Klohn Crippen Berger

Teck Coal Limited
Elkview Operations

West Fork Tailings Facility and Lagoons A, B, C, and D

2020 Annual Summary of Facility Performance

M09963A14.730

March 2021

March 31, 2021

Teck Coal Limited - Elkview Operations
R.R. #1, Highway #3
Sparwood, British Columbia
V0B 2G1

Ms. Meghan Barton, E.I.T.,
Tailings Engineer

Dear Ms. Barton:

West Fork Tailings Facility and Lagoons A, B, C, and D
2020 Annual Summary of Facility Performance

We are pleased to submit the 2020 Annual Summary of Facility Performance report for the Teck Elkview Operations West Fork Tailings Facility, and Lagoons A, B, C, and D.

Please contact us if you have any questions regarding this report.

Yours truly,

KLOHN CRIPPEN BERGER LTD.

Michael Cyr, P.Eng.
Senior Geotechnical Engineer / Project Manager

AS/MT:jc

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

Teck Coal Limited
Elkview Operations

West Fork Tailings Facility and Lagoons A, B, C, and D

2020 Annual Summary of Facility Performance

EXECUTIVE SUMMARY

This report presents the 2020 annual summary of facility performance review of the Teck Elkview Operations (EVO) West Fork Tailings Facility (WFTF) and the Lagoon Tailings Area, comprising Lagoons A, B, C, and D, between 2019 to October 2020.

This report has been prepared in accordance with the requirements of:

- British Columbia Ministry of Energy, Mines and Petroleum Resources (MEMPR[1]) Health, Safety, and Reclamation Code (HSRC) for Mines in British Columbia ("the Code") (MEM 2017); and
- Teck's 2019 Guideline for Tailings and Water Retaining Structures (TWRS).

The 2020 inspection of the WFTF and Lagoons A, B, C, and D, was completed on September 21 and 22, 2020 by Mr. Andy Small, P.Eng. and Mr. Michael Tin, E.I.T. of Klohn Crippen Berger (KCB). The Tailings Storage Facility (TSF) Qualified Person (as defined by the Code) at the time of the inspection was Mr. Jason Garwood, P.Geo., who was also on site during the inspection. The Engineer of Record (EoR) for the tailings facilities is Mr. Andy Small, P. Eng., of KCB, who was part of the inspection team and was involved in the preparation of this report.

Summary of Facility Description

Fine tailings materials are deposited sub-aerially at the WFTF which is the primary fine tailings storage facility. Tailings were also deposited into Lagoon D intermittently when the WFTF GEHO pipeline that routes tailings to the WFTF was under maintenance during the year. The WFTF embankment was constructed using rock fill overlying bedrock foundations and is approximately 35 m high, containing an estimated 9,500,000 m^3 of tailings.

Lagoons A, B, and C were constructed as ring-dyke embankments and are no longer receiving tailings from the plant, while Lagoon D still receives a small portion of fine tailings from the plant. Lagoon D is also a ring-dyke facility.

Lagoon A is an inactive TSF, and Lagoon B is an active TSF because it is used as a temporary water storage for Wash Plant overflow. The dams were primarily constructed using silty sand, and sand and gravel fill materials. Lagoon A and B contains an estimated 185,000 m^3 and 295,000 m^3 of tailings, respectively. A riprap armoured spillway is located at the west side of Lagoon A; Lagoon B has no formal spillway.

Lagoon C no longer receives tailings; however, it is used intermittently to store sediments that have been excavated from several site sumps and ponds. Lagoon C was also constructed using silty sand, and sand and gravel fill materials. It has a maximum dam height of approximately 19.5 m and

[1] The current British Columbia Ministry of Energy, Mines and Low-Carbon Innovation (MEMLI) was previously known under the names British Columbia Ministry of Energy, Mines and Petroleum Resources (MEMPR) and British Columbia Ministry of Energy and Mines (MEM).

contains an estimated 4,660,000 m^3 of tailings. Lagoon C does not have a spillway, and it is not required under the current conditions.

Since the commissioning of the WFTF in 2006, Lagoon D has become the secondary tailings storage location. The Lagoon D starter embankment comprised similar sand and gravel materials, and subsequent embankment raises comprised coarse coal rejects (CCR) material. Lagoon D has been raised using the upstream raise method to a maximum dam height of 59 m, containing approximately 22,760,000 m^3 of tailings.

The consequence category for the facilities is summarised in Table E-1; this is the maximum classification considering both flood-induced and fair-weather conditions, in accordance with the Code.

Table E-1 Facility Consequence Category

Facility	Consequence Category
WFTF	Low
Lagoon A	Low
Lagoon B	Low
Lagoon C	High
Lagoon D	Very High

There have been no significant changes in 2020 to warrant modifying the classifications for the WFTF and Lagoons A, B, C, and D.

Summary of Key Hazards

The key external hazards for the WFTF and Lagoon Tailings Area are seismic and meteorological hazards, and the facilities meet regulatory requirements to contain the Inflow Design Flood (IDF) and withstand seismic load conditions.

The exception to this is Lagoon B, which does not have adequate storage to contain the IDF (Wood, 2019). EVO is currently in the process of developing conceptual closure designs for the Lagoons, and the closure design will address this concern.

A summary of the Earthquake Design Ground Motion (EDGM) criteria for each facility is presented in Table E-2.

Table E-2 EDGM Criteria for WFTF and Lagoon Tailings Area

Structure	CDA (2013) Consequence Classification [1]	Earthquake Design Ground Motion (EDGM)	
		Minimum Design (AEP) [3]	Design [4]
WFTF	Low	1 in 100-yr	1 in 2,475-yr (PGA = 0.128 g)
Lagoon A	Low	1 in 100-yr	1 in 2,475-yr (PGA = 0.128 g)
Lagoon B	Low	1 in 100-yr	1 in 2,475-yr (PGA = 0.128 g)
Lagoon C	High	1 in 2,475-yr	1 in 2,475 (PGA = 0.128 g)
Lagoon D	Very High	1/2 between 1 in 2,475-yr and 1 in 10,000-yr (or MCE)	1 in 5,000-yr (PGA = 0.18 g)

Summary of Significant Changes in 2020

The Adit Toe Berm, at the WFTF, has been raised approximately 3 m to El. 1674 m at the time of the inspection.

A comprehensive site investigation was conducted at Lagoons A, B, C, and D in 2019 and the site investigation reports were completed in July 2020. The results of the site investigation indicated that there were potential GLU silty clay foundations below the northern portion of Lagoon D, the western portion of Lagoon A, and the eastern portion of Lagoon C. The presence of GLU at Lagoon A and Lagoon C (East Dam) were not previously known. The results of the site investigation were used in stability models for the Lagoons.

The following desktop studies were also completed during 2020:

- Stability analyses were completed for the Lagoon A and B dams, confirming that the dams achieve a static FoS of 1.5.
- The detailed raise design scope of work for the WFTF was also commenced in September 2020, focusing on raising the WFTF from a crest elevation of 1685 m to El. 1710 m.
- The order of magnitude conceptual closure study for the Lagoon Tailings Area commenced in September and is expected to be completed in 2021. The Lagoons are planned to be closed in a phased approach, and further analyses and planning is required during the next closure design stages. This work is common to Lagoons A, B, C, and D.

Significant Changes in Instrumentation and/or Visual Monitoring Records

There were no significant changes in the instrumentation or visual monitoring records during 2020, with the dams performing in accordance with the anticipated trends.

Significant Changes to Stability and / or Surface Water Control

No significant changes to the WFTF, Lagoons A, B, C, and D were observed that would affect embankment stability. No signs of cracking, wet spots, or deformations were observed during the 2020 inspections. However, minor erosion was observed in several areas at Lagoon D, and these areas should be monitored as an ongoing maintenance item.

The potential GLU foundation units at Lagoons A, C, and D were further defined and characterised during the 2019 Lagoons Site Investigation program. Interpretation of the data from the investigation was completed in 2020, and the stability analyses updates for Lagoons A, B, C, and D were completed for selected critical sections in 2020.

Stability analyses were completed for the western portion of Lagoon A, southern portion of Lagoon B, Lagoon C East Dam, and northern portion of Lagoon D where GLU is present in the foundations. The analyses indicate the dams achieve a static FoS of 1.5 for drained conditions, as per regulatory requirements.

There was no ponded water in Lagoons A, B, or C at the time of inspection. There was approximately 3 m of freeboard available in Lagoon D at the time of inspection, consistent with typical operating conditions. The EVO site water balance model was updated by Golder in June 2020, and the EVO Mine Water Management Plan was also updated in June 2020.

Summary of Review of OMS Manual

EVO has three separate OMS Manuals for the TSFs, encompassing inactive Lagoons A, B, and C, Lagoon D and the WFTF. All three OMS Manuals were updated in March 2020 and submitted to the British Columbia Ministry of Energy, Mines and Low-Carbon Innovation (BCMEMLI).

Summary of Review of ERP

EVO developed an Emergency Response Plan (ERP) for the WFTF in 2020, and KCB reviewed the ERP, and concluded that it is an adequate action plan in the event of a dam safety emergency at the WFTF.

An ERP was prepared for Lagoon D in October 2014 and was tabletop tested in late 2018 to assess effectiveness. ERP documents for Lagoons A, B, C, and D were up to date for 2020.

Scheduled Date for next Dam Safety Review

A Dam Safety Review (DSR) for the tailings facilities was conducted by SRK Consulting in 2018 and the final report was delivered in March 2019. The next DSR is planned for 2023 as required by the Code.

Summary of Recommendations

There are no priority[2] 1 or 2 recommendations outstanding for the facilities. Other than following the procedures in the OMS Manual, there is one priority 3 recommendation arising from the 2020 annual summary of facility performance review. This recommendation is described in Section 9. EVO also tracks additional recommendations made during the 2018 DSR (SRK, 2019) and from other reports that are beyond what would be identified from a dam safety inspection. These are not included in the recommendation table in Section 9.

[2] Recommendation priority guidelines specified in the HSRC Guidance Document (BCMEM, 2016), and assigned by KCB.

TABLE OF CONTENTS

TABLE OF CONTENTS
(continued)

List of Tables

TABLE OF CONTENTS

(continued)

List of Figures

List of Appendices

CLARIFICATIONS REGARDING THIS REPORT

This report is an instrument of service of Klohn Crippen Berger (KCB). The report has been prepared for the exclusive use of Teck Coal Limited (Client) for the specific application to the West Fork Tailings Facility, Lagoons A, B, C, and D, and it may not be relied upon by any other party without KCB's written consent. KCB has prepared this report in a manner consistent with the level of care, skill and diligence ordinarily provided by members of the same profession for projects of a similar nature at the time and place the services were rendered. KCB makes no warranty, express or implied.

This report is an instrument of service of Klohn Crippen Berger (KCB). The report has been prepared for the exclusive use of Teck Coal Limited (Client) for the specific application to the Elkview Operations, and it may not be relied upon by any other party without KCB's written consent.

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

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

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

1 INTRODUCTION

1.1 General

Klohn Crippen Berger Ltd. (KCB) was engaged by Teck Coal Limited to complete the 2020 Annual Summary of Facility Performance report for the West Fork Tailings Facility (WFTF) and the Lagoon Tailings Area (Lagoons A, B, C, and D) at the Elkview Operations (EVO) site. This report presents the results of the 2020 annual summary of facility performance review, including a review of available monitoring data from December 2019 to the end of October 2020.

This report was prepared in accordance with:

- British Columbia Ministry of Energy, Mines and Petroleum Resources (MEMPR[3]) Health, Safety and Reclamation Code for Mines in British Columbia ("the Code") (MEM 2017) and the Guidance Document – Health Safety and Reclamation Code for Mines in British Columbia (BCMEM 2016), and
- Teck's 2019 Guidelines for Tailings and Water Retaining Structures (TWRS).

The site inspection for the WFTF and Lagoons A, B, C, and D was conducted from September 21 to 22, 2020, by Mr. Andy Small, P.Eng. and Mr. Michael Tin, E.I.T. of KCB. The previous site inspection for these structures was conducted from July 8 to 9, 2019, by Mr. Michael Cyr, P.Eng. and Mr. David Willms, P.Eng. of KCB.

This report is organized as follows:

- Section 2: overview of the project background and dam description as it relates to the annual summary of facility performance;
- Section 3: summary of activities since the last annual summary of facility performance;
- Section 4: review of 2020 inspection observations;
- Section 5: review of monitoring records;
- Section 6: summary of 2020 climate aspects;
- Section 7: summary of water management aspects;
- Section 8: review of documentation and relevant failure modes to support the dam safety assessment; and
- Section 9: recommendations for ongoing operations, maintenance, and surveillance of the dams.

[3] The current British Columbia Ministry of Energy, Mines and Low Carbon Innovation (MEMLI) was previously known under the names British Columbia Ministry of Energy, Mines and Petroleum Resources (MEMPR) and British Columbia Ministry of Energy and Mines (MEM).

1.2 Engineer of Record and Tailings Storage Facility Qualified Person

Mr. Andy Small, P.Eng., as a representative of KCB, is the Engineer of Record (EoR) for the EVO Tailings Storage Facilities (TSFs), including the WFTF, and Lagoons A, B, C, and D. He had filled the role since 2014 while working with Wood PLC (previously Amec Foster Wheeler). Mr. Small joined KCB in August 2018 and on November 8, 2018, submitted a letter to EVO confirming that KCB will support Mr. Small in continuing as the EoR for the EVO TSFs. He visited the site once in 2020 and was involved in the preparation of this report.

Mr. Jason Garwood, P.Geo., of EVO, was the TSF Qualified Person at the site in 2020, as defined by the Code.

1.3 Regulatory Requirements

This report reviews the operation and performance of the TSF dams relative to the following:

- "Health, Safety and Reclamation Code for Mines in British Columbia", by the Ministry of Energy, Mines, & Petroleum Resources (MEM 2017);
- "Guidance Document – Health, Safety and Reclamation Code for Mines in British Columbia", Version 1.0, Updated in July 2016 by the BC Ministry of Energy and Mines (BCMEM 2016);
- "Dam Safety Guidelines 2007 (revised in 2013)", by the Canadian Dam Association (CDA 2007 and 2013);
- "Technical Bulletin: Application of Dam Safety Guidelines to Mining Dams", by the Canadian Dam Association (CDA 2019); and
- "Developing an Operation, Maintenance, and Surveillance Manual for Tailings and Water Management Facilities" 3rd Edition, by the Mining Association of Canada (MAC 2019).

2 BACKGROUND

2.1 General

The EVO coal mine site is approximately 3 km east of the town of Sparwood, in southeastern British Columbia. Underground coal mining at the site began in the late 1890's, with open pit mining operated since 1969. The site has a remaining life of mine (LOM) of approximately 30 years. The site comprises the following key tailings management and processing facilities:

- West Fork Tailings Facility (WFTF)
- Lagoon Tailings Area (Lagoons A, B, C, and D)
- Coarse Coal Refuse (CCR) Dump
- Wash Plant

The focus of this report is on the WFTF and Lagoons A, B, C, and D. The annual summary of facility performance review for the CCR Dump has been reported separately. An overview of the WFTF and Lagoons A, B, C, and D is presented in the following section.

2.2 Dam Description

2.2.1 WFTF

The WFTF is an active TSF and was commissioned in 2006 with the purpose of serving as the primary fine tailings storage facility on site. The dam is located on the eastern perimeter of the site, approximately 1 km from the Adit Pit and is confined by the Adit Waste Dump, West Fork Dump, Adit Ridge and Cowboy Ridge. Fine refuse material is deposited into the WFTF via six spigots located along the embankment. Tailings deposition is managed to keep ponded water at the northern extent of the WFTF, away from the embankment. Limited information is available on the surficial soils within the vicinity of the WFTF, however George et al. (1986) indicates that the area comprised bare rock surfaces, colluvial fans and mass-wasting debris (SRK 2019).

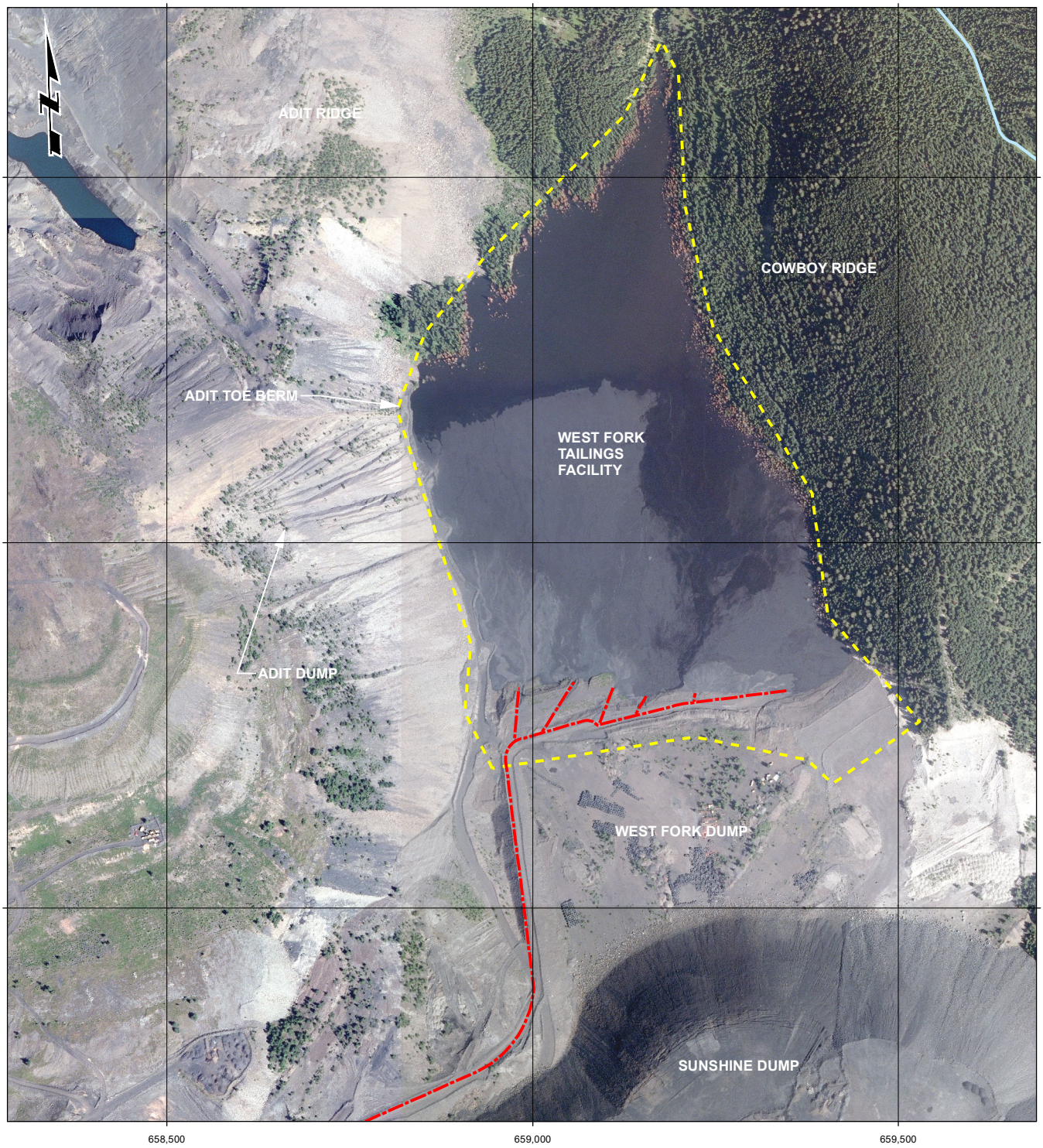
The Adit Toe Berm road (which includes a filter) is also progressively raised ahead of tailings deposition to minimise the infiltration of tailings fines into the Adit Waste Dump. The tailings surface elevation within the WFTF typically rises at an approximate rate of 2 m to 4 m per year, depending on the production of fine tailings from the wash plant. The WFTF embankment will require progressive raises as the tailings level increases. Water within the WFTF is not reclaimed, but seeps through tailings and adjacent dumps. The general information and the current configuration for the WFTF is presented in Table 2.1 and the location of the WFTF is presented in Figure 2.1

Table 2.1 WFTF General Information and Configuration

Key Parameters	WFTF
CDA Consequence Classification	Low
Tailings Deposition in 2020 (1)	866,000 t
Estimated Impounded Tailings Volume (m^3)	9,520,000
Estimated Impounded Water Volume (m^3)	300,000
Approximate Footprint (ha)	28.5
Crest Length (m)	480
Crest Elevation (m)	1,680
Crest Width (m)	50
Maximum Dam Height (m)	35
Maximum Dam Impoundment Depth (m)(2)	80
Raise Method	Downstream
Overall Downstream Slope Grade	2.5H:1V
Adit Toe Berm Elevation (m)	1,674
Adit Toe Berm Slope Grade	37° (angle of repose)
Maximum Allowable Tailings Deposition Rate (m^3/day)	6,500 (normal operations) 13,100 (periodic emergencies)

Source: Elkview Operations – 2018 TSF Dam Safety Review (SRK 2019) and 2020 data (Teck 2020)

Note: 1. Tailings deposition quantity is approximate only.
2. Maximum dam impoundment depth estimated from WFTF crest elevation to lowest elevation of tailings placement (Wood 2019).



LEGEND

- CREEK
- TAILINGS FACILITY
- TAILINGS DEPOSITION LINE

NOTES

1. DATUM, PROJECTION: NAD83, UTM ZONE 11 (WKID 26911)
2. IMAGERY FROM TECK ELKVIEW OPERATIONS (COLLECTED IN 2019).

NOT FOR CONSTRUCTION

SCALE 0 150 m

CLIENT: Teck

Klohn Crippen Berger

PROJECT: TECK ELKVIEW OPERATIONS
2020 ANNUAL SUMMARY OF FACILITY PERFORMANCE

TITLE: WEST FORK TAILINGS FACILITY
PLAN LAYOUT

SCALE	PROJECT No.	FIG. No.
1:8,000	M09963A14	2.1

ANSI A

SAVE DATE: 2021-03-24(12:51 PM)
FILE PATH: \\INT.KLOHN.COM\PROJDATA\M\FRE\M09963A14-TCL-EVO-2020 DSI\400 DRAWINGS\GIS\REPORTS\DSI\FIG2_1_WFTF.MXD (DMASE)

2.2.2 Lagoon Tailings Area

The Lagoon Tailings Area, comprising Lagoons A, B, C, and D is located on the western perimeter of the site, immediately west of the wash plant. The arrangement of the lagoon facilities is presented in Figure 2.2. The majority of the fine refuse material separated during the coal washing process has historically been deposited in Lagoons A, B, C, and D, and is now deposited into the WFTF. The general information and the current configuration for these facilities is presented in Table 2.2, with additional details provided in the following sections.

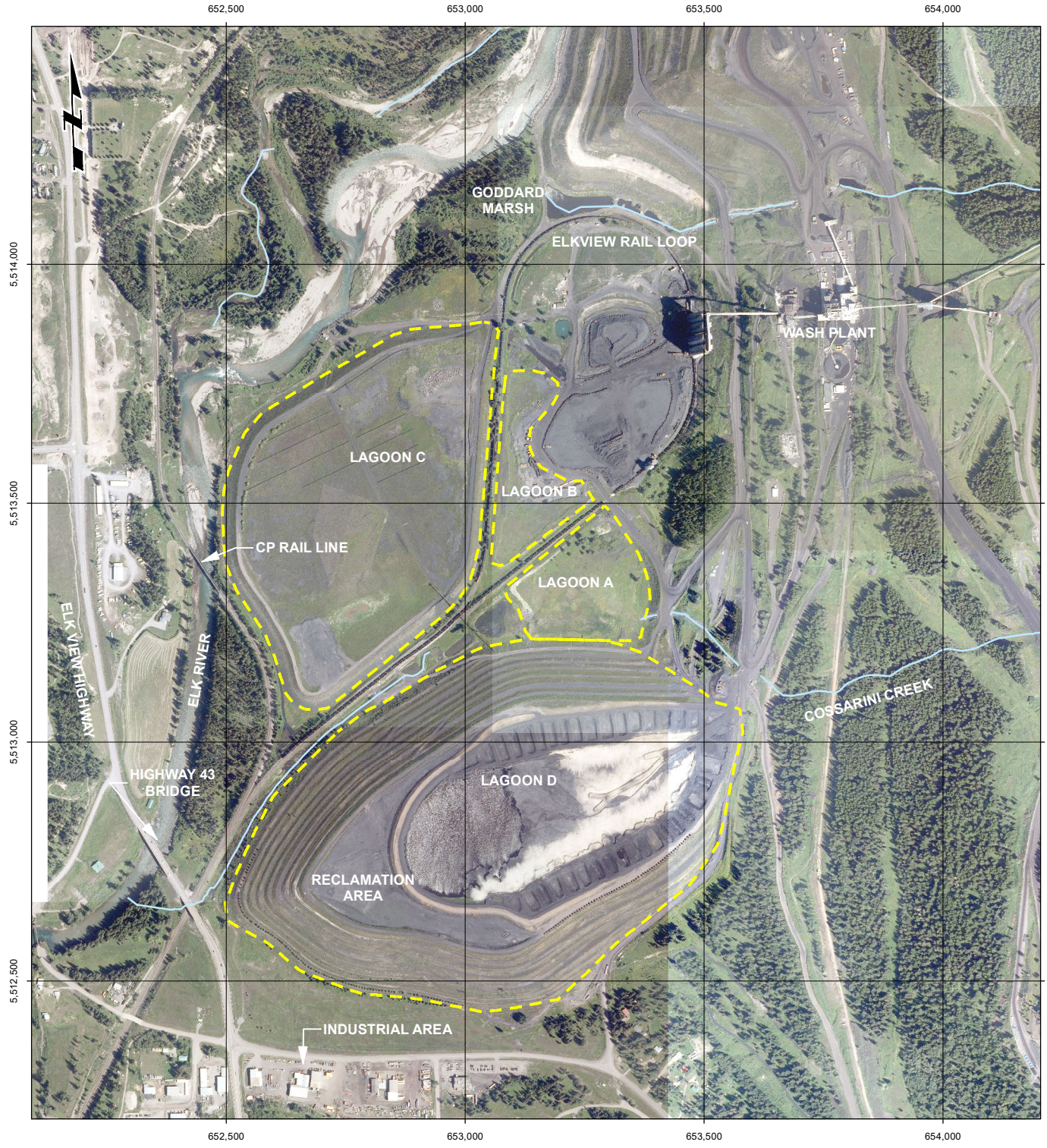
Lagoons A, B, C, and D have been constructed on the floodplains of the Elk River. A review of the Elk Valley late Quaternary geology and geomorphology indicated this area was previously covered by a glacial lake that deposited glaciolacustrine silts and clays along with areas of alluvial sediments (SRK 2019).

Table 2.2 Lagoon Tailings Area General Information and Configuration

Key Parameters	Lagoon A	Lagoon B	Lagoon C	Lagoon D
CDA Consequence Classification	Low	Low	High	Very High
Tailings Deposition in 2020 [1]	None	None	None	Yes 82,200 t
Impounded Tailings Volume (m^3)	185,000	295,000	4,658,600	22,760,000
Maximum Operating Pond Volume (m^3)	550	0	18,000	288,000
Approximate Footprint (ha)	5.8	4.5	32.6	61
Crest Length (m)	1,100	800	2,000	2,226
Crest Width (m)	6	6	6	6 to 10
Crest Elevation (El. m)	1119.0	1118.5	1129.3	1168 (West) 1172 (East)
Maximum Dam Height (m)	4	4	19.5	59
Raise Method	No raises.	No raises.	Upstream for East embankment Downstream for all other embankments	Upstream
Overall Downstream Slope Grade	1.8H:1V	1.75H:1V	1.75H:1V	2.7H:1V to 3.4H:1V
Inter-berm Side Slope	N/A	N/A	N/A	2H:1V (typical)
Spillway Elevation (El. m)	1118.3	1118.2[2]	N/A	N/A
Spillway Width (m)	5	3[2]	N/A	N/A

Source: Elkview Operations – 2018 TSF Dam Safety Review (SRK 2019) and 2020 data (EVO, 2020)

Notes: 1. Tailings deposition quantity is approximate only.
2. Spillway for Lagoon B is not a formal spillway. It is an observed low spot in the crest.



LEGEND

- CREEK
- LAGOON BOUNDARY

NOTES

1. DATUM, PROJECTION: NAD83, UTM ZONE 11 (WKID 26911)
2. IMAGERY FROM TECK ELKVIEW OPERATIONS (COLLECTED IN 2019).

NOT FOR CONSTRUCTION

SCALE 0 250 m

CLIENT: Teck

Klohn Crippen Berger

PROJECT: TECK ELKVIEW OPERATIONS
2020 ANNUAL SUMMARY OF FACILITY PERFORMANCE

TITLE: LAGOON TAILINGS AREA
PLAN LAYOUT

SCALE	PROJECT No.	FIG. No.
1:12,000	M09963A14	2.2

ANSI A

SAVE DATE: 2021-03-24(12:52 PM)
FILE PATH: \\INT.KLOHN.COM\PROJDATA\M\FRE\M09963A14-TCL-EVO-2020 DSI\400 DRAWINGS\GIS\REPORTS\DSI\FIG2_2_LAGOONS.MXD (DMASE)

Lagoon A

Lagoon A is an inactive TSF, was used during the mine start-up period in the 1960's. The facility is currently inactive. The tailings in this facility are impounded by embankments approximately 4 m in height at the north and west perimeter of the storage. The eastern perimeter of the impoundment is confined by Harmer Ridge and the Lagoon D embankment confines the southern side of the impoundment. There are no construction records available for Lagoon A, however site investigations indicate the starter embankment was primarily constructed using silty sand, and sand and gravel glacial till materials.

The foundations comprise coarse-grained gravelly sand glacial till followed by glaciofluvial sands and sandy silts. Foundation glaciolacustrine clay was identified under the western portion of Lagoon A.

Water from Cossarini Creek flows directly through Lagoon A and discharges out of the spillway at the western perimeter of the facility into a series of check dam ponds (Otto Ponds). Lagoon A is in the "active care" phase of closure.

Lagoon B

Lagoon B is an active TSF and was used for initial tailings storage at the commencement of mining and processing in the 1960's. Similar to Lagoon A, the tailings are impounded by 4 m high embankments to the west and south, coal stockpiles to the north, and Harmer Ridge to the east. Lagoon B is considered an active facility because it receives emergency overflow process water from the wash plant when required. EVO have limited the quantity of plant water discharge to Lagoon B to reduce the risk of overtopping. Lagoon B requires an impoundment capacity increase or construction of a spillway to meet regulatory requirements. Retained water within Lagoon B is left to infiltrate through the tailings into the ground surface. There are no construction records available for Lagoon B, however site investigations indicate the starter embankment was primarily constructed using silty sand, and sand and gravel glacial till materials. The foundations comprise coarse-grained gravelly sand glacial till, underlain by glaciofluvial sands, sandy silts, and interbedded glaciolacustrine clays.

Lagoon C

Lagoon C is an inactive TSF and was operated from 1970 to 1996, with tailings deposition ceasing in 1987. From 1987 to 1996, Lagoon C was used to temporarily retain excess decant water from Lagoon D. Its current purpose is to store sediments excavated as part of routine maintenance from several sedimentation ponds and sumps. The starter dam was constructed in 1970 using sand and gravel fill, with two subsequent raises completed in 1985 and 1986 using CCR. The upstream raise method was utilised on the eastern embankment due to site infrastructure constraints and the north, south and west embankments were raised using the downstream method. The foundation comprises coarse-grained gravelly sand glacial till underlain by interbedded glaciofluvial silty sands, and glaciolacustrine clays and silts.

Additional infrastructure at Lagoon C includes an out-of-service pipeline, which enabled Lagoon D decant water to be discharged to Lagoon C. Lagoon C also has wind fencing to manage dust, power line infrastructure along the western embankment crest, and a natural gas pipeline buried adjacent to

the toe of the dam, at the western perimeter. Lagoon C has sufficient capacity to safely manage its IDF without a spillway, and ponded water infiltrates through the tailings to the natural ground.

A summary of the raise construction history for Lagoon C is presented in Table 2.3.

Table 2.3 Lagoon C Raise Construction History

Year	Crest Elevation (El. m)	Construction Material	Comments
1970	1,120	Sands and gravels	Stater Dam construction.
1982	1,120	Sands and gravels and Coarse Coal Rejects	South extension dam was constructed with sands and gravels to elevation El. 1,114 m and to elevation El. 1,120.4 m using Coarse Coal Rejects.
1985	1,125	Coarse Coal Rejects	4.6 m dam raise. Upstream raise method used for the east embankment and the downstream raise method was used for all other embankments.
1986	1,129	Coarse Coal Rejects	4.3 m dam raise using same raise method as 1985.
1987	1,129	N/A	Tailings deposition to Lagoon C ceased.

Note: The above table is a summary for embankment raises only. Additional activities were undertaken on the dam other than the raises listed.

Lagoon D

Lagoon D is a ring-dyke tailings storage facility, with tailings deposition commencing in the early 1970's. Since the commissioning of the WFTF in 2006, Lagoon D has become the secondary tailings storage location, with approximately 11.5% of fine tailings being deposited in Lagoon D on an annual basis. The facility sand and gravel ring-dyke starter dam was constructed in 1972, with consecutive upstream raises constructed using CCR. The north, south and west embankments were raised using the upstream method and the eastern perimeter is confined by the natural hillside. Lagoon D is underlain by sand and gravel alluvial deposits overlying GLU clays and silts.

Since 2005, tailings have been deposited into shallow cells on the northeastern and southeastern perimeter of the ring-dyke. The cells vary in length and width, however typical cell dimensions are 60 m long x 15 m wide, with cell depths ranging from 1.8 m to 4.1 m. This tailings management system enables faster consolidation of the tailings in individual cells while allowing bleed water to drain towards the centre of Lagoon D via solid pipes that connect individual cells to the centre of the impoundment. Tailings from the cells are then excavated and placed on the Reclamation Area at the western portion of the facility.

In 2018, the crest elevation of the active deposition area of Lagoon D was raised to elevation 1,168 m to provide additional storage for water during flood events. Along the north and south sides of Lagoon D, the dam raise was from 0 m to 2 m. The Inner Ring Road was raised 2 m.

Lagoon D has sufficient capacity to effectively manage the pond and IDF without a spillway. Water from the pond can also be pumped to and from the wash plant.

A summary of the raise construction history for Lagoon D is presented in Table 2.4.

Table 2.4 Lagoon D Raise Construction History

Year	Crest Elevation (El. M)	Construction Material	Comments
1972	1,123	Sand and gravel from inside lagoon	Starter embankment.
1979	1,130	Coarse Coal Rejects	7 m upstream raise.
1986–1887	1,133	Compacted tailings with a CCR exterior	3 m upstream raise.
1993	1,142 (west) 1,146 (east)	Coarse Coal Rejects	North Embankment construction only. Portions of compacted tailings was removed and replaced with compacted Coarse Coal Rejects.
	1,140	Coarse Coal Rejects and coarse tailings	West Embankment construction only.
	1,143 (west) 1,146 (east)	Coarse Coal Rejects	South Embankment construction.
1995-2001	1,151 (west) 1,155 (east)	Coarse Coal Rejects	Embankments were raised in approximate annual increments of 0.6 m to 2.5 m.
2002	1,156 (west) 1,158 (east)	Coarse Coal Rejects	Cell construction was adopted to enhance beach development.
2004–2005	1,160.5 (west) 1,162.5 (east)	Coarse Coal Rejects	Incremental 1 m embankment raises each year.
2006	Nominal 1,161.5	Coarse Coal Rejects	Nominal 1 m raise of the embankment. WFTF becomes operational this year.
2009–2011	1,166	Coarse Coal Rejects	Lagoon D constructed to the permitted elevation of El. 1,166 m. Internal ring road was constructed to elevation El. 1,164 m.
2012	1,166	Coarse Coal Rejects	Additional compacted 2 m lift on internal dike. Internal ring road was raised to the same elevation as the perimeter embankment
2018	1,168	Coarse Coal Rejects	Internal ring road dyke and portions of the Lagoon D dam (eastern side) was raised to elevation 1,168 m to increase the available freeboard.

Note: The above table is a summary for embankment raises only. Additional activities were undertaken on the dam other than the raises listed.

2.3 Design Basis

The design basis for the EVO TSFs is summarized in Table 2.5 and Table 2.6.

The WFTF and Lagoon Tailings Area structures statisfy the minimum criteria according to the Code (MEM 2017), the HSRC Guidance Document (MEM, 2016) and CDA guidelines (2013, 2019). The following exception is noted:

- The current configuration of Lagoon B does not meet the regulatory requirements for containment of the IDF.

Table 2.5 Design Basis – Summary for WFTF and Lagoon Tailings Area

Structure	CDA (2013) Consequence Classification [1]	Inflow Design Flood (IDF)		Earthquake Design Ground Motion (EDGM)		Freeboard Requirements
		Minimum Design Flood (AEP) [3]	Design [4]	Minimum Design (AEP) [3]	Design [4]	
WFTF	Low	1 in 100-yr	1/3 between 1,000-yr and Probable Maximum Flood (PMF)	1 in 100-yr	1 in 2,475-yr (PGA = 0.128 g)	2.82 m [5]
Lagoon A	Low	1 in 100-yr	24-hr 1 in 200yr (spillway)	1 in 100-yr	1 in 2,475-yr (PGA = 0.128 g)	0.33 m
Lagoon B	Low	1 in 100-yr	1 in 100-yr	1 in 100-yr	1 in 2,475-yr (PGA = 0.128 g)	0.33 m
Lagoon C	High	1/3 between 1,000-yr and PMF	1/3 between 1,000-yr and PMF	1 in 2,475-yr	1 in 2,475 (PGA = 0.128 g)	2 m minimum freeboard
Lagoon D	Very High	2/3 between 1,000-yr and PMF	72-hr PMF	1/2 between 1 in 2,475-yr and 1 in 10,000-yr (or MCE)	1 in 5,000-yr (PGA = 0.18 g)	1.25 m minimum freeboard and 60 m wide beach maintained

Notes:

1. CDA 2013 Dam Safety Guidelines categories: Low, Significant, High, Very High, and Extreme.
2. Minimum freeboard above maximum operating pond level and pond setback distance, reproduced from the OMS manual.
3. Based on HSRC Guidance Document (BCMEM, 2016). A minimum event duration of 72-hours is required for IDF containment for impoundments with no spillway. The minimum IDF and EDGM for the WFTF, Lagoon A, and B, is based on CDA guidelines (CDA 2013), because these facilities were permitted prior to the relevant subsections of the HSRC coming into force.
4. Current design criteria.
5. Freeboard based on Wood 2018 72hr-Probable Maximum Precipitation (PMP) depth estimate of 483 mm.

Table 2.6 Design Basis – Minimum Factor of Safety Criteria for Slope Stability

Loading Condition	Minimum Factor of Safety (CDA 2013)	Minimum Factor of Safety (MEM 2017)
		Tailings Dams
Static – Long Term Steady State	1.5	1.5
Seismic – Post-earthquake	1.2	-
Seismic – Pseudo-static	1.0	-

Notes: Rapid drawdown is not applicable for the TSFs.

3 DAM SAFETY ACTIVITIES IN 2020

The following activities relating to the safety of the dams were undertaken between December 2019 and October 2020.

3.1 WFTF

- The tailings elevation adjacent to the embankment increased from El. 1,669 m to El. 1,671.8 m (measured from the spigot location at the east end of the impoundment), approximately 2.8 m, and is within the typical rate of rise for the WFTF. The tailings elevation is surveyed at three-month intervals.
- The Adit Toe Berm roadway (including filter) was raised 3.5 m ahead of tailings deposition from an approximate elevation of El. 1,671.5 m to EL. 1,674 m. A design for future Adit Toe Berm raises was prepared by KCB to minimize the risk of fines migration from the WFTF into the Adit Waste Dump (KCB 2019b). The design enables the site personnel to continue raising the Adit Toe Berm under the supervision of EVO engineers.
- The detailed raise design scope of work for the WFTF was commenced in September 2020, focusing on raising the WFTF from a crest elevation of 1685 m to El. 1710 m.

3.2 Lagoon A

- Stability analyses were completed for the Lagoon A dam, confirming that the dam achieves a static FoS of 1.5.
- The order of magnitude conceptual closure study for the Lagoon Tailings Area commenced in September and is expected to be completed in 2021. The Lagoons will be closed in a phased approach, and further analyses and planning is required during the next closure design stages. This work is common to Lagoons A, B, C, and D.

3.3 Lagoon B

- Stability analyses were completed for the Lagoon B dam, confirming that the dam achieves a static FoS of 1.5.
- Routine discharge of plant washdown water to the southeast corner of Lagoon B continued through the December 2019 to October 2020 period under written approval from both the EVO Geotechnical Department and the Environment Department. The requirement to obtain internal written approval is due to the minimal freeboard available for storing water on the surface of the Lagoon. There were six discharges into Lagoon B during the 2020 period:
  - January 14, 2020
  - March 16, 2020
  - April 28, 2020
  - July 2, 2020
  - August 18, 2020
  - October 14, 2020

3.4 Lagoon C

- Sediment excavated from several sumps and ponds at the EVO site were dumped in Lagoon C and tracked-packed with a dozer. This is expected to continue as a routine operation to effectively maintain ponds and sumps. Approximately 840 t of material was placed on Lagoon C at the southwest corner from December 2019 to October 2020.
- Stability analyses indicate the FoS for the East Dam of Lagoon C exceeds 1.5 for static drained conditions.

3.5 Lagoon D

- Intermittent tailings deposition occurred at the Lagoon D cells throughout the 2019 to 2020 period. Approximately 82,200 t of tailings was deposited during this period.
- Routine maintenance was carried out on the tailings cells, pipe elevations, and roads as required.
- Tailings from the cells were excavated, placed and compacted in the Reclamation Area. The Reclamation Area was grassed at the time of the inspection.
- It is noted that no additional raises are planned for Lagoon D, with all future tailings to be deposited into the WFTF. EVO are in the process of removing the tailings deposition pipeline from Lagoon D.
- The 2020 LiDAR was completed by EVO, and processed on August 30 to track the progress of tailings deposition at Lagoon D. An updated plan layout and representative cross sections based on the most current survey are presented in Appendix III.
- GPS survey pins for Section H Lower and Section C Lower were replaced.
- Stability analyses indicates the FoS for the north dam of Lagoon D overlying GLU exceeds 1.5 for static drained conditions.

4 SITE OBSERVATIONS / RESULTS OF SITE INSPECTION

The visual inspections conducted by Mr. Small and Mr. Tin included observing the condition of the facilities to identify deficiencies and other potential concerns regarding the geotechnical stability of the landforms. There were no concerns related to water management. No signs of structural distress were observed during the inspections of the crest, upstream beach, downstream slope, abutments and toe area. Structural distress that would be of concern includes tension cracks, settlement, sloughs, slumps or excessive erosion.

Inspection forms and selected photographs of the facilities are presented in Appendix I and II, and summary of (anomalous) observations are included in Table 4.1. Only observations that are different than expected are noted. This avoids the need to be stating items such as “slopes appear in good condition.” Table 4.1 also includes notes, on whether the observations are new, and if there is an associated dam safety concern that should be addressed. Comments and recommendations arising from the observations are in Section 9.

Table 4.1 Summary of (Anomalous) Observations

No.	(Anomalous) Observations	Change from 2019 DSI?	Dam Safety Concern?	Photo Reference
WFTF				
WFTF-1	There were no observations of fine tailings migration into the abutments of the WFTF embankment.	Yes	No	IW-1, IW-4
WFTF-2	The differential height elevation between Adit Toe Berm crest level and the surface of the tailings is approximately 7 m, exceeding 4 m design maximum at the northern end of the reservoir (based on data provided and observations). This occurred because the tailings beach slopes down towards the north end of the pond, hence building the Adit Toe Berm to a consistent elevation results in building the berm beyond design limits at the northern section. This is not a dam safety concern for the WFTF dam, but does present a potential safety risk to operators constructing the Adit Toe Berm.	Yes	No	IW-9
Lagoon A				
N/A	No anomalous observations for the 2020 period.	N/A	N/A	N/A
Lagoon B				
LB-1	A portion of the crest was observed to be narrow, and may possibly be a low spot.	No	No	IB-3
LB-2	A minor erosion gully was observed from the crest of Lagoon B.	No	No	IB-5
Lagoon C				
LC-1	A local low spot on the crest near the trestle was observed.	No	No	IC-9
LC-2	Erosion on the upstream side of the crest was observed at the north section of the Lagoon near the pumphouse. It is not expected that this erosion could propagate though the crest of the dam, causing a significant dam failure.	No	No	IC-3, IC-4

No.	(Anomalous) Observations	Change from 2019 DSI?	Dam Safety Concern?	Photo Reference
LC-3	The buried pipe at the western toe of Lagoon C was flowing at the time of inspection. This pipe drains the fill material at the western toe of Lagoon C, adjacent to the buried gas pipeline.	No	No	IC-11
Lagoon D				
LD-1	Minor downstream erosion was observed at several locations around the Lagoon D dam.	No	No	ID-12, ID-14
LD-2	The staff gauge used to measure the depth of the decant pond was observed to be covered with tailings sediment, obscuring the depth marks. EVO personnel should clean or replace staff gauges as required, and the OMS Manual should be updated to include this maintenance practice.	Yes	No	ID-10

5 MONITORING AND INSTRUMENTATION REVIEW

A review of monitoring and instrumentation data was completed for the WFTF and Lagoon Tailings Area by KCB. The monitoring instrumentation at site comprises a network of VWPs, standpipe piezometers, GPS survey monuments and inclinometers. Measurements are collected by the EVO tailings geotechnical team, with the data evaluated against the Quantifiable Performance Objectives (QPOs) for the WFTF and Lagoon Tailings Area. The data review is escalated to the EoR where there is an exceedance of a trigger level for any of the monitoring instruments. The current monitoring program is sufficient to assess the performance of the facilities against safety targets. A review of the monitoring and instrumentation data and procedures at site is presented below, with the location of each monitoring instrument and data shown in Appendix IV.

5.1 Piezometric Data and Phreatic Surfaces

The measured phreatic surface level within the standpipe piezometers and VWPs in all facilities is consistent with historic trends. There were no trigger level exceedances over the December 2019 to November 2020 period and there are no safety concerns for the WFTF and lagoons. A summary of the piezometric data and phreatic surfaces is provided below, with piezometer measurements reported in Appendix IV.

5.1.1 Lagoon A, and B

- The two VWPs installed in Lagoon A indicate the phreatic surface elevation is at approximately El. 1114.4 m and El. 1114.8 m at the eastern and western extent of Lagoon A, respectively. The phreatic surface elevation is approximately 1 m above the base of the tailings, equivalent to 3.3 m below the embankment crest.
- The performance of Lagoon B is likely to be similar to Lagoon A due to the similar embankment configuration and proximity to Lagoon A. Due to the low consequence of failure, it is judged that no monitoring instrumentation is necessary for the Lagoon B dam.

5.1.2 Lagoon C

The following instruments were installed to facilitate performance monitoring of the Lagoon C dams:

- 15 VWPs
- 6 standpipe piezometers (excludes broken OW-C1 and OW-C4 piezometers).

Piezometer data for the 2019 to 2020 period indicates that the phreatic surface within Lagoon C generally remains consistent with previous trends. The piezometric surface level ranges from EL. 1113 m to El. 1115 m, and is generally near the base of the tailings, or at the original ground surface level. All standpipes showed a peak water level around May which likely correlates with a higher Elk River water level during freshet. There were some standpipe piezometers that were not read during the 2019 to 2020 period, because they were either scheduled to be decommissioned or they are backup instruments (only to be read when there is an alert level exceedance on another instrument).

5.1.3 Lagoon D

The following instruments were installed to facilitate performance monitoring of Lagoon D:

- 30 VWPs (19 of which are read regularly).
- 46 standpipe piezometers (excludes broken D1, OW9432, 99-02 and V01-01 piezometers).

Piezometer data for the 2019 to 2020 period indicates that the phreatic surface within Lagoon D generally remains consistent with previous trends. The phreatic surface level is generally measured between El. 1110 m to El. 1116 m, which is a range approximately 3 m below the original ground surface level, and up to 3m within the tailings zone. The piezometers generally indicate a downward gradient, suggesting drainage also occurs through the gravel foundations below the Lagoon D embankment. This downward gradient has been observed since 2012 and the trend continued throughout the 2019 to 2020 period. There were some standpipe piezometers and VWPs that were not read during the 2019 to 2020 period, because they were either scheduled to be decommissioned or they are backup instruments (only to be read when there is an alert level exceedance on another instrument).

5.1.4 WFTF

The following instruments have previously been installed to enable monitoring of the WFTF:

- 10 VWPs.
- 2 standpipe piezometers (groundwater wells).

The VWP data indicates that the pore water pressures measured at these instruments were slightly above the tip of the VWPs and did not significantly fluctuate during the 2019 to 2020 inspection period. In some cases, the conditions at the tip of the VWP were dry and the measurements were generally consistent with the measurements from the previous year.

The VWPs were not installed as part of the dam safety monitoring program. They were installed to monitor the pore-water pressures in the tailings due to the concern for tailings migration into the toe of the Adit Waste Rock Dump. The piezometers indicate negative pore-pressure measurements, and only VW29159 and VW38582 indicated a phreatic surface approximately 0.9 m and 0.02 m above the tip of the VWP, respectively. The results indicate the tailings are draining.

The water levels within two groundwater monitoring wells (WF-2 South and WF-3 North) have gradually increased with the deposition of tailings in the WFTF since commissioning in 2006. It is noted that the two groundwater monitoring wells are located downstream of the WFTF dam and are not representative of the phreatic surface at the location of the WFTF embankment itself. The water levels were not measured during the 2019 to 2020 period.

5.2 Deformations

The no significant movements or displacements were measured for Lagoons C and D during the July 2019 to November 2020 period, and there are no safety concerns for the facilities. GPS data for

Lagoons C and D did not show any concerns, and is being used for due diligence monitoring with respect to credible but very low probability embankment or foundation instability. A summary for each dam is presented below.

5.2.1 Lagoon A and B

There are no settlement or lateral movement monitoring instruments installed in Lagoons A or B. Routine inspections are adequate to monitor these facilities.

5.2.1 Lagoon C

GPS Survey Monuments

- Eight GPS survey monuments (four pairs at the crest and embankment toe along sections A-A, B-B, C-C and D-D) were monitored on a quarterly basis.
- All GPS survey monuments measured resultant horizontal movements of less than 100 mm. The GPS survey monument readings are within the expected performance of the GPS monitoring system and below the first alert level of 50 mm of movement.
- Some erroneous data was removed from the 2019 to 2020 records, and this data was not consistent with previous trends or observed performance of the dam via inspections. EVO have clarified that these readings may be erroneous, potentially due to factors such as satellite signal blockage and adverse atmospheric conditions. Therefore the erroneous readings are not considered to be a dam safety concern.

5.2.2 Lagoon D

Four inclinometers are installed in Lagoon D (North “LD_N”, South “LD_S”, BH-D-19-03 and BH-D-19-06) and extend through to the foundations. Cumulative displacements are measured for the A-Axis and B-Axis, with negative readings assigned for the upslope movement. The baseline readings for the LD_N and LD_S inclinometers were recorded on February 20, 2013 and March 19, 2013 respectively. The baseline readings for inclinometers BH-D-19-02, BH-D-19-03 and BH-D-19-06 were recorded on May 28, 2020. The inclinometers were most recently measured in June 2020, and BH-D-19-06 was additionally measured twice in August 2020, and once in September 2020 in response to a recorded displacement.

LD_N

- A shape array (SAA) was installed in LD_N in 2019. The cumulative displacement from the 2020 measurements is consistent with previous measurements, with less than 5 mm of displacement in the downstream direction of Lagoon D.
- Incremental displacement measurements indicate downstream and upstream movements of less than 3 mm. The B-Axis indicated similar movements for the same period, indicating tailings settlement along the casing.
- No significant discrete displacements or localised shear planes were recorded during the 2019 to 2020 period.

- Since the 2013 baseline reading, no indications of discrete zones of movement have been observed, and the cumulative displacement trend is typical of tailings settlement adjacent to the inclinometer casing.

LD_S

- The June 2020 measurements were generally consistent with previous measurements. Cumulative displacement in the a-axis reached up to -4 mm at approximately El. 1129 m, and in the b-axis the cumulative displacement was -3.5 mm at approximately El. 1135.5 m. This trend is consistent with the Lagoon D tailings consolidating under self-weight, with tailings at the top of casing settling towards the upstream direction.
- The incremental displacement for both the A-axis and B-axis was typically less than 1 mm below the top of casing, with a maximum incremental displacement of 1 mm recorded.
- Since the 2013 baseline reading, no indications of discrete zones of movement have been observed, and the cumulative displacement trend is typically of tailings settlement adjacent to the inclinometer casing.

BH-D-19-02

- The cumulative displacement from the June 2020 reading indicates less than 1 mm of movement in both the A-axis and B-axis, except at the top of casing. These measurements indicate no discrete zones of movement have been observed, no concern for the performance of the dam.

BH-D-19-03

- The cumulative displacement from the June 2020 reading indicates less than 1 mm of movement in both the A-axis and B-axis. These measurements indicate no discrete zones of movement have been observed, no concern for the performance of the dam.

BH-D-19-06

- The cumulative displacement for El. 1130 m to the top of casing (El. 1150.86 m) was 2.5 mm for the A-axis, and ranged from -2 mm to +2 mm in the B-axis for the full depth of the inclinometer. The measurements for the 2019 to 2020 period up to September 2020 are indicative of minor settling of tailings around the casing.
- The cumulative displacement up to the September 2020 reading indicates less than 1 mm of movement in both the A-axis and B-axis from El. 1094 m (in gravelly sand) up to the top of casing. The cumulative displacement measurements indicate no discrete zones of movement have been observed, and therefore there is no concern for the performance of the dam.
- The first inclinometer measurement in June 2020 (since the May 2020 baseline) indicated a 1.8 mm movement between El. 1128.5 m and El. 1130 m in tailings materials, and there was an initial concern that there might be a localised shear plane. Three follow up readings were measured on August 6 and 21, and September 15 to confirm the readings. The measurements are relatively small and does not indicate any discrete zones of movement, and therefore there is no concern for the performance of the dam.

GPS Survey Monuments

- Eight sets of GPS survey monuments are installed along each section of Lagoon D for a total of 29 GPS survey monuments (as shown in Appendix IV).
- All cross sections except H-H, have three survey monuments, typically located at the crest, midslope and toe of the embankment. Cross section H-H has two survey monuments, one located at the crest and the other is located at the toe of the embankment.
- Some survey monuments have recorded displacements outside of the survey tolerance (15 mm), but within the 50 mm threshold.
- It is noted that some erroneous data was removed from the 2019 to 2020 records, and this data was not consistent with previous trends or observed performance of the dam through inspections. EVO have clarified that these readings may be erroneous, potentially due to factors such as satellite signal blockage and adverse atmospheric conditions. Therefore the erroneous readings are not considered to be a dam safety concern.

5.2.3 WFTF

The WFTF was constructed using rock fill overlying competent bedrock foundations, with a low height, and therefore foundation instability is very unlikely. Also, as noted above, the piezometric levels are very low and hence it was judged that no instrumentation is required at the WFTF to monitor deformations at this time.

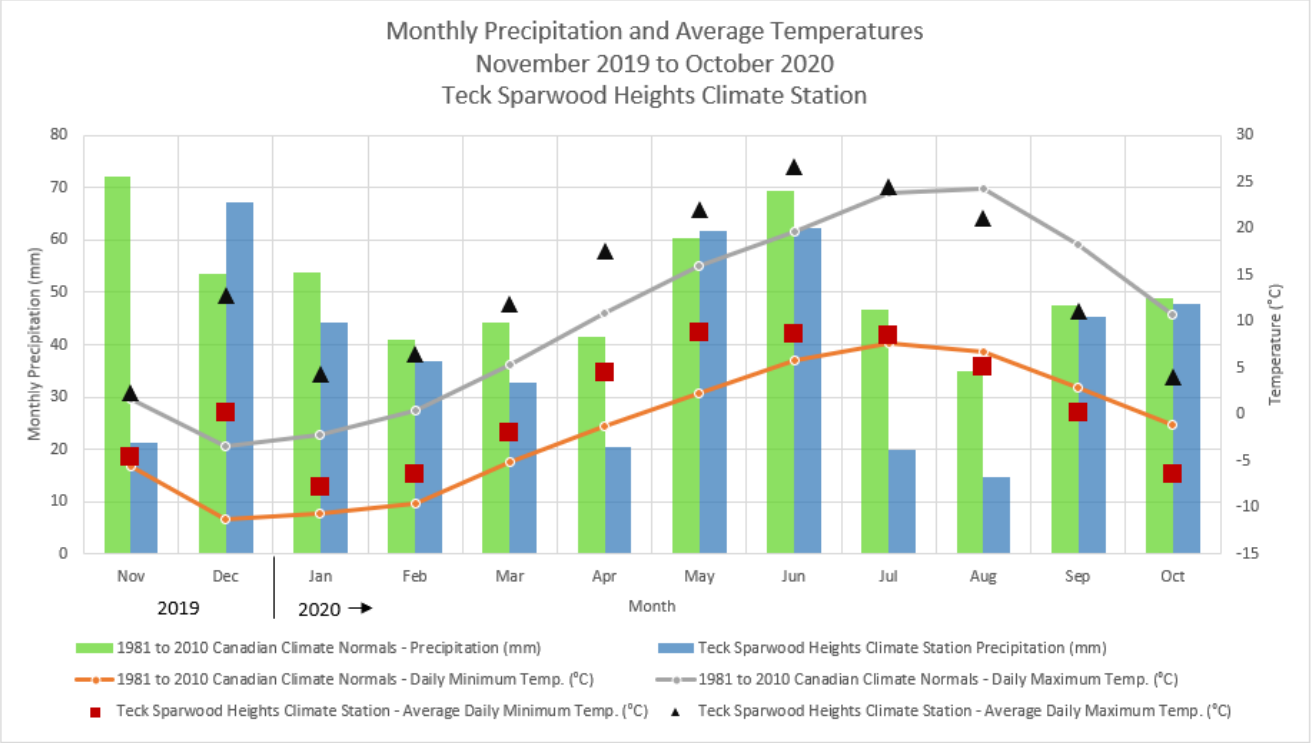
6 CLIMATE

The Elk Valley is semi-arid due to the lack of moisture that reaches eastern British Columbia. Both the amount of precipitation and the temperature are highly influenced by elevation in this area, causing more accumulation of snowpack at higher elevations.

Figure 6.1 presents the climate averages for Sparwood based on the Teck Sparwood Heights climate station. The Teck Sparwood Heights climate station data was used for this reporting period because Environment Canada Sparwood Station (ID 1157630) was missing several months of data. The total recorded precipitation from the November 2019 to end of October 2020 period was approximately 474 mm, compared to the average at Sparwood of 614 mm (based on Environment Canada Sparwood climate normal from 1981 to 2010).

Precipitation during December 2019 and from May of 2020 was higher than the 2010 Canadian climate normal for Sparwood. The precipitation for the 2019 to 2020 period has generally been lower in comparison the 2010 Canadian climate normal for Sparwood.

Figure 6.1 Climate Averages for Sparwood



Note: 1. Source: Environment Canada Sparwood Climate Normals (1981 to 2010) (Climate ID 1157630; El. 1138 m), and EVO Sparwood Heights Climate Station (El. 1138 m).

7 WATER MANAGEMENT

The site water balance model for Lagoon C and D, and the WFTF was updated in 2020 (Golder 2020), and the EVO Mine Water Management Plan was updated in June 2020 (EVO 2020). The 2020 site water balance GoldSim model was updated using revised topography, climate, hydrology data, and site operations and water management data. The following sections provide a summary of the water management strategies used at each facility.

7.1 WFTF

Tailings discharge is managed from six spigots located along the WFTF embankment. The decant pond is subsequently formed at the northern portion of the dam, confined by the Adit Ridge and the Cowboy Ridge. The decant pond in the WFTF is not reclaimed, and seeps into the tailings and adjacent waste rock dumps. The WFTF has sufficient freeboard to accommodate a 72-hr PMF event.

7.2 Lagoon A

Lagoon A does not receive any pumped tailings or water discharge, and rainfall typically infiltrates the tailings into the sand and gravel foundations, or ponds on the surface of the lagoon and discharges through the spillway. The spillway was designed to accommodate the 1 in 200-year event. The water management at Lagoon A is managed passively and does not require any actions from site personnel.

7.3 Lagoon B

EVO pumps sediment water to Lagoon B on occasion, and this water and rainfall infiltrates through the tailings to the natural ground surface. EVO is able to utilize the impoundment capacity of Lagoon B to receive overflow process water in emergency situations, and this occurred six times during the 2020 period (refer to Section 3.3). The hydrotechnical assessment by Wood (2019) recommended upgrading the dam to meet regulatory requirements. EVO is in the process of developing closure options for Lagoons A, B, C, and D. The closure option for Lagoon B may eliminate the requirement to construct a spillway, unless the closure activities for Lagoon B do not commence before 2026.

7.4 Lagoon C

Tailings deposition to Lagoon C has ceased since the late 1980’s and the structure was designed to accommodate the 72-hour, 1/3 between the 1 in 1,000-yr and PMF event, and maintain freeboard for wave runup. Lagoon C is currently utilized as a sediment disposal location for sediments excavated from various sumps and ponds. Ponded water typically infiltrates through the tailings and discharges at ground surface level where the tailings is in contact with sand and gravel foundations. Lagoon C has sufficient capacity to safely manage its IDF without a spillway, and ponded water infiltrates through the tailings to the natural ground.

7.5 Lagoon D

Tailings deposition to Lagoon D is managed using shallow cells to enable faster consolidation of tailings, with bleed water draining towards the center of the structure via temporary solid pipes though the pipe walls. Lagoon D does not possess an emergency spillway. The central decant pond is managed to maintain a 1.25 m minimum freeboard and 60 m wide beach to the ring-dyke embankments. The decant pond can accommodate the 72-hour PMP event, and also the 30-day PMP event. Water from the decant pond can be transferred to the plant site by pumping. The freeboard for Lagoon D is measured with a staff gauge on the north side of the Inner Ring Road.

7.6 Discharge Quantities and Quality

Seepage from the WFTF is expected to report to shallow bedrock sequences below the embankment. Typically, the infiltration of rainfall or ponded water through the tailings occurs slowly, with no observed seepage recovery points. During the January 2020 to December 2020 period, there were water quality exceedances measured. It is noted that EVO reports water quality data directly to the Ministry of Environment.

Rainfall infiltrating through the surface of the Lagoons typically drains to the ground surface level. The original ground comprises layers of sand and gravel, glaciolacustrine clay, and till. The sand and gravel layers act as drains, draining the water from the lagoons into the groundwater system. Infiltration into the groundwater system is not measured and water quality for the Lagoon TSFs are not tested by EVO.

8 DAM SAFETY ASSESSMENT

The WFTF, and Lagoons A, B, C, and D, appeared to be in good physical condition with no signs of structural distress based on observations during the 2020 inspection. At the time of inspection tailings deposition to the Lagoon D cells was occurring and the structure was being operated in accordance with the procedures in the OMS Manual.

The following sections provide additional detail on specific dam safety categories and detail deficiencies where applicable.

8.1 Dam Classification Review

The WFTF, Lagoon A and Lagoon B have been classified as “Low” consequence structures in accordance with the CDA guidelines (Wood 2019). Lagoon C and D and have been classified as “High” (Amec 2014) and “Very High” consequence structures respectively due to the potential impacts to the downstream environment and population at risk (Wood 2018). The current consequence classifications for the WFTF and Lagoons A, B, C, and D are appropriate.

8.2 Failure Modes Review

Risk assessments for the WFTF, and Lagoons A, B, C, and D were completed in 2020 and Q1 of 2021.

8.2.1 Definition of failure modes

In undertaking a review of the failure modes, it is appropriate to first define what is meant by a failure mode.

A failure mode commences with an initiating event (trigger) that is the loading or physical condition that starts the failure process. This is followed by the failure progression, which is the mechanism that can lead to a dam failure (such as overtopping, instability, or internal erosion), but it is important to note that not all failure mechanisms will result in a breach of the dam (a failure of the “dam system”). The failure mechanism may become arrested or there may be interventions that prevent the failure mechanism from progressing to a breach.

Hence, a failure mode refers to the combination of a triggering event, the failure mechanism, and the actual breach of the dam.

8.2.2 Overtopping

WFTF

The WFTF available freeboard during the 2020 site inspection was approximately 6 m from the top of the tailings beach elevation to the crest level, with an available impoundment capacity of approximately 4.5 Mm^3, exceeding a 72-hr PMF volume of approximately 1.1 Mm^3.Therefore, failure via overtopping is effectively managed with the available impoundment capacity.

Lagoons A, B, C, and D

The passive water management strategy for Lagoons A, B, and C is to allow ponded water to infiltrate through the tailings and dissipate into the foundations. Lagoon D currently maintains an operational pond, and is designed with adequate freeboard to meet the design criteria. The risk of overtopping for Lagoons A, C, and D is managed through appropriately designed impoundment capacity and minimum freeboards (refer Table 2.5).

The freeboard and flood routing analyses completed for Lagoon B, determined that Lagoon B does not have adequate impoundment capacity to contain the required IDF (Wood 2019), however this may be addressed by the closure design scope of works (in progress).

8.2.3 Internal Erosion and Piping

WFTF

No piping of the WFTF embankment was observed during the 2020 inspection. During the 2019 dam safety inspection, tailings was observed to be migrating into the WFTF abutment where the filter material may be too coarse. This was not observed during the 2020 inspection. The requirement for filters is being assessed during the detailed design phase for raising the WFTF.

Lagoons A, B, C, and D

Lagoons A, B, and C do not maintain a pond and therefore failure due to internal erosion and piping is effectively prevented.

Lagoon D maintains an operational pond, however, monitoring instruments typically indicate a downward flow to the foundations. No piping of embankments or tailings material was observed during the 2020 inspection or routine inspections by EVO personnel. And no piping is expected based on the groundwater flow pattern, and material compatibility between CCR and tailings.

Monitoring the embankment slopes and toes for seepage and erosion is part of the scheduled surveillance during routine inspections, and failure via internal erosion and piping is effectively prevented.

8.2.4 Slope Instability

WFTF

No signs of slope instability were observed for the WFTF and Lagoons A, B, C, and D, during the 2020 inspection. The WFTF achieved the minimum target FoS described in Section 2.3.

Lagoons A, B, C, and D

Based on previous geotechnical investigations, potential glaciolacustrine silty clay foundation units underlie portions of Lagoons A, B, C, and D. Stability analyses for these structures indicate that the structures meet the minimum target FoS for relevant loading conditions as described in Section 2.3. Additional detailed stability analyses are in progress for Lagoons C, and D.

Therefore, failure via slope instability is effectively managed with current design controls.

8.2.5 Surface Erosion

EVO personnel conduct routine inspections of the tailings facilities and monitor the downstream and upstream slopes for surface erosion caused by snow melt or rainfall runoff. Surface erosion was observed on the surface of Lagoon C at a point near the pumphouse which should be repaired as part of closure works, however this is not a dam safety concern. Minor surface erosion was also observed on Lagoon D at several downstream slope locations. The downstream minor erosion should be monitored, tracked and repaired. Minor erosion gullies were observed on the downstream slope of Lagoon B, and no surface erosion was observed on Lagoon A.

The magnitude of surface erosion for the WFTF and Lagoons A, B, C, and D, is not a concern to the safety of the dams. EVO has been utilizing a tackifier to effectively control most of the erosion on the downstream face of the structures. Therefore, failure via surface erosion is effectively managed with the current controls.

8.2.6 Earthquake

The WFTF is not susceptible to instability by seismic ground motions because the embankment was constructed using rockfill overlying bedrock foundations. Lagoons A and B are not susceptible to seismic ground motions because of the low design seismicity (less than 0.1 g) and the relatively small height of the facilities. EVO has adopted a 1 in 2,475-year return period seismic event for these structures which meets regulatory requirements. Therefore, failure via an earthquake is effectively managed by the design.

Lagoon C and D have been designed to a 1 in 2,475-year and 1 in 5,000-year return period seismic event, respectively. However, more detailed stability analyses for these structures are in progress.

8.3 OMS Manual and ERP

EVO have three separate OMS Manuals, encompassing inactive Lagoons A, B and C, Lagoon D and the WFTF. All three OMS Manuals for were updated in March 2021.

An ERP was prepared for Lagoon D in October 2014 which is a combined emergency preparedness plan and emergency response plan and was subject to a tabletop test in 2018. The ERP document will be updated in 2021 with consideration of the results of the Lagoon D dam break inundation study. The ERP document for Lagoons A, B, and C is up to date for 2020, with no revisions required.

An ERP was prepared for the WFTF in 2020 and is an adequate action plan in the event of an emergency at the WFTF.

8.4 Dam Safety Reviews

The last DSR completed for the EVO site was in 2018, which covered Lagoons A, B, C, and D and the WFTF. DSRs are conducted at five-yearly intervals, and the next DSR is planned for 2023.

9 SUMMARY OF RECOMMENDATIONS

A summary of previous recommendations and 2020 annual summary of facility performance review recommendations are provided in the following sections. Recommendations are prioritized based on the scheme recommended in MEM (2016), as shown in Table 9.1.

Each recommendation is assigned a number with the prefix based on the year that item was recommended. Recommendations noted as completed or closed in this report are presented in gray and will be removed from the register in subsequent reports.

Each item is defined as a dam safety deficiency or a non-conformance, with the CDA (2016) definitions as follows:

- Deficiency: “an inadequacy, or uncertainty in the adequacy, of the dam system to meet its performance goals in accordance with good dam safety practices”.
- Non-conformance: “an inadequacy in the non-physical controls (procedures, processes and management systems) necessary to maintain the safety of the dam”.

Table 9.1 Prioritization of Action Items

Priority	Description
1	A high probability or actual dam safety issues considered dangerous to life, health or the environment, or a significant risk of regulatory enforcement.
2	If not corrected, could likely result in dam safety issues leading to injury, environmental impact or significant regulatory enforcement; or, a repetitive deficiency that demonstrates a systematic breakdown of procedures.
3	Single occurrences of deficiencies or non-conformances that alone would not be expected to result in dam safety issues.
4	Best Management Practice – further improvements are necessary to meet best practices or reduce potential risks.

9.1 Summary of Previous Recommendations

Outstanding recommendations related to the inspections of the dams and the review of performance that were provided in previous annual inspections for the TSFs are presented in Table 9.2. The table also indicates if each recommendation is still appropriate and what actions have been taken. Recommendations from previous reviews that have been addressed have not been included.

Table 9.2 Summary of Previous Recommendations

Action ID	Dam	Deficiency or Non-Conformance	Applicable Regulation or OMS Manual Reference	Recommended Action	Priority	Status / Recommended Deadline
Previous Recommendations						
2019-01	Lagoon B	Deficiency. Lagoon B does not meet regulatory compliance volume for flood storage.	HSRC 2017	Lagoon B requires an increase in impoundment capacity to manage the IDF (72-hr Probable Maximum Precipitation), or requires the construction of a spillway to meet regulatory requirements.	3	Not Complete. If Lagoon B is selected to remain in service beyond 2026, then this recommendation should be completed in 2021.
2019-02	Lagoon D	Deficiency. GPS survey monuments H Lower and C Lower pins were destroyed.	OMS Manual	These GPS survey monuments should be replaced.	3	Completed in 2020
2019-03	Lagoon D	Deficiency. The pipes that allow the cells to drain into the central area of Lagoon D appeared to have inconsistent elevations that may possibly be higher than the outer walls of the cells.	OMS Manual	It is recommended that the pipe elevations be visually checked and corrected as required. This procedure should be implemented in the OMS Manual and training should be given to staff assigned to moving the pipes.	3	Completed in 2020
2019-04	WFTF	Deficiency. Possible signs of tailings migration into the abutment was observed during the 2019 inspection.	N/A	The next stage of the design to El. 1,710 m should include measures to minimize the risk of tailings migration through WFTF embankment.	3	Closed. The detailed design of the WFTF is in progress and the requirement for a filter is being assessed. Note that tailings migration into the abutments was not observed during the 2020 inspection.
2019-05	WFTF	Non-Conformance. The freeboard requirement for the WFTF is not stated in the OMS manual.	OMS Manual	The freeboard requirements for the WFTF should be stated in the OMS manual.	3	Completed in 2020

Action ID	Dam	Deficiency or Non-Conformance	Applicable Regulation or OMS Manual Reference	Recommended Action	Priority	Status / Recommended Deadline
2019-06	Lagoons A, B, C and D	Non-Conformance. The stability analyses for these facilities should be reviewed based on the 2019 Lagoon Site Investigation data, and potentially revised, pending the outcomes.	N/A	Review and conduct revised stability analyses for the facilities.	3	Completed in 2020
2019-07	All Facilities	Non-Conformance. The OMS Manual should include maintenance items described in the 2019 DSI report.	OMS Manual	The OMS Manual should be updated to include maintenance items described in Section 4.6, with recommendations to repair minor erosion as required.	3	Completed Q1 2021

Notes: Recommendation priority guidelines specified in the HSRC Guidance Document (BCMEM, 2016) and assigned by KCB.

Priority 1: A high probability or actual dam safety issue considered dangerous to life, health or the environment, or a significant risk of regulatory enforcement.

Priority 2: If not corrected could likely result in dam safety issues leading to injury, environmental impact or significant regulatory enforcement; or, a repetitive deficiency that demonstrates a systematic breakdown of procedures.

Priority 3: Single occurrences of deficiencies or non-conformances that alone would not be expected to result in dam safety issues.

Priority 4: Best Management Practice as a suggestion for continuous improvement towards industry best practices that could further reduce potential risks.

9.2 2020 Annual Inspection Recommendations

In addition to following the OMS Manual, the following recommendations in Table 9.3 should be undertaken.

Table 9.3 Summary of Recommendations

Action ID	Dam	Deficiency or Non-Conformance	Applicable Regulation or OMS Manual Reference	Recommended Action	Priority	Status / Recommended Deadline
2020 Recommendations						
2020-01	WFTF	Opportunity for improvement. The height between the Adit Toe Berm crest and tailings surface elevation exceeded the design allowance of 4 m. This is not a dam safety concern, however this non-conformance may pose a safety risk to personnel and equipment on the Adit Toe Berm.	N/A	Adit Toe Berm crest elevation should be monitored during construction, so that the height differential between the Adit Toe Berm crest and tailings surface does not exceed 4 m.	4	To be completed in 2021

Notes: Recommendation priority guidelines specified in the HSRC Guidance Document (BCMEM, 2016) and assigned by KCB.
Priority 1: A high probability or actual structure safety issue considered dangerous to life, health or the environment, or a significant risk of regulatory enforcement.
Priority 2: If not corrected could likely result in structure safety issues leading to injury, environmental impact or significant regulatory enforcement; or, a repetitive deficiency that demonstrates a systematic breakdown of procedures.
Priority 3: Single occurrences of deficiencies or non-conformances that alone would not be expected to result in structure safety issues.
Priority 4: Best Management Practice as a suggestion for continuous improvement towards industry best practices that could further reduce potential risks.

10 CLOSING

Based on the site inspections noted and data reviewed, the WFTF and Lagoons A, B, C, and D, are in an adequate condition and they continue to perform satisfactorily.

If you have any questions, please contact the undersigned.

KLOHN CRIPPEN BERGER LTD.

Michael Tin, E.I.T.
Geotechnical Engineer

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
A. SMALL
39684
2021-03-31

C.A (Andy) Small, P.Eng.
Senior Geotechnical Engineer

REFERENCES

AMEC. 2013. “Tailings Storage Facilities - Lagoon C and Lagoon D”. Issued October 2013.

AMEC. 2014. “Dam Breach Inundation Study for Lagoon C”. Issued November 2014.

British Columbia Ministry of Energy and Mines. (MEM). 2016. “Guidance Document: Health, Safety and Reclamation Code for Mines in British Columbia”. Version 1.0. Updated July.

British Columbia Ministry of Energy, Mines, & Petroleum Resources. (MEM). 2017. “Health, Safety and Reclamation Code for Mines in British Columbia”. February.

British Columbia Ministry of Forests, Land and Natural Resource Operations. (BCFLNRO). 2016. “British Columbia Dam Safety Regulation”. February 29.

Canadian Dam Association. (CDA). 2007. “Technical Bulletin: Geotechnical Considerations for Dam Safety”.

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

Canadian Dam Association. (CDA). 2016. “Technical Bulletin: Dam Safety Reviews”.

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

Golder. 2020. “Elkview Operations Water Balance Model”. Issued June 30, 2020.

Klohn Crippen Berger Ltd. (KCB). 2019b. “Elkview Operations - Adit Toe Berm IFC Drawings”. Issued July 31, 2019.

Mining Association of Canada. (MAC). 2011. “Developing an Operation, Maintenance and Surveillance Manual for Tailings and Water Management Facilities”.

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

SRK Consulting (Canada) Ltd. 2019. “Teck Elkview Operations – 2018 TSF Dam Safety Review”. Issued March 2019.

Teck Elkview Operations (Teck). 2014. “Elkview Operations – Lagoon D Tailings Facility – Emergency Preparedness Plan (EPP) & Emergency Response Plan (ERP)”. Issued October 2018.

Teck Elkview Operations (Teck). 2020. “Mine Water Management Plan – Elkview Operations”. Issued June 30, 2020.

Wood. 2019. “Tailings Storage Facilities – West Fork Tailings Facility and Lagoons A, B, C and D – 2018 Dam Safety Inspection Report”. Issued March 25, 2019.

Wood. 2019. “Lagoons B Overtopping Study – Lagoon B Dam Safety – Elkview Operations”. Issued June 28, 2019.

APPENDIX I

Inspection Photographs

Lagoon A
Lagoon B
Lagoon C
Lagoon D
WFTF

Appendix I
Inspection Photographs
(Taken on September 21 and 22, 2020 during annual inspection)

I-1.1 Lagoon A

The Lagoon A photograph locations plan layout is presented on Figure I-1. The following general notes are applicable to the inspection photographs:

1. Selected photo locations and direction taken are approximate only.
2. Selected photos are representative of the condition of the facility at the time of inspection, and do not include all photos taken during the inspection. EVO was provided with all photos taken during the inspection.

LEGEND

- ELKVIEW 2020 PHOTO LOCATION
- LAGOON BOUNDARY
- CREEK

NOTES

1. DATUM, PROJECTION: NAD83, UTM ZONE 11 (WKID 26911)
2. IMAGERY FROM EVO (COLLECTED IN 2019).

NOT FOR CONSTRUCTION

SCALE 0 50 m

CLIENT: Teck

Klohn Crippen Berger

PROJECT: TECK ELKVIEW OPERATIONS
2020 ANNUAL SUMMARY OF FACILITY PERFORMANCE

TITLE: LAGOON A PHOTOGRAPH LOCATIONS PLAN LAYOUT

SCALE	PROJECT No.	FIG. No.
1:2,500	M09963A14	I-1

ANSI A

SAVE DATE: 2021-03-24(12:56 PM)
FILE PATH: \\INT.KLOHN.COM\PROJDATA\M\FRE\M09963A14-TCL-EVO-2020 DSI\400 DRAWINGS\GIS\REPORTS\DSI\FIGI-1_DSI_LAGOONA.MXD (DMASE)

Photo IA-1 Lagoon A general conditions and spillway. (from Lagoon D looking northeast)

Photo IA-2 Lagoon A surface and Cossarini Creek culvert outlets. (looking west)

Photo IA-3 Lagoon A crest and spillway riprap. (looking north)

Photo IA-4 Lagoon A Spillway riprap. (looking west)

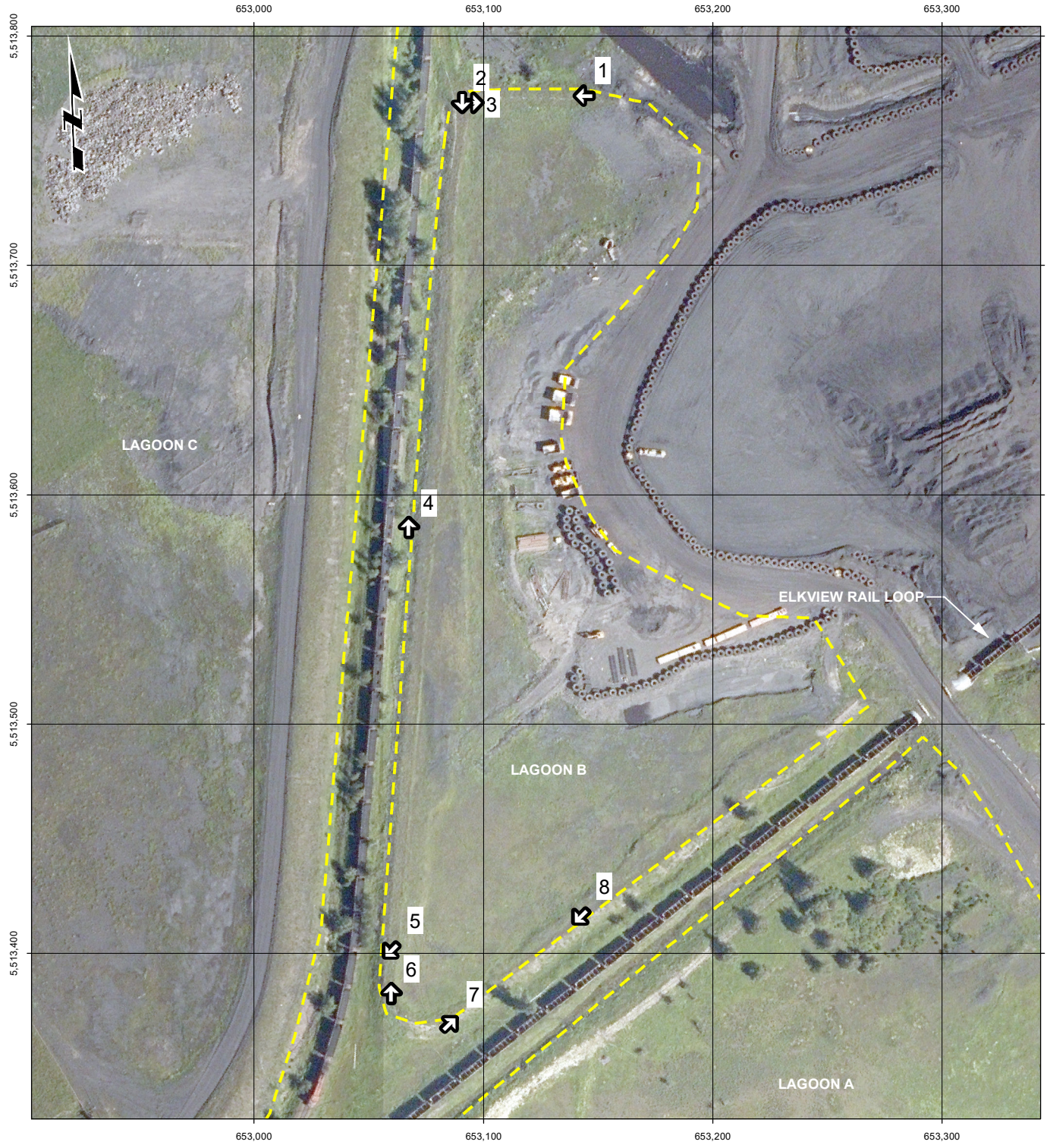
Photo IA-5 Lagoon A crest. (looking east)

Photo IA-6 Lagoon A crest. (looking west)

I-1.2 Lagoon B

The Lagoon B photograph locations plan layout is presented on Figure I-2. The following general notes are applicable to the inspection photographs:

1. Selected photo locations and direction taken are approximate only.
2. Selected photos are representative of the condition of the facility at the time of inspection, and do not include all photos taken during the inspection. EVO was provided with all photos taken during the inspection.



LEGEND

- ELKVIEW 2020 PHOTO LOCATION
- LAGOON BOUNDARY

NOTES

1. DATUM, PROJECTION: NAD83, UTM ZONE 11 (WKID 26911)
2. IMAGERY FROM EVO (COLLECTED IN 2019).

NOT FOR CONSTRUCTION

SCALE 0 50 m

CLIENT: Teck

Klohn Crippen Berger

PROJECT: TECK ELKVIEW OPERATIONS
2020 ANNUAL SUMMARY OF FACILITY PERFORMANCE

TITLE: LAGOON B PHOTOGRAPH LOCATIONS PLAN LAYOUT

SCALE	PROJECT No.	FIG. No.
1:2,500	M09963A14	I-2

ANSI A

SAVE DATE: 2021-03-24(12:57 PM)
FILE PATH: \\INT.KLOHN.COM\PROJDATA\M\FRE\M09963A14-TCL-EVO-2020 DSI\400 DRAWINGS\GIS\REPORTS\DSI\FIGI-2_DSI_LAGOONB.MXD (DMASE)

Photo IB-1 Lagoon B crest. (looking west)

Photo IB-2 Lagoon B crest and typical surface conditions. (looking south)

Photo IB-3 Lagoon B potential low spot in crest. (looking west)

Photo IB-4 Lagoon B crest. (looking north)

Photo IB-5 Lagoon B minor erosion gully. (looking southwest)

Photo IB-6 Lagoon B crest. (looking north)

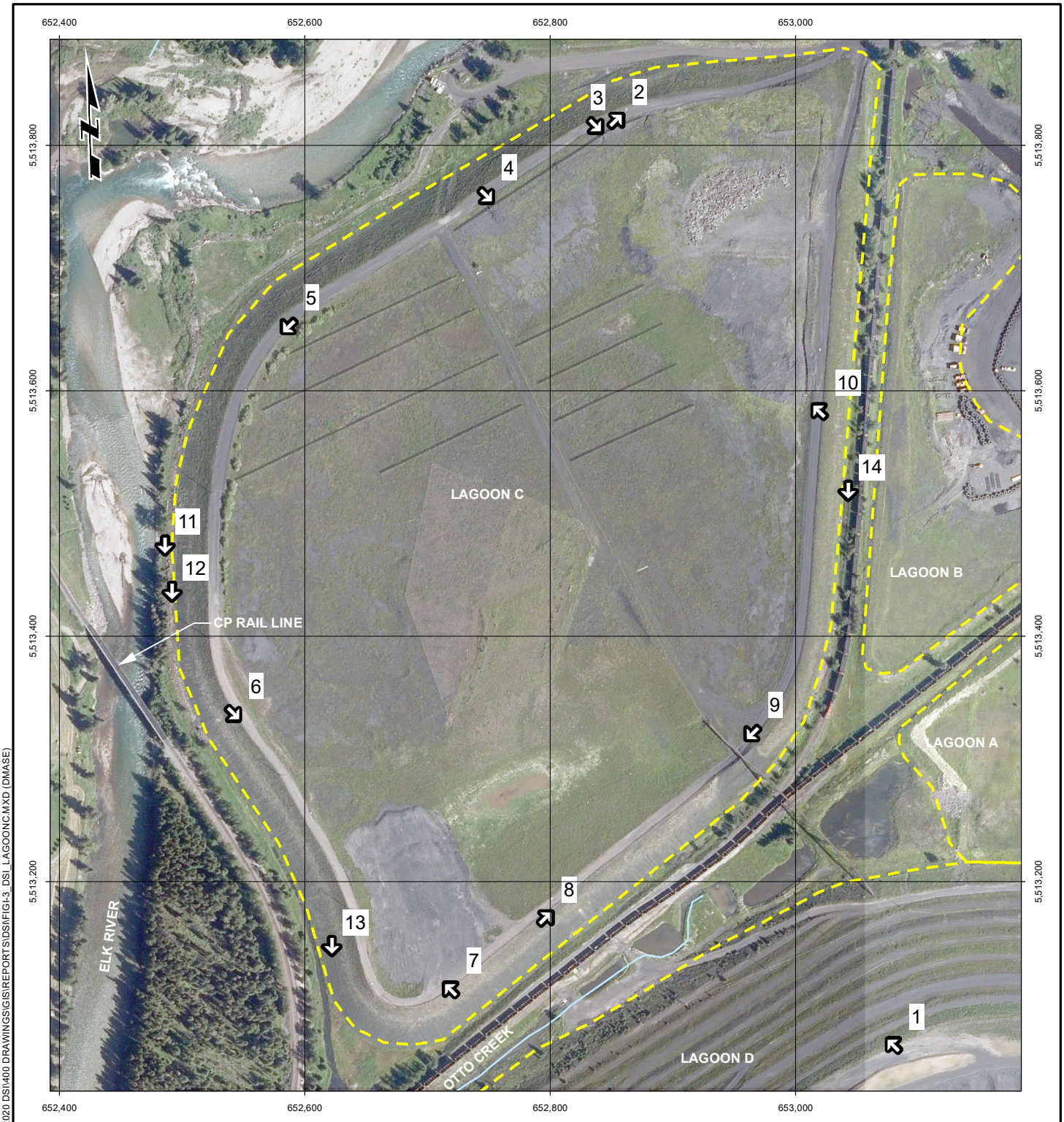
Photo IB-7 Lagoon B crest. (looking northeast)

Photo IB-8 Lagoon B crest. (looking southwest)

I-1.3 Lagoon C

The Lagoon C photograph locations plan layout is presented on Figure I-3. The following general notes are applicable to the inspection photographs:

1. Selected photo locations and direction taken are approximate only.
2. Selected photos are representative of the condition of the facility at the time of inspection, and do not include all photos taken during the inspection. EVO was provided with all photos taken during the inspection.



LEGEND

- ELKVIEW 2020 PHOTO LOCATION
- LAGOON BOUNDARY
- CREEK

NOTES

1. DATUM, PROJECTION: NAD83, UTM ZONE 11 (WKID 26911)
2. IMAGERY FROM EVO (COLLECTED IN 2019).

NOT FOR CONSTRUCTION

SCALE 0 100 m

CLIENT: Teck

Klohn Crippen Berger

PROJECT: TECK ELKVIEW OPERATIONS
2020 ANNUAL SUMMARY OF FACILITY PERFORMANCE

TITLE: LAGOON C PHOTOGRAPH LOCATIONS PLAN LAYOUT

SCALE	PROJECT No.	FIG. No.
1:4,500	M09963A14	I-3

ANSI A

SAVE DATE: 2021-03-24(12:58 PM)
FILE PATH: \\INT.KLOHN.COM\PROJDATA\M\FRE\M09963A14-TCL-EVO-2020 DSI\400 DRAWINGS\GIS\REPORTS\DSI\FIGI-3_DSI_LAGOONC.MXD (DMASE)

Photo IC-1 Lagoon C overview. (standing on Lagoon D looking northwest)

Photo IC-2 Lagoon C Typical crest conditions. (looking northeast)

Photo IC-3 Lagoon C minor erosion upstream of crest near pumphouse. (looking southeast)

Photo IC-4 Lagoon C minor erosion upstream of crest near pumphouse. (looking southeast)

Photo IC-5 Lagoon C typical crest condition. (looking southwest)

Photo IC-6 Lagoon C crest and powerlines. (looking southeast)

Photo IC-7 Lagoon C sediment placement. (looking north)

Photo IC-8 Lagoon C crest and slope. (looking east)

Photo IC-9 Lagoon C crest - decant pond transfer pipeline from Lagoon D to Lagoon C. (looking southwest)

Photo IC-10 Lagoon C sediment placement. (looking northwest)

Photo IC-11 Lagoon C toe riprap and buried pipe. (looking south)

Photo IC-12 Lagoon C toe riprap, adjacent to the Elk River. (looking south)

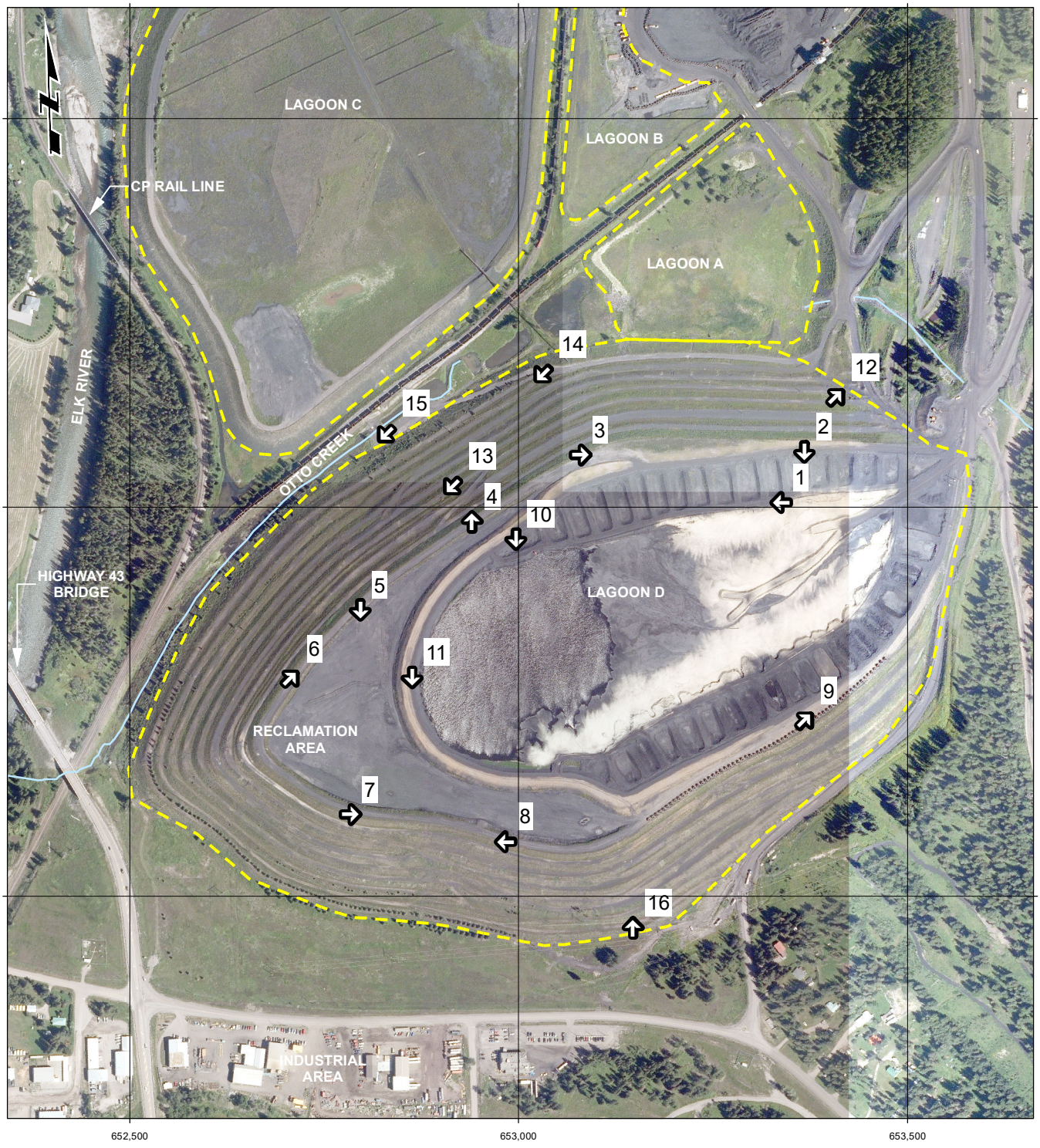
Photo IC-13 Lagoon C ponding between toe and rail line. (looking south)

Photo IC-14 Lagoon C toe adjacent to the Elkview rail line. (looking south)

I-1.4 Lagoon D

The Lagoon D photograph locations plan layout is presented on Figure I-4. The following general notes are applicable to the inspection photographs:

1. Selected photo locations and direction taken are approximate only.
2. Selected photos are representative of the condition of the facility at the time of inspection, and do not include all photos taken during the inspection. EVO was provided with all photos taken during the inspection.



LEGEND

ELKVIEW 2020 PHOTO LOCATION

LAGOON BOUNDARY

CREEK

NOTES

1. DATUM, PROJECTION: NAD83, UTM ZONE 11 (WKID 26911)
2. IMAGERY FROM EVO (COLLECTED IN 2019).

NOT FOR CONSTRUCTION

SCALE 0 150 m

CLIENT: Teck

Klohn Crippen Berger

PROJECT: TECK ELKVIEW OPERATIONS
2020 ANNUAL SUMMARY OF FACILITY PERFORMANCE

TITLE: LAGOON D PHOTOGRAPH LOCATIONS PLAN LAYOUT

SCALE	PROJECT No.	FIG. No.
1:7,500	M09963A14	I-4

ANSI A

SAVE DATE: 2021-03-24(12:58 PM)
FILE PATH: \\INT.KLOHN.COM\PROJDATA\M\FRE\M09963A14-TCL-EVO-2020 DSI\400 DRAWINGS\GIS\REPORTS\DSI\FIGI-4_DSI_LAGOOND.MXD (DMASE)

Photo ID-1 Lagoon D tailings beach. (looking west)

Photo ID-2 Lagoon D tailings cells. (looking south)

Photo ID-3 Lagoon D crest typical condition. (looking east)

Photo ID-4 Lagoon D inclinometer (LD_N)

Photo ID-5 Lagoon D Reclamation Area. (looking south)

Photo ID-6 Lagoon D crest and bench typical conditions. (looking northeast)

Photo ID-7 Lagoon D crest. (looking east)

Photo ID-8 Lagoon D south bench typical conditions. (looking west)

Photo ID-9 Lagoon D crest typical conditions. (looking northeast)

Photo ID-10 Lagoon D decant pond staff gauge unreadable (looking south).

Photo ID-11 Lagoon D Inner Ring Road crest and decant pond. (looking south)

Photo ID-12 Lagoon D bench minor erosion. (looking northeast)

Photo ID-13 Lagoon D bench and instrumentation typical condition. (looking west)

Photo ID-14 Lagoon D bench minor erosion. (looking west)

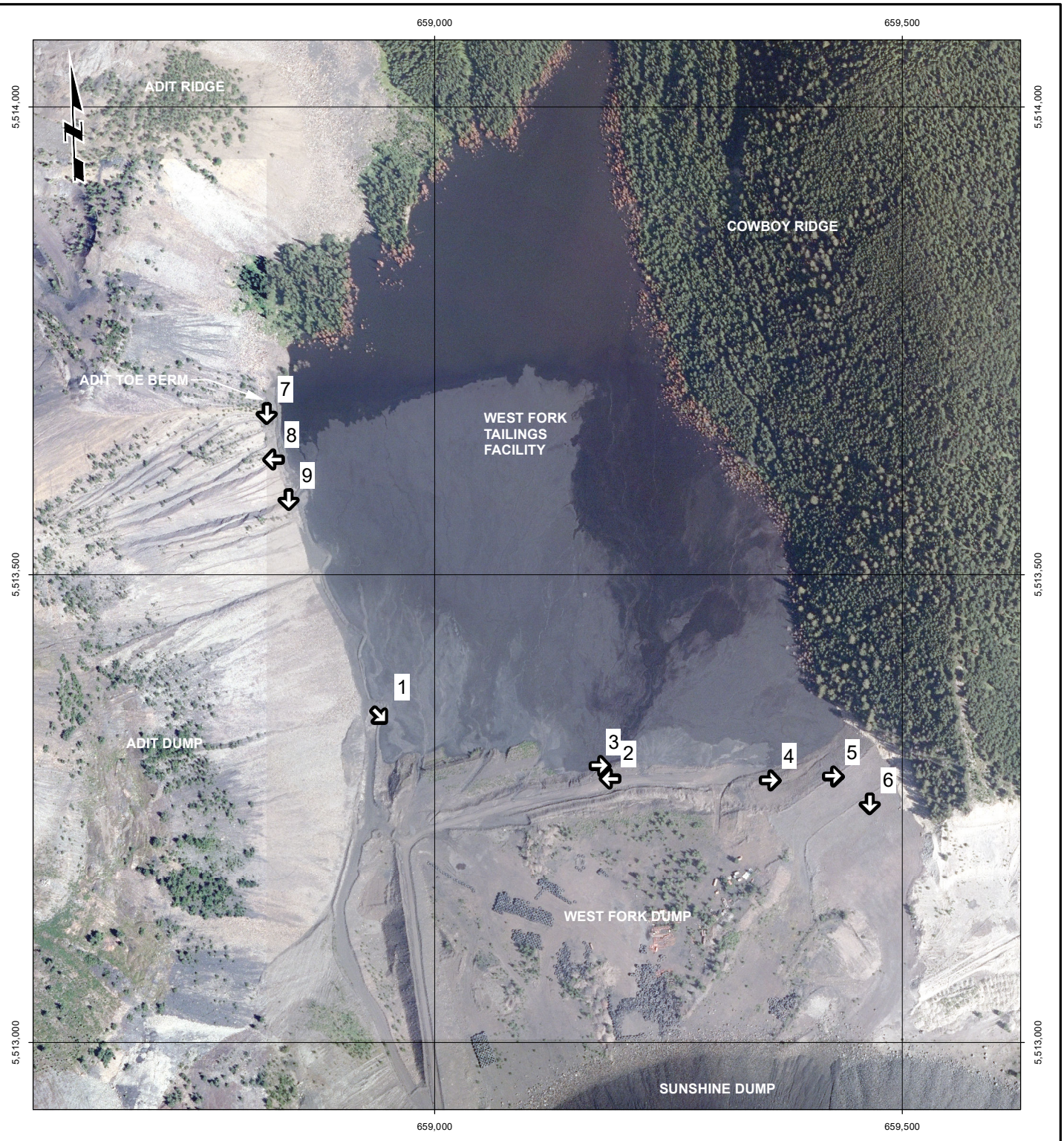
Photo ID-15 Lagoon D ponding at the toe (Otto Ponds) adjacent to the rail line. (looking west)

Photo ID-16 Lagoon D southern bench. (looking north)

I-1.5 West Fork Tailings Facility (WFTF)

The WFTF photograph locations plan layout is presented on Figure I-5. The following general notes are applicable to the inspection photographs:

1. Selected photo locations and direction taken are approximate only.
2. Selected photos are representative of the condition of the facility at the time of inspection, and do not include all photos taken during the inspection. EVO was provided with all photos taken during the inspection.



LEGEND

ELKVIEW 2020 PHOTO LOCATION

TAILINGS DEPOSITION LINE

NOTES

1. DATUM, PROJECTION: NAD83, UTM ZONE 11 (WKID 26911)
2. IMAGERY FROM EVO (COLLECTED IN 2019).

NOT FOR CONSTRUCTION

SCALE 0 125 m

CLIENT: Teck

Klohn Crippen Berger

PROJECT: TECK ELKVIEW OPERATIONS
2020 ANNUAL SUMMARY OF FACILITY PERFORMANCE

TITLE: WEST FORK TAILINGS FACILITY
PHOTOGRAPH LOCATIONS
PLAN LAYOUT

SCALE	PROJECT No.	FIG. No.
1:6,000	M09963A14	I-5

ANSI A

SAVE DATE: 2021-03-24(12:59 PM)
FILE PATH: \\INT.KLOHN.COM\PROJDATA\M\FRE\M09963A14-TCL-EVO-2020 DSI\400 DRAWINGS\GIS\REPORTS\DSI\FIGI-5_DSI_WFTF.MXD (DMASE)

Photo IW-1 WFTF embankment overview. (looking southeast)

Photo IW-2 WFTF embankment. (looking west)

Photo IW-3 WFTF embankment. (looking east)

Photo IW-4 WFTF Tailings contact at the east abutment. (looking east)

Photo IW-5 WFTF typical crest conditions at the east abutment. (looking east)

Photo IW-6 WFTF downstream of embankment. (looking south)

Photo IW-7 WFTF Adit Toe Berm typical conditions. (looking south)

Photo IW-8 WFTF Adit Dump erosion above Adit Toe Berm. (looking west)

Photo IW-9 WFTF tailings beach and pond. (looking south)

APPENDIX II

Inspection Checklists

WFTF
Lagoon A
Lagoon B
Lagoon C
Lagoon D

Annual Summary of Facility Performance Inspection Checklist

Klohn Crippen Berger

Dam Site	Teck Elkview Operations		
Dam Structure	Lagoon A		
Inspected by	Michael Tin E.I.T	Crest El.	1,119.0 m
Accompanied by	Jason Garwood, P.Geo.	Spillway Invert El.	1,118.3 m
Date of Inspection	September 22, 2020	Reservoir Level El.	No pond observed
Walk Over Inspection	Crest/Slopes/Toe	Available Freeboard	None - surface flows to spillway
Weather Conditions	Cloudy / Overcast		

ID	Observed Features	Yes	No	N/A	Comments
1.0	***Upstream Dam Slope and Tailings Surface***				
1.1	Concern with Current or Previous Water Level		X		
1.2	Evidence of Wave or Other Erosion/Gullying		X		
1.3	Evidence of Sloughing/Sliding		X		
1.4	Evidence of Cracking		X		
1.5	Evidence of Movement		X		
1.6	Other Deformation/Settlement/Sinkholes		X		
1.7	Other Unusual Conditions		X		
1.8	Repairs Required		X		
2.0	***Dam Crest***				
2.1	Evidence of Shoulder/Erosion		X		
2.2	Evidence of Cracking		X		
2.3	Evidence of Movement		X		
2.4	Other Deformation/Settlement/Sinkholes		X		
2.5	Concerns with Low Areas on the Crest		X		
2.6	Concerns with crest width		X		
2.7	Other Unusual Conditions		X		
2.8	Repairs Required		X		
3.0	***Downstream Dam Slope***				
3.1	Evidence of Erosion		X		
3.2	Evidence of Sloughing/Sliding		X		
3.3	Evidence of Cracking		X		
3.4	Evidence of Movement		X		
3.5	Any Other Deformation		X		
3.6	Signs of Phreatic Surface/Seepage		X		
3.7	Seepages Observed		X		
3.8	Is Seepage (if any) Turbid		X		
3.9	Other Unsual Conditions		X		
3.10	Repairs Required		X		
4.0	***Dam Abutments***				
4.1	Seepages Observed			X	
4.2	Is Seepage (if any) Turbid			X	
4.3	Evidence of Erosion			X	
4.4	Evidence of Cracking			X	
4.5	Evidence of Movement			X	
4.6	Other Deformation/Settlement/Sinkholes			X	
4.7	Other Unusual Conditions			X	
4.8	Repairs Required			X	

Annual Summary of Facility Performance Inspection Checklist

Klohn Crippen Berger

Dam Site	Teck Elkview Operations		
Dam Structure	Lagoon A		
Inspected by	Michael Tin E.I.T	Crest El.	1,119.0 m
Accompanied by	Jason Garwood, P.Geo.	Spillway Invert El.	1,118.3 m
Date of Inspection	September 22, 2020	Reservoir Level El.	No pond observed.
Walk Over Inspection	Crest/Slopes/Toe	Available Freeboard	None - surface flows to spillway
Weather Conditions	Cloudy / Overcast		

ID	Observed Features	Yes	No	N/A	Comments
5.0	***Downstream Toe***				
5.1	Seepages Observed		X		
5.2	Is Seepage (if any) Turbid		X		
5.3	Evidence of Soft Toe Condition		X		
5.4	Evidence of Sloughing/Sliding		X		
5.5	Evidence of Boils		X		
5.6	Evidence of Contamination/Vegetation Kills		X		
5.7	Excessive Vegetation		X		
5.8	Other Unusual Conditions		X		
5.9	Repairs Required		X		
6.0	***Spillway***				
6.1	Obstruction by debris or vegetation		X		
6.2	Lack of Erosion Protection		X		
6.3	Slope Deterioration (Sloughing, Erosion etc...)		X		
6.4	Other Unusual Conditions		X		
6.5	Repairs Required		X		
7.0	***Other***				
7.1	Other Unusual Conditions		X		
7.2	Sketch (if required):				

Cossarini Creek culverts, located upstream of Lagoon A, were flowing at the time of inspection.

Annual Summary of Facility Performance Inspection Checklist

Klohn Crippen Berger

Dam Site	Teck Elkview Operations		
Dam Structure	Lagoon B		
Inspected by	Andy Small P.Eng	Crest El.	1,118.5 m
Accompanied by	Meghan Barton E.I.T	Spillway Invert El.	None. (1,118.2 m low spot)
Date of Inspection	September 22, 2020	Reservoir Level El.	No pond observed
Walk Over Inspection	Crest/Slopes/Toe	Available Freeboard	0.33 m (tailings surface to low spot)
Weather Conditions	Cloudy / Overcast		

ID	Observed Features	Yes	No	N/A	Comments
1.0	***Upstream Dam Slope and Tailings Surface***				
1.1	Concern with Current or Previous Water Level		X		
1.2	Evidence of Wave or Other Erosion/Gullying		X		
1.3	Evidence of Sloughing/Sliding		X		
1.4	Evidence of Cracking		X		
1.5	Evidence of Movement		X		
1.6	Other Deformation/Settlement/Sinkholes		X		
1.7	Other Unusual Conditions		X		
1.8	Repairs Required		X		
2.0	***Dam Crest***				
2.1	Evidence of Shoulder/Erosion		X		
2.2	Evidence of Cracking		X		
2.3	Evidence of Movement		X		
2.4	Other Deformation/Settlement/Sinkholes		X		
2.5	Concerns with Low Areas on the Crest		X		
2.6	Concerns with crest width		X		
2.7	Other Unusual Conditions		X		
2.8	Repairs Required		X		
3.0	***Downstream Dam Slope***				
3.1	Evidence of Erosion		X		
3.2	Evidence of Sloughing/Sliding		X		
3.3	Evidence of Cracking		X		
3.4	Evidence of Movement		X		
3.5	Any Other Deformation		X		
3.6	Signs of Phreatic Surface/Seepage		X		
3.7	Seepages Observed		X		
3.8	Is Seepage (if any) Turbid		X		
3.9	Other Unusual Conditions		X		
3.10	Repairs Required		X		
4.0	***Dam Abutments***				
4.1	Seepages Observed			X	
4.2	Is Seepage (if any) Turbid			X	
4.3	Evidence of Erosion			X	
4.4	Evidence of Cracking			X	
4.5	Evidence of Movement			X	
4.6	Other Deformation/Settlement/Sinkholes			X	
4.7	Other Unusual Conditions			X	
4.8	Repairs Required			X	

Annual Summary of Facility Performance Inspection Checklist

Klohn Crippen Berger

Dam Site	Teck Elkview Operations		
Dam Structure	Lagoon B		
Inspected by	Andy Small P.Eng	Crest El.	1,118.5 m
Accompanied by	Meghan Barton E.I.T	Spillway Invert El.	1,118.2 m (low spot)
Date of Inspection	September 22, 2020	Reservoir Level El.	No pond observed
Walk Over Inspection	Crest/Slopes/Toe	Available Freeboard	0.33 m (tailings surface to low spot)
Weather Conditions	Cloudy / Overcast		

ID	Observed Features	Yes	No	N/A	Comments
5.0	***Downstream Toe***				
5.1	Seepages Observed		X		
5.2	Is Seepage (if any) Turbid		X		
5.3	Evidence of Soft Toe Condition		X		
5.4	Evidence of Sloughing/Sliding		X		
5.5	Evidence of Boils		X		
5.6	Evidence of Contamination/Vegetation Kills		X		
5.7	Excessive Vegetation		X		
5.8	Other Unusual Conditions		X		
5.9	Repairs Required		X		
6.0	***Spillway***				
6.1	Obstruction by debris or vegetation			X	No Spillway
6.2	Lack of Erosion Protection			X	
6.3	Slope Deterioration (Sloughing, Erosion etc...)			X	
6.4	Other Unusual Conditions			X	
6.5	Repairs Required			X	
7.0	***Other***				
7.1	Other Unusual Conditions		X		
7.2	Sketch (if required):				

Annual Summary of Facility Performance Inspection Checklist

Klohn Crippen Berger

Dam Site	Teck Elkview Operations		
Dam Structure	Lagoon C		
Inspected by	Michael Tin E.I.T	Crest El.	1,129.3 m
Accompanied by	Jason Garwood, P.Geo.	Spillway Invert El.	None. (1,127.3 m low spot a trestle)
Date of Inspection	September 21, 2020	Reservoir Level El.	No pond observed
Walk Over Inspection	Crest/Slopes/Toe/Crest Surface	Available Freeboard	Varies
Weather Conditions	Sunny / Mostly Clear		

ID	Observed Features	Yes	No	N/A	Comments
1.0	***Upstream Dam Slope and Tailings Surface***				
1.1	Concern with Current or Previous Water Level		X		
1.2	Evidence of Wave or Other Erosion/Gullying	X			Upstream erosion at a point near the pumphouse (same condition as 2019 inspection and not worsening). To be monitored.
1.3	Evidence of Sloughing/Sliding		X		
1.4	Evidence of Cracking		X		
1.5	Evidence of Movement		X		
1.6	Other Deformation/Settlement/Sinkholes		X		
1.7	Other Unusual Conditions		X		
1.8	Repairs Required		X		
2.0	***Dam Crest***				
2.1	Evidence of Shoulder/Erosion		X		
2.2	Evidence of Cracking		X		
2.3	Evidence of Movement		X		
2.4	Other Deformation/Settlement/Sinkholes		X		
2.5	Concerns with Low Areas on the Crest	X			Minor localised low area
2.6	Concerns with crest width		X		
2.7	Other Unusual Conditions		X		
2.8	Repairs Required		X		
3.0	***Downstream Dam Slope***				
3.1	Evidence of Erosion		X		
3.2	Evidence of Sloughing/Sliding		X		
3.3	Evidence of Cracking		X		
3.4	Evidence of Movement		X		
3.5	Any Other Deformation		X		
3.6	Signs of Phreatic Surface/Seepage		X		
3.7	Seepages Observed	X			Change in vegetation indicating occasional wet spots
3.8	Is Seepage (if any) Turbid		X		
3.9	Other Unusual Conditions		X		
3.10	Repairs Required		X		
4.0	***Dam Abutments***				
4.1	Seepages Observed			X	
4.2	Is Seepage (if any) Turbid			X	
4.3	Evidence of Erosion			X	
4.4	Evidence of Cracking			X	
4.5	Evidence of Movement			X	
4.6	Other Deformation/Settlement/Sinkholes			X	
4.7	Other Unusual Conditions			X	
4.8	Repairs Required			X	

Annual Summary of Facility Performance Inspection Checklist

Klohn Crippen Berger

Dam Site	Teck Elkview Operations		
Dam Structure	Lagoon C		
Inspected by	Michael Tin E.I.T	Crest El.	1.129.3 m
Accompanied by	Jason Garwood, P.Geo.	Spillway Invert El.	None. (1,127.3 m low spot)
Date of Inspection	September 21, 2020	Reservoir Level El.	No pond observed
Walk Over Inspection	Crest/Slopes/Toe/Crest Surface	Available Freeboard	Varies
Weather Conditions	Sunny / Mostly Clear		

ID	Observed Features	Yes	No	N/A	Comments
5.0	***Downstream Toe***				
5.1	Seepages Observed		X		
5.2	Is Seepage (if any) Turbid		X		
5.3	Evidence of Soft Toe Condition		X		
5.4	Evidence of Sloughing/Sliding		X		
5.5	Evidence of Boils		X		
5.6	Evidence of Contamination/Vegetation Kills		X		
5.7	Excessive Vegetation		X		
5.8	Other Unusual Conditions		X		
5.9	Repairs Required		X		
6.0	***Spillway***				
6.1	Obstruction by debris or vegetation			X	
6.2	Lack of Erosion Protection			X	
6.3	Slope Deterioration (Sloughing, Erosion etc...)			X	
6.4	Other Unusual Conditions			X	
6.5	Repairs Required			X	
7.0	***Other***				
7.1	Other Unusual Conditions			X	
7.2	Sketch (if required):				

Buried pipe culvert at the western toe was flowing at the time of the inspection.
This culvert is udnerstood to drain the marsh area at the toe of the riprap on the western toe of Lagoon C.

Annual Summary of Facility Performance Inspection Checklist

Klohn Crippen Berger

Dam Site	Teck Elkview Operations		
Dam Structure	Lagoon D		
Inspected by	Andy Small P.Eng / Michael Tin E.I.T	Crest El.	1,168.0 m
Accompanied by	Jason Garwood P.Geo / Meghan Barton E.I.T	Spillway Invert El.	None.
Date of Inspection	September 21, 2020	Reservoir Level El.	1,165.0 m
Walk Over Inspection	Crest/Slopes/Toe/Crest Surface	Available Freeboard	3.0 m
Weather Conditions	Sunny / Mostly Clear		

ID	Observed Features	Yes	No	N/A	Comments
1.0	***Upstream Dam Slope and Tailings Surface***				
1.1	Concern with Current or Previous Water Level		X		
1.2	Evidence of Wave or Other Erosion/Gullying		X		
1.3	Evidence of Sloughing/Sliding		X		
1.4	Evidence of Cracking		X		
1.5	Evidence of Movement		X		
1.6	Other Deformation/Settlement/Sinkholes		X		
1.7	Other Unusual Conditions		X		
1.8	Repairs Required		X		
2.0	***Dam Crest***				
2.1	Evidence of Shoulder/Erosion		X		
2.2	Evidence of Cracking		X		
2.3	Evidence of Movement		X		
2.4	Other Deformation/Settlement/Sinkholes		X		
2.5	Concerns with Low Areas on the Crest		X		
2.6	Concerns with crest width		X		
2.7	Other Unusual Conditions	X			Minor animal burrows in benches.
2.8	Repairs Required		X		
3.0	***Downstream Dam Slope***				
3.1	Evidence of Erosion	X			Minor erosion on slope.
3.2	Evidence of Sloughing/Sliding		X		
3.3	Evidence of Cracking		X		
3.4	Evidence of Movement		X		
3.5	Any Other Deformation		X		
3.6	Signs of Phreatic Surface/Seepage		X		
3.7	Seepages Observed		X		
3.8	Is Seepage (if any) Turbid		X		
3.9	Other Unsual Conditions		X		
3.10	Repairs Required		X		
4.0	***Dam Abutments***				
4.1	Seepages Observed		X		
4.2	Is Seepage (if any) Turbid		X		
4.3	Evidence of Erosion		X		
4.4	Evidence of Cracking		X		
4.5	Evidence of Movement		X		
4.6	Other Deformation/Settlement/Sinkholes		X		
4.7	Other Unusual Conditions		X		
4.8	Repairs Required		X		

Annual Summary of Facility Performance Inspection Checklist

Klohn Crippen Berger

Dam Site	Teck Elkview Operations		
Dam Structure	Lagoon D		
Inspected by	Andy Small P.Eng / Michael Tin E.I.T	Crest El.	1,168.0 m
Accompanied by	Jason Garwood P.Geo / Meghan Barton E.I.T	Spillway Invert El.	None.
Date of Inspection	September 21, 2020	Reservoir Level El.	1,165.0 m
Walk Over Inspection	Crest/Slopes/Toe/Crest Surface	Available Freeboard	3.0 m
Weather Conditions	Sunny / Mostly Clear		

ID	Observed Features	Yes	No	N/A	Comments
5.0	***Downstream Toe***				
5.1	Seepages Observed		X		
5.2	Is Seepage (if any) Turbid		X		
5.3	Evidence of Soft Toe Condition		X		
5.4	Evidence of Sloughing/Sliding		X		
5.5	Evidence of Boils		X		
5.6	Evidence of Contamination/Vegetation Kills		X		
5.7	Excessive Vegetation		X		
5.8	Other Unusual Conditions		X		
5.9	Repairs Required		X		
6.0	***Spillway***				
6.1	Obstruction by debris or vegetation			X	
6.2	Lack of Erosion Protection			X	
6.3	Slope Deterioration (Sloughing, Erosion etc...)			X	
6.4	Other Unusual Conditions			X	
6.5	Repairs Required			X	
7.0	***Other***				
7.1	Other Unusual Conditions		X		
7.2	Sketch (if required):				

Annual Summary of Facility Performance Inspection Checklist

Klohn Crippen Berger

Dam Site	Teck Elkview Operations		
Dam Structure	West Fork Tailings Facility		
Inspected by	Andy Small P.Eng / Michael Tin E.I.T	Crest El.	1,679.5 m
Accompanied by	Jason Garwood P.Geo / Meghan Barton E.I.T	Spillway Invert El.	None.
Date of Inspection	September 21 and 22, 2020	Reservoir Level El.	1,668 m
Walk Over Inspection	Crest/slopes/Toe/Surface	Available Freeboard	10.5 m
Weather Conditions	Sunny / Mostly Clear		

ID	Observed Features	Yes	No	N/A	Comments
1.0	***Upstream Dam Slope***				
1.1	Concern with Current or Previous Water Level		X		
1.2	Evidence of Wave or Other Erosion/Gullying		X		
1.3	Evidence of Sloughing/Sliding		X		
1.4	Evidence of Cracking		X		
1.5	Evidence of Movement		X		
1.6	Other Deformation/Settlement/Sinkholes		X		
1.7	Other Unusual Conditions		X		
1.8	Repairs Required		X		
2.0	***Dam Crest***				
2.1	Evidence of Shoulder/Erosion		X		
2.2	Evidence of Cracking		X		
2.3	Evidence of Movement		X		
2.4	Other Deformation/Settlement/Sinkholes		X		
2.5	Concerns with Low Areas on the Crest		X		
2.6	Concerns with crest width		X		
2.7	Other Unusual Conditions		X		
2.8	Repairs Required		X		
3.0	***Downstream Dam Slope***				
3.1	Evidence of Erosion		X		
3.2	Evidence of Sloughing/Sliding		X		
3.3	Evidence of Cracking		X		
3.4	Evidence of Movement		X		
3.5	Any Other Deformation		X		
3.6	Signs of Phreatic Surface/Seepage		X		
3.7	Seepages Observed		X		
3.8	Is Seepage (if any) Turbid		X		
3.9	Other Unsual Conditions		X		
3.10	Repairs Required		X		
4.0	***Dam Abutments***				
4.1	Seepages Observed		X		
4.2	Is Seepage (if any) Turbid		X		
4.3	Evidence of Erosion		X		No tailings migration was observed.
4.4	Evidence of Cracking		X		
4.5	Evidence of Movement		X		
4.6	Other Deformation/Settlement/Sinkholes		X		
4.7	Other Unusual Conditions		X		
4.8	Repairs Required		X		

Annual Summary of Facility Performance Inspection Checklist

Klohn Crippen Berger

Dam Site	Teck Elkview Operations		
Dam Structure	West Fork Tailings Facility		
Inspected by	Andy Small P.Eng / Michael Tin E.I.T	Crest El.	1,679.5 m
Accompanied by	Jason Garwood P.Geo / Meghan Barton E.I.T	Spillway Invert El.	None.
Date of Inspection	September 21 and 22, 2020	Reservoir Level El.	1,668 m
Walk Over Inspection	Crest/slopes/Toe/Surface	Available Freeboard	10.5 m
Weather Conditions	Sunny / Mostly Clear		

ID	Observed Features	Yes	No	N/A	Comments
5.0	***Downstream Toe***				
5.1	Seepages Observed		X		
5.2	Is Seepage (if any) Turbid		X		
5.3	Evidence of Soft Toe Condition		X		
5.4	Evidence of Sloughing/Sliding		X		
5.5	Evidence of Boils		X		
5.6	Evidence of Contamination/Vegetation Kills		X		
5.7	Excessive Vegetation		X		
5.8	Other Unusual Conditions		X		
5.9	Repairs Required		X		
6.0	***Spillway***				
6.1	Obstruction by debris or vegetation			X	
6.2	Lack of Erosion Protection			X	
6.3	Slope Deterioration (Sloughing, Erosion etc...)			X	
6.4	Other Unusual Conditions			X	
6.5	Repairs Required			X	
7.0	***Other***				
7.1	Other Unusual Conditions		X		
7.2	Sketch (if required):				

Adit Toe Berm was constructed to an average elevation of El. 1,674 m at the time of inspection.

APPENDIX III

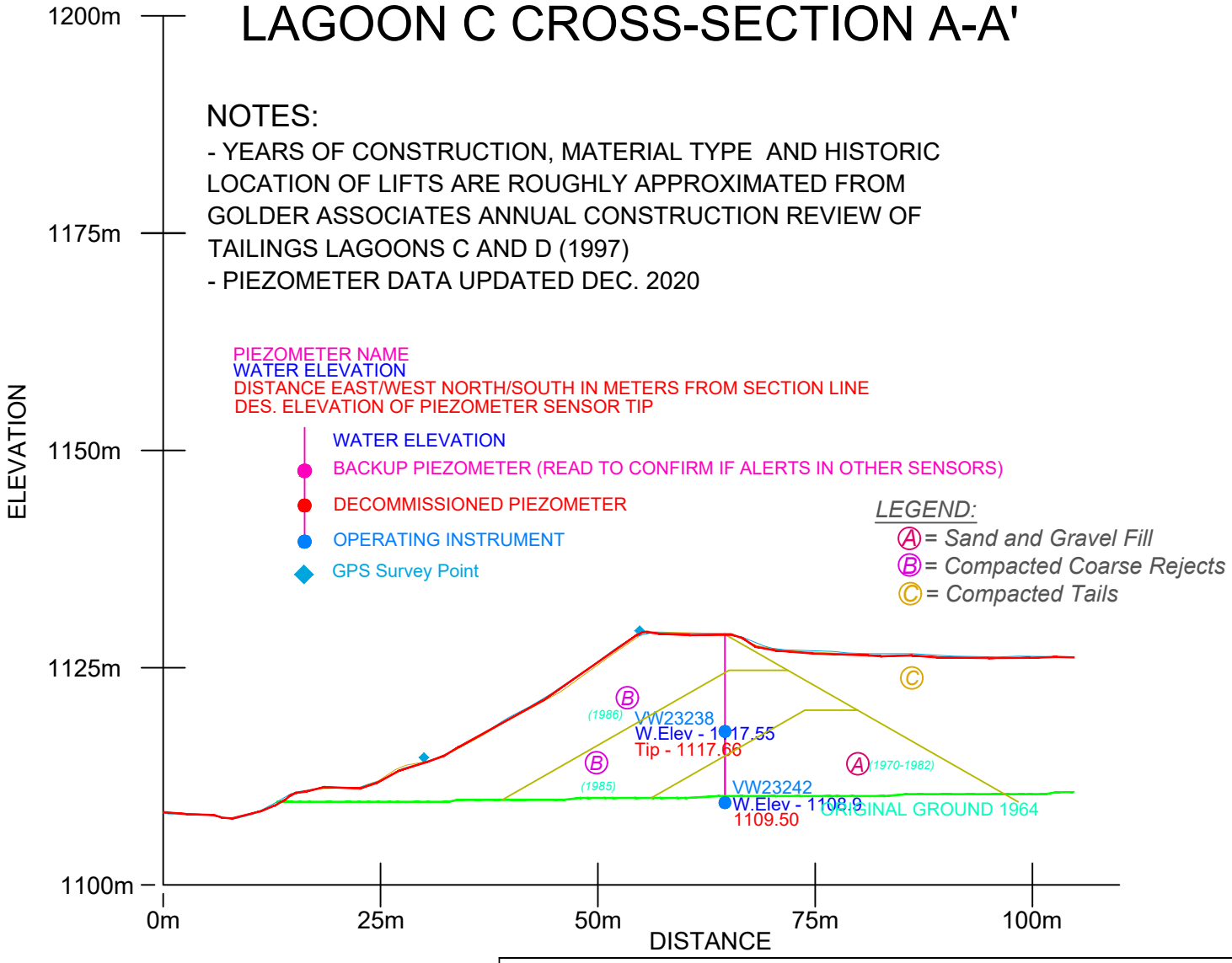
Dam Cross Sections (provided by EVO)

Lagoon C
Lagoon D

CROSS-SECTION
ORIGIN COORD: 14538.12E, 52909.99N
AZIMUTH: 144°50'19"

LAGOON C CROSS-SECTION A-A'

NOTES:
- YEARS OF CONSTRUCTION, MATERIAL TYPE AND HISTORIC LOCATION OF LIFTS ARE ROUGHLY APPROXIMATED FROM GOLDER ASSOCIATES ANNUAL CONSTRUCTION REVIEW OF TAILINGS LAGOONS C AND D (1997)
- PIEZOMETER DATA UPDATED DEC. 2020



Teck Elkview Operations

Geotechnical Engineering

LAGOON C CROSS-SECTION A-A'
2020

DATE: Dec. 2020	SCALE:	DWG. NO. :
DWN BY: A. Yeomans	REV BY: M. Barton	

CROSS-SECTION
ORIGIN COORD: 14267.12E, 52774.79N
AZIMUTH: 115°6'0"

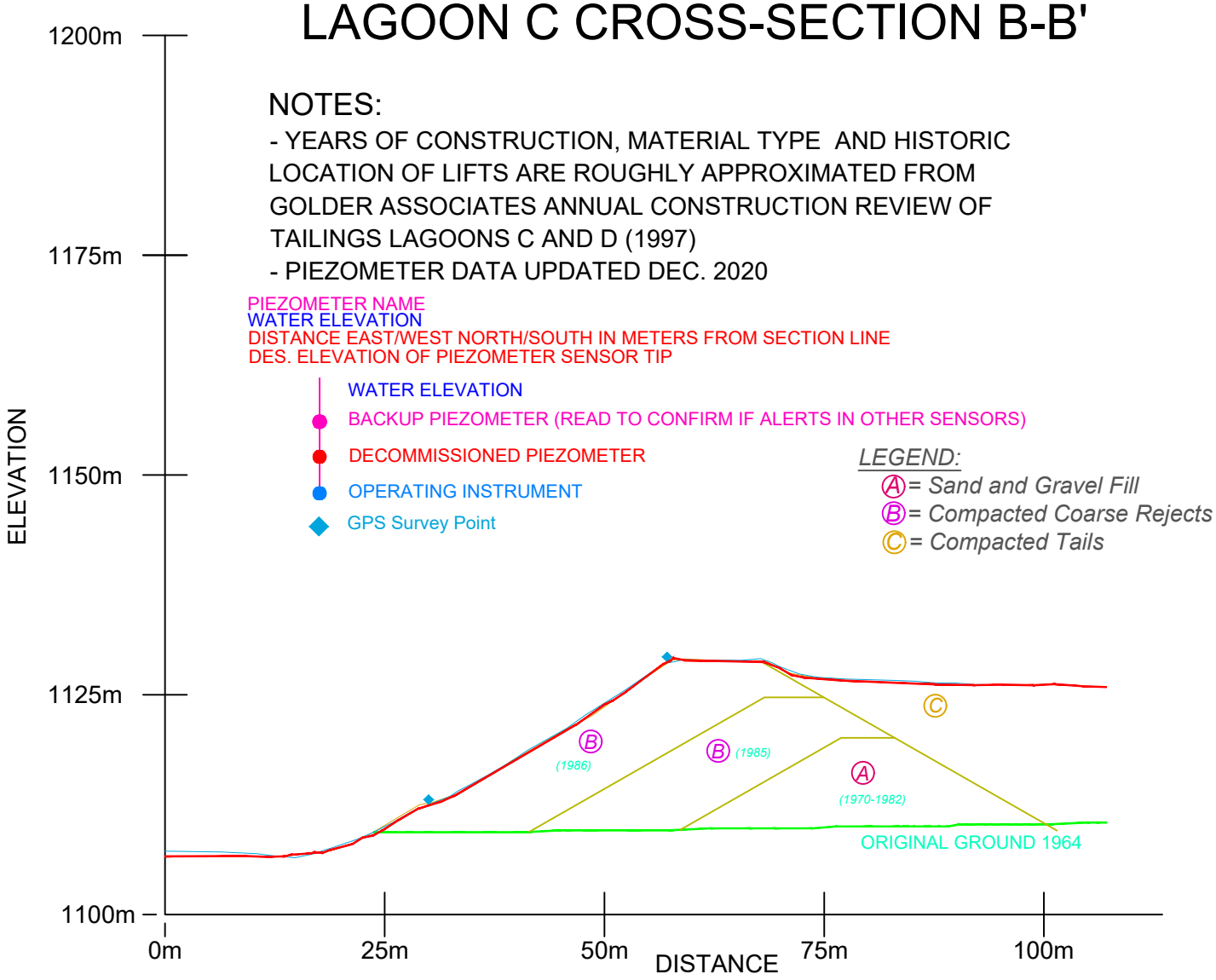
LAGOON C CROSS-SECTION B-B'

NOTES:
- YEARS OF CONSTRUCTION, MATERIAL TYPE AND HISTORIC LOCATION OF LIFTS ARE ROUGHLY APPROXIMATED FROM GOLDER ASSOCIATES ANNUAL CONSTRUCTION REVIEW OF TAILINGS LAGOONS C AND D (1997)
- PIEZOMETER DATA UPDATED DEC. 2020

PIEZOMETER NAME
WATER ELEVATION
DISTANCE EAST/WEST NORTH/SOUTH IN METERS FROM SECTION LINE
DES. ELEVATION OF PIEZOMETER SENSOR TIP

WATER ELEVATION
BACKUP PIEZOMETER (READ TO CONFIRM IF ALERTS IN OTHER SENSORS)
DECOMMISSIONED PIEZOMETER
OPERATING INSTRUMENT
GPS Survey Point

LEGEND:
Ⓐ = Sand and Gravel Fill
Ⓑ = Compacted Coarse Rejects
Ⓒ = Compacted Tails



Teck Elkview Operations

Geotechnical Engineering

LAGOON C CROSS-SECTION B-B'
2020

DATE: Dec. 2020	SCALE:	DWG. NO. :
DWN BY: A. Yeomans	REV BY: M. Barton	

CROSS-SECTION
ORIGIN COORD: 14253.35E, 52508.06N
AZIMUTH: 82°8'31"

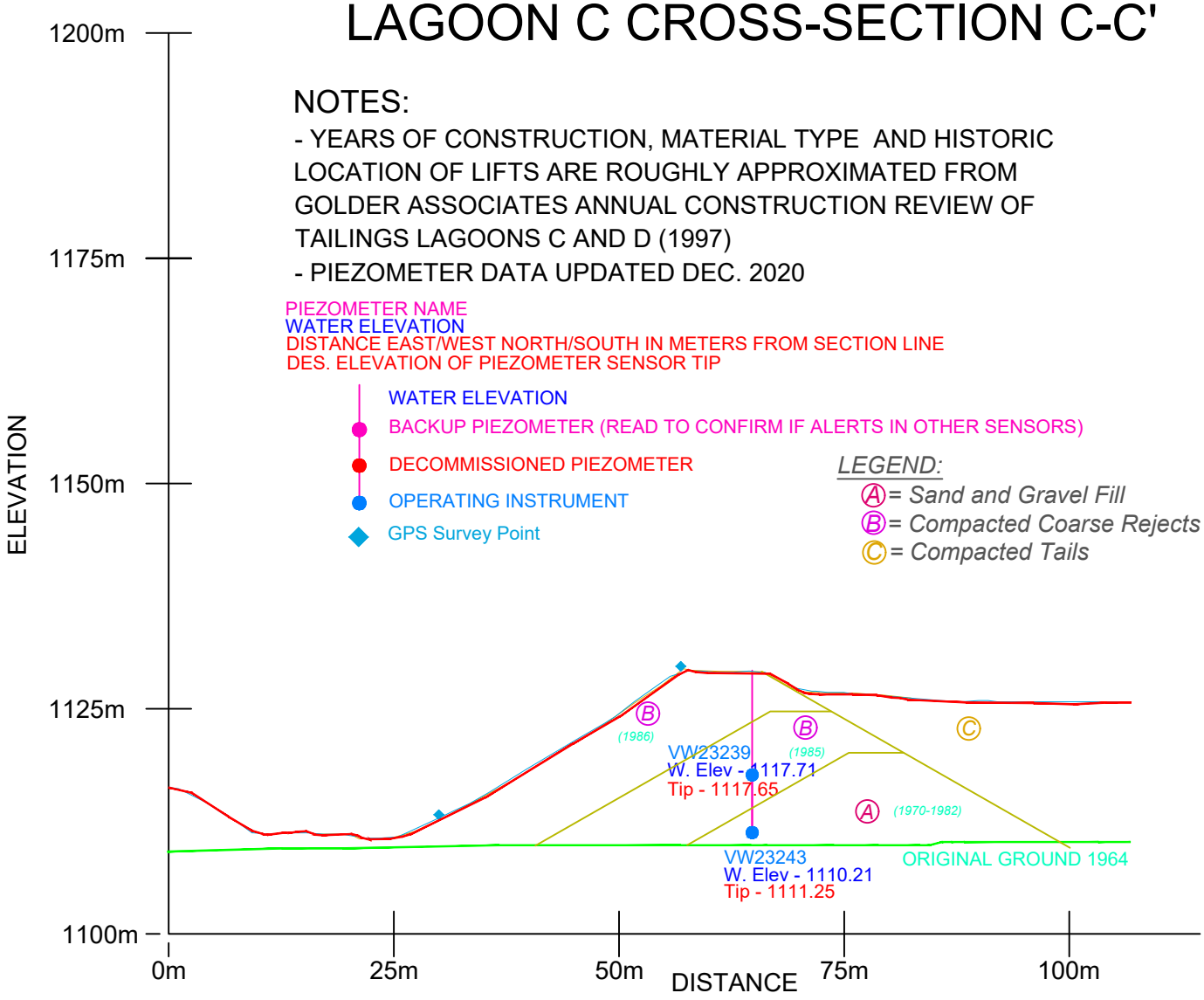
LAGOON C CROSS-SECTION C-C'

NOTES:
- YEARS OF CONSTRUCTION, MATERIAL TYPE AND HISTORIC LOCATION OF LIFTS ARE ROUGHLY APPROXIMATED FROM GOLDER ASSOCIATES ANNUAL CONSTRUCTION REVIEW OF TAILINGS LAGOONS C AND D (1997)
- PIEZOMETER DATA UPDATED DEC. 2020

PIEZOMETER NAME
WATER ELEVATION
DISTANCE EAST/WEST NORTH/SOUTH IN METERS FROM SECTION LINE
DES. ELEVATION OF PIEZOMETER SENSOR TIP

WATER ELEVATION
BACKUP PIEZOMETER (READ TO CONFIRM IF ALERTS IN OTHER SENSORS)
DECOMMISSIONED PIEZOMETER
OPERATING INSTRUMENT
GPS Survey Point

LEGEND:
Ⓐ = Sand and Gravel Fill
Ⓑ = Compacted Coarse Rejects
Ⓒ = Compacted Tails



Teck Elkview Operations

Geotechnical Engineering

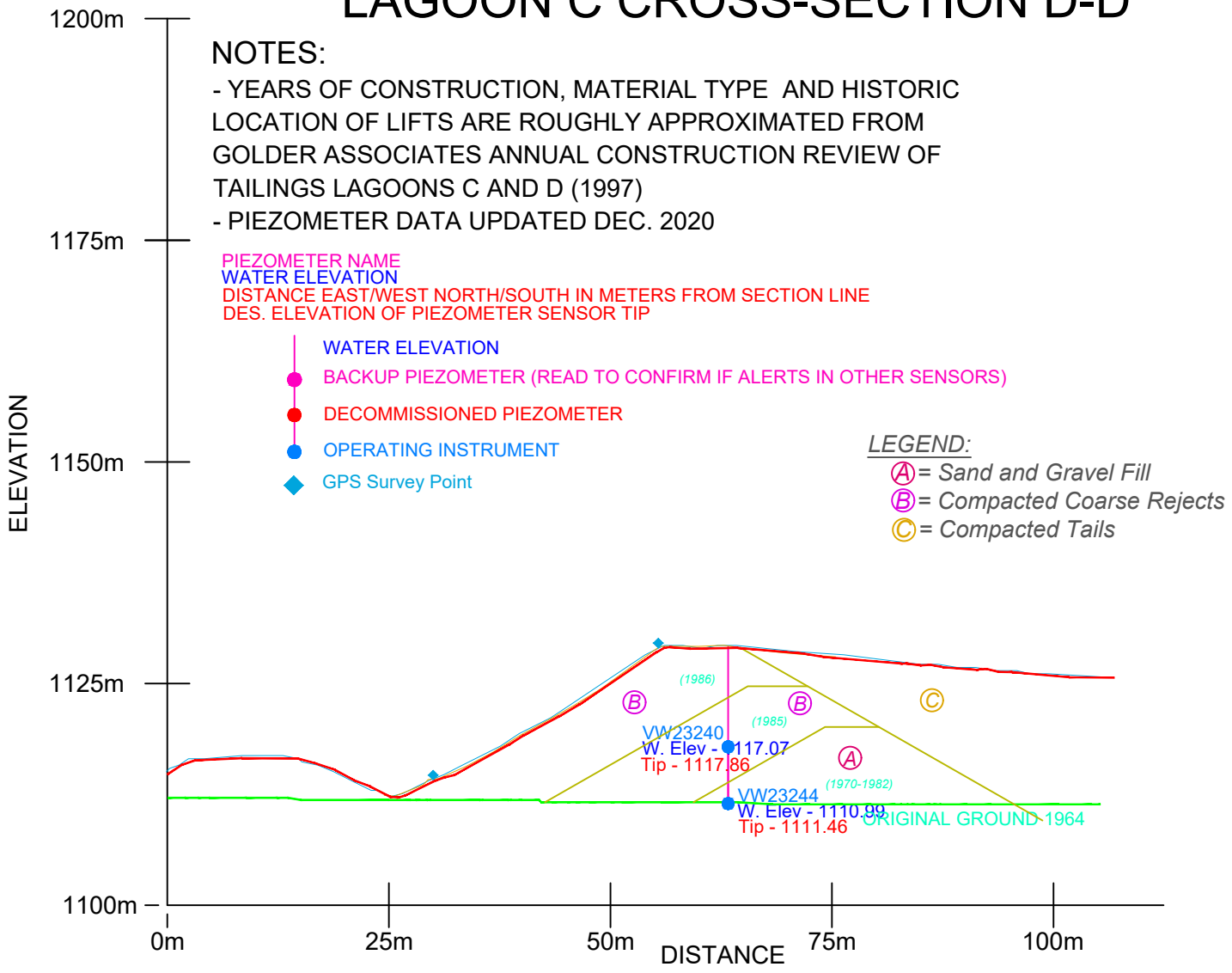
LAGOON C CROSS-SECTION C-C'
2020

DATE: Dec. 2020	SCALE:	DWG. NO. :
DWN BY: A. Yeomans	REV BY: M. Barton	

CROSS-SECTION
ORIGIN COORD: 14489.78E, 52319.17N
AZIMUTH: 345°37'1"

LAGOON C CROSS-SECTION D-D'

NOTES:
- YEARS OF CONSTRUCTION, MATERIAL TYPE AND HISTORIC LOCATION OF LIFTS ARE ROUGHLY APPROXIMATED FROM GOLDER ASSOCIATES ANNUAL CONSTRUCTION REVIEW OF TAILINGS LAGOONS C AND D (1997)
- PIEZOMETER DATA UPDATED DEC. 2020



Teck Elkview Operations

Geotechnical Engineering

LAGOON C CROSS-SECTION D-D'
2020

DATE: Dec. 2020	SCALE:	DWG. NO. :
DWN BY: A. Yeomans	REV BY: M. Barton	

CROSS-SECTION
ORIGIN COORD: 14278.06E, 52280.63N
AZIMUTH: 324°12'9"

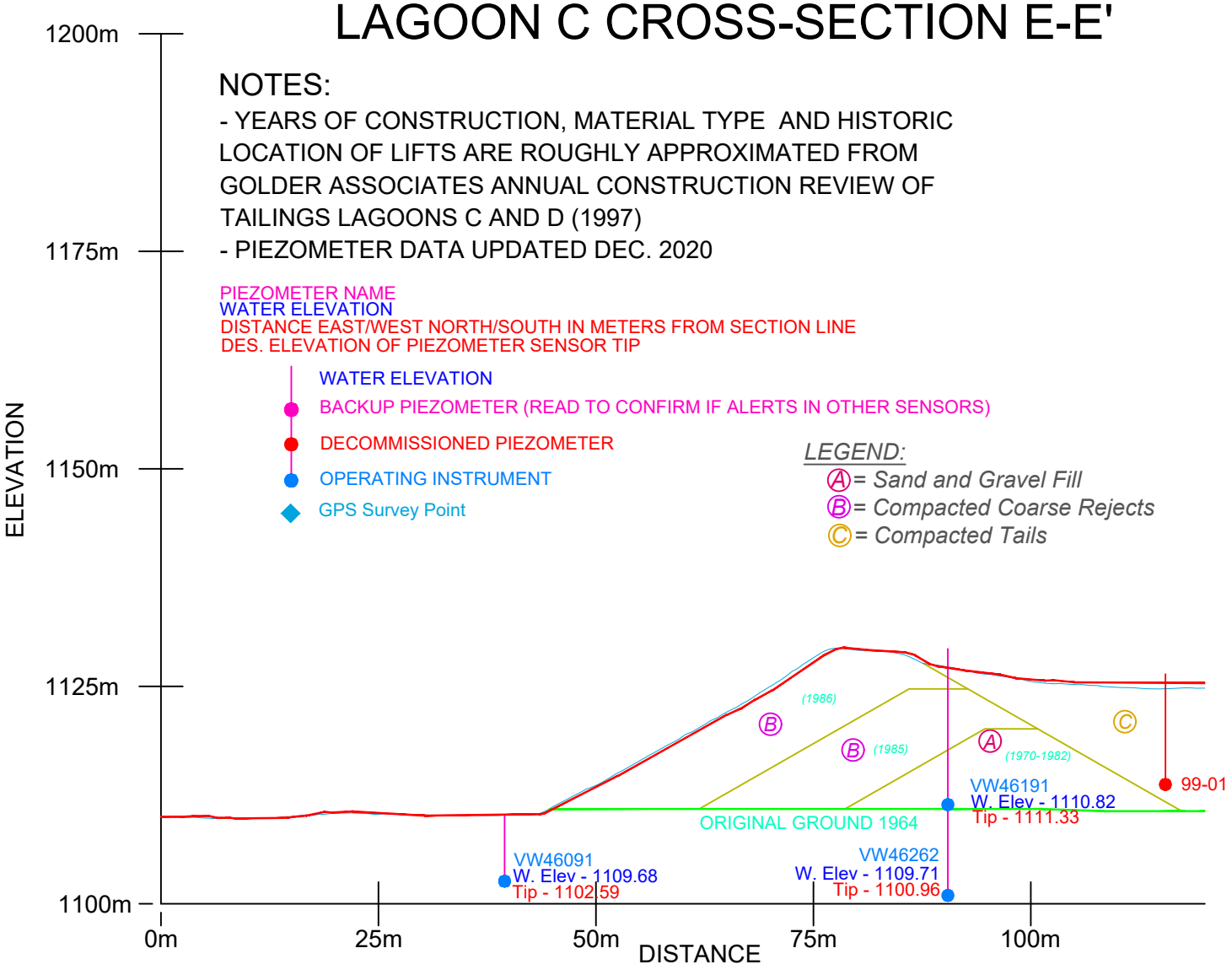
LAGOON C CROSS-SECTION E-E'

NOTES:
- YEARS OF CONSTRUCTION, MATERIAL TYPE AND HISTORIC LOCATION OF LIFTS ARE ROUGHLY APPROXIMATED FROM GOLDER ASSOCIATES ANNUAL CONSTRUCTION REVIEW OF TAILINGS LAGOONS C AND D (1997)
- PIEZOMETER DATA UPDATED DEC. 2020

PIEZOMETER NAME
WATER ELEVATION
DISTANCE EAST/WEST NORTH/SOUTH IN METERS FROM SECTION LINE
DES. ELEVATION OF PIEZOMETER SENSOR TIP

WATER ELEVATION
BACKUP PIEZOMETER (READ TO CONFIRM IF ALERTS IN OTHER SENSORS)
DECOMMISSIONED PIEZOMETER
OPERATING INSTRUMENT
GPS Survey Point

LEGEND:
Ⓐ = Sand and Gravel Fill
Ⓑ = Compacted Coarse Rejects
Ⓒ = Compacted Tails



Teck Elkview Operations

Geotechnical Engineering

LAGOON C CROSS-SECTION E-E'
2020

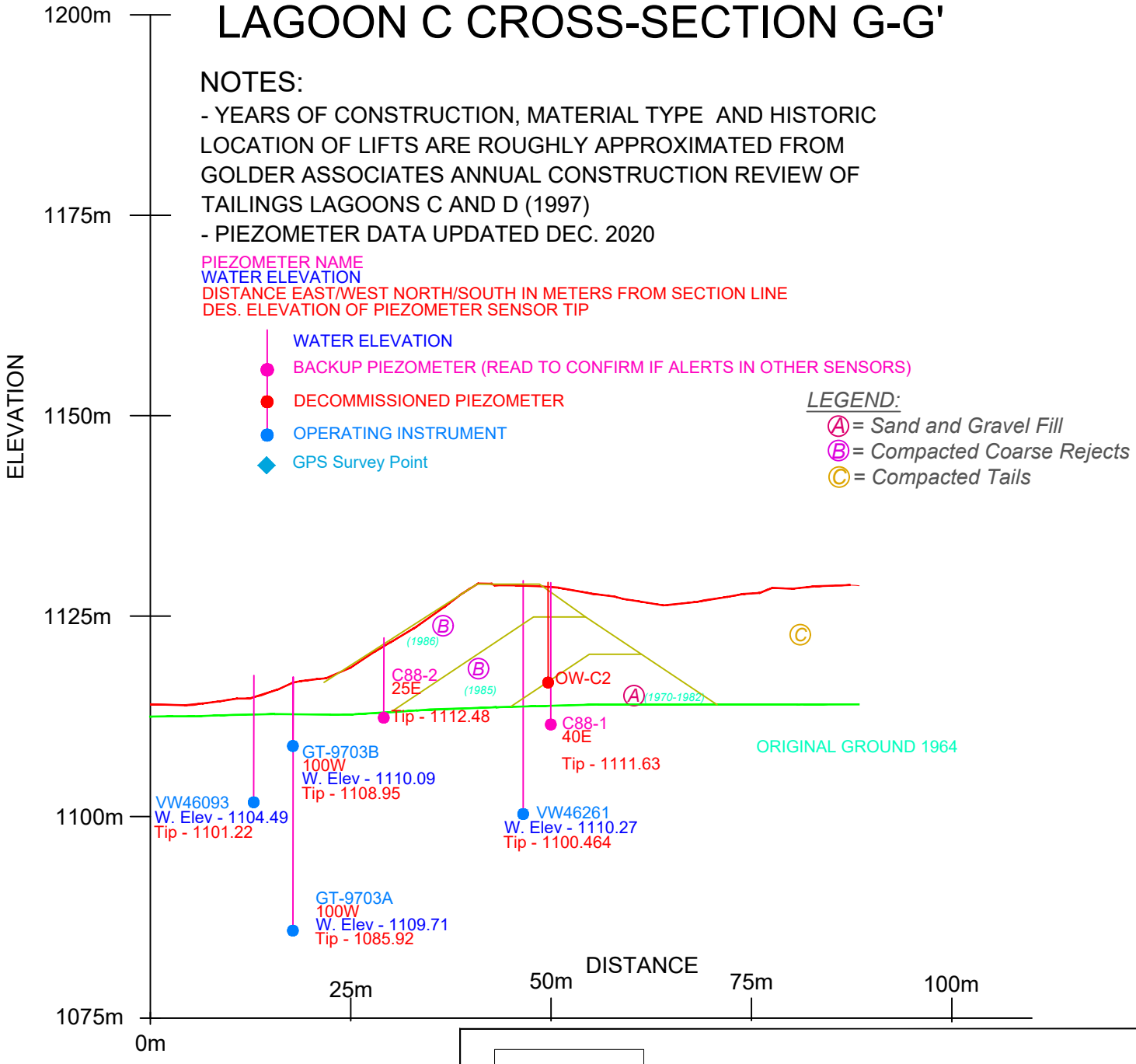
DATE: Dec. 2020	SCALE:	DWG. NO. :
DWN BY: A. Yeomans	REV BY: M. Barton	

CROSS-SECTION
ORIGIN COORD: 14538.12E, 52909.99N
AZIMUTH: 144°50'19"

LAGOON C CROSS-SECTION G-G'

NOTES:
- YEARS OF CONSTRUCTION, MATERIAL TYPE AND HISTORIC LOCATION OF LIFTS ARE ROUGHLY APPROXIMATED FROM GOLDER ASSOCIATES ANNUAL CONSTRUCTION REVIEW OF TAILINGS LAGOONS C AND D (1997)
- PIEZOMETER DATA UPDATED DEC. 2020

PIEZOMETER NAME
WATER ELEVATION
DISTANCE EAST/WEST NORTH/SOUTH IN METERS FROM SECTION LINE
DES. ELEVATION OF PIEZOMETER SENSOR TIP



Teck Elkview Operations

Geotechnical Engineering

LAGOON C CROSS-SECTION G-G'
2020

DATE: Dec. 2020	SCALE:	DWG. NO. :
DWN BY: A. Yeomans	REV BY: M. Barton	

CROSS-SECTION
ORIGIN COORD: 14960.53E, 52265.72N
AZIMUTH: 202°53'07"

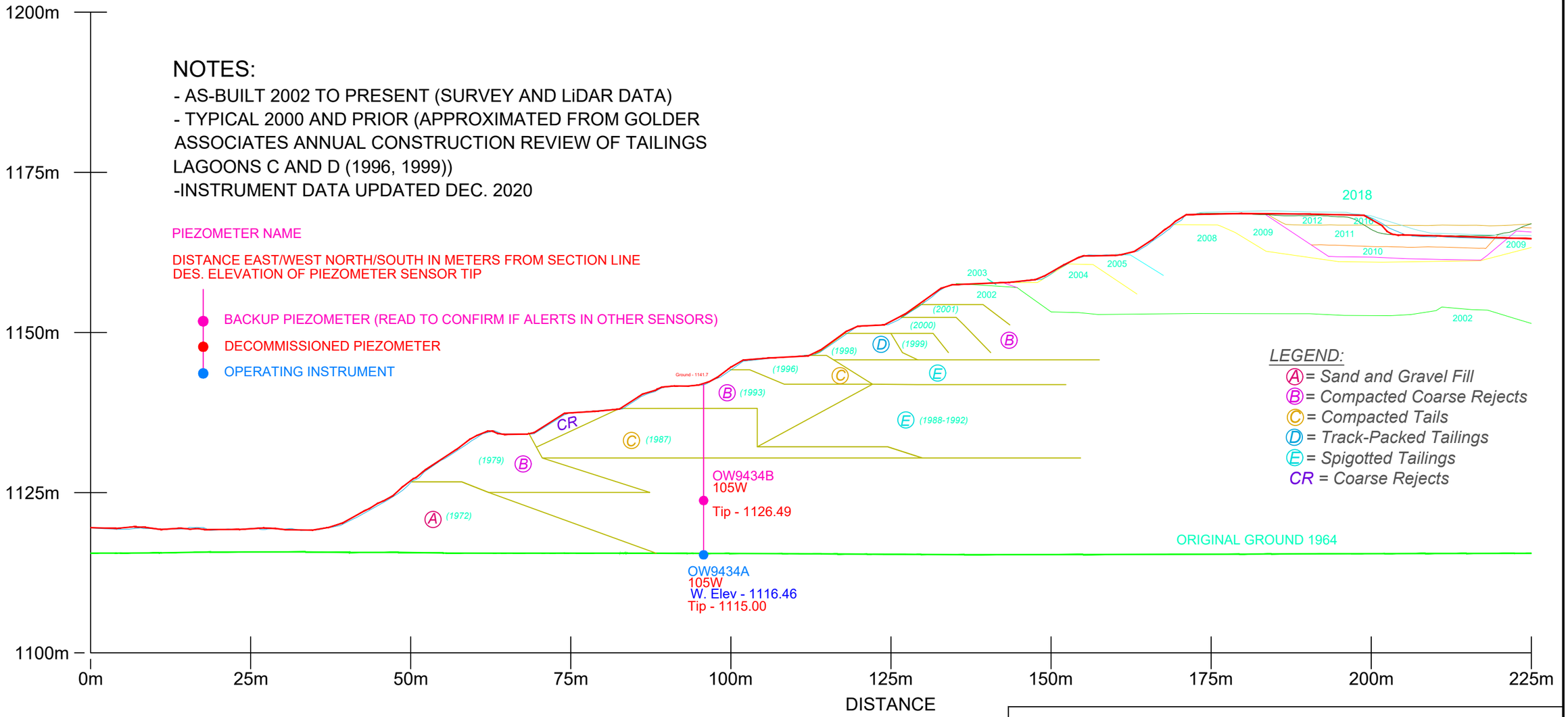
LAGOON D CROSS-SECTION A-A'

NOTES:
- AS-BUILT 2002 TO PRESENT (SURVEY AND LiDAR DATA)
- TYPICAL 2000 AND PRIOR (APPROXIMATED FROM GOLDER ASSOCIATES ANNUAL CONSTRUCTION REVIEW OF TAILINGS LAGOONS C AND D (1996, 1999))
-INSTRUMENT DATA UPDATED DEC. 2020

PIEZOMETER NAME

DISTANCE EAST/WEST NORTH/SOUTH IN METERS FROM SECTION LINE
DES. ELEVATION OF PIEZOMETER SENSOR TIP

- BACKUP PIEZOMETER (READ TO CONFIRM IF ALERTS IN OTHER SENSORS)
- DECOMMISSIONED PIEZOMETER
- OPERATING INSTRUMENT



LEGEND:
- *A = Sand and Gravel Fill*
- *B = Compacted Coarse Rejects*
- *C = Compacted Tails*
- *D = Track-Packed Tailings*
- *E = Spigotted Tailings*
- *CR = Coarse Rejects*

Teck Elkview Operations

Geotechnical Engineering

LAGOON D CROSS-SECTION A-A'
2020

DATE: Dec. 2020	SCALE:	DWG. NO. :
DWN BY: A. YEOMANS	REV BY: M. Barton	

CROSS-SECTION
ORIGIN COORD: 14726.30E, 52346.74N
AZIMUTH: 182°47'27"

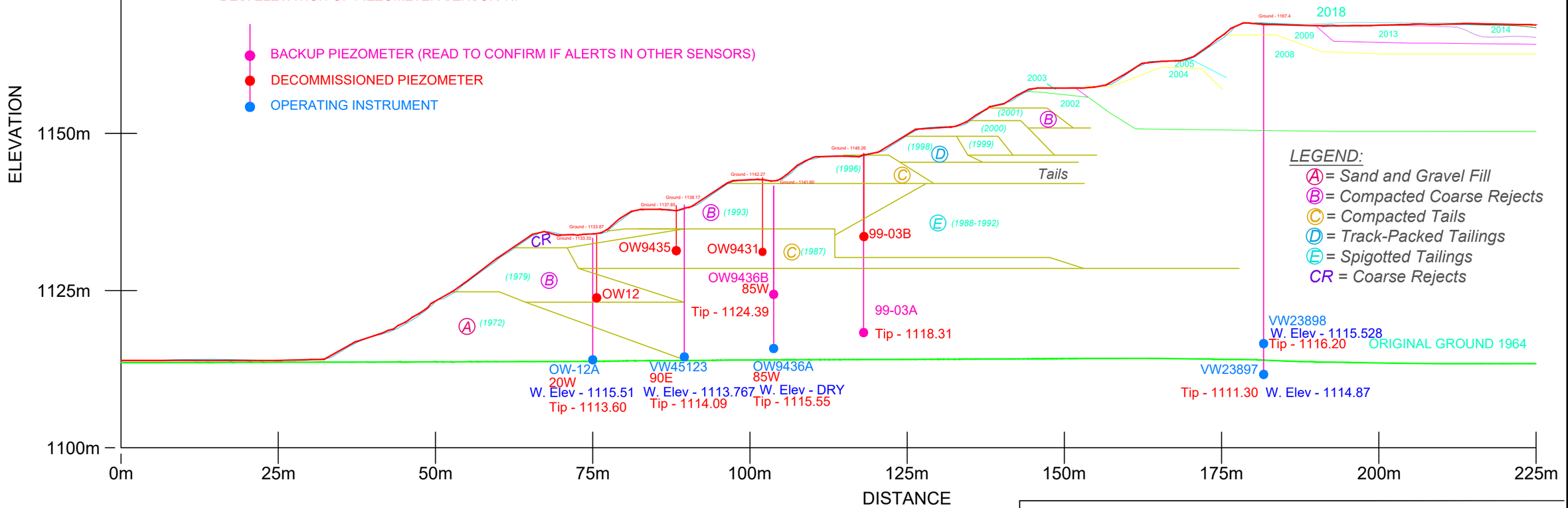
LAGOON D CROSS-SECTION B-B'

NOTES:
- AS-BUILT 2002 TO PRESENT (SURVEY AND LiDAR DATA)
- 2001 AND PRIOR ARE ROUGHLY APPROXIMATED FROM GOLDER ASSOCIATES ANNUAL CONSTRUCTION REVIEW OF TAILINGS LAGOONS C AND D (1996, 1999)
-INSTRUMENT DATA UPDATED DEC. 2020

PIEZOMETER NAME

DISTANCE EAST/WEST NORTH/SOUTH IN METERS FROM SECTION LINE
DES. ELEVATION OF PIEZOMETER SENSOR TIP

BACKUP PIEZOMETER (READ TO CONFIRM IF ALERTS IN OTHER SENSORS)
DECOMMISSIONED PIEZOMETER
OPERATING INSTRUMENT



Teck

Elkview Operations

Geotechnical Engineering

LAGOON D CROSS-SECTION B-B'
2020

DATE: Dec. 2020	SCALE:	DWG. NO. :
DWN BY: A. YEOMANS	REV BY: M. Barton	

CROSS-SECTION
ORIGIN COORD: 14491.89E, 52303.38N
AZIMUTH: 168°11'50"

LAGOON D CROSS-SECTION C-C'

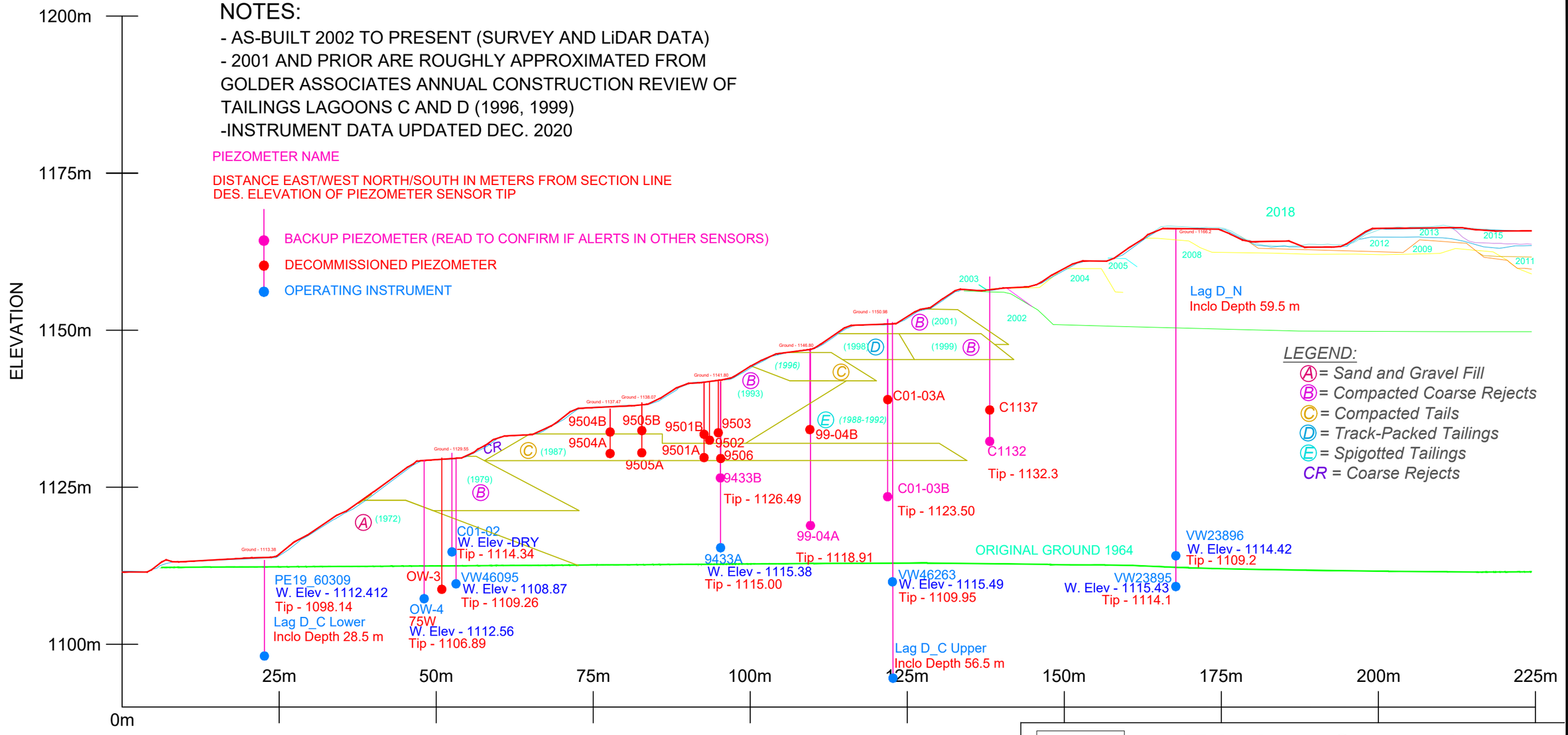
NOTES:

- AS-BUILT 2002 TO PRESENT (SURVEY AND LiDAR DATA)
- 2001 AND PRIOR ARE ROUGHLY APPROXIMATED FROM GOLDER ASSOCIATES ANNUAL CONSTRUCTION REVIEW OF TAILINGS LAGOONS C AND D (1996, 1999)
-INSTRUMENT DATA UPDATED DEC. 2020

PIEZOMETER NAME

DISTANCE EAST/WEST NORTH/SOUTH IN METERS FROM SECTION LINE
DES. ELEVATION OF PIEZOMETER SENSOR TIP

- BACKUP PIEZOMETER (READ TO CONFIRM IF ALERTS IN OTHER SENSORS)
- DECOMMISSIONED PIEZOMETER
- OPERATING INSTRUMENT



Teck

Elkview Operations

Geotechnical Engineering

LAGOON D CROSS-SECTION C-C'
2020

DATE: Dec. 2020	SCALE:	DWG. NO. :
DWN BY: A. YEOMANS	REV BY: M. Barton	

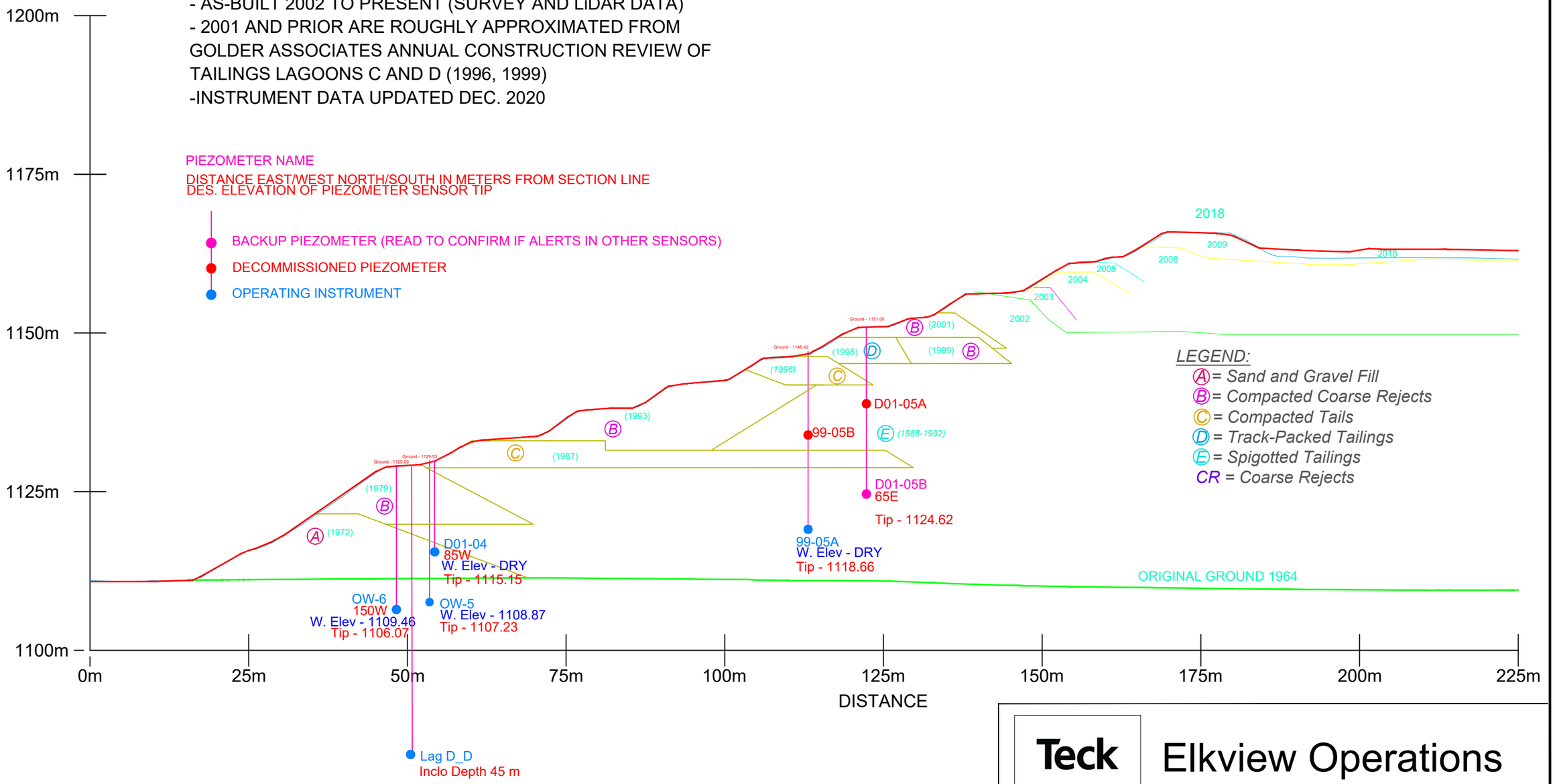
CROSS-SECTION
ORIGIN COORD: 14249.70E, 52237.31N
AZIMUTH: 155°43'21"

LAGOON D CROSS-SECTION D-D'

NOTES:
- AS-BUILT 2002 TO PRESENT (SURVEY AND LiDAR DATA)
- 2001 AND PRIOR ARE ROUGHLY APPROXIMATED FROM GOLDER ASSOCIATES ANNUAL CONSTRUCTION REVIEW OF TAILINGS LAGOONS C AND D (1996, 1999)
-INSTRUMENT DATA UPDATED DEC. 2020

PIEZOMETER NAME
DISTANCE EAST/WEST NORTH/SOUTH IN METERS FROM SECTION LINE
DES. ELEVATION OF PIEZOMETER SENSOR TIP

BACKUP PIEZOMETER (READ TO CONFIRM IF ALERTS IN OTHER SENSORS)
DECOMMISSIONED PIEZOMETER
OPERATING INSTRUMENT



LEGEND:
- *A = Sand and Gravel Fill*
- *B = Compacted Coarse Rejects*
- *C = Compacted Tails*
- *D = Track-Packed Tailings*
- *E = Spigotted Tailings*
- *CR = Coarse Rejects*

Teck Elkview Operations

Geotechnical Engineering

LAGOON D CROSS-SECTION D-D'
2020

DATE: Dec. 2020	SCALE:	DWG. NO. :
DWN BY: A. YEOMANS	REV BY: M. Barton	

CROSS-SECTION
ORIGIN COORD: 13974.88E, 51969.26N
AZIMUTH: 90°31'40"

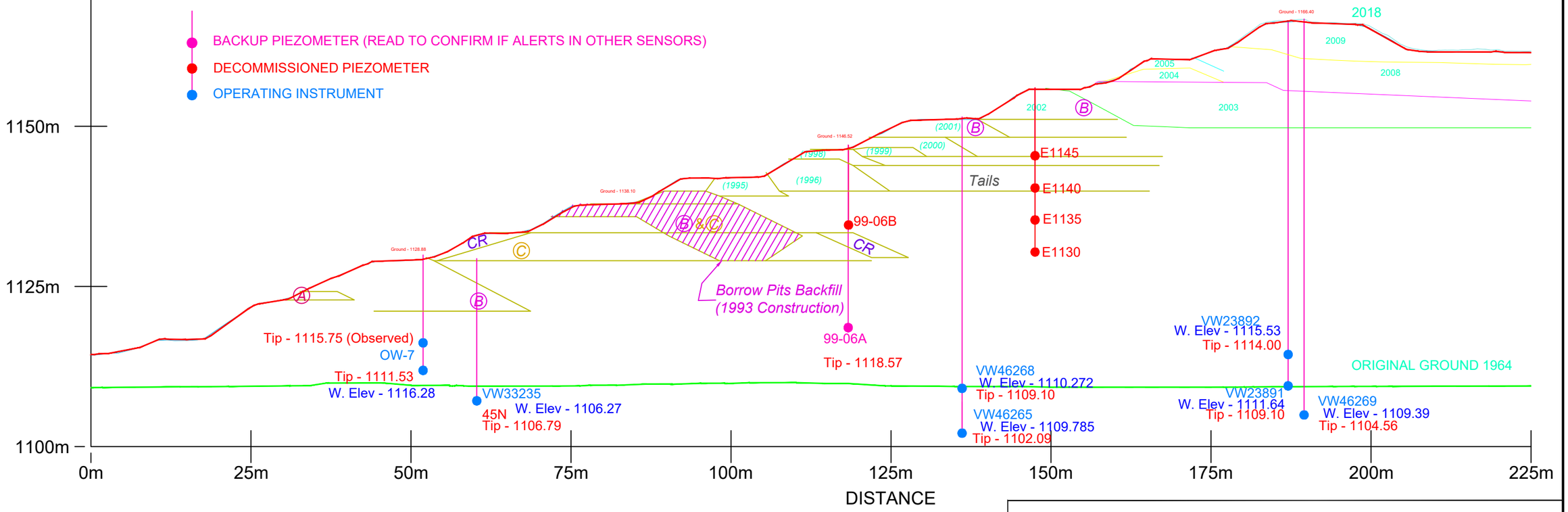
LAGOON D CROSS-SECTION E-E'

NOTES:
- AS-BUILT 2002 TO PRESENT (SURVEY AND LiDAR DATA)
- 2001 AND PRIOR ARE ROUGHLY APPROXIMATED FROM GOLDER ASSOCIATES ANNUAL CONSTRUCTION REVIEW OF TAILINGS LAGOONS C AND D (1996, 1999)
-INSTRUMENT DATA UPDATED DEC. 2020

LEGEND:
- Ⓐ = Sand and Gravel Fill
- Ⓑ = Compacted Coarse Rejects
- Ⓒ = Compacted Tails
- Ⓓ = Track-Packed Tailings
- Ⓔ = Spigotted Tailings
- CR = Coarse Rejects

PIEZOMETER NAME
DISTANCE EAST/WEST NORTH/SOUTH IN METERS FROM SECTION LINE
DES. ELEVATION OF PIEZOMETER SENSOR TIP

- BACKUP PIEZOMETER (READ TO CONFIRM IF ALERTS IN OTHER SENSORS)
- DECOMMISSIONED PIEZOMETER
- OPERATING INSTRUMENT



Teck Elkview Operations

Geotechnical Engineering

LAGOON D CROSS-SECTION E-E'
2020

DATE: Dec. 2020	SCALE:	DWG. NO. :
DWN BY: A. YEOMANS	REV BY: M. Barton	

CROSS-SECTION
ORIGIN COORD: 14225.89E, 51679.04N
AZIMUTH: 24°05'20"

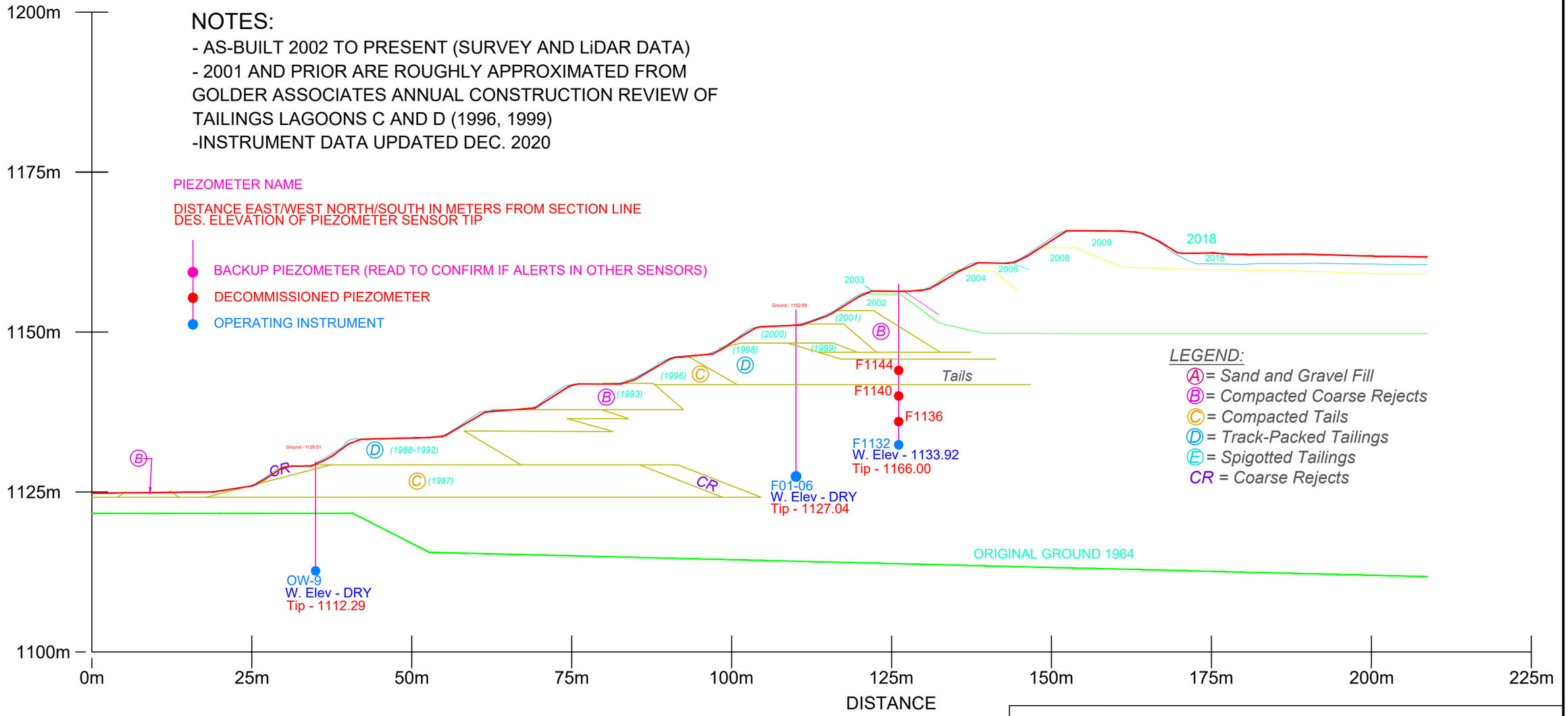
LAGOON D CROSS-SECTION F-F'

NOTES:
- AS-BUILT 2002 TO PRESENT (SURVEY AND LiDAR DATA)
- 2001 AND PRIOR ARE ROUGHLY APPROXIMATED FROM GOLDER ASSOCIATES ANNUAL CONSTRUCTION REVIEW OF TAILINGS LAGOONS C AND D (1996, 1999)
-INSTRUMENT DATA UPDATED DEC. 2020

PIEZOMETER NAME

DISTANCE EAST/WEST NORTH/SOUTH IN METERS FROM SECTION LINE
DES. ELEVATION OF PIEZOMETER SENSOR TIP

BACKUP PIEZOMETER (READ TO CONFIRM IF ALERTS IN OTHER SENSORS)
DECOMMISSIONED PIEZOMETER
OPERATING INSTRUMENT



Teck Elkview Operations

Geotechnical Engineering

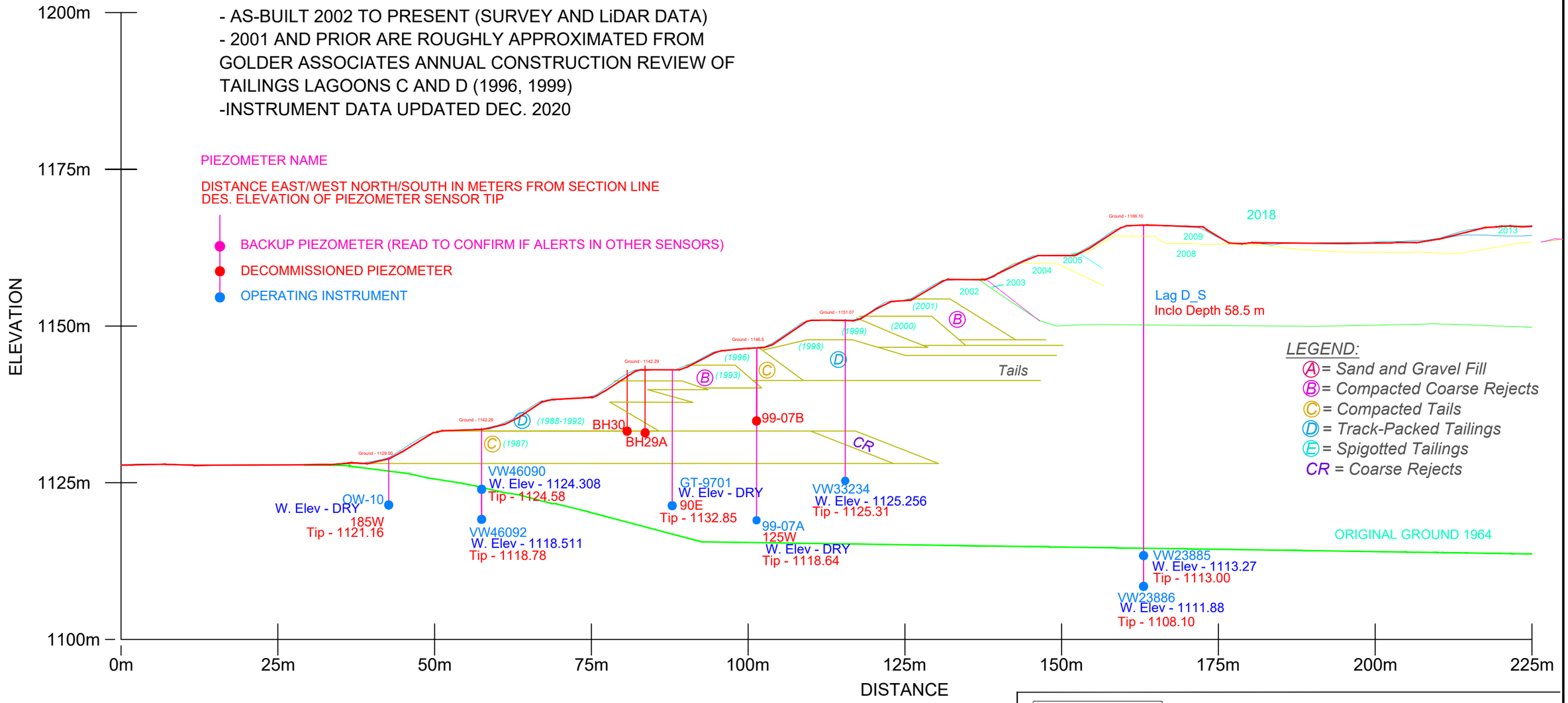
LAGOON D CROSS-SECTION F-F'
2020

DATE: Dec. 2020	SCALE:	DWG. NO. :
DWN BY: A. YEOMANS	REV BY: M. Barton	

CROSS-SECTION
ORIGIN COORD: 14583.76E, 51528.38N
AZIMUTH: 350°18'50"

LAGOON D CROSS-SECTION G-G'

NOTES:
- AS-BUILT 2002 TO PRESENT (SURVEY AND LiDAR DATA)
- 2001 AND PRIOR ARE ROUGHLY APPROXIMATED FROM GOLDER ASSOCIATES ANNUAL CONSTRUCTION REVIEW OF TAILINGS LAGOONS C AND D (1996, 1999)
-INSTRUMENT DATA UPDATED DEC. 2020



Teck

Elkview Operations

Geotechnical Engineering

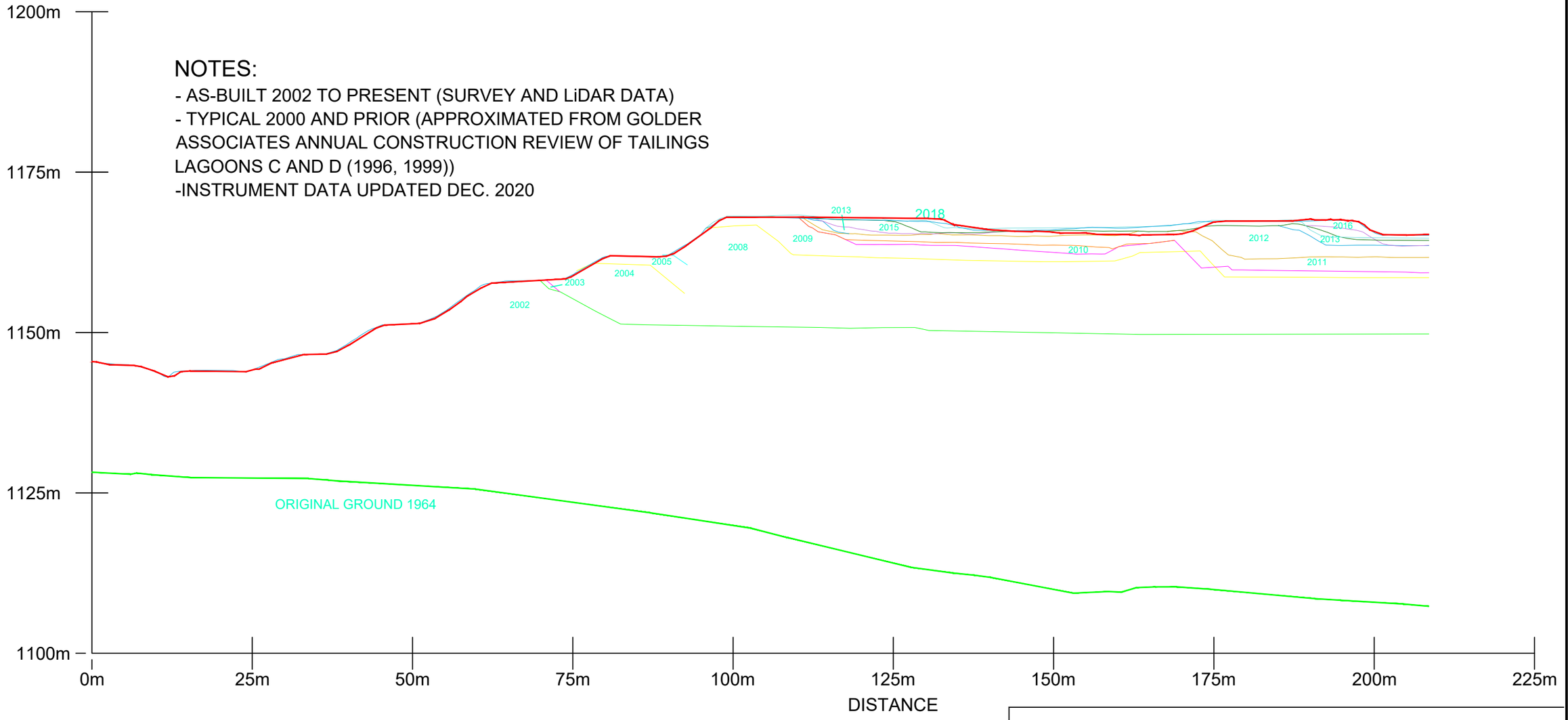
LAGOON D CROSS-SECTION G-G'
2020

DATE: Dec. 2020	SCALE:	DWG. NO. :
DWN BY: A. YEOMANS	REV BY: M. Barton	

CROSS-SECTION
ORIGIN COORD: 14865.68E, 51638.80N
AZIMUTH: 350°43'36"

LAGOON D CROSS-SECTION H-H'

NOTES:
- AS-BUILT 2002 TO PRESENT (SURVEY AND LiDAR DATA)
- TYPICAL 2000 AND PRIOR (APPROXIMATED FROM GOLDER ASSOCIATES ANNUAL CONSTRUCTION REVIEW OF TAILINGS LAGOONS C AND D (1996, 1999))
-INSTRUMENT DATA UPDATED DEC. 2020



Teck Elkview Operations

Geotechnical Engineering

LAGOON D CROSS-SECTION H-H'
2020

DATE: Dec. 2020	SCALE:	DWG. NO. :
DWN BY: A. YEOMANS	REV BY: M. Barton	

APPENDIX IV

Monitoring Instrument Data and Plots (provided by EVO)

WFTF
Lagoon A
Lagoon B
Lagoon C
Lagoon D

Appendix IV
2020 Piezometric Level Observations

Table IV-1.0 2020 Piezometric Level Observation

Dam	Piezometer ID	Stability Section	VWP Tip Elevation or Standpipe Screen Elevation (m)	Max Measured Water Table Elevation[1] (m)	2020 Observations
WFTF	VWP VW38582	N/A	1657.93	1657.95	Steady trend. Equivalent water table 0.02m above VWP tip.
WFTF	VWP VW38583	N/A	1658.87	Dry	Steady trend. Dry.
WFTF	VWP VW38584	N/A	1657.48	Dry	Steady trend. Dry.
WFTF	VWP VW38585	N/A	1657.08	Dry	Steady trend. Dry.
WFTF	VWP VW38586	N/A	1661.31	Dry	Steady trend. Dry.
WFTF	VWP VW27171	N/A	1657.08	Dry	Steady trend. Dry.
WFTF	VWP VW27172	N/A	1658.06	Dry	Steady trend. Dry.
WFTF	VWP VW29155	N/A	1657.87	Dry	Steady trend. Dry.
WFTF	VWP VW29158	N/A	1657.31	Dry	Steady trend. Dry.
WFTF	VWP VW29159	N/A	1656.62	1657.53	Steady trend. 0.04 m decrease from 2019 annual inspection.
WFTF	Standpipe WF-2 SOUTH	N/A	N/A	N/A	Not reported
WFTF	Standpipe WF-3 NORTH	N/A	N/A	N/A	Not reported
Lagoon A	VWP PE19_60307	A-A	1113.59	1114.64	No trend established yet – first year of readings.
Lagoon A	VWP PE19_60301	A-A	1112.69	1114.80	No trend established yet – first year of readings.
Lagoon C	VWP VW23238	A-A	1117.66	1117.67	Steady trend. 0.01 m increase from 2019 annual inspection.
Lagoon C	VWP VW23242	A-A	1109.50	Dry	Steady trend. Dry.
Lagoon C	VWP VW23239	C-C	1117.65	1117.81	Steady trend. 0.16 m above VWP tip.
Lagoon C	VWP VW23243	C-C	1111.25	Dry	Steady trend. Dry.
Lagoon C	Standpipe 99-01	D-D	1113.72	N/A	This is a backup instrument (not read in 2020)
Lagoon C	VWP VW46191	D-D	1111.33	Dry	Steady trend. Dry.
Lagoon C	VWP VW46262	D-D	1100.96	1109.78	Steady trend. 0.02 m decrease from 2019 annual inspection.

Dam	Piezometer ID	Stability Section	VWP Tip Elevation or Standpipe Screen Elevation (m)	Max Measured Water Table Elevation[1] (m)	2020 Observations
Lagoon C	VWP VW46091	D-D	1102.59	1109.77	No measurements taken in 2020. Reading shown is from 2019.
Lagoon C	VWP VW23240	D-D	1117.86	Dry	Steady trend. Dry.
Lagoon C	VWP VW23244	D-D	1111.46	Dry	Steady trend. Dry.
Lagoon C	VWP VW23241	N/A	1118.60	Dry	Steady trend. Dry.
Lagoon C	VWP VW23245	N/A	1111.03	1112.85	Steady trend. 1.31 m decrease from 2019 annual inspection.
Lagoon C	VWP VW46261	G-G	1100.46	1110.73	Steady trend. 0.34 m increase from 2019 annual inspection.
Lagoon C	VWP VW46093	G-G	1101.22	1104.70	Steady trend. 0.02 m decrease from 2019 annual inspection.
Lagoon C	Standpipe OW-C-88-1	G-G	1111.63	N/A	This is a backup instrument (not read in 2020)
Lagoon C	Standpipe OW-C-88-2	G-G	1112.48	Dry	Steady trend. Dry.
Lagoon C	Standpipe OW-C2	G-G	1116.87	N/A	Scheduled to be decommissioned (not read).
Lagoon C	Standpipe GT-9703 A	G-G	1085.92	1110.19	Steady trend. 0.31 m increase from 2019 annual inspection.
Lagoon C	Standpipe GT-9703 B	G-G	1108.50	1110.51	Steady trend. 0.25 m increase from 2019 annual inspection.
Lagoon C	VWP VW_ PE19_60310	New	1106.69	1113.30	No measurements taken in 2020 due to erroneous readings. Reading shown is from 2019.
Lagoon C	VWP VW_ PE19_60311	New	1106.64	1112.25	No measurements taken in 2020 due to erroneous readings. Reading shown is from 2019.
Lagoon D	VWP VW23897	B-B	1111.30	1115.17	Not read in 2020. Stated reading is from 2019 annual inspection.
Lagoon D	VWP VW23898	B-B	1116.20	Dry	Steady trend. Dry. The VWP readings are erroneous from July 6th 2020, to November 2nd 2020.
Lagoon D	Standpipe 99-03A	B-B	1118.31	N/A	This is a backup instrument (not read in 2020)
Lagoon D	Standpipe 99-03B	B-B	1133.21	N/A	Scheduled to be decommissioned (not read).
Lagoon D	Standpipe OW-12	B-B	1123.50	N/A	Scheduled to be decommissioned (not read).
Lagoon D	Standpipe OW-12A	B-B	1113.60	1115.96	Steady trend. 0.01 m decrease from 2019 annual inspection.
Lagoon D	Standpipe OW-9431	B-B	1130.79	N/A	Scheduled to be decommissioned (not read).
Lagoon D	Standpipe OW-9435	B-B	1130.97	N/A	Scheduled to be decommissioned (not read).

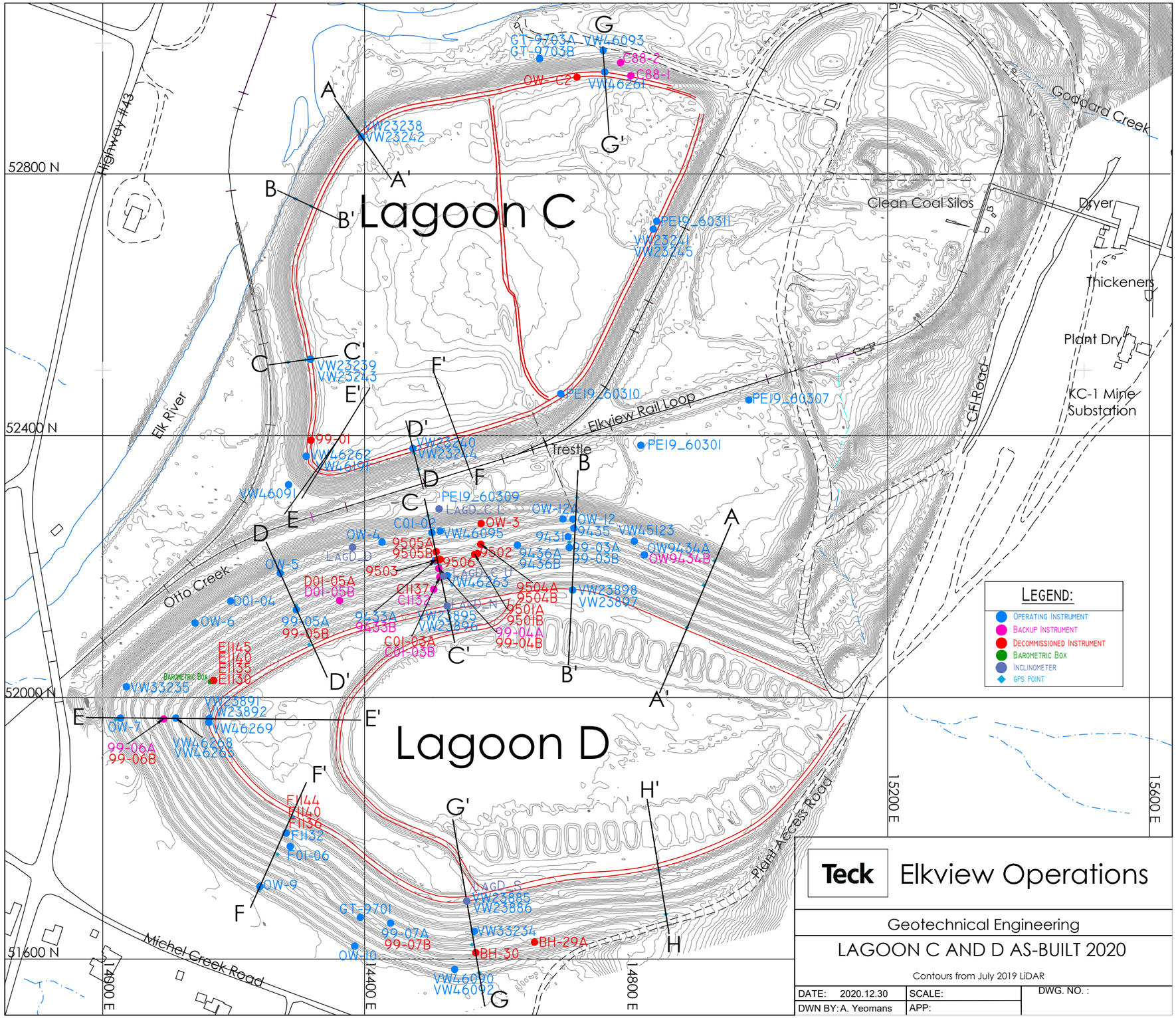
Dam	Piezometer ID	Stability Section	VWP Tip Elevation or Standpipe Screen Elevation (m)	Max Measured Water Table Elevation[1] (m)	2020 Observations
Lagoon D	VWP VW23895	C-C	1114.10	1115.47	Steady trend. 1.33 m decrease from 2019 annual inspection.
Lagoon D	VWP VW23896	C-C	1109.20	1114.52	Steady trend. 1.19 m decrease from 2019 annual inspection.
Lagoon D	VWP VW65023 (C1137)	C-C	1137.05	N/A	Scheduled to be decommissioned (not read)
Lagoon D	VWP VW65026 (C1132)	C-C	1132.16	N/A	This is a backup instrument (not read in 2020)
Lagoon D	VWP VW46263	C-C	1109.95	1115.65	Steady trend. 0.05 m decrease from 2019 annual inspection.
Lagoon D	Standpipe C01-03A	C-C	1138.95	N/A	Scheduled to be decommissioned (not read).
Lagoon D	Standpipe C01-03B	C-C	1123.50	N/A	This is a backup instrument (not read in 2020)
Lagoon D	Standpipe OW-9505A	C-C	1130.11	N/A	Scheduled to be decommissioned (not read).
Lagoon D	Standpipe OW-9505B	C-C	1133.65	N/A	Scheduled to be decommissioned (not read).
Lagoon D	Standpipe OW-9503	C-C	1133.33	N/A	Scheduled to be decommissioned (not read).
Lagoon D	Standpipe OW-9506	C-C	1129.26	N/A	Scheduled to be decommissioned (not read).
Lagoon D	Standpipe OW-9433A	C-C	1115.00	1116.42	Steady trend. 0.52 m decrease since 2019 annual inspection.
Lagoon D	Standpipe OW-9433B	C-C	1126.49	N/A	Scheduled to be decommissioned (not read).
Lagoon D	Standpipe 99-04A	C-C	1118.91	N/A	Scheduled to be decommissioned (not read).
Lagoon D	Standpipe 99-04B	C-C	1133.81	N/A	Scheduled to be decommissioned (not read).
Lagoon D	VWP VW46095	C-C	1109.26	Dry	Steady trend. Dry.
Lagoon D	Standpipe C01-02	C-C	1114.34	Dry	Steady trend. Dry.
Lagoon D	VWP VW_ PE19_60309	C-C	1098.14	1112.39	No trend (first reading is not representative of actual conditions). Not read in 2020.
Lagoon D	Standpipe D01-05A	CC-DD	1138.55	N/A	Scheduled to be decommissioned (not read).
Lagoon D	Standpipe D01-05B	CC-DD	1124.62	N/A	This is a backup instrument (not read in 2020)
Lagoon D	Standpipe OW-5	D-D	1107.23	1110.36	Steady trend. 0.24 m increase from 2019 annual inspection.
Lagoon D	Standpipe 99-05A	D-D	1118.66	Dry	Steady trend. Dry.

Dam	Piezometer ID	Stability Section	VWP Tip Elevation or Standpipe Screen Elevation (m)	Max Measured Water Table Elevation[1] (m)	2020 Observations
Lagoon D	Standpipe 99-05B	D-D	1133.54	N/A	Scheduled to be decommissioned (not read).
Lagoon D	Standpipe D01-04	DD-EE	1115.15	Dry	Steady trend. Dry.
Lagoon D	VWP VW23891	E-E	1109.1	1111.75	Steady trend. 0.4 m decrease from 2019 annual inspection.
Lagoon D	VWP VW23892	E-E	1114.0	1115.65	Steady trend. 0.08 decrease from 2019 annual inspection.
Lagoon D	VWP VW46269	E-E	1104.56	1109.86	Steady trend. 0.42 m increase from 2019 annual inspection.
Lagoon D	VWP VW46265	E-E	1102.09	1110.58	Steady trend. 0.7 m increase from 2019 annual inspection (single instance in Feb 2020).
Lagoon D	VWP VW46268	E-E	1109.10	1110.83	Steady trend. 0.64 m increase from 2019 annual inspection (single instance in Feb 2020).
Lagoon D	Standpipe 99-06A	E-E	1118.57	N/A	This is a backup instrument (not read in 2020)
Lagoon D	Standpipe 99-06B	E-E	1134.22	N/A	Scheduled to be decommissioned (not read).
Lagoon D	Standpipe OW-7	E-E	1111.53	1116.35	Steady trend. 0.02 m decrease from 2019 annual inspection.
Lagoon D	VWP VW33235	E-E	1106.79	Dry	Steady trend. Dry.
Lagoon D	VWP VW 62745 (F1144)	F-F	1144.0	N/A	Scheduled to be decommissioned (not read).
Lagoon D	VWP VW 65027 (F1140)	F-F	1140.0	N/A	Scheduled to be decommissioned (not read).
Lagoon D	VWP VW 12394-134 (F1136)	F-F	1136.00	N/A	Scheduled to be decommissioned (not read).
Lagoon D	VWP VW 66325 (F1132)	F-F	1132.00	N/A	Scheduled to be decommissioned (not read).
Lagoon D	Standpipe F01-06	F-F	1127.04	Dry	Steady trend. Dry.
Lagoon D	Standpipe OW-9	F-F	1112.29	Dry	Steady trend. Dry.
Lagoon D	Standpipe GT-9701	FF-GG	1120.97	Dry	Steady trend. Dry.
Lagoon D	VWP VW23885	G-G	1113.00	1113.76	Steady trend. 0.54 m decrease from 2019 annual inspection.
Lagoon D	VWP VW23886	G-G	1108.10	1112.02	Steady trend. 0.22 m decrease from 2019 annual inspection.

Dam	Piezometer ID	Stability Section	VWP Tip Elevation or Standpipe Screen Elevation (m)	Max Measured Water Table Elevation[1] (m)	2020 Observations
Lagoon D	VWP VW33234	G-G	1125.31	1125.37	Steady trend. 0.02 m decrease from 2019 annual inspection. Note that readings from May 2020 onwards were erroneous.
Lagoon D	VWP VW46090	G-G	1124.58	1124.82	Steady trend. 0.41 m increase from 2019 annual inspection.
Lagoon D	VWP VW46092	G-G	1118.78	Dry	Steady trend. Dry.
Lagoon D	BH 30	G-G	1132.85	N/A	Scheduled to be decommissioned (not read).
Lagoon D	VWP VW45123	AA-BB	1114.09	Dry	Steady trend. Dry.
Lagoon D	Standpipe OW-9434A	AA-BB	1115.00	1116.47	Steady trend. 0.31 m increase from 2019 annual inspection.
Lagoon D	Standpipe OW-9434B	AA-BB	1123.77	N/A	This is a backup instrument (not read in 2020)
Lagoon D	Standpipe OW-9436A	BB-CC	1115.55	Dry	Decreasing trend. 0.44 m decrease from 2019 annual inspection.
Lagoon D	Standpipe OW-9436B	BB-CC	1124.39	N/A	This is a backup instrument (not read in 2020)
Lagoon D	Standpipe OW-9504A	BB-CC	1130.00	N/A	Scheduled to be decommissioned (not read).
Lagoon D	Standpipe OW-9504B	BB-CC	1133.42	N/A	Scheduled to be decommissioned (not read).
Lagoon D	Standpipe OW-9502	BB-CC	1132.14	N/A	Scheduled to be decommissioned (not read).
Lagoon D	Standpipe OW-9501A	BB-CC	1129.37	N/A	Scheduled to be decommissioned (not read).
Lagoon D	Standpipe OW-9501B	BB-CC	1133.09	N/A	Scheduled to be decommissioned (not read).
Lagoon D	Standpipe OW-3	BB-CC	1108.48	N/A	Scheduled to be decommissioned (not read).
Lagoon D	Standpipe OW-4	CC-DD	1106.86	1112.56	Steady trend. 0.35 m decrease from 2019 annual inspection.
Lagoon D	Standpipe OW-6	DD-EE	1106.70	1109.57	Steady trend. 0.1 m decrease from 2019 annual inspection.
Lagoon D	VWP VW 12394-136 (E1140)	DD-EE	1142.49	N/A	Scheduled to be decommissioned (not read).
Lagoon D	VWP VW 12394-135 (E1145)	DD-EE	1144.61	N/A	Scheduled to be decommissioned (not read).
Lagoon D	VWP VW 65025 (E1135)	DD-EE	1135.00	N/A	Scheduled to be decommissioned (not read).
Lagoon D	VWP VW 65024 (E1130)	DD-EE	1130.00	N/A	Scheduled to be decommissioned (not read).

Dam	Piezometer ID	Stability Section	VWP Tip Elevation or Standpipe Screen Elevation (m)	Max Measured Water Table Elevation[1] (m)	2020 Observations
Lagoon D	Standpipe OW-10	FF-GG	1121.16	Dry	Steady trend. Dry.
Lagoon D	Standpipe 99-07A	FF-GG	1118.64	Dry	Steady trend. Dry.
Lagoon D	Standpipe 99-07B	FF-GG	1134.48	N/A	Scheduled to be decommissioned (not read).
Lagoon D	Standpipe BH 29A	GG-HH	1132.59	N/A	Scheduled to be decommissioned (not read).

Note: 1. Max measured water table elevation refers to the maximum recorded level for the 2019/2020 period since the previous annual inspection (October 2019). This level may vary from the drawing cross-sections which shows the last recorded measurement for each instrument.


Lagoon C
Lagoon D
Highway #43
Elk River
Otto Creek
Goddard Creek
Michel Creek Road
Elkview Rail Loop
Trestle
CFI Road
Plant Access Road
Clean Coal Silos
Dryer
Thickeners
Plant Dry
KC-1 Mine Substation
Barometric Box
52800 N
52400 N
52000 N
51600 N
15200 E
15600 E
14400 E
14800 E
LEGEND:
Operating Instrument
Backup Instrument
Decommissioned Instrument
Barometric Box
Inclinometer
GPS Point
Teck
Elkview Operations
Geotechnical Engineering
LAGOON C AND D AS-BUILT 2020
Contours from July 2019 LiDAR
DATE: 2020.12.30
SCALE:
DWG. NO. :
DWN BY: A. Yeomans
APP:

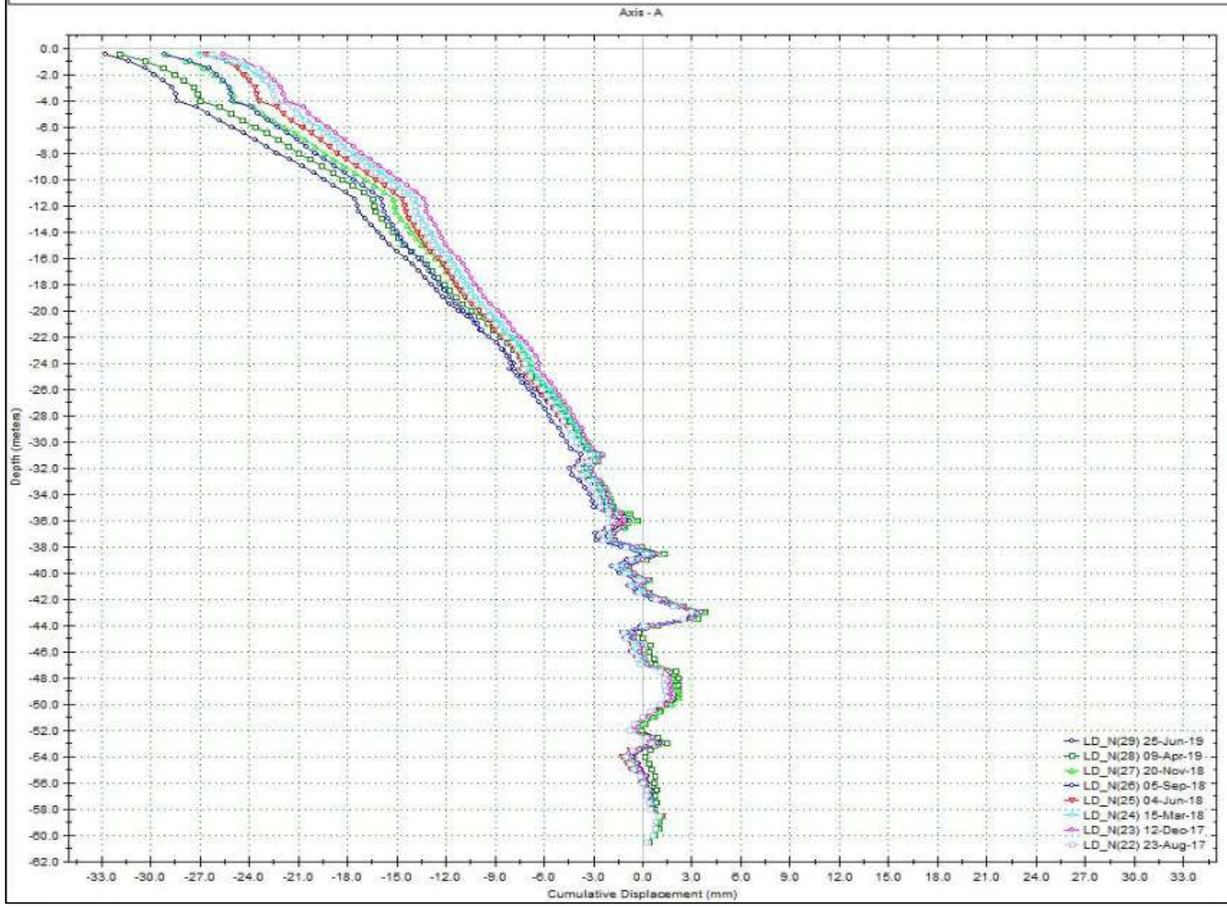
RST Instruments Ltd.

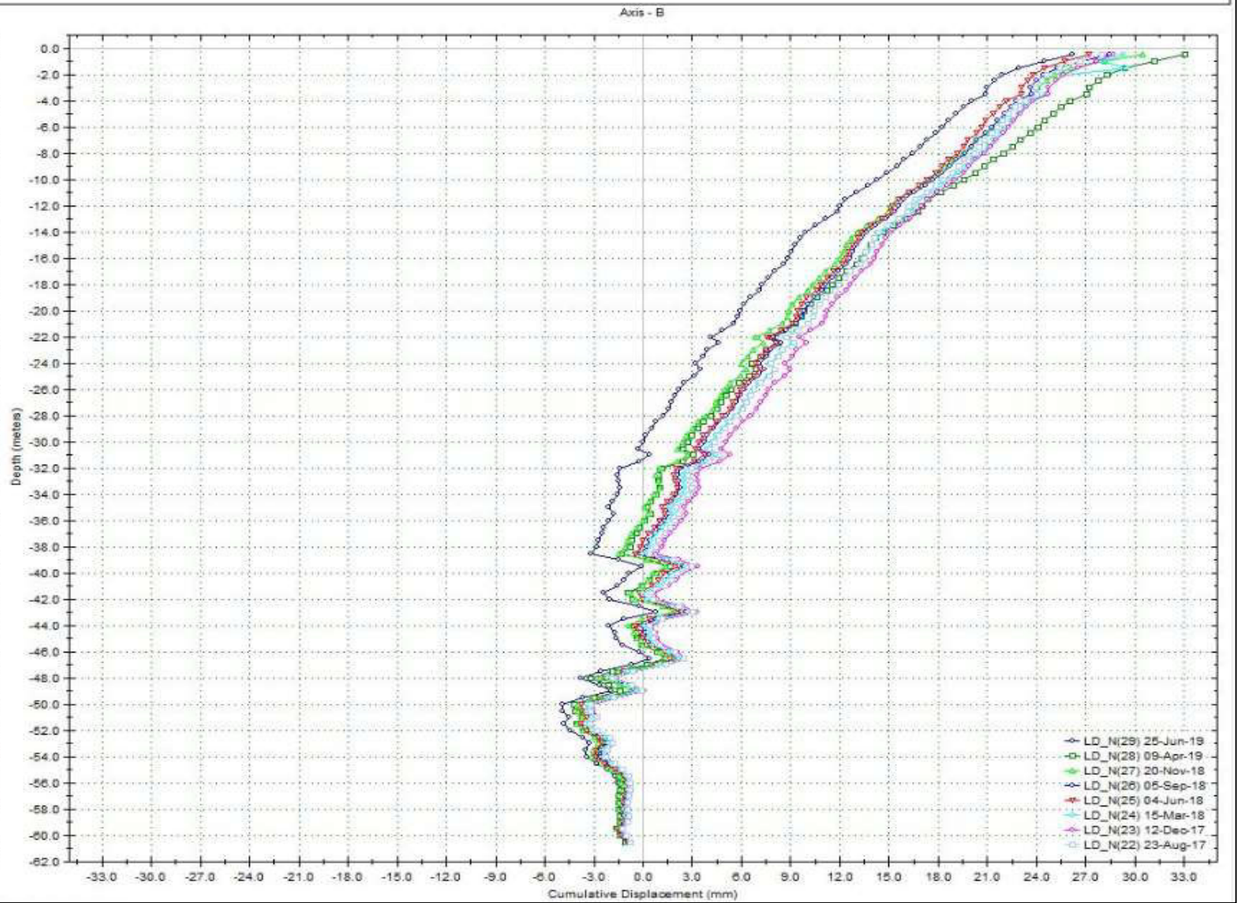
CUMULATIVE DISPLACEMENT

Inclinalysis v.2.27

Borehole : LD_N
Project : LagoonD
Location :
Northing :
Easting :
Collar :

Spiral Correction : N/A
Collar Elevation : 0.0 meters
Borehole Total Depth : 60.5 meters
North Groove Azimuth :
Base Reading : 2013 Feb 20 11:27
Axis A Azimuth : 0.0 degrees





Notes: 1. Inclinometer plots provided by Teck.

Date & Time: 2021-03-30 19:22
Figure File: Z:\M\REM\09963A14-TCL-EVO-2020 DSI\500 External Data\Instrumentation\20210308_EVO Revised Plots\MT Version for Report\Inclinometers\Lagoon D\[LD_N Inclinometer Plots historical.xlsx]1.0 LD_N Cumm (historical)

CLIENT
Teck
TECK ELKVIEW OPERATIONS LTD.

Klohn Crippen Berger

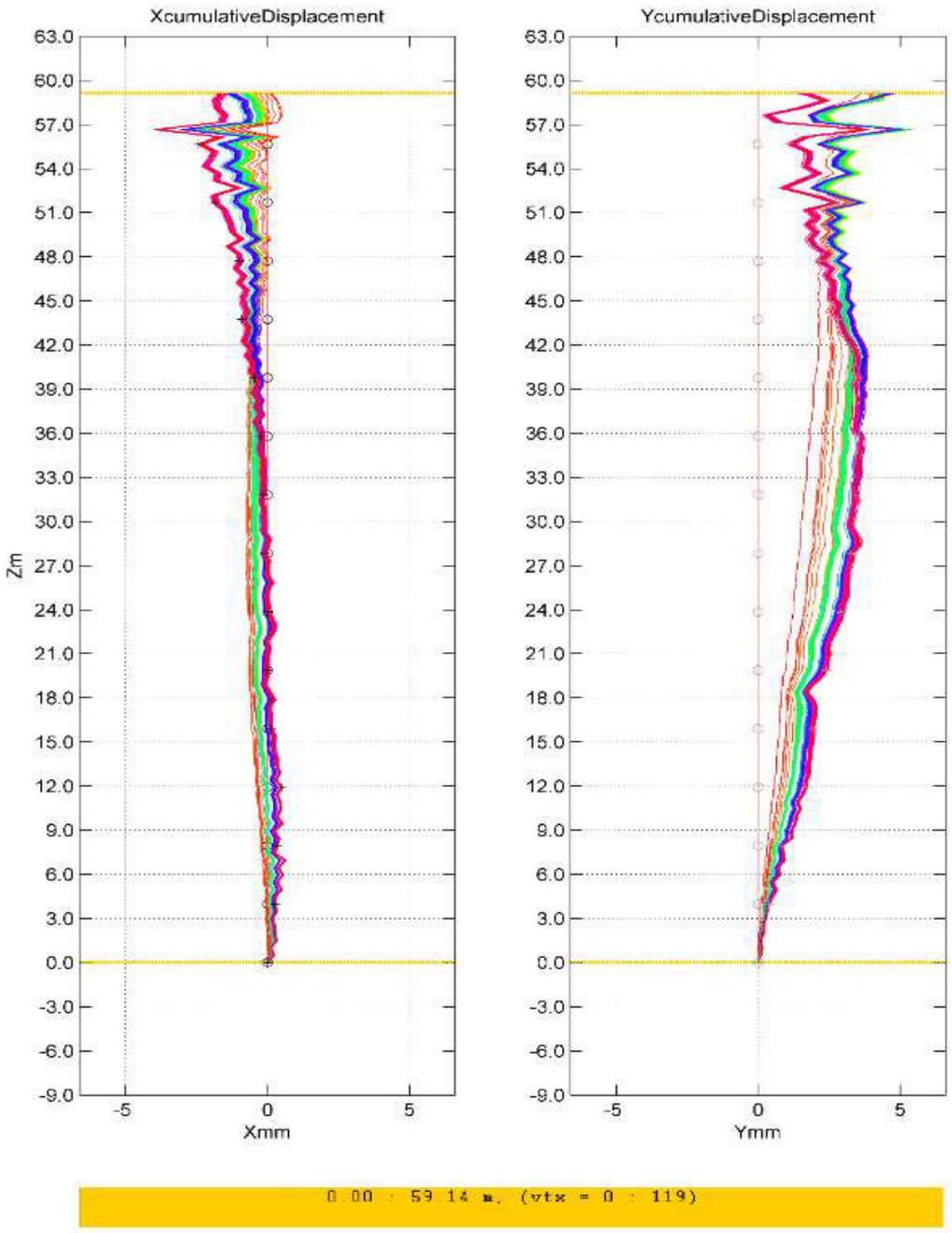
PROJECT
TECK ELKVIEW OPERATIONS
2020 ANNUAL SUMMARY OF FACILITY PERFORMANCE

TITLE
LAGOON D INCLINOMETER MONITORING
INCLINOMETER LD_N
HISTORICAL CUMMULATIVE DISPLACEMENT
(UP TO 2019)

PROJECT No. M09963A14

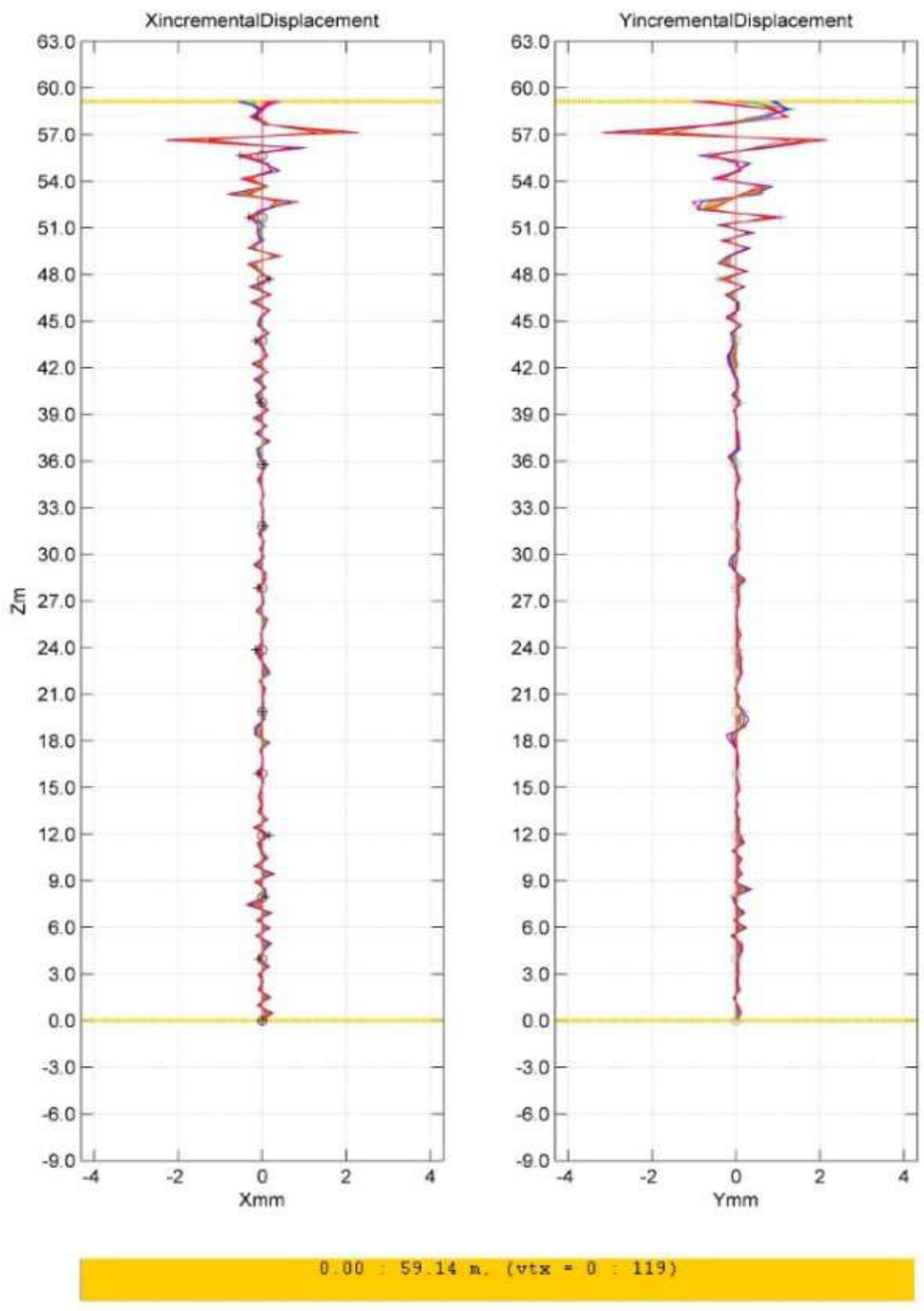
FIG. No. n/a

CUMMULATIVE DISPLACEMENT PLOT



0.00 : 59.14 m. (vtx = 0 : 119)

INCREMENTAL DISPLACEMENT PLOT



0.00 : 59.14 m. (vtx = 0 : 119)

Notes: 1. Inclinometer plots provided by Teck.

CLIENT: Teck — TECK ELKVIEW OPERATIONS LTD.

Klohn Crippen Berger

PROJECT: TECK ELKVIEW OPERATIONS
2020 ANNUAL SUMMARY OF FACILITY PERFORMANCE

TITLE: LAGOON D INCLINOMETER MONITORING
INCLINOMETER LD_N SHAPE ARRAY
DISPLACEMENT (2019 to 2020)

PROJECT No. M09963A14

FIG. No. n/a

Date & Time: 2021-03-30 19:22
Figure File: Z:\M\FREM09963A14-TCL-EVO-2020 DSI\500 External Data\Instrumentation\20210308_EVO Revised Plots\MT Version for Report\Inclinometers\Lagoon D\[LD_N Inclinometer Plots historical.xlsx]1.0 LD_N Cumm (historical)

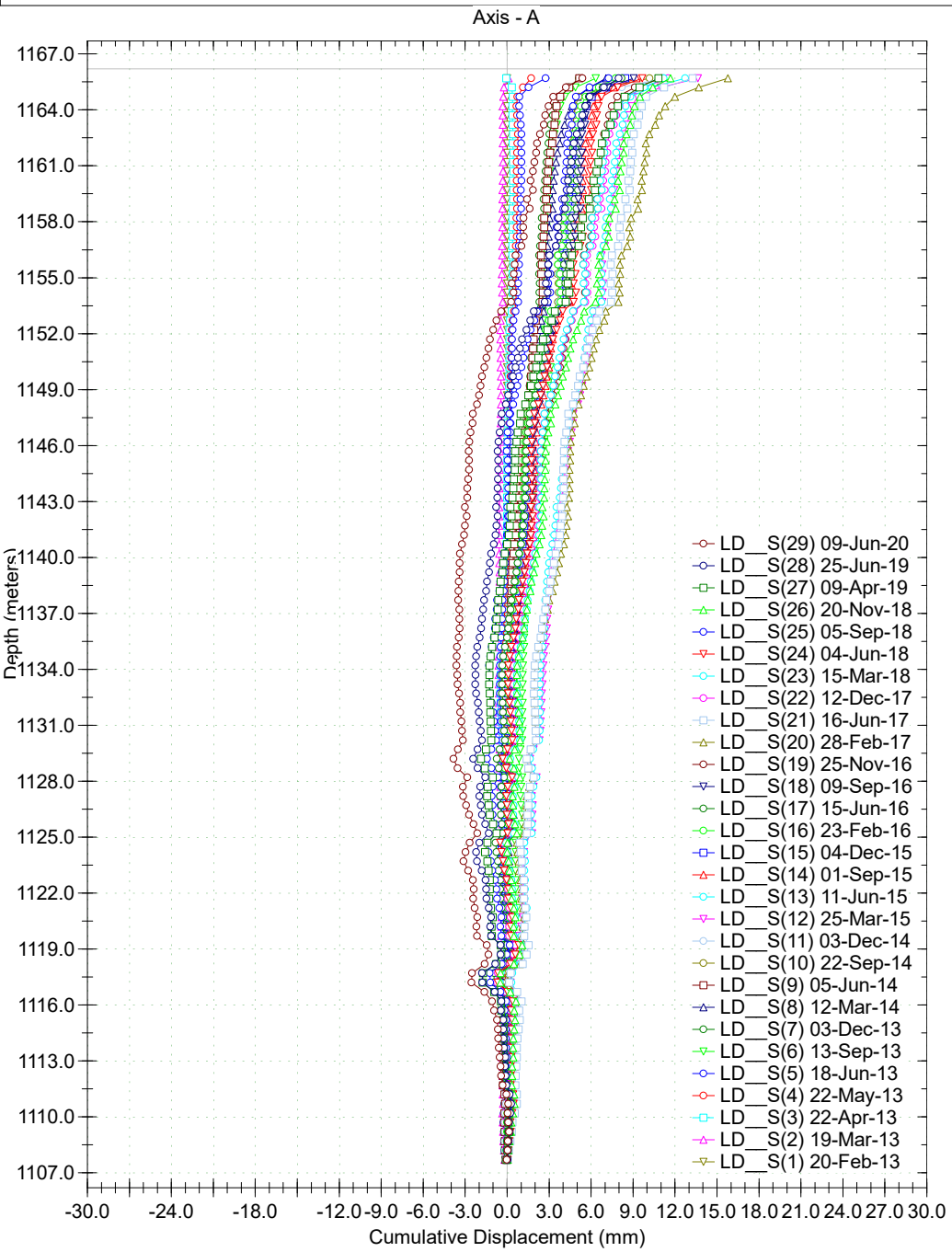
RST Instruments Ltd.

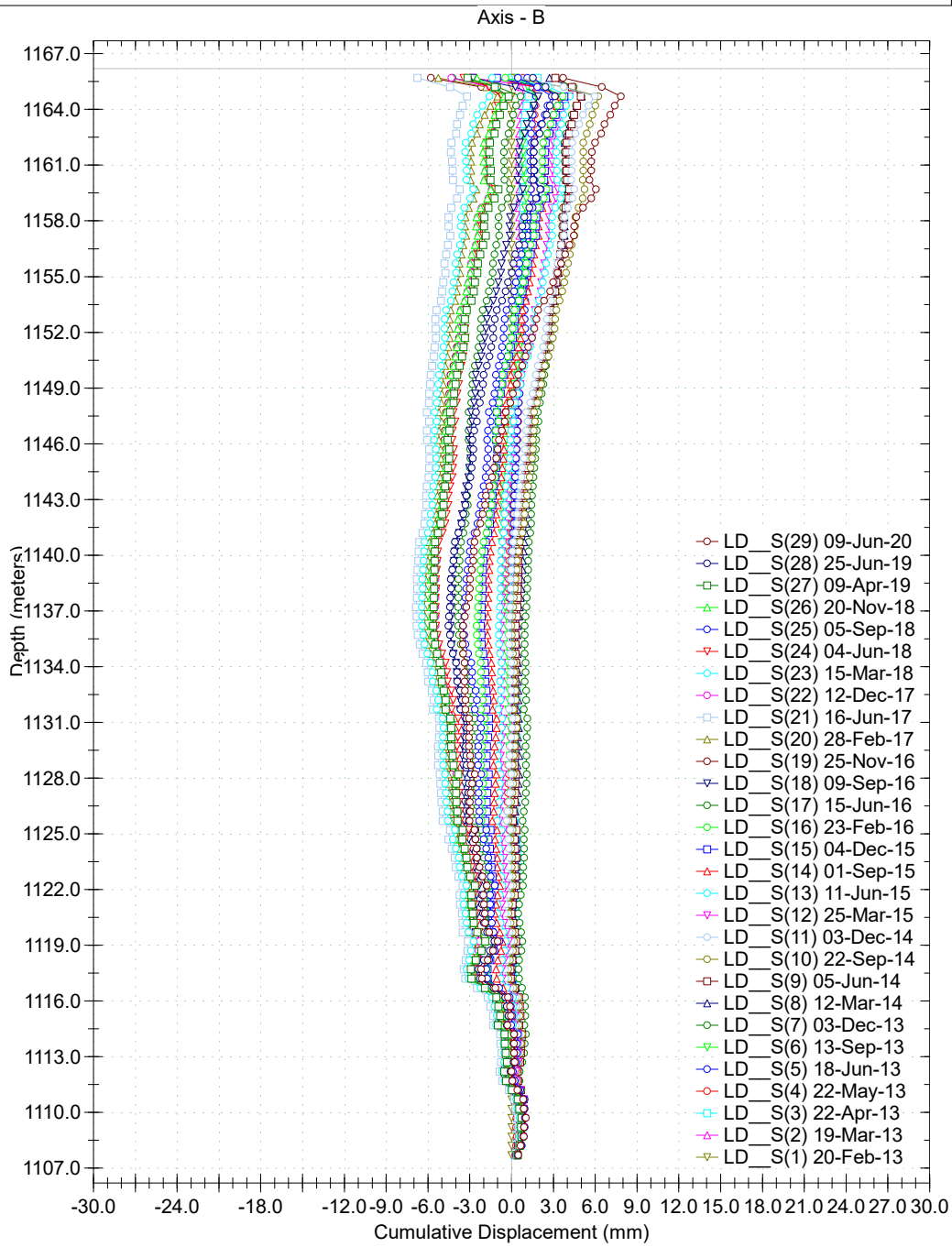
CUMULATIVE DISPLACEMENT

Inclinalysis v. 2.48.7

Borehole : Lagoon D_S
Project : Lagoon D
Location :
Northing : 51686.162
Easting : 14556.423
Collar : 1166.162

Spiral Correction : N/A
Collar Elevation : :1166.20 meters
Reading Depth : 58.5 meters
A+ Groove Azimuth : 214
Base Reading : 2013 Feb 20 12:51
Applied Azimuth : 214.0 degrees





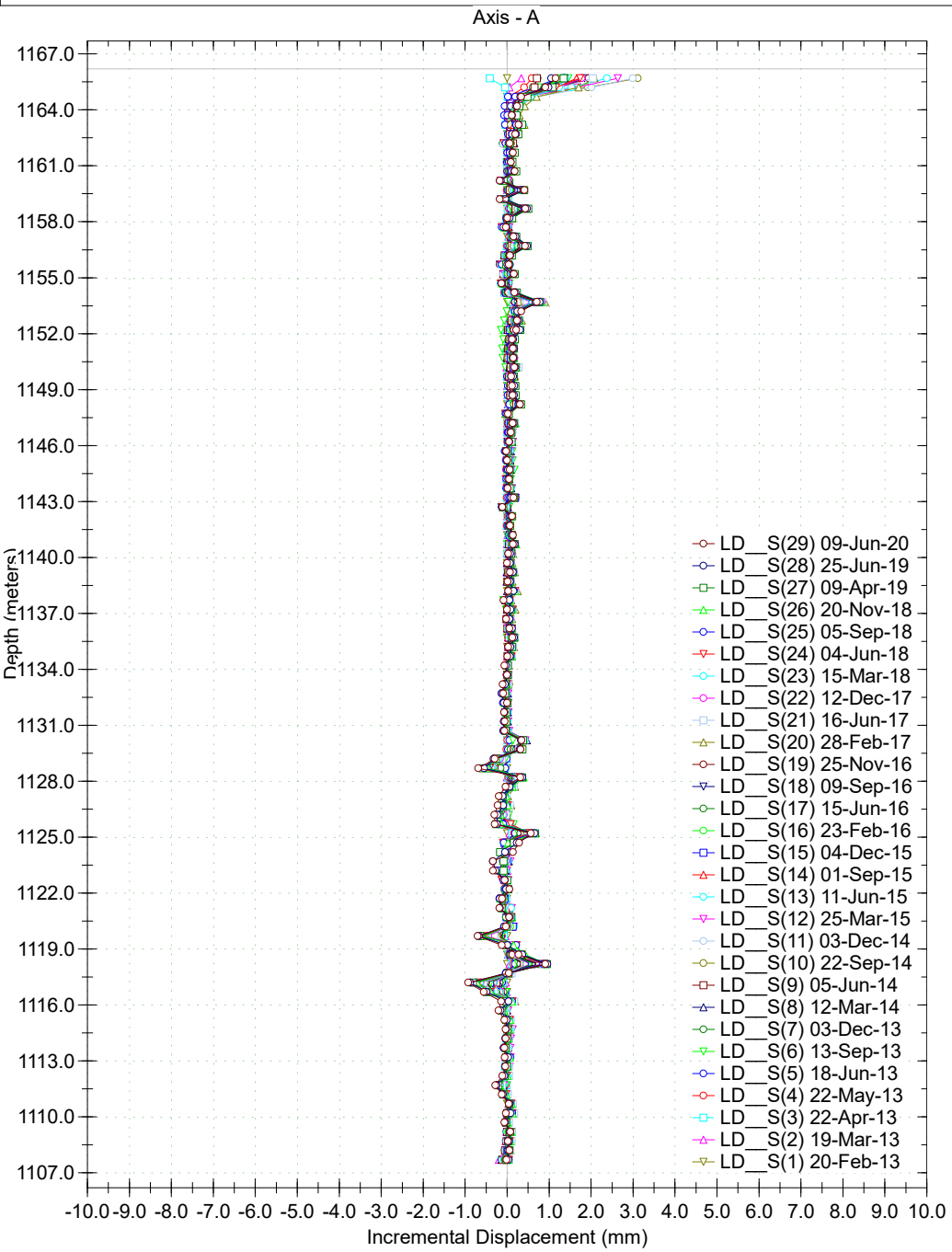
RST Instruments Ltd.

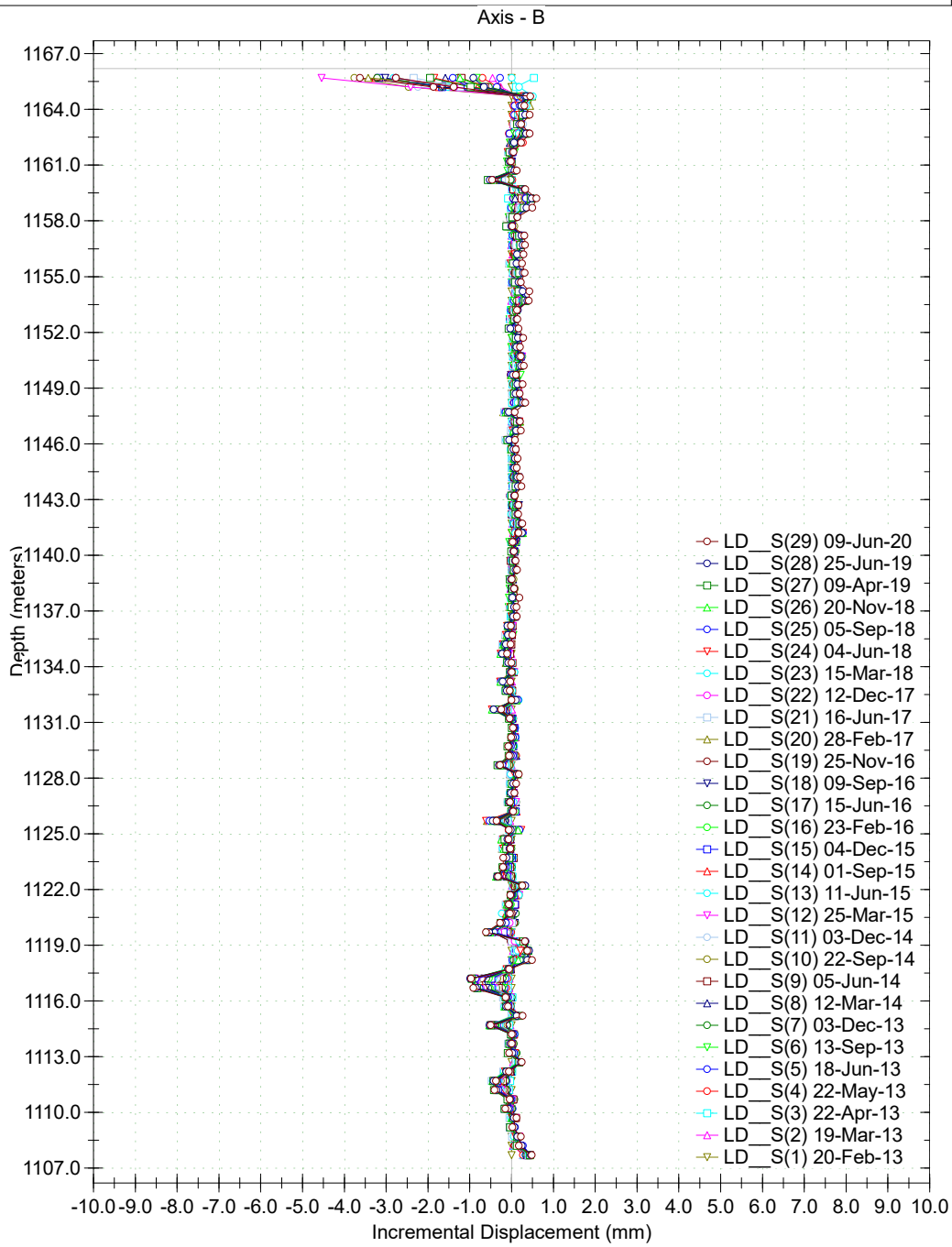
INCREMENTAL DISPLACEMENT

Inclinalysis v. 2.48.7

Borehole : Lagoon D_S
Project : Lagoon D
Location :
Northing : 51686.162
Easting : 14556.423
Collar : 1166.162

Spiral Correction : N/A
Collar Elevation : :1166.20 meters
Reading Depth : 58.5 meters
A+ Groove Azimuth : 214
Base Reading : 2013 Feb 20 12:51
Applied Azimuth : 214.0 degrees





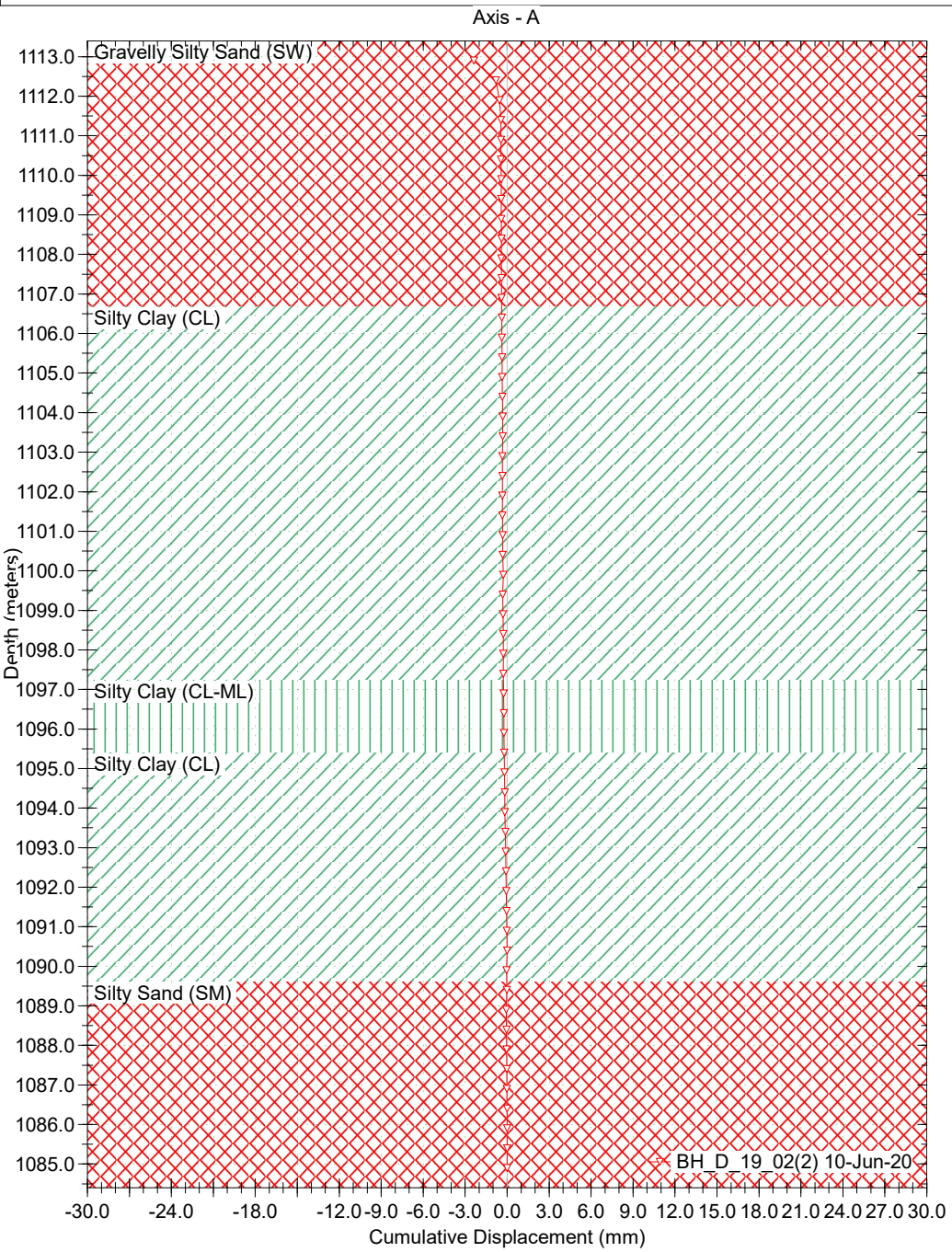
RST Instruments Ltd.

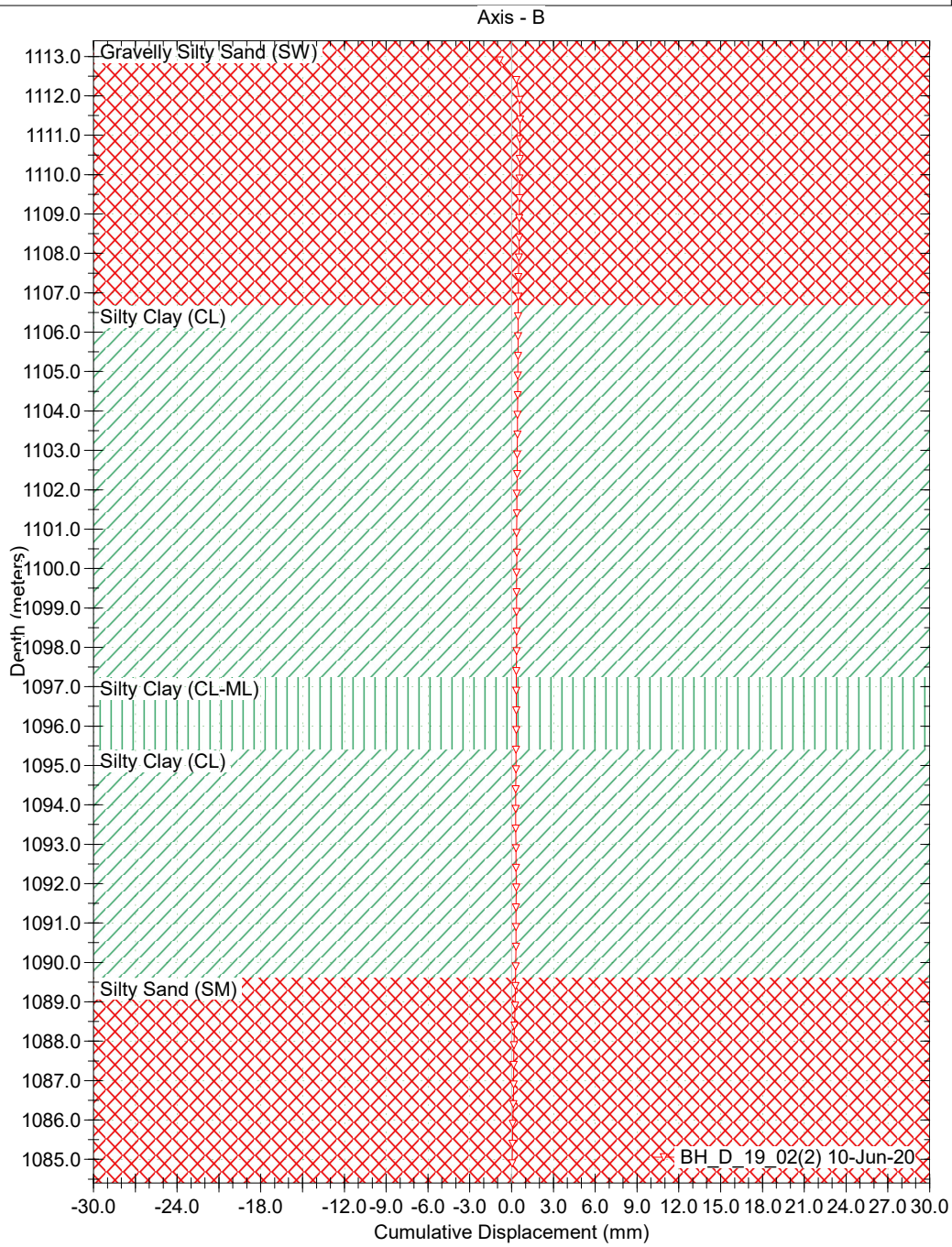
CUMULATIVE DISPLACEMENT

Inclinalysis v. 2.48.7

Borehole : BH-D-19-02
Project : Lagoon D
Location : Lagoon D
Northing : 52288.093
Easting : 14513.925
Collar : 1113.377

Spiral Correction : N/A
Colar Elevation : :1113.40 meters
Reading Depth : 28.5 meters
A+ Groove Azimuth : 326
Base Reading : 2020 May 07 13:23
Applied Azimuth : 326.0 degrees





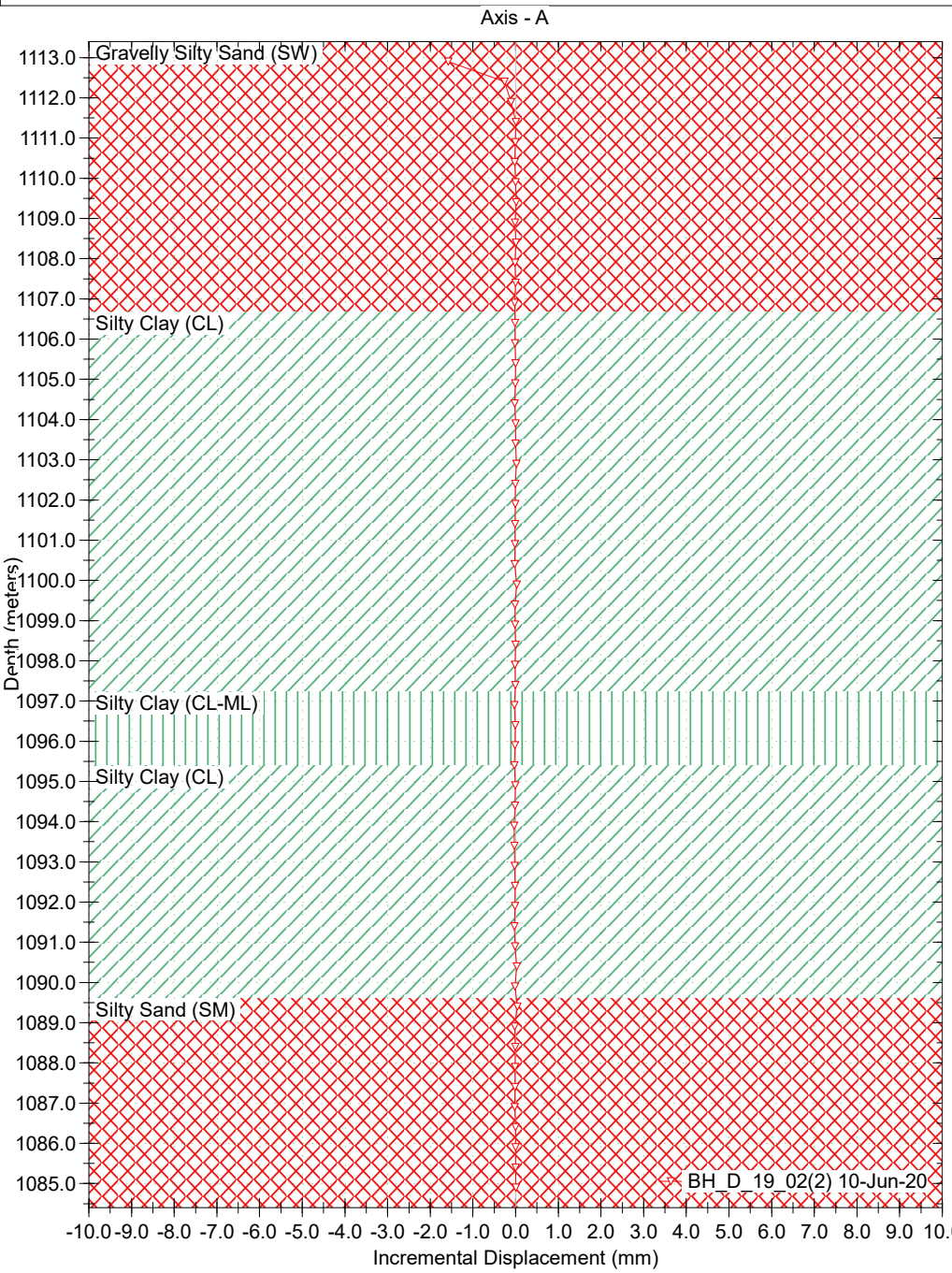
RST Instruments Ltd.

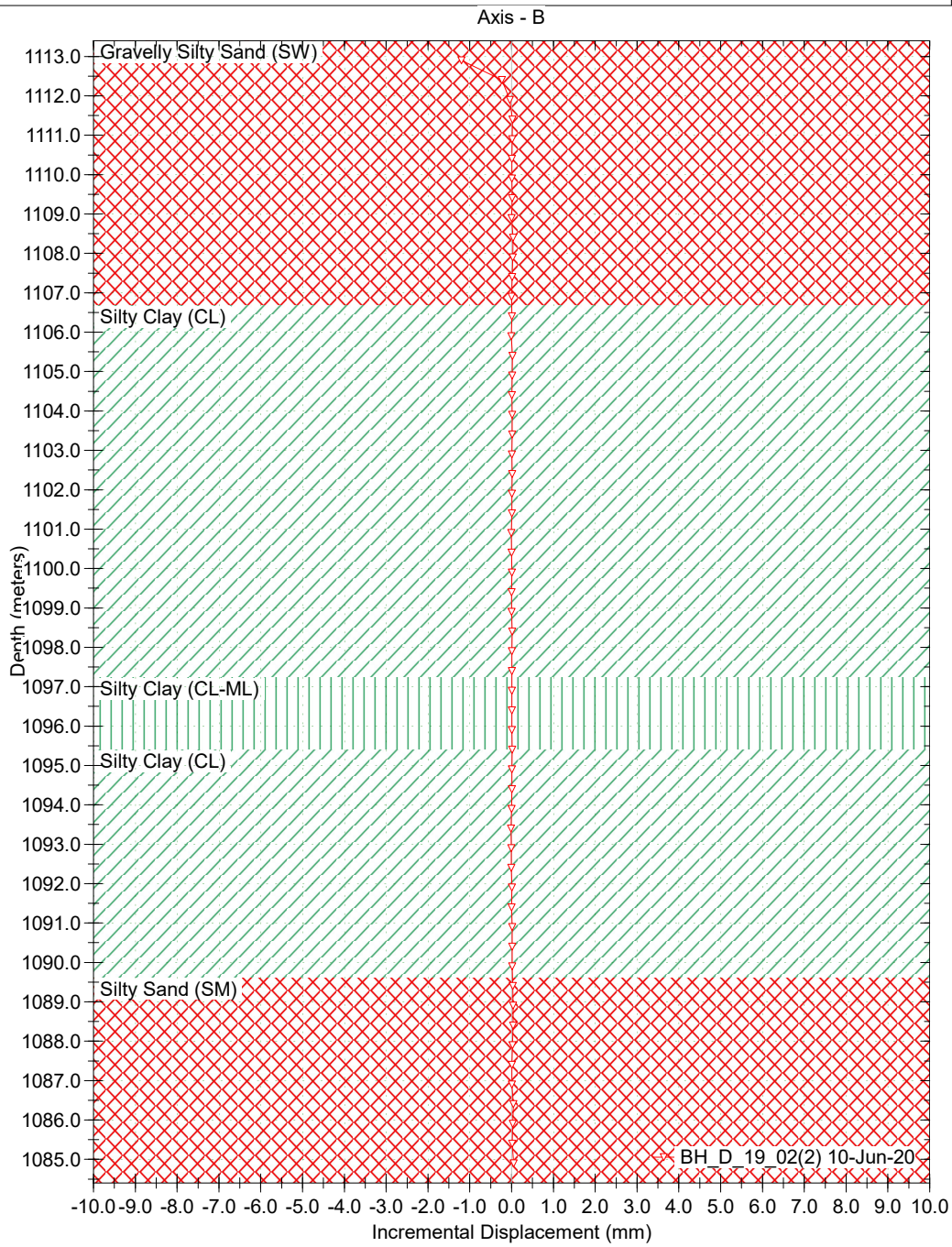
INCREMENTAL DISPLACEMENT

Inclinalysis v. 2.48.7

Borehole : BH-D-19-02
Project : Lagoon D
Location : Lagoon D
Northing : 52288.093
Easting : 14513.925
Collar : 1113.377

Spiral Correction : N/A
Colar Elevation : :1113.40 meters
Reading Depth : 28.5 meters
A+ Groove Azimuth : 326
Base Reading : 2020 May 07 13:23
Applied Azimuth : 326.0 degrees





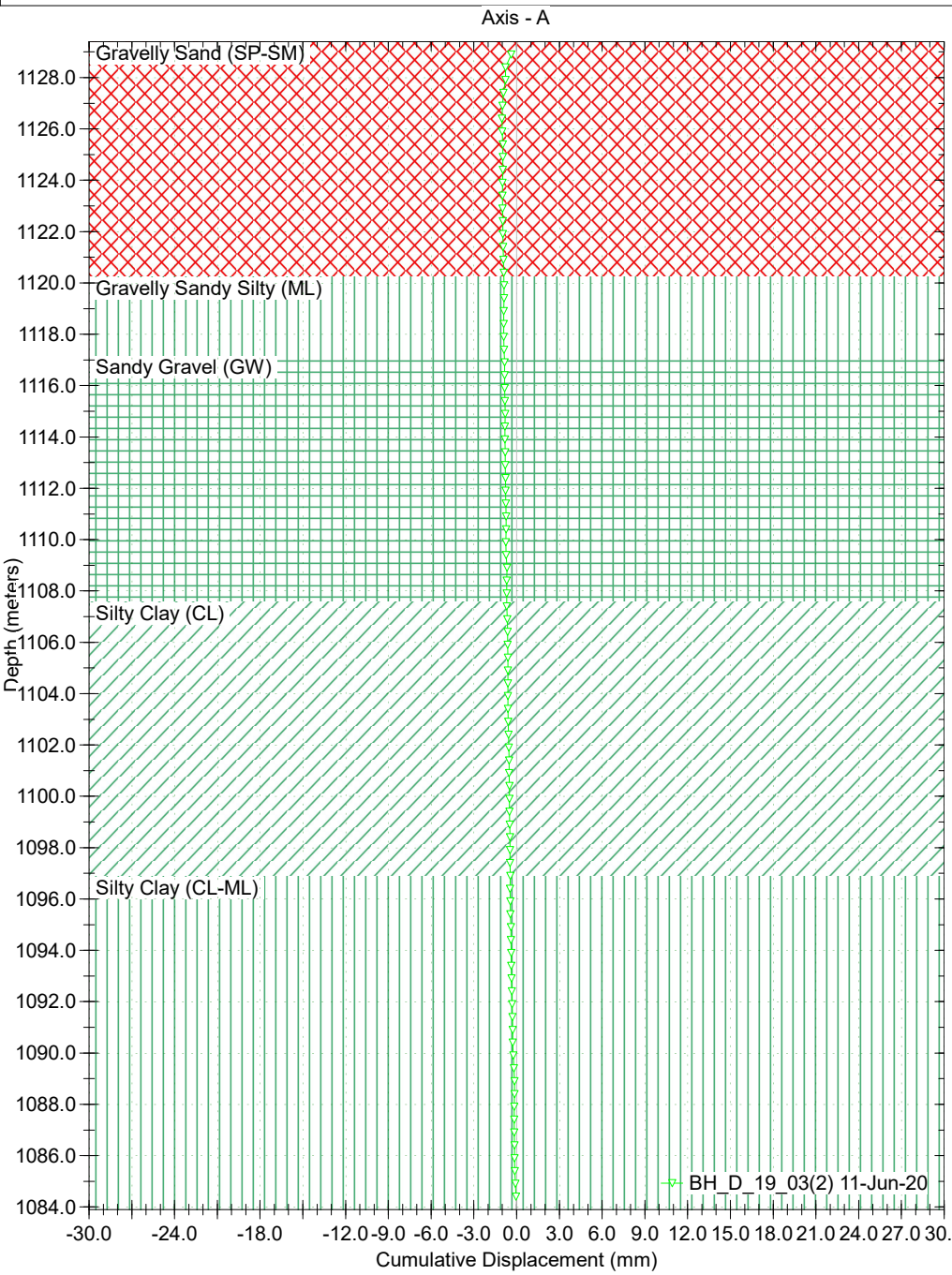
RST Instruments Ltd.

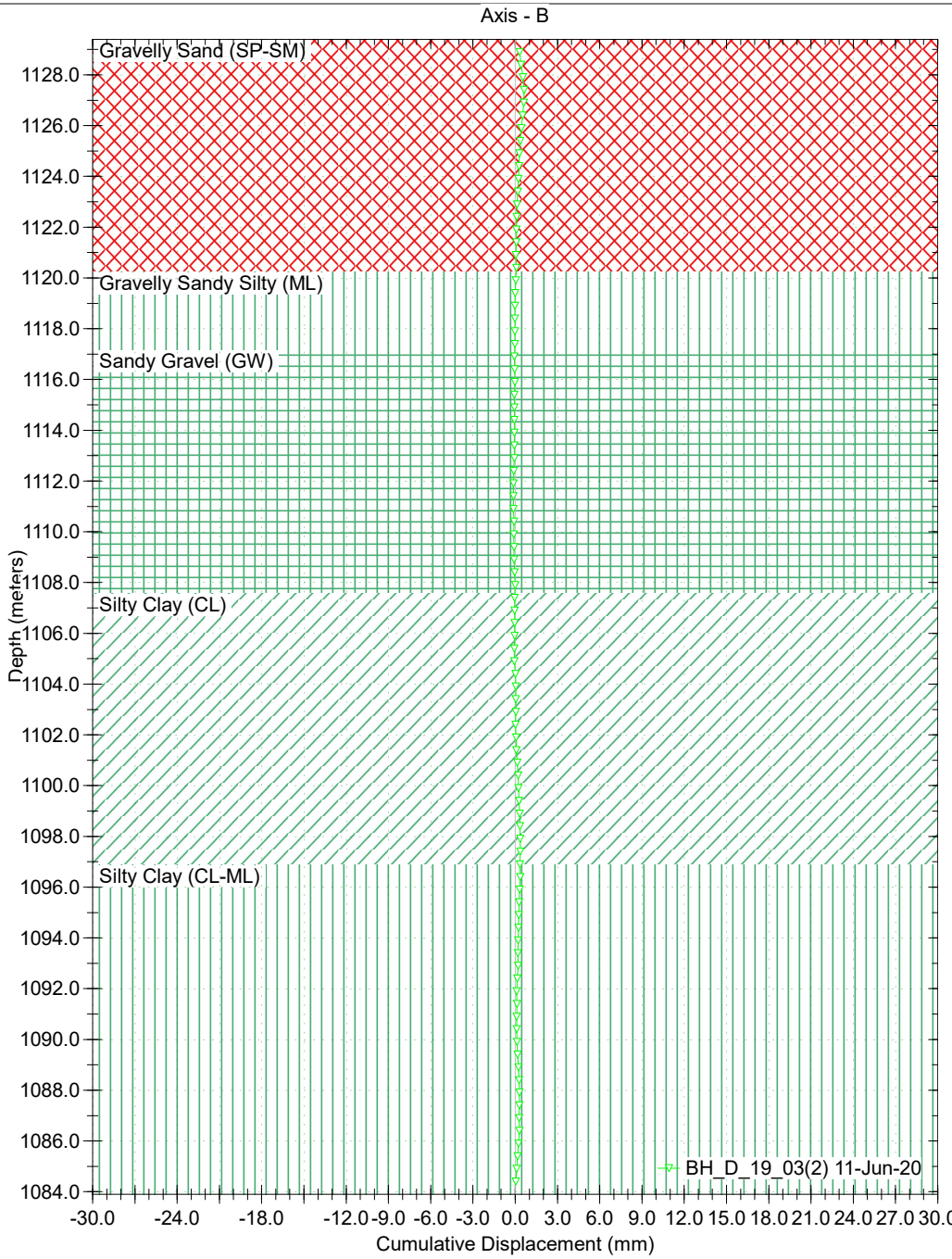
CUMULATIVE DISPLACEMENT

Inclinalysis v. 2.48.7

Borehole : BH-D-19-03
Project : Lagoon D
Location : Lagoon D
Northing : 52229.439
Easting : 14381.767
Collar : 1129.356

Spiral Correction : N/A
Colar Elevation : :1129.40 meters
Reading Depth : 45.0 meters
A+ Groove Azimuth : 001
Base Reading : 2020 May 07 14:23
Applied Azimuth : 1.0 degrees





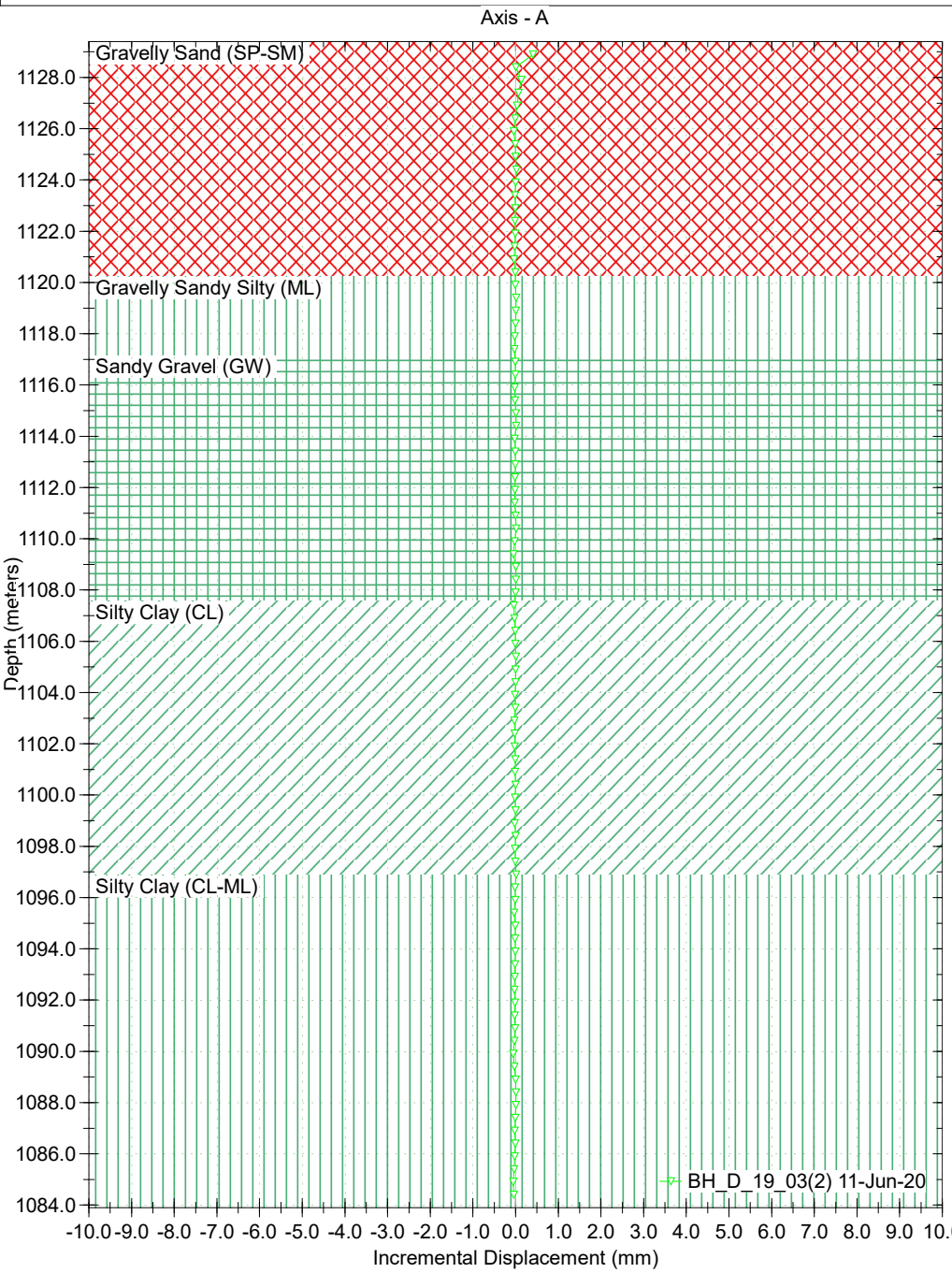
RST Instruments Ltd.

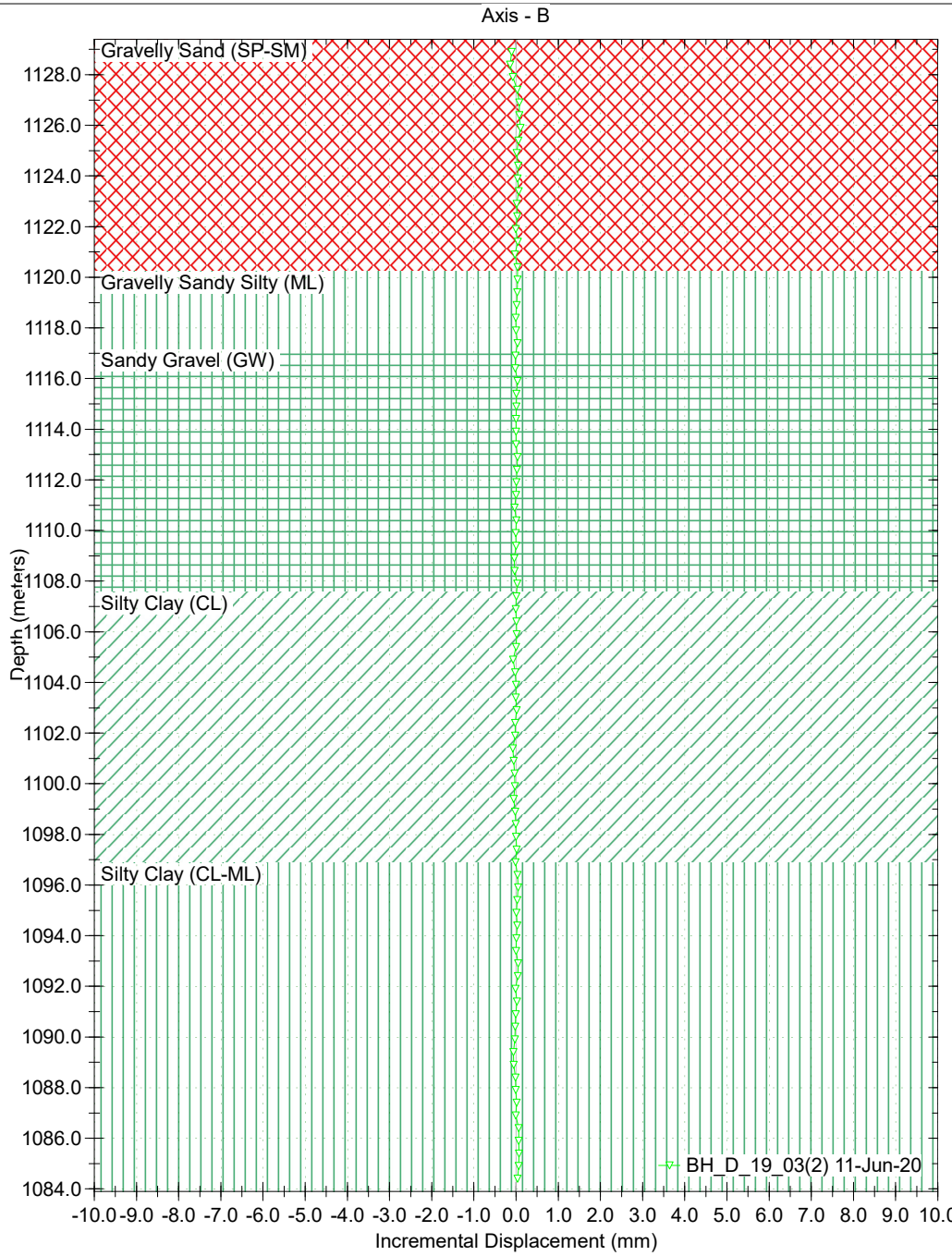
INCREMENTAL DISPLACEMENT

Inclinalysis v. 2.48.7

Borehole : BH-D-19-03
Project : Lagoon D
Location : Lagoon D
Northing : 52229.439
Easting : 14381.767
Collar : 1129.356

Spiral Correction : N/A
Colar Elevation : :1129.40 meters
Reading Depth : 45.0 meters
A+ Groove Azimuth : 001
Base Reading : 2020 May 07 14:23
Applied Azimuth : 1.0 degrees





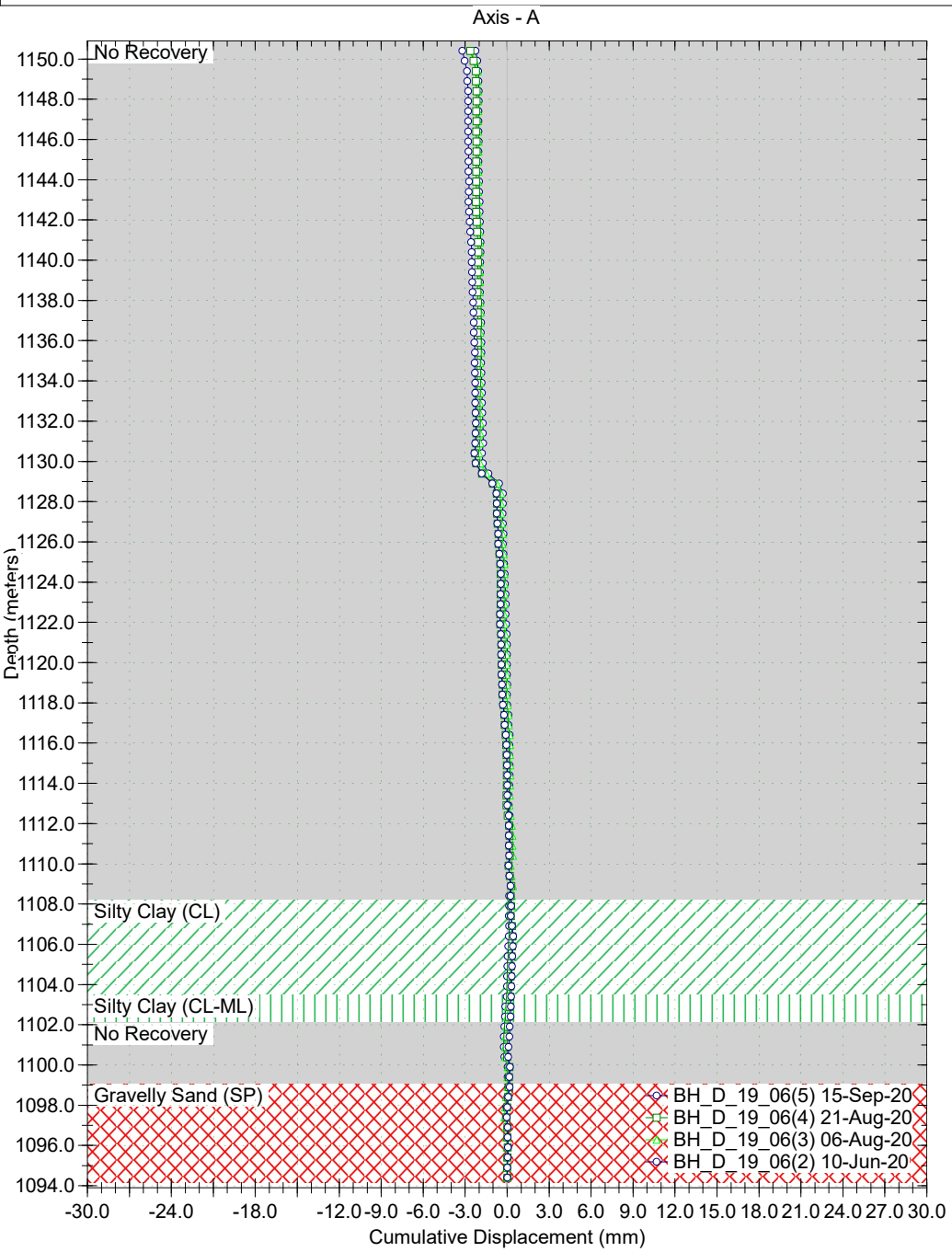
RST Instruments Ltd.

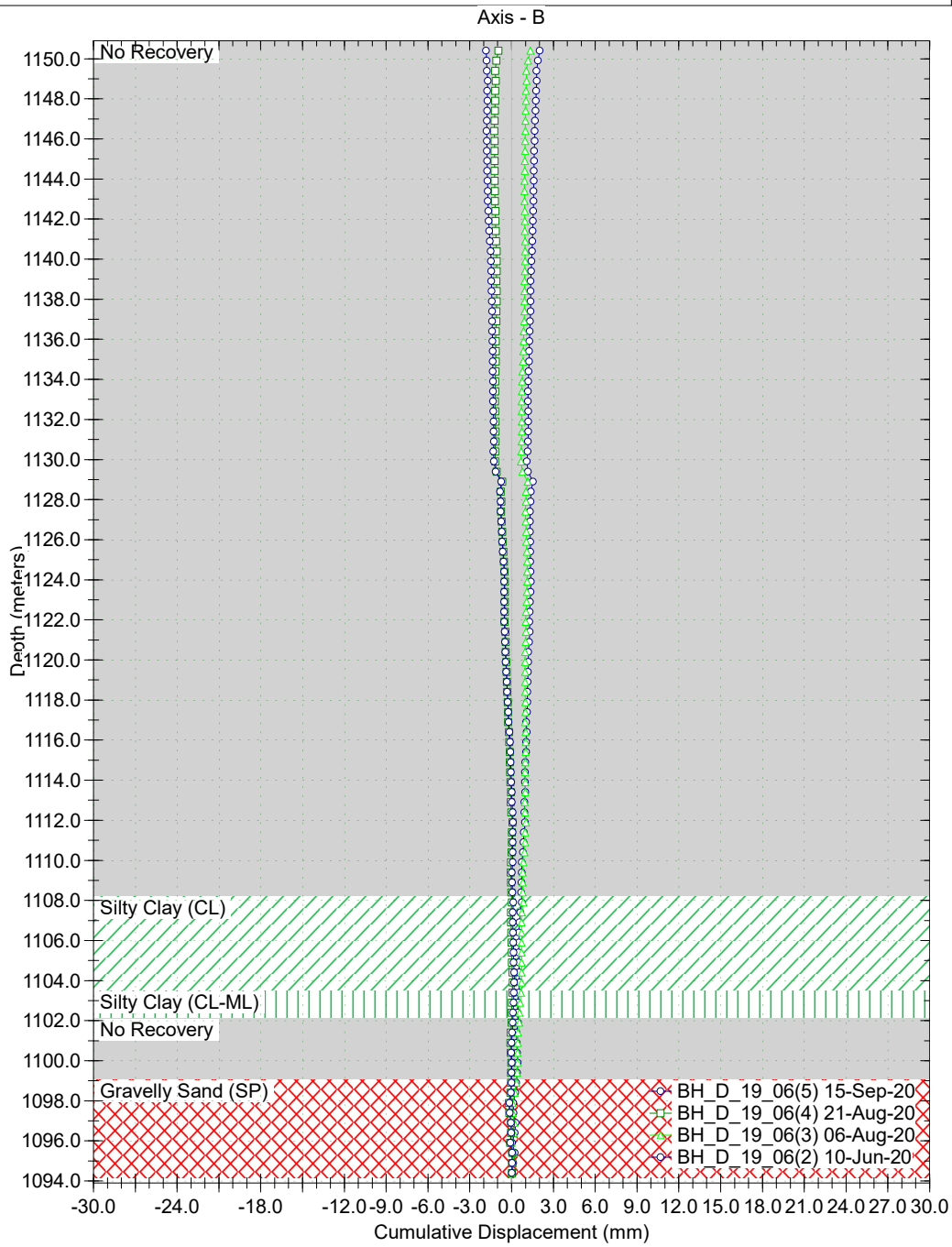
CUMULATIVE DISPLACEMENT

Inclinalysis v. 2.48.7

Borehole : BH-D-19-06
Project : Lagoon D
Location : Lagoon D
Northing : 52185.445
Easting : 14521.075
Collar : 1150.86

Spiral Correction : N/A
Colar Elevation : :1150.90 meters
Reading Depth : 56.5 meters
A+ Groove Azimuth : 302
Base Reading : 2020 May 06 12:22
Applied Azimuth : 302.0 degrees





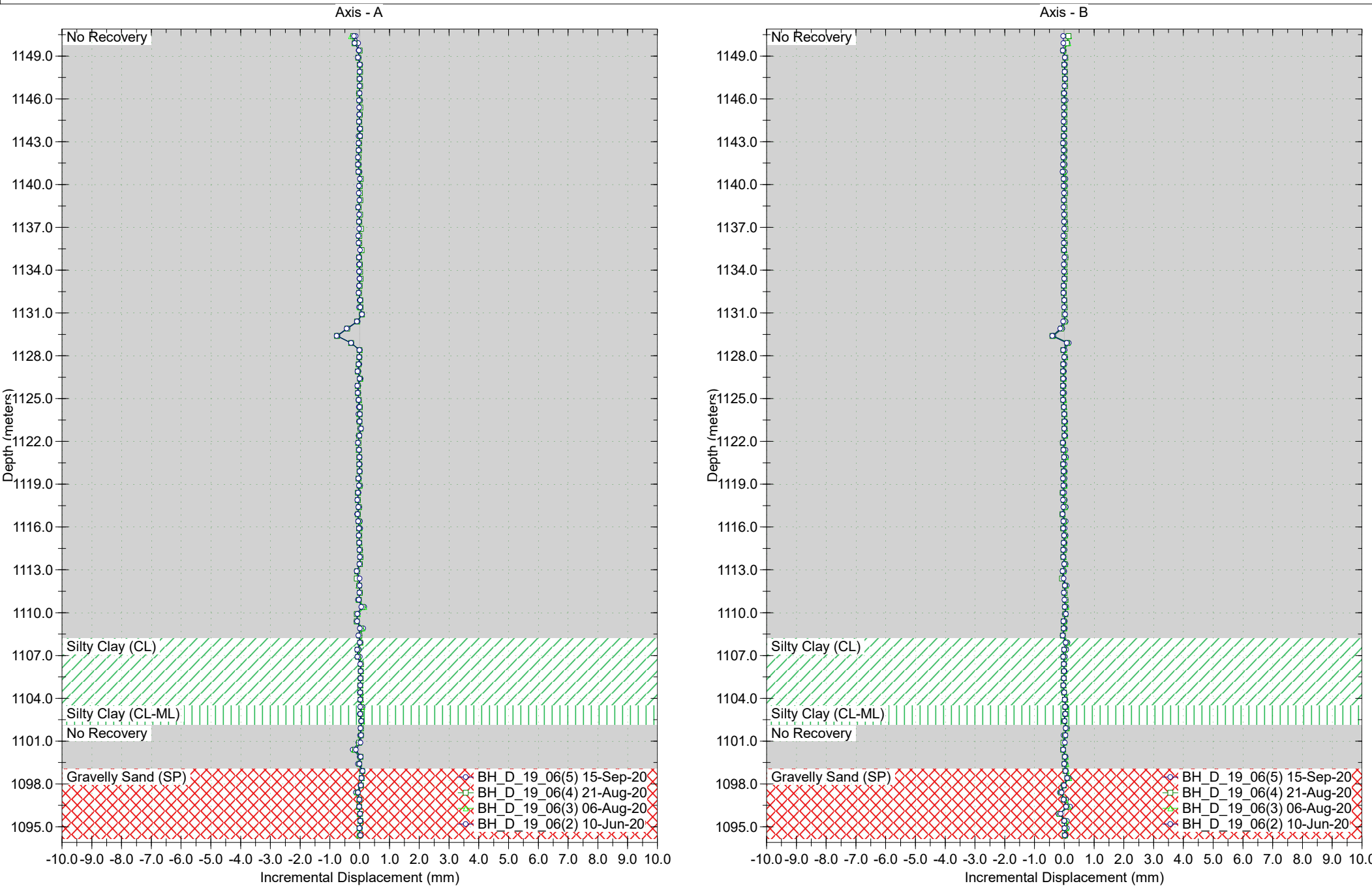
RST Instruments Ltd.

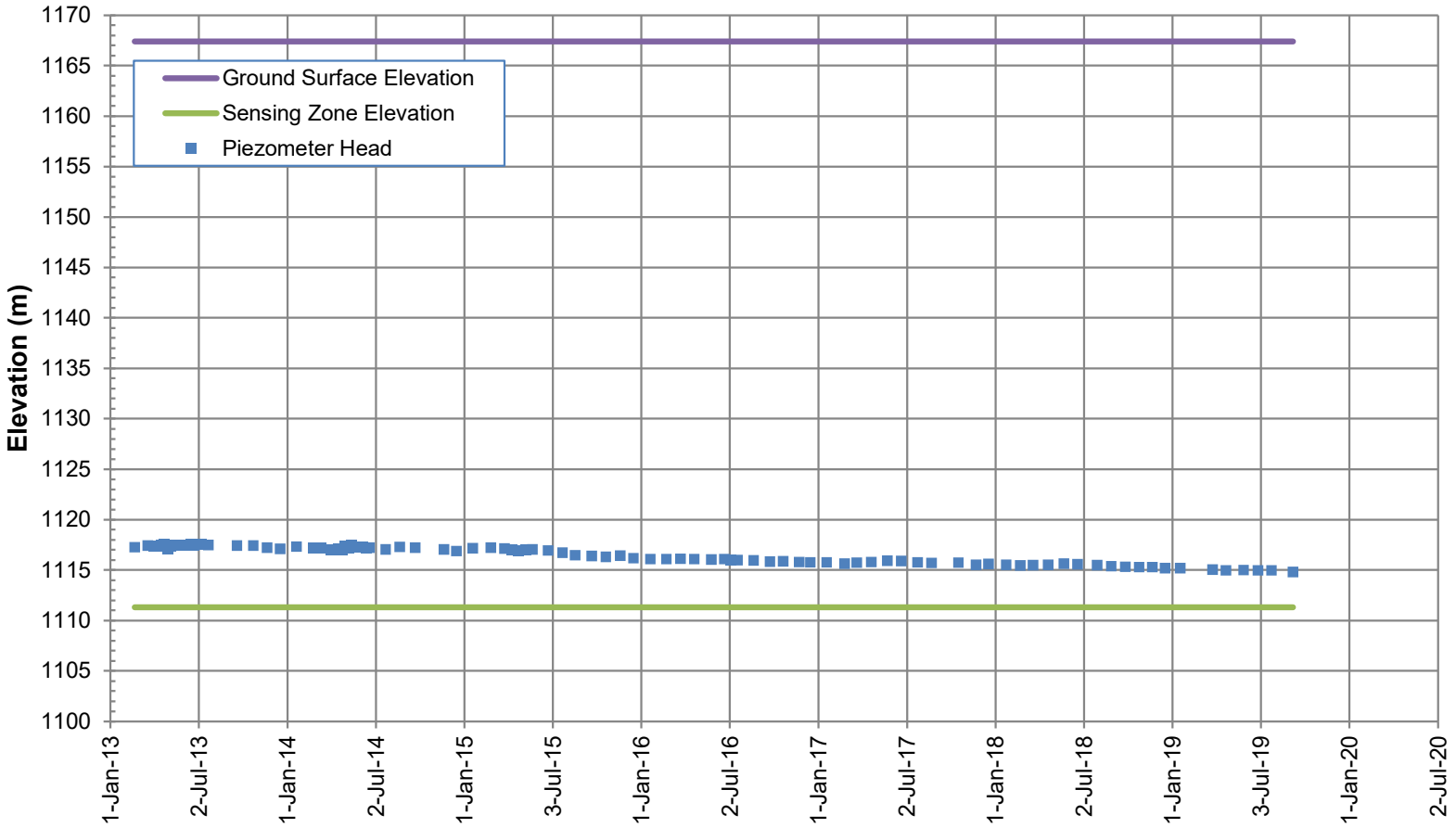
INCREMENTAL DISPLACEMENT

Inclinalysis v. 2.48.7

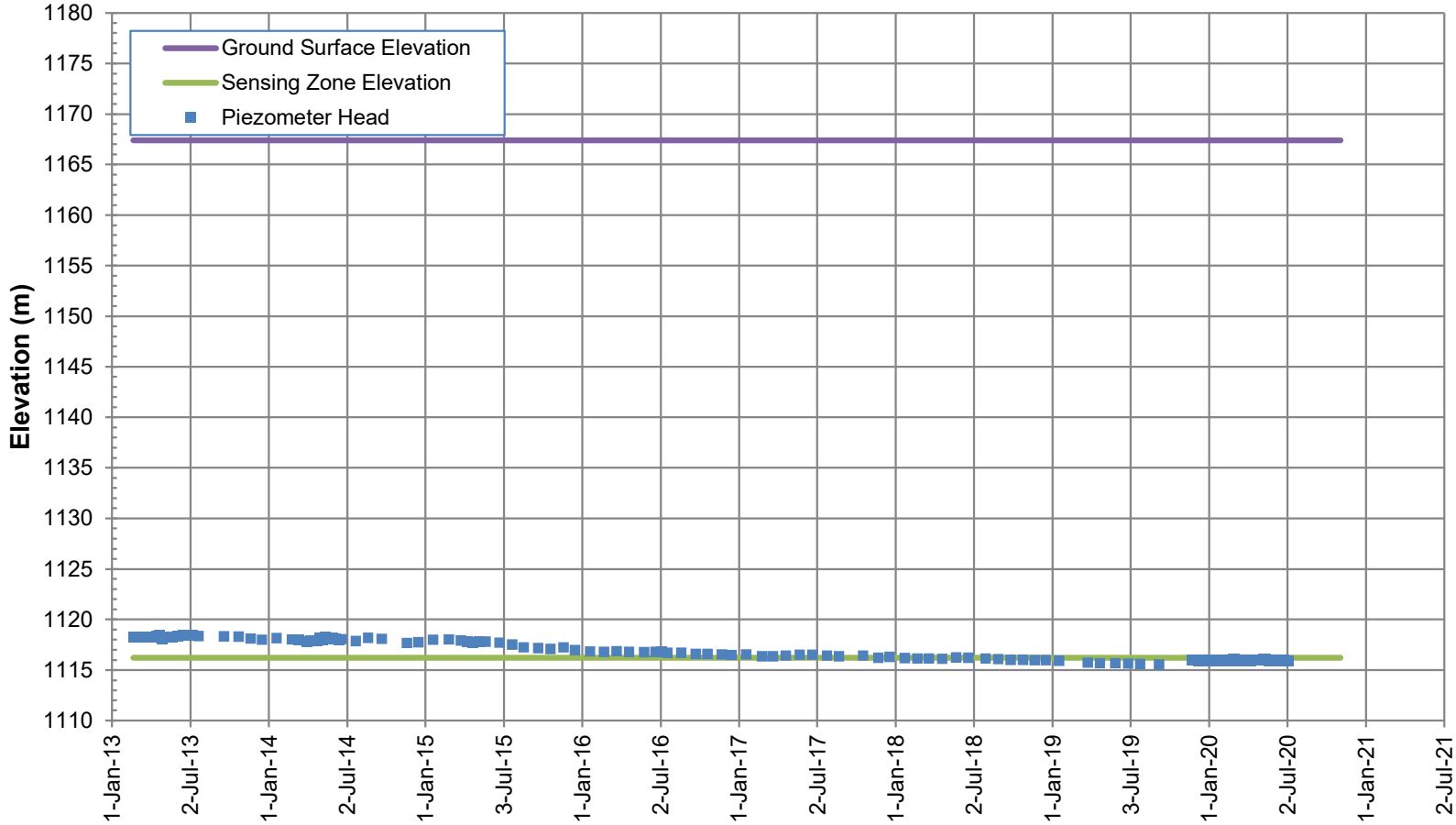
Borehole : BH-D-19-06
Project : Lagoon D
Location : Lagoon D
Northing : 52185.445
Easting : 14521.075
Collar : 1150.86

Spiral Correction : N/A
Colar Elevation : :1150.90 meters
Reading Depth : 56.5 meters
A+ Groove Azimuth : 302
Base Reading : 2020 May 06 12:22
Applied Azimuth : 302.0 degrees

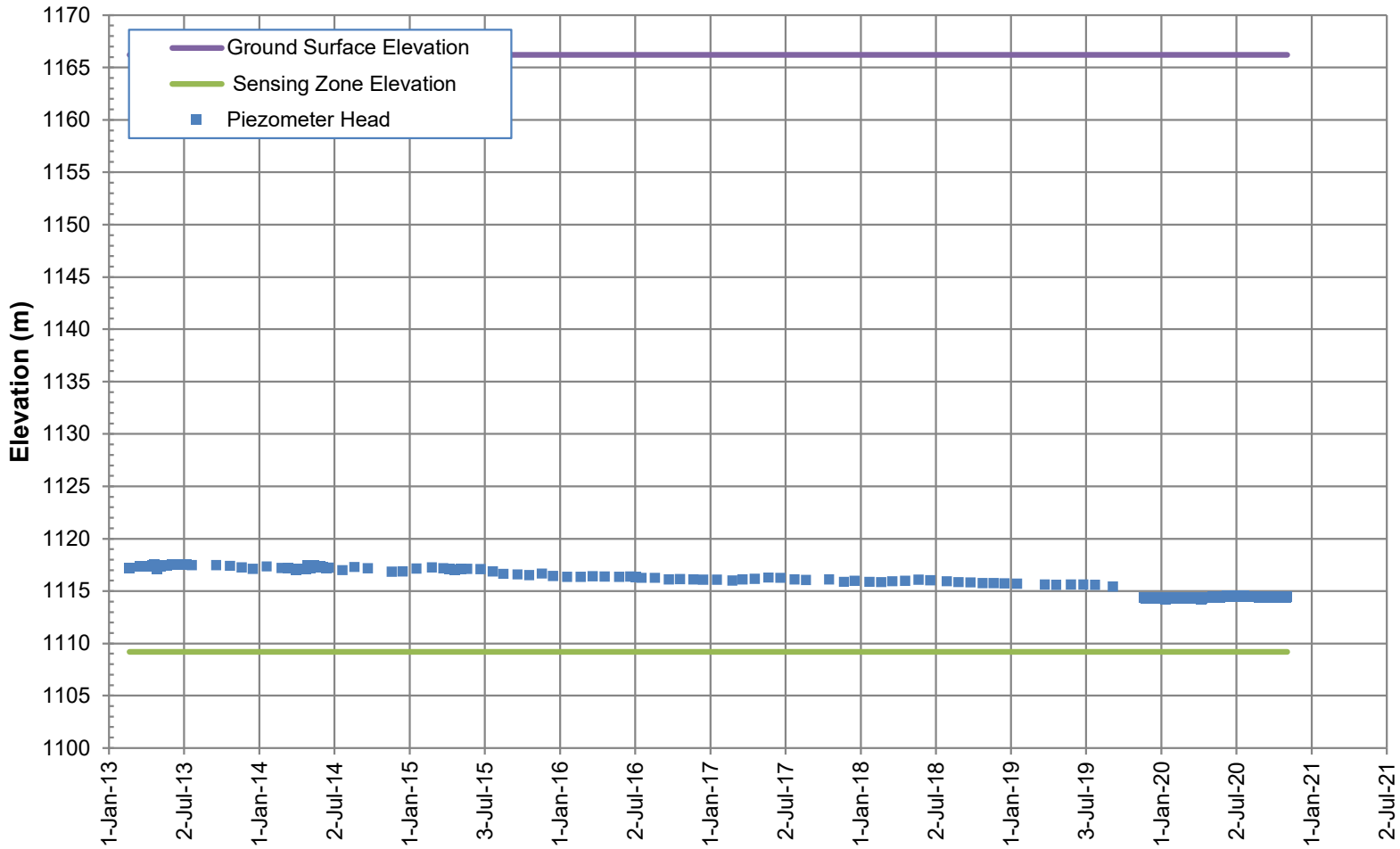




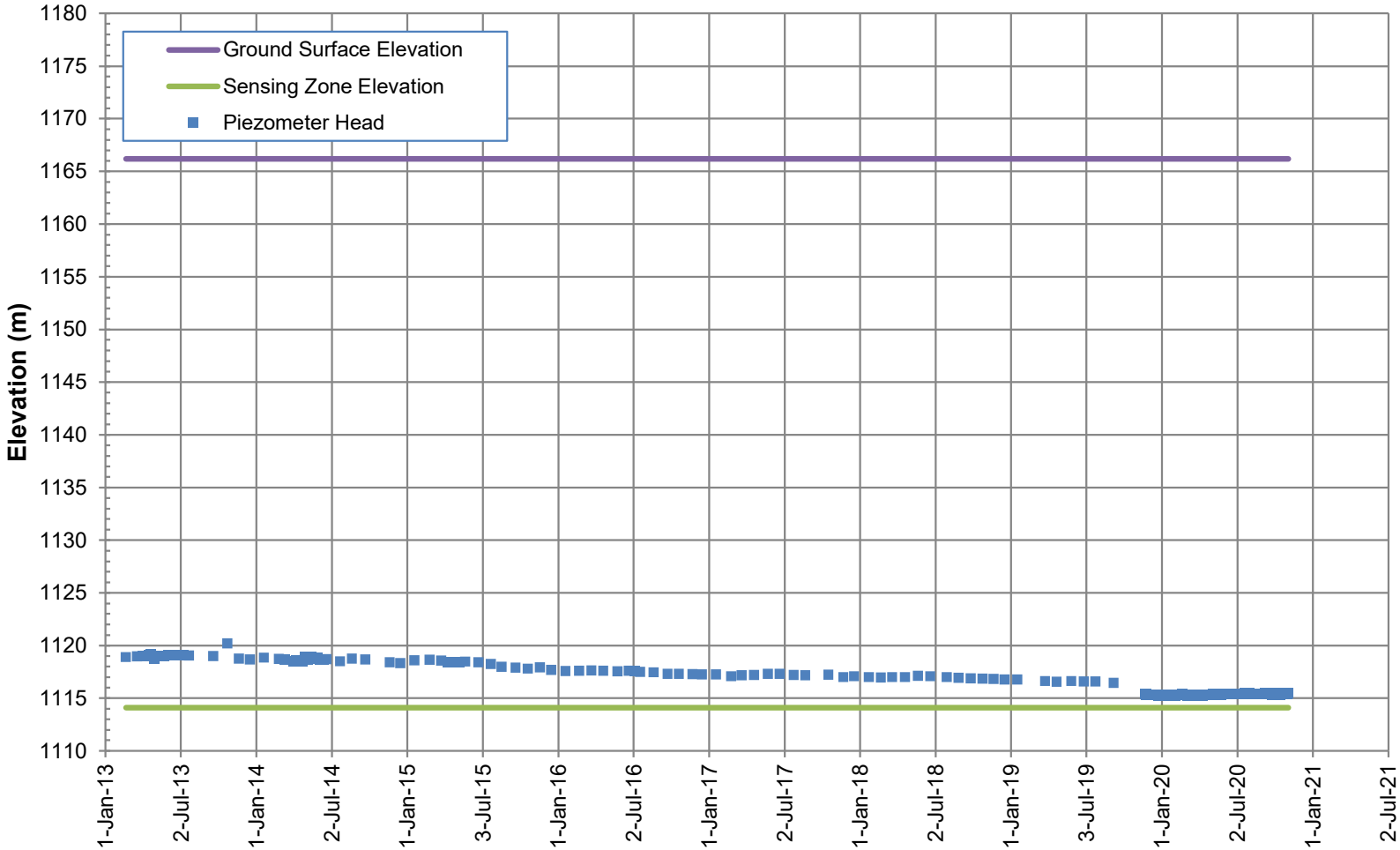
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
VW 23897 Pore Pressure	Name:	



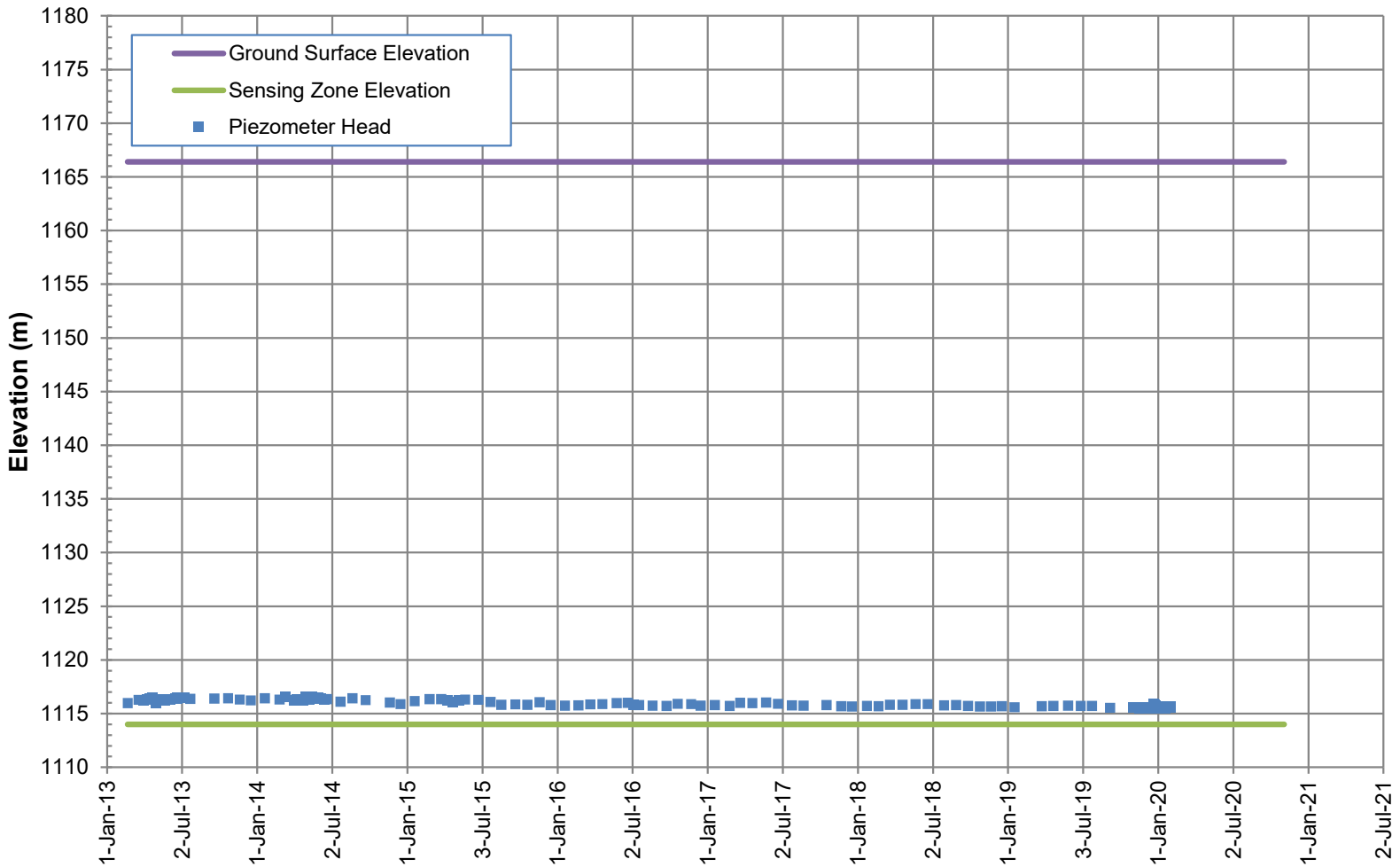
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
VW 23898 Pore Pressure	Name:	



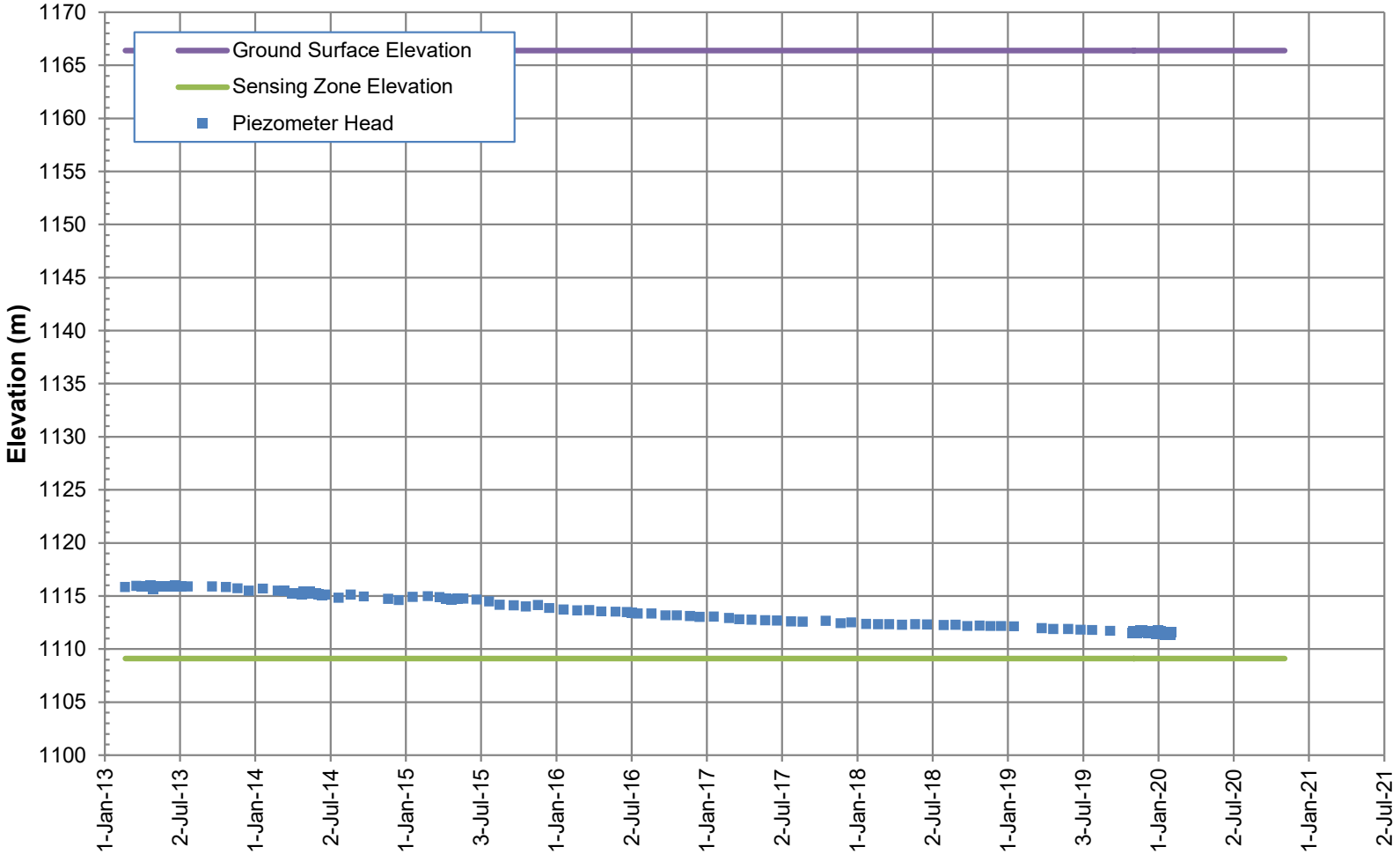
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
VW 23896 Pore Pressure	Name:	



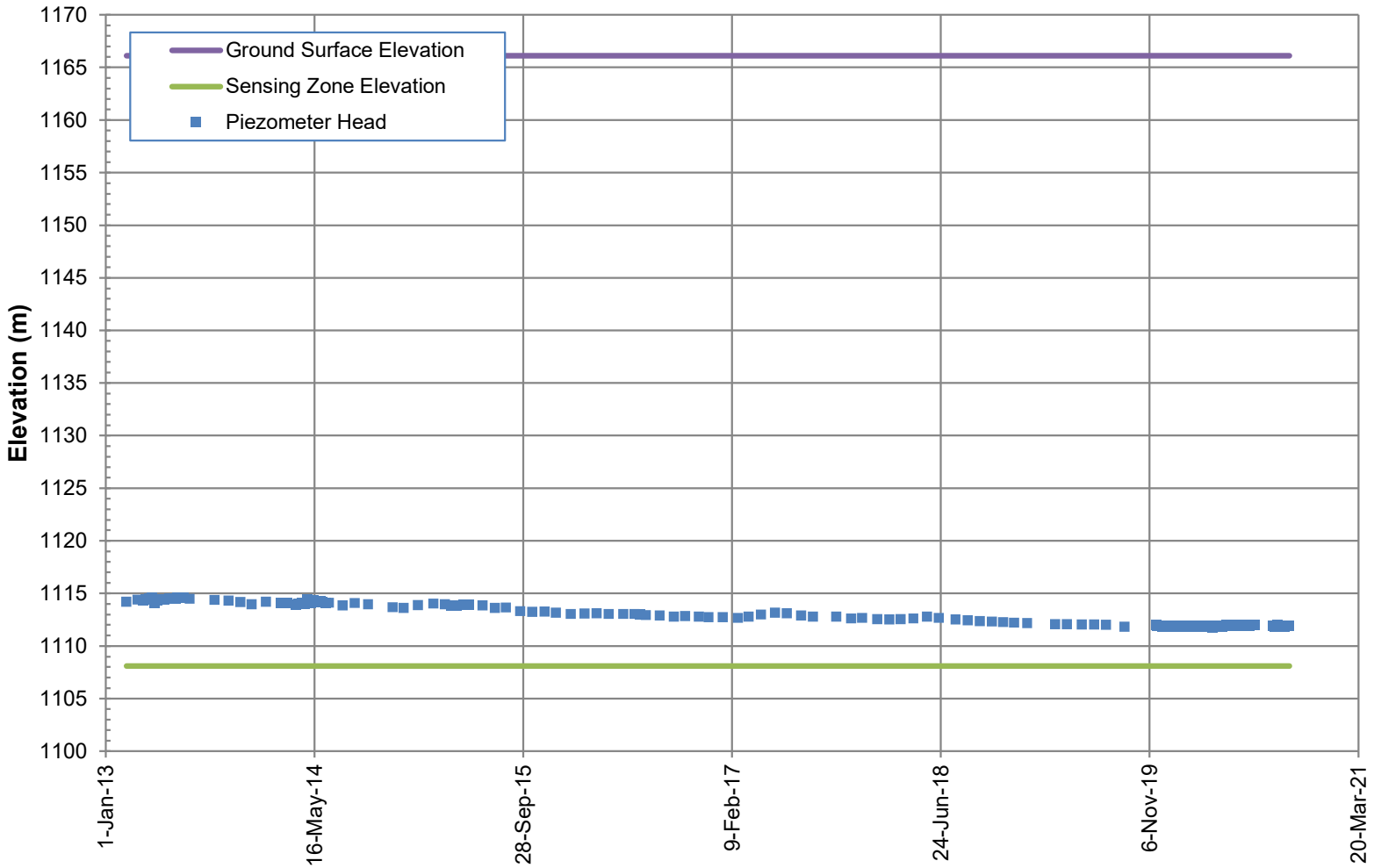
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
VW 23895 Pore Pressure	Name:	



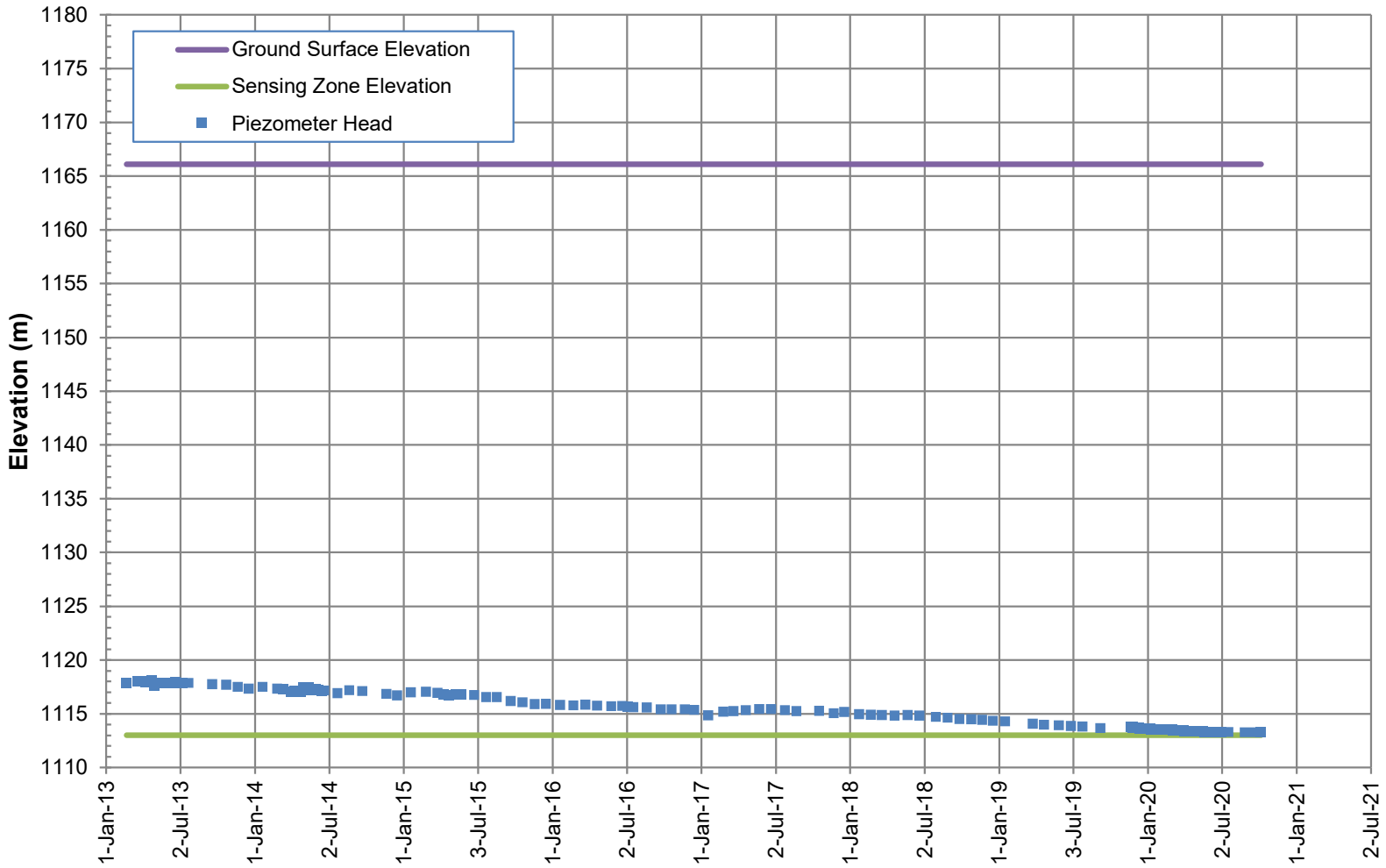
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
VW 23892 Pore Pressure	Name:	



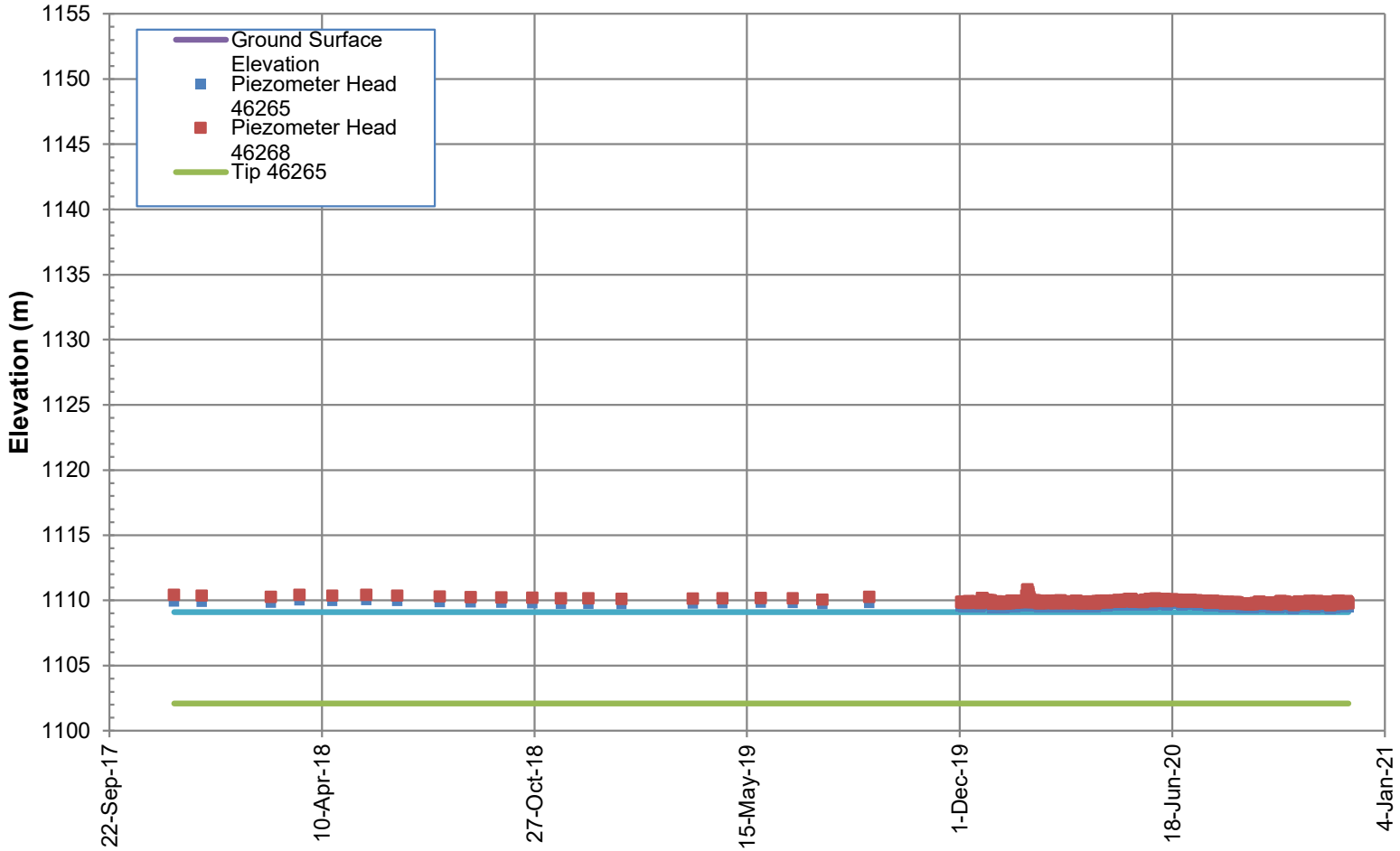
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
VW 23891 Pore Pressure	Name:	



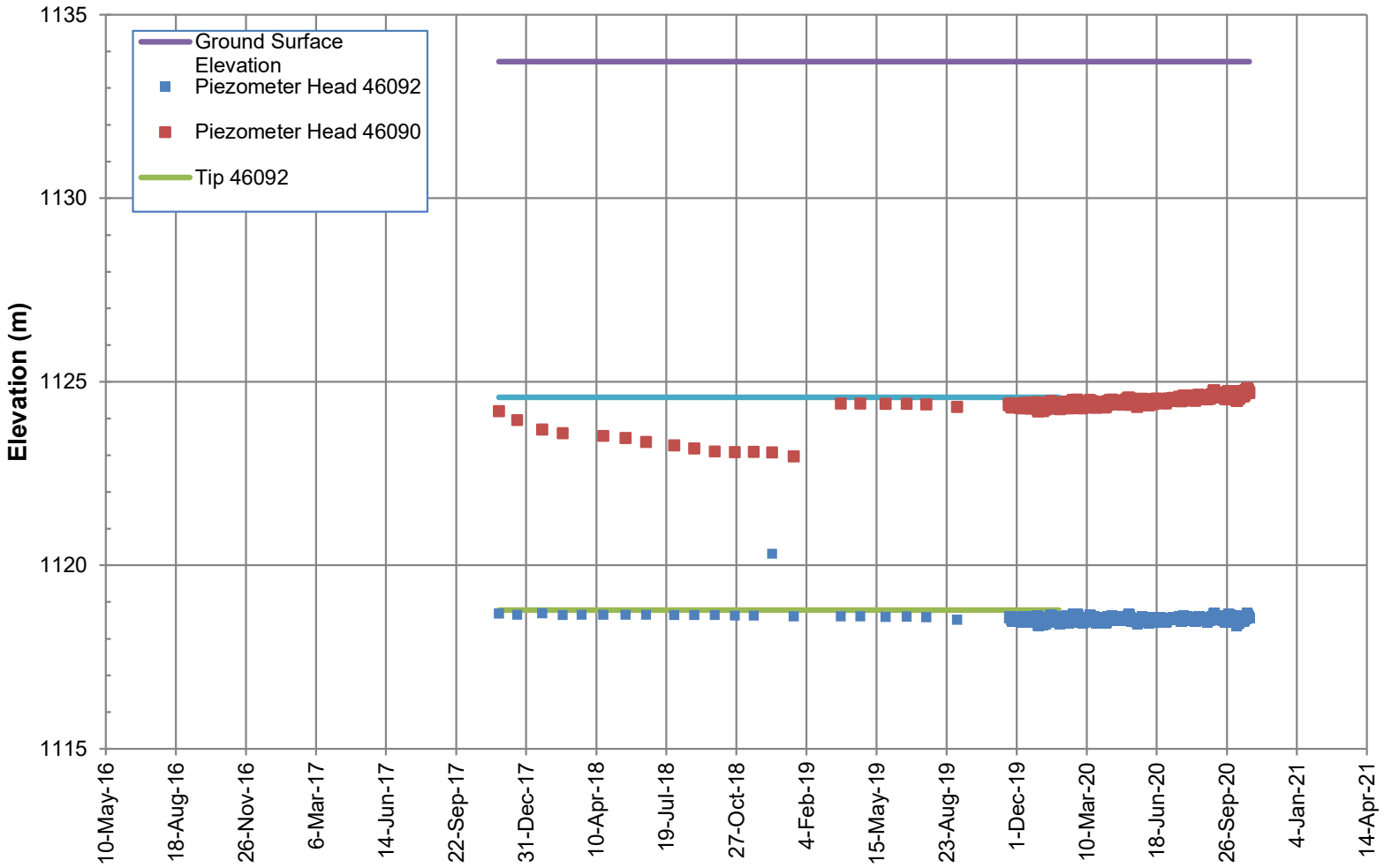
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
VW 23886 Pore Pressure	Name:	



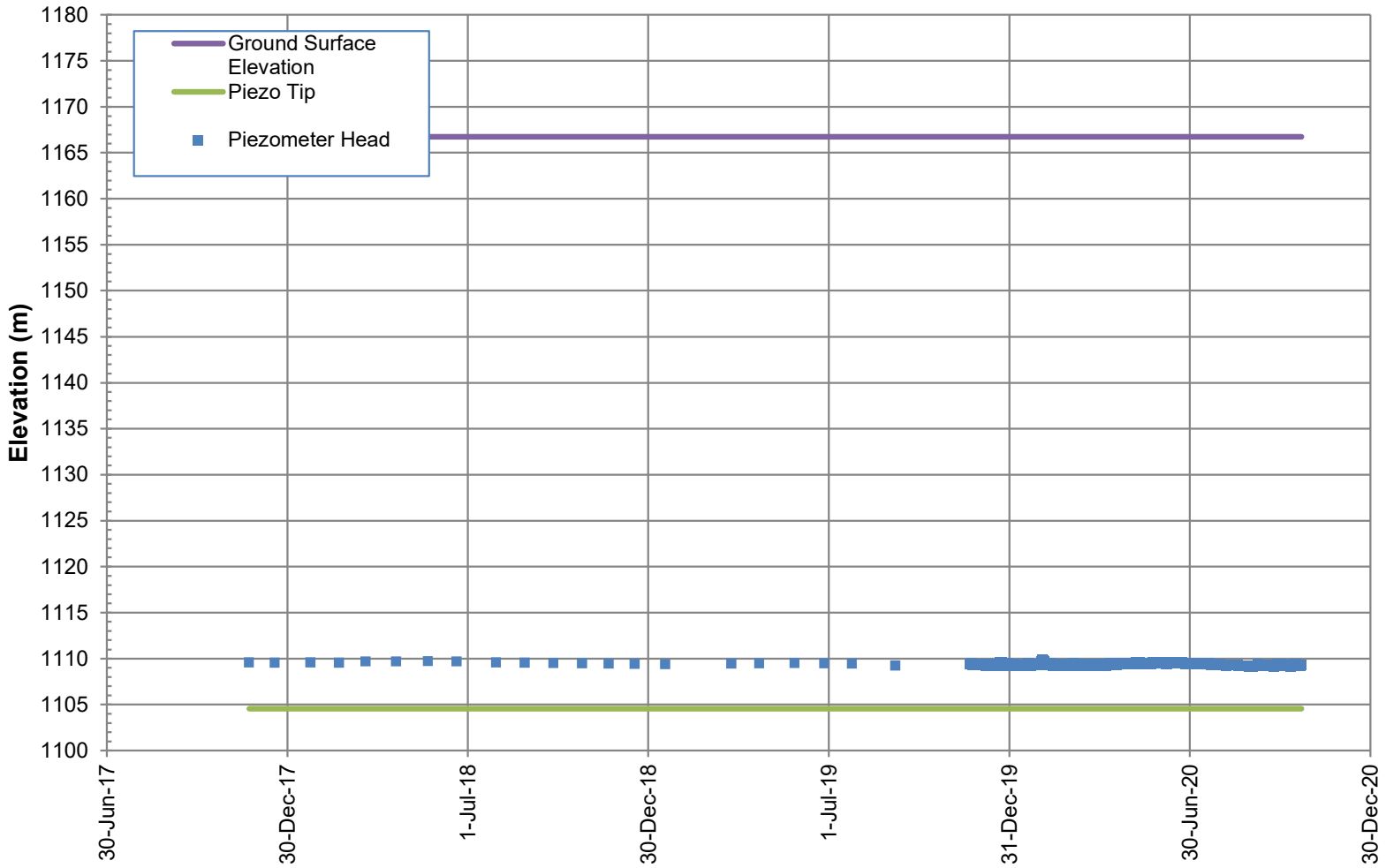
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
VW 23885 Pore Pressure	Name:	



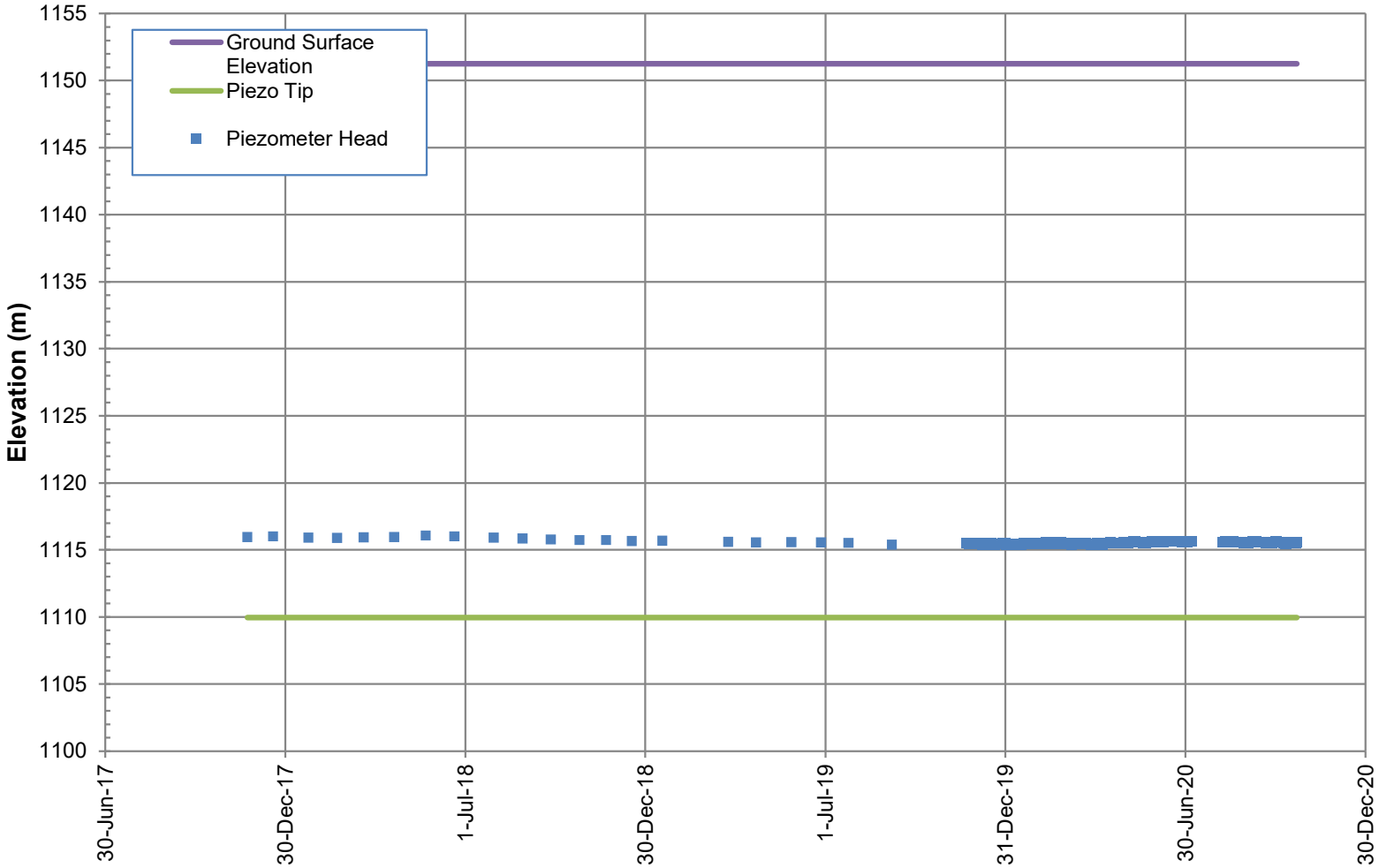
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
VW 46265/46268	Name:	



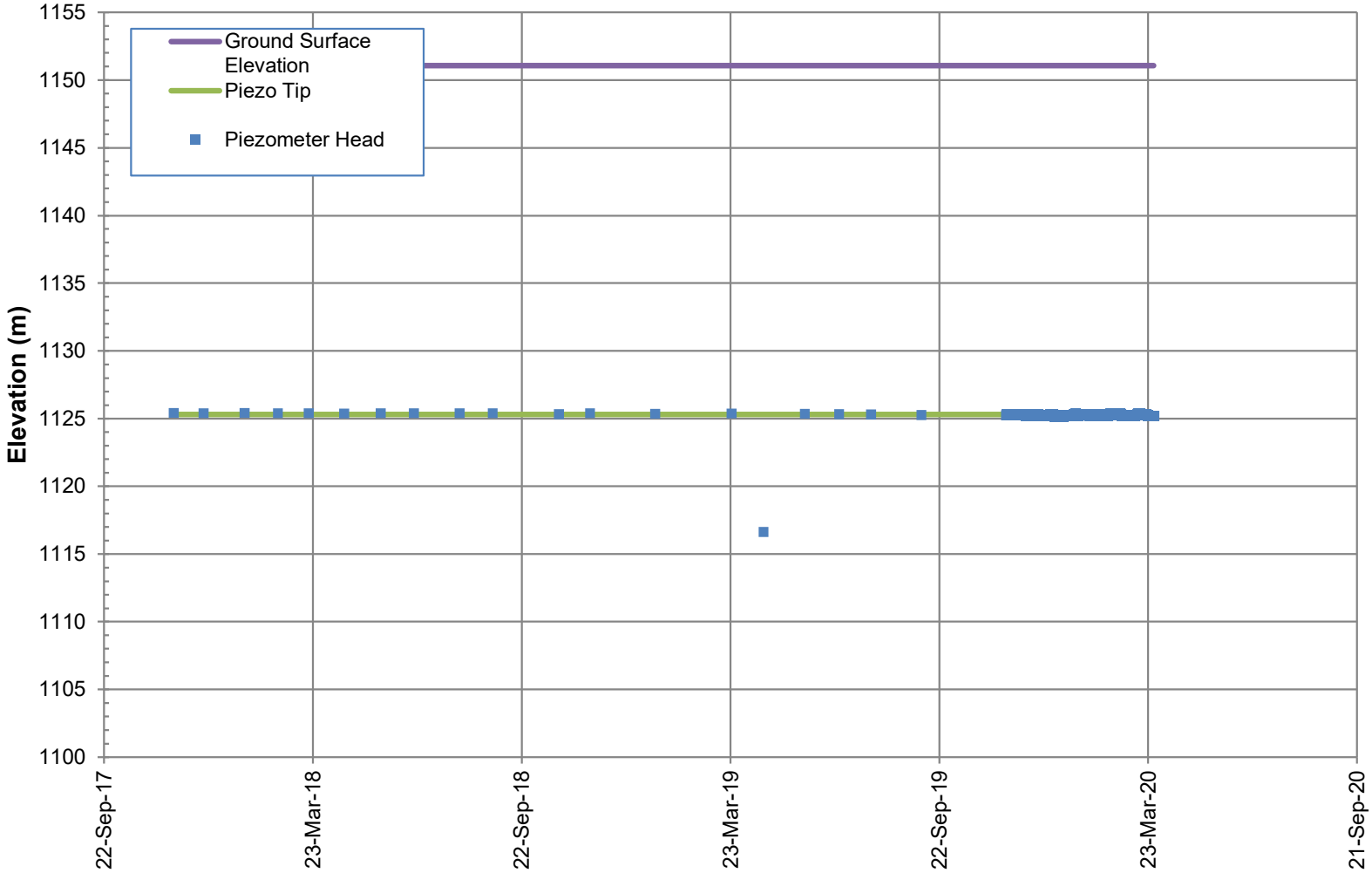
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
VW 46092/ VW 46090	Name:	



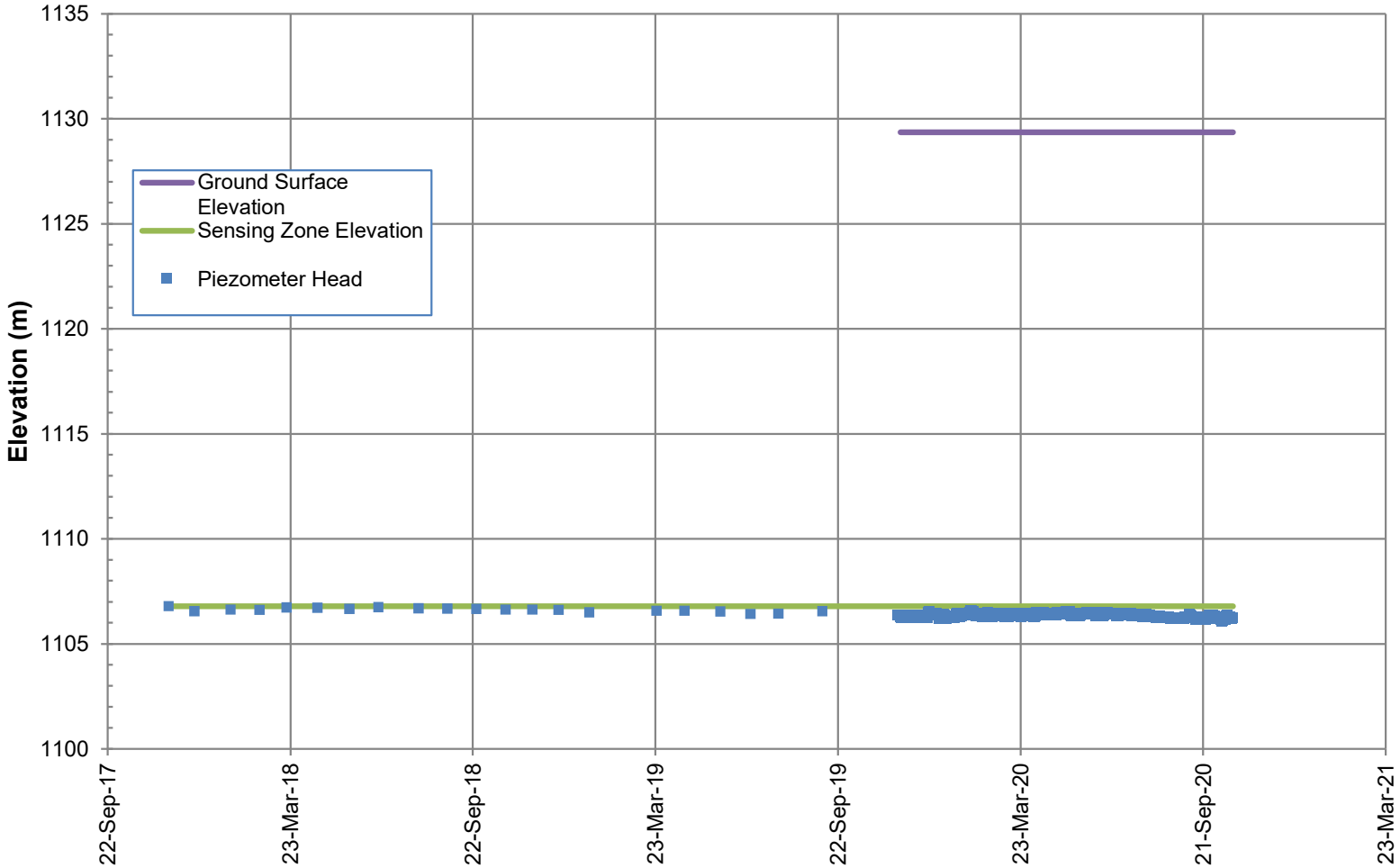
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
VW 46269	Name:	



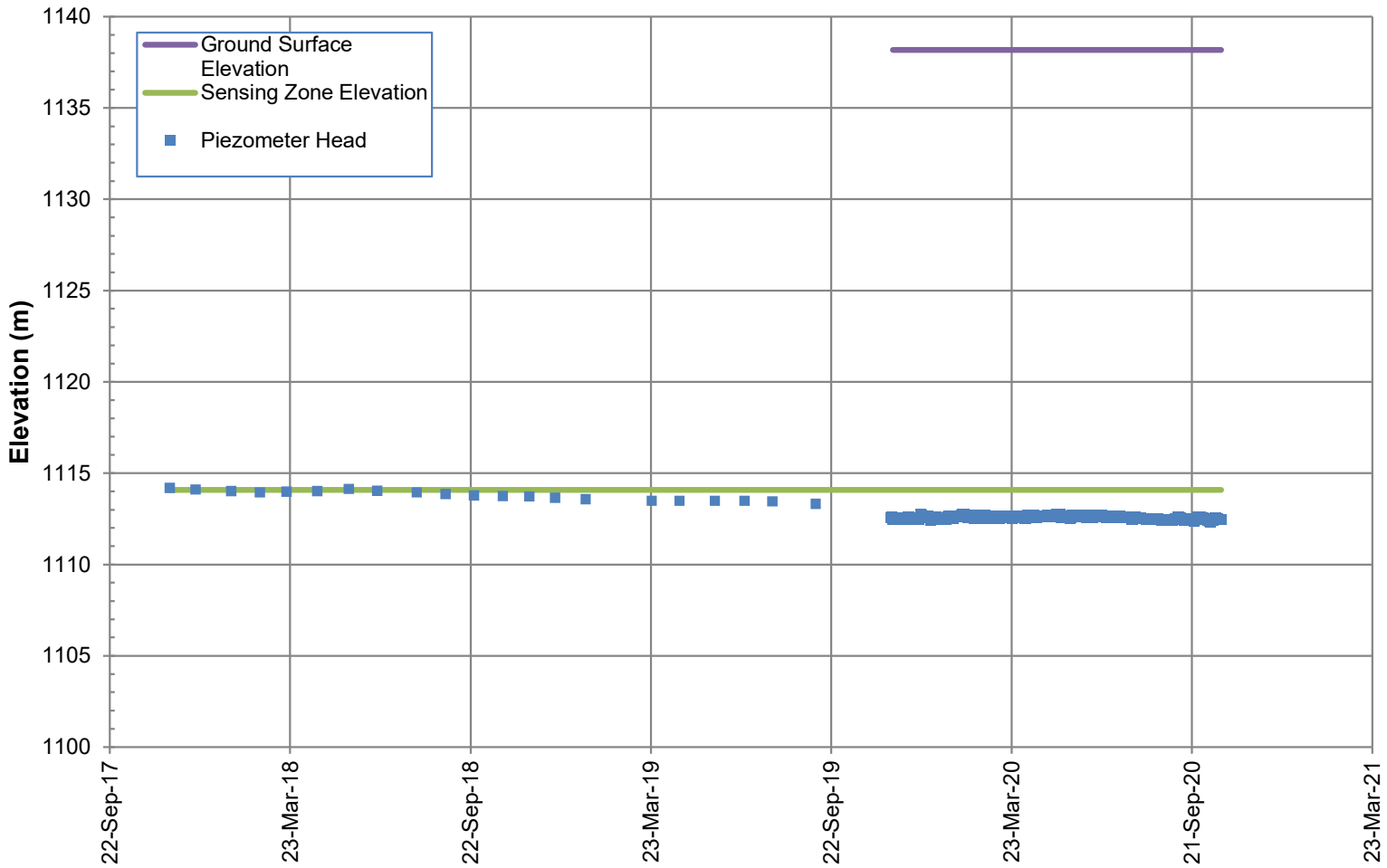
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
VW 46263	Name:	



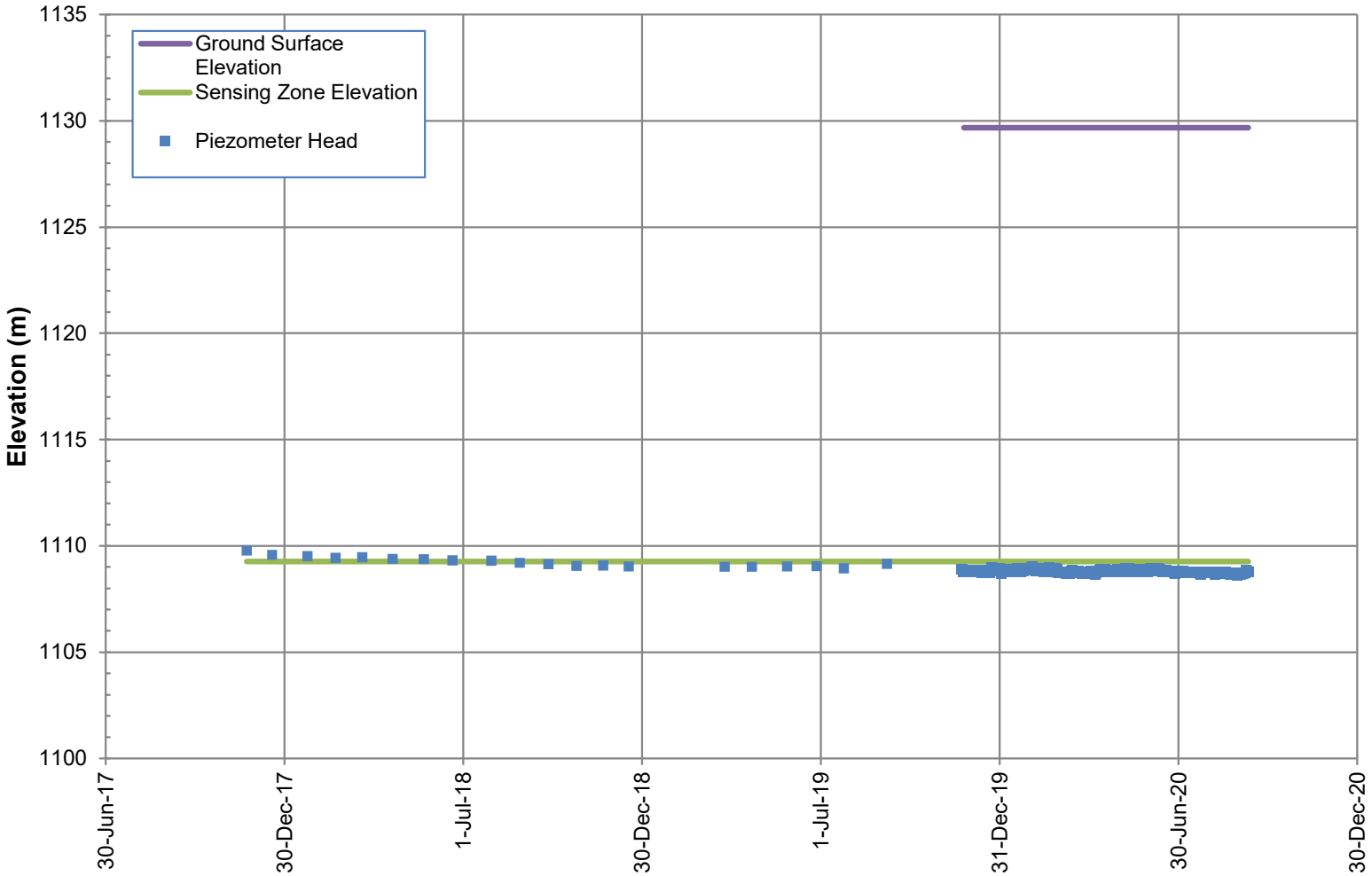
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
	Name:	
VW 33234		



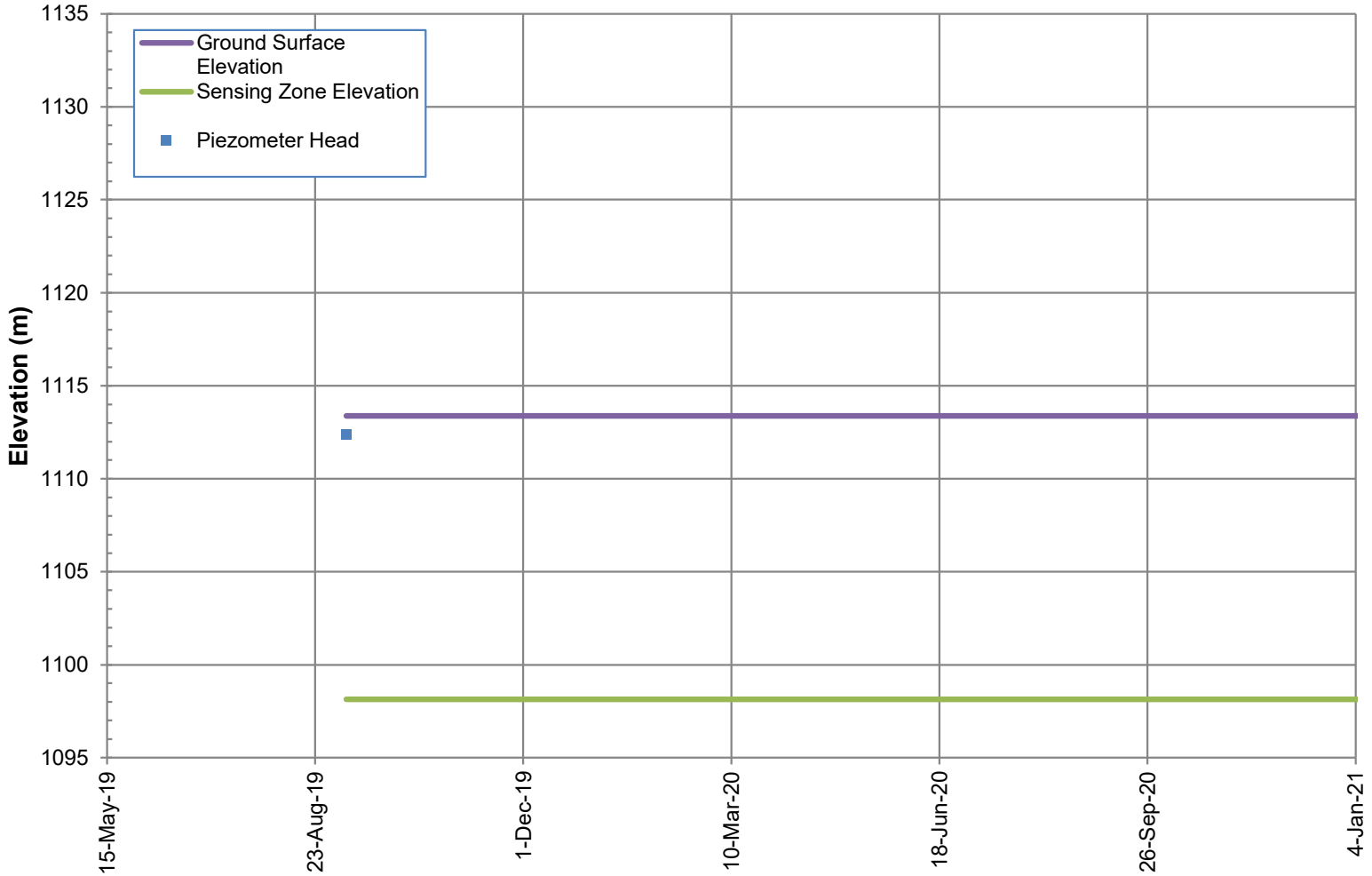
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
VW 33235	Name:	



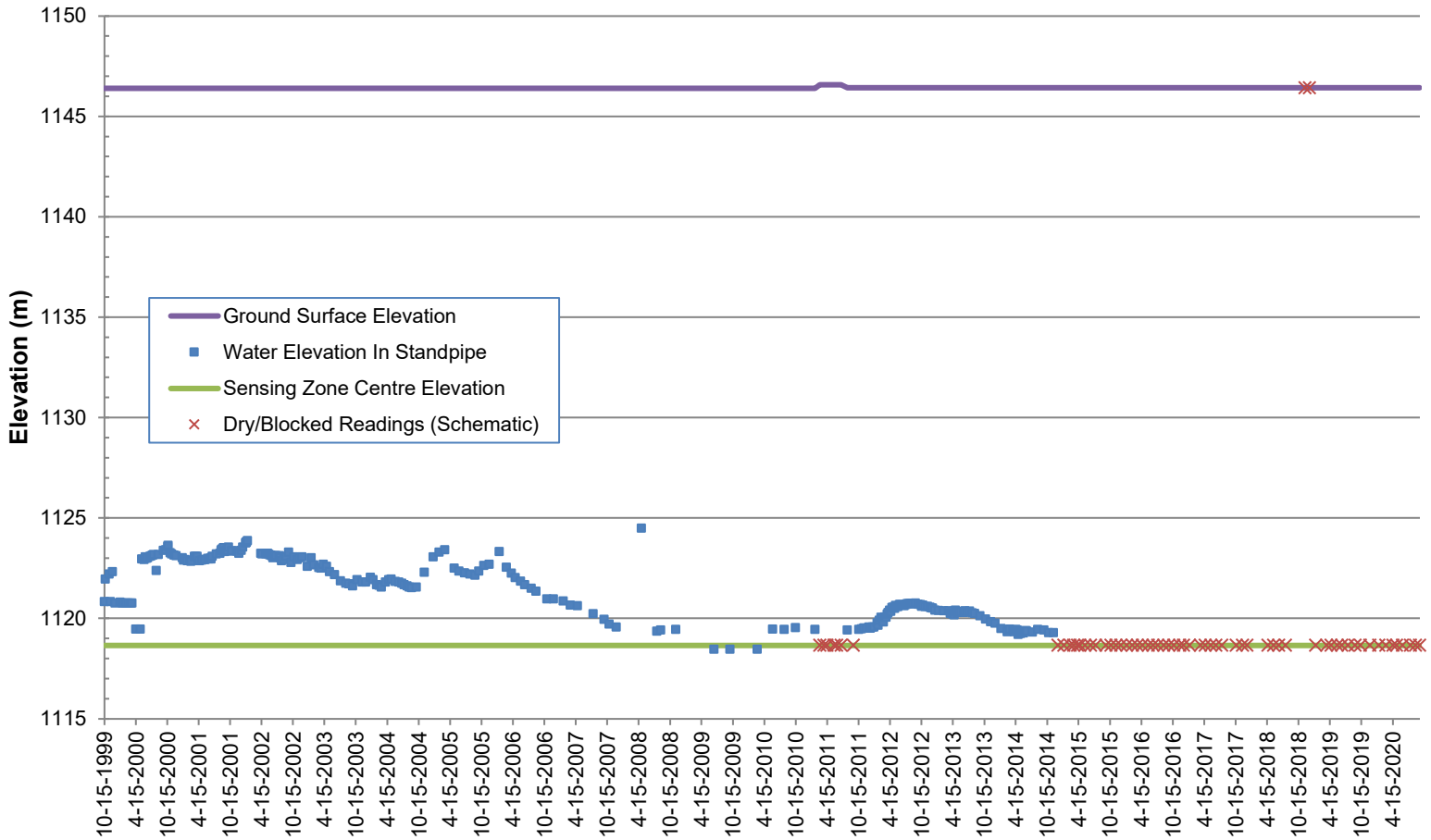
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
VW 45123	Name:	



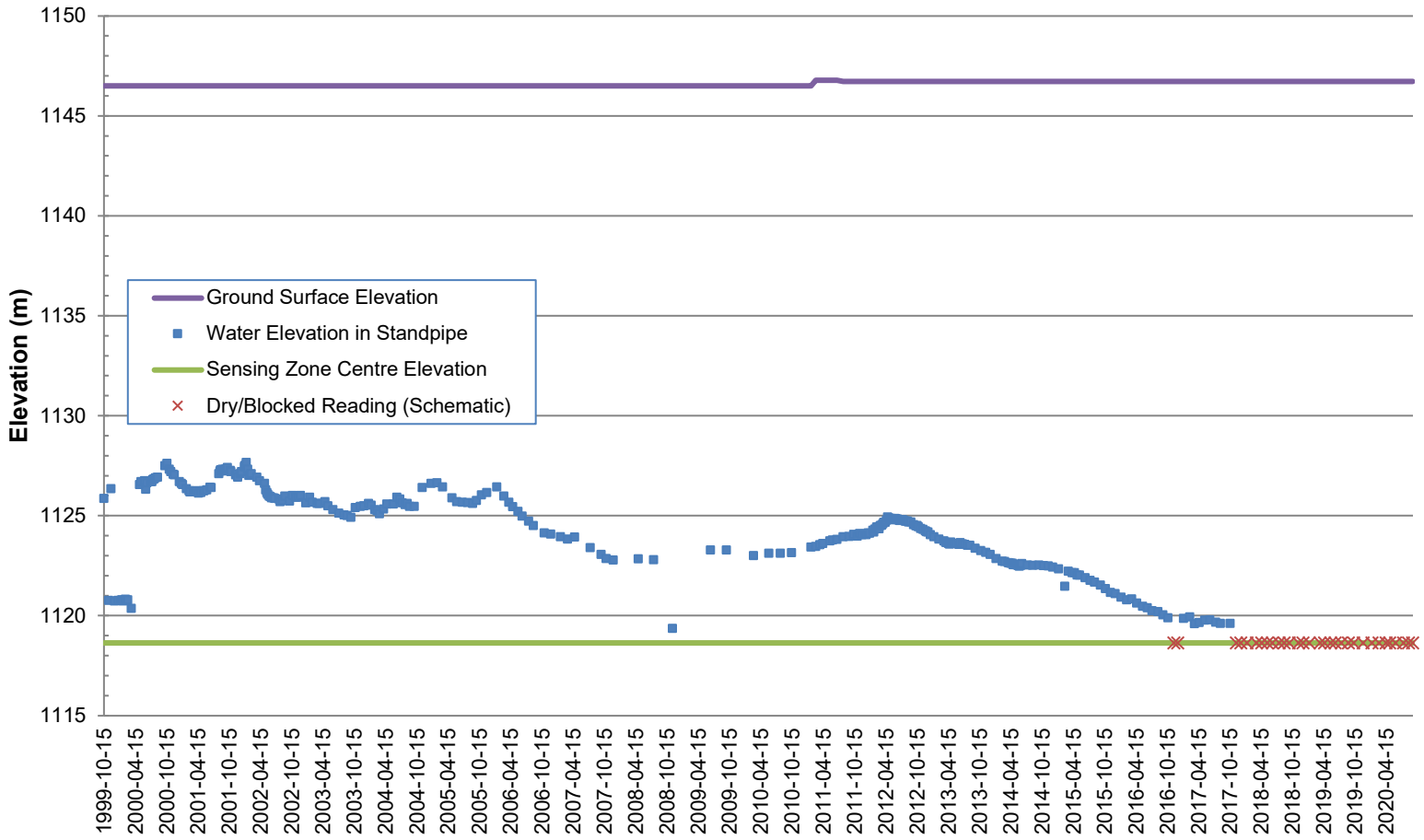
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
VW 46095	Name:	



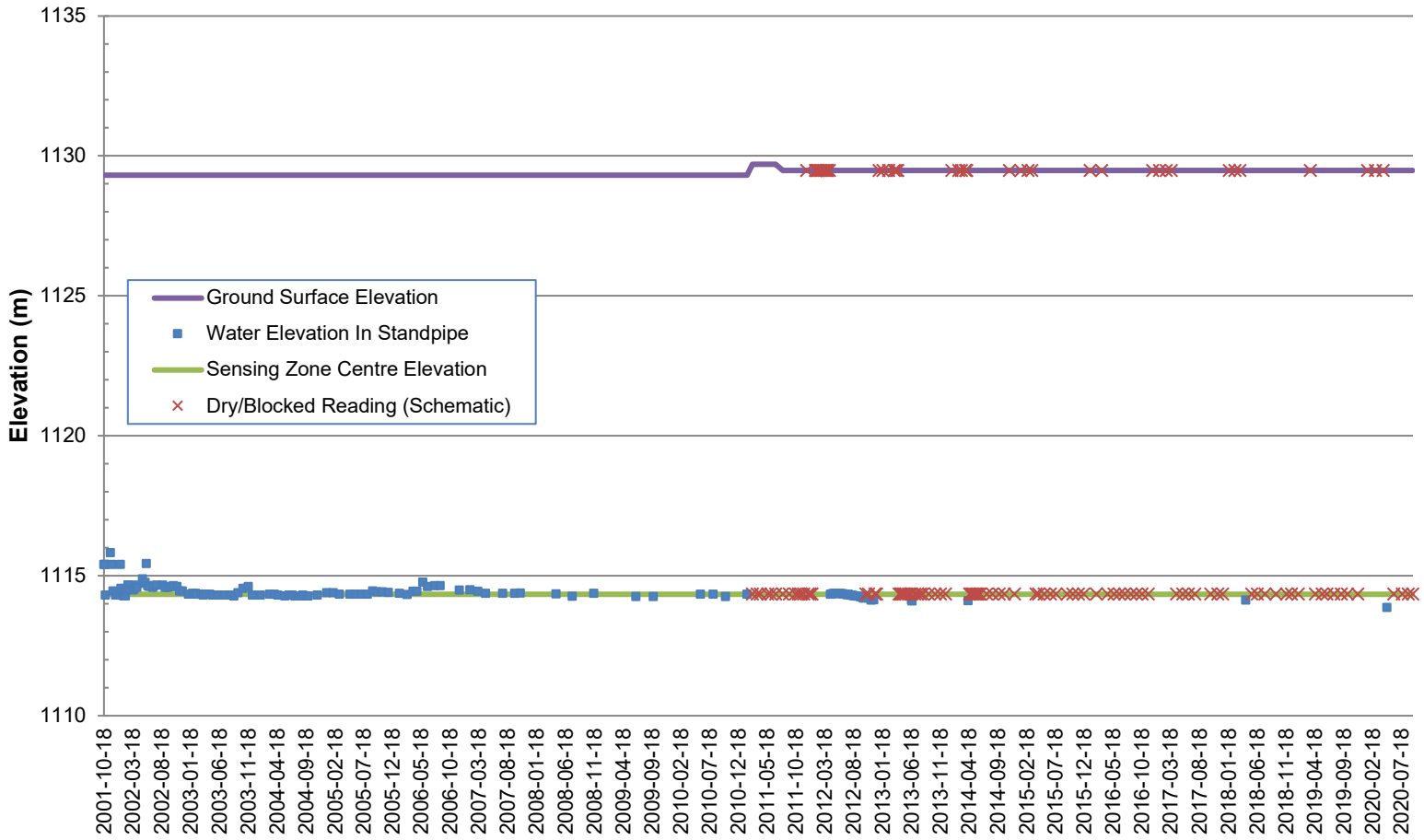
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
PE19_60309	Name:	



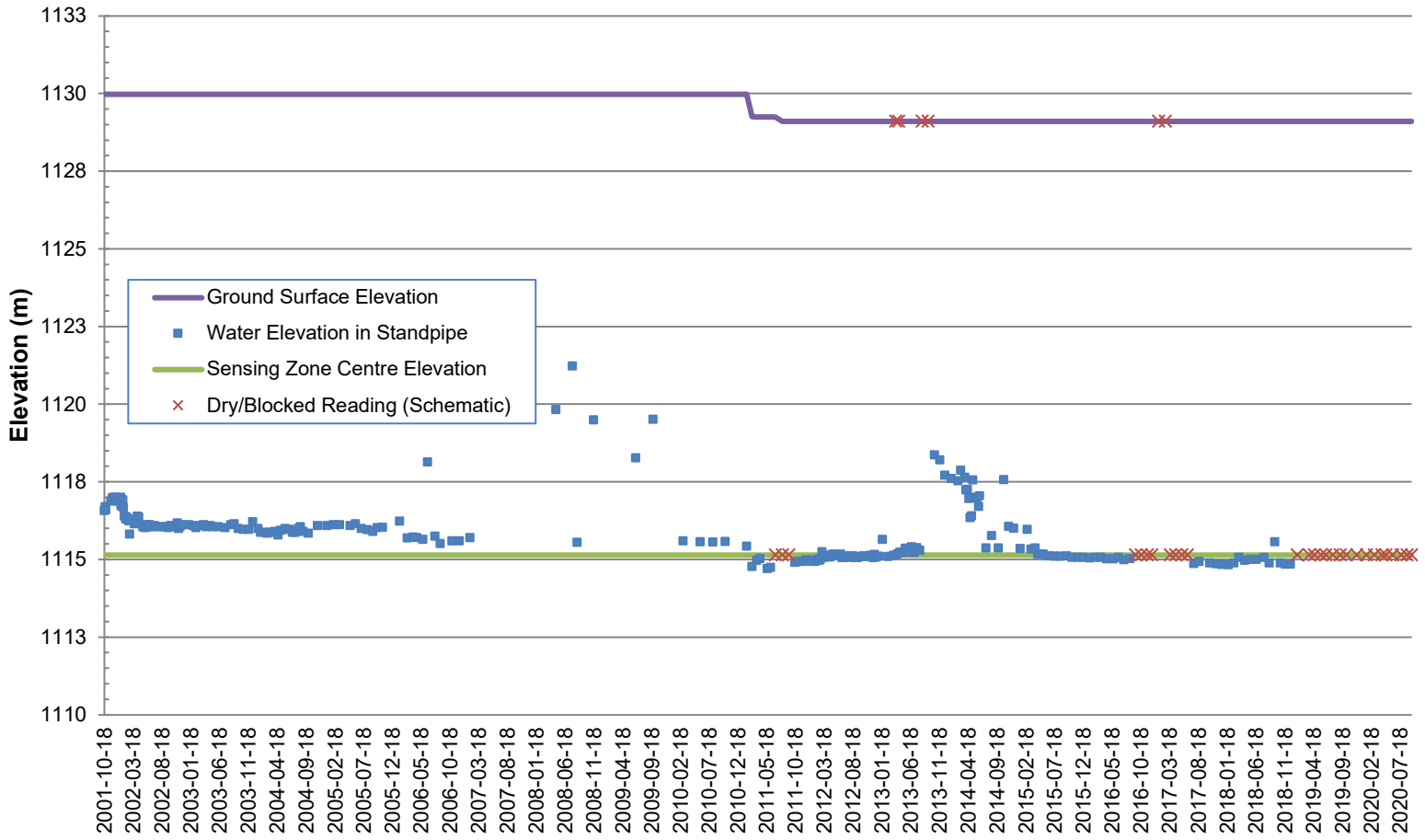
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe 99-05A		



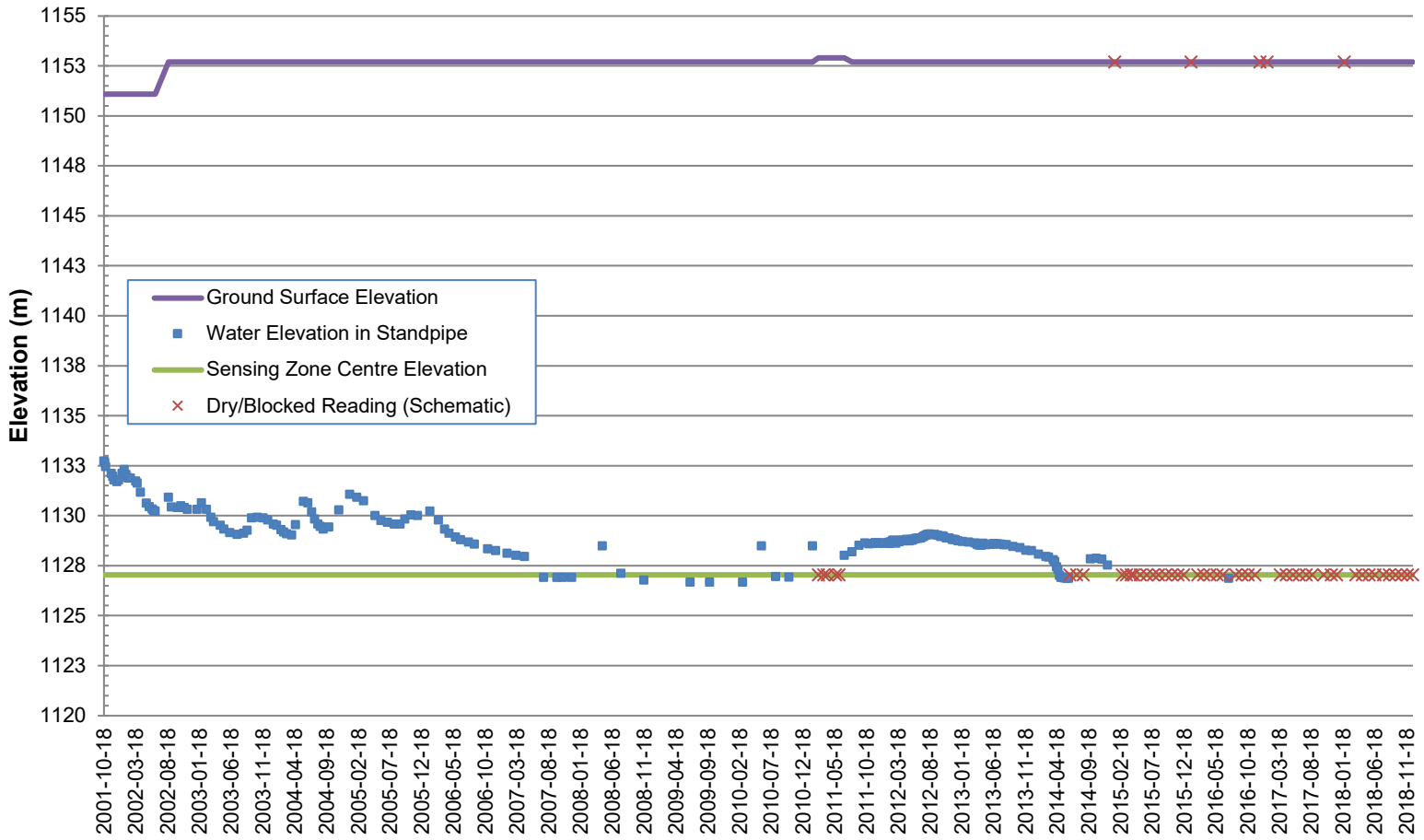
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe 99-07A		



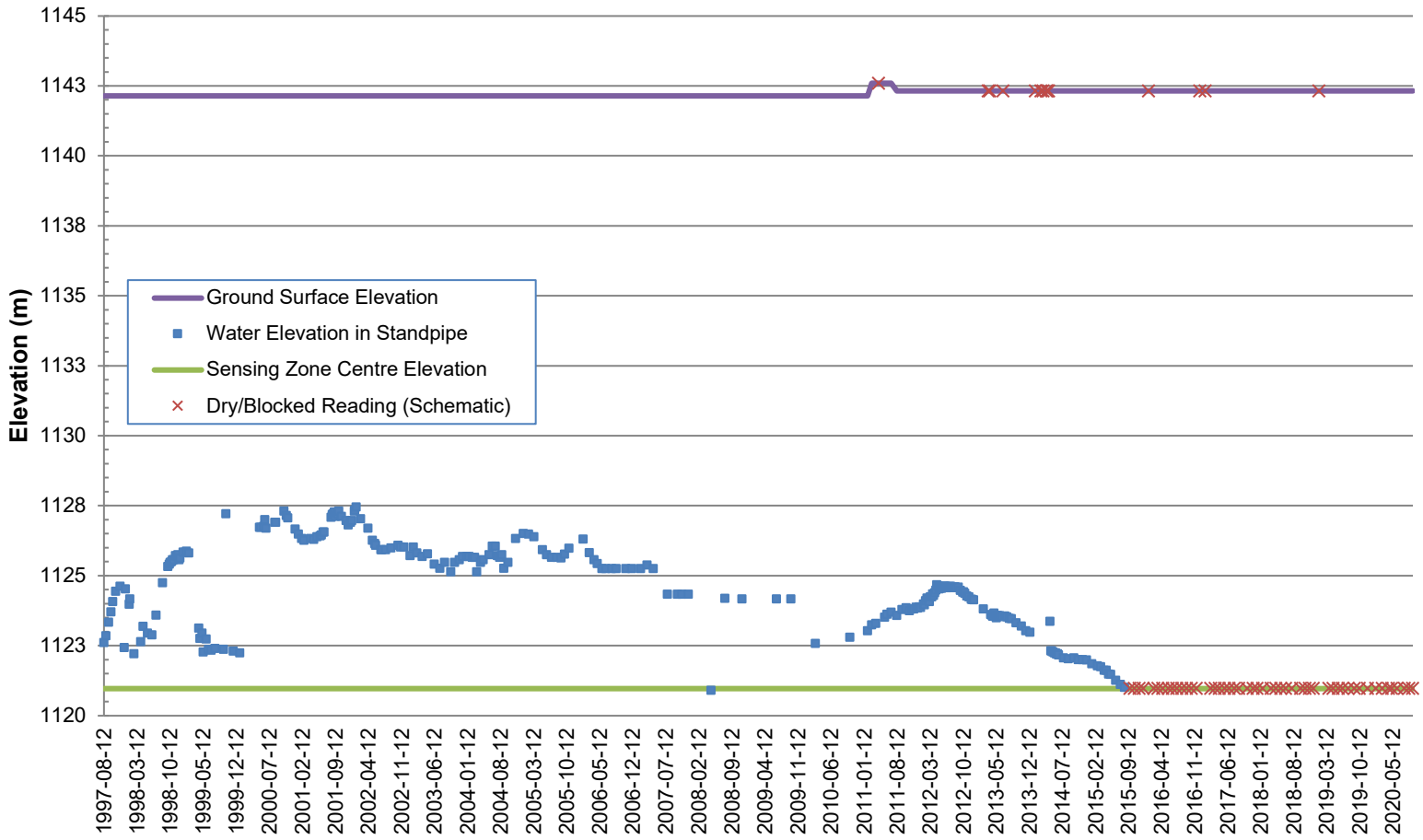
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe C01-02		



Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe D01-04		

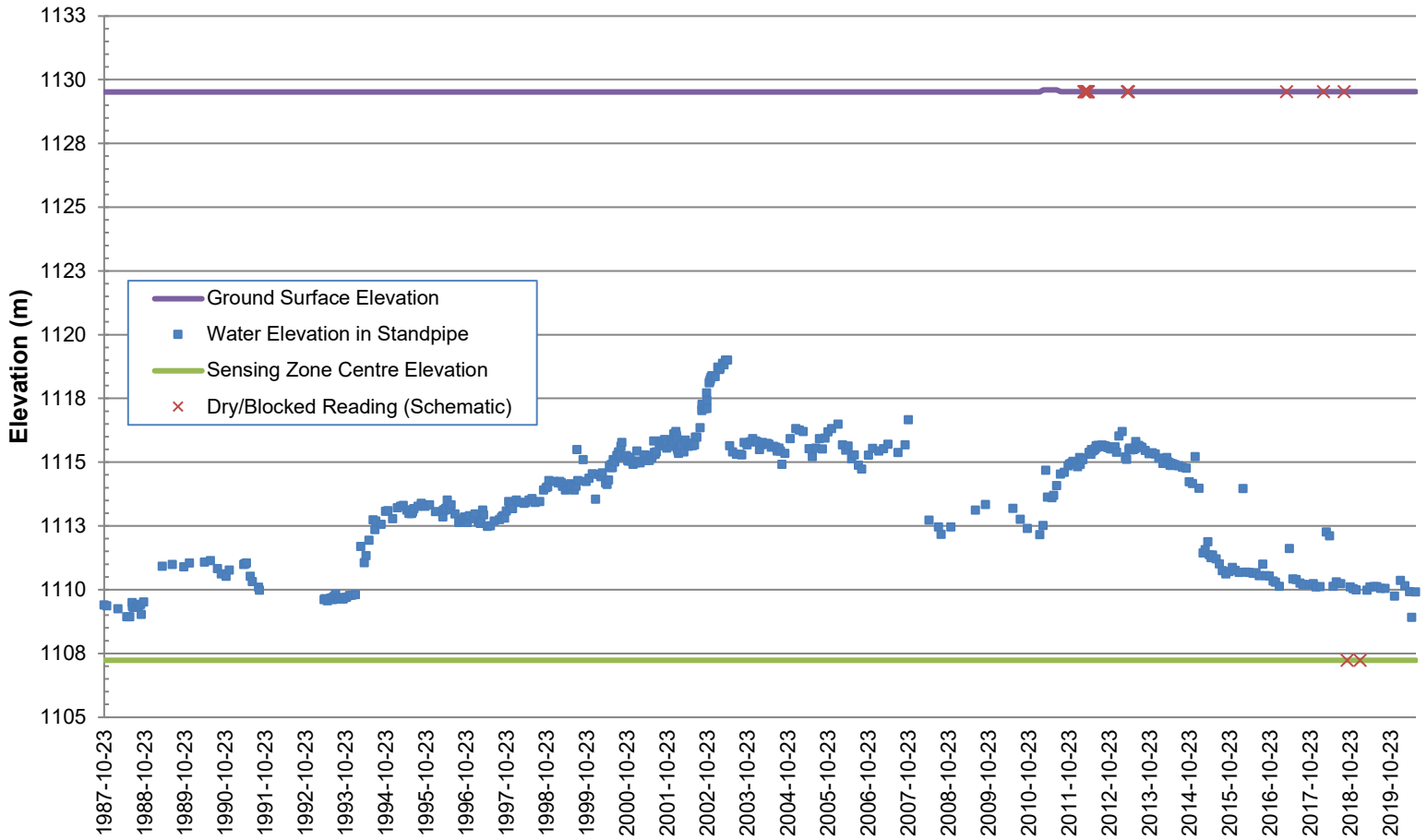


Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe F01-06		

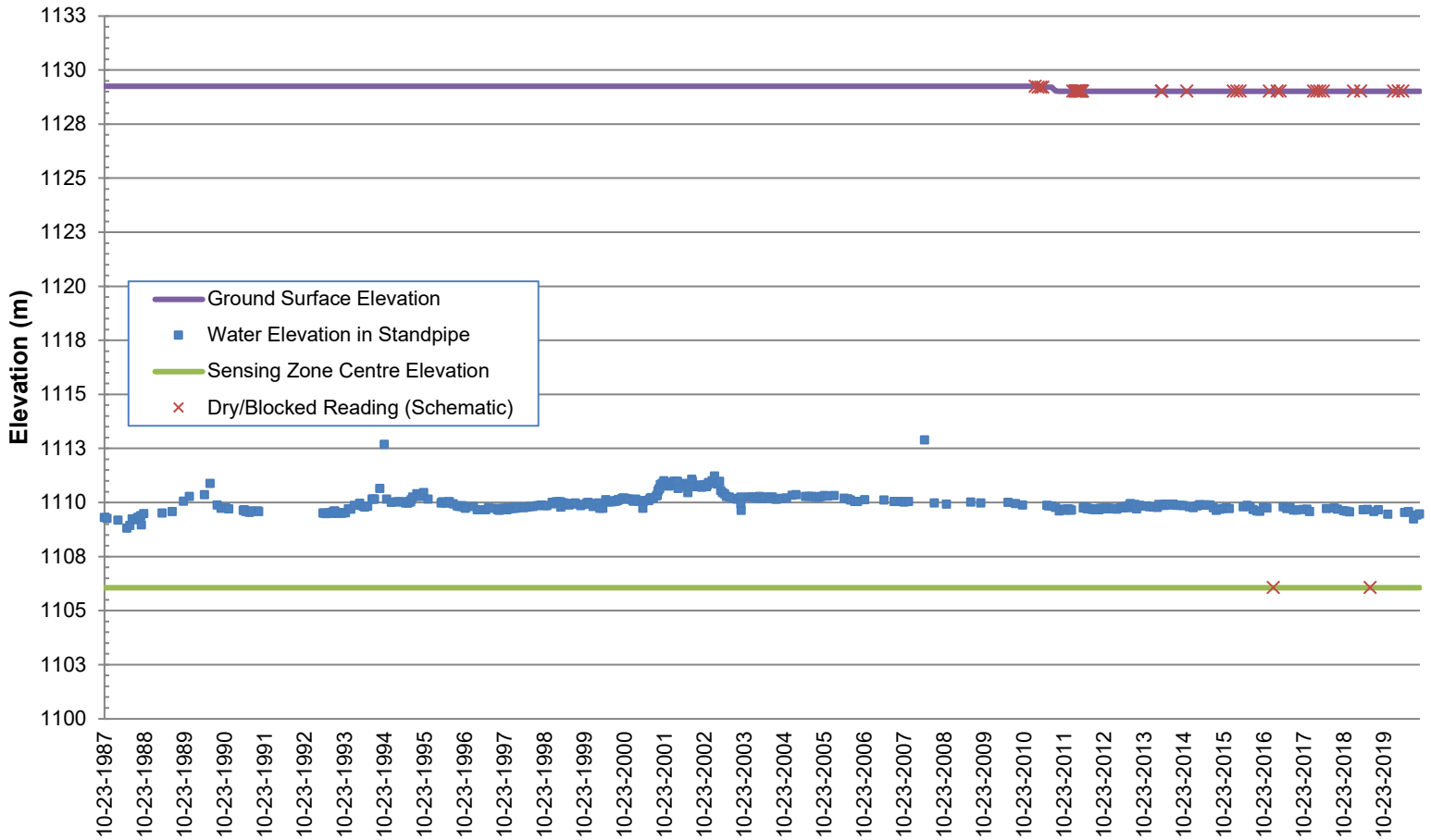


Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe GT-9701		

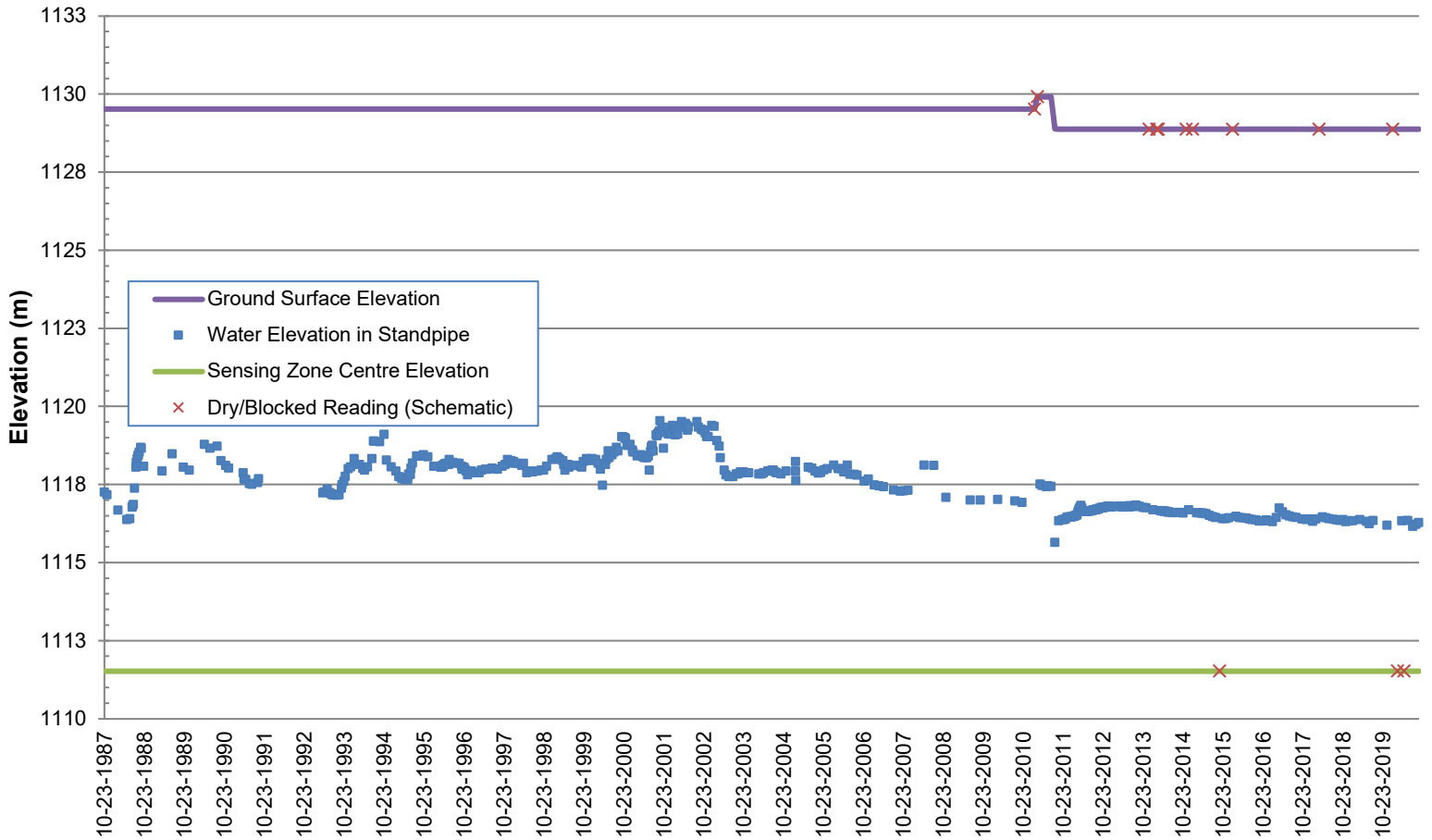
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe OW-4		



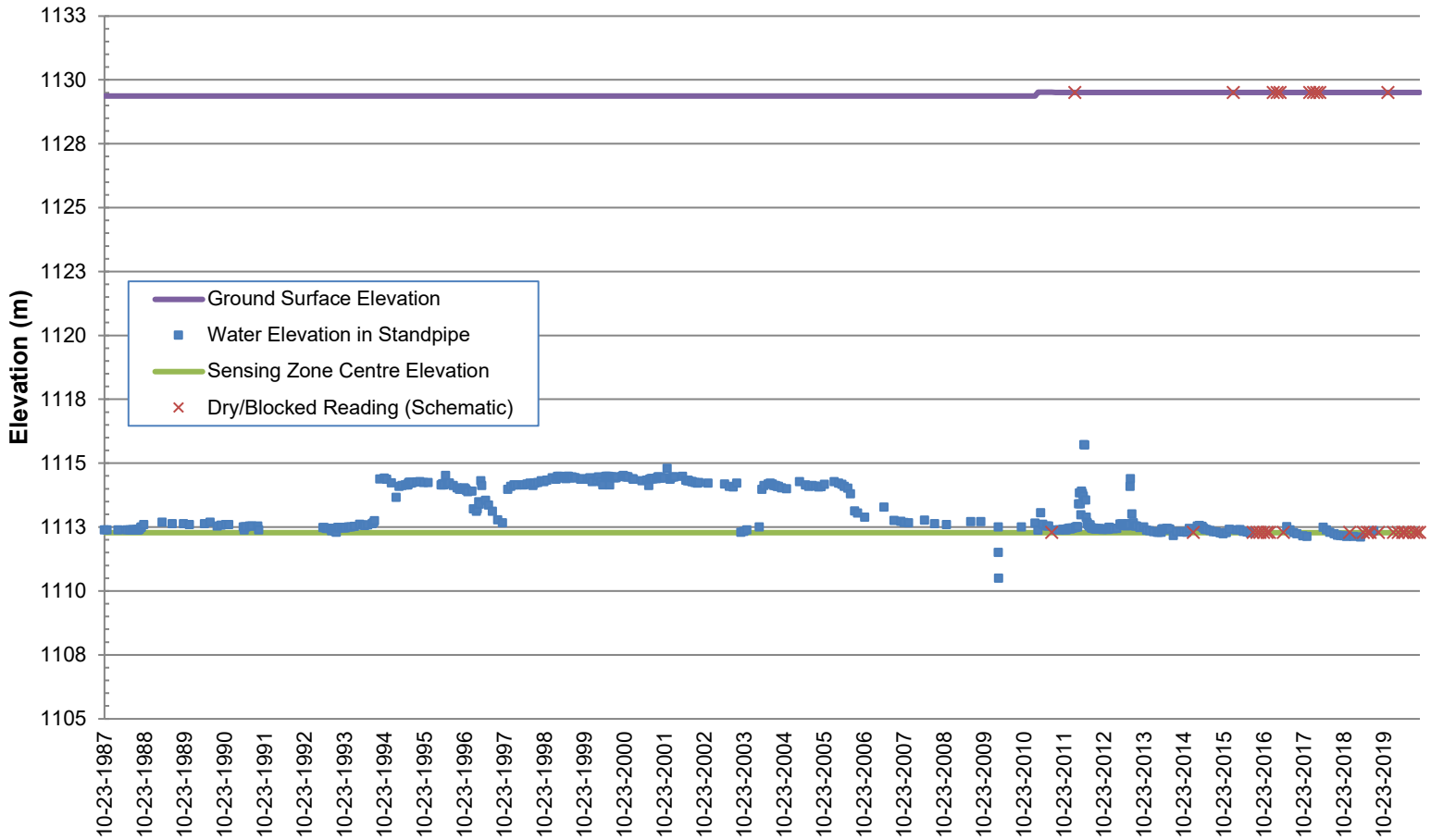
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe OW-5		



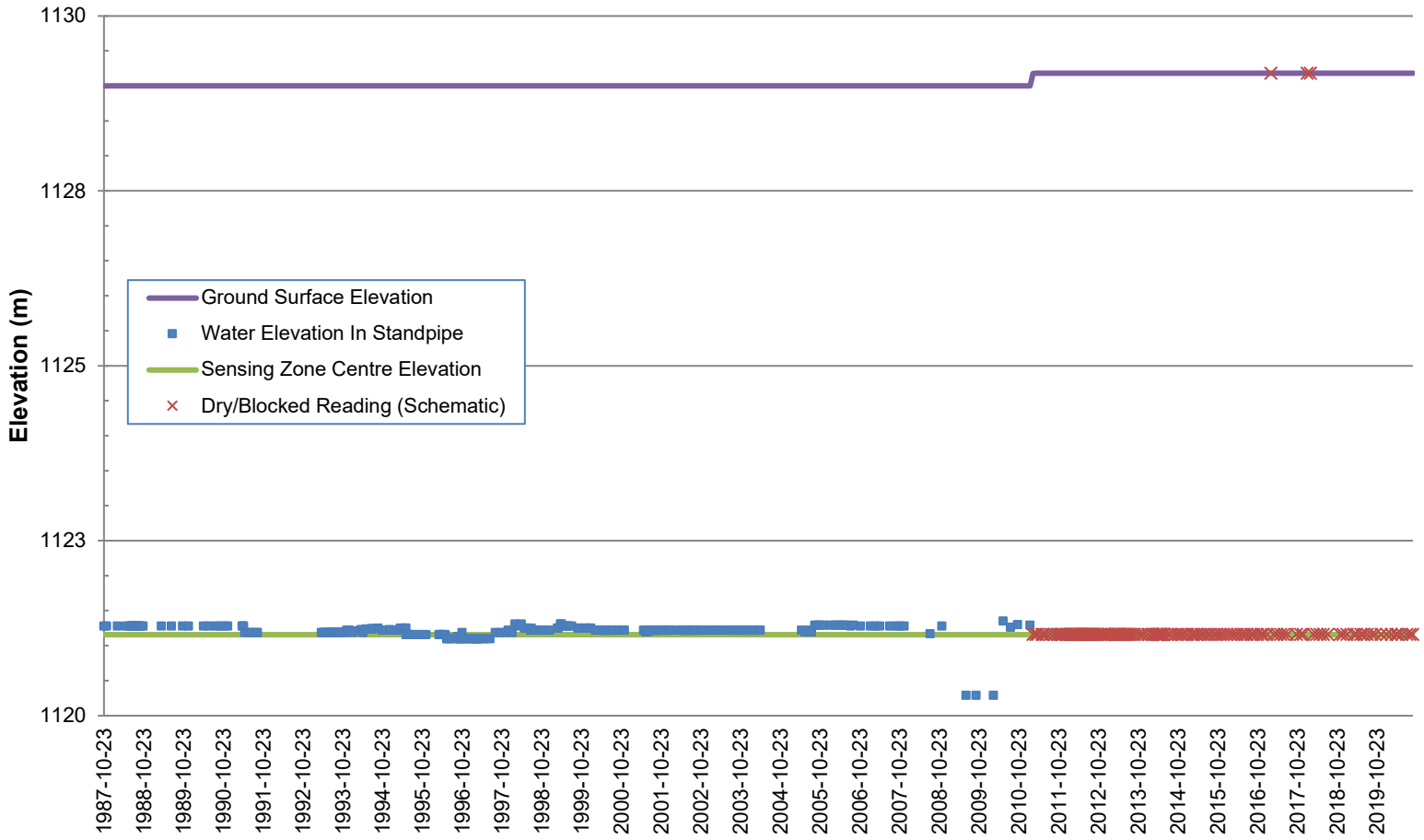
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe OW-6		



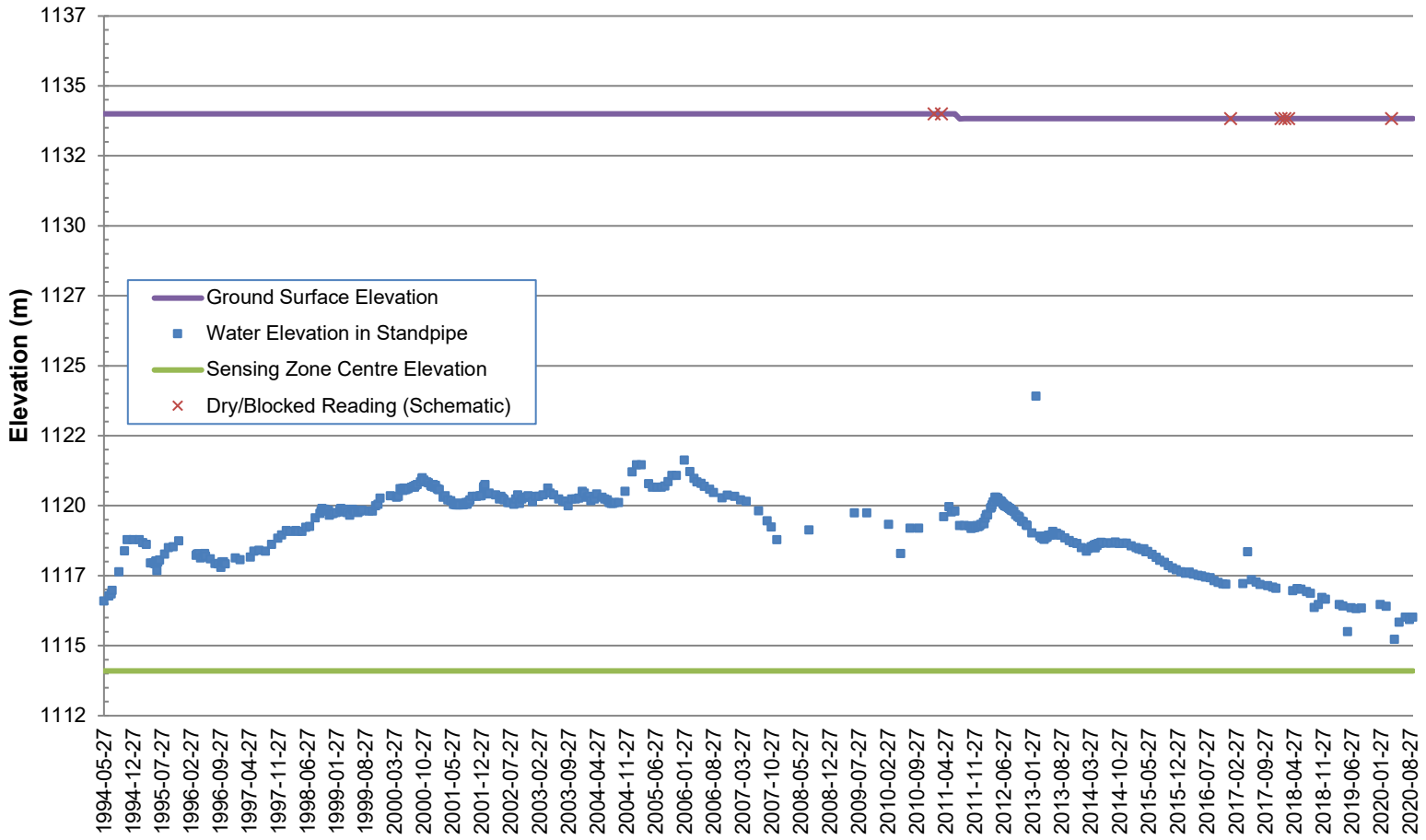
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe OW-7		



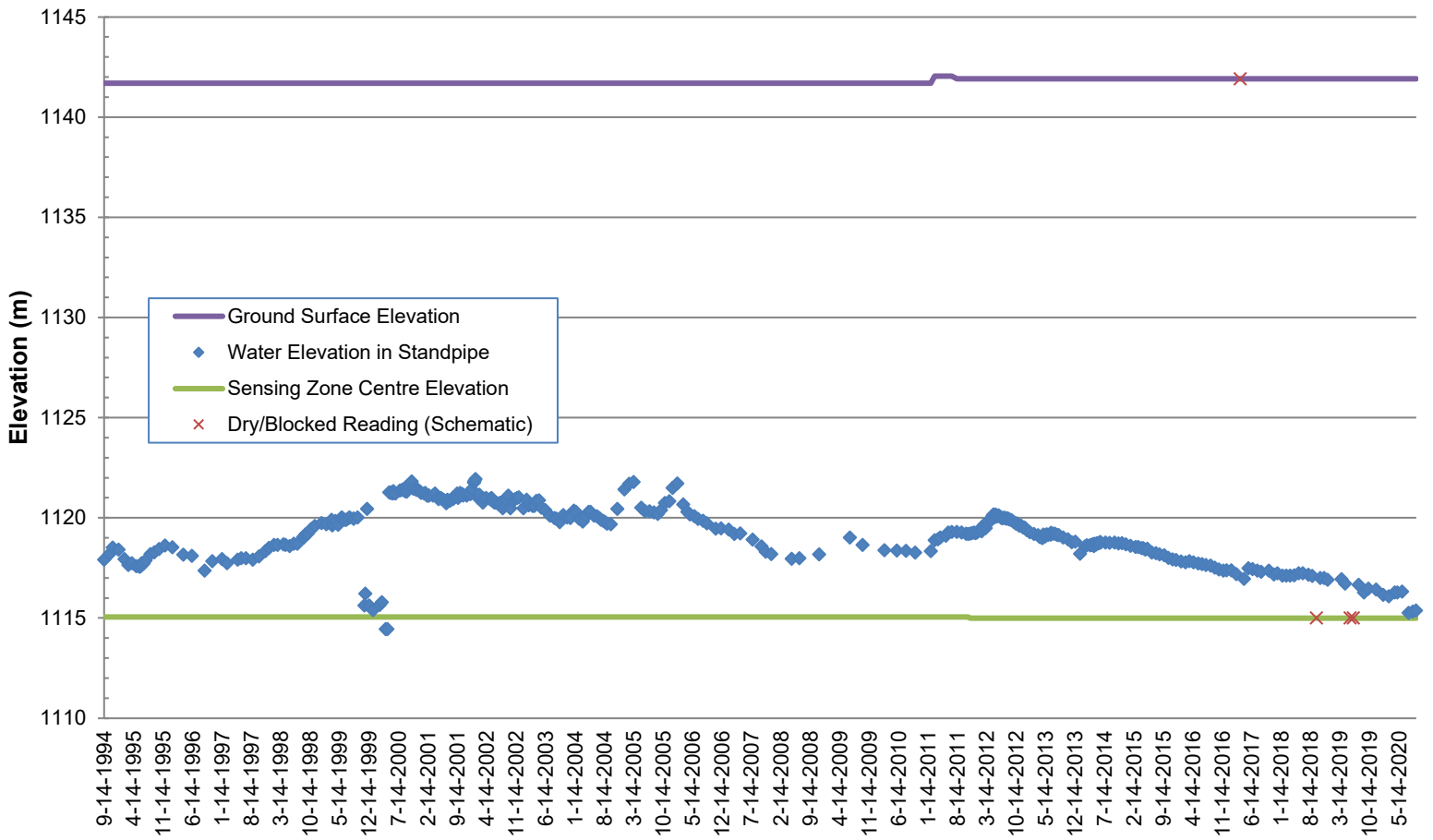
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe OW-9		



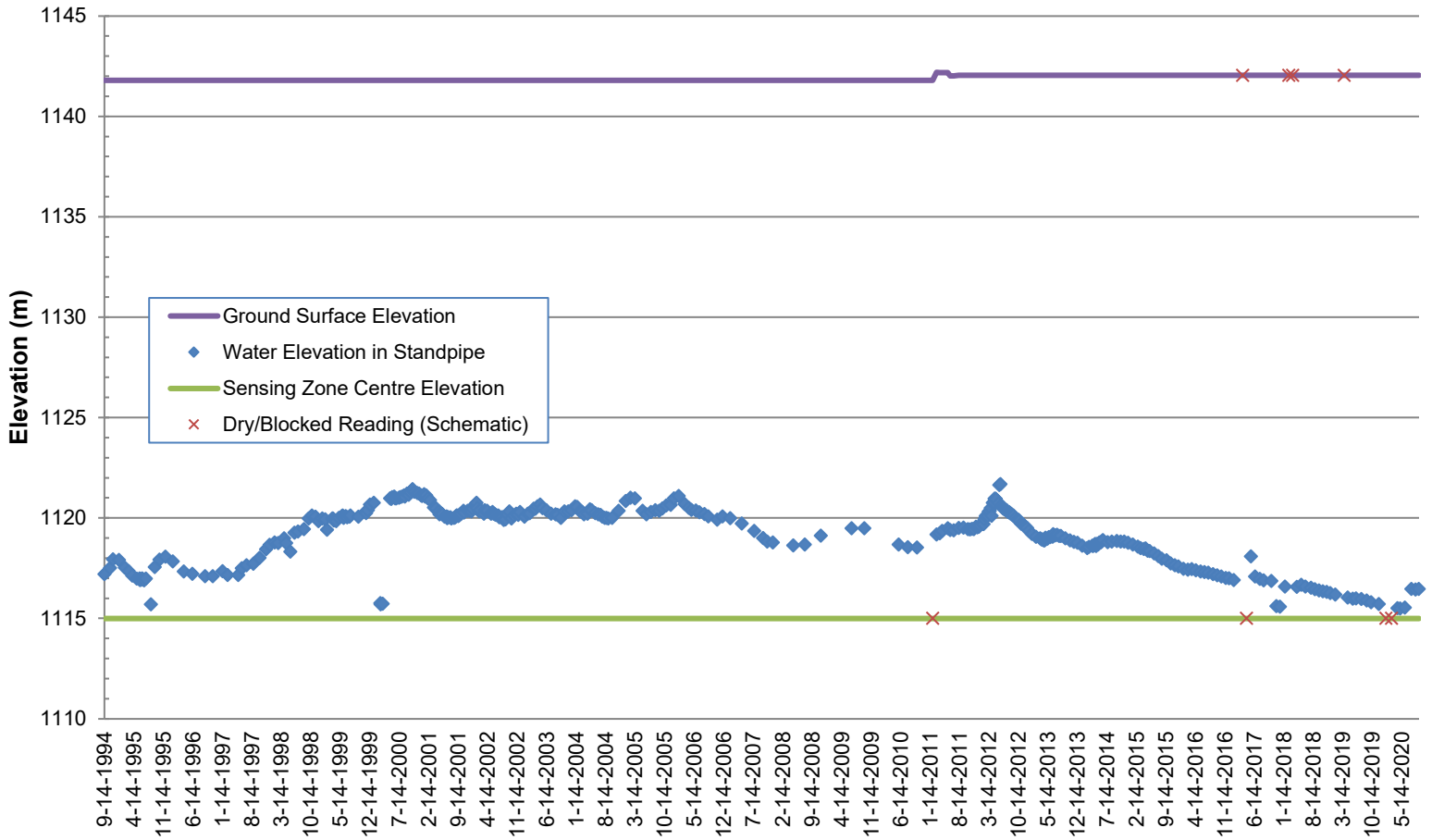
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe OW-10		



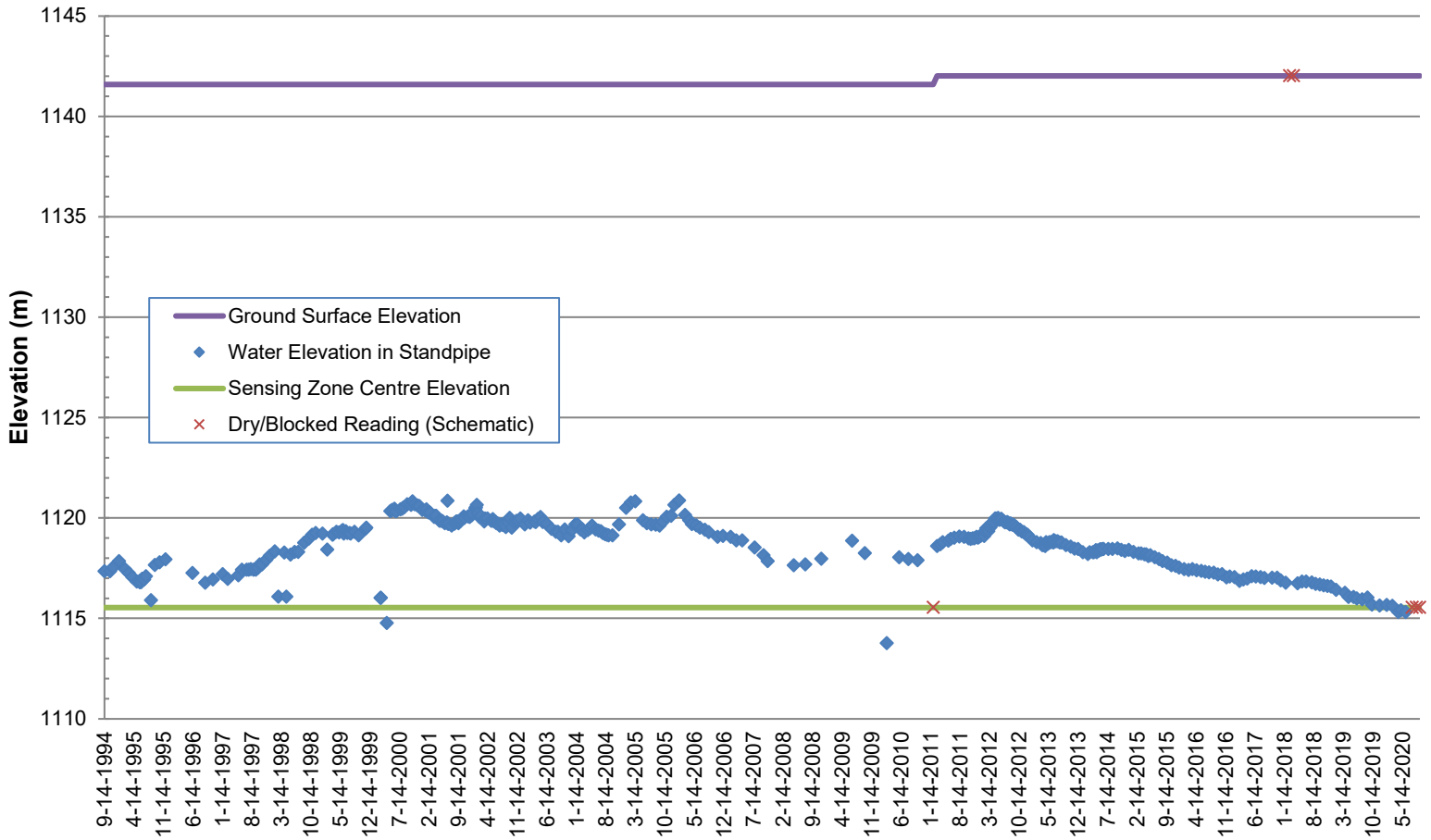
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe OW-12A		



Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe OW9433A		

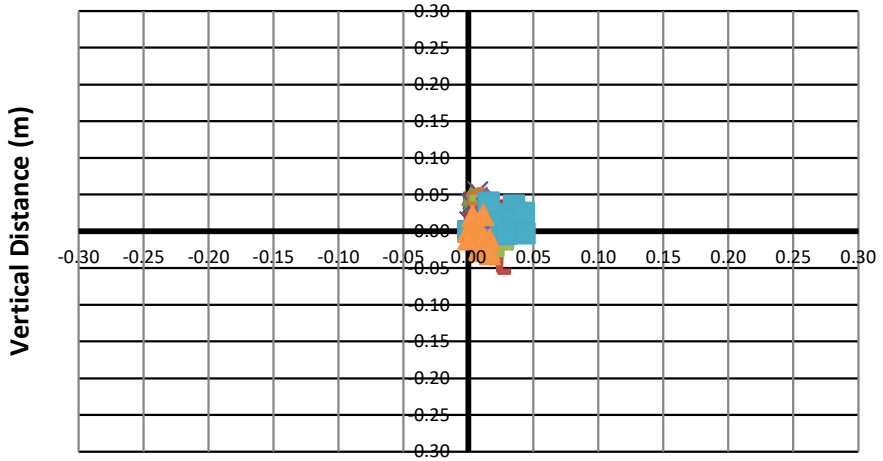


Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe OW9434A		

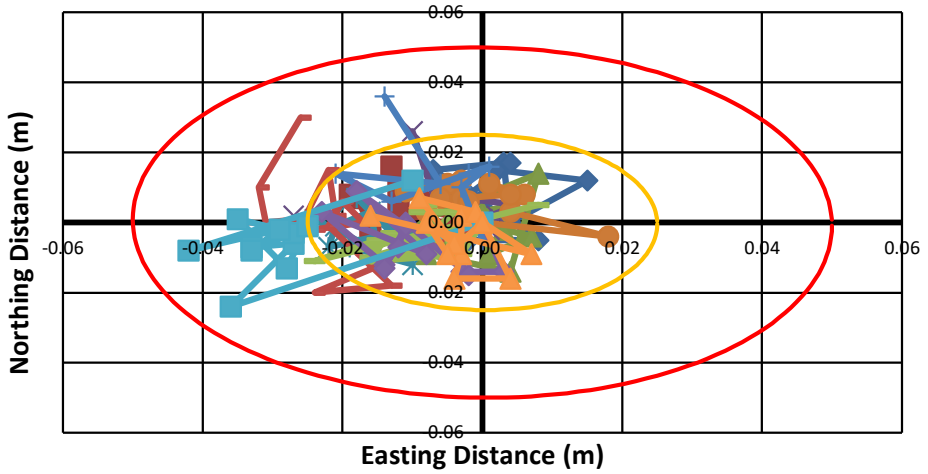


Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe OW9436A		

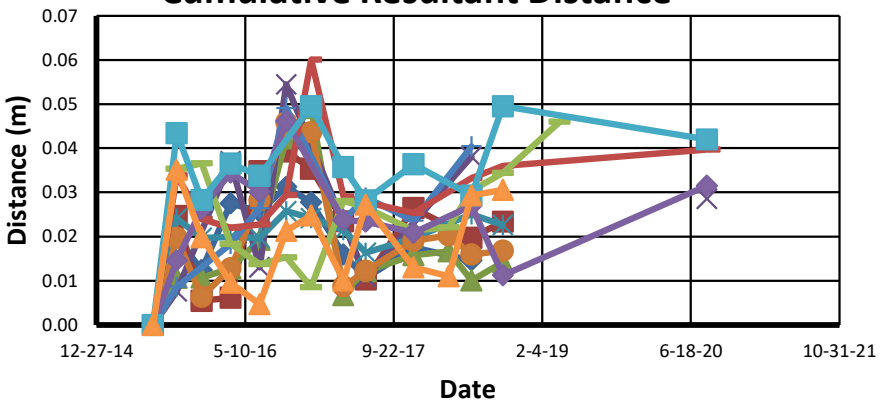
Cross Sectional View of Movement



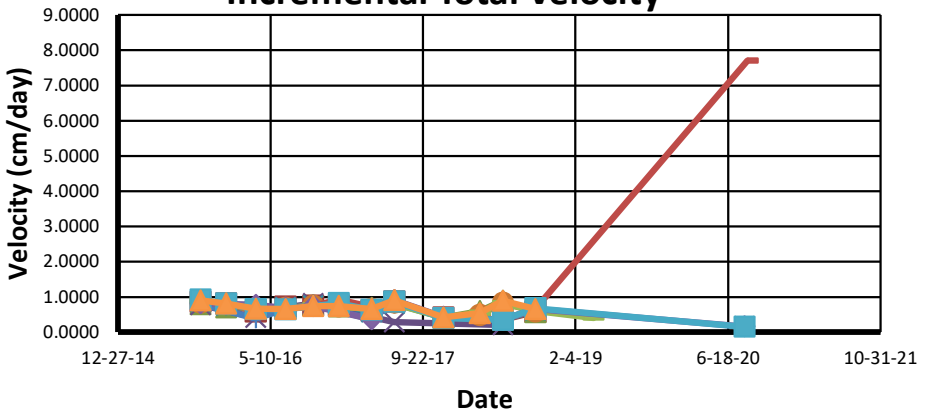
Plan View of Movement



Cumulative Resultant Distance



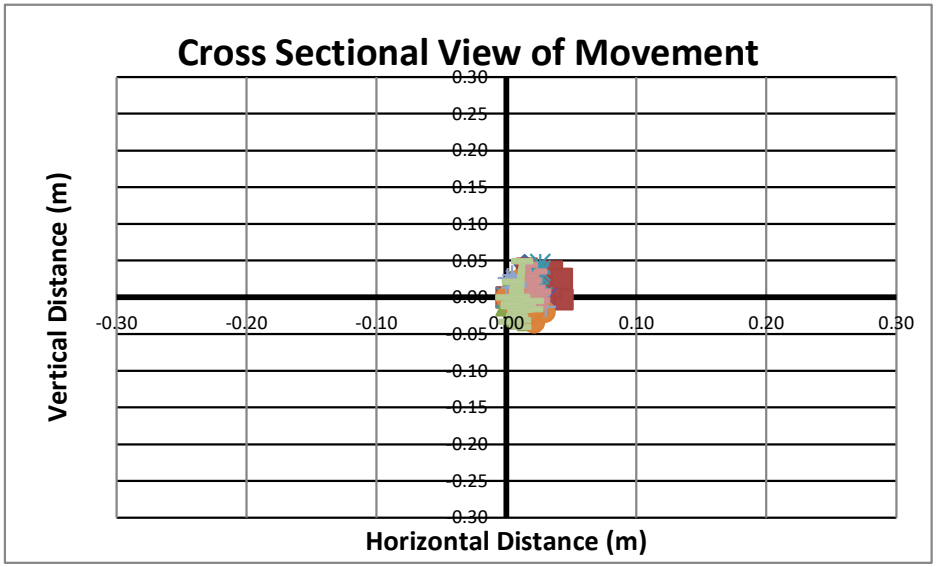
Incremental Total Velocity

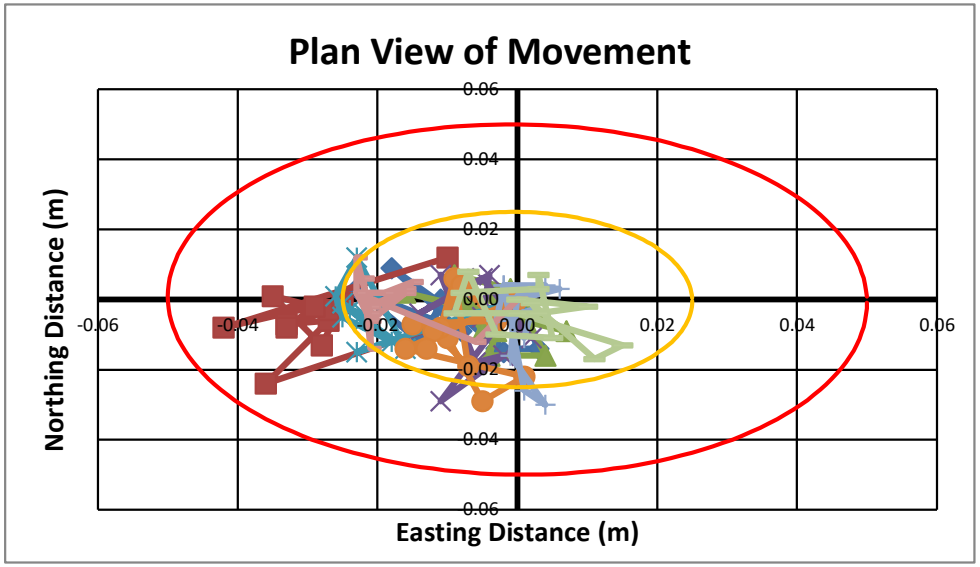


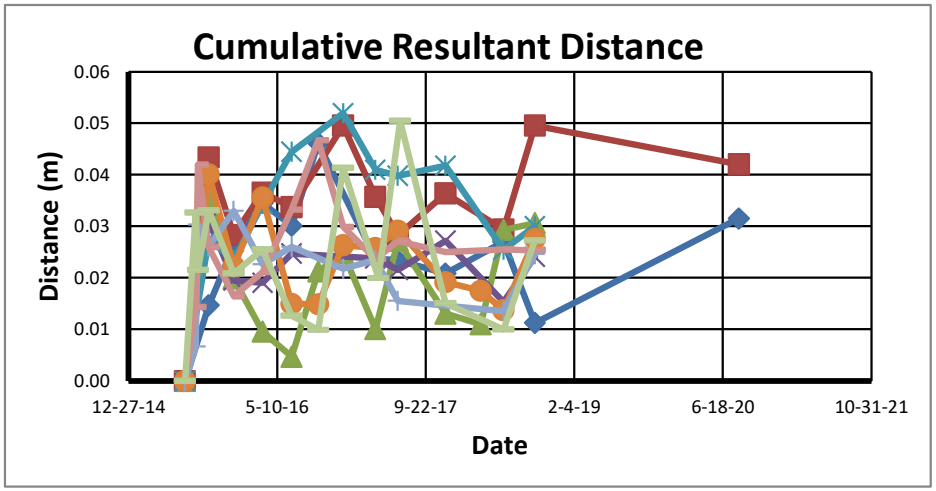
LEGEND

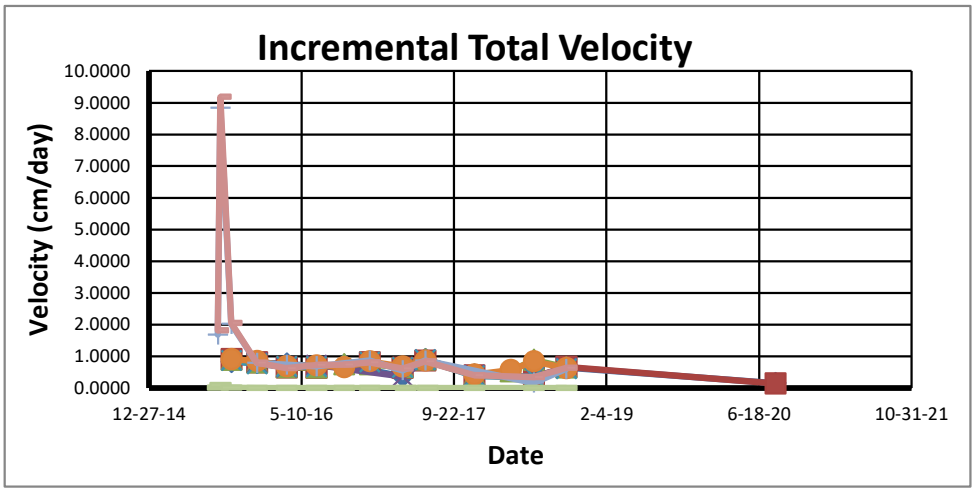
DAL DAM DAU
DBL DBM DBU
DCL DCM DCU
DDL DDM DDU

Teck Coal - Elkview Operations		
Lagoon D GPS Survey Pins	Date:	Revision
North GPS Survey Pins		





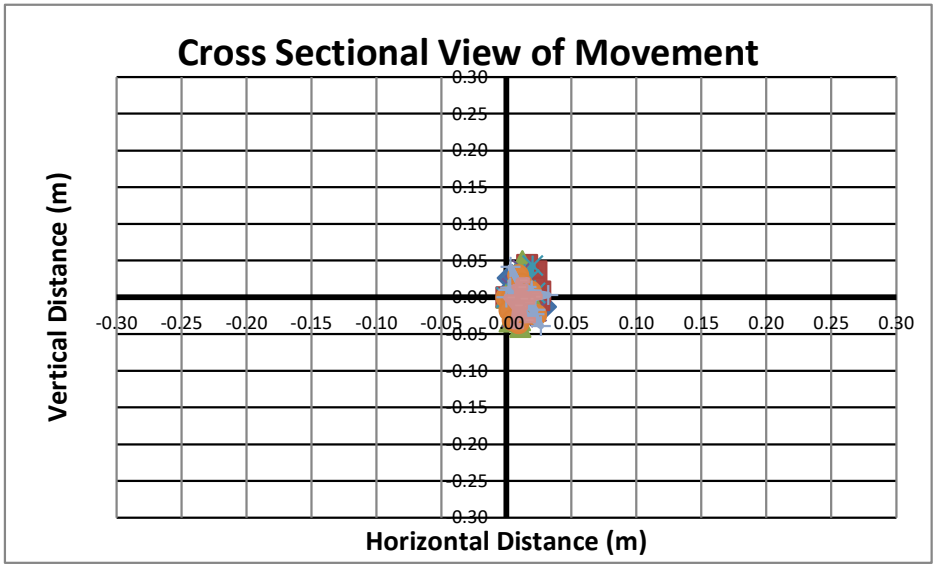


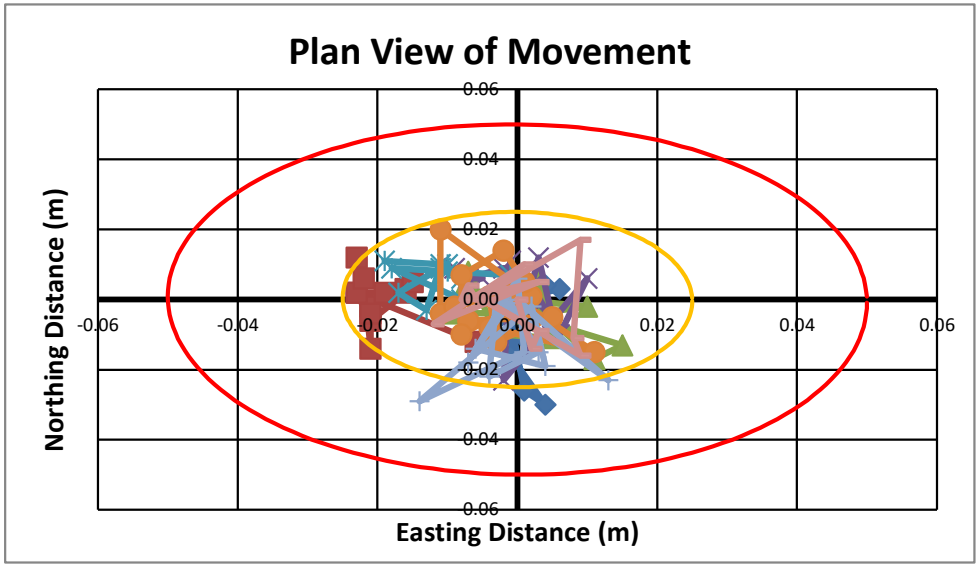


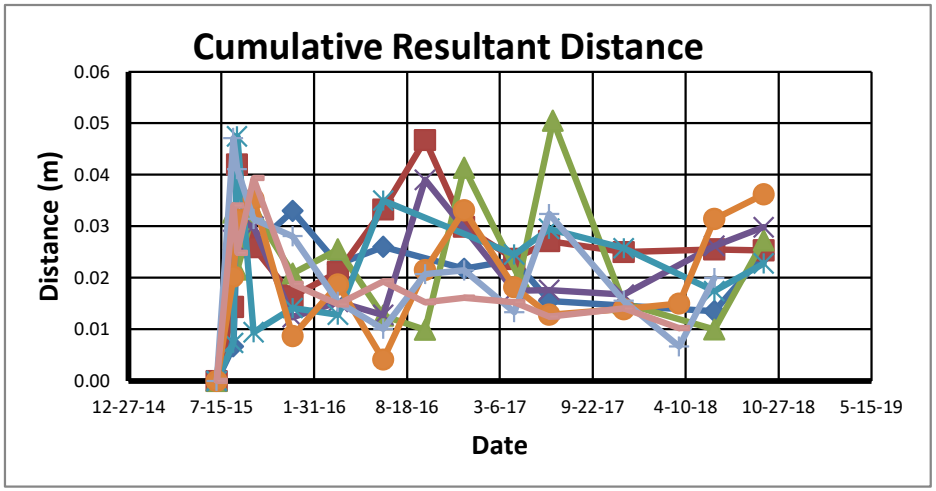
LEGEND

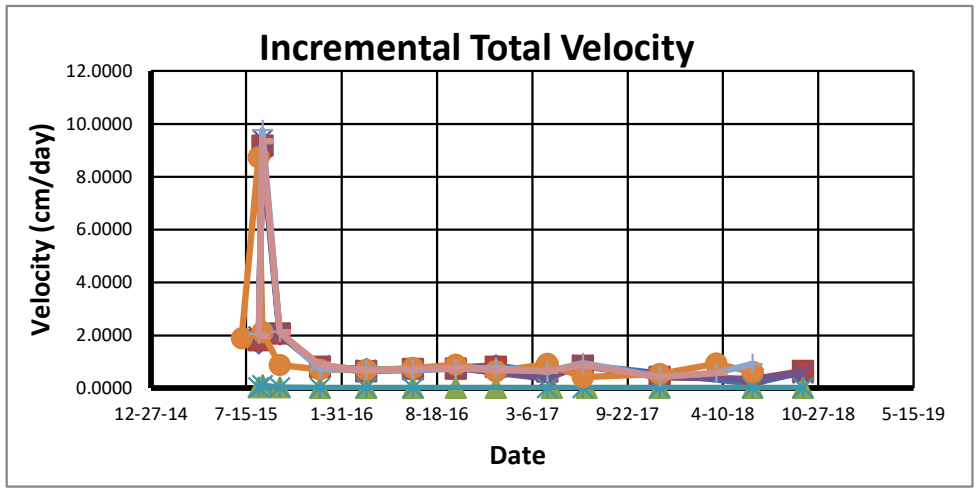
DDL DDM DDU
DEL DEM DEU
DFL DFM DFU

Teck Coal - Elkview Operations		
Lagoon D GPS Survey Pins	Date:	Revision
West GPS Survey Pins		





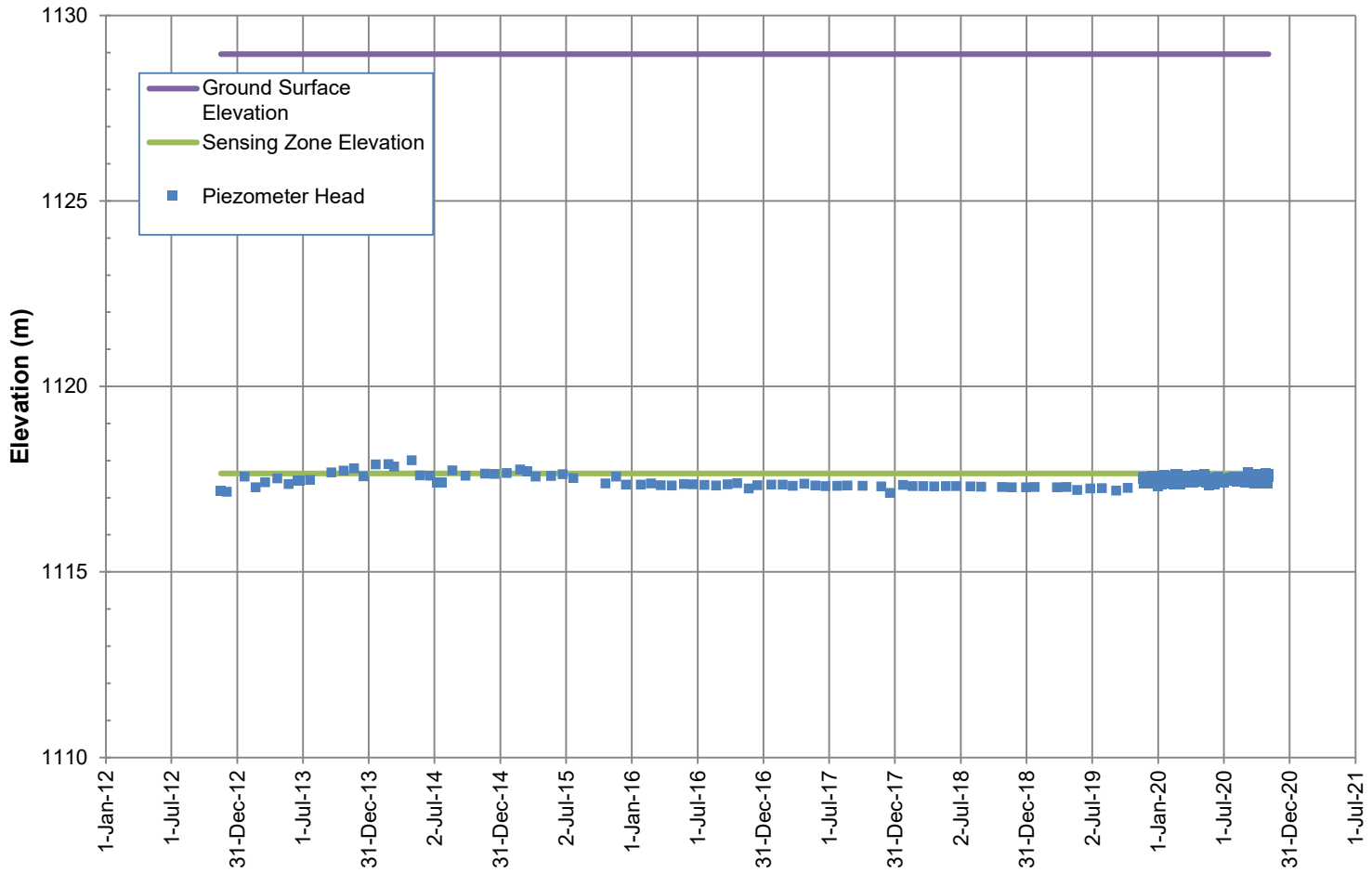




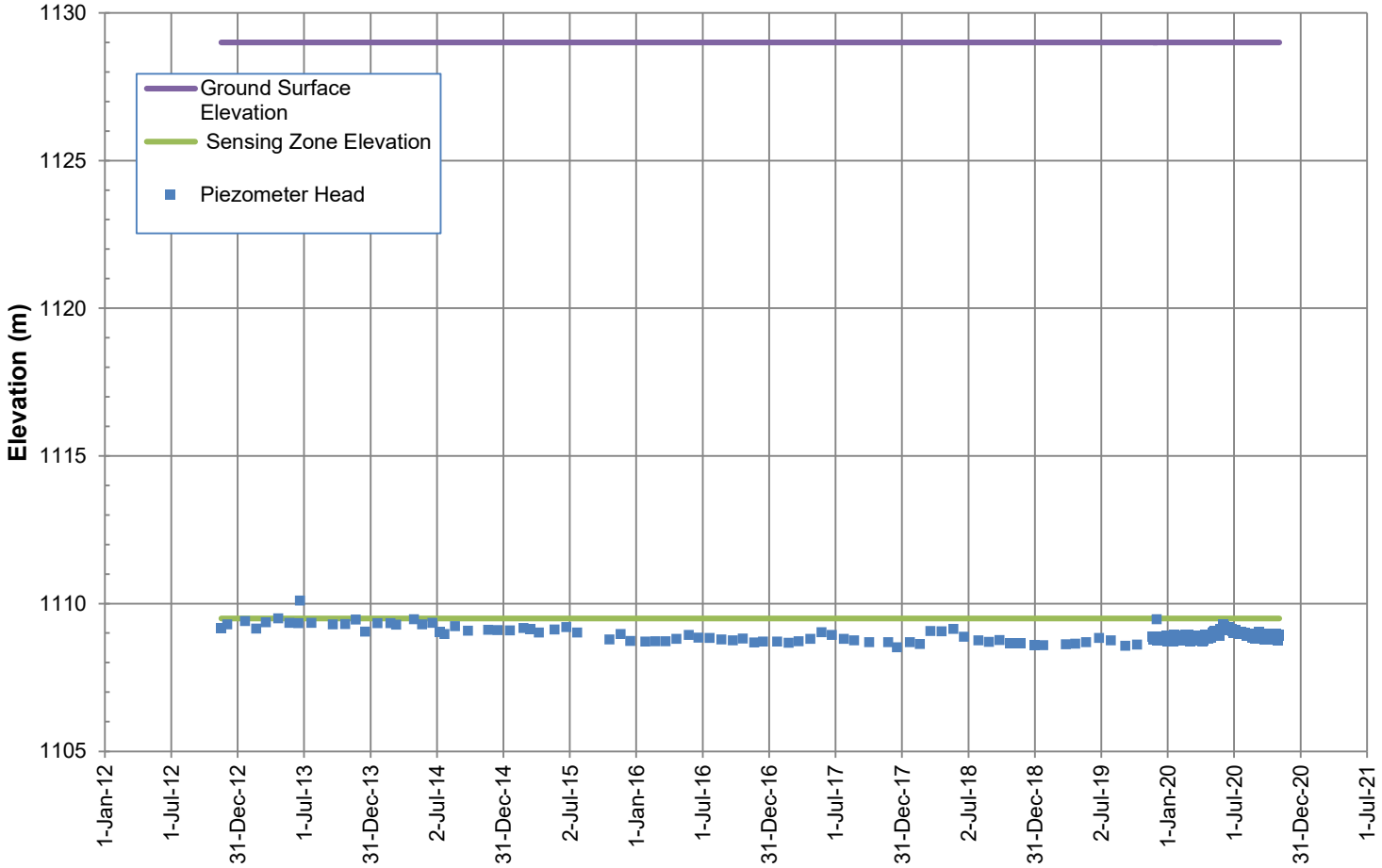
LEGEND

DFL DFM DFU
DGL DGM DGU
DHL DHU

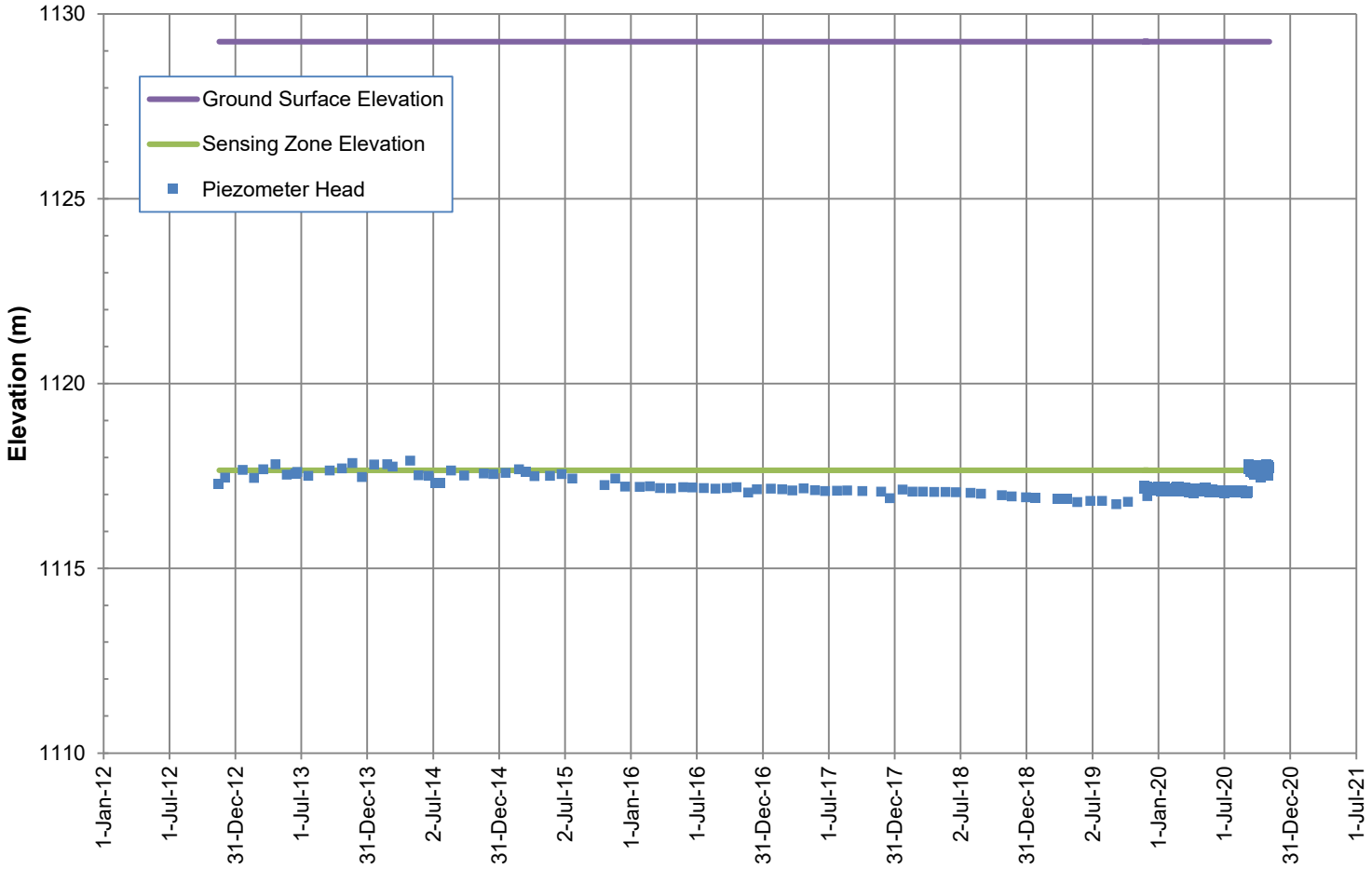
Teck Coal - Elkview Operations		
Lagoon D GPS Survey Pins	Date:	Revision
South GPS Survey Pins		



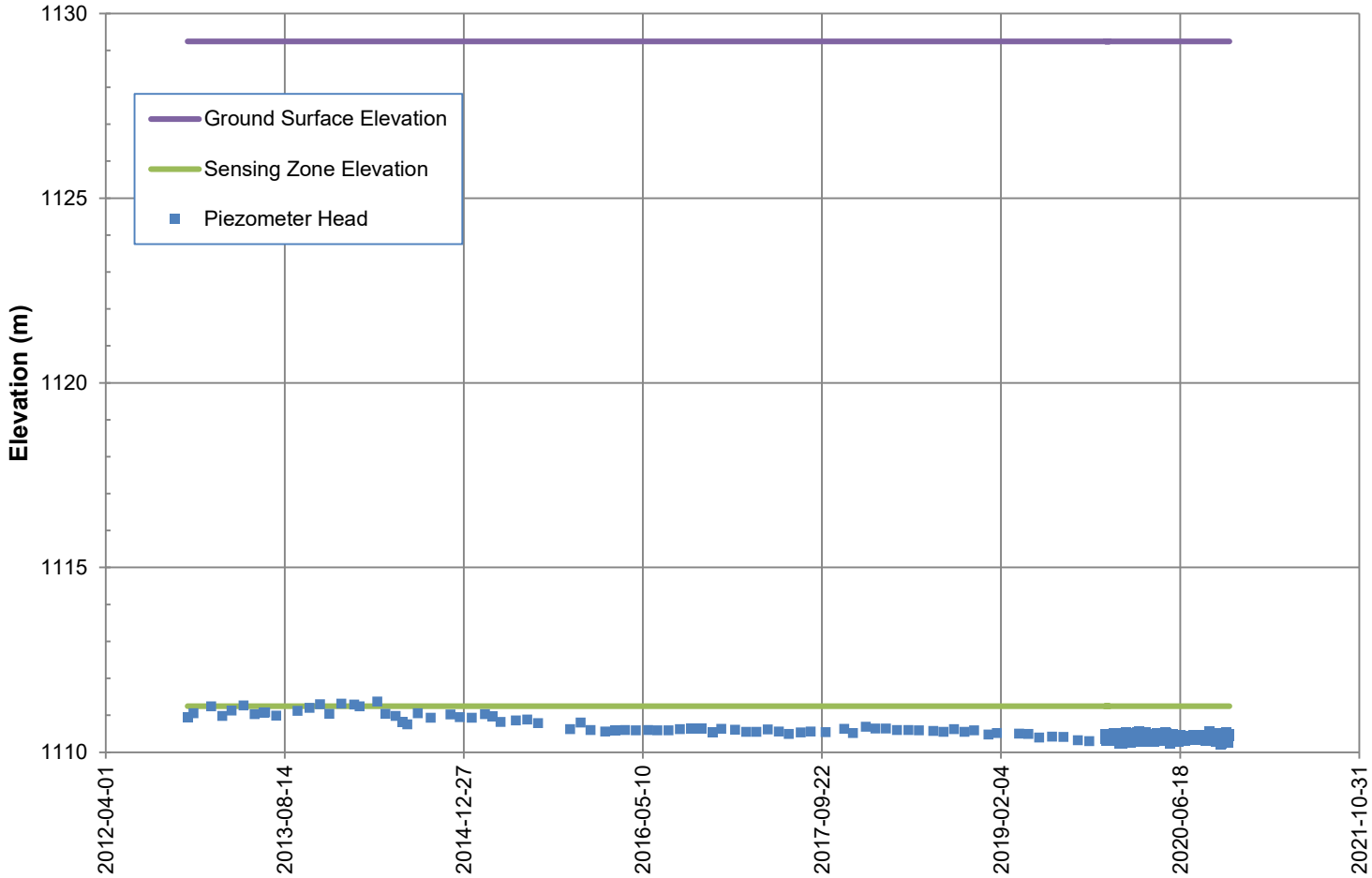
Teck Coal - Elkview Operations		
Lagoon C Piezometers	Date:	Revision
VW 23238 Pore Pressure	Name:	



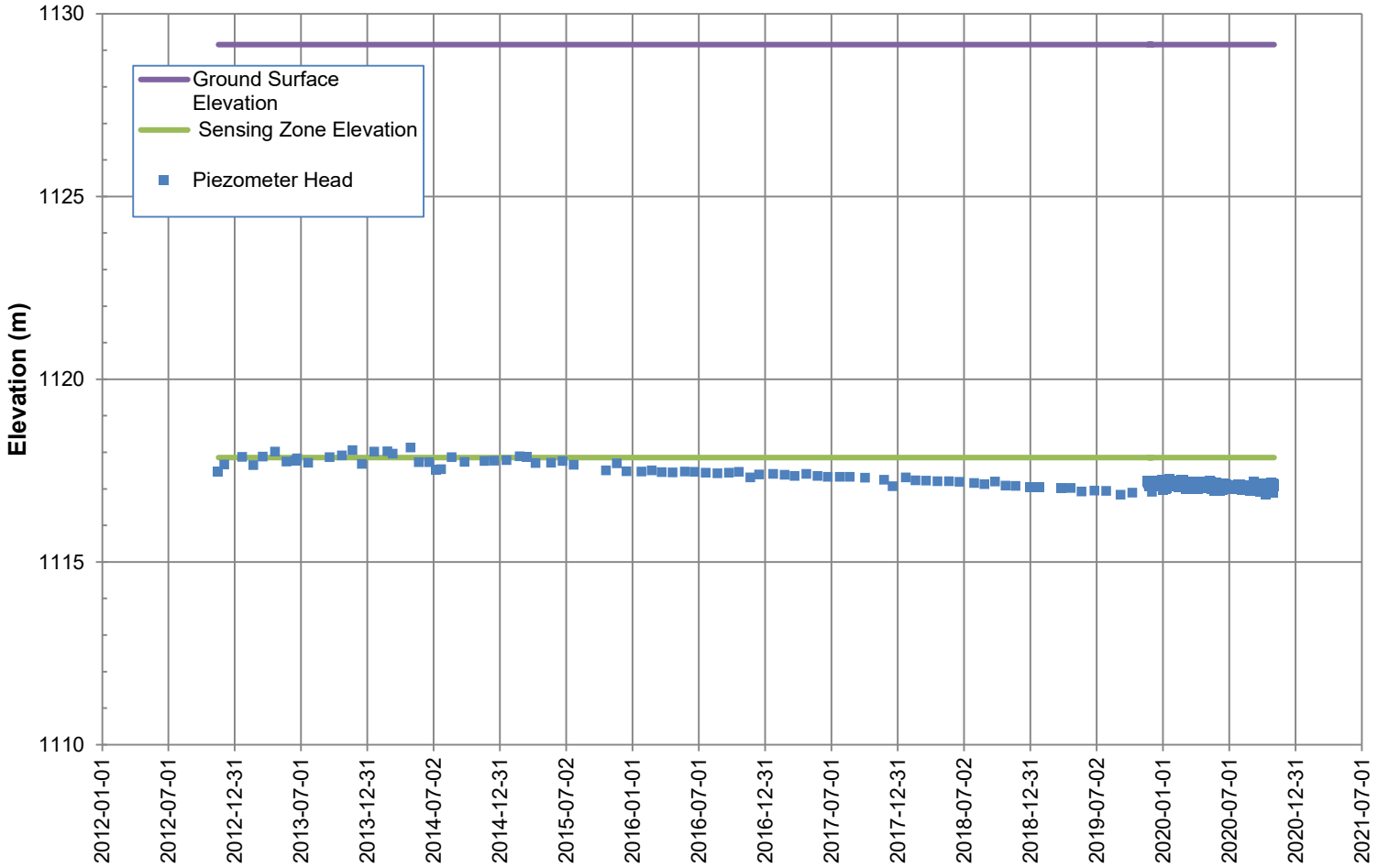
Teck Coal - Elkview Operations		
Lagoon C Piezometers	Date:	Revision
VW 23242 Pore Pressure	Name:	



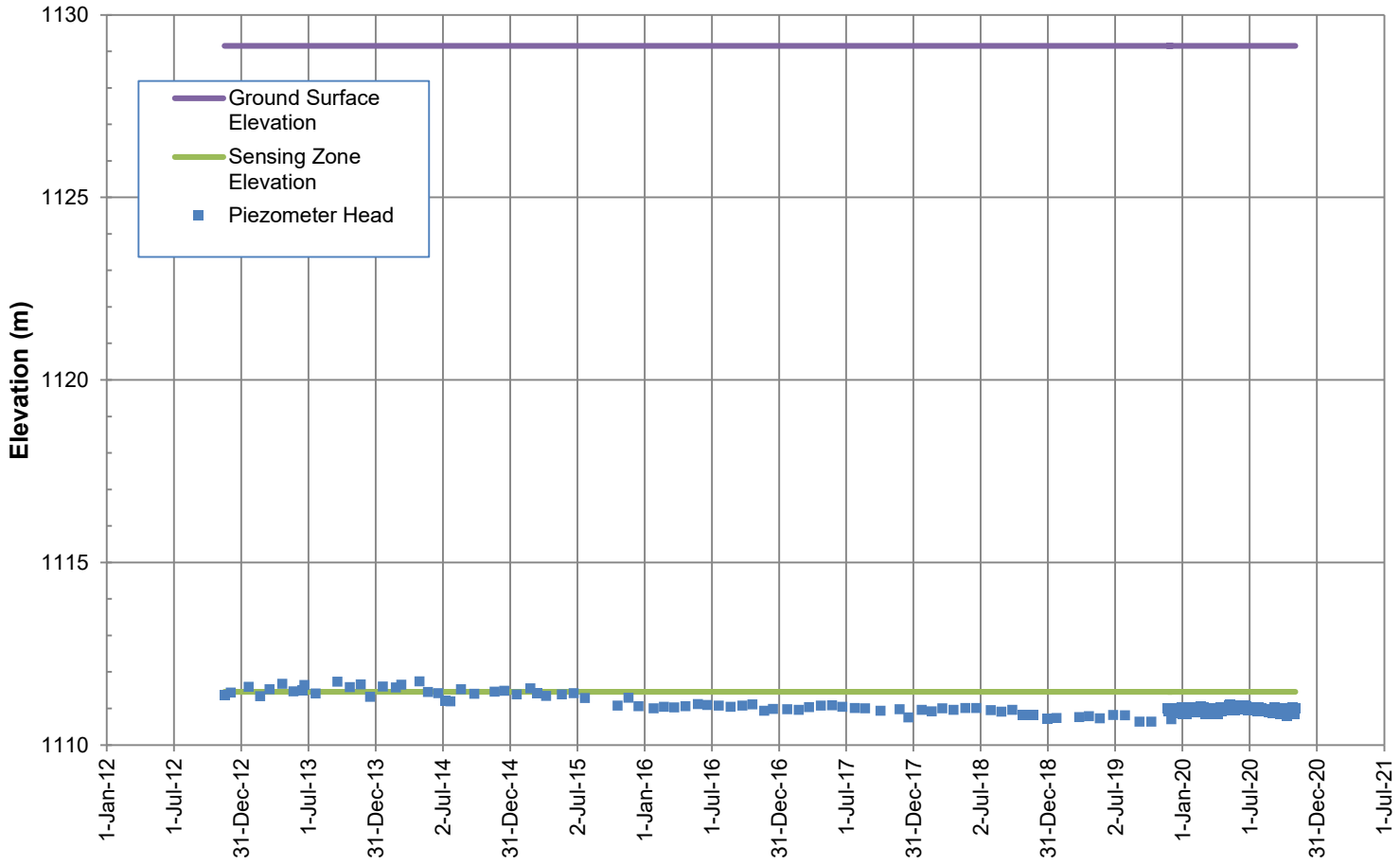
Teck Coal - Elkview Operations		
Lagoon C Piezometers	Date:	Revision
VW 23239 Pore Pressure	Name:	



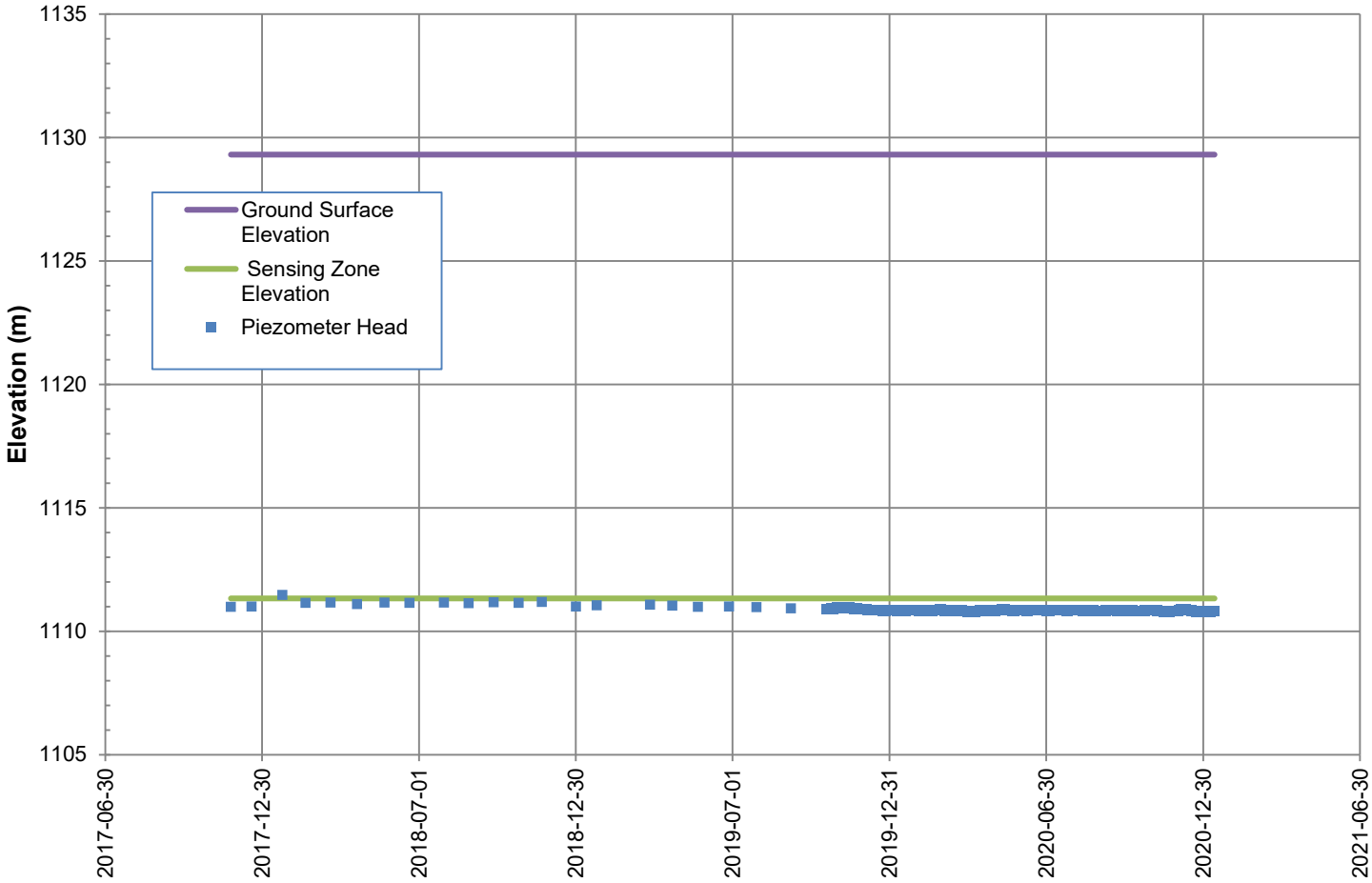
Teck Coal - Elkview Operations		
Lagoon C Piezometers	Date:	Revision
VW 23243 Pore Pressure	Name:	



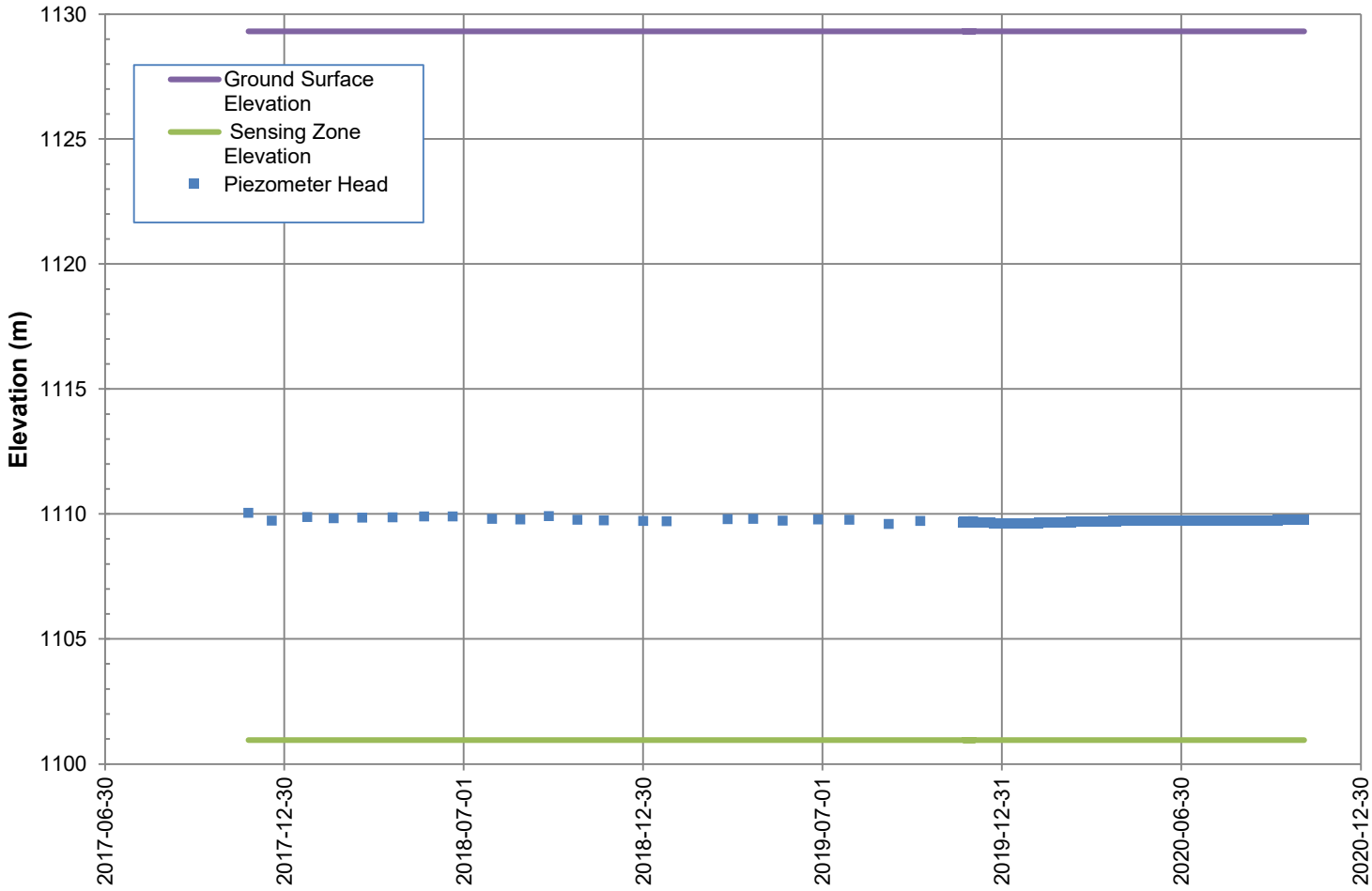
Teck Coal - Elkview Operations		
Lagoon C Piezometers	Date:	Revision
VW 23240 Pore Pressure	Name:	



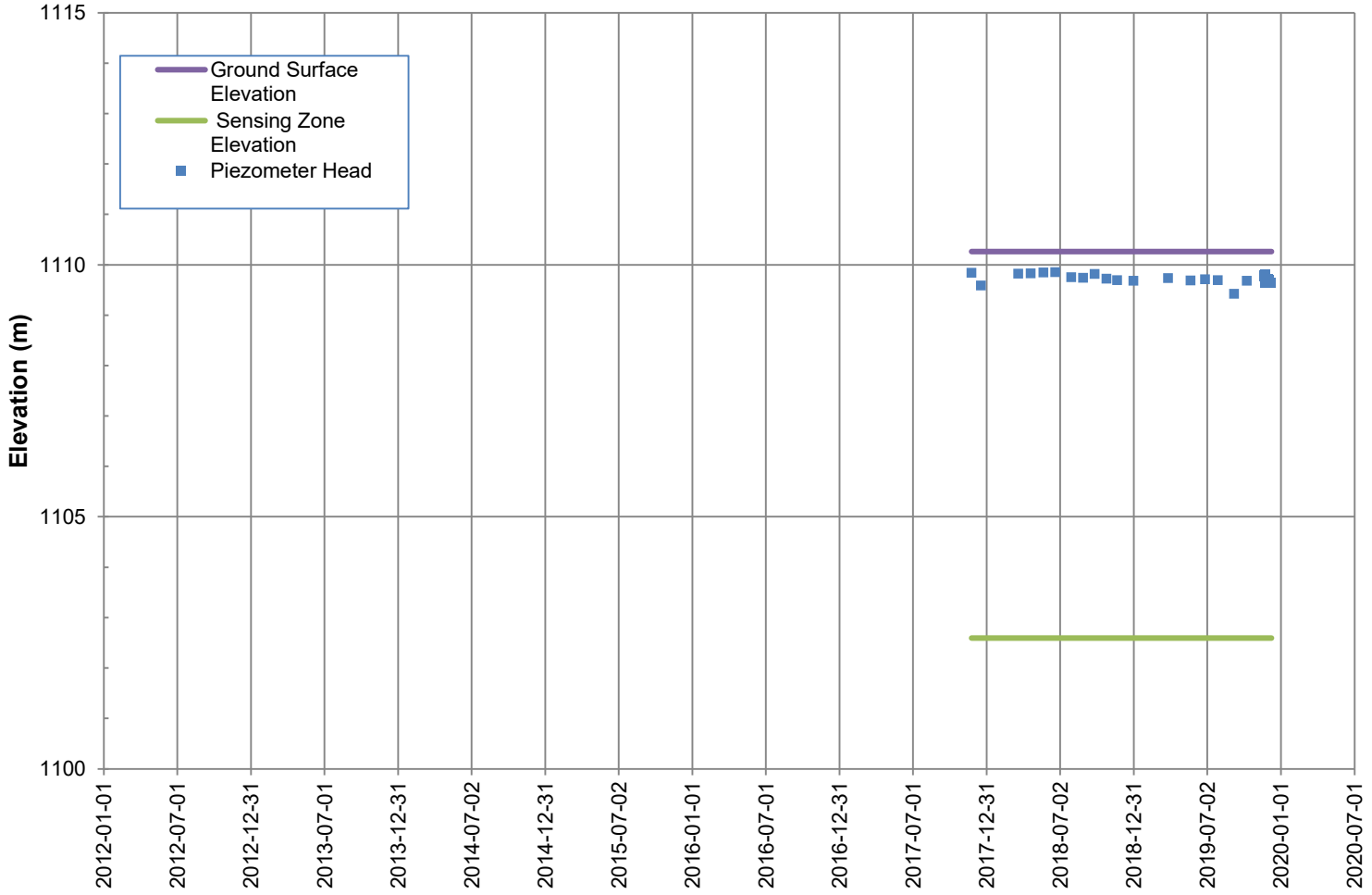
Teck Coal - Elkview Operations		
Lagoon C Piezometers	Date:	Revision
VW 23244 Pore Pressure	Name:	



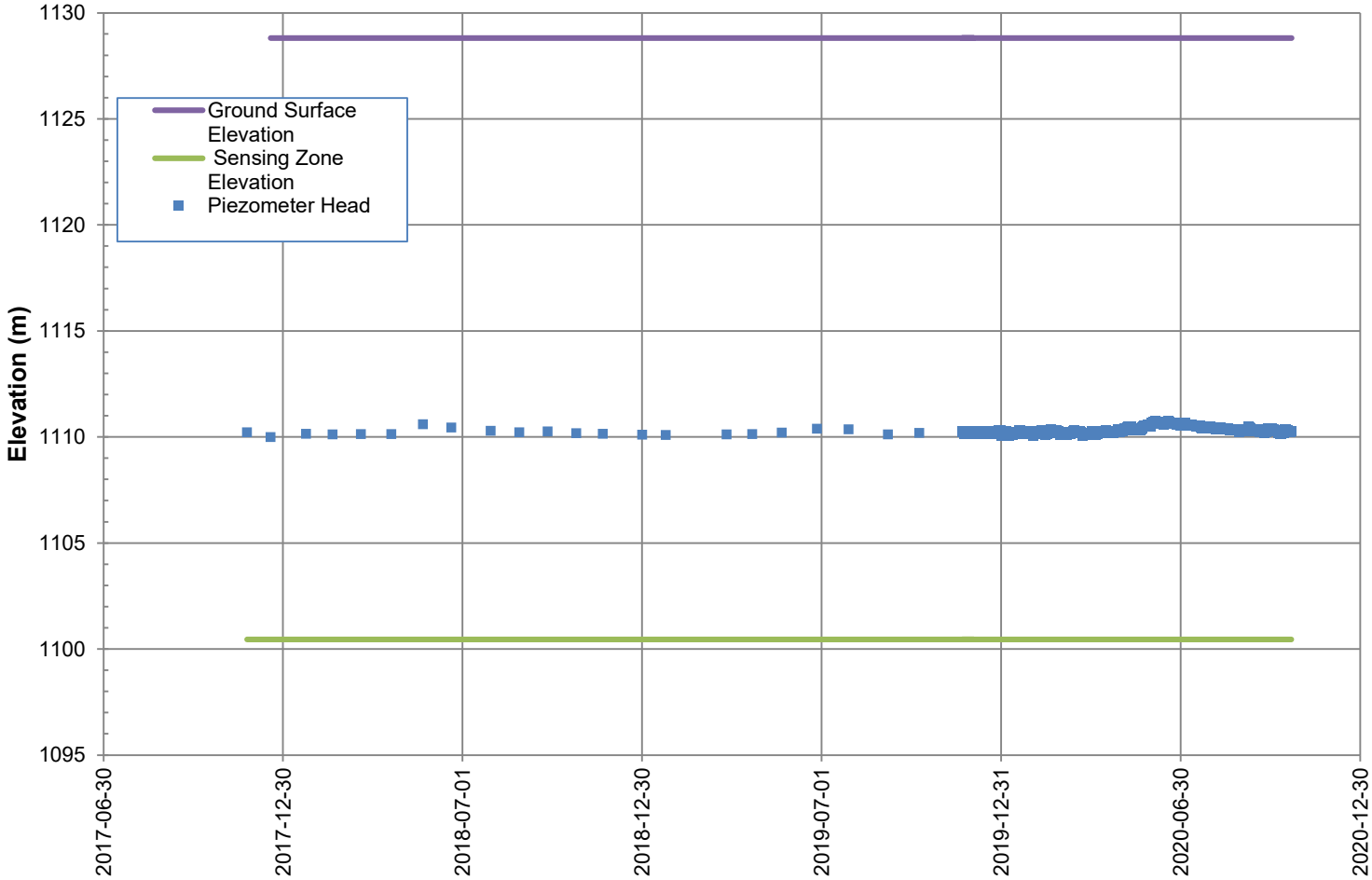
Teck Coal - Elkview Operations		
Lagoon C Piezometers	Date:	Revision
VW 46191 Pore Pressure	Name:	



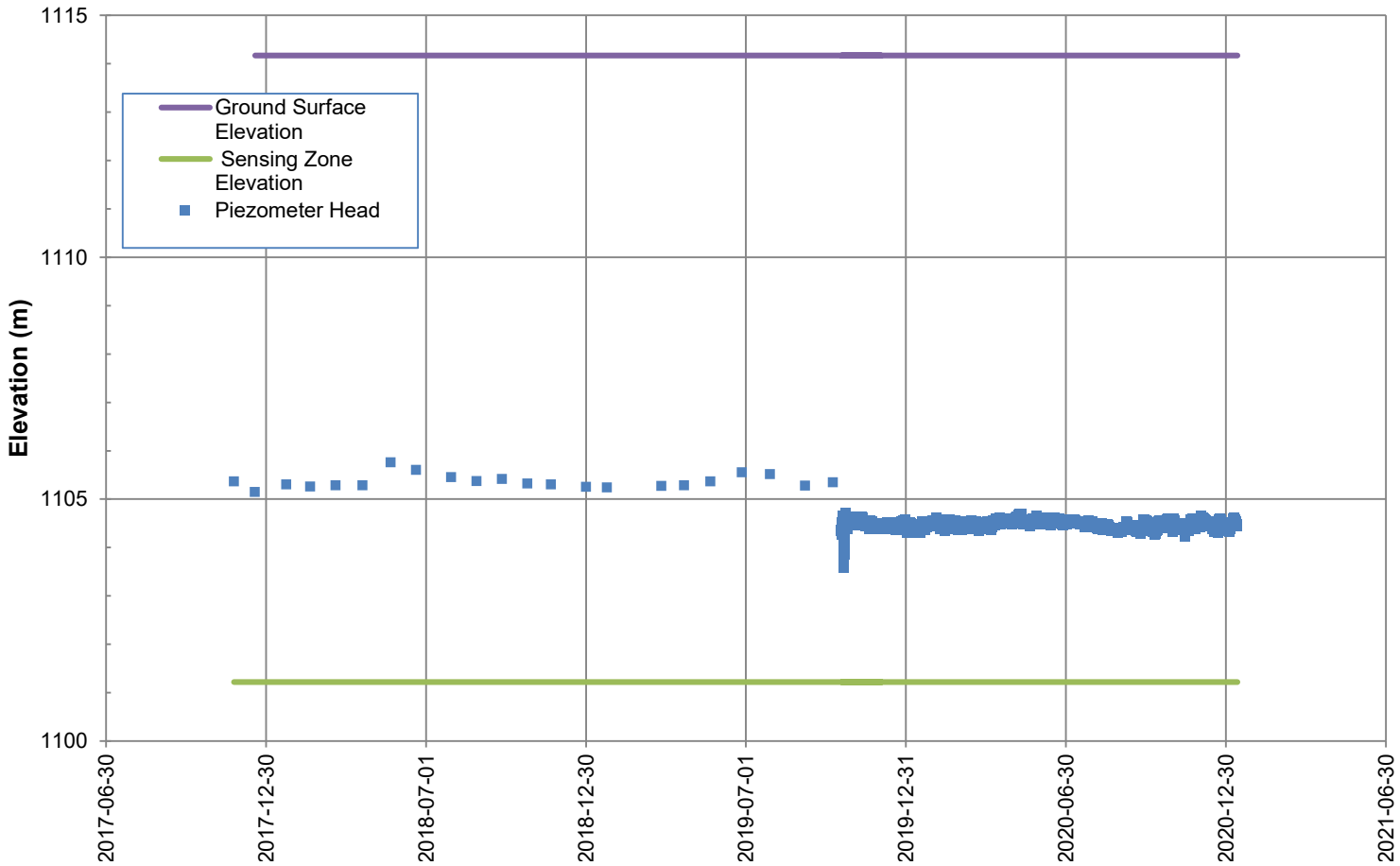
Teck Coal - Elkview Operations		
Lagoon C Piezometers	Date:	Revision
VW 46262 Pore Pressure	Name:	



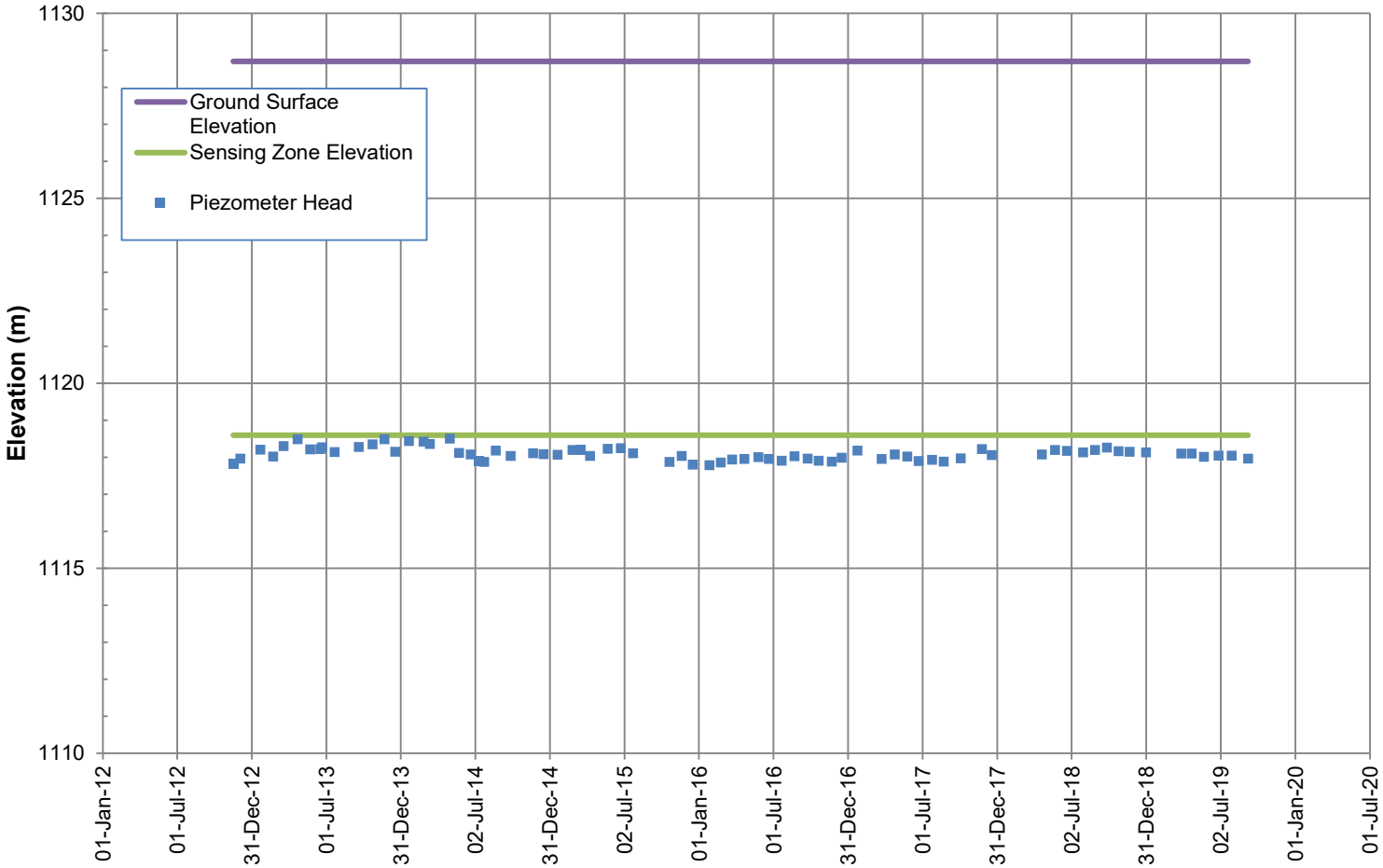
Teck Coal - Elkview Operations		
Lagoon C Piezometers	Date:	Revision
VW 46091 Pore Pressure	Name:	



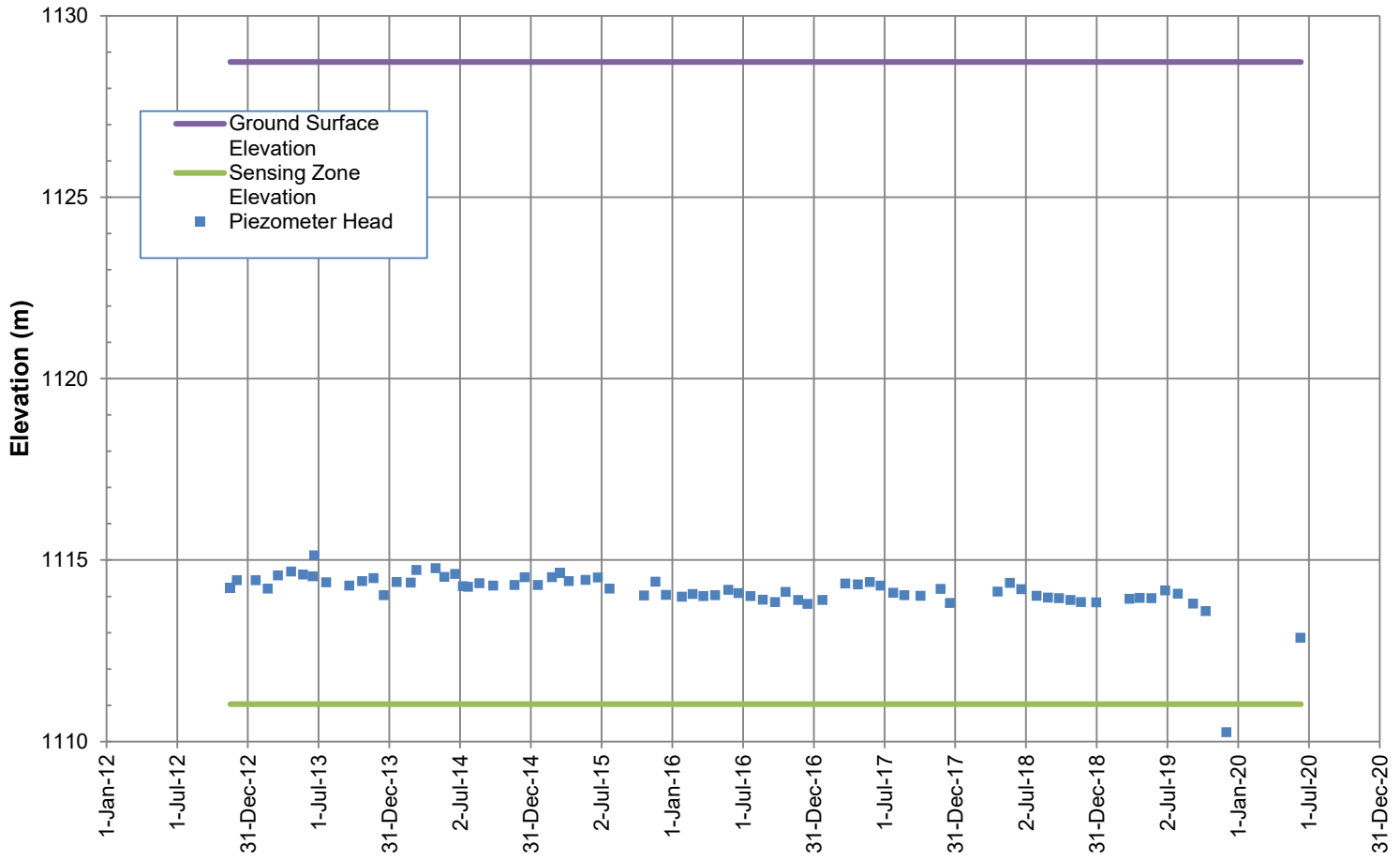
Teck Coal - Elkview Operations		
Lagoon C Piezometers	Date:	Revision
VW 46261 Pore Pressure	Name:	



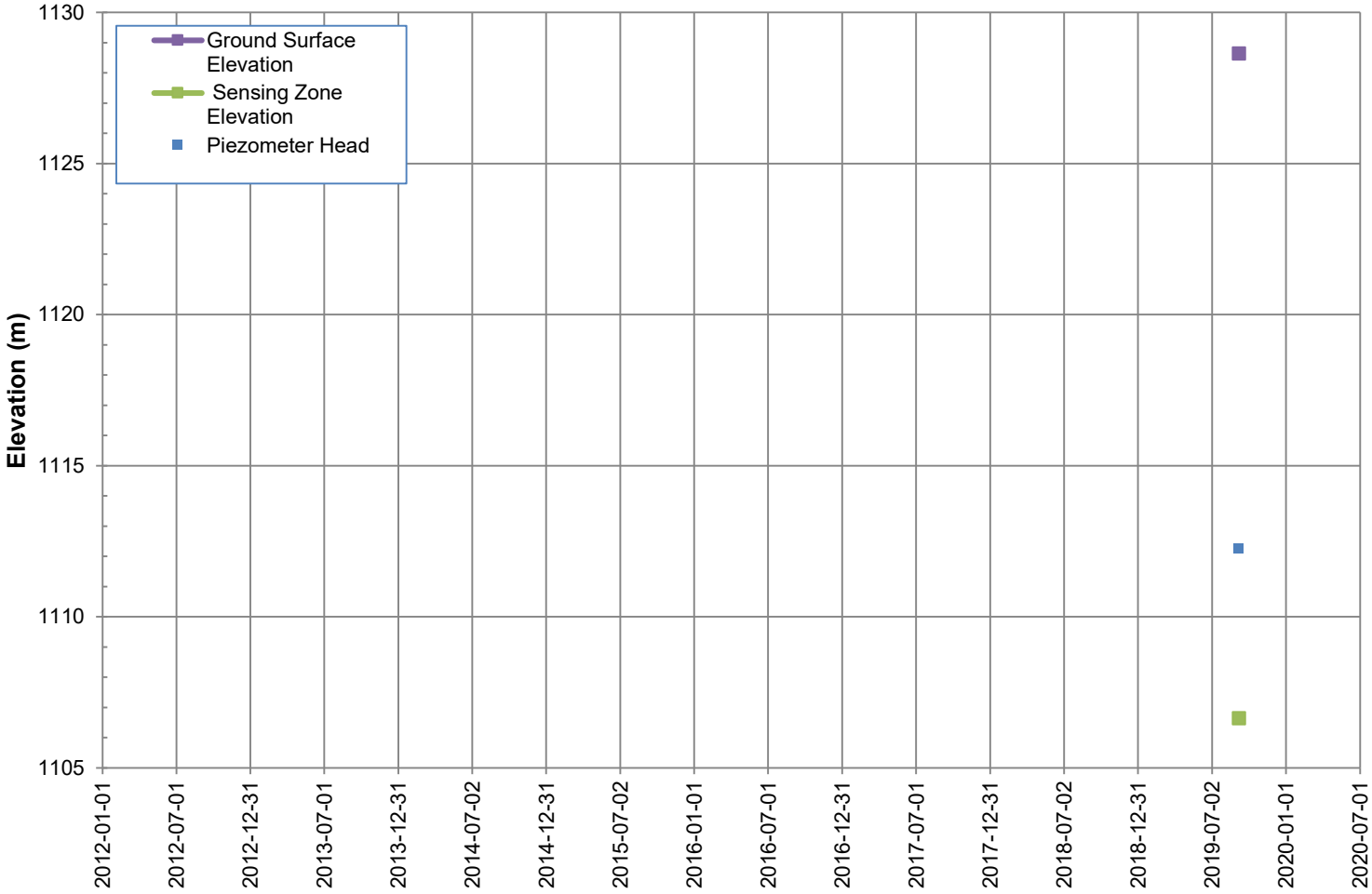
Teck Coal - Elkview Operations		
Lagoon C Piezometers	Date:	Revision
VW 46093 Pore Pressure	Name:	



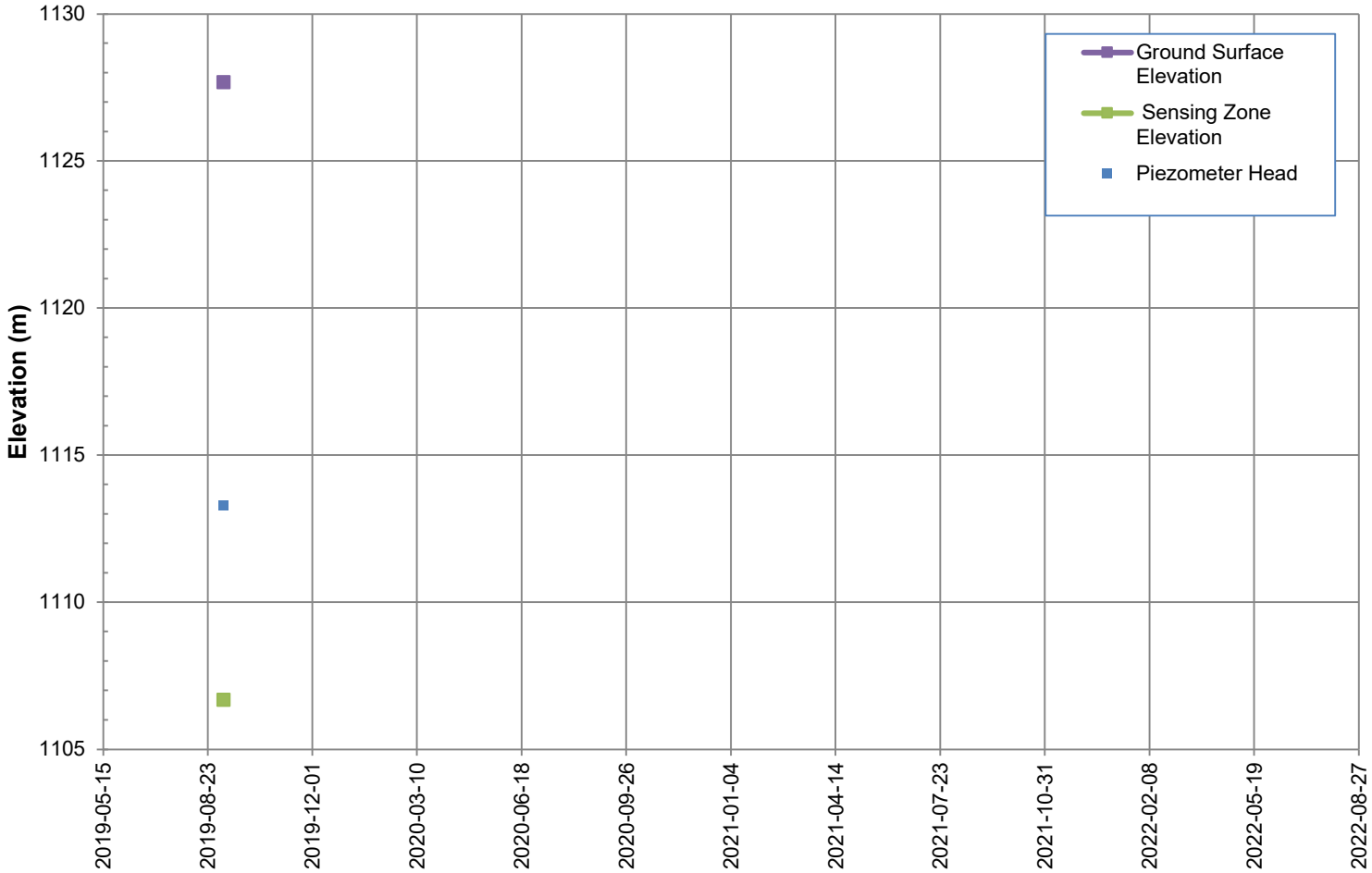
Teck Coal - Elkview Operations		
Lagoon C Piezometers	Date:	Revision
VW 23241 Pore Pressure	Name:	



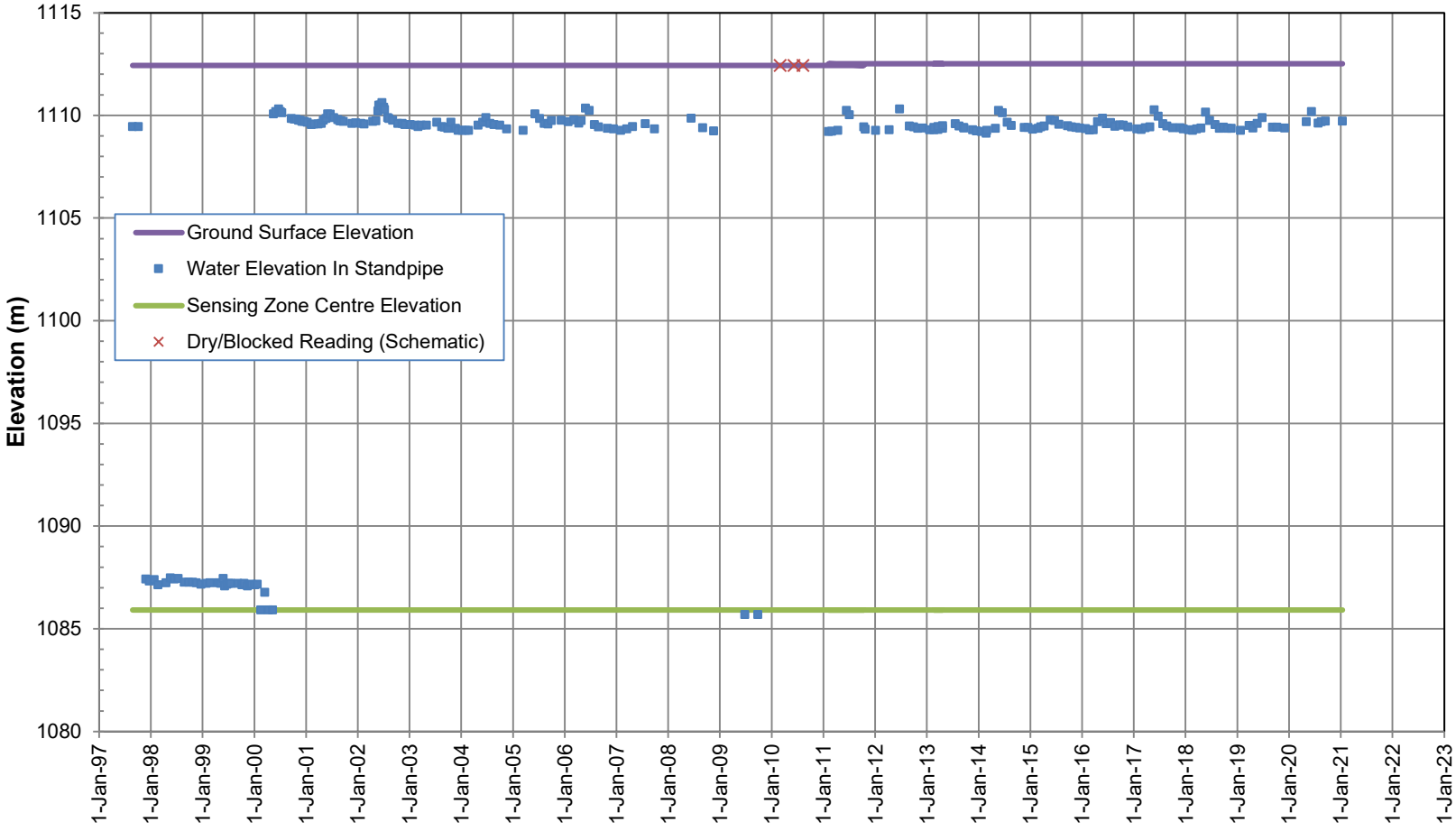
Teck Coal - Elkview Operations		
Lagoon C Piezometers	Date:	Revision
VW 23245 Pore Pressure	Name:	



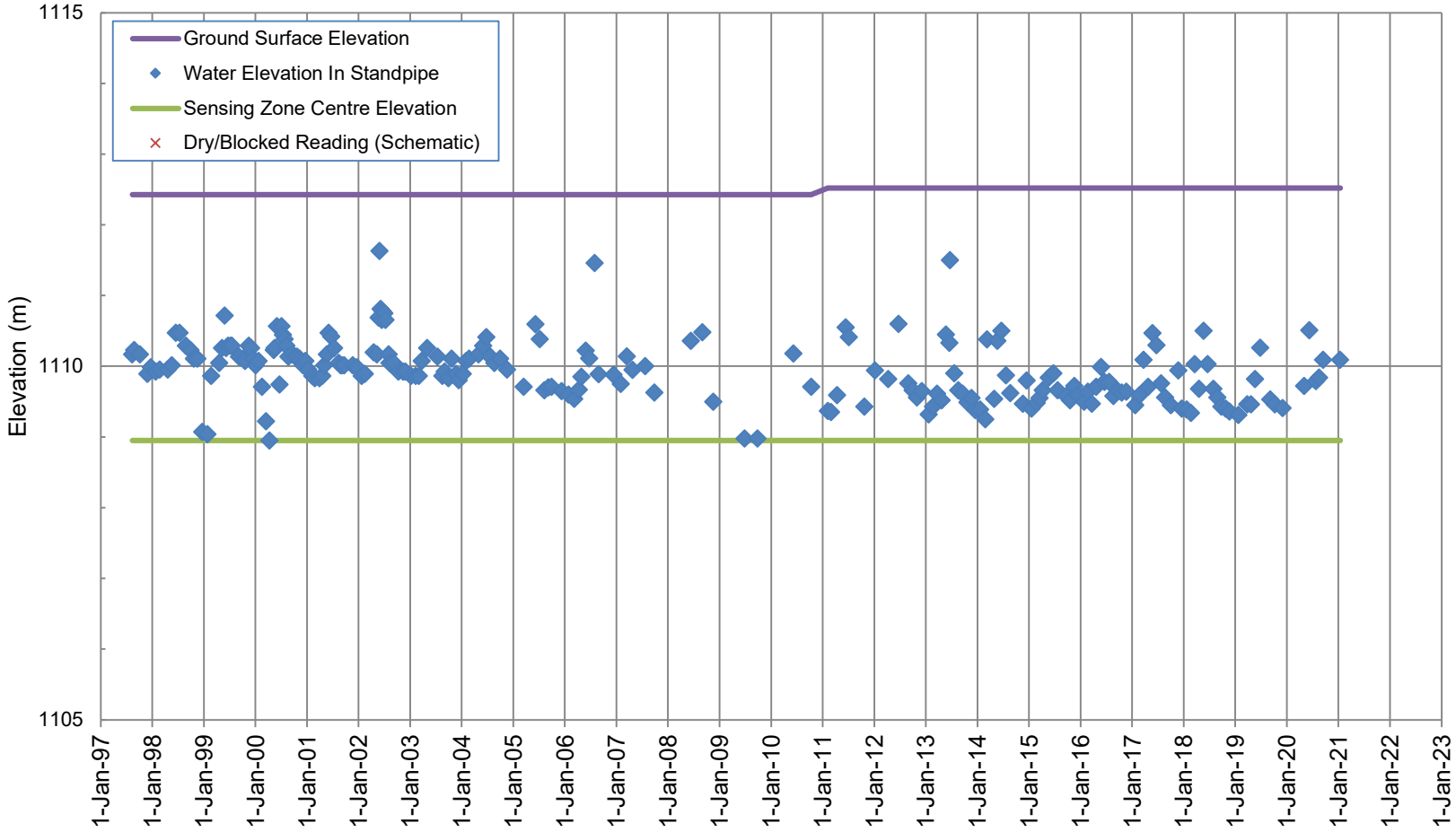
Teck Coal - Elkview Operations		
Lagoon C Piezometers	Date:	Revision
PE19_60311 Pore Pressure	Name:	



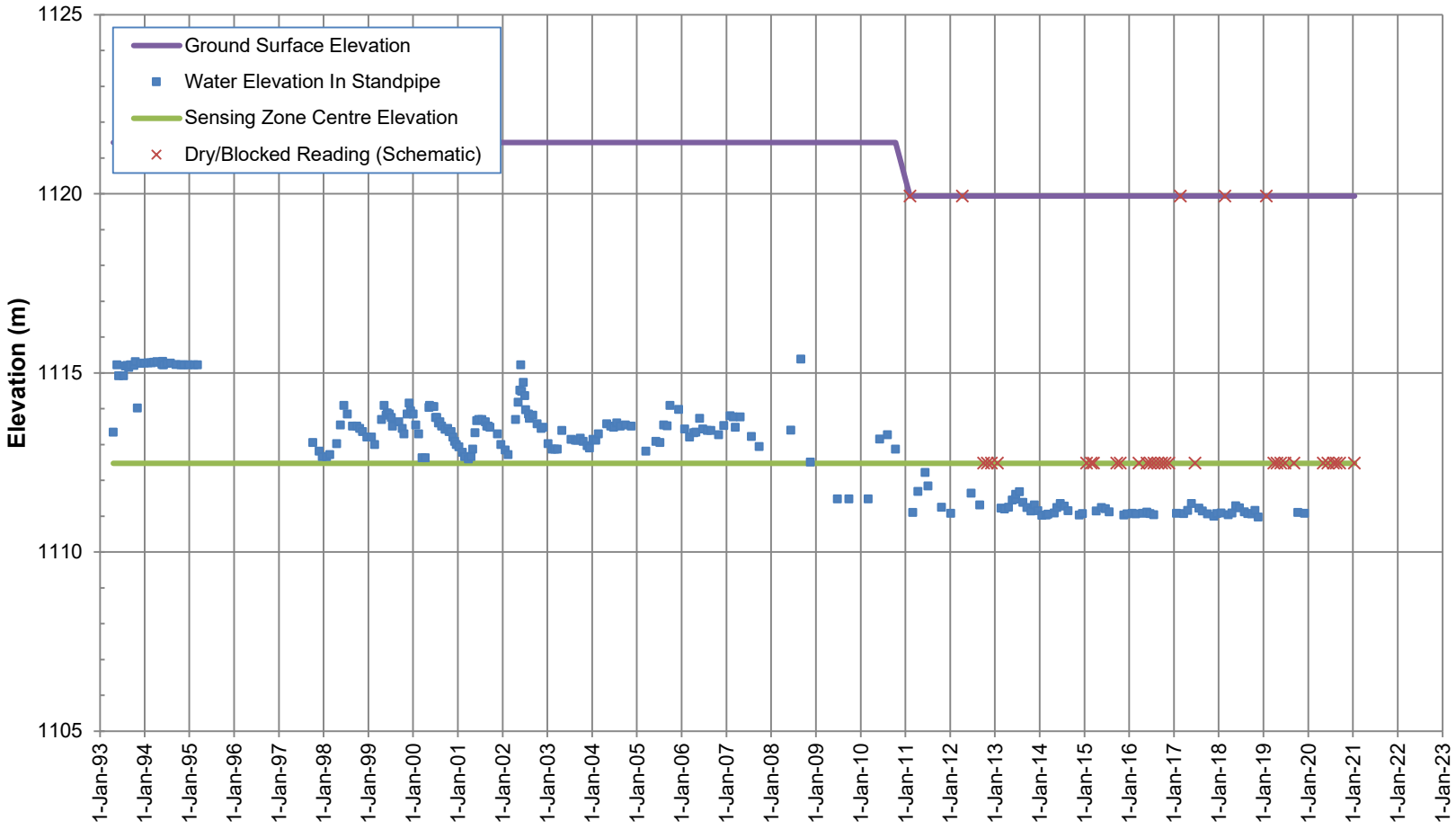
Teck Coal - Elkview Operations		
Lagoon C Piezometers	Date:	Revision
PE19_60310 Pore Pressure	Name:	



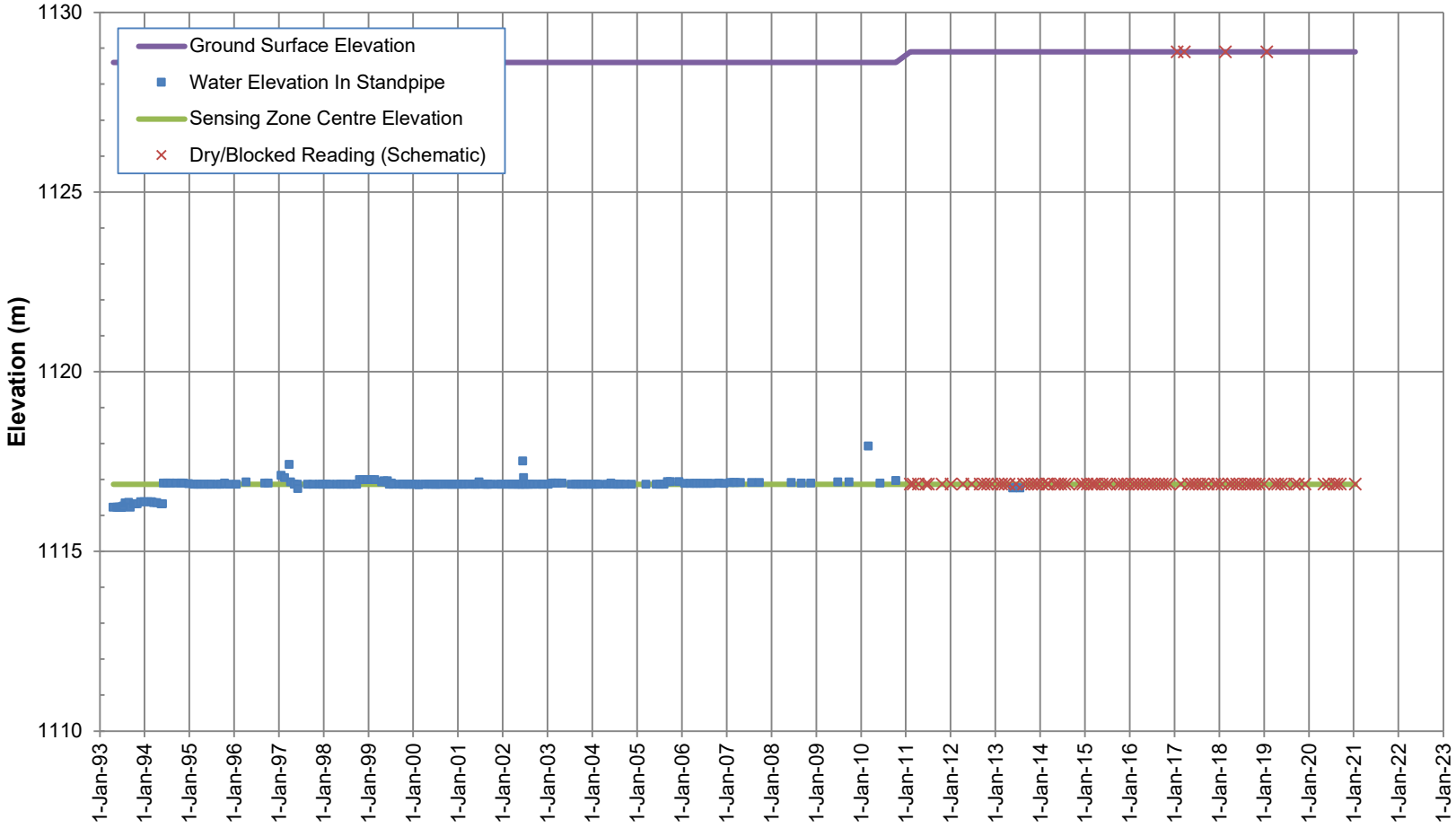
Teck Coal - Elkview Operations		
Lagoon C Piezometers	Date:	Revision
Standpipe GT-9703A		



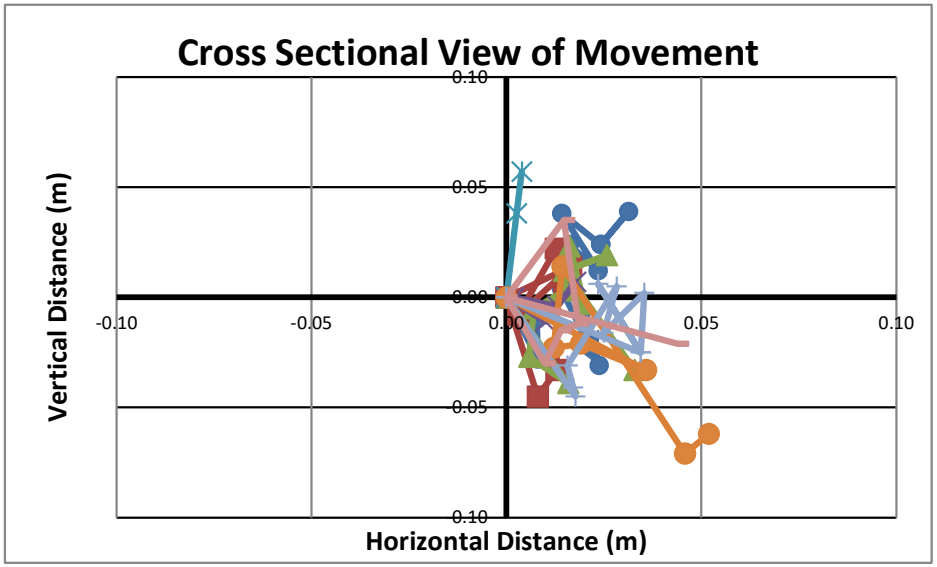
Teck Coal - Elkview Operations		
Lagoon C Piezometers	Date:	Revision
Standpipe GT-9703B		

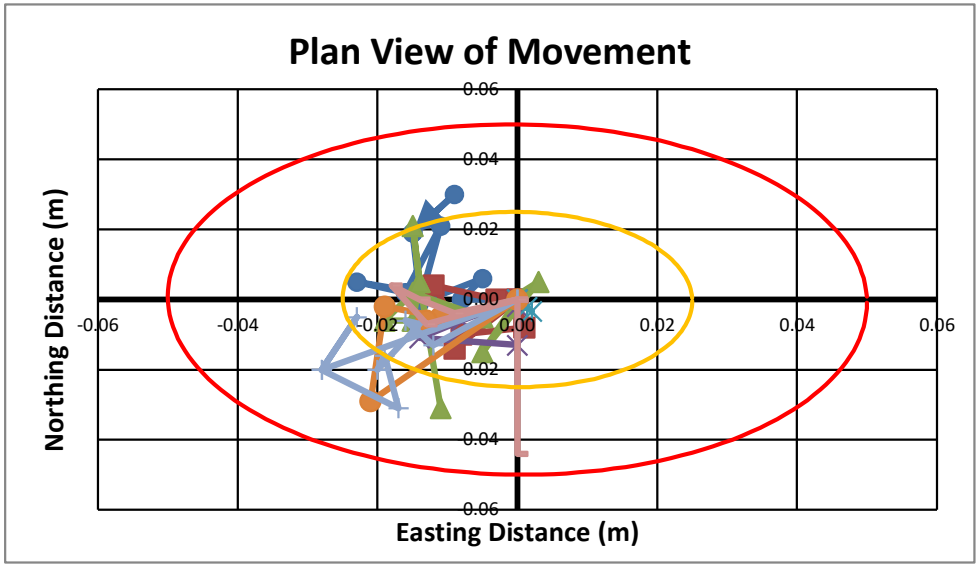


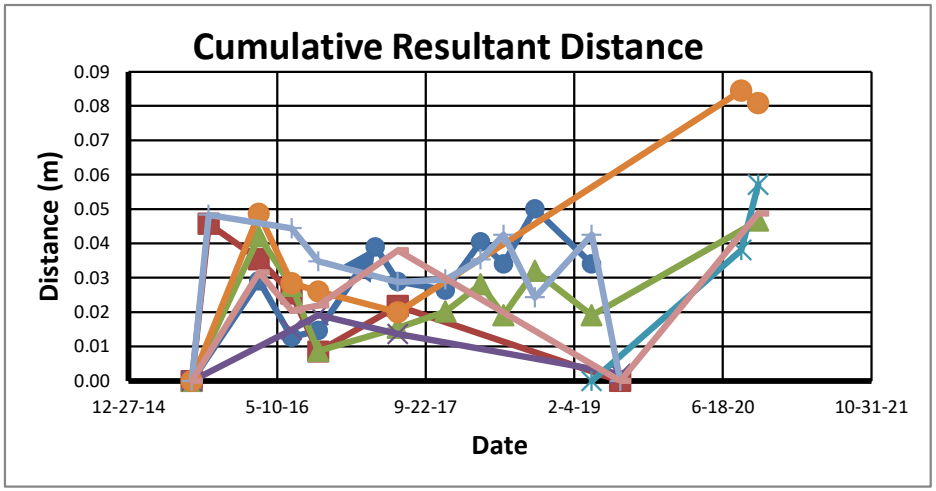
Teck Coal - Elkview Operations		
Lagoon C Piezometers	Date:	Revision
Standpipe C88-2		

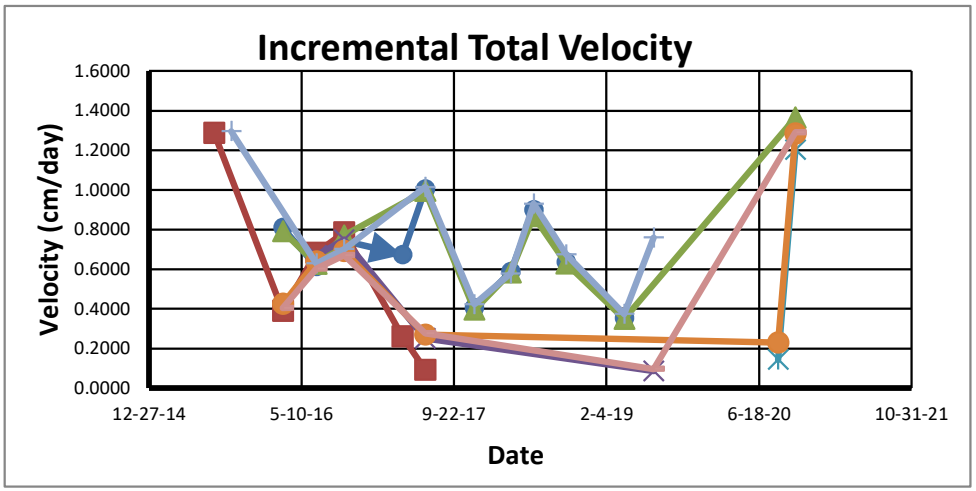


Teck Coal - Elkview Operations		
Lagoon C Piezometers	Date:	Revision
Standpipe OW-C2		





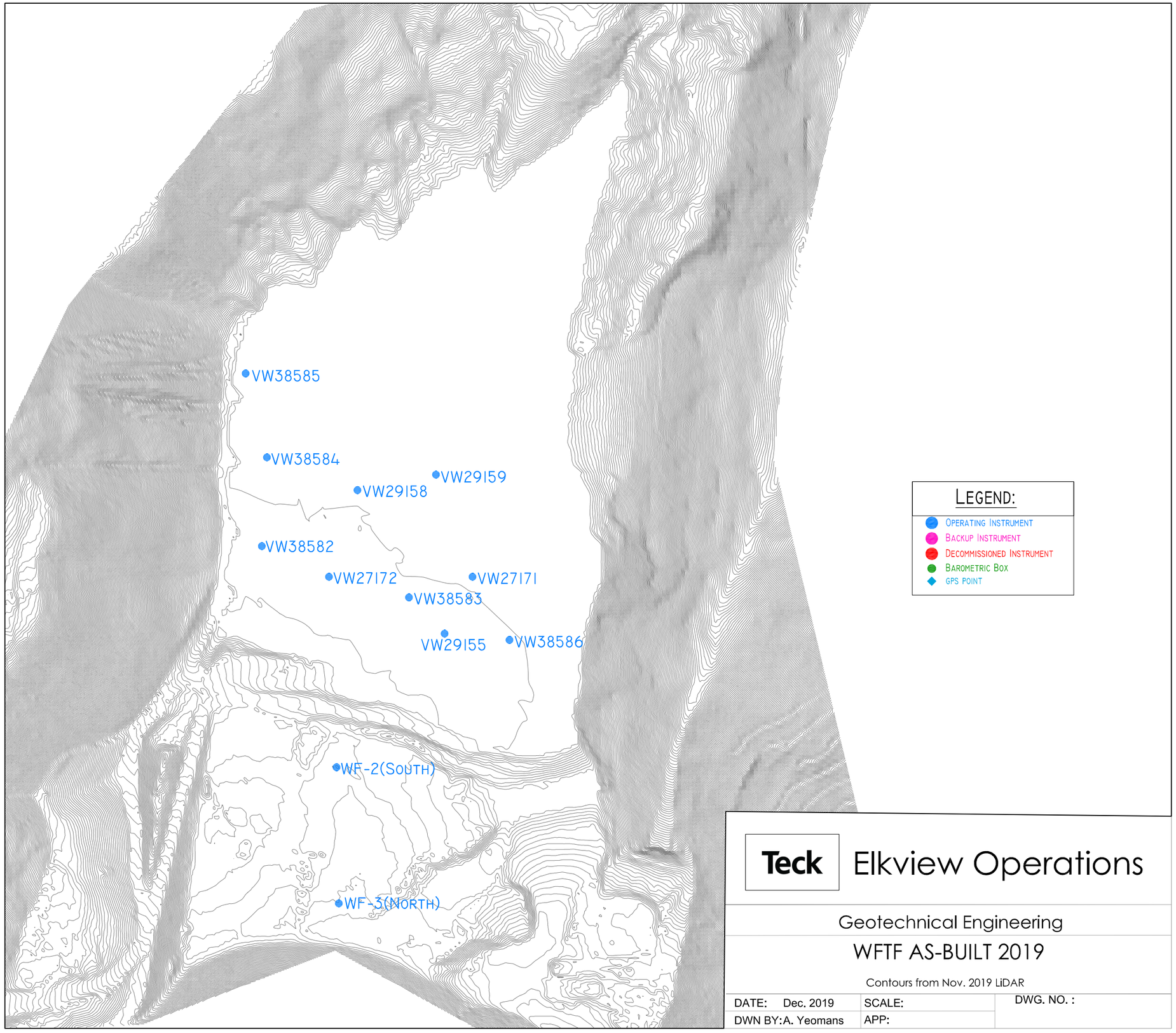




LEGEND

CAU CAL CBU CBL CCU CCL CDU CDL

Teck Coal - Elkview Operations		
Lagoon C GPS Survey Pins	Date:	Revision
All GPS Survey Pins		



LEGEND:

- Operating Instrument
- Backup Instrument
- Decommissioned Instrument
- Barometric Box
- GPS Point

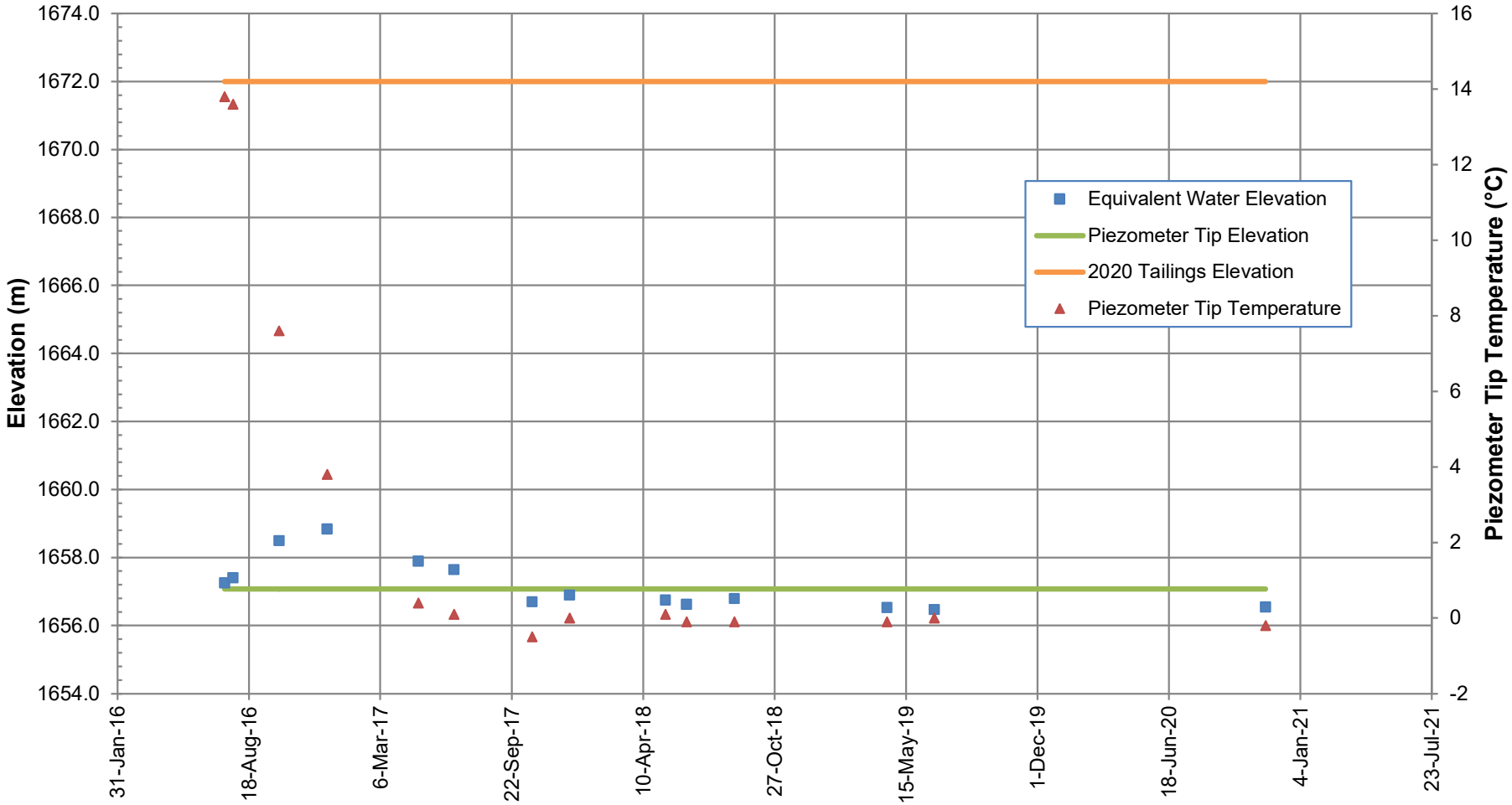
Teck Elkview Operations

Geotechnical Engineering

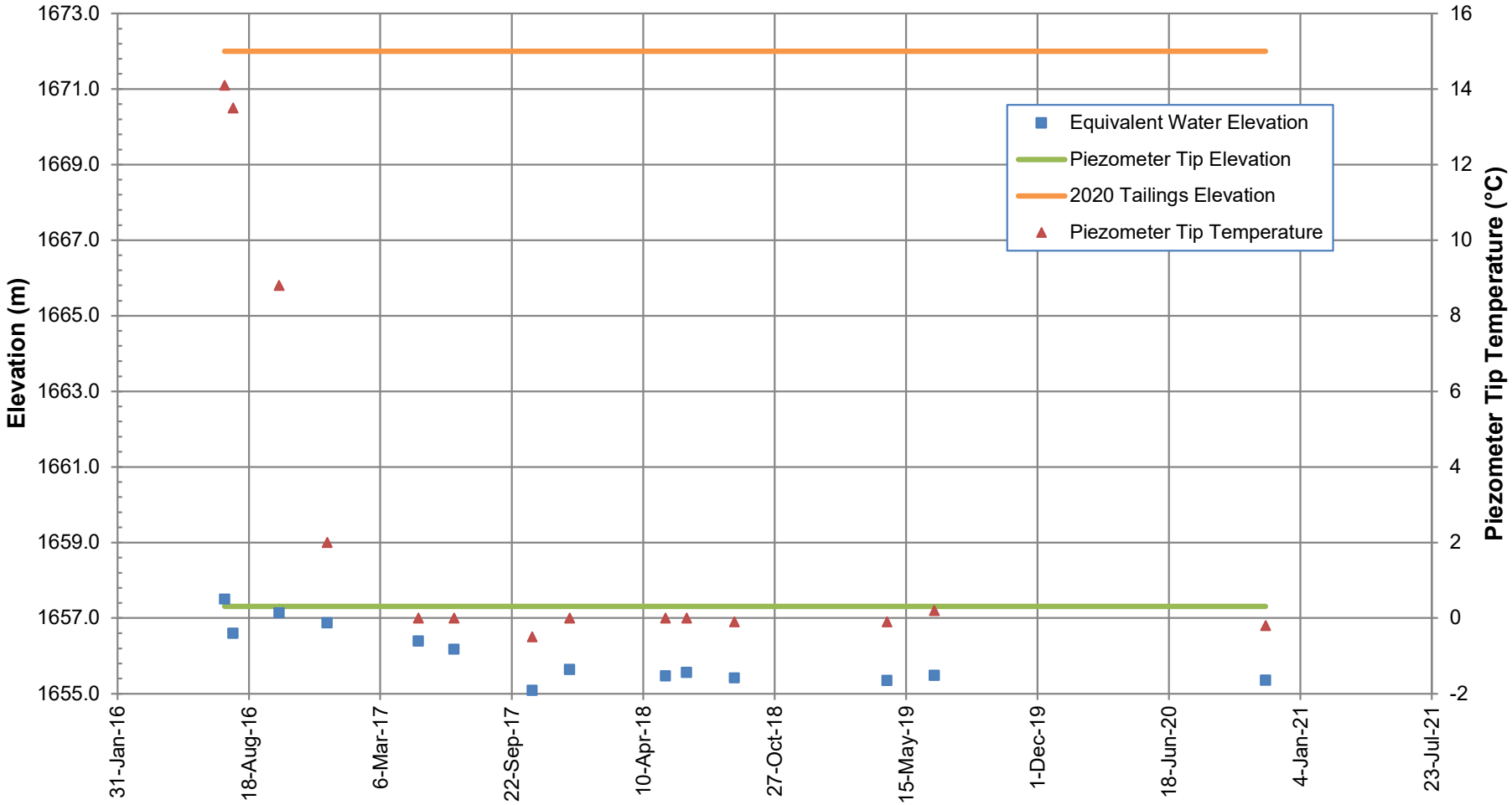
WFTF AS-BUILT 2019

Contours from Nov. 2019 LiDAR

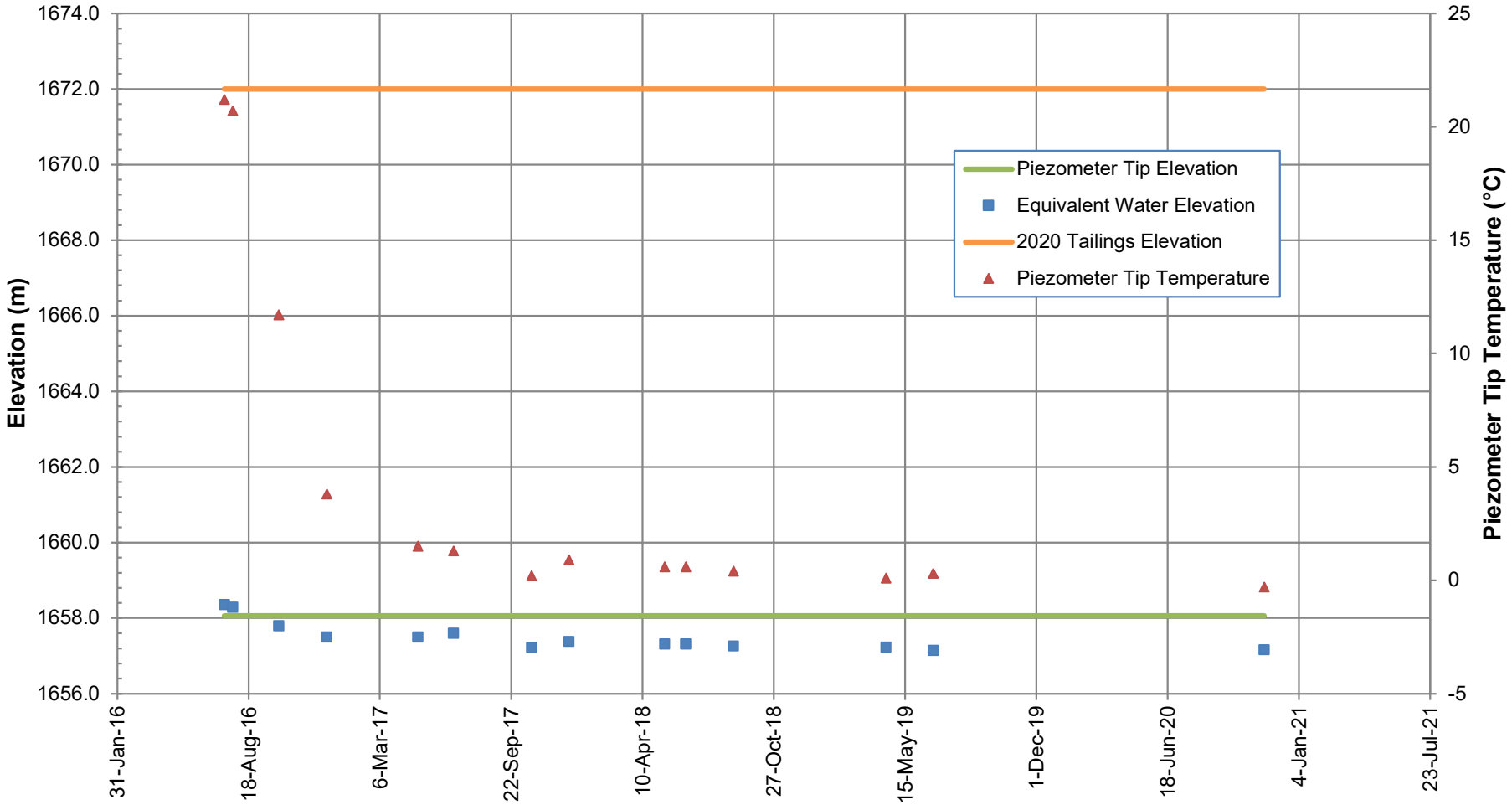
DATE: Dec. 2019	SCALE:	DWG. NO. :
DWN BY:A. Yeomans	APP:	



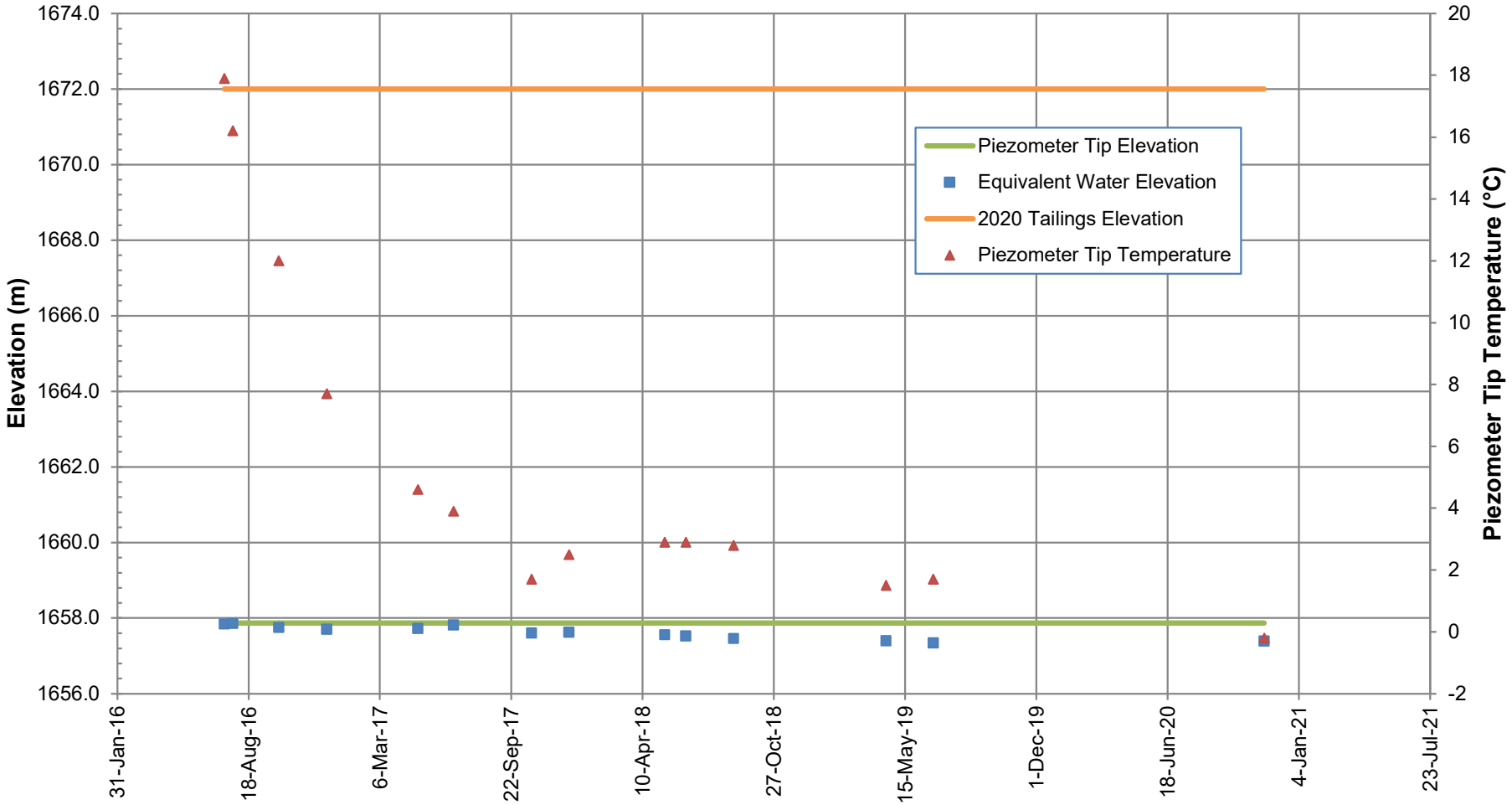
Teck Coal - Elkview Operations		
WFTF Piezometers	Date:	Revision
Vibrating Wire Piezometer 27171		



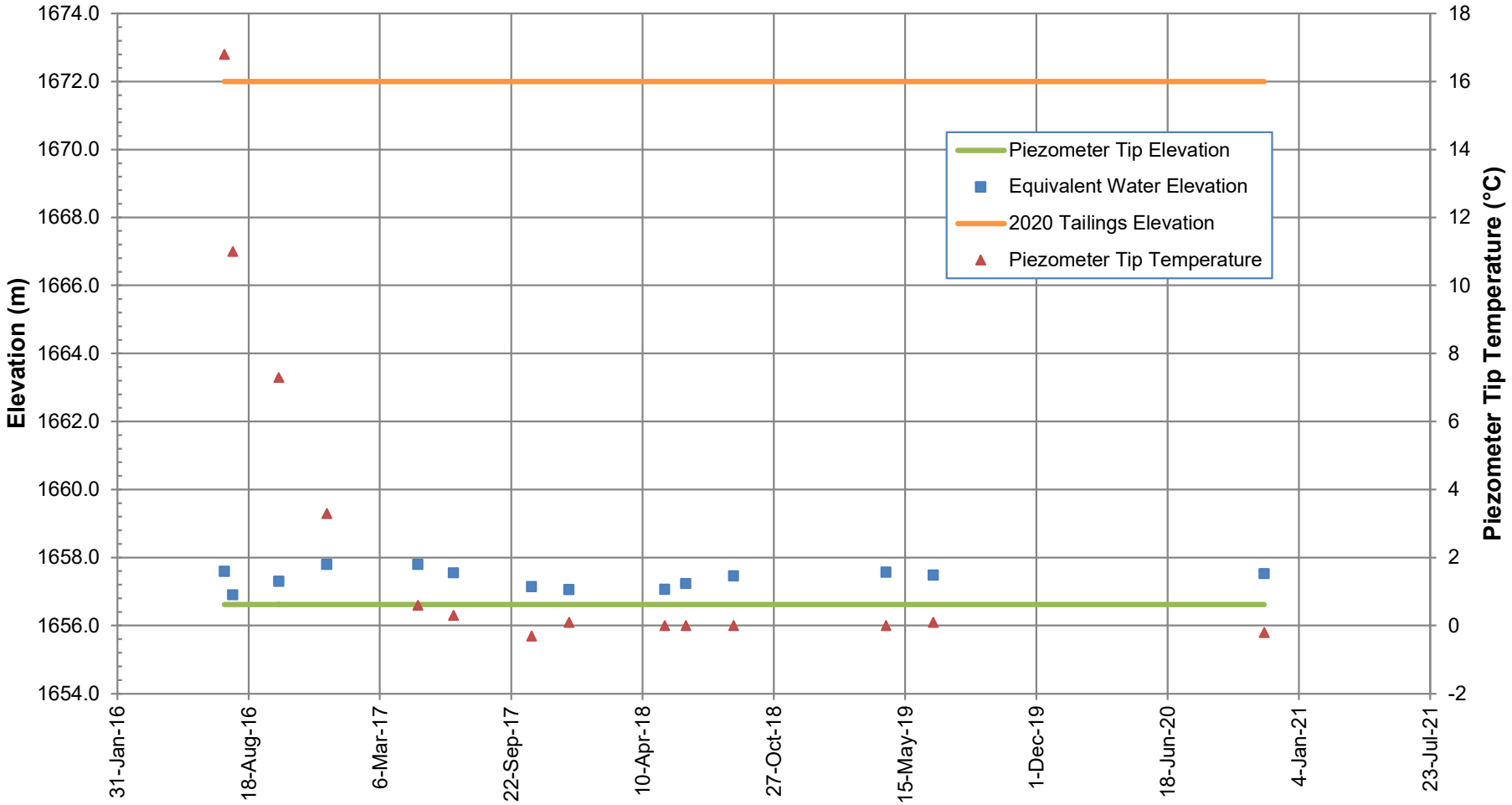
Teck Coal - Elkview Operations		
WFTF Piezometers	Date:	Revision
Vibrating Wire Piezometer 29158		



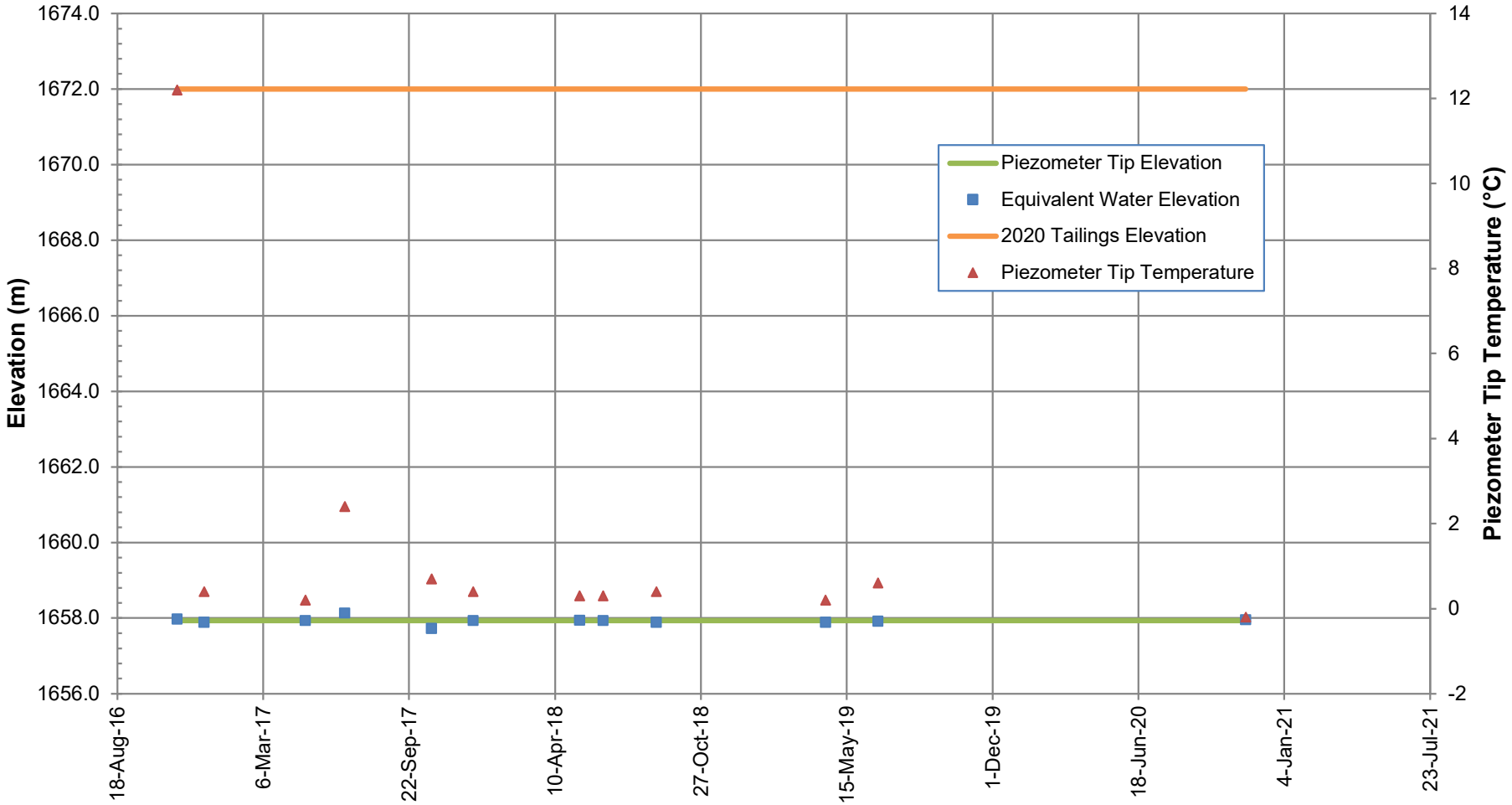
Teck Coal - Elkview Operations		
WFTF Piezometers	Date:	Revision
Vibrating Wire Piezometer 27172		



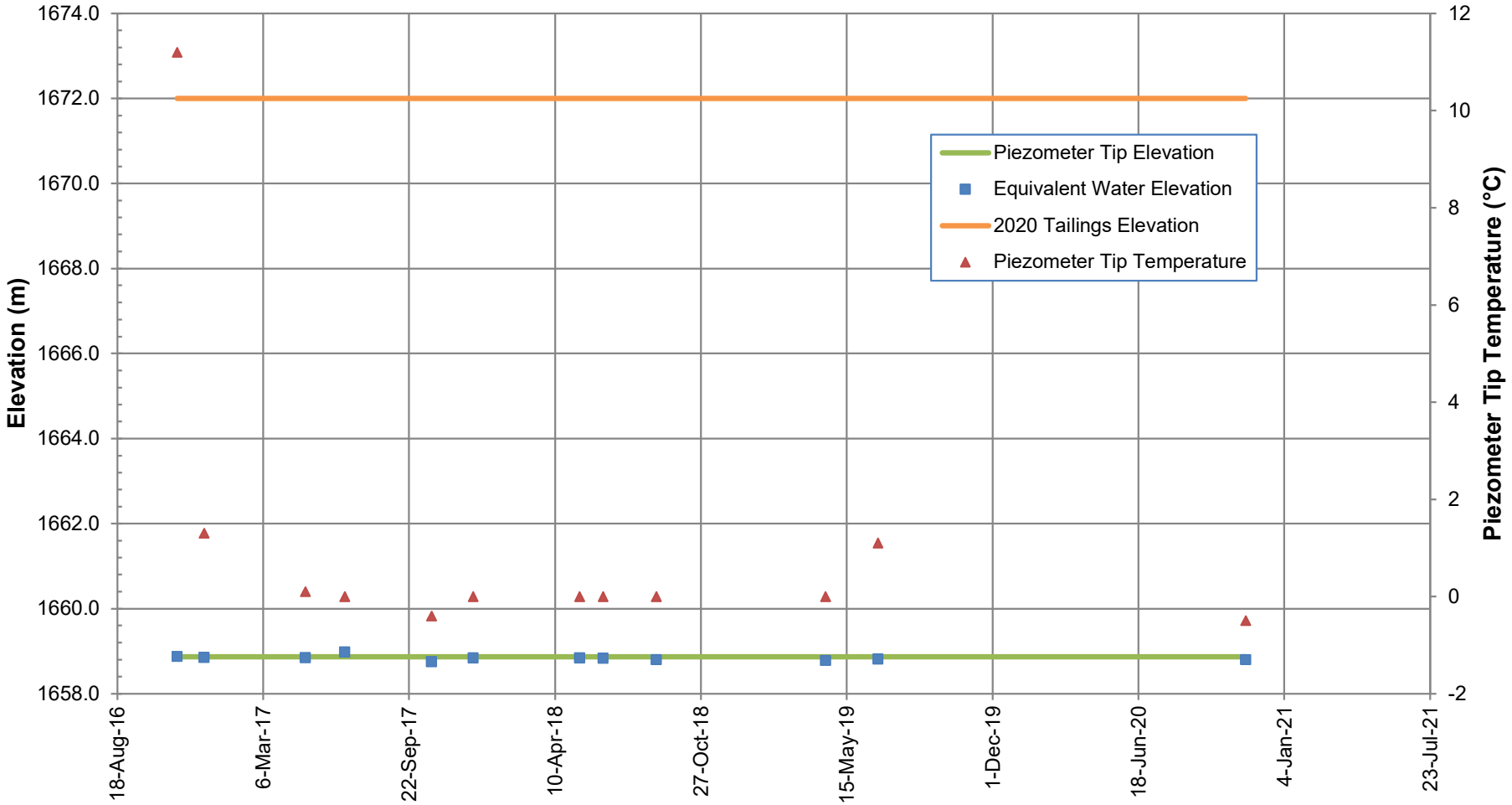
Teck Coal - Elkview Operations		
WFTF Piezometers	Date:	Revision
Vibrating Wire Piezometer 29155		



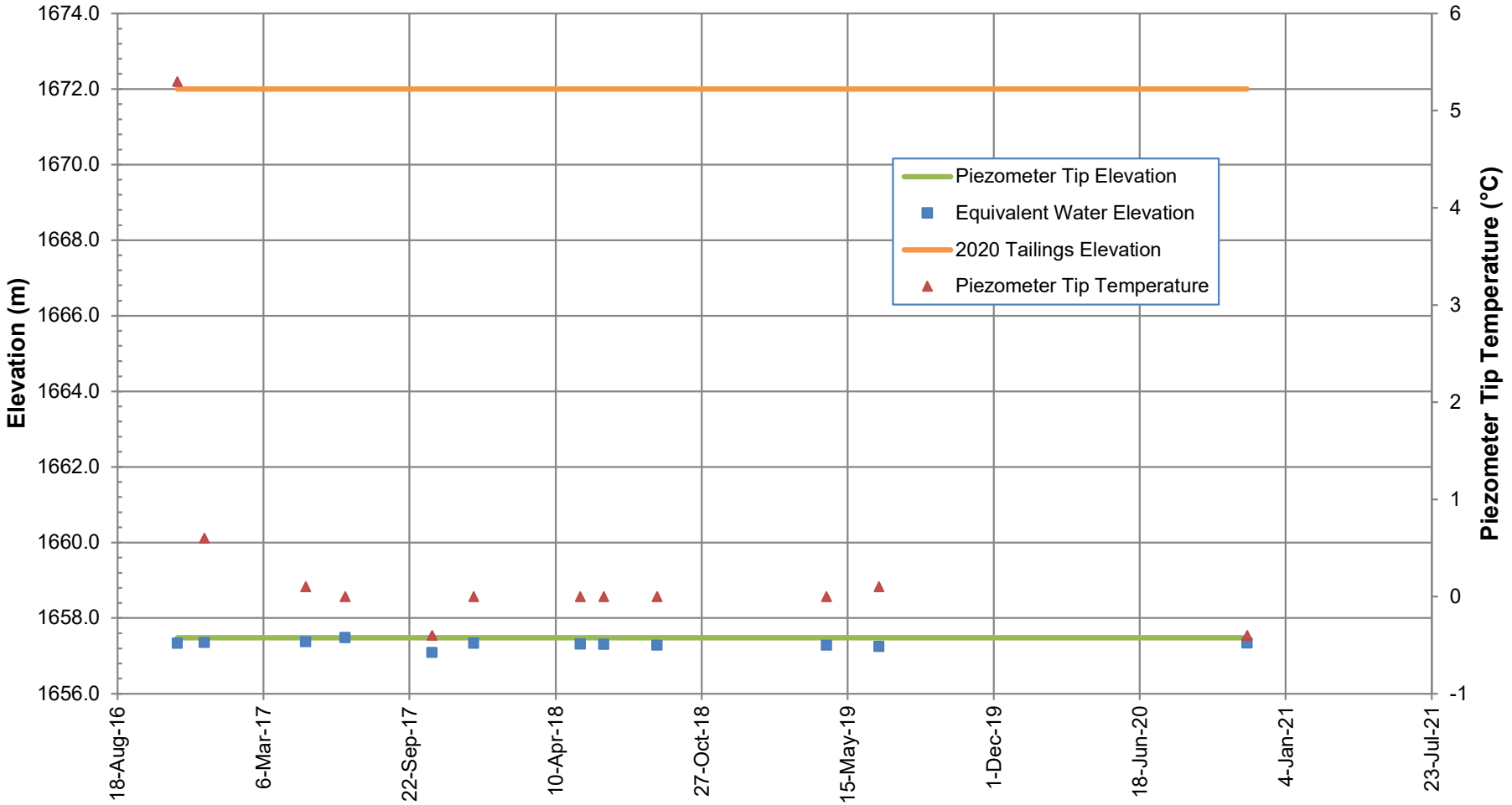
Teck Coal - Elkview Operations		
WFTF Piezometers	Date:	Revision
Vibrating Wire Piezometer 29159		



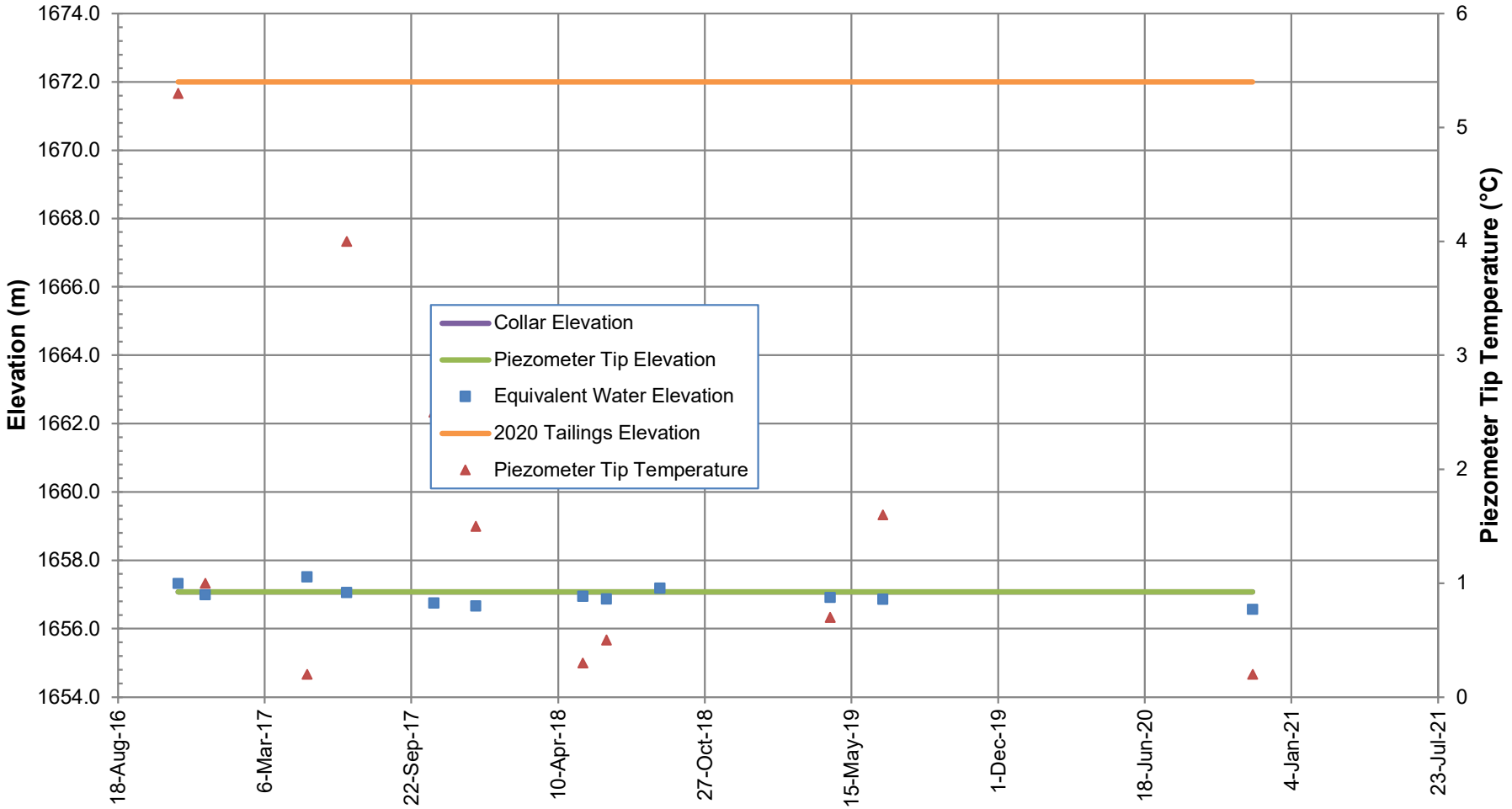
Teck Coal - Elkview Operations		
WFTF Piezometers	Date:	Revision
Vibrating Wire Piezometer 38582		



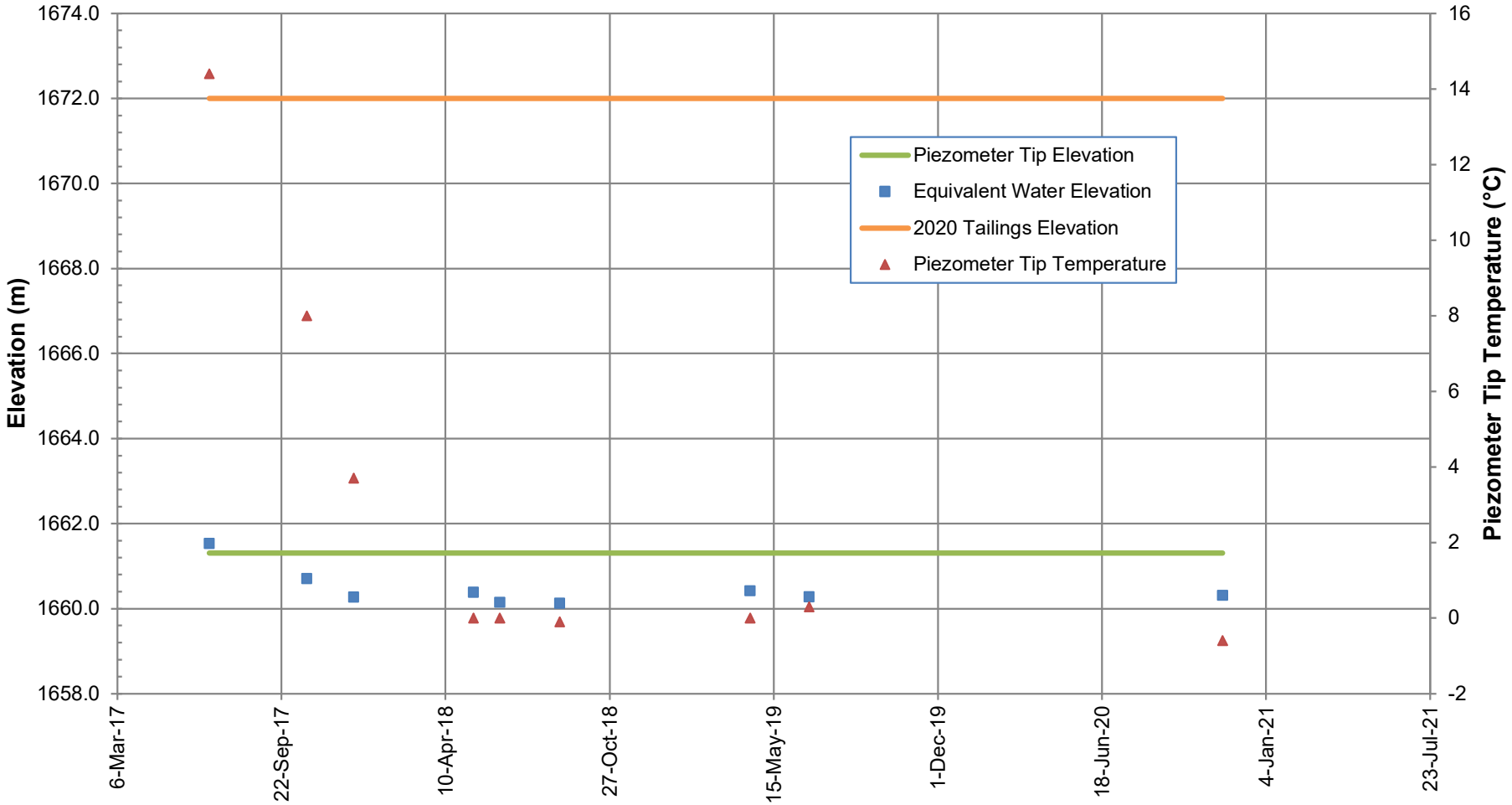
Teck Coal - Elkview Operations		
WFTF Piezometers	Date:	Revision
Vibrating Wire Piezometer 38583		



Teck Coal - Elkview Operations		
WFTF Piezometers	Date:	Revision
Vibrating Wire Piezometer 38584		



Teck Coal - Elkview Operations		
WFTF Piezometers	Date:	Revision
Vibrating Wire Piezometer 38585		



Teck Coal - Elkview Operations		
WFTF Piezometers	Date:	Revision
Vibrating Wire Piezometer 38585		