Teck Coal Limited – Elkview Operations

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

2017 Dam Safety Inspection

Final Report

Submitted to:

Teck Coal Limited – Elkview Operations
Sparwood, British Columbia

Submitted by:

Amec Foster Wheeler Environment & Infrastructure,
a Division of Amec Foster Wheeler Americas Limited
Fredericton, New Brunswick

March 2018

TE173017

29 March 2018

TE173017

Teck Coal Limited – Elkview Operations
R.R. #1, Highway #3
Sparwood, BC
V0B 2G1

Attention: Mr. Adam Walker / Mr. Zane Leonard:

Re: Final Report – 2017 Dam Safety Inspection
Tailings Storage Facilities
West Fork Tailings Facility and Lagoons A, B, C and D

Amec Foster Wheeler Environment & Infrastructure, a Division of Amec Foster Wheeler Americas Limited (Amec Foster Wheeler), is pleased to submit this Final Report of the 2017 Dam Safety Inspection of the West Fork Tailings Facility and Lagoons A, B, C and D at the Teck Coal Limited - Elkview Operation. In general, the structures are in satisfactory condition.

Please contact the undersigned should you have any questions or wish to discuss any aspects of the report.

Yours truly,

Amec Foster Wheeler Environment & Infrastructure,
a Division of Amec Foster Wheeler Americas Limited

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EXECUTIVE SUMMARY

Amec Foster Wheeler Environmental & Infrastructure, a Division of Amec Foster Wheeler Americas Limited (Amec Foster Wheeler), was retained by Teck Coal Limited - Elkview Operations (Elkview), near Sparwood, British Columbia (BC), to conduct a Dam Safety Inspection (DSI) on the West Fork Tailings Facility (WFTF) and Lagoons A, B, C and D. This report reflects operational and performance aspects of the tailings facilities from the beginning of October 2016 up to the end of September 2017.

This DSI was completed by a senior dam safety engineer who is also a registered Professional Engineer in the Province of BC as required under Section 10.5.3 of the Health, Safety and Reclamation Code for Mines in BC (MEMPR, 2008 and 2017). Evaluation of the dams and spillways and preparation of this report follow section 4.2 of the Health, Safety and Reclamation Code for Mines in BC (HSRC, 2017) which is the governing guidance document for these facilities. The following resources were also used in preparation of the DSI, the Canadian Dam Association (CDA) *Dam Safety Guidelines 2007 (Revised 2013)*, *British Columbia Dam Safety Regulation (Reg. 163/2011)*, the requirements of the Ministry of Energy, Mines and Petroleum Resources (MEMPR) (including MEMPR's updated guidelines for Annual DSI's, revised August 2013), and industry best practices in Canada.

On the basis of the operational and monitoring information provided by Elkview and the site inspection performed, Amec Foster Wheeler considers that the performance of the WFTF and Lagoons A, B, C and D continues to be satisfactory.

In accordance with the HSRC (2017 updates), the Lagoons and WFTF are considered tailings storage facilities. Moreover, Lagoons A, B, C and D are considered as tailings dams since they contain tailings. WFTF has been considered as a tailings dam since early 2017 when its beach elevation reached 1660 m. The beach tailings elevation was measured at 1662 m in July 2017.

The following presents the findings of the DSI for tailings dams in accordance with MEMPR's guidelines for annual DSI reports as per the format suggested in Section 4.2 of the HSRC Guidance document (MEMPR, 2016).

a) Summary of Facility Description

At Elkview, the clean coal is obtained by washing the mined material to isolate the saleable coal from other materials. The waste from the washing process can be further subdivided into coarse material and fine material. The fine refuse was traditionally placed into tailings storage areas designated as Lagoons A, B, C and D. The coarse refuse is placed in the Coarse Coal Refuse/Mixed Coal Refuse (CCR/MCR) Dump. Tailings are no longer discharged on Lagoons A and B and as such are considered inactive tailings facilities. Lagoon C has been inactive since 1987 and has been used as an emergency water decant facility for Lagoon D as well as periodic dredge spoils storage. Elkview commissioned the WFTF in 2006 for ongoing storage of fine

refuse materials. Lagoon D is at its permitted elevation, and has become a secondary storage option, used when tailings cannot be sent to the WFTF. The following table provides pertinent configuration information regarding the five tailings facilities.

Tailings Facility	Max Embankment Height (m)
WFTF	80
Lagoon A	4
Lagoon B	4
Lagoon C	19.5
Lagoon D	57

b) Summary of Key Hazards

The key hazards to the tailings dams are meteorological and seismicity.

Tailings Facility	Meteorological Hazard	Seismicity Hazard
WFTF	WFTF does not have a constructed spillway so meteorological could be considered as a hazard to WFTF. The facility has approximately 17.5 m of freeboard as of 2017. This is considered sufficient freeboard at this time for the facility since the facility should be able to contain a 72 hour probable maximum precipitation (PMP). However, it should be assessed to confirm this and determine if the facility can contain the 72 hour PMP at its ultimate configuration (i.e., ultimate dam height and tailings elevation). This will be assessed in 2018 based on the water balance model of WFTF.	The dam is not susceptible to seismic ground motions because it is constructed with rockfill on a competent bedrock foundation.
Lagoon A	Lagoon A has a spillway; therefore, this hazard is considered a low threat to the dam.	The dam is not susceptible to seismic ground motions because of the low design seismicity (less than 0.1g) and its small size
Lagoon B	Lagoon B does not have a constructed spillway, so meteorological is considered as a hazard to Lagoon B and this is identified as a concern in this DSI.	The dam is not susceptible to seismic ground motions because of the low design seismicity (less than 0.1g), the tailings are not saturated, and its small size.
Lagoon C	This hazard is considered a low threat to the dam as the facility can contain a 72 hour probable maximum precipitation.	The dam is well designed and built to withstand seismic ground motions.
Lagoon D	This hazard is considered a low threat to the dam as the facility can contain a 72 hour probable maximum precipitation.	The dam is well designed and built to withstand seismic ground motions.

c) Consequence Classification (ref. Canadian Dam Association, 2007 Dam Safety Guidelines)

The WFTF currently meets the standard definition of a “dam” under the CDA Guidelines since the tailings beach elevation reached to 1660 m in early 2017. The current and final tailings configurations at WFTF are designated as a “Low” consequence classification under CDA

Guidelines (Amec Foster Wheeler, 2016c) for both fair-weather and flood-induced failure conditions.

Under the CDA Guidelines the consequence classification for Lagoons A and B are considered as “Low”.

Under the CDA Guidelines, Lagoon C has been designated with a “High” consequence classification for both fair-weather conditions and flood-induced events as outlined in the 2013 DSR. Lagoon D has been designated with a “High” consequence classification under fair-weather conditions and a “Very High” consequence classification under flood-induced events. There were no observations made during the 2017 DSI that suggested that the classifications should be changed.

d) Summary of Significant Changes (e.g. construction, development downstream, etc.)

There were no significant construction activities at WFTF or at Lagoons A, B, C and D from October 2016 to September 2017. Sediment excavated from sumps and ponds, located around the site, was placed within Lagoon C at the northeast corner of the facility below the level of the perimeter road. General maintenance activities were conducted around the sites, as required, and as recommended from the 2016 inspection.

e) Significant Changes in Instrumentation and/or Visual Monitoring Records

WFTF has two (2) groundwater monitoring wells that remain active within the historic West Fork Dump fill. The historical records of the water levels within these monitoring wells indicate this is a well-drained system. In 2016, nine (9) vibrating wire piezometers were installed within the tailings pond. In June 2017, one vibrating wire piezometer was installed within the eastern section of the tailings pond. The readings from those piezometer from July 2016 to September 2017 indicate the pore pressures stayed dry or fluctuated within a very small range.

There is no instrumentation installed at Lagoons A and B. No instrumentation installations are required at this time.

The instrumentation for Lagoon C consists of four (4) nested pairs of vibrating wire piezometers and a series of six (6) standpipes. In 2017, most of standpipes and vibrating wire piezometers were reported dry or negative. The VW23245 recorded water levels are well below the surface elevation of the crest. There were no significant changes in instrumentation readings at Lagoon C.

The instrumentation for Lagoon D consists of a network of forty six (46) standpipe piezometers as well as eighteen (18) vibrating wire piezometers, eight (8) of which were installed at four locations as nested installations in 2012. The other ten (10) vibrating wire piezometers were installed at three locations (i.e., four piezometers at varying elevations). Water levels throughout

2017 indicate a well-drained system representing low pore pressures which is similar to previous year records.

f) Significant Changes to Dam Stability and/or Surface Water Control

There are no significant changes observed in terms of stability and surface water control for WFTF or Lagoons A, B, C and D.

g) Summary of Review of the OMS Manual

As described in Part 10.5.2 of the Health, Safety and Reclamation Code for Mines in British Columbia, all operating dams shall have a current Operations, Maintenance and Surveillance (OMS) Manual. The annual report shall indicate the latest revision date of the OMS Manual.

The OMS Manuals have been frequently updated for the facilities. The Lagoon D OMS Manual was last updated in June 2015. In March 2015 an update to the OMS Manual was issued for Lagoons A, B, and C; the OMS Manual for all three lagoons was combined into one document under the title “Inactive Tailings Facilities”. A separate OMS Manual was developed for the active WFTF in 2012. Based on the review conducted as part of the 2013 DSR, these manuals are generally complete and cover most of the important elements, including management roles and responsibilities, for safe operations. Elkview continues to review these manuals annually and provide updates when required. The next planned detailed review of the OMS manuals will be conducted in 2018.

h) Summary of Review of the Emergency Preparedness and Response Plan

For tailings dams classified as High or Very High Consequence, an Emergency Preparedness Plan (EPP) is required (CDA guidelines, 2007). The annual report shall indicate the latest revision date of the EPP document.

The Lagoon D combined Emergency Preparedness Plan (EPP) and Emergency Response Plan (ERP) manual was updated in October 2014. The Lagoon A, B, and C EPP/ERP manual was also updated in October 2014; for this update, similar to the OMS, all three lagoons were combined into one document under the title “Inactive Tailings Facilities”. A tabletop test of the Lagoon D ERP was performed by Elkview on 28 January 2014. The manuals are generally complete and cover most of the important elements, including management roles and responsibilities, for safe operations. Elkview conducts annual reviews of the EPP/ERP manuals and provide updates when required as per the section 4.3 of the HSRC code. Another table top testing exercise will be conducted in 2018 for the facilities and if required, the EPP/ERP will be updated pending the results of the table top.

i) Scheduled date for formal DSR

As described in Part 10.5.4 of the Health, Safety and Reclamation Code for Mines in British Columbia, a dam safety review report for a tailings storage, water management facilities and associated dams shall be prepared at least every 5 years or as directed by the chief inspector.

A formal DSR was conducted for Lagoons C and D in 2013. The next scheduled DSR for these two facilities is tentatively planned by Elkview for 2018.

j) Summary of Recommendations

Section 8 provides a complete listing of the recommendations. There are no Priority 1 recommendations that would indicate a near term threat to dam safety. Moreover, there are no key recommendations that need to be addressed in a short-term period.

Table of Concordance

To assist HSRC with reviewing this report, a table of concordance with the HSRC requirements for DSIs was prepared and is included below. The table outlines the HSRC requirements for a DSI report and indicates where each requirement is addressed, or specifies a reason why a particular section is not relevant to this site.

Components form HSRC	Sections in Report	Comments
1. Executive Summary	Executive Summary	
(a) Summary of Facility Description.	Executive Summary	
(b) Summary of key hazards.	Executive Summary	
(c) Consequence Classification.	Executive Summary	
(d) Summary of significant changes (e.g. construction, development downstream, etc.).	Executive Summary	
(e) Significant changes in instrumentation and/or visual monitoring records.	Executive Summary	
(f) Significant changes to stability and/or surface water control.	Executive Summary	
(g) Summary of review of the OMS manual.	Executive Summary	
(h) Summary of review of the Emergency Preparedness and Response Plan.	Executive Summary	
(i) Scheduled date for the next formal Dam Safety Review in accordance the Code and the CDA Dam Safety Guidelines (2013).	Executive Summary	
(j) Summary of recommendations	Executive Summary	
2. Facility Description	Section 2	
(a) Description of facility components	Section 2	

Components form HSRC	Sections in Report	Comments
(b) History of key construction milestone	Not included	The dams containing the lagoons have not been modified or raised for many years. The 2013 DSR contains details on the history of construction
(c) Summary of past years' construction (if any) with a description of any problems and stabilization.	Same as above	Same as above
(d) Summary of past years operation (tailings deposition, etc.)	Section 3	
3. Identification of Engineer of Record and TSF qualified person.	Section 6	
4. Updated plan and representative cross sections.	Appendix C – WFTF Appendix D – Lagoon C Appendix E – Lagoon D	
5. Site photographs.	Appendix F – WFTF Appendix G – Lagoon A Appendix H – Lagoon B Appendix I – Lagoon C Appendix J – Lagoon D	
6. Review of climate data.	Section 4.1	
7. Water balance review and reconciliation.	Section 4.2	
8. Freeboard and storage availability (in excess of the design flood).	Section 4.3	
9. Water discharge system, volumes, and quality.	Section 3 and Section 4.3	The only discharge is from Lagoon A and it meets water quality requirements.
10. Seepage occurrence and water quality.	Section 7.5	
11. Surface water control and surface erosion.	Section 6	
12. Instrumentation review including:	Section 5	
(a) Phreatic surfaces and piezometric data.	Section 5	
(b) Settlement.	Section 5	
(c) Lateral movement.	Section 5	
13. Recommendations	Section 8	

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IMPORTANT NOTICE

This report was prepared exclusively for Teck Coal Limited – Elkview Operations by Amec Foster Wheeler Environment & Infrastructure, a wholly owned subsidiary of Amec Foster Wheeler Americas Limited. The quality of information, conclusions and estimates contained herein is consistent with the level of effort involved in Amec Foster Wheeler services and based on: i) information available at the time of preparation, ii) data supplied by outside sources, and iii) the assumptions, conditions and qualifications set forth in this report. This report is intended to be used by Teck Coal Limited – Elkview Operations only, subject to the terms and conditions of its contract with Amec Foster Wheeler. Any other use of, or reliance on, this report by any third party is at that party's sole risk.

1.0 INTRODUCTION

Amec Foster Wheeler Environment & Infrastructure, a Division of Amec Foster Wheeler Americas Limited (Amec Foster Wheeler) was retained by Teck Coal to conduct a Dam Safety Inspection on the West Fork Tailings Facility and Lagoons A, B, C and D at the Elkview Operations, near Sparwood, BC. This report presents the results of the 2017 DSI.

DSI reporting on tailings facilities is a requirement under Section 10.5.3 of the HSRC (MEMPR 2016). As of early 2017, WFTF was considered as a dam since the tailings beach reached the 1660 m elevation.

This report presents the results of the 2017 dam safety inspection and a review of the operational and performance aspects of the tailings facilities from the beginning of October 2016 up to the end of September 2017.

This DSI was carried out following the Canadian Dam Association (CDA) 2007 Dam Safety Guidelines (updated in 2013), as well as the British Columbia (BC) Ministry of Energy, Mines and Petroleum Resources (MEMPR, 2017) as well as the requirements of the *Mines Act* and Health, Safety and Reclamation Code for Mines in BC, and best practices and procedures in the industry.

This report provides the following:

- Section 2.0 - Facility description;
- Section 3.0 - Summary of activities since the 2016 DSI related to dam safety;
- Section 4.0 - Review of climate data and water balance;
- Section 5.0 - Instrumentation readings;
- Section 6.0 - Results of the DSI;
- Section 7.0 - Assessment of dam safety; and
- Section 8.0 - Recommendations arising from the DSI.

2.0 FACILITY DESCRIPTION

The Elkview mine site is located in southeast British Columbia, approximately 3.5 km from the Town of Sparwood as illustrated in Figure 2.1. The mine has been an open pit operation since 1969 and has a remaining reserve life of approximately 31 years at a planned annual production rate of approximately 7 million tonnes of clean coal (Teck, 2016a).

Elkview obtains clean coal by washing the mined material to isolate the saleable coal from other materials. The waste from the washing process can be further subdivided into coarse material and fine material. The coarse refuse is placed in the CCR/MCR Dump. The majority of the fine refuse was traditionally placed into tailings storage areas designated as Lagoons A, B, C and D within the Lagoon Tailings area. This area is immediately down slope of the process plant, on a plain adjacent to the Elk River. In this area, there are two "ring dyke" tailings dams of significance; Lagoon C and Lagoon D (AMEC, 2013b). Lagoon A has been inactive tailings storage facility that was used during the mine start-up for storage of the fine tailings. Surface water from Cossarini Creek diversion is routed through Lagoon A and into the Otto Pond system downstream of Lagoon A. Lagoon B is an inactive tailings storage facility that currently retains no fluids. Lagoon B is sometimes used for plant discharge water when required. Lagoon C has been inactive since 1987 and has been used as an emergency water decant facility for Lagoon D as well as periodic dredge spoils storage. Lagoon D has been used since the early 1970s, however with the commissioning of the WFTF for storage of fine refuse materials in 2006, Lagoon D has become a secondary storage option for when tailings cannot be sent to the WFTF. There is roughly 390,000 tonnes of tailings storage remaining in Lagoon D. Figure 2.2 presents an aerial view of the WFTF and Figures 2.3 to 2.5 show aerial views of Lagoons A through D, respectively.

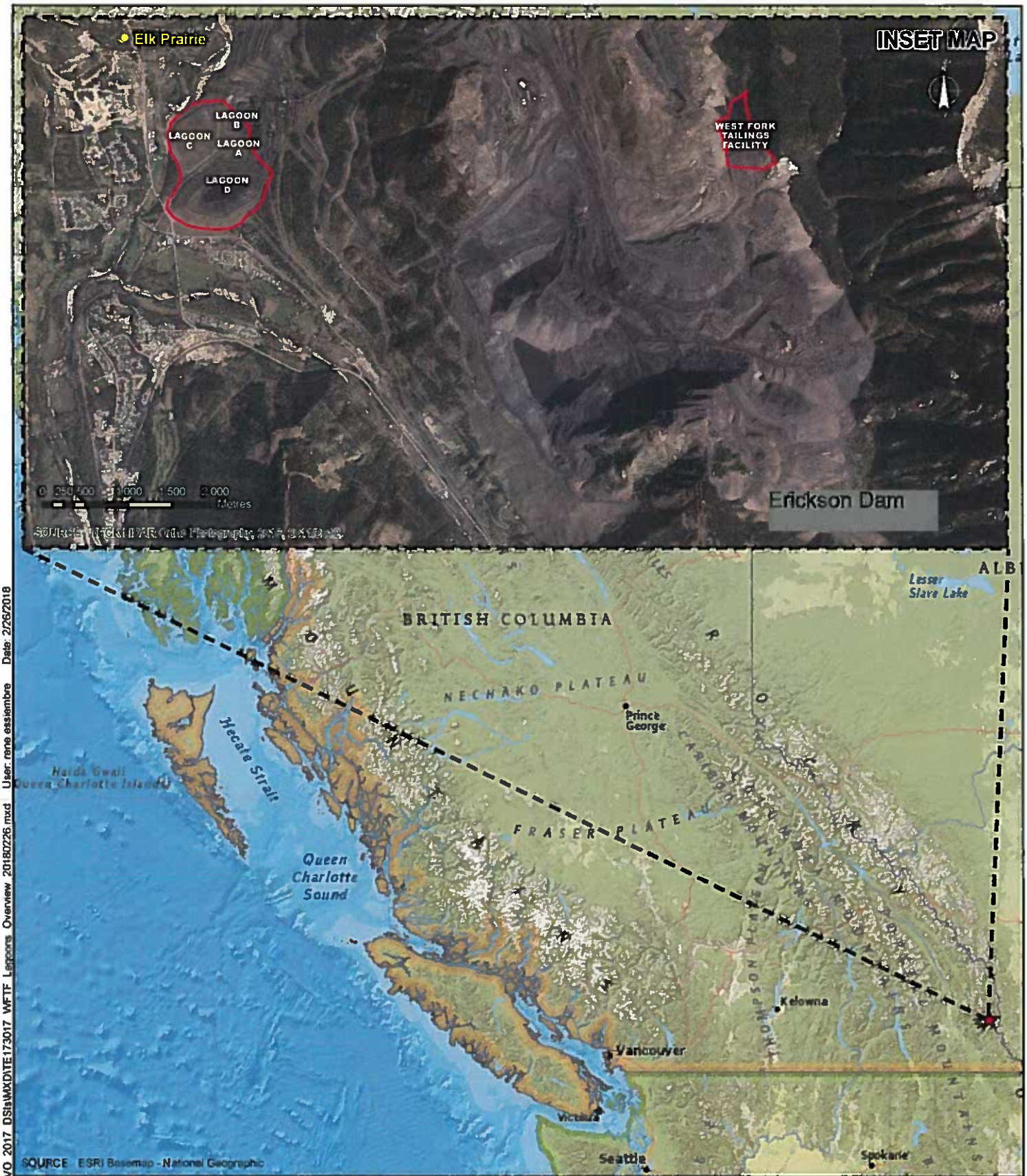
There is a spillway at Lagoons A and B, but no spillway for Lagoons C and D and the WFTF. Water from Lagoon A is directed to Otto Creek and meets the discharge water quality. No water is discharged from Lagoon B. Water that accumulates in Lagoon B is pumped out.

The WFTF is located approximately 1 km southeast of the Adit Pit in the upper reaches of the Erickson Valley. The facility consists of a confined area created by the abutting of the West Fork Dump with Cowboy Ridge and Adit Dump. Tailings are impounded within the facility by the West Fork Dump to the south, the Adit Dump to the west and natural ground to the north and east (i.e. Cowboy Ridge). In 2013, as the level of deposited tailings was approaching a low point at the east end of the West Fork Dump, EVO placed additional rockfill in this area to increase the dump containment to an elevation of 1679.5 m (AMEC, 2014a).

Table 2.1 provides pertinent configuration information regarding the five tailings facilities.

Table 2.1 Tailings Facility Configuration Information

Tailings Facility	Max Embankment Height (m)	Approx. Footprint Area (ha)	Impounded Tailings Volume (m^3)	Impounded Water Volume (m^3)
WFTF	80	28.5	7,840,000	300,000
Lagoon A	4	5.8	185,000	550
Lagoon B	4	4.5	287,700	0
Lagoon C	19.5	32.6	4,658,600	0
Lagoon D	57	58.8	22,380,000	202,000



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amec foster wheeler

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PROJECT NO: TE173017

PROJECT: WEST FORK TAILINGS FACILITY AND LAGOONS 2017 DSI REPORT

TITLE: OVERVIEW LOCATION MAP WEST FORK TAILINGS FACILITY & LAGOONS

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FIGURE NO: 2.1

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PROJECT: WEST FORK TAILINGS FACILITY AND LAGOONS 2017 DSI REPORT

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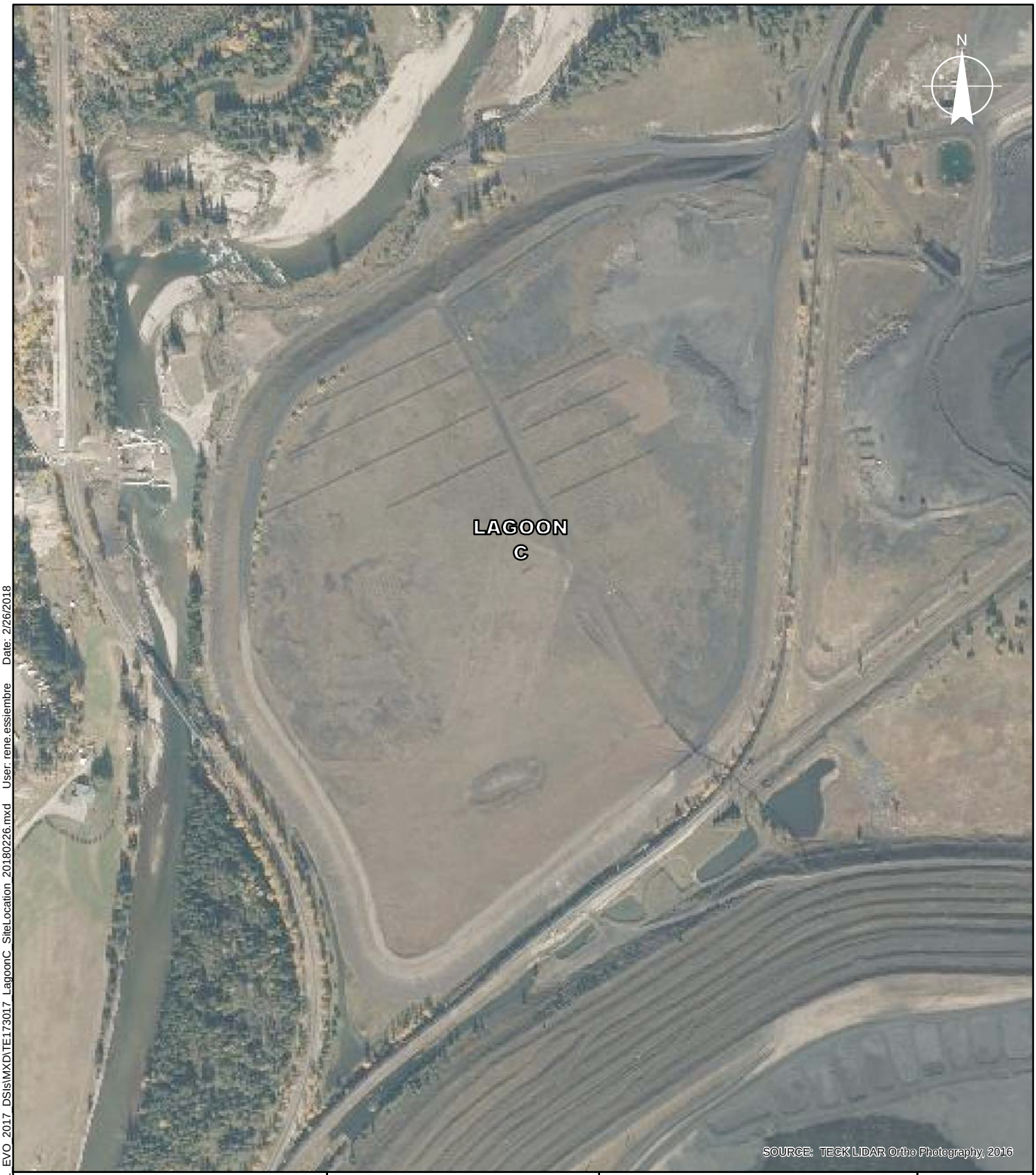

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	PROJECT NO: TE173017		FIGURE NO: 2.5

3.0 ACTIVITIES SINCE THE 2016 DSI RELATED TO DAM SAFETY

The following activities with respect to dam safety are understood to have taken place at the tailings facilities over the period of October 2016 to September 2017.

West Fork Tailings Facility

The tailings level within the WFTF impoundment has risen throughout 2016 and 2017 from about El. 1659 m (September 2016) up to El. 1662 m (July 2017).

A water balance model was developed for WFTF in 2017 to predict volumes and elevations of water and tailings within the WFTF from July 2017 to the end of 2020.

A 2-dimensional seepage model was developed for the WFTF to assess the potential for tailings fines migration through the Adit Dump (Amec Foster Wheeler, 2016e). A key recommendation from the study was that piezometers should be installed in the WFTF tailings beach to obtain information that can be used for future calibration and projection of the seepage patterns. In addition to the five existing vibrating wire piezometers installed in June 2016, nine vibrating wire piezometers were installed within the tailings deposition area in November 2016 and one vibrating wire piezometer was installed in June 2017, resulting a total of ten active piezometers.

In 2017, the seepage model was further developed for the final WFTF tailings configuration by using the results of the newly installed piezometers to assess the potential for fine tailings migration (Amec Foster Wheeler, 2017b). The draft report is contained in Appendix A. The model found that simulated hydraulic gradients in the saturated zone are generally less than 0.5 m/m; however, localized gradients at the zone of outflow at the bottom of the model reach values greater than 1. The likelihood that tailings migrates into the waste dump after closure is low. However, due to the limited readings of the newly installed piezometer, the 2D model should be revisited in coming years and calibrated to piezometer readings to re-estimate hydraulic gradients at closure. This is a new recommendation for the 2017 DSI report. The expansion of the current model to 3D would allow for improved characterization of seepages processes.

Some of the tension cracks on the edges of the benches upstream slope of the southern containment of the WFTF noted in the previous DSI reports have been repaired in 2017.

Lagoon A:
No new activities were undertaken between October 2016 and September 2017. It is noted that Lagoon A's spillway at the west dam was upgraded with rockfill in early 2016 to channel and convey surface water off the crest. Survey data for this construction is contained in Appendix A of this report.

In 2017, the slumped areas at the west end of the north slope were repaired.

Lagoon B:
As part of plant maintenance activities, episodic discharges of plant washdown water were directed to the southeast corner of Lagoon B. There is no discharge structure and very little freeboard available for storing water on the surface of the Lagoon. In order to reduce the likelihood of overtopping the Lagoon, Elkview has put in place procedures such that discharge to the Lagoon is only permitted with written permission from both the Elkview Geotechnical Department and Environment Department.

Lagoon C:
Sediment excavated from various sumps and sedimentation ponds located around the site was placed on the surface of Lagoon C. Sediment (approximately 20 tonnes) was placed in the northeastern region adjacent to the access ramp and in the Southwest corner of the Lagoon. The sediments are dumped and spread out with a dozer.

Risk assessment for Lagoons C and D was conducted in 2017. The draft report is under review.

Lagoon D:
Episodic discharges of tailings at an overall average rate of about 160 tonnes/day were performed at Lagoon D throughout 2017; discharge into Lagoon D occurred for multiple reasons including WFTF pipeline maintenance, WFTF pipe capacity, plant maintenance, etc. Tailings were discharged into cells around the perimeter of Lagoon to maintain beach requirements. Cell and road maintenance was also performed on an as needed basis.

Risk assessment for Lagoons C and D was conducted in 2017. The draft report is under review.

4.0 CLIMATE DATA AND WATER BALANCE

4.1 Climate Data

The total precipitation recorded at the mine site (data provided by Elkview) from October 2016 to the end of September 2017 was 588.4 millimetres (mm). Based on site precipitation records from 1987 to 2017, the total average precipitation for this time period is estimated at 589.2 mm (see Appendix A for precipitation and temperature chart). There were approximately 214 days without precipitation from October 2016 to September 2017 (i.e., 59% of 12 months period).

It is noticed that precipitations from February to April 2017 is significantly higher than the historical average amount. Moreover, with the average temperature in March and April above zero (see the chart in Appendix B), runoff amount in Spring 2017 is higher than the historical average amount.

4.2 Water Balance

A specific dam safety water balance for the WFTF was completed in 2017. The water balance was from July 2017 to end of December 2020. The current available freeboard (about 17.5 m) is far in excess of the annual precipitation or design storm events (AMEC, 2003). The water balance model does not include the ultimate configuration of the facility (i.e., ultimate dam height and tailings elevation).

A specific dam safety water balance for Lagoon A and B, under the current site conditions has not been completed. As Lagoons A and B are no longer in use, a water balance will be formally addressed upon closure of the facility.

A water balance model in spreadsheet format was developed in 2017 for Lagoons C and D that considered the inputs and outputs, including evaporation and seepage.

4.3 Freeboard and Flood Routing

WFTF

The current available freeboard for the WFTF is about 17.5 m as of September 2017 as measured from the current crest level of El. 1679.5 m. WFTF has not been assessed if it can contain the 72 hours PMP from now until the facility reaches the ultimate configuration. This will be addressed as a recommendation in this 2017 DSI report.

Lagoons A and B

Lagoons A and B do not have an established freeboard and flood routing analyses completed. This will be established upon closure of the facilities. In 2016, the spillway at Lagoon A was upgraded with rockfill material. Further analysis is underway on Lagoon B to determine the available capacity and determine spillway design parameters.

Lagoon C

Lagoon C can contain the 72 hours PMP. The Lagoon has had no tailings deposition since the late 1980's and is currently used for episodic disposal of dredged sediments.

Lagoon D

Currently, the specified design freeboard, above the maximum operating pond level, for Lagoon D is 1.25 m, which includes 0.25 m for the minimum flood storage (AMEC 2002) and 1 m for freeboard. The ponded area varies in size, but the freeboard is maintained. Freeboard is measured with a staff gauge on the east side of the internal splitter dyke. This freeboard can contain the 72 hours PMP.

The low area to the west side of the splitter dyke also has a freeboard of 1.25 m and can also contain the 72 hour PMP.

5.0 INSTRUMENTATION READINGS

A review of the instrumentation readings was conducted for the WFTF, Lagoon C and Lagoon D. There is no instrumentation in Lagoons A and B. The instrumentation readings are presented prior to the site visit observations to aid interpretation of the site observations.

The instrument data was provided by Elkview for review in the form of spreadsheets with time-history plots. The plots of piezometer readings comprised of piezometric elevations versus time and tailings surface or free water pond elevations versus time. Inclinometer readings were also reviewed and have also been plotted versus time.

5.1 West Fork Tailings Facility

Two groundwater monitoring wells were installed in the original West Fork Dump fill, WF-2 (South) and WF-3 (North). In July 2015, the well FW-02 was considered no longer safe to access due to the Sun-toe dump. However, in June 2017, FW-02 has become accessible and the water levels were read in 2017. A third angled standpipe (WF-1) was installed in Cowboy Ridge on the East abutment; however, it was discontinued as part of the 2013 dump development activities. Water levels monitored in the remaining wells (North and South standpipes) by Elkview indicate a well-drained system at the south buttress area. Appendix C contains the map of the standpipes at the WFTF. Since tailings storage began in 2006 the water levels measured in WF-2 and WF-3 have slowly risen by about 12.42 and 8.56 m, respectively, in response to over 51 m of tailings deposition. This behaviour illustrates the importance of maintaining a wide, above water tailings beach adjacent to the dump face. A plot of the water levels in monitoring wells and standpipe, and tailings level for WFTF can be seen in Appendix C.

To monitor pore pressures at different locations within the tailings deposition area the following piezometers were installed:

- Five vibrating wire piezometers VW27171, 27172, 29155, 29158 and 29159 were installed in June 2016;
- Four vibrating wire piezometers 38582, 38583, 38584 and 38585 were installed in November 2016; and
- One vibrating wire piezometer 38586 was installed in June 2017.

Locations and the plots of pore water pressure for each piezometer are included in Appendix C. The limited readings from the vibrating wire piezometers show that the pore water pressures at the piezometers fluctuated within a very small range. The piezometers often experienced dry condition or the water levels were just slightly above the tip elevations. However, it is noticed that the May 2017 water level at VW38585, which is located at the northwest of the WFTF pond, below the Adit toe, shows a spike of 0.44 m but then went back to dry after that. There are no concerns at this point with this piezometer reading.

5.2 Lagoon C

According to the records, the free water pond in Lagoon C was at an approximate elevation of 1126 m prior to mid-2009 at the northeast corner. Thereafter, the free water pond elevation decreased to approximately 1125 m until mid-2011. In September 2011, the ponded water was noted at the southwest corner of Lagoon C while the one at the northeast location was dry. Since 2012, the entire Lagoon C has been recorded dry.

The instrumentation for Lagoon C consists of four nested pairs of vibrating wire piezometers and a series of six standpipes. Elkview has prepared five cross-sections (i.e., A, B, C, E and D from north to south, counter clockwise) for Lagoon C as shown in Appendix D. The cross-sections reported water levels from October 3rd, 2017. In 2017, three (99-01, C88-1 and OW-C2) of the six standpipes were reportedly dry while the readings of the C88-2 standpipe show stable and low water levels, similar to the 2016 levels. The other two (GT-9703A and GT-9703B) recorded water levels for 2017 show they are approximately 1.5 m below the surface elevation, no change from previous years. These two standpipes are located at the toe of Lagoon C and close to the Elk River. It is noted that the readings of the 3 non-dry standpipes (C88-2, GT-9703A and GT-9703B) show a peak of water level in May 2017 which were probably caused by higher river level during spring melt.

Three pairs of vibrating wire piezometers (i.e., VW23238/23242, VW23239/23243 and VW23244/23240) recorded negative readings throughout October 2016 to September 2017. Regarding to the remaining piezometer pair (VW23241 and VW23245), negative readings for VW23241 were recorded; whereas the recorded water levels of the VW23245 are well below (i.e., approximately 14.5 m lower) the ground surface and similar to previously recorded levels. Plots of piezometer and standpipe data for Lagoon C can be seen in Appendix D.

In the summer of 2015, Elkview Geotech group installed eight survey monuments (i.e., four pair-sets at four sections A-A, B-B, C-C and D-D) on Lagoon C to monitor lateral movement. Appendix D contains the GPS location map and the plot showing the results of the lateral movement survey. There have been insignificant movements observed for northing and easting directions. Movements have been within instrumentation accuracies and no significant trends have been observed.

5.3 Lagoon D

Lagoon D contains a network of forty six active standpipe piezometers (excluding three broken ones D1, 99-02 and V01-01). Lagoon D also has eighteen vibrating wire piezometers, eight of which were installed at four locations as nested installations in 2012 (i.e., two piezometers at varying elevations). The other ten vibrating wire piezometers were installed per AMEC (2002) recommendations at three locations (i.e., four piezometers at varying elevations).

Elkview has prepared eight cross-sections for Lagoon D as shown in Appendix E. Plots of piezometer readings can also be found in Appendix E. The cross-section reported water levels in October 2017 indicate a well-drained system representing low pore pressures. The water level from sections C-C to F-F, is approximately 25 m lower than the crest surface. All piezometers

have shown a steady decrease in water levels since 2012. The data also indicates the presence of downward gradients which suggest that the Lagoon is under drained by the soil below it; thus enhancing the overall stability of the Lagoon. It was noticed that water levels recorded at standpipe OW-7 located at the toe of Section E-E' was found to be slightly higher (i.e., at least 4 m higher) than water levels recorded at piezometers OW-6 and OW-9 located near the toe at the north and south of OW-7. The higher water level at the toe of section E-E' are not considered a stability issue. This could be due to the topography of the adjacent area, which requires further investigation.

Monitoring data from inclinometer Lagoon D North (LD_N) and Lagoon D South (LD_S) were reviewed as part of this DSI. The cumulative displacement plots for the A-Axis and B-Axis are presented in Appendix E. Cumulative movements were recorded between February 2013 and August 2017 for both North and South locations. It is noted that the negative readings were assigned for the upslope movement.

The A-Axis for Inclinometer LD_N showed overall movement measured to the top of the casing of about 25 mm to the upstream (southward), from February 2013 to August 2017. The B-Axis for Inclinometer LD_N showed movements of approximately 27.5 mm to the east through this same period. It is noted that the baseline reading was revised and chosen as February 20, 2013. Despite the relatively significant level of movement recorded there are no indications of discrete zones of movement and the lower displacement patterns are typical of minor settlement behaviour.

Inclinometer LD_S shows a similar movement pattern with 10 mm of overall A-Axis displacement recorded from baseline reading on March 19, 2013 to June 2017 to the upstream (northward). Movements recorded on the B-Axis showed movements of approximately 13 mm to the west through this same period. .

In July 2015, eight sets of GPS survey points were installed at eight sections of Lagoon D, with 3 points (upper, middle and lower) for each set, except for section H-H' having only upper and lower points. The GPS readings have an accuracy of approximately +/-1.5 cm. Appendix E contains the plot showing the results of the lateral movement survey of those sets. There have been insignificant movements (within 0.025 m from the original location) observed for northing and easting directions for most of the survey points. The mid-D survey point shows movement (i.e., movement between 0.020 to 0.035 m from the original point). No stability concern should be addressed at this point. Regarding to the changes in elevation, the survey points elevations are found varying within a small range (i.e., maximum of 0.06 m (in March 2016) from the original elevation). These observations are well within the accuracy of the equipment.

6.0 RESULTS OF DAM SAFETY INSPECTION (DSI)

The site inspection/condition assessment was conducted for the WFTF, and Lagoons A, B, C and D on 6-7 June 2017. The inspections were carried out by Michael Cyr, P.Eng., and [redacted] EIT., from Amec Foster Wheeler and Zane Leonard, Aaron Glover, and Adam Walker from Elkview. It is noted that since 2014, Andy Small, P.Eng., of Amec Foster Wheeler, has been assigned as the Engineer of Record (EOR) for the site. Adam Walker is the TSF qualified person at the site.

The visual inspection included, but was not limited to, observing the condition of the WFTF and the Lagoons for deficiencies, and potential or immediate concerns. No subsurface investigations to examine the soil conditions were conducted at the Lagoons at the time of the site inspections. Representative photographs of the WFTF and Lagoons A through D are presented in Appendices F to J, respectively.

When describing the structures and sites in this report, the standard orientation convention used in dam engineering was employed where the terminology “Left” and “Right” are used while looking in the downstream direction.

The following observations were noted during this inspection. Checklists that were completed as part of the DSI are included in Appendix K.

6.1 General Observations

These general observations apply to the WFTF and Lagoons A to D:

- Vegetation including grass and shrubs were observed on the Lagoons but not on WFTF. Vegetation cover makes it difficult to observe cracks, localized slumps or movements, and animal burrows, if present. *This was also noted in the 2013 DSR and past DSIs.* There was no major slumping or movement observed on the slope of the Lagoons.
- Animal tracks and trails (likely Elk and Mule deer) were evident on the slopes of the Lagoons. These trails lead down the slopes to the river. With increased traffic these trails could create depressions, leading to erosion gullies. *This was also noted in the 2013 DSR and past DSIs.*

6.2 West Fork Tailings Facility

The following observations were made at the WFTF:

- Overall, the WFTF appeared to be in satisfactory condition.
- Active tailings discharge was occurring at the most eastern spigot line at the time of the site visit. There was good beach development taking place (Appendix F - Photographs F3, F4, F5 and F8).

- Ponded water was located at the north section of the tailings facility against the Adit dump and natural hillsides with tailings beach spreading mostly at the southern side of the dump (Appendix F - Photographs F1 and F2). The beaching area is noted larger than in previous year. The tailings level was surveyed at about El. 1662 m in September 2017.
- Some braided flow channels were noted on the beach along the west side of the facility, near the toe of the Adit dump. The channels head from the spigot point towards the toe of the Adit dump and then run northward parallel to the toe (Appendix F – Photograph F4). This could be an indication of tailings fines ingress into the dump rockfill (Appendix F-Photograph F9). *This was also noted in the previous DSIs (since 2014 to now).*
- A sign of tailings ingress was found at the southeast corner of the beach area, near the toe of the 2013 raised (left abutment area) (Appendix F – Photographs F15 and F16).
- Erosion of the dump slope due to tailings discharge below the spigot lines was noted (Appendix F – Photographs F11 and F12). It is recommended to continue using conveyor belts below the discharge lines to reduce erosion.
- Tension cracking along the Geho road, noticed in previous DSI reports were no longer present. However, a longitudinal crack was observed around spigot 5 during the 2017 site visit. (Appendix F - Photograph F19).
- The crest and downstream slope of the 2013 development area at the east abutment showed no signs of settlement or movement and appeared to be similar to 2016 condition (Appendix F - Photographs F14, F-17 and F-18). *This was also noted in the 2016 DSI.*
- Standing water was noted at the extreme downstream toe of the Cowboy dump, roughly 450 m downstream of the crest centerline (Appendix F - Photograph F20).

6.3 Lagoon A

The following observations were made at the Lagoon A:

- Overall, the Lagoon appeared to be in satisfactory condition.
- No new slumping and erosion has developed along the southwest section of the lagoon on either side of the previous armored overflow section since that section was filled with new riprap material at downstream slope in 2016. No active seepage exiting from the bottom of the new riprap placement section was noted.
- Several low spots and slumps along the slope on the north side of the lagoon noted in previous DSI were not found in this DSI. Crest work along the northwest corner has removed many of these low spots.
- The spillway at the west face was upgraded with new rockfill material in 2016 (Appendix G – Photographs G-4 to G-8).
- One discharge pipe was observed during the site visit. The pipe is located at the northwest section of the north slope of Lagoon A. The pipe had no dripping water at the time of the Site visit (Appendix G - Photograph G-19).
- Two rockfill amoured outlets were observed at the west end of the north embankment of Lagoon A acting as overflow spillways (Appendix G - Photographs G-14 to G-17).

- Water from Cossarini Creek discharges into the Lagoon through a pair of culverts at the east end of the facility (Appendix G - Photograph G-2). Water was discharging through the lower culvert during the site visit (Appendix G - Photograph G-10).

6.4 Lagoon B

The following observations were made at Lagoon B:

- Overall, the Lagoon appeared to be in satisfactory condition - Photographs H-1 and H-2).
- The crest of the dam was not uniform and the elevation of the dam varies across its length (Appendix H - Photographs H-9, H-10, H-11, H-14 and H-15). Erosion was noted on the north side of the lagoon (Appendix H - Photograph H-3). *This was also noted in the previous DSIs.*
- Sand bags were placed at the southwest corner of the Lagoon to prevent overtopping of ponding water at this location. There is very little freeboard for storage of water on the surface of the Lagoon. The sand bags were in very poor condition and may not be effective (Appendix H - Photographs H-9 and H-10). *This was also noted in the previous DSIs.*
- Cut trees located on the downstream and crest were left on the dam. This made it difficult to visually inspect the downstream slope of the dam (Appendix H - Photographs H-12, H-14 and H-16). *This was also noted in the previous DSIs.*
- A discharge pipe was observed on the southeast section of the Lagoon. Recent discharge of water had occurred in the southeast corner of the Lagoon (Appendix H - Photographs H-17 and H-18). *This was also noted in the previous DSIs.*

6.5 Lagoon C

The following observations were made at Lagoon C:

- Overall, the Lagoon appeared to be in satisfactory condition.
- Active placement of sediment excavated from site sedimentation ponds and sumps was in progress at northeast corner at the time of the inspection. The sediment was placed in the northeast corner of the lagoon adjacent to the access ramp and spread with a dozer (Appendix I - Photographs I-1 to I-4 and I-8). *This was also noted in the previous DSIs.*
- Grading of the access road regularly takes place on the crest of the Lagoon to remove ruts from vehicle traffic and provide a more trafficable surface. *This was also noted in the previous DSIs.* It is noted that the road below the trestle pipeline at the northeast corner is lower in elevation (Appendix I - Photograph I-12).
- Erosion gullies were observed on downstream of north slopes, west, south and east slopes (Appendix I – Photographs I-9 to I-11, I-13, I-22, I-24 and I-28). *This was also noted in the previous DSIs.*

- Ponded water was observed beyond the toe of the Lagoon at the east, south and west slopes, and southwest corner (Appendix I - Photographs I-6, I-9, I-11, I-13, I-14, I-15 and I-27). However, no seepage was observed from the toe at those locations. Ponded water at the toe could be from underground seepage or from the local drainage area. *This was also noted in the previous DSIs.*
- The Elk River is located near the toe of the Lagoon and stretches from the north side of the lagoon around to the west side. (Appendix I - Photographs I-1 to I-4). Riprap was noted along the toe, the condition of which does not appear to have changed since 2013 (Appendix I - Photographs I-18, I-19, I-21 to I-23). The riprap covers a diversion culvert that drains the water from the pond at the south end of the lagoon and discharges into the Elk River (Appendix I - Photograph I-20). The riprap also covers a natural gas pipeline routed along the edge of the Elk River (Appendix I - Photograph I-21). Bedrock was noted on the bank of the Elk River at the water's edge. *This was also noted in the previous DSIs.*
- An overhead pipeline in the southeast corner of the Lagoon was previously used to transport tailings and as an emergency decant from Lagoon D to Lagoon C (Appendix I - Photographs I-2, I-3, I-11 and I-12). Pipelines were also noted routed up the downstream slope on the north side of the Lagoon (Appendix I - Photograph I-26). *This was also noted in the previous DSIs.*

6.6 Lagoon D

The following observations were made at Lagoon D:

- Overall, the Lagoon appeared to be in satisfactory condition (Appendix J - Photographs J-1 to J-6).
- Lagoon D is an active tailings disposal facility and several cells were prepared to receive tailings on the dam crest (Appendix J - Photographs J-1 to J-3, J-6, J-7 and J-8). The crest of the dam was uniform (Appendix J - Photographs J-9, J-31 and J-32). *These were also noted in the previous DSIs.*
- It is noted that dry tailings were placed on the surface of the west side, outside of the tailings cells area (Appendix J - Photographs J-1, J-2, J-4, J-5 and J-24).
- Erosion gullies and local slumps on the downstream slopes were evident at some locations and are likely the result of runoff from the embankment crest and/or top of benches (Appendix J - Photographs J-10, J-13, J-15, J-16, J-18, J-25, J-26, J-28, J-29 and J-33). Erosion gullies are considered minor. *Erosion gullies and local slumps were also noted in the previous DSIs.*
- Several local sinkholes were found at the upstream crest, area within the southwest fencing area (Appendix J – Photograph J-27). This may be due to the differential settlement in tailings (compacted adjacent tailings cells). These sinkholes were noticed in the 2016 DSI and later found that the sinkholes have likely existed for a few years after comparing photos from past years. Some sinkholes were infilled before the 2017 DSI visit. The wind control fencing has deformed in some areas near the sinkholes. These are not

considered a concern with respect to the safety of the dam as they are internal and in the tailings beach. *This was also noted in the previous DSIs.*

- Two seep areas were identified on the north slope (Appendix J - Photographs J-10 to J-12). *These were also noted in the 2016 DSI.*
- Trees located on the downstream slope were cut in 2013 and left on the dam along the north section of the Lagoon (Appendix J - Photographs J-11, J-14, J-16 and J-18). *This was also noted in the previous DSI.*
- Standing water was observed at the toe of the dam along the northern sections of the Lagoon (Appendix J - Photographs J-16 to J-18). *This was also noted in the 2013 to 2016 DSI.* This area corresponds to the Otto Creek drainage and includes the Otto Ponds however it is unclear whether there is a seepage component contributing to the water. Such a seepage component would likely be insignificant based on review of piezometric data which suggests a well-drained structure as noted above.
- Animal borrows and beaver activities were noticed at the toe next to the standing water pond of the north dam (Appendix J - Photographs J-18 to J-20). An animal borrow was also found at the toe of the south dam (Appendix J - Photograph J-33).

7.0 DAM SAFETY ASSESSMENT

7.1 Dam Classification

West Fork Tailings Facility

In essence, the WFTF is a depression formed between the West Fork Dump to the south, the Adit Dump to the west and natural ground to the north and east (i.e., Cowboy Ridge). In 2013, EVO placed additional rockfill in the east end of the West Fork Dump to increase the dump containment to an elevation of 1679.5 m (AMEC, 2014), known as the West Fork expansion. Dam classification for WFTF was conducted in June 2016 (Amec Foster Wheeler, 2016c). According to the 2016 WFTF dam classification, once the tailings level reaches El. 1660 m, the WFTF will begin to act as a dam and the WFTF will be designated with appropriate "Low" consequence rating under CDA Guidelines for both fair-weather and flood-induced failure conditions (Amec Foster Wheeler, 2016c). As of early 2017, the WFTF currently meets the standard definition of a "dam" under the CDA Guidelines since the beach reached to 1662 m elevation. Moreover, the 2016 WFTF dam classification indicates that for the final tailings configuration (i.e., crest level of El. 1710 m), WFTF will also be designated with a "Low" consequence classification for both failure events.

It is noted that the consequences of failure would likely be limited to reputation/regulatory and internal to Elkview as the even more massive Mid Dump and Erickson Dump (built across the entire Erickson Valley about 2 km downstream) provides substantial secondary containment against a breach of the WFTF (AMEC, 2010).

Lagoons A and B

Lagoons A and B were only used during mine start-up and are essentially coincidental with the natural ground. Water from plant operations is sometimes discharged to Lagoon B during emergency situations and plant maintenance activities. Lagoons A and B are defined as Tailings Storage Facilities dams under the HSRC guidelines. Under the CDA Guidelines the consequence classification for Lagoons A and B are considered as "Low".

Lagoons C and D

Under the CDA Guidelines, Lagoon C has been designated with a "High" consequence classification for both sunny day conditions and flooding events as outlined in the 2013 DSR. Lagoon D has been designated with a "High" consequence classification under sunny day conditions and a "Very High" consequence classification under flooding events.

There were no observations made during the 2017 DSI that suggested that the classifications should be changed.

7.2 Review of Downstream and Upstream Conditions

As noted above, there has been no change in these conditions that would warrant a change in classification.

7.3 Design Basis

The Lagoons are required to satisfy minimum factor of safety (FoS) criteria under steady state static and seismic conditions: The HSRC guidelines, provide return periods for the Maximum Credible Earthquake (MCE) and Inflow Design Flood (IDF) criteria, based on the consequence classification. The minimum FoS are 1.5 and 1.2 for long-term steady state and post-liquefaction conditions, respectively (AMEC 2013b). These FoS values should be applied for the operation conditions.

The following seismic and flooding criteria have been assigned to Lagoons C and D:

Lagoon C – High Consequence

AEP Earthquake: 1/2475 (PGA =0.13g)
IDF: 1/3 between the 1/1000 and Probable Maximum Flood (PMF)

Lagoon D – Very High Consequence (Under Flood Induced Event)

AEP Earthquake: ½ between 1/2475 and MCE (1/10,000)
IDF: 2/3 between the 1/1000 and Probable Maximum Flood (PMF)

Lagoon D – High Consequence (Under Fair Weather)

AEP Earthquake: 1/2475 (PGA =0.13g)

Amec Foster Wheeler conducted the stability analyses for Lagoon C in 2015 (Amec Foster Wheeler, 2016b). The FOS for global instability was estimated meet the target FOS 1.5 but the FOS for shallow slip surfaces are less than 1.5. The result was based on limited borehole information and none since 1984. A geotechnical investigation in October and November 2017 was conducted to address this. The results of the investigation will be presented in 2018.

According to the stability analyses conducted for Lagoon D (Amec Foster Wheeler, 2016d), the dams containing Lagoon D are safe with the estimates of static loading FOS of 1.6 and the post liquefaction FOS of 1.5. The result, however, was based on limited borehole information. A geotechnical investigation in October and November 2017 was conducted to address this. The results of the investigation will be presented in 2018.

There were no observations made during the 2017 DSI that suggested that these criteria need to be modified.

7.4 Hazard and Failure Modes Review

These were reviewed in general terms for the Lagoons C and D as part of the 2013 DSR (AMEC 2013b) and it was determined that there was sufficient margin of safety to adequately manage the risk of the typical major failure modes or hazards such as slope instability or overtopping. The failure modes for Lagoons A and B have not been formally assessed and, as indicated above there is a concern with respect to overtopping of the berms. Early 2016, Elkview constructed a new spillway on Lagoon A to address this concern.

As of early 2017, the WFTF becomes classified as a tailings dam. According to the Dam Classification of WFTF (Amec Foster Wheeler, 2016c), regardless of the major failure modes or hazards such as seismic, internal erosion or overtopping during a flood event, the release of tailings and water from the breach of WFTF could flow downstream to the Erickson Valleys but then would be impounded by Erickson Dump.

7.5 Physical Performance

Table 7.1 summarizes the physical performance of the structures based on the site inspection performed. As noted in the table, the only items that are not satisfactory are the hydrotechnical aspects of Lagoons A and B that have been discussed above.

Table 7.1 Summary of Physical Performance

Structure	Physical	Hydro-technical	Hydro-geological
WFTF	Satisfactory	Satisfactory	Satisfactory
Lagoon A	Satisfactory	Satisfactory	Satisfactory
Lagoon B	Satisfactory	Not Satisfactory	Satisfactory
Lagoon C	Satisfactory	Satisfactory	Satisfactory
Lagoon D	Satisfactory	Satisfactory	Satisfactory

For the Lagoons, the geochemical aspects have been shown as not being a concern. Elkview has advised that the groundwater monitoring wells located beyond the toe of Lagoon D have not seen an adverse effect on the water quality as a result of drainage from Lagoon D into the underlying soil and monitoring of these wells has ceased. Assessment of the effects on water quality are beyond the scope of this DSI. Elkview reports information on overall site water quality in a separate document to the Ministry of Environment (MOE).

7.6 Operational Performance

Table 7.2 summarizes the operational performance of the structures based on discussions with Elkview staff and a review of the OMS procedures, monthly inspection reports and instrumentation data provided.

Table 7.2 Summary of Operational Performance

Structure	Instrumentation	Operational Procedures	Maintenance
WFTF	Satisfactory	Satisfactory	Satisfactory
Lagoon A	N/A	Satisfactory	Satisfactory
Lagoon B		Satisfactory	Satisfactory
Lagoon C	Satisfactory	Satisfactory	Satisfactory
Lagoon D	Satisfactory	Satisfactory	Satisfactory

7.7 Review of OMS, EPP and ERP Manuals

The Operation, Maintenance and Surveillance (OMS), Emergency Preparedness Plan (EPP) and Emergency Response Plan (ERP) Manuals have been frequently updated for the tailings facilities and Elkview continues to do so with the assistance of Amec Foster Wheeler.

The latest revision of the OMS Manual for Lagoon D is dated in June 2015 while the latest OMS Manual for Lagoons A, B and C is dated in March 2015. A separate OMS Manual was developed for the active WFTF in 2012. All three OMS Manuals have been updating since early 2017 and will be re-issued in 2018.

The Lagoon D combined EPP and Emergency Response Plan (ERP) manual was updated in October 2014. The Lagoon A, B, and C EPP/ERP manual was also updated in October 2014; for this update, similar to the OMS, all three lagoons were combined into one document under the title “Inactive Tailings Facilities”. Both EPP/ERP manuals are planned to be updated in 2018.

8.0 RECOMMENDATIONS

The WFTF and Lagoons A, B, C and D are considered to be in satisfactory condition. The current surveillance program is adequate and should continue to be followed. Recommendations for the continued safe operation of the tailings facilities are provided in Table 8.1. These recommendations pertain to studies or actions beyond the current OMS structure. Recommendations from the 2013 DSR and past DSIs with comments on the status for each recommendation are also provided in Table 8.1. Each recommendation is assigned a number with the prefix based on the year that item was recommended. Previous recommendations duplicating surveillance requirements of the OMS Manuals have been closed and removed from Table 8.1.

The priority for each recommendation has been re-evaluated as of September 2017 based on the priority levels descriptions in the HSRC guidance document:

> ***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. This may include planned or ongoing construction items that require specific monitoring.

As noted in Table 8.1, there are fifteen recommendations made for the continued safe operation of the facilities including two additional recommendations arising from this year's DSI and six recommendations (2013-01, 2014-05, 2013-06, 2013-07, 2013-10 and 2013-12) are closed in this year DSI period. The remaining seven of the previous recommendations are still applicable and ongoing. There are no Priority 1 recommendations that would indicate an imminent threat to dam safety and the majority of the recommendations pertain to non-urgent non-compliances and opportunities for improvement. It is noted five recommendations were closed in the 2016 DSI period (2014-03, 2014-4, 2013-04, 2013-05 and 2013 -11) and therefore, removed out of Table 8.1.

Table 8.1 Summary of Recommendations

No.	Recommendation Description	Source of Recommenda-tion	2017 Comments and Recommended Actions	Deficiency or Non-Con-formance	Applicable Regulation or OMS Reference	Priority Level	Recom-mended Timeline/ Status
General Recommendations for All Structures							
2014-01	A detailed risk assessment (failure modes and effects analysis) should be undertaken for the facilities to better catalogue and assess the risks.	2014 DSI	The risk assessment for Lagoons C and D was conducted in 2017. Draft report is under the review and will be issued in 2018. A risk assessment will be conducted for Lagoons A, B and WFTF in 2018.	Deficiency	N/A	4	2018
West Fork Tailings Facility							
2013-01	A review of the waste dump development plan should be conducted for the WFTF to confirm that the closure objectives of the facility will be satisfied. This review should consider the raise plan for the facility in conjunction with the development plans for the West Fork and Erickson dumps to make efficient use of waste rock while considering long term closure landform and land use objectives.	2013 DSI	**This recommendation has been closed**. EVO completed this in 2017. Incorporated as BRE permit.	N/A	N/A	N/A	**Closed**
2017-01	**The 2D model should be revisited every other year and calibrated to piezometer readings to re-estimate hydraulic gradients at closure.**	**2017 DSI**	**The 2-D seepage model was conducted in 2017, it will be updated with instrumentation readings and finalized in 2018. (report, Amec Foster Wheeler 2017b)**	**Deficiency**	**N/A**	**3**	**2018**
2017-02	**The current water balance model should be upgraded to include the increases of the tailings surface and dam crest over time up to the ultimate configuration. An assessment should be conducted to determine if WFTF can contain water under the 72 hour PMP flood event.**	**2017 DSI**	**As of 2017, WFTF became a tailings dam; however, it does not have a spillway.**	**Non-con-formance**	**N/A**	**2**	**2018**

No.	Recommendation Description	Source of Recommendation	2017 Comments and Recommended Actions	Deficiency or Non-Conformance	Applicable Regulation or OMS Reference	Priority Level	Recommended Timeline/ Status
Lagoon A							
2014-05	Repair slumped areas of the Lagoon banks on the north and west sides with development of a controlled overflow section to prevent uncontrolled overtopping events in the future.	2014 DSI	**This recommendation has been closed.** In 2017, the slumped areas at the north slope were repaired.	Deficiency	N/A	3	**Closed**
Lagoon B							
2015-01	Assess the potential for overtopping the dam containing Lagoon B and determine if remedial measures are required.	2015 DSI	The 2015 DSI report indicated that this should be done in 2016, but the deferral to 2018 is considered acceptable because of the low expected risk of overtopping. Elkview are managing the water in Lagoon B and preventing overtopping.	N/A	N/A	3	2018
Lagoon C							
2013-02	Investigate possible removal of the overhead pipelines located in the southeast corner of the Lagoon as identified in the risk assessment. The wood structure could deteriorate over time creating voids in the Lagoon embankment.	2013 DSI	This recommendation is still applicable.	Deficiency	N/A	3	end-2019
2013-03	Along the shoreline of the Elk River, the grading, riprap material weathering, soil erosion and the existence of a filter zone under riprap needs to be assessed in the design evaluations.	2013 DSR	This recommendation is still applicable. The 2014 DSI report indicated that this should be done in 2016, but the deferral to 2018 is considered acceptable because of the low expected risk of significant erosion at this location.	N/A	N/A	4	2018

No.	Recommendation Description	Source of Recommendation	2017 Comments and Recommended Actions	Deficiency or Non-Conformance	Applicable Regulation or OMS Reference	Priority Level	Recommended Timeline/ Status
2013-06	The OMS, EPP and ERP Manuals need to be updated	2013 DSR	This recommendation has been closed. The OMS, EPP and ERP are reviewed yearly and updated if required by Elkview as part of the HSRC requirements.	N/A	HSRC	3	Closed
2013-07	A water balance should be prepared integrating both Lagoons C and D basins.	2013 DSR	This recommendation has been closed. Site wide Elkview operations water quality model was completed in 2017 (Amec Foster Wheeler, 2017c). In addition, Teck completed a WB Model (spreadsheet) for Lagoons C and D.	N/A	N/A	4	Closed
2013-08	Per 2007 CDA guidelines, the next DSR for Lagoon C will be due in seven years (2020).	2013 DSR	EVO is tentatively planning to complete the next DSR in 2018 as HSRC (MEM 2017) requires DSR every five years.	N/A	HSRC	4	2018
Lagoon D							
2014-07	The unused pipes/culverts including the unused buried pipes should continue to be monitored with problematic pipes removed or suitably plugged/grouted in place as directed by the EOR. The surveillance and maintenance sections of the OMS Manual should be updated accordingly.	2014 DSI	OMS will be updated in 2018 to include surveillance and maintenance of pipes and culverts.	N/A	OMS	4	2018
2013-10	The OMS, EPP and ERP Manuals need to be updated.	2013 DSR	This recommendation has been closed The OMS, EPP and ERP are reviewed yearly and updated if required by Elkview as part of the HSRC requirements	N/A	HSRC	3	Closed

No.	Recommendation Description	Source of Recommenda-tion	2017 Comments and Recommended Actions	Deficiency or Non-Con-formance	Applicable Regulation or OMS Reference	Priority Level	Recom-mended Timeline/ Status
2013-12	A detailed flood routing study should be undertaken that considers the topography of the top of Lagoon D, the updated hydrology, longer duration events such as 30-day rain and snowmelt events, and the infiltration.	2013 DSR	**This recommendation has been closed.** Teck completed the water balance Model (spreadsheet) in 2017. This recommendation is addressed by that WB Model.	N/A	N/A	4	**Closed**
2013-13	Per 2007 CDA guidelines, the next DSR for Lagoon D should be performed in five years	2013 DSR	EVO is tentatively planning to complete the next DSR in 2018 as HSRC (MEM 2017) requires DSR every five year.	N/A	HSRC	4	2018

9.0 CLOSING REMARKS AND LIMITATIONS

This report was prepared by Thuy Wilson, P.Eng., (Registered in the Province of New Brunswick) and reviewed by Andy Small, P.Eng., (Registered in the Province of British Columbia), who is the Engineer of Record for these facilities.

Recommendations presented herein are based on a geotechnical evaluation of the findings of the site visit noted.

This report has been prepared for the exclusive use of Teck Coal Limited – Elkview Operations for specific application to the area within this report. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibility of such third parties. Amec Foster Wheeler accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report. It has been prepared in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made.

Respectfully submitted,

Amec Foster Wheeler Environment & Infrastructure,
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C.A. (Andy) Small, M.Sc., P.Eng. (BC)
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APPENDIX A
Supporting Documents

Memo

To	**Andy Small**	File no	**TE163013**
From	[redacted]	cc	**Gil Violette** **Michael Cyr**
Tel			
Date	**April 5, 2017**		

Subject: **Teck Coal Limited - Elkview Operations**
West Fork Tailings Facility
Seepage Model

1.0 INTRODUCTION

This memo provides the methodology and results of a seepage model to assess the potential for fine tailings migration at West Fork Tailings Facility (WFTF) at Elkview Operations (EVO). This is a follow up memo to previous test pit observations and piezometer installation at WFTF.

This scope was prepared by Amec Foster Wheeler Environment & Infrastructure, a division of Amec Foster Wheeler Americas Limited (Amec Foster Wheeler) as part of the 2016 Engineer of Record (EOR) tasks associated with the tailings and water management structures at the EVO site.

Amec Foster Wheeler developed a seepage model to evaluate the hydraulic gradients at the final WFTF tailings configuration. The memo includes a brief description of EVO and the WFTF, followed by the seepage modeling setup and material parameters, and a discussion on potential for fines migration in the tailings.

2.0 SITE AND WFTF DESCRIPTION

Elkview Operations is located approximately three kilometres east of Sparwood in southeastern British Columbia. It is one of Teck's five steelmaking coal operations in the Elk Valley. The Elkview Mine has been in nearly continuous operation since 1969 and, as of 2016, has a minimum of another 41 years of mine life at a production rate of approximately 7 million clean tonnes per year (www.teck.com).

The clean coal is obtained by washing the mined material to isolate the saleable coal from other materials. The waste from the washing process can be further subdivided into coarse material and fine material. The fine refuse was traditionally placed into tailings storage areas designated as Lagoons A, B, C and D. The WFTF is located roughly 6 kilometres east of the Lagoons. The

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majority of the fine refuse is being deposited in the WFTF since 2006, with intermittent deposition in Lagoon D for plant maintenance.

The WFTF is located approximately 1 km southeast of the Adit Pit in the upper reaches of the Erikson Valley. Figure 2-1 shows the WFTF. The facility consists of a confined area created by the abutting of the West Fork Dump with Cowboy Ridge. Tailings are impounded within the facility by the West Fork Dump to the south, the Adit Dump to the west and natural ground to the north and east (i.e. Cowboy Ridge). Figure 2-2 shows the Adit Spoil Pile (dump) next to the WFTF tailings area. Figure 2-3 displays the cross-section depicted in Figure 2-1.

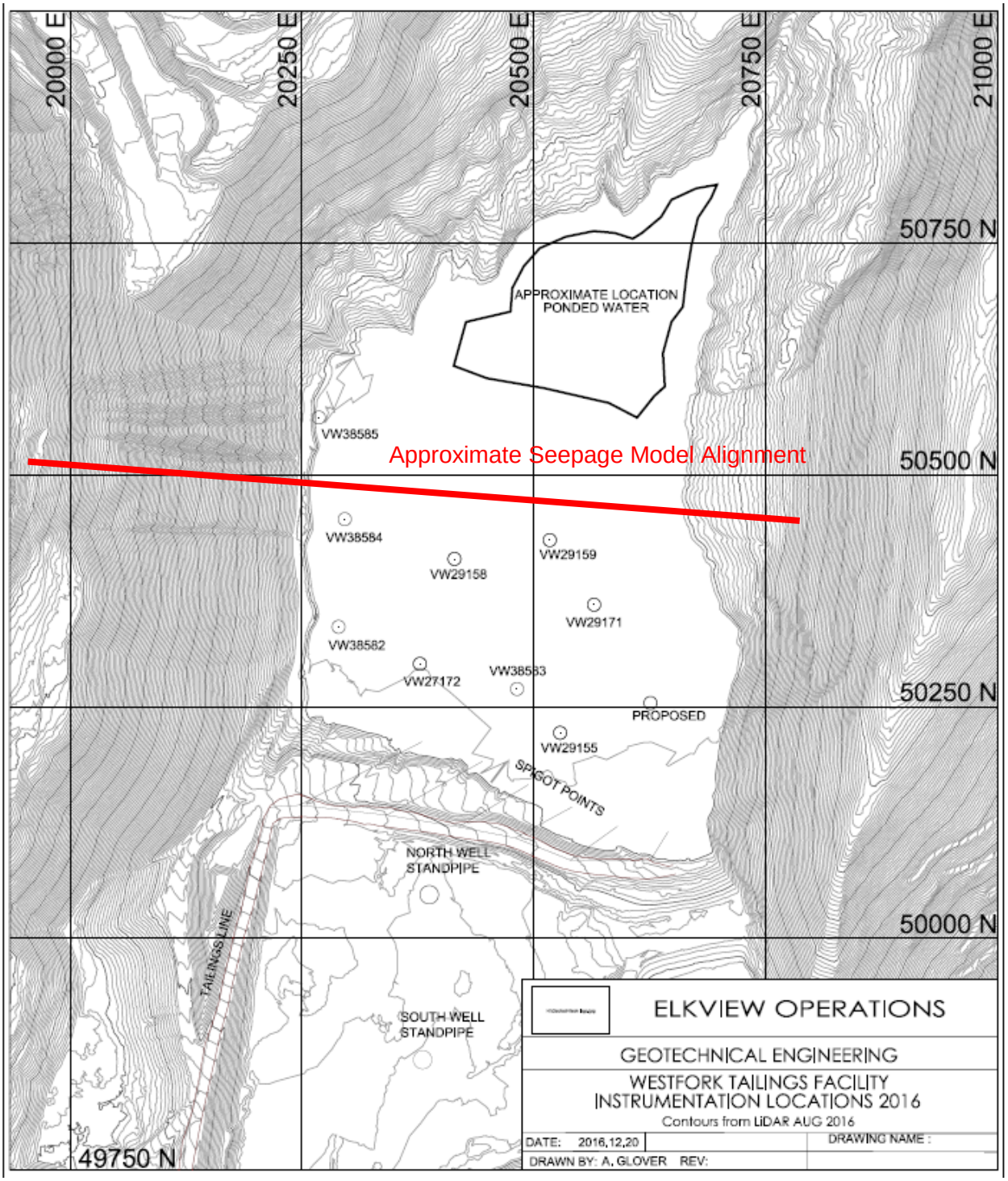

Figure 2-1: Plan View of the WFTF and installed VWPs

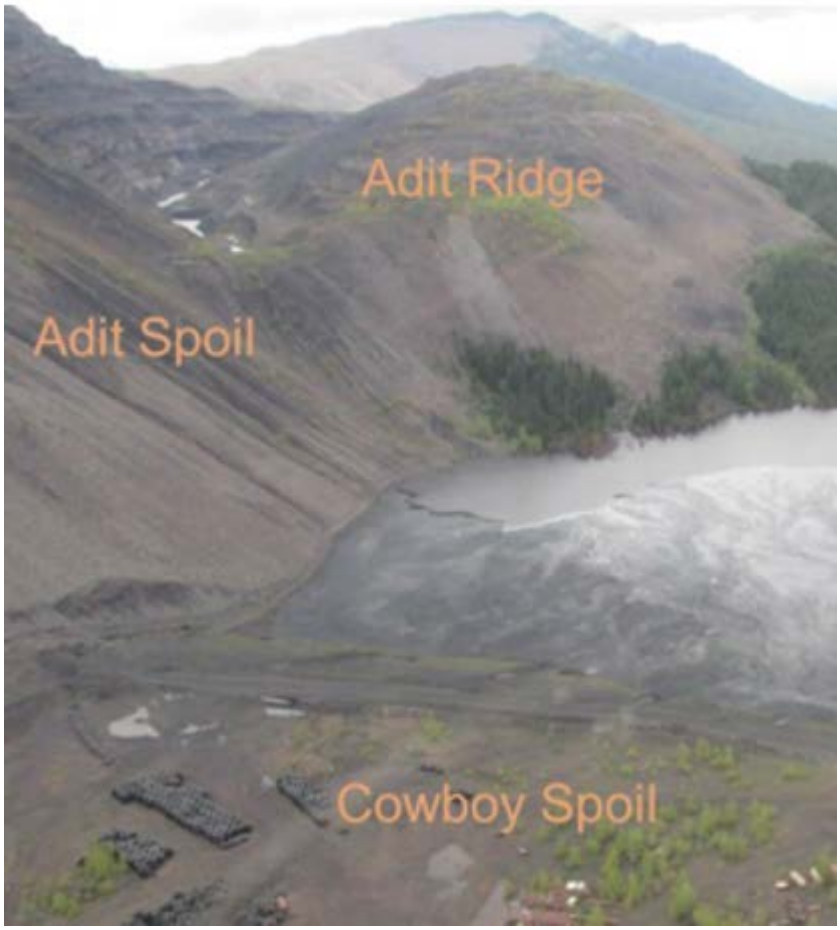

Figure 2-2: View of the Adit Dump next to the WFTF, looking northwest

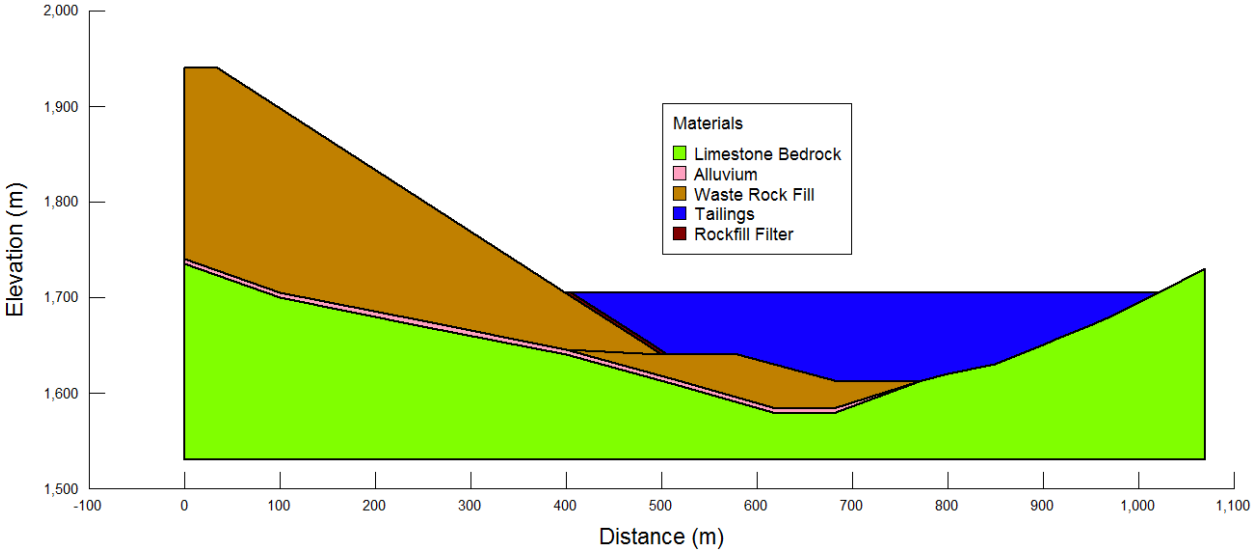

Figure 2-3: Conceptual model of WFTF layer geometries

3.0 BACKGROUND

In the past, coal fines have migrated into the Adit Dump and a filter zone was placed to prevent this. This filter zone is composed of selected finer grained waste rock and placed at the toe of Adit Dump in 5 m wide zone lifts commensurate with tailings deposition. Testing done by Amec Foster Wheeler in 2015 indicated that the filter zone is marginally filter compatible with the tailings; therefore, there is potential for fines to mobilize from the tailings facility, and flow towards the Adit Dump through the filter zone. A test pit program was conducted in 2015 to assess the migration of tailings fines through the Adit Road (Amec Foster Wheeler, 2015). Approximate hydraulic gradients that could transport the coal fines were estimated based on the visual appearance of fines in the Adit Road fill. These hydraulic gradients were estimated to range from 0.6 - 0.8 m/m. This was considered to be a minor issue during operations and did not require remediation. However, at closure, with a potentially elevated water table (and higher hydraulic gradient), there was a concern that the fines migration could continue and cause challenges with the closure landscape.

SNC-Lavalin developed a 2D numerical model in SEEP/W (GEO-SLOPE, 2012) to assess seepage in the WFTF. This model evaluated seepage flowing from the North to South; however, did not assess the potential for the development of critical gradients orthogonal to the section.

Two standpipe wells (North Well and South Well in Figure 2-1) were installed at the WFTF in August 2005. Data from these wells indicates that water levels (corresponding to well completion depths of roughly 150 mbgs) at the site have historically been in the range of 1520-1540 masl.

Amec Foster Wheeler recommended the installation of 12 vibrating wire piezometers (VWPs) to be installed a shallow depth (approximately 0.15 to 0.3 m deep) into the tailings surface to monitor the groundwater level in the tailings (Amec Foster Wheeler, 2016). EVO installed nine of these piezometers in 2016, with another one planned when site access improves. The locations are shown in Figure 2-1. Manual VWP readings conducted between July 2016 and October 2016 indicate the instruments are above the groundwater level, with the exception of one installed in the northwest corner of the facility. These piezometers did not read positive pore water pressures in 2016, but were installed in 2016 to provide future readings and support calibration of subsequent seepage models.

4.0 MODEL DEVELOPMENT

This section discusses the model geometry, boundary conditions and material parameters used in the seepage model. SEEP/W (GEO-SLOPE, 2012) is a finite element code capable of simulating transient, variably saturated, density dependent groundwater flow. SEEP/W was selected for this particular setting due the presence of variably saturated conditions at the WFTF.

4.1 Model Geometry

The WFTF layers shown in Figure 4-1 are based on the 2003 design report by AMEC Earth & Environment (2003). The section modelled in SEEP/W (shown in yellow in Figure 4-1) was taken as a sub-section of the tailings layer (full tailings layer geometry shown in Figure 2-3). This was done to focus the simulations on the distribution of gradients in the tailings layer. The elevation of the top of tailings was taken as 1705 masl. This represents the closure elevation of tailings facility (SNC-Lavalin, 2015). Please note that the rockfill filter layer is located between the blue tailings layer and the waste rock fill.

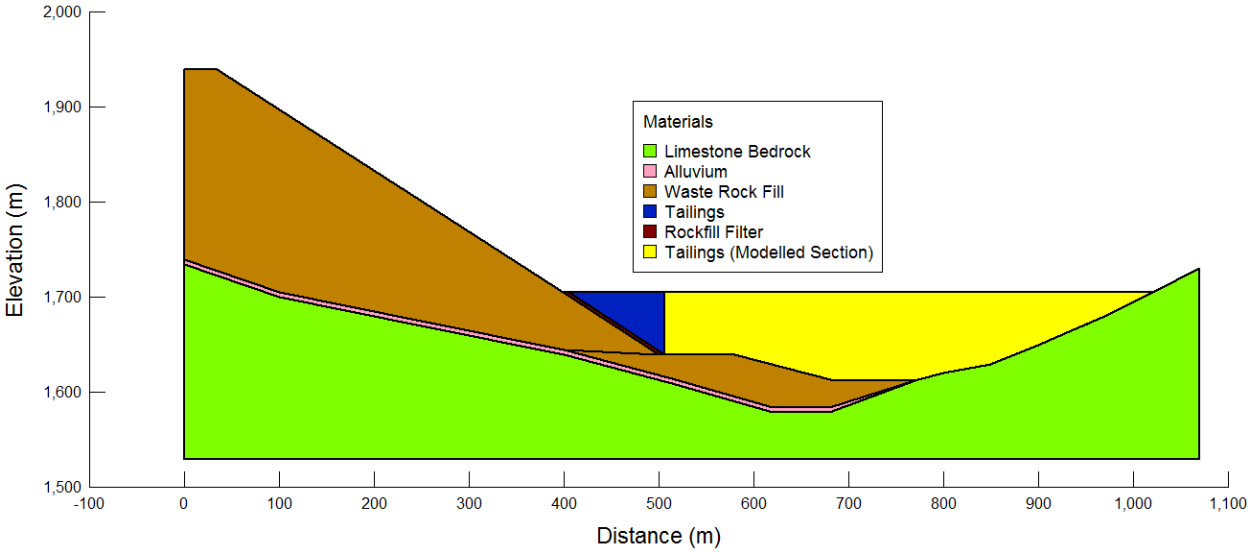

Figure 4-1: WFTF layer geometries and modelled SEEP/W section.

A finite-element grid of 32933 triangular elements was constructed. The width of elements was roughly 1 m. The left hand side of the tailings layer was clipped based on the assumption that flow lines resulting from infiltrating water in this location would be purely vertical and therefore form a groundwater divide. Unsaturated flow simulations are computationally expensive (i.e. require a large amount of computing power and time for simulation); therefore, the simulated section was reduced to the tailings layer in order to target the assessment of gradients in the tailings layer.

4.2 Material Properties

The hydraulic conductivity of the tailings layer was retrieved from the SNC-Lavalin seepage model of the WFTF (K = $1.7x10^{-7}$m/s). Material properties for the tailings relating to unsaturated modelling were retrieved from literature values for coal tailings, and are presented in the appendix of this report.

4.3 Boundary Conditions

The top of the modelled section (elevation of closure) was assigned an infiltration boundary condition of 20 mm/month. The value was calculated as 50% of the annual precipitation for 2016. The infiltration is dependent on the slope, vegetation, and soil permeability at the near surface; therefore, the value of 50% represents a conservative estimate with respect to seepage as we would expect less for a facility designed to mitigate infiltration considering these three parameters. The bottom left-hand boundary of the model was given zero pressure condition to represent the waste rock fill layer as acting as a free draining material (represented by the red dots). The bottom right-hand boundary of the model was taken as no-flow boundary condition to represent the underlying bedrock layer as impermeable. The left-hand boundary of the domain was set as a no-flow boundary as part of the assumption of purely vertical percolation at this location. The boundary conditions are depicted in Figure 4-2.

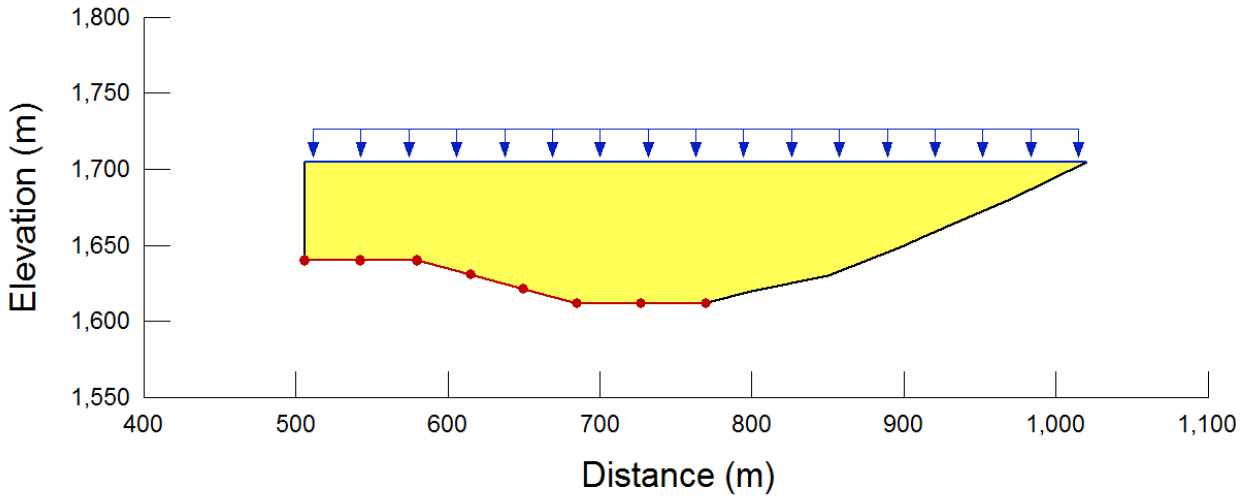

Figure 4-2: Model boundary conditions for the tailings. The blue arrows denote the infiltration boundary condition (20 mm/month). The red dots denote the zero pressure boundary condition.

5.0 MODEL RESULTS

Figure 5-1 displays the simulated hydraulic heads, pressure heads, and hydraulic gradients. The hydraulic heads generally decrease with depth, indicating downward flow. The simulated pressure heads are largely less than zero over the model domain; however, a zone of positive pressure develops at the right-hand side of the domain (i.e. above the no-flow boundary). This represents the perching of water above the impermeable bedrock layer. The development of the perched conditions results in lateral flow across the bedrock interface (i.e. from right to left), towards the free draining boundary condition at the bottom of the model domain.

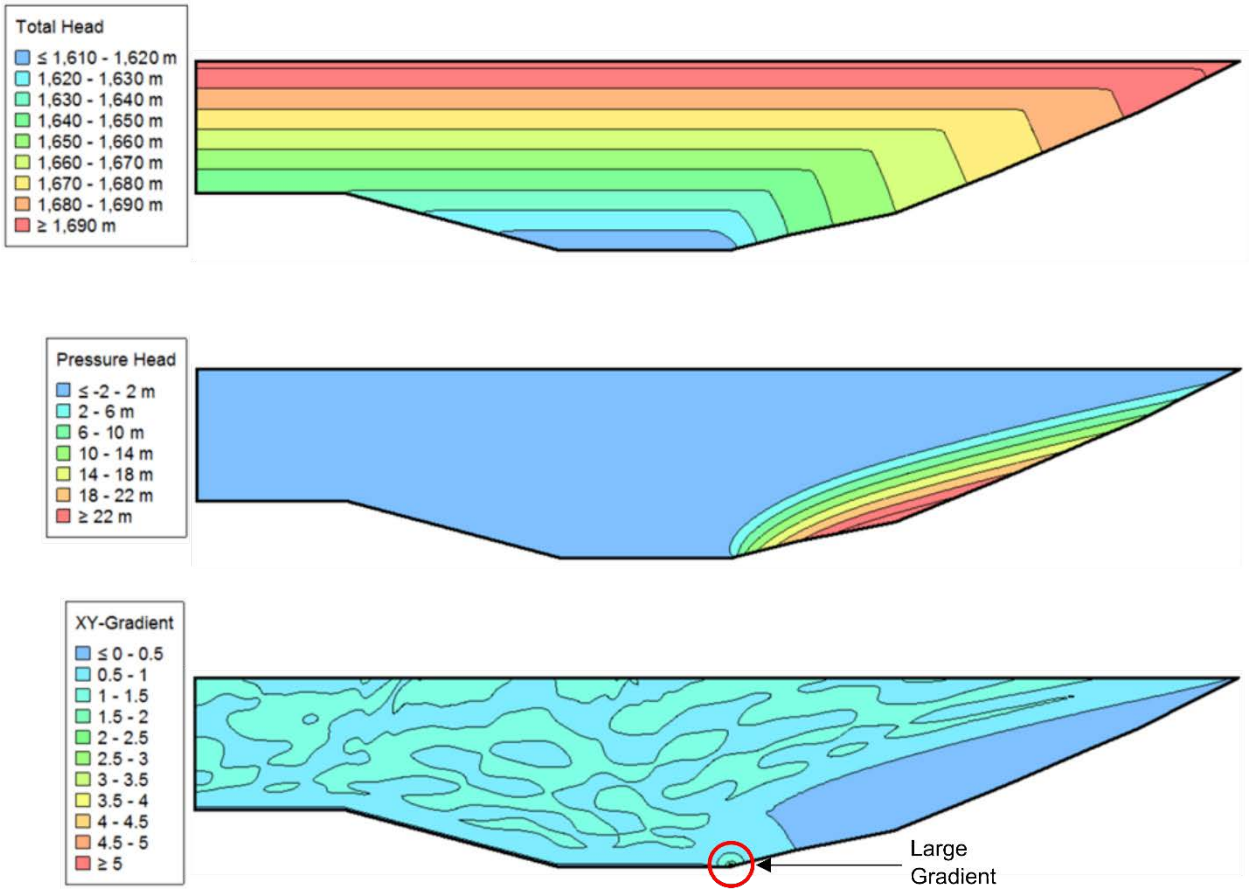

Figure 5-1: Simulated hydraulic heads, pressure heads, and hydraulic gradients

Figure 5-1 shows that hydraulic gradients are greatest at the bottom of the model domain where the zero pressure boundary condition is adjacent to the no-flow boundary condition. Flows in the model converge at this location, resulting in a large hydraulic gradient. The hydraulic gradient at the corresponding node is greater than 5 m/m. Gradients at nodes outside a radius of 5 m from this node are below roughly 0.8 m/m. Hydraulic gradients in regions outside of the saturated zone show to be in excess of 1 m/m; however, these gradients are of little concern as they pose no risk with respect to piping since the area is unsaturated.

6.0 CONCLUSIONS AND RECOMENDATIONS

Simulated hydraulic gradients in the saturated zone of the model are generally less than 0.5 m/m; however, localized gradients at the zone of outflow at the bottom of the model reach values greater than 1. This is a direct result of the conceptual model layer geometry (and resulting SEEP/W model layer and boundary conditions). A simulated perched groundwater condition develops above the impermeable bedrock interface. This subsequently results in lateral movement of water across the bedrock interface toward the free draining layer below the tailings layer. The highest gradient was simulated at the point where the impermeable interface meets contact of the tailings layer with the free draining layer (i.e. where perched water is able to drain downward out of the modelled section).

The 2D model should be revisited in coming years and calibrated to piezometer readings to re-estimate hydraulic gradients at closure. Additional data from field investigations would also serve to facilitate improved construction and operation of the model (e.g. borehole data). The expansion of the current model to 3D would allow for improved characterization of seepages processes.

7.0 CLOSING REMARKS

This memo was prepared by Andy Small, P.Eng. and [redacted], E.I.T. and was reviewed by Gil Violette, P.Eng.

This memo has been prepared for the exclusive use of Teck Coal Ltd. Elkview Operations for specific application to the area within this memo. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibility of such third parties.

Please contact the undersigned at 506-458-1000 should you have any questions or wish to discuss any aspects of this memo.

Respectfully submitted,

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APPENDIX A
Model Development

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The van Genucthen function (van Genuchten, 1980) was implemented to characterize flow in the unsaturated zone of the model domain. The computer code RETC (van Genuchten et al., 1991) was used to perform regression analysis on literature characteristic curve data for coal tailings (Qiu and Sego, 2001). Values for hydraulic conductivity were based on values reported by SNC for the site. The following table presents the values used for simulation.

Table A1: WFTF Tailings Material Properties

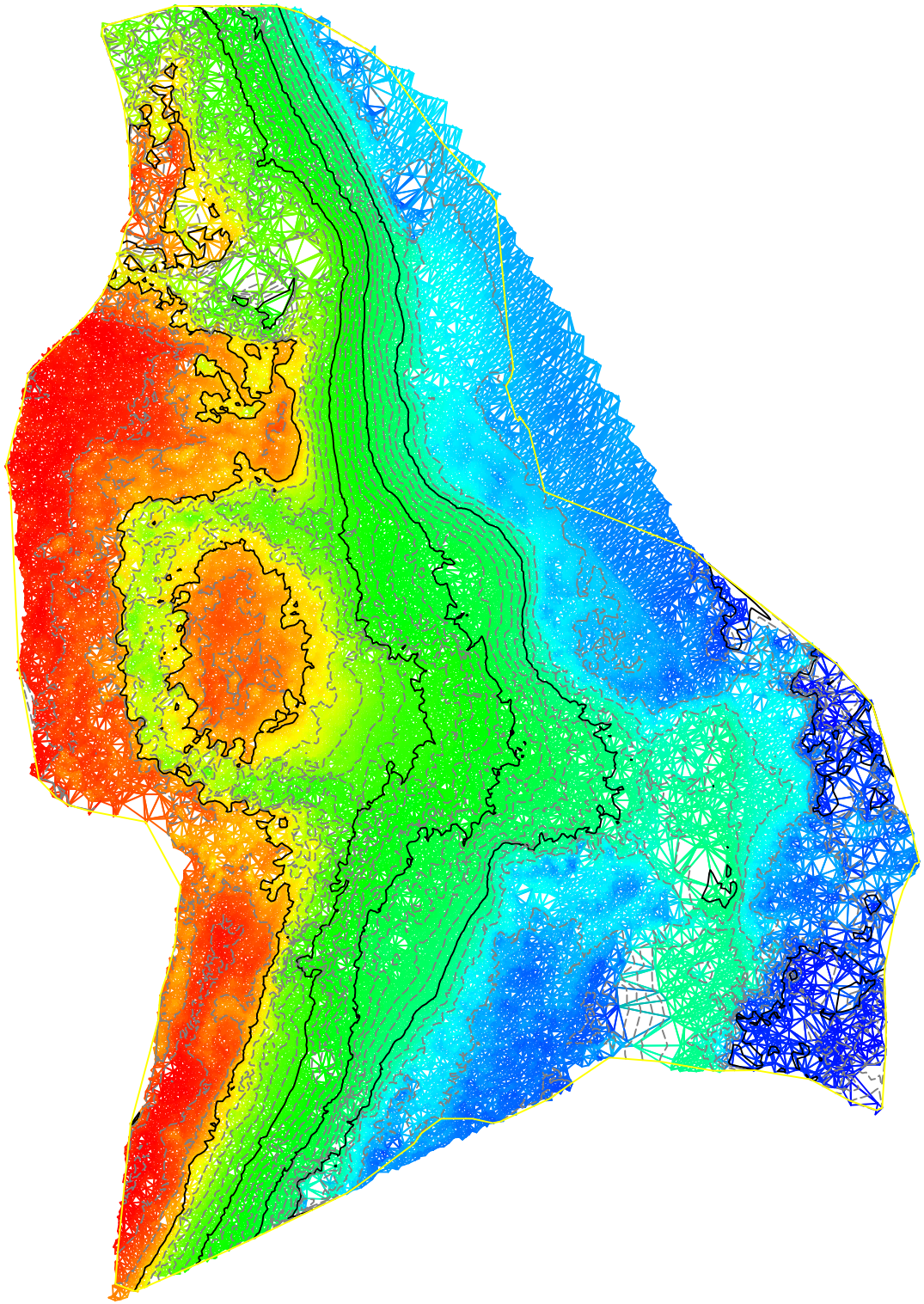
Parameter	Value
K (m/s)	$1.5 \cdot 10^{-7}$
Θ_S	0.475
Θ_R	0.18
α (m^{-1})	0.38
n	1.28

where:

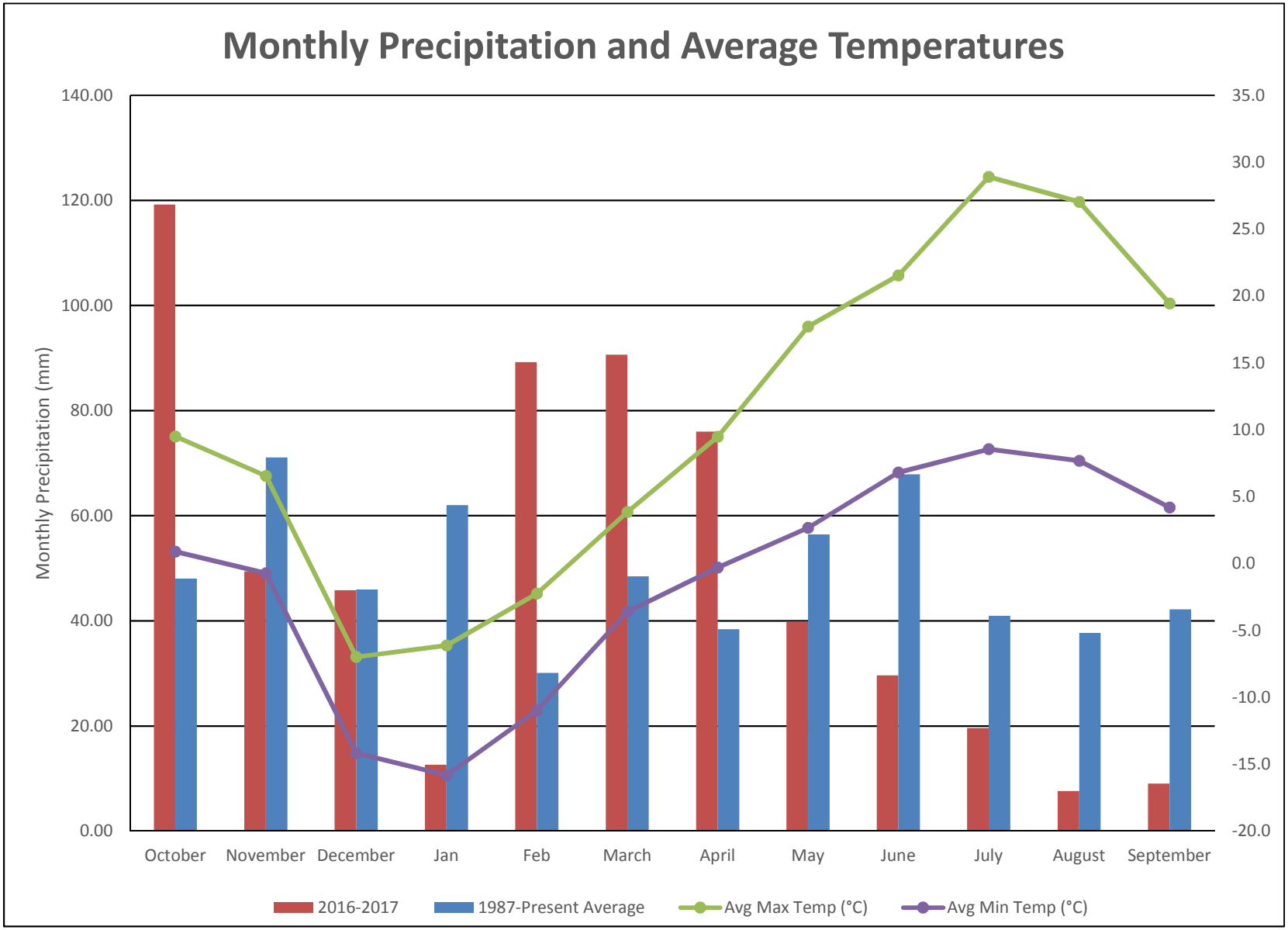
K = saturated hydraulic conductivity (m/s)
Θ_S = saturated moisture content
Θ_R = residual moisture content
α = van Genuchten fitting parameter (m^{-1})
n = van Genuchten fitting parameter

Several assumptions were made based on conceptualization of the investigation in order to facilitate the construction of the numerical model. These assumptions include:

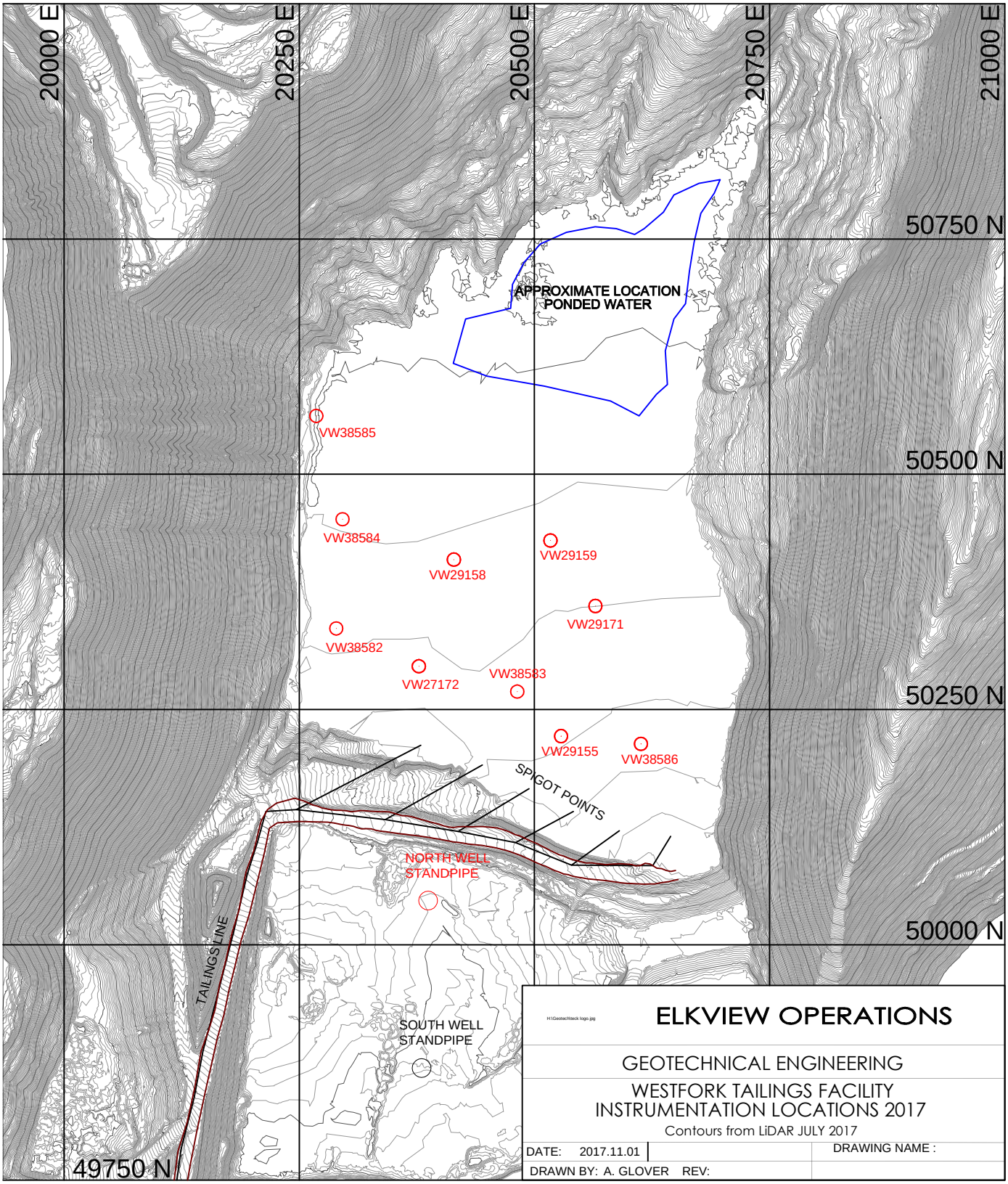
- The waste rock fill layer is free draining, and does not develop positive pore-water pressures below the tailings layer
- The limestone bedrock layer is impermeable
- Average annual infiltration is 50% of the total precipitation
- Literature unsaturated parameters for coal tailings reflect those of the site
- Hydraulic conductivity is homogeneous and isotropic in the tailings layer



APPENDIX B
2017 Precipitation Data


Monthly Precipitation and Average Temperatures
Monthly Precipitation (mm)
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
-5.0
-10.0
-15.0
-20.0
October
November
December
Jan
Feb
March
April
May
June
July
August
September
2016-2017
1987-Present Average
Avg Max Temp (°C)
Avg Min Temp (°C)

APPENDIX C
WFTF Plan, Sections and Instrumentation Data Plots



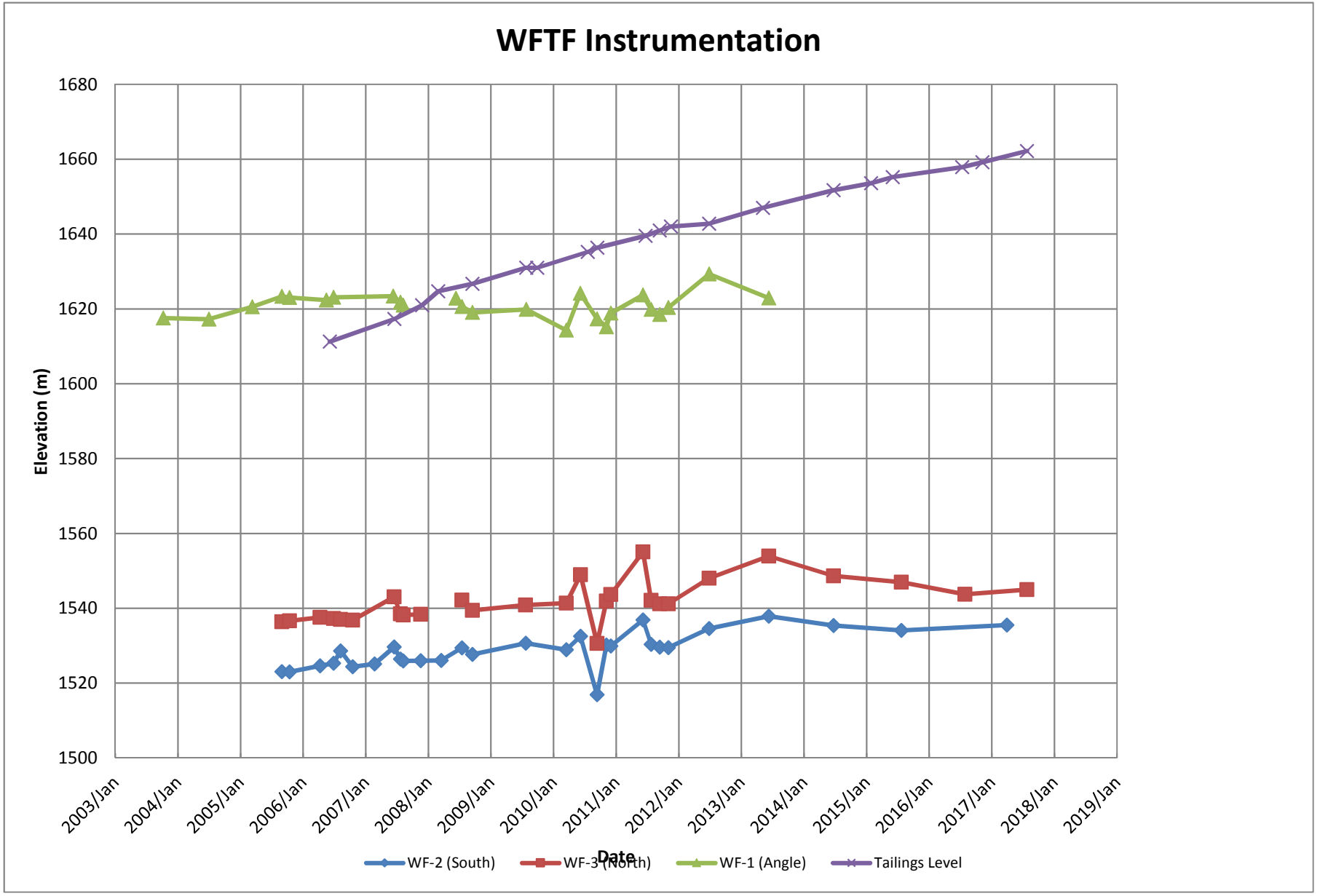
ELKVIEW OPERATIONS

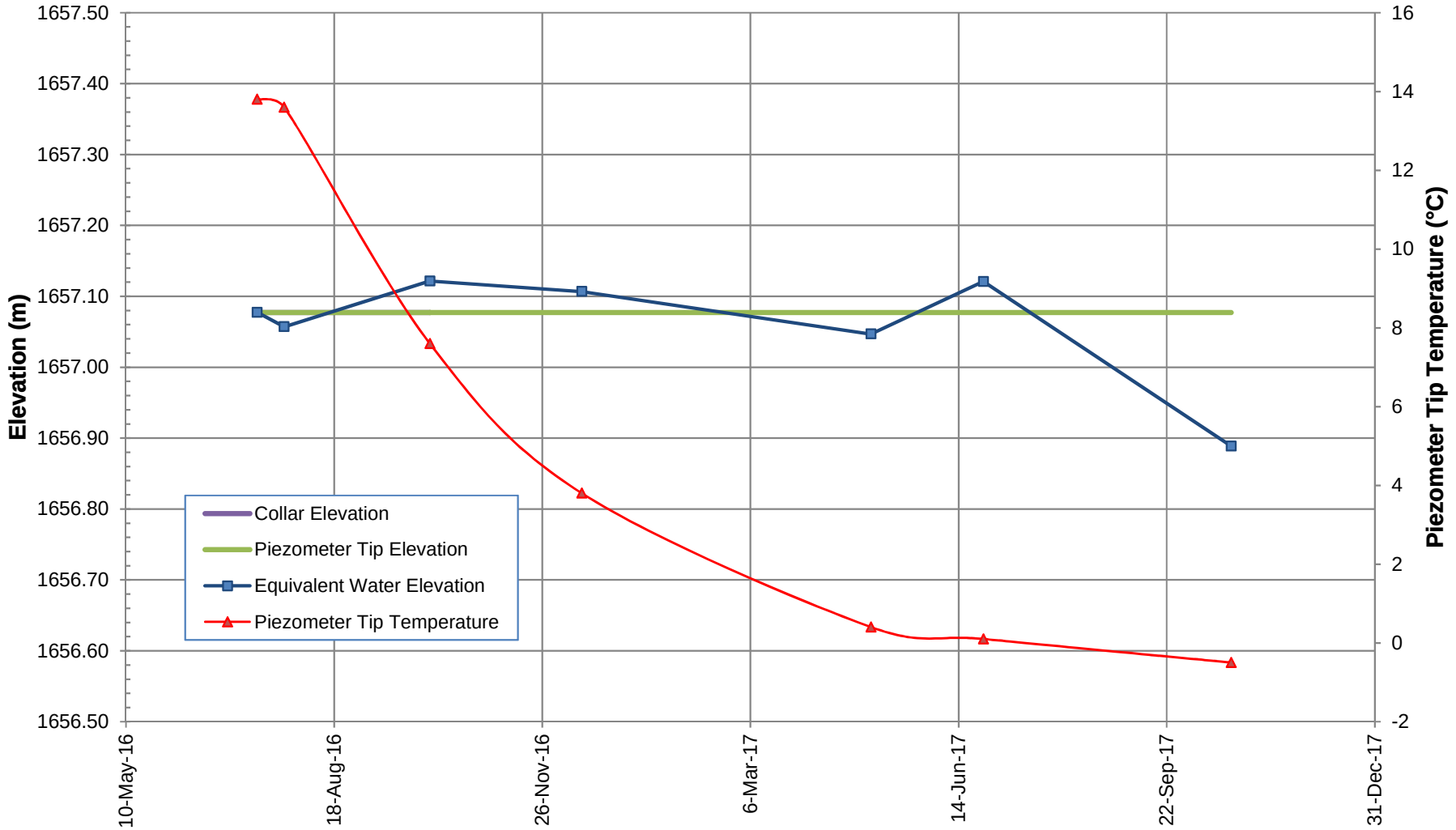
GEOTECHNICAL ENGINEERING

WESTFORK TAILINGS FACILITY
INSTRUMENTATION LOCATIONS 2017

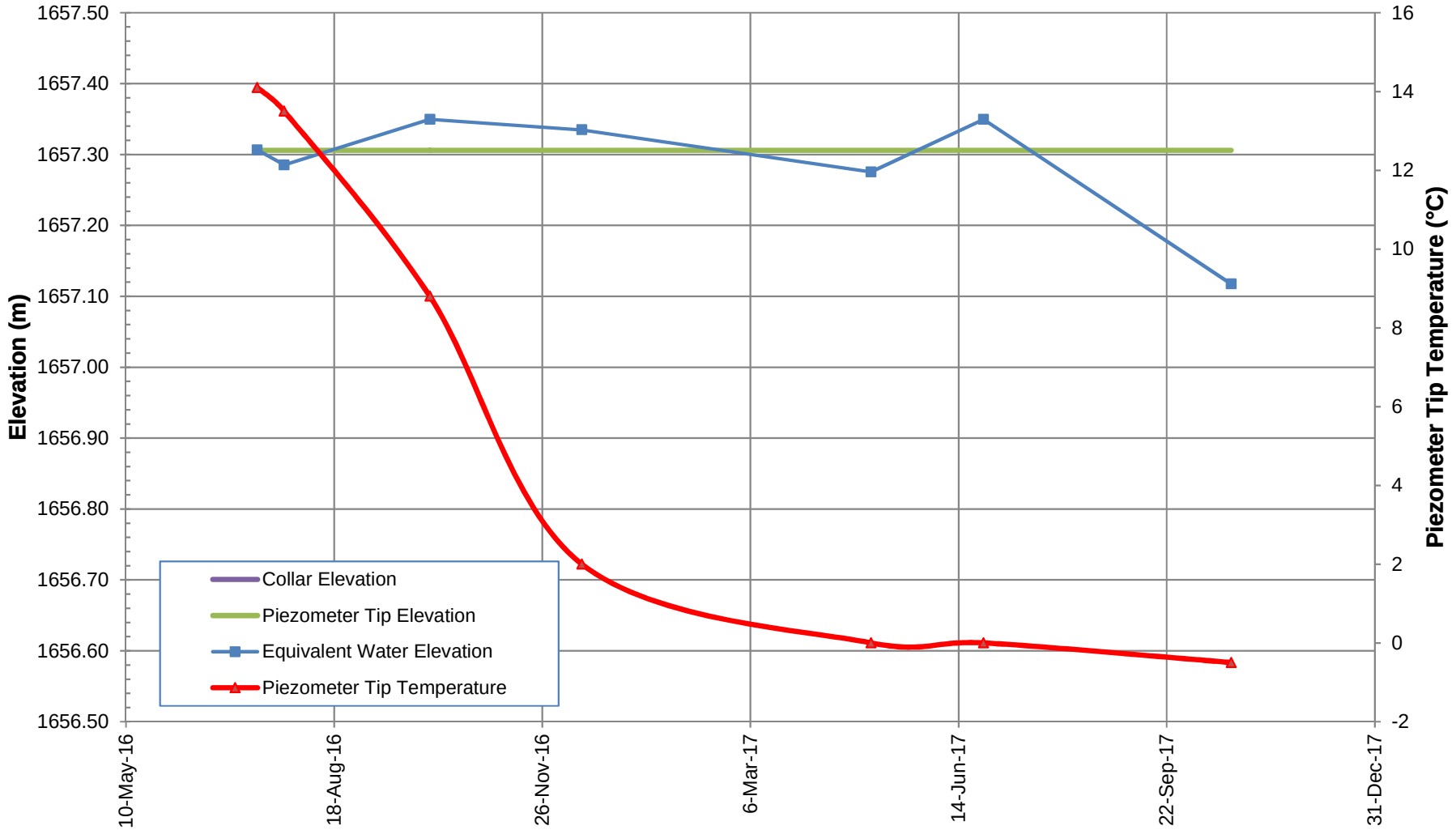
Contours from LiDAR JULY 2017

DATE: 2017.11.01	DRAWING NAME :
DRAWN BY: A. GLOVER REV:	

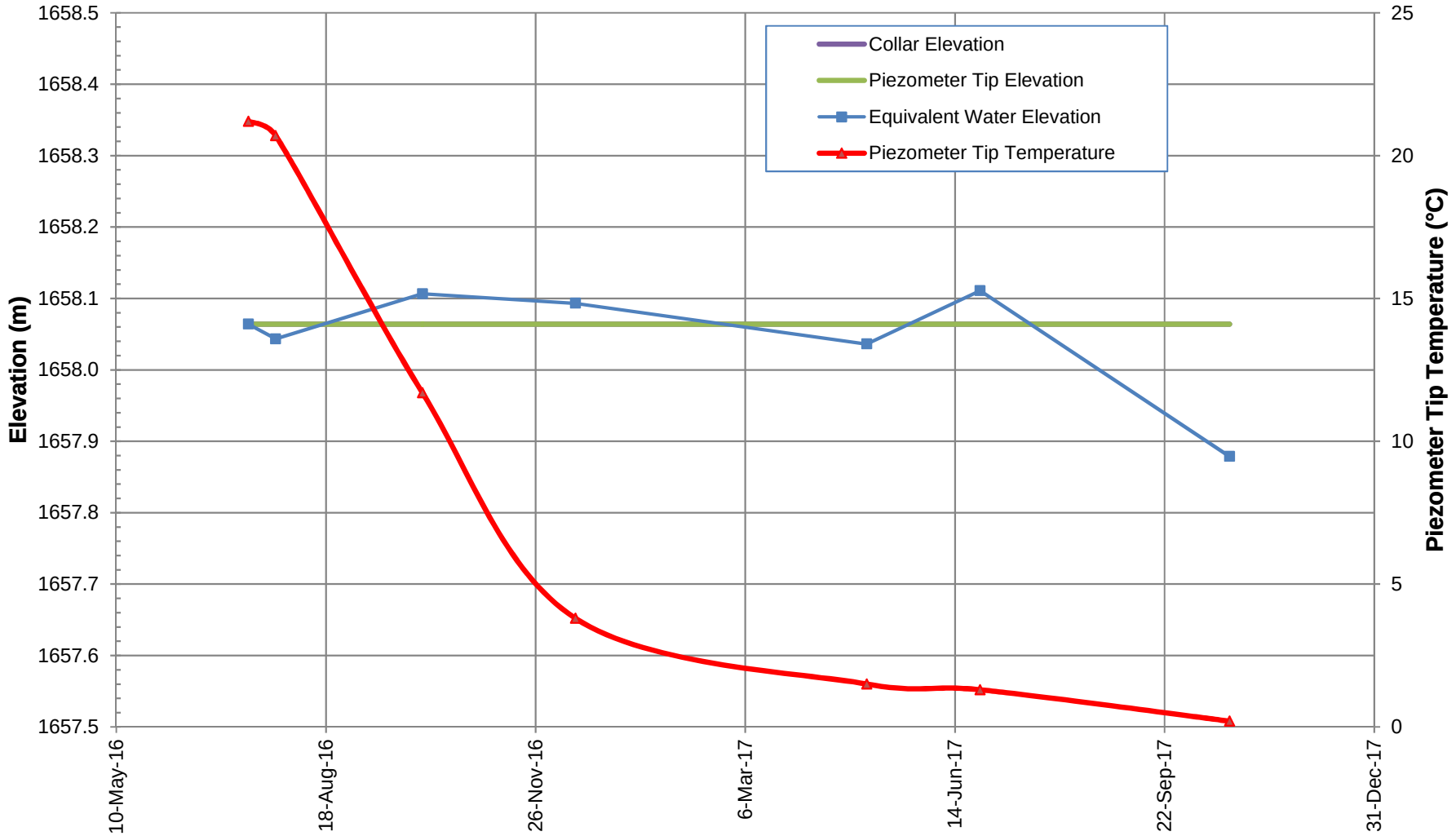

WFTF Instrumentation
Elevation (m)
1680
1660
1640
1620
1600
1580
1560
1540
1520
1500
2003/Jan
2004/Jan
2005/Jan
2006/Jan
2007/Jan
2008/Jan
2009/Jan
2010/Jan
2011/Jan
2012/Jan
2013/Jan
2014/Jan
2015/Jan
2016/Jan
2017/Jan
2018/Jan
2019/Jan
Date
WF-2 (South)
WF-3 (North)
WF-1 (Angle)
Tailings Level



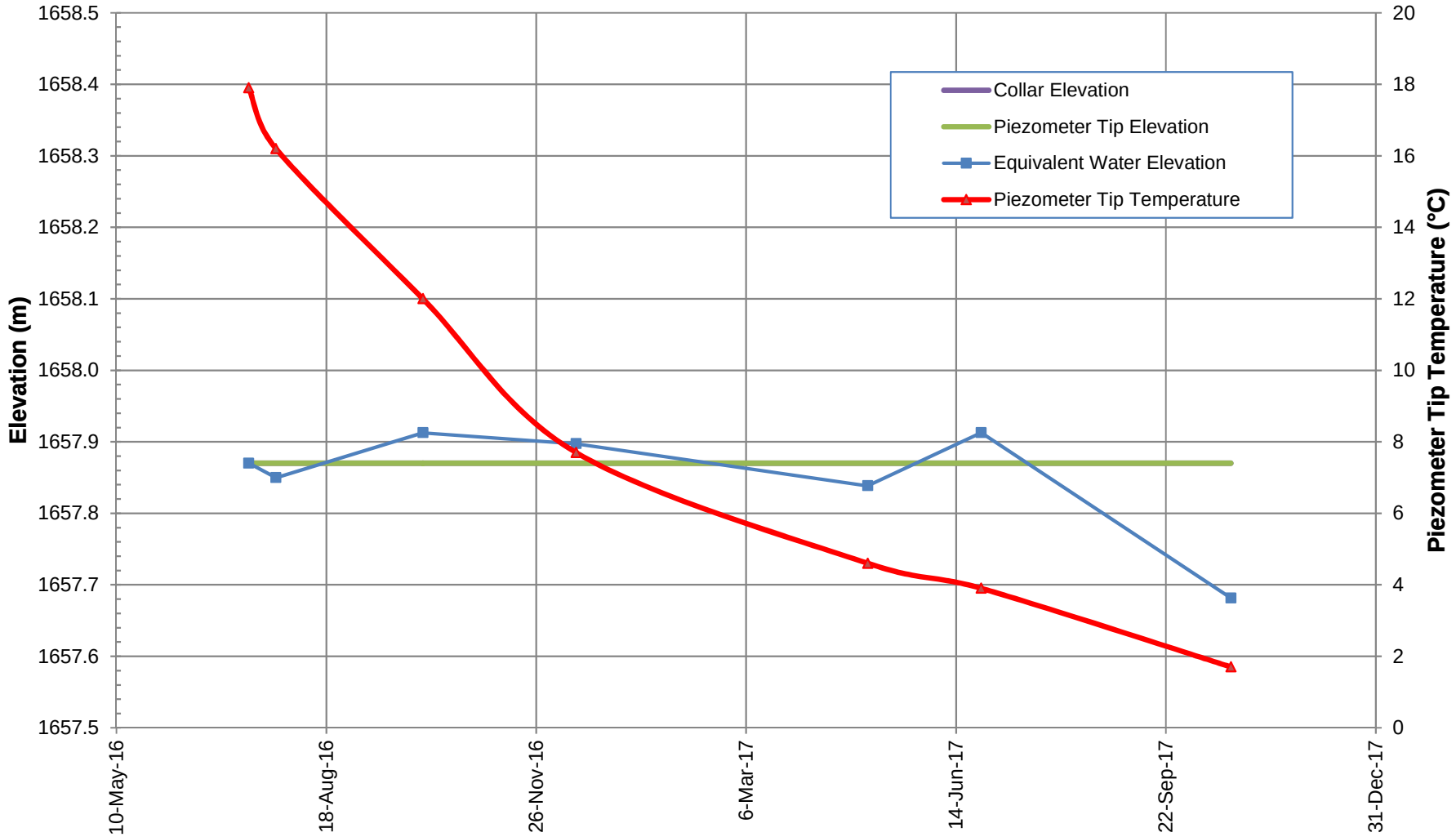
Teck Coal - Elkview Operations		
Bodie Dump Piezometers	Date:	Revision
Vibrating Wire Piezometer 27171		



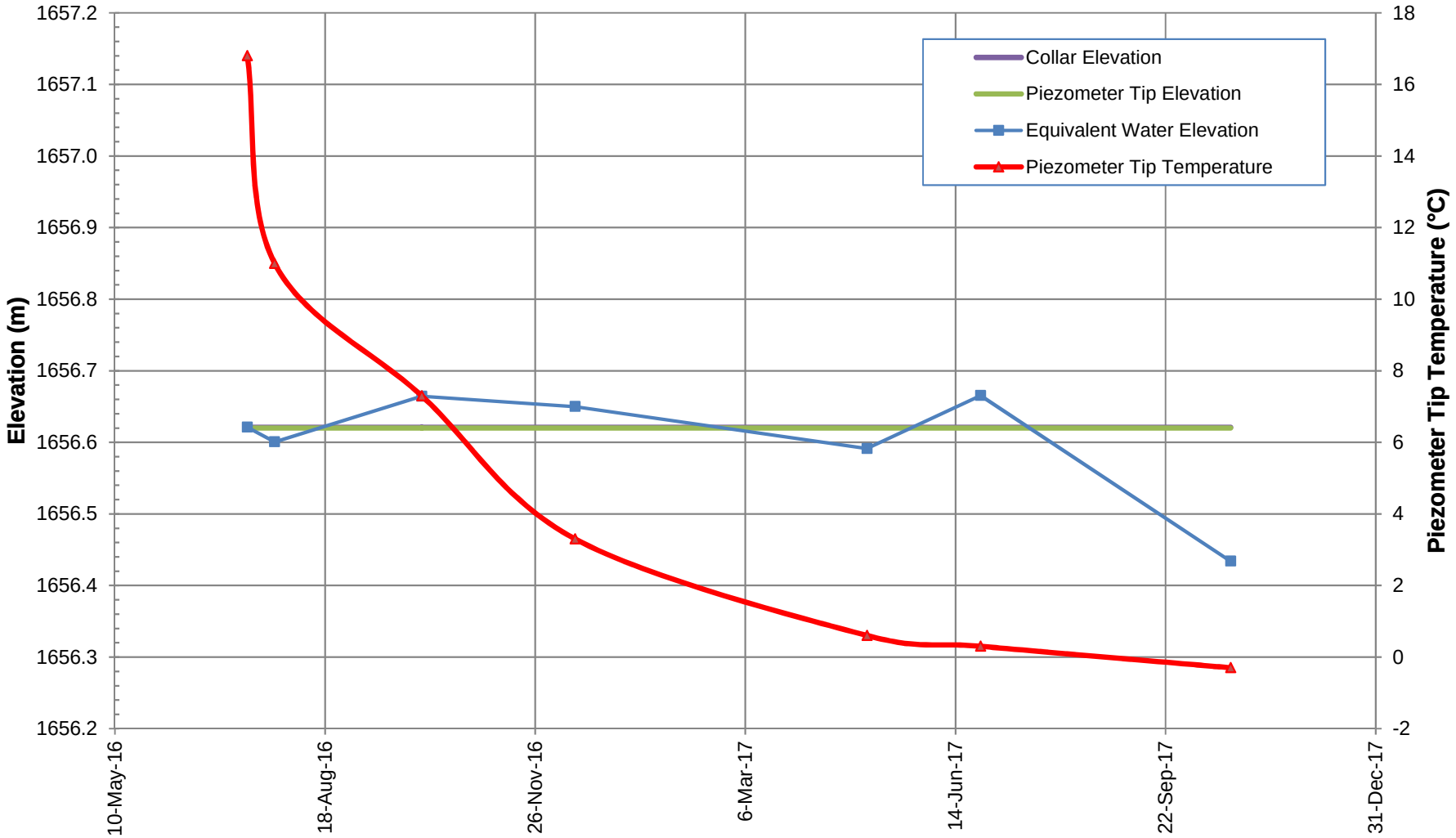
Teck Coal - Elkview Operations		
Bodie Dump Piezometers	Date:	Revision
Vibrating Wire Piezometer 29158		



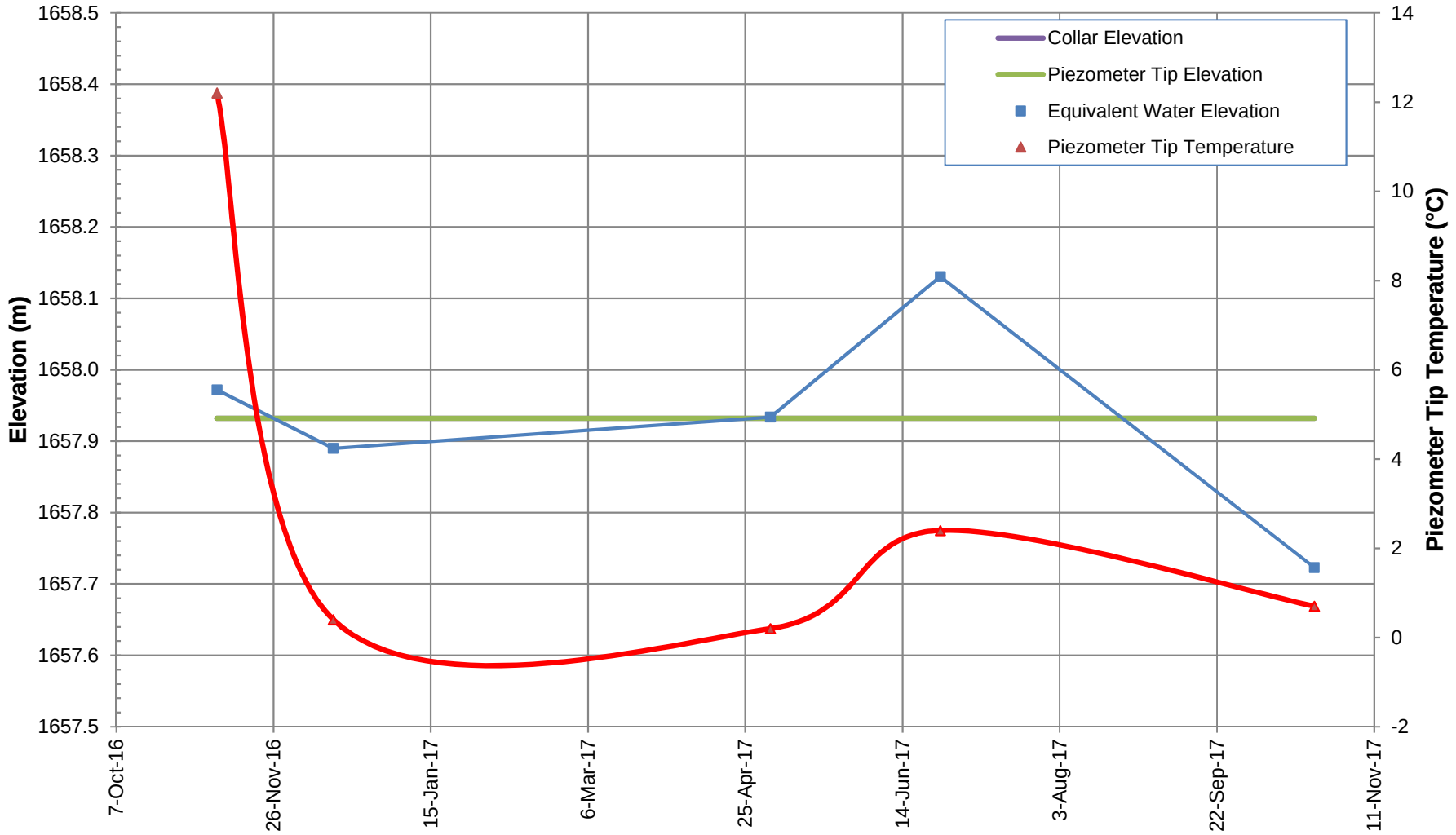
Teck Coal - Elkview Operations		
Bodie Dump Piezometers	Date:	Revision
Vibrating Wire Piezometer 27172		



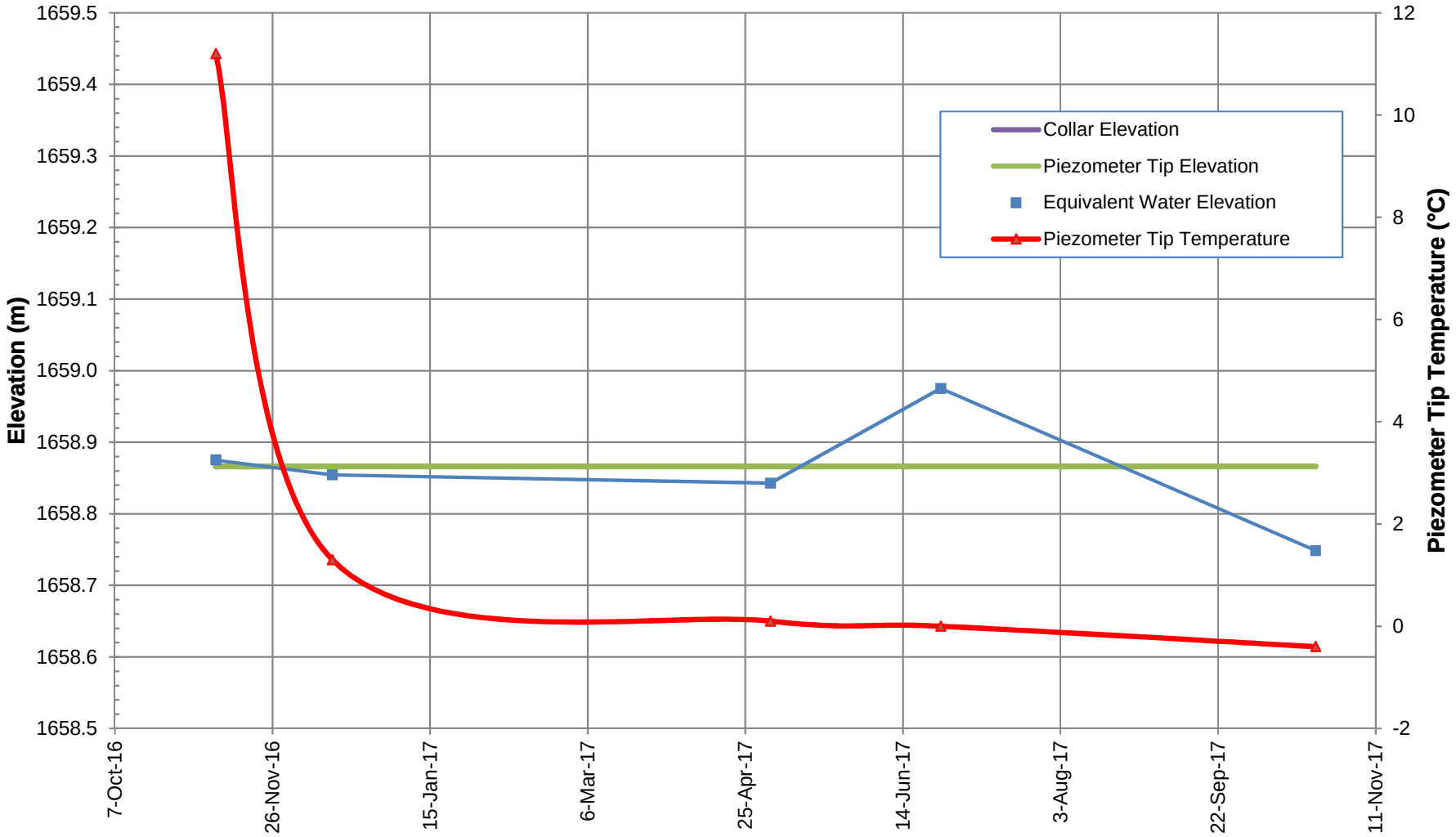
Teck Coal - Elkview Operations		
Bodie Dump Piezometers	Date:	Revision
Vibrating Wire Piezometer 29155		



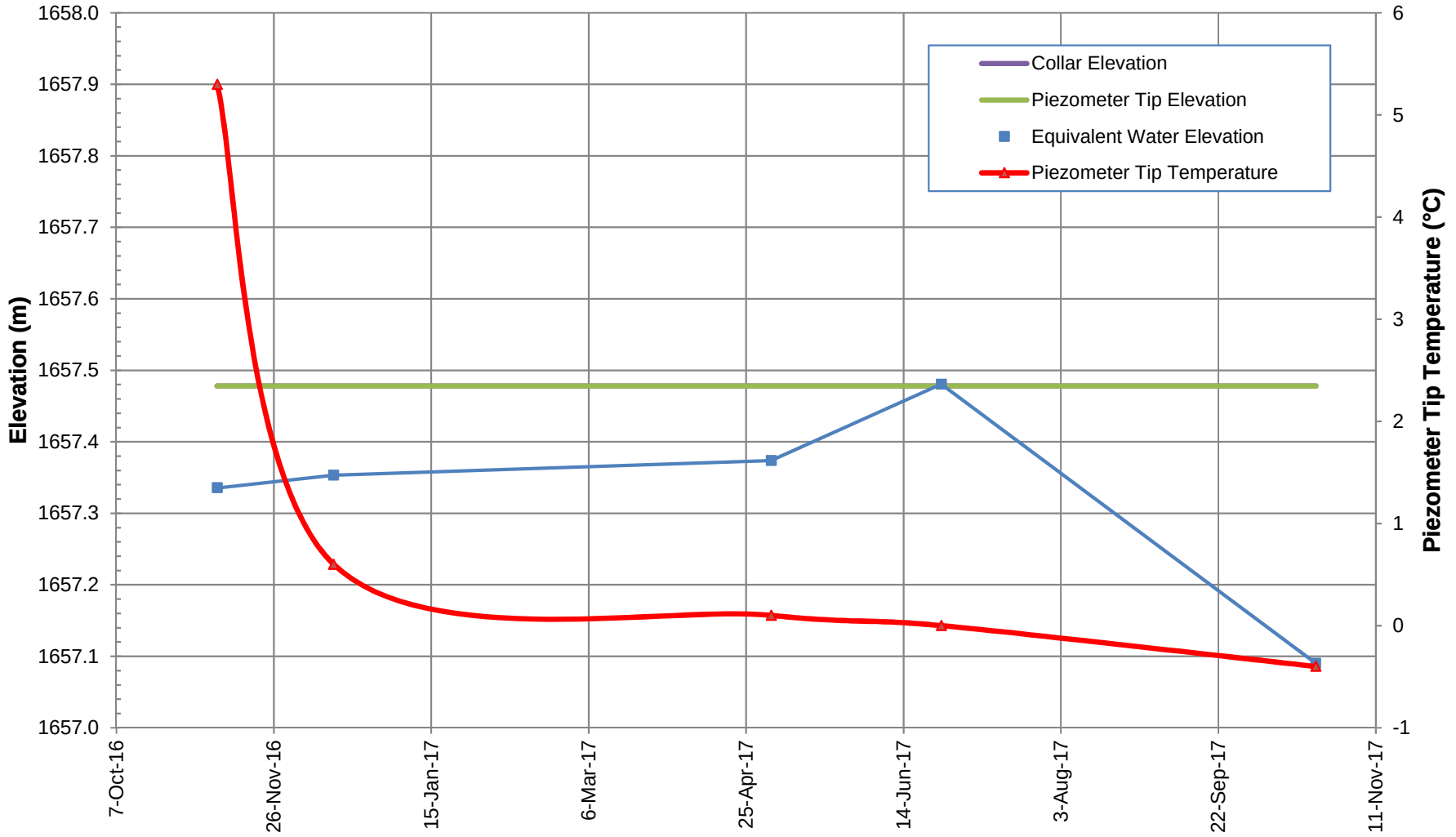
Teck Coal - Elkview Operations		
Bodie Dump Piezometers	Date:	Revision
Vibrating Wire Piezometer 29159		



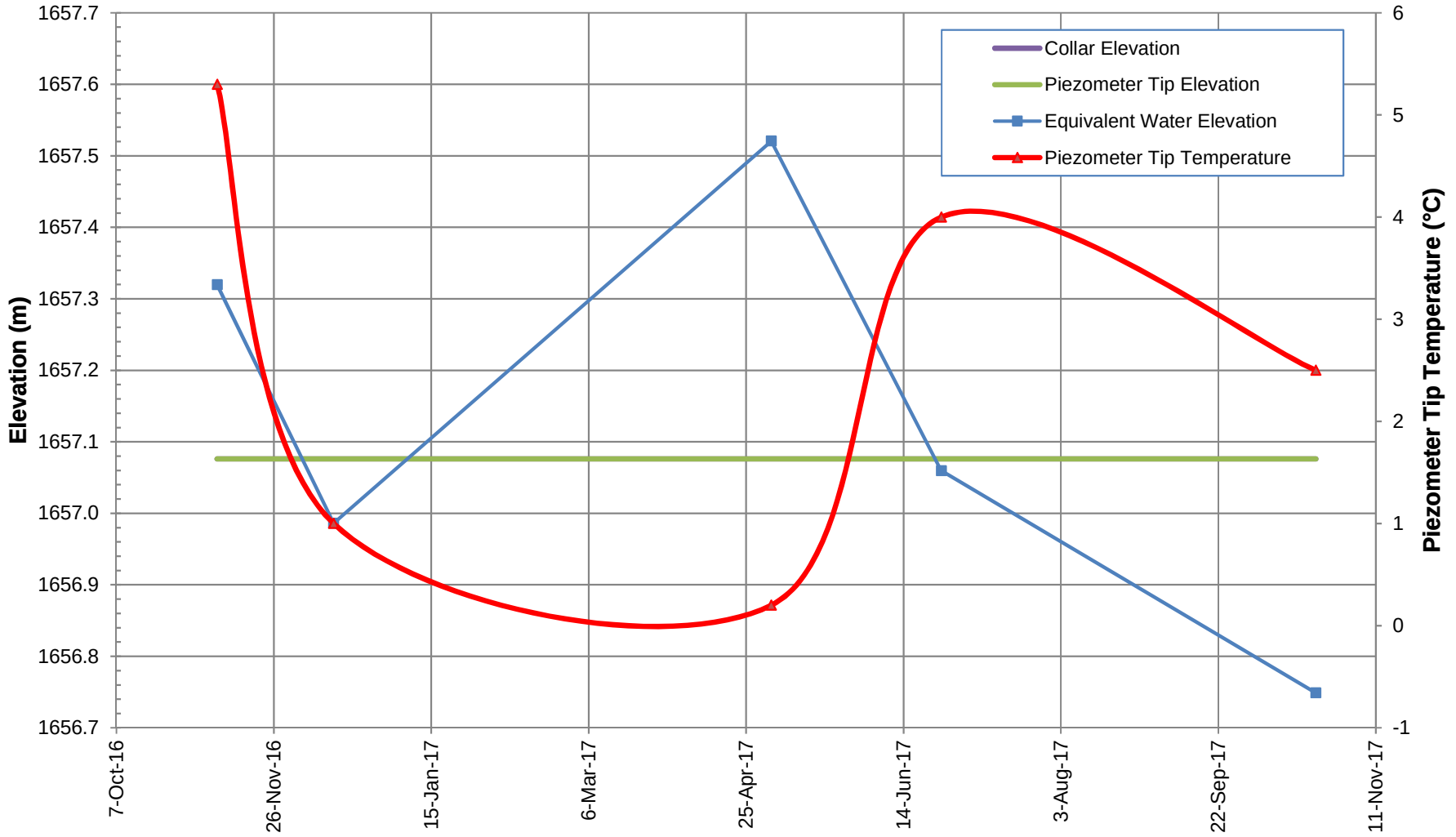
Teck Coal - Elkview Operations		
Bodie Dump Piezometers	Date:	Revision
Vibrating Wire Piezometer 38582		



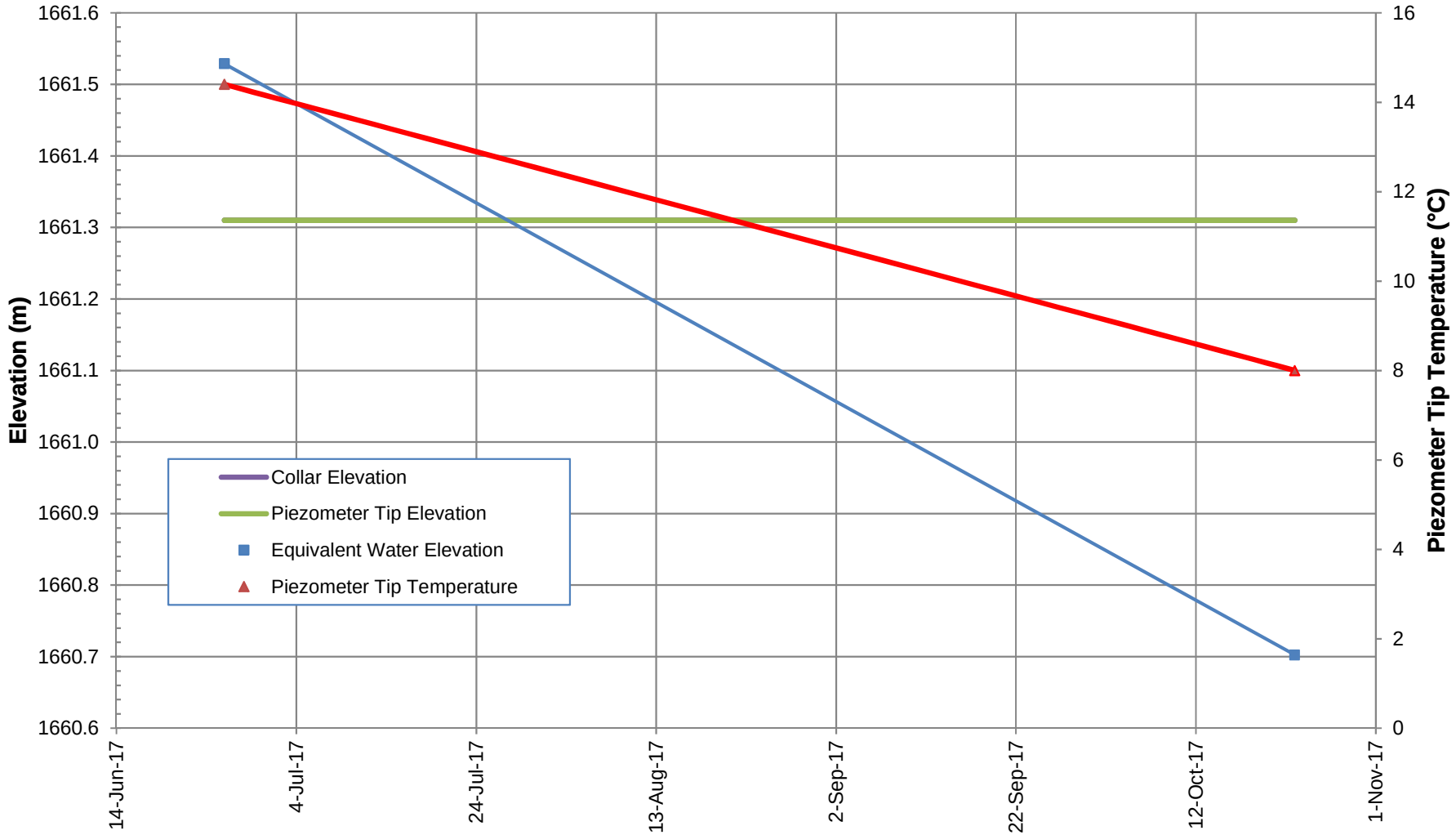
Teck Coal - Elkview Operations		
Bodie Dump Piezometers	Date:	Revision
Vibrating Wire Piezometer 38583		



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



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



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

APPENDIX D
Lagoon C
Cross Sections and Instrumentation Data Plots

H:\PROJECTS\TE173017_TCL_EVO_2017_DSI\CAD\DRAWINGS\TE173017_MACASSA_LAGOON C-D SITE PLANS 2018-02-21.dwg - 2/22/2018 4:04 PM - Messer, Wendell

NOTES:

1. ALL DIMENSIONS ARE IN METRES (m) UNLESS OTHERWISE NOTED.

0m 10 20 30 40 50 60

1 : 1500

DRAFT

NO.	DESCRIPTION	NO.	DATE	DESCRIPTION
		5		
		4		
		3		
		2		
		1		
REFERENCE DRAWINGS		REVISIONS		

STAMP:

CLIENT: Teck

amec foster wheeler

DRAWN BY:	WM
DESIGNED BY:	-
CHECKED BY :	EG
SCALE :	1:1500
DATE :	2018/02/07

PROJECT: LAGOONS AND WFTF - 2017 DSI REPORT

TITLE: INSTRUMENTATION LOCATION MAP AT LAGOON C

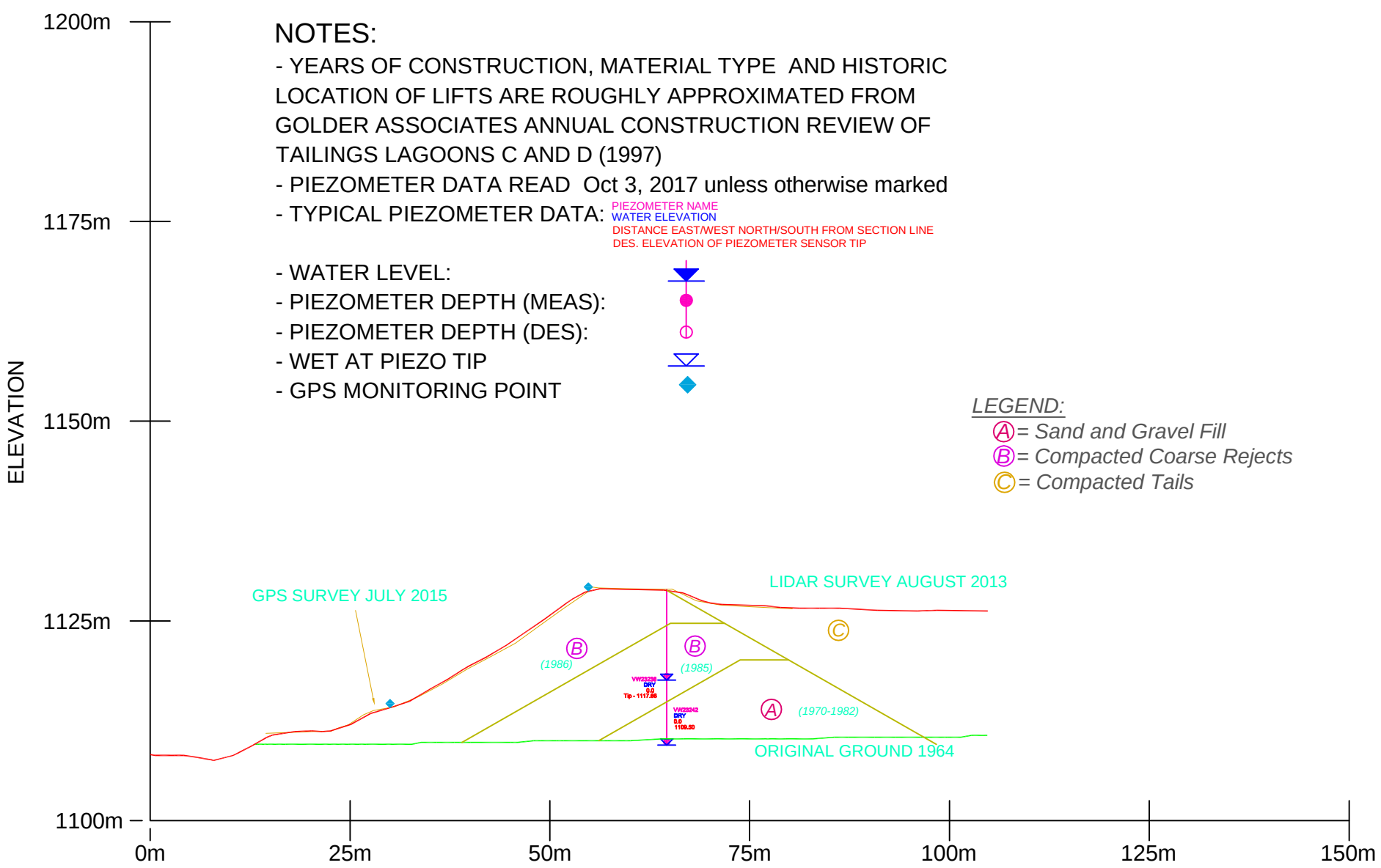
DATUM :	-
PROJECTION :	MINE GRID
PROJECT NO. :	TE173017
REV. :	0
FIGURE NO. :	FIG D1

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 READ Oct 3, 2017 unless otherwise marked
- TYPICAL PIEZOMETER DATA: PIEZOMETER NAME / WATER ELEVATION / DISTANCE EAST/WEST NORTH/SOUTH FROM SECTION LINE / DES. ELEVATION OF PIEZOMETER SENSOR TIP
- WATER LEVEL:
- PIEZOMETER DEPTH (MEAS):
- PIEZOMETER DEPTH (DES):
- WET AT PIEZO TIP
- GPS MONITORING POINT

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



H:\Geotech\teck logo.jpg

Elkview Operations

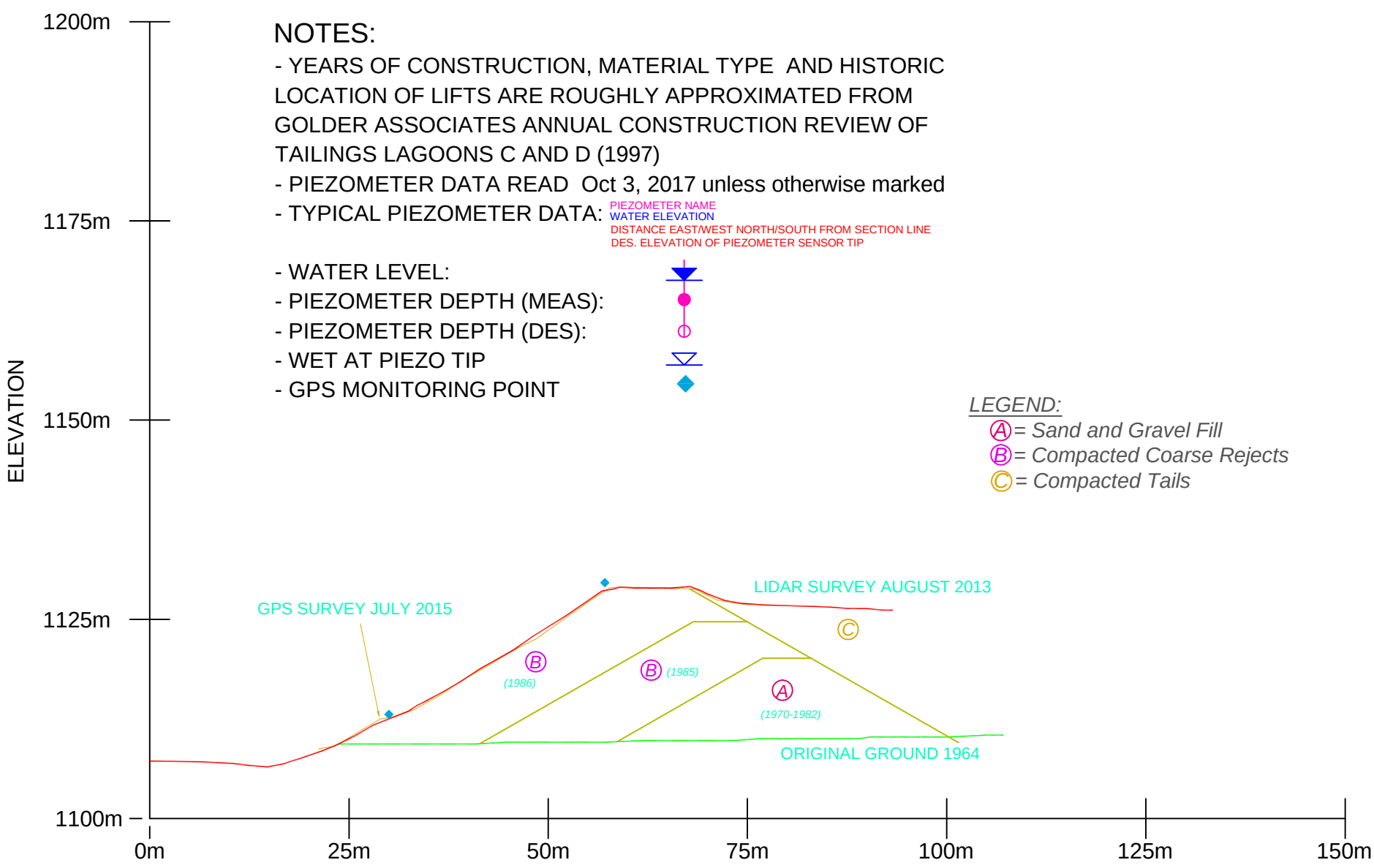
Geotechnical Engineering

LAGOON C CROSS-SECTION A-A’
2017

DATE: NOV. 2017	SCALE:	DWG. NO. :
DWN BY: A. GLOVER	REV BY:	

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

LAGOON C CROSS-SECTION B-B’



H:\Geotech\teck logo.jpg

Elkview Operations

Geotechnical Engineering

LAGOON C CROSS-SECTION B-B’
2017

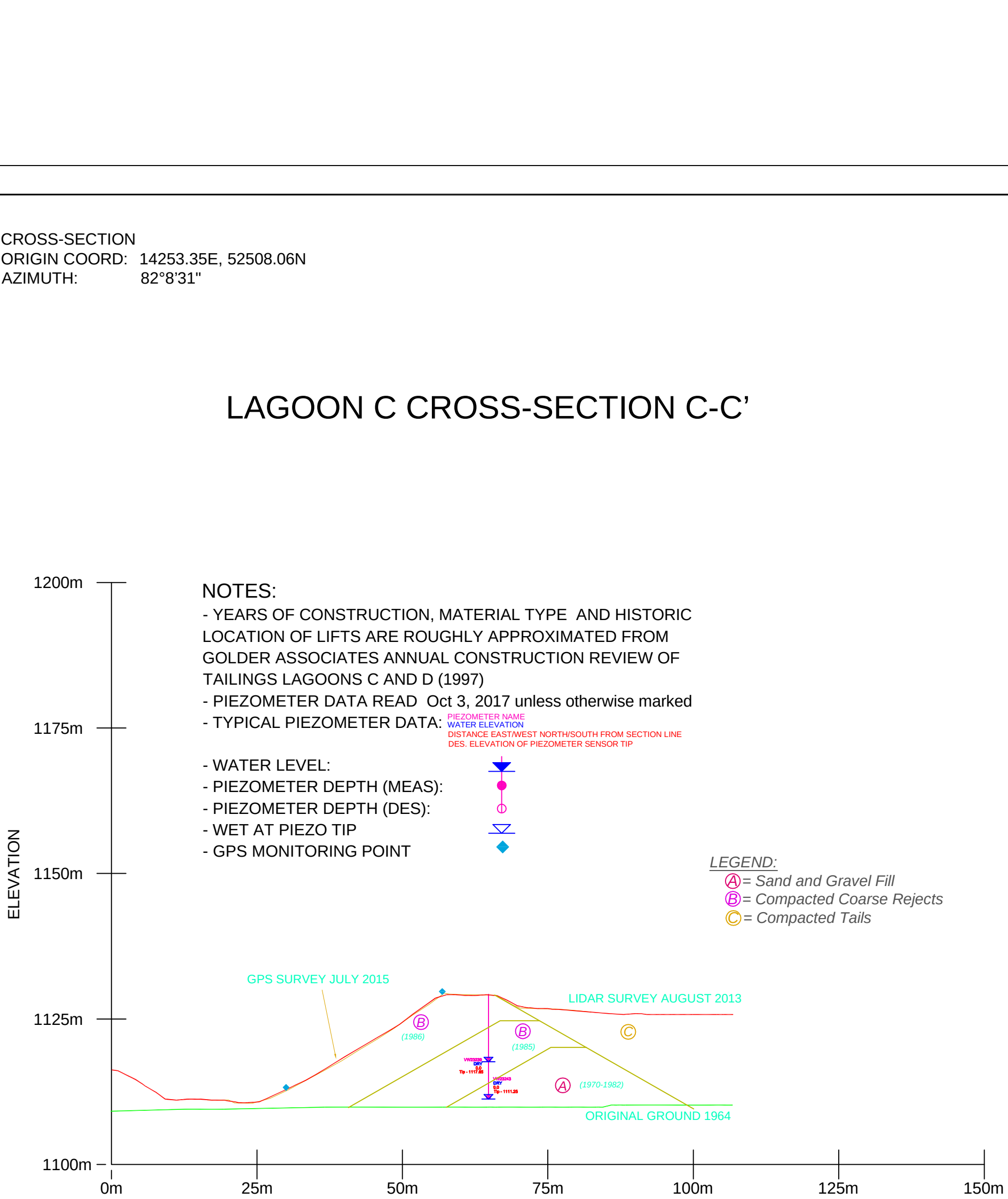
DATE: NOV. 2017	SCALE:	DWG. NO. :
DWN BY: A. GLOVER	REV BY:	

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 READ Oct 3, 2017 unless otherwise marked
- TYPICAL PIEZOMETER DATA: PIEZOMETER NAME / WATER ELEVATION / DISTANCE EAST/WEST NORTH/SOUTH FROM SECTION LINE / DES. ELEVATION OF PIEZOMETER SENSOR TIP
- WATER LEVEL:
- PIEZOMETER DEPTH (MEAS):
- PIEZOMETER DEPTH (DES):
- WET AT PIEZO TIP
- GPS MONITORING POINT

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



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Elkview Operations

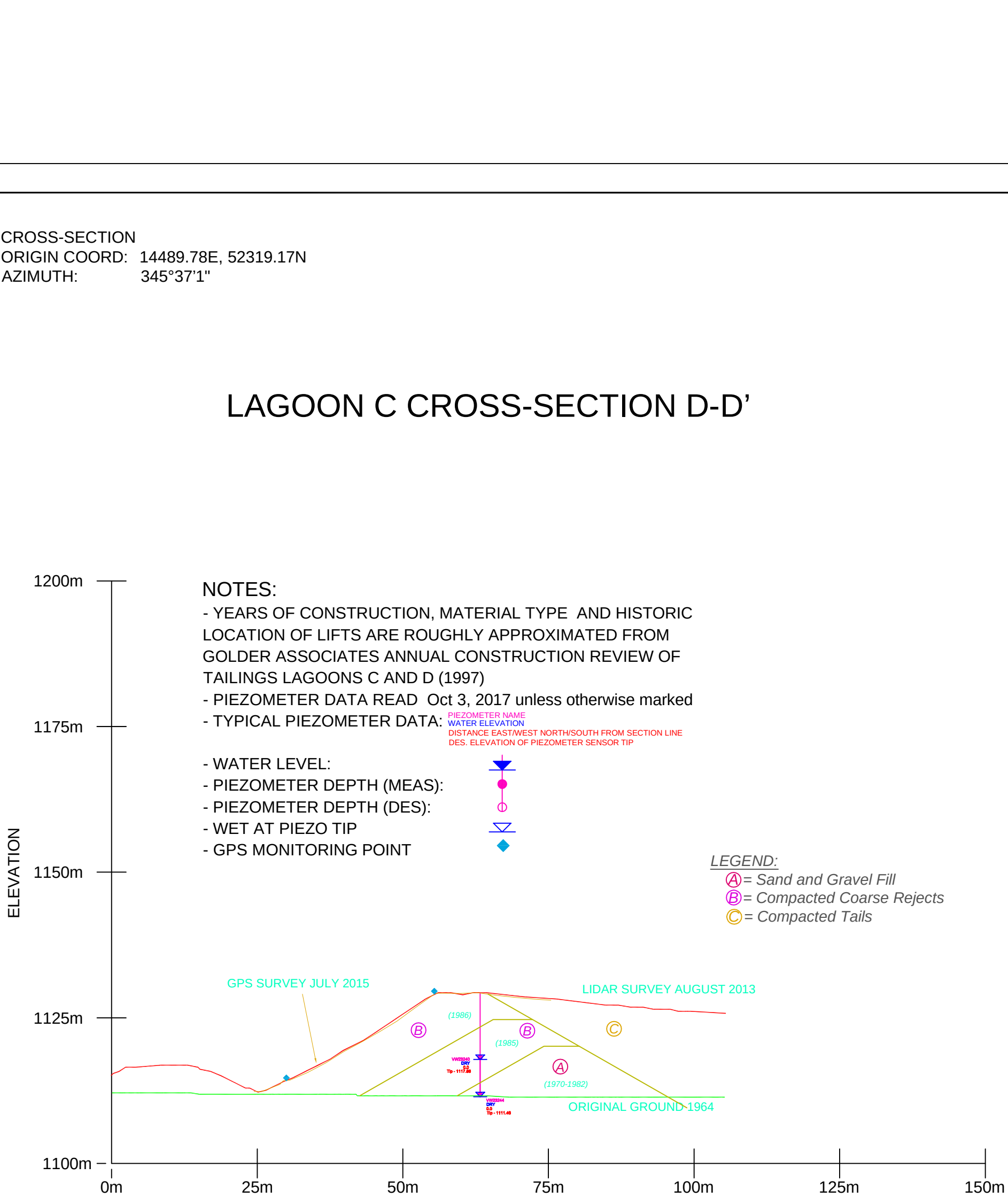
Geotechnical Engineering

LAGOON C CROSS-SECTION C-C’
2017

DATE: NOV. 2017	SCALE:	DWG. NO. :
DWN BY: A. GLOVER	REV BY:	

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

LAGOON C CROSS-SECTION D-D'



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Elkview Operations

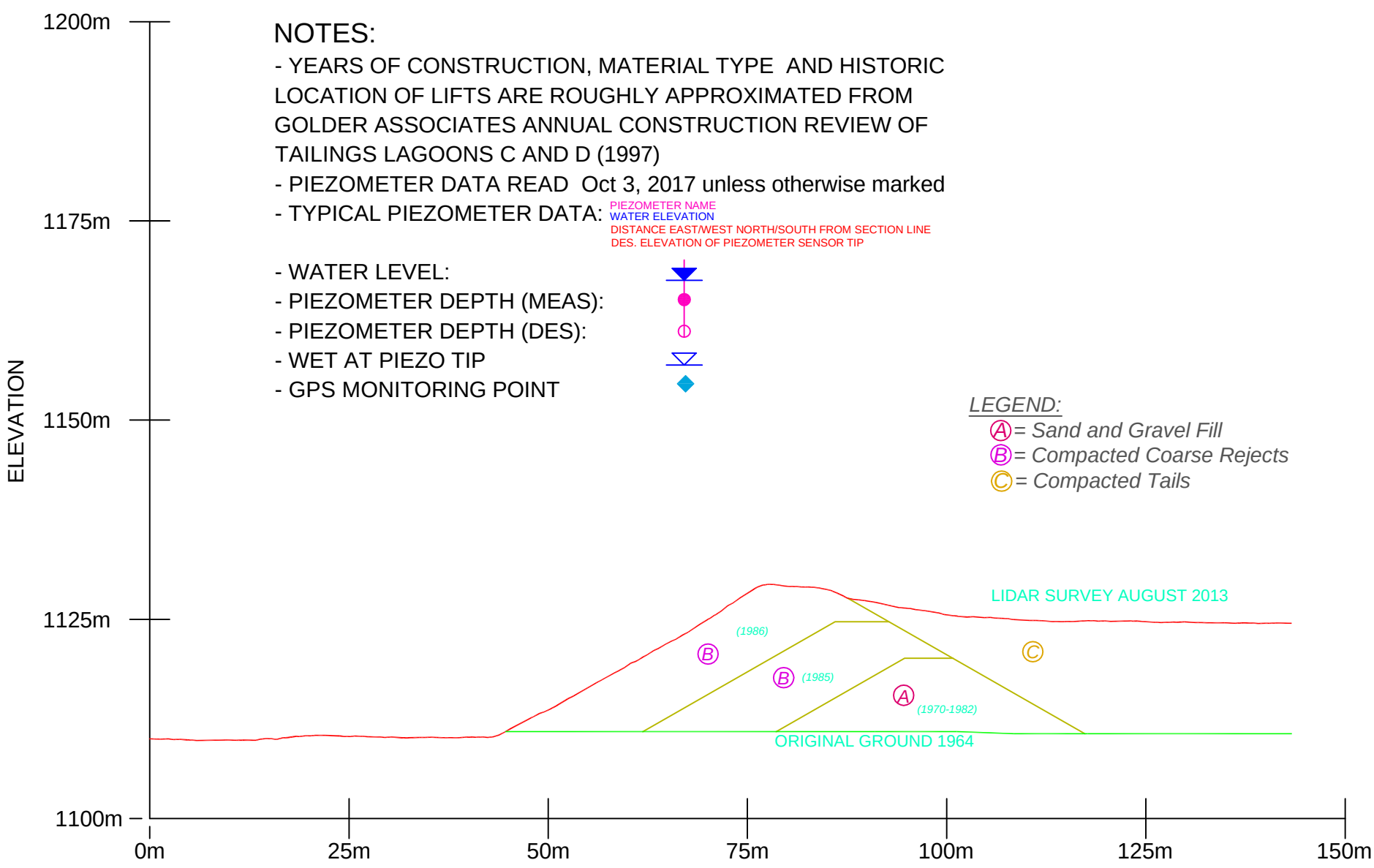
Geotechnical Engineering

LAGOON C CROSS-SECTION D-D' 2017

DATE: NOV. 2017	SCALE:	DWG. NO. :
DWN BY: A. GLOVER	REV BY:	

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

LAGOON C CROSS-SECTION E-E’



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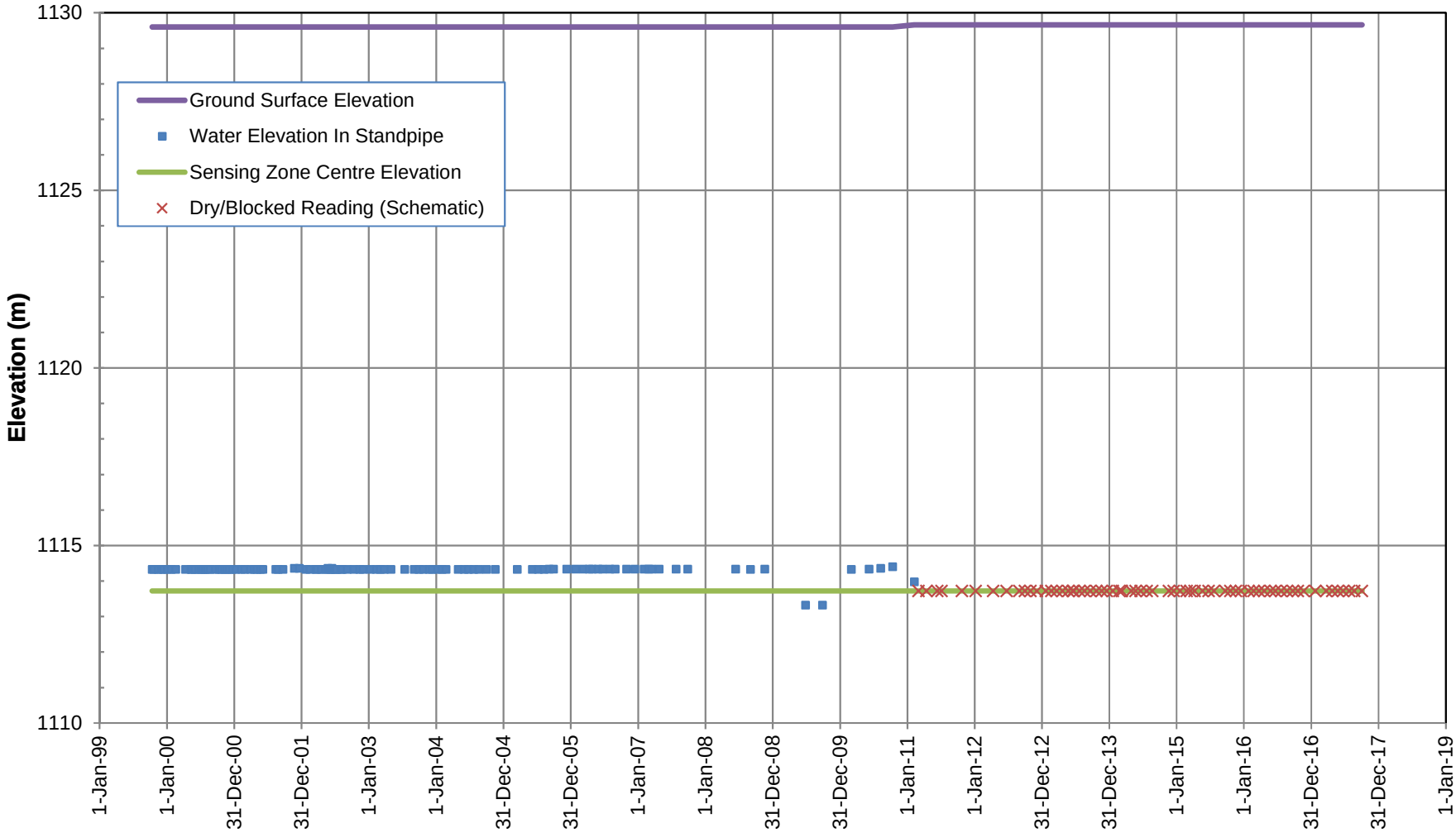
Elkview Operations

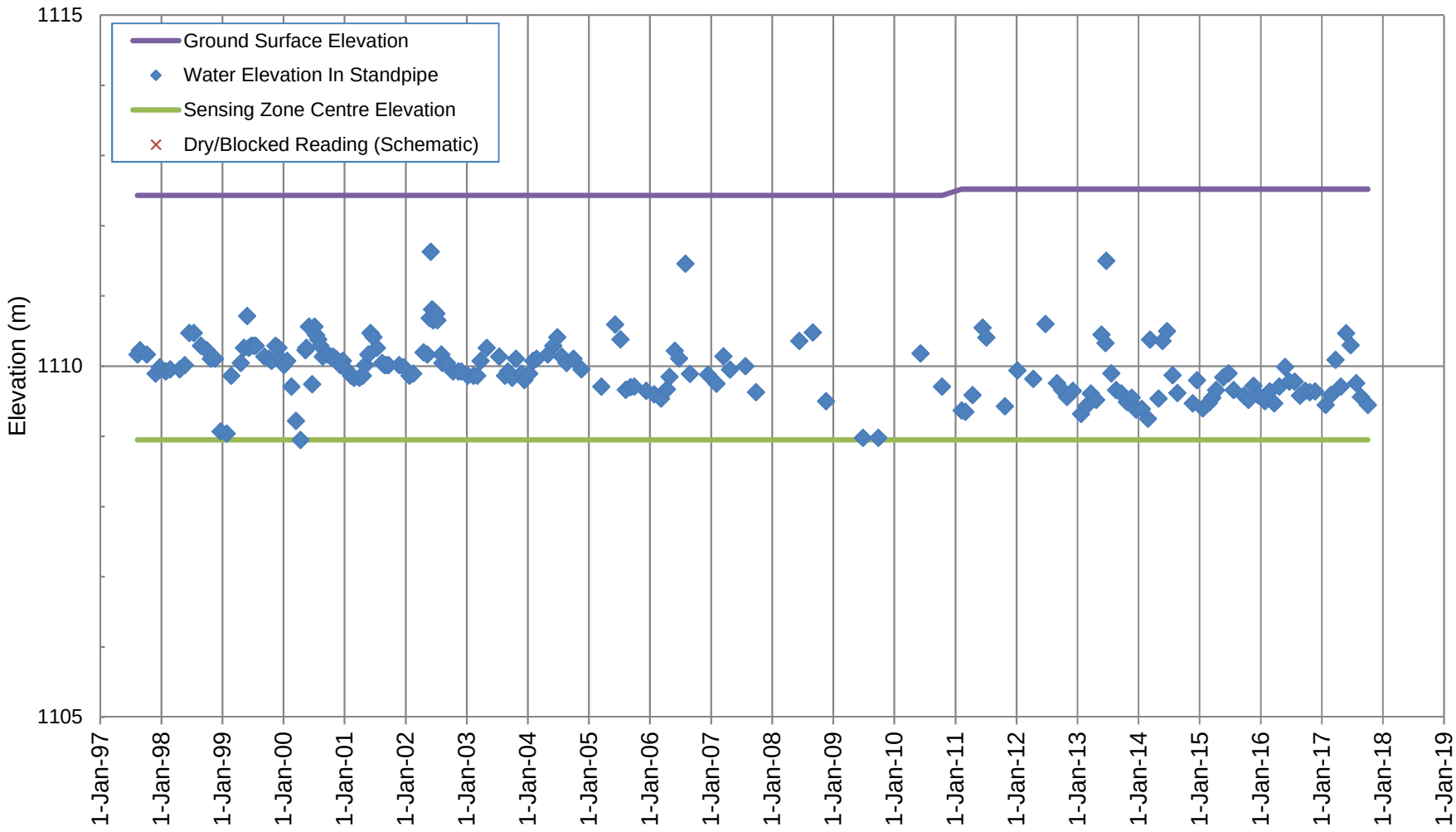
Geotechnical Engineering

LAGOON C CROSS-SECTION E-E’
2017

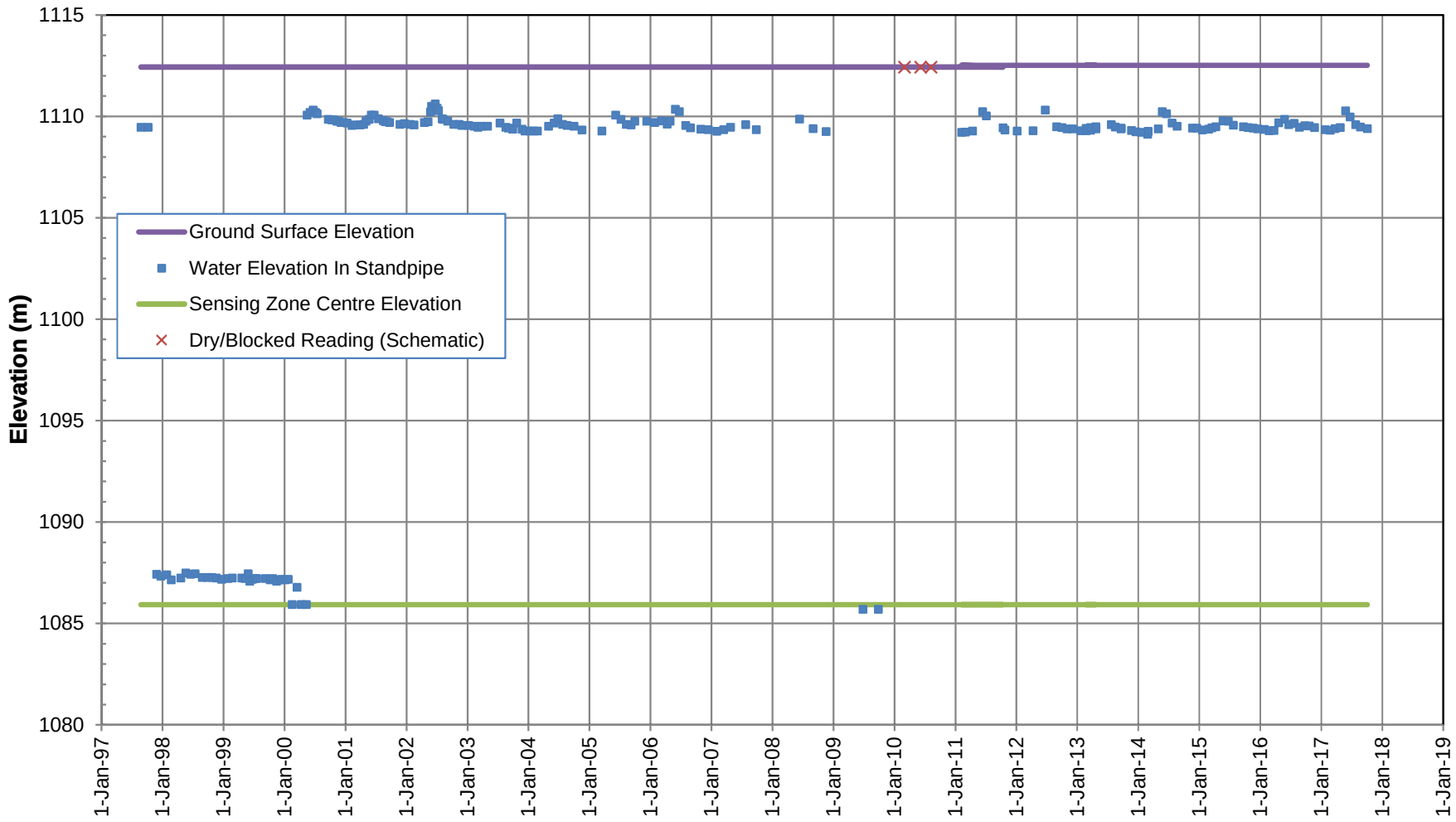
DATE: NOV. 2017	SCALE:	DWG. NO. :
DWN BY: A. GLOVER	REV BY:	



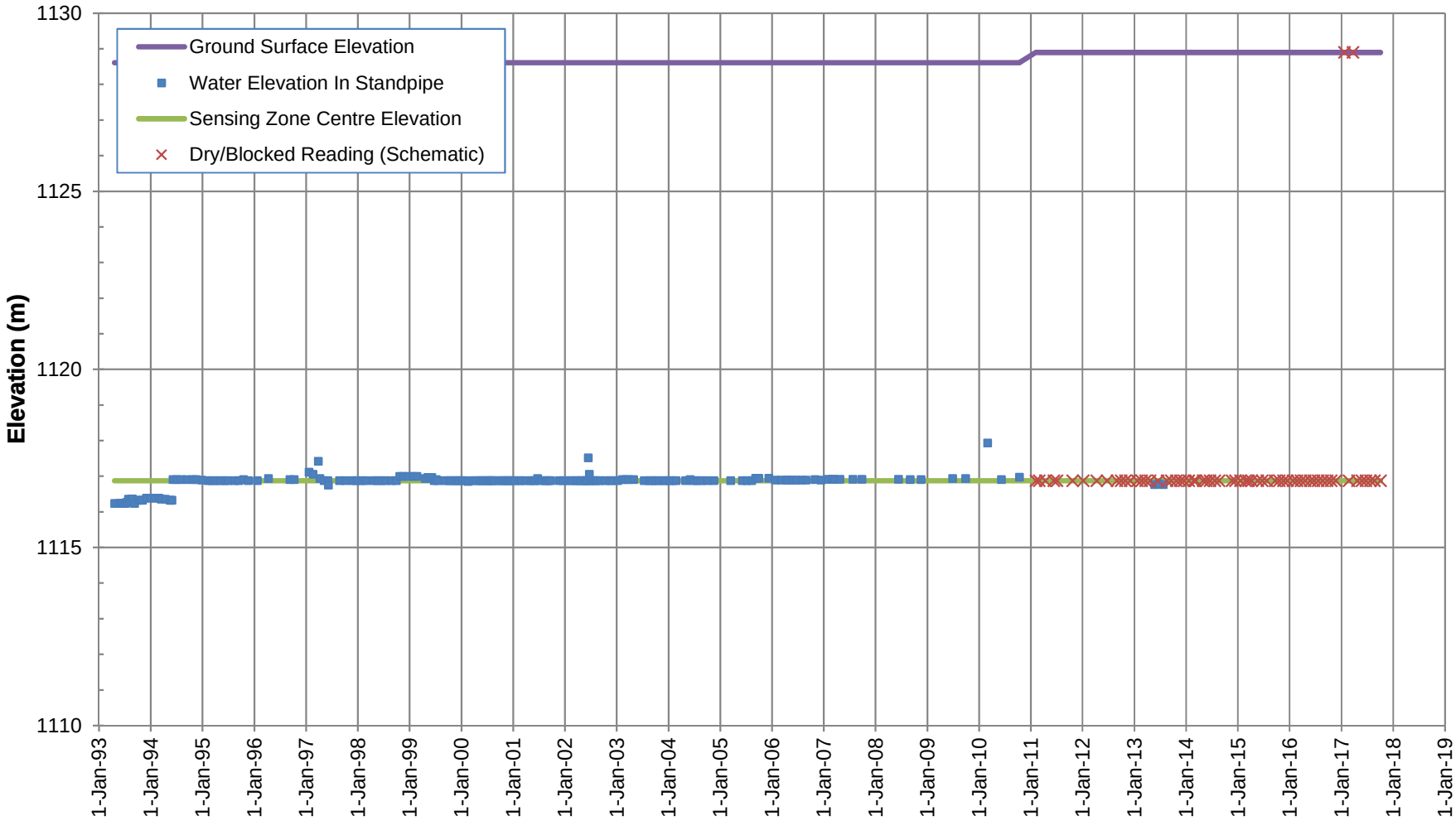
Teck Coal - Elkview Operations		
Lagoon C Piezometers	Date:	Revision
Standpipe 99-01		



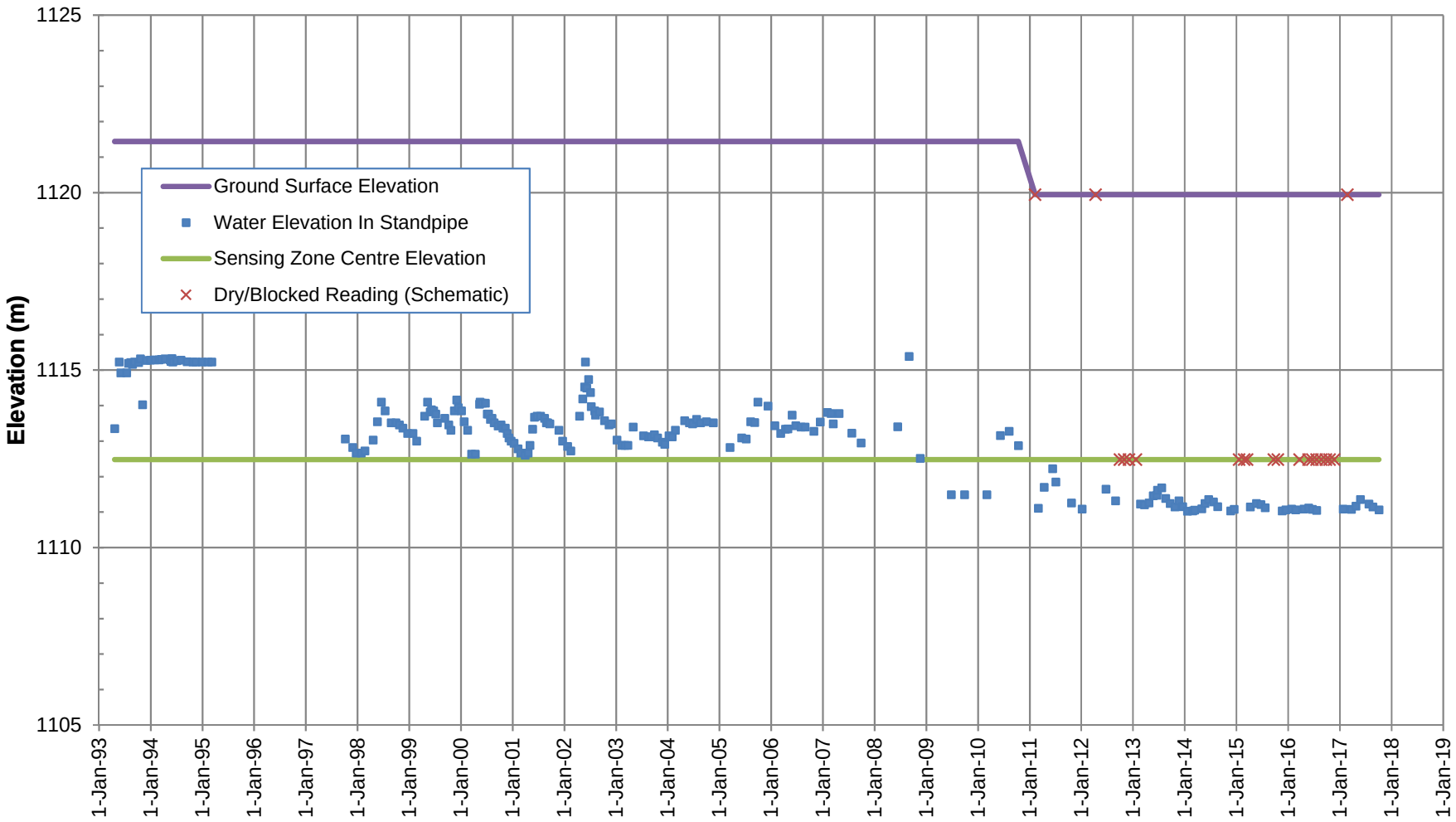
Teck Coal - Elkview Operations		
Lagoon C Piezometers	Date:	Revision
Standpipe GT-9703B		



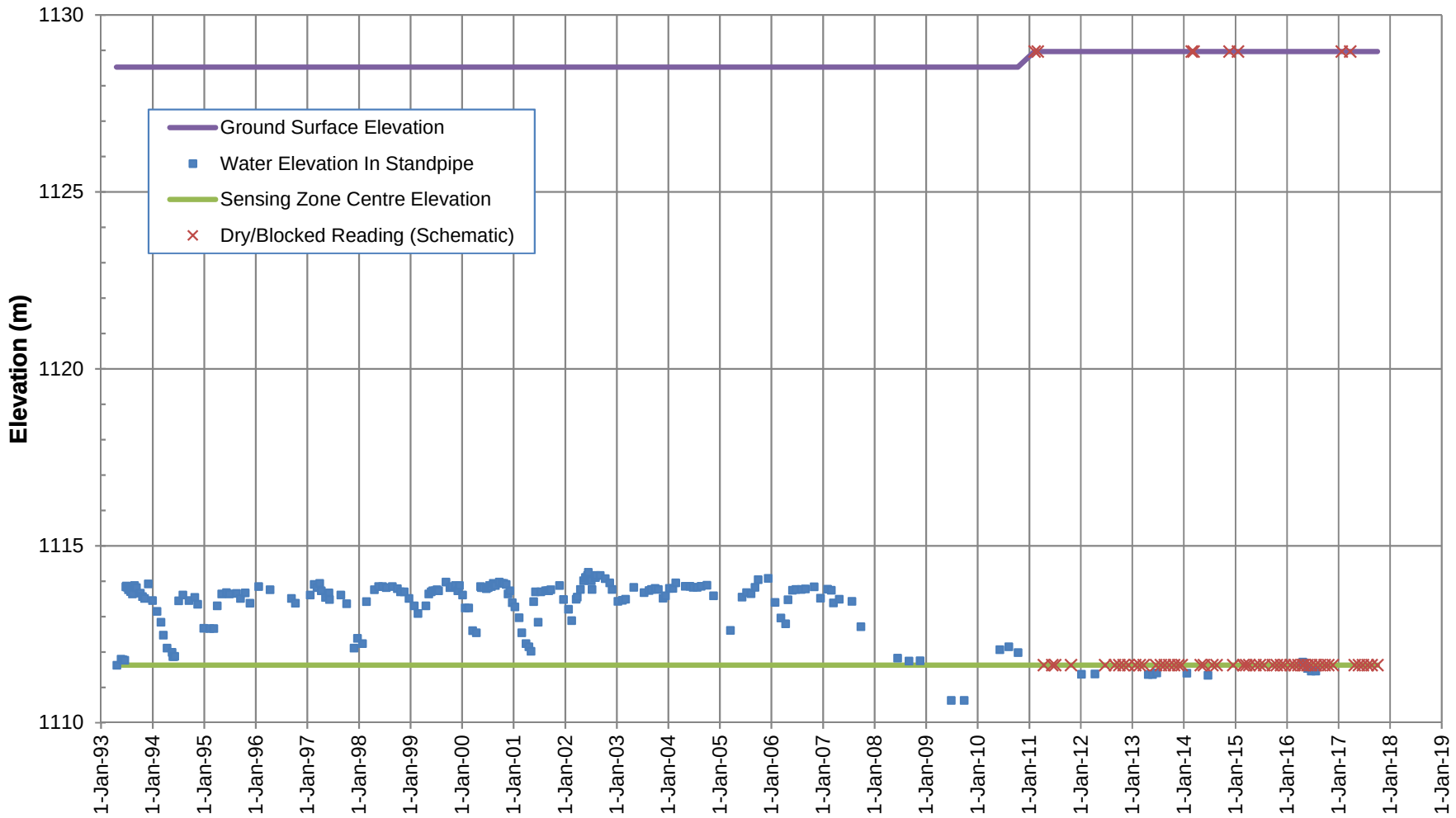
Teck Coal - Elkview Operations		
Lagoon C Piezometers	Date:	Revision
Standpipe GT-9703A		



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

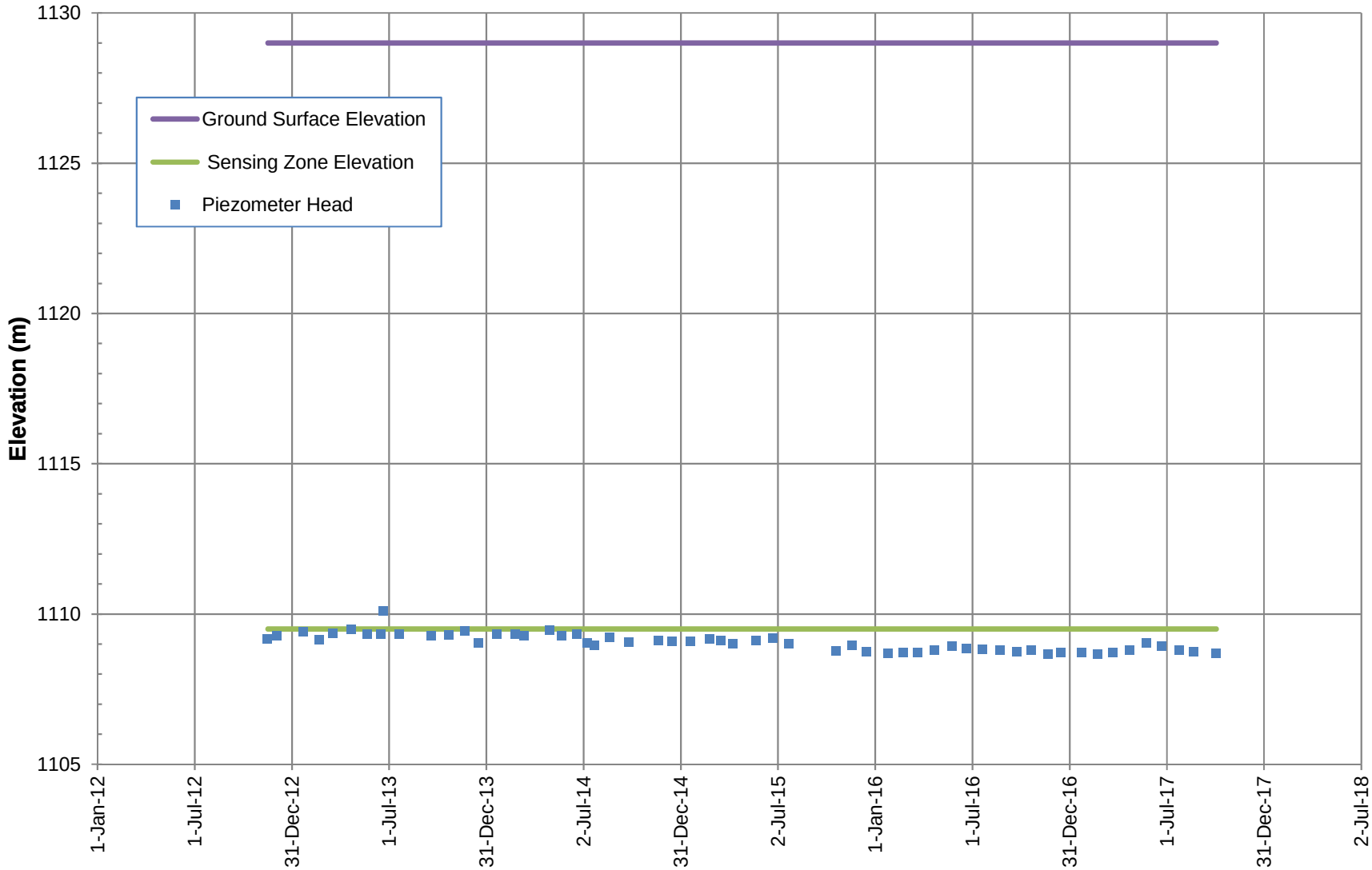


Teck Coal - Elkview Operations		
Lagoon C Piezometers	Date:	Revision
Standpipe C88-2		

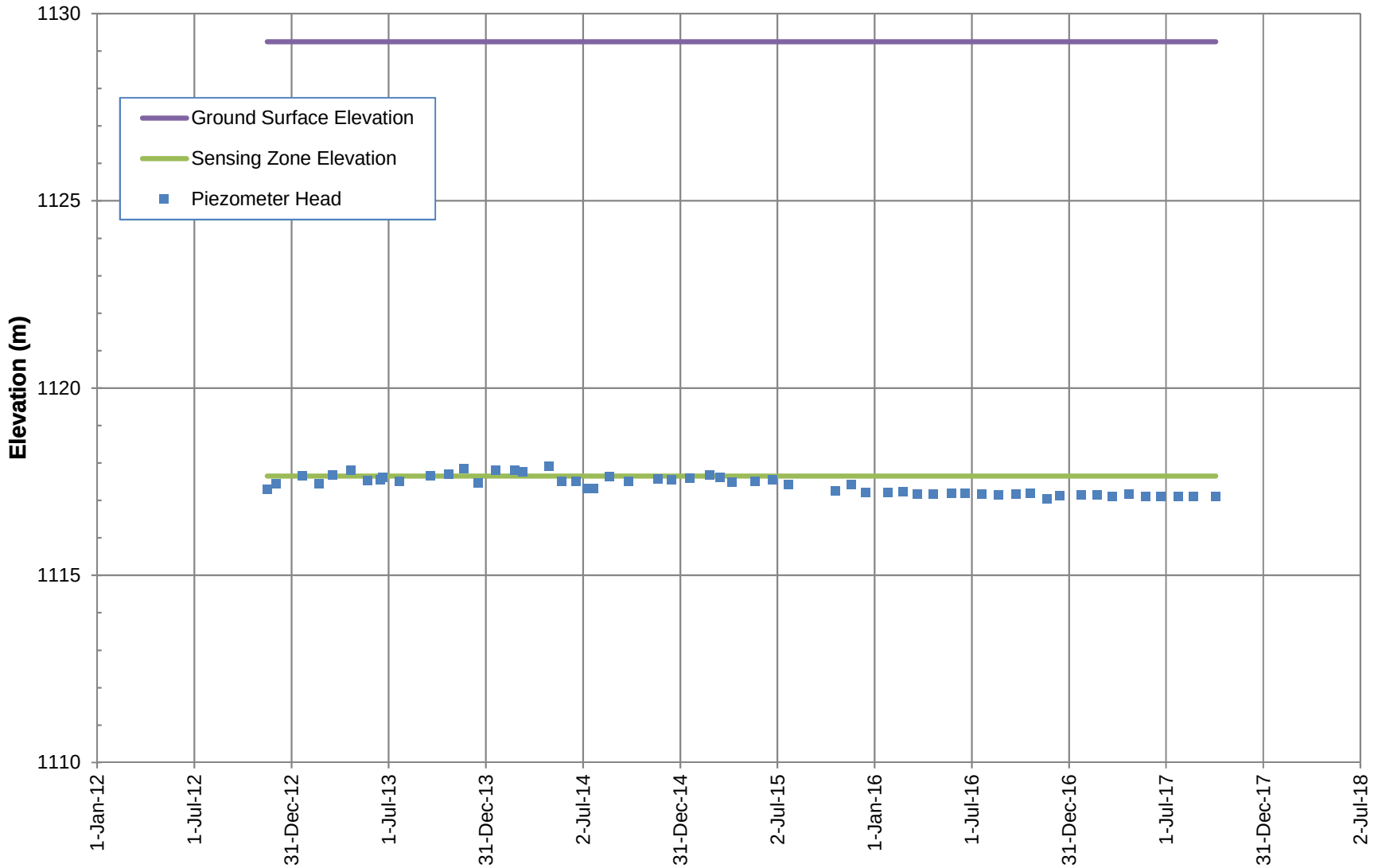


Teck Coal - Elkview Operations		
Lagoon C Piezometers	Date:	Revision
Standpipe C88-1		

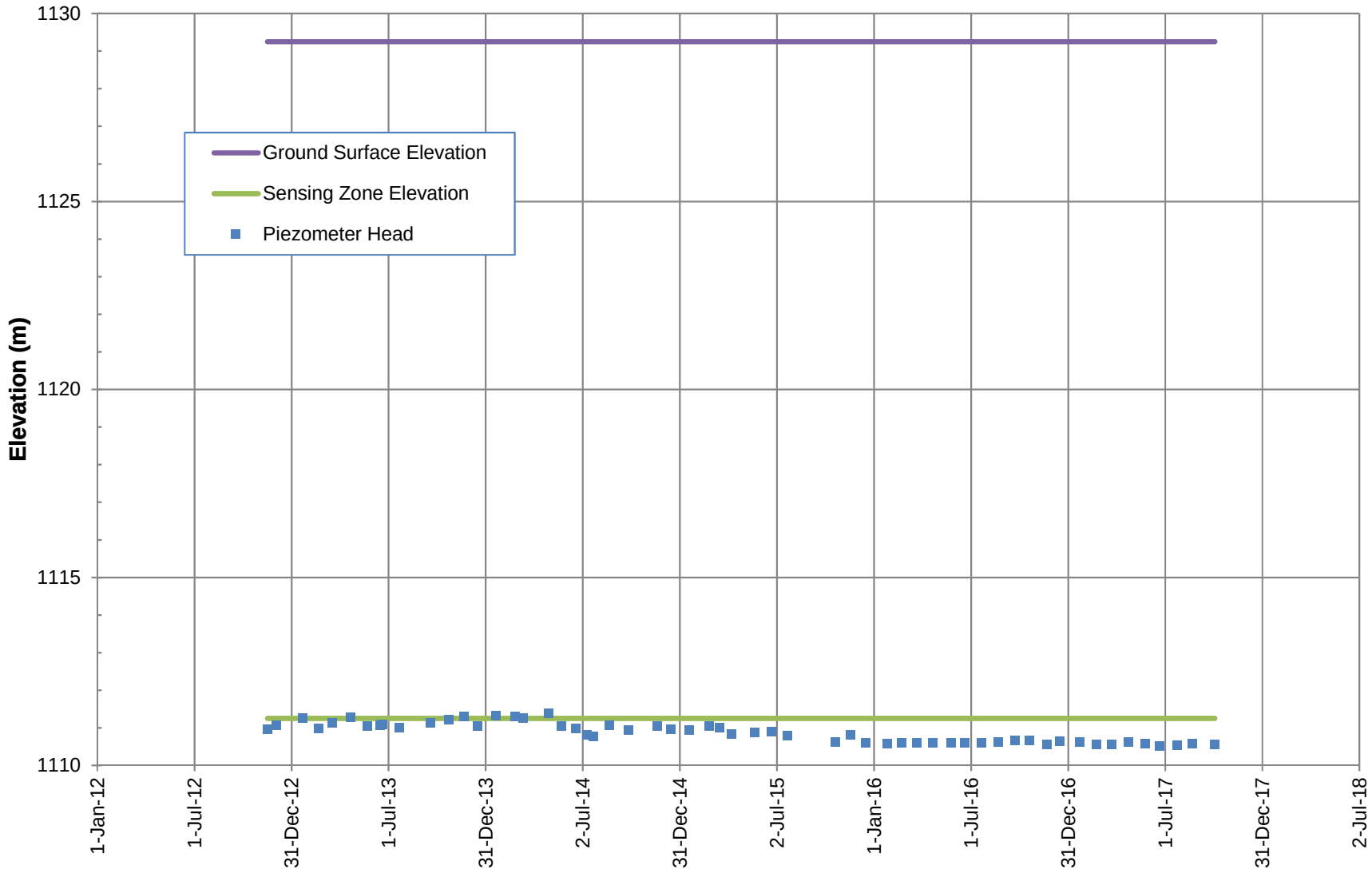
Teck Coal - Elkview Operations		
Lagoon C Piezometers	Date:	Revision
VW 23238 Pore Pressure (A-A)	Name:	



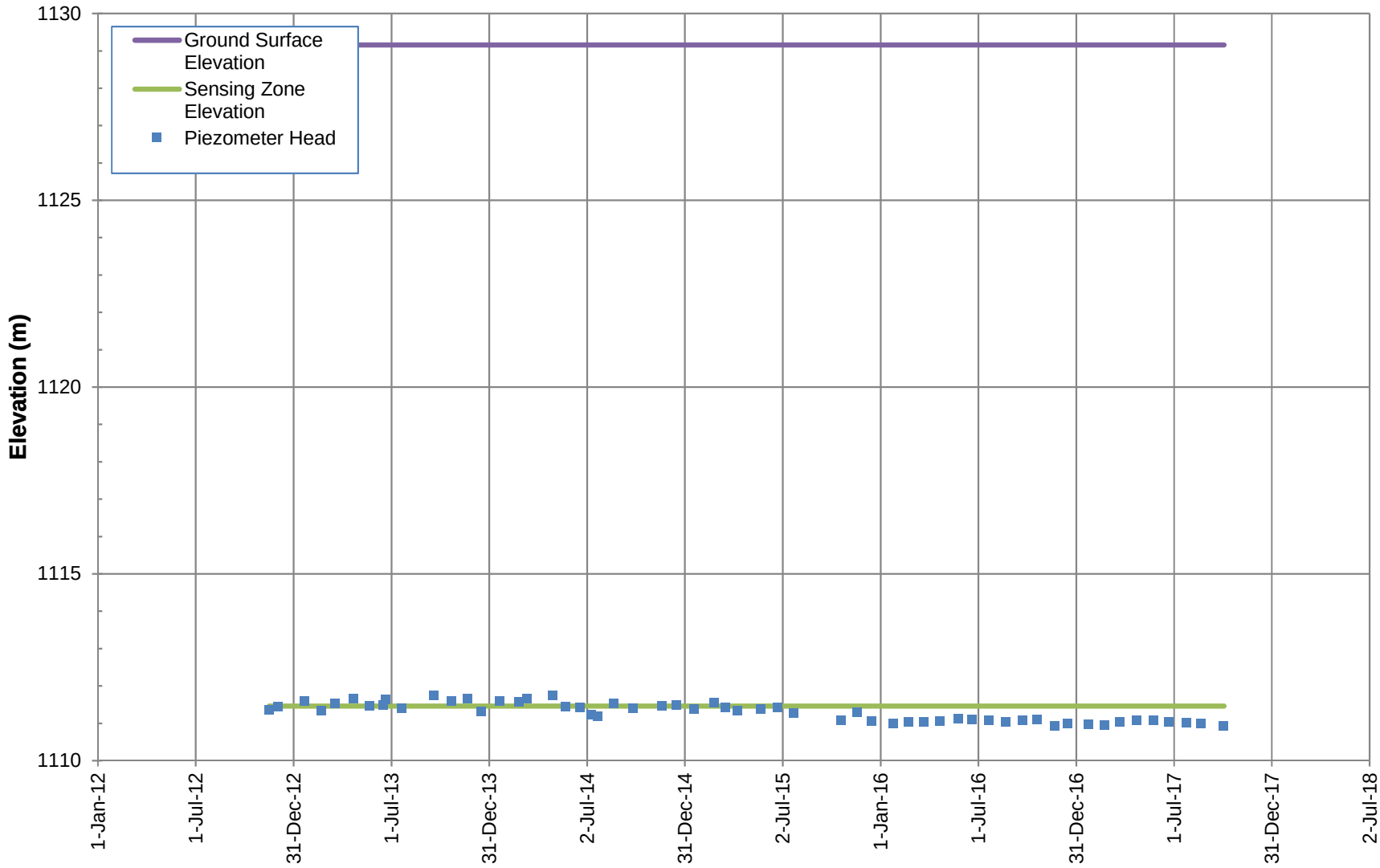
Teck Coal - Elkview Operations		
Lagoon C Piezometers	Date:	Revision
VW 23242 Pore Pressure (A-A)	Name:	



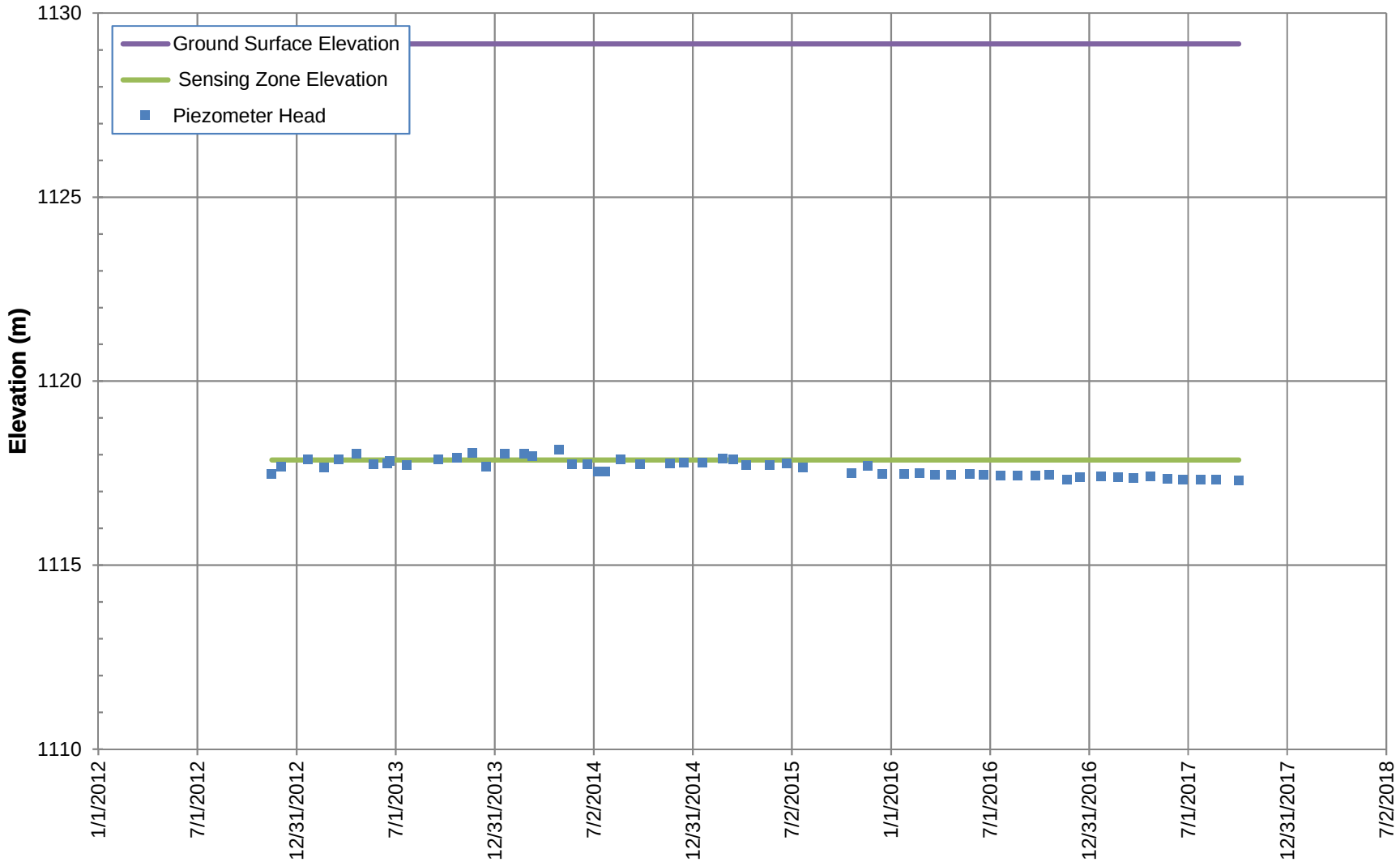
Teck Coal - Elkview Operations		
Lagoon C Piezometers	Date:	Revision
VW 23239 Pore Pressure (C-C)	Name:	



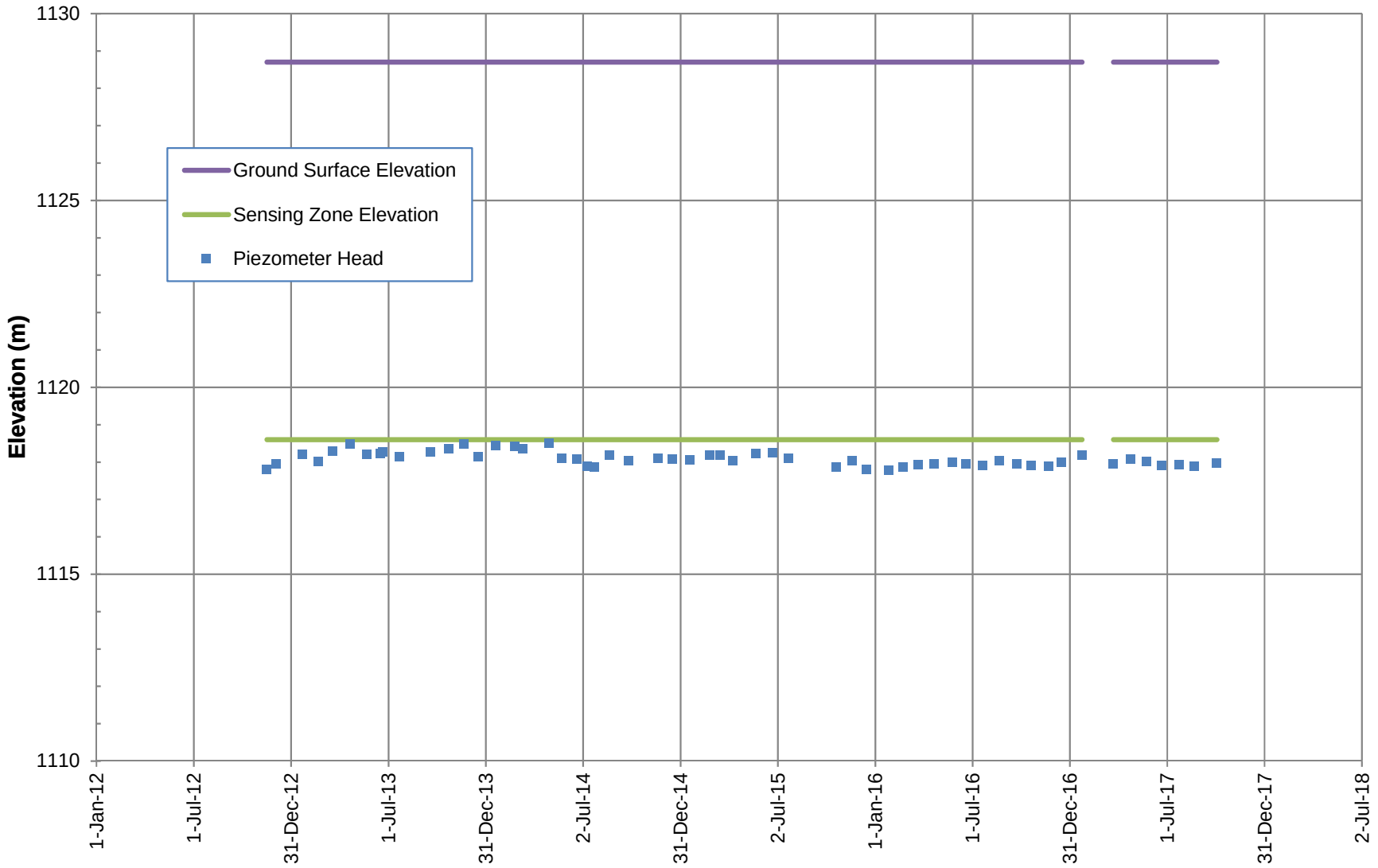
Teck Coal - Elkview Operations		
Lagoon C Piezometers	Date:	Revision
VW 23243 Pore Pressure (C-C)	Name:	



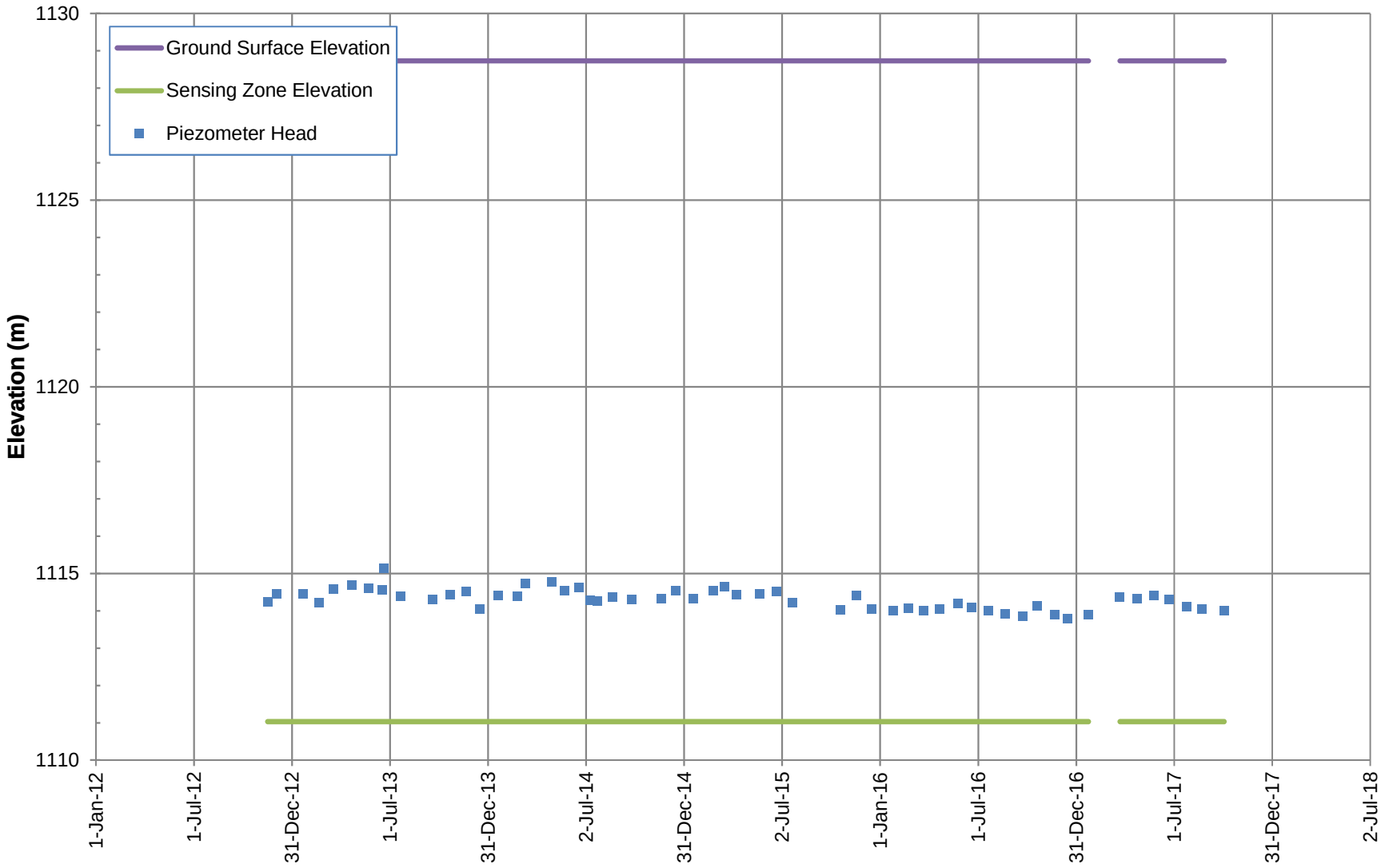
Teck Coal - Elkview Operations		
Lagoon C Piezometers	Date:	Revision
VW 23244 Pore Pressure (D-D)	Name:	



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

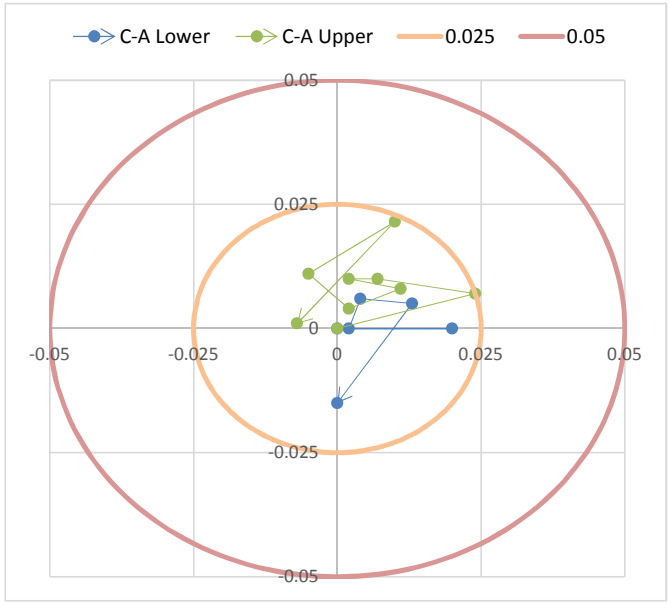


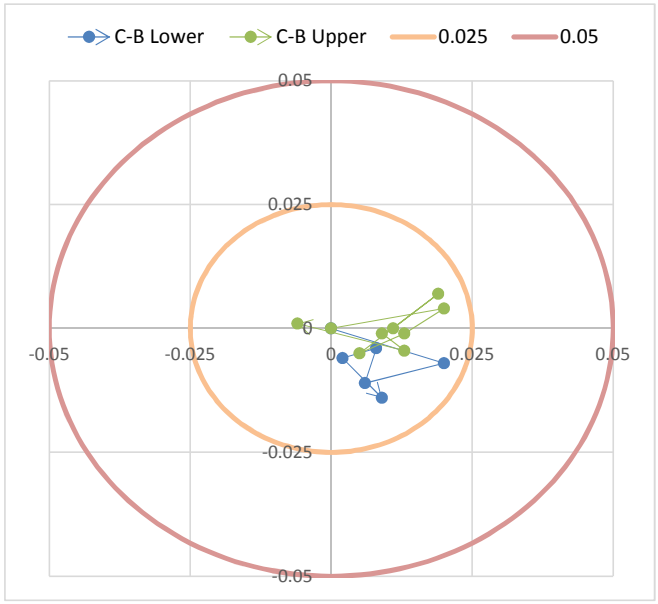
Teck Coal - Elkview Operations		
Lagoon C Piezometers	Date:	Revision
VW 23241 Pore Pressure	Name:	

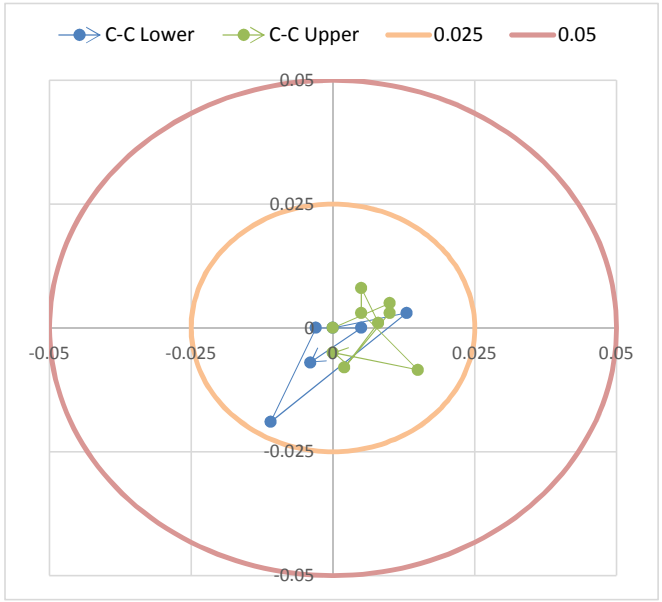


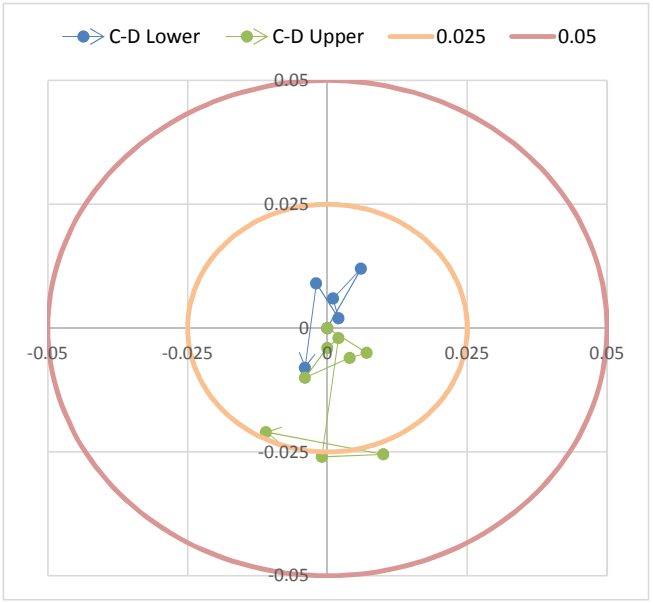
Teck Coal - Elkview Operations		
Lagoon C Piezometers	Date:	Revision
VW 23245 Pore Pressure	Name:	

EASTING AND NORTHING DELTA FOR GPS CONTROL POINTS AT LAGOON C (FROM JULY 2015 TO JUNE 2017)

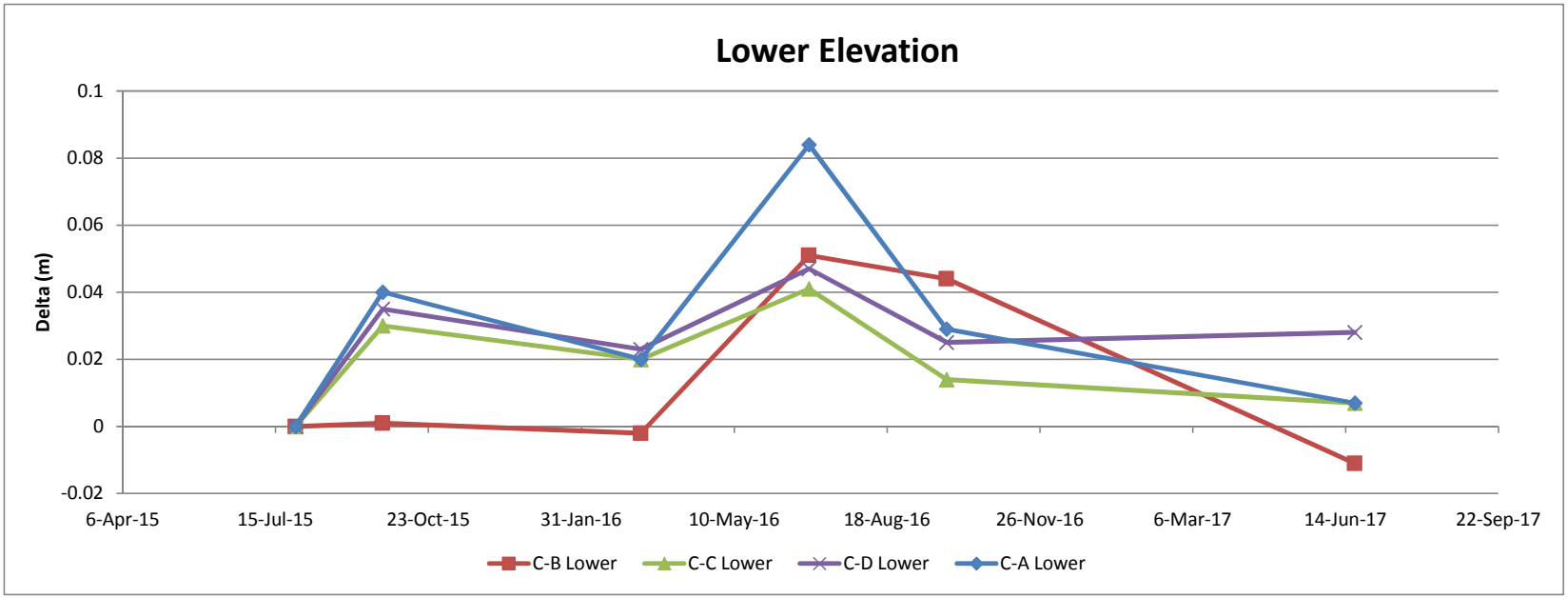


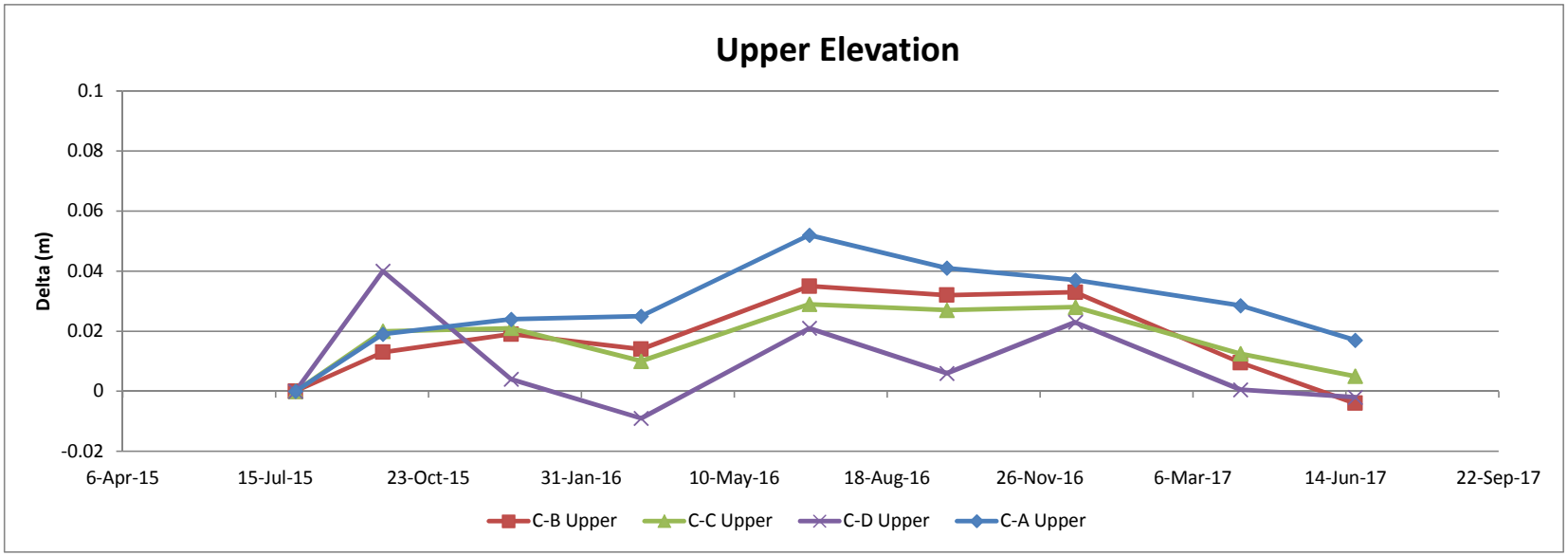




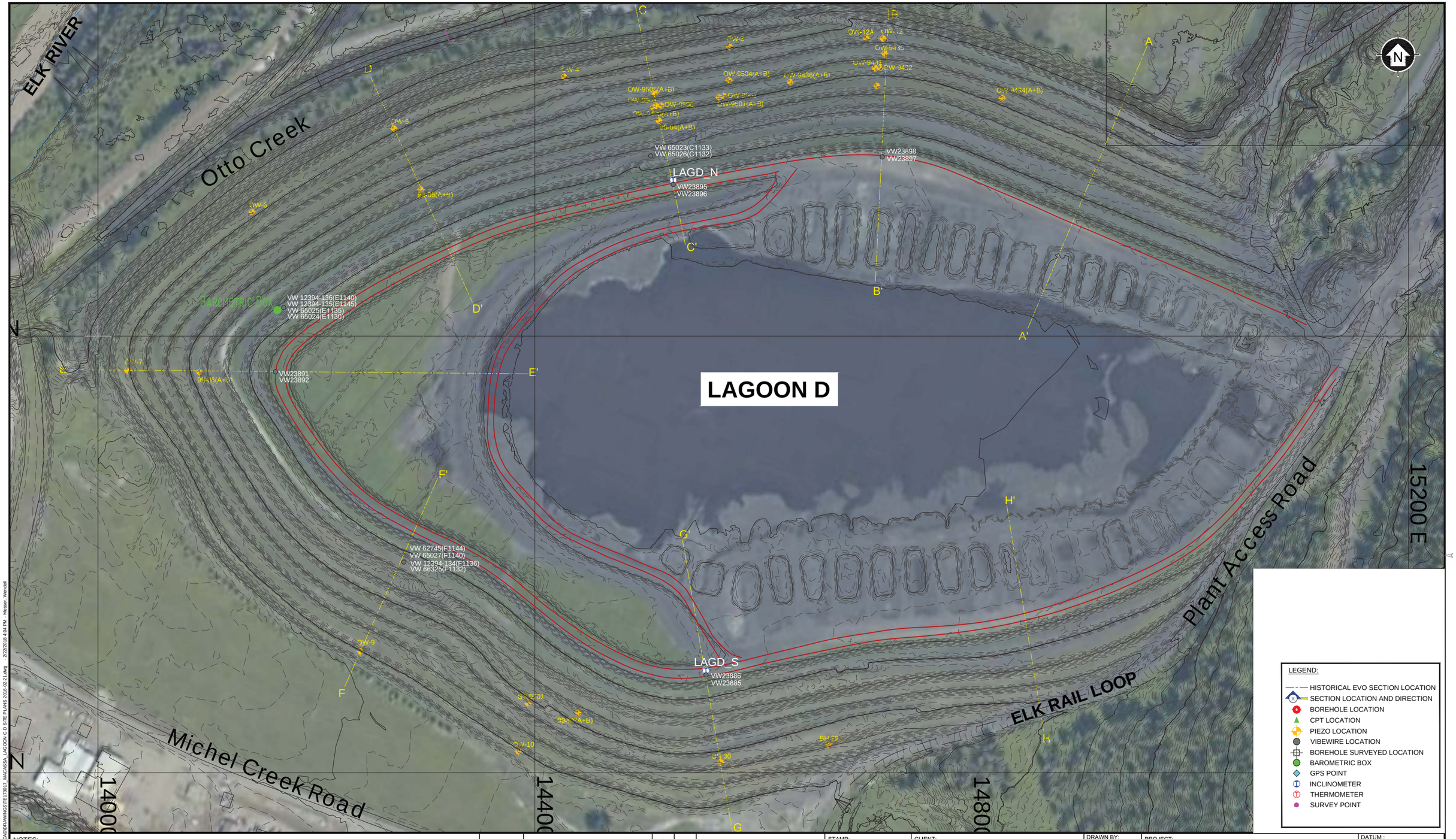


ELEVATION DELTA FOR GPS CONTROL POINTS AT LAGOON C (FROM JULY 2015 TO JUNE 2017)





APPENDIX E
Lagoon D
Cross Sections and Instrumentation Data Plots



NOTES:

1. ALL DIMENSIONS ARE IN METRES (m) UNLESS OTHERWISE NOTED.

0m 10 20 30 40 50 60
1 : 1500

DRAFT

NO.	DESCRIPTION	NO.	DATE	DESCRIPTION
		5		
		4		
		3		
		2		
		1		

REFERENCE DRAWINGS | REVISIONS

STAMP:

CLIENT: Teck

amec foster wheeler

DRAWN BY:	WM
DESIGNED BY:	-
CHECKED BY :	EG
SCALE :	1:1500
DATE :	2018/02/07

PROJECT: LAGOONS AND WFTF - 2017 DSI REPORT

TITLE: INSTRUMENTATION LOCATION MAP AT LAGOON D

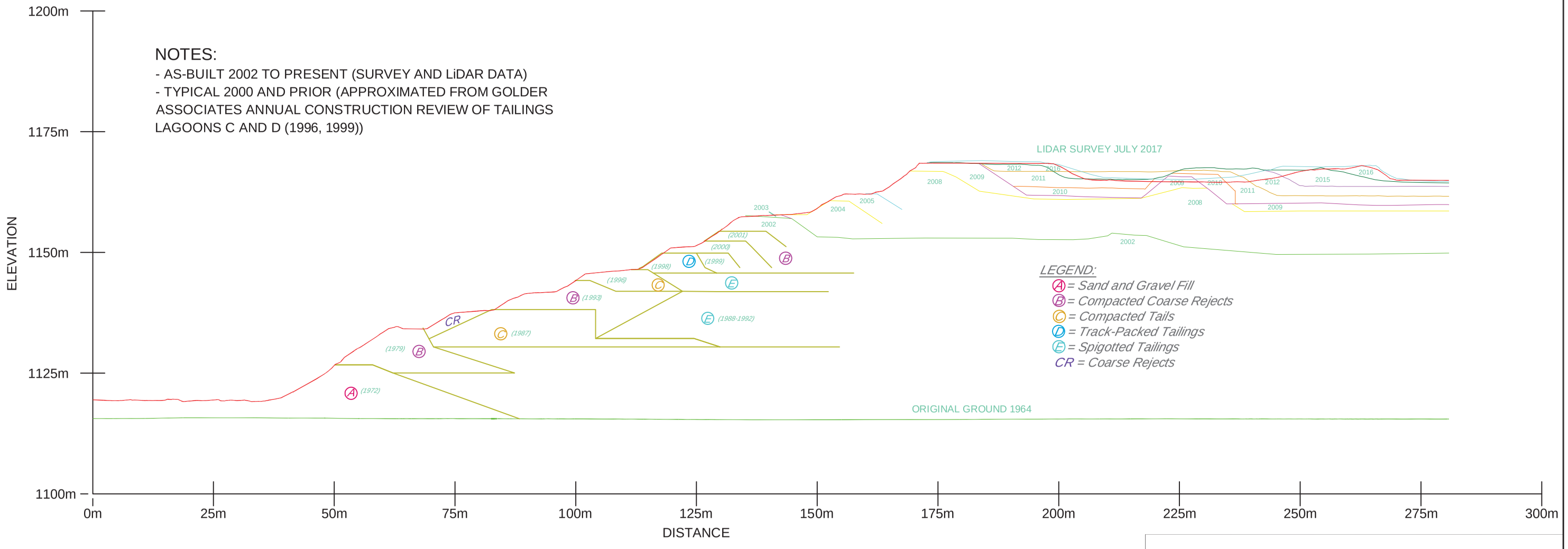
DATUM :	-
PROJECTION :	MINE GRID
PROJECT NO. :	TE173017
REV. :	0
FIGURE NO. :	FIG E1

H:\PROJECTS\TE17317_TGL_EVO_2017_DSI\CAD\DRAWINGS\TE17317_MACASSA_LAGOON C-D SITE PLANS-2018-02-21.dwg - 2/22/2018 4:04 PM - Nelser, Wendell

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))



H:\G-eotech\tech logo.jpg

Elkview Operations

Geotechnical Engineering

LAGOON D CROSS-SECTION A-A'
2017

DATE: NOV. 2017	SCALE:	DWG. NO. :
DWN BY: A. GLOVER	REV BY:	

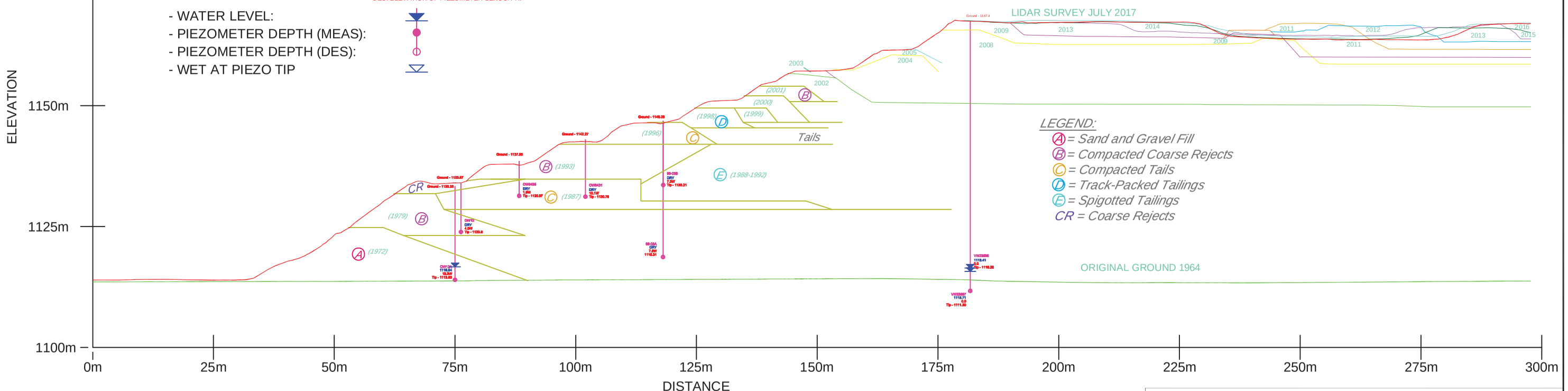
CROSS-SECTION
ORIGIN COORD: 14726.30E, 52346.74N
AZIMUTH: 182°47'27"

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)
- PIEZOMETER DATA READ Oct. 17, 2017 unless otherwise marked
- TYPICAL PIEZOMETER DATA:

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

- WATER LEVEL:
- PIEZOMETER DEPTH (MEAS):
- PIEZOMETER DEPTH (DES):
- WET AT PIEZO TIP



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LAGOON D CROSS-SECTION B-B'
2017

DATE: NOV. 2017	SCALE:	DWG. NO. :
DWN BY: A. GLOVER	REV BY:	

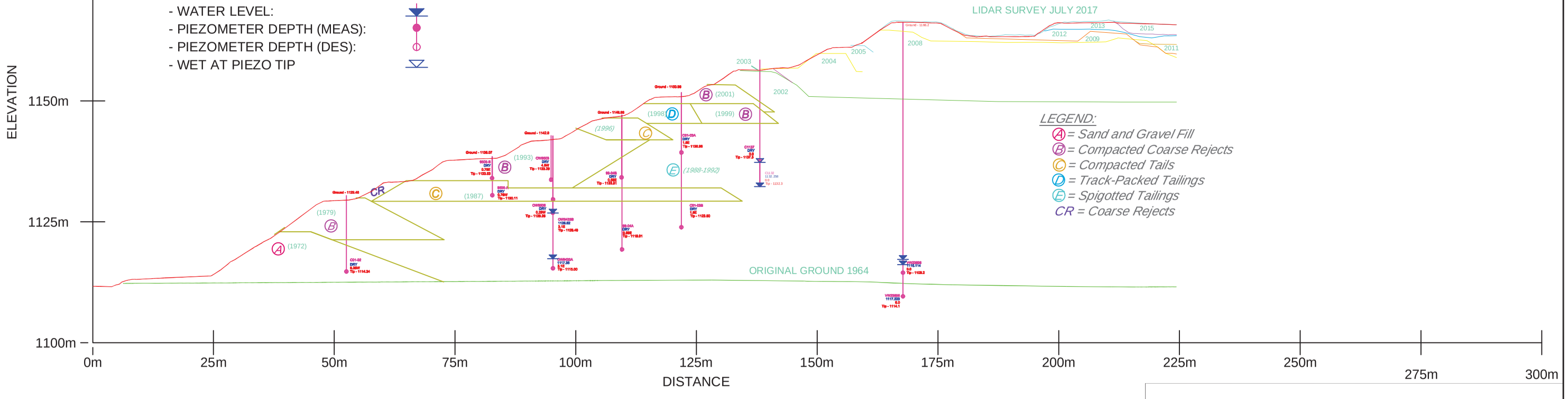
CROSS-SECTION
ORIGIN COORD: 14491.89E, 52303.38N
AZIMUTH: 168°11'50"

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)
- PIEZOMETER DATA READ Oct. 17, 2017 unless otherwise marked
- TYPICAL PIEZOMETER DATA:

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

- WATER LEVEL:
- PIEZOMETER DEPTH (MEAS):
- PIEZOMETER DEPTH (DES):
- WET AT PIEZO TIP



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LAGOON D CROSS-SECTION C-C'
2017

DATE: NOV. 2017	SCALE:	DWG. NO. :
DWN BY: A. GLOVER	REV BY:	

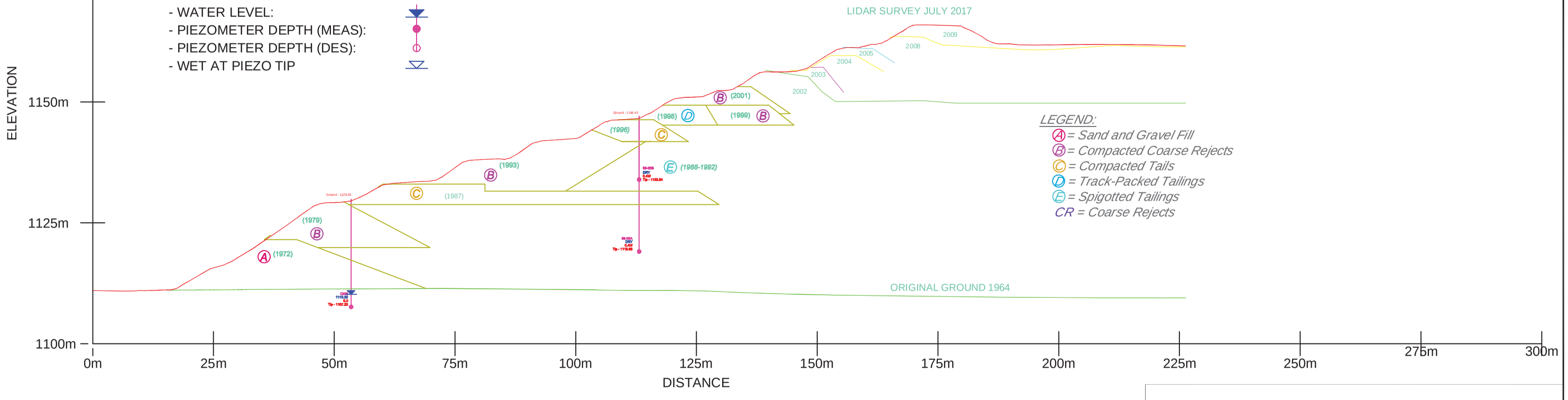
CROSS-SECTION
ORIGIN COORD: 14249.70E, 52237.31N
AZIMUTH: 155°43'21"

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)
- PIEZOMETER DATA READ Oct. 17, 2017
- TYPICAL PIEZOMETER DATA:

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

- WATER LEVEL:
- PIEZOMETER DEPTH (MEAS):
- PIEZOMETER DEPTH (DES):
- WET AT PIEZO TIP



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LAGOON D CROSS-SECTION D-D'
2017

DATE: NOV. 2017	SCALE:	DWG. NO. :
DWN BY: A. GLOVER	REV BY:	

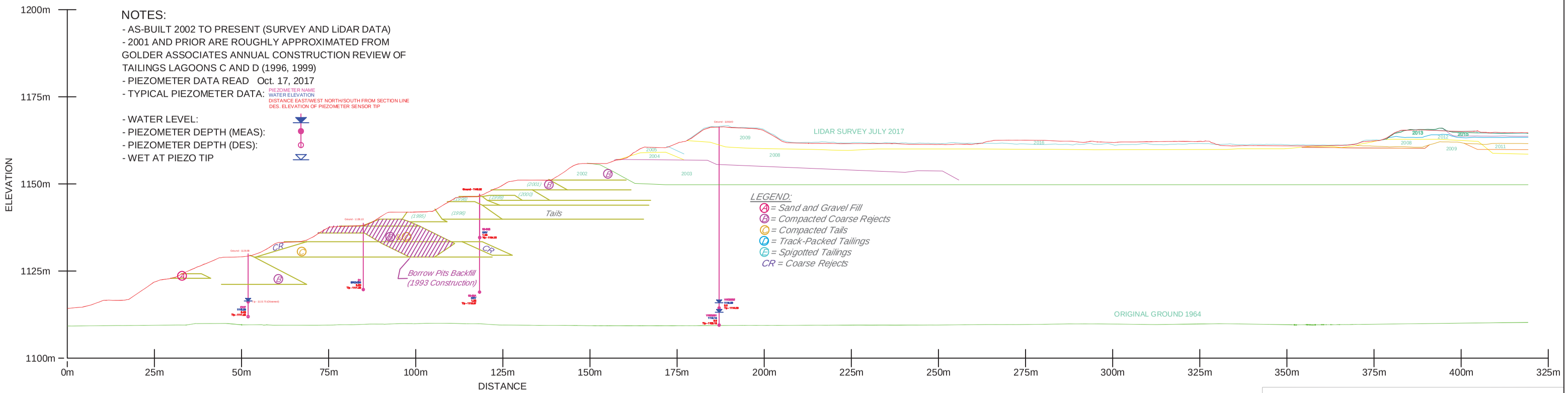
CROSS-SECTION
ORIGIN COORD: 13974.88E, 51969.26N
AZIMUTH: 90°31'40"

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)
- PIEZOMETER DATA READ Oct. 17, 2017
- TYPICAL PIEZOMETER DATA:

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

- WATER LEVEL:
- PIEZOMETER DEPTH (MEAS):
- PIEZOMETER DEPTH (DES):
- WET AT PIEZO TIP



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LAGOON D CROSS-SECTION E-E'
2017

DATE: NOV. 2017	SCALE:	DWG. NO. :
DWN BY: A. GLOVER	REV BY:	

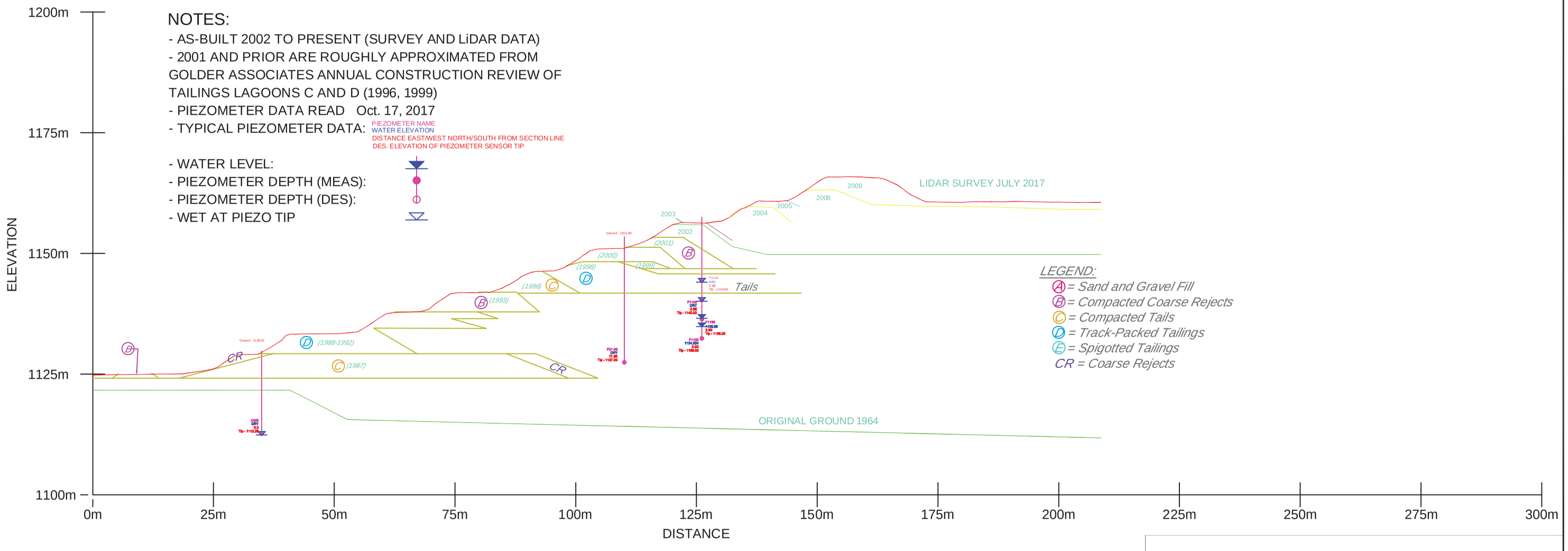
CROSS-SECTION
ORIGIN COORD: 14225.89E, 51679.04N
AZIMUTH: 24°05'20"

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)
- PIEZOMETER DATA READ Oct. 17, 2017
- TYPICAL PIEZOMETER DATA:

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

- WATER LEVEL:
- PIEZOMETER DEPTH (MEAS):
- PIEZOMETER DEPTH (DES):
- WET AT PIEZO TIP



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LAGOON D CROSS-SECTION F-F'
2017

DATE: NOV. 2017	SCALE:	DWG. NO. :
DWN BY: A. GLOVER	REV BY:	

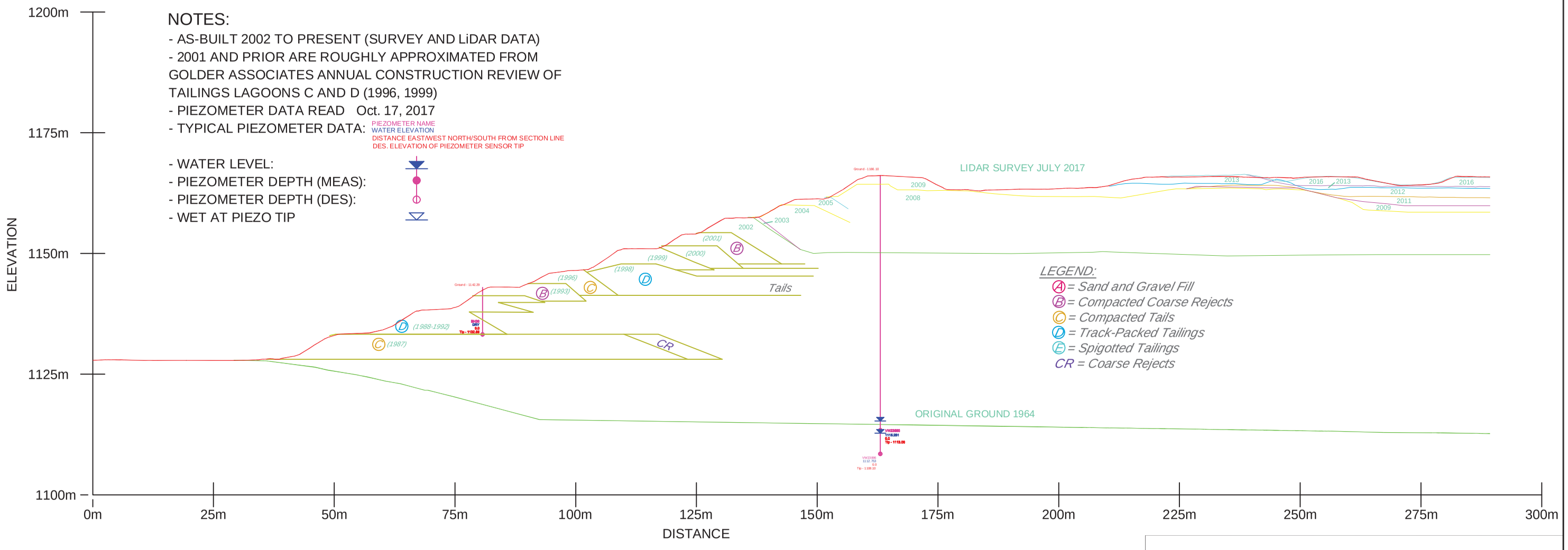
CROSS-SECTION
ORIGIN COORD: 14583.76E, 51528.38N
AZIMUTH: 350°18'50"

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)
- PIEZOMETER DATA READ Oct. 17, 2017
- TYPICAL PIEZOMETER DATA:

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

- WATER LEVEL:
- PIEZOMETER DEPTH (MEAS):
- PIEZOMETER DEPTH (DES):
- WET AT PIEZO TIP



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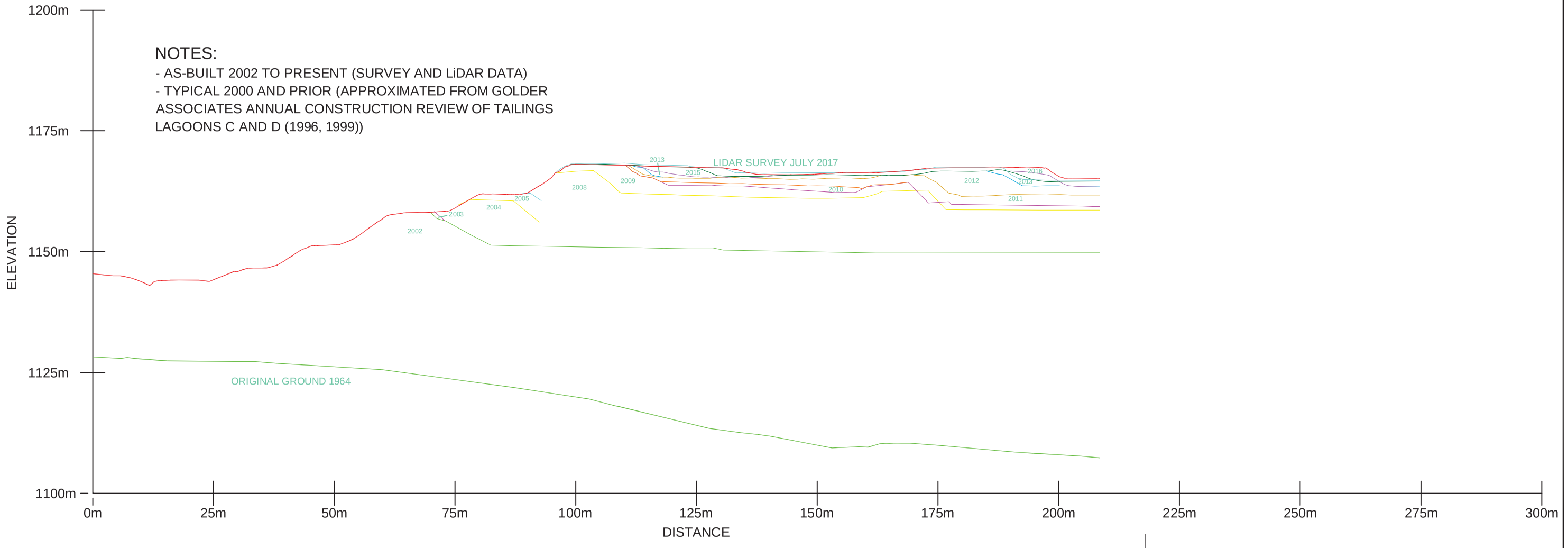
LAGOON D CROSS-SECTION G-G'
2017

DATE: NOV. 2017	SCALE:	DWG. NO. :
DWN BY: A. GLOVER	REV BY:	

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))



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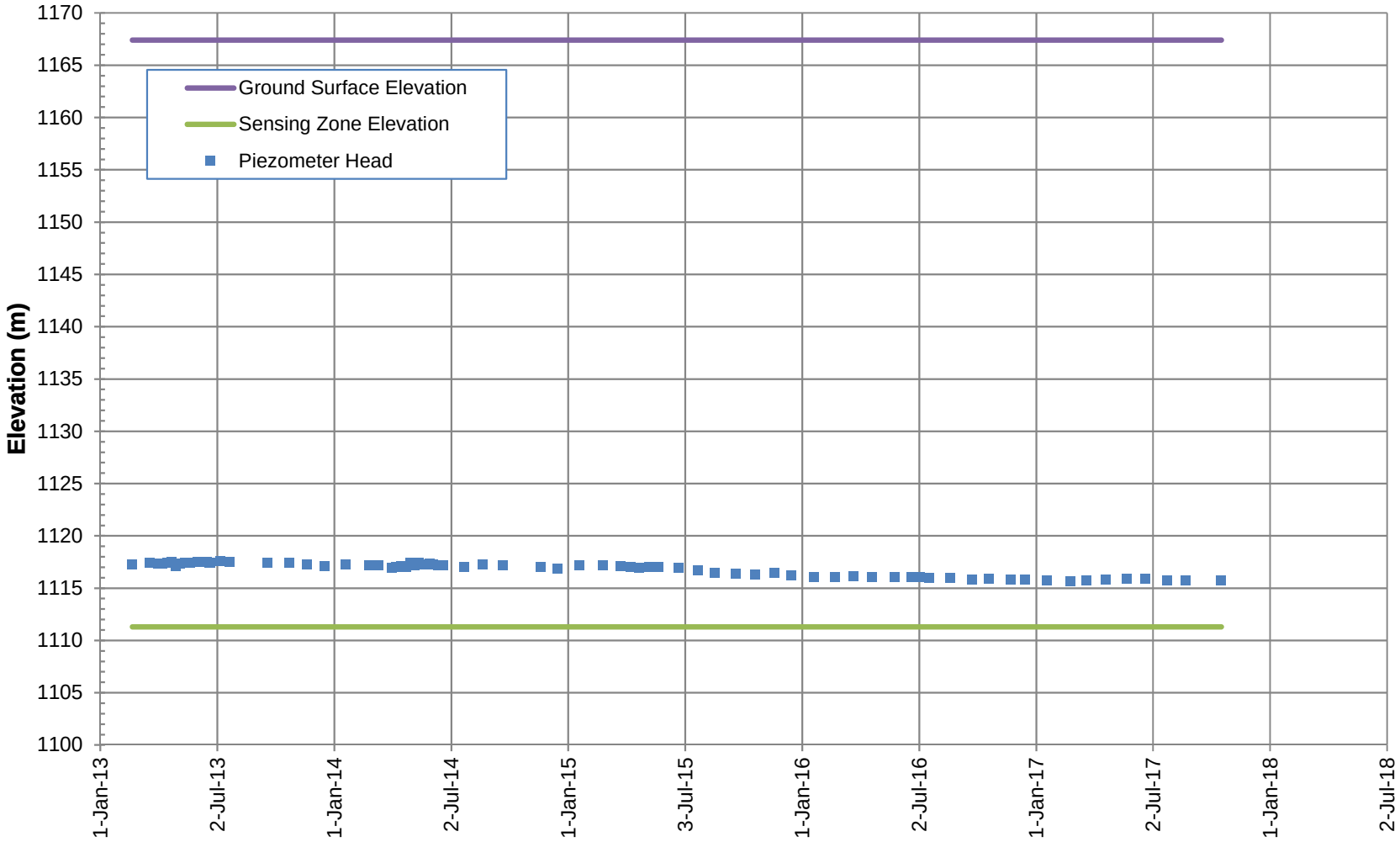
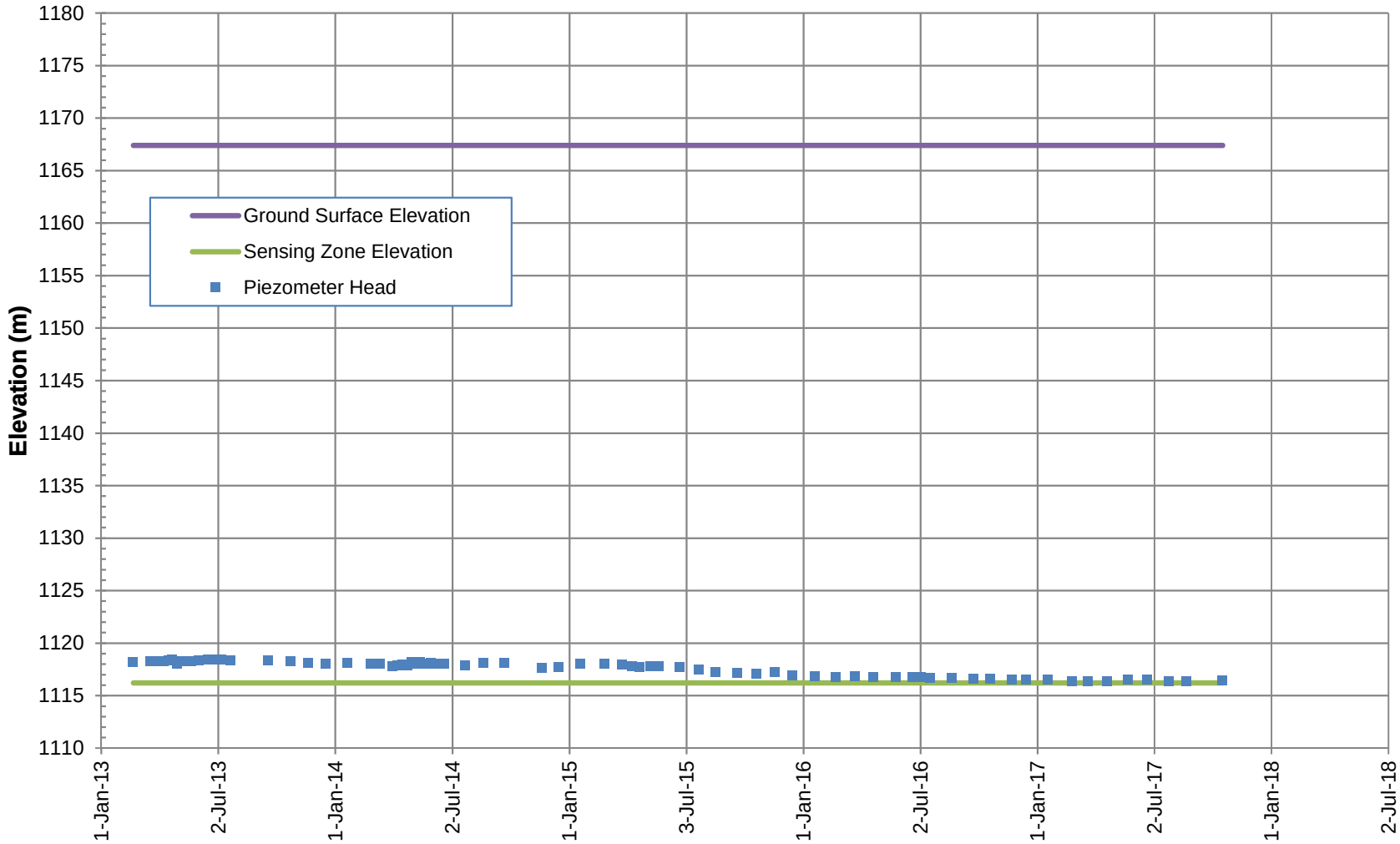
LAGOON D CROSS-SECTION H-H’
2017

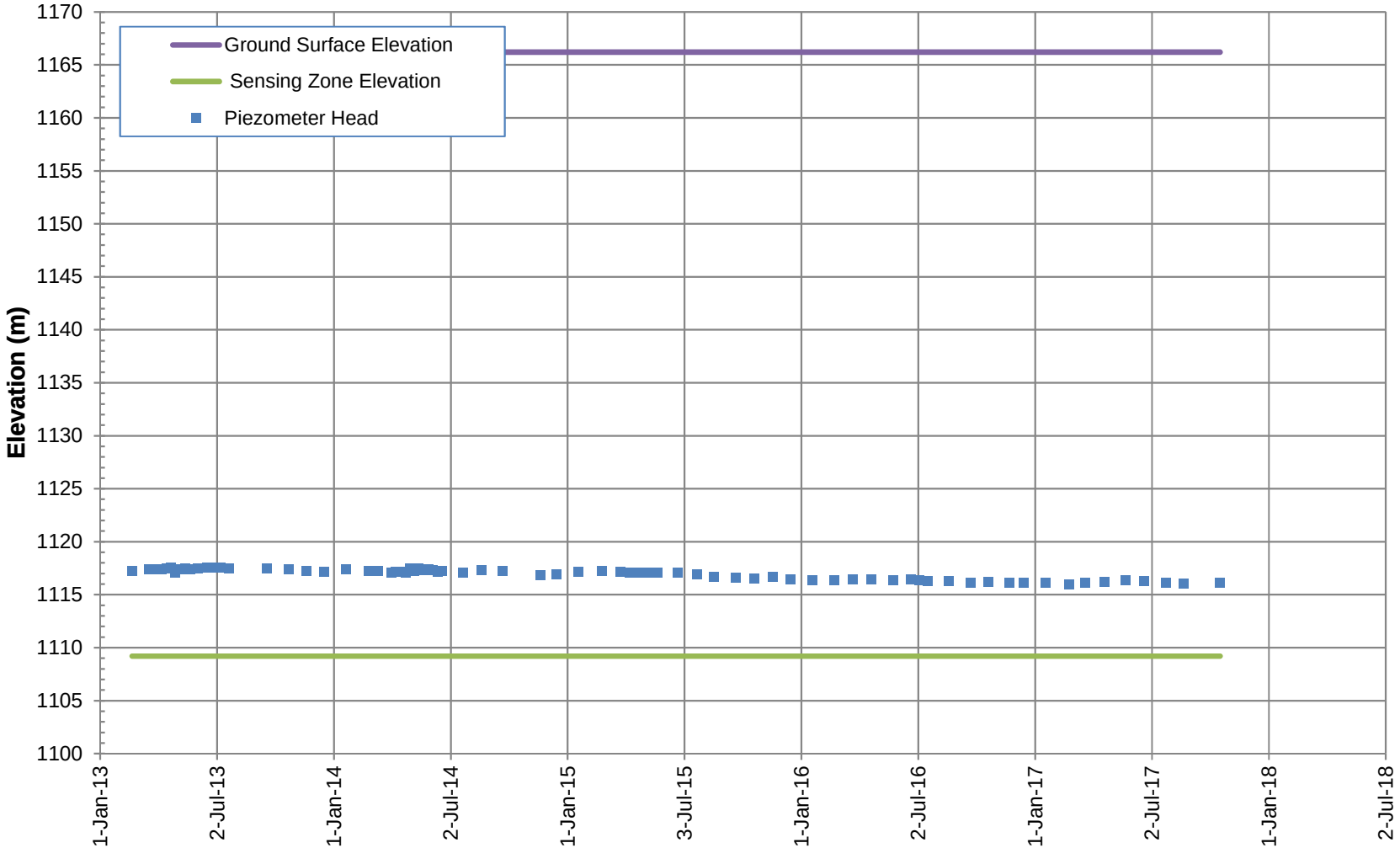
DATE: NOV. 2017	SCALE:	DWG. NO. :
DWN BY: A. GLOVER	REV BY:	



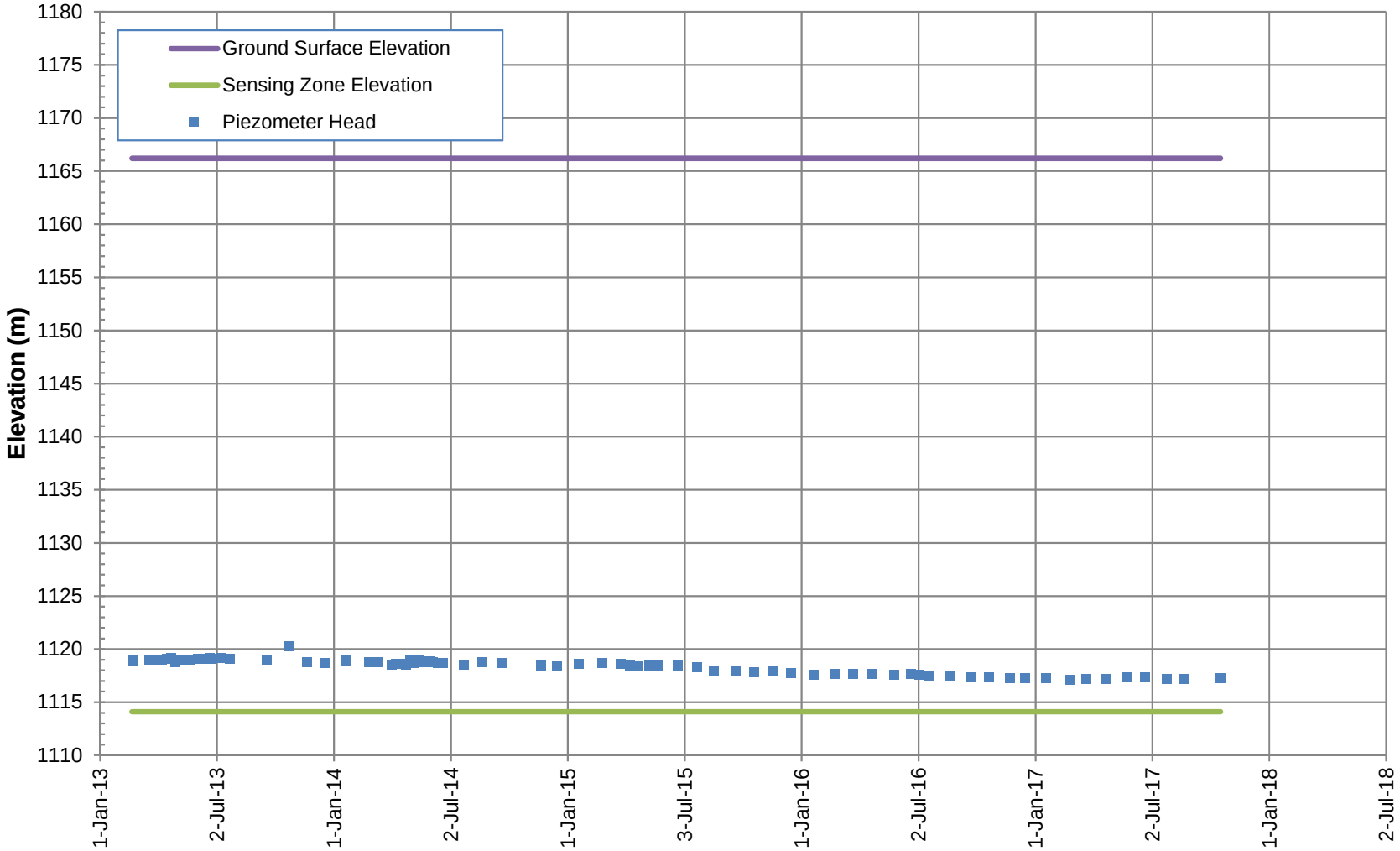
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
VW 23897 Pore Pressure (B-B)	Name:	



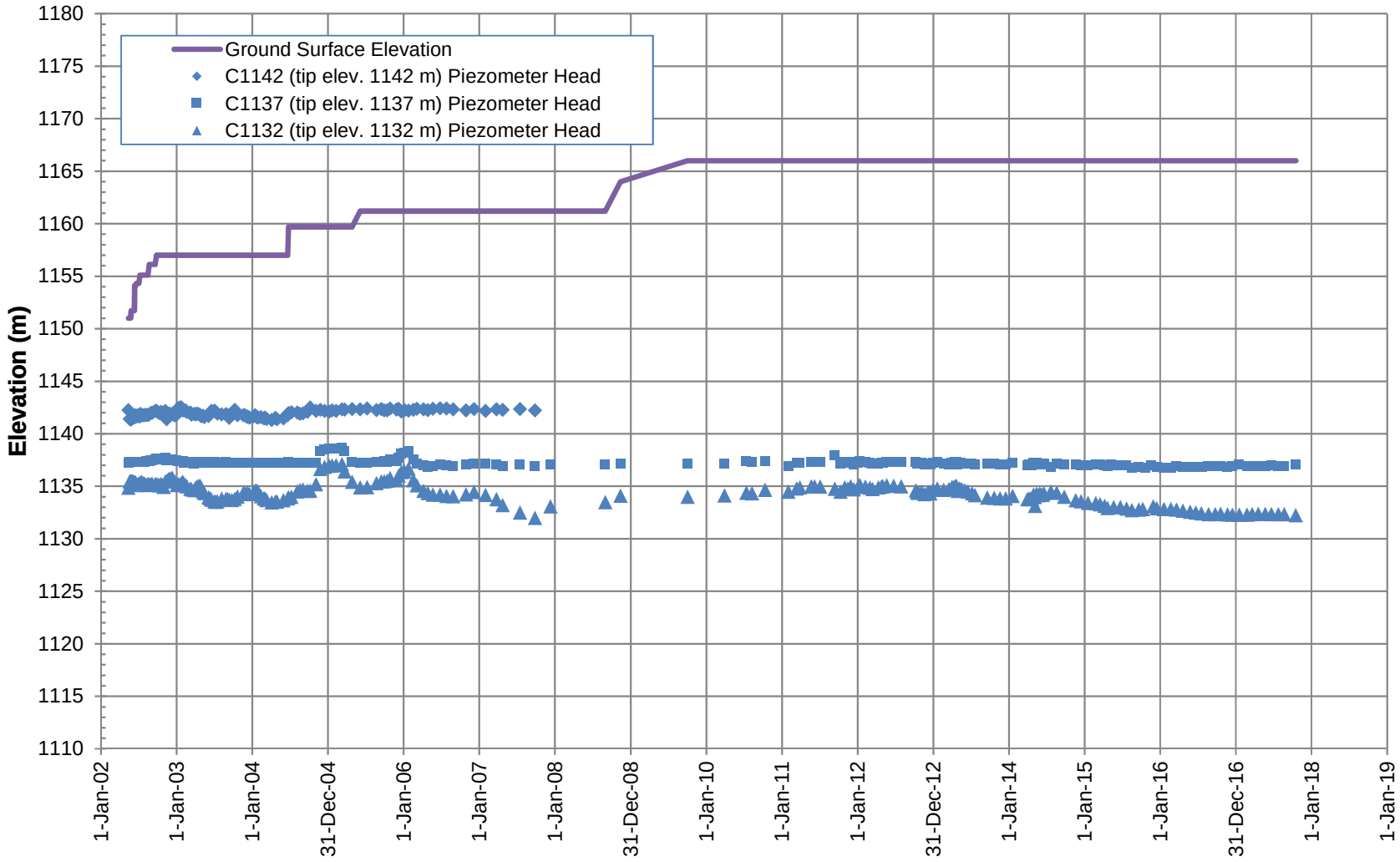
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
VW 23898 Pore Pressure (B-B)	Name:	



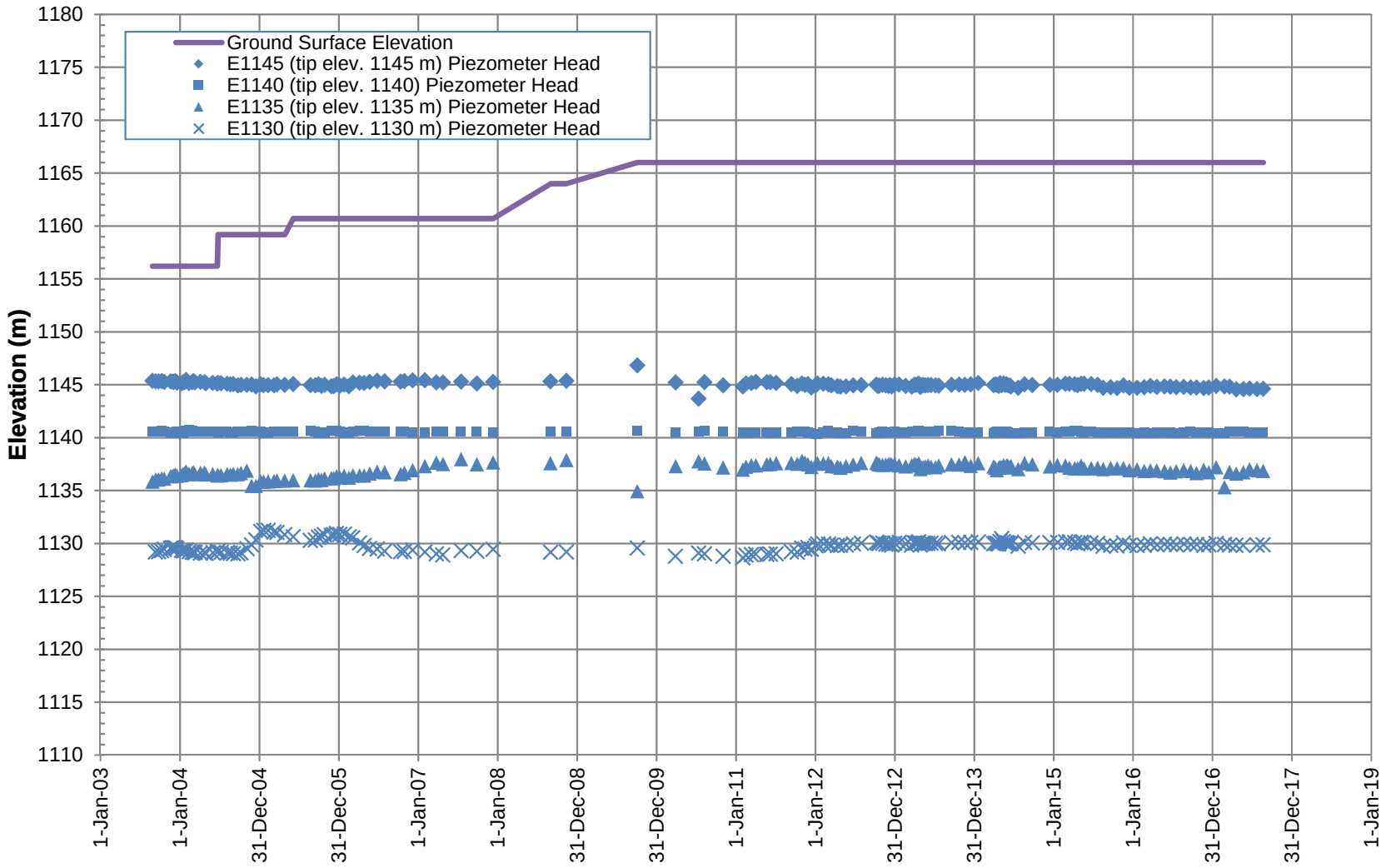
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
VW 23896 Pore Pressure (C-C')	Name:	



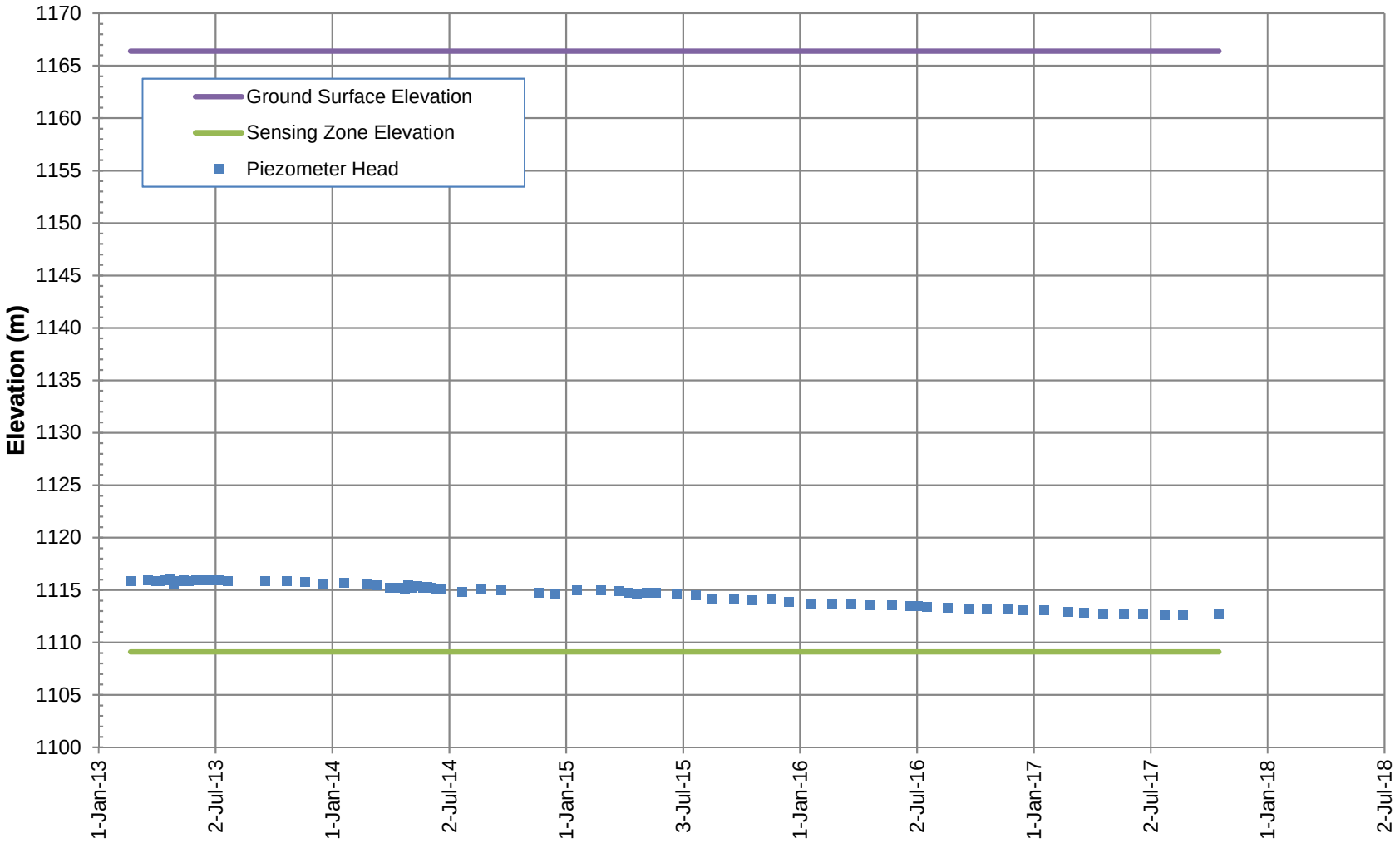
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
VW 23895 Pore Pressure (C-C')	Name:	



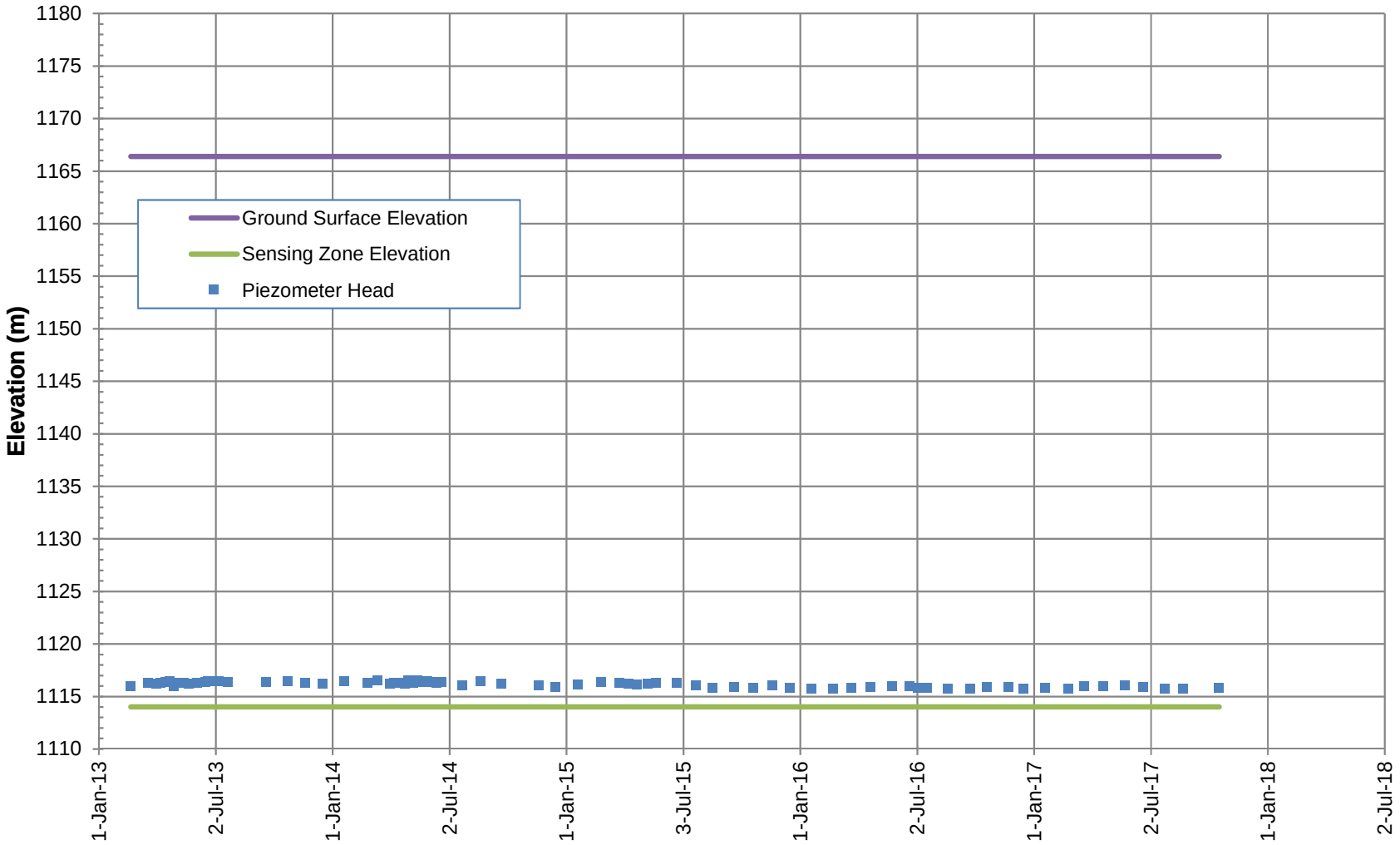
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Series C VWP Pore Pressure	Name:	



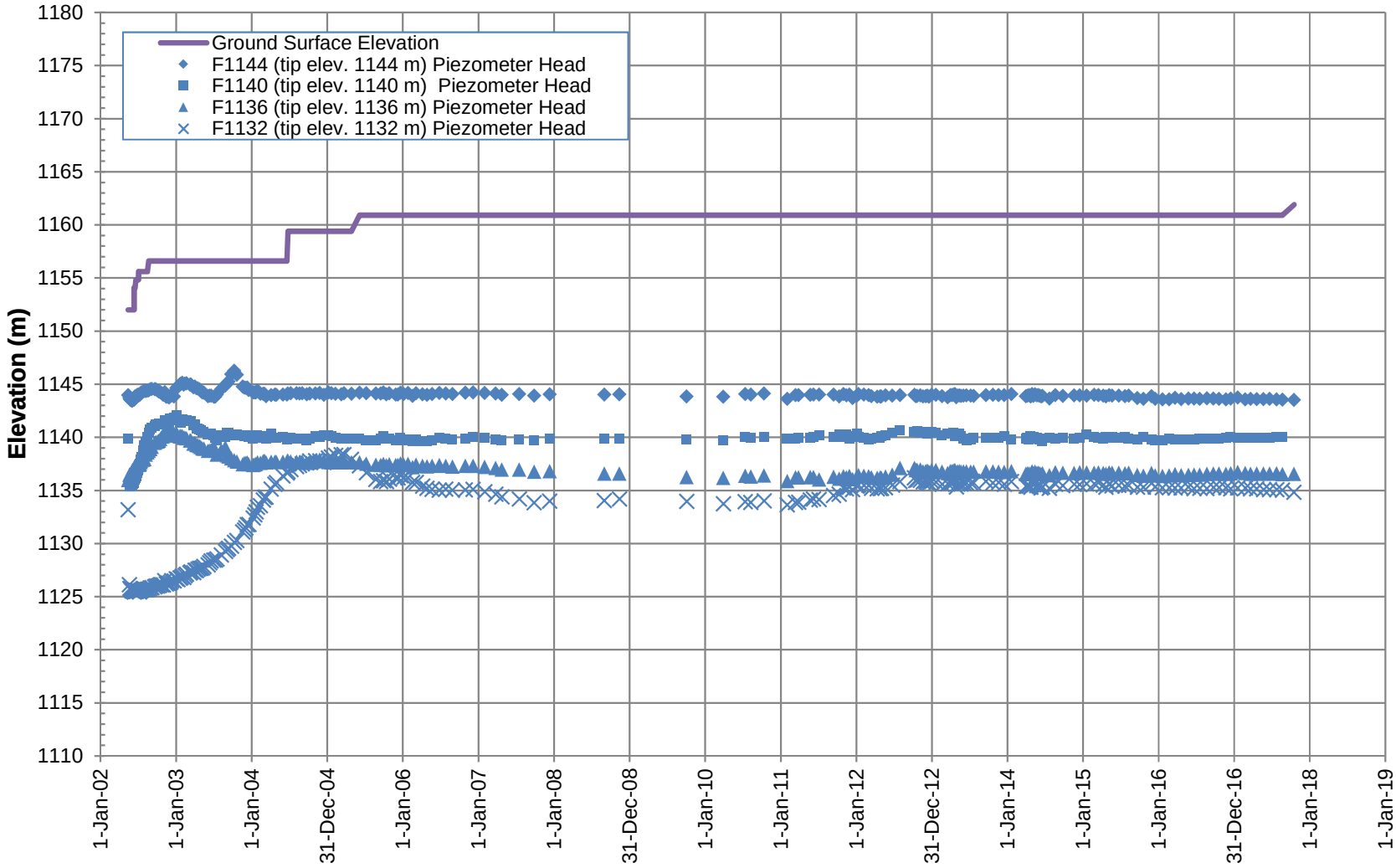
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Series E VWP Pore Pressure	Name:	



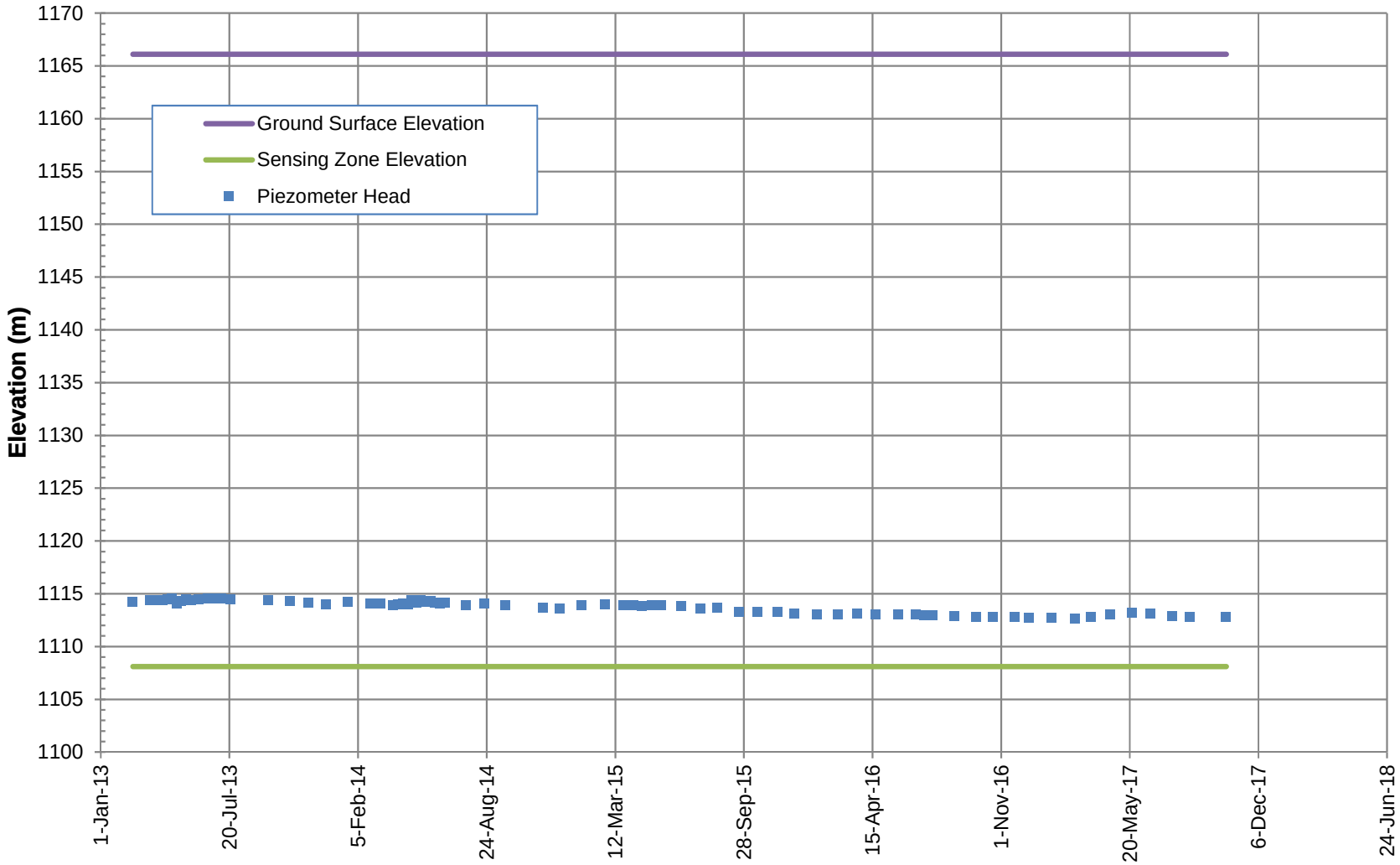
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
VW 23891 Pore Pressure (E-E')	Name:	



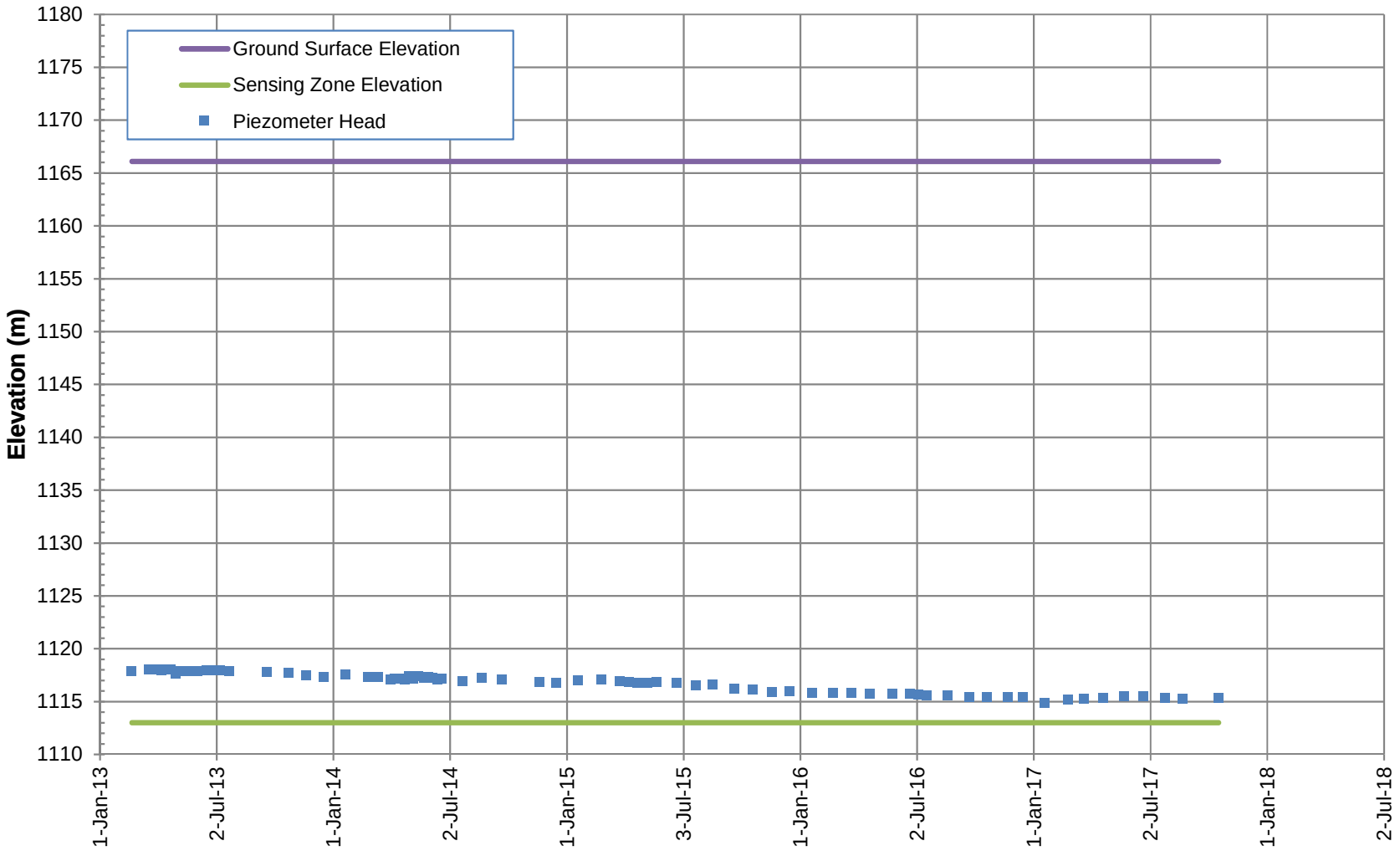
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
VW 23892 Pore Pressure	Name:	



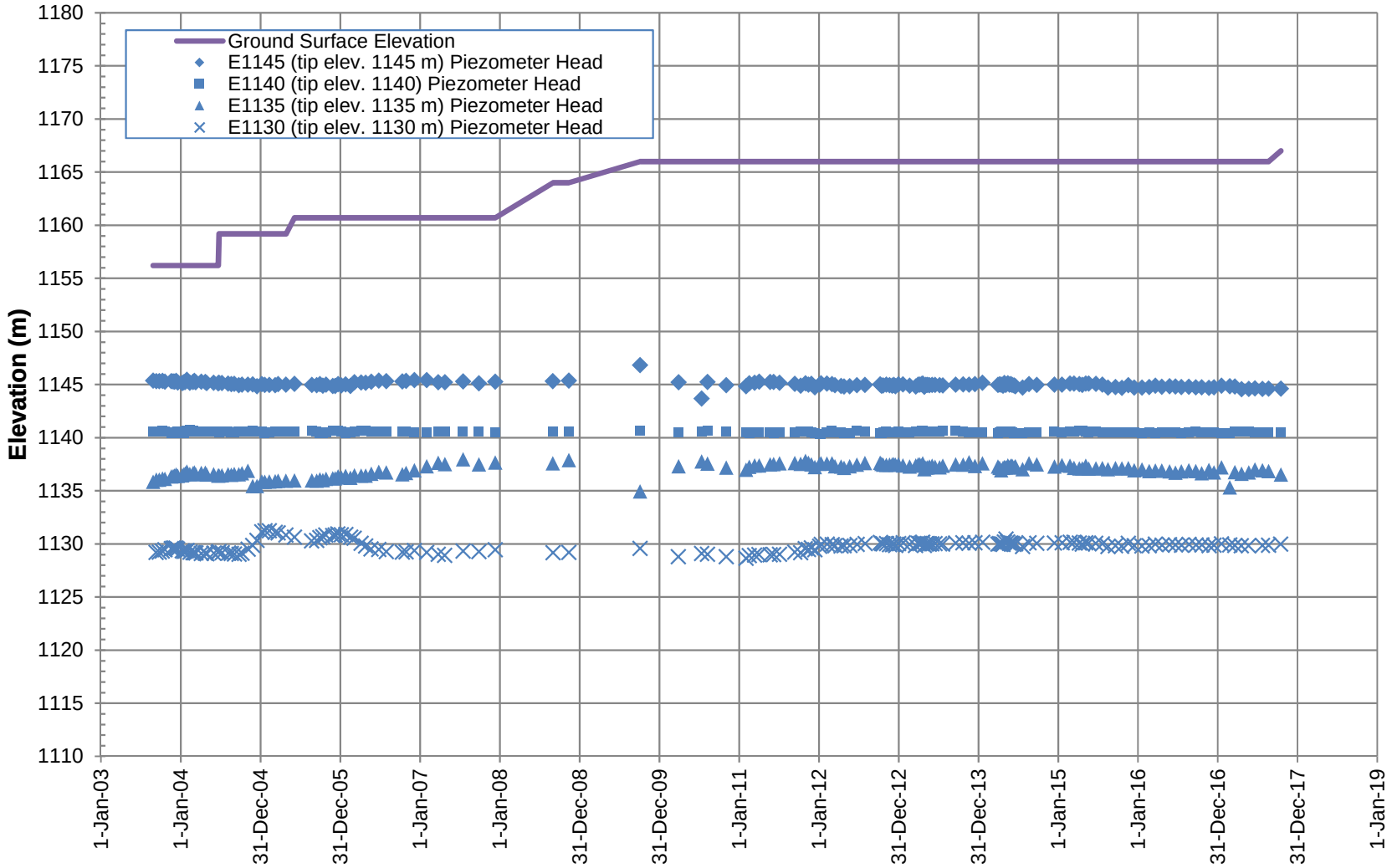
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
F Series VWP Pore Pressure	Name:	



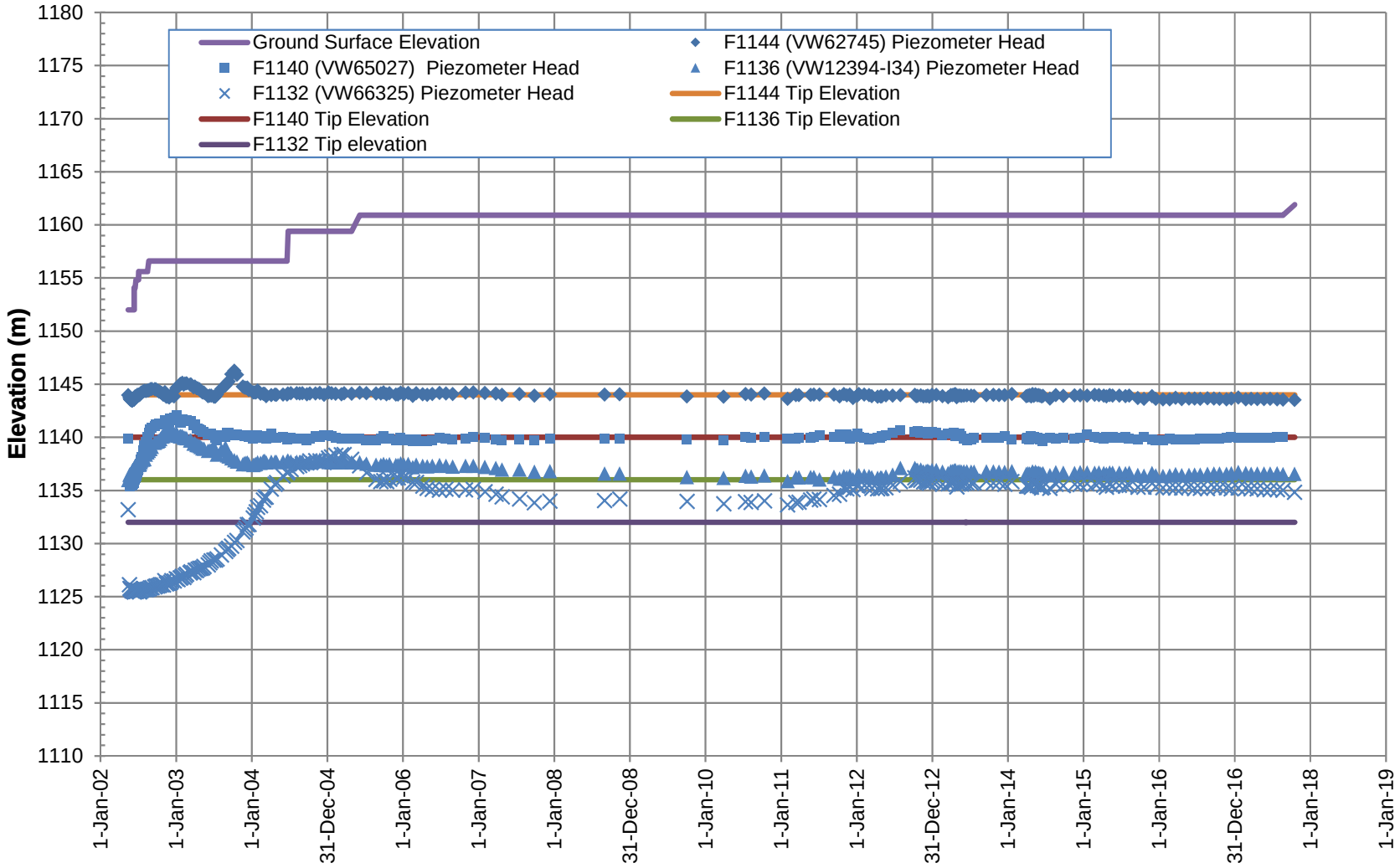
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
VW 23886 Pore Pressure (G-G')	Name:	



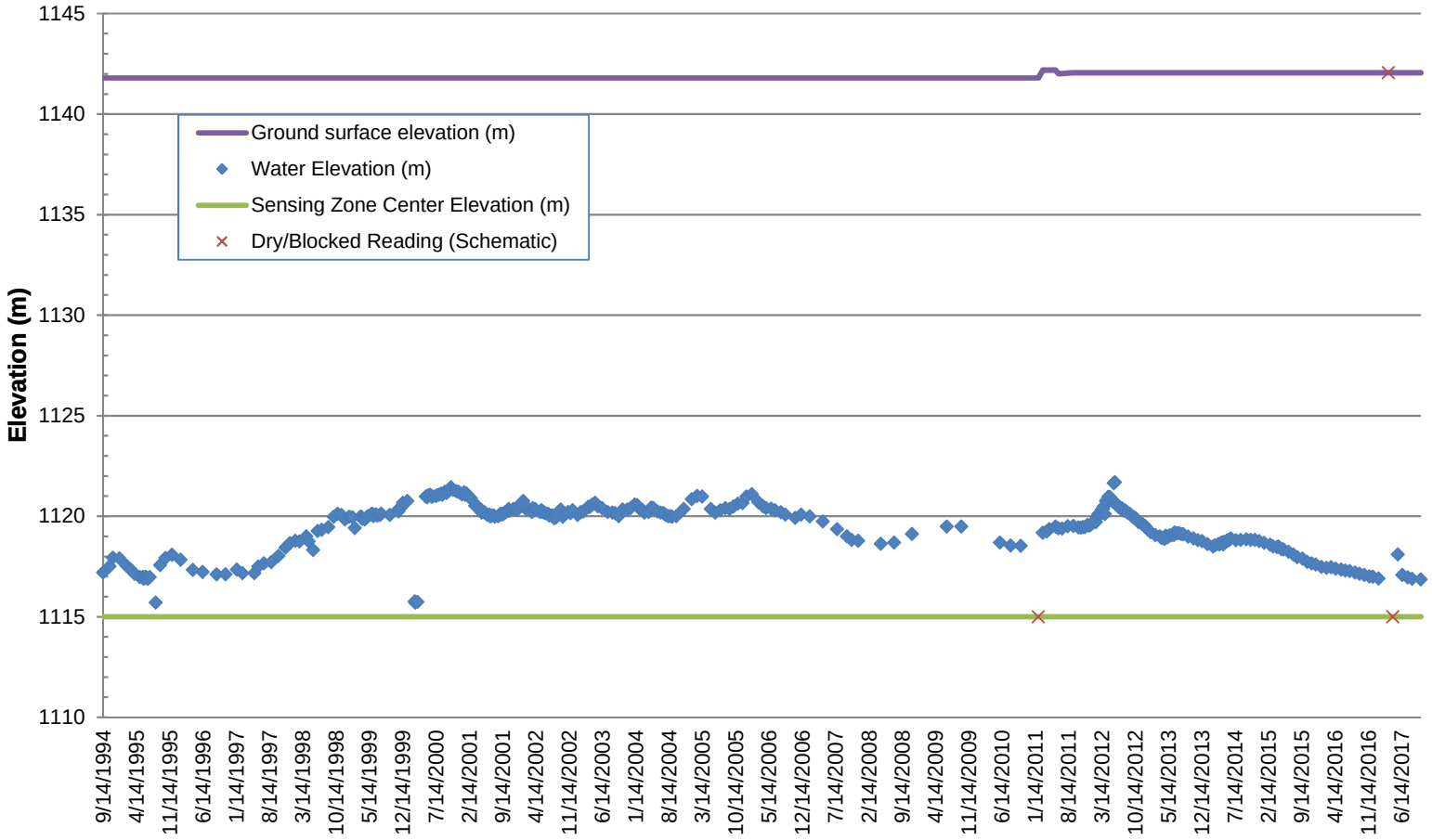
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
VW 23885 Pore Pressure (G-G')	Name:	



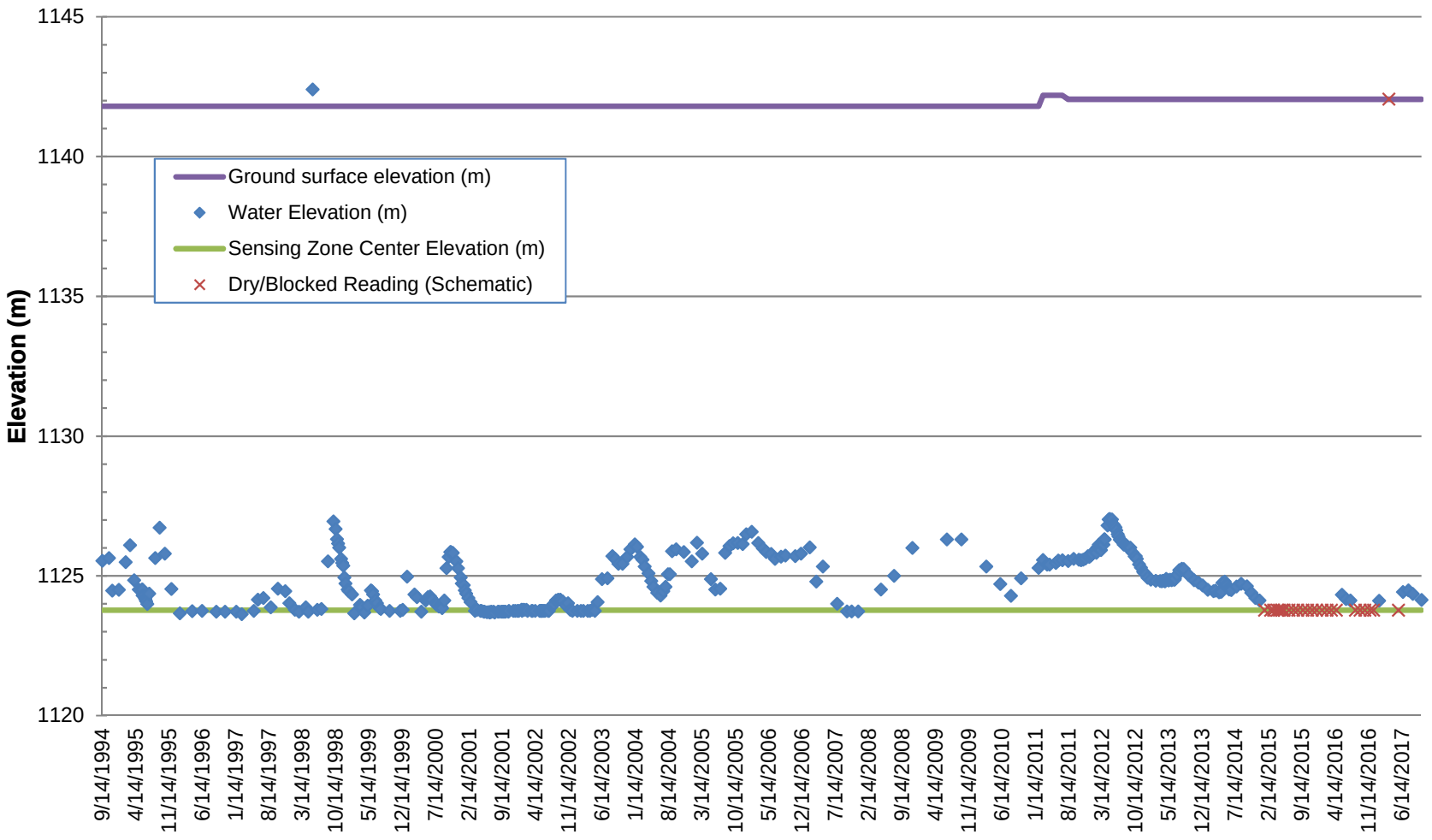
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Series E VWP Pore Pressure	Name:	



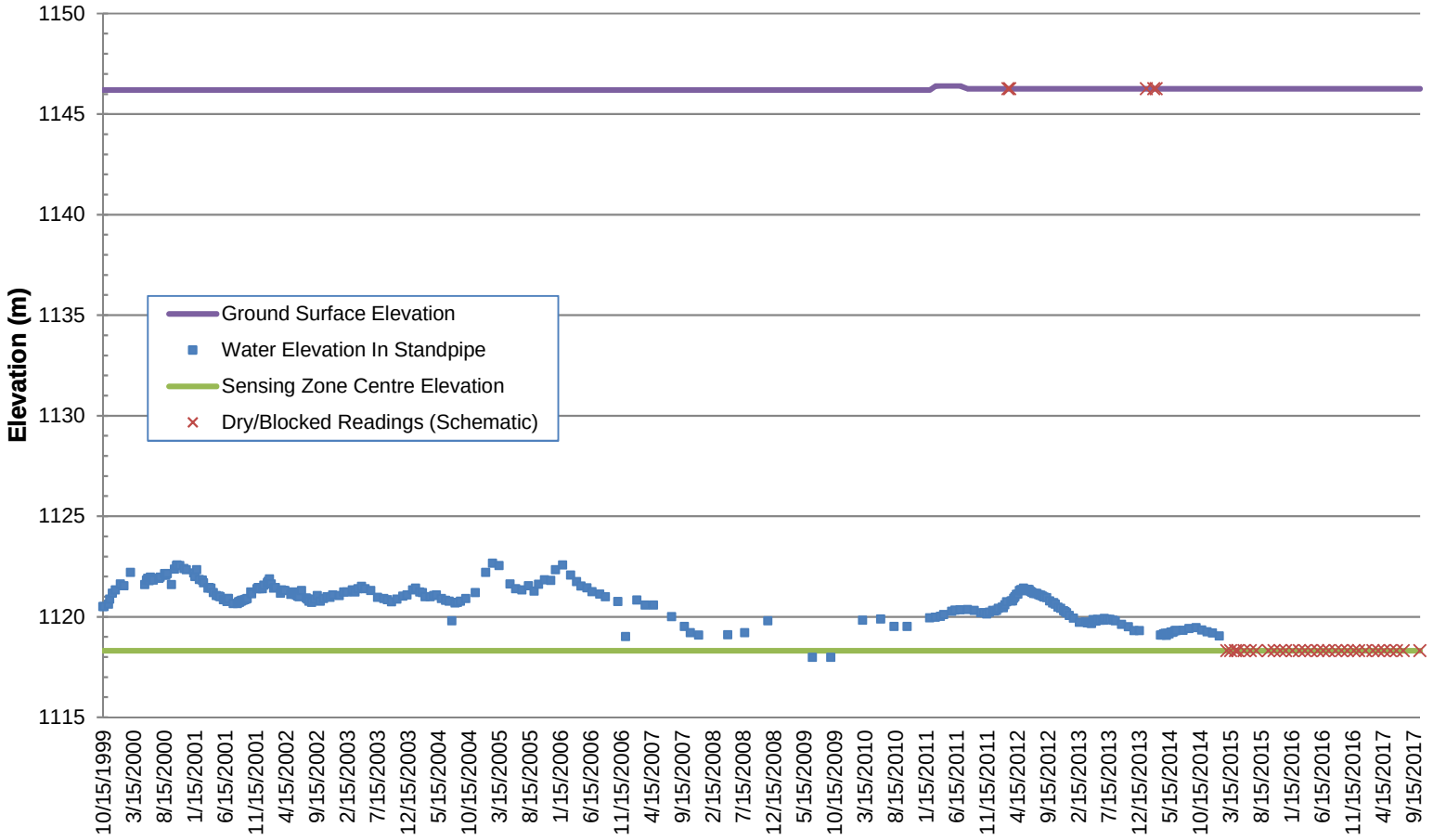
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
F Series VWP Pore Pressure (F-F')	Name:	



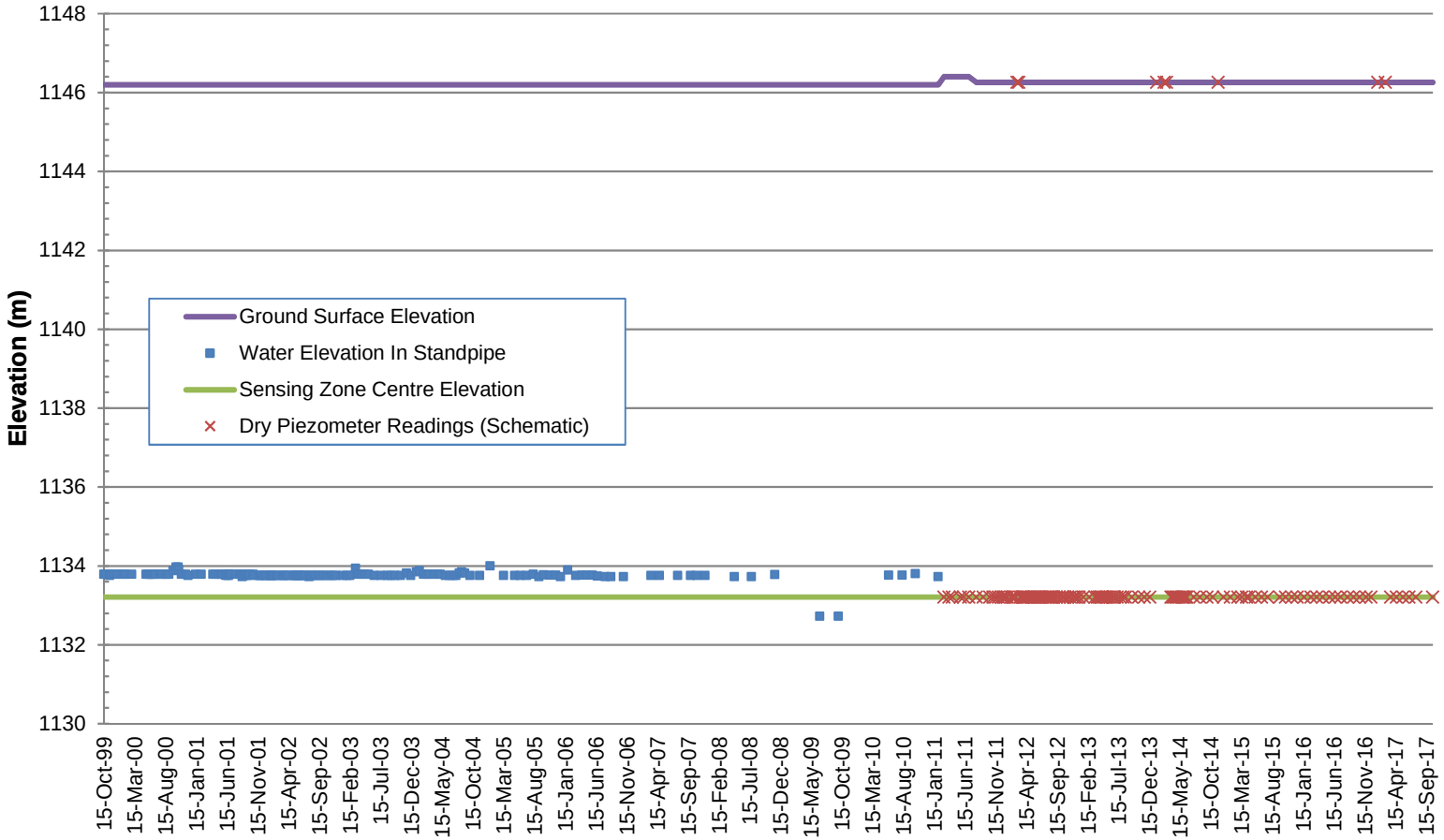
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe OW9434A (bt A-A' & B-B')		



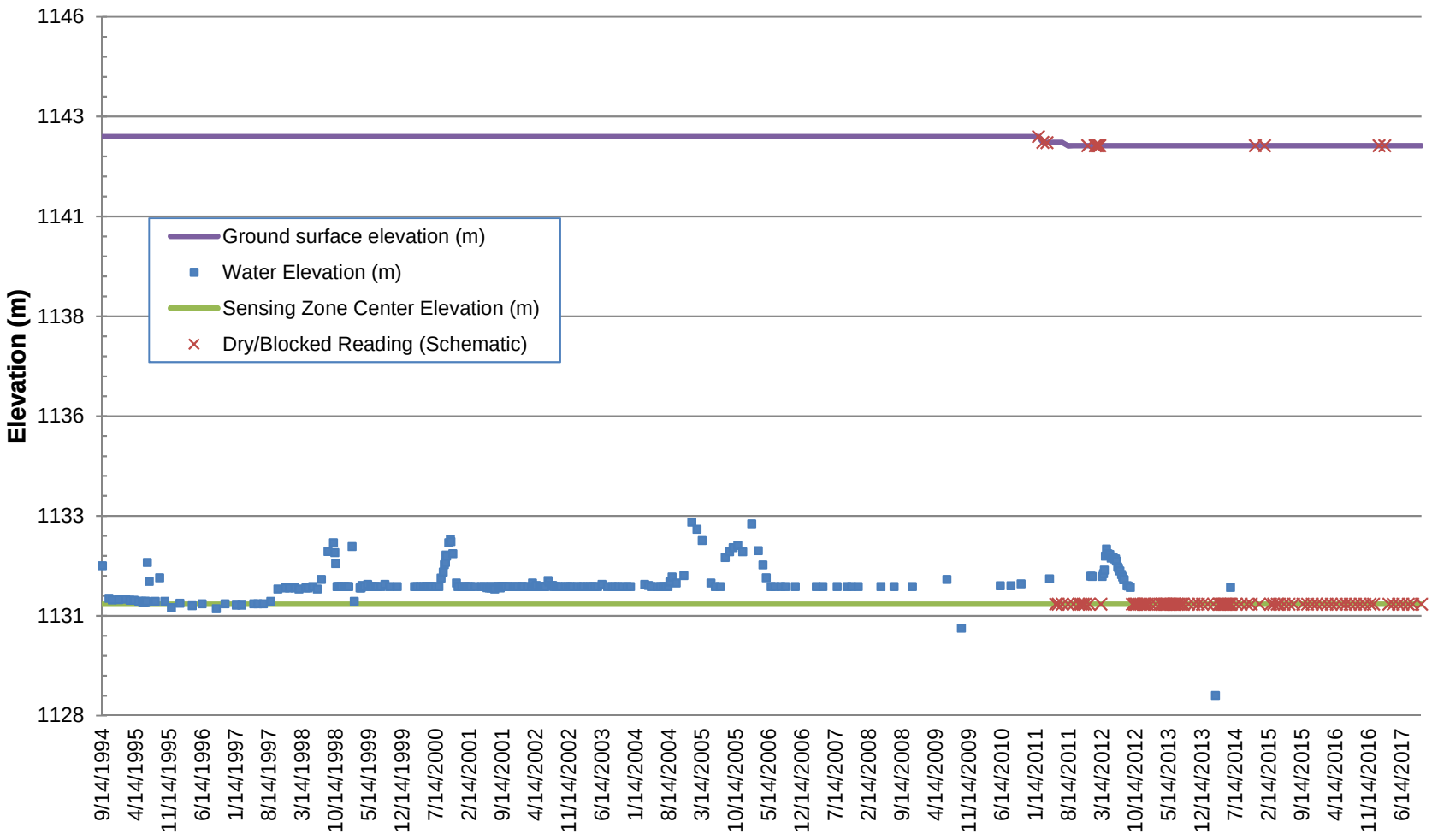
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe OW9434B (bt A-A' & B-B')		



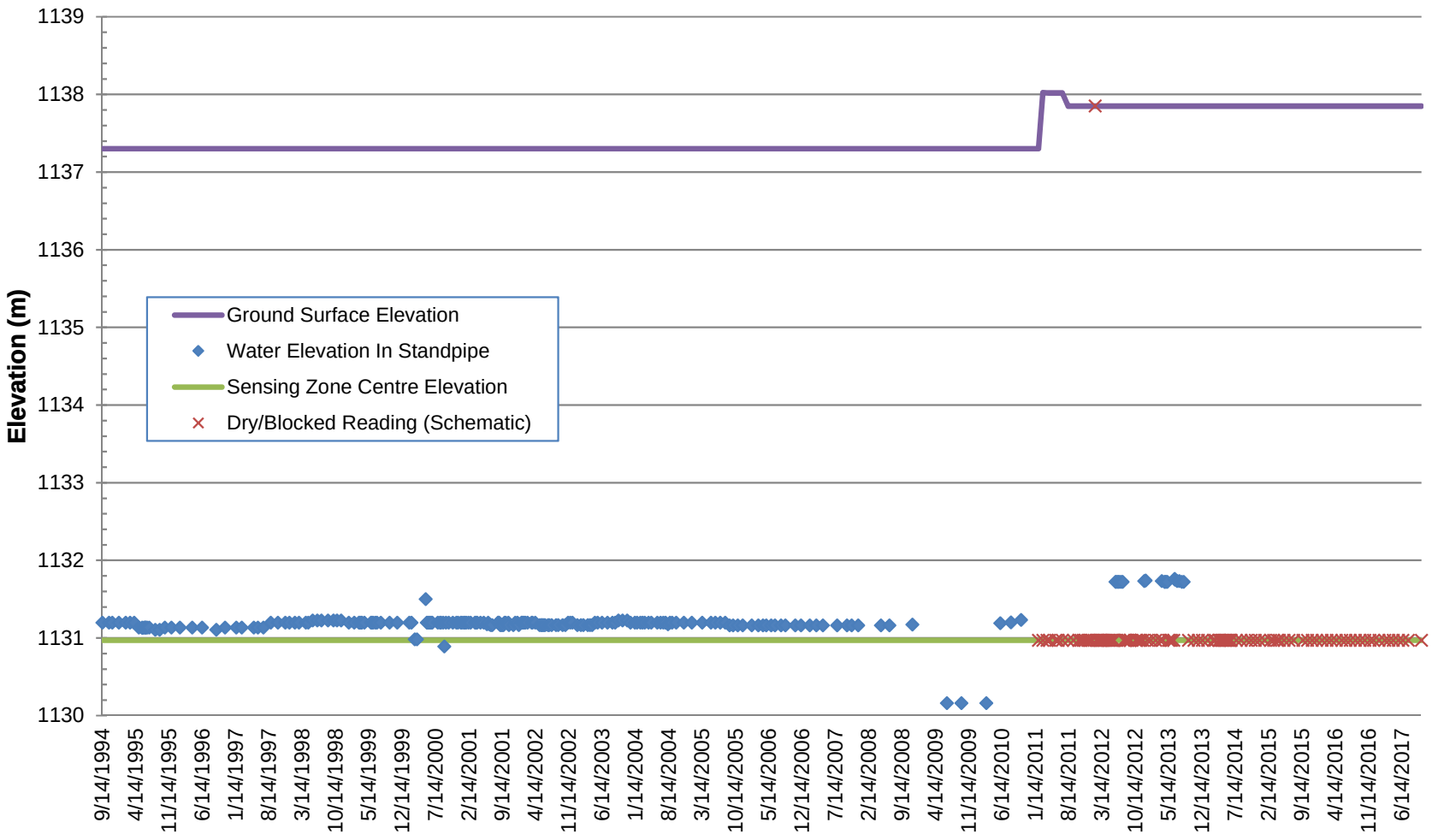
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe 99-03A (B-B')		



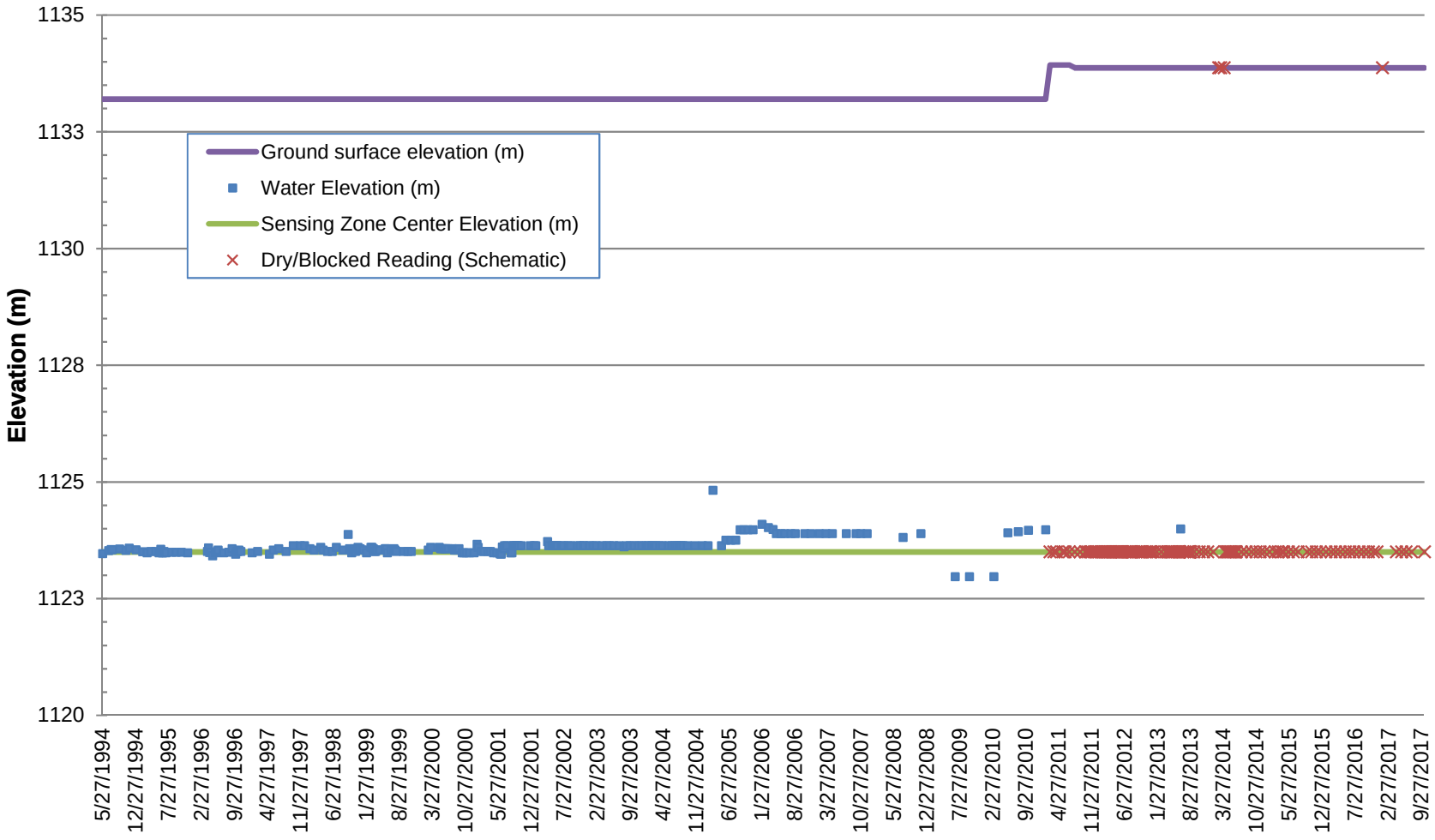
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe 99-03B (B-B')		



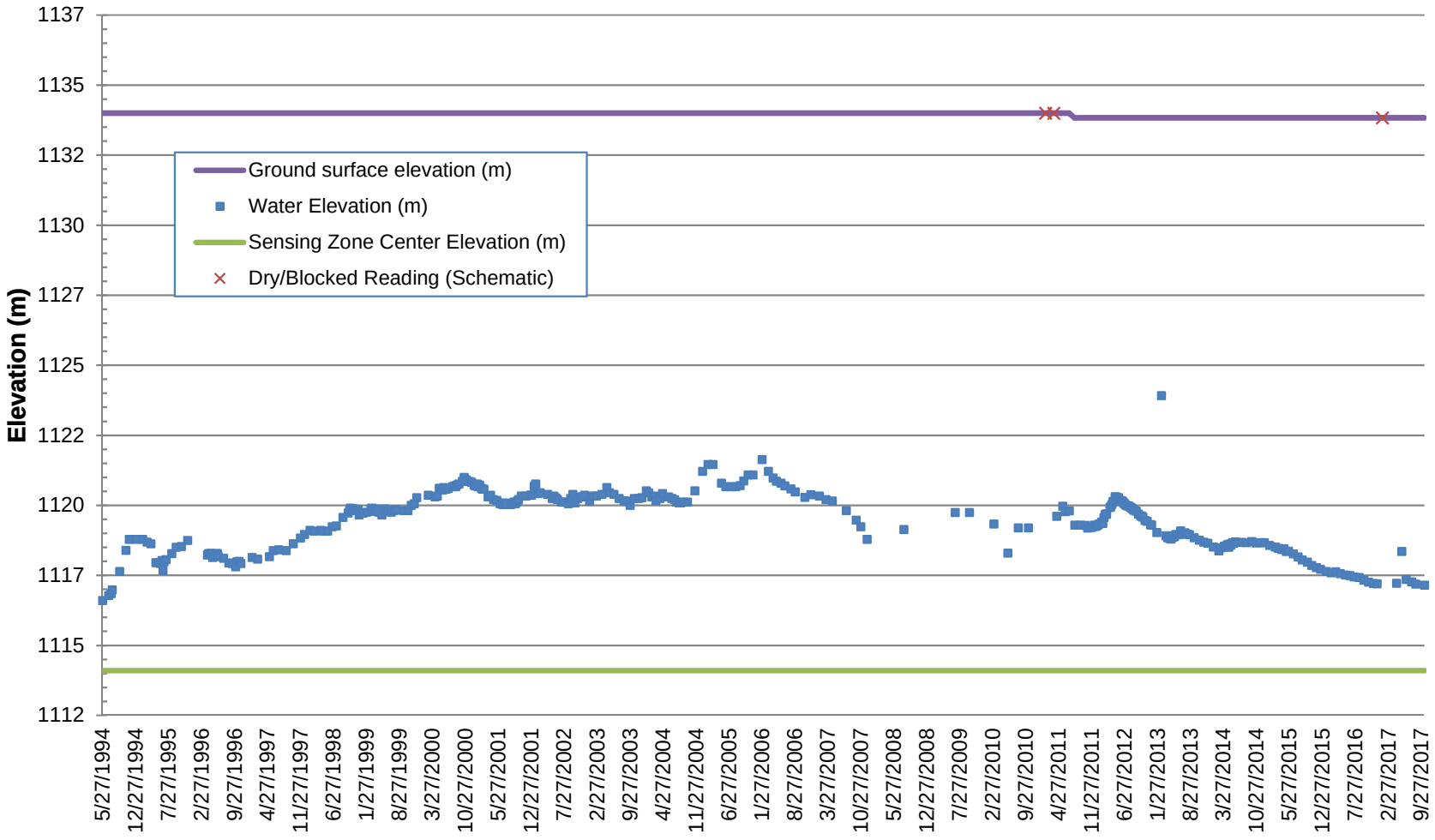
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe OW9431 (B-B')		



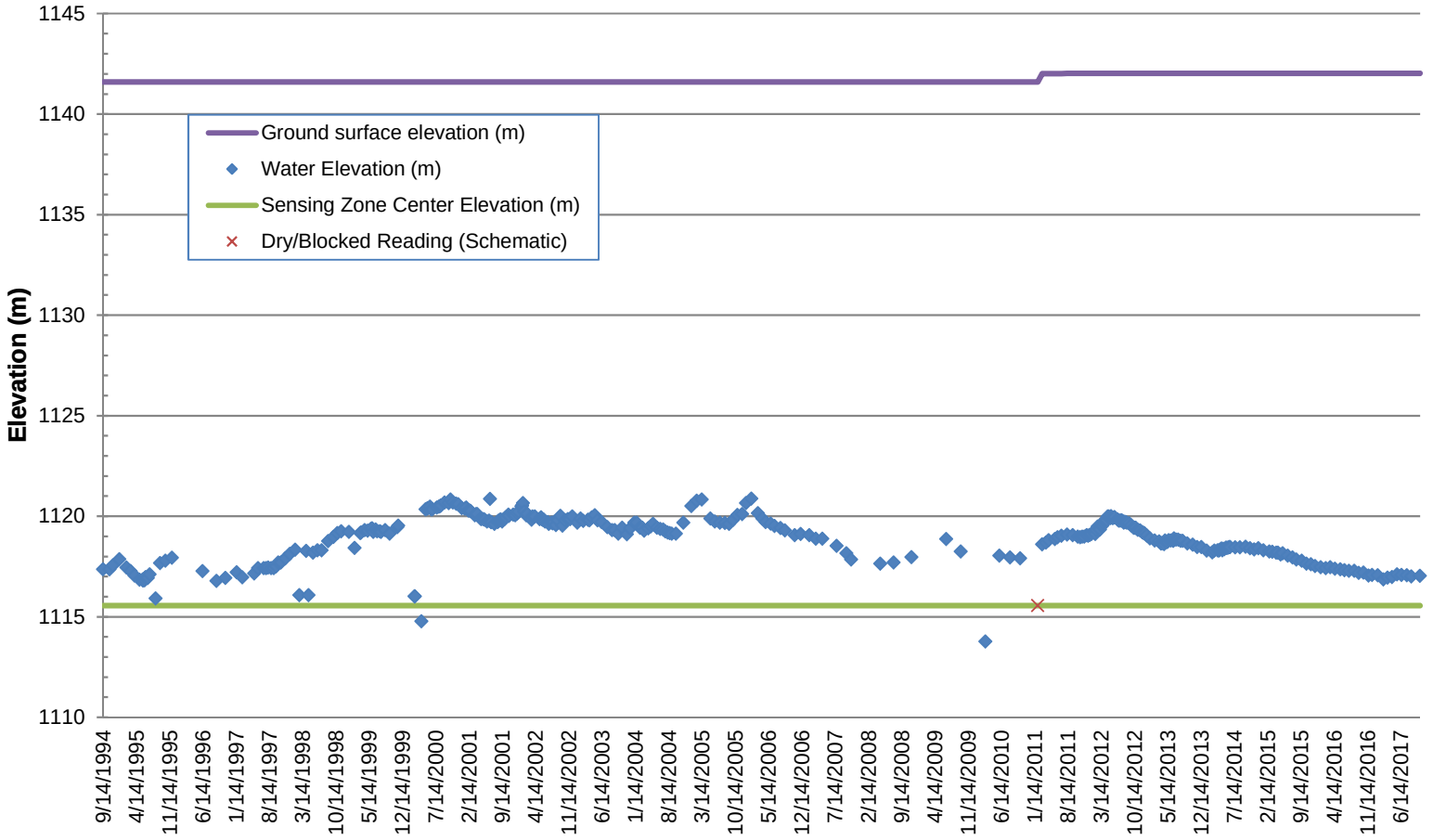
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe OW9435 (B-B')		



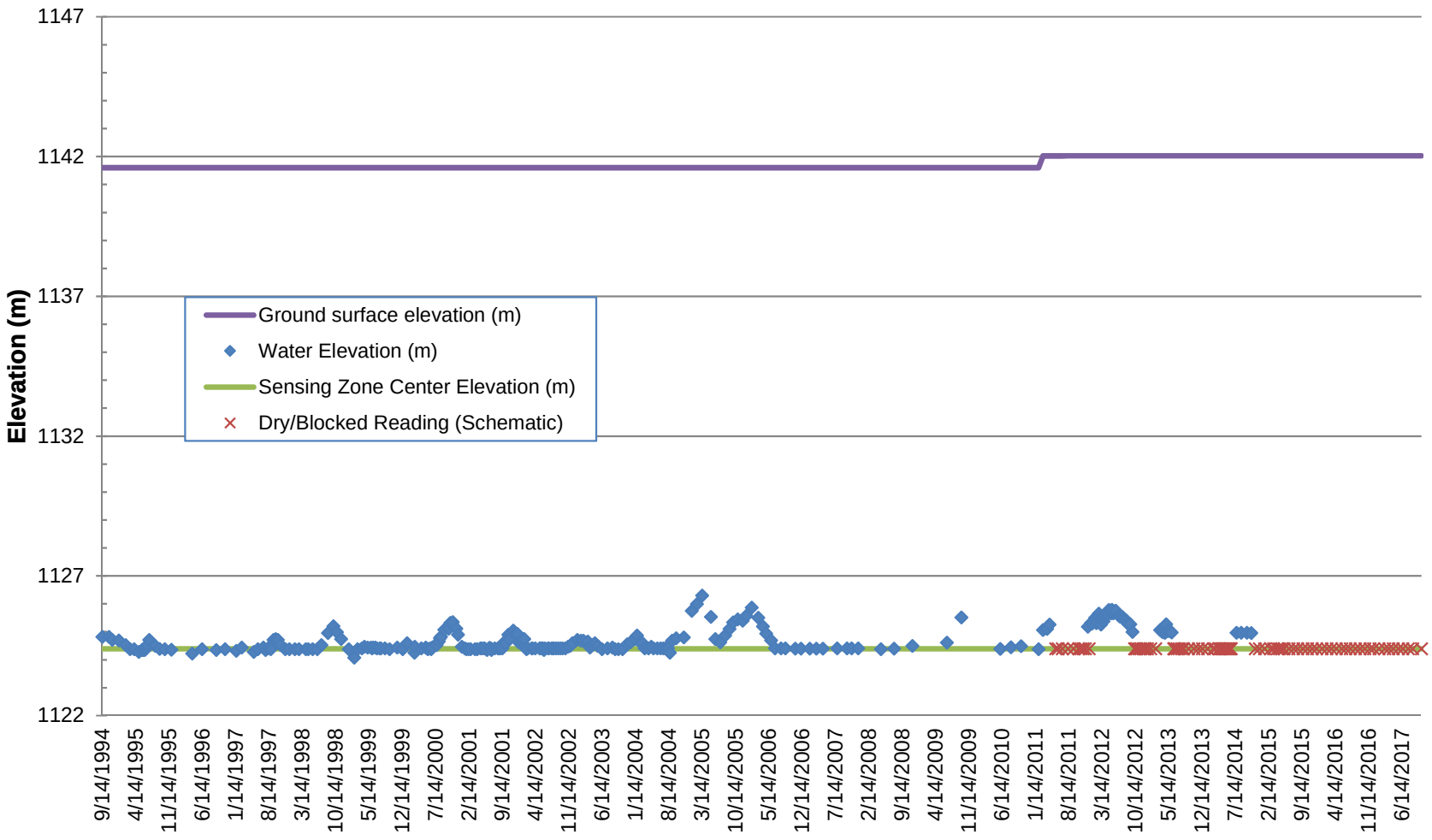
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe OW-12 (B-B')		



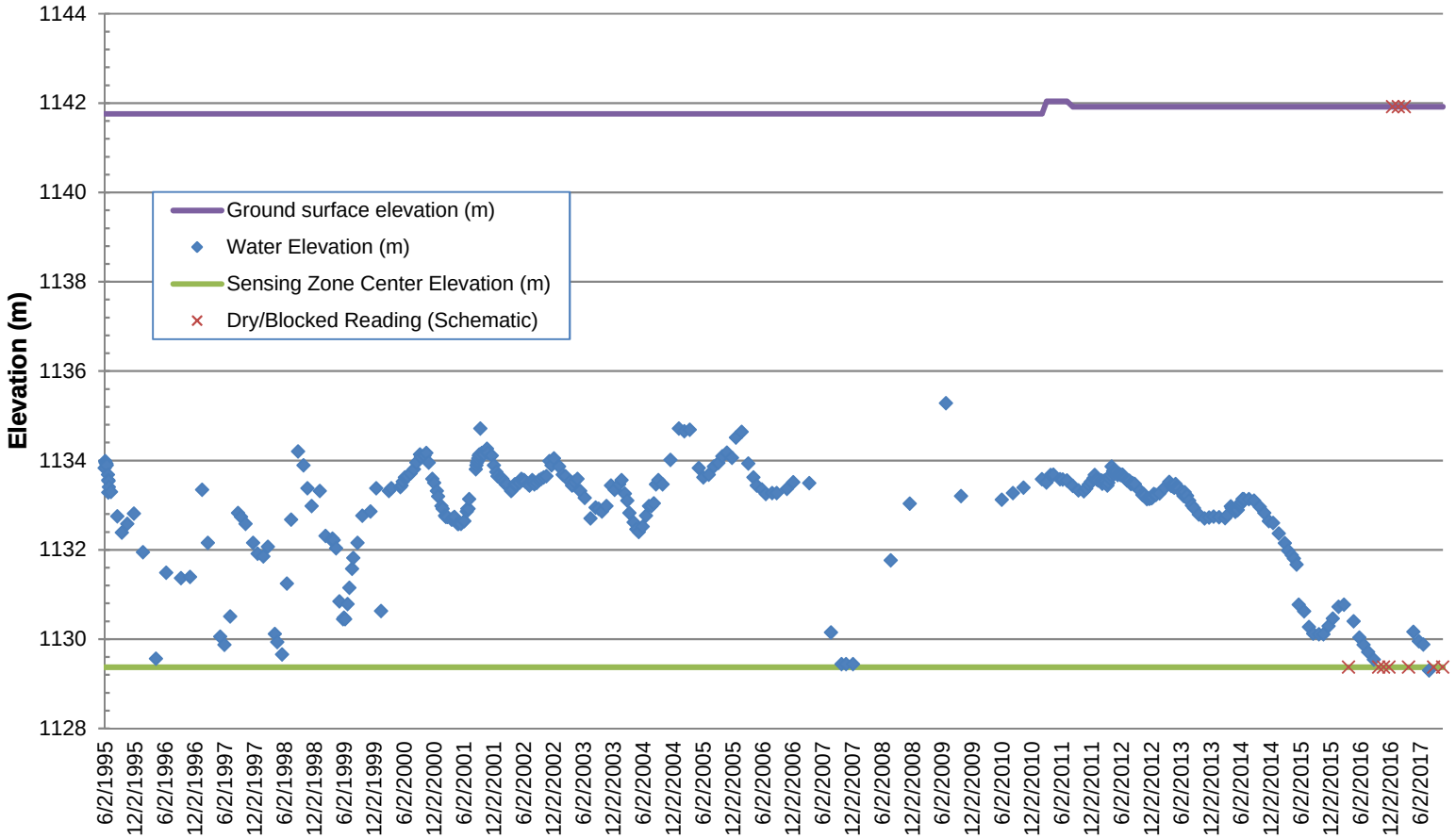
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe OW-12A (B-B')		



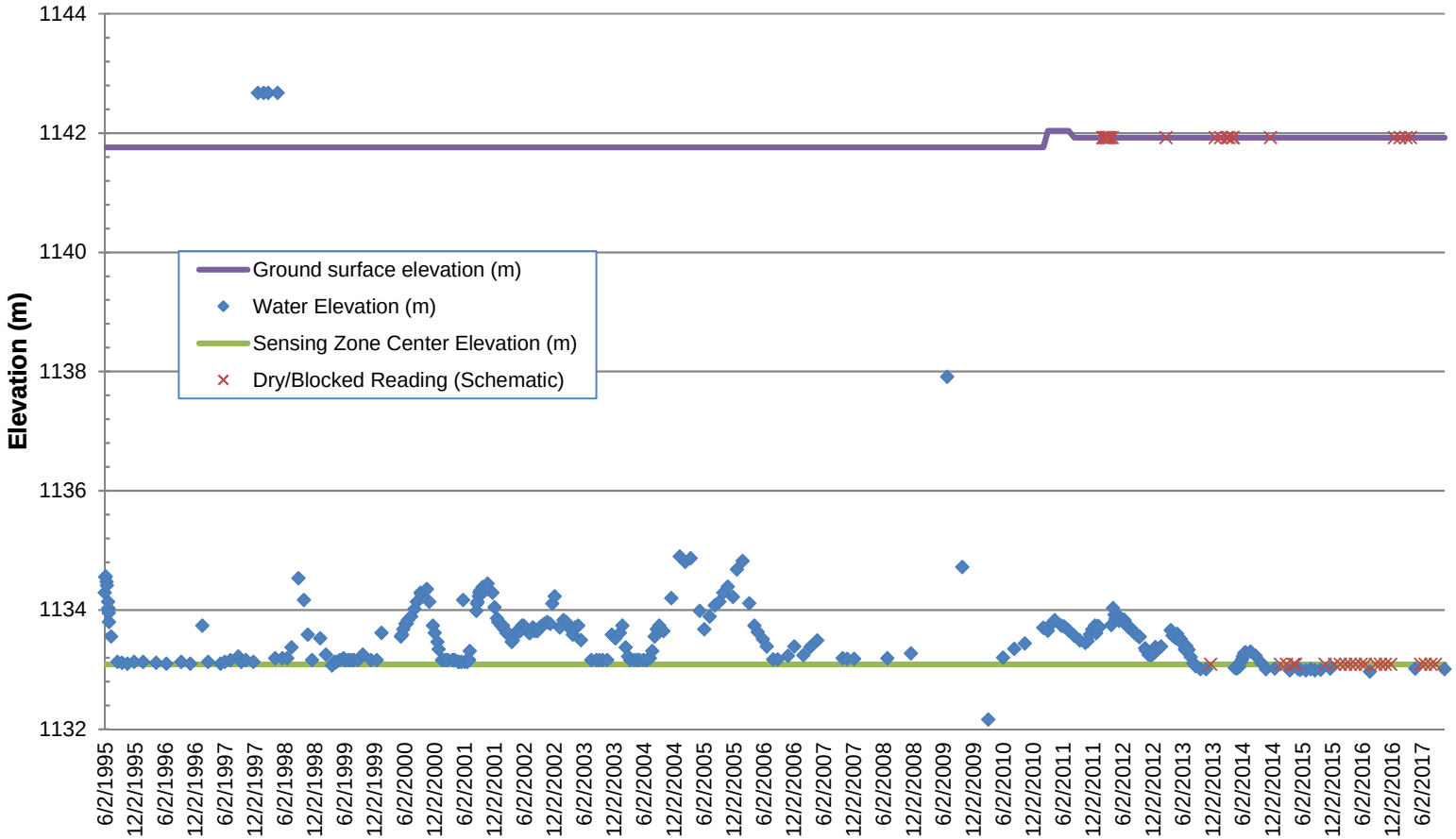
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe OW9436A (bt B-B' & C-C')		



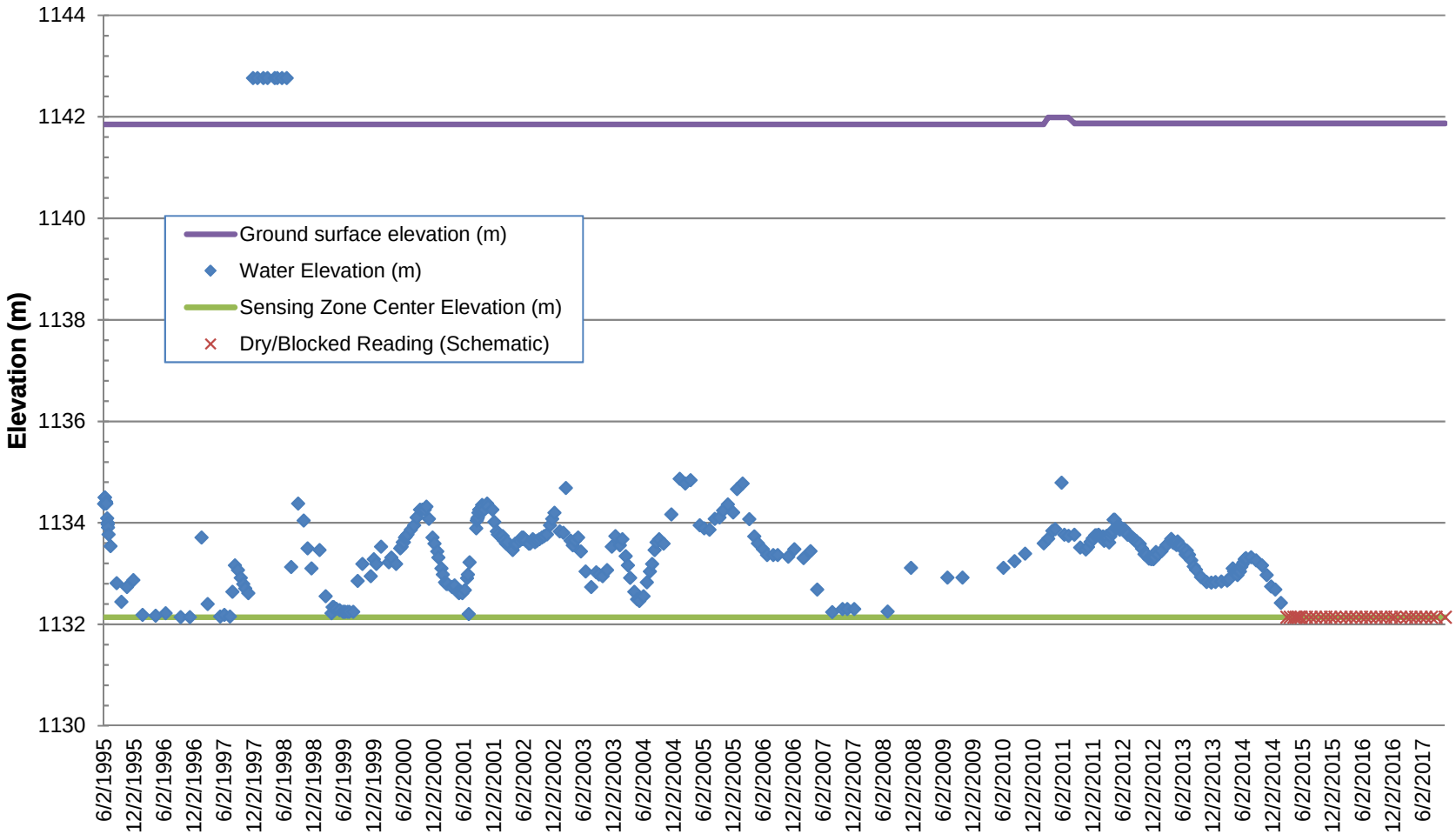
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe OW9436B (bt B-B' & C-C')		



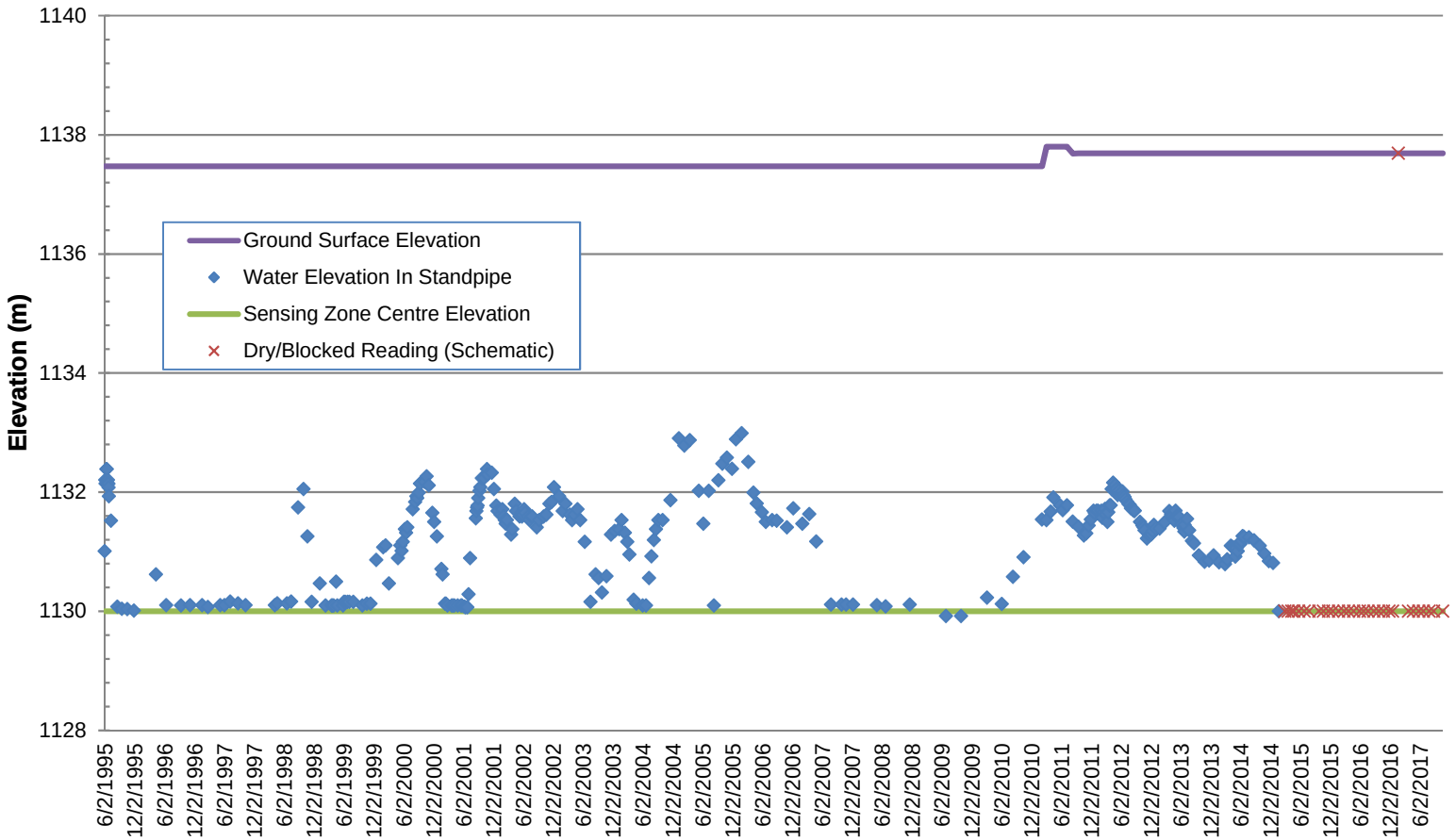
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe OW9501A (bt B-B' & C-C')		



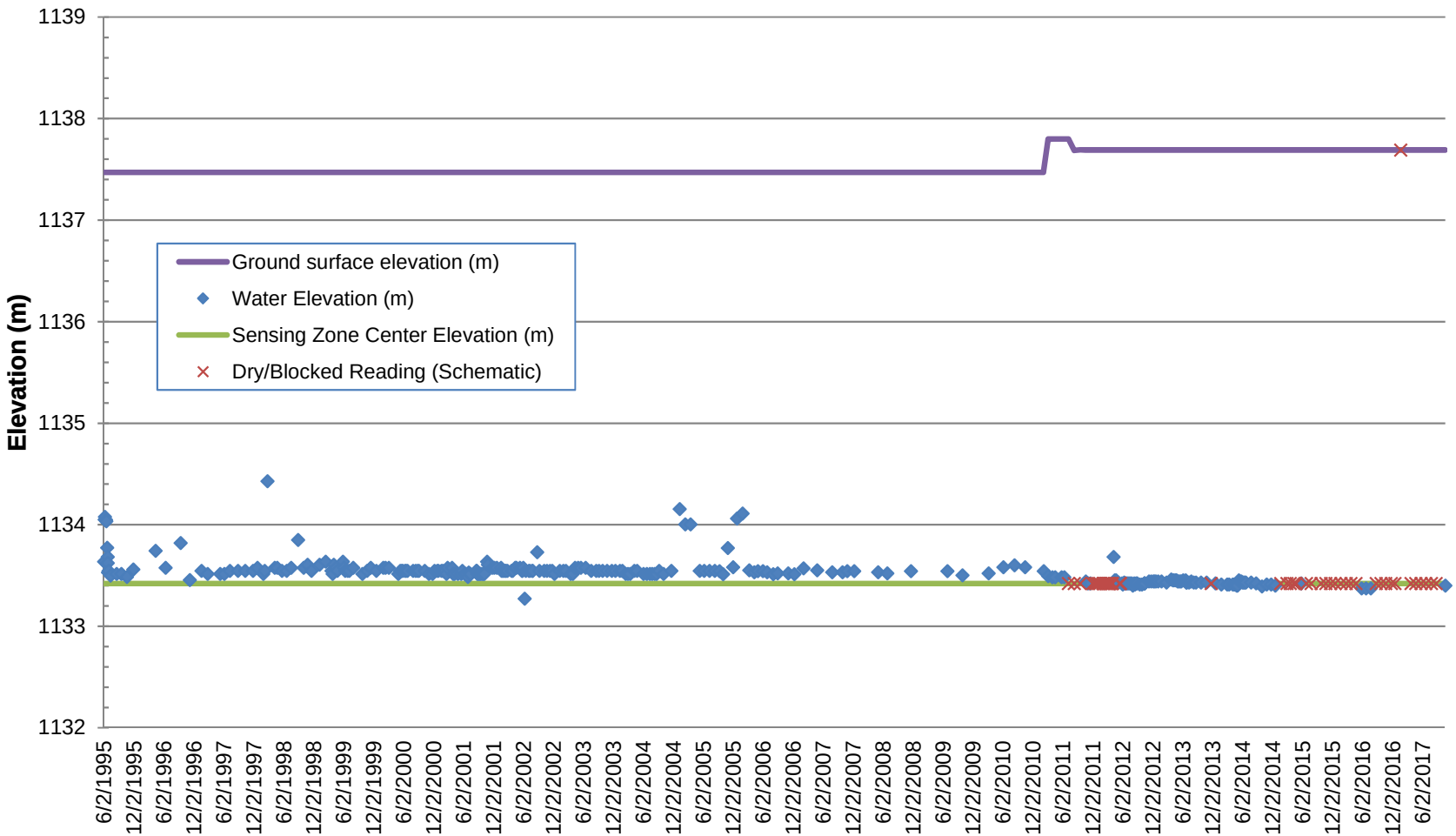
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe OW9501B (bt B-B' & C-C')		



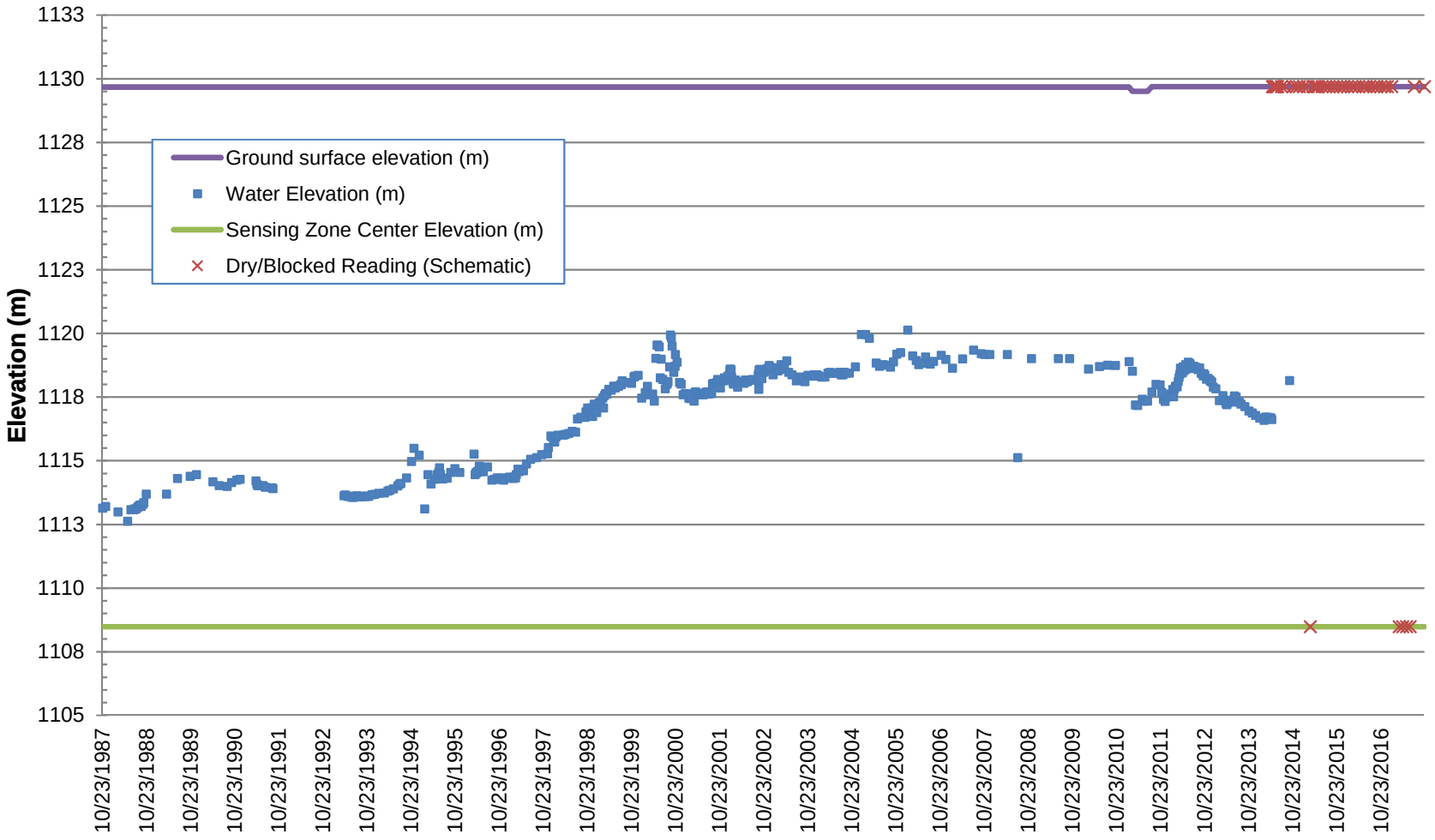
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe OW9502 (bt B-B' & C-C')		



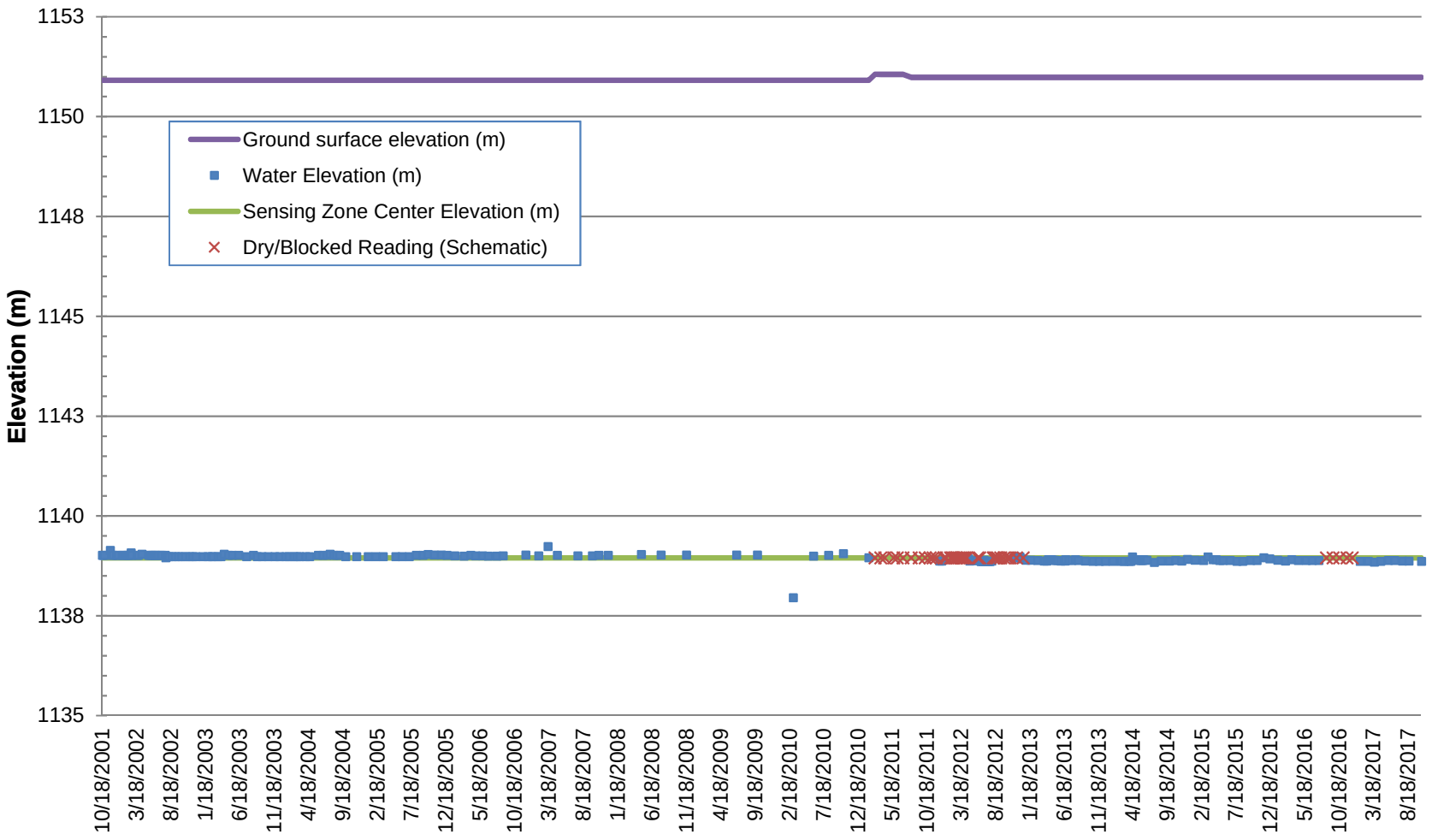
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe OW9504A (bt B-B' & C-C')		



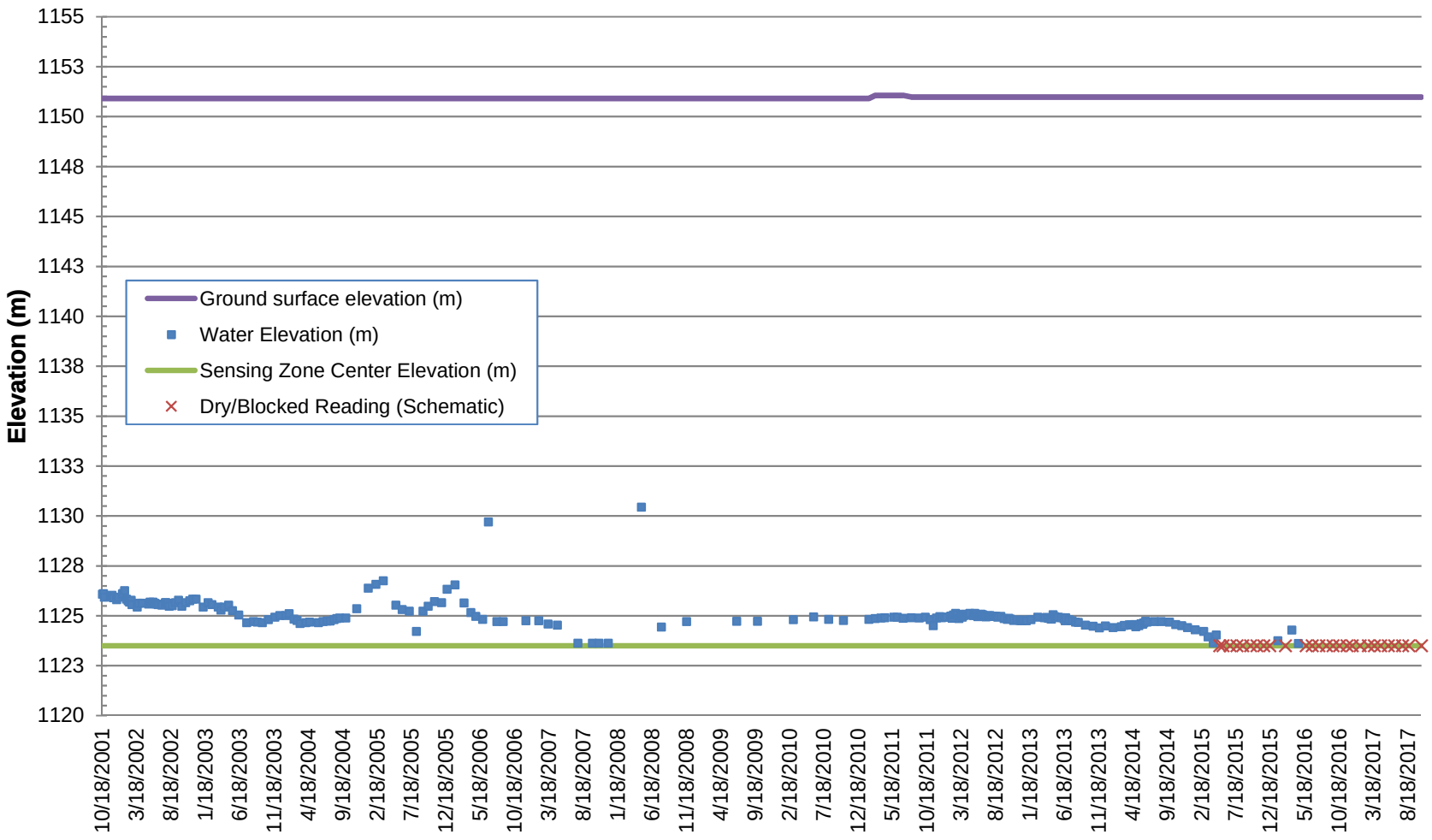
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe OW9504B (bt B-B' & C-C')		



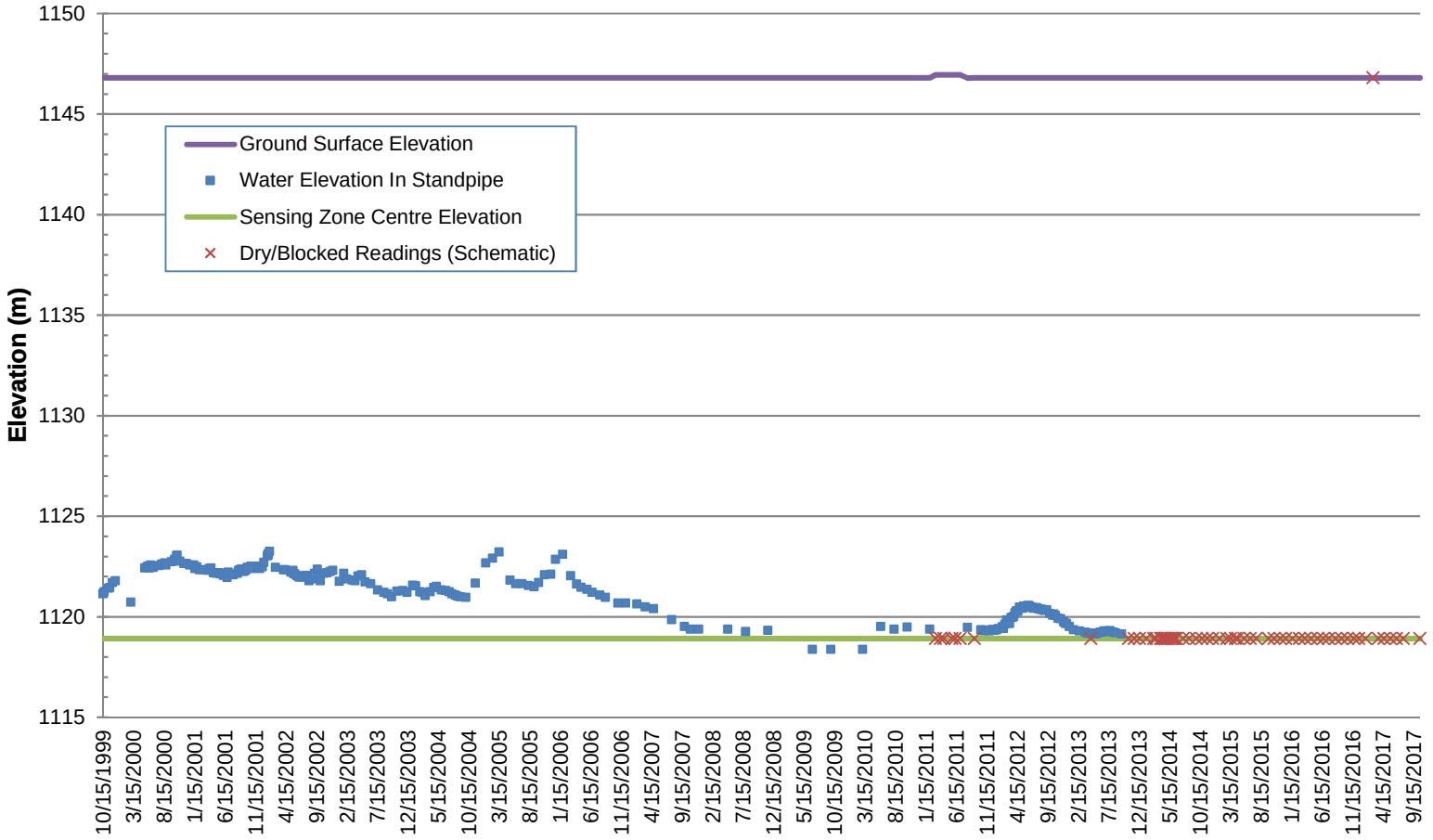
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe OW-3 (bt B-B' & C-C')		



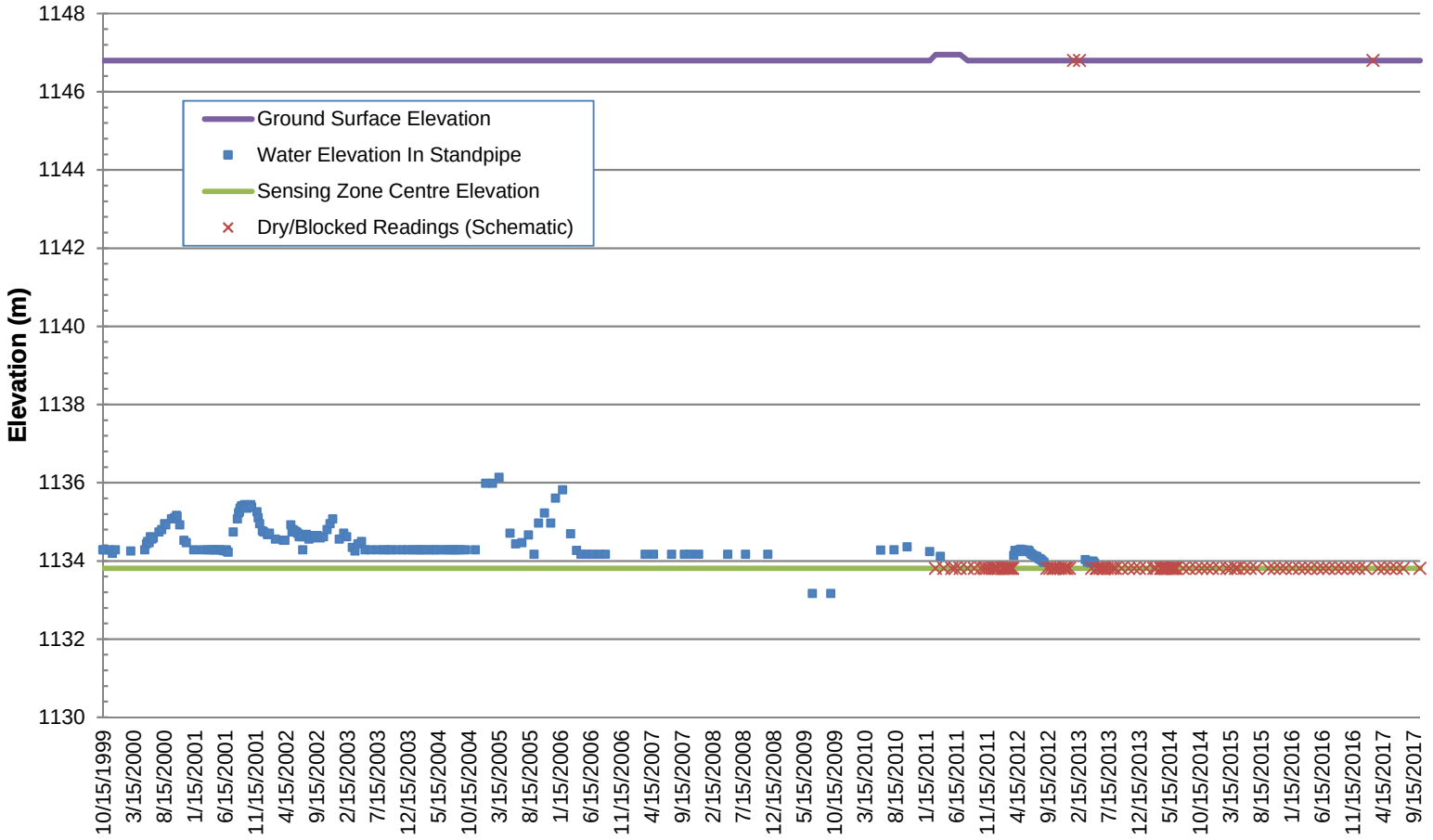
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe C01-03A (C-C')		



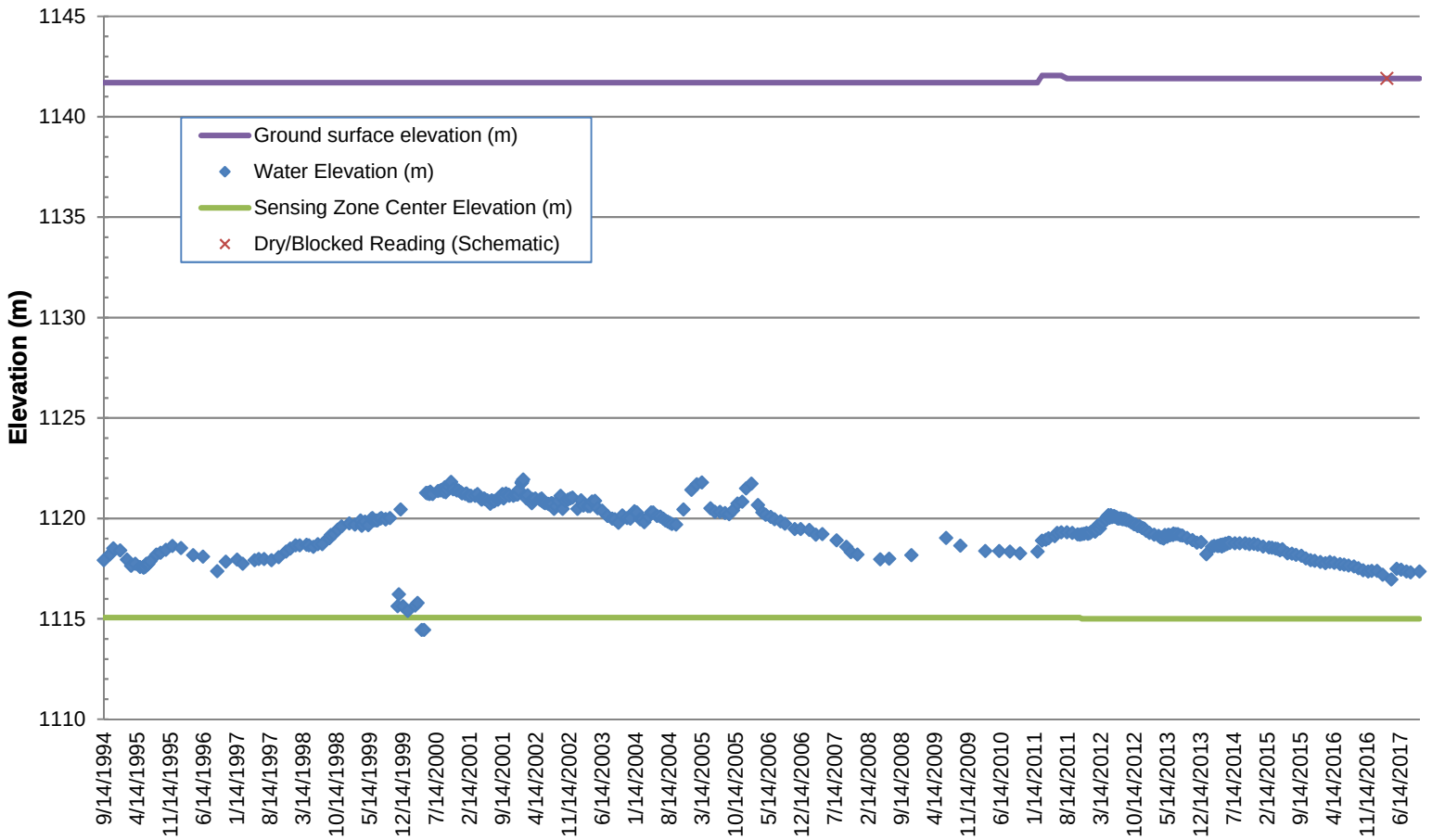
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe C01-03B (C-C')		



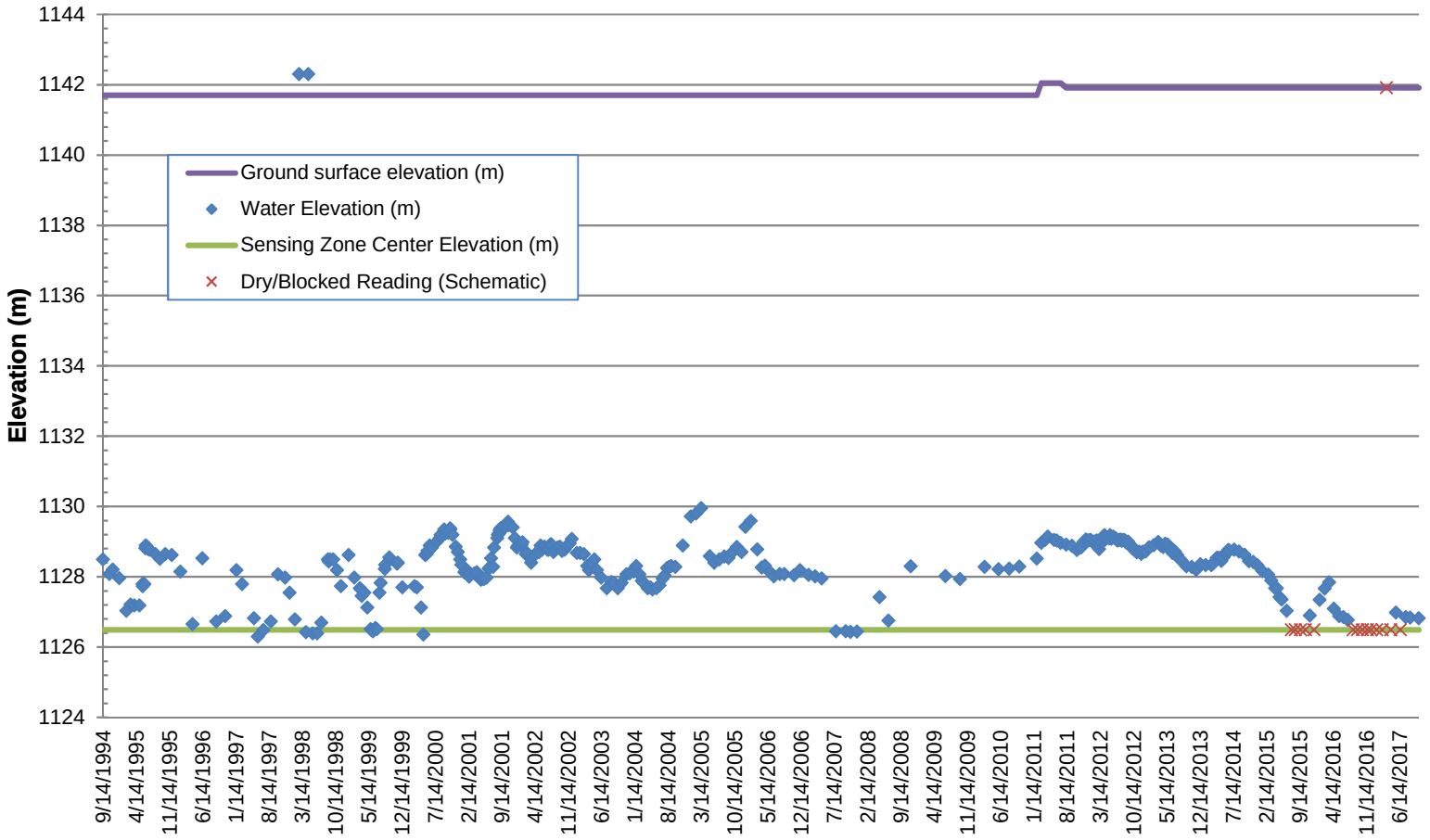
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe 99-04A (C-C')		



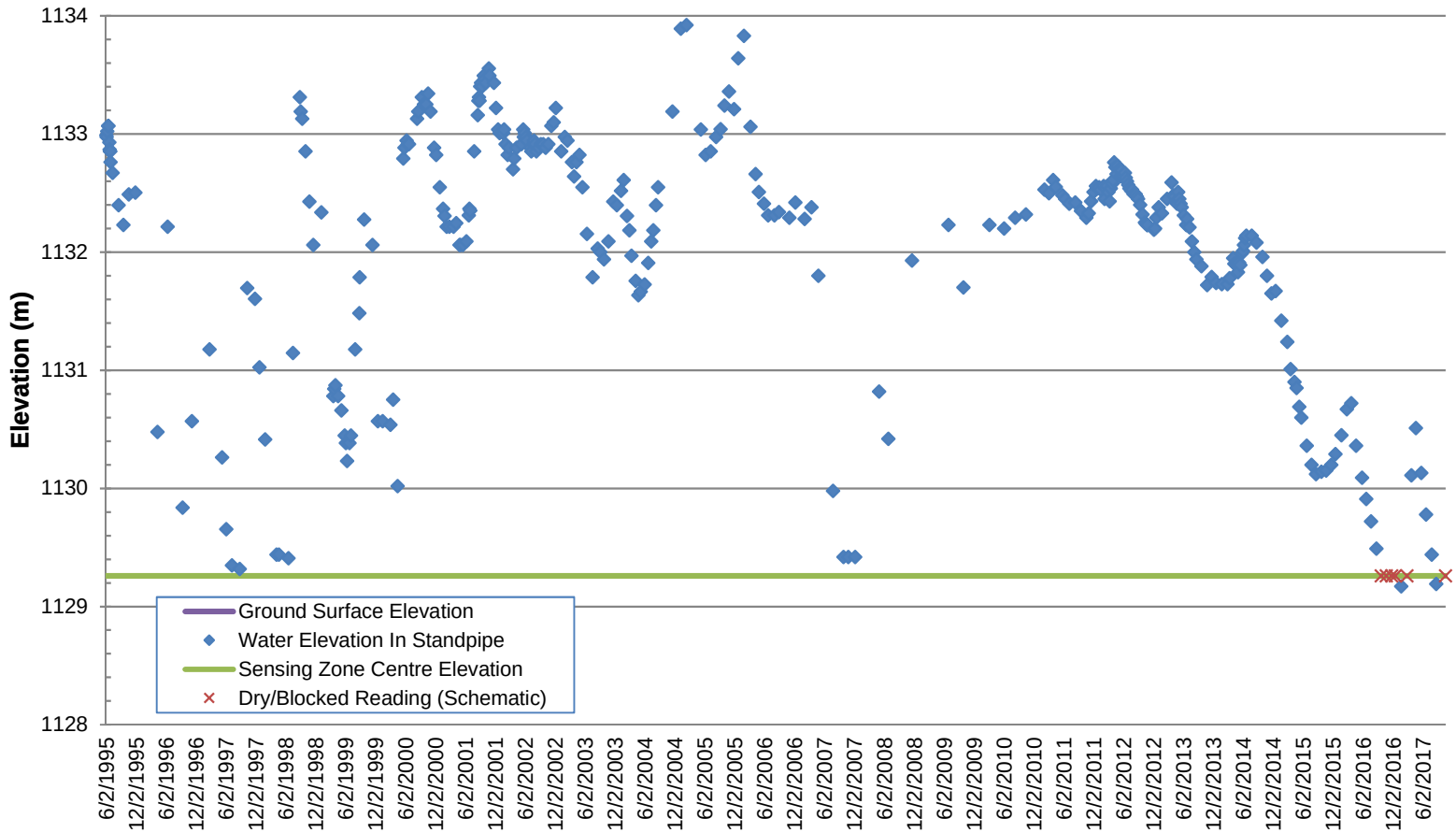
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe 99-04B (C-C')		



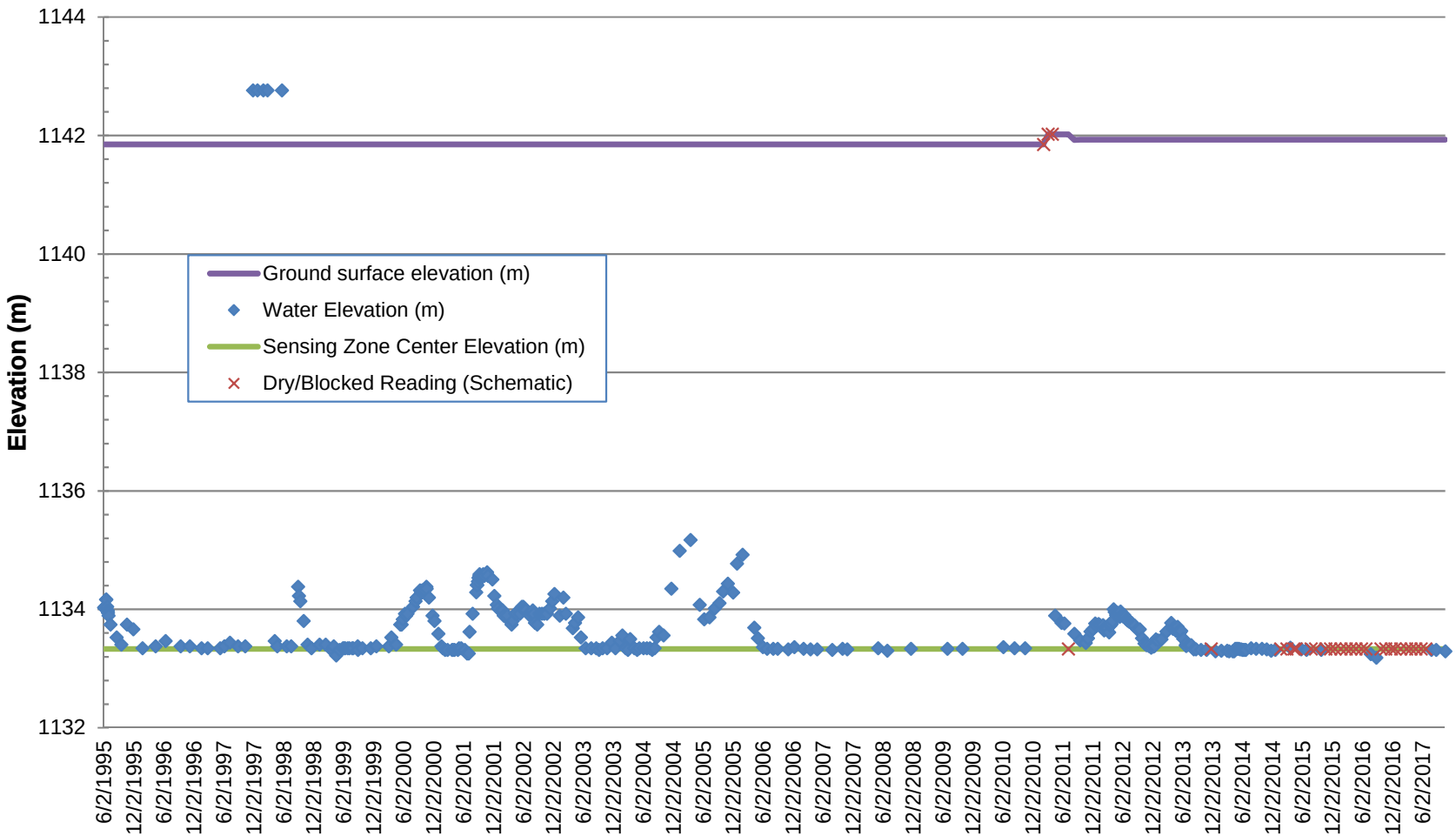
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe OW9433A (C-C')		



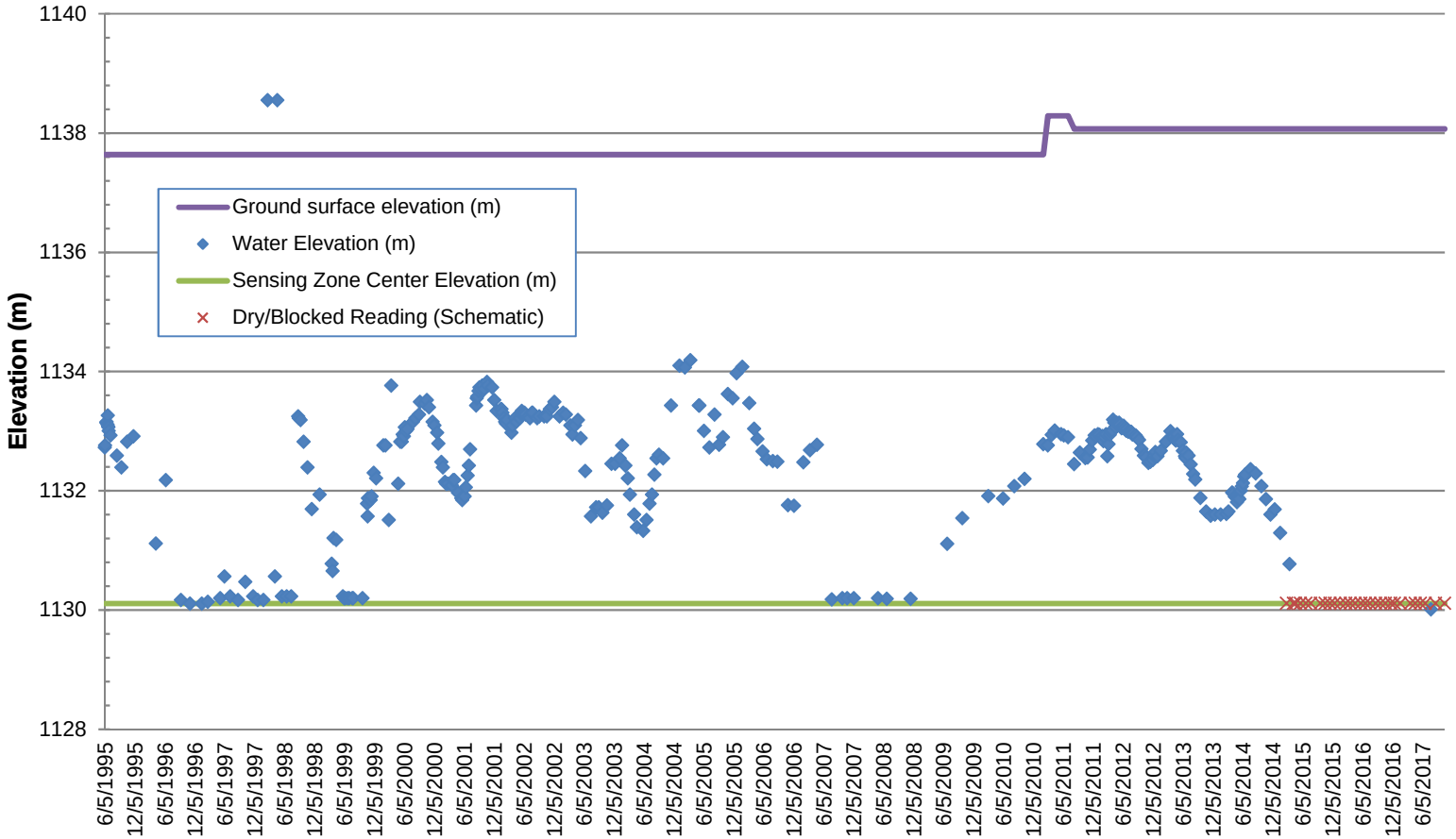
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe OW9433B (C-C')		



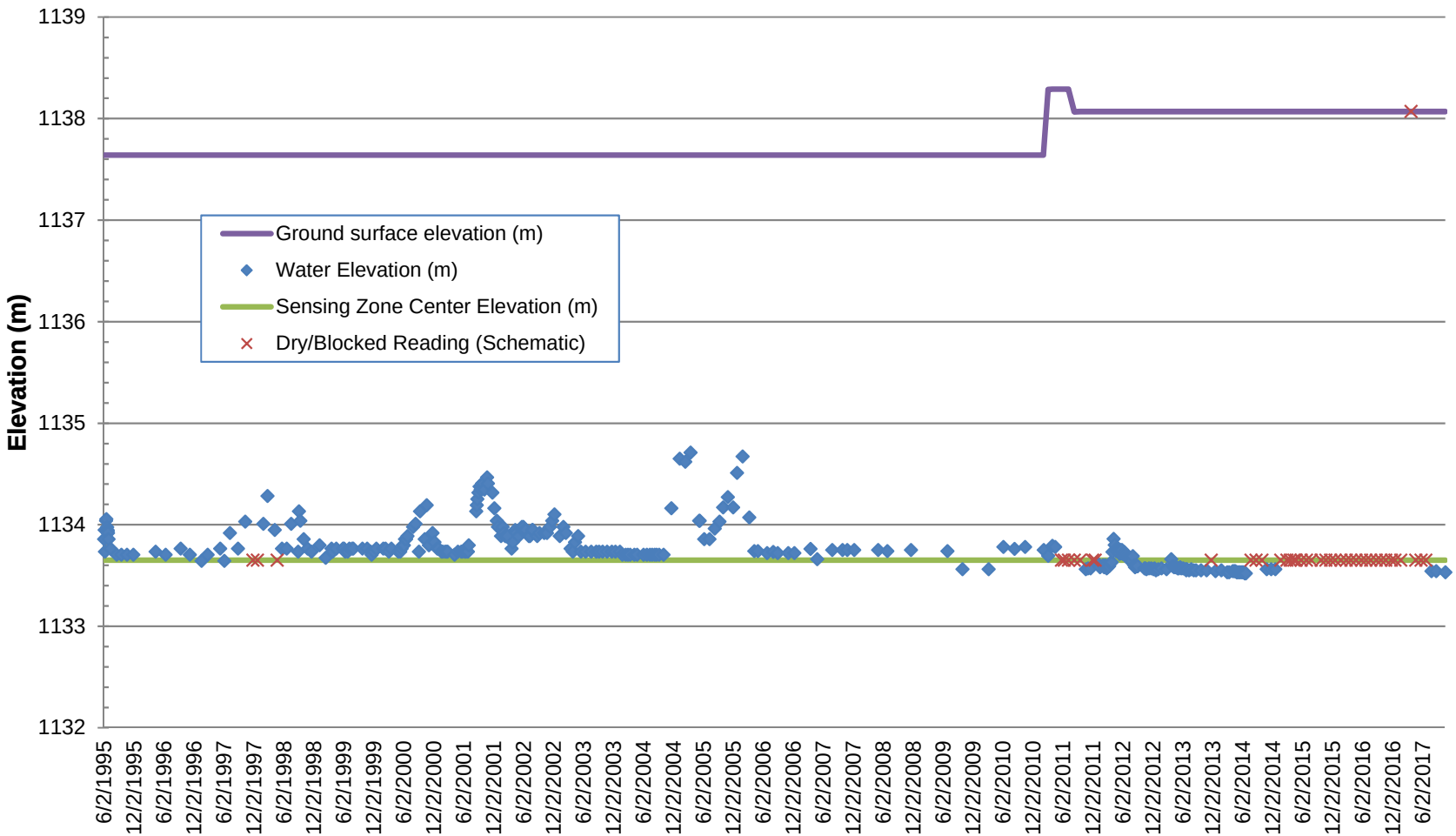
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe OW9506 (C-C')		



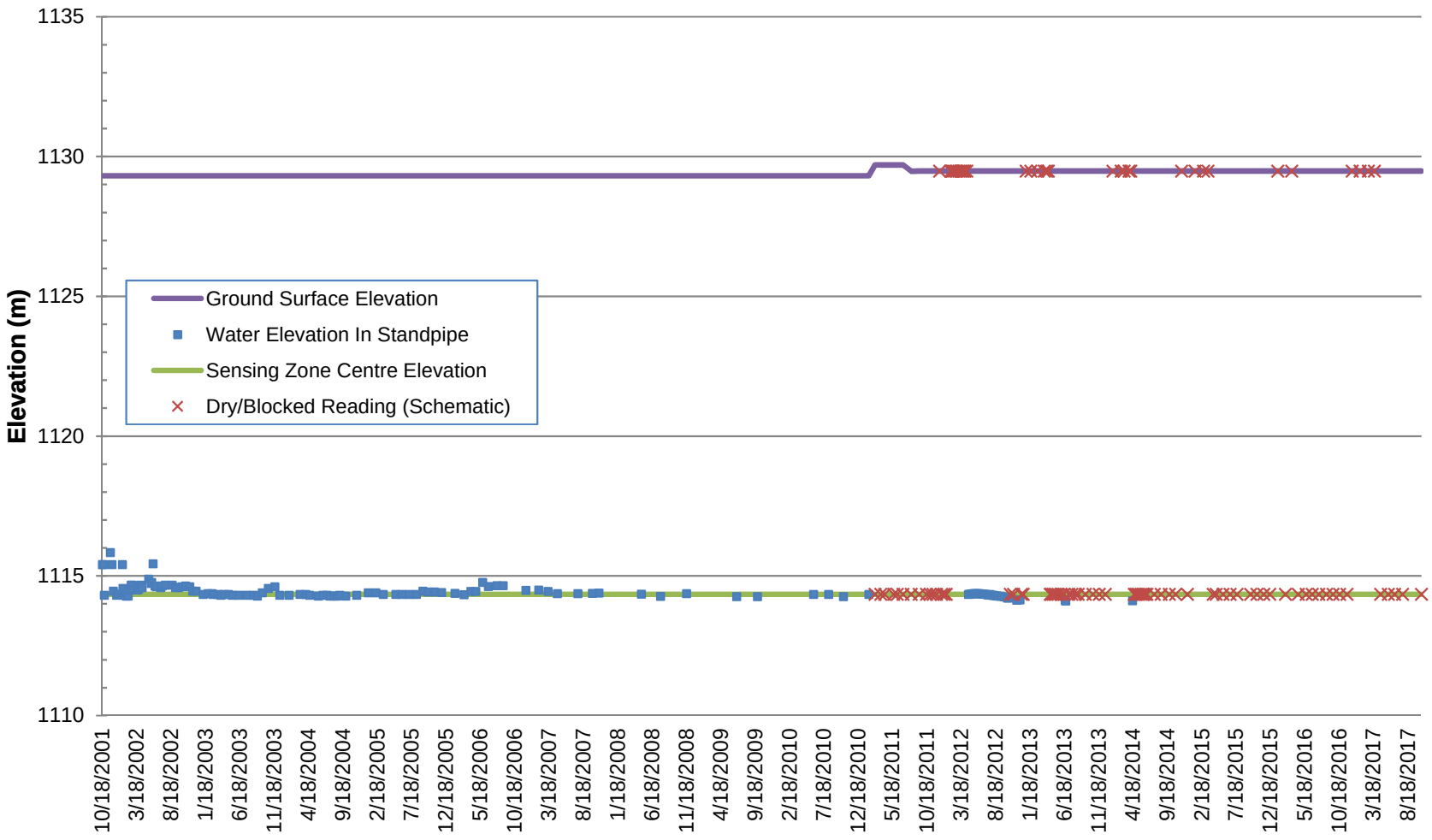
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe OW9503 (C-C')		



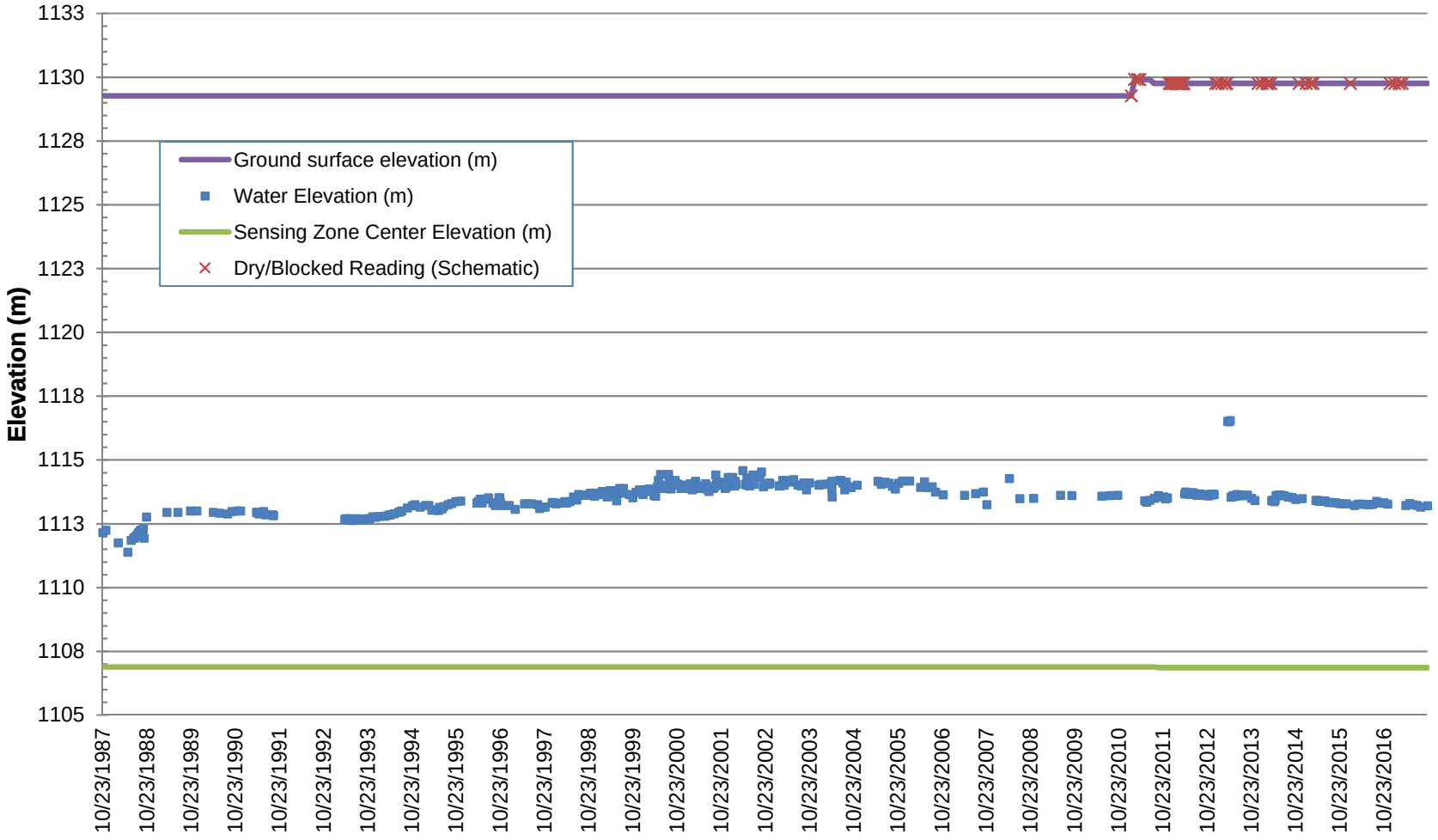
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe OW9505A (C-C')		



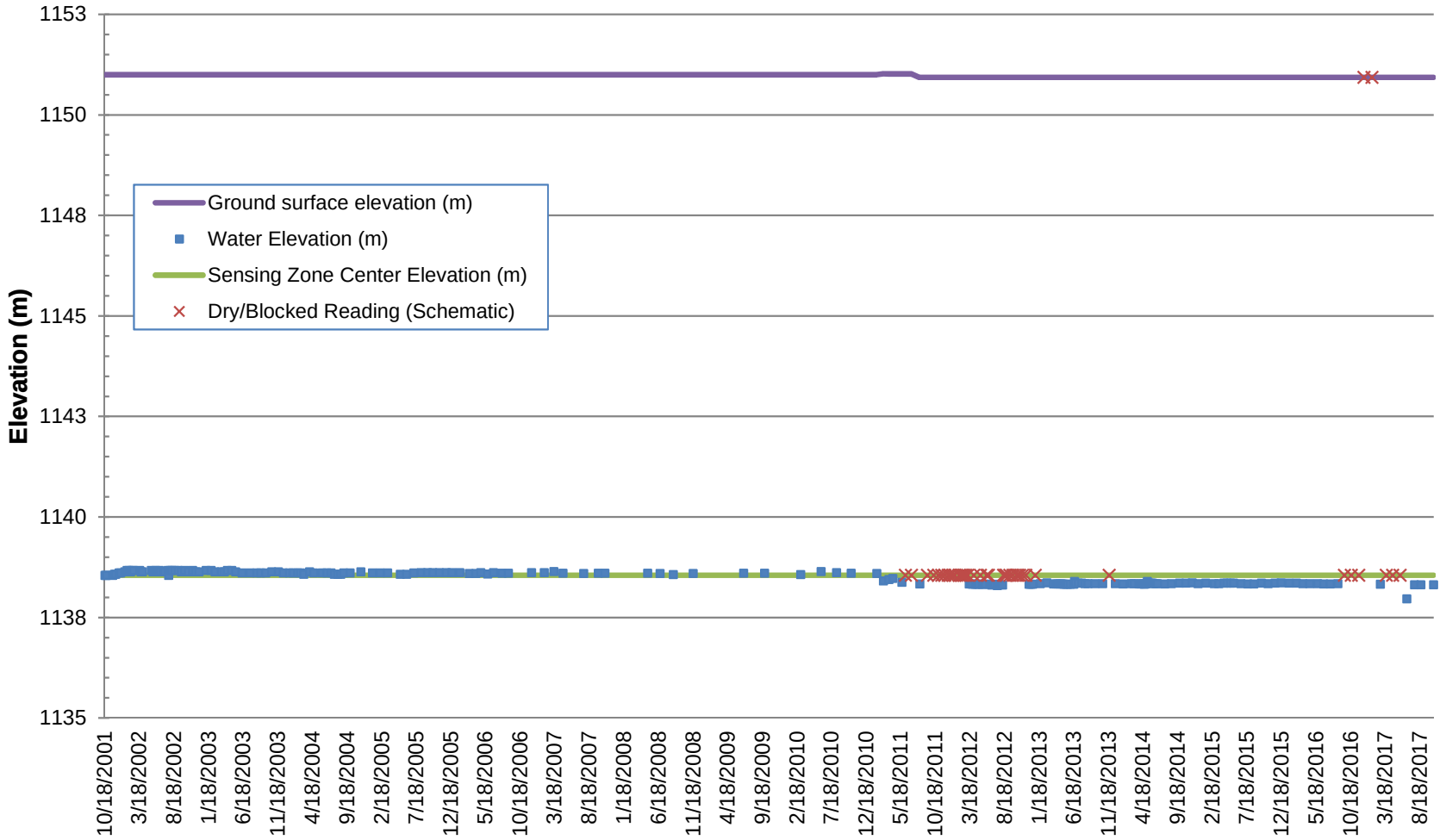
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe OW9505B (C-C')		



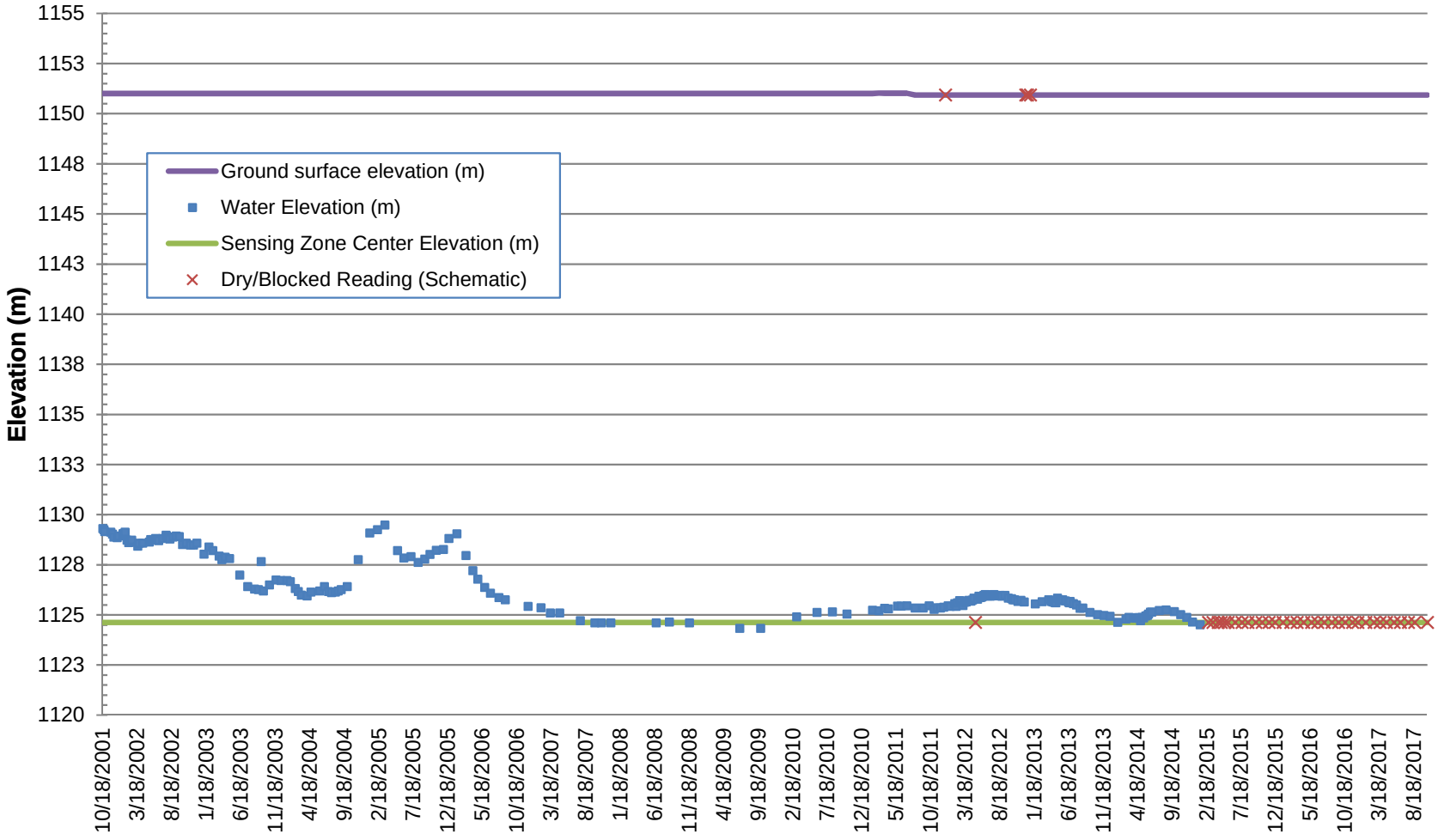
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe C01-02 (C-C')		



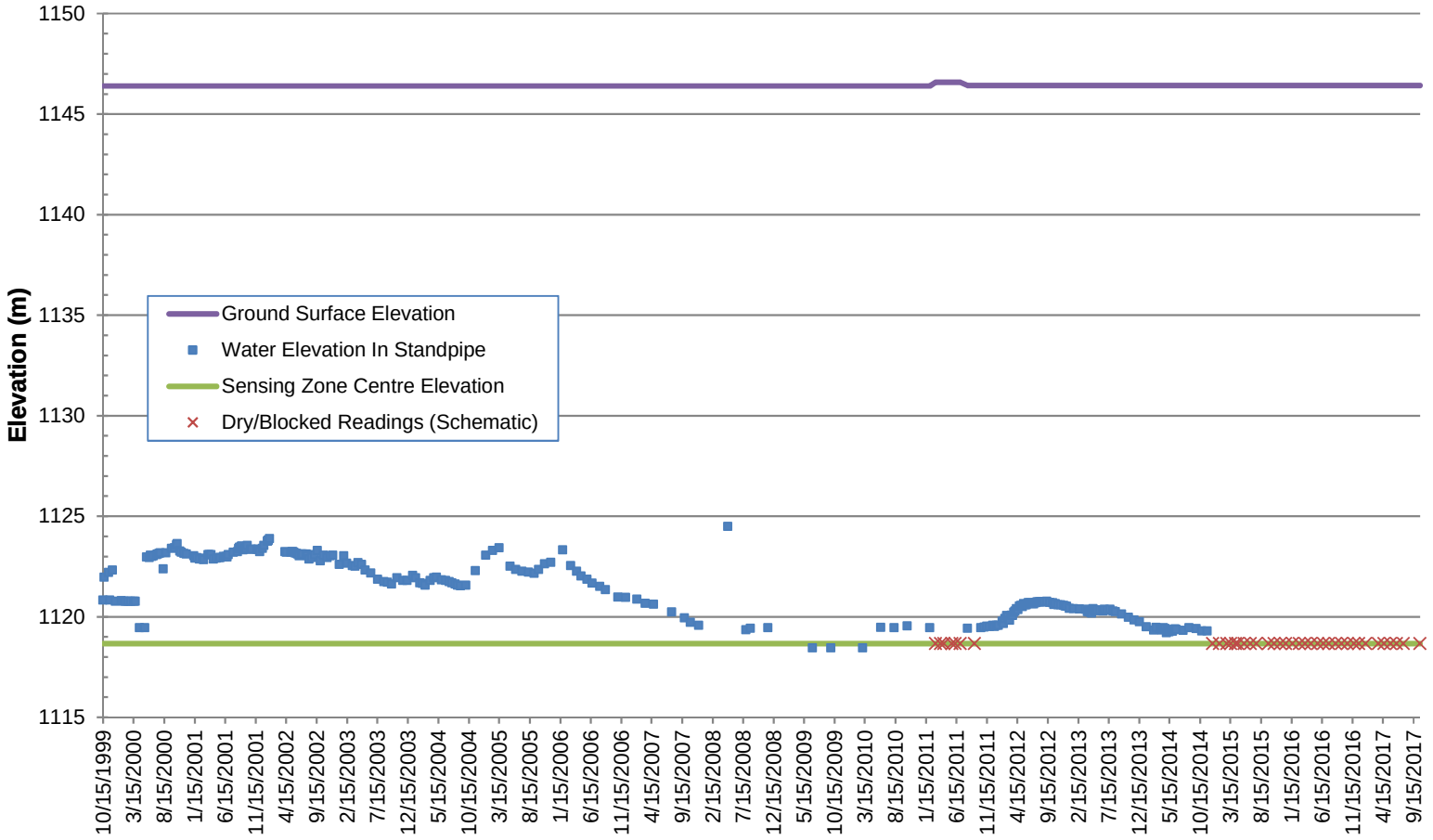
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe OW-4 (bt C-C' & D-D')		



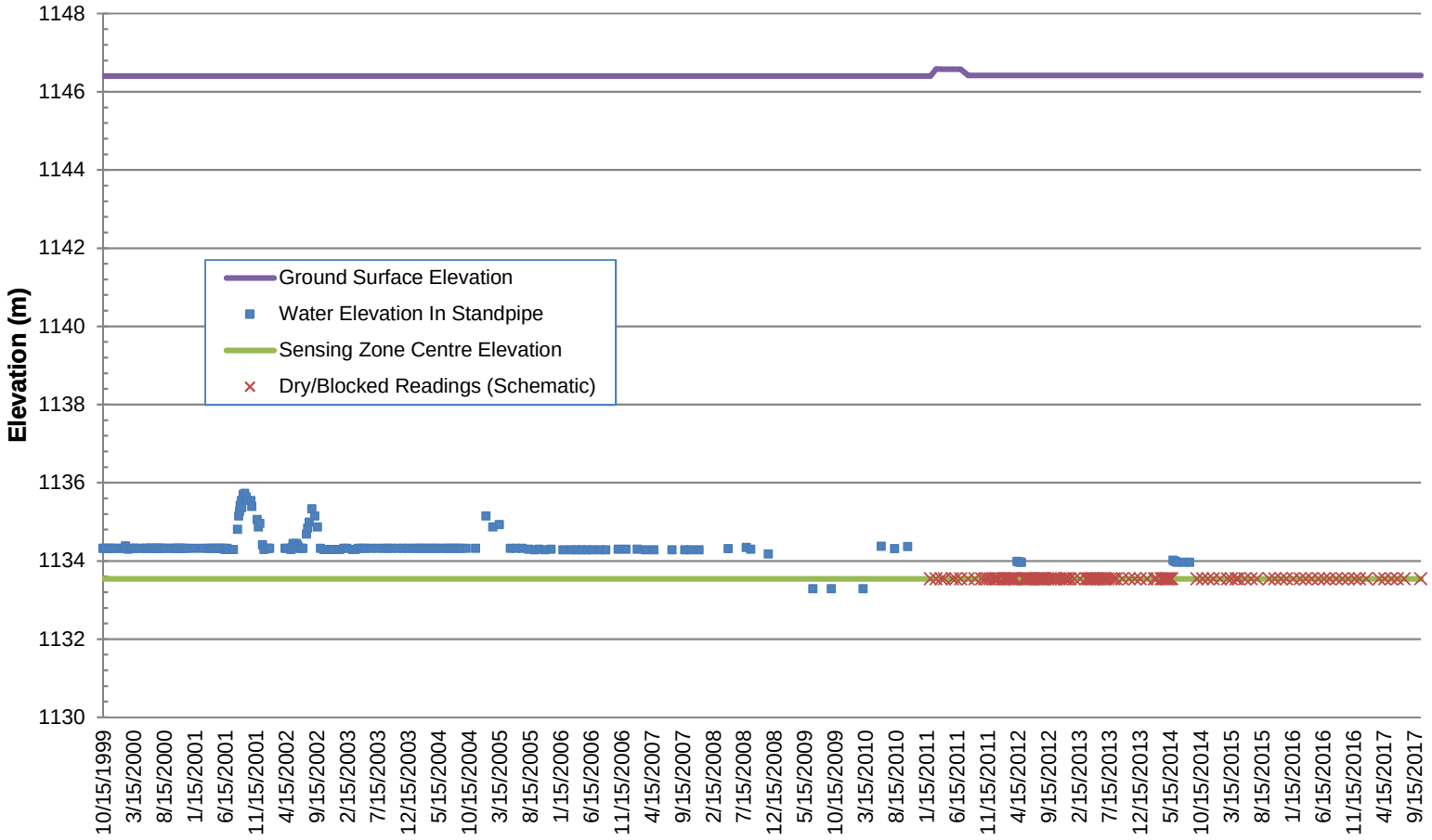
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe D01-05A (bt C-C' & D-D')		



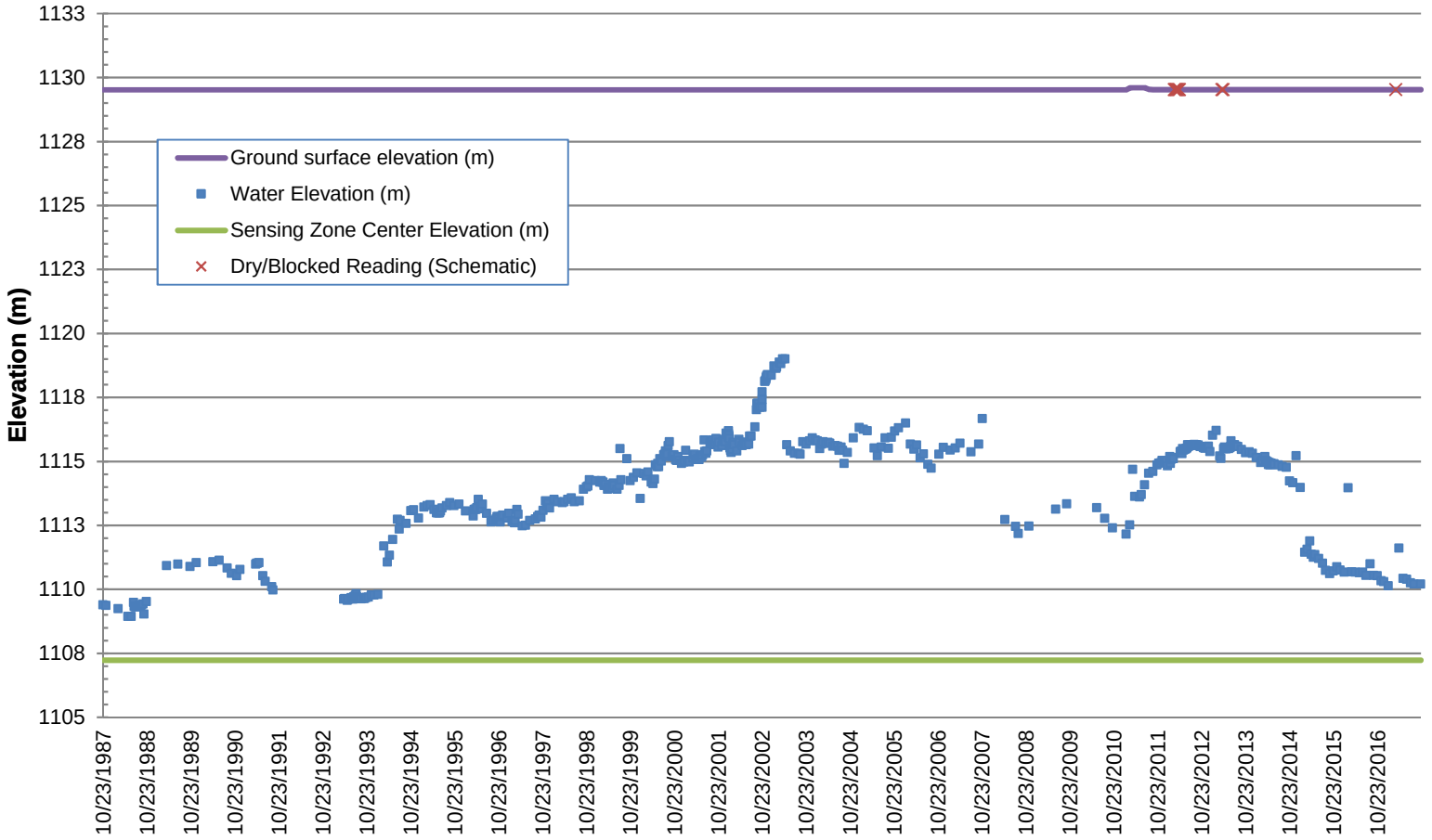
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe D01-05B (bt C-C' & D-D')		



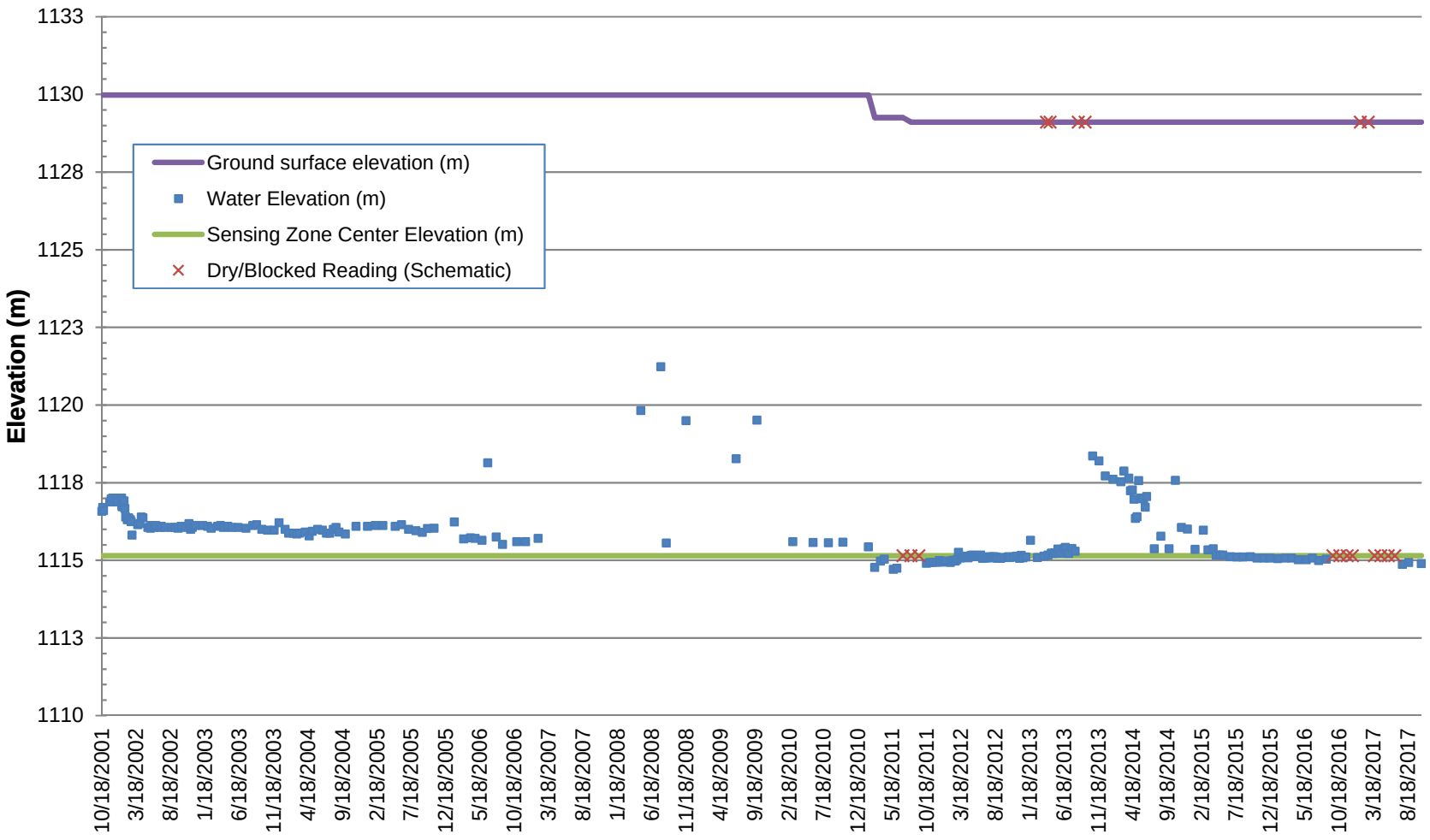
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe 99-05A (D-D')		



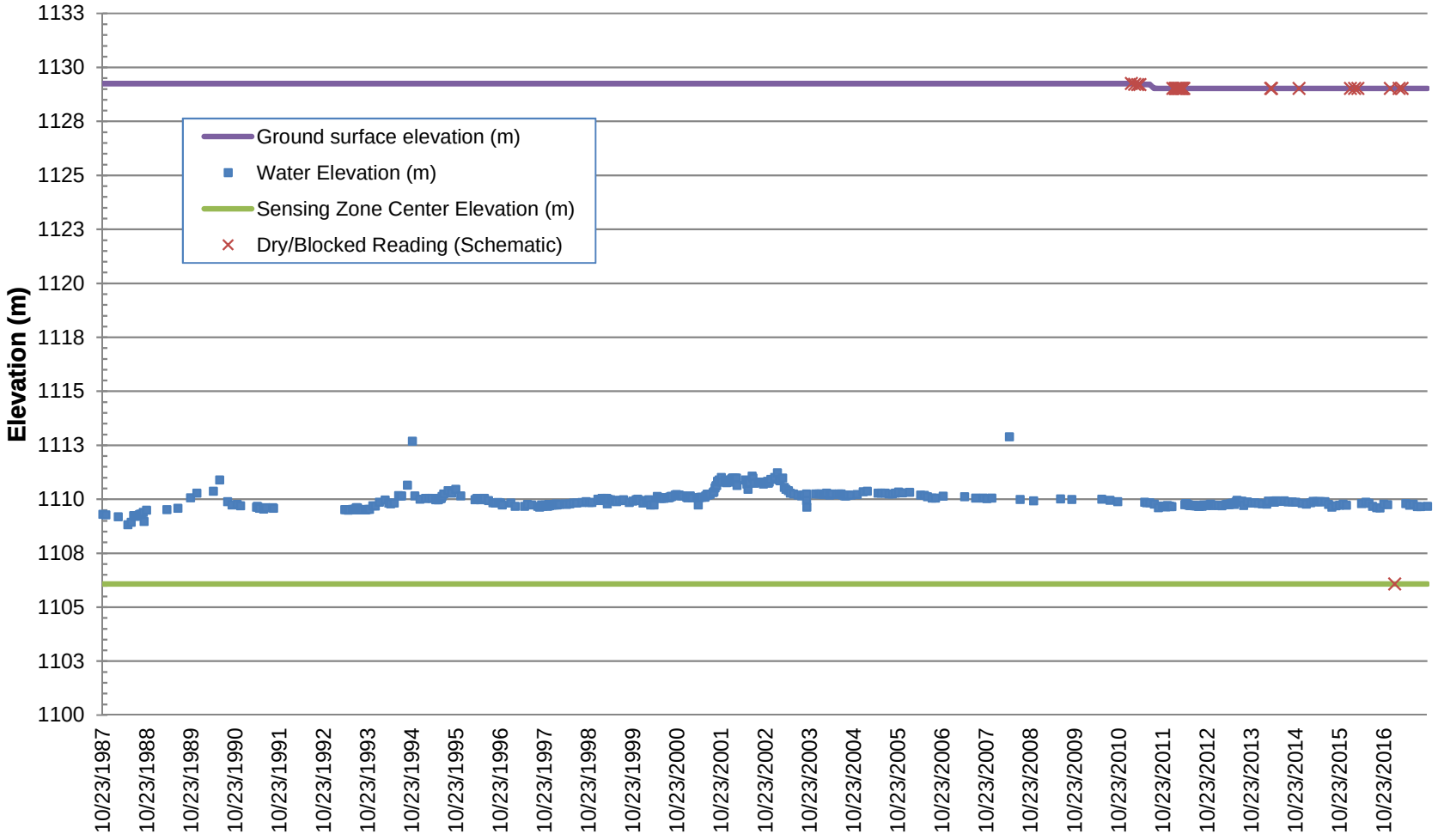
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe 99-05B (D-D')		



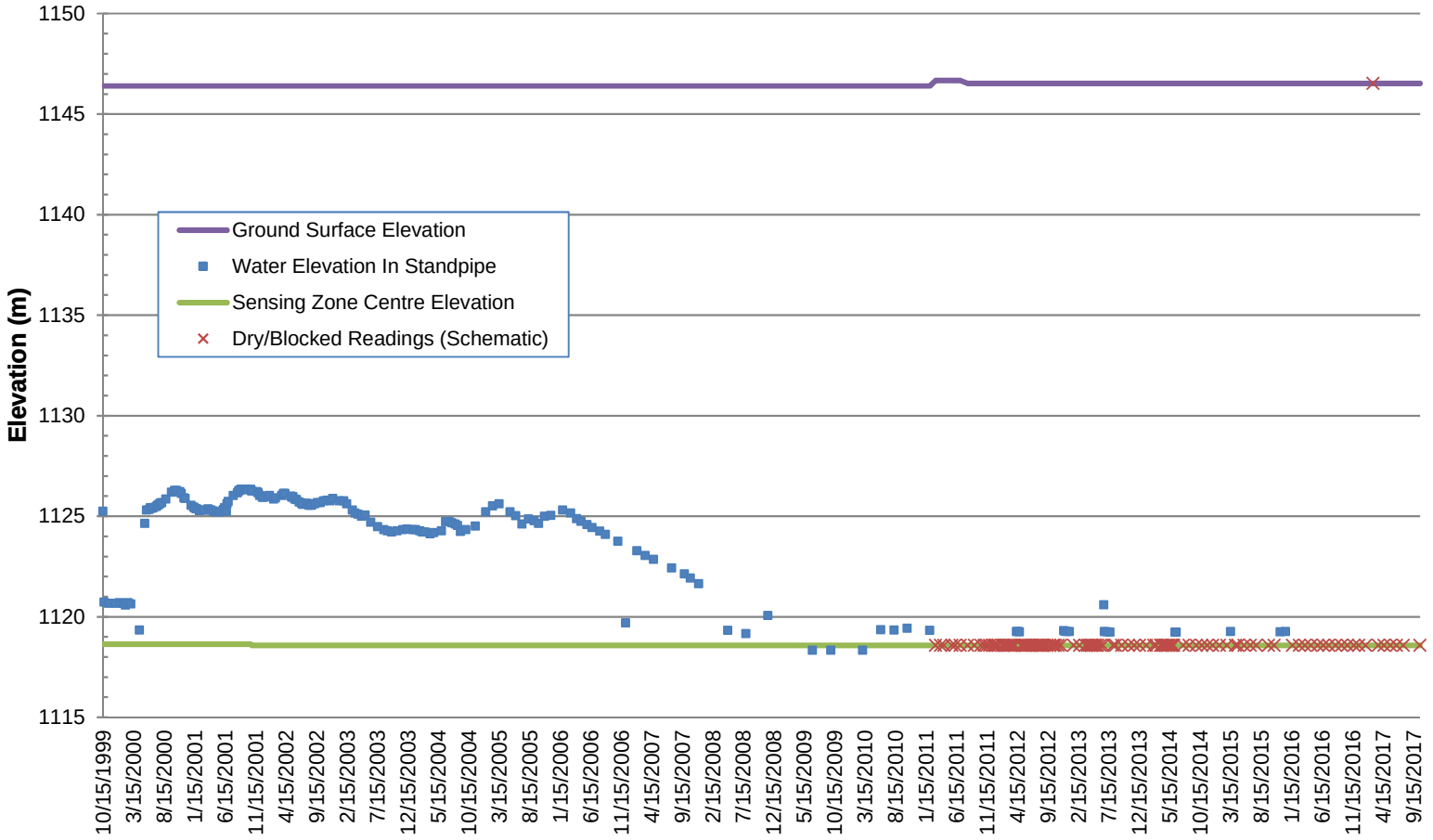
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe OW-5 (D-D')		



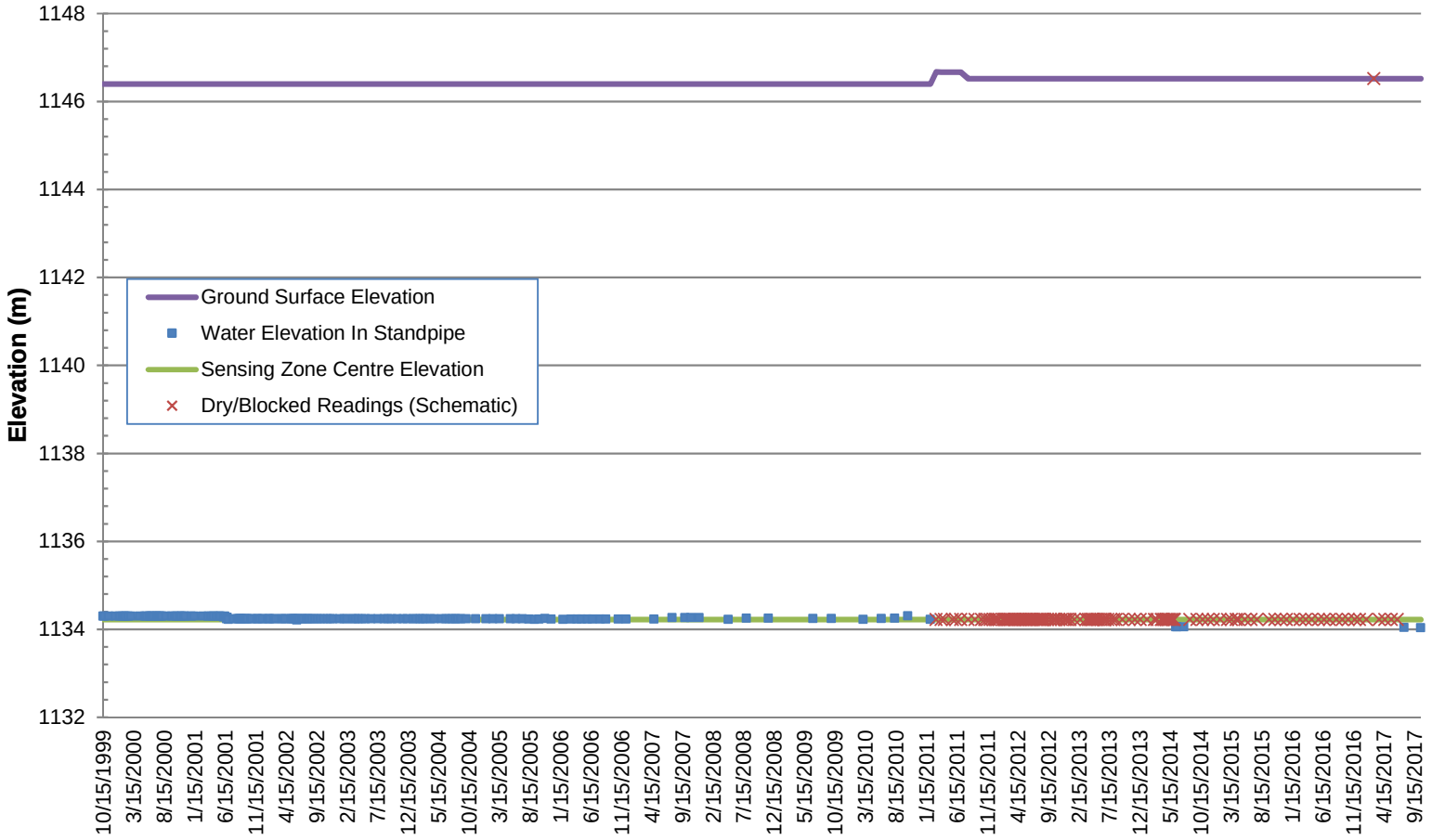
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe D01-04 (bt D-D' & E-E')		



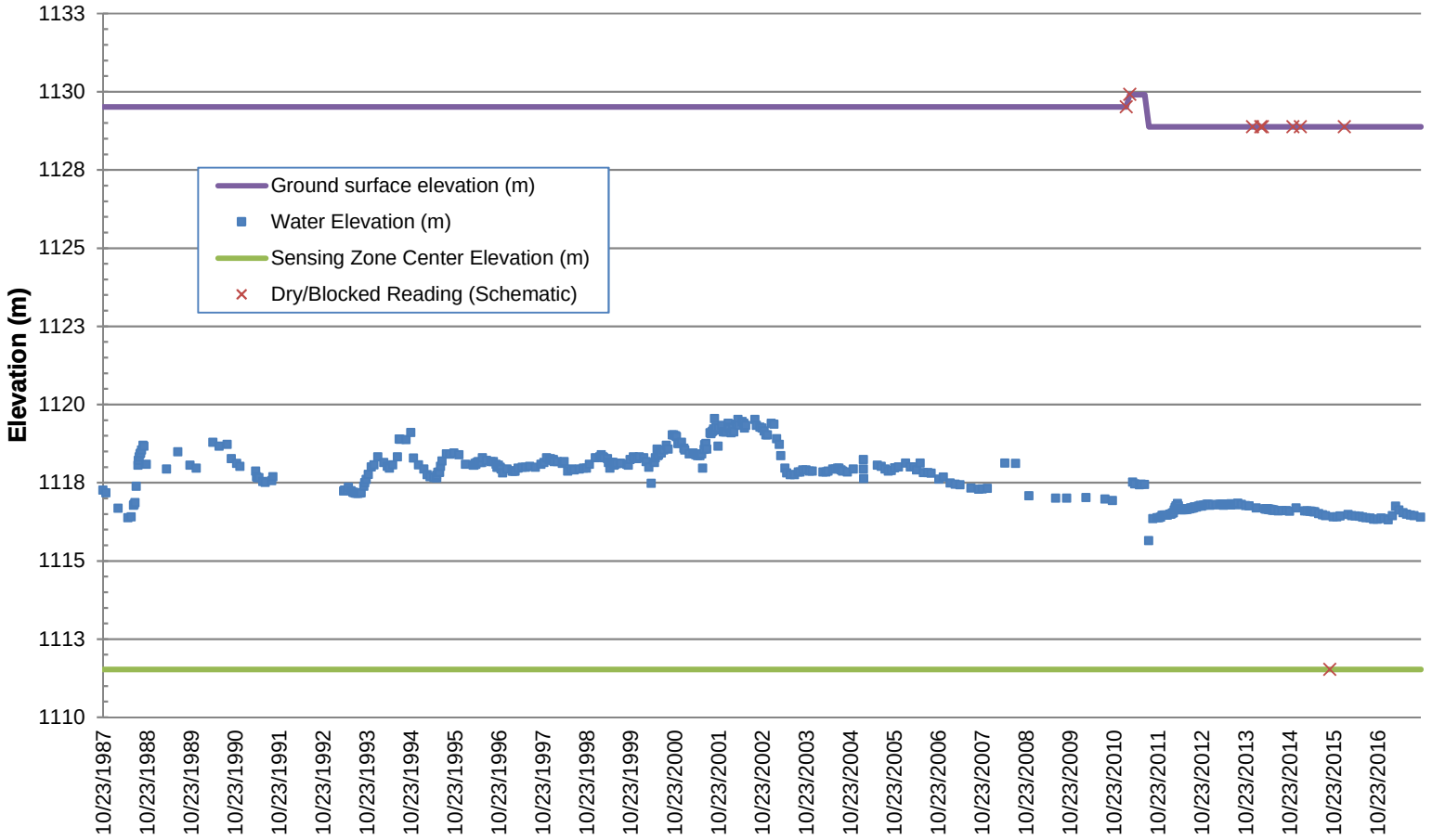
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe OW-6 (bt D-D' & E-E')		



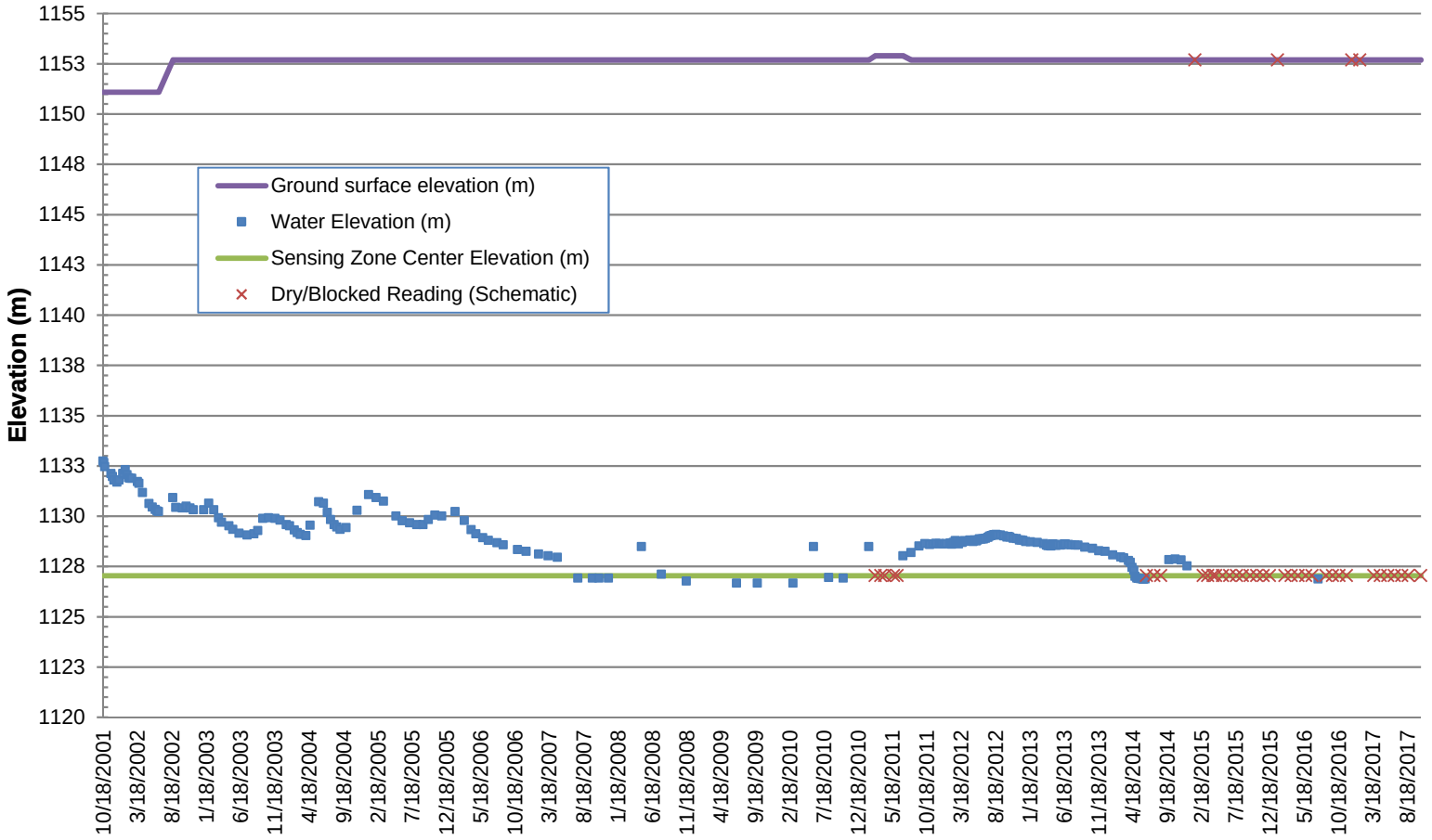
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe 99-06A (E-E')		



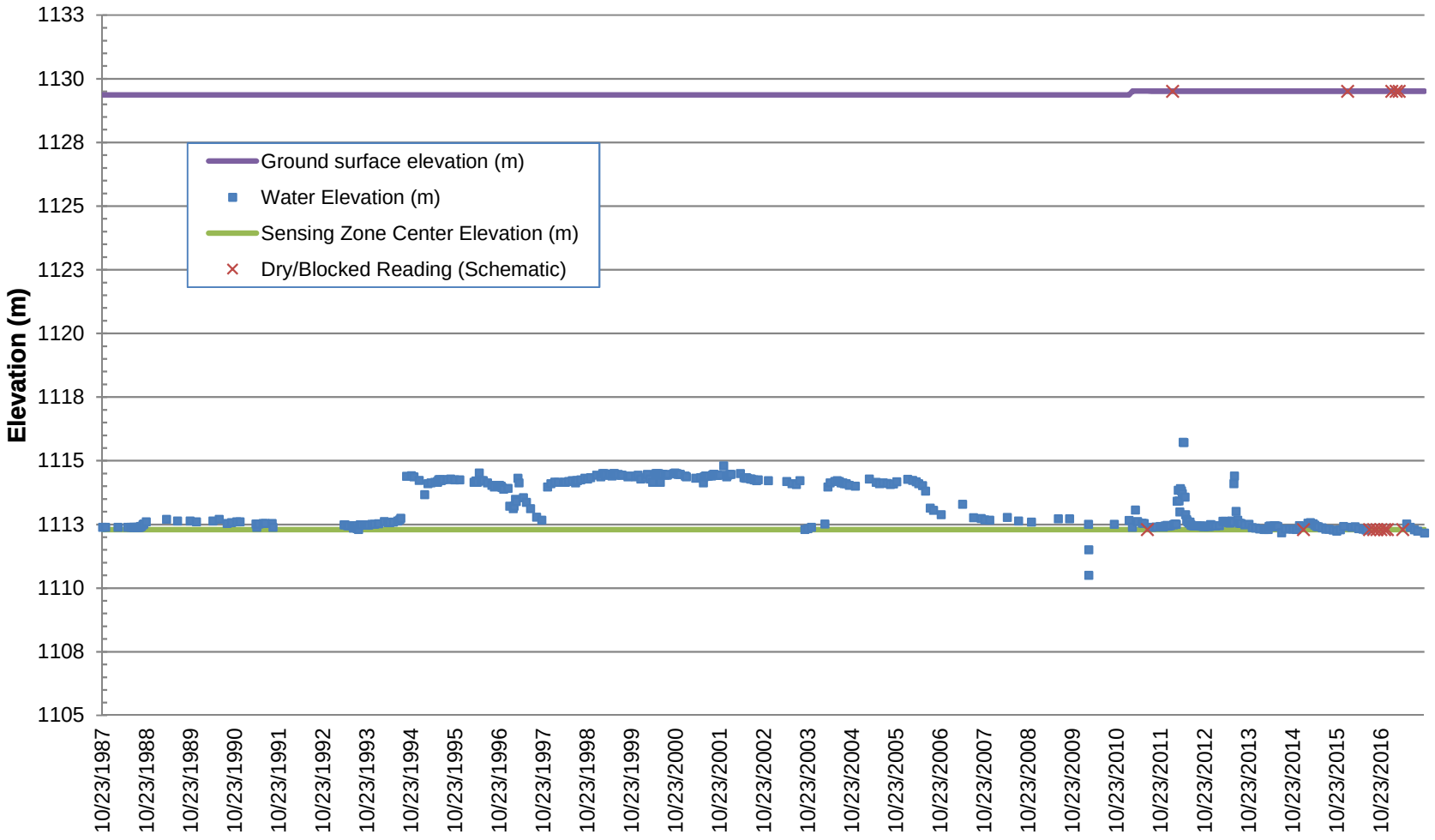
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe 99-06B (E-E')		



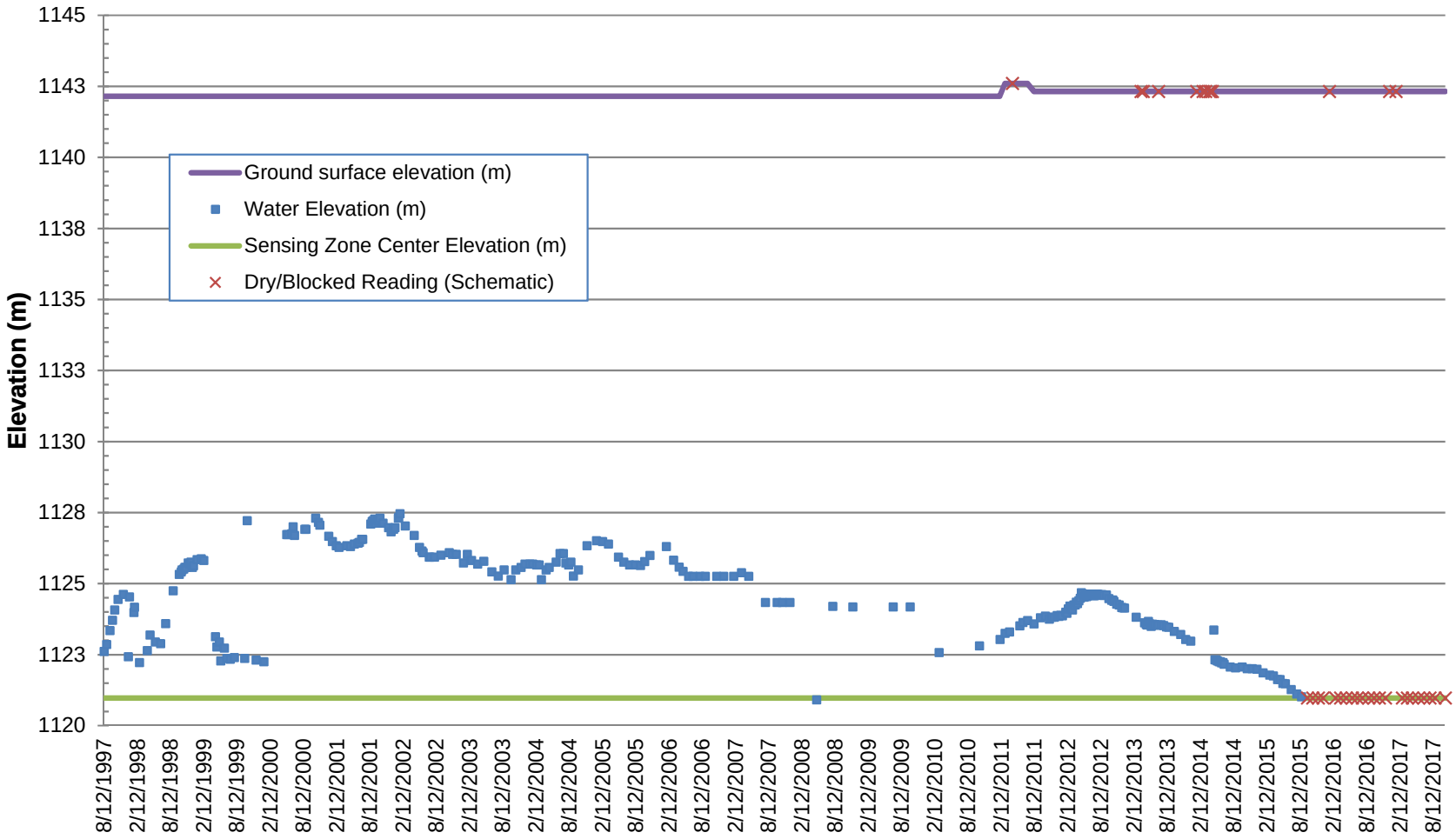
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe OW-7 (E-E')		



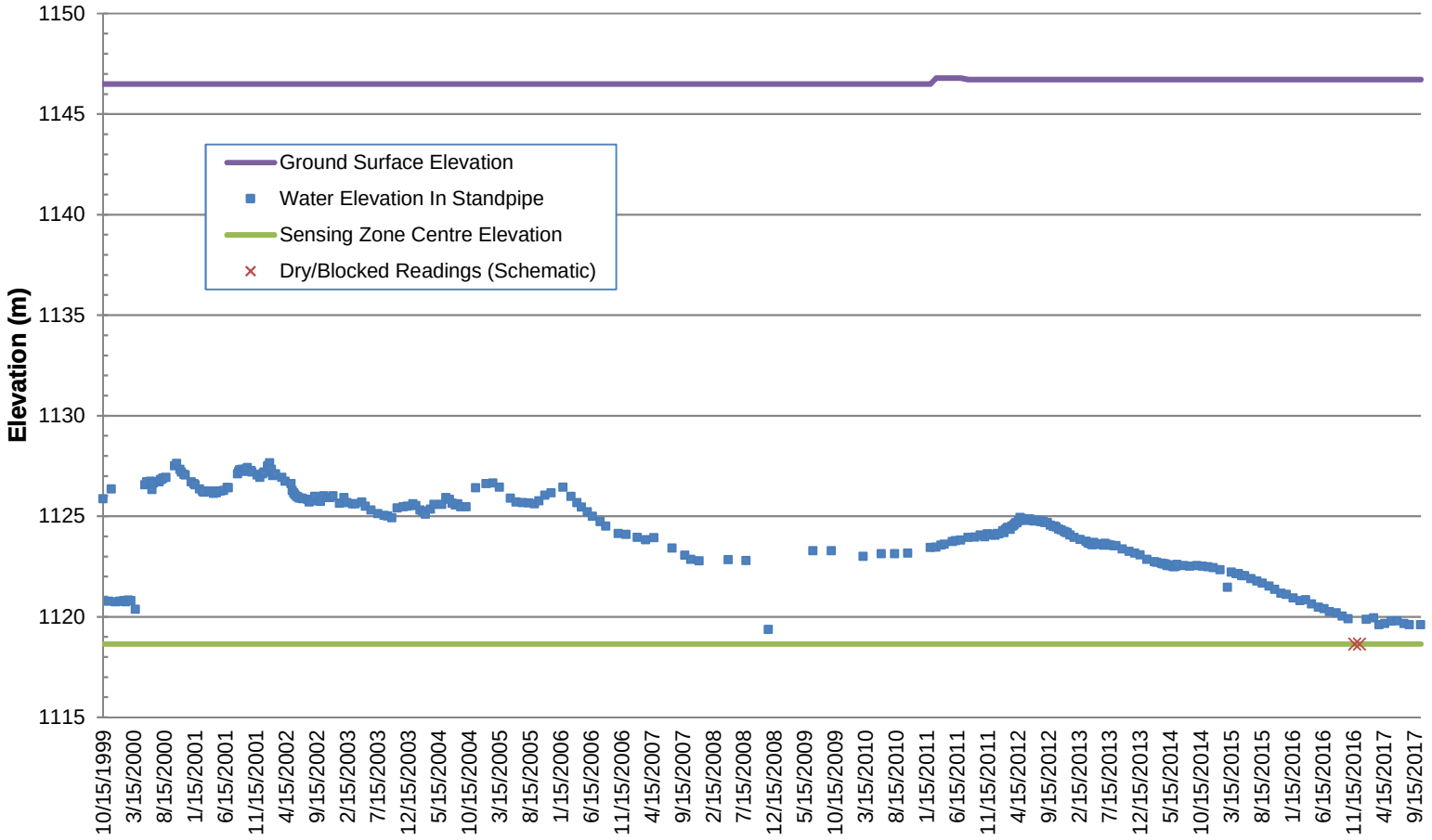
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe F01-06 (F-F')		



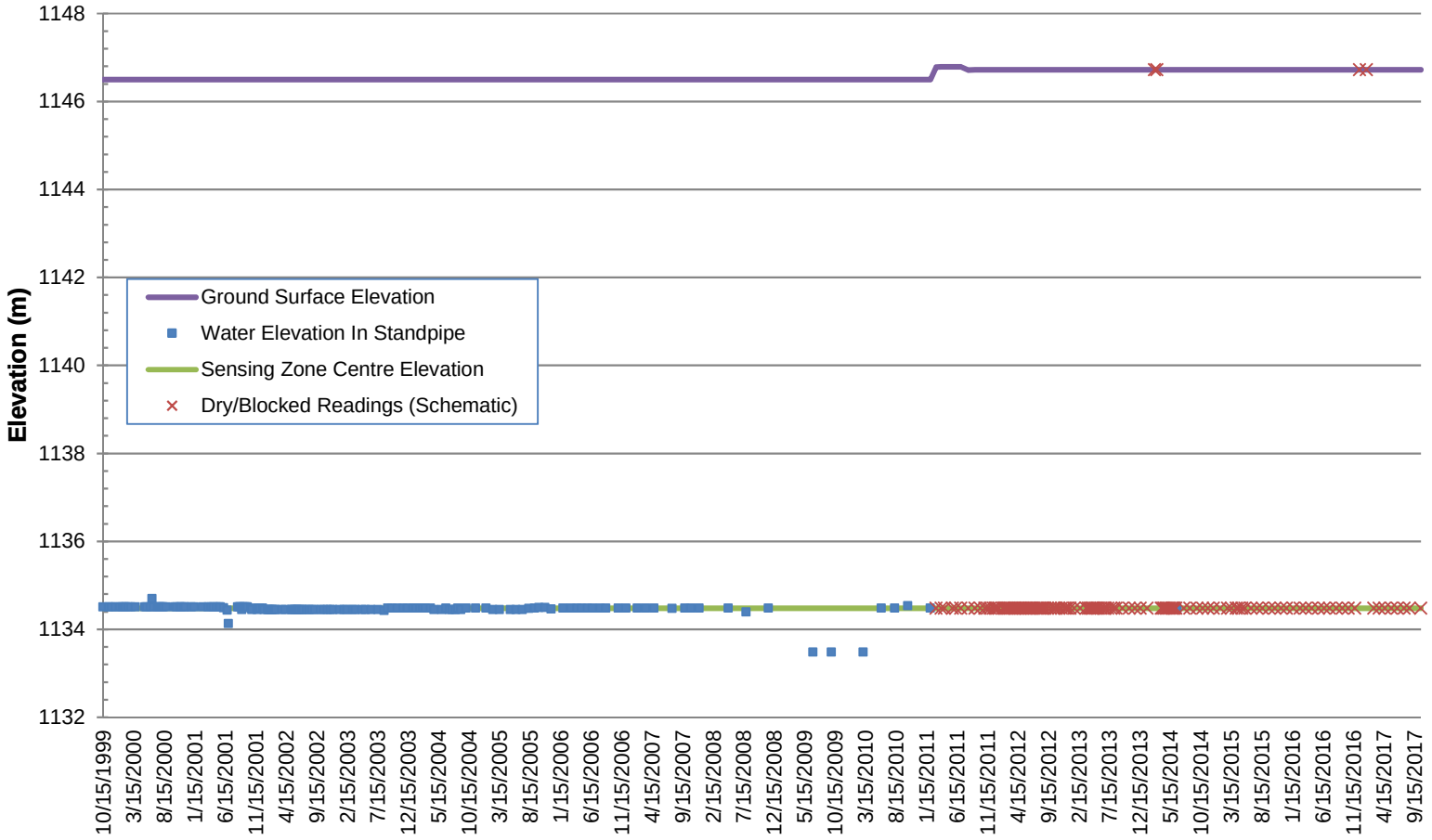
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe OW-9 (F-F')		



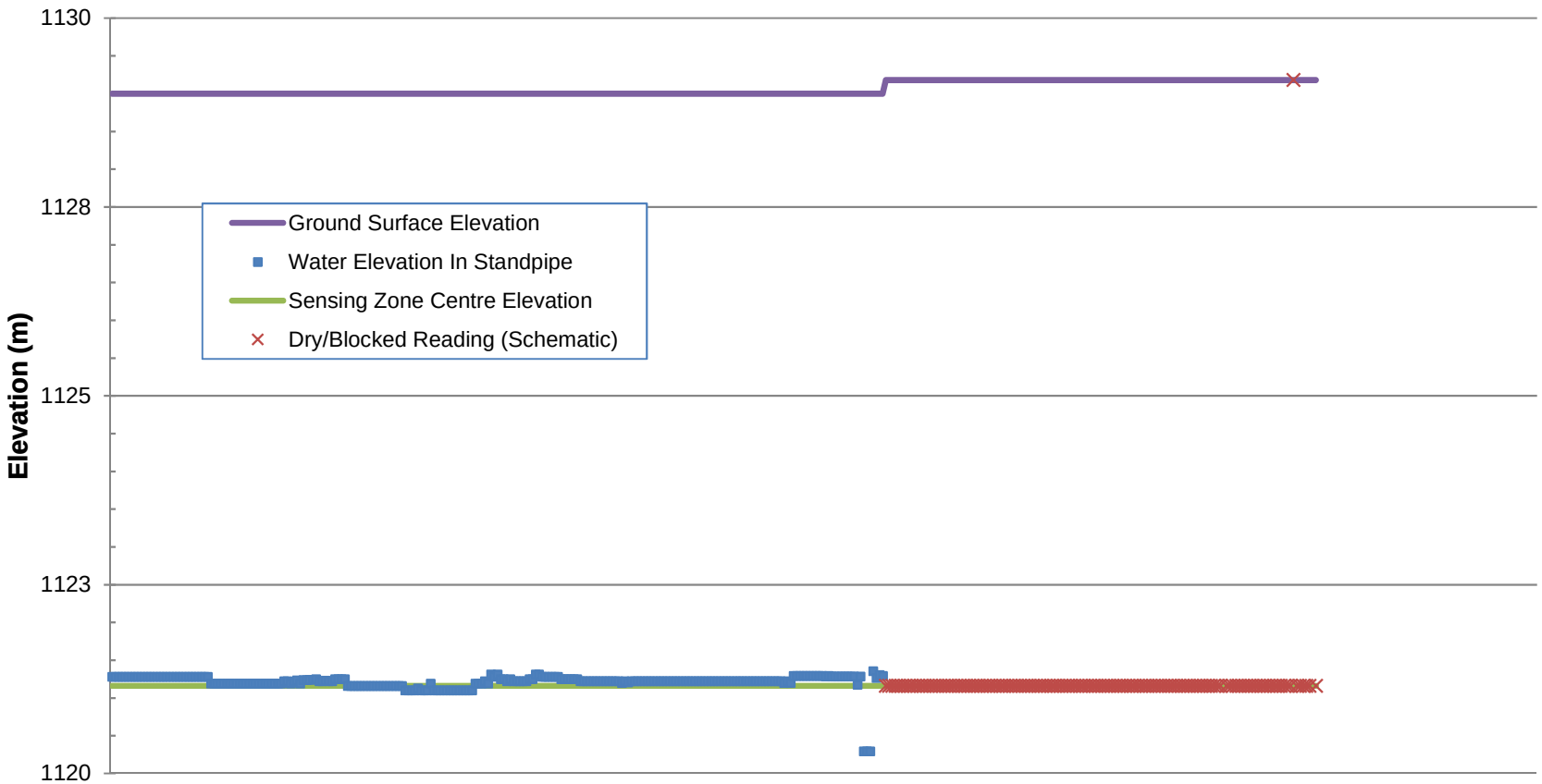
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe GT-9701 (bt F-F' & G-G')		



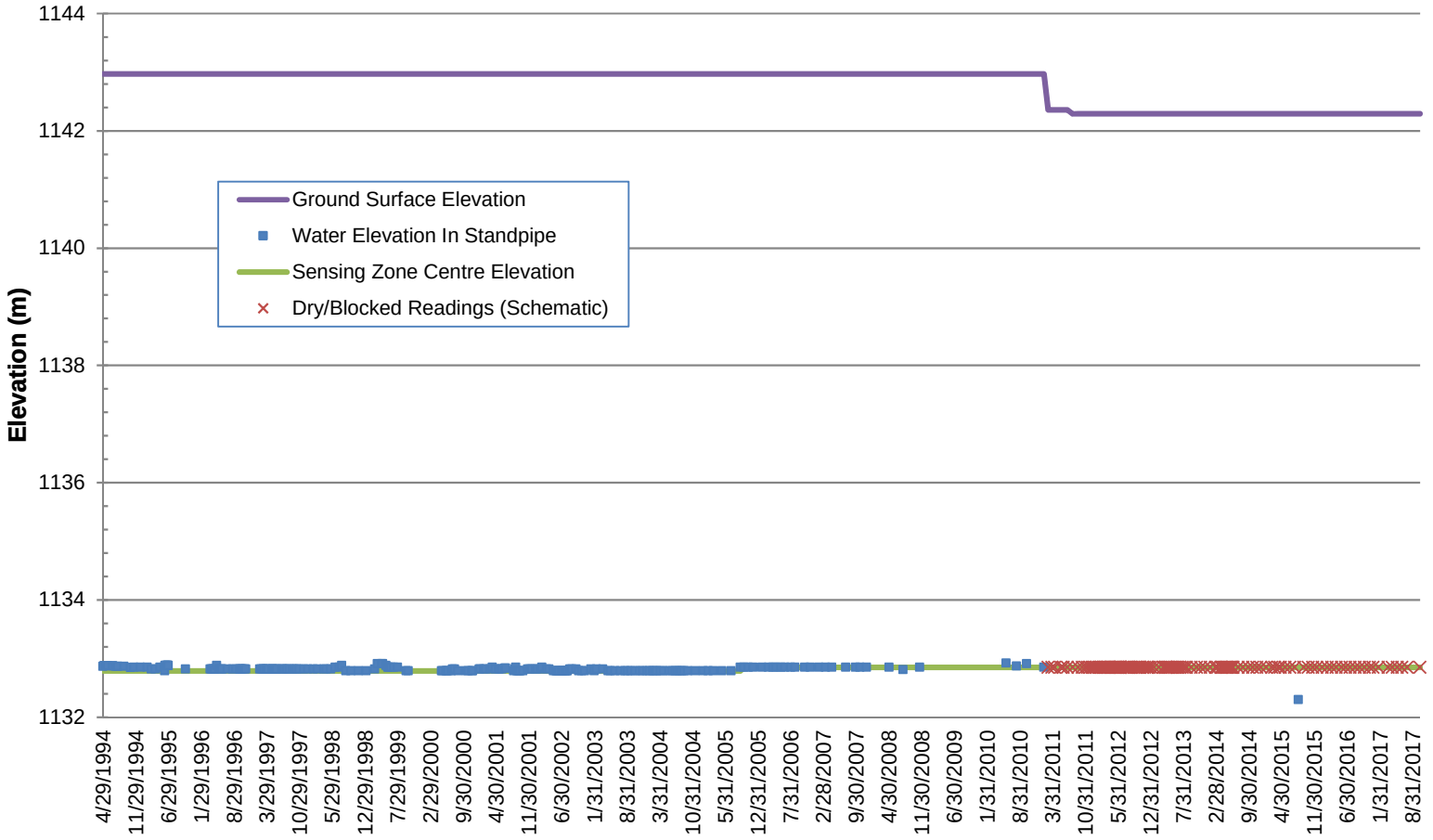
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe 99-07A (bt F-F' & G-G')		



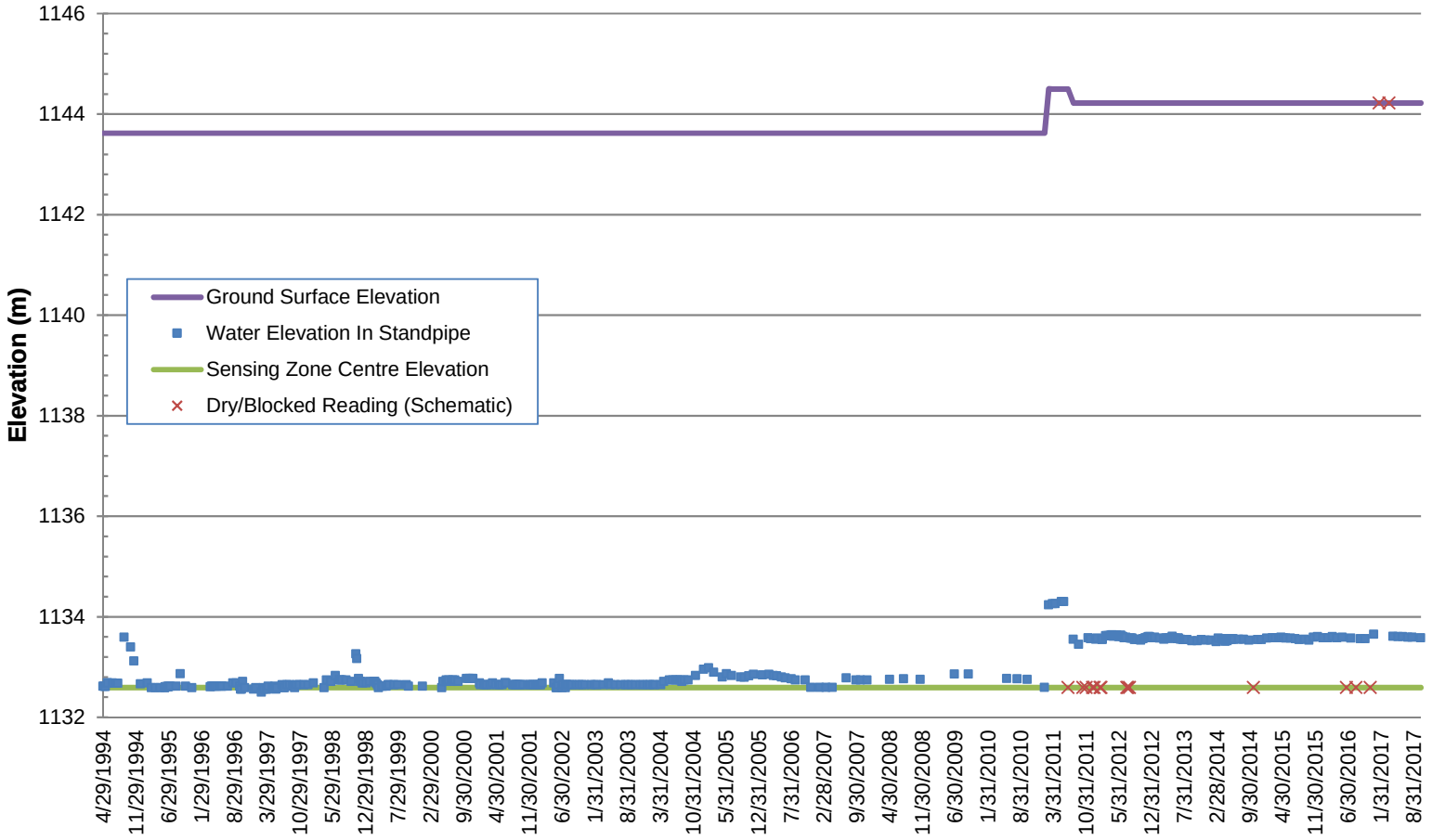
Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe 99-07B (bt F-F' & G-G')		



Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe OW-10 (bt F-F' & G-G')		



Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe BH-30 (G-G')		



Teck Coal - Elkview Operations		
Lagoon D Piezometers	Date:	Revision
Standpipe BH-29A (bt G-G' & H-H')		

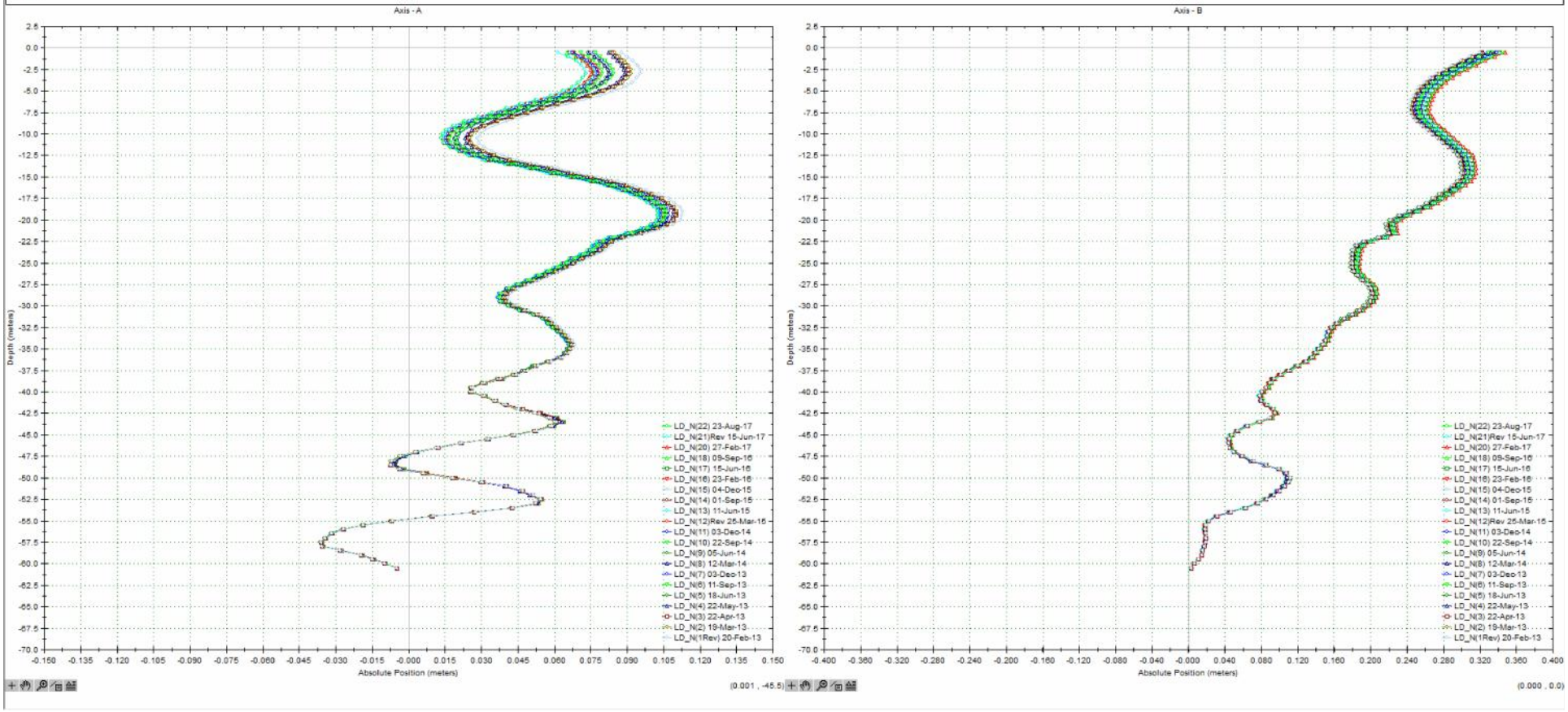
RST Instruments Ltd.

ABSOLUTE POSITION

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



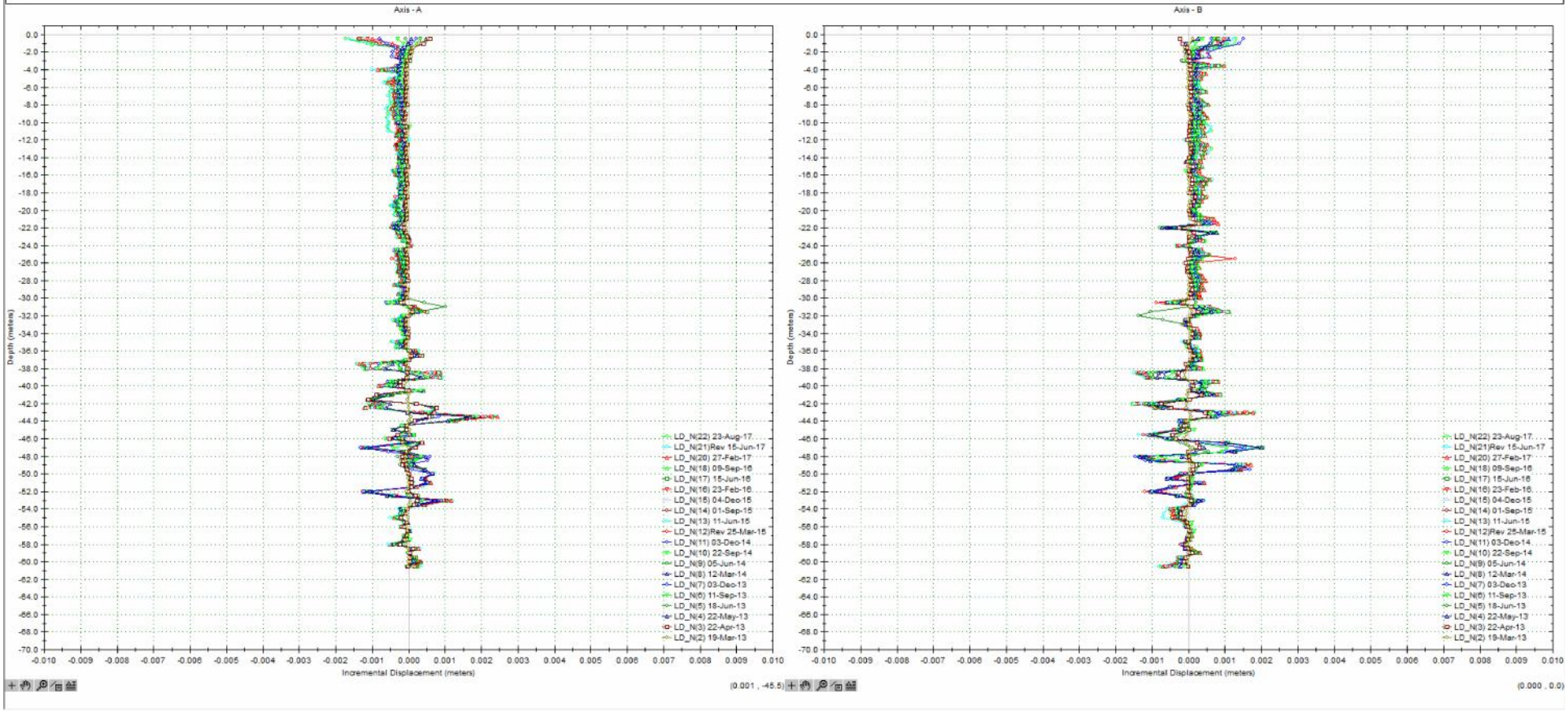
RST Instruments Ltd.

INCREMENTAL 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



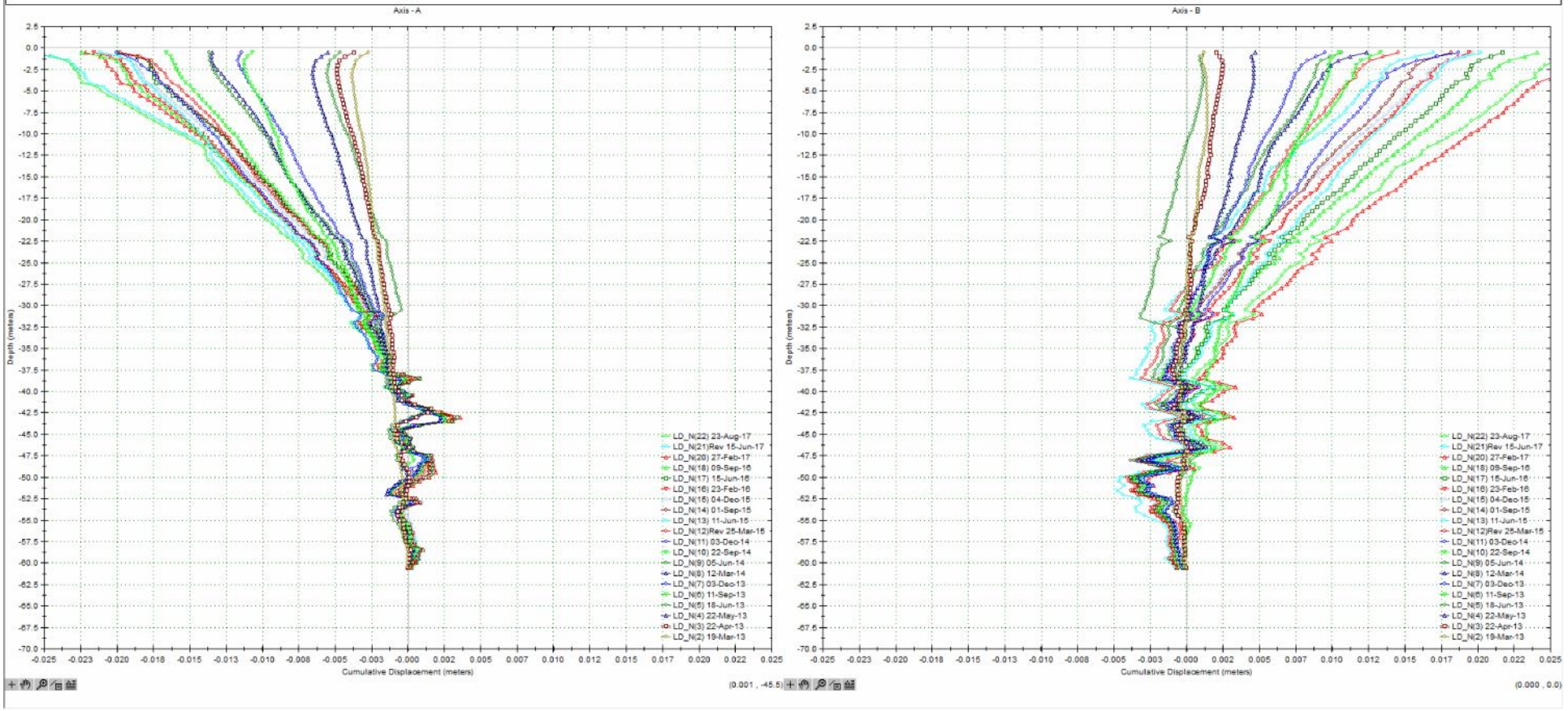
RST Instruments Ltd.

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



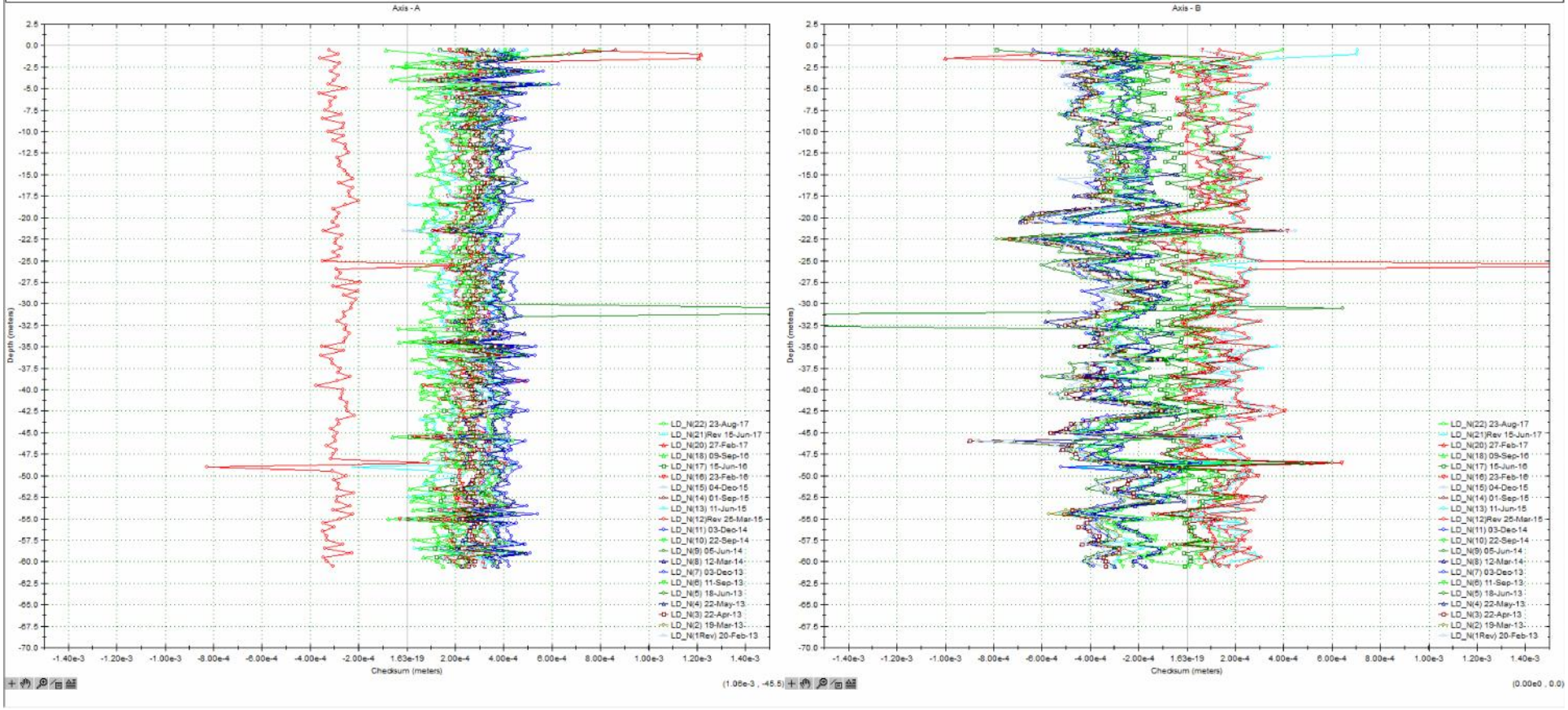
RST Instruments Ltd.

CHECKSUM

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



(1.06e-3 , -45.5)

(0.00e0 , 0.0)

RST Instruments Ltd.

Borehole : LD_N
Project : LagoonD
Location :
Northing :
Easting :
Collar :
Collar Elev : 0.0 meters

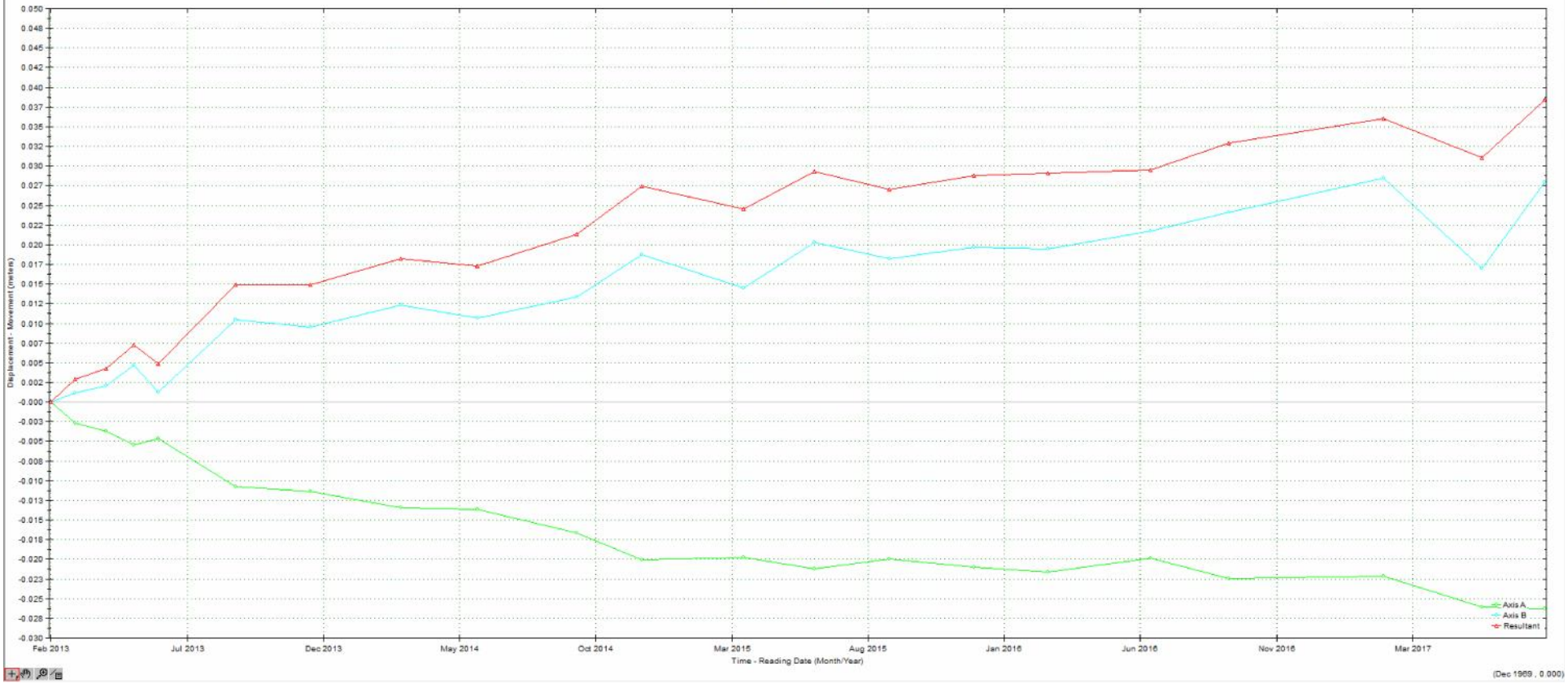
TIME PLOT

Displacement vs. Time

Inclinalysis v.2.27

Spiral Correction : N/A
Movement Depth : 0.5 - 60.5 meters
Borehole Total Depth : 60.5 meters
North Groove Azimuth :
Latest Reading : 2017 Aug 23 14:26
Initial Reading : 2013 Feb 20 11:27
Axis A Azimuth : 0.0 degrees

Time Plot : 0.5 - 60.5 meters



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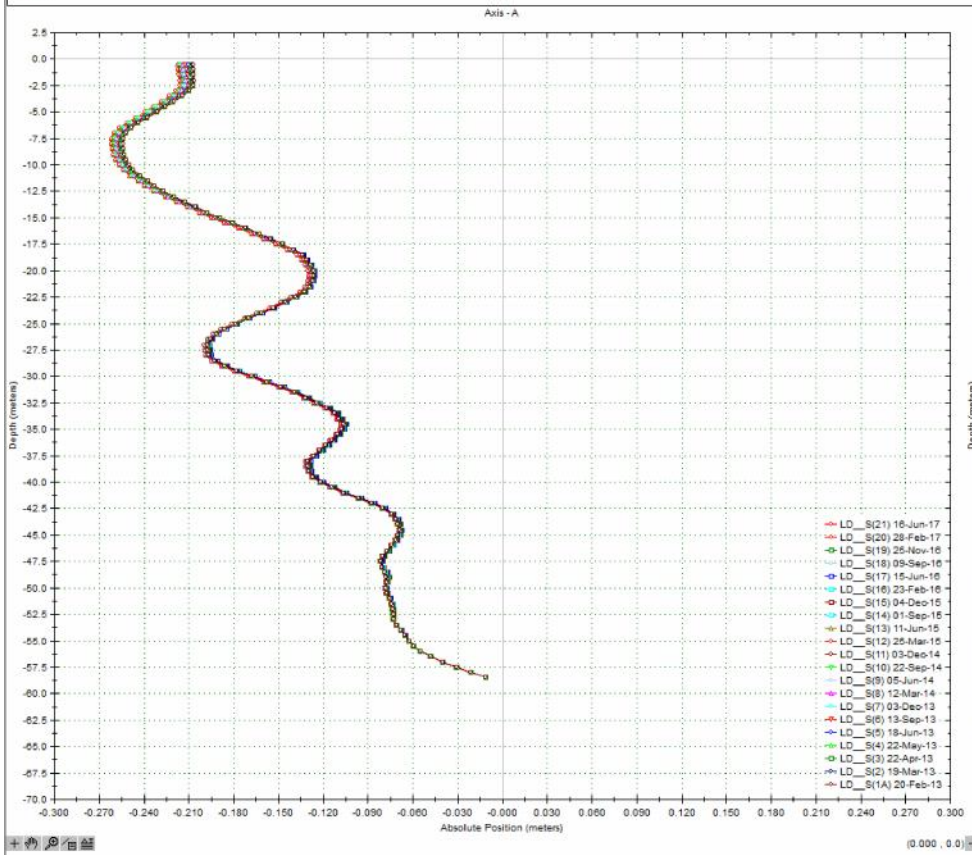
RST Instruments Ltd.

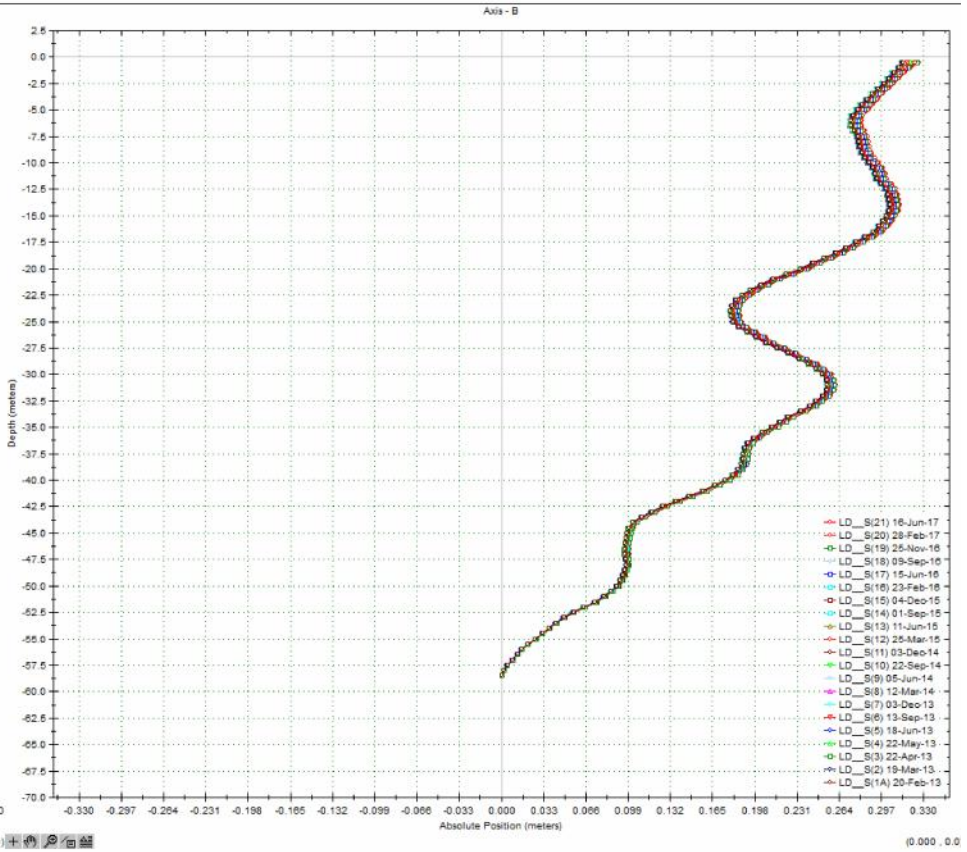
ABSOLUTE POSITION

Inclinalysis v.2.27

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

Spiral Correction : N/A
Collar Elevation : 0.0 meters
Borehole Total Depth : 68.6 meters
North Groove Azimuth :
Base Reading : 2013 Feb 20 12:51
Axis A Azimuth : 0.0 degrees





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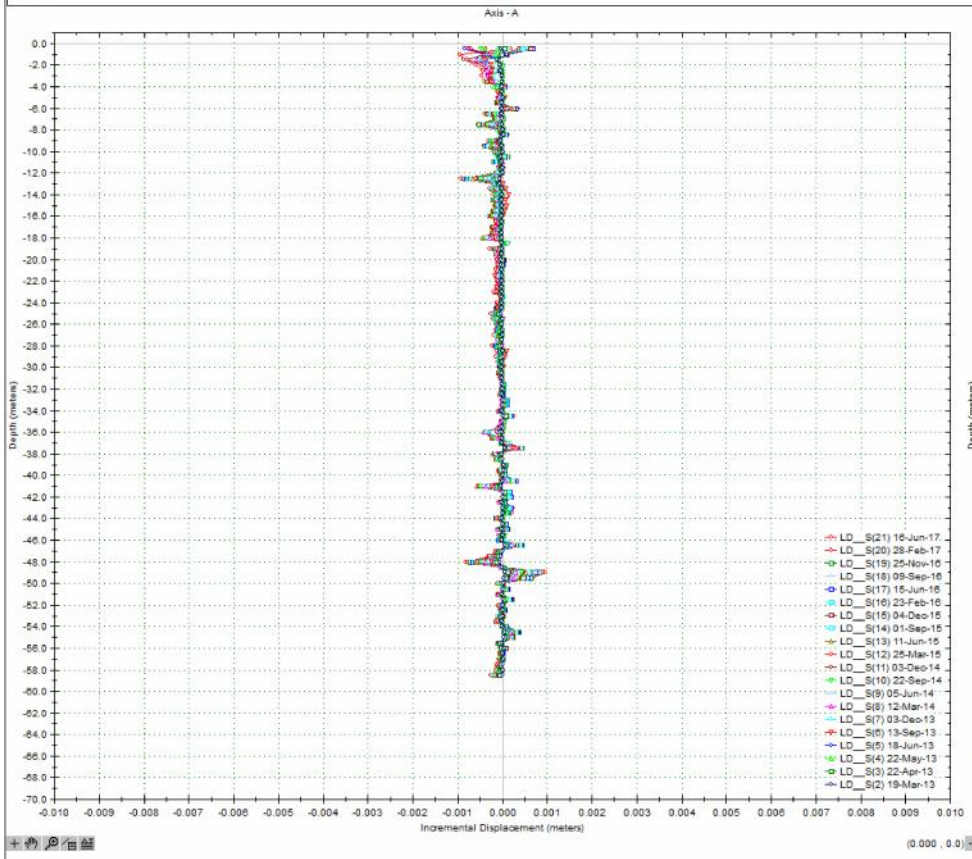
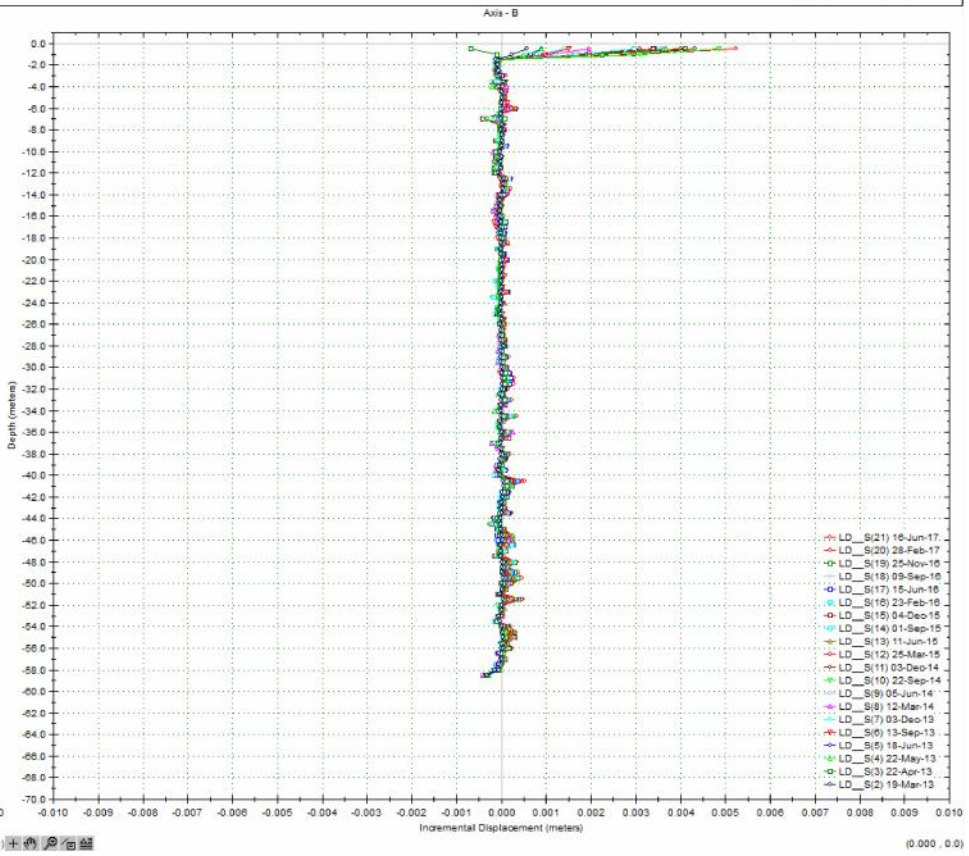
INCREMENTAL DISPLACEMENT

Inclinalysis v.2.27

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

Spiral Correction : N/A
Collar Elevation : 0.0 meters
Borehole Total Depth : 58.5 meters
North Groove Azimuth :
Base Reading : 2013 Feb 20 12:51
Axis A Azimuth : 0.0 degrees





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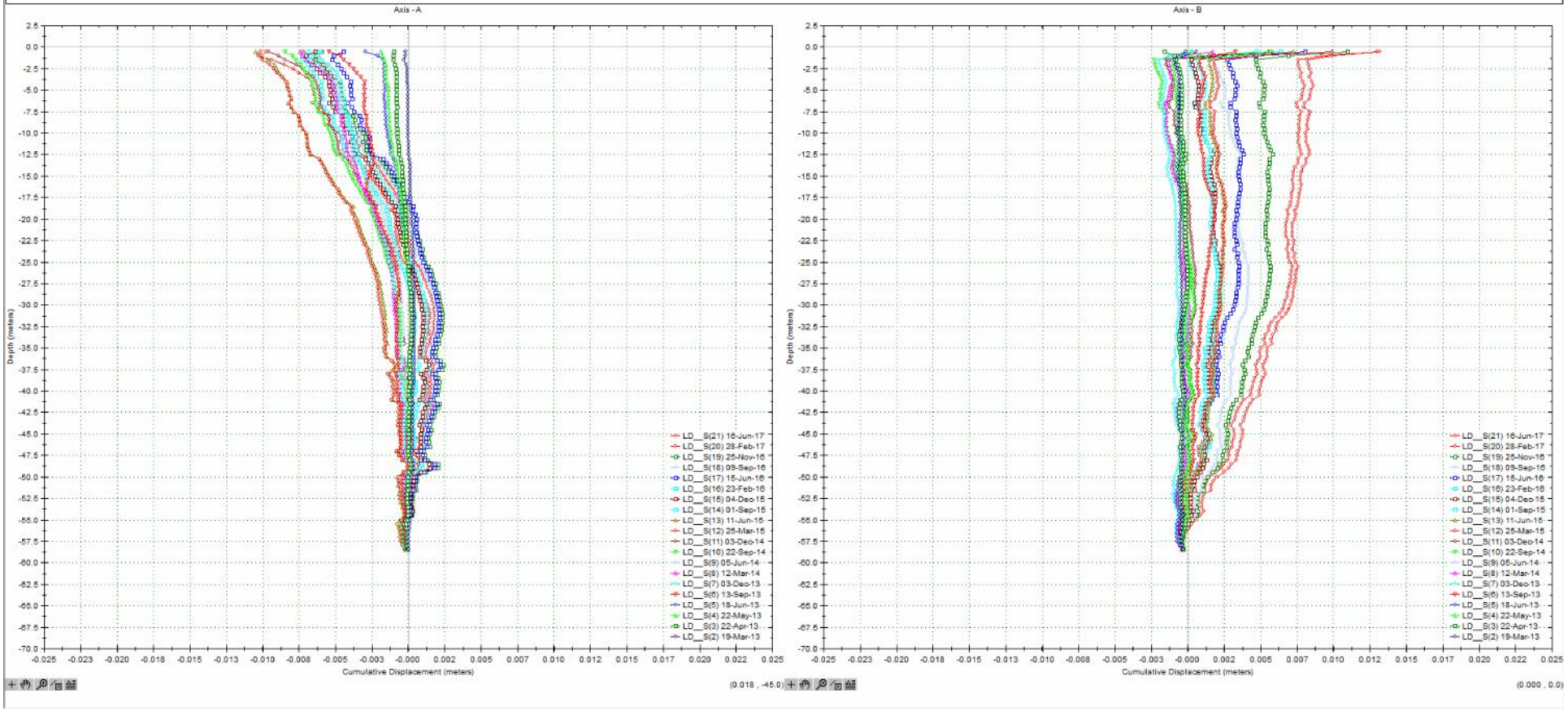
CUMULATIVE DISPLACEMENT

InclInalysis v.2.27

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

Spiral Correction : N/A
Collar Elevation : 0.0 meters
Borehole Total Depth : 58.5 meters
North Groove Azimuth :
Base Reading : 2013 Feb 20 12:51
Axis A Azimuth : 0.0 degrees



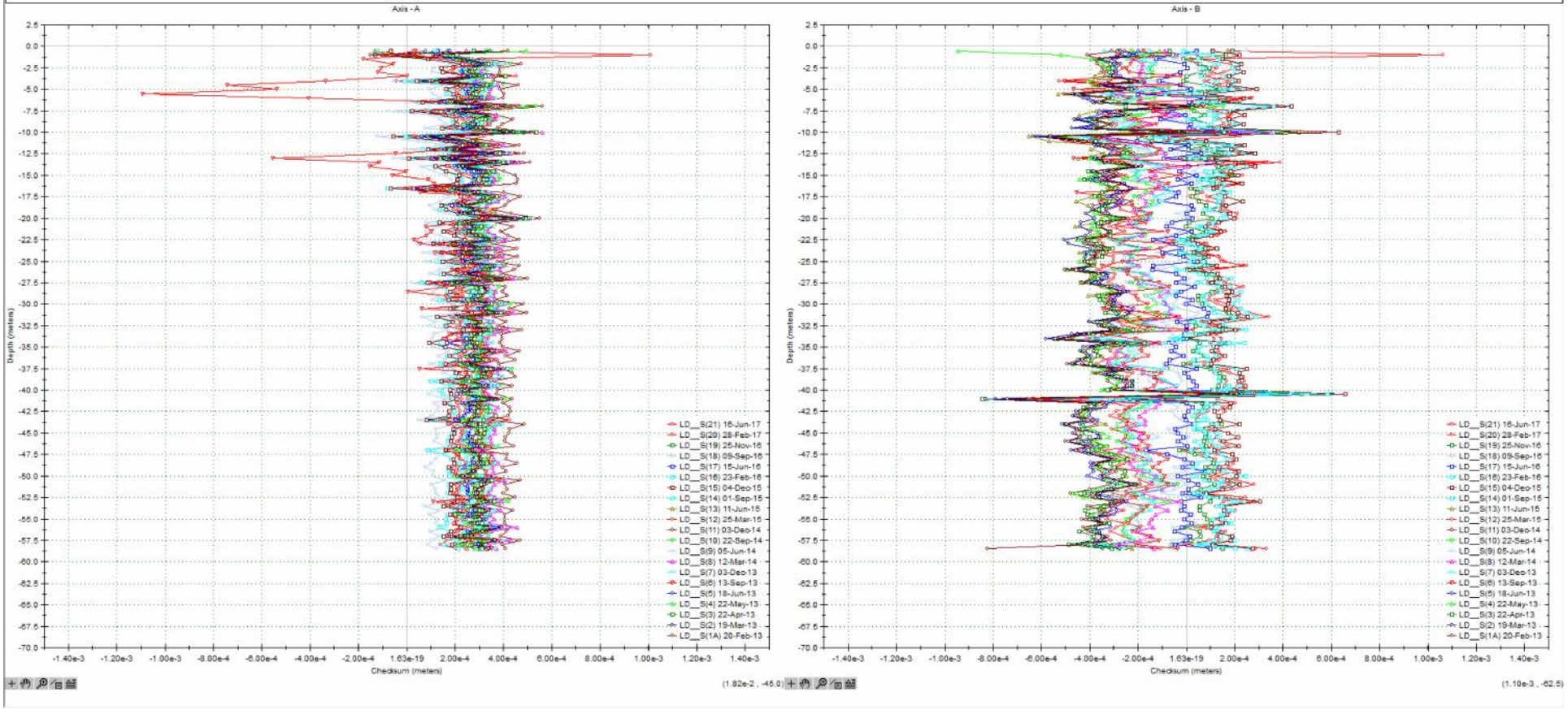
RST Instruments Ltd.

CHECKSUM

Inclinalysis v.2.27

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

Spiral Correction : N/A
Collar Elevation : 0.0 meters
Borehole Total Depth : 58.5 meters
North Groove Azimuth :
Base Reading : 2013 Feb 20 12:51
Axis A Azimuth : 0.0 degrees



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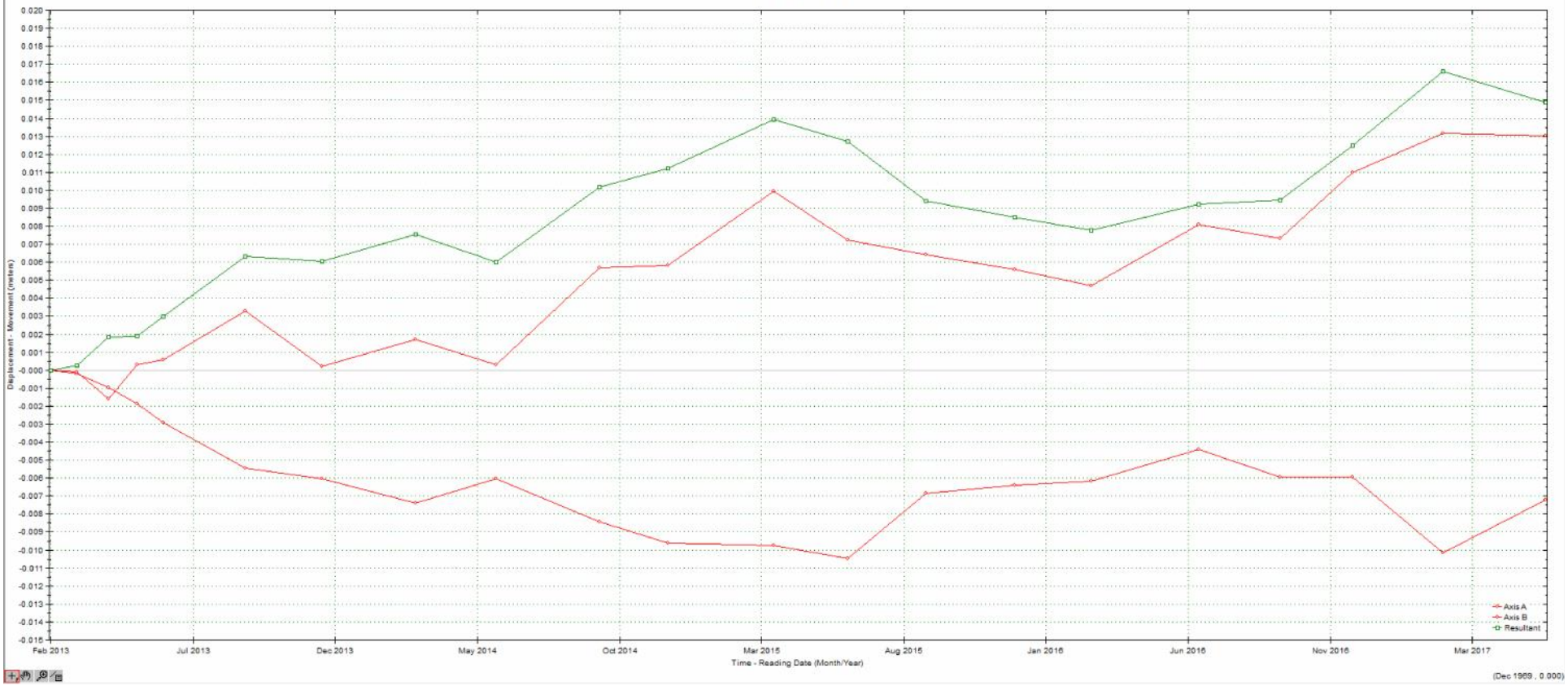
TIME PLOT
Displacement vs. Time

Inclinalysis v.2.27

Borehole : LD__S
Project : LagoonD
Location :
Northing :
Easting :
Collar :
Collar Elev : 0.0 meters

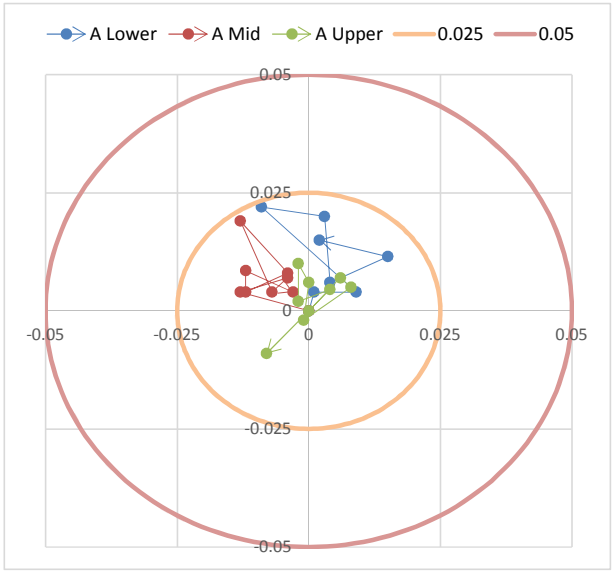
Spiral Correction : N/A
Movement Depth : 0.5 - 58.5 meters
Borehole Total Depth : 58.5 meters
North Groove Azimuth :
Latest Reading : 2017 Jun 16 12:33
Initial Reading : 2013 Feb 20 12:51
Axis A Azimuth : 0.0 degrees

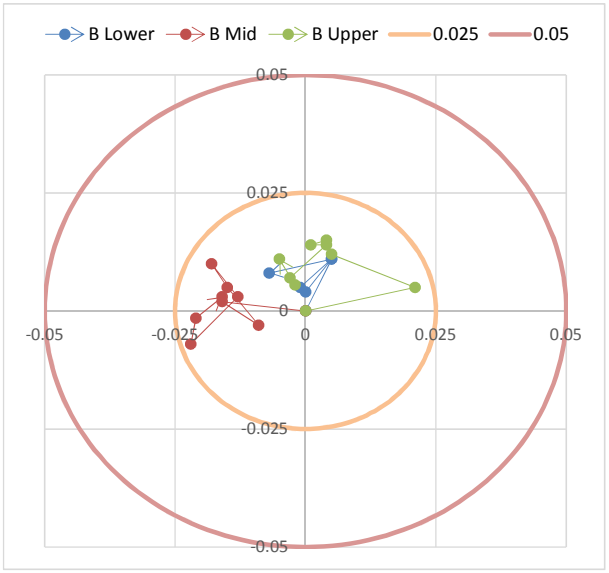
Time Plot : 0.5 - 58.5 meters

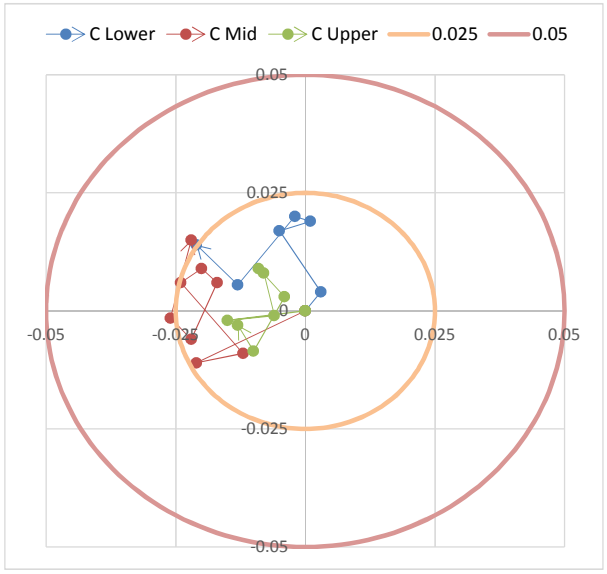


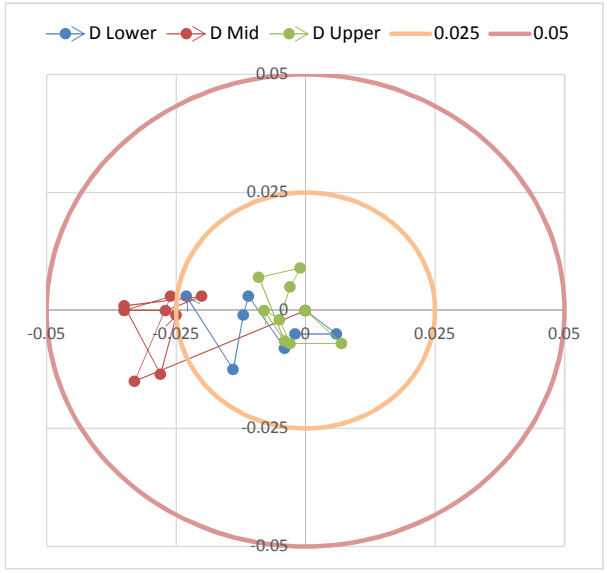
(Dec 1969 , 0.000)

EASTING AND NORTHING DELTA FOR GPS CONTROL POINTS AT LAGOON D (FROM JULY 2015 TO JUNE 2017)

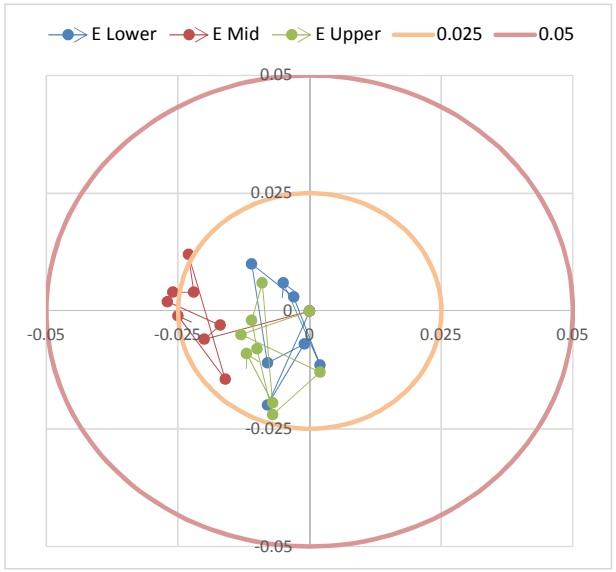


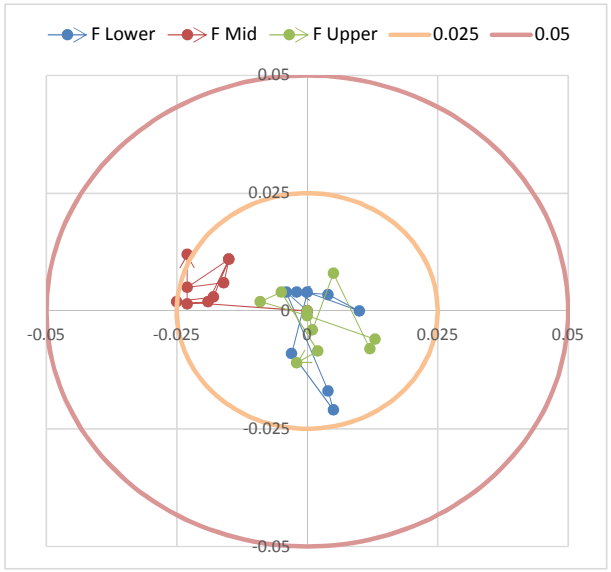


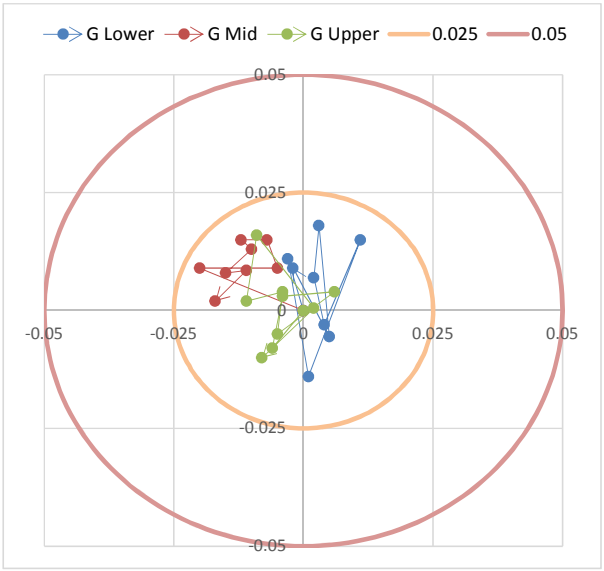


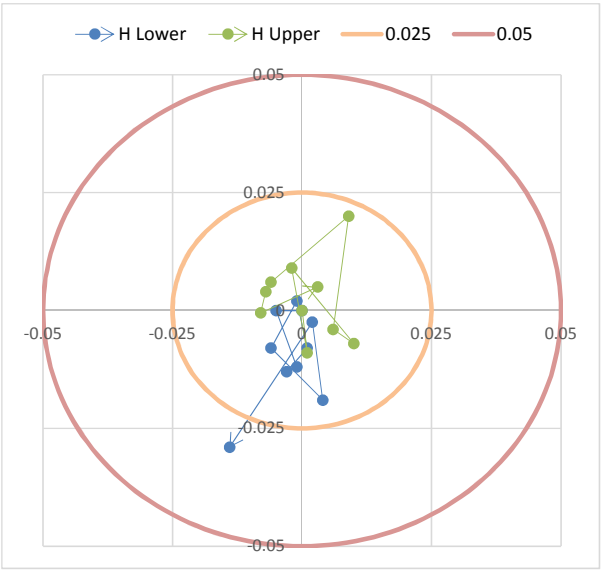


EASTING AND NORTHING DELTA FOR GPS CONTROL POINTS AT LAGOON D (FROM JULY 2015 TO JUNE 2017)

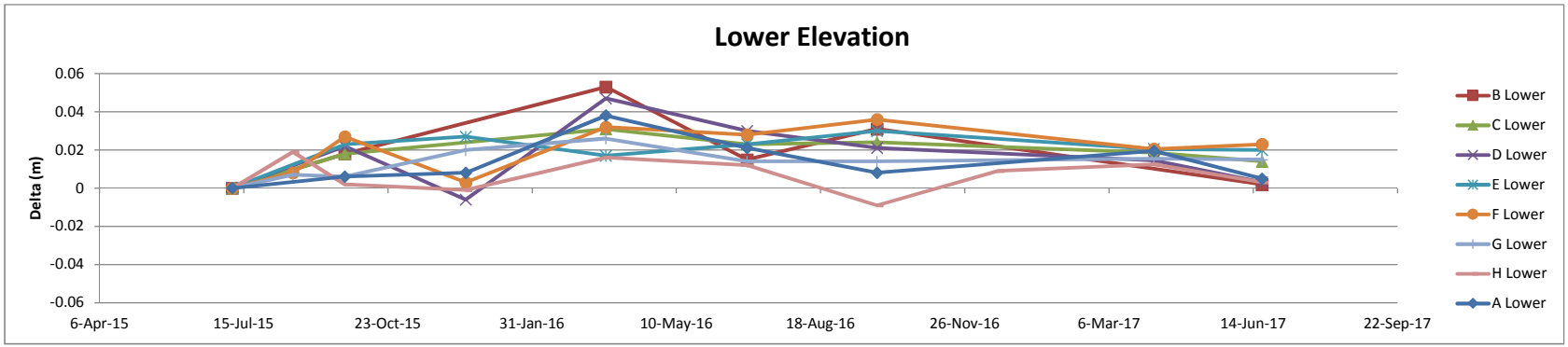


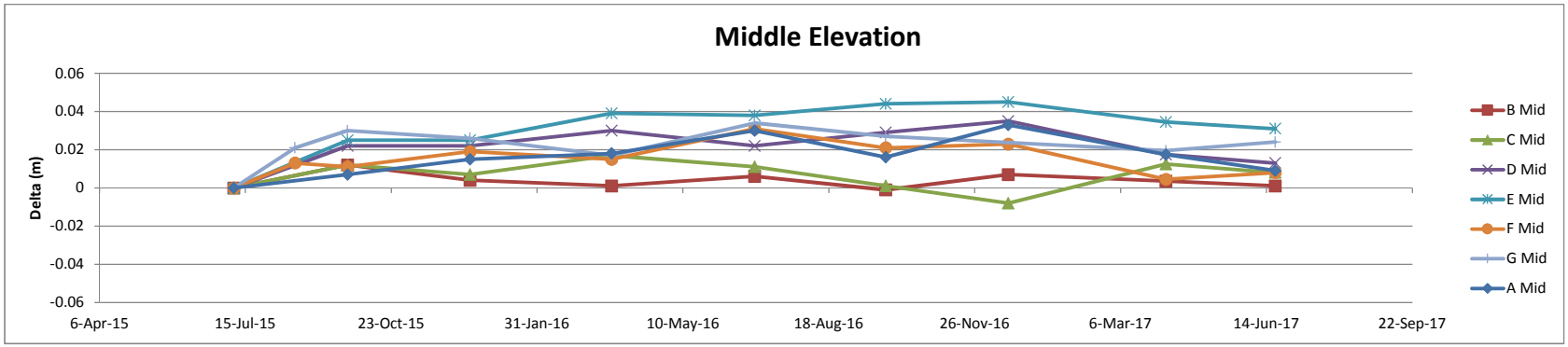


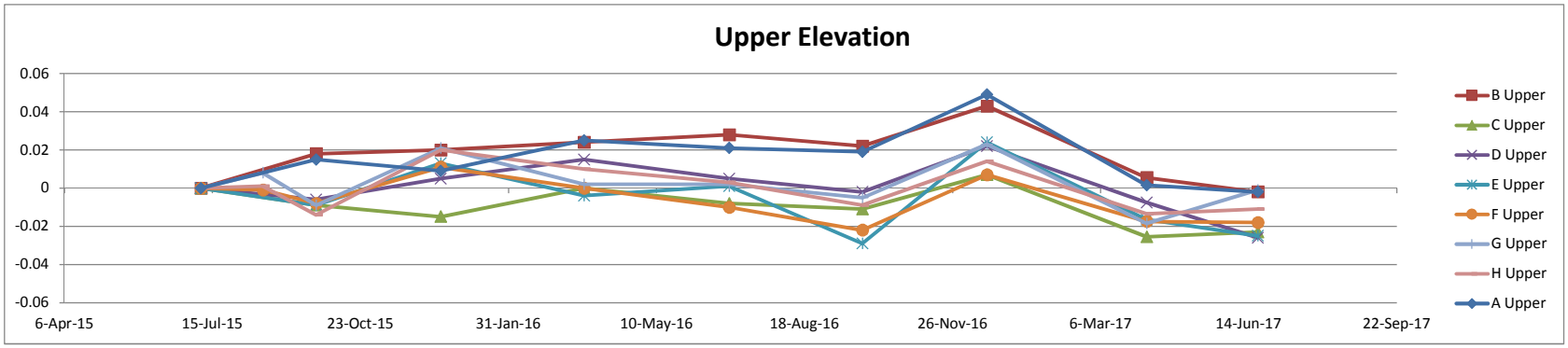




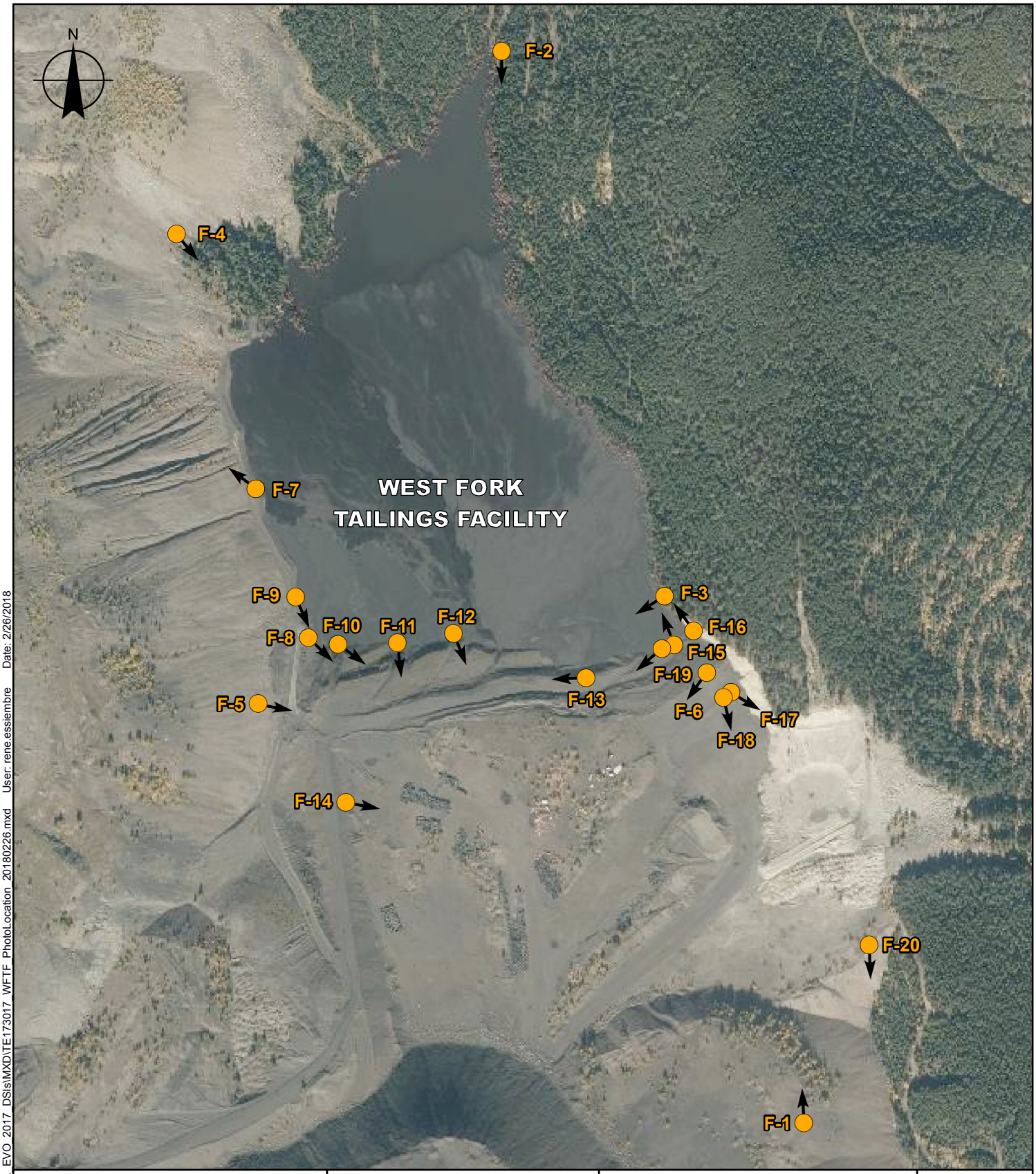
ELEVATION DELTA FOR GPS CONTROL POINTS AT LAGOON D (FROM JULY 2015 TO JUNE 2017)







APPENDIX F
West Fork Tailings Facility
Dam Safety Inspection Photographs



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			CHK'D BY: TW
	DATUM: NAD 83	TITLE: PHOTO LOCATION WEST FORKS TAILINGS FACILITY	DATE: 02/26/2018
amec foster wheeler	PROJECTION: UTM ZONE 11 NORTH		REV. NO: R0
	PROJECT NO: TE173017		FIGURE NO: APPENDIX F

Photograph F - 1: Showing aerial overview of WFTF, looking north.

Photograph F - 2: Showing aerial overview of upstream of WFTF, looking south.

Photograph F - 3: **Showing an aerial view of tailings pipelines and tailings beaching at the WTFT, looking west.**

Photograph F - 4: **Showing an aerial view of upstream of the WTFT, looking southeast.**

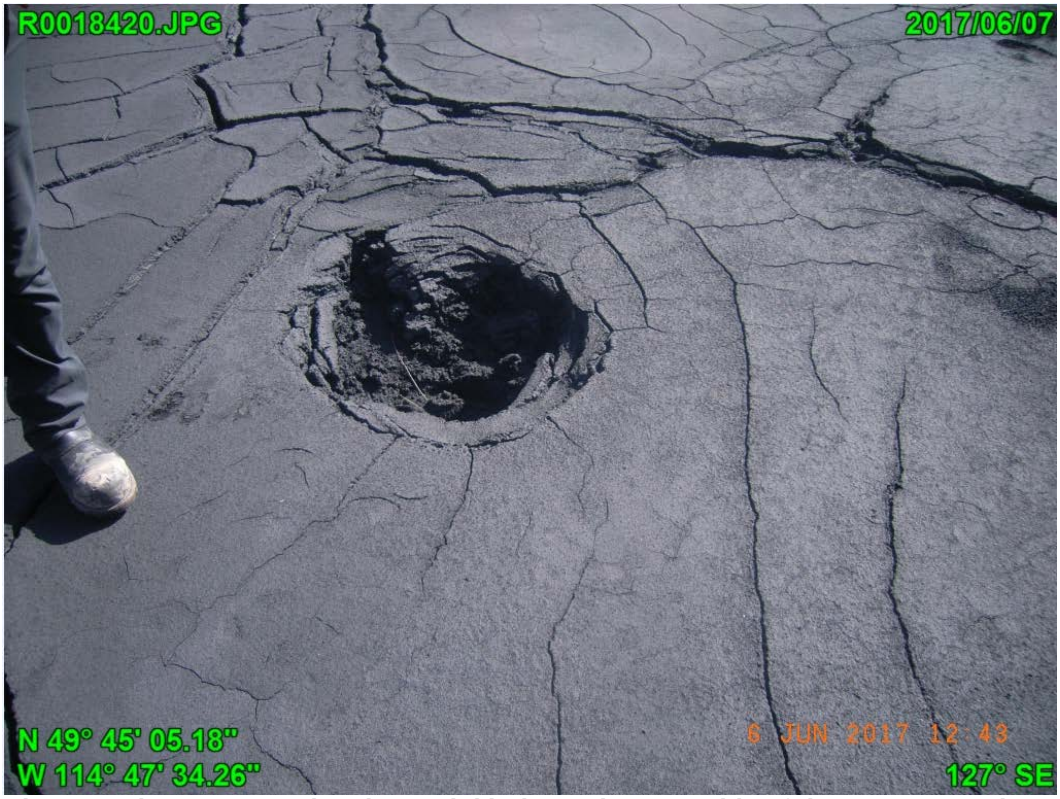
Photograph F - 5: **Showing an aerial view of upstream of the WTFT, looking east.**

Photograph F - 6: **Showing the south abutment, looking southwest from east abutment.**

Photograph F - 7: **Showing road constructed along toe of Adit dump looking northwest.**

Photograph F - 8: **Showing beach tailings on upstream, looking southeast from west abutment.**

Photograph F - 9: **Showing evidence of infiltration on the west side of the WFTF near the Adit dump, looking south.**



Photograph F - 10: **Showing a sinkhole on the west side of the WFTF near the Adit dump.**

Photograph F - 11: **Showing an erosion gully on upstream slope due to tailings discharged from spigot 1 pipe located close to the Adit dump, looking south.**

Photograph F - 12: **Showing an erosion gully on upstream slope due to tailings discharged from spigot 2 pipe, looking south.**

Photograph F - 13: **Showing Geho Road, looking west. (Photo P1100592, 07/06/2017).**

Photograph F - 14: **Showing the 2013 raised area at the east abutment, looking east.**

Photograph F - 15: **Showing seepage at the east abutment against the2013 raised, looking north.**

Photograph F - 16: **Showing tailings beach at southeast corner of the basin, looking north. Noted seepage track on the tailings beach.**

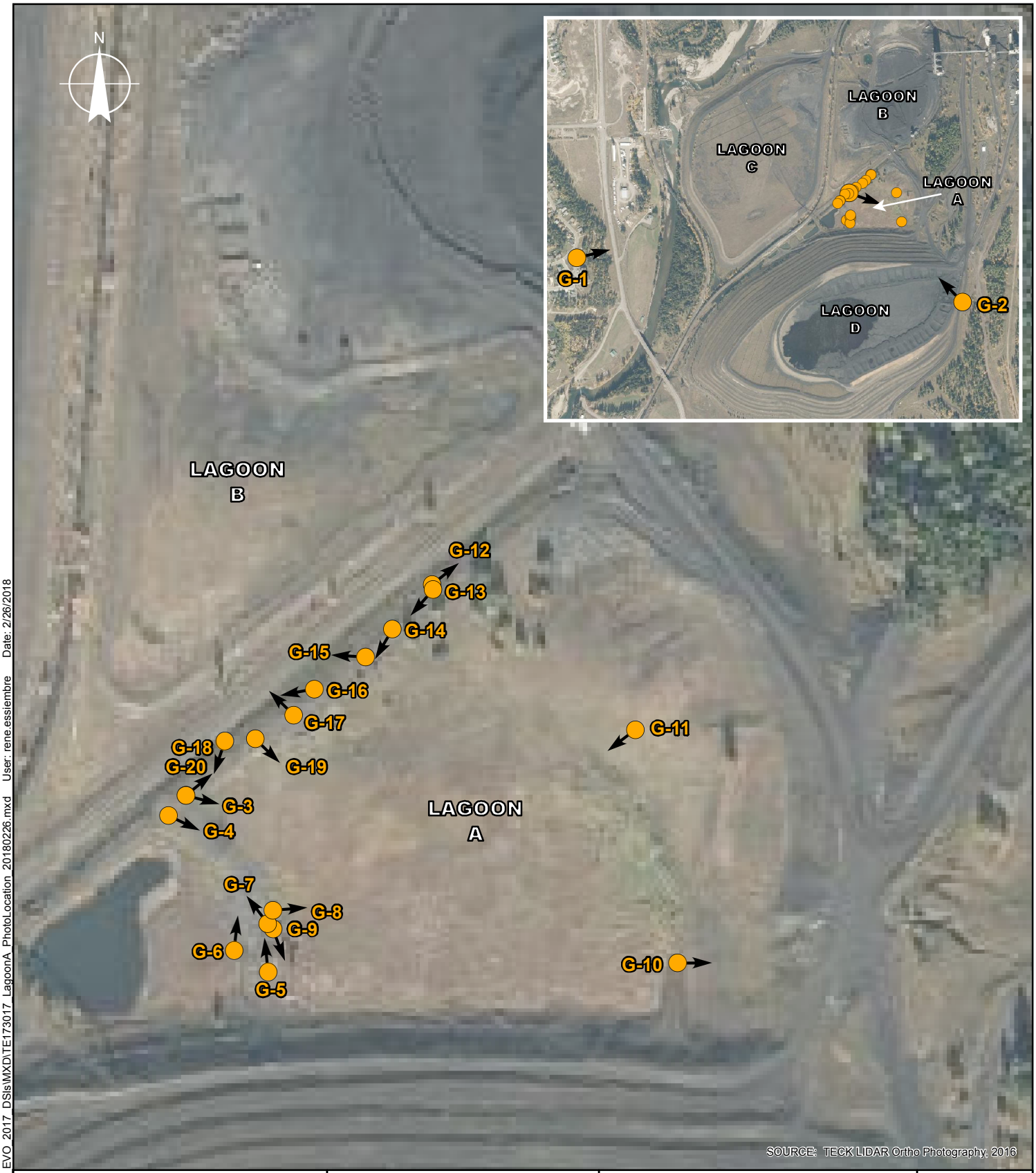
Photograph F - 17: **Showing east abutment at WFTF downstream slope, looking southeast.**

Photograph F - 18: **Showing downstream slope, east abutment and toe looking south.**

Photograph F - 19: **Showing a longitudinal cracking around spigot 5 (Photo P1100577, 06/06/2017).**

Photograph F - 20: **Showing toe of Cowboy dump looking south. Note toe is located approximately 450 m downstream of crest centerline.**

APPENDIX G
Lagoon A
Dam Safety Inspection Photographs



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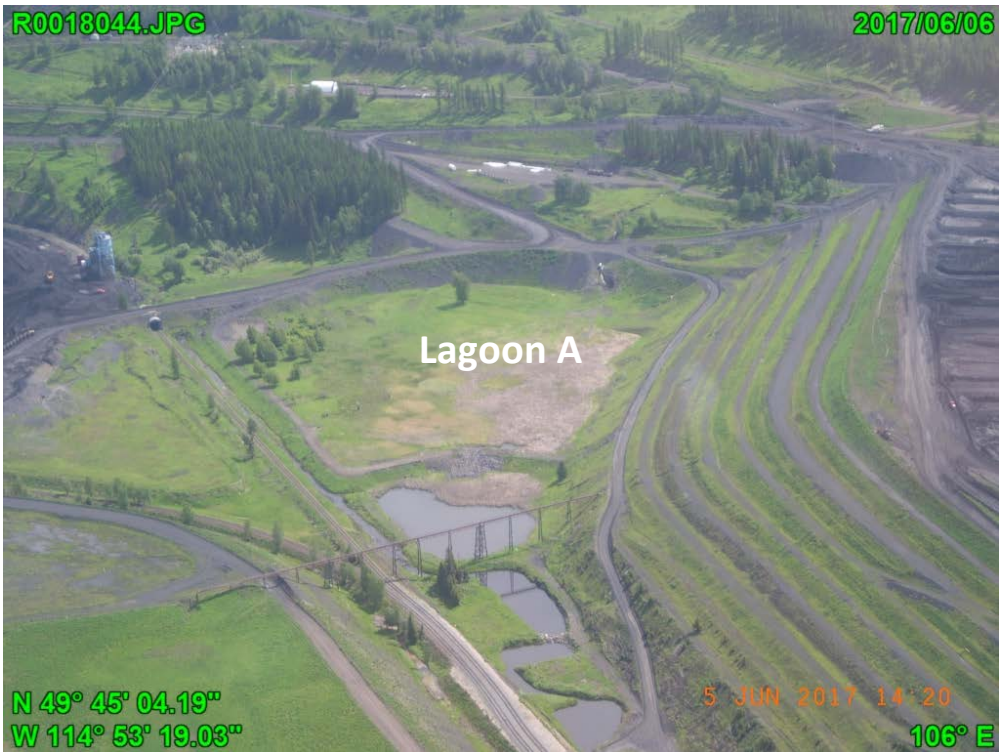
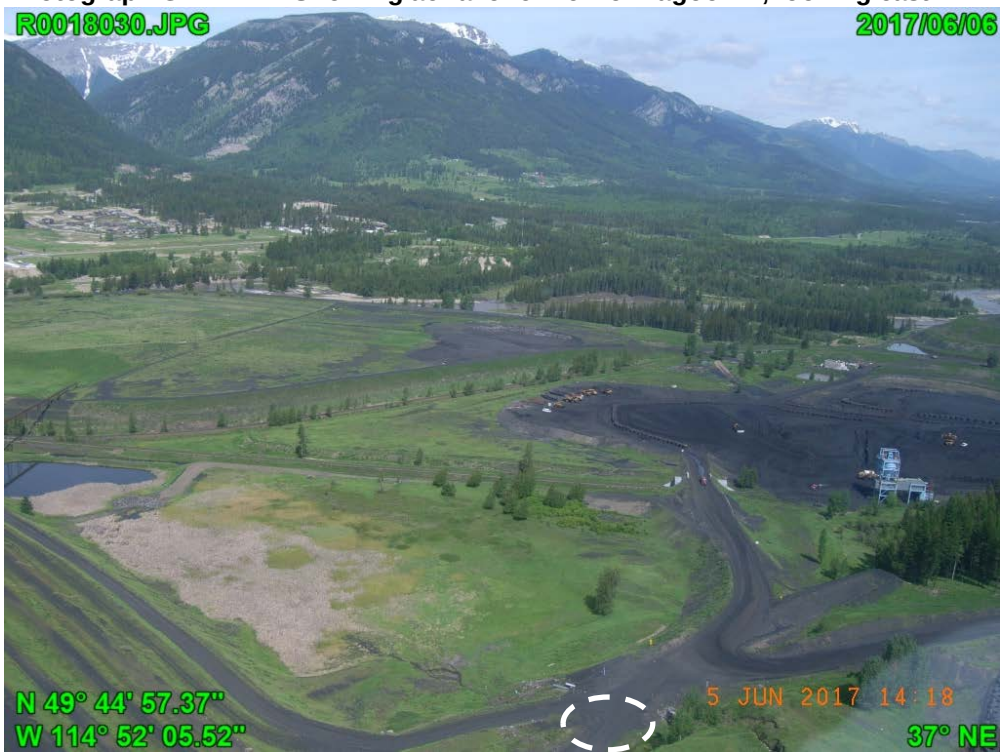
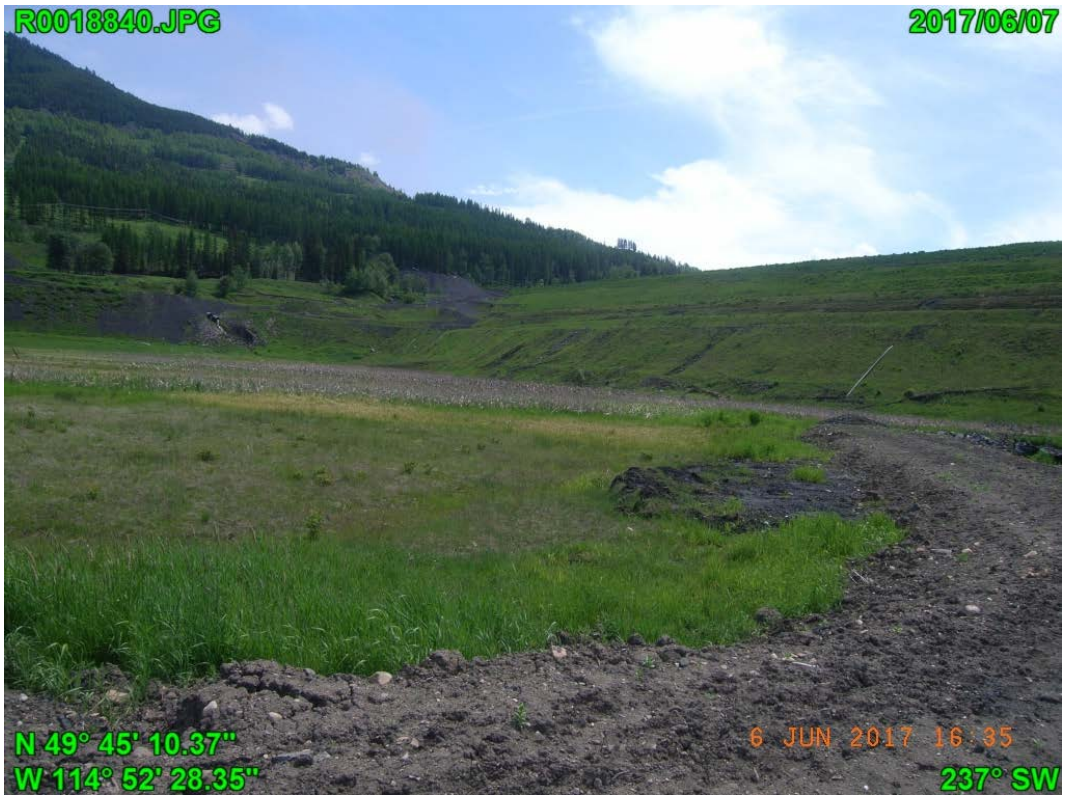
			CHK'D BY: TW
	DATUM: NAD 83		DATE: 02/26/2018
amec foster wheeler	PROJECTION: UTM ZONE 11 NORTH	TITLE: PHOTO LOCATION LAGOON A	REV. NO: R0
	PROJECT NO: TE173017		FIGURE NO: APPENDIX G



Photograph G - 1: **Showing aerial overview of Lagoon A, looking east.**



Photograph G - 2: **Showing an overview of the Lagoon A. Noted the Cossarini Creek inflow to east side of Lagoon A through 2 culverts, looking northwest.**



Photograph G - 3: **Showing the south side of Lagoon A, looking southeast.**

Photograph G - 4: **Showing west berm and the spillway, looking southeast.**

Photograph G - 5: **Showing downstream of the west berm and the spillway, looking north.**

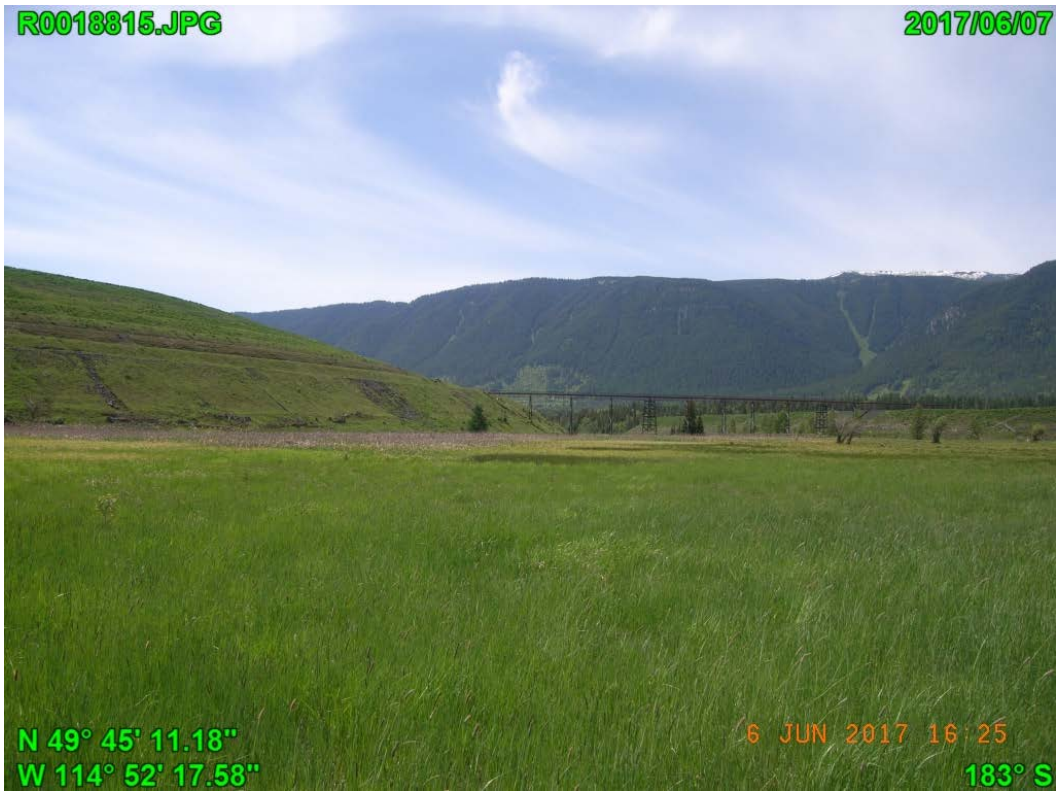
Photograph G - 6: **Showing downstream of the spillway of the west face of Lagoon A, looking north.**

Photograph G - 7: **Showing the spillway and riprap placement at downstream west slope, looking northwest.**

Photograph G - 8: **Showing upstream of the upgraded spillway, looking southeast.**

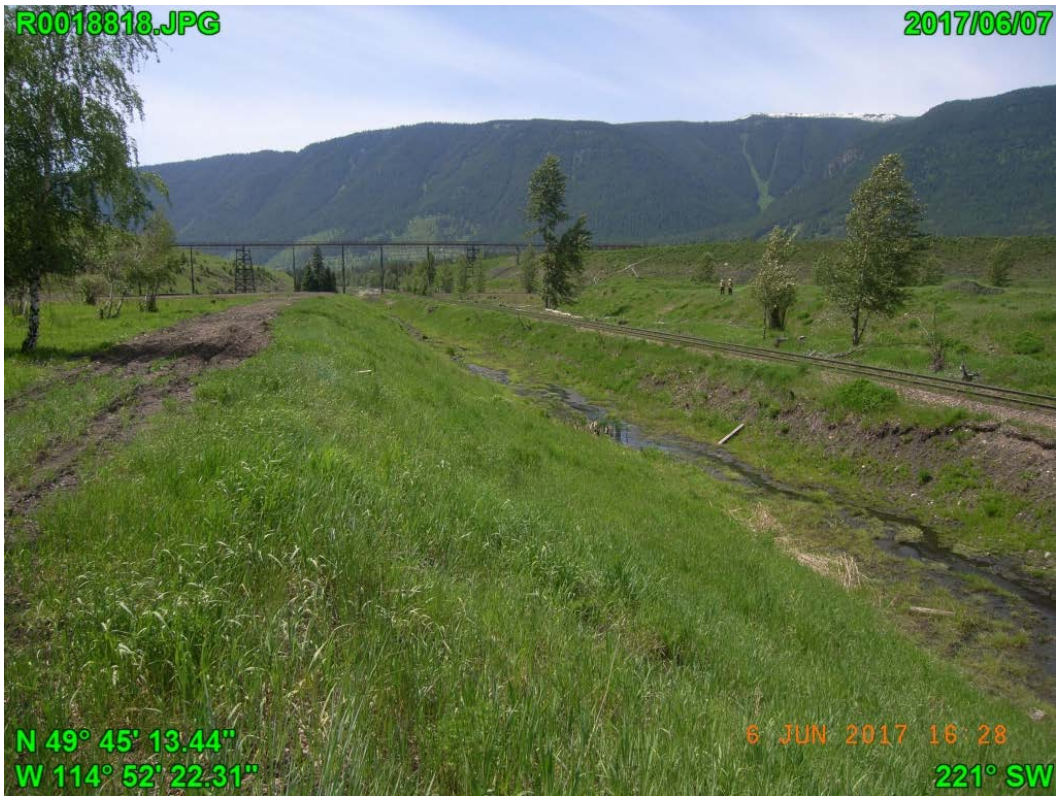
Photograph G - 9: **Showing the crest of at the west face, looking south.**

Photograph G - 10: **Showing water discharge from Cossarini Creek onto east side of Lagoon A, looking east.**



Photograph G - 11: Overview of southwest corner of Lagoon A, looking southwest.

Photograph G - 12: Showing downstream slope of Lagoon A on north embankment at northeast corner, looking northeast.



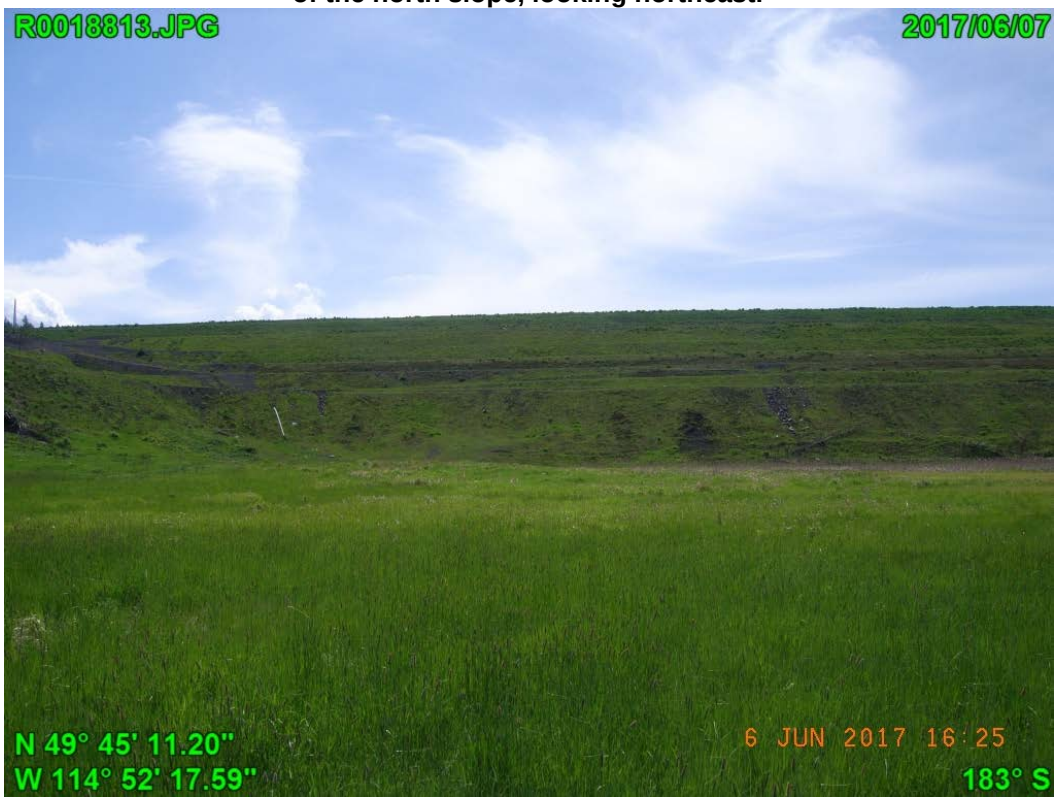
Photograph G - 13: **Showing downstream slope of Lagoon A north embankment, looking southwest.**

Photograph G - 14: **Showing the road along the north side of Lagoon A, looking southwest. Noted an amoured outlet in the mid length of the north berm.**

Photograph G - 15: **Showing the closer view of the amoured outlet on the north slope, looking west.**

Photograph G - 16: **Showing the downstream of north slope and another armoured outlet further west, looking west.**

Photograph G - 17: **Showing a closer view of the amoured outlet at the west end of the north slope, looking northeast.**



Photograph G - 18: **Showing the surface of Lagoon A at southeast corner, looking southeast.**

Photograph G - 19: **Showing pipe flow on northwest end of Lagoon A, looking southwest.**

Photograph G - 20: **Showing the north side of Lagoon A, looking northeast.**

APPENDIX H
Lagoon B
Dam Safety Inspection Photographs

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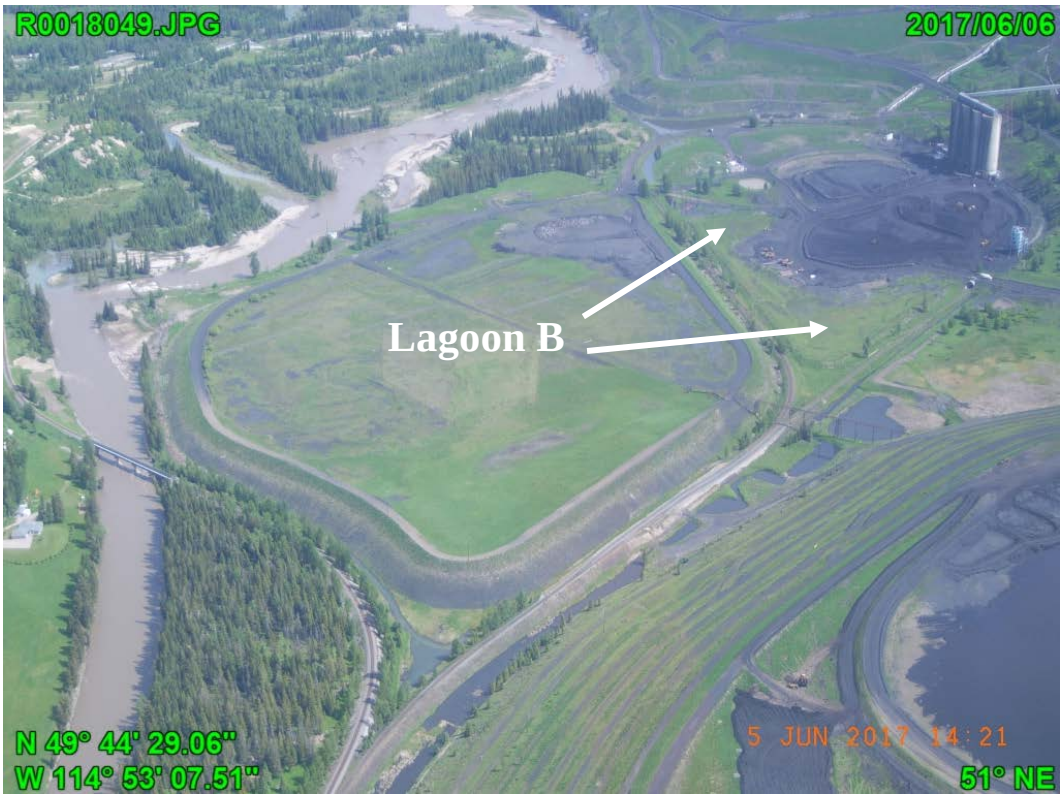
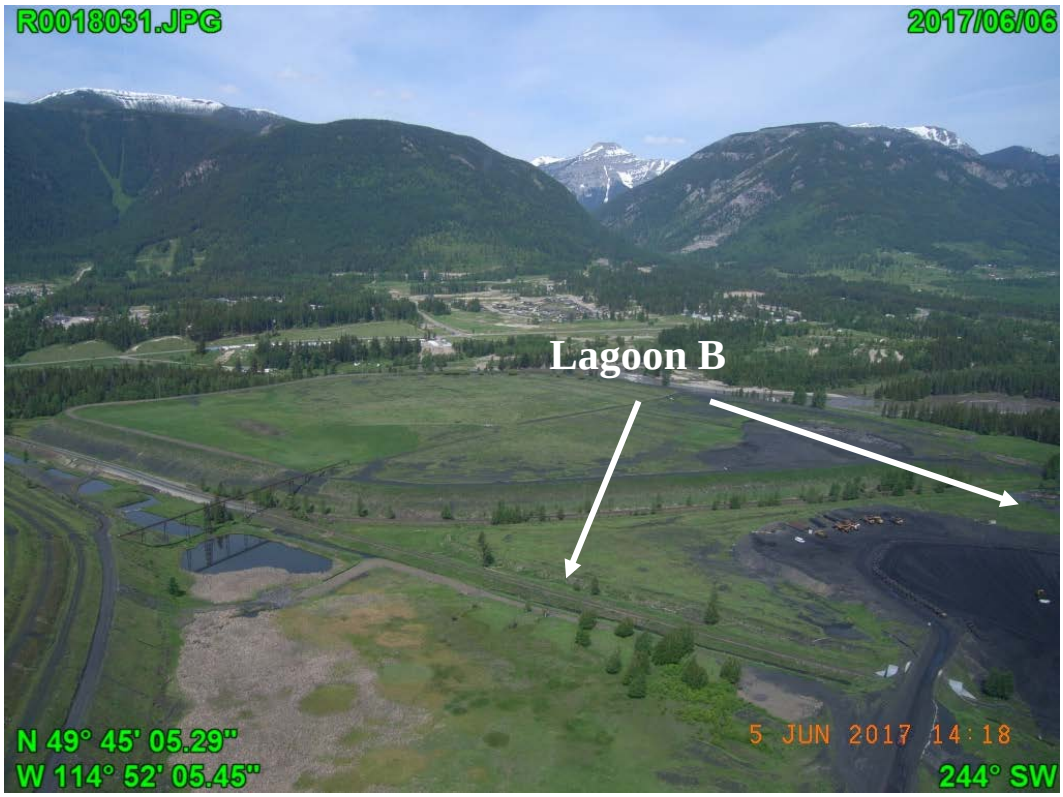
amec foster wheeler	PROJECTION: UTM ZONE 11 NORTH		REV. NO: R0
	PROJECT NO: TE173017		FIGURE NO: APPENDIX H



Photograph H - 1: **Showing aerial overview of Lagoon B, looking west.**



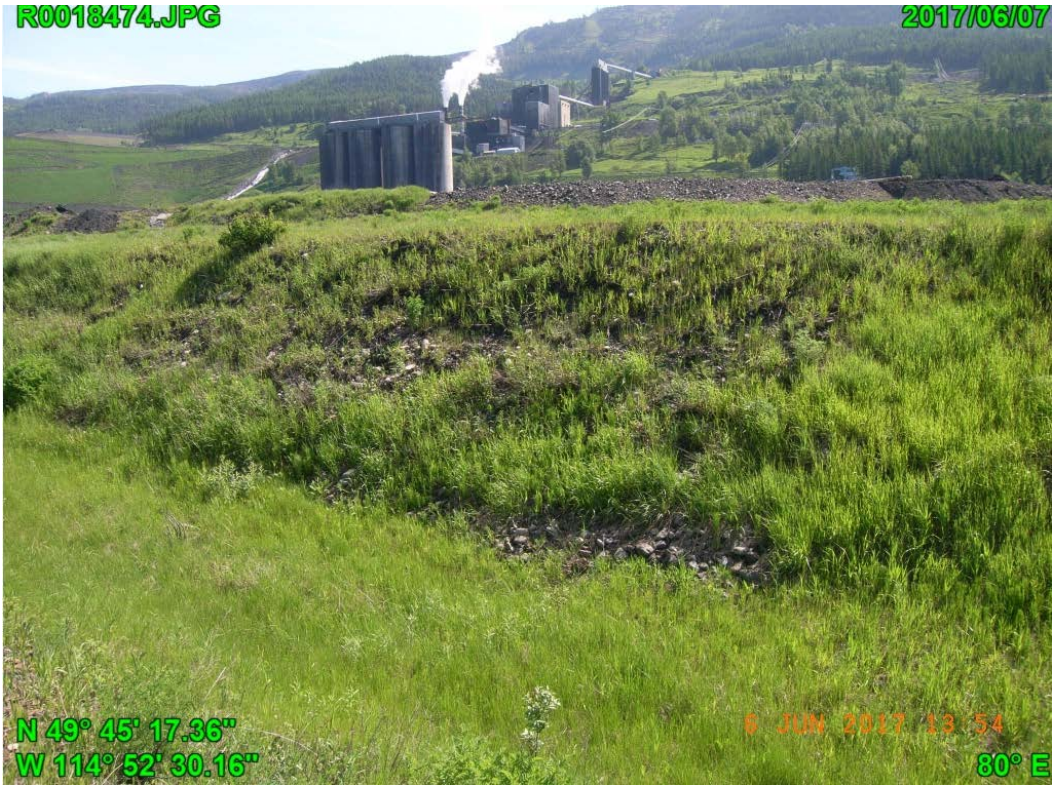
Photograph H - 2: **Showing aerial overview of Lagoon B, looking northwest.**

Photograph H - 3: **Showing east end of the north embankment of Lagoon B, looking east. (Photo No. P1100789, 2017/06/07).**

Photograph H - 4: **Showing northeast area of Lagoon B, looking northeast. (Photo No. P1100788, 2017/06/07).**

Photograph H - 5: **Showing downstream slope of north end of the west embankment of Lagoon B, looking north. Noted ponded water at toe. (Photo No. P1100786, 2017/06/07)**

Photograph H - 6: **Showing west embankment of Lagoon B, looking southwest. (Photo No. P1100784, 2017/06/07)**



Photograph H - 7: **Showing erosion on the slope of west embankment of Lagoon B, looking northeast.**

Photograph H - 8: **Showing a pipeline at the toe at south end of the west embankment and an erosion gully, looking north. (Photo No. P1100775, 2017/06/07)**

Photograph H - 9: **Showing plastic sand bag left at the southwest corner, looking north. (Photo No. P1100770, 2017/06/07)**

Photograph H - 10: **Showing west surface of Lagoon B, view from southwest corner, looking north. (Photo No. P1100769, 2017/06/07)**

Photograph H - 11: **Showing south surface of Lagoon B, view from southwest corner, looking northeast. (Photo No. P1100767, 2017/06/07)**

Photograph H - 12: **Showing south end of Lagoon B, looking southwest. Noted the outlet steel pipe on the south slope. (Photo No. P1100764, 2017/06/07)**

Photograph H - 13: **Showing dry outlet at southwest corner of Lagoon B, looking north. (Photo No. P1100766, 2017/06/07)**

Photograph H - 14: **Showing northwest area of Lagoon B, looking northeast. (Photo No. P1100762, 2017/06/07)**

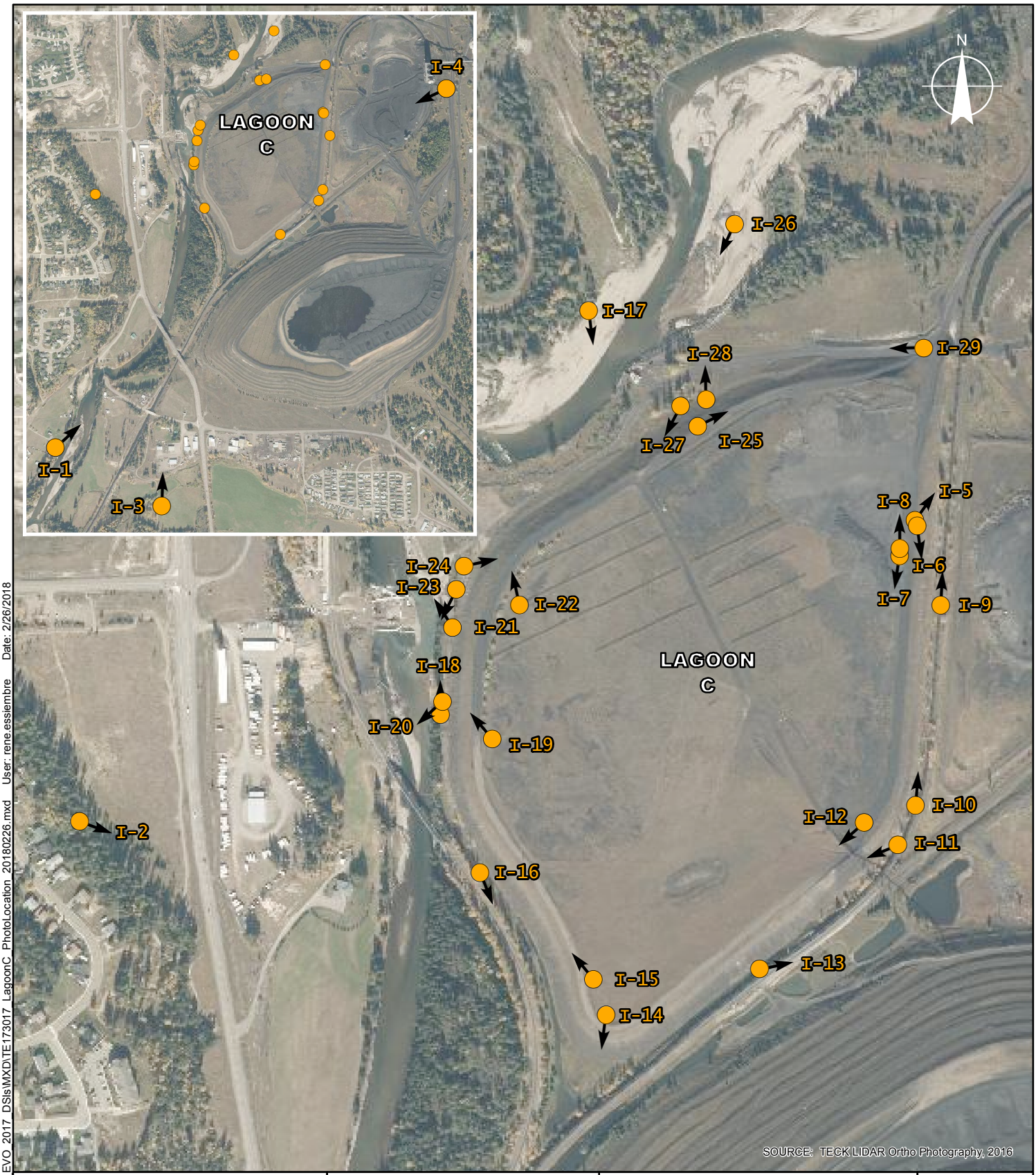
Photograph H - 15: **Showing crest and slope on south side of Lagoon B, Looking southwest (Photo No. P1100758, 2017/06/07).**

Photograph H - 16: **Showing north end of the south side of Lagoon B, looking northeast. (Photo No. P1100759, 2017/06/07).**

Photograph H - 17: **Showing tailings discharge pipe and discharge area located at the southeast corner of Lagoon B, looking northeast. (Panorama Photo, 2017/06/07)**

Photograph H - 18: **Showing tailings discharge area located at the southeast corner of Lagoon B, looking southeast (Photo No. P1100748, 2017/06/07).**

APPENDIX I
Lagoon C
Dam Safety Inspection Photographs



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CLIENT: Teck

amec foster wheeler

SCALE: 0 50 100 200 Meters 1:6,000

DATUM: NAD 83

PROJECTION: UTM ZONE 11 NORTH

PROJECT NO: TE173017

PROJECT: WEST FORK TAILINGS FACILITY AND LAGOONS 2017 DSI REPORT

TITLE: PHOTO LOCATION LAGOON C

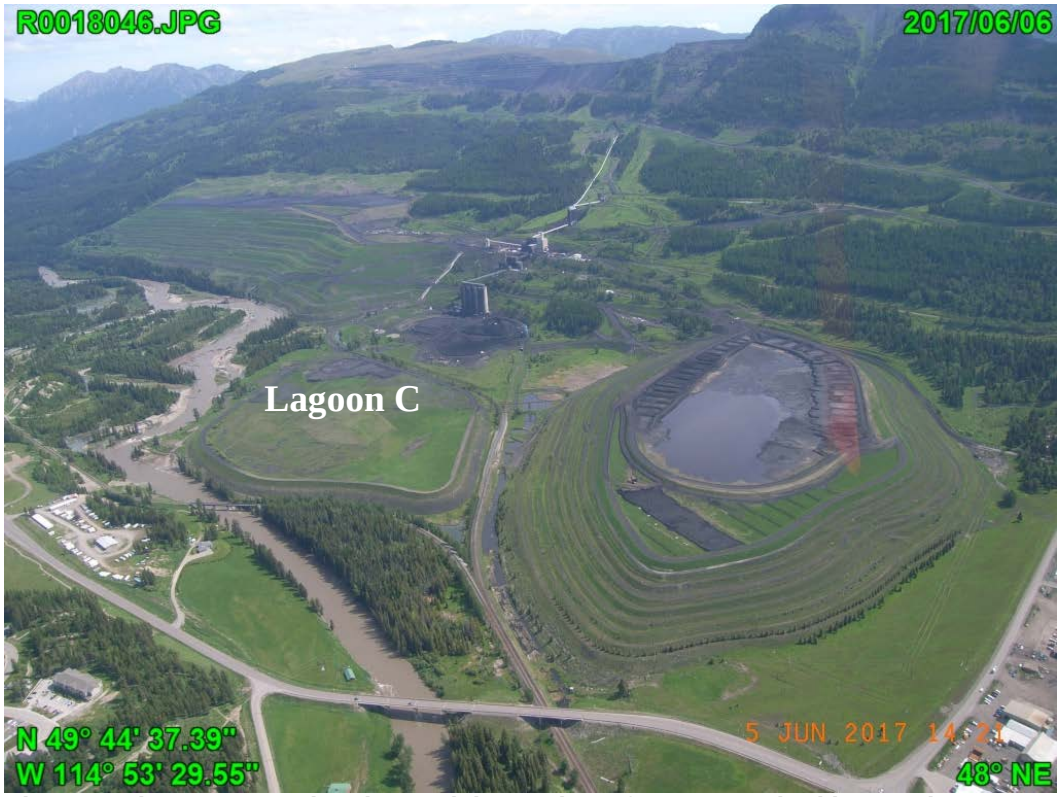
DWN BY: RE

CHK'D BY: TW

DATE: 2/26/2018

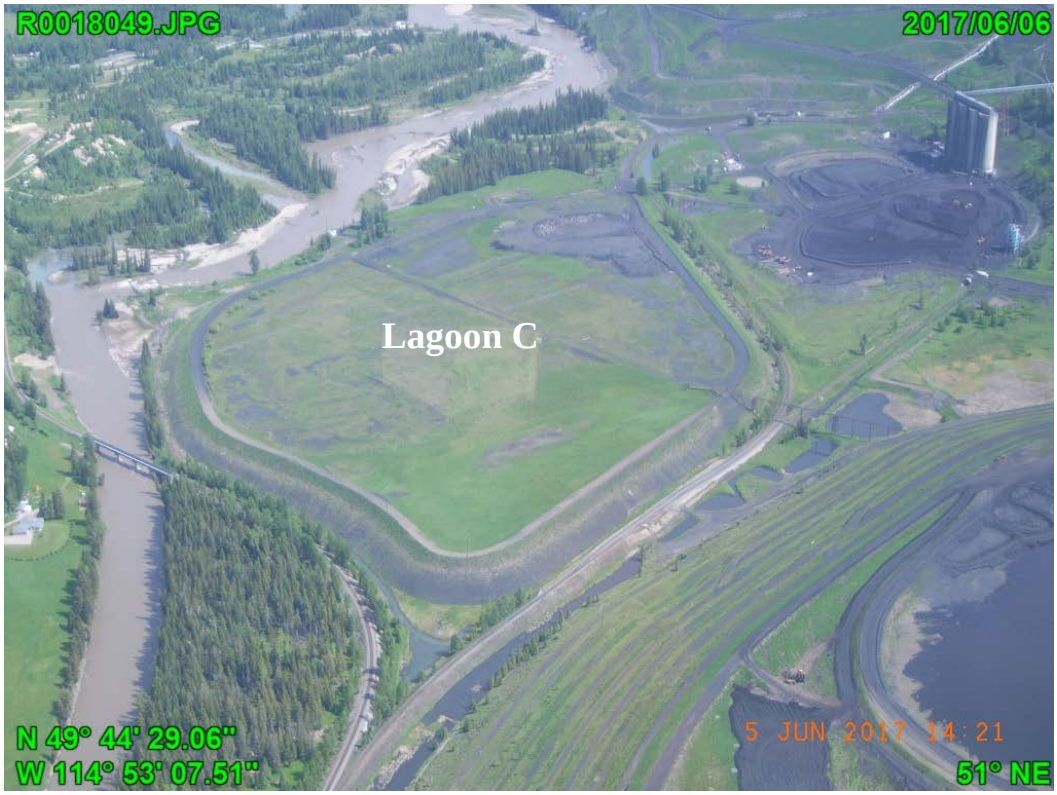
REV. NO: R0

FIGURE NO: APPENDIX I



Photograph I - 1: Showing aerial overview of Lagoon C, looking northeast.

Photograph I - 2: Showing aerial overview of Lagoon C, looking east.



Photograph I - 3: **Showing aerial overview of Lagoon C, looking north.**

Photograph I - 4: **Showing aerial overview of Lagoon C, looking west. (Photo No. P1100452, 2017/06/06)**

Photograph I - 5: **Showing the crest and shoulder of the north end of east slope of Lagoon C, looking north.**

Photograph I - 6: **Showing the crest and shoulder of the north end of east slope of Lagoon C, looking south.**

Photograph I - 7: **Showing the crest and upstream from the north end of Lagoon C, looking south. (Photo No. P1100611, 2017/06/07)**

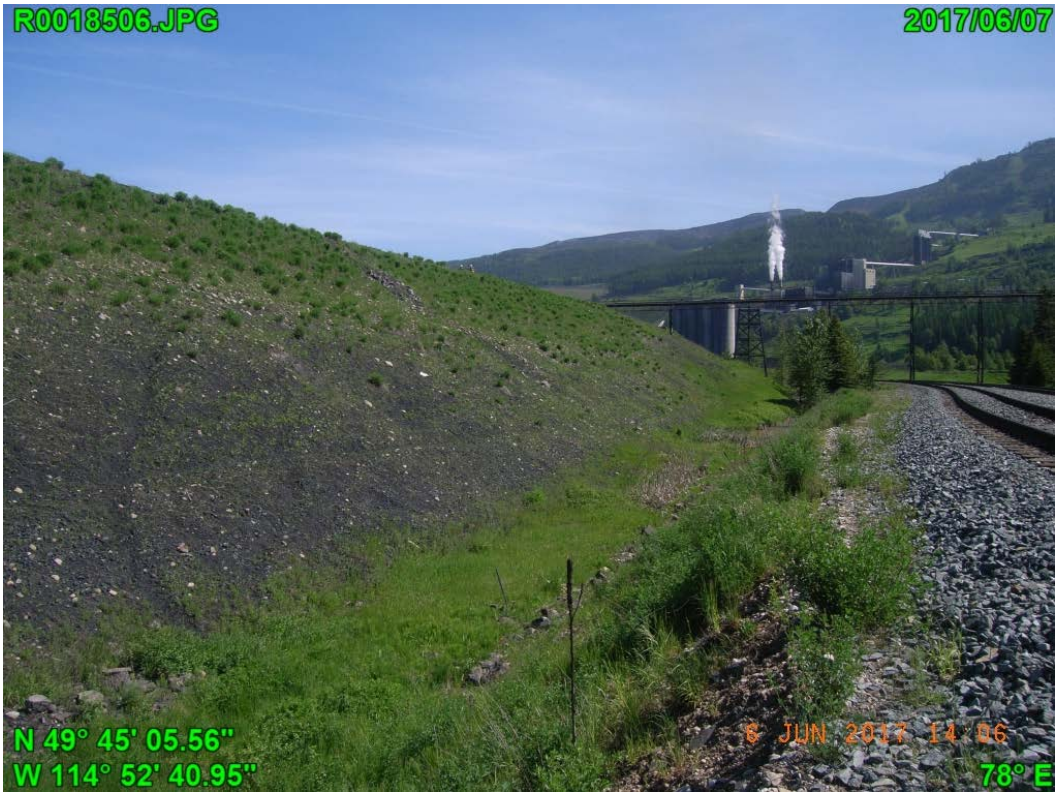
Photograph I - 8: **Showing the crest and upstream at the north end of Lagoon C, looking north. (Photo No. P1100615, 2017/06/07)**

Photograph I - 9: **Showing erosion at east slope toe of Lagoon C, looking north.**

Photograph I - 10: **Showing erosion at the south end of the east slope toe of Lagoon C, looking north.**

Photograph I - 11: **Showing toe and downstream slope at the southeast corner of Lagoon C, looking southwest.**

Photograph I - 12: **Showing the crest and shoulder of Lagoon C south embankment, looking southwest. Noted the crest is narrow and the access road is depressed underneath the trestle. (Photo No.P1100623, 2017/06/07)**



Photograph I - 13: Showing south slope and erosion on south slope of Lagoon C, looking northeast.

Photograph I - 14: Showing downstream toe at southwest corner of Lagoon C, looking southwest. (Photo No.P1100641, 2017/06/07)

Photograph I - 15: **Showing west crest and slope of Lagoon C at southwest corner, looking northwest. Noted beaver activities at the pond (Photo No. P1100644, 2017/06/07).**

Photograph I - 16: **Showing west slope and toe of Lagoon C, looking southeast.**

Photograph I - 17: **Showing an aerial view of the west slope and toe of Lagoon C, looking south.**

Photograph I- 18: **Showing west slope and toe of Lagoon C, showing erosion protection, looking north.**

Photograph I - 19: **Showing west slope and toe of Lagoon C, looking northwest. (Photo No. P1100657, 2017/06/07)**

Photograph I- 20: **Showing discharge outlet at the west slope toe of Lagoon C.**

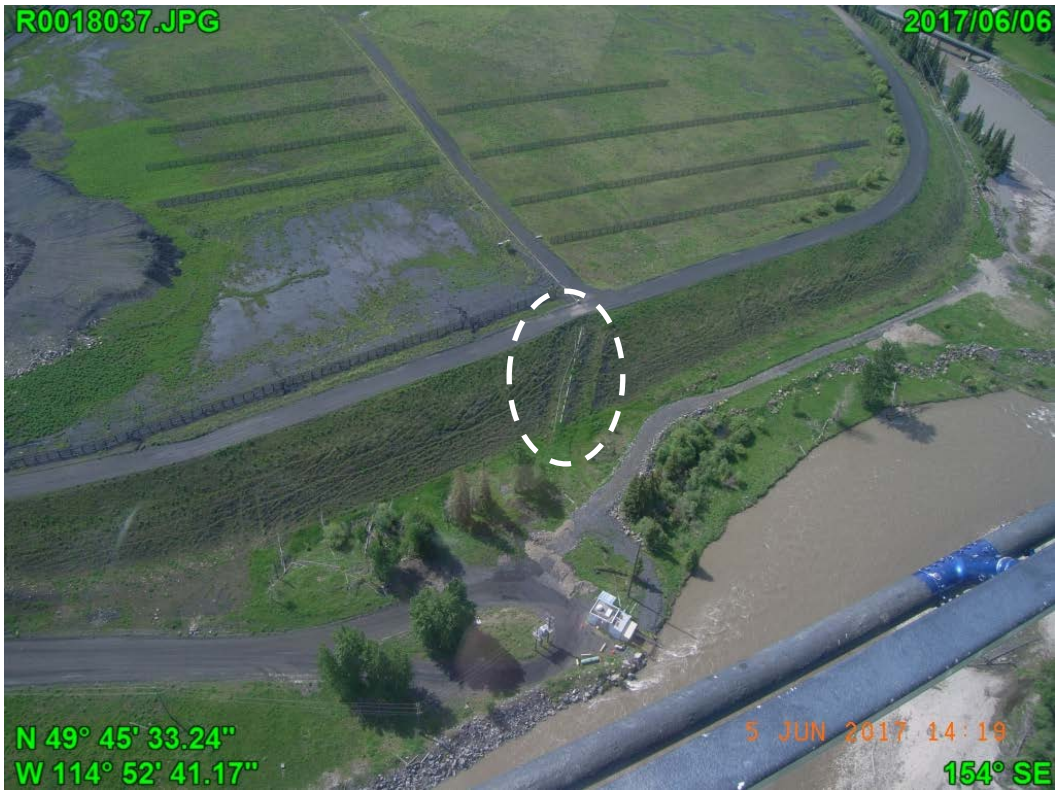
Photograph I - 21: **Showing the sign of natural gas line at west slope toe of Lagoon C, looking north.**

Photograph I - 22: **Showing west slope and toe of Lagoon C at northwest corner, looking north. (Photo No.P1100665, 2017/06/07)**

Photograph I - 23: **Showing erosion riprap along the shoreline of the Elk River, at the west toe of Lagoon C, looking southwest.**

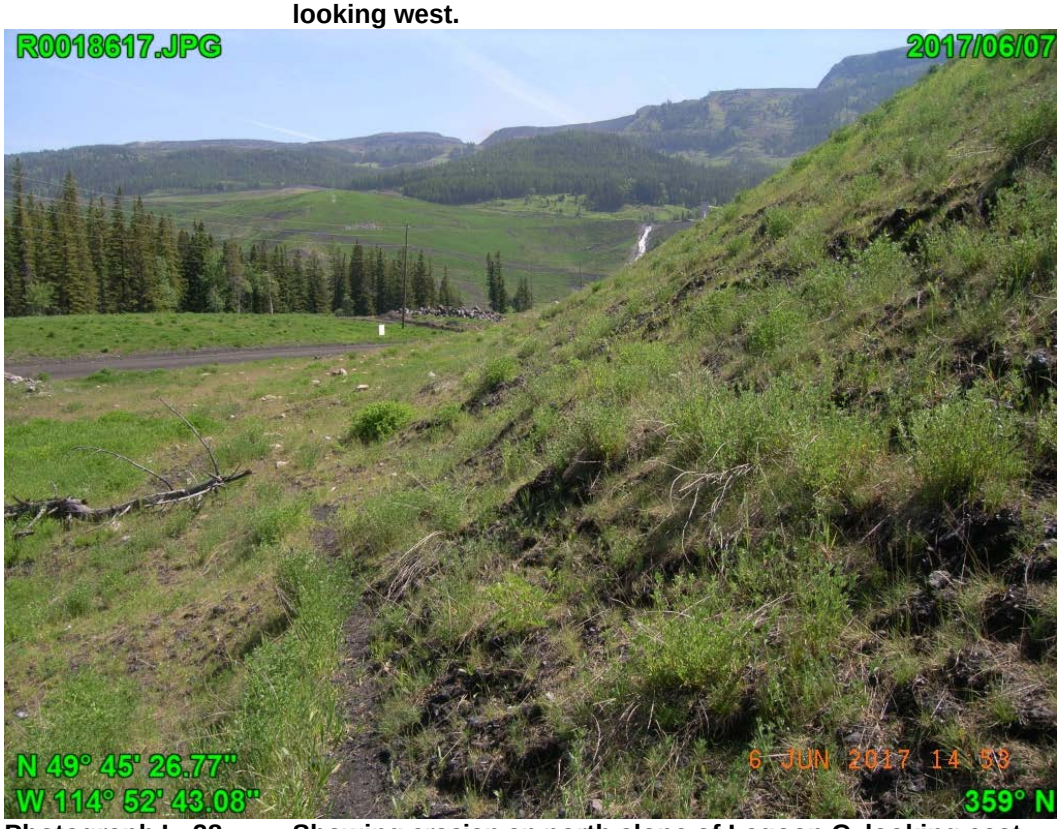
Photograph I - 24: **Showing erosion on slope at northwest corner of Lagoon C, looking northeast.**

Photograph I - 25: **Showing crest and upstream at the northwest corner of Lagoon C, looking northeast. (Photo No. P1100670, 2017/06/07)**



Photograph I - 26: **Showing pipeline routed on north slope of Lagoon C, looking Southwest.**

Photograph I - 27: **Showing ponded water at toe of north slope of Lagoon C, looking west.**

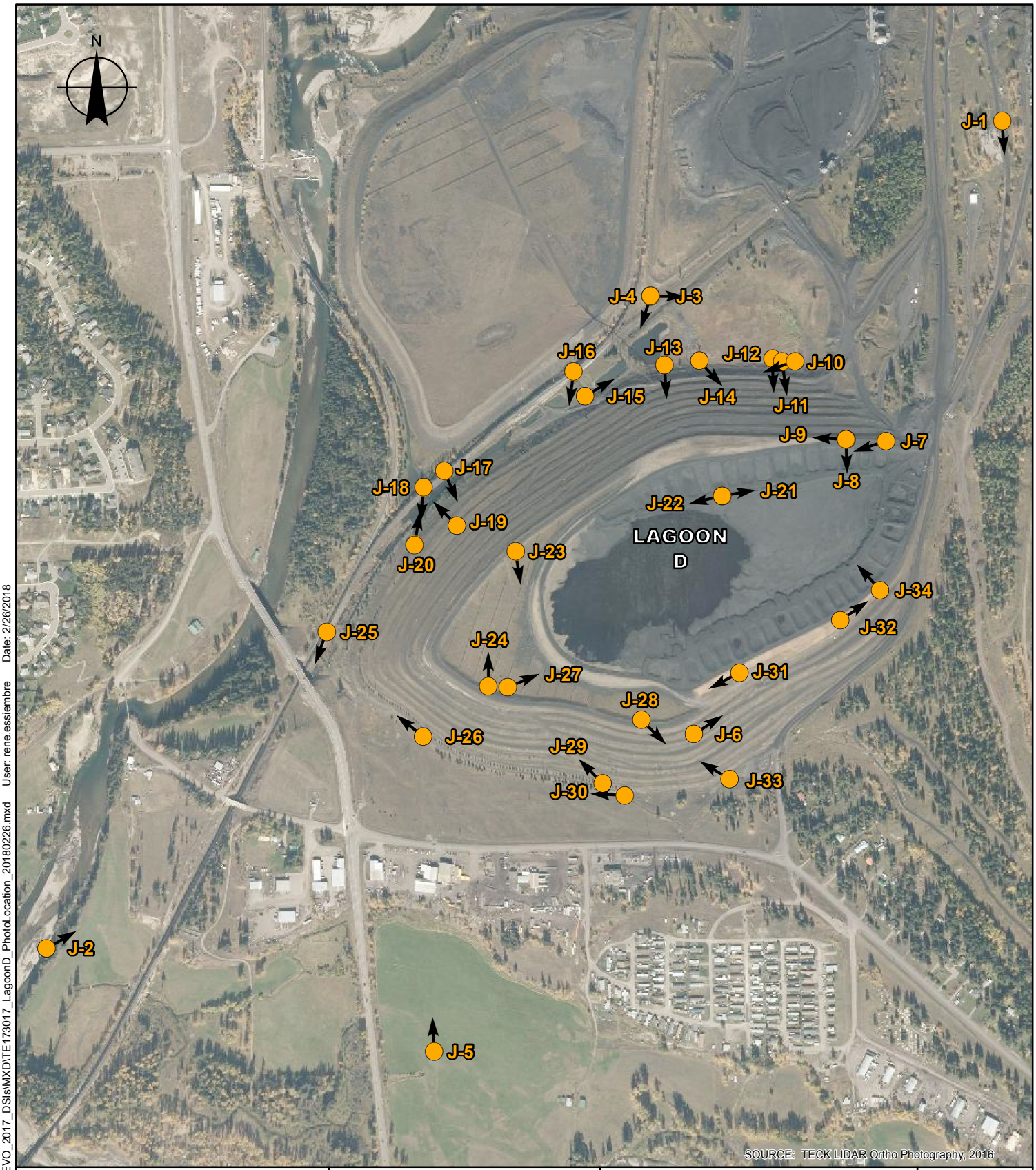


Photograph I - 28: **Showing erosion on north slope of Lagoon C, looking east.**

Photograph I - 29: **Showing the toe of northeast corner of Lagoon C, looking west.**

Photograph I - 30: **Showing the surface of northwest area of Lagoon C, looking southwest. (Photo No.P1100678, 2017/06/07)**

APPENDIX J
Lagoon D
Dam Safety Inspection Photographs



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CLIENT: Teck

amec foster wheeler

SCALE: 0 50 100 200 300 400 Meters 1:9,500

DATUM: NAD 83

PROJECTION: UTM ZONE 11 NORTH

PROJECT NO: TE173017

PROJECT: WEST FORK TAILINGS FACILITY AND LAGOONS 2017 DSI REPORT

TITLE: PHOTO LOCATION LAGOON D

DWN BY: RE

CHK'D BY: TW

DATE: 2/26/2018

REV. NO: R0

FIGURE NO: APPENDIX J

Photograph J - 1: **Showing an aerial overview of Lagoon D, looking south.**

Photograph J - 2: **Showing an aerial overview of Lagoon D, looking northeast.**

Photograph J - 3: **Showing surface of the west corner and east end of the north slope of Lagoon D, looking east.**

Photograph J - 4: **Showing surface of the east corner and west end of the north slope of Lagoon D, looking southwest.**

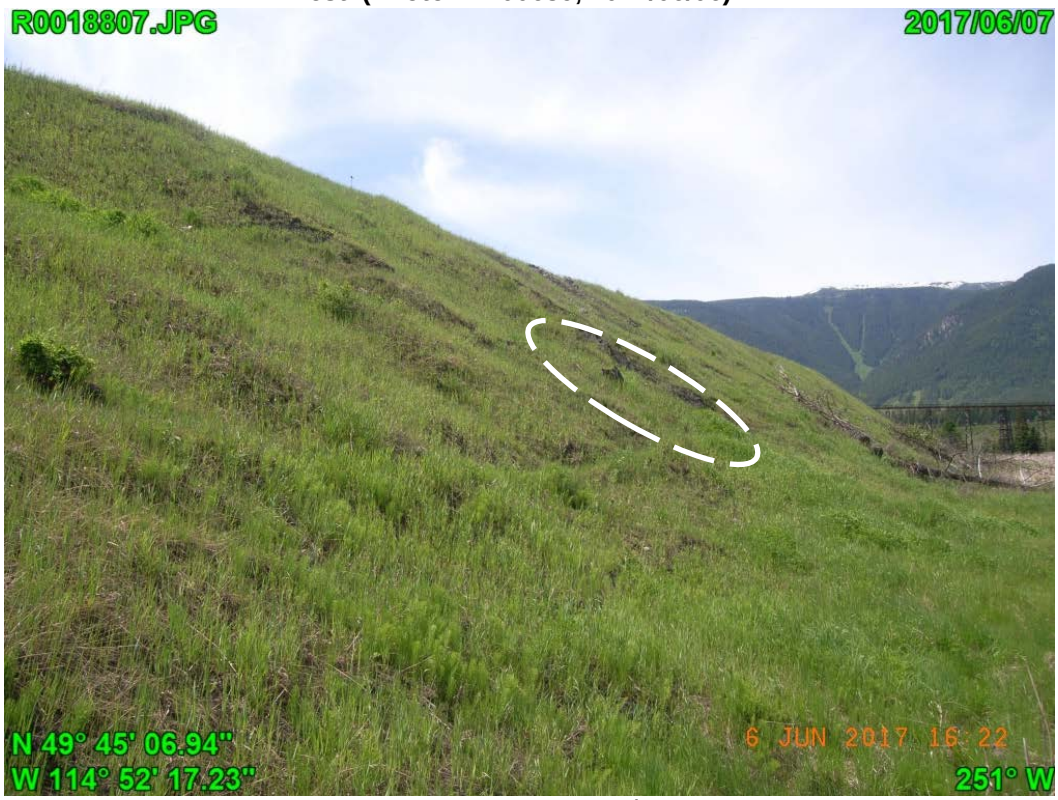
Photograph J - 5: **Showing surface of the west corner and west end of the south slope of Lagoon D, looking north.**

Photograph J - 6: **Showing surface of the east corner and east end of the south slope of Lagoon D, looking northeast.**

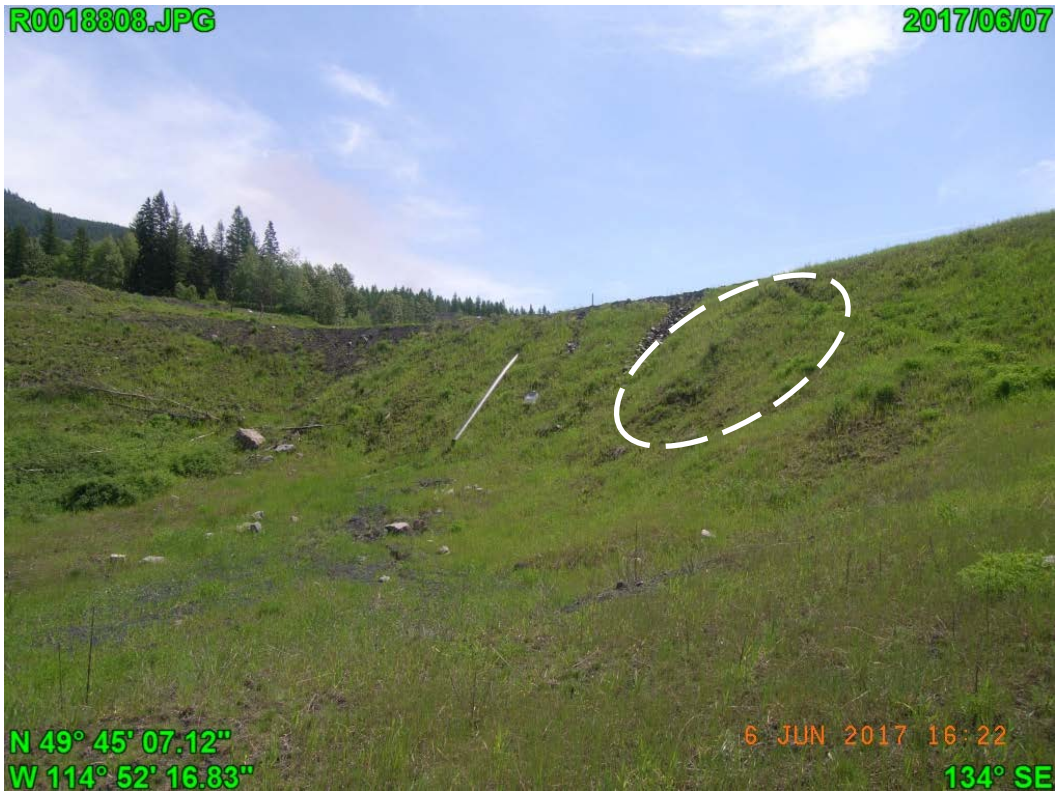
Photograph J - 7: **Showing an upstream tailings cells at the northeast corner of Lagoon D, looking west. (Photo P1100684, 2017/06/06)**

Photograph J - 8: **Showing a close-view of a sinkhole within the tailings cell of Lagoon D, looking south. (Photo P1100688, 2017/06/06)**

Photograph J - 9: **Showing the north crest at east end of Lagoon D, looking west. (Photo P1100689, 2017/06/06)**



Photograph J - 10: **Showing the toe and the 2nd seep area at the east end of North toe of Lagoon D, looking west.**



Photograph J - 11: **Showing a close-view of the first seep area on the north slope, looking southeast.**

Photograph J - 12: **Showing a close-view of the second seep area on the north slope, looking southeast.**

Photograph J - 13: **Showing erosion gully at lower north slope, looking south up from the toe.**

Photograph J - 14: **Showing north slope, looking east. Noted the pipe on the lower north slope.**

Photograph J - 15: **Showing the toe and lower section of north slope of Lagoon D, looking northeast. Note erosion at the toe.**

Photograph J - 16: **Showing the lower north slope of Lagoon D, looking southwest. Noted Otto Pond at the toe and erosions on the slope.**

Photograph J - 17: **Showing an erosion at the bank of the pond located at the toe of north slope of Lagoon D, looking south.**

Photograph J - 18: **Showing the toe at west end of the north slope of Lagoon D, looking southwest. Noted beaver activities within this area.**

Photograph J - 19: **Showing an animal borrow on the toe of north slope of Lagoon D, looking southwest.**

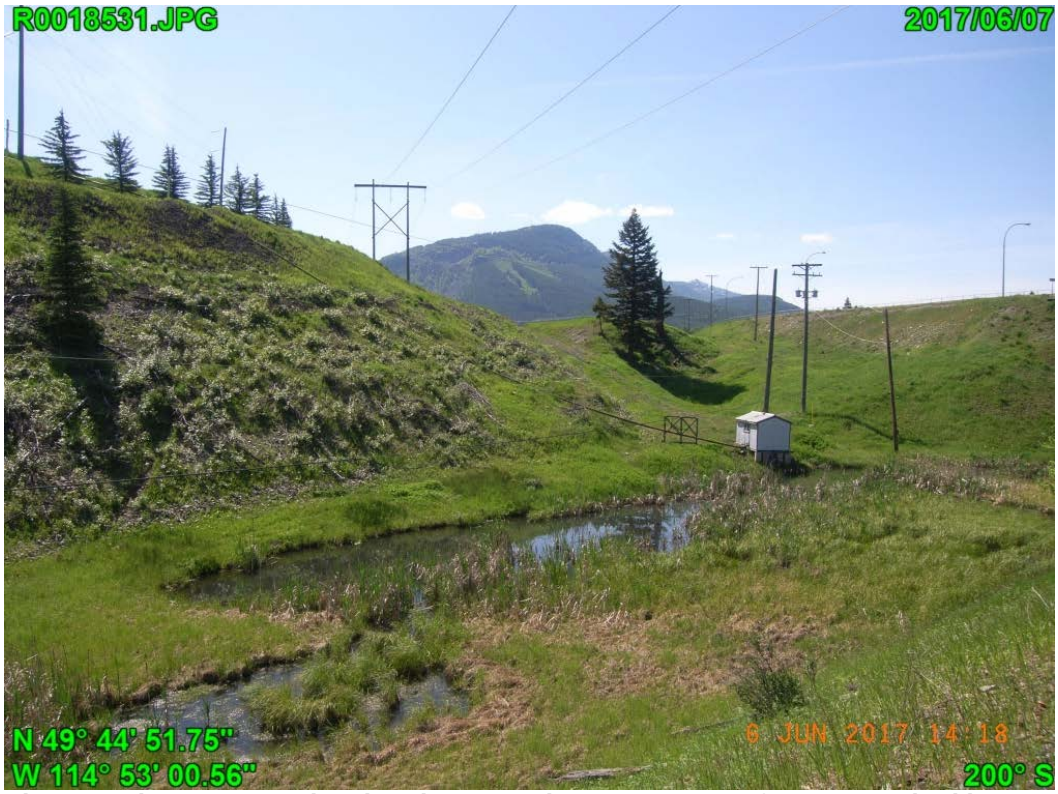
Photograph J - 20: **Showing an animal activity at the toe of the north slope of Lagoon D, looking northwest.**

Photograph J - 21: **Showing upstream tailings beach at the north section of Lagoon D, looking east. (Photo P1100702, 2017/06/06)**

Photograph J - 22: **Showing upstream tailings beach at the north section of Lagoon D, looking west. (Photo P1100703, 2017/06/06)**

Photograph J - 23: **Showing surface of the west corner of Lagoon D, looking south. Noted active tailings deposition on the surface (Photo P1100719, 2017/06/06)**

Photograph J - 24: **Showing tailings placement on the surface at the west corner of Lagoon D, looking north. (Photo P1100717, 2017/06/06)**



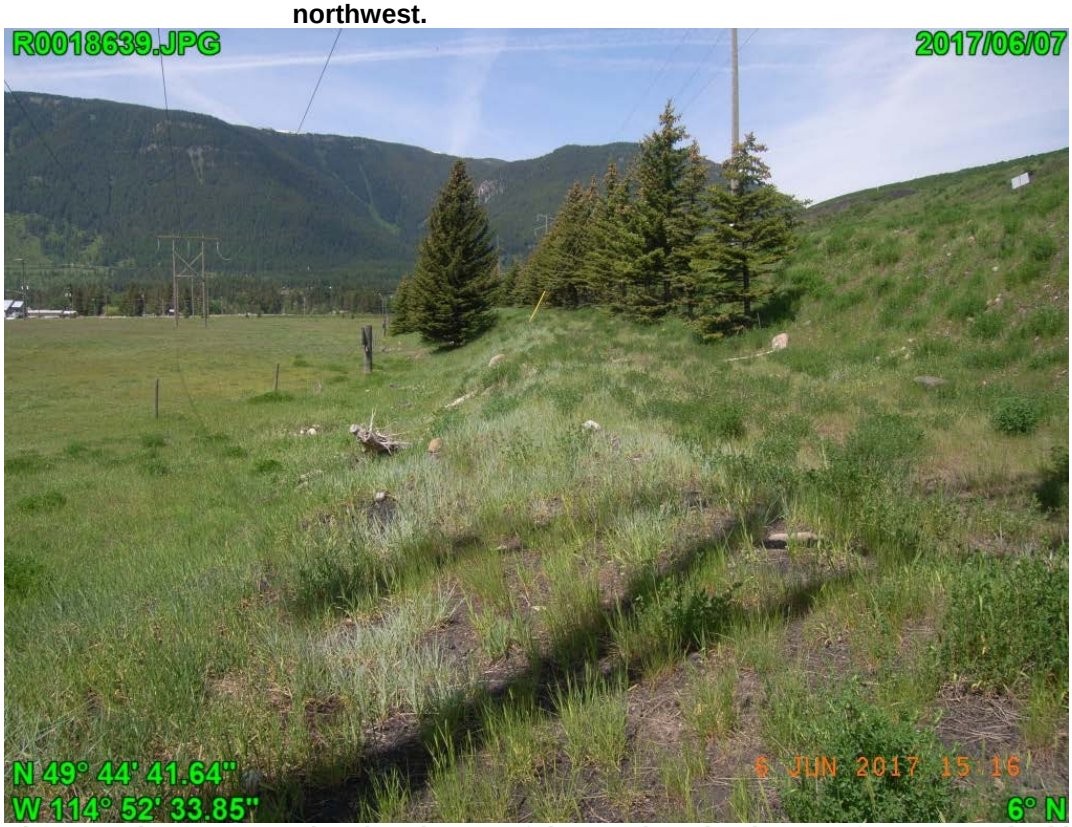
Photograph J - 25: **Showing the toe at the west corner of Lagoon D, looking southwest.**

Photograph J - 26: **Showing the toe of the dam at west end of Lagoon D, looking northwest.**

Photograph J - 27: **Showing a sinkhole at south west crest of Lagoon D, looking east. (Photo P1100730, 2017/06/06).**

Photograph J - 28: **Showing the crest shoulder at the south corner of Lagoon D, looking southeast. (Photo P1100733, 2017/06/07).**

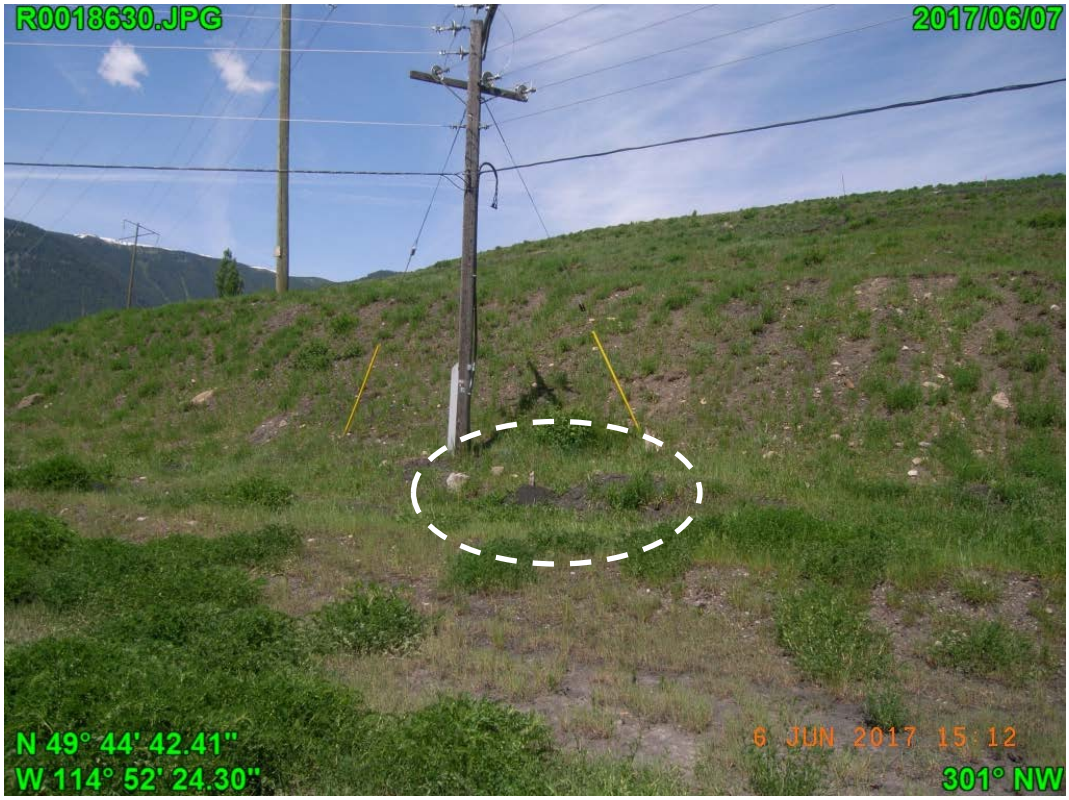
Photograph J - 29: **Showing erosion on the south slope of Lagoon D, looking northwest.**



Photograph J - 30: **Showing the toe of the south embankment of Lagoon D, looking west.**

Photograph J - 31: **Showing dam crest and upstream surface at the south area of Lagoon D, looking west. (Photo P1100735, 2017/06/07).**

Photograph J - 32: **Showing crest and upper south slope of Lagoon D, looking northeast. (Photo P1100736, 2017/06/06)**



Photograph J - 33: **Showing the toe and lower south slope at south corner of Lagoon D, looking northwest. Noted an animal borrow at the toe.**

Photograph J - 34: **Showing a tailings cell at southeast section of Lagoon D, looking northeast. (Photo P1100742, 2017/06/07)**

APPENDIX K
Dam Safety Inspection Checklists

Dam Safety Inspection Checklist

Dam Site: Teck Coal Limited - Elkview Operations
Structure: West Fork Tailing Facility
Inspection Carried Out By: [redacted], EIT. / Michael Cyr, P.Eng.
Date of Inspection: 6 -7 June 2017
Walk Over Inspection Conducted: Yes
Weather Conditions: Sunny, clear, ~26°C

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	X			Significant erosion around spigots 1-3 from tailings
1.3	Deterioration of Erosion Protection	X			No erosion protection in place
1.4	Unusual Accumulation of Debris/Logs		X		
1.5	Evidence of Sloughing/Sliding		X		
1.6	Evidence of Cracks	X			Longitudinal cracking around spigot 5 – does not appear recent
1.7	Any Other Deformation		X		
1.8	Excessive Vegetation		X		
1.9	Other Unusual Conditions		X		
2.0	***Dam Crest and Above Water Beach (if applicable)***				
2.1	Evidence of Shoulder Erosion		X		
2.2	Evidence of Cracking		X		
2.3	Other Deformation/Settlement/Sinkholes	X			Sinkholes at left abutment and along adit dump toe road up to 0.6 m dia.
2.4	Concerns with Low Areas on the Crest		X		
2.5	Concerning Vegetation Growth		X		
2.6	Other Unusual Conditions	X			Animal tracks on tailings beach
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	Any Other Deformation		X		
3.5	Signs of Phreatic Surface/Seepage		X		
3.6	Seepages Observed		X		
3.7	Is Seepage (if any) Turbid		X		
3.8	Non-Uniform Slope		X		
3.9	Excessive Vegetation		X		
3.10	Vegetation Kills		X		
3.11	Other Unusual Conditions		X		
4.0	***Dam Buttresses (if applicable)***				
4.1	Evidence of Erosion			X	
4.2	Evidence of Sloughing/Sliding			X	
4.3	Evidence of Cracking			X	
4.4	Any Other Deformation			X	
4.5	Signs of Phreatic Surface/Seepage			X	
4.6	Seepages Observed			X	
4.7	Is Seepage (if any) Turbid			X	
4.8	Non-Uniform Slope			X	
4.9	Excessive Vegetation			X	
4.10	Vegetation Kills			X	
4.11	Other Unusual Conditions			X	
5.0	***Dam Abutments***				
5.1	Seepages Observed		X		
5.2	Is Seepage (if any) Turbid		X		
5.3	Evidence of Erosion		X		
5.4	Evidence of Cracks		X		
5.5	Other Deformation/Settlement		X		
5.6	Evidence of Repairs		X		
5.7	Concerns with Low areas at the		X		
5.8	Other Unusual Conditions		X		
6.0	***Downstream Toe***				
6.1	Seepages Observed		X		Pond visible below dump, did not inspect closely
6.2	Is Seepage (if any) Turbid		X		
6.3	Evidence of Soft Toe Condition		X		
6.4	Evidence of Boils		X		
6.5	Evidence of Contamination		X		

Dam Safety Inspection Checklist

Dam Site: Teck Coal Limited - Elkview Operations
Structure: West Fork Tailing Facility
Inspection Carried Out By: [redacted], EIT. / Michael Cyr, P.Eng.
Date of Inspection: 7 June 2017
Walk Over Inspection Conducted: Yes
Weather Conditions: Sunny, clear, ~26°C

ID	Observed Features	Yes	No	N/A	Comments
6.6	Excessive Vegetation		X		
6.7	Concern with Outlet of Drains		X		
6.8	Other Unusual Conditions		X		
7.0	***Spillway/Flow Control Structures***				
7.1	Evidence of Erosion or Obstructions.			X	
7.2	Unusual Intensity of Flow in Spillway			X	
7.3	Concern with Inlet Channel/Debris Boom Operation			X	
7.4	Unusual Accumulation of Debris/Logs			X	
7.5	Concerns with Spillway Weir/Flow Controls			X	
7.6	Evidence of Damage to Channel Armouring			X	
7.7	Evidence of Sloughing/Sliding/Sedimentation			X	
7.8	Other Deformation/Settlement			X	
7.9	Excessive Vegetation			X	
7.10	Concern with Road Crossing			X	
7.11	Concern with Stilling Basin and Outlet Structure			X	
7.12	Evidence of Repairs			X	
7.13	Other Unusual Conditions			X	
8.0	***Diversion Ditches/Drainage Swales (if applicable)***				
8.1	Evidence of Erosion or Obstructions.			X	
8.2	Unusual Intensity of Flow in Channel			X	
8.3	Evidence of Damage to Channel Armouring			X	
8.4	Evidence of Sloughing/Sliding/Sedimentation			X	
8.5	Other Deformation/Settlement			X	
8.6	Excessive Vegetation			X	
8.7	Evidence of Repairs			X	
8.8	Other Unusual Conditions			X	
9.0	***Comments***				
9.1	Other site observations				

Dam Safety Inspection Checklist

Dam Site: Teck Coal Limited - Elkview Operations
Structure: Lagoon A
Inspection Carried Out By: Michael Cyr, P.Eng.
Date of Inspection: 7 June 2017
Walk Over Inspection Conducted: Yes
Weather Conditions: Sunny, clear, ~26°C

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		X		
1.3	Deterioration of Erosion Protection		X		
1.4	Unusual Accumulation of Debris/Logs		X		
1.5	Evidence of Sloughing/Sliding		X		
1.6	Evidence of Cracks		X		
1.7	Any Other Deformation		X		
1.8	Excessive Vegetation		X		
1.9	Other Unusual Conditions		X		
2.0	***Dam Crest and Above Water Beach (if applicable)***				
2.1	Evidence of Shoulder Erosion		X		
2.2	Evidence of Cracking		X		
2.3	Other Deformation/Settlement/Sinkholes		X		
2.4	Concerns with Low Areas on the Crest		X		
2.5	Concerning Vegetation Growth		X		
2.6	Other Unusual Conditions		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	Any Other Deformation		X		
3.5	Signs of Phreatic Surface/Seepage		X		
3.6	Seepages Observed		X		
3.7	Is Seepage (if any) Turbid		X		
3.8	Non-Uniform Slope		X		
3.9	Excessive Vegetation		X		
3.10	Vegetation Kills		X		
3.11	Other Unusual Conditions		X		
4.0	***Dam Buttresses (if applicable)***				
4.1	Evidence of Erosion			X	
4.2	Evidence of Sloughing/Sliding			X	
4.3	Evidence of Cracking			X	
4.4	Any Other Deformation			X	
4.5	Signs of Phreatic Surface/Seepage			X	
4.6	Seepages Observed			X	
4.7	Is Seepage (if any) Turbid			X	
4.8	Non-Uniform Slope			X	
4.9	Excessive Vegetation			X	
4.10	Vegetation Kills			X	
4.11	Other Unusual Conditions			X	
5.0	***Dam Abutments***				
5.1	Seepages Observed		X		
5.2	Is Seepage (if any) Turbid		X		
5.3	Evidence of Erosion		X		
5.4	Evidence of Cracks		X		
5.5	Other Deformation/Settlement		X		
5.6	Evidence of Repairs		X		
5.7	Concerns with Low areas at the		X		
5.8	Other Unusual Conditions		X		
6.0	***Downstream Toe***				
6.1	Seepages Observed		X		
6.2	Is Seepage (if any) Turbid		X		
6.3	Evidence of Soft Toe Condition		X		
6.4	Evidence of Boils		X		
6.5	Evidence of Contamination		X		

Dam Safety Inspection Checklist

Dam Site: Teck Coal Limited - Elkview Operations
Structure: Lagoon A
Inspection Carried Out By: [redacted], EIT. / Michael Cyr, P.Eng.
Date of Inspection: 7 June 2017
Walk Over Inspection Conducted: Yes
Weather Conditions: Sunny, clear, ~26°C

ID	Observed Features	Yes	No	N/A	Comments
6.6	Excessive Vegetation		X		
6.7	Concern with Outlet of Drains		X		
6.8	Other Unusual Conditions		X		
7.0	***Spillway/Flow Control Structures***				
7.1	Evidence of Erosion or Obstructions.		X		
7.2	Unusual Intensity of Flow in Spillway		X		
7.3	Concern with Inlet Channel/Debris Boom Operation		X		
7.4	Unusual Accumulation of Debris/Logs		X		
7.5	Concerns with Spillway Weir/Flow Controls		X		
7.6	Evidence of Damage to Channel Armouring		X		
7.7	Evidence of Sloughing/Sliding/Sedimentation		X		
7.8	Other Deformation/Settlement		X		
7.9	Excessive Vegetation		X		
7.10	Concern with Road Crossing			X	
7.11	Concern with Stilling Basin and Outlet Structure		X		
7.12	Evidence of Repairs		X		
7.13	Other Unusual Conditions		X		
8.0	***Diversion Ditches/Drainage Swales (if applicable)***				
8.1	Evidence of Erosion or Obstructions.			X	
8.2	Unusual Intensity of Flow in Channel			X	
8.3	Evidence of Damage to Channel Armouring			X	
8.4	Evidence of Sloughing/Sliding/Sedimentation			X	
8.5	Other Deformation/Settlement			X	
8.6	Excessive Vegetation			X	
8.7	Evidence of Repairs			X	
8.8	Other Unusual Conditions			X	
9.0	***Comments***				
9.1	Other site observations				
	One pipe previously observed on the downstream north slope was flowing				

Dam Safety Inspection Checklist

Dam Site: Teck Coal Limited - Elkview Operations
Structure: Lagoon B
Inspection Carried Out By: [redacted], EIT. / Michael Cyr, P.Eng.
Date of Inspection: 7 June 2017
Walk Over Inspection Conducted: Yes
Weather Conditions: Sunny, clear, ~26°C

ID	Observed Features	Yes	No	N/A	Comments
1.0	***Upstream Dam Slope***				
1.1	Concern with Current or Previous Water Level		X		No water in lagoon
1.2	Evidence of Wave or Other Erosion		X		
1.3	Deterioration of Erosion Protection		X		
1.4	Unusual Accumulation of Debris/Logs		X		
1.5	Evidence of Sloughing/Sliding		X		
1.6	Evidence of Cracks		X		
1.7	Any Other Deformation		X		
1.8	Excessive Vegetation		X		
1.9	Other Unusual Conditions		X		
2.0	***Dam Crest and Above Water Beach (if applicable)***				
2.1	Evidence of Shoulder Erosion		X		
2.2	Evidence of Cracking		X		
2.3	Other Deformation/Settlement/Sinkholes		X		
2.4	Concerns with Low Areas on the Crest	X			Low area at left abutment where flush line debris accumulating
2.5	Concerning Vegetation Growth		X		
2.6	Other Unusual Conditions		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	Any Other Deformation		X		
3.5	Signs of Phreatic Surface/Seepage		X		
3.6	Seepages Observed		X		
3.7	Is Seepage (if any) Turbid		X		
3.8	Non-Uniform Slope		X		
3.9	Excessive Vegetation	X			Large shrub/small tree to right of “spillway”
3.10	Vegetation Kills		X		
3.11	Other Unusual Conditions	X			12” steel pipe sticking out of slope, no flow but lush vegetation
4.0	***Dam Buttresses (if applicable)***				
4.1	Evidence of Erosion			X	
4.2	Evidence of Sloughing/Sliding			X	
4.3	Evidence of Cracking			X	
4.4	Any Other Deformation			X	
4.5	Signs of Phreatic Surface/Seepage			X	
4.6	Seepages Observed			X	
4.7	Is Seepage (if any) Turbid			X	
4.8	Non-Uniform Slope			X	
4.9	Excessive Vegetation			X	
4.10	Vegetation Kills			X	
4.11	Other Unusual Conditions			X	
5.0	***Dam Abutments***				
5.1	Seepages Observed		X		
5.2	Is Seepage (if any) Turbid		X		
5.3	Evidence of Erosion		X		
5.4	Evidence of Cracks		X		
5.5	Other Deformation/Settlement		X		
5.6	Evidence of Repairs		X		
5.7	Concerns with Low areas at the		X		
5.8	Other Unusual Conditions		X		
6.0	***Downstream Toe***				
6.1	Seepages Observed		X		
6.2	Is Seepage (if any) Turbid		X		
6.3	Evidence of Soft Toe Condition		X		
6.4	Evidence of Boils		X		
6.5	Evidence of Contamination		X		

Dam Safety Inspection Checklist

Dam Site: Teck Coal Limited - Elkview Operations
Structure: Lagoon B
Inspection Carried Out By: [redacted], EIT. / Michael Cyr, P.Eng.
Date of Inspection: 7 June 2017
Walk Over Inspection Conducted: Yes
Weather Conditions: Sunny, clear, ~26°C

ID	Observed Features	Yes	No	N/A	Comments
6.6	Excessive Vegetation		X		
6.7	Concern with Outlet of Drains		X		
6.8	Other Unusual Conditions	X			Bent steel pipe sticking up at toe near “spillway”
7.0	***Spillway/Flow Control Structures***				
7.1	Evidence of Erosion or Obstructions.	X			Gullying into slope
7.2	Unusual Intensity of Flow in Spillway			X	No flow or water at time of inspection
7.3	Concern with Inlet Channel/Debris Boom Operation			X	
7.4	Unusual Accumulation of Debris/Logs			X	
7.5	Concerns with Spillway Weir/Flow Controls			X	
7.6	Evidence of Damage to Channel Armouring	X			Sand bags all broken apart
7.7	Evidence of Sloughing/Sliding/Sedimentation			X	
7.8	Other Deformation/Settlement			X	
7.9	Excessive Vegetation			X	
7.10	Concern with Road Crossing			X	
7.11	Concern with Stilling Basin and Outlet Structure			X	
7.12	Evidence of Repairs			X	
7.13	Other Unusual Conditions			X	
8.0	***Diversion Ditches/Drainage Swales (if applicable)***				
8.1	Evidence of Erosion or Obstructions.			X	
8.2	Unusual Intensity of Flow in Channel			X	
8.3	Evidence of Damage to Channel Armouring			X	
8.4	Evidence of Sloughing/Sliding/Sedimentation			X	
8.5	Other Deformation/Settlement			X	
8.6	Excessive Vegetation			X	
8.7	Evidence of Repairs			X	
8.8	Other Unusual Conditions			X	
9.0	***Comments***				
9.1	Other site observations				
	Significant amounts of animal tracks on Lagoon.				

Dam Safety Inspection Checklist

Dam Site: Teck Coal Limited - Elkview Operations
Structure: Lagoon C
Inspection Carried Out By: [redacted], EIT. / Michael Cyr, P.Eng.
Date of Inspection: 7 June 2017
Walk Over Inspection Conducted: Yes
Weather Conditions: Sunny, clear, ~26°C

ID	Observed Features	Yes	No	N/A	Comments
1.0	***Upstream Dam Slope***				
1.1	Concern with Current or Previous Water Level		X		No water in pond
1.2	Evidence of Wave or Other Erosion		X		
1.3	Deterioration of Erosion Protection		X		
1.4	Unusual Accumulation of Debris/Logs		X		
1.5	Evidence of Sloughing/Sliding		X		
1.6	Evidence of Cracks		X		
1.7	Any Other Deformation		X		
1.8	Excessive Vegetation		X		
1.9	Other Unusual Conditions		X		
2.0	***Dam Crest and Above Water Beach (if applicable)***				
2.1	Evidence of Shoulder Erosion		X		
2.2	Evidence of Cracking		X		
2.3	Other Deformation/Settlement/Sinkholes		X		
2.4	Concerns with Low Areas on the Crest	X			Under decant tower crest is narrow and road is low
2.5	Concerning Vegetation Growth		X		
2.6	Other Unusual Conditions	X			Ongoing placement of spoils at northeast corner
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	Any Other Deformation		X		
3.5	Signs of Phreatic Surface/Seepage		X		
3.6	Seepages Observed		X		
3.7	Is Seepage (if any) Turbid		X		
3.8	Non-Uniform Slope		X		
3.9	Excessive Vegetation		X		
3.10	Vegetation Kills		X		
3.11	Other Unusual Conditions		X		
4.0	***Dam Buttresses (if applicable)***				
4.1	Evidence of Erosion			X	
4.2	Evidence of Sloughing/Sliding			X	
4.3	Evidence of Cracking			X	
4.4	Any Other Deformation			X	
4.5	Signs of Phreatic Surface/Seepage			X	
4.6	Seepages Observed			X	
4.7	Is Seepage (if any) Turbid			X	
4.8	Non-Uniform Slope			X	
4.9	Excessive Vegetation			X	
4.10	Vegetation Kills			X	
4.11	Other Unusual Conditions			X	
5.0	***Dam Abutments***				
5.1	Seepages Observed			X	
5.2	Is Seepage (if any) Turbid			X	
5.3	Evidence of Erosion			X	
5.4	Evidence of Cracks			X	
5.5	Other Deformation/Settlement			X	
5.6	Evidence of Repairs			X	
5.7	Concerns with Low areas at the			X	
5.8	Other Unusual Conditions			X	
6.0	***Downstream Toe***				
6.1	Seepages Observed		X		
6.2	Is Seepage (if any) Turbid		X		
6.3	Evidence of Soft Toe Condition		X		
6.4	Evidence of Boils		X		
6.5	Evidence of Contamination		X		

Dam Safety Inspection Checklist

Dam Site: Teck Coal Limited - Elkview Operations
Structure: Lagoon C
Inspection Carried Out By: [redacted], EIT. / Michael Cyr, P.Eng.
Date of Inspection: 7 June 2017
Walk Over Inspection Conducted: Yes
Weather Conditions: Sunny, clear, ~26°C

ID	Observed Features	Yes	No	N/A	Comments
6.6	Excessive Vegetation		X		
6.7	Concern with Outlet of Drains		X		
6.8	Other Unusual Conditions	X			River erosion protection discontinuous in size and coverage
7.0	***Spillway/Flow Control Structures***				
7.1	Evidence of Erosion or Obstructions.			X	
7.2	Unusual Intensity of Flow in Spillway			X	
7.3	Concern with Inlet Channel/Debris Boom Operation			X	
7.4	Unusual Accumulation of Debris/Logs			X	
7.5	Concerns with Spillway Weir/Flow Controls			X	
7.6	Evidence of Damage to Channel Armouring			X	
7.7	Evidence of Sloughing/Sliding/Sedimentation			X	
7.8	Other Deformation/Settlement			X	
7.9	Excessive Vegetation			X	
7.10	Concern with Road Crossing			X	
7.11	Concern with Stilling Basin and Outlet Structure			X	
7.12	Evidence of Repairs			X	
7.13	Other Unusual Conditions			X	
8.0	***Diversion Ditches/Drainage Swales (if applicable)***				
8.1	Evidence of Erosion or Obstructions.			X	
8.2	Unusual Intensity of Flow in Channel			X	
8.3	Evidence of Damage to Channel Armouring			X	
8.4	Evidence of Sloughing/Sliding/Sedimentation			X	
8.5	Other Deformation/Settlement			X	
8.6	Excessive Vegetation			X	
8.7	Evidence of Repairs			X	
8.8	Other Unusual Conditions			X	

9.0	***Comments***
9.1	Other site observations
	Significant amount of animal tracks the Lagoon.

Dam Safety Inspection Checklist

Dam Site: Teck Coal Limited - Elkview Operations
Structure: Lagoon D
Inspection Carried Out By: [redacted], EIT. / Michael Cyr, P.Eng.
Date of Inspection: 7 June 2017
Walk Over Inspection Conducted: Yes
Weather Conditions: Sunny, clear, ~26°C

ID	Observed Features	Yes	No	N/A	Comments
1.0	***Upstream Dam Slope***				
1.1	Concern with Current or Previous Water Level		X		Pond level near inside of cells
1.2	Evidence of Wave or Other Erosion		X		
1.3	Deterioration of Erosion Protection		X		
1.4	Unusual Accumulation of Debris/Logs		X		
1.5	Evidence of Sloughing/Sliding		X		
1.6	Evidence of Cracks		X		
1.7	Any Other Deformation		X		
1.8	Excessive Vegetation		X		
1.9	Other Unusual Conditions		X		
2.0	***Dam Crest and Above Water Beach (if applicable)***				
2.1	Evidence of Shoulder Erosion		X		
2.2	Evidence of Cracking	X			Cell 6 previously breached from culvert failure into lagoon
2.3	Other Deformation/Settlement/Sinkholes	X			Sinkholes visible ~20 m u/s of crest in west lagoon, some filled in
2.4	Concerns with Low Areas on the Crest		X		
2.5	Concerning Vegetation Growth		X		
2.6	Other Unusual Conditions		X		Ongoing placement of excavated tailings in lifts in west lagoon
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	Any Other Deformation		X		
3.5	Signs of Phreatic Surface/Seepage		X		
3.6	Seepages Observed		X		
3.7	Is Seepage (if any) Turbid		X		
3.8	Non-Uniform Slope		X		
3.9	Excessive Vegetation		X		
3.10	Vegetation Kills		X		
3.11	Other Unusual Conditions		X		
4.0	***Dam Buttresses (if applicable)***				
4.1	Evidence of Erosion			X	
4.2	Evidence of Sloughing/Sliding			X	
4.3	Evidence of Cracking			X	
4.4	Any Other Deformation			X	
4.5	Signs of Phreatic Surface/Seepage			X	
4.6	Seepages Observed			X	
4.7	Is Seepage (if any) Turbid			X	
4.8	Non-Uniform Slope			X	
4.9	Excessive Vegetation			X	
4.10	Vegetation Kills			X	
4.11	Other Unusual Conditions			X	
5.0	***Dam Abutments***				
5.1	Seepages Observed			X	
5.2	Is Seepage (if any) Turbid			X	
5.3	Evidence of Erosion			X	
5.4	Evidence of Cracks			X	
5.5	Other Deformation/Settlement			X	
5.6	Evidence of Repairs			X	
5.7	Concerns with Low areas at the			X	
5.8	Other Unusual Conditions			X	
6.0	***Downstream Toe***				
6.1	Seepages Observed		X		
6.2	Is Seepage (if any) Turbid		X		
6.3	Evidence of Soft Toe Condition		X		
6.4	Evidence of Boils		X		
6.5	Evidence of Contamination		X		

Dam Safety Inspection Checklist

Dam Site: Teck Coal Limited - Elkview Operations
Structure: Lagoon D
Inspection Carried Out By: [redacted] EIT. / Michael Cyr, P.Eng.
Date of Inspection: 7 June 2017
Walk Over Inspection Conducted: Yes
Weather Conditions: Sunny, clear, ~26°C

ID	Observed Features	Yes	No	N/A	Comments
6.6	Excessive Vegetation		X		
6.7	Concern with Outlet of Drains		X		
6.8	Other Unusual Conditions	X			Animal burrows in toe from Otto Pond.
7.0	***Spillway/Flow Control Structures***				
7.1	Evidence of Erosion or Obstructions.			X	
7.2	Unusual Intensity of Flow in Spillway			X	
7.3	Concern with Inlet Channel/Debris Boom Operation			X	
7.4	Unusual Accumulation of Debris/Logs			X	
7.5	Concerns with Spillway Weir/Flow Controls			X	
7.6	Evidence of Damage to Channel Armouring			X	
7.7	Evidence of Sloughing/Sliding/Sedimentation			X	
7.8	Other Deformation/Settlement			X	
7.9	Excessive Vegetation			X	
7.10	Concern with Road Crossing			X	
7.11	Concern with Stilling Basin and Outlet Structure			X	
7.12	Evidence of Repairs			X	
7.13	Other Unusual Conditions			X	
8.0	***Diversion Ditches/Drainage Swales (if applicable)***				
8.1	Evidence of Erosion or Obstructions.			X	
8.2	Unusual Intensity of Flow in Channel			X	
8.3	Evidence of Damage to Channel Armouring			X	
8.4	Evidence of Sloughing/Sliding/Sedimentation			X	
8.5	Other Deformation/Settlement			X	
8.6	Excessive Vegetation			X	
8.7	Evidence of Repairs			X	
8.8	Other Unusual Conditions			X	

9.0	***Comments***
9.1	Other site observations
	Significant amount of animal tracks on the lagoon.