Klohn Crippen Berger

Teck Metals Ltd.

Sullivan TSF 2022

Annual Summary of Tailings Facility Performance Report

A05807A22

March 2023

March 22, 2023

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

Jason McBain
Senior Engineer, Engineering and Remediation

Dear Mr. McBain:

Annual Summary of Tailings Facility Performance Report
Sullivan TSF 2022

Klohn Crippen Berger is pleased to submit a copy of the 2022 Annual Summary of Tailings Facility Performance Report (AFPR) for Teck Metal Ltd.'s Sullivan Mine located near Kimberley, British Columbia. This report documents our visual observations of the existing conditions of the Sullivan Mine tailings embankments and our review of the instrumentation data to August 31, 2022. The reporting period for this 2022 AFPR is September 1, 2021, through August 31, 2022.

We appreciate the opportunity to continue to provide our services to Teck Metals. Please call the undersigned at 780-733-4592 if you have any questions.

Yours truly,

KLOHN CRIPPEN BERGER LTD.

Pamela Fines, M.A.Sc., P.Eng.
Associate / Manager, Edmonton

PF/bb

Klohn Crippen Berger Ltd.
109, 4208 97 St NW ▪ Edmonton AB T6E 5Z9 ▪ Canada
t 780.444.0706 ▪ www.klohn.com

Teck Metals Ltd.

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Annual Summary of Tailings Facility Performance Report

CLARIFICATIONS REGARDING THIS REPORT

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5. KCB should be consulted regarding the interpretation or application of the findings and recommendations in the report.

EXECUTIVE SUMMARY

This report presents the 2022 Annual Summary of tailings facility performance at Sullivan Mine located in Kimberley, British Columbia. The 2022 annual facility performance report (AFPR) is the 31st consecutive annual inspection of the embankments at the facility carried out by Klohn Crippen Berger Ltd. (KCB).

As per previous AFPRs by KCB, off-site water discharge quality, groundwater quality and monitoring, and geochemical assessment and monitoring are excluded from the scope of this report. These aspects are reviewed by others and are reported separately. These issues would only be referred to if they were contributory to facility integrity for any of the tailings structures. This has not been the case to date, including the 2022 review period.

The report presents the key findings from the site visit by the Engineer of Record (EoR), Ms. Pamela Fines, P.Eng. and Ms. Makayla Rettger, EIT (SK) on May 25 to 26, 2022, as well as a review of the instrumentation data collected, and routine work performed at Sullivan Mine between September 1, 2021, and August 31, 2022.

Based on the visual inspection of the site during the AFPR and a review of available instrument data, the embankments appear to continue to be in good physical condition, and the observed performance has been consistent with historical performance and is satisfactory. There was no evidence of any potential dam safety concerns for facilities that have been inactive for at least >25 years and, in some cases, more than 50 years.

Facility Description

After almost a century of operations, the Sullivan Mine was closed at the end of 2001. Reclamation work on the tailings area was formally initiated in 1990 and was essentially completed by 2008.

There is a total of 15 earthfill embankment structures that create seven separate storage facilities for tailings, Acid Rock Drainage (ARD) water, and water treatment sludge. The earthfill structures have a combined length of about 10.4 km, with maximum heights varying from 4.2 m to 29 m. A summary of the maximum height and crest lengths of the main embankments for each facility is shown in Table ES.1 below.

While many of the tailings facilities were initially designed and constructed through the 1970s and 1980s or earlier, field investigations and design reviews (stability and performance assessments) have been periodically completed since that time. Over the 10 years leading up to closure, a significant amount of work was conducted to enhance long-term stability; modifications to the containment structures included flattening of slopes and/or construction of toe berms such that the structures meet or exceed industry recommended Factors of Safety (FoS) under static and dynamic loading, considering the Maximum Credible Earthquake and assuming all saturated tailings liquefy. In addition, a closure surface water management plan was put in place including construction of surface water diversions and spillways to safely handle flows from the respective Inflow Design Floods (IDF). Finally, these tailings facilities all reside above original ground and continue to drain at variable rates to the point where most of the contained tailings are largely unsaturated. As a result, the portion of

tailings vulnerable to liquefaction has significantly reduced from that assumed during design of the stabilization measures prior to closure.

The only active facility in terms of receiving solid materials is the Sludge Impoundment. No modifications have been required for the Sludge Impoundment embankments to date. This is because the original design capacity of the facility far exceeded production requirements and there had been little accumulation of sludge immediately against the embankments. Teck is currently completing a site-wide review of their water management plan including the Sludge Impoundment. A design review is pending for the Sludge Impoundment following completion of this review and an assessment of future water treatment plans which may impact the Sludge Impoundment storage requirements.

Table ES.1 Summary of Storage Facilities at Sullivan Mine

Storage Facility	Embankments	Type	Approximate Embankment Length (m)	Approximate Maximum Embankment Height (m)	Starter Dike Constructed (Year)[1]	Year of Last Dike Raise (Year)
Iron TSF	Iron Dike	Iron Tailings	1500	29.0	1975	1999
Old Iron TSF	Old Iron Dike	Iron Tailings	520	7.6	Prior to 1948	Unknown
	Iron TSF Divider Dike	Iron Tailings	1190	3.6 [3]	Post 1948	Unknown
Siliceous TSF	No. 1 Siliceous Dike	Silica Tailings	2000	4.9 [3]	1923	1979
	No. 2 Siliceous Dike	Silica Tailings	730	9.5	1975	1982
	No. 3 Siliceous Dike	Silica Tailings	1540	12.5	1975	1984
Gypsum TSF	East Gypsum Dike	Gypsum	670	16.8	1969	1983
	West Gypsum Dike	Gypsum	640	22.9	1969	1986
	Northeast Dike	Gypsum, Seepage Water	120	10.0	1985	1985
	Recycle Dam	Seepage/ARD Water	90	6.0	1985	1985
Calcine TSF	Calcine Dike	Calcine	520	4.6 [3]	1972	1986
ARD Pond[2]	North Dam	ARD/Seepage Water	460	7.6	2001	2001
	South Dam	ARD/Seepage Water	330	16.8	1976	2001
Sludge Impoundment	North Dike	Sludge	120	4.3	1978	1978
	South Dike	Sludge	200	6.1	1978	1978

Notes:

[1] Starter Dike information based on data from Annual Inspection Report by SRK-Robinson dated June 1991.

[2] The ARD Pond is established at the site of the old Cooling Pond.

[3] Tailings were placed downstream of both Iron TSF Divider Dike and No. 1 Siliceous Dike. The original height of the Iron TSF Divider and No. 1 Siliceous Dikes from original ground is 10.7 m and 16.8 m, respectively. A municipal landfill is downstream from the Calcine Dike. The height of the Calcine Dike from original ground is 15.2 m.

Credible Failure Modes Review

KCB understands that Teck's long-term goal for all of their tailings facilities, where physically possible, is to reach landform status, with all potential failure modes that could result in catastrophic release of tailings and/or water being either not present or having been reduced to non-credible. Teck's long-term goal for the Sullivan facilities is for all potential failure modes to be non-credible, based on extreme loading conditions, or to manage the risk to ALARP (i.e., as low as reasonably practicable) using appropriate loading conditions when it is not practicable to address extreme loading conditions.

The Sullivan risk register was reviewed by KCB and Teck in May 2022. There were no changes to the key hazards and the existing controls were adequate to manage potential failure modes.

To supplement the risk review, Teck, with support from KCB, conducted a credible catastrophic failure mode assessment in April 2022. Teck's definition of a "catastrophic" failure is one with a risk to life safety or irreversible impact to a rare or valued ecosystem, social or cultural heritage element. The assessment concluded that, based on the available information and current understanding of the site, there are no credible "catastrophic" failure scenarios for the Sullivan tailings facilities.

The following is a summary of the controls in place at Sullivan Mine to manage the risks associated with the key failure modes for the facilities. The slope instability failure mode is considered credible (though non-catastrophic), while the internal erosion and overtopping failure modes are not credible for the current and historic loading conditions. Based on the observations above and the available information, Teck is managing the potential failure mechanisms for the TSFs appropriately.

Overtopping

The likelihood of overtopping failures leading to catastrophic consequences up to and including Extreme consequence loading conditions is negligible, and therefore non-credible, for the inactive tailings storage facilities given the closure water management measures already in place (e.g. drainage channels, spillways, etc. designed to discharge the probable maximum flood (PMF).

This is also applicable for the active water storage facilities, ARD Pond and Iron Pond, because they have emergency spillways designed to safely pass the PMF. The likelihood is even more remote for the ARD Pond because it can store a PMF before the water level rises to the invert of the spillway.

For the active Sludge Impoundment, the likelihood of an overtopping failure leading to catastrophic consequences is non-credible as there is no population in the vicinity of the dam.

Internal Erosion / Piping

The likelihood of internal erosion/piping failure modes resulting in catastrophic consequences is considered to be negligible, and therefore non-credible, for the tailings facilities because the pond water levels are low (Iron Pond) or completely absent (inactive facilities) and the associated piezometric surfaces within the tailings are very low.

The likelihood of internal erosion/piping failure modes resulting in catastrophic consequences is considered negligible for the ARD Pond Dams. These dams have filter zones in the dam cross-section. There is a seepage pathway on the left abutment of the South Dam that responds to the reservoir water fluctuations, however investigations and assessments have determined that the soils are internally stable and not susceptible to internal erosion.

For the Sludge Impoundment, the likelihood of an internal erosion/ piping failure leading to catastrophic consequences is considered to be negligible, and therefore non-credible, due to the inclusion of filters in the embankment and the lack of a permanent pond.

Slope Stability

Static stability factors of safety are well above the minimum recommended values for all the structures and the likelihood of failure under static loadings leading to catastrophic consequences is considered negligible and non-credible.

The likelihood of seismic instability (foundation and slope) failure modes leading to catastrophic consequences is considered to be negligible, and therefore non-credible, for the facilities because of the seismic stabilization measures completed prior to closure. As previously indicated, since closure in 2001, the phreatic surface in the tailings facilities has decreased significantly so that the portion of tailings vulnerable to seismic liquefaction has also significantly reduced compared to original design assumptions. The likelihood of seismic instability leading to catastrophic consequences for the Gypsum and Siliceous TSFs is currently judged to be low, pending further review once the assessments from the investigation are completed. The likelihood of slope instability leading to catastrophic consequences for these two facilities is considered to be non-credible due to the lack of a permanent pond and very low phreatic surface within the tailings, which means that while slumping could occur within the facility, downstream consequences will be limited. There are no liquefiable materials present in the foundation and embankment fill of the ARD Pond Dams and the deformations induced by the maximum credible earthquake (MCE) are computed to be small and acceptable. Therefore, the likelihood of seismic instability leading to catastrophic consequences is considered negligible, and therefore non-credible, for the ARD Pond Dams. It should be noted that a due diligence update of the seismic stability of all structures is underway to better reflect existing conditions and to incorporate the revised seismic hazard assessment. This work is important to update the supporting documentation but is not expected to materially change the current conclusions.

Key Observations (Instrumentation and Visual)

Notification levels have been established for all instruments installed prior to 2020. The current notifications levels for piezometers are not intended to be indicative of a dam safety concern but rather to identify any measured change from historic or expected behaviour that warrants a due diligence review by Teck and the Engineer of Record (or designate) to understand the likely cause of that change. The current monitoring period is from September 1, 2021 to August 31, 2022. The previous monitoring period was from September 1, 2020 to August 31, 2021.

Notification levels tied to seismic stability assumptions for two facilities and internal erosion at the ARD Pond Dams and the Silicious Pond Dams are now in place. The alert levels update also includes updated levels based on more recent historical performance.

A facility-by-facility indication of condition and stability follows, inclusive of those for facilities deemed to have no credible failure modes leading to catastrophic consequences.

Iron TSF

Based on the visual observations and instrumentation review, the Iron TSF and its emergency spillway are in good condition and are performing satisfactorily.

Seepage near station 5+00 is monitored by Weir #3 and Weir #4 installed in the drainage ditch. Seepage near station 24+00 is collected in an existing low-lying area beyond the toe of the embankment. There are no obvious changes in the seepage conditions compared to previous years.

All 30 piezometers showed relatively constant piezometric, or slightly increased readings compared to the previous monitoring period. Increased readings can be attributed to changes in weather conditions (i.e., wetter spring). The readings were generally consistent with historic monitoring trends.

Old Iron TSF

Based on the visual observations and instrumentation review, the Old Iron TSF and the Iron TSF Divider Dike are in good condition, with no visible changes from previous inspections, and are performing satisfactorily.

Five of the nine currently monitored piezometers in the Old Iron TSF showed a slight increase in piezometric levels when compared to the previous monitoring period. The remaining four piezometers showed a decrease or no change in piezometric levels compared to the previous monitoring period. The readings were generally consistent with historic monitoring trends.

Siliceous TSF

Based on the visual observations and instrumentation review, the Siliceous TSF is in good condition, with no visible changes from previous inspections, and is performing satisfactorily.

Visual observation of seepage indicates similar flows as previous years with no indication of sediment in the seepage flows.

17 out of 18 piezometers currently being read showed stable or decreasing piezometric levels compared to the previous monitoring period. The remaining piezometer showed a slight increase from the previous monitoring period. The readings were generally consistent with historic monitoring trends.

Gypsum TSF

Based on the visual observations and instrumentation review, the East and West Gypsum TSFs, including the Northeast Gypsum Dike and the Recycle Dam, are in good condition with no visual changes from previous inspections, and are performing satisfactorily.

All 15 piezometers currently being read at the Gypsum TSF showed reduced or stable piezometric levels compared to the previous monitoring period. The readings were generally consistent with historic monitoring trends.

There are continued indications of burrowing animal activity at the toe of the embankments; the extent of these observations is not considered a dam safety issue but represents a safety hazard for personnel. Teck has worked to fill in the burrows, and this will need to continue for the new burrows identified.

The Sondex gauge was not scheduled to be read during this monitoring period. The inclinometer was read during this reporting period but the data suggests that the casing is settling and can no longer provide reliable data. The instrument will be removed from the instrument list.

ARD Pond

Based on the visual observations and instrumentation review, the North and South Dams are in good condition with no visual changes from previous inspections and are performing satisfactorily.

All of the 13 currently monitored piezometers in the ARD Pond Dams indicated a slight increase or stable piezometric level compared to the previous monitoring period. The increase could be attributed to weather conditions such as increased precipitation from the previous year. The readings were generally consistent with historic monitoring trends.

Calcine TSF

Based on visual observations, the Calcine TSF is in good condition with no visual changes from previous inspections and is performing satisfactorily.

Sludge Impoundment

Based on the visual observations, the North and South Dikes of the Sludge Impoundment are in good condition with no visual changes from previous inspections and are performing satisfactorily. Reporting for these instruments began in October 2021, and therefore comparison to previous monitoring periods is unavailable at this time.

OMS and MERP Manuals

The Operation, Maintenance, and Surveillance (OMS) Manual for the Sullivan Mine Tailings Facilities was updated in March 2022. The OMS Manual will be reviewed and updated again in early 2023 to include GISTM (2020) criteria.

The Mine Emergency Preparedness and Response Plan (MERP) was updated in 2022.

Deficiencies and Non-conformances

There were no new deficiencies or non-conformances identified, and therefore, no new recommendations arising from the current AFPR.

Previous recommendations that are still outstanding are summarized in the table below.

Consistent with past annual reviews, deficiencies and non-conformances are grouped according to the following four categories:

- Deficiency (D): An unacceptable dam performance condition based on analysis results and/or site observations/instrument data with respect to criteria outlined in the 2022 HSRC and 2016 Guidance Document, best practices, and/or applicable regulatory requirements.
- Potential Deficiency (PD): A dam performance condition that requires further evaluation to determine if the condition is a deficiency.
- Non-Conformance (NC): Defined as a deviation from established policies, procedures, operating instructions, maintenance requirements, or surveillance plans. A non-conformance is not an indication of unacceptable dam performance.
- Items Requiring Updates to Meet Updated Regulatory Standards (RS): Condition where regulatory requirements have changed and have become more stringent following initial design and/or construction.

Independent Dam Safety Review

The most recent Dam Safety Review (DSR) for the Sullivan Mine TSFs and dams was initiated by Haley and Aldrich in 2018. The DSR report was finalized in January 2021. The HSRC regulations (EMLCI 2022) mandate that a DSR be undertaken every five years regardless of the consequence classification of the structures. Therefore, the next DSR is scheduled to be initiated in 2023.

Table ES.2 Summary of Outstanding Recommendations from Past DSIs and New Recommendations from Current Annual Performance Report UPDATED IN SECTON 6

Structure	ID No.	Deficiency of Non-Conformance	Applicable Regulation or OMS Reference	Recommended Action	Deficiency Type	Priority	Recommended Deadline/Status
Previous Recommendations Closed/Superseded							
Previous Recommendations Ongoing							
Sludge Impoundment	2017-3	A review of the Sludge Impoundment is needed.	EMLCI HSRC (2022) & CDA Guidelines: Application to Mining Dams (2019)	Review of the current design freeboard and design sludge levels is required. To facilitate the design update, the Sludge Impoundment surface should be surveyed to obtain average sludge deposition rates. Review of entire facility should be completed to address storage, life expectancy of the facility, and regulatory requirements.	RS	3	Q4 2024 UPDATE – Site investigation completed. The site investigation data will be combined with other groundwater information and form the basis for a workshop between Teck and KCB on the future of the facility. After the workshop is completed, a scope of work will be developed based on the workshop outcomes.

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1 INTRODUCTION

1.1 Purpose, Scope of Work, and Methodology

This report presents the results of the 2022 Annual Summary of Tailings Facility performance of the tailings embankments and other dams at the Teck Metals Ltd. (Teck) former Sullivan Mine, located in Kimberley, British Columbia. The work was carried out in general accordance with our proposal letter dated March 18, 2022 and the Teck Guideline for Tailing and Water Retaining Structures (Teck 2019).

The scope of work consists of:

- a visual inspection of the physical condition of the various containment embankments and water retention dams during the site visit May 25 and 26, 2022;
- a review of the climate and water balance data for the site;
- a review of the annual flow rates recorded from weirs for the Acid Rock Drainage (ARD) pond and Iron Tailings Storage Facility (TSF);
- a review of updated piezometer and settlement records provided by Teck in 2022; and
- a review of the risk register for the storage facilities.

The reporting period for this annual report (AFPR) is September 1, 2021 to August 31, 2022. The previous monitoring period was from September 1, 2020 to August 31, 2021. Figures 1 through 3 show the project location and general layout of the tailings facilities.

This is the 31st AFPR of the Sullivan Mine tailings embankments carried out by Klohn Crippen Berger Ltd. (KCB). Annual reports for the periods preceding KCB's involvement were prepared by SRK-Robinson Inc. from 1989 to 1991 and by Robinson Dames and Moore from 1984 to 1988.

As per previous annual inspection reports by KCB, this report focuses on the geotechnical performance of the tailings embankments and water balance for the tailings facilities. Off-site water discharge quality, groundwater quality and monitoring, and geochemical assessment and monitoring are excluded from the scope of this report. These aspects are reviewed by others and are reported separately. These issues would only be referred to if they were contributory to facility integrity for any of the tailings structures. This has not been the case to date, including the 2022 review period.

1.2 Regulatory Requirements

1.2.1 Mines Act and HSRC

This annual inspection addresses the performance of the tailings/sludge storage facilities and associated water management infrastructure in accordance with the Health, Safety, and Reclamation Code for Mines in British Columbia (EMLCI 2022) and Guidance Documents (EMLCI 2016), which forms part of the Mines Act (RSBC 1996).

As required by the HSRC, the following persons have been designated:

- Engineer of Record – Ms. Pamela Fines, P.Eng. (KCB)
- Responsible Tailings Facility Engineer – Mr. Jason McBain, P.Eng. (Teck)

1.2.2 Water Act and BC Dam Safety Regulation

None of the tailings embankments or dams at Sullivan Mine require a water licence and are therefore not regulated by the BC Dam Safety Regulations. A conditional water licence (C050428) has been issued for the construction of the sludge impoundment. The BC Dam Safety Regulation was referenced for guidance related to dam safety, where appropriate.

1.2.3 Permits and Licenses

Sullivan Mine is regulated by the following permits:

- Reclamation Permit M-74 (amended June 3, 2020) issued by the Ministry of Mines. This permit is issued under the provision of the Mines Act (RSBC 1996) and addresses reclamation, metal leaching, and acid rock drainage requirements at Sullivan Mine. The requirements of the permit are:
  - monitoring programs of vegetation, surface water, and groundwater;
  - annual reporting as required under the HSRC (EMLCI 2022); and
  - informing the ministry of changes at the mine that might impact the amount of the reclamation security.
- Effluent Permit PE-00189 (October 24, 2016) issued by the Ministry of Environment and Climate Change Strategy. This permit is issued under the provision of the Environmental Management Act (SBC 2003) and authorizes the discharge of effluent from the drainage water treatment plant to the St. Mary River as well as sludge to the land-based storage pond, and effluent from the 3700 foot portal to Kimberley Creek. Requirements under this permit include:
  - General requirements (Section 2 of the permit) which state the conditions under which the Drainage Water Treatment Plant (DWTP) and Sludge Impoundment must be operated (i.e. maintaining the infrastructure in good working order, addressing emergencies, modification to infrastructure and processes, and suspension).
  - Monitoring and reporting requirements (Sections 3 and 6 of the permit) which describe monitoring work to conduct on the discharges and receiving environment as well as the reporting frequency (i.e., spring and fall).
- Permit PR6742 (January 2, 2018) issued by the Ministry of Environmental Protection & Sustainability: Waste Management. This permit is issued under the provision of the Environmental Management Act (SBC 2003) and authorizes the discharge of refuse to a landfill. The landfill is located within the boundaries of the Old Iron TSF (northwest corner) and is denoted as E242184 and E310949 by the Ministry. Requirements under this permit include:

- reporting of volumes of material placed within the landfill; and
- regular inspection and maintenance of the landfill works.

1.3 Facility Description

There is a total of 15 earthfill embankment structures that form the seven separate storage facilities. A summary of the seven facilities and their associated embankment structures is provided in Table 1.1. The earthfill structures have a combined crest length of just over 10.4 km, with the maximum heights varying from 4.2 m to 29 m. A plan of the storage facilities and their retaining structures is provided in Figure 1.

The two water retaining dams[2], designated as the North Dam and South Dam, that form the ARD Pond are shown in Figure 20. This pond, located at the former Cooling Pond site, annually stores the mine contact water collected from the Sullivan Mine site requiring treatment. The two sludge retention embankments, designated as the North and South Dikes, that form the Sludge Impoundment are shown in Figure 27. This impoundment is located south of the St. Mary River and stores sludge produced from treatment of mine contact water at the DWTP[1].

Other than the above earthfill structures, the other embankments listed in Table 1.1 have been used primarily for tailings storage. Typically, these embankments consist of an initial earthfill starter section raised incrementally over the years using the upstream method of construction. The design and construction records for the original Old Iron TSF Dikes and the No. 1 Siliceous Dike (which were constructed during the 1920's to 1940's), are not available, so it is unclear how these were originally constructed. In the 1990's, following the static liquefaction failure experienced at the Iron Dike (Davies et al, 1998) in 1991, the long-term stability of all the tailings embankments were assessed which led to the construction of stabilization measures (i.e. slopes flattening and/or toe buttresses) to meet required design criteria. A discussion of the design basis and criteria is provided in Section 5.1.

The Iron Pond, the ARD Pond, the West Gypsum Seepage Collection Pond, and the Northeast Gypsum and Recycle Dam seepage collection ponds are the only storage facilities that are still active as they are used as integral components of the overall surface water and groundwater management strategy at the Sullivan Mine. The Sludge Impoundment is also active but does not retain ponded water. The other tailings facilities have been decommissioned and surface reclamation is complete. The reclamation included draining and covering the TSF surface and constructing surface water runoff conveyance channels and spillways.

Water collected at Sullivan Mine through mine drainage, contaminated groundwater, and seepage from TSFs and waste dumps is stored in the ARD Pond and then pumped to the DWTP. The ARD Pond serves as a flow equalization basin to facilitate seasonal operating campaigns at the DWTP. The treated water is released to the environment (St. Mary River) and the sludge is deposited in the Sludge Impoundment. The ARD Pond was designed with a spillway, which connects to the Iron Pond

[1] In this report KCB refers to water retaining earthfill embankments as "dams" and refers to the earthfill embankments that are constructed for tailings storage and sludge storage as "dikes."

in the Iron TSF. The Iron TSF has an emergency spillway to safely convey excess water offsite from flood events up to and including the PMF. This spillway discharges flood flows into Cow Creek, which in turn discharges into the St. Mary River.

Site location plans and typical embankment sections are provided in Figures 5 through 28.

Table 1.1 Summary of Storage Facilities at Sullivan Mine

Storage Facility	Embankments	Type	Approximate Embankment Length (m)	Approximate Maximum Embankment Height (m)	Starter Dike Constructed (Year)[1]	Year of Last Dike Raise (Year)
Iron TSF	Iron Dike	Iron Tailings	1500	29.0	1975	1999
Old Iron TSF	Old Iron Dike	Iron Tailings	520	7.6	Prior to 1948	Unknown
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	Recycle Dam	Seepage/ARD Water	90	6.0	1985	1985
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	South Dam	ARD/Seepage Water	330	16.8	1976	2001
Sludge Impoundment	North Dike	Sludge	120	4.3	1978	1978
	South Dike	Sludge	200	6.1	1978	1978

Notes:

1. Starter Dike information based on data from Annual Inspection Report by SRK-Robinson dated June 1991.
2. The ARD Pond is established at the site of the old Cooling Pond.
3. Tailings were placed downstream of both Iron TSF Divider Dike and No. 1 Siliceous Dike. The original height of the Iron TSF Divider and No. 1 Siliceous Dikes from original ground is 10.7 m and 16.8 m, respectively. A municipal landfill abuts the downstream slope of the Calcine Dike. The height of the Calcine Dike from original ground is 15.2 m.

1.4 Background Information and History

After almost a century of operations, the Sullivan Mine was closed at the end of 2001 with approximately 94,000,000 tonnes of tailings stored in various TSFs and approximately 16,900,000 tonnes of mine waste stored at the former mine. Reclamation work on the tailings areas was formally initiated in 1990 and was essentially complete by 2008.

The mine had been mainly underground and operated on a near-continuous basis from the early 1900's to 2001. In the last decade prior to closure, the mine was processing primarily lead/zinc ore. For most of the mine's operating life, mill tailings were hydraulically transported to an area immediately southeast of the concentrator for disposal and storage. The historical development of the tailings area is summarized in Table 1.2. Gypsum and circulation water from operation of the fertilizer plant have also been stored in the tailings area. These by-products from the fertilizer plant were produced from about 1969 to 1987.

The DWTP, which began operating in 1979, continues to operate as part of the water management plan for the site. The DWTP treats acid rock drainage and other seepage produced from the underground mine and waste storage facilities. Sludge from the DWTP is located in an impoundment about 2 km south of Marysville near the DWTP. Figure 2 illustrates the relative locations of the DWTP, the tailings facilities, and the pipelines from the underground mine and highlights the primary seepage collection system.

Table 1.2 Historical Development

Date	Process	Storage Area	Comments
Prior to 1941	Milling/Flotation for lead and zinc recovery	One tailings stream to Old Iron TSF	
1941 to 1985	Tin Recovery Circuit	Iron Tailings to Old Iron TSF and Iron TSF Siliceous tailings to No. 1, 2, and 3 Siliceous Cells	
1953 to 1987	Fertilizer production including roasting of iron concentrate Waste products include iron oxide and gypsum	Iron oxide (known as calcine tailings) to Calcine TSF Gypsum tailings to East and West Gypsum Cells	Gypsum TSF not developed until 1968; prior to that gypsum tailings were stored and seasonally discharged to the St. Mary River during spring freshet
1975 to 1987	Fertilizer Plant effluent water	Stored and recycled from Cooling Ponds 1 and 2	
1987 to 2001	Fertilizer plant closed; single mill tailings stream	Single stream to Iron TSF	
1979 to present	Drainage Water Treatment Plant (DWTP) Sludge Impoundment	Sludge Impoundment	Located offsite, 1.5 km south of Marysville, 0.5 km south of DWTP
2001 to present	Water storage for feed to DWTP	Cooling Ponds 1 and 2 converted to ARD Pond	

1.4.1 Reference Reports

In 1991, Teck retained KCB to conduct forensic investigations to assess the failure of the (then) Active Iron Tailings Pond Dike. The work included the design of remedial measures to reinstate the Iron Dike and then subsequently extended to include a review the existing and long-term stability of a number of other tailings dikes. These studies were part of Teck efforts toward decommissioning and eventual closure of the Sullivan Mine tailings facilities. Stability assessments, and the design and implementation of stabilization measures if required, were completed for the Iron Dike, the East and West Gypsum Dikes, the No. 1, No. 2, and No. 3 Siliceous Dikes, and the Old Iron Dike. The design and construction of two new dams for the ARD pond were also completed, including new spillways and a downstream flood impact study. Additional post-closure assessments have been performed as required based on performance. The details of the design and construction records for the facilities are documented in KCB (and predecessor companies) reports.

1.4.2 Reference As-Built Drawings

Teck has updated as-built drawings for the various facilities post reclamation. An updated LiDAR imaged created in December 2012 was used to update the figures attached to this report. There have been no significant construction/modifications to the as-built conditions since the drawings by TM Tech Services were issued. A 2019 LiDAR survey was completed but a comparison to the 2012 surface showed very little change and the drawings have not been updated with the new survey surface.

1.4.3 Units of Measure and Coordinates

To facilitate the long-term monitoring of the site, this report has converted historical values recorded in imperial units of measure in the Sullivan Mine Grid coordinate system to metric units in UTM (NAD 83). Some figures still reference stationing along embankments in imperial units.

2 MINE ACTIVITIES IN 2022

2.1 Tailings/Sludge Deposition and Available Storage

The Sullivan Mine closed in 2001 and, therefore, all of the tailings storage facilities are no longer active.

The Sludge Impoundment continues to be active and provides storage of sludge generated from treatment of mine contact water through the DWTP. The average annual sludge deposition rate since closure is 2,800 tonnes/year and the total deposited sludge volume is approximately 182,000 tonnes.

2.2 Main Construction Activities (September 2021 to August 2022)

Construction related activities that take place each year are primarily associated with ongoing care and maintenance, such as road grading, cleaning of ditches, rodent burrow infilling, removal of trees and shrubs from embankment slopes as necessary, maintenance of the seepage collection system, maintenance of instrumentation and management of instrumentation data.

Specific key activities conducted over the current inspection period from September 1, 2021 to August 31, 2022 included:

- Backfilling of a void near the 943 pump station.
- Repair of steel v-notch weir plates.
- Lowering of low operating level in the Iron Pond.

Prior to the site visit in 2022, site staff lowered the intake levels for the 945/946 pumps located near the West Gypsum seepage collection pond and drew down the pond level. This allowed for a cleanout and regrading of the weir channels that drain towards the seepage pond. Plans were in development to remove an access road around the seepage collection pond to allow the pond to be lowered even further. Reducing the storage of water anywhere on the TSF is recommended and the area will be inspected again during the 2023 AFRP site visit.

2.3 Site Investigation

A site investigation was completed in October and November 2020 at the ARD South Dam, Iron TSF, Old Iron TSF, Siliceous TSF and Gypsum TSF. Site investigation was also completed at the Sludge Impoundment in September 2021. New instruments were installed during the 2020 and 2021 site investigations. Notification levels for the new instruments are being developed.

2.4 Updates to Embankment Cross-Sections

Typical cross-sections for each embankment have been previously updated using the 2012 LiDAR data and are shown in the figures included with this report.

A comparison of select cross-sections generated between the 2012 LiDAR surfaces and the 2019 LiDAR surfaces indicated no significant changes to the physical configuration of the embankments on the site. The updated sludge surface in the Sludge Pond from the 2019 LiDAR is provided in Figure 27.

2.5 Dam Safety Review

The most recent Dam Safety Review (DSR) for the Sullivan Mine TSFs and dams was initiated by Haley and Aldrich in 2018. The DSR report was finalized in January 2021. The previous DSR was completed by Golder Associates in 2013. The HSRC regulations (EMLCI 2017) mandate that a DSR be undertaken every five years regardless of the consequence classification of the structures. Therefore, the next DSR is scheduled to be initiated in 2023

3 CLIMATE REVIEW AND WATER MANAGEMENT – TAILINGS AREA

3.1 Overview

The water management system at Sullivan Mine involves the collection and treatment of mine drainage, contaminated groundwater, and seepage from TSFs and waste dumps. The only active storage facilities used as part of the water management system are the ARD Pond, Iron Pond and West Gypsum Seepage Collection Pond. Details of the system are included in the Sullivan Mine Seepage Collection Manual (Teck, 2021).

In general, water from the mine and tailings areas is collected and conveyed to the ARD Pond for storage to facilitate seasonal operating campaigns at the DWTP. The main sources of water include:

- Mine water from the underground workings is pumped seasonally from the 3700 ft portal and flows via gravity to the ARD Pond.
- Water collected from the Upper and Lower Mine Yard seepage collection systems flows via gravity in the 3900 line to the ARD Pond.
- Water from the tailings seepage collection pumps and sumps, is pumped as required to the ARD Pond.

The main function of the Iron Pond is to provide storage of contaminated/contact water during spring runoff events. In addition, the system has the flexibility to by-pass the ARD Pond with temporary routing of mine and seepage water to the Iron Pond, where it can then be pumped to the ARD Pond or directly to the DWTP if required.

The ARD Pond has a storage capacity that allows for efficient operation of the DWTP for discrete periods of time and provides control over the time period when treated effluent is discharged to St. Mary River.

It should be noted that studies are underway to identify options and opportunities to improve the current water management system which, at the same time, can contribute to Teck's overall objective of continual risk reduction for the Sullivan Mine.

3.2 Climate

3.2.1 Precipitation

Climate stations in the Environment Canada (EC) database relevant to the Sullivan Mine Tailings Facilities precipitation and active during the time period of this water balance assessment are Kimberley PCC (Station No. 1154203) located approximately 3 km southwest of the mine and Cranbrook A (Station No. 1152105) located about 13 km southeast of the mine.

For the purpose of this assessment, site precipitation was estimated as the daily precipitation recorded at Kimberley PCC, with any missing data filled by precipitation recorded at the Cranbrook A station. Table 3.1 summarizes the total precipitation and snowpack estimated for the mine from

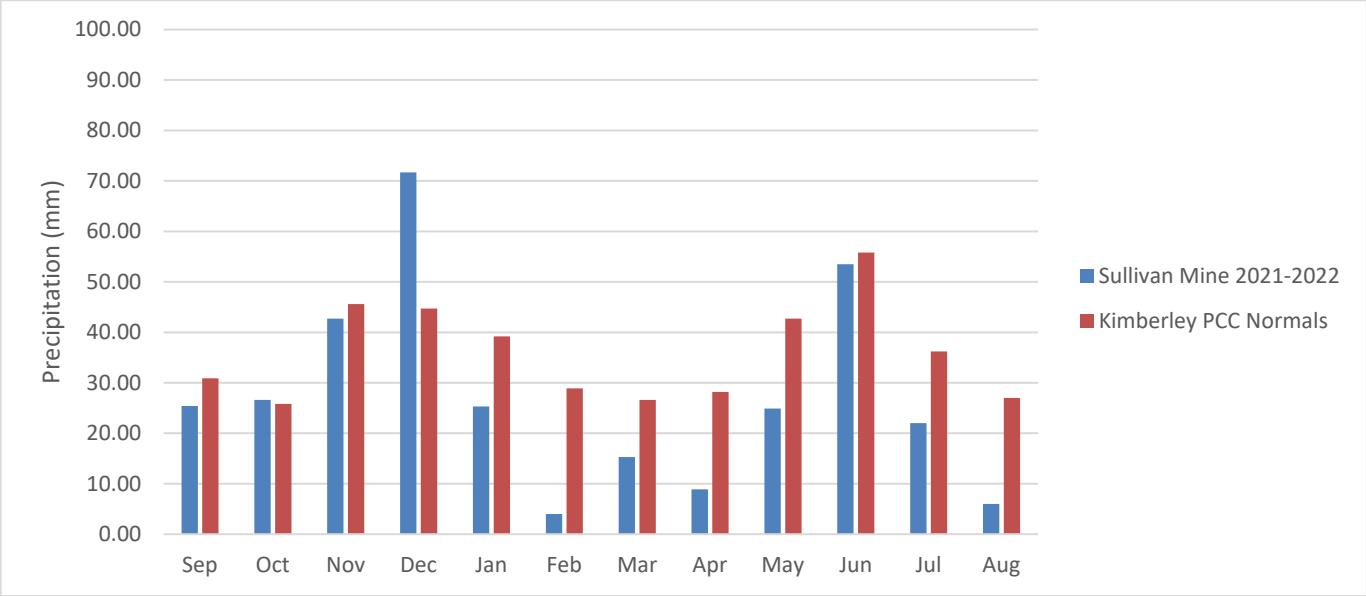
September 1, 2021, to August 31, 2022 and provides a comparison with the corresponding climate normals for Kimberley calculated between 1981 – 2010 (EC 2019). The total precipitation for the current monitoring period and the climate normals are also graphically shown on Figure 3.1.

On an overall annual basis, the conditions over the current monitoring period were drier than the Kimberley PCC normal levels. However, on a monthly basis, it was wetter than normal in December and October, and drier than normal in September, November, and from January to August.

Table 3.1 Monthly Total Precipitation at Sullivan Mine 2021 – 2022 Compared to Normals from Kimberley PCC Station

Month	2021 - 2022 Total Precipitation (mm)	Normal Total Precipitation (mm)	2021 - 2022 Snow Depth (cm)	Normal Snow Depth (cm)
Sep 2021	25.4	30.9	0	0.0
Oct 2021	26.6	25.8	0	0.0
Nov 2021	42.7	45.6	6.9	6.0
Dec 2021	71.7	44.7	78.8	22.0
Jan 2022	25.3	39.2	27.2	34.0
Feb 2022	4	28.9	4	39.0
Mar 2022	15.3	26.6	6.6	19.0
Apr 2022	8.9	28.2	2	0.0
May 2022	24.9	42.7	0	0.0
Jun 2022	53.5	55.8	0	0.0
Jul 2022	22	36.2	0	0.0
Aug 2022	6	27.0	0	0.0
Total	**326.3**	**431.6**	**125.5**	**120**

Figure 3.1 Monthly Total Precipitation at Sullivan Mine 2021-2022 Compared to Normals from Kimberley PCC Station



The precipitation data collected for the water balance is for the ARD Pond and its surrounding catchment. All water collected in the mine and tailings areas is pumped to the ARD Pond, and these flows are measured and recorded by Teck.

3.2.2 Evaporation

Monthly lake evaporation data at the tailings area for the reporting period was estimated using the WREVAP model by SRK (2014). The WREVAP model uses the dew point temperature, average temperature, and global solar radiation to estimate the lake evaporation. The mean monthly lake evaporation depths modelled for data collected at Kimberley A station is shown in Table 3.2.

Table 3.2 Mean Monthly Evapotranspiration Rates at Kimberley A Station

Month	Mean Evaporation (mm)
September	65
October	30
November	5
December	0
January	0
February	4
March	36
April	71
May	117
June	135
July	163
August	130
Total	**756**

3.3 Water Levels in ARD Pond and Iron Pond

The two key water storage ponds at the tailings area are the ARD Pond and Iron Pond. The area-volume curves and measured water elevations for these ponds are provided in the following sections.

3.3.1 Area-Volume Curves

ARD Pond

The ARD Pond is formed by the South and North Dams built in 2001. The dam crest elevation is at El. 1048.0 m and the pond's spillway crest elevation is at 1047.4 m. Flood discharges from the ARD Pond spillway reports to the Iron Pond. The Maximum Operating Level (MOL) for the pond is set at El. 1046.5 m (KCC, 2000). Figure XII.1 shows the pond area-volume curve used for the water balance assessment. Based on that curve, the pond surface area is approximately 10 ha and its storage volume is approximately 710 dam^3 at MOL.

Iron Pond

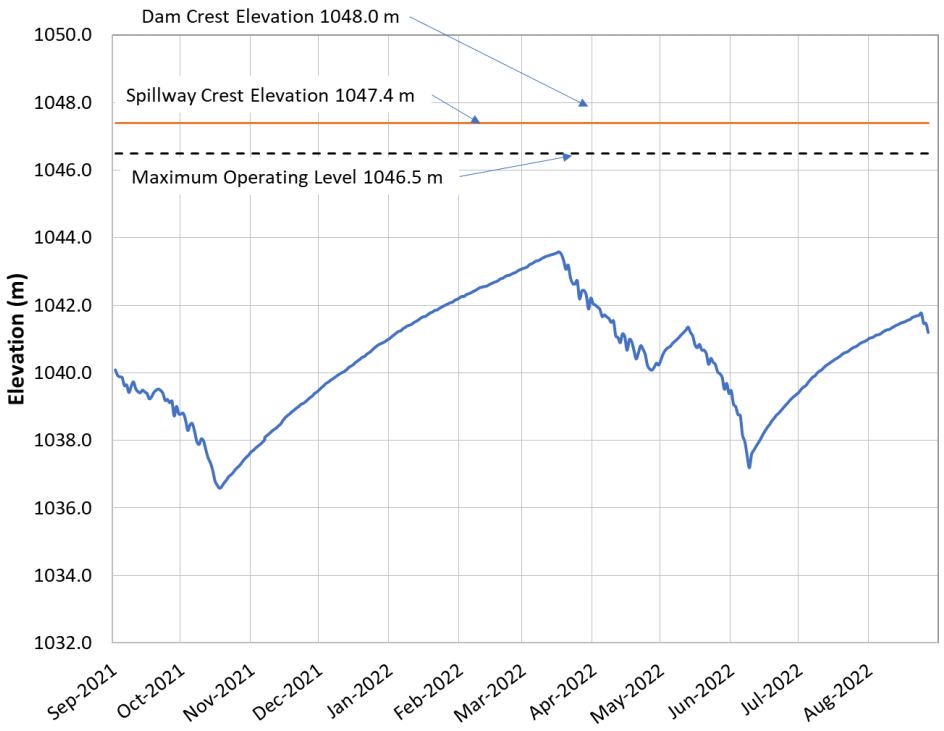
During normal operation, surface runoff from the Iron TSF and the upstream area is collected in the Iron Pond where it is then pumped to the ARD Pond or directly to the DWTP. In addition, the Iron Pond also provides emergency storage when the capacity of the ARD Pond is exceeded. The LiDAR survey from 2012, provided by Teck, shows the elevation of the top of the embankment to be at 1042.0 m and the elevation of the emergency spillway crest at 1041.0 m, which is consistent with the original design. The stage-storage curve (KCB 2007) for the pond is shown on Figure XII.2 and indicates that the storage capacity of the Iron Pond at the emergency spillway crest elevation of 1041.0 m is about 380 dam^3.

3.3.2 Pond Water Levels

ARD Pond

Figure 3.2 shows the water levels measured by Teck in the ARD Pond from September 2021 to August 2022. The pond level was recorded daily.

Figure 3.2 ARD Pond Level 2021 – 2022



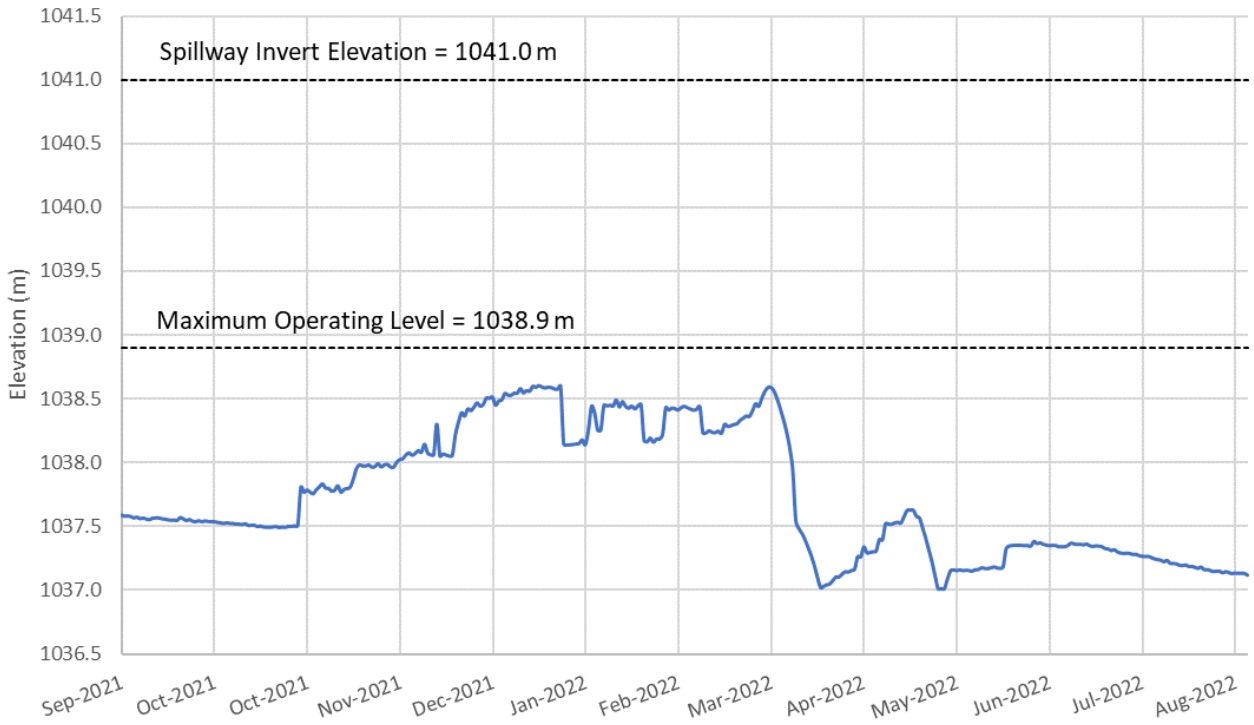
Based on the pond water levels, the maximum level observed during the reporting period was El. 1043.6 m, which occurred on March 16, 2022. This is 2.9 m lower than the maximum operating level (MOL) and is 3.8 m below the spillway crest elevation. There was no water discharged from the ARD Pond spillway to the Iron Pond during the water balance reporting period. The spillway has never discharged since the ARD pond was constructed.

Iron Pond

Figure 3.3 shows the measured water levels by Teck in the Iron Pond from September 2021 to August 2022. The pond level was recorded daily.

Based on pond water levels, the maximum level observed during the reporting period was El. 1038.6 m around January 13, 2022, which is 2.4 m below the spillway invert elevation. There was no water discharged from the Iron Pond spillway during the water balance period, and records show that water has never been discharged to the spillway since it was constructed after mine closure.

Figure 3.3 Iron Pond Level 2021 – 2022



3.4 Tailings Area Water Balance

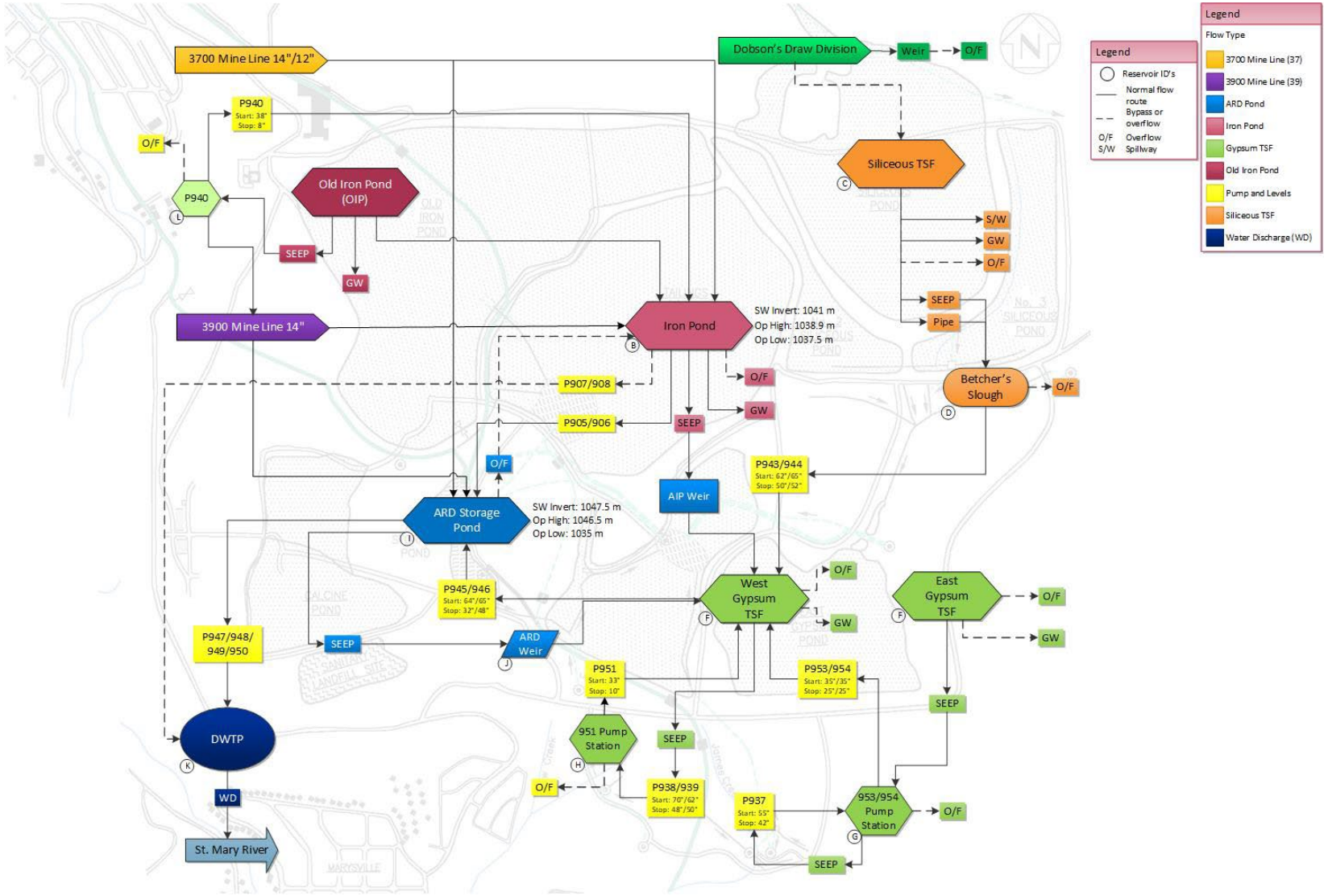
3.4.1 General

Teck manages and tracks the annual water balance for the Sullivan Mine. This section provides a review of the water balance for the current monitoring period from September 1, 2021 to August 31, 2022. The focus of the water balance is for the ARD Pond, as it is the central facility where all collected mine contact water is directed to for storage and then conveyed to the DWTP for treatment.

3.4.2 Water Balance Schematic

Figure 3.4 shows a schematic of the tailings area.

Figure 3.4 Tailings Area Water Balance Schematic



3.4.3 Inflows

As shown on Figure 3.4, inflows to the ARD Storage Pond include the following:

- Seepage from the Iron Pond, Gypsum TSF, and Siliceous TSF, which is collected in the West Gypsum Seepage Collection Pond and directed to the ARD Pond through Pumps 945 and 946.
- Discharge from the mine through the 3700 and 3900 Mine Lines. The 3700 line carries water from the underground mine to the ARD Storage Pond. The 3900 line collects water from the waste dumps, aquifer dewatering wells, and Sullivan Creek as well as pump 940, which collects seepage from the Old Iron TSF, and carries the water to the ARD Pond.
- Pumped flows from the Iron Pond.
- Direct precipitation on the ARD Storage Pond surface and runoff from the surrounding catchment.

Pump data noted above was provided by Teck, rainfall data was obtained from Environment Canada weather stations and runoff was estimated using runoff parameters for the surrounding catchment.

Precipitation and runoff are calculated for the ARD Pond only. All other inflows are captured as measured pump flows to the ARD Pond, which already include precipitation and runoff from all other tailings areas. The ARD Pond catchment area is 0.179 km^2 (SRK 2014), including the pond and its surrounding catchment. Precipitation and runoff inflows were estimated based on the precipitation depths presented in Table 3.1, and estimated pond and catchment areas, which vary by pond level. The following inputs and assumptions were used for the precipitation and runoff estimates:

- monthly yield coefficients ranging from 0.15 to 0.30, as estimated by SRK (2014);
- precipitation accumulated as snow November through March; and
- 100% of accumulated snow melted in March, based on the snowpack data shown in Table 3.1.

3.4.4 Outflows

Outflows from the ARD Storage Pond include the following:

- Seepage through the South Dam (Weir #1 ARDWU), reporting to the West Gypsum Seepage Collection Pond. The weir also collects runoff from the dam face and upstream area.
- Water pumped from the ARD Pond to the DWTP.
- Evaporation from the pond surface.

Water is pumped from the ARD Pond to the DWTP through pumps 947/948/949/950/952. The water is treated and then released to the St. Mary River.

Evaporation losses from the ARD Pond were estimated by multiplying the monthly evaporation depth shown in Table 3.2 by the estimated water surface area of the pond based on the measured pond elevation. Evaporation losses from other areas are reflected in the measured pump flows.

3.4.5 Water Balance Summary

A summary of the estimated monthly inflow and outflow volumes for the ARD Pond is provided in Table 3.3. The water storage in the ARD Storage Pond is calculated monthly based on the inflows and outflows and compared to the observed storage (calculated from the measured water elevation and stage-elevation curve), as summarized in Table 3.3. These volumes are based on the original capacity of the pond, so the accumulation of solids in the pond means that the actual water volume is somewhat less than the table indicates but recent bathymetry indicate that accumulated sediment is minimal and will not have a significant impact on the storage volume.

Agreement between the observed and calculated storage is variable on a monthly basis. The difference between the observed and calculated year-end storage volumes amounts to 17% of the annual inflow to the pond.

The calculated annual difference of 17% over the current monitoring period is slightly greater than the calculated annual difference of 14% for the previous monitoring period.

Table 3.3 ARD Pond Monthly Water Balance Summary

Description	Units	Sep 2021	Oct 2021	Nov 2021	Dec 2021	Jan 2022	Feb 2022	Mar 2022	Apr 2022	May 2022	Jun 2022	Jul 2022	Aug 2022	Sept. 2021–Aug. 2022
Beginning Water Level	(m)	1040.09	1038.78	1037.66	1039.43	1040.96	1042.17	1043.06	1042.05	1040.39	1039.47	1039.43	1041.02	1040.71
Beginning Storage	(dam^3)	189.90	117.56	66.11	152.12	245.25	330.76	399.51	321.03	208.64	154.26	151.93	248.88	228.81
Inflow:														
Pump 905/906/907/908	(dam^3)	0.0	0.0	0.0	0.0	0.0	0.4	13.5	11.4	10.8	0.0	0.0	0.0	36.1
Pump 945 / 946	(dam^3)	33.9	35.8	40.4	41.2	42.1	39.3	107.2	62.9	50.5	46.0	37.6	37.6	574.6
Mine Line 3700	(dam^3)	177.8	80.4	0.0	0.0	0.0	0.0	0.0	169.1	173.9	16.3	0.0	0.0	617.5
Mine Line 3900	(dam^3)	61.3	60.3	59.4	68.6	59.8	50.1	63.0	91.1	115.8	116.6	90.3	90.3	926.7
Precipitation and Runoff	(dam^3)	1.8	2.0	2.6	5.1	2.0	0.3	20.8	0.7	1.8	4.2	1.8	1.8	45.0
Total Inflow	**(dam^3)**	274.8	178.5	102.4	114.9	103.9	90.1	204.6	335.2	352.9	183.1	129.7	129.7	2199.8
Outflow:														
Pump 947/948/949/950/952	(dam^3)	307.6	211.6	0.0	0.0	0.0	0.0	230.5	483.4	385.7	159.7	0.0	0.0	1778.4
Weir 1 ARDWU	(dam^3)	Negligible												
Evaporation	(dam^3)	3.0	1.4	0.3	0.0	0.0	0.3	2.5	4.2	6.5	8.2	10.7	10.7	47.8
Total Outflow	**(dam^3)**	310.6	213.0	0.3	0.0	0.0	0.3	233.0	487.6	392.2	168.0	10.7	10.7	1826.6
Calculated Net Change in Storage	(dam^3)	-35.7	-34.5	102.0	114.8	103.8	89.8	-28.5	-152.4	-39.3	15.2	119.0	119.0	373.2
Calculated Month-End Storage	(dam^3)	154.2	83.0	168.2	267.0	349.1	420.6	371.0	168.6	169.3	169.4	270.9	367.9	602.0
Observed Month-End Storage	(dam^3)	117.6	66.1	152.1	245.3	330.8	399.5	321.0	208.6	154.3	151.9	248.9	230.6	230.6

3.5 Flood Management

Reclamation work on the tailings areas commenced in 1990 and continued after mine closure in 2001 until it was completed in 2008. The reclamation work primarily comprised the development and construction of a multi-layer soil cover system of float rock and till over the tailings areas. A summary of the flood management structures and applicable design criteria is presented below.

- Surface water collection/diversion channels and spillways have been designed and constructed in the tailings areas for flood management. The main channels and spillways are Dobson's Draw diversion, Siliceous Spillway and outlet channel, ARD Pond spillway, Channel C within the Iron Pond and the Iron Pond emergency spillway. They are designed to safely pass the Probable Maximum Flood (PMF) events. The channels are riprap lined and the spillways include stilling basins.
- As previously indicated, the Iron Pond is intended to provide storage of mine contact surface water during spring runoff events. The Iron Pond is designed to store the 100-year snowmelt event above the maximum operating level and controlled release of the 1000-year snowmelt event has also been provided for, if it cannot be stored. If the pond level at the start of the snowmelt event was below the maximum operating level then a larger than 100-year snowmelt event could be stored before discharge via the emergency spillway. The emergency spillway for the Iron Pond is designed to safely pass the PMF. Key characteristics of the Iron Pond are provided in Section 3.6.1.
- As previously indicated, the ARD Pond is the central water storage facility where all collected contaminated/contact water is directed to for storage and then subsequently conveyed to the DWTP for treatment. The ARD Pond has been designed to store the 48-hour PMF and also includes a spillway designed to safely pass a 24 hr PMF (after the 48-hour PMF has been stored). Note that, in essence, the ARD Pond is capable of safely handling two 48-Hr PMFs occurring in succession. Key characteristics of the ARD Pond are provided in Section 3.6.2.

It should be highlighted that the 24-Hr PMF, which was selected as the Inflow Design Flood (IDF) for the Sullivan Mine tailings facilities, exceeds the minimum criteria for their respective consequence classifications, as specified in CDA (2013, 2014) and EMLCI (2017). Teck has elected to adopt higher IDF values within the framework of continual risk reduction.

3.6 Freeboard and Storage – Water Storage Ponds

3.6.1 Iron Pond

The maximum operating level of the Iron Pond is El. 1038.9 m. The stage-storage curve of the pond is shown on Figure XII.2, and its key design and performance characteristics are provided in Table 3.4.

Table 3.4 Relevant Iron Pond Characteristics

Item	Value
Top of the Dike Elevation (m)	1042.0
Spillway Crest Elevation (m)	1041.0
Maximum Operating Level (m)	1038.9
Storage Capacity at the MOL (dam^3)	76.9
Designed Storage Capacity up to the Spillway (dam^3)	614.2
Minimum Water Level in 2021-2022 (m)	1037.0
Maximum Water Level in 2021-2022 (m)	1038.6
Maximum Storage in 2021-2022 (dam^3)	46.3
Minimum Available Capacity Below MOL 2020-2021 (dam^3)	30.7

As previously discussed in Section 3.3.2, and shown on Figure 3.3, the maximum water level elevation recorded in the Iron Pond over this monitoring period was 1038.6 m, which is 2.4 m below the emergency spillway crest elevation and 3.4 m below the minimum Iron Dike crest elevation.

3.6.2 ARD Pond

The maximum operating level of the ARD Pond is set at El. 1046.5 m, which is 0.9 m lower than the spillway invert (El. 1047.4 m). It allows for a flood storage depth of 0.8 m for a 48-hour Probable Maximum Flood (PMF) plus 0.1 m freeboard to the spillway invert. The elevation of the top of the dam is set at 1048.0 m, providing a vertical distance of 0.6 m above the spillway invert. This vertical distance allows for a 0.3 m surcharge above the spillway crest and a dam freeboard of 0.3 m (KCB 2018) when routing the IDF (PMF) through the spillway to the Iron Pond.

The stage-storage curve of the pond is shown on Figure XII.1, and its key design and performance characteristics are provided in Table 3.5.

Table 3.5 Relevant ARD Pond Characteristics

Item	Value
Top of Dam Elevation (m)	1048.0
Spillway Crest Elevation (m)	1047.4
Maximum Operating Level (m)	1046.5
Storage Capacity at the MOL (dam^3)	710.7
Designed Storage Capacity for PMF (dam^3)	50.0
Designed Freeboard for PMF (m)	0.3
Minimum Water Level in 2021-2022 (m)	1036.6
Maximum Water Level in 2021-2022 (m)	1043.6
Maximum Storage in 2021-2022 (dam^3)	442.5
Minimum Available Capacity Below MOL 2021-2022 (dam^3)	268.2

As previously discussed in Section 3.3.2, and shown on Figure 3.2, the maximum water level elevation recorded in the ARD Pond over this monitoring period was 1043.6 m, which is 3.8 m below the spillway crest elevation and 4.4 m below the dam crest elevation.

3.7 Off-Site Surface Water Discharge Volumes

There were no off-site water discharges from the ARD Pond and Iron Pond spillways during the reporting period. These spillways have not operated since they were constructed (in 2001 for the ARD Pond spillway, and in 2007 with modifications in 2009 for the Iron Pond emergency spillway).

The only discharge to the environment is treated effluent water from the DWTP, which enters the St. Mary River. Table 3.6 provides a summary of the monthly discharge volumes, as provided by Teck. As shown, the total water discharge volume from the DWTP between September 2021 and August 2022 was 1876 dam^3.

Table 3.6 Summary of Treated Water Discharge to St. Mary River

Month	Total Volume (dam^3)	Average Discharge per Day (dam^3)
Sep 2021	307.58	10.25
Oct 2021	211.57	6.82
Mar 2022	230.54	7.44
Apr 2022	483.42	16.11
May 2022	385.66	12.44
June 2022	159.69	5.32
August 2022	97.72	3.15
Total	**1876.17**	

The average daily discharge volumes over this monitoring period were less than the maximum daily limit of 28 dam^3 as compliant with the permit PE-00189.

3.8 Water Discharge Quality

Water discharge quality is not included in the scope of this report. Teck separately reports groundwater quality and discharge water quality to the BC Ministry of Environment as specified in Permit PE-00189.

4 SITE OBSERVATIONS AND INSTRUMENTATION REVIEW

4.1 Visual Observations

The on-site inspection of the embankments was carried out by Ms. Pamela Fines, P.Eng. (Engineer of Record) and Ms. Makayla Rettger, EIT. (SK) of KCB from May 25 to May 26, 2022. The weather during the inspection was cool with mostly clear skies. The 2022 Inspection Checklists that were completed for each embankment are included in Appendix I. A summary of the visual observations of each embankment is below.

Selected photographs of the various embankments taken during the site visit are presented in Appendix II and are referenced throughout this report. Appendix II has been subdivided so as to group the photographs according to the facilities, as follows:

- ARD Pond, ARD Spillway, Weirs 1 and 2 II-1
- Iron TSF, Iron Pond, Emergency Spillway, Weir 3 and 4 II-9
- Siliceous TSF, Siliceous Spillway, Siliceous Decants II-21
- Gypsum TSF, II-28
- Sludge Impoundment II-32
- Calcine TSF II-35
- Old Iron TSF, Iron TSF Divider Dike II-36

4.1.1 ARD Pond

The visual inspection indicated that the North and South Dam were in good physical condition with no signs of structural distress. The riprap on the upstream side of both dams was in good condition with no evidence of movements or damage (Photo II.1 and II.2). It was noted that there is sporadic vegetation growth on the upstream face of both dams but is not a dam safety concern and should be managed as part of the ongoing vegetation management program on site. Several large pieces of wood were observed on the upstream slope of the North Dam, the debris is not a dam safety concern but should be removed as part of good practice to prevent them from possibly blocking the spillway during a flood event.

An area of surface erosion was observed below an outlet pipe adjacent to the pumphouse located near the South Dam of the ARD Pond (Photo II.3). This area should be monitored and repaired if it begins to encroach on the pumphouse. This is not a dam safety concern but the pumphouse is an integral part of site water management.

The downstream slope of the North Dam appeared to be in similar condition to the previous years. The slope is well grassed with no significant patches of bare or loose soil observed (Photo II.4). Localized depressions/steepened slopes along the toe of the North Dam have been noted during the annual inspections. These areas were purposely constructed by locally excavating into the dam slope to manage seepage exiting from the dam. Seepage collects in the toe ditch and flows to the seepage

pond at the west end of the dam. Vegetation clearing was completed before the 2022 inspection and the slope and toe area were easier to observe (Photo II.5).

The downstream slope of the South Dam appeared to be in similar condition to previous annual inspections (Photo II.6). The slope is well grassed with no significant patches of bare or loose soil observed.

The ditch south of the South Dam that feeds into Weir #1 and Weir #2 is heavily vegetated with grass and other plants, which may impede flow (Photo II.7). Teck has done significant work at all the weirs to reduce the amount of water bypassing the weirs, the low permeability cut-off material can be seen in Photo II.7. The ditches should be cleaned as part of the vegetation management program documented in the OMS manual.

4.1.2 Iron TSF and Iron Dike

The visual inspection indicated that the Iron Dike was in good physical condition with no signs of structural distress. No cracking or other unusual physical conditions were noted along the crest or downstream slopes. Dike slopes and crest were grassed with no significant areas observed with bare or loose soil (Photos II.9).

Seepage continued similarly to previous years at the downstream toe of the embankment near station 5+00. Seepage is monitored by two weirs (Weir #3 and Weir #4) installed within the drainage ditch (Photos II.13 through II.16). The notch in the weir plate in Weir #4 has become worn and should be replaced or repaired (Photo II.16). Seepage was also occurring near the downstream toe of the dike near station 24+00 and is being collected in the existing ditch and low-lying area, this seepage should continue to be monitored visually as part of routine inspections and collection of weir flow data.

The visual inspection of the Iron Pond (contained within the Iron TSF) indicated that it was in good condition.

The Emergency Spillway Channel extends from the southwest corner of Iron TSF and down the west side of the West Gypsum TSF. The visual inspection indicated the spillway was in good physical condition (Photos II.17 through II.20). Some grass, shrubs, and other vegetation were present in the lower portion of the spillway near the southwest corner of the West Gypsum TSF and the 951 Pump House. The rip rap appeared to be in good condition with no signs of movement or particle breakdown. Vegetation clearing in the spillway should be completed as part of the ongoing vegetation management program documented in the OMS manual.

4.1.3 No. 1, 2, and 3 Siliceous TSFs

The visual inspection indicated that the No. 1, 2, and 3 Siliceous Dikes were in good physical condition with no signs of structural distress (Photos II.21 through II.25). Seepage of variable amounts generally occurs from the toes of all Siliceous Dikes during the spring from runoff due to snowmelt water infiltration through the cover system. This seepage occurred during operations and has continued but at much lower rates after mine closure. The observed seepage conditions appeared to be similar to

those observed in previous annual inspections. The seepage water is collected by drainage ditches. Inspection of seepage locations along the Siliceous dikes is performed by Teck on a regular basis. Signs of surface seepage emerging from the downstream slopes of the embankments were not evident during KCB's site visit.

A small trickle of flow was observed from the historical drain pipe installed into the No. 3 Siliceous Dike (Photo II.25). It is KCB's understanding that flow is relatively constant through these pipes during the entire year. A decant installed in 2000 within the No. 2 Siliceous Dike was dry and generally only sees flow during freshet. Flow from both decants are monitored and recorded as part of the regular inspections by Teck and KCB as noted in the OMS manual. Any changes in flow rate or sediment in the flow should be reported to KCB.

The surface water runoff conveyance channel from No. 1 Siliceous Cell across No. 3 Siliceous Cell, the diversion channel to the north of No. 1 and No. 3 cells, and the emergency spillway channel constructed on the east slope of No. 3 Siliceous Dike were in good physical condition at the time of the site visit with no sign of movement or particle breakdown (Photo II.26 and II.27). The upper portion of the spillway across the No. 3 Siliceous cell is heavily grassed.

4.1.4 East and West Gypsum TSFs

The visual inspection indicated that the East Gypsum Dike was in good physical condition with no signs of structural distress (Photo II.28). Embankment slopes were well-grassed with no significant areas of bare or loose soil observed. Several large rodent burrows were observed along the dam slopes and toe but are not considered to be a dam safety issue. However, the burrows are safety hazard to personnel walking along the dam toe and slope. Rodent burrows should be infilled as they're identified. No seepage was observed in the ditch at the toe of the embankment.

The visual inspection indicated that the West Gypsum Dike was in good physical condition with no signs of structural distress. Embankment slopes were well-grassed with no significant areas of bare or loose soil observed (Photo II.29). Animal burrows were observed near the embankment toe. These burrows are not a dam safety issue; however, the burrows are safety hazard to personnel walking along the dam toe and slope. Rodent burrows should be infilled as they're identified.

4.1.5 Northeast Gypsum Dike and Recycle Dam

The visual inspection indicated that the Northeast Gypsum Dike and the Recycle Dam were in good physical condition with no signs of structural distress. The slopes of both embankments were well grassed (Photos II.30 and II.31). Animal tracks were observed along the downstream slope of the Northeast Gypsum Dike and don't appear to have changed significantly since being observed during last year's inspection.

4.1.6 Sludge Impoundment

Both the North and South Dikes of the Sludge Impoundment were observed to be in good physical condition during the inspection. The sludge level in the impoundment adjacent to the North Dike is

nearing the design levels of approximately one metre below the crest elevation; deposited sludge is approximately 2.0 m below the crest elevation at the South Dike.

Vegetation is becoming established on both dams (Photo II.32 through II.34) and should be removed as part of the vegetation management program documented in the OMS manual. Vegetation management should include clearing of any slash piles created from past clearing activities at the sludge impoundment.

4.1.7 Calcine TSF

The visual inspection indicated that the Calcine Dike was in good physical condition with no signs of structural distress (Photo II.35). The downstream slope of the embankment is sporadically vegetated and is buttressed by a municipal landfill.

The old beach surface is at crest level upstream of the dike and gently slopes downward towards the north (upstream). There was no free water observed during the inspection and vegetation has become established over the entire impoundment. Calcine removal from a pit developed at the northwest side of the lower cell ceased in 2011/2012 and this area was reclaimed. The pit is well drained and no standing water was observed.

4.1.8 Old Iron TSF

The visual inspection indicated that the Old Iron Dike and Iron TSF Divider Dike were in good physical condition with no signs of structural distress. The downstream slope of the Old Iron Dike was grassed with no significant areas of bare or loose soil (Photo II.37 and II.8). There were no signs of seepage. The Iron TSF Divider Dike is buttresses by the Iron TSF and is currently being used as an access road between the two TSFs (Photo II.39). No physical changes were observed from the previous annual inspection. The Iron TSF Divider Dike is buttresses on both sides with tailings.

4.2 Instrumentation Data Review

Based on the review of the instrumentation data and observations from the site inspection of May 25 and 26, 2022, there were no dam safety concerns identified. The current monitoring schedule for all instruments will be generally unchanged for the 2023 monitoring period. The monitoring frequencies are summarized in Table 4.1 and are detailed for each item in Appendix III. Additional readings may be requested as required depending on trends observed during the 2023 reporting period. Based on the TSFs performance to date, the piezometers and reading frequency are considered sufficient for ongoing monitoring of the facility under current conditions (KCB 2022a).

Table 4.1 Monitoring Frequencies for 2022 Reporting Period

Embankment		Monitoring Frequency (3x = three times per year, 3y = every 3 years, A = annually, AV = annual visual, M = monthly, W = weekly) Consult notes for conditional changes and special regimes.				
		Piezometers	Settlement	Inclinometers	Seepage[8]	Water Levels
Iron TSF	Iron Dike	3x[1]	A + 3y[5]	-	W[7]	Daily
Old Iron TSF	Old Iron Dike	3x[2]	-	-	-	-
	Iron TSF Divider Dike	A[3]	-	-	-	-
Siliceous TSF	No. 1, 2, and 3 Dikes	A	-	-	-	-
Gypsum TSF	West Gypsum Dike	3x[2]	A + 3y[6]	-	AV	-
	East Gypsum Dike	A	A + 3y[6]	3y	AV	-
	Northeast Gypsum Dike and Recycle Dam	-	3y	-	-	-
ARD Pond	North Dam	M[4]	3y	-	-	Daily
	South Dam	M[4]	3y	-	W[7]	Daily
Sludge Impoundment	North Dike	-	A	-	-	-
	South Dike	-	A	-	-	-

Notes:

[1] Three times per year (spring, summer, and fall) except P92-H which is recorded weekly by a datalogger and P92-02 and P92-25 which are read monthly.

[2] Three times per year (spring, summer, and fall).

[3] Annually in the spring if possible, to capture peak level.

[4] Read pneumatic piezometers weekly when pond is above 1045 m. Read standpipe piezometers weekly when ARD pond is about 1040 m and daily when ARD pond is about 1045 m.

[5] Survey of Iron Dike from Station 0+00 to 12+00 to be completed annually.

[6] Settlement plates to be surveyed annually, Sondex gauge to be read every three years.

[7] Weirs measured daily between March 1 and May 30. Read daily for three days following rainfall event > 10 mm in 24 hours.

[8] Record pond levels when weirs read. When reading weirs, provide visual observations of ditch flows, e.g. ice build-up, flows around or under weir, etc.

Quantifiable Performance Objectives (QPOs) have been established in terms of notifications levels for the instrumentation installed within the embankments and notification levels relative to pond water elevations and corresponding freeboard for the ARD Pond and the Iron Pond In addition, a checklist of qualitative indicators (e.g., observation of cracking, slumping, erosion, etc.) for routine visual inspections, event-driven visual inspections, and annual visual inspections have been developed. Additional details, including summary tales of instrumentation data and corresponding notification levels, are provided in Appendix III.

It is important to emphasize that the current notification levels for the available instruments, including piezometers, seepage weirs, settlement systems, and inclinometer casings, are not associated with any dam safety concerns. Rather, they are based on historical trends of reading in a particular instrument with the objective of highlighting readings that could be indicative of a potential change from historical norms in order to prompt a closer review as a matter of due

diligence. The specified notification levels are well below the assumed levels for stability assessments.

Teck contracts instrument reading and monitoring data collecting to Vast Resource Solutions (Vast), who provide the raw data for upload to GeoExplorer. Monitoring is also completed by Teck personnel.

4.2.1 Iron TSF

The locations of the existing instruments at the Iron Dike are shown on Figure 5. Typical sections showing geometry and pore pressure response are shown on Figures 6 and 7.

Piezometric Levels

Time plots of the piezometric readings received from Vast are presented on Figures IV-1 through IV-10 in Appendix IV. Peak values recorded over this period are reported in Table III-3.

The Iron Dike piezometer readings remained below notification levels and are well below the assumed levels for stability assessments.

Settlements

The most recent survey of settlement plates and embankment crest was carried out by Teck in October 2021. Teck is transitioning to InSAR for tracking of movements for the Legacy Facilities and recently ran a historical assessment using available data from 2018 through 2022. Data for Sullivan shows minimal settlement over the past 3 years for the Iron TSF.

Seepage Flows

Two weirs (Weir #3 and Weir #4) exist to monitor seepage from the toe of the west portion of the Iron Dike. Weir #3 is located near the toe of the embankment and Weir #4 is located 300 m downstream.

Weir #3 measured peak flows of 25.9 m3/day in November 2021. The flow data indicates minimum flows through the weir of 0.0 m3/day to 0.93 m3/day. Historical data for Weir #3 is presented in Figure IV- 11.

Weir #4 flow data shows a peak flow of 333.6 m3/day in March 2022. Minimum flows varied from 1.7 m3/day to 26.2 m3/day. Historic data for Weir #4 is presented in Figure IV-11. It should be noted that this weir is approximately 300 m downstream from the embankment toe and flow measurements will include surface runoff from surrounding terrain as well as seepage flows.

The weirs are read at a minimum monthly, with daily or weekly readings performed during periods of higher flows and/or when the ARD Pond elevations is above 1145 m. Additional readings occur following heavy rainfall events.

4.2.2 Old Iron TSF

The locations of existing instruments at the Old Iron TSF (Old Iron Dike and Iron TSF Divider Dike) are shown on Figure 8. A typical section showing geometry is shown on Figure 9.

Piezometric Levels

Time plots of the piezometric readings received from Vast are presented on Figures V-1 through V-4 in Appendix IV. Peak values recorded over this period are reported in Table III-4.

All of the existing piezometers at the Old Iron TSF (9 of 9) were below the notification level for the monitoring period.

4.2.3 Siliceous TSF

The location of existing instruments on the Siliceous TSF are shown on Figure 10. Typical sections are shown on Figures 11 and 12.

Piezometric Levels

Plots of the piezometer readings for Siliceous TSF are shown on Figures VI-1 through VI-6. Peak values recorded over this period are reported in Table III-5.

No. 1 Siliceous Dike

The piezometers at No. 1 Siliceous Dike (4 of 4) recorded slight increases or stable peak pore water pressures compared to the previous monitoring period and were below the notification level for the monitoring period. P105, a standpipe piezometer installed in the embankment adjacent to No. 3 Cell, has been reading near or above its notification level for several years including after an attempted flush in 2014. It is suspected that the piezometer may be plugged internally.

No. 2 Siliceous Dike

All of the existing piezometers at No. 2 Siliceous Dike (3 of 3) recorded reduced peak pore water pressures compared to the previous monitoring period and were below the notification level for the monitoring period.

An existing pneumatic piezometer downstream of No. 2 Siliceous Dike and along Betcher's Slough is now monitored by Teck. This monitoring is not reported to KCB but if a significant change in flow rate or cloudy flow is observed KCB should be notified to determine if any action needs to be taken.

No. 3 Siliceous Dike

All but one of the existing piezometers at No. 3 Siliceous Dike (12 of 13) recorded stable or reduced peak pore water pressures compared to the previous monitoring period and were below the notification level for the monitoring period. The remaining piezometer showed a slight increase in peak pore water pressure compared to the previous monitoring period, and remains below the notification level.

Seepage Flows

There are currently no flow measuring capabilities in the area of the Siliceous TSFs. During the site inspection, we inspected both the shallow decant and historical decant.

4.2.4 East and West Gypsum TSFs

The location of existing instruments on the Gypsum TSFs are shown on Figures 13, 16, and 18. Typical sections are shown on Figures 14, 15, 17, and 19

Piezometric Levels

Plots of the piezometer readings for Gypsum TSFs are shown on Figures VII-2 and VII-3 for West Gypsum Dike and Figures VIII-1 through VII-3 for East Gypsum Dike. Peak values recorded over this period are reported in Table III-6.

West Gypsum Dike

All of the existing piezometers at West Gypsum Dike (7 of 7) recorded reduced peak pore water pressures compared to the previous monitoring period and all were below the notification level during the monitoring period.

East Gypsum Dike

All of the existing piezometers at East Gypsum Dike (8 of 8) recorded stable or reduced peak pore water pressures compared to the previous monitoring period and were below the notification level during the monitoring period.

Northeast Gypsum Dike and Recycle Dam

Standpipe piezometers in the Northeast Gypsum Dike and Recycle dam have not been monitored since 2004. Piezometric levels consistently matched pond elevations and were not providing information to assess embankment performance. The Dike/Dam have a long history of good performance, relatively low heights, and any impacts in the unlikely event of a failure would be wholly contained within the impoundment area; ongoing monitoring of the piezometric levels was considered unnecessary.

Settlement

West Gypsum Dike

The most recent survey of settlement plates and embankment crest was carried out by Teck in October 2021. Teck is transitioning to InSAR for tracking of movements for the Legacy Facilities and recently ran a historical assessment using available data from 2018 through 2022. InSAR data for the facility shows in the range of 3 mm per year of settlement within the Gypsum TSF.

Consolidation of the West Gypsum Cell tailings is monitored with a Sondex settlement gauge, S97-01, installed about 50 m upstream of the crest at Station 10+00 (Figure VII-1). A reading of the Sondex

gauge was taken during the 2019 DSI. The Sondex gauge has recorded total consolidation settlement of about 1.7 m since 1994. This is within the expected settlement for the facility. As indicated in KCB's report Stability Review of Gypsum Dikes dated November 26, 1993, long term creep is a common characteristic of gypsum. Continued consolidation of the gypsum tailings is not considered a dam safety concern. Regular crest surveys are conducted to confirm that the dam crest remains at or above the design elevation. The Sondex gauge is no longer readable as the manufacturer has discontinued support of this equipment. Long term settlement will now be tracked using InSAR data.

East Gypsum Dike

The most recent survey of settlement plates and embankment crest was carried out by Teck in October 2021. Teck is transitioning to InSAR for tracking of movements for the Legacy Facilities and recently ran a historical assessment using available data from 2018 through 2022. InSAR data for the facility shows in the range of 3 mm per year of settlement within the Gypsum TSF.

Consolidation of the East Gypsum Cell tailings is monitored with a Sondex settlement gauge, S94-02, installed about 25 m upstream of the crest at Station 33+00 (Figure VIII-1). A reading of the Sondex gauge was taken during the 2019 DSI. The Sondex gauge has recorded total consolidation settlement of about 1.0 m since 1994. This is within expected settlement for the facility. As indicated in KCB's report Stability Review of Gypsum Dikes dated November 26, 1993, long term creep is a common characteristic in gypsum. Continued consolidation of the gypsum tailings is to be expected and is not considered a dam safety concern. Regular crest surveys are conducted to confirm that the dam crest remains at or above the design elevation. The Sondex gauge is no longer readable as the manufacturer has discontinued support of this equipment. Long term settlement will now be tracked using InSAR data.

Northeast Gypsum Dike and Recycle Dam

The most recent survey of settlement plates and embankment crest was carried out by Teck in October 2021. Teck is transitioning to InSAR for tracking of movements for the Legacy Facilities and recently ran a historical assessment using available data from 2018 through 2022.. InSAR data shows minimal settlement in the past 3 years.

Past surveys, presented in Appendix IX, indicated negligible settlements since 2007.

4.2.5 ARD Pond

The location of existing instruments on the ARD Pond Dams are shown on Figure 20. Typical sections are shown on Figures 21 through 24.

Piezometric Levels

Historic data for the piezometers installed in ARD North and South Dams is shown on Figures X-1 through X-4.

North Dam

All of the existing piezometers at ARD North Dam (8 of 8) recorded slight increases or stable peak pore water pressures compared to the previous monitoring period. All were below the notification level during the monitoring period.

South Dam

All of the existing piezometers at ARD South Dam (5 of 5) recorded stable or slightly increased pore water pressures compared to the previous monitoring period. PP01-05 and PP01-06 were briefly above the notification level for the instruments for the 2022 max reading. The current notification level is based on historic readings only and this is not a dam safety concern. The instrument should continue to be monitored as per the schedule in Appendix III, Table III-7. The new instruments installed in 2020 are being monitored by an automated collection system. There are no previous records to compare maximum pore water pressures to previous monitoring periods.

Settlement

South Dam

The most recent survey of settlement plates and embankment crest was carried out by Teck in October 2021. Teck is transitioning to InSAR for tracking of movements for the Legacy Facilities and recently ran a historical assessment using available data from 2018 through 2022.. InSAR data shows minimal movement over the past 3 years.

Past data, included in Figure X-7, shows no notable settlement since 2001 and less than 25 mm of lateral movement since the end of construction.

North Dam

The most recent survey of settlement plates and embankment crest was carried out by Teck in October 2021. Teck is transitioning to InSAR for tracking of movements for the Legacy Facilities and recently ran a historical assessment using available data from 2018 through 2022.

Past data, included in Figure X-8, shows less than 20 mm of settlement since 2001 and less than 25 mm of lateral movement since the end of construction.

Seepage Flows

Two weirs (Weir #1 and Weir #2) exist to monitor seepage from the toe of the ARD South Dam. Weir #1 is located near the toe of the Dam and Weir #2 is located approximately 50 m downstream.

Weir #1 measured peak flows of 54.9 m3/day in March 2022. The flow data indicates minimum flows through the weir of 0.1 m3/day to 13.1 m3/day. Historical data for Weir #1 is presented in Figure X-5.

Weir #2 flow data shows a peak flow of 79.5 m3/day in March 2022. Minimum flows varied from 0 m3/day to 12.7 m3/day. Historic data for Weir #2 is presented in Figure X-6. It should be noted that

this weir is approximately 50 m downstream from the embankment toe and flow measurements will include surface runoff from surrounding terrain as well as seepage flows.

4.2.6 Calcine TSF

A plan view of the Calcine Dike is shown on Figure 25. Typical sections showing geometry and pore pressure response are shown on Figure 26.

Water Levels

Three standpipe piezometers are located on the embankment crest, as shown on Figure 25. The piezometers were last read in 2004 and have been dry since 1986. Piezometer monitoring at the Calcine Dike ceased in 2007. Given that the pit (where calcine was previously excavated) at the northwest side of the lower cell has always been dry and the Calcine Dike is buttressed on its downstream slope by the existing municipal landfill, continued reading of these piezometers was considered unnecessary.

4.2.7 Sludge Impoundment

A plan view of the Sludge Impoundment is shown on Figure 27. Typical sections showing geometry are shown on Figures 28.

Piezometric Levels

There are no piezometers installed to monitor water levels in the Sludge Impoundment Dikes. Water deposited during sludge deposition or due to precipitation drains through the embankment (which contains a filter zone) or into the foundation. New instruments were installed in September 2021 and have been recording data since October 2021. There are no previous records to compare maximum pore water pressures to previous monitoring periods.

Settlement

In the previous annual inspection, 2019 LiDAR survey data was used to evaluate the embankment crest elevation compared to design elevation. Embankment crest elevation on the north and south dam was found to be above design elevation apart from the south side of the south dam briefly dipping below design. This was consistent with 2012 LiDAR data which indicates that there has been little to no settlement in the last 7 years. Teck is transitioning to InSAR for tracking of movements for the Legacy Facilities and recently ran a historical assessment using available data from 2018 through 2022 which confirms the limited settlement.

5 TAILINGS FACILITY ASSESSMENT

5.1 Failure Modes Review

KCB understands that Teck's long-term goal for all of their tailings facilities is, where physically possible, to reach landform status, with all potential failure modes that could result in catastrophic release of tailings and/or water being either not present or having been reduced to non-credible. Teck's long-term goal for the Sullivan facilities is for all potential failure modes to be non-credible, based on extreme loading conditions, or to manage the risk to ALARP (i.e., as low as reasonably practicable) using appropriate loading conditions when it is not practicable to address extreme loading conditions.

The Sullivan risk register was reviewed by KCB and Teck in May 2022. There were no changes to the key hazards and the existing controls were adequate to managed potential failure modes.

To supplement the risk review, Teck, with support from KCB, conducted a credible catastrophic failure mode assessment in April 2022. Teck's definition of a "catastrophic" failure is one with a risk to life safety or irreversible impact to a rare or valued ecosystem, social or cultural heritage element. The assessment concluded that, based on the available information and current understanding of the site, there are no credible "catastrophic" failure scenarios for the Sullivan tailings facilities.

The following is a summary of the controls in place at Sullivan Mine to manage the risks associated with the key failure modes for the facilities. The slope instability failure mode is considered credible (though non-catastrophic), while the internal erosion and overtopping failure modes are not credible for the current and historic loading conditions. Based on the observations above and the available information, Teck is managing the potential failure mechanisms for the TSFs appropriately.

5.1.1 Overtopping

Tailings Storage Facilities

The tailings facilities are no longer active. The Iron TSF does maintain a pond that is actively managed. The Iron Pond operates along with the ARD Pond as part of the site wide water management activities.

As previously discussed in Section 3.5, surface water collection/diversion channels and spillways have been constructed in the tailings areas for flood management, which are designed to safely pass the Probable Maximum Flood (PMF) events. The likelihood of overtopping failures leading to catastrophic consequences up to and including Extreme consequence loading conditions are considered negligible, and therefore non-credible.

ARD Pond

The ARD Pond has been designed to store the 48-hour PMF and also includes a spillway designed to safely route a 24 hr PMF (after the 48-hour PMF has been stored) (see Section 3.5). Therefore, the likelihood of overtopping is considered negligible and a non-credible failure mode.

Sludge Impoundment

According to Dames and Moore (1978), the 1:200-year return period flood event was adopted for design of the Sludge Impoundment. However, as the actual sludge production rate has been much lower than assumed in the original design by others, the impoundment currently has flood storage capacity in excess of design. While overtopping of the sludge impoundment is credible, the consequences of overtopping will not result in a catastrophic consequences. The sludge is fully drained and no pond is maintained during normal operations. There is no population downstream of the sludge pond within a potential inundation area.

5.1.2 Internal Erosion and Piping

Tailings Storage Facilities

The tailings storage facilities are no longer active, and since completion of the reclamation cover, the phreatic levels within the tailings have steadily decreased. As a result, the exit seepage gradients are correspondingly low, and therefore, the likelihood of an internal erosion/piping related failure through the embankments and/or through their foundations leading to a catastrophic failure is considered to be negligible and therefore non-credible.

There are internal drains constructed in the Iron, Siliceous, and Gypsum TSFs, with pipes that extend through the embankments, which represent a potential vulnerability to internal erosion/piping as they deteriorate over time. Only the drain from the Silicious impoundment is still open and draining, all other drains have been covered with inverted filters. Because of the very low hydraulic gradients and small volume of free water available, the likelihood of this failure mode via the deteriorated conduits leading to catastrophic consequences remains negligible. A review of this vulnerability is being completed to assess this risk if local ponding occurs above these pipes due to an extreme flood events that could potentially increase the local phreatic surface and, therefore, temporarily increase the local seepage gradients. It is expected that, even under such an extreme condition, the limited amount of free water source in direct contact with the conduits will greatly limit the extent to which piped materials can be transported and the potential for a catastrophic failure mode is considered non-credible. In any event, the results of this review will inform the decision as to whether additional measures might be necessary to reduce the risk related to these structures.

ARD Pond

The likelihood of internal erosion/piping failure modes resulting in catastrophic consequences is considered to be negligible for the ARD Pond Dams. These dams have filter zones in the dam cross-section. While there are indications of a potential seepage pathway on the left abutment of the South Dam which respond to the reservoir water fluctuations, investigations and assessments have noted that the soils are internally stable and the piezometric response through the abutment is insufficient to trigger and sustain internal erosion in the abutment.

Sludge Impoundment

For the Sludge Impoundment, the likelihood of an internal erosion/ piping failure leading to catastrophic consequences is negligible, and therefore noncredible, due to the inclusion of filters in the embankment and the lack of a permanent pond.

5.1.3 Slope Instability

- The dikes have been observed over many years since closure and no visual signs of instability have been documented.
- The good performance of the embankments indicates the engineering controls are adequate to prevent slope instability of the facilities under the current loading conditions.
  - A Design Basis document (KCB, 2002) was prepared for the TSFs and summarized previous stability assessments completed. The assessments recognized that loose contractive saturated tailings, such as those present in the tailings storage facilities at the Sullivan Mine, are susceptible to static and seismic liquefaction. Although a seismic hazard study was completed to estimate of the ground motions for the Maximum Credible Earthquake, the decision was made to conservatively assume that all saturated tailings would liquefy, irrespective of the earthquake ground motion, as the basis at that time for design of stabilization measures. Therefore, all saturated tailings (i.e. all tailings below the phreatic surface prevailing at the time of the analyses) were assigned the liquefied residual undrained strength for stability calculations.
  - The closure configuration design was based on these assumptions and meets current regulatory requirements for both static and seismic stability.
  - A due diligence review and update of the seismic stability of all structures is underway to better reflect existing conditions based on the current phreatic surface levels and the revised seismic hazard assessment and recent data collected on the density of the foundation soils at both the Silicious and Gypsum TSFs. However, the lack of permanent pond and low phreatic surface mean that even if there is settlement or deformations due to seismic loading the material runout will be limited and the potential for catastrophic downstream consequences is considered negligible. The lack of pond and dry tailings both represent much more favorable conditions when compared to the assumptions made during original design of the stabilization measures.
  - The results of the seismic stability updates are important as supporting documentation towards Teck's long-term goal of eventually removing credible failure modes (non-catastrophic) associated with seismic loading.
  - The ARD pond was designed to meet static and pseudo-static factors of safety.
- Visual observations indicate there are no significant erosion features on the crest or slopes of the dikes. The minor erosion rills observed on some dikes is very common for this type of facility and are not expected to rapidly develop into erosion gullies that could threaten the stability of the embankment.

- The operational controls to prevent slope instability of the facilities include active management of pond levels where ponds are present, monitoring of the phreatic surface in the facility as well as routine inspections of the condition of the embankments. Particular attention (daily monitoring) is paid to pond levels and piezometer data during freshet when the ARD pond level is highest prior to start of the DWTP.
- The design and operational controls in place manage slope instability for the current loading conditions and for earthquakes up to the 1/10,000-yr event for all TSFs. Based on Teck's tailings governance and the risk assessment framework, the potential impacts of such an event would not be catastrophic to health and safety or the environment, nor from a community relations, reputation, legal, or financial perspective.

5.2 OMS Manual

The most recent version of the Operation, Maintenance, and Surveillance (OMS) Manual for the Sullivan Mine tailings facilities was updated in 2022 (SUL-OMS-001, March 29, 2022) by Teck. Review of the OMS manual was in progress at the time of this report. Teck will continue to review the manual annually and make revisions as necessary, with input from the EoR.

5.3 Mine Emergency Response Plan

The current version of the MERP was updated in January 2019 when it was converted from the previous Emergency Preparedness and Response Plan (EPRP), and updated in April 2022. The plan meets the regulatory requirements and guidance documents from CDA and the Mining Association of Canada. The plan includes identification of communities of interest, failure modes, and responses to various emergencies.

As required by HSRC (EMCLI, 2022), the MERP is tested annually using desk-top scenarios. A table-top exercise to review and update the Emergency Preparedness Response Plan was hosted by Teck and attended by the current Sullivan EoR on April 30, 2022.

The emergency reporting contact list is also reviewed and updated as required.

6 SUMMARY

The Sullivan Mine TSFs, ARD Pond and the Sludge Impoundment appear to be in good physical condition and the observed performance during the 2022 site inspections is consistent with the expected design conditions and historical performance.

There were no deficiencies, non-conformances or issues of concern identified in this year's review, and therefore, there are no new recommendations.

A summary of previous annual performance review recommendations that were outstanding, and their updated status, are summarized in Table 6.1. All of the recommendations pertain to the framework of continual improvements in the dam safety management program, such as documentation and maintenance/surveillance protocols. The recommendation for the Sludge Impoundment is part of the design review and update that is already being planned by Teck and KCB.

As per previous annual reviews, deficiencies and non-conformances are grouped according to the following four categories:

- Deficiency (D): An unacceptable dam performance condition based on analysis results and/or site observations/instrument data with respect to criteria outlined in the 2017 HSRC and 2016 Guidance Document, best practices, and/or applicable regulatory requirements.
- Potential (PD): A dam performance condition that requires further evaluation to determine if the condition is a deficiency.
- Non-Conformance (NC): Defined as a deviation from established policies, procedures, operating instructions, maintenance requirements, or surveillance plans. A non-conformance is not an indication of unacceptable dam performance.
- Items Requiring Updates to Meet Updated Regulatory Standards (RS): Condition where regulatory requirements have changed and have become more stringent following initial design and/or construction.

Table 6.1 Summary of Outstanding Recommendations from Past DSIs and New Recommendations from Current Annual Inspection

Structure	ID No.	Deficiency of Non-Conformance	Applicable Regulation or OMS Reference	Recommended Action	Deficiency Type	Priority	Recommended Deadline/Status
Previous Recommendations Closed/Superseded							
Previous Recommendations Ongoing							
Sludge Impoundment	2017-3	A review of the Sludge Impoundment is needed.	EMLCI HSRC (2022) & CDA Guidelines: Application to Mining Dams (2019)	Review of the current design freeboard and design sludge levels is required. To facilitate the design update, the Sludge Impoundment surface should be surveyed to obtain average sludge deposition rates. Review of entire facility should be completed to address storage, life expectancy of the facility, and regulatory requirements.	RS	3	Q4 2024 UPDATE – Site investigation completed. The site investigation data will be combined with other groundwater information and form the basis for a workshop between Teck and KCB on the future of the facility. After the workshop is completed, a scope of work will be developed based on the workshop outcomes.

7 CLOSING

We appreciate the opportunity to continue to provide our services to Teck Metals.

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

22 Mar. 2023

Pamela Fines, P.Eng.
Associate, Manager, Edmonton

Senior Reviewed by: Bill Chin, P.Eng.

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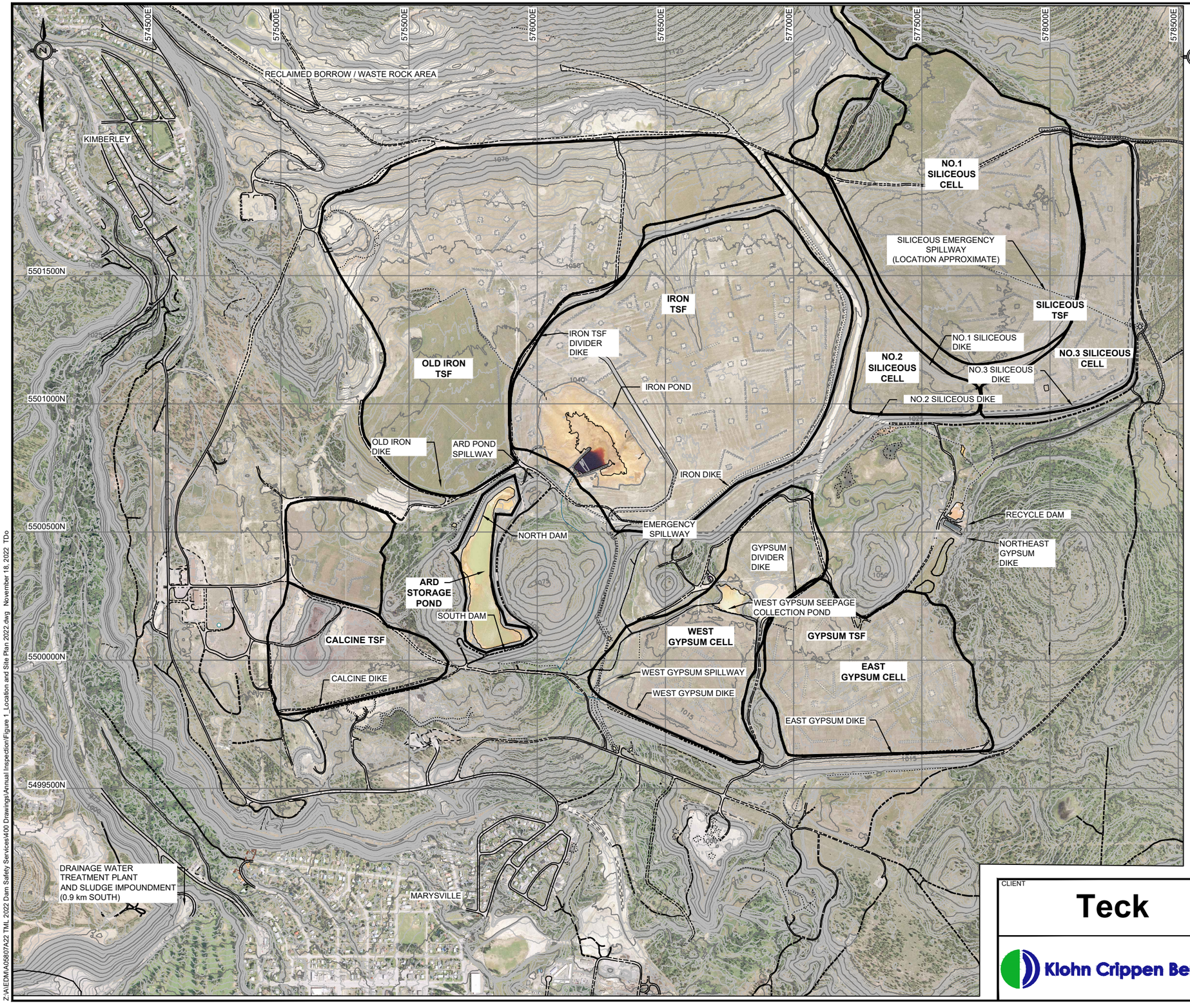
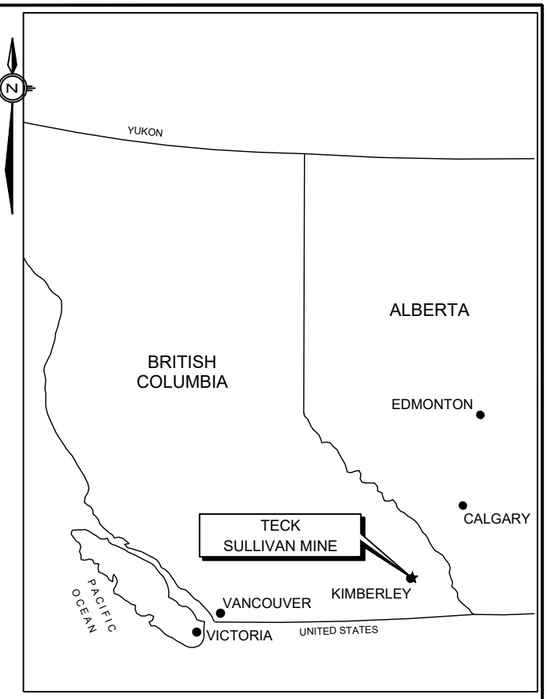
FIGURES





PROJECT LOCATION PLAN
N.T.S

NOTES:

1. SURFACE TOPOGRAPHY FROM LIDAR PROVIDED BY TECK METALS LTD. DATED DECEMBER 2012.
2. ELEVATIONS ARE GEODETIC.
3. MAP COORDINATE SYSTEM = U.T.M. (NAD 83). CONTOUR INTERVAL IS ONE METRE.
4. AERIAL PHOTO PROVIDED BY TECK METALS LTD. DATE: 2008.

SCALE 1:15 000 0 150 300 m

CLIENT: Teck

Klohn Crippen Berger

PROJECT: SULLIVAN MINE
2022 ANNUAL INSPECTION REPORT

TITLE: LOCATION AND SITE PLAN

SCALE	PROJECT No.	FIG. No.
AS-SHOWN	A05807A22	1

KCB-FIG8-L

Z:\AEDM\A05807A22 TML 2022 Dam Safety Services\400 Drawings\Annual Inspection\Figure 1_Location and Site Plan 2022.dwg November 18, 2022 TDo

LEGEND

- DECANT TOWER
- DISCHARGE
- INTAKE
- AIR RELIEF VALVE
- PUMPING FACILITY
- MANHOLE
- BREATHER
- FLOW DIRECTION ARROW
- PIPE LINE
- DWT / MINE LINE
- DITCH
- TOE DRAIN

0 2000' 4000'
SCALE BAR

TO AN "OFF PROPERTY" LOCATION
942 PUMP
TAILINGS POND SEEPAGE COLLECTION SYSTEM
No. 3 SILICEOUS CELL
No. 1 SILICEOUS CELL
BETCHER'S SLOUGH
943/944 PUMP
No. 2 SILICEOUS CELL
943 PUMP PONDS
DOBSON'S DRAW INTAKE
SEEPAGE COLLECTION PIPE
6"
EAST GYPSUM CELL
IRON TSF
EAST DITCH
6"
James Creek
953/954 PUMP
HIGHWAY No. 95A TO CRANBROOK
905/906/907/908 PUMPS
IRON POND
8"
945 /946 PUMPS
WEST GYPSUM SEEPAGE COLLECTION POND
3700 LEVEL MINE LINE
MINE WATER DISCHARGE
DWT LINE
CULVERT
951 PUMP
2@2"
938 PUMP
14"
14"
WEST DITCH
3"
6"
939 PUMP
2" DRAIN LINE
Cow Creek
FORMER CONCENTRATOR
ARD STORAGE POND
HIGHWAY 95A MANHOLE
947/948 PUMPS
949/950/952
940 PUMP
3700 LEVEL MINE LINE
14" MINE LINE
STILES SUB
CALCINE TSF
SANITARY LANDFILL SITE
3900 LEVEL MINE LINE
MARYSVILLE
OLD GYPSUM PONDS
3700 PORTAL
OVERPASS
FORMER FERTILIZER PLANT SITE
3900 LEVEL MINE LINE
DRAINAGE WATER TREATMENT PLANT PIPE LINE (18" - 22")
Mark Creek
St. Mary River
DRAINAGE WATER TREATMENT (D.W.T.) PLANT
ST. MARY GRAVEL PIT
ST. MARY RIVER PUMP HOUSE
D.W.T. PLANT SLUDGE IMPOUNDMENT
TO FOREST CROWN
LOWER MINE YARD SEEPAGE COLLECTION SYSTEM

SCALE 1:12 500 0 125 250 m

NOTES:

1. FROM TM Tech SERVICES DRAWING K100E3007 DATED FEB. 3, 2009, REV. 1.

CLIENT: Teck	PROJECT: SULLIVAN MINE 2022 ANNUAL INSPECTION REPORT		
Klohn Crippen Berger	TITLE: TAILINGS SEEPAGE COLLECTION AND DWT PLANT LOCATION		
	SCALE: AS-SHOWN	PROJECT No.: A05807A22	FIG. No.: 2

KCB-FIG-B-L

Z:\AEDM\A05807A22 TML 2022 Dam Safety Services\400 Drawings\Annual Inspection\Figure 2 Seepage Collection Plan 2022.dwg November 17, 2022 TDo

NOTES:

1. SURFACE TOPOGRAPHY FROM LIDAR PROVIDED BY TECK METALS LTD. DATED DECEMBER 2012.
2. ELEVATIONS ARE GEODETIC.
3. MAP COORDINATE SYSTEM = U.T.M. (NAD 83). CONTOUR INTERVAL IS ONE METRE.
4. LOCATIONS OF DESIGN SECTIONS ARE APPROXIMATE

PLAN

SCALE = 1:12 500

SCALE 1:12 500 0 125 250 m

CLIENT: Teck

Klohn Crippen Berger

PROJECT: SULLIVAN MINE
2022 ANNUAL INSPECTION REPORT

TITLE: GENERAL ARRANGEMENT OF DESIGN SECTIONS

SCALE	PROJECT No.	FIG. No.
AS-SHOWN	A05807A22	3

KCB-FIG-B-L

Z:\A\EDM\A05807A22 TML 2022 Dam Safety Services\400 Drawings\Annual Inspection\Figure 3_Design Sections Arrangment 2022.dwg November 17, 2022 TDo

574500E 575000E 575500E 576000E 576500E 577000E 577500E 578000E 578500E 579000E

5502000N 5501500N 5501000N 5500500N 5500000N 5499500N

LANDFILL (CPR BALLAST DUMP)

OLD IRON TSF

IRON TSF DIVIDER DIKE

IRON TSF

IRON POND

OLD IRON DIKE

ARD POND SPILLWAY

NORTH DAM

IRON DIKE

EMERGENCY SPILLWAY

SOUTH DAM

ARD STORAGE POND

WEIR #4 (APPROX. LOCATION °

GYPSUM DIVIDER DIKE

WEST GYPSUM SEEPAGE COLLECTION POND

WEST GYPSUM CELL

GYPSUM TSF

WEST GYPSUM EMERGENCY SPILLWAY

WEST GYPSUM DIKE

EAST GYPSUM CELL

EAST GYPSUM DIKE

CALCINE TSF

CALCINE DIKE

SILICEOUS EMERGENCY SPILLWAY (LOCATION APPROXIMATE)

SILICEOUS TSF

NO.1 SILICEOUS CELL

NO.1 SILICEOUS DIKE

NO.2 SILICEOUS CELL

NO.2 SILICEOUS DIKE

NO.3 SILICEOUS DIKE

NO.3 SILICEOUS CELL

RECYCLE DAM

NORTHEAST GYPSUM DIKE

NOTES:

1. GENERAL TOPOGRAPHY FROM LIDAR DATED DECEMBER 2012.
2. ELEVATIONS ARE GEODETIC.
3. MAP COORDINATE SYSTEM = U.T.M. (NAD 83). CONTOUR INTERVAL IS ONE METRE.

LEGEND

LOCATION AND DIRECTION OF PHOTOGRAPHS TAKEN DURING ANNUAL INSPECTION

PHOTO NUMBER

104 — LOCATION WHERE PHOTO WAS TAKEN

101 — DIRECTION OF VIEW PANORAMA

SCALE 1:12 500 0 125 250 m

CLIENT: Teck

Klohn Crippen Berger

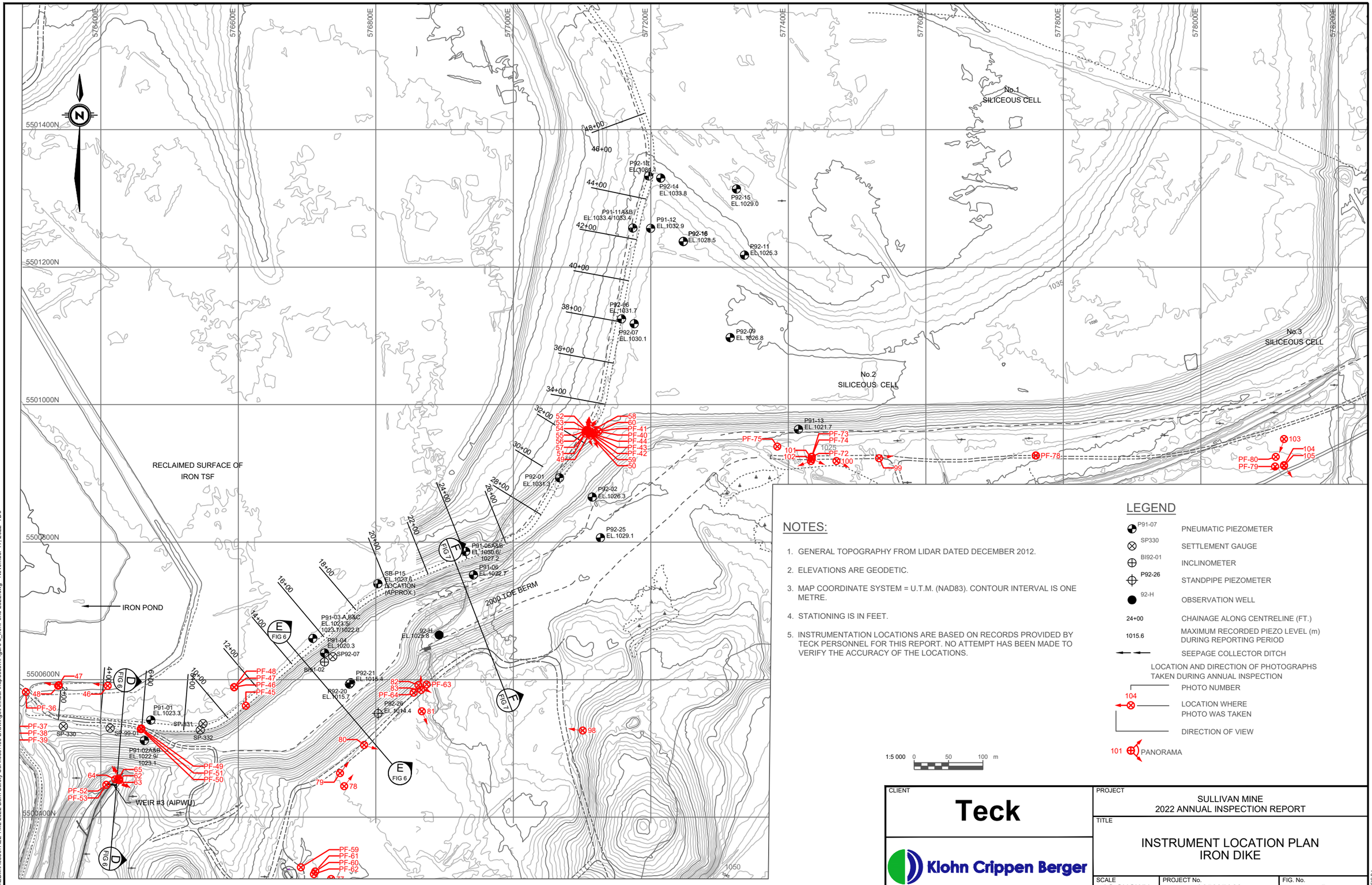
PROJECT: SULLIVAN MINE 2022 ANNUAL INSPECTION REPORT

TITLE: GENERAL ARRANGEMENT OF TAILINGS FACILITIES, PHOTO LOCATIONS

SCALE	PROJECT No.	FIG. No.
AS-SHOWN	A05807A22	4

KCB-FIG-B-L

Z:\AIEDM\A05807A22 TML 2022 Dam Safety Services\400 Drawings\Annual Inspection\Figure 4_Photo Location 2022.dwg November 22, 2022 TDo



NOTES:

1. GENERAL TOPOGRAPHY FROM LIDAR DATED DECEMBER 2012.
2. ELEVATIONS ARE GEODETIC.
3. MAP COORDINATE SYSTEM = U.T.M. (NAD83). CONTOUR INTERVAL IS ONE METRE.
4. STATIONING IS IN FEET.
5. INSTRUMENTATION LOCATIONS ARE BASED ON RECORDS PROVIDED BY TECK PERSONNEL FOR THIS REPORT. NO ATTEMPT HAS BEEN MADE TO VERIFY THE ACCURACY OF THE LOCATIONS.

LEGEND

- P91-07 — PNEUMATIC PIEZOMETER
- SP330 — SETTLEMENT GAUGE
- BI92-01 — INCLINOMETER
- P92-26 — STANDPIPE PIEZOMETER
- 92-H — OBSERVATION WELL
- 24+00 — CHAINAGE ALONG CENTRELINE (FT.)
- 1015.6 — MAXIMUM RECORDED PIEZO LEVEL (m) DURING REPORTING PERIOD
- SEEPAGE COLLECTOR DITCH

LOCATION AND DIRECTION OF PHOTOGRAPHS TAKEN DURING ANNUAL INSPECTION

- PHOTO NUMBER
- 104 — LOCATION WHERE PHOTO WAS TAKEN
- DIRECTION OF VIEW
- 101 PANORAMA

1:5 000 0 50 100 m

CLIENT: Teck

Klohn Crippen Berger

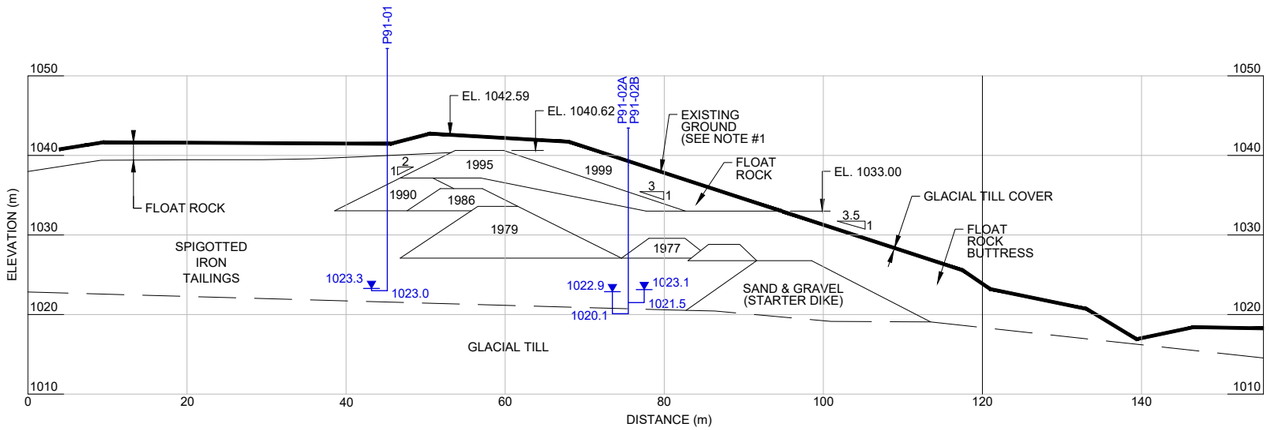
PROJECT: SULLIVAN MINE
2022 ANNUAL INSPECTION REPORT

TITLE: INSTRUMENT LOCATION PLAN
IRON DIKE

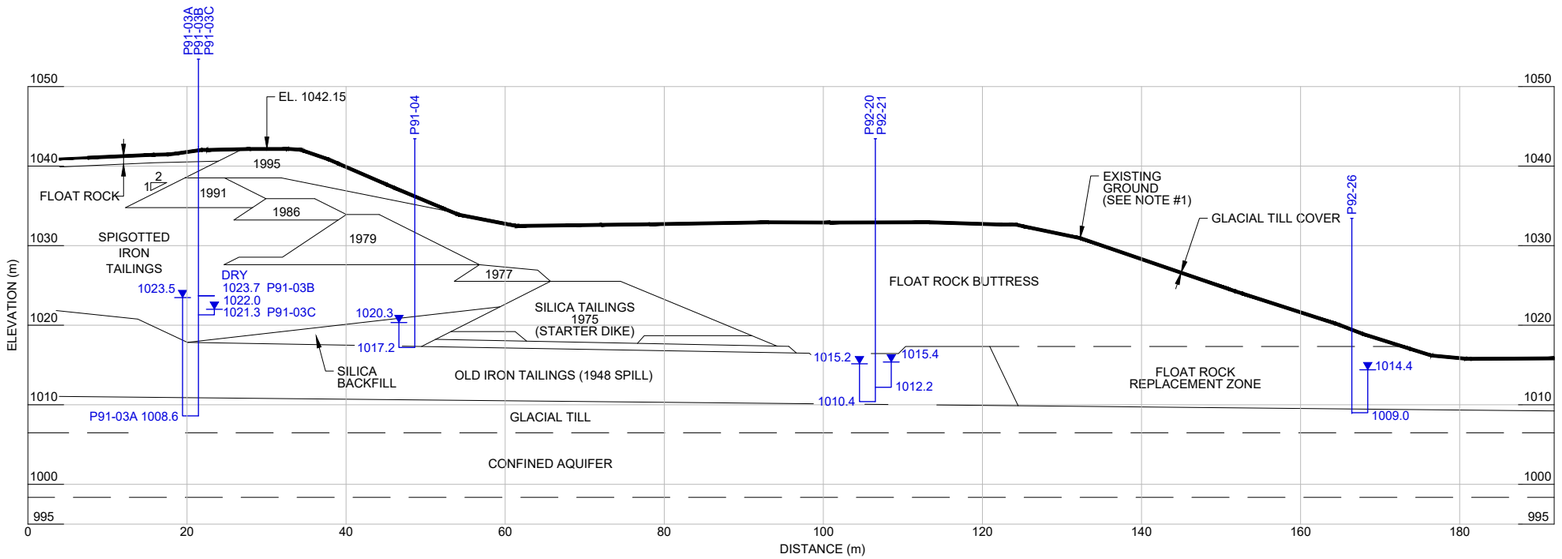
SCALE	PROJECT No.	FIG. No.
AS-SHOWN	A05807A22	5

KCB-FIG-B-L

Z:\A\EDM\A05807A22 TML 2022 Dam Safety Services\400 Drawings\Annual Inspection\Figure 5_IronPond 2022.dwg November 17, 2022 TDo



D SECTION
FIG 5 SCALE = 1:750



E SECTION
FIG 5 SCALE = 1:750

NOTES:

1. SURFACE TOPOGRAPHY FROM LIDAR PROVIDED BY TECK METALS LTD. DATED DECEMBER 2012.
2. SUBSURFACE LITHOLOGY TRACED FROM 1995 ACTIVE IRON DIKE - GEOTECHNICAL DESIGN OF 1995 DIKE RAISE.

LEGEND:

P91-01	PIEZOMETER
1023.8 / 1021.4	MAXIMUM RECORDED PIEZO LEVEL (m) DURING REPORTING PERIOD / PIEZOMETER TIP

1:750 0 7.5 15 m

CLIENT: Teck

Klohn Crippen Berger

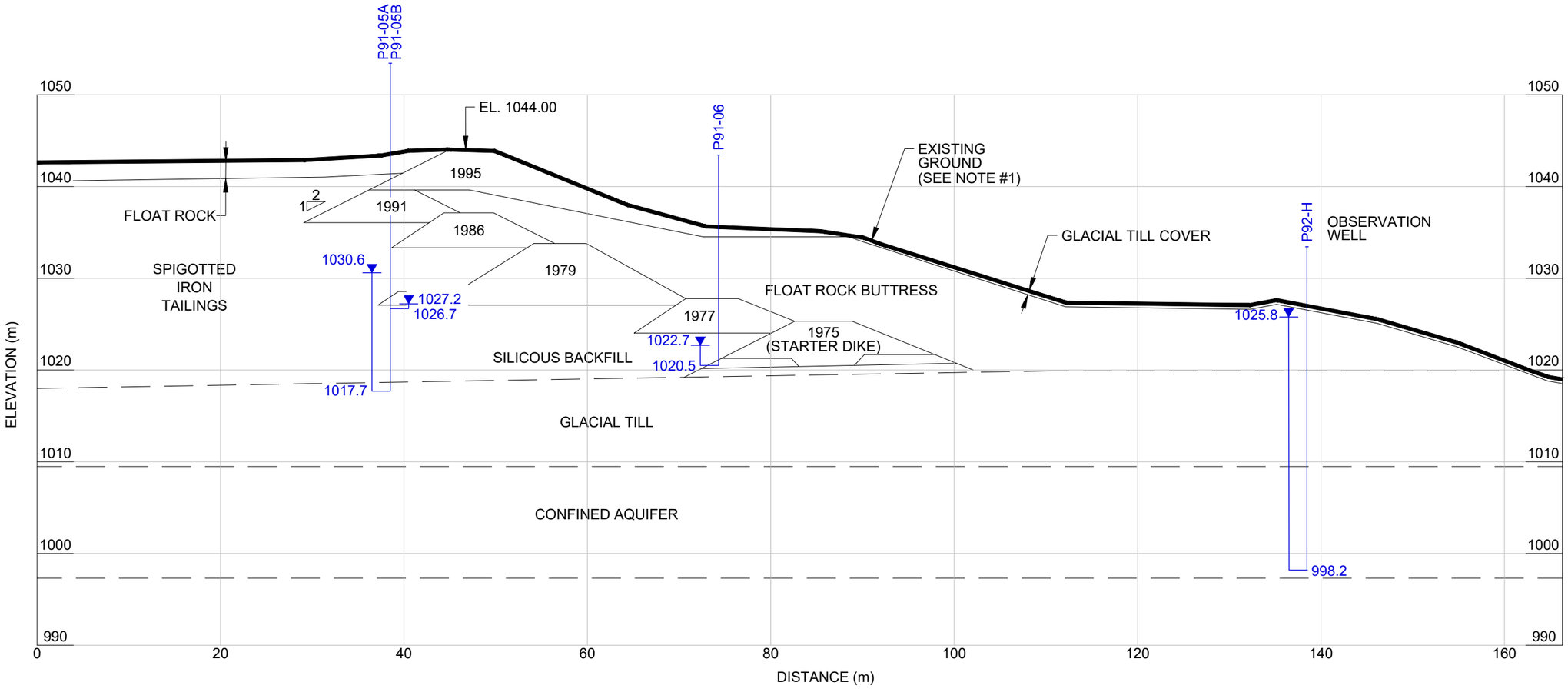
PROJECT: SULLIVAN MINE
2022 ANNUAL INSPECTION REPORT

TITLE: IRON DIKE
SECTIONS D AND E

SCALE	PROJECT No.	FIG. No.
AS-SHOWN	A05807A22	6

KCB-FIG-8-L

Z:\A\EDM\A05807A22 TML 2022 Dam Safety Services\400 Drawings\Annual Inspection\Figure 6.7_Iron Dike Sections 2022.dwg November 17, 2022 TDo



F
FIG 5

SECTION

SCALE = 1:500

NOTES:

1. SURFACE TOPOGRAPHY FROM LIDAR PROVIDED BY TECK METALS LTD. DATED DECEMBER 2012.
2. SUBSURFACE LITHOLOGY TRACED FROM 1995 ACTIVE IRON DIKE - GEOTECHNICAL DESIGN OF 1995 DIKE RAISE.

LEGEND:

- P91-01 — PIEZOMETER
- 1023.8 / 1021.4 — MAXIMUM RECORDED PIEZO LEVEL (m) DURING REPORTING PERIOD / PIEZOMETER TIP

1:750 0 7.5 15 m

CLIENT: Teck

Klohn Crippen Berger

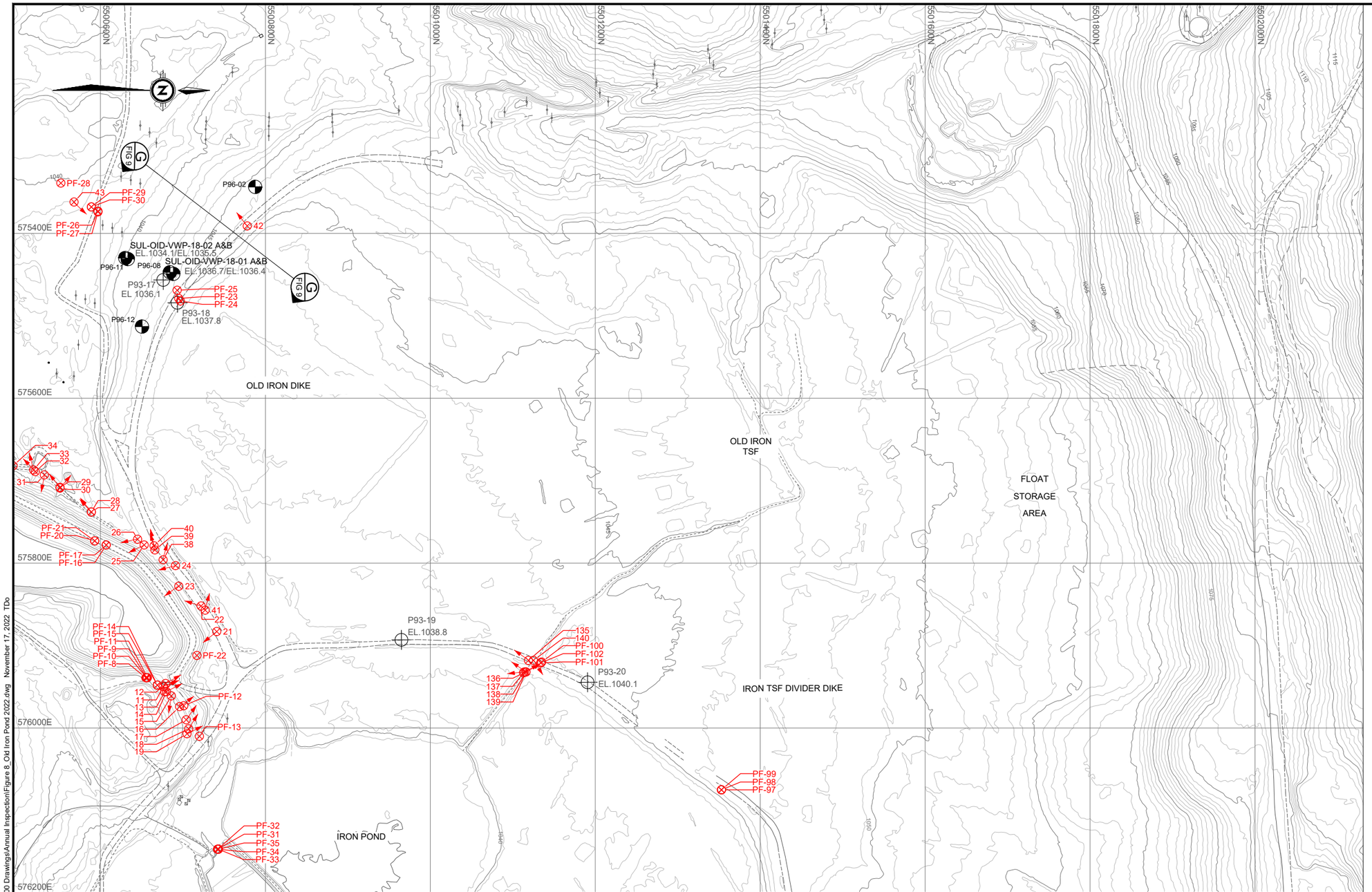
PROJECT: SULLIVAN MINE
2022 ANNUAL INSPECTION REPORT

TITLE: IRON DIKE
SECTION F

SCALE	PROJECT No.	FIG. No.
AS-SHOWN	A05807A22	7

KCB-FIG-B-L

Z:\AIED\MA\05807A22 TML 2022 Dam Safety Services\400 Drawings\Annual Inspection\Figure 6.7_Iron Dike Sections 2022.dwg November 17, 2022 TDo



1:5 000 0 50 100 m

NOTES:

1. GENERAL TOPOGRAPHY FROM LIDAR DATED DECEMBER 2012.
2. ELEVATIONS ARE GEODETIC.
3. MAP COORDINATE SYSTEM = U.T.M. (NAD83).
4. INSTRUMENTATION LOCATIONS ARE BASED ON RECORDS PROVIDED BY TECK PERSONNEL FOR THIS REPORT. NO ATTEMPT HAS BEEN MADE TO VERIFY THE ACCURACY OF THE LOCATIONS.

LEGEND:

SUL-OID-VWP-18-01A&B — VIBRATING WIRE PIEZOMETER

P205 — STANDPIPE PIEZOMETER

P91-07 — PNEUMATIC PIEZOMETER

EL.1032.1 — MAXIMUM RECORDED PIEZO LEVEL (m) DURING REPORTING PERIOD

LOCATION AND DIRECTION OF PHOTOGRAPHS TAKEN DURING ANNUAL INSPECTION

104 — PHOTO NUMBER

LOCATION WHERE PHOTO WAS TAKEN

DIRECTION OF VIEW

101 — PANORAMA

CLIENT: Teck

Klohn Crippen Berger

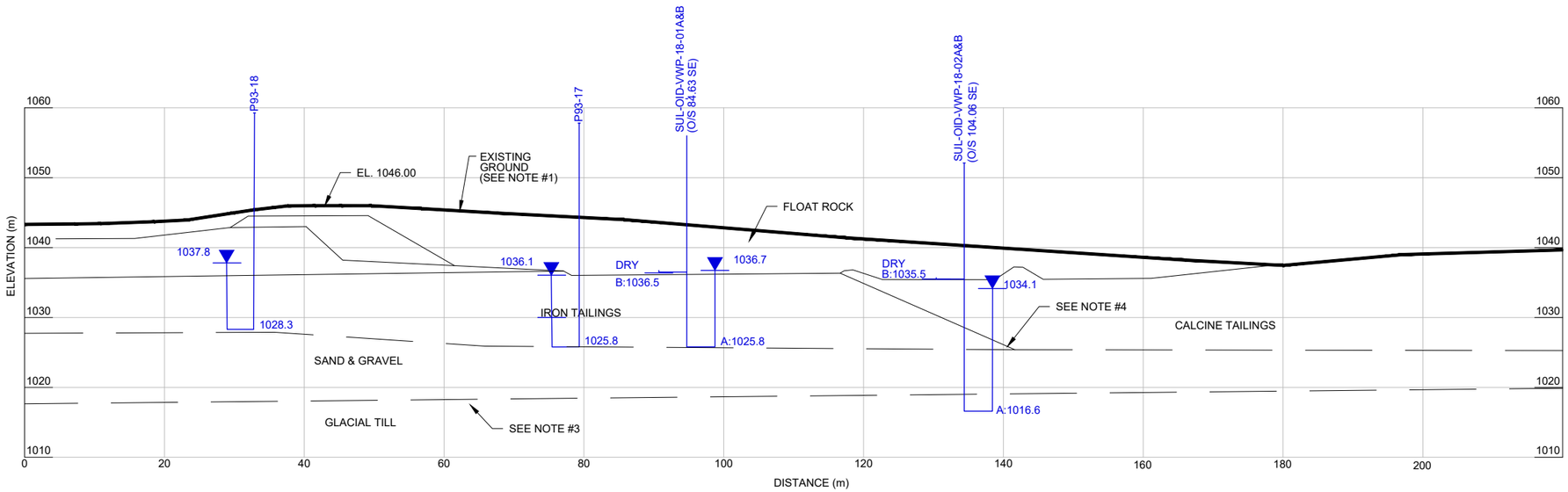
PROJECT: SULLIVAN MINE
2022 ANNUAL INSPECTION REPORT

TITLE: INSTRUMENT LOCATION PLAN
OLD IRON & IRON TSF DIVIDER DIKES

SCALE	PROJECT No.	FIG. No.
AS-SHOWN	A05807A22	8

KCB-FIGB-L

Z:\A\EDM\A05807A22 TML 2022 Dam Safety Services\400 Drawings\Annual Inspection\Figure 8_Old Iron Pond 2022.dwg November 17, 2022 TDs



G FIG 8 SECTION
SCALE = 1:750

NOTES:

1. SURFACE TOPOGRAPHY FROM LIDAR PROVIDED BY TECK METALS LTD. DATED DECEMBER 2012.
2. SUBSURFACE LITHOLOGY TRACED FROM 1994 SULLIVAN MINE STABILITY REVIEW OF SOUTHWEST LIMB.
3. APPROXIMATE ELEVATION OF GLACIAL TILL SURFACE FROM BOREHOLE 92-F (OFFSET 200 FT WEST).
4. APPROXIMATE LOCATION OF "SOUTH DAM", AN EARLY DYKE WHICH EXPERIENCED TWO FAILURES IN 1926 AND 1930, FROM 1964 TOPOGRAPHY. THE SOUTHWEST LIMB (WHICH INCLUDES SECTION G) OF THE IRON DYKE WAS PROBABLY THE FINAL INCREMENTAL RAISE OF THE "SOUTH DAM" ACCORDING TO THE 1994 SULLIVAN MINE STABILITY REVIEW OF SOUTHWEST LIMB.

LEGEND:

P91-01 — PIEZOMETER

1023.8 — MAXIMUM RECORDED PIEZO LEVEL (m) DURING REPORTING PERIOD

1021.4 — PIEZOMETER TIP

1:750 0 7.5 15 m

CLIENT: Teck

Klohn Crippen Berger

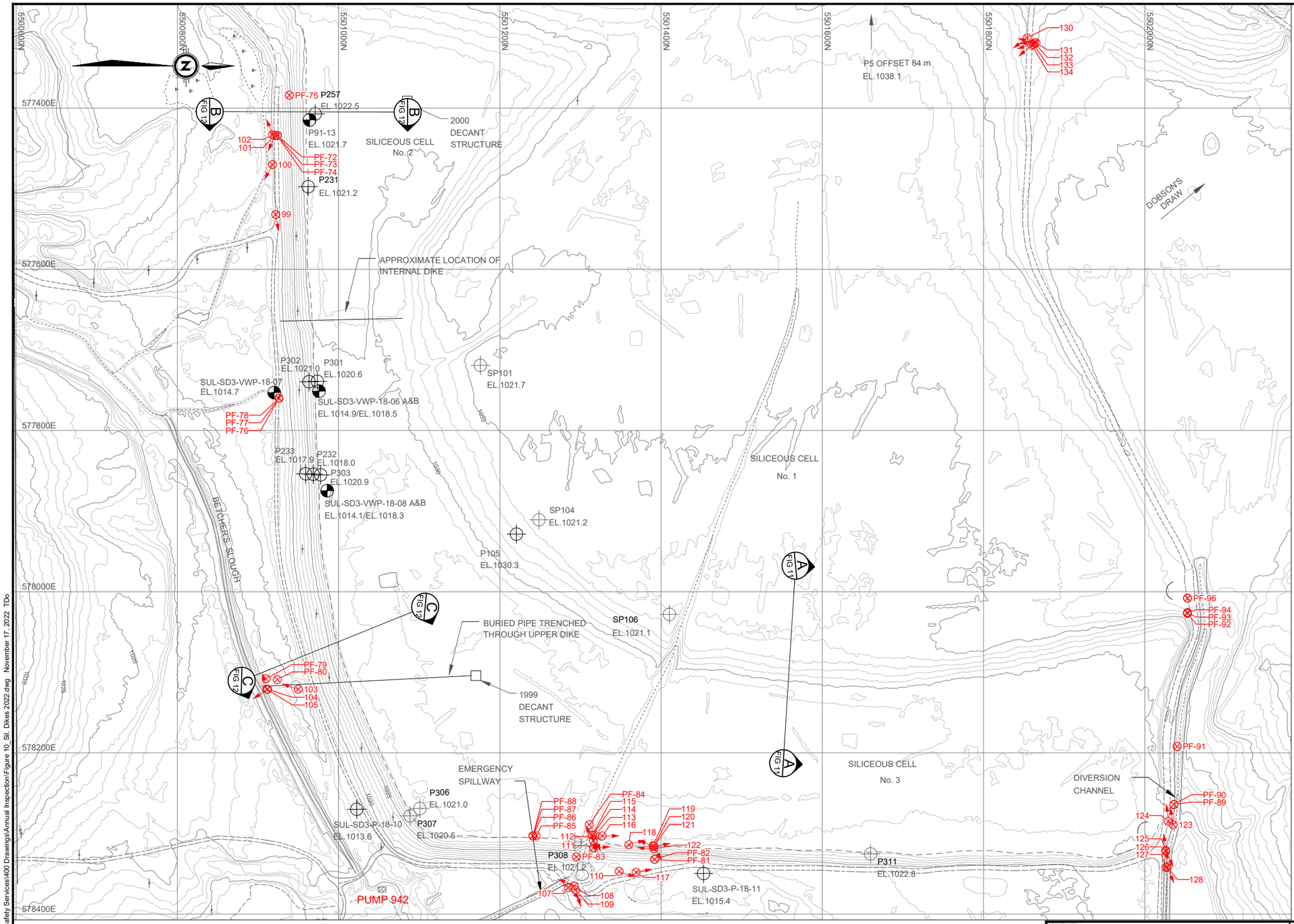
PROJECT: SULLIVAN MINE
2022 ANNUAL INSPECTION REPORT

TITLE: OLD IRON DIKE
SECTION G

SCALE	PROJECT No.	FIG. No.
AS-SHOWN	A05807A22	9

KCB-FIG-8-L

Z:\AEDM\A05807A22 TML 2022 Dam Safety Services\400 Drawings\Annual Inspection\Figure 9_Old Iron Dike Section 2022.dwg November 17, 2022 TDo



NOTES:

1. GENERAL TOPOGRAPHY FROM LIDAR DATED DECEMBER 2012.
2. ELEVATIONS ARE GEODETIC.
3. MAP COORDINATE SYSTEM = U.T.M. (NAD83).
4. INSTRUMENTATION LOCATIONS ARE BASED ON RECORDS PROVIDED BY TECK PERSONNEL FOR THIS REPORT. NO ATTEMPT HAS BEEN MADE TO VERIFY THE ACCURACY OF THE LOCATIONS.
5. SPILLWAY LOCATIONS ARE APPROXIMATE.

LEGEND:

SUL-SD3-VWP-18-06A&B — VIBRATING WIRE PIEZOMETER

P91-07 — PNEUMATIC PIEZOMETER

P205 — STANDPIPE PIEZOMETER

SP206 — STANDPIPE PIEZOMETER AND SETTLEMENT PLATE

EL.1032.1 — MAXIMUM RECORDED PIEZO LEVEL (m) DURING REPORTING PERIOD

LOCATION AND DIRECTION OF PHOTOS TAKEN DURING ANNUAL INSPECTION

104 — PHOTO NUMBER; LOCATION WHERE PHOTO WAS TAKEN; DIRECTION OF VIEW

101 — PANORAMA

CLIENT: Teck

Klohn Crippen Berger

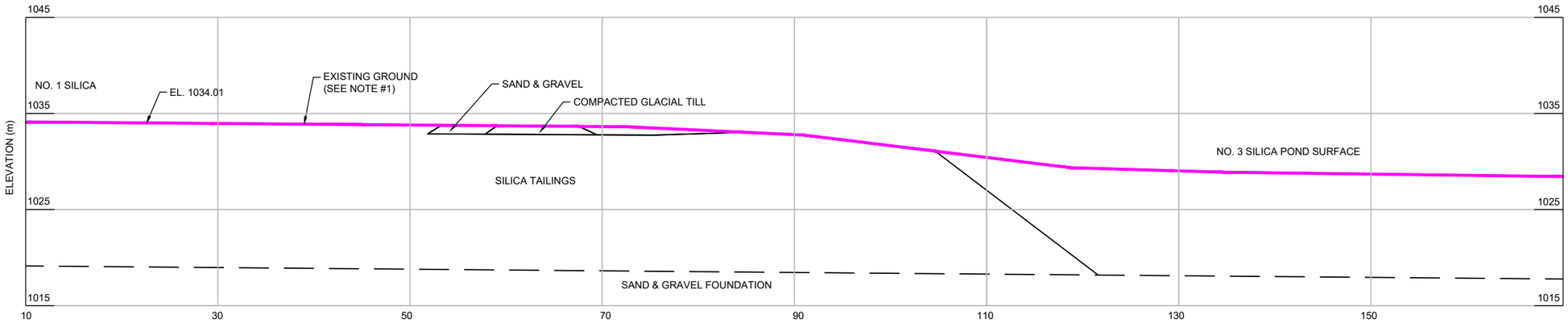
PROJECT: SULLIVAN MINE
2022 ANNUAL INSPECTION REPORT

TITLE: INSTRUMENT LOCATION PLAN
NO. 1, 2 & 3
SILICEOUS DIKES

SCALE	PROJECT No.	FIG. No.
AS-SHOWN	A05807A22	10

KCB-FIG#-L

Z:\AIEDM\A05807A22 TML 2022 Dam Safety Services\400 Drawings\Annual Inspection\Figure 10_Sil. Dikes 2022.dwg November 17, 2022 TDo



A SECTION
FIG 10 SCALE = 1:500

NOTES:

1. SURFACE TOPOGRAPHY FROM LIDAR PROVIDED BY TECK METALS LTD. DATED DECEMBER 2012.
2. SUBSURFACE LITHOLOGY TRACED FROM 1994 SULLIVAN MINE STABILITY REVIEW OF SILICA DYKES.

1:500 0 5 10 m

CLIENT: Teck

Klohn Crippen Berger

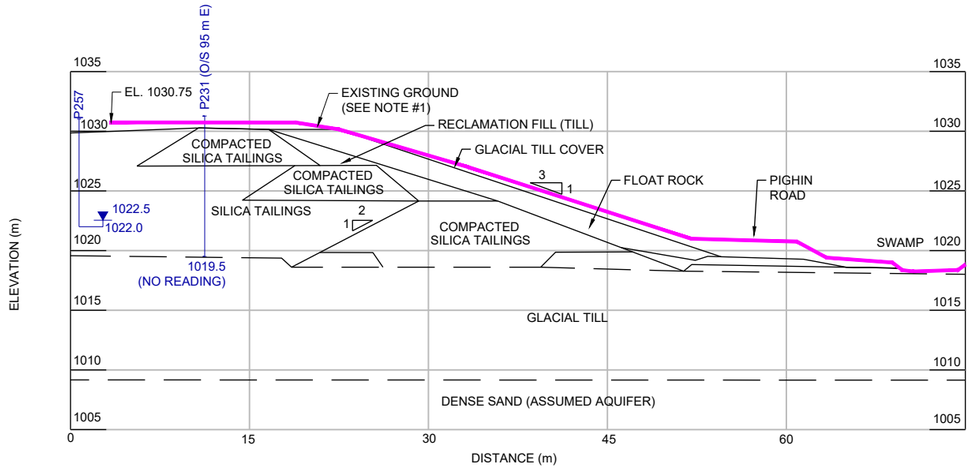
PROJECT: SULLIVAN MINE
2022 ANNUAL INSPECTION REPORT

TITLE: NO. 1 SILICEOUS DIKE
SECTION A

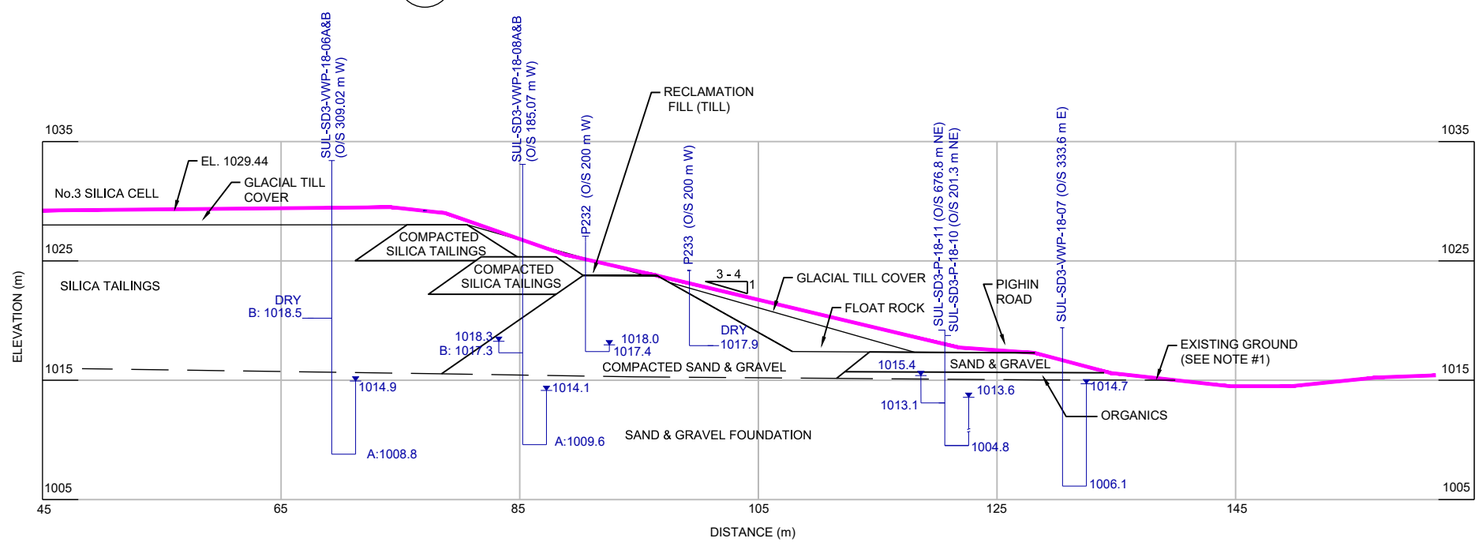
SCALE	PROJECT No.	FIG. No.
AS-SHOWN	A05807A22	11

KCB-FIG-B-L

Z:\AEDM\A05807A22 TML 2022 Dam Safety Services\400 Drawings\Annual Inspection\Figure 11.12_Siliceous TSF Sections 2022.dwg November 17, 2022 TDo



B SECTION
FIG 10 SCALE = 1:500



C SECTION
FIG 10 SCALE = 1:500

NOTES:

1. GENERAL TOPOGRAPHY FROM LIDAR DATED DECEMBER 2012.
2. SUBSURFACE LITHOLOGY TRACED FROM 1994 SULLIVAN MINE STABILITY REVIEW OF SILICA DYKES.

LEGEND:

P91-01	PIEZOMETER
1023.8	MAXIMUM RECORDED PIEZO LEVEL (m) DURING REPORTING PERIOD
1021.4	PIEZOMETER TIP

1:500 0 5 10 m

CLIENT: Teck

Klohn Crippen Berger

PROJECT: SULLIVAN MINE
2022 ANNUAL INSPECTION REPORT

TITLE: NO. 2 AND NO. 3 SILICEOUS DIKES
SECTIONS B AND C

SCALE	PROJECT No.	FIG. No.
AS-SHOWN	A05807A22	12

KCB-FIG-B-L

Z:\A\EDM\A05807A22 TML 2022 Dam Safety Services\400 Drawings\Annual Inspection\Figure 11.12_Siliceous TSF Sections 2022.dwg November 17, 2022 TDo

5500000N

5499800N

5499600N

576200E

576400E

576600E

576800E

PF-116

PF-117

PF-118

PF-119

RETURN PIPE FROM 951 PUMP HOUSE

191

192

193

PF-120

PF-121

PF-122

190

PF-149

PF-150

PF-152

PF-151

STA. 10+00

WEST GYPSUM DIKE

P FIG 14

BI94-01

P93-01 & 93-02

EL.1004.5 & 1004.3

S94-01

P93-03 & 93-04

EL.1004.1 & 1004.1

SP97-01

SP97-05

P93-05

EL.995.1

Q FIG 14

STA. 15+00

PF-156

P94-01

PF-148

PF-153

PF-154

PF-155

PF-157

210

209

208

PF-146

R FIG 15

STA. 20+00

P93-06

P93-07

EL.997.9

SP97-06

SURVEYORS CHAINAGE LINE (1993)

WEIR (NO LONGER READ)

1025

1020

1010

1005

1000

995

990

985

PF-125

PF-124

PF-123

951 PUMP HOUSE

194

198

196

195

197

P FIG 14

CREEK

COW

PF-142

P94-03

SUL-WGP-P18-03

EL.994.2

207

206

205

204

PF-141

Q FIG 14

R FIG 15

NOTES:

1. GENERAL TOPOGRAPHY FROM LIDAR DATED DECEMBER 2012.
2. ELEVATIONS ARE GEODETIC.
3. MAP COORDINATE SYSTEM = U.T.M. (NAD83). CONTOUR INTERVAL IS ONE METRE.
4. STATIONING IS IN FEET.
5. INSTRUMENTATION LOCATIONS ARE BASED ON RECORDS PROVIDED BY TECK NO ATTEMPT HAS BEEN MADE TO VERIFY THE ACCURACY OF THE LOCATIONS.

LEGEND:

P93-15	1993 STANDPIPE PIEZOMETER
P94-01	STANDPIPE PIEZOMETER
SP97-01	SETTLEMENT PLATE
BI94-02	INCLINOMETER
S94-02	SONDEX SETTLEMENT GAUGE
EL.1032.1	MAXIMUM RECORDED PIEZO LEVEL (m) DURING REPORTING PERIOD

LOCATION AND DIRECTION OF PHOTOGRAPHS TAKEN DURING ANNUAL INSPECTION

104 — PHOTO NUMBER; LOCATION WHERE PHOTO WAS TAKEN; DIRECTION OF VIEW

101 — PANORAMA

1:2 500 0 25 50 m

CLIENT: Teck

Klohn Crippen Berger

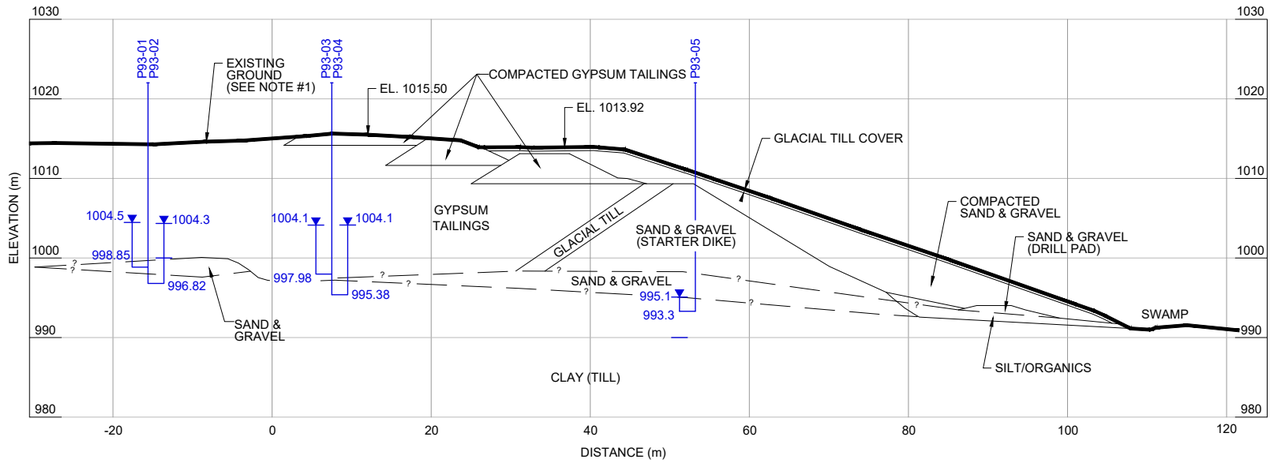
PROJECT: SULLIVAN MINE
2022 ANNUAL INSPECTION REPORT

TITLE: INSTRUMENT LOCATION PLAN
WEST GYPSUM DIKE

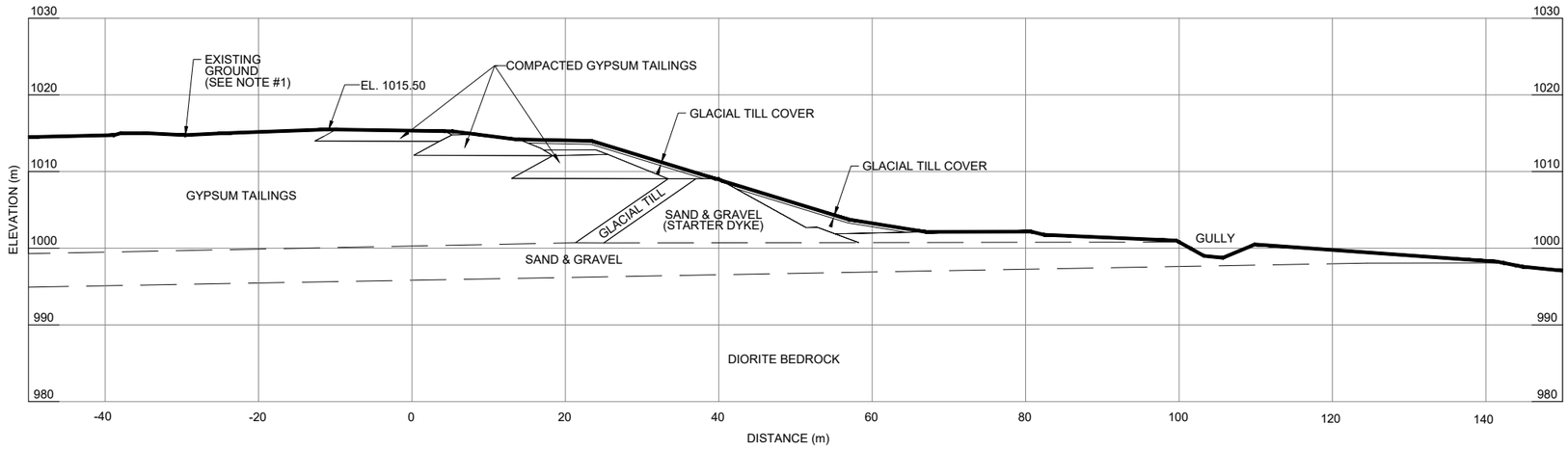
SCALE	PROJECT No.	FIG. No.
AS-SHOWN	A05807A22	13

KCB-FIG-B-L

Z:\AIEDM\A05807A22 TML 2022 Dam Safety Services\400 Drawings\Annual Inspection\Figure 13_WestGyp 2022.dwg November 17, 2022 TDo



P SECTION
FIG 13 SCALE = 1:750



Q SECTION
FIG 13 SCALE = 1:750

NOTES:

1. SURFACE TOPOGRAPHY FROM LIDAR PROVIDED BY TECK METALS LTD. DATED DECEMBER 2012.
2. SUBSURFACE LITHOLOGY TRACED FROM 1993 SULLIVAN MINE STABILITY REVIEW OF GYPSUM DYKES.

LEGEND:

P93-01 PIEZOMETER

1006.30 MAXIMUM RECORDED PIEZO LEVEL (m) DURING REPORTING PERIOD

1000.2 PIEZOMETER TIP

1:750 0 7.5 15 m

CLIENT: Teck

Klohn Crippen Berger

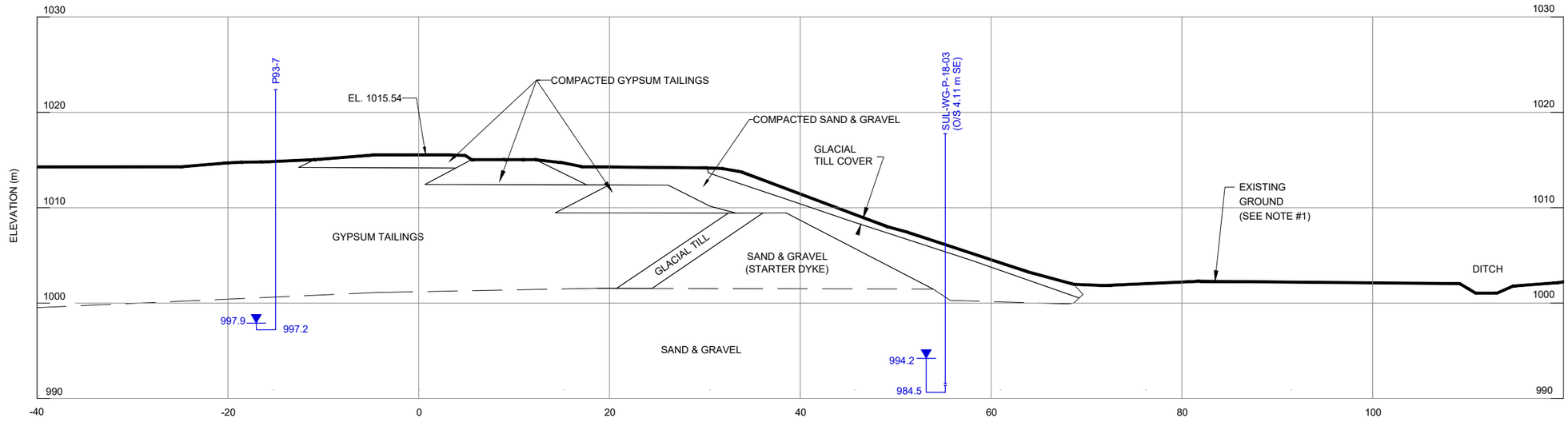
PROJECT: SULLIVAN MINE
2022 ANNUAL INSPECTION REPORT

TITLE: WEST GYPSUM DIKE
SECTIONS P AND Q

SCALE	PROJECT No.	FIG. No.
AS-SHOWN	A05807A22	14

KCB-FIG-B-L

Z:\AIEDM\A05807A22 TML 2022 Dam Safety Services\400 Drawings\Annual Inspection\Figure 14.15_West Gypsum Dike Sections 2022.dwg November 17, 2022 TDo



R FIG 13 SECTION
SCALE = 1:500

NOTES:

1. SURFACE TOPOGRAPHY FROM LIDAR PROVIDED BY TECK METALS LTD. DATED DECEMBER 2012.
2. SUBSURFACE LITHOLOGY TRACED FROM 1993 SULLIVAN MINE STABILITY REVIEW OF GYPSUM DYKES.

LEGEND:

P93-01 — PIEZOMETER

1006.30 — MAXIMUM RECORDED PIEZO LEVEL (m) DURING REPORTING PERIOD

1000.2 — PIEZOMETER TIP

1:500 0 5 10 m

CLIENT: Teck

Klohn Crippen Berger

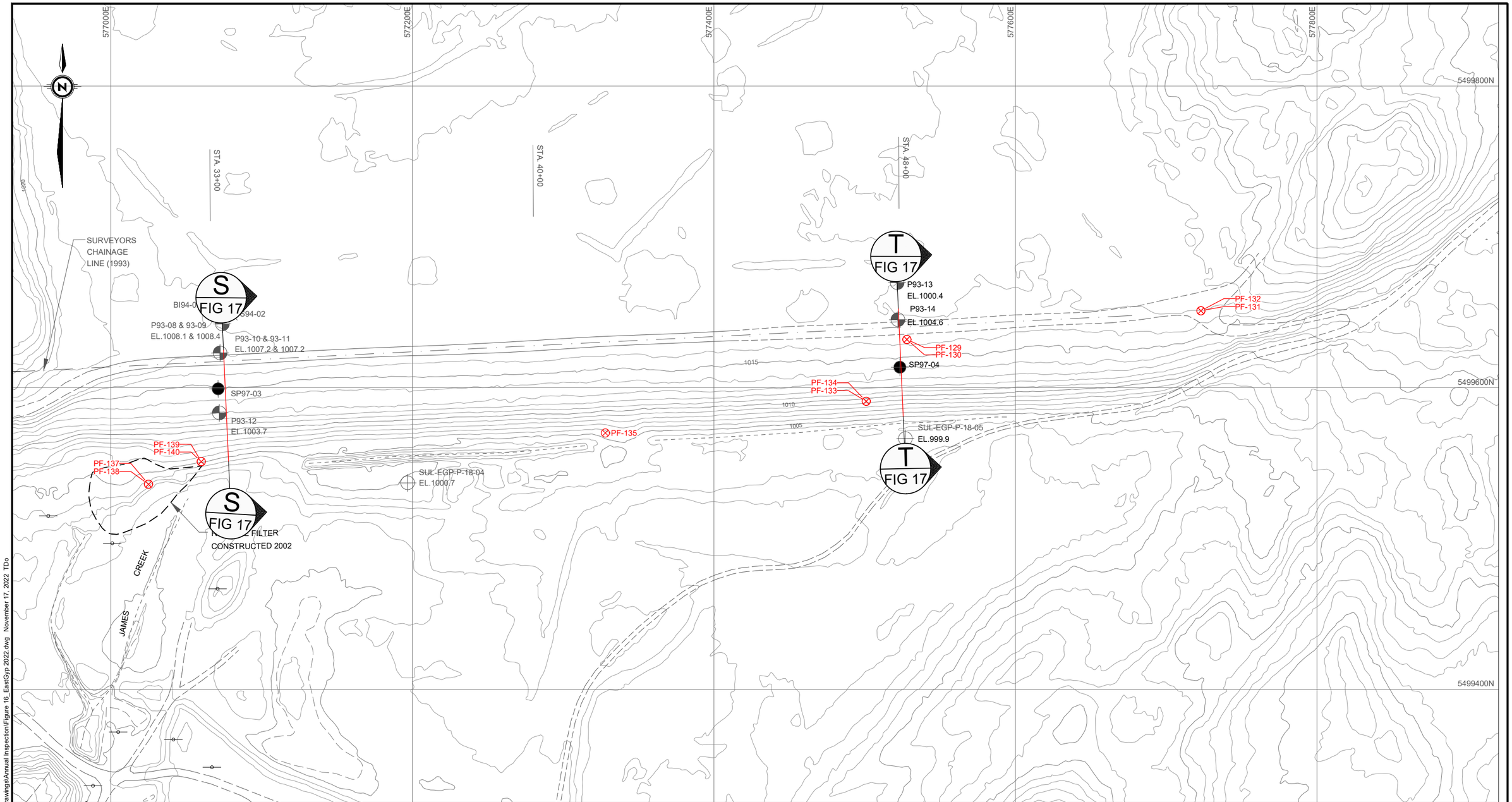
PROJECT: SULLIVAN MINE
2022 ANNUAL INSPECTION REPORT

TITLE: WEST GYPSUM DIKE
SECTION R

SCALE	PROJECT No.	FIG. No.
AS-SHOWN	A05807A22	15

KCB-FIG-B-L

Z:\AIEDM\A05807A22 TML 2022 Dam Safety Services\400 Drawings\Annual Inspection\Figure 14,15_West Gypsum Dike Sections 2022.dwg November 17, 2022 TDo



NOTES:

1. GENERAL TOPOGRAPHY FROM LIDAR DATED DECEMBER 2012.
2. ELEVATIONS ARE GEODETIC.
3. MAP COORDINATE SYSTEM = U.T.M. (NAD83). CONTOUR INTERVAL IS ONE METRE.
4. STATIONING IS IN FEET.
5. INSTRUMENTATION LOCATIONS ARE BASED ON RECORDS PROVIDED BY TECK NO ATTEMPT HAS BEEN MADE TO VERIFY THE ACCURACY OF THE LOCATIONS.

LEGEND:

P93-15	1993 STANDPIPE PIEZOMETER
P94-01	STANDPIPE PIEZOMETER
SP97-01	SETTLEMENT PLATE
BI94-02	INCLINOMETER
S94-02	SONDEX SETTLEMENT GAUGE
EL.1032.1	MAXIMUM RECORDED PIEZO LEVEL (m) DURING REPORTING PERIOD

LOCATION AND DIRECTION OF PHOTOGRAPHS TAKEN DURING ANNUAL INSPECTION

- PHOTO NUMBER
- 104 — LOCATION WHERE PHOTO WAS TAKEN
- DIRECTION OF VIEW
- PANORAMA

1:2 500 0 25 50 m

CLIENT: Teck

Klohn Crippen Berger

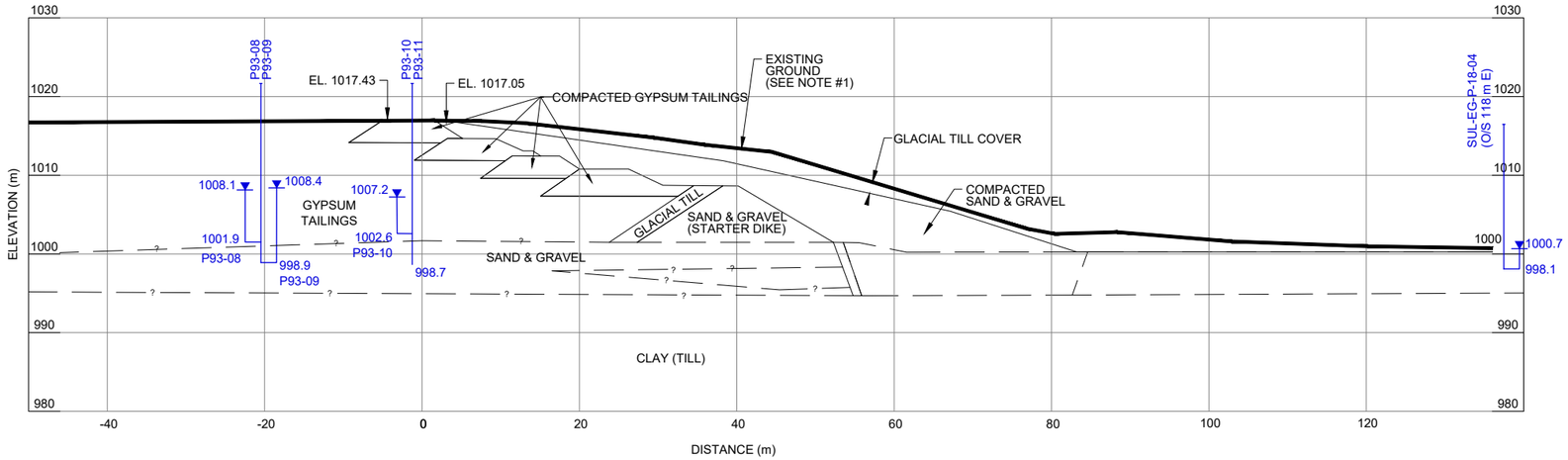
PROJECT: SULLIVAN MINE
2022 ANNUAL INSPECTION REPORT

TITLE: INSTRUMENT LOCATION PLAN
EAST GYPSUM DIKE

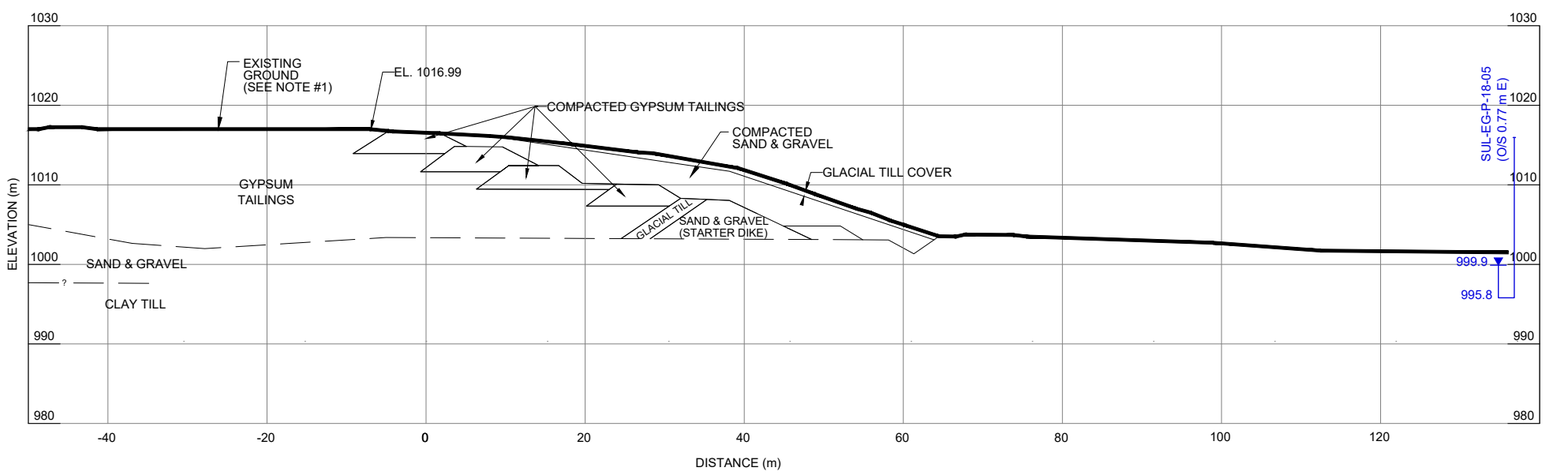
SCALE	PROJECT No.	FIG. No.
AS-SHOWN	A05807A22	16

KCB-FIGB-L

Z:\A\EDM\A05807A22 TML 2022 Dam Safety Services\400 Drawings\Annual Inspection\Figure 16_EastGyp 2022.dwg November 17, 2022 TDo



S SECTION
FIG 16 SCALE = 1:750



T SECTION
FIG 16 SCALE = 1:750

NOTES:

1. SURFACE TOPOGRAPHY FROM LIDAR PROVIDED BY TECK METALS LTD. DATED DECEMBER 2012.
2. SUBSURFACE LITHOLOGY TRACED FROM 1993 SULLIVAN MINE STABILITY REVIEW OF GYPSUM DYKES.

LEGEND:

P93-01 PIEZOMETER

1006.30 MAXIMUM RECORDED PIEZO LEVEL (m) DURING REPORTING PERIOD

1000.2 PIEZOMETER TIP

1:750 0 7.5 15 m

CLIENT
Teck

Klohn Crippen Berger

PROJECT
SULLIVAN MINE
2022 ANNUAL INSPECTION REPORT

TITLE
EAST GYPSUM DIKE
SECTIONS S AND T

SCALE	PROJECT No.	FIG. No.
AS-SHOWN	A05807A22	17

KCB-FIG-F-L

Z:\AIEDM\A05807A22 TML 2022 Dam Safety Services\400 Drawings\Annual Inspection\Figure 17_East Gypsum Dike Sections 2022.dwg November 17, 2022 TDo

577400E
577600E
577800E
578000E
578200E
5500600N
5500400N
1045
1040
U FIG 19
U FIG 19
RECYCLE DAM
NORTH EAST GYPSUM DIKE
97
95
94
93
92
91
90
89
88
87
86
85
84
1:2 500 0 25 50 m

NOTES:

1. GENERAL TOPOGRAPHY FROM LIDAR DATED DECEMBER 2012.
2. ELEVATIONS ARE GEODETIC.
3. MAP COORDINATE SYSTEM = U.T.M. (NAD83). CONTOUR INTERVAL IS ONE METRE.
4. INSTRUMENTATION LOCATIONS ARE BASED ON RECORDS PROVIDED BY TECK PERSONNEL FOR THIS REPORT. NO ATTEMPT HAS BEEN MADE TO VERIFY THE ACCURACY OF THE LOCATIONS.

LEGEND:

LOCATION AND DIRECTION OF PHOTOGRAPHS TAKEN DURING ANNUAL INSPECTION

104 — PHOTO NUMBER

LOCATION WHERE PHOTO WAS TAKEN

DIRECTION OF VIEW

101 — PANORAMA

CLIENT: Teck

Klohn Crippen Berger

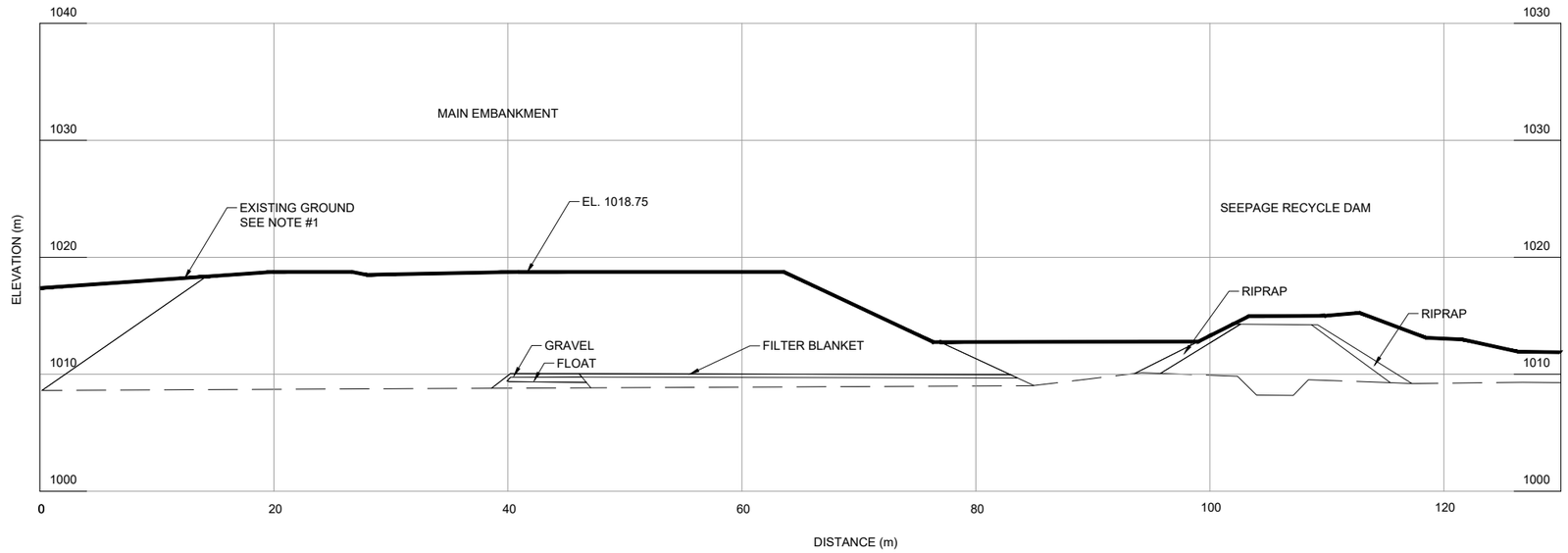
PROJECT: SULLIVAN MINE
2022 ANNUAL INSPECTION REPORT

TITLE: INSTRUMENT LOCATION PLAN
NORTHEAST GYPSUM DIKE
AND RECYCLE DAM

SCALE	PROJECT No.	FIG. No.
AS-SHOWN	A05807A22	18

KCB-FIG-8-L

Z:\A\EDM\A05807A22 TML 2022 Dam Safety Services\400 Drawings\Annual Inspection\Figure 18_NEGyp 2022.dwg November 17, 2022 TDo



U / FIG 18 — SECTION
SCALE = 1:500.

NOTES:

1. SURFACE TOPOGRAPHY FROM LIDAR PROVIDED BY TECK METALS LTD. DATED DECEMBER 2012.
2. SUBSURFACE LITHOLOGY TRACED FROM REPORT ON 1985 CONSTRUCTION ACTIVITIES: NORTHEAST RETENTION EMBANKMENT GYPSUM PONDS.

1:500 0 5.0 10 m

CLIENT: Teck

Klohn Crippen Berger

PROJECT: SULLIVAN MINE
2022 ANNUAL INSPECTION REPORT

TITLE: NORTHEAST GYPSUM DIKE AND RECYCLE DAM SECTION U

SCALE	PROJECT No.	FIG. No.
AS-SHOWN	A05807A22	19

KCB-FIG8-L

Z:\AIEDM\A05807A22 TML 2022 Dam Safety Services\400 Drawings\Annual Inspection\Figure 19_Northeast Gypsum Dike and Recycle Dam Section 2022.dwg November 17, 2022 TDo

N POND

575 000 E

575 800 E OLD IRON POND

5 500 800 N

5 500 600 N

5 500 400 N

5 500 200 N

5 500 000 N

ACCESS ROAD

EMERGENCY SPILLWAY

LOCATION OF DISCHARGE FLUMES

NORTH DAM

EAST PERIMETER ROAD

DWTP PUMP STATION

SOUTH DAM

ARD STORAGE POND

ARD WEIR #2

WEIR #1 (ARDWU)

SUMP

ND-01 EL.1040.2

ND-02D EL.1039.1

ND-02S EL.1041.4

ND-03 EL.1038.3

SD-01 EL.1034.3

SD-02 EL.1029.6

SD-03 EL.1036.8

PP01-01 EL.1041.7

PP01-02 EL.1042.0

PP01-03 EL.1038.8

PP01-04 EL.1041.1

PP01-05 EL.1031.0

PP01-06 EL.1030.9

SP01-01

SP01-02

SP01-03

SP01-04

SP01-05

SP01-06

PF-1 PF-2 PF-3 PF-4 PF-5 PF-6 PF-7 PF-8 PF-9 PF-10 PF-11 PF-12 PF-13 PF-14 PF-15 PF-17 PF-18 PF-19 PF-20 PF-22 PF-31 PF-32 PF-33 PF-34 PF-35 PF-115 PF-116 PF-117 PF-118 PF-119

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188

H FIG 21 I FIG 21 J FIG 22 K FIG 22 L FIG 23 M FIG 23 N FIG 24

NOTES:

1. GENERAL TOPOGRAPHY FROM LIDAR DATED DECEMBER 2012.
2. ELEVATIONS ARE GEODETIC.
3. MAP COORDINATE SYSTEM = U.T.M. (NAD 83).

LEGEND:

- PNEUMATIC PIEZOMETER
- STANDPIPE PIEZOMETER
- SETTLEMENT PIN
- SEEPAGE COLLECTOR DITCH
- EL.1032.1 — MAXIMUM RECORDED PIEZO LEVEL (m) DURING REPORTING PERIOD

LOCATION AND DIRECTION OF PHOTOGRAPHS TAKEN DURING ANNUAL INSPECTION

- 104 — PHOTO NUMBER; LOCATION WHERE PHOTO WAS TAKEN; DIRECTION OF VIEW
- 101 — PANORAMA

1:2 500 0 25 50 m

CLIENT: Teck

Klohn Crippen Berger

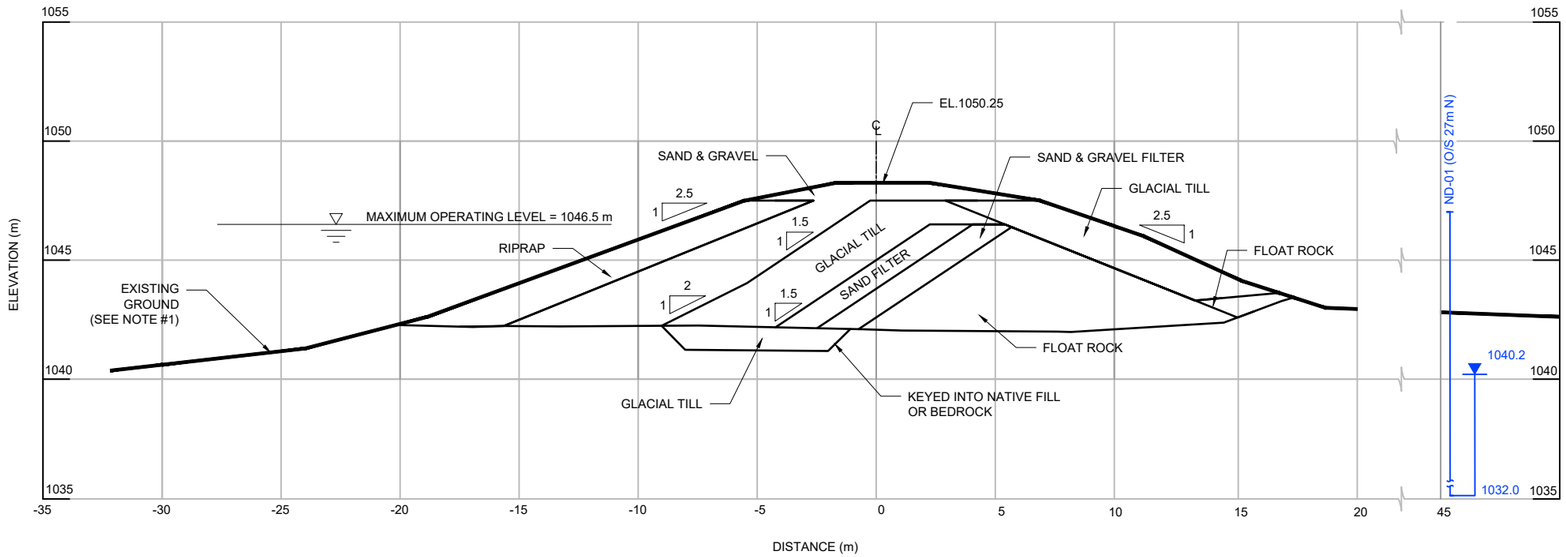
PROJECT: SULLIVAN MINE 2022 ANNUAL INSPECTION REPORT

TITLE: ARD STORAGE POND PLAN AND LAYOUT

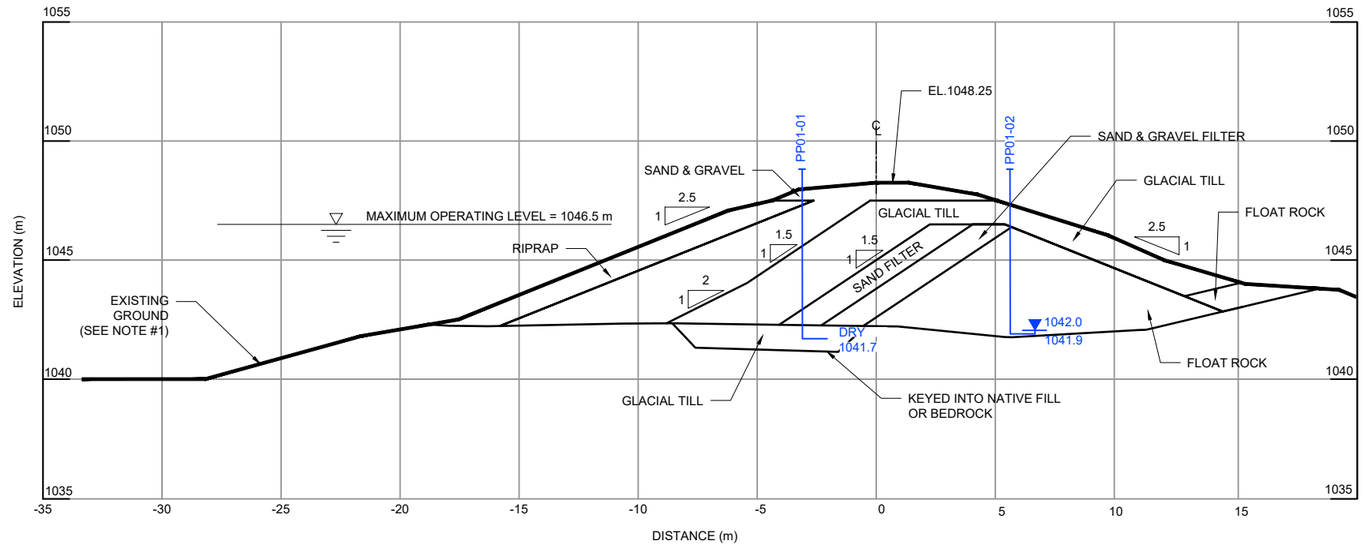
SCALE	PROJECT No.	FIG. No.
AS-SHOWN	A05807A22	20

Z:\AIEDM\A05807A22 TML 2022 Dam Safety Services\400 Drawings\Annual Inspection\Figure 20_ARD 2022.dwg November 17, 2022 TDo

KCB-FIG-B-L



H SECTION
FIG 20 SCALE = 1:250



I SECTION
FIG 20 SCALE = 1:250

NOTES:

1. SURFACE TOPOGRAPHY FROM LIDAR PROVIDED BY TECK METALS LTD. DATED DECEMBER 2012.
2. SUBSURFACE LITHOLOGY TRACED FROM 2002 SULLIVAN MINE TAILINGS FACILITY STORAGE POND NO. 1 CONSTRUCTION RECORD REPORT.

LEGEND:

P91-01 — PIEZOMETER

1023.8 / 1021.4 — MAXIMUM RECORDED PIEZO LEVEL (m) DURING REPORTING PERIOD / PIEZOMETER TIP

1:250 0 2.5 5.0 m

CLIENT: Teck

Klohn Crippen Berger

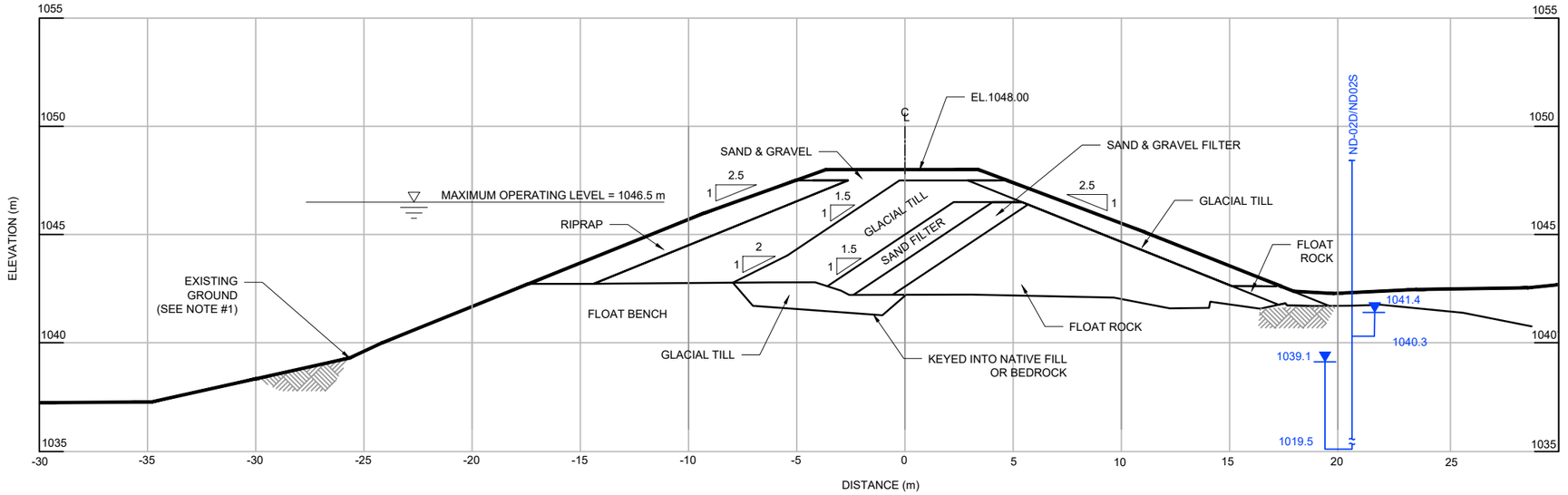
PROJECT: SULLIVAN MINE
2022 ANNUAL INSPECTION REPORT

TITLE: ARD STORAGE POND
NORTH DAM SECTIONS H AND I

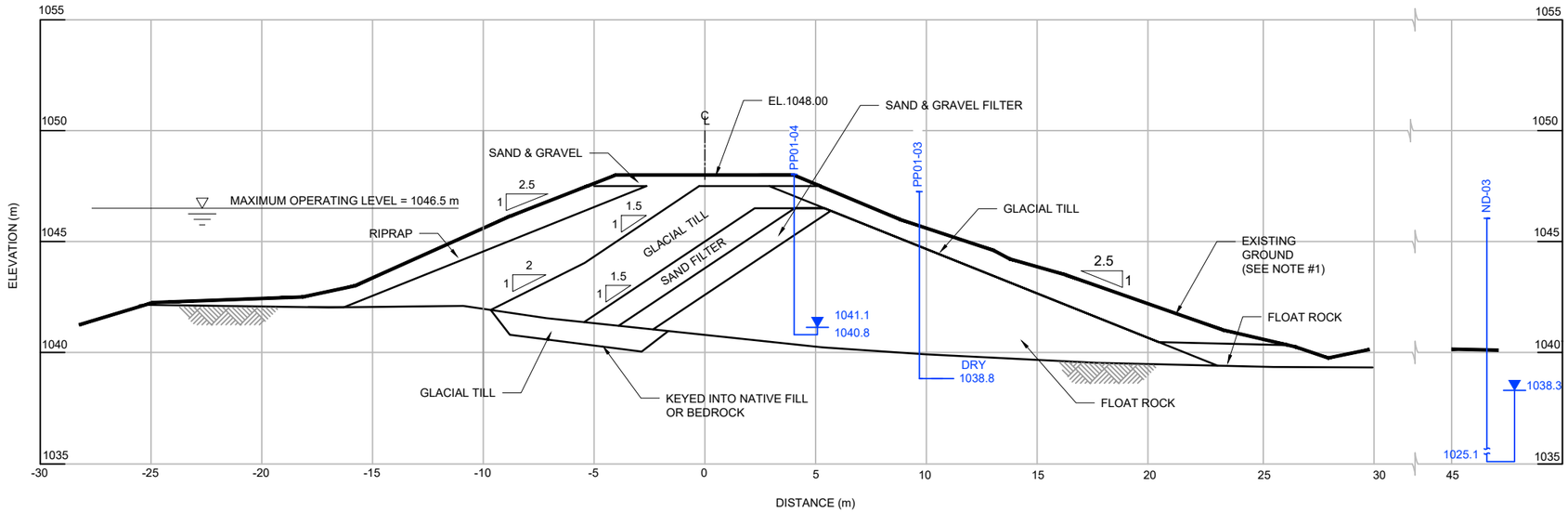
SCALE	PROJECT No.	FIG. No.
AS-SHOWN	A05807A22	21

KCB-FIG-B-L

Z:\AIEM\A05807A22 TML 2022 Dam Safety Services\400 Drawings\Annual Inspection\Figure 21.22_ARD Storage Pond North Dam Sections 2022.dwg November 17, 2022 TDo



J SECTION
FIG 20 SCALE = 1:250



K SECTION
FIG 20 SCALE = 1:250

NOTES:

1. SURFACE TOPOGRAPHY FROM LIDAR PROVIDED BY TECK METALS LTD. DATED DECEMBER 2012.
2. SUBSURFACE LITHOLOGY TRACED FROM 2002 SULLIVAN MINE TAILINGS FACILITY STORAGE POND NO. 1 CONSTRUCTION RECORD REPORT.

LEGEND:

P91-01 — PIEZOMETER

1023.8 — MAXIMUM RECORDED PIEZO LEVEL (m) DURING REPORTING PERIOD

1021.4 — PIEZOMETER TIP

1:250 0 2.5 5.0 m

CLIENT: Teck

Klohn Crippen Berger

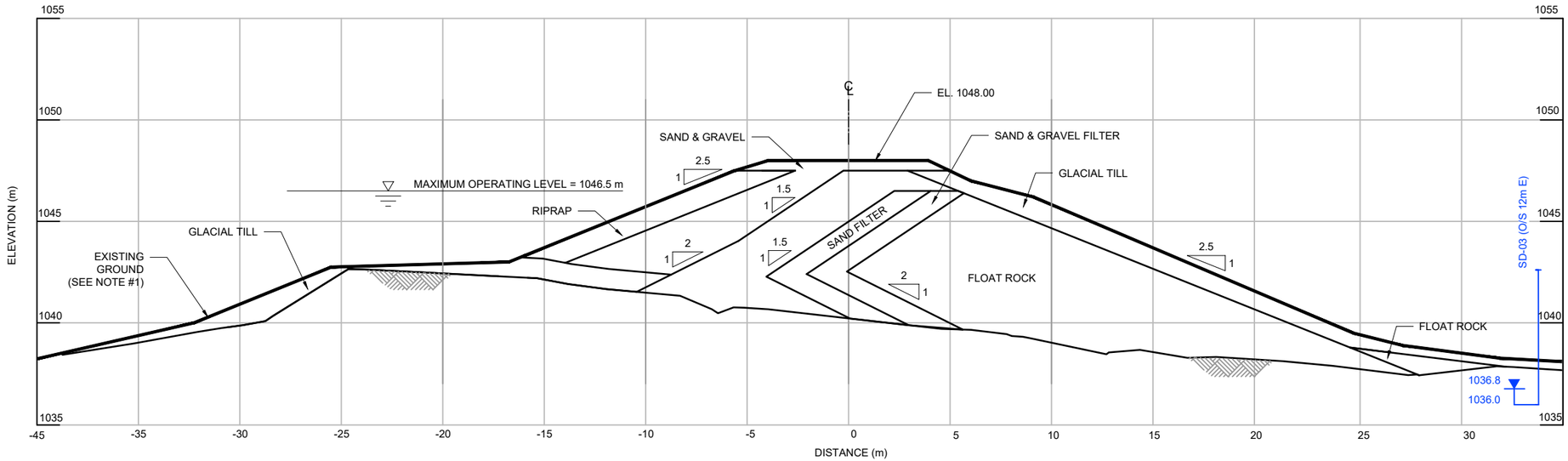
PROJECT: SULLIVAN MINE
2022 ANNUAL INSPECTION REPORT

TITLE: ARD STORAGE POND
NORTH DAM SECTIONS J AND K

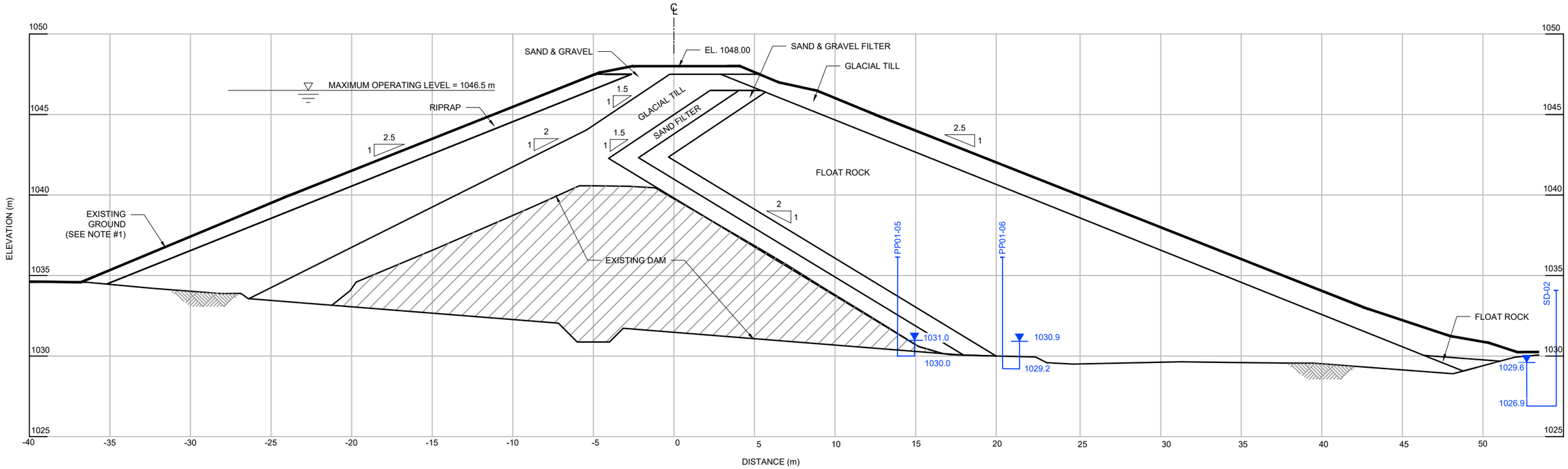
SCALE	PROJECT No.	FIG. No.
AS-SHOWN	A05807A22	22

KCB-FIG-B-L

Z:\A\EDM\A05807A22 TML 2022 Dam Safety Services\400 Drawings\Annual Inspection\Figure 21.22_ARD Storage Pond North Dam Sections 2022.dwg November 17, 2022 TDo



L SECTION
FIG 20 SCALE = 1:250



M SECTION
FIG 20 SCALE = 1:250

NOTES:

1. SURFACE TOPOGRAPHY FROM LIDAR PROVIDED BY TECK METALS LTD. DATED DECEMBER 2012.
2. SUBSURFACE LITHOLOGY TRACED FROM 2002 SULLIVAN MINE TAILINGS FACILITY STORAGE POND NO. 1 CONSTRUCTION RECORD REPORT.

LEGEND:

P91-01 PIEZOMETER

1023.8 MAXIMUM RECORDED PIEZO LEVEL (m) DURING REPORTING PERIOD

1021.4 PIEZOMETER TIP

1:250 0 2.5 5.0 m

CLIENT: Teck

Klohn Crippen Berger

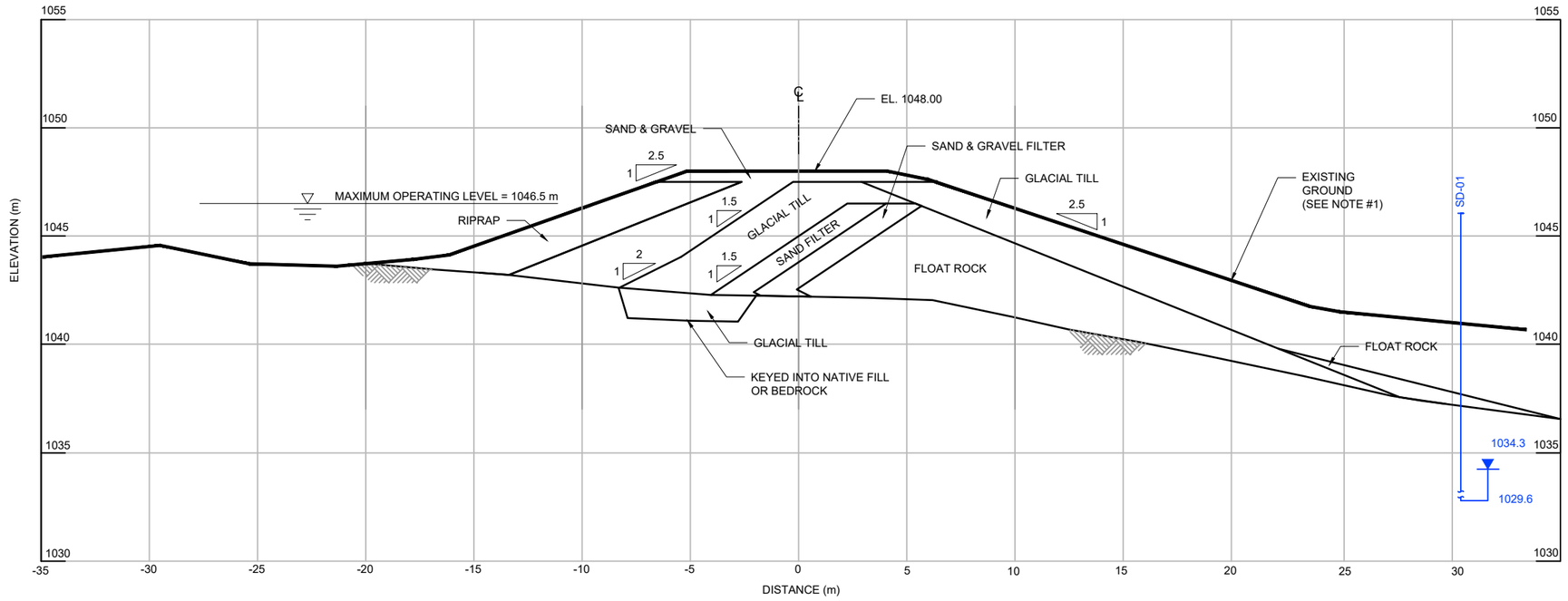
PROJECT: SULLIVAN MINE
2022 ANNUAL INSPECTION REPORT

TITLE: ARD STORAGE POND
SOUTH DAM SECTIONS L AND M

SCALE	PROJECT No.	FIG. No.
AS-SHOWN	A05807A22	23

KCB-FIG-B-L

Z:\A\EDM\A05807A22 TML 2022 Dam Safety Services\400 Drawings\Annual Inspection\Figure 23.24_ARD Storage Pond South Dam Sections 2022.dwg November 17, 2022 TDo



N SECTION
FIG 20 SCALE = 1:250

NOTES:

1. SURFACE TOPOGRAPHY FROM LIDAR PROVIDED BY TECK METALS LTD. DATED DECEMBER 2012.
2. SUBSURFACE LITHOLOGY TRACED FROM 2002 SULLIVAN MINE TAILINGS FACILITY STORAGE POND NO. 1 CONSTRUCTION RECORD REPORT.

LEGEND:

P91-01 — PIEZOMETER

1023.8 / 1021.4 — MAXIMUM RECORDED PIEZO LEVEL (m) DURING REPORTING PERIOD / PIEZOMETER TIP

1:250 0 2.5 5.0 m

CLIENT: Teck	PROJECT: SULLIVAN MINE 2022 ANNUAL INSPECTION REPORT		
Klohn Crippen Berger	TITLE: ARD STORAGE POND SOUTH DAM SECTION N		
	SCALE: AS-SHOWN	PROJECT No.: A05807A22	FIG. No.: 24

KCB-FIG-8-L

Z:\AIEDM\A05807A22 TML 2022 Dam Safety Services\400 Drawings\Annual Inspection\Figure 23,24_ARD Storage Pond South Dam Sections 2022.dwg November 17, 2022 TDo

575000E
575200E
575400E
575600E
575800E
5500200N
5500000N
5499800N
PF-105
PF-104
PF-103
145
144
143
142
141
CALCINE TSF
FIG 26
FIG 26
PF-110
PF-109
PF-112
PF-111
PF-108
PF-107
PF-106
C1
C2
C3
159
162
163
164
165
160
161
158
157
156
154
155
146
148
147
151
152
153
149
150
1030
1035
1040
1045
1050
1055
1038
PF-2
PF-1
3
4
5
2
6
7
10
1
9
8
177
181
180
188
184
185
186
187
179
178
182
183
45
1:2 500 0 25 50 m

NOTES:

1. GENERAL TOPOGRAPHY FROM LIDAR DATED DECEMBER 2012.
2. ELEVATIONS ARE GEODETIC.
3. MAP COORDINATE SYSTEM = U.T.M. (NAD83). CONTOUR INTERVAL IS ONE METRE.
4. INSTRUMENTATION LOCATIONS ARE BASED ON RECORDS PROVIDED BY TECK PERSONNEL FOR THIS REPORT. NO ATTEMPT HAS BEEN MADE TO VERIFY THE ACCURACY OF THE LOCATIONS.

LEGEND:

MONITORING WELL - ABANDONED

LOCATION AND DIRECTION OF PHOTOGRAPHS DURING ANNUAL INSPECTION

104 — LOCATION WHERE PHOTO WAS TAKEN

PHOTO NUMBER

DIRECTION OF VIEW

101 — PANORAMA

CLIENT: Teck

Klohn Crippen Berger

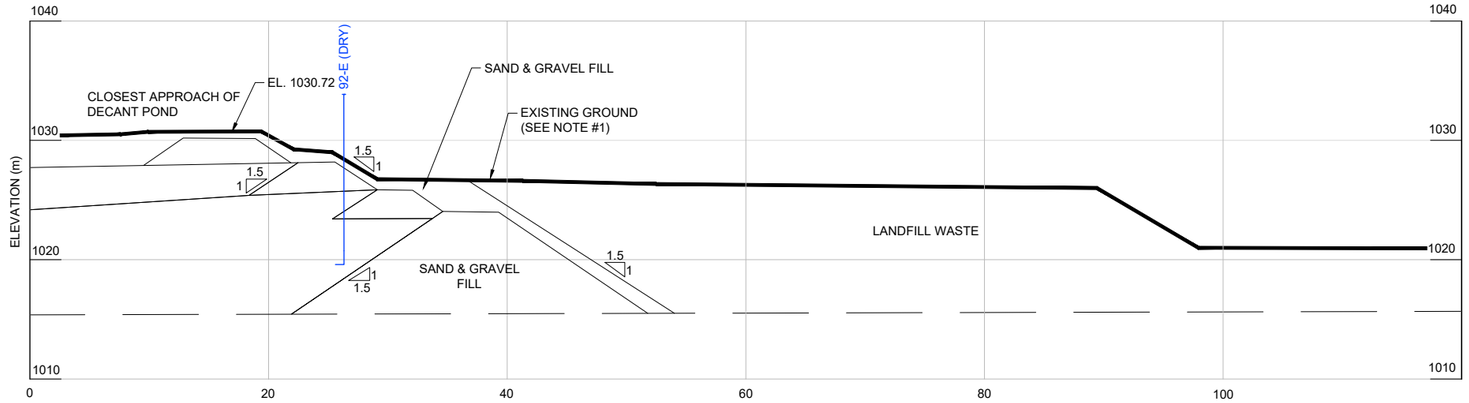
PROJECT: SULLIVAN MINE
2022 ANNUAL INSPECTION REPORT

TITLE: INSTRUMENT LOCATION PLAN
CALCINE DIKE

SCALE	PROJECT No.	FIG. No.
AS-SHOWN	A05807A22	25

KCB-FIG-8-L

Z:\AIE\DM\A05807A22 TML 2022 Dam Safety Services\400 Drawings\Annual Inspection\Figure 25_Calcine 2022.dwg November 18, 2022 TDo



O SECTION
FIG 25 SCALE = 1:500

NOTES:

1. SURFACE TOPOGRAPHY FROM LIDAR PROVIDED BY TECK METALS LTD. DATED DECEMBER 2012.
2. SUBSURFACE LITHOLOGY TRACED FROM 1979 SOIL INVESTIGATION AND DESIGN SECOND DYKE EXTENSION CALCINE DYKE.

LEGEND:

P91-01 PIEZOMETER

1:500 0 5.0 10 m

CLIENT
Teck

Klohn Crippen Berger

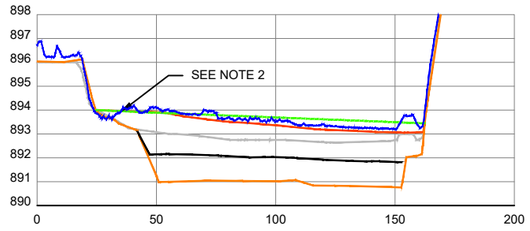
PROJECT
SULLIVAN MINE
2022 ANNUAL INSPECTION REPORT

TITLE
CALCINE DIKE
SECTION O

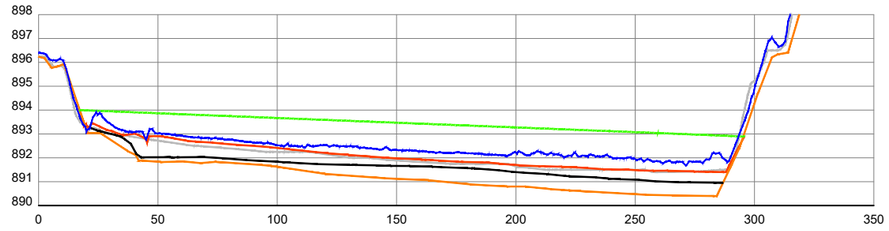
SCALE	PROJECT No.	FIG. No.
AS-SHOWN	A05807A22	26

KCB-FIG-8-L

Z:\AIEDM\A05807A22 TML 2022 Dam Safety Services\400 Drawings\Annual Inspection\Figure 26_Calcine Dike Section 2022.dwg November 18, 2022 TDo

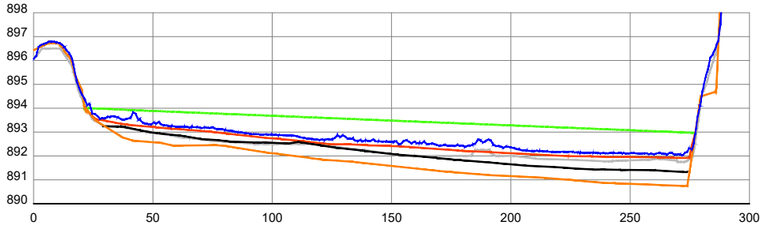


V SECTION
SCALE = 1:2500



X SECTION
SCALE = 1:2500

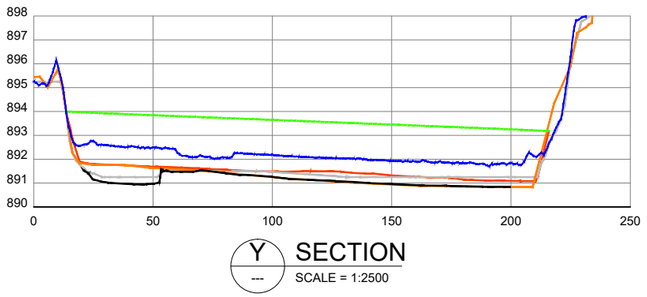
NOTE:EXCESS SLUDGE DEPOSIT RELOCATED OCTOBER 2015



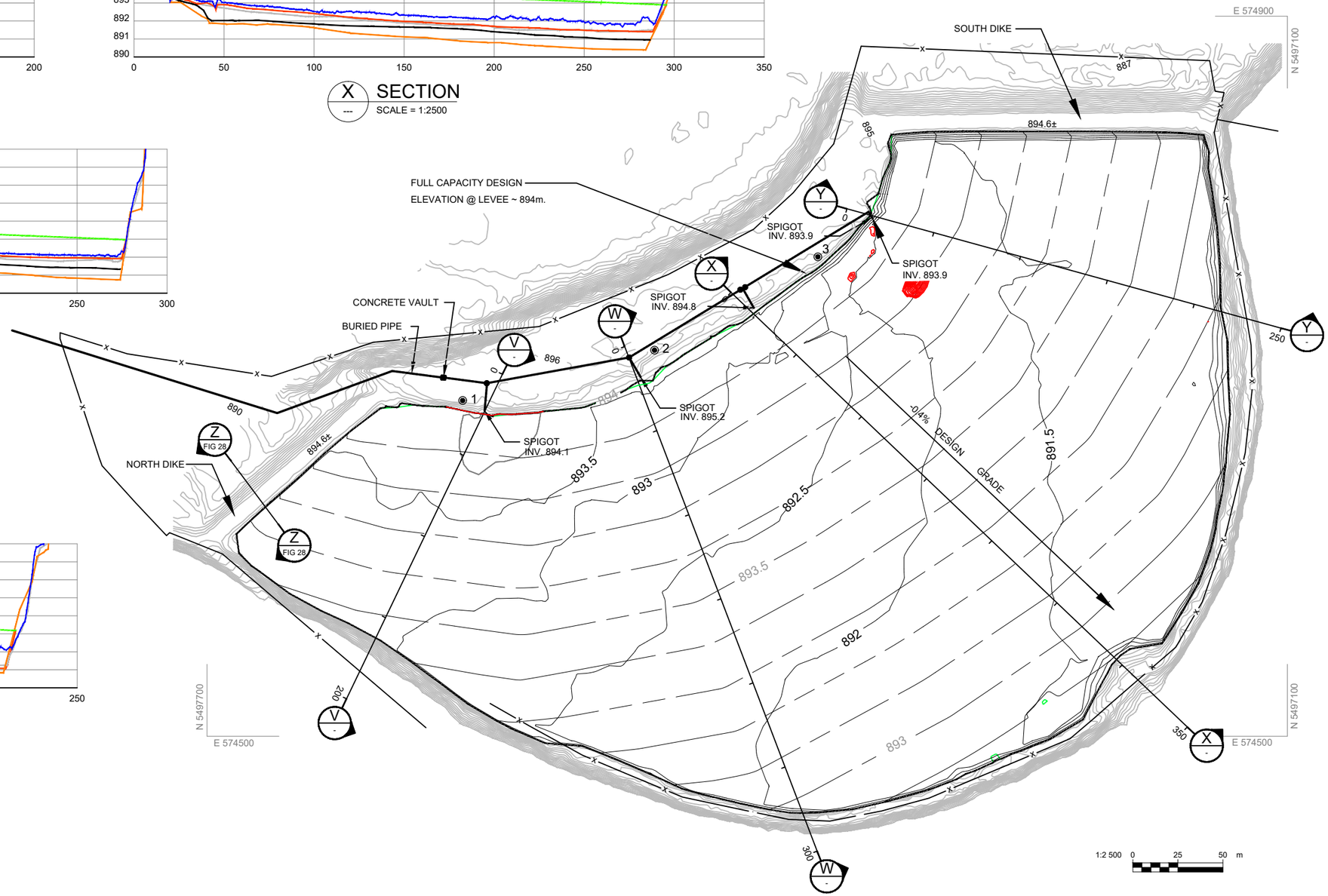
W SECTION
SCALE = 1:2500

VOLUME SUMMARY

2001 SURVEY TO FULL POOL @ 0.4% GRADIENT ~ 278,000 cu.m.	
2001(MAY 8) SURVEY TO 2009(SEPT 18)	~ 52,430 cu.m.
2012 LIDAR SURFACE TO FULL POOL	~ 182,550 cu.m.
2015 SURFACE TO FULL POOL	~ 163,630 cu.m.



Y SECTION
SCALE = 1:2500



LEGEND:

LOCATION AND DIRECTION OF PHOTOGRAPHS TAKEN DURING 2015 INSPECTION
PHOTO NUMBER
8.01
LOCATION WHERE PHOTO WAS TAKEN
DIRECTION OF VIEW

2001 SURFACE
2009 SURVEY
2012 LIDAR SURVEY
2015 SURVEY (INTERVAL 0.5m)
2019 LIDAR SURVEY
FULL POOL DESIGN SURFACE (INTERVAL 0.25m)
FULL POOL PERIMETER (128,500 sq.m.)
DENOTES SHUT OFF STANDPIPE
1 CONTROL MONUMENT PLACED 2015

NOTES:

1. SLUDGE IMPOUNDMENT LAYOUT AND CROSS SECTIONS PROVIDED BY TM TECH SERVICES, DRAWING NO. K101A2243 DATED SEPTEMBER 9 2015.
2. EXCESS SLUDGE AT SPIGOT NO. 1 RELOCATED OCTOBER 27, 2015.

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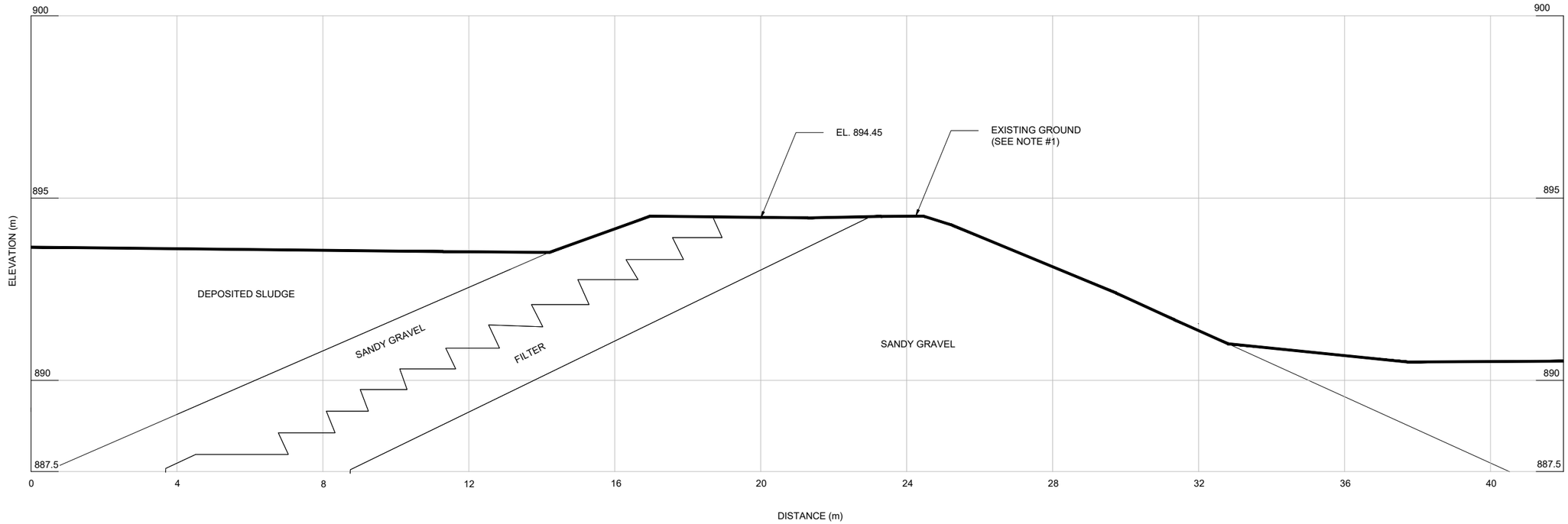
PROJECT: SULLIVAN MINE
2022 ANNUAL INSPECTION REPORT

TITLE: SLUDGE IMPOUNDMENT DIKES PLAN

SCALE	PROJECT No.	FIG. No.
AS-SHOWN	A05807A22	27

KCB-FIG-B-L

Z:\AIEDM\A05807A22 TML 2022 Dam Safety Services\400 Drawings\Annual Inspection\Figure 27_Sludge 2022.dwg November 18, 2022 TDo



Z SECTION
\- SCALE = 1:125

NOTES:

1. SURFACE TOPOGRAPHY FROM LIDAR PROVIDED BY TECK METALS LTD. DATED DECEMBER 2012.
2. SUBSURFACE LITHOLOGY TRACED FROM 1978 CONSTRUCTION ACTIVITIES SLUDGE STORAGE POND - STAGE I DYKES.

1:125 0 1.25 2.5 m

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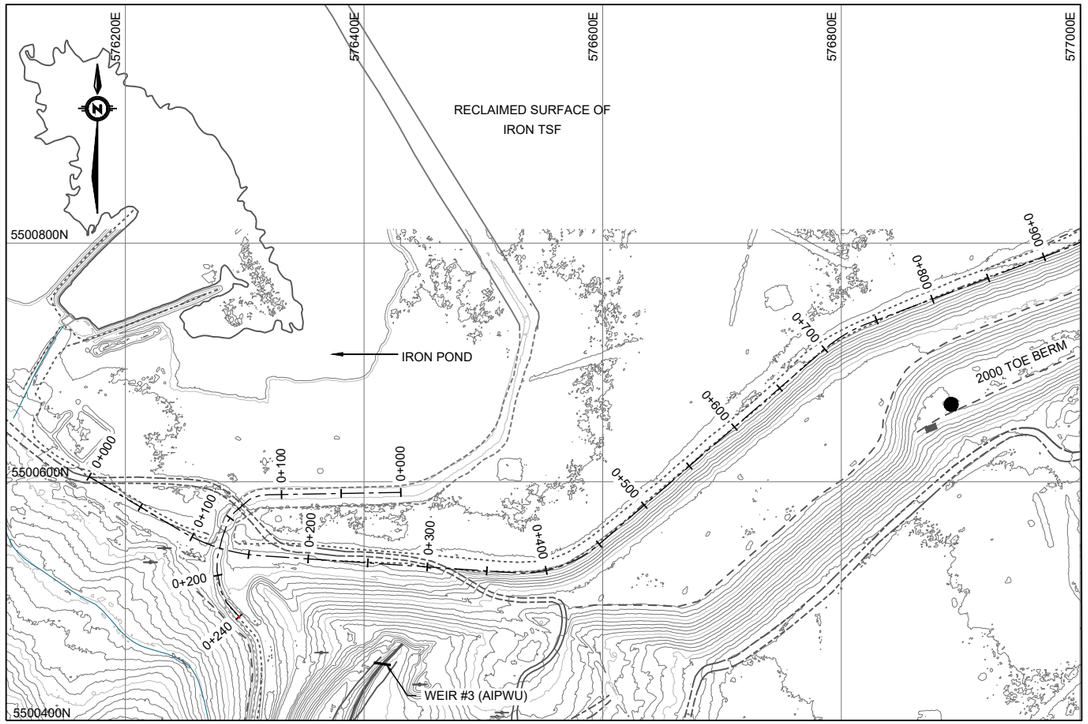
PROJECT: SULLIVAN MINE
2022 ANNUAL INSPECTION REPORT

TITLE: SLUDGE IMPOUNDMENT DIKES
SECTION Z

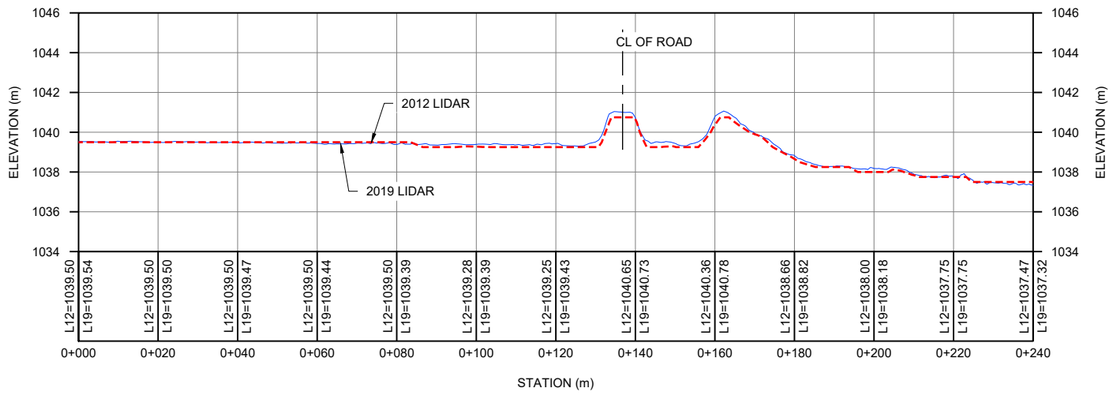
SCALE	PROJECT No.	FIG. No.
AS-SHOWN	A05807A22	28

KCB-FIG-B-L

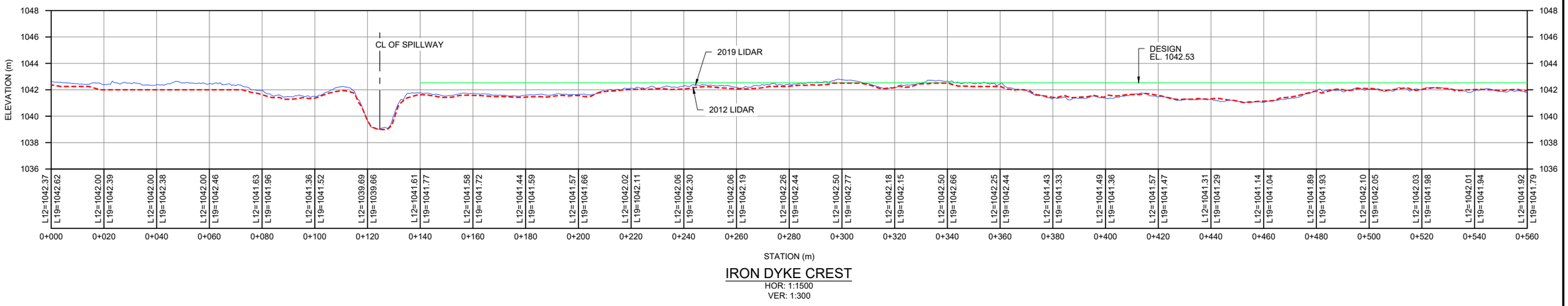
Z:\AE\M\A05807A22 TML 2022 Dam Safety Services\400 Drawings\Annual Inspection\Figure 28_Sludge Impoundment Sections 2022.dwg November 18, 2022 TDo



PLAN
SCALE : 1:5000



SPILLWAY
HOR: 1:1500
VER: 1:300



IRON DYKE CREST
HOR: 1:1500
VER: 1:300

1:300 0 3.0 6.0 m
1:1500 0 15 30 m
1:5000 0 50 100 m

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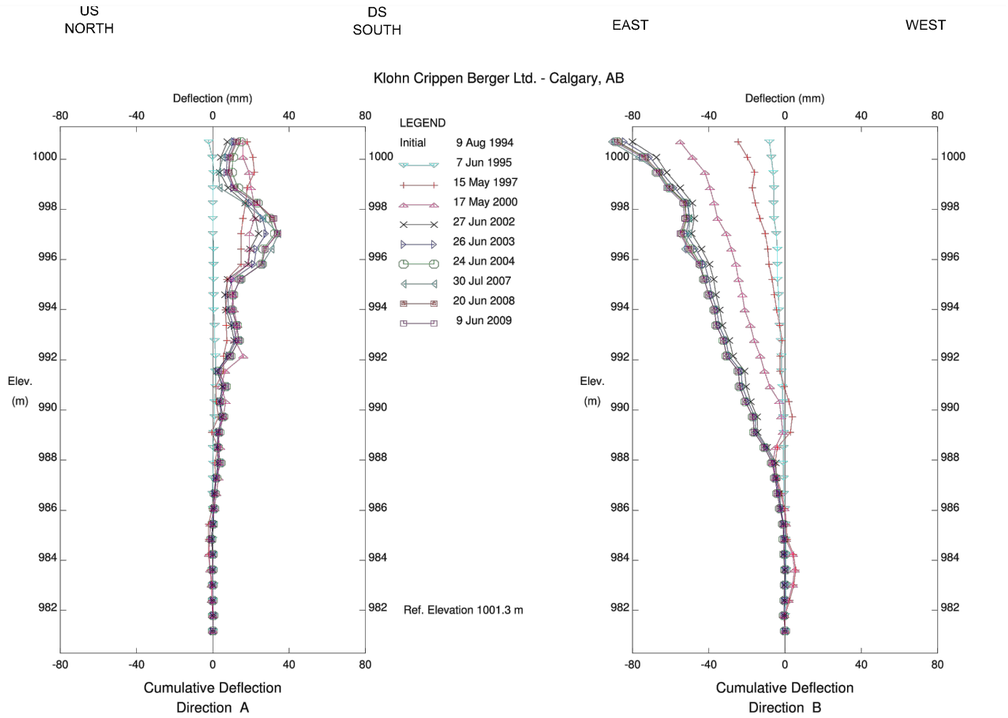
PROJECT
SULLIVAN MINE
2022 ANNUAL INSPECTION REPORT

TITLE
IRON DIKE CREST
AND SPILLWAY PROFILE

SCALE	PROJECT No.	FIG. No.
AS-SHOWN	A05807A22	IV-15

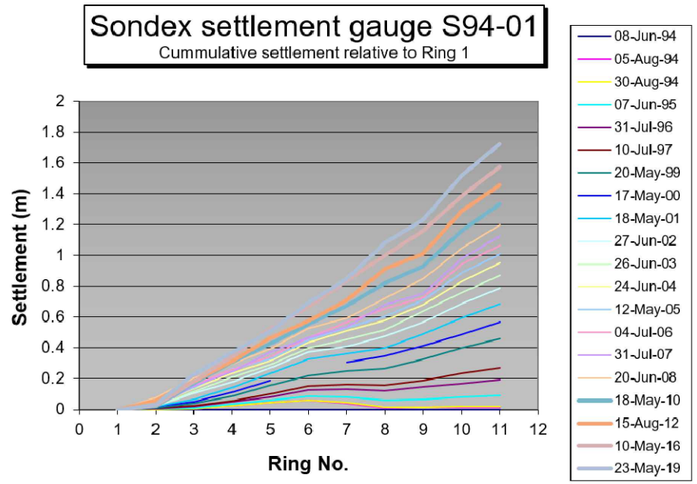
KCB-FIG-8-L

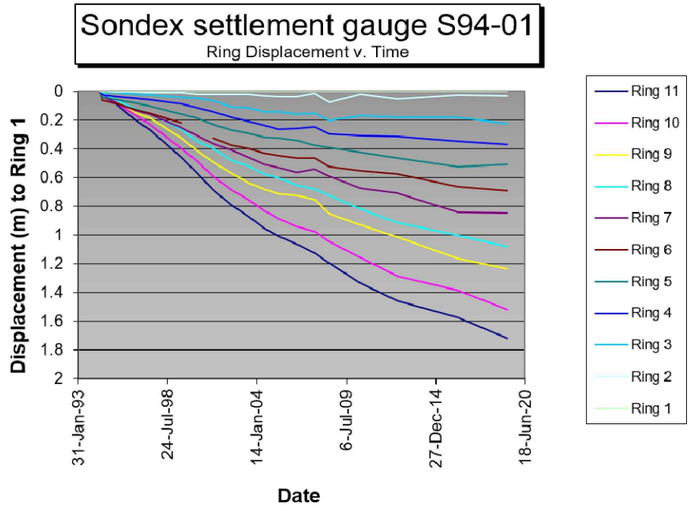
Z:\AEDM\A05807A22 TML 2022 Dam Safety Services\400 Drawings\Annual Inspection\Figure IV-15 2022.dwg November 18, 2022 TDo



GYPSUM DYKES FACILITY, Inclinometer BI-94-01
SULLIVAN MINE, KIMBERLY

(CAN NO LONGER READ. BLOCKED AT 4.7 m BELOW THE GROUND SURFACE)





CLIENT
Teck

Klohn Crippen Berger

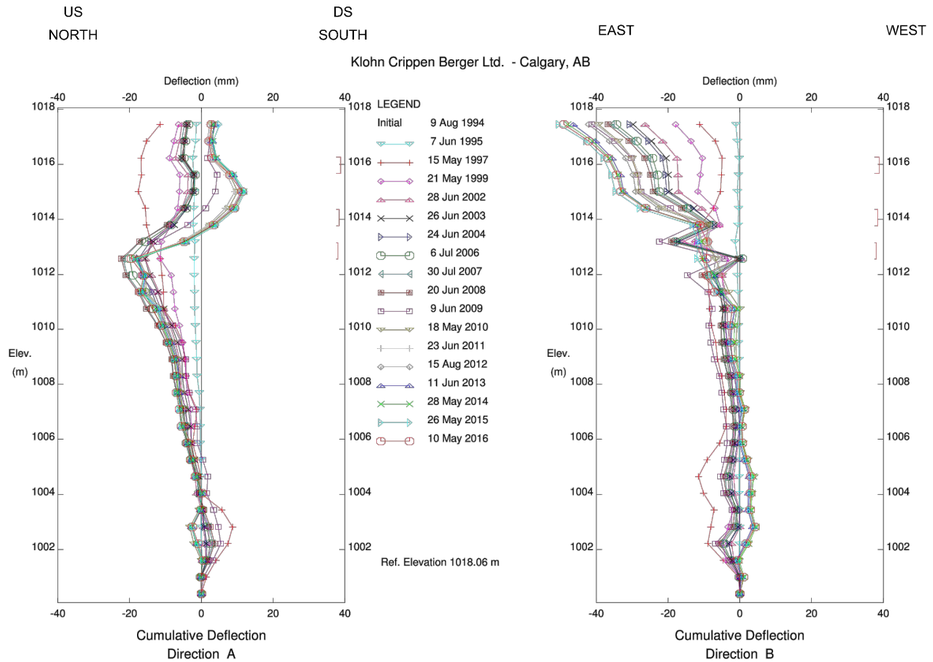
PROJECT
SULLIVAN MINE
2022 ANNUAL INSPECTION REPORT

TITLE
WEST GYPSUM DIKE
SONDEX AND
INCLINOMETER PLOTS

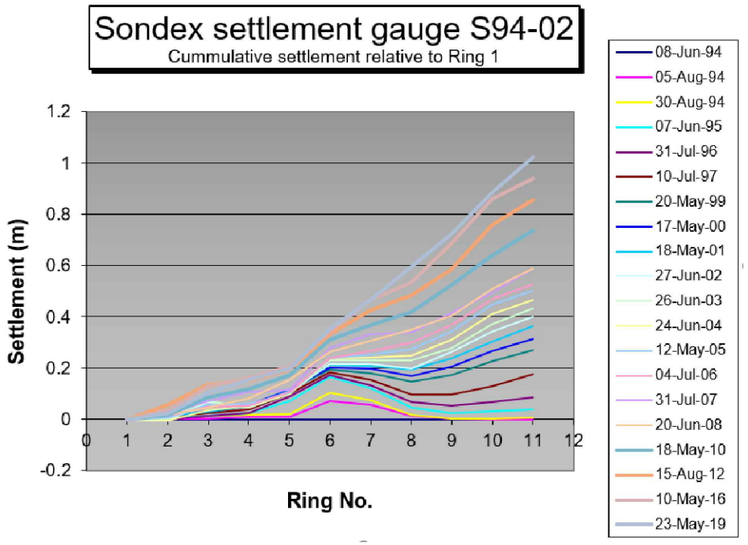
SCALE	PROJECT No.	FIG. No.
AS-SHOWN	A05807A22	VII-1

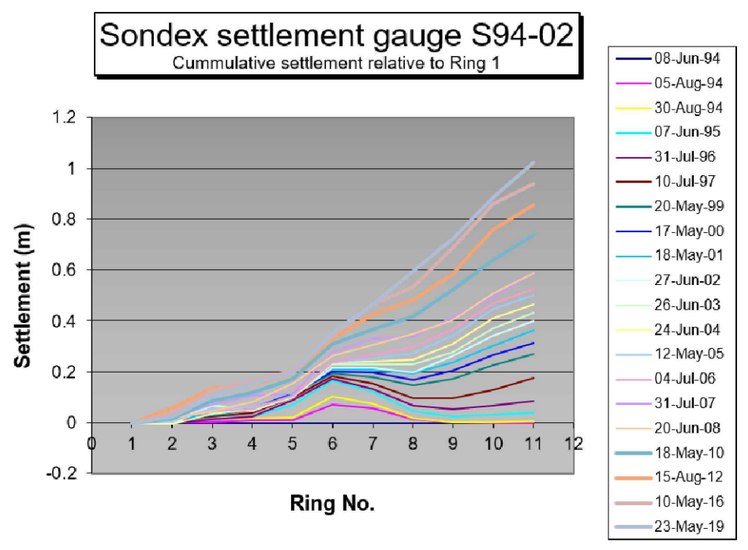
KCB-FIG-B-L

Z:\A\EDM\A05807A22 TML 2022 Dam Safety Services\400 Drawings\Annual Inspection\Figure VII-1.dwg November 18, 2022 TDo



GYPSUM DYKES FACILITY, Inclinometer BI-94-02
SULLIVAN MINE, KIMBERLEY





CLIENT
Teck

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PROJECT
SULLIVAN MINE
2022 ANNUAL INSPECTION REPORT

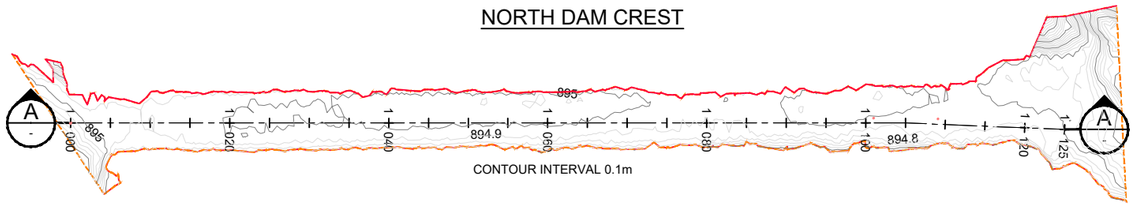
TITLE
EAST GYPSUM DIKE
SONDEX AND
INCLINOMETER PLOTS

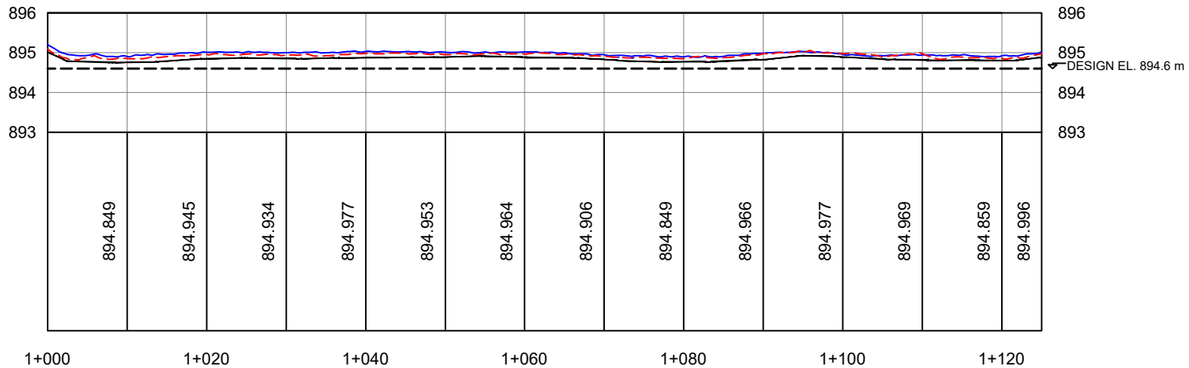
SCALE	PROJECT No.	FIG. No.
AS-SHOWN	A05807A22	VIII-1

KCB-FIG-B-L

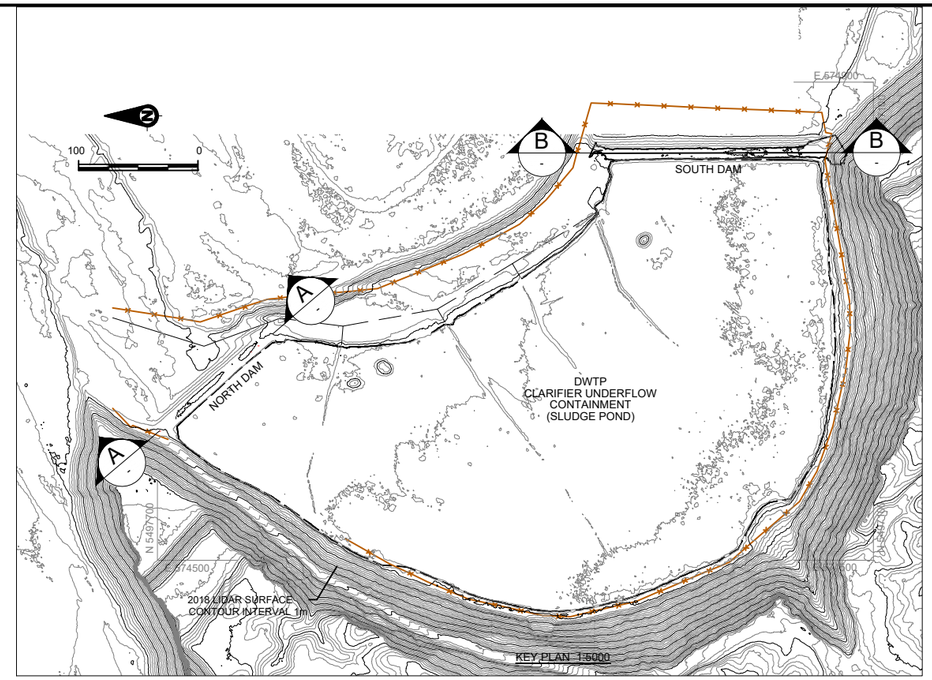
Z:\A\EDM\A05807A22 TML 2022 Dam Safety Services\400 Drawings\Annual Inspection\Figure VIII-1 2022.dwg November 18, 2022 TDo

NORTH DAM CREST

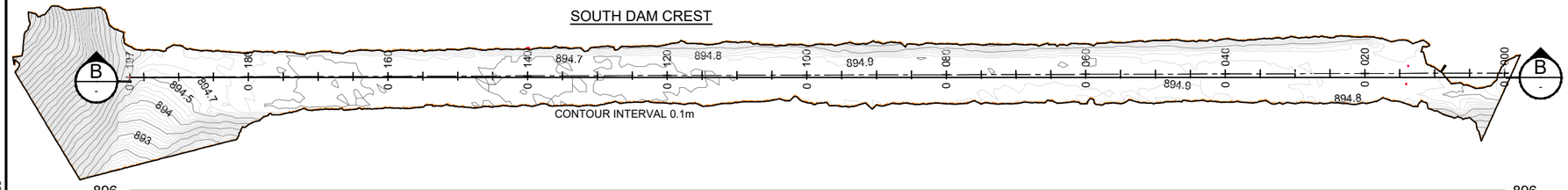


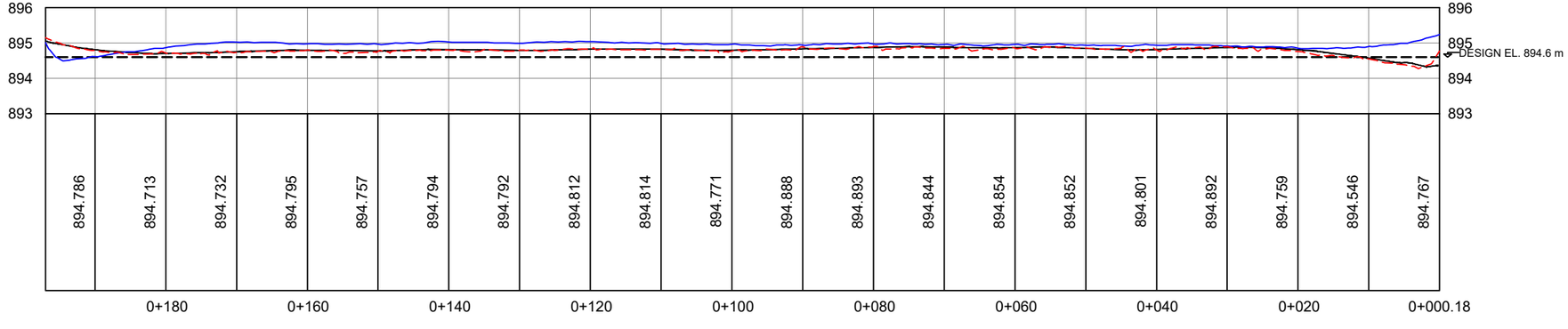


A PROFILE
SCALE 1:750 HORZ.
1:150 VERT.



SOUTH DAM CREST





B PROFILE
SCALE 1:750 HORZ.
1:150 VERT.

LEGEND

- 2012 LIDAR
- 2019 LIDAR

1:5000 0 50 100 m
1:150 0 1.5 3 m
1:750 0 7.5 15 m

CLIENT
Teck

Klohn Crippen Berger

PROJECT
SULLIVAN MINE
2022 ANNUAL INSPECTION REPORT

TITLE
SLUDGE POND
DIKE CREST PROFILES

SCALE	PROJECT No.	FIG. No.
AS-SHOWN	A05807A22	XI-1

KCB-FIG-B-L

Z:\AIEDM\A05807A22 TML 2022 Dam Safety Services\400 Drawings\Annual Inspection\Figure XI-1 2022.dwg November 22, 2022 TDo

APPENDIX I

2022 Visual Inspection

TML Sullivan Inpsection Checklist

Structure: ARD South

Date: May 25/22

Weather: +8 cloudy

Snow Cover? YES / NO

Inspected by: P. Fines, M. Rettger

Pond Elevation:

Operational Limits:

Inspection Item	Remarks
Dam Crest Surface	
Cracks	no
Erosion	no
Settlement/Depressions	no
Vegetation growth	no
Animal Activity (burrows)	no
Any unusual conditions	no well gravelled
Ponding of water	no
Dam Upstream Slope	
Slope protection (riprap)	good
Surface erosion/gullying	no
Slides or sloughing	no
Settlement/Depressions	no
Bulging	no
Cracks	no
Vegetation growth	veg on slope, bushes
Animal Activity (burrows)	N/A
Any unusual conditions	N/A
Dam Downstream Slope and Toe	
Slope protection (grass)	good
Surface erosion/gullying	old erosion gully → rocks + grass
Slides or sloughing	no
Settlement/Depressions	no
Bulging	no
Cracks	no
Vegetation growth	grass on slope, cattail in seepage ditch
Animal Activity (burrows)	burrows / animal activity at toe
Any unusual conditions	

TML Sullivan Inpsection Checklist

Structure: ARD North

Date: May 25/22

Weather: +8, cloudy

Snow Cover? YES / (NO)

Inspected by: P. Fines & M. Rettger

Pond Elevation:

Operational Limits:

Inspection Item	Remarks
Dam Crest Surface	
Cracks	no
Erosion	no
Settlement/Depressions	no
Vegetation growth	some on crest, grass in gravel
Animal Activity (burrows)	no
Any unusual conditions	no
Ponding of water	no
Dam Upstream Slope	
Slope protection (riprap)	yes, adequate
Surface erosion/gullying	no
Slides or sloughing	no
Settlement/Depressions	no
Bulging	no
Cracks	no
Vegetation growth	some shrubs, mostly cut down
Animal Activity (burrows)	no
Any unusual conditions	logs mostly removed fr last time
Dam Downstream Slope and Toe	
Slope protection (grass)	good
Surface erosion/gullying	no
Slides or sloughing	no
Settlement/Depressions	old depressions, no change
Bulging	no
Cracks	no
Vegetation growth	trees at toe cut down
Animal Activity (burrows)	gopher hole right abutment, animal burrow at toe
Any unusual conditions	

TML Sullivan Inpsection Checklist

Structure: Iron TSF

Date:	May 25/22	Inspected by:	P. Fines & M. Aetger
Weather:	+10, cloudy	Pond Elevation:	
Snow Cover?	YES / (NO)	Operational Limits:	

Inspection Item	Remarks
Dam Crest Surface	
Cracks	no
Erosion	no
Settlement/Depressions	no
Vegetation growth	some, grass
Animal Activity (burrows)	no
Any unusual conditions	no
Ponding of water	no
Dam Upstream Slope	
Slope protection (riprap)	till cover & vegetation
Surface erosion/gullying	no
Slides or sloughing	no
Settlement/Depressions	no
Bulging	no
Cracks	no
Vegetation growth	yes,
Animal Activity (burrows)	no
Any unusual conditions	no
Dam Downstream Slope and Toe	
Slope protection (grass)	yes, adequate
Surface erosion/gullying	no
Slides or sloughing	no
Settlement/Depressions	no
Bulging	no
Cracks	no
Vegetation growth	no
Animal Activity (burrows)	not observed
Any unusual conditions	water (orange) at E toe flowing in seepage ditch. no sediment gravel [illegible]

WEIRS → D/S → "V"-notched

TML Sullivan Inpsection Checklist

Structure: Sil #1

Date: May 25/22

Weather:

Snow Cover? YES / NO

Inspected by: P. Fines + M. Rettger

Pond Elevation:

Operational Limits:

Inspection Item	Remarks
Dam Crest Surface	
Cracks	no
Erosion	no
Settlement/Depressions	no
Vegetation growth	grass
Animal Activity (burrows)	not observed
Any unusual conditions	no
Ponding of water	no
Dam Upstream Slope	
Slope protection (riprap)	no, grass
Surface erosion/gullying	no
Slides or sloughing	no
Settlement/Depressions	no
Bulging	no
Cracks	no
Vegetation growth	grass
Animal Activity (burrows)	no
Any unusual conditions	no
Dam Downstream Slope and Toe	
Slope protection (grass)	yes, grass
Surface erosion/gullying	no
Slides or sloughing	no
Settlement/Depressions	no
Bulging	no
Cracks	no
Vegetation growth	no (just grass
Animal Activity (burrows)	not observed
Any unusual conditions	

TML Sullivan Inpsection Checklist

Structure: Sil 2 ~~#4~~

Date: Mar 25/22

Inspected by: P. Fines & M. Rettger

Weather:

Pond Elevation:

Snow Cover? YES / (NO)

Operational Limits:

Inspection Item	Remarks
Dam Crest Surface / impoundment	seepage pipe partially blocked at toe
Cracks	no
Erosion	no
Settlement/Depressions	no
Vegetation growth	yes
Animal Activity (burrows)	not observed
Any unusual conditions	no
Ponding of water	no
Dam Upstream Slope	
Slope protection (riprap)	
Surface erosion/gullying	
Slides or sloughing	
Settlement/Depressions	
Bulging	
Cracks	
Vegetation growth	
Animal Activity (burrows)	
Any unusual conditions	
Dam Downstream Slope and Toe	
Slope protection (grass)	grass
Surface erosion/gullying	no
Slides or sloughing	no
Settlement/Depressions	no
Bulging	no
Cracks	no
Vegetation growth	sparse in places, early spring
Animal Activity (burrows)	tracks, digging
Any unusual conditions	

TML Sullivan Inpsection Checklist

Structure: Sil 3

Date: May 25/22

Weather: +10, cloudy

Snow Cover? YES / NO

Inspected by: I

Pond Elevation:

Operational Limits:

Inspection Item	Remarks
Dam Crest Surface / impoundment	
Cracks	no
Erosion	no
Settlement/Depressions	hummocky
Vegetation growth	yes,
Animal Activity (burrows)	not observed
Any unusual conditions	no
Ponding of water	no
Dam Upstream Slope	
Slope protection (riprap)	
Surface erosion/gullying	
Slides or sloughing	
Settlement/Depressions	
Bulging	
Cracks	
Vegetation growth	
Animal Activity (burrows)	
Any unusual conditions	
Dam Downstream Slope and Toe	
Slope protection (grass)	yes, sparse in areas, cool spring?
Surface erosion/gullying	no
Slides or sloughing	no
Settlement/Depressions	no
Bulging	no
Cracks	no
Vegetation growth	yes, same areas sparse
Animal Activity (burrows)	animal tracks,
Any unusual conditions	some areas w/ lack of veg, doesn't seem to be slump, clay top soil?

TML Sullivan Inpsection Checklist

Structure: Recycle Dam

Date: Mar 25/22

Inspected by: P. Fines & M. Aeltger

Weather:

Pond Elevation:

Snow Cover? YES / NO

Operational Limits:

Inspection Item	Remarks
Dam Crest Surface	
Cracks	no
Erosion	no
Settlement/Depressions	no
Vegetation growth	grass, no shrubs, slightly tall
Animal Activity (burrows)	not observed
Any unusual conditions	no
Ponding of water	no
Dam Upstream Slope	
Slope protection (riprap)	grass, no rip rap
Surface erosion/gullying	no
Slides or sloughing	no
Settlement/Depressions	no
Bulging	no
Cracks	no
Vegetation growth	no
Animal Activity (burrows)	no
Any unusual conditions	no
Dam Downstream Slope and Toe	
Slope protection (grass)	rock / gravel
Surface erosion/gullying	no
Slides or sloughing	no
Settlement/Depressions	no
Bulging	no
Cracks	no
Vegetation growth	no
Animal Activity (burrows)	no
Any unusual conditions	

TML Sullivan Inpsection Checklist

Structure: NE Gypsum Dam

Date: Mar 25/22

Inspected by: P. Fines & M. Rettger

Weather:

Pond Elevation:

Snow Cover? YES / NO

Operational Limits:

Inspection Item	Remarks
Dam Crest Surface	
Cracks	no
Erosion	no
Settlement/Depressions	no
Vegetation growth	well grassed
Animal Activity (burrows)	no
Any unusual conditions	no
Ponding of water	no
Dam Upstream Slope	
Slope protection (riprap)	N/A
Surface erosion/gullying	no
Slides or sloughing	no
Settlement/Depressions	no
Bulging	no
Cracks	no
Vegetation growth	well grassed
Animal Activity (burrows)	no
Any unusual conditions	no
Dam Downstream Slope and Toe	
Slope protection (grass)	yes
Surface erosion/gullying	no
Slides or sloughing	no
Settlement/Depressions	no
Bulging	no
Cracks	no
Vegetation growth	shrubby, trees
Animal Activity (burrows)	animal paths, tracks
Any unusual conditions	

TML Sullivan Inpsection Checklist

Structure: Old Iron TSF

Date: May 25/22

Inspected by: P. Fines & M. Rettger

Weather:

Pond Elevation:

Snow Cover? YES / NO

Operational Limits:

Inspection Item	Remarks
Dam Crest Surface	-gravelly
Cracks	no
Erosion	no
Settlement/Depressions	no
Vegetation growth	sparse weeds
Animal Activity (burrows)	no
Any unusual conditions	no
Ponding of water	no
Dam Upstream Slope	
Slope protection (riprap)	grass
Surface erosion/gullying	no
Slides or sloughing	
Settlement/Depressions	
Bulging	
Cracks	
Vegetation growth	
Animal Activity (burrows)	
Any unusual conditions	
Dam Downstream Slope and Toe	
Slope protection (grass)	yes adequate
Surface erosion/gullying	no
Slides or sloughing	no
Settlement/Depressions	no
Bulging	no
Cracks	no
Vegetation growth	grass, low & manageable
Animal Activity (burrows)	not observed
Any unusual conditions	

TML Sullivan Inpsection Checklist

Structure: West Gypsum

Date: Mar 26/22

Weather: +20 - cloudy

Snow Cover? YES / NO

Inspected by: P. Fines & M. Rettger

Pond Elevation:

Operational Limits:

Inspection Item	Remarks
Dam Crest Surface	- some shrubs in spillway
Cracks	no
Erosion	no
Settlement/Depressions	no
Vegetation growth	some grass
Animal Activity (burrows)	yes on shoulder, gopher, 1 badger
Any unusual conditions	no
Ponding of water	no
Dam Upstream Slope	
Slope protection (riprap)	rocks, N/A
Surface erosion/gullying	no
Slides or sloughing	no
Settlement/Depressions	no
Bulging	no
Cracks	no
Vegetation growth	tall grass
Animal Activity (burrows)	gopher holes
Any unusual conditions	no
Dam Downstream Slope and Toe	
Slope protection (grass)	yes
Surface erosion/gullying	no
Slides or sloughing	no
Settlement/Depressions	no
Bulging	no
Cracks	no
Vegetation growth	grass, some tall reeds by pumphouse
Animal Activity (burrows)	gopher holes at toe + slope
Any unusual conditions	

TML Sullivan Inpsection Checklist

Structure: East Gypsum

Date: May 26/22

Inspected by: P. Fines & M. Bettger

Weather:

Pond Elevation:

Snow Cover? YES / NO

Operational Limits:

Inspection Item	Remarks
Dam Crest Surface	
Cracks	no
Erosion	no
Settlement/Depressions	no
Vegetation growth	no, well gravelled
Animal Activity (burrows)	some gopher on shoulder
Any unusual conditions	no
Ponding of water	no
Dam Upstream Slope	
Slope protection (riprap)	N/A
Surface erosion/gullying	no
Slides or sloughing	no
Settlement/Depressions	no
Bulging	no
Cracks	no
Vegetation growth	grass
Animal Activity (burrows)	gopher holes
Any unusual conditions	no
Dam Downstream Slope and Toe	
Slope protection (grass)	yes
Surface erosion/gullying	no
Slides or sloughing	no
Settlement/Depressions	no
Bulging	no
Cracks	no
Vegetation growth	no
Animal Activity (burrows)	YES → gopher & large badger holes on E half
Any unusual conditions	

TML Sullivan Inpsection Checklist

Structure: N+S Sludge

Date: _____ Inspected by: _____

Weather: _____ Pond Elevation: _____

Snow Cover? YES / NO Operational Limits: _____

Inspection Item	Remarks
Dam Crest Surface	
Cracks	No
Erosion	No
Settlement/Depressions	No
Vegetation growth	No, some minor grass
Animal Activity (burrows)	on shoulder of S dyke crest
Any unusual conditions	no
Ponding of water	no
Dam Upstream Slope	
Slope protection (riprap)	yes
Surface erosion/gullying	no
Slides or sloughing	no
Settlement/Depressions	no
Bulging	no
Cracks	no
Vegetation growth	some vegn
Animal Activity (burrows)	no
Any unusual conditions	no
Dam Downstream Slope and Toe	
Slope protection (grass)	gravel & rocks
Surface erosion/gullying	no
Slides or sloughing	no
Settlement/Depressions	no
Bulging	no
Cracks	no
Vegetation growth	lots of tall trees & shrubs
Animal Activity (burrows)	no
Any unusual conditions	

APPENDIX II

Site Visit Photographs

Appendix II
Site Visit Photographs

Photo II.1 ARD South Dam Upstream Slope

Photo II.2 North Dam Upstream Slope

Photo II.3 Erosion adjacent to pumphouse

Photo II.4 ARD North Dam Downstream Slope

Photo II.5 Vegetation at toe of North Dam

Photo II.6 South Dam Downstream Slope

Photo II.7 Weir 1 downstream ditch

Photo II.8 Weir 2 – AIPWU

Photo II.9 Iron Dike Downstream Slope

Photo II.10 Iron Dike Crest and Crest of Toe Berm

Photo II.11 Overview of Iron Pond

Photo II.12 Overview of Iron TSF looking towards Iron Pond

Photo II.13 Weir #3

Photo II.14 Channel Upstream of Weir #3

Photo II.15 Weir #4

Photo II.16 Weir #4 worn notch

Photo II.17 Emergency Spillway Channel Inlet

Photo II.18 Emergency Spillway Channel upper section looking downstream from inlet

Photo II.19 Emergency Spillway Channel looking upstream from connection to West Gypsum TSF

Photo II.20 Emergency Spillway Channel outlet to Cow Creek

Photo II.21 No. 1 Siliceous Dike Downstream Slope

Photo II.22 No. 2 Siliceous Dike

Photo II.23 No. 3 Siliceous Dike

Photo II.24 Seepage downstream of No. 2 Siliceous Dike

Photo II.25 Decant outlet channel downstream of No. 3 Siliceous

Photo II.26 Siliceous TSF Spillway

Photo II.27 Siliceous TSF Spillway on No. 3 Siliceous TSF

Photo II.28 East Gypsum Dike downstream slope

Photo II.29 West Gypsum Dike downstream slope

Photo II.30 Recycle Dam downstream slope

Photo II.31 Northeast Gypsum Dike Downstream Side

Photo II.32 Sludge Impoundment North Dike downstream slope

Photo II.33 Sludge Impoundment South Dike Crest and Upstream Slope

Photo II.34 Sludge Impoundment South Dike Downstream Slope

Photo II.35 Calcine Dike Crest and Downstream Slope

Photo II.36 Old Iron Dike Crest and Upstream Slope

Photo II.37 Old Iron Dike downstream slope

Photo II.38 Iron TSF Divider Dike

APPENDIX III

2022 Instrumentation Monitoring

Appendix III
Quantifiable Performance Objectives and 2022 Instrumentation Monitoring

III.1 QUANTIFIABLE PERFORMANCE OBJECTIVES

Quantifiable Performance Objectives (QPOs) have been established for all of the instrumentation and for the freeboard under normal operating conditions for those tailings facilities which have ponds, i.e., ARD Pond and Iron Pond. The QPOs are discussed below.

III.1.1 Piezometric

Pneumatic, standpipe, and vibrating wire piezometers are all used at site to monitor phreatic surfaces within the tailings facilities and foundations. The notification levels established for the piezometers, required monitoring frequency and current readings are summarized in Section III.2 Table AIII.3.

The following is required when a notification level is reached for a single instrument:

- Data, data reductions, and calculations are checked for accuracy and correctness
- If no errors are found in the calculations, the Mine Manager is notified that an anomalous reading has been observed and that further assessment must be conducted. The EOR is notified at this time. The EOR will evaluate data for reliability, review data within the general vicinity of the individual instrument. The EOR may require the following:
  - Check of readout equipment to verify that it is functioning correctly and to verify calibration
  - Reread instrument and other nearby instruments for confirmation
  - Adjust on-going monitoring frequency as required
- If it is observed that an instrument or piece of readout equipment has stopped functioning, the Mine Manager and subsequently, the EOR should be notified immediately. If considered critical, a replacement instrument should be installed.

If several instruments within an area of the dikes or dams are observed to exceed the notification levels, then the following is required:

- The Mine Manager and EOR should be notified within 24 hours.
- Monitoring frequency will be increased as needed based on assessment of common trend.
- EOR to assess the dam integrity and may recommend analyses, site visit, or implementation of remedial actions as required.

III.1.2 Settlement

There are several methods used to monitor settlement at the Sullivan Mine tailings facilities. These include settlement plates, Sondex settlement gauges, and surveys.

Notification levels have been established for the various settlement measurements. These are summarized along with survey results and required monitoring frequency in Section III.2 Table AIII.4.

The following response is required when the notification level is exceeded at one instrument:

- Notify EoR within 24 hours upon verification of reading exceedance.
- EoR to evaluate data for reliability, and review survey data within the general vicinity of the individual survey monument in question. EoR may recommend repeat measurement and increased on-going monitoring frequency.

If more than one instrument within the facility indicates exceedance of the notification level, then the following is required:

- Notify EoR within 24 hours upon verification of reading exceedance.
- Repeat reading within one week.
- EoR to assess dam integrity and may recommend analyses, site visit, or other action.

III.1.3 Lateral Movement

There is one inclinometer installed in the East Gypsum Dike to monitor lateral movements. A notification level has been established for the inclinometer and is provided along with the required monitoring frequency in Section III.2 Table AIII.4.

The following response is required when the notification level is exceeded:

- Data reductions are checked for accuracy and correctness.
- EoR to evaluate data for reliability and review other instrumentation in vicinity of the slope inclinometer. Repeat measurement and/or measurement of other instruments may be recommended.
- EoR to assess dam integrity and may recommend analyses, site visit or other action.

III.1.4 Seepage

There are four weirs installed to measure seepage from the ARD Pond South Dam and the Iron Dike. Notification levels have been established and are provided along with the required monitoring frequency in Section III.2 Table AIII.5.

The following response is required when the notification level is exceeded:

- Data and data reductions are checked for accuracy and correctness.
- EoR to evaluate data for reliability and review other instrumentation in the vicinity. Repeat measurement and/or measurement of other instruments may be recommended.
- EoR to assess dam integrity and may recommend analyses, site visit, or other action.

III.1.5 Freeboard

There are three notification levels which have been set for the ARD Pond and the Iron Pond, which are provided in Section III.2 Table AIII.6.

Notification Level 1 indicates when the pumps should be started to transfer water to either the Drainage Water Treatment Plant (ARD Pond) or to the ARD Pond (Iron Pond).

Notification Level 2 indicates when water levels are approaching maximum operating levels. When Notification Level 2 is met or exceeded, transfer of water should continue as well as notifying the EOR and minimizing inflows. For the ARD Pond, this could include diverting 3700/39000 to the Iron Pond and for the Iron Pond, stop pumping to the Iron Pond and divert runoff if possible.

Notification Level 3 indicates when water levels are within 0.5 m of the spillway inverts. When Notification Level 3 is met or exceeded, continue with transfer of water, minimizing inflows, notification of the EOR, and notify MEMPR/MOE of potential spill as well as enacting Emergency Preparedness and Response Plan (EPRP).

III.1.6 Visual Inspections

As part of the QPOs, a series of regularly scheduled inspections is required to ensure that the tailings facilities are operating as intended and to identify problems and issues so that necessary corrective actions may be implemented in a timely manner. The main types of inspections are as follows:

- routine inspections (performed by Teck staff)
- event driven inspections (performed by Teck staff, and the Engineer of Record depending on the event)
- annual inspection (performed by the Engineer of Record)
- dam safety review (performed by an independent and qualified professional engineer)

Routine Visual Inspections

Routine visual inspections are performed by Teck staff and documented using one of the standard inspection forms, which are included in Appendix E of the OMS Manual. Two types of forms are provided: one for Weekly/Bi-weekly inspections and forms for Monthly/Annual inspections.

The minimum visual inspection frequency for each of the structures can be found in Table III-1.

Table III-1 Visual Inspection Requirements for the Dikes and Dams at Sullivan Mine

Dike		CDA Classification	Pond Elevation	Visual Inspection Requirements
ARD Pond Dikes		Very High	< 1040 m	Monthly
			>1040 m	Weekly (a Monthly Inspection form must be filled in once per week if pond is high for an extended period of time, i.e., greater than one month)
Iron Dike (STA 0+00 to 10+00)		High	N/A	Monthly
Iron Dike (STA 10+00 to end of dam)		High	N/A[1]	Annually
Old Iron TSF	Old Iron Dike	Low	N/A[1]	Annually
	Iron TSF Divider Dike	Low		
Siliceous Cell Dikes #1, #2 and #3		Low		Annually
Gypsum TSF	West Gypsum Dike	High		Annually
	East Gypsum Dike	High		
Northeast Gypsum Dike and Recycle Dam		Low		Annually
Calcine Dike		Low		Annually
Sludge Pond		Low	N/A	Bi-Weekly during DWTP operations otherwise Annually

Note: [1] Closed facility, no active pond

The following is a list of general information that should be recorded (monthly and annual inspections):

- signs of depressions and/or movements of the downstream dam/dike slope
- general condition of the dam/dike crest, toe, and faces, looking for settlement, erosion, seepage, cracking, animal burrows, vegetation growth or other abnormal conditions
- water levels in active ponds
- depth of flow in spillways (record zero flow in spillway as 0.0 m^3)
- issues related to blockage and inadequate capacity of spillway channels
- seepage noting change in flow rate and visual cloudiness and any new seepage

Documentation of the routine inspections should be submitted to the Mine Manager following each inspection. If any maintenance requirements or anomalies are identified during the inspection, these must be identified to the mine manager.

The annual routine inspection by Teck staff should be planned such that it does not coincide with the annual inspection performed by the Engineer of Record. The annual routine inspection should include photographs of key features and any potential dam/dike safety concerns.

The completed inspection forms are stored in an electronic data base system, and hard copies of the inspection forms are catalogued and stored at Sullivan Mine.

Event Driven Inspections

In addition to routine inspections, special inspections may be required for significant seismic or climatic events, or anomalous instrumentation readings. Table III-2 presents the specific inspections to be carried out following specified events. All events involve immediate inspection by Teck staff, followed if required by notification to or inspection by the Engineer of Record.

Table III-2 Event Driven Inspections

Item	Event	Action	Comment
Embankments	Earthquake M5 or bigger within 100 km	Immediate inspection by Teck staff	Call the Engineer of Record if damage is noted
		Read all instruments within one week	Send instrument data to the Engineer of Record
	Earthquake M6 or bigger within 100 km	Inspection by the Engineer of Record Read all instruments	
	Rainfall (50 year event): 6 hour > 40 mm 24 hour > 56 mm Snowpack (50 year event): Accumulated snow water equivalent > 360 mm	Check and record water ponding Check dam toe seepage daily Drawdown water level if necessary	
	DWTP water delivery system fails	Check water level in the ARD Pond and Iron Pond daily Check rainfall daily Prepare standby pumps if required	Call the Engineer of Record if one pond is more than 75% full
	Instability or noticeable deformation, displacement of riprap.	Inspection by the Engineer of Record	
Surface Water Conveyance System	Rainfall (50 year event): 6 hour > 40 mm 24 hour > 56 mm Snowpack (50 year event): Accumulated snow water equivalent > 360 mm	Check and record water flow and ponding Check channels for debris Check channels for damage to riprap lining	

Annual Inspections

Annual inspections shall be carried out by the Engineer of Record for the tailings facilities for Sullivan Mine. The objective of the annual inspection is to confirm the routine inspections carried out, and to carry out a review of the conditions of the facilities and facility operation. The site water balance is reviewed to confirm the inputs and assumptions are still valid according to the current conditions.

The Engineer of Record issues an annual inspection report to the Mine Manager containing observations and recommendations. This report provides information to be used to revise the operation, maintenance, and surveillance programs as necessary and to assist in planning for future operation of the facility. The annual inspection reports are issued to the British Columbia Ministry of Environment (BC MOE) by March 31 each year (as stated in Permit No. 74). Copies of the annual inspection report are to be stored at Sullivan Mine.

III.2 INSTRUMENT DATA SUMMARY

The lists of active instruments and measurement points, along with alarm notification levels and maximum readings from the 2022 DSI reporting period, are shown in Tables AIII.3, AIII.4, AIII.5, and AIII.6. Updated instrument readings were provided to KCB by Vast Resources (Vast) and Teck staff on several occasions from September 2021 to August 2022. Vast of Cranbrook, British Columbia is contracted by Teck to read the pneumatic and standpipe piezometers, and WSP to survey the settlement plates and dike crests. The daily/weekly readings for the weirs and ARD Pond standpipes were performed by Teck staff. Copies of the plots that were produced for each impoundment area are included in Appendix IV through Appendix X.

Table III-3 Active Piezometers – Iron TSF

Group Designation	Piezometer No.	Northing	Easting	Elevation Ground (m)	Top of Casing Elevation (m)	Tip/Bottom of Casing (m)	General Location	Instrument Type	Recommended Reading Frequency	Notification Level (m)	Max Measured Piezometer Level In 2022[1] (m)	Max 2022 Level Relative To 2021[2]	Comment
	Iron TSF												
Line 6+00	P91 – 1	5500541.5	576470.5	1037.3	N/A	1023.0	Dike	Pneumatic	Three times a year (spring, summer and fall)	1028.4	1023.2 2022-05-18	↓	
	P91 – 2A	5500512.5	576459.9	1029.7	N/A	1020.1	Road	Pneumatic		1026.9	1023.0 2022-05-18	↑	
	P91 – 2B	5500511.9	576462.4	1029.3	N/A	1021.5	Road	Pneumatic		1026.9	1023.1 2022-05-18	↔	
Line 16+00	SB – P15	5500739.4	576803.0	1033.9	N/A	1029.0	Iron TSF	Pneumatic		1036.2	1032.6 2022-05-18	↔	
	P91 – 3A	5500660.4	576707.5	1038.4	N/A	1008.6	Dike	Pneumatic		1024.8	1023.4 2022-05-18	↓	
	P91 – 3B	5500661.3	576708.4	1038.3	N/A	1023.7	Dike	Pneumatic		1025.8	1023.7 N/A	↔	Dry
	P91 – 3C	5500660.4	576709.0	1038.9	N/A	1021.3	Dike	Pneumatic		1025.8	1021.9 2021-10-26	↓	
	P91 – 4	5500630.6	576730.8	1031.5	N/A	1017.2	Bench	Pneumatic		1022.0	1020.2 2020-05-18	↓	
	P92 – 20	5500593.9	576760.7	1033.0	N/A	1010.4	Bench	Pneumatic		1015.9	1015.2 2022-05-18	↔	
	P92 – 21	5500595.8	576762.3	1033.0	N/A	1012.2	Bench	Pneumatic		1015.9	1015.5 2022-05-18	↑	
Line 24+00	P91 – 5A	5500482.1	576931.7	1039.7	N/A	1017.7	2400 Bench at Dike	Pneumatic		1031.8	1030.8 2022-05-18	↑	
	P91 – 5B	5500786.8	576930.2	1039.7	N/A	1026.7	2400 Bench at Dike	Pneumatic		1030.0	1027.0 2021-10-26	↓	
	P91 - 6	5500752.7	576941.0	1031.5	N/A	1020.5	2400 Bench at Dike	Pneumatic		1023.6	1022.7 2022-05-18	↔	
Line 30+00	P92 – 1	5500893.9	577066.3	1035.1	N/A	1021.1	91 Dike	Pneumatic		1033.0	1031.4 2022-05-18	↑	
	P92 – 2	5500865.9	577113.8	1028.6	N/A	1024.0	Slope	Pneumatic	Monthly	1027.8	1026.5 2022-04-01	↑	
Line 38+00	P92 – 6	5501125.1	577156.5	1042.1	N/A	1024.2	91 Dike	Pneumatic	Three times a year (spring, summer and fall)	1033.6	1031.9 2022-05-18	↑	
	P92 – 7	5501118.0	577174.9	1040.2	N/A	1029.6	Slope	Pneumatic		1032.7	1030.4 2022-05-18	↑	
	P92 – 9	5501097.9	577314.6	1029.9	N/A	1025.3	Toe	Pneumatic		1028.4	1027.7 2022-05-18	↑	
Line 42+00	P92 – 11	5501217.8	577335.4	1031.5	N/A	1025.0	Toe	Pneumatic		1028.4	1025.6 2022-05-18	↑	
	P91 – 11A	5501258.1	577172.2	1042.4	N/A	1027.0	91 Dike	Pneumatic		1036.7	1033.2 2022-05-18	↓	
	P91 – 11B	5501258.1	577172.2	1042.3	N/A	1029.9	91 Dike	Pneumatic		1036.7	1033.3 2022-05-18	↓	
	P91 – 12	5501209.4	577418.1	1040.9	N/A	1029.7	Slope	Pneumatic		1034.5	1032.9 2022-05-18	↔	

Group Designation	Piezometer No.	Northing	Easting	Elevation Ground (m)	Top of Casing Elevation (m)	Tip/Bottom of Casing (m)	General Location	Instrument Type	Recommended Reading Frequency	Notification Level (m)	Max Measured Piezometer Level In 2022[1] (m)	Max 2022 Level Relative To 2021[2]	Comment
	Iron TSF												
	P92 - 16	5501237.6	577246.4	1037.3	N/A	1027.6	Slope	Pneumatic		1030.6	1029.1 2022-05-18	↑	
Line 45+00	P92 - 13	5504074.8	577182.3	1040.5	N/A	1031.3	91 Dike	Pneumatic		1037.3	1031.3 2022-05-18	↓	Dry
	P92 - 14	5504071.7	577199.9	1037.4	N/A	1029.6	Slope	Pneumatic		1036.8	1034.0 2022-05-18	↑	
	P92 - 15	5501320.2	577314.9	1030.3	N/A	1029.0	Toe	Pneumatic		1030.3	1029.3 2020-10-19	↑	
Line 54+00	P5	5501660.5	577228.4	1039.1	1041.6	1037.4	Toe at Siliceous Cell #1	Standpipe	Annually	1039.5	1038.6 2022-04-05	↑	
Toe Piezometers	P92 – H	5500665.1	576891.7	1025.6	N/A	998.1	21+00	VWP	Remotely monitored (hourly readings). Review data monthly.	1032.0	1025.8 2022-04-18	↔	
	P92 – 25	5500806.7	577125.8	1022.9	N/A	999.0	28+00	Pneumatic	Monthly	1032.0	1029.2 2022-04-01	↑	
	P92 – 26	5500550.3	576802.5		1019.8	1009.1	16+00	Standpipe	Three times a year (spring, summer and fall)	1015.0	1014.5 2022-04-01	↑	

Notes:

1. 2022 reporting period runs from September 1, 2021 to August 31, 2022.
2. Water levels are considered equal if differences are ≤ 0.1 m.

Table III-4 Active Piezometers – Old Iron TSF

Group Designation	Piezometer No.	Northing	Easting	Ground Elevation (m)	Top of Casing Elevation (m)	Tip/Bottom of Casing (m)	General Location	Instrument Type	Recommended Reading Frequency	Notification Level	Max Measured Piezometer Level In 2022[1]	Max 2022 Level Relative To 2021[2]	Comment
	Old Iron TSF												
Old Iron Dike	P93 – 17	5500680.3	575451.9	1043.0	1043.0	1025.8	Dike	Standpipe	Three times a year (spring, summer and fall)	1037.3	1036.5 2022-04-05	↑	
	P93 – 18	5500701.7	575475.6	1044.4	1044.7	1028.3	Dike	Standpipe		1039.0	1037.8 2022-04-05	↔	
	~~P96 – 08~~	-	-	-	~~N/A~~	~~Unknown~~	~~MCE Buttress~~	~~Pneumatic~~		~~2.6~~[2]	-	-	Replaced with new vibrating wire piezometer in 2018.
	~~P96 – 11~~	~~Not available~~	~~Not available~~	~~Not available~~	~~Not available~~	~~Not available~~	~~MCE Buttress~~	~~Pneumatic~~		~~1.5~~	-	-	Slow leak, erratic data, replaced with new vibrating wire piezometer in 2018.
	P96 – 12	5500652.6	575518.6		N/A	Unknown	MCE Buttress	Pneumatic		0.9[3]	0.1 2022-04-05	↑	
	SUL-OID-VWP-18-01 A&B	5500688.4	575449.2	1043.4	Tip A:	1025.8	MCE Buttress	VWP	Remotely monitored (hourly readings). Review data monthly.	Pending review	1037.0 2022-05-21	↑	
					Tip B:	1036.5		VWP		Pending review	1036.5 2022-04-06	↑	
	SUL-OID-VWP-18-02 A&B	5500633.2	575431.2	1040.1	Tip A:	1016.6	MCE Buttress	VWP		Pending review	1034.7 2022-04-13	↑	
					Tip B:	1035.5		VWP		Pending review	1035.4 2022-01-27	↓	
Iron TSF Divider Dike	P93 – 19	5500962.3	575892.0	1042.6	1043.6	1025.6	Dike	Standpipe	Annual	1040.15	1039.8 2022-04-05	↓	
	P93 – 20	5501191.4	575943.2	1044.1	1045.3	1026.4	Dike	Standpipe		1041.25	1040.1 2022-04-05	↔	

Notes:

1. 2022 reporting period runs from September 1, 2021 to August 31, 2022.
2. Water levels are considered equal if differences are ≤ 0.1 m.
3. Installation elevation not known.

Table III-5 Active Piezometers – Siliceous TSF

Group Designation	Piezometer No.	Northing	Easting	Ground Elevation (m)	Top of Casing Elevation (m)	Tip/Bottom of Casing (m)	General Location	Instrument Type	Recommended Reading Frequency	Notification Level	Max Measured Piezometer Level In 2022[1]	Max 2022 Level Relative To 2021[2]	Comment
	Siliceous Dikes												
West Side Siliceous Dike #1	P5	5501660.5	577228.4	1039.1	1041.6	1037.4	Cell #1	Standpipe	P105 and P5 annually unless change > 0.5 m or at notification levels then read all Piezometers	1039.5	1038.6 2022-04-05	↑	
	SP101	5501176.3	577719.3	1035.4	1036.4	1021.6	Cell #1	Standpipe		1023.9	1021.7 2022-04-01	↔	
Middle Siliceous Dike #1	P105	5501220.6	577927.9	1033.0	1033.2	1021.3	Cell #1	Standpipe		1022.0	1030.0 2022-04-01	↓	Max. 2019, 2020 & 2021 readings above notification level. Casing likely blocked.
	~~SP104~~	~~5501248.9~~	~~577910.8~~	~~1035.4~~	~~1035.1~~	~~1021.1~~	~~Cell #1~~	~~Standpipe~~		~~1022.0~~	~~N/A~~		Blocked at 1031.3
East Side Siliceous Dike #1	SP106	5501410.5	578028.7	1034.1	1034.7	1020.9	Cell #1	Standpipe		1021.4	1021.1 2022-04-01	↔	
Crest Siliceous Dike #2	P231	5500962.2	577497.5	1031.2	1031.2	1019.5	Cell #2	Standpipe	Annual (Spring)	1022.3	1020.7 2022-04-01	N/A	No reading in 2021
	P257	5500971.0	577407.3	1031.3	1030.4	1022.0	Cell #2	Standpipe		1025.0	1022.4 2022-04-01	↓	
	P91 – 13	5500964.5	577413.7	1029.7	N/A	1020.0	Cell #2	Pneumatic	Three times a year (spring, summer and fall)	1025.0	1021.6 2022-05-18	↓	
Lines 3+00/7+00 Siliceous Dike #3	~~P303~~	~~5500977.6~~	~~577855.0~~	~~1029.1~~	~~1029.3~~	~~1020.9~~	~~7+00 Crest~~	~~Standpipe~~	P232, P301 and P303 annually unless change > 0.5 m then read all Piezometers	~~1022.3~~	~~1020.9 2021-04-12~~	↔	Dry Replaced by SUL-SD3-VWP-18-08
	~~P301~~	~~5500973.6~~	~~577739.0~~	~~1028.1~~	~~1029.4~~	~~1020.6~~	~~3+00 Crest~~	~~Standpipe~~		~~1022.3~~	~~1020.6 2021-04-12~~	↔	Replaced by SUL-SD3-VWP-18-06
	~~P302~~	~~5500963.3~~	~~577739.5~~	~~1025.7~~	~~1027.2~~	~~1021.0~~	~~3+00 Slope~~	~~Standpipe~~		~~1021.2~~	~~1021.1 2021-04-12~~	↔	Replaced by SUL-SD3-VWP-18-07
	P232	5500968.5	577854.3	1026.7	1027.3	1017.4	7+00 Slope	Standpipe		1019.3	1017.9 2022-04-01	↓	
	P233	5500959.1	577853.8	1023.6	1024.3	1017.9	7+00 Slope	Standpipe		1019.3	1017.9 2022-04-01	↔	Dry
	SUL-SD3-VWP-18-06 A&B	5500975.7	577751.2	1029.2	Tip A:	1008.8	3+00 Crest	VWP	Remotely monitored (hourly readings). Review data monthly.	Pending review	1014.9 2022-08-31	↔	
					Tip B:	1018.5		VWP		Pending review	1018.0 2022-08-31	N/A	Dry
	SUL-SD3-VWP-18-07	5500920.1	577753.0	1017.1	Tip A:	1006.1	3+00 Toe	VWP		Pending review	1014.7 2021-04-13	↓	
	SUL-SD3-VWP-18-08 A&B	5500985.8	577874.7	1029.6	Tip A:	1009.6	7+00 Crest	VWP		Pending review	1014.1 2020-09-08	↓	
					Tip B:	1017.3		VWP		Pending review	1018.3 2020-12-02	↔	
	~~SUL-SD3-VWP-18-09~~	~~5500919.4~~	~~577852.5~~	~~1016.8~~	~~Tip A:~~	~~1013.4~~	~~7+00 Toe~~	~~VWP~~		~~Pending review~~		~~N/A~~	Non-functioning
Siliceous Dike #3 East Side	P306	5501100.8	578268.9	1028.4	1029.6	1020.9	Crest	Standpipe	Monthly first 12 months then annual (in Spring)	Pending review	1021.0 2022-04-01	↔	Stopped reading in 2004 as dry since 1985. Reinstated 2019. Top of casing to be re-surveyed.
	P307	5501088.7	578278.1	1026.1	1027.0	1020.2	Crest	Standpipe		Pending review	1020.5 2022-04-01	↔	Stopped reading in 2004 as dry since 1985. Reinstated 2019.Top of casing to be re-surveyed. Notification level to be

Group Designation	Piezometer No.	Northing	Easting	Ground Elevation (m)	Top of Casing Elevation (m)	Tip/Bottom of Casing (m)	General Location	Instrument Type	Recommended Reading Frequency	Notification Level	Max Measured Piezometer Level In 2022[1]	Max 2022 Level Relative To 2021[2]	Comment
	Siliceous Dikes												
													etermined following survey and review of readings since 2019.
	P308	5501293.0	578310.5	1028.8	1030.0	1020.8	Crest	Standpipe		Pending review	1021.2 2022-04-01	↔	Stopped reading in 2004 as dry since 1985. Reinstated 2019. Top of casing to be re-surveyed. Notification level to be determined following survey and review of readings since 2019.
	P311	5501659.8	578325.4	1028.8	1030.0	1022.5	Crest	Standpipe		Pending review	1022.8 2022-04-01	↔	Stopped reading in 2004 as dry since 1985. Reinstated 2019. Top of casing to be re-surveyed. Notification level to be determined following survey and review of readings since 2019.
Siliceous Dike #3	SUL-SD3-P-18-10	5501022.5	578270.0	1018.1	1019.4	1004.8	Toe	Standpipe	Monthly	Pending review	1013.5 2022-04-01	↓	
	SUL-SD3-P-18-11	5501452.7	578349.6	1022.1	1023.5	1013.1	Toe	Standpipe		Pending review	1015.5 2022-04-01	↑	

Notes:

1. 2022 reporting period runs from September 1, 2021 to August 31, 2022.
2. Water levels are considered equal if differences are ≤ 0.1 m.

Table III-6 Active Piezometers – Gypsum TSF

Group Designation	Piezometer No.	Northing	Easting	Ground Elevation (m)	Top of Casing Elevation (m)	Tip/Bottom of Casing Elevation (m)	General Location	Instrument Type	Recommended Reading Frequency	Notification Level	Max Measured Piezometer Level In 2022[1]	Max 2022 Level Relative To 2021[2]	Comment
	Gypsum TSF												
West Gypsum Dike Line 10+00	P93 – 1	5499811.6	576419.4	1013.8	1014.9	1000.0	Upstream	Standpipe	Three times a year (spring, summer and fall)	1008.0	1004.0 2021-11-01	↓	
	P93 – 2	5499811.0	576420.9	1014.4	1014.4	996.8	Upstream	Standpipe		1008.0	1003.9 2021-11-01	↓	
	P93 – 3	5499789.6	576411.6	1017.5	1016.1	998.0	Crest	Standpipe		1008.0	1003.7 2021-11-01	↓	
	P93 – 4	5499790.2	576409.5	1017.5	1016.4	995.4	Crest	Standpipe		1008.0	1004.0 2021-11-01	↓	
	P93 – 5	5499751.1	576388.7	1011.1	1011.9	993.3	Downstream	Standpipe		1008.0	995.0 2022-04-01	↓	
West Gypsum Dike Line 20+00	~~P93 – 6~~	~~5499691.8~~	~~576696.5~~	~~1014.4~~	~~1014.9~~	~~997.9~~	~~Upstream~~	~~Standpipe~~	Three times a year (spring, summer, and fall)	~~1008.0~~	-	-	Standpipe blocked at ~ 10.4 m
	P93 – 7	5499670.8	576688.2	1015.3	1016.6	997.2	Crest	Standpipe		1008.0	997.5 2021-11-01	↓	
	SUL-WG-P-18-03	5499599.9	576662.0	1001.5	1002.9	984.5	Toe	Standpipe	Monthly	Pending review	993.9 2021-09-09	↓	
East Gypsum Dike Line 33+00	P93 – 8	5499642.3	577074.1	1017.2	1017.7	1001.9	Upstream	Standpipe	Annual	1010.1	1007.9 2022-04-01	↓	
	P93 – 9	5499642.6	577072.6	1017.2	1017.8	998.9	Upstream	Standpipe		1010.1	1008.3 2022-04-01	↓	
	P93 – 10	5499640.6	580423.8	1017.5	1018.0	1002.6	Crest	Standpipe		1009.5	1007.0 2022-04-01	↓	
	P93 – 11	5499622.5	577071.1	1017.5	1018.0	998.7	Crest	Standpipe		1008.6	1007.2 (9-Jul-2019)	↔	Blocked, not read in 2020,2021 and 2022 monitoring period
	P93 – 12	5499583.8	577073.5	1013.5	1013.0	1000.8	Toe	Standpipe		1004.7	1003.6 2022-04-01	↓	
	SUL-EG-P-18-04	5499537.0	577196.9	1004.6	1005.9	998.1	Toe	Standpipe	Monthly	Pending review	1000.6 2022-04-01	↓	
East Gypsum Dike Line 48+00	P93 – 13	5499669.6	577521.5	1016.8	1017.6	1000.3	Upstream	Standpipe	Annual	1002.5	1000.4 (5-Apr-2019)	N/A	Not read in 2020,2021 and 2022
	P93 – 14	5499645.3	577521.9	1017.2	1017.7	1004.3	Crest	Standpipe		1005.6	1004.6 2021-04-15	↔	Dry, blocked at 13.3 m
	SUL-EG-P-18-05	5499566.3	577527.0	1003.1	1004.5	995.8	Toe	Standpipe	Monthly	Pending review	999.5 2022-04-01	↓	

Notes:

1. 2022 reporting period runs from September 1, 2021 to August 31, 2022.
2. Water levels are considered equal if differences are ≤ 0.1 m.

Table III-7 Active Piezometers – ARD Storage Pond

Group Designation	Piezometer No.	Northing	Easting	Ground Elevation (m)	Top of Casing Elevation (m)	Tip/Bottom of Casing Elevation (m)	General Location	Instrument Type	Recommended Reading Frequency	Notification Level	Max Measured Piezometer Level In 2021[1]	Max 2022 Level Relative To 2021[2]	Comment
	ARD Storage Pond												
North Dam	PP01-01	5500675.6	575840.0	N/A	N/A	1041.7	North Dam	Pneumatic	Monthly, with additional readings taken weekly when the Pond level is above 1040 masl, or daily when the Pond level is above 1045 masl. The pneumatic piezometers are to be read monthly.	1042.7	1042.0 2022-03-06	↑	
	PP01-02	5500682.7	575834.9	N/A	N/A	1041.9	North Dam	Pneumatic		1042.7	1042.3 2022-03-06	↑	
	PP01-03	5500552.0	575738.1	N/A	N/A	1038.8	North Dam	Pneumatic		1039.8	1039.6 2022-03-06	↑	
	PP01-04	5500549.5	575743.1	N/A	N/A	1040.8	North Dam	Pneumatic		1041.8	1041.5 2022-04-01	↑	
	ND-01	5500756.6	575907.3	1042.2	1042.7	1032.0	North Abutment	Standpipe		1042.2	1040.6 2022-04-01	↑	
	ND-02D	5500636.4	575769.0	1042.2	1042.7	1019.5	Toe	Standpipe		1041.5	1040.6 2022-01-21	↑	
	ND-02S	5500636.3	575768.9	1042.2	1042.7	1040.3	Toe	Standpipe		1041.5	1041.4 2021-03-25	↔	
	ND-03	5500542.8	575693.1	1038.4	1039.2	1025.1	Toe	Standpipe		1039.2	1038.7 2022-04-01	↑	
South Dam	PP01-05	5500026.7	575892.8	N/A	N/A	1030.0	South Dam	Pneumatic		1031.0	1031.2 2022-02-08	↑	2022 max above notification level
	PP01-06	5500020.4	575893.4	N/A	N/A	1029.2	South Dam	Pneumatic		1030.5	1031.1 2022-02-08	↑	2022 max and most recent reading above notification level
	SD-01	5500056.6	576006.3	1041.0	1041.6	1029.6	South Abutment	Standpipe		1041.0	1034.3 2022-04-01	↔	
	SD-02	5499985.4	575904.0	1029.9	1030.5	1026.9	Toe	Standpipe		1029.9	1029.7 2022-07-01	↑	
	SD-03	5499995.4	575737.2	1037.0	1038.1	1036.0	South Abutment	Standpipe		1037.0	1036.9 2022-03-18	↑	
	SUL-ARDSD-VWP-20-01	5500086.0	576003.0	1048.0	N/A	1037.54		VWP	Remotely monitored (hourly readings). Review data monthly.	Pending Review	1040.5 2022-03-22	N/A	Instrument began recording in October 2021
	SUL-ARDSD-VWP-20-02	5500060.0	576015.0	1041.0	N/A	1036.28		VWP			1037.9 2022-04-03	N/A	Instrument began recording in October 2021
	SUL-ARDSD-VWP-20-03	5500036.0	576030.0	1037.0	N/A	1033.19		VWP			1033.5 2022-04-13	N/A	Instrument began recording in October 2021
	SUL-ARDSD-VWP-20-04	5500009.0	575972.0	1031.0000	N/A	1026.7700		VWP			1030.4 2022-03-08	N/A	Instrument began recording in October 2021

Notes:

1. 2022 reporting period runs from September 1, 2021 to August 31, 2022.
2. Water levels are considered equal if differences are ≤ 0.1 m.

Table III-8 Active Piezometers – Sludge Impoundment

Group Designation	Piezometer No.	Northing	Easting	Ground Elevation (m)	Top of Casing Elevation (m)	Tip/Bottom of Casing Elevation (m)	General Location	Instrument Type	Recommended Reading Frequency	Notification Level	Max Measured Piezometer Level In 2021[1]	Max 2021 Level Relative To 2020[2]	Comment
	Sludge Impoundment												
North Dam	SUL-SPND-VWP-21-01	5497697.0	574643.0	890.5	N/A	884.71	North Dam	VWP	Remotely monitored (hourly readings). Review data monthly.	Pending review	887.13 2022-04-07	N/A	Instrument began recording in October 2021
	SUL-SPND-VWP-21-02	5497643.0	574659.0	894.5	N/A	879.57	North Dam	VWP			887.33 2022-04-07	N/A	Instrument began recording in October 2021
	SUL-SPND-VWP-21-05	5497663.0	574643.0	894.5	N/A	884.04	North Dam	VWP			886.73 2022-04-07	N/A	Instrument began recording in October 2021
South Dam	SUL-SPSD-VWP-21-03	5497285.0	574865.0	888.0	N/A	879.85	South Dam	VWP			886.20 2022-04-07	N/A	Instrument began recording in October 2021
	SUL-SPSD-VWP-21-04	5497186.0	574842.0	894.5	N/A	874.18	South Dam	VWP			885.80 2022-04-07	N/A	Instrument began recording in October 2021
	SUL-SPSD-VWP-21-06	5497240.0	574844.0	894.5	N/A	879.56	South Dam	VWP			885.3 2022-06-28	N/A	Instrument began recording in October 2021

Notes:

1. 2022 reporting period runs from September 1, 2021 to August 31, 2022.
2. Water levels are considered equal if differences are ≤ 0.1 m.

Table III-9 Active Settlement and Inclinometer Measuring Instruments

Type	Instrument Number	Initial Elevation (m)	Location	Notification Level	Recommended Reading Frequency	Measured Level in 2021 (m)	Comment [2]
Iron Dike							
Settlement plates	SP330[1]	1037.40	2+00	>25 mm over 3 years	Every 3 Years	N/A	Surveyed in 2018. Less than 40 mm of settlement since 2007.
	SP331[1]	1042.44	9+00			N/A	Surveyed in 2018. Less than 65 mm of settlement since 2007.
	SP332[2]	1041.79	9+00			N/A	Surveyed in 2018. Less than 45 mm of settlement since 2007.
	SP 92 – 07	1034.91	16+00			N/A	Surveyed in 2018. Less than 35 mm of settlement since 2007.
	SP 99 – 01[3]	1042.07	4+00			N/A	Surveyed in 2018. Less than 45 mm of settlement since 2007.
Dike Crest Survey	-	-	0+00 to 12+00 centerline, U/S, D/S dike crest	1042 m	Annually	N/A	Moved to InSAR monitoring.
Gypsum TSF Dikes							
Settlement plates at West Gypsum Dike	SP97 – 01	1014.592	Line 10+00 Slope	>60 mm over 3 years	Annually	N/A	Settled 0 mm since 2017.
	SP97 – 05	1015.568	Line 10+00 Crest			N/A	Settled 23 mm since 2017.
	SP97 – 06	1015.936	Line 20+00 Slope			N/A	Settled 22 mm since 2017.
Sondex gauge and Inclinometer at West Gypsum Dike	S94 – 01	N/A	Line10+00 Upstream	>90 mm over 3 years	Every 3 Years	N/A	Reading taken in 2019. Cumulative change since 1994 of 1.720, incremental change since 2016 of 0.14.
	~~BI94-01~~	~~N/A~~	~~Line10+00 Upstream~~	~~N/A~~	~~Inactive~~	~~N/A~~	Inclinometer blocked since 2006 (last read in 2004). Do not replace unless other instruments indicate signs of movement.
Settlement plates at East Gypsum Dike	SP97 – 03	1017.676	Line 33+00	>60 mm over 3 years	Annually	N/A	Settled 17 mm since 2017..
	SP97 – 04	1017.457	Line 48+00		Annually	N/A	Settled 28 mm since 2017.
Sondex gauge and Inclinometer at East Gypsum Dike	S94 – 02	N/A	Line 33+00 Upstream	>60 mm over 3 years	Every 3 Years	N/A	Reading taken in 2019. Cumulative change since 1994 of 1.02, incremental change since 2016 of 0.08.
	BI94 – 02	N/A	Line 33+00 Upstream	>25 mm horizontal movement over 3 years	Every 3 Years	N/A	Reading in inclinometer are now very unreliable due to settlement of the casing. Do not replace unless other monitoring indicate signs of movement.
Settlement plates at N.E. Gypsum Dike	SW (S1)	1019.264	Main Dike	>5 mm over 3 years	Every 3 Years	N/A	Surveyed in 2018. Less than 2 mm of settlement since 2007.
	SE (S2)	1019.073	Main Dike		Every 3 Years	N/A	Surveyed in 2018. Essentially 0 mm of settlement since 2007.
ARD Storage Pond							
Settlement Plates	SP01-01	1048.009	North Dam	>25 mm over 3 years	Every 3 Years	N/A	Surveyed in 2018. Less than 7 mm of settlement since 2001
	SP01-02	1048.224	North Dam			N/A	Surveyed in 2018. Less than 15 mm of settlement since 2001.
	SP01-03	1048.113	North Dam			N/A	Surveyed in 2018. Less than 19 mm of settlement since 2001.
	SP01-04	1048.311	South Dam			N/A	Surveyed in 2018. Less than 8 mm of settlement since 2001.
	SP01-05	1048.310	South Dam			N/A	Surveyed in 2018. Essentially 0 mm of settlement since 2001.
	SP01-06	1048.351	South Dam			N/A	Surveyed in 2018. Less than 9 mm of settlement since 2001.
Sludge Impoundment Dikes							
Dike Crest Survey	-	-	North Dike centerline, U/S, D/S dike crest	894.6	Annually	N/A	
			South Dike centerline, U/S, D/S dike crest	894.6	Annually	N/A	

Notes:

1. SP330 and 331 lowered in 2006. (2) SP332 raised in 2004. (3) SP99-01 lowered in 2006.
2. Ground based survey is being replaced with InSAR review of settlement and movement trends.

Table III-10 Active Seepage Measurements September 1, 2021 – August 31, 2022

Structure/ Weir	Min. Current Reading Frequency	Notification Level	Weir Readings and Observations – September 1, 2021 to August 31, 2022																					
			September		October		November		December		January		February		March		April		May		June		July		August	
			Max. flow	Min. flow	Max. flow	Min. flow	Max. flow	Min. flow	Max. flow	Min. flow	Max. flow	Min. flow	Max. flow	Min. flow	Max. flow	Min. flow	Max. flow	Min. flow	Max. flow	Min. flow	Max. flow	Min. flow	Max. flow	Min. flow	Max. flow	Min. flow
			m^3/day		m^3/day		m^3/day		m^3/day		m^3/day		m^3/day		m^3/day		m^3/day		m^3/day		m^3/day		m^3/day		m^3/day	
ARD Pond/Weir #1 (ARDWU)	Weekly with daily readings between March 1 and May 30. Daily readings when the pond level is > 1045 m. Read for 3 days following rainfall event >10 mm.	150 m^3/day	20.42	0.11	7.68	0.11	2.77	0.11	0.11	0.11	13.13	0.11	41.17	0.11	54.93	13.13	29.71	3.87	29.71	1.51	7.68	0.11	0.11	0.11	7.68	0.11
ARD Pond/Weir #2		175 m^3/day	0.88	Dry	5.78	Dry	5.78	Dry	0.88	Dry	10.40	Dry	16.73	Dry	79.50	12.72	24.93	0.88	24.93	0.11	5.78	Dry	Dry	Dry	Dry	Dry
AIP[1] Dike/Weir #3 (AIPWU)	Weekly with daily readings between March 1 and May 30. Read for 3 days following rainfall event >10 mm.	50 m^3/day	0.93	0.12	2.82	Dry	25.93	0.12	0.34	Dry	Dry	Dry	Dry	Dry	2.82	Dry	2.82	0.12	2.82	0.12	2.82	0.12	2.82	0.93	2.82	0.12
AIP[1] Dike/Weir #4		500 m^3/day	26.17	9.56	20.76	1.73	34.01	3.51	26.17	Dry	19.53	Dry	27.64	Dry	333.59	26.17	93.33	14.02	65.35	14.02	26.17	14.02	14.02	9.56	14.02	3.51
West Gypsum Cell/Toe of Gravel Buttress at Cow Creek (STA. 11+00)	Visual Reading Annually	Cloudy flow	Flow is clear (observed as part of May 2022 site visit)																					
East Gypsum Cell/Toe of Dike Adjacent to James Creek	Visual Reading Annually	Cloudy flow	Flow is clear (observed as part of May 2022 site visit)																					

Notes:

1. AIP = Iron Pond

Table III-11 Active Pond Water Level Monitoring Locations

Type	Description	Location	Primary Purpose	Reading Frequency	Notification Level 1	Notification Level 2	Notification Level 3	General Water Level Information (m)
Iron Pond Water Level	Electronic readout unit.	Iron Dike Pump Station	Overtopping	Daily	1038.5 (Pump to ARD Pond)	1038.9 (As for Level 1 and notify EOR, minimize inflows, consider pumping to DWTP)	1040.5 (As for Level 2 and notify MEMPR/MOE, enact EPRP)	1037.3 Measured low water
								1041.61 Measured high water
								1041.0[1] (Spillway invert)
								1042.0 (Top of dike)
Pond Water Level	Electronic readout unit with pressure transducer in bottom of wet well at el. 1034 m.	Pump wet well, data transmitted to DWT control room through the PLC system	Dam Stability	Daily	1045.5 (Pump to DWTP)	1046.5 (As for Level 1 and notify EOR, minimize inflows (e.g. divert 3700/3900 to Iron Pond))	1046.9 (As for Level 2 and notify MEMPR/MOE, enact EPRP)	1036.6 Measured low water
								1043.4 Measured high water
								1046.5 9 Maximum operating level)
								1047.4 (Spillway invert)
								1048.0 (Top of dam)

Notes:

1. The surveyed as-constructed invert elevations for the Iron Pond/Emergency Spillway varied from 1040.8 m to 1041.4 m, with the design elevation being 1041.0 m.

APPENDIX IV

Iron Dike Instrumentation

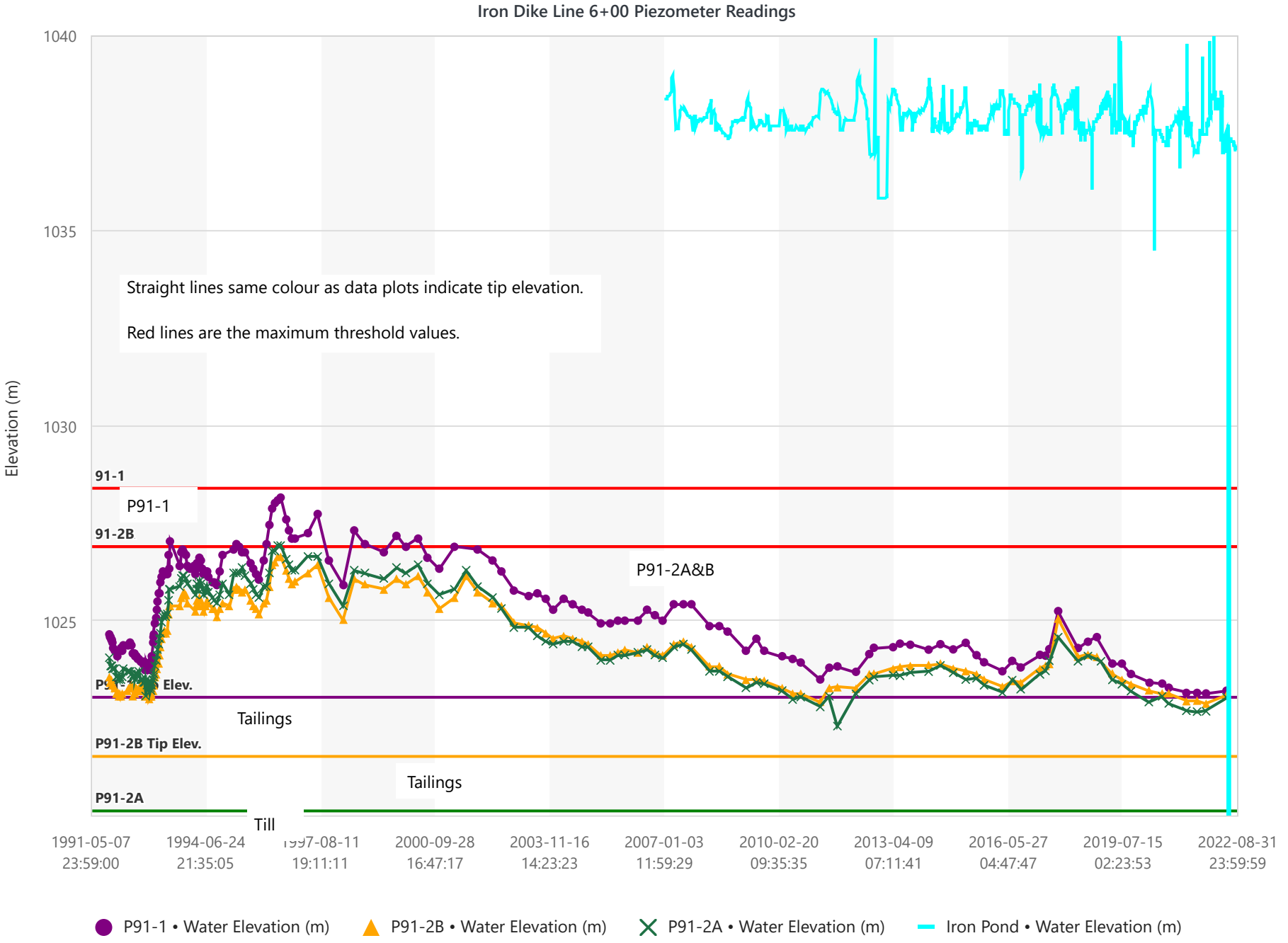
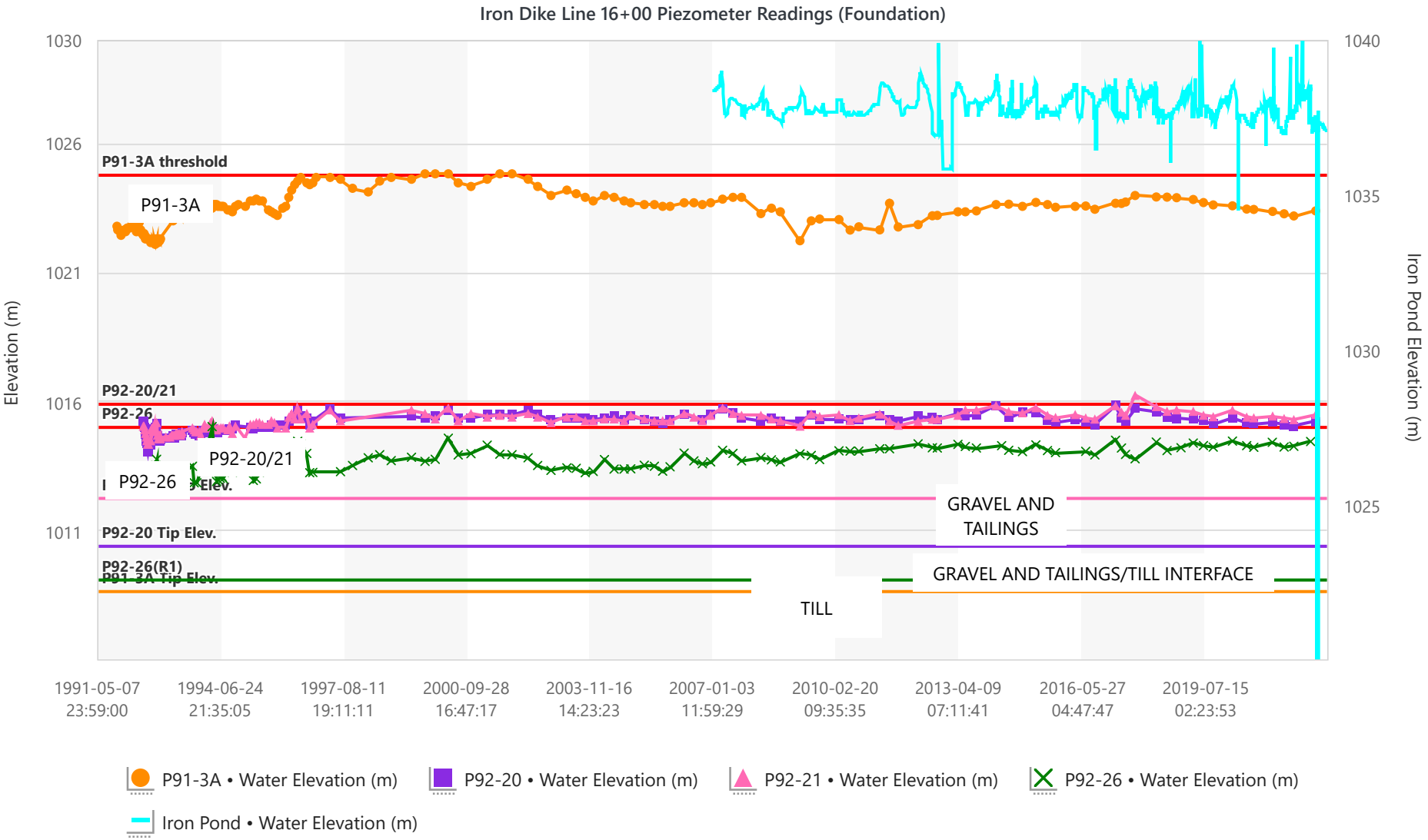


Figure IV-1 STN 6+00



Straight lines same colour as data plots indicate tip elevation.

Red lines are the maximum threshold values.

Standpipe piezometers were flushed in July/August 2014. Not all sediment was removed and some casings also cut or extended/repaired at this time. Therefore a new top of casing and new depth to bottom of standpipe was recorded for many instruments. Older data will appear below tip elevation if previously read "dry" or if previous top of casing elevation was incorrect due to damage.

SPxxx represents readings to point of flushing. SPxxx(R1) represents readings post flushing. If no (R1) plot then no change to top of casing elevation or depth to bottom of standpipe.

Figure IV-2 STN 16+00 Foundation

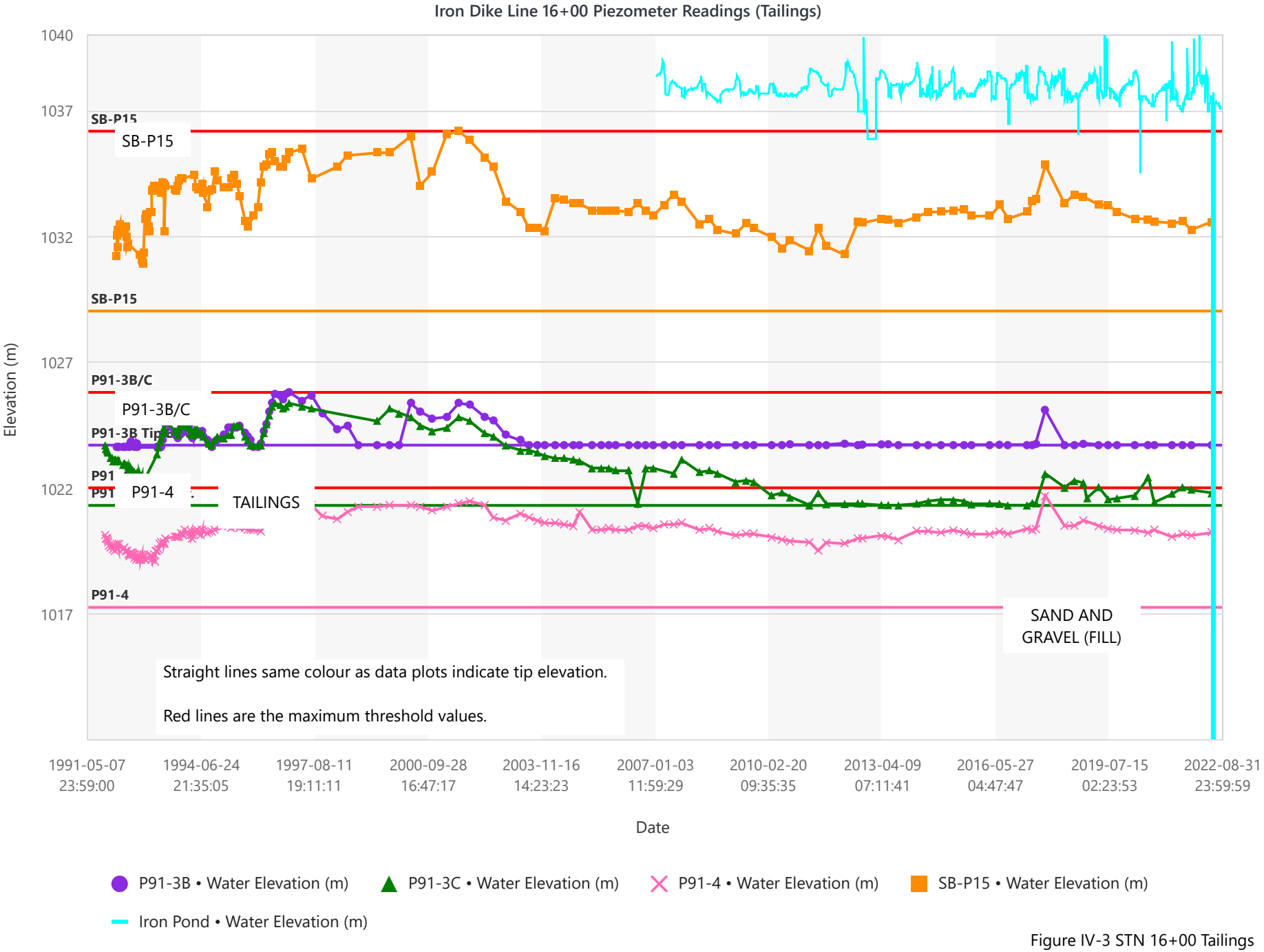


Figure IV-3 STN 16+00 Tailings

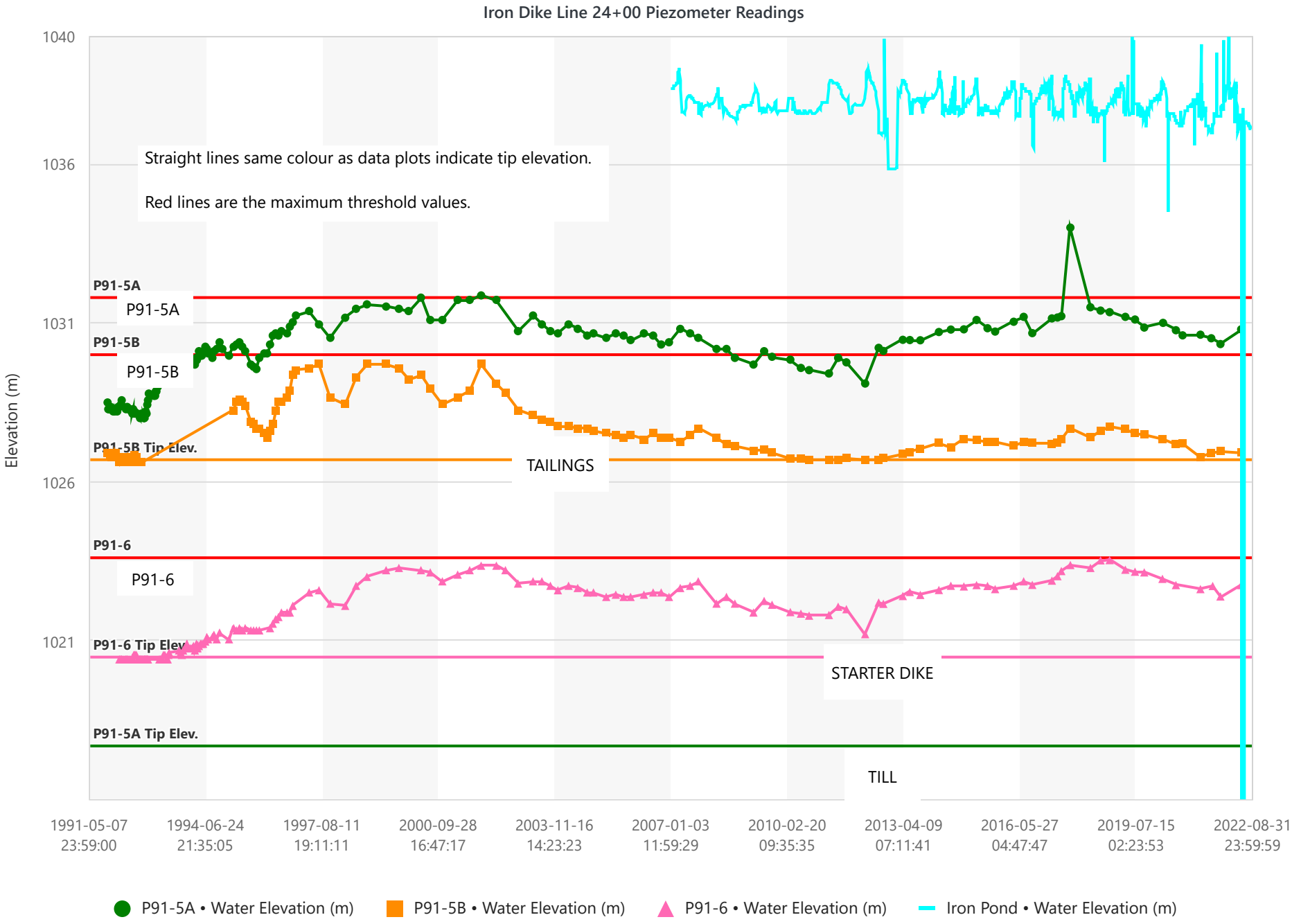


Figure IV-4 STN 24+00

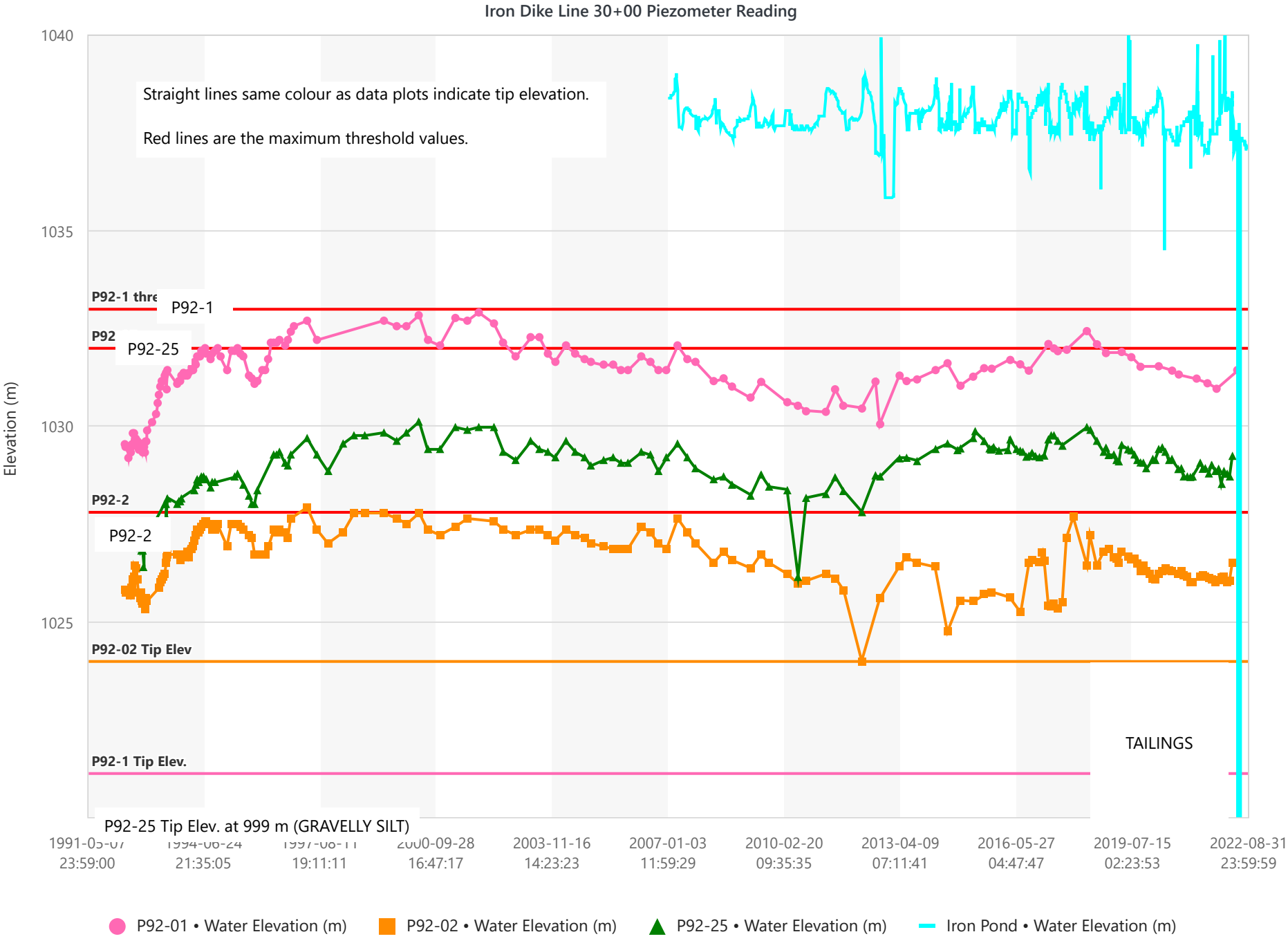


Figure IV-5 STN 30+00

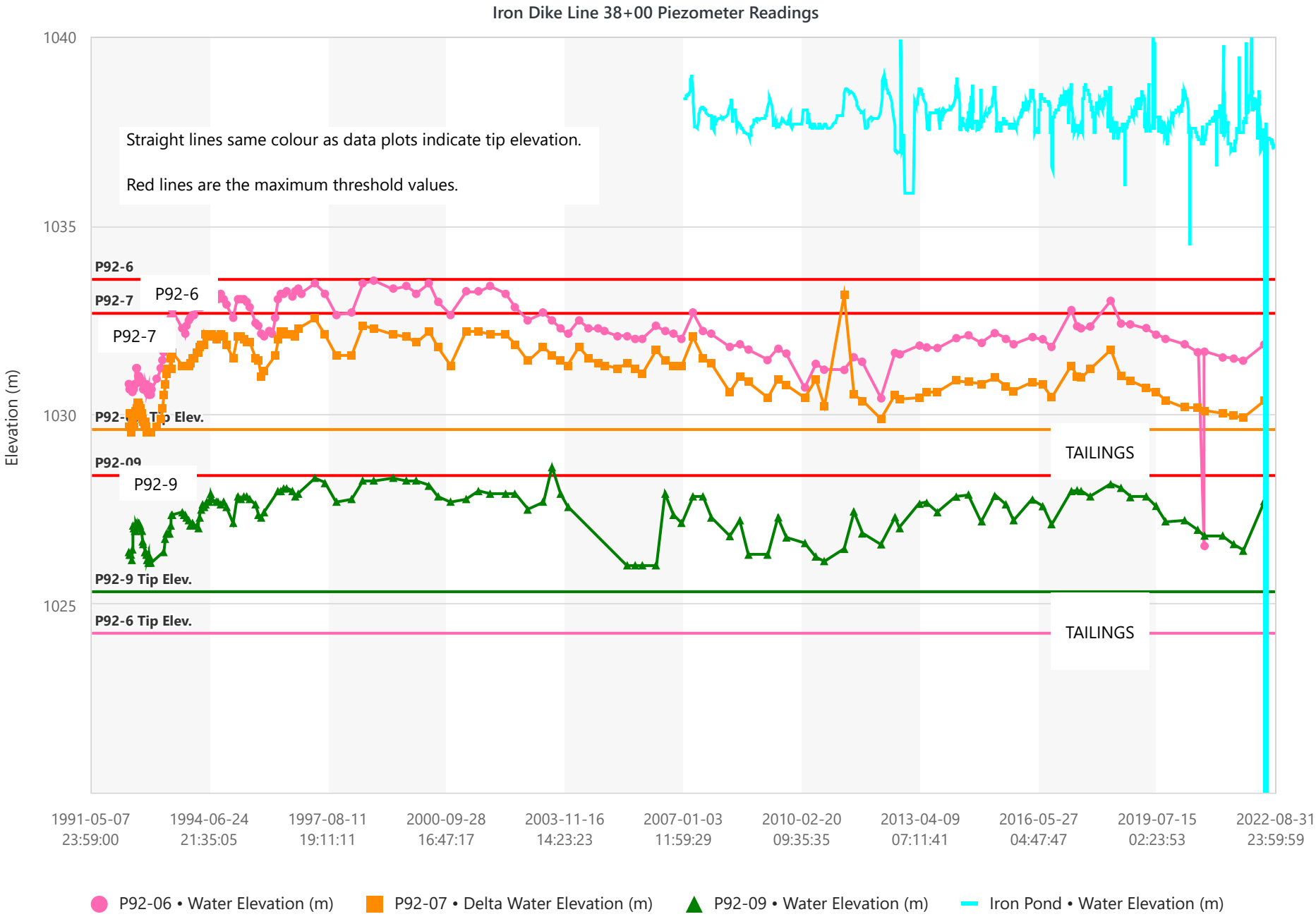


Figure IV-6 STN 38+00

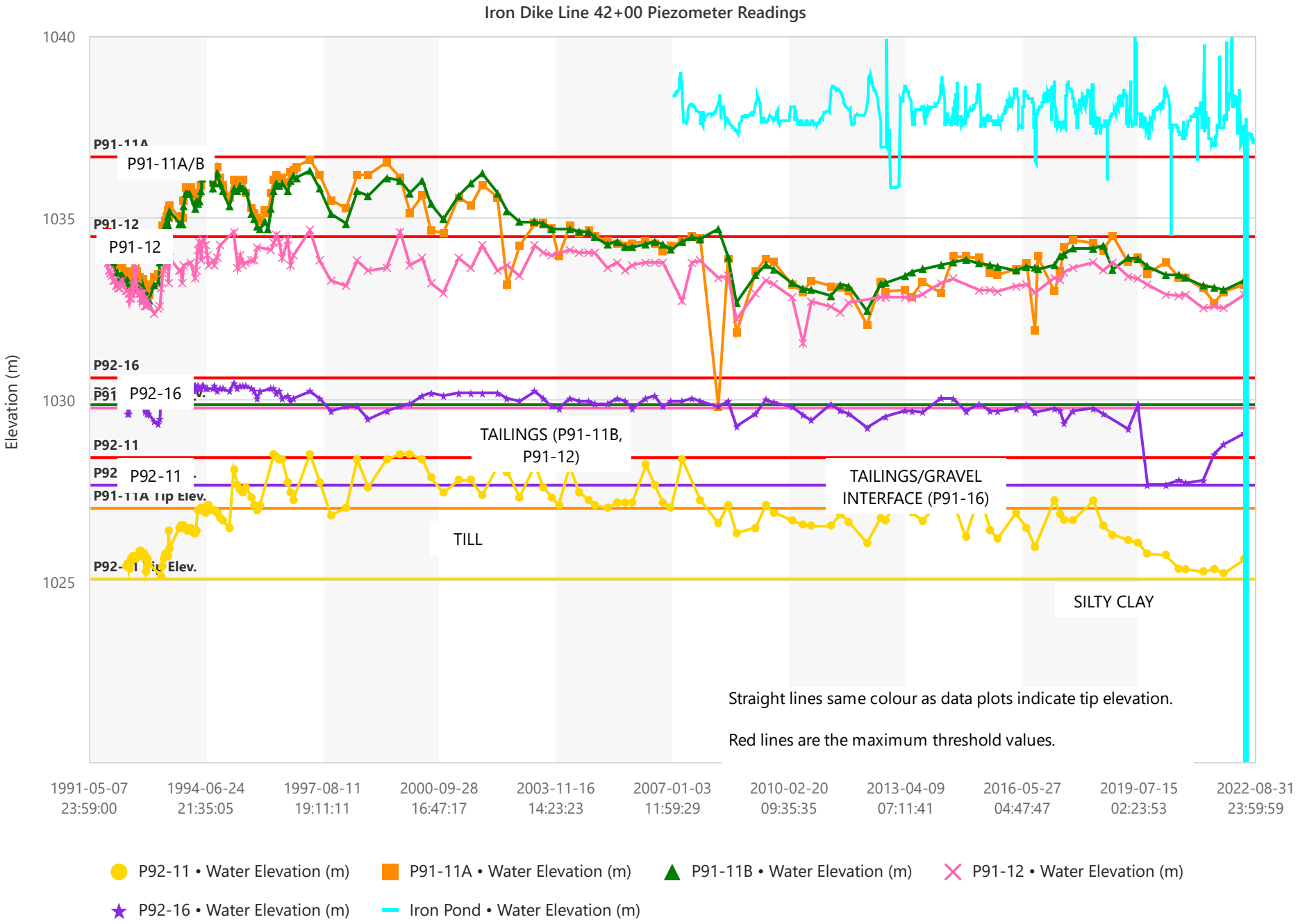


Figure IV-7 STN 42+00

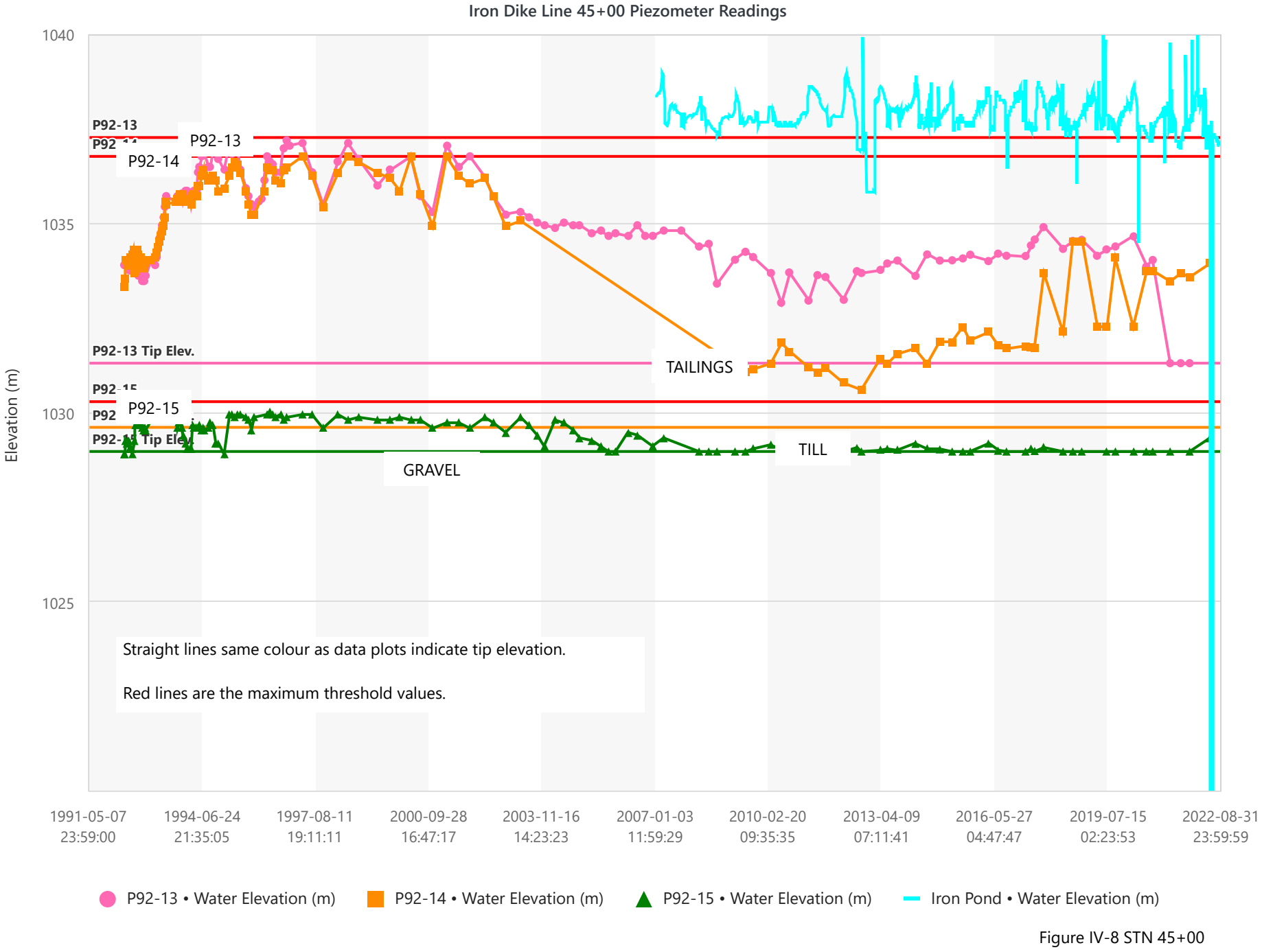
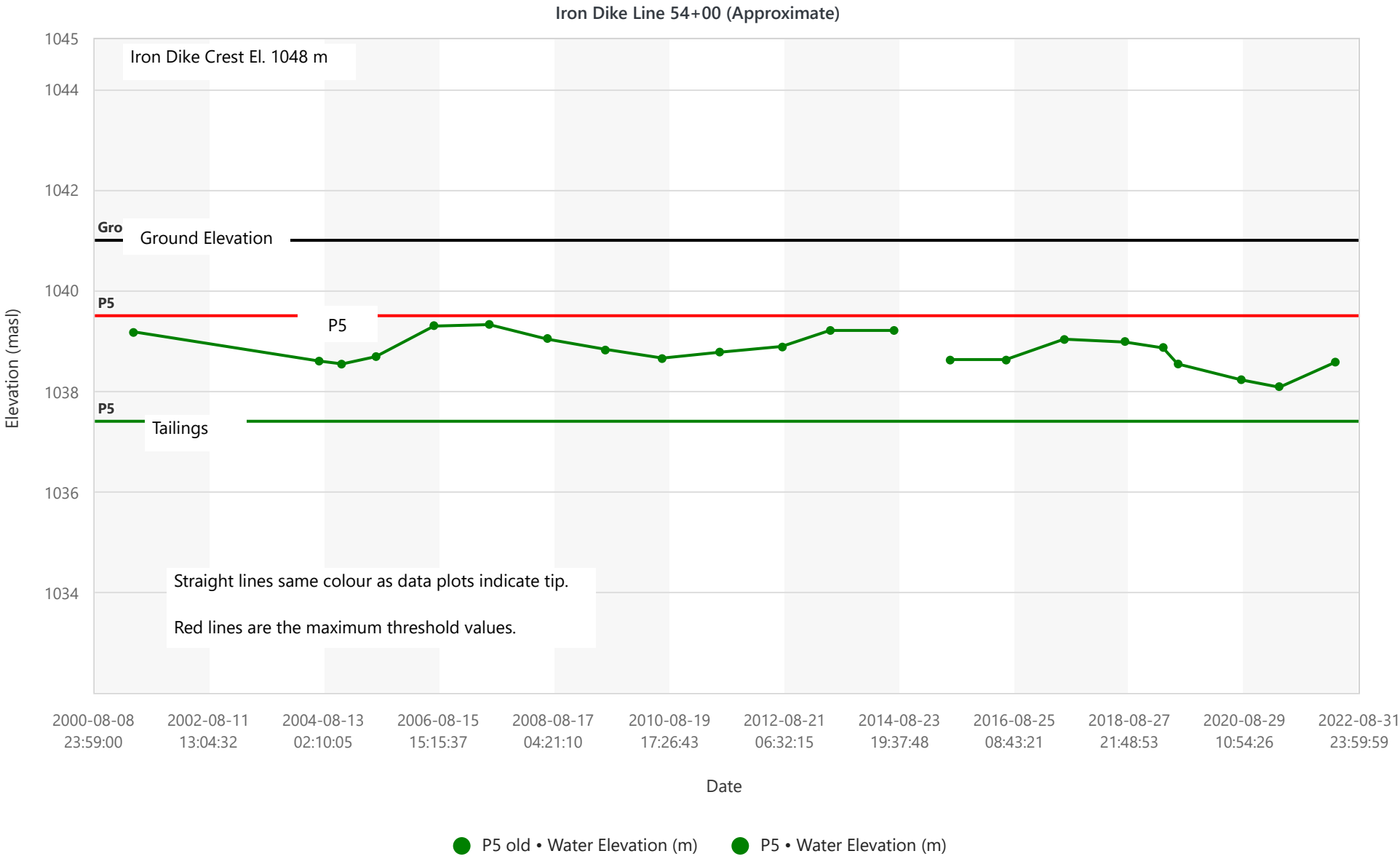


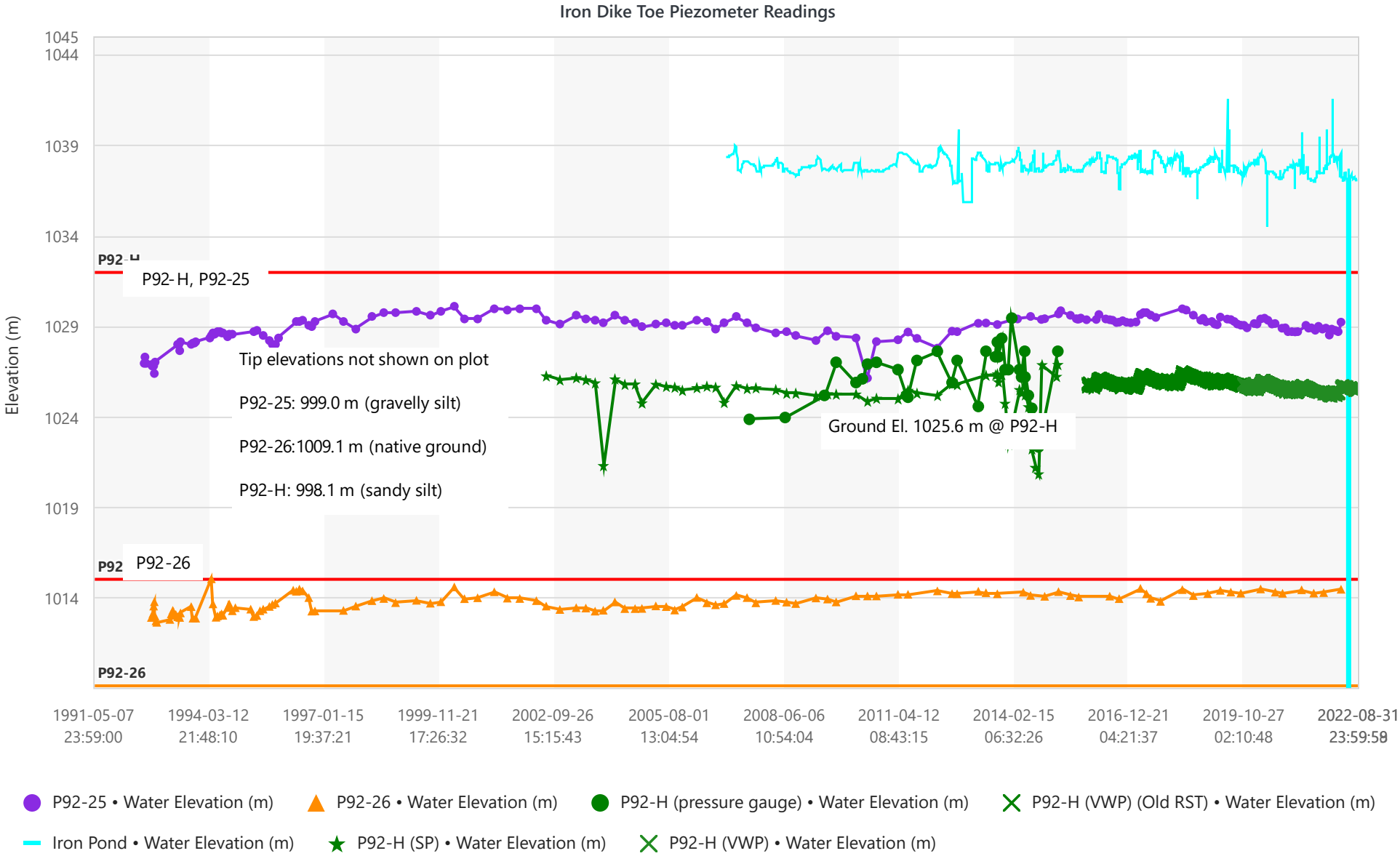
Figure IV-8 STN 45+00



Standpipe piezometers were flushed in July/August 2014. Not all sediment was removed and some casings also cut or extended/repaired at this time. Therefore a new top of casing and new depth to bottom of standpipe was recorded for many instruments. Older data will appear below tip elevation if previously read "dry" or if previous top of casing elevation was incorrect due to damage.

SPxxx represents readings to point of flushing. SPxxx(R1) represents readings post flushing. If no (R1) plot then no change to top of casing elevation or depth to bottom of standpipe.

Figure IV-9 Line 54+00



Straight lines same colour as data plots indicate tip elevation.

Red lines are the maximum threshold values.

Standpipe piezometers were flushed in July/August 2014. Not all sediment was removed and some casings also cut or extended/repaired at this time. Therefore a new top of casing and new depth to bottom of standpipe was recorded for many instruments. Older data will appear below tip elevation if previously read "dry" or if previous top of casing elevation was incorrect due to damage.

Figure IV-10 Toe Piezometers

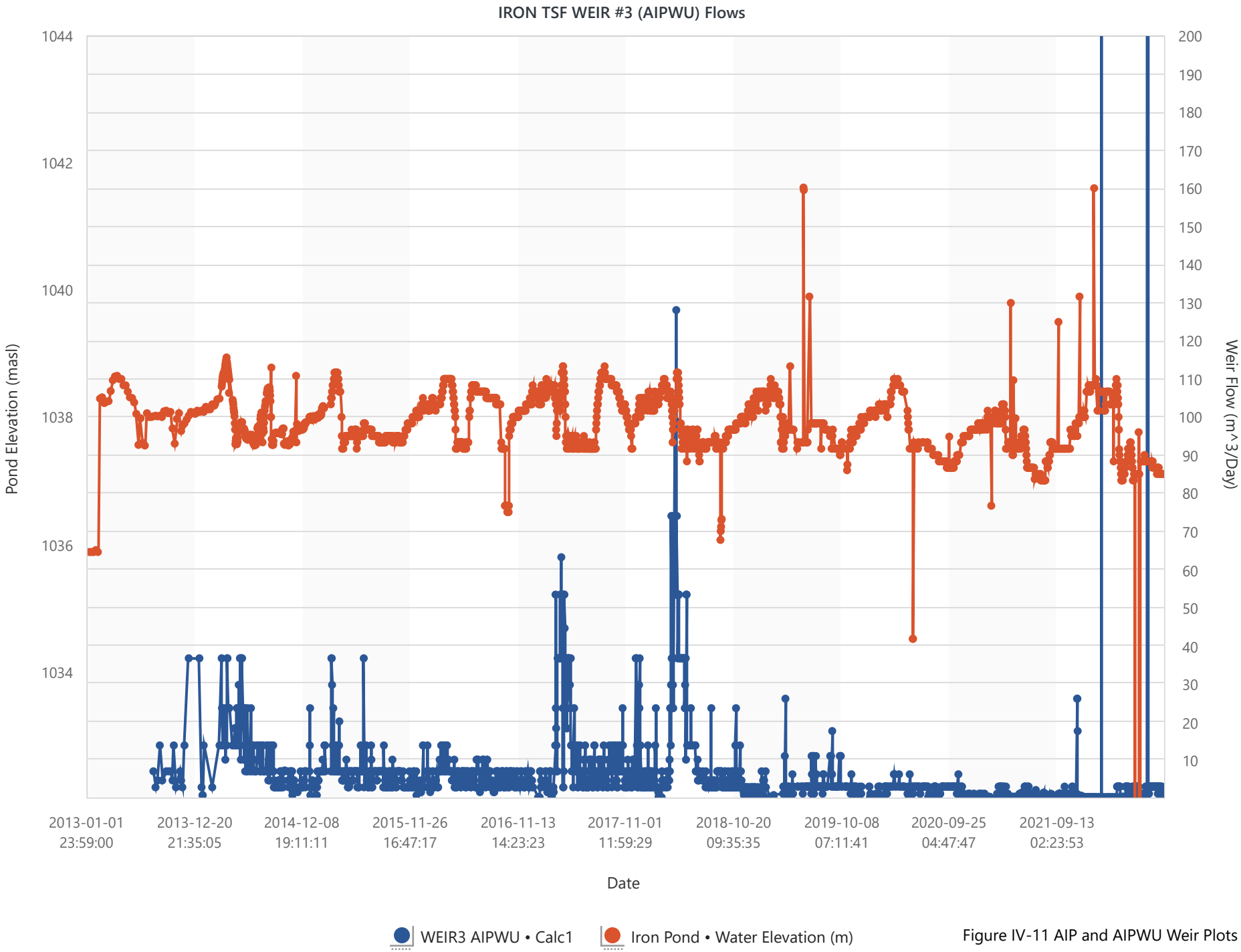
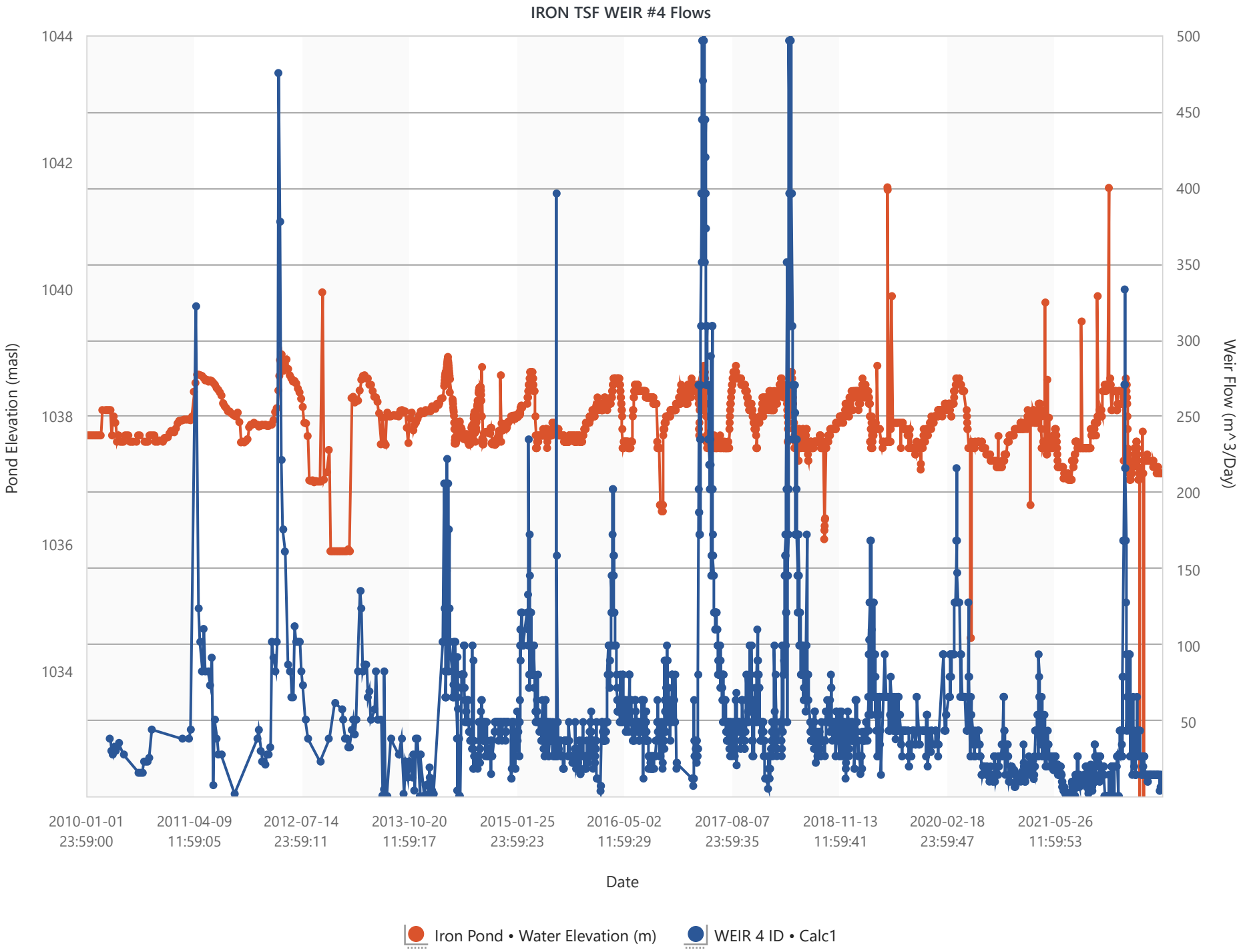


Figure IV-11 AIP and AIPWU Weir Plots


IRON TSF WEIR #4 Flows
Pond Elevation (masl)
1044
1042
1040
1038
1036
1034
Weir Flow (m^3/Day)
500
450
400
350
300
250
200
150
100
50
2010-01-01 23:59:00
2011-04-09 11:59:05
2012-07-14 23:59:11
2013-10-20 11:59:17
2015-01-25 23:59:23
2016-05-02 11:59:29
2017-08-07 23:59:35
2018-11-13 11:59:41
2020-02-18 23:59:47
2021-05-26 11:59:53
Date
Iron Pond • Water Elevation (m)
WEIR 4 ID • Calc1

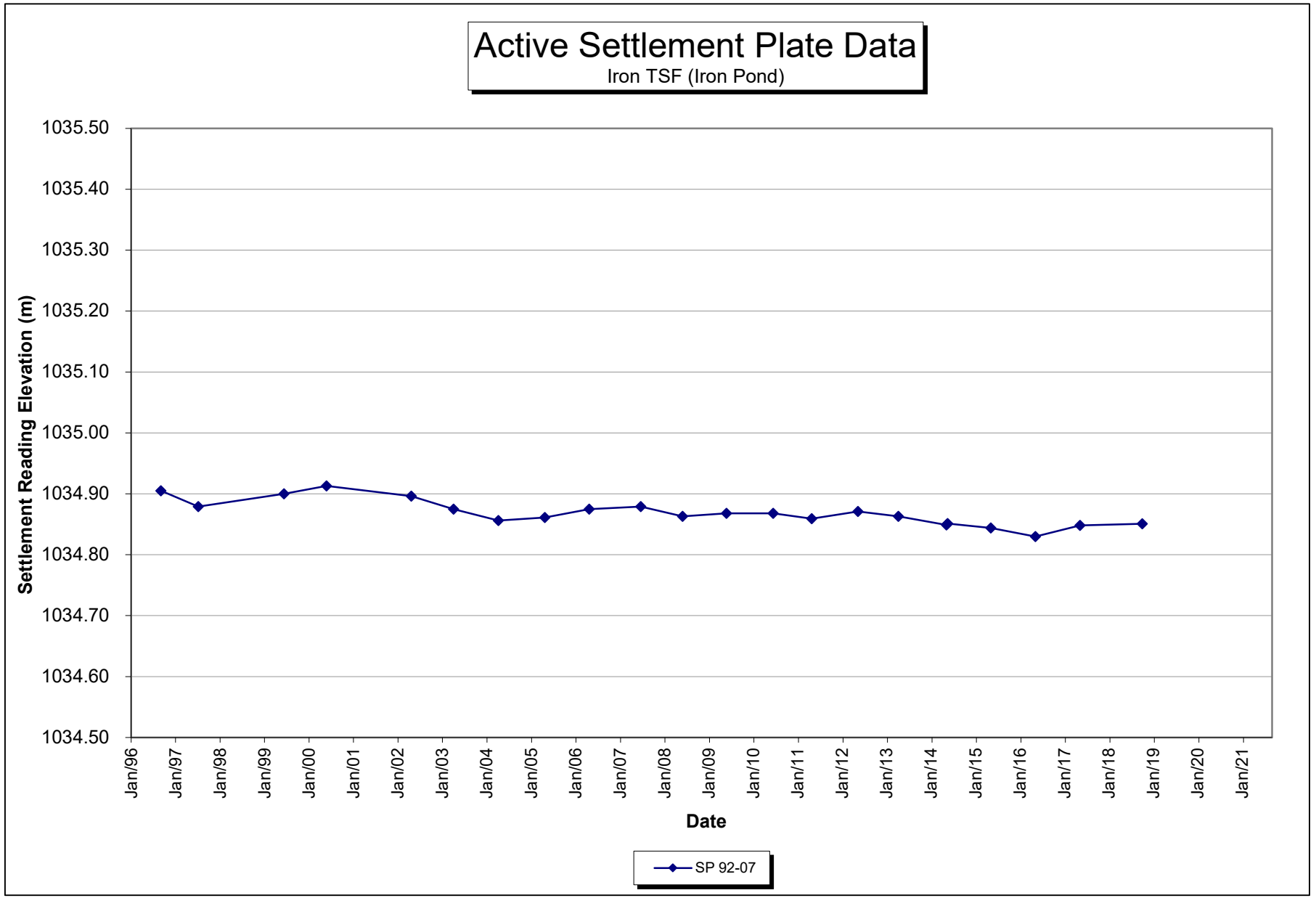


Figure IV-12 SP 92-07

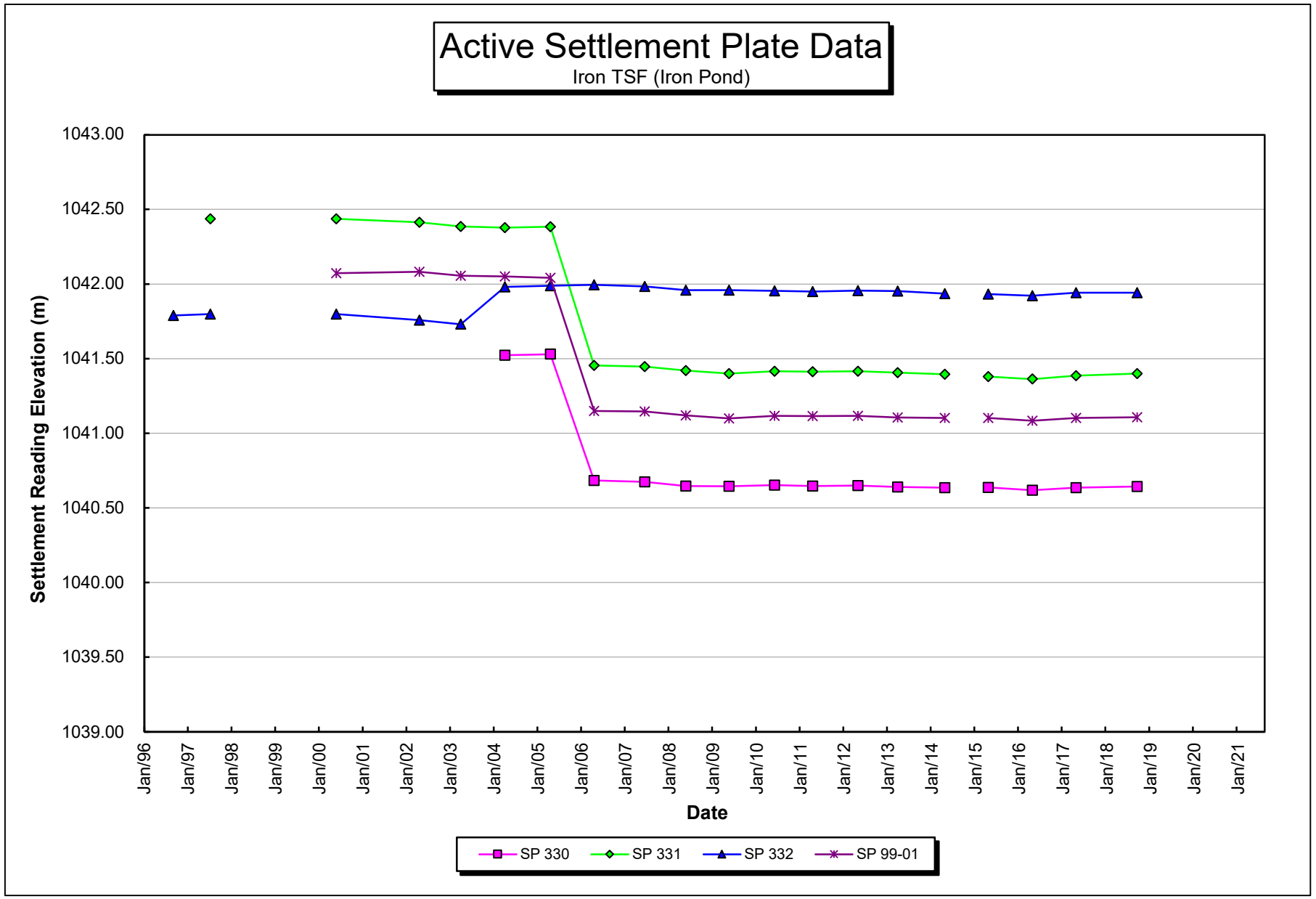


Figure IV-13 SP 330 - 332 and SP 99-01

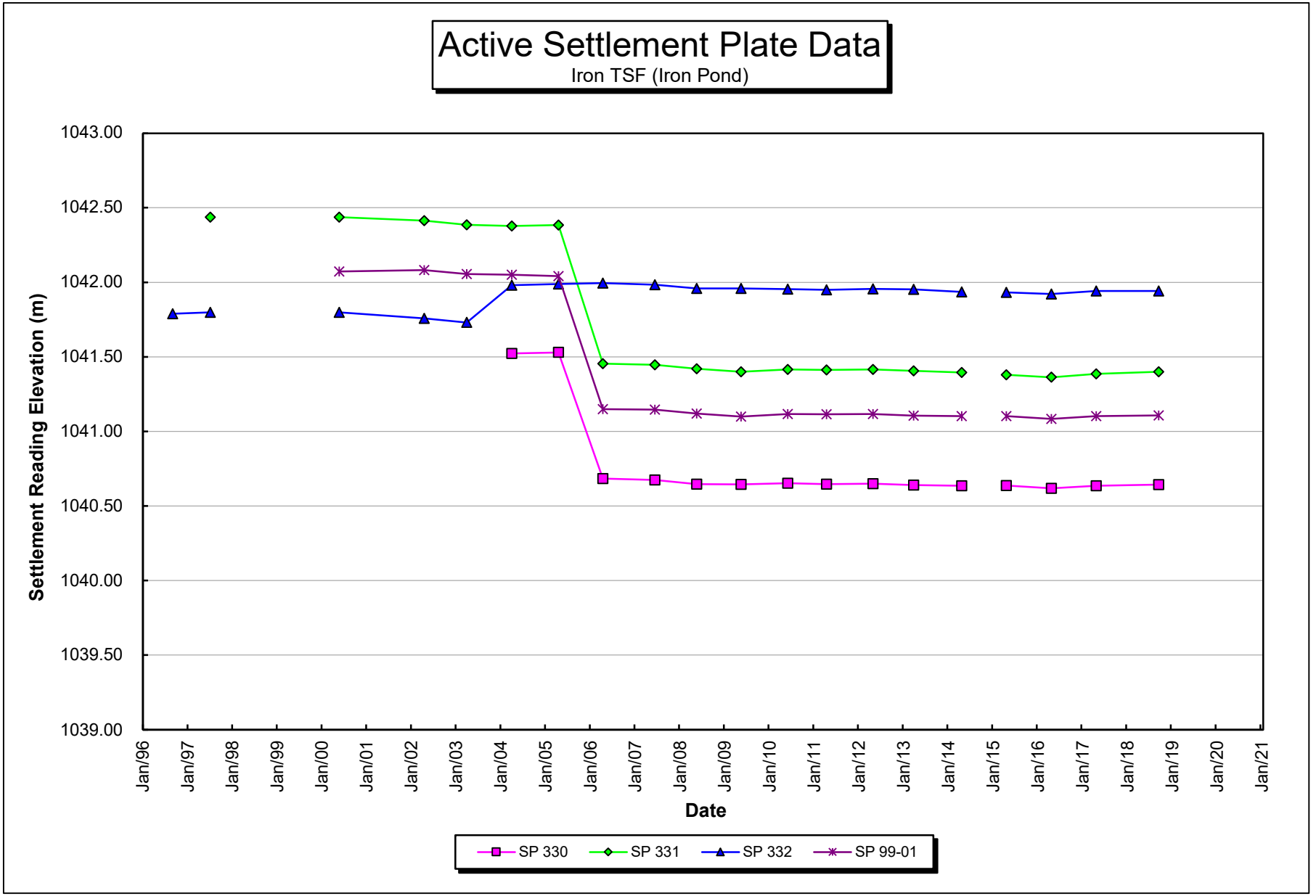
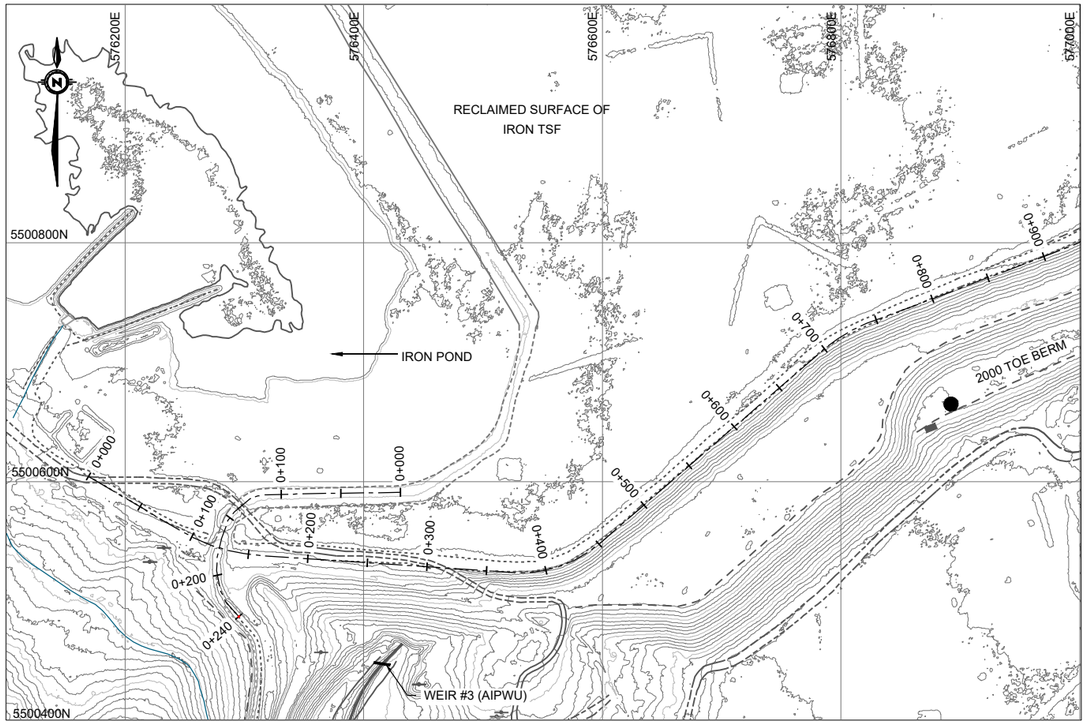
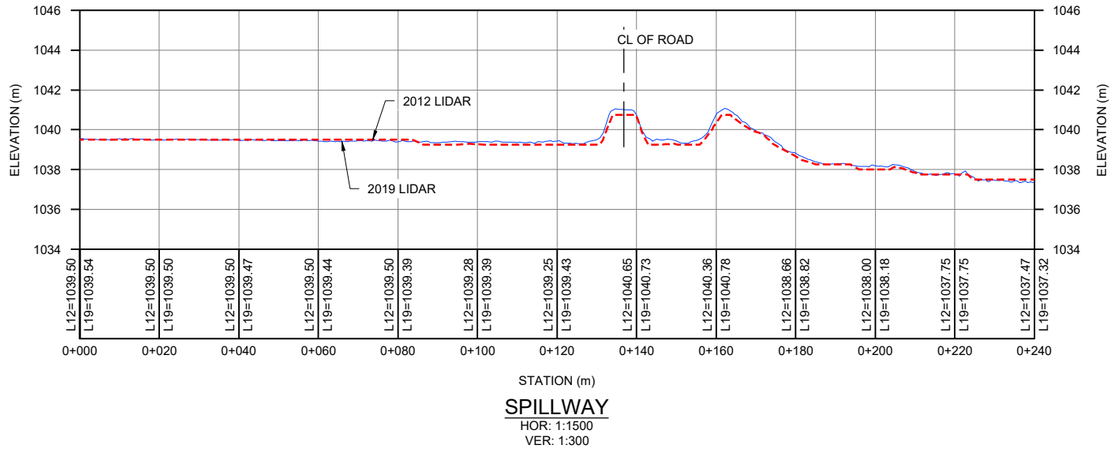
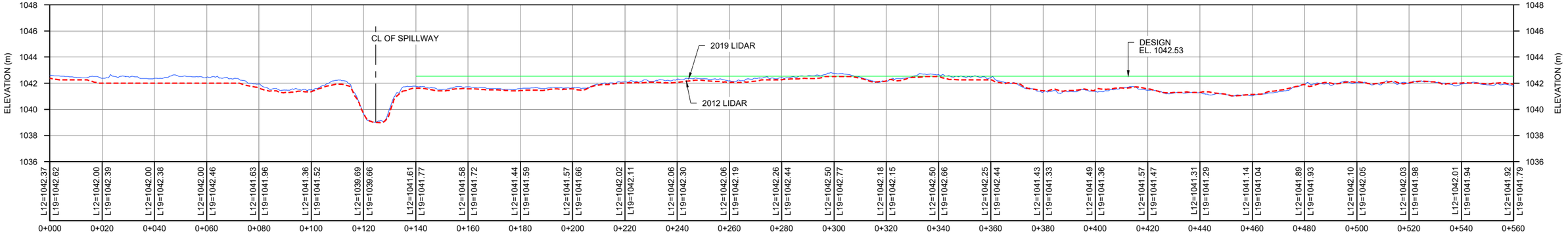


Figure IV-14 SP 330 - 332 and SP 99-01





SPILLWAY
HOR: 1:1500
VER: 1:300



IRON DYKE CREST
HOR: 1:1500
VER: 1:300

1:5 000 0 50 100 m

CLIENT: Teck

Klohn Crippen Berger

PROJECT: SULLIVAN MINE
2021 ANNUAL INSPECTION REPORT

TITLE: IRON DIKE CREST
AND SPILLWAY PROFILE

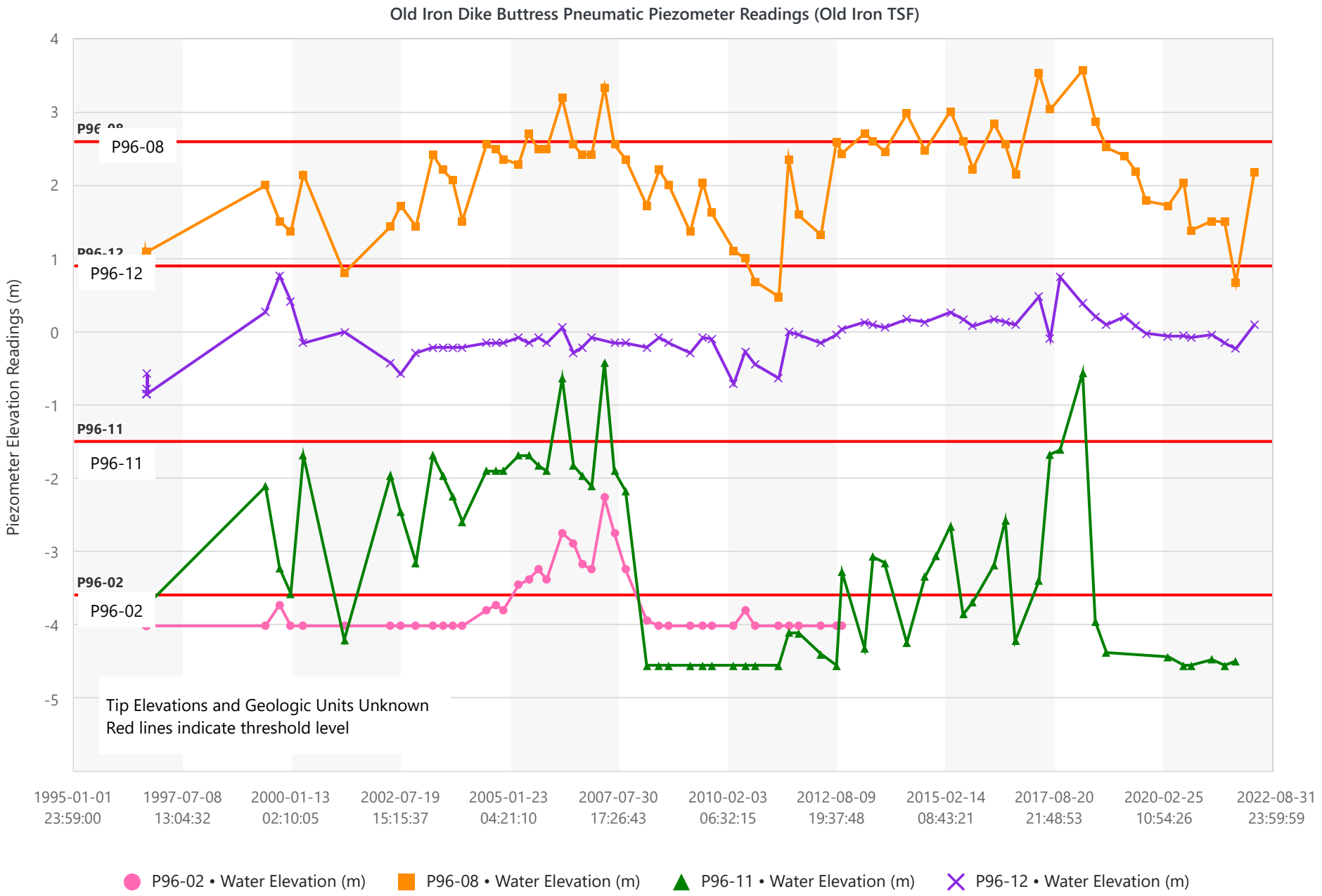
PROJECT No. A05807A21

FIG No. FIGURE IV-15

K2C-D-B

APPENDIX V

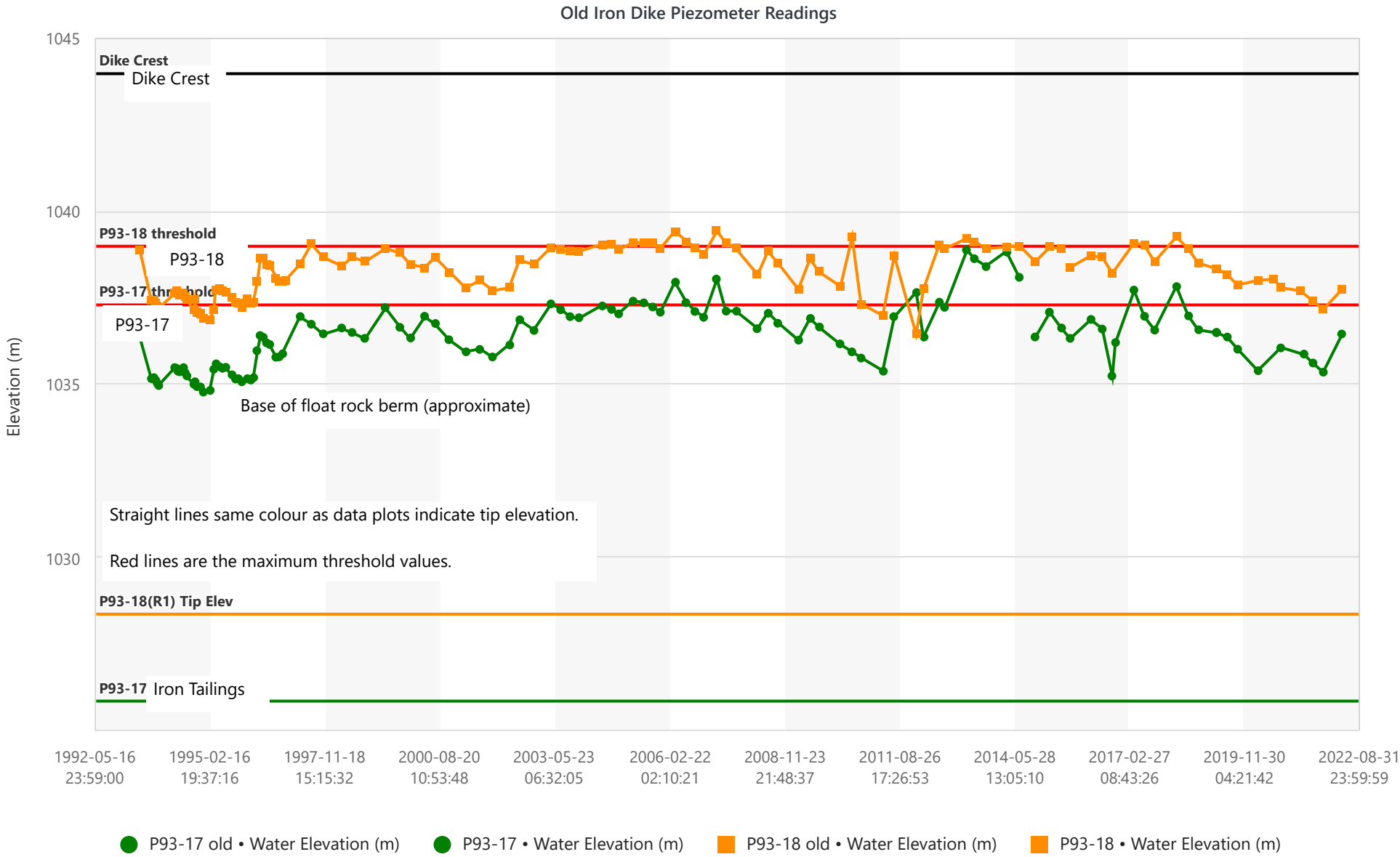
Old Iron Instrumentation



Elevations are relative to elevation of top of tailings or original ground prior to construction of the toe berm in 1996, i.e. m of head measured - difference between top of berm in 1996 and estimated top of ground prior to berm construction.

P96-02: Destroyed
P96-11: Slow leak 2008 unable to get reading until 2011, erratic data since 2012, replaced in 2018

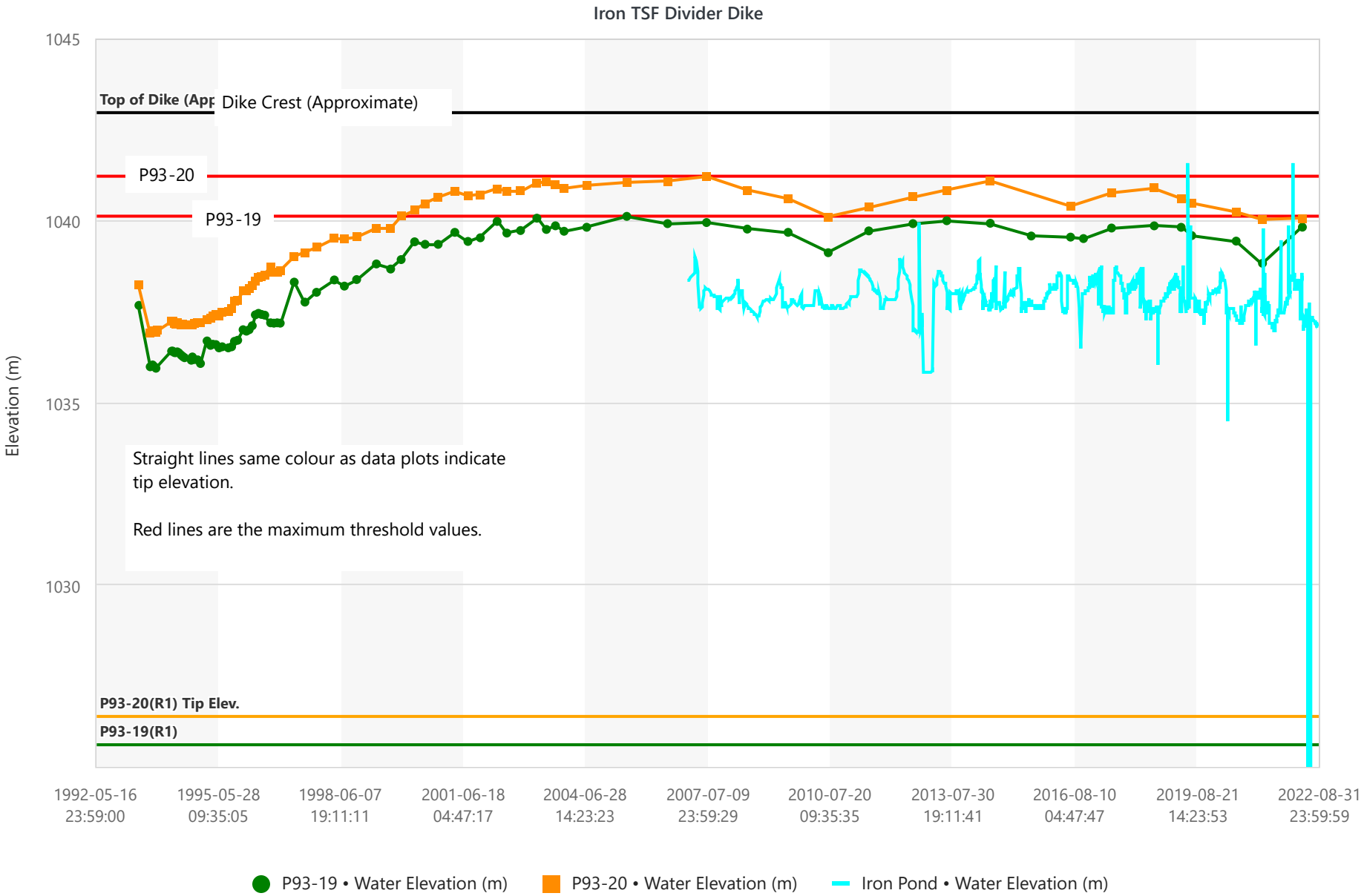
Figure V-1 Old Iron Dike Buttress



Standpipe piezometers were flushed in July/August 2014. Not all sediment was removed and some casings also cut or extended/repaired at this time. Therefore a new top of casing and new depth to bottom of standpipe was recorded for many instruments. Older data will appear below tip elevation if previously read "dry" or if previous top of casing elevation was incorrect due to damage.

P-xxx old represents readings to point of flushing. P-xxx represents readings post flushing. If no "old" plot then no change to top of casing elevation or depth to bottom of standpipe.

Figure V-2 Old Iron Dike



Standpipe piezometers were flushed in July/August 2014. Not all sediment was removed and some casings also cut or extended/repaired at this time. Therefore a new top of casing and new depth to bottom of standpipe was recorded for many instruments. Older data will appear below tip elevation if previously read "dry" or if previous top of casing elevation was incorrect due to damage.

Figure V-3 Iron TSF Divider Dike

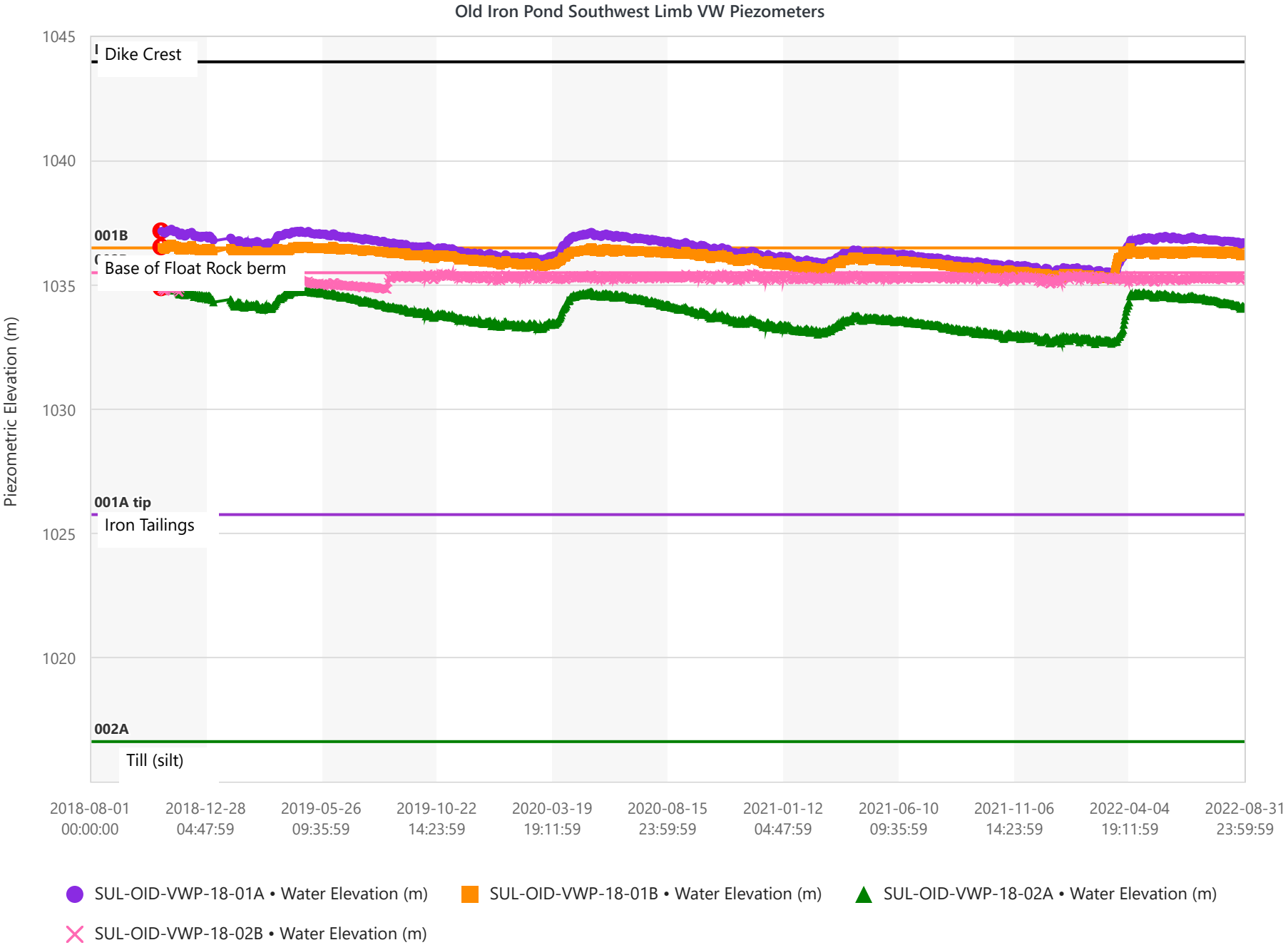
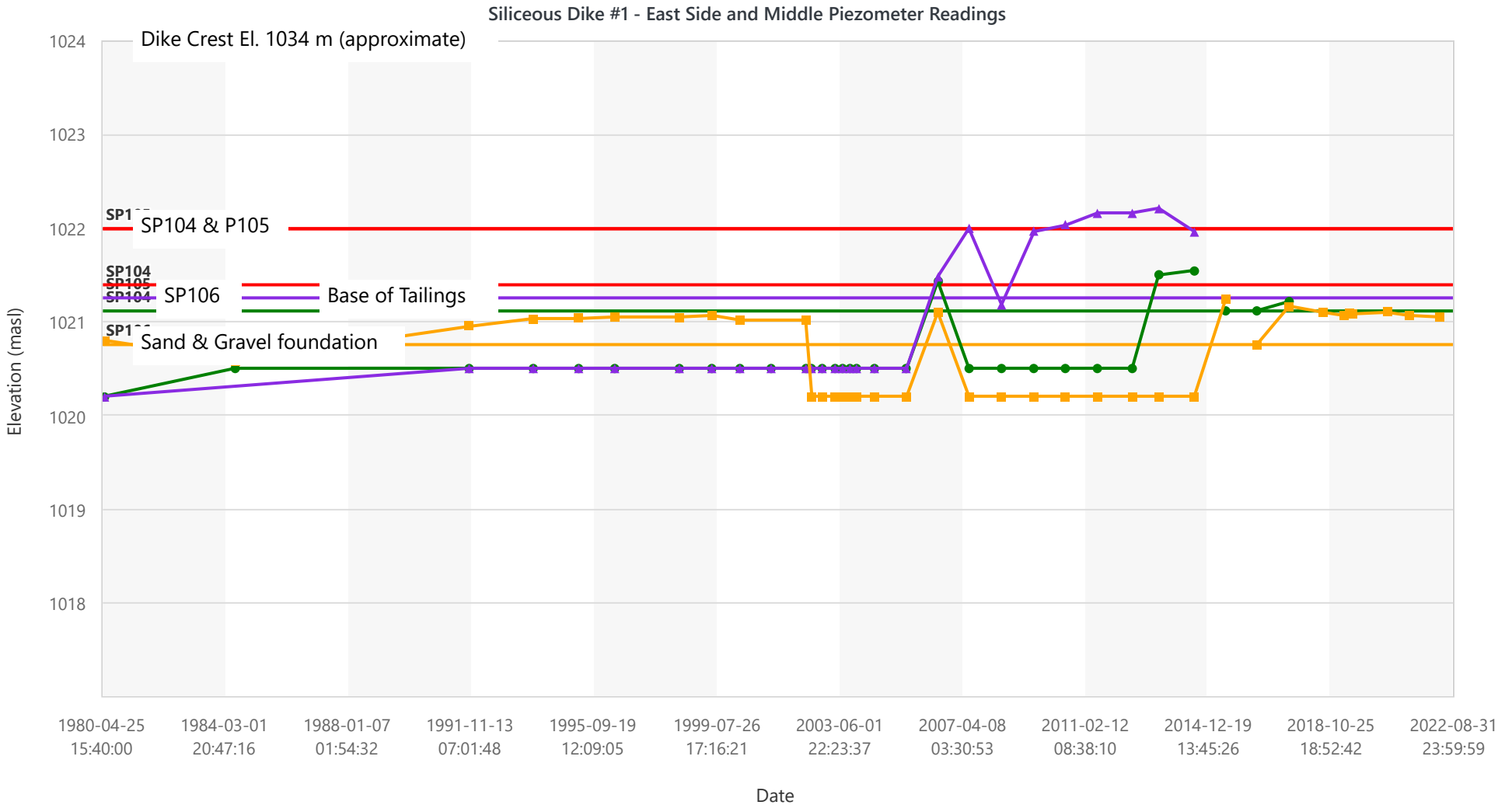


Figure V-4 Old Iron Dike VWP

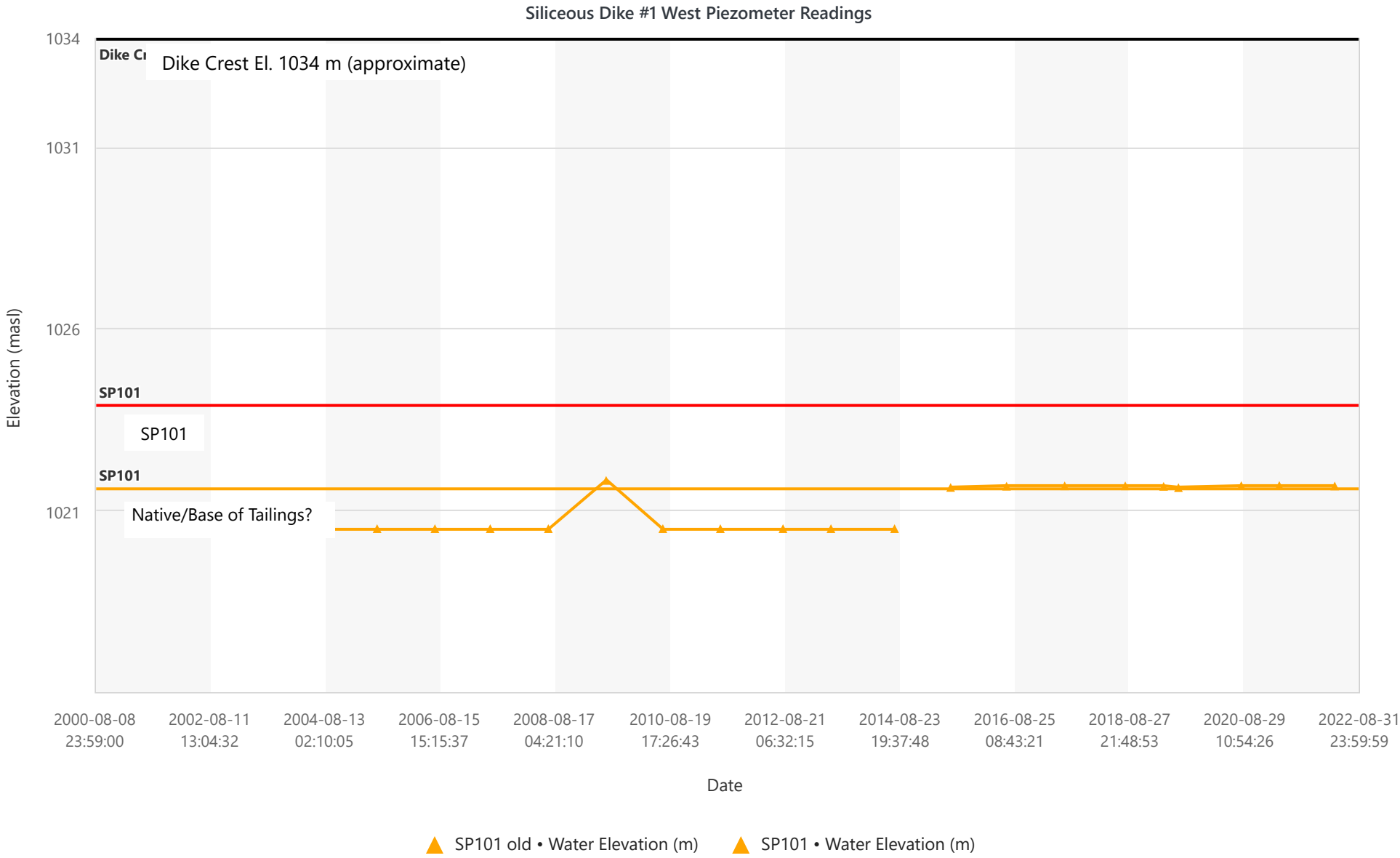
APPENDIX VI

Siliceous Dike Instrumentation



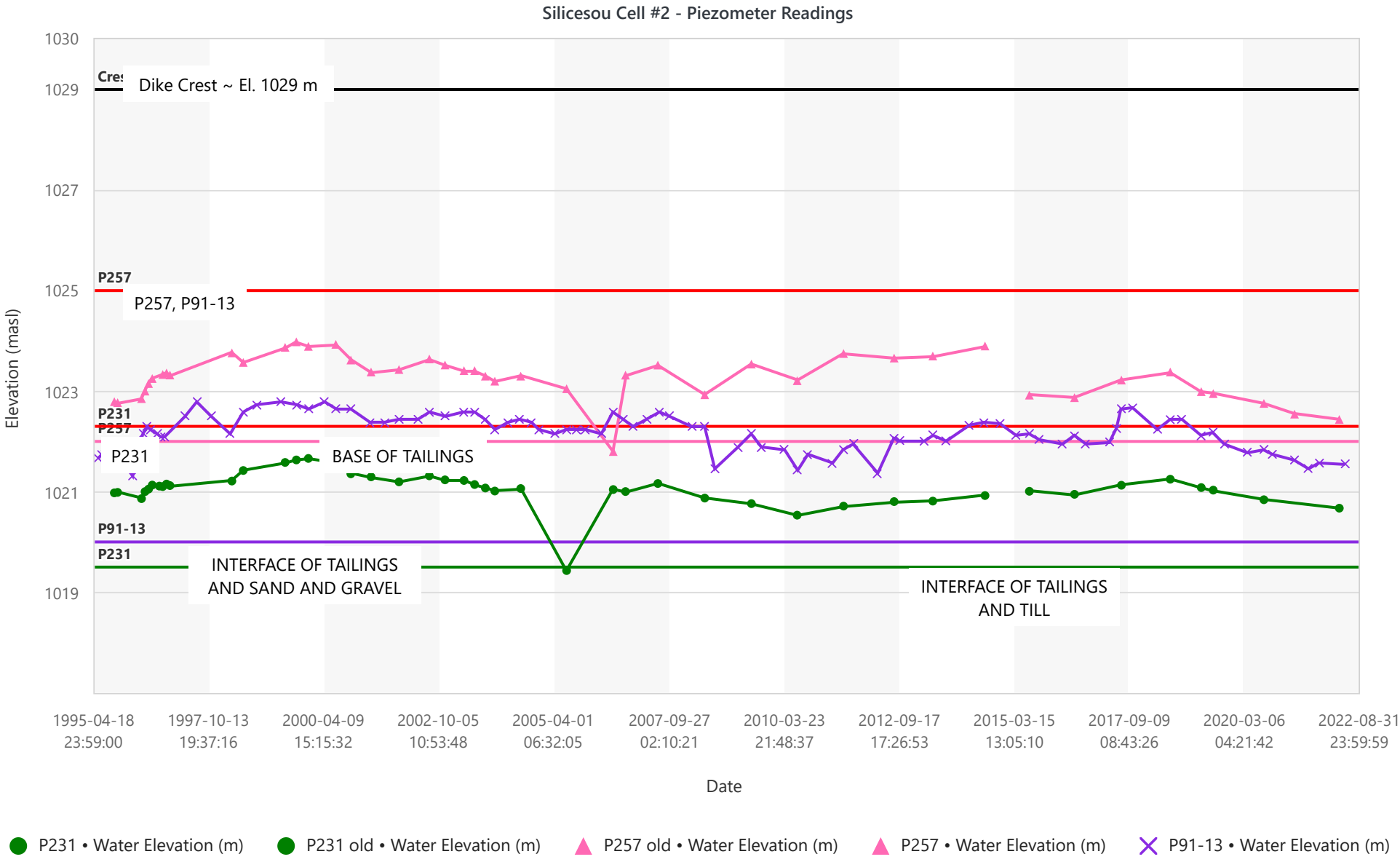
Notes:
Straight lines same colour as data plots indicate bottom of standpipe/tip elevation.
Read lines are threshold values.
Standpipe piezometers were flushed in July/August 2014. Not all sediment was removed and some casings also cut or extended/repaired at this time. Therefore a new top of casing and new depth to bottom of standpipe was recorded for many instruments. Older data will appear below tip elevation if previously read "dry" or if previous top of casing elevation was incorrect due to damage.
Pxxx old represents readings to point of flushing. Pxxx represents readings post flushing. If no "old" plot then no change to top of casing elevation or depth to bottom of standpipe.

Figure VI-1



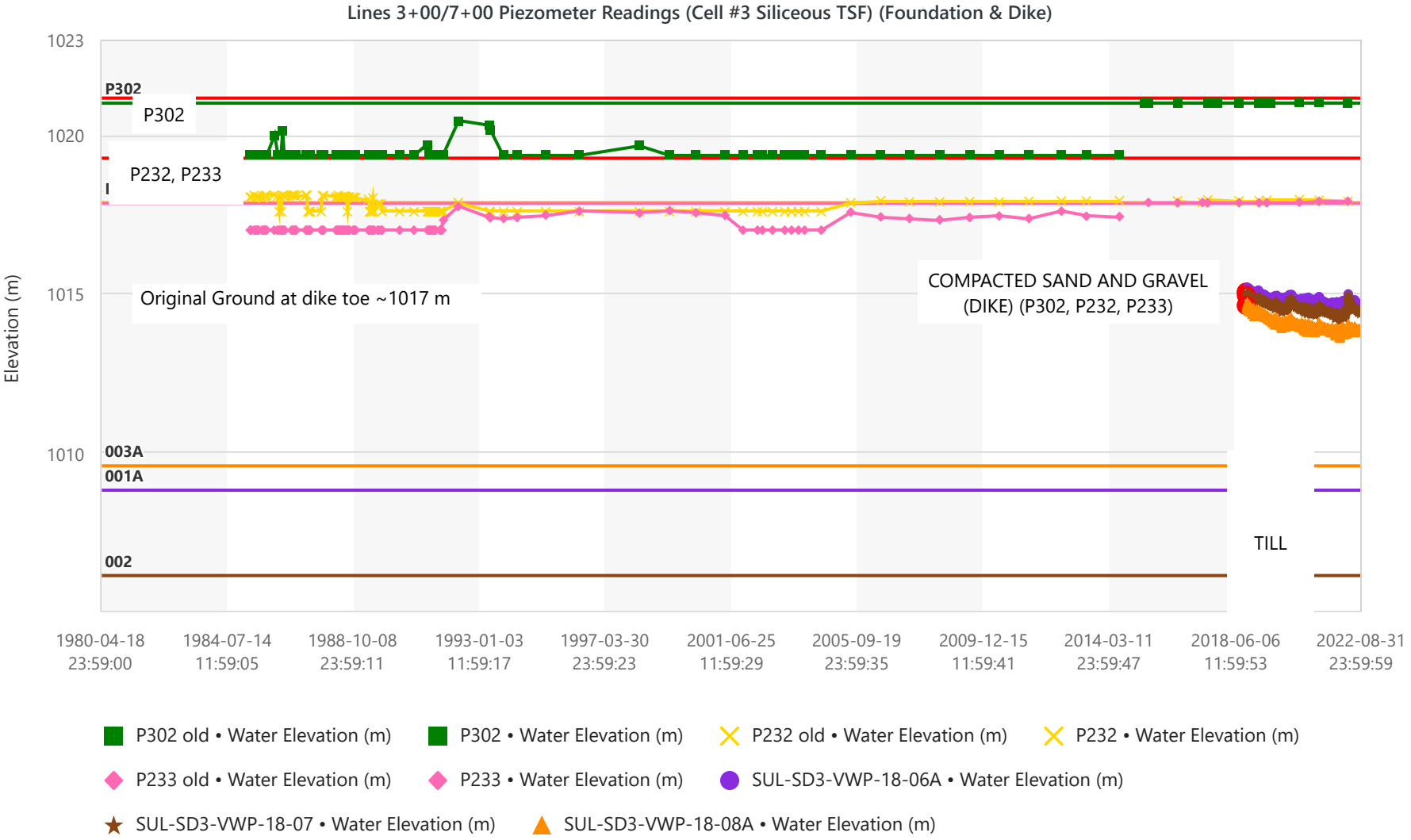
Notes:
Straight lines same colour as data plots indicate bottom of standpipe/tip elevation.
Red lines are the maximum threshold values.
Standpipe piezometers were flushed in July/August 2014. Not all sediment was removed and some casings also cut or extended/repaired at this time. Therefore a new top of casing and new depth to bottom of standpipe was recorded for many instruments. Older data will appear below tip elevation if previously read "dry" or if previous top of casing elevation was incorrect due to damage.
Pxxx old represents readings to point of flushing. Pxxx represents readings post flushing. If no "old" plot then no change to top of casing elevation or depth to bottom of standpipe.

Figure VI-2



Notes:
Straight lines same colour as data plots indicate bottom of standpipe/tip elevation.
Red lines are the threshold values.
Standpipe piezometers were flushed in July/August 2014. Not all sediment was removed and some casings also cut or extended/repaired at this time. Therefore a new top of casing and new depth to bottom of standpipe was recorded for many instruments. Older data will appear below tip elevation if previously read "dry" or if previous top of casing elevation was incorrect due to damage.
Pxxx old represents readings to point of flushing. Pxxx represents readings post flushing. If no "old" plot then no change to top of casing elevation or depth to bottom of standpipe.

Figure VI-3



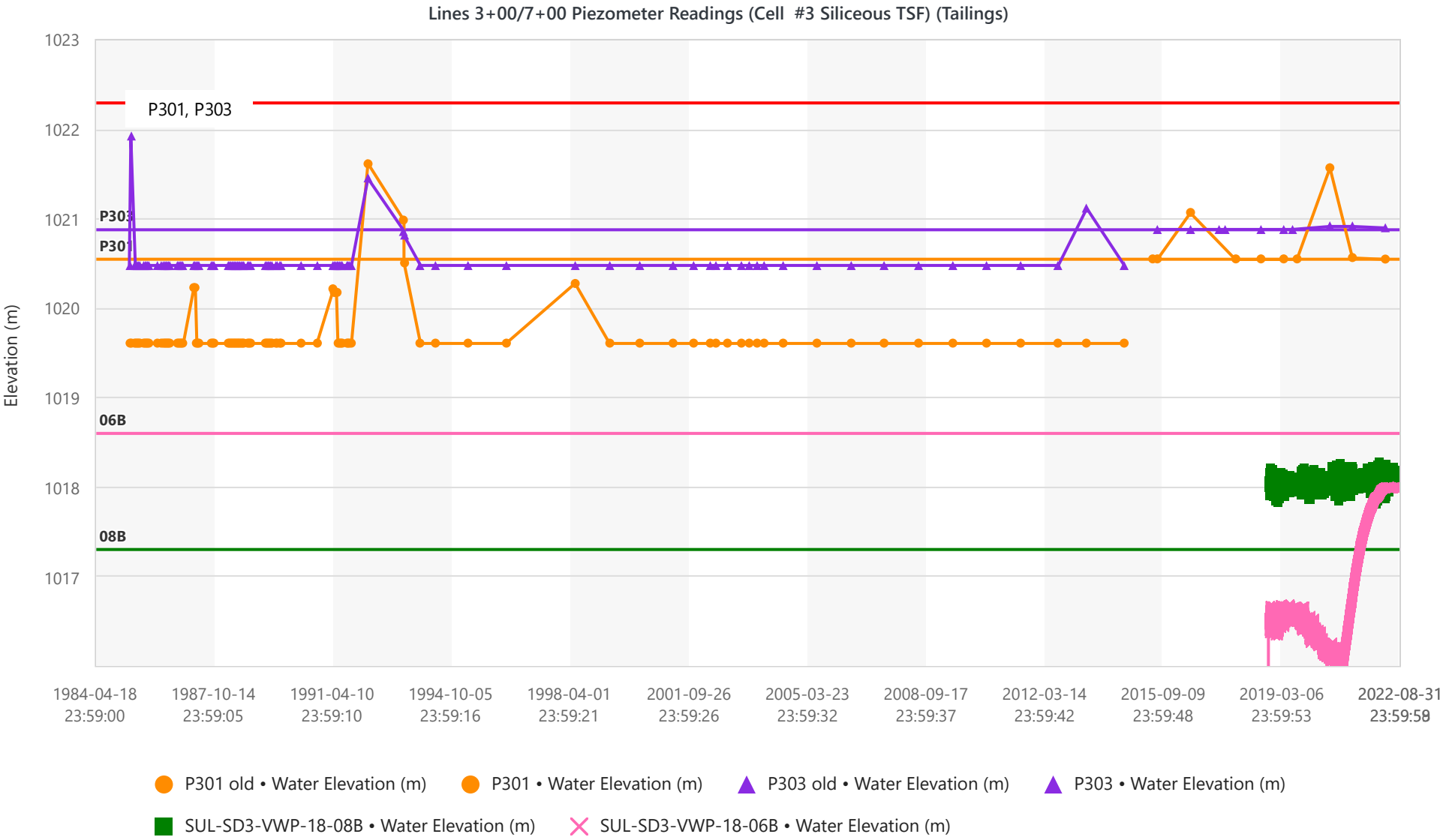
Straight lines same colour as data plots indicate tip elevation.

Red lines are the maximum threshold values.

Standpipe piezometers were flushed in July/August 2014. Not all sediment was removed and some casings also cut or extended/repaired at this time. Therefore a new top of casing and new depth to bottom of standpipe was recorded for many instruments. Older data will appear below tip elevation if previously read "dry" or if previous top of casing elevation was incorrect due to damage.

Pxxx old represents readings to point of flushing. Pxxx represents readings post flushing. If no "old" plot then no change to top of casing elevation or depth to bottom of standpipe.

Figure VI-4 Siliceous Cell #3 TSF Line 3 +00/7+00 (Foundation and Dike)



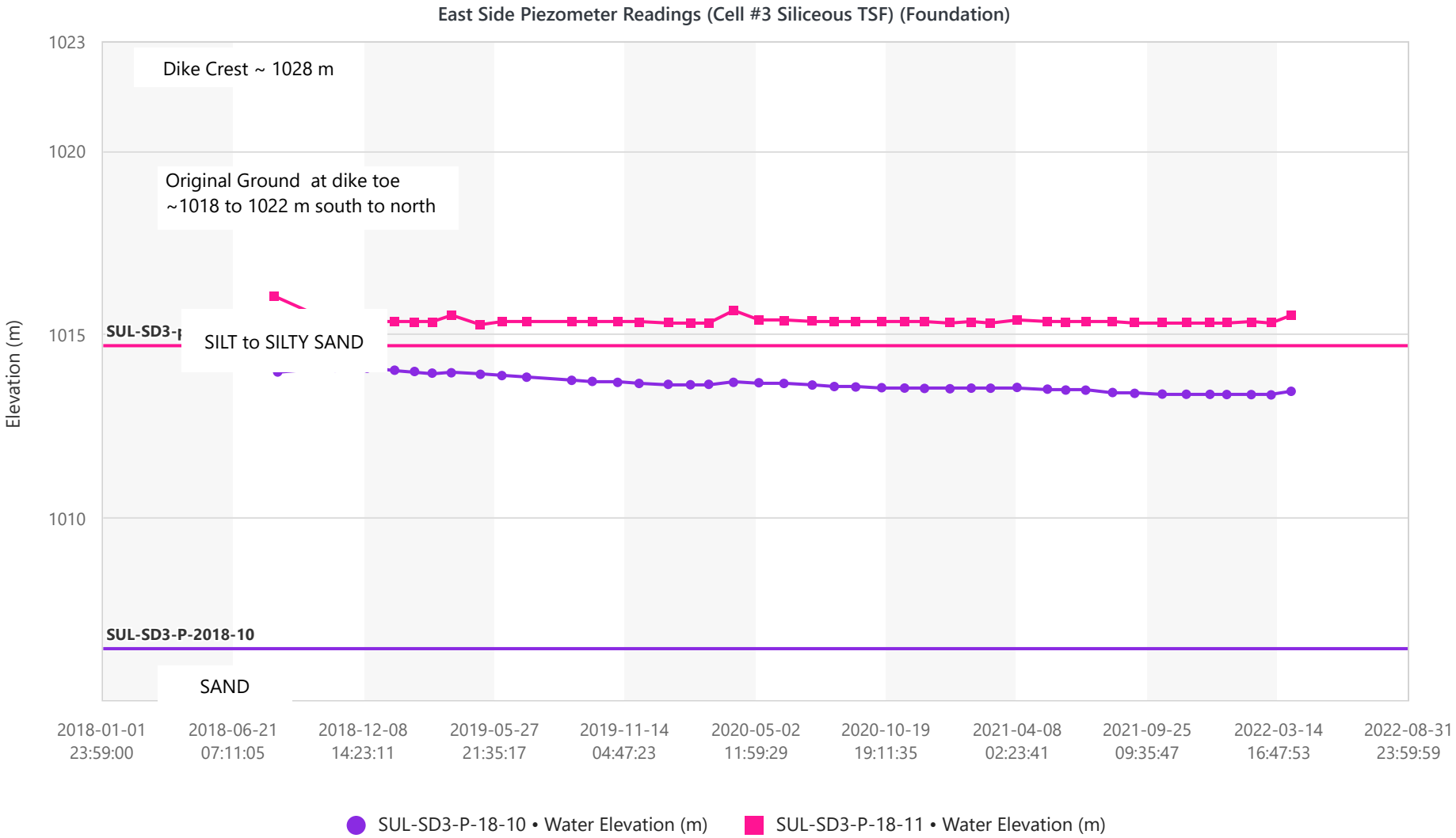
Straight lines same colour as data plots indicate tip elevation.

Red lines are the maximum threshold values.

Standpipe piezometers were flushed in July/August 2014. Not all sediment was removed and some casings also cut or extended/repaired at this time. Therefore a new top of casing and new depth to bottom of standpipe was recorded for many instruments. Older data will appear below tip elevation if previously read "dry" or if previous top of casing elevation was incorrect due to damage.

Pxxx old represents readings to point of flushing. Pxxx represents readings post flushing. If no "old" plot then no change to top of casing elevation or depth to bottom of standpipe.

Figure VI-5 Silceous Cell #3 TSF Line 3+00/7+00 (Tailings)



Straight lines same colour as data plots indicate tip elevation.

Red lines are the maximum threshold values.

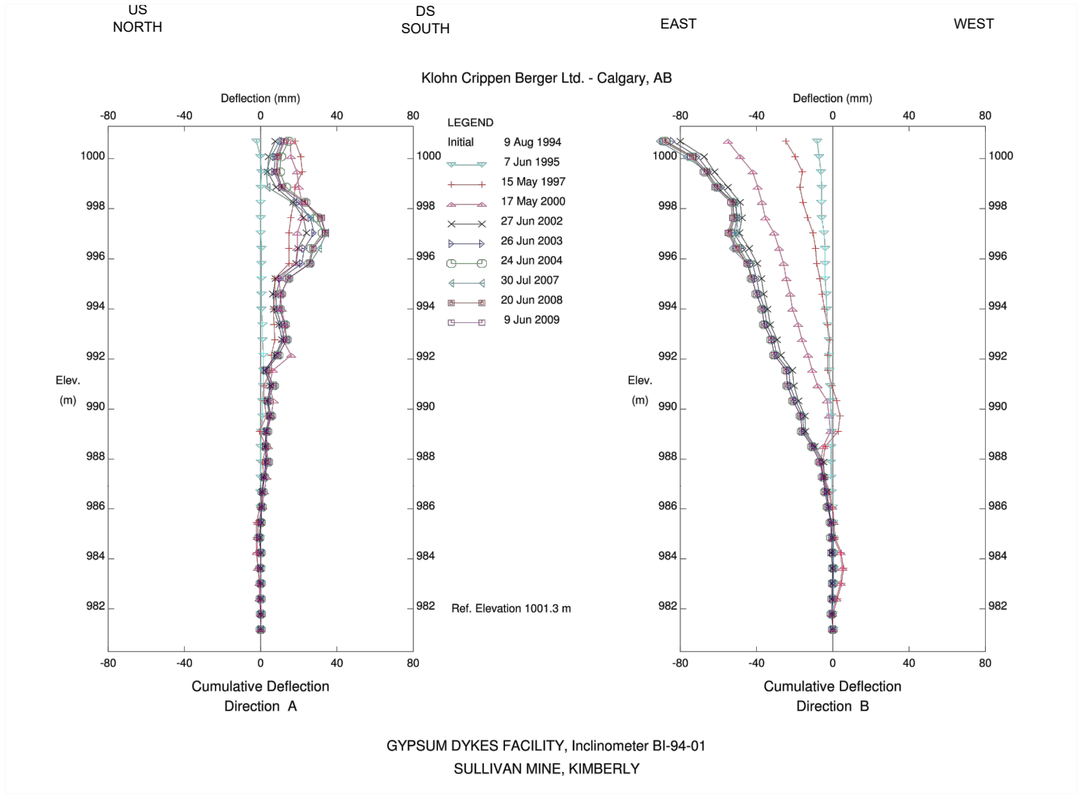
Standpipe piezometers were flushed in July/August 2014. Not all sediment was removed and some casings also cut or extended/repaired at this time. Therefore a new top of casing and new depth to bottom of standpipe was recorded for many instruments. Older data will appear below tip elevation if previously read "dry" or if previous top of casing elevation was incorrect due to damage.

Pxxx old represents readings to point of flushing. Pxxx represents readings post flushing. If no "old" plot then no change to top of casing elevation or depth to bottom of standpipe.

Figure VI-6 Siliceous Cell #3
TSF East (Foundation)

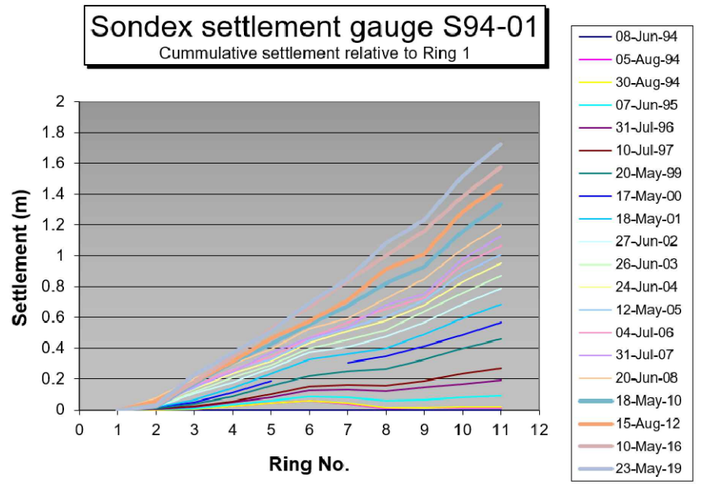
APPENDIX VII

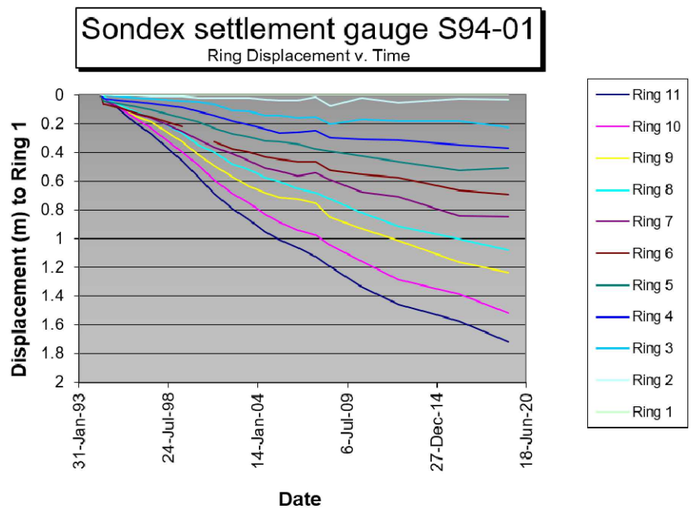
W Gypsum Dike Instrumentation



GYPSUM DYKES FACILITY, Inclinometer BI-94-01
SULLIVAN MINE, KIMBERLY

(CAN NO LONGER READ. BLOCKED AT 4.7 m BELOW THE GROUND SURFACE)





CLIENT
Teck

Klohn Crippen Berger

PROJECT
SULLIVAN MINE
2021 ANNUAL INSPECTION REPORT

TITLE
WEST GYPSUM DIKE
SONDEX AND
INCLINOMETER PLOTS

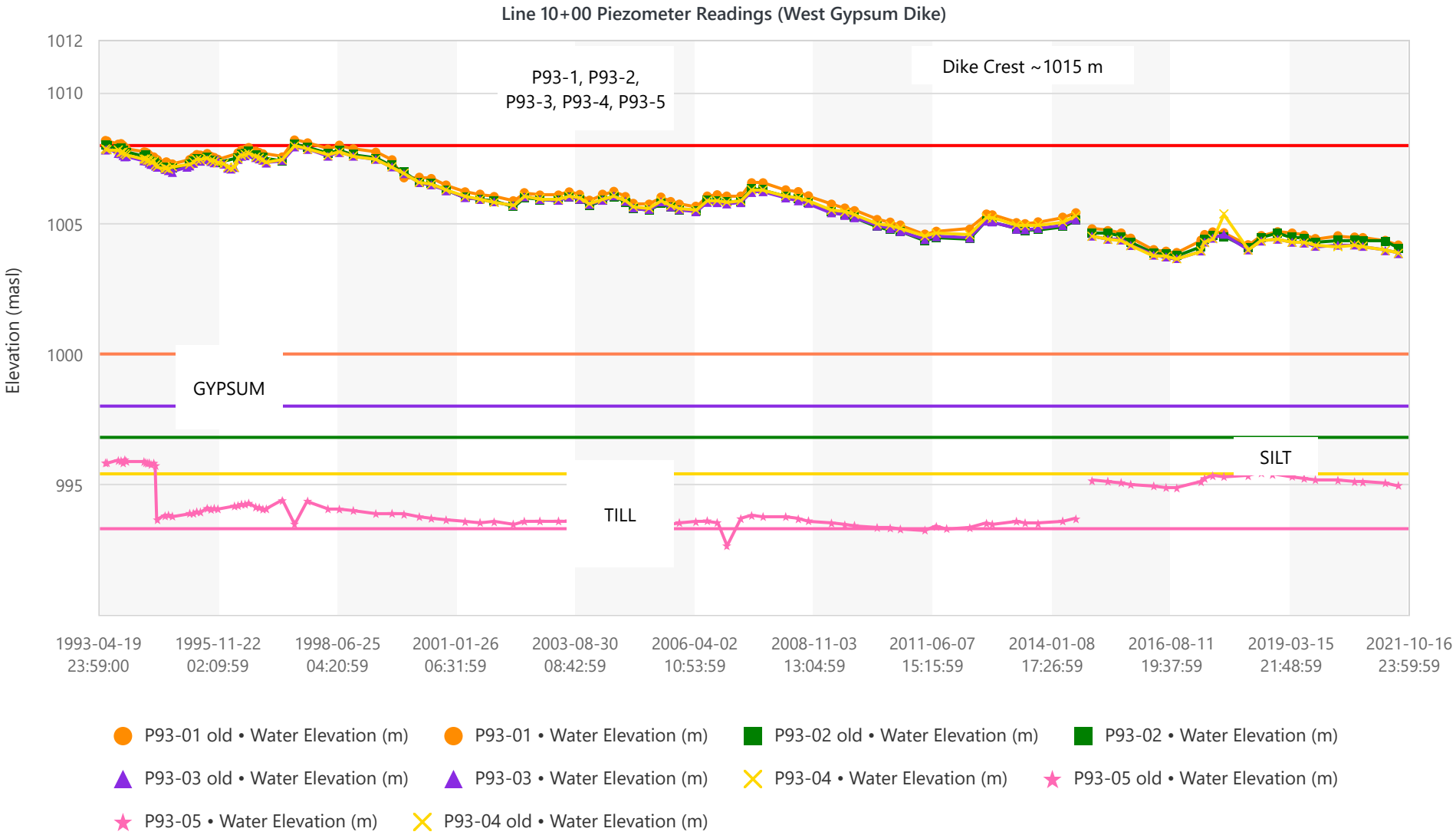
PROJECT No. A05807A21

FIG. No. FIGURE VII-1

KCC-F-B-M

A05807A14 FIGure VI-1.dwg

Z:\A\EDM\A05807A21 TML 2021 Annual Inspection\400 Drawings\Annual Inspection\Figure VII-1.dwg Layout=LAYOUT1 October 18, 2021 8:54:16 AM



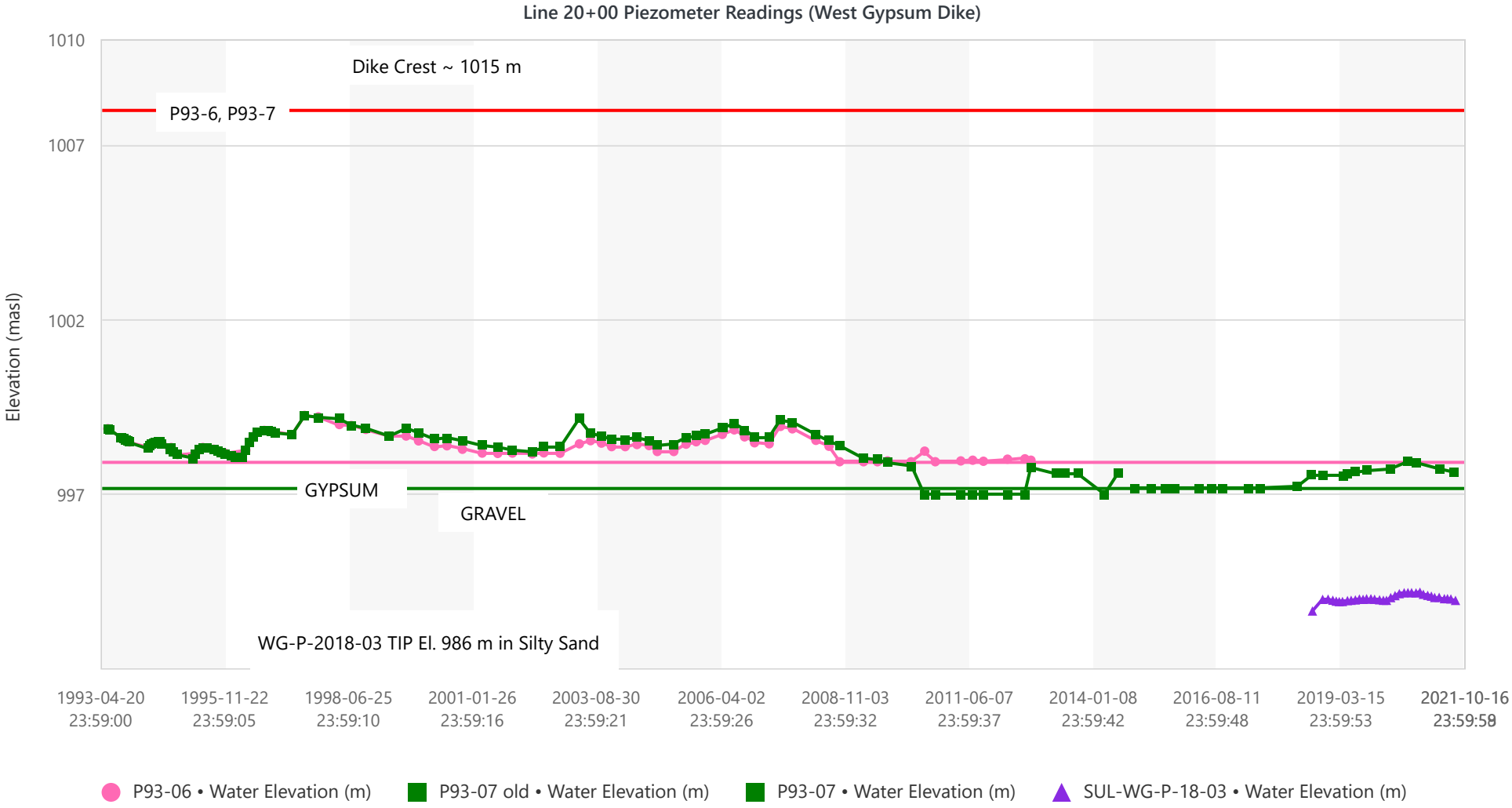
Straight lines same colour as data plots indicate tip elevation.

Red lines are the maximum threshold values.

Standpipe piezometers were flushed in July/August 2014. Not all sediment was removed and some casings also cut or extended/repaired at this time. Therefore a new top of casing and new depth to bottom of standpipe was recorded for many instruments. Older data will appear below tip elevation if previously read "dry" or if previous top of casing elevation was incorrect due to damage.

SPxxx old represents readings to point of flushing. SPxxx represents readings post flushing. If no "old" plot then no change to top of casing elevation or depth to bottom of

Figure VII-2 Line 10+00



Straight lines same colour as data plots indicate tip elevation.

Red lines are the maximum threshold values.

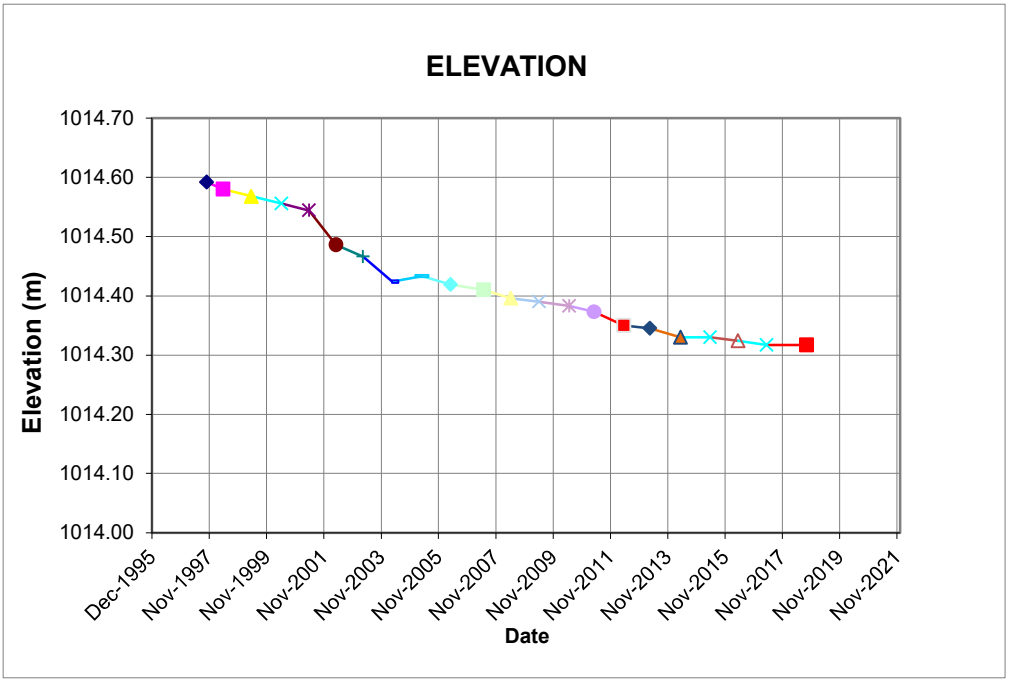
Standpipe piezometers were flushed in July/August 2014. Not all sediment was removed and some casings also cut or extended/repaired at this time. Therefore a new top of casing and new depth to bottom of standpipe was recorded for many instruments. Older data will appear below tip elevation if previously read "dry" or if previous top of casing elevation was incorrect due to damage.

SPxxx old represents readings to point of flushing. SPxxx represents readings post flushing. If no "old" plot then no change to top of casing elevation or depth to bottom of standpipe.

Figure VII-3 Line 20+00

SP97-01 Line 10+00

SETTLEMENT PLATES - WEST GYPSUM DIKE



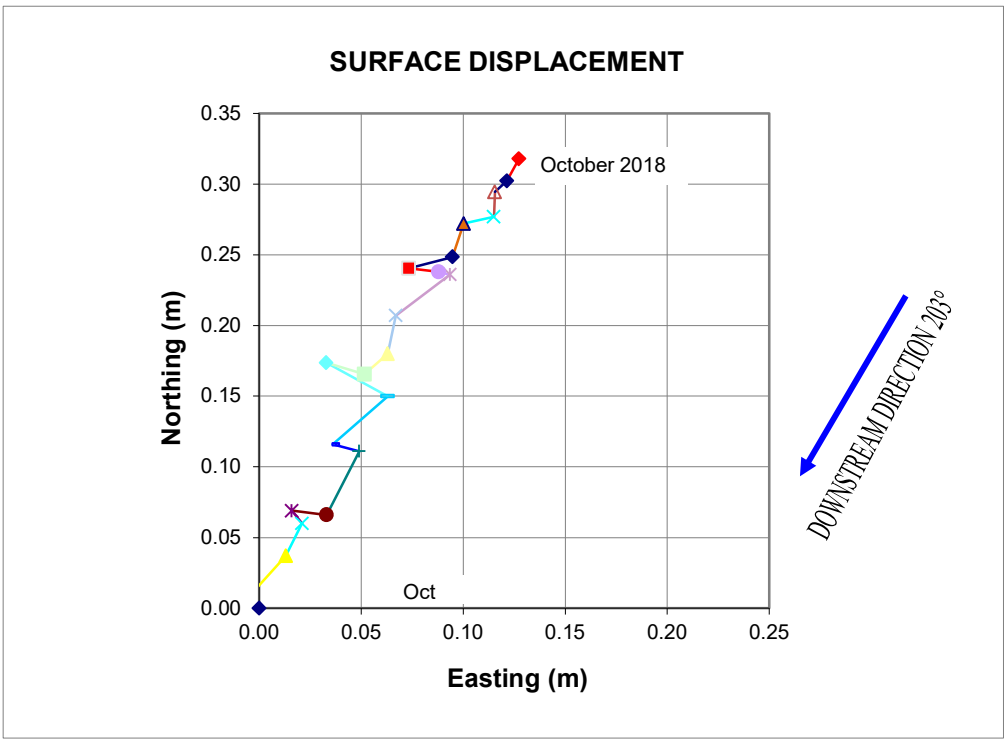
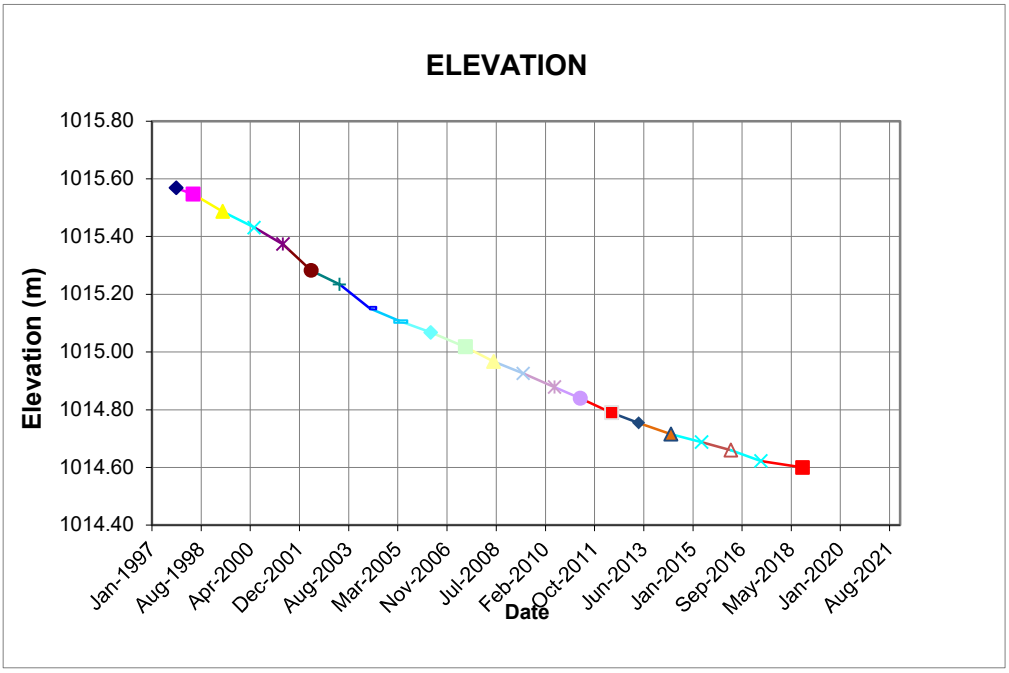


Figure VII-4-SP97-01

SP97-05 Line 10+00

SETTLEMENT PLATES - WEST GYPSUM DIKE



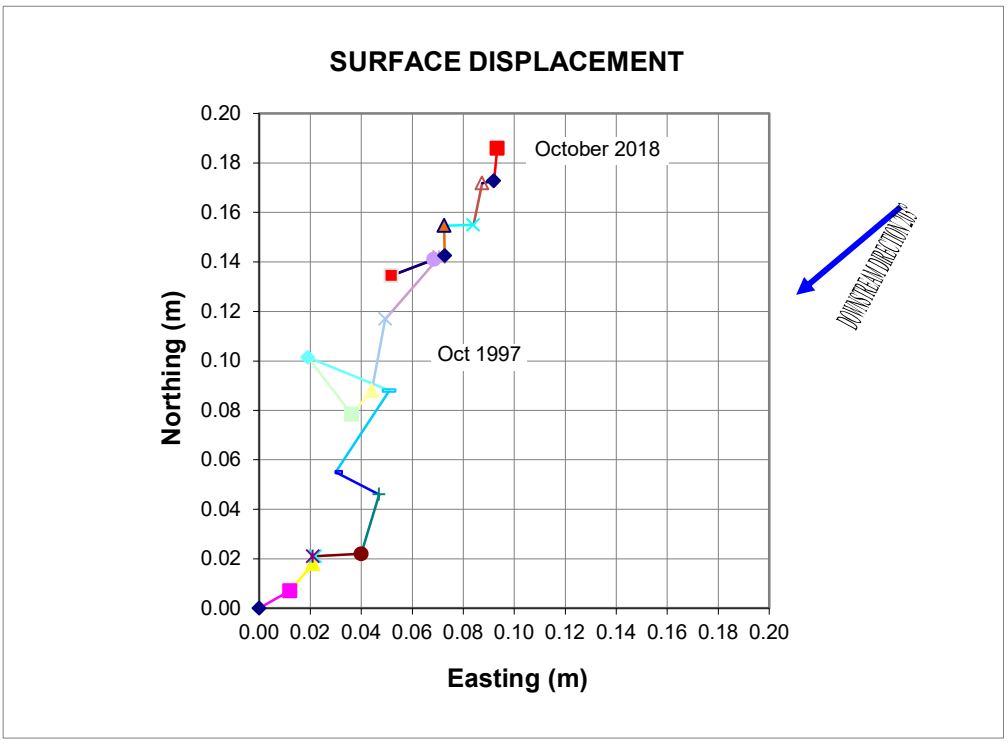
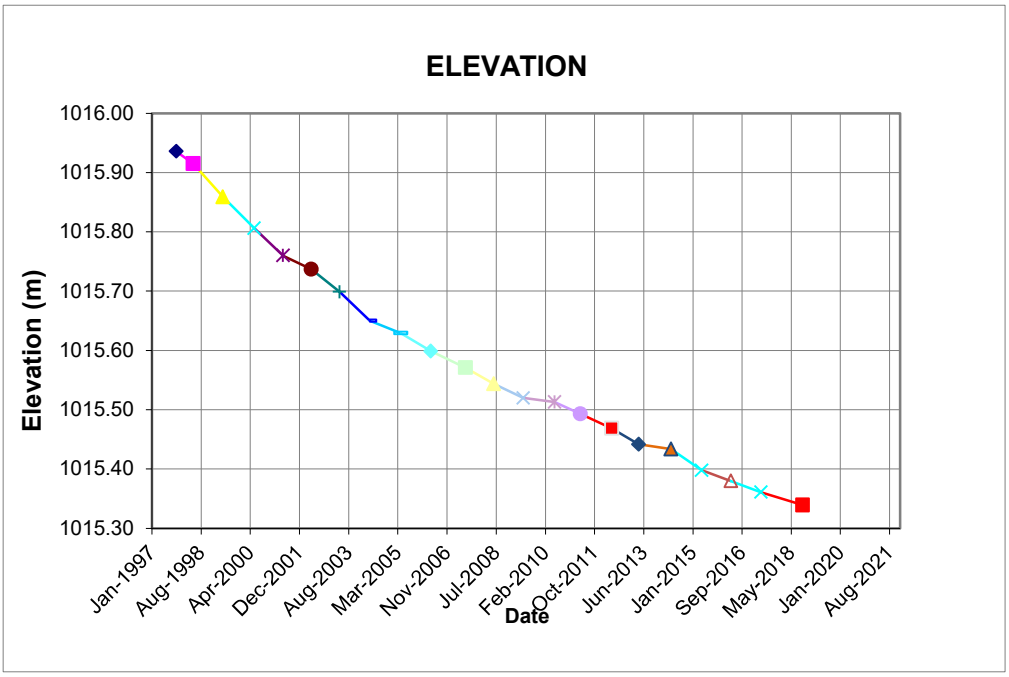


Figure VII-5-SP97-05

SP97-06 Line 20+00
SETTLEMENT PLATES - WEST GYPSUM DIKE



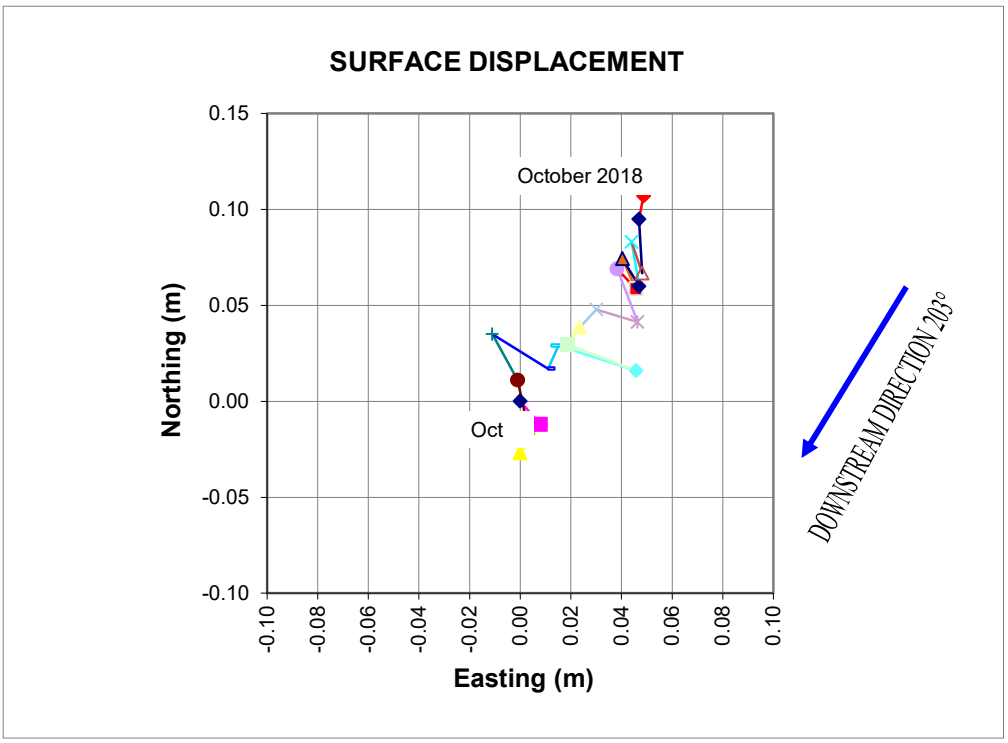
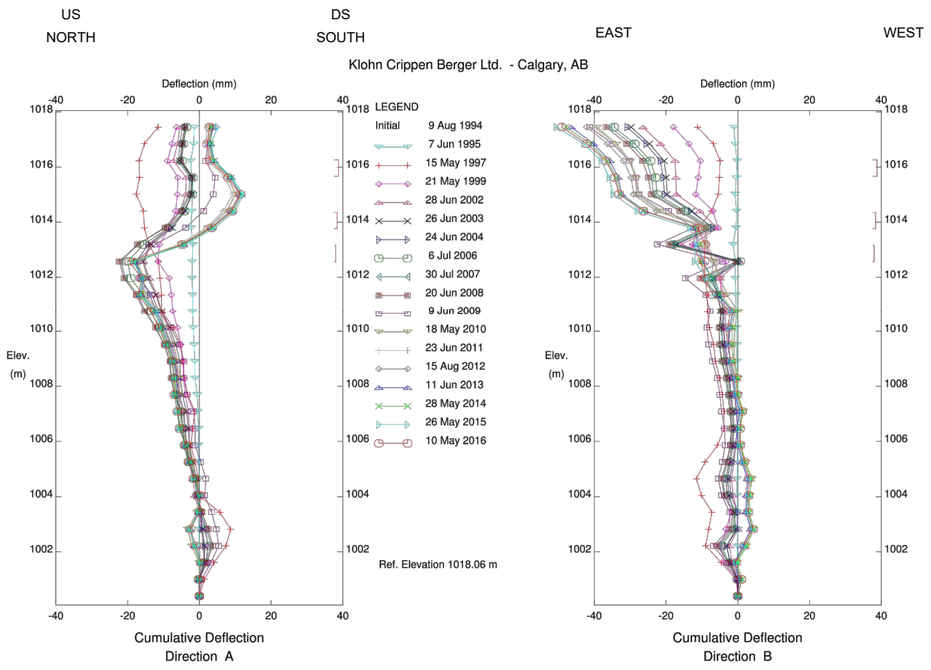


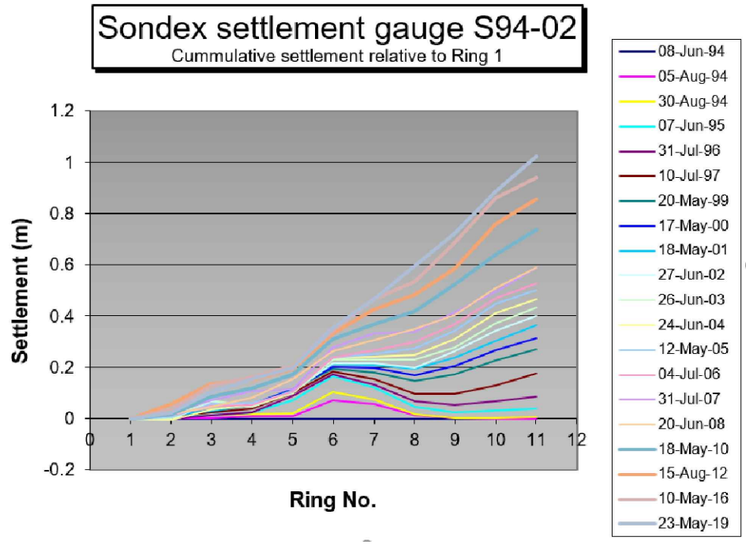
Figure VII-6-SP97-06

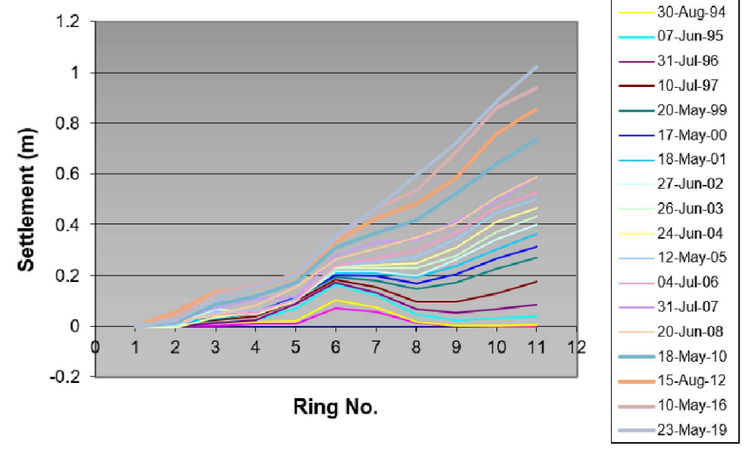
APPENDIX VIII

E Gypsum Dike Instrumentation



GYPSUM DYKES FACILITY, Inclinometer BI-94-02
SULLIVAN MINE, KIMBERLEY





CLIENT
Teck

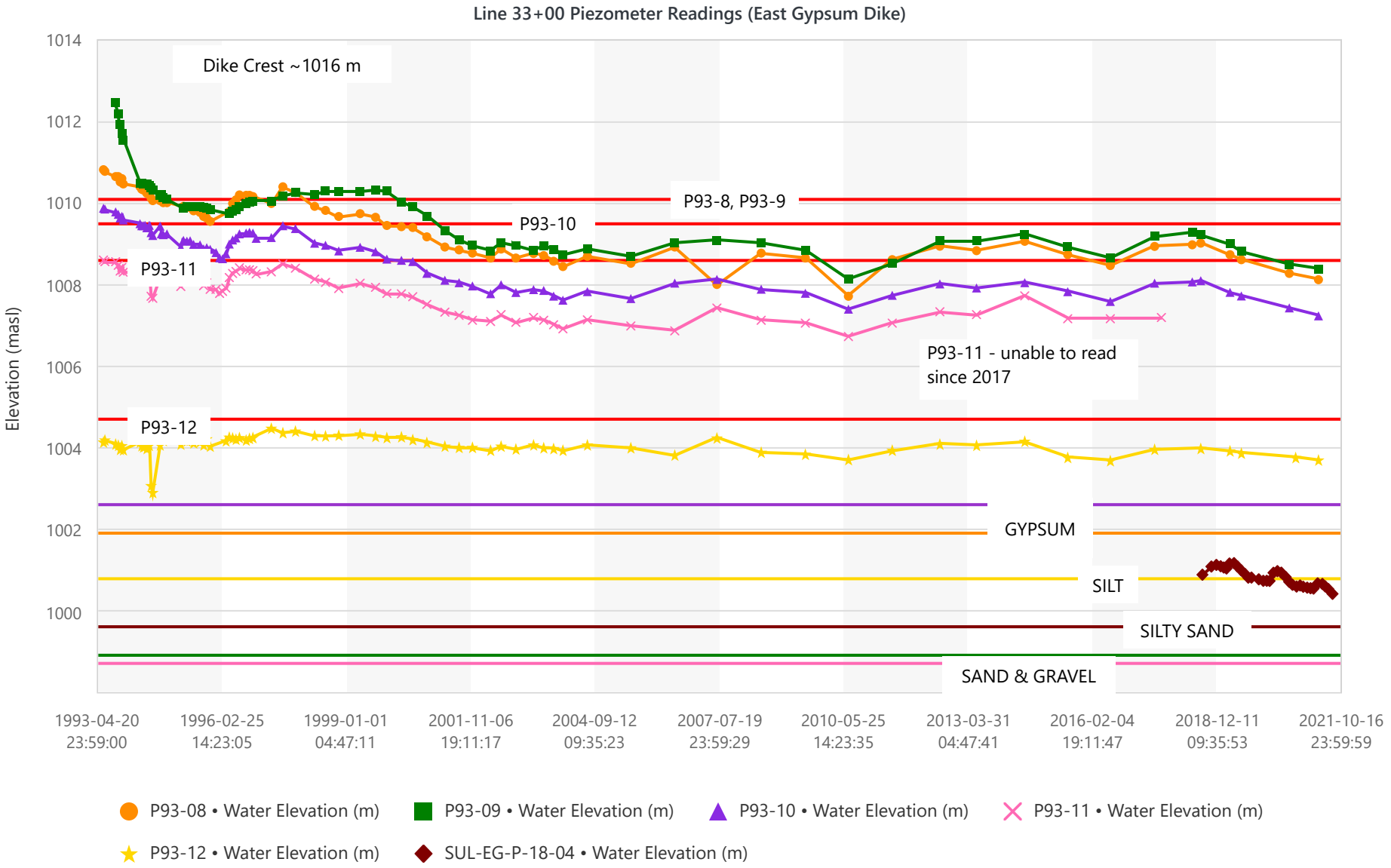
Klohn Crippen Berger

PROJECT
SULLIVAN MINE
2021 ANNUAL INSPECTION REPORT

TITLE
EAST GYPSUM DIKE
SONDEX AND
INCLINOMETER PLOTS

PROJECT No.
A05807A21

FIG. No.
FIGURE VIII-1

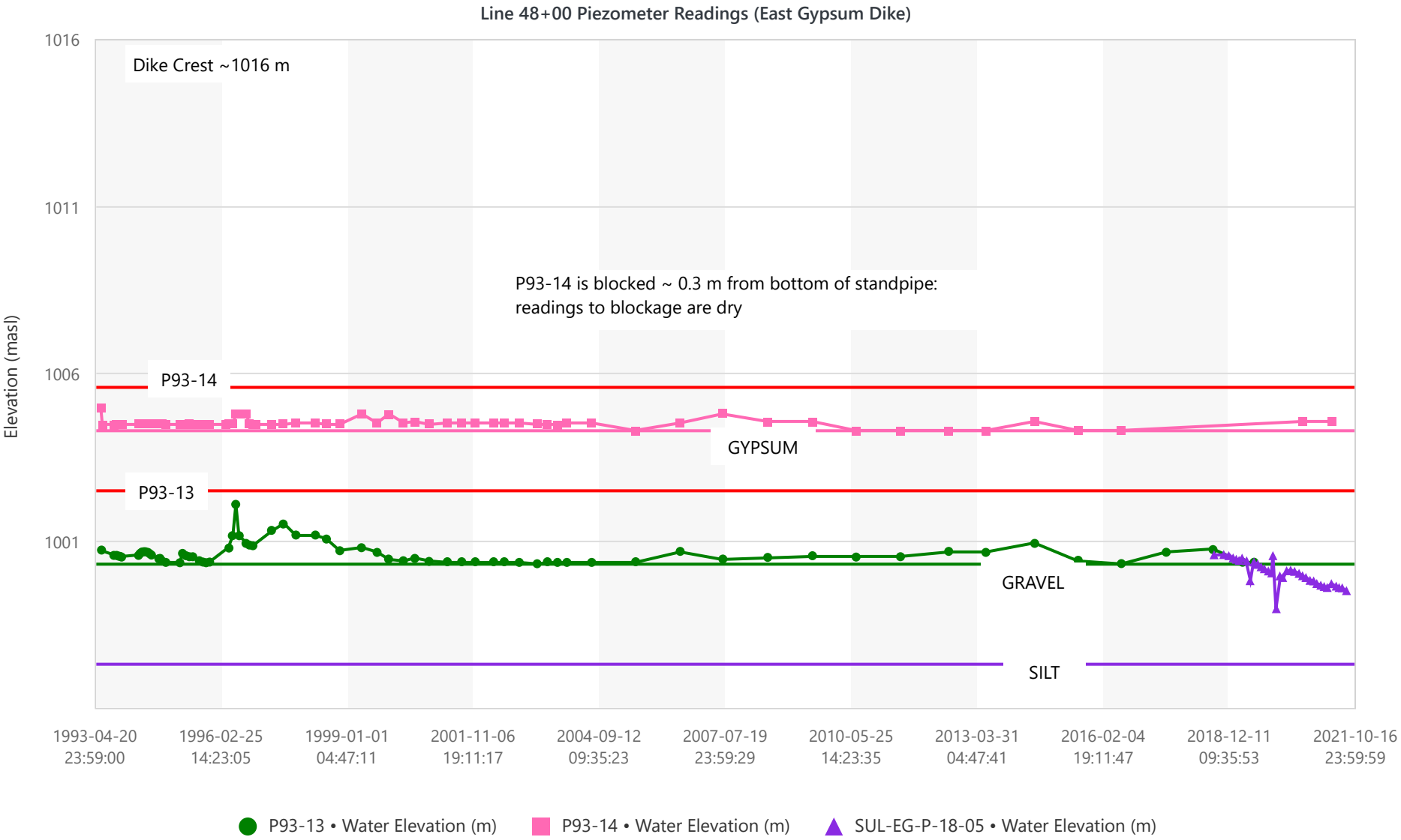


Straight lines same colour as data plots indicate tip elevation.

Red lines are the maximum threshold values.

Standpipe piezometers were flushed in July/August 2014. Not all sediment was removed and some casings also cut or extended/repaired at this time. Therefore a new top of casing and new depth to bottom of standpipe was recorded for many instruments. Older data will appear below tip elevation if previously read "dry" or if previous top of casing elevation was incorrect due to damage.

Figure VIII-2 Line 33+00



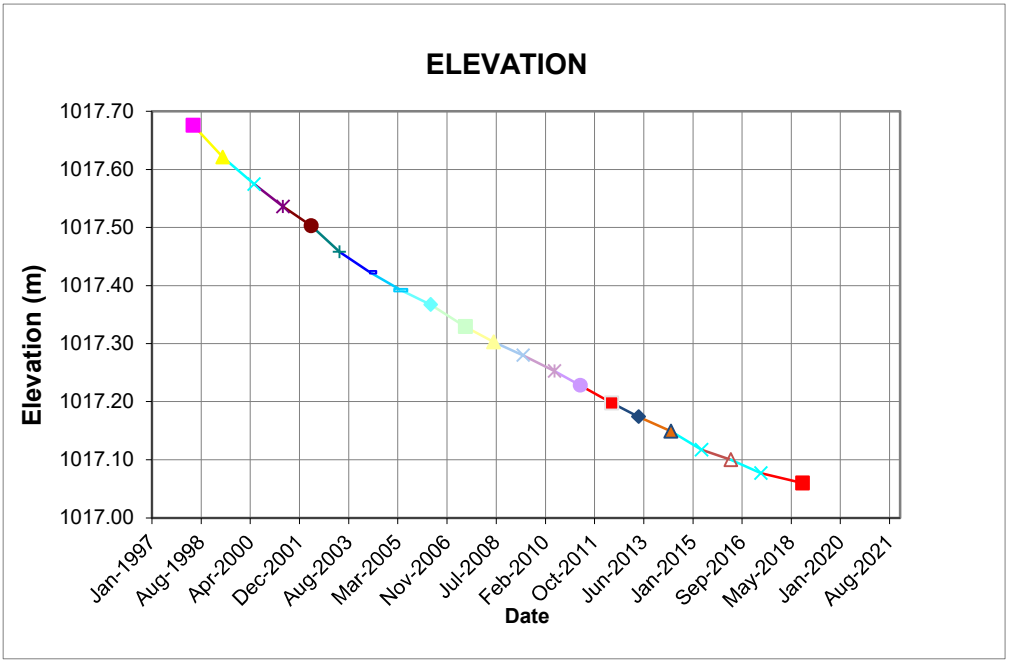
Straight lines same colour as data plots indicate tip elevation.

Red lines are the maximum threshold values.

Standpipe piezometers were flushed in July/August 2014. Not all sediment was removed and some casings also cut or extended/repaired at this time. Therefore a new top of casing and new depth to bottom of standpipe was recorded for many instruments. Older data will appear below tip elevation if previously read "dry" or if previous top of casing elevation was incorrect due to damage.

Figure VIII-3 Line 48+00

SP97-03 Line 33+00
SETTLEMENT PLATES - EAST GYPSUM DIKE



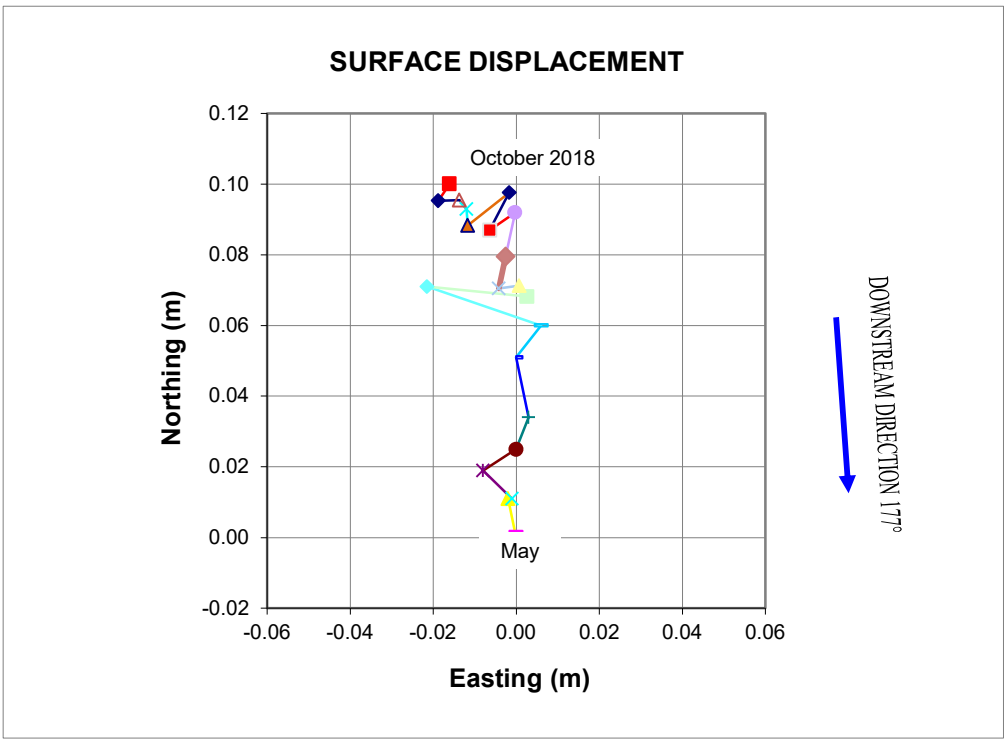
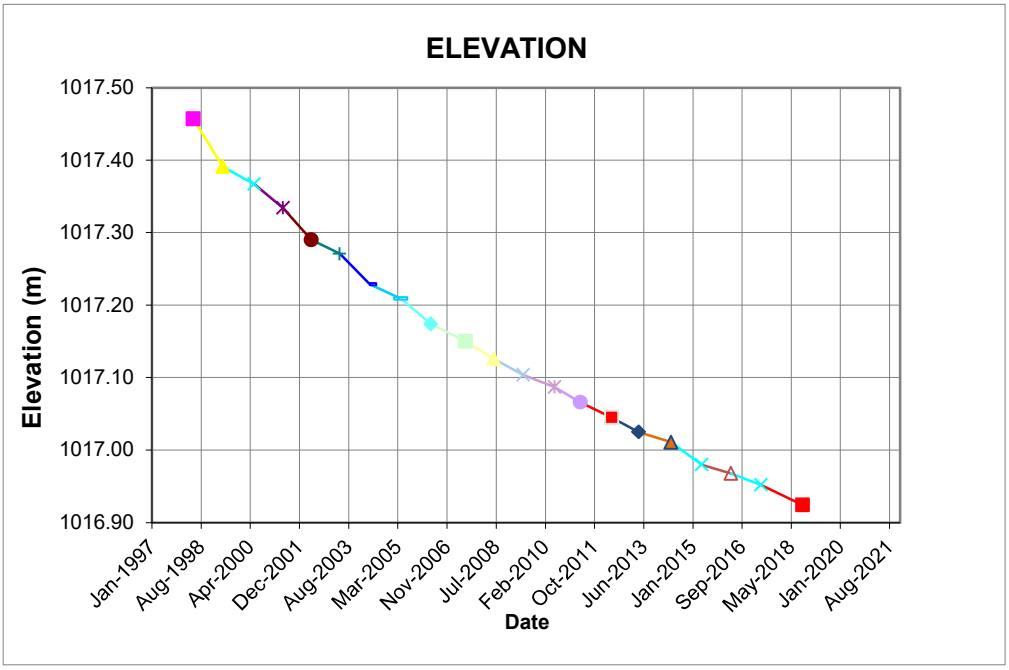


Figure VIII-4-SP97-03

SP97-04 Line 48+00

SETTLEMENT PLATES - EAST GYPSUM DIKE



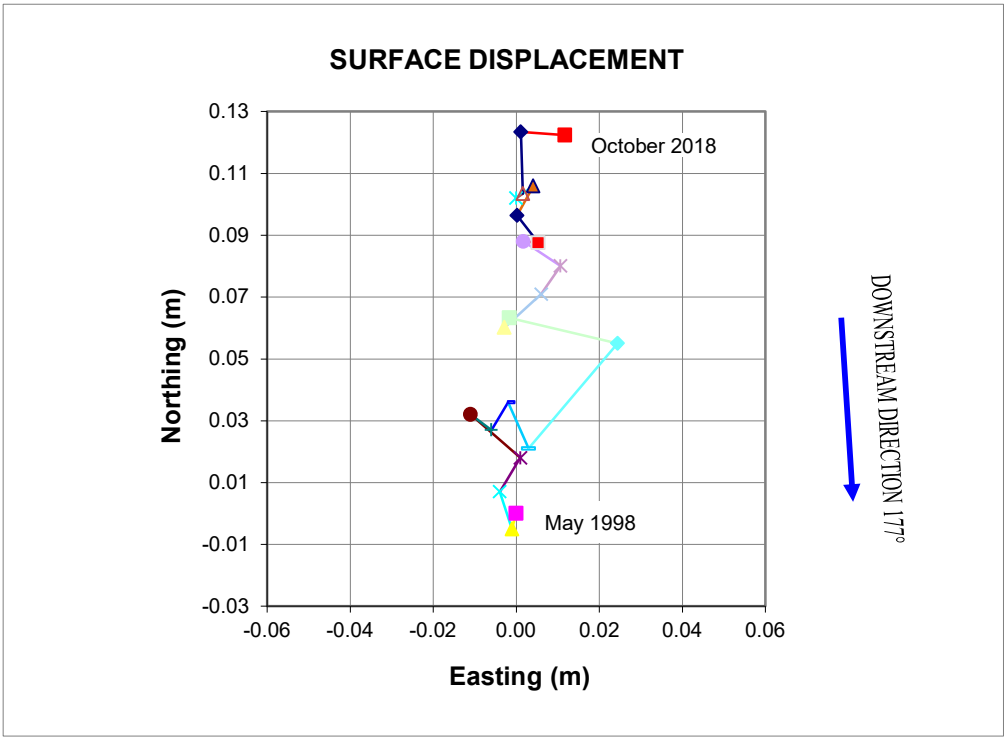
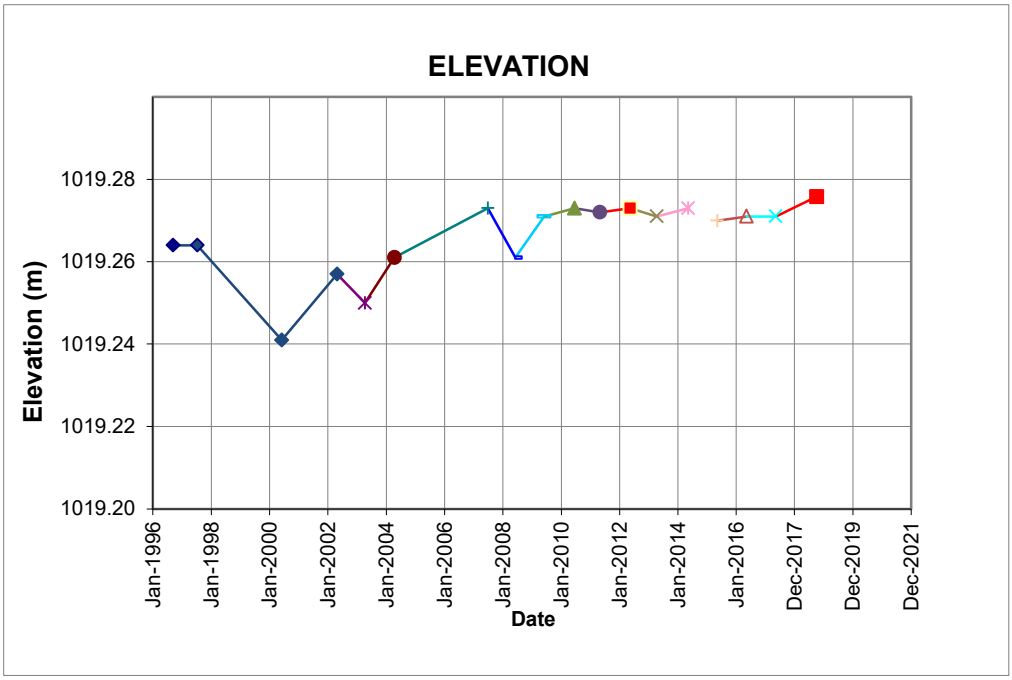


Figure VIII-5-SP97-04

APPENDIX IX

NE Gypsum Dike Instrumentation

W Pipe
NE Gypsum Dike



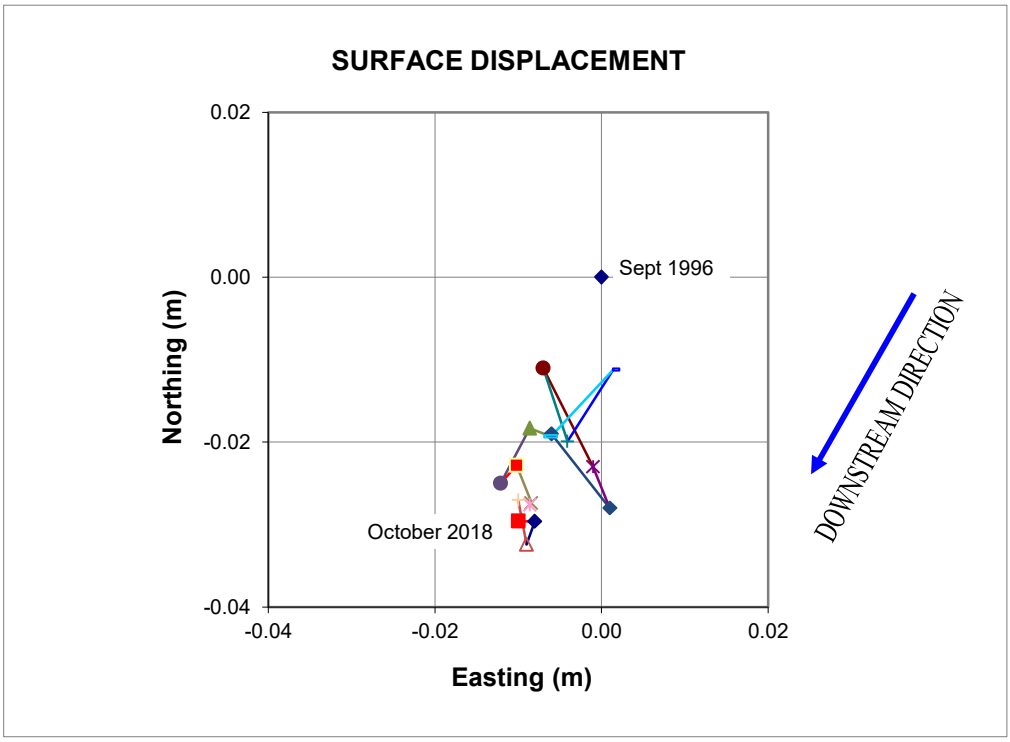
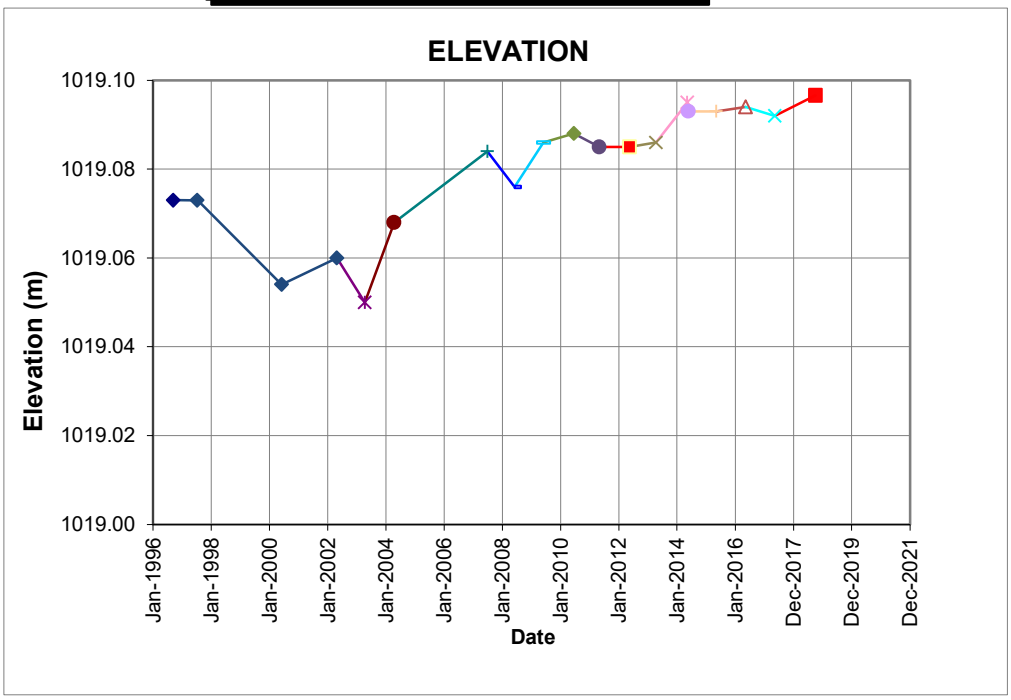


Figure IX-1 NE Gypsum Dike W pipe

E Pipe
NE Gypsum Dike



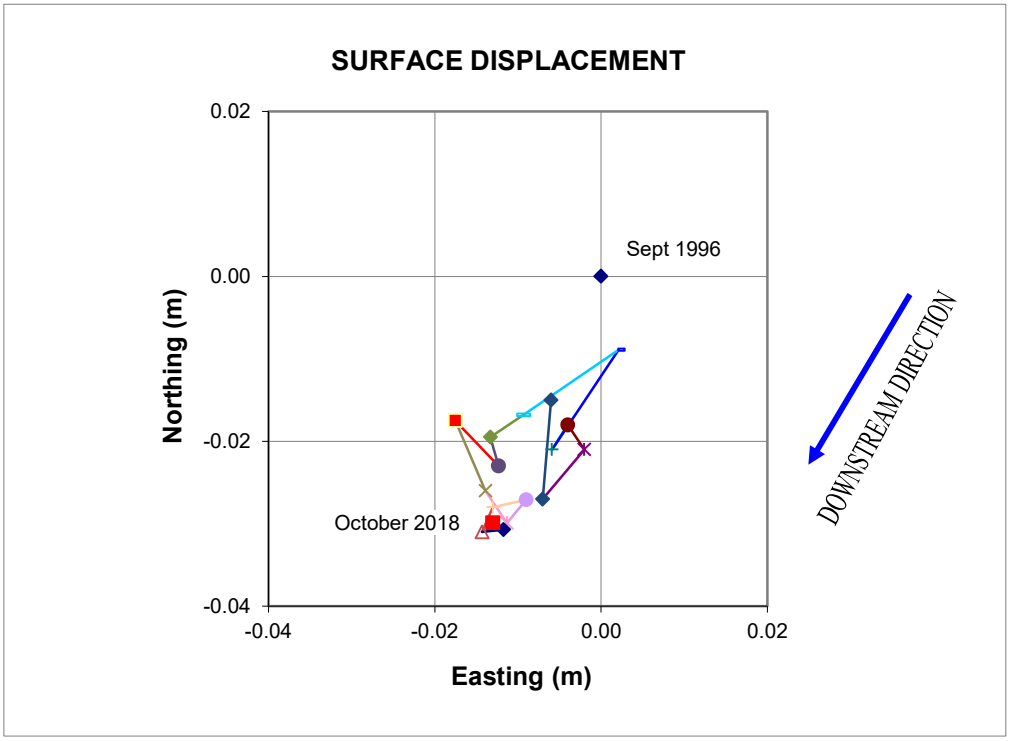


Figure IX-2 NE Gypsum Dike E pipe

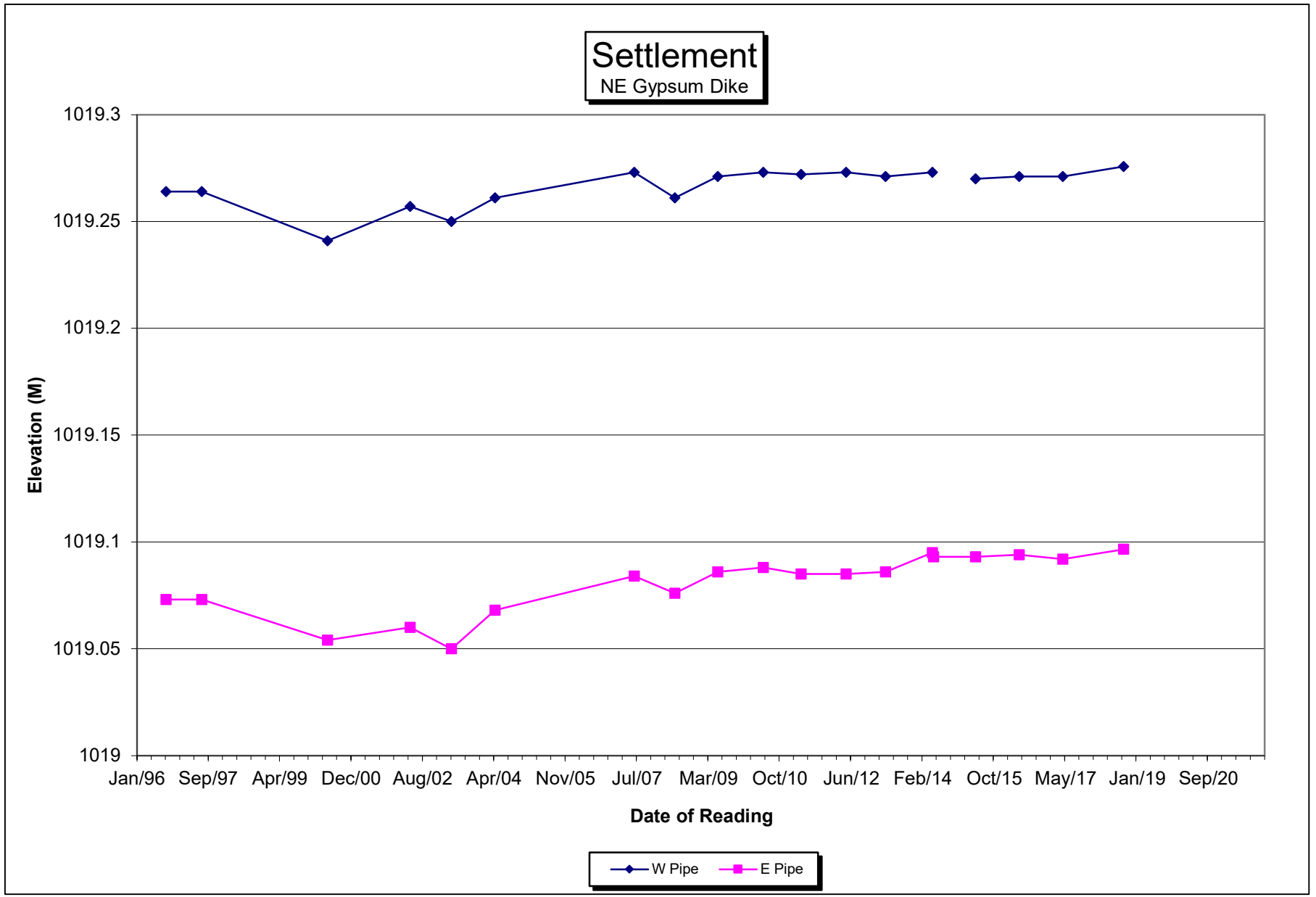

Settlement
NE Gypsum Dike
1019.3
1019.25
1019.2
1019.15
1019.1
1019.05
1019
Elevation (M)
Jan/96
Sep/97
Apr/99
Dec/00
Aug/02
Apr/04
Nov/05
Jul/07
Mar/09
Oct/10
Jun/12
Feb/14
Oct/15
May/17
Jan/19
Sep/20
Date of Reading
W Pipe
E Pipe

Figure IX-3

APPENDIX X

ARD Instrumentation

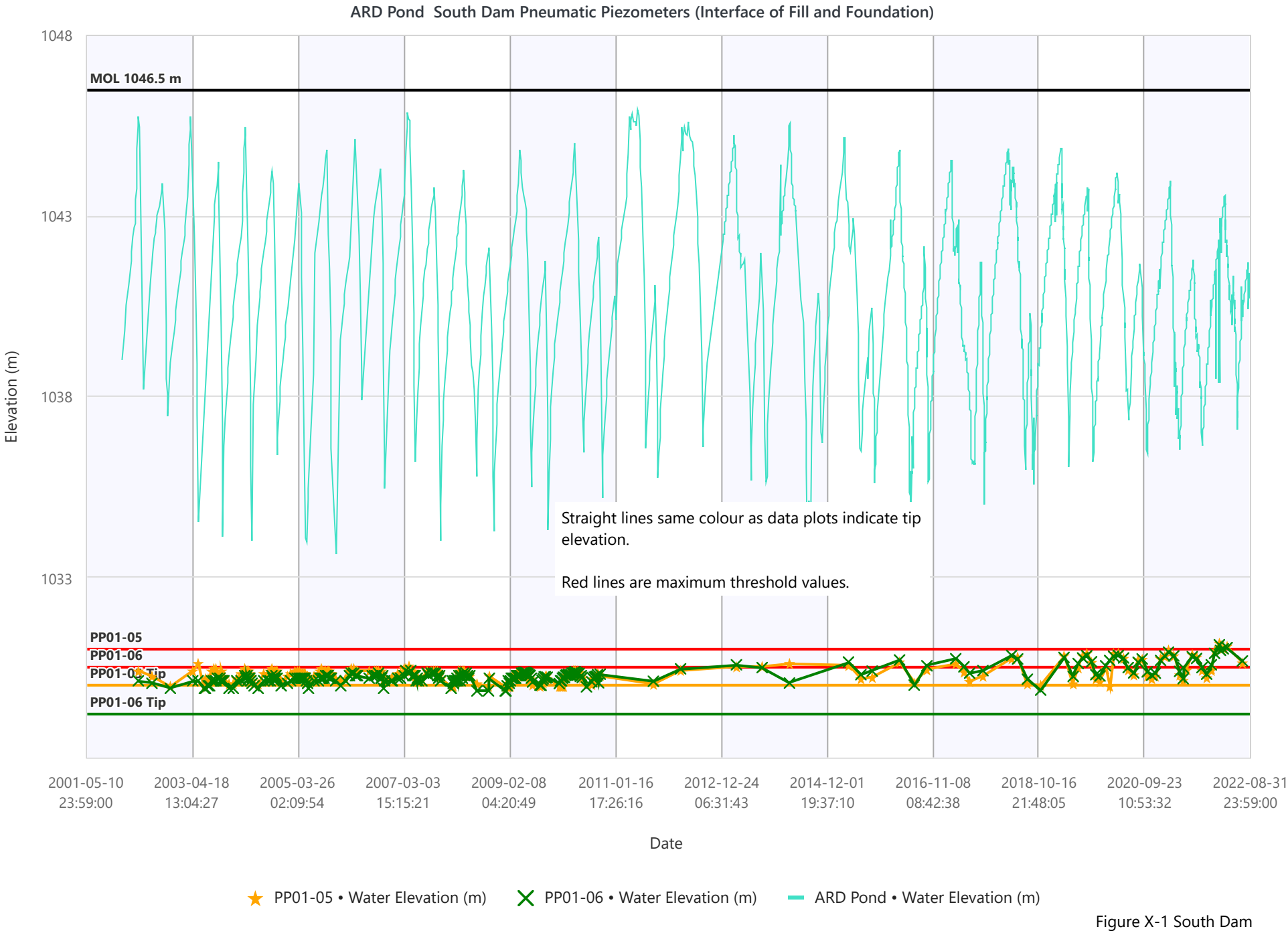
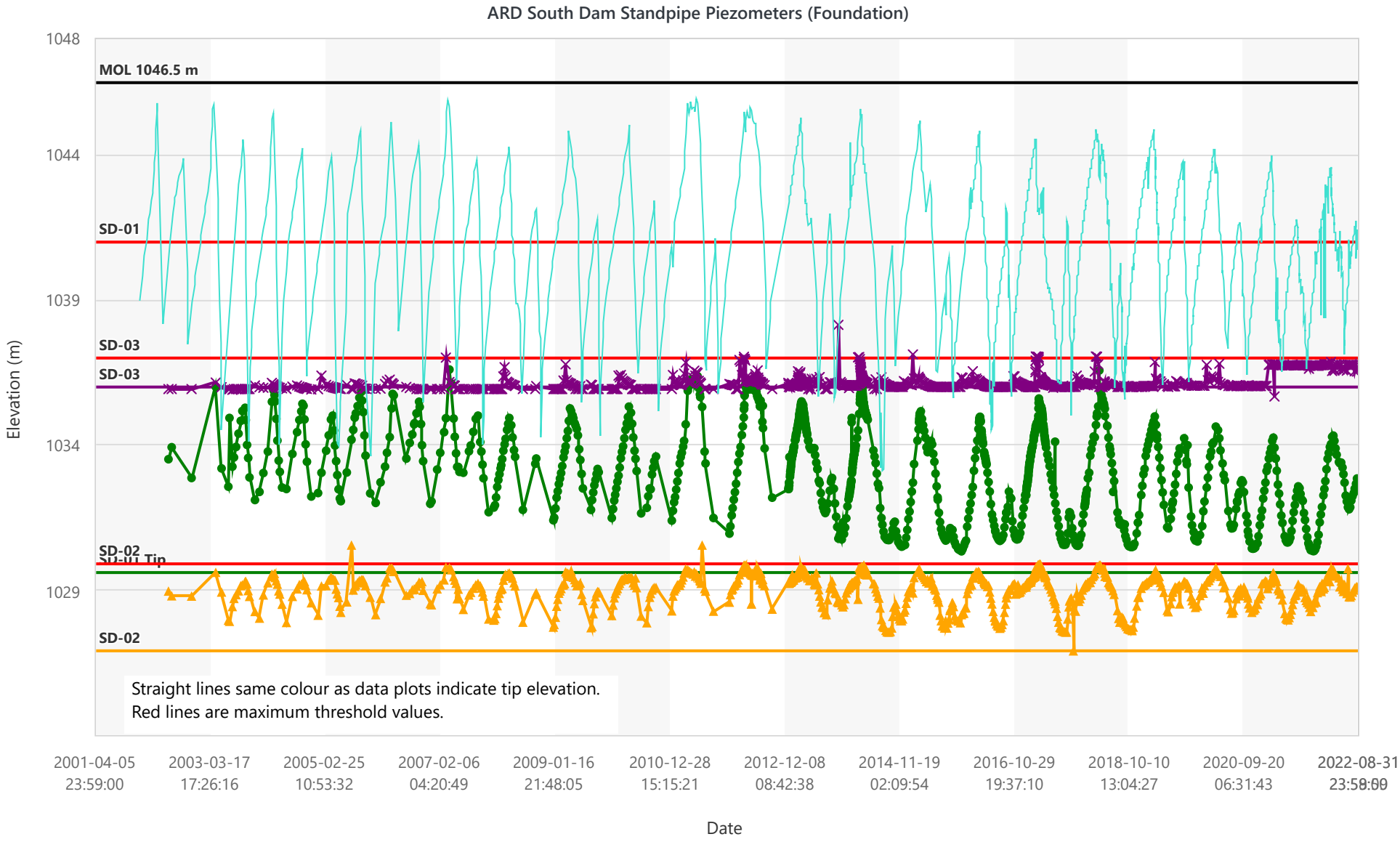
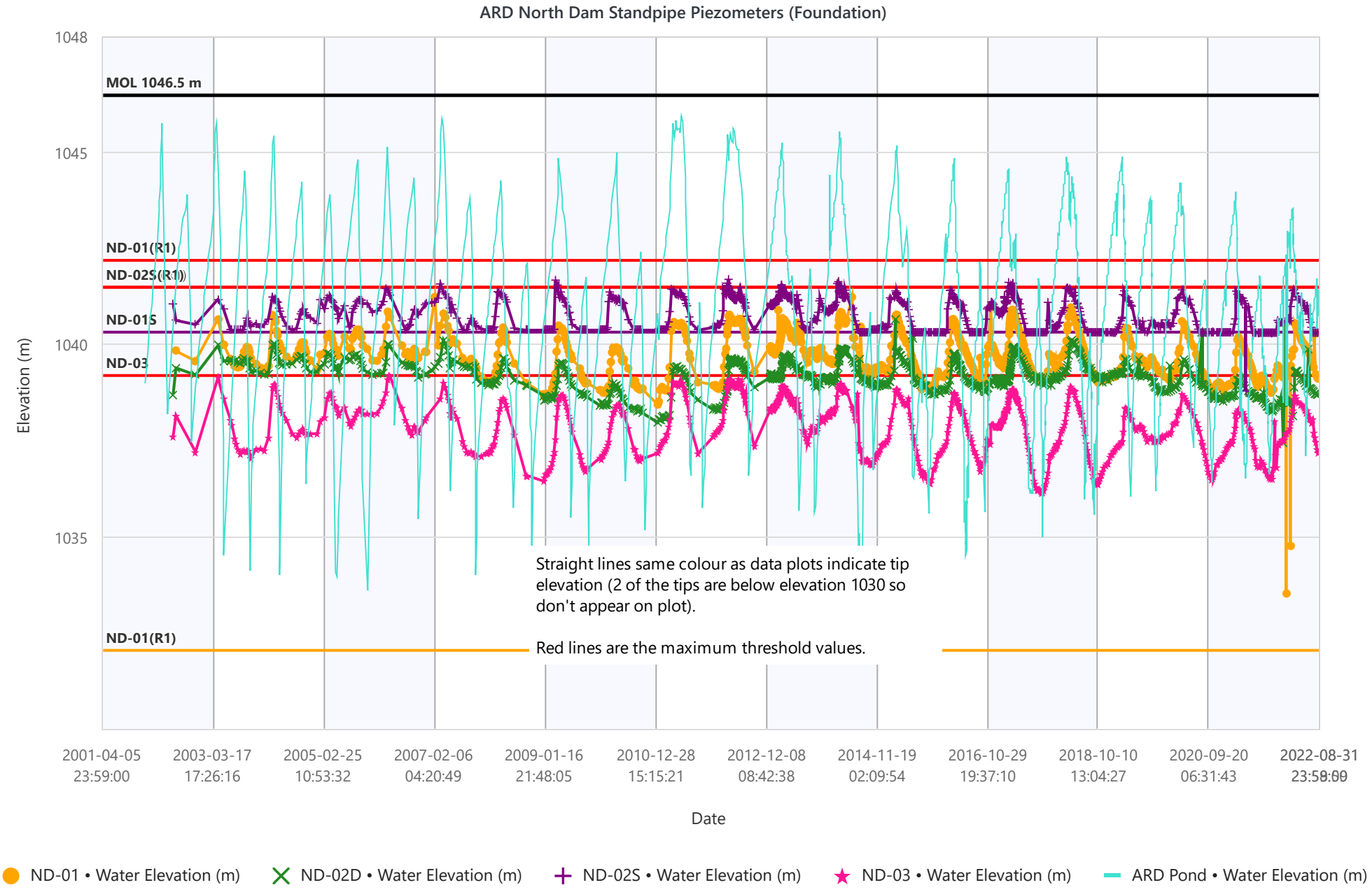


Figure X-1 South Dam



Standpipe piezometers were flushed in July/August 2014. Not all sediment was removed and some casings also cut or extended/repaired at this time. Therefore a new top of casing and new depth to bottom of standpipe was recorded for many instruments. Only noticeable for those instruments which record "dry" or if previous top of casing elevation was incorrect due to damage.

Figure X-2 South Dam Standpipe



Standpipe piezometers were flushed in July/August 2014. Not all sediment was removed and some casings also cut or extended/repaired at this time. Therefore a new top of casing and new depth to bottom of standpipe was recorded for many instruments. Only noticeable for those instruments which record "dry" or if previous top of casing elevation was incorrect due to damage.

Figure X-3 North Dam Standpipes

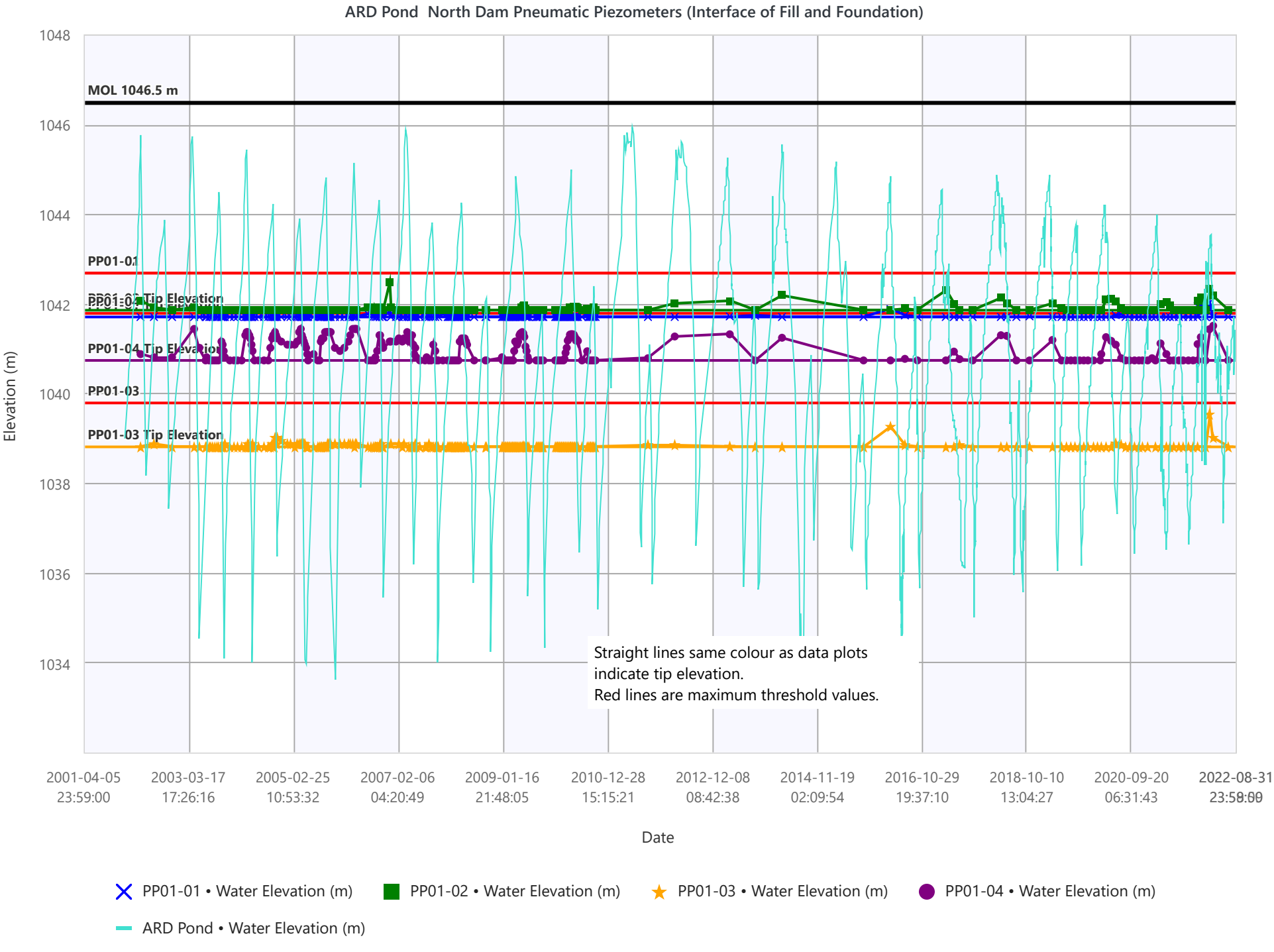


Figure X-4 North Dam Piezometers

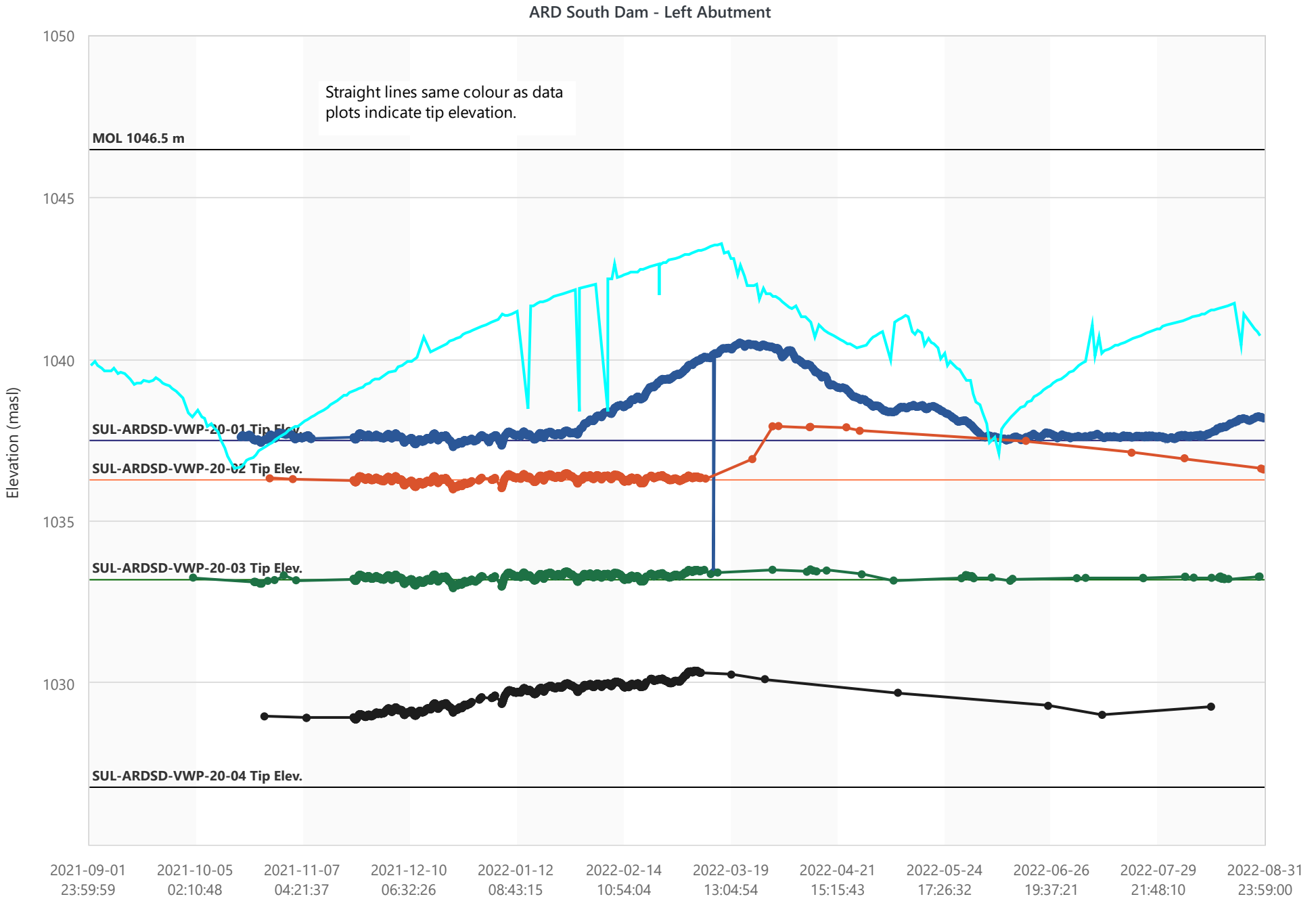


Figure X-5 South Dam - Left Abutment

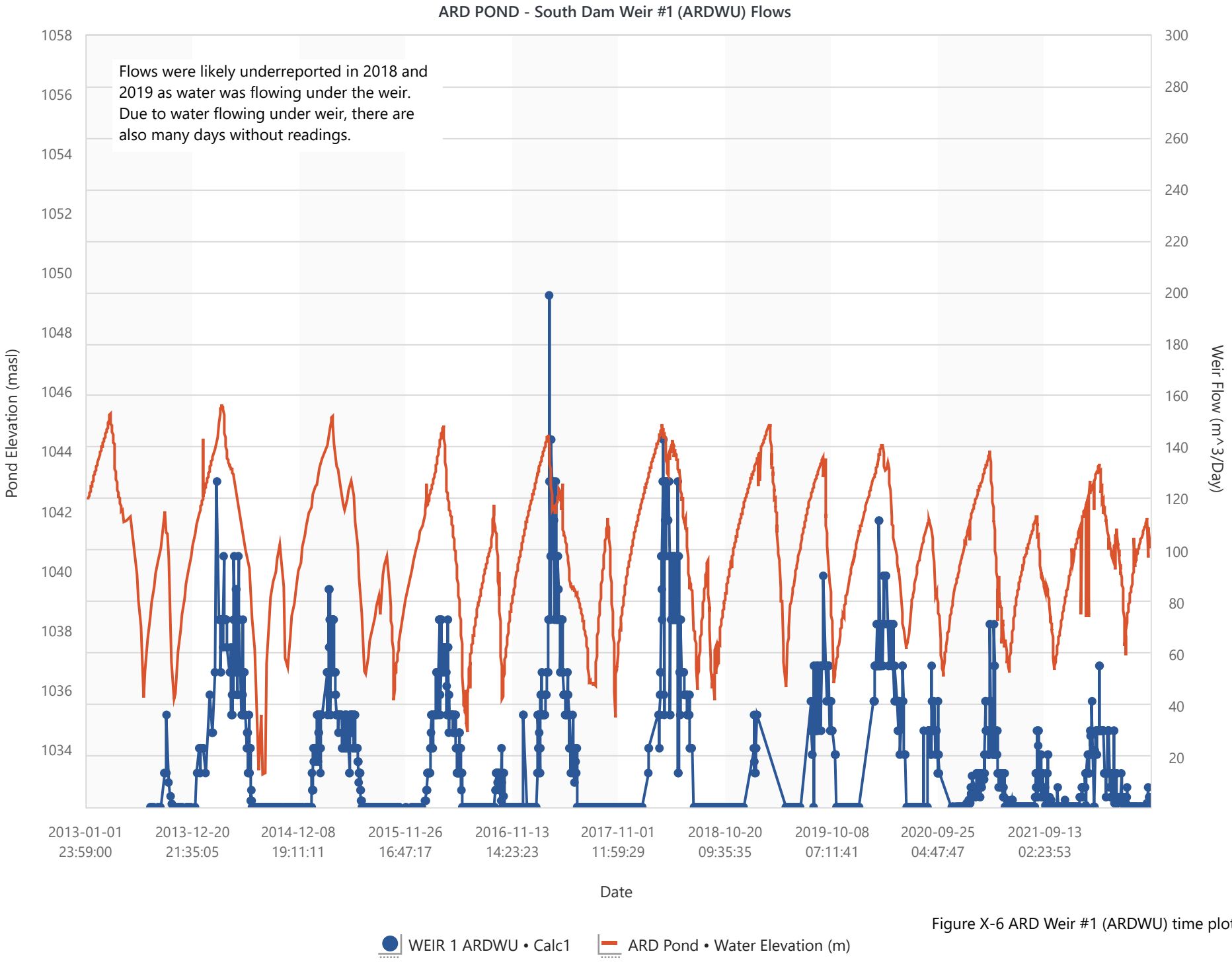


Figure X-6 ARD Weir #1 (ARDWU) time plot

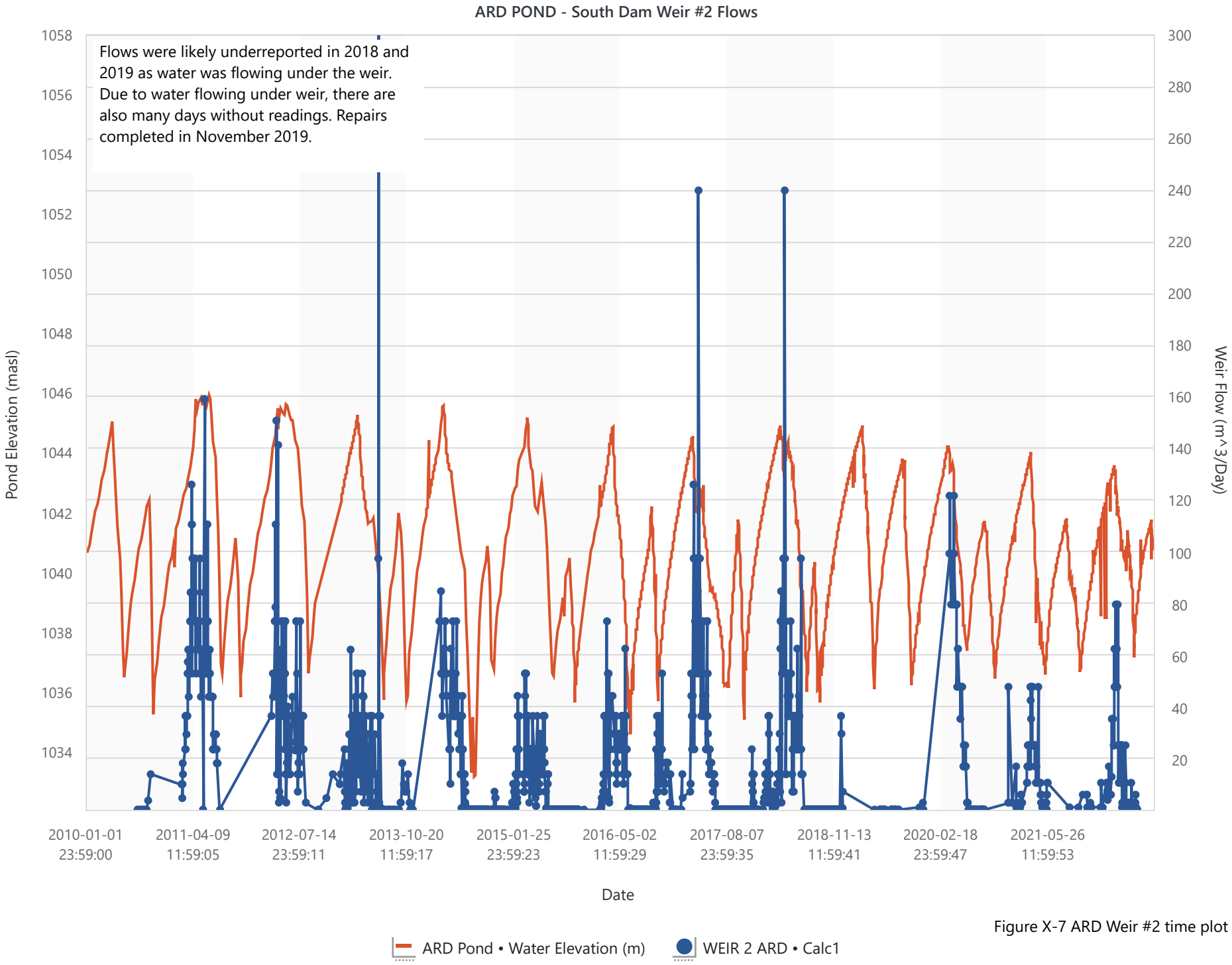


Figure X-7 ARD Weir #2 time plot

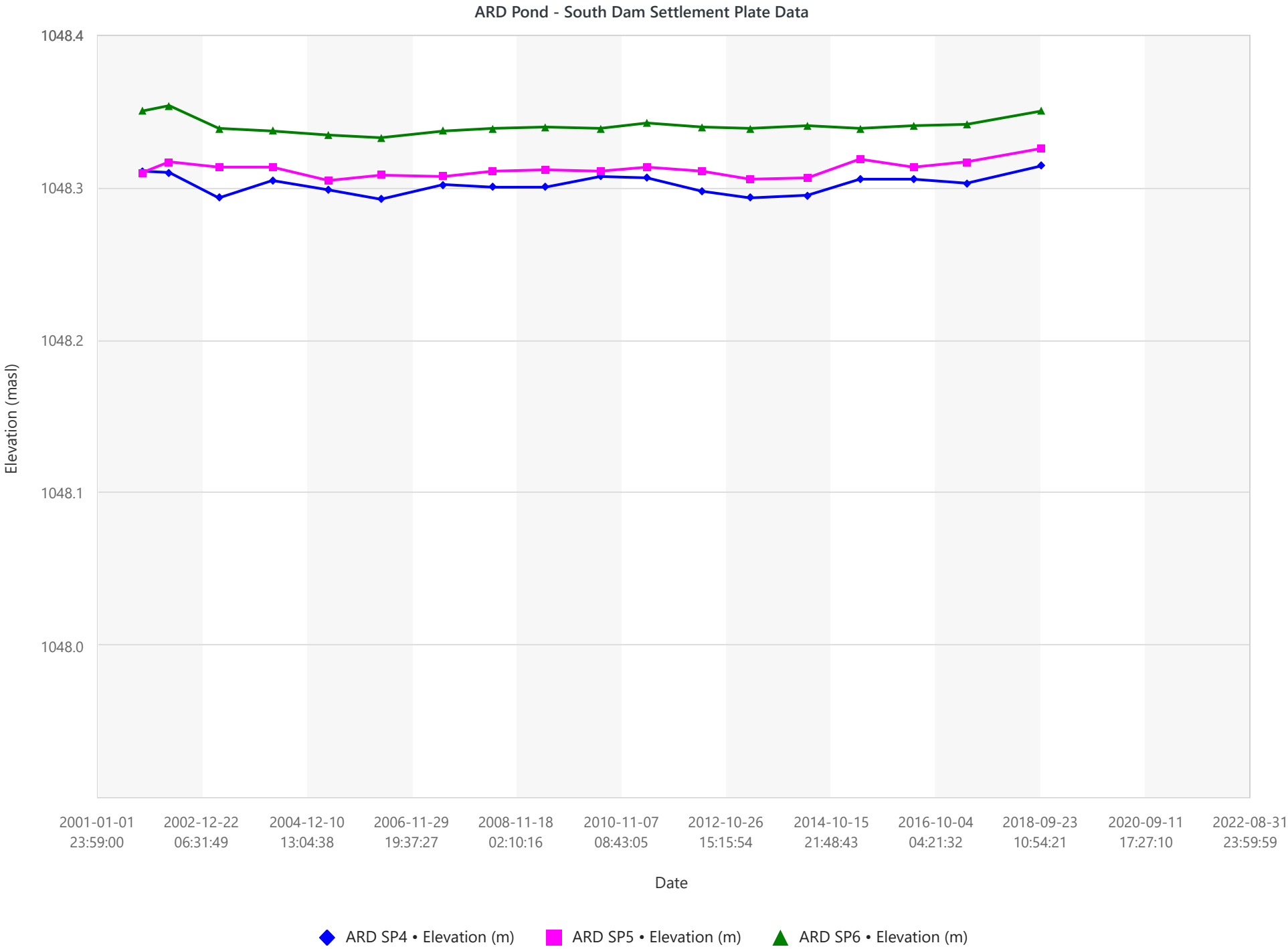

ARD Pond - South Dam Settlement Plate Data
1048.4
1048.3
1048.2
1048.1
1048.0
Elevation (masl)
2001-01-01 23:59:00
2002-12-22 06:31:49
2004-12-10 13:04:38
2006-11-29 19:37:27
2008-11-18 02:10:16
2010-11-07 08:43:05
2012-10-26 15:15:54
2014-10-15 21:48:43
2016-10-04 04:21:32
2018-09-23 10:54:21
2020-09-11 17:27:10
2022-08-31 23:59:59
Date
ARD SP4 • Elevation (m)
ARD SP5 • Elevation (m)
ARD SP6 • Elevation (m)

Figure X-8

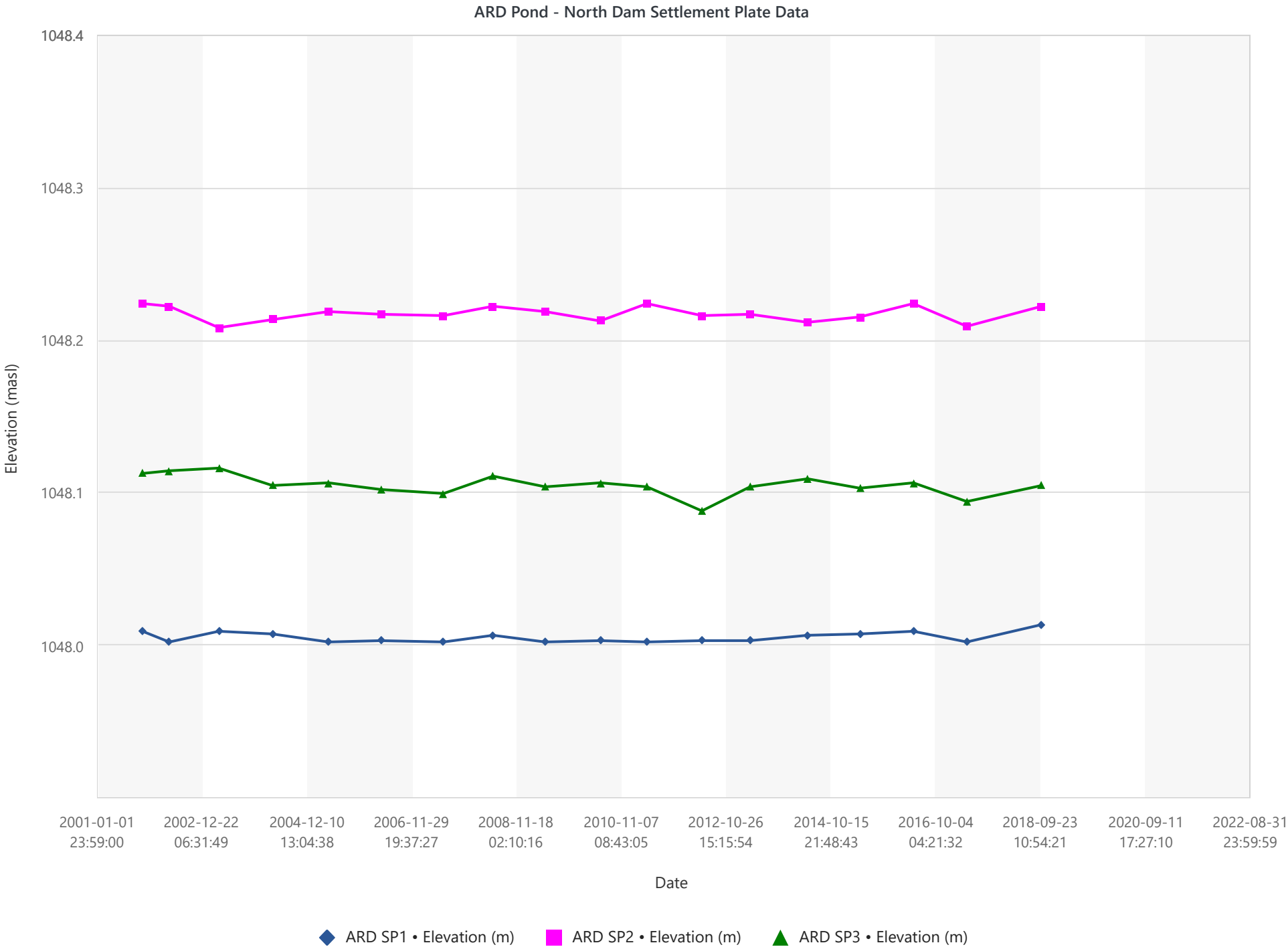

ARD Pond - North Dam Settlement Plate Data
1048.4
1048.3
1048.2
1048.1
1048.0
Elevation (masl)
2001-01-01 23:59:00
2002-12-22 06:31:49
2004-12-10 13:04:38
2006-11-29 19:37:27
2008-11-18 02:10:16
2010-11-07 08:43:05
2012-10-26 15:15:54
2014-10-15 21:48:43
2016-10-04 04:21:32
2018-09-23 10:54:21
2020-09-11 17:27:10
2022-08-31 23:59:59
Date
ARD SP1 • Elevation (m)
ARD SP2 • Elevation (m)
ARD SP3 • Elevation (m)

Figure X-9

APPENDIX XI

Sludge Pond Instrumentation

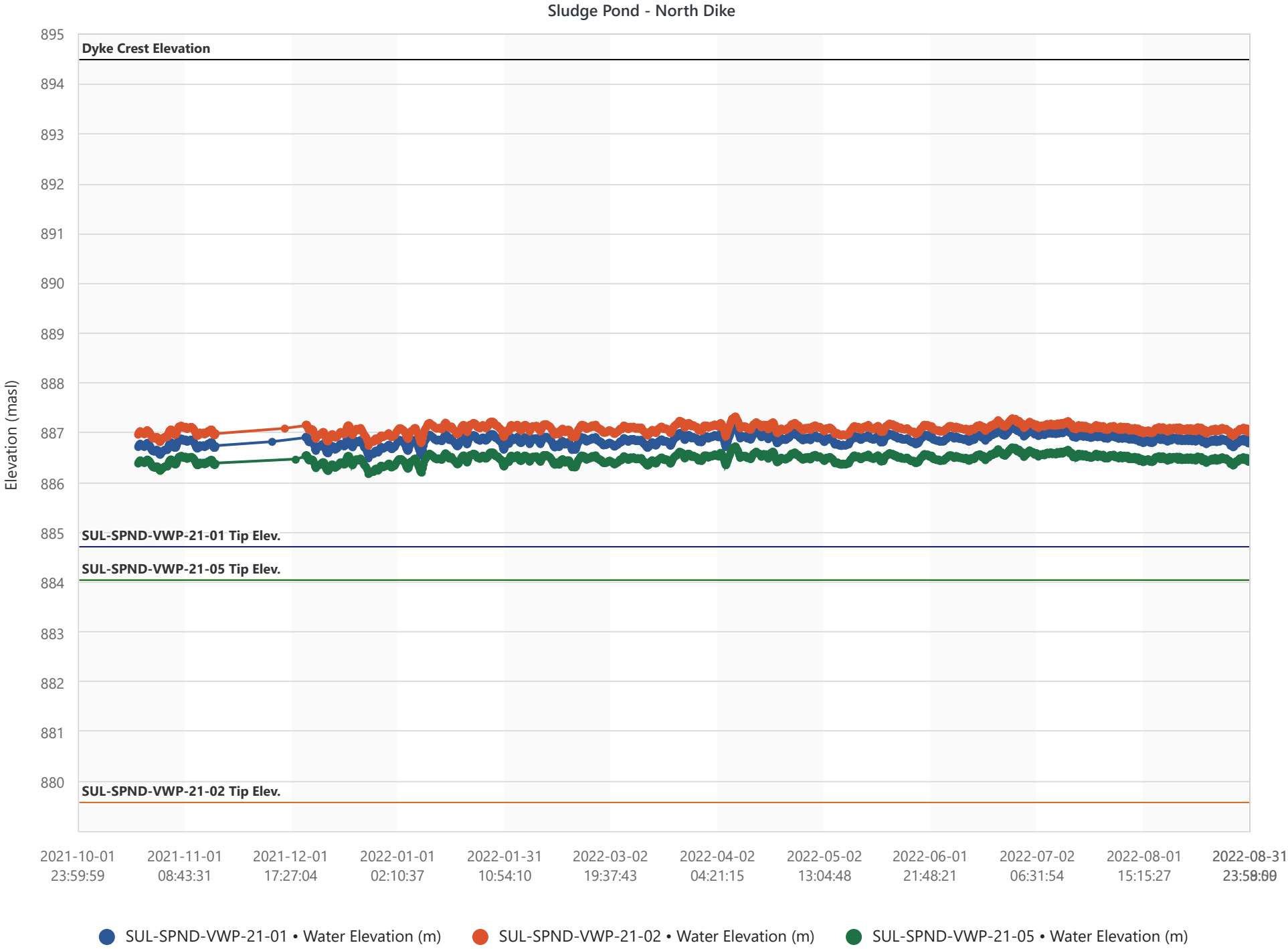


Figure XI-1 Sludge Pond North Dike

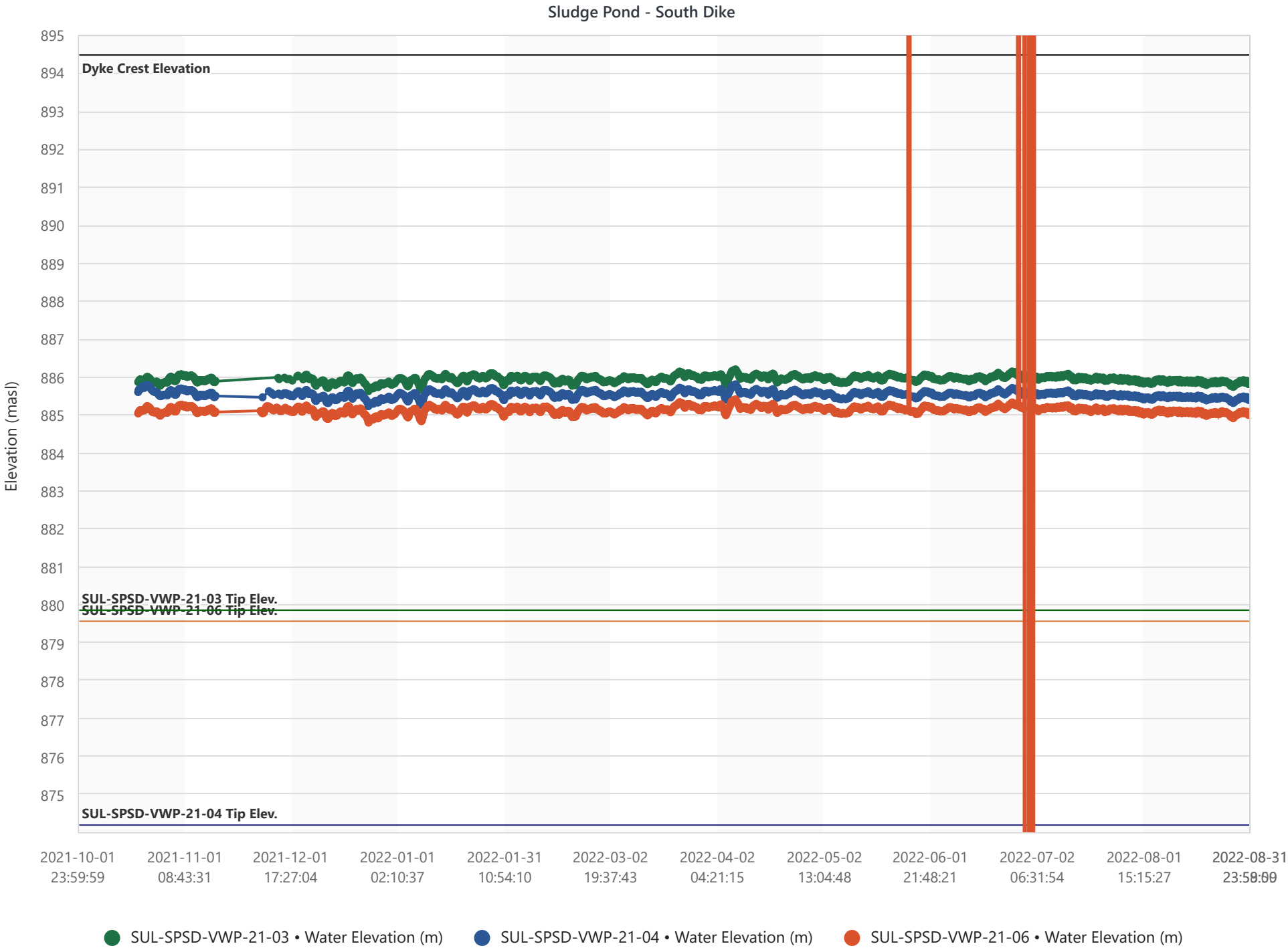
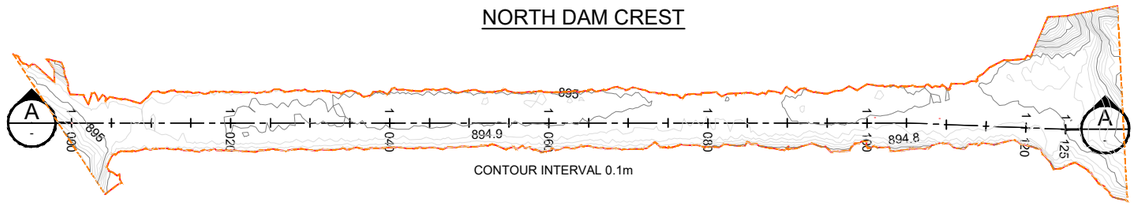


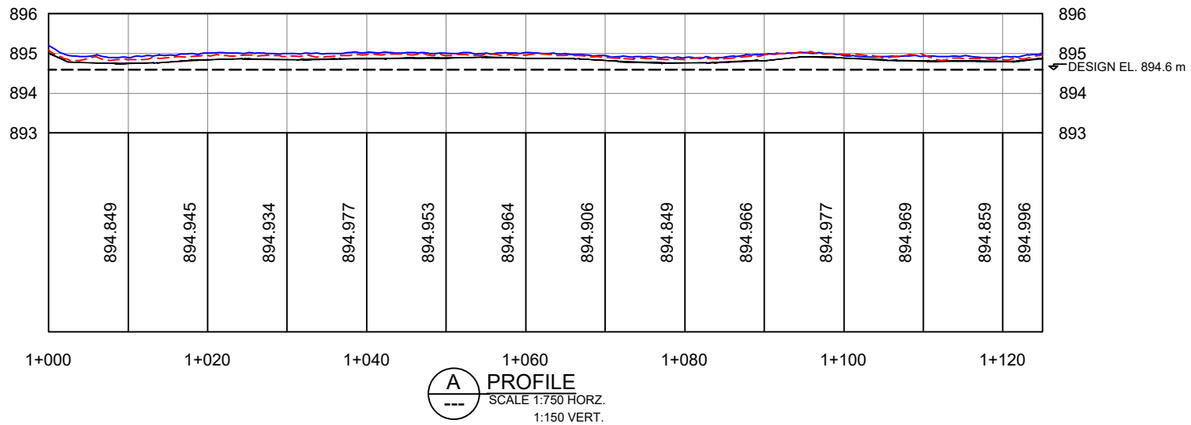
Figure XI-2 Sludge Pond South Dike

APPENDIX XII

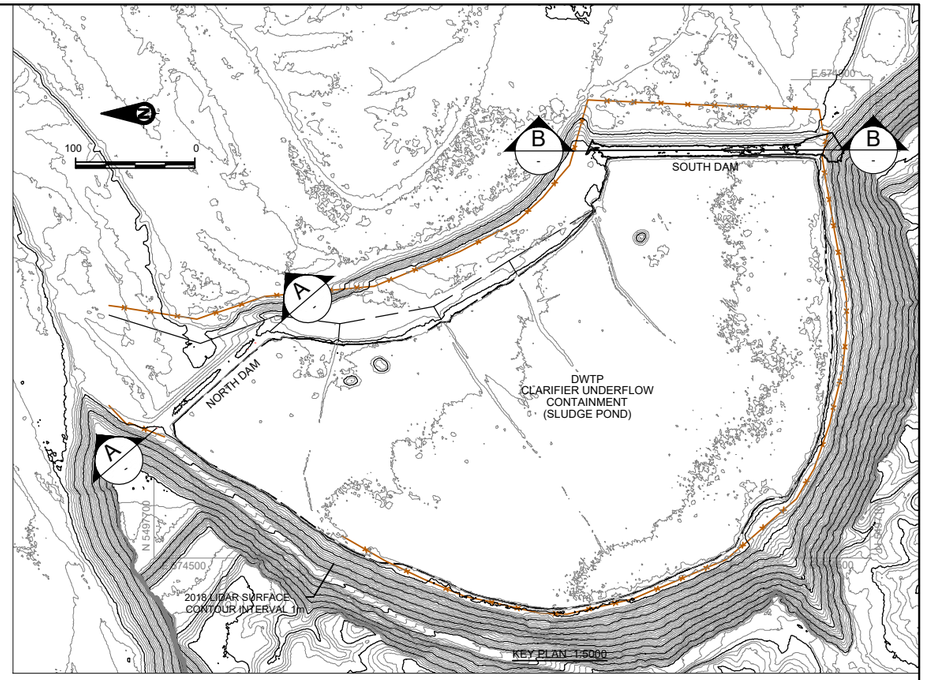
Sludge Pond Dike Crest Survey

NORTH DAM CREST

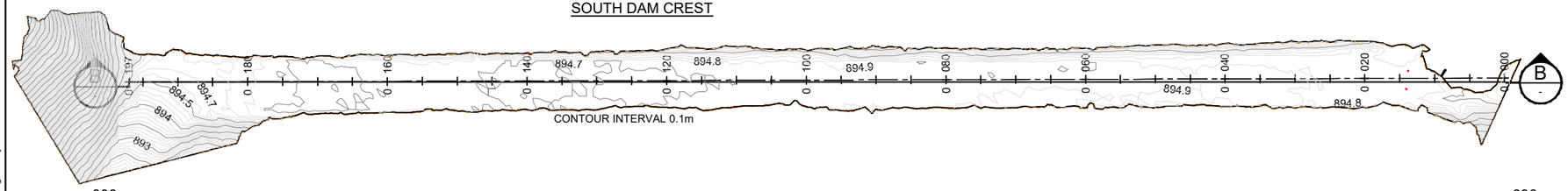


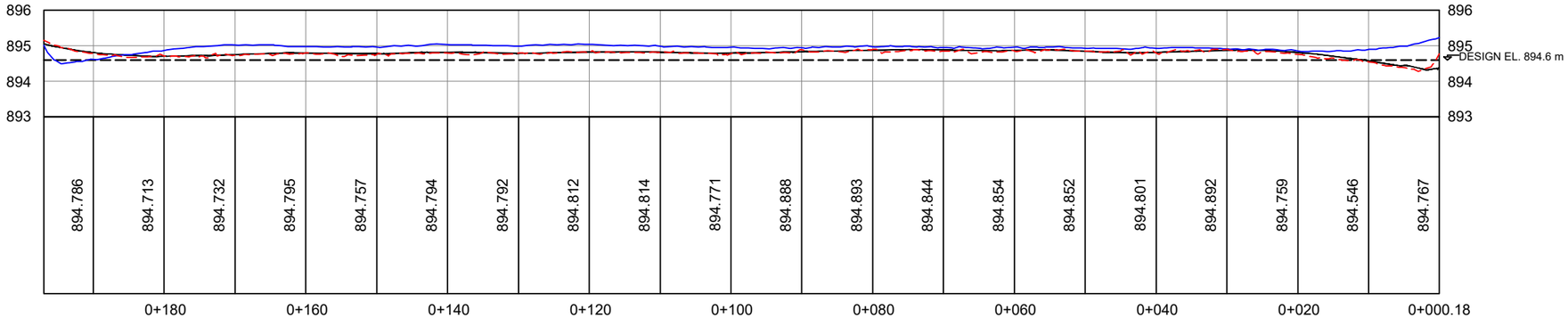


A PROFILE
SCALE 1:750 HORZ.
1:150 VERT.



SOUTH DAM CREST





B PROFILE
SCALE 1:750 HORZ.
1:150 VERT.

LEGEND

2012 LIDAR

2019 LIDAR

1:150 0 1.5 3 m
1:750 0 7.5 15 m

CLIENT: Teck

Klohn Crippen Berger

PROJECT: SULLIVAN MINE
2021 ANNUAL INSPECTION REPORT

TITLE: SLUDGE POND
DIKE CREST PROFILES

PROJECT No. A05807A21

FIG No. FIGURE XI-1

KCC-D-B

APPENDIX XIII

Pond Storage Curves

Appendix XII
Pond Storage Curves

Figure XII-1 ARD Storage Pond Area - Volume Curve

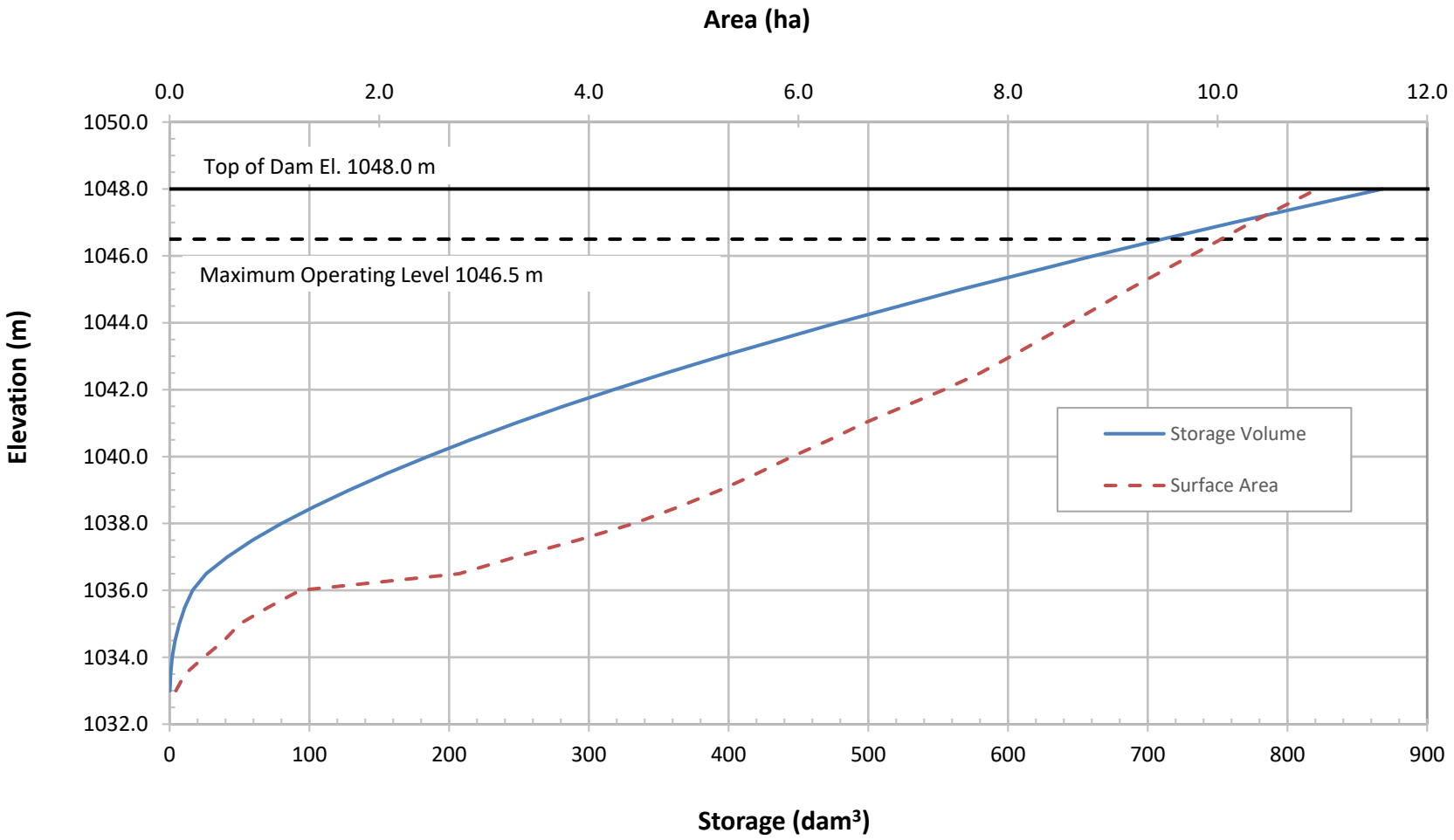


Figure XII-2 Iron Pond Stage - Volume Curve