compliance

The OMS Manual (HVC 2022) was reviewed by the TSF QP and the EoR during the review period and an updated version was issued in 2024. The 2022 version of the OMS Manual was current during the review period and is used as the reference document for this AFPR. The changes made in 2024 were typical for a routine OMS Manual update (e.g., updating emergency contact information and minor modifications to the surveillance program agreed upon with the EoR).

The Highmont TSF surveillance program, described in the OMS Manual (HVC 2022), is appropriate for an inactive, reclaimed TSF 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, as it is collected, during routine weekly meetings by the HVC site team, 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, show that OMS Manual requirements were met during the review period.

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

Surveillance Activity	Facility	Minimum Frequency[3]	Responsible Party	Documentation	2023 Frequency Compliance	Notes for the Review Period
Inspections						
Routine Visual Inspection[1]	Highmont Dams	Every 2 Months	HVC	HVC Inspection Reports (Reviewed by KCB)	Yes	Completed monthly.
	S1, S2, S3,and S5 Ponds	Monthly	HVC		Yes	Completed monthly.
	S8 Pond	Quarterly	HVC		Yes	Completed quarterly.
Event-Driven Inspection	All	Event-Driven[2]	HVC		N/A	No event-driven inspection during the review period.
AFPR	All	Annually	KCB		Yes	This report.
Dam Safety Review	All	Every 5 years	HVC	Report	Yes	2023 DSR is underway, site visit completed. Regulatory submission deadline March 31, 2024.
Instrumentation Monitoring						
Piezometers	Highmont Dams Spillway, S1, and S2 Ponds	Quarterly	HVC	AFPR Report by KCB	Yes	Measured quarterly, except when PW-C (Tall), P-D, P-G, PW-J, and P-K were not accessible due to the Environmental team fencing in May and when the instruments were not accessible due to snow cover.
	P-E, P-G, P-K	Monthly				
Seepage flow instruments	S1, S3, S5 and S8 Ponds	Quarterly	HVC		N/A	Not required for dam performance monitoring as was removed from 2024 OMS Manual update.
Pond level	All	Monthly	HVC		Yes	Highmont TSF Pond levels surveyed and measured throughout the year though a transducer installed in spillway channel; see Section 5.2. S1, S2, S3, S5, and S8 pond level measurements are automated.
Surveys						
Dam Crest – Survey Monuments	Highmont Dams	Annually	HVC	AFPR Report by KCB	Yes	-

Note:
1. Visual inspections include observations of unusual condition and/or dam safety concerns (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; and 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 Level and Freeboard

The Highmont TSF pond level was directly surveyed four times during the review period. Pond level readings since 2018 are plotted on Figure 5.1.

HVC also measures water levels in the Highmont TSF spillway channel with a transducer, connected to an automated datalogger, installed upstream of the spillway sliding gate. Spillway water level readings since 2018 are shown on Figure 5.2. The spillway transducer can be used to estimate the TSF pond level but has the following limitations:

- When the Highmont TSF pond is at or above the invert of the culverts through the crest access road (El. 1480.2 m) and the spillway gate is closed, the spillway water level is equivalent to the Highmont TSF pond level.
- When the gate is open and there is flow through the spillway, the water level measured by the transducer may be lower than the pond level, but it still provides information regarding pond fluctuations between survey points.
- There are no records of when the sliding gate was open or closed during the review period.

Between the survey and the transducer measurement, HVC met the minimum monitoring frequency requirement set in the OMS Manual (HVC 2022).

The following is noted regarding pond levels during the review period:

- The highest water level measured by the spillway transducer was EL. 1480.60 m and occurred on May 6, 2023, whereas the water level measured at the spillway on May 8 was El. 1480.58 m (-0.02 m). This shows a close correlation between the pond level and the spillway water levels.
- The highest pond level surveyed, El. 1480.62 m, occurred on May 8, 2023, during freshet, and was less than the previous year (–0.03 m) (see Table 5.2 and Figure 5.1).
- The pond level fluctuations observed during the review period are consistent with climate observations (Section 4.2) – limited rain during snowmelt (March and April) contributed to a mild freshet. As shown on Figure 5.1, pond levels during the review period are within the range observed since 2018.

Table 5.2 Change in Highmont TSF spillway channel Water Elevation

Annual Change	Change in Pond Level 2022 to 2023	Range of Annual Pond Level Change 2018 to 2023
Peak Water Level	–0.03 m	–0.4 m to 0.4 m

Figure 5.1 Highmont TSF Pond Elevations – 2018 to 2023

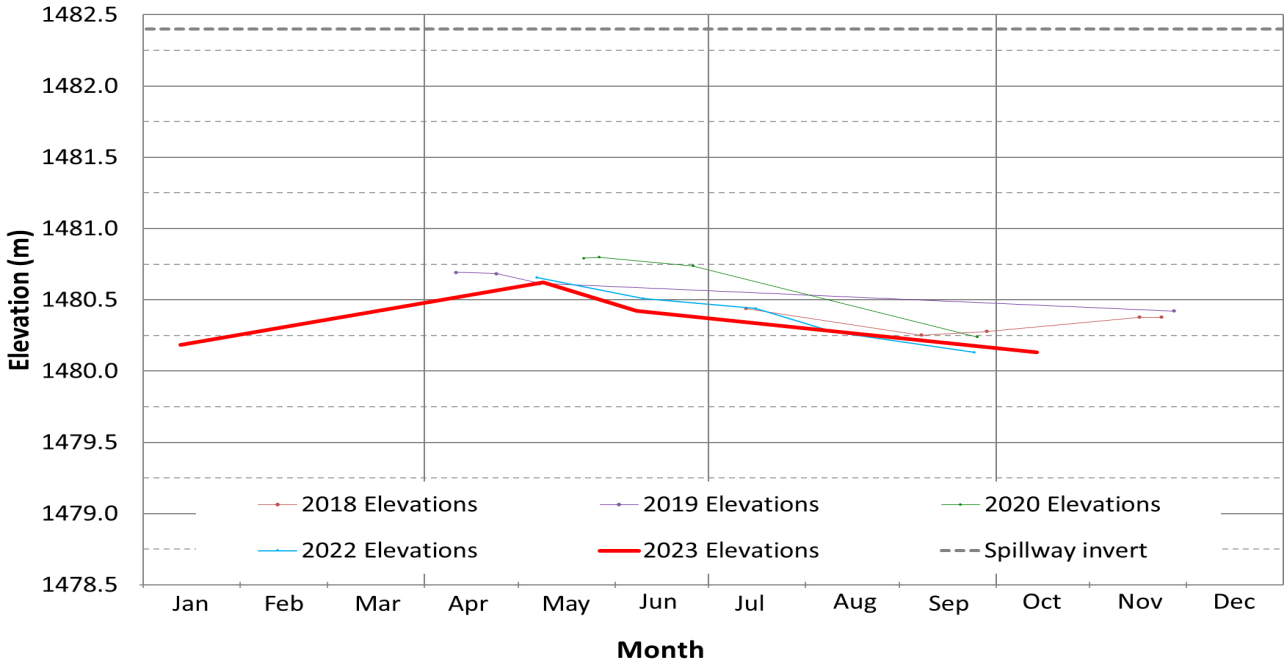
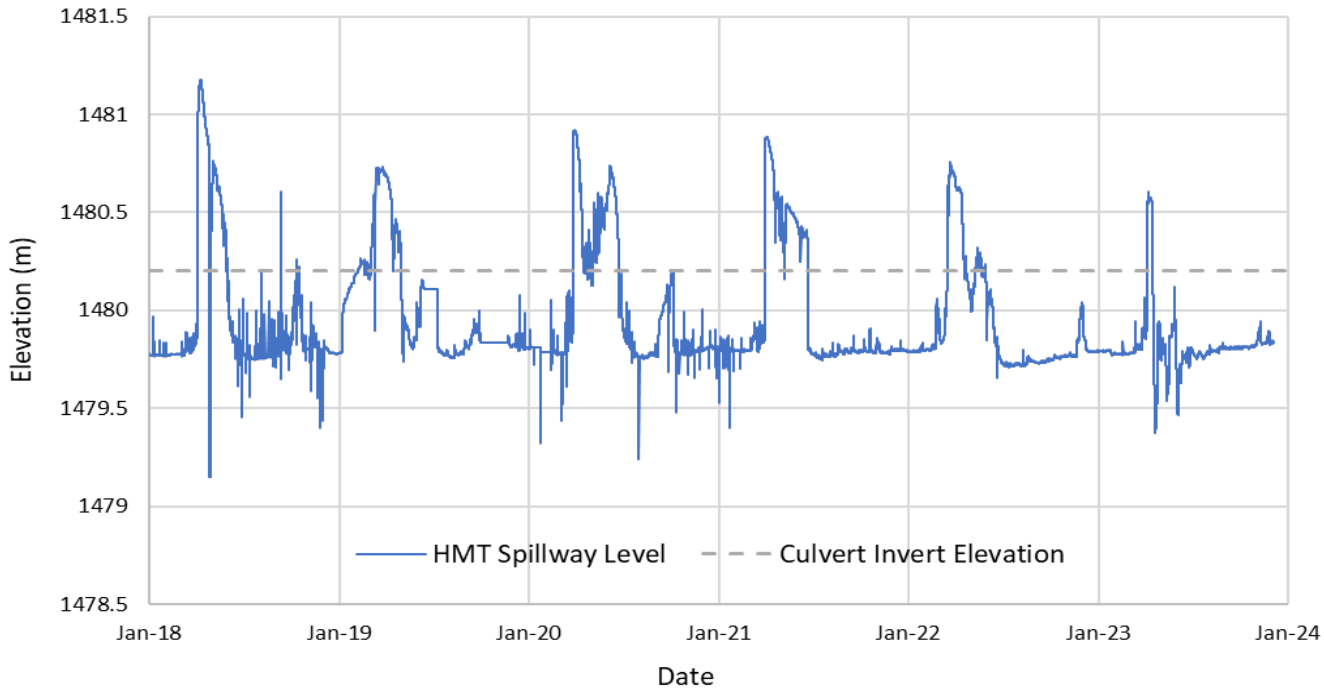


Figure 5.2 Pond Level Measured at Highmont TSF Spillway Channel Upstream of the Gate – 2018 to 2023



Note: Transducer is installed at El. 1479.5 m.

The minimum freeboard measured at the Highmont TSF and the seepage recovery ponds during the review period is summarized in Table 5.3. During the review period, normal and flood freeboard requirements were met.

Table 5.3 Freeboard for Highmont TSF and Seepage Recovery Ponds

Dam	Minimum Freeboard (m) [1]		
	Flood Freeboard Required[2]	Normal Freeboard Required[2]	Observed During the Review Period[3]
Highmont TSF	0.2	1.1	6.4
S1 Pond	0.3	0.4	1.4
S2 Pond	0.4	0.6	1.7
S3 Pond	0.3	0.6	1.2
S5 Pond	0.3	0.4	3.5
S8 Pond	0.3	0.3	0.8

Notes:
1. Refers to the minimum vertical distance between the dam crest and the pond level; based on KCB (2022).
2. CDA (2007) defines two freeboard requirements for dam safety: the vertical distance between the lowest point of the crest of the dam and the maximum operating pond level, referred to as Normal freeboard; and the vertical distance between crest of the lowest point of the dam and the peak reservoir level during the IDF, referred to as Flood freeboard.
3. Based on the maximum recorded pond elevation during the review period.

During the review period, the water level in ponds S1, S2, S3, and S8 exceeded the Notification Level (NL) threshold, as summarized in Table 5.4 to Table 5.7. Similar to the way NLs are set up at other TSFs at the HVC Mine Site, if an NL threshold is exceeded, HVC and the EoR are notified of a change in pattern or typical level. An exceedance, however, does not represent a dam performance concern.

The reasons behind the NL threshold exceedances include:

- seasonal climate fluctuation (e.g., S1 Pond – May 2023);
- controlled discharges between seepage recovery ponds as per flow schematic in Figure 6 (e.g., S2 Pond and S8 Pond);
- and potential frozen lines coupled with malfunctioning heaters (e.g., S3 Pond).

During these times, minimum freeboard requirements were met and the pond levels were brought back below the NL threshold as soon as it was practicable.

Table 5.4 S1 Pond Water Level Exceedances

Date	Maximum Water Level above NL (El. 1442.8 m) (m)	Minimum Freeboard Measured while above NL (m)
May. 02 to May. 06, 2023	0.9	1.3
May. 06 to May. 07, 2023	0.2	2.0
May. 08 to May. 13, 2023	0.2	2.0

Table 5.5 S2 Pond Water Level Exceedances

Date	Maximum Water Level above NL (El. 1457 m) (m)	Minimum Freeboard Measured while above NL (m)
Dec. 26, 2022 to Jan 28, 2023	0.3	1.8
Apr. 03 to Apr. 12, 2023	0.1	1.9

Table 5.6 S3 Pond Water Level Exceedances

Date	Maximum Water Level above NL (i.e., 1456.5 m) (m)	Minimum Freeboard Measured while above NL (m)
Nov. 8 to 12, 2022	0.2	2.4
Nov. 30, 2022 to Feb. 13, 2023	1.3	1.2
Feb. 22 to Mar. 15, 2023	0.7	1.8
Sep. 16 to Sep. 20, 2023	0.2	2.3

Table 5.7 S8 Pond Water Level Exceedances

Date	Maximum Water Level above NL (i.e., 1450.8 m) (m)	Minimum Freeboard Measured while above NL (m)
Feb. 18 to Feb 21, 2023	0.1	1.1
Mar. 11 to Apr. 11, 2023	0.3	0.9
Jun. 24 to Jun. 30, 2023	0.4	0.8

5.3 Piezometers

At the end of the review period, 25 standpipe piezometers were active in the Highmont TSF (Figure 3). The current suite of instruments is considered sufficient for the existing configuration of the Highmont TSF. All piezometers are installed in the TSF's tailings beach.

Piezometers have measured relatively consistent trends and values since installation and are below levels assumed in the design analysis. NL thresholds have been defined and, if exceeded, notify HVC and the EoR of a change in pattern or typical level. An exceedance, however, does not necessarily represent a performance concern. No changes to existing threshold values were proposed for the 2022 or 2024 OMS Manual updates.

Piezometric elevations measured by active piezometers are plotted on Figure 7 to Figure 11. A summary of key observations for piezometric readings during the review period are:

- No NL threshold exceedances were measured during the review period.
- Most piezometric readings and trends during the review period were consistent with readings since 2011 (except for P-M and P-I).
- Piezometric levels during the review period show that groundwater levels in the impoundment are highest near the middle of the beach and fall towards the Highmont TSF perimeter dams and the pond. This pattern has been persistent for the instrumentation record for the existing condition.

- Piezometric readings at P-M and P-I, installed near the middle of the beach upstream of the East Dam, rose during Q2 2023 (1481.69 m to 1483.34 m and 1480.62 m to 1482.31 m, respectively). The peak piezometric levels did not exceed threshold values and were equivalent to those measured in 2017 following an above average freshet. The response during the review period is likely a response to increased infiltration on the beach due to the relocation of discharge points from the S3 Pond and S5 Pond (Section 3). This is related to the same mechanism associated with the seepage observed along the access ramp over the South Dam downstream slope (Section 5.1).

5.4 Survey Monuments

Survey of the monuments at the Highmont TSF are plotted on Figure 12. During the review period, there were no horizontal threshold value exceedances, and the survey locations from the review period were within the cluster of previous readings and showing no horizontal deformation trend. The settlement (vertical) threshold at monument P7 was exceeded but this is interpreted to be related to reliability of the survey method discussed below, rather than representative of actual movements. The overall magnitude of settlement to date, if accurate, is not impacting freeboard (Section 5.2) or other aspects of performance.

In November 2019, HVC changed to a GPS Real-Time Kinematic (RTK) method to survey the monuments. The horizontal surveys plotted on Figure 12 are for the RTK method only, based on the initial RTK survey location.

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 12).

Surveys in 2023 suggested all monuments measured settlement relative to 2022, whereas in previous years the monuments had shown a mix of uplift and settlement. 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 that would explain this response. KCB and HVC will consider alternate displacement monitoring methods, specifically related to settlement, as part of a surveillance program review planned for 2024. This review will include a review of INSAR data (20 m centers) that HVC has been completed for the site and to assess whether it would be a preferred alternative to monitor settlement.

5.5 Seepage

For the existing condition of the Highmont TSF dams, as per the OMS Manual (HVC 2022), turbid seepage is the primary performance indicator rather than flow. This is captured by visual inspection and no such observations were made during the review period.

In addition to monitoring seepage turbidity, HVC measures seepage flows at V-notch weirs installed upstream of the S1 Pond and S3 Pond (Figure 13). No seepage flow readings are required upstream of S5 Pond and S8 Pond as per the OMS Manual (HVC 2022). Seepage from the dam is observed at these locations during routine visual inspections and flow reports to the respective seepage ponds.

Clear seepage (i.e., no turbidity) at the access ramp of the South Dam was observed during the 2023 AFPR site visit. This seepage was first observed by HVC in 2022; conditions have remained similar since then. KCB notes the following:

- Above the starter dam, the South Dam is pervious with engineered filters and clear seepage through the dam is not a concern.
- The seepage is the result of relocating the S3 Pond and S5 Pond reclaim discharge lines closer to the dam face in 2022 (KCB 2023), upstream of where the seepage was observed. This increased infiltration into the tailing beach, which seeped through the pervious segment of the dam, is not related to dam safety issues or unacceptable performance.
- The seepage daylighting at the ramp is captured by the S3 Pond. As discussed in Section 3, HVC installed a culvert in December 2023 to address the ponding of water in this area.

5.6 Water Quality

HVC's Water Quality Monitoring and Reporting Plan, approved under the PE-376 effluent permit (MECCS 2023), specifies minimum water-quality sampling requirements at the HVC Mine Site, including downstream of the Highmont TSF. A revision to the PE-376 effluent permit was issued to HVC on July 27, 2023. The revised permit removes the previously authorized discharge location at the Highmont spillway; no changes to operations have been implemented during the review period.

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, 2024. The report, when available, should be referred to for monitoring data and a discussion of the results. Water quality samples required under the PE-376 permit, from the Highmont TSF and associated seepage ponds, were collected during the review period. For the reported non-compliances during the review period, refer to the annual water-quality monitoring report.

With regards to the design of the Highmont TSF, there were no surface discharges from the spillway, and the primary controls related to seepage (i.e., tailings beach and downstream seepage recovery ponds) 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:

Highmont TSF:

- Impoundment, dam crest, and downstream slopes appear similar to conditions observed during previous site visits. Closure covers continue to perform well on downstream slopes. Seepage was observed daylighting through the South Dam access ramp fill (Section 5.1).

Highmont TSF Spillway Channel:

- Dead trees were observed in the portion of the spillway channel parallel to S2 Pond. If the IDF were to occur, these trees could be swept into the spillway channel and potentially obstruct it. Dead trees and vegetation in spillway channels are managed through the routine maintenance described in the OMS Manual (HVC 2022) and thus, no further action is recommended.
- Spillway channel culverts at the S2 Pond road, at the toe of the North Dam, are partially blocked due to debris from road regrading in 2023 (see Photo I-A-21). Refer to AFPR recommendation HG-2023-01 (Table 8.2).

S5 Pond:

- The two overflow pipes at the Pumping Sub-cell were blocked at intake, as intended by HVC to prevent discharge to the environment.

7 ASSESSMENT OF DAM SAFETY

7.1 Review of Potential Downstream Consequences

Conditions and land use downstream of the Highmont TSF 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.

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

Teck provided the following statement regarding the consequence classification of the facility:

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

A "High" consequence category, based on the CDA (2013) classification scheme, has been assigned to the Highmont TSF. The seepage recovery ponds' consequence classification ranges from High (S3 Pond), to Significant (S1 Pond, S2 Pond, S8 Pond), to Low (S8 Pond). There have been no material changes to the TSF and seepage recovery ponds, or to their upstream or downstream conditions during the review period, that support a modification to their consequence category.

The spillway design flood and the earthquake design ground motion (EDGM) for the facility meets or exceeds the equivalent requirements under the HSRC (EMLI 2022).

7.2 Failure Modes Review

7.2.1 Overview

Potential failure modes for the Highmont 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.

7.2.2 Highmont TSF Dams

Overtopping

The spillway design flood (PMF) is greater than the minimum IDF (Section 4.4) recommended under the HSRC (EMLI 2022) and is an effective control to prevent overtopping. Furthermore, under existing conditions, the following additional controls and factors significantly reduce the potential for overtopping:

- Freeboard: The Highmont TSF maintained a freeboard greater than 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 3.9 m. This exceeds the minimum freeboard of 0.2 m required to accommodate wave run-up and wind (Table 5.3).
- Beach width: at the peak PMF flood level, the beach separating the pond from the dam crest would be a minimum of 290 m.

Slope Stability – Static and Seismic Loading

KCB updated the stability assessment of the Highmont TSF dams in 2021 and concluded that calculated FOS values for the structure meet the CDA (2019) guidelines for static ($\geq$ 1.5), pseudo-static ($\geq$ 1.0), and post-earthquake stability ($\geq$ 1.2), under the design loads required per the HSRC (EMLI 2022). In addition, the Highmont TSF dams have been demonstrated to be stable under normal operating conditions during its service life and, under their existing configuration, over the more than 35 years post-reclamation.

There are multiple layers of control included in the design and operation of the Highmont TSF to prevent structural failure of the dam, including:

- The dam shell is built of compacted rockfill and granular filter zones on a competent foundation.
- The dam was stable during operations at the design downstream slope (1.5H:1V). During reclamation, the slopes were shallowed to approximately 2.3H:1V to 2.5H:1V.

- The Highmont TSF dams do not have brittle failure modes (i.e., no risk of developing a sudden failure) that could result in breach of the structure or loss of containment.

Based on test pits conducted before construction of the starter dam, a stiff silt layer, underlying glacial till, is present in the South Dam foundation. The silt layer was included in a stability assessment considering reasonably conservative assumptions (e.g., continuity, strength parameters). Even under these reasonably conservative assumptions, the dam meets design criteria.

Internal Erosion and Piping

The primary controls for managing internal erosion through the Highmont TSF dams are a wide tailings beach that reduces the piezometric levels and seepage gradients near the dam, and near the filter zones in the dam shell.

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.

7.2.3 Seepage Recovery Pond Dams

Overtopping

- The S1 Pond, S2 Pond, S3 Pond, S5 Pond, and S8 Pond can manage the IDF requirements under HSRC (EMLI 2022), refer to Section 4.4.

Slope Stability – Static and Seismic Loading

- S1 Pond, S2 Pond, and S8 Pond: Stability analyses under static, pseudo-static, and post-earthquake loading, indicate the FOS for slip surfaces through dam fill and foundation are greater than the minimum FOS required by HSRC (KCB 2015a, 2015b).
- S3 Pond: The retaining dam at the S3 Pond meets FOS criteria for normal loading conditions and no issues of instability have been noted during the service life (KCB 2015a, 2015b). A portion of the dam is built on an alluvial sand and gravel deposit (KL 1980b). No information regarding the in-situ density of this material is available to assess the liquefaction susceptibility under the EDGM (2,475-year return period earthquake). HVC follows a risk-based approach in operating the S3 Pond, maintaining a pond elevation at or below El. 1456.5 m to mitigate pond release if the dam becomes unstable during the EDGM (KCB 2022c). This operational target level was exceeded four times during the review period (see Section 5.2).
- S5 Pond: The S5 Pond berm has performed well since the crest was raised in 2015, with no reported observations of structural instability (e.g., cracking, slumping). This is consistent with other structures built of compacted fill with similar side slopes (approximately 1.7H:1V) and height (up to 6 m) on competent glacial till foundation.

Internal Erosion and Piping

- The absence of suspended solids noted in observed seepage water during routine inspections over the service life of the seepage pond dams suggests failure by internal erosion is effectively managed by the existing design controls (e.g., filter compatible drainage blanket below the downstream slope).

7.3 Status of Dam Safety Review Recommendations

The most recent DSR of the Highmont 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 DSR included 29 recommendations related to the Highmont TSF, many of which are similar (e.g., update flood routing to most recent hydrology) but are repeated for each structure. During the review period, one of the remaining two recommendations was addressed (S5-001) by completing the Highmont TSF flood routing update (KCB 2022b). The only outstanding recommendation from the DSR is related to the Highmont TSF spillway, which is also covered by the AFPR recommendation HD-2017-01 (Table 8.1) and discussed in Section 4.4.

HVC commissioned a Dam Safety Review (DSR) of the Highmont TSF during 2023, which meets the five-year DSR frequency required under the HSRC. The DSR report was being finalized during the preparation of this report and is due for submission to the Ministry of Energy, Mines and Low Carbon Innovation (EMLI) prior to the end of March 2024. An action plan to address any recommendations will be prepared by HVC and the EoR, and reported in the next AFPR. The next DSR is scheduled to be initiated in 2028 (five-year frequency).

7.4 Emergency Preparedness and Response

The Highmont TSF EPRP forms a part of the OMS Manual (HVC 2022), which was reviewed during the review period. Similar to the OMS Manual, the EPRP the document went through a routine update and an update was issued in 2024. The Highmont TSF 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 December 5, 2023, participants from HVC's operation team (including site management), and including the TSF QP, participated in a simulated exercise to test the TSF EPRP. The Highmont TSF EoR also participated in this exercise.

8 SUMMARY

Based on the review of measured performance and observations summarized herein, KCB concludes that the Highmont TSF performed as expected, was maintained within design requirements, and operated in accordance with the OMS Manual (HVC 2022) from October 2022 through September 2023.

Dam safety recommendations identified during past AFPRs, and their current status, are summarized in Table 8.1. Two new recommendations were identified during the 2023 AFPR and are summarized in Table 8.2. One was to clear the Highmont TSF spillway culverts that were partially obstructed during the road regrading work. This does not represent an imminent dam safety concern at the facility but should be done to prevent ongoing erosion. The second is to update the OMS Manual with changes introduced by the revisions to the PE-376 permit issued during the review period.

During the review period, two of the three recommendations from previous AFPRs were closed (shown in *italics*) and one of the two outstanding recommendations from the DSR (S5-001) was also closed. The outstanding DSR recommendation (HD-008) is captured by AFPR recommendation HD-2017-01 and pertains to the regrading of the toe road downstream of the North Dam. HVC started this work Q4 2023.

Table 8.1 Previous Recommendations Related to Facility Performance – Status Update

ID No.	Performance Area	Recommended Action	Priority[1]	Deadline (Status)
HD-2017-01	Flood Management	HVC should modify the spillway channel to pass the peak spillway design outflow beneath the access road or regrade the road surface so that water that flows over the road will report to the downstream spillway channel.	3	Q4 2020 (Open – HVC started works in Q4 2023 based on 2022 flood routing)
S2-2019-01	*Flood Management*	*S2 Pond spillway channel profile has been changed due to the temporary access over the channel. Original channel profile/capacity should be restored.*	*3*	*Q1 2020 (Closed)*
S5-2018-02	*Flood Management*	*To accommodate the temporary blocking of the S5 Pond spillway during freshet, raise the dam crest so that the IDF (100-year 72-hour duration) can be stored within the reservoir, assuming no pumping is required. (Take into consideration, HD-2018-02)*	*2*	*Q3 2021 (Closed)*

Note:
1. Recommendation priority guidelines, specified by Teck 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 8.2 2023 Recommendations Related to Facility Performance

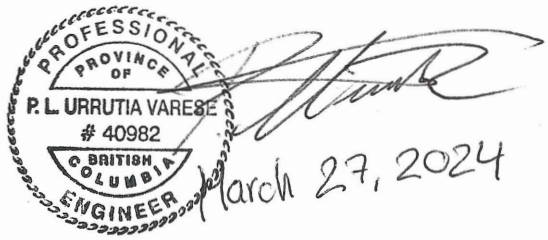
ID No.	Performance Area	Recommended Action	Priority[1]	Recommended Deadline
Highmont TSF				
HD-2023-01	Maintenance	The Highmont Spillway culverts crossing the S2 Pond road, at the toe of the North Dam, are partially blocked due to the road regrading works. Culverts should be cleared.	3	Q3 2024
HD-2023-02	OMS Manual	Update OMS Manual with changes introduced by the PE-376 changes.	3	Q1 2025

Note: 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



Pablo Urrutia, P.Eng.
Engineer of Record, Designated Representative
Senior Geotechnical Engineer

REFERENCES

Canadian Dam Association (CDA). 2019. “Technical Bulletin: Application of Dam Safety Guidelines to Mining Dams”.

CDA. 2013. “Dam Safety Guidelines 2007 (Revised 2013)”.

Global Industry Standard on Tailings Management (GISTM). 2020. Co-convened by the International Council on Mining and Metals (ICMM), United Nations Environment Programme (UNEP) and Principles for Responsible Investment (PRI). August.

Golder member of WSP (Golder). 2021. “Surface Water Quantity Existing Conditions”. Prepared for Teck Highland Valley Copper Partnership – HVC 2040 Project”, September 8.

Golder. 2020. “Spring Extreme Events and Wind Analysis”. Prepared for Teck Highland Valley Copper Partnership. September 29.

Klohn Crippen Consultants Ltd. (KC). 1996. “Bethlehem and Highmont Tailings Dams – Long-Term Stability Assessment,” December 9.

KC. 1994. “Stability Review and Spillway Design – Bethlehem and Highmont Tailings Impoundment”, December 14.

Klohn Crippen Berger (KCB). 2023. “2022 Highmont TSF Annual Facility Performance Report”, March 16.

KCB. 2022b. “Legacy Tailings Storage Facilities Flood Routing Assessments: Highmont TSF and Seepage Ponds Flood Routing. March 29.

KCB. 2022c. Highmont S3 Dam Post-Earthquake Stability Assessment. March 15.

KCB. 2015a. “Highland Valley Copper – 2014 DSI recommendations – Highmont Seepage Dams Stability Update (DSI-SD-01)”, December 2.

KCB. 2015b. “HVC Tailings Dams – Highmont Tailings Storage Facility Response to MEM Memorandum – February 3, 2015”, June 25.

Klohn Leonoff (KL). 1980a. File:VA 1526. “Highmont Tailings Disposal System – Report No. 5 Seepage Recovery”, April 3.

KL. 1980b. “Highmont Tailings Disposal System – Report on Seepage Recovery”, April 3.

Mining Association of Canada (MAC). 2019. “Developing an Operation, Maintenance and Surveillance Manual for Tailings and Water Management Facilities”, February.

Ministry of Energy, Mines and Low Carbon Innovation (EMLI). 2021. “Permit M11 – Approving Mine Plan and Reclamation Program (Issued Pursuant Section of the Mines Act R.S.B.C. 1996, c. 293)”, June.

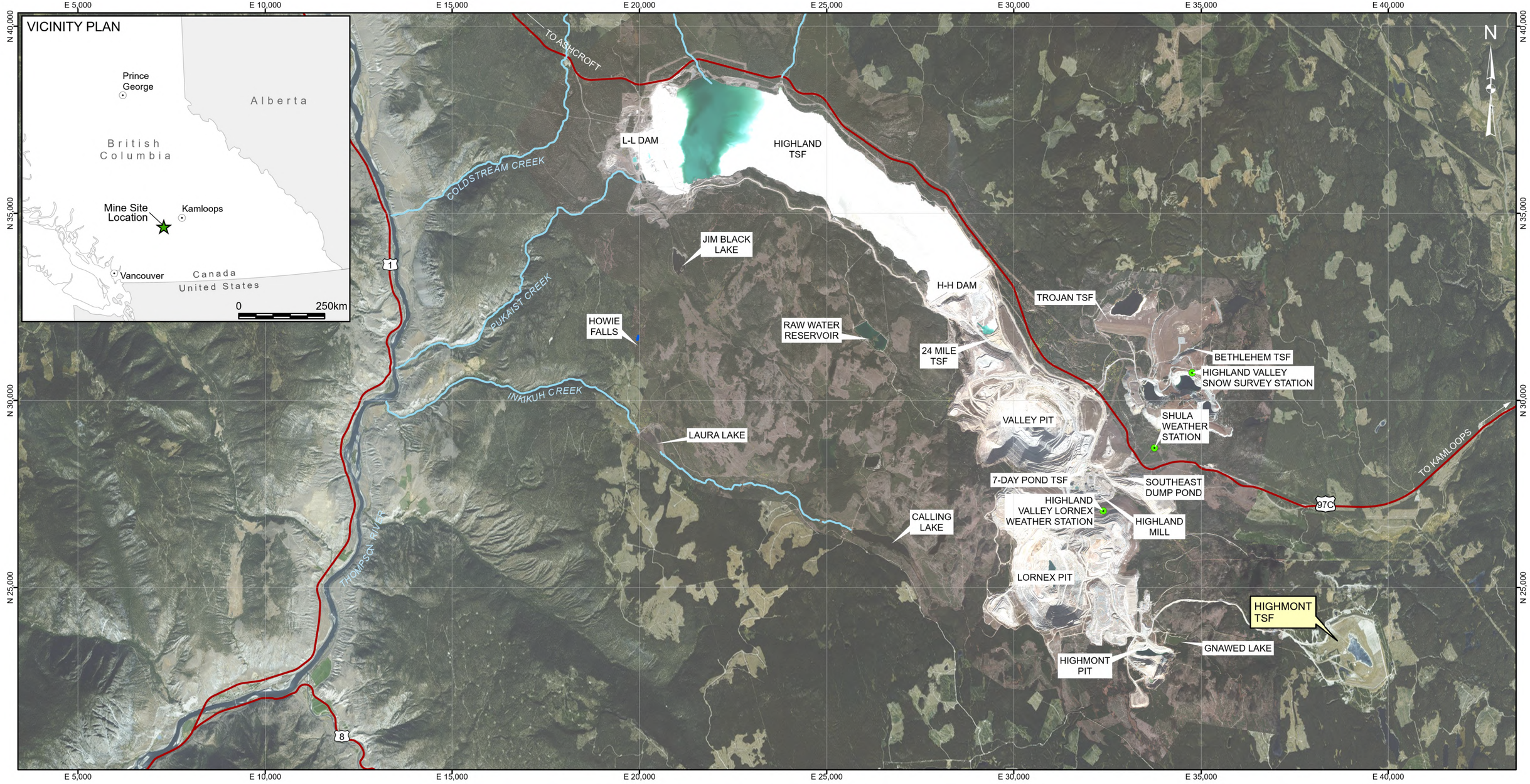
EMLI. 2022. “Health, Safety and Reclamation Code for Mines in British Columbia, Revised” November.

Ministry of Environment and Climate Change Strategy (MECCS). 2023. “Permit 376.” July 27.

SRK Consulting. 2019. “Highmont Tailings Storage Facility 2018 Dam Safety Review”, March.

Teck Highland Valley Copper Partnership (HVC). 2022. “Highmont Tailings Storage Facility – Operation, Maintenance, and Surveillance Manual”, June.

FIGURES



LEGEND

- 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 2012).
4. IMAGERY FROM HVC OBTAINED OCTOBER, 2023, SUPPLEMENTED WITH IMAGERY FROM ESRI.

NOT FOR CONSTRUCTION

SCALE 0 5km

CLIENT: Highland Valley Copper / Teck

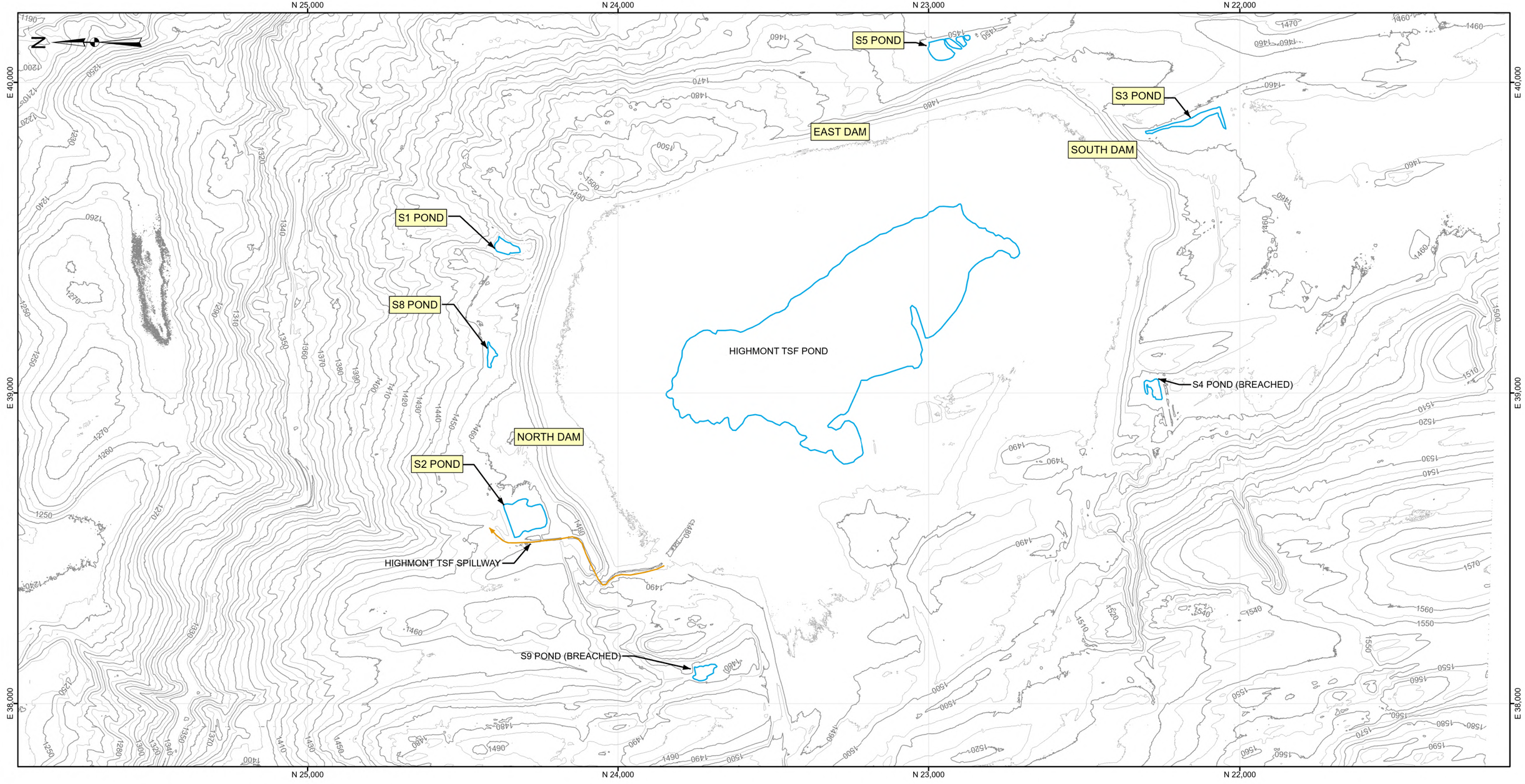
Klohn Crippen Berger

PROJECT: HIGHMONT TAILINGS STORAGE FACILITY
2023 ANNUAL FACILITY PERFORMANCE REPORT

TITLE: MINE SITE PLAN

SCALE	PROJECT No.	FIG No.
AS SHOWN	M02341C62	1

SAVE DATE: 2024-03-11 3:56 PM
FILE PATH: Z:\MIVCR\M02341C62-HVC-2023 AFPR\400 Drawings\GIS\M02341C62_AFPR_Figure1.aprx (afischer)



LEGEND

- SPILLWAY
- WATERBODY

NOTES:

1. PROJECTION: HVC MINE GRID.
2. TOPOGRAPHY FROM HVC, LIDAR FLOWN ON AUGUST 23RD, 2014.

NOT FOR CONSTRUCTION

SCALE 0 500m

CLIENT: Highland Valley Copper / Teck

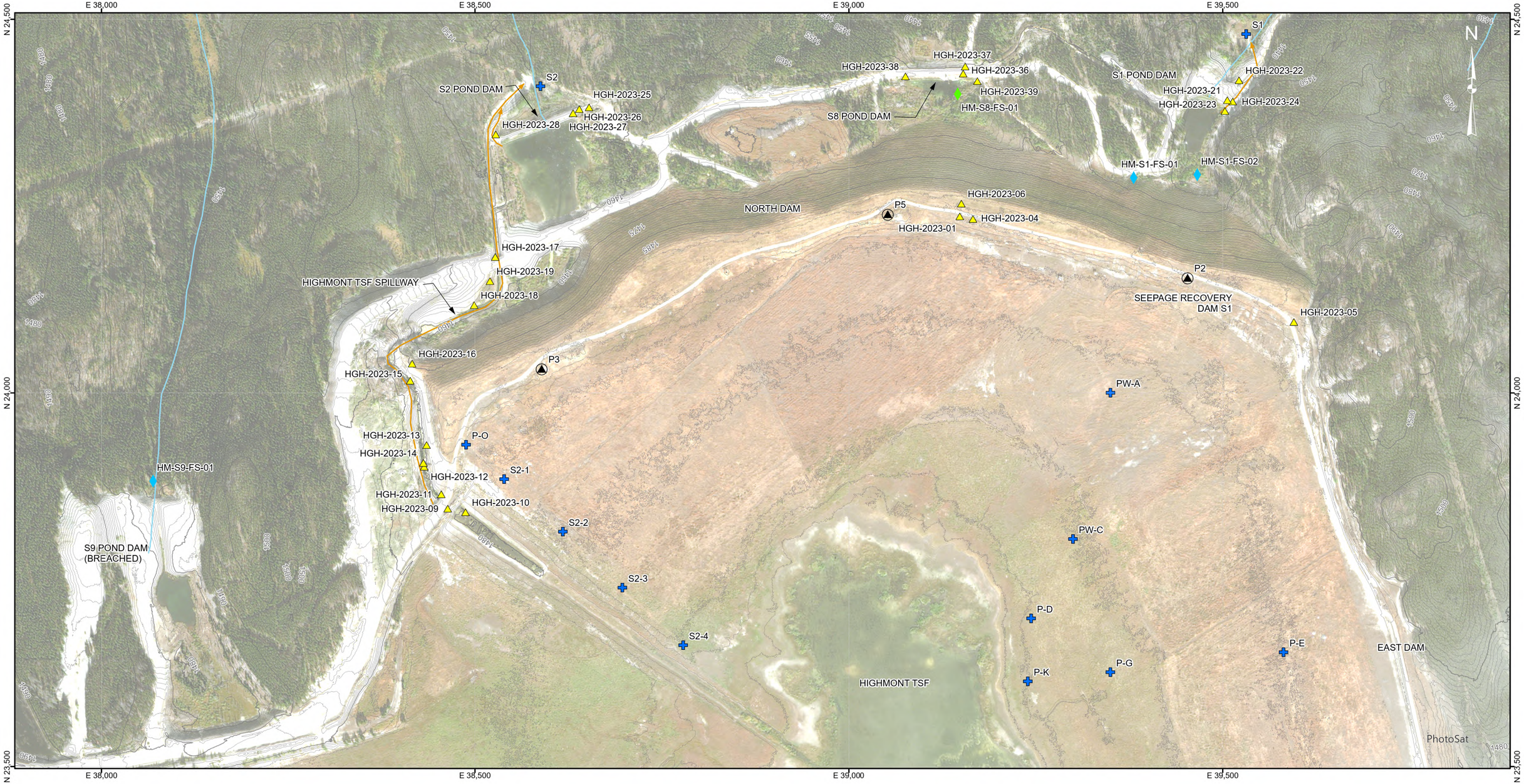
Klohn Crippen Berger

PROJECT: HIGHMONT TAILINGS STORAGE FACILITY
2023 ANNUAL FACILITY PERFORMANCE REPORT

TITLE: HIGHMONT TAILINGS STORAGE FACILITY OVERVIEW

SCALE	PROJECT No.	FIG No.
AS SHOWN	M02341C62	2

SAVE DATE: 2024-03-11 3:41 PM
FILE PATH: Z:\MVCRM\02341C62-HVC-2023 AFPR\400 Drawings\GIS\M02341C62_AFPR_Figures.aprx (afischer)



LEGEND

- WAYPOINT (HGH-2023-xx)
- ACTIVE INSTRUMENT
  - STANDPIPE PIEZOMETER
  - WEIR
  - PIPE/BUCKET FLOW READING
  - TOTAL STATION POINT
- DAM
- SPILLWAY

NOTES:

1. PROJECTION: HVC MINE GRID.
2. IMAGERY FROM HVC OBTAINED SEPTEMBER, 2020.
3. TOPOGRAPHY FROM HVC, LIDAR FLOWN ON AUGUST 23RD, 2014.

NOT FOR CONSTRUCTION

SCALE 0 100m

CLIENT: Highland Valley Copper / Teck

PROJECT: HIGHMONT TAILINGS STORAGE FACILITY
2023 ANNUAL FACILITY PERFORMANCE REPORT

TITLE: NORTH DAM
PLAN

Klohn Crippen Berger

SCALE	PROJECT No.	FIG No.
AS SHOWN	M02341C62	3

SAVE DATE: 2024-03-12 10:03 AM
FILE PATH: Z:\MV\CR\M02341C62-HVC-2023 AFPR\400 Drawings\GIS\M02341C62_AFPR_Figures.aprx (afischer)

N 24,000 N 23,500 N 23,000 N 22,500

E 40,000 E 39,500

HGH-2023-32 HGH-2023-33 HGH-2023-35 HGH-2023-34 S5 POND DAM HM-S5-FS-01 HGH-2023-20 EAST DAM HGH-2023-02 HGH-2023-07 P6 HM-S3-FS-01 P4 HGH-2023-08 HGH-2023-03 SOUTH DAM PW-L P-M PW-H S3-1 HGH-2023-05 P-E P-N S3-2 P-I PW-P PW-J P2 PW-A P-G PW-C P-D P-K

LEGEND

- WAYPOINT (HGH-2023-xx)

ACTIVE INSTRUMENT
- STANDPIPE PIEZOMETER
- WEIR
- PIPE/BUCKET FLOW READING
- TOTAL STATION POINT

- CREEK
- SPILLWAY
- INDEX CONTOUR (5 m)
- INTERMEDIATE CONTOUR (1 m)

NOTES:

1. PROJECTION: HVC MINE GRID.
2. IMAGERY OBTAINED SEPTEMBER, 2020.
3. TOPOGRAPHY FROM HVC, LIDAR FLOWN ON AUGUST 23RD, 2014.

NOT FOR CONSTRUCTION

SCALE 0 100m

CLIENT: Highland Valley Copper / Teck

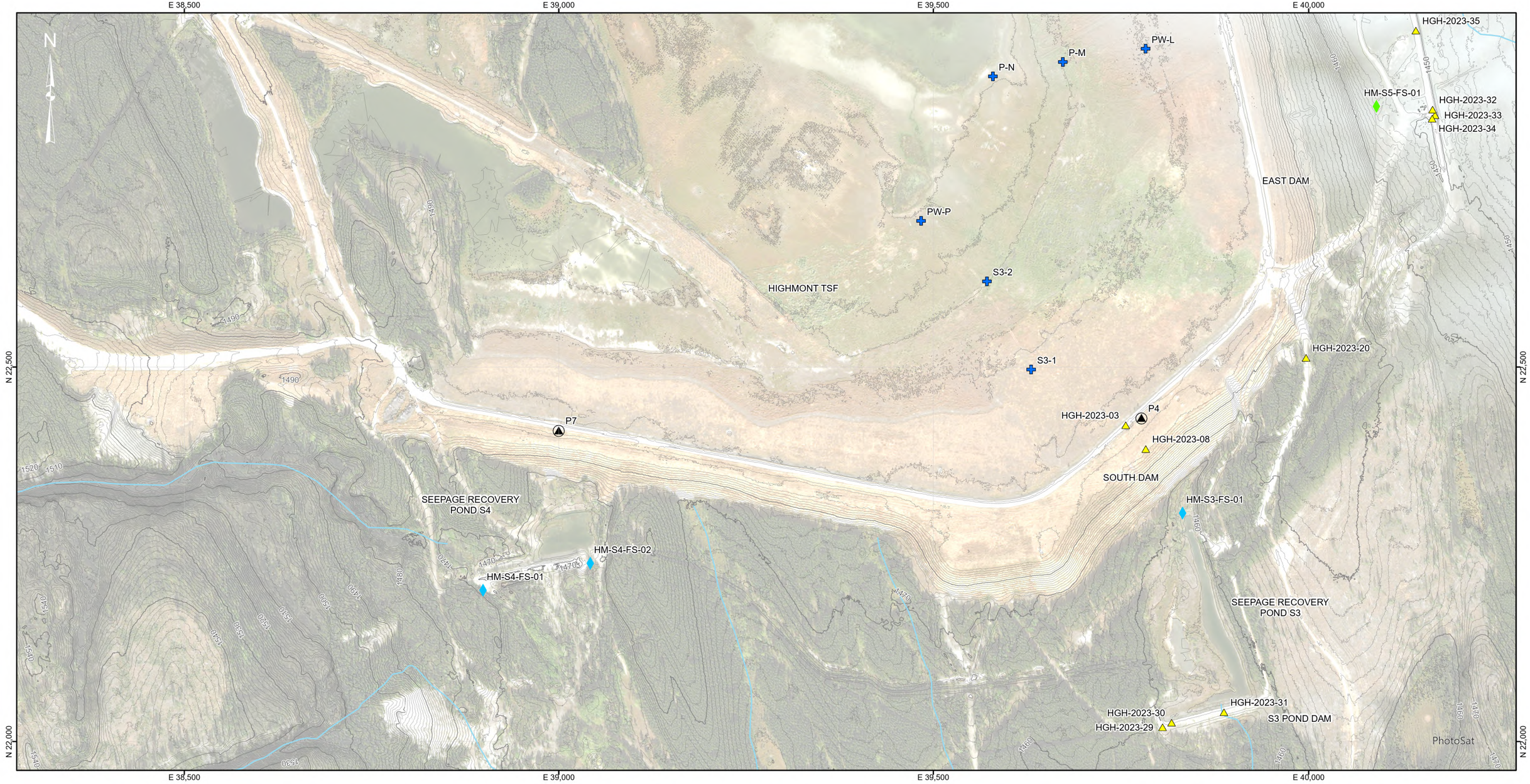
Klohn Crippen Berger

PROJECT: HIGHMONT TAILINGS STORAGE FACILITY
2023 ANNUAL FACILITY PERFORMANCE REPORT

TITLE: EAST DAM PLAN

SCALE	PROJECT No.	FIG No.
AS SHOWN	M02341C62	4

SAVE DATE: 2024-03-12 9:44 AM
FILE PATH: Z:\MVCR\M02341C62-HVC-2023 AFPR\400 Drawings\GIS\M02341C62_AFPR_Figures.aprx (afischer)



LEGEND

- WAYPOINT (HGH-2023-xx)
- ACTIVE INSTRUMENT
  - STANDPIPE PIEZOMETER
  - WEIR
  - PIPE/BUCKET FLOW READING
  - TOTAL STATION POINT
- CREEK
- SPILLWAY
- DAM

NOTES:

1. PROJECTION: HVC MINE GRID.
2. IMAGERY OBTAINED SEPTEMBER, 2020.
3. TOPOGRAPHY FROM HVC, LIDAR FLOWN ON AUGUST 23RD, 2014.

NOT FOR CONSTRUCTION

SCALE 0 100m

CLIENT: Highland Valley Copper / Teck

PROJECT: HIGHMONT TAILINGS STORAGE FACILITY
2023 ANNUAL FACILITY PERFORMANCE REPORT

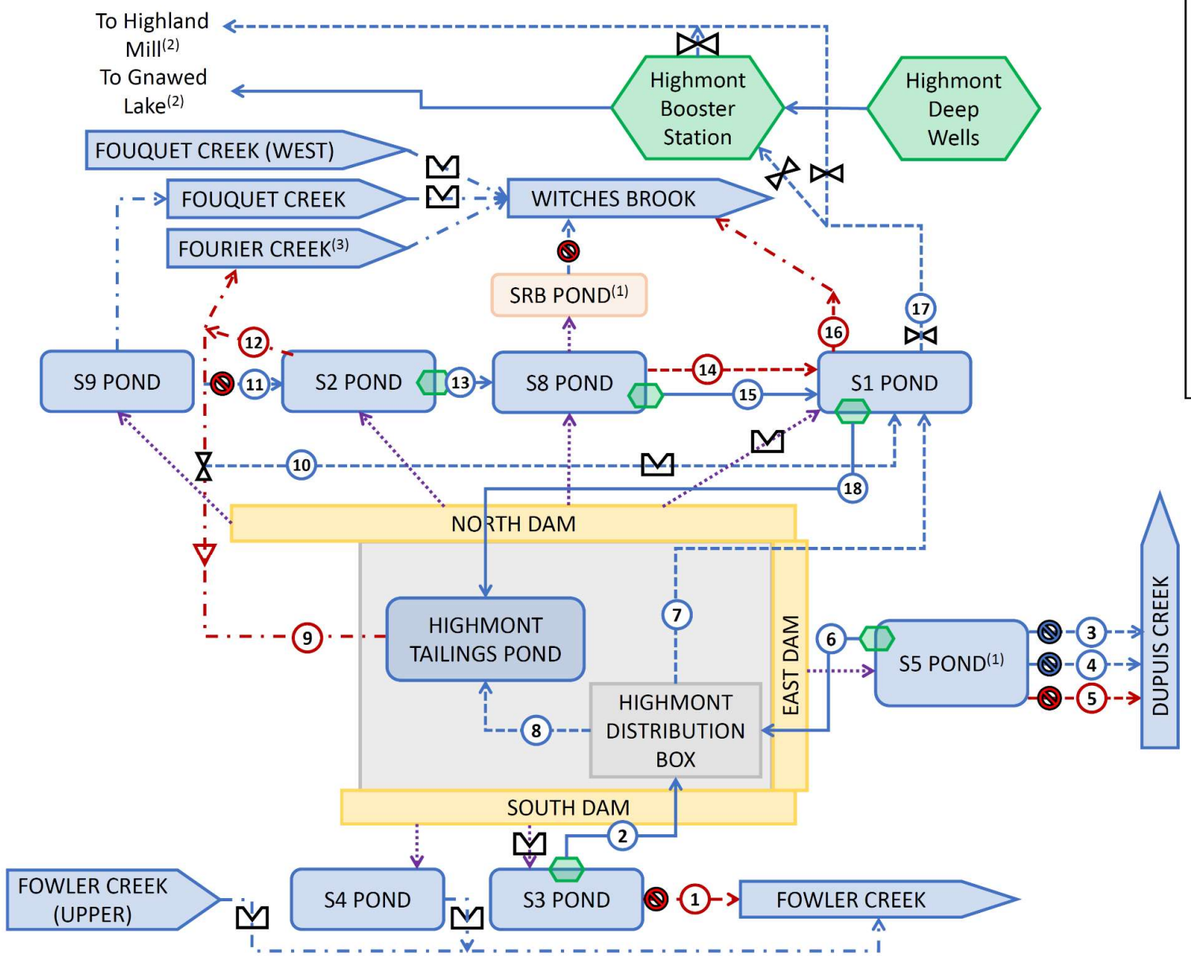
TITLE: SOUTH DAM
PLAN

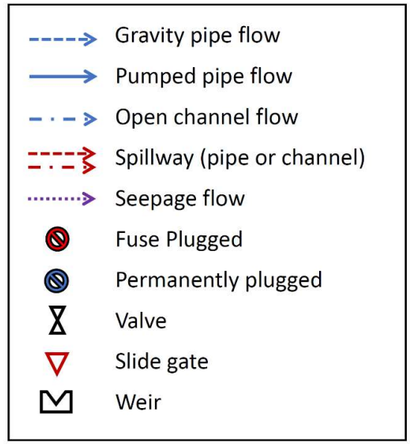
Klohn Crippen Berger

SCALE	PROJECT No.	FIG No.
AS SHOWN	M02341C62	5

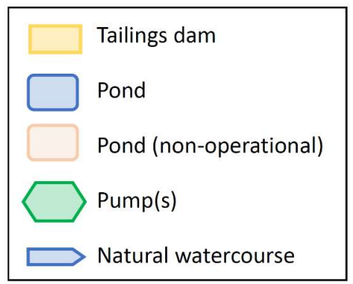
SAVE DATE: 2024-03-12 10:19 AM
FILE PATH: Z:\MVCR\M02341C62-HVC-2023 AFPR\400 Drawings\GIS\M02341C62_AFPR_Figures.aprx (afischer)

HIGHMONT
CONCEPTUAL FLOW DIAGRAM





Notes:
1. The Sulfate Reduction Bacteria (SRB) pond at S8 is downstream of the S8 Dam. The SRB pond at S5 consists of the five ponds in series in the centre of the facility. Water quality in both ponds do not meet discharge requirements at this time.
2. See the Gnawed Lake process flow diagram for additional details from S1 to the Mill.
3. Subject to water license constraints. See Environment for details.



No.	Name	Description	Status
1	S3 Spillway	Open channel	Non-operational, plugged prior to 2010
2	S3 Reclaim	Seepage water pumped to the Highmont TSF	Operational
3	S5 Outlet #1	2x 8"dia. HDPE pipes with control valves	Non-operational, metal plates placed at intake and pipes filled with till in 2015
4	S5 Outlet #2	1 x 8"dia. HDPE pipe with control valve	
5	S5 Overflow	2x 200 mm dia. HDPE pipes	Operational, partially blocked at intake
6	S5 Reclaim	Pond water pumped to the Highmont TSF	Operational
7	Distribution to S1	1x 18" dia. pipeline from the Highmont Distribution Box to S1	Non-Operational
8	Distribution Box to Tailings Pond	1x 18" dia. pipeline from the Highmont Distribution Box to the tailings pond	Non-Operational
9	Highmont Spillway	Open channel comprised of (U/S to D/S): i) Lock-block control sill; ii) Approach channel excavated in tailings; iii) Culvert crossings; iv) Channel excavated through rock; v) Flow control structure with 4' high slide gate and diversion to S1; and vi) Till plug diversion to S2 (decommissioned).	Operational
10	Diversion to S1	18" dia. HDPE pipeline	Operational
11	Diversion to S2	Open channel	Non-Operational
12	S2 Spillway	Open channel	Operational
13	S2 Outlet	1x 18" dia. HDPE pipeline carrying water pumped from S2 to S8	Operational
14	S8 Spillway	1x 18" dia. HDPE pipe with trash rack and headwall	Operational
15	S8 Outlet	1x 14" dia. HDPE pipeline carrying water pumped from S8 to S1	Operational
16	S1 Spillway	1x 900 mm dia. HDPE pipe discharging onto a riprap-lined apron	Operational
17	S1 Outlet	600 mm dia. HDPE pipe with manually operated valve	Operational
18	S1 Reclaim	Seepage water pumped back to the tailings pond	Operational

NOT FOR CONSTRUCTION

CLIENT: Highland Valley Copper / Teck

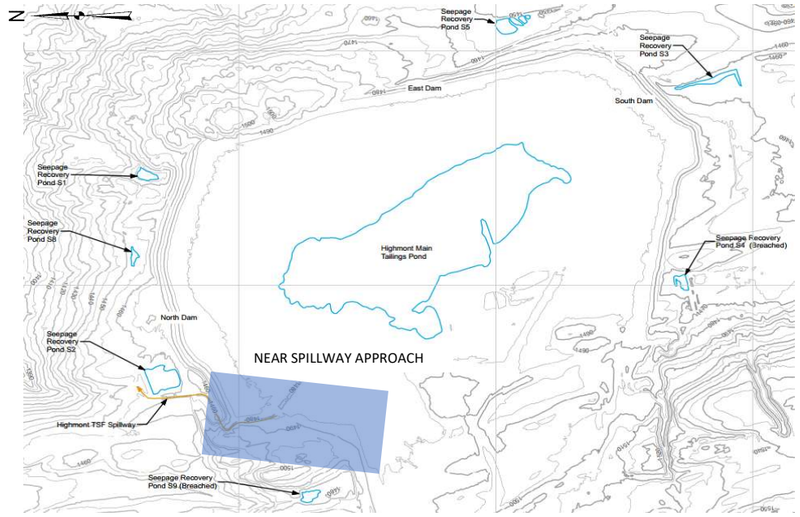
PROJECT: HIGHMONT TAILINGS STORAGE FACILITY
2023 ANNUAL FACILITY PERFORMANCE REPORT

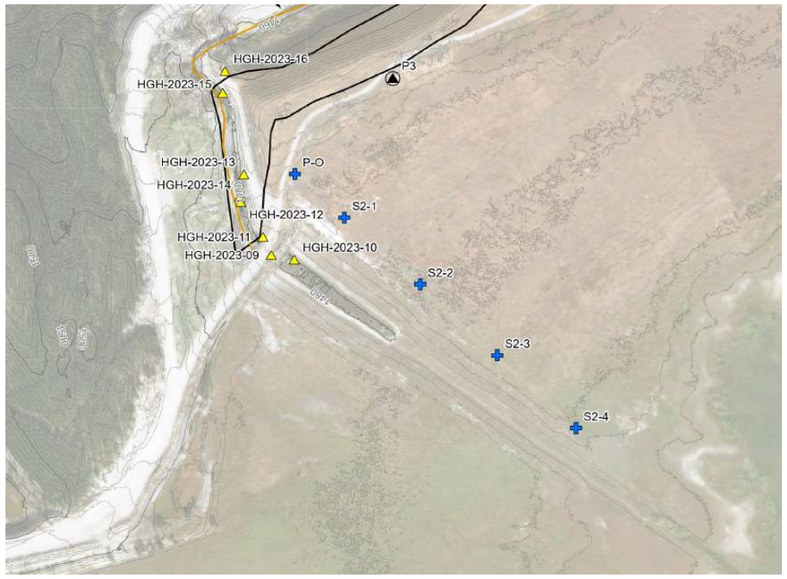
TITLE: FLOW SCHEMATIC FOR HIGHMONT TAILINGS STORAGE FACILITY

Klohn Crippen Berger

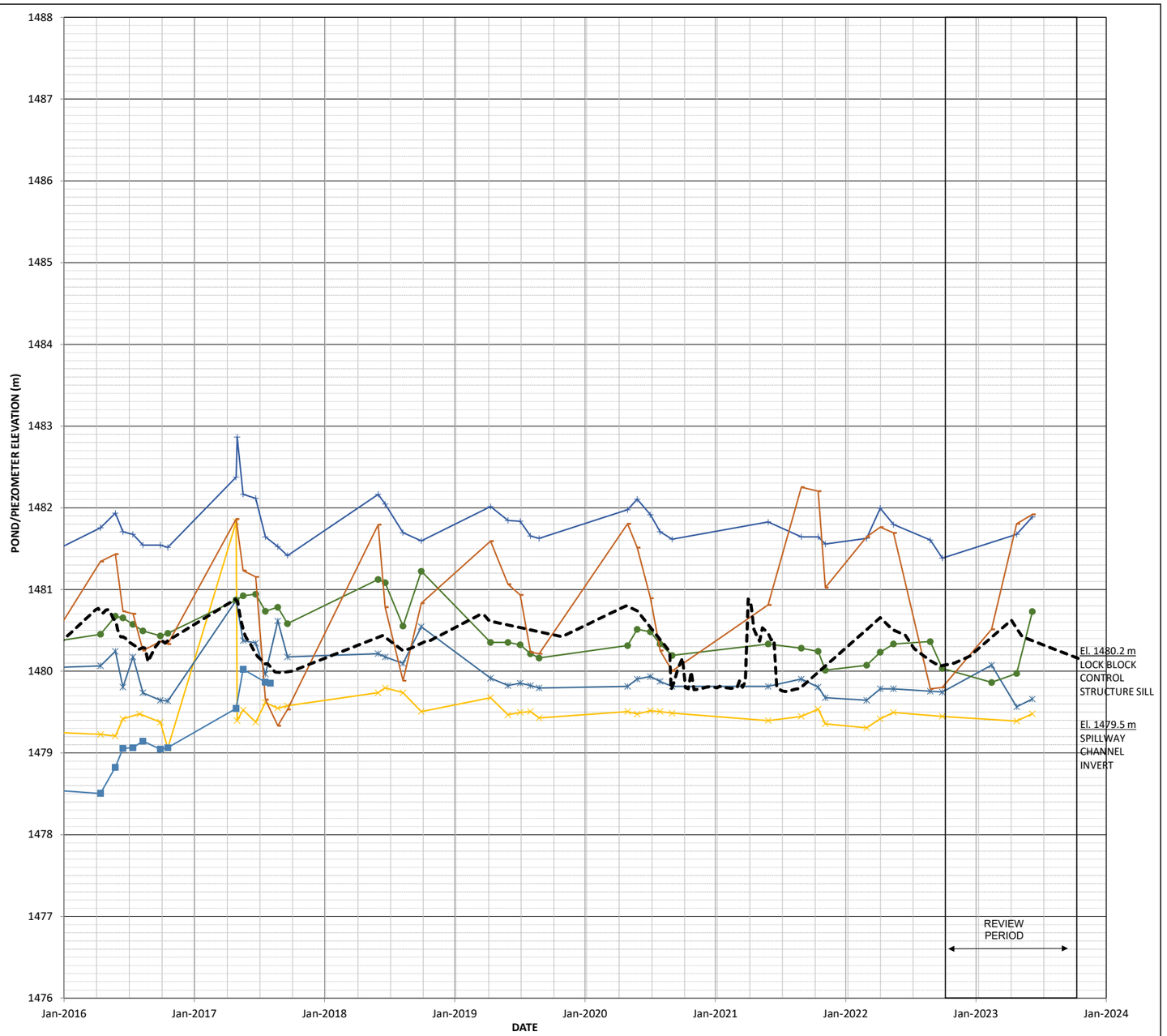
SCALE	PROJECT No.	FIG. No.
NTS	M02341C62	6

FILE PATH: Z:\MV\VCR\M02341C62-HVC-2023 APPR\700 DELIVERABLES\720 WORKING\2023 APPR\HIGHMONT\FIGURES\DO NOT ISSUE - FOR PFD (FIG6)\FIG 6- PFD.XLSX - 2024-03-11 11:19





PIEZOMETER ID	2023 Threshold Value (m)
P-O	1482.4
S2-1	1481.4
S2-2	1482.0
S2-3	1483.4
S2-4	1482.9



LEGEND:

- P-O (TIP EL. 1478.8 m)
- S2-1 (TIP EL. 1477.5 m)
- S2-2 (TIP EL. 1479.2 m)
- S2-3 (TIP EL. 1476.7 m)
- S2-4 (TIP EL. 1477.8 m)
- PW-A (TIP EL. 1473.3 m)
- HIGHMONT TSF POND LEVEL

CLIENT: Highland Valley Copper / Teck

Klohn Crippen Berger

PROJECT: HIGHMONT TAILINGS STORAGE FACILITY
2023 ANNUAL FACILITY PERFORMANCE REPORT

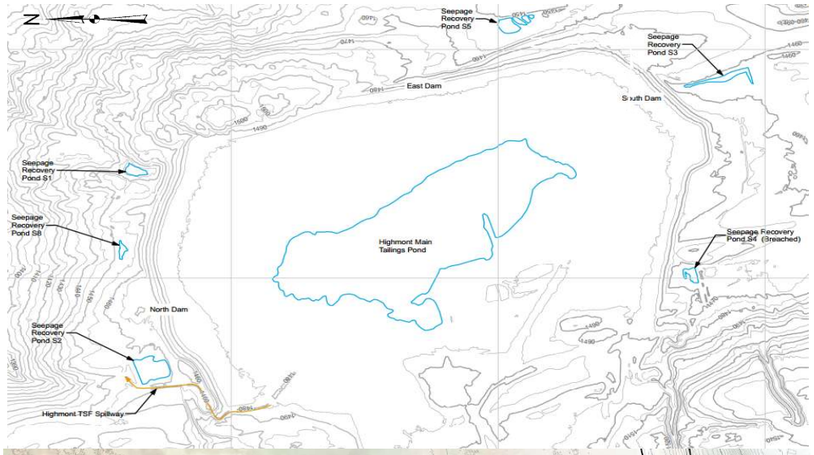
TITLE: HIGHMONT TSF PIEZOMETRIC DATA
YEARS 2016 TO 2023

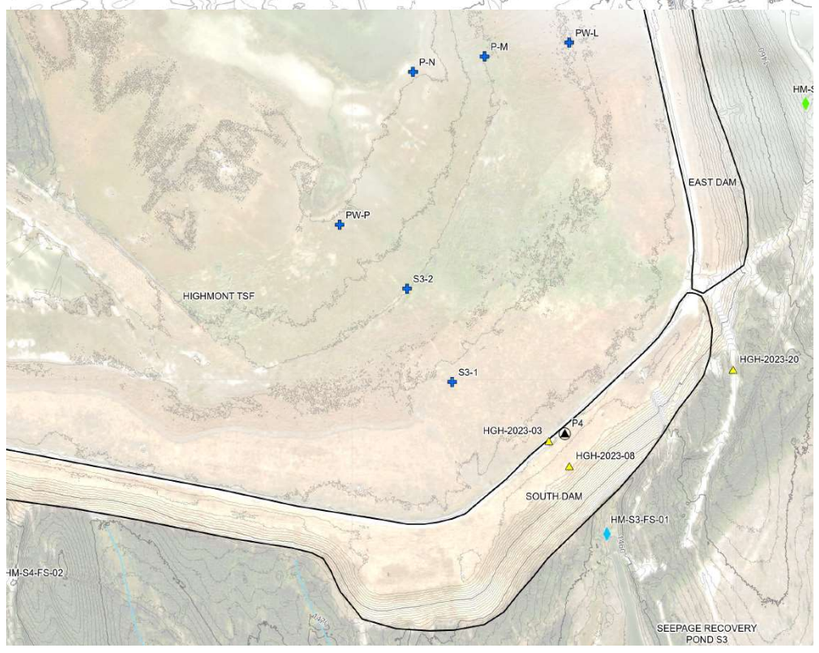
NEAR SPILLWAY APPROACH

PROJECT No. M02341C62

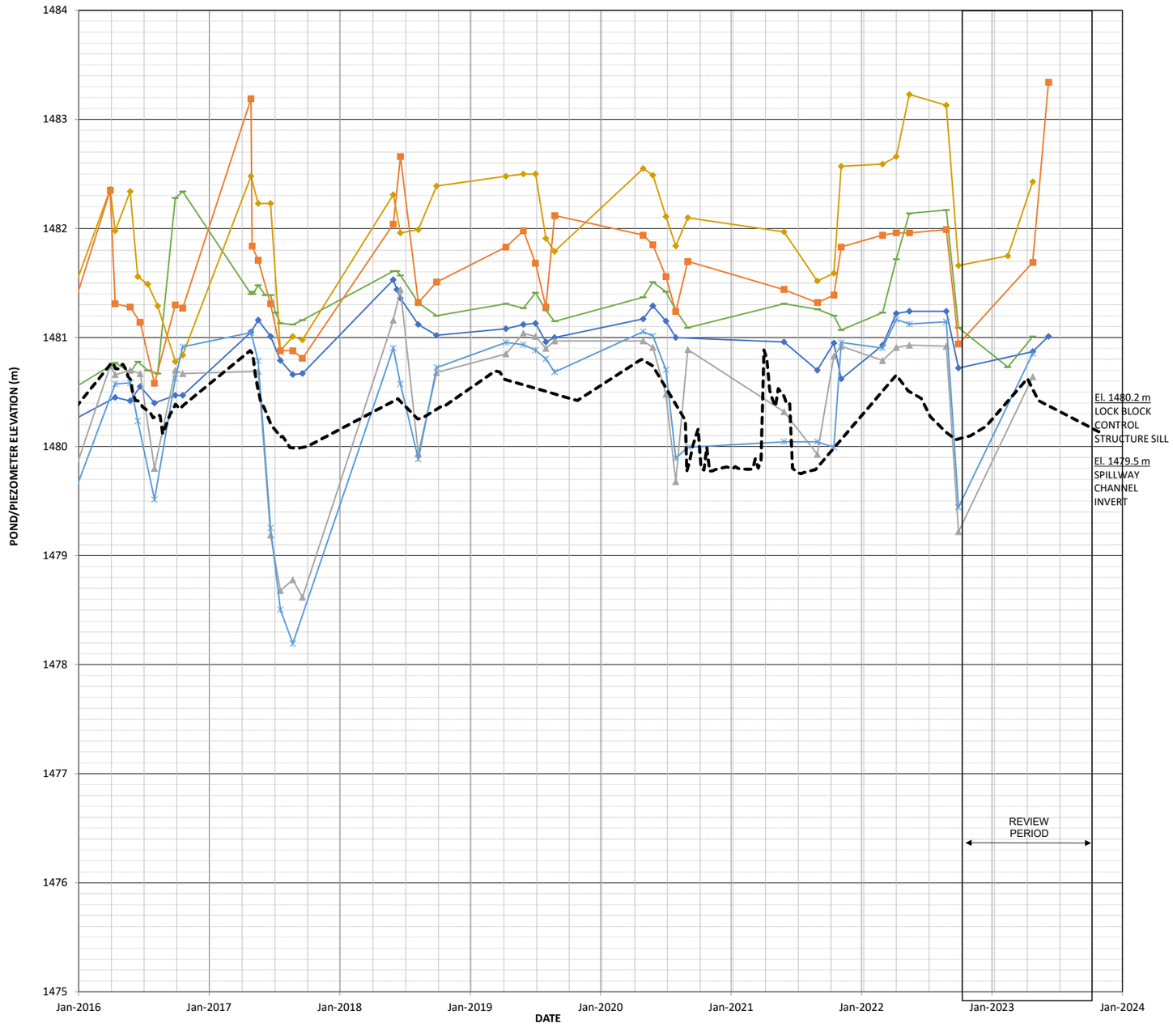
FIG No. 7

March 11, 2024
Z:\MV\CRM\2341C62-HVC-2023 AEPR\300 Design\320 - Piezometer Data\Highmont\[231201 Highmont Piezo.xlsx]SEEPAGE PONDS





PIEZOMETER ID	2023 Threshold Value (m)
PW-L	1481.8
P-M	1483.5
P-N	1481.9
S3-1	1482
S3-2	1483
PW-P	1481.6



NOTES:

1- PW-L WAS REPORTED DRY ON SEP 30, 2020 BUT HAS BEEN OPERATIONAL DURING THE 2022 REPORTING PERIOD.

2. S3-1 AND S3-2 MARGINALLY EXCEEDED THE NOTIFICATION LEVEL THRESHOLD BETWEEN JUNE 12 AND SEPTEMBER 23, 2022. THERE RESPONSES ARE NOT RELATED TO PERFORMANCE OR DESIGN COMPLIANCE CONCERNS. REFER TO SECTION 5.3 OF THE MAIN TEXT.

LEGEND:

- S3-1 (TIP EL. 1476.3 m)
- S3-2 (TIP EL. 1477.4 m)
- PW-L (TIP EL. 1473.5 m)
- P-M (TIP EL. 1474.3 m)
- P-N (TIP EL. 1473.6 m)
- PW-P (TIP EL. 1473.5 m)
- HIGHMONT TSF POND LEVEL
- READING DURING REVIEW PERIOD ABOVE NOTIFICATION LEVEL

CLIENT: Highland Valley Copper / Teck

Klohn Crippen Berger

PROJECT: HIGHMONT TAILINGS STORAGE FACILITY
2023 ANNUAL FACILITY PERFORMANCE REPORT

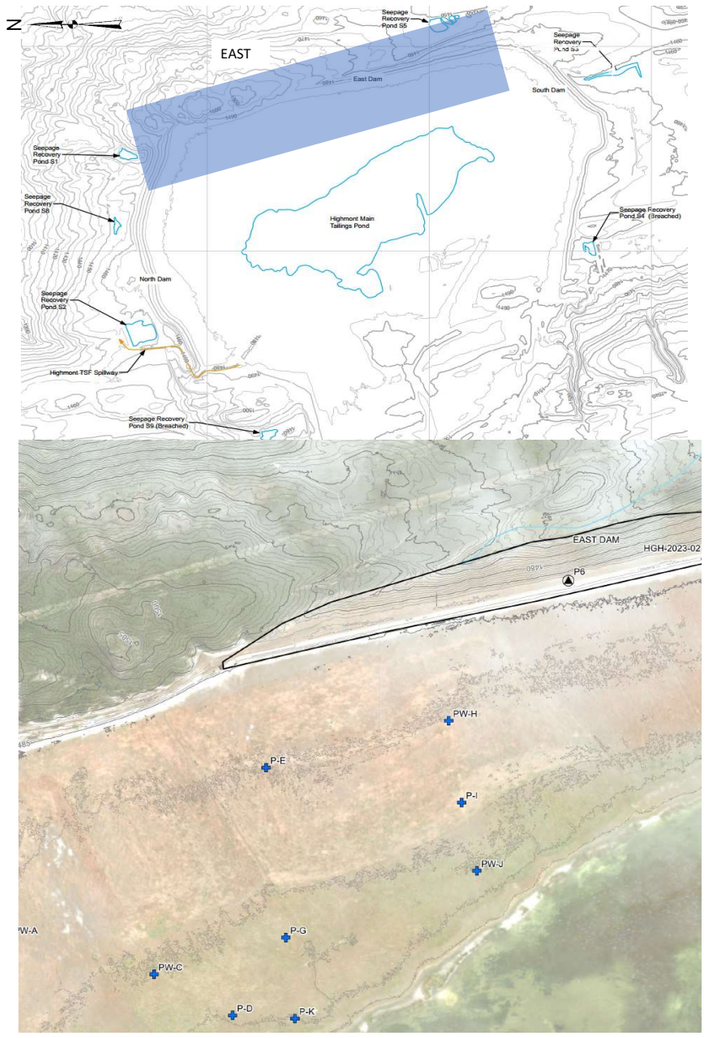
TITLE: HIGHMONT TSF PIEZOMETRIC DATA
YEARS 2016 TO 2023

SOUTHEAST

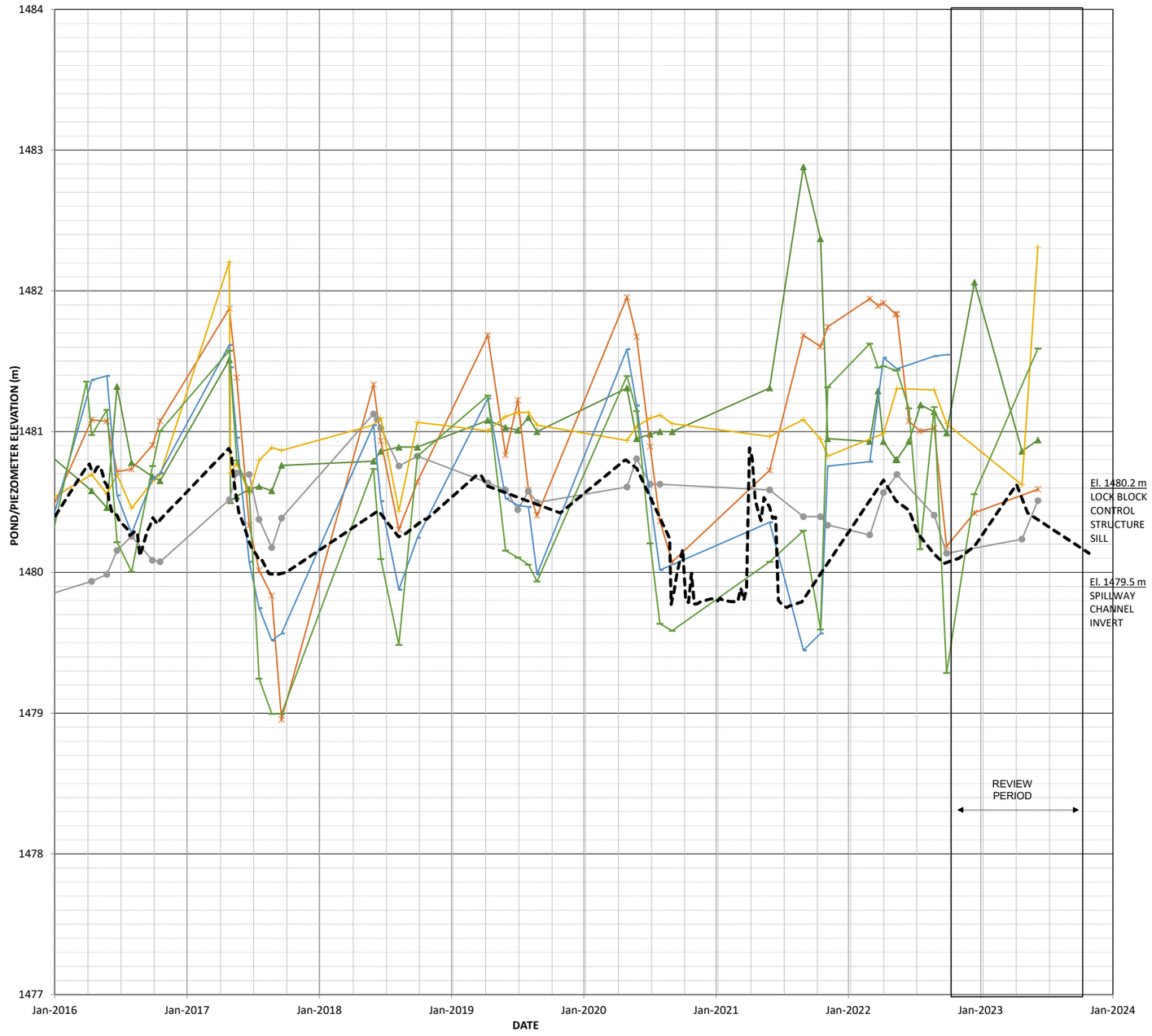
PROJECT No. M02341C62

FIG No. 8

March 11, 2024
Z:\MV\CRM\M02341C62-HVC-2022 AFPR\300 Design\320 - Piezometer Data\Highmont\[231201 Highmont Piezo.xls\SEEPAGE PONDS



PIEZOMETER ID	2023 Threshold Value (m)
P-E	1483.4
P-G	1482.5
P-K	1482.2
PW-H	1481.3
P-I	1482.7
PW-J	1482.1



NOTES:

1. PW-H AND PW-J WERE REPORTED DRY ON SEP 30, 2020.
2. NO READINGS TAKEN IN MARCH 2022 FOR P-I DUE TO FROZEN CONDITIONS.

LEGEND:

- P-E (TIP EL. 1473.4 m)
- P-G (TIP EL. 1475 m)
- PW-H (TIP EL. 1473.4 m)
- P-I (TIP EL. 1474.6 m)
- PW-J (TIP EL. 1475.4 m)
- P-K (TIP EL. 1474.9 m)
- HIGHMONT TSF POND LEVEL

CLIENT: Highland Valley Copper / Teck

Klohn Crippen Berger

PROJECT: HIGHMONT TAILINGS STORAGE FACILITY
2023 ANNUAL FACILITY PERFORMANCE REPORT

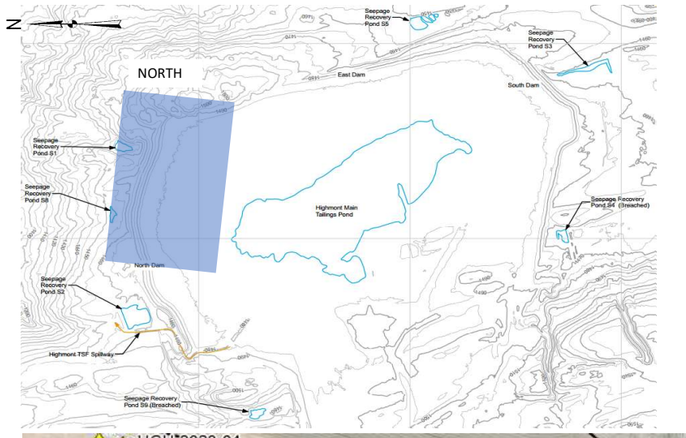
TITLE: HIGHMONT TSF PIEZOMETRIC DATA
YEARS 2016 TO 2023

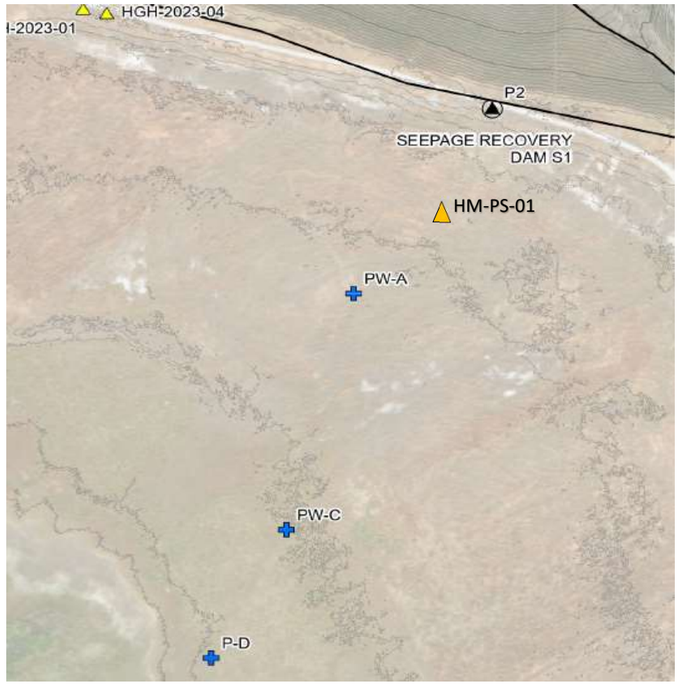
EAST

PROJECT No. M02341C62

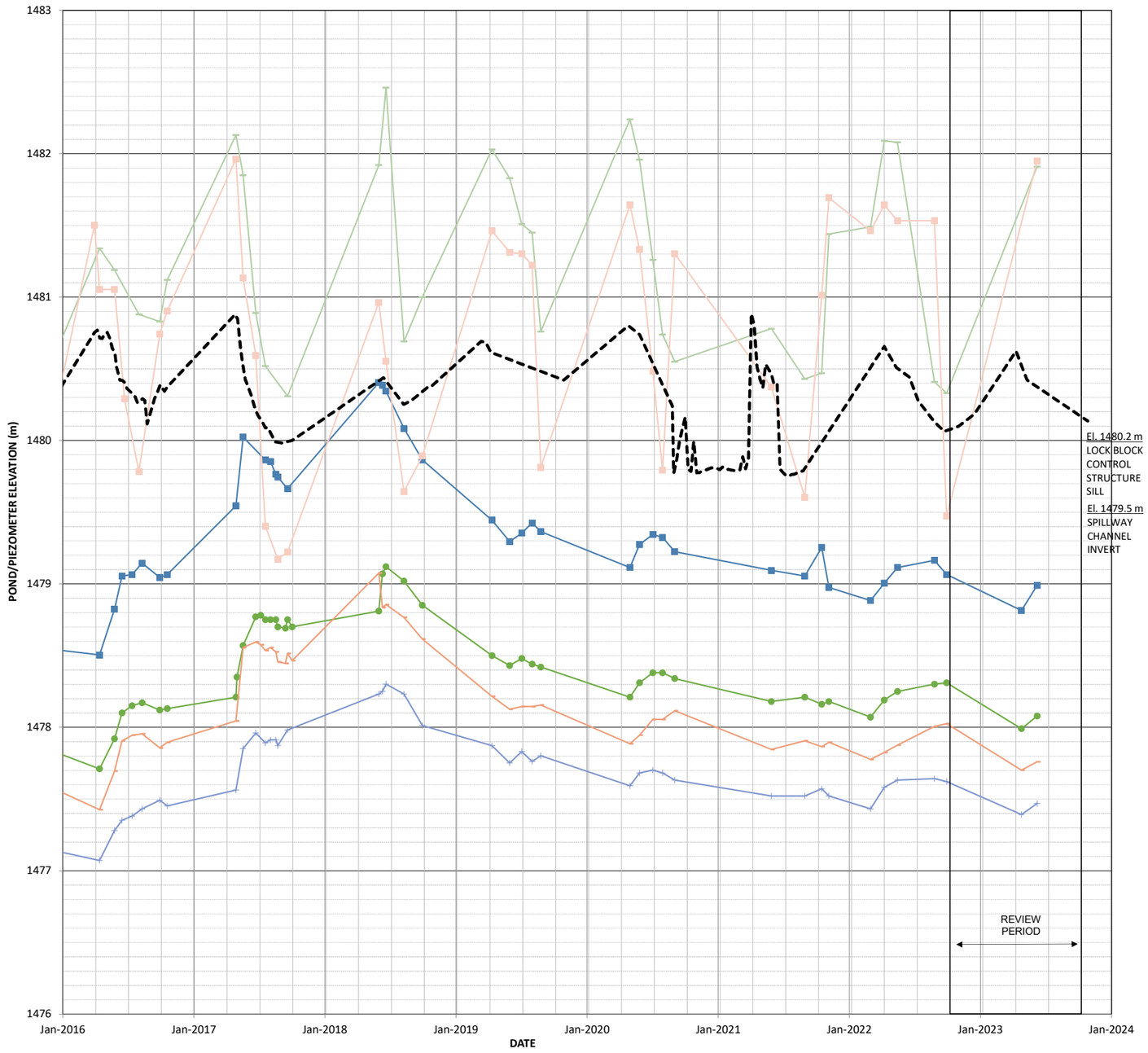
FIG No. 9

March 11, 2024
Z:\MV\CRM\M02341C62-HVC-2023 AFPR\300 Design\320 - Piezometer Data\Highmont\[231201 Highmont Piezo.xlsx]SEEPAGE PONDS





PIEZOMETER ID	2023 Threshold Value (m)
PW-A	1480.5
PW-C (TALL)	1482.7
P-D	1482.2
HM-PS-01 (13-SRK-14)	1480.5
HM-PS-02 (13-SRK-14)	1480.5
HM-PS-03 (13-SRK-13)	1480.5



LEGEND:

- PW-A (TIP EL. 1473.3 m)
- PW-C (TALL) (TIP EL. 1475.8 m)
- P-D (TIP EL. 1476.6 m)
- HM-PS-01 (13-SRK-14) (TIP EL. 1466.8 m)
- HM-PS-02 (13-SRK-14) (TIP EL. 1456.6 m)
- HM-PS-03 (13-SRK-13) (TIP EL. 1456.9 m)
- HIGHMONT TSF POND LEVEL

CLIENT: Highland Valley Copper / Teck

Klohn Crippen Berger

PROJECT: HIGHMONT TAILINGS STORAGE FACILITY
2023 ANNUAL FACILITY PERFORMANCE REPORT

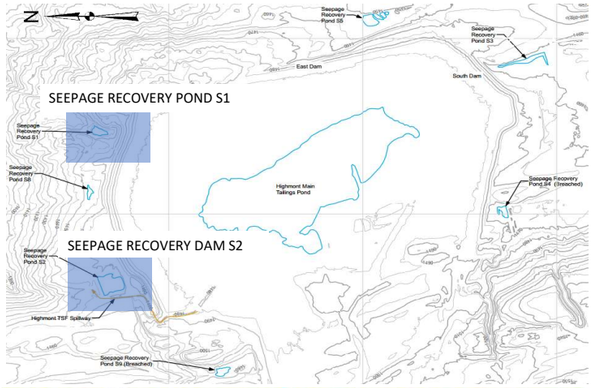
TITLE: HIGHMONT TSF PIEZOMETRIC DATA
YEARS 2016 TO 2023

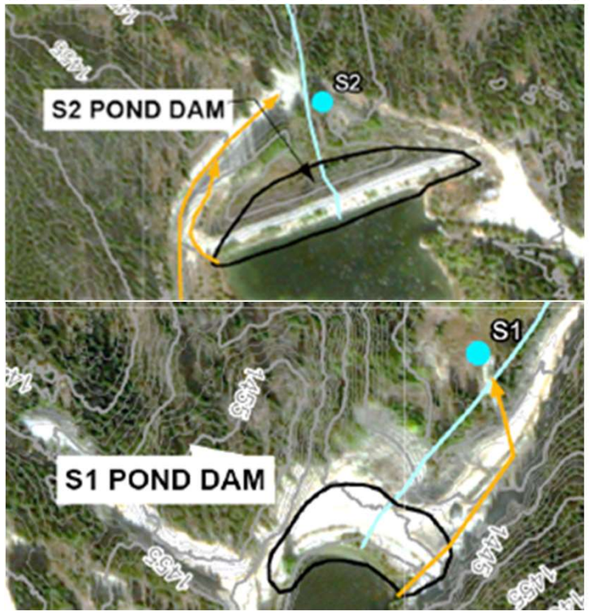
NORTH

PROJECT No. M02341C62

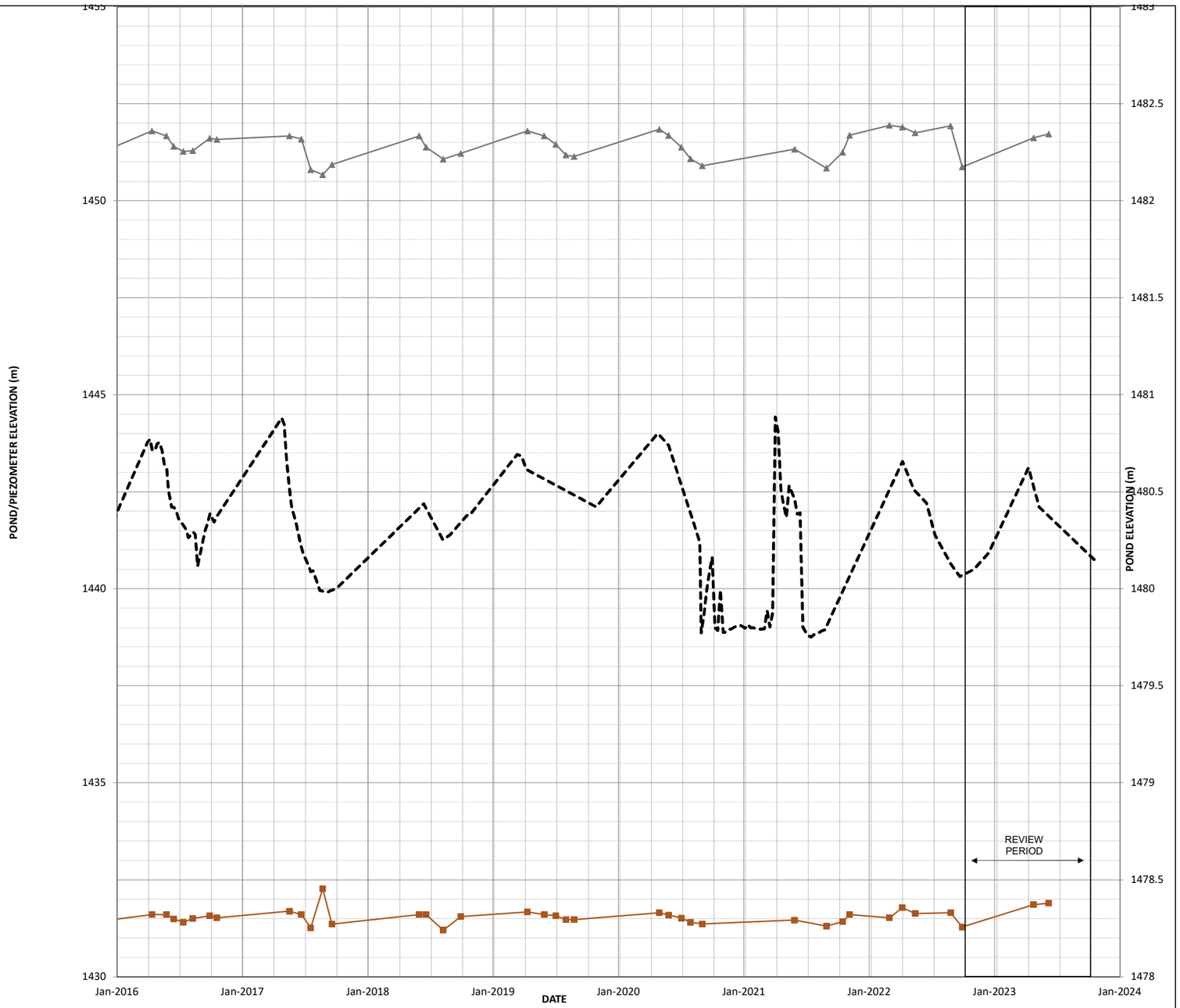
FIG No. 10

March 11, 2024
Z:\MV\CRM\2341C62-HVC-2023 AFPR\300 Design\320 - Piezometer Data\Highmont\[231201 Highmont Piezo.xlsx]SEEPAGE POND'S





PIEZOMETER ID	2023 Threshold Value (m)
S1	1432.4
S2	1452.5



NOTES:
1. PIEZOMETER WATER ELEVATIONS PLOTTED ON PRIMARY (LEFT) AXIS, POND ELEVATION PLOTTED ON SECONDARY (RIGHT) AXIS.
2. TIP ELEVATIONS FOR S-1 AND S-2 ARE UNAVAILABLE.
3. HIGHMONT POND LEVEL PLOTS TRANSDUCER DATA FROM SEPTEMBER 27, 2020 TO THE END OF THE 2021 AFPR REPORTING PERIOD.

LEGEND:
- HIGHMONT TSF POND LEVEL
- S1 (TIP EL. UNKNOWN)
- S2 (TIP EL. UNKNOWN)

CLIENT: Highland Valley Copper / Teck

Klohn Crippen Berger

PROJECT: HIGHMONT TAILINGS STORAGE FACILITY
2023 ANNUAL FACILITY PERFORMANCE REPORT

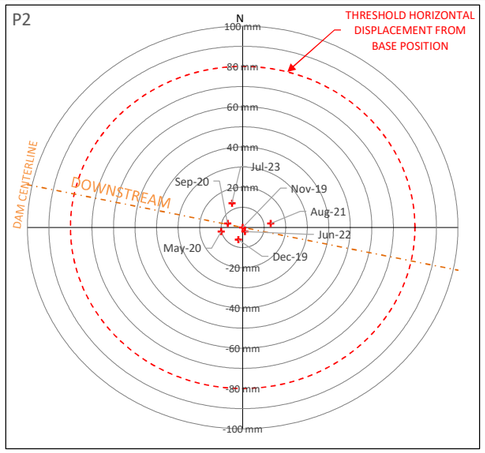
TITLE: HIGHMONT TSF PIEZOMETRIC DATA
YEARS 2016 TO 2023

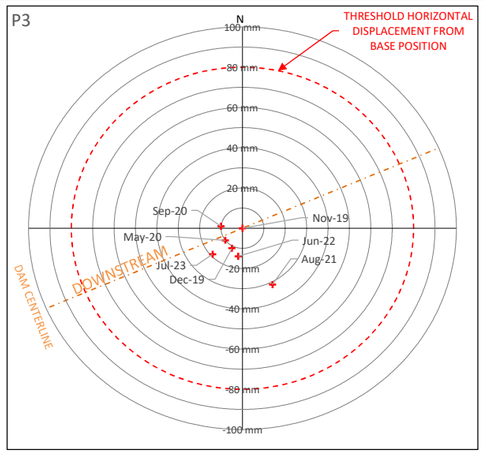
SEEPAGE PONDS

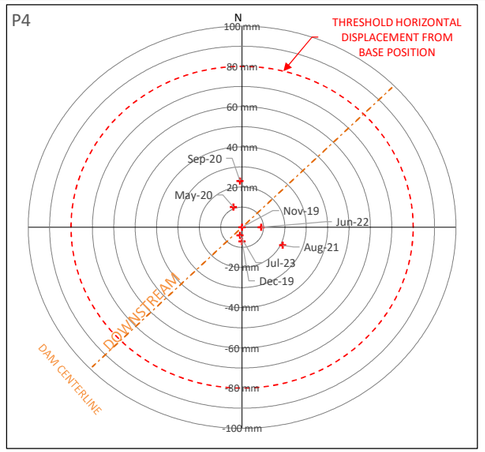
PROJECT No. M02341C62

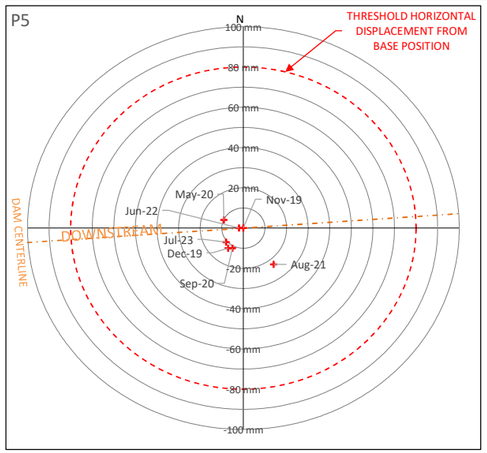
FIG No. 11

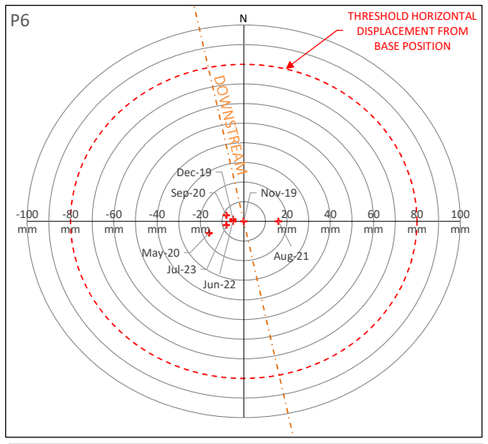
March 11, 2024
Z:\MV\CRM\M02341C62-HVC-2023 AFPR\300 Design\320 - Piezometer Data\Highmont\[231201 Highmont Piezo.xlsx]SEEPAGE PONDS





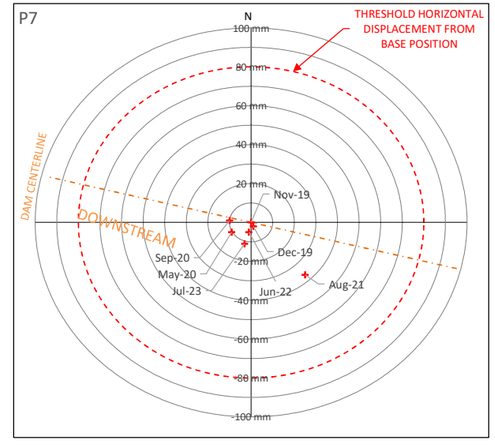






MONUMENT ID	TOTAL STATION SURVEY METHOD THRESHOLDS		
	HORIZONTAL DISPLACEMENT FROM ORIGINAL POSITION (mm)	INCREMENTAL SETTLEMENT BETWEEN READINGS (mm)	TOTAL SETTLEMENT (mm)
P2	80	20	50
P3			50
P4			75
P5			50
P6			75
P7			75

LEGEND:
- P2
- P3
- P4
- P5
- P6
- P7



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. HIGHMONT DAM CREST MOVEMENT MONITORING DATA PRIOR TO 2007 NOT SHOWN.
4. P2 JUNE 2016 READING (NOT SHOWN IN PLAN PLOT) LOCATED 139 MM FROM INITIAL 2007 READING. READING WAS REVIEWED AND FOUND MORE LIKELY RELATED TO SURVEY ERROR THAN DISPLACEMENT. DISPLACEMENT WAS MOSTLY IN A NORTHWEST DIRECTION PERPENDICULAR TO THE DAM ORIENTATION, BUT SLIGHTLY IN THE DOWNSTREAM DIRECTION.
5. P4 2008, AND 2009 READINGS (NOT SHOWN IN PLAN PLOT) LOCATED 240 mm and 167 mm FROM INITIAL 2007 READING, RESPECTIVELY. 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 DISPLACEMENT ON OCTOBER 17, 2019. THIS ASSUMES NO SETTLEMENT OCCURED BETWEEN OCTOBER. 17 AND NOVEMBER 12, 2019.

CLIENT: Highland Valley Copper / Teck

Klohn Crippen Berger

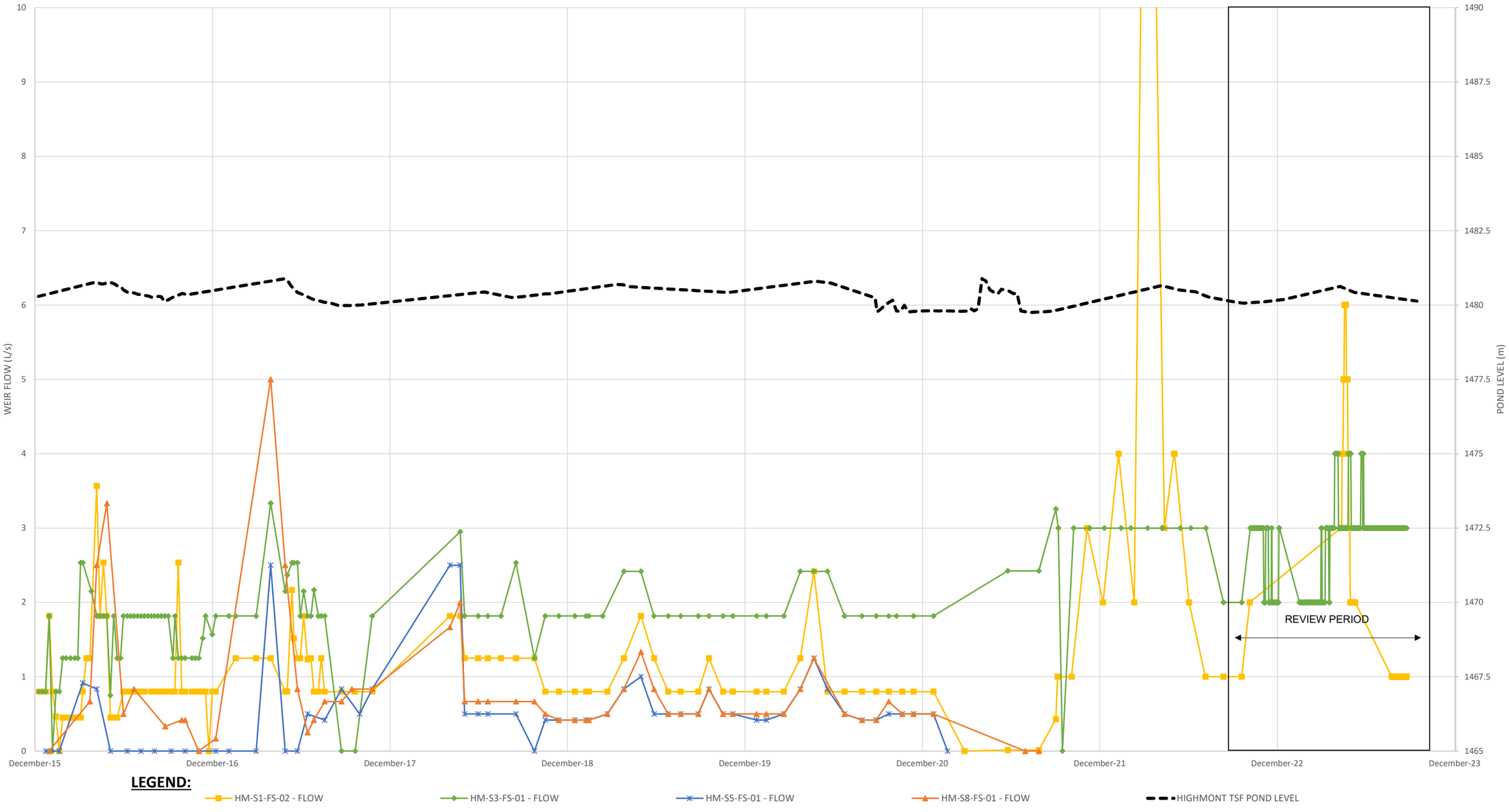
PROJECT: HIGHMONT TAILINGS STORAGE FACILITY
2023 ANNUAL FACILITY PERFORMANCE REPORT

TITLE: HIGHMONT DAM
SURVEY MONUMENT READINGS

PROJECT No. M02341C62

FIG No. 12

March 11, 2024
Z:\MVCR\M02341C62-HVC-2023 AFPR\300 Design\340 Dam movement monitoring\343 Survey Monuments\Highmont\[231207 HighmontDamMonitoring.xlsm]Figure



Notes:
1. PRELIMINARY FLOWS ARE CHECKED ANNUALLY BASED ON ANNUAL WEIR CALIBRATION VERIFICATION.
2. WEIR FLOW PLOTTED ON PRIMARY (LEFT) AXIS, HIGHMONTH POND ELEVATION PLOTTED ON SECONDARY (RIGHT) AXIS.
3. HIGHMONTH POND LEVEL PLOTS TRANSDUCER DATA FROM SEPTEMBER 27, 2020 TO THE END OF THE 2023 AFPR REPORTING PERIOD.
4. DATA WAS NOT PROVIDED FOR HM-S5-FS-01 AND HM-S8-FS-01 FOR THE 2023 REPORTING PERIOD

CLIENT: Highland Valley Copper / Teck

Klohn Crippen Berger

PROJECT: HIGHMONT TAILINGS STORAGE FACILITY
2023 ANNUAL FACILITY PERFORMANCE REPORT

TITLE: HIGHMONTH TSF SEEPAGE PONDS
WEIR FLOWS

PROJECT No. M02341C62

FIG No. 13

December 8, 2023
Z:\MVCR\M02341C62-HVC-2023 AFPR\300 Design\350 Seepage Data\Highmont\[231206 Highmont Weir.xlsx]Fig. II-7 Seepage Pond Weir

APPENDIX I

Site Visit Checklist, Observations and Photographs

APPENDIX I-A

North, East, and South Dams

Site Visit Checklist, Observations and Photographs

Appendix I-A
Annual Facility Performance Report Site Visit Checklist, Observations and Photographs – North, East, and South Dams

SITE VISIT CHECKLIST

Facility:	Highmont North, East, and South Dams	**Site Visit Date:**	September 28, 2023
Weather:	Sunny	**Inspector(s):**	Pablo Urrutia, P.Eng. Cheryl Torres, P.Eng.
Freeboard (pond level to dam crest):	6.4 m		

Outlet Condition Survey

Description	Outlet Controls?	Was it flowing?	Flow rate
Spillway Channel	Control gate (slightly open)	☐ Yes ☒ No	Ponded water observed, no flow

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

EMBANKMENT	Yes/No	SPILLWAY	Yes/No
U/S Slope	☒ Yes ☐ No	Culverts Crossing Dam	☒ Yes ☐ No
Crest	☒ Yes ☐ No	Channel Invert	☒ Yes ☐ No
D/S Slope	☒ Yes ☐ No	Channel Slopes	☒ Yes ☐ No
D/S Toe	☒ Yes ☐ No	Culverts	☒ Yes ☐ No
PIPELINE DIVERSION	**Yes/No**		
Trash Rack	☒ Yes ☐ No		

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

INDICATOR	EMBANKMENT	SPILLWAY
Piping	☐ Yes ☒ No	
Sinkholes	☐ Yes ☒ No	
Seepage	☐ 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:
- No dam safety deficiencies observed.

Comments:
- Refer to Site Visit Observations section.

SITE VISIT OBSERVATIONS

Impoundment

- **Tailings Beach**: The tailings beach is well vegetated, and the pond was well setback from the dam crest (>290 m) based on reservoir level, typical for this time of year (Photo I-A-1 to Photo I-A-3).
- **Pond**: At the time of the site visit the pond was centrally located in the impoundment, similar to the image on Figure 1 through Figure 3 (Photo I-A-1 to Photo I-A-3).

Dam

- **Crest**: Good physical condition. No signs of significant erosion, deterioration, displacement, or cracking (Photo I-A-4 to Photo I-A-6). Minor rutting on North Dam crest and crest access road was observed; rutting is managed by HVC as needed (Photo I-A-4 to Photo I-A-5).
- **Left and Right Abutments**: Good physical condition. No signs of erosion, deterioration, horizontal displacement, or cracking.
- **Downstream Slope and Spillway**:
  - Good physical condition. Downstream slope well vegetated throughout, providing adequate erosion protection for future service life (Photo I-A-8 to Photo I-A-12).
  - The steepened lower portion of the North Dam downstream slope near the dam spillway is noticeably less vegetated. (Photo I-A-7 and Photo I-A-8).
  - There is vegetation growth in the Highmont spillway channel (downstream of approach channel and rock chute), which is typical of this time of the year. No further action beyond routine maintenance specified in OMS Manual (HVC 2022) is required (Photo I-A-16 to Photo I-A-19).
  - Spillway channel culverts at the S2 Pond road, at the toe of the North Dam, are partially blocked due to debris from road regrading in 2023. Refer to AFPR recommendation HD-2023-01.
- **Seepage**:
  - Seepage from North Dam western underdrains was minimal and clear. The ponded water did not reach the toe of the dam and no flow was seen through the road culverts to S2 Pond. There are no signs of recent ponding or issues related to seepage flow through the road fill (Photo I-A-22).
  - No seepage was observed along downstream toe of East Dam.
  - Seepage was observed through the South Dam access road fill.

SITE VISIT PHOTOGRAPHS

LEGEND:

- HGH = Highmont Tailings Facility.
- HGH-2023-## refers to 2023 AFPR waypoints shown on Figure 3, Figure 4, and Figure 5.
- Photographs taken during the site visit on September 28, 2023.

Photo I-A-1 View of tailings impoundment and pond from North Dam. Beach is covered by vegetation. No signs of distress, settlement, or depression. Small pond is present in the centre of facility (HGH-2023-01).

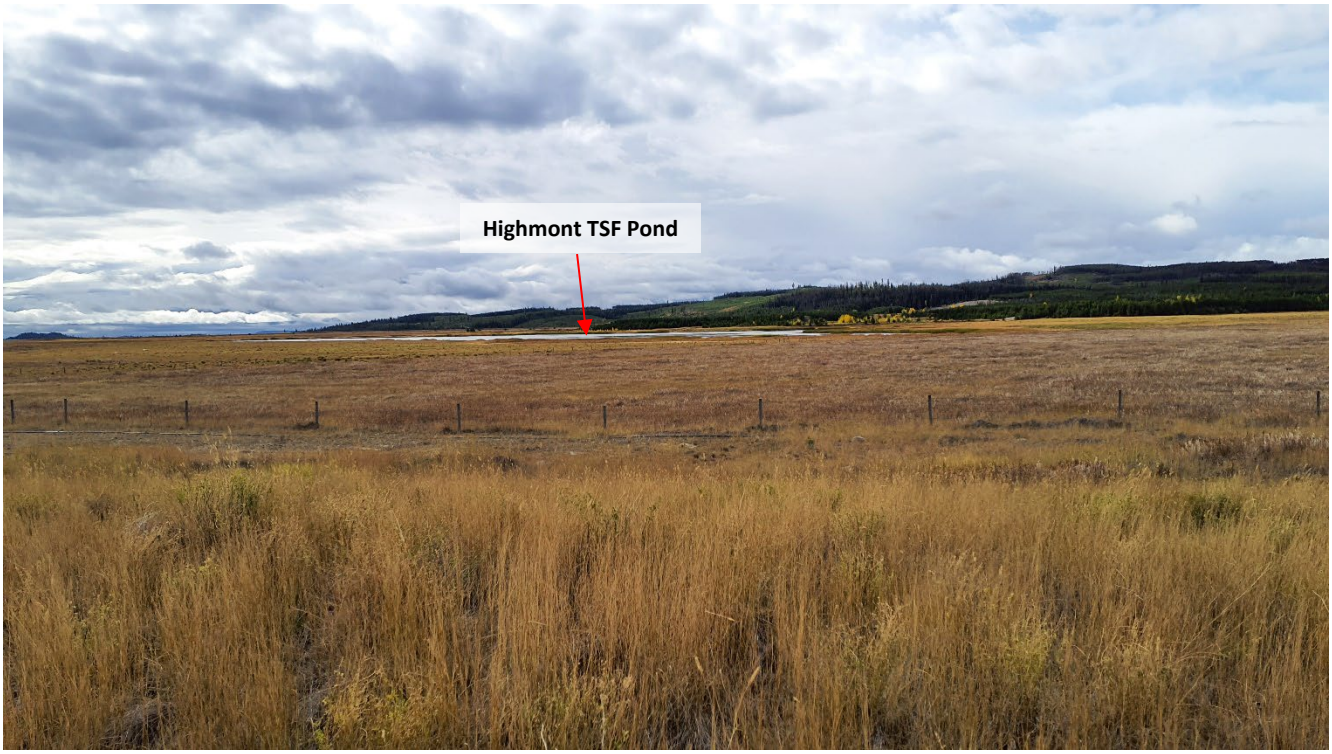


Photo I-A-2 View of tailings impoundment and beach from East Dam (HGH-2023-02)

Photo I-A-3 View of tailings impoundment and beach from South Dam (HGH-2023-03)

Photo I-A-4 View of North Dam crest looking west and east respectively. Crest is in good condition. No signs of distress, settlement, or depression (HGH-2023-01 and HGH-2023-04)

Photo I-A-5 North Dam crest near right abutment. Crest is in good condition (HGH-2023-05)

Photo I-A-6 View of East Dam crest looking north and south respectively. Crest is in good condition. No signs of deformation or distress were observed (HGH-2023-02)

Photo I-A-7 View of North Dam downstream toe and S8 Pond. No signs of distress or deformation were observed (HGH-2023-06)

Photo I-A-8 View of North Dam downstream slope looking east and west respectively (HGH-2023-06)

Photo I-A-9 East Dam downstream slope. Slope is vegetated and in good condition (HGH-2023-07)

Photo I-A-10 View of South Dam downstream slope. Slope is vegetated and in good condition (HGH-2023-08)

Photo I-A-11 View of South Dam downstream slope and S3 pond. Slope is vegetated and in good condition (HGH-2022-08)

Photo I-A-12 Highmont Spillway approach channel, concrete lock-block control sill. Water ponded downstream of sill is controlled by level at spillway flow control gate (HGH-2023-09)

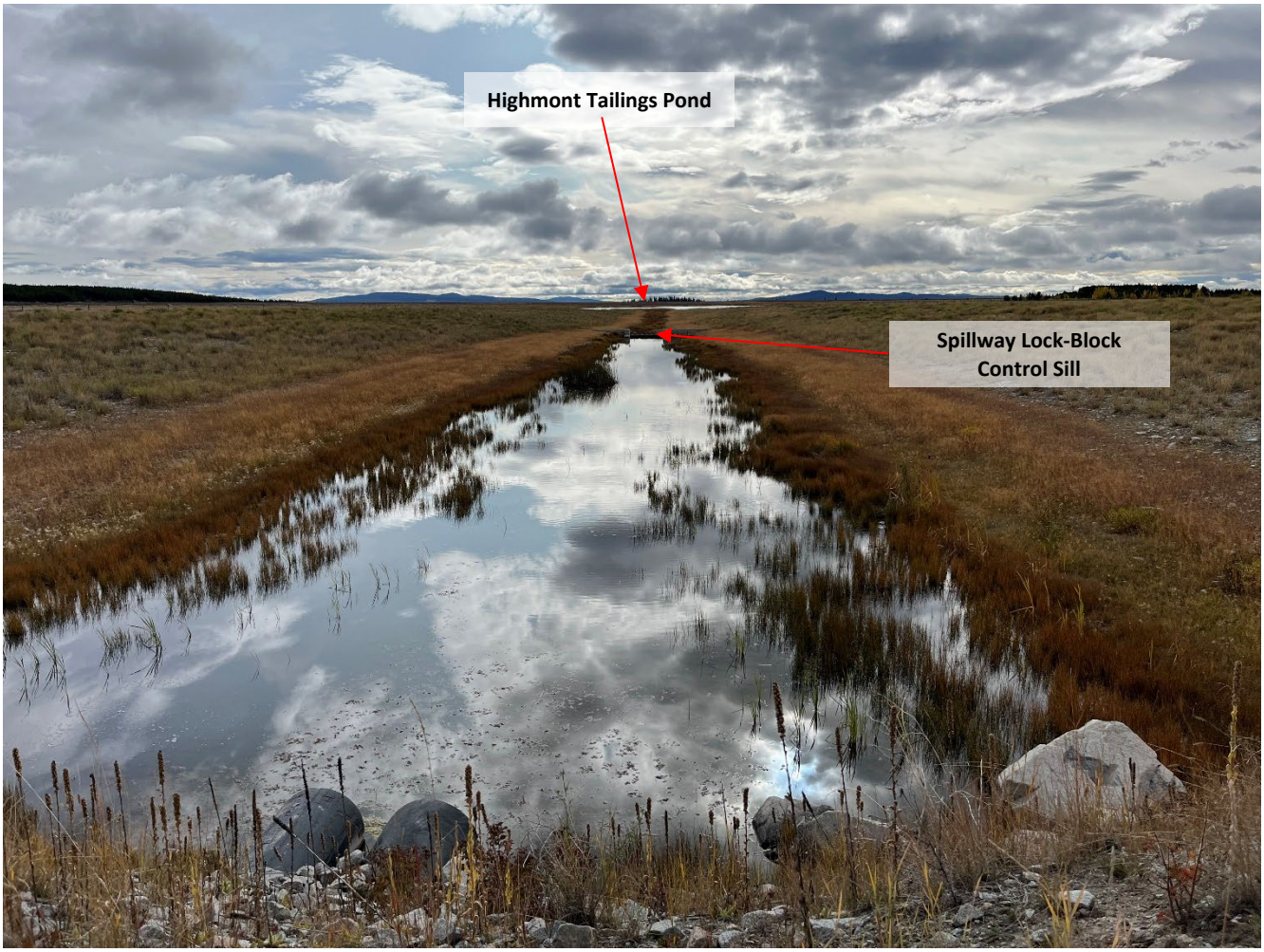


Photo I-A-13 Approach channel. Road culverts are partially submerged, section upstream of culverts is clear of debris and vegetation (HGH-2023-10)

Photo I-A-14 Area downstream of approach channel culverts and upstream of flow control gate – the picture shows the typical grass growth occurring annually in the channel (HGH-2023-11)

Photo I-A-15 Spillway flow control gate. Sliding gate is slightly open (HGH-2023-12)

Photo I-A-16 Downstream area of spillway flow control gate (HGH-2023-13 and HGH-2023-14)

Photo I-A-17 Highmont Spillway channel, S1 Pond diversion trash rack. Minor flow into the diversion. Trash rack is clear of debris. No flow downstream of diversion (HGH-2023-15)

Photo I-A-18 North Dam downstream slope and toe, downstream of Highmont Spillway chute. North dam toe is in good condition. No signs of distress or deformation (HGH-2023-16)

Photo I-A-19 Spillway channel downstream of spillway chute. Water is ponded downstream of spillway drop, which is typical (HGH-2023-18)

Photo I-A-20 View of spillway channel downstream of S2 Pond road at the toe of the North Dam. Gass observed in channel is typical of this time of the year and does not require further action beyond routine maintenance specified in OMS Manual (HVC 2022) (HGH-2023-17)

Photo I-A-21 North Dam toe access road crossing culvert (downstream of road). Culverts are partially blocked; see AFPR recommendation HD-2023-01 (HGH-2023-17)

Photo I-A-22 South Dam toe access road to S3 Pond. Clear seepage observed through the road fill and ponding in lower elevation rut; refer to Section 5.1 in the main text for further discussion (HGH-2023-20)

APPENDIX I-B

Seepage Recovery Ponds

Site Visit Checklist, Observations and Photographs

Appendix I-B
Site Visit Checklist, Observations, and Photographs – Seepage Recovery Dams

SITE VISIT CHECKLISTS

Seepage Recovery Pond S1

Facility:	Highmont Seepage Recovery Dam S1	**Site Visit Date:**	September 28, 2023
Weather:	Sunny	**Inspector(s):**	Pablo Urrutia, P.Eng. Cheryl Torres, P.Eng.
Freeboard (pond level to dam crest):	1.4 m		

Outlet Condition Survey

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

Are the following components in ***SATISFACTORY CONDITION***?

(check one if applicable)

EMBANKMENT	Yes/No	SPILLWAY	Yes/No
U/S Slope	☒ Yes ☐ No	Entrance	☒ Yes ☐ No
Crest	☒ Yes ☐ No	Walls	☒ Yes ☐ No
D/S Slope	☒ Yes ☐ No	Channel	☒ Yes ☐ No
D/S Toe	☒ Yes ☐ No	Channel Slopes	☒ Yes ☐ No

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

INDICATOR	EMBANKMENT	SPILLWAY
Piping	☐ Yes ☒ No	
Sinkholes	☐ Yes ☒ No	
Seepage	☐ 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:

- No dam safety deficiencies observed.

Comments / Notes:

- Refer to Site Visit Observations section.

Seepage Recovery Pond S2

Facility:	Highmont Seepage Recovery Dam S2	**Site Visit Date:**	September 28, 2023
Weather:	Sunny	**Inspector(s):**	Pablo Urrutia, P.Eng. Cheryl Torres, P.Eng.
Freeboard (pond level to dam crest):	2.7 m		

Outlet Condition Survey

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

Are the following components in ***SATISFACTORY CONDITION***?

(check one if applicable)

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

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

INDICATOR	EMBANKMENT	SPILLWAY
Piping	☐ Yes ☒ No	
Sinkholes	☐ Yes ☒ No	
Seepage	☐ Yes ☒ No	
Surface 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.

Comments / Notes:

- Refer to Site Visit Observations section.

Seepage Recovery Pond S3

Facility:	Highmont Seepage Recovery Dam S3	**Site Visit Date:**	September 28, 2023
Weather:	Sunny	**Inspector(s):**	Pablo Urrutia, P.Eng. Cheryl Torres, P.Eng.
Freeboard (pond level to dam crest):	2.5 m		

Outlet Condition Survey

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

Are the following components in ***SATISFACTORY CONDITION***?

(check one if applicable)

EMBANKMENT	Yes/No	SPILLWAY	Yes/No
U/S Slope	☒ Yes ☐ No	Entrance	☐ Yes ☐ No ☒ N/A
Crest	☒ Yes ☐ No	Walls	☐ Yes ☐ No ☒ N/A
D/S Slope	☒ Yes ☐ No	Channel	☐ Yes ☐ No ☒ N/A
D/S Toe	☒ Yes ☐ No	Channel Slopes	☐ Yes ☐ No ☒ N/A

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

INDICATOR	EMBANKMENT	SPILLWAY
Piping	☐ Yes ☒ No	
Sinkholes	☐ Yes ☒ No	
Seepage	☐ 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:

- No dam safety deficiencies observed.

Comments:

- Refer to Site Visit Observations section.

Seepage Recovery Pond S5

Facility:	Highmont Seepage Recovery Dam S5	**Site Visit Date:**	September 28, 2023
Weather:	Sunny	**Inspector(s):**	Pablo Urrutia, P.Eng. Cheryl Torres, P.Eng.
Freeboard (pond level to dam crest):	2.9 m		

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	OUTLET Pipe - north	Yes/No	OUTLET Pipe - south	Yes/No
U/S slope	☒ Yes ☐ No	Inlet	Closed/Plugged	Inlet	Closed/Plugged
Crest	☒ Yes ☐ No				
D/S Slope	☒ Yes ☐ No				
D/S Toe	☒ Yes ☐ No				

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

INDICATOR	EMBANKMENT	OUTLET - north	OUTLET - south
Seepage	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No
External 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 observed.

Comments:

- Refer to Site Visit Observations section.

Seepage Recovery Pond S8

Facility:	Highmont Seepage Recovery Dam S8	**Site Visit Date:**	September 28, 2023
Weather:	Sunny	**Inspector(s):**	Pablo Urrutia, P.Eng. Cheryl Torres, P.Eng.
Freeboard (pond level to dam crest):	1.6 m		

Outlet Condition Survey

Description	Outlet Controls?	Was it flowing?	Flow rate
Outflow Pipe	N/A	☐ Yes ☒ No	N/A

Are the following components in ***SATISFACTORY CONDITION***?

(check one if applicable)

EMBANKMENT	Yes/No	OUTLET	Yes/No
U/S Slope	☒ Yes ☐ No	Outlet Pipe	☒ Yes ☐ No
Crest	☒ Yes ☐ No	Outlet Controls	☒ Yes ☐ No
D/S Slope	☒ Yes ☐ No		
D/S Toe	☒ Yes ☐ No		

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

INDICATOR	EMBANKMENT	OUTLET
Piping	☐ Yes ☒ No	
Sinkholes	☐ 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.

Comments:

- Refer to Site Visit Observations section.

SITE VISIT OBSERVATIONS

Seepage Recovery Pond S1

- **Crest**: Good physical condition. No signs of significant erosion, deterioration, displacement, or cracking (Photo I-B-1).
- **Left and Right Abutment**: Good physical condition. No signs of significant erosion, deterioration, displacement, or cracking.
- **Downstream Slope**: Good physical condition. Slope covered in gravel and moderately vegetated. This provides adequate erosion protection based on performance over the service life (Photo I-B-2).
- **Pond**: At the time of site visit was about 1.5 m below the spillway invert, which is typical for this time of the year (Photo I-B-3).
- **Spillway**: Good physical condition (Photo I-B-5).
- **Low-level Outlet**: The outlet pipe trash rack was clear of large debris (Photo I-B-4).
- **Seepage**: None observed.

Seepage Recovery Pond S2

- **Crest**: Good physical condition. No signs of significant erosion, deterioration, displacement, or cracking (Photo I-B-6).
- **Left and Right Abutment**: Good physical condition. No signs of significant erosion, deterioration, displacement, or cracking.
- **Downstream Slope:** Good physical condition. Well vegetated near left abutment, and sparsely vegetated throughout the rest of the downstream slope. Gravel and vegetation provide adequate erosion protection based on performance over the service life (Photo I-B-7).
- **Pond:** Pond level was more than 2 m below the invert of the spillway, which is typical for this time of the year (Photo I-B-8 and Photo I-B-9).
- **S2 Inlet Channel – Highmont TSF Spillway Diversion**: A plug was in place across the S2 inlet, so no flow was diverted from the Highmont TSF spillway into S2.
- **Spillway**: Good physical condition. Spillway channel was partially blocked (i.e., reduced section) at the time of the site visit. After the site visit, HVC returned the channel to design dimensions in October 2022, which addresses AFPR recommendation S2-2019-01.
- **Seepage**: Seepage is not monitored downstream of the dam; however, signs of recent ponded water at the downstream toe were observed (healthy vegetation at the toe). This has been observed in previous site visits and it is not a cause for concern (Photo I-B-10).

Seepage Recovery Pond S3

- **Crest**: Good physical condition. No indicators of significant concern observed (e.g., cracking, slumping, horizontal displacement) (Photo I-B-12 to Photo I-B-14).
- **Left and Right Abutment**: Good physical condition. No observations of significant scour or other indicators of potential concern (e.g., cracking, slumping, horizontal displacement).
- **Downstream Slope**: Good physical condition. Slope is sparsely vegetated over the layer of gravel which provides adequate erosion protection based on performance over the service life (Photo I-B-15).
- **Pond**: At the time of the site visit, impoundment was almost dry and the water level was more than 2 m below the crest of the dam (Photo I-B-13 and Photo I-B-14).
- **Seepage**: Seepage is not monitored downstream of the dam. No ponded water was observed at the downstream toe in the low point.
- **Spillway**: Spillway intake is blocked with glacial till to prevent discharge of water that does not meet water quality regulatory requirements (Photo I-B-16).

Seepage Recovery Pond S5

- **Crest**: Good physical condition. No signs of significant erosion, deterioration, displacement, or cracking (Photo I-B-17). The low point along the access road was regraded by HVC in October 2022; refer to Section 3 in the main text.
- **Left and Right Abutment**: Good physical condition. No signs of significant erosion, deterioration, displacement, or cracking.
- **Downstream Slope**: Good physical condition. Minor vegetation present throughout slope. No signs of erosion, deterioration, or animal activity (Photo I-B-18).
- **Pond**: During the site visit, the pond was observed to be more than 1.0 m below crest of dam, which is typical for this time of the year. Pond was highly vegetated during the site visit, which is typical for this facility (Photo I-B-19 and Photo I-B-20).
- **Low-level Outlet and Spillway**: The Low-Level Outlet valves were closed and the inlets of the spillway pipes were partially obstructed by sand bags, as intended by HVC to prevent discharge to the environment.
- **Seepage**: Change of vegetation on the downstream toe of the perimeter crest suggests there has been temporary ponding at the toe, likely due to the run-off. No seepage was observed.

Seepage Recovery Pond S8

- **Crest**: Good physical condition. No signs of significant erosion, deterioration, displacement, or cracking (Photo I-B-20).
- **Left and Right Abutment**: Good physical condition. No signs of significant erosion, deterioration, displacement, or cracking.

- **Downstream Slope**: Good physical condition. Moderate vegetation throughout slope and large wood debris present. No observed signs of erosion, deterioration, or adverse displacement. (Photo I-B-21).
- **Pond**: The pond was at a typical elevation during the site visit (Photo I-B-22 to Photo I-B-24).
- **Spillway**: The outlet pipe was clear of debris (Photo I-B-24).
- **Seepage**: None observed.

SITE VISIT PHOTOGRAPHS

LEGEND:

- HGH = Highmont Tailings Facility.
- HGH-2023-## refers to 2023 AFPR waypoints shown on Figure 3, Figure 4, and Figure 5.
- All photographs taken during the site visit on September 28, 2023.

Seepage Recovery Pond S1

Photo I-B-1 S1 Pond: Overview of crest looking west towards left abutment (HGH-2023-21)

Photo I-B-2 S1 Pond: Dam downstream slope (HGH-2023-22)

Photo I-B-3 S1 Pond: View of impoundment, spillway intake, and Low-Level Outlet (LLO) (HGH-2023-21)

Photo I-B-4 S1 Pond: LLO to the left of spillway intake. Water was flowing into the LLO at the time of the site visit (HGH-2023-23).

Photo I-B-5 S1 Pond: Spillway channel and pipe intake looking downstream. Channel is clear of vegetation and no sign of obstruction was observed at the pipe intake (HGH-2023-24).

Seepage Recovery Pond S2

Photo I-B-6 S2 Pond: View of embankment crest, looking toward left abutment (HGH-2023-25).

Photo I-B-7 S2 Pond: View of downstream slope. Slope is in good condition (HGH-2023-26).

Photo I-B-8 S2 Pond: Overview of upstream slope riprap. Slope is in good condition (HGH-2023-27).

Photo I-B-9 S2 Pond: Impoundment with view of downstream slope of Highmont North Dam in the background and Low-Level Outlet (HGH-2023-25).

Photo I-B-10 S2 Pond: Vegetation and ponded water at downstream toe (HGH-2023-28).

Seepage Recovery Pond S3

Photo I-B-11 S3 Pond: Overview of upstream slope right abutment (HGH-2023-29).

Photo I-B-12 S3 Pond: View of embankment crest, looking toward left abutment (HGH-2023-29).

Photo I-B-13 S3 Pond: Overview of dam crest from mid dam, looking toward left abutment (HGH-2023-31).

Photo I-B-14 S3 Pond: Overview of dam crest from left abutment (HGH-2023-31).

Photo I-B-15 S3 Pond: Overview of downstream slope from right abutment (HGH-2023-31).

Photo I-B-16 S3 Pond: View of blocked spillway inlet at right abutment (HGH-2023-30).

Seepage Recovery Pond S5

Photo I-B-17 S5 Pond: Overview of crest; in good condition (HGH-2023-32).

Photo I-B-18 S5 Pond: Downstream slope of perimeter crest, looking north (HGH-2023-33).

Photo I-B-19 S5 Pond: Overview of Pumping Sub-cell (HGH-2023-34).

Photo I-B-20 S5 Pond: Overview of pond from left abutment (HGH-2023-35).

Seepage Recovery Pond S8

Photo I-B-21 S8 Pond: Overview of crest from right abutment (HGH-2023-36).

Photo I-B-22 S8 Pond: View of downstream slope (HGH-2023-37).

Photo I-B-23 S8 Pond: View of S8 Pond impoundment. Highmont North Dam downstream slope is visible on right hand side of picture (HGH-2023-38).

Photo I-B-24 S8 Pond: View of impoundment, catwalk and outlet pump to S1 Pond (HGH-2022-39).

Photo I-B-25 S8 Pond: Overview of overflow pipe trash rack. Rack is clear of debris. Current water level is below the invert (HGH-2023-39).