MYRA FALLS TAILINGS STORAGE FACILITIES
2017 DAM SAFETY INSPECTION REPORT

Submitted to:

Nyrstar Myra Falls Ltd.
Campbell River, BC

Submitted by:

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

31 March 2018

Amec Foster Wheeler File: NX14001B

EXECUTIVE SUMMARY

This Dam Safety Inspection (DSI) report provides a summary of the operation, maintenance, and surveillance of Tailings Disposal Facilities (TDFs) for Myra Falls Mine (the mine), operated by Nyrstar Myra Falls Ltd. (NMF) for the year 2017. It also summarizes the activities related to the mine's surface water management system during the year. There are two TDFs at Myra Falls Mine the Old TDF and Lynx TDF.

This report was prepared by Amec Foster Wheeler Environment & Infrastructure (Amec Foster Wheeler) in accordance with the requirements of the British Columbia Ministry of Energy, Mines and Petroleum Products (MEMPR), including MEMPR's "Guidance Document – Health, Safety and Reclamation Code for Mines in British Columbia" (MEMPR 2017).

The following list provides the information to be included in the executive summary for facilities that impound water or saturated tailings as required by the MEMPR Guidance Document.

a) Summary of Facility Description

Old TDF

The Old TDF is a high consequence classification tailings dam in the post-operation, transition phase of its lifecycle since it received its last tailings in 2011. It was initially designed by Knight Piésold Ltd. and constructed started in the early 1980s. Conventional cyclone overflow (fine) tailings were hydraulically placed from the outer embankment berm (OEB), which was raised to elevation 336.5 m (3384 m mine datum) by upstream construction with till and waste rock, achieving an overall dam slope of about 4H:1V. Cyclone underflow (coarse) tailings were used for mine backfill or hydraulically placed in an adjacent cell where the Old TDF Surge Pond is now located. In the late 1990s, Klohn-Crippen Consultants Ltd. (Klohn) was retained to assume the role of geotechnical engineering consultant for the tailings facility. The tailings are susceptible to liquefaction so a seismic upgrade berm was added to the outside of the OEB to improve the stability.

In the 2000s, a Paste Plant was built and two new tailings cells were created at a setback and inside of the OEB to form what is now referred to as the Amalgamated Paste Area (APA). The APA Berm (formerly referred to as the Paste Berm), was constructed primarily of well-graded waste rock with some coarse tailings to its final elevation of approximately 344 m (3391.5 m mine datum) in 2006. In 2006, Amec Foster Wheeler assumed the role of geotechnical engineering consultant for the tailings facilities. The Old TDF water management infrastructure was upgraded in 2015-2016 in accordance with the CDA guidelines (2013).

In 2017 a stabilization berm was constructed around the toe of the APA Berm to improve the post-seismic stability of the facility. The stabilization berm was built of fill material overtop of a filter and seepage collection layers.

Work on the Old TDF closure cover is tentatively scheduled for 2018. This work will continue to progress the facility from the transition to active closure phase of the lifecycle.

Lynx TDF

The Lynx TDF is a high consequence classification tailings dam located in the old Lynx Pit area. The facility was designed in the early 2000s by Klohn-Crippen, and the starter dam was partially constructed when Amec Foster Wheeler assumed the role of geotechnical consultant. Tailing deposition in the facility started in 2008. Tailings are contained by Lynx Pit walls and waste rock dumps to the northwest, north and northeast and by Lynx Dam to the southwest, south and southeast. Lynx Dam is a centerline earthfilled dam that has been raised 5 times. It has a 16-m wide crest with 2H:1V downstream slopes on the south and west sides and 4H:1V on the east side. Pond level is controlled by pumping and the facility does not have an emergency spillway. In its current configuration there is capacity to store the Environmental Design Flood (EDF), a 24 hour storm event with a 1:200 AEP, however the facility is not capable of storing or discharging the Inflow Design Flood (IDF).

In 2017 Lynx Dam was raised for the fifth time, from an elevation of 356.8 m to 361.1 m, for an approximate height of 35 m. This work included preparing the foundation and abutment surfaces, building earthfilled buttress on the downstream, core and upstream sides of the dam and construction of a filter layer adjacent to the waste rock dump to the northeast of the facility.

A sixth raise of Lynx Dam is planned to be constructed in 2018. The planned work includes raising the dam crest to an elevation of 365.1 m and building an operations spillway to discharge the IDF.

b) Summary of key hazards

Other than the risk of failure and the potential massive release of tailings into the environment, the key hazards to both tailings facilities are:

- Tailings with high susceptibility to earthquake-induced liquefaction (dams partly constructed on tailings).
- High seismic hazard.
- Heavy precipitation during the fall-winter period.
- Mountainous terrain with elevated risk of rockfalls and debris flows in steep gullies.
- Waste rock dump slopes at marginal factors of safety above the tailings facilities.
- Sulphide-rich potentially acid-generating (PAG) mine waste and tailings, and omnipresence of acid rock drainage (ARD) impacted surface water and groundwater.

For Lynx TDF, there are three other key hazards:

- Potentially unreliable upstream water diversions across steep catchment areas.
- Extreme flooding followed by dam overtopping in the absence of an emergency spillway (in light of potential diversion failure).
- Flooding of the underground mine workings beneath the facility if the hydraulic bulkheads or mine pillars collapse.

c) Classification of the dam(s) in terms of Consequence of Failure in accordance with Table 2-1 of the CDA Dam Safety Guidelines (2013)

The Old TDF and Lynx TDF are both categorized as “high” consequence classification dams. The classification is primarily due to the potential environmental consequences associated with a massive release of tailings, which are interpreted to constitute a “significant loss or deterioration of important fish habitat”.

Further details are available in Sections 2.3.2 and 2.4.2.

d) Summary of significant changes (e.g. construction, development downstream, etc.)

NMF began work to resume mining operations in 2017, which were stopped in 2015. This work included upgrades to the water treatment systems, underground and mill. It was completed by others and did not impact the TDFs.

Construction work was carried out for both the Old TDF and Lynx TDF in 2017. A detailed discussion of construction work is included in Section 8.0. Major construction work of the TDFs included:

- A stabilization berm was construction around the toe of the Old TDF APA Berm to address post seismic stability concerns.
- Lynx Dam was raised to an elevation of 361.1 m.
- Lynx Spring Drain was extended to beyond the toe of the 362.5 m Lynx Dam raise.
- Waste rock was removed from Waste Rock Dump 2 (WRD 2) and grading in preparation for water rock removal was undertaken in Waste Rock Dump 3 (WRD 3) on the slopes above Lynx dam.

Dredging sludge from the water treatment systems were deposited in Lynx TDF, no tailings or other materials were deposited.

e) Significant changes in instrumentation and/or visual monitoring records

Performance of the Old TDF and Lynx TDF is assessed by visual inspections and monitoring instrumentation. Instrumentation includes piezometers for measuring pore water pressures, survey monuments for monitoring settlement and displacement and slope inclinometers for measuring internal deformation. The following changes to the instrumentation system occurred in 2017:

- Two new piezometers were installed in the Lynx Springs Drain to monitor water levels within the drain.
- Several piezometers were destroyed or stopped transmitting data in 2017. A detailed summary of the destroyed piezometers and work to repair the instrumentation system is provided in Appendix B.
- Some instrumentation data was lost due to depleted batteries in Hut A, Hut B and Lynx Hut.

- A non-essential slope inclinometer at the toe of Lynx Dam was decommissioned.
- The Lynx surface survey monuments were removed in August for construction. The survey monuments have not been replaced, they are an important component for monitoring dam safety so should be replaced as soon as possible.

A detailed discussion of the instrumentation monitoring results is provided in Section 7.0. Piezometer levels generally followed previously observed trends in 2017. The highest groundwater levels were observed in November following precipitation events. Minimal movements were observed from the surface monument surveys for both the Old TDF and Lynx TDF.

As part of routine surveillance activities, the following visual inspections were carried out:

- Twenty-five weekly inspections of the tailings facilities were carried out by NMF and Amec Foster Wheeler personnel.
- Twelve monthly inspections were carried out by the Engineer of Record.

Visual monitoring indicates that both TDF dams continue to perform satisfactorily. Additional details regarding visual inspections are discussed in Section 6.0.

f) Significant changes to dam stability and/or surface water control

A seismic stabilization berm was constructed around the toe of the APA Berm. Details of construction are discussed in Section 8.0.

Material was removed from WRD 2 and regraded in WRD 3 on the slopes above Lynx TDF which changed the established surface water flow, infiltration and discharge patterns for the area. The changes to surface water infiltration and discharge are still being observed but at the time are not considered to impact the safety of Lynx TDF.

g) Summary of review of the Operation, Maintenance and Surveillance (OMS) Manual

The OMS Manual is in the process of being updated and revised by Amec Foster Wheeler. The revised version is scheduled for publication 31 March 2018.

h) Summary of review of the Emergency Preparedness and Response Plan (EPP)

The EPP can be found in Section 9 of the OMS Manual. The Emergency Response Plan was reviewed by the Engineer of Record in March 2018 and recommendations for improvements provide to NMF.

i) Scheduled date for the next formal Dam Safety Review (DSR) in accordance with the Health, Safety and Reclamation Code for Mines in British Columbia (MEM 2017) and the CDA Dam Safety Guidelines (CDA 2013)

A formal DSR was completed for both tailings facilities in June 2016 by Tierra Group International Ltd. (Tierra Group). The previous DSR was completed in 2013 by Robertson Geotechnical Consulting Ltd. (RGC). These reviews were completed at a higher frequency than required by the CDA guidelines (2013).

The next DSR must be completed by 2021 to meet regulatory requirements. A summary tracking the status of recommendations from RGC and Tierra Group's reviews is provided in Section 9.1.

j) Summary of recommendations

The status of recommendations from previous DSIs and DSRs is provided in Section 9.0. Based on 2017 engineering work with respect to operations, maintenance and surveillance for the TDFs the following is recommended:

Structure	ID	Deficiency or Non-Conformance	Regulatory Requirement or OMS Reference	Recommended Action	Priority(1)	Recommended Deadline/Status
Old TDF	2017-01	Decant structure and pipe through West APA berm was not fully grouted for decommissioning.	N/A	Complete grouting and decommissioning of west decant pipe in advance of Old TDF closure to reduce long term risks of piping erosion. Complete before the tower is plugged with tailings.	3	31 December 2018
All	2017-02	Multiple piezometers were destroyed or stopped functioning in 2017.	OMS Section 5	Assess which piezometers are still functional. EOR to evaluate spatial piezometer coverage. Replace or repair broken piezometers that are missing from essential monitoring areas.	3	30 September 2018
Lynx TDF	2017-03	Survey monuments were removed from Lynx TDF in August 2017 for construction and have not been replaced.	OMS Section 5	Replace survey monuments and complete a baseline survey	2	30 April 2018

Structure	ID	Deficiency or Non-Conformance	Regulatory Requirement or OMS Reference	Recommended Action	Priority(1)	Recommended Deadline/Status
Lynx TDF	2017-04	Restart plans in 2018 include a change in tailings production from cyclone fine tailings to whole tailings.	OMS Section 5	Tailings samples should be collected semi-annually for lab testing to validate design assumptions. Tailings surface surveys should be carried out on a quarterly basis to assess average dry density and consolidation. A detailed investigation of whole tailings properties should be completed once 5 m of tailings have been placed.	2	31 December 2018
Lynx	2017-05	Deleterious material was observed in the southwest corner of Lynx Dam during foundation preparation. Subsequent documentation review resulted in questions regarding starter dam completion and quality control activities.	OMS Section 5	Carry out a geotechnical and geophysical investigation of the original starter dam. Install vibrating wires and slope inclinometers as outlined in the proposed investigation plan.	2	30 June 2018

Structure	ID	Deficiency or Non-Conformance	Regulatory Requirement or OMS Reference	Recommended Action	Priority[(1)]	Recommended Deadline/Status
Lynx	2017-06	Surveys of the paste surface of Lynx TDF were not completed in 2017.	OMS Sections 5.0 and 7.0	Review internal staff availability to complete quarterly surveys, if required contract external surveyors to complete.	2	30 June 2018
Lynx	2017-07	Lynx TDF does not have the capacity to store or discharge the IDF	HSRC	Construct an Operations Spillway to discharge the IDF	2	31 December 2018

1 Priority levels are defined as follows by MEM (2016):

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

TABLE OF CONTENTS

Page

EXECUTIVE SUMMARY ..... **i**

1.0 INTRODUCTION **1**
1.1 Scope of Report 1
1.2 Annual Reporting Requirements 1
1.3 Engineer of Record and TSF Qualified Person 2

2.0 BACKGROUND AND FACILITY DESIGN **2**
2.1 Elevation Datum and Coordinate System 2
2.2 Historical Development 3
2.3 Old TDF 3
2.3.1 Summary 3
2.3.2 Dam Classification 4
2.3.3 Key Design Criteria 4
2.4 Lynx TDF 5
2.4.1 Summary 5
2.4.2 Dam Classification 5
2.4.3 Key Design Criteria 6
2.5 Waste Rock Dumps 7

3.0 CLIMATIC REVIEW **8**
3.1 Precipitation 8
3.2 Temperature 12

4.0 TAILINGS MANAGEMENT **12**
4.1 Old TDF Tailings Management 13
4.2 Lynx TDF Tailings Management 13
4.2.1 2017 Material Deposition in Lynx TDF 14
4.2.2 As-Built Storage and Raise Requirements 14

5.0 WATER MANAGEMENT **15**
5.1 Non-Contact Water 16
5.1.1 Arnica Diversion 16
5.1.2 Upper Lynx Diversion 16
5.1.3 Lower Lynx Diversion 17
5.1.4 Old TDF Seismic Upgrade Berm 17
5.1.5 Lynx TDF Area 17
5.2 Old TDF Contact Water 17
5.2.1 Amalgamated Paste Area 18
5.2.2 TDF Strip and Old TDF Surge Pond 19
5.2.3 Diversion Ditch Spring Drain 20
5.3 Lynx TDF Contact Water 20
5.3.1 Lynx Dam Toe 21
5.3.2 Lynx Springs Drain 21

TABLE OF CONTENTS

Page

5.3.3 Flow Monitoring in the Underground Lynx Mine 21
5.3.4 Depressions in the Tailings Surface 22
5.4 Other Contact Water Management 22
5.5 Water Treatment 23

6.0 DAM INSPECTIONS 23
6.1 Inspections by NMF 23
6.2 Inspections by Amec Foster Wheeler 24

7.0 INSTRUMENTATION MONITORING RESULTS 27
7.1 Lynx TDF Monitoring 27
7.1.1 Piezometers 27
7.1.2 Surface Monuments 28
7.1.3 Slope Inclinometers 29
7.2 Old TDF Monitoring 30
7.2.1 Piezometers 30
7.2.2 Surface Monuments 32
7.2.3 Slope Inclinometers 32

8.0 SUMMARY OF CONSTRUCTION 33
8.1 APA Stabilization Berm 33
8.2 Lynx Dam Raise 34
8.3 Lynx Spring Drain 35
8.4 Waste Rock Dump Removal 35

9.0 SUMMARY OF RECOMMENDATIONS 36
9.1 Previous Recommendations 36
9.2 New Recommendations from 2017 42

10.0 LIMITATIONS AND CLOSING REMARKS 45

REFERENCES 46

LIST OF TABLES

Table 1: Key Contacts 2
Table 2: Old TDF Design Criteria 4
Table 3: Lynx TDF Design Criteria 6
Table 4: Monthly Precipitation 8
Table 5: Monthly Temperatures 12
Table 6: Summary of Key Monthly Dam Inspection Actions 24
Table 7: Summary of Previous Recommendations 37
Table 8: Summary of New Recommendations 43

LIST OF FIGURES

Figure 1: Monthly Precipitation Data 10
Figure 2: Annual Total Precipitation 1979-2017 11

LIST OF DRAWINGS

010701: Site Location Plan
010702: General Site Arrangement Plan
010703: Old TDF Instrumentation – Piezometers
010704: Old TDF Instrumentation – Piezometers – Details 1 & 2
010705: Old TDF Instrument Planes – Sections 1 & A
010706: Old TDF Instrument Planes – Sections 3 & 4
010707: Old TDF Instrument Planes – Sections 5 & 6
010708: Old TDF Instrumentation –Monuments and Inclinometers
010709: Lynx TDF Instrumentation – Vibrating Wire Piezometers
010710: Lynx TDF Instrumentation – Monuments and Inclinometers
010711: Lynx TDF Instrument Plane D (Sta. 1+85 m)
010712: Lynx TDF Instrument Plane E (Sta. 3+50 m)
010713: Lynx TDF Instrument Plane F (Sta. 4+57 m)
010714: Drainage Area Map

LIST OF APPENDICES

Appendix A Selected Photographs
Appendix B Instrumentation Monitoring
Appendix B1 Quarterly Monitoring Data Update Reports (included on digital copy)
Appendix B2 Instrumentation and Piezometer Operational Status (included on digital copy)
Appendix C NMF Inspection Reports (included on digital copy)
Appendix D Amec Foster Wheeler Dam Inspections (included on digital copy)

IMPORTANT NOTICE

This report was prepared exclusively for Nyrstar Myra Falls Ltd. by Amec Foster Wheeler Environment & Infrastructure. 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 Nyrstar Myra Falls Ltd. 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

This document reports the 2017 Dam Safety Inspection (DSI), which presents a summary of the operation, maintenance, and surveillance of the Tailings Disposal Facilities (TDFs) during 2017 for Myra Falls Mine (the mine), operated by Nyrstar Myra Falls Ltd. (NMF). These facilities comprise the Old TDF and Lynx TDF. The location of the mine is shown on Drawing 010701.

1.1 Scope of Report

Typical reporting requirements for annual DSI reports require that the report addresses the calendar year and be submitted no later than 31 March of the following year. The scope of this report addresses the period spanning 1 January through 31 December 2017, which is referred to as the "reporting period". It is based on observations made during site visits, a review of instrumentation/monitoring data, climate data, ongoing construction activities, and any other notable occurrences, should they occur (seismic events, landslides, etc.).

Construction activities undertaken and completed in 2017 for both the Old TDF and Lynx TDF are documented under separate cover in the 2017 As-Built Construction Report (Amec Foster Wheeler 2018b) dated 31 March 2018.

1.2 Annual Reporting Requirements

This report has been prepared in accordance with the requirements of the British Columbia Ministry of Energy, Mines and Petroleum Resources (MEMPR), including MEMPR's "Guidance Document – Health, Safety and Reclamation Code (HSRC) for Mines in British Columbia" (MEMPR, June 2017).

For the reader's convenience, the numbered items required by the MEMPR HSRC Guidance Document can be found in the following sections of this report:

1. Executive Summary – precedes the table of contents
2. Facility Description – Section 2.0 and Section 5.0 (also see Section 4.0 for a summary of past years' operation and Section 8.0 for this year's construction)
3. Identification of Engineer of Record (EoR) and TSF Qualified Person – Section 1.3
4. Updated plan and representative cross sections – drawings appended to the end of the report
5. Site Photographs – in Appendices A and in Appendix D
6. Review of Climate Data – Section 3.0
7. Water balance review and reconciliation – Section 5.0
8. Freeboard and storage availability (in excess of the design flood) – Section 4.0
9. Water discharge system, volumes and quality – Section 5.0 and the 2017 Annual Effluent Report under Effluent Permit PE-06858 submitted to the Ministry of Environment (MoE) (NMF 2018b)

10. Seepage occurrence and water quality – Section 5.0 and the 2017 Annual Reclamation Report under M-26 submitted to MEM (NMF 2018a)
11. Surface water control and surface erosion – Section 5.0
12. Instrumentation Review – Section 7.0 and in Appendix B1 and B2
13. Recommendations – Section 9.0.

1.3 Engineer of Record and TSF Qualified Person

The EoR and the TSF Qualified Person are the same for both TDFs at the Myra Falls Mine and are identified in Table 1 below:

Table 1: Key Contacts

Function	Name	Company	Contact Information
Engineer of Record	Dan Hughes-Games, P.Eng.	Amec Foster Wheeler	dan.hughes-games@amecfw.com 250-729-2440
TSF Qualified Person	Martin Bussieres, P.Eng.	Nyrstar Myra Falls	martin.bussieres@nyrstar.com 250-287-9271

Role and responsibilities of the EoR and the TSF Qualified Person are defined in the HSRC Guidance Document (MEMPR 201).

2.0 BACKGROUND AND FACILITY DESIGN

2.1 Elevation Datum and Coordinate System

Myra Falls Mine is in the process of transitioning construction and facility management from a local grid coordinate system to global coordinates.

Mine Grid north is on a bearing of approximately 48° relative to true north. Mine grid distances are in meters. Mine grid is shown where appropriate on the drawings accompanying this report. Mine datum elevations are adjusted upwards by 3047.518 m so that all values remain positive to the bottom of the underground mine. Mine datum and geodetic elevations do not overlap. The lowest point near site is the surface of Buttle Lake at approximately El. 3270 m (222.5 m geodetic), whereas the highest point near site is Mt. Myra at 4852.5 m (1805 m geodetic).

The global coordinate system selected for use on the site is NAD 83 with coordinates projected to Universal Transverse Mercator (UTM) Zone 10 and the geodetic datum is Canada Geoid Model HT2_0.

This report was prepared using UTM and geodetic elevations. Except for the drawings where elevations are generally in mine datum. Azimuth directions given in descriptions in this report are given relative to true north, regardless of which coordinate system is used.

2.2 Historical Development

Prospecting began in the early 1900s, with the first industrial mine production in the 1960s and the development of the Lynx open pit. Most surface mining operations terminated around 1975, after which the underground development of the Lynx and H-W ore bodies commenced. During this period, the cyclone segregated sand fraction of the tailings was used as backfill in decommissioned underground workings, and the fine fraction of the tailings was deposited directly in the south end of Buttle Lake.

In the early 1980s the provincial government prohibited further tailings deposition to Buttle Lake due to concerns over water quality, resulting in the design and construction of the Old TDF. The Old TDF operated as the primary tailings facility between 1984 and 2008, with final deposition in 2009.

The Lynx TDF was built in the old Lynx pit area as the Old TDF neared its ultimate design life. The Lynx TDF first received tailings in 2008 and is currently the only active TDF on site.

Additional details on the design and operation of each facility are presented below.

2.3 Old TDF

2.3.1 Summary

The Old TDF was designed by Knight Piésold Ltd. with a modified-centreline (upstream) constructed tailings dam in the early 1980s. Conventional cyclone overflow tailings in the Old TDF were hydraulically placed from the outer embankment berm (OEB), which was raised periodically by filling with till and waste rock on top of the upstream side of the previous berm and over the edge of the uncompacted tailings beach, achieving an overall dam slope of about 4H:1V. The Old TDF included two primary deposition cells: Area I and Area II.

Further investigations and stability analysis in the mid-1990s by Knight Piésold Ltd. and Klohn-Crippen Consultants Ltd. (Klohn), determined that the tailings had a high susceptibility to liquefaction, and therefore the Old TDF had a high probability of failure during strong seismic ground motion. Klohn was retained to design a seismic upgrade for the Old TDF and assume the role of geotechnical engineering consultant for the TDF.

In the early 2000s it was determined that the Old TDF had reached its practical elevation limit with respect to overall post-seismic slope stability. Klohn designed a new berm that was constructed on the tailings surface at a setback from the OEB, and created two new cells for tailings deposition (Klohn 2001a). The mine constructed a paste plant to produce thickened paste tailings soon after the construction of the new cells. The two cells were combined to form the Amalgamated Paste Area (APA), and the perimeter cell berm was designated the APA Berm (formerly called Paste Berm). APA Berm is constructed primarily of well-graded waste rock, with some coarse tailings sand inclusion near the toe on the upstream side.

Amec Foster Wheeler[1] has fulfilled the role of geotechnical engineering consultant for the TDFs at Myra Falls Mine since 2006. A conceptual design upgrade of the APA Berm to withstand the design seismic ground motions was prepared by AMEC in 2011 and included in the conceptual

[1] Including predecessor companies: AMEC Earth & Environmental from 2006-2011 and AMEC Environment & Infrastructure from 2011 to 2014, each respectively a Division of AMEC Americas Limited.

closure plan (NMF 2012). In 2016, Amec Foster Wheeler (2016f) revised and completed the APA Berm stabilization design. This design was incorporated in the Old TDF closure cover design completed to permit level in 2016 by Amec Foster Wheeler (2016h).

The APA Berm stabilization comprised constructing a buttress around the toe of the APA Berm, this work was completed in 2017 and is described in Section 8.0.

2.3.2 Dam Classification

The Old TDF is assessed as having a "HIGH" consequence classification relative to criteria outlined in the CDA guidelines, based primarily on the significant environmental impacts that would result from a hypothetical failure of the facility. This consequence classification was confirmed by NMF upon the completion of a dam breach inundation study (Amec Foster Wheeler 2015a).

2.3.3 Key Design Criteria

Key design criteria for the Lynx TDF are summarized in Table 2.

Table 2: Old TDF Design Criteria

Aspect	Original Design Criteria	Updated Criteria[(1)]
Environmental Design Flood	Based on 24-hour storm event Assume diversion functions 1/200 AEP, 24-hour storm event	Based on 24-hour storm event Assume diversion functions 1/200 AEP, 24-hour storm event
Inflow Design Flood	Based on 24-hour storm event Assume diversion failure Operations and Closure: 1/1000 AEP, 24-hour storm event	Based on 24-hour storm event Applies to both diversions and impoundment Operations, Transition, Active Closure[(2)]: 1/3 between 1/1000 AEP and PMF Passive Closure: 2/3 between 1/1000 AEP and PMF
Flood storage and freeboard	Operations: Dry in normal conditions Flood attenuation through storage Spillway flow if diversion ditch breaches Spillway flow if EDF exceeded Minimum 0.5 m freeboard Closure: Dry cover, no flood storage or freeboard	Operations, Transition: Dry in normal conditions Minimize water storage Spillway flow if EDF exceeded Minimum 1.0 m freeboard up to IDF Active and Passive Closure: Dry cover, no flood storage or freeboard

Aspect	Original Design Criteria	Updated Criteria[1]
Dam Stability (static)	Short term or temporary: FoS ≥ 1.3 Long term, steady state: FoS ≥ 1.5	Short term or temporary: FoS ≥ 1.3 Long term, steady state: FoS ≥ 1.5
Dam stability (seismic)	Operations and Closure: Based on 50% of the Maximum Credible Earthquake, PGA = 0.30 g M7.5 intraplate earthquake Post-seismic FoS ≥ 1.1 FoS ≥ 1.25 through the toe drain. (FoS: Factor of Safety)	Operations, Transition, Active Closure[2]: 1/2475 AEP, 0.55 g, M9.0 subduction earthquake Passive Closure: 1/2 between 1/2475 and 1/10000 AEP, 0.63 g M9.0 subduction earthquake FoS ≥ 1.2, post-earthquake

1 Updated criteria are derived from the updated CDA Guidelines and Mining Dams Supplement (CDA 2013, 2014), revised MEM requirements for 1.0 m minimum freeboard, MoE requirements for the EDF magnitude, and the updated seismic hazard assessment (Amec Foster Wheeler 2016b).

2 CDA Mining Dams Supplement (CDA 2014) implies that the higher "Closure - Passive Care" standards might be applied where it is anticipated that the "Closure - Active Care" configuration is expected to last decades or centuries if there are not sufficient resources on hand to address emergencies stemming from extreme floods or major earthquakes.

2.4 Lynx TDF

2.4.1 Summary

The Lynx TDF is retained by a U-shaped, centreline constructed, rock fill embankment dam across the low side of the Lynx open pit, with its base at a minimum of about El. 325.5 m. The dam was raised five times, most recently in 2017 as described in Section 8.0. The current crest is at nominally El. 361.1 m. The centreline remains at a fixed alignment during each raise and the downstream toe extends further from the centreline. The ultimate design crest height is El. 382.5 m, 21.4 m above the current crest, approximately 50% higher than the current height. The south and west sides of the embankment are sloped at 2H:1V and the east side is at 4H:1V. The upstream buttress is sloped at 2H:1V. The embankment has a relatively wide, horizontal crest, with a total width of 16 m.

The most recent update to the Lynx TDF design can be found in the 2018 Lynx TDF Ultimate design report (Amec Foster Wheeler 2018a). Prior design details are found in in Klohn (2001b), AMEC (2008b, 2010a, b, c, 2011a, b, and 2013), and Amec Foster Wheeler (2015b, c, 2016a, b 2017f, g, h and i).

2.4.2 Dam Classification

The Lynx TDF is assessed as having a "HIGH" consequence classification using criteria outlined in the CDA guidelines, based primarily on the significant environmental impacts that would result

from a hypothetical failure of the facility. This consequence classification was confirmed by NMF upon the completion of a dam breach inundation study (Amec Foster Wheeler 2015a).

2.4.3 Key Design Criteria

Key design criteria for the Lynx TDF are summarized in Table 3:

Table 3: Lynx TDF Design Criteria

Aspect	Original Design Criteria	Updated Criteria[(1)]
Environmental Design Flood	Based on 24-hour storm event Assume diversion functions 1/200 AEP, 24-hour storm event	Based on 24-hour storm event Assume diversion fails 1/200 AEP, 24-hour storm event 303,000 m^3 total volume
Inflow Design Flood	Based on 24-hour storm event Assume diversions function effectively Operations: 1/1000 AEP 78,000 m^3 total volume Closure: PMF	Based on 24-hour storm event Assume diversions fail Operations, Transition, Active Closure[(2)]: 1/3 between 1/1000 AEP and PMF Passive Closure: 2/3 between 1/1000 AEP and PMF
Flood storage and freeboard	Operations: Maximum 1 m water against dam crest in normal conditions Store IDF Minimum 0.5 m freeboard No spillway Closure: Not designed, presumed dry cover and spillway	Operations, Transition: Minimize water against dam crest in normal conditions Store EDF Minimum 1.0 m freeboard Spillway required to route IDF. Active and Passive Closure: Minimize storage, clean water spillway.
Dam Stability (static)	Short term or temporary: FoS ≥ 1.3 Long term, steady state: FoS ≥ 1.5	Short term or temporary: FoS ≥ 1.3 Long term, steady state: FoS ≥ 1.5

Aspect	Original Design Criteria	Updated Criteria[1]
Dam stability (seismic)	Operations and Closure: Based on 100% of the Maximum Credible Earthquake, PGA = 0.60 g M7.5 intraplate earthquake	Operations, Transition, Active Closure[5]: 1/2475 AEP, 0.55 g, M9.0 subduction earthquake Passive Closure: 1/2 between 1/2475 and 1/10000 AEP, 0.63 g M9.0 subduction earthquake
	Post-seismic FoS ≥ 1.3	FoS ≥ 1.2, post-earthquake

1 Updated criteria are derived from the updated CDA Guidelines and Mining Dams Supplement (CDA 2013, 2014), revised MEM requirements for 1.0 m minimum freeboard, MoE requirements for the EDF magnitude, and the updated seismic hazard assessment (Amec Foster Wheeler 2016b).

2 CDA Mining Dams Supplement (CDA 2014) implies that the higher "Closure - Passive Care" standards might be applied where it is anticipated that the "Closure - Active Care" configuration is expected to last decades or centuries if there are not sufficient resources on hand to address emergencies stemming from extreme floods or major earthquakes.

2.5 Waste Rock Dumps

Four waste rock dumps are located above and adjacent to Lynx TDF. They are irregularly shaped with benches, over steepened slopes, and crossed by several active and abandoned roads. They were built between 1960's and 2015, however limited records or designs exist.

Waste Rock Dump 2 (WRD 2) is located on the upper slopes northeast of the Lynx TDF. Cut slopes in the dump are generally over steepened and marginally stable.

Waste Rock Dump 3 (WRD 3) is located within the Lower Pit, northwest of Lynx TDF. It is divided into two Zones, 3A is located between 390 and 500 m elevation and 3B between 320 and 390 m elevation. The face of 3A had slope angle between 38° and 40° and contains some overhangs up to 5 m high.

Amec Foster Wheeler presented a stability review of the waste rock dumps in March 2016 (Amec Foster Wheeler 2016c) in response to a ministerial requirement. The stability review identified potentially low static and pseudostatic factors of safety and as a result, potential hazards to Lynx TDF related to the presence of the dumps above the facility. The initial report recommended following up the stability review with analysis and design of slope stabilization measures.

Amec Foster Wheeler (2017b) completed a preliminary stabilization design for WRD 2, 3A and 3B. The stabilization design concluded that WRD 2 and 3A must be removed, and that WRD 3B must also be removed unless further investigation and analysis indicates that it is stable.

Removal of WRD 2 and 3A began in 2017 and is described in Section 8.0. Amec Foster Wheeler prepared detailed design, drawings and specifications for the removal of the dumps (2017j, k, l and m).

3.0 CLIMATIC REVIEW

The climate in the Myra Falls area is classified as Marine West Coast, based on the Köppen Climate Classification System (Government of Canada 1957). Weather patterns in the area are typical of the coastal regions of British Columbia. The climate at Myra Falls is characterized by a cool, wet season starting in September and extending until May and a warm, dry season starting in May and extending to September. Most winters are temperate in that they do not have prolonged periods of sub-zero temperatures; however, exceptions do occur and some winters remain slightly below zero for extended periods. Most of the annual precipitation at the mine site falls in the wet season as rain, with occasional snow during the winter months. Snow is common at higher elevations between mid-fall and late spring, and so the hydrology of the surrounding natural streams typically includes a significant spring runoff component, usually peaking in late May to late June.

There is one weather station near the Paste Plant that is fully instrumented, automated station and is the only station currently monitored. A weather station near the Power House was removed in 2017 as it was within the dam raise footprint. The Power House weather station was a manual station and was the source of weather data from 1978 to 2015.

3.1 Precipitation

Monthly precipitation totals and extremes are presented in Figure 1. Yearly precipitation totals are summarized on Figure 2. Complete monthly precipitation records and statistics are found in the Quarterly Reports in Appendix B1. Based on data between 1979 to 2017, the site has an average annual precipitation of 2,573 mm. Monthly variations in precipitation and temperature are shown in Table 4 and Table 5.

The total annual precipitation recorded in 2017 were greater than average with over 2,612 mm (2,469 mm as rain and approximately 143 mm of snow water equivalent). The winter months were rainy, October and November were particularly wet.

Table 4: Monthly Precipitation

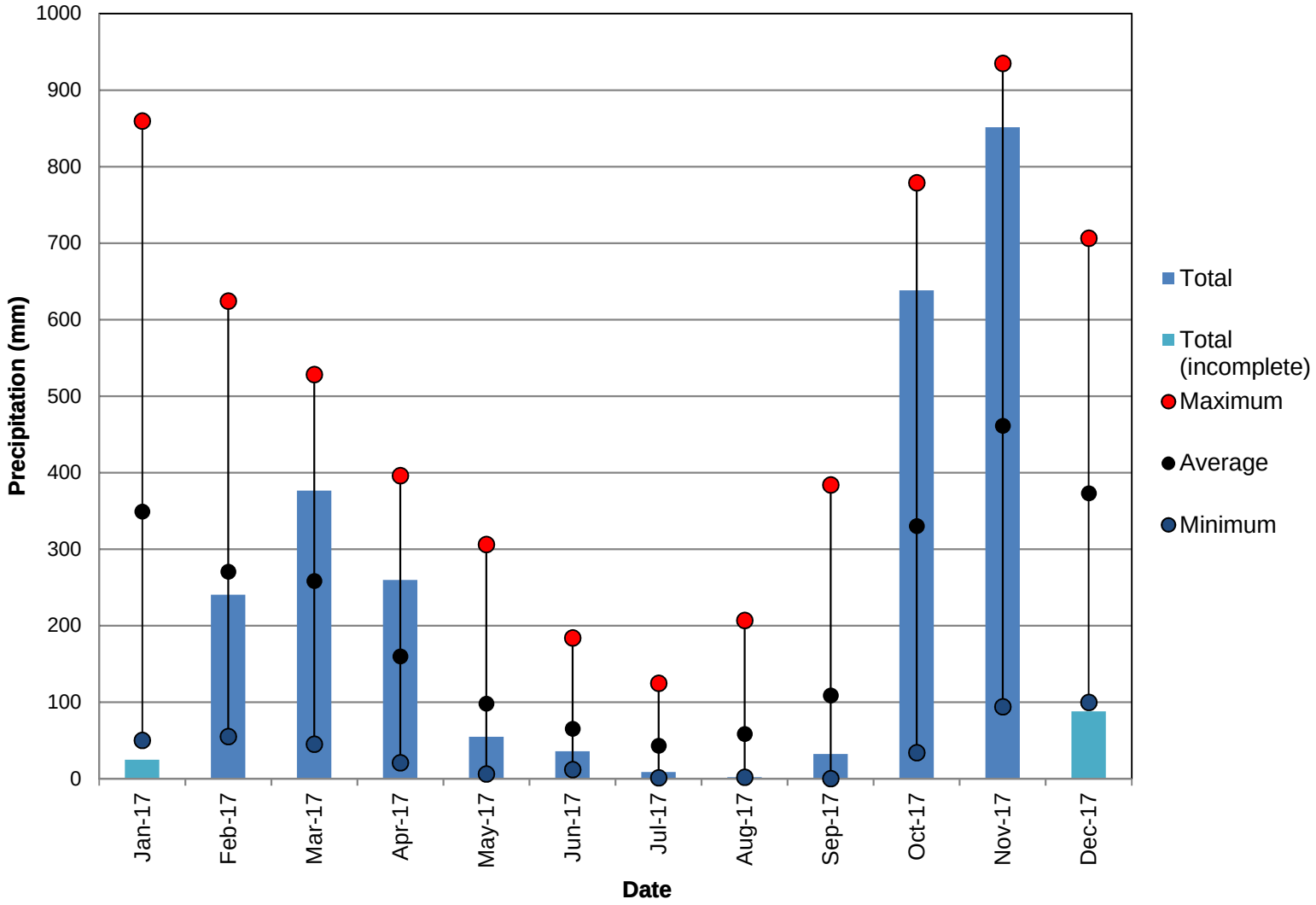
Month	Precipitation (mm)	
	Average[(1)]	2017
January	349	25[(2)]
February	270	240
March	258	377
April	160	260
May	98	55
June	65	36
July	43	9

Month	Precipitation (mm)	
	Average[(1)]	**2017**
August	58	2
September	109	32
October	330	638
November	461	851
December	373	88[(3)]
Total	**2,574**	**2,613**

1 Precipitation data obtained from NMF (average based precipitation data for the power house station from 1979 to 2014 and for the Paste Plant station from 2015 and onwards).

2 Data not recorded between 1 January to 24 January 2017.

3 Data not recorded between 26 December to 31 December 2017.



File No.: NX14001B.2017

Figure 1: Monthly Precipitation Data

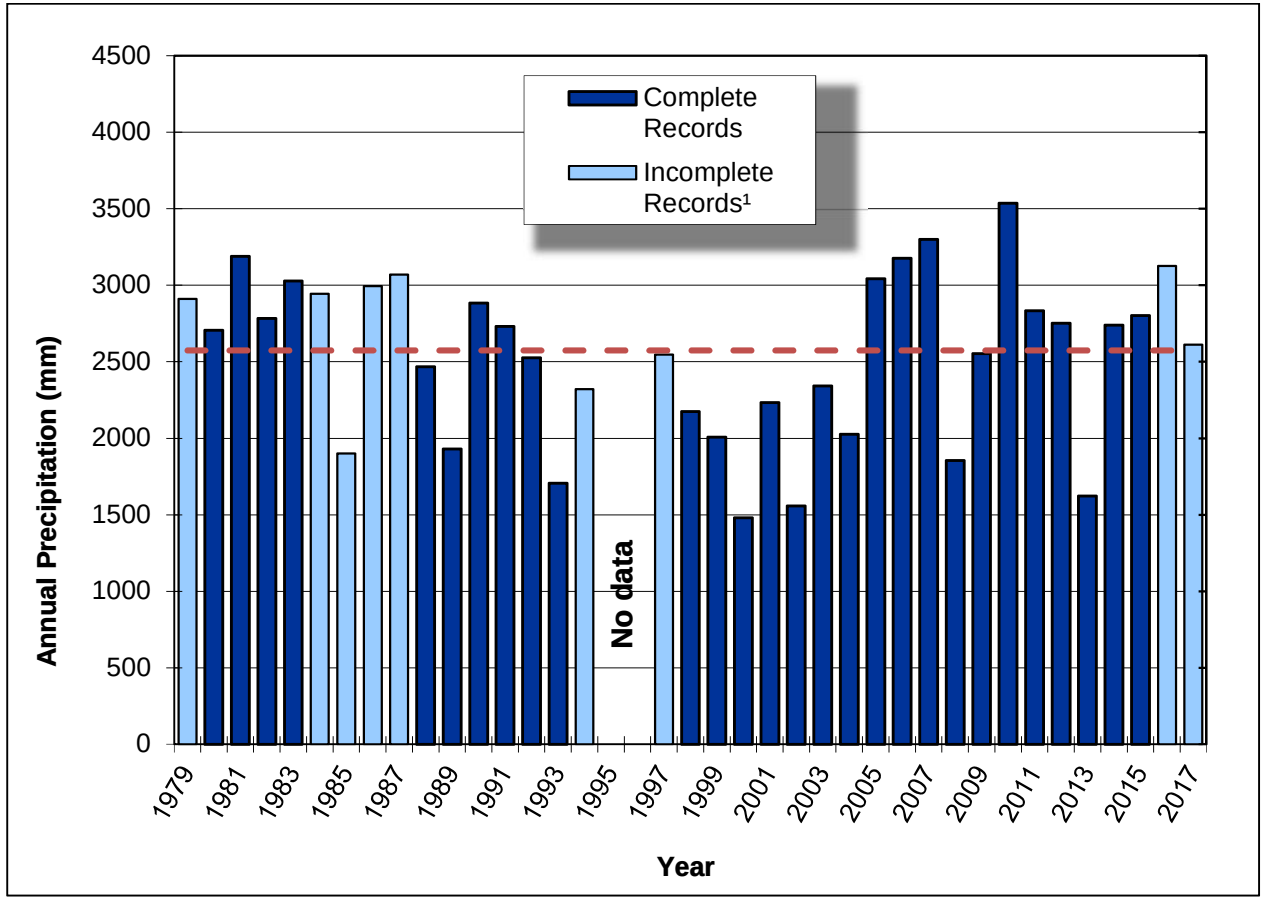


Figure 2: Annual Total Precipitation 1979-2017

1 For years with incomplete records, the average monthly rainfall from years with complete records have been used to fill gaps (precipitation data for the power house station between 1979 to 2014 and for the Paste Plant station from 2015 and onwards).

2 Average annual precipitation is based only on years with complete records.

3.2 Temperature

Q1 2017 was warm with most precipitation falling in the form of rain. As shown in Table 5, September 2017 was unusually warm with maximum temperatures higher than the maximum temperatures recorded from 2006 to 2016 (previous period of record). Monthly minimum temperatures in 2017 were also generally warmer than the minimum temperature recorded for each month over the previous period of record.

Table 5: Monthly Temperatures

Month	Previous Period of Record[1]		2017[2]	
	Maximum	Minimum	Maximum	Minimum
January[3]	11.9	-12.0	8.7	-5.3
February	12.5	-12.0	11.8	-7.2
March	19.0	-8.3	13.9	-7.4
April	23.1	-4.0	15.9	-2.0
May	31.0	-1.5	29.9	0.9
June	34.3	1.0	33.2	4.0
July	38.9	4.2	30.7	9.0
August	36.0	4.9	35.6	10.3
September	32.0	-1.0	34.6	3.2
October	23.5	-2.0	20.8	-0.3
November	16.1	-11.0	13.9	-6.2
December [4]	12.8	-13.0	5.6	-6.8

1 Temperature data obtained from Myra Falls site from 2006 to 2016.

2 Temperature data recorded at the Paste Plant weather station.

3 Data not recorded between 1 January to 24 January 2017.

4 Data not recorded between 26 December to 31 December 2017.

4.0 TAILINGS MANAGEMENT

Milling operations and tailings production stopped in June 2015 to upgrade various infrastructure on the site. Tailings historically deposited prior to 2015 were produced using a cycloning process to separate the “whole tailings” into fine and coarse tailings. Historically a whole tailings stream could be separated into approximately 55% coarse tailings and 45% fine tailings. In general, the fine tailings were dewatered by the Paste Plant and deposited in the TDFs; whereas coarse tailings were used as underground backfill with excess stockpiled in the Reclaimed Sands Area or used for construction. Details on how coarse and fine tailings were processed and stored are available in the 2016 DSI (Amec Foster Wheeler 2017c).

NMF plans to restart operations and tailings production in 2018. With the restart NMF plans to change their tailings production method to only produce whole tailings. Whole tailings will be used for underground backfill with excess pumped to the Paste Plant for dewatering prior to disposal in Lynx TDF. The Paste Plant will be similar in design and function to the prior configuration and will include a gravity thickener, vacuum filters, mix tanks, and positive displacement pumps.

4.1 Old TDF Tailings Management

The Old TDF is in the post-operation, transition phase of its lifecycle. No significant volume of tailings has been placed in the facility since 2009. The APA Berm is at its final elevation of approximately 344.0 m and has not been raised since May 2006. The tailings inside the APA Berm are at the maximum storage elevation of 342.0 m. Survey data indicates the APA Berm is not subject to significant ongoing settlement or deformation.

The sloping paste surface of the APA continues to be gradually eroded by surface runoff. The lidar survey of July 2015 indicates the gullies are up to about 2 m deep and 6 m wide. The eroded material washes away with the surface runoff. Some is ultimately deposited in low-gradient areas along the upstream side of the APA Berm, reducing flood storage of the facility. Occasional ditching is required to maintain surface runoff along the APA Berm towards the decant in the southwest corner of the APA.

4.2 Lynx TDF Tailings Management

Historically Lynx TDF was filled with dewatered fine tailings, construction waste, sludge from the water treatment ponds and fines from slump cleanouts. The dewatered fine tailings were discharged from the Spring Drain platform near the north pit wall at an approximate elevation of 353.5 m.

Dewatered whole tailings are planned to be deposited in Lynx TDF in 2018 once milling operations resume. Behaviour and density of the whole tailings is assumed to be similar to fine tailings. For capacity calculations whole tailings are assumed to have a dry density of 1.2 t/m^3. This assumption should be evaluated by completing the following:

- Tailings samples should be collected semi-annually for moisture content, specific gravity (solids density), volumetric mass and hydrometer testing (particle size).
- Monthly tailings production should also be monitored by NMF and tailings surface surveys carried out on a quarterly basis to assess the average dry volumetric mass and tailings consolidation.
- A detailed tailings investigation should be completed once a minimum of 5 m of whole tailings have been placed. The detailed investigation should include seismic electrical cone penetration tests, field vane shear tests, consolidations tests, post-cyclic, constant volume and simple shear strength testing.

To improve storage capacity the following methods should be used for deposition of future materials into Lynx TDF.

- Dewatered whole tailings should be deposited from the dam to build a subaerial beach of very low permeability material along the upstream face of the dam. This will effectively

keep the pond away from the dam. The active deposition point should be moved frequently to build a uniformly sloped and shaped beach. The use of these methods should result in improved storage by encouraging drainage and desiccation of the tailings slope.

- A beach slope steeper than 5% was assumed for capacity calculations. A shallower beach slope will reduce the storage capacity. The surface of the beach should be surveyed frequently to confirm this assumption.
- Dredged sludge material should be dewatered/thickened if practical and placed in the north end of the pit. The high water content of this may decrease the overall storage density achieved in the facility and adversely affect water quality in the water pumped from the Lynx TDF to the treatment system. Note that treatment pond sludges are not geochemically stable in an acid environment and their future dissolution may cause settlements.

  Covering the APA area would reduce the volume of sludge material created as eroded tailings ultimately reach the water treatment system where they are then dredged and deposited in Lynx TDF.

4.2.1 2017 Material Deposition in Lynx TDF

Material deposited in Lynx TDF in 2017 consisted of sludge dredged from the water treatment system as tailings were not produced. The dredged material has a high water content and low bulk density which created a relatively thick and continuous layer across the surface of Lynx TDF.

Material was dredged from Superpond and pumped to Lynx TDF, 24 hours per day, between 1 January and 31 July. The pump is rated to pump 800 gallons per minutes and the dredge material contains approximately 10% solids by weight, with the solids having a specific gravity of approximately 2.9. Based on these values approximately 100,000 tonnes of solids were deposited in Lynx TDF in 2017.

The most recent Lynx paste surface survey was on 26 October 2016, the scheduled quarterly surveys of the impoundment surveys (as per the OMS) were not completed in 2017. Routine surveys are used to track material consolidation and performance. In 2018 routine surveying should resume and be carried out at a minimum of 4 times per year as outlined in the OMS.

4.2.2 As-Built Storage and Raise Requirements

Facility surface surveys were not carried out in 2017. The most recent comprehensive account of source tonnage and incremental volume changes is presented in the 2016-Q4 Quarterly Monitoring Report provided as an Appendix to the 2016 DSI, (Amec Foster Wheeler, 2017c).

Construction work in 2017 raised Lynx Dam crest to an elevation of 361.1 m. With this raise Lynx TDF has the capacity to store the EDF (a 1:200 AEP 24 hour storm event) as well as a limited volume tailings. The current available flood and tailings storage while leaving 1 m of freeboard (maximum operating level of 360.1 m) is approximately 350,000 m^3. Approximately 303,000 m^3 are required for storage of the EDF leaving 47,000 m^3 available for tailings storage.

A dam raise to 362.5 m and construction of a spillway was planned for 2017 construction. However, production fell behind schedule so the spillway and planned dam raise were not

completed. Without construction of the spillway Lynx TDF does not have the capacity to store or discharge the IDF. The ability to pass the IDF is required for compliance with CDA guidelines. It should be noted that the facility is transitioning between the original (CDA 2007) and updated designs (CDA 2013, 2014). The original design did not have a spillway and contemplated flood handling by storage of a smaller IDF volume, assessed at 78,000 m³. Subsequent analysis has revised the method of IDF determination resulting in larger flow rates and volumes. The currently facility has approximately 4 times as much storage as the original design. Completion of the Operations Spillway is currently scheduled for the 2018 construction season.

NMF provided tailings production forecasts, however they requested the information remain confidential. The most recent information provided to Amec Foster Wheeler is dated 16 October 2017. Based on the provide information a dam raise from 362.5 m to 365.1 m and construction of an Operations Spillway is planned for 2018. This would provide capacity for 230,000 m^3 of tailings storage relative to current levels, could store the EDF, and could discharge the IDF.

5.0 WATER MANAGEMENT

The mine's water management system has two main purposes.

1. Divert non-contact water around the surface workings, waste rock dumps, and tailings facilities and convey the water directly into Myra Creek.
2. Capture contact water including surface runoff and pumped water from mine-affected areas and convey it to the water treatment system for release to Myra Creek.

The water management system consists of a series of diversion ditches upslope of the mine area, storage within the tailings facilities, various pumping systems, decant structures, and a series of treatment ponds. NMF monitors the treated water for water quality.

Work to assess existing TDF structures and bring in line with current CDA guidelines for flood capacity has been ongoing since 2012. Upgrades to the Old TDF were completed between 2014 and 2016. The Lynx TDF was assessed to not have sufficient capacity to contain a 1:200 AEP (EDF) and did not have an emergency spillway to discharge the IDF. To address these deficiencies construction of a dam raise and spillway was planned for 2017; however, construction fell behind schedule so the spillway was not constructed. As such there is not capacity to store or discharge the IDF.

The following sections provide a brief description on the configuration and performance of the pertinent aspects of the water management system. For a detailed account of water quality monitoring results and objectives, the reader is referred to the NMFs annual reports to MEMPR and MoE for 2017 (NMF 2018a and b). For a detailed account of site water balance under peak demand, see AMEC's previous water management report (AMEC 2008a).

5.1 Non-Contact Water

Non-contact runoff from the three primary drainage areas upslope from the mine site on the north side of the valley is collected and diverted by the main diversion ditch system. Drainage areas for the mine are shown on Drawing 010714. The main diversion system consists of three ditches.

1. Arnica Diversion Ditch, which flows east to west above the Lynx TDF into Arnica Creek.
2. Upper Lynx Diversion Ditch which flows from west to east above the Lynx TDF and into a natural unnamed stream, locally referred to as “Cascade Creek”.
3. Lower Lynx Diversion Ditch which diverts Cascade Creek and runoff from the hillside above the Old TDF from west to east along the upstream edge the Old TDF and into Myra Creek.

Past design of site structures was carried out under previous standards which considered significantly lower flood thresholds than current standards. Since the late 1990s the design threshold has been the 1/1000 AEP event. Prior to the mid-1990s most structures were designed for 1/200 AEP events. The upper diversions above the Lynx TDF lack documentation of design criteria and were likely field fit to accommodate short-term observed conditions.

Formal inspections of the diversion ditch system are carried out on a quarterly basis, and more frequently during and immediately after significant storm events. Inspection of the LLDD is carried out during NMF’s weekly inspections. Inspection reports are included in Appendix C. Typical maintenance activities have included removal of fallen trees, rocks or debris from the ditches, and minor repairs to the LLDD shotcrete lining.

5.1.1 Arnica Diversion

The Upper Arnica Reach functioned as intended through the reporting period. Specific concerns were not observed.

The Lower Arnica Reach functioned as intended through the reporting period. Erosion damage to the terminus of the diversion where it discharges to Arnica Creek was observed in April. The erosion damage had not been repaired at the time of writing.

5.1.2 Upper Lynx Diversion

The Upper Lynx Diversion functioned as intended during the reporting period. Specific concerns were not observed.

Construction activities in the WRD 2 removed the road connection from the WRD 2 haul road to the Lower Lynx Diversion trail, which provided a secondary access point to the Upper Lynx Diversion. Road access to the Lower Lynx Diversion trail should be reinstated so the area is readily accessible during an emergency. Annual clearing of the road should also be completed to maintain multiple vehicle access points to the Upper Lynx Diversion in case of emergency.

5.1.3 Lower Lynx Diversion

The LLDD functioned as intended through the reporting period.

The terminus of the concrete cloth was observed to be undermined and not well bonded to the bedrock in September. Repair recommendations were provided but have not been carried out.

Two repairs to the Lower Lynx Diversion Ditch concrete cloth were carried out on 30 and 31 October 2017 by Nuna Innovations Inc., of Squamish BC. One repair location was where a log had hit the cloth near the former Alder Reach intersection and the other was on the road side where a snow plow had damaged the cloth. For the repairs the existing concrete cloth was manipulated into place, patches of cloth were cut to fill in voids, and the cloth was anchored down with screws and sealed using a product called Sikaflex.

5.1.4 Old TDF Seismic Upgrade Berm

The design intent for water management of the Old TDF Seismic Upgrade Berm area is to have distributed runoff over the clean fill cover and directly into Myra Creek.

Following the completion of the Seismic Upgrade Berm there have been some observed areas of ponded water on the relatively flat surface of its main bench. Each of the ponded areas has an associated outlet point, where the accumulated surface runoff flows over the crest of the upgrade berm and down towards Myra Creek.

The Seismic Upgrade design assumes that the buttress remains unsaturated. Ponding water on top of the buttress potentially increases local infiltration and could reduce stability conditions, and therefore potentially represents a departure from the design. Amec Foster Wheeler continues to recommend filling or regrading of the areas to promote surface runoff rather than infiltration. The surface should be graded at a minimum of 2% towards Myra Creek to promote sheet flow. These recommendations were initially given in the 2013 Construction As-built report, but have not yet been fully carried out.

5.1.5 Lynx TDF Area

The Lynx TDF is fully within the contact water portion of the site and as such has no associated non-contact water.

5.2 Old TDF Contact Water

The Old TDF receives water from the following sources:

- Release of porewater from within the tailings mass during long-term consolidation
- Precipitation on the impoundment area
- Groundwater flux into the facilities
- Discharge from the LLDD sub-drainage system

The release of water due to the long-term consolidation of the tailings in the APA and the Strip is considered negligible in the current surface water balance (as the consolidation of these areas is functionally complete with respect to measurable settlements). Precipitation is, therefore, the largest source of water to the Old TDF (about 1 million m^3 per year) and the influx of groundwater

is an important secondary source (about 5 to 10 L/s of additional flow to the sub-surface) (RGC 2014b). Shallow groundwater flows are significant with respect to the contaminant load balance for this area of the site. Shallow flows also affect surface water management when it flows to the Strip Area at the toe of the east abutment of the APA Berm.

In 2016 the LLDD subdrain system was installed, which drains water to the north side of the APA. The total volume of water reporting to the tailings surface from these drains is not known. The drains are typically dry; however, during peak runoff events, three of the drains have been noted to flow “full”, likely on the order of 20 L/s each, and other drains have been observed to trickle.

Water leaves the Old TDF by surface drainage and subsurface drainage into the underlying aquifer. The Inner and Outer Drains collect sufficient groundwater to capture most of the subsurface geochemical load. Some groundwater bypasses the drains and flows down the valley in the underlying aquifer. Groundwater flows in the Inner and Outer Drains report to the treatment system via Pumphouse 4. Further discussion of flows to groundwater and the Old TDF under-drains is provided in RGC (2014a) and was incorporated into the Interim Site-Wide Closure and Reclamation Plan that was submitted in July 2014 (RGC 2014c).

The current water management system is designed to convey flows from the various internal catchments to the Surge Pond up to the IDF. Flows leaving the Surge Pond up to 1/1000 AEP are routed to the treatment system. Flows in excess of 1/1000 AEP, up to the IDF, will be discharged to Myra Creek through the Surge Pond overflow spillway.

Key water management issues encountered in the Old TDF during the reporting period are discussed in the following sections.

5.2.1 Amalgamated Paste Area

The APA is currently configured as an internal impoundment cell containing a sloping paste stack extending up from the perimeter embankment to the hillside and/or Waste Rock Dump 6 at gradients up to about 5%. The impoundment has new decants which were constructed in 2016 at its southeast and southwest corners, which receive runoff proportional to the subtle drainage grades along the perimeter embankment. Approximately the western two-thirds of the surface typically drain to the West Decant at the southwest corner from which it is routed through a pipeline to the Old TDF Surge Pond. The eastern third of the surface drains to the East Decant, from which it is routed through a pipeline to the East Strip area. A single pond would form between the decants across the entire width of the facility in the event of peak runoff events or in the event that either decant had reduced functionality.

The old APA Decant structure was the single means of passive drainage in operational conditions until 2016. It is located near the new West Decant, and previously conveyed water through a pipeline and directly to the treatment system inlet ditch. The portion of the pipeline extending below the APA Berm was partially grouted for decommissioning as part of the 2017 construction works, however due to equipment failures during grouting only the downstream end of the discharge pipe was grouted as described in Section 8.1. The upstream end of the pipe and the decant tower remain unfilled. Further work is required to complete decommissioning of the old decant.

A shallow pond is typically present in the southeast corner of the APA during the wet season, and has been associated with seepage at the toe of the APA Berm. Springs in the tailings surface on the adjacent East Strip have also been noted (Amec Foster Wheeler 2017b). Seepage pads and a drain zone were constructed along the east toe of the APA Berm as part of 2017 construction works to address seepage and springs observed in the area. The seepage pads were constructed using layers of drain rock and coarse filter material separated from underlying and overlying fill by geotextile. A description of construction of the seepage pads is provided in Section 8.0.

Tailing surface runoff water was observed to be leaking into the inlet of the APA Operations Spillway in 2016 and early 2017. Water from the leak was observed to be re-emerging on the side of the APA Operations Spillway in the West Strip area. Emergency repairs consisted of filling the leak area with well graded mine waste. Interim repairs were made later in the year in more favorable weather conditions by covering the entire inlet area with well graded mine waste and then a layer of excavated tailings in order to build a filter compatible plug across the head of the spillway riprap. This is considered a temporary solution, intended to function only until the Old TDF closure cover is implemented. A permanent repair should be implemented, consistent with the original spillway design intent if the closure cover project is not implemented within the next few years.

5.2.2 TDF Strip and Old TDF Surge Pond

Water management in the Strip Area was generally within normal levels during the reporting period. Contact water flows east within the East Strip, through culverts below the APA Operations Spillway, and through the West Strip Channel into the Old TDF Surge Pond.

The design for the Surge Pond assumes a normal operating water level of 2.5 m depth to promote sedimentation upstream of the treatment system. During normal operations there is approximately 1 m of freeboard below the lip of the spillway. An outlet tower is located at the west end of the Surge Pond. The tower has a large orifice to control flow during normal operations, and has a low-level outlet (LLO) gate valve that can be opened to lower water levels to within 0.5 m of the pond bottom and fully exposing the toe buttress at the east end of the pond.

Operating the pond at the design outlet provides the intended degree of surge attenuation and optimizes sedimentation within the Surge Pond. Operating the pond drawn down to the LLO greatly increases the potential surge attenuation capacity (through partially or fully closing the LLO valve during an event) and accordingly can potentially reduce the peak flows into the treatment system. However operating shallower water reduces the likelihood of sediment to settle out of the water, and will result in more tailings and fine material entering the water treatment system. Both management strategies (LLO normally open or closed) are safe from a dam management perspective and therefore NMF should choose water levels to optimize treatment system performance as required. To date, NMF has typically elected to maintain lower levels using the LLO to reduce the peak flows.

The Surge Pond is lined with HDPE geomembrane to reduce the infiltration of water through the tailings and into the underlying aquifer and assist with sediment removal during maintenance. The design includes an underdrainage system below the liner to reduce the potential for liner uplift when the pond is drained. No discharge from the subdrain outlet piping has been observed to date.

The EOR noted in the monthly dam safety inspection of August 2017 that the Surge Pond spillway invert had been partially filled in through road use and maintenance activities and was higher than the design elevation. Work was carried out to restore the elevation of the invert to the design elevation. The existing geomembrane liner was damaged during the repairs where it is exposed at surface at the seepage and erosion control sill. The defect in the liner is considered to pose a low potential for spillway erosion due to seepage losses, but could potentially be repaired.

5.2.3 Diversion Ditch Spring Drain

The Diversion Ditch Springs Drain (DDSD) was constructed in August 2016 to capture and convey seepage water from a large spring at the APA Berm east abutment. The seepage water is thought to originate as overflow from the valley sidewall within the natural talus adjacent to the tailings facility, and the spring only flows during periods of intense peak runoff. The DDSD consists of a high permeability capture and conveyance zone upstream of the APA Berm which discharges to the east end of the East Strip. The high permeability zone is isolated from the adjacent APA tailings and APA Berm fills by a filter sequence, and is constructed using non-PAG materials to reduce the potential for water contamination within the drain. Full details are provided in Amec Foster Wheeler's 2016 As-built Report (2017c).

The Diversion Ditch Spring Drain functioned as intended in 2017.

5.3 Lynx TDF Contact Water

The Lynx TDF operates as an open-ended system with several unquantifiable inputs and outputs and therefore does not have a detailed water balance that is kept current. However, the facility water management design basis is focussed on management of short duration peak runoff events, and operational water management requires maintenance of a relatively small pond during normal operating conditions.

The Lynx TDF receives water from the following four sources:

- Release of water from tailings or waste materials deposited as paste or slurries upon initial deposition (can be significant from raw tailings or thickener underflow).
- Additional release of porewater from within the tailings mass during long-term consolidation (insignificant compared to other sources).
- Precipitation on the impoundment catchment area (potentially the single largest source, and the most variable).
- Groundwater flux into the facilities (potentially significant).

Water management in the Lynx TDF is generally consistent with the design concept. The small amount of water that accumulates on the Lynx TDF paste surface typically forms a shallow pond across most of the tailings surface. The facility is operated with typically less than about 1 m depth of water retained in the pond. Under normal operating circumstances, water either infiltrates into the pit walls or the Lynx TDF dam, or is pumped from the facility and discharged into the treatment system. Pumping capacity varies with the season but is typically handled by two electric pumps with a capacity of 0.04 m^3/s (600 gpm). When this pumping capacity is insufficient, additional diesel pumps with capacities varying from 0.07 to 0.16 m^3/s (1200 to 2600 gpm) are deployed.

Peak water accumulation events are accommodated by maintaining sufficient freeboard for temporary retention of storm water. No significant accumulations of flood water were observed during the reporting period, and water levels generally remained at normal operational levels.

The following sections detail specific water management items for Lynx TDF during the reporting period.

5.3.1 Lynx Dam Toe

Water ponded in the area between the toe of Lynx dam and Super Pond multiple times in 2017 during heavy rain events. Water ponding in this area should be avoided as the berm separating the area from Super Pond is not designed to retain water. The berm is made of uncontrolled fills and could potentially be susceptible to piping erosion or slope displacements resulting in sudden release of the water from the dam toe area into Super Pond. The dam toe area should be actively monitored and pumped during storm events.

NMF implemented controls to prevent water from ponding in the dam toe area in February 2018. Drainage of water from upslope water was redirected or captured to prevent it from reaching the dam toe.

5.3.2 Lynx Springs Drain

A significant bedrock source of groundwater was uncovered in 2011 near elevation 352.5 m on the east side of the Lynx TDF, below WRD 2. Capture and conveyance of the spring is essential to the long-term stability of the Lynx TDF surface, particularly during closure conditions (AMEC 2013). The Lynx Springs Drain is designed to convey the spring water out of the facility by gravity drainage. Construction of the drain began in 2014 and continued in 2017. In 2017 the drain was extended from Sta. 0+188 to 0+263, details of construction described in Section 8.3.

A temporary sandbag sump was built at the Lynx Spring Drain outlet at the end of the 2017 construction activities. The sump was initially drained by a 250 mm HDPE pipe leading to Manhole 2. A second pipe was to be added during wrap up works but was not. The sump overtopped and partially failed during a storm event, in part leading to the inundation of the dam toe discussed above. The 250 mm pipe was replaced with a 610 mm pipe in February 2018.

5.3.3 Flow Monitoring in the Underground Lynx Mine

Proactive monitoring of the flow volume and water quality in the 15-Level Phillips Reach sump is required as part of the facility operating procedures due to potential connection of the base of Lynx TDF to the underlying Lynx Underground Mine, and the connection of the Lynx Underground Mine to the rest of the underground workings, where personnel may be present. Turbidity or sudden increases in water pressures at the Lynx Bulkhead (15335XN) could indicate catastrophic erosion of the paste tailings and/or sand filled stopes under the Lynx TDF. NMF's operating procedures call for evacuation of the underground mine and assessment of the situation in the event of an increase to flow, pressure or turbidity at the Lynx bulkhead. Automated monitoring and detection systems are in place at the bulkhead and automated warning systems are in place throughout the underground mine.

NMF (personal communication) indicated that no events occurred at the Lynx Bulkhead in 2017.

5.3.4 Depressions in the Tailings Surface

A depression has repeatedly formed in the paste surface near the north corner of the Lynx TDF. The depression is persistent, re-forming after being covered with fresh tailings or pond dredging material. The depression was first observed in the Spring of 2012 and ranges between 10 to 15 m in diameter. Formation of the depression is likely the result of internal erosion of the tailings by downwards groundwater flow, presumably into the underground workings. Current assessment suggests that the erosion is occurring at the base of the tailings from other groundwater sources, and that the overlying tailings are settling into the resulting void space. Drainage from surface through the sinkhole is not evident nor suspected.

The depression was observed during parts of the reporting period, but has not apparently changed in location or size. Monitoring of the depression continues when it is evident. The area is inspected weekly by NMF and monthly by Amec Foster Wheeler. The depression is set back from the tailings dam; therefore, it presents a very low risk to the integrity of the dam embankment.

A second sinkhole was observed in December 2017 at a point mid-way between the upstream end of the Lynx Springs Drain and south arm of the dam, again well away from the dam. The location and diameter of the second sinkhole have not yet been measurable. Visual estimates suggest it is approximately 70% of the diameter of the first sinkhole. It has not been observed again since covered by dredging slimes in January 2018.

Groundwater flow paths involved with any depression formation in Lynx TDF are likely complicated and could involve exposed stopes, intercepted drifts, manways, ore passes, mill holes, exploration drill holes, natural joints, or manmade fractures in the pit walls. Survey data and mine records indicate that the first depression overlies 12-Level stope, which is directly below the base of the Lynx TDF and was partly exposed during removal of the crown pillar. NMF indicated that entry into the underground mine below the facility for the purposes of investigation of the sinkhole is not safe as the area has not been maintained in decades. The second depression appears to overlie the former Lower East Borrow area near the pit highwall and close to an old surface ramp that lead down into the bottom of the pit before filling.

As noted in Section 5.3.3, the Lynx Level-15 bulkhead is in place to prevent catastrophic release of tailings from the unmaintained underground areas below Lynx TDF to the active underground workings. As such, the depressions do not present an immediate risk to mine safety. However, internal erosion of the tailings presents a potential long-term issue relating to stability of the tailings surface and may influence closure cover designs.

5.4 Other Contact Water Management

In other areas of the mine site where runoff, seepage, and other flows are potentially impacted by acid rock drainage, these flows are collected in various sumps and directed to the treatment system. Around the tailings facilities, these areas include waste rock dumps, haul roads, and the dam shells. Flows are directed to the treatment system by a combination of ditching, pumping and decants.

5.5 Water Treatment

The water treatment system is based on mitigation of low pH water to reduce the solubility of dissolved metals. Lime is added at a number of locations on the mine site including along the Strip and in several mixing tanks at the inlet of the treatment system at the head of the Super Pond. The Super Pond is the primary settling pond, after which the treated water flows through six additional polishing ponds to improve water clarity. The locations of the Super Pond and the Polishing Ponds are shown on Drawing 010702. The various aspects of the water treatment system are inspected monthly by NMF personnel. The details of the operation and performance of the water treatment system including water management inspection reports by NMF are summarized in NMFs annual reports to MEMPR and MoE for 2017 (NMF 2017b, c).

6.0 DAM INSPECTIONS

6.1 Inspections by NMF

Visual inspections of the Lynx and Old TDFs are carried out as part of ongoing monitoring activities. Inspections are routinely conducted or event-driven, following flooding or an earthquake. Routine TDF inspections were carried out weekly by NMF during most of the year and on a monthly basis if the site is covered in snow. Due to NMF staffing changes Amec Foster Wheeler construction review staff assisted in completing weekly inspections in July, August and September.

The LLDD is inspected weekly with the upper diversions inspected quarterly. Since the mine is under “care and maintenance” and with the Old TDF being in the transition phase, the inspection schedule was adapted in consultation with the EOR and NMF staff availability. For example, NMF did not conduct the inspection on weeks where the Engineer of Record conducted monthly inspections.

Visual inspection reports are included in Appendix C. The reviews are based on visual inspection of the following:

- The Lynx TDF for active areas of paste deposition, the location, extent, and clarity of ponded water, and the function of the sump pump.
- The APA, Strip, and Surge Pond areas for the extent and clarity of ponded water and the function of the decant in each area.
- The Lynx TDF, Old TDF APA Berm, OEB, and Seismic Upgrade for surface erosion, settlement, depressions, cracks, bulges, and signs of seepage.
- The diversion ditch for flow rate, obstructions (slumps, fallen trees, etc.), and damage to lined areas.
- Any other anomalies or changes for any of the above structures.

NMF and Amec Foster Wheeler reported 25 inspections between 12 January and 27 December 2017. NMF reported that no documents exist between February 17 and July 9 due to staffing changes. In general, the observations in NMF inspection reports are consistent with those made

by Amec Foster Wheeler during monthly inspections. A summary table of NMF observations and the complete inspection report records are presented in Appendix C.

6.2 Inspections by Amec Foster Wheeler

The EOR inspected the Old TDF, Lynx TDF, and diversion ditch systems on a monthly basis during the reporting period as outlined in the OMS. Conditions are observed in and around the facilities, with emphasis on water management, dam stability, and seepage conditions. Amec Foster Wheeler personnel met with NMF staff during the inspection site visits to discuss any concerns relating to the facility operation. Amec Foster Wheeler carried out twelve inspections in 2017. Dam inspection summaries are presented in Appendix D. The action items related to these monthly inspections are briefly summarized below:

Table 6: Summary of Key Monthly Dam Inspection Actions

Date	Dam Inspection Actions	Action Taken
20 January	Improve snow clearing of the TDFs to enable adequate level of detail to be collected in weekly inspections and provide emergency access to key drainage structures	Snow clearing was completed.
	Relocate pumping electrical equipment in Lynx TDF to higher ground or lower water levels within the facility to prevent pumping equipment from becoming submerged.	Pump was relocated.
20 February	Re-establish haul ramp ditch above Lynx TDF/Waste Dump 3 to direct water to Waste Dump 2. Prevent redirection of water over slope crest into Waste Dump 3.	Waste Dump 2 and 3 were reconfigured during construction.
	Improve surface water drainage along the APA Berm toe between the DDSD and the southeast corner of the berm	Drainage in area was changed during APA berm stabilization project.
	Check the sand boils at the APA berm toe southeast corner on wet days to gain information on when they occur	Seepage pads were extended during construction of APA Stabilization Berm to address boils.
	Review piezometer information in the APA east abutment area	Piezometer information reviewed during Q1 reporting
19 March	Repairs to snowplow and log damage in LLDD should be undertaken as soon as practical, if possible prior to freshet. Measures should be taken to prevent further snowplow damage.	Repairs completed in October.

Date	Dam Inspection Actions	Action Taken
	Erosion protection measures should be implemented for active LLDD subdrains, if practical. Construction plans included a surface ditch parallel to the LLDD access road but this was not completed.	Work not completed.
	Repair APA Operations Spillway inlet with filter compatible materials as outlined in its design if the facility closure plan is not implemented.	Interim repair completed using layers of low permeability tailings material placed over the leak area. This should be sufficient for 2 to 3 years until the closure cover is constructed.
20 April	Drain or pump standing water from the toe of Lynx TDF Dam in the future foundation area.	Area was dry during May inspection.
	Repair erosion damage to lower end of Arnica Reach Diversion Ditch	Work not completed.
18 May	No additional action items were identified as a result of the inspection.	N/A
20 June	No additional action items were identified as a result of the inspection.	N/A
20 July	Consider replacing non-stainless hardware securing the Surge Pond liner to the decant tower.	Work not completed.
17 August	Repair concrete-to-bedrock transition at terminal end of LLDD, where concrete has been undercut by erosion of loose bedrock.	Work not completed.
	Replace loose anchors in LLDD, trim off loose anchors after replacement.	Nuna (liner installation company) reviewed the damaged anchors/screws but did not have concerns or recommend repairs.
	Clear minor rockfall debris from LLDD bedrock section.	Debris cleared.
	Remove excess fill from Old TDF Surge Pond Spillway invert and resurvey to confirm design grades.	Invert was cleared, however during clearing spillway was damaged as discussed in Section 5.2.2.
20 September	No action items identified as a result of the inspection.	N/A

Date	Dam Inspection Actions	Action Taken
17 October	Restore full pumping capability in Lynx TDF as soon as practicable in preparation for winter water management.	Pumps replaced in Lynx TDF by November inspection.
	Repair erosion damage to Lower Arnica Reach as a matter of routine maintenance.	Work not completed.
28 November	Improve pumping and water control in Panel 15 at the toe of Lynx TDF in order to reduce piezometric levels at the dam toe and reduce risks to Super Pond.	Water was pumped from area. Additional work was carried out as described in Section 5.3.1.
	Alter staff gauge in Lynx TDF to correlate to elevation data and dam freeboard requirements.	Work not completed.
	Move Lynx TDF pumping equipment to higher ground such that it will not get flooded out within the operating range of the impoundment.	Work not completed.
	Consider mitigating sediment transport in A-Ramp and Paste Plant Hill Road ditches.	Work not completed
	Mitigate runoff over slope with Paste Plant Hill Road at the end of WRD 6.	WRD 6 area reconfigured.
	Debris net at Cascade Debris Basin requires clearing as soon as practicable.	Debris removed from catchment net.
20 December	Sinkhole observed in Lynx TDF between upstream end of Lynx Springs and South Arm. Requested survey of sinkhole.	Sinkhole was not surveyed because it was covered and has not reappeared. Monitor area and if it reappears complete survey as soon as practicable.
	Open windrows along APA Berm toe road in East Strip to reduce ponding of water.	Work not completed.
	Check excavations along Lynx Foundation area to confirm they do not encroach on conveyor foundation bearing soils.	Work not completed.
	Configure electric pumps for dewatering of Lynx TDF for winter water management.	Pumps set up to dewater Lynx TDF
	Add discharge capacity and increase height of check dam at Lynx Springs Drain.	Spring Drain check dam reconfigured in 2018.

7.0 INSTRUMENTATION MONITORING RESULTS

Assessment of the performance of the Old TDF and the Lynx TDF includes monitoring of porewater pressures, survey of surface monuments for movement, and monitoring of slope inclinometers for internal deformation. This section presents a summary of the observed data and instrumentation network.

Data is received and reviewed by Amec Foster Wheeler on a quarterly basis. However due to delays related to personnel being involved with other site activities the quarterly reporting was not finalized until March 2018. Based on these delays, changes to the schedule and format for reporting the monitoring program are under consideration for 2018. The quarterly reports are provided in Appendix B1. They contain the following monitoring data presented in a series of figures and tables.

- Rainfall and temperature records
- Vibrating wire piezometer (VWP) readings
- Deformation monument surveys
- Slope inclinometer readings

The piezometers and weather station were connected to an automated network between 2015 and 2016 (Amec Foster Wheeler, 2016e). As the automated system is still relatively new, some data was lost during the year due to depleted batteries and programming errors. Progressive steps have been recommended to make the system more robust as described in the Instrumentation Status memorandum provided in Appendix B2. Details on the missing data and some mitigation measures are discussed in the following subsections.

7.1 Lynx TDF Monitoring

This section summarizes the Lynx TDF instrumentation monitoring results and modifications to the instrumentation network during the reporting period.

7.1.1 Piezometers

Lynx TDF piezometer network consists of:

- VWPs at various depths within the paste tailings, and along the upstream toe of Lynx Dam.
- VWPs in Lynx Dam core and downstream buttress fill.
- VWPs in the shallow and deep foundation soils within Lynx Dam ultimate footprint.

Piezometer installation details are found in the reports: 2011 Paste Investigation (AMEC 2012), 2014 Lynx Foundation Investigation (Amec Foster Wheeler 2015b) and 2015 Lynx Supplemental Drilling (Amec Foster Wheeler 2016a).

The configuration of the network is shown on Drawing 010709. Cross-sections along Instrumentation Planes D, E and F are provided on Drawings 010711, 010712 and 010713. The piezometers are connected to the automated data collected system. They were read once per day until 26 June 2017 after which reading frequencies were increased to once per hour to track pore pressures during construction.

Several instruments have ceased to function since their installation. Appendix B2 includes a discussion on the instrumentation status, and provides a summary table showing the status of all VWPs and sensors. During the 2017 reporting period the following Lynx instruments were damaged:

- RStar unit 4801 was struck by an excavator on 5 July 2017 damaging the mounting stake. Unit continued to send/receive data during Q3 and Q4.
- VWP 31089 and VWP 17721 is missing data after 17 September 2017. It is assumed that the lead cables were damaged due to settlement of the upstream dam buttress.
- RStar unit 4797 was struck by an unknown object on 8 July 2017 damaging the unit's antenna and mounting enclosure. The unit continued to send/receive data during Q3, however it is missing data after 5 October 2017. VWP 29325, 33781 and 33782 are connected to this unit.
- VWP 29333 and VWP 29323 were disconnected for construction 12 August 2017. They were reconnected on 17 October 2017 however the piezometers did not resume transmitting data.
- VWP 29331 started intermittently missing data on 17 October 2017. The piezometer was disconnected and reconnected to the system on this day. The piezometer missed all data after 27 October 2017.
- Lynx Hut is missing all data after 26 November 2017.
- Lynx RStar units sporadically missed data between 26 November and 31 December.

The piezometer levels follow general precipitation trends through the wet season from late September to late April. Once the dry season conditions begin, the piezometer levels tend to drop steadily before stabilizing at a low level. Following the first rains of the wet season, the pore pressures rapidly return to typical wet season values and resume following precipitation trends. The sensitivity to precipitation trends varies amongst the piezometer groups depending on their location.

The deep foundation piezometers typically show a strong response to precipitation trends. Recorded pore pressures in the paste tailings are also generally correlatable with recorded precipitation intensity. Piezometer readings in the shallow foundation remain relatively stable and are less affected by seasonal precipitation trends. The most sensitive shallow piezometers show a damped response to precipitation trends with occasional spikes in pressure in relation with peak rainfall events. Piezometer readings in the dam fill typically reflect close to zero groundwater pressure throughout the year.

Two new piezometers were installed in the Lynx Springs Drain in December 2017 to measure water levels within the drain. The piezometers have not been connected to the automated network.

7.1.2 Surface Monuments

Surface deformation monuments are prescribed along the inside edge of the upstream and the downstream crest of Lynx Dam. There are thirteen monument locations on the upstream crest

and eight monument locations on the downstream crest. Four monuments were destroyed and not replaced since installation in January 2015. The remaining survey monuments were surveyed then removed in early September 2017 to allow for dam construction. As of time of this report, the survey monuments have not been re-established. Survey monuments are an important component for monitoring dam safety and should be reinstated as soon as possible.

The prescribed monument layout is reflected on Drawing 010710. Deformation monuments were surveyed in May and September in 2017. Position data and calculated cumulative displacements in the transverse (i.e. perpendicular to the dam alignment), longitudinal (i.e. parallel to the dam alignment) and vertical directions are reported in the quarterly reports provided in Appendix B1 in a tabulated form. In general, the majority of the total cumulative displacements and settlements between the initial survey (at original installation in January 2015) and the last (in September 2017), are less than the calculated error of the survey equipment. Nine of the upstream crest monuments experienced settlement greater than the survey error, with a maximum settlement of 5.0 cm. Two of the downstream crest monuments exhibited displacement and settlement greater than the survey error with a maximum displacement of 4.8 cm of settlement. Most monuments exhibiting minor displacements are situated on the upstream crest, the toe of which is founded over tailings and anticipated to settle appreciably.

7.1.3 Slope Inclinometers

Two slope inclinometers casing were installed near Lynx TDF in 2015; BH14-08A, located on the Lynx Dam crest, and BH14-10A, located near the toe of the ultimate dam. The locations of the inclinometers are shown in plan and cross-section on Drawings 010710 and 010713, respectively.

Inclinometer BH14-10A at the toe of Lynx Dam was decommissioned by filling with bentonite chips in October 2017 during construction. The reading in May 2017 indicated no significant movement of the inclinometer. Note that the inclinometer at this location was installed in order to facilitate one-time downhole shearwave velocity measurements, and was not intended as a fundamental component of the monitoring network.

Inclinometer BH14-08A casing profile was surveyed three times in 2017: in May and October as part of routine monitoring, and again in December following completion of dam raise construction for the year. The profile survey in October showed a maximum incremental displacement of 1 mm and cumulative displacement of 10 mm. This movement is in the upstream direction and located between 2 and 18 m below the dam crest. It is interpreted to be caused by consolidation of the tailings supporting the upstream dam buttress, which is expected and does not pose a concern to dam safety. The profile survey in October also showed a maximum of 40 mm cumulative displacement between 0 and 2 m depth, however this movement is not a concern as it is confined to the stick-up of the inclinometer casing above ground surface and does not indicate movement of the dam fill.

The inclinometer casing for BH14-08A was extended by 6 m during construction (Amec Foster Wheeler, 2018b). The casing was surveyed in December following completion of the dam raise and will be used as the new baseline to compare future surveys to.

7.2 Old TDF Monitoring

This section summarizes the Old TDF instrumentation monitoring results and modifications to the instrumentation network during the reporting period.

7.2.1 Piezometers

The Old TDF piezometer network comprises:

- VWPs under the outer embankment berm and in the upper tailings beach along instrumentation planes A and C, which are respectively oriented perpendicular to the Old TDF embankments at Stations 0+350 and 1+250 (data collected in Hut A and Hut C).
- VWPs located below the base of the APA Berm (P-Series previously referred to as Plane B, data collected in Hut B).
- VWPs in the paste tailings, in the southeast corner of the APA near Plane 5, which coincides with Plane C.
- VWPs in the APA Berm fill, foundation tailings and soils falling along six instrument planes oriented perpendicular to the APA Berm and referred to as Planes 1 to 6.
- VWPs at the base, southeast slope toe and east slope crest of the Old TDF Surge Pond, installed during the 2016 Surge Pond East Slope Site Investigation.

The configuration of the Old TDF piezometer network is shown on Drawings 010703 and 010704. Cross-sections of the Old TDF along Instrumentation Planes 1, A, and 2 through 6 are provided on Drawing 010705, 010706 and 010707. The majority of the piezometers monitor porewater pressures within the tailings with the exception of two VWPs in Plane A that were installed in the underlying foundation soils.

The quarterly monitoring reports include the weekly maximum pressure heads measured for each piezometer. This data is presented in tables and plots grouped by instrumentation planes and location. Piezometers were read daily until 26 June 2017, when reading frequencies were increased to hourly to track pore pressures during construction.

Several instruments have ceased to function since their installation. Appendix B2 provides a summary table showing the status of all VWPs and the sensors. During the 2017 reporting period the following changes to the Old TDF piezometer network occurred.

Removed from Program

- The following malfunctioning sensors were eliminated from the monitoring program: VW32228 on Plane 1, VW32240 on Plane 2, and VW32227 along Plane 5.

Repairs

- VWP36971 and VWP36973 were reconnected to RStar unit 5006 on 30 April 2017 and began to transmit and record data. Theses piezometers were disconnected in 2016 for construction.
- VWP 32223 started to transmit data again on 8 September 2017. The piezometer had stopped transmitting data in May 2016. At the time of writing it is not known why the piezometer began transmitting.
- Hut A's datalogger reliability was assessed by RST during a site visit on 4 and 5 October 2017. RST replaced a 7 Ahr battery with a larger 200 Ahr battery.

Broken and Malfunctioning

- Hut A missed all readings between 1 April and 3 May due to a depleted battery.
- VWP 17724, VWP 17722 and VWP 17726 missed most readings between 1 April and 30 June. These VWP are all connected to RStar unit 4304.
- VWP 32224 and VWP32238 missed some readings between 1 April and 29 May. These VWP are both connected to RStar unit 4302.
- VWP 32225 and VWP32229 missed a few readings between 1 April and 29 May. These VWP are both connected to RStar unit 4292.
- VWP 36972 lead cable was severed by construction equipment on 30 June 2017.
- VWP 17724, VWP 17722 and VWP 17726 missed some readings between 1 July and 27 July. These VWP are all connected to RStar unit 4304.
- VWP32234 is missing all pressure data after 18 July 2017.
- VWP 32222 began intermittently missing data after 26 July 2017.
- VWP 32220 missed some readings between July 26 and September 30. VWP 17730 missed some readings between August 4 and September 30. VWP33241 missed a few readings between September 5 and September 30. These VWP are connected to RStar unit 4294.
- VWP 32228 is missing all data after6 September 2017.
- VWP P10 is missing all data 18 September 2017.
- Hut B (P-1 to P-7 and P-11 to P-14) missed all readings between 17 November and 31 December, except for one reading collected on 25 December.
- Hut C missed some readings during Q4.
- VW32222, VW32241 and VW17730 missed some readings between 26 July and 31 December. These VWP are connected to RStar Unit 4292.

Missing Data Due to Programming Errors

- Hut A missed all data between July 20 to August 7, August 25 to 27, September 8 to 11, and September 21 to 25, due to a programming error when daily readings were switched to hourly for construction monitoring.
- Hut C missed all data between July 26 to 27, September 8 to 11, and September 21 to 25, due to a programming error when daily readings were switched to hourly for construction monitoring.

Pore pressures recorded during the reporting period for the Planes A, B, and C and the APA piezometers generally showed seasonal trends consistent with previous trends. Some short-term elevated pore water pressures were observed in selected piezometers during the summer months, as was anticipated due to loading from construction of the APA stabilization berm.

7.2.2 Surface Monuments

Survey monuments are installed on the crest of key embankments of the Old TDF to monitor horizontal and vertical movements. There are eleven monuments on the APA Berm, nine monuments on the Outer Embankment Berm (6:1 Buttress), and fifteen monuments on the outer crest of the Seismic Upgrade Berm. Four additional monuments have been destroyed since installation and have not been replaced. The monument layout is reflected on Drawing 010708. Monuments are surveyed using a total station. Position data and total displacement in the transverse, longitudinal and vertical directions are reported in Appendix B1. The combined measurement error for the Old TDF monument survey is approximately 1.0 cm for both horizontal and vertical displacement. As such, displacements below a threshold of 2.0 cm are not considered significant.

Two monuments surveys were carried out in 2017, one in May and the other in August. The total cumulative displacements and settlements between the initial survey and the last were generally insignificant and less than the error of the survey. Six monuments experienced movement greater the survey error:

- Located on the east portion of the downstream edge of the seismic upgrade berm TDF14-10 and TDF14-14 experienced 3.2 and 3.8 cm of uplift since installation.
- Located on the east portion of the downstream edge of the seismic upgrade berm TDF-11 experienced 2.6 cm of upstream movement since installation.
- Located on the APA Berm TDF14-31, TDF14-32 and TDF14-34 experienced 4.7, 4.9 and 2.3 cm of downstream movement since installation.

7.2.3 Slope Inclinometers

Two slope inclinometer casings are installed within the Outer Embankment Berm of the Old TDF; BH15-32 and BH51-35. Casing profile surveys were carried out twice during 2017, in May and October. The surveys showed minimal amounts of movement within the error of the instrument. The maximum measured cumulative displacement was 15 mm in BH15-35. This movement was located in the top 10 m of the casing.

8.0 SUMMARY OF CONSTRUCTION

Details of 2017 TDF construction activities on site are provided in the 2017 Annual Construction Report (Amec Foster Wheeler 2018b). A brief overview of construction activities of the Old TDF and Lynx TDF is provided in the following subsections. Major construction work of the TDFs included:

- A stabilization berm was construction around the toe of the APA berm to address seismic stability concerns.
- A raise of Lynx Dam to elevation 362.5 m was designed, and was constructed to elevation 361.1 m.
- Lynx Spring Drain was extended to beyond the toe of the 362.5 m Lynx Dam raise.
- Waste rock was removed from WRD 2 – Phase 1.
- Grading in preparation for removal of waste rock was undertaken in WRD 3.

Amec Foster Wheeler prepared construction designs, design drawings and specifications for the work. Amec Foster Wheeler was also on site full time during construction for construction review.

The 2017 construction plan comprised raising the dam to 362.5 m elevation and constructing an Operations Spillway. However due to construction delays the dam was only raised to 361.1 m and the spillway was not built. The Operations Spillway as designed was specific to the 362.5 m dam raise and would need to be removed as part of the next dam raise, which is currently scheduled for construction in 2018. The raise planned for 2018 includes an updated Operations Spillway with a higher invert.

With a dam crest elevation of 361.1 m Lynx TDF has the capacity to store a small volume of tailings and the EDF; however, it does not have the capacity to store or discharge the IDF. Storage capacity is described in more detail in Section 4.2.2.

8.1 APA Stabilization Berm

Construction was performed between 22 June and 22 September 2017 in accordance with the design drawings and specifications issued on 24 February 2017 (2017a). The following works were completed.

- A filter layer was built around the toe of the existing APA berm. For the filter layer, geotextile covered by coarse bedding material was placed around the toe of the APA berm.
- Four existing seepage pads were connected and extended to address piping erosion concerns at the southeast corner of the berm. Geotextile and drain rock was placed between the seepage pads. The drain rock and existing seepage pads were then covered by a second layer of geotextile and a layer of coarse bedding material. Swales were also excavated to drain water from the drain rock layer to the east strip.
- A stabilization berm was construction around the toe of the APA berm to an elevation of 339 m (3386 m mine datum). The berm was constructed of general fill placed over the

filter layer and seepage pads. The berm was built with a 2% cross-fall to reduce ponding of water on the crest.

- Tailings were excavated and placed over the upstream side of the APA berm to reduce infiltration into the face of the berm. The tailings extended between the east side of the APA Operations Spillway to the East Decant.
- Two relic pipes that extended through the APA berm were decommissioned. Grout was pumped into the pipes to fill the void to reduce erosion potential. A 250 mm pipe located east of the spillway was filled with grout according to design. Difficulties were encountered during grouting of the 610 mm original decant pipe located below the west arm of the APA Berm. Equipment failures resulted in termination of the grouting work after only about the lower half of the target zone were grouted. The upper half of the pipe and the base of the decant tower remain open. Future work is required to decommission this pipe.

8.2 Lynx Dam Raise

Work on the Lynx Dam raise was completed between 10 July and 20 December, in accordance with design drawings and technical specifications prepared by Amec Foster Wheeler (2017f and g). Foundation preparation work was performed until the dam raise permit was issued in August. The following work was completed as part of dam raise activities.

- The dam foundation was prepared by excavating to competent natural soils as reviewed and approved by the geotechnical engineer. Foundation excavations were completed using 50 m wide panels which were excavated and backfilled prior to excavating adjacent areas.
- The dam was raised using a centerline method. The downstream shell was built using granular fill (Zone A) compacted to a very dense state. The filter core was constructed of silty fill (Zone J) compacted to a compact to dense state. The upstream buttress was constructed of Zone A, Zone J and boulders to buttress the filter core.
- Existing instrumentation on the dam was raised with the dam. Instrumentation raises were built using a filter compatible bedding material (Zone J2).
- A filter was built adjacent to Waste Rock Dump 1 near the east abutment of the dam. The purpose of the filter was to reduce the potential for migration of tailings into the waste rock dump. The filter was constructed of a 6 m wide berm of Zone J material that extended and overlapped existing bedrock.

Deleterious material was observed in the cut slope of the southwest corner of the existing dam during foundation preparation in Panel 5. The EOR was consulted and a test trench was excavated 4.5 m into the dam face on 17 July 2017 to assess the extent of the deleterious material. Deleterious material consisting of loose, wet, high-fines mine waste containing a mix of wood, concrete, metal, and plastic debris was observed for the full depth of the test trench. A review of construction records and past site photographs suggests that the deleterious material was waste piled near the edge of a construction zone that was buried and incorporated into the dam during completion of the starter dam. A borehole investigation and geophysical investigation

are planned for 2018 to investigate the properties of the starter dam further (Amec Foster Wheeler, 2017n).

8.3 Lynx Spring Drain

Work on the Lynx Springs Drain was carried out in 2017 continuing from work started in 2014. Work was carried out intermittently between 11 August and 15 December, in accordance with design drawings and specifications prepared by Amec Foster Wheeler (2017h). Due to adverse weather conditions NMF decided to truncate construction of the Spring Drain at the footprint of the 362.5 m raise instead of building the full design. The following works were completed as part of Spring Drain construction.

- The upstream cover of Spring Drain was completed. It consisted of finishing placement of a layer of fine filter material and placing a layer of Zone J material.
- The Spring Drain was extended from the end of the existing Spring Drain to beyond the toe of the 362.5 m dam raise, Sta. 0+188 to 0+263. It was constructed by excavating the ditch shape, then placing geomembrane, filter layers and drain rock. Each layer of material was tied-into the existing layer of the existing Spring Drain.
- Two vibrating wire piezometers were placed in the invert of the drain to monitor water levels within the drain.
- A toe drain was built in the Panel 15 area to convey and capture seepage water at the toe of the dam. The toe drain is planned to connect to the ultimate dam toe drain which will be modified from the configuration presented in the Lynx TDF Dam Face Closure Cover Permit Level Design (Amec Foster Wheeler 2016g).

8.4 Waste Rock Dump Removal

Waste rock was removed from WRD 2 from 16 August and 30 November 2017. Waste rock grading in preparation for removal was carried out in WRD 3 between25 September and 26 October. The waste rock dump activities were carried out in accordance with design drawings and specifications prepared by Amec Foster Wheeler (2017j, k, l and m). The waste rock dumps are being removed as part of reclamation activities and because they do not meet regulatory requirements for factor of safety and geotechnical stability, and therefore could pose a hazard to the tailings facility, and do not have slopes that are suitable for closure and reclamation. The slopes above the work areas were monitored daily for changes to stability as part of the safe work plan. Monitoring included visual reviews by the geotechnical engineer and surveys of monuments.

Work in WRD 2 occurred in the Phase 1 area, which is located in the lower east portion of WRD 2. This area is separated from the remainder of the waste rock dump. Waste rock was removed by pushing material from the top of the Phase 1 area down to a haul road where it was loaded into haul trucks. Waste rock was removed to a depth where natural ground was encountered. Material removed from WRD 2 was used for Lynx Dam raise construction. An access road connecting the WRD 2 haul road to the Lower Lynx Diversion ditch was removed during the work. It was reconstructed in February 2018, restoring the lower access to the diversion.

Work in WRD 3 comprised pushing material from the top of the waste rock dump down the slope to infill overhanging sections of the dump. Material was pushed from WRD 3A towards WRD 3B.

The overhanging sections of the dump were infilled by the end of the work, consistent with the safe work plan; however, rainfall in October infiltrated the relatively high-fines material in the dump, and increased the moisture content to a point where it was significantly wet of optimum for compaction, and therefore not suitable for construction without significant moisture conditioning. As such no waste rock was removed from WRD 3.

9.0 SUMMARY OF RECOMMENDATIONS

9.1 Previous Recommendations

Outstanding recommendations discussed in the 2016 Dam Inspection Report are provided in Table 7. The table indicates what action has been taken with respect to the recommendations and the status of each recommendation in terms of priority from both dam safety and mine management/planning perspectives. Recommendations that were indicated in the previous report as completed or no longer relevant due to changed circumstances have been omitted from the table.

Table 7: Summary of Previous Recommendations

Structure	Tracking Number	Previous Recommendation	Updates	Status/Priority
2013 Dam Status Report (AMEC 2014a)				
Old TDF	2013-11	Additional grading should be undertaken on any remaining areas of the main bench of the Old TDF Seismic Upgrade Berm that continue to pond or redirect surface water.	In 2017 ponded water continues to be observed on the seismic upgrade berm. Regrading of berm is planned for 2018 as part of closure cover activities.	Incomplete Priority 3
2013 Old TDF DSR (RGC 2014a)				
Old TDF	2013-19	Expedite closure planning and construction of approved closure works.	Permit-level closure cover design developed in 2016 by Amec Foster Wheeler (2016s).	Ongoing Priority 4
2013 Lynx TDF DSR (RGC 2014a)				
Lynx TDF	2013-23	Consider relocating the waste rock dumps [above Lynx TDF] as soon as is practical.	Removal of Waste Rock Dump 2 and Waste Rock Dump 3 started in 2017. Continued works are planned for 2018.	Ongoing Priority 2
2014-Q3 DSI Report (AMEC 2014b)				
Old TDF	2014-03	Measures should be taken to mitigate erosion of the paste stack in the APA. Implementation of a simple waste rock cover is likely the most practical option.	The springs along the top of the paste stack were collected in a surface ditch. The ditch was filled over as part of the LLDD project. Re-establishing it was included in the project specification but was not completed in 2016. No additional work was carried out in this area in 2017.	Incomplete Priority 4

Structure	Tracking Number	Previous Recommendation	Updates	Status/Priority
Lynx TDF	2014-09	Investigate options for dewatering of dredge material prior to deposition in Lynx TDF.		In Progress Priority 4
Old TDF & Lynx TDF	2014-11	Connect all piezometers to an automated logging system. Implement real-time networking and internet access to the system to improve the timely availability and use of data.	Instrumentation is connected to an automated logging system. Online instrumentation platform suppliers were contacted in 2017 for quotes and product descriptions. Real-time access for offsite users is planned but has not been implemented.	Ongoing Priority 2
2015 DSI Report (Amec Foster Wheeler 2016d)				
Old TDF & Lynx TDF	2015-01	Where possible, adopt updated design criteria derived from CDA guidelines and MEM/MOE requirements, as outlined in Table 2 in Section 2.3.3 and Table 3 in Section 2.4.3	Completed for Old TDF upslope and internal water management. Outstanding for Myra Creek at the toe of the Old TDF (see Recommendation 2016-10).	Complete/ongoing Priority 2
Old TDF	2015-04	Install freeboard indicators in the east and west Strip and Old TDF Surge Pond (no longer applicable to West strip)	No work occurred in 2017.	Incomplete Priority 4
2016 DSI Report (Amec Foster Wheeler 2017c)				
All	2016-01	Some OMS Manual Holders do not have a current registered hard copy of the document.	OMS manual distributed in July 2017. However, the OMS manual is currently in the process of being updated, scheduled to be published 31 March 2018. OMS manual will be re-distributed once complete.	Complete/Ongoing Priority 3

Structure	Tracking Number	Previous Recommendation	Updates	Status/Priority
All	2016-02	Data loggers run out of battery power in the winter, resulting in loss of critical weather and/or piezometer monitoring information.	RST visited the site in October 2017. They reviewed the configuration of Hut A and Hut C and changed the battery set up in Hut A. NMF also set up an email alert system for if there is a low battery. Battery power issues occurred in Lynx Hut and Hut B in November/December 2017. Alternative power options for the data logger Huts should be investigated.	Ongoing. Priority 3.
All	2016-03	In 2016, documentation exists for 35 out of a prospective 52 weekly facility inspections by NMF, representing only 67% completion.	In May 2017 NMF reviewed staffing assignments to ensure that personnel had time to prioritize completing and documenting inspections. In consultation with the EOR it was agreed that the weekly inspections could be omitted for weeks where the EOR conducted a monthly inspection during the period of care and maintenance. However, documentation only exists for 25 of 40 remaining weekly facility inspections for 2017. Staffing assignments and document filling procedures should be reviewed for 2018.	Incomplete. Priority 3

Structure	Tracking Number	Previous Recommendation	Updates	Status/Priority
Lynx TDF	2016-04	Source of groundwater feeding high-volume spring in northeast corner of Lynx dam foundation is not understood.	Groundwater spring captured by an engineered drain in Panel 15. Upland areas reviewed to reduce infiltration in the lower reaches of WRD 2 and on top of WRD 1.	Complete. Priority 4
All	2016-05	Lynx TDF does not currently have a defined piezometer threshold framework or instrumentation-based alarm system.	No work occurred in 2017.	Incomplete. Priority 3
Old TDF	2016-06	Contact water leaked into the Operations Spillway during normal operations.	The spillway was repaired using layers of low permeability tailings material placed over the leak area. This is considered an interim repair which will be sufficient for 2 to 3 years until the closure cover is constructed. If the closure cover is not constructed in this time a more permanent repair is required.	Complete. Priority 2
Lynx TDF	2016-07	Arnica and Upper Lynx Diversion Ditches are impeded by the growth of brush and trees	Brushing maintenance was carried out to clear the diversion channels.	Complete Priority 2
Lynx TDF	2016-08	OMS document lacks clear information on surveillance or maintenance of upslope diversions	OMS Manual in the process of being updated. Update is scheduled to be published 31 March 2018.	Complete. Priority 2
All	2016-09	Facility inspection forms include outdated inspection items and old maps	Updated forms to reflect current configuration and inspection items	Complete. Priority 4

Structure	Tracking Number	Previous Recommendation	Updates	Status/Priority
Old TDF, Super Pond, Polishing Ponds	2016-10	Myra Creek channel designed for 1/1000 AEP, which is less than current CDA guidance. Identified during the 2016 DSR.	Update IDF values for Myra Creek to 2/3 between 1/1000 AEP and PMF, and review hydraulic capacity of Myra Creek channel and adequacy of riprap revetment.	Incomplete. Priority 2
2016 DSR Report (Tierra Group 2017)				
Lynx TDF	2016-11	Monitor settlement and cracking in the upstream edge of the crest.	Included in the facility monitoring plan	Complete. Priority 2.
Lynx TDF	2016-12	Monitor the presence of ponding water and seepage at the toe of the dam.	Included in weekly and monthly inspections	Complete. Priority 2.
Lynx TDF	2016-13	NMF to address this minor issue [sinkhole] prior to closure if the feature does not stabilize naturally.	To be addressed as part of closure planning.	Incomplete. Priority 4.
Lynx TDF	2016-14	Update OMS and EMP Manuals to reflect current care and maintenance condition and personnel.	OMS and EMP Manuals in the process of being updated. Update is scheduled to be published 31 March 2018.	Complete/ongoing. Priority 2.

9.2 New Recommendations from 2017

Table 8 summarizes Amec Foster Wheeler's recommendations with respect to the operations, maintenance, and surveillance of the tailings dams and associated structures based on engineering work carried out in 2017.

Table 8: Summary of New Recommendations

Structure	ID	Deficiency or Non-Conformance	Regulatory Requirement or OMS Reference	Recommended Action	Priority[(1)]	Recommended Deadline/Status
Old TDF	2017-01	Decant structure and pipe through West APA berm was not fully grouted for decommissioning.	N/A	Complete grouting and decommissioning of west decant pipe in advance of Old TDF closure to reduce long term risks of piping erosion. Complete before the tower is plugged with tailings.	3	31 December 2018
All	2017-02	Multiple piezometers were destroyed or stopped functioning in 2017.	OMS Section 5	Assess which piezometers are still functional. EOR to evaluate spatial piezometer coverage. Replace or repair broken piezometers that are missing from essential monitoring areas.	3	30 September 2018
Lynx TDF	2017-03	Survey monuments were removed from Lynx TDF in August 2017 for construction and have not been replaced.	OMS Section 5	Replace survey monuments and complete a baseline survey	2	30 April 2018
Lynx TDF	2017-04	Restart plans in 2018 include a change in tailings production from cyclone fine tailings to whole tailings.	OMS Section 5	Tailings samples should be collected semi-annually for lab testing to validate design assumptions. Tailings surface surveys should be carried out on a quarterly basis to assess average dry density and consolidation. A detailed investigation of whole tailings properties should be completed once 5 m of tailings have been placed.	2	31 December 2018

Structure	ID	Deficiency or Non-Conformance	Regulatory Requirement or OMS Reference	Recommended Action	Priority[1]	Recommended Deadline/Status
Lynx	2017-05	Deleterious material was observed in the southwest corner of Lynx Dam during foundation preparation. Subsequent documentation review resulted in questions regarding starter dam completion and quality control activities.	OMS Section 5	Carry out a geotechnical and geophysical investigation of the original starter dam. Install vibrating wires and slope inclinometers as outlined in the proposed investigation plan.	2	30 June 2018
Lynx	2017-06	Surveys of the paste surface of Lynx TDF were not completed in 2017.	OMS Sections 5.0 and 7.0	Review internal staff availability to complete quarterly surveys, if required contract external surveyors to complete.	2	30 June 2018
Lynx	2017-07	Lynx TDF does not have the capacity to store or discharge the IDF	HSRC	Construct an Operations Spillway to discharge the IDF.	2	31 December 2018

1 Priority levels are defined as follows by MEM (2016):

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

10.0 LIMITATIONS AND CLOSING REMARKS

This Dam Safety Inspection report has been prepared using the available information, including observations and measurements carried out within the reporting period. It necessarily relies on available background information including design, as-built, and assessment reports by Amec Foster Wheeler and others. The site has a long historical legacy and, in some cases, has significant gaps in as-built information and performance records. The observations, conclusions, and recommendations presented in this report are accordingly based on the known and inferred conditions and are subject to revision should any new information be made available.

This report has been prepared for the exclusive use of Nyrstar Myra Falls Ltd. 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 dam inspection practices. No other warranty, express or implied, is made.

Respectfully submitted,

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

Reviewed by:

Original signed and sealed by
Dan Hughes-Games, P.Eng.

Original signed by
Ed McRoberts, P.Eng., Ph.D.

Dan Hughes-Games, P.Eng.
Senior Geotechnical Engineer

Ed McRoberts, P.Eng., Ph.D.
Principal Geotechnical Engineer

[redacted]

[redacted] EIT
Geotechnical Engineer

REFERENCES

AMEC Earth & Environmental, 2008a. “Water Management Study – Progress Report #1”. Technical Report, 25 February 2008.

AMEC Earth & Environmental, 2008b. “Lynx Pit Tailings Disposal Facility, Design Report, Myra Falls Mine”. Technical Report, August 2008.

AMEC Earth & Environmental, 2010a. “Revised Lynx Pit Tailings Facility Under-Drain Design, Myra Falls Mine, BC”. Technical Memorandum, 7 June 2010.

AMEC Earth & Environmental, 2010b. “Lynx Pit Tailings Facility French Drain Construction, Myra Falls Mine, BC”. Technical Memorandum, 21 July 2010.

AMEC Earth & Environmental, 2010c. “Groundwater Interception in Lynx Pit Tailings Facility, Myra Falls Mine, BC”, Technical Report, 24 August 2010.

AMEC Environment & Infrastructure, 2011a. “Lynx TDF - Foundation Drain Extension, Myra Falls Mine, BC”. Technical Report, 31 May 2011.

AMEC Environment & Infrastructure, 2011b. “Myra Falls Tailings Disposal Facility, 2010 Annual Review”. Technical Report, June 2011.bcc

AMEC Environment & Infrastructure, 2012. “2011 Geotechnical Investigation Report, Paste Investigation and Instrumentation, Myra Falls, BC”. Technical Report, 5 April 2012.

AMEC Environment & Infrastructure, 2013. “Lynx Tailings Disposal Facility, Conceptual Design for Seepage Interceptor Drain, Myra Falls Mine, BC”. Technical Report, 10 September 2013.

AMEC Environment & Infrastructure, 2014a. "Myra Falls Tailings Storage Facilities, 2013 Annual Dam Status Report”. Technical Report, March 2014.

AMEC Environment & Infrastructure, 2014b. "Myra Falls Tailings Storage Facilities, 2014-Q3 Dam Safety Inspection Report”. Technical Report, November 2014.

Amec Foster Wheeler Environment & Infrastructure, 2015a. “Myra Falls Tailings Disposal Facilities Dam Breach Inundation Study”. Technical Report, January 2015.

Amec Foster Wheeler Environment & Infrastructure, 2015b. “2014 Lynx Foundation Investigation, Myra Falls, BC, Geotechnical Factual Summary Report”. Technical Report, 20 March 2015.

Amec Foster Wheeler Environment & Infrastructure, 2015c. “Lynx Tailings Disposal Facility Dam Stability Assessment and Design Update Report”. Technical Report, 22 April 2015.

Amec Foster Wheeler Environment & Infrastructure, 2016a. “2015 Lynx Supplemental Drilling – Myra Falls, BC – Geotechnical Summary Report. Technical Report, 12 February 2016.

Amec Foster Wheeler Environment & Infrastructure, 2016b. “Update on Seismic Stability and Deformation Assessment – Myra Falls Lynx Dam Tailings Facility, Interim Dam Raise to Elevation 3410 m, Myra Falls, BC”. Technical Report, 23 February 2016.

Amec Foster Wheeler Environment & Infrastructure, 2016c. “Myra Falls Lynx Tailings Disposal Facility Waste Rock Dump Stability Review”. Technical Report, 30 March 2016.

Amec Foster Wheeler Environment & Infrastructure, 2016d. "Myra Falls Tailings Storage Facilities, 2015 Dam Safety Inspection Report”. Technical Report, 31 March 2016.

Amec Foster Wheeler Environment & Infrastructure, 2016e. “Nyrstar Myra Falls Mine – Instrumentation Automation Project Summary”. Technical Memorandum, 13 July 2016.

Amec Foster Wheeler Environment & Infrastructure, 2016f. “Nyrstar Myra Falls - Old Tailings Disposal Facility - APA Paste Berm Stability Report”. Technical Report, 26 August 2016.

Amec Foster Wheeler Environment & Infrastructure, 2016g. “Nyrstar Myra Falls – Lynx TDF Dam Face Closure Cover Permit Level Design.” Technical Report, 16 December 2016.

Amec Foster Wheeler Environment & Infrastructure, 2016h. “Nyrstar Myra Falls Mine - Old TDF Closure Cover - Permit Level Design”. Technical Report, 23 December 2016.

Amec Foster Wheeler Environment & Infrastructure, 2017a. “Myra Falls Mine Site Amalgamated Paste Area (APA) Berm Stabilization Detailed Design”. Technical Specifications, 24 February 2017.

Amec Foster Wheeler Environment & Infrastructure, 2017b. “Lynx Waste Dump Stabilization Preliminary Design – Myra Falls, BC”. Technical Report, 6 March 2017.

Amec Foster Wheeler Environment & Infrastructure, 2017c. “Myra Falls Mine Tailings Storage Facilities, 2017 Dam Safety Inspection”. Technical Report, 31 March 2017.

Amec Foster Wheeler Environment & Infrastructure, 2017d. “Myra Falls Mine Tailings Storage Facilities, 2017 As-built Report”. Technical Report, 31 March 2017.

Amec Foster Wheeler Environment & Infrastructure, 2017e. “Short-Term Mitigation Measures, Seepage at APA Berm Southeast Toe, Myra Falls Mine, BC”. Letter, 16 May 2017.

Amec Foster Wheeler Environment & Infrastructure, 2017f. “Myra Falls Lynx TDF Foundation Preparation, Rev 1”. Technical Specifications, 3 August 2017.

Amec Foster Wheeler Environment & Infrastructure, 2017g. “Myra Falls Lynx Dam Raise 362.5 m, Rev 1”. Technical Specifications, 3 August 2017.

Amec Foster Wheeler Environment & Infrastructure, 2017h. “Myra Falls Lynx TDF Lynx Springs Drain”. Technical Specifications, 4 August 2017.

Amec Foster Wheeler Environment & Infrastructure, 2017i. “Myra Falls Lynx Interim Spillway”. Technical Specifications, 15 August 2017.

Amec Foster Wheeler Environment & Infrastructure, 2017j. “Myra Falls Waste Dump 2 Removal Phase 1”. Technical Specifications, 6 September 2017.

Amec Foster Wheeler Environment & Infrastructure, 2017k. “Waste Rock Dump 2 – Phase 1 Removal, Myra Falls Mine, BC”. Design Letter, 6 September 2017.

Amec Foster Wheeler Environment & Infrastructure, 2017l. “Myra Falls Waste Rock Dump 3 Removal”. Technical Specifications, 12 September 2017.

Amec Foster Wheeler Environment & Infrastructure, 2017m. "Waste Rock Dump 3 Removal, Myra Falls Mine, BC". Design Letter, 12 September 2017.

Amec Foster Wheeler Environment & Infrastructure, 2017n. "Draft – Supplementary Geotechnical Investigation for Lynx TDF Dam, Myra Falls, BC". Letter, 18 December 2017.

Amec Foster Wheeler Environment & Infrastructure, 2018a. "Myra Falls Lynx Tailings Disposal Facility Ultimate Operation Configuration Permit-Level Design". Design Report, 2 March 2018.

Amec Foster Wheeler Environment & Infrastructure, 2018b. "Myra Falls Tailings Storage Facilities, 2017 As-built Construction Report". Report, 31 March 2018.

Canadian Dam Association, 2007. "Dam Safety Guidelines 2007".

Canadian Dam Association, 2013. "Dam Safety Guidelines 2007 (2013 Edition)".

Canadian Dam Association, 2014. "Application of Dam Safety Guidelines to Mining Dams". Technical Bulletin.

Klohn-Crippen Consultants Ltd., 2001a. "Myra Falls Operations – Paste Tailings in Existing Facility, Detail Engineering Report". Technical Report, July 2001.

Klohn-Crippen Consultants Ltd., 2001b. "Myra Falls Operations Paste Tailings in Lynx Pit Detailed Engineering". Technical Report, 8 August 2001.

Ministry of Energy & Mines of British Columbia, 2016. "Guidance Document – Health, Safety and Reclamation Code for Mines in British Columbia. Version 1.0". 20 July 2016.

Ministry of Energy, Mines and Petroleum Resources of British Columbia, 2017. "Health Safety and Reclamation Code for Mines in British Columbia". 28 February 2017.

Nyrstar Myra Falls, 2012. "Nyrstar Myra Falls, Tailings Disposal Facility (TDF), Closure Plan". Technical Report, February 2012.

Nyrstar Myra Falls, 2018a. "Nyrstar Myra Falls Mine – Annual Reclamation Report, 2017". Technical Report to Ministry of Mines, 31 March 2018.

Nyrstar Myra Falls, 2018b. "Nyrstar Myra Falls Mine – Annual Effluent Report, 2017". Technical Report to Ministry of Environment, 31 March 2018.

Robertson GeoConsultants Inc., 2014a. "Myra Falls Old Tailings Disposal Facility, 2013 Dam Safety Review, Rev 1". Technical Report, dated February 2014.

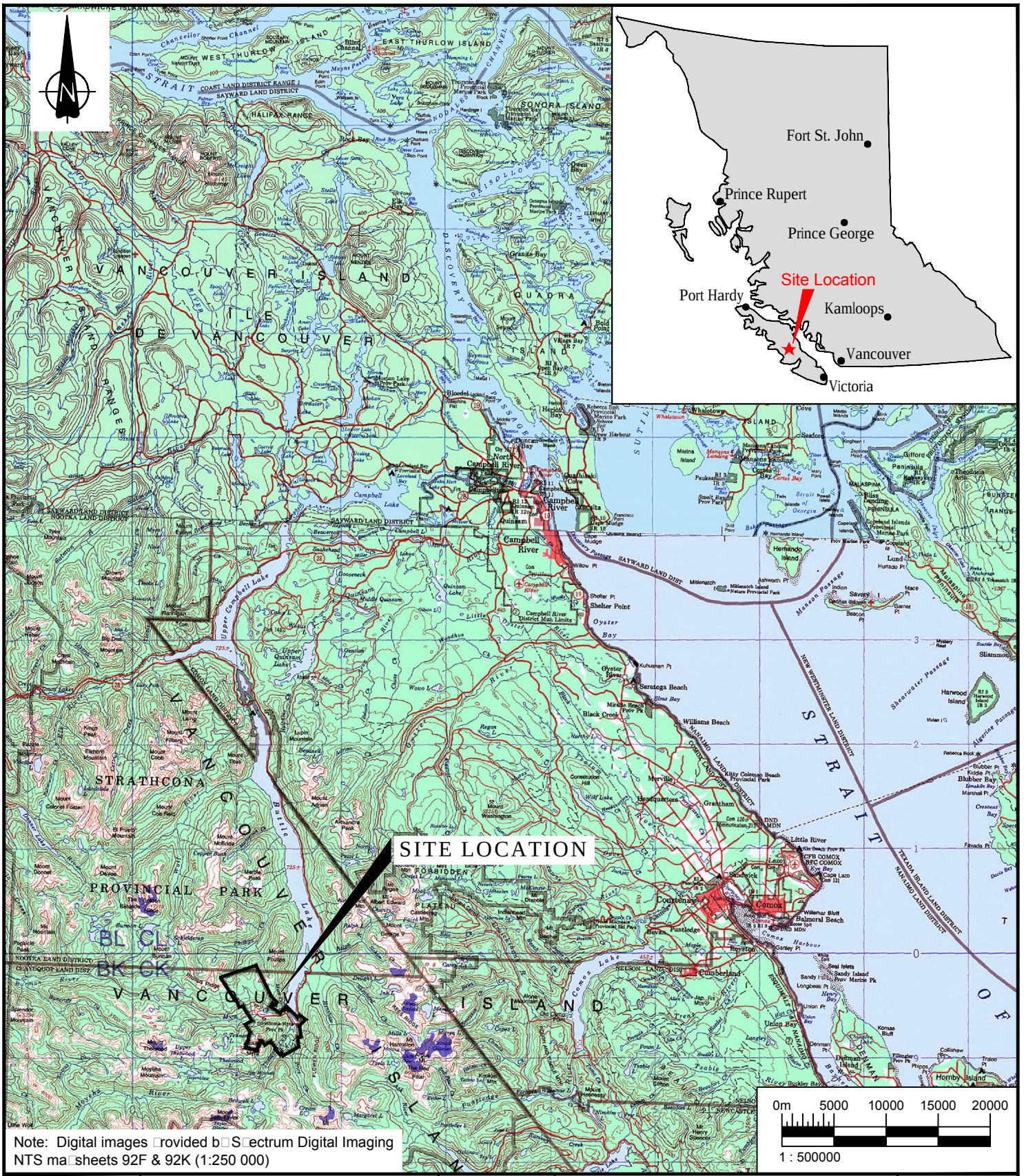
Robertson GeoConsultants Inc., 2014b. "Site-Wide Contaminant Load Balance Model for Nyrstar Myra Falls". Technical Report, dated July 2014.

Robertson GeoConsultants Inc., 2014c. "Interim Site-Wide Closure and Reclamation Plan for Nyrstar Myra Falls". Technical Report, dated July 2014.

Tierra Group International Ltd 2017. "2016 Dam Safety Review (Final), Myra Falls Mine". Technical Report. February 2017

amec
foster
wheeler

Drawings



Note: Digital images □rovided b□ S□ectrum Digital Imaging
NTS ma□sheets 92F & 92K (1:250 000)

amec foster wheeler
Environment & Infrastructure

CLIENT: nyrstar

Amec Foster Wheeler
Environment & Infrastructure
4385 Boban Drive, Nanaimo, B.C., V9T 5V9
Tel. 250 758-1887 Fax 250 758-1899

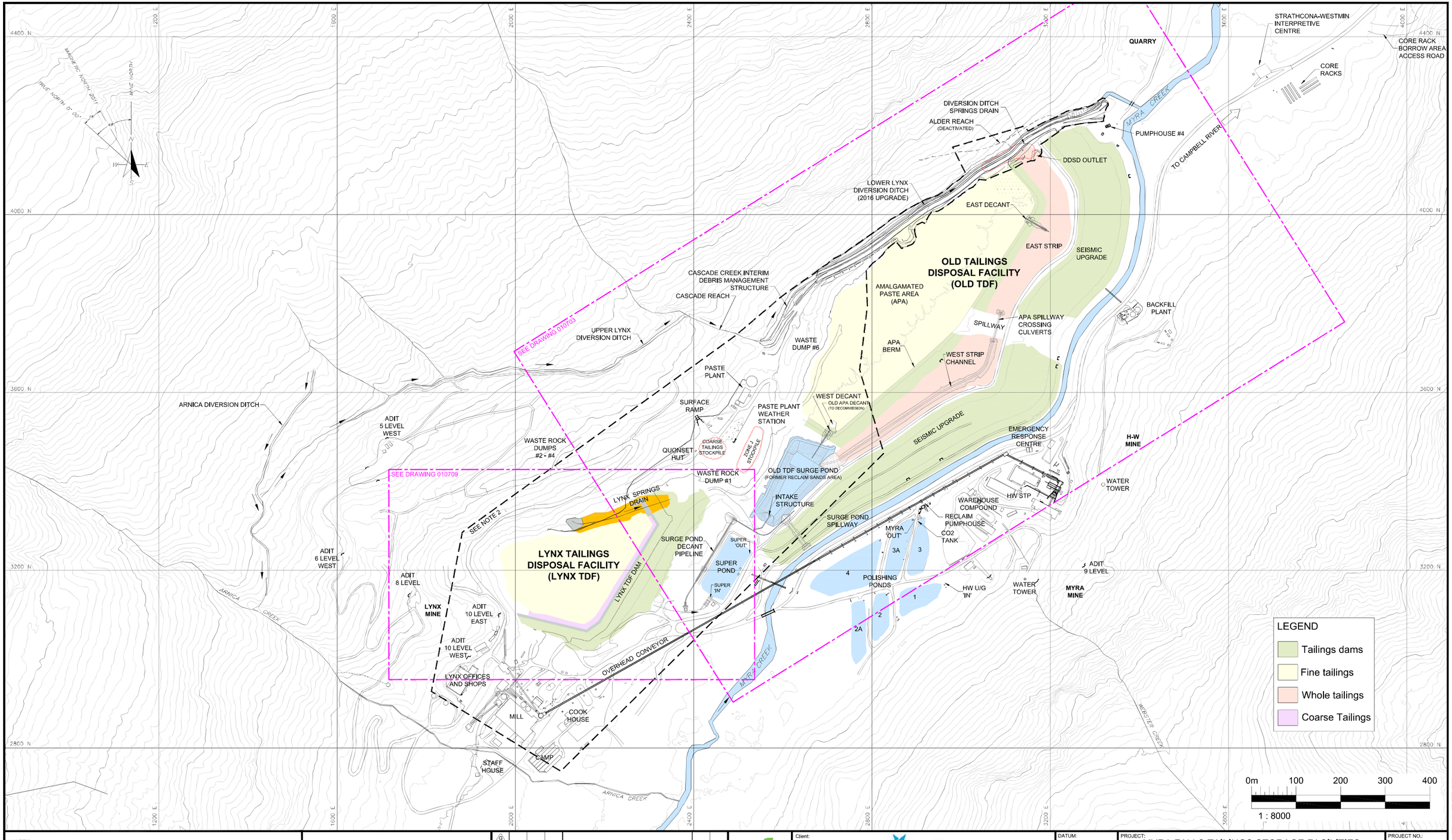
DWN BY:	F.Beso□□i
CHK'D BY:	D.Hughes-Games
DATUM:	NAD 83
PROJECTION:	UTM ZONE 10
SCALE:	1:500000

PROJECT: MYRA FALLS TAILINGS FACILITIES
2017 DAM SAFETY INSPECTION

TITLE: SITE LOCATION PLAN

DATE:	MARCH 2018
PROJECT NO:	NX14001B
REV. NO:	
FIGURE NO:	010701

C:\Users\yuan.chen\appdata\local\temp\AcPublish_12156\010701.dwg – 701 – Mar. 29, 2018 12:53pm – yuan.chen



NOTES:
1. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH AMEC FOSTER WHEELER ENVIRONMENT & INFRASTRUCTURE REPORT NO. NX14001B "MYRA FALLS TAILINGS STORAGE FACILITIES 2017 DAM SAFETY INSPECTION REPORT", DATED MARCH 2018.
2. SURVEY SURFACE TOPOGRAPHY SUPPLIED BY CLIENT. REFERS TO JUNE 2015 LIDAR SURVEY OUTSIDE THE DASHED LINE AND A COMBINATION OF 2015/2016 AS-BUILT SURVEYS INSIDE THE DASHED LINE.
3. THIS SURVEY IS REFERENCED TO MINE DATUM (MASL + 3047.5 m).
4. CONTOUR INTERVAL: 10 m.

REV	D	M	Y	ISSUE / REVISION DESCRIPTION	ENG.	APPR.
G						
F						
E						
D						
C						
B						
A	31	03	2018	ISSUED FOR DOCUMENTATION	AER	DHG

amec foster wheeler
Environment & Infrastructure

Client: nyrstar

Amec Foster Wheeler
Environment & Infrastructure
4385 Boban Drive, Nanaimo, B.C., V9T 5V9
Tel. 250 758-1887 Fax 250 758-1899

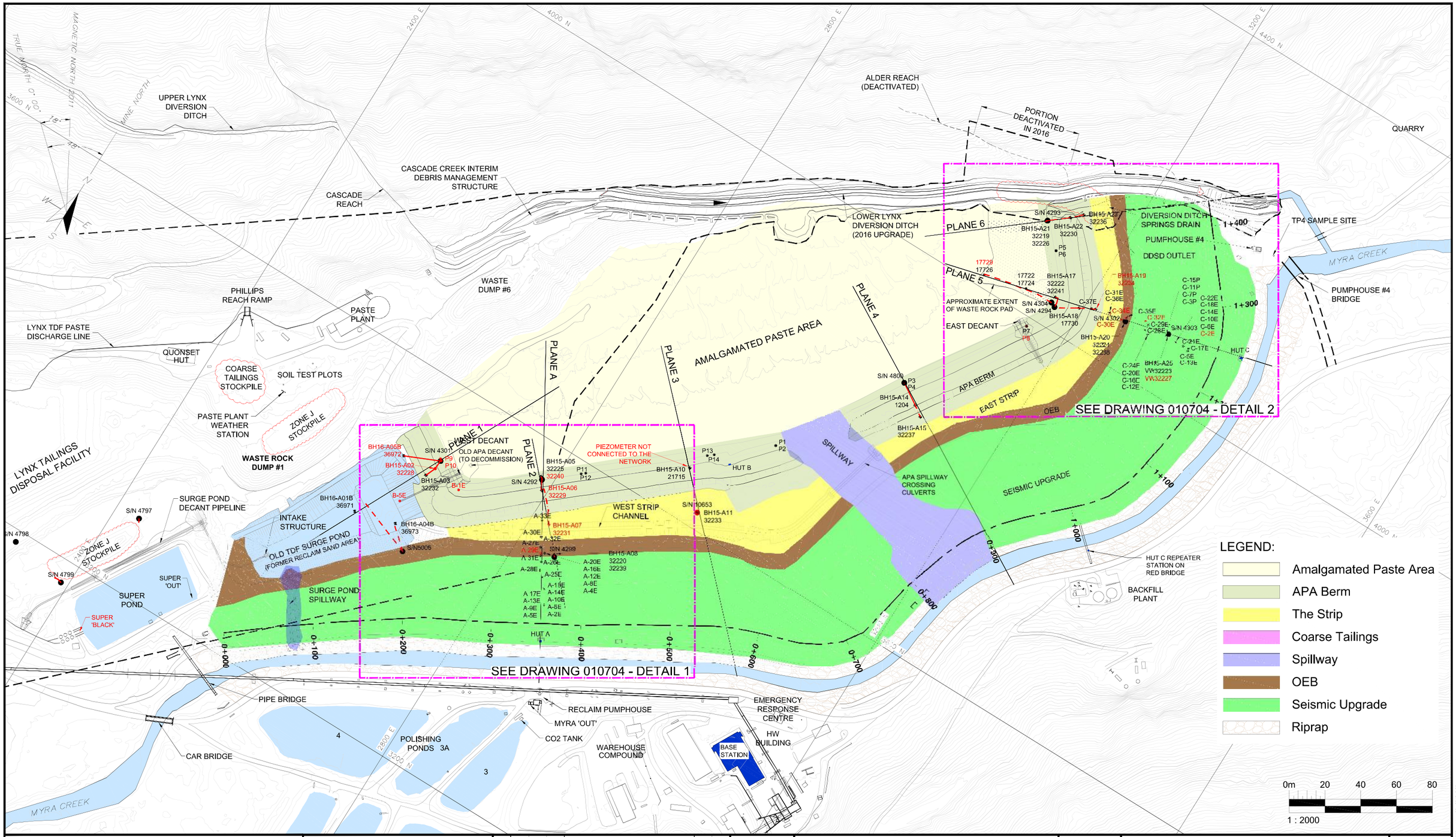
DATUM:	MINE
PROJECTION:	MINE
DRAWN BY:	K.L.
REVIEWED BY:	D. H.G.
SCALE:	1:8000

PROJECT: MYRA FALLS TAILINGS STORAGE FACILITIES 2017 DAM SAFETY INSPECTION

TITLE: GENERAL SITE ARRANGEMENT PLAN

PROJECT NO.:	NX14001B
REVISION NO.	A
DATE:	MARCH 2018
DRAWING NO.:	010702
SHEET NO.:	2 of 14

P:\CAD\CAD\DWG\010702.dwg - XREF - Nov. 29, 2018 - 12:52pm - jyatsuchiw



NOTES:
1. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH AMEC FOSTER WHEELER ENVIRONMENT & INFRASTRUCTURE REPORT NO. NX14001B "MYRA FALLS TAILINGS STORAGE FACILITIES 2017 DAM SAFETY INSPECTION REPORT", DATED MARCH 2018.
2. SURVEY SURFACE TOPOGRAPHY SUPPLIED BY CLIENT. REFERS TO JUNE 2015 LIDAR SURVEY OUTSIDE THE DASHED LINE AND A COMBINATION OF 2015/2016 AS-BUILT SURVEYS INSIDE THE DASHED LINE.
3. THIS SURVEY IS REFERENCED TO MINE DATUM (MASL + 3047.5 m).
4. CONTOUR INTERVAL: 2 m

LEGEND:
- * A-28E — PIEZOMETER (FUNCTIONAL)
- * A-28E — PIEZOMETER (NOT FUNCTIONAL)
- S/N 10646 — SINGLE-CHANNEL DATALOGGER
- S/N 4300 — MULTI-CHANNEL DATALOGGER
- BURIED WIRE(S)
- EXPOSED WIRE(S)

REV	D	M	Y	ISSUE / REVISION DESCRIPTION	ENG.	APPR.
G						
F						
E						
D						
C						
B						
A	31	03	2018	ISSUED FOR DOCUMENTATION	AER	DHG

amec foster wheeler — Environment & Infrastructure

Client: nyrstar

Amec Foster Wheeler
Environment & Infrastructure
4385 Boban Drive, Nanaimo, B.C., V9T 5V9
Tel. 250 758-1887 Fax 250 758-1899

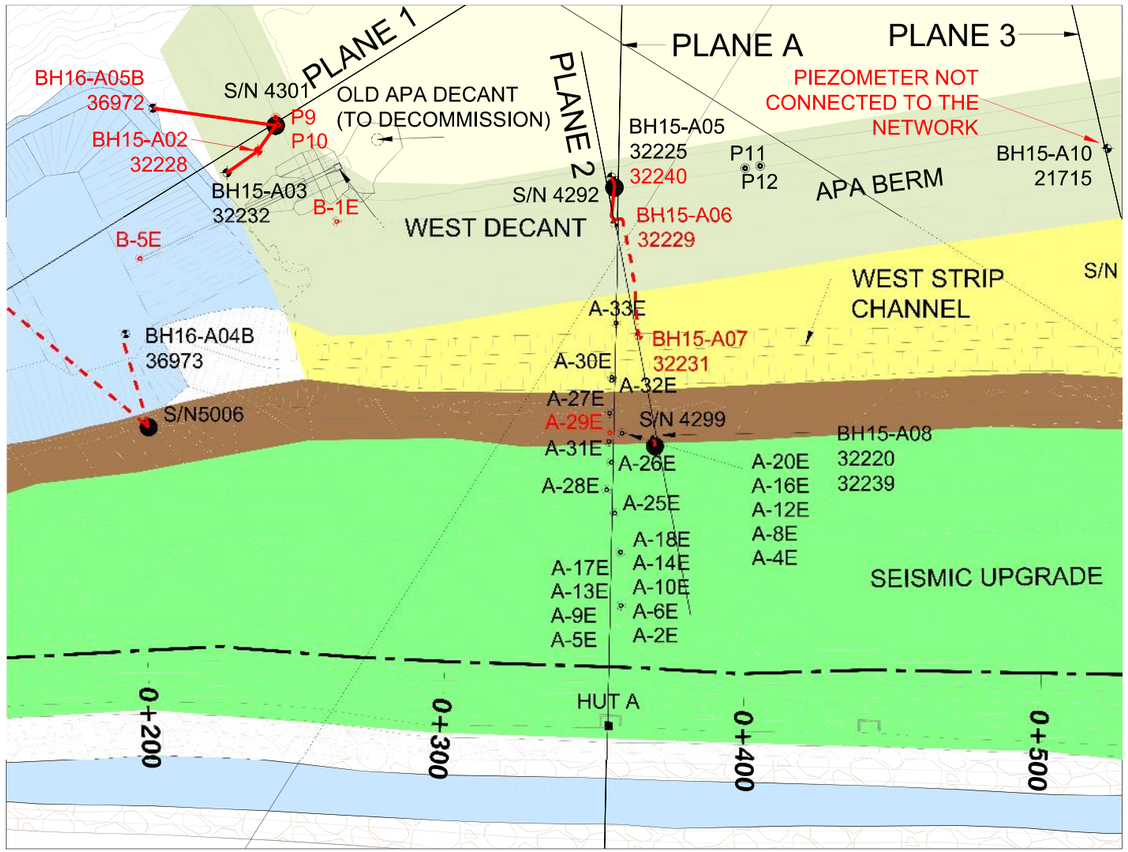
DATUM:	MINE
PROJECTION:	MINE
DRAWN BY:	YC
REVIEWED BY:	D.H.G.
SCALE:	1:4000

PROJECT: MYRA FALLS TAILINGS STORAGE FACILITIES 2017 DAM SAFETY INSPECTION

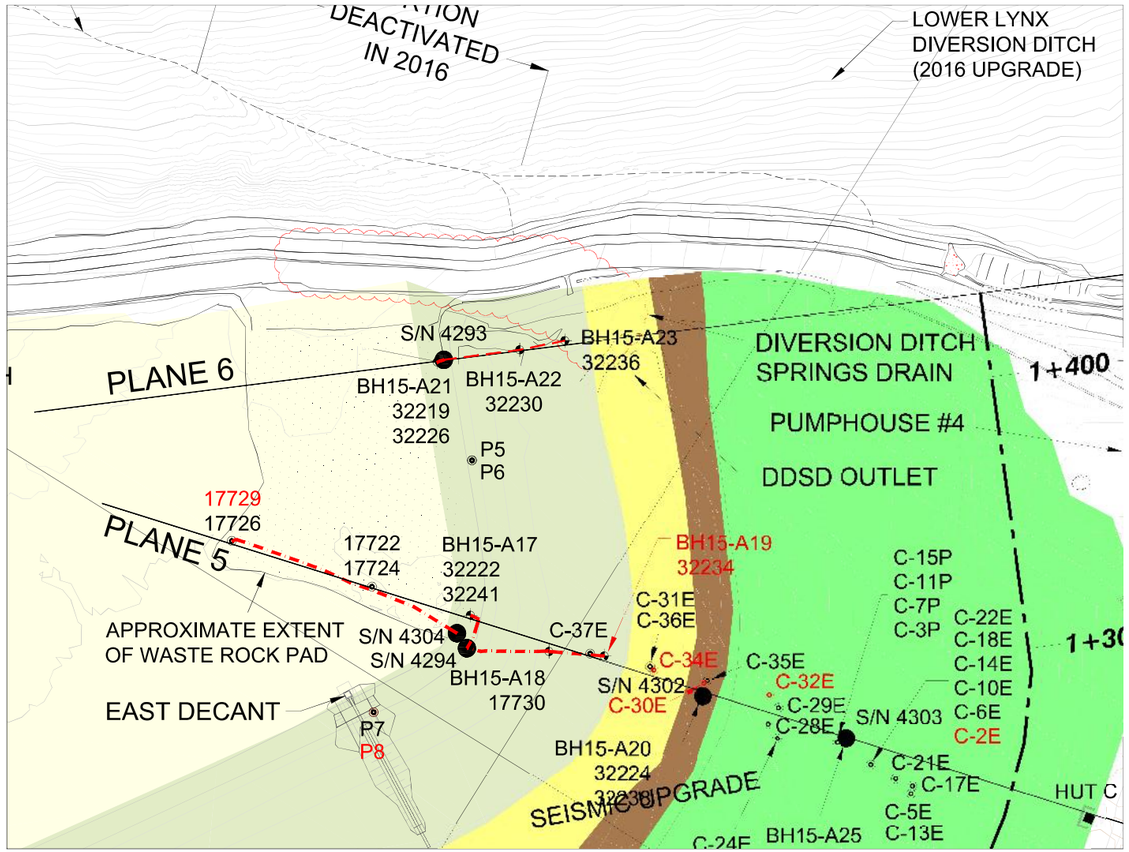
TITLE: OLD TAILINGS DISPOSAL FACILITY INSTRUMENTATION PIEZOMETERS

PROJECT NO.:	NX14001B
REVISION NO.	A
DATE:	MARCH 2018
DRAWING NO.:	010703
SHEET NO.:	3 of 14

P:\DWG\NX\NX14001B\REPORT\010703.dwg — 203 — Mon, 26, 2018 2:09pm — yccarlucci



DETAIL 1
INSTRUMENT PLANES 1 & 2



DETAIL 2
INSTRUMENT PLANES 5 & 6

0m 20 40 60 80
1 : 1000

NOTES:
1. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH AMEC FOSTER WHEELER ENVIRONMENT & INFRASTRUCTURE REPORT NO. NX14001B "MYRA FALLS TAILINGS STORAGE FACILITIES 2017 DAM SAFETY INSPECTION REPORT", DATED MARCH 2018.
2. SURVEY SURFACE TOPOGRAPHY SUPPLIED BY CLIENT AND PREDATES THE 2015/2016 CONSTRUCTION.
3. THIS SURVEY IS REFERENCED TO MINE DATUM (MASL + 3047.5 m).

LEGEND:
- A-28E — PIEZOMETER (FUNCTIONAL)
- A-28E — PIEZOMETER (NOT FUNCTIONAL)
- S/N 10646 — SINGLE-CHANNEL DATALOGGER
- S/N 4300 — MULTI-CHANNEL DATALOGGER
- BURIED WIRE(S)
- EXPOSED WIRE(S)

REV	D	M	Y	ISSUE / REVISION DESCRIPTION	ENG.	APPR.
A	31	03	2018	ISSUED FOR DOCUMENTATION	AER	DHG

amec foster wheeler
Environment & Infrastructure

Client: nyrstar

Amec Foster Wheeler
Environment & Infrastructure
4385 Boban Drive, Nanaimo, B.C., V9T 5V9
Tel. 250 758-1887 Fax 250 758-1899

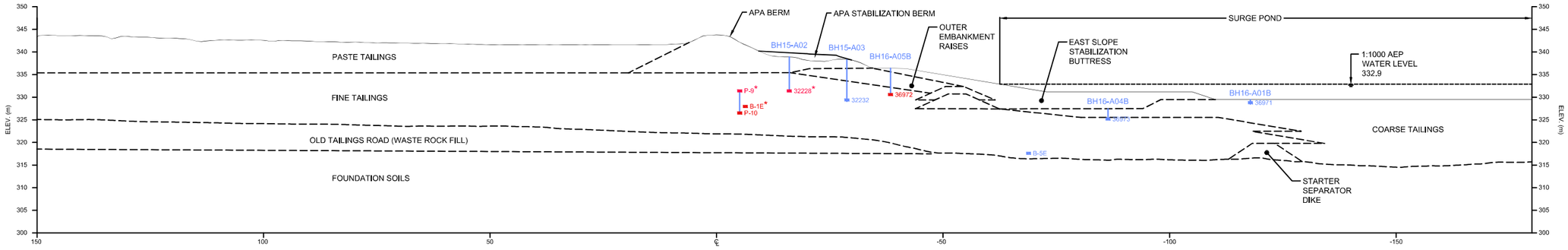
DATUM:	MINE
PROJECTION:	MINE
DRAWN BY:	YC
REVIEWED BY:	D.H.G.
SCALE:	1:2000

PROJECT: MYRA FALLS TAILINGS STORAGE FACILITIES
2017 DAM SAFETY INSPECTION

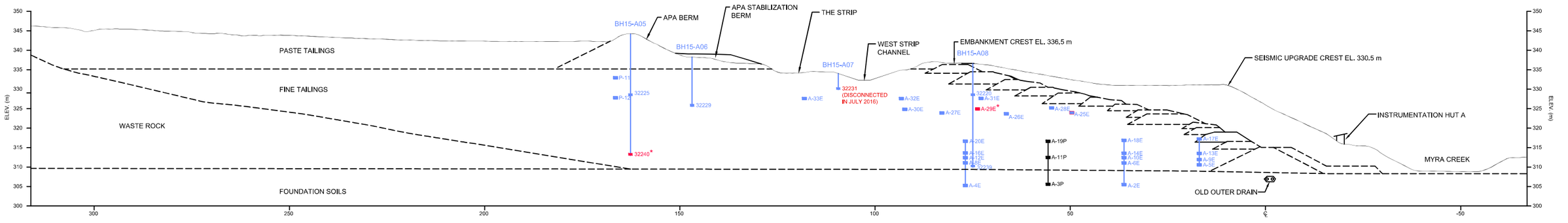
TITLE: OLD TAILINGS DISPOSAL FACILITY
INSTRUMENTATION - PIEZOMETERS
DETAILS 1 & 2

PROJECT NO.:	NX14001B
REVISION NO.	A
DATE:	MARCH 2018
DRAWING NO.:	010704
SHEET NO.:	4 of 14

P:\CAD\CW\CW0 010704.dwg - 704 - Mar. 29, 2018 12:53pm - yoon.choi



SECTION 1/703 INSTRUMENTATION PLANE 1
STA. 1+252



SECTION A/703 INSTRUMENTATION PLANE A (PLANE 2)
STA. 0+355

0m 10 20 30 40
1 : 1000

NOTES:
1. SECTION A ADOPTED FROM KLOHN CRIPPEN BERGER, PROJECT No. M07632 A52, DRAWING No. D-52304, REV. B DATED MARCH 31, 2006.
2. ORIGINAL GROUND SURFACE TOPOGRAPHY DEVELOPED FROM KNIGHT AND PIESOLD DRAWING 1287.046, DATED 31 MAY 1983.
3. INSIDE MATERIAL ZONE BOUNDARIES, SECTION LOCATIONS AND ORIENTATIONS ARE APPROXIMATE.
4. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH AMEC FOSTER WHEELER ENVIRONMENT & INFRASTRUCTURE REPORT NO. NX14001B "MYRA FALLS TAILINGS STORAGE FACILITIES 2017 DAM SAFETY INSPECTION REPORT", DATED MARCH 2018.
5. SURVEY SURFACE TOPOGRAPHY SUPPLIED BY CLIENT.
6. THIS SURVEY IS REFERENCED TO MINE DATUM (MASL + 3047.5 m) AND CONVERTED TO GEODETIC ELEVATION.

LEGEND:
- A-20E VIBRATING WIRE PIEZOMETER
- A-19P PNEUMATIC PIEZOMETER
- A-20E* NO LONGER FUNCTIONING OR LOST

REV	D	M	Y	ISSUE / REVISION DESCRIPTION	ENG.	APPR.
6						
5						
4						
3						
2						
1						
0	31	03	2018	ISSUED FOR DOCUMENTATION	AER	DHG

amec foster wheeler
Environment & Infrastructure

Client: nyrstar

Amec Foster Wheeler
Environment & Infrastructure
4385 Boban Drive, Nanaimo, B.C., V9T 5V9
Tel. 250 758-1887 Fax 250 758-1899

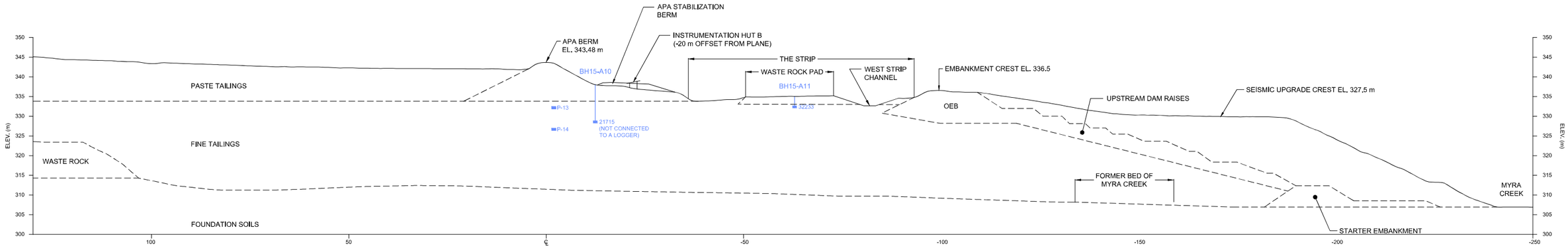
DATUM: MINE
PROJECTION: MINE
DRAWN BY: K.L.
REVIEWED BY: D.H.G.
SCALE: 1:1000

PROJECT: MYRA FALLS TAILINGS STORAGE FACILITIES 2017 DAM SAFETY INSPECTION

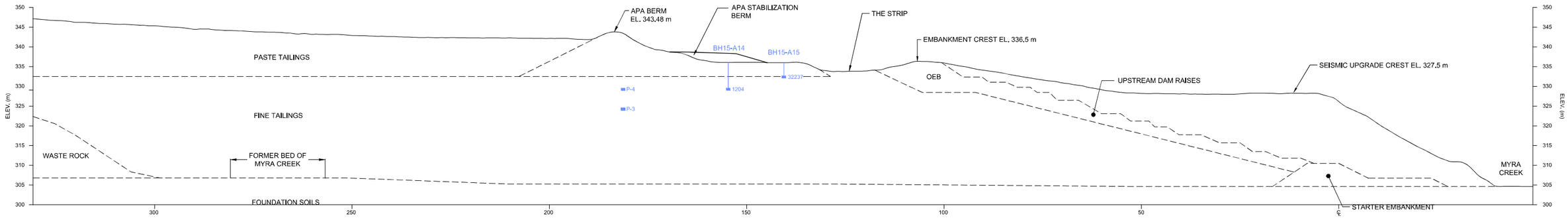
TITLE: OLD TAILINGS DISPOSAL FACILITY INSTRUMENTATION PLANES 1 & 2

PROJECT NO.: NX14001B
REVISION NO.: A
DATE: MARCH 2018
DRAWING NO.: 010705
SHEET NO.: 5 of 14

P:\CAD\CAD\Dwg\703\Dwg – 703 – Mar. 29, 2018 12:05pm – yamadam



SECTION 3 / 703 INSTRUMENTATION PLANE 3



SECTION 4 / 703 INSTRUMENTATION PLANE 4
STA. 0+900

0m 10 20 30 40

1 : 1000

NOTES:
1. ORIGINAL GROUND SURFACE TOPOGRAPHY DEVELOPED FROM KNIGHT AND PIESOLD DRAWING 1287.046, DATED 31 MAY 1983.
2. INSIDE MATERIAL ZONE BOUNDARIES, SECTION LOCATIONS AND ORIENTATIONS ARE APPROXIMATE.
3. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH AMEC FOSTER WHEELER ENVIRONMENT & INFRASTRUCTURE REPORT NO. NX14001B "MYRA FALLS TAILINGS STORAGE FACILITIES 2017 DAM SAFETY INSPECTION REPORT", DATED MARCH 2018.
4. SURVEY SURFACE TOPOGRAPHY SUPPLIED BY CLIENT.
5. THIS SURVEY IS REFERENCED TO MINE DATUM (MASL + 3047.5 m) AND CONVERTED TO GEODETIC ELEVATION.

LEGEND:
- A-20E VIBRATING WIRE PIEZOMETER
- A-19P PNEUMATIC PIEZOMETER
- A-20E * NO LONGER FUNCTIONING OR LOST

REV	D	M	Y	ISSUE / REVISION DESCRIPTION	ENG.	APPR.
A	31	03	2018	ISSUED FOR DOCUMENTATION	AER	DHG

amec foster wheeler Environment & Infrastructure

Client: nyrstar

Amec Foster Wheeler
Environment & Infrastructure
4385 Boban Drive, Nanaimo, B.C., V9T 5V9
Tel. 250 758-1887 Fax 250 758-1899

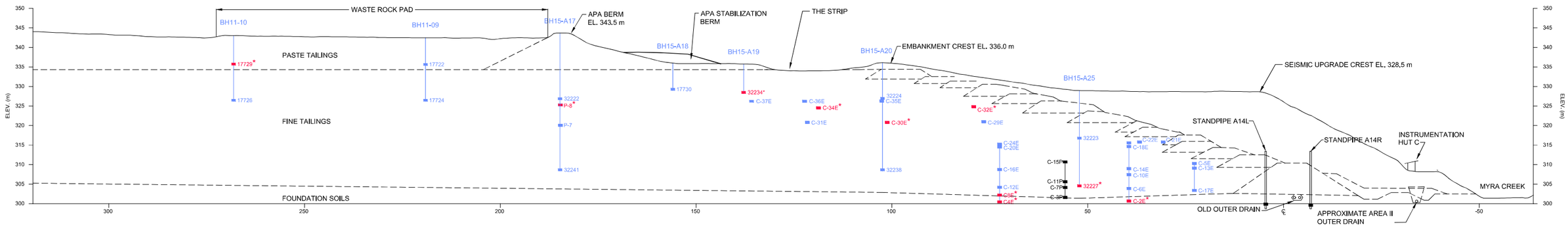
DATUM: MINE
PROJECTION: MINE
DRAWN BY: YC
REVIEWED BY: D,H,G
SCALE: 1:1000

PROJECT: MYRA FALLS TAILINGS STORAGE FACILITIES 2017 DAM SAFETY INSPECTION

TITLE: OLD TAILINGS DISPOSAL FACILITY INSTRUMENTATION PLANES 3 & 4

PROJECT NO.: NX14001B
REVISION NO.: A
DATE: MARCH 2018
DRAWING NO.: 010706
SHEET NO.: 6 of 14

G:\CAD\NX\NX14001 RG BERGEN\010706.dwg — Mar 29, 2018, 11:43am — anne.rose



SECTION 5 / 703 — INSTRUMENTATION PLANE 5 / PLANE C
STA. 1+252

SECTION 6 / 703 — INSTRUMENTATION PLANE 6
STA. 1+428

0m 10 20 30 40
1 : 1000

NOTES:
1. SECTION 5 ADOPTED FROM KLOHN CRIPPEN BERGER, PROJECT No. M07632 A52, DRAWING No. D-52304, REV. B DATED MARCH 31, 2006.
2. INSIDE MATERIAL ZONE BOUNDARIES, SECTION AND LOCATIONS AND ORIENTATIONS ARE APPROXIMATE.
3. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH AMEC FOSTER WHEELER ENVIRONMENT & INFRASTRUCTURE REPORT NO. NX14001B "MYRA FALLS TAILINGS STORAGE FACILITIES 2017 DAM SAFETY INSPECTION REPORT", DATED MARCH 2018.
4. SURVEY SURFACE TOPOGRAPHY SUPPLIED BY CLIENT.
5. THIS SURVEY IS REFERENCED TO MINE DATUM (MASL + 3047.5 m) AND CONVERTED TO GEODETIC ELEVATION.

LEGEND:
- A-20E — VIBRATING WIRE PIEZOMETER
- A-19P — PNEUMATIC PIEZOMETER
- A-20E* — NO LONGER FUNCTIONING OR LOST

REV	D	M	Y	ISSUE / REVISION DESCRIPTION	ENG.	APPR.
A	31	03	2018	ISSUED FOR DOCUMENTATION	AER	DHG

amec foster wheeler
Environment & Infrastructure

Client: nyrstar

Amec Foster Wheeler
Environment & Infrastructure
4385 Boban Drive, Nanaimo, B.C., V9T 5V9
Tel. 250 758-1887 Fax 250 758-1899

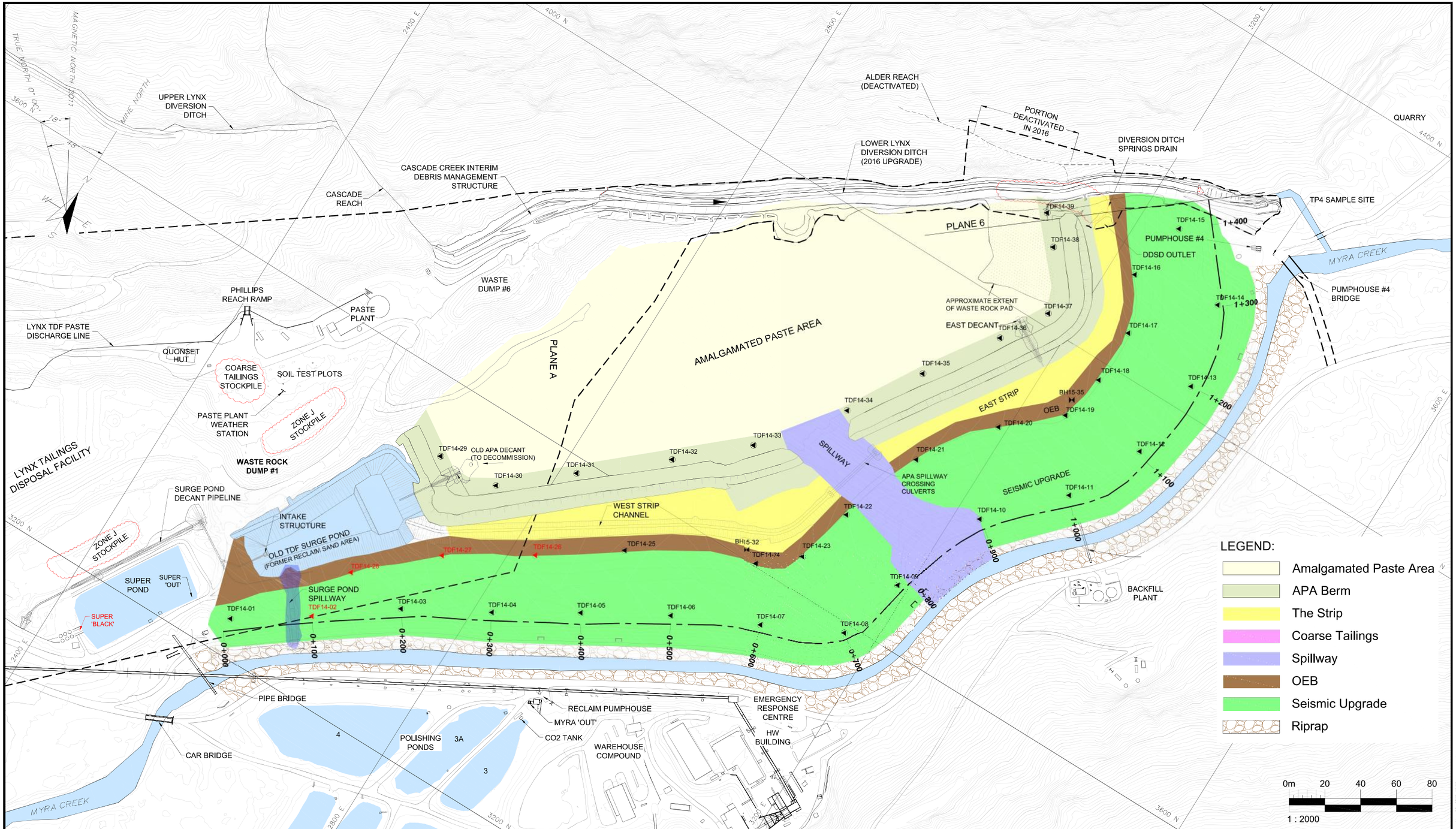
DATUM: MINE
PROJECTION: MINE
DRAWN BY: YC
REVIEWED BY: D.H.G
SCALE: 1:1000

PROJECT: MYRA FALLS TAILINGS STORAGE FACILITIES
2017 DAM SAFETY INSPECTION

TITLE: OLD TAILINGS DISPOSAL FACILITY
INSTRUMENTATION
PLANES 5 & 6

PROJECT NO.: NX14001B
REVISION NO.: A
DATE: MARCH 2018
DRAWING NO.: 010707
SHEET NO.: 7 of 14

D:\FALLS\NX\NX14001B\010707\Rev A - 707 - Mar 29, 2018, 13:43pm - jcox.dwg



NOTES:
1. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH AMEC FOSTER WHEELER ENVIRONMENT & INFRASTRUCTURE REPORT NO. NX14001B "MYRA FALLS TAILINGS STORAGE FACILITIES 2017 DAM SAFETY INSPECTION REPORT", DATED MARCH 2018.
2. SURVEY SURFACE TOPOGRAPHY SUPPLIED BY CLIENT, REFERS TO JUNE 2015 LIDAR SURVEY OUTSIDE THE DASHED LINE AND A COMBINATION OF 2015/2016 AS-BUILT SURVEYS INSIDE THE DASHED LINE.
3. THIS SURVEY IS REFERENCED TO MINE DATUM (MASL + 3047.5 m)
4. CONTOUR INTERVAL: 2 m

LEGEND:

TDF14-04 SURFACE MOVEMENT MONUMENT
TDF14-04 SURFACE MONUMENT (DESTROYED)
BH15-35 SLOPE INCLINOMETER

REV	D	M	Y	ISSUE / REVISION DESCRIPTION	ENG.	APPR.
A	31	03	2018	ISSUED FOR DOCUMENTATION	AER	DHG

amec foster wheeler
Environment & Infrastructure

Client: nyrstar

Amec Foster Wheeler
Environment & Infrastructure
4385 Boban Drive, Nanaimo, B.C., V9T 5V9
Tel. 250 758-1887 Fax 250 758-1899

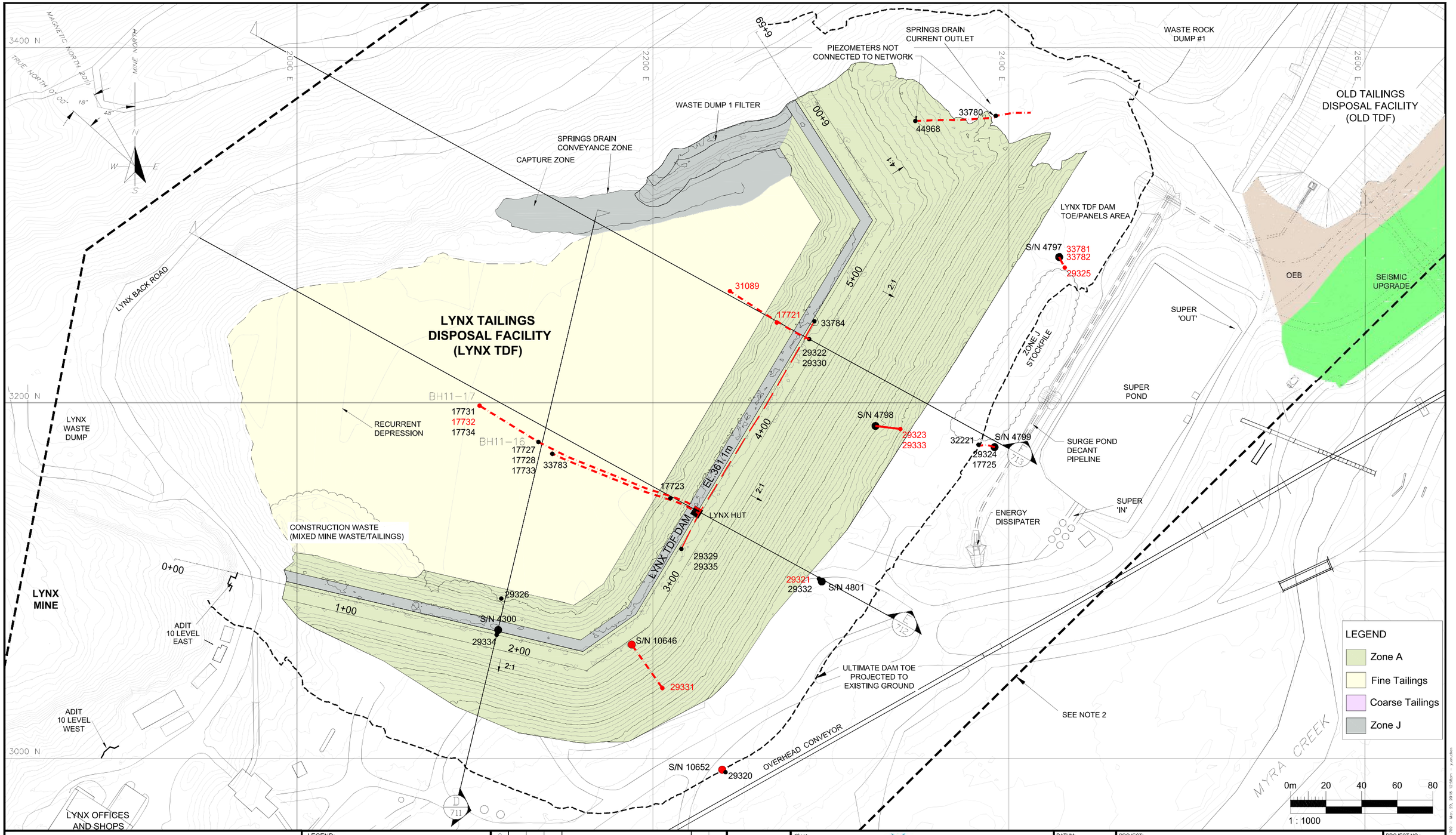
DATUM:	MINE
PROJECTION:	MINE
DRAWN BY:	YC
REVIEWED BY:	D.H.G.
SCALE:	1:4000

PROJECT: MYRA FALLS TAILINGS STORAGE FACILITIES 2017 DAM SAFETY INSPECTION

TITLE: OLD TAILINGS DISPOSAL FACILITY INSTRUMENTATION MONUMENTS AND INCLINOMETERS

PROJECT NO.:	NX14001B
REVISION NO.	A
DATE:	MARCH 2018
DRAWING NO.:	010708
SHEET NO.:	8 of 14

P:\CAD\CW\CW2 355 - REPORT\010708.dwg - 703 - Mar. 29, 2018 - 12:24pm - joshuchan



NOTES:
1. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH AMEC FOSTER WHEELER ENVIRONMENT & INFRASTRUCTURE REPORT NO. NX14001B "MYRA FALLS TAILINGS STORAGE FACILITIES 2017 DAM SAFETY INSPECTION REPORT", DATED MARCH 2018.
2. SURVEY SURFACE TOPOGRAPHY SUPPLIED BY CLIENT. REFERS TO JUNE 2015 LIDAR SURVEY OUTSIDE THE DASHED LINE AND A COMBINATION OF 2015/2016 AS-BUILT SURVEYS INSIDE THE DASHED LINE.
3. THIS SURVEY IS REFERENCED TO MINE DATUM (MASL + 3047.5 m)
4. CONTOUR INTERVAL: 2 m
5. 2017 SPRING DRAIN PIEZO SURVEY PROVIDED BY CLIENT ON 11 JANUARY 2018. UAV SURVEY RECEIVED FROM CLIENT ON 24 JANUARY 2018.

LEGEND:
- 29334 VIBRATING WIRE PIEZOMETERS
- S/N 10646 SINGLE-CHANNEL DATALOGGER
- S/N 4300 MULTI-CHANNEL DATALOGGER
- BURIED WIRE(S)
- EXPOSED WIRE(S)
- 29334 VIBRATING WIRE PIEZOMETERS (NOT FUNCTIONAL)

REV	D	M	Y	ISSUE / REVISION DESCRIPTION	ENG.	APPR.
A	31	03	2018	ISSUED FOR DOCUMENTATION	AER	DHG

amec foster wheeler
Environment & Infrastructure

Client: nyrstar

Amec Foster Wheeler
Environment & Infrastructure
4385 Boban Drive, Nanaimo, B.C., V9T 5V9
Tel. 250 758-1887 Fax 250 758-1899

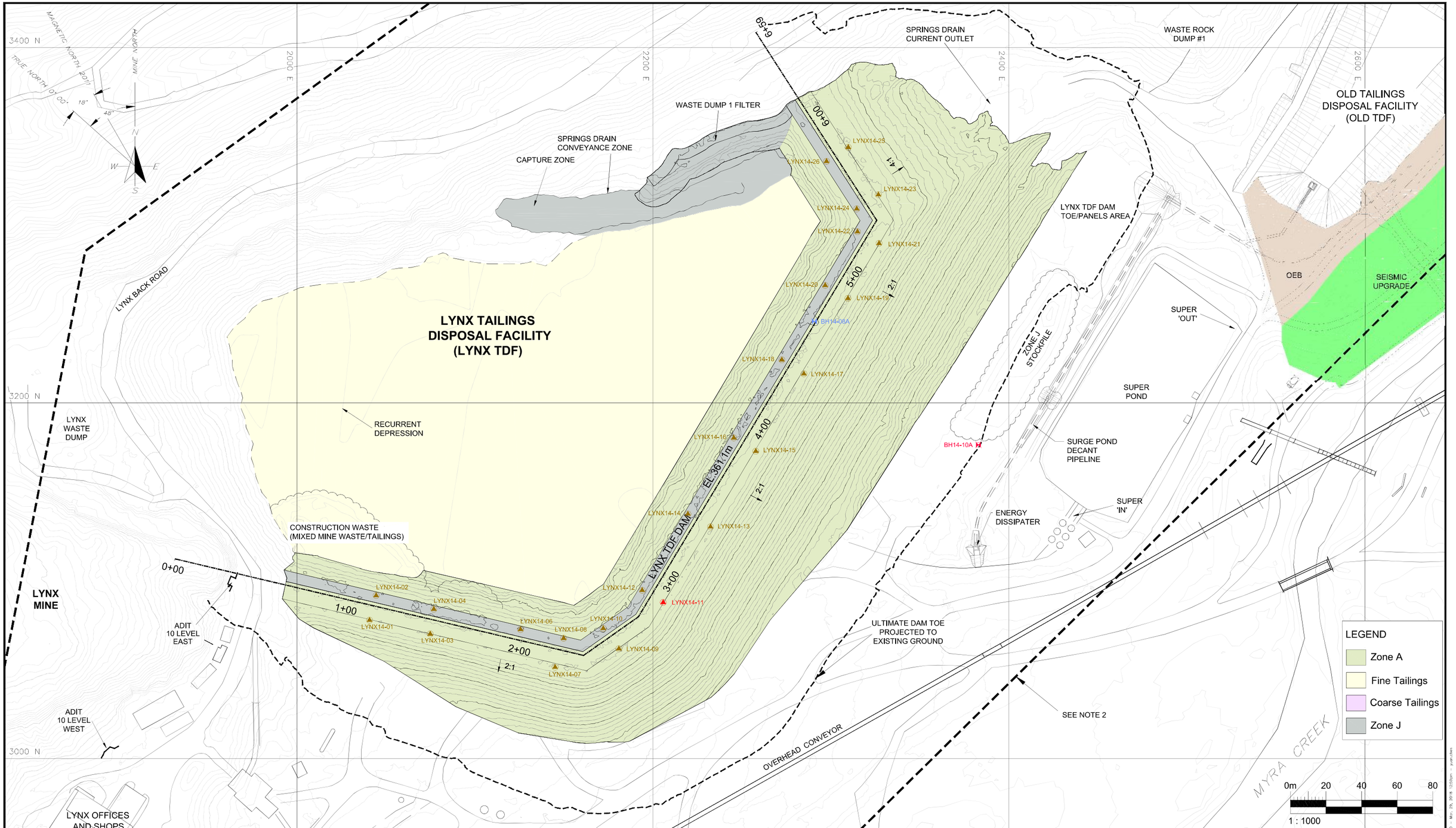
DATUM:	MINE
PROJECTION:	MINE
DRAWN BY:	YC
REVIEWED BY:	D.H.G
SCALE:	1:2000

PROJECT: MYRA FALLS TAILINGS STORAGE FACILITIES 2017 DAM SAFETY INSPECTION

TITLE: LYNX TAILINGS DISPOSAL FACILITY INSTRUMENTATION VIBRATING WIRE PIEZOMETERS

PROJECT NO.:	NX14001B
REVISION NO.	A
DATE:	MARCH 2018
DRAWING NO.:	010709
SHEET NO.:	9 of 14

N:\CAD\CIVIL\NX\NX14001B\010709.dwg 709 - Mon, 26, 2018 - 12:56pm - ryan.lokos



NOTES:
1. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH AMEC FOSTER WHEELER ENVIRONMENT & INFRASTRUCTURE REPORT NO. NX14001B "MYRA FALLS TAILINGS STORAGE FACILITIES 2017 DAM SAFETY INSPECTION REPORT", DATED MARCH 2018.
2. SURVEY SURFACE TOPOGRAPHY SUPPLIED BY CLIENT. REFERS TO JUNE 2015 LIDAR SURVEY OUTSIDE THE DASHED LINE AND A COMBINATION OF 2015/2016 AS-BUILT SURVEYS INSIDE THE DASHED LINE.
3. THIS SURVEY IS REFERENCED TO MINE DATUM (MASL + 3047.5 m)
4. CONTOUR INVERVAL: 2 m
5. UAV SURVEY RECEIVED FROM CLIENT ON 24 JANUARY 2018.

LEGEND:
- LYNX14-04 — SURFACE MOVEMENT MONUMENT REMOVED FOR CONSTRUCTION
- LYNX14-04 — SURFACE MONUMENT (DESTROYED)
- BH14-10A — SLOPE INCLINOMETER
- BH14-10A — SLOPE INCLINOMETER (DECOMMISSIONED)

REV	D	M	Y	ISSUE / REVISION DESCRIPTION	ENG.	APPR.
G						
F						
E						
D						
C						
B						
A	31	03	2018	ISSUED FOR DOCUMENTATION	AER	DHG

amec foster wheeler
Environment & Infrastructure

Client: nyrstar

Amec Foster Wheeler
Environment & Infrastructure
4385 Boban Drive, Nanaimo, B.C., V9T 5V9
Tel. 250 758-1887 Fax 250 758-1899

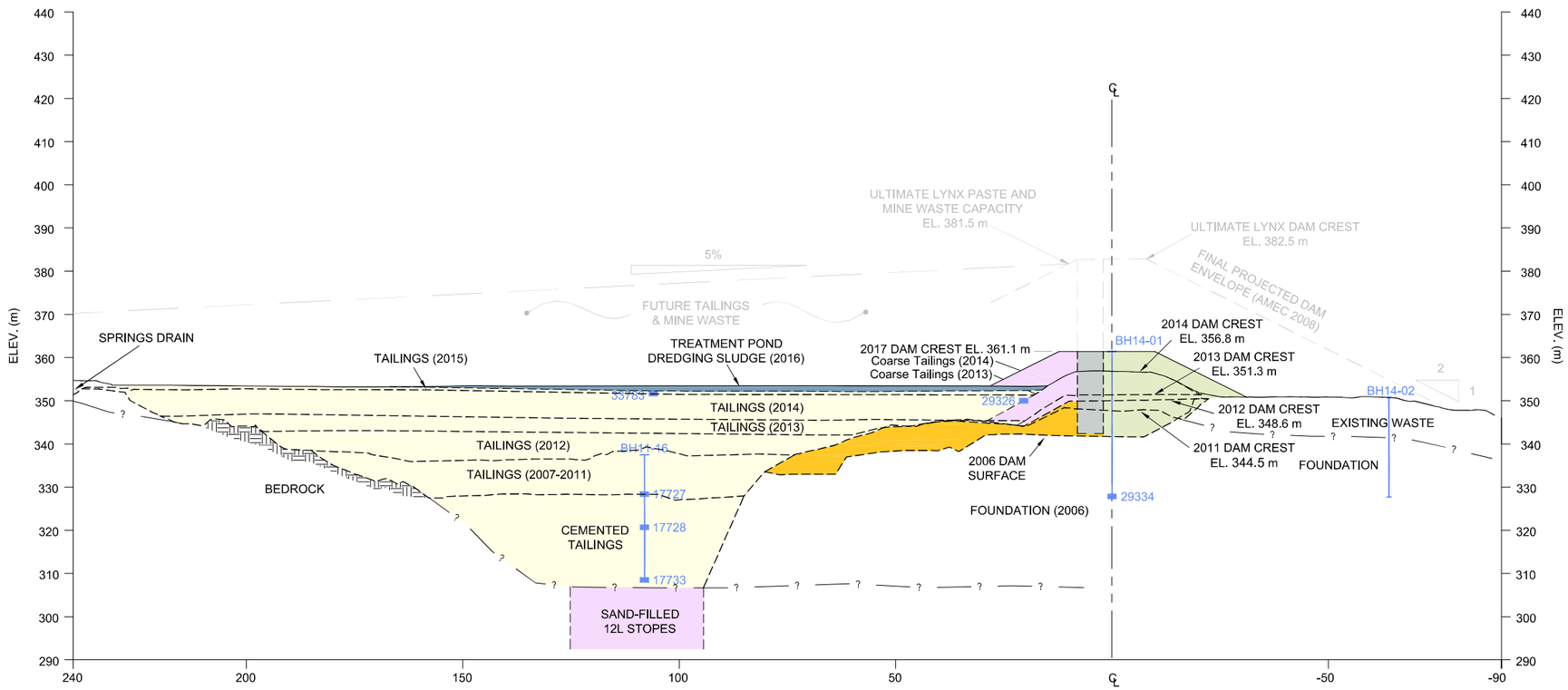
DATUM:	MINE
PROJECTION:	MINE
DRAWN BY:	YC
REVIEWED BY:	D.H.G
SCALE:	1:2000

PROJECT: MYRA FALLS TAILINGS STORAGE FACILITIES 2017 DAM SAFETY INSPECTION

TITLE: LYNX TAILINGS DISPOSAL FACILITY INSTRUMENTATION MONUMENTS AND INCLINOMETERS

PROJECT NO.:	NX14001B
REVISION NO.	A
DATE:	MARCH 2018
DRAWING NO.:	010710
SHEET NO.:	9 of 14

N:\CAD\DRAWINGS\NX14001B REPORT\NX14001B-Dwg - 010 - Mar. 28, 2018 12:05pm - yvon.chen



SECTION D 709 — INSTRUMENT PLANE D (SCHEMATIC CROSS SECTION)
STA. 1+85

LEGEND:

- Compacted Rockfill (Zone A)
- Compacted Rockfill and Fines (Zone J)
- Uncompacted Rockfill and Tailings (Nominally Zone J)
- Treatment Pond Dredging Sludge
- Fine Tailings (Paste or Thickener Underflow)
- Permeable Rockfill (Zone C1-C4)
- Coarse Tailings (Cyclone Underflow)
- 17724 Vibrating Wire Piezometers

0m 10 20 30 40 50
1 : 1250

NOTES:
1. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH AMEC FOSTER WHEELER ENVIRONMENT & INFRASTRUCTURE REPORT NO. NX14001B "MYRA FALLS TAILINGS STORAGE FACILITIES 2017 DAM SAFETY INSPECTION REPORT", DATED MARCH 2018.
2. SURVEY SURFACE TOPOGRAPHY SUPPLIED BY CLIENT.
3. THIS SURVEY IS REFERENCED TO MINE DATUM (MASL + 3047.5 m) AND CONVERTED TO GEODETIC ELEVATION.

REV	D	M	Y	ISSUE / REVISION DESCRIPTION	ENG.	APPR.
A	31	03	2018	ISSUED FOR DOCUMENTATION	AER	DHG

amec foster wheeler
Environment & Infrastructure

Client: nyrstar

Amec Foster Wheeler
Environment & Infrastructure
4385 Boban Drive, Nanaimo, B.C., V9T 5V9
Tel. 250 758-1887 Fax 250 758-1899

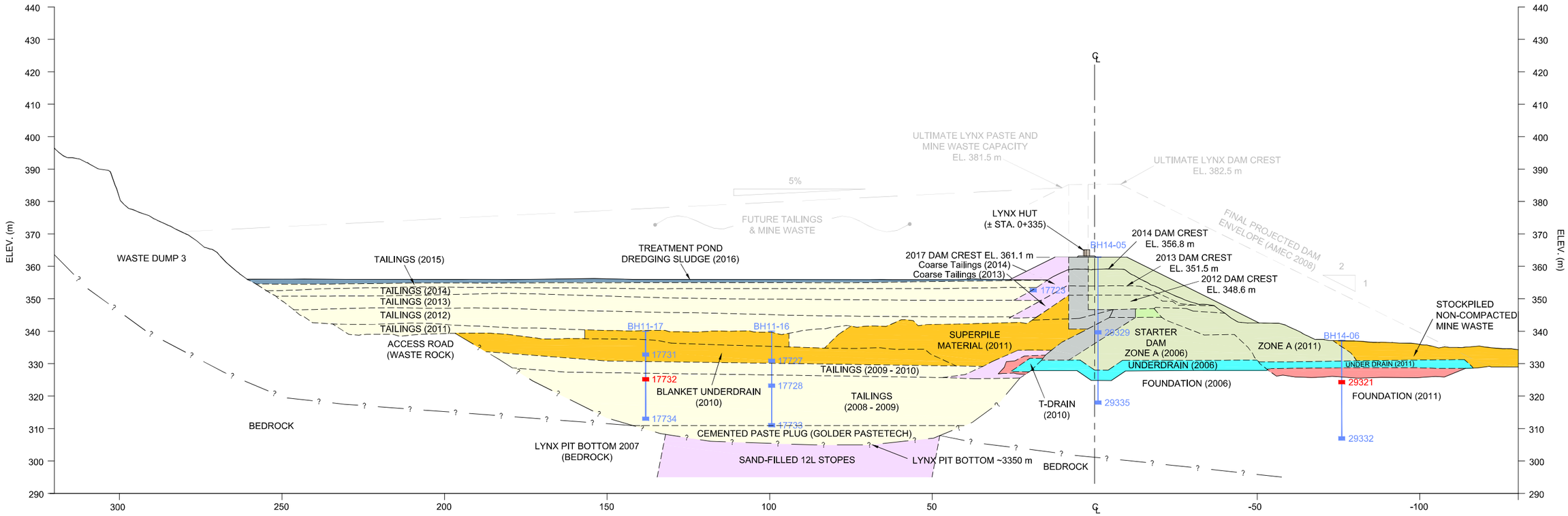
DATUM:	MINE
PROJECTION:	MINE
DRAWN BY:	YC
REVIEWED BY:	D. H.G
SCALE:	1:1250

PROJECT: MYRA FALLS TAILINGS STORAGE FACILITIES
2017 DAM SAFETY INSPECTION

TITLE: LYNX TAILINGS DISPOSAL FACILITY
INSTRUMENT PLANE D
(STA. 1+85)

PROJECT NO.:	NX14001B
REVISION NO.	A
DATE:	MARCH 2017
DRAWING NO.:	010711
SHEET NO.:	11 of 14

P:\CAD\CIV\DWG DSI REPORT\010711.dwg – 711 – Mar. 29, 2018 12:59pm – yuan.chen



LEGEND:

- Compacted Rockfill (Zone A)
- Compacted Rockfill and Fines (Zone J)
- Uncompacted Rockfill and Tailings (Nominally Zone J)
- Treatment Pond Dredging Sludge
- Fine Tailings (Paste or Thickener Underflow)
- Permeable Rockfill (Zone C1-C4)
- Coarse Tailings (Cyclone Underflow)
- 17724 Vibrating Wire Piezometers
- 17732 Vibrating Wire Piezometers (NOT FUNCTIONAL)

SECTION E 709 INSTRUMENT PLANE E (SCHEMATIC CROSS SECTION)
STA. 3+40

0m 10 20 30 40 50
1 : 1250

NOTES:
1. 2006 TO 2011 SURVEYS MODIFIED FROM NVI MINING LTD. MYRA FALLS OPERATIONS "LYNX PIT TAILINGS FACILITY", SECTION 3 - APPROX. STA. 3+73, DATED 15 MARCH 2012.
2. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH AMEC FOSTER WHEELER ENVIRONMENT & INFRASTRUCTURE REPORT NO. NX14001B "MYRA FALLS TAILINGS STORAGE FACILITIES 2017 DAM SAFETY INSPECTION REPORT", DATED MARCH 2018.
3. SURVEY SURFACE TOPOGRAPHY SUPPLIED BY CLIENT.
4. THIS SURVEY IS REFERENCED TO MINE DATUM (MASL + 3047.5 m) AND CONVERTED TO GEODETIC ELEVATION.

REV	D	M	Y	ISSUE / REVISION DESCRIPTION	ENG.	APPR.
A	31	03	2018	ISSUED FOR DOCUMENTATION	AER	DHG

amec foster wheeler
Environment & Infrastructure

Client: nyrstar

Amec Foster Wheeler
Environment & Infrastructure
4385 Boban Drive, Nanaimo, B.C., V9T 5V9
Tel. 250 758-1887 Fax 250 758-1899

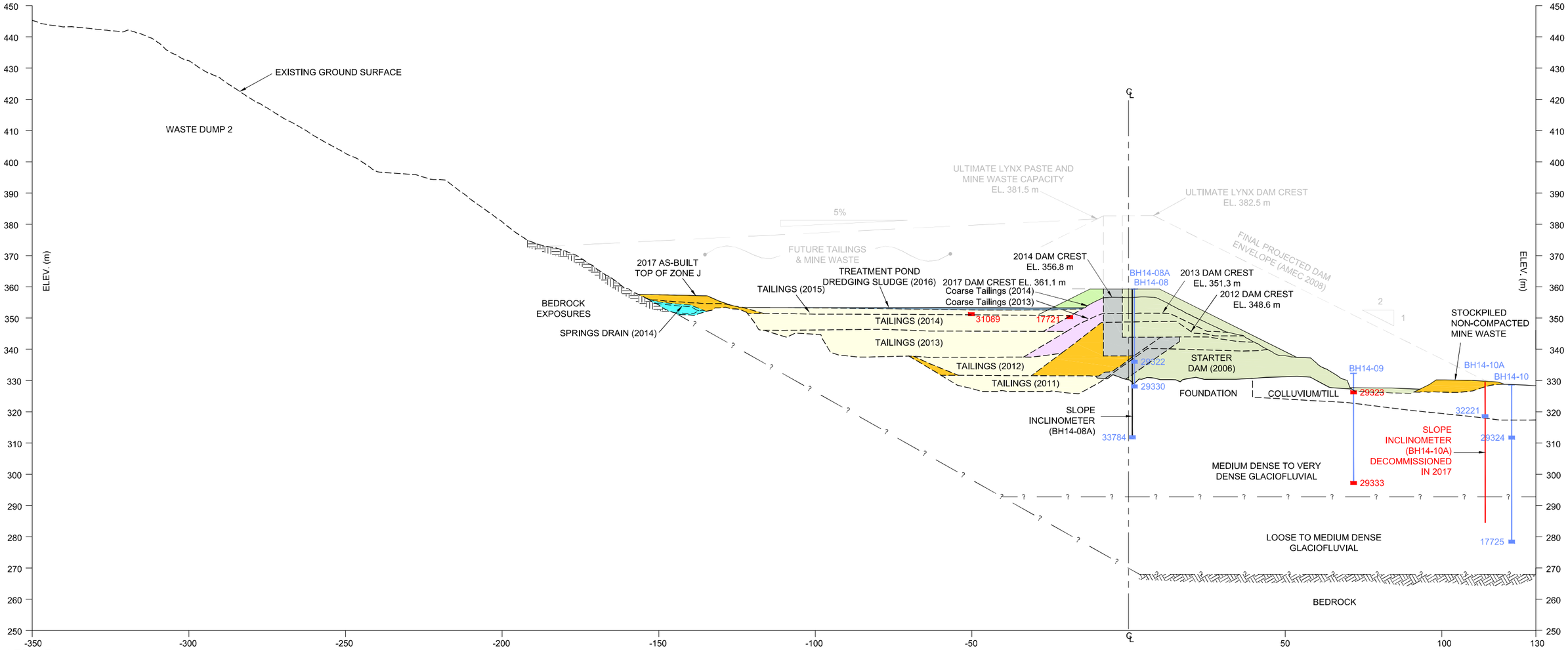
DATUM: MINE
PROJECTION: MINE
DRAWN BY: YC
REVIEWED BY: D.H.G
SCALE: 1:1250

PROJECT: MYRA FALLS TAILINGS STORAGE FACILITIES
2017 DAM SAFETY INSPECTION

TITLE: LYNX TAILINGS DISPOSAL FACILITY
INSTRUMENT PLANE E
(STA. 3+40)

PROJECT NO.: NX14001B
REVISION NO.: A
DATE: MARCH 2017
DRAWING NO.: 010712
SHEET NO.: 12 of 14

P:\CAD\CIV\DWG DSI REPORT\010712.dwg – 712 – Mar. 29, 2018 1:00pm – yuan.chen



LEGEND:

- Compacted Rockfill (Zone A)
- Compacted Rockfill and Fines (Zone J)
- Uncompacted Rockfill and Tailings (Nominally Zone J)
- Treatment Pond Dredging Sludge
- Fine Tailings (Paste or Thickener Underflow)
- Coarse Tailings (Cyclone Underflow)
- Permeable Rockfill (Zone C1-C4)
- 17724 Vibrating Wire Piezometers
- Slope Inclinometers
- 17724 Vibrating Wire Piezometers (NOT FUNCTIONAL)

0m 10 20 30 40 50

1 : 1250

NOTES:
1. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH AMEC FOSTER WHEELER ENVIRONMENT & INFRASTRUCTURE REPORT NO. NX14001B "MYRA FALLS TAILINGS STORAGE FACILITIES 2017 DAM SAFETY INSPECTION REPORT", DATED MARCH 2018.
2. SURVEY SURFACE TOPOGRAPHY SUPPLIED BY CLIENT.
3. THIS SURVEY IS REFERENCED TO MINE DATUM (MASL + 3047.5 m) AND CONVERTED TO GEODETIC ELEVATION.

REV	D	M	Y	ISSUE / REVISION DESCRIPTION	ENG.	APPR.
A	31	03	2018	ISSUED FOR DOCUMENTATION	AER	DHG

amec foster wheeler
Environment & Infrastructure

Client: nyrstar

Amec Foster Wheeler
Environment & Infrastructure
4385 Boban Drive, Nanaimo, B.C., V9T 5V9
Tel. 250 758-1887 Fax 250 758-1899

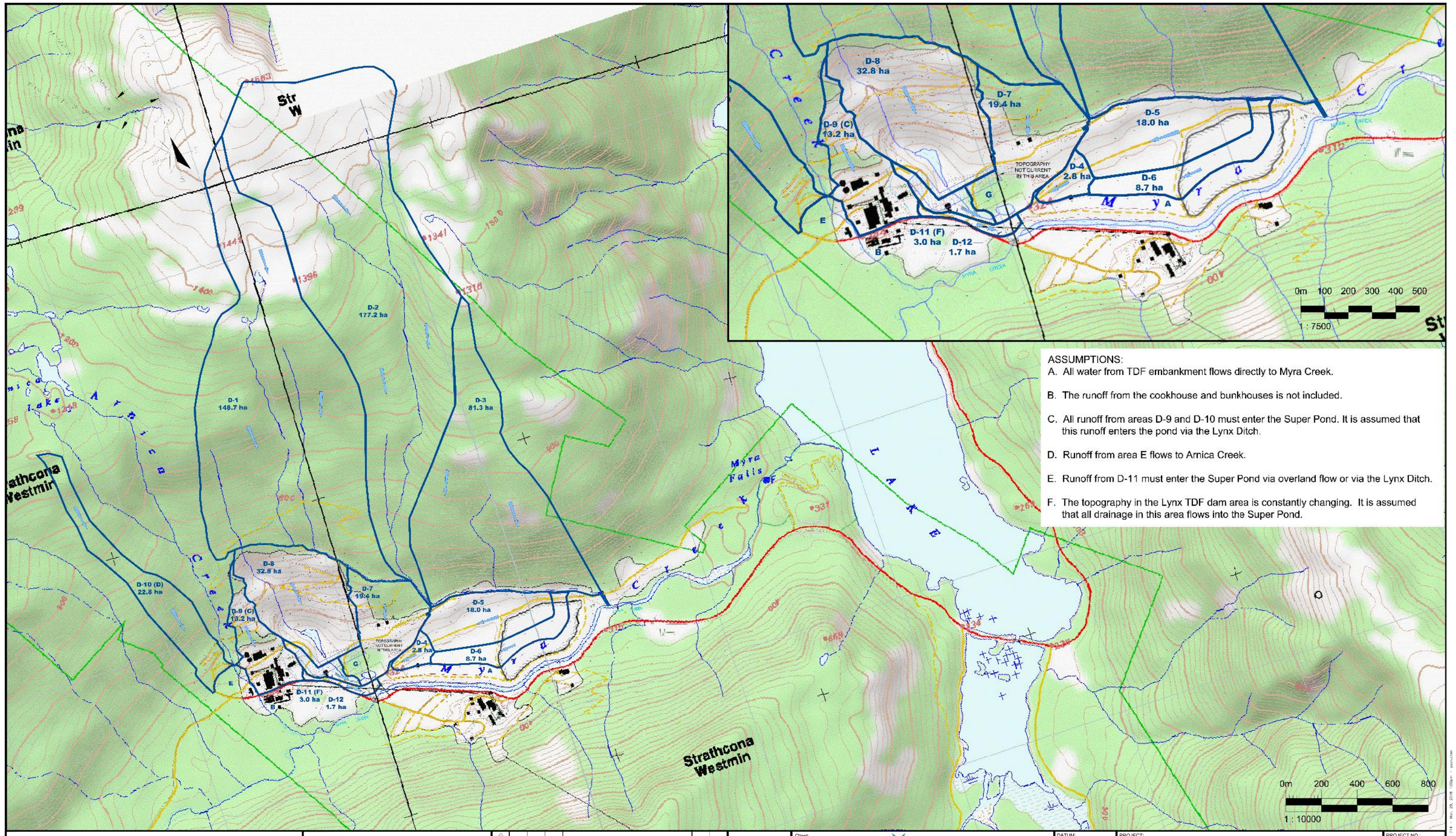
DATUM: MINE
PROJECTION: MINE
DRAWN BY: YC
REVIEWED BY: D.H.G.
SCALE: 1:1250

PROJECT: MYRA FALLS TAILINGS STORAGE FACILITIES
2017 DAM SAFETY INSPECTION

TITLE: LYNX TAILINGS DISPOSAL FACILITY
INSTRUMENT PLANE F
(STA. 4+57)

PROJECT NO.: NX14001B
REVISION NO.: A
DATE: MARCH 2017
DRAWING NO.: 010713
SHEET NO.: 13 of 14

P:\CAD\CIV\DWG DSI REPORT\010713.dwg — 713 — Mar. 29, 2018 1:00pm — yuan.chen



ASSUMPTIONS:

A. All water from TDF embankment flows directly to Myra Creek.

B. The runoff from the cookhouse and bunkhouses is not included.

C. All runoff from areas D-9 and D-10 must enter the Super Pond. It is assumed that this runoff enters the pond via the Lynx Ditch.

D. Runoff from area E flows to Arnica Creek.

E. Runoff from D-11 must enter the Super Pond via overland flow or via the Lynx Ditch.

F. The topography in the Lynx TDF dam area is constantly changing. It is assumed that all drainage in this area flows into the Super Pond.

NOTES:
1. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH AMEC FOSTER WHEELER ENVIRONMENT & INFRASTRUCTURE REPORT NO. NX14001B "MYRA FALLS TAILINGS STORAGE FACILITIES 2017 DAM SAFETY INSPECTION REPORT", DATED MARCH 2018.
2. SURFACE TOPOGRAPHY BASED ON 2006 SURVEY DATA.
3. THIS SURVEY IS REFERENCED TO MINE DATUM (MASL + 3047.5 m).
4. THE IMAGE PROVIDES CONTOUR INFORMATION OUTSIDE OF THE SURVEY DATA. THIS INFORMATION IS ON MASL DATUM. THE IMAGE WAS OBTAINED FROM SPECTRUM DIGITAL IMAGING LTD.

LEGEND

DRAINAGE BOUNDARY

FLOW DIRECTION

D-4 2.8 ha — DRAINAGE AREA ID / DRAINAGE AREA (in Hectares)

REV	D	M	Y	ISSUE / REVISION DESCRIPTION	ENG.	APPR.
G						
F						
E						
D						
C						
B						
A	31	03	2018	ISSUED FOR DOCUMENTATION	AER	DHG

amec foster wheeler
Environment & Infrastructure

Client: nyrstar

Amec Foster Wheeler
Environment & Infrastructure
4385 Boban Drive, Nanaimo, B.C., V9T 6V9
Tel. 250 758-1887 Fax 250 758-1899

DATUM:	MINE
PROJECTION:	MINE
DRAWN BY:	YC
REVIEWED BY:	D,H,G
SCALE:	AS SHOWN

PROJECT: MYRA FALLS TAILINGS STORAGE FACILITIES 2017 DAM SAFETY INSPECTION

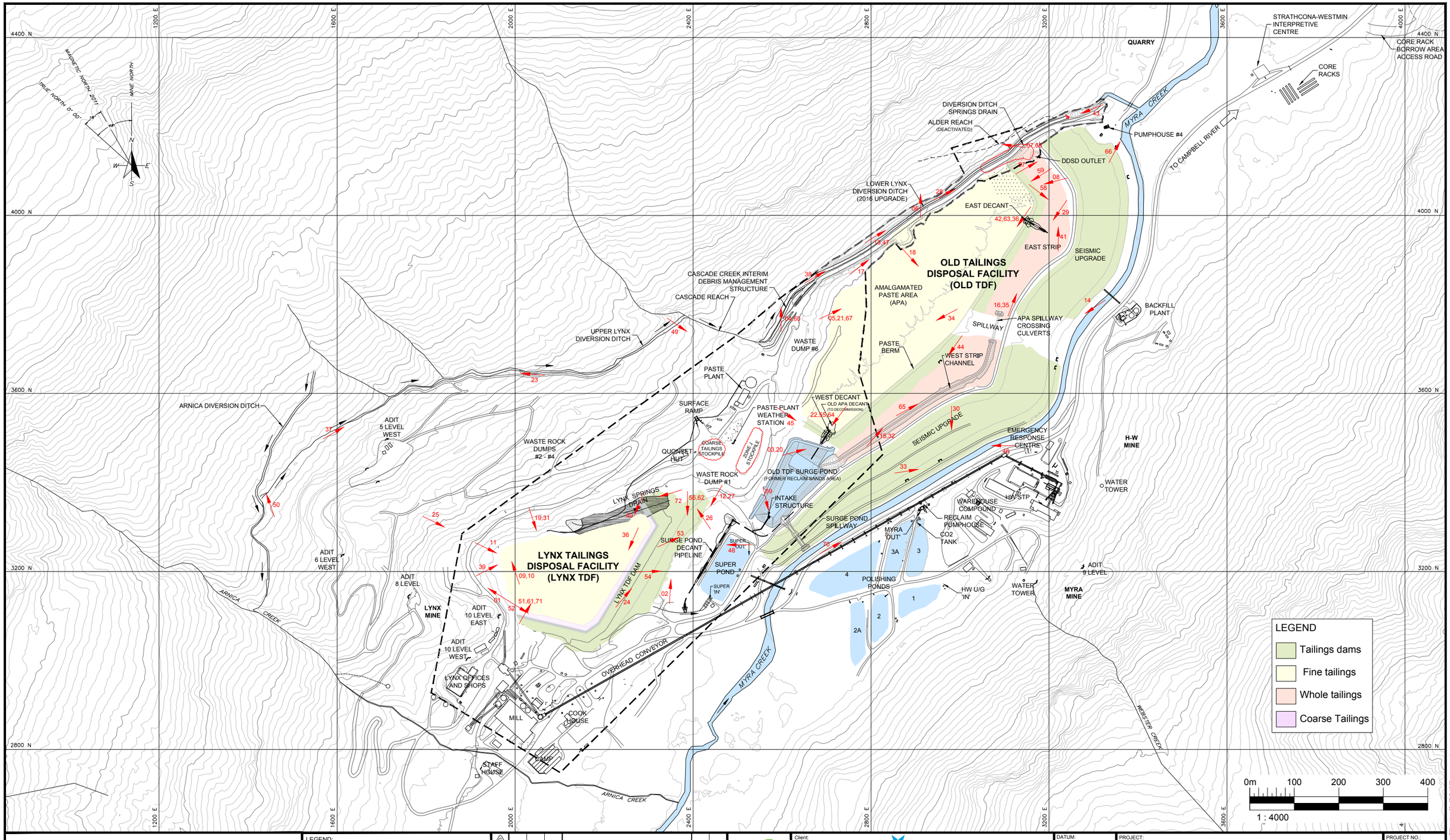
TITLE: DRAWING AREA MAP

PROJECT NO.:	NX14001B
REVISION NO.	A
DATE:	MARCH 2018
DRAWING NO.:	010714
SHEET NO.:	14 of 14

P:\CAD\CIVIL\NX14001B DSI REPORT\010714.dwg - 714 - Mar 29, 2018 1:00pm - yacoucher

Appendix A

Selected Photographs



NOTES:
1. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH AMEC FOSTER WHEELER ENVIRONMENT & INFRASTRUCTURE REPORT NO. NX14001B "MYRA FALLS TAILINGS STORAGE FACILITIES 2017 DAM SAFETY INSPECTION REPORT", DATED MARCH 2018.
2. SURVEY SURFACE TOPOGRAPHY SUPPLIED BY CLIENT. REFERS TO JUNE 2015 LIDAR SURVEY OUTSIDE THE DASHED LINE AND A COMBINATION OF 2015/2016 AS-BUILT SURVEYS INSIDE THE DASHED LINE.
3. THIS SURVEY IS REFERENCED TO MINE DATUM (MASL + 3047.5 m)
4. CONTOUR INTERVAL: 10 m

LEGEND:
42 PHOTOGRAPH NUMBER AND DIRECTION

REV	D	M	Y	ISSUE / REVISION DESCRIPTION	ENG.	APPR.
A	31	03	2018	ISSUED FOR DOCUMENTATION	AER	DHG

amec foster wheeler
Environment & Infrastructure

Client: nyrstar

Amec Foster Wheeler
Environment & Infrastructure
4385 Boban Drive, Nanaimo, B.C., V9T 5V9
Tel. 250 758-1887 Fax 250 758-1899

DATUM:	MINE
PROJECTION:	MINE
DRAWN BY:	YC
REVIEWED BY:	DHG
ORIGINAL SCALE:	1:8000

PROJECT: MYRA FALLS TAILINGS STORAGE FACILITIES 2017 DAM SAFETY INSPECTION

TITLE: APPENDIX A PHOTOGRAPH LOCATION PLAN

PROJECT NO.:	NX14001B
REVISION NO.	A
DATE:	MARCH 2018
DRAWING NO.:	010715
SHEET NO.:	1 of 1

P:\CAD\DWG\010715.dwg - 715 - Mar 29, 2018 - 12:22pm - yyan.chan



Photo 1: Waste Dump 3 slopes above the north end of Lynx TDF (20 January 2017)



Photo 2: Downstream slope of south arm of Lynx Dam (20 January 2017)



Photo 3: East end of Surge Pond (20 January 2017)



Photo 4: Lower Lynx Diversion Ditch debris catchment net (20 January 2017)



Photo 5: Snow covering surface of Old TDF APA (20 January 2017)



Photo 6: Surface water flowing into Lower Lynx Diversion Ditch near deactivated Alder Reach (20 January 2017).



Photo 7: Log damage to concrete cloth in Lower Lynx Diversion Ditch near Alder Reach (20 January 2017)



Photo 8: Sand boils observed in east portion of East Strip, Old TDF (20 January 2017)



Photo 9: Groundwater discharge from north slopes above Lynx TDF, close up of yellow box shown on Photo 10 (16 February 2017)

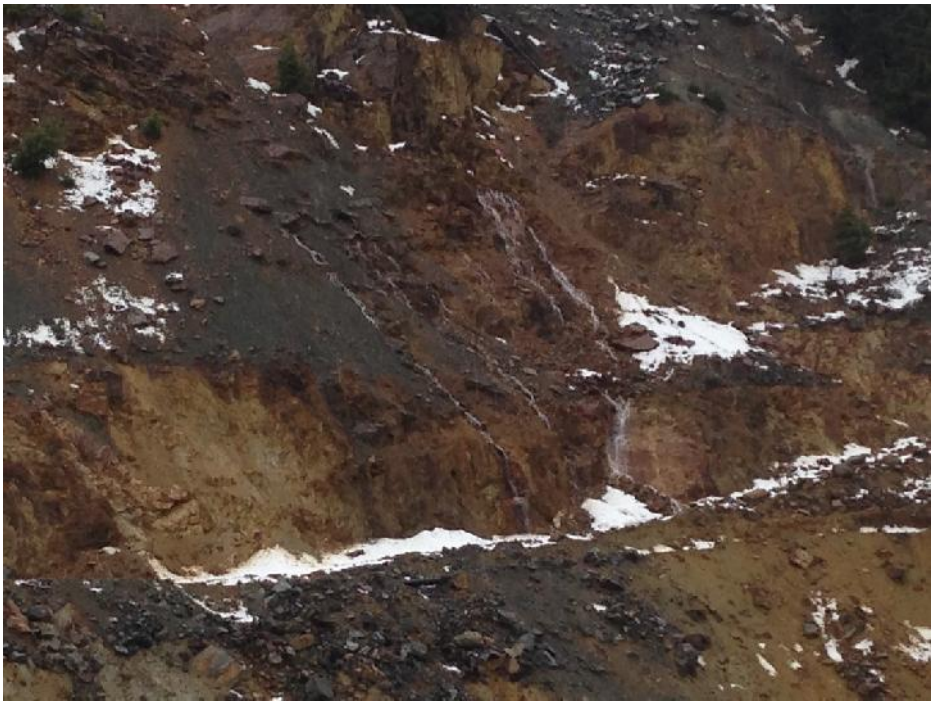


Photo 10: Close up of groundwater discharge from north slopes above Lynx TDF (16 February 2017)



Photo 11: Lynx TDF (20 February 2017)



Photo 12: Southeast corner of Lynx Dam downstream slopes (20 February 2017)



Photo 13: Surface water on slopes above Lower Lynx Diversion Ditch (20 February 2017)



Photo 14: Old TDF seismic upgrade berm slopes and operations spillway (20 February 2017)



Photo 15: Water ponded in West Channel of Old TDF (21 March 2017)



Photo 16: Water ponded in East Strip of Old TDF (21 March 2017)



Photo 17: Damaged concrete cloth of Lower Lynx Diversion Ditch (21 March 2017)



Photo 18: Erosion gullies in surface of Old TDF APA (21 March 2017)



Photo 19: Surface of Lynx TDF (21 March 2017)



Photo 20: East portion of Surge Pond (20 April 2017)



Photo 21: Old TDF APA as viewed from Waste Dump 6 (20 April 2017)



Photo 22: Water flowing into west decant intake structure of Old TDF APA (20 April 2017)



Photo 23: Tree fallen across Upper Lynx Diversion Ditch (20 April 2017)



Photo 24: Water ponding in area between toe of Lynx Dam south arm and Super Pond (20 April 2107)



Photo 25: Surface of Lynx TDF (18 May 2017)



Photo 26: Groundwater discharge from toe of Lynx Dam near Panel 15 (18 May 2017)



Photo 27: Downstream slopes of south arm of Lynx Dam (18 May 2017)



Photo 28: Lower Lynx Diversion Ditch, wood debris caught on concrete cloth screw (18 May 2017)



Photo 29: East Strip, dry (18 May 2017)



Photo 30: Water ponded on surface of Old TDF Seismic Upgrade Berm (18 May 2017)



Photo 31: Surface of Lynx TDF (20 June 2017)



Photo 32: West Channel (20 June 2017)



Photo 33: Gully created by runoff erosion at the crest of Old TDF Seismic Upgrade Berm (9 July 2017)



Photo 34: Dry tailing surface of Old TDF APA (15 July 2017)



Photo 35: Dry Old TDF East Strip (15 July 2017)



Photo 36: Upstream crest of Lynx Dam (15 July 2017)



Photo 37: Upper Lynx Diversion Ditch (20 July 2017)



Photo 38: Top of Lower Lynx Diversion Ditch (23 July 2017)



Photo 39: Surface of Lynx TDF (23 July 2017)



Photo 40: Pump on surface of Lynx TDF (30 July 2017)



Photo 41: Dry Old TDF East Strip (17 August 2017)



Photo 42: East Decant and tailings smear on upstream side of Old TDF APA berm (17 August 2017)



Photo 43: Unbonded shotcrete and bedrock, bottom of Lower Lynx Diversion Ditch (17 August 2017)



Photo 44: Downstream side of APA berm, Old TDF (27 September 2017)



Photo 45: West arm of APA berm, Old TDF (27 September 2017)



Photo 46: Drilling investigation borehole in Old TDF Seismic Upgrade Berm (27 September 2017)



Photo 47: Low flow in Lower Lynx Diversion Ditch (27 September 2017)



Photo 48: South arm of Lynx Dam (27 September 2017)



Photo 49: Cascade Reach between Upper and Lower Lynx Diversion Ditch (17 October 2017)



Photo 50: Arnica Diversion (17 October 2017)



Photo 51: Water pooled on the surface of Lynx TDF (17 October 2017)



Photo 52: Water ponded in panel excavation west arm of Lynx Dam (17 October 2017)



Photo 53: Water ponded at southwest toe of Lynx Dam (17 October 2017)



Photo 54: Superpond (17 October 2017)



Photo 55: Water ponded in old decant structure, West APA, Old TDF (17 October 2017)



Photo 56: Water ponded at toe of Lynx dam between south arm and Superpond (19 November 2017)



Photo 57: Water flowing from Diversion Ditch Spring Drain into East Strip (19 November 2017)



Photo 58: Water in East Strip (19 November 2017)



Photo 59: Water flowing from swale extending from seepage pad, toe of east APA stability berm, Old TDF (19 November 2017)



Photo 60: Debris in Lower Lynx Diversion Ditch debris catchment net (28 November 2017)



Photo 61: Water ponded on surface of Lynx TDF (28 November 2017)



Photo 62: Water ponded at toe of Lynx Dam (28 November 2017)



Photo 63: Water ponded on surface of APA, Old TDF (28 November 2017)



Photo 64: Water flowing into west decant structure Old TDF APA (28 November 2017)



Photo 65: Boulders and debris in West Strip Channel, Old TDF (28 November 2017)



Photo 66: Water flowing over surface of Old TDF seismic upgrade berm (28 November 2017)



Photo 67: Erosion gullies on surface of APA, Old TDF (28 November 2017)



Photo 68: Patch of Lower Lynx Diversion Ditch concrete cloth where log had caused damaged (28 November 2017)



Photo 69: Surge Pond decant structure (20 December 2017)



Photo 70: Myra Creek near Surge Pond operations spillway (20 December 2017)



Photo 71: Frozen surface of Lynx TDF (20 December 2017)



Photo 72: Outlet and sump of Lynx Springs Drain (20 December 2017)

Appendix B

Instrumentation Monitoring

Appendix B1

Quarterly Monitoring Data Update Reports
(included on digital copy)

Memo

Date: March 30, 2018

To: Nicole Pesonen

From: Frederic Besozzi

CC: Christine Peters, Dan Hughes-Games, [redacted]

Ref: NX14001B.2017

Re: **Nyrstar Myra Falls Tailings Management Facilities**
Q1-2017 Dam Safety Monitoring Data Update

1.0 BACKGROUND

Amec Foster Wheeler Environment & Infrastructure (Amec Foster Wheeler) has been retained by Nyrstar Myra Falls (NMF) to receive, process and review the monitoring data from the Myra Falls mine tailings management facilities on a quarterly basis as part of the dam operation and surveillance program. This memorandum includes a brief review of the monitoring data collected throughout the first quarter of 2017 (Q1-2017), which included:

- Rainfall and temperature records, and
- Vibrating wire piezometer (VWP) readings.

The updated monitoring data is presented in a series of figures and tables included in Attachments A through C.

Provision of background information is not the purpose of this memorandum. The reader is referred to the annual Dam Safety Inspection (DSI) reports, annual construction reviews, OMS manual and design reports for further details on the facility design, development and operation.

2.0 DATA RECEIVED AND REVIEWED

A summary of data received and collated is provided in Table 1, together with information on the source, format, reading frequency, time range and gaps, if any.

Amec Foster Wheeler Environment & Infrastructure,
a Division of Amec Foster Wheeler Americas Limited
4385 Boban Drive
Nanaimo, BC, V9T 5V9
Tel: 250-758-1887
amecfw.com

Table 1 – Monitoring Data Source and Status

Monitoring Data Type	Source (Acquisition Mode)	Format Received	Reading Frequency	Responsible	Remarks
Weather data for Paste Plant	Automated readings	Raw data logger download (Excel)	Daily, hourly	NMF	Missing data from 01 January to 25 January 2017
VWP readings for Lynx TDF	Automated readings	Raw data logger download (Excel)	4 times a day	NMF	
VWP readings for Old TDF (old VWP)	Automated readings, Huts A, B, and C	Raw data logger download (Excel)	Daily	NMF	67 days missing for Hut A 23 days missing in January for Hut B (logger returned NAN values for the remaining 8 days except for P-6) 28 days missing for Hut C
New VWP at the Old TDF	Automated readings	Raw data logger download (Excel)	4 times a day	NMF	
Deformation monuments for both Lynx and Old TDF	Land survey, total station	Excel	Every two months	NMF	Not surveyed due to snow cover
Tailings surface (Lynx TDF)	Land survey, GPS and total station reflectorless	LandXML surface	Quarterly	NMF	Not surveyed due to snow cover
Lynx TDF deposition data	Mill data, underground and surface backfill data	Excel file	Monthly	NMF	
Slope Inclinometer	Slope inclinometer device	RPP file, Excel file	Bi-annually	Amec Foster Wheeler Site Engineer	Profile survey not scheduled for Q1

3.0 WEATHER DATA

Weather data for the mine site is collected from the Paste Plant station. The Paste Plant station automatically collects hourly rainfall, snow pack, relative humidity, temperature, and wind data. Precipitation data was collected from the Powerhouse station up to 2015 and has since been used only periodically to record weather data at the mine site. Snowfall is calculated as the daily difference in average snow pack, which is converted in water equivalent (10 mm of snow equals 1 mm of rain) to calculate total daily precipitation.

Monthly average and extreme temperature values are presented in Attachment A. Monthly precipitation records and statistics since 1979 as well as daily rainfall records during Q1-2017 are also included in Attachment A.

Monthly precipitation totals compared to historical mean values in February and were higher than normal in March. The monthly total for January could not be compared to historical values due to a significant data gap.

Monthly maximum and minimum temperatures were within the range of maximum and minimum values for the previous period of record (2006 through 2016).

4.0 PIEZOMETERS

The Q1-2017 monitoring data update includes the automated monitoring of pore water pressure data from the vibrating wire piezometers at the Old TDF and Lynx TDF. The locations of these instruments are shown on Drawings 010703, 010704, and 010709 in the 2016 DSI report (Amec Foster Wheeler, 2017a)[1]. Cross-sections of the Old TDF and Lynx TDF along the major instrumentation planes are provided on Drawings 010705 through 010707 and 010711 through 010713 of the DSI report.

4.1 Lynx TDF

Lynx TDF piezometer network comprises:

- VWPs at various depth within the paste tailings of Lynx TDF,
- VWPs in Lynx Dam fill, and
- VWPs in the shallow and deep foundation soils within Lynx Dam ultimate footprint.

4.1.1 Piezometer Results

Weekly maximum piezometer levels for Lynx TDF are presented in Tables 1 and 2 and daily records are shown on Figures 1 through 5 of Attachment B. Piezometer levels are reported in

[1] Amec Foster Wheeler Environment & Infrastructure (2017a). Myra Falls Tailings Storage Facilities 2016 Dam Safety Inspection Report. File No. NX14001B, Nanaimo, 31 March 2017.

geodetic elevations but pressure heads (in metres of water) are plotted for few locations (see Figure 3b and 5) where VWP are recording, or have been recording, negative (suction) pressures.

Analysis of the processed data for Lynx TDF piezometers collected during Q1-2017 revealed a similar trend from the same period in 2016 but ending the quarter with slightly higher piezometer levels than for the previous year. The deep foundation piezometers located in permeable sand and gravel formations typically exhibit a clear response to rainfall patterns. Phreatic levels peaked twice followed by a rapid drop during the period; once during the third week of January and once during the third week of February. The second peak occurred after three consecutive days with high rainfall (over 140 mm of rain from February 14 to 16). Rainfall records were not are available for the first peak but a similar scenario is likely as high precipitation levels were recorded in Tofino and Port Alberni between January 16 and 17.

During the third week of January, new peak VWP levels were reached within the paste tailings upstream of Lynx Dam south arm (354.11 m geodetic at VW31089). VWP levels remained high throughout Q1-2017, which reflect the generally high pond water levels in Lynx TDF during this period.

During the second half of March, groundwater levels increased dramatically south of Lynx Dam toe at location VW32221 (Plane F). The Lynx foundation panels area was mostly drained during March 21 inspection but ponded water observed in the area during January 20 and February 20 inspections. A similar trend was observed at the same location in November 2016. In both instances, piezometer levels for the other VWP located within the shallow foundation soils did not exhibit such response and remained stable. Since the 2015 foundation preparation works, flooding in the panels area may contribute to recharge the shallow, perched aquifer postulated by Robertson GeoConsultants Ltd.

4.2 Old TDF

The Old TDF piezometer network comprises:

- VWPs under the outer embankment berm and in the upper tailings beach along instrumentation planes A and C (data collected in Hut A and Hut C),
- VWPs located below the base of the Paste Berm (data collected in Hut B),
- VWPs in the APA Paste Berm fill, foundation tailings and soils, divided between instrumentation Planes 1 through 6,
- VWPs in the paste tailings, in the southeast corner of the Amalgamated Paste Area (APA), and
- VWPs at the base, southeast slope toe and east slope crest of the Old TDF Surge Pond.

4.2.1 Piezometer Results

Weekly maximum piezometer levels for the Old TDF instrument planes are presented in Tables 1 through 3 and Figures 1 through 14 of Attachment C. The piezometer levels are reported in pressure heads (in metres of water) and compared to the revised VWP thresholds. The VWP thresholds have been revised to formulate a new rationale for threshold conditions based on estimated reductions in effective stress at each piezometer. The thresholds were developed based on the long-term static and post seismic stability models which include the closure cover over the facility (Amec Foster Wheeler, 2017b)[2].

The following threshold exceedances were noted:

Instrument Plane A/Plane 2:

- A-2E and A-4E exceeded trigger points S3 and P1 throughout the quarter (these two VWPs are located in the foundation soils beneath the Old TDF, recorded pressure heads ranged from 4 to 6 m indicating phreatic levels close to the base of tailings, i.e. approximately 310 m elevation)
- A-26E and A-28E exceeded trigger points S2 and P1 throughout the quarter
- A-18E and VW32220 exceeded trigger point S1 on most weeks
- P-11 exceeded trigger points S1 and P1 on most weeks.

Instrument Plane C/Plane 5:

- C-29E exceeded trigger points S3 and P1 throughout the quarter
- VW32224 exceeded trigger points S2 and P1 on most weeks
- C-17E, VW32238, all of the Upper Tailings Beach VWPs, and VW17730 exceeded trigger points S1 and P1 on most weeks
- VW32241, and Paste Berm VW32222, VW17724 and VW17722 exceeded trigger points S1 approximately 40% of the time.

Although several threshold exceedances were noted during Q1-2017, pore pressures were in general slightly lower than during the same period over the past two years. Pore pressures were back to normal wet season values compared to maximum levels experienced during in October and November 2016.

The VWPs that are the most responsive to rainfall peaked twice during the quarter such as discussed above for the deep foundation VWPs at Lynx TDF. These VWPs include VW32241

[2] Amec Foster Wheeler Environment & Infrastructure (2017b). Old Tailings Facility Vibrating Wire Piezometer Threshold Update. Technical Letter, File No. NX14001B, Nanaimo, 17 March 2017.

located along Plane 5 near the base of tailings, VW17730 and VW32222 both located on Plane 5 but in the tailings beneath the Paste Berm and all of Plane 6 VWPs.

The following malfunctioning sensors were eliminated from the monitoring program: VW32228 on Plane 1, VW32240 on Plane 2, and VW32227 along Plane 5.

VW32231 on Plane 2 as well as VW36971 and VW36973 on Plane 1 were disconnected during construction in July 2016. The plan is to reconnect them later this year. VW21715 on Plane 3 is not connected to a data logger and has not manually been collected since March 2016.

5.0 DEFORMATION MONUMENTS

Snow cover precluded survey of the monument network during Q1-2017. The most recent readings are those of September 2016 and were presented in the Q3-2016 quarterly report.

6.0 SLOPE INCLINOMETERS

Slope inclinometer surveys were not carried out during Q1-2017. The next readings are planned for Q2-2017.

7.0 TAILINGS PRODUCTION AND STORAGE

NMF suspended its mining and milling operations in June 2015 for an indefinite period of time. Tailings production has not taken place since that time.

Dredge material from the Superpond was deposited in Lynx TDF during Q1-2017. Paste surveys of the surface of Lynx TDF were not carried out during Q1-2017 because of snow cover.

8.0 CLOSURE

This memorandum has been prepared for the exclusive use of Nyrstar Myra Falls for specific application to the area within this memorandum. Any use which a third party makes of this memorandum, 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 memorandum. It has been prepared in accordance with generally accepted geotechnical and tailings dam engineering practices. No other warranty, express or implied, is made.

Attachment A

Weather Data

Table\Figure Number	Title
Table 1	Monthly Precipitation Data by Year
Table 2	2017 Monthly Temperatures (˚C)
Figure 1	Monthly Precipitation at Myra Falls
Figure 2	Daily Rainfall at the Paste Plant Weather Station

amec foster wheeler

Table 1: Monthly Precipitation Data by Year

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual Total	
YEAR	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	Actual	Inferred
*1979						71	125	47	384	343	187	620		(2909)
1980	270	296	90	241	52	87	70	37	181	180	497	706	2706	
1981	346	428	118	278	114	125	78	63	310	450	466	412	3189	
1982	299	505	110	193	22	27	19	35	89	779	213	493	2783	
1983	530	624	375	84	42	130	95	60	60	218	619	193	3028	
*1984	399	520		263	193	32	9	40	95	576	340	220		(2944)
*1985	64	175	148	114	85	21	32	21	77					(1886)
*1986			418	88	239	89	41	4	54	590		390		(2982)
*1987		337	425	263	223	184	59	18	98	84	592	437		(3070)
1988	343	203	212	215	215	80	25	29	114	246	582	201	2467	
1989	329	102	224	198	63	72	42	42	18	339	250	253	1931	
1990	372	283	123	59	82	130	31	70	19	565	806	344	2883	
1991	353	543	86	126	80	28	33	207	8	60	596	610	2730	
1992	860	305	45	244	6	41	11	36	90	390	257	241	2527	
1993	57	55	289	207	148	64	77	92	1	180	141	393	1705	
*1994	258		203	149	79	137	6	47	74	219	380	499		(2321)
*1995	- no data -													
*1996	- no data -													
*1997		64	259	217	124	183	72	114	0	442	348	374		(2547)
1998	571	419	159	21	37	14	67	3	3	130	473	279	2175	
1999	219	295	174	96	50	16	1	114	55	138	667	183	2007	
2000	50	218	99	76	132	50	124	52	62	325	168	125	1479	
2001	333	123	144	107	132	38	38	163	67	200	519	367	2233	
2002	195	134	56	93	41	23	28	27	51	34	588	288	1557	
2003	471	61	412	177	50	51	44	30	45	558	94	348	2341	
2004	327	134	160	40	24	42	23	74	157	218	489	340	2026	
2005	433	70	223	396	306	58	100	54	98	515	268	522	3043	
2006	616	316	379	125	76	46	28	5	77	139	811	561	3176	
2007	538	288	438	208	75	129	71	69	167	410	491	416	3300	
2008	250	176	188	59	80	29	8	162	22	260	458	163	1854	
2009	140	139	291	91	171	44	35	17	165	321	882	258	2553	
2010	666	353	381	223	171	60	2	19	269	478	285	629	3535	
2011	284	327	528	166	80	12	82	42	340	295	478	200	2834	
2012	601	241	424	199	55	86	10	14	16	317	525	264	2752	
2013	96	267	168	112	125	66	3	125	277	57	227	100	1622	
2014	170	243	341	170	48	32	32	17	144	589	404	548	2740	
2015	259	332	460	105	35	15	20	149	217	262	248	700	2802	
*2016	**469**	**374**	**507**	**81**	**17**	**63**	**31**	**61**	**87**	**501**	**935**			(3499)
*2017		**240**	**377**											(2650)
Num.	32	34	35	35	35	36	36	36	36	35	34	34	**28**	(37)
Avg.	349	270	258	157	99	66	44	60	111	326	449	373	**2499**	(2562)
St. Dev.	191	146	142	82	72	46	34	50	100	184	216	168	**565**	(552)
Max.	860	624	528	396	306	184	125	207	384	779	935	706	**3535**	(3535)
Min.	50	55	45	21	6	12	1	3	0	34	94	100	**1479**	(1479)

Notes: Compiled from daily observations recorded at the powerhouse weather station (Environment Canada) prior to 2015 and from the Paste Plant from 2015 onwards

Lime shading - dry (value < monthly mean - standard deviation)

Aqua shading - wet (value > monthly mean + standard deviation)

Peach shading - Precipitation data taken from the Paste Plant weather station.

* = years with incomplete data sets

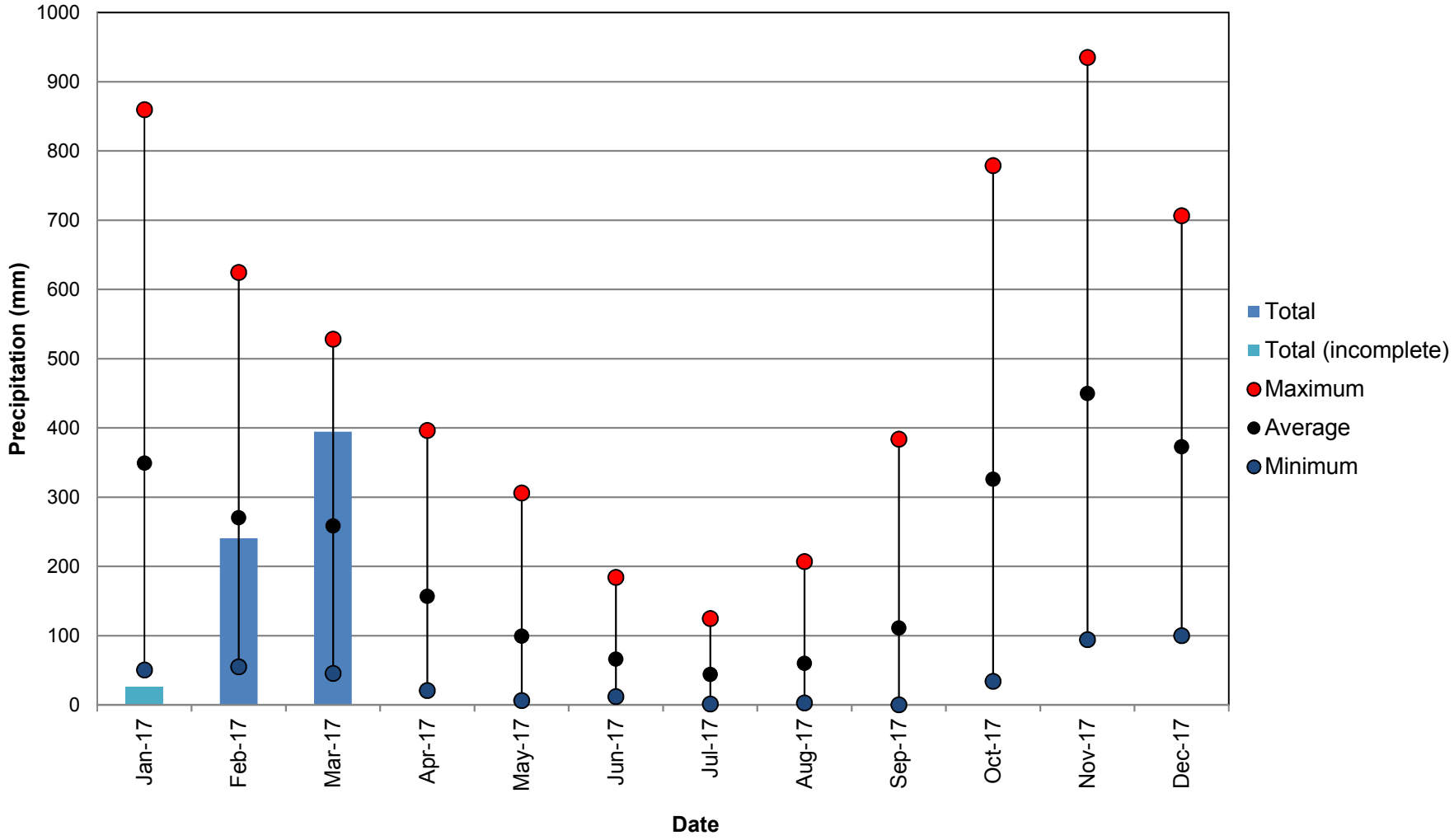
Table 2: 2017 Monthly Temperatures (˚C)

Month	Previous Period of Record[1]		2017[2]	
	Minimum	Maximum	Minimum	Maximum
January	-12.0	11.9	-5.3	8.7
February	-12.0	12.5	-7.2	11.8
March	-8.3	19.0	-7.4	13.9
April	-4.0	23.1		
May	-1.5	31.0		
June	1.0	34.3		
July	4.2	38.9		
August	4.9	36.0		
September	-1.0	32.0		
October	-2.0	23.5		
November	-11.0	16.1		
December	-13.0	12.8		

[1] Temperature data obtained from Myra Falls site from 2006 to end of 2016.
[2] Temperature data recorded at the Paste Plant weather station. Statistics from 25 January 2017, inclusively.

amec foster wheeler

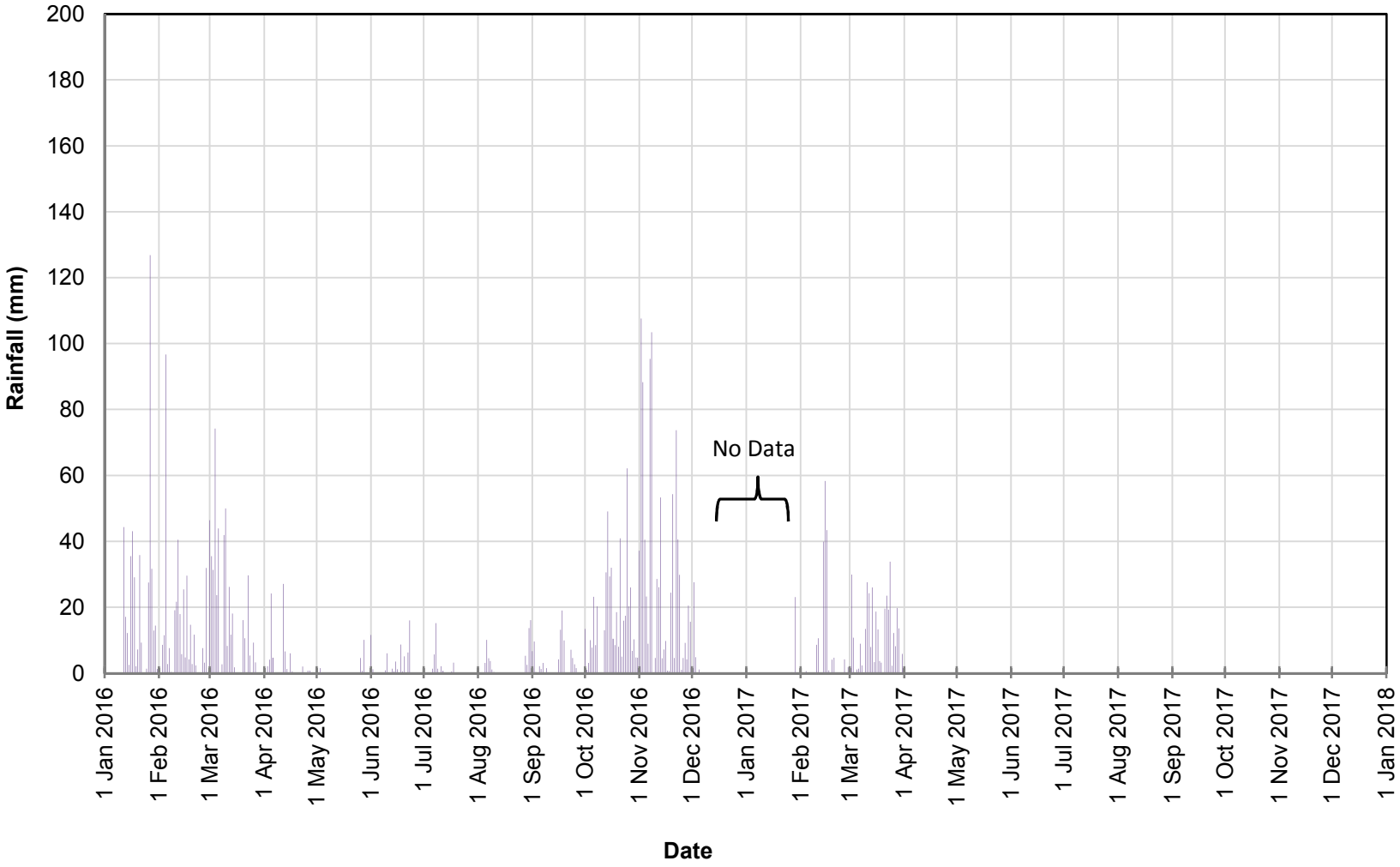
Figure 1: Monthly Precipitation at Myra Falls



File No.: NX14001B.2017

amec foster wheeler

Figure 2: Daily Rainfall at the Paste Plant Weather Station



Attachment B

Lynx TDF VWP Data

Table\Figure Number	Title
Table 1	Lynx Paste Tailings – Weekly Maximum Vibrating Wire Piezometer Readings
Table 2	Lynx Dam – Weekly Maximum Vibrating Wire Piezometer Readings
Figure 1	Lynx TDF – Deep Paste VWP Data
Figure 2	Lynx Dam – Shallow Paste VWP Data
Figure 3a	Lynx Dam – Shallow Foundation VWP Data (Elevation Head)
Figure 3b	Lynx Dam – Shallow Foundation VWP Data (Pressure Head)
Figure 4	Lynx Dam – Deep Foundation VWP Data
Figure 5	Lynx Dam – Dam Fill VWP Data

Nyrstar Myra Falls
2017 Dam Safety Inspection
Attachment B

File No.: NX14001B.2017

Table 1: Lynx Paste Tailings - Weekly Maximum Vibrating Wire Piezometer Readings

Location	Lynx TDF - Upstream Dam Toe and Paste Tailings										
Plane and Position	Plane D - U/S Toe	Plane E - U/S Toe	Plane F - U/S Toe	Plane D, E - Central	Plane D, E - Central	Plane D, E - Central	Plane E - Central	Plane E - Central	Plane E - Central	Plane D, E - Central	Plane F - Central
Piezometer	29326	17723	17721	17727	17728	17733	17731	17732	17734	33783	31089
Historical Max. Value	351.47	353.54	354.09	341.20	335.50	323.96	345.75	340.40	327.38	354.11	353.68
Tip Elevation (m)	350.00	350.70	350.90	328.40	320.70	308.50	330.30	322.70	310.50	351.66	351.26
2017-01-01	350.84	353.13	353.72	338.60	332.02	318.15	343.63		322.95	353.67	353.34
2017-01-08	350.95	353.17	353.74	338.63	331.89	317.91	343.71		322.44	353.74	353.34
2017-01-15	351.29	353.54	354.09	338.82	332.64	319.01	343.69		324.55	354.11	353.68
2017-01-22	351.16	353.28	353.81	338.80	332.75	319.06	343.97		324.79	353.80	353.40
2017-01-29	350.89	353.17	353.71	338.92	332.61	318.77	344.18		324.22	353.67	353.31
2017-02-05	350.88	353.12	353.64	338.86	332.24	318.24	344.06		322.98	353.72	353.25
2017-02-12	350.79	353.44	353.98	338.52	331.98	318.14	343.42		322.94	353.98	353.56
2017-02-19	350.81	353.40	353.94	338.49	332.28	318.55	343.29		324.00	353.93	353.53
2017-02-26	350.83	353.25	353.78	338.59	332.28	318.53	343.52		323.86	353.72	353.34
2017-03-05	350.89	353.24	353.74	338.48	331.84	317.97	343.52		322.56	353.76	353.33
2017-03-12	350.97	353.40	353.95	338.14	331.58	317.70	343.01		322.21	353.85	353.46
2017-03-19	351.06	353.36	353.89	338.18	331.70	317.78	342.93		322.38	353.83	353.41
2017-03-26	351.19	353.42	353.93	338.21	331.82	317.97	342.92		322.78	353.85	353.45

Legend:

330.05	Historical maximum value
328.29	Negative pore pressure (elevation head below tip elevation)
	Blank spaces indicate no data available

Table 2: Lynx Dam - Weekly Maximum Vibrating Wire Piezometer Readings

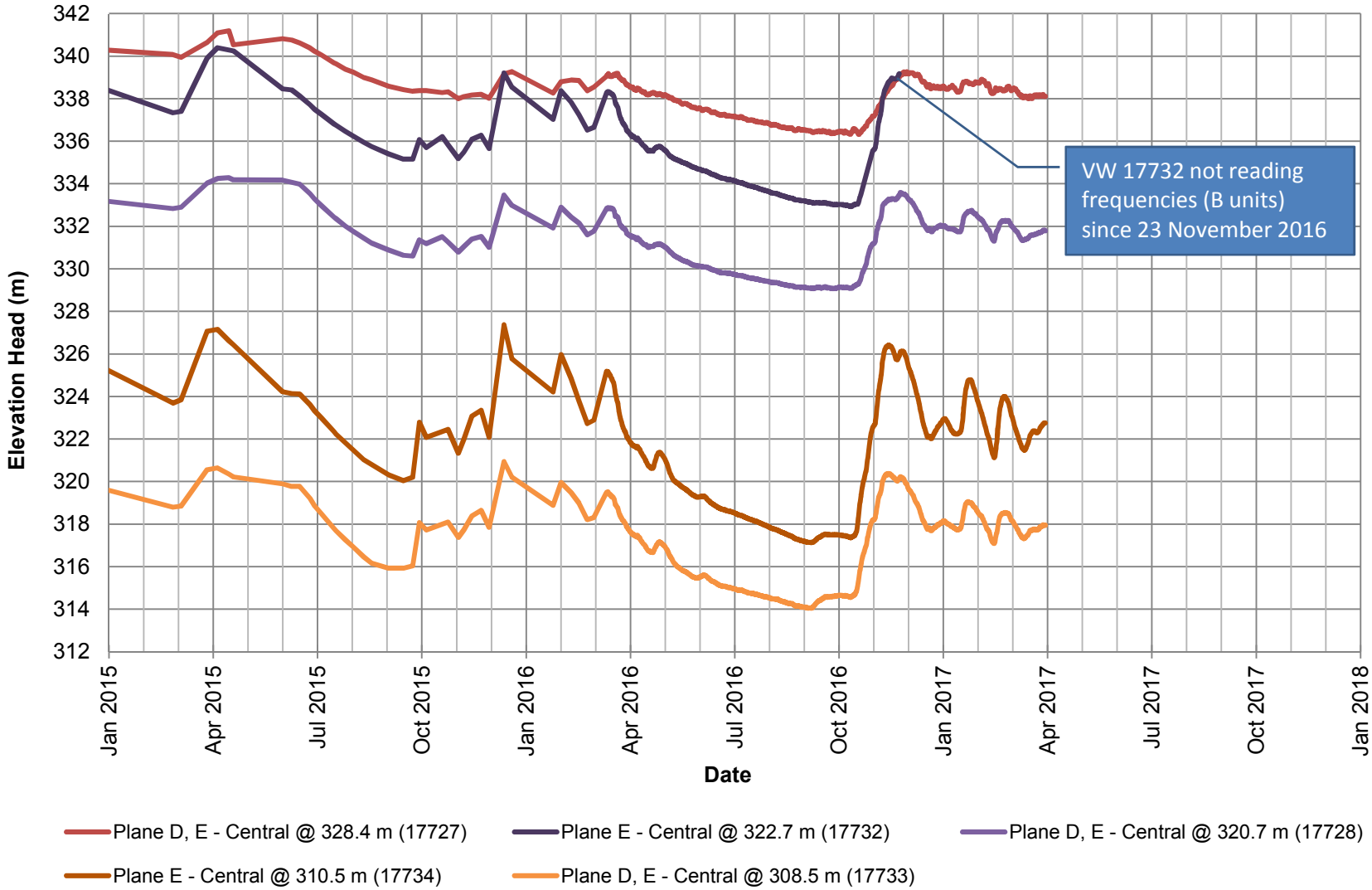
Location	Lynx Dam - Shallow Foundation								Lynx Dam - Deep Foundation									Lynx Dam Fill	
Plane and Position	Plane D - West Arm	Conveyor - Lynx Southwest	Plane E - South Arm	Plane E - South Toe	Plane F - South Arm	Plane F - South Toe	Plane F - Lynx South	Dam Toe - Lynx Southwest	Plane E - South Toe	Plane F - South Arm	Plane F - South Toe	Plane F - Lynx South	Plane F - Lynx South	Lynx Southeast	Lynx Southeast	Lynx Southeast	Plane F - South Arm	Plane F - South Arm	Plane E - South Arm
Piezometer	29334	29320	29335	29321	29330	29323	32221	29331	29332	29336	29333	17725	29324	29325	33781	33782	33784	29322	29329
Historical Max. Value	329.48	324.35	319.05	323.30	329.59	326.38	321.60	320.73	317.59	316.07	317.26	317.11	318.60	315.41	319.99	316.60	320.21	337.49	336.98
Tip Elevation (m)	328.40	323.50	315.90	322.40	328.40	326.10	318.55	306.30	305.20	311.10	296.70	278.30	311.60	304.30	314.40	294.45	311.85	337.30	336.90
2017-01-01	*328.22*	323.64	317.66	322.98	328.52	326.15	*318.55*	316.02	314.83	315.92	313.93	313.59	314.41	312.88	314.47	313.02	318.49	*337.24*	*336.75*
2017-01-08	*328.29*	323.65	317.79	322.89	328.63	326.17	318.59	315.58	314.65	315.97	313.53	313.15	313.97	312.68	*314.14*	312.59	318.19	*337.28*	*336.78*
2017-01-15	328.66	324.08	317.91	323.18	328.71	326.22	318.83	318.37	315.46	315.97	315.31	315.09	316.08	313.57	316.05	314.53	319.22	337.30	*336.79*
2017-01-22	328.72	323.67	317.82	323.05	328.57	326.14	318.90	318.34	315.66	315.87	315.28	315.01	316.03	313.66	315.73	314.41	319.22	*337.17*	*336.72*
2017-01-29	*328.36*	323.66	317.81	323.06	328.63	326.21	*318.53*	316.71	315.52	315.93	314.39	314.05	314.92	313.52	314.78	313.48	318.86	337.30	*336.78*
2017-02-05	*328.28*	323.63	317.87	322.98	328.67	326.17	318.61	316.32	315.25	315.97	314.07	313.73	314.57	313.36	314.44	313.16	318.42	*337.28*	*336.77*
2017-02-12	328.65	323.93	317.90	323.13	328.71	326.26	319.51	318.28	315.57	315.94	315.35	315.12	316.11	313.67	316.16	314.56	319.33	337.32	*336.79*
2017-02-19	328.68	323.61	317.84	323.11	328.60	326.19	319.58	318.29	315.78	315.88	315.34	315.08	316.10	313.78	315.98	314.50	319.31	*337.22*	*336.73*
2017-02-26	328.45	323.65	317.74	322.89	328.55	326.24	319.61	316.81	315.71	315.84	314.51	314.14	315.03	313.70	314.72	313.55	318.96	*337.27*	*336.75*
2017-03-05	*328.23*	323.65	317.77	322.88	328.58	326.22	320.00	316.15	315.09	315.88	313.96	313.65	314.49	313.20	314.61	313.09	318.42	*337.23*	*336.73*
2017-03-12	328.43	323.71	317.70	323.09	328.53	326.26	321.60	317.07	315.26	315.77	314.56	314.33	315.22	313.31	315.09	313.76	319.01	*337.25*	*336.73*
2017-03-19	328.46	323.69	317.70	323.02	328.52	326.23	321.52	317.25	315.45	315.78	314.70	314.51	315.45	313.45	315.29	313.94	319.11	*337.24*	*336.73*
2017-03-26	328.54	323.75	317.68	323.14	328.51	326.25	321.43	317.59	315.76	315.79	314.90	314.65	315.63	313.71	315.40	314.05	319.40	*337.23*	*336.73*

Legend:

330.05	Historical maximum value
328.29	Negative pore pressure (elevation head below tip elevation)
	Blank spaces indicate no data available

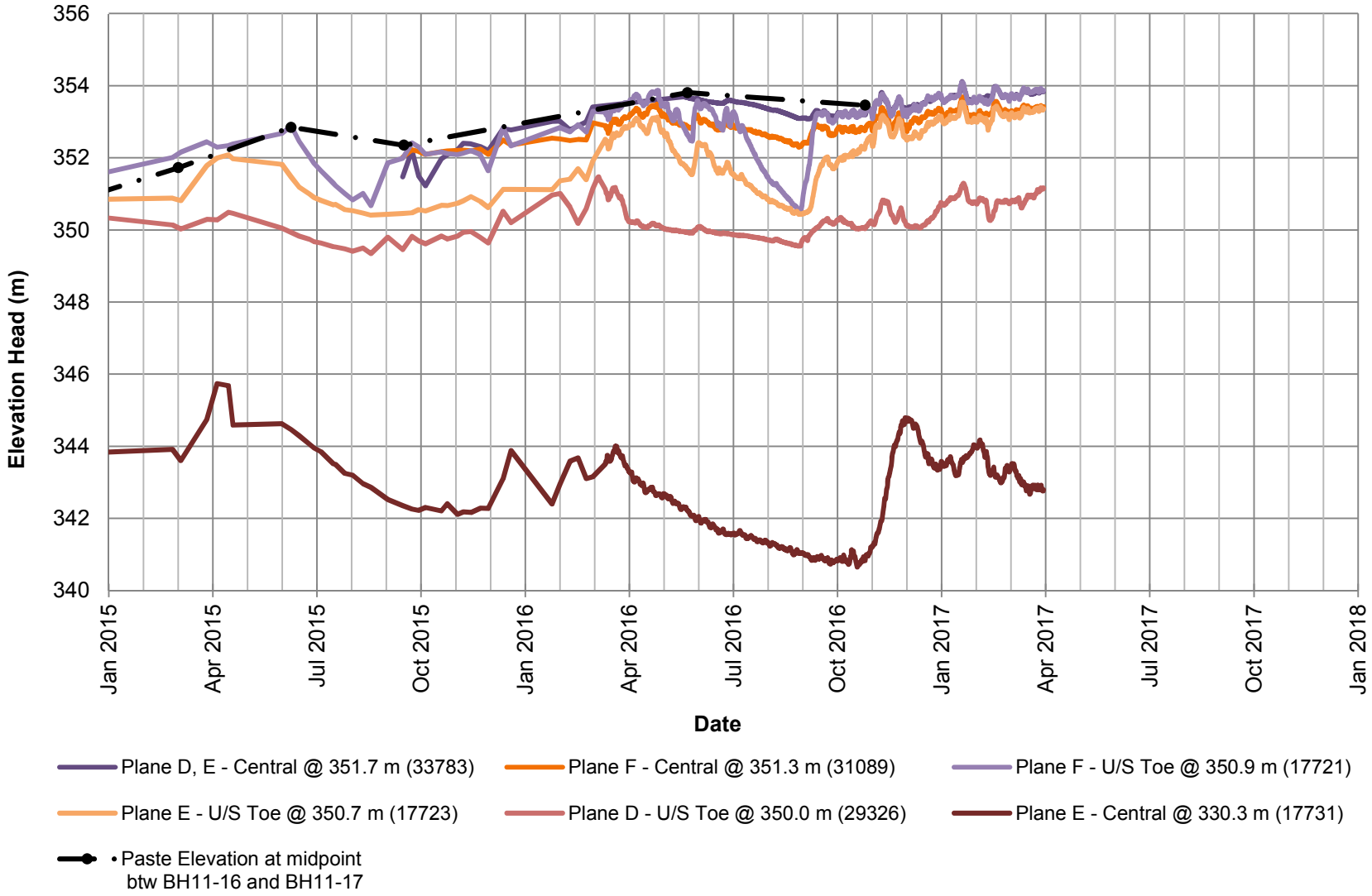
amec foster wheeler

Figure 1: Lynx TDF - Deep Paste VWP Data



amec foster wheeler

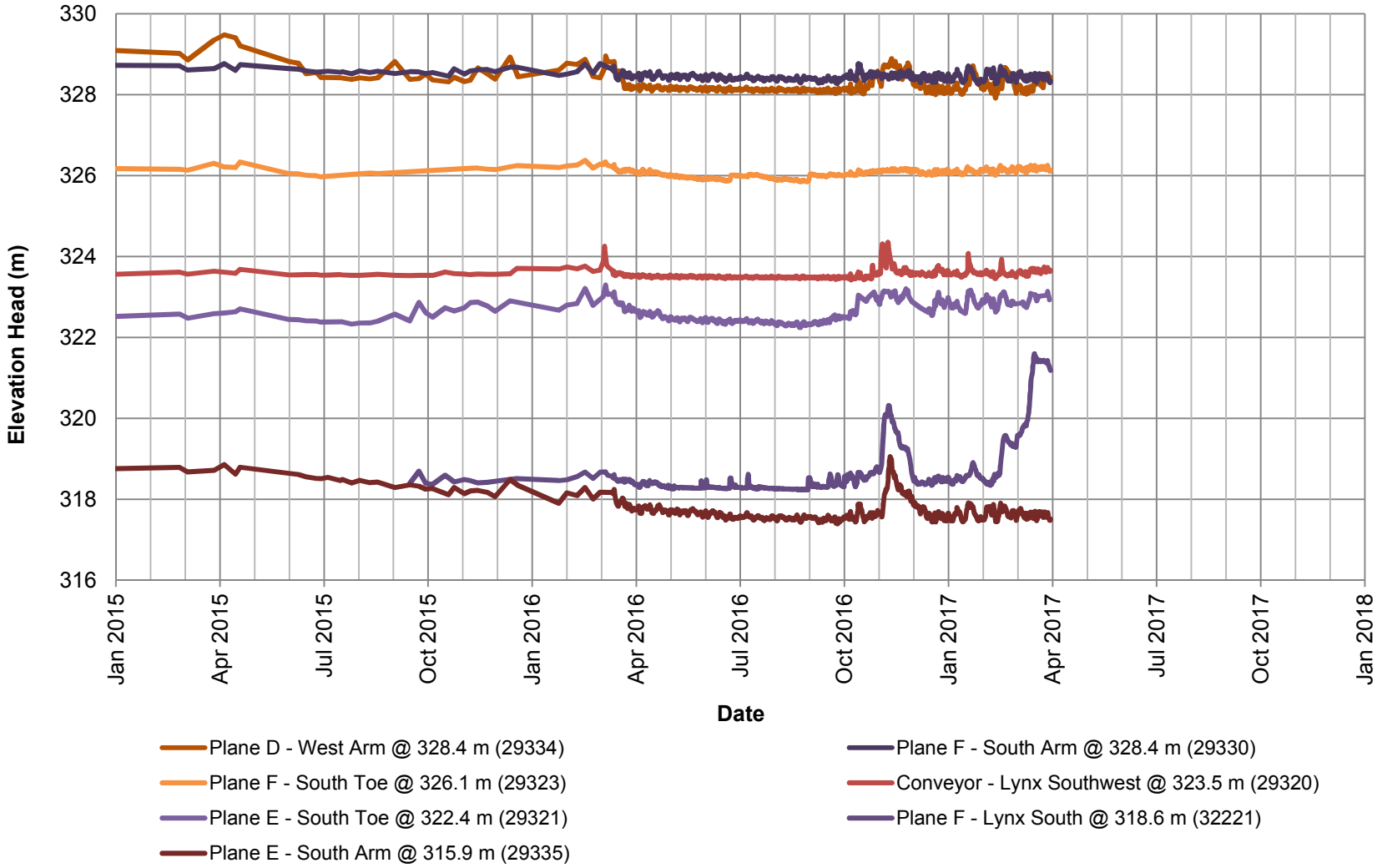
Figure 2: Lynx TDF - Shallow Paste VWP Data



File No.: NX14001B.2017

amec foster wheeler

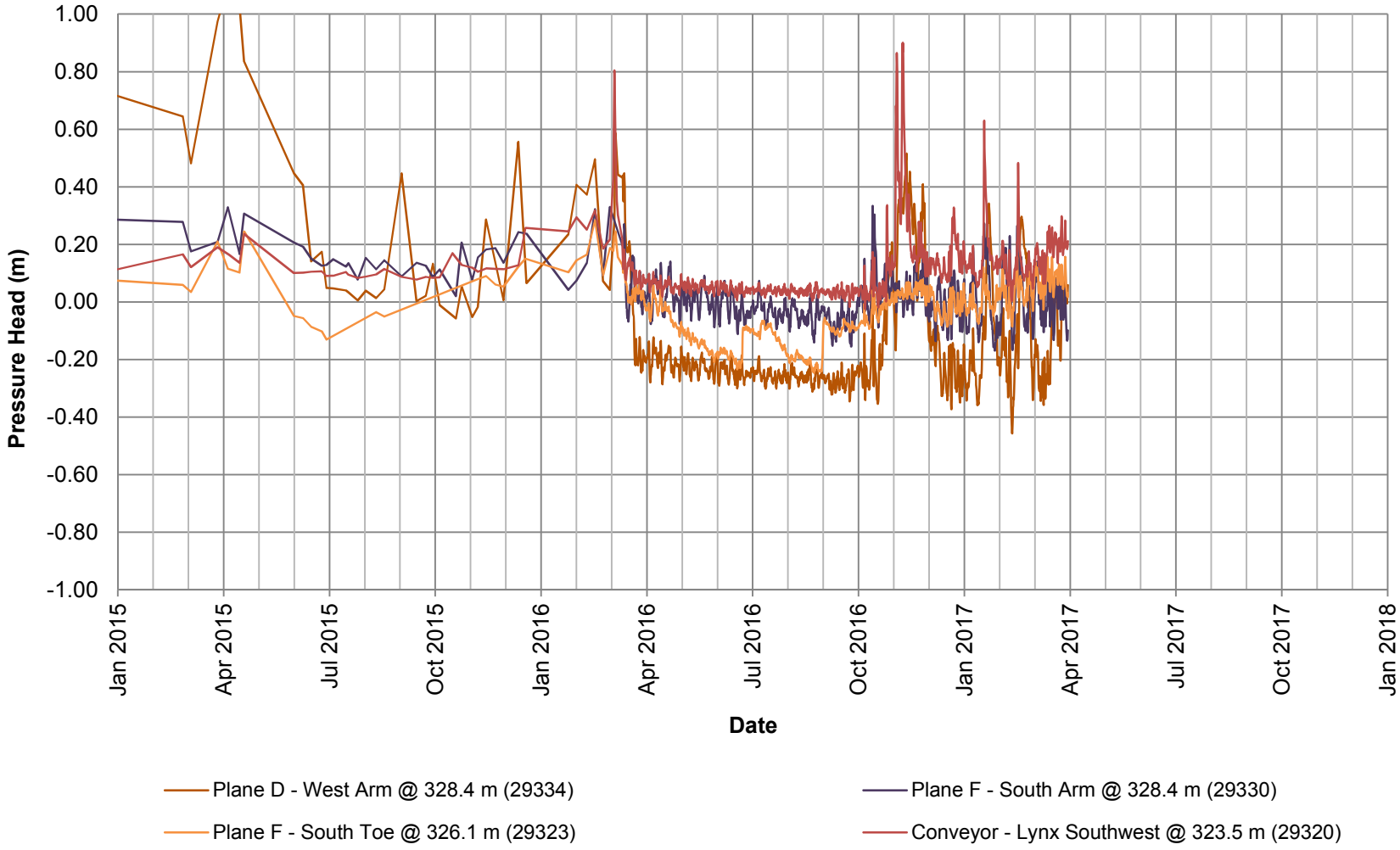
Figure 3a: Lynx Dam - Shallow Foundation VWP Data



File No.: NX14001B.2017

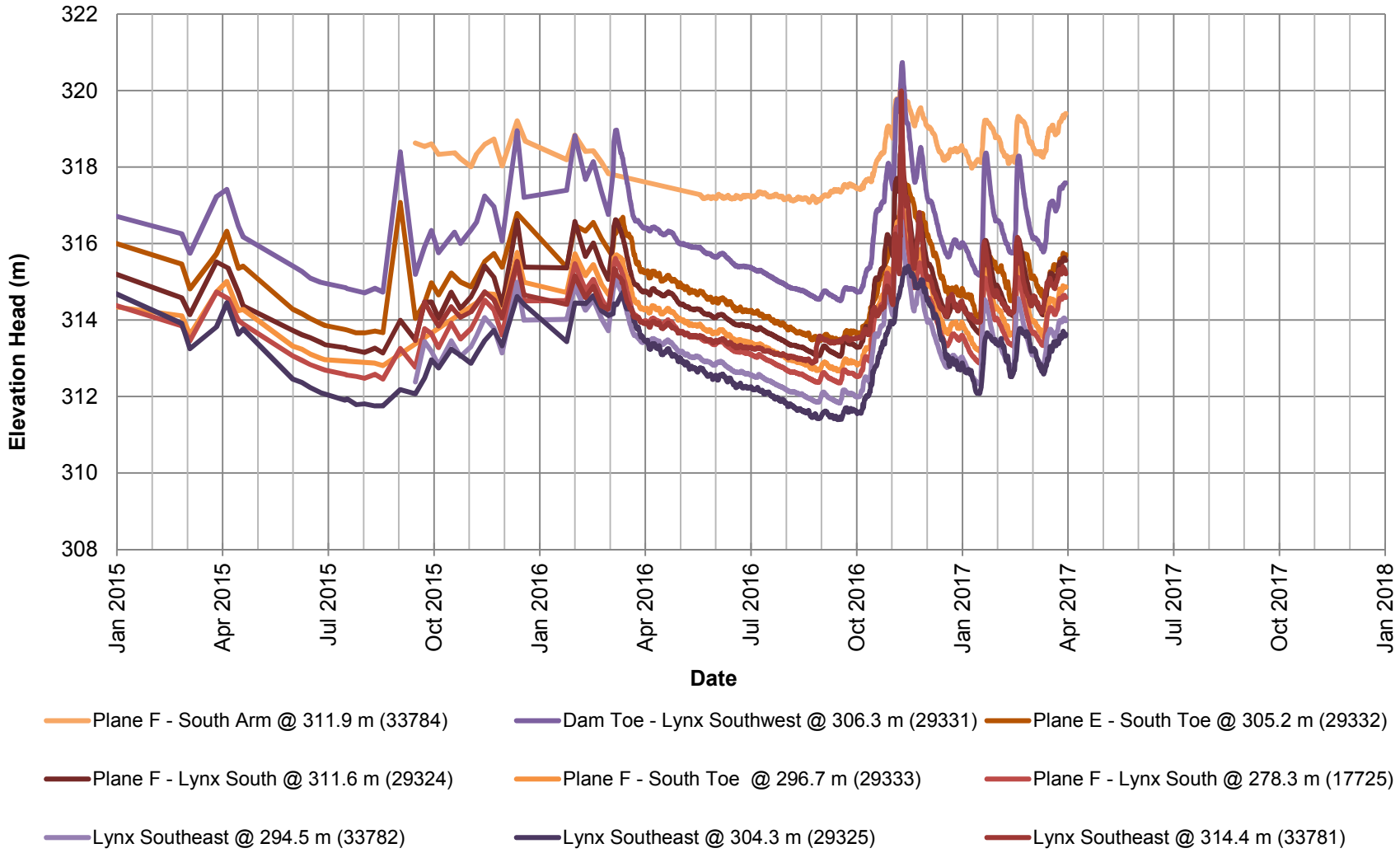
amec foster wheeler

Figure 3b: Lynx Dam - Shallow Foundation VWP Data



amec foster wheeler

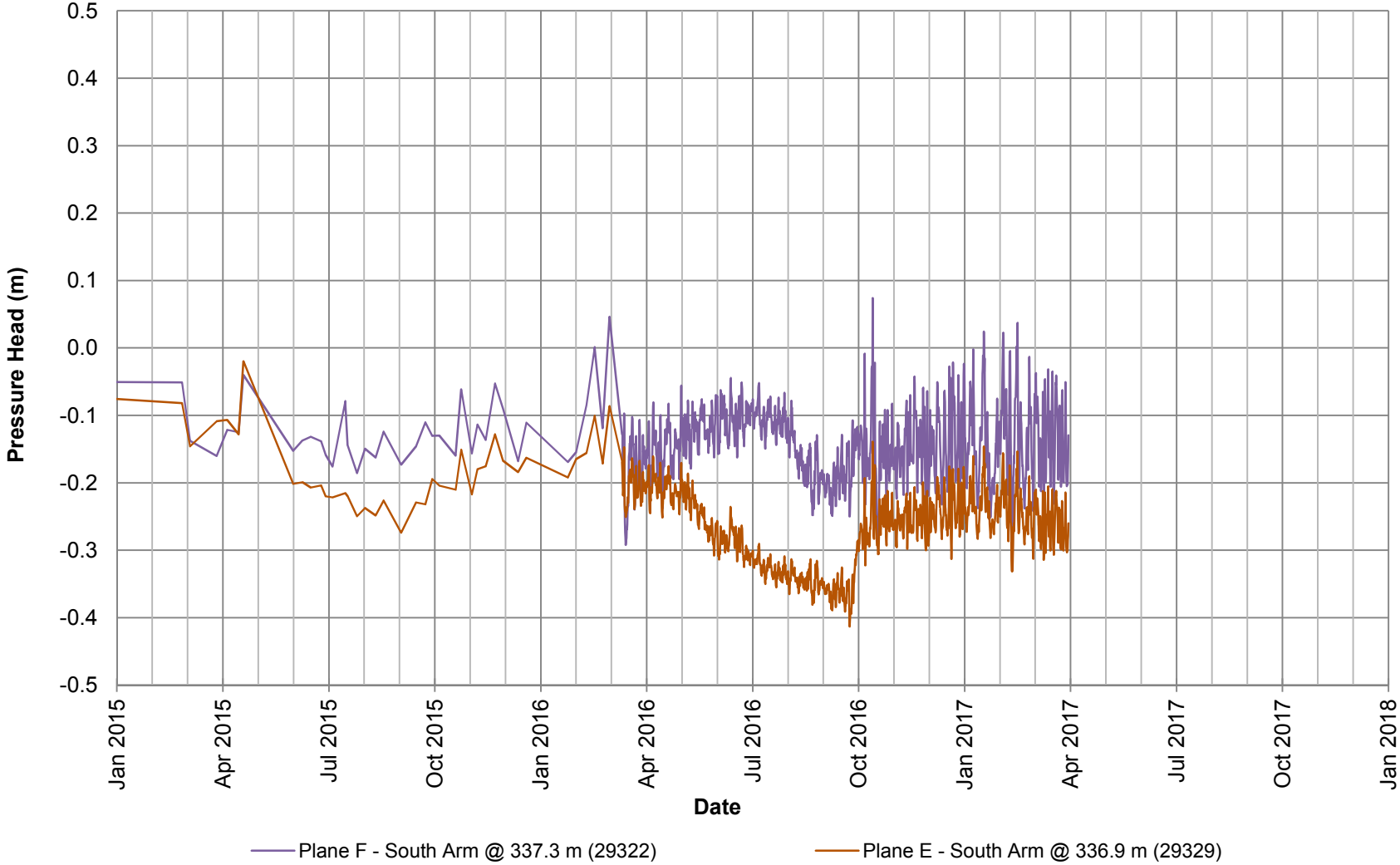
Figure 4: Lynx Dam - Deep Foundation VWP Data



File No.: NX14001B.2017

amec foster wheeler

Figure 5: Lynx Dam - Dam Fill VWP Data



Attachment C

Old TDF VWP Data

Table\Figure Number	Title
Table 1	Old TDF - Instrument Plane A – Weekly Maximum VWP Readings
Table 2	Old TDF - Instrument Planes 1, 3, 4, 6 and Outliers – Weekly Maximum VWP Readings
Table 3	Old TDF - Instrument Place 5 – Weekly Maximum VWP Readings
Figure 1	Old TDF Piezometer Records – Plane 1 (32228, 36971, 36973, 36972, 32232, P-10)
Figure 2	Old TDF Piezometer Records – Plane A, Outer Embankment Slope, Location 1 (A-5E, A-9E, A-13E, A-17E)
Figure 3	Old TDF Piezometer Records – Plane A, Outer Embankment Slope, Location 2 (A-2E, A-6E, A-10E, A-14E, A-18E)
Figure 4	Old TDF Piezometer Records – Plane A, Outer Embankment Slope, Location 3 (A-4E, 32239, A-8E, A-12E, A-16E, A-20E)
Figure 5	Old TDF Piezometer Records – Plane A, Upper Tailings Beach (A-26E, A-27E, A-30E, A-31E, A-32E, 32220)
Figure 6	Old TDF Piezometer Records – Plane A, Strip and Paste Berm (A33-E, 32231, 32229, 32225, P-11, P-12)
Figure 7	Old TDF Piezometer Records – Plane 3 (32233, 21715, P-13, P-14) and Plane 3/4 (P-1, P-2)
Figure 8	Old TDF Piezometer Records – Plane 4 (32237, 1204, P-3, P-4)
Figure 9	Old TDF Piezometer Records – Plane 5, Outer Embankment Slope, Location 1 (C-5E, C-13E, C-17E, C-21E)
Figure 10	Old TDF Piezometer Records – Plane 5, Outer Embankment Slope, Location 2 and Lower Tailings (C-6E, C-10E, C-14E, C-18E, C-22E, 32223, 32241)
Figure 11	Old TDF Piezometer Records – Plane 5, Outer Embankment Slope, Location 3 (C-12E, C-16E, 32238, C-20E, C-24E)
Figure 12	Old TDF Piezometer Records – Plane 5, Upper Tailings Beach (C-29E, C-31E, C-35E, 32224, C-36E, C-37E, 32234)
Figure 13	Old TDF Piezometer Records – Plane 5, Paste Berm and Upstream Tailings (17730, 32222, P-7, 17724, 17726, 17722)
Figure 14	Old TDF Piezometer Records – Plane 5/6 (P-5, P-6) and Plane 6 (32236, 32230, 32226, 32219)

amec foster wheeler

Table 1: Old TDF - Instrument Plane A - Weekly Maximum VWP Pressure Head (m)

Location	Outer Embankment Slope - 1				Outer Embankment Slope - 2					Outer Embankment Slope - 3						Upper Tailings Beach							Strip and Paste Berm					
ID	A-5E	A-9E	A-13E	A-17E	A-2E	A-6E	A-10E	A-14E	A-18E	A-4E	32239	A-8E	A-12E	A-16E	A-20E	A-26E	A-27E	A-28E	A-30E	A-32E	A-31E	32220	A-33E	32231	32229	32225	P-11	P-12
Tip Elevation	310.4	311.7	313.4	317.0	305.4	310.9	312.3	313.4	316.8	305.2	310.3	311.0	312.3	313.6	316.7	323.7	323.9	325.2	324.8	327.7	327.8	328.6	327.5	330.2	325.9	328.6	332.6	326.6
Trigger Point S1	3.8	5.1	5.1	1.1	0.0	4.5	5.5	5.1	1.3	0.0	2.8	3.6	4.7	5.6	6.6	1.7	4.7	0.7	5.3	3.3	1.5	1.1	5.5	2.3	5.7	4.9	3.2	5.5
Trigger Point S2	4.4	6.5	6.5	2.6	2.1	5.3	7.2	6.5	2.8	2.2	3.5	4.4	6.0	7.5	7.5	2.4	6.6	1.1	7.0	4.2	3.2	2.5	7.5	2.9	7.5	6.7	4.1	7.5
Trigger Point S3	7.3	10.8	10.9	4.3	2.1	8.8	12.0	10.9	4.6	2.2	5.8	7.3	10.0	12.5	12.5	4.8	11.0	1.8	11.6	7.0	5.2	4.2	12.5	4.9	12.5	11.3	6.8	12.5
Trigger Point P1	***2.9***	***4.3***	***4.3***	***1.7***	***2.1***	***3.5***	***4.8***	***4.3***	***1.9***	***2.3***	***2.3***	***2.9***	***4.0***	***5.0***	***5.0***	***1.6***	***4.4***	***0.7***	***4.7***	***2.7***	***2.1***	***1.7***	***5.0***	***2.0***	***5.0***	***4.5***	***2.7***	***5.0***
2017-01-01	1.6	1.6	2.0	0.5	***4.5***	1.5	1.4	1.2	1.4	***3.9***	1.0	0.7	-1.8	1.9	0.5	***4.0***	4.1	***1.5***	1.5	1.1	0.9	0.9	1.5		3.4	4.3		
2017-01-08	1.4	1.4	1.8	0.4	***4.4***	1.3	1.2	1.0	1.2	***3.8***	1.1	0.6	-2.0	1.8	0.3	***3.7***	3.8	***1.2***	1.1	0.9	0.7	0.3	1.2		3.4	4.2		
2017-01-15	2.0	1.7	2.1	0.8	***5.7***	1.8	1.6	1.4	1.4	***5.2***	1.5	1.2	-1.7	2.1	0.6	***3.8***	4.0	***1.4***	1.4	1.3	1.0	0.0	1.5		3.5	4.3		
2017-01-22	1.7	1.5	1.9	0.5	***5.3***	1.6	1.4	1.2	1.4	***4.7***	1.4	0.9	-1.9	1.9	0.4	***3.8***	3.9	***1.3***	1.3	1.0	0.8	1.3	1.4		3.5	4.4		
2017-01-29											1.1											1.3			3.5	4.4	***3.2***	2.3
2017-02-05	1.4	1.3	1.7	0.4	***4.6***	1.2	1.1	0.9	1.1	***4.0***	1.1	0.6	-2.1	1.6	0.3	***3.7***	3.9	***1.2***	1.2	0.9	0.7	1.2	1.2		3.5	4.3	***3.1***	2.3
2017-02-12	1.4	1.4	1.8	0.4	***4.6***	1.3	1.1	1.0	1.2	***4.0***	1.5	0.6	-2.0	1.7	0.3	***3.7***	3.9	***1.3***	1.2	0.9	0.7	0.1	1.2		3.5	4.4	***3.2***	2.3
2017-02-19	1.9	1.7	2.1	0.7	***5.5***	1.8	1.6	1.4	1.5	***5.0***	1.5	1.1	-1.7	2.1	0.6	***3.9***	4.1	***1.5***	1.4	1.2	1.0	0.6	1.5		3.5	4.4	***3.2***	2.3
2017-02-26	1.8	1.7	2.1	0.6	***4.8***	1.6	1.5	1.3	1.4	***4.3***	1.1	0.8	-1.8	2.0	0.5	***4.0***	4.2	***1.6***	1.5	1.2	0.9	0.2	1.5		3.4	4.3	***3.1***	2.2
2017-03-05	1.6	1.6	2.1	0.7	***4.7***	1.5	1.5	1.2	1.4	***4.1***	1.0	0.9	-1.8	2.0	0.6	***4.0***	4.2	***1.6***	1.5	1.2	1.0	0.1	1.5		3.4	4.3	***3.1***	2.2
2017-03-12	1.7	1.5	2.0	0.6	***5.0***	1.6	1.4	1.2	1.4	***4.5***	1.2	0.8	-1.9	1.9	0.5	***4.0***	4.1	***1.5***	1.5	1.1	0.9	1.4	1.5		3.5	4.5	***3.3***	2.3
2017-03-19											1.1											***1.7***			3.6	***4.6***	***3.5***	2.4
2017-03-26											1.3											***1.9***			3.7	***4.7***	***3.7***	2.5

Nyrstar Myra Falls
2017 Dam Safety Inspection
Attachment C

File No.: NX14001B.2017

Table 2: Old TDF - Instrument Planes 1, 3, 4, 6 and Outliers - Weekly Maximum VWP Pressure Head (m)

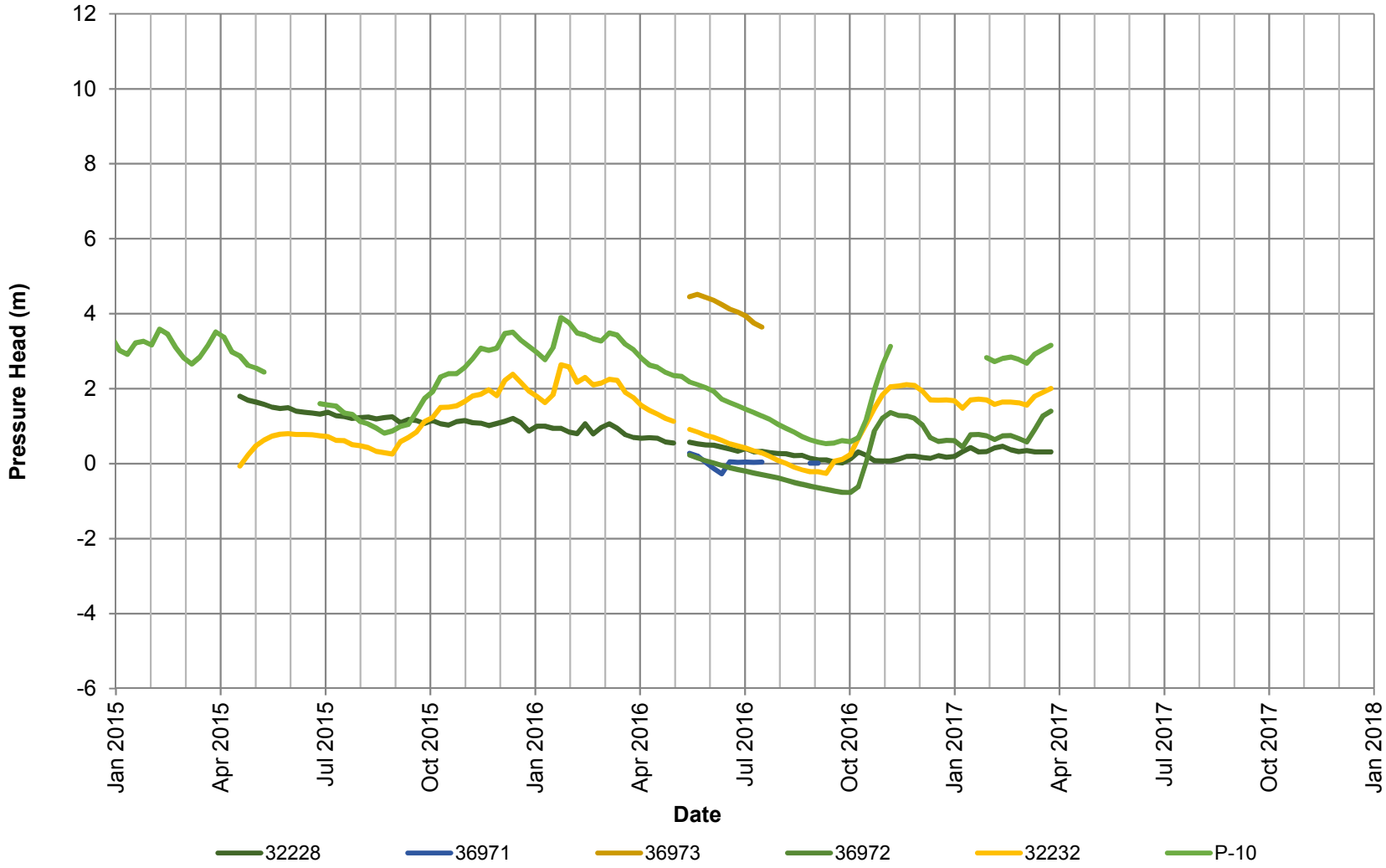
Location		Plane 1					Plane 3				Plane 3/4		Plane 4				Plane 5/6		Plane 6			
Piezometer	32228	36971	36973	36972	32232	P-10	32233	21715	P-13	P-14	P-1	P-2	1204	32237	P-3	P-4	P-5	P-6	32219	32226	32230	32236
Tip Elevation	331.4	325.7	319.7	328.0	329.4	326.9	332.4	329.3	332.2	326.7	324.4	329.4	329.3	332.4	324.3	329.3	325.1	329.4	335.2	330.6	328.8	330.4
Trigger Point S1	3.2	4.4	3.7	3.8	3.5	4.3	1.7	7.5	6.4	9.0	9.0	7.5	8.7	1.7	11.0	9.5	14.3	14.9	7.9	13.5	14.1	9.0
Trigger Point S2	5.1	6.4	5.2	5.6	5.4	6.3	1.8	8.3	7.1	10.0	10.0	8.4	10.3	2.1	13.0	10.8	15.5	16.1	8.6	14.5	15.2	9.5
Trigger Point S3	7.0	8.4	6.9	7.5	7.3	8.3	2.5	10.8	9.1	13.0	13.0	11.0	12.5	2.5	16.0	13.2	17.8	18.5	9.9	16.6	17.2	11.2
Trigger Point P1	***2.3***	***3.4***	***2.9***	***2.8***	***2.5***	***3.3***	***1.4***	***6.3***	***5.3***	***7.5***	***7.5***	***6.3***	***8.6***	***1.8***	***11.0***	***9.2***	***12.4***	***12.9***	***6.9***	***11.6***	***12.2***	***7.8***
2017-01-01	0.2			0.6	1.7		0.7						2.2	0.5					0.6	2.5	2.4	2.6
2017-01-08	0.3			0.4	1.5		0.3						2.2	0.3				3.8	-0.1	2.2	2.2	2.6
2017-01-15	0.4			0.8	1.7		0.7						2.4	0.8				3.8	2.8	5.4	5.2	4.7
2017-01-22	0.3			0.8	1.7		0.7						2.4	0.8					1.1	3.4	3.7	3.5
2017-01-29	0.3			0.7	1.7	2.8	0.7		1.7	0.6	-0.8	0.7	2.4	0.6	0.6	2.0	4.9	4.0	0.2	2.4	2.4	2.5
2017-02-05	0.4			0.6	1.6	2.7	0.3		1.6	0.4	-0.9	0.6	2.4	0.3	0.7	1.8	4.7	3.8	0.0	2.1	1.9	2.1
2017-02-12	0.5			0.7	1.6	2.8	0.8		1.9	0.5	-0.8	0.6	2.4	0.8	0.6	1.9	6.3	5.5	2.3	5.2	5.0	4.5
2017-02-19	0.4			0.8	1.6	2.8	0.8		1.8	0.6	-0.8	0.7	2.4	0.7	0.6	2.0	6.2	5.0	1.3	3.9	4.2	3.8
2017-02-26	0.3			0.7	1.6	2.8	0.6		1.6	0.5	-0.8	0.7	2.3	0.5	0.5	1.8	4.9	3.9	0.3	2.3	2.1	2.2
2017-03-05	0.4			0.6	1.6	2.7	0.6		1.6	0.3	-0.8	0.6	2.3	0.5	0.6	1.8	4.5	3.7	0.1	2.1	1.7	2.0
2017-03-12	0.3			0.9	1.8	2.9	0.8		1.7	0.5	-0.8	0.7	2.5	0.8	0.4	2.0	5.5	4.6	1.1	3.5	3.7	3.5
2017-03-19	0.3			1.3	1.9	3.0	0.8		1.8	0.8	-0.8	0.8	2.5	0.9	0.5	2.1	5.6	4.9	1.5	3.9	4.1	3.8
2017-03-26	0.3			1.4	2.0	3.2	0.9		1.9	0.9	-0.7	0.8	2.6	1.0	0.5	2.2	5.8	5.0	1.5	3.9	4.1	3.8

Table 3: Old TDF - Instrument Plane 5 - Weekly Maximum VWP Pressure Head (m)

Location	Outer Embankment Slope - 1				Outer Embankment Slope - 2							Outer Embankment Slope - 3					Upper Tailings Beach							Paste Berm					
ID	C-5E	C-13E	C-17E	C-21E	C-6E	C-10E	C-14E	C-18E	C-22E	32223	32241	C-12E	C-16E	32238	C-20E	C-24E	C-29E	C-31E	C-35E	32224	C-36E	C-37E	32234	17730	32222	P-7	17724	17726	17722
Tip Elevation	310.1	308.9	303.2	315.7	303.7	307.3	308.9	314.5	315.4	316.8	308.7	305.5	308.7	308.7	314.5	315.2	322.3	322.0	326.7	327.0	326.6	326.6	328.5	329.3	326.9	319.8	326.2	326.3	335.4
Trigger Point S1	2.0	2.0	1.5	1.3	5.5	6.5	6.5	2.8	1.1	3.2	2.3	5.3	6.5	2.3	6.5	6.4	0.0	4.7	1.3	1.1	2.5	3.1	2.4	2.5	4.0	6.1	4.5	4.4	2.1
Trigger Point S2	4.2	4.4	3.1	2.8	12.3	14.0	14.0	6.1	2.3	7.0	5.0	11.4	14.0	4.9	13.9	13.9	0.0	10.1	2.7	2.3	5.3	6.6	5.1	5.4	8.6	13.1	9.6	9.0	4.6
Trigger Point S3	7.8	8.1	5.8	5.3	22.8	26.0	25.9	11.3	3.5	12.4	9.0	20.5	26.0	9.0	25.9	25.8	0.0	18.7	5.0	4.1	9.8	12.2	9.3	10.0	16.0	24.2	17.9	17.5	8.5
Trigger Point P1	***2.6***	***2.6***	***1.9***	***1.7***	***7.3***	***8.5***	***8.5***	***3.7***	***1.1***	***4.2***	***3.0***	***6.8***	***8.5***	***3.0***	***8.5***	***8.4***	***0.0***	***6.1***	***1.6***	***1.4***	***3.3***	***4.0***	***3.1***	***3.3***	***5.2***	***8.0***	***5.9***	***5.7***	***2.7***
2017-01-01											1.5			2.5						***2.5***			***3.7***	***3.9***	4.2		4.2	2.8	2.1
2017-01-08											1.4			2.5						***2.3***			***3.5***	***3.7***	3.9		4.1	3.0	2.0
2017-01-15	-0.2	0.1	***2.4***	-0.1	4.3	0.0	0.7	-1.7	0.5		***4.1***	3.1	1.6	***3.1***	1.0	0.9	***5.1***	***8.8***	***2.2***	***2.7***	***3.7***	***5.8***	***4.5***	***5.4***	***5.6***		4.1	2.8	1.8
2017-01-22	-0.2	-0.2	1.9	-0.2	4.1	-0.1	0.7	-1.5	0.3		***4.1***	2.8	1.4	***3.1***	1.0	0.6	***5.1***	***8.9***	***2.2***	***2.6***	***3.5***	***5.6***	***4.2***	***4.5***	4.7		4.7	2.8	2.1
2017-01-29	-0.2	-0.2	***2.0***	-0.2	4.2	0.1	0.8	-1.5	0.3		1.9	2.8	1.3	2.7	1.0	0.6	***5.0***	***8.6***	***2.0***	***2.5***	***3.4***	***5.2***	***3.6***	***3.9***	4.1	4.5	4.3	3.0	2.0
2017-02-05	-0.2	0.0	***1.9***	-0.2	4.1	0.1	0.8	-1.7	0.5		1.8	2.7	1.1	2.7	0.8	0.8	***4.8***	***8.3***	***1.9***	***2.4***	3.0	***4.8***	***3.4***	***3.6***	3.8	4.5	4.2	3.0	2.0
2017-02-12	-0.2	0.1	***2.5***	-0.1	4.5	0.2	0.9	-1.6	0.5		***3.6***	3.2	1.7	***3.1***	1.0	0.8	***5.0***	***8.6***	***2.1***	***2.5***	***3.4***	***5.6***	***4.3***	***5.2***	***5.4***	4.8	4.6	3.0	2.2
2017-02-19	-0.2	0.1	***2.3***	-0.1	4.4	0.2	1.0	-1.6	0.5		***3.8***	3.1	1.7	***3.1***	1.0	0.9	***5.0***	***8.8***	***2.1***	***2.5***	***3.6***	***5.6***	***4.2***	***4.7***	4.9	4.8	4.7	2.9	2.2
2017-02-26	-0.2	0.0	***2.0***	-0.1	4.2	0.1	0.9	-1.5	0.4		2.0	2.8	1.2	2.7	1.0	0.8	***4.9***	***8.6***	***2.0***	***2.5***	3.3	***5.1***	***3.5***	***3.8***	4.0	4.6	4.3	2.9	2.0
2017-03-05	-0.2	0.0	***1.9***	-0.1	4.1	0.1	0.9	-1.6	0.5		1.1	2.8	1.2	2.5	0.8	0.8	***4.8***	***8.3***	***1.9***	***2.3***	3.1	***4.9***	***3.4***	***3.7***	3.9	4.4	4.2	2.9	1.9
2017-03-12	-0.2	-0.1	***2.1***	-0.2	4.2	0.0	0.8	-1.8	0.4		2.4	2.9	1.3	2.7	0.8	0.7	***4.7***	***8.6***	***2.0***	***2.5***	***3.4***	***5.3***	***3.9***	***4.5***	4.7	4.7	4.5	2.9	2.1
2017-03-19	-0.2	0.0	***2.0***	-0.2	4.2	0.1	0.8	-1.7	0.4		2.3	2.8	1.2	2.7	0.8	0.8	***4.9***	***8.6***	***2.1***	***2.6***	***3.5***	***5.5***	***4.1***	***4.8***	5.0	4.8	4.6	2.9	2.2
2017-03-26	-0.2	0.0	***2.2***	-0.2	4.3	0.2	0.9	-1.5	0.4		2.7	3.0	1.4	2.8	1.0	0.8	***5.2***	***8.7***	***2.2***	***2.6***	***3.5***	***5.5***	***4.1***	***4.8***	5.0	4.9	4.7	2.9	2.3

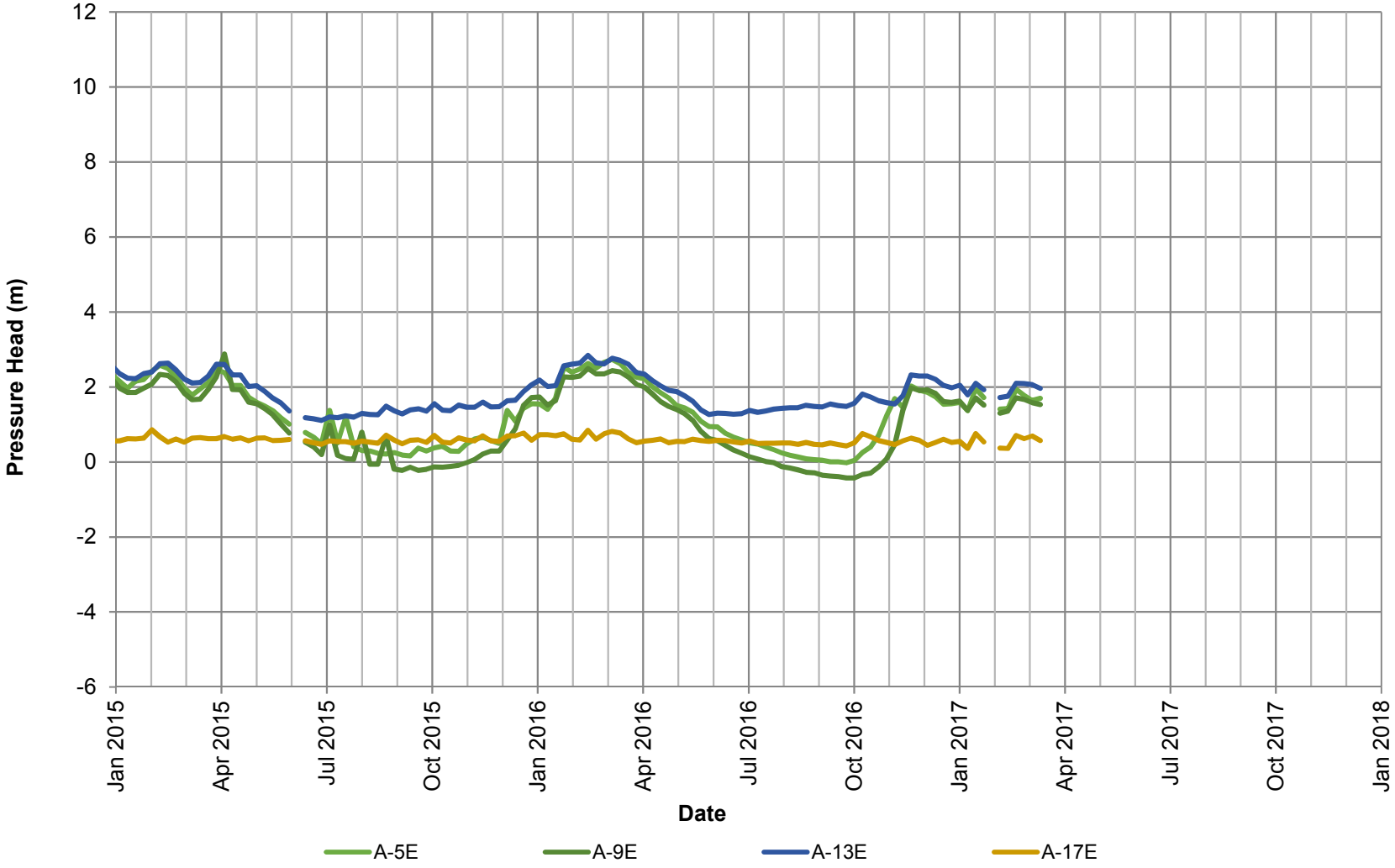
amec foster wheeler

Figure 1: Old TDF Piezometer Records - Plane 1
32228, 36971, 36973, 36972, 32232, P-10



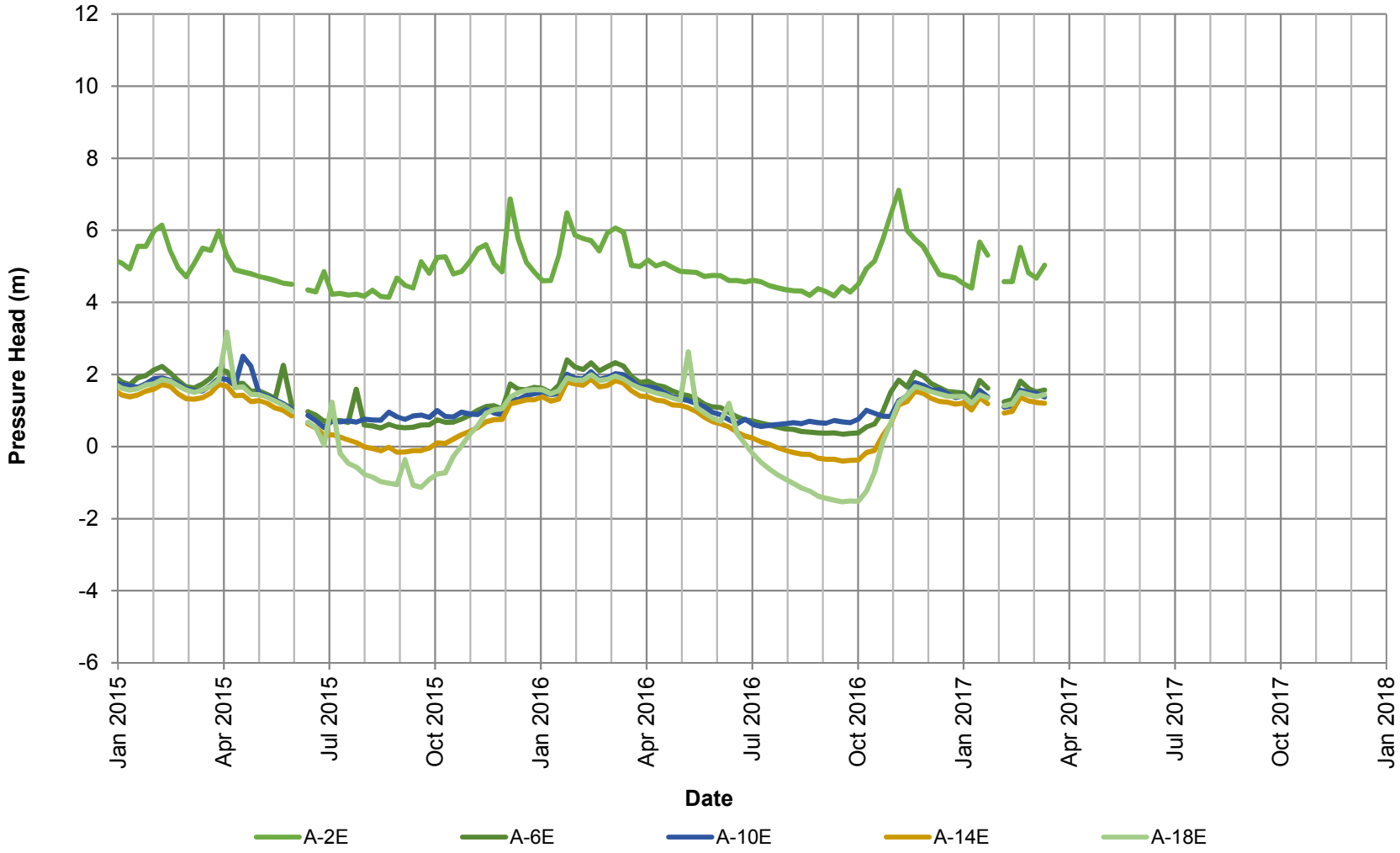
amec foster wheeler

Figure 2: Old TDF Piezometer Records - Plane A Outer Embankment Slope, Location 1 A-5E, A-9E, A-13E, A-17E



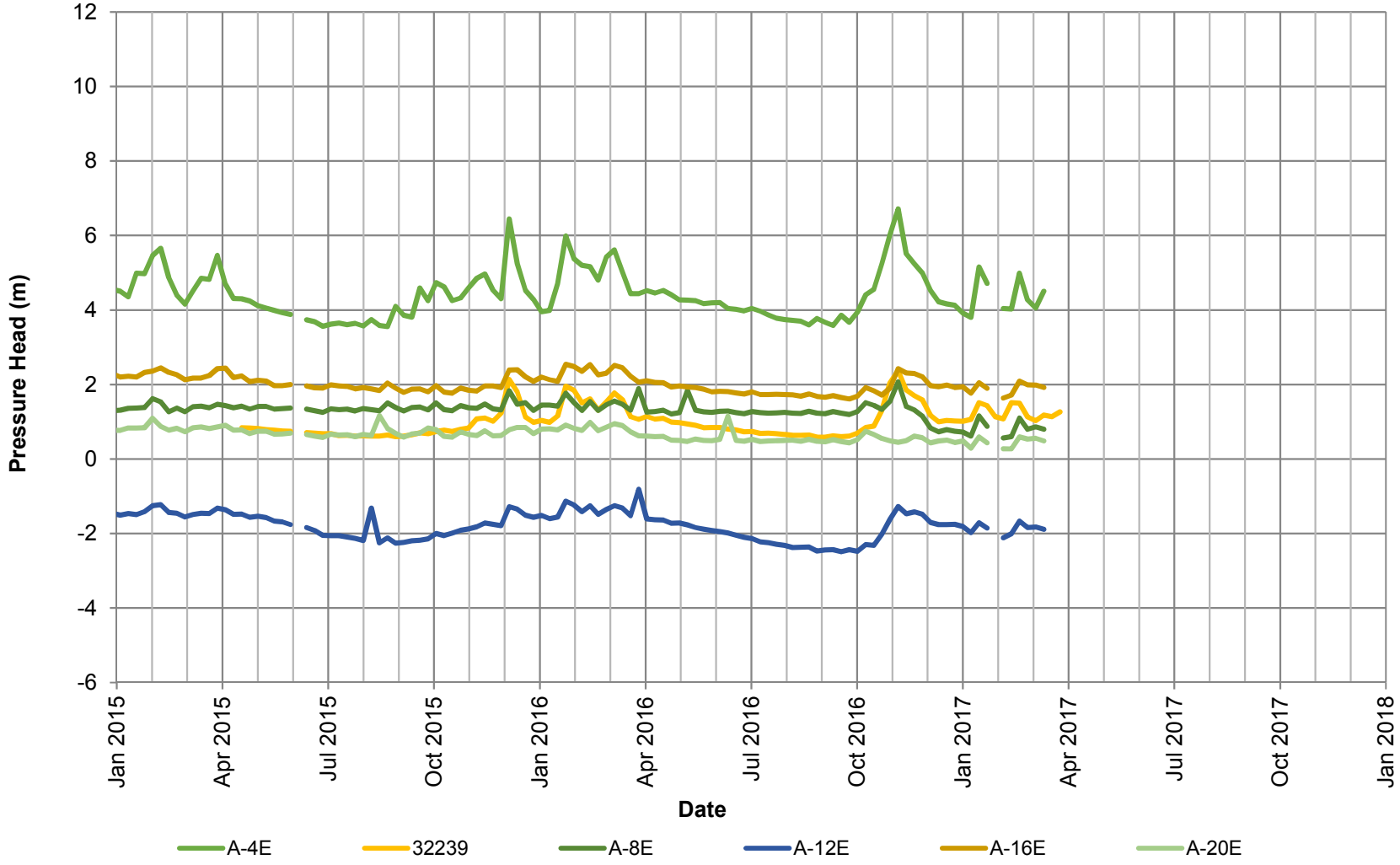
amec foster wheeler

Figure 3: Old TDF Piezometer Records - Plane A Outer Embankment Slope, Location 2 A-2E, A-6E, A-10E, A-14E, A-18E



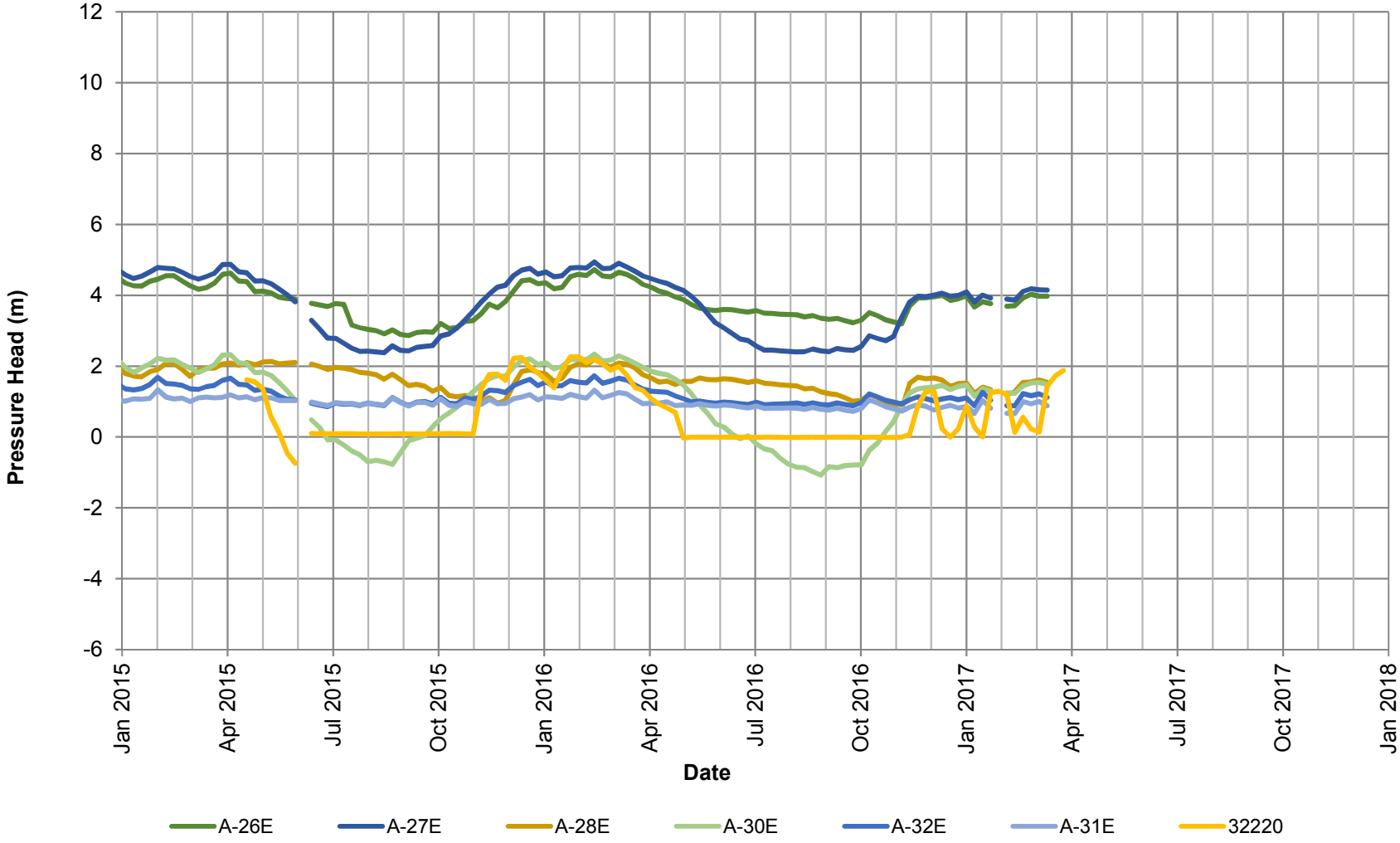
amec foster wheeler

Figure 4: Old TDF Piezometer Records - Plane A
Outer Embankment Slope, Location 3
A-4E, 32239, A-8E, A-12E, A-16E, A-20E



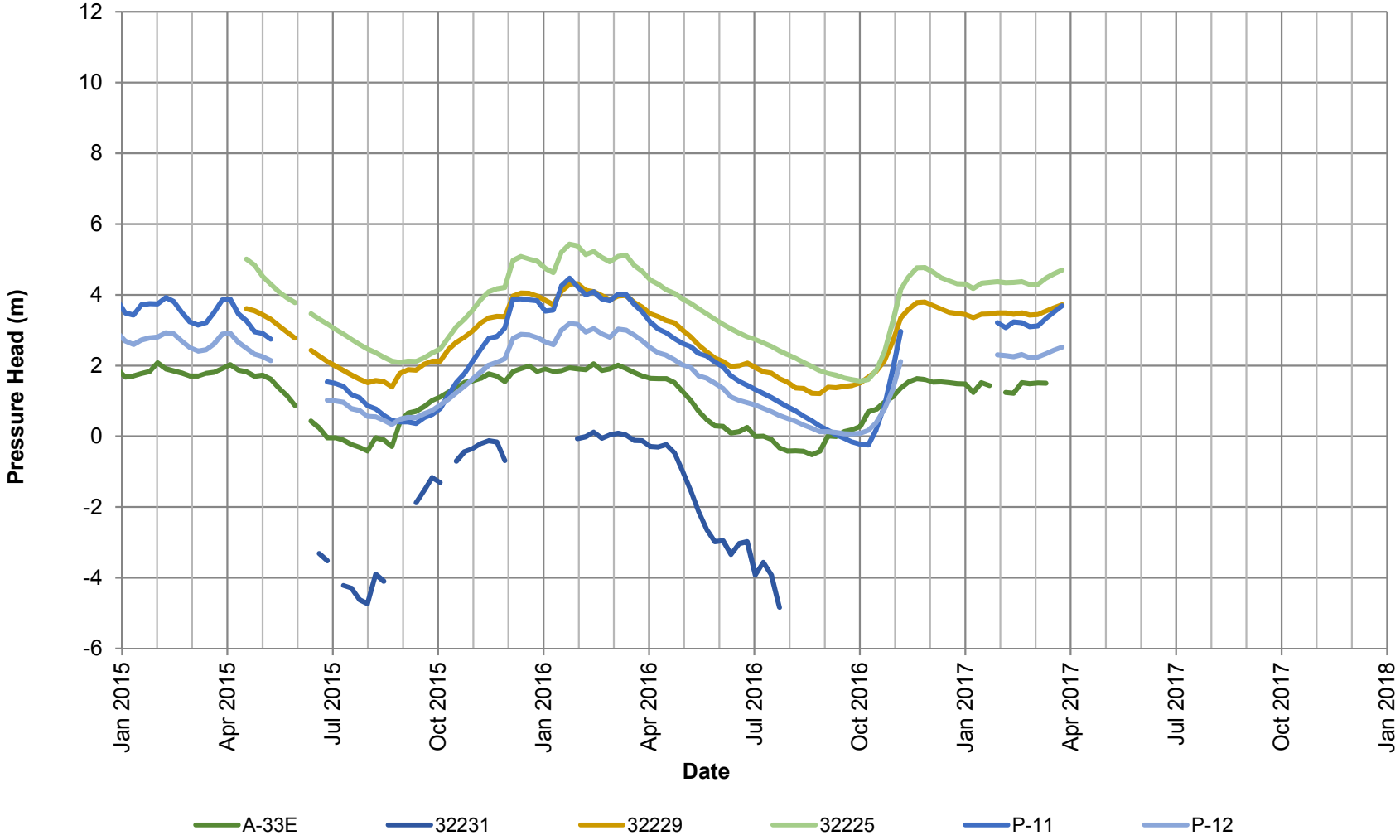
amec foster wheeler

Figure 5: Old TDF Piezometer Records - Plane A
Upper Tailings Beach
A-26E, A-27E, A-28E, A-30E, A-31E, A-32E, 32220



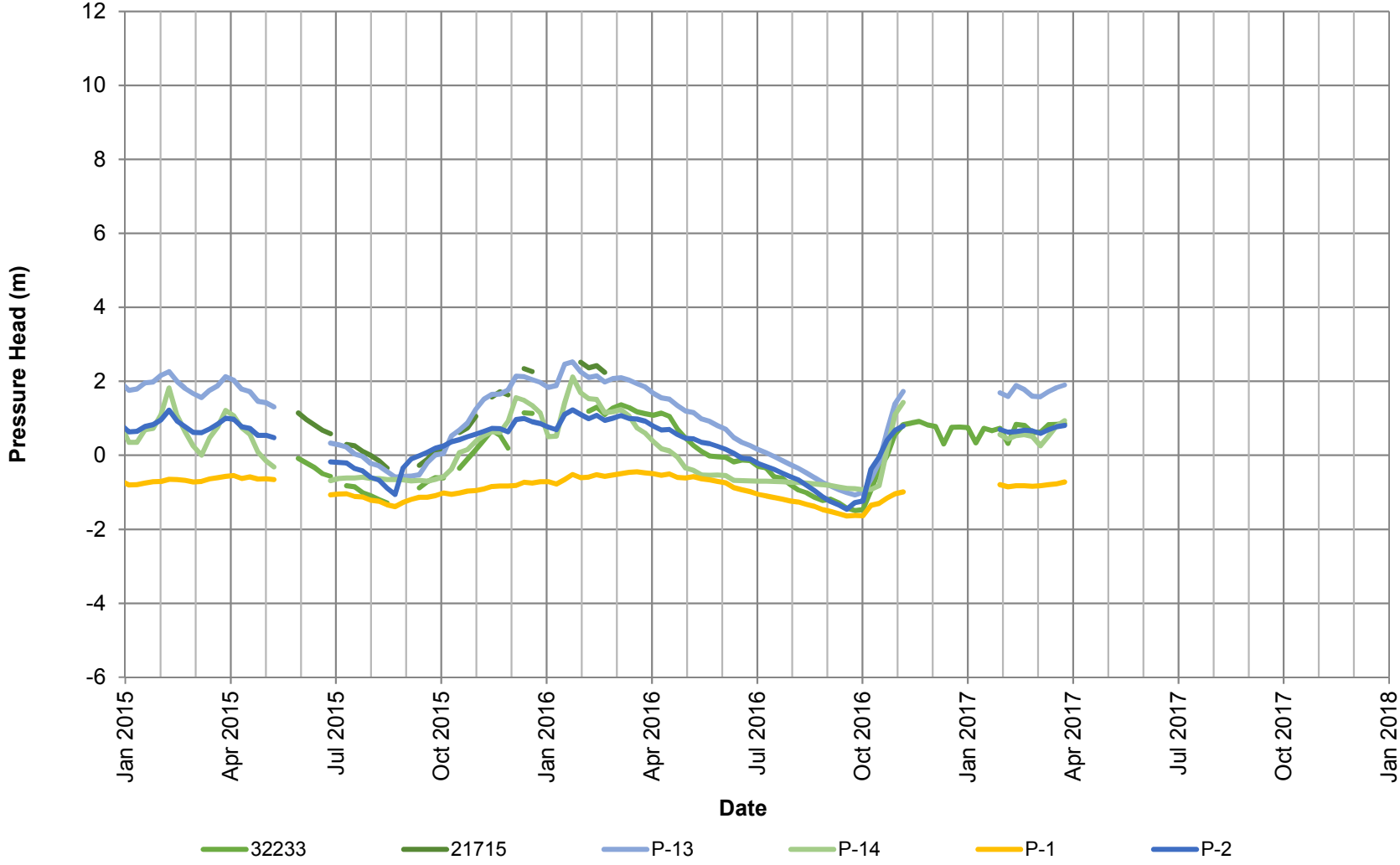
amec foster wheeler

Figure 6: Old TDF Piezometer Records - Plane A
Strip and Paste Berm
A33-E, 32231, 32229, 32225, P-11, P-12



amec foster wheeler

Figure 7: Old TDF Piezometer Records
Plane 3 (32233, 21715, P-13, P-14) and Plane 3/4 (P-1, P-2)



amec foster wheeler

Figure 8: Old TDF Piezometer Records - Plane 4
32237, 1204, P-3, P-4

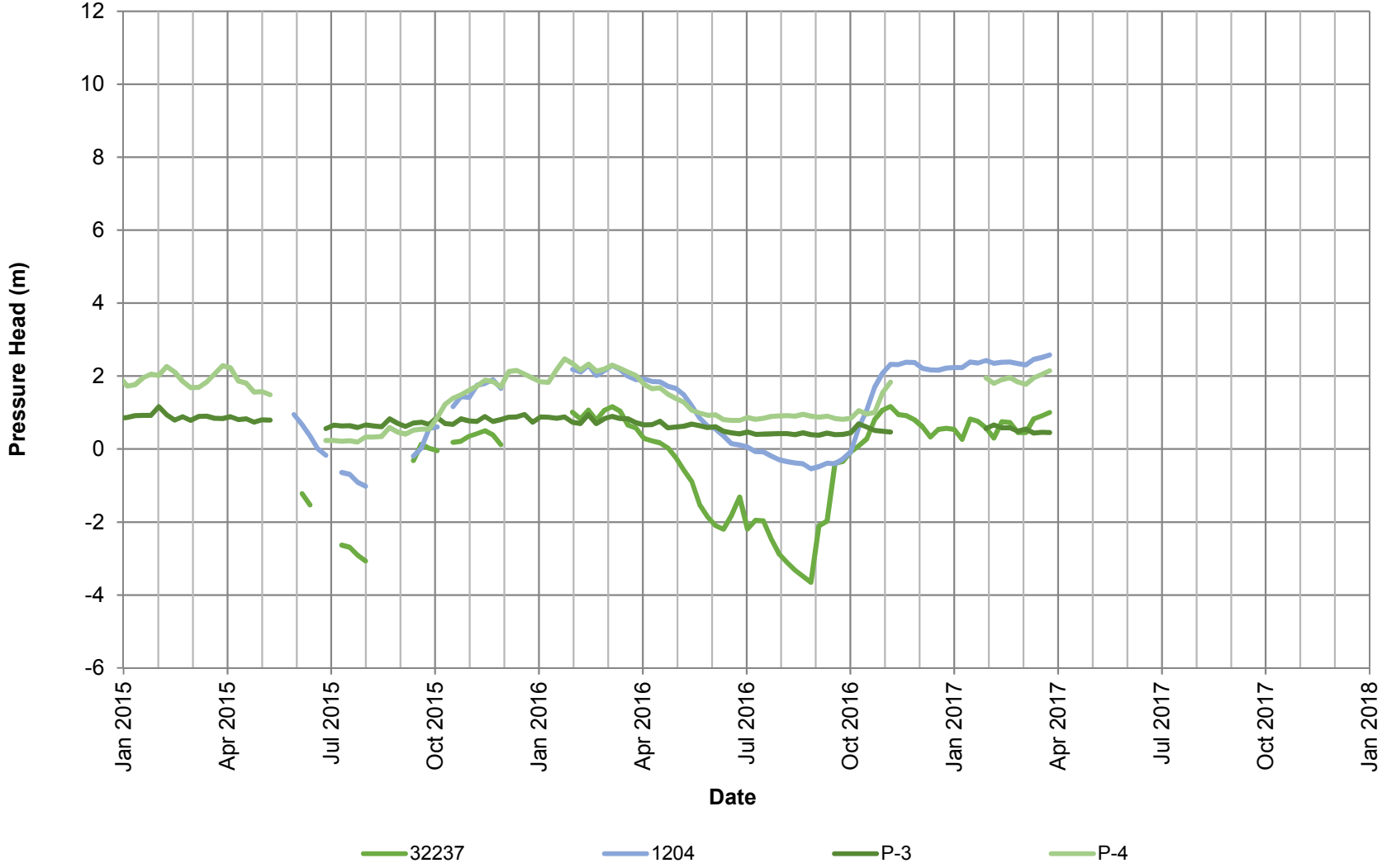
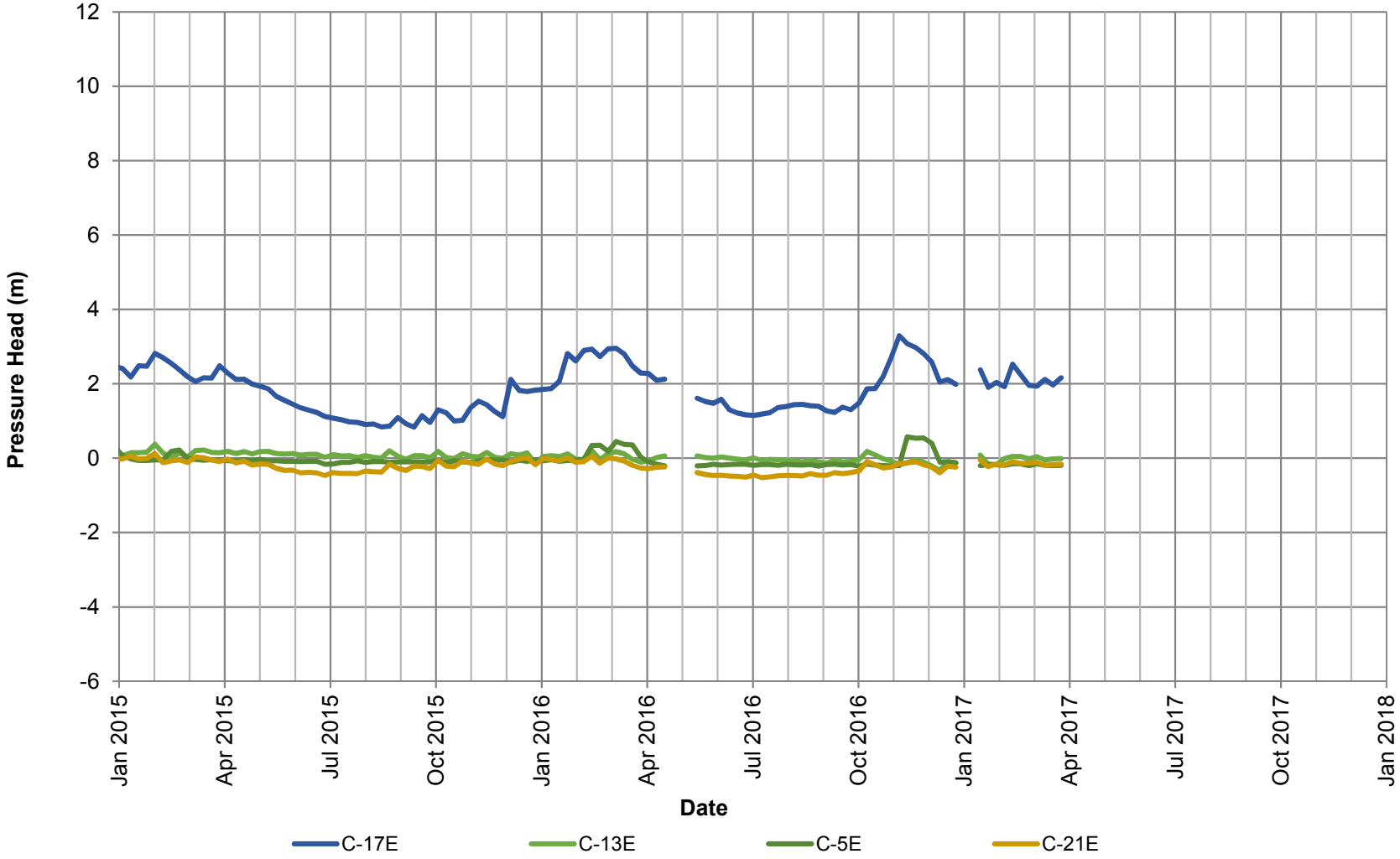
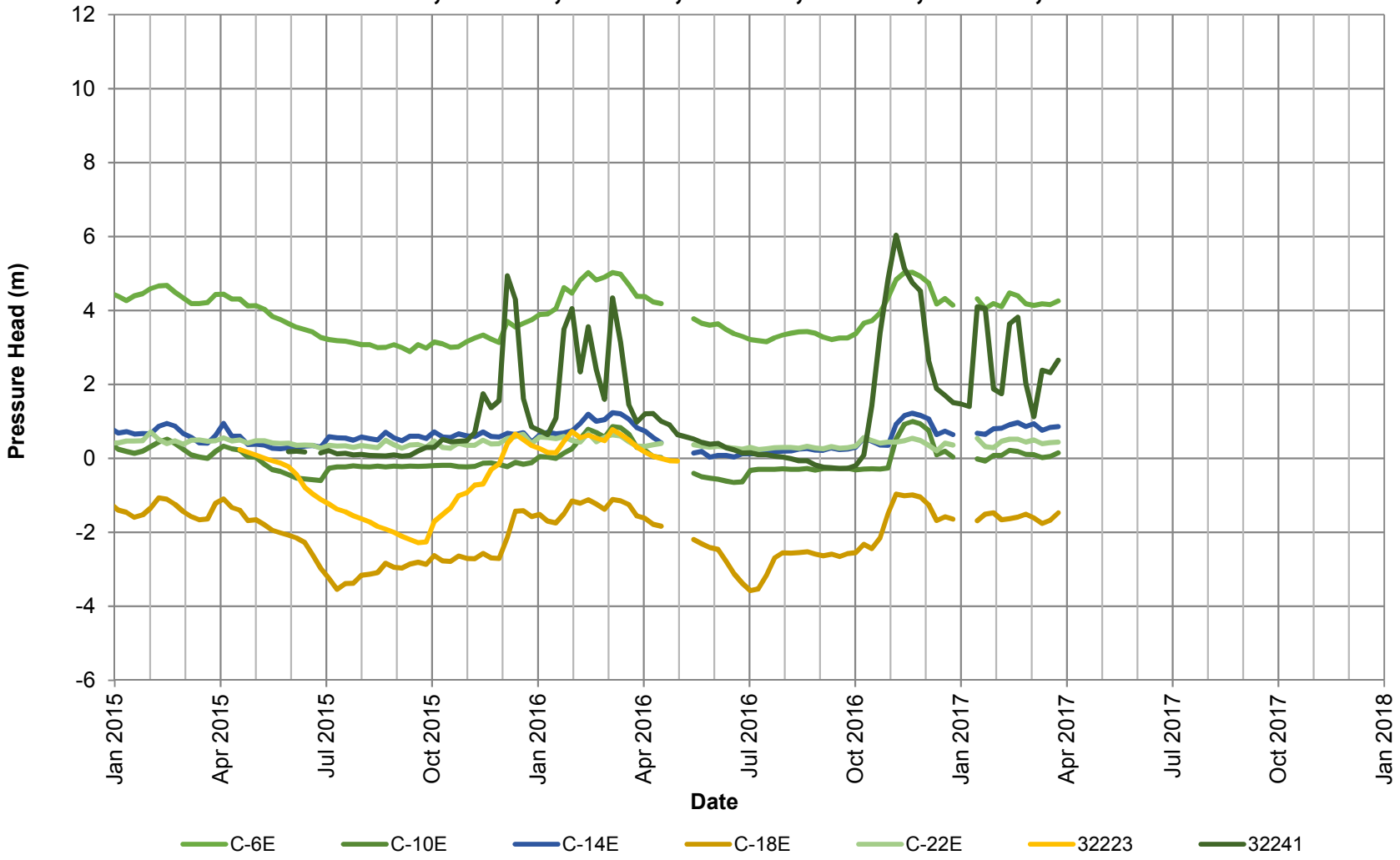


Figure 9: Old TDF Piezometer Records - Plane 5
Outer Embankment Slope, Location 1
C-5E, C-13E, C-17E, C-21E



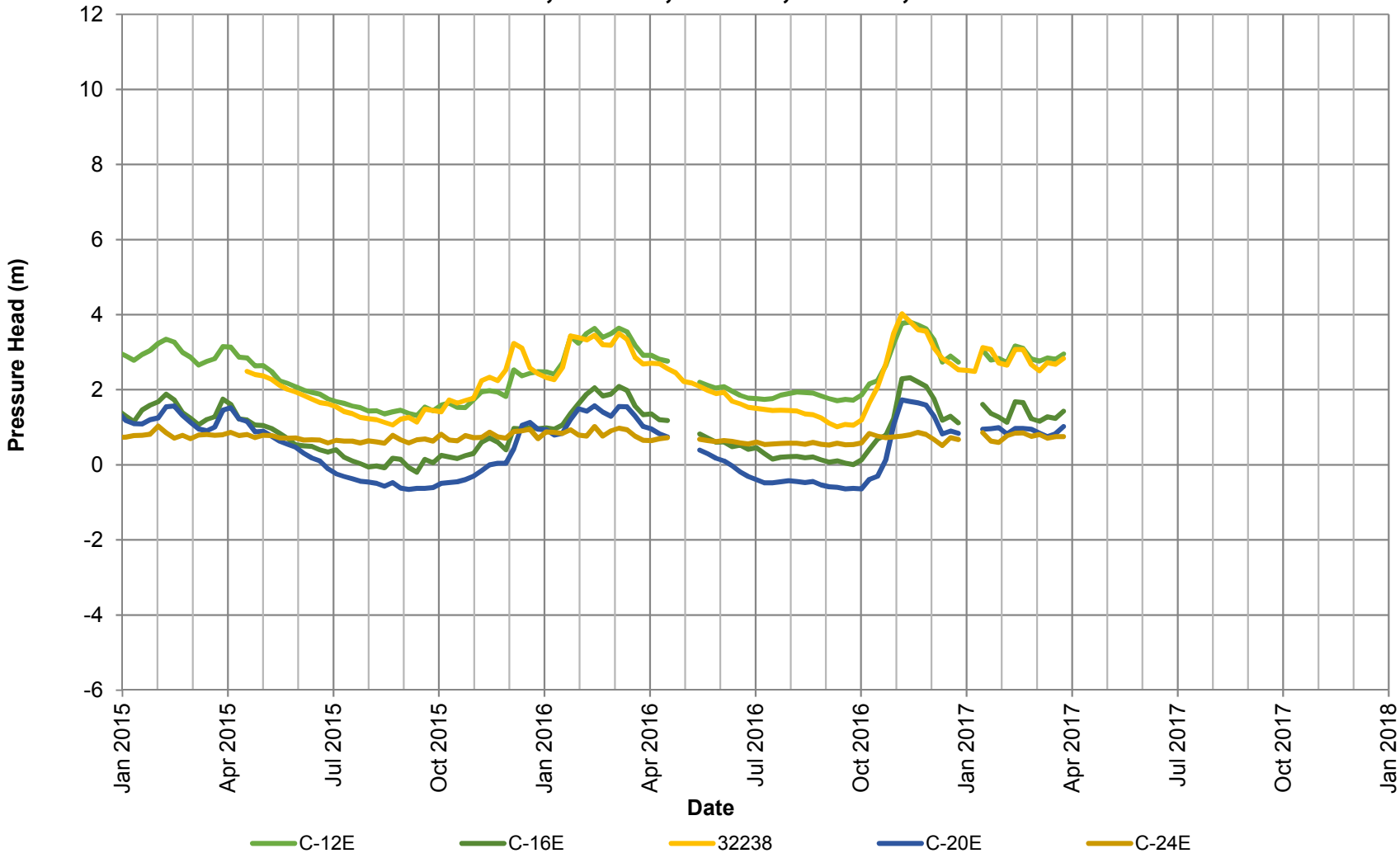
amec foster wheeler

Figure 10: Old TDF Piezometer Records - Plane 5
Outer Embankment Slope, Location 2 and Lower Tailings
C-6E, C-10E, C-14E, C-18E, C-22E, 32223, 32241



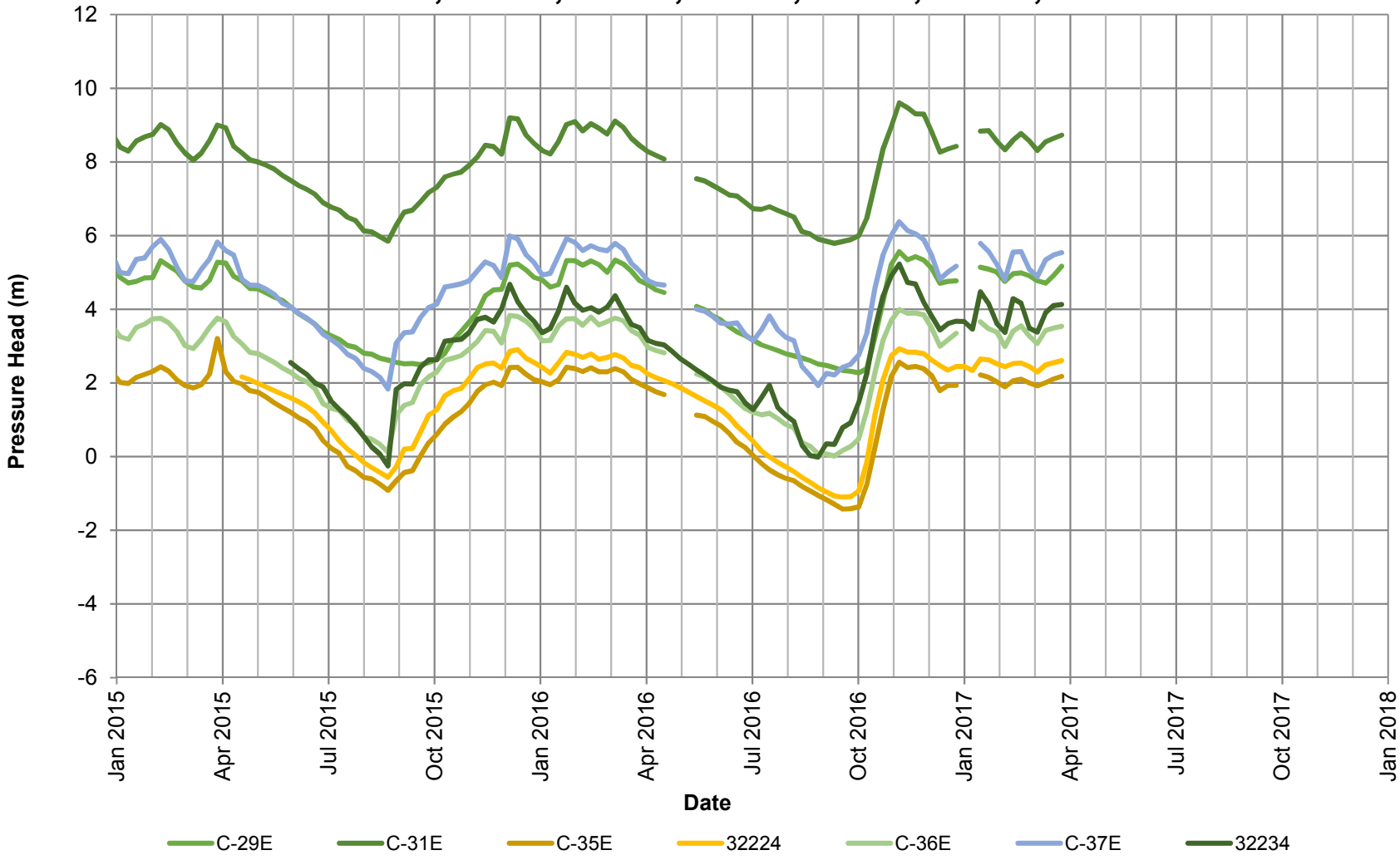
amec foster wheeler

Figure 11: Old TDF Piezometer Records - Plane 5
Outer Embankment Slope, Location 3
C-12E, C-16E, 32238, C-20E, C-24E



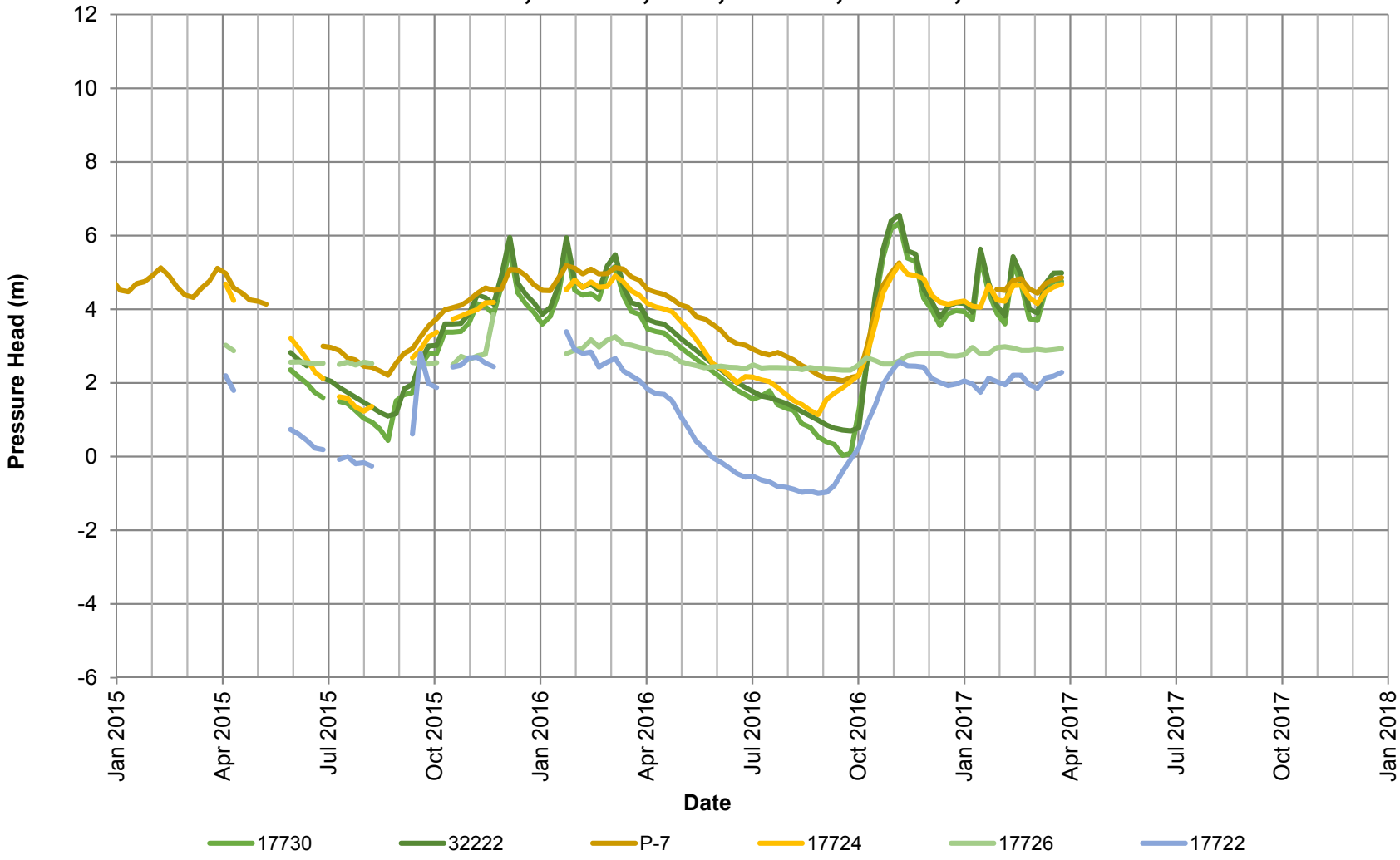
amec foster wheeler

Figure 12: Old TDF Piezometer Records - Plane 5
Upper Tailings Beach
C29E, C-31E, C-35E, 32224, C-36E, C-37E, 32234



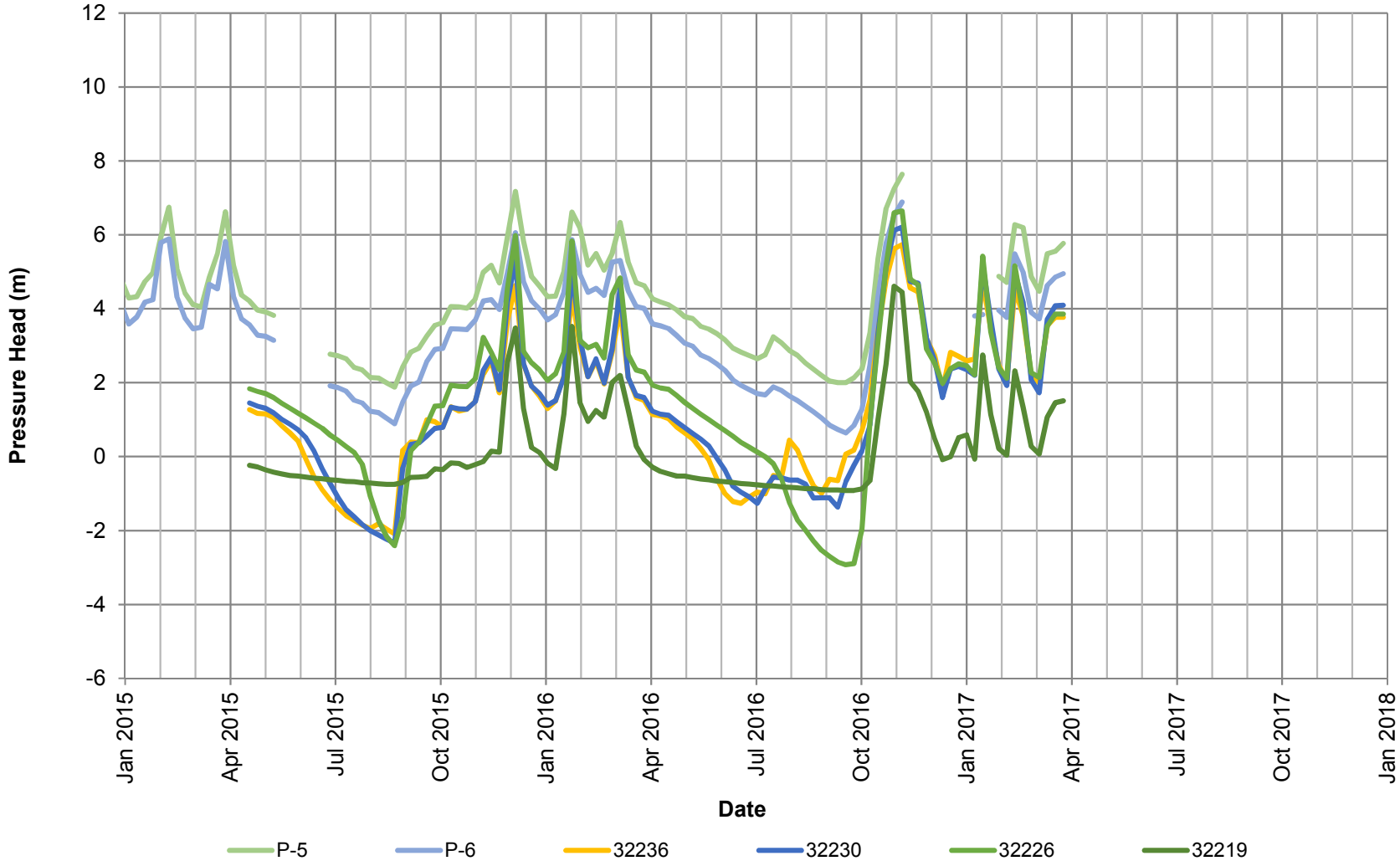
amec foster wheeler

Figure 13: Old TDF Piezometer Records - Plane 5
Paste Berm and Upstream Tailings
17730, 32222, P-7, 17724, 17726, 17722



amec foster wheeler

Figure 14: Old TDF Piezometer Records
Plane 5/6 (P-5, P-6) and Plane 6 (32236, 32230, 32226, 32219)



Memo

Date: 30 March 2018

To: Nicole Pesonen

From: Frederic Besozzi

CC: Christine Peters, Dan Hughes-Games

Ref: NX14001B.2017

Re: **Nyrstar Myra Falls Tailings Management Facilities**
Q2-2017 Dam Safety Monitoring Data Update

1.0 BACKGROUND

Amec Foster Wheeler Environment & Infrastructure (Amec Foster Wheeler) was retained by Nyrstar Myra Falls (NMF) to receive, process and review the monitoring data from the Myra Falls mine tailings management facilities on a quarterly basis as part of the dam operation and surveillance program. This memorandum includes a brief review of the monitoring data collected throughout the second quarter of 2017 (Q2-2017), which included:

- Rainfall and temperature records,
- Vibrating wire piezometer (VWP) readings,
- Slope inclinometer readings, and
- Deformation monument surveys,

The updated monitoring data is presented in a series of figures and tables included in Attachments A through E.

Provision of background information is not the purpose of this memorandum. The reader is referred to the annual Dam Safety Inspection (DSI) reports, annual construction reviews, OMS manual and design reports for further details on the facility design, development and operation.

2.0 DATA RECEIVED AND REVIEWED

A summary of data received and collated is provided in Table 1, together with information on the source, format, reading frequency, time range and gaps, if any.

Amec Foster Wheeler Environment & Infrastructure,
a Division of Amec Foster Wheeler Americas Limited
4385 Boban Drive
Nanaimo, BC, V9T 5V9
Tel: 250-758-1887
amecfw.com

Table 1 – Monitoring Data Source and Status

Monitoring Data Type	Source (Acquisition Mode)	Format Received	Reading Frequency	Responsible	Remarks
Weather data from Paste Plant	Automated readings	Raw data logger download (Excel)	Daily, hourly	NMF	
VWP readings for Lynx TDF	Automated readings	Raw data logger download (Excel)	4 times a day	NMF	
VWP readings for Old TDF (old VWP)	Automated readings, Huts A, B, and C	Raw data logger download (Excel)	Daily – April 1 to June 26 Hourly – June 26 to 30	NMF	Missing Hut A data: 01 April to 03 May
New VWP at the Old TDF	Automated readings	Raw data logger download (Excel)	4 times a day – April 1 to June 26 Hourly – June 26 to 30	NMF	
Deformation monuments for both Lynx and Old TDF	Land survey, total station	Excel	Quarterly	NMF	
Tailings surface (Lynx TDF)	Land survey, GPS and total station reflectorless	LandXML surface	Quarterly	NMF	
Slope Inclinometer	Slope inclinometer device	RPP file, Excel file	Twice annually	Amec Foster Wheeler Site Engineer	

3.0 WEATHER DATA

Weather data for the mine site is collected from the Paste Plant station. The Paste Plant station automatically collects hourly rainfall, snow pack, relative humidity, temperature, and wind data. Precipitation data was collected from the Powerhouse station up to 2015 and has since been used only periodically to record weather data at the mine site. Snowfall is calculated as the daily difference in average snow pack, which is converted in water equivalent (10 mm of snow equals 1 mm of rain) to calculate total daily precipitation.

Monthly average and extreme temperature values are presented in Attachment A. Monthly precipitation records and statistics since 1979 as well as daily rainfall records during Q2-2017 are also included in Attachment A.

Monthly precipitation totals indicated April was wetter than average, exceeding the average by 100 mm.

Monthly maximum and minimum temperatures were within the range of maximum and minimum values for the previous period of record (2006 through 2016).

4.0 PIEZOMETERS

The Q2-2017 monitoring data update includes the automated monitoring of pore water pressure data from the vibrating wire piezometers at the Old TDF and Lynx TDF. The locations of these instruments are shown on Drawings 010703, 010704, and 010709 in the 2016 DSI report (Amec Foster Wheeler, 2017a)[1]. Cross-sections of the Old TDF and Lynx TDF along the major instrumentation planes are provided on Drawings 010705 through 010707 and 010711 through 010713 of the DSI report.

4.1 Lynx TDF

Lynx TDF piezometer network comprises:

- VWPs at various depths within the paste tailings of Lynx TDF,
- VWPs in Lynx Dam fill, and
- VWPs in the shallow and deep foundation soils within Lynx Dam ultimate footprint.

4.1.1 Piezometer Results

Weekly maximum piezometer levels for Lynx TDF are presented in Tables 1 and 2 and shown on Figures 1 through 5 of Attachment B. Piezometer levels are reported in geodetic elevations but

[1] Amec Foster Wheeler Environment & Infrastructure (2017a). Myra Falls Tailings Storage Facilities 2016 Dam Safety Inspection Report. File No. NX14001B, Nanaimo, 31 March 2017.

pressure heads (in metres of water) are plotted for few locations (see Figure 3b and 5) where VWP are recording, or have been recording, negative (suction) pressures.

Trends in the processed data for Lynx TDF piezometers collected during Q2-2017 are generally consistent with piezometer levels measured in Q2-2016.

Four VWPs located on Plane F showed trends with piezometer levels higher than surrounding piezometers.

- VWP 32221, a shallow foundation piezometer located outside the current dam footprint near the Super Pond, showed an elevation pressure head approximately 3 m higher than previously recorded. This elevated pressure is assumed to be caused by fill placed in the area.

- VWP 33784, a deeper foundation piezometer located near the dam crest had an elevation head approximately 1 m higher than recorded during Q2-2016.

- VWP 29336 and 29322 both located in Plane F also recorded new peak pressure heads in the first half of June. The pressure heads recorded for both piezometers were consistent with previous trends and within 0.1 m of previously recorded maximums.

4.2 Old TDF

The Old TDF piezometer network comprises:

- VWPs under the outer embankment berm and in the upper tailings beach along instrumentation planes A and C (data collected in Hut A and Hut C),
- VWPs located below the base of the Paste Berm (data collected in Hut B),
- VWPs in the APA Paste Berm fill, foundation tailings and soils, divided between instrumentation Planes 1 through 6,
- VWPs in the paste tailings, in the southeast corner of the Amalgamated Paste Area (APA), and
- VWPs at the base, southeast slope toe and east slope crest of the Old TDF Surge Pond.

On 30 April 2017 two piezometers VWP36971 and VWP36973 were reconnected to RStar unit 5006, and began to record and transmit data.

On 26 June 2017 automated piezometer readings were switched from daily to hourly for construction.

4.2.1 Piezometer Results

Weekly maximum piezometer levels for Old TDF Huts A, B and C are presented in Tables 1 through 3 and Figures 1 through 14 of Attachment C. The piezometer levels are reported in pressure heads (in metres of water) and compared to the revised VWP thresholds. The VWP thresholds have been revised to formulate a new rationale for threshold conditions based on estimated reductions in effective stress at each piezometer. The thresholds were developed based on the long-term static and post seismic stability models which include the closure cover over the facility (Amec Foster Wheeler, 2017b)[2].

The following threshold exceedances were noted:

Instrument Plane A/Plane 2:

- A-2E and A-4E exceeded trigger points S3 and P1 throughout the quarter.
- A-28E exceed trigger points P1, and S2 or S3 throughout the quarter.
- A-26E exceeded trigger points S2 and P1 throughout the quarter.
- VWP 32220 and P-11 exceed trigger points P1, and S1 or S2 in April, then decreased below threshold levels.
- A-18E exceeded trigger point S1 in May, then decreased below threshold levels.

Instrument Planes 1, 3, 4 and 6

- Piezometers did not exceeded trigger points throughout the quarter

Instrument Plane C/Plane 5:

- C-29E exceeded trigger points S3 and P1 throughout the quarter
- VW32241 and VW32238 exceeded trigger points P1 and S2 or S1 for the start of the quarter, then decreased below threshold levels in June
- C-17E, all of the Upper Tailings Beach VWPs, and VW17730 exceeded trigger points S1 or S2, and P1 on most weeks
- Paste Berm VW32222, VW17724 and VW17722 exceeded trigger points S1 in April then decreased below threshold levels for the remainder of the quarter

In general measured pressure head were consistent with trends observed during the previous year, Q2-2016, with the following exceptions:

[2] Amec Foster Wheeler Environment & Infrastructure (2017b). Old Tailings Facility Vibrating Wire Piezometer Threshold Update. Technical Letter, File No. NX14001B, Nanaimo, 17 March 2017.

- In Plane 5 VW32241 and C-14E had measured pressure heads approximately 1 m and 0.5 m higher than recorded in Q2-2016.
- Piezometers in Planes 5 and 6 showed pressure heads 1 to 2 m higher than recorded Q2-2016. These piezometers showed a decreasing trend in pressure head over the quarter.
- At the end of June an increase in pressure head was recorded in piezometers A5-E, A-10E, A-12E, P-7 and VW17722. The increase in pressure is assumed to be caused by loading from fill placed for construction of the APA stabilization berm.

4.2.2 Piezometer Damage

Several piezometers missed or stopped transmitting data during Q2-2017.

- VWP 17724, VWP 17722 and VWP 17726 missed all readings between April 1 and June 30. These VWP are all connected to RStar unit 4304.
- VWP 32224 and VWP32238 missed some readings between April 1 and May 29. These VWP are both connected to RStar unit 4302.
- VWP 32225 and VWP32229 missed a few readings between April 1 and May 29. These VWP are both connected to RStar unit 4292.
- VWP 36972's lead cable was severed on 30 June 2017.

5.0 SLOPE INCLINOMETERS

Slope inclinometer casings are installed to monitor long-term deformations in the foundation soils beneath the Old TDF at BH15-32 and BH15-35, and in Lynx Dam and its foundation at BH14-08A and BH14-10A. Locations of these casings can be found in Drawings 010708 and 010710 of the 2016 DSI report. Plots illustrating cumulative and incremental displacement measured during Q2-2017 are provided in Attachment D.

Numerous sources of error can occur during inclinometer profile surveys. Errors can be caused by the probe itself, or to its position at each of the depth intervals, which may be due to human error or independent movement of the casing from the surrounding soil mass following the base readings. Errors can be random or systematic. Systematic errors can be partially corrected to reduce influence on incremental displacement values. Random errors may also occur, such as sensor errors or variability in probe positioning due to the tolerances of the casing grooves. Random errors are generally not additive with depth or with time, but rather, cancel out. The reported accuracy of the probe is 0.2 mm horizontal deflection per 0.5 m length at each reading.

Displacements indicated by slope inclinometer readings are considered significant if the incremental displacement repeatably exceeds the measurement tolerance, and clear

displacement trends are indicated on the incremental displacement plot versus time. Such trends are also represented by an offset in the cumulative displacement data. In either case, slope inclinometer readings are interpreted and compared to movement measured from the surface monitoring monument network.

5.1.1 Lynx TDF Slope Inclinometers

The third profile survey of the Lynx TDF inclinometer casings was collected in May 2017.

For inclinometer BH14-08A, the initial survey from March 2016 showed larger displacements than subsequently measured in November 2016 or March 2017. It is assumed this is due to a bias from the probe. As such the initial baseline reading for BH14-08A was adjusted from March 2016 to November 2016 to remove the bias.

Minor displacements were measured in the surficial 4 m of BH14-08A and BH14-10A. The displacement is located near surface and is assumed to be caused by construction or nearby traffic. Total cumulative displacements for Q2-2017 were 5 mm for BH14-08A and 3 mm for BH14-10A. Note that BH14-10A is located within prepared foundation areas approximately 20 m from the dam toe.

5.1.2 Old TDF Slope Inclinometers

The fourth profile survey of the Old TDF inclinometers was completed in May 2017. Minimal displacement was observed in these inclinometers. Maximum measured cumulative displacements were 13 mm in BH15-32 and 7 mm in BH15-35. The majority of the measured movement appears to be within 5 to 7 m of surface and is interpreted to be caused by traffic or construction.

6.0 DEFORMATION MONUMENTS

Surface deformation monuments consisting of survey prisms are installed in key locations at both tailings facilities. The surface monuments were surveyed in Q2-2017. Both raw survey data and calculated cumulative displacements in the transverse (i.e. perpendicular to the dam alignment), longitudinal (i.e. parallel to the dam alignment) and vertical directions are reported in Attachment E in a tabulated form.

6.1 Lynx TDF

Monuments are installed along the inside edge of the upstream and the downstream crest of Lynx Dam. There are thirteen monuments on the upstream crest and eight monuments on the downstream crest. One monument was replaced since the Sept 2016 readings. There are three monuments that were destroyed since installation that have not been replaced.

The monument layout is reflected on Drawing 010710 of the 2016 DSI report. The combined measurement error (total of instrument, human, and network) for the Lynx TDF monument survey

is approximately 1.5 cm and 1.0 cm for horizontal and vertical displacement, respectively. As such, displacements below a threshold of 2.0 cm are not considered significant.

Seven upstream monuments experienced more than 2 cm of movement since the baseline survey.

- Lynx-14-04, 2.2 cm of settlement.
- Lynx-14-08, 3.1 cm of upstream movement and 3 cm of settlement.
- Lynx-14-12, 3.7 cm of settlement.
- Lynx-14-14, 2.9 cm of upstream movement and 4.0 cm of settlement.
- Lynx-14-16, 3.4 cm of upstream movement and 3.8 cm of settlement.
- Lynx-14-18, 2.2 cm of upstream movement.
- Lynx-14-22, 2.4 cm of settlement.

Upstream movement and settlement of the upstream buttress is expected as the tailings consolidate.

One downstream monuments experienced more than 2 cm of transverse movements.

- Lynx-14-13, 2.1 cm of upstream movement.

6.2 Old TDF

Monuments are installed on the downstream crest of key embankments within the Old TDF. There are eleven monuments on the Paste Berm, nine monuments on the Outer Embankment Berm (6:1 Buttress), and fifteen monuments on the Seismic Upgrade Berm. Six monuments were replaced since the September 2016 survey. There are five monuments that were destroyed since initial installation that have not been replaced.

The monument layout is reflected on Drawing 010708 of the 2016 DSI report. The combined measurement error for the Old TDF monument survey is approximately 1.0 cm for both horizontal and vertical displacement. As such, displacements below a threshold of 2.0 cm are not considered significant.

The total cumulative displacements and settlements between the initial survey and Q2-2017 were generally insignificant and equal to 2 cm or less. Seven monuments have experienced more than 2 cm of movement.

- Located on the downstream side of the seismic upgrade berm TDF14-10 and TDF14-14 have experienced 2.4 and 2.6 cm of uplift since initial installation.

- Located on the Outer Embankment Berm TDF14-25 has experienced 2.1 cm of settlement since initial installation.

- On the downstream Paste Berm TDF14-34 and TDF14-36 have experienced 2.9 and 2.0 cm of transverse movement towards the east.

- Also on the downstream Paste Berm TDF14-31 and TDF14-32 have experienced 3.9 and 4.2 cm of transverse movement as well as 3.3 and 2.2 cm of settlement.

7.0 TAILINGS PRODUCTION AND STORAGE

NMF suspended its mining and milling operations in June 2015 for an indefinite period of time. Tailings production has not taken place since that time.

Dredged material from the Super Pond was deposited in the Lynx TDF during Q2-2017.

A paste survey was not completed during Q2-2017. As such there is no tailings density and storage capacity update included in this report.

8.0 CLOSURE

This memorandum has been prepared for the exclusive use of Nyrstar Myra Falls for specific application to the area within this memorandum. Any use which a third party makes of this memorandum, 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 memorandum. It has been prepared in accordance with generally accepted geotechnical and tailings dam engineering practices. No other warranty, express or implied, is made.

Attachment A

Weather Data

Table\Figure Number	Title
Table 1	Monthly Precipitation Data by Year
Table 2	2017 Monthly Temperatures (˚C)
Figure 1	Monthly Precipitation at Myra Falls
Figure 2	Daily Rainfall at the Paste Plant Weather Station

amec foster wheeler

Table 1: Monthly Precipitation Data by Year

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual Total	
YEAR	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	Actual	Inferred
*1979						71	125	47	384	343	187	620		(2911)
1980	270	296	90	241	52	87	70	37	181	180	497	706	2706	
1981	346	428	118	278	114	125	78	63	310	450	466	412	3189	
1982	299	505	110	193	22	27	19	35	89	779	213	493	2783	
1983	530	624	375	84	42	130	95	60	60	218	619	193	3028	
*1984	399	520		263	193	32	9	40	95	576	340	220		(2944)
*1985	64	175	148	114	85	21	32	21	77					(1886)
*1986			418	88	239	89	41	4	54	590		390		(2982)
*1987		337	425	263	223	184	59	18	98	84	592	437		(3070)
1988	343	203	212	215	215	80	25	29	114	246	582	201	2467	
1989	329	102	224	198	63	72	42	42	18	339	250	253	1931	
1990	372	283	123	59	82	130	31	70	19	565	806	344	2883	
1991	353	543	86	126	80	28	33	207	8	60	596	610	2730	
1992	860	305	45	244	6	41	11	36	90	390	257	241	2527	
1993	57	55	289	207	148	64	77	92	1	180	141	393	1705	
*1994	258		203	149	79	137	6	47	74	219	380	499		(2321)
*1995	- no data -													
*1996	- no data -													
*1997		64	259	217	124	183	72	114	0	442	348	374		(2547)
1998	571	419	159	21	37	14	67	3	3	130	473	279	2175	
1999	219	295	174	96	50	16	1	114	55	138	667	183	2007	
2000	50	218	99	76	132	50	124	52	62	325	168	125	1479	
2001	333	123	144	107	132	38	38	163	67	200	519	367	2233	
2002	195	134	56	93	41	23	28	27	51	34	588	288	1557	
2003	471	61	412	177	50	51	44	30	45	558	94	348	2341	
2004	327	134	160	40	24	42	23	74	157	218	489	340	2026	
2005	433	70	223	396	306	58	100	54	98	515	268	522	3043	
2006	616	316	379	125	76	46	28	5	77	139	811	561	3176	
2007	538	288	438	208	75	129	71	69	167	410	491	416	3300	
2008	250	176	188	59	80	29	8	162	22	260	458	163	1854	
2009	140	139	291	91	171	44	35	17	165	321	882	258	2553	
2010	666	353	381	223	171	60	2	19	269	478	285	629	3535	
2011	284	327	528	166	80	12	82	42	340	295	478	200	2834	
2012	601	241	424	199	55	86	10	14	16	317	525	264	2752	
2013	96	267	168	112	125	66	3	125	277	57	227	100	1622	
2014	170	243	341	170	48	32	32	17	144	589	404	548	2740	
2015	259	332	460	105	35	15	20	149	217	262	248	700	2802	
*2016	**469**	**374**	**507**	**81**	**17**	**63**	**31**	**61**	**87**	**501**	**935**			(3499)
*2017		**240**	**377**	**260**	**55**	**36**								(2679)
Num.	32	34	35	36	36	37	36	36	36	35	34	34	**28**	(37)
Avg.	349	270	258	160	98	65	44	60	111	326	449	373	**2499**	(2563)
St. Dev.	191	146	142	83	71	46	34	50	100	184	216	168	**565**	(552)
Max.	860	624	528	396	306	184	125	207	384	779	935	706	**3535**	(3535)
Min.	50	55	45	21	6	12	1	3	0	34	94	100	**1479**	(1479)

Notes: Compiled from daily observations recorded at the powerhouse weather station (Environment Canada) prior to 2015 and from the Paste Plant from 2015 onwards

Lime shading - dry (value < monthly mean - standard deviation)

Aqua shading - wet (value > monthly mean + standard deviation)

Peach shading - Precipitation data taken from the Paste Plant weather station.

* = years with incomplete data sets

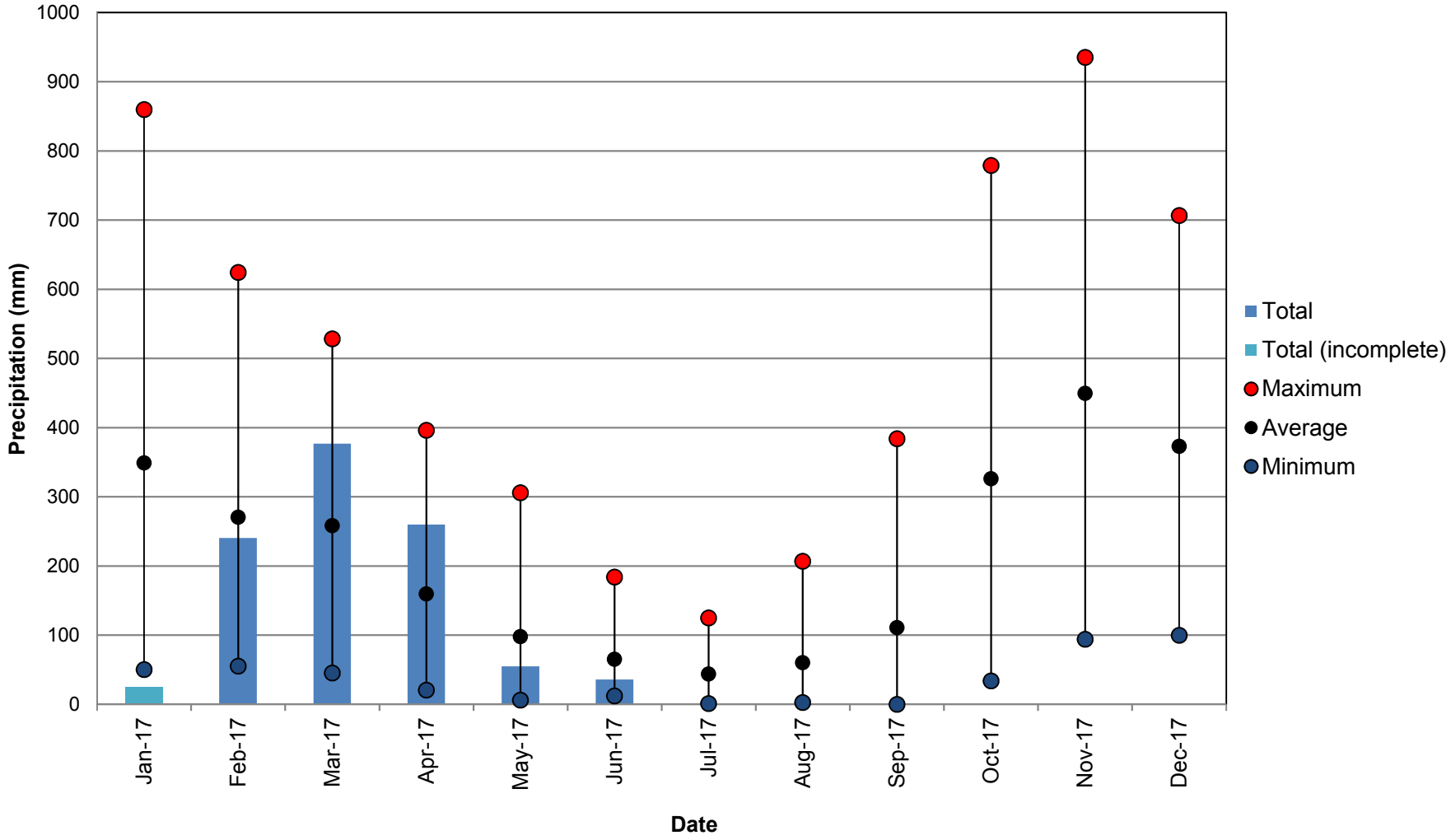
Table 2: 2017 Monthly Temperatures (˚C)

Month	Previous Period of Record[1]		2017[2]	
	Minimum	Maximum	Minimum	Maximum
January	-12.0	11.9	-5.3	8.7
February	-12.0	12.5	-7.2	11.8
March	-8.3	19.0	-7.4	13.9
April	-4.0	23.1	-2.0	15.9
May	-1.5	31.0	0.9	29.9
June	1.0	34.3	4.0	33.2
July	4.2	38.9		
August	4.9	36.0		
September	-1.0	32.0		
October	-2.0	23.5		
November	-11.0	16.1		
December	-13.0	12.8		

[1] Temperature data obtained from Myra Falls site from 2006 to end of 2016.
[2] Temperature data recorded at the Paste Plant weather station. Statistics from 25 January 2017, inclusively.

amec foster wheeler

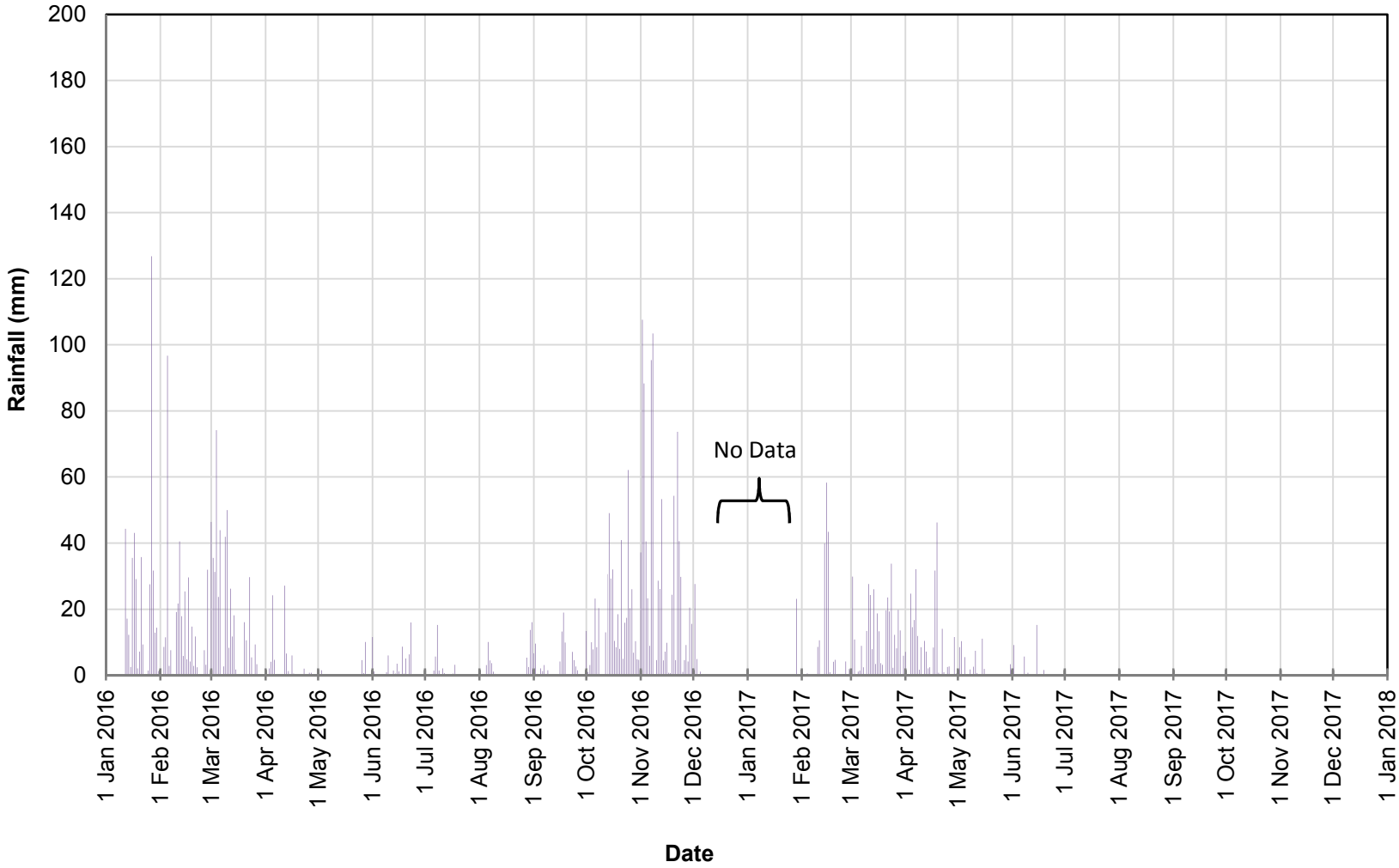
Figure 1: Monthly Precipitation at Myra Falls



File No.: NX14001B.2017

amec foster wheeler

Figure 2: Daily Rainfall at the Paste Plant Weather Station



Attachment B

Lynx TDF VWP Data

Table\Figure Number	Title
Table 1	Lynx Paste Tailings - Weekly Maximum Vibrating Wire Piezometer Readings
Table 2	Lynx Dam - Weekly Maximum Vibrating Wire Piezometer Readings
Figure 1	Lynx TDF – Deep Paste VWP Data
Figure 2	Lynx TDF – Shallow Paste VWP Data
Figure 3a	Lynx Dam – Shallow Foundation VWP Data
Figure 3b	Lynx Dam – Shallow Foundation VWP Data
Figure 4	Lynx Dam – Deep Foundation VWP Data
Figure 5	Lynx Dam – Dam Fill VWP Data

Nyrstar Myra Falls
2017 Dam Safety Inspection
Attachment B

File No.: NX14001B.2017

Table 1: Lynx Paste Tailings - Weekly Maximum Vibrating Wire Piezometer Readings

Location	Lynx TDF - Upstream Dam Toe and Paste Tailings										
Plane and Position	Plane D - U/S Toe	Plane E - U/S Toe	Plane F - U/S Toe	Plane D, E - Central	Plane D, E - Central	Plane D, E - Central	Plane E - Central	Plane E - Central	Plane E - Central	Plane D, E - Central	Plane F - Central
Piezometer	29326	17723	17721	17727	17728	17733	17731	17732	17734	33783	31089
Historical Max. Value	351.47	353.54	354.09	341.20	335.50	323.96	345.75	340.40	327.38	354.11	353.68
Tip Elevation (m)	350.00	350.70	350.90	328.40	320.70	308.50	330.30	322.70	310.50	351.66	351.26
2017-04-02	351.28	353.54	354.01	338.45	331.93	317.95	343.20		322.75	353.91	353.53
2017-04-09	351.20	353.39	353.88	338.34	331.91	317.96	343.08		322.80	353.84	353.41
2017-04-16	350.54	353.33	353.90	338.25	331.70	317.63	343.02		322.29	353.80	353.38
2017-04-23	350.44	353.19	353.85	338.08	331.37	317.25	342.81		321.59	353.77	353.37
2017-04-30	350.29	353.25	353.88	337.86	331.09	316.87	342.47		320.99	353.78	353.38
2017-05-07	350.24	353.28	353.88	337.59	330.75	316.36	342.15		320.16	353.80	353.39
2017-05-14	350.34	353.27	353.88	337.48	330.43	315.85	342.02		319.29	353.79	353.38
2017-05-21	350.51	353.26	353.87	337.22	330.12	315.34	341.63		318.54	353.79	353.38
2017-05-28	350.51	353.23	353.83	337.11	329.92	314.99	341.48		318.03	353.79	353.38
2017-06-04	350.34	353.23	353.86	336.95	329.76	314.73	341.37		317.68	353.80	353.38
2017-06-11	350.18	353.27	353.89	336.87	329.68	314.69	341.22		317.55	353.83	353.43
2017-06-18	350.26	353.27	353.84	336.75	329.62	314.66	341.04		317.46	353.82	353.39
2017-06-25	350.26	353.11	353.83	336.76	329.59	314.65	341.04		317.41	353.81	353.39

Legend:

330.05	Historical maximum value
328.29	Negative pore pressure (elevation head below tip elevation)
	Blank spaces indicate no data available

Table 2: Lynx Dam - Weekly Maximum Vibrating Wire Piezometer Readings

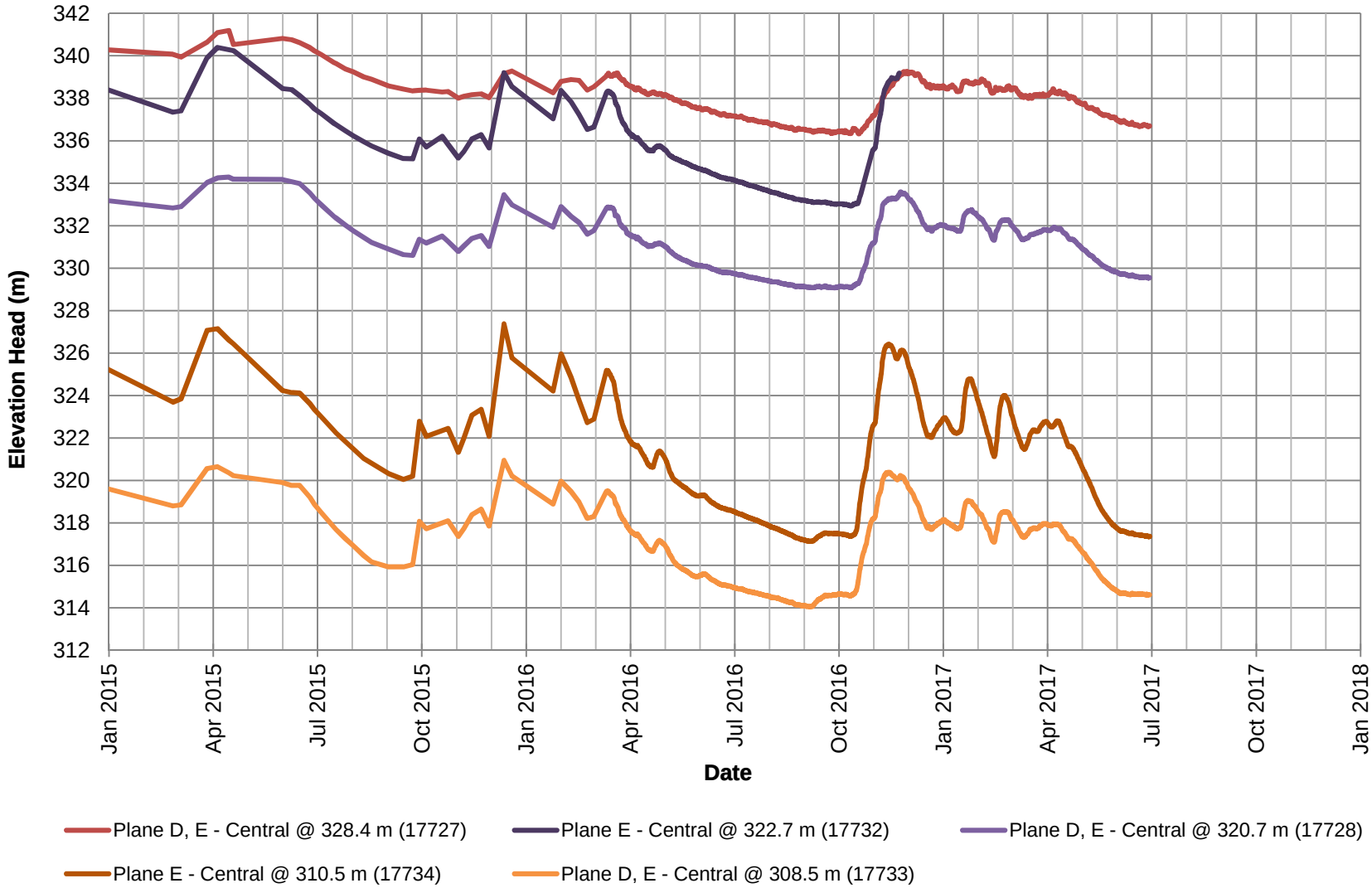
Location	Lynx Dam - Shallow Foundation								Lynx Dam - Deep Foundation									Lynx Dam Fill	
Plane and Position	Plane D - West Arm	Conveyor - Lynx Southwest	Plane E - South Arm	Plane E - South Toe	Plane F - South Arm	Plane F - South Toe	Plane F - Lynx South	Dam Toe - Lynx Southwest	Plane E - South Toe	Plane F - South Arm	Plane F - South Toe	Plane F - Lynx South	Plane F - Lynx South	Lynx Southeast	Lynx Southeast	Lynx Southeast	Plane F - South Arm	Plane F - South Arm	Plane E - South Arm
Piezometer	29334	29320	29335	29321	29330	29323	32221	29331	29332	29336	29333	17725	29324	29325	33781	33782	33784	29322	29329
Historical Max. Value	329.48	324.35	319.05	323.30	329.59	326.38	323.12	320.73	317.59	316.40	317.26	317.11	318.60	315.41	319.99	316.60	320.21	337.53	336.98
Tip Elevation (m)	328.40	323.50	315.90	322.40	328.40	326.10	318.55	306.30	305.20	311.10	296.70	278.30	311.60	304.30	314.40	294.45	311.85	337.30	336.90
2017-04-02	328.42	323.69	317.85	322.90	328.66	326.24	321.18	317.46	315.90	316.04	314.78	314.54	315.48	313.85	315.17	313.95	319.35	*337.29*	*336.75*
2017-04-09	328.40	323.63	317.68	322.94	328.50	326.15	321.09	317.39	315.82	315.93	314.83	314.59	315.50	313.78	315.19	314.00	319.44	*337.21*	*336.71*
2017-04-16	*328.21*	323.67	317.63	322.96	328.49	326.15	321.18	317.06	315.56	315.91	314.66	314.39	315.26	313.58	315.02	313.83	319.36	*337.24*	*336.71*
2017-04-23	*328.24*	323.61	317.63	322.93	328.49	326.14	321.34	317.06	315.57	315.93	314.63	314.39	315.25	313.60	314.94	313.83	319.36	*337.20*	*336.69*
2017-04-30	*328.20*	323.58	317.62	322.87	328.51	326.13	322.00	316.65	315.36	315.92	314.34	314.10	314.93	313.38	314.61	313.54	319.27	*337.21*	*336.69*
2017-05-07	*328.15*	323.54	317.57	322.81	328.46	*326.06*	322.43	316.57	315.21	316.10	314.25	314.04	314.86	313.18	314.55	313.48	319.22	*337.17*	*336.66*
2017-05-14	*328.20*	323.56	317.63	322.83	328.52	*326.07*	322.87	316.46	315.20	316.31	314.17	313.97	314.76	313.14	314.50	313.40	319.11	337.34	*336.68*
2017-05-21	*328.14*	323.53	317.51	322.73	328.43	*326.02*	322.22	316.39	315.07	316.31	314.16	313.96	314.71	312.99	314.47	313.39	319.14	337.37	*336.65*
2017-05-28	*328.14*	323.54	317.52	322.71	328.45	*326.01*	323.12	316.41	315.10	316.35	314.21	314.01	314.77	313.03	314.50	313.45	319.12	337.31	*336.66*
2017-06-04	*328.18*	323.55	317.58	322.70	328.52	*326.00*	322.10	316.30	315.04	316.40	314.10	313.90	314.68	312.98	314.43	313.33	319.08	337.43	*336.67*
2017-06-11	*328.21*	323.56	317.54	322.65	328.50	*325.98*	323.09	316.11	314.91	316.33	313.95	313.74	314.52	312.84	*314.35*	313.17	319.03	337.53	*336.69*
2017-06-18	*328.12*	323.53	317.40	322.54	*328.38*	*325.99*	321.65	316.00	314.75	316.16	313.94	313.64	314.40	312.67	*314.30*	313.07	319.03	337.45	*336.65*
2017-06-25	*328.15*	323.53	317.43	322.54	328.43	*325.96*	320.71	315.95	314.75	316.18	313.80	313.59	314.33	312.67	*314.27*	313.02	318.98	*337.19*	*336.65*

Legend:

330.05	Historical maximum value
328.29	Negative pore pressure (elevation head below tip elevation)
	Blank spaces indicate no data available

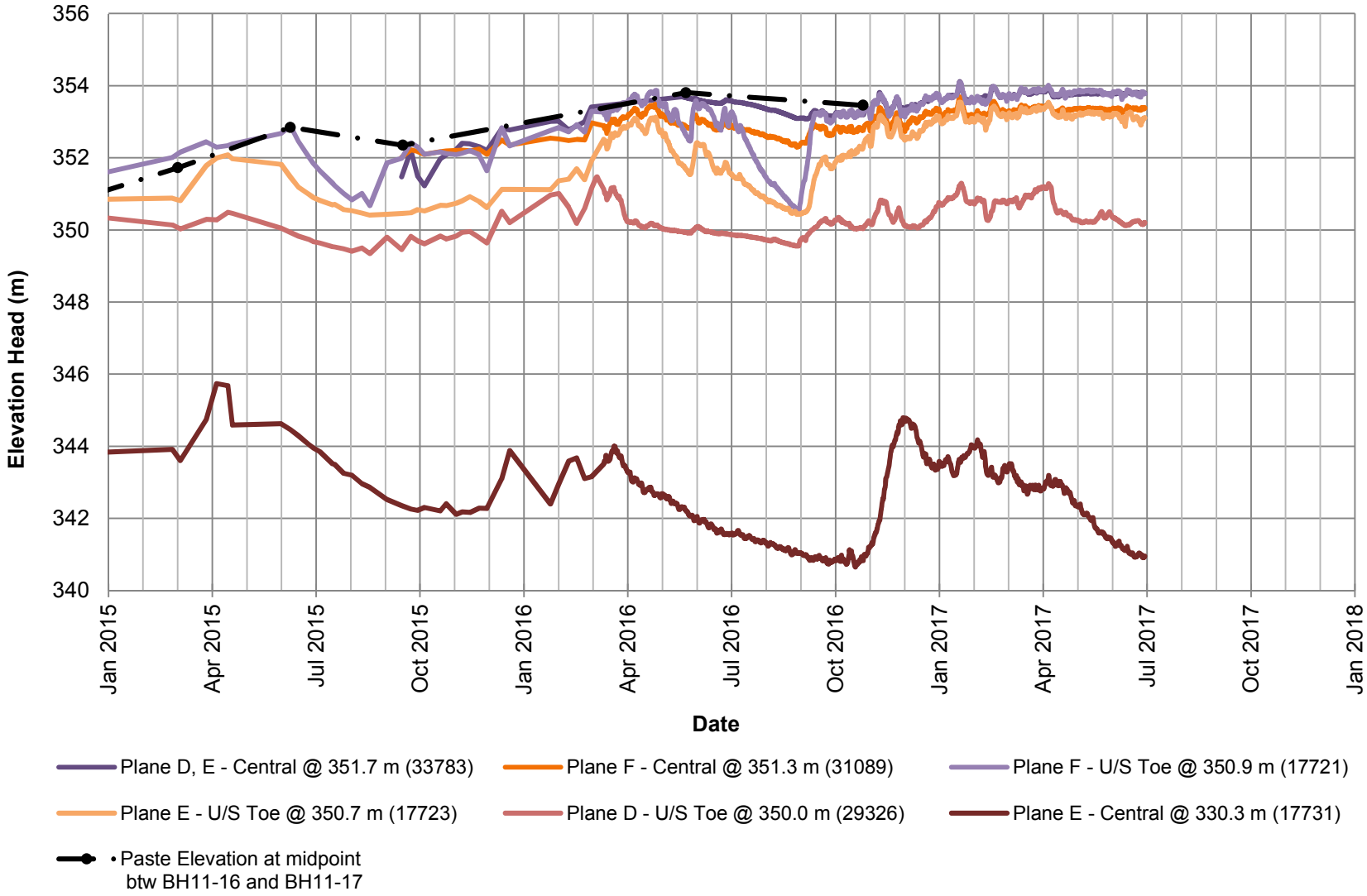
amec foster wheeler

Figure 1: Lynx TDF - Deep Paste VWP Data



amec foster wheeler

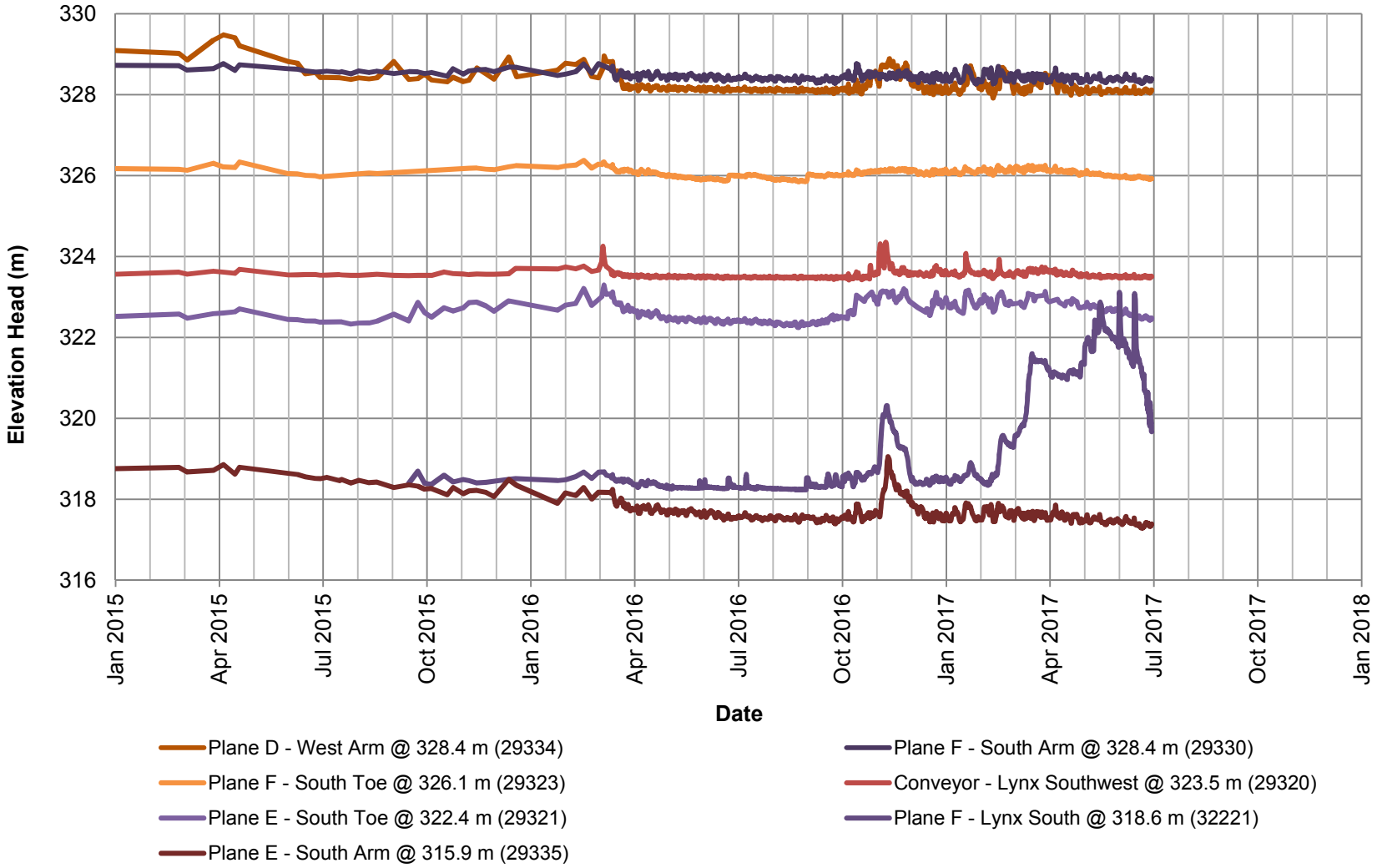
Figure 2: Lynx TDF - Shallow Paste VWP Data



File No.: NX14001B.2017

amec foster wheeler

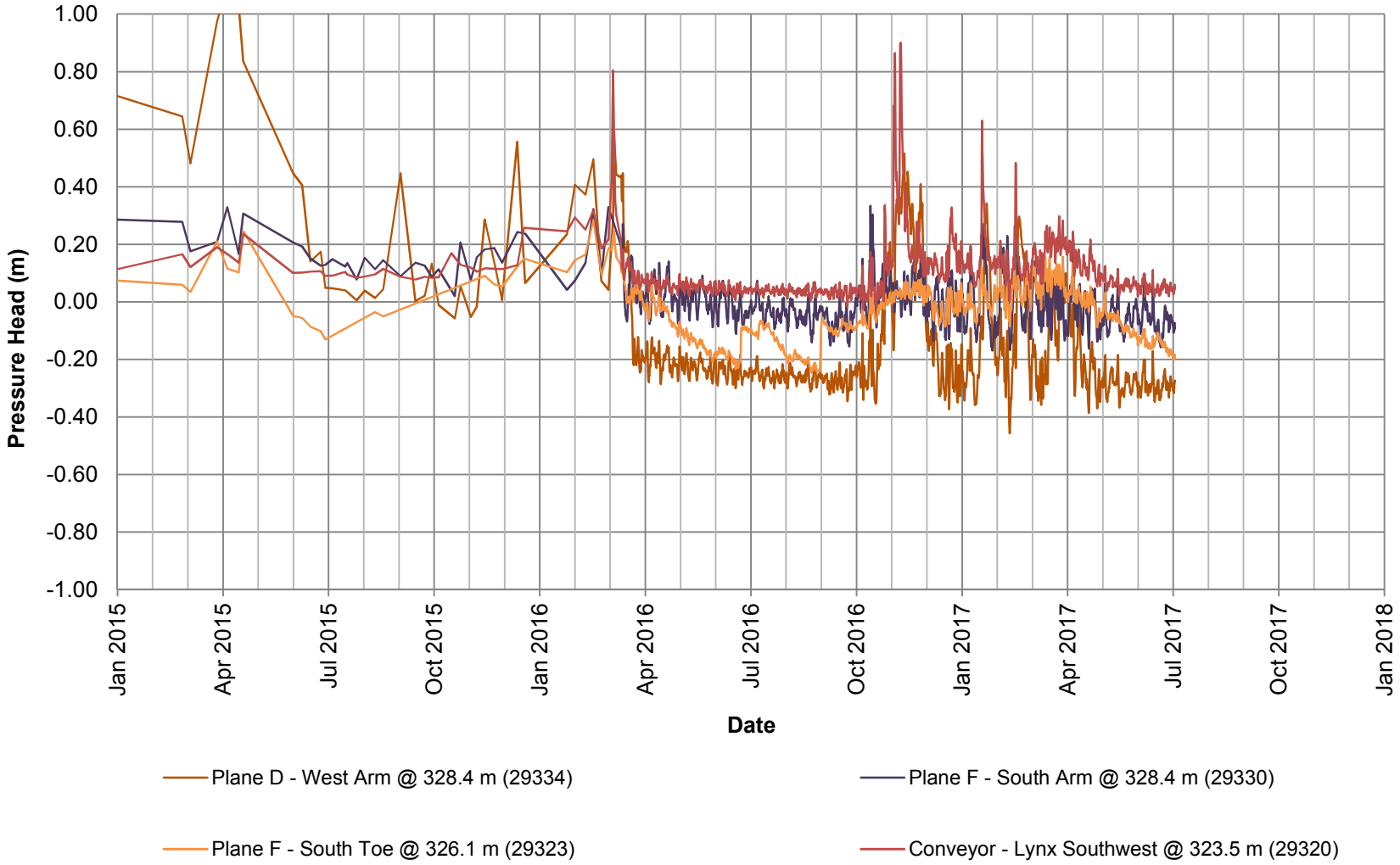
Figure 3a: Lynx Dam - Shallow Foundation VWP Data



File No.: NX14001B.2017

amec foster wheeler

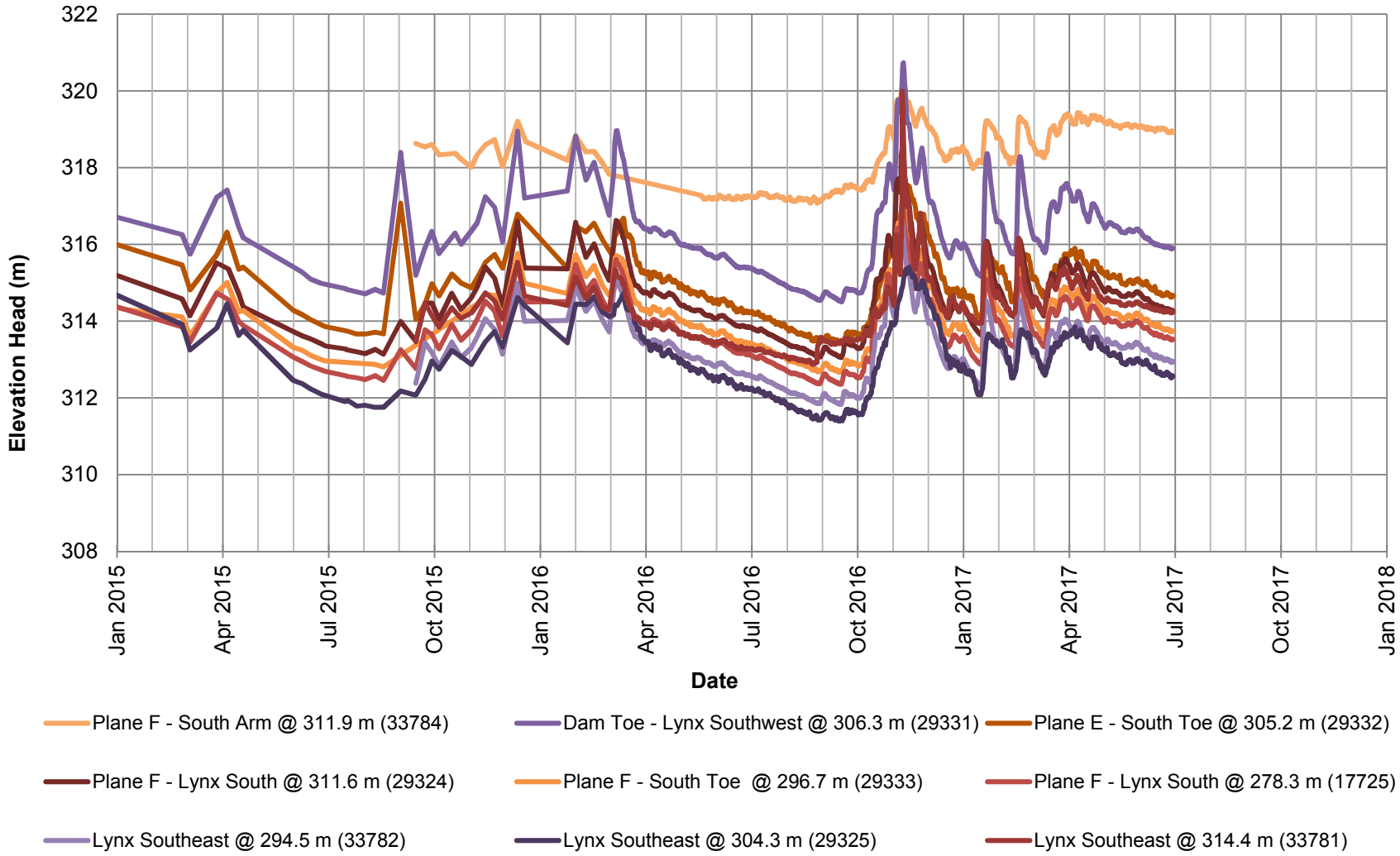
Figure 3b: Lynx Dam - Shallow Foundation VWP Data



File No.: NX14001B.2017

amec foster wheeler

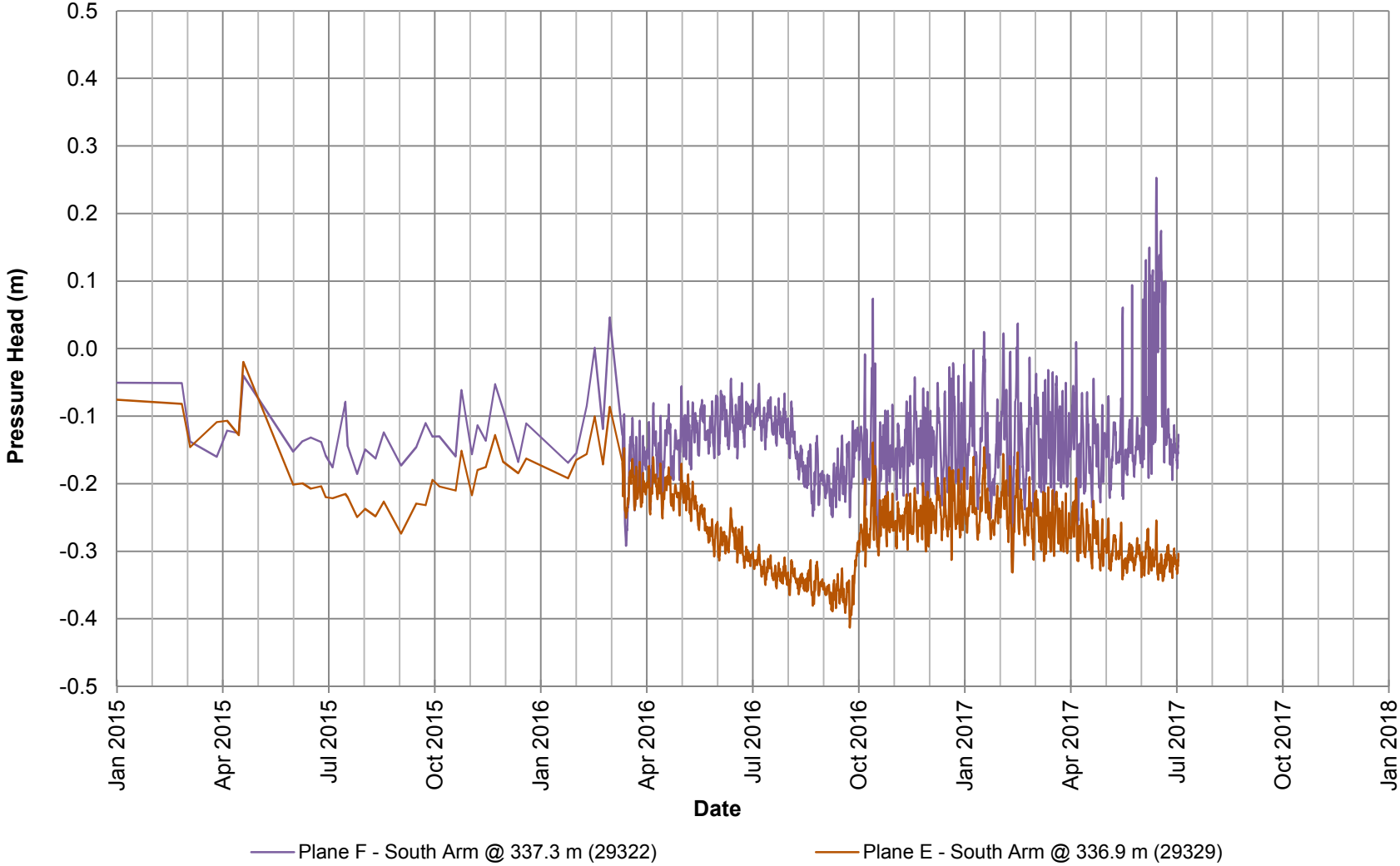
Figure 4: Lynx Dam - Deep Foundation VWP Data



File No.: NX14001B.2017

amec foster wheeler

Figure 5: Lynx Dam - Dam Fill VWP Data



File No.: NX14001B.2017

Attachment C

Old TDF Huts A, B and C VWP Data

Table\Figure Number	Title
Table 1	Old TDF - Instrument Plane A – Weekly Maximum VWP Pressure Head
Table 2	Old TDF – Instrument Planes 1, 3, 4, 6 and Outliers – Weekly Maximum VWP Pressure Head
Table 3	Old TDF – Instrument Plane 5 – Weekly Maximum VWP Pressure Head
Figure 1	Old TDF Piezometer Records – Plane 1
Figure 2	Old TDF Piezometer Records – Plane A, Outer Embankment Slope, Location 1
Figure 3	Old TDF Piezometer Records – Plane A, Outer Embankment Slope, Location 2
Figure 4	Old TDF Piezometer Records – Plane A, Outer Embankment Slope, Location 3
Figure 5	Old TDF Piezometer Records – Plane A Upper Tailings Beach
Figure 6	Old TDF Piezometer Records – Plane A Strip and Paste Berm
Figure 7	Old TDF Piezometer Records – Plane 3 and Plane 3/4
Figure 8	Old TDF Piezometer Records – Plane 4
Figure 9	Old TDF Piezometer Records – Plane 5 Outer embankment Slope, Location 1
Figure 10	Old TDF Piezometer Records – Plane 5 Outer Embankment Slope, Location 2 and Lower Tailings
Figure 11	Old TDF Piezometer Records – Plane 5 Outer Embankment Slope, Location 3
Figure 12	Old TDF Piezometer Records – Plane 5 Upper Tailings Beach
Figure 13	Old TDF Piezometer Records – Plane 5 Paste Berm and Upstream Tailings
Figure 14	Old TDF Piezometer Records – Plane 5/6 and Plane 6

Nyrstar Myra Falls
2017 Dam Safety Inspection
Attachment C

File No.: NX14001B.2017

amec foster wheeler

Table 1: Old TDF - Instrument Plane A - Weekly Maximum VWP Pressure Head (m)

Location	Outer Embankment Slope - 1				Outer Embankment Slope - 2					Outer Embankment Slope - 3						Upper Tailings Beach							Strip and Paste Berm					
ID	A-5E	A-9E	A-13E	A-17E	A-2E	A-6E	A-10E	A-14E	A-18E	A-4E	32239	A-8E	A-12E	A-16E	A-20E	A-26E	A-27E	A-28E	A-30E	A-32E	A-31E	32220	A-33E	32231	32229	32225	P-11	P-12
Tip Elevation	310.4	311.7	313.4	317.0	305.4	310.9	312.3	313.4	316.8	305.2	310.3	311.0	312.3	313.6	316.7	323.7	323.9	325.2	324.8	327.7	327.8	328.6	327.5	330.2	325.9	328.6	332.6	326.6
Trigger Point S1	3.8	5.1	5.1	1.1	0.0	4.5	5.5	5.1	1.3	0.0	2.8	3.6	4.7	5.6	6.6	1.7	4.7	0.7	5.3	3.3	1.5	1.1	5.5	2.3	5.7	4.9	3.2	5.5
Trigger Point S2	4.4	6.5	6.5	2.6	2.1	5.3	7.2	6.5	2.8	2.2	3.5	4.4	6.0	7.5	7.5	2.4	6.6	1.1	7.0	4.2	3.2	2.5	7.5	2.9	7.5	6.7	4.1	7.5
Trigger Point S3	7.3	10.8	10.9	4.3	2.1	8.8	12.0	10.9	4.6	2.2	5.8	7.3	10.0	12.5	12.5	4.8	11.0	1.8	11.6	7.0	5.2	4.2	12.5	4.9	12.5	11.3	6.8	12.5
Trigger Point P1	***2.9***	***4.3***	***4.3***	***1.7***	***2.1***	***3.5***	***4.8***	***4.3***	***1.9***	***2.3***	***2.3***	***2.9***	***4.0***	***5.0***	***5.0***	***1.6***	***4.4***	***0.7***	***4.7***	***2.7***	***2.1***	***1.7***	***5.0***	***2.0***	***5.0***	***4.5***	***2.7***	***5.0***
2017-04-02																						***1.9***			3.7	***4.6***	***3.5***	2.5
2017-04-09																						***1.8***			3.6	***4.5***	***3.4***	2.4
2017-04-16																						1.6			3.5	4.4	***3.3***	2.3
2017-04-23																						1.6			3.4	4.4	***3.3***	2.3
2017-04-30	2.1	1.8	2.2	0.6	***5.2***	1.8	1.6	1.3	1.5	***4.6***	1.3	0.9	-1.8	2.0	0.5	***4.1***	4.3	***1.7***	1.6	1.2	0.9	1.3	1.5		3.3	4.3	***3.0***	2.2
2017-05-07	2.0	1.7	2.1	0.6	***5.1***	1.7	1.6	1.3	1.4	***4.5***	1.1	0.8	-1.8	2.0	0.5	***4.0***	4.2	***1.8***	1.6	1.2	0.9	0.0	1.5		3.2	4.1	***2.9***	2.1
2017-05-14	1.8	1.6	2.0	0.6	***5.0***	1.6	1.5	1.2	1.4	***4.4***	1.1	2.2	-1.8	2.0	0.5	***3.9***	4.1	***1.8***	1.5	1.2	0.9	0.0	1.4		3.1	4.0	***2.7***	2.0
2017-05-21	1.7	1.5	1.9	0.6	***5.2***	1.6	2.1	1.2	1.3	***4.5***	1.2	0.9	-1.8	1.9	0.4	***3.7***	3.9	***1.8***	1.2	1.1	0.8	0.0	1.2		3.0	3.8	2.6	1.9
2017-05-28	1.5	1.3	1.8	0.6	***5.2***	1.5	1.3	1.1	1.2	***4.6***	1.2	0.8	-1.0	1.9	0.4	***3.6***	3.8	***1.8***	1.1	1.1	0.9	0.0	1.0		2.8	3.7	2.4	1.7
2017-06-04	1.4	1.2	1.7	0.7	***5.0***	1.4	1.3	1.0	1.1	***4.4***	1.1	0.9	-1.9	1.9	0.4	***3.5***	3.6	***1.9***	0.8	1.1	0.9	0.0	0.7		2.6	3.6	2.3	1.6
2017-06-11	1.2	0.8	1.5	0.6	***4.9***	1.3	1.1	0.9	0.9	***4.4***	1.0	0.9	-1.9	1.8	0.3	***3.5***	3.3	***1.9***	0.6	1.1	0.9	0.0	0.6		2.4	3.4	2.2	1.5
2017-06-18	1.0	0.7	1.4	0.5	***4.9***	1.1	1.7	0.7	0.8	***4.3***	0.9	0.7	-2.1	1.7	0.2	***3.4***	3.1	***1.8***	0.3	1.0	0.8	0.0	0.4		2.3	3.3	2.0	1.3
2017-06-25	1.8	0.6	1.4	0.6	***4.9***	1.1	1.9	0.7	0.7	***4.3***	0.9	0.8	-0.3	1.7	0.3	***3.4***	3.0	***1.8***	0.2	1.0	0.8	0.0	0.3		2.2	3.2	1.9	1.3

Table 2: Old TDF - Instrument Planes 1, 3, 4, 6 and Outliers - Weekly Maximum VWP Pressure Head (m)

Location		Plane 1					Plane 3				Plane 3/4		Plane 4				Plane 5/6		Plane 6			
Piezometer	32228	36971	36973	36972	32232	P-10	32233	21715	P-13	P-14	P-1	P-2	1204	32237	P-3	P-4	P-5	P-6	32219	32226	32230	32236
Tip Elevation	331.4	325.7	319.7	328.0	329.4	326.9	332.4	329.3	332.2	326.7	324.4	329.4	329.3	332.4	324.3	329.3	325.1	329.4	335.2	330.6	328.8	330.4
Trigger Point S1	3.2	4.4	3.7	3.8	3.5	4.3	1.7	7.5	6.4	9.0	9.0	7.5	8.7	1.7	11.0	9.5	14.3	14.9	7.9	13.5	14.1	9.0
Trigger Point S2	5.1	6.4	5.2	5.6	5.4	6.3	1.8	8.3	7.1	10.0	10.0	8.4	10.3	2.1	13.0	10.8	15.5	16.1	8.6	14.5	15.2	9.5
Trigger Point S3	7.0	8.4	6.9	7.5	7.3	8.3	2.5	10.8	9.1	13.0	13.0	11.0	12.5	2.5	16.0	13.2	17.8	18.5	9.9	16.6	17.2	11.2
Trigger Point P1	***2.3***	***3.4***	***2.9***	***2.8***	***2.5***	***3.3***	***1.4***	***6.3***	***5.3***	***7.5***	***7.5***	***6.3***	***8.6***	***1.8***	***11.0***	***9.2***	***12.4***	***12.9***	***6.9***	***11.6***	***12.2***	***7.8***
2017-04-02	0.5			1.3	1.9	3.1	0.8		1.8	0.9	-0.7	0.9	2.7	0.8	0.7	2.2	5.4	4.6	1.0	3.6	3.8	3.6
2017-04-09	0.4			1.3	1.8	3.0	0.8		1.7	0.9	-0.7	0.8	2.6	0.9	0.5	2.1	5.6	4.8	0.9	3.7	4.0	3.6
2017-04-16	0.3			1.1	1.7	2.9	0.8		1.7	0.7	-0.7	0.8	2.6	0.9	0.4	2.1	5.6	4.9	1.0	3.9	4.2	3.7
2017-04-23	0.3			1.0	1.7	2.9	0.7		1.7	0.7	-0.7	0.8	2.6	0.8	0.4	2.1	5.5	4.5	0.8	3.1	3.4	3.1
2017-04-30	0.4			0.7	1.5	2.7	0.6		1.5	0.4	-0.7	0.6	2.4	0.5	0.4	1.8	4.9	3.9	-0.1	2.6	2.9	2.4
2017-05-07	0.3			0.5	1.3	2.5	0.4		1.4	0.2	-0.7	0.6	2.3	0.4	0.4	1.7	4.9	3.8	-0.3	2.5	2.8	2.3
2017-05-14	0.4			0.3	1.2	2.4	0.2		1.3	-0.1	-0.7	0.5	2.3	0.2	0.4	1.6	4.5	3.5	-0.4	2.0	2.1	1.8
2017-05-21	0.3			0.2	1.1	2.3	0.0		1.1	-0.3	-0.8	0.4	2.1	0.0	0.3	1.4	4.4	3.3	-0.5	1.8	2.0	1.7
2017-05-28	0.3			0.1	1.0	2.2	-0.2		1.0	-0.6	-0.8	0.3	2.1	-0.5	0.3	1.4	4.3	3.2	-0.5	1.7	1.8	1.5
2017-06-04	0.4			0.1	0.9	2.1	-0.2		0.9	-0.7	-0.8	0.2	1.8	-0.6	0.4	1.4	4.1	3.0	-0.6	1.5	1.6	1.3
2017-06-11	0.3			0.0	0.8	2.0	-0.4		0.8	-0.7	-0.9	0.1	1.6	-1.1	0.4	1.4	3.8	2.8	-0.6	1.2	1.0	1.0
2017-06-18	0.2			0.0	0.7	2.0	-0.4		0.7	-0.7	-0.9	0.1	1.5	-1.2	0.2	1.2	3.5	2.6	-0.6	1.1	0.7	0.8
2017-06-25	0.3			-0.1	0.8	1.9	-0.5		0.6	-0.7	-0.9	0.0	1.5	-1.2	0.2	1.3	3.4	2.6	-0.6	1.0	0.6	0.8

Nyrstar Myra Falls
2017 Dam Safety Inspection
Attachment C

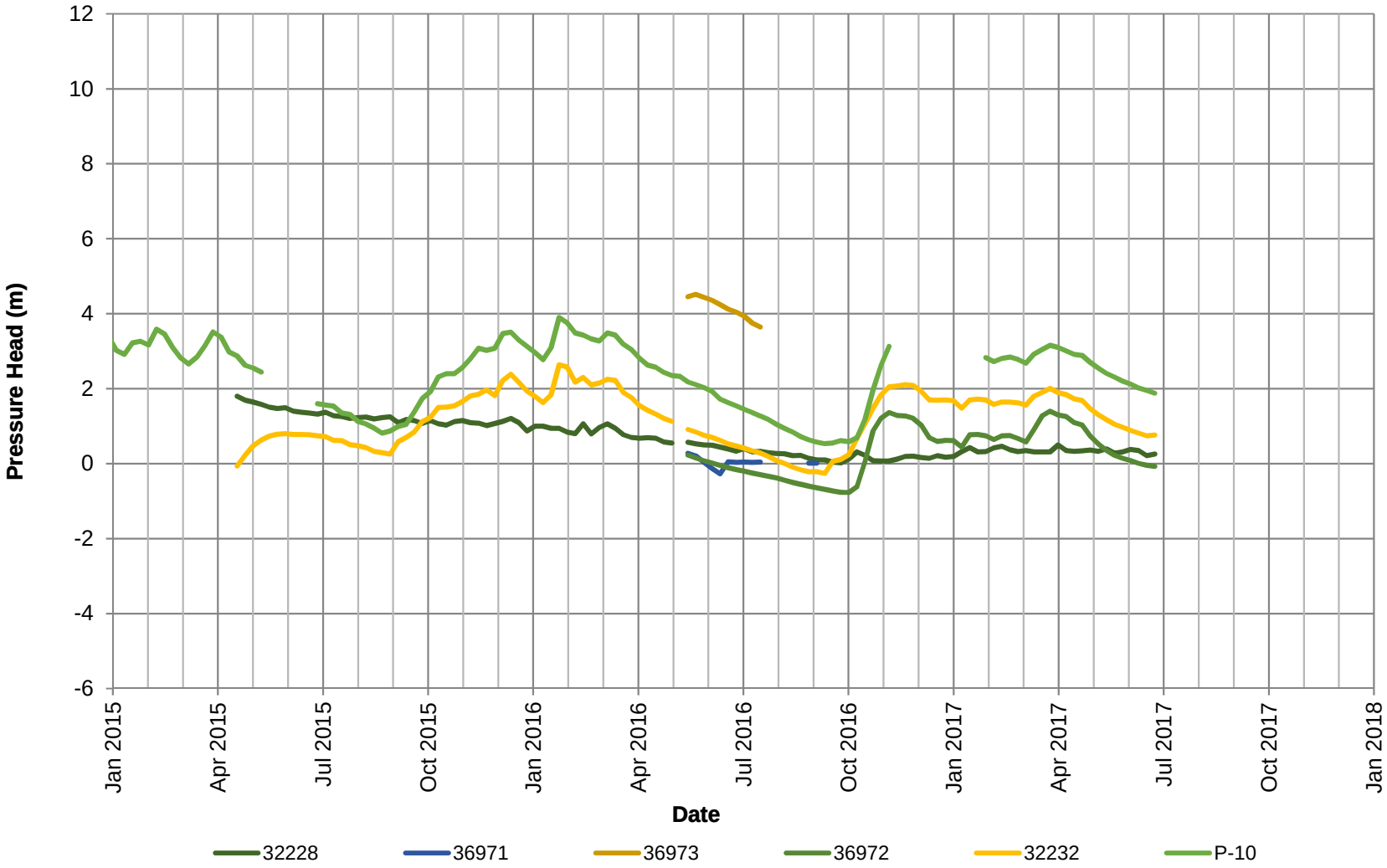
File No.: NX14001B.2017

Table 3: Old TDF - Instrument Plane 5 - Weekly Maximum VWP Pressure Head (m)

Location	Outer Embankment Slope - 1				Outer Embankment Slope - 2							Outer Embankment Slope - 3					Upper Tailings Beach							Paste Berm					
ID	C-5E	C-13E	C-17E	C-21E	C-6E	C-10E	C-14E	C-18E	C-22E	32223	32241	C-12E	C-16E	32238	C-20E	C-24E	C-29E	C-31E	C-35E	32224	C-36E	C-37E	32234	17730	32222	P-7	17724	17726	17722
Tip Elevation	310.1	308.9	303.2	315.7	303.7	307.3	308.9	314.5	315.4	316.8	308.7	305.5	308.7	308.7	314.5	315.2	322.3	322.0	326.7	327.0	326.6	326.6	328.5	329.3	326.9	319.8	326.2	326.3	335.4
Trigger Point S1	2.0	2.0	1.5	1.3	5.5	6.5	6.5	2.8	1.1	3.2	2.3	5.3	6.5	2.3	6.5	6.4	0.0	4.7	1.3	1.1	2.5	3.1	2.4	2.5	4.0	6.1	4.5	4.4	2.1
Trigger Point S2	4.2	4.4	3.1	2.8	12.3	14.0	14.0	6.1	2.3	7.0	5.0	11.4	14.0	4.9	13.9	13.9	0.0	10.1	2.7	2.3	5.3	6.6	5.1	5.4	8.6	13.1	9.6	9.0	4.6
Trigger Point S3	7.8	8.1	5.8	5.3	22.8	26.0	25.9	11.3	3.5	12.4	9.0	20.5	26.0	9.0	25.9	25.8	0.0	18.7	5.0	4.1	9.8	12.2	9.3	10.0	16.0	24.2	17.9	17.5	8.5
Trigger Point P1	***2.6***	***2.6***	***1.9***	***1.7***	***7.3***	***8.5***	***8.5***	***3.7***	***1.1***	***4.2***	***3.0***	***6.8***	***8.5***	***3.0***	***8.5***	***8.4***	***0.0***	***6.1***	***1.6***	***1.4***	***3.3***	***4.0***	***3.1***	***3.3***	***5.2***	***8.0***	***5.9***	***5.7***	***2.7***
2017-04-02	-0.1	0.2	***2.3***	0.0	4.5	0.5	1.2	-1.3	0.6		2.5	3.2	1.5	2.9	1.2	0.9	***5.1***	***8.7***	***2.2***	***2.5***	***3.5***	***5.4***	***4.0***	***4.6***	4.8	4.8	4.6	3.1	2.3
2017-04-09	0.1	0.0	***2.3***	-0.2	4.5	0.4	1.1	-1.4	0.5		2.9	3.1	1.6	2.9	1.1	0.8	***5.1***	***8.7***	***2.1***	***2.5***	***3.5***	***5.5***	***4.0***	***4.6***	4.8	4.8	4.6	3.0	2.3
2017-04-16	0.0	-0.1	***2.4***	-0.1	4.5	0.4	1.1	-1.5	0.4		3.0	3.2	1.6	3.0	1.1	0.7	***5.0***	***8.7***	***2.1***	***2.5***	***3.5***	***5.4***	***4.0***	***4.7***	4.9	4.8	4.6	3.0	2.4
2017-04-23	0.0	-0.1	***2.3***	-0.2	4.5	0.3	1.1	-1.5	0.4		***3.0***	3.1	1.6	3.0	1.0	0.7	***5.0***	***8.7***	***2.1***	***2.5***	***3.5***	***5.4***	***3.9***	***4.3***	4.5	4.8	4.6	3.0	2.3
2017-04-30	-0.1	-0.1	***2.3***	-0.2	4.4	0.2	1.0	-1.6	0.4		2.7	3.0	1.5	2.9	0.9	0.7	***4.9***	***8.5***	***1.9***	***2.3***	3.2	***5.0***	***3.4***	***3.7***	4.0	4.5	4.3	2.9	2.0
2017-05-07	-0.1	0.0	***2.1***	-0.2	4.3	0.1	0.9	-1.7	0.4		3.0	2.9	1.4	2.8	0.8	0.7	***4.7***	***8.4***	***1.8***	***2.2***	3.0	***4.9***	***3.3***	***3.7***	3.9	4.4	4.2	2.9	1.9
2017-05-14	-0.2	0.0	***2.0***	-0.2	4.1	0.0	0.9	-1.8	0.4		2.1	2.8	1.2	2.6	0.7	0.7	***4.6***	***8.2***	***1.7***	***2.1***	2.8	***4.7***	3.0	***3.3***	3.5	4.3	4.0	2.8	1.8
2017-05-21	-0.2	-0.1	***2.1***	-0.3	4.2	0.0	0.9	-1.9	0.3		2.8	2.8	1.3	2.7	0.6	0.7	***4.5***	***8.1***	1.6	***1.9***	2.6	***4.5***	2.8	3.1	3.4	4.1	3.9	2.6	1.6
2017-05-28	-0.2	0.0	***2.0***	-0.3	4.1	-0.1	0.9	-2.0	0.4		2.4	2.8	1.2	2.6	0.6	0.7	***4.5***	***8.0***	1.5	***1.8***	2.6	***4.5***	2.7	3.0	3.2	4.0	3.8	2.5	1.4
2017-06-04	-0.2	0.0	1.8	-0.3	4.0	-0.3	1.1	-2.0	0.4		1.7	2.5	1.0	2.4	0.5	0.7	***4.4***	***7.9***	1.3	***1.7***	2.4	***4.4***	2.6	2.8	3.1	3.9	3.6	2.5	1.2
2017-06-11	-0.2	0.0	1.6	-0.3	3.9	-0.3	1.1	-2.1	0.4		1.1	2.4	0.9	2.2	0.4	0.7	***4.3***	***7.8***	1.2	***1.6***	2.3	***4.1***	2.4	2.7	2.9	3.8	3.4	2.4	0.8
2017-06-18	-0.2	-0.1	1.6	-0.5	3.7	-0.5	0.9	-2.3	0.3		0.8	2.2	0.9	2.1	0.3	0.6	***4.2***	***7.6***	1.0	***1.5***	2.2	***4.2***	2.4	2.6	2.8	3.6	3.5	2.3	0.6
2017-06-25	-0.2	-0.1	1.6	-0.4	3.7	-0.5	1.0	-2.3	0.3		0.7	2.2	0.9	2.1	0.2	0.6	***4.1***	***7.5***	1.0	1.4	2.1	4.0	2.3	2.5	2.7	4.0	3.3	2.3	0.7

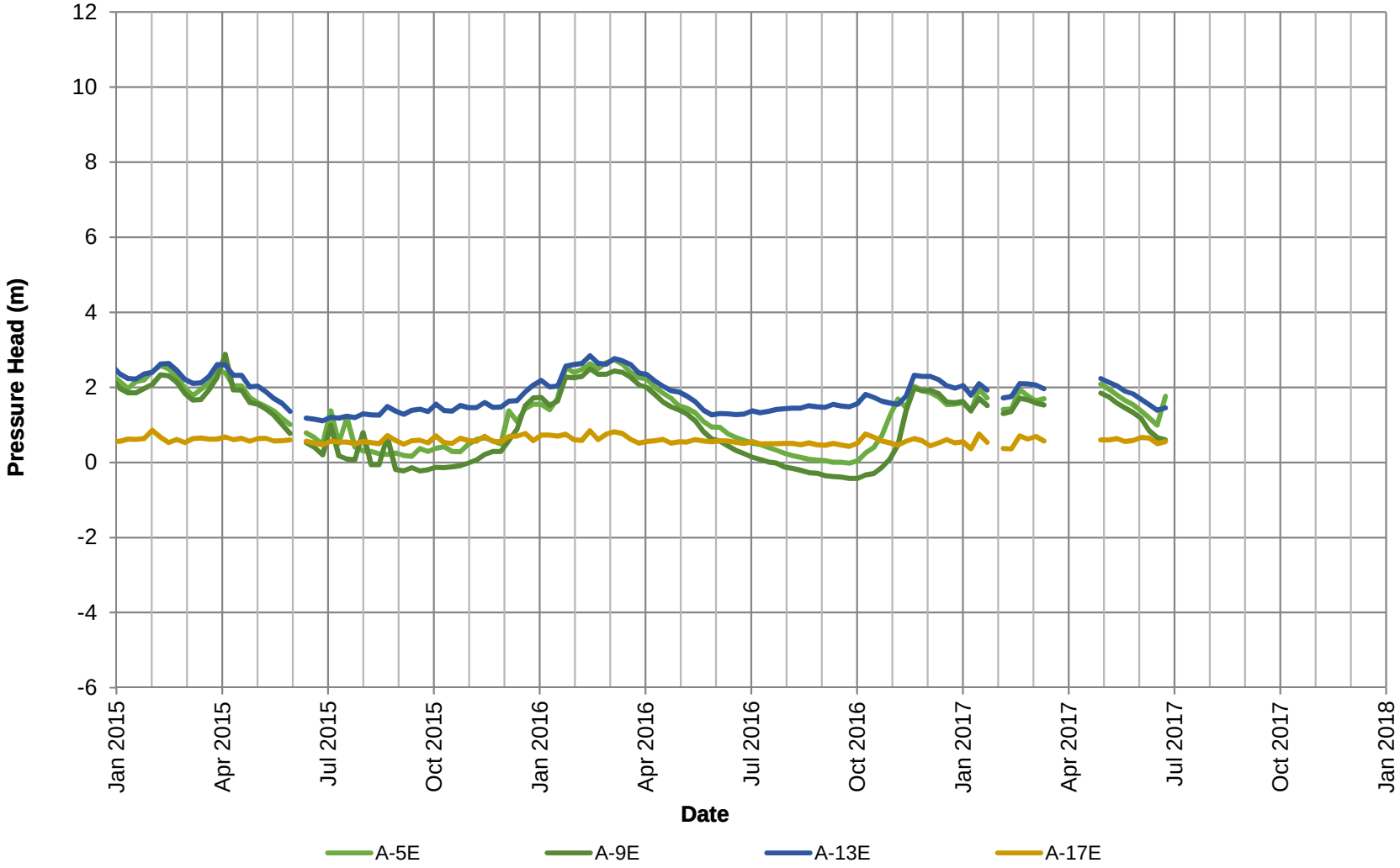
amec foster wheeler

Figure 1: Old TDF Piezometer Records - Plane 1
32228, 36971, 36973, 36972, 32232, P-10



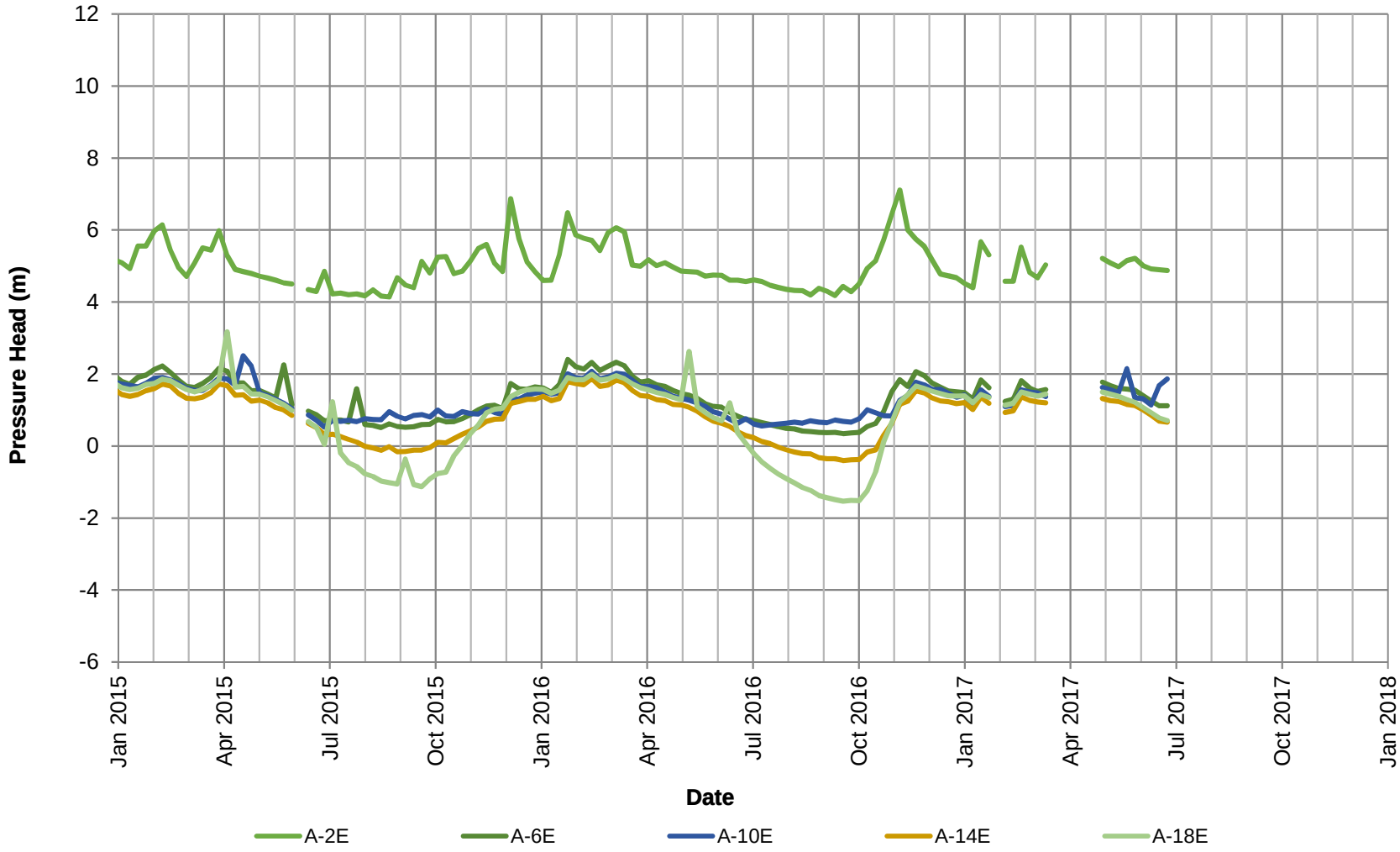
amec foster wheeler

Figure 2: Old TDF Piezometer Records - Plane A Outer Embankment Slope, Location 1 A-5E, A-9E, A-13E, A-17E



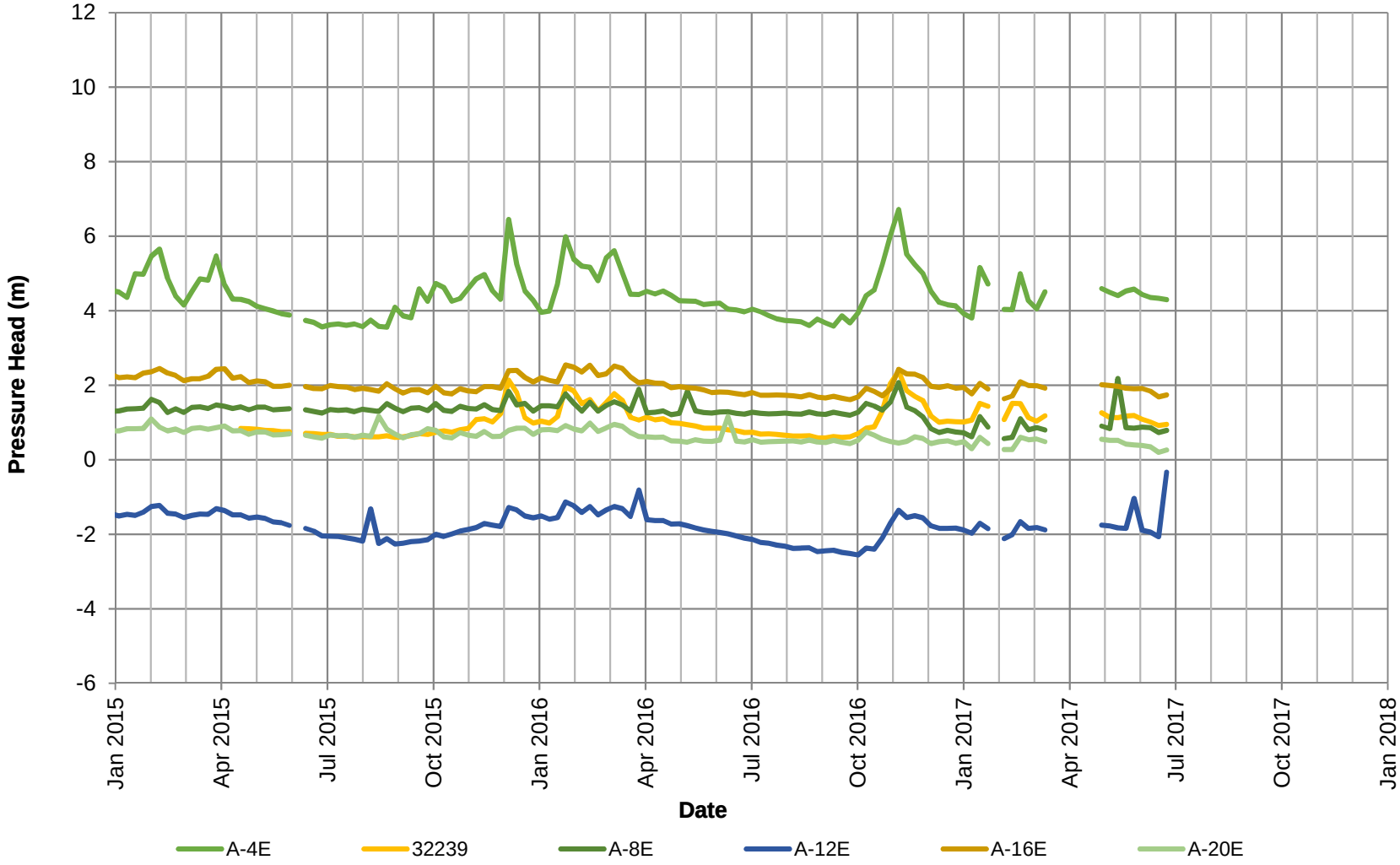
amec foster wheeler

Figure 3: Old TDF Piezometer Records - Plane A Outer Embankment Slope, Location 2 A-2E, A-6E, A-10E, A-14E, A-18E



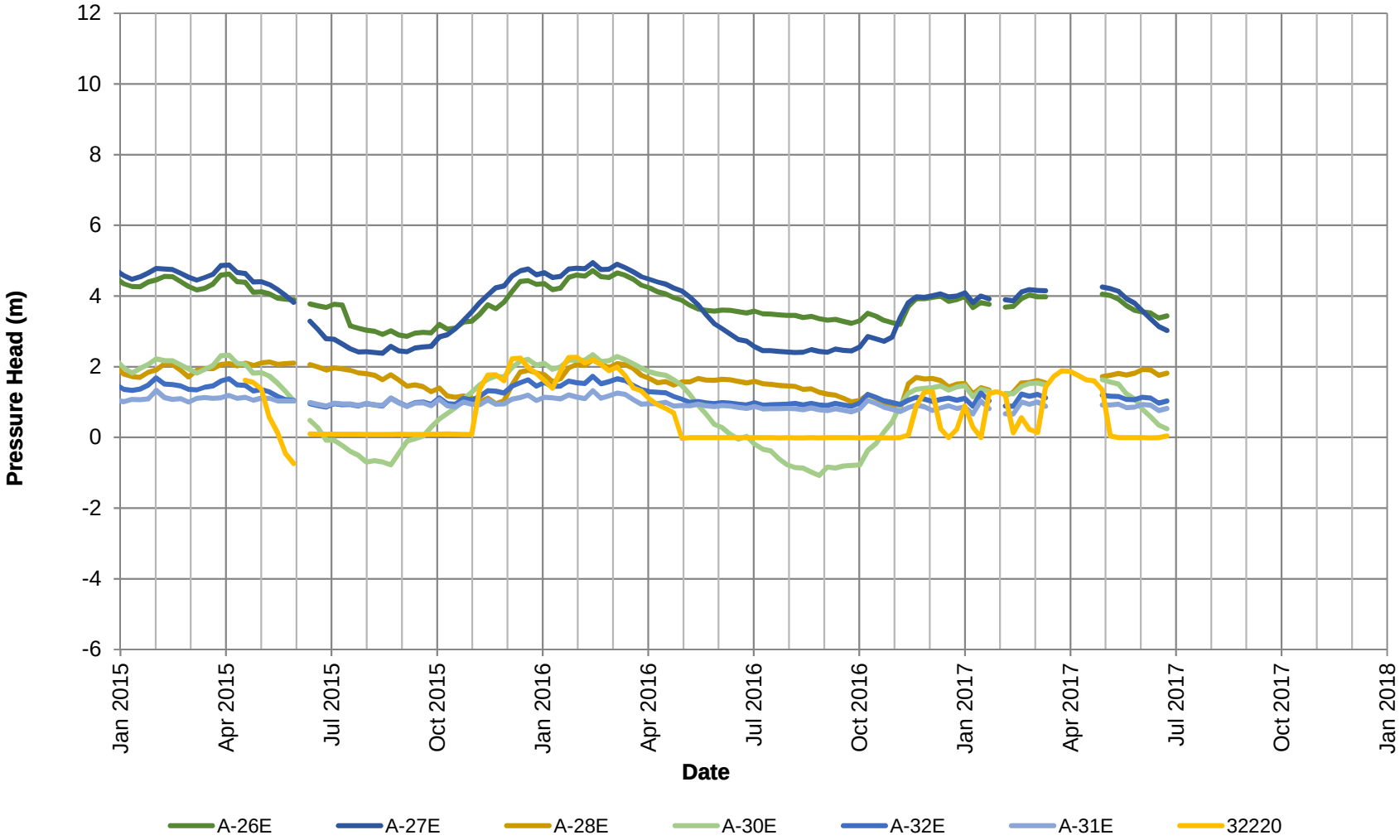
amec foster wheeler

Figure 4: Old TDF Piezometer Records - Plane A Outer Embankment Slope, Location 3 A-4E, 32239, A-8E, A-12E, A-16E, A-20E



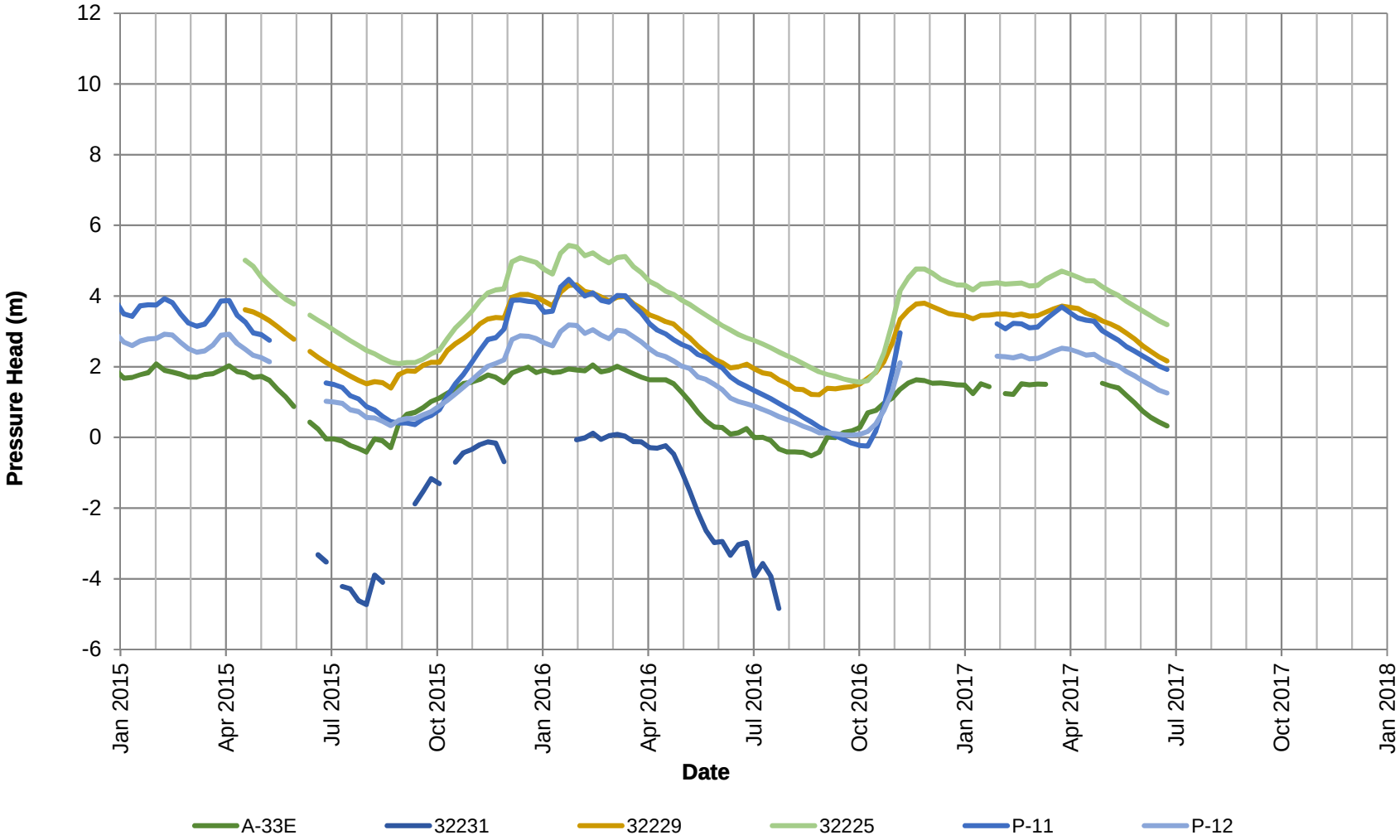
amec foster wheeler

Figure 5: Old TDF Piezometer Records - Plane A Upper Tailings Beach A-26E, A-27E, A-28E, A-30E, A-31E, A-32E, 32220



amec foster wheeler

Figure 6: Old TDF Piezometer Records - Plane A
Strip and Paste Berm
A33-E, 32231, 32229, 32225, P-11, P-12



amec foster wheeler

Figure 7: Old TDF Piezometer Records
Plane 3 (32233, 21715, P-13, P-14) and Plane 3/4 (P-1, P-2)

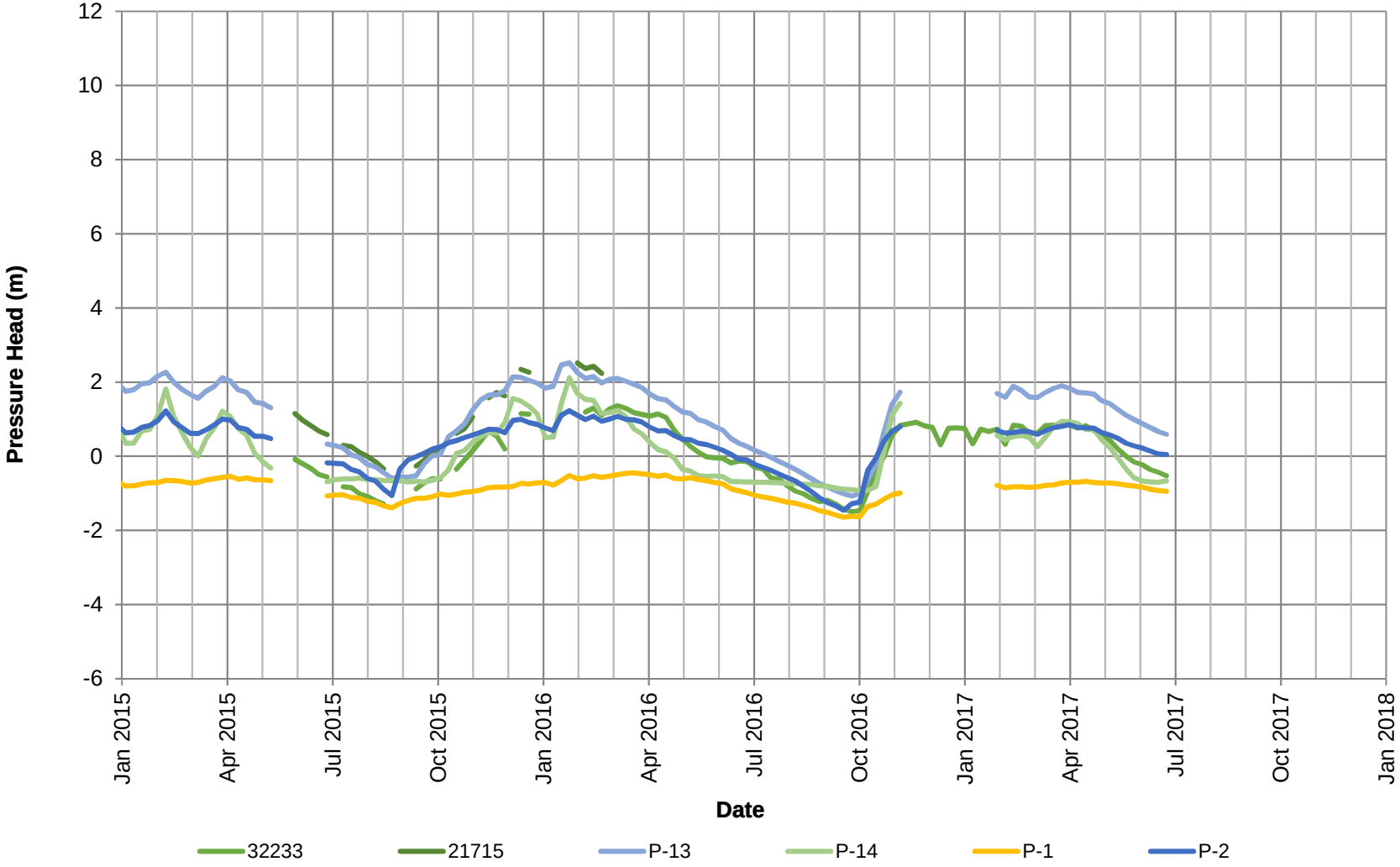


Figure 8: Old TDF Piezometer Records - Plane 4
32237, 1204, P-3, P-4

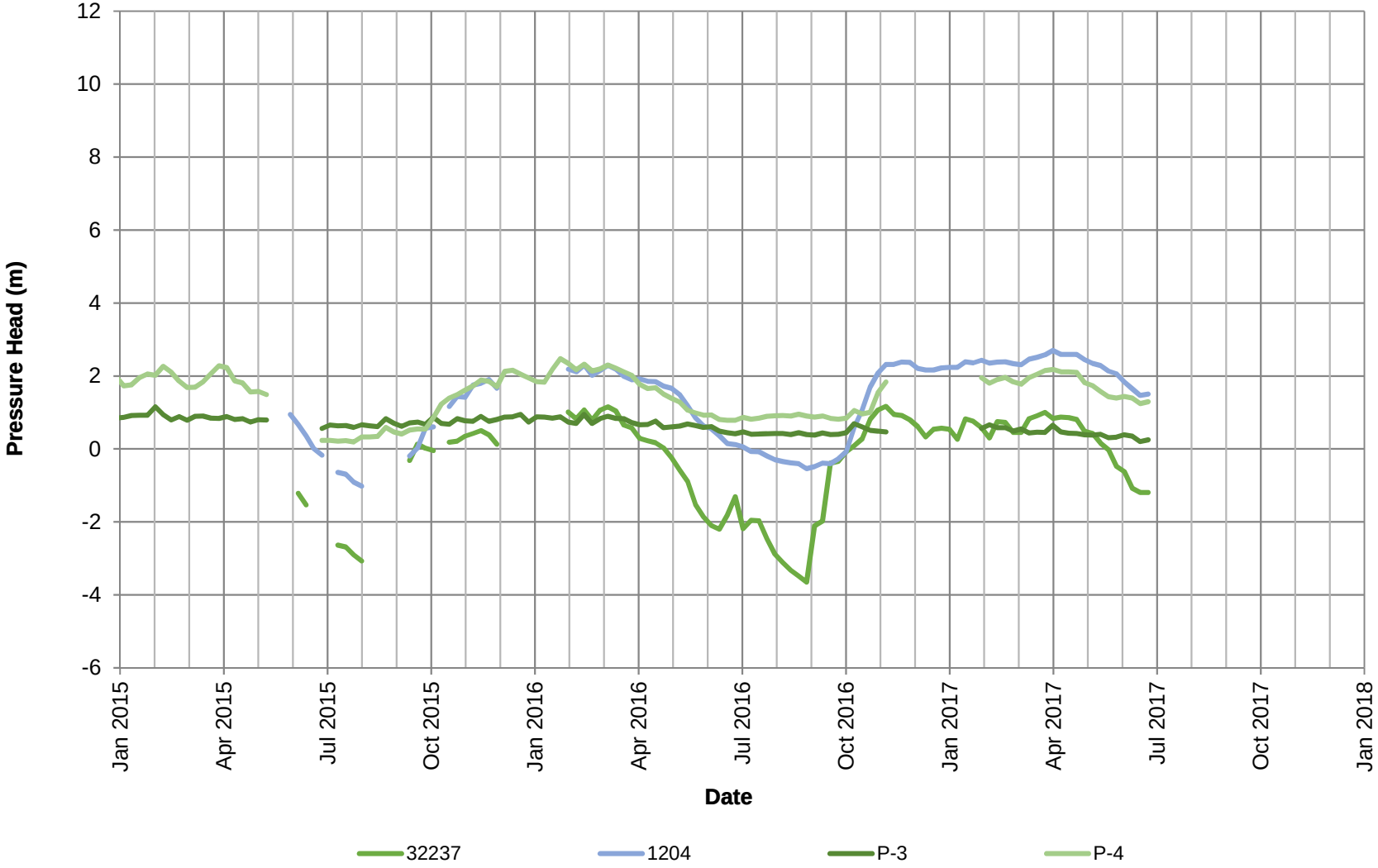


Figure 9: Old TDF Piezometer Records - Plane 5
Outer Embankment Slope, Location 1
C-5E, C-13E, C-17E, C-21E

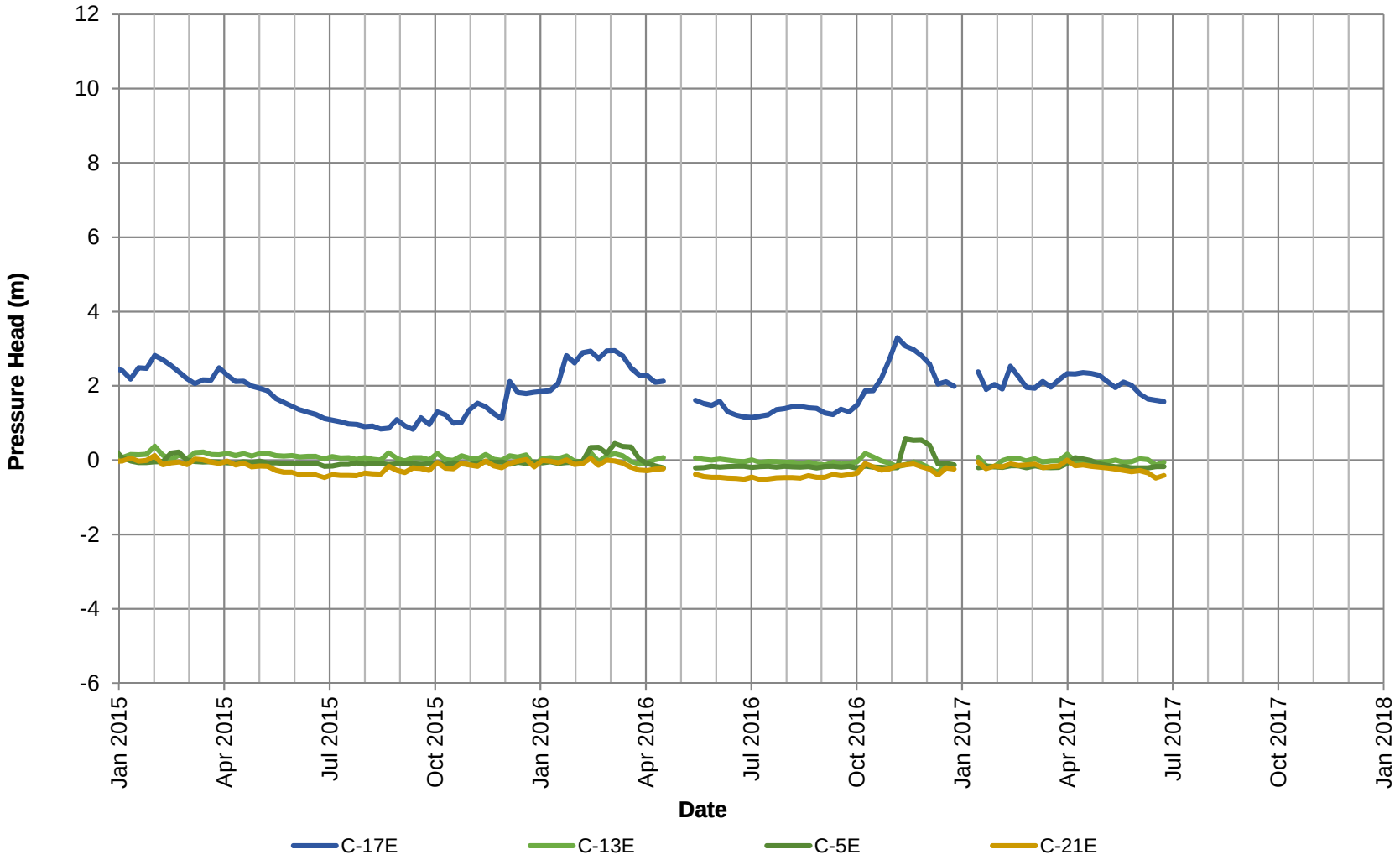
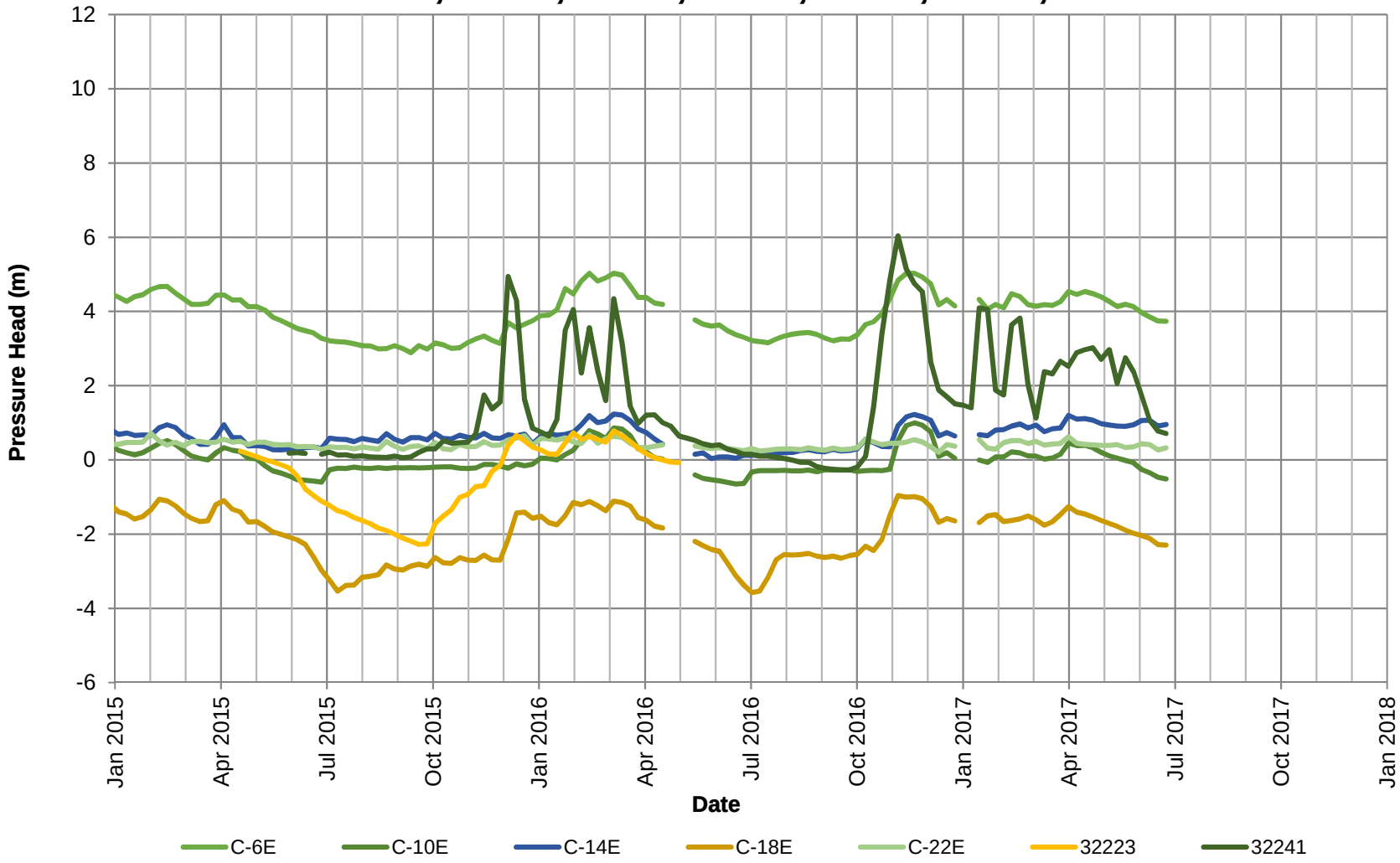


Figure 10: Old TDF Piezometer Records - Plane 5
Outer Embankment Slope, Location 2 and Lower Tailings
C-6E, C-10E, C-14E, C-18E, C-22E, 32223, 32241



amec foster wheeler

Figure 11: Old TDF Piezometer Records - Plane 5 Outer Embankment Slope, Location 3 C-12E, C-16E, 32238, C-20E, C-24E

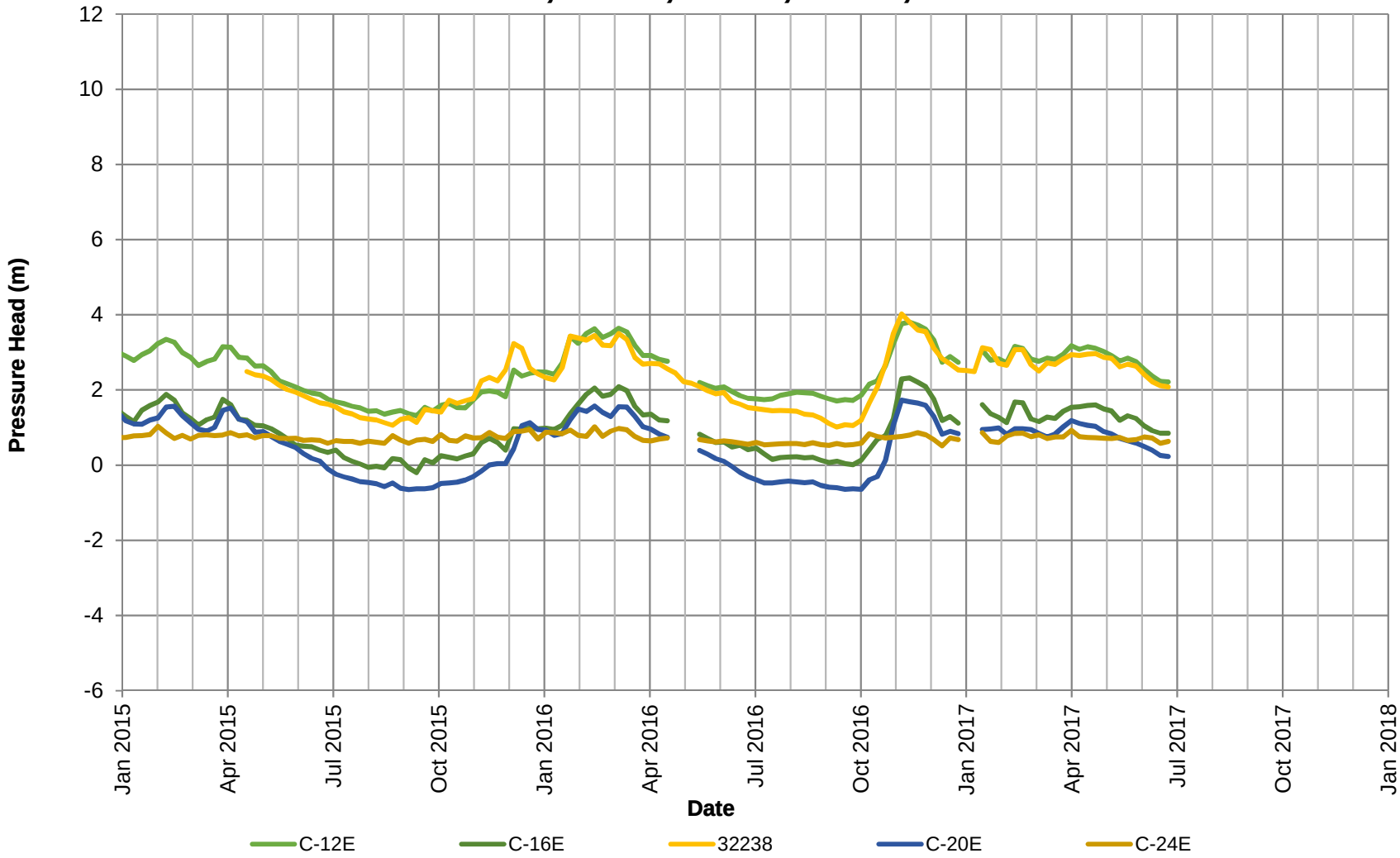


Figure 12: Old TDF Piezometer Records - Plane 5
Upper Tailings Beach
C29E, C-31E, C-35E, 32224, C-36E, C-37E, 32234

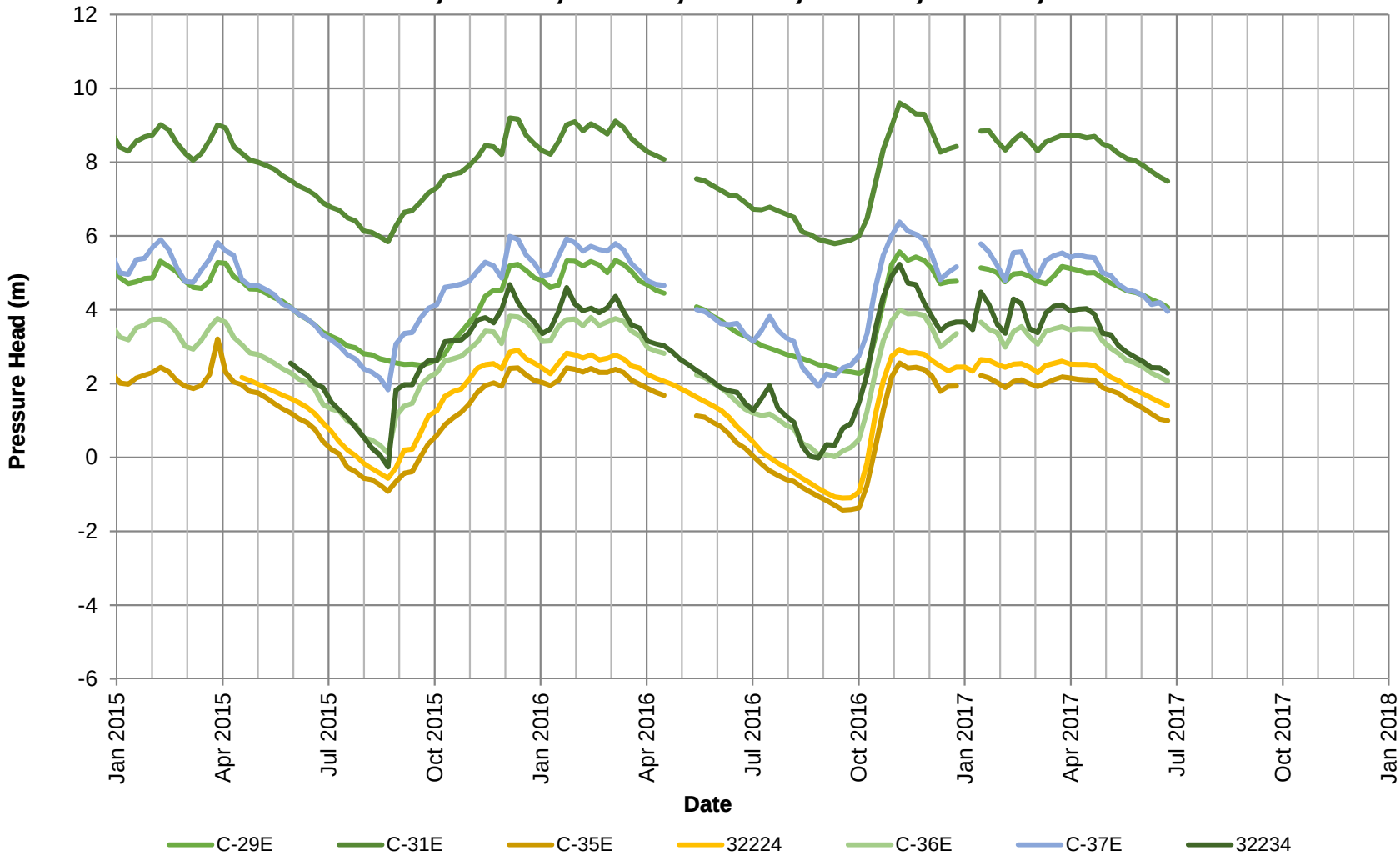


Figure 13: Old TDF Piezometer Records - Plane 5
Paste Berm and Upstream Tailings
17730, 32222, P-7, 17724, 17726, 17722

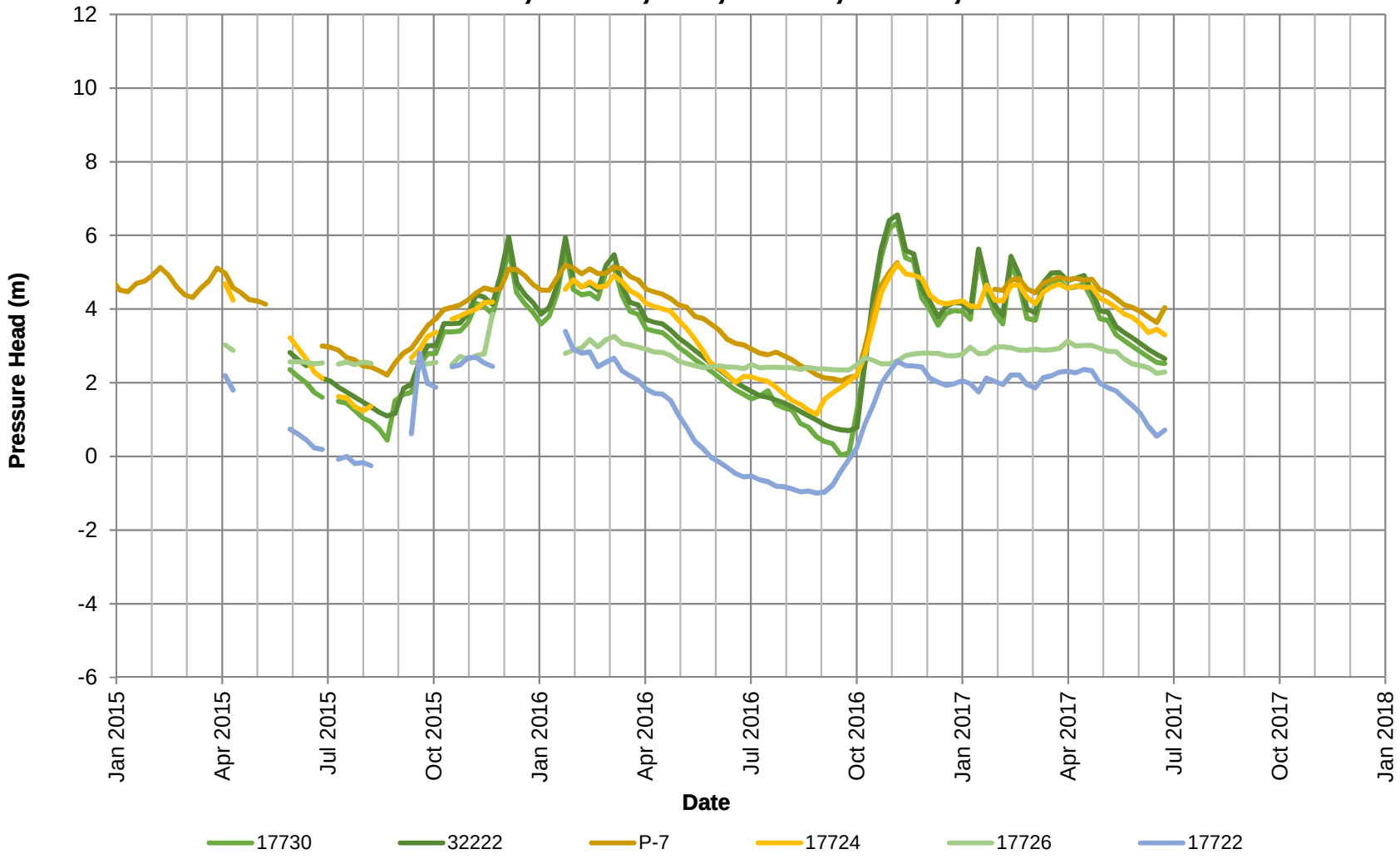
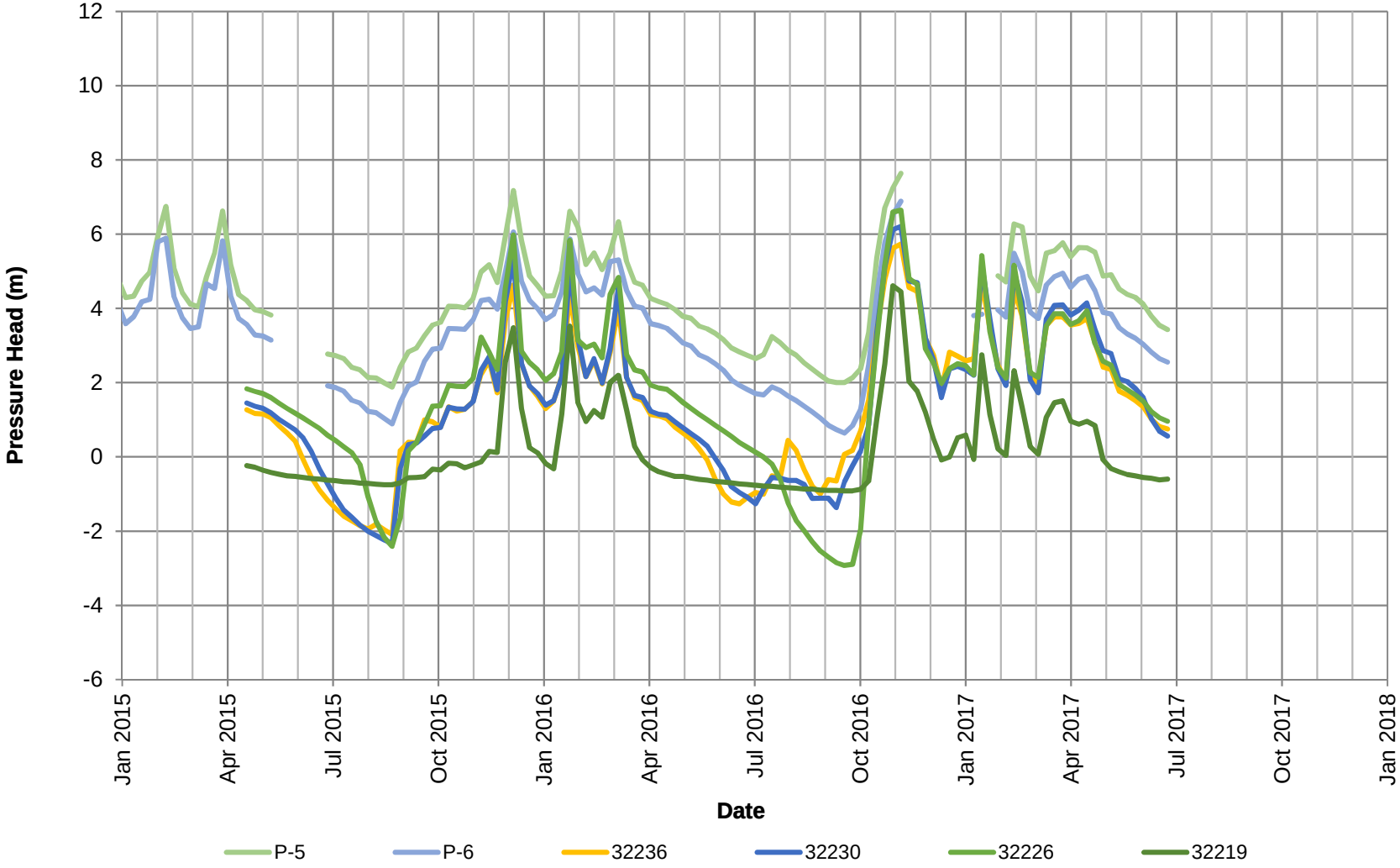


Figure 14: Old TDF Piezometer Records
Plane 5/6 (P-5, P-6) and Plane 6 (32236, 32230, 32226, 32219)



Attachment D

Slope Inclinometer Data

Table\Figure Number	Title
Figure 1	Cumulative Displacement – BH15-32
Figure 2	Incremental Displacement – BH15-32
Figure 3	Cumulative Displacement – BH15-35
Figure 4	Incremental Displacement – BH15-35
Figure 5	Cumulative Displacement – BH14-08A
Figure 6	Incremental Displacement – BH14-08A
Figure 7	Cumulative Displacement – BH14-10A
Figure 8	Incremental Displacement – BH14-10A

RST Instruments Ltd.

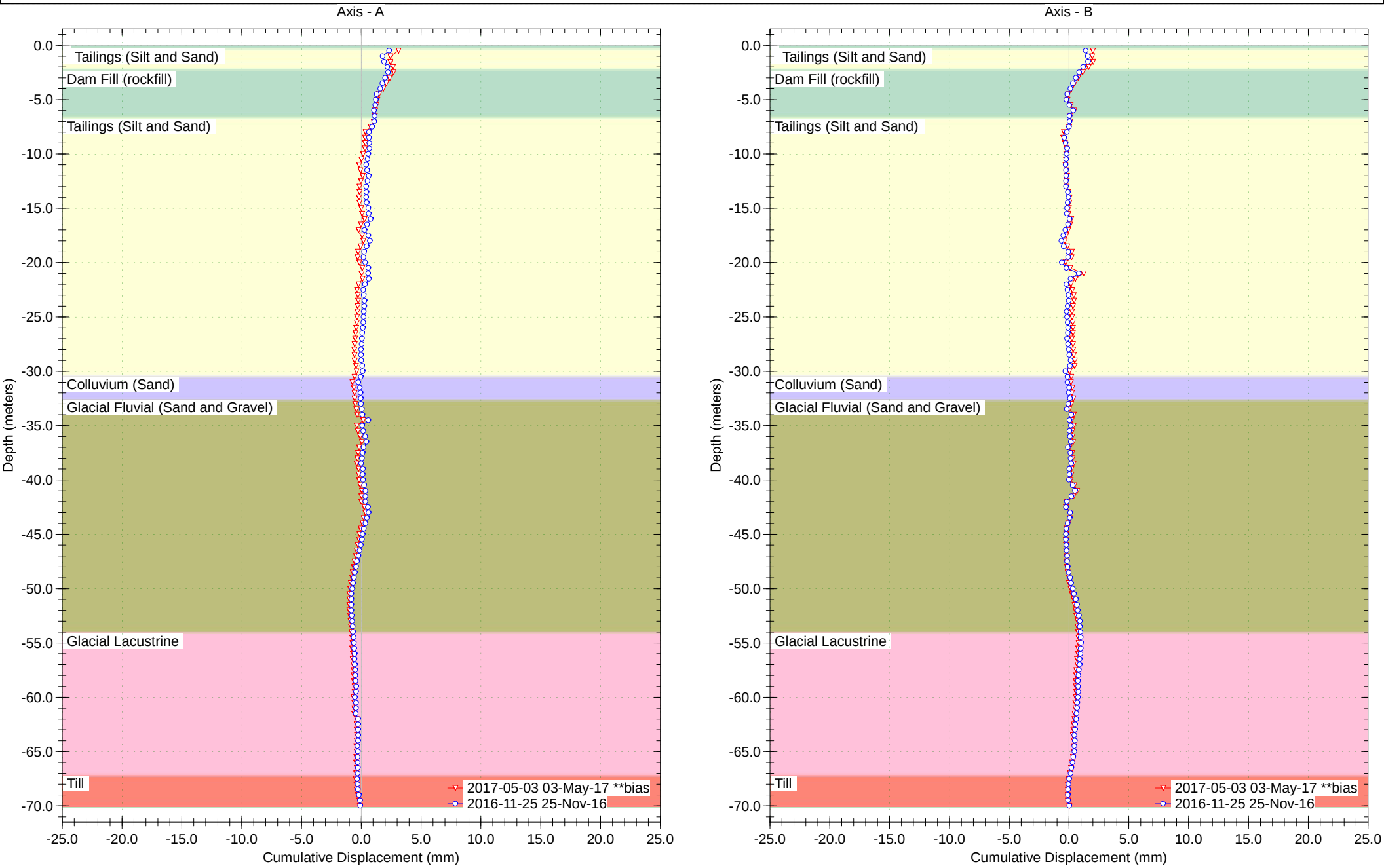
CUMULATIVE DISPLACEMENT

Inclinalysis v. 2.47.5

Borehole : BH15-32
Project : Site - Myra Falls
Location : Old TDF
Northing :
Easting :
Collar : 337.3 m

Spiral Correction : N/A
Collar Elevation : 0.0 meters
Borehole Total Depth : 70.0 meters
A+ Groove Azimuth :
Base Reading : 2016 Mar 09 15:37
Applied Azimuth : 0.0 degrees

Figure 1



RST Instruments Ltd.

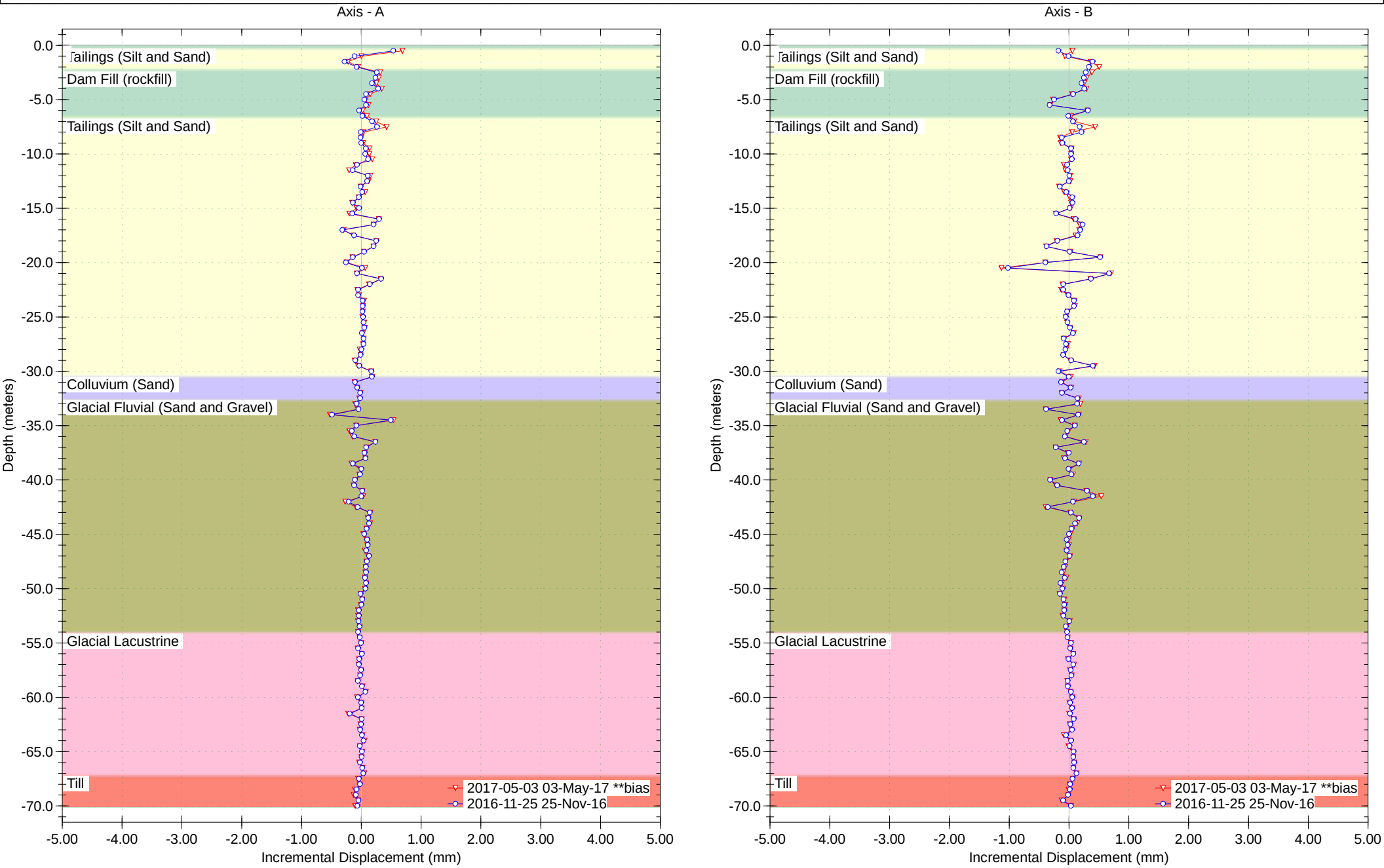
INCREMENTAL DISPLACEMENT

Inclinalysis v. 2.47.5

Borehole : BH15-32
Project : Site - Myra Falls
Location : Old TDF
Northing :
Easting :
Collar : 337.3 m

Spiral Correction : N/A
Collar Elevation : 0.0 meters
Borehole Total Depth : 70.0 meters
A+ Groove Azimuth :
Base Reading : 2016 Mar 09 15:37
Applied Azimuth : 0.0 degrees

Figure 2



RST Instruments Ltd.

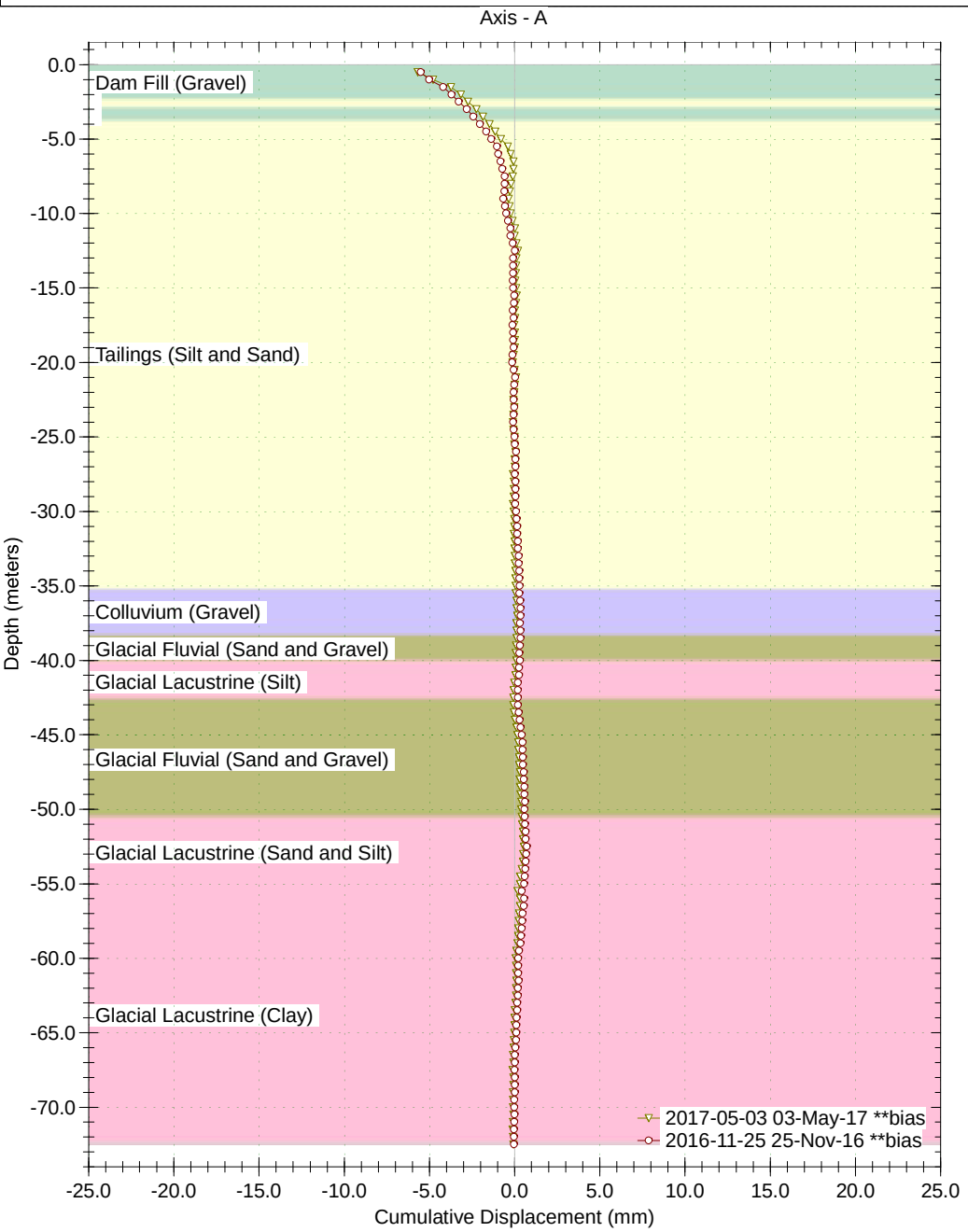
CUMULATIVE DISPLACEMENT

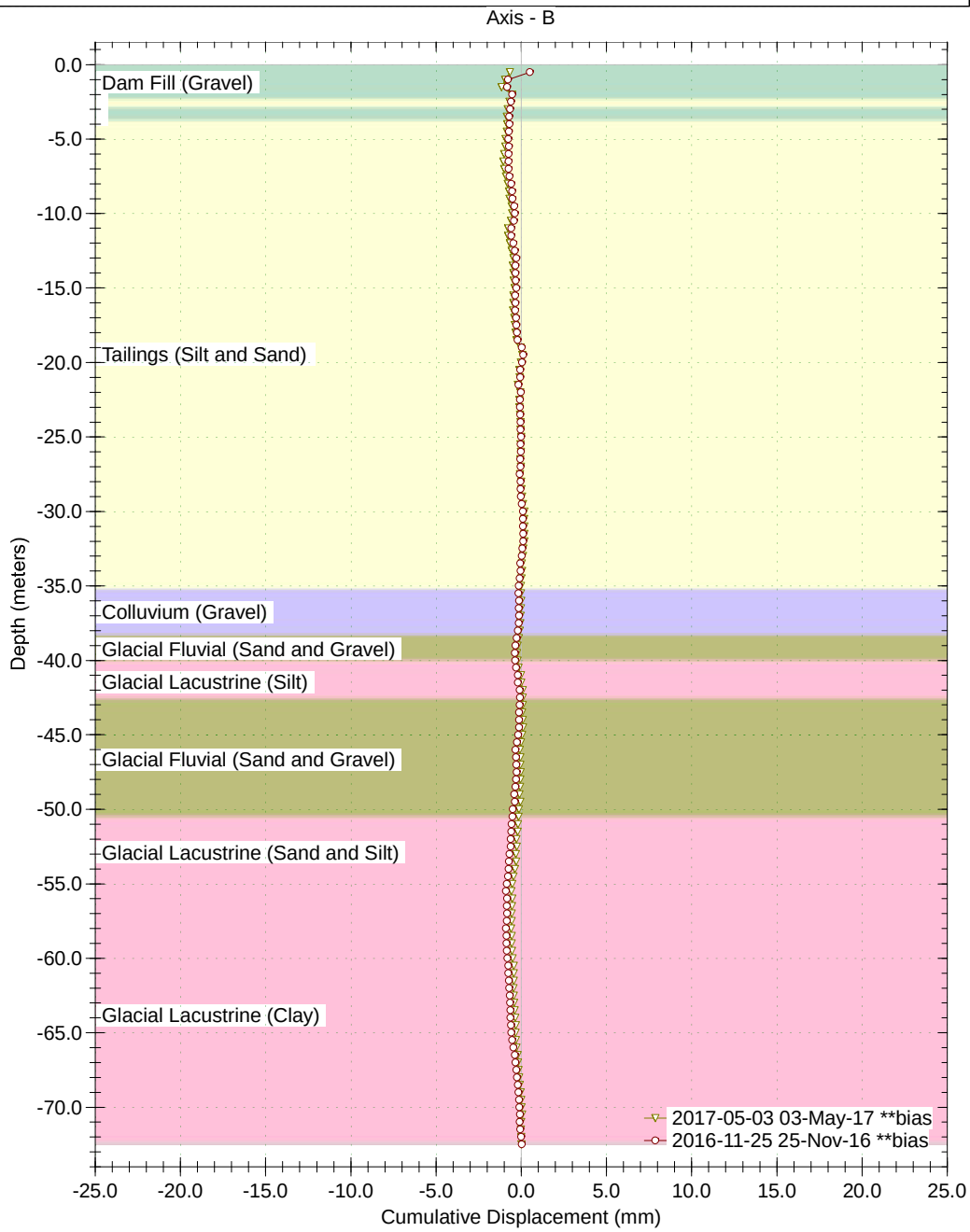
Inclinalysis v. 2.47.5

Borehole : BH15-35
Project : Site - Myra Falls
Location : Old TDF
Northing :
Easting :
Collar : 336.9 m

Spiral Correction : N/A
Collar Elevation : 0.0 meters
Borehole Total Depth : 72.5 meters
A+ Groove Azimuth :
Base Reading : 2016 Mar 09 13:29
Applied Azimuth : 0.0 degrees

Figure 3





RST Instruments Ltd.

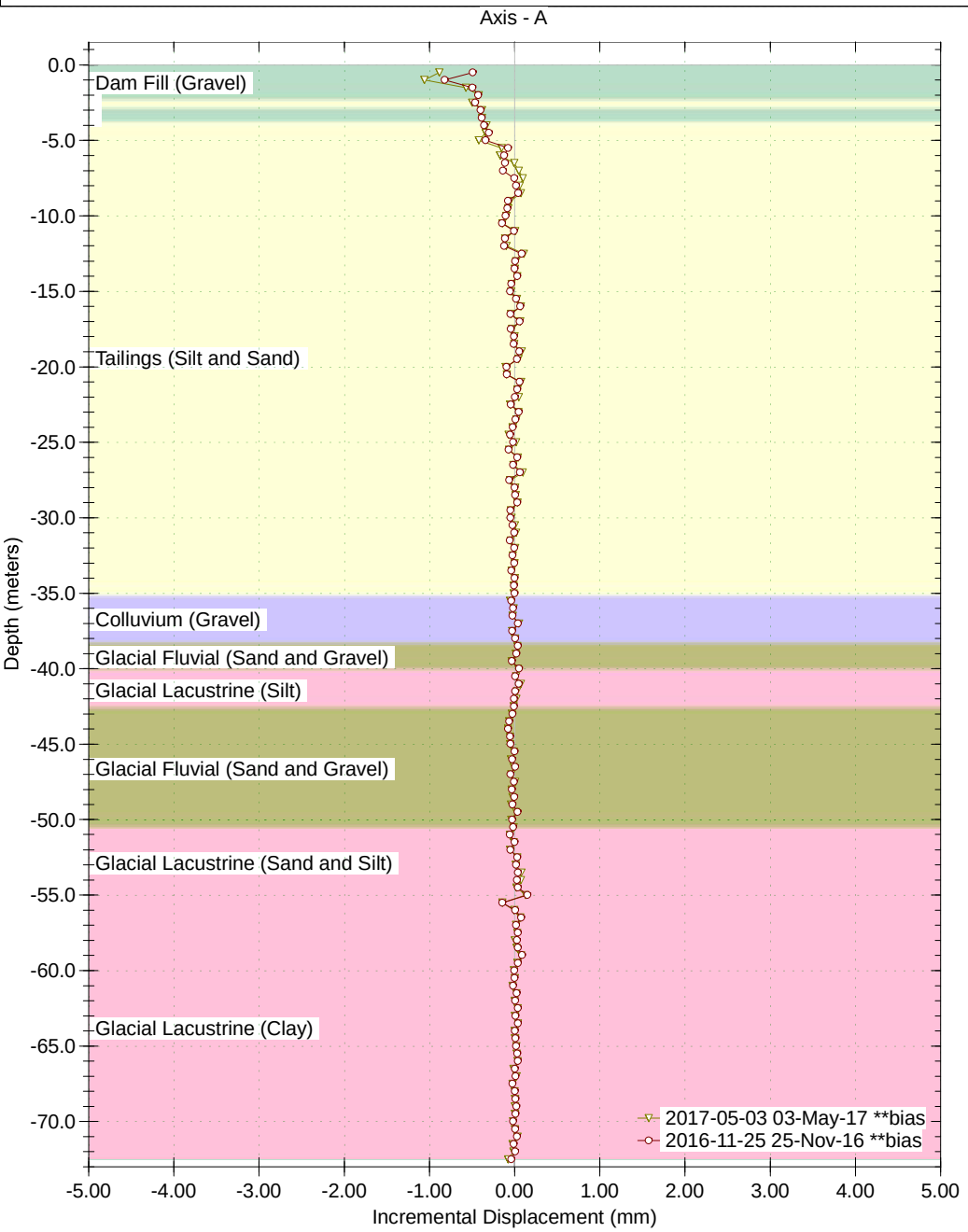
INCREMENTAL DISPLACEMENT

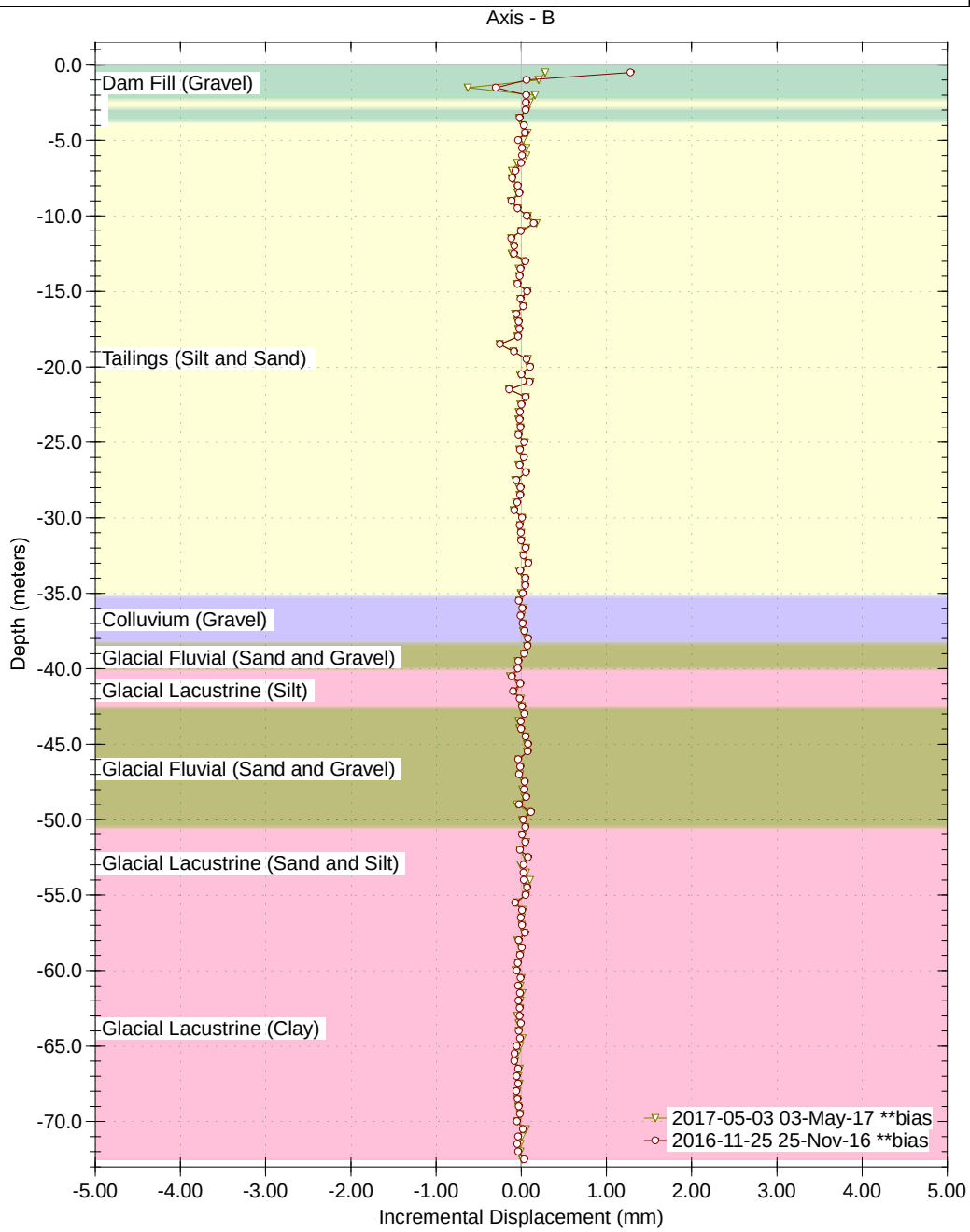
Inclinalysis v. 2.47.5

Borehole : BH15-35
Project : Site - Myra Falls
Location : Old TDF
Northing :
Easting :
Collar : 336.9 m

Spiral Correction : N/A
Collar Elevation : 0.0 meters
Borehole Total Depth : 72.5 meters
A+ Groove Azimuth :
Base Reading : 2016 Mar 09 13:29
Applied Azimuth : 0.0 degrees

Figure 4





RST Instruments Ltd.

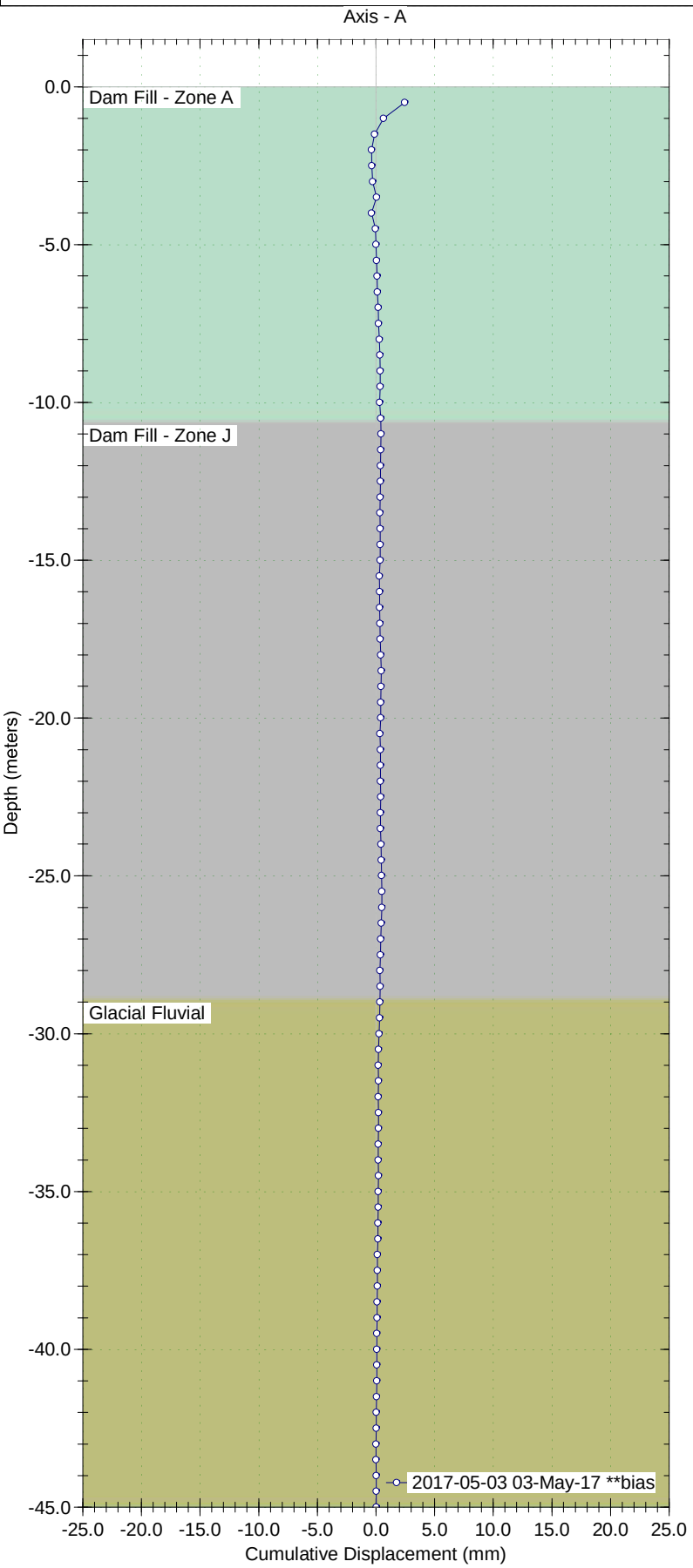
CUMULATIVE DISPLACEMENT

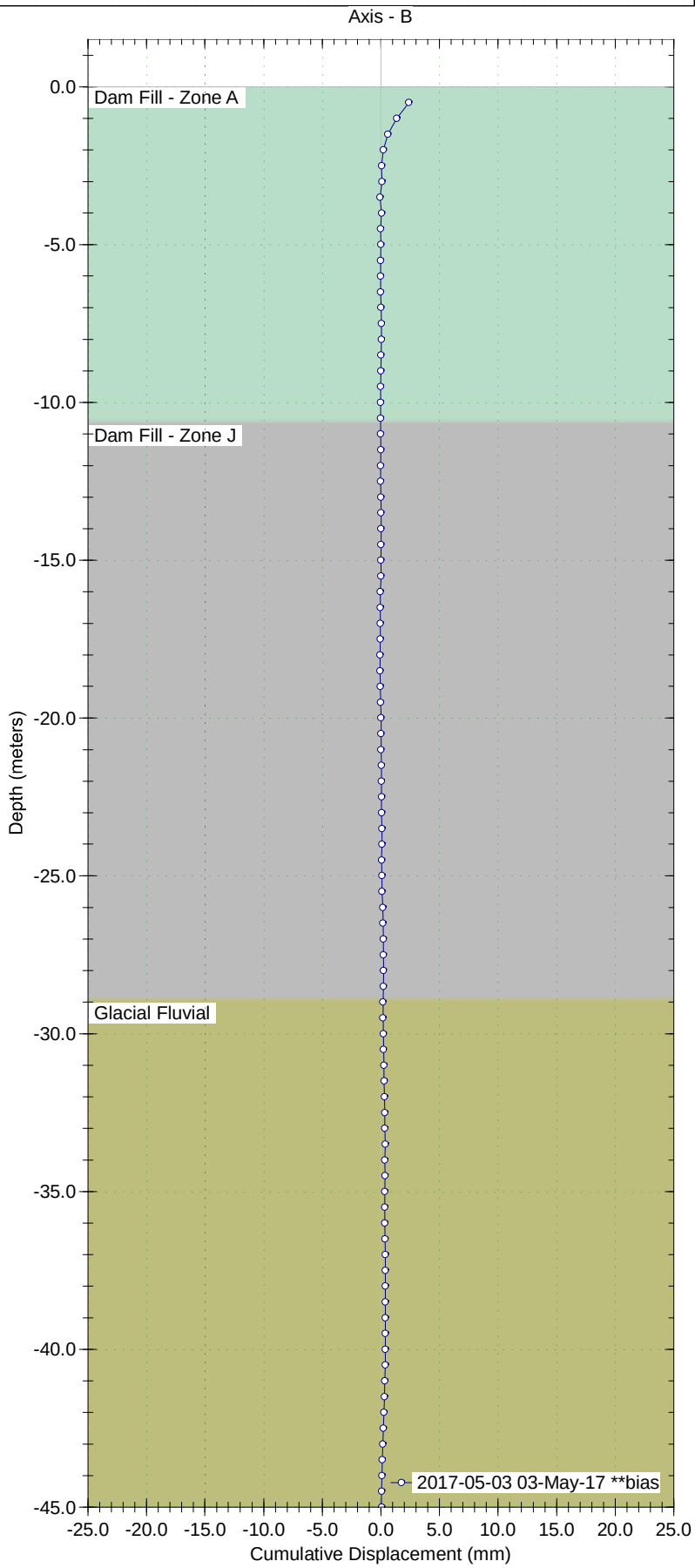
Inclinalysis v. 2.47.5

Borehole : BH14-08A
Project : Site - Myra Falls
Location : Lynx TDF
Northing :
Easting :
Collar : 357.5 m

Spiral Correction : N/A
Collar Elevation : 0.0 meters
Borehole Total Depth : 45.0 meters
A+ Groove Azimuth :
Base Reading :
Applied Azimuth : 0.0 degrees

Figure 5



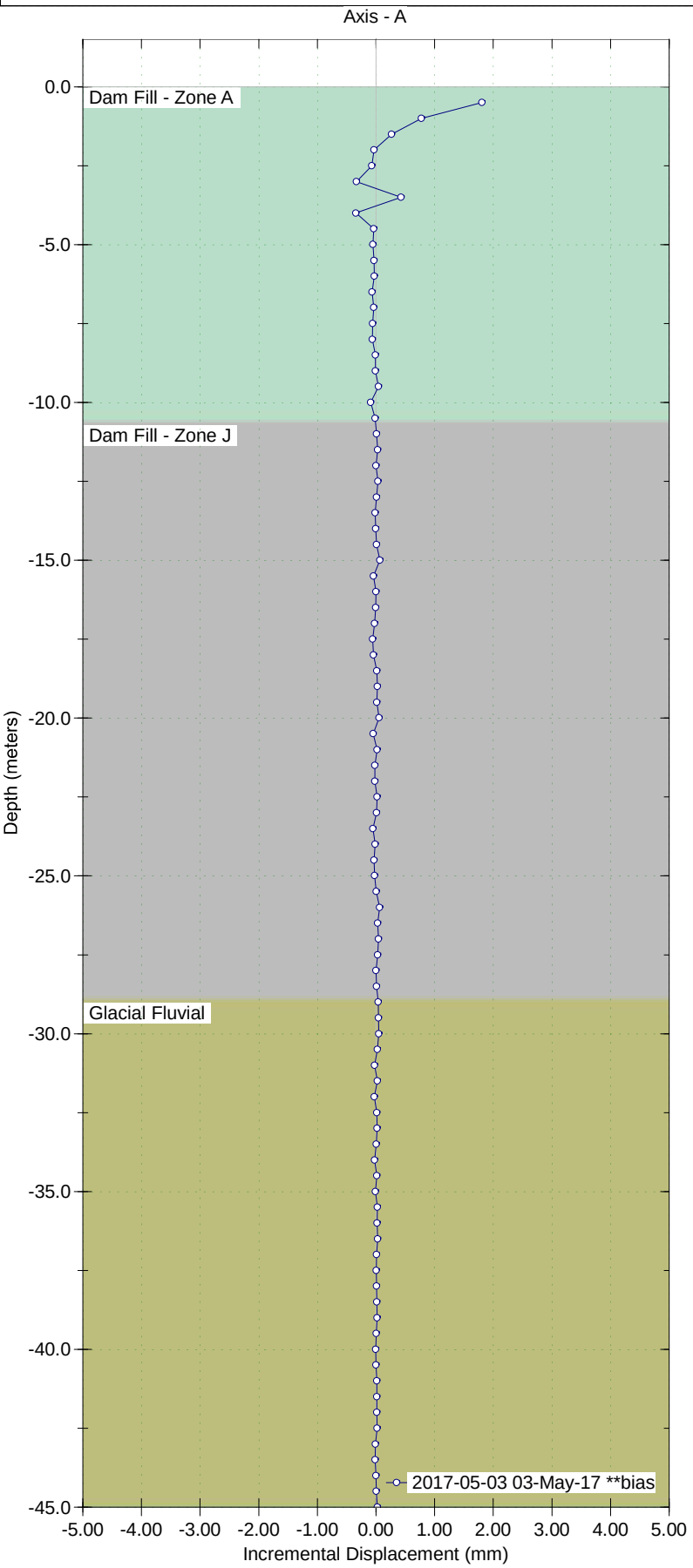


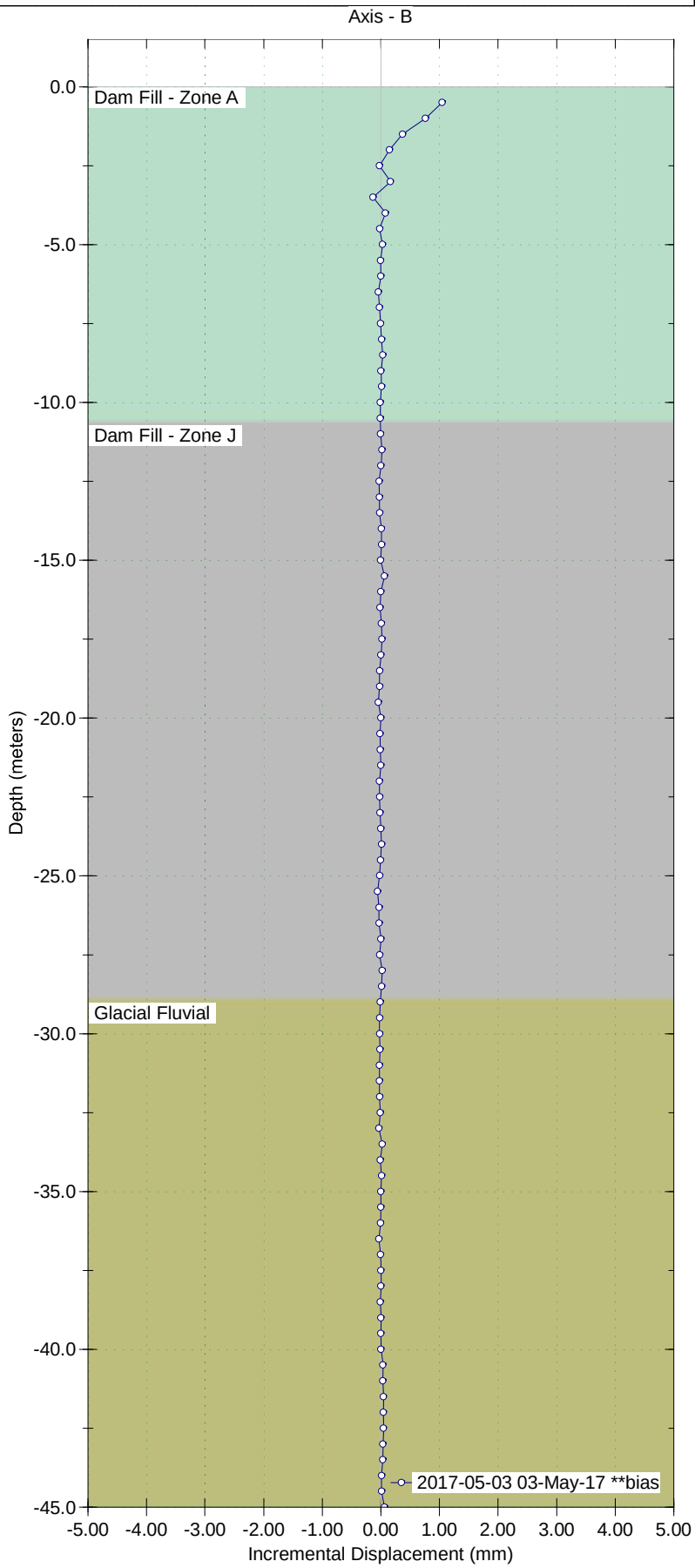
RST Instruments Ltd. | INCREMENTAL DISPLACEMENT | Inclinalysis v. 2.47.5

Borehole : BH14-08A
Project : Site - Myra Falls
Location : Lynx TDF
Northing :
Easting :
Collar : 357.5 m

Spiral Correction : N/A
Collar Elevation : 0.0 meters
Borehole Total Depth : 45.0 meters
A+ Groove Azimuth :
Base Reading :
Applied Azimuth : 0.0 degrees

Figure 6





RST Instruments Ltd.

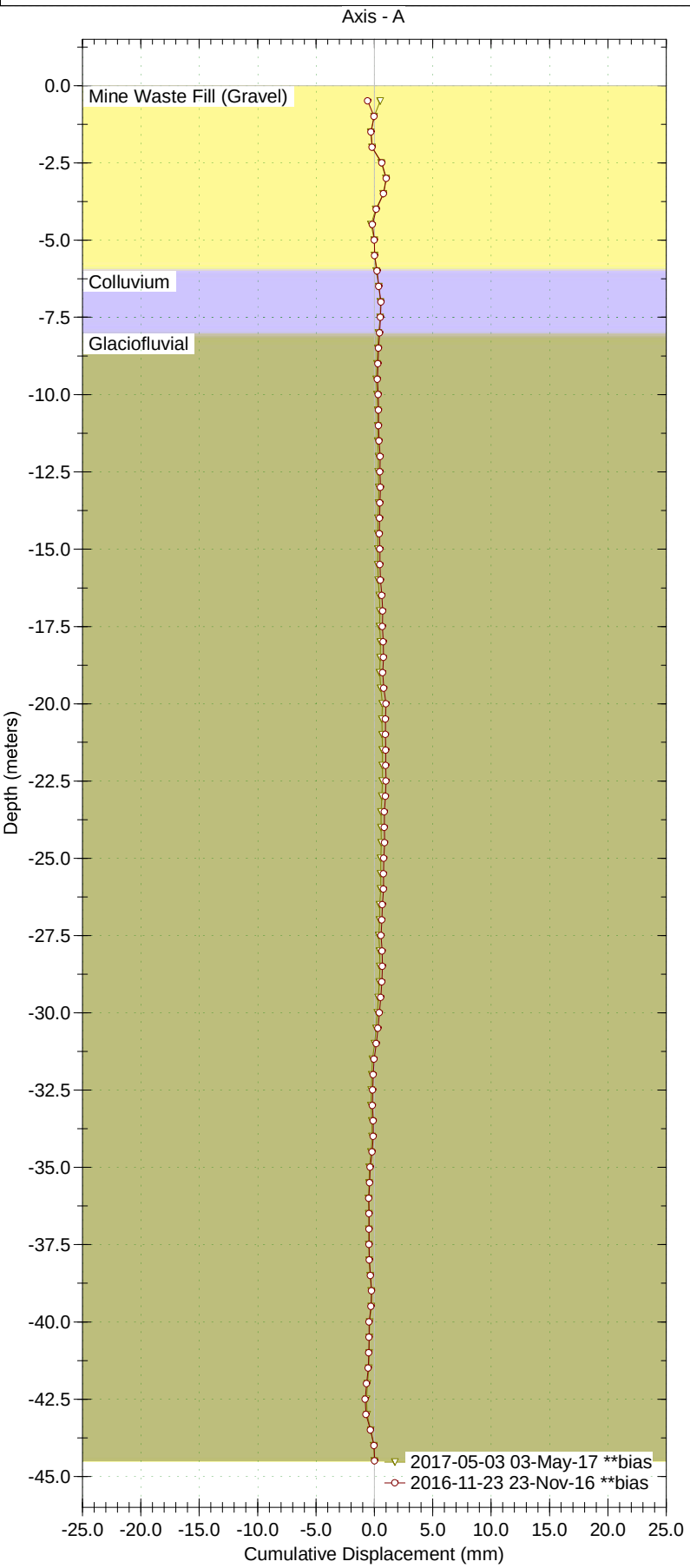
CUMULATIVE DISPLACEMENT

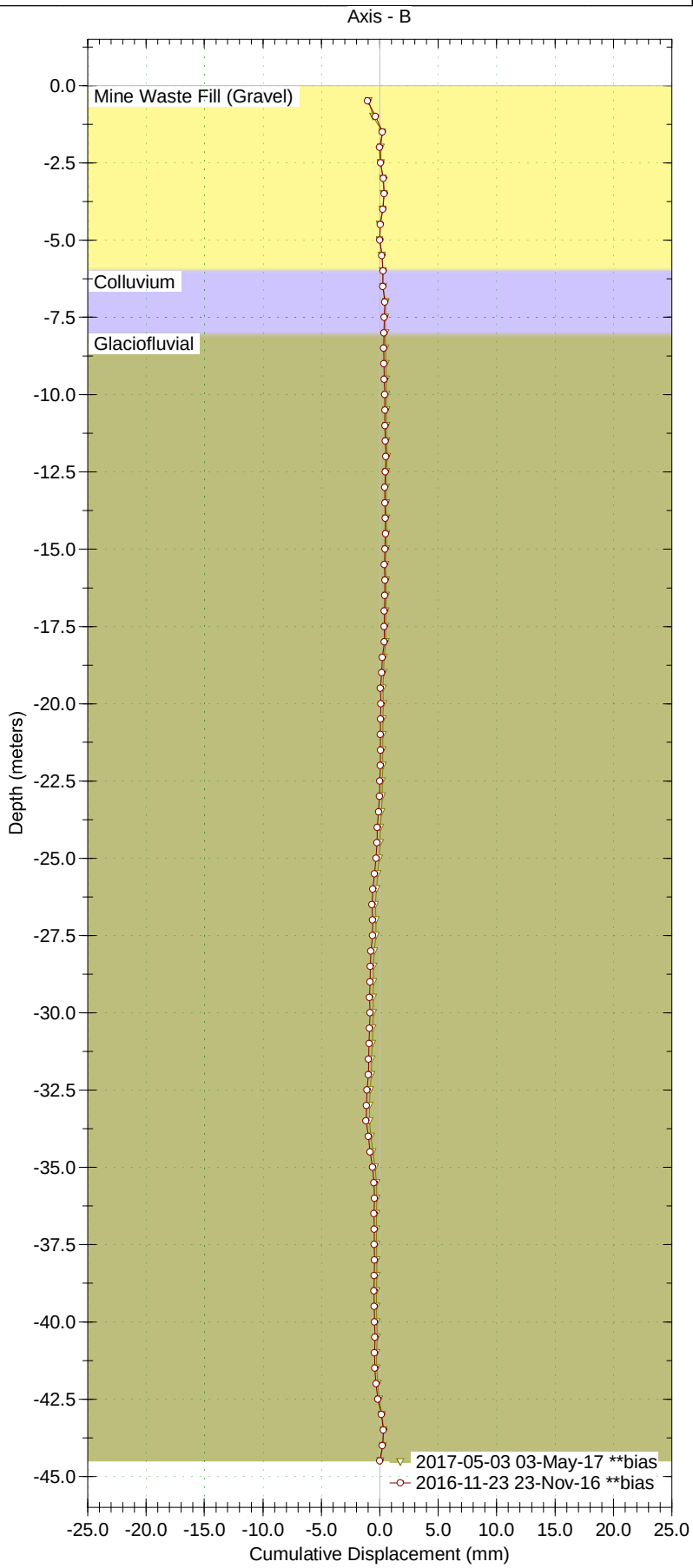
Inclinalysis v. 2.47.5

Borehole : BH14-10A
Project : Site - Myra Falls
Location :
Northing :
Easting :
Collar : 357.5 m

Spiral Correction : N/A
Collar Elevation : 0.0 meters
Borehole Total Depth : 44.5 meters
A+ Groove Azimuth :
Base Reading : 2016 Mar 08 20:35
Applied Azimuth : 0.0 degrees

Figure 7





RST Instruments Ltd.

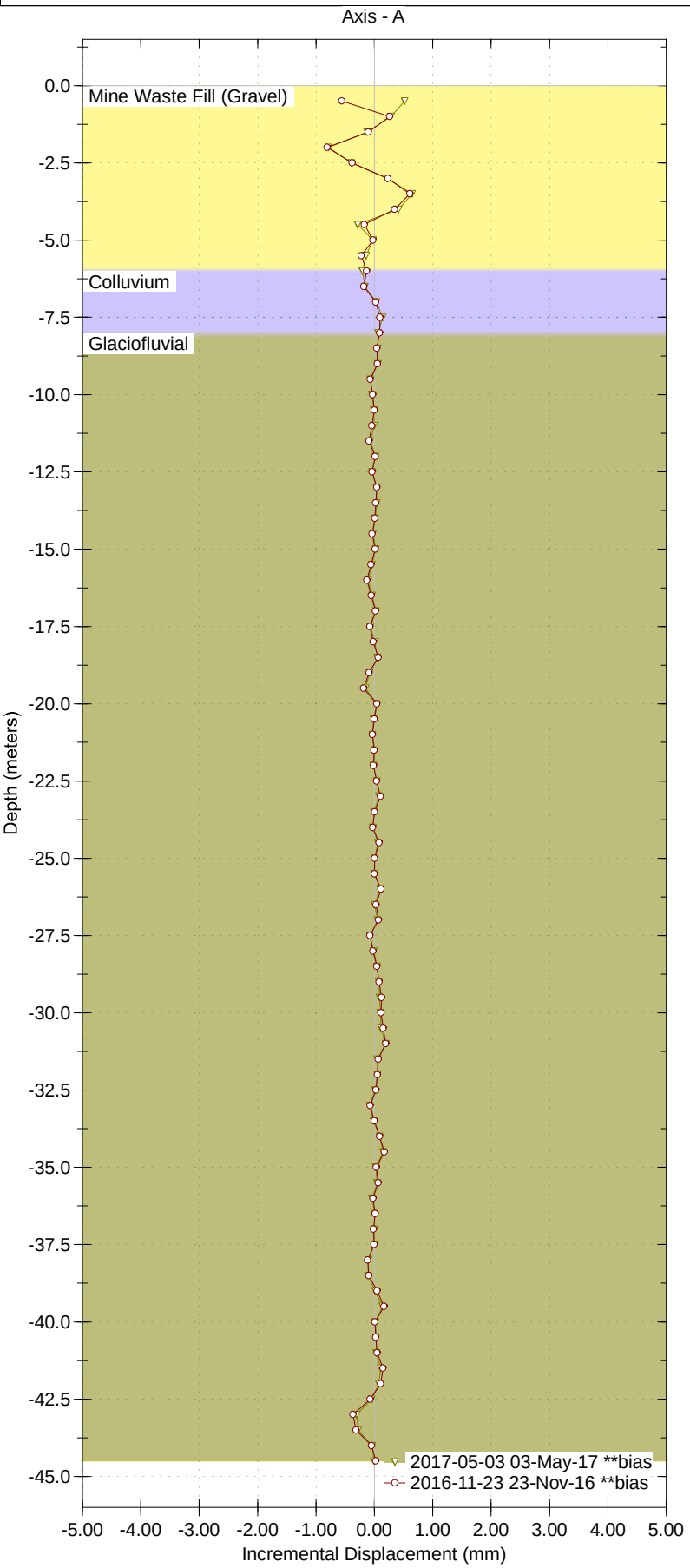
INCREMENTAL DISPLACEMENT

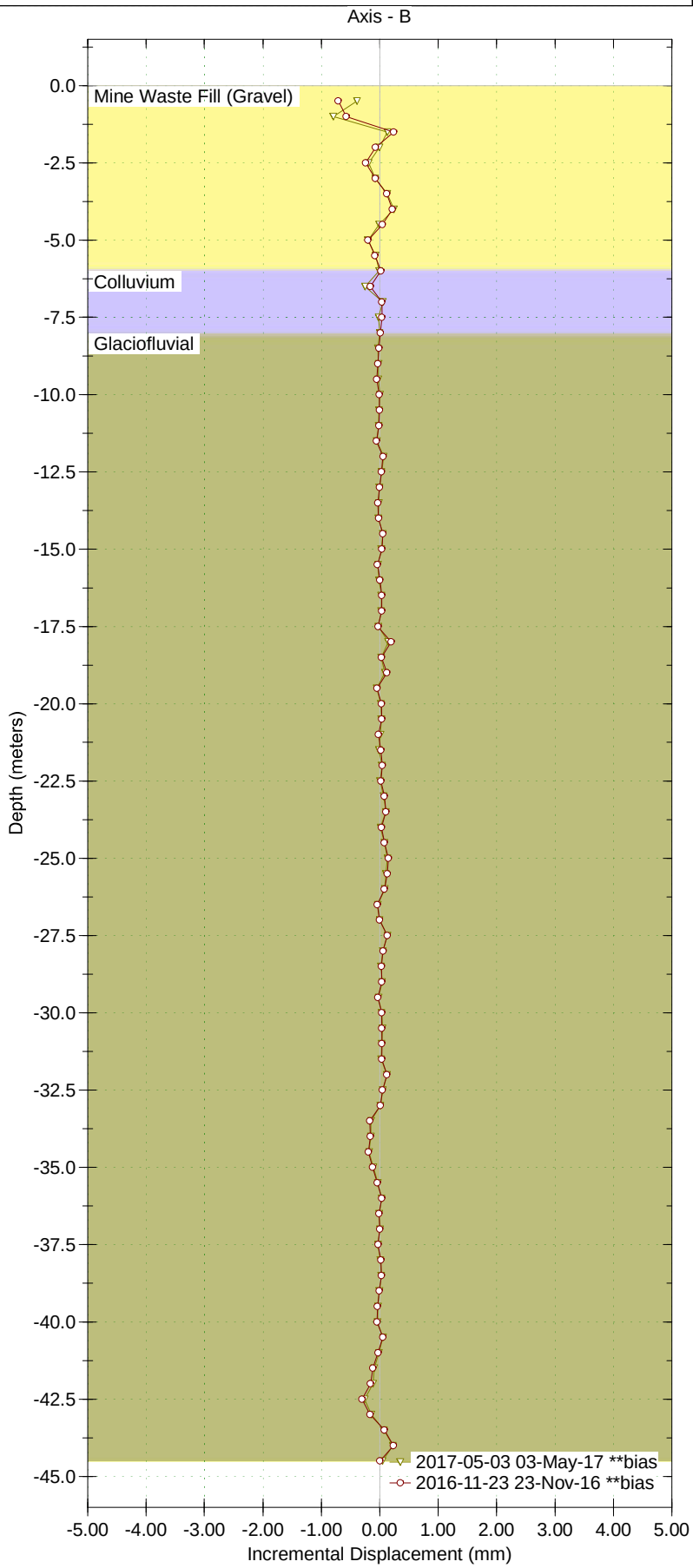
Inclinalysis v. 2.47.5

Borehole : BH14-10A
Project : Site - Myra Falls
Location :
Northing :
Easting :
Collar : 357.5 m

Spiral Correction : N/A
Collar Elevation : 0.0 meters
Borehole Total Depth : 44.5 meters
A+ Groove Azimuth :
Base Reading : 2016 Mar 08 20:35
Applied Azimuth : 0.0 degrees

Figure 8





Attachment E

Deformation Monument Data

Table\Figure Number	Title
Table 1	Old TDF - Monument Monitoring Summary – Raw Data
Table 2	Old TDF – Monument Monitoring Summary – Cumulative Values (Change from Initial)
Table 3	Lynx TDF – Monument Monitoring Summary – Raw Data
Table 4	Lynx TDF – Monument Monitoring Summary – Cumulative Values (Change from Initial)

amec foster wheeler

Table 1: Old TDF - Monument Monitoring Summary - Raw Data

	TDF14-01			TDF14-02			TDF14-03			TDF14-04		
	Seismic Upgrade Downstream Edge											
	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation
Initial	3240.38	2575.24	3378.19	3290.92	2650.77	3378.25	3350.50	2730.91	3377.89	3400.78	2819.24	3378.04
12-Jan-15	3240.38	2575.23	3378.19	3290.93	2650.76	3378.25	3350.50	2730.91	3377.89	3400.78	2819.24	3378.04
03-Mar-15	3240.38	2575.23	3378.18	3290.92	2650.76	3378.24	3350.50	2730.91	3377.88	3400.78	2819.24	3378.04
27-May-15	3240.39	2575.23	3378.18	3290.93	2650.76	3378.24	3350.50	2730.90	3377.89	3400.77	2819.24	3378.04
02-Jul-15	3240.39	2575.24	3378.17	3290.93	2650.77	3378.25	3350.50	2730.90	3377.89	3400.78	2819.23	3378.04
06-Aug-15	3240.39	2575.23	3378.18	3290.93	2650.77	3378.25	3350.50	2730.91	3377.89	3400.78	2819.24	3378.04
03-Sep-15	3240.38	2575.24	3378.19	3290.93	2650.77	3378.25	3350.50	2730.91	3377.89	3400.78	2819.23	3378.04
13-Oct-15	3240.38	2575.23	3378.19	3290.93	2650.76	3378.25	3350.51	2730.90	3377.89	3400.78	2819.23	3378.04
24-Nov-15	3240.38	2575.23	3378.19	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	3400.78	2819.24	3378.04
08-Jan-16	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	3350.50	2730.90	3377.89	#N/A	#N/A	#N/A
03-Feb-16	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	3350.50	2730.90	3377.89	#N/A	#N/A	#N/A
22-Mar-16	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	3350.50	2730.90	3377.89	#N/A	#N/A	#N/A
28-Jun-16	#N/A	#N/A	#N/A	3290.93	2650.77	3378.25	3350.50	2730.91	3377.89	3400.78	2819.23	3378.05
15-Sep-16	Destroyed			Destroyed			Destroyed			Destroyed		
15-May-17	3240.39	2575.24	3378.18				3350.51	2730.91	3377.88	3400.79	2819.24	3378.03

Notes:

1 - Survey data provided by Nyrstar Myra Falls.
2 - The measurement error (total of instrument, human and network) for the Old TDF monument survey is approximately 1.0 cm for both horizontal and vertical displacement.
3 - Values in table are reported in meters.
4 - '#N/A' indicates no survey data available for that date.

	TDF14-05			TDF14-06			TDF14-07			TDF14-08		
	Seismic Upgrade Downstream Edge											
	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation
Initial	3452.82	2903.63	3377.93	3503.30	2990.58	3377.65	3547.89	3081.34	3377.15	3589.49	3165.47	3376.24
12-Jan-15	3452.82	2903.63	3377.93	3503.30	2990.58	3377.64	3547.89	3081.35	3377.15	3589.49	3165.47	3376.24
03-Mar-15	3452.82	2903.63	3377.93	3503.31	2990.57	3377.65	3547.89	3081.34	3377.15	3589.49	3165.47	3376.23
27-May-15	3452.81	2903.63	3377.93	3503.31	2990.57	3377.65	3547.89	3081.34	3377.15	3589.48	3165.46	3376.24
02-Jul-15	3452.82	2903.62	3377.92	3503.31	2990.58	3377.65	3547.89	3081.34	3377.15	3589.49	3165.46	3376.24
06-Aug-15	3452.82	2903.63	3377.93	3503.31	2990.57	3377.65	3547.89	3081.34	3377.16	3589.49	3165.46	3376.24
03-Sep-15	3452.82	2903.63	3377.94	3503.31	2990.57	3377.65	3547.89	3081.34	3377.16	3589.48	3165.46	3376.24
13-Oct-15	3452.82	2903.62	3377.93	3503.31	2990.57	3377.66	3547.89	3081.34	3377.16	3589.49	3165.46	3376.24
24-Nov-15	#N/A	#N/A	#N/A	3503.31	2990.58	3377.66	3547.89	3081.35	3377.16	3589.50	3165.47	3376.24
08-Jan-16	3452.82	2903.63	3377.94	3503.30	2990.59	3377.66	3547.89	3081.35	3377.16	3589.51	3165.47	3376.24
03-Feb-16	3452.82	2903.63	3377.95	3503.31	2990.58	3377.66	3547.88	3081.34	3377.16	3589.49	3165.46	3376.24
22-Mar-16	3452.82	2903.63	3377.94	3503.31	2990.58	3377.66	3547.89	3081.35	3377.16	3589.50	3165.46	3376.24
28-Jun-16	3452.82	2903.62	3377.94	3503.31	2990.57	3377.66	3547.89	3081.35	3377.16	3589.49	3165.46	3376.24
15-Sep-16	Destroyed			3503.31	2990.57	3377.66	3547.89	3081.35	3377.16	3589.49	3165.46	3376.25
15-May-17	3452.82	2903.63	3377.93	3503.31	2990.57	3377.66	3547.89	3081.35	3377.16	3589.49	3165.46	3376.25

	TDF14-09			TDF14-10			TDF14-11			TDF14-12		
	Seismic Upgrade Downstream Edge											
	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation
Initial	3666.95	3188.03	3375.73	3778.35	3227.23	3376.11	3853.75	3297.90	3376.34	3937.07	3338.75	3376.19
12-Jan-15	3666.95	3188.03	3375.72	3778.35	3227.23	3376.11	3853.76	3297.89	3376.34	3937.07	3338.75	3376.19
03-Mar-15	3666.95	3188.03	3375.72	3778.35	3227.22	3376.11	3853.76	3297.90	3376.35	3937.07	3338.75	3376.19
27-May-15	3666.94	3188.03	3375.72	3778.35	3227.23	3376.11	3853.74	3297.91	3376.33	3937.08	3338.75	3376.19
02-Jul-15	3666.95	3188.02	3375.73	3778.36	3227.23	3376.11	3853.75	3297.88	3376.32	3937.08	3338.75	3376.19
06-Aug-15	3666.94	3188.02	3375.73	3778.35	3227.23	3376.12	3853.75	3297.90	3376.33	3937.07	3338.75	3376.20
03-Sep-15	3666.94	3188.03	3375.73	3778.35	3227.23	3376.12	3853.74	3297.91	3376.34	3937.07	3338.75	3376.20
13-Oct-15	3666.95	3188.02	3375.73	3778.35	3227.23	3376.12	3853.75	3297.89	3376.34	3937.07	3338.75	3376.20
24-Nov-15	3666.96	3188.02	3375.73	3778.35	3227.22	3376.13	3853.78	3297.88	3376.34	3937.08	3338.75	3376.20
08-Jan-16	3666.97	3188.02	3375.73	3778.35	3227.22	3376.12	#N/A	#N/A	#N/A	3937.07	3338.75	3376.20
03-Feb-16	3666.95	3188.02	3375.73	3778.35	3227.23	3376.12	#N/A	#N/A	#N/A	3937.07	3338.75	3376.20
22-Mar-16	3666.95	3188.02	3375.73	3778.35	3227.23	3376.12	3853.77	3297.88	3376.33	3937.07	3338.75	3376.20
28-Jun-16	3666.95	3188.02	3375.73	3778.35	3227.22	3376.13	3853.76	3297.90	3376.33	3937.07	3338.75	3376.20
15-Sep-16	3666.95	3188.02	3375.73	3778.35	3227.22	3376.13	3853.77	3297.89	3376.34	3937.07	3338.75	3376.20
15-May-17	3666.95	3188.02	3375.74	3778.35	3227.22	3376.14	3853.76	3297.89	3376.34	3937.07	3338.75	3376.20

	TDF14-13			TDF14-14			TDF14-15			TDF14-16		
				Seismic Upgrade Downstream Edge						6:1 Buttress Crest Edge		
	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation
Initial	4029.16	3348.94	3376.12	4122.22	3325.97	3375.95	4171.78	3244.21	3376.21	4102.12	3229.40	3383.18
12-Jan-15	4029.17	3348.93	3376.12	4122.22	3325.97	3375.95	4171.78	3244.21	3376.21	4102.12	3229.40	3383.18
03-Mar-15	4029.16	3348.94	3376.12	4122.23	3325.97	3375.95	4171.78	3244.20	3376.21	4102.12	3229.40	3383.18
27-May-15	4029.17	3348.93	3376.12	4122.22	3325.97	3375.95	4171.78	3244.20	3376.21	4102.12	3229.41	3383.18
02-Jul-15	4029.17	3348.93	3376.12	4122.22	3325.97	3375.95	4171.78	3244.21	3376.21	4102.12	3229.41	3383.18
06-Aug-15	4029.16	3348.93	3376.12	4122.22	3325.97	3375.96	4171.78	3244.21	3376.21	4102.12	3229.41	3383.18
03-Sep-15	4029.16	3348.94	3376.13	4122.22	3325.97	3375.96	4171.78	3244.21	3376.22	4102.12	3229.41	3383.18
13-Oct-15	4029.16	3348.93	3376.12	4122.22	3325.97	3375.97	#N/A	#N/A	#N/A	4102.12	3229.41	3383.19
24-Nov-15	4029.17	3348.93	3376.12	4122.21	3325.97	3375.96	4171.78	3244.21	3376.22	4102.12	3229.41	3383.19
08-Jan-16	4029.16	3348.94	3376.13	4122.22	3325.98	3375.96	4171.78	3244.21	3376.22	4102.12	3229.41	3383.18
03-Feb-16	4029.17	3348.93	3376.12	4122.22	3325.97	3375.96	4171.78	3244.21	3376.22	4102.12	3229.41	3383.19
22-Mar-16	4029.16	3348.93	3376.12	4122.22	3325.97	3375.96	4171.78	3244.21	3376.22	4102.12	3229.40	3383.19
28-Jun-16	4029.16	3348.94	3376.13	4122.22	3325.97	3375.97	Line of Sight Obstructed			4102.12	3229.41	3383.19
15-Sep-16	4029.16	3348.94	3376.13	4122.22	3325.98	3375.98				4102.12	3229.41	3383.19
15-May-17	4029.16	3348.94	3376.12	4122.22	3325.97	3375.98				4102.12	3229.41	3383.19

	TDF14-17			TDF14-18			TDF14-19			TDF14-20		
				6:1 Buttress Crest Edge								
	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation
Initial	4042.75	3257.88	3382.85	3980.71	3257.73	3382.88	3927.51	3247.16	3383.00	3876.79	3190.58	3383.38
12-Jan-15	4042.75	3257.88	3382.85	3980.72	3257.73	3382.88	3927.51	3247.16	3383.00	3876.80	3190.58	3383.38
03-Mar-15	4042.74	3257.88	3382.84	3980.72	3257.73	3382.88	3927.51	3247.16	3383.00	3876.80	3190.58	3383.38
27-May-15	4042.75	3257.88	3382.85	3980.72	3257.73	3382.87	3927.51	3247.16	3383.00	3876.79	3190.58	3383.38
02-Jul-15	4042.75	3257.88	3382.85	3980.72	3257.73	3382.88	3927.51	3247.16	3383.00	3876.79	3190.58	3383.38
06-Aug-15	4042.75	3257.88	3382.84	3980.72	3257.73	3382.88	3927.51	3247.16	3383.00	3876.79	3190.58	3383.38
03-Sep-15	4042.75	3257.88	3382.85	3980.71	3257.73	3382.88	3927.51	3247.16	3383.00	3876.79	3190.58	3383.38
13-Oct-15	4042.74	3257.88	3382.85	3980.71	3257.73	3382.88	3927.51	3247.16	3383.00	3876.79	3190.58	3383.38
24-Nov-15	4042.74	3257.88	3382.85	3980.72	3257.73	3382.88	3927.51	3247.16	3383.00	3876.79	3190.58	3383.39
08-Jan-16	4042.74	3257.88	3382.84	#N/A	#N/A	#N/A	3927.51	3247.16	3383.00	#N/A	#N/A	#N/A
03-Feb-16	4042.74	3257.88	3382.84	#N/A	#N/A	#N/A	3927.51	3247.16	3383.00	#N/A	#N/A	#N/A
22-Mar-16	4042.74	3257.88	3382.84	3980.71	3257.73	3382.88	3927.51	3247.16	3383.00	3876.79	3190.58	3383.38
28-Jun-16	4042.74	3257.88	3382.84	3980.71	3257.73	3382.88	3927.51	3247.16	3383.00	3876.79	3190.58	3383.38
15-Sep-16	4042.74	3257.88	3382.85	3980.71	3257.73	3382.88	3927.51	3247.16	3383.00	3876.79	3190.58	3383.38
15-May-17	4042.74	3257.88	3382.84	3980.71	3257.73	3382.88	3927.51	3247.16	3383.00	#N/A	#N/A	#N/A

	TDF14-21			TDF14-22			TDF14-23			TDF14-24		
	6:1 Buttress Crest Edge											
	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation
Initial	3797.26	3131.99	3383.24	3703.68	3098.22	3383.45	3637.59	3080.92	3383.34	3603.28	3040.47	3383.55
12-Jan-15	3797.26	3131.99	3383.25	3703.68	3098.22	3383.45	3637.59	3080.92	3383.35	3603.28	3040.47	3383.55
03-Mar-15	3797.27	3131.98	3383.24	3703.68	3098.22	3383.45	3637.59	3080.92	3383.34	3603.28	3040.47	3383.55
27-May-15	3797.26	3131.99	3383.24	3703.68	3098.23	3383.45	3637.59	3080.92	3383.34	3603.29	3040.47	3383.55
02-Jul-15	3797.27	3132.00	3383.24	3703.68	3098.22	3383.45	3637.59	3080.92	3383.34	3603.28	3040.47	3383.55
06-Aug-15	3797.26	3131.99	3383.24	3703.68	3098.22	3383.45	3637.59	3080.92	3383.34	3603.28	3040.47	3383.55
03-Sep-15	3797.26	3131.99	3383.25	3703.68	3098.23	3383.45	3637.59	3080.92	3383.34	3603.28	3040.47	3383.55
13-Oct-15	3797.26	3131.99	3383.25	3703.68	3098.22	3383.45	3637.59	3080.92	3383.34	3603.28	3040.47	3383.55
24-Nov-15	3797.26	3131.99	3383.25	3703.69	3098.21	3383.45	3637.59	3080.92	3383.34	3603.28	3040.47	3383.55
08-Jan-16	3797.26	3131.99	3383.25	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
03-Feb-16	3797.26	3131.99	3383.25	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
22-Mar-16	3797.26	3131.99	3383.25	3703.68	3098.22	3383.44	3637.59	3080.92	3383.34	3603.28	3040.47	3383.55
28-Jun-16	3797.27	3131.99	3383.25	3703.68	3098.22	3383.44	3637.59	3080.92	3383.34	3603.28	3040.47	3383.55
15-Sep-16	3797.27	3131.99	3383.25	3703.68	3098.22	3383.44	3637.59	3080.92	3383.34	3603.28	3040.47	3383.55
15-May-17	3797.26	3131.99	3383.25	3703.68	3098.22	3383.44	3637.59	3080.92	3383.34	3603.28	3040.47	3383.54

	TDF14-25			TDF14-26			TDF14-27			TDF14-28		
	6:1 Buttress Crest Edge											
	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation
Initial	3537.96	2908.55	3383.56	3480.58	2826.60	3383.58	3425.17	2738.42	3383.33	3355.37	2662.12	3382.17
12-Jan-15	3537.96	2908.55	3383.56	3480.58	2826.60	3383.58	3425.17	2738.42	3383.33	3355.36	2662.12	3382.17
03-Mar-15	3537.97	2908.55	3383.55	3480.58	2826.60	3383.57	3425.17	2738.42	3383.32	3355.36	2662.12	3382.17
27-May-15	3537.99	2908.54	3383.55	3480.57	2826.60	3383.57	3425.16	2738.42	3383.33	3355.36	2662.12	3382.17
02-Jul-15	3537.97	2908.55	3383.55	3480.58	2826.59	3383.57	3425.17	2738.42	3383.33	3355.36	2662.12	3382.17
06-Aug-15	3537.98	2908.55	3383.55	3480.58	2826.59	3383.57	3425.17	2738.42	3383.33	3355.36	2662.12	3382.17
03-Sep-15	3537.98	2908.54	3383.56	3480.58	2826.59	3383.57	3425.17	2738.42	3383.32	3355.36	2662.12	3382.18
13-Oct-15	3537.97	2908.55	3383.55	3480.58	2826.59	3383.57	3425.17	2738.42	3383.32	3355.36	2662.12	3382.18
24-Nov-15	3537.95	2908.56	3383.57	3480.58	2826.59	3383.57	3425.17	2738.42	3383.32	3355.36	2662.12	3382.18
08-Jan-16	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A			
03-Feb-16	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	3425.17	2738.42	3383.32			
22-Mar-16	3537.96	2908.55	3383.55	3480.57	2826.59	3383.56	3425.16	2738.42	3383.32			
28-Jun-16	3537.96	2908.55	3383.54	3480.58	2826.59	3383.56	3425.17	2738.42	3383.32			
15-Sep-16	3537.96	2908.55	3383.54									
15-May-17	3537.97	2908.55	3383.54									

Destroyed

Destroyed

Destroyed

	TDF14-29			TDF14-30			TDF14-31			TDF14-32		
	Paste Berm Downstream Crest Edge											
	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation
Initial	3519.12	2678.37	3390.79	3523.85	2748.32	3390.66	3583.38	2817.55	3390.62	3652.89	2900.05	3390.73
12-Jan-15	3519.12	2678.37	3390.79	3523.85	2748.32	3390.66	3583.37	2817.55	3390.62	3652.89	2900.06	3390.74
03-Mar-15	3519.12	2678.37	3390.79	3523.85	2748.32	3390.66	3583.37	2817.55	3390.62	3652.89	2900.05	3390.73
27-May-15	3519.12	2678.37	3390.79	#N/A	#N/A	#N/A	3583.40	2817.55	3390.61	3652.91	2900.06	3390.73
02-Jul-15	3519.11	2678.37	3390.79	3523.85	2748.32	3390.66	3583.37	2817.55	3390.61	3652.89	2900.06	3390.73
06-Aug-15	3519.12	2678.37	3390.79	3523.85	2748.32	3390.66	3583.39	2817.55	3390.61	3652.90	2900.06	3390.73
03-Sep-15	3519.12	2678.37	3390.79	3523.85	2748.32	3390.66	3583.39	2817.54	3390.61	3652.90	2900.06	3390.73
13-Oct-15	3519.12	2678.37	3390.79	3523.85	2748.32	3390.66	3583.38	2817.55	3390.61	3652.90	2900.06	3390.73
24-Nov-15	3519.12	2678.37	3390.79	3523.84	2748.32	3390.66	3583.38	2817.55	3390.61	3652.89	2900.06	3390.73
08-Jan-16	3519.11	2678.36	3390.79	3523.84	2748.32	3390.65	3583.35	2817.55	3390.60	3652.87	2900.06	3390.72
03-Feb-16	3519.11	2678.36	3390.79	3523.84	2748.32	3390.65	3583.37	2817.55	3390.61	3652.89	2900.06	3390.73
22-Mar-16	3519.11	2678.36	3390.79	3523.83	2748.33	3390.64	3583.36	2817.55	3390.60	3652.88	2900.06	3390.73
28-Jun-16	3519.11	2678.36	3390.79	3523.84	2748.32	3390.64	3583.38	2817.55	3390.59	3652.89	2900.06	3390.72
15-Sep-16		Destroyed			Destroyed		3583.36	2817.55	3390.59	3652.88	2900.06	3390.72
15-May-17	3519.10	2678.37	3390.77	3523.80	2748.36	3390.62	3583.35	2817.57	3390.58	3652.86	2900.09	3390.71

	TDF14-33			TDF14-34			TDF14-35			TDF14-36		
	Paste Berm Downstream Crest Edge											
	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation
Initial	3714.63	2968.90	3390.63	3803.14	3037.30	3390.45	3882.88	3087.05	3390.58	3962.49	3139.32	3390.60
12-Jan-15	3714.63	2968.90	3390.63	3803.14	3037.29	3390.45	3882.88	3087.05	3390.58	3962.49	3139.33	3390.59
03-Mar-15	3714.63	2968.90	3390.63	3803.14	3037.29	3390.44	3882.89	3087.05	3390.58	3962.50	3139.33	3390.59
27-May-15	3714.64	2968.91	3390.63	3803.15	3037.31	3390.44	3882.87	3087.06	3390.58	3962.49	3139.33	3390.59
02-Jul-15	3714.63	2968.90	3390.63	3803.14	3037.30	3390.44	3882.87	3087.06	3390.58	3962.49	3139.33	3390.59
06-Aug-15	3714.63	2968.91	3390.63	3803.14	3037.30	3390.44	3882.88	3087.06	3390.58	3962.50	3139.33	3390.59
03-Sep-15	3714.64	2968.91	3390.63	3803.14	3037.31	3390.45	3882.88	3087.06	3390.58	3962.49	3139.33	3390.60
13-Oct-15	3714.63	2968.91	3390.63	3803.14	3037.30	3390.45	3882.87	3087.06	3390.58	3962.49	3139.33	3390.60
24-Nov-15	3714.63	2968.91	3390.63	3803.14	3037.31	3390.45	3882.87	3087.06	3390.59	3962.49	3139.33	3390.60
08-Jan-16	3714.62	2968.90	3390.61	3803.14	3037.28	3390.44	3882.87	3087.05	3390.58	3962.48	3139.35	3390.59
03-Feb-16	3714.63	2968.91	3390.62	3803.14	3037.30	3390.45	3882.87	3087.06	3390.58	3962.49	3139.33	3390.59
22-Mar-16	3714.63	2968.90	3390.62	3803.14	3037.29	3390.44	3882.87	3087.06	3390.58	3962.49	3139.34	3390.59
28-Jun-16	3714.63	2968.90	3390.61	3803.14	3037.30	3390.44	3882.87	3087.06	3390.58	3962.49	3139.34	3390.60
15-Sep-16	3714.62	2968.90	3390.62	3803.14	3037.29	3390.44	3882.88	3087.06	3390.58	3962.49	3139.34	3390.59
15-May-17	3714.62	2968.91	3390.61	3803.13	3037.32	3390.44	3882.87	3087.06	3390.58	3962.49	3139.35	3390.59

	TDF14-37			TDF14-38			TDF14-39		
	Paste Berm Downstream Crest Edge								
	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation
Initial	4014.21	3170.38	3390.57	4080.29	3135.95	3390.59	4109.21	3109.71	3391.16
12-Jan-15	4014.21	3170.38	3390.57	4080.29	3135.95	3390.59	4109.21	3109.71	3391.16
03-Mar-15	4014.21	3170.38	3390.58	4080.29	3135.95	3390.59	4109.20	3109.71	3391.16
27-May-15	4014.20	3170.37	3390.57	4080.30	3135.95	3390.59	4109.21	3109.71	3391.16
02-Jul-15	4014.20	3170.38	3390.57	4080.30	3135.95	3390.59	4109.21	3109.71	3391.17
06-Aug-15	4014.20	3170.38	3390.57	4080.29	3135.95	3390.59	4109.21	3109.71	3391.17
03-Sep-15	4014.20	3170.38	3390.58	4080.30	3135.95	3390.59	4109.21	3109.71	3391.17
13-Oct-15	4014.20	3170.38	3390.58	4080.29	3135.95	3390.60	4109.21	3109.71	3391.17
24-Nov-15	4014.20	3170.38	3390.58	4080.29	3135.95	3390.60	4109.21	3109.71	3391.18
08-Jan-16	4014.20	3170.39	3390.58	4080.29	3135.95	3390.59	4109.23	3109.73	3391.17
03-Feb-16	4014.20	3170.38	3390.58	4080.29	3135.95	3390.59	4109.21	3109.71	3391.17
22-Mar-16	4014.20	3170.38	3390.58	4080.29	3135.95	3390.59	4109.21	3109.71	3391.17
28-Jun-16	4014.20	3170.38	3390.58	4080.29	3135.95	3390.59	4109.21	3109.72	3391.17
15-Sep-16	4014.20	3170.39	3390.58	4080.29	3135.95	3390.60	4109.20	3109.72	3391.17
15-May-17	4014.20	3170.39	3390.58	4080.29	3135.96	3390.59	4109.20	3109.72	3391.17

Table 2: Old TDF - Monument Monitoring Summary - Cumulative Values (Change from Initial)

	TDF14-01					TDF14-02				
	Seismic Upgrade Downstream Edge									
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.4	180	-0.2	-0.3	0.1	0.2	117	-0.2	0.0	0.1
03-Mar-15	0.7	186	-0.3	-0.6	-1.0	0.2	208	0.0	-0.2	-0.6
27-May-15	0.7	153	-0.7	-0.3	-0.8	0.4	148	-0.4	-0.2	-0.2
02-Jul-15	0.5	85	-0.4	0.4	-1.7	0.2	77	-0.1	0.2	-0.1
06-Aug-15	0.6	157	-0.5	-0.3	-0.5	0.1	158	0.0	0.0	0.1
03-Sep-15	0.3	280	0.2	-0.1	-0.2	0.1	22	0.0	0.1	0.2
13-Oct-15	0.5	176	-0.3	-0.3	0.1	0.3	124	-0.3	0.0	0.4
24-Nov-15	0.7	226	0.1	-0.6	0.5	#N/A	#N/A	#N/A	#N/A	#N/A
08-Jan-16	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
03-Feb-16	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
22-Mar-16	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
28-Jun-16	#N/A	#N/A	#N/A	#N/A	#N/A	0.1	22	0.0	0.1	0.6
15-Sep-16	Destroyed					Destroyed				
15-May-17										

Notes:

1 - Survey Data provided by Nyrstar Myra Falls.
2 - The combined measurement error (total of instrument, human and network) for the Old TDF monument survey is approximately 1.0cm for both horizontal and vertical displacement.
3 - Negative values are in the upstream direction, positive values are in the downwstream direction.
4 - Negative values are to the west, positive values are to the east.
5 - Negative values are descending stations along dam centreline and positive values are for ascending stations.
6 - Yellow shading indicates significant cumulative displacement over 2 cm has occurred.
7 - '#N/A' indicates no survey data available for that date. Displacement values are based on changes from the last available readings.
8 - Green shading indicates monument was replaced on that date. Displacement after that date is calculated with respect to the initial survey reading on the replacement date.

	TDF14-03					TDF14-04				
	Seismic Upgrade Downstream Edge					Seismic Upgrade Downstream Edge				
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.2	90	-0.2	0.1	-0.2	0.5	90	-0.5	0.2	-0.6
03-Mar-15	0.2	277	0.2	-0.1	-0.6	0.4	-83	-0.1	0.3	-0.5
27-May-15	0.2	171	-0.1	-0.1	0.0	0.2	215	0.0	-0.2	-0.1
02-Jul-15	0.2	171	-0.1	-0.1	0.0	0.8	171	-0.7	-0.4	-0.3
06-Aug-15	0.1	81	-0.1	0.1	0.1	0.6	81	-0.6	0.0	0.0
03-Sep-15	0.1	159	-0.1	0.0	0.2	0.8	125	-0.8	-0.1	0.1
13-Oct-15	0.4	130	-0.4	0.0	0.2	1.0	130	-1.0	-0.1	0.2
24-Nov-15	#N/A	#N/A	#N/A	#N/A	#N/A	0.5	134	-0.5	-0.1	0.1
08-Jan-16	0.4	190	-0.2	-0.4	0.4	#N/A	#N/A	#N/A	#N/A	#N/A
03-Feb-16	0.3	236	0.1	-0.3	0.2	#N/A	#N/A	#N/A	#N/A	#N/A
22-Mar-16	0.3	194	-0.1	-0.3	0.2	#N/A	#N/A	#N/A	#N/A	#N/A
28-Jun-16	0.2	245	0.1	-0.2	0.1	0.8	-115	-0.8	-0.1	0.3
15-Sep-16	Destroyed					Destroyed				
15-May-17										

	TDF14-05					TDF14-06				
	Seismic Upgrade Downstream Edge					Seismic Upgrade Downstream Edge				
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.4	117	-0.4	0.0	0.0	0.3	342	0.2	0.2	-1.0
03-Mar-15	0.1	180	0.0	-0.1	-0.3	0.4	162	-0.3	-0.3	-0.4
27-May-15	0.9	245	0.5	-0.7	-0.4	1.4	139	-1.3	-0.4	0.0
02-Jul-15	1.3	171	-0.8	-1.0	-0.8	0.4	99	-0.4	0.2	-0.2
06-Aug-15	0.8	173	-0.5	-0.6	0.0	0.7	132	-0.7	-0.1	0.5
03-Sep-15	1.0	142	-0.9	-0.4	0.3	1.2	143	-1.1	-0.5	0.5
13-Oct-15	1.2	151	-1.0	-0.7	0.1	0.4	130	-0.4	-0.1	0.6
24-Nov-15	#N/A	#N/A	#N/A	#N/A	#N/A	0.5	44	-0.1	0.4	1.3
08-Jan-16	0.9	180	-0.4	-0.8	0.9	1.4	335	1.1	0.8	0.6
03-Feb-16	1.1	141	-1.0	-0.4	1.3	0.3	102	-0.3	0.1	0.9
22-Mar-16	1.0	168	-0.6	-0.8	0.4	0.3	59	-0.1	0.2	0.6
28-Jun-16	1.2	155	-1.0	-0.7	0.8	0.5	108	-0.5	0.1	0.9
15-Sep-16	Destroyed					0.5	123	-0.5	0.0	1.3
15-May-17						0.8	105	-0.8	0.2	1.1

	TDF14-07					TDF14-08				
	Seismic Upgrade Downstream Edge									
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.3	0	0.1	0.3	0.2	0.0	#DIV/0!	0.0	0.0	-0.1
03-Mar-15	0.2	285	0.2	0.0	-0.3	0.3	257	0.1	-0.3	-0.4
27-May-15	0.4	184	-0.1	-0.4	0.0	1.1	243	0.1	-1.0	-0.3
02-Jul-15	0.2	103	-0.2	0.0	0.1	0.7	175	-0.6	-0.3	-0.1
06-Aug-15	0.1	192	0.0	-0.1	0.5	0.7	223	-0.2	-0.6	0.3
03-Sep-15	0.5	208	0.1	-0.5	0.4	0.9	232	-0.1	-0.9	0.3
13-Oct-15	0.1	333	0.0	0.0	0.3	0.4	221	-0.1	-0.4	0.3
24-Nov-15	0.6	17	0.0	0.6	0.7	0.7	88	-0.3	0.6	0.4
08-Jan-16	1.0	10	0.2	1.0	0.4	1.4	98	-0.9	1.0	0.2
03-Feb-16	0.4	265	0.4	-0.2	1.1	0.5	173	-0.4	-0.2	0.4
22-Mar-16	0.5	356	0.2	0.4	0.7	0.8	126	-0.8	0.3	0.2
28-Jun-16	0.3	353	0.1	0.2	0.8	0.6	174	-0.5	-0.3	0.3
15-Sep-16	0.4	340	0.2	0.3	1.2	0.5	146	-0.5	0.0	0.7
30-Aug-17	0.8	321	0.7	0.4	1.0	0.6	156	-0.6	-0.1	1.3

	TDF14-09					TDF14-10				
	Seismic Upgrade Downstream Edge									
	Magnitude	Direction 2 (deg)	Transverse[2]	Longitudinal[3]	Vertical	Magnitude	Direction 2 (deg)	Transverse[2]	Longitudinal[3]	Vertical
Initial										
12-Jan-15	0.2	270	0.0	-0.2	-0.1	0.1	90	-0.1	0.1	0.0
03-Mar-15	0.3	265	0.0	-0.2	-0.2	0.3	167	-0.2	-0.1	-0.3
27-May-15	1.5	281	0.6	-1.4	-0.3	0.1	56	0.0	0.1	-0.5
02-Jul-15	1.0	214	-0.7	-0.7	0.0	0.6	46	0.1	0.6	-0.1
06-Aug-15	1.1	258	0.0	-1.1	0.3	0.2	14	0.2	0.2	0.4
03-Sep-15	1.3	265	0.1	-1.2	0.5	0.2	247	0.0	-0.1	1.0
13-Oct-15	0.7	233	-0.3	-0.6	0.4	0.2	247	0.0	-0.1	0.8
24-Nov-15	0.9	134	-0.7	0.5	0.2	0.3	167	-0.2	-0.1	1.4
08-Jan-16	1.9	126	-1.4	1.3	0.4	0.9	183	-0.7	-0.6	1.2
03-Feb-16	0.7	176	-0.7	-0.1	0.6	0.2	76	-0.1	0.2	1.1
22-Mar-16	0.7	209	-0.5	-0.5	0.1	0.2	256	0.1	-0.2	1.2
28-Jun-16	0.7	233	-0.3	-0.6	0.5	0.4	135	-0.4	0.0	1.6
15-Sep-16	0.6	185	-0.6	-0.2	0.8	0.4	186	-0.3	-0.3	2.0
15-May-17	1.0	191	-1.0	-0.4	1.0	0.4	153	-0.4	-0.1	2.4

	TDF14-11					TDF14-12				
	Seismic Upgrade Downstream Edge									
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	1.5	132	-1.5	0.0	0.3	0.2	243	-0.1	-0.2	-0.2
03-Mar-15	1.2	107	-1.1	0.5	0.9	0.2	310	0.2	-0.2	0.0
27-May-15	1.9	319	1.9	0.2	-0.8	0.2	142	-0.2	0.1	-0.3
02-Jul-15	1.6	167	-1.3	-0.9	-1.5	0.4	148	-0.4	0.2	0.0
06-Aug-15	0.4	203	-0.1	-0.4	-0.4	0.2	234	-0.1	-0.2	0.3
03-Sep-15	1.3	315	1.3	0.0	0.0	0.3	262	0.0	-0.3	0.7
13-Oct-15	0.6	143	-0.6	-0.1	0.5	0.3	218	-0.2	-0.2	0.5
24-Nov-15	3.7	127	-3.7	0.4	0.1	0.2	142	-0.2	0.1	0.6
08-Jan-16	#N/A	#N/A	#N/A	#N/A	#N/A	0.5	244	-0.2	-0.5	0.7
03-Feb-16	#N/A	#N/A	#N/A	#N/A	#N/A	0.1	176	-0.1	0.0	0.7
22-Mar-16	2.8	129	-2.8	0.2	-0.5	0.2	178	-0.2	0.0	0.4
28-Jun-16	0.7	86	-0.4	0.5	-0.7	0.2	178	-0.2	0.0	0.9
15-Sep-16	1.7	121	-1.6	0.4	0.0	0.5	265	0.0	-0.5	1.2
15-May-17	1.0	137	-1.0	-0.1	0.8	0.4	202	-0.4	-0.2	1.1

	TDF14-13					TDF14-14				
	Seismic Upgrade Downstream Edge									
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.2	117	0.1	-0.2	0.2	0.2	207	0.2	-0.1	0.1
03-Mar-15	0.2	15	-0.2	0.0	0.2	0.5	110	-0.2	-0.4	0.4
27-May-15	0.3	154	0.3	-0.2	-0.5	0.3	257	0.2	0.2	0.0
02-Jul-15	0.5	164	0.5	-0.2	-0.1	0.2	163	0.1	-0.1	0.0
06-Aug-15	0.3	230	0.2	0.2	0.0	0.5	298	0.1	0.5	0.9
03-Sep-15	0.3	290	-0.1	0.3	0.6	0.3	299	0.1	0.3	1.4
13-Oct-15	0.5	228	0.3	0.3	0.4	0.4	304	0.0	0.4	1.8
24-Nov-15	0.3	154	0.3	-0.2	0.4	1.0	284	0.4	0.9	1.4
08-Jan-16	0.4	268	0.0	0.3	0.5	0.9	300	0.1	0.9	1.3
03-Feb-16	0.3	130	0.2	-0.3	0.4	0.8	281	0.4	0.7	1.5
22-Mar-16	0.3	171	0.3	-0.1	-0.1	0.5	262	0.3	0.3	1.5
28-Jun-16	0.4	268	0.0	0.3	0.6	0.7	282	0.3	0.6	1.9
15-Sep-16	0.8	301	-0.3	0.7	0.9	0.5	314	0.0	0.5	2.9
15-May-17	0.6	278	0.0	0.6	0.5	0.4	291	0.1	0.4	2.6

	TDF14-15 Seismic Upgrade Downstream Edge					TDF14-16 6:1 Buttress Crest Edge				
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.4	108	-0.1	-0.3	0.2	0.1	180	0.1	-0.1	0.1
03-Mar-15	0.6	125	0.0	-0.6	0.5	0.2	143	0.0	-0.2	0.3
27-May-15	0.4	149	0.2	-0.5	0.5	0.2	330	-0.1	0.2	0.0
02-Jul-15	0.1	157	0.1	-0.1	0.0	0.0	27	0.0	0.0	0.2
06-Aug-15	0.4	28	-0.5	0.1	0.9	0.1	8	-0.1	0.1	0.2
03-Sep-15	0.4	42	-0.4	0.0	1.4	0.0	27	0.0	0.0	0.3
13-Oct-15	#N/A	#N/A	#N/A	#N/A	#N/A	0.4	311	0.0	0.4	0.7
24-Nov-15	0.1	353	-0.3	0.3	1.8	0.3	278	0.1	0.2	0.8
08-Jan-16	0.1	356	-0.6	0.5	1.6	0.3	323	-0.1	0.3	0.5
03-Feb-16	0.2	345	-0.4	0.5	1.7	0.3	297	0.1	0.3	0.7
22-Mar-16	0.1	248	0.0	0.0	1.7	0.1	233	0.1	0.0	0.7
28-Jun-16	Line of Sight Obstructed					0.2	308	0.0	0.2	0.6
15-Sep-16						0.3	342	-0.1	0.2	1.0
15-May-17						0.3	292	0.1	0.3	0.7

	TDF14-17 6:1 Buttress Crest Edge					TDF14-18 6:1 Buttress Crest Edge				
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.2	207	0.2	0.1	0.0	0.2	117	-0.1	0.2	0.0
03-Mar-15	0.3	320	-0.2	0.3	-0.1	0.3	69	0.1	0.3	-0.3
27-May-15	0.2	323	-0.1	0.1	0.0	0.2	157	-0.2	0.1	-0.7
02-Jul-15	0.1	342	-0.1	0.0	0.0	0.2	157	-0.2	0.1	-0.6
06-Aug-15	0.0	207	0.0	0.0	-0.2	0.2	157	-0.2	0.1	-0.3
03-Sep-15	0.2	185	0.2	0.0	0.0	0.1	193	-0.1	0.0	-0.2
13-Oct-15	0.4	309	-0.2	0.4	0.3	0.3	254	-0.1	-0.3	-0.3
24-Nov-15	0.6	276	0.0	0.6	0.3	0.3	108	-0.1	0.3	-0.1
08-Jan-16	0.8	290	-0.1	0.8	-0.2	#N/A	#N/A	#N/A	#N/A	#N/A
03-Feb-16	0.8	290	-0.1	0.8	-0.1	#N/A	#N/A	#N/A	#N/A	#N/A
22-Mar-16	0.5	302	-0.2	0.5	-0.1	0.0	297	0.0	0.0	-0.3
28-Jun-16	0.6	297	-0.2	0.6	-0.3	0.1	350	0.1	0.0	-0.1
15-Sep-16	0.4	309	-0.2	0.4	0.0	0.2	330	0.2	-0.1	-0.3
15-May-17	0.6	301	-0.2	0.6	-0.6	0.3	357	0.3	0.0	-0.4

	TDF14-19					TDF14-20				
	6:1 Buttress Crest Edge									
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.1	135	-0.1	0.0	0.2	0.4	104	-0.3	0.3	0.1
03-Mar-15	0.1	90	-0.1	0.1	0.1	0.6	122	-0.5	0.2	-0.2
27-May-15	0.0	90	0.0	0.0	-0.1	0.3	354	0.3	0.1	-0.7
02-Jul-15	0.1	90	-0.1	0.1	0.1	0.6	28	0.3	0.5	-0.5
06-Aug-15	0.1	270	0.0	-0.1	0.1	0.3	39	0.1	0.3	-0.3
03-Sep-15	0.1	270	0.0	-0.1	0.3	0.3	68	0.0	0.3	0.1
13-Oct-15	0.2	238	0.0	-0.2	0.1	0.1	345	0.1	0.0	-0.2
24-Nov-15	0.2	90	-0.1	0.2	0.2	0.3	354	0.3	0.1	0.4
08-Jan-16	0.1	22	0.1	0.1	0.4	#N/A	#N/A	#N/A	#N/A	#N/A
03-Feb-16	0.2	35	0.1	0.2	0.1	#N/A	#N/A	#N/A	#N/A	#N/A
22-Mar-16	0.2	11	0.2	0.1	0.2	0.5	321	0.5	-0.1	-0.1
28-Jun-16	0.3	50	0.1	0.3	0.4	0.4	41	0.1	0.4	-0.1
15-Sep-16	0.2	35	0.1	0.2	0.4	0.3	39	0.1	0.3	-0.1
15-May-17	0.4	46	0.1	0.4	0.1	#N/A	#N/A	#N/A	#N/A	#N/A

	TDF14-21					TDF14-22				
	6:1 Buttress Crest Edge									
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.1	45	0.0	0.1	0.2	0.1	90	0.0	0.1	0.0
03-Mar-15	0.8	148	-0.8	0.1	-0.1	0.2	95	-0.1	0.2	-0.6
27-May-15	0.5	320	0.4	-0.1	-0.7	0.8	353	0.8	0.1	-0.6
02-Jul-15	0.6	11	0.4	0.4	-0.5	0.3	221	-0.2	-0.2	-0.6
06-Aug-15	0.3	2	0.2	0.1	-0.2	0.3	342	0.3	0.0	-0.3
03-Sep-15	0.2	176	-0.1	-0.1	0.5	0.4	333	0.4	-0.1	-0.5
13-Oct-15	0.1	299	0.1	-0.1	0.3	0.3	313	0.2	-0.1	-0.6
24-Nov-15	0.2	308	0.2	-0.1	0.9	1.3	142	-1.2	0.5	-0.1
08-Jan-16	0.5	220	-0.2	-0.4	0.6	#N/A	#N/A	#N/A	#N/A	#N/A
03-Feb-16	0.4	291	0.3	-0.3	0.3	#N/A	#N/A	#N/A	#N/A	#N/A
22-Mar-16	0.5	287	0.4	-0.4	0.4	0.3	161.0	-0.3	0.0	-1.0
28-Jun-16	0.2	103	-0.1	0.2	0.3	0.1	257.5	0.0	-0.1	-1.3
15-Sep-16	0.3	156	-0.3	0.0	0.8	0.3	178.2	-0.3	-0.1	-1.1
15-May-17	0.2	318	0.2	0.0	0.7	0.2	310	0.2	-0.1	-1.7

	TDF14-23					TDF14-24				
	6:1 Buttress Crest Edge									
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.2	63	0.0	0.2	0.9	0.2	243	0.2	-0.1	0.4
03-Mar-15	0.3	49	0.2	0.3	0.2	0.4	190	0.0	-0.4	-0.1
27-May-15	0.4	38	0.3	0.3	0.5	0.4	131	-0.4	-0.3	0.1
02-Jul-15	0.2	161	-0.2	0.0	0.3	0.3	174	-0.1	-0.2	0.1
06-Aug-15	0.2	51	0.1	0.2	0.5	0.3	156	-0.2	-0.3	0.3
03-Sep-15	0.1	25	0.1	0.1	0.3	0.4	162	-0.2	-0.4	0.2
13-Oct-15	0.2	350	0.2	0.0	0.2	0.2	171	-0.1	-0.2	0.1
24-Nov-15	0.7	96	-0.2	0.6	0.4	0.2	242	0.1	-0.1	0.2
08-Jan-16	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
03-Feb-16	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
22-Mar-16	0.4	70	0.0	0.4	0.1	0.2	200	0.0	#N/A	0.0
28-Jun-16	0.5	47	0.2	0.4	0.0	0.2	200	0.0	-0.2	0.0
15-Sep-16	0.3	83	0.0	0.3	0.1	0.4	176	-0.1	-0.4	0.0
15-May-17	0.5	51	0.2	0.4	-0.2	0.2	160	-0.1	-0.1	-1.4

	TDF14-25					TDF14-26				
	6:1 Buttress Crest Edge									
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.0	#DIV/0!	0.0	0.0	0.0	0.0	#DIV/0!	0.0	0.0	0.0
03-Mar-15	0.5	169	-0.3	-0.3	-0.7	0.2	336	0.2	0.1	-0.2
27-May-15	2.3	115	-2.2	0.4	-1.0	0.9	271	0.8	-0.4	-0.9
02-Jul-15	0.6	106	-0.5	0.2	-1.2	0.9	207	0.0	-0.9	-0.7
06-Aug-15	1.3	116	-1.2	0.2	-0.9	0.3	200	0.0	-0.3	-1.0
03-Sep-15	1.6	125	-1.6	0.0	-0.7	0.7	164	-0.5	-0.5	-0.9
13-Oct-15	1.0	118	-0.9	0.1	-1.0	0.7	164	-0.5	-0.5	-1.1
24-Nov-15	1.6	294	1.6	-0.3	0.8	0.4	227	0.1	-0.4	-0.5
08-Jan-16	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
03-Feb-16	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
22-Mar-16	0.4	262	0.3	-0.2	-1.5	0.8	242	0.4	-0.7	-1.3
28-Jun-16	0.4	190	-0.2	-0.3	-2.3	0.7	238	0.3	-0.6	-1.8
15-Sep-16	0.5	188	-0.2	-0.4	-1.8	Destroyed				
15-May-17	0.9	117	-0.9	0.1	-2.1					

	TDF14-27					TDF14-28				
	6:1 Buttress Crest Edge									
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.0	#DIV/0!	0.0	0.0	-0.2	0.2	270	0.1	-0.1	0.0
03-Mar-15	0.2	313	0.2	0.0	-0.6	0.4	257	0.2	-0.4	-0.5
27-May-15	0.4	274	0.4	-0.2	-0.2	0.4	217	0.0	-0.4	0.0
02-Jul-15	0.4	232	0.1	-0.4	-0.3	0.3	253	0.2	-0.3	0.0
06-Aug-15	0.2	219	0.0	-0.2	-0.3	0.3	253	0.2	-0.3	0.0
03-Sep-15	0.3	167	-0.2	-0.2	-0.4	0.3	253	0.2	-0.3	0.2
13-Oct-15	0.4	171	-0.3	-0.3	-0.4	0.2	213	0.0	-0.2	0.2
24-Nov-15	0.4	222	0.0	-0.4	-0.5	0.6	249	0.2	-0.5	0.1
08-Jan-16	#N/A	#N/A	#N/A	#N/A	#N/A	Destroyed				
03-Feb-16	0.4	243	0.2	-0.3	-0.5					
22-Mar-16	0.5	238	0.2	-0.5	-0.5					
28-Jun-16	0.4	222	0.0	-0.4	-0.9					
15-Sep-16	Destroyed									
15-May-17										

	TDF14-29					TDF14-30				
	Paste Berm Downstream Crest Edge									
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.1	45	-0.1	0.0	-0.2	0.2	333	0.2	0.1	-0.5
03-Mar-15	0.1	247	0.1	0.0	-0.3	0.3	321	0.3	0.1	-0.5
27-May-15	0.3	302	0.1	0.3	-0.3	#N/A	#N/A	#N/A	#N/A	#N/A
02-Jul-15	0.8	268	0.7	0.4	-0.4	0.7	266	0.5	-0.5	-0.6
06-Aug-15	0.5	306	0.2	0.4	-0.3	0.5	302	0.5	-0.1	-0.6
03-Sep-15	0.6	248	0.6	0.1	-0.4	0.3	243	0.1	-0.3	-0.7
13-Oct-15	0.5	255	0.5	0.2	-0.4	0.3	279	0.3	-0.2	-0.8
24-Nov-15	0.7	267	0.6	0.4	-0.5	0.9	294	0.8	-0.3	-0.9
08-Jan-16	1.2	237	1.2	0.0	-0.2	1.6	290	1.5	-0.6	-1.5
03-Feb-16	1.2	240	1.2	0.1	-0.3	1.5	288	1.4	-0.6	-1.9
22-Mar-16	1.1	253	1.1	0.3	-0.4	2.0	295	1.9	-0.5	-2.0
28-Jun-16	1.4	256	1.3	0.5	-0.8	1.7	292	1.6	-0.5	-2.6
15-Sep-16	Destroyed					Destroyed				
15-May-17										

	TDF14-31					TDF14-32				
	Paste Berm Downstream Crest Edge									
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.1	270	0.1	-0.1	0.7	0.1	0	0.1	0.1	0.4
03-Mar-15	0.3	198	-0.1	-0.3	0.0	0.2	161	-0.2	-0.1	-0.1
27-May-15	2.8	97	-2.3	1.5	-0.4	2.2	73.8	-1.2	1.8	-0.3
02-Jul-15	0.5	347	0.4	0.3	-0.5	0.5	51.0	-0.1	0.5	-0.4
06-Aug-15	1.3	91	-1.0	0.8	-0.2	1.3	81	-0.8	1.0	-0.4
03-Sep-15	1.7	104	-1.6	0.8	-0.6	1.2	80	-0.8	0.9	-0.5
13-Oct-15	0.8	92	-0.6	0.5	-0.9	0.9	63	-0.3	0.8	-0.4
24-Nov-15	0.6	124	-0.6	0.1	-0.9	0.5	78	-0.3	0.4	-0.4
08-Jan-16	2.5	276	2.1	-1.4	-2.0	2.3	283	2.0	-1.1	-1.0
03-Feb-16	0.4	280	0.4	-0.2	-1.1	0.7	349	0.6	0.4	0.1
22-Mar-16	1.1	279	1.0	-0.6	-1.5	0.9	309	0.9	0.0	-0.7
28-Jun-16	0.1	108	-0.1	0.0	-3.0	0.8	358	0.5	0.6	-1.4
15-Sep-16	1.5	273	1.2	-0.9	-2.5	0.9	296	0.9	-0.2	-1.3
15-May-17	3.9	313	3.9	0.2	-3.3	4.4	325	4.2	1.0	-2.2

	TDF14-33					TDF14-34				
	Paste Berm Downstream Crest Edge									
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.1	180	-0.1	-0.1	0.4	0.4	180	-0.3	-0.2	0.1
03-Mar-15	0.2	169	-0.2	-0.1	-0.3	0.4	164	-0.3	-0.1	-0.4
27-May-15	1.7	51	-0.2	1.0	-0.3	1.9	9	1.4	1.2	-0.5
02-Jul-15	0.3	348	0.2	-0.1	-0.2	0.5	288	0.4	-0.3	-0.5
06-Aug-15	0.9	43	0.0	0.5	-0.1	0.9	0	0.7	0.4	-0.5
03-Sep-15	1.1	43	0.0	1.1	0.1	1.4	0	1.2	0.7	-0.3
13-Oct-15	0.8	33	0.2	0.4	0.1	0.9	347	0.8	0.3	-0.2
24-Nov-15	0.7	30	0.2	0.2	0.1	1.7	350	1.6	0.6	0.4
08-Jan-16	0.8	262	0.5	-0.4	-1.9	1.9	192	-1.4	-1.3	-1.1
03-Feb-16	0.4	6	0.2	0.2	-0.9	0.1	301	0.1	-0.1	0.0
22-Mar-16	0.3	231	0.0	-0.3	-1.1	0.9	193	-0.6	-0.6	-0.7
28-Jun-16	0.3	348	0.2	0.3	-1.5	0.2	32	0.1	0.2	-0.8
15-Sep-16	0.6	289	0.5	0.1	-1.4	0.5	193	-0.3	-0.3	-0.9
15-May-17	1.4	328	1.3	-0.2	-1.6	2.9	328	2.9	0.0	-0.5

	TDF14-35					TDF14-36				
	Paste Berm Downstream Crest Edge									
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.2	117	-0.2	0.1	-0.2	0.4	27	0.2	0.4	-0.6
03-Mar-15	1.0	118	-0.9	0.5	0.0	0.9	70	-0.2	0.9	-0.7
27-May-15	0.7	291	0.5	-0.4	-0.4	0.4	323	0.4	0.0	-0.9
02-Jul-15	0.6	329	0.6	0.0	0.0	0.5	357	0.4	0.3	-0.6
06-Aug-15	0.0	323	0.0	0.0	0.2	0.4	41	0.1	0.4	-0.6
03-Sep-15	0.2	27	0.1	0.1	0.4	0.5	18	0.3	0.4	-0.2
13-Oct-15	0.5	299	0.4	-0.2	0.3	0.7	339	0.6	0.1	-0.2
24-Nov-15	0.4	306	0.4	-0.2	0.9	0.4	356	0.4	0.2	-0.1
08-Jan-16	0.4	262	0.2	-0.4	0.3	2.7	342	2.6	0.7	-0.3
03-Feb-16	1.0	290	0.8	-0.6	0.2	1.1	337	1.1	0.2	-0.4
22-Mar-16	0.8	288	0.6	-0.5	0.1	1.2	339	1.2	0.2	-0.3
28-Jun-16	0.5	316	0.5	-0.1	0.5	1.3	3	1.1	0.8	-0.2
15-Sep-16	0.4	339	0.4	0.1	0.5	1.6	6	1.3	1.0	-0.3
15-May-17	1.1	328	1.1	0.0	0.0	2.2	347	2.0	0.7	-0.5

	TDF14-37					TDF14-38				
	Paste Berm Downstream Crest Edge									
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.0	#DIV/0!	0.0	0.0	0.0	0.2	153	0.1	-0.2	-0.1
03-Mar-15	0.6	58	0.2	0.6	0.2	0.3	205	0.3	-0.1	0.0
27-May-15	0.6	226	-0.3	-0.5	-0.4	0.6	96	-0.3	-0.5	0.1
02-Jul-15	0.5	260	0.1	-0.5	-0.1	0.3	63	-0.3	-0.1	0.1
06-Aug-15	0.3	254	0.0	-0.3	0.0	0.2	77	-0.1	-0.1	0.1
03-Sep-15	0.4	304	0.3	-0.2	0.3	0.4	99	-0.2	-0.3	0.3
13-Oct-15	0.7	271	0.2	-0.7	0.4	0.3	333	-0.1	0.2	0.7
24-Nov-15	0.3	254	0.0	-0.3	0.3	0.0	333	0.0	0.0	0.8
08-Jan-16	1.2	340	1.2	-0.1	0.6	0.2	52	-0.2	0.0	0.1
03-Feb-16	0.6	271	0.2	-0.6	0.2	0.2	187	0.1	-0.1	0.1
22-Mar-16	0.7	279	0.3	-0.7	0.2	0.2	217	0.2	0.0	0.1
28-Jun-16	0.6	315	0.5	-0.3	0.4	0.2	30	-0.2	0.0	0.0
15-Sep-16	1.1	333	1.1	-0.2	0.2	0.6	18	-0.5	0.2	0.4
15-May-17	1.4	319	1.2	-0.6	0.4	0.6	9	-0.5	0.4	0.0

	TDF14-39 Paste Berm Downstream Crest Edge				
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial					
12-Jan-15	0.0	72	-0.3	-0.2	0.1
03-Mar-15	0.3	239	0.2	0.1	0.2
27-May-15	0.2	68	-0.2	-0.1	0.3
02-Jul-15	0.2	40	-0.6	0.0	0.4
06-Aug-15	0.6	53	-0.6	-0.1	0.4
03-Sep-15	0.6	62	-0.8	-0.3	0.8
13-Oct-15	0.8	19	-0.6	0.2	1.1
24-Nov-15	0.6	46	-0.5	0.0	1.4
08-Jan-16	0.6	49	-3.2	-0.4	0.6
03-Feb-16	3.2	41	-0.8	0.0	0.6
22-Mar-16	0.8	40	-0.6	0.0	0.6
28-Jun-16	0.6	33	-0.9	0.1	0.7
15-Sep-16	0.9	349	-1.0	1.3	0.7
15-May-17	1.6	354	-0.9	1.0	0.4

amec foster wheeler

Table 3: Lynx TDF - Monument Monitoring Summary - Raw Data

	LYNX-14-01			LYNX-14-02			LYNX-14-03			LYNX-14-04			LYNX-14-06		
	Downstream Cr.			Upstream Cr.			Downstream Cr.			Upstream Cr.			Upstream Cr.		
	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation
Initial	3077.76	2040.76	3404.35	3091.67	2044.45	3404.53	3070.03	2074.83	3404.39	3083.99	2076.87	3404.44	3072.53	2125.60	3404.54
12-Jan-15	3077.76	2040.77	3404.34	3091.67	2044.45	3404.53	3070.03	2074.83	3404.40	3083.99	2076.88	3404.43	3072.53	2125.59	3404.54
03-Mar-15	3077.75	2040.77	3404.35	3091.67	2044.45	3404.53	3070.03	2074.83	3404.40	3083.99	2076.87	3404.43	3072.53	2125.59	3404.54
27-May-15	3077.75	2040.77	3404.34	3091.67	2044.45	3404.53	3070.03	2074.83	3404.39	3083.99	2076.87	3404.43	3072.53	2125.59	3404.53
02-Jul-15	3077.76	2040.76	3404.34	3091.67	2044.45	3404.53	3070.04	2074.83	3404.39	3083.99	2076.87	3404.43	3072.53	2125.59	3404.53
06-Aug-15	3077.76	2040.77	3404.34	3091.67	2044.45	3404.53	3070.03	2074.83	3404.39	3083.99	2076.87	3404.43	3072.53	2125.59	3404.53
03-Sep-15	3077.75	2040.77	3404.34	3091.67	2044.45	3404.53	#N/A	#N/A	#N/A	3083.99	2076.87	3404.43	3072.53	2125.59	3404.53
11-Sep-15	3077.75	2040.76	3404.34	3091.67	2044.45	3404.53	#N/A	#N/A	#N/A	3083.99	2076.87	3404.43	3072.53	2125.59	3404.53
01-Oct-15	3077.75	2040.77	3404.34	3091.67	2044.45	3404.53	3070.03	2074.83	3404.39	#N/A	#N/A	#N/A	3072.53	2125.59	3404.53
17-Nov-15	3077.76	2040.77	3404.34	3091.67	2044.45	3404.53	3070.04	2074.83	3404.39	3083.99	2076.87	3404.43	3072.54	2125.59	3404.53
06-Jan-16	3077.75	2040.77	3404.34	3091.67	2044.45	3404.52	3070.04	2074.83	3404.39	3083.99	2076.87	3404.41	3072.54	2125.59	3404.53
02-Feb-16	3077.76	2040.77	3404.34	3091.67	2044.45	3404.52	3070.04	2074.83	3404.40	3083.99	2076.87	3404.42	3072.54	2125.59	3404.53
22-Mar-16	3077.75	2040.76	3404.34	3091.67	2044.45	3404.52	#N/A	#N/A	#N/A	3083.99	2076.87	3404.42	3072.54	2125.59	3404.53
23-May-16	3077.75	2040.76	3404.34	3091.68	2044.45	3404.52	#N/A	#N/A	#N/A	3083.99	2076.87	3404.42	3072.54	2125.59	3404.53
02-Sep-16	3077.75	2040.76	3404.34	3091.68	2044.45	3404.52	3070.04	2074.82	3404.40	3083.99	2076.87	3404.41	3072.54	2125.59	3404.52
15-May-17	3077.75	2040.76	3404.34	3091.68	2044.45	3404.52	3070.04	2074.82	3404.39	3084.00	2076.87	3404.41	3072.54	2125.59	3404.53

Notes:

1 - Survey data provided by Nyrstar Myra Falls.
2 - The combined measurement error (total of instrument, human and network) for the LynxTDF monument survey is approximately 1.5 cm and 1.0 cm for horizontal and vertical displacement, respectively.
3 - Values in table are reported in meters.
4 - Cr. : crest
5 - Green shading indicates monument was replaced on that date. Displacement after that date is calculated with repect to the survey reading on the replacement date.
6 - Peach shading indicates monument was disturbed and was re-set on that date.
7 - '#N/A' indicates no survey data available for that date.

	LYNX-14-07			LYNX-14-08			LYNX-14-09			LYNX-14-10			LYNX-14-11		
	Downstream Cr.			Upstream Cr.			Downstream Cr.			Upstream Cr.			Downstream Cr.		
	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation
Initial	3051.31	2145.00	3404.27	3067.61	2149.80	3404.47	3061.72	2180.82	3404.31	3073.12	2172.04	3404.58	3087.77	2205.73	3404.33
12-Jan-15	3051.31	2145.00	3404.27	3067.62	2149.81	3404.46	3061.71	2180.82	3404.32	3073.12	2172.04	3404.58	3087.76	2205.73	3404.33
03-Mar-15	3051.31	2145.00	3404.27	3067.62	2149.80	3404.46	3061.71	2180.82	3404.31	3073.13	2172.03	3404.57	3087.76	2205.72	3404.32
27-May-15	3051.31	2144.99	3404.27	3067.63	2149.81	3404.46	3061.70	2180.81	3404.31	3073.14	2172.04	3404.55			
02-Jul-15	3051.31	2145.00	3404.27	3067.63	2149.81	3404.46	3061.72	2180.82	3404.31	3073.14	2172.04	3404.55			
06-Aug-15	3051.31	2145.00	3404.27	3067.63	2149.81	3404.45	3061.72	2180.82	3404.30	3073.14	2172.04	3404.54			
03-Sep-15	3051.30	2144.99	3404.27	3067.63	2149.81	3404.45	3061.71	2180.82	3404.31	3073.13	2172.04	3404.54			
11-Sep-15	#N/A	#N/A	#N/A	3067.63	2149.81	3404.45	#N/A	#N/A	#N/A	3073.12	2172.03	3404.55			
01-Oct-15	3051.31	2145.00	3404.27	3067.63	2149.81	3404.45	3061.72	2180.82	3404.31	3073.14	2172.04	3404.54			
17-Nov-15	3051.31	2144.99	3404.27	3067.63	2149.80	3404.45	3061.72	2180.82	3404.31	3073.14	2172.04	3404.55			
06-Jan-16	3051.32	2145.00	3404.27	3067.64	2149.81	3404.44	3061.73	2180.82	3404.31	3073.16	2172.03	3404.54			
02-Feb-16	3051.32	2145.00	3404.27	3067.63	2149.81	3404.45	3061.72	2180.82	3404.31	3073.15	2172.03	3404.55			
22-Mar-16	3051.31	2144.99	3404.27	3067.64	2149.81	3404.44	3061.72	2180.82	3404.31	3073.15	2172.03	3404.55			
23-May-16	3051.31	2144.99	3404.27	3067.64	2149.80	3404.43	3061.72	2180.82	3404.30	3073.16	2172.02	3404.54			
02-Sep-16	3051.31	2144.99	3404.27	3067.64	2149.81	3404.44	3061.72	2180.82	3404.31	3073.16	2172.02	3404.54			
15-May-17	3051.31	2144.99	3404.27	3067.65	2149.80	3404.44	3061.72	2180.81	3404.30	3073.17	2172.01	3404.53			

Destroyed

	LYNX-14-12			LYNX-14-13			LYNX-14-14			LYNX-14-15			LYNX-14-16		
	Upstream Cr.			Downstream Cr.			Upstream Cr.			Downstream Cr.			Upstream Cr.		
	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation
Initial	3094.58	2193.91	3404.62	3130.28	2232.31	3404.22	3137.50	2219.58	3404.43	3172.85	2257.76	3404.21	3180.34	2245.37	3404.42
12-Jan-15	3094.58	2193.91	3404.62	3130.28	2232.31	3404.22	3137.51	2219.58	3404.43	3172.85	2257.76	3404.21	3180.34	2245.36	3404.42
03-Mar-15	3094.58	2193.91	3404.61	3130.28	2232.31	3404.22	3137.51	2219.58	3404.43	3172.85	2257.77	3404.21	3180.33	2245.36	3404.42
27-May-15	3094.58	2193.90	3404.60	3130.28	2232.30	3404.21	3137.51	2219.57	3404.42	3172.85	2257.75	3404.20	3180.34	2245.35	3404.40
02-Jul-15	3094.58	2193.90	3404.60	3130.28	2232.30	3404.21	3137.51	2219.57	3404.41	3172.85	2257.75	3404.20	3180.33	2245.35	3404.40
06-Aug-15	3094.58	2193.90	3404.60	3130.29	2232.30	3404.21	3137.51	2219.56	3404.41	3172.85	2257.75	3404.20	3180.34	2245.35	3404.40
03-Sep-15	3094.57	2193.90	3404.60	3130.27	2232.30	3404.21	3137.50	2219.57	3404.41	3172.83	2257.76	3404.21	3180.32	2245.36	3404.40
11-Sep-15	3094.58	2193.90	3404.60	3130.28	2232.30	3404.21	3137.51	2219.56	3404.41	3172.85	2257.75	3404.20	3180.33	2245.35	3404.40
01-Oct-15	3094.58	2193.90	3404.60	3130.28	2232.30	3404.22	3137.51	2219.56	3404.41	3172.85	2257.76	3404.21	3180.34	2245.35	3404.40
17-Nov-15	3094.59	2193.90	3404.59	#N/A	#N/A	#N/A	3137.52	2219.56	3404.41	3172.81	2257.77	3404.18	3180.34	2245.35	3404.40
06-Jan-16	3094.60	2193.90	3404.59	3130.30	2232.30	3404.20	3137.53	2219.56	3404.39	3172.82	2257.76	3404.18	3180.35	2245.33	3404.39
02-Feb-16	3094.59	2193.90	3404.59	3130.29	2232.30	3404.21	3137.52	2219.56	3404.40	3172.81	2257.77	3404.19	3180.34	2245.34	3404.40
22-Mar-16	3094.59	2193.90	3404.59	3130.28	2232.30	3404.21	3137.52	2219.56	3404.40	3172.81	2257.76	3404.19	#N/A	#N/A	#N/A
23-May-16	3094.58	2193.90	3404.59	3130.29	2232.30	3404.21	3137.52	2219.56	3404.39	3172.80	2257.76	3404.19	3180.33	2245.34	3404.40
02-Sep-16	3094.58	2193.90	3404.58	3130.29	2232.30	3404.20	3137.52	2219.55	3404.39	3172.81	2257.76	3404.18	3180.33	2245.34	3404.39
15-May-17	3094.59	2193.89	3404.58	3130.29	2232.29	3404.20	3137.52	2219.55	3404.39	#N/A	#N/A	#N/A	3180.34	2245.33	3404.38

	LYNX-14-17			LYNX-14-18			LYNX-14-19			LYNX-14-20			LYNX-14-21		
	Downstream Cr.			Upstream Cr.			Downstream Cr.			Upstream Cr.			Downstream Cr.		
	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation
Initial	3216.40	2284.77	3404.07	3224.27	2272.37	3404.40	3258.82	2309.50	3404.24	3266.12	2296.73	3404.46	3289.82	2326.98	3404.49
12-Jan-15	3216.39	2284.77	3404.06	3224.27	2272.37	3404.40	3258.81	2309.50	3404.23	#N/A	#N/A	#N/A	3289.82	2326.99	3404.49
03-Mar-15	3216.39	2284.77	3404.07	3224.27	2272.38	3404.40	3258.81	2309.49	3404.23	3266.12	2296.73	3404.45	3289.82	2326.98	3404.49
27-May-15	3216.40	2284.77	3404.06	3224.27	2272.37	3404.39	3258.82	2309.50	3404.23	3266.12	2296.73	3404.44	3289.82	2326.98	3404.48
02-Jul-15	3216.40	2284.77	3404.06	3224.27	2272.37	3404.38	3258.82	2309.49	3404.23	3266.12	2296.73	3404.44	3289.82	2326.98	3404.48
06-Aug-15	3216.40	2284.77	3404.06	3224.27	2272.37	3404.38	3258.82	2309.50	3404.23	3266.12	2296.73	3404.44	3289.82	2326.98	3404.48
03-Sep-15	3216.40	2284.77	3404.05	3224.25	2272.38	3404.38	3258.82	2309.49	3404.23	3266.12	2296.73	3404.44	3289.82	2326.98	3404.48
11-Sep-15	#N/A	#N/A	#N/A	3224.27	2272.37	3404.38	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
01-Oct-15	3216.40	2284.76	3404.05	3224.27	2272.37	3404.38	3258.82	2309.49	3404.23	3266.12	2296.73	3404.44	3289.82	2326.98	3404.48
17-Nov-15	3216.40	2284.76	3404.06	3224.28	2272.36	3404.38	3258.82	2309.49	3404.23	3266.12	2296.73	3404.44	3289.81	2326.98	3404.49
06-Jan-16	3216.40	2284.76	3404.06	3224.30	2272.36	3404.38	3258.81	2309.49	3404.23	3266.12	2296.72	3404.43	3289.82	2326.98	3404.48
02-Feb-16	3216.40	2284.77	3404.07	3224.28	2272.37	3404.39	3258.81	2309.49	3404.22	3266.12	2296.73	3404.44	3289.81	2326.98	3404.48
22-Mar-16	3216.40	2284.77	3404.06	3224.28	2272.36	3404.39	3258.82	2309.49	3404.23	3266.12	2296.72	3404.44	3289.82	2326.98	3404.48
23-May-16	3216.40	2284.77	3404.06	3224.27	2272.37	3404.38	3258.81	2309.49	3404.22	3266.12	2296.72	3404.43	3289.82	2326.98	3404.48
02-Sep-16	3216.40	2284.77	3404.05	3224.28	2272.37	3404.37	3258.82	2309.49	3404.22	3266.12	2296.73	3404.43	3289.82	2326.98	3404.48
15-May-17	#N/A	#N/A	#N/A	3224.28	2272.36	3404.38	3258.82	2309.50	3404.23	3266.13	2296.73	3404.44	3289.82	2326.98	3404.49

	LYNX-14-22			LYNX-14-23			LYNX-14-24			LYNX-14-25			LYNX-14-26		
	Upstream Cr.			Downstream Cr.			Upstream Cr.			Downstream Cr.			Upstream Cr.		
	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation
Initial	3296.33	2314.85	3404.55	3317.18	2326.61	3404.00	3309.21	2314.46	3404.53	3343.85	2309.70	3404.14	3335.95	2297.48	3404.52
12-Jan-15	3296.32	2314.85	3404.55	3317.18	2326.61	3404.00	3309.21	2314.45	3404.53	3343.85	2309.70	3404.14	3335.94	2297.49	3404.52
03-Mar-15	3296.32	2314.84	3404.55	3317.18	2326.62	3404.00	3309.20	2314.45	3404.53	3343.85	2309.70	3404.14	3335.94	2297.50	3404.51
27-May-15	3296.33	2314.85	3404.54	3317.18	2326.62	3403.99	3309.21	2314.46	3404.53	3343.85	2309.70	3404.14	3335.94	2297.49	3404.51
02-Jul-15	3296.32	2314.84	3404.54	3317.18	2326.61	3404.00	3309.21	2314.45	3404.53	3343.85	2309.70	3404.14	3335.94	2297.49	3404.51
06-Aug-15	3296.32	2314.85	3404.54	3317.18	2326.62	3403.99	3309.20	2314.46	3404.52	3343.85	2309.70	3404.14	3335.94	2297.49	3404.51
03-Sep-15	3296.32	2314.84	3404.54	3317.18	2326.62	3403.99	3309.20	2314.46	3404.52	3343.85	2309.70	3404.14	3335.94	2297.49	3404.50
11-Sep-15	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
01-Oct-15	3296.32	2314.84	3404.54	3317.18	2326.61	3403.99	3309.20	2314.45	3404.52	3343.85	2309.70	3404.14	3335.94	2297.49	3404.51
17-Nov-15	3296.32	2314.84	3404.54	3317.18	2326.61	3403.99	3309.20	2314.45	3404.52	3343.85	2309.70	3404.14	3335.94	2297.49	3404.51
06-Jan-16	3296.33	2314.84	3404.53	3317.18	2326.61	3403.99	3309.21	2314.45	3404.52	3343.85	2309.70	3404.14	3335.94	2297.49	3404.50
02-Feb-16	3296.33	2314.85	3404.53	3317.18	2326.62	3403.99	3309.20	2314.46	3404.53	#N/A	#N/A	#N/A	3335.94	2297.49	3404.51
22-Mar-16	3296.33	2314.84	3404.53	3317.18	2326.62	3403.99	3309.21	2314.45	3404.53	3343.85	2309.70	3404.12	3335.94	2297.49	3404.51
23-May-16	3296.33	2314.84	3404.53	3317.18	2326.62	3403.99	3309.20	2314.45	3404.52	3343.85	2309.71	3404.12	#N/A	#N/A	#N/A
02-Sep-16	3296.33	2314.84	3404.53	3317.18	2326.61	3403.99	3309.21	2314.45	3404.52	3343.86	2309.71	3404.12	3335.95	2297.49	3404.50
15-May-17	3296.33	2314.84	3404.53	3317.19	2326.62	3403.99	3309.20	2314.45	3404.52	3343.86	2309.71	3404.12	3335.95	2297.49	3404.51

amec foster wheeler

Table 4: Lynx TDF - Monument Monitoring Summary - Cumulative Values (Change from Initial)

	LYNX-14-01 Downstream Cr.					LYNX-14-02 Upstream Cr.				
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.4	326	0.1	0.3	-0.2	0.1	0	0.0	0.1	-0.2
03-Mar-15	0.5	307	0.3	0.4	0.0	0.1	315	0.1	0.1	-0.2
27-May-15	0.5	307	0.3	0.4	-0.5	0.2	270	0.2	0.0	-0.4
02-Jul-15	0.2	333	0.1	0.2	-0.5	0.1	180	0.0	-0.1	-0.4
06-Aug-15	0.4	333	0.1	0.4	-0.5	0.0	#N/A	0.0	0.0	-0.4
03-Sep-15	0.7	297	0.5	0.4	-0.5	0.3	288	0.3	0.2	-0.4
11-Sep-15	0.4	297	0.3	0.3	-0.8	0.1	270	0.1	0.0	-0.4
01-Oct-15	0.4	315	0.2	0.4	-0.6	0.1	45	-0.1	0.1	-0.4
17-Nov-15	0.4	326	0.1	0.3	-0.6	0.3	108	-0.3	-0.2	-0.5
06-Jan-16	0.6	301	0.4	0.4	-0.7	0.5	90	-0.5	-0.1	-1.6
02-Feb-16	0.6	342	0.1	0.6	-0.2	0.5	79	-0.5	0.0	-1.3
22-Mar-16	0.5	281	0.5	0.2	-0.2	0.5	101	-0.5	-0.2	-1.2
23-May-16	0.4	297	0.3	0.3	-0.4	0.6	99	-0.6	-0.2	-1.4
02-Sep-16	0.5	281	0.5	0.2	-0.5	0.7	90	-0.7	-0.2	-1.8
15-May-17	0.4	253	0.4	0.0	-0.5	1.1	99	-1.0	-0.4	-1.8

Notes:

1 - Survey Data provided by Nyrstar Myra Falls.
2 - The combined measurement error (total of instrument, human and network) for the LynxTDF monument survey is approximately 1.5 cm and 1.0 cm for horizontal and vertical displacement, respectively.
3 - Negative values are in the upstream direction, positive values are in the downwstream direction.
4 - Negative values are to the west, positive values are to the east.
5 - Negative values are descending stations along dam centreline and positive values are for ascending stations.
6 - Cr. : crest
7 - Yellow shading indicates significant cumulative displacement over 2 cm has occurred.
8 - Green shading indicates monument was replaced on that date. Displacement after that date is calculated with repect to the initial survey reading on the replacement date .
9 - '#N/A' indicates no survey data available for that date. Displacement values are based on changes from the last available readings.
10 - Peach shading indicates monument was disturbed and was re-set on that date.

	LYNX-14-03 Downstream Cr.					LYNX-14-04 Upstream Cr.				
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.1	135	-0.1	-0.1	0.2	0.3	342	0.0	0.3	-0.3
03-Mar-15	0.5	217	0.4	-0.3	0.2	0.6	279	0.6	0.2	-0.3
27-May-15	0.5	169	0.0	-0.5	0.1	0.3	252	0.3	0.0	-0.4
02-Jul-15	0.5	143	-0.2	-0.5	0.1	0.1	225	0.1	-0.1	-0.5
06-Aug-15	0.3	162	0.0	-0.3	0.1	0.2	270	0.2	0.0	-0.6
03-Sep-15	#N/A	#N/A	#N/A	#N/A	#N/A	0.6	279	0.6	0.2	-0.5
11-Sep-15	#N/A	#N/A	#N/A	#N/A	#N/A	0.3	270	0.3	0.1	-0.6
01-Oct-15	0.3	162	0.0	-0.3	0.1	#N/A	#N/A	#N/A	#N/A	#N/A
17-Nov-15	0.5	143	-0.2	-0.5	0.1	0.1	45	-0.1	0.1	-0.7
06-Jan-16	0.6	135	-0.3	-0.5	0.1	0.3	108	-0.3	-0.2	-2.2
02-Feb-16	0.6	141	-0.3	-0.6	0.4	0.1	90	-0.1	0.0	-1.9
22-Mar-16	#N/A	#N/A	#N/A	#N/A	#N/A	0.2	180	0.0	-0.2	-1.8
23-May-16	#N/A	#N/A	#N/A	#N/A	#N/A	0.3	135	-0.1	-0.2	-2.0
02-Sep-16	0.8	166	0.0	-0.8	0.2	0.3	108	-0.3	-0.2	-2.2
15-May-17	1.1	156	-0.2	-1.0	0.2	0.6	114	-0.5	-0.4	-2.2

	LYNX-14-06 Upstream Cr.					LYNX-14-07 Downstream Cr.				
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.1	180	0.0	-0.1	0.1	0.3	0	-0.1	0.3	0.0
03-Mar-15	0.4	236	0.3	-0.1	-0.3	0.1	315	0.1	0.1	0.0
27-May-15	0.6	171	0.0	-0.6	-0.8	0.3	135	-0.1	-0.2	-0.3
02-Jul-15	0.6	149	-0.2	-0.6	-1.1	0.4	104	-0.4	-0.2	-0.4
06-Aug-15	0.6	149	-0.2	-0.6	-1.0	0.3	90	-0.3	-0.1	-0.5
03-Sep-15	0.6	231	0.6	-0.3	-1.0	0.5	248	0.5	-0.1	-0.5
11-Sep-15	0.4	166	0.0	-0.4	-1.0	#N/A	#N/A	#N/A	#N/A	#N/A
01-Oct-15	0.4	135	-0.2	-0.4	-1.0	0.2	90	-0.2	0.0	-0.5
17-Nov-15	0.8	113	-0.6	-0.5	-1.2	0.5	112	-0.4	-0.3	-0.8
06-Jan-16	1.3	103	-1.2	-0.6	-1.4	1.0	84	-1.0	-0.1	-0.8
02-Feb-16	0.9	103	-0.8	-0.4	-0.9	0.7	90	-0.7	-0.2	-0.6
22-Mar-16	0.8	150	-0.2	-0.8	-1.0	0.5	143	-0.2	-0.5	-0.5
23-May-16	0.9	139	-0.4	-0.8	-1.3	0.6	121	-0.4	-0.4	-0.6
02-Sep-16	0.9	139	-0.4	-0.8	-1.5	0.6	135	-0.3	-0.5	-0.8
15-May-17	1.2	113	-0.9	-0.7	-1.3	0.8	130	-0.5	-0.6	-0.8

	LYNX-14-08 Upstream Cr.					LYNX-14-09 Downstream Cr.				
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.4	45	-0.4	0.2	-0.3	0.3	288	0.3	-0.1	0.2
03-Mar-15	0.1	45	-0.1	0.1	-0.5	0.4	256	0.3	-0.3	-0.2
27-May-15	1.4	82	-1.4	-0.1	-1.1	1.6	240	0.7	-1.5	-0.9
02-Jul-15	1.6	83	-1.6	-0.2	-1.2	0.5	202	-0.1	-0.5	-0.4
06-Aug-15	1.6	75	-1.6	0.0	-1.4	0.3	135	-0.3	0.0	-1.0
03-Sep-15	1.2	76	-1.2	0.0	-1.5	0.9	243	0.4	-0.8	-0.7
11-Sep-15	1.3	81	-1.3	-0.1	-1.5	#N/A	#N/A	#N/A	#N/A	#N/A
01-Oct-15	1.6	76	-1.6	0.0	-1.5	0.3	180	-0.2	-0.2	0.0
17-Nov-15	1.2	90	-1.2	-0.3	-1.5	0.6	108	-0.6	0.2	-0.5
06-Jan-16	3.0	82	-3.0	-0.3	-3.0	1.7	90	-1.4	1.0	-0.8
02-Feb-16	1.7	77	-1.7	0.0	-2.0	0.1	90	-0.1	0.1	-0.5
22-Mar-16	2.2	82	-2.2	-0.2	-2.4	0.6	149	-0.5	-0.2	-0.5
23-May-16	2.2	87	-2.2	-0.4	-4.2	0.5	169	-0.4	-0.4	-1.3
02-Sep-16	2.4	85	-2.4	-0.4	-3.0	0.5	143	-0.5	-0.2	-0.9
15-May-17	3.1	87	-3.1	-0.6	-3.0	0.9	126	-0.9	0.0	-1.2

	LYNX-14-10 Upstream Cr.					LYNX-14-11 Downstream Cr.				
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.1	135	-0.1	0.0	0.1	0.7	262	0.3	-0.7	-0.1
03-Mar-15	0.8	104	-0.8	0.3	-0.2	1.3	198	-0.8	-1.0	-0.5
27-May-15	1.5	94	-1.3	0.8	-2.9	#N/A	#N/A	#N/A	#N/A	#N/A
02-Jul-15	1.8	90	-1.5	1.0	-3.1	#N/A	#N/A	#N/A	#N/A	#N/A
06-Aug-15	1.6	90	-1.3	0.9	-3.2	#N/A	#N/A	#N/A	#N/A	#N/A
03-Sep-15	0.7	98	-0.6	0.3	-3.3	#N/A	#N/A	#N/A	#N/A	#N/A
11-Sep-15	0.4	117	-0.4	0.1	-3.0	#N/A	#N/A	#N/A	#N/A	#N/A
01-Oct-15	1.8	87	-1.4	1.1	-3.3	#N/A	#N/A	#N/A	#N/A	#N/A
17-Nov-15						#N/A	#N/A	#N/A	#N/A	#N/A
06-Jan-16	1.9	118	-1.9	0.2	-0.7	#N/A	#N/A	#N/A	#N/A	#N/A
02-Feb-16	1.1	139	-1.0	-0.2	0.2	#N/A	#N/A	#N/A	#N/A	#N/A
22-Mar-16	1.1	139	-1.0	-0.2	0.2	#N/A	#N/A	#N/A	#N/A	#N/A
23-May-16	2.1	135	-2.1	-0.4	-0.9	#N/A	#N/A	#N/A	#N/A	#N/A
02-Sep-16	2.3	131	-2.3	-0.2	-1.4	#N/A	#N/A	#N/A	#N/A	#N/A
15-May-17						#N/A	#N/A	#N/A	#N/A	#N/A

	LYNX-14-12 Upstream Cr.					LYNX-14-13 Downstream Cr.				
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.3	18	0.2	0.2	0.0	0.4	34	0.2	0.3	0.0
03-Mar-15	0.1	0	0.1	0.1	-0.6	0.1	315	0.1	0.0	0.1
27-May-15	0.4	166	-0.4	-0.1	-1.4	0.9	180	-0.8	-0.5	-1.1
02-Jul-15	0.4	153	-0.4	0.0	-1.7	0.9	167	-0.9	-0.3	-0.9
06-Aug-15	0.3	162	-0.3	-0.1	-1.8	1.0	156	-1.0	-0.1	-1.3
03-Sep-15	0.9	252	0.2	-0.9	-1.9	1.4	234	-0.1	-1.4	-1.2
11-Sep-15	0.5	169	-0.5	-0.2	-2.0	1.0	174	-0.9	-0.4	-0.5
01-Oct-15	0.4	180	-0.3	-0.2	-1.7	0.9	174	-0.8	-0.4	-0.3
17-Nov-15	1.2	114	-1.0	0.7	-2.2	#N/A	#N/A	#N/A	#N/A	#N/A
06-Jan-16	2.0	108	-1.5	1.3	-2.7	1.9	126	-1.7	0.7	-1.5
02-Feb-16	0.8	113	-0.6	0.4	-2.4	1.3	135	-1.2	0.3	-0.8
22-Mar-16	1.0	143	-1.0	0.1	-2.6	1.2	175	-1.1	-0.5	-0.9
23-May-16	0.7	164	-0.7	-0.2	-3.0	1.3	162	-1.2	-0.3	-1.3
02-Sep-16	0.8	187	-0.6	-0.5	-3.5	1.5	160	-1.5	-0.3	-1.5
15-May-17	1.4	144	-1.4	0.1	-3.7	2.1	146	-2.1	0.1	-1.7

	LYNX-14-14 Upstream Cr.					LYNX-14-15 Downstream Cr.				
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.3	45	0.1	0.3	0.0	0.3	0	0.3	0.2	0.2
03-Mar-15	0.2	90	-0.1	0.2	-0.3	0.4	333	0.4	0.0	0.2
27-May-15	1.1	158	-1.1	-0.2	-1.5	0.8	187	-0.6	-0.5	-0.9
02-Jul-15	1.2	160	-1.1	-0.2	-1.9	0.8	173	-0.7	-0.3	-0.8
06-Aug-15	1.5	148	-1.5	0.0	-2.2	0.8	166	-0.8	-0.2	-0.8
03-Sep-15	1.1	214	-0.5	-1.0	-2.3	1.7	263	0.7	-1.6	-0.6
11-Sep-15	1.5	157	-1.5	-0.2	-2.6	0.9	193	-0.7	-0.6	-1.0
01-Oct-15	1.6	140	-1.5	0.2	-1.8	0.3	198	-0.2	-0.2	0.1
17-Nov-15	2.3	137	-2.3	0.5	-2.5					
06-Jan-16	3.2	129	-3.0	1.1	-3.7	1.0	114	-0.8	0.6	0.3
02-Feb-16	2.1	131	-2.0	0.7	-2.9	0.4	326	0.4	0.0	1.3
22-Mar-16	2.4	145	-2.4	0.2	-2.9	0.8	247	0.1	-0.8	1.6
23-May-16	2.2	146	-2.2	0.1	-3.9	1.1	260	0.4	-1.0	0.8
02-Sep-16	2.8	142	-2.8	0.3	-4.4	0.9	252	0.2	-0.9	0.5
15-May-17	2.9	148	-2.9	0.1	-4.0	#N/A	#N/A	#N/A	#N/A	#N/A

	LYNX-14-16 Upstream Cr.					LYNX-14-17 Downstream Cr.				
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.2	153	-0.2	0.0	0.0	0.4	214	-0.2	-0.3	-0.9
03-Mar-15	0.5	202	-0.3	-0.4	-0.5	0.7	207	-0.4	-0.6	0.0
27-May-15	1.3	176	-1.2	-0.6	-1.8	0.3	108	-0.2	0.2	-0.9
02-Jul-15	1.3	184	-1.1	-0.8	-2.4	0.8	157	-0.8	-0.1	-0.9
06-Aug-15	1.5	169	-1.4	-0.5	-2.4	0.3	108	-0.2	0.2	-0.9
03-Sep-15	1.7	239	0.0	-1.7	-2.4	0.7	146	-0.7	0.0	-1.2
11-Sep-15	1.6	187	-1.3	-1.0	-2.6	#N/A	#N/A	#N/A	#N/A	#N/A
01-Oct-15	1.4	180	-1.2	-0.7	-2.3	1.1	158	-1.1	-0.2	-1.2
17-Nov-15	2.1	155	-2.1	-0.2	-2.4	1.4	172	-1.3	-0.5	-0.6
06-Jan-16	3.7	154	-3.7	-0.3	-3.1	1.3	162	-1.2	-0.3	-0.8
02-Feb-16	2.5	173	-2.3	-1.0	-2.1	0.2	117	-0.2	0.1	0.0
22-Mar-16	#N/A	#N/A	#N/A	#N/A	#N/A	0.9	117	-0.8	0.5	-0.8
23-May-16	2.6	191	-2.0	-1.8	-2.1	0.9	148	-0.9	0.0	-1.1
02-Sep-16	2.8	184	-2.3	-1.6	-3.2	1.0	135	-1.0	0.2	-1.3
15-May-17	3.9	178	-3.4	-1.9	-3.8	#N/A	#N/A	#N/A	#N/A	#N/A

	LYNX-14-18 Upstream Cr.					LYNX-14-19 Downstream Cr.				
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.6	99	-0.4	0.5	0.0	0.3	270	0.2	-0.3	-0.5
03-Mar-15	0.6	355	0.5	0.2	-0.1	0.6	219	-0.2	-0.6	-0.3
27-May-15	0.5	158	-0.5	-0.1	-1.6	0.1	180	-0.1	-0.1	-0.8
02-Jul-15	0.5	158	-0.5	-0.1	-1.9	0.6	180	-0.5	-0.3	-0.7
06-Aug-15	0.6	149	-0.6	0.0	-2.1	0.1	225	0.0	-0.1	-0.9
03-Sep-15	1.4	282	1.0	-1.0	-2.2	0.6	171	-0.6	-0.2	-1.0
11-Sep-15	0.5	204	-0.3	-0.4	-2.1	#N/A	#N/A	#N/A	#N/A	#N/A
01-Oct-15	0.4	214	-0.2	-0.3	-2.6	0.9	180	-0.8	-0.5	-1.2
17-Nov-15	1.9	122	-1.7	0.9	-2.3	0.9	186	-0.7	-0.5	-1.2
06-Jan-16	3.3	125	-3.0	1.3	-2.3	1.0	197	-0.7	-0.8	-1.0
02-Feb-16	1.5	127	-1.4	0.6	-1.4	0.8	203	-0.4	-0.6	-1.4
22-Mar-16	2.0	131	-1.9	0.6	-1.6	0.8	173	-0.7	-0.3	-0.9
23-May-16	1.1	146	-1.1	0.1	-2.0	0.8	194	-0.6	-0.6	-1.6
02-Sep-16	1.1	142	-1.1	0.1	-3.1	0.5	169	-0.5	-0.2	-1.3
15-May-17	2.2	141	-2.2	0.3	-1.9	0.3	136	-0.3	0.1	-0.9

	LYNX-14-20 Upstream Cr.					LYNX-14-21 Downstream Cr.				
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	#N/A	#N/A	#N/A	#N/A	#N/A	0.5	292	0.4	-0.3	0.0
03-Mar-15	0.5	202	-0.3	-0.4	-0.6	0.9	243	0.1	-0.9	0.1
27-May-15	0.0	#DIV/0!	0.0	0.0	-1.1	0.6	239	0.0	-0.6	-0.4
02-Jul-15	0.4	194	-0.3	-0.3	-1.3	0.7	225	-0.2	-0.7	-0.3
06-Aug-15	0.1	270	0.1	-0.1	-1.4	0.5	259	0.2	-0.5	-0.4
03-Sep-15	0.4	207	-0.2	-0.4	-1.6	0.5	233	-0.1	-0.5	-0.6
11-Sep-15	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
01-Oct-15	0.7	188	-0.5	-0.4	-1.7	0.7	214	-0.3	-0.7	-0.5
17-Nov-15	0.9	180	-0.8	-0.5	-1.6	1.2	228	-0.2	-1.2	0.1
06-Jan-16	1.1	175	-1.0	-0.5	-2.1	1.0	233	-0.1	-1.0	-0.2
02-Feb-16	0.5	158	-0.5	-0.1	-1.9	1.0	270	0.5	-0.9	-0.1
22-Mar-16	1.1	158	-1.1	-0.2	-1.9	0.7	225	-0.2	-0.7	-0.1
23-May-16	1.0	186	-0.8	-0.6	-2.4	0.8	263	0.3	-0.7	-0.1
02-Sep-16	0.4	135	-0.4	0.1	-2.5	0.9	234	-0.1	-0.9	-0.1
15-May-17	0.9	139	-0.9	0.2	-1.5	0.3	289	0.2	-0.2	0.1

	LYNX-14-22 Upstream Cr.					LYNX-14-23 Downstream Cr.				
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.3	288	0.2	-0.2	-0.5	0.2	297	0.0	0.2	-0.1
03-Mar-15	0.6	239	0.0	-0.6	-0.5	0.4	297	0.0	0.4	0.0
27-May-15	0.1	270	0.1	-0.1	-1.2	0.3	342	-0.2	0.2	-0.6
02-Jul-15	0.4	214	-0.2	-0.3	-1.2	0.1	270	0.1	0.1	-0.4
06-Aug-15	0.3	288	0.2	-0.2	-1.4	0.5	349	-0.4	0.4	-0.6
03-Sep-15	0.3	252	0.1	-0.3	-1.6	0.2	333	-0.1	0.2	-0.8
11-Sep-15	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
01-Oct-15	0.7	196	-0.5	-0.5	-1.6	0.1	225	0.1	0.0	-0.8
17-Nov-15	0.6	211	-0.3	-0.5	-1.5	0.3	288	0.1	0.3	-0.7
06-Jan-16	0.4	124	-0.3	0.2	-2.8	0.2	63	-0.2	-0.1	-0.7
02-Feb-16	0.2	27	0.1	0.2	-2.5	0.8	7	-0.7	0.3	-0.7
22-Mar-16	0.7	153	-0.7	-0.1	-2.2	0.4	56	-0.3	-0.1	-0.6
23-May-16	0.3	135	-0.3	0.1	-2.7	0.4	0	-0.3	0.2	-0.9
02-Sep-16	0.4	124	-0.3	0.2	-2.8	0.3	72	-0.2	-0.2	-1.1
15-May-17	0.6	129	-0.6	0.2	-2.4	1.0	36	-1.0	-0.1	-0.7

	LYNX-14-24 Upstream Cr.					LYNX-14-25 Downstream Cr.				
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.4	214	0.4	0.0	-0.2	0.2	297	0.0	0.2	-0.3
03-Mar-15	0.7	225	0.7	0.2	-0.4	0.7	225	0.7	0.2	-0.4
27-May-15	0.4	256	0.3	0.3	-0.6	0.3	288	0.1	0.3	-0.4
02-Jul-15	0.4	225	0.4	0.1	-0.6	0.4	243	0.4	0.2	-0.3
06-Aug-15	0.5	281	0.2	0.5	-0.8	0.5	281	0.2	0.5	-0.3
03-Sep-15	0.5	248	0.4	0.3	-1.0	0.3	270	0.2	0.3	-0.6
11-Sep-15	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
01-Oct-15	0.9	216	0.9	0.0	-0.9	0.4	236	0.3	0.1	-0.5
17-Nov-15	0.6	231	0.6	0.2	-0.8	0.3	270	0.2	0.3	-0.4
06-Jan-16	1.1	285	0.3	1.1	-1.2	1.1	285	0.3	1.1	-1.2
02-Feb-16	0.5	259	0.4	0.4	-0.4	#N/A	#N/A	#N/A	#N/A	#N/A
22-Mar-16	0.9	207	0.9	-0.1	-0.5	0.1	90	-0.1	-0.1	-1.7
23-May-16	0.7	225	0.7	0.2	-0.8	0.2	0	-0.2	0.1	-2.0
02-Sep-16	0.7	207	0.7	-0.1	-1.0	0.5	53	-0.5	-0.2	-2.1
15-May-17	0.7	230	0.7	0.2	-0.6	0.6	35	-0.6	0.0	-1.6

	LYNX-14-26 Upstream Cr.				
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial					
12-Jan-15	1.7	294	0.3	1.7	-0.1
03-Mar-15	1.7	324	-0.6	1.6	-0.6
27-May-15	1.5	307	-0.1	1.5	-0.9
02-Jul-15	1.3	297	0.1	1.3	-1.0
06-Aug-15	1.6	305	-0.1	1.6	-1.1
03-Sep-15	1.5	302	0.0	1.5	-1.5
11-Sep-15	#N/A	#N/A	#N/A	#N/A	#N/A
01-Oct-15	1.3	293	0.2	1.3	-1.3
17-Nov-15	1.4	295	0.2	1.4	-1.1
06-Jan-16	1.0	287	0.3	1.0	-1.7
02-Feb-16	1.5	307	-0.1	1.5	-1.2
22-Mar-16	1.1	285	0.3	1.1	-1.2
23-May-16	#N/A	#N/A	#N/A	#N/A	#N/A
02-Sep-16					
15-May-17	0.1	30	-0.1	0.0	0.4

Memo

Date: 30 March 2018

To: Nicole Pesonen

From: [redacted]

CC: Christine Peters, Dan Hughes-Games

Ref: NX14001B.2017

Re: **Nyrstar Myra Falls Tailings Management Facilities**
Q3-2017 Dam Safety Monitoring Data Update

1.0 BACKGROUND

Amec Foster Wheeler Environment & Infrastructure (Amec Foster Wheeler) was retained by Nyrstar Myra Falls (NMF) to receive, process and review the monitoring data from the Myra Falls Mine tailings management facilities on a quarterly basis as part of the dam operation and surveillance program. This memorandum includes a brief review of the monitoring data collected throughout the third quarter of 2017 (Q3-2017), which included:

- Rainfall and temperature records
- Vibrating wire piezometer (VWP) readings
- Deformation monument surveys

The updated monitoring data is presented in a series of figures and tables included in Attachments A through D.

Provision of background information is not the purpose of this memorandum. The reader is referred to the annual Dam Safety Inspection (DSI) reports, annual construction reviews, OMS manual and design reports for further details on the facility design, development and operation.

2.0 DATA RECEIVED AND REVIEWED

A summary of data received and collated is provided in Table 1, together with information on the source, format, reading frequency, time range and gaps, if any.

Amec Foster Wheeler Environment & Infrastructure,
a Division of Amec Foster Wheeler Americas Limited
4385 Boban Drive
Nanaimo, BC, V9T 5V9
Tel: 250-758-1887
amecfw.com

Table 1 – Monitoring Data Source and Status

Monitoring Data Type	Source (Acquisition Mode)	Format Received	Reading Frequency	Responsible	Remarks
Weather data from Paste Plant	Automated readings	Raw data logger download (Excel)	Daily, hourly	NMF	
VWP readings for Lynx TDF	Automated readings	Raw data logger download (Excel)	Hourly	NMF	-VWP 29323 and 29332 disconnected for construction on 12 August 2017 -VWP31089 and 17721 missing data after 17 September 2017
VWP readings for Old TDF (old VWP)	Automated readings, Huts A, B, and C	Raw data logger download (Excel)	Hourly	NMF	Due to a programming error when switching from daily to hourly readings data was lost for the following: -Hut A July 20 to August 7; August 25 to 27; September 8 to 11; September 21 to 25 -Hut C July 26 and 27; September 8 to 11; September 21 to 25 -VWP P10 missing data after 18 September 2017
New VWP at the Old TDF	Automated readings	Raw data logger download (Excel)	Hourly	NMF	-VWP36972 was severed 30 June 2017 -VWP32234 is missing pressure data after 18 July 2017 -VWP3228 is missing data 6 September 2017
Deformation monuments for both Lynx and Old TDF	Land survey, total station	Excel	Quarterly	NMF	
Tailings surface (Lynx TDF)	Land survey, GPS and total station reflectorless	LandXML surface	Quarterly	NMF	Tailings were not deposited during Q3-2017
Slope Inclinometer	Slope inclinometer device	RPP file, Excel file	Twice annually	Amec Foster Wheeler Site Engineer	Slope Inclinometer profile survey not scheduled for Q3-2017

3.0 WEATHER DATA

Weather data for the mine site is collected from the Paste Plant station. The Paste Plant station automatically collects hourly rainfall, snow pack, relative humidity, temperature, and wind data. Precipitation data was collected from the Powerhouse station up to 2015 and has since been used only periodically to record weather data at the mine site. Snowfall is calculated as the daily difference in average snow pack, which is converted in water equivalent (10 mm of snow equals 1 mm of rain) to calculate total daily precipitation.

Monthly average and extreme temperature values are presented in Attachment A. Monthly precipitation records and statistics since 1979 as well as daily rainfall records over the quarter are also included in Attachment A.

Monthly precipitation totals were below average for both July and August. The rainfall for both months varied from the average by more than 1 standard deviation.

The monthly maximum and minimum temperatures for July were within the range of maximum and minimum values for the previous record (2006 to 2016). For August the maximum record temperature was 35.6 °C, which is within 0.5 °C of the previous record. September was 2.6 °C hotter than the previous recorded maximum.

4.0 PIEZOMETERS

The Q3-2017 monitoring data update includes the automated monitoring of pore water pressure data from the vibrating wire piezometers at the Old TDF and Lynx TDF. The locations of these instruments are shown on Drawings 010703, 010704, and 010709 in the 2016 DSI report (Amec Foster Wheeler, 2017a)[1]. Cross-sections of the Old TDF and Lynx TDF along the major instrumentation planes are provided on Drawings 010705 through 010707 and 010711 through 010713 of the DSI report.

4.1 Lynx TDF

Lynx TDF piezometer network comprises:

- VWPs at various depths within the paste tailings of Lynx TDF
- VWPs in Lynx Dam fill
- VWPs in the shallow and deep foundation soils within Lynx Dam ultimate footprint

[1] Amec Foster Wheeler Environment & Infrastructure (2017a). Myra Falls Tailings Storage Facilities 2016 Dam Safety Inspection Report. File No. NX14001B, Nanaimo, 31 March 2017.

4.1.1 Piezometer Results

Weekly maximum piezometer levels for Lynx TDF are presented in Tables 1 and 2 and shown on Figures 1 through 5 of Attachment B. Piezometer levels are reported in geodetic elevations except for a few locations where VWP negative pressures (suction) have been observed. As such for Figure 3b and 5 pressure heads, in meters of water, are plotted.

Two VWP (VWP 29362 and VWP 17721) located in the upstream paste tailings had historical maximum readings during the last two weeks of August. These high pressure readings are due to construction of the upstream dam buttress. Other piezometer readings for Lynx TDF Q3-2017 were consistent with previous Q3 trends.

4.1.2 Piezometer Damage

During Q3-2017 construction the following Lynx TDF piezometers were damaged, disconnected from the automated system or stopped transmitting data:

- RStar unit 4801 was struck by an excavator on 5 July 2017 damaging the mounting stake. Unit continued to send/receive data during Q3.
- RStar unit 4797 was struck by an unknown object on 8 July 2017 damaging the mounting enclosure. Unit continued to send/receive data during Q3.
- VWP 29333 and VWP 29323 were disconnected for construction 12 August 2017.
- VWP 31089 and VWP 17721 are missing data after 17 September 2017. It is assumed that the lead cables were damaged due to settlement of the upstream dam buttress.

4.2 Old TDF

The Old TDF piezometer network comprises:

- VWPs under the outer embankment berm and in the upper tailings beach along instrumentation planes A and C (data collected in Hut A and Hut C).
- VWPs located below the base of the Paste Berm (data collected in Hut B).
- VWPs in the APA Paste Berm fill, foundation tailings and soils, divided between instrumentation Planes 1 through 6.
- VWPs in the paste tailings, in the southeast corner of the Amalgamated Paste Area (APA).
- VWPs at the base, southeast slope toe and east slope crest of the Old TDF Surge Pond.

During the Q3 reporting period VWP 32223 resumed transmitting data on September 8, 2017, without any adjustment or repair of the network having taken place.

4.2.1 Piezometer Results

Weekly maximum piezometer levels for Old TDF piezometers are presented in Tables 1 to 3 and Figures 1 to 14 of Attachment C. The piezometer levels are reported in pressure heads (in meters of water) and compared to the revised VWP thresholds. The VWP thresholds were revised in March 2017 to formulate a new rationale for threshold conditions based on estimated reductions in effective stress at each piezometer. The thresholds were developed based on the long-term static and post seismic stability models which include the closure cover over the facility (Amec Foster Wheeler, 2017b)[2].

The following threshold exceedances were noted:

Instrument Plane A/Plane 2:

- A-2E and A-4E exceeded trigger points S3 and P1 throughout the quarter.
- A-26E and A28E exceed trigger points P1, and S2 throughout the quarter.

Instrument Planes 1, 3, 4 and 6:

- VWP 36971 exceed trigger limit P1 throughout the quarter, it also exceeded limit S1 at the start of the quarter then decreased below threshold levels.

Instrument Plane C/Plane 5

- C-29E exceeded trigger points S3 and P1 throughout the quarter.
- C-31E exceeded trigger point S1 throughout the quarter, and exceeded P1 at the start of the quarter then decreased below threshold levels.
- C17E, VWP 32224 and C37E exceeded trigger points S1 at the start of the quarter then decreased below threshold limits.

In general measured pressure head were consistent with trends observed during the previous year, Q3-2016, with the following exceptions:

- In Panel A elevated pore water pressure up to 2 m above the seasonal average were observed in piezometer A-2E, A-E4, A-5E, A-6E, A-8E, A-9E, A-10E, A-12E, A-18E and A-20E. These elevated pressure were caused by loading from fill placed for construction of the APA stabilization berm.

[2] Amec Foster Wheeler Environment & Infrastructure (2017b). Old Tailings Facility Vibrating Wire Piezometer Threshold Update. Technical Letter, File No. NX14001B, Nanaimo, 17 March 2017.

- In Plane 3 an elevated pore water pressure was observed in VWP 32233 near the end of the July due to fill loading during construction of the APA stabilization berm.
- In Plane 5 in VWP 17726, pore water pressures dropped by 2 m in September. This is interpreted to be because fill material stockpiled near the piezometer was removed.

4.2.2 Piezometer Damage

Several piezometers began intermittently sending data during Q3.

- VWP 17724, VWP 17722 and VWP 17726 missed some readings between July 1 and July 27. These VWP are all connected to RStar unit 4304.
- VWP 17730 missed some hourly readings between August 4 and September 30. VWP 32220 missed many readings between July 26 and September 30. VWP 33241 missed some readings between September 5 and September 30. These VWP are all connected to RStar unit 4294.

During Q3-2017 construction the following Old TDF piezometers were damaged or stopped transmitting data:

- VWP32234 is missing pressure data after 18 July 2017.
- VWP 32228 is missing data after 6 September 2017.
- VWP P10 is missing data after 18 September 2017.

5.0 SLOPE INCLINOMETERS

Slope inclinometer casing surveys were not scheduled during the Q3 reporting period.

During Q3-2017 the slope inclinometer casing for BH14-10A was damaged. The inclinometer casing was decommissioned by filling with bentonite chips in Q4. Note that this slope inclinometer casing was installed for the purposes of enabling downhole shearwave velocity measurements and was not intended to be a part of the permanent monitoring network.

6.0 DEFORMATION MONUMENTS

Surface deformation monuments consisting of survey prisms are installed in key locations at both tailings facilities. The surface monuments were surveyed in Q3-2017. Both raw survey data and calculated cumulative displacements in the transverse (i.e. perpendicular to the dam alignment), longitudinal (i.e. parallel to the dam alignment) and vertical directions are reported in Attachment D in a tabulated form.

6.1 Lynx TDF

Monuments are installed along the inside edge of the upstream and the downstream crest of Lynx Dam. There are thirteen monuments on the upstream crest and eight monuments on the downstream crest. Four monuments on the downstream crest were destroyed since installation and have not been replaced. For Lynx Dam raise construction all survey monuments were removed at the end of August 2017.

The monument layout is shown on Drawing 010710 of the 2016 DSI report. For monuments Lynx-14-01 to Lynx-14-19 the combined measurement error (total of instrument, human, and network) for the Lynx TDF monument survey is approximately 1.5 cm and 1.0 cm for horizontal and vertical displacement, respectively. As such, displacements below a threshold of 2.0 cm are not considered significant.

The control point for monuments Lynx-14-20 to Lynx-14-26 was destroyed before the Q3-2017 survey due to Waste Dump 2 removal and excavation at the Lynx Dam west abutment. So the Q3 survey for these monuments was based on a resection using three of the other monuments. NMF estimated the combined measurement error to be approximately 4.5 cm for vertical displacement. As such displacements below a threshold of 4.5 cm area not considered significant.

Nine upstream monuments experienced movement greater than the survey error as measured relative to their initial surveyed installation coordinates.

- Lynx-14-04, 2.4 cm of settlement.
- Lynx-14-08, 2.2 cm of upstream movement and 3.2 cm of settlement.
- Lynx-14-12, 4.1 cm of settlement.
- Lynx 14-14, 2.5 cm of upstream movement and 5.0 cm of settlement.
- Lynx14-16, 2.6 cm of upstream movement and 3.8 cm of settlement.
- Lynx-14-18, 3.0 cm of settlement.
- Lynx-14-20, 3.6 cm of settlement.
- Lynx-14-22, 4.2 cm of settlement.
- Lynx-14-24, 2.3 cm of settlement.

Upstream movement and settlement in the upstream buttress is anticipated due to consolidation of the tailings mass. The observed upstream movement and settlement is within anticipated magnitudes not considered to represent a dam safety concern.

Two downstream monuments experienced movement greater than the survey error.

- Lynx-14-13 experienced 2.3 cm of settlement.
- Lynx-14-21 experienced 2.7 cm of upstream movement, 2.3 cm of movement towards the west and 4.8 cm of settlement.

6.2 Old TDF

Monuments are installed on the downstream crest of key embankments within the Old TDF. There are eleven monuments on the Paste Berm, nine monuments on the Outer Embankment Berm (6:1 Buttress), and fifteen monuments on the Seismic Upgrade Berm. Four monuments were destroyed since initial installation and have not been replaced. No monuments were replaced between the May 2017 and August 2017 surveys.

The monument layout is reflected on Drawing 010708 of the 2016 DSI report. The combined measurement error for the Old TDF monument survey is approximately 1.0 cm for both horizontal and vertical displacement. As such, displacements below a threshold of 2.0 cm are not considered significant.

The total cumulative displacements and settlements between the initial survey and Q3-2017 were generally insignificant and equal to 2 cm or less. Six monuments experienced movement greater the survey error:

- Located on the east portion of the downstream edge of the seismic upgrade berm TDF14-10 and TDF14-14 experienced 3.2 and 3.8 cm of uplift since installation.
- Located on the east portion of the downstream edge of the seismic upgrade berm TDF-11 experienced 2.6 cm of upstream movement since installation.
- Located on the APA Berm TDF14-31, TDF14-32 and TDF14-34 experienced 4.7, 4.9 and 2.3 cm of downstream movement since installation.

7.0 TAILINGS PRODUCTION AND STORAGE

NMF suspended its mining and milling operations in June 2015 for an indefinite period of time. Tailings were not deposited in the facility during Q3-2017.

A paste survey was not completed during Q3-2017. As such there is no tailings density and storage capacity update included in this report.

8.0 CLOSURE

This memorandum has been prepared for the exclusive use of Nyrstar Myra Falls for specific application to the area within this memorandum. Any use which a third party makes of this memorandum, 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 memorandum. It has been prepared in accordance with generally accepted geotechnical and tailings dam engineering practices. No other warranty, express or implied, is made.

Attachment A

Weather Data

Table\Figure Number	Title
Table 1	Monthly Precipitation Data by Year
Table 2	2017 Monthly Temperatures (˚C)
Figure 1	Monthly Precipitation at Myra Falls
Figure 2	Daily Rainfall at the Paste Plant Weather Station

Nyrstar Myra Falls
2017 Dam Safety Inspection
Attachment A

amec foster wheeler

Table 1: Monthly Precipitation Data by Year

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual Total	
YEAR	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	Actual	Inferred
*1979						71	125	47	384	343	187	620		(2911)
1980	270	296	90	241	52	87	70	37	181	180	497	706	2706	
1981	346	428	118	278	114	125	78	63	310	450	466	412	3189	
1982	299	505	110	193	22	27	19	35	89	779	213	493	2783	
1983	530	624	375	84	42	130	95	60	60	218	619	193	3028	
*1984	399	520		263	193	32	9	40	95	576	340	220		(2944)
*1985	64	175	148	114	85	21	32	21	77					(1886)
*1986			418	88	239	89	41	4	54	590		390		(2982)
*1987		337	425	263	223	184	59	18	98	84	592	437		(3070)
1988	343	203	212	215	215	80	25	29	114	246	582	201	2467	
1989	329	102	224	198	63	72	42	42	18	339	250	253	1931	
1990	372	283	123	59	82	130	31	70	19	565	806	344	2883	
1991	353	543	86	126	80	28	33	207	8	60	596	610	2730	
1992	860	305	45	244	6	41	11	36	90	390	257	241	2527	
1993	57	55	289	207	148	64	77	92	1	180	141	393	1705	
*1994	258		203	149	79	137	6	47	74	219	380	499		(2321)
*1995	- no data -													
*1996	- no data -													
*1997		64	259	217	124	183	72	114	0	442	348	374		(2547)
1998	571	419	159	21	37	14	67	3	3	130	473	279	2175	
1999	219	295	174	96	50	16	1	114	55	138	667	183	2007	
2000	50	218	99	76	132	50	124	52	62	325	168	125	1479	
2001	333	123	144	107	132	38	38	163	67	200	519	367	2233	
2002	195	134	56	93	41	23	28	27	51	34	588	288	1557	
2003	471	61	412	177	50	51	44	30	45	558	94	348	2341	
2004	327	134	160	40	24	42	23	74	157	218	489	340	2026	
2005	433	70	223	396	306	58	100	54	98	515	268	522	3043	
2006	616	316	379	125	76	46	28	5	77	139	811	561	3176	
2007	538	288	438	208	75	129	71	69	167	410	491	416	3300	
2008	250	176	188	59	80	29	8	162	22	260	458	163	1854	
2009	140	139	291	91	171	44	35	17	165	321	882	258	2553	
2010	666	353	381	223	171	60	2	19	269	478	285	629	3535	
2011	284	327	528	166	80	12	82	42	340	295	478	200	2834	
2012	601	241	424	199	55	86	10	14	16	317	525	264	2752	
2013	96	267	168	112	125	66	3	125	277	57	227	100	1622	
2014	170	243	341	170	48	32	32	17	144	589	404	548	2740	
2015	259	332	460	105	35	15	20	149	217	262	248	700	2802	
*2016	**469**	**374**	**507**	**81**	**17**	**63**	**31**	**61**	**87**	**501**	**935**			(3499)
*2017		**240**	**377**	**260**	**55**	**36**	**9**	**2**	**32**					(2507)
Num.	32	34	35	36	36	37	37	37	37	35	34	34	**28**	(37)
Avg.	349	270	258	160	98	65	43	58	109	326	449	373	**2499**	(2558)
St. Dev.	191	146	142	83	71	46	34	50	100	184	216	168	**565**	(552)
Max.	860	624	528	396	306	184	125	207	384	779	935	706	**3535**	(3535)
Min.	50	55	45	21	6	12	1	2	0	34	94	100	**1479**	(1479)

Notes: Compiled from daily observations recorded at the powerhouse weather station (Environment Canada) prior to 2015 and from the Paste Plant from 2015 onwards

Lime shading - dry (value < monthly mean - standard deviation)

Aqua shading - wet (value > monthly mean + standard deviation)

Peach shading - Precipitation data taken from the Paste Plant weather station.

* = years with incomplete data sets

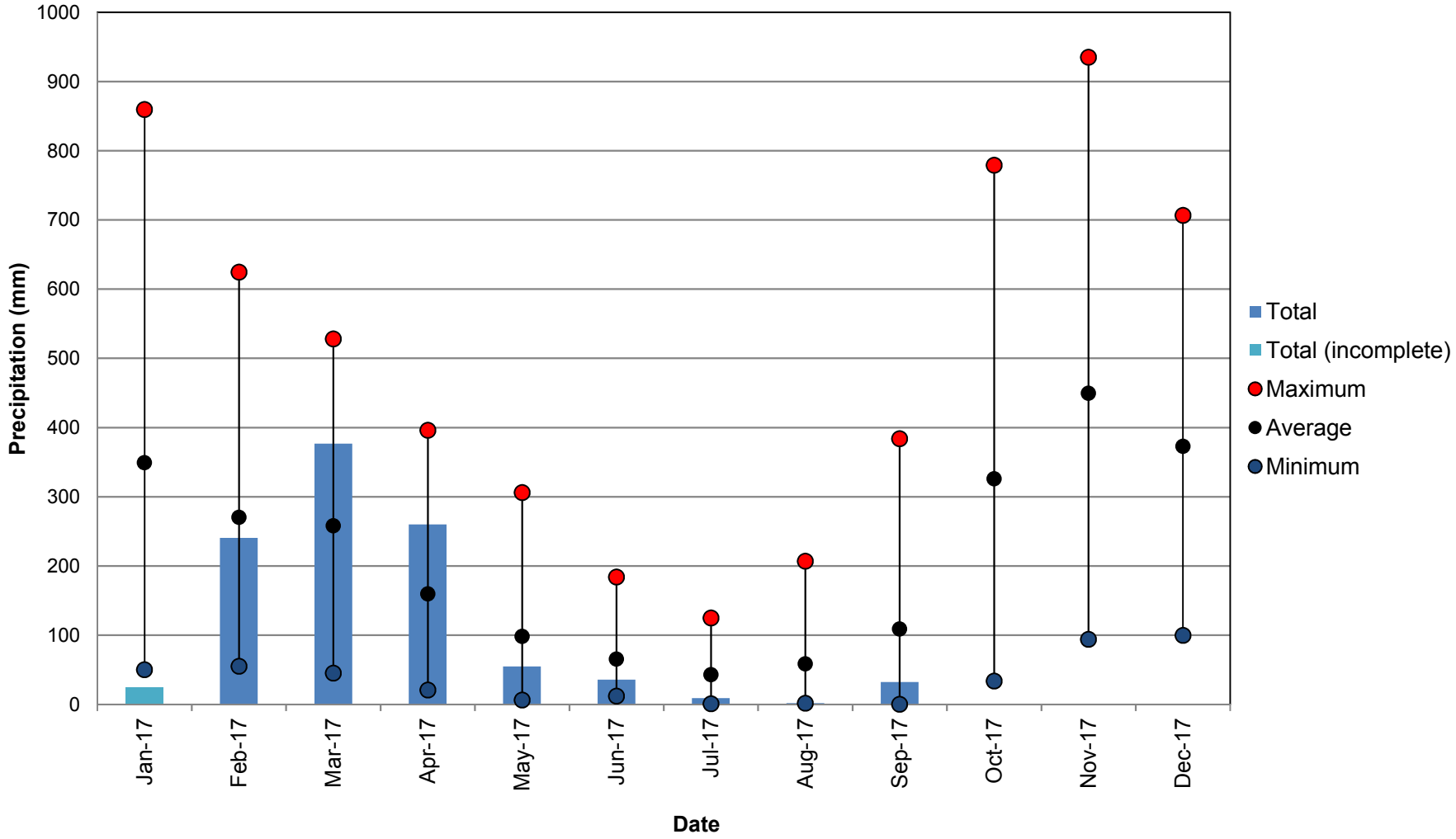
Table 2: 2017 Monthly Temperatures (˚C)

Month	Previous Period of Record[1]		2017[2]	
	Minimum	Maximum	Minimum	Maximum
January	-12.0	11.9	-5.3	8.7
February	-12.0	12.5	-7.2	11.8
March	-8.3	19.0	-7.4	13.9
April	-4.0	23.1	-2.0	15.9
May	-1.5	31.0	0.9	29.9
June	1.0	34.3	4.0	33.2
July	4.2	38.9	9.0	30.7
August	4.9	36.0	10.3	35.6
September	-1.0	32.0	3.2	**34.6**
October	-2.0	23.5		
November	-11.0	16.1		
December	-13.0	12.8		

[1] Temperature data obtained from Myra Falls site from 2006 to end of 2016.
[2] Temperature data recorded at the Paste Plant weather station. Statistics from 25 January 2017, inclusively.

amec foster wheeler

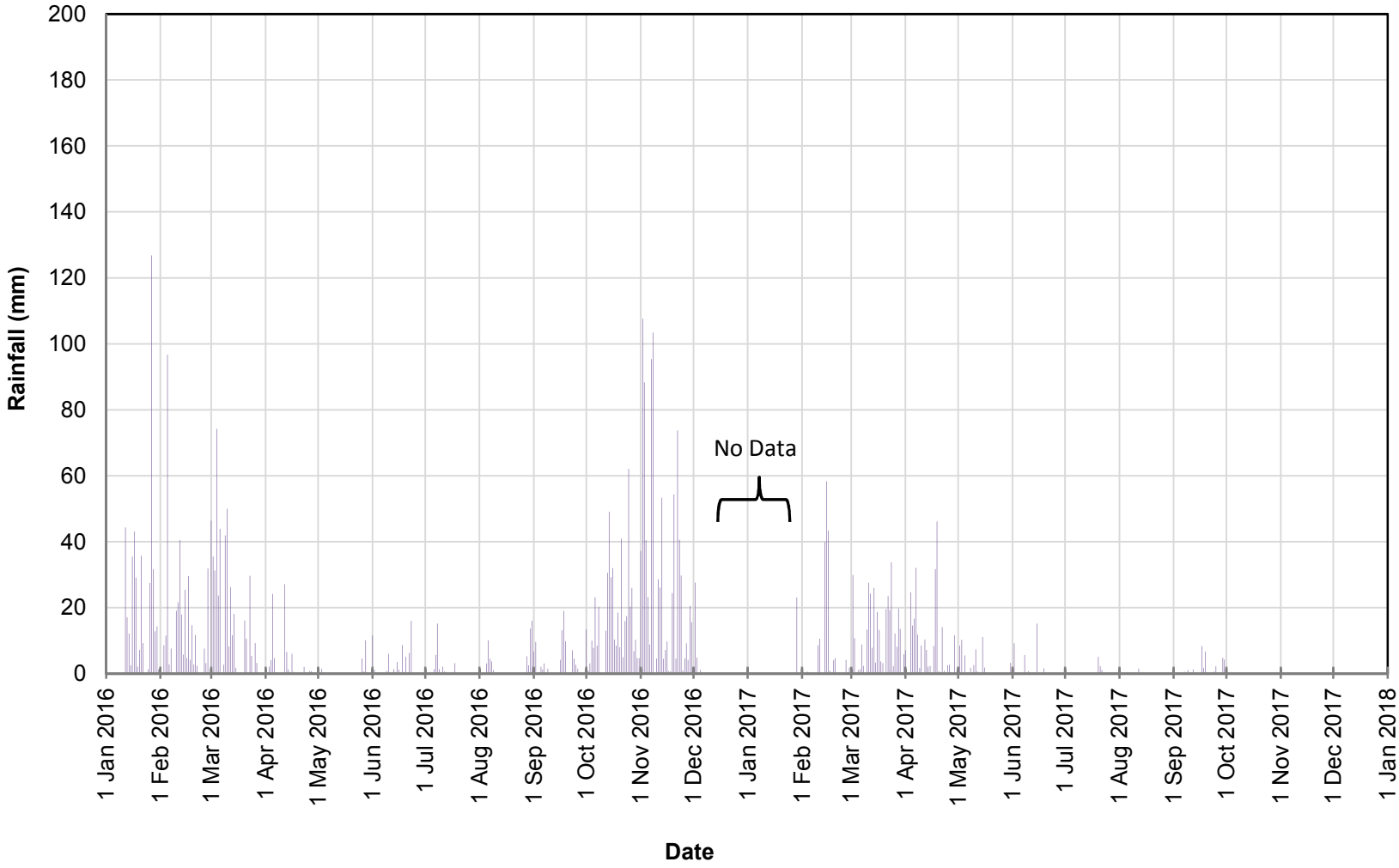
Figure 1: Monthly Precipitation at Myra Falls



File No.: NX14001B.2017

amec foster wheeler

Figure 2: Daily Rainfall at the Paste Plant Weather Station



File No.: NX14001B.2017

Attachment B

Lynx TDF VWP Data

Table\Figure Number	Title
Table 1	Lynx Paste Tailings - Weekly Maximum Vibrating Wire Piezometer Readings
Table 2	Lynx Dam - Weekly Maximum Vibrating Wire Piezometer Readings
Figure 1	Lynx TDF – Deep Paste VWP Data
Figure 2	Lynx TDF – Shallow Paste VWP Data
Figure 3a	Lynx Dam – Shallow Foundation VWP Data
Figure 3b	Lynx Dam – Shallow Foundation VWP Data
Figure 4	Lynx Dam – Deep Foundation VWP Data
Figure 5	Lynx Dam – Dam Fill VWP Data

Nyrstar Myra Falls
2017 Dam Safety Inspection
Attachment B

File No.: NX14001B.2017

Table 1: Lynx Paste Tailings - Weekly Maximum Vibrating Wire Piezometer Readings

Location	Lynx TDF - Upstream Dam Toe and Paste Tailings										
Plane and Position	Plane D - U/S Toe	Plane E - U/S Toe	Plane F - U/S Toe	Plane D, E - Central	Plane D, E - Central	Plane D, E - Central	Plane E - Central	Plane E - Central	Plane E - Central	Plane D, E - Central	Plane F - Central
Piezometer	29326	17723	17721	17727	17728	17733	17731	17732	17734	33783	31089
Historical Max. Value	353.00	353.54	354.79	341.20	335.50	323.96	345.75	340.40	327.38	354.11	353.68
Tip Elevation (m)	350.00	350.70	350.90	328.40	320.70	308.50	330.30	322.70	310.50	351.66	351.26
2017-07-02	350.27	353.12	353.82	336.69	329.56	314.62	340.93		317.37	353.81	353.39
2017-07-09	350.11	352.74	353.51	336.68	329.51	314.59	340.88		317.32	353.78	353.32
2017-07-16	350.11	352.76	353.69	336.64	329.46	314.53	340.83		317.21	353.72	353.27
2017-07-23	350.28	352.95	353.69	336.60	329.42	314.43	340.81		317.06	353.72	353.29
2017-07-30	350.74	353.07	353.72	336.58	329.40	314.45	340.78		317.12	353.74	353.32
2017-08-06	350.74	352.89	353.26	336.55	329.44	314.66	340.75		317.39	353.72	353.27
2017-08-13	*350.00*	351.99	352.83	336.55	329.42	314.53	340.73		317.19	353.66	353.19
2017-08-20	*349.90*	351.46	354.79	336.46	329.30	314.25	340.63		316.84	353.59	353.17
2017-08-27	353.00	352.30	354.68	336.46	329.26	314.11	340.65		316.64	353.53	353.23
2017-09-03	351.65	351.46	352.70	336.40	329.20	314.01	340.58		316.48	353.47	353.18
2017-09-10	350.16	350.99	352.07	336.36	329.16	313.88	340.53		316.33	353.41	353.15
2017-09-17	350.39	351.04		336.38	329.17	314.00	340.60		316.47	353.37	
2017-09-24	*349.78*	350.80		336.29	329.11	314.06	340.49		316.52	353.33	

Legend:

330.05	Historical maximum value
328.29	Negative pore pressure (elevation head below tip elevation)
	Blank spaces indicate no data available

Nyrstar Myra Falls
2017 Dam Safety Inspection
Attachment B

File No.: NX14001B.2017

Table 2: Lynx Dam - Weekly Maximum Vibrating Wire Piezometer Readings

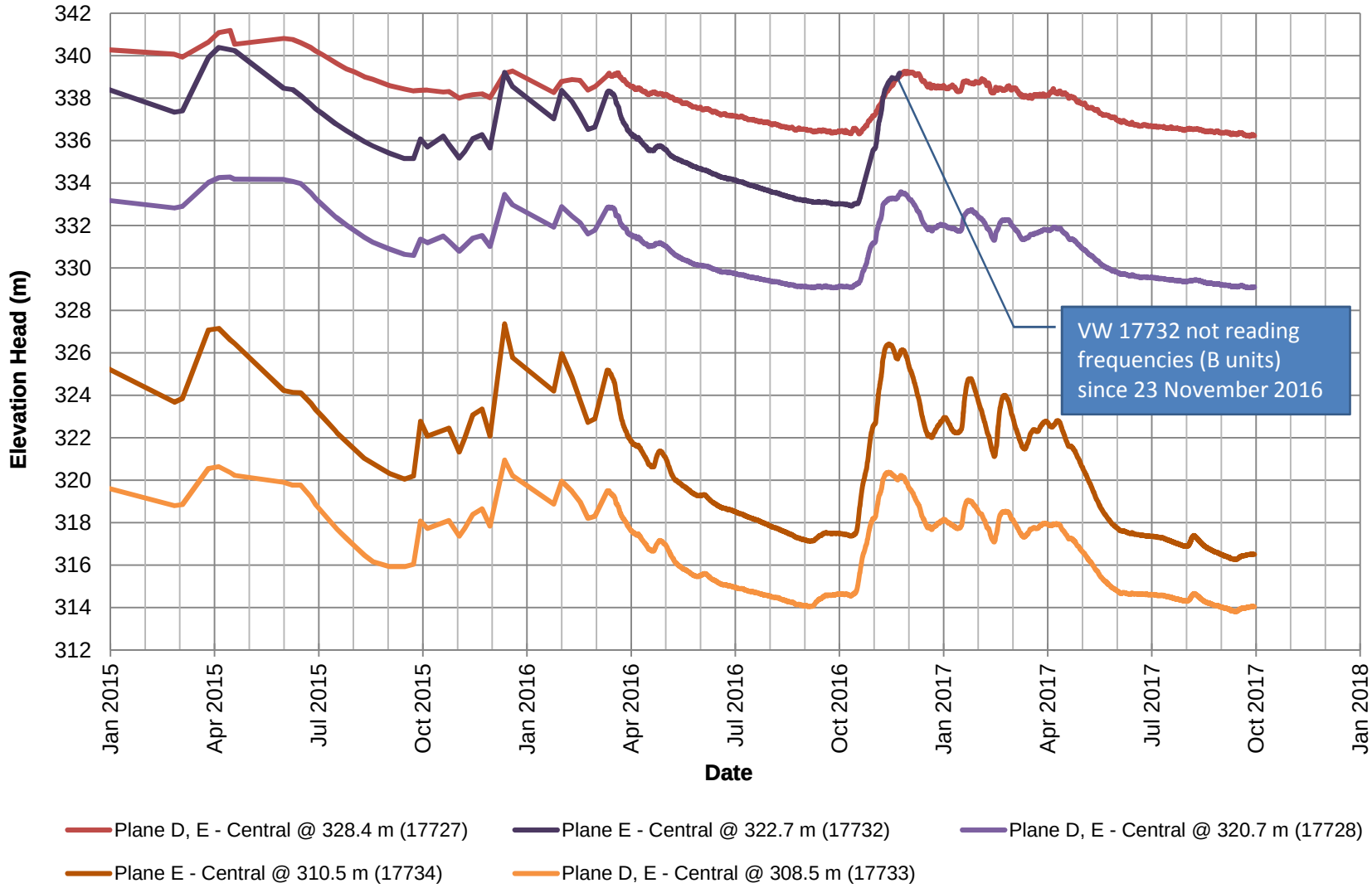
Location	Lynx Dam - Shallow Foundation								Lynx Dam - Deep Foundation									Lynx Dam Fill	
Plane and Position	Plane D - West Arm	Conveyor - Lynx Southwest	Plane E - South Arm	Plane E - South Toe	Plane F - South Arm	Plane F - South Toe	Plane F - Lynx South	Dam Toe - Lynx Southwest	Plane E - South Toe	Plane F - South Arm	Plane F - South Toe	Plane F - Lynx South	Plane F - Lynx South	Lynx Southeast	Lynx Southeast	Lynx Southeast	Plane F - South Arm	Plane F - South Arm	Plane E - South Arm
Piezometer	29334	29320	29335	29321	29330	29323	32221	29331	29332	29336	29333	17725	29324	29325	33781	33782	33784	29322	29329
Historical Max. Value	329.48	324.35	319.05	323.30	329.59	326.38	323.12	320.73	317.59	316.40	317.26	317.11	318.60	315.41	319.99	316.60	320.21	337.53	336.98
Tip Elevation (m)	328.40	323.50	315.90	322.40	328.40	326.10	318.55	306.30	305.20	311.10	296.70	278.30	311.60	304.30	314.40	294.45	311.85	337.30	336.90
2017-07-02	*328.12*	323.52	317.37	322.47	*328.39*	*325.92*	319.31	315.88	314.64	316.08	313.72	313.51	314.26	312.54	*314.23*	312.94	318.94	*337.17*	*336.64*
2017-07-09	*328.12*	323.51	317.35	322.46	*328.39*	*325.90*	*318.36*	315.74	314.53	316.01	313.62	313.38	314.13	312.43	*314.17*	312.80	318.87	*337.16*	*336.64*
2017-07-16	*328.13*	323.52	317.34	322.46	*328.38*	*325.87*	*318.35*	315.56	314.39	315.93	313.45	313.23	314.00	312.28	*314.10*	312.60	318.77	*337.18*	*336.65*
2017-07-23	*328.12*	323.52	317.32	322.43	*328.38*	*325.85*	*318.33*	315.38	314.25	315.85	313.34	313.13	313.89	312.16	*314.06*	312.55	318.69	*337.17*	*336.64*
2017-07-30	*328.14*	323.53	317.34	322.47	328.41	*325.82*	*318.34*	315.23	314.12	315.77	313.21	313.01	313.78	312.04	*314.02*	312.44	318.67	*337.19*	*336.65*
2017-08-06	*328.12*	323.51	317.32	322.43	328.41	*325.82*	*318.32*	315.09	314.04	315.72	313.15	312.92	313.68	311.97	*313.99*	312.36	318.53	*337.17*	*336.66*
2017-08-13	*328.12*	323.51	317.32	322.42	328.41		*318.30*	314.99	313.93	315.66		312.80	313.55	311.86	*313.95*	312.25	318.39	*337.15*	*336.66*
2017-08-20	*328.12*	323.51	317.26	322.40	*328.37*		*318.28*	314.85	313.74	315.46		312.65	313.39	311.65	*313.90*	312.09	318.31	*337.15*	*336.65*
2017-08-27	*328.15*	323.54	317.30	322.43	328.41		*318.29*	314.75	313.66	315.40		312.53	313.27	311.54	*313.89*	311.98	318.22	*337.19*	*336.66*
2017-09-03	*328.12*	323.53	317.26	*322.40*	*328.38*		*318.28*	314.63	313.52	315.26		312.53	313.21	311.40	*313.88*	311.99	318.10	*337.17*	*336.64*
2017-09-10	*328.12*	323.52	317.24	*322.38*	*328.38*		*318.29*	314.74	313.60	315.20		312.63	313.33	311.50	*313.89*	312.08	318.08	*337.16*	*336.63*
2017-09-17	*328.17*	323.55	317.33	322.45	328.46		*318.30*	314.70	313.65	315.28		312.63	313.34	311.54	*313.90*	312.09	317.94	*337.21*	*336.66*
2017-09-24	*328.11*	323.53	317.24	*322.39*	*328.38*		*318.26*	314.66	313.55	315.14		312.59	313.30	311.46	*313.90*	312.05	317.94	*337.17*	*336.63*

Legend:

330.05	Historical maximum value
328.29	Negative pore pressure (elevation head below tip elevation)
	Blank spaces indicate no data available

amec foster wheeler

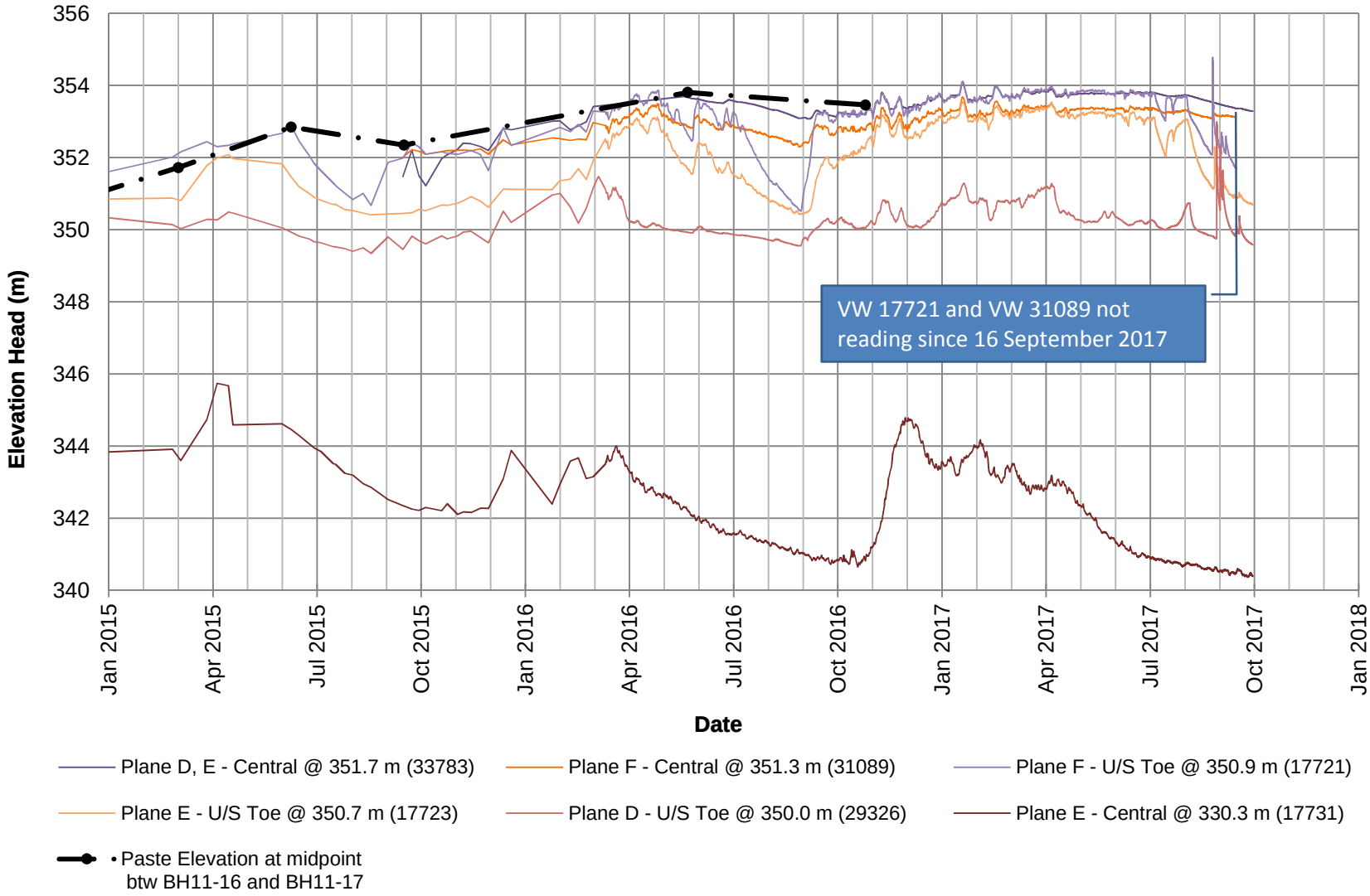
Figure 1: Lynx TDF - Deep Paste VWP Data



File No.: NX14001B.2017

amec foster wheeler

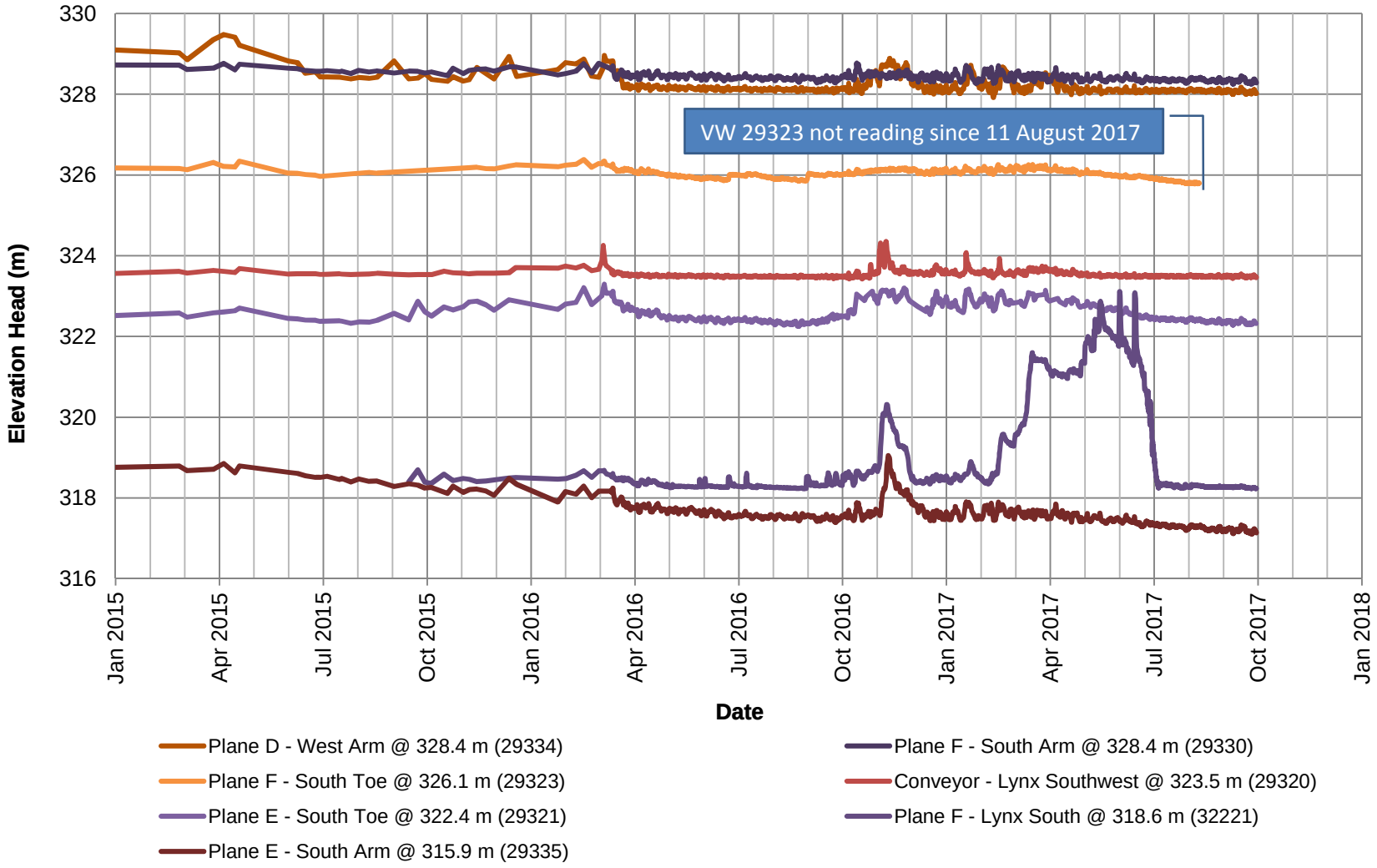
Figure 2: Lynx TDF - Shallow Paste VWP Data



File No.: NX14001B.2017

amec foster wheeler

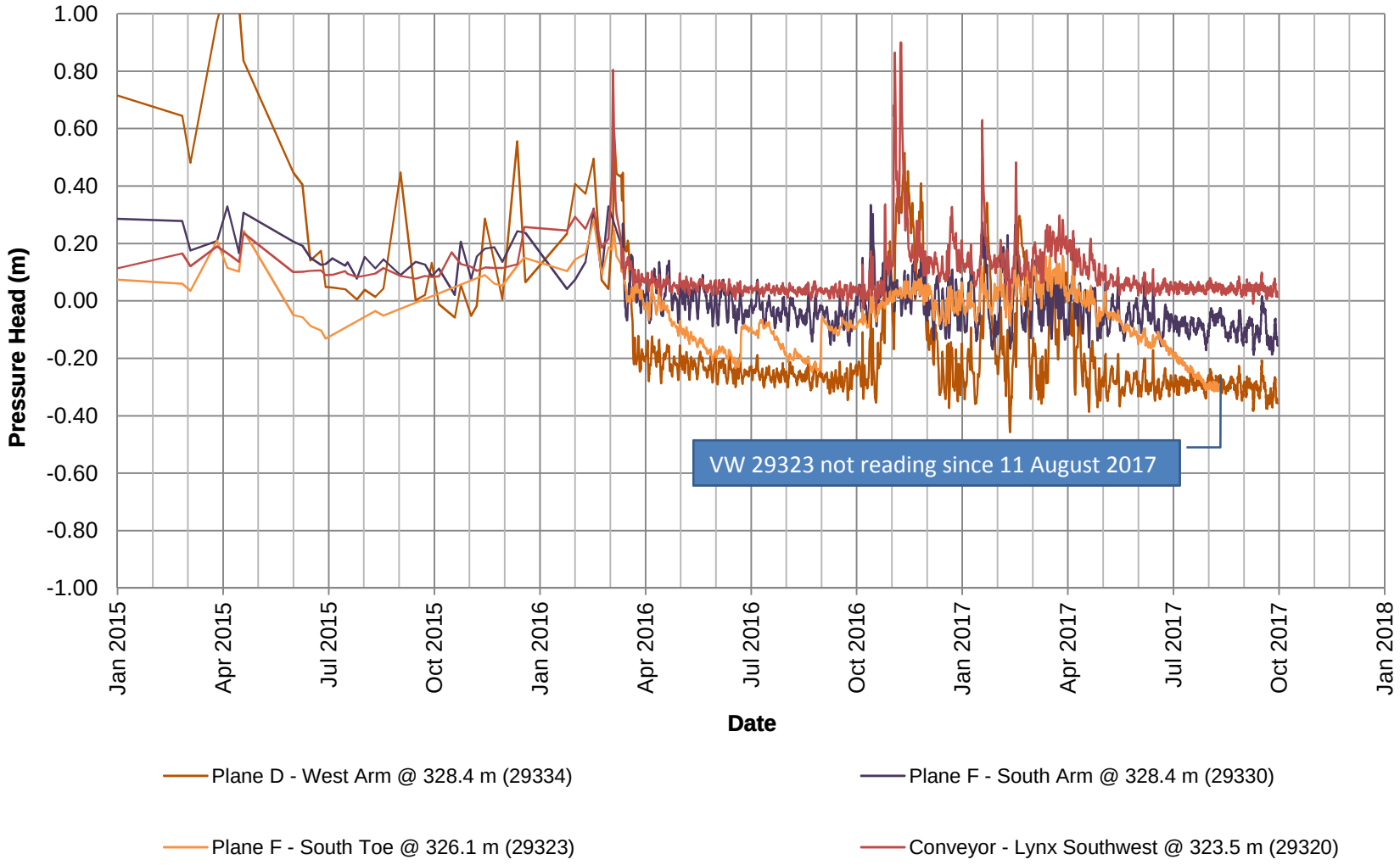
Figure 3a: Lynx Dam - Shallow Foundation VWP Data



File No.: NX14001B.2017

amec foster wheeler

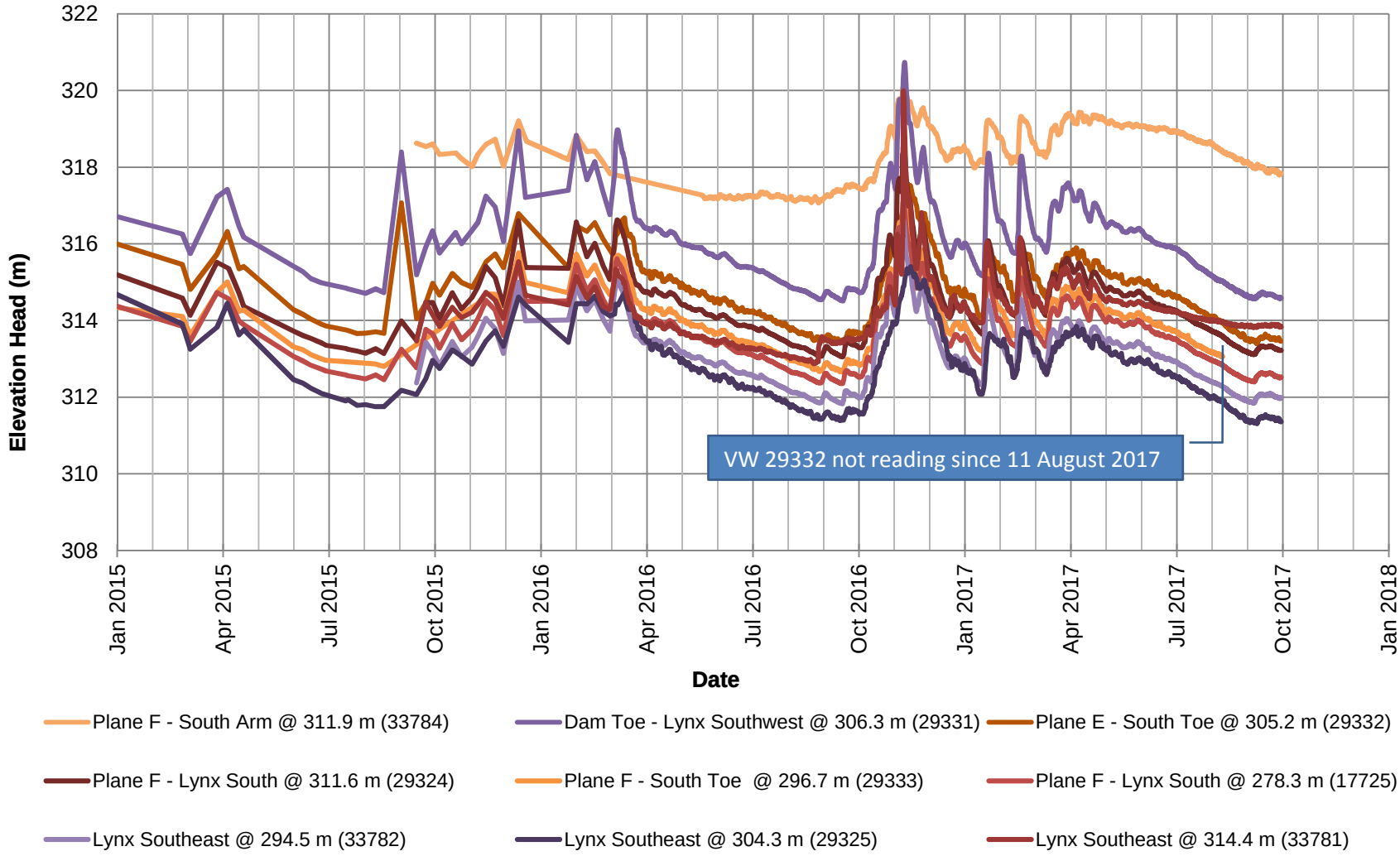
Figure 3b: Lynx Dam - Shallow Foundation VWP Data



File No.: NX14001B.2017

amec foster wheeler

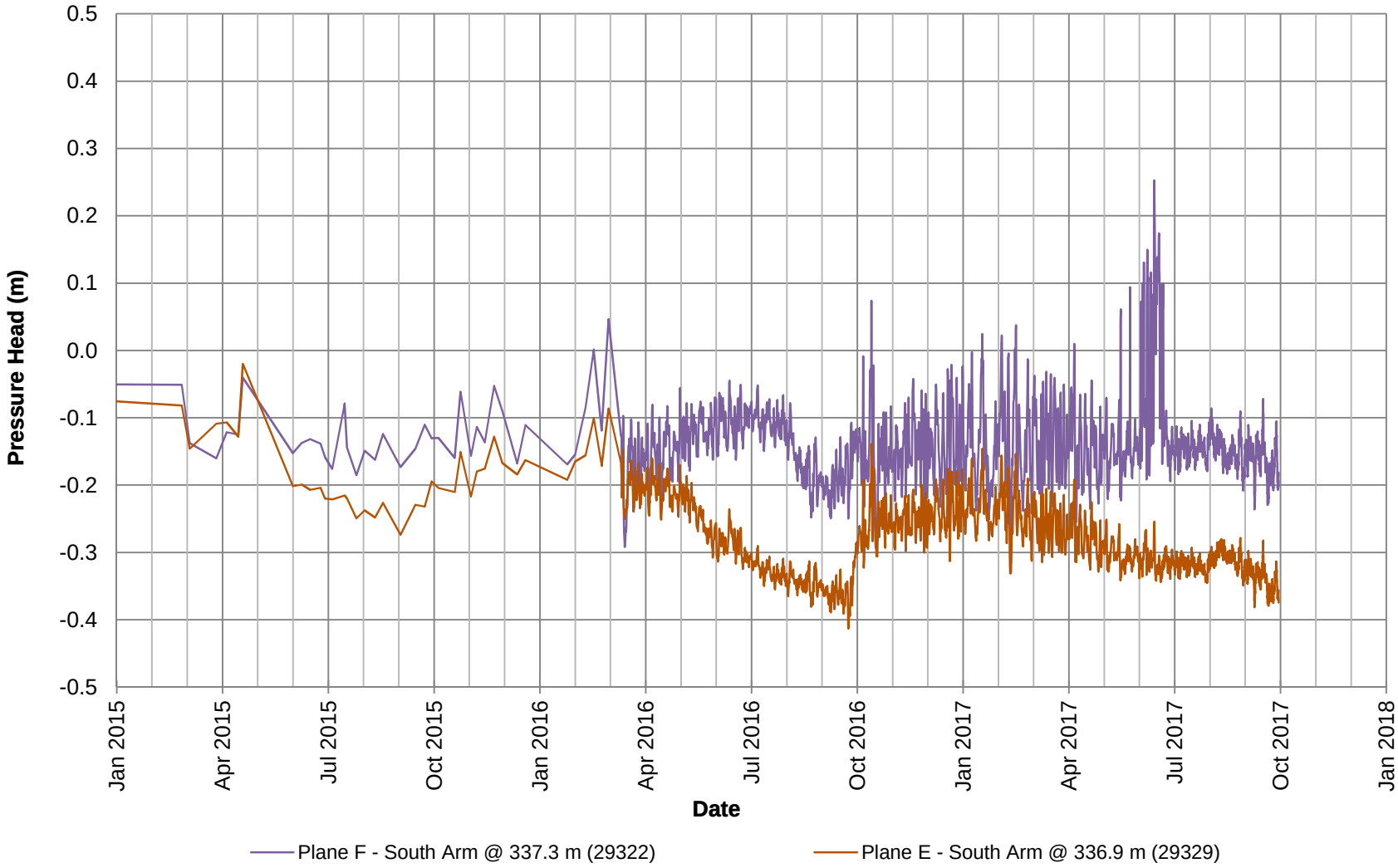
Figure 4: Lynx Dam - Deep Foundation VWP Data



File No.: NX14001B.2017

amec foster wheeler

Figure 5: Lynx Dam - Dam Fill VWP Data



File No.: NX14001B.2017

Attachment C

Old TDF VWP Data

Table\Figure Number	Title
Table 1	Old TDF - Instrument Plane A – Weekly Maximum VWP Pressure Head
Table 2	Old TDF – Instrument Planes 1, 3, 4, 6 and Outliers – Weekly Maximum VWP Pressure Head
Table 3	Old TDF – Instrument Plane 5 – Weekly Maximum VWP Pressure Head
Figure 1	Old TDF Piezometer Records – Plane 1
Figure 2	Old TDF Piezometer Records – Plane A, Outer Embankment Slope, Location 1
Figure 3	Old TDF Piezometer Records – Plane A, Outer Embankment Slope, Location 2
Figure 4	Old TDF Piezometer Records – Plane A, Outer Embankment Slope, Location 3
Figure 5	Old TDF Piezometer Records – Plane A Upper Tailings Beach
Figure 6	Old TDF Piezometer Records – Plane A Strip and Paste Berm
Figure 7	Old TDF Piezometer Records – Plane 3 and Plane 3/4
Figure 8	Old TDF Piezometer Records – Plane 4
Figure 9	Old TDF Piezometer Records – Plane 5 Outer embankment Slope, Location 1
Figure 10	Old TDF Piezometer Records – Plane 5 Outer Embankment Slope, Location 2 and Lower Tailings
Figure 11	Old TDF Piezometer Records – Plane 5 Outer Embankment Slope, Location 3
Figure 12	Old TDF Piezometer Records – Plane 5 Upper Tailings Beach
Figure 13	Old TDF Piezometer Records – Plane 5 Paste Berm and Upstream Tailings
Figure 14	Old TDF Piezometer Records – Plane 5/6 and Plane 6

Nyrstar Myra Falls
2017 Dam Safety Inspection
Attachment C

File No.: NX14001B.2017

amec foster wheeler

Table 1: Old TDF - Instrument Plane A - Weekly Maximum VWP Pressure Head (m)

Location	Outer Embankment Slope - 1				Outer Embankment Slope - 2					Outer Embankment Slope - 3						Upper Tailings Beach							Strip and Paste Berm					
ID	A-5E	A-9E	A-13E	A-17E	A-2E	A-6E	A-10E	A-14E	A-18E	A-4E	32239	A-8E	A-12E	A-16E	A-20E	A-26E	A-27E	A-28E	A-30E	A-32E	A-31E	32220	A-33E	32231	32229	32225	P-11	P-12
Tip Elevation	310.4	311.7	313.4	317.0	305.4	310.9	312.3	313.4	316.8	305.2	310.3	311.0	312.3	313.6	316.7	323.7	323.9	325.2	324.8	327.7	327.8	328.6	327.5	330.2	325.9	328.6	332.6	326.6
Trigger Point S1	3.8	5.1	5.1	1.1	0.0	4.5	5.5	5.1	1.3	0.0	2.8	3.6	4.7	5.6	6.6	1.7	4.7	0.7	5.3	3.3	1.5	1.1	5.5	2.3	5.7	4.9	3.2	5.5
Trigger Point S2	4.4	6.5	6.5	2.6	2.1	5.3	7.2	6.5	2.8	2.2	3.5	4.4	6.0	7.5	7.5	2.4	6.6	1.1	7.0	4.2	3.2	2.5	7.5	2.9	7.5	6.7	4.1	7.5
Trigger Point S3	7.3	10.8	10.9	4.3	2.1	8.8	12.0	10.9	4.6	2.2	5.8	7.3	10.0	12.5	12.5	4.8	11.0	1.8	11.6	7.0	5.2	4.2	12.5	4.9	12.5	11.3	6.8	12.5
Trigger Point P1	***2.9***	***4.3***	***4.3***	***1.7***	***2.1***	***3.5***	***4.8***	***4.3***	***1.9***	***2.3***	***2.3***	***2.9***	***4.0***	***5.0***	***5.0***	***1.6***	***4.4***	***0.7***	***4.7***	***2.7***	***2.1***	***1.7***	***5.0***	***2.0***	***5.0***	***4.5***	***2.7***	***5.0***
2017-07-02	1.6	1.3	1.4	0.5	***4.8***	1.9	1.6	0.5	0.5	***4.8***	0.9	0.8	-1.2	1.7	0.2	***3.4***	2.9	***1.8***	0.0	1.0	0.8	0.0	0.4		2.8	3.1	1.8	1.4
2017-07-09	0.7	0.4	1.4	0.5	***4.7***	0.9	1.5	0.4	0.4	***4.1***	0.8	0.8	-1.3	1.6	0.2	***3.4***	2.8	***1.7***	0.0	1.0	0.8	0.0	0.3		2.7	3.1	1.7	1.4
2017-07-16	0.6	0.2	1.5	0.5	***5.2***	1.7	0.7	0.3	0.0	***4.0***	0.8	0.8	-2.2	1.6	0.2	***3.4***	2.6	***1.7***	-0.2	1.0	0.8	0.0	0.2		2.2	2.9	1.5	1.1
2017-07-23											0.8											0.0			2.6	2.9	1.4	1.2
2017-07-30											0.8											0.0			2.5	2.8	1.3	1.1
2017-08-06	0.3	0.0	1.6	0.5	***4.4***	0.6	0.6	0.0	-0.7	***3.8***	0.7	0.8	-2.4	1.7	1.5	***3.0***	2.6	***1.6***	-0.5	1.0	0.8	0.0	0.1		2.3	2.7	1.2	1.0
2017-08-13	1.1	0.7	1.6	0.5	***4.4***	1.5	1.4	0.0	-0.8	***3.8***	0.7	0.8	-2.4	1.7	0.2	***3.0***	2.5	***1.6***	-0.6	1.0	0.8	0.0	0.0		2.2	2.5	1.1	0.9
2017-08-20	0.2	-0.2	1.6	0.5	***4.3***	0.5	0.6	-0.1	-0.9	***3.7***	0.7	0.8	-2.4	1.6	0.2	***2.9***	2.5	***1.6***	-0.8	1.0	0.7	0.0	-0.1		2.0	2.4	0.9	0.7
2017-08-27	0.2	0.6	1.6	0.5	***5.6***	0.5	1.4	-0.1	1.0	***3.6***	0.7	0.8	-1.5	1.7	0.2	***2.9***	2.6	***1.6***	-0.9	1.0	0.8	0.0	-0.1		2.0	2.3	0.8	0.6
2017-09-03	0.1	-0.3	1.6	0.5	***4.2***	0.5	0.6	-0.2	-1.1	***4.3***	0.7	0.8	-2.5	1.6	0.2	***2.9***	2.6	***1.5***	-1.0	1.0	0.8	0.0	-0.2		1.9	2.2	0.6	0.5
2017-09-10	0.9	-0.3	1.7	0.5	***4.3***	0.4	0.6	-0.3	-1.3	***3.7***	0.7	1.5	-2.5	1.6	0.2	***2.9***	2.6	***1.5***	-1.1	1.0	0.8	0.0	-0.3		1.7	2.1	0.5	0.4
2017-09-17	0.1	-0.3	1.7	0.6	***4.3***	0.4	0.7	-0.2	-1.3	***3.7***	0.7	0.9	-2.5	1.7	0.3	***3.0***	2.6	***1.5***	-1.2	1.1	0.8	0.0	-0.3		1.9	2.0	0.4	0.4
2017-09-24	0.0	-0.4	1.7	0.5	***4.3***	0.4	0.7	-0.4	-1.5	***4.3***	0.7	0.8	-1.7	1.6	0.9	***2.7***	2.6	***1.4***	-1.3	1.0	0.8	0.0	-0.3		1.5	1.8	0.2	0.2

Table 2: Old TDF - Instrument Planes 1, 3, 4, 6 and Outliers - Weekly Maximum VWP Pressure Head (m)

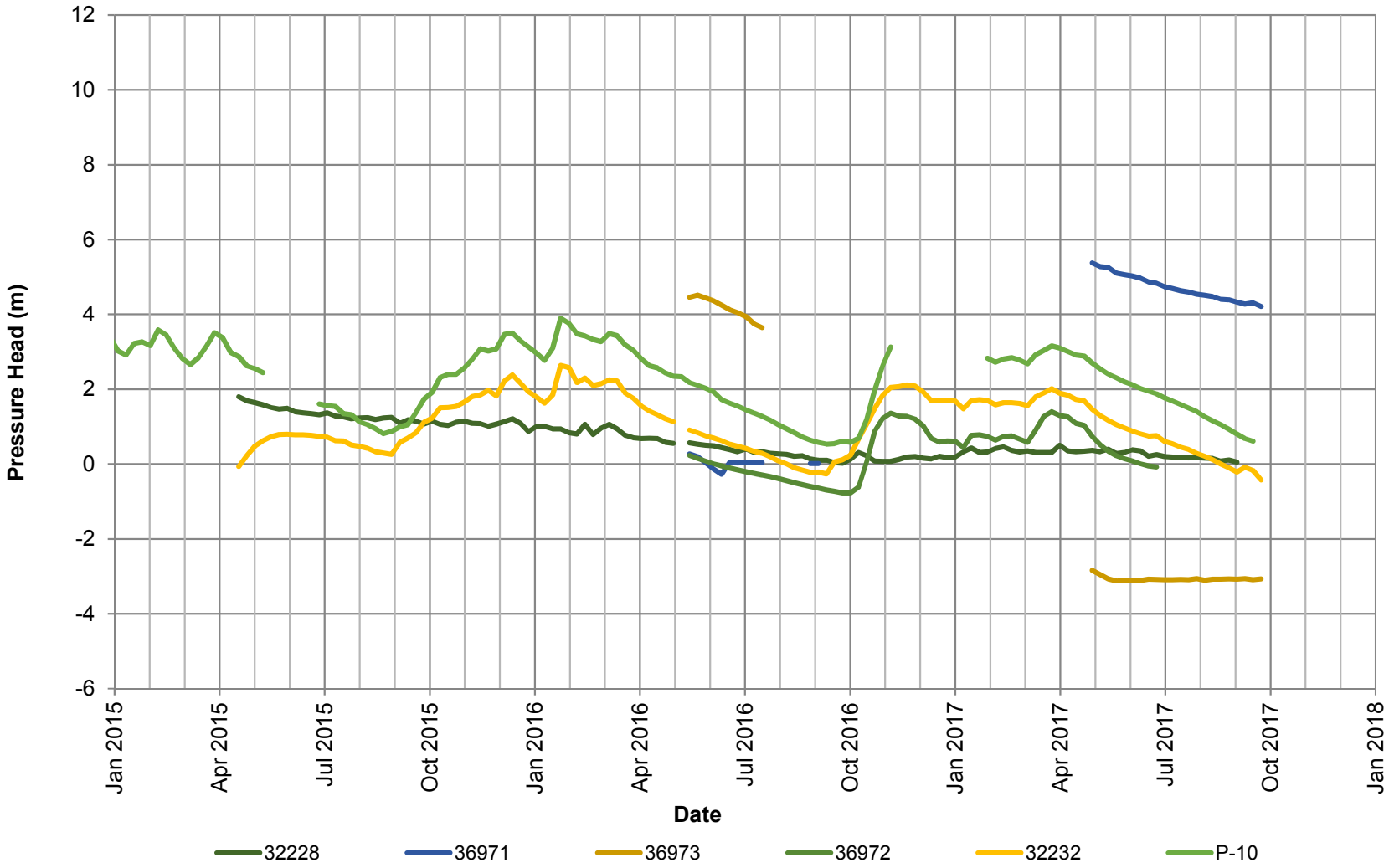
Location		Plane 1					Plane 3				Plane 3/4		Plane 4				Plane 5/6		Plane 6			
Piezometer	32228	36971	36973	36972	32232	P-10	32233	21715	P-13	P-14	P-1	P-2	1204	32237	P-3	P-4	P-5	P-6	32219	32226	32230	32236
Tip Elevation	331.4	325.7	319.7	328.0	329.4	326.9	332.4	329.3	332.2	326.7	324.4	329.4	329.3	332.4	324.3	329.3	325.1	329.4	335.2	330.6	328.8	330.4
Trigger Point S1	3.2	4.4	3.7	3.8	3.5	4.3	1.7	7.5	6.4	9.0	9.0	7.5	8.7	1.7	11.0	9.5	14.3	14.9	7.9	13.5	14.1	9.0
Trigger Point S2	5.1	6.4	5.2	5.6	5.4	6.3	1.8	8.3	7.1	10.0	10.0	8.4	10.3	2.1	13.0	10.8	15.5	16.1	8.6	14.5	15.2	9.5
Trigger Point S3	7.0	8.4	6.9	7.5	7.3	8.3	2.5	10.8	9.1	13.0	13.0	11.0	12.5	2.5	16.0	13.2	17.8	18.5	9.9	16.6	17.2	11.2
Trigger Point P1	***2.3***	***3.4***	***2.9***	***2.8***	***2.5***	***3.3***	***1.4***	***6.3***	***5.3***	***7.5***	***7.5***	***6.3***	***8.6***	***1.8***	***11.0***	***9.2***	***12.4***	***12.9***	***6.9***	***11.6***	***12.2***	***7.8***
2017-07-02	0.2	***4.7***	-3.1		0.6	1.8	-0.6		0.5	-0.7	-1.0	-0.1	1.5	-1.3	0.2	1.3	3.3	2.4	-0.6	0.8	0.5	0.7
2017-07-09	0.2	***4.7***	-3.1		0.5	1.7	-0.7		0.5	-0.7	-1.1	-0.1	1.5	-1.7	0.2	1.3	3.2	2.3	-0.6	0.7	0.5	0.8
2017-07-16	0.2	***4.6***	-3.1		0.5	1.6	-0.9		0.4	-0.7	-1.0	-0.1	1.3	-1.9	0.2	1.3	3.8	2.7	-0.7	0.7	1.1	0.7
2017-07-23	0.2	***4.6***	-3.1		0.4	1.5	-0.9		0.4	-0.7	-1.0	0.0	1.3	-2.3	0.2	1.3	3.3	2.3	-0.7	0.6	0.5	0.6
2017-07-30	0.2	***4.5***	-3.1		0.3	1.4	-0.9		0.2	-0.7	-1.1	-0.3	1.2	-2.5	0.2	1.3	3.0	2.0	-0.7	0.4	0.4	0.5
2017-08-06	0.2	***4.5***	-3.1		0.2	1.3	-1.3		0.1	-0.7	-1.2	-0.4	1.0	-2.8	0.2	1.3	2.9	1.9	-0.7	0.4	0.4	0.4
2017-08-13	0.2	***4.5***	-3.1		0.1	1.2	-1.4		0.0	-0.7	-1.2	-0.5	1.0	-3.0	0.2	1.3	2.7	1.8	-0.7	0.3	0.3	0.4
2017-08-20	0.1	***4.4***	-3.1		0.0	1.1	-1.6		-0.1	-0.7	-1.3	-0.6	0.9	-3.2	0.2	1.3	2.6	1.7	-0.7	0.2	0.3	0.2
2017-08-27	0.1	***4.4***	-3.1		-0.1	0.9	-1.6		-0.3	-0.7	-1.4	-0.8	0.9	-3.3	0.2	1.4	2.5	1.6	-0.8	0.1	0.2	-0.1
2017-09-03	0.0	***4.3***	-3.1		-0.2	0.8	-0.4		-0.4	-0.7	-1.4	-0.9	0.9	-3.5	0.2	1.3	2.4	1.4	-0.8	-0.1	-0.1	-0.8
2017-09-10		***4.3***	-3.1		-0.1	0.7	-0.1		-0.5	-0.8	-1.5	-1.1	0.8	-3.7	0.2	1.3	2.3	1.3	-0.8	-0.9	-0.5	-0.9
2017-09-17		***4.3***	-3.1		-0.2	0.6	-0.1		-0.7	-0.7	-1.5	-1.3	0.9	-3.8	0.3	1.4	2.2	1.2	-0.8	-1.7	-0.8	-1.3
2017-09-24		***4.2***	-3.1		-0.4		-0.1		-0.8	-0.8	-1.7	-1.5	0.8	-4.0	0.2	1.3	2.0	1.0	-0.8	-2.2	-1.2	-1.5

Table 3: Old TDF - Instrument Plane 5 - Weekly Maximum VWP Pressure Head (m)

Location	Outer Embankment Slope - 1				Outer Embankment Slope - 2							Outer Embankment Slope - 3					Upper Tailings Beach							Paste Berm					
ID	C-5E	C-13E	C-17E	C-21E	C-6E	C-10E	C-14E	C-18E	C-22E	32223	32241	C-12E	C-16E	32238	C-20E	C-24E	C-29E	C-31E	C-35E	32224	C-36E	C-37E	32234	17730	32222	P-7	17724	17726	17722
Tip Elevation	310.1	308.9	303.2	315.7	303.7	307.3	308.9	314.5	315.4	316.8	308.7	305.5	308.7	308.7	314.5	315.2	322.3	322.0	326.7	327.0	326.6	326.6	328.5	329.3	326.9	319.8	326.2	326.3	335.4
Trigger Point S1	2.0	2.0	1.5	1.3	5.5	6.5	6.5	2.8	1.1	3.2	2.3	5.3	6.5	2.3	6.5	6.4	0.0	4.7	1.3	1.1	2.5	3.1	2.4	2.5	4.0	6.1	4.5	4.4	2.1
Trigger Point S2	4.2	4.4	3.1	2.8	12.3	14.0	14.0	6.1	2.3	7.0	5.0	11.4	14.0	4.9	13.9	13.9	0.0	10.1	2.7	2.3	5.3	6.6	5.1	5.4	8.6	13.1	9.6	9.0	4.6
Trigger Point S3	7.8	8.1	5.8	5.3	22.8	26.0	25.9	11.3	3.5	12.4	9.0	20.5	26.0	9.0	25.9	25.8	0.0	18.7	5.0	4.1	9.8	12.2	9.3	10.0	16.0	24.2	17.9	17.5	8.5
Trigger Point P1	***2.6***	***2.6***	***1.9***	***1.7***	***7.3***	***8.5***	***8.5***	***3.7***	***1.1***	***4.2***	***3.0***	***6.8***	***8.5***	***3.0***	***8.5***	***8.4***	***0.0***	***6.1***	***1.6***	***1.4***	***3.3***	***4.0***	***3.1***	***3.3***	***5.2***	***8.0***	***5.9***	***5.7***	***2.7***
2017-07-02	-0.2	-0.1	1.5	-0.5	3.6	-0.6	1.0	-2.5	0.3		0.6	2.1	0.7	2.0	0.1	0.6	***3.9***	***7.4***	0.9	1.3	2.0	3.8	2.1	2.3	2.5	3.7	3.1	2.2	0.3
2017-07-09	-0.2	-0.1	1.3	-0.5	3.5	-0.7	1.0	-2.6	0.3		0.4	2.0	0.6	1.8	0.0	0.6	***3.9***	***7.2***	0.7	1.1	1.8	3.7	1.9	2.2	2.4	3.5	2.8	2.2	-0.1
2017-07-16	-0.2	-0.1	1.2	-0.5	3.4	-0.7	1.0	-2.8	0.3		0.3	1.9	0.6	1.7	-0.1	0.6	***3.7***	***7.2***	0.5	0.9	1.6	3.9	2.0	2.5	2.3	3.3	2.5	2.2	-0.3
2017-07-23											0.3			1.6						0.7				2.2	2.3	3.3	2.2	2.3	-0.4
2017-07-30											0.2			1.5						0.5				1.9	2.1	3.1	2.0	2.3	-0.5
2017-08-06	-0.2	-0.1	1.0	-0.4	3.1	-0.7	1.0	-3.4	0.3		0.1	1.7	0.5	1.4	-0.4	0.6	***3.4***	***6.7***	-0.1	0.2	1.1	3.1		1.8	2.0	3.0	1.8	2.3	-0.6
2017-08-13	-0.2	-0.1	0.9	-0.4	3.1	-0.7	1.0	-3.6	0.3		0.1	1.6	0.3	1.3	-0.5	0.6	***3.3***	***6.6***	-0.3	0.0	0.9	3.0		1.7	1.9	2.9	1.7	2.3	-0.6
2017-08-20	-0.2	-0.1	0.8	-0.4	3.1	-0.6	0.9	-3.6	0.3		0.0	1.6	0.0	1.2	-0.6	0.5	***3.1***	***6.4***	-0.5	-0.2	0.8	2.8		1.6	1.8	2.7	1.5	2.3	-0.8
2017-08-27	-0.2	-0.1	0.9	-0.4	3.0	-0.6	1.0	-3.5	0.3		0.0	1.5	0.2	1.1	-0.7	0.6	***3.0***	***6.3***	-0.6	-0.3	0.6	2.7		1.4	1.7	2.6	1.4	2.3	-0.8
2017-09-03	-0.2	-0.1	0.9	-0.4	3.0	-0.6	1.0	-3.4	0.3		-0.1	1.5	0.0	1.1	-0.8	0.6	***2.9***	***6.2***	-0.7	-0.5	0.4	2.5		1.3	1.6	2.5	1.3	2.3	-0.9
2017-09-10	-0.2	-0.1	0.8	-0.4	3.0	-0.5	0.9	-3.3	0.3	-0.4	-0.1	1.4	-0.1	1.1	-0.8	0.5	***2.7***	6.0	-0.9	-0.6	0.2	2.3		1.1	1.5	2.5	1.2	2.2	-0.9
2017-09-17	-0.2	0.0	0.8	-0.3	3.0	-0.4	1.0	-3.2	0.3	-0.3	-0.1	1.4	-0.1	1.1	-0.8	0.6	***2.7***	6.0	-1.0	-0.7	0.1	2.1		0.9	1.3	2.4	1.1	0.6	-0.9
2017-09-24	-0.2	-0.1	0.8	-0.3	2.9	-0.3	0.9	-3.1	0.3	-0.4	-0.1	1.3	-0.2	1.0	-0.9	0.5	***2.6***	5.8	-1.2	-0.9	-0.1	1.9		0.8	1.2	2.3	1.1	-0.1	-1.0

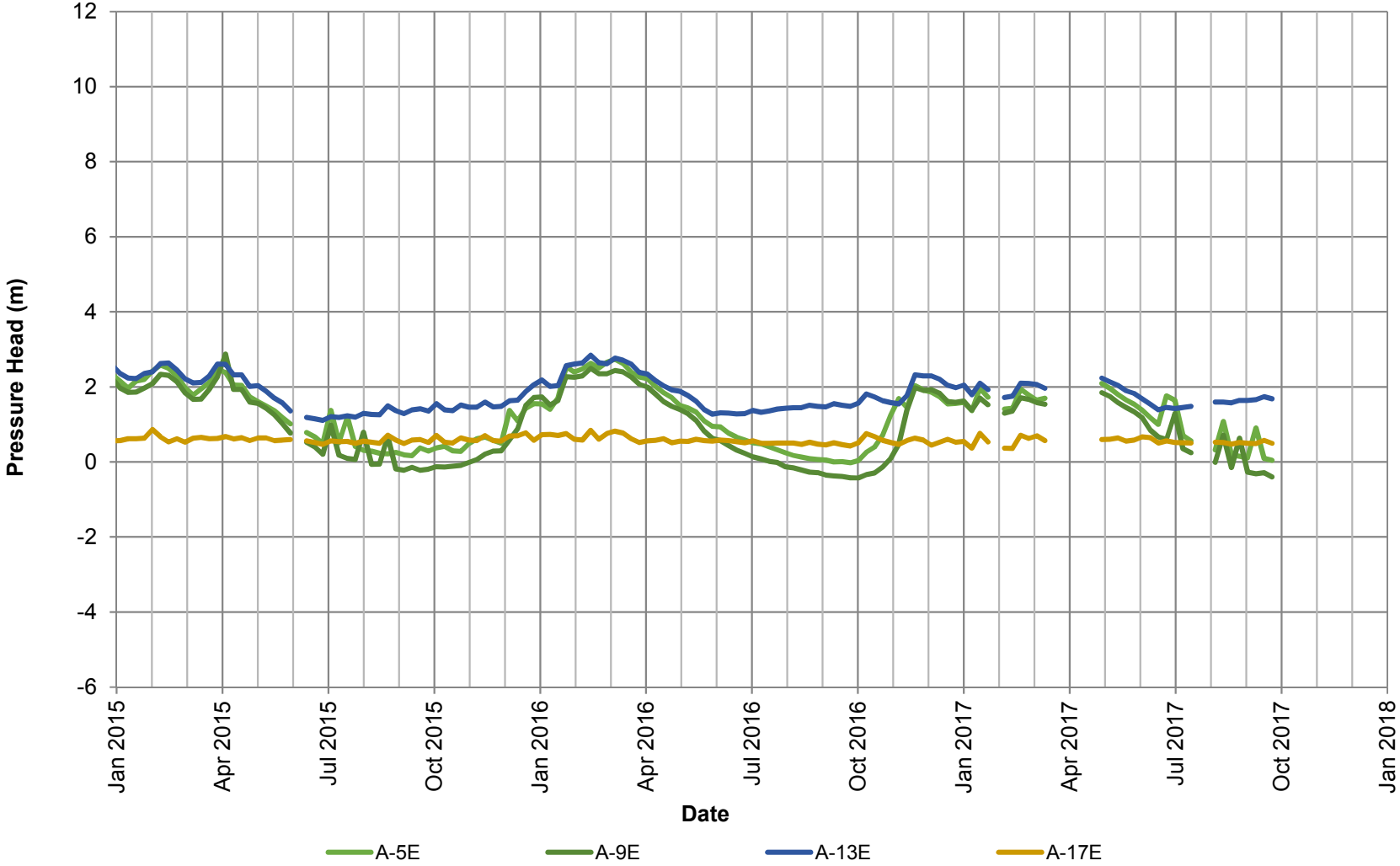
amec foster wheeler

Figure 1: Old TDF Piezometer Records - Plane 1
32228, 36971, 36973, 36972, 32232, P-10



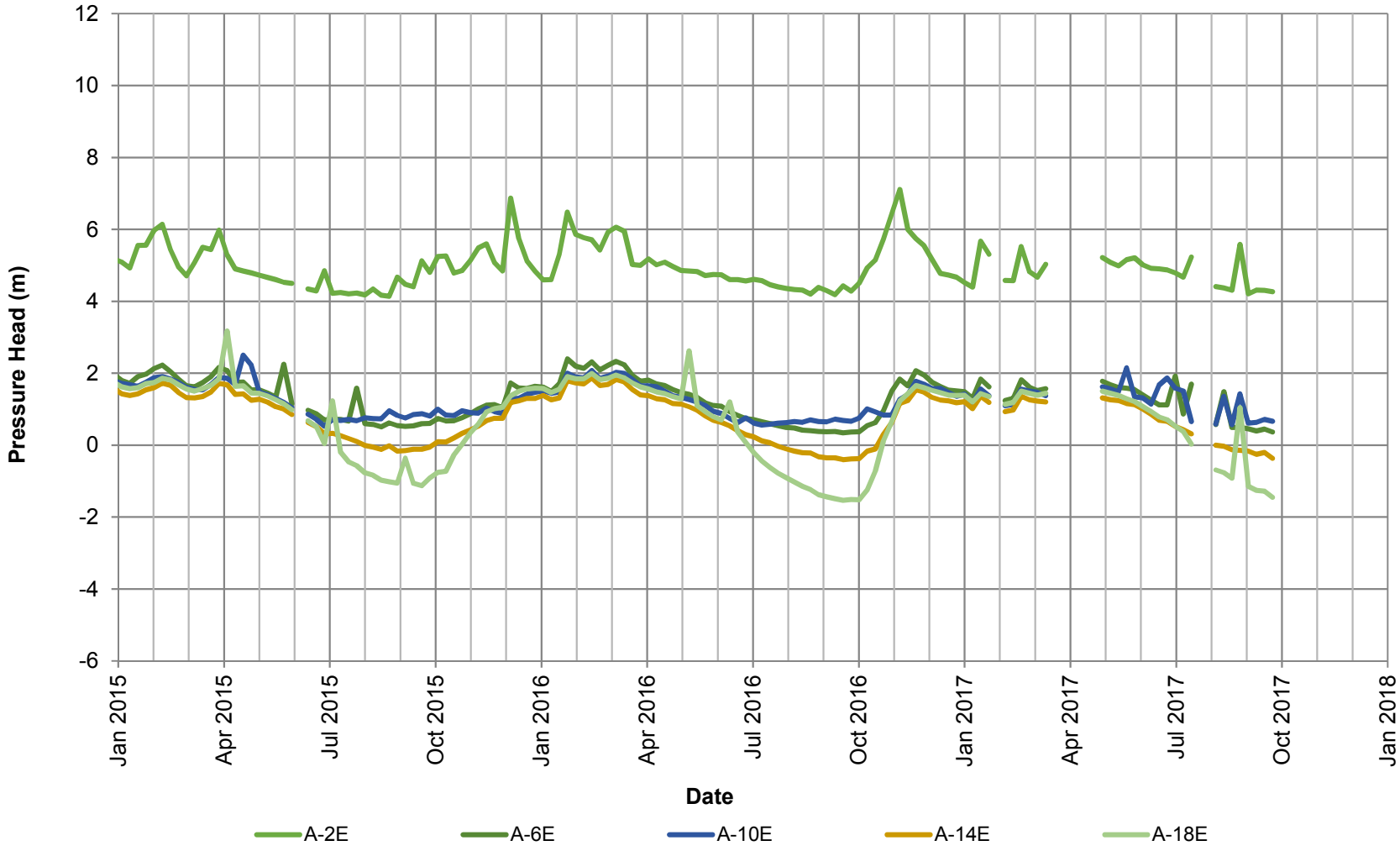
amec foster wheeler

Figure 2: Old TDF Piezometer Records - Plane A Outer Embankment Slope, Location 1 A-5E, A-9E, A-13E, A-17E



amec foster wheeler

Figure 3: Old TDF Piezometer Records - Plane A Outer Embankment Slope, Location 2 A-2E, A-6E, A-10E, A-14E, A-18E



amec foster wheeler

Figure 4: Old TDF Piezometer Records - Plane A
Outer Embankment Slope, Location 3
A-4E, 32239, A-8E, A-12E, A-16E, A-20E

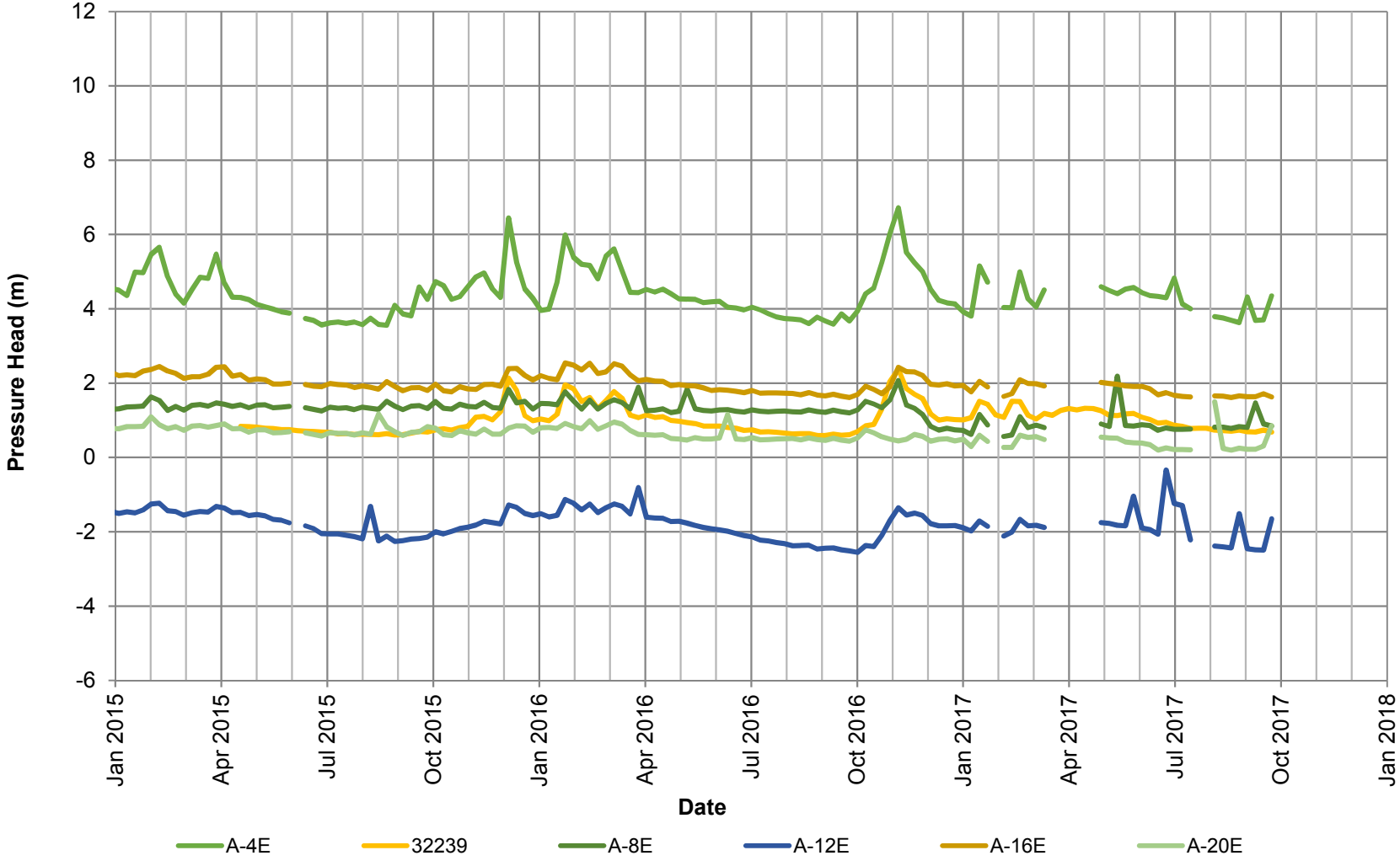
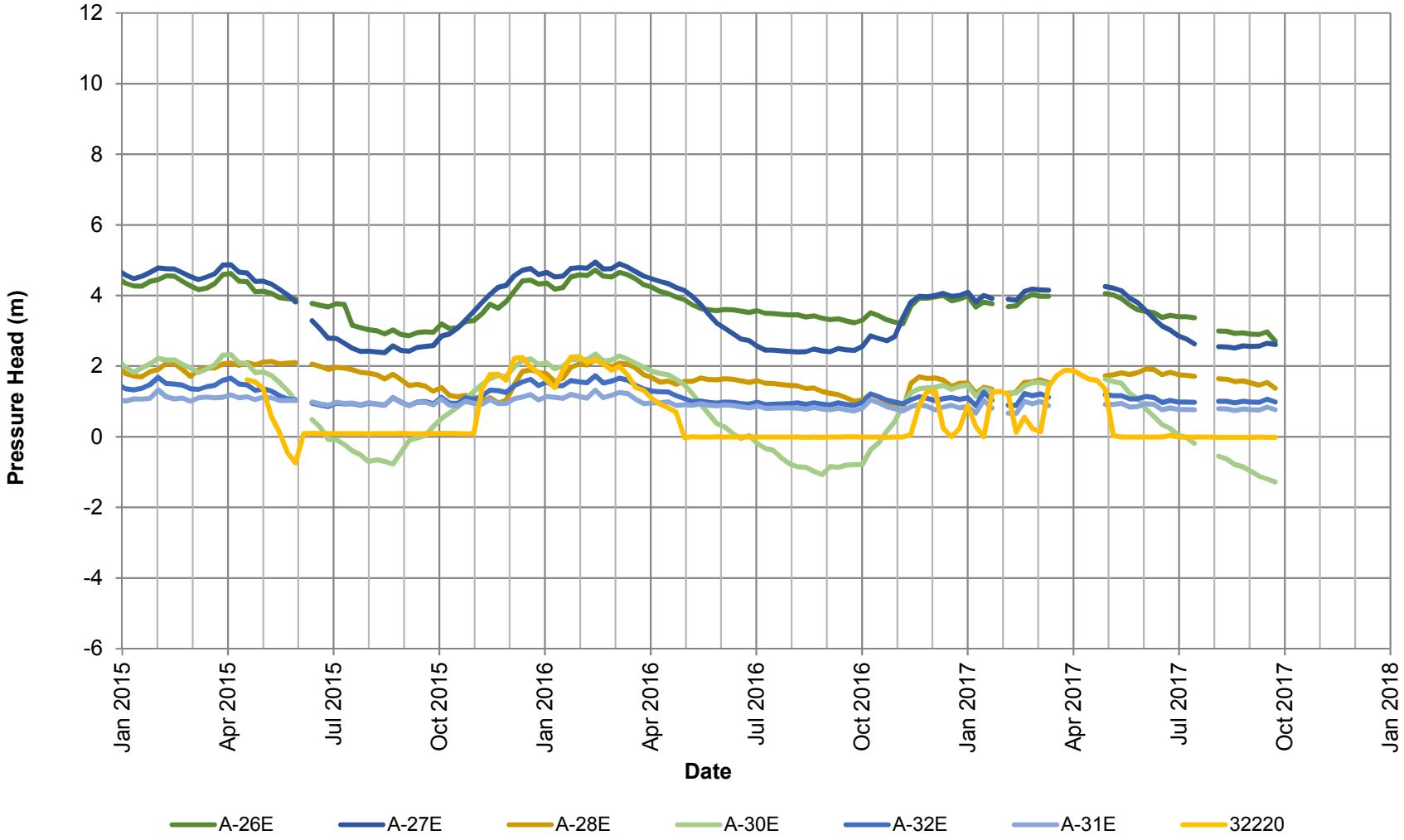


Figure 5: Old TDF Piezometer Records - Plane A
Upper Tailings Beach
A-26E, A-27E, A-28E, A-30E, A-31E, A-32E, 32220



amec foster wheeler

Figure 6: Old TDF Piezometer Records - Plane A
Strip and Paste Berm
A33-E, 32231, 32229, 32225, P-11, P-12

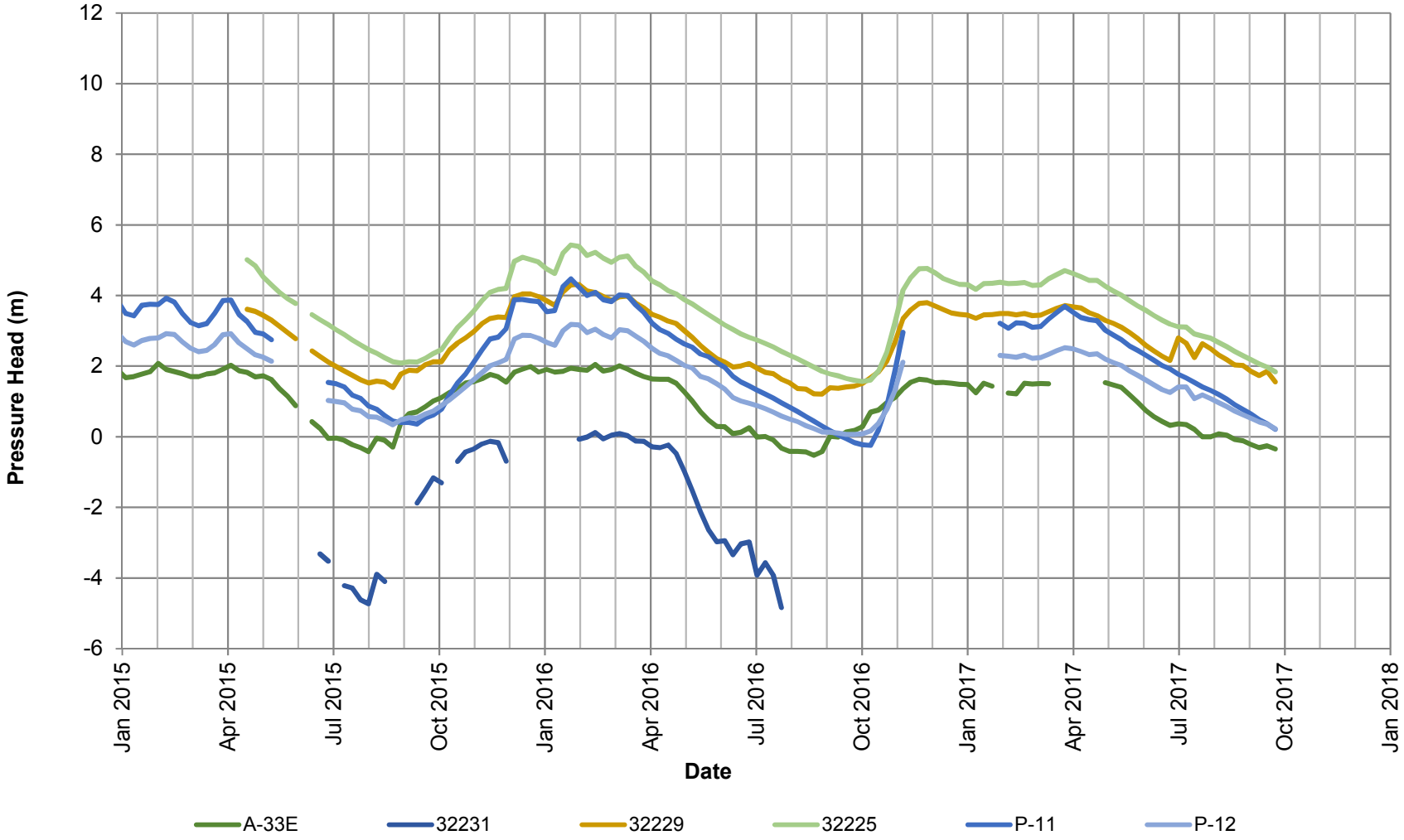


Figure 7: Old TDF Piezometer Records
Plane 3 (32233, 21715, P-13, P-14) and Plane 3/4 (P-1, P-2)

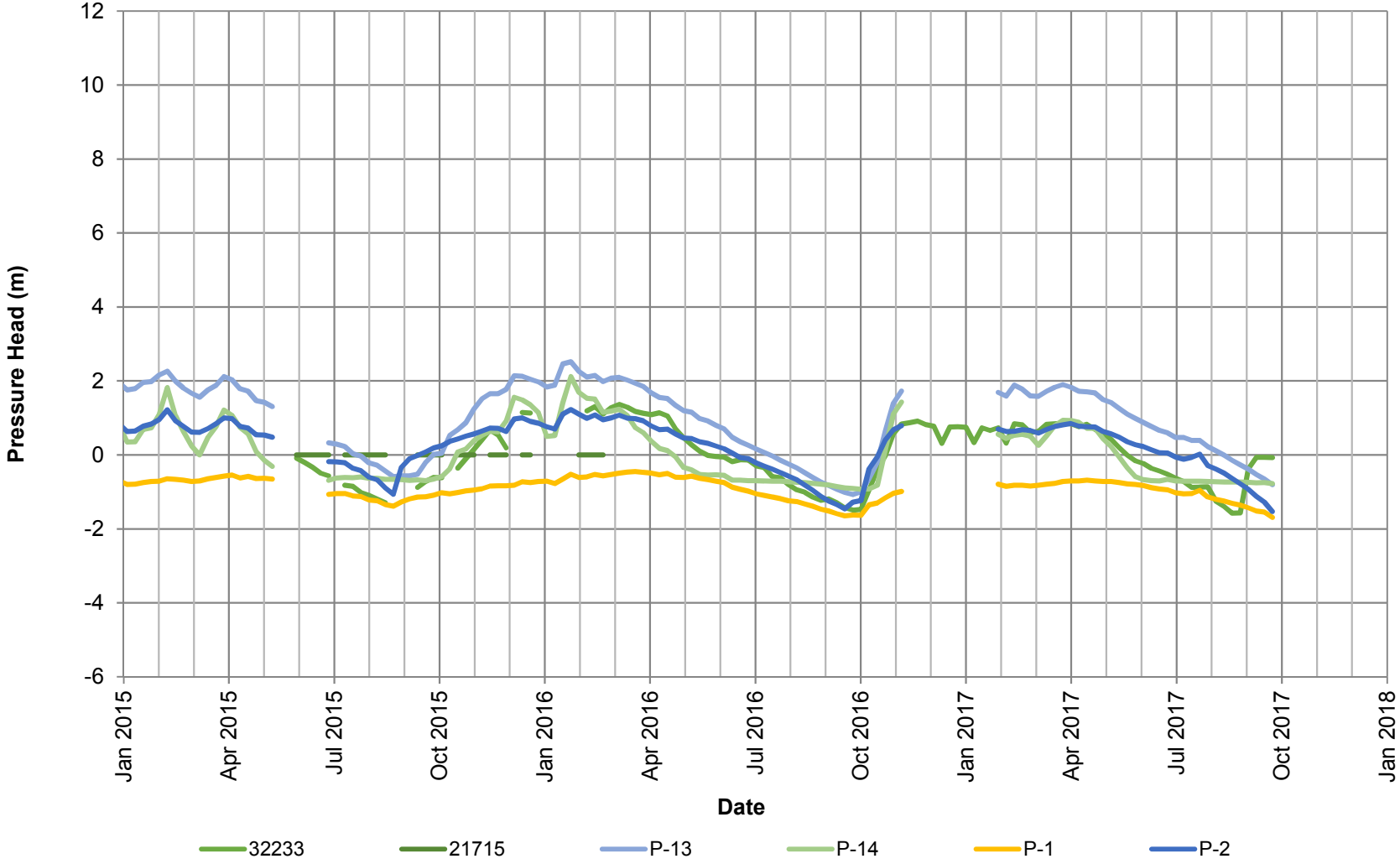


Figure 8: Old TDF Piezometer Records - Plane 4
32237, 1204, P-3, P-4

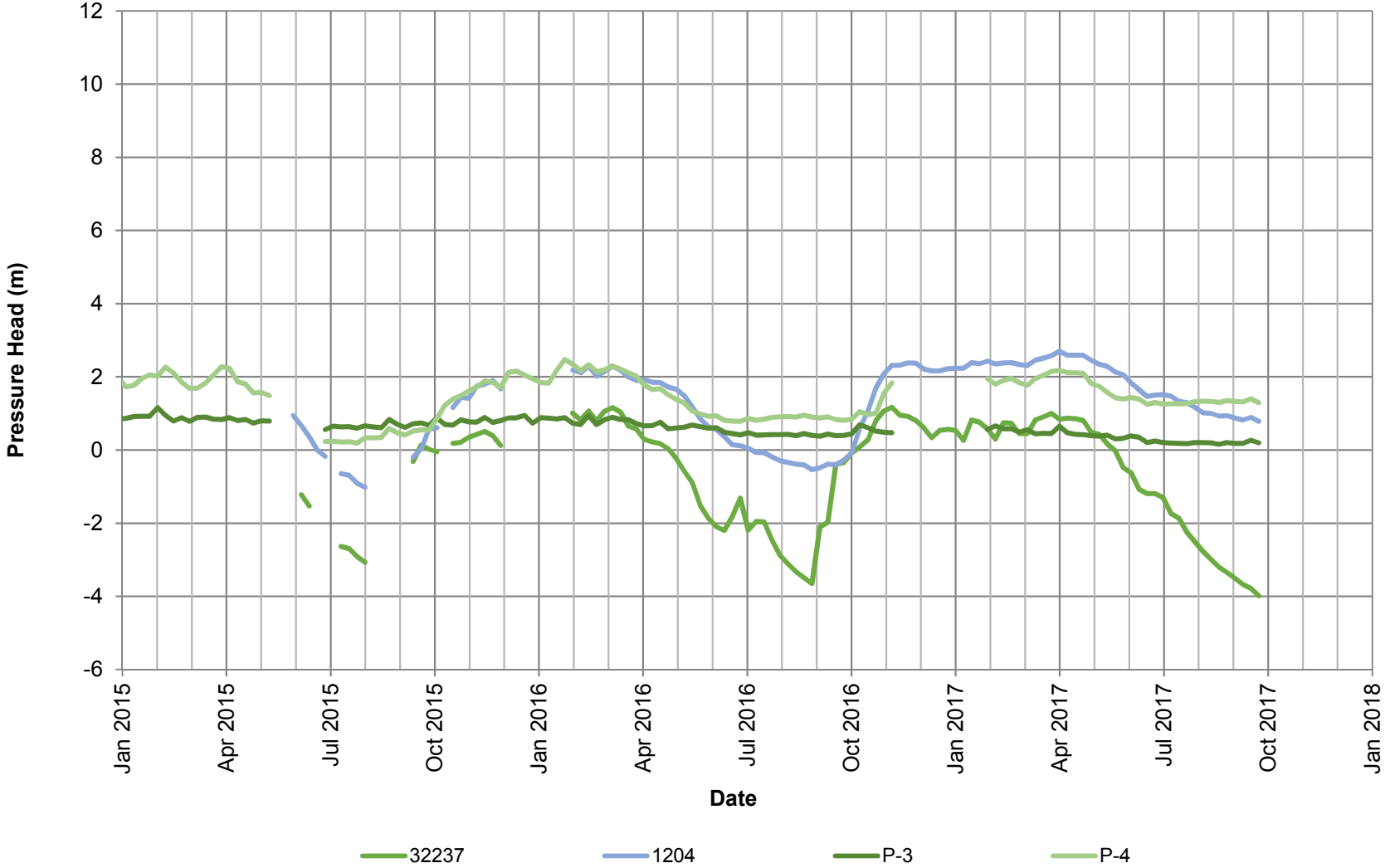
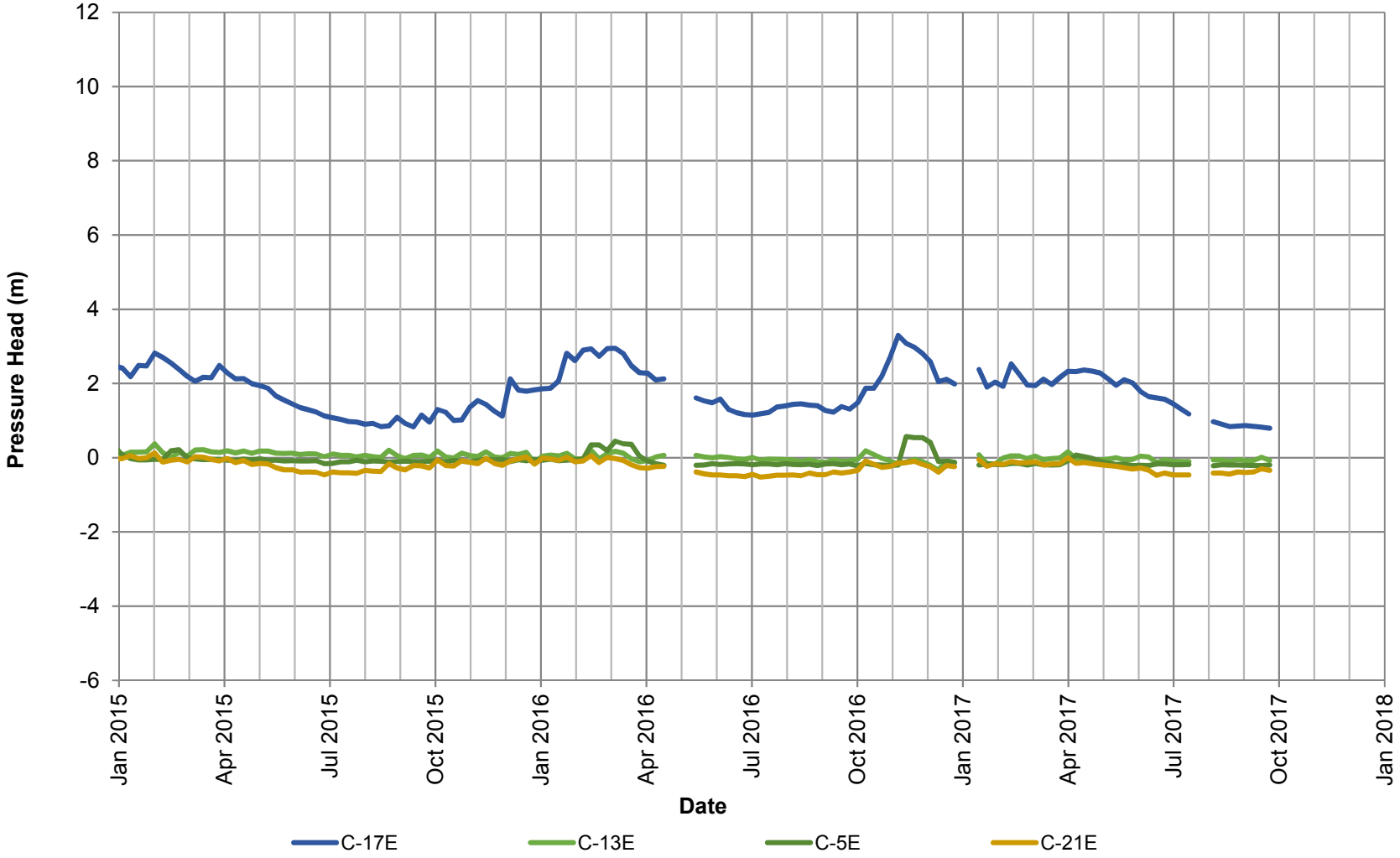
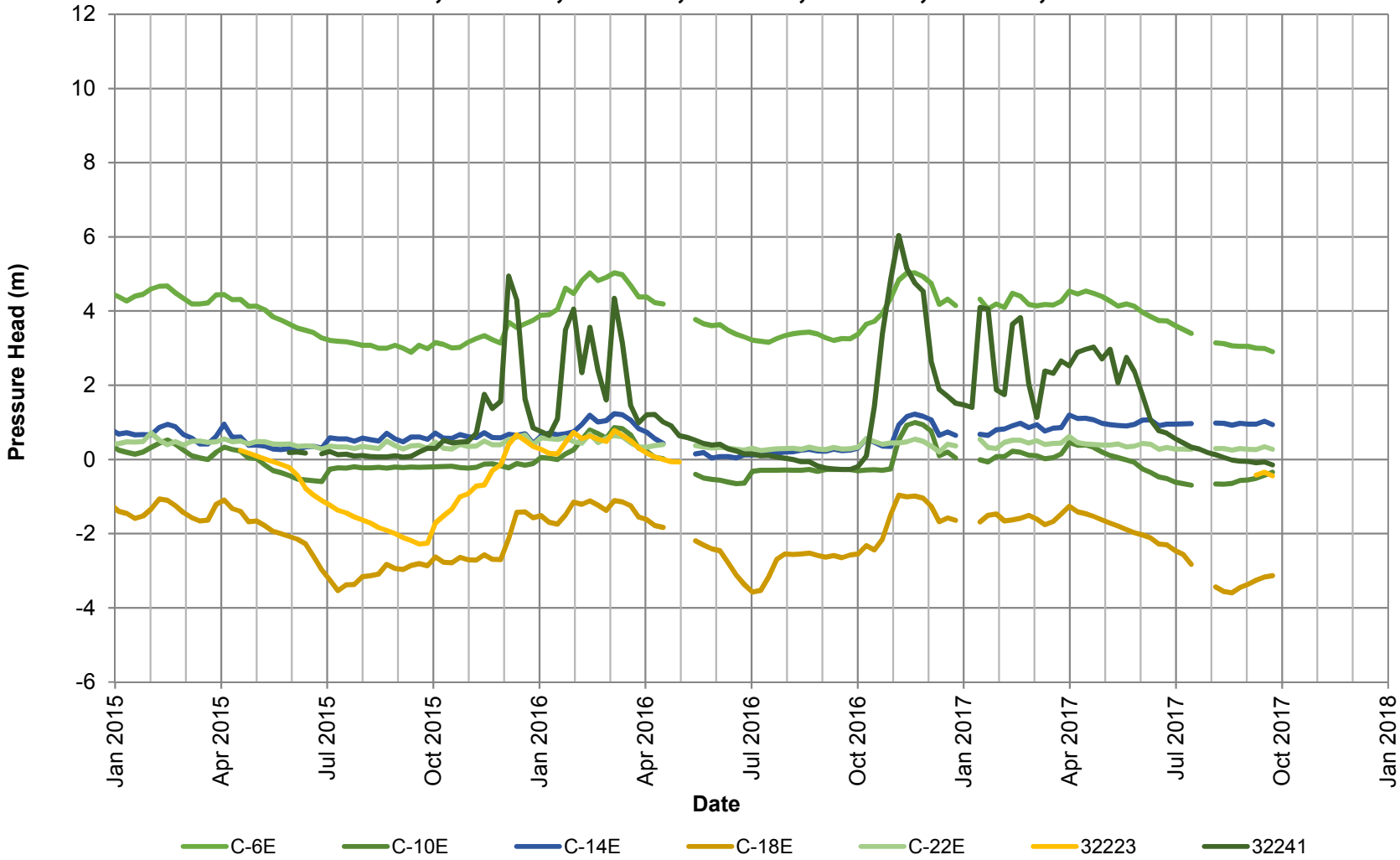


Figure 9: Old TDF Piezometer Records - Plane 5
Outer Embankment Slope, Location 1
C-5E, C-13E, C-17E, C-21E



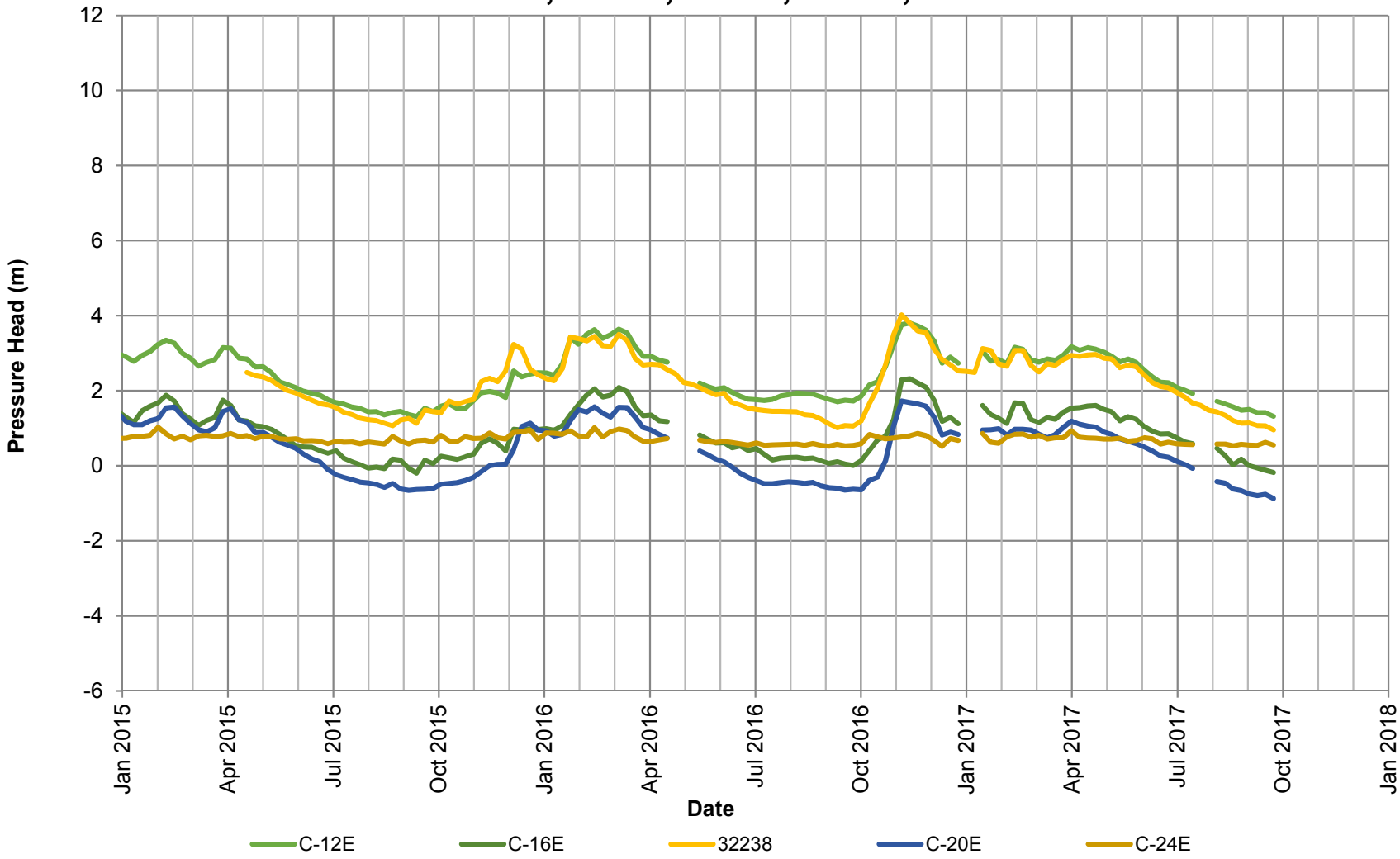
amec foster wheeler

Figure 10: Old TDF Piezometer Records - Plane 5
Outer Embankment Slope, Location 2 and Lower Tailings
C-6E, C-10E, C-14E, C-18E, C-22E, 32223, 32241



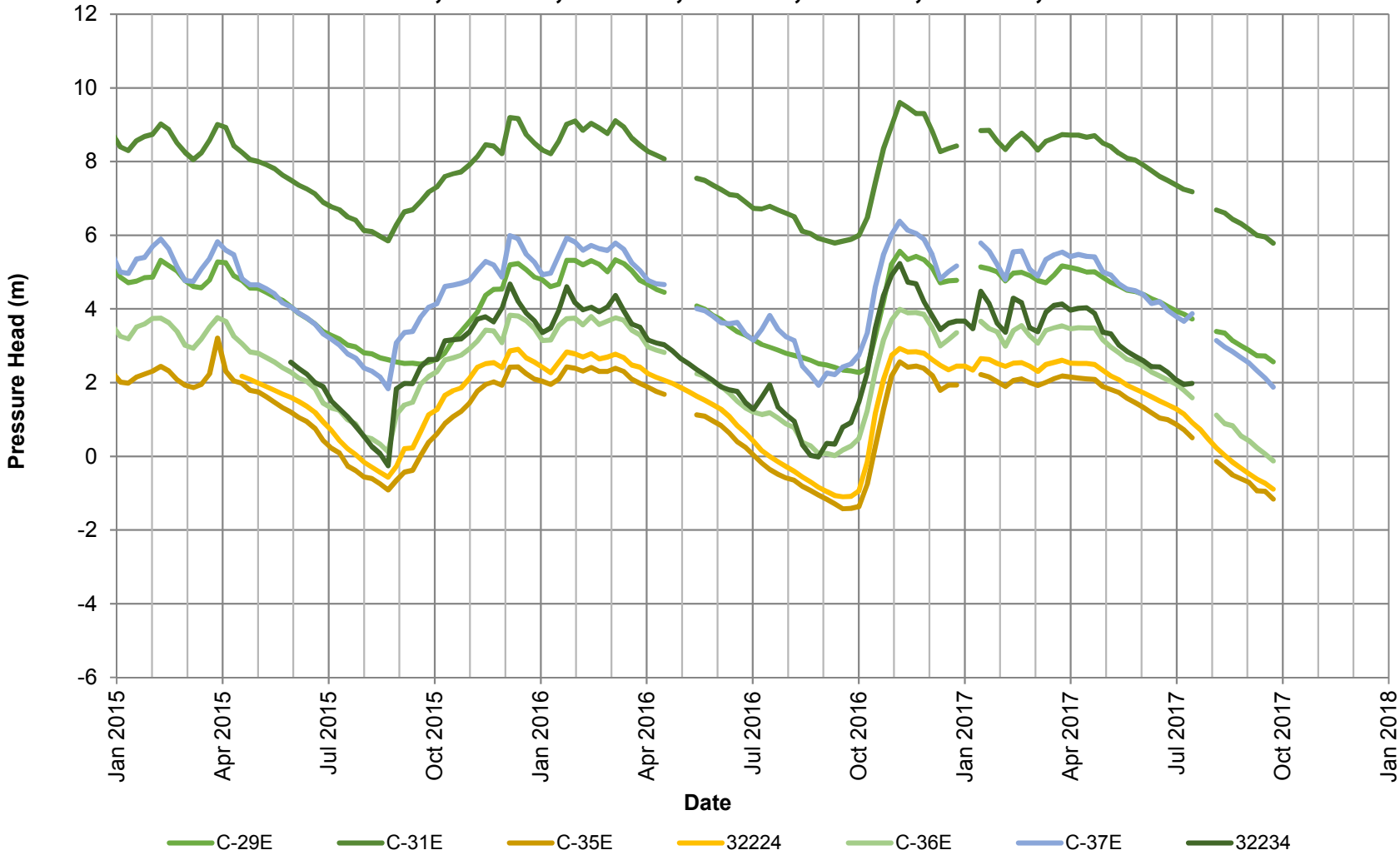
amec foster wheeler

Figure 11: Old TDF Piezometer Records - Plane 5
Outer Embankment Slope, Location 3
C-12E, C-16E, 32238, C-20E, C-24E



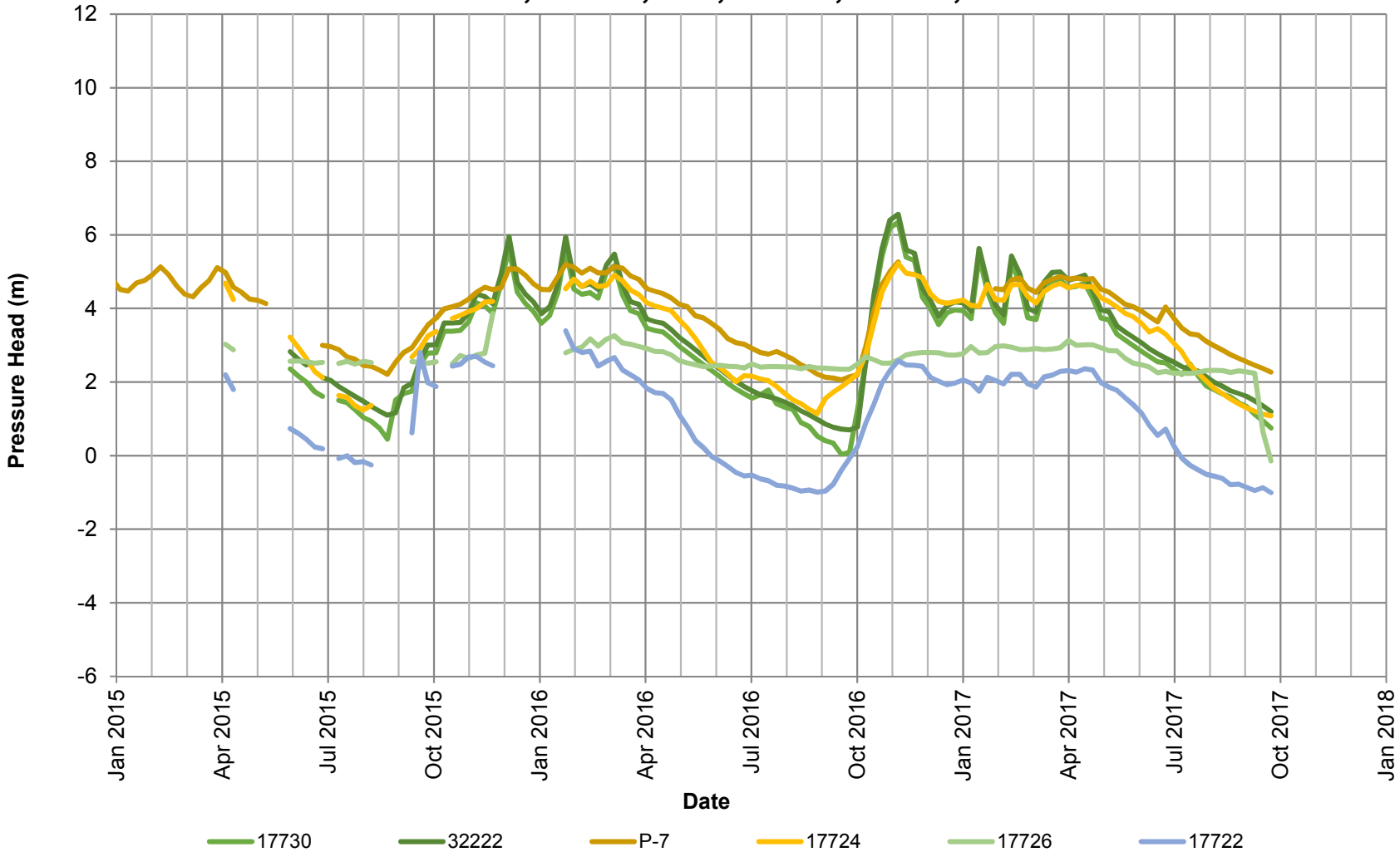
amec foster wheeler

Figure 12: Old TDF Piezometer Records - Plane 5
Upper Tailings Beach
C29E, C-31E, C-35E, 32224, C-36E, C-37E, 32234



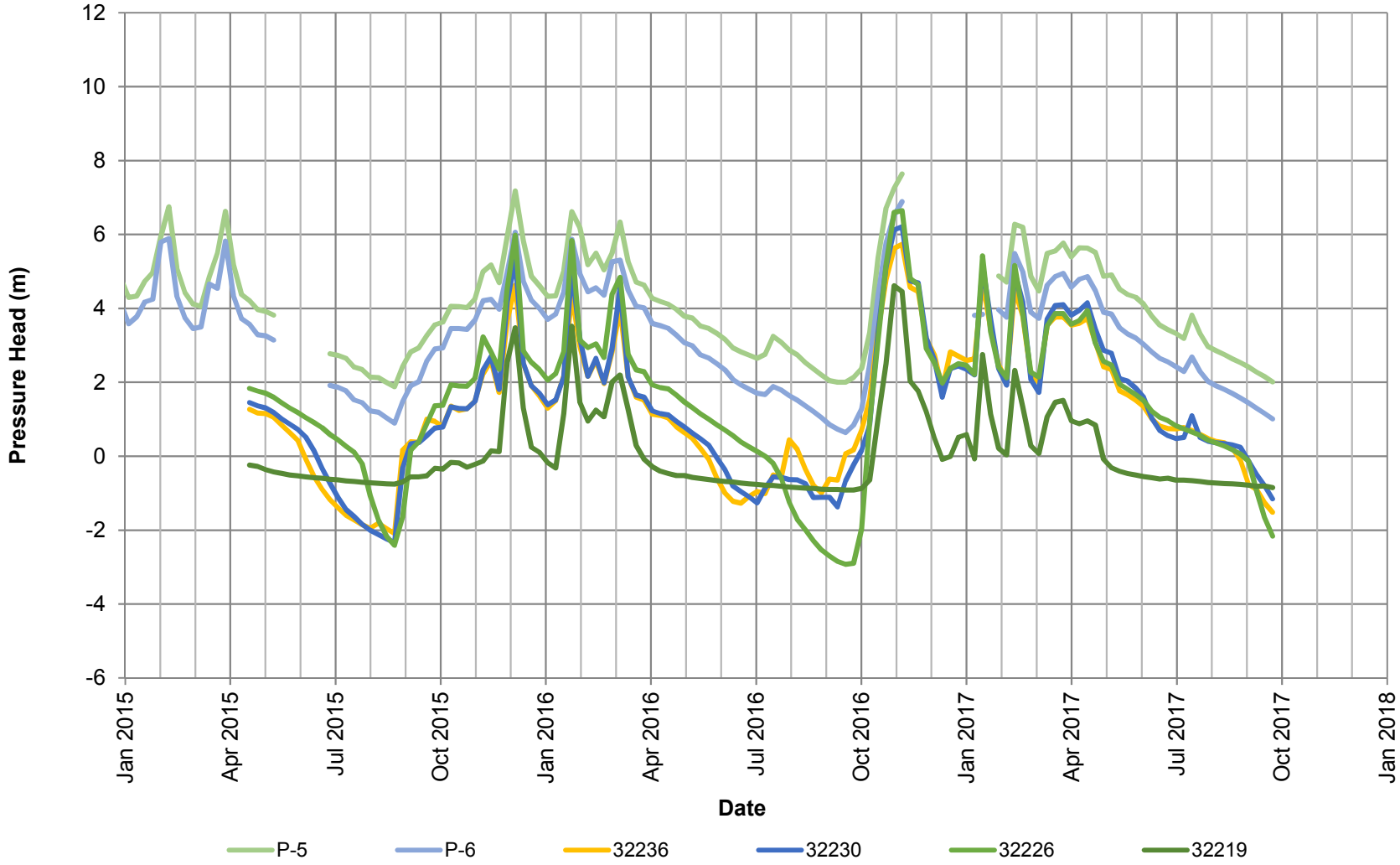
amec foster wheeler

Figure 13: Old TDF Piezometer Records - Plane 5
Paste Berm and Upstream Tailings
17730, 32222, P-7, 17724, 17726, 17722



amec foster wheeler

Figure 14: Old TDF Piezometer Records
Plane 5/6 (P-5, P-6) and Plane 6 (32236, 32230, 32226, 32219)



Attachment D

Deformation Monument Data

Table\Figure Number	Title
Table 1	Old TDF - Monument Monitoring Summary – Raw Data
Table 2	Old TDF – Monument Monitoring Summary – Cumulative Values (Change from Initial)
Table 3	Lynx TDF – Monument Monitoring Summary – Raw Data
Table 4	Lynx TDF – Monument Monitoring Summary – Cumulative Values (Change from Initial)

amec foster wheeler

Table 1: Old TDF - Monument Monitoring Summary - Raw Data

	TDF14-01			TDF14-02			TDF14-03			TDF14-04		
	Seismic Upgrade Downstream Edge											
	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation
Initial	3240.38	2575.24	3378.19	3290.92	2650.77	3378.25	3350.50	2730.91	3377.89	3400.78	2819.24	3378.04
12-Jan-15	3240.38	2575.23	3378.19	3290.93	2650.76	3378.25	3350.50	2730.91	3377.89	3400.78	2819.24	3378.04
03-Mar-15	3240.38	2575.23	3378.18	3290.92	2650.76	3378.24	3350.50	2730.91	3377.88	3400.78	2819.24	3378.04
27-May-15	3240.39	2575.23	3378.18	3290.93	2650.76	3378.24	3350.50	2730.90	3377.89	3400.77	2819.24	3378.04
02-Jul-15	3240.39	2575.24	3378.17	3290.93	2650.77	3378.25	3350.50	2730.90	3377.89	3400.78	2819.23	3378.04
06-Aug-15	3240.39	2575.23	3378.18	3290.93	2650.77	3378.25	3350.50	2730.91	3377.89	3400.78	2819.24	3378.04
03-Sep-15	3240.38	2575.24	3378.19	3290.93	2650.77	3378.25	3350.50	2730.91	3377.89	3400.78	2819.23	3378.04
13-Oct-15	3240.38	2575.23	3378.19	3290.93	2650.76	3378.25	3350.51	2730.90	3377.89	3400.78	2819.23	3378.04
24-Nov-15	3240.38	2575.23	3378.19	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	3400.78	2819.24	3378.04
08-Jan-16	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	3350.50	2730.90	3377.89	#N/A	#N/A	#N/A
03-Feb-16	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	3350.50	2730.90	3377.89	#N/A	#N/A	#N/A
22-Mar-16	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	3350.50	2730.90	3377.89	#N/A	#N/A	#N/A
28-Jun-16	#N/A	#N/A	#N/A	3290.93	2650.77	3378.25	3350.50	2730.91	3377.89	3400.78	2819.23	3378.05
15-Sep-16	Destroyed			Destroyed			Destroyed			Destroyed		
15-May-17	3240.39	2575.24	3378.18				3350.51	2730.91	3377.88	3400.79	2819.24	3378.03
30-Aug-17	3240.39	2575.24	3378.18				3350.51	2730.91	3377.88	3400.80	2819.24	3378.03

Notes:

1 - Survey data provided by Nyrstar Myra Falls.
2 - The measurement error (total of instrument, human and network) for the Old TDF monument survey is approximately 1.0 cm for both horizontal and vertical displacement.
3 - Values in table are reported in meters.
4 - '#N/A' indicates no survey data available for that date.

	TDF14-05			TDF14-06			TDF14-07			TDF14-08		
	Seismic Upgrade Downstream Edge											
	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation
Initial	3452.82	2903.63	3377.93	3503.30	2990.58	3377.65	3547.89	3081.34	3377.15	3589.49	3165.47	3376.24
12-Jan-15	3452.82	2903.63	3377.93	3503.30	2990.58	3377.64	3547.89	3081.35	3377.15	3589.49	3165.47	3376.24
03-Mar-15	3452.82	2903.63	3377.93	3503.31	2990.57	3377.65	3547.89	3081.34	3377.15	3589.49	3165.47	3376.23
27-May-15	3452.81	2903.63	3377.93	3503.31	2990.57	3377.65	3547.89	3081.34	3377.15	3589.48	3165.46	3376.24
02-Jul-15	3452.82	2903.62	3377.92	3503.31	2990.58	3377.65	3547.89	3081.34	3377.15	3589.49	3165.46	3376.24
06-Aug-15	3452.82	2903.63	3377.93	3503.31	2990.57	3377.65	3547.89	3081.34	3377.16	3589.49	3165.46	3376.24
03-Sep-15	3452.82	2903.63	3377.94	3503.31	2990.57	3377.65	3547.89	3081.34	3377.16	3589.48	3165.46	3376.24
13-Oct-15	3452.82	2903.62	3377.93	3503.31	2990.57	3377.66	3547.89	3081.34	3377.16	3589.49	3165.46	3376.24
24-Nov-15	#N/A	#N/A	#N/A	3503.31	2990.58	3377.66	3547.89	3081.35	3377.16	3589.50	3165.47	3376.24
08-Jan-16	3452.82	2903.63	3377.94	3503.30	2990.59	3377.66	3547.89	3081.35	3377.16	3589.51	3165.47	3376.24
03-Feb-16	3452.82	2903.63	3377.95	3503.31	2990.58	3377.66	3547.88	3081.34	3377.16	3589.49	3165.46	3376.24
22-Mar-16	3452.82	2903.63	3377.94	3503.31	2990.58	3377.66	3547.89	3081.35	3377.16	3589.50	3165.46	3376.24
28-Jun-16	3452.82	2903.62	3377.94	3503.31	2990.57	3377.66	3547.89	3081.35	3377.16	3589.49	3165.46	3376.24
15-Sep-16	Destroyed			3503.31	2990.57	3377.66	3547.89	3081.35	3377.16	3589.49	3165.46	3376.25
15-May-17	3452.82	2903.63	3377.93	3503.31	2990.57	3377.66	3547.89	3081.35	3377.16	3589.49	3165.46	3376.25
30-Aug-17	3452.83	2903.63	3377.92	3503.31	2990.57	3377.66	3547.88	3081.35	3377.16	3589.49	3165.46	3376.25

	TDF14-09			TDF14-10			TDF14-11			TDF14-12		
	Seismic Upgrade Downstream Edge											
	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation
Initial	3666.95	3188.03	3375.73	3778.35	3227.23	3376.11	3853.75	3297.90	3376.34	3937.07	3338.75	3376.19
12-Jan-15	3666.95	3188.03	3375.72	3778.35	3227.23	3376.11	3853.76	3297.89	3376.34	3937.07	3338.75	3376.19
03-Mar-15	3666.95	3188.03	3375.72	3778.35	3227.22	3376.11	3853.76	3297.90	3376.35	3937.07	3338.75	3376.19
27-May-15	3666.94	3188.03	3375.72	3778.35	3227.23	3376.11	3853.74	3297.91	3376.33	3937.08	3338.75	3376.19
02-Jul-15	3666.95	3188.02	3375.73	3778.36	3227.23	3376.11	3853.75	3297.88	3376.32	3937.08	3338.75	3376.19
06-Aug-15	3666.94	3188.02	3375.73	3778.35	3227.23	3376.12	3853.75	3297.90	3376.33	3937.07	3338.75	3376.20
03-Sep-15	3666.94	3188.03	3375.73	3778.35	3227.23	3376.12	3853.74	3297.91	3376.34	3937.07	3338.75	3376.20
13-Oct-15	3666.95	3188.02	3375.73	3778.35	3227.23	3376.12	3853.75	3297.89	3376.34	3937.07	3338.75	3376.20
24-Nov-15	3666.96	3188.02	3375.73	3778.35	3227.22	3376.13	3853.78	3297.88	3376.34	3937.08	3338.75	3376.20
08-Jan-16	3666.97	3188.02	3375.73	3778.35	3227.22	3376.12	#N/A	#N/A	#N/A	3937.07	3338.75	3376.20
03-Feb-16	3666.95	3188.02	3375.73	3778.35	3227.23	3376.12	#N/A	#N/A	#N/A	3937.07	3338.75	3376.20
22-Mar-16	3666.95	3188.02	3375.73	3778.35	3227.23	3376.12	3853.77	3297.88	3376.33	3937.07	3338.75	3376.20
28-Jun-16	3666.95	3188.02	3375.73	3778.35	3227.22	3376.13	3853.76	3297.90	3376.33	3937.07	3338.75	3376.20
15-Sep-16	3666.95	3188.02	3375.73	3778.35	3227.22	3376.13	3853.77	3297.89	3376.34	3937.07	3338.75	3376.20
15-May-17	3666.95	3188.02	3375.74	3778.35	3227.22	3376.14	3853.76	3297.89	3376.34	3937.07	3338.75	3376.20
30-Aug-17	3666.95	3188.02	3375.74	3778.35	3227.22	3376.14	3853.77	3297.88	3376.34	3937.07	3338.75	3376.21

	TDF14-13			TDF14-14			TDF14-15			TDF14-16		
				Seismic Upgrade Downstream Edge						6:1 Buttress Crest Edge		
	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation
Initial	4029.16	3348.94	3376.12	4122.22	3325.97	3375.95	4171.78	3244.21	3376.21	4102.12	3229.40	3383.18
12-Jan-15	4029.17	3348.93	3376.12	4122.22	3325.97	3375.95	4171.78	3244.21	3376.21	4102.12	3229.40	3383.18
03-Mar-15	4029.16	3348.94	3376.12	4122.23	3325.97	3375.95	4171.78	3244.20	3376.21	4102.12	3229.40	3383.18
27-May-15	4029.17	3348.93	3376.12	4122.22	3325.97	3375.95	4171.78	3244.20	3376.21	4102.12	3229.41	3383.18
02-Jul-15	4029.17	3348.93	3376.12	4122.22	3325.97	3375.95	4171.78	3244.21	3376.21	4102.12	3229.41	3383.18
06-Aug-15	4029.16	3348.93	3376.12	4122.22	3325.97	3375.96	4171.78	3244.21	3376.21	4102.12	3229.41	3383.18
03-Sep-15	4029.16	3348.94	3376.13	4122.22	3325.97	3375.96	4171.78	3244.21	3376.22	4102.12	3229.41	3383.18
13-Oct-15	4029.16	3348.93	3376.12	4122.22	3325.97	3375.97	#N/A	#N/A	#N/A	4102.12	3229.41	3383.19
24-Nov-15	4029.17	3348.93	3376.12	4122.21	3325.97	3375.96	4171.78	3244.21	3376.22	4102.12	3229.41	3383.19
08-Jan-16	4029.16	3348.94	3376.13	4122.22	3325.98	3375.96	4171.78	3244.21	3376.22	4102.12	3229.41	3383.18
03-Feb-16	4029.17	3348.93	3376.12	4122.22	3325.97	3375.96	4171.78	3244.21	3376.22	4102.12	3229.41	3383.19
22-Mar-16	4029.16	3348.93	3376.12	4122.22	3325.97	3375.96	4171.78	3244.21	3376.22	4102.12	3229.40	3383.19
28-Jun-16	4029.16	3348.94	3376.13	4122.22	3325.97	3375.97	Line of Sight Obstructed			4102.12	3229.41	3383.19
15-Sep-16	4029.16	3348.94	3376.13	4122.22	3325.98	3375.98				4102.12	3229.41	3383.19
15-May-17	4029.16	3348.94	3376.12	4122.22	3325.97	3375.98				4102.12	3229.41	3383.19
30-Aug-17	4029.16	3348.94	3376.13	4122.21	3325.98	3375.99				4102.12	3229.41	3383.19

	TDF14-17			TDF14-18			TDF14-19			TDF14-20		
				6:1 Buttress Crest Edge								
	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation
Initial	4042.75	3257.88	3382.85	3980.71	3257.73	3382.88	3927.51	3247.16	3383.00	3876.79	3190.58	3383.38
12-Jan-15	4042.75	3257.88	3382.85	3980.72	3257.73	3382.88	3927.51	3247.16	3383.00	3876.80	3190.58	3383.38
03-Mar-15	4042.74	3257.88	3382.84	3980.72	3257.73	3382.88	3927.51	3247.16	3383.00	3876.80	3190.58	3383.38
27-May-15	4042.75	3257.88	3382.85	3980.72	3257.73	3382.87	3927.51	3247.16	3383.00	3876.79	3190.58	3383.38
02-Jul-15	4042.75	3257.88	3382.85	3980.72	3257.73	3382.88	3927.51	3247.16	3383.00	3876.79	3190.58	3383.38
06-Aug-15	4042.75	3257.88	3382.84	3980.72	3257.73	3382.88	3927.51	3247.16	3383.00	3876.79	3190.58	3383.38
03-Sep-15	4042.75	3257.88	3382.85	3980.71	3257.73	3382.88	3927.51	3247.16	3383.00	3876.79	3190.58	3383.38
13-Oct-15	4042.74	3257.88	3382.85	3980.71	3257.73	3382.88	3927.51	3247.16	3383.00	3876.79	3190.58	3383.38
24-Nov-15	4042.74	3257.88	3382.85	3980.72	3257.73	3382.88	3927.51	3247.16	3383.00	3876.79	3190.58	3383.39
08-Jan-16	4042.74	3257.88	3382.84	#N/A	#N/A	#N/A	3927.51	3247.16	3383.00	#N/A	#N/A	#N/A
03-Feb-16	4042.74	3257.88	3382.84	#N/A	#N/A	#N/A	3927.51	3247.16	3383.00	#N/A	#N/A	#N/A
22-Mar-16	4042.74	3257.88	3382.84	3980.71	3257.73	3382.88	3927.51	3247.16	3383.00	3876.79	3190.58	3383.38
28-Jun-16	4042.74	3257.88	3382.84	3980.71	3257.73	3382.88	3927.51	3247.16	3383.00	3876.79	3190.58	3383.38
15-Sep-16	4042.74	3257.88	3382.85	3980.71	3257.73	3382.88	3927.51	3247.16	3383.00	3876.79	3190.58	3383.38
15-May-17	4042.74	3257.88	3382.84	3980.71	3257.73	3382.88	3927.51	3247.16	3383.00	#N/A	#N/A	#N/A
30-Aug-17	4042.74	3257.88	3382.84	3980.71	3257.73	3382.88	3927.51	3247.16	3383.00	3876.79	3190.58	3383.39

	TDF14-21			TDF14-22			TDF14-23			TDF14-24		
	6:1 Buttress Crest Edge											
	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation
Initial	3797.26	3131.99	3383.24	3703.68	3098.22	3383.45	3637.59	3080.92	3383.34	3603.28	3040.47	3383.55
12-Jan-15	3797.26	3131.99	3383.25	3703.68	3098.22	3383.45	3637.59	3080.92	3383.35	3603.28	3040.47	3383.55
03-Mar-15	3797.27	3131.98	3383.24	3703.68	3098.22	3383.45	3637.59	3080.92	3383.34	3603.28	3040.47	3383.55
27-May-15	3797.26	3131.99	3383.24	3703.68	3098.23	3383.45	3637.59	3080.92	3383.34	3603.29	3040.47	3383.55
02-Jul-15	3797.27	3132.00	3383.24	3703.68	3098.22	3383.45	3637.59	3080.92	3383.34	3603.28	3040.47	3383.55
06-Aug-15	3797.26	3131.99	3383.24	3703.68	3098.22	3383.45	3637.59	3080.92	3383.34	3603.28	3040.47	3383.55
03-Sep-15	3797.26	3131.99	3383.25	3703.68	3098.23	3383.45	3637.59	3080.92	3383.34	3603.28	3040.47	3383.55
13-Oct-15	3797.26	3131.99	3383.25	3703.68	3098.22	3383.45	3637.59	3080.92	3383.34	3603.28	3040.47	3383.55
24-Nov-15	3797.26	3131.99	3383.25	3703.69	3098.21	3383.45	3637.59	3080.92	3383.34	3603.28	3040.47	3383.55
08-Jan-16	3797.26	3131.99	3383.25	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
03-Feb-16	3797.26	3131.99	3383.25	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
22-Mar-16	3797.26	3131.99	3383.25	3703.68	3098.22	3383.44	3637.59	3080.92	3383.34	3603.28	3040.47	3383.55
28-Jun-16	3797.27	3131.99	3383.25	3703.68	3098.22	3383.44	3637.59	3080.92	3383.34	3603.28	3040.47	3383.55
15-Sep-16	3797.27	3131.99	3383.25	3703.68	3098.22	3383.44	3637.59	3080.92	3383.34	3603.28	3040.47	3383.55
15-May-17	3797.26	3131.99	3383.25	3703.68	3098.22	3383.44	3637.59	3080.92	3383.34	3603.28	3040.47	3383.54
30-Aug-17	3797.27	3131.98	3383.26	3703.68	3098.22	3383.44	3637.59	3080.92	3383.34	3603.28	3040.47	3383.54

	TDF14-25			TDF14-26			TDF14-27			TDF14-28		
	6:1 Buttress Crest Edge											
	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation
Initial	3537.96	2908.55	3383.56	3480.58	2826.60	3383.58	3425.17	2738.42	3383.33	3355.37	2662.12	3382.17
12-Jan-15	3537.96	2908.55	3383.56	3480.58	2826.60	3383.58	3425.17	2738.42	3383.33	3355.36	2662.12	3382.17
03-Mar-15	3537.97	2908.55	3383.55	3480.58	2826.60	3383.57	3425.17	2738.42	3383.32	3355.36	2662.12	3382.17
27-May-15	3537.99	2908.54	3383.55	3480.57	2826.60	3383.57	3425.16	2738.42	3383.33	3355.36	2662.12	3382.17
02-Jul-15	3537.97	2908.55	3383.55	3480.58	2826.59	3383.57	3425.17	2738.42	3383.33	3355.36	2662.12	3382.17
06-Aug-15	3537.98	2908.55	3383.55	3480.58	2826.59	3383.57	3425.17	2738.42	3383.33	3355.36	2662.12	3382.17
03-Sep-15	3537.98	2908.54	3383.56	3480.58	2826.59	3383.57	3425.17	2738.42	3383.32	3355.36	2662.12	3382.18
13-Oct-15	3537.97	2908.55	3383.55	3480.58	2826.59	3383.57	3425.17	2738.42	3383.32	3355.36	2662.12	3382.18
24-Nov-15	3537.95	2908.56	3383.57	3480.58	2826.59	3383.57	3425.17	2738.42	3383.32	3355.36	2662.12	3382.18
08-Jan-16	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A			
03-Feb-16	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	3425.17	2738.42	3383.32			
22-Mar-16	3537.96	2908.55	3383.55	3480.57	2826.59	3383.56	3425.16	2738.42	3383.32			
28-Jun-16	3537.96	2908.55	3383.54	3480.58	2826.59	3383.56	3425.17	2738.42	3383.32		Destroyed	
15-Sep-16	3537.96	2908.55	3383.54									
15-May-17	3537.97	2908.55	3383.54		Destroyed			Destroyed				
30-Aug-17	3537.96	2908.55	3383.54									

	TDF14-29			TDF14-30			TDF14-31			TDF14-32		
	Paste Berm Downstream Crest Edge											
	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation
Initial	3519.12	2678.37	3390.79	3523.85	2748.32	3390.66	3583.38	2817.55	3390.62	3652.89	2900.05	3390.73
12-Jan-15	3519.12	2678.37	3390.79	3523.85	2748.32	3390.66	3583.37	2817.55	3390.62	3652.89	2900.06	3390.74
03-Mar-15	3519.12	2678.37	3390.79	3523.85	2748.32	3390.66	3583.37	2817.55	3390.62	3652.89	2900.05	3390.73
27-May-15	3519.12	2678.37	3390.79	#N/A	#N/A	#N/A	3583.40	2817.55	3390.61	3652.91	2900.06	3390.73
02-Jul-15	3519.11	2678.37	3390.79	3523.85	2748.32	3390.66	3583.37	2817.55	3390.61	3652.89	2900.06	3390.73
06-Aug-15	3519.12	2678.37	3390.79	3523.85	2748.32	3390.66	3583.39	2817.55	3390.61	3652.90	2900.06	3390.73
03-Sep-15	3519.12	2678.37	3390.79	3523.85	2748.32	3390.66	3583.39	2817.54	3390.61	3652.90	2900.06	3390.73
13-Oct-15	3519.12	2678.37	3390.79	3523.85	2748.32	3390.66	3583.38	2817.55	3390.61	3652.90	2900.06	3390.73
24-Nov-15	3519.12	2678.37	3390.79	3523.84	2748.32	3390.66	3583.38	2817.55	3390.61	3652.89	2900.06	3390.73
08-Jan-16	3519.11	2678.36	3390.79	3523.84	2748.32	3390.65	3583.35	2817.55	3390.60	3652.87	2900.06	3390.72
03-Feb-16	3519.11	2678.36	3390.79	3523.84	2748.32	3390.65	3583.37	2817.55	3390.61	3652.89	2900.06	3390.73
22-Mar-16	3519.11	2678.36	3390.79	3523.83	2748.33	3390.64	3583.36	2817.55	3390.60	3652.88	2900.06	3390.73
28-Jun-16	3519.11	2678.36	3390.79	3523.84	2748.32	3390.64	3583.38	2817.55	3390.59	3652.89	2900.06	3390.72
15-Sep-16	Destroyed			Destroyed			3583.36	2817.55	3390.59	3652.88	2900.06	3390.72
15-May-17	3519.10	2678.37	3390.77	3523.80	2748.36	3390.62	3583.35	2817.57	3390.58	3652.86	2900.09	3390.71
30-Aug-17	3519.11	2678.37	3390.76	3523.81	2748.36	3390.61	3583.33	2817.57	3390.58	3652.85	2900.09	3390.71

	TDF14-33			TDF14-34			TDF14-35			TDF14-36		
	Paste Berm Downstream Crest Edge											
	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation
Initial	3714.63	2968.90	3390.63	3803.14	3037.30	3390.45	3882.88	3087.05	3390.58	3962.49	3139.32	3390.60
12-Jan-15	3714.63	2968.90	3390.63	3803.14	3037.29	3390.45	3882.88	3087.05	3390.58	3962.49	3139.33	3390.59
03-Mar-15	3714.63	2968.90	3390.63	3803.14	3037.29	3390.44	3882.89	3087.05	3390.58	3962.50	3139.33	3390.59
27-May-15	3714.64	2968.91	3390.63	3803.15	3037.31	3390.44	3882.87	3087.06	3390.58	3962.49	3139.33	3390.59
02-Jul-15	3714.63	2968.90	3390.63	3803.14	3037.30	3390.44	3882.87	3087.06	3390.58	3962.49	3139.33	3390.59
06-Aug-15	3714.63	2968.91	3390.63	3803.14	3037.30	3390.44	3882.88	3087.06	3390.58	3962.50	3139.33	3390.59
03-Sep-15	3714.64	2968.91	3390.63	3803.14	3037.31	3390.45	3882.88	3087.06	3390.58	3962.49	3139.33	3390.60
13-Oct-15	3714.63	2968.91	3390.63	3803.14	3037.30	3390.45	3882.87	3087.06	3390.58	3962.49	3139.33	3390.60
24-Nov-15	3714.63	2968.91	3390.63	3803.14	3037.31	3390.45	3882.87	3087.06	3390.59	3962.49	3139.33	3390.60
08-Jan-16	3714.62	2968.90	3390.61	3803.14	3037.28	3390.44	3882.87	3087.05	3390.58	3962.48	3139.35	3390.59
03-Feb-16	3714.63	2968.91	3390.62	3803.14	3037.30	3390.45	3882.87	3087.06	3390.58	3962.49	3139.33	3390.59
22-Mar-16	3714.63	2968.90	3390.62	3803.14	3037.29	3390.44	3882.87	3087.06	3390.58	3962.49	3139.34	3390.59
28-Jun-16	3714.63	2968.90	3390.61	3803.14	3037.30	3390.44	3882.87	3087.06	3390.58	3962.49	3139.34	3390.60
15-Sep-16	3714.62	2968.90	3390.62	3803.14	3037.29	3390.44	3882.88	3087.06	3390.58	3962.49	3139.34	3390.59
15-May-17	3714.62	2968.91	3390.61	3803.13	3037.32	3390.44	3882.87	3087.06	3390.58	3962.49	3139.35	3390.59
30-Aug-17	3714.62	2968.91	3390.61	3803.13	3037.32	3390.44	3882.87	3087.06	3390.58	3962.49	3139.35	3390.59

	TDF14-37			TDF14-38			TDF14-39		
	Paste Berm Downstream Crest Edge								
	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation
Initial	4014.21	3170.38	3390.57	4080.29	3135.95	3390.59	4109.21	3109.71	3391.16
12-Jan-15	4014.21	3170.38	3390.57	4080.29	3135.95	3390.59	4109.21	3109.71	3391.16
03-Mar-15	4014.21	3170.38	3390.58	4080.29	3135.95	3390.59	4109.20	3109.71	3391.16
27-May-15	4014.20	3170.37	3390.57	4080.30	3135.95	3390.59	4109.21	3109.71	3391.16
02-Jul-15	4014.20	3170.38	3390.57	4080.30	3135.95	3390.59	4109.21	3109.71	3391.17
06-Aug-15	4014.20	3170.38	3390.57	4080.29	3135.95	3390.59	4109.21	3109.71	3391.17
03-Sep-15	4014.20	3170.38	3390.58	4080.30	3135.95	3390.59	4109.21	3109.71	3391.17
13-Oct-15	4014.20	3170.38	3390.58	4080.29	3135.95	3390.60	4109.21	3109.71	3391.17
24-Nov-15	4014.20	3170.38	3390.58	4080.29	3135.95	3390.60	4109.21	3109.71	3391.18
08-Jan-16	4014.20	3170.39	3390.58	4080.29	3135.95	3390.59	4109.23	3109.73	3391.17
03-Feb-16	4014.20	3170.38	3390.58	4080.29	3135.95	3390.59	4109.21	3109.71	3391.17
22-Mar-16	4014.20	3170.38	3390.58	4080.29	3135.95	3390.59	4109.21	3109.71	3391.17
28-Jun-16	4014.20	3170.38	3390.58	4080.29	3135.95	3390.59	4109.21	3109.72	3391.17
15-Sep-16	4014.20	3170.39	3390.58	4080.29	3135.95	3390.60	4109.20	3109.72	3391.17
15-May-17	4014.20	3170.39	3390.58	4080.29	3135.96	3390.59	4109.20	3109.72	3391.17
30-Aug-17	#N/A	#N/A	#N/A	4080.29	3135.96	3390.58	4109.20	3109.73	3391.17

Table 2: Old TDF - Monument Monitoring Summary - Cumulative Values (Change from Initial)

	TDF14-01					TDF14-02				
	Seismic Upgrade Downstream Edge									
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.4	180	-0.2	-0.3	0.1	0.2	117	-0.2	0.0	0.1
03-Mar-15	0.7	186	-0.3	-0.6	-1.0	0.2	208	0.0	-0.2	-0.6
27-May-15	0.7	153	-0.7	-0.3	-0.8	0.4	148	-0.4	-0.2	-0.2
02-Jul-15	0.5	85	-0.4	0.4	-1.7	0.2	77	-0.1	0.2	-0.1
06-Aug-15	0.6	157	-0.5	-0.3	-0.5	0.1	158	0.0	0.0	0.1
03-Sep-15	0.3	280	0.2	-0.1	-0.2	0.1	22	0.0	0.1	0.2
13-Oct-15	0.5	176	-0.3	-0.3	0.1	0.3	124	-0.3	0.0	0.4
24-Nov-15	0.7	226	0.1	-0.6	0.5	#N/A	#N/A	#N/A	#N/A	#N/A
08-Jan-16	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
03-Feb-16	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
22-Mar-16	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
28-Jun-16	#N/A	#N/A	#N/A	#N/A	#N/A	0.1	22	0.0	0.1	0.6
15-Sep-16	Destroyed					Destroyed				
15-May-17										
30-Aug-17	0.4	349	0.3	0.2	-0.3					

Notes:

1 - Survey Data provided by Nyrstar Myra Falls.
2 - The combined measurement error (total of instrument, human and network) for the Old TDF monument survey is approximately 1.0cm for both horizontal and vertical displacement.
3 - Negative values are in the upstream direction, positive values are in the downwstream direction.
4 - Negative values are to the west, positive values are to the east.
5 - Negative values are descending stations along dam centreline and positive values are for ascending stations.
6 - Yellow shading indicates significant cumulative displacement over 2 cm has occurred.
7 - '#N/A' indicates no survey data available for that date. Displacement values are based on changes from the last available readings.
8 - Green shading indicates monument was replaced on that date. Displacement after that date is calculated with respect to the initial survey reading on the replacement date.

	TDF14-03					TDF14-04				
	Seismic Upgrade Downstream Edge									
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.2	90	-0.2	0.1	-0.2	0.5	90	-0.5	0.2	-0.6
03-Mar-15	0.2	277	0.2	-0.1	-0.6	0.4	-83	-0.1	0.3	-0.5
27-May-15	0.2	171	-0.1	-0.1	0.0	0.2	215	0.0	-0.2	-0.1
02-Jul-15	0.2	171	-0.1	-0.1	0.0	0.8	171	-0.7	-0.4	-0.3
06-Aug-15	0.1	81	-0.1	0.1	0.1	0.6	81	-0.6	0.0	0.0
03-Sep-15	0.1	159	-0.1	0.0	0.2	0.8	125	-0.8	-0.1	0.1
13-Oct-15	0.4	130	-0.4	0.0	0.2	1.0	130	-1.0	-0.1	0.2
24-Nov-15	#N/A	#N/A	#N/A	#N/A	#N/A	0.5	134	-0.5	-0.1	0.1
08-Jan-16	0.4	190	-0.2	-0.4	0.4	#N/A	#N/A	#N/A	#N/A	#N/A
03-Feb-16	0.3	236	0.1	-0.3	0.2	#N/A	#N/A	#N/A	#N/A	#N/A
22-Mar-16	0.3	194	-0.1	-0.3	0.2	#N/A	#N/A	#N/A	#N/A	#N/A
28-Jun-16	0.2	245	0.1	-0.2	0.1	0.8	-115	-0.8	-0.1	0.3
15-Sep-16	Destroyed					Destroyed				
15-May-17										
30-Aug-17	0.7	37	0.0	0.7	-0.1	0.8	37	-0.6	0.5	-0.1

	TDF14-05					TDF14-06				
	Seismic Upgrade Downstream Edge									
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.4	117	-0.4	0.0	0.0	0.3	342	0.2	0.2	-1.0
03-Mar-15	0.1	180	0.0	-0.1	-0.3	0.4	162	-0.3	-0.3	-0.4
27-May-15	0.9	245	0.5	-0.7	-0.4	1.4	139	-1.3	-0.4	0.0
02-Jul-15	1.3	171	-0.8	-1.0	-0.8	0.4	99	-0.4	0.2	-0.2
06-Aug-15	0.8	173	-0.5	-0.6	0.0	0.7	132	-0.7	-0.1	0.5
03-Sep-15	1.0	142	-0.9	-0.4	0.3	1.2	143	-1.1	-0.5	0.5
13-Oct-15	1.2	151	-1.0	-0.7	0.1	0.4	130	-0.4	-0.1	0.6
24-Nov-15	#N/A	#N/A	#N/A	#N/A	#N/A	0.5	44	-0.1	0.4	1.3
08-Jan-16	0.9	180	-0.4	-0.8	0.9	1.4	335	1.1	0.8	0.6
03-Feb-16	1.1	141	-1.0	-0.4	1.3	0.3	102	-0.3	0.1	0.9
22-Mar-16	1.0	168	-0.6	-0.8	0.4	0.3	59	-0.1	0.2	0.6
28-Jun-16	1.2	155	-1.0	-0.7	0.8	0.5	108	-0.5	0.1	0.9
15-Sep-16	Destroyed					0.5	123	-0.5	0.0	1.3
15-May-17						0.8	105	-0.8	0.2	1.1
30-Aug-17	1.1	88	-1.0	0.6	-0.8	0.4	118	-0.4	0.0	1.5

	TDF14-07					TDF14-08				
	Seismic Upgrade Downstream Edge									
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.3	0	0.1	0.3	0.2	0.0	#DIV/0!	0.0	0.0	-0.1
03-Mar-15	0.2	285	0.2	0.0	-0.3	0.3	257	0.1	-0.3	-0.4
27-May-15	0.4	184	-0.1	-0.4	0.0	1.1	243	0.1	-1.0	-0.3
02-Jul-15	0.2	103	-0.2	0.0	0.1	0.7	175	-0.6	-0.3	-0.1
06-Aug-15	0.1	192	0.0	-0.1	0.5	0.7	223	-0.2	-0.6	0.3
03-Sep-15	0.5	208	0.1	-0.5	0.4	0.9	232	-0.1	-0.9	0.3
13-Oct-15	0.1	333	0.0	0.0	0.3	0.4	221	-0.1	-0.4	0.3
24-Nov-15	0.6	17	0.0	0.6	0.7	0.7	88	-0.3	0.6	0.4
08-Jan-16	1.0	10	0.2	1.0	0.4	1.4	98	-0.9	1.0	0.2
03-Feb-16	0.4	265	0.4	-0.2	1.1	0.5	173	-0.4	-0.2	0.4
22-Mar-16	0.5	356	0.2	0.4	0.7	0.8	126	-0.8	0.3	0.2
28-Jun-16	0.3	353	0.1	0.2	0.8	0.6	174	-0.5	-0.3	0.3
15-Sep-16	0.4	340	0.2	0.3	1.2	0.5	146	-0.5	0.0	0.7
15-May-17	0.8	321	0.7	0.4	1.0	0.6	156	-0.6	-0.1	1.3
30-Aug-17	0.8	321	0.7	0.4	1.0	0.6	156	-0.6	-0.1	1.3

	TDF14-09					TDF14-10				
	Seismic Upgrade Downstream Edge									
	Magnitude	Direction 2 (deg)	Transverse[2]	Longitudinal[3]	Vertical	Magnitude	Direction 2 (deg)	Transverse[2]	Longitudinal[3]	Vertical
Initial										
12-Jan-15	0.2	270	0.0	-0.2	-0.1	0.1	90	-0.1	0.1	0.0
03-Mar-15	0.3	265	0.0	-0.2	-0.2	0.3	167	-0.2	-0.1	-0.3
27-May-15	1.5	281	0.6	-1.4	-0.3	0.1	56	0.0	0.1	-0.5
02-Jul-15	1.0	214	-0.7	-0.7	0.0	0.6	46	0.1	0.6	-0.1
06-Aug-15	1.1	258	0.0	-1.1	0.3	0.2	14	0.2	0.2	0.4
03-Sep-15	1.3	265	0.1	-1.2	0.5	0.2	247	0.0	-0.1	1.0
13-Oct-15	0.7	233	-0.3	-0.6	0.4	0.2	247	0.0	-0.1	0.8
24-Nov-15	0.9	134	-0.7	0.5	0.2	0.3	167	-0.2	-0.1	1.4
08-Jan-16	1.9	126	-1.4	1.3	0.4	0.9	183	-0.7	-0.6	1.2
03-Feb-16	0.7	176	-0.7	-0.1	0.6	0.2	76	-0.1	0.2	1.1
22-Mar-16	0.7	209	-0.5	-0.5	0.1	0.2	256	0.1	-0.2	1.2
28-Jun-16	0.7	233	-0.3	-0.6	0.5	0.4	135	-0.4	0.0	1.6
15-Sep-16	0.6	185	-0.6	-0.2	0.8	0.4	186	-0.3	-0.3	2.0
15-May-17	1.0	191	-1.0	-0.4	1.0	0.4	153	-0.4	-0.1	2.4
30-Aug-17	0.9	183	-0.9	-0.2	1.7	1.0	182	-0.7	-0.6	3.2

	TDF14-11					TDF14-12				
	Seismic Upgrade Downstream Edge									
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	1.5	132	-1.5	0.0	0.3	0.2	243	-0.1	-0.2	-0.2
03-Mar-15	1.2	107	-1.1	0.5	0.9	0.2	310	0.2	-0.2	0.0
27-May-15	1.9	319	1.9	0.2	-0.8	0.2	142	-0.2	0.1	-0.3
02-Jul-15	1.6	167	-1.3	-0.9	-1.5	0.4	148	-0.4	0.2	0.0
06-Aug-15	0.4	203	-0.1	-0.4	-0.4	0.2	234	-0.1	-0.2	0.3
03-Sep-15	1.3	315	1.3	0.0	0.0	0.3	262	0.0	-0.3	0.7
13-Oct-15	0.6	143	-0.6	-0.1	0.5	0.3	218	-0.2	-0.2	0.5
24-Nov-15	3.7	127	-3.7	0.4	0.1	0.2	142	-0.2	0.1	0.6
08-Jan-16	#N/A	#N/A	#N/A	#N/A	#N/A	0.5	244	-0.2	-0.5	0.7
03-Feb-16	#N/A	#N/A	#N/A	#N/A	#N/A	0.1	176	-0.1	0.0	0.7
22-Mar-16	2.8	129	-2.8	0.2	-0.5	0.2	178	-0.2	0.0	0.4
28-Jun-16	0.7	86	-0.4	0.5	-0.7	0.2	178	-0.2	0.0	0.9
15-Sep-16	1.7	121	-1.6	0.4	0.0	0.5	265	0.0	-0.5	1.2
15-May-17	1.0	137	-1.0	-0.1	0.8	0.4	202	-0.4	-0.2	1.1
30-Aug-17	2.7	126	-2.6	0.3	0.8	0.6	257	0.0	-0.6	2.0

	TDF14-13					TDF14-14				
	Seismic Upgrade Downstream Edge									
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.2	117	0.1	-0.2	0.2	0.2	207	0.2	-0.1	0.1
03-Mar-15	0.2	15	-0.2	0.0	0.2	0.5	110	-0.2	-0.4	0.4
27-May-15	0.3	154	0.3	-0.2	-0.5	0.3	257	0.2	0.2	0.0
02-Jul-15	0.5	164	0.5	-0.2	-0.1	0.2	163	0.1	-0.1	0.0
06-Aug-15	0.3	230	0.2	0.2	0.0	0.5	298	0.1	0.5	0.9
03-Sep-15	0.3	290	-0.1	0.3	0.6	0.3	299	0.1	0.3	1.4
13-Oct-15	0.5	228	0.3	0.3	0.4	0.4	304	0.0	0.4	1.8
24-Nov-15	0.3	154	0.3	-0.2	0.4	1.0	284	0.4	0.9	1.4
08-Jan-16	0.4	268	0.0	0.3	0.5	0.9	300	0.1	0.9	1.3
03-Feb-16	0.3	130	0.2	-0.3	0.4	0.8	281	0.4	0.7	1.5
22-Mar-16	0.3	171	0.3	-0.1	-0.1	0.5	262	0.3	0.3	1.5
28-Jun-16	0.4	268	0.0	0.3	0.6	0.7	282	0.3	0.6	1.9
15-Sep-16	0.8	301	-0.3	0.7	0.9	0.5	314	0.0	0.5	2.9
15-May-17	0.6	278	0.0	0.6	0.5	0.4	291	0.1	0.4	2.6
30-Aug-17	1.0	300	-0.4	0.9	1.2	1.0	297	0.2	0.9	3.8

	TDF14-15					TDF14-16				
	Seismic Upgrade Downstream Edge					6:1 Buttress Crest Edge				
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.4	108	-0.1	-0.3	0.2	0.1	180	0.1	-0.1	0.1
03-Mar-15	0.6	125	0.0	-0.6	0.5	0.2	143	0.0	-0.2	0.3
27-May-15	0.4	149	0.2	-0.5	0.5	0.2	330	-0.1	0.2	0.0
02-Jul-15	0.1	157	0.1	-0.1	0.0	0.0	27	0.0	0.0	0.2
06-Aug-15	0.4	28	-0.5	0.1	0.9	0.1	8	-0.1	0.1	0.2
03-Sep-15	0.4	42	-0.4	0.0	1.4	0.0	27	0.0	0.0	0.3
13-Oct-15	#N/A	#N/A	#N/A	#N/A	#N/A	0.4	311	0.0	0.4	0.7
24-Nov-15	0.1	353	-0.3	0.3	1.8	0.3	278	0.1	0.2	0.8
08-Jan-16	0.1	356	-0.6	0.5	1.6	0.3	323	-0.1	0.3	0.5
03-Feb-16	0.2	345	-0.4	0.5	1.7	0.3	297	0.1	0.3	0.7
22-Mar-16	0.1	248	0.0	0.0	1.7	0.1	233	0.1	0.0	0.7
28-Jun-16	Line of Sight Obstructed					0.2	308	0.0	0.2	0.6
15-Sep-16						0.3	342	-0.1	0.2	1.0
15-May-17						0.3	292	0.1	0.3	0.7
30-Aug-17						0.3	297	0.1	0.3	0.9

	TDF14-17					TDF14-18				
	6:1 Buttress Crest Edge									
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.2	207	0.2	0.1	0.0	0.2	117	-0.1	0.2	0.0
03-Mar-15	0.3	320	-0.2	0.3	-0.1	0.3	69	0.1	0.3	-0.3
27-May-15	0.2	323	-0.1	0.1	0.0	0.2	157	-0.2	0.1	-0.7
02-Jul-15	0.1	342	-0.1	0.0	0.0	0.2	157	-0.2	0.1	-0.6
06-Aug-15	0.0	207	0.0	0.0	-0.2	0.2	157	-0.2	0.1	-0.3
03-Sep-15	0.2	185	0.2	0.0	0.0	0.1	193	-0.1	0.0	-0.2
13-Oct-15	0.4	309	-0.2	0.4	0.3	0.3	254	-0.1	-0.3	-0.3
24-Nov-15	0.6	276	0.0	0.6	0.3	0.3	108	-0.1	0.3	-0.1
08-Jan-16	0.8	290	-0.1	0.8	-0.2	#N/A	#N/A	#N/A	#N/A	#N/A
03-Feb-16	0.8	290	-0.1	0.8	-0.1	#N/A	#N/A	#N/A	#N/A	#N/A
22-Mar-16	0.5	302	-0.2	0.5	-0.1	0.0	297	0.0	0.0	-0.3
28-Jun-16	0.6	297	-0.2	0.6	-0.3	0.1	350	0.1	0.0	-0.1
15-Sep-16	0.4	309	-0.2	0.4	0.0	0.2	330	0.2	-0.1	-0.3
15-May-17	0.6	301	-0.2	0.6	-0.6	0.3	357	0.3	0.0	-0.4
30-Aug-17	0.4	291	-0.1	0.4	-0.6	0.2	330	0.2	-0.1	0.1

	TDF14-19					TDF14-20				
	6:1 Buttress Crest Edge									
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.1	135	-0.1	0.0	0.2	0.4	104	-0.3	0.3	0.1
03-Mar-15	0.1	90	-0.1	0.1	0.1	0.6	122	-0.5	0.2	-0.2
27-May-15	0.0	90	0.0	0.0	-0.1	0.3	354	0.3	0.1	-0.7
02-Jul-15	0.1	90	-0.1	0.1	0.1	0.6	28	0.3	0.5	-0.5
06-Aug-15	0.1	270	0.0	-0.1	0.1	0.3	39	0.1	0.3	-0.3
03-Sep-15	0.1	270	0.0	-0.1	0.3	0.3	68	0.0	0.3	0.1
13-Oct-15	0.2	238	0.0	-0.2	0.1	0.1	345	0.1	0.0	-0.2
24-Nov-15	0.2	90	-0.1	0.2	0.2	0.3	354	0.3	0.1	0.4
08-Jan-16	0.1	22	0.1	0.1	0.4	#N/A	#N/A	#N/A	#N/A	#N/A
03-Feb-16	0.2	35	0.1	0.2	0.1	#N/A	#N/A	#N/A	#N/A	#N/A
22-Mar-16	0.2	11	0.2	0.1	0.2	0.5	321	0.5	-0.1	-0.1
28-Jun-16	0.3	50	0.1	0.3	0.4	0.4	41	0.1	0.4	-0.1
15-Sep-16	0.2	35	0.1	0.2	0.4	0.3	39	0.1	0.3	-0.1
15-May-17	0.4	46	0.1	0.4	0.1	#N/A	#N/A	#N/A	#N/A	#N/A
30-Aug-17	0.2	35	0.1	0.2	0.2	0.2	87	-0.1	0.1	0.4

	TDF14-21					TDF14-22				
	6:1 Buttress Crest Edge									
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.1	45	0.0	0.1	0.2	0.1	90	0.0	0.1	0.0
03-Mar-15	0.8	148	-0.8	0.1	-0.1	0.2	95	-0.1	0.2	-0.6
27-May-15	0.5	320	0.4	-0.1	-0.7	0.8	353	0.8	0.1	-0.6
02-Jul-15	0.6	11	0.4	0.4	-0.5	0.3	221	-0.2	-0.2	-0.6
06-Aug-15	0.3	2	0.2	0.1	-0.2	0.3	342	0.3	0.0	-0.3
03-Sep-15	0.2	176	-0.1	-0.1	0.5	0.4	333	0.4	-0.1	-0.5
13-Oct-15	0.1	299	0.1	-0.1	0.3	0.3	313	0.2	-0.1	-0.6
24-Nov-15	0.2	308	0.2	-0.1	0.9	1.3	142	-1.2	0.5	-0.1
08-Jan-16	0.5	220	-0.2	-0.4	0.6	#N/A	#N/A	#N/A	#N/A	#N/A
03-Feb-16	0.4	291	0.3	-0.3	0.3	#N/A	#N/A	#N/A	#N/A	#N/A
22-Mar-16	0.5	287	0.4	-0.4	0.4	0.3	161.0	-0.3	0.0	-1.0
28-Jun-16	0.2	103	-0.1	0.2	0.3	0.1	257.5	0.0	-0.1	-1.3
15-Sep-16	0.3	156	-0.3	0.0	0.8	0.3	178.2	-0.3	-0.1	-1.1
15-May-17	0.2	318	0.2	0.0	0.7	0.2	310	0.2	-0.1	-1.7
30-Aug-17	1.1	169	-1.0	-0.3	1.1	0.4	192	-0.4	-0.2	-1.5

	TDF14-23					TDF14-24				
	6:1 Buttress Crest Edge									
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.2	63	0.0	0.2	0.9	0.2	243	0.2	-0.1	0.4
03-Mar-15	0.3	49	0.2	0.3	0.2	0.4	190	0.0	-0.4	-0.1
27-May-15	0.4	38	0.3	0.3	0.5	0.4	131	-0.4	-0.3	0.1
02-Jul-15	0.2	161	-0.2	0.0	0.3	0.3	174	-0.1	-0.2	0.1
06-Aug-15	0.2	51	0.1	0.2	0.5	0.3	156	-0.2	-0.3	0.3
03-Sep-15	0.1	25	0.1	0.1	0.3	0.4	162	-0.2	-0.4	0.2
13-Oct-15	0.2	350	0.2	0.0	0.2	0.2	171	-0.1	-0.2	0.1
24-Nov-15	0.7	96	-0.2	0.6	0.4	0.2	242	0.1	-0.1	0.2
08-Jan-16	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
03-Feb-16	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
22-Mar-16	0.4	70	0.0	0.4	0.1	0.2	200	0.0	#N/A	0.0
28-Jun-16	0.5	47	0.2	0.4	0.0	0.2	200	0.0	-0.2	0.0
15-Sep-16	0.3	83	0.0	0.3	0.1	0.4	176	-0.1	-0.4	0.0
15-May-17	0.5	51	0.2	0.4	-0.2	0.2	160	-0.1	-0.1	-1.4
30-Aug-17	0.2	79	0.0	0.2	-0.4	0.4	243	0.3	-0.2	-1.2

	TDF14-25					TDF14-26				
	6:1 Buttress Crest Edge									
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.0	#DIV/0!	0.0	0.0	0.0	0.0	#DIV/0!	0.0	0.0	0.0
03-Mar-15	0.5	169	-0.3	-0.3	-0.7	0.2	336	0.2	0.1	-0.2
27-May-15	2.3	115	-2.2	0.4	-1.0	0.9	271	0.8	-0.4	-0.9
02-Jul-15	0.6	106	-0.5	0.2	-1.2	0.9	207	0.0	-0.9	-0.7
06-Aug-15	1.3	116	-1.2	0.2	-0.9	0.3	200	0.0	-0.3	-1.0
03-Sep-15	1.6	125	-1.6	0.0	-0.7	0.7	164	-0.5	-0.5	-0.9
13-Oct-15	1.0	118	-0.9	0.1	-1.0	0.7	164	-0.5	-0.5	-1.1
24-Nov-15	1.6	294	1.6	-0.3	0.8	0.4	227	0.1	-0.4	-0.5
08-Jan-16	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
03-Feb-16	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
22-Mar-16	0.4	262	0.3	-0.2	-1.5	0.8	242	0.4	-0.7	-1.3
28-Jun-16	0.4	190	-0.2	-0.3	-2.3	0.7	238	0.3	-0.6	-1.8
15-Sep-16	0.5	188	-0.2	-0.4	-1.8	Destroyed				
15-May-17	0.9	117	-0.9	0.1	-2.1					
30-Aug-17	0.5	200	-0.1	-0.5	-1.9					

	TDF14-27					TDF14-28				
	6:1 Buttress Crest Edge									
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.0	#DIV/0!	0.0	0.0	-0.2	0.2	270	0.1	-0.1	0.0
03-Mar-15	0.2	313	0.2	0.0	-0.6	0.4	257	0.2	-0.4	-0.5
27-May-15	0.4	274	0.4	-0.2	-0.2	0.4	217	0.0	-0.4	0.0
02-Jul-15	0.4	232	0.1	-0.4	-0.3	0.3	253	0.2	-0.3	0.0
06-Aug-15	0.2	219	0.0	-0.2	-0.3	0.3	253	0.2	-0.3	0.0
03-Sep-15	0.3	167	-0.2	-0.2	-0.4	0.3	253	0.2	-0.3	0.2
13-Oct-15	0.4	171	-0.3	-0.3	-0.4	0.2	213	0.0	-0.2	0.2
24-Nov-15	0.4	222	0.0	-0.4	-0.5	0.6	249	0.2	-0.5	0.1
08-Jan-16	#N/A	#N/A	#N/A	#N/A	#N/A					
03-Feb-16	0.4	243	0.2	-0.3	-0.5					
22-Mar-16	0.5	238	0.2	-0.5	-0.5					
28-Jun-16	0.4	222	0.0	-0.4	-0.9					
15-Sep-16						Destroyed				
15-May-17	Destroyed									
30-Aug-17										

	TDF14-29					TDF14-30				
	Paste Berm Downstream Crest Edge									
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.1	45	-0.1	0.0	-0.2	0.2	333	0.2	0.1	-0.5
03-Mar-15	0.1	247	0.1	0.0	-0.3	0.3	321	0.3	0.1	-0.5
27-May-15	0.3	302	0.1	0.3	-0.3	#N/A	#N/A	#N/A	#N/A	#N/A
02-Jul-15	0.8	268	0.7	0.4	-0.4	0.7	266	0.5	-0.5	-0.6
06-Aug-15	0.5	306	0.2	0.4	-0.3	0.5	302	0.5	-0.1	-0.6
03-Sep-15	0.6	248	0.6	0.1	-0.4	0.3	243	0.1	-0.3	-0.7
13-Oct-15	0.5	255	0.5	0.2	-0.4	0.3	279	0.3	-0.2	-0.8
24-Nov-15	0.7	267	0.6	0.4	-0.5	0.9	294	0.8	-0.3	-0.9
08-Jan-16	1.2	237	1.2	0.0	-0.2	1.6	290	1.5	-0.6	-1.5
03-Feb-16	1.2	240	1.2	0.1	-0.3	1.5	288	1.4	-0.6	-1.9
22-Mar-16	1.1	253	1.1	0.3	-0.4	2.0	295	1.9	-0.5	-2.0
28-Jun-16	1.4	256	1.3	0.5	-0.8	1.7	292	1.6	-0.5	-2.6
15-Sep-16	Destroyed					Destroyed				
15-May-17										
30-Aug-17	0.5	109	-0.3	-0.4	-0.9	0.7	75	-0.4	0.5	-1.2

	TDF14-31					TDF14-32				
	Paste Berm Downstream Crest Edge									
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.1	270	0.1	-0.1	0.7	0.1	0	0.1	0.1	0.4
03-Mar-15	0.3	198	-0.1	-0.3	0.0	0.2	161	-0.2	-0.1	-0.1
27-May-15	2.8	97	-2.3	1.5	-0.4	2.2	73.8	-1.2	1.8	-0.3
02-Jul-15	0.5	347	0.4	0.3	-0.5	0.5	51.0	-0.1	0.5	-0.4
06-Aug-15	1.3	91	-1.0	0.8	-0.2	1.3	81	-0.8	1.0	-0.4
03-Sep-15	1.7	104	-1.6	0.8	-0.6	1.2	80	-0.8	0.9	-0.5
13-Oct-15	0.8	92	-0.6	0.5	-0.9	0.9	63	-0.3	0.8	-0.4
24-Nov-15	0.6	124	-0.6	0.1	-0.9	0.5	78	-0.3	0.4	-0.4
08-Jan-16	2.5	276	2.1	-1.4	-2.0	2.3	283	2.0	-1.1	-1.0
03-Feb-16	0.4	280	0.4	-0.2	-1.1	0.7	349	0.6	0.4	0.1
22-Mar-16	1.1	279	1.0	-0.6	-1.5	0.9	309	0.9	0.0	-0.7
28-Jun-16	0.1	108	-0.1	0.0	-3.0	0.8	358	0.5	0.6	-1.4
15-Sep-16	1.5	273	1.2	-0.9	-2.5	0.9	296	0.9	-0.2	-1.3
15-May-17	3.9	313	3.9	0.2	-3.3	4.4	325	4.2	1.0	-2.2
30-Aug-17	4.8	301	4.7	-0.8	-4.1	4.9	311	4.9	0.0	-2.0

	TDF14-33					TDF14-34				
	Paste Berm Downstream Crest Edge									
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.1	180	-0.1	-0.1	0.4	0.4	180	-0.3	-0.2	0.1
03-Mar-15	0.2	169	-0.2	-0.1	-0.3	0.4	164	-0.3	-0.1	-0.4
27-May-15	1.7	51	-0.2	1.0	-0.3	1.9	9	1.4	1.2	-0.5
02-Jul-15	0.3	348	0.2	-0.1	-0.2	0.5	288	0.4	-0.3	-0.5
06-Aug-15	0.9	43	0.0	0.5	-0.1	0.9	0	0.7	0.4	-0.5
03-Sep-15	1.1	43	0.0	1.1	0.1	1.4	0	1.2	0.7	-0.3
13-Oct-15	0.8	33	0.2	0.4	0.1	0.9	347	0.8	0.3	-0.2
24-Nov-15	0.7	30	0.2	0.2	0.1	1.7	350	1.6	0.6	0.4
08-Jan-16	0.8	262	0.5	-0.4	-1.9	1.9	192	-1.4	-1.3	-1.1
03-Feb-16	0.4	6	0.2	0.2	-0.9	0.1	301	0.1	-0.1	0.0
22-Mar-16	0.3	231	0.0	-0.3	-1.1	0.9	193	-0.6	-0.6	-0.7
28-Jun-16	0.3	348	0.2	0.3	-1.5	0.2	32	0.1	0.2	-0.8
15-Sep-16	0.6	289	0.5	0.1	-1.4	0.5	193	-0.3	-0.3	-0.9
15-May-17	1.4	328	1.3	-0.2	-1.6	2.9	328	2.9	0.0	-0.5
30-Aug-17	1.1	316	1.1	-0.3	-1.8	2.4	326	2.3	-0.1	-1.2

	TDF14-35					TDF14-36				
	Paste Berm Downstream Crest Edge									
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.2	117	-0.2	0.1	-0.2	0.4	27	0.2	0.4	-0.6
03-Mar-15	1.0	118	-0.9	0.5	0.0	0.9	70	-0.2	0.9	-0.7
27-May-15	0.7	291	0.5	-0.4	-0.4	0.4	323	0.4	0.0	-0.9
02-Jul-15	0.6	329	0.6	0.0	0.0	0.5	357	0.4	0.3	-0.6
06-Aug-15	0.0	323	0.0	0.0	0.2	0.4	41	0.1	0.4	-0.6
03-Sep-15	0.2	27	0.1	0.1	0.4	0.5	18	0.3	0.4	-0.2
13-Oct-15	0.5	299	0.4	-0.2	0.3	0.7	339	0.6	0.1	-0.2
24-Nov-15	0.4	306	0.4	-0.2	0.9	0.4	356	0.4	0.2	-0.1
08-Jan-16	0.4	262	0.2	-0.4	0.3	2.7	342	2.6	0.7	-0.3
03-Feb-16	1.0	290	0.8	-0.6	0.2	1.1	337	1.1	0.2	-0.4
22-Mar-16	0.8	288	0.6	-0.5	0.1	1.2	339	1.2	0.2	-0.3
28-Jun-16	0.5	316	0.5	-0.1	0.5	1.3	3	1.1	0.8	-0.2
15-Sep-16	0.4	339	0.4	0.1	0.5	1.6	6	1.3	1.0	-0.3
15-May-17	1.1	328	1.1	0.0	0.0	2.2	347	2.0	0.7	-0.5
30-Aug-17	0.8	320	0.8	-0.1	0.1	2.2	354	2.0	1.0	-0.7

	TDF14-37					TDF14-38				
	Paste Berm Downstream Crest Edge									
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.0	#DIV/0!	0.0	0.0	0.0	0.2	153	0.1	-0.2	-0.1
03-Mar-15	0.6	58	0.2	0.6	0.2	0.3	205	0.3	-0.1	0.0
27-May-15	0.6	226	-0.3	-0.5	-0.4	0.6	96	-0.3	-0.5	0.1
02-Jul-15	0.5	260	0.1	-0.5	-0.1	0.3	63	-0.3	-0.1	0.1
06-Aug-15	0.3	254	0.0	-0.3	0.0	0.2	77	-0.1	-0.1	0.1
03-Sep-15	0.4	304	0.3	-0.2	0.3	0.4	99	-0.2	-0.3	0.3
13-Oct-15	0.7	271	0.2	-0.7	0.4	0.3	333	-0.1	0.2	0.7
24-Nov-15	0.3	254	0.0	-0.3	0.3	0.0	333	0.0	0.0	0.8
08-Jan-16	1.2	340	1.2	-0.1	0.6	0.2	52	-0.2	0.0	0.1
03-Feb-16	0.6	271	0.2	-0.6	0.2	0.2	187	0.1	-0.1	0.1
22-Mar-16	0.7	279	0.3	-0.7	0.2	0.2	217	0.2	0.0	0.1
28-Jun-16	0.6	315	0.5	-0.3	0.4	0.2	30	-0.2	0.0	0.0
15-Sep-16	1.1	333	1.1	-0.2	0.2	0.6	18	-0.5	0.2	0.4
15-May-17	1.4	319	1.2	-0.6	0.4	0.6	9	-0.5	0.4	0.0
30-Aug-17	#N/A	#N/A	#N/A	#N/A	#N/A	1.0	4	-0.8	0.6	-1.0

	TDF14-39 Paste Berm Downstream Crest Edge				
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial					
12-Jan-15	0.0	72	-0.3	-0.2	0.1
03-Mar-15	0.3	239	0.2	0.1	0.2
27-May-15	0.2	68	-0.2	-0.1	0.3
02-Jul-15	0.2	40	-0.6	0.0	0.4
06-Aug-15	0.6	53	-0.6	-0.1	0.4
03-Sep-15	0.6	62	-0.8	-0.3	0.8
13-Oct-15	0.8	19	-0.6	0.2	1.1
24-Nov-15	0.6	46	-0.5	0.0	1.4
08-Jan-16	0.6	49	-3.2	-0.4	0.6
03-Feb-16	3.2	41	-0.8	0.0	0.6
22-Mar-16	0.8	40	-0.6	0.0	0.6
28-Jun-16	0.6	33	-0.9	0.1	0.7
15-Sep-16	0.9	349	-1.0	1.3	0.7
15-May-17	1.6	354	-0.9	1.0	0.4
30-Aug-17	1.3	357	-1.2	1.2	0.8

amec foster wheeler

Table 3: Lynx TDF - Monument Monitoring Summary - Raw Data

	LYNX-14-01			LYNX-14-02			LYNX-14-03			LYNX-14-04			LYNX-14-06		
	Downstream Cr.			Upstream Cr.			Downstream Cr.			Upstream Cr.			Upstream Cr.		
	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation
Initial	3077.76	2040.76	3404.35	3091.67	2044.45	3404.53	3070.03	2074.83	3404.39	3083.99	2076.87	3404.44	3072.53	2125.60	3404.54
12-Jan-15	3077.76	2040.77	3404.34	3091.67	2044.45	3404.53	3070.03	2074.83	3404.40	3083.99	2076.88	3404.43	3072.53	2125.59	3404.54
03-Mar-15	3077.75	2040.77	3404.35	3091.67	2044.45	3404.53	3070.03	2074.83	3404.40	3083.99	2076.87	3404.43	3072.53	2125.59	3404.54
27-May-15	3077.75	2040.77	3404.34	3091.67	2044.45	3404.53	3070.03	2074.83	3404.39	3083.99	2076.87	3404.43	3072.53	2125.59	3404.53
02-Jul-15	3077.76	2040.76	3404.34	3091.67	2044.45	3404.53	3070.04	2074.83	3404.39	3083.99	2076.87	3404.43	3072.53	2125.59	3404.53
06-Aug-15	3077.76	2040.77	3404.34	3091.67	2044.45	3404.53	3070.03	2074.83	3404.39	3083.99	2076.87	3404.43	3072.53	2125.59	3404.53
03-Sep-15	3077.75	2040.77	3404.34	3091.67	2044.45	3404.53	#N/A	#N/A	#N/A	3083.99	2076.87	3404.43	3072.53	2125.59	3404.53
11-Sep-15	3077.75	2040.76	3404.34	3091.67	2044.45	3404.53	#N/A	#N/A	#N/A	3083.99	2076.87	3404.43	3072.53	2125.59	3404.53
01-Oct-15	3077.75	2040.77	3404.34	3091.67	2044.45	3404.53	3070.03	2074.83	3404.39	#N/A	#N/A	#N/A	3072.53	2125.59	3404.53
17-Nov-15	3077.76	2040.77	3404.34	3091.67	2044.45	3404.53	3070.04	2074.83	3404.39	3083.99	2076.87	3404.43	3072.54	2125.59	3404.53
06-Jan-16	3077.75	2040.77	3404.34	3091.67	2044.45	3404.52	3070.04	2074.83	3404.39	3083.99	2076.87	3404.41	3072.54	2125.59	3404.53
02-Feb-16	3077.76	2040.77	3404.34	3091.67	2044.45	3404.52	3070.04	2074.83	3404.40	3083.99	2076.87	3404.42	3072.54	2125.59	3404.53
22-Mar-16	3077.75	2040.76	3404.34	3091.67	2044.45	3404.52	#N/A	#N/A	#N/A	3083.99	2076.87	3404.42	3072.54	2125.59	3404.53
23-May-16	3077.75	2040.76	3404.34	3091.68	2044.45	3404.52	#N/A	#N/A	#N/A	3083.99	2076.87	3404.42	3072.54	2125.59	3404.53
02-Sep-16	3077.75	2040.76	3404.34	3091.68	2044.45	3404.52	3070.04	2074.82	3404.40	3083.99	2076.87	3404.41	3072.54	2125.59	3404.52
15-May-17	3077.75	2040.76	3404.34	3091.68	2044.45	3404.52	3070.04	2074.82	3404.39	3084.00	2076.87	3404.41	3072.54	2125.59	3404.53
25-Aug-17	3077.75	2040.77	3404.34	3091.68	2044.45	3404.52	3070.03	2074.82	3404.40	3083.99	2076.87	3404.41	3072.54	2125.60	3404.54

Notes:

1 - Survey data provided by Nyrstar Myra Falls.
2 - The combined measurement error (total of instrument, human and network) for the LynxTDF monument survey is approximately 1.5 cm and 1.0 cm for horizontal and vertical displacement, respectively.
3 - Values in table are reported in meters.
4 - Cr. : crest
5 - Green shading indicates monument was replaced on that date. Displacement after that date is calculated with repect to the survey reading on the replacement date.
6 - Peach shading indicates monument was disturbed and was re-set on that date.
7 - '#N/A' indicates no survey data available for that date.
8 - The original control point was destroyed before 25 August 2017 survey, which was based on a resection using three of the monuments. Nyrstar Myra Falls estimated the combined measurement error to approximately 4.5 cm for vertical displacement on the setup used to surveys monuments LYNX-14-20 through LYNX-14-26.
9 - All monuments were removed at the end of August 2017 to allow the Lynx Dam raise construction to proceed.

	LYNX-14-07			LYNX-14-08			LYNX-14-09			LYNX-14-10			LYNX-14-11		
	Downstream Cr.			Upstream Cr.			Downstream Cr.			Upstream Cr.			Downstream Cr.		
	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation
Initial	3051.31	2145.00	3404.27	3067.61	2149.80	3404.47	3061.72	2180.82	3404.31	3073.12	2172.04	3404.58	3087.77	2205.73	3404.33
12-Jan-15	3051.31	2145.00	3404.27	3067.62	2149.81	3404.46	3061.71	2180.82	3404.32	3073.12	2172.04	3404.58	3087.76	2205.73	3404.33
03-Mar-15	3051.31	2145.00	3404.27	3067.62	2149.80	3404.46	3061.71	2180.82	3404.31	3073.13	2172.03	3404.57	3087.76	2205.72	3404.32
27-May-15	3051.31	2144.99	3404.27	3067.63	2149.81	3404.46	3061.70	2180.81	3404.31	3073.14	2172.04	3404.55			
02-Jul-15	3051.31	2145.00	3404.27	3067.63	2149.81	3404.46	3061.72	2180.82	3404.31	3073.14	2172.04	3404.55			
06-Aug-15	3051.31	2145.00	3404.27	3067.63	2149.81	3404.45	3061.72	2180.82	3404.30	3073.14	2172.04	3404.54			
03-Sep-15	3051.30	2144.99	3404.27	3067.63	2149.81	3404.45	3061.71	2180.82	3404.31	3073.13	2172.04	3404.54			
11-Sep-15	#N/A	#N/A	#N/A	3067.63	2149.81	3404.45	#N/A	#N/A	#N/A	3073.12	2172.03	3404.55			
01-Oct-15	3051.31	2145.00	3404.27	3067.63	2149.81	3404.45	3061.72	2180.82	3404.31	3073.14	2172.04	3404.54			
17-Nov-15	3051.31	2144.99	3404.27	3067.63	2149.80	3404.45	3061.72	2180.82	3404.31	3073.14	2172.04	3404.55			
06-Jan-16	3051.32	2145.00	3404.27	3067.64	2149.81	3404.44	3061.73	2180.82	3404.31	3073.16	2172.03	3404.54			
02-Feb-16	3051.32	2145.00	3404.27	3067.63	2149.81	3404.45	3061.72	2180.82	3404.31	3073.15	2172.03	3404.55			
22-Mar-16	3051.31	2144.99	3404.27	3067.64	2149.81	3404.44	3061.72	2180.82	3404.31	3073.15	2172.03	3404.55			
23-May-16	3051.31	2144.99	3404.27	3067.64	2149.80	3404.43	3061.72	2180.82	3404.30	3073.16	2172.02	3404.54			
02-Sep-16	3051.31	2144.99	3404.27	3067.64	2149.81	3404.44	3061.72	2180.82	3404.31	3073.16	2172.02	3404.54			
15-May-17	3051.31	2144.99	3404.27	3067.65	2149.80	3404.44	3061.72	2180.81	3404.30	3073.17	2172.01	3404.53			
25-Aug-17	3051.31	2144.99	3404.27	3067.64	2149.81	3404.44	3061.72	2180.82	3404.30	3073.17	2172.01	3404.53			

Destroyed

	LYNX-14-12			LYNX-14-13			LYNX-14-14			LYNX-14-15			LYNX-14-16		
	Upstream Cr.			Downstream Cr.			Upstream Cr.			Downstream Cr.			Upstream Cr.		
	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation
Initial	3094.58	2193.91	3404.62	3130.28	2232.31	3404.22	3137.50	2219.58	3404.43	3172.85	2257.76	3404.21	3180.34	2245.37	3404.42
12-Jan-15	3094.58	2193.91	3404.62	3130.28	2232.31	3404.22	3137.51	2219.58	3404.43	3172.85	2257.76	3404.21	3180.34	2245.36	3404.42
03-Mar-15	3094.58	2193.91	3404.61	3130.28	2232.31	3404.22	3137.51	2219.58	3404.43	3172.85	2257.77	3404.21	3180.33	2245.36	3404.42
27-May-15	3094.58	2193.90	3404.60	3130.28	2232.30	3404.21	3137.51	2219.57	3404.42	3172.85	2257.75	3404.20	3180.34	2245.35	3404.40
02-Jul-15	3094.58	2193.90	3404.60	3130.28	2232.30	3404.21	3137.51	2219.57	3404.41	3172.85	2257.75	3404.20	3180.33	2245.35	3404.40
06-Aug-15	3094.58	2193.90	3404.60	3130.29	2232.30	3404.21	3137.51	2219.56	3404.41	3172.85	2257.75	3404.20	3180.34	2245.35	3404.40
03-Sep-15	3094.57	2193.90	3404.60	3130.27	2232.30	3404.21	3137.50	2219.57	3404.41	3172.83	2257.76	3404.21	3180.32	2245.36	3404.40
11-Sep-15	3094.58	2193.90	3404.60	3130.28	2232.30	3404.21	3137.51	2219.56	3404.41	3172.85	2257.75	3404.20	3180.33	2245.35	3404.40
01-Oct-15	3094.58	2193.90	3404.60	3130.28	2232.30	3404.22	3137.51	2219.56	3404.41	3172.85	2257.76	3404.21	3180.34	2245.35	3404.40
17-Nov-15	3094.59	2193.90	3404.59	#N/A	#N/A	#N/A	3137.52	2219.56	3404.41	3172.81	2257.77	3404.18	3180.34	2245.35	3404.40
06-Jan-16	3094.60	2193.90	3404.59	3130.30	2232.30	3404.20	3137.53	2219.56	3404.39	3172.82	2257.76	3404.18	3180.35	2245.33	3404.39
02-Feb-16	3094.59	2193.90	3404.59	3130.29	2232.30	3404.21	3137.52	2219.56	3404.40	3172.81	2257.77	3404.19	3180.34	2245.34	3404.40
22-Mar-16	3094.59	2193.90	3404.59	3130.28	2232.30	3404.21	3137.52	2219.56	3404.40	3172.81	2257.76	3404.19	#N/A	#N/A	#N/A
23-May-16	3094.58	2193.90	3404.59	3130.29	2232.30	3404.21	3137.52	2219.56	3404.39	3172.80	2257.76	3404.19	3180.33	2245.34	3404.40
02-Sep-16	3094.58	2193.90	3404.58	3130.29	2232.30	3404.20	3137.52	2219.55	3404.39	3172.81	2257.76	3404.18	3180.33	2245.34	3404.39
15-May-17	3094.59	2193.89	3404.58	3130.29	2232.29	3404.20	3137.52	2219.55	3404.39				3180.34	2245.33	3404.38
25-Aug-17	3094.59	2193.90	3404.57	3130.29	2232.30	3404.20	3137.52	2219.56	3404.38				3180.33	2245.33	3404.38

Destroyed

	LYNX-14-17			LYNX-14-18			LYNX-14-19			LYNX-14-20			LYNX-14-21		
	Downstream Cr.			Upstream Cr.			Downstream Cr.			Upstream Cr.			Downstream Cr.		
	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation
Initial	3216.40	2284.77	3404.07	3224.27	2272.37	3404.40	3258.82	2309.50	3404.24	3266.12	2296.73	3404.46	3289.82	2326.98	3404.49
12-Jan-15	3216.39	2284.77	3404.06	3224.27	2272.37	3404.40	3258.81	2309.50	3404.23	#N/A	#N/A	#N/A	3289.82	2326.99	3404.49
03-Mar-15	3216.39	2284.77	3404.07	3224.27	2272.38	3404.40	3258.81	2309.49	3404.23	3266.12	2296.73	3404.45	3289.82	2326.98	3404.49
27-May-15	3216.40	2284.77	3404.06	3224.27	2272.37	3404.39	3258.82	2309.50	3404.23	3266.12	2296.73	3404.44	3289.82	2326.98	3404.48
02-Jul-15	3216.40	2284.77	3404.06	3224.27	2272.37	3404.38	3258.82	2309.49	3404.23	3266.12	2296.73	3404.44	3289.82	2326.98	3404.48
06-Aug-15	3216.40	2284.77	3404.06	3224.27	2272.37	3404.38	3258.82	2309.50	3404.23	3266.12	2296.73	3404.44	3289.82	2326.98	3404.48
03-Sep-15	3216.40	2284.77	3404.05	3224.25	2272.38	3404.38	3258.82	2309.49	3404.23	3266.12	2296.73	3404.44	3289.82	2326.98	3404.48
11-Sep-15	#N/A	#N/A	#N/A	3224.27	2272.37	3404.38	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
01-Oct-15	3216.40	2284.76	3404.05	3224.27	2272.37	3404.38	3258.82	2309.49	3404.23	3266.12	2296.73	3404.44	3289.82	2326.98	3404.48
17-Nov-15	3216.40	2284.76	3404.06	3224.28	2272.36	3404.38	3258.82	2309.49	3404.23	3266.12	2296.73	3404.44	3289.81	2326.98	3404.49
06-Jan-16	3216.40	2284.76	3404.06	3224.30	2272.36	3404.38	3258.81	2309.49	3404.23	3266.12	2296.72	3404.43	3289.82	2326.98	3404.48
02-Feb-16	3216.40	2284.77	3404.07	3224.28	2272.37	3404.39	3258.81	2309.49	3404.22	3266.12	2296.73	3404.44	3289.81	2326.98	3404.48
22-Mar-16	3216.40	2284.77	3404.06	3224.28	2272.36	3404.39	3258.82	2309.49	3404.23	3266.12	2296.72	3404.44	3289.82	2326.98	3404.48
23-May-16	3216.40	2284.77	3404.06	3224.27	2272.37	3404.38	3258.81	2309.49	3404.22	3266.12	2296.72	3404.43	3289.82	2326.98	3404.48
02-Sep-16	3216.40	2284.77	3404.05	3224.28	2272.37	3404.37	3258.82	2309.49	3404.22	3266.12	2296.73	3404.43	3289.82	2326.98	3404.48
15-May-17	Destroyed			3224.28	2272.36	3404.38	3258.82	2309.50	3404.23	3266.13	2296.73	3404.44	3289.82	2326.98	3404.49
25-Aug-17				3224.28	2272.37	3404.37	Destroyed			3266.12	2296.72	3404.42	3289.82	2326.95	3404.44

	LYNX-14-22			LYNX-14-23			LYNX-14-24			LYNX-14-25			LYNX-14-26		
	Upstream Cr.			Downstream Cr.			Upstream Cr.			Downstream Cr.			Upstream Cr.		
	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation	Northing	Easting	Elevation
Initial	3296.33	2314.85	3404.55	3317.18	2326.61	3404.00	3309.21	2314.46	3404.53	3343.85	2309.70	3404.14	3335.95	2297.48	3404.52
12-Jan-15	3296.32	2314.85	3404.55	3317.18	2326.61	3404.00	3309.21	2314.45	3404.53	3343.85	2309.70	3404.14	3335.94	2297.49	3404.52
03-Mar-15	3296.32	2314.84	3404.55	3317.18	2326.62	3404.00	3309.20	2314.45	3404.53	3343.85	2309.70	3404.14	3335.94	2297.50	3404.51
27-May-15	3296.33	2314.85	3404.54	3317.18	2326.62	3403.99	3309.21	2314.46	3404.53	3343.85	2309.70	3404.14	3335.94	2297.49	3404.51
02-Jul-15	3296.32	2314.84	3404.54	3317.18	2326.61	3404.00	3309.21	2314.45	3404.53	3343.85	2309.70	3404.14	3335.94	2297.49	3404.51
06-Aug-15	3296.32	2314.85	3404.54	3317.18	2326.62	3403.99	3309.20	2314.46	3404.52	3343.85	2309.70	3404.14	3335.94	2297.49	3404.51
03-Sep-15	3296.32	2314.84	3404.54	3317.18	2326.62	3403.99	3309.20	2314.46	3404.52	3343.85	2309.70	3404.14	3335.94	2297.49	3404.50
11-Sep-15	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
01-Oct-15	3296.32	2314.84	3404.54	3317.18	2326.61	3403.99	3309.20	2314.45	3404.52	3343.85	2309.70	3404.14	3335.94	2297.49	3404.51
17-Nov-15	3296.32	2314.84	3404.54	3317.18	2326.61	3403.99	3309.20	2314.45	3404.52	3343.85	2309.70	3404.14	3335.94	2297.49	3404.51
06-Jan-16	3296.33	2314.84	3404.53	3317.18	2326.61	3403.99	3309.21	2314.45	3404.52	3343.85	2309.70	3404.14	3335.94	2297.49	3404.50
02-Feb-16	3296.33	2314.85	3404.53	3317.18	2326.62	3403.99	3309.20	2314.46	3404.53	#N/A	#N/A	#N/A	3335.94	2297.49	3404.51
22-Mar-16	3296.33	2314.84	3404.53	3317.18	2326.62	3403.99	3309.21	2314.45	3404.53	3343.85	2309.70	3404.12	3335.94	2297.49	3404.51
23-May-16	3296.33	2314.84	3404.53	3317.18	2326.62	3403.99	3309.20	2314.45	3404.52	3343.85	2309.71	3404.12	#N/A	#N/A	#N/A
02-Sep-16	3296.33	2314.84	3404.53	3317.18	2326.61	3403.99	3309.21	2314.45	3404.52	3343.86	2309.71	3404.12	3335.95	2297.49	3404.50
15-May-17	3296.33	2314.84	3404.53	3317.19	2326.62	3403.99	3309.20	2314.45	3404.52	3343.86	2309.71	3404.12	3335.95	2297.49	3404.51
25-Aug-17	3296.33	2314.83	3404.51	3317.18	2326.61	3403.98	3309.20	2314.45	3404.51	3343.84	2309.73	3404.11	3335.94	2297.50	3404.48

amec foster wheeler

Table 4: Lynx TDF - Monument Monitoring Summary - Cumulative Values (Change from Initial)

	LYNX-14-01 Downstream Cr.					LYNX-14-02 Upstream Cr.				
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.4	326	0.1	0.3	-0.2	0.1	0	0.0	0.1	-0.2
03-Mar-15	0.5	307	0.3	0.4	0.0	0.1	315	0.1	0.1	-0.2
27-May-15	0.5	307	0.3	0.4	-0.5	0.2	270	0.2	0.0	-0.4
02-Jul-15	0.2	333	0.1	0.2	-0.5	0.1	180	0.0	-0.1	-0.4
06-Aug-15	0.4	333	0.1	0.4	-0.5	0.0	#N/A	0.0	0.0	-0.4
03-Sep-15	0.7	297	0.5	0.4	-0.5	0.3	288	0.3	0.2	-0.4
11-Sep-15	0.4	297	0.3	0.3	-0.8	0.1	270	0.1	0.0	-0.4
01-Oct-15	0.4	315	0.2	0.4	-0.6	0.1	45	-0.1	0.1	-0.4
17-Nov-15	0.4	326	0.1	0.3	-0.6	0.3	108	-0.3	-0.2	-0.5
06-Jan-16	0.6	301	0.4	0.4	-0.7	0.5	90	-0.5	-0.1	-1.6
02-Feb-16	0.6	342	0.1	0.6	-0.2	0.5	79	-0.5	0.0	-1.3
22-Mar-16	0.5	281	0.5	0.2	-0.2	0.5	101	-0.5	-0.2	-1.2
23-May-16	0.4	297	0.3	0.3	-0.4	0.6	99	-0.6	-0.2	-1.4
02-Sep-16	0.5	281	0.5	0.2	-0.5	0.7	90	-0.7	-0.2	-1.8
15-May-17	0.4	253	0.4	0.0	-0.5	1.1	99	-1.0	-0.4	-1.8
25-Aug-17	0.6	301	0.4	0.4	-0.5	0.8	76	-0.8	0.0	-1.7

Notes:

1 - Survey Data provided by Nyrstar Myra Falls.
2 - The combined measurement error (total of instrument, human and network) for the LynxTDF monument survey is approximately 1.5 cm and 1.0 cm for horizontal and vertical displacement, respectively.
3 - Negative values are in the upstream direction, positive values are in the downwstream direction.
4 - Negative values are to the west, positive values are to the east.
5 - Negative values are descending stations along dam centreline and positive values are for ascending stations.
6 - Cr. : crest
7 - Yellow shading indicates significant cumulative displacement over 2 cm has occurred.
8 - Green shading indicates monument was replaced on that date. Displacement after that date is calculated with repect to the initial survey reading on the replacement date .
9 - '#N/A' indicates no survey data available for that date. Displacement values are based on changes from the last available readings.
10 - Peach shading indicates monument was disturbed and was re-set on that date.

	LYNX-14-03 Downstream Cr.					LYNX-14-04 Upstream Cr.				
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.1	135	-0.1	-0.1	0.2	0.3	342	0.0	0.3	-0.3
03-Mar-15	0.5	217	0.4	-0.3	0.2	0.6	279	0.6	0.2	-0.3
27-May-15	0.5	169	0.0	-0.5	0.1	0.3	252	0.3	0.0	-0.4
02-Jul-15	0.5	143	-0.2	-0.5	0.1	0.1	225	0.1	-0.1	-0.5
06-Aug-15	0.3	162	0.0	-0.3	0.1	0.2	270	0.2	0.0	-0.6
03-Sep-15	#N/A	#N/A	#N/A	#N/A	#N/A	0.6	279	0.6	0.2	-0.5
11-Sep-15	#N/A	#N/A	#N/A	#N/A	#N/A	0.3	270	0.3	0.1	-0.6
01-Oct-15	0.3	162	0.0	-0.3	0.1	#N/A	#N/A	#N/A	#N/A	#N/A
17-Nov-15	0.5	143	-0.2	-0.5	0.1	0.1	45	-0.1	0.1	-0.7
06-Jan-16	0.6	135	-0.3	-0.5	0.1	0.3	108	-0.3	-0.2	-2.2
02-Feb-16	0.6	141	-0.3	-0.6	0.4	0.1	90	-0.1	0.0	-1.9
22-Mar-16	#N/A	#N/A	#N/A	#N/A	#N/A	0.2	180	0.0	-0.2	-1.8
23-May-16	#N/A	#N/A	#N/A	#N/A	#N/A	0.3	135	-0.1	-0.2	-2.0
02-Sep-16	0.8	166	0.0	-0.8	0.2	0.3	108	-0.3	-0.2	-2.2
15-May-17	1.1	156	-0.2	-1.0	0.2	0.6	114	-0.5	-0.4	-2.2
25-Aug-17	0.6	189	0.2	-0.6	0.2	0.2	63	-0.2	0.1	-2.4

	LYNX-14-06 Upstream Cr.					LYNX-14-07 Downstream Cr.				
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.1	180	0.0	-0.1	0.1	0.3	0	-0.1	0.3	0.0
03-Mar-15	0.4	236	0.3	-0.1	-0.3	0.1	315	0.1	0.1	0.0
27-May-15	0.6	171	0.0	-0.6	-0.8	0.3	135	-0.1	-0.2	-0.3
02-Jul-15	0.6	149	-0.2	-0.6	-1.1	0.4	104	-0.4	-0.2	-0.4
06-Aug-15	0.6	149	-0.2	-0.6	-1.0	0.3	90	-0.3	-0.1	-0.5
03-Sep-15	0.6	231	0.6	-0.3	-1.0	0.5	248	0.5	-0.1	-0.5
11-Sep-15	0.4	166	0.0	-0.4	-1.0	#N/A	#N/A	#N/A	#N/A	#N/A
01-Oct-15	0.4	135	-0.2	-0.4	-1.0	0.2	90	-0.2	0.0	-0.5
17-Nov-15	0.8	113	-0.6	-0.5	-1.2	0.5	112	-0.4	-0.3	-0.8
06-Jan-16	1.3	103	-1.2	-0.6	-1.4	1.0	84	-1.0	-0.1	-0.8
02-Feb-16	0.9	103	-0.8	-0.4	-0.9	0.7	90	-0.7	-0.2	-0.6
22-Mar-16	0.8	150	-0.2	-0.8	-1.0	0.5	143	-0.2	-0.5	-0.5
23-May-16	0.9	139	-0.4	-0.8	-1.3	0.6	121	-0.4	-0.4	-0.6
02-Sep-16	0.9	139	-0.4	-0.8	-1.5	0.6	135	-0.3	-0.5	-0.8
15-May-17	1.2	113	-0.9	-0.7	-1.3	0.8	130	-0.5	-0.6	-0.8
25-Aug-17	0.9	84	-0.9	-0.1	-0.4	0.2	153	-0.1	-0.2	-0.9

	LYNX-14-08 Upstream Cr.					LYNX-14-09 Downstream Cr.				
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.4	45	-0.4	0.2	-0.3	0.3	288	0.3	-0.1	0.2
03-Mar-15	0.1	45	-0.1	0.1	-0.5	0.4	256	0.3	-0.3	-0.2
27-May-15	1.4	82	-1.4	-0.1	-1.1	1.6	240	0.7	-1.5	-0.9
02-Jul-15	1.6	83	-1.6	-0.2	-1.2	0.5	202	-0.1	-0.5	-0.4
06-Aug-15	1.6	75	-1.6	0.0	-1.4	0.3	135	-0.3	0.0	-1.0
03-Sep-15	1.2	76	-1.2	0.0	-1.5	0.9	243	0.4	-0.8	-0.7
11-Sep-15	1.3	81	-1.3	-0.1	-1.5	#N/A	#N/A	#N/A	#N/A	#N/A
01-Oct-15	1.6	76	-1.6	0.0	-1.5	0.3	180	-0.2	-0.2	0.0
17-Nov-15	1.2	90	-1.2	-0.3	-1.5	0.6	108	-0.6	0.2	-0.5
06-Jan-16	3.0	82	-3.0	-0.3	-3.0	1.7	90	-1.4	1.0	-0.8
02-Feb-16	1.7	77	-1.7	0.0	-2.0	0.1	90	-0.1	0.1	-0.5
22-Mar-16	2.2	82	-2.2	-0.2	-2.4	0.6	149	-0.5	-0.2	-0.5
23-May-16	2.2	87	-2.2	-0.4	-4.2	0.5	169	-0.4	-0.4	-1.3
02-Sep-16	2.4	85	-2.4	-0.4	-3.0	0.5	143	-0.5	-0.2	-0.9
15-May-17	3.1	87	-3.1	-0.6	-3.0	0.9	126	-0.9	0.0	-1.2
25-Aug-17	2.2	77	-2.2	0.0	-3.2	0.5	101	-0.5	0.2	-1.2

	LYNX-14-10 Upstream Cr.					LYNX-14-11 Downstream Cr.				
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.1	135	-0.1	0.0	0.1	0.7	262	0.3	-0.7	-0.1
03-Mar-15	0.8	104	-0.8	0.3	-0.2	1.3	198	-0.8	-1.0	-0.5
27-May-15	1.5	94	-1.3	0.8	-2.9					
02-Jul-15	1.8	90	-1.5	1.0	-3.1					
06-Aug-15	1.6	90	-1.3	0.9	-3.2					
03-Sep-15	0.7	98	-0.6	0.3	-3.3					
11-Sep-15	0.4	117	-0.4	0.1	-3.0					
01-Oct-15	1.8	87	-1.4	1.1	-3.3					
17-Nov-15								Destroyed		
06-Jan-16	1.9	118	-1.9	0.2	-0.7					
02-Feb-16	1.1	139	-1.0	-0.2	0.2					
22-Mar-16	1.1	139	-1.0	-0.2	0.2					
23-May-16	2.1	135	-2.1	-0.4	-0.9					
02-Sep-16	2.3	131	-2.3	-0.2	-1.4					
15-May-17										
25-Aug-17	0.3	301	0.3	0.0	-0.3					

	LYNX-14-12 Upstream Cr.					LYNX-14-13 Downstream Cr.				
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.3	18	0.2	0.2	0.0	0.4	34	0.2	0.3	0.0
03-Mar-15	0.1	0	0.1	0.1	-0.6	0.1	315	0.1	0.0	0.1
27-May-15	0.4	166	-0.4	-0.1	-1.4	0.9	180	-0.8	-0.5	-1.1
02-Jul-15	0.4	153	-0.4	0.0	-1.7	0.9	167	-0.9	-0.3	-0.9
06-Aug-15	0.3	162	-0.3	-0.1	-1.8	1.0	156	-1.0	-0.1	-1.3
03-Sep-15	0.9	252	0.2	-0.9	-1.9	1.4	234	-0.1	-1.4	-1.2
11-Sep-15	0.5	169	-0.5	-0.2	-2.0	1.0	174	-0.9	-0.4	-0.5
01-Oct-15	0.4	180	-0.3	-0.2	-1.7	0.9	174	-0.8	-0.4	-0.3
17-Nov-15	1.2	114	-1.0	0.7	-2.2	#N/A	#N/A	#N/A	#N/A	#N/A
06-Jan-16	2.0	108	-1.5	1.3	-2.7	1.9	126	-1.7	0.7	-1.5
02-Feb-16	0.8	113	-0.6	0.4	-2.4	1.3	135	-1.2	0.3	-0.8
22-Mar-16	1.0	143	-1.0	0.1	-2.6	1.2	175	-1.1	-0.5	-0.9
23-May-16	0.7	164	-0.7	-0.2	-3.0	1.3	162	-1.2	-0.3	-1.3
02-Sep-16	0.8	187	-0.6	-0.5	-3.5	1.5	160	-1.5	-0.3	-1.5
15-May-17	1.4	144	-1.4	0.1	-3.7	2.1	146	-2.1	0.1	-1.7
25-Aug-17	1.0	156	-1.0	-0.1	-4.1	1.5	148	-1.5	0.0	-2.3

	LYNX-14-14 Upstream Cr.					LYNX-14-15 Downstream Cr.				
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.3	45	0.1	0.3	0.0	0.3	0	0.3	0.2	0.2
03-Mar-15	0.2	90	-0.1	0.2	-0.3	0.4	333	0.4	0.0	0.2
27-May-15	1.1	158	-1.1	-0.2	-1.5	0.8	187	-0.6	-0.5	-0.9
02-Jul-15	1.2	160	-1.1	-0.2	-1.9	0.8	173	-0.7	-0.3	-0.8
06-Aug-15	1.5	148	-1.5	0.0	-2.2	0.8	166	-0.8	-0.2	-0.8
03-Sep-15	1.1	214	-0.5	-1.0	-2.3	1.7	263	0.7	-1.6	-0.6
11-Sep-15	1.5	157	-1.5	-0.2	-2.6	0.9	193	-0.7	-0.6	-1.0
01-Oct-15	1.6	140	-1.5	0.2	-1.8	0.3	198	-0.2	-0.2	0.1
17-Nov-15	2.3	137	-2.3	0.5	-2.5					
06-Jan-16	3.2	129	-3.0	1.1	-3.7	1.0	114	-0.8	0.6	0.3
02-Feb-16	2.1	131	-2.0	0.7	-2.9	0.4	326	0.4	0.0	1.3
22-Mar-16	2.4	145	-2.4	0.2	-2.9	0.8	247	0.1	-0.8	1.6
23-May-16	2.2	146	-2.2	0.1	-3.9	1.1	260	0.4	-1.0	0.8
02-Sep-16	2.8	142	-2.8	0.3	-4.4	0.9	252	0.2	-0.9	0.5
15-May-17	2.9	148	-2.9	0.1	-4.0	Destroyed				
25-Aug-17	2.5	146	-2.5	0.1	-5.0					

	LYNX-14-16 Upstream Cr.					LYNX-14-17 Downstream Cr.				
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.2	153	-0.2	0.0	0.0	0.4	214	-0.2	-0.3	-0.9
03-Mar-15	0.5	202	-0.3	-0.4	-0.5	0.7	207	-0.4	-0.6	0.0
27-May-15	1.3	176	-1.2	-0.6	-1.8	0.3	108	-0.2	0.2	-0.9
02-Jul-15	1.3	184	-1.1	-0.8	-2.4	0.8	157	-0.8	-0.1	-0.9
06-Aug-15	1.5	169	-1.4	-0.5	-2.4	0.3	108	-0.2	0.2	-0.9
03-Sep-15	1.7	239	0.0	-1.7	-2.4	0.7	146	-0.7	0.0	-1.2
11-Sep-15	1.6	187	-1.3	-1.0	-2.6	#N/A	#N/A	#N/A	#N/A	#N/A
01-Oct-15	1.4	180	-1.2	-0.7	-2.3	1.1	158	-1.1	-0.2	-1.2
17-Nov-15	2.1	155	-2.1	-0.2	-2.4	1.4	172	-1.3	-0.5	-0.6
06-Jan-16	3.7	154	-3.7	-0.3	-3.1	1.3	162	-1.2	-0.3	-0.8
02-Feb-16	2.5	173	-2.3	-1.0	-2.1	0.2	117	-0.2	0.1	0.0
22-Mar-16	#N/A	#N/A	#N/A	#N/A	#N/A	0.9	117	-0.8	0.5	-0.8
23-May-16	2.6	191	-2.0	-1.8	-2.1	0.9	148	-0.9	0.0	-1.1
02-Sep-16	2.8	184	-2.3	-1.6	-3.2	1.0	135	-1.0	0.2	-1.3
15-May-17	3.9	178	-3.4	-1.9	-3.8	Destroyed				
25-Aug-17	3.2	184	-2.6	-1.8	-3.8					

	LYNX-14-18 Upstream Cr.					LYNX-14-19 Downstream Cr.				
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.6	99	-0.4	0.5	0.0	0.3	270	0.2	-0.3	-0.5
03-Mar-15	0.6	355	0.5	0.2	-0.1	0.6	219	-0.2	-0.6	-0.3
27-May-15	0.5	158	-0.5	-0.1	-1.6	0.1	180	-0.1	-0.1	-0.8
02-Jul-15	0.5	158	-0.5	-0.1	-1.9	0.6	180	-0.5	-0.3	-0.7
06-Aug-15	0.6	149	-0.6	0.0	-2.1	0.1	225	0.0	-0.1	-0.9
03-Sep-15	1.4	282	1.0	-1.0	-2.2	0.6	171	-0.6	-0.2	-1.0
11-Sep-15	0.5	204	-0.3	-0.4	-2.1	#N/A	#N/A	#N/A	#N/A	#N/A
01-Oct-15	0.4	214	-0.2	-0.3	-2.6	0.9	180	-0.8	-0.5	-1.2
17-Nov-15	1.9	122	-1.7	0.9	-2.3	0.9	186	-0.7	-0.5	-1.2
06-Jan-16	3.3	125	-3.0	1.3	-2.3	1.0	197	-0.7	-0.8	-1.0
02-Feb-16	1.5	127	-1.4	0.6	-1.4	0.8	203	-0.4	-0.6	-1.4
22-Mar-16	2.0	131	-1.9	0.6	-1.6	0.8	173	-0.7	-0.3	-0.9
23-May-16	1.1	146	-1.1	0.1	-2.0	0.8	194	-0.6	-0.6	-1.6
02-Sep-16	1.1	142	-1.1	0.1	-3.1	0.5	169	-0.5	-0.2	-1.3
15-May-17	2.2	141	-2.2	0.3	-1.9	0.3	136	-0.3	0.1	-0.9
25-Aug-17	1.1	142	-1.1	0.1	-3.0	Destroyed				

	LYNX-14-20 Upstream Cr.					LYNX-14-21 Downstream Cr.				
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	#N/A	#N/A	#N/A	#N/A	#N/A	0.5	292	0.4	-0.3	0.0
03-Mar-15	0.5	202	-0.3	-0.4	-0.6	0.9	243	0.1	-0.9	0.1
27-May-15	0.0	#DIV/0!	0.0	0.0	-1.1	0.6	239	0.0	-0.6	-0.4
02-Jul-15	0.4	194	-0.3	-0.3	-1.3	0.7	225	-0.2	-0.7	-0.3
06-Aug-15	0.1	270	0.1	-0.1	-1.4	0.5	259	0.2	-0.5	-0.4
03-Sep-15	0.4	207	-0.2	-0.4	-1.6	0.5	233	-0.1	-0.5	-0.6
11-Sep-15	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
01-Oct-15	0.7	188	-0.5	-0.4	-1.7	0.7	214	-0.3	-0.7	-0.5
17-Nov-15	0.9	180	-0.8	-0.5	-1.6	1.2	228	-0.2	-1.2	0.1
06-Jan-16	1.1	175	-1.0	-0.5	-2.1	1.0	233	-0.1	-1.0	-0.2
02-Feb-16	0.5	158	-0.5	-0.1	-1.9	1.0	270	0.5	-0.9	-0.1
22-Mar-16	1.1	158	-1.1	-0.2	-1.9	0.7	225	-0.2	-0.7	-0.1
23-May-16	1.0	186	-0.8	-0.6	-2.4	0.8	263	0.3	-0.7	-0.1
02-Sep-16	0.4	135	-0.4	0.1	-2.5	0.9	234	-0.1	-0.9	-0.1
15-May-17	0.9	139	-0.9	0.2	-1.5	0.3	289	0.2	-0.2	0.1
25-Aug-17	1.4	168	-1.4	-0.5	-3.6	3.6	190	-2.7	-2.3	-4.8

	LYNX-14-22 Upstream Cr.					LYNX-14-23 Downstream Cr.				
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.3	288	0.2	-0.2	-0.5	0.2	297	0.0	0.2	-0.1
03-Mar-15	0.6	239	0.0	-0.6	-0.5	0.4	297	0.0	0.4	0.0
27-May-15	0.1	270	0.1	-0.1	-1.2	0.3	342	-0.2	0.2	-0.6
02-Jul-15	0.4	214	-0.2	-0.3	-1.2	0.1	270	0.1	0.1	-0.4
06-Aug-15	0.3	288	0.2	-0.2	-1.4	0.5	349	-0.4	0.4	-0.6
03-Sep-15	0.3	252	0.1	-0.3	-1.6	0.2	333	-0.1	0.2	-0.8
11-Sep-15	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
01-Oct-15	0.7	196	-0.5	-0.5	-1.6	0.1	225	0.1	0.0	-0.8
17-Nov-15	0.6	211	-0.3	-0.5	-1.5	0.3	288	0.1	0.3	-0.7
06-Jan-16	0.4	124	-0.3	0.2	-2.8	0.2	63	-0.2	-0.1	-0.7
02-Feb-16	0.2	27	0.1	0.2	-2.5	0.8	7	-0.7	0.3	-0.7
22-Mar-16	0.7	153	-0.7	-0.1	-2.2	0.4	56	-0.3	-0.1	-0.6
23-May-16	0.3	135	-0.3	0.1	-2.7	0.4	0	-0.3	0.2	-0.9
02-Sep-16	0.4	124	-0.3	0.2	-2.8	0.3	72	-0.2	-0.2	-1.1
15-May-17	0.6	129	-0.6	0.2	-2.4	1.0	36	-1.0	-0.1	-0.7
25-Aug-17	1.5	169	-1.4	-0.5	-4.2	0.3	288	0.1	0.3	-2.0

	LYNX-14-24 Upstream Cr.					LYNX-14-25 Downstream Cr.				
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial										
12-Jan-15	0.4	214	0.4	0.0	-0.2	0.2	297	0.0	0.2	-0.3
03-Mar-15	0.7	225	0.7	0.2	-0.4	0.7	225	0.7	0.2	-0.4
27-May-15	0.4	256	0.3	0.3	-0.6	0.3	288	0.1	0.3	-0.4
02-Jul-15	0.4	225	0.4	0.1	-0.6	0.4	243	0.4	0.2	-0.3
06-Aug-15	0.5	281	0.2	0.5	-0.8	0.5	281	0.2	0.5	-0.3
03-Sep-15	0.5	248	0.4	0.3	-1.0	0.3	270	0.2	0.3	-0.6
11-Sep-15	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
01-Oct-15	0.9	216	0.9	0.0	-0.9	0.4	236	0.3	0.1	-0.5
17-Nov-15	0.6	231	0.6	0.2	-0.8	0.3	270	0.2	0.3	-0.4
06-Jan-16	1.1	285	0.3	1.1	-1.2	1.1	285	0.3	1.1	-1.2
02-Feb-16	0.5	259	0.4	0.4	-0.4	#N/A	#N/A	#N/A	#N/A	#N/A
22-Mar-16	0.9	207	0.9	-0.1	-0.5	0.1	90	-0.1	-0.1	-1.7
23-May-16	0.7	225	0.7	0.2	-0.8	0.2	0	-0.2	0.1	-2.0
02-Sep-16	0.7	207	0.7	-0.1	-1.0	0.5	53	-0.5	-0.2	-2.1
15-May-17	0.7	230	0.7	0.2	-0.6	0.6	35	-0.6	0.0	-1.6
25-Aug-17	1.5	222	1.5	0.2	-2.3	2.7	329	-1.2	2.4	-3.3

	LYNX-14-26 Upstream Cr.				
	Magnitude (cm)	Direction 2 (deg)	Transverse[3] (cm)	Longitudinal[4] (cm)	Vertical[5] (cm)
Initial					
12-Jan-15	1.7	294	0.3	1.7	-0.1
03-Mar-15	1.7	324	-0.6	1.6	-0.6
27-May-15	1.5	307	-0.1	1.5	-0.9
02-Jul-15	1.3	297	0.1	1.3	-1.0
06-Aug-15	1.6	305	-0.1	1.6	-1.1
03-Sep-15	1.5	302	0.0	1.5	-1.5
11-Sep-15	#N/A	#N/A	#N/A	#N/A	#N/A
01-Oct-15	1.3	293	0.2	1.3	-1.3
17-Nov-15	1.4	295	0.2	1.4	-1.1
06-Jan-16	1.0	287	0.3	1.0	-1.7
02-Feb-16	1.5	307	-0.1	1.5	-1.2
22-Mar-16	1.1	285	0.3	1.1	-1.2
23-May-16	#N/A	#N/A	#N/A	#N/A	#N/A
02-Sep-16					
15-May-17	0.1	30	-0.1	0.0	0.4
25-Aug-17	0.9	333	-0.5	0.8	-2.0

Memo

Date: 30 March 2018

To: Nicole Pesonen

From: [redacted]

CC: Christine Peters, Dan Hughes-Games

Ref: NX14001B.2017

Re: **Nyrstar Myra Falls Tailings Management Facilities**
Q4-2017 Dam Safety Monitoring Data Update

1.0 BACKGROUND

Amec Foster Wheeler Environment & Infrastructure (Amec Foster Wheeler) was retained by Nyrstar Myra Falls (NMF) to receive, process and review the monitoring data from the Myra Falls Mine tailings management facilities on a quarterly basis as part of the dam operation and surveillance program. This memorandum includes a brief review of the monitoring data collected throughout the fourth quarter of 2017 (Q4-2017), which included:

- Rainfall and temperature records
- Vibrating wire piezometer (VWP) readings
- Slope Inclinometer readings

The updated monitoring data is presented in a series of figures and tables included in Attachments A through D.

Provision of background information is not the purpose of this memorandum. The reader is referred to the annual Dam Safety Inspection (DSI) reports, annual construction reviews, OMS manual and design reports for further details on the facility design, development and operation.

2.0 DATA RECEIVED AND REVIEWED

A summary of data received and reviewed is provided in Table 1, together with information on the source, format, reading frequency, time range and gaps, if any.

Amec Foster Wheeler Environment & Infrastructure,
a Division of Amec Foster Wheeler Americas Limited
4385 Boban Drive
Nanaimo, BC, V9T 5V9
Tel: 250-758-1887
amecfw.com

Table 1 – Monitoring Data Source and Status

Monitoring Data Type	Source (Acquisition Mode)	Format Received	Reading Frequency	Responsible	Remarks
Weather data from Paste Plant	Automated readings	Raw data logger download (Excel)	Daily, hourly	NMF	Missing data between 25 and 31 of December
VWP readings for Lynx TDF	Automated readings	Raw data logger download (Excel)	Hourly	NMF	Missing data between 26 November and 31 December. See section 4.1.2. Piezometer Damage
VWP readings for Old TDF (old VWP)	Automated readings, Huts A, B, and C	Raw data logger download (Excel)	Hourly	NMF	Missing data between November 17 and December 31. See section 4.1.2. Piezometer Damage
New VWP at the Old TDF	Automated readings	Raw data logger download (Excel)	Hourly	NMF	Missing data between October 1 and December 31 See section 4.1.2. Piezometer Damage
Deformation monuments for both Lynx and Old TDF	Land survey, total station	Excel	Quarterly	NMF	Survey not completed during Q4
Tailings surface (Lynx TDF)	Land survey, GPS and total station reflectorless	LandXML surface	Quarterly	NMF	Survey not completed during Q4
Slope Inclinometer	Slope inclinometer device	RPP file, Excel file	Twice annually	Amec Foster Wheeler Site Engineer	BH14-08A was surveyed twice during the quarter

3.0 WEATHER DATA

Weather data for the mine site is collected from the Paste Plant station. The Paste Plant station automatically collects hourly rainfall, snow pack, relative humidity, temperature, and wind data. Precipitation data was collected from the Powerhouse station up to 2015 and has since been used only periodically to record weather data at the mine site. Snowfall is calculated as the daily difference in average snow pack, which is converted in water equivalent (10 mm of snow equals 1 mm of rain) to calculate total daily precipitation.

Monthly average and extreme temperature values are presented in Attachment A. Monthly precipitation records and statistics since 1979 as well as daily rainfall records over the quarter are also included in Attachment A.

Monthly precipitation totals were above average for both October and November. The rainfall for both months varied from the average by more than 1 standard deviation. Weather data between December 25 and December 31 was not available, therefore precipitation data for December is incomplete. The trend for the available data indicated December 2017 was dryer than normal.

The monthly maximum and minimum temperatures for October to December were within the range of maximum and minimum values for the previous record (2006 to 2016).

4.0 PIEZOMETERS

The Q4-2017 monitoring data update includes the automated monitoring of pore water pressure data from the vibrating wire piezometers at the Old TDF and Lynx TDF. The locations of these instruments are shown on Drawings 010703, 010704, and 010709 in the 2016 DSI report (Amec Foster Wheeler, 2017a)[1]. Cross-sections of the Old TDF and Lynx TDF along the major instrumentation planes are provided on Drawings 010705 through 010707 and 010711 through 010713 of the DSI report.

Atmospheric pressures are used to process the vibrating wire piezometer data as the frequency of vibration of the wire varies with pressure. There are two barometers at Myra Falls Mine one in the Lynx Hut and the other in Hut C. Generally atmospheric pressures from Lynx Hut are used to process the piezometer data on site. However, Lynx Hut is missing data after 25 November 2017. Unfortunately Hut C is also sporadically missing data between 25 November and 31 December. For times when atmospheric pressure was not recorded on site, atmospheric pressure readings from the Tofino Airport converted to the location of Myra Falls Mine were used to process the data[2].

[1] Amec Foster Wheeler Environment & Infrastructure (2017a). Myra Falls Tailings Storage Facilities 2016 Dam Safety Inspection Report. File No. NX14001B, Nanaimo, 31 March 2017.

2 US Standard Atmosphere, 1976: http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/19770009539.pdf

4.1 Lynx TDF

Lynx TDF piezometer network comprises:

- VWPs at various depths within the paste tailings of Lynx TDF
- VWPs in Lynx Dam fill
- VWPs in the shallow and deep foundation soils within Lynx Dam ultimate footprint

Two new piezometers were installed in the Lynx Spring Drain during Q4-2017 to measure water levels within the drain. The piezometers were installed on 9 December 2017, but have not been connected to the automated instrumentation system (RStar unit or Lynx Hut). The piezometers installed are:

- Piezometer VW44968, 1.0 MPa, was placed at Sta. 0+204 El. 344.4.
- Piezometer VW33780, 0.7 MPa, was placed at Sta. 0+249 El. 343.0.

4.1.1 Piezometer Results

Weekly maximum piezometer levels for Lynx TDF are presented in Tables 1 and 2 and shown on Figures 1 through 5 of Attachment B. Piezometer levels are reported in geodetic elevations but pressure heads (in metres of water) are plotted for few locations (see Figure 3b and 5) where VWP negative pressures (suction) have been observed.

The Lynx piezometer data generally followed a similar trend to previously recorded data for the Q4-2016 period.

Two VWPs on Plane F experiences new maximum pore pressures during the latter half of November. VWP 32221 is located near the Zone J stockpile and experienced a pore pressure of 325.35 m, which is 2.48 m higher than previously recorded maximum in June 2017. This increase in pore pressure is attributed to waste material being stockpiled in the area and is not of a magnitude that presents a dam safety concern. VWP 33784 is located below the crest of Lynx Dam and experienced a maximum pressure of 320.23 m on 25 November, this is 0.02 m higher than the previous recorded maximum from November 2016. This piezometer ceased functioning after this reading so it is unknown if pore pressures continued to rise. The elevated pore water pressure is assumed to be caused by heavy rains.

4.1.2 Piezometer Damage

During Q4-2017 the following Lynx TDF piezometers were damaged, disconnected from the automated system or stopped transmitting data:

- VWP 29325, 33781 and 33782 are missing data after 5 October 2017. These VWPs are connected to RStar unit 4797. This RStar unit was struck by an unknown object on 8 July 2017 damaging the RStar unit's antenna.

- VWP 29333 and 29323 were reconnected to RStar unit 4798 on 17 October 2017, however these piezometers did not start transmitting data.
- VWP 29331 intermittently missed data after 17 October 2017. The piezometer was disconnected and reconnected to the system on this day.
- VWP 29321 is missing data after 27 October 2017.
- Lynx Hut is missing data after 26 November 2017.
- Lynx RStar units sporadically missed data between 26 November and 31 December.

4.2 Old TDF

The Old TDF piezometer network comprises:

- VWPs under the outer embankment berm and in the upper tailings beach along instrumentation planes A and C (data collected in Hut A and Hut C).
- VWPs located below the base of the Paste Berm (data collected in Hut B).
- VWPs in the APA Paste Berm fill, foundation tailings and soils, divided between instrumentation Planes 1 through 6.
- VWPs in the paste tailings, in the southeast corner of the Amalgamated Paste Area (APA).
- VWPs at the base, southeast slope toe and east slope crest of the Old TDF Surge Pond.

4.2.1 Piezometer Results

Weekly maximum piezometer levels for Old TDF piezometers are presented in Tables 1 through 3 and Figures 1 through 14 of Attachment C. The piezometer levels are reported in pressure heads (in metres of water) and compared to the revised VWP thresholds. The VWP thresholds were revised in March 2017 to formulate a new rationale for threshold conditions based on estimated reductions in effective stress at each piezometer. The thresholds were developed based on the long-term static and post seismic stability models which include the closure cover over the facility (Amec Foster Wheeler, 2017b)[3].

The following threshold exceedances were noted:

<u>Plane A/Plane 1</u>

- A-2E and A-4E exceeded trigger points S3 and P1 throughout the quarter.
- A-26E and A28E exceed trigger points S1 or S2 and P1 throughout the quarter.
- VWP 3225 exceeded trigger point S1 and P1 during the latter half of November.
- VWP 36971 exceeded trigger points P1 throughout the quarter and S1 from mid-November through December.
- VWP 32232 exceeded trigger point P1 during the latter half of November.

[3] Amec Foster Wheeler Environment & Infrastructure (2017b). Old Tailings Facility Vibrating Wire Piezometer Threshold Update. Technical Letter, File No. NX14001B, Nanaimo, 17 March 2017.

Plane 3

- VWP 32233 exceeded trigger point P1, S1 and S2 during the latter half of December.

Plane C/Plane 5

- C-17E, VWP 32241, VWP 32238, C-35E, VWP 32224, C-36E, VWP 32222, VWP 17724 and VWP 17722 exceeded trigger points S1 or S2 and P1 during the latter half of the quarter.
- C-29E exceeded trigger point S3 and P1 for the quarter.
- C-31E exceeded trigger point S1 and P1 for the quarter.
- C-37E and VWP 17730 exceeded trigger point S1 or S2 and P1 from mid-October through December.

In general measured pressure head were consistent with trends observed during Q4-2016.

4.2.2 Piezometer Damage

During Q4-2017 construction the following Old TDF piezometers were damaged or stopped transmitting data:

- Hut B (P-1 to P-7 and P-11 to P-14) missed all readings between 17 November and 31 December, except for one reading collected on 25 December. The data is missing because the hut lost power due to a depleted battery.
- Hut C missed some readings during Q4, with all readings missed between 23 and 31 of December. The data is missing because the hut lost power due to a depleted battery.
- VW32222, VW32241 and VW17730 intermittently data during Q4. These VWPs are connected to RStar Unit 4294.

5.0 SLOPE INCLINOMETERS

Slope inclinometer casings are installed to monitor long-term deformations in the TDF foundation soils. Four inclinometer casing are located on site, BH15-32 and BH15-35 at the Old TDF and BH14-08a and BH14-10a at Lynx TDF. Locations of these casings can be found in Drawings 010708 and 010710 of the 2016 DSI report. Plots illustrating cumulative and incremental displacement measured during Q4-2017 are provided in Attachment D.

Numerous sources of error can occur during inclinometer profile surveys. Errors can be caused by the probe itself, or to its position at each of the depth intervals, which may be due to human error or independent movement of the casing from the surrounding soil mass following the base readings. Errors can be random or systematic. Systematic errors can be partially corrected to reduce influence on incremental displacement values. Random errors may also occur, such as sensor errors or variability in probe positioning due to the tolerances of the casing grooves. Random errors are generally not additive with depth or with time, but rather, cancel out. The reported accuracy of the probe is 0.2 mm horizontal deflection per 0.5 m length at each reading.

Displacements indicated by slope inclinometer readings are considered significant if the incremental displacement repeatably exceeds the measurement tolerance, and clear displacement trends are indicated on the incremental displacement plot versus time. Such trends

are also represented by an offset in the cumulative displacement data. In either case, slope inclinometer readings are interpreted and compared to movement measured from the surface monitoring monument network.

5.1.1 Lynx TDF Slope Inclinometers

The inclinometer casing for BH14-10a was damaged in September 2017, and was decommissioned by filling with bentonite chips in October 2017. As such a profile survey was not collected in Q4-2017. Note that the inclinometer at this location was installed in order to facilitate one-time downhole shearwave velocity measurements, and was not intended as a fundamental component of the monitoring network.

The casing for BH14-08A was raised 6 m as part of the Lynx Dam raise construction. The casing profile was surveyed prior to extension in October 2017. The survey indicated minor displacements with a maximum measured incremental displacement of 1 mm and a cumulative displacement of 10 mm. The displacement is in the upstream direction and located between 2 and 18 m below the dam crest. This movement is interpreted to be caused by consolidation of the tailings supporting the upstream dam buttress, which is anticipated and does not pose a dam safety concern. The profile survey shows up to 40 mm cumulative displacement between 0 and 2 m depth, however this movement is within the length of inclinometer casing above ground surface and does not indicate movement of the dam fill.

The inclinometer casing BH14-08A was surveyed in December following extension of the casing. This survey will be used as the new baseline to compare future surveys to.

5.1.2 Old TDF Slope Inclinometers

The fifth profile survey of the inclinometers installed in the Old TDF was completed in October 2017. Minimal displacement was observed in these inclinometers. Measured cumulative displacements were up to 10 mm in BH15-32 and 15 mm in BH15-35. The majority of the measured movement appears to be within 10 m of surface.

6.0 DEFORMATION MONUMENTS

The surface monuments were not surveyed in Q4-2017.

Survey monuments on Lynx TDF were removed in August 2017 as part of construction. At the time of writing the monuments have not been reinstated. Deformation monuments are a critical surveillance tool for monitoring dam safety. These deformation monuments should be reinstated and surveyed as soon as possible.

7.0 TAILINGS PRODUCTION AND STORAGE

NMF suspended its mining and milling operations in June 2015 for an indefinite period of time. No tailings production has taken place since that time. Tailings were not deposited in the facility during Q4-2017.

No paste survey was completed during Q4-2017. As such there is no tailings density and storage capacity update included in this report.

8.0 CLOSURE

This memorandum has been prepared for the exclusive use of Nyrstar Myra Falls for specific application to the area within this memorandum. Any use which a third party makes of this memorandum, 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 memorandum. It has been prepared in accordance with generally accepted geotechnical and tailings dam engineering practices. No other warranty, express or implied, is made.

Attachment A

Weather Data

Table\Figure Number	Title
Table 1	Monthly Precipitation Data by Year
Table 2	2017 Monthly Temperatures (˚C)
Figure 1	Monthly Precipitation at Myra Falls
Figure 2	Daily Rainfall at the Paste Plant Weather Station

amec foster wheeler

Table 1: Monthly Precipitation Data by Year

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual Total	
YEAR	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	Actual	Inferred
*1979						71	125	47	384	343	187	620		(2911)
1980	270	296	90	241	52	87	70	37	181	180	497	706	2706	
1981	346	428	118	278	114	125	78	63	310	450	466	412	3189	
1982	299	505	110	193	22	27	19	35	89	779	213	493	2783	
1983	530	624	375	84	42	130	95	60	60	218	619	193	3028	
*1984	399	520		263	193	32	9	40	95	576	340	220		(2944)
*1985	64	175	148	114	85	21	32	21	77					(1901)
*1986			418	88	239	89	41	4	54	590		390		(2994)
*1987		337	425	263	223	184	59	18	98	84	592	437		(3070)
1988	343	203	212	215	215	80	25	29	114	246	582	201	2467	
1989	329	102	224	198	63	72	42	42	18	339	250	253	1931	
1990	372	283	123	59	82	130	31	70	19	565	806	344	2883	
1991	353	543	86	126	80	28	33	207	8	60	596	610	2730	
1992	860	305	45	244	6	41	11	36	90	390	257	241	2527	
1993	57	55	289	207	148	64	77	92	1	180	141	393	1705	
*1994	258		203	149	79	137	6	47	74	219	380	499		(2321)
*1995	- no data -													
*1996	- no data -													
*1997		64	259	217	124	183	72	114	0	442	348	374		(2547)
1998	571	419	159	21	37	14	67	3	3	130	473	279	2175	
1999	219	295	174	96	50	16	1	114	55	138	667	183	2007	
2000	50	218	99	76	132	50	124	52	62	325	168	125	1479	
2001	333	123	144	107	132	38	38	163	67	200	519	367	2233	
2002	195	134	56	93	41	23	28	27	51	34	588	288	1557	
2003	471	61	412	177	50	51	44	30	45	558	94	348	2341	
2004	327	134	160	40	24	42	23	74	157	218	489	340	2026	
2005	433	70	223	396	306	58	100	54	98	515	268	522	3043	
2006	616	316	379	125	76	46	28	5	77	139	811	561	3176	
2007	538	288	438	208	75	129	71	69	167	410	491	416	3300	
2008	250	176	188	59	80	29	8	162	22	260	458	163	1854	
2009	140	139	291	91	171	44	35	17	165	321	882	258	2553	
2010	666	353	381	223	171	60	2	19	269	478	285	629	3535	
2011	284	327	528	166	80	12	82	42	340	295	478	200	2834	
2012	601	241	424	199	55	86	10	14	16	317	525	264	2752	
2013	96	267	168	112	125	66	3	125	277	57	227	100	1622	
2014	170	243	341	170	48	32	32	17	144	589	404	548	2740	
2015	259	332	460	105	35	15	20	149	217	262	248	700	2802	
*2016	469	374	507	81	17	63	31	61	87	501	935	No data		(3126)
*2017	25	240	377	260	55	36	9	2	32	638	851	88		(2612)
Num.	33	34	35	36	36	37	37	37	37	36	35	35	**28**	(37)
Avg.	349	270	258	160	98	65	43	58	109	330	461	373	**2573**	(2551)
St. Dev.	196	146	142	83	71	46	34	50	100	189	223	173	**565**	(533)
Max.	860	624	528	396	306	184	125	207	384	779	935	706	**3535**	(3535)
Min.	50	55	45	21	6	12	1	2	0	34	94	100	**1479**	(1479)

Notes: Compiled from daily observations recorded at the powerhouse weather station (Environment Canada) prior to 2015 and from the Paste Plant from 2015 onwards

Lime shading - dry (value < monthly mean - standard deviation)

Aqua shading - wet (value > monthly mean + standard deviation)

Peach shading - Precipitation data taken from the Paste Plant weather station.

* = years with incomplete data sets

Table 2: 2017 Monthly Temperatures (˚C)

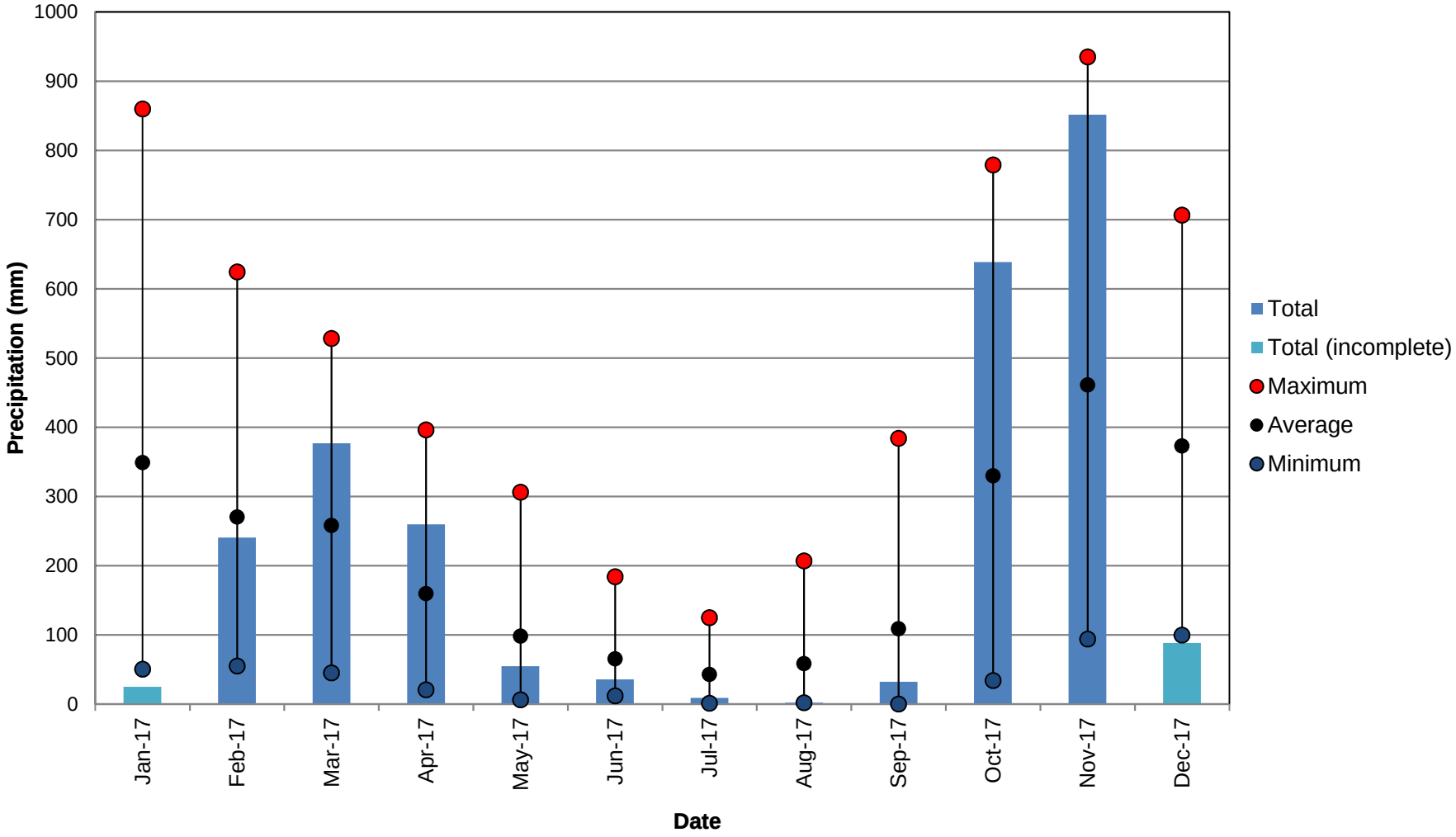
Month	Previous Period of Record[1]		2017[2]	
	Minimum	Maximum	Minimum	Maximum
January	-12.0	11.9	-5.3	8.7
February	-12.0	12.5	-7.2	11.8
March	-8.3	19.0	-7.4	13.9
April	-4.0	23.1	-2.0	15.9
May	-1.5	31.0	0.9	29.9
June	1.0	34.3	4.0	33.2
July	4.2	38.9	9.0	30.7
August	4.9	36.0	10.3	35.6
September	-1.0	32.0	3.2	**34.6**
October	-2.0	23.5	-0.3	20.8
November	-11.0	16.1	-6.2	13.9
December	-13.0	12.8	-6.8	5.6

[1] Temperature data obtained from Myra Falls site from 2006 to 25 December of 2017.

[2] Temperature data recorded at the Paste Plant weather station. Statistics from 25 January 2017 to 25 December 2017.

amec foster wheeler

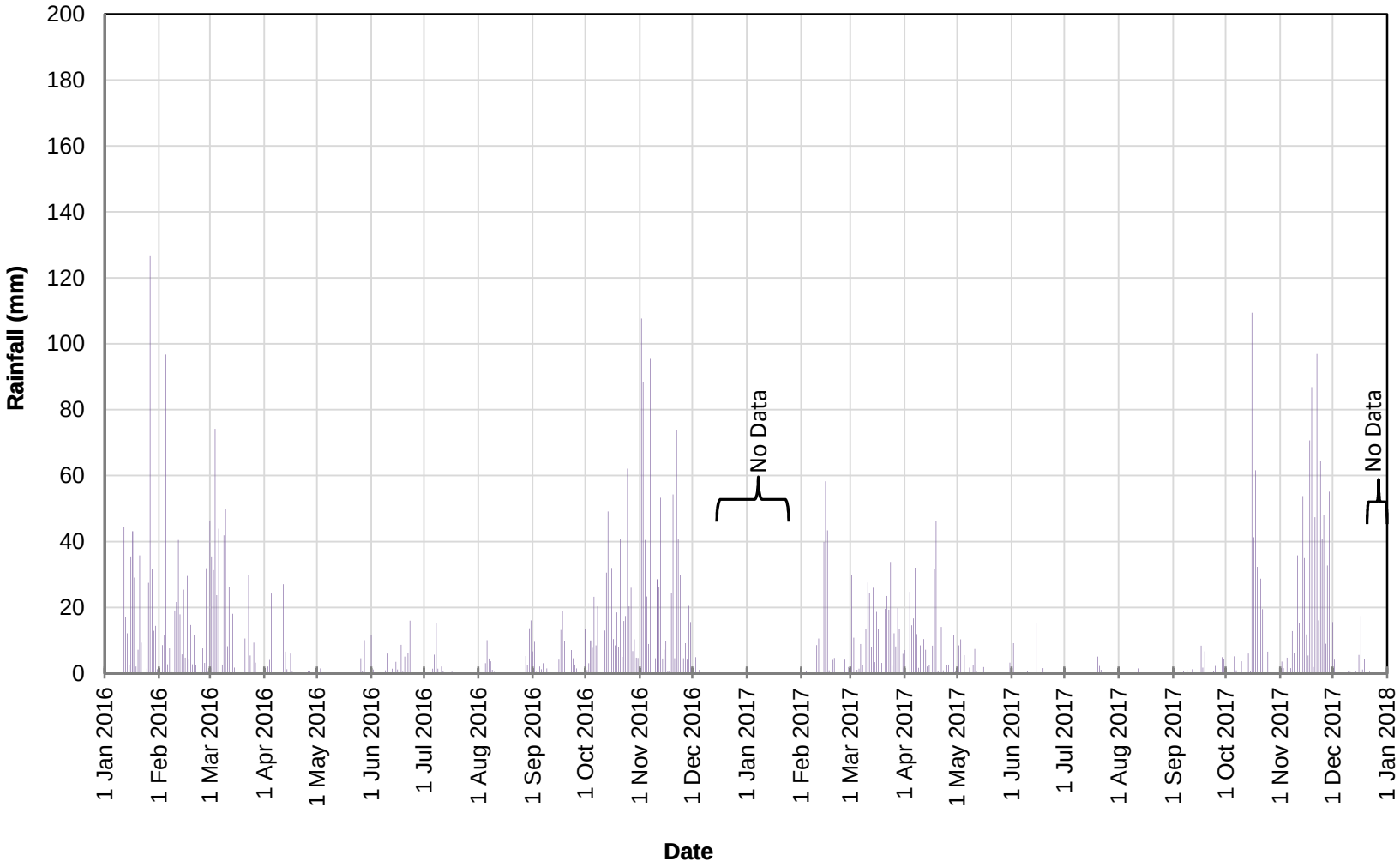
Figure 1: Monthly Precipitation at Myra Falls



File No.: NX14001B.2017

amec foster wheeler

Figure 2: Daily Rainfall at the Paste Plant Weather Station



File No.: NX14001B.2017

Attachment B

Lynx TDF VWP Data

Table\Figure Number	Title
Table 1	Lynx Paste Tailings - Weekly Maximum Vibrating Wire Piezometer Readings
Table 2	Lynx Dam - Weekly Maximum Vibrating Wire Piezometer Readings
Figure 1	Lynx TDF – Deep Paste VWP Data
Figure 2	Lynx TDF – Shallow Paste VWP Data
Figure 3a	Lynx Dam – Shallow Foundation VWP Data
Figure 3b	Lynx Dam – Shallow Foundation VWP Data
Figure 4	Lynx Dam – Deep Foundation VWP Data
Figure 5	Lynx Dam – Dam Fill VWP Data

Nyrstar Myra Falls
2017 Dam Safety Inspection
Attachment B

File No.: NX14001B.2017

Table 1: Lynx Paste Tailings - Weekly Maximum Vibrating Wire Piezometer Readings

Location	Lynx TDF - Upstream Dam Toe and Paste Tailings										
Plane and Position	Plane D - U/S Toe	Plane E - U/S Toe	Plane F - U/S Toe	Plane D, E - Central	Plane D, E - Central	Plane D, E - Central	Plane E - Central	Plane E - Central	Plane E - Central	Plane D, E - Central	Plane F - Central
Piezometer	29326	17723	17721	17727	17728	17733	17731	17732	17734	33783	31089
Historical Max. Value	353.00	353.54	354.79	341.20	335.50	323.96	345.75	340.40	327.38	354.11	353.68
Tip Elevation (m)	350.00	350.70	350.90	328.40	320.70	308.50	330.30	322.70	310.50	351.66	351.26
2017-10-01	*349.73*	*350.69*		336.28	329.10	314.05	340.48		316.51	353.29	
2017-10-08	*349.59*	*350.61*		336.27	329.08	313.99	340.47		316.44	353.24	
2017-10-15	*349.76*	351.74		336.57	329.59	314.90	340.69		317.75	353.78	
2017-10-22	*349.85*	351.73		336.77	330.40	316.68	340.82		320.40	353.74	
2017-10-29	*349.81*	351.78		336.99	330.63	316.99	341.15		320.73	353.54	
2017-11-05	*349.86*	351.82		336.98	330.60	316.95	341.27		320.69	353.55	
2017-11-12	*349.90*	351.92		337.14	331.14	317.53	341.38		321.77	353.63	
2017-11-19	*349.96*	352.20		337.77	332.38	318.99	341.97		324.64	354.05	
2017-11-26	350.02										
2017-12-03	*349.99*										
2017-12-10	350.72										
2017-12-17	350.15										
2017-12-24	*349.98*										

Legend:

330.05	Historical maximum value
328.29	Negative pore pressure (elevation head below tip elevation)
	Blank spaces indicate no data available

Table 2: Lynx Dam - Weekly Maximum Vibrating Wire Piezometer Readings

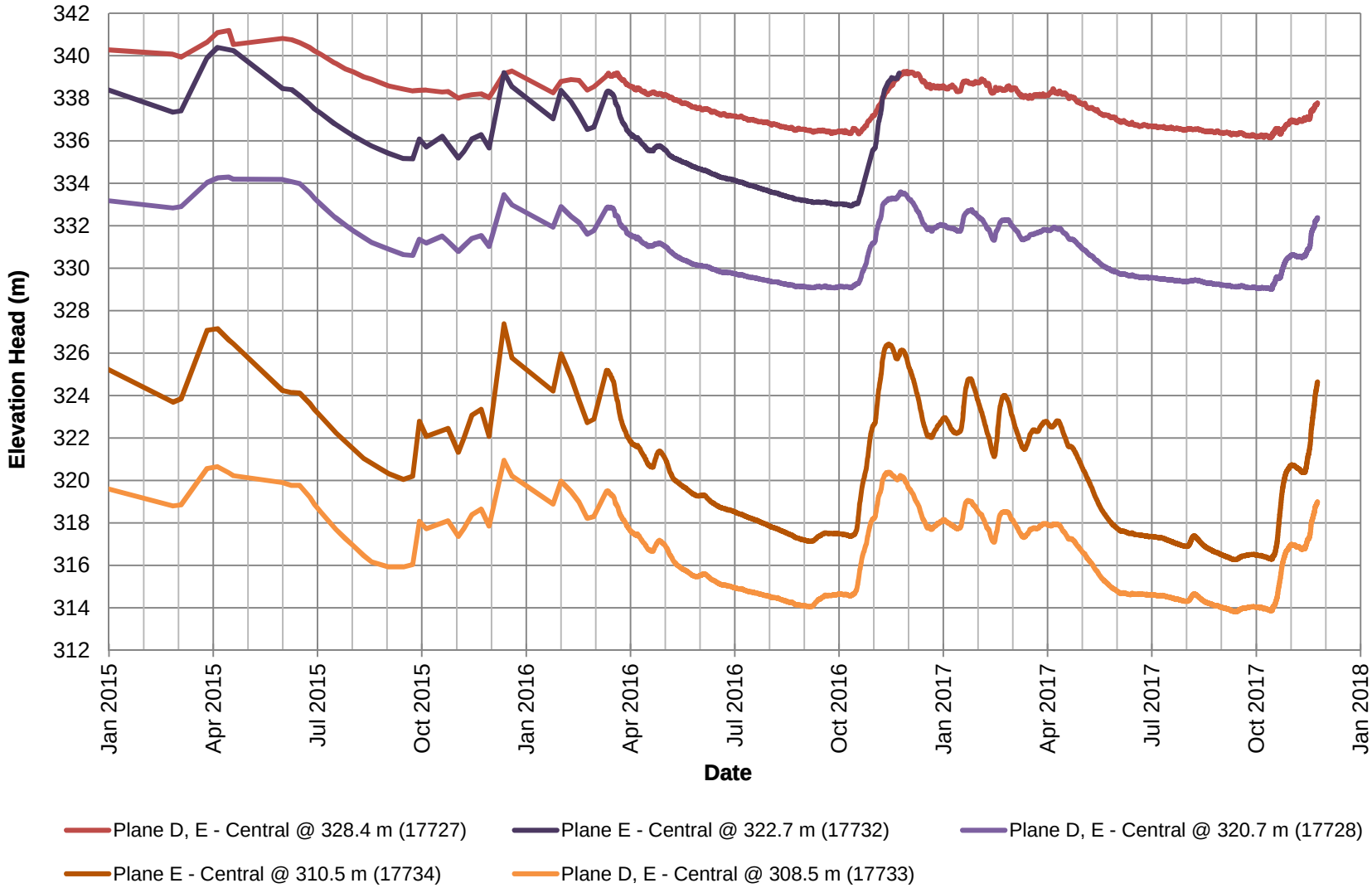
Location	Lynx Dam - Shallow Foundation								Lynx Dam - Deep Foundation									Lynx Dam Fill	
Plane and Position	Plane D - West Arm	Conveyor - Lynx Southwest	Plane E - South Arm	Plane E - South Toe	Plane F - South Arm	Plane F - South Toe	Plane F - Lynx South	Dam Toe - Lynx Southwest	Plane E - South Toe	Plane F - South Arm	Plane F - South Toe	Plane F - Lynx South	Plane F - Lynx South	Lynx Southeast	Lynx Southeast	Lynx Southeast	Plane F - South Arm	Plane F - South Arm	Plane E - South Arm
Piezometer	29334	29320	29335	29321	29330	29323	32221	29331	29332	29336	29333	17725	29324	29325	33781	33782	33784	29322	29329
Historical Max. Value	329.48	324.35	319.05	323.30	329.59	326.38	325.35	320.73	317.59	316.40	317.26	317.11	318.60	315.41	319.99	316.60	320.23	337.53	336.98
Tip Elevation (m)	328.40	323.50	315.90	322.40	328.40	326.10	318.55	306.30	305.20	311.10	296.70	278.30	311.60	304.30	314.40	294.45	311.85	337.30	336.90
2017-10-01	*328.15*	323.54	317.23	*322.39*	*328.38*		*318.27*	314.63	313.45	315.03		312.53	313.23	311.37	*313.85*	311.99	317.86	*337.20*	*336.65*
2017-10-08	*328.16*	323.55	317.22	*322.39*	*328.38*		*318.27*	314.56	313.45	315.03		312.47	313.17				317.87	*337.21*	*336.65*
2017-10-15	328.53	323.60	317.36	322.88	328.52		322.55	313.74	313.67	315.13		312.92	313.33				318.09	*337.29*	*336.70*
2017-10-22	328.50	323.56	317.32	322.80	328.45		322.63	315.11	313.79	315.35		313.00	313.42				318.50	*337.23*	*336.67*
2017-10-29	*328.21*	323.56	317.28		328.45		318.84	314.69	313.62	315.39		312.50	312.94				317.98	*337.22*	*336.74*
2017-11-05	*328.17*	323.56	317.23		328.42		321.63	314.04	313.05	315.16		312.13	312.50				317.67	*337.23*	*336.74*
2017-11-12	328.67	323.69	317.32		328.51		323.12	315.54	313.86	315.11		313.30	313.80				318.43	*337.27*	*336.77*
2017-11-19	329.09	324.30	317.92		328.47	326.19	325.11	319.55	316.16	315.96		316.32	317.58				320.23	*337.29*	*336.82*
2017-11-26	329.24	324.33				326.24	325.35		316.63			316.36	317.67						
2017-12-03	329.04	323.76				*326.10*	324.71		316.93			315.40	316.52						
2017-12-10	328.78	323.78				326.20	322.50		314.98			314.06	314.88						
2017-12-17	328.51	323.71				326.15	321.14		314.80			313.29	314.00	312.11	*314.16*	311.88			
2017-12-24	328.50	323.75				326.20	320.87		313.56			312.08	312.48	311.92	*314.13*	311.77			

Legend:

330.05	Historical maximum value
328.29	Negative pore pressure (elevation head below tip elevation)
	Blank spaces indicate no data available

amec foster wheeler

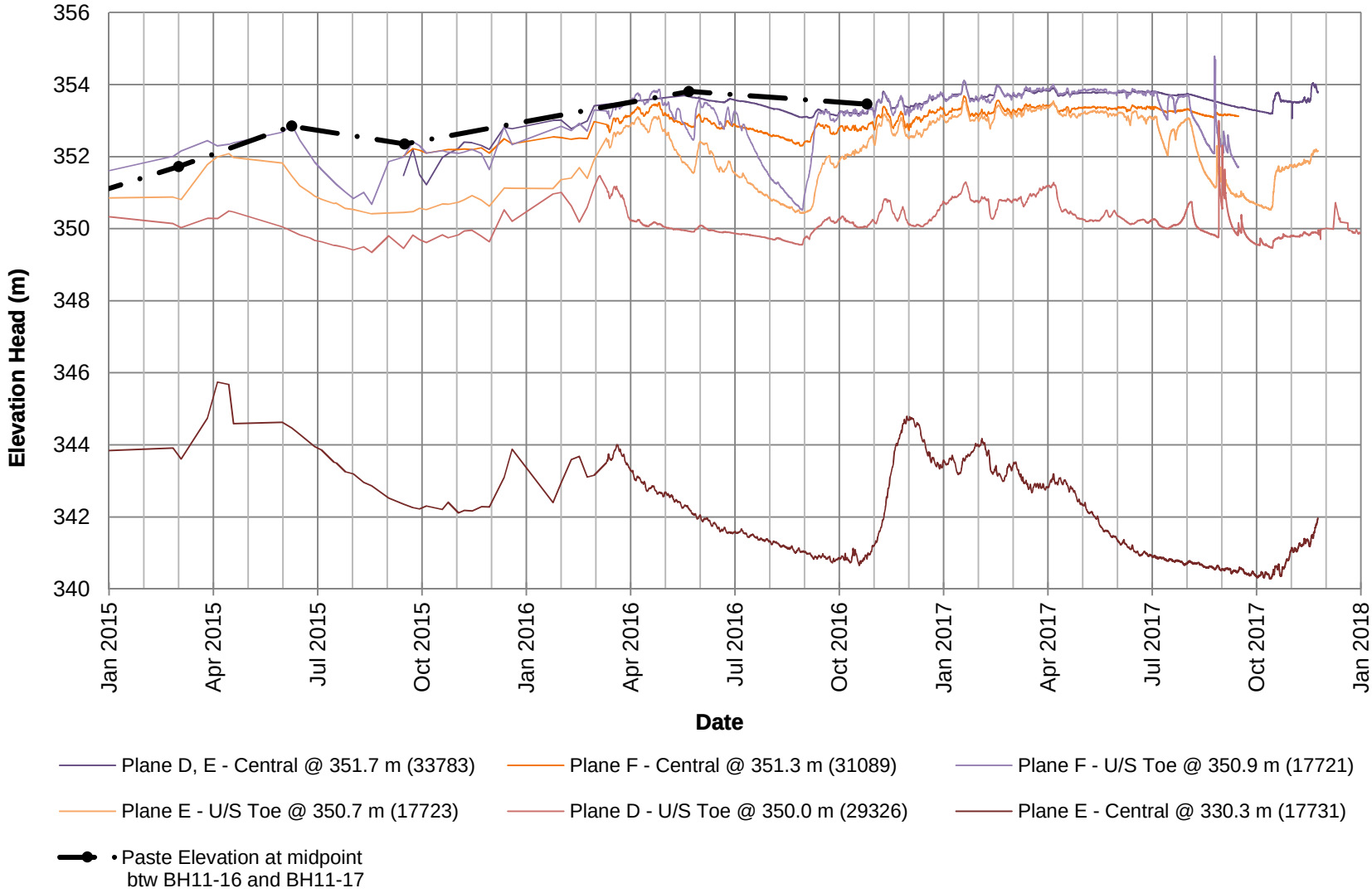
Figure 1: Lynx TDF - Deep Paste VWP Data



File No.: NX14001B.2017

amec foster wheeler

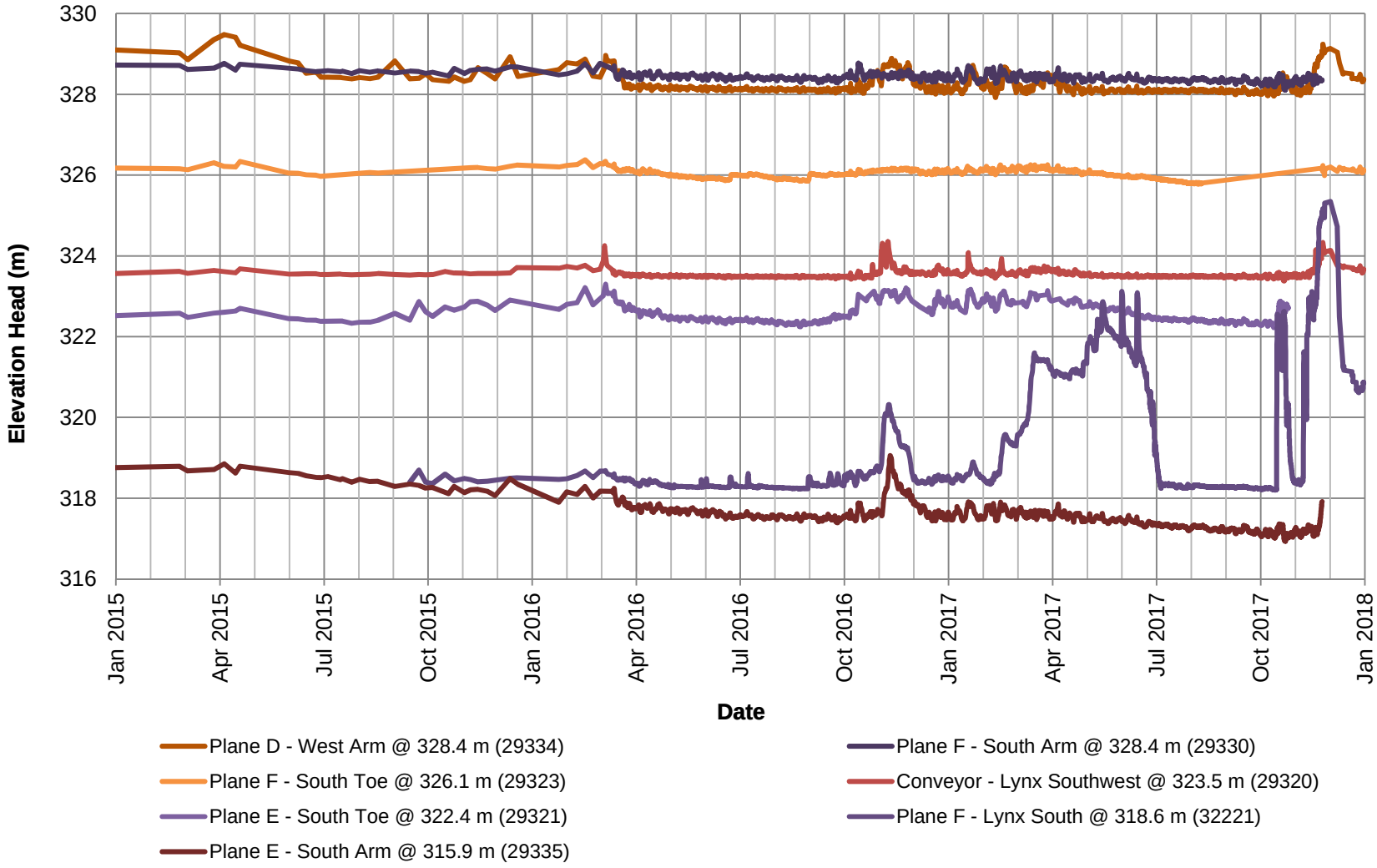
Figure 2: Lynx TDF - Shallow Paste VWP Data



File No.: NX14001B.2017

amec foster wheeler

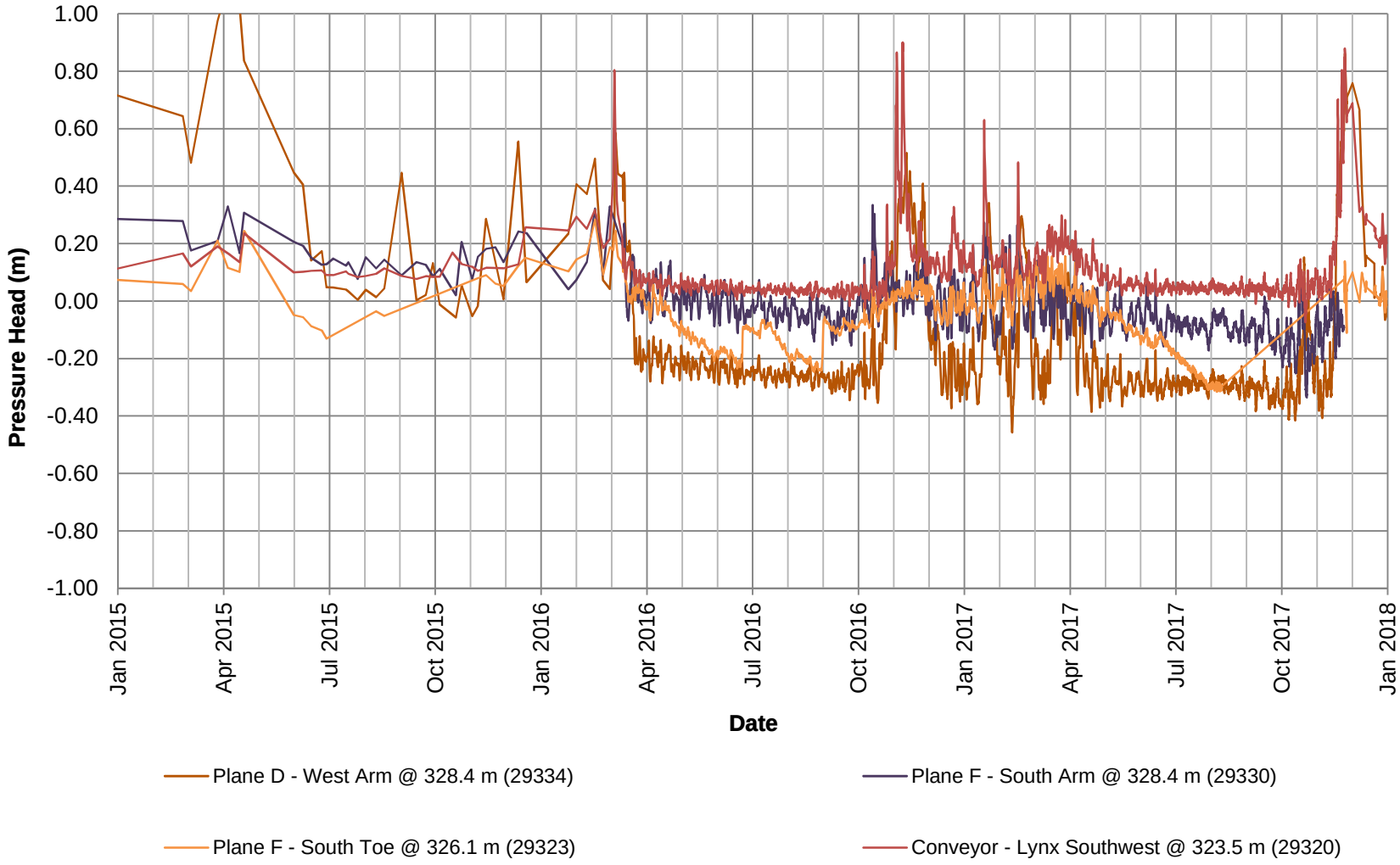
Figure 3a: Lynx Dam - Shallow Foundation VWP Data



File No.: NX14001B.2017

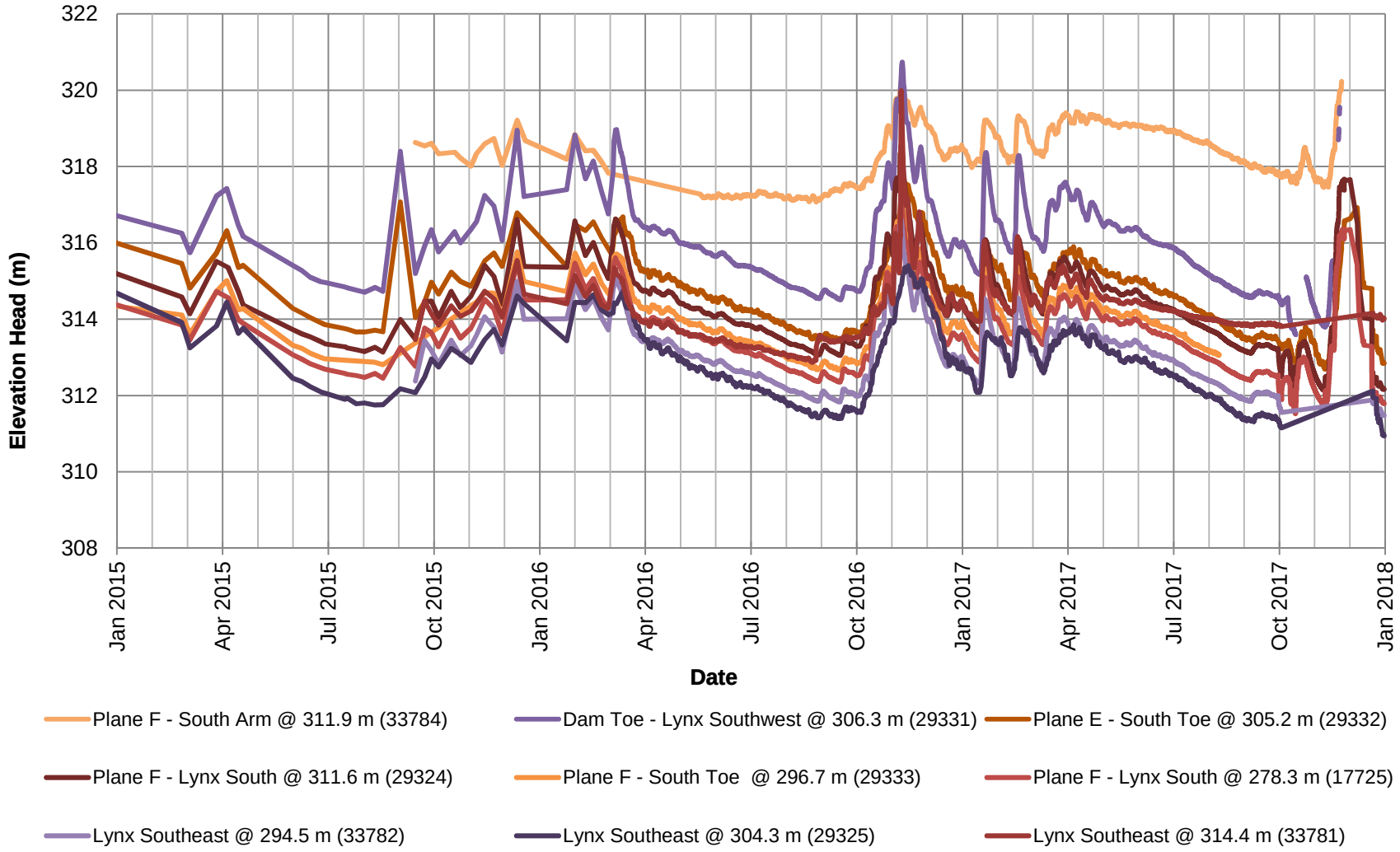
amec foster wheeler

Figure 3b: Lynx Dam - Shallow Foundation VWP Data



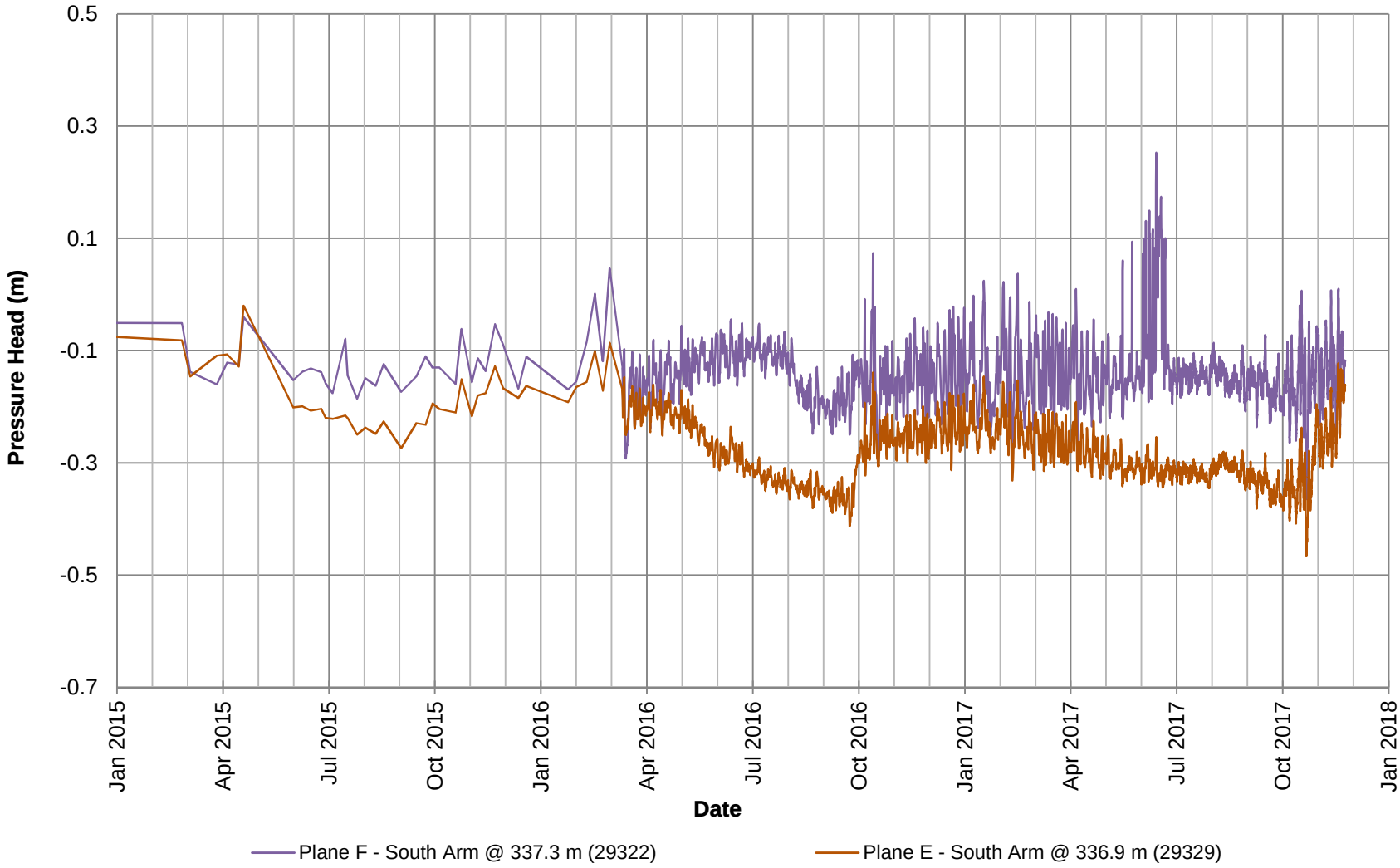
amec foster wheeler

Figure 4: Lynx Dam - Deep Foundation VWP Data



amec foster wheeler

Figure 5: Lynx Dam - Dam Fill VWP Data



File No.: NX14001B.2017

Attachment C

Old TDF VWP Data

Table\Figure Number	Title
Table 1	Old TDF - Instrument Plane A – Weekly Maximum VWP Pressure Head
Table 2	Old TDF – Instrument Planes 1, 3, 4, 6 and Outliers – Weekly Maximum VWP Pressure Head
Table 3	Old TDF – Instrument Plane 5 – Weekly Maximum VWP Pressure Head
Figure 1	Old TDF Piezometer Records – Plane 1
Figure 2	Old TDF Piezometer Records – Plane A, Outer Embankment Slope, Location 1
Figure 3	Old TDF Piezometer Records – Plane A, Outer Embankment Slope, Location 2
Figure 4	Old TDF Piezometer Records – Plane A, Outer Embankment Slope, Location 3
Figure 5	Old TDF Piezometer Records – Plane A Upper Tailings Beach
Figure 6	Old TDF Piezometer Records – Plane A Strip and Paste Berm
Figure 7	Old TDF Piezometer Records – Plane 3 and Plane 3/4
Figure 8	Old TDF Piezometer Records – Plane 4
Figure 9	Old TDF Piezometer Records – Plane 5 Outer embankment Slope, Location 1
Figure 10	Old TDF Piezometer Records – Plane 5 Outer Embankment Slope, Location 2 and Lower Tailings
Figure 11	Old TDF Piezometer Records – Plane 5 Outer Embankment Slope, Location 3
Figure 12	Old TDF Piezometer Records – Plane 5 Upper Tailings Beach
Figure 13	Old TDF Piezometer Records – Plane 5 Paste Berm and Upstream Tailings
Figure 14	Old TDF Piezometer Records – Plane 5/6 and Plane 6

Table 1: Old TDF - Instrument Plane A - Weekly Maximum VWP Pressure Head (m)

Location	Outer Embankment Slope - 1				Outer Embankment Slope - 2					Outer Embankment Slope - 3						Upper Tailings Beach							Strip and Paste Berm					
ID	A-5E	A-9E	A-13E	A-17E	A-2E	A-6E	A-10E	A-14E	A-18E	A-4E	32239	A-8E	A-12E	A-16E	A-20E	A-26E	A-27E	A-28E	A-30E	A-32E	A-31E	32220	A-33E	32231	32229	32225	P-11	P-12
Tip Elevation	310.4	311.7	313.4	317.0	305.4	310.9	312.3	313.4	316.8	305.2	310.3	311.0	312.3	313.6	316.7	323.7	323.9	325.2	324.8	327.7	327.8	328.6	327.5	330.2	325.9	328.6	332.6	326.6
Trigger Point S1	3.8	5.1	5.1	1.1	0.0	4.5	5.5	5.1	1.3	0.0	2.8	3.6	4.7	5.6	6.6	1.7	4.7	0.7	5.3	3.3	1.5	1.1	5.5	2.3	5.7	4.9	3.2	5.5
Trigger Point S2	4.4	6.5	6.5	2.6	2.1	5.3	7.2	6.5	2.8	2.2	3.5	4.4	6.0	7.5	7.5	2.4	6.6	1.1	7.0	4.2	3.2	2.5	7.5	2.9	7.5	6.7	4.1	7.5
Trigger Point S3	7.3	10.8	10.9	4.3	2.1	8.8	12.0	10.9	4.6	2.2	5.8	7.3	10.0	12.5	12.5	4.8	11.0	1.8	11.6	7.0	5.2	4.2	12.5	4.9	12.5	11.3	6.8	12.5
Trigger Point P1	***2.9***	***4.3***	***4.3***	***1.7***	***2.1***	***3.5***	***4.8***	***4.3***	***1.9***	***2.3***	***2.3***	***2.9***	***4.0***	***5.0***	***5.0***	***1.6***	***4.4***	***0.7***	***4.7***	***2.7***	***2.1***	***1.7***	***5.0***	***2.0***	***5.0***	***4.5***	***2.7***	***5.0***
2017-10-01	0.0	0.4	1.7	0.5	***4.3***	0.4	0.7	-0.4	-1.6	***3.7***	0.7	0.8	-2.6	1.6	0.2	***2.7***	2.6	***1.3***	-1.3	1.0	0.8	0.0	-0.4		1.5	1.7	0.1	0.1
2017-10-08	0.0	-0.4	1.7	0.5	***4.3***	0.4	0.7	-0.4	-1.6	***3.7***	0.7	0.8	-2.6	1.6	0.2	***2.6***	2.7	***1.3***	-1.4	1.0	0.8	0.0	-0.4		1.3	1.6	-0.1	0.1
2017-10-15	0.3	-0.4	1.8	0.6	***5.4***	0.5	0.8	-0.3	-1.6	***4.8***	0.8	1.0	-2.5	1.8	0.4	***2.7***	2.8	***1.4***	-1.0	1.1	0.9	0.0	0.1		1.6	1.6	-0.2	0.1
2017-10-22	0.3	-0.4	1.8	0.6	***5.1***	0.5	0.8	-0.4	-1.7	***4.6***	0.8	1.0	-2.5	1.7	0.3	***2.6***	2.8	***1.3***	-0.7	1.1	0.8	0.0	0.4		1.7	1.9	0.3	0.3
2017-10-29	0.1	-0.4	1.8	0.6	***4.7***	0.4	0.8	-0.3	-1.6	***4.1***	0.7	0.9	-2.5	1.7	0.3	***2.6***	2.8	***1.2***	-0.6	1.0	0.8	0.0	0.5		1.8	2.1	0.4	0.4
2017-11-05	0.0	-0.5	1.7	0.5	***4.4***	0.4	0.8	-0.4	-1.4	***3.8***	0.7	0.9	-2.5	1.6	0.3	***2.6***	2.8	***1.1***	-0.6	1.0	0.8	0.0	0.5		1.9	2.2	0.5	0.4
2017-11-12	0.4	-0.4	1.8	0.6	***5.3***	0.6	0.9	-0.3	-1.3	***4.8***	0.9	1.0	-2.4	1.7	0.4	***2.6***	3.0	***1.2***	-0.4	1.1	0.9	0.0	0.7		2.5	3.0	1.4	0.8
2017-11-19	1.4	0.0	1.8	0.6	***7.2***	1.4	0.8	0.4	-0.1	***6.8***	2.0	1.8	-1.7	2.0	0.3	***2.8***	2.9	***1.1***	0.1	1.1	0.8	0.1	1.0		3.5	***4.6***		
2017-11-26	1.6	0.2	1.9	0.7	***7.2***	1.6	1.0	0.7	0.8	***6.7***	2.3	2.0	-1.5	2.2	0.4	***3.3***	3.1	***1.1***	0.6	1.2	0.9	0.6	1.3		4.0	***5.1***		
2017-12-03	1.0	0.3	1.7	0.5	***5.8***	1.3	0.9	0.8	1.0	***5.4***	1.7	1.2	-1.7	2.0	0.3	***3.8***	3.3	***0.9***	0.8	1.0	0.7	1.0	1.4		4.0	***5.1***		
2017-12-10	0.6	0.4	1.7	0.5	***5.0***	1.1	0.9	0.8	1.0	***4.4***	1.1	0.8	-1.9	1.8	0.3	***4.1***	3.5	***0.9***	0.9	1.0	0.7	0.2	1.4		3.7	***4.7***		
2017-12-17	0.8	0.7	1.9	0.7	***4.9***	1.3	1.1	0.9	1.2	***4.3***	1.2	1.1	-1.8	2.0	0.5	***4.3***	3.7	***1.2***	1.1	1.2	0.9	0.2	1.5		3.6	***4.5***		
2017-12-24	0.7	0.8	1.8	0.7	***4.5***	1.2	1.1	0.9	1.2	***4.0***	1.1	1.0	-1.9	1.9	0.4	***4.3***	3.6	***1.2***	1.0	1.1	0.9	0.1	1.3		3.4	4.2		
2017-12-31	0.8	0.9	1.8	0.6	***4.6***	1.2	1.1	0.9	1.1	***4.0***	1.1	0.9	-1.9	1.9	0.3	***4.2***	3.5	***1.2***	0.9	1.1	0.8	0.2	1.2		3.3	4.1		

Nyrstar Myra Falls
2017 Dam Safety Inspection
Attachment C

File No.: NX14001B.2017

Table 2: Old TDF - Instrument Planes 1, 3, 4, 6 and Outliers - Weekly Maximum VWP Pressure Head (m)

Location		Plane 1					Plane 3				Plane 3/4		Plane 4				Plane 5/6		Plane 6			
Piezometer	32228	36971	36973	36972	32232	P-10	32233	21715	P-13	P-14	P-1	P-2	1204	32237	P-3	P-4	P-5	P-6	32219	32226	32230	32236
Tip Elevation	331.4	325.7	319.7	328.0	329.4	326.9	332.4	329.3	332.2	326.7	324.4	329.4	329.3	332.4	324.3	329.3	325.1	329.4	335.2	330.6	328.8	330.4
Trigger Point S1	3.2	4.4	3.7	3.8	3.5	4.3	1.7	7.5	6.4	9.0	9.0	7.5	8.7	1.7	11.0	9.5	14.3	14.9	7.9	13.5	14.1	9.0
Trigger Point S2	5.1	6.4	5.2	5.6	5.4	6.3	1.8	8.3	7.1	10.0	10.0	8.4	10.3	2.1	13.0	10.8	15.5	16.1	8.6	14.5	15.2	9.5
Trigger Point S3	7.0	8.4	6.9	7.5	7.3	8.3	2.5	10.8	9.1	13.0	13.0	11.0	12.5	2.5	16.0	13.2	17.8	18.5	9.9	16.6	17.2	11.2
Trigger Point P1	***2.3***	***3.4***	***2.9***	***2.8***	***2.5***	***3.3***	***1.4***	***6.3***	***5.3***	***7.5***	***7.5***	***6.3***	***8.6***	***1.8***	***11.0***	***9.2***	***12.4***	***12.9***	***6.9***	***11.6***	***12.2***	***7.8***
2017-10-01		***4.2***	-3.0		-0.5		-0.1		-0.9	-0.8	-1.8	-1.8	0.7	-4.1	0.2	1.3	1.9	0.8	-0.9	-2.4	-1.4	-1.7
2017-10-08		***4.2***	-3.0		-0.6		-0.1		-1.0	-0.8	-1.8	-2.0	0.7	-4.3	0.2	1.2	1.7	0.6	-0.9	-2.6	-1.7	-1.8
2017-10-15		***4.3***	-3.0		0.7		0.1		-0.4	-0.8	-1.7	-1.2	0.9	-0.1	0.4	1.3	3.9	2.9	-0.7	2.1	2.3	2.1
2017-10-22		***4.2***	-3.0		1.1		0.2		0.2	-0.7	-1.5	-0.4	0.9	0.0	0.3	1.3	4.6	3.5	-0.6	2.3	2.7	2.4
2017-10-29		***4.3***	-3.1		1.1		0.0		0.2	-0.7	-1.4	-0.2	1.1	0.0	0.3	1.2	4.6	3.5	-0.6	2.1	2.3	2.0
2017-11-05		***4.3***	-3.1		1.0		0.0		0.2	-0.7	-1.4	-0.2	1.1	0.0	0.3	1.2	4.1	3.2	-0.7	1.6	1.4	1.3
2017-11-12		***4.4***	-3.1		2.0		0.3		0.9	-0.2	-1.3	0.0	1.5	0.6	0.4	1.3	5.8	5.1	0.3	4.5	4.6	4.0
2017-11-19		***4.8***	-3.0		***2.8***		0.7						2.1	1.1					4.4	6.7	6.3	5.3
2017-11-26		***5.1***	-2.9		***2.9***		0.9						2.3	1.2					3.6	6.4	6.2	5.2
2017-12-03		***5.1***	-2.8		2.5		0.9						2.3	1.0					1.5	3.9	4.3	3.7
2017-12-10		***5.1***	-2.9		2.0		1.4						2.2	0.5					0.2	2.4	2.5	2.0
2017-12-17		***5.2***	-2.8		1.9		***1.7***						2.3	0.5					0.0	2.1	2.0	1.6
2017-12-24		***5.1***	-2.9		1.7		***1.8***		1.5	0.1	-1.0	0.4	2.2	0.3	0.3	1.6	4.4	3.6	-0.2	2.1	2.3	2.2
2017-12-31		***5.0***	-2.9		1.4		***1.4***						2.1	0.2					-0.3	1.8	1.7	1.2

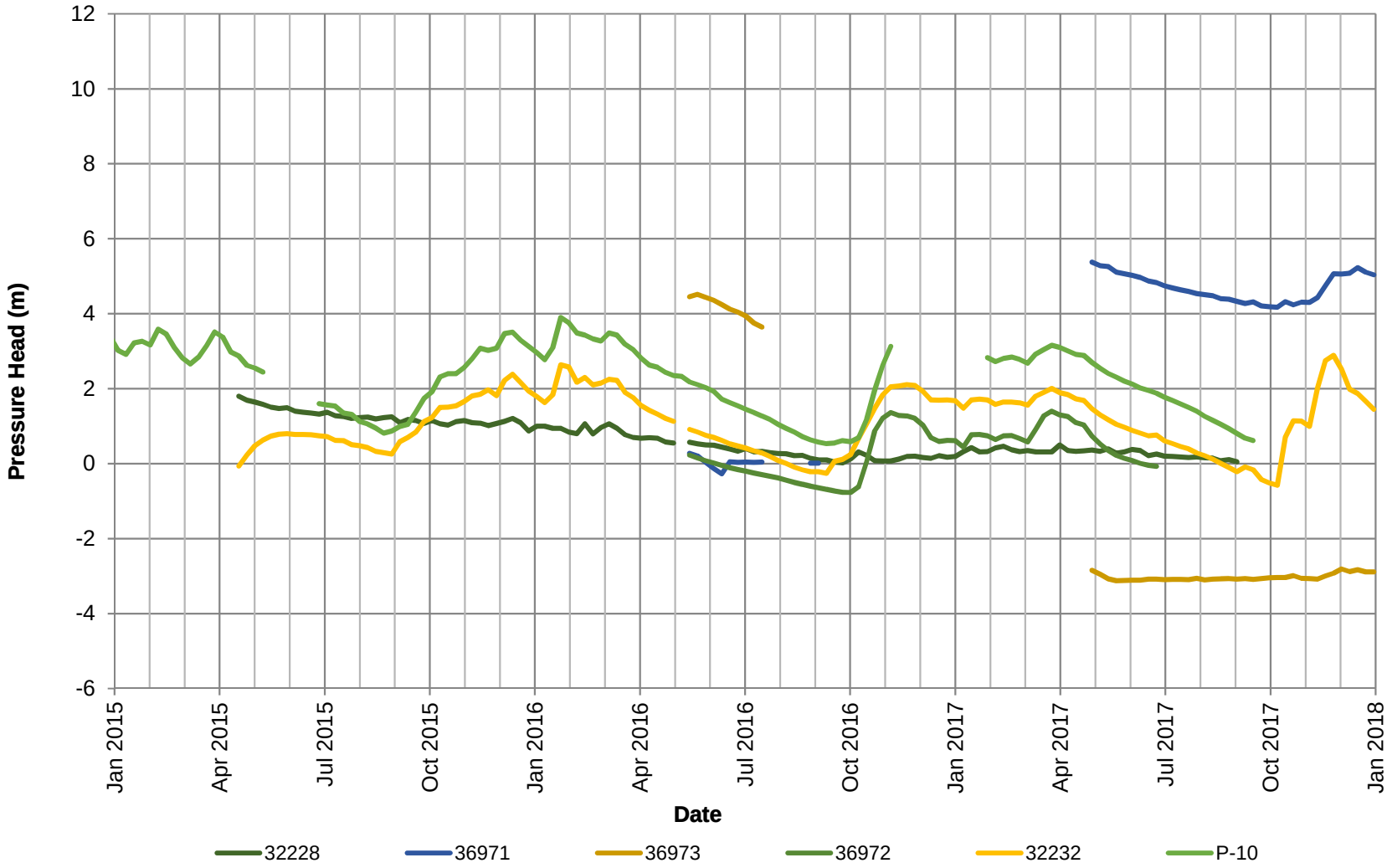
Nyrstar Myra Falls
2017 Dam Safety Inspection
Attachment C

File No.: NX14001B.2017

Table 3: Old TDF - Instrument Plane 5 - Weekly Maximum VWP Pressure Head (m)

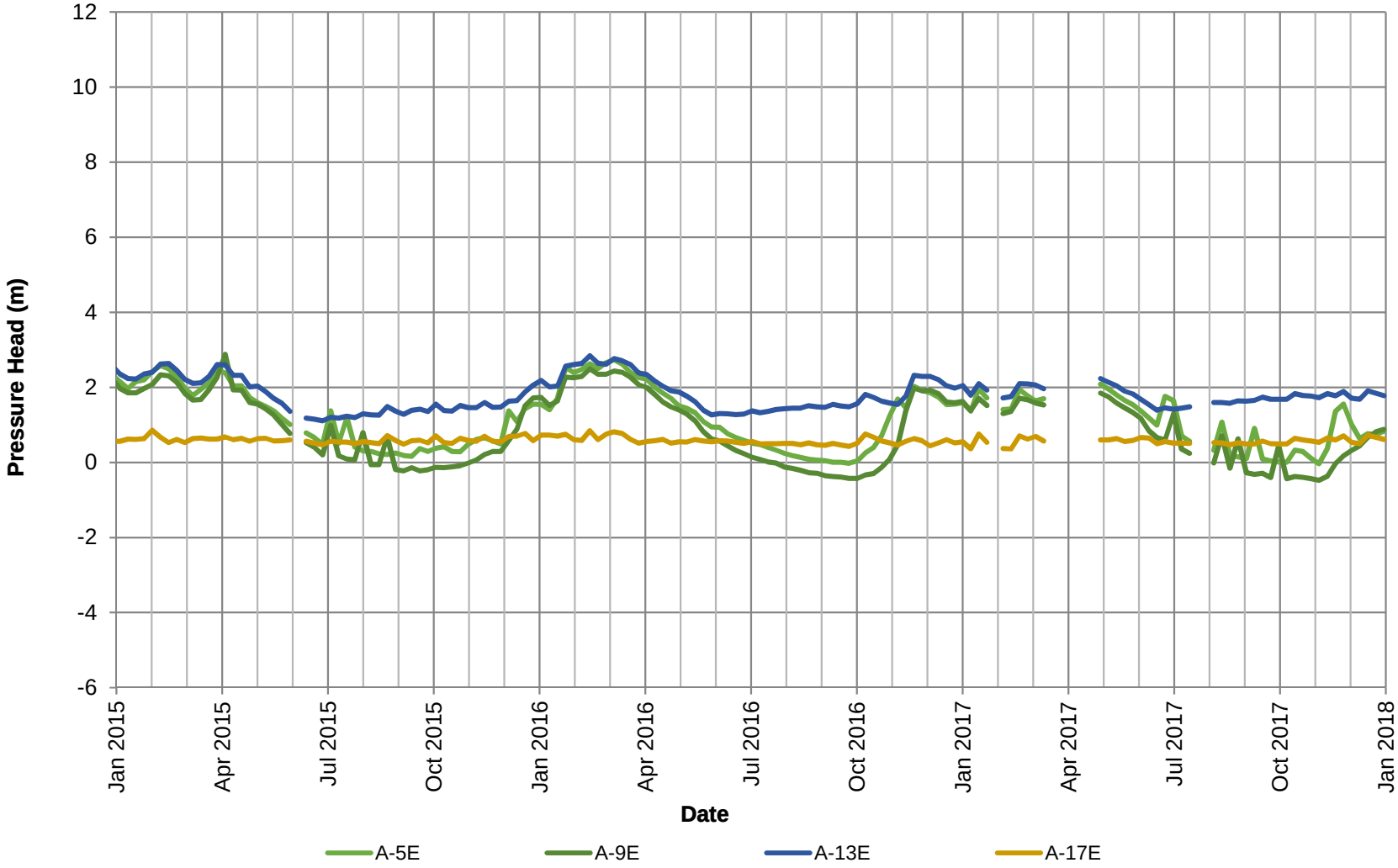
Location	Outer Embankment Slope - 1				Outer Embankment Slope - 2							Outer Embankment Slope - 3					Upper Tailings Beach							Paste Berm					
ID	C-5E	C-13E	C-17E	C-21E	C-6E	C-10E	C-14E	C-18E	C-22E	32223	32241	C-12E	C-16E	32238	C-20E	C-24E	C-29E	C-31E	C-35E	32224	C-36E	C-37E	32234	17730	32222	P-7	17724	17726	17722
Tip Elevation	310.1	308.9	303.2	315.7	303.7	307.3	308.9	314.5	315.4	316.8	308.7	305.5	308.7	308.7	314.5	315.2	322.3	322.0	326.7	327.0	326.6	326.6	328.5	329.3	326.9	319.8	326.2	326.3	335.4
Trigger Point S1	2.0	2.0	1.5	1.3	5.5	6.5	6.5	2.8	1.1	3.2	2.3	5.3	6.5	2.3	6.5	6.4	0.0	4.7	1.3	1.1	2.5	3.1	2.4	2.5	4.0	6.1	4.5	4.4	2.1
Trigger Point S2	4.2	4.4	3.1	2.8	12.3	14.0	14.0	6.1	2.3	7.0	5.0	11.4	14.0	4.9	13.9	13.9	0.0	10.1	2.7	2.3	5.3	6.6	5.1	5.4	8.6	13.1	9.6	9.0	4.6
Trigger Point S3	7.8	8.1	5.8	5.3	22.8	26.0	25.9	11.3	3.5	12.4	9.0	20.5	26.0	9.0	25.9	25.8	0.0	18.7	5.0	4.1	9.8	12.2	9.3	10.0	16.0	24.2	17.9	17.5	8.5
Trigger Point P1	***2.6***	***2.6***	***1.9***	***1.7***	***7.3***	***8.5***	***8.5***	***3.7***	***1.1***	***4.2***	***3.0***	***6.8***	***8.5***	***3.0***	***8.5***	***8.4***	***0.0***	***6.1***	***1.6***	***1.4***	***3.3***	***4.0***	***3.1***	***3.3***	***5.2***	***8.0***	***5.9***	***5.7***	***2.7***
2017-10-01	-0.2	-0.1	0.8	-0.3	2.9	-0.3	0.9	-3.1	0.3	-0.5	-0.2	1.3	0.2	0.9	-0.9	0.5	***2.5***	5.7	-1.3	-1.0	-0.2	1.8		0.5	1.1	2.2	1.0	-0.3	-1.0
2017-10-08	-0.2	-0.1	0.8	-0.3	2.9	-0.3	0.9	-3.0	0.3	-0.5	-0.2	1.3	0.1	0.9	-0.9	0.5	***2.4***	5.6	-1.5	-1.2	-0.3	1.7		0.2	0.9	2.1	0.9	-0.3	-1.1
2017-10-15	-0.2	0.1	1.6	-0.2	3.3	-0.3	1.1	-2.8	0.4	-0.3	1.3	1.8	0.3	1.5	-0.8	0.7	***2.4***	***6.2***	-1.0	-0.5	0.7	3.1		2.7	3.7	2.6	1.7	-0.1	-0.9
2017-10-22	-0.2	0.0	1.1	-0.2	3.1	-0.2	1.0	-2.9	0.4	-0.4	1.2	1.7	0.2	1.5	-0.8	0.7	***2.8***	***6.9***	-0.3	0.5	1.7	3.9		***5.2***	3.5	3.4	2.8	-0.2	-0.3
2017-10-29	-0.2	0.0	0.8	-0.2	2.9	-0.3	1.0	-2.8	0.4	-0.3	0.7	1.5	0.1	1.4	-0.7	0.7	***3.1***	***7.1***	0.1	0.8	2.0	***4.1***		3.2	5.1	3.6	3.0	0.3	0.2
2017-11-05	-0.2	0.0	0.8	-0.2	2.9	-0.3	1.0	-2.9	0.4	-0.3	***3.2***	1.4	0.0	1.3	-0.7	0.6	***3.2***	***7.2***	0.3	0.9	2.1	***4.1***		3.1	3.4	3.6	3.2	0.6	0.4
2017-11-12	-0.2	0.1	1.3	-0.1	3.1	-0.3	1.1	-2.7	0.5	-0.1	2.0	1.8	0.4	2.0	-0.4	0.7	***3.7***	***7.9***	0.9	***1.6***	2.7	***5.0***		***4.9***	5.0	4.2	3.9	1.0	1.2
2017-11-19	-0.2	0.0	***2.2***	-0.2	3.7	-0.2	1.1	-2.8	0.4	0.5	***5.3***	2.6	0.8	***3.1***	0.1	0.8	***5.0***	***9.0***	***2.1***	***2.7***	***3.6***	***6.1***		***6.2***	***6.4***		4.8	1.5	2.1
2017-11-26	-0.1	0.1	***2.3***	0.0	3.8	-0.2	1.2	-1.5	0.6	1.0	***5.9***	2.7	1.2	***3.4***	1.1	0.9	***5.4***	***9.4***	***2.4***	***2.9***	***3.9***	***6.3***		***6.2***	***6.4***		5.1	1.9	2.3
2017-12-03	0.0	-0.1	1.8	-0.1	3.6	-0.1	1.1	-1.4	0.5	1.0	***4.6***	2.5	1.1	***3.1***	1.1	0.8	***5.3***	***9.4***	***2.4***	***2.9***	***3.9***	***6.2***		***4.9***	5.2		4.9	2.0	2.2
2017-12-10	-0.1	-0.2	1.9	-0.1	3.7	-0.1	1.2	-1.5	0.4	0.6	1.9	2.4	1.0	2.5	0.8	0.7	***5.1***	***8.7***	***2.1***	***2.6***	***3.5***	***5.4***		***3.9***	4.1		4.3	2.1	1.9
2017-12-17	0.0	0.1	***2.0***	0.0	3.9	-0.1	1.5	-1.5	0.6	0.5	1.1	2.6	1.1	2.6	0.8	0.9	***4.9***	***8.4***	***2.0***	***2.5***	3.1	***4.9***		***3.7***	3.9		4.1	2.3	1.9
2017-12-24										0.3	***3.8***			2.4						***2.3***				***3.6***	3.8		3.9	2.3	1.6
2017-12-31	0.0	-0.1	1.9	-0.1	3.9	-0.2	1.3	-1.7	0.5	0.3	0.7	2.5	1.0	2.3	0.6	0.8	***4.7***	***8.2***	***1.8***	***2.2***	2.9	***4.7***		***3.4***	3.7		3.8	2.2	1.5

Figure 1: Old TDF Piezometer Records - Plane 1
32228, 36971, 36973, 36972, 32232, P-10



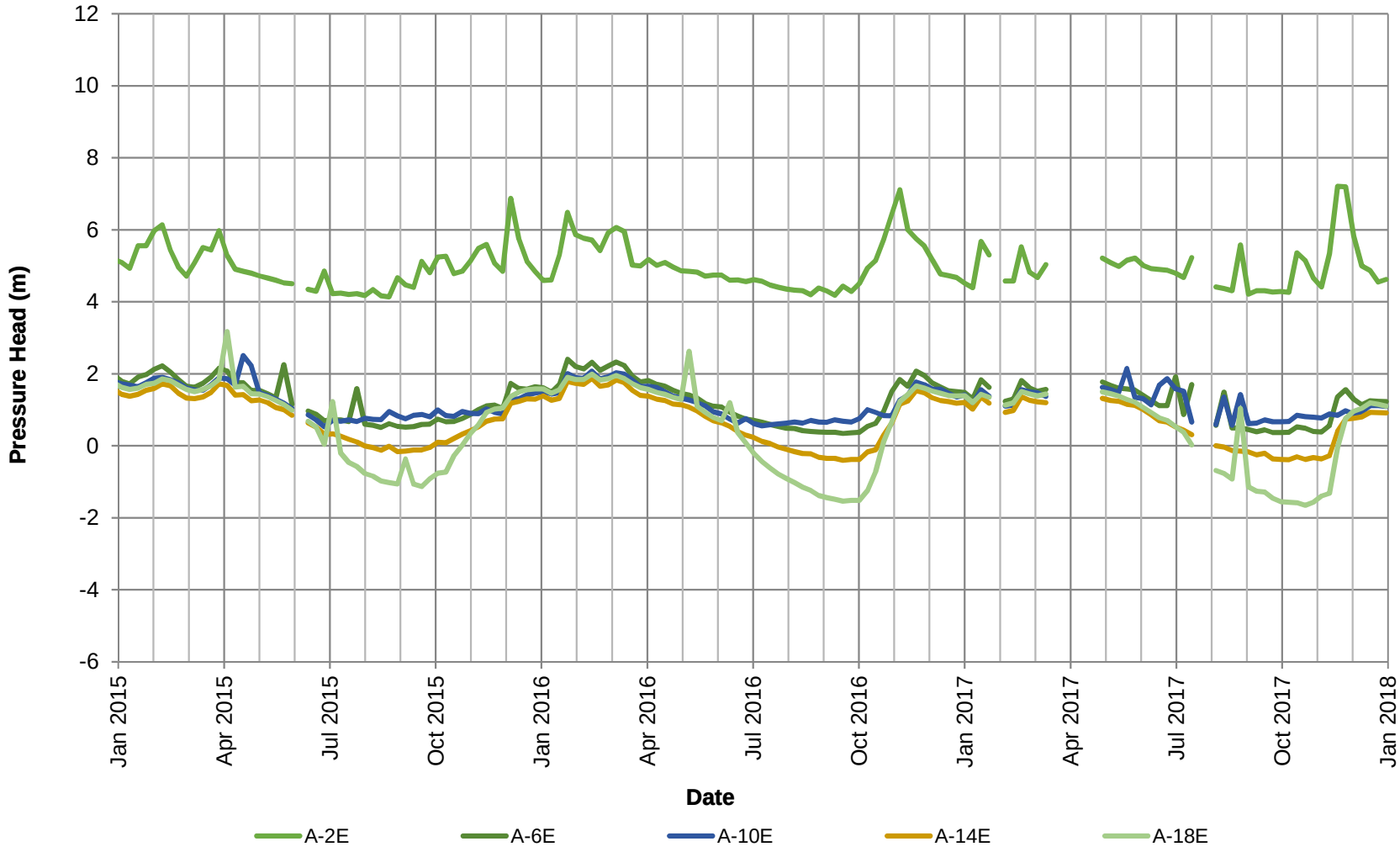
amec foster wheeler

Figure 2: Old TDF Piezometer Records - Plane A Outer Embankment Slope, Location 1 A-5E, A-9E, A-13E, A-17E



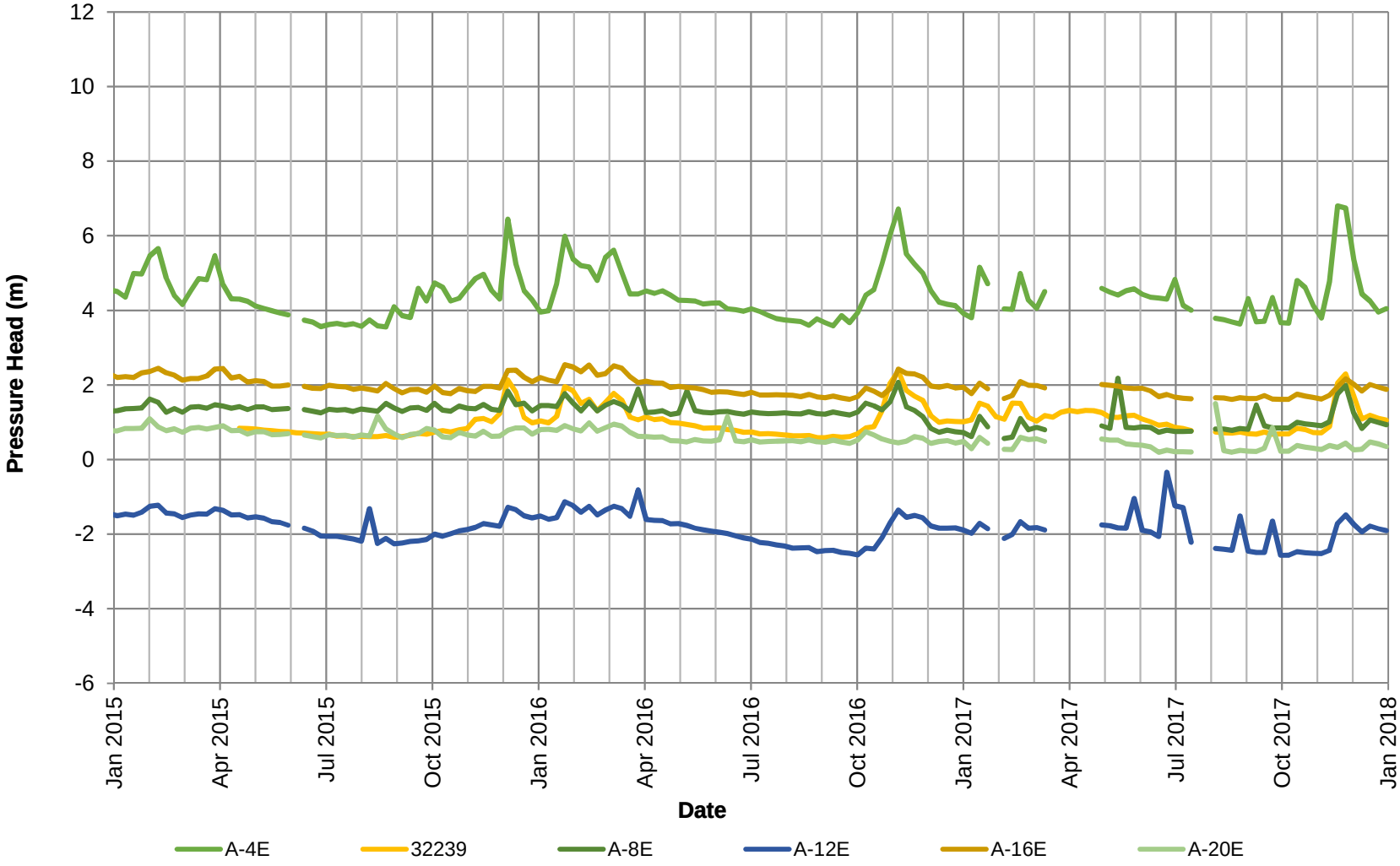
amec foster wheeler

Figure 3: Old TDF Piezometer Records - Plane A Outer Embankment Slope, Location 2 A-2E, A-6E, A-10E, A-14E, A-18E



amec foster wheeler

Figure 4: Old TDF Piezometer Records - Plane A Outer Embankment Slope, Location 3 A-4E, 32239, A-8E, A-12E, A-16E, A-20E



amec foster wheeler

Figure 5: Old TDF Piezometer Records - Plane A
Upper Tailings Beach
A-26E, A-27E, A-28E, A-30E, A-31E, A-32E, 32220

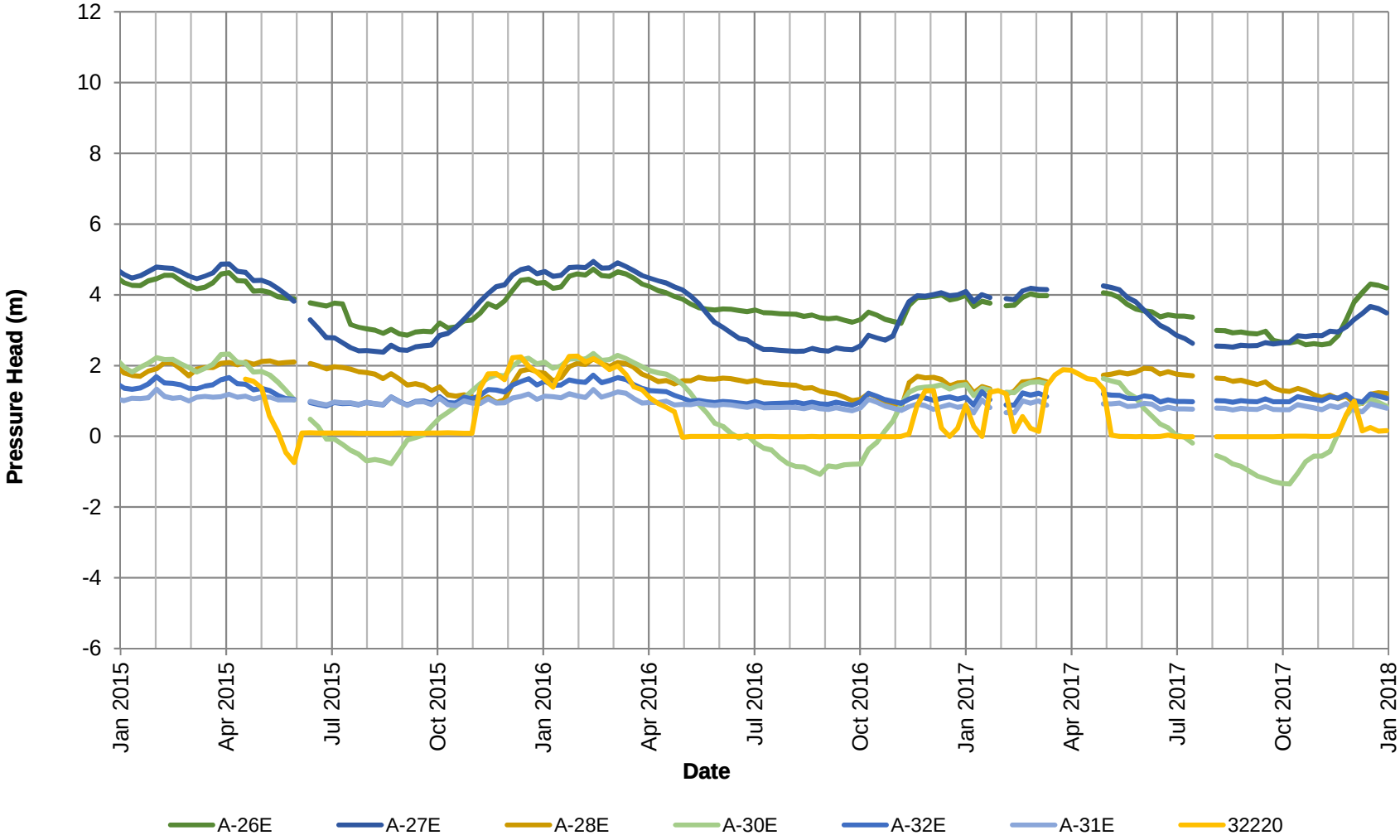


Figure 6: Old TDF Piezometer Records - Plane A
Strip and Paste Berm
A33-E, 32231, 32229, 32225, P-11, P-12

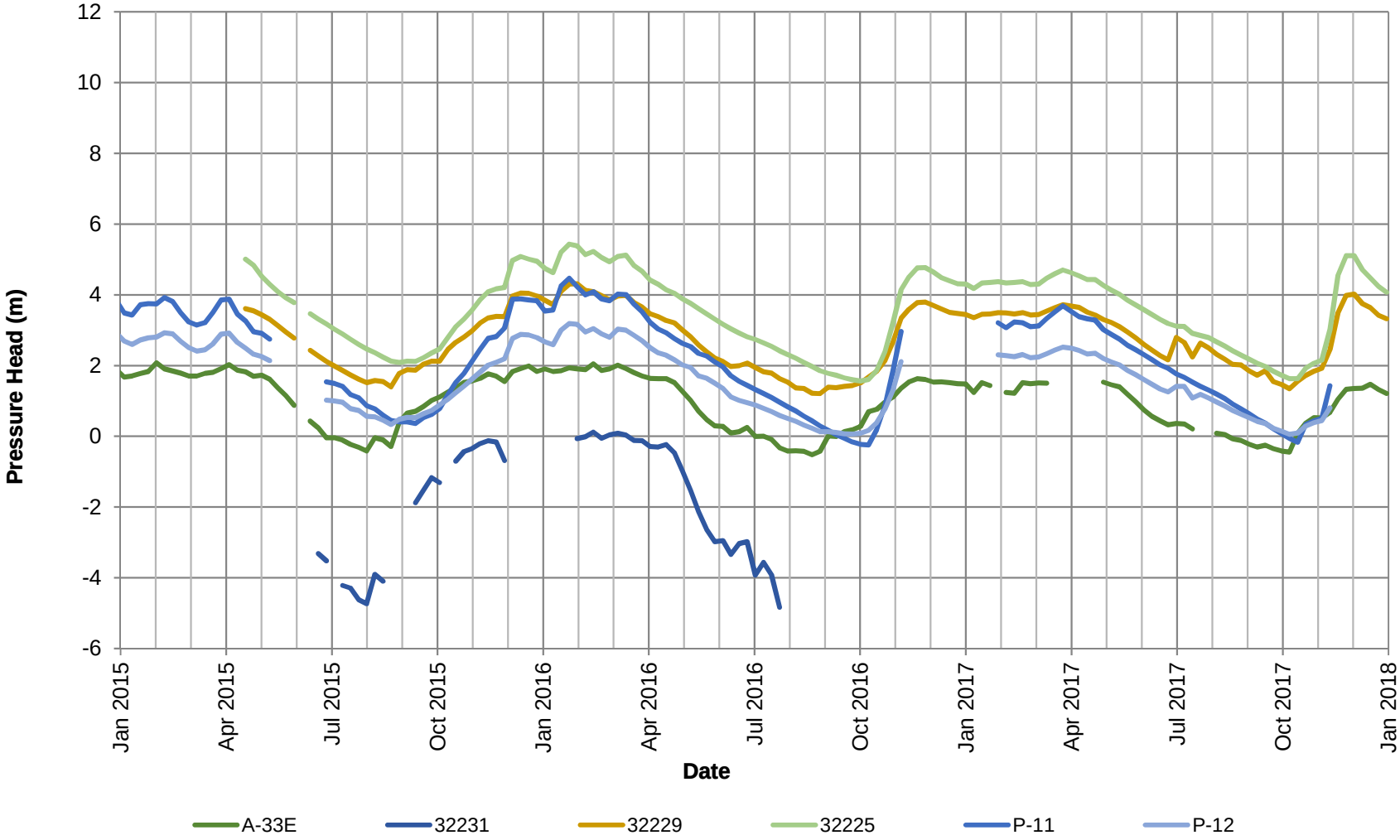


Figure 7: Old TDF Piezometer Records
Plane 3 (32233, 21715, P-13, P-14) and Plane 3/4 (P-1, P-2)

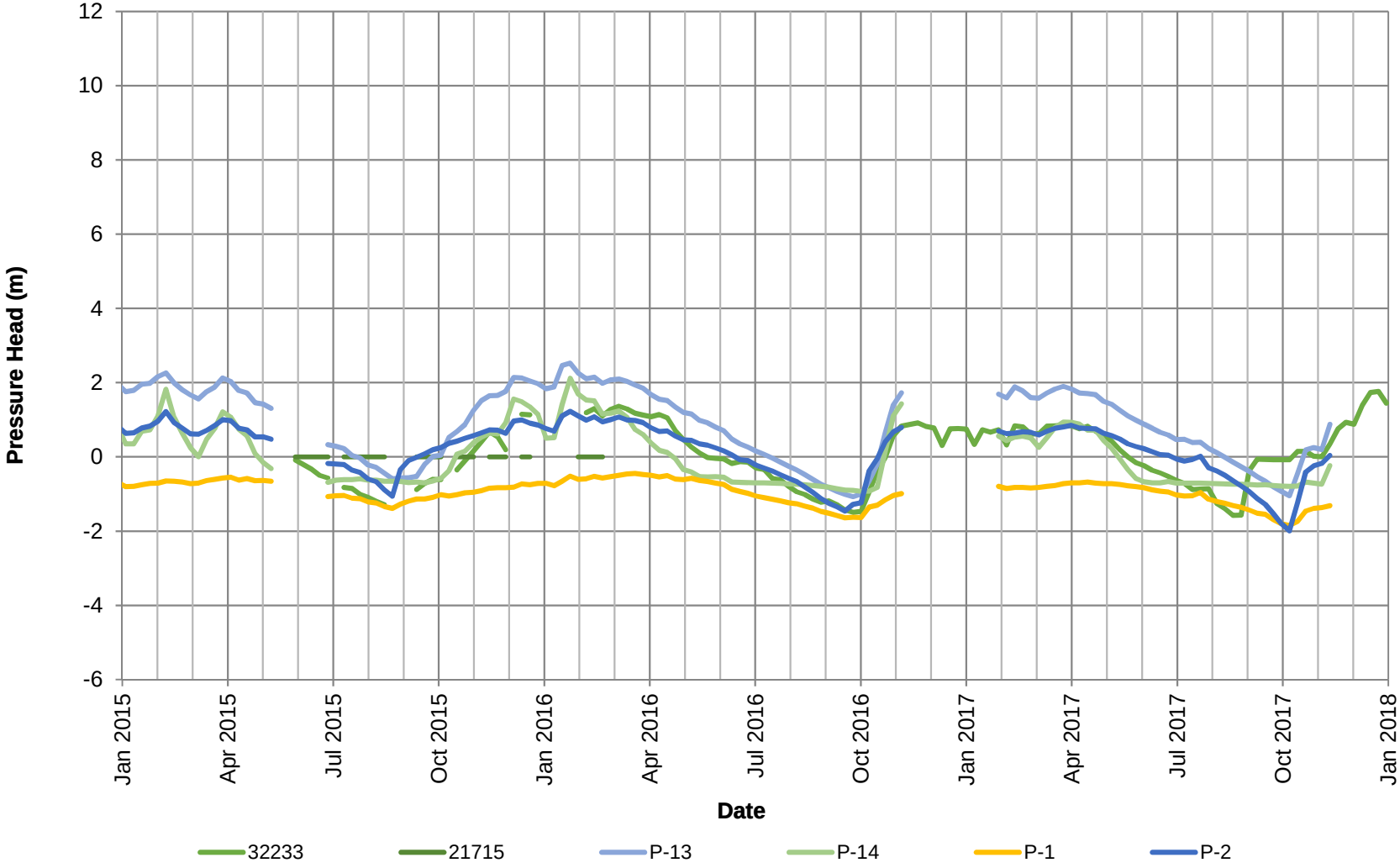


Figure 8: Old TDF Piezometer Records - Plane 4
32237, 1204, P-3, P-4

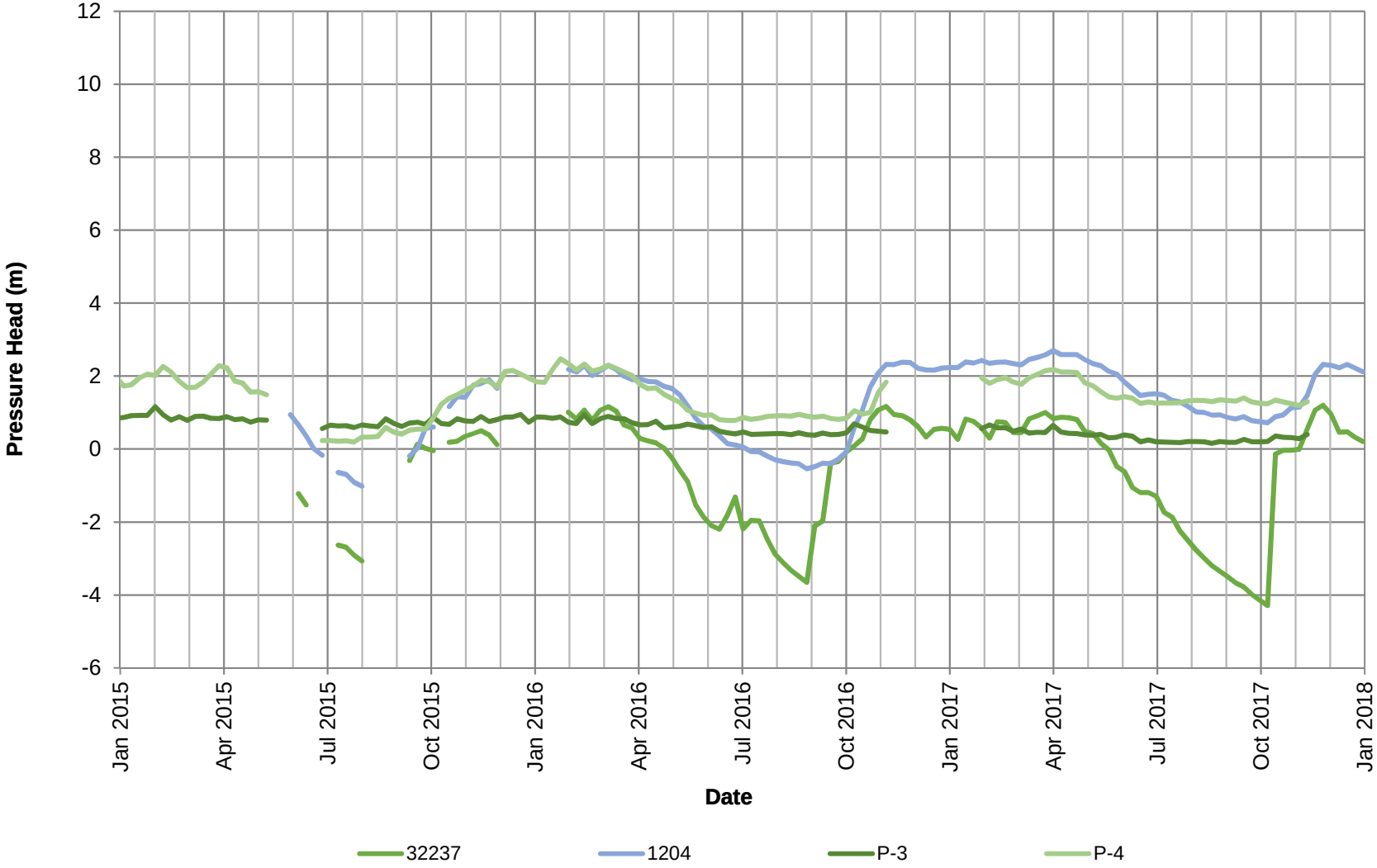
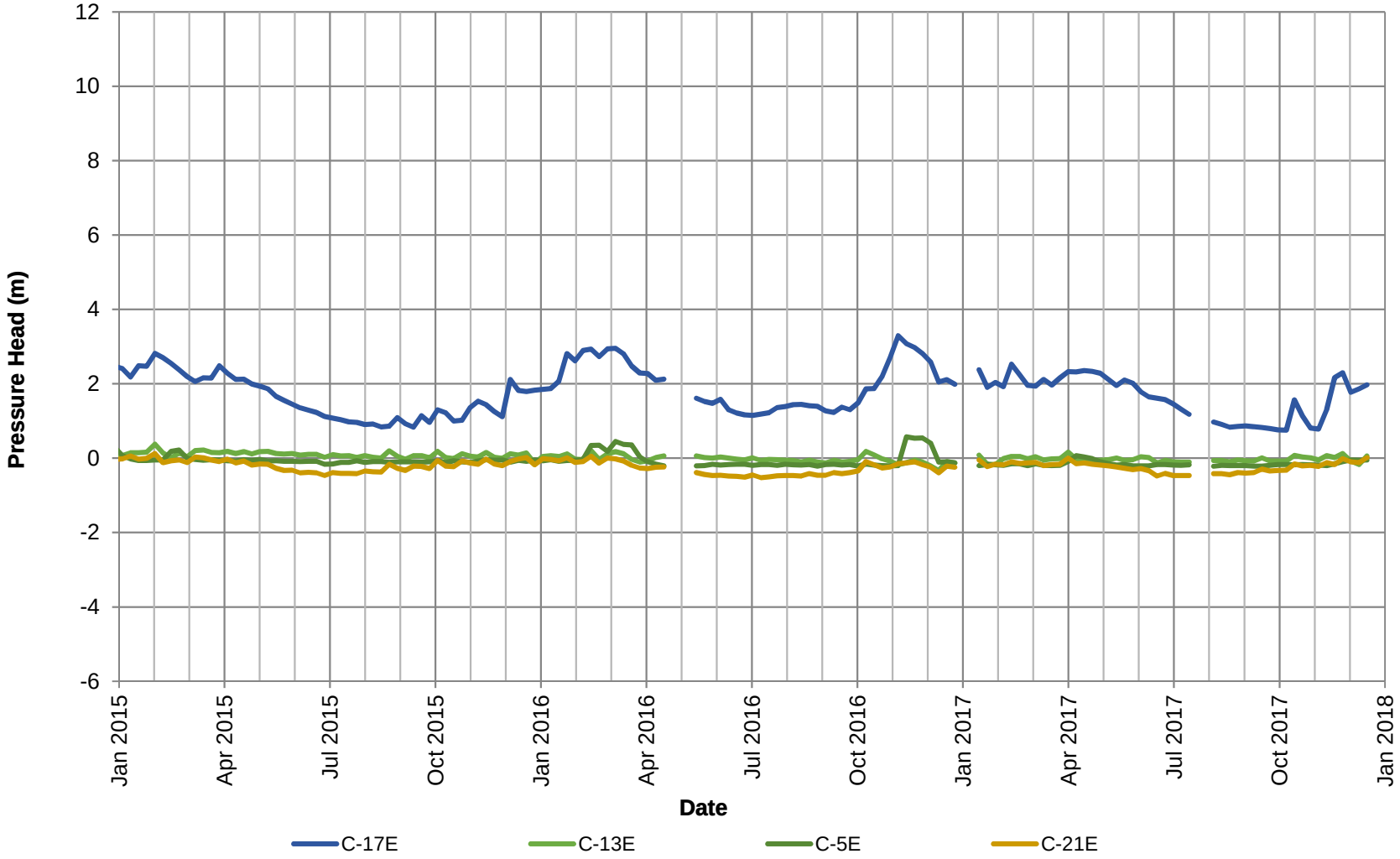
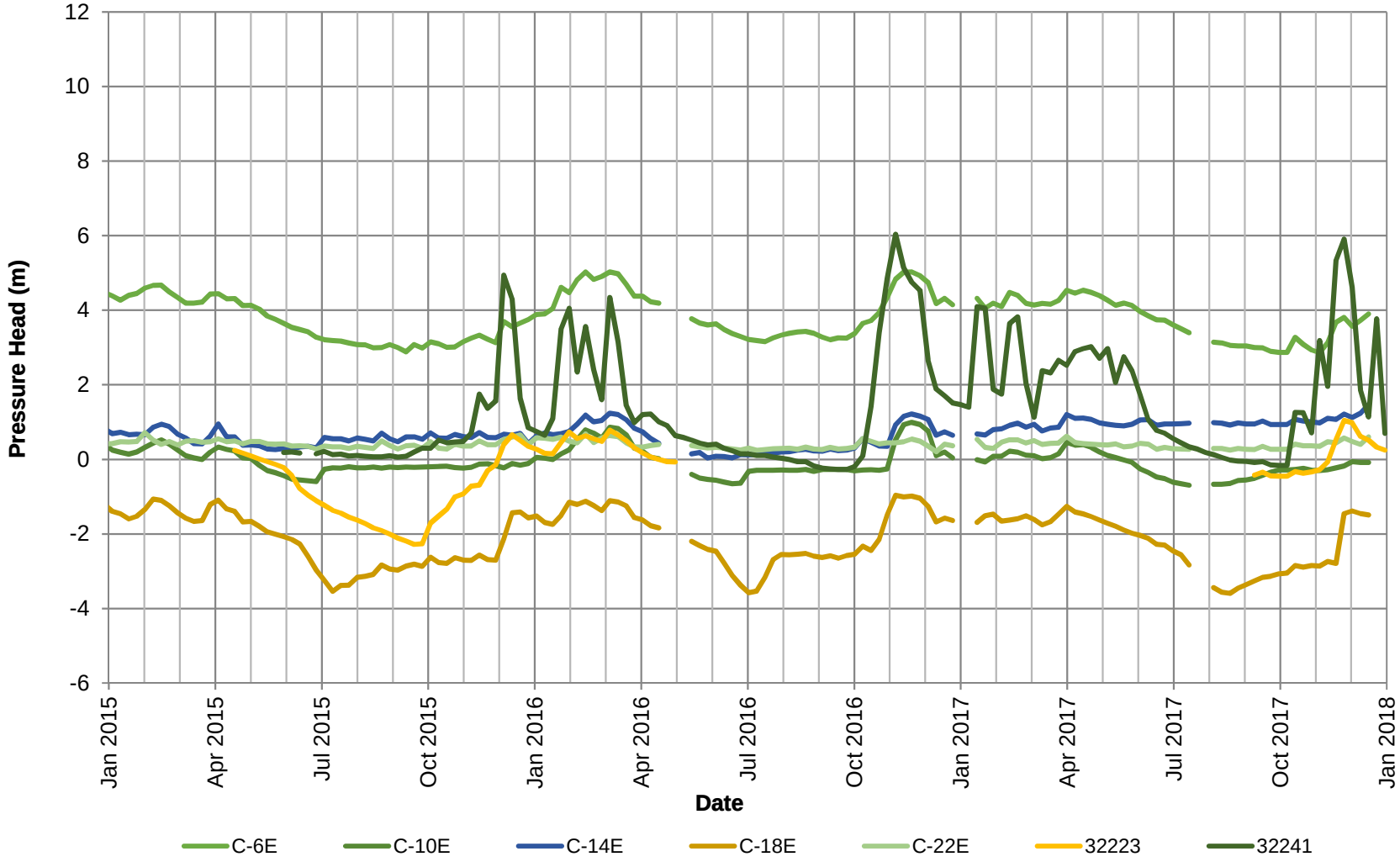


Figure 9: Old TDF Piezometer Records - Plane 5
Outer Embankment Slope, Location 1
C-5E, C-13E, C-17E, C-21E



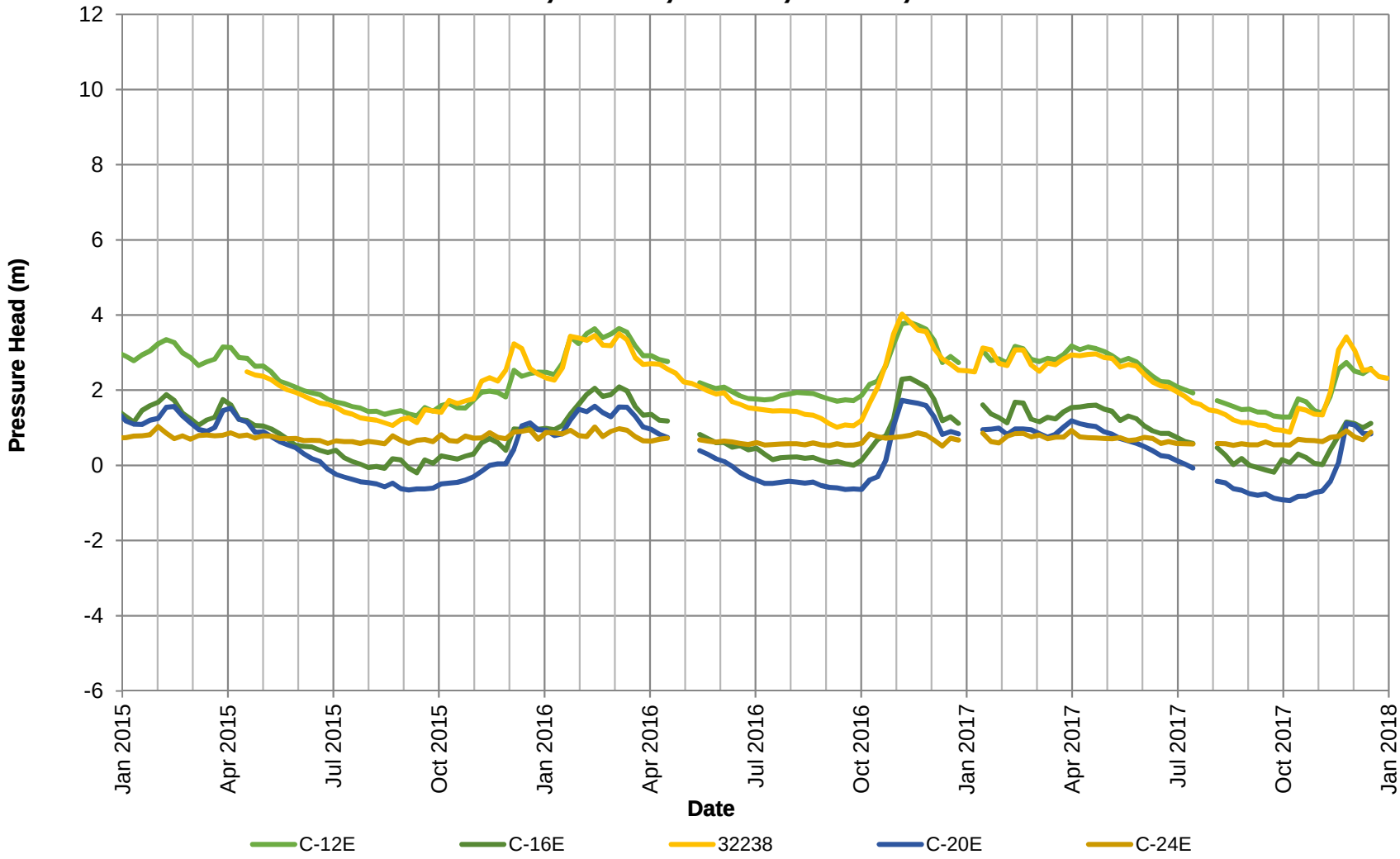
amec foster wheeler

Figure 10: Old TDF Piezometer Records - Plane 5
Outer Embankment Slope, Location 2 and Lower Tailings
C-6E, C-10E, C-14E, C-18E, C-22E, 32223, 32241



amec foster wheeler

Figure 11: Old TDF Piezometer Records - Plane 5
Outer Embankment Slope, Location 3
C-12E, C-16E, 32238, C-20E, C-24E



amec foster wheeler

Figure 12: Old TDF Piezometer Records - Plane 5
Upper Tailings Beach
C29E, C-31E, C-35E, 32224, C-36E, C-37E, 32234

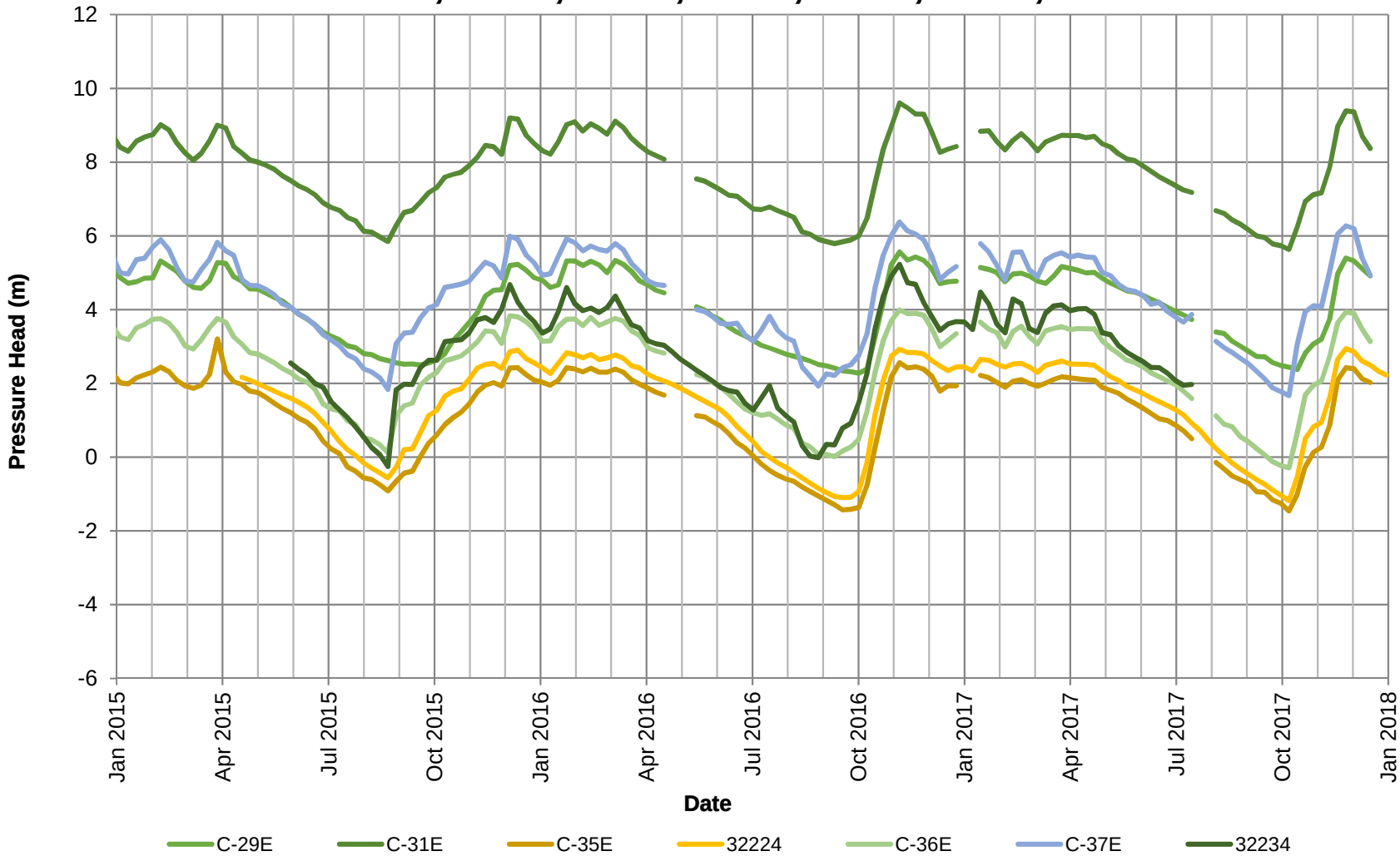


Figure 13: Old TDF Piezometer Records - Plane 5
Paste Berm and Upstream Tailings
17730, 32222, P-7, 17724, 17726, 17722

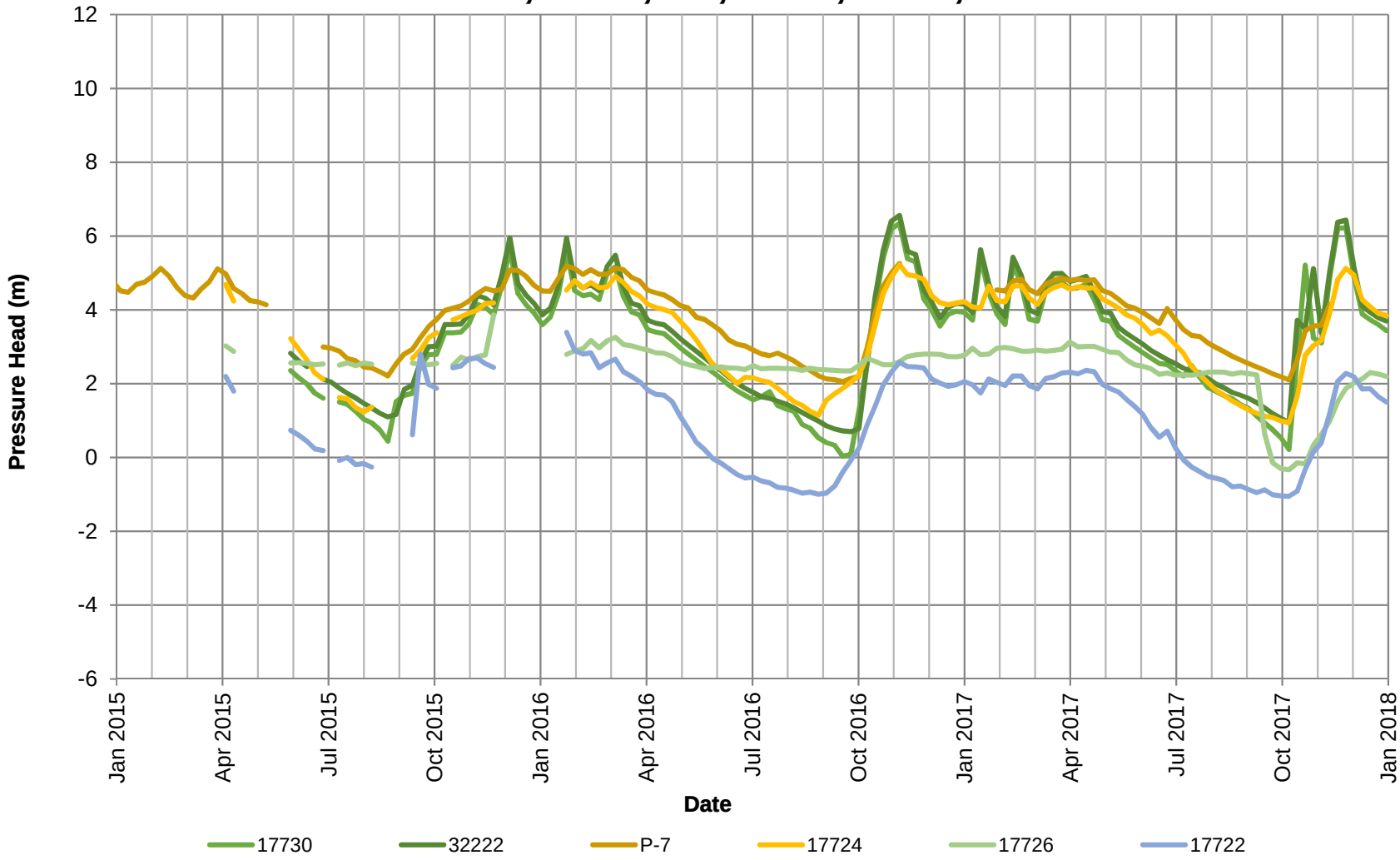
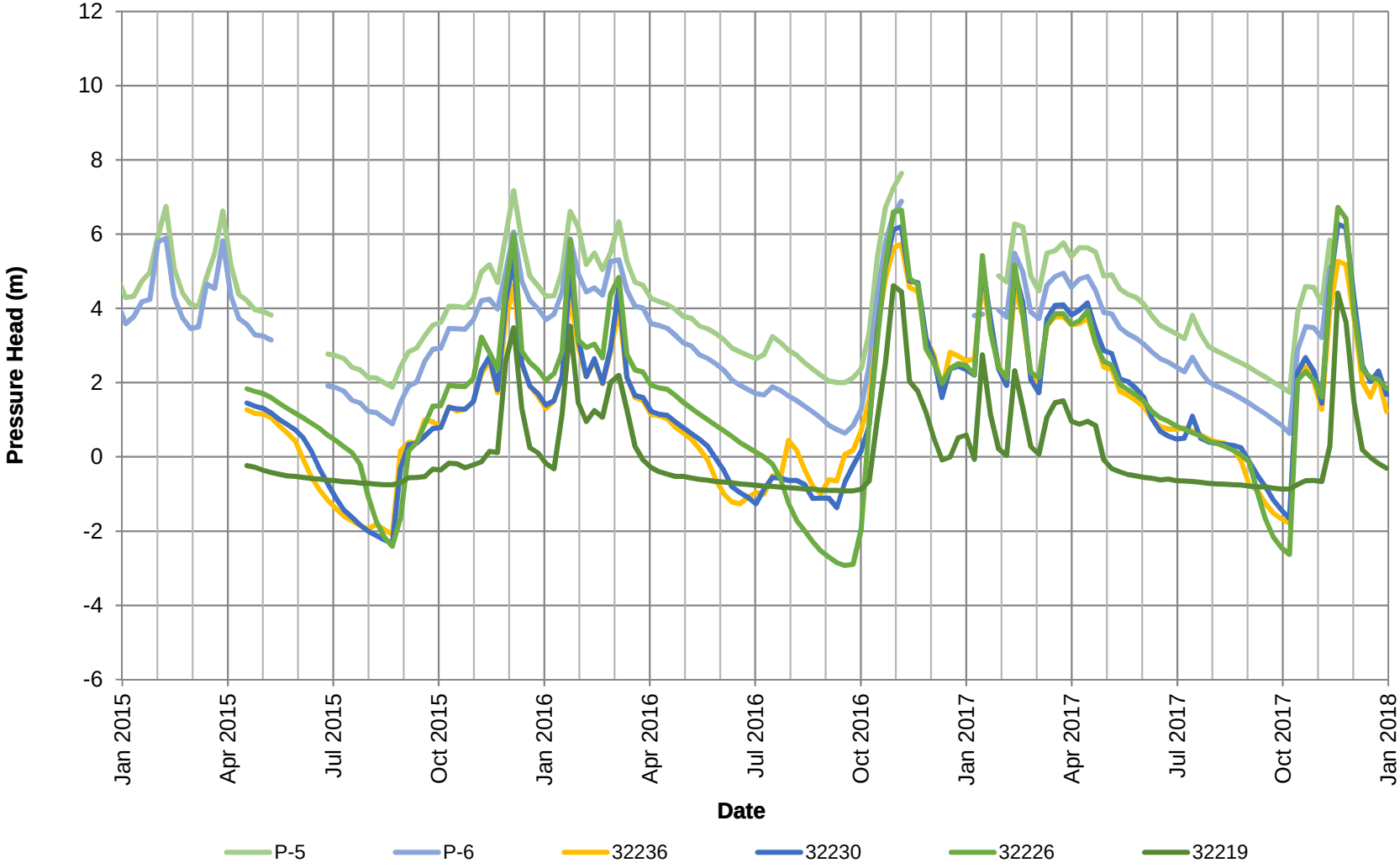


Figure 14: Old TDF Piezometer Records
Plane 5/6 (P-5, P-6) and Plane 6 (32236, 32230, 32226, 32219)



Attachment D

Slope Inclinometer Data

Table\Figure Number	Title
Figure 1	Cumulative Displacement – BH15-32
Figure 2	Incremental Displacement – BH15-32
Figure 3	Cumulative Displacement – BH15-35
Figure 4	Incremental Displacement – BH15-35
Figure 5	Cumulative Displacement – BH14-08A
Figure 6	Incremental Displacement – BH14-08A

RST Instruments Ltd.

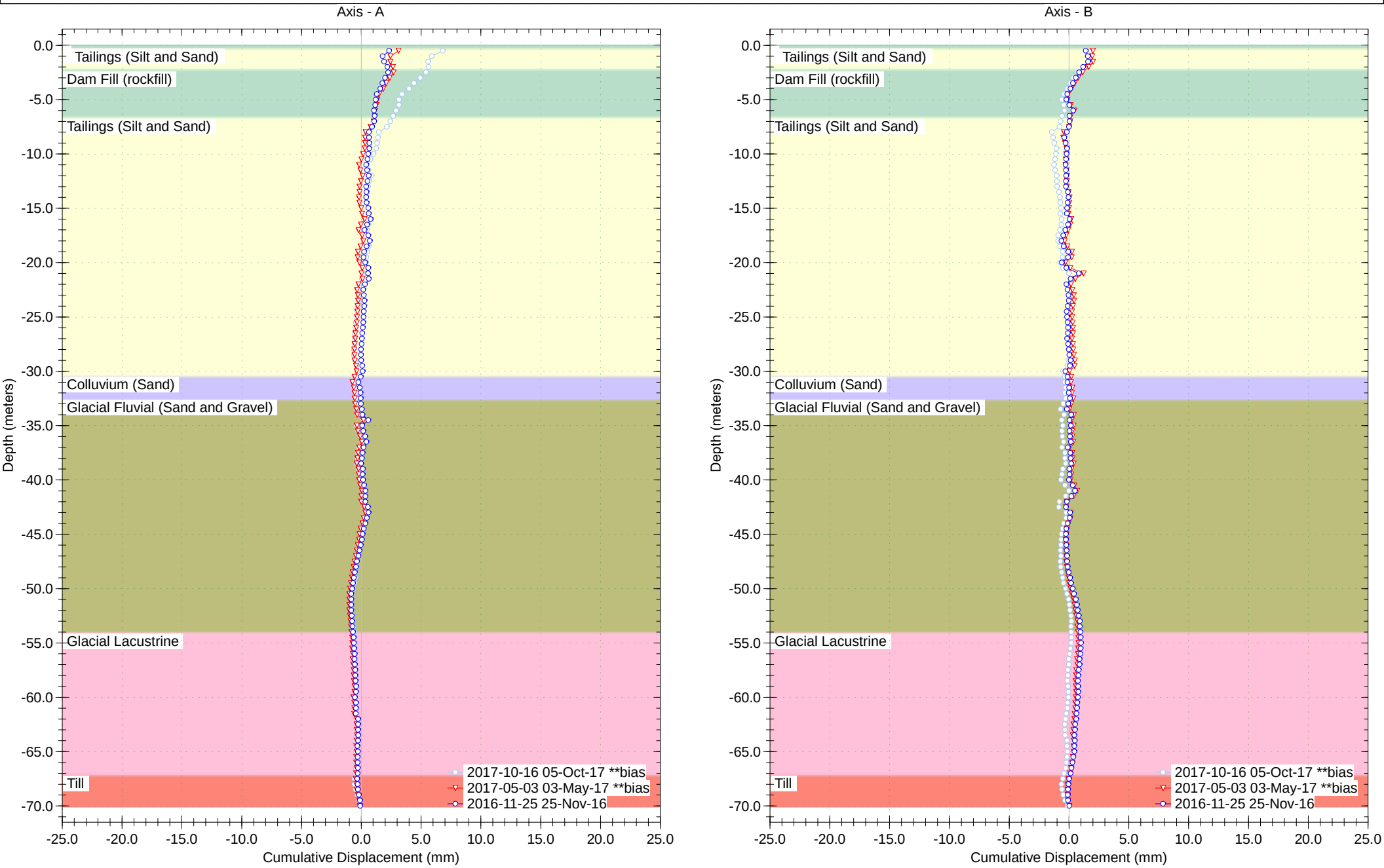
CUMULATIVE DISPLACEMENT

Inclinalysis v. 2.47.5

Borehole : BH15-32
Project : Site - Myra Falls
Location : Old TDF
Northing :
Easting :
Collar : 337.3 m

Spiral Correction : N/A
Collar Elevation : 0.0 meters
Borehole Total Depth : 70.0 meters
A+ Groove Azimuth :
Base Reading : 2016 Mar 09 15:37
Applied Azimuth : 0.0 degrees

Figure 1



RST Instruments Ltd.

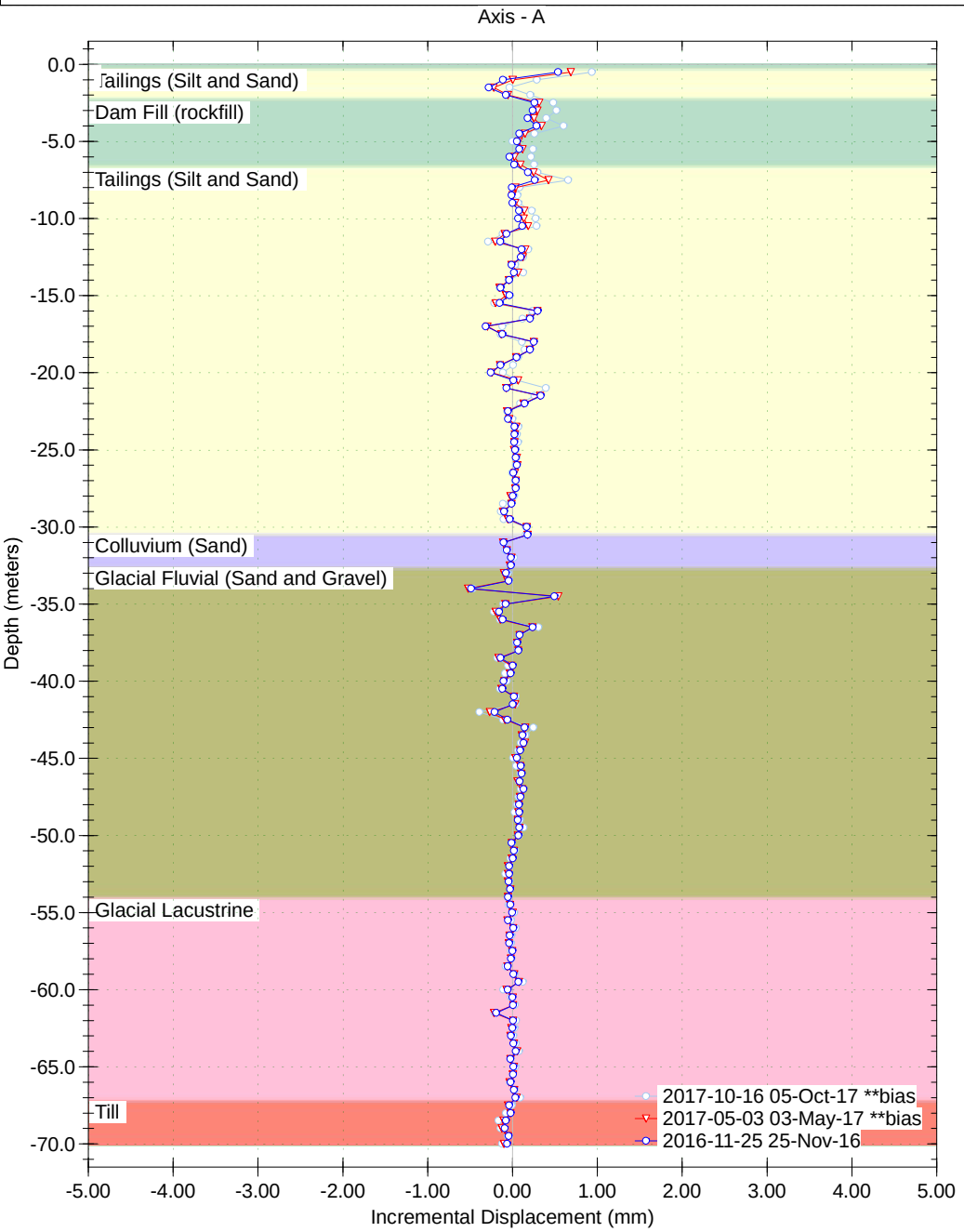
INCREMENTAL DISPLACEMENT

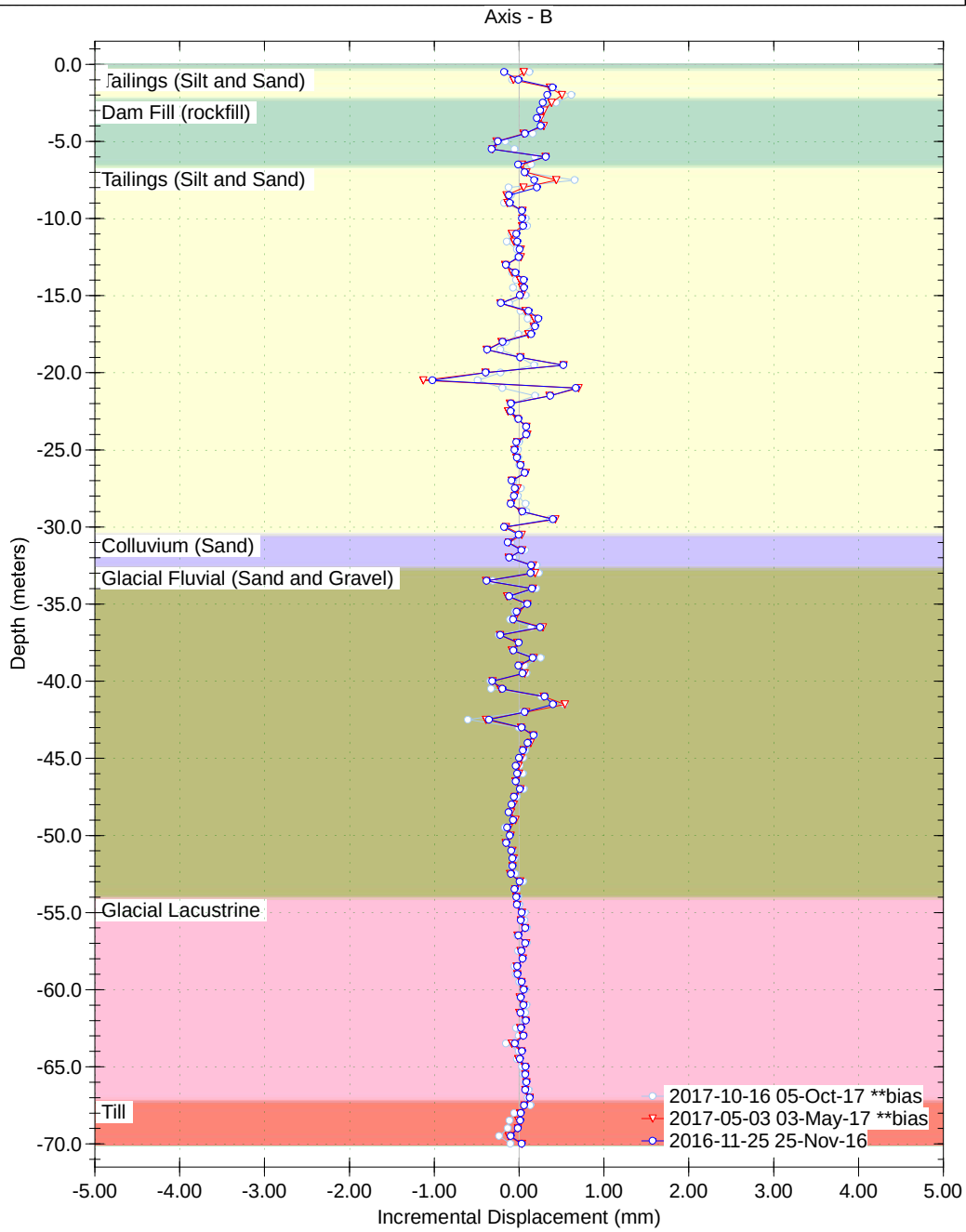
Inclinalysis v. 2.47.5

Borehole : BH15-32
Project : Site - Myra Falls
Location : Old TDF
Northing :
Easting :
Collar : 337.3 m

Spiral Correction : N/A
Collar Elevation : 0.0 meters
Borehole Total Depth : 70.0 meters
A+ Groove Azimuth :
Base Reading : 2016 Mar 09 15:37
Applied Azimuth : 0.0 degrees

Figure 2





RST Instruments Ltd.

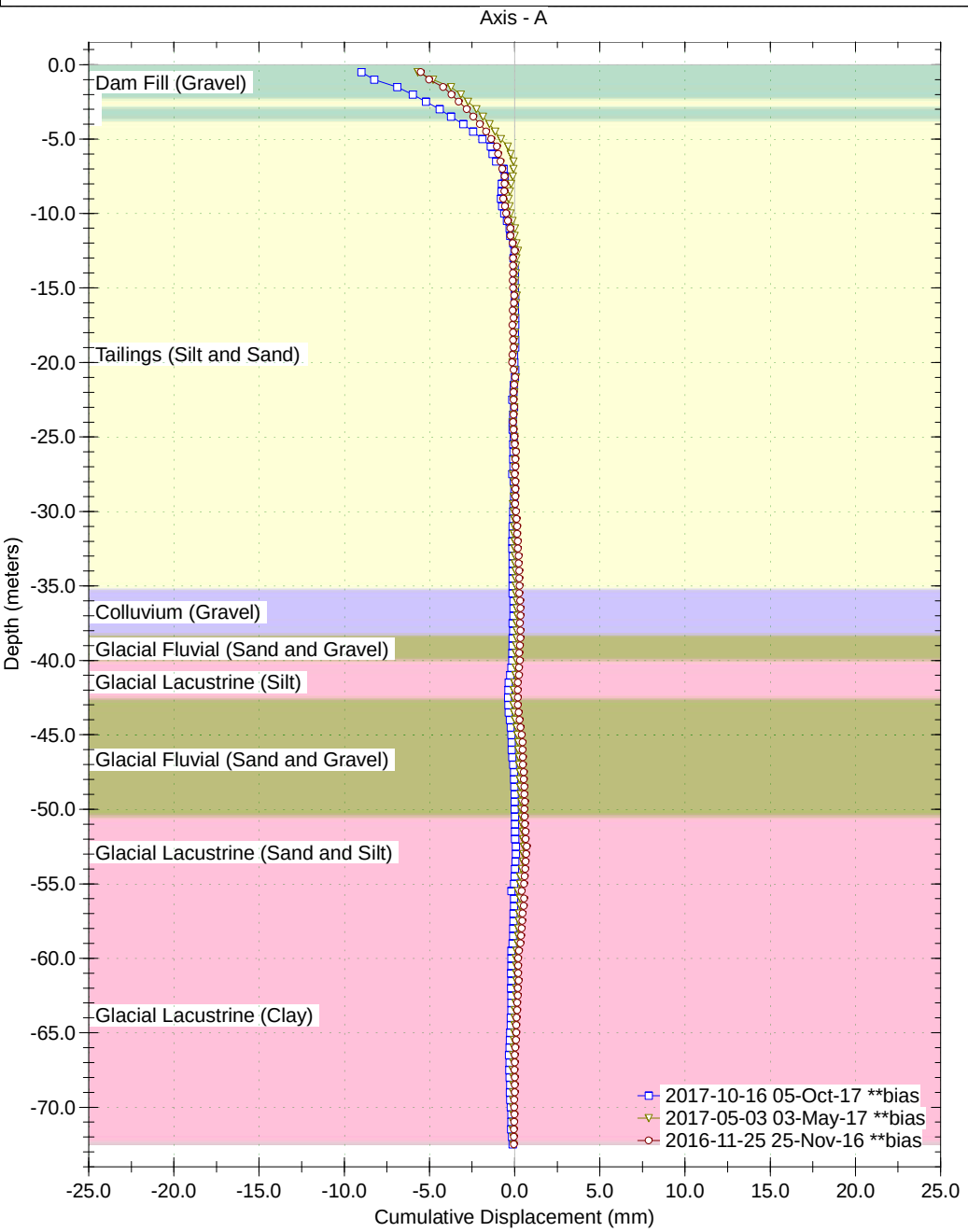
CUMULATIVE DISPLACEMENT

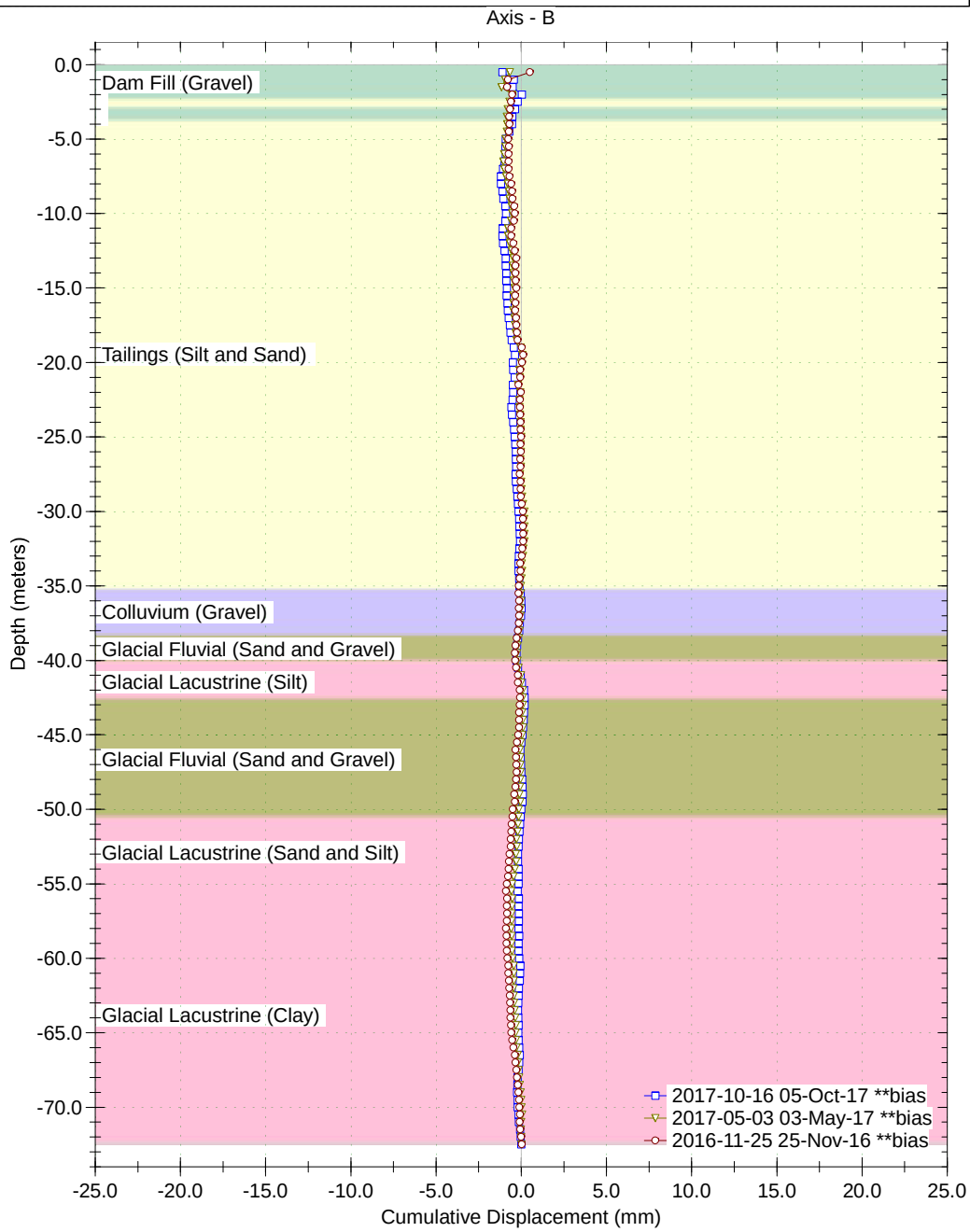
Inclinalysis v. 2.47.5

Borehole : BH15-35
Project : Site - Myra Falls
Location : Old TDF
Northing :
Easting :
Collar : 336.9 m

Spiral Correction : N/A
Collar Elevation : 0.0 meters
Borehole Total Depth : 72.5 meters
A+ Groove Azimuth :
Base Reading : 2016 Mar 09 13:29
Applied Azimuth : 0.0 degrees

Figure 3





RST Instruments Ltd.

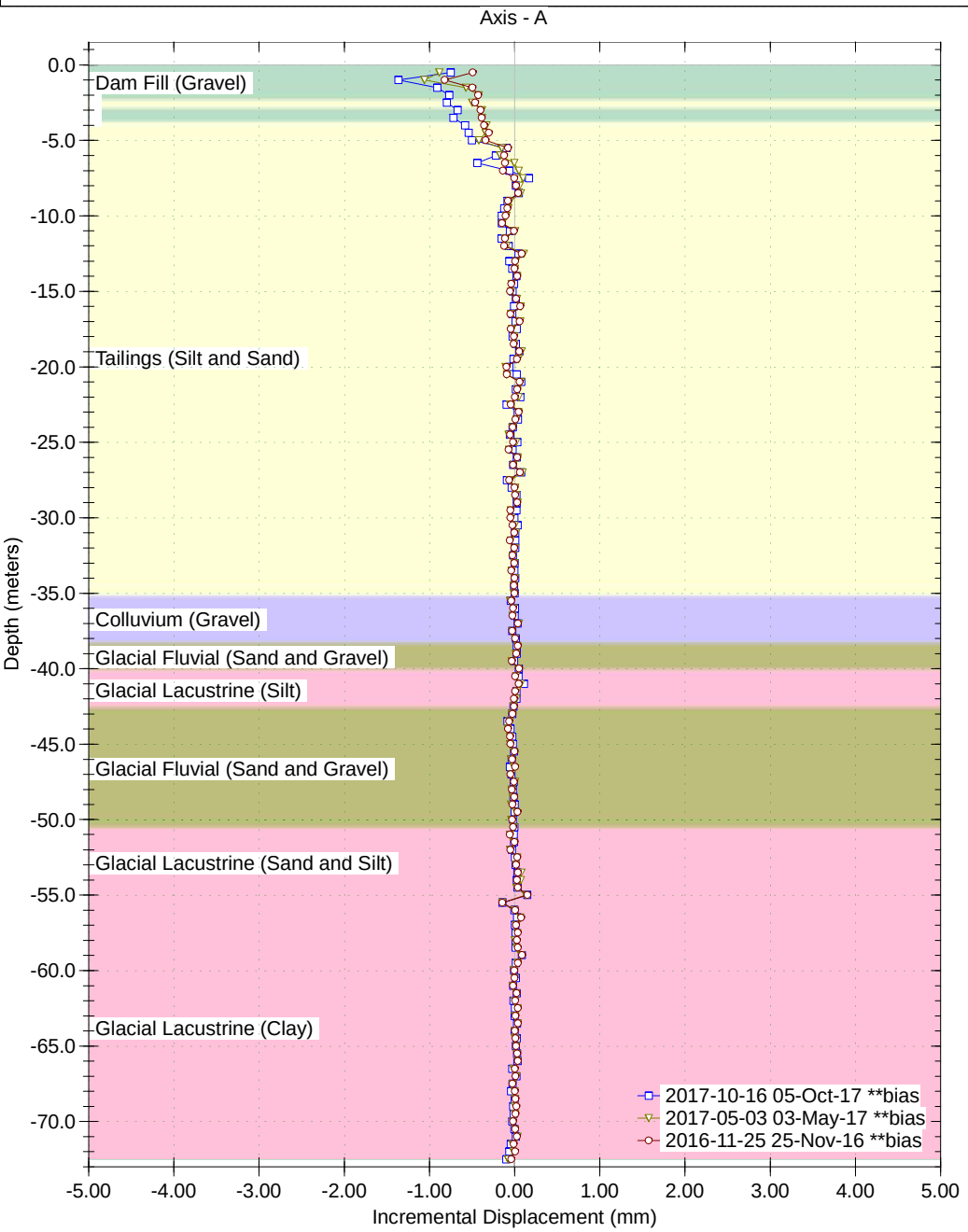
INCREMENTAL DISPLACEMENT

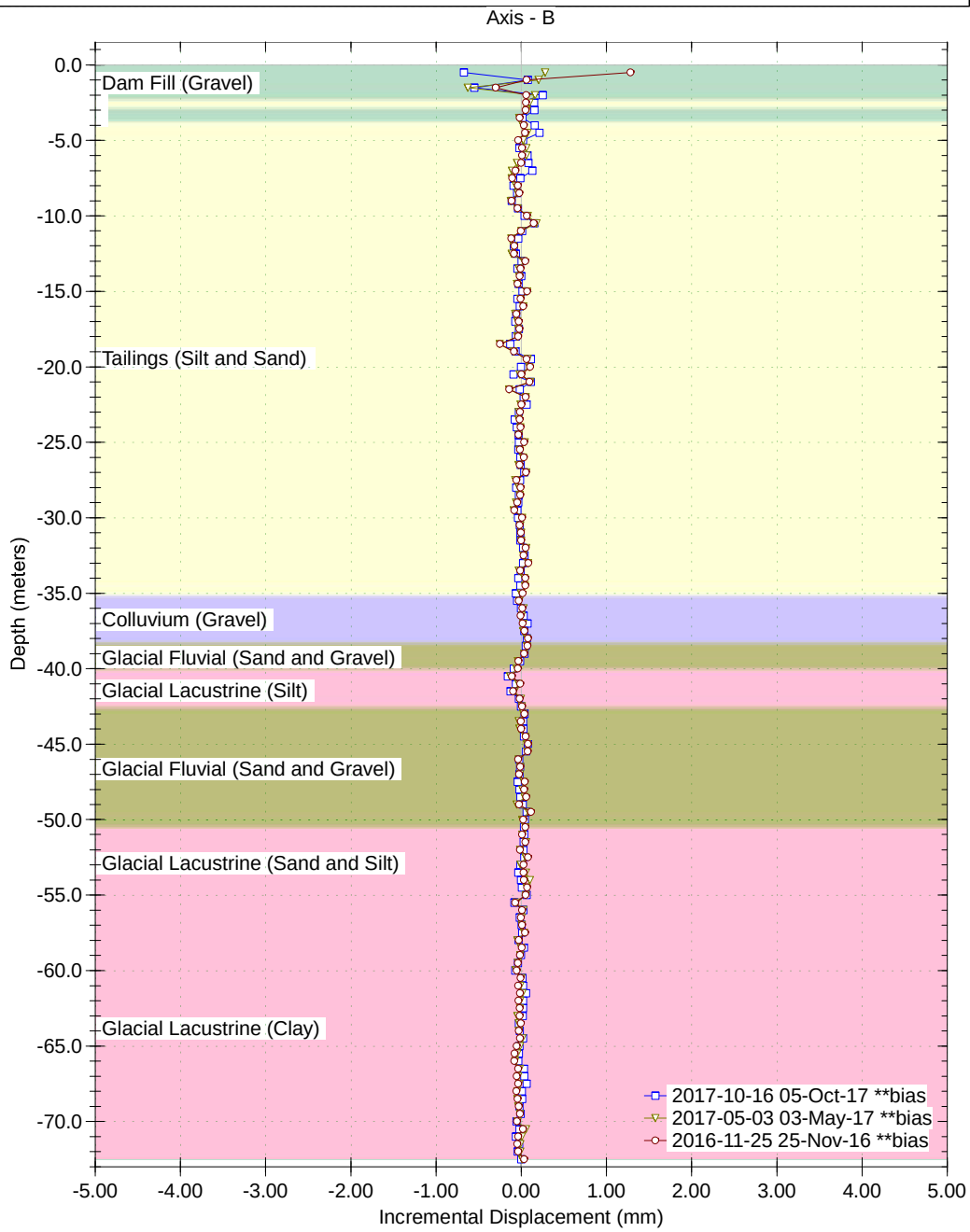
Inclinalysis v. 2.47.5

Borehole : BH15-35
Project : Site - Myra Falls
Location : Old TDF
Northing :
Easting :
Collar : 336.9 m

Spiral Correction : N/A
Collar Elevation : 0.0 meters
Borehole Total Depth : 72.5 meters
A+ Groove Azimuth :
Base Reading : 2016 Mar 09 13:29
Applied Azimuth : 0.0 degrees

Figure 4





RST Instruments Ltd.

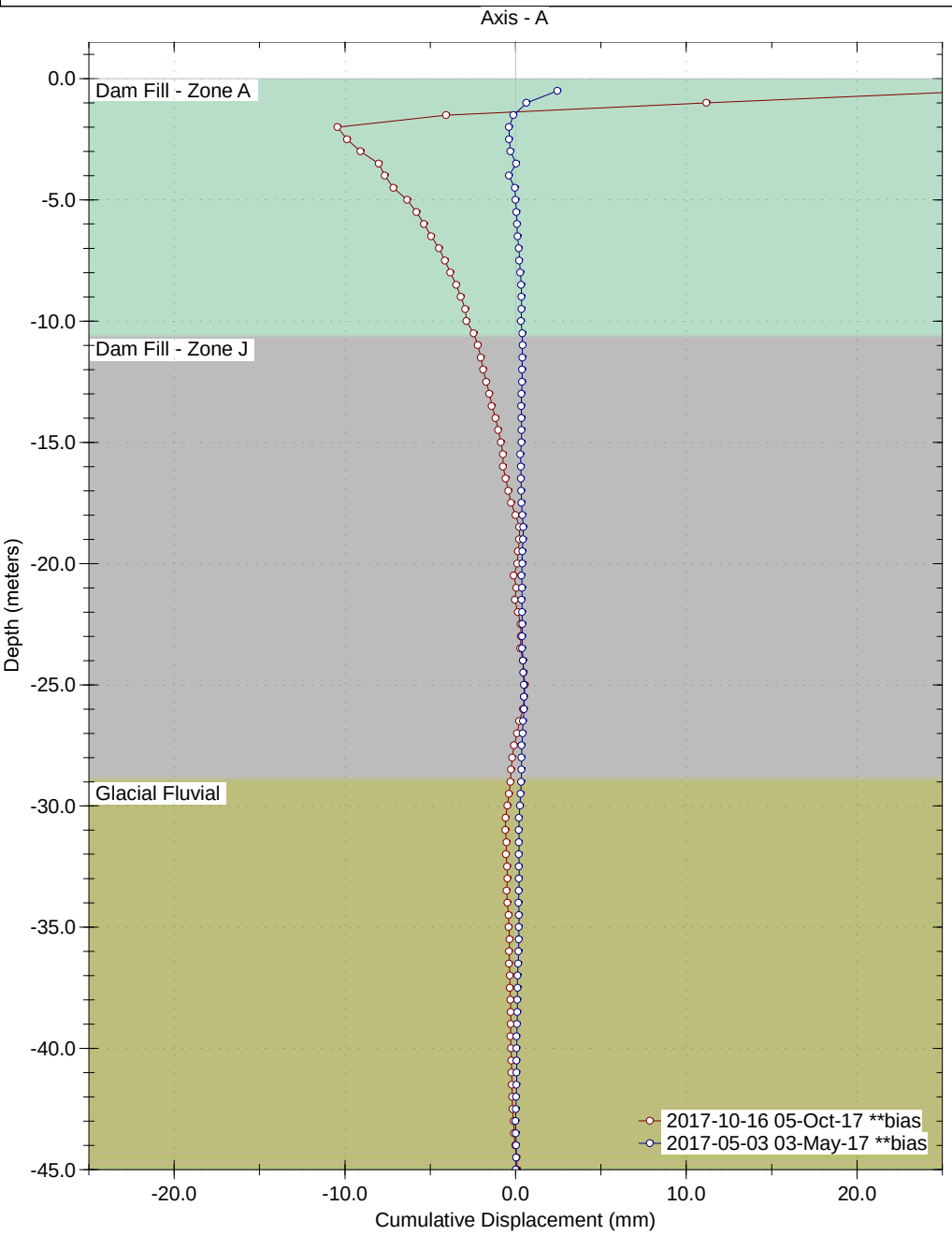
CUMULATIVE DISPLACEMENT

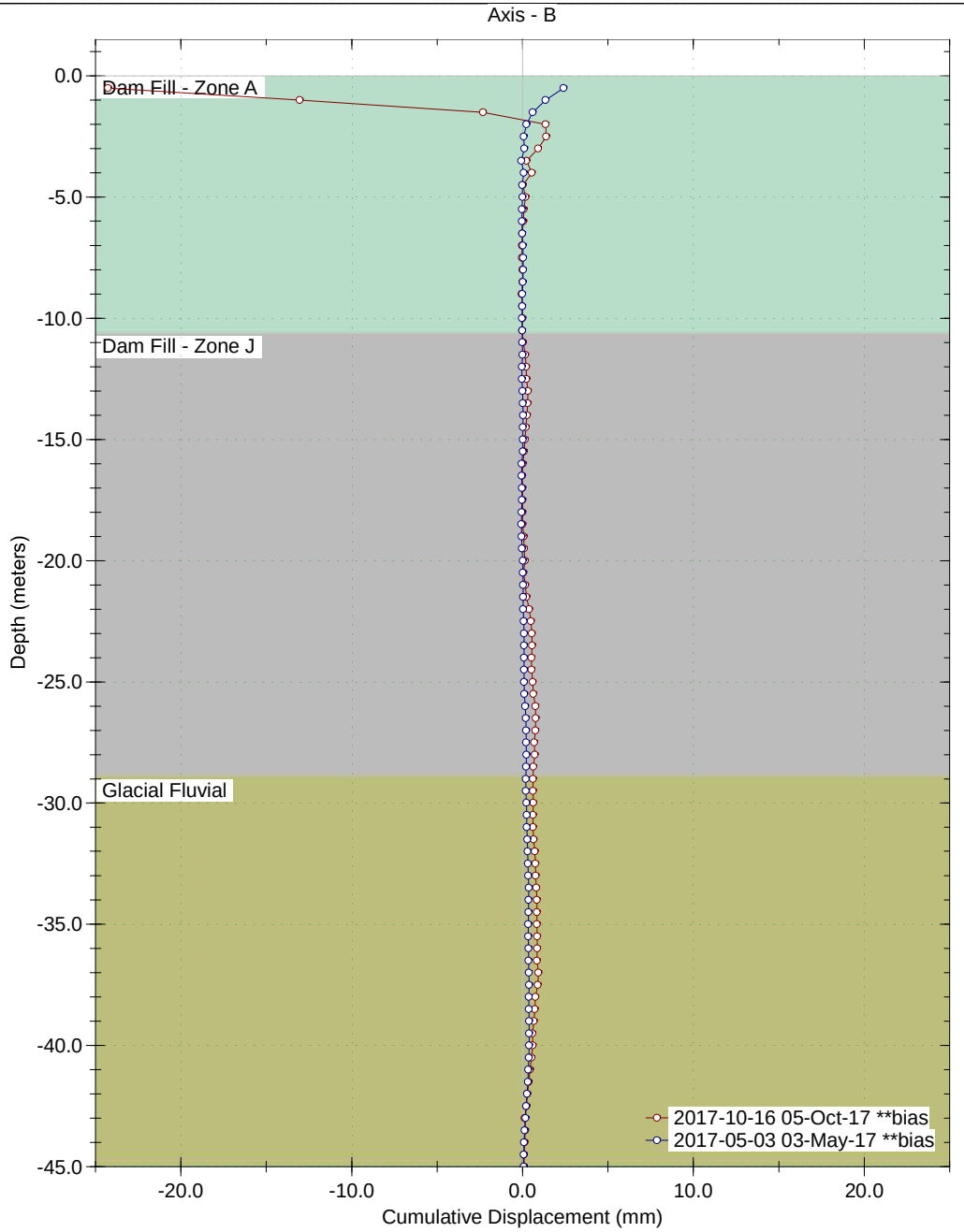
Inclinalysis v. 2.47.5

Borehole : BH14-08A
Project : Site - Myra Falls
Location : Lynx TDF
Northing :
Easting :
Collar : 357.5 m

Spiral Correction : N/A
Collar Elevation : 0.0 meters
Borehole Total Depth : 45.0 meters
A+ Groove Azimuth :
Base Reading :
Applied Azimuth : 0.0 degrees

Figure 5





RST Instruments Ltd.

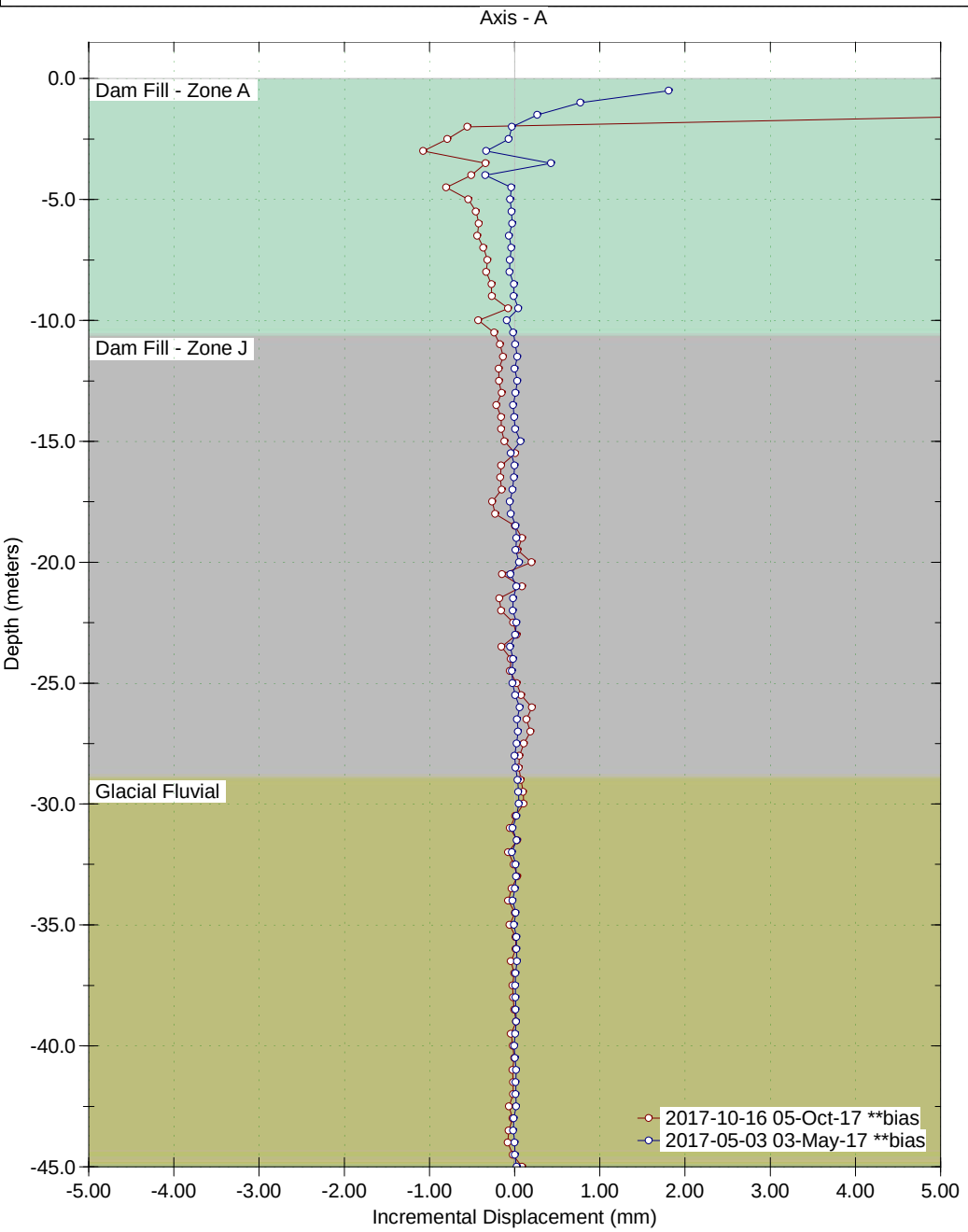
INCREMENTAL DISPLACEMENT

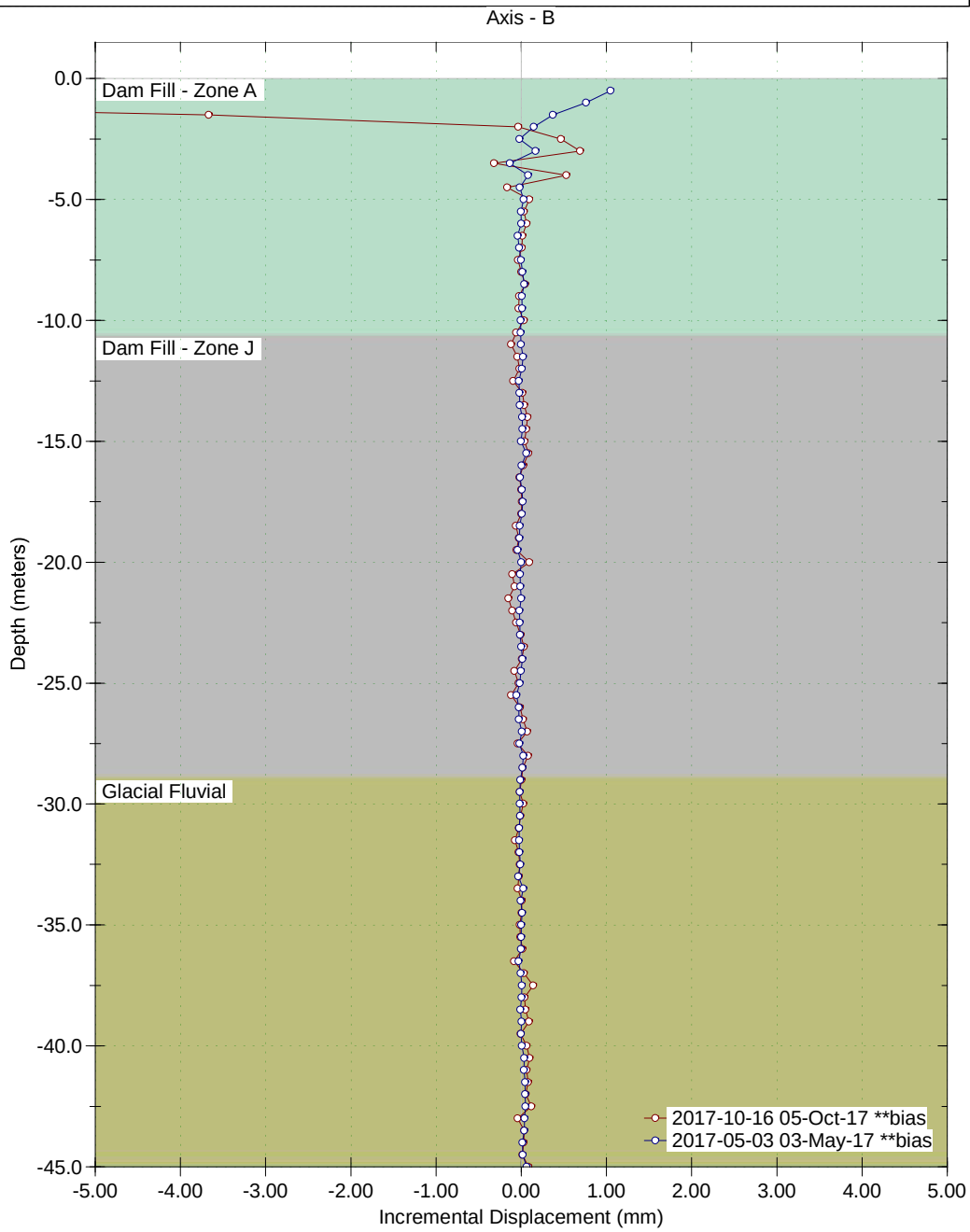
Inclinalysis v. 2.47.5

Borehole : BH14-08A
Project : Site - Myra Falls
Location : Lynx TDF
Northing :
Easting :
Collar : 357.5 m

Spiral Correction : N/A
Collar Elevation : 0.0 meters
Borehole Total Depth : 45.0 meters
A+ Groove Azimuth :
Base Reading :
Applied Azimuth : 0.0 degrees

Figure 6





Appendix B2

Piezometer Operational Status
(included on digital copy)

Memo

To:	Nicole Pesonen		
From:	[redacted], EIT		
Tel:	1.250.758.1887	**File No:**	NX14001B
Date:	30 March 2018	**Reviewed by:**	Dan Hughes-Games, P.Eng.
		Cc:	Christine Peters

Subject: Instrumentation Status - Nyrstar Myra Falls Mine

1.0 INTRODUCTION

This memorandum presents a summary of the status of the automated instrumentation network at Myra Falls Mines at the end of 2017. It summarizes instrumentation that are not functional, proposed repair work and discusses options to improve the system.

2.0 BACKGROUND

Instrumentation is used to monitor and assess the safety of the two tailings disposal facilities, Old TDF and Lynx TDF, at Myra Falls Mine. Instrumentation on site includes vibrating wire piezometers, seismometers, barometers, slope inclinometers, constellations of survey monuments and a weather station. The majority of the instrumentation on site is manufactured and supplied by RST Ltd. of Maple Ridge, BC and connected to data loggers manufactured and supplied by Campbell Scientific of Utah.

Between 2015 and 2016 the weather station, piezometers, seismometers and barometers were connected to an automated instrumentation system by RST. Full details of this work are provided in Amec Foster Wheeler's memorandum "Nyrstar Myra Falls Mine – Instrumentation Automation Project Summary" dated 13 July 2016.

3.0 DAMAGED PIEZOMETERS AND REPAIRS

Since the automated network was created some piezometers have been damaged or stopped functioning. These should be repaired or replaced where they provide critical information for monitoring dam safety. The attached Table B2-1 provides a summary of the operational status of the piezometers on site.

Amec Foster Wheeler Environment & Infrastructure,
a Division of Amec Foster Wheeler Americas Limited
4385 Boban Drive
Nanaimo, BC, V9T 5V9
Tel: 250-758-1887
amecfw.com

The subsections below describe: instrumentation are malfunctioning and should be assessed to plan repair work; instrumentation that have not been connected to the system; and instrumentation with cables that should be buried.

3.1 Assessment of Malfunctioning Piezometers

Piezometers in the automated network may be malfunctioning because of severed cables, loose cable connections, damaged RStars units (radio units) or depleted data logger batteries. Malfunctioning piezometers should be assessed in the field to determine if and how they can be repaired. The following are anticipated outcomes from the field assessment.

- If a cable is transmitting a signal it can be reconnected to the datalogger.
- If a cable is transmitting a signal at the borehole but not at the datalogger it is because the cable was severed or was damaged. For these cases the cable should be spliced, trenched and reconnected to the appropriate data logger.
- If the cable is transmitting a signal but the RStar is not transmitting to the network it is likely that the RStar unit is damaged. In this case the RStar unit should be disconnected and sent to RST for repair.
- If a cable is not transmitting a signal at the RStar unit and the cable cannot be recovered at the borehole collar location, the piezometer is considered damaged beyond repair. For these cases the EOR should evaluate the purpose of the piezometer and depending on instrumentation coverage in the area may recommend installing a replacement piezometer.

Table 1 provides a summary of malfunctioning piezometers that should be assessed.

Table 1: Malfunctioning Piezometers to be Assessed

Structure	Location	Unit #	Known Information	Field Assessment
Old TDF	APA West Arm	P-10	Missing data after 18 September 2017	Check if cables are transmitting signal at RStar unit or borehole
	APA West Arm	32228	Missing data after 6 September 2017	Check if cables are transmitting signal at RStar unit or borehole
	APA West Arm	36972	Missing data after 30 June 2017	Check if cables are transmitting signal at RStar unit or borehole
	West end of West Channel Strip	32231	Missing data after 24 July 2016	Check if cables are transmitting signal at RStar unit or borehole
	Southeast Corner	32222	Intermittently missing data after 26 July 2017	Check cable connection and signal at RStar unit

	Southeast Corner	32234	Transducer is missing data after 18 July 2017, thermistor continues to send data	Check if cables are transmitting signal at RStar unit or borehole
	Southeast Corner	RStar 4294	VWP 32222, 32241 and 17730 are connected to this unit. They are intermittently missing data and sending erroneous data since September 2017.	Check cable connections to RStar unit.
Lynx TDF	Southwest Corner	29331	Intermittently missing data after 17 October 2017. Cable was disconnected and reconnected to the system on that day.	Check cable connections/signal at RStar unit
	South Toe	29321	Missing data after 27 October 2017	Check cable connection/signal at RStar unit
	South Toe	RStar 4798	VWP 29323 and 29333 were reconnected to RStar unit on 17 October 2017 but did not begin transmitting data	Check connection at RStar Unit and confirm if cables are transmitting a signal
	Southeast Toe	RStar 4797	VWP 33781, 33782 and 29325 are connected to this RStar unit. They after missing data after 5 October 2017	Check cable connection/signal at RStar unit
	Paste	17732	Missing transducer data after 23 November 2016	Check cable connection/signal at Lynx Hut
	Paste	17721	Missing data after 17 September 2017	Check cable connection/signal at Lynx Hut
	Paste	31089	Missing data after 17 September 2017	Check cable connection/signal at Lynx Hut

3.2 Piezometers to Connected to the System

Three piezometers are not connected to the automated network. Table 2 provides a summary of the work and supplies required to connect these instruments to the network.

Table 2: Piezometers to be Connected to Automated Network

Structure	Location	Piezometer #	Work to be Complete	Supplies to Be Ordered
Old TDF	APA west of Spillway	VWP 21715	Extend existing cable to Hut B and trench cables. Hut B is approximately 40 m east of the piezometer. Requires excavator and cable bedding material.	40 m of piezometer cable
Lynx Springs Drain	Lynx Springs Drain	VWP 33780 VWP 44968	These piezometers are not connected to an RStar unit. The RStar unit for the piezometers is on site, stored in the Amec Foster Wheeler Lynx Office, but does not have an enclosure to protect it.	DT2055 enclosure and mounting stake

3.3 Piezometers to Cables to be Buried

On the Old TDF there are six RStar units that have exposed cables extending between the borehole and the unit. Burying piezometer cables increases protection from damage due to traffic, equipment, wildlife, and vandalism. The trenches should be 1 m wide and 1 m deep, cables should be placed on a 0.1 m thick pad of bedding material (Zone J2 material) and covered with bedding material such that there is a minimum 100 mm thickness of bedding in all directions from the wire. Table 3 provides a summary of the cables to be buried and the approximate length of trench.

Table 3: Cables to be Buried

RStar #	Location	Work Description
RStar 4301	West APA	Trench existing cables 5 m upslope from APA stability berm to unit.
RStar 4292	Southwest APA	Trench existing cables 5 m upslope from APA stability berm to unit.
RStar 4800	APA east of Spillway	Trench existing cables 5 m upslope from APA stability berm to unit.
RStar 4294	Southeast APA	Trench existing cables 5 m upslope from APA stability berm to unit.
RStar 4293	East APA	Trench existing cables 5 m upslope from APA stability berm to unit.
RStar 4304	East APA upstream side	Trench existing cables 2 m from crusher area to unit.

4.0 DATA LOGGER PROGRAMMING

Occasionally the automated network records “NAN” (not a number) or values that are obvious outliers. This is likely caused by the radio signal being blocked or interrupted at the time of connection. We suspect that trying to reconnect to the logger may in some cases return a correct value. As such the data logger script should be reviewed and improved by adding a logical algorithm to attempt several reconnections following a missing or nonsensical reading.

5.0 NEW INSTRUMENTATION

There are two working barometers on site, one in the Lynx Hut and the other in Hut C. During 2017-Q4 both barometers stopped recording due to depleted batteries. Barometric data is an important component of the instrumentation system as it is used to process piezometer data for the site. To make the instrumentation system more robust a barometer should be added to the Paste Plant Weather Station.

6.0 ONLINE ACCESS TO INSTRUMENTATION SYSTEM

For the automated instrumentation system to function in a meaningful way it needs to be accessible in real-time to offsite users through a secure internet connection. In the event of an emergency, such as an extreme weather or seismic event, the EOR needs to be able to view sensor data to evaluate the safety of the dam and provide immediate recommendations.

Currently the instrumentation data on site is downloaded from stations using a program called Loggernet created by Campbell Scientific. Loggernet outputs raw data that requires processing based on the individual instrumentation calibration constants, measured atmospheric pressures and measured temperatures. The collected raw data is emailed to Amec Foster Wheeler who processes it using excel spreadsheets.

We understand that Nyrstar is in the process of setting up Geoviewer, a program created by RST, which process the data automatically and output graphs and charts. By purchasing an add-on the Geoviewer program has the capability of creating a website to share the output data, however the website created is not secure and is accessible to anyone with the link.

There are many methods and tools available to provide secure online access to instrumentation data. Amec Foster Wheeler contacted seven instrumentation suppliers in 2017 to evaluate different tools and costs. The following four options were considered simplest and cost effective to implement.

1. **VPN -** Designate an on-site computer for the sole purpose of viewing and accessing instrumentation data. This computer would have the existing Loggernet and Geoviewer programs running at all times. Nyrstar IT would then set up and run a VPN to this computer so off site users could login to view and access the data.
2. **Create a Secure Login for Geoviewer-** Based on preliminary discussions, RST indicated they could create a secure login page for the website Geoviewer creates. This option requires purchasing the Geoviewer add-on program and designating an on-site computer

to be continually running Loggernet and Geoviewer. As this is not a standard service offered by RST this option requires initial design costs and a monthly subscription fee. Alternatively, Nyrstar IT could assess the cost of creating and managing a secure log-in page for the website Geoviewer creates.

3. **Atlas Web Platform –** Atlas is an instrumentation processing and viewing web platform created by Durham Slope Indicator of Burnaby, BC. The Atlas platform has built in security and is password protected. For this option a designated on-site computer would be set up to continually run Loggernet. A File Transfer Protocol (FTP) link would be set up on the computer to automatically transfer Loggernet data to the Atlas web platform. Once set up the Atlas platform processes the data and outputs graphs and tables. Other similar commercially available online instrumentation platforms are available, however Atlas is considered the favourable choice for this option as it would be simple to set up, local support is available, and it has a low monthly subscription fee.
4. **Base Station with Ethernet Connection-** The existing base station logger (CR800) could be replaced with a logger that contains a built in ethernet connection (CR1000 and NL116 interface). Off-site users could connect through the internet to the new base station logger using Loggernet to download the data. Multilevel security could be set up on the new logger so that the information is only accessible by password. The drawback of this option is it does not process the data so on-site and off-site users would not be viewing the same outputs.

We recommend the first option as a potentially effective means of providing the requisite level of access both on and off site, and best symmetry for onsite and offsite users.

7.0 ALERT AND ALARM THRESHOLDS

VWP alert and alarm thresholds were created for the Old TDF in 2017, as described in Amec Foster Wheeler's memorandum "Old Tailings Facility Vibrating Cable Piezometer Triggers", dated 27 February 2017. The thresholds were created based on a sensitivity analysis of Factors of Safety (FoS) with respect to changing pore water pressures. Implementation of these thresholds was intended to be a staged approach, with the first stage inputting values as obtained from the stability models, which themselves are based on an assumption of uniform hydrogeological properties. The second stage of adjustment is to review those sensors that frequently report alert or alarm thresholds and adjust the values to reflect local hydrogeological conditions at the sensor. We recommend proceeding with the second stage adjustments in order to reduce the incidence of alarms under non-exceptional conditions.

VWP alert and alarm thresholds have not been created for Lynx TDF. Stability models and piezometer data should be reviewed and threshold alarms created for Lynx TDF.

8.0 INSTRUMENTATION HUTS POWER SUPPLY

The instrumentation Huts (A, B, C and Lynx) are powered with batteries charged by solar panels. Charging with solar panels is challenging in the winter because Mount Myra casts a shadow over a large portion of the site for multiple months. The huts are deep within this shadow.

Data was lost in Hut A during Q1-2017 due to a depleted battery. RST reviewed the system in October and replaced a 7 Ah battery in the hut with a 100 Ah battery. Data was lost in Huts B and C and in the Lynx Hut during Q4-2017 after the system review, also due to depleted batteries.

The instrumentation system is currently set up to send an alert email when the battery voltage drops. Personnel can then swap the battery and charge it. We recommend evaluating alternative power options which require less human intervention in order to make the system more robust. Some suggested alternative methods for powering the Huts include:

- Connecting Huts A and C to grid power by running aerial lines over Myra Creek.
- Adding stand-alone electrical generators to power the Huts during winter, such as automated propane or gas generators.
- Adding larger batteries at the Huts.

Increasing the size of the solar panels is unlikely to improve the power supply as the mountain shadow is considered “hard” shade. Cells in a solar panel are connected in series, so if even a small portion of the panel is shaded it decreases the power output significantly[1]. Efficiencies of the solar panels could potentially be improved by:

- Mounting them further from the Huts in a location that is not fully shaded in the winter (likely not practical, or any more practical than hard-wiring the huts to the grid)
- Mounting the solar panels vertically to prevent snow build up.

[1] The Effects of Shade on Solar Panels < https://blog.wholesalesolar.com/effect-shade-solar-panels/>, 20 February 2018.

9.0 LIMITATIONS AND CLOSING REMARKS

This memorandum has been prepared for the exclusive use of Nyrstar Myra Falls Ltd. for specific application to the area within this memorandum. 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 dam inspection practices. No other warranty, express or implied, is made.

Respectfully submitted,

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

Reviewed by:

[redacted]

Original signed and sealed by
Dan Hughes-Games, P.Eng.

[redacted], EIT
Geotechnical Engineer

Dan Hughes-Games, P.Eng.
Senior Geotechnical Engineer

Table B2-1 Operational Status of Old TDF - Plane A Vibrating Wire Piezometers

Piezometer Number	Tip Elevation Mine Grid (m)	Tip Elevation Geodetic (m)	Thermistor Status	Transducer Status	Piezometer Status
ATM	-	-	-	OK	OK, functioning
A-0E	3356.2	308.7	-	-	Destroyed August 1999
A-1E	3352.8	305.2	OK	OK	OK, functioning
A-2E	3352.9	305.4	OK	OK	OK, functioning
A-4E	3352.7	305.2	OK	OK	OK, functioning
A-5E	3357.9	310.4	OK	OK	OK, functioning
A-6E	3358.4	310.9	OK	OK	OK, functioning
A-8E	3358.5	311.0	OK	OK	OK, functioning
A-9E	3359.2	311.7	-	OK	Thermistor not functioning
A-10E	3359.8	312.3	OK	OK	OK, functioning
A-12E	3359.9	312.4	OK	OK	OK, functioning
A-13E	3360.9	313.4	OK	OK	OK, functioning
A-14E	3360.9	313.4	-	OK	Thermistor not functioning
A-16E	3361.1	313.6	-	OK	Thermistor not functioning
A-17E	3364.5	317.0	OK	OK	OK, functioning
A-18E	3364.3	316.7	OK	OK	OK, functioning
A-20E	3364.2	316.6	OK	OK	OK, functioning
A-25E	3371.4	323.9	OK	OK	OK, functioning
A-26E	3371.2	323.7	OK	OK	OK, functioning
A-27E	3371.4	323.9	OK	OK	OK, functioning
A-28E	3372.6	325.1	-	OK	Thermistor not functioning
A-29E	3372.4	324.9	-	-	Not functioning
A-30E	3372.3	324.8	OK	OK	OK, functioning
A-31E	3375.3	327.8	OK	OK	OK, functioning
A-32E	3375.2	327.7	OK	OK	OK, functioning
A-33E	3375.0	327.5	OK	OK	OK, functioning

Operational Status of Old TDF - Paste Berm Area I and II Vibrating Wire Piezometers

Piezometer Number	Tip Elevation Mine Grid (m)	Tip Elevation Geodetic (m)	Thermistor Status	Transducer Status	Piezometer Status
ATM	-		OK	-	No transducer installed
B-1E	3375.5	328.0	-	-	Not functioning after July 2009
B-5E	3365.1	317.6	-	-	Not functioning
P-1	3371.9	324.4	OK	OK	OK, functioning
P-2	3376.9	329.4	OK	OK	OK, functioning
P-3	3371.8	324.3	OK	OK	OK, functioning
P-4	3376.8	329.3	OK	OK	OK, functioning
P-5	3372.6	325.1	OK	OK	OK, functioning
P-6	3376.9	329.4	OK	OK	OK, functioning
P-7	3367.3	319.8	OK	OK	OK, functioning
P-8	3372.5	325.0	-	-	Not functioning after August 2011
P-9	3378.9	331.4	-	-	Not functioning
P-10	3374.0	326.5	-	-	Not functioning after 18 September 2017
P-11	3380.1	332.6	OK	OK	OK, functioning
P-12	3374.0	326.5	OK	OK	OK, functioning
P-13	3379.7	332.2	OK	OK	OK, functioning
P-14	3374.2	326.7	OK	OK	OK, functioning

Operational Status of Old TDF - Plane C Vibrating Wire Piezometers

Piezometer Number	Tip Elevation Mine Grid (m)	Tip Elevation Geodetic (m)	Thermistor Status	Transducer Status	Piezometer Status
ATM	-	-	OK	OK	OK, occasional false readings
C-2E	3348.0	300.5	OK	OK	OK, functioning
C-4E	3348.1	300.6	OK	-	Not functioning
C-5E	3357.6	310.1	-	OK	Thermistor not functioning
C-6E	3351.2	303.7	-	OK	Thermistor not functioning
C-8E	3350.0	302.5	-	-	Not functioning
C-10E	3354.8	307.3	-	OK	Thermistor not functioning
C-12E	3353.0	305.5	-	OK	Thermistor not functioning
C-13E	3356.4	308.9	OK	OK	OK, functioning
C-14E	3356.3	308.7	-	OK	Thermistor not functioning
C-16E	3356.2	308.7	-	OK	Thermistor not functioning
C-17E	3350.7	303.1	OK	OK	OK, functioning
C-18E	3362.0	314.5	OK	OK	OK, functioning
C-20E	3362.0	314.5	OK	OK	OK, functioning
C-21E	3363.1	315.6	OK	OK	OK, functioning
C-22E	3362.9	315.4	OK	OK	OK, functioning
C-24E	3362.7	315.2	-	OK	Thermistor not functioning
C-29E	3369.8	322.3	OK	OK	OK, functioning
C-30E	3369.5	322.0	OK	-	Transducer not functioning
C-31E	3369.5	322.0	OK	OK	OK, functioning
C-32E	3372.3	324.8	-	-	Not functioning
C-34E	3372.2	324.7	-	-	Not functioning
C-35E	3374.2	326.7	OK	OK	OK, functioning
C-36E	3374.1	326.6	OK	OK	OK, functioning
C-37E	3374.1	326.6	OK	OK	OK, functioning
17722[5]	3382.9	335.4	OK	OK	OK, functioning
17724	3373.7	326.2	OK	OK	OK, functioning
17726	3373.8	326.3	OK	OK	OK, functioning
17729	3383.0	335.5	-	-	Not functioning

Operational Status of Old TDF - Plane 1 Vibrating Wire Piezometers

Piezometer Number	Tip Elevation Mine Grid (m)	Tip Elevation Geodetic (m)	Thermistor Status	Transducer Status	Piezometer Status
32228	3378.9	331.4	Unknown	Unknown	Not functioning after 6 September 2017
32232	3376.9	329.4	OK	OK	OK, functioning

Operational Status of Old TDF - Plane 2 Vibrating Wire Piezometers

Piezometer Number	Tip Elevation Mine Grid (m)	Tip Elevation Geodetic (m)	Thermistor Status	Transducer Status	Piezometer Status
32225	3376.1	328.6	OK	OK	OK, functioning
32240	3360.8	313.3	OK	OK	OK, functioning
32229	3373.4	325.9	OK	OK	OK, functioning
32231	3377.7	330.2	-	-	Not functioning after 24 July 2016
32220	3376.1	328.6	OK	OK	OK, functioning
32239	3357.8	310.3	OK	OK	OK, functioning

Operational Status of Old TDF - Plane 3 Vibrating Wire Piezometers

Piezometer Number	Tip Elevation Mine Grid (m)	Tip Elevation Geodetic (m)	Thermistor Status	Transducer Status	Piezometer Status
21715	3376.8	329.3	Unknown	Unknown	Status unknown, wire not connected to data logger
32233	3379.9	332.4	OK	OK	OK, functioning

Operational Status of Old TDF - Plane 4 Vibrating Wire Piezometers

Piezometer Number	Tip Elevation Mine Grid (m)	Tip Elevation Geodetic (m)	Thermistor Status	Transducer Status	Piezometer Status
1204	3376.8	329.3	OK	OK	OK, functioning
32237	3379.9	332.4	OK	OK	OK, functioning

Operational Status of Old TDF - Plane 5 Vibrating Wire Piezometers

Piezometer Number	Tip Elevation Mine Grid (m)	Tip Elevation Geodetic (m)	Thermistor Status	Transducer Status	Piezometer Status
32222	3374.4	326.9	OK	OK	OK, intermittent functioning since 26 July 2017
32241	3356.2	308.7	OK	OK	OK, functioning
17730	3376.8	329.3	OK	OK	OK, functioning
32234	3376.0	328.5	OK	-	Transducer not functioning after 18 July 2017
32224	3374.5	327.0	OK	OK	OK, functioning
32238	3356.2	308.7	OK	OK	OK, functioning
32223	3364.3	316.8	-	OK	Thermistor not functioning after 02 May 2016
32227	3352.1	304.6	OK	OK	OK, functioning

Operational Status of Old TDF - Plane 6 Vibrating Wire Piezometers

Piezometer Number	Tip Elevation Mine Grid (m)	Tip Elevation Geodetic (m)	Thermistor Status	Transducer Status	Piezometer Status
32219	3382.7	335.2	OK	OK	OK, functioning
32226	3378.1	330.6	OK	OK	OK, functioning
32230	3376.3	328.8	OK	OK	OK, functioning
32236	3377.9	330.4	OK	OK	OK, functioning

Operational Status of Old TDF - Surge Pond East Slope Vibrating Wire Piezometers

Piezometer Number	Tip Elevation Mine Grid (m)	Tip Elevation Geodetic (m)	Thermistor Status	Transducer Status	Piezometer Status
36971	3382.7	335.2	OK	OK	OK, functioning
36972	3378.1	330.6	Unknown	Unknown	Not functioning after 30 June 2017, lead wire severed
36973	3376.3	328.8	OK	OK	OK, functioning

Operational Status of Lynx TDF - Plane D Vibrating Wire Piezometers

Piezometer Number	Tip Elevation Mine Grid (m)	Tip Elevation Geodetic (m)	Thermistor Status	Transducer Status	Piezometer Status
29334	3375.9	328.4	OK	OK	OK, functioning
29326	3397.5	350.0	OK	OK	OK, functioning

Operational Status of Lynx TDF - Plane E Vibrating Wire Piezometers

Piezometer Number	Tip Elevation Mine Grid (m)	Tip Elevation Geodetic (m)	Thermistor Status	Transducer Status	Piezometer Status
17727	3375.9	328.4	OK	OK	OK, functioning
17728	3368.2	320.7	-	OK	Thermistor not functioning
17731	3377.8	330.3	OK	OK	OK, functioning
17732	3370.2	322.7	OK	-	Not functioning after 23 November 2016
17733	3356.0	308.5	-	OK	Thermistor not functioning
17734	3358.0	310.5	-	OK	Thermistor not functioning
29321	3369.9	322.4	-	-	Not functioning after 27 October 2017
29329	3384.4	336.9	OK	OK	OK, functioning
29332	3352.7	305.2	OK	OK	OK, functioning
29335	3363.4	315.9	OK	OK	OK, functioning
17723	3398.2	350.7	OK	OK	OK, functioning
33783	3399.2	351.7	OK	OK	OK, functioning

Operational Status of Lynx TDF - Plane F Vibrating Wire Piezometers

Piezometer Number	Tip Elevation Mine Grid (m)	Tip Elevation Geodetic (m)	Thermistor Status	Transducer Status	Piezometer Status
17725	3325.8	278.3	OK	OK	OK, functioning
29322	3384.8	337.3	OK	OK	OK, functioning
29323	3373.6	326.1	-	-	Reconnected on 17 October, 2017 but did not start functioning
29324	3359.1	311.5	OK	OK	OK, functioning
29330	3375.9	328.4	OK	OK	OK, functioning
29333	3344.2	296.7	-	-	Reconnected on 17 October, 2017 but did not start functioning
29336	3358.6	311.1	-	-	Reporting erroneous data, replaced by VW31089
31089	3398.8	351.3	-	-	Stopped functioning after 17 September 2017
17721	3398.8	351.3	-	-	Stopped functioning after 17 September 2017
32221	3366.1	318.6	OK	OK	OK, functioning

Operational Status of Lynx TDF - Other Vibrating Wire Piezometers

Piezometer Number	Tip Elevation Mine Grid (m)	Tip Elevation Geodetic (m)	Thermistor Status	Transducer Status	Piezometer Status
29320	3371.0	323.4	OK	OK	OK, functioning
29325	3351.8	304.3	-	-	Stopped functioning after 5 October 2017
29331	3353.8	306.3	-	-	Started intermittently functioning since 17 October 2017
33781	3361.9	314.4	-	-	Stopped functioning after 5 October 2017
33782	3342.0	294.5	-	-	Stopped functioning after 5 October 2017
33784	3359.4	311.9	OK	OK	OK, functioning

Appendix C

NMF Inspection Reports
(included on digital copy)

Summary of 2017 NMF TDF Inspections

Date	Observations/Action Taken
Lynx TDF	
15 December 2017	Erosion gully forming on Waste Dump 1 between Quonset Hut and Lynx Dam.
Old TDF	
30 July 2017	New tailings smear on upstream side of APA berm.
21 December 2017	Material in West Strip Channel.
Lower Lynx Diversion Ditch	
23 July 2017	Gravel and boulders deposited in upper shotcrete section of ditch.
21 September 2017	Gravel and boulders in ditch have been removed.
10 November 2017	Material caught in debris catchment net.
21 December 2017	Material caught in catchment net has been removed.

MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

All parts of this inspection report should be completed. Adverse conditions should be described. Additional information may be put on attached pages

INSPECTION DETAILS

Inspector Name: B. Maxwell

Inspector Position: Project Coordinator

Inspection Date/Time: JAN 12th/17

Weather Conditions: Clear -14°c

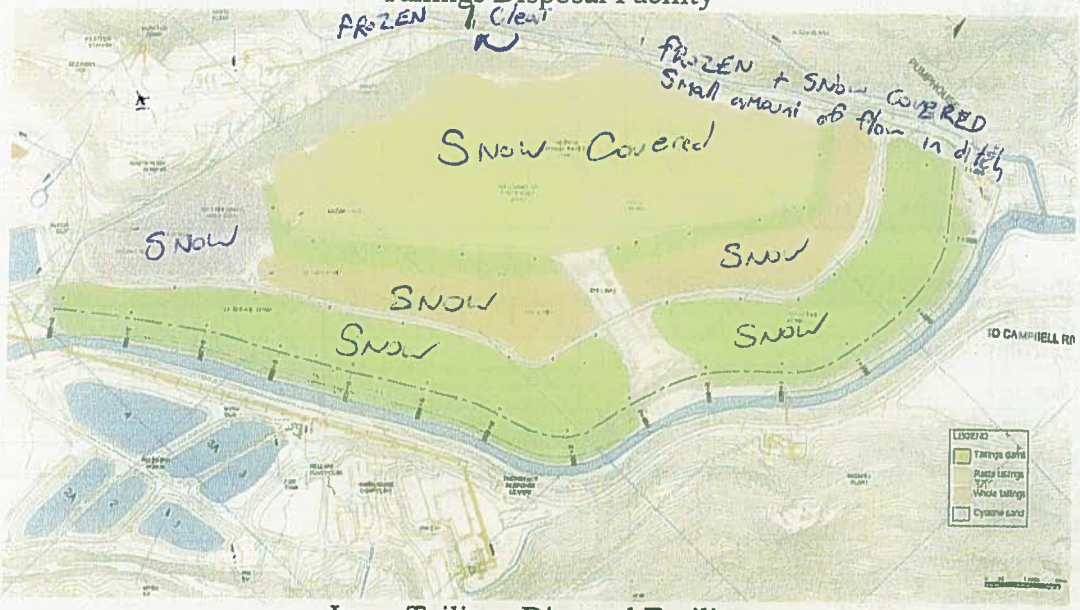
Reason for Inspection:

Routine ☑

Special Condition ☐

ADDITIONAL COMMENTS

Tailings Disposal Facility



Lynx Tailings Disposal Facility



MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

INSPECTOR NAME: _____ **DATE:** _____

INSPECTION POINT / ITEMS	CONDITION						
	RATING						REMARKS / DESCRIPTIONS
Tailings Dam Crest (Strip+6:1)	S	F	P	U	N	NA	
Surface Cracks - Transverse						✓	
Surface Cracks - Longitudinal						✓	SNOW
Settlement / Depressions						✓	
Erosion or Gully Channels						✓	
Spillway Inspection	S	F	P	U	N	NA	
Invert opening clear?	✓						
Riprap coverage adequate?	✓						
Tailings Dam Slope and Toe	S	F	P	U	N	NA	
Surface Erosion						✓	
Surface Settlement / Depressions						✓	SNOW
Sinkholes						✓	
Cracks / Slope Movement/Bulging						✓	
Seepage / Wet Areas						✓	
Amalgamated Paste Area	S	F	P	U	N	NA	
Active Tailings Placement? If yes, show on map							NO
Pond Water Elevation (Top of decant is 3390.3)	✓						
Depth of water at decant inlet and clarity	✓						
Inlet opening clear?	✓						
Sand Storage Area–Pond to Crest Distance > 10 m?						✓	
TDF Strip	S	F	P	U	N	NA	
Distance between water and outer embankment > 20m?						✓	SNOW
Lynx Diversion Ditch	S	F	P	U	N	NA	
Ditch Clear? No infill material?	✓						SNOW and ice in ditch
Any Ditch Damage?		✓					Nothing new
Signs of Ditch Overtopping?	✓						
Flow Conditions in Ditch (m^3/s)	✓						Very Low
Paste Berm Crest (APA)	S	F	P	U	N	NA	
Surface Cracks - Transverse	✓						
Surface Cracks - Longitudinal						✓	SNOW
Settlement / Depressions						✓	
Erosion or Gully Channels						✓	
Lynx TDF	S	F	P	U	N	NA	
Sink holes or depressions evident in the tailings?	✓						
Sump pump currently pumping?						✓	NO
Ponded water evident on paste tails? if yes, how deep?							SNOW covered
Is water flowing into the pit? If yes, show on map	✓						PUMP
Evidence of slope failure into the Lynx TDF?	✓						
Active Tailings Placement? if yes, show on map						✓	NO

*** RATING LEGEND**

S = Satisfactory (Meets the intended purpose)

F = Fair (Meets intended purpose, but some maintenance needed)

P = Poor (May not meet intended purpose, repair or modify)

U = Unsatisfactory (Will not meet intended purpose, repair or modify)

N = Not inspected

NA = Not applicable

Additional Comments:

_____

_____

_____

_____

_____

_____

LYNX TDF DIVERSION DITCH INSPECTIONS

INSPECTION DETAILS

Inspector Name: B. Maxwell

Inspector Position: Project Coordinator

Inspection Date/Time: 17/01/25

Weather Conditions: clear 2°c

Reason for Inspection: Routine ☑ Special Condition ☐

Photos: (Y)/N

Additional Comments: Transcribed from other Sources

OBSERVATIONS

Ditch Clear: yes

Any Damage: No

Signs of Overtopping: No

Current Flow: Med

Signs of Seepage Below Ditch: ARNica 0+400

Slope Failures Above Ditch: 0+650 Cascade

Other Concerns:

Inspections and photos to be filed in the environmental drive under:

ENV LAB ▸ TDF, Piezos, Ponds ▸ TDF Inspections and Monitoring ▸ YEAR ▸ ULDD Inspections

See page two for sketch

LYNX TDF DIVERSION DITCH INSPECTIONS

INSPECTION DETAILS

Inspector Name: B. Maxwell

Inspector Position: Project Coordinator

Inspection Date/Time: 17/02/17

Weather Conditions: Sunny, Snow on ground

Reason for Inspection: Routine ☑ Special Condition ☐

Photos: (Y)/N

Additional Comments: Transcribed from other sources

OBSERVATIONS

Ditch Clear: Snow in arnica ditch. Cascade clear.

Any Damage: No

Signs of Overtopping: No

Current Flow: Low

Signs of Seepage Below Ditch: ARNICA Near 0+400

Slope Failures Above Ditch: Unravelling near 0+650 (cascade)

Other Concerns:

Inspections and photos to be filed in the environmental drive under:

ENV LAB ▸ TDF, Piezos, Ponds ▸ TDF Inspections and Monitoring ▸ YEAR ▸ ULDD Inspections

See page two for sketch

MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

All parts of this inspection report should be completed. Adverse conditions should be described. Additional information may be put on attached pages

INSPECTION DETAILS

Inspector Name: [redacted]

Inspector Position: Consultant – geotechnical engineer, EIT

Inspection Date/Time: July 9, 2017 – 8:00

Weather Conditions: Overcast to Sunny 10-20°C

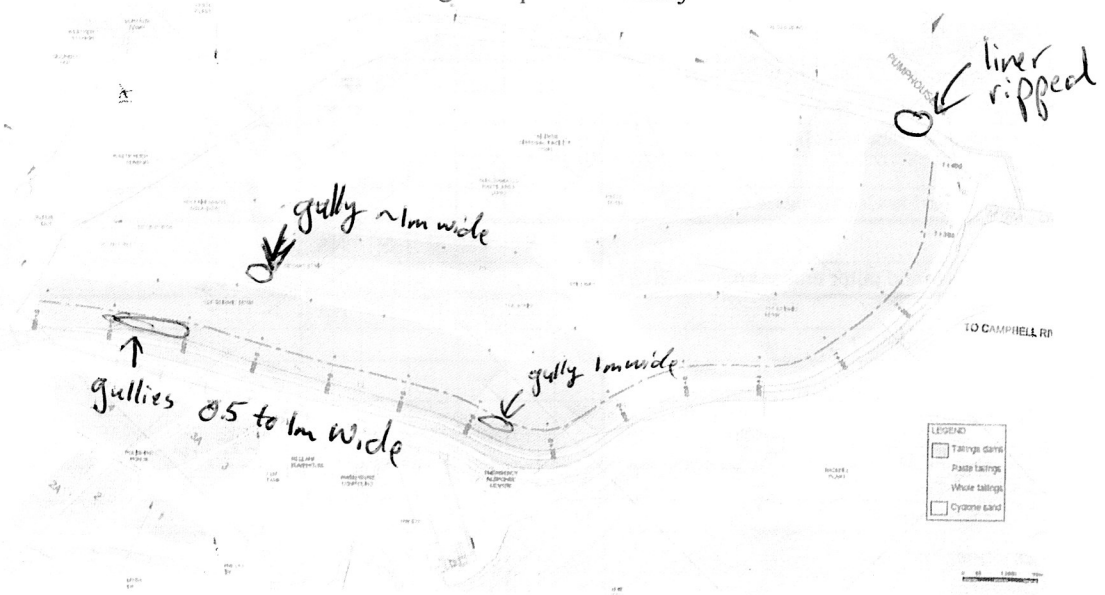
Reason for Inspection:

Routine ☒

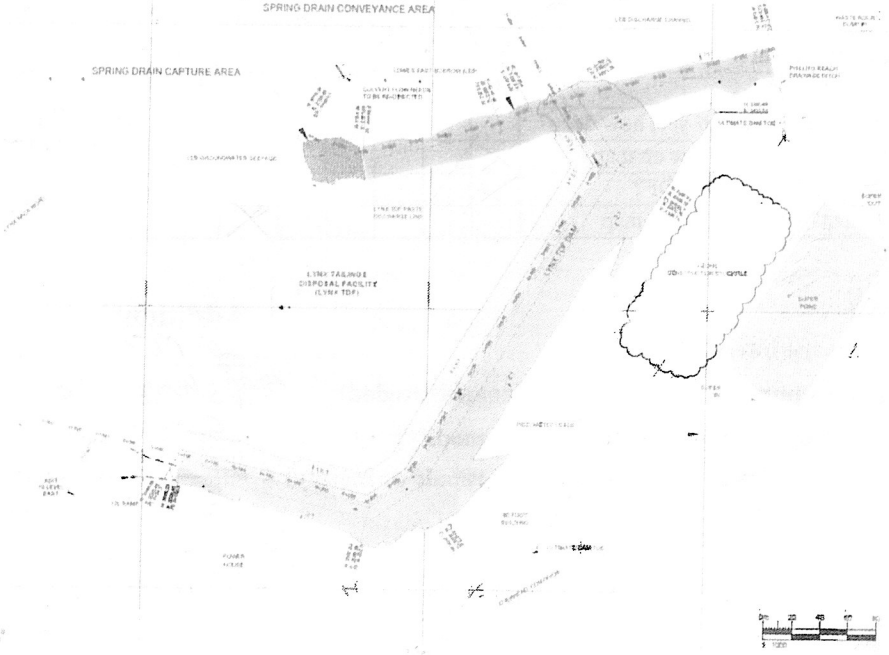
Special Condition ☐

ADDITIONAL COMMENTS

Tailings Disposal Facility



Lynx Tailings Disposal Facility



MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

INSPECTOR NAME: [redacted] **DATE:** July 9, 2017

INSPECTION POINT / ITEMS	CONDITION						
	RATING						REMARKS / DESCRIPTIONS
Tailings Dam Crest (Strip+6:1)	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Cracks - Transverse	X						
Surface Cracks - Longitudinal	X						
Settlement / Depressions	X						
Erosion or Gully Channels		X					Gullies up to 1m wide between sta. 0+200 to 0+800
Spillway Inspection	**S**	**F**	**P**	**U**	**N**	**NA**	
Invert opening clear?	X						
Riprap coverage adequate?	X						
Tailings Dam Slope and Toe	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Erosion	X						
Surface Settlement / Depressions	X						
Sinkholes	X						
Cracks / Slope Movement/Bulging	X						
Seepage / Wet Areas	X						
Amalgamated Paste Area	**S**	**F**	**P**	**U**	**N**	**NA**	
Active Tailings Placement? If yes, show on map						X	NO
Pond Water Elevation (Top of decant is 3390.3)						X	Dry
Depth of water at decant inlet and clarity						X	Dry
Inlet opening clear?	X						
Sand Storage Area–Pond to Crest Distance > 10 m?						X	
TDF Strip	**S**	**F**	**P**	**U**	**N**	**NA**	
Distance between water and outer embankment > 20m?						X	Dry
Lynx Diversion Ditch	**S**	**F**	**P**	**U**	**N**	**NA**	
Ditch Clear? No infill material?		X					
Any Ditch Damage?			X				rip in liner @ alder reach intersection
Signs of Ditch Overtopping?	X						
Flow Conditions in Ditch (m^3/s)							1-5 m^3/s
Paste Berm Crest (APA)	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Cracks - Transverse	X						
Surface Cracks - Longitudinal		X					minor cracks <1cm wide
Settlement / Depressions	X						
Erosion or Gully Channels	X						
Lynx TDF	**S**	**F**	**P**	**U**	**N**	**NA**	
Sink holes or depressions evident in the tailings?	X						
Sump pump currently pumping?							NO
Ponded water evident on paste tails? if yes, how deep?							~1 to 2Ft
Is water flowing into the pit? If yes, show on map	X						NO
Evidence of slope failure into the Lynx TDF?	X						NO
Active Tailings Placement? if yes, show on map						X	

* **RATING LEGEND**

S = Satisfactory (Meets the intended purpose)

F = Fair (Meets intended purpose, but some maintenance needed)

P = Poor (May not meet intended purpose, repair or modify)

U = Unsatisfactory (Will not meet intended purpose, repair or modify)

N = Not inspected

NA = Not applicable

Additional Comments:

minor gully on South side of west strip channel where it enters the surge pond.

LYNX TDF DIVERSION DITCH INSPECTIONS

INSPECTION DETAILS

Inspector Name: [redacted]

Inspector Position: Consultant - geotechnical engineer, EIT

Inspection Date/Time: July 9, 2017 12:30

Weather Conditions: Sunny ~20 °C

Reason for Inspection: Routine ☒ Special Condition ☐

Photos: (Y)/N

Additional Comments: Upper Lynx Diversion Ditch not inspected.

OBSERVATIONS

Ditch Clear: Some cobbles and branches. Majority clear

Any Damage: rip in liner near Alder Reach intersection

Signs of Overtopping: NO

Current Flow: 1-5 m^3/s

Signs of Seepage Below Ditch: NO

Slope Failures Above Ditch: NO

Other Concerns:

Inspections and photos to be filed in the environmental drive under:

ENV LAB ▸ TDF, Piezos, Ponds ▸ TDF Inspections and Monitoring ▸ YEAR ▸ ULDD Inspections

See page two for sketch

MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

All parts of this inspection report should be completed. Adverse conditions should be described. Additional information may be put on attached pages

INSPECTION DETAILS

Inspector Name: [redacted]

Inspector Position: AmecFW, Geotechnical Engineer, EIT

Inspection Date/Time: July 15, 2017 5:00pm

Weather Conditions: Overcast 18°C, windy

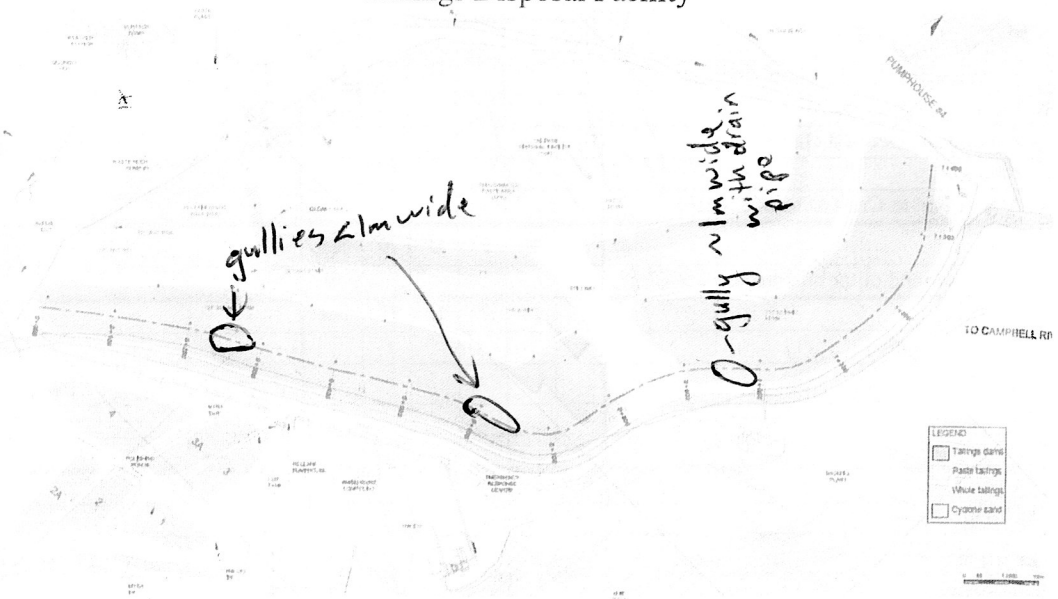
Reason for Inspection:

Routine [X]

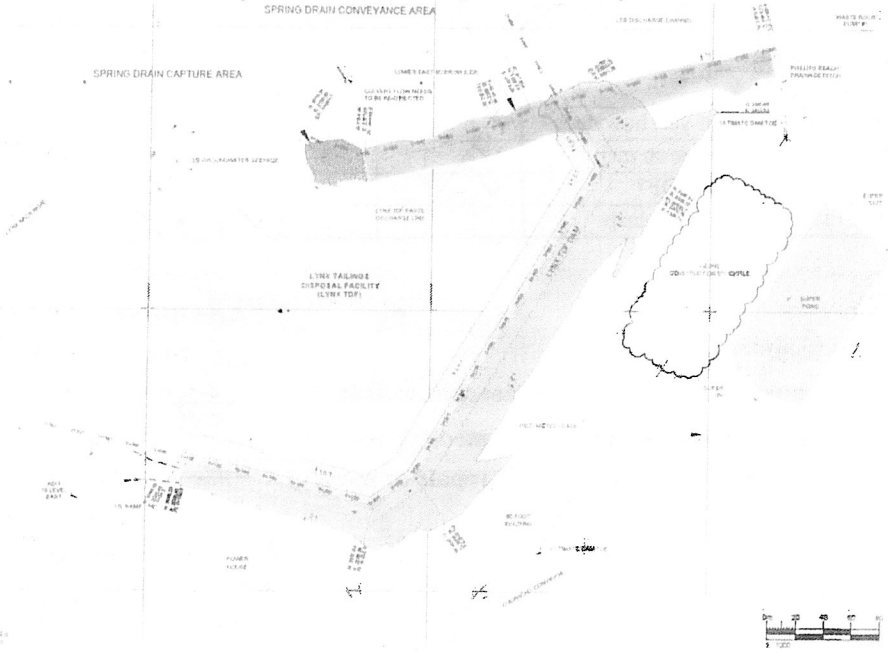
Special Condition [ ]

ADDITIONAL COMMENTS

Tailings Disposal Facility



Lynx Tailings Disposal Facility



MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

INSPECTOR NAME: [redacted] **DATE:** July 15, 2017

INSPECTION POINT / ITEMS	CONDITION						
	RATING						REMARKS / DESCRIPTIONS
Tailings Dam Crest (Strip+6:1)	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Cracks - Transverse	✓						
Surface Cracks - Longitudinal	✓						
Settlement / Depressions	✓						
Erosion or Gully Channels		✓					minor gullies up to 1m wide
Spillway Inspection	**S**	**F**	**P**	**U**	**N**	**NA**	
Invert opening clear?	✓						
Riprap coverage adequate?	✓						
Tailings Dam Slope and Toe	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Erosion		✓					Minor gullies up to 1m wide
Surface Settlement / Depressions	✓						
Sinkholes	✓						
Cracks / Slope Movement/Bulging	✓						
Seepage / Wet Areas	✓						
Amalgamated Paste Area	**S**	**F**	**P**	**U**	**N**	**NA**	
Active Tailings Placement? If yes, show on map						✓	NO
Pond Water Elevation (Top of decant is 3390.3)						✓	Dry
Depth of water at decant inlet and clarity						✓	Dry
Inlet opening clear?	✓						
Sand Storage Area–Pond to Crest Distance > 10 m?	✓						
TDF Strip	**S**	**F**	**P**	**U**	**N**	**NA**	
Distance between water and outer embankment > 20m?						✓	Dry
Lynx Diversion Ditch	**S**	**F**	**P**	**U**	**N**	**NA**	
Ditch Clear? No infill material?	✓						
Any Ditch Damage?		✓					riprap liner near alder reach
Signs of Ditch Overtopping?	✓						
Flow Conditions in Ditch (m^3/s)	✓						1-5 m^3/s
Paste Berm Crest (APA)	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Cracks - Transverse	✓						
Surface Cracks - Longitudinal		✓					on upstream side of crest <1 cm
Settlement / Depressions	✓						
Erosion or Gully Channels	✓						
Lynx TDF	**S**	**F**	**P**	**U**	**N**	**NA**	
Sink holes or depressions evident in the tailings?	✓						
Sump pump currently pumping?						✓	
Ponded water evident on paste tails? if yes, how deep?	✓						Dry
Is water flowing into the pit? If yes, show on map	✓						Dry
Evidence of slope failure into the Lynx TDF?	✓						No
Active Tailings Placement? if yes, show on map						✓	NO

*** RATING LEGEND**

S = Satisfactory (Meets the intended purpose)

F = Fair (Meets intended purpose, but some maintenance needed)

P = Poor (May not meet intended purpose, repair or modify)

U = Unsatisfactory (Will not meet intended purpose, repair or modify)

N = Not inspected

NA = Not applicable

Additional Comments:

Longitudinal cracking on Lynx dam crest on upstream slope <1 cm wide

LYNX TDF DIVERSION DITCH INSPECTIONS

INSPECTION DETAILS

Inspector Name: [redacted]

Inspector Position: Consultant, AmecFW, Geotechnical Engineer, EIT

Inspection Date/Time: July 15, 2017 5:00 pm

Weather Conditions: Overcast ~18°C, windy

Reason for Inspection: Routine ☒ Special Condition ☐

Photos: (Y)/N

Additional Comments:

OBSERVATIONS

Ditch Clear: Yes

Any Damage: rip in liner near alder reach intersection

Signs of Overtopping: no

Current Flow: 1-5 m^3/s

Signs of Seepage Below Ditch: no

Slope Failures Above Ditch: no

Other Concerns:
only lower lynx diversion ditch inspected

Inspections and photos to be filed in the environmental drive under:
ENV LAB ▸ TDF, Piezos, Ponds ▸ TDF Inspections and Monitoring ▸ YEAR ▸ ULDD Inspections

See page two for sketch

MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

All parts of this inspection report should be completed. Adverse conditions should be described. Additional information may be put on attached pages

INSPECTION DETAILS

Inspector Name: ERINN RAISON

Inspector Position: GEOTECHNICAL ENGINEER (AMEC FOSTER WHEELER)

Inspection Date/Time: 2017-07-23

Weather Conditions: BROKEN CLOUDS; ≈ 14°C

Reason for Inspection:

Routine	X WEEKLY INSPECTION
Special Condition	

ADDITIONAL COMMENTS

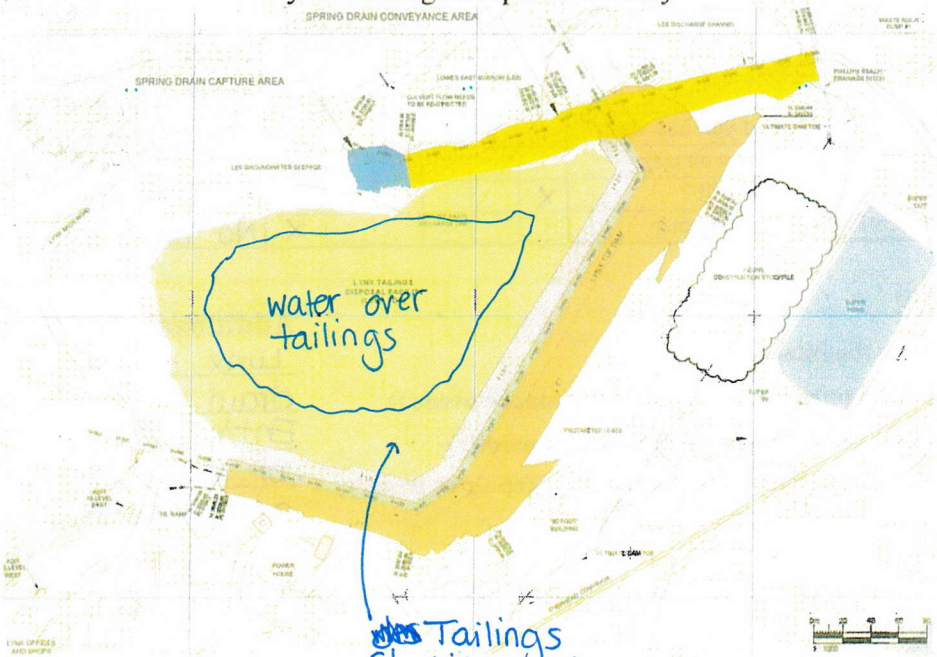
NO MAJOR ISSUES AT THIS TIME

Tailings Disposal Facility



Small possible seepage where berm has not been constructed

Lynx Tailings Disposal Facility



water over tailings

Tailings Starting to dry out

MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

INSPECTOR NAME: ERIWN RAISON **DATE:** 2017-07-23

INSPECTION POINT / ITEMS	CONDITION						
	RATING						REMARKS / DESCRIPTIONS
Tailings Dam Crest (Strip+6:1)	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Cracks - Transverse	X						
Surface Cracks - Longitudinal	X						
Settlement / Depressions	X						-Dry along 6:1 Slope +seismic upgrade berm
Erosion or Gully Channels	X						-None observed.
Spillway Inspection	**S**	**F**	**P**	**U**	**N**	**NA**	
Invert opening clear?	X						
Riprap coverage adequate?	X						
Tailings Dam Slope and Toe	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Erosion		X					Some erosion observed, minor but could grow with time
Surface Settlement / Depressions	X						None observed
Sinkholes	X						None observed
Cracks / Slope Movement/Bulging	X						None observed
Seepage / Wet Areas	X						None observed
Amalgamated Paste Area	**S**	**F**	**P**	**U**	**N**	**NA**	
Active Tailings Placement? If yes, show on map						X	No tailings placement
Pond Water Elevation (Top of decant is 3390.3)	X						Dry No water in APA
Depth of water at decant inlet and clarity	X						None, dry
Inlet opening clear?	X						Both decants are clear.
Sand Storage Area–Pond to Crest Distance > 10 m?	X						Stockpiles are offset from crest
TDF Strip	**S**	**F**	**P**	**U**	**N**	**NA**	
Distance between water and outer embankment > 20m?	X					NA	Dry No water
Lynx Diversion Ditch	**S**	**F**	**P**	**U**	**N**	**NA**	
Ditch Clear? No infill material?	X						Slight gravel infill in shotcrete section
Any Ditch Damage?	X						Log damaged upslope section of ditch
Signs of Ditch Overtopping?	X						No signs
Flow Conditions in Ditch (m^3/s)							1-5 m^3/s
Paste Berm Crest (APA)	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Cracks - Transverse	X						No cracks observed
Surface Cracks - Longitudinal	X						" " "
Settlement / Depressions	X						No settlement observed, some potholes on crest.
Erosion or Gully Channels	X						No major erosion issues observed.
Lynx TDF	**S**	**F**	**P**	**U**	**N**	**NA**	
Sink holes or depressions evident in the tailings?	X						None can easily be deliniated.
Sump pump currently pumping?						X	Not currently pumping
Ponded water evident on paste tails? if yes, how deep?		X					Yes ≈ 3" drying up, Needs to be dry
Is water flowing into the pit? If yes, show on map						X	No 4 to 6" on u/s side
Evidence of slope failure into the Lynx TDF?	X						No new rockfall; no signs of new instability
Active Tailings Placement? if yes, show on map						X	No active placement

*** RATING LEGEND**

S = Satisfactory (Meets the intended purpose)

F = Fair (Meets intended purpose, but some maintenance needed)

P = Poor (May not meet intended purpose, repair or modify)

U = Unsatisfactory (Will not meet intended purpose, repair or modify)

N = Not inspected

NA = Not applicable

Additional Comments:

Lynx - Pooled water over springs drain near top of drain inlet. Entire toe of old TDF was not inspected by foot, Select areas were inspected

LYNX TDF DIVERSION DITCH INSPECTIONS

INSPECTION DETAILS

Inspector Name: ERINN RAISON

Inspector Position: GEOTECHNICAL ENGINEER (AMEC FOSTER WHEELER)

Inspection Date/Time: 2017-07-23 ; 08:00

Weather Conditions: OVERCAST / BROKEN CLOUDS ≃ 15°C

Reason for Inspection: Routine ☒ Special Condition ☐

Photos: (Y)/N

Additional Comments: LOWER LYNX DIVERSION DITCH INSPECTION ONLY

OBSERVATIONS

Ditch Clear: Yes

Any Damage: Yes (Note 3)

Signs of Overtopping: No

Current Flow: ≃ 1-5 m^3/s

Signs of Seepage Below Ditch: NONE OBSERVED

Slope Failures Above Ditch: NONE OBSERVED

① Some gravel depositing in upper ^ section Shotcrete.

② One large boulder ≃ 2 ft ø sitting on upslope side of concrete cloth near start of concrete cloth

③ Log has fallen off alder reach and damaged upslope side of concrete cloth.

Other Concerns:
NONE AT THIS TIME

Inspections and photos to be filed in the environmental drive under:

ENV LAB ▸ TDF, Piezos, Ponds ▸ TDF Inspections and Monitoring ▸ YEAR ▸ ULDD Inspections

See page two for sketch

MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

All parts of this inspection report should be completed. Adverse conditions should be described. Additional information may be put on attached pages

INSPECTION DETAILS

Inspector Name: ERINN RAISON

Inspector Position: GEOTECHNICAL ENG. AMEC

Inspection Date/Time: 2017-07-30 / 15:00

Weather Conditions: Clear Sunny

Reason for Inspection:

Routine [X]

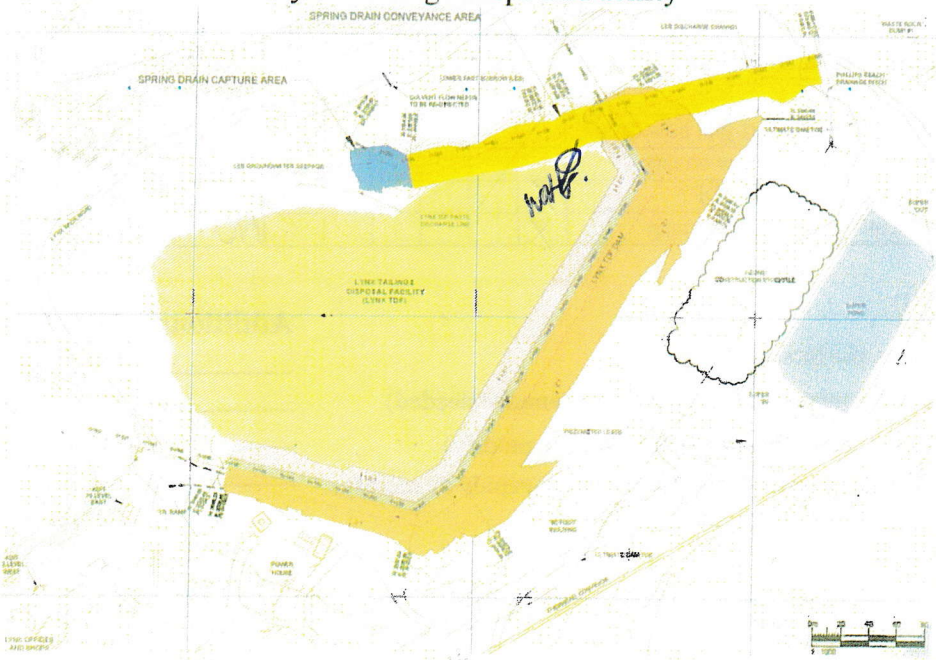
Special Condition [ ]

ADDITIONAL COMMENTS

Tailings Disposal Facility



Lynx Tailings Disposal Facility



MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

INSPECTOR NAME: ERINN RAISON **DATE:** 2017-07-30

INSPECTION POINT / ITEMS	CONDITION						
	RATING						REMARKS / DESCRIPTIONS
Tailings Dam Crest (Strip+6:1)	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Cracks - Transverse	X						
Surface Cracks - Longitudinal	X						
Settlement / Depressions	X						
Erosion or Gully Channels		X					few old ones off 6:1
Spillway Inspection	**S**	**F**	**P**	**U**	**N**	**NA**	
Invert opening clear?	X						has new tailings smear
Riprap coverage adequate?	X						
Tailings Dam Slope and Toe	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Erosion	X						None observed from afar.
Surface Settlement / Depressions					X		did not walk entire extent.
Sinkholes					X		
Cracks / Slope Movement/Bulging					X		
Seepage / Wet Areas					X		
Amalgamated Paste Area	**S**	**F**	**P**	**U**	**N**	**NA**	
Active Tailings Placement? If yes, show on map							No, stockpiling of coarse tailings
Pond Water Elevation (Top of decant is 3390.3)	X						Dry
Depth of water at decant inlet and clarity	X						Dry
Inlet opening clear?							yes
Sand Storage Area–Pond to Crest Distance > 10 m?	M					X	
TDF Strip	**S**	**F**	**P**	**U**	**N**	**NA**	
Distance between water and outer embankment > 20m?	X						Dry
Lynx Diversion Ditch	**S**	**F**	**P**	**U**	**N**	**NA**	
Ditch Clear? No infill material?	X						See other inspection
Any Ditch Damage?	X						
Signs of Ditch Overtopping?	X						No
Flow Conditions in Ditch (m^3/s)							20.5 m^3/s
Paste Berm Crest (APA)	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Cracks - Transverse	X						None observed
Surface Cracks - Longitudinal	X						"
Settlement / Depressions	X						"
Erosion or Gully Channels	X						"
Lynx TDF	**S**	**F**	**P**	**U**	**N**	**NA**	
Sink holes or depressions evident in the tailings?		X					Cannot easily be observed.
Sump pump currently pumping?							Yes. Unsure.
Ponded water evident on paste tails? if yes, how deep?							Yes ≅ 1 foot
Is water flowing into the pit? If yes, show on map							Yes - unsure location.
Evidence of slope failure into the Lynx TDF?	X						No
Active Tailings Placement? if yes, show on map	X						No.

*** RATING LEGEND**

S = Satisfactory (Meets the intended purpose)

F = Fair (Meets intended purpose, but some maintenance needed)

P = Poor (May not meet intended purpose, repair or modify)

U = Unsatisfactory (Will not meet intended purpose, repair or modify)

N = Not inspected

NA = Not applicable

Additional Comments:

LYNX TDF DIVERSION DITCH INSPECTIONS

INSPECTION DETAILS

Inspector Name: ERINN RAISON

Inspector Position: GEOTECHNICAL ENGINEER

Inspection Date/Time: 2017-07-30 / 15:00

Weather Conditions: Clear sunny +27°C

Reason for Inspection: Routine ☒ Special Condition ☐

Photos: (Y)/N

Additional Comments: only inspected lower lynx diversion ditch

OBSERVATIONS

Ditch Clear: YES ①

Any Damage: Yes, Old ②

Signs of Overtopping: No

Current Flow: < 0.5 m^3/s

Signs of Seepage Below Ditch: None observed

Slope Failures Above Ditch: None observed

Other Concerns: Not at this time.

① Some infilling of gravel in the upper section

② Tree from Alder Reach hit concrete cloth

Inspections and photos to be filed in the environmental drive under:

ENV LAB ▸ TDF, Piezos, Ponds ▸ TDF Inspections and Monitoring ▸ YEAR ▸ ULDD Inspections

See page two for sketch

MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

All parts of this inspection report should be completed. Adverse conditions should be described. Additional information may be put on attached pages

INSPECTION DETAILS

Inspector Name: [redacted]

Inspector Position: AmecFW, Geotech Engineer, EIT

Inspection Date/Time: Aug 4, 2017 9:30am

Weather Conditions: Sunny/Smoky, 20 to 30°C

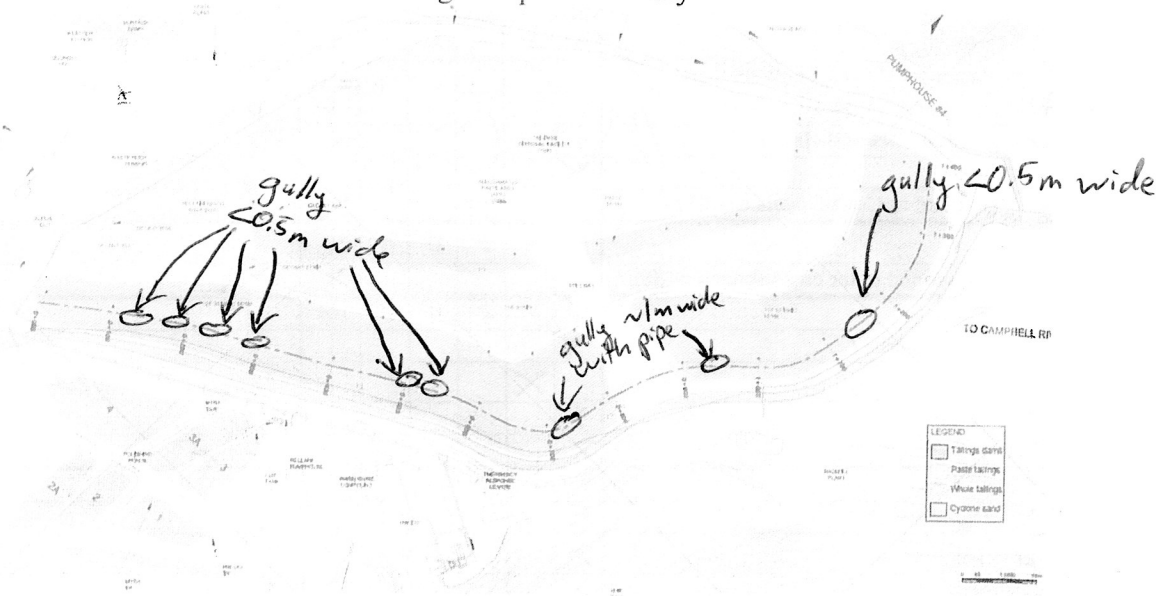
Reason for Inspection:

Routine [X]

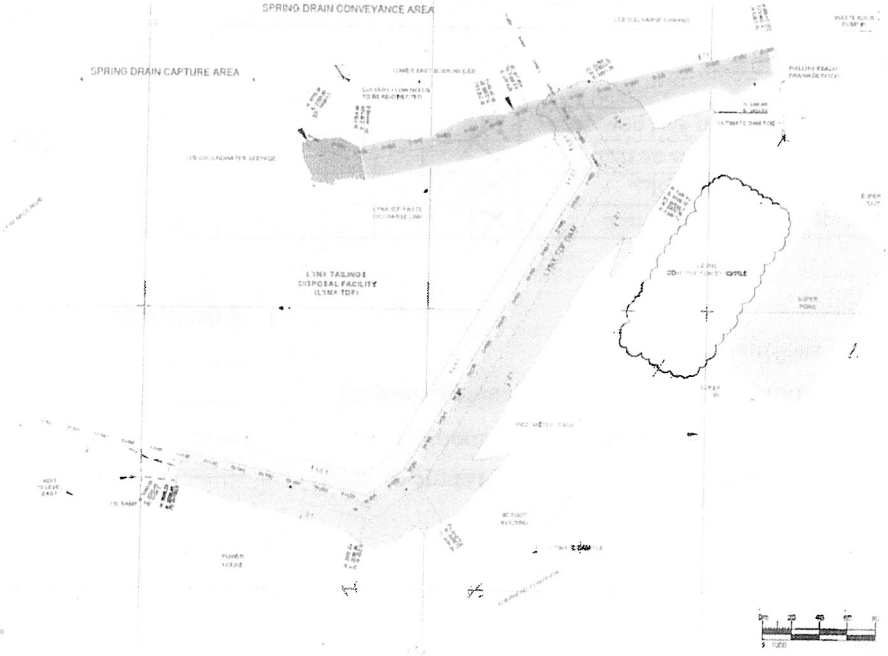
Special Condition [ ]

ADDITIONAL COMMENTS

Tailings Disposal Facility



Lynx Tailings Disposal Facility



MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

INSPECTOR NAME: [redacted] **DATE:** Aug 4, 2017

INSPECTION POINT / ITEMS	CONDITION						
	RATING						REMARKS / DESCRIPTIONS
Tailings Dam Crest (Strip+6:1)	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Cracks - Transverse	X						
Surface Cracks - Longitudinal	X						
Settlement / Depressions	X						
Erosion or Gully Channels		X					Minor erosion gullies, marked on drawing
Spillway Inspection	**S**	**F**	**P**	**U**	**N**	**NA**	
Invert opening clear?	X						
Riprap coverage adequate?	X						
Tailings Dam Slope and Toe	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Erosion	X						
Surface Settlement / Depressions	X						
Sinkholes	X						
Cracks / Slope Movement/Bulging	X						
Seepage / Wet Areas	X						Dry
Amalgamated Paste Area	**S**	**F**	**P**	**U**	**N**	**NA**	
Active Tailings Placement? If yes, show on map						X	No
Pond Water Elevation (Top of decant is 3390.3)						X	Dry
Depth of water at decant inlet and clarity						X	Dry
Inlet opening clear?	X						Yes
Sand Storage Area–Pond to Crest Distance > 10 m?						X	
TDF Strip	**S**	**F**	**P**	**U**	**N**	**NA**	
Distance between water and outer embankment > 20m?						X	Dry
Lynx Diversion Ditch	**S**	**F**	**P**	**U**	**N**	**NA**	
Ditch Clear? No infill material?	X						
Any Ditch Damage?		X					Damage to cloth near alder reach
Signs of Ditch Overtopping?	X						NO
Flow Conditions in Ditch (m^3/s)	X						$< 1 m^3/s$
Paste Berm Crest (APA)	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Cracks - Transverse	X						
Surface Cracks - Longitudinal	X						
Settlement / Depressions	X						
Erosion or Gully Channels	X						
Lynx TDF	**S**	**F**	**P**	**U**	**N**	**NA**	
Sink holes or depressions evident in the tailings?	X						
Sump pump currently pumping?					X		
Ponded water evident on paste tails? if yes, how deep?	X						~0.5m deep
Is water flowing into the pit? If yes, show on map	X						NO
Evidence of slope failure into the Lynx TDF?	X						No
Active Tailings Placement? if yes, show on map	X						No

*** RATING LEGEND**

S = Satisfactory (Meets the intended purpose)

F = Fair (Meets intended purpose, but some maintenance needed)

P = Poor (May not meet intended purpose, repair or modify)

U = Unsatisfactory (Will not meet intended purpose, repair or modify)

N = Not inspected

NA = Not applicable

Additional Comments:

LYNX TDF DIVERSION DITCH INSPECTIONS

INSPECTION DETAILS

Inspector Name: [redacted]

Inspector Position: AmecFW Geotech Engineer EIT

Inspection Date/Time: Aug 4, 2017 12:00

Weather Conditions: Sunny/smoky 20-30 °C

Reason for Inspection: Routine ☒ Special Condition ☐

Photos: Y/N

Additional Comments: Only inspected lower lynx diversion ditch

OBSERVATIONS

Ditch Clear: Yes

Any Damage: Concrete cloth damaged at Alder reach

Signs of Overtopping: No

Current Flow: $< 1 m^3/s$

Signs of Seepage Below Ditch: none observed

Slope Failures Above Ditch: none observed

Other Concerns:

Inspections and photos to be filed in the environmental drive under:

ENV LAB ▸ TDF, Piezos, Ponds ▸ TDF Inspections and Monitoring ▸ YEAR ▸ ULDD Inspections

See page two for sketch

MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

All parts of this inspection report should be completed. Adverse conditions should be described. Additional information may be put on attached pages

INSPECTION DETAILS

Inspector Name: [redacted]

Inspector Position: Geotechnical Engineer, EIT

Inspection Date/Time: 10:00 to 16:00 – intermittent

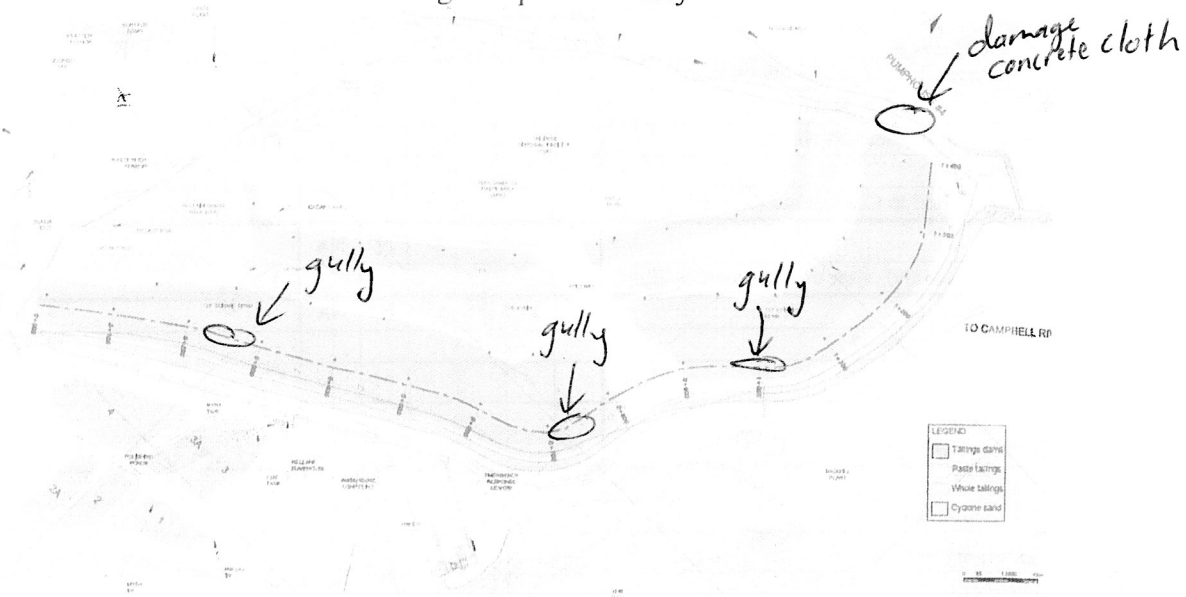
Weather Conditions: Sunny ~20°C

Reason for Inspection:

- **Routine** ☑
- **Special Condition** ☐

ADDITIONAL COMMENTS

Tailings Disposal Facility



Lynx Tailings Disposal Facility



MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

INSPECTOR NAME: [redacted] **DATE:** Aug 13, 2017

INSPECTION POINT / ITEMS	CONDITION						
	RATING						REMARKS / DESCRIPTIONS
Tailings Dam Crest (Strip+6:1)	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Cracks - Transverse	✓						
Surface Cracks - Longitudinal	✓						
Settlement / Depressions	✓						
Erosion or Gully Channels		✓					Minor gullies <1m wide
Spillway Inspection	**S**	**F**	**P**	**U**	**N**	**NA**	
Invert opening clear?	✓						
Riprap coverage adequate?	✓						
Tailings Dam Slope and Toe	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Erosion	✓						
Surface Settlement / Depressions	✓						
Sinkholes	✓						
Cracks / Slope Movement/Bulging	✓						
Seepage / Wet Areas	✓						
Amalgamated Paste Area	**S**	**F**	**P**	**U**	**N**	**NA**	
Active Tailings Placement? If yes, show on map						✓	
Pond Water Elevation (Top of decant is 3390.3)						✓	Dry
Depth of water at decant inlet and clarity						✓	Dry
Inlet opening clear?	✓						
Sand Storage Area–Pond to Crest Distance > 10 m?						✓	
TDF Strip	**S**	**F**	**P**	**U**	**N**	**NA**	
Distance between water and outer embankment > 20m?						✓	Dry
Lynx Diversion Ditch	**S**	**F**	**P**	**U**	**N**	**NA**	
Ditch Clear? No infill material?	✓						
Any Ditch Damage?		✓					Damaged concrete cloth
Signs of Ditch Overtopping?	✓						
Flow Conditions in Ditch (m^3/s)	✓						<1 m^3/s
Paste Berm Crest (APA)	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Cracks - Transverse	✓						
Surface Cracks - Longitudinal	✓						
Settlement / Depressions	✓						
Erosion or Gully Channels	✓						
Lynx TDF	**S**	**F**	**P**	**U**	**N**	**NA**	
Sink holes or depressions evident in the tailings?	✓						
Sump pump currently pumping?						✓	NO
Ponded water evident on paste tails? if yes, how deep?	✓						Dry
Is water flowing into the pit? If yes, show on map					✓		not sure
Evidence of slope failure into the Lynx TDF?	✓						
Active Tailings Placement? if yes, show on map	✓						NO

*** RATING LEGEND**

S = Satisfactory (Meets the intended purpose)

F = Fair (Meets intended purpose, but some maintenance needed)

P = Poor (May not meet intended purpose, repair or modify)

U = Unsatisfactory (Will not meet intended purpose, repair or modify)

N = Not inspected

NA = Not applicable

Additional Comments:

Drove for inspection

LYNX TDF DIVERSION DITCH INSPECTIONS

INSPECTION DETAILS

Inspector Name: [redacted]

Inspector Position: Geotechnical Engineer, EIT

Inspection Date/Time: Aug 13, 2017 ~16:00

Weather Conditions: Sunny ~20°C

Reason for Inspection: Routine ☑ Special Condition ☐

Photos: (Y)/N

Additional Comments: Upper Lynx TDF Diversion Ditch not inspected

OBSERVATIONS

Ditch Clear: Yes

Any Damage: Concrete cloth damaged at alder reach

Signs of Overtopping: No

Current Flow: $< 1\ m^3/s$

Signs of Seepage Below Ditch: No

Slope Failures Above Ditch: No

Other Concerns:

Inspections and photos to be filed in the environmental drive under:

ENV LAB ▸ TDF, Piezos, Ponds ▸ TDF Inspections and Monitoring ▸ YEAR ▸ ULDD Inspections

See page two for sketch

MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

All parts of this inspection report should be completed. Adverse conditions should be described. Additional information may be put on attached pages

INSPECTION DETAILS

Inspector Name: MURRAY HELMOT

Inspector Position: CONSULTING GEOTECH ENGINEER

Inspection Date/Time: 29 AUGUST 2017 - 10:00 AM

Weather Conditions: SUNNY, ~22°C

Reason for Inspection:

Routine [X]

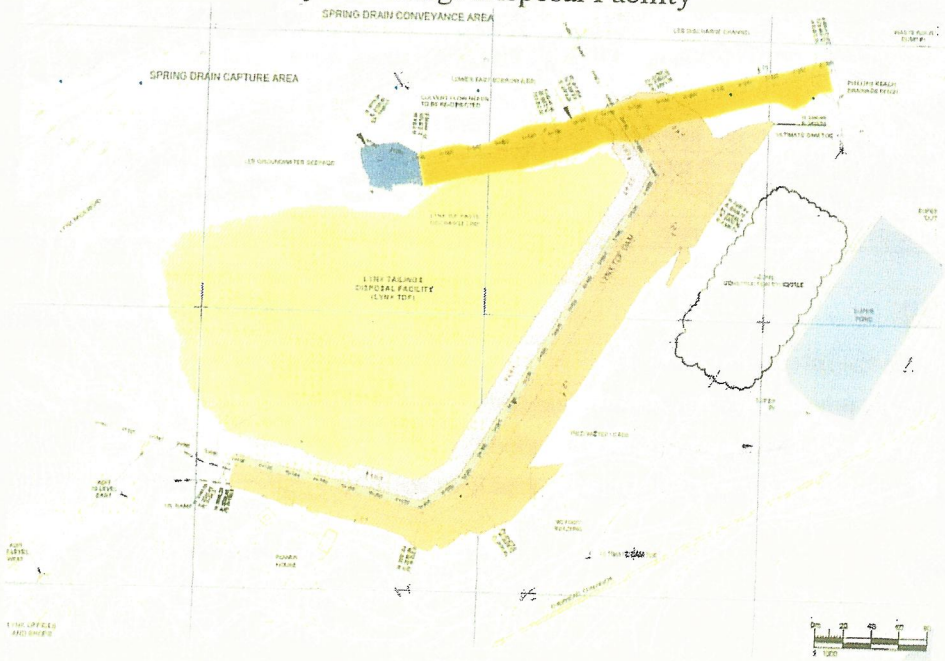
Special Condition [ ]

ADDITIONAL COMMENTS

Tailings Disposal Facility



Lynx Tailings Disposal Facility



MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

INSPECTOR NAME: MURRAY HEBNER **DATE:** 29 AUG 2017

INSPECTION POINT / ITEMS	CONDITION						
	RATING						REMARKS / DESCRIPTIONS
Tailings Dam Crest (Strip+6:1)	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Cracks - Transverse	✓						
Surface Cracks - Longitudinal	✓						
Settlement / Depressions	✓						
Erosion or Gully Channels		✓					TWO GULLIES NOTED OFF SUB
Spillway Inspection	**S**	**F**	**P**	**U**	**N**	**NA**	
Invert opening clear?		✓					SOME PASTE PULLED UP ON RIPRAP, RAISING INVERT
Riprap coverage adequate?	✓						
Tailings Dam Slope and Toe	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Erosion	✓						
Surface Settlement / Depressions	✓						
Sinkholes	✓						
Cracks / Slope Movement/Bulging	✓						
Seepage / Wet Areas	✓						
Amalgamated Paste Area	**S**	**F**	**P**	**U**	**N**	**NA**	
Active Tailings Placement? If yes, show on map						X	
Pond Water Elevation (Top of decant is 3390.3)						X	DRY
Depth of water at decant inlet and clarity						X	DRY
Inlet opening clear?	X						
Sand Storage Area–Pond to Crest Distance > 10 m?						X	NO LONGER EXISTS
TDF Strip	**S**	**F**	**P**	**U**	**N**	**NA**	STRIP DRY
Distance between water and outer embankment > 20m?	✓						SOME SEDIMENTATION IN WEST STRIP CHANNEL
Lynx Diversion Ditch	**S**	**F**	**P**	**U**	**N**	**NA**	
Ditch Clear? No infill material?	✓						MINOR GRAVEL NOTED ESCAPE
Any Ditch Damage?							TREE CONTACTED SIDE NOTED MINOR REACH
Signs of Ditch Overtopping?	✓					X	
Flow Conditions in Ditch (m^3/s)	✓						~1 m^3/MIN
Paste Berm Crest (APA)	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Cracks - Transverse	✓						
Surface Cracks - Longitudinal	✓						
Settlement / Depressions	✓						
Erosion or Gully Channels	✓						
Lynx TDF	**S**	**F**	**P**	**U**	**N**	**NA**	
Sink holes or depressions evident in the tailings?	✓						NO SINKHOLE VISIBLE
Sump pump currently pumping?	✓						NO
Ponded water evident on paste tails? if yes, how deep?	✓						DRY
Is water flowing into the pit? If yes, show on map	✓						WATER FLOWING OVER SPILLWAY DRAIN
Evidence of slope failure into the Lynx TDF?	✓						
Active Tailings Placement? if yes, show on map	✓						NO

*** RATING LEGEND**

S = Satisfactory (Meets the intended purpose)

F = Fair (Meets intended purpose, but some maintenance needed)

P = Poor (May not meet intended purpose, repair or modify)

U = Unsatisfactory (Will not meet intended purpose, repair or modify)

N = Not inspected

NA = Not applicable

Additional Comments:

MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

All parts of this inspection report should be completed. Adverse conditions should be described. Additional information may be put on attached pages

INSPECTION DETAILS

Inspector Name: MURRAY HELMER

Inspector Position: GEOTECHNICAL CONSULTANT

Inspection Date/Time: 2017-09-03 12:00

Weather Conditions: SUNNY, ~26°C

Reason for Inspection:

Routine ☒ WEEKLY INSPECTION

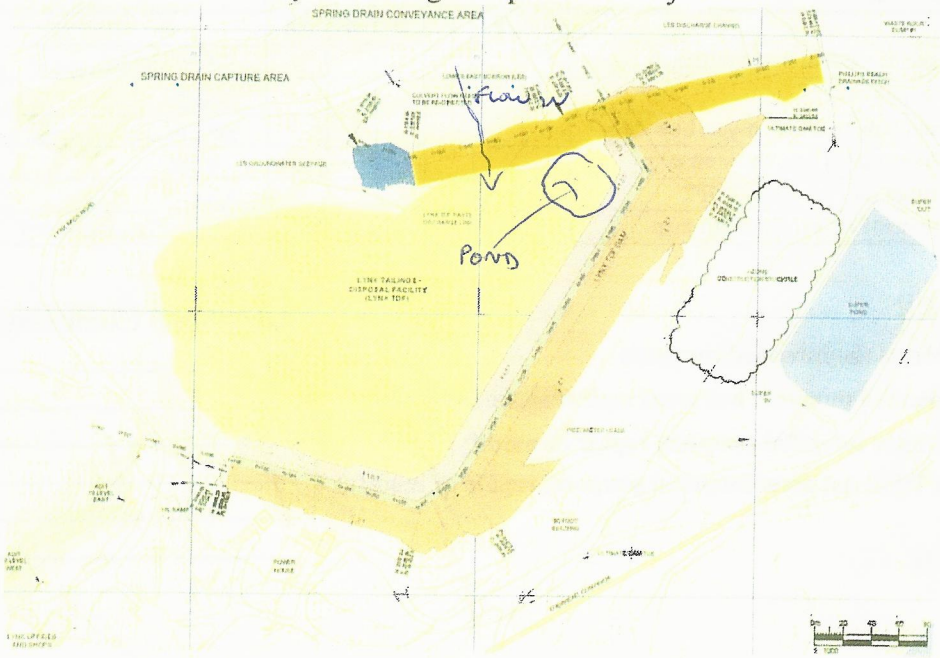
Special Condition ☐

ADDITIONAL COMMENTS

Tailings Disposal Facility



Lynx Tailings Disposal Facility



MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

INSPECTOR NAME: MURRAY HOLMOR **DATE:** 2017-09-03

INSPECTION POINT / ITEMS	CONDITION						
	RATING						REMARKS / DESCRIPTIONS
Tailings Dam Crest (Strip+6:1)	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Cracks - Transverse	X						
Surface Cracks - Longitudinal	X						
Settlement / Depressions	X						
Erosion or Gully Channels	X						
Spillway Inspection	**S**	**F**	**P**	**U**	**N**	**NA**	
Invert opening clear?	X						
Riprap coverage adequate?	X						
Tailings Dam Slope and Toe	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Erosion		X					MINOR GULLIES ON UNSIDE SLOPE
Surface Settlement / Depressions	X						
Sinkholes	X						
Cracks / Slope Movement/Bulging	X						
Seepage / Wet Areas	X						MIGRATING ON SUB
Amalgamated Paste Area	**S**	**F**	**P**	**U**	**N**	**NA**	
Active Tailings Placement? If yes, show on map						X	
Pond Water Elevation (Top of decant is 3390.3)						X	NO WATER
Depth of water at decant inlet and clarity						X	
Inlet opening clear?	X						
Sand Storage Area–Pond to Crest Distance > 10 m?						X	DOES NOT EXIST ANYMORE
TDF Strip	**S**	**F**	**P**	**U**	**N**	**NA**	
Distance between water and outer embankment > 20m?						X	NO WATER
Lynx Diversion Ditch	**S**	**F**	**P**	**U**	**N**	**NA**	
Ditch Clear? No infill material?	X						
Any Ditch Damage?							DAMAGED AREA FROM FROST
Signs of Ditch Overtopping?	X						
Flow Conditions in Ditch (m^3/s)	X						~20 L/S
Paste Berm Crest (APA)	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Cracks - Transverse	X						
Surface Cracks - Longitudinal	X						
Settlement / Depressions	X						
Erosion or Gully Channels	X						
Lynx TDF	**S**	**F**	**P**	**U**	**N**	**NA**	
Sink holes or depressions evident in the tailings?	X						NO SINKHOLES VISIBLE
Sump pump currently pumping?							ND
Ponded water evident on paste tails? if yes, how deep?							SM. POND ~30cm DEEP NORTH SPIGOT PUMP
Is water flowing into the pit? If yes, show on map							YES
Evidence of slope failure into the Lynx TDF?						X	ND
Active Tailings Placement? if yes, show on map						X	ND PLACEMENT

*** RATING LEGEND**

S = Satisfactory (Meets the intended purpose)

F = Fair (Meets intended purpose, but some maintenance needed)

P = Poor (May not meet intended purpose, repair or modify)

U = Unsatisfactory (Will not meet intended purpose, repair or modify)

N = Not inspected

NA = Not applicable

Additional Comments:

MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

All parts of this inspection report should be completed. Adverse conditions should be described. Additional information may be put on attached pages

INSPECTION DETAILS

Inspector Name: [redacted]

Inspector Position: Environmental Sampler

Inspection Date/Time: 21/09/17

Weather Conditions: SUNNY, CLEAR

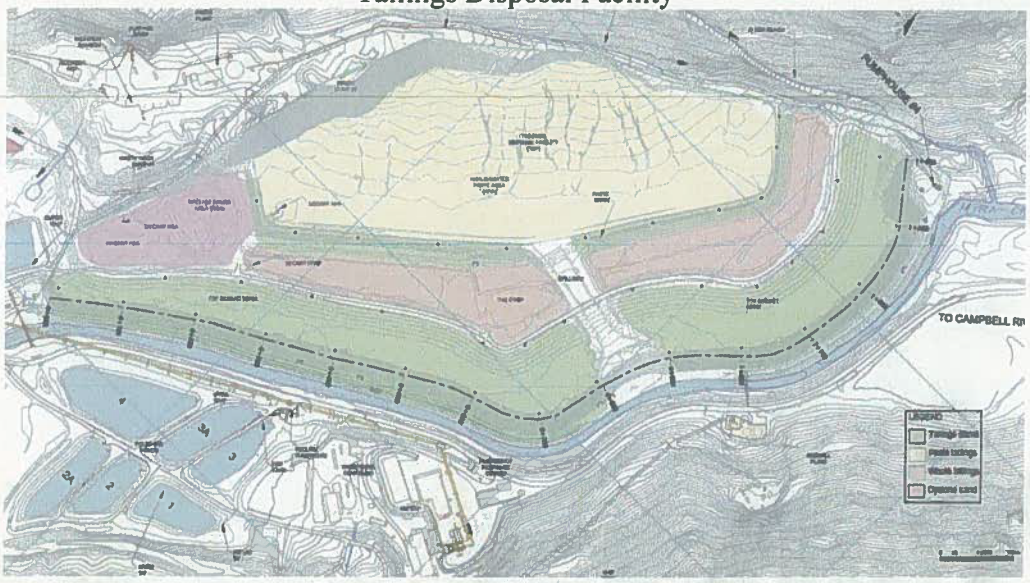
Reason for Inspection:

Routine [X]

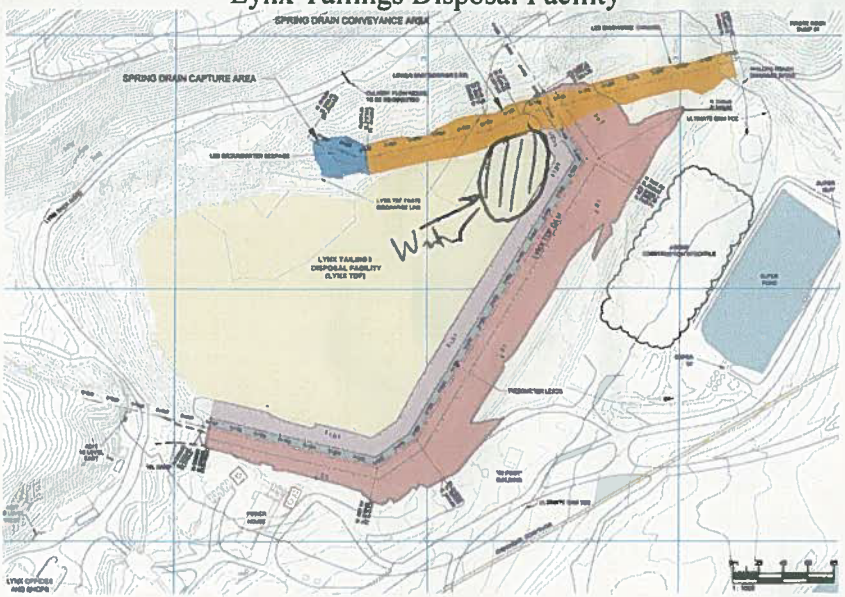
Special Condition [ ]

ADDITIONAL COMMENTS

Tailings Disposal Facility



Lynx Tailings Disposal Facility



MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

INSPECTOR NAME: [redacted] DATE: 21/09/2017

INSPECTION POINT / ITEMS	CONDITION						
	RATING						REMARKS / DESCRIPTIONS
Tailings Dam Crest	S	F	P	U	N	NA	
Surface Cracks - Transverse	✓						
Surface Cracks - Longitudinal	✓						
Settlement / Depressions	✓						
Erosion or Gully Channels	✓						
Spillway Inspection	S	F	P	U	N	NA	
Invert opening clear?	✓						
Riprap coverage adequate?	✓						
Tailings Dam Slope and Toe	S	F	P	U	N	NA	
Surface Erosion	✓						
Surface Settlement / Depressions	✓						
Sinkholes	✓						
Cracks / Slope Movement/Bulging	✓						
Seepage / Wet Areas	✓						
Other Unusual Conditions							
Amalgamated Paste Area	S	F	P	U	N	NA	
Active Tailings Placement? If yes, show on map						✓	
Pond Water Elevation (Top of decant is 3390.3)						✓	
Depth of water at decant inlet and clarity						✓	
Inlet opening clear?	✓						
Sand Storage Area–Pond to Crest Distance > 10 m?						✓	
TDF Strip	S	F	P	U	N	NA	
Distance between water and outer embankment > 20m?	✓						
Decant inlet opening clear?	✓						
Depth of water at decant inlet and clarity?						✓	
Lynx Diversion Ditch	S	F	P	U	N	NA	
Ditch Clear? No infill material?	✓						REMOVED SMALL BOULDER/LARGE TREE ON SLOPE SIDE BANK
Any Ditch Damage?		✓					
Signs of Ditch Overtopping?	✓						
Flow Conditions in Ditch (m^3/s)	✓						VERY SLOW
Paste Berm Crest	S	F	P	U	N	NA	
Surface Cracks - Transverse	✓						
Surface Cracks - Longitudinal	✓						
Settlement / Depressions	✓						
Erosion or Gully Channels	✓						
Lynx TDF	S	F	P	U	N	NA	
Sink holes or depressions evident in the tailings?	✓						
Sump pump currently pumping?	✓						
Ponded water evident on paste tails? if yes, how deep?	✓					✓	SHALLOW
Is water flowing into the pit? If yes, show on map							
Evidence of slope failure into the Lynx TDF?	✓						
Active Tailings Placement? if yes, show on map						✓	

* **RATING LEGEND (see next page)**

S = Satisfactory (Meets the intended purpose)

F = Fair (Meets intended purpose, but some maintenance needed)

P = Poor (May not meet intended purpose, repair or modify)

U = Unsatisfactory (Will not meet intended purpose, repair or modify)

N = Not inspected

NA = Not applicable

Additional Comments:

BOULDER PILE NEAR WEST CHANNEL, UNSURE OF PURPOSE

MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

All parts of this inspection report should be completed. Adverse conditions should be described. Additional information may be put on attached pages

INSPECTION DETAILS

Inspector Name: [redacted]

Inspector Position: Environmental Sampler

Inspection Date/Time: Sept 28 2017

Weather Conditions: Sunny Clear ~ 23°C

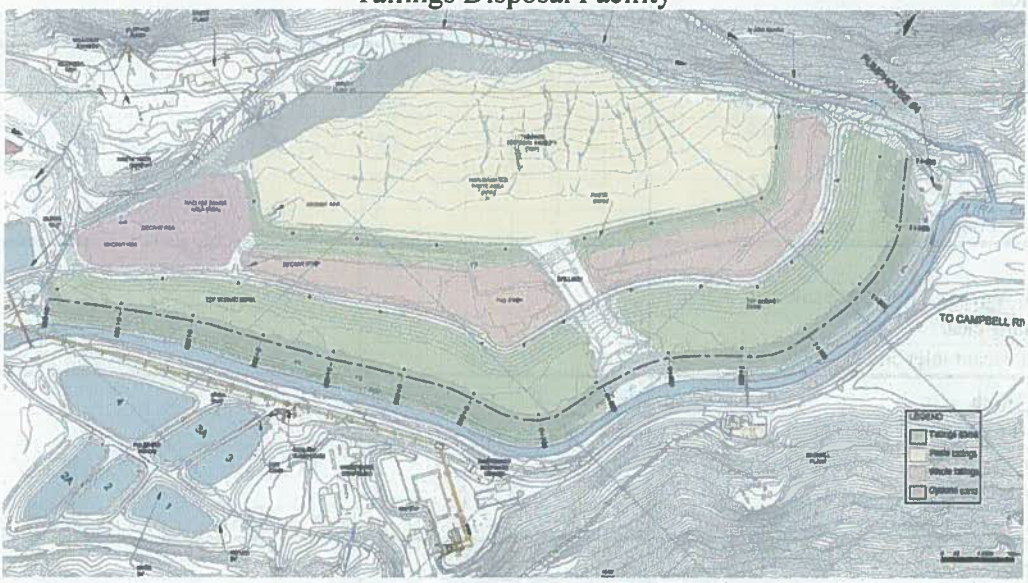
Reason for Inspection:

Routine ☑

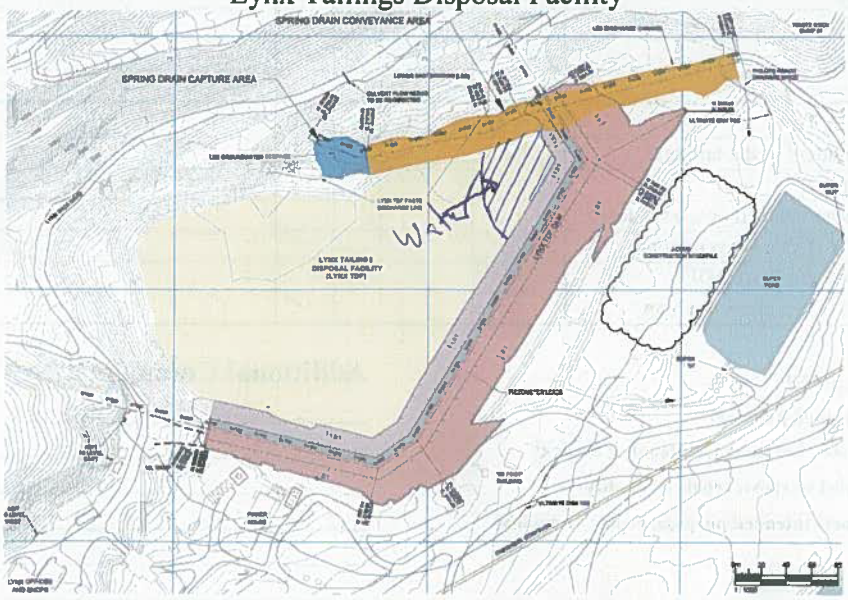
Special Condition ☐

ADDITIONAL COMMENTS

Tailings Disposal Facility



Lynx Tailings Disposal Facility



MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

INSPECTOR NAME: **DATE:**

INSPECTION POINT / ITEMS	CONDITION						
	RATING						REMARKS / DESCRIPTIONS
Tailings Dam Crest	S	F	P	U	N	NA	
Surface Cracks - Transverse	✓						
Surface Cracks - Longitudinal	✓						
Settlement / Depressions	✓						
Erosion or Gully Channels	✓						
Spillway Inspection	S	F	P	U	N	NA	
Invert opening clear?	✓						
Riprap coverage adequate?	✓						
Tailings Dam Slope and Toe	S	F	P	U	N	NA	
Surface Erosion	✓						
Surface Settlement / Depressions	✓						
Sinkholes	✓						
Cracks / Slope Movement/Bulging	✓						
Seepage / Wet Areas	✓						
Other Unusual Conditions	✓						
Amalgamated Paste Area	S	F	P	U	N	NA	
Active Tailings Placement? If yes, show on map						✓	
Pond Water Elevation (Top of decant is 3390.3)						✓	
Depth of water at decant inlet and clarity						✓	
Inlet opening clear?	✓						
Sand Storage Area–Pond to Crest Distance > 10 m?						✓	
TDF Strip	S	F	P	U	N	NA	
Distance between water and outer embankment > 20m?						✓	
Decant inlet opening clear?	✓						
Depth of water at decant inlet and clarity?						✓	
Lynx Diversion Ditch	S	F	P	U	N	NA	
Ditch Clear? No infill material?	✓						
Any Ditch Damage?	✓						TREE ON HILLSIDE BOULDAR
Signs of Ditch Overtopping?	✓						
Flow Conditions in Ditch (m^3/s)	✓						ALMOST NO FLOW
Paste Berm Crest	S	F	P	U	N	NA	
Surface Cracks - Transverse	✓						
Surface Cracks - Longitudinal	✓						
Settlement / Depressions	✓						
Erosion or Gully Channels	✓						
Lynx TDF	S	F	P	U	N	NA	
Sink holes or depressions evident in the tailings?	✓						
Sump pump currently pumping?							
Ponded water evident on paste tails? if yes, how deep?	✓						
Is water flowing into the pit? If yes, show on map	✓						
Evidence of slope failure into the Lynx TDF?	✓						
Active Tailings Placement? if yes, show on map						✓	

* **RATING LEGEND (see next page)**

S = Satisfactory (Meets the intended purpose)

F = Fair (Meets intended purpose, but some maintenance needed)

P = Poor (May not meet intended purpose, repair or modify)

U = Unsatisfactory (Will not meet intended purpose, repair or modify)

N = Not inspected

NA = Not applicable

Additional Comments:

MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

All parts of this inspection report should be completed. Adverse conditions should be described. Additional information may be put on attached pages

INSPECTION DETAILS

Inspector Name: [redacted]

Inspector Position: Environmental Sampler

Inspection Date/Time: ~~Sept~~ Oct 6, 2017

Weather Conditions: Raining

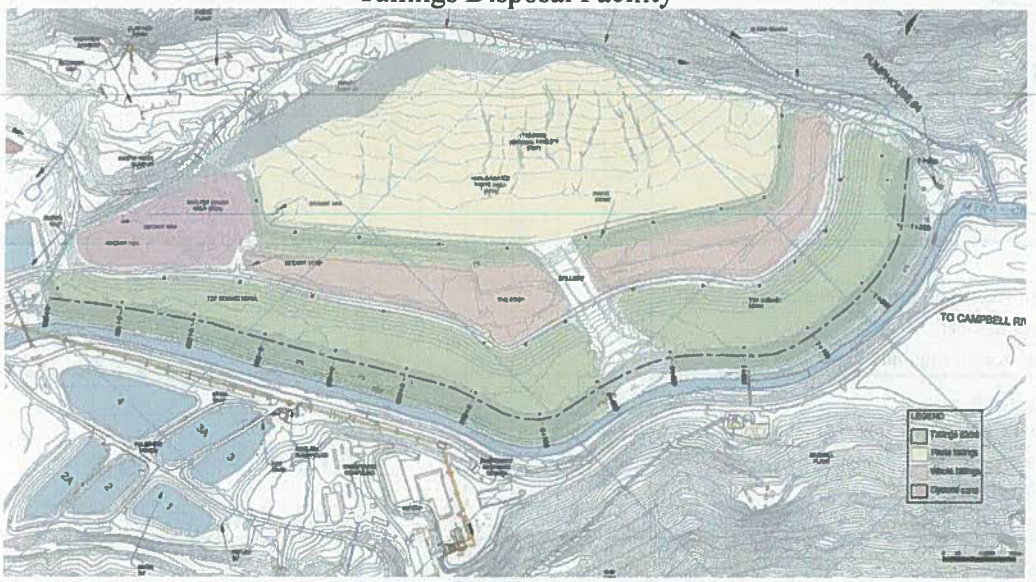
Reason for Inspection:

Routine ☑

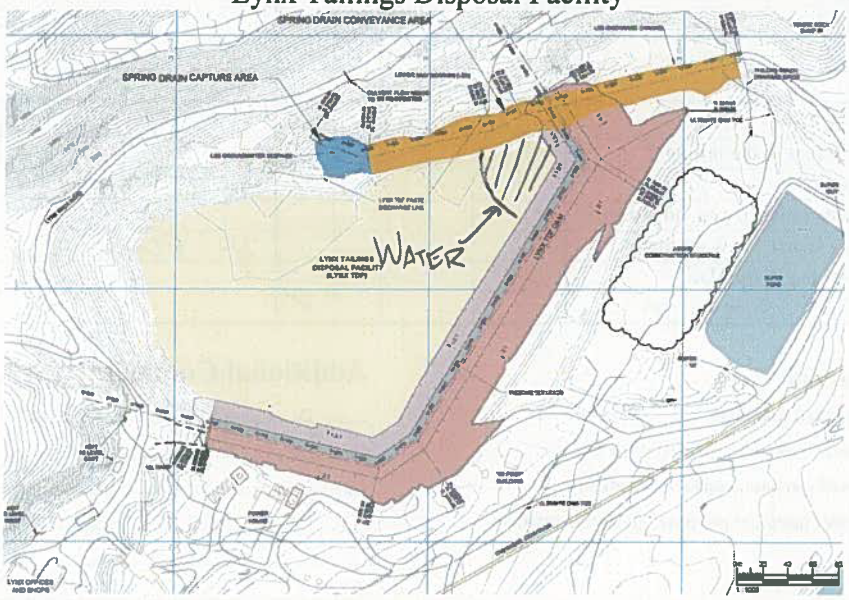
Special Condition ☐

ADDITIONAL COMMENTS

Tailings Disposal Facility



Lynx Tailings Disposal Facility



MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

INSPECTOR NAME: **DATE:**

INSPECTION POINT / ITEMS	CONDITION						
	RATING						REMARKS / DESCRIPTIONS
Tailings Dam Crest	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Cracks - Transverse	✓						
Surface Cracks - Longitudinal	✓						
Settlement / Depressions	✓						
Erosion or Gully Channels	✓						
Spillway Inspection	**S**	**F**	**P**	**U**	**N**	**NA**	
Invert opening clear?	✓						
Riprap coverage adequate?	✓						
Tailings Dam Slope and Toe	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Erosion	✓						
Surface Settlement / Depressions	✓						
Sinkholes	✓						
Cracks / Slope Movement/Bulging	✓						
Seepage / Wet Areas	✓						
Other Unusual Conditions	✓						
Amalgamated Paste Area	**S**	**F**	**P**	**U**	**N**	**NA**	
Active Tailings Placement? If yes, show on map						✓	
Pond Water Elevation (Top of decant is 3390.3)						✓	
Depth of water at decant inlet and clarity						✓	
Inlet opening clear?	✓						
Sand Storage Area–Pond to Crest Distance > 10 m?	✓						
TDF Strip	**S**	**F**	**P**	**U**	**N**	**NA**	
Distance between water and outer embankment > 20m?	✓						
Decant inlet opening clear?	✓						
Depth of water at decant inlet and clarity?						✓	
Lynx Diversion Ditch	**S**	**F**	**P**	**U**	**N**	**NA**	
Ditch Clear? No infill material?	✓						
Any Ditch Damage?	✓						TREE DAMAGE
Signs of Ditch Overtopping?	✓						
Flow Conditions in Ditch (m^3/s)	✓						SLOW FLOW
Paste Berm Crest	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Cracks - Transverse	✓						
Surface Cracks - Longitudinal	✓						
Settlement / Depressions	✓						
Erosion or Gully Channels	✓						
Lynx TDF	**S**	**F**	**P**	**U**	**N**	**NA**	
Sink holes or depressions evident in the tailings?	✓						
Sump pump currently pumping?							
Ponded water evident on paste tails? if yes, how deep?	✓						
Is water flowing into the pit? If yes, show on map	✓						NO FLOW
Evidence of slope failure into the Lynx TDF?	✓						
Active Tailings Placement? if yes, show on map						✓	

*** RATING LEGEND (see next page)**

S = Satisfactory (Meets the intended purpose)

F = Fair (Meets intended purpose, but some maintenance needed)

P = Poor (May not meet intended purpose, repair or modify)

U = Unsatisfactory (Will not meet intended purpose, repair or modify)

N = Not inspected

NA = Not applicable

Additional Comments:

MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

All parts of this inspection report should be completed. Adverse conditions should be described. Additional information may be put on attached pages

INSPECTION DETAILS

Inspector Name: [redacted]

Inspector Position: Environmental Sampler

Inspection Date/Time: Oct 14 Afternoon

Weather Conditions: light rain

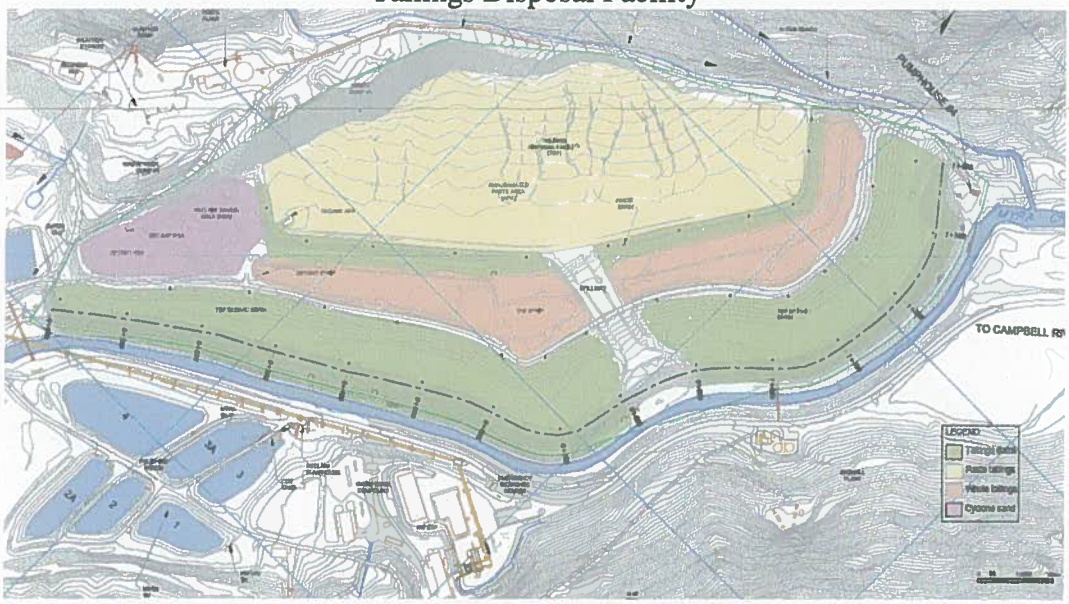
Reason for Inspection:

Routine ☑

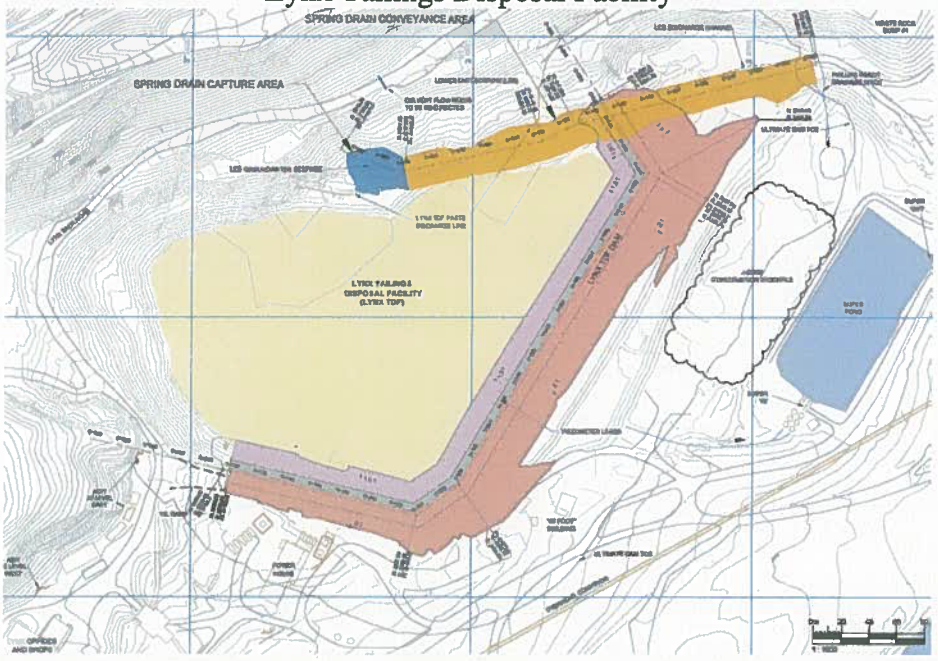
Special Condition ☐

ADDITIONAL COMMENTS

Tailings Disposal Facility



Lynx Tailings Disposal Facility



MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

INSPECTOR NAME: _____ **DATE:** _____

INSPECTION POINT / ITEMS	CONDITION						
	RATING						REMARKS / DESCRIPTIONS
Tailings Dam Crest (Strip+6:1)	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Cracks - Transverse	✓						
Surface Cracks - Longitudinal	✓						
Settlement / Depressions	✓						
Erosion or Gully Channels	✓						
Spillway Inspection	**S**	**F**	**P**	**U**	**N**	**NA**	
Invert opening clear?	✓						
Riprap coverage adequate?	✓						
Tailings Dam Slope and Toe	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Erosion	✓						
Surface Settlement / Depressions	✓						
Sinkholes	✓						
Cracks / Slope Movement/Bulging	✓						
Seepage / Wet Areas	✓						
Amalgamated Paste Area	**S**	**F**	**P**	**U**	**N**	**NA**	
~~Active Tailings Placement? If yes, show on map~~							
Pond Water Elevation (Top of decant is 3390.3)						✓	
Depth of water at decant inlet and clarity						✓	
Inlet opening clear?	✓						
~~Sand Storage Area–Pond to Crest Distance > 10 m?~~							
TDF Strip	**S**	**F**	**P**	**U**	**N**	**NA**	
Distance between water and outer embankment > 20m?							
Lynx Diversion Ditch	**S**	**F**	**P**	**U**	**N**	**NA**	
Ditch Clear? No infill material?	✓						Tree at top of hill
Any Ditch Damage?	✓						Still log
Signs of Ditch Overtopping?	✓						
Flow Conditions in Ditch (m^3/s)	✓						minimal
Paste Berm Crest (APA)	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Cracks - Transverse	✓						
Surface Cracks - Longitudinal	✓						
Settlement / Depressions	✓						
Erosion or Gully Channels	✓						
Lynx TDF	**S**	**F**	**P**	**U**	**N**	**NA**	
Sink holes or depressions evident in the tailings?	✓						
Sump pump currently pumping?	✓						
Ponded water evident on paste tails? if yes, how deep?	✓						
Is water flowing into the pit? If yes, show on map	✓						
Evidence of slope failure into the Lynx TDF?	✓						
Active Tailings Placement? if yes, show on map	✓						

*** RATING LEGEND**

S = Satisfactory (Meets the intended purpose)

F = Fair (Meets intended purpose, but some maintenance needed)

P = Poor (May not meet intended purpose, repair or modify)

U = Unsatisfactory (Will not meet intended purpose, repair or modify)

N = Not inspected

NA = Not applicable

Additional Comments:

_____

_____

_____

_____

_____

_____

MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

All parts of this inspection report should be completed. Adverse conditions should be described. Additional information may be put on attached pages

INSPECTION DETAILS

Inspector Name: [redacted]

Inspector Position: Environmental Sampler

Inspection Date/Time: Oct 21 PM

Weather Conditions: Moderate rain

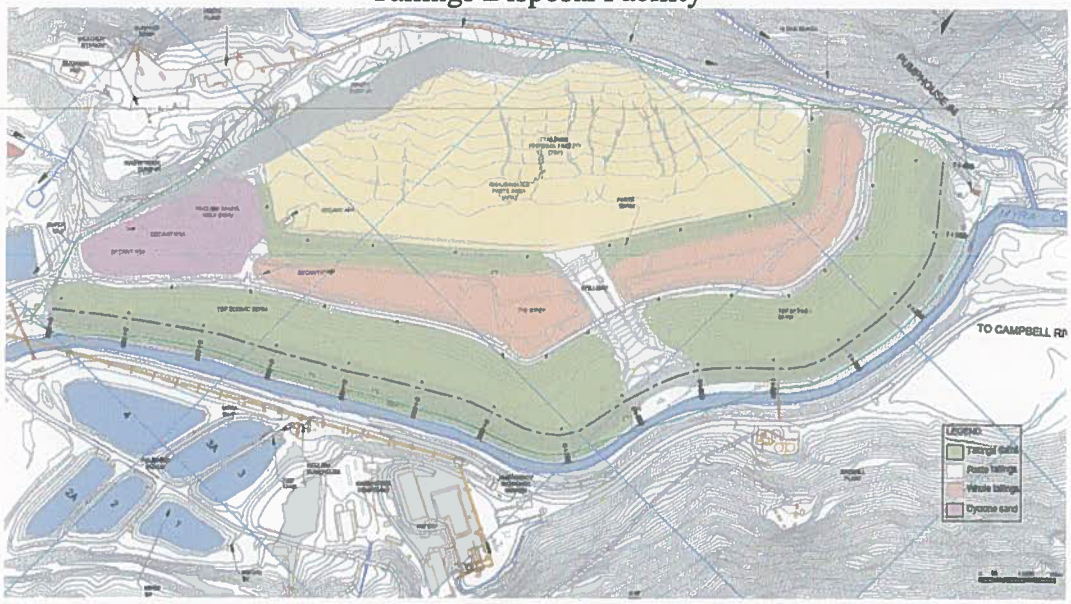
Reason for Inspection:

Routine ☐

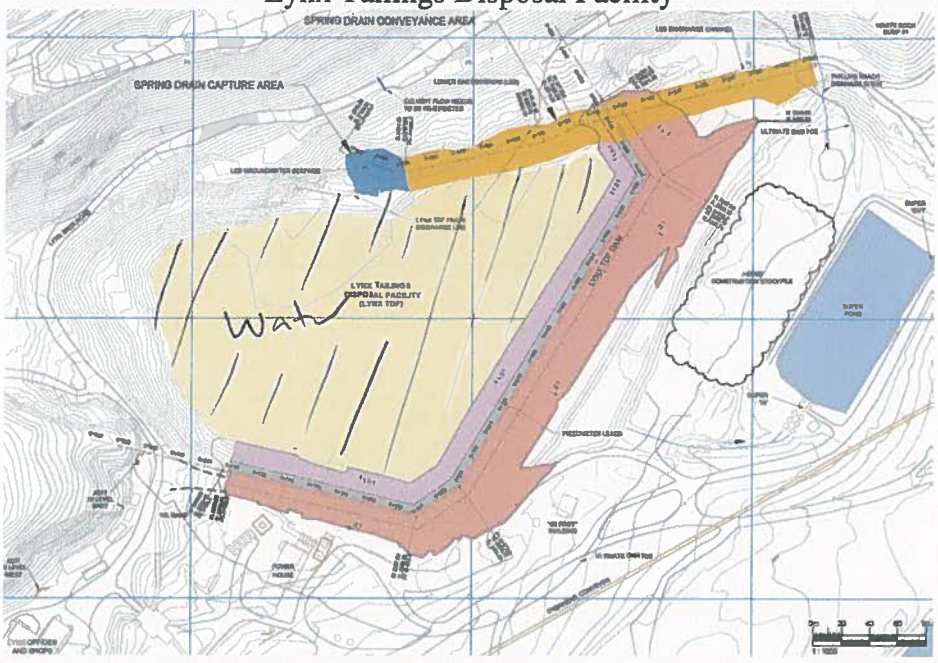
Special Condition ☐

ADDITIONAL COMMENTS

Tailings Disposal Facility



Lynx Tailings Disposal Facility



MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

INSPECTOR NAME: [redacted] **DATE:** Oct 21

INSPECTION POINT / ITEMS	CONDITION						
	RATING						REMARKS / DESCRIPTIONS
Tailings Dam Crest (Strip+6:1)	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Cracks - Transverse	✓						
Surface Cracks - Longitudinal	✓						
Settlement / Depressions	✓						
Erosion or Gully Channels	✓						
Spillway Inspection	**S**	**F**	**P**	**U**	**N**	**NA**	
Invert opening clear?	✓						
Riprap coverage adequate?	✓						
Tailings Dam Slope and Toe	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Erosion	✓						
Surface Settlement / Depressions	✓						
Sinkholes	✓						
Cracks / Slope Movement/Bulging	✓						
Seepage / Wet Areas	✓						
Amalgamated Paste Area	**S**	**F**	**P**	**U**	**N**	**NA**	
Active Tailings Placement? If yes, show on map						✓	
Pond Water Elevation (Top of decant is 3390.3)						✓	
Depth of water at decant inlet and clarity	✓						
Inlet opening clear?	✓						
Sand Storage Area–Pond to Crest Distance > 10 m?						✓	
TDF Strip	**S**	**F**	**P**	**U**	**N**	**NA**	
Distance between water and outer embankment > 20m?	✓						
Lynx Diversion Ditch	**S**	**F**	**P**	**U**	**N**	**NA**	
Ditch Clear? No infill material?	✓						
Any Ditch Damage?	✓						
Signs of Ditch Overtopping?	✓						
Flow Conditions in Ditch (m^3/s)	✓						moderate flow
Paste Berm Crest (APA)	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Cracks - Transverse	✓						
Surface Cracks - Longitudinal	✓						
Settlement / Depressions	✓						
Erosion or Gully Channels	✓						
Lynx TDF	**S**	**F**	**P**	**U**	**N**	**NA**	
Sink holes or depressions evident in the tailings?	✓						
Sump pump currently pumping?	✓						
Ponded water evident on paste tails? if yes, how deep?	✓						~ 1-2 ft
Is water flowing into the pit? If yes, show on map						✓	
Evidence of slope failure into the Lynx TDF?	✓						
Active Tailings Placement? if yes, show on map						✓	

*** RATING LEGEND**

S = Satisfactory (Meets the intended purpose)

F = Fair (Meets intended purpose, but some maintenance needed)

P = Poor (May not meet intended purpose, repair or modify)

U = Unsatisfactory (Will not meet intended purpose, repair or modify)

N = Not inspected

NA = Not applicable

Additional Comments:

MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

All parts of this inspection report should be completed. Adverse conditions should be described. Additional information may be put on attached pages

INSPECTION DETAILS

Inspector Name: [redacted]

Inspector Position: Environmental Sampler

Inspection Date/Time: Oct 28, 2017

Weather Conditions: Clear sunny, slight fog

Reason for Inspection:

Routine ☑

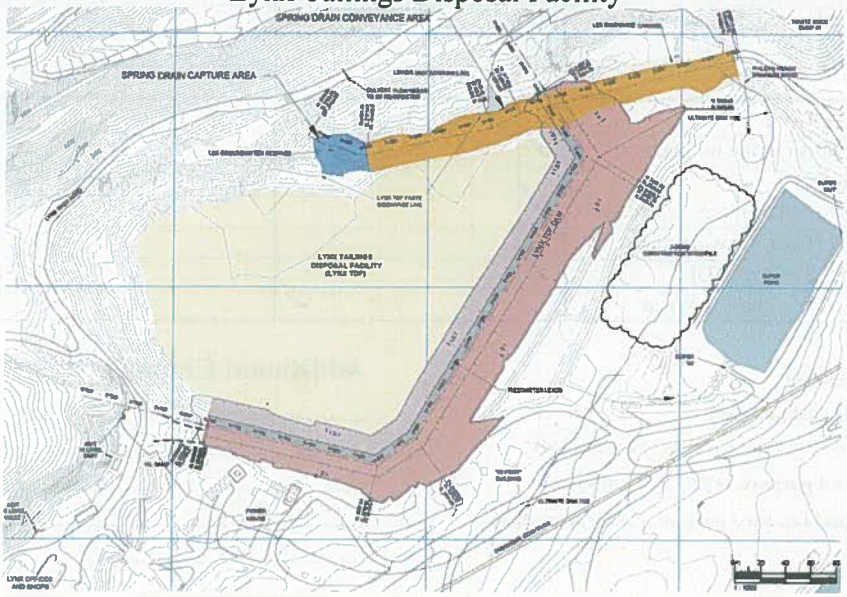
Special Condition ☐

ADDITIONAL COMMENTS

Tailings Disposal Facility



Lynx Tailings Disposal Facility



MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

INSPECTOR NAME: **DATE:**

INSPECTION POINT / ITEMS	CONDITION						
	RATING						REMARKS / DESCRIPTIONS
Tailings Dam Crest	S	F	P	U	N	NA	
Surface Cracks - Transverse	✓						
Surface Cracks - Longitudinal							
Settlement / Depressions	✓						
Erosion or Gully Channels	✓						
Spillway Inspection	S	F	P	U	N	NA	
Invert opening clear?	✓						
Riprap coverage adequate?	✓						
Tailings Dam Slope and Toe	S	F	P	U	N	NA	
Surface Erosion	✓						
Surface Settlement / Depressions	✓						
Sinkholes	✓						
Cracks / Slope Movement/Bulging	✓						
Seepage / Wet Areas	✓						
Other Unusual Conditions	✓						
Amalgamated Paste Area	S	F	P	U	N	NA	
Active Tailings Placement? If yes, show on map						✓	
Pond Water Elevation (Top of decant is 3390.3)						✓	
Depth of water at decant inlet and clarity						✓	
Inlet opening clear?	✓						
Sand Storage Area–Pond to Crest Distance > 10 m?	✓						
TDF Strip	S	F	P	U	N	NA	
Distance between water and outer embankment > 20m?	✓						
Decant inlet opening clear?	✓						
Depth of water at decant inlet and clarity?	✓						No water at decant
Lynx Diversion Ditch	S	F	P	U	N	NA	
Ditch Clear? No infill material?		✓					Some small boulders/large cobbles
Any Ditch Damage?	✓						beg damage
Signs of Ditch Overtopping?	✓						
Flow Conditions in Ditch (m^3/s)	✓						
Paste Berm Crest	S	F	P	U	N	NA	
Surface Cracks - Transverse	✓						
Surface Cracks - Longitudinal	✓						
Settlement / Depressions	✓						
Erosion or Gully Channels	✓						
Lynx TDF	S	F	P	U	N	NA	
Sink holes or depressions evident in the tailings?	✓						
Sump pump currently pumping?							
Ponded water evident on paste tails? if yes, how deep?	✓						
Is water flowing into the pit? If yes, show on map							
Evidence of slope failure into the Lynx TDF?	✓						
Active Tailings Placement? if yes, show on map						✓	

*** RATING LEGEND (see next page)**

S = Satisfactory (Meets the intended purpose)

F = Fair (Meets intended purpose, but some maintenance needed)

P = Poor (May not meet intended purpose, repair or modify)

U = Unsatisfactory (Will not meet intended purpose, repair or modify)

N = Not inspected

NA = Not applicable

Additional Comments:

Version 5 – Nov 2008

MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

All parts of this inspection report should be completed. Adverse conditions should be described. Additional information may be put on attached pages

INSPECTION DETAILS

Inspector Name: [redacted]

Inspector Position: Environmental Sampler

Inspection Date/Time: 04 Nov 4 2017

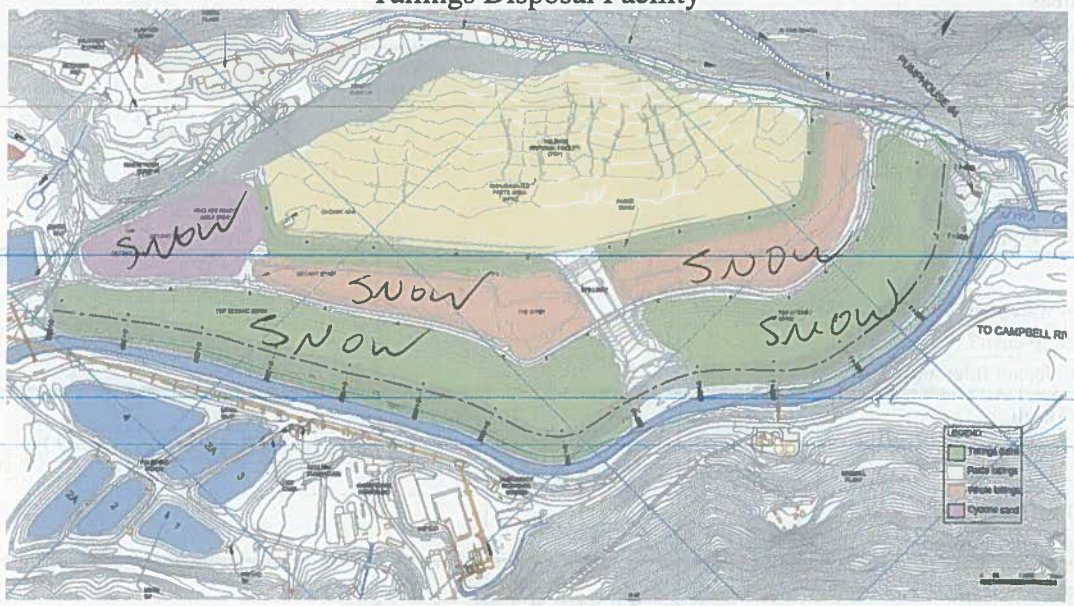
Weather Conditions: Snowing, -2

Reason for Inspection:

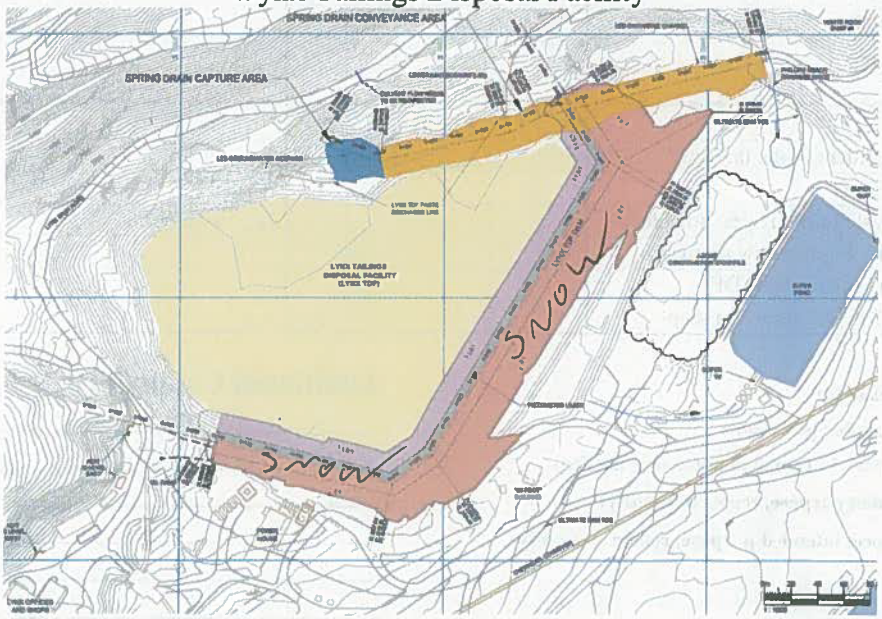
- **Routine** ☑
- **Special Condition** ☐

ADDITIONAL COMMENTS

Tailings Disposal Facility



Lynx Tailings Disposal Facility



MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

INSPECTOR NAME: [redacted] DATE: Nov 4

INSPECTION POINT / ITEMS	CONDITION						
	RATING						REMARKS / DESCRIPTIONS
Tailings Dam Crest	S	F	P	U	N	NA	
Surface Cracks - Transverse	✓						
Surface Cracks - Longitudinal	✓						
Settlement / Depressions	✓						
Erosion or Gully Channels	✓						
Spillway Inspection	S	F	P	U	N	NA	
Invert opening clear?	✓						
Riprap coverage adequate?	✓						
Tailings Dam Slope and Toe	S	F	P	U	N	NA	
Surface Erosion	✓						
Surface Settlement / Depressions	✓						
Sinkholes	✓						
Cracks / Slope Movement/Bulging	✓						
Seepage / Wet Areas	✓						
Other Unusual Conditions	✓						
Amalgamated Paste Area	S	F	P	U	N	NA	
Active Tailings Placement? If yes, show on map	✗					✓	
Pond Water Elevation (Top of decant is 3390.3)						✓	
Depth of water at decant inlet and clarity						✓	
Inlet opening clear?	✓						
Sand Storage Area–Pond to Crest Distance > 10 m?	✓						
TDF Strip	S	F	P	U	N	NA	
Distance between water and outer embankment > 20m?	✓						
Decant inlet opening clear?	✓						
Depth of water at decant inlet and clarity?						✓	
Lynx Diversion Ditch	S	F	P	U	N	NA	
Ditch Clear? No infill material?	✓						small boulders / large cobbles
Any Ditch Damage?	✓						
Signs of Ditch Overtopping?	✓						
Flow Conditions in Ditch (m^3/s)	✓						
Paste Berm Crest	S	F	P	U	N	NA	
Surface Cracks - Transverse	✓						
Surface Cracks - Longitudinal	✓						
Settlement / Depressions	✓						
Erosion or Gully Channels	✓						
Lynx TDF	S	F	P	U	N	NA	
Sink holes or depressions evident in the tailings?	✓						
Sump pump currently pumping?							
Ponded water evident on paste tails? if yes, how deep?	✓						< 1 ft
Is water flowing into the pit? If yes, show on map	✓						
Evidence of slope failure into the Lynx TDF?	✓						
Active Tailings Placement? if yes, show on map						✓	

*** RATING LEGEND (see next page)**

S = Satisfactory (Meets the intended purpose)

F = Fair (Meets intended purpose, but some maintenance needed)

P = Poor (May not meet intended purpose, repair or modify)

U = Unsatisfactory (Will not meet intended purpose, repair or modify)

N = Not inspected

NA = Not applicable

Additional Comments:

MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

All parts of this inspection report should be completed. Adverse conditions should be described. Additional information may be put on attached pages

INSPECTION DETAILS

Inspector Name: [redacted]

Inspector Position: Environmental Sampler

Inspection Date/Time: Nov 10

Weather Conditions: Cloudy, dry

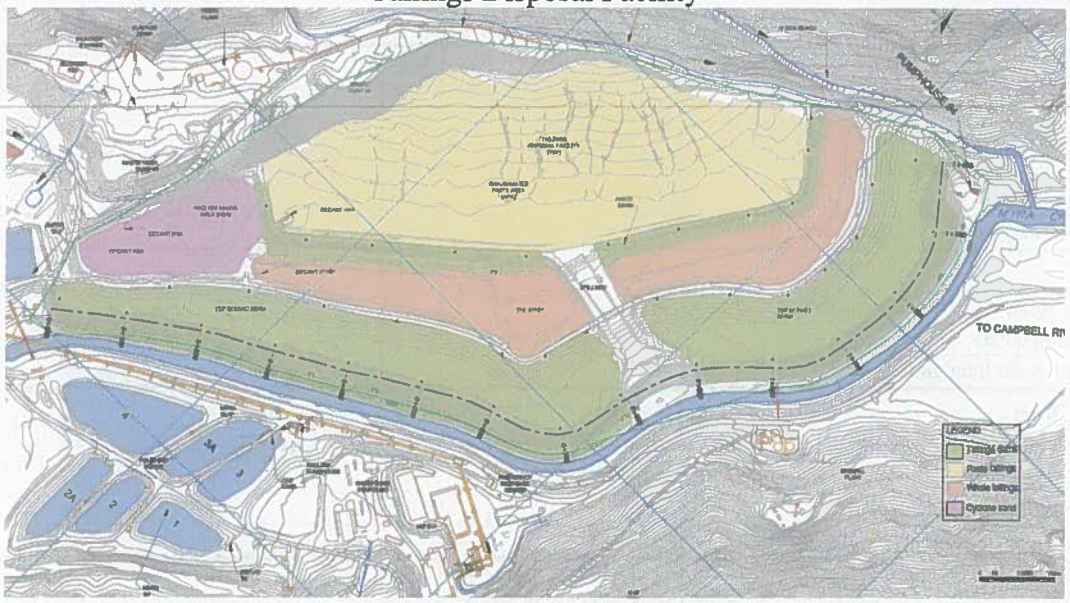
Reason for Inspection:

Routine ☑

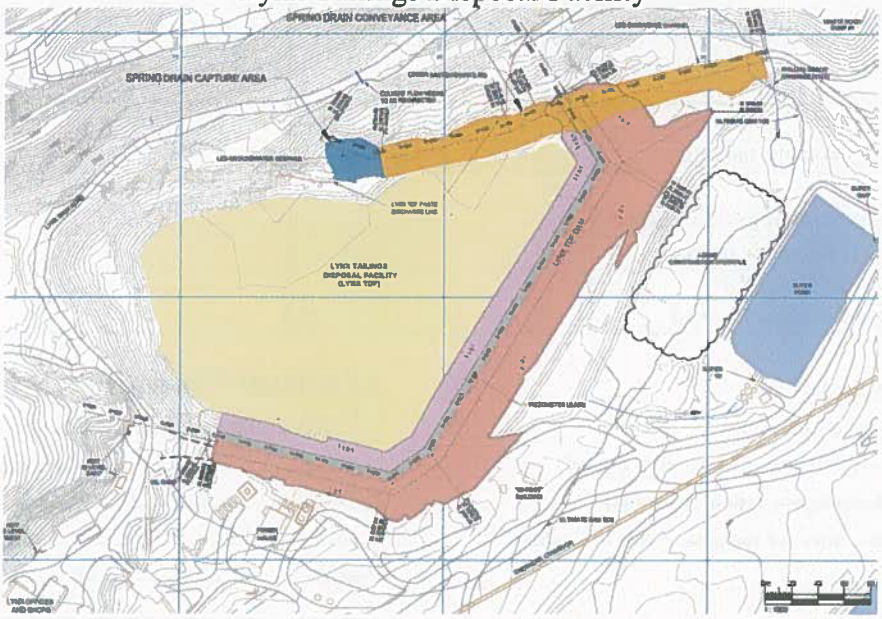
Special Condition ☐

ADDITIONAL COMMENTS

Tailings Disposal Facility



Lynx Tailings Disposal Facility



MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

INSPECTOR NAME: [redacted] **DATE:** NOV 10

INSPECTION POINT / ITEMS	CONDITION						
	RATING						REMARKS / DESCRIPTIONS
Tailings Dam Crest	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Cracks - Transverse	✓						
Surface Cracks - Longitudinal	✓						
Settlement / Depressions	✓						
Erosion or Gully Channels	✓						
Spillway Inspection	**S**	**F**	**P**	**U**	**N**	**NA**	
Invert opening clear?	✓						
Riprap coverage adequate?	✓						
Tailings Dam Slope and Toe	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Erosion	✓						
Surface Settlement / Depressions	✓						
Sinkholes	✓						
Cracks / Slope Movement/Bulging	✓						
Seepage / Wet Areas	✓						
Other Unusual Conditions	✓						
Amalgamated Paste Area	**S**	**F**	**P**	**U**	**N**	**NA**	
Active Tailings Placement? If yes, show on map						✓	
Pond Water Elevation (Top of decant is 3390.3)						✓	
Depth of water at decant inlet and clarity	✓						
Inlet opening clear?	✓						
Sand Storage Area–Pond to Crest Distance > 10 m?						✓	
TDF Strip	**S**	**F**	**P**	**U**	**N**	**NA**	
Distance between water and outer embankment > 20m?	✓						
Decant inlet opening clear?	✓						
Depth of water at decant inlet and clarity?	✓						
Lynx Diversion Ditch	**S**	**F**	**P**	**U**	**N**	**NA**	
Ditch Clear? No infill material?	✓						small rocks
Any Ditch Damage?	✓						
Signs of Ditch Overtopping?	✓						
Flow Conditions in Ditch (m^3/s)	✓						Moderate
Paste Berm Crest	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Cracks - Transverse	✓						
Surface Cracks - Longitudinal	✓						
Settlement / Depressions	✓						
Erosion or Gully Channels	✓						
Lynx TDF	**S**	**F**	**P**	**U**	**N**	**NA**	
Sink holes or depressions evident in the tailings?	✓						
Sump pump currently pumping?	✓						
Ponded water evident on paste tails? if yes, how deep?	✓						
Is water flowing into the pit? If yes, show on map	✓						
Evidence of slope failure into the Lynx TDF?	✓						
Active Tailings Placement? if yes, show on map						✓	

*** RATING LEGEND (see next page)**

S = Satisfactory (Meets the intended purpose)

F = Fair (Meets intended purpose, but some maintenance needed)

P = Poor (May not meet intended purpose, repair or modify)

U = Unsatisfactory (Will not meet intended purpose, repair or modify)

N = Not inspected

NA = Not applicable

Additional Comments:

Material in ring net

small V notches on clean rock (bil) water flowing over the side

MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

All parts of this inspection report should be completed. Adverse conditions should be described. Additional information may be put on attached pages

INSPECTION DETAILS

Inspector Name: [redacted]

Inspector Position: Environmental sampler

Inspection Date/Time: Nov 17

Weather Conditions: light rain

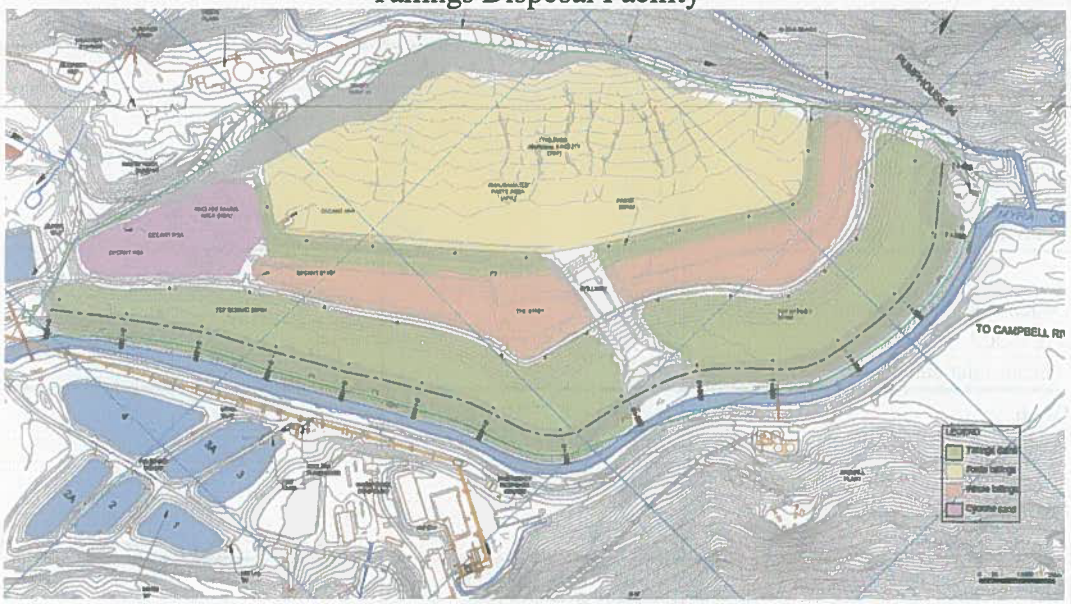
Reason for Inspection:

Routine ☑

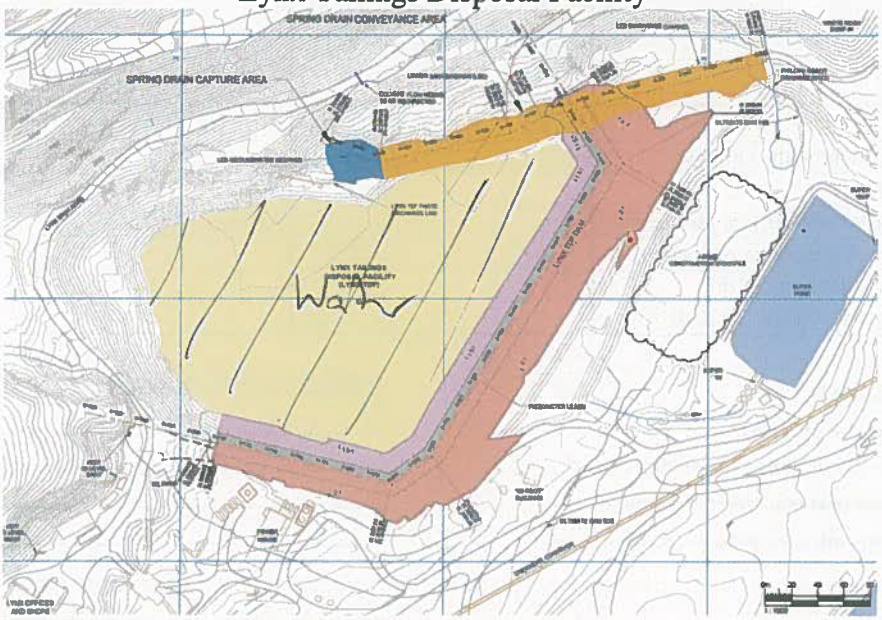
Special Condition ☐

ADDITIONAL COMMENTS

Tailings Disposal Facility



Lynx Tailings Disposal Facility



MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

INSPECTOR NAME: [redacted] DATE: Nov 17

INSPECTION POINT / ITEMS	CONDITION						
	RATING						REMARKS / DESCRIPTIONS
Tailings Dam Crest	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Cracks - Transverse	✓						
Surface Cracks - Longitudinal	✓						
Settlement / Depressions	✓						
Erosion or Gully Channels	✓						
Spillway Inspection	**S**	**F**	**P**	**U**	**N**	**NA**	
Invert opening clear?	✓						
Riprap coverage adequate?	✓						
Tailings Dam Slope and Toe	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Erosion	✓						
Surface Settlement / Depressions	✓						
Sinkholes	✓						
Cracks / Slope Movement/Bulging	✓						
Seepage / Wet Areas	✓						
Other Unusual Conditions							
Amalgamated Paste Area	**S**	**F**	**P**	**U**	**N**	**NA**	
Active-Tailings Placement? If yes, show on map						✓	
Pond Water Elevation (Top of decant is 3390.3)	✓					✓	
Depth of water at decant inlet and clarity	✓						
Inlet opening clear?	✓						
Sand Storage Area–Pond to Crest Distance > 10 m?						✓	
TDF Strip	**S**	**F**	**P**	**U**	**N**	**NA**	
Distance between water and outer embankment > 20m?	✓						
Decant inlet opening clear?	✓						
Depth of water at decant inlet and clarity?	✓						
Lynx Diversion Ditch	**S**	**F**	**P**	**U**	**N**	**NA**	
Ditch Clear? No infill material?	✓						
Any Ditch Damage?	✓						
Signs of Ditch Overtopping?	✓						
Flow Conditions in Ditch (m^3/s)	✓						moderate – light
Paste Berm Crest	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Cracks - Transverse	✓						
Surface Cracks - Longitudinal	✓						
Settlement / Depressions	✓						
Erosion or Gully Channels	✓						
Lynx TDF	**S**	**F**	**P**	**U**	**N**	**NA**	
Sink holes or depressions evident in the tailings?	✓						
Sump pump currently pumping?	✓						
Ponded water evident on paste tails? if yes, how deep?	✓						shallow
Is water flowing into the pit? If yes, show on map						✓	
Evidence of slope failure into the Lynx TDF?	✓						
Active Tailings Placement? if yes, show on map						✓	

*** RATING LEGEND (see next page)**

S = Satisfactory (Meets the intended purpose)

F = Fair (Meets intended purpose, but some maintenance needed)

P = Poor (May not meet intended purpose, repair or modify)

U = Unsatisfactory (Will not meet intended purpose, repair or modify)

N = Not inspected

NA = Not applicable

Additional Comments:

MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

All parts of this inspection report should be completed. Adverse conditions should be described. Additional information may be put on attached pages

INSPECTION DETAILS

Inspector Name: [redacted]

Inspector Position: Environmental Sampler

Inspection Date/Time: Nov 25

Weather Conditions: Rain, 6°C

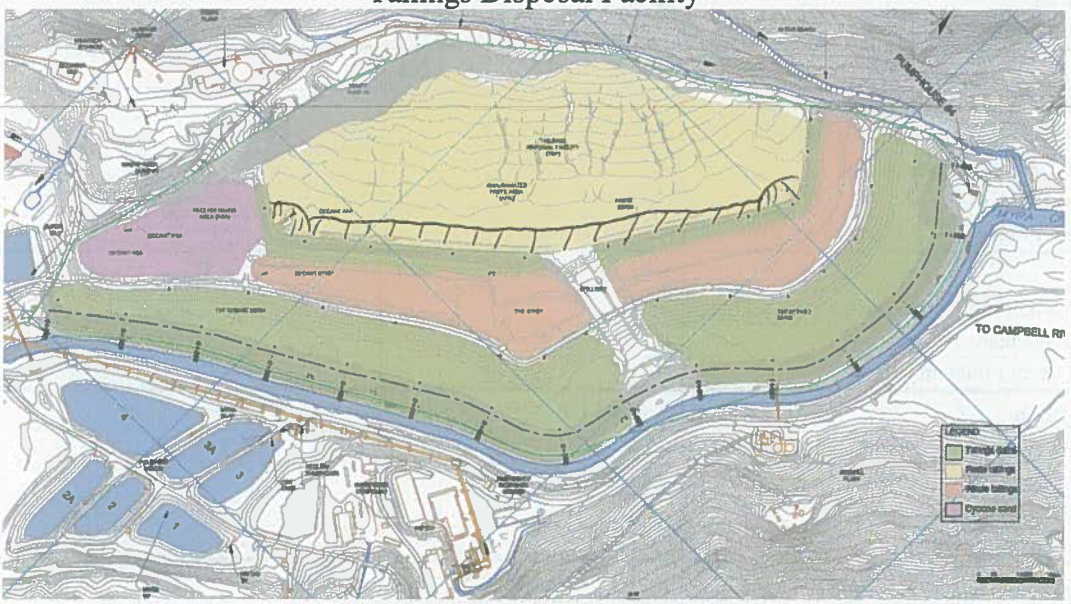
Reason for Inspection:

Routine ☑

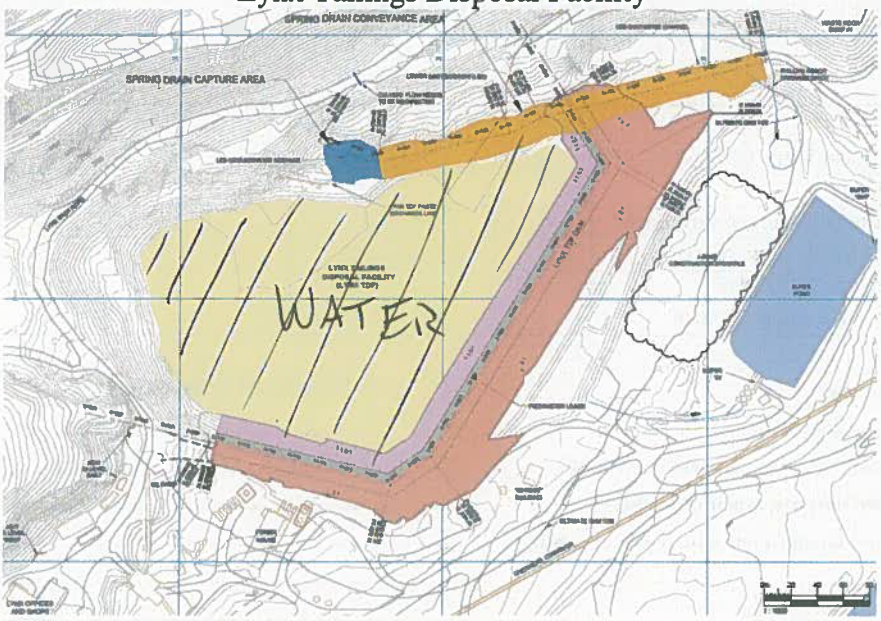
Special Condition ☐

ADDITIONAL COMMENTS

Tailings Disposal Facility



Lynx Tailings Disposal Facility



MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

INSPECTOR NAME: _____ **DATE:** _____

INSPECTION POINT / ITEMS	CONDITION						
	RATING						REMARKS / DESCRIPTIONS
Tailings Dam Crest	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Cracks - Transverse	✓						
Surface Cracks - Longitudinal	✓						
Settlement / Depressions	✓						
Erosion or Gully Channels	✓						
Spillway Inspection	**S**	**F**	**P**	**U**	**N**	**NA**	
Invert opening clear?	✓						
Riprap coverage adequate?	✓						
Tailings Dam Slope and Toe	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Erosion	✓						
Surface Settlement / Depressions	✓						
Sinkholes	✓						
Cracks / Slope Movement/Bulging	✓						
Seepage / Wet Areas	✓						
Other Unusual Conditions	✓						
Amalgamated Paste Area	**S**	**F**	**P**	**U**	**N**	**NA**	
Active Tailings-Placement? If yes, show on map						✓	
Pond Water Elevation (Top of decant is 3390.3)	✓						low
Depth of water at decant inlet and clarity	✓						
Inlet opening clear?	✓						
Sand Storage Area–Pond to Crest Distance > 10 m?						✓	
TDF Strip	**S**	**F**	**P**	**U**	**N**	**NA**	
Distance between water and outer embankment > 20m?	✓						
Decant inlet opening clear?	✓						
Depth of water at decant inlet and clarity?	✓						
Lynx Diversion Ditch	**S**	**F**	**P**	**U**	**N**	**NA**	
Ditch Clear? No infill material?	✓						
Any Ditch Damage?	✓						
Signs of Ditch Overtopping?	✓						
Flow Conditions in Ditch (m^3/s)	✓						Fast strong flow
Paste Berm Crest	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Cracks - Transverse	✓						
Surface Cracks - Longitudinal	✓						
Settlement / Depressions	✓						
Erosion or Gully Channels	✓						
Lynx TDF	**S**	**F**	**P**	**U**	**N**	**NA**	
Sink holes or depressions evident in the tailings?	✓						
Sump pump currently pumping?	✓						
Ponded water evident on paste tails? if yes, how deep?	✓						
Is water flowing into the pit? If yes, show on map	✓						
Evidence of slope failure into the Lynx TDF?	✓						
Active Tailings Placement? if yes, show on map						✓	

*** RATING LEGEND (see next page)**

S = Satisfactory (Meets the intended purpose)

F = Fair (Meets intended purpose, but some maintenance needed)

P = Poor (May not meet intended purpose, repair or modify)

U = Unsatisfactory (Will not meet intended purpose, repair or modify)

N = Not inspected

NA = Not applicable

Additional Comments:

_____

_____

_____

_____

_____

_____

MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

All parts of this inspection report should be completed. Adverse conditions should be described. Additional information may be put on attached pages

INSPECTION DETAILS

Inspector Name: [redacted]

Inspector Position: Environmental Sampler

Inspection Date/Time: Dec 9 2017 3:30 PM

Weather Conditions: Foggy -1°C

Reason for Inspection:

Routine ☑

Special Condition ☐

ADDITIONAL COMMENTS

Tailings Disposal Facility



Lynx Tailings Disposal Facility



MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

INSPECTOR NAME: [redacted] DATE: Dec 9 2017

INSPECTION POINT / ITEMS	CONDITION						
	RATING						REMARKS / DESCRIPTIONS
Tailings Dam Crest	S	F	P	U	N	NA	
Surface Cracks - Transverse	✓						
Surface Cracks - Longitudinal	✓						
Settlement / Depressions	✓						
Erosion or Gully Channels	✓						
Spillway Inspection	S	F	P	U	N	NA	
Invert opening clear?	✓						
Riprap coverage adequate?	✓						
Tailings Dam Slope and Toe	S	F	P	U	N	NA	
Surface Erosion	✓						
Surface Settlement / Depressions	✓						
Sinkholes	✓						
Cracks / Slope Movement/Bulging	✓						
Seepage / Wet Areas	✓						
Other Unusual Conditions							
Amalgamated Paste Area	S	F	P	U	N	NA	
Active Tailings Placement? If yes, show on map						✓	
Pond Water Elevation (Top of decant is 3390.3)						·	
Depth of water at decant inlet and clarity							
Inlet opening clear?							
Sand Storage Area–Pond to Crest Distance > 10 m?						✓	
TDF Strip	S	F	P	U	N	NA	
Distance between water and outer embankment > 20m?	✓						
Decant inlet opening clear?	✓						
Depth of water at decant inlet and clarity?						✓	
Lynx Diversion Ditch	S	F	P	U	N	NA	
Ditch Clear? No infill material?	✓						
Any Ditch Damage?	✓						
Signs of Ditch Overtopping?	✓						
Flow Conditions in Ditch (m^3/s)	✓						Slow
Paste Berm Crest	S	F	P	U	N	NA	
Surface Cracks - Transverse	✓						
Surface Cracks - Longitudinal	✓						
Settlement / Depressions	✓						
Erosion or Gully Channels	✓						
Lynx TDF	S	F	P	U	N	NA	
Sink holes or depressions evident in the tailings?	✓						
Sump pump currently pumping?					✓		
Ponded water evident on paste tails? if yes, how deep?	✓						Frozen top layer
Is water flowing into the pit? If yes, show on map	✓						No water flowing in
Evidence of slope failure into the Lynx TDF?	✓						
Active Tailings Placement? if yes, show on map						✓	

*** RATING LEGEND (see next page)**

S = Satisfactory (Meets the intended purpose)

F = Fair (Meets intended purpose, but some maintenance needed)

P = Poor (May not meet intended purpose, repair or modify)

U = Unsatisfactory (Will not meet intended purpose, repair or modify)

N = Not inspected

NA = Not applicable

Additional Comments:

- Everything covered in frost
- Ring net clear
- some small woody debris on downstream side of ring net

MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

All parts of this inspection report should be completed. Adverse conditions should be described. Additional information may be put on attached pages

INSPECTION DETAILS

Inspector Name: [redacted]

Inspector Position: Environmental Sampler

Inspection Date/Time: Dec 15 2017

Weather Conditions:

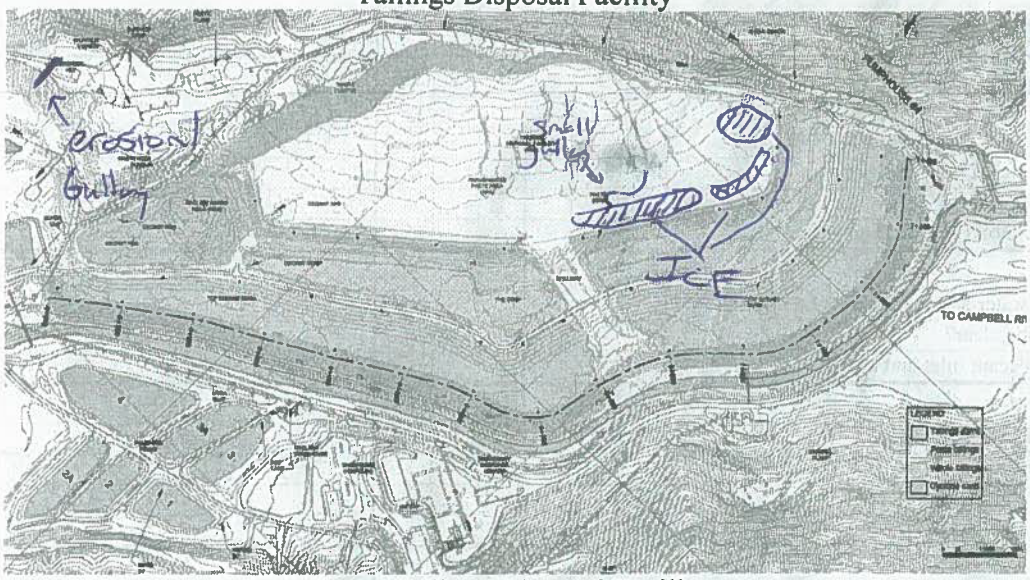
Reason for Inspection:

Routine ☑

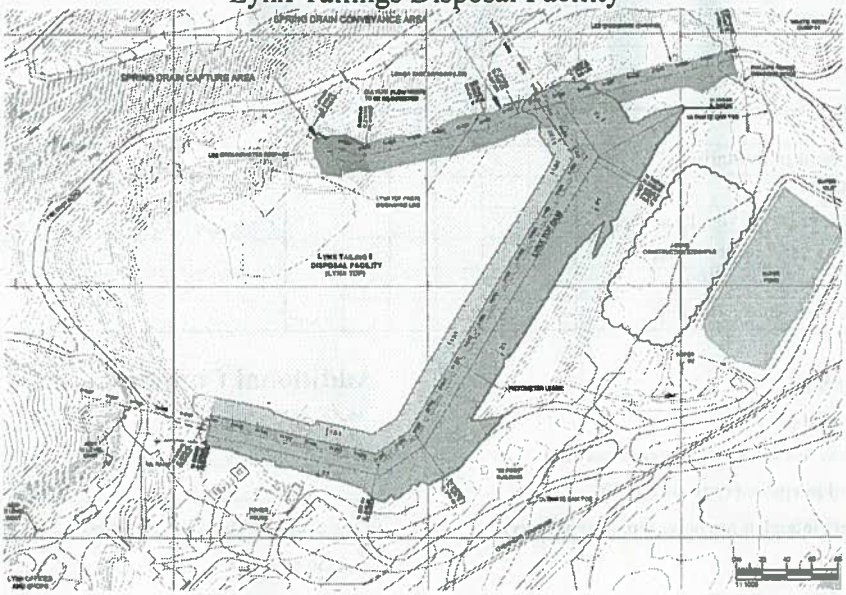
Special Condition ☐

ADDITIONAL COMMENTS

Tailings Disposal Facility



Lynx Tailings Disposal Facility



MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

INSPECTOR NAME: [redacted] DATE: DEC 15 2017

INSPECTION POINT / ITEMS	CONDITION						
	RATING						REMARKS / DESCRIPTIONS
Tailings Dam Crest	S	F	P	U	N	NA	
Surface Cracks - Transverse	✓						
Surface Cracks - Longitudinal	✓						
Settlement / Depressions	✓						
Erosion or Gully Channels	✓						
Spillway Inspection	S	F	P	U	N	NA	
Invert opening clear?	✓						
Riprap coverage adequate?	✓						
Tailings Dam Slope and Toe	S	F	P	U	N	NA	
Surface Erosion	✓						
Surface Settlement / Depressions	✓						
Sinkholes	✓						
Cracks / Slope Movement/Bulging	✓						
Seepage / Wet Areas	✓						
Other Unusual Conditions							
Amalgamated Paste Area	S	F	P	U	N	NA	
Active Tailings Placement? If yes, show on map						✓	
Pond Water Elevation (Top of decant is 3390.3)	✓						
Depth of water at decant inlet and clarity						✓	
Inlet opening clear?	✓						
Sand Storage Area–Pond to Crest Distance > 10 m?						✓	
TDF Strip	S	F	P	U	N	NA	
Distance between water and outer embankment > 20m?	✓						
Decant inlet opening clear?	✓						
Depth of water at decant inlet and clarity?	✓						
Lynx Diversion Ditch	S	F	P	U	N	NA	
Ditch Clear? No infill material?		✓					lots of small woody debris
Any Ditch Damage?	✓						
Signs of Ditch Overtopping?	✓						
Flow Conditions in Ditch (m^3/s)	✓						slow
Paste Berm Crest	S	F	P	U	N	NA	
Surface Cracks - Transverse	✓						
Surface Cracks - Longitudinal	✓						
Settlement / Depressions	✓						
Erosion or Gully Channels	✓						
Lynx TDF	S	F	P	U	N	NA	
Sink holes or depressions evident in the tailings?	✓						
Sump pump currently pumping?					✓		
Ponded water evident on paste tails? if yes, how deep?	✓						Frozen layer on top
Is water flowing into the pit? If yes, show on map	✓						
Evidence of slope failure into the Lynx TDF?	✓						
Active Tailings Placement? if yes, show on map						✓	

* **RATING LEGEND (see next page)**

S = Satisfactory (Meets the intended purpose)

F = Fair (Meets intended purpose, but some maintenance needed)

P = Poor (May not meet intended purpose, repair or modify)

U = Unsatisfactory (Will not meet intended purpose, repair or modify)

N = Not inspected

NA = Not applicable

Version 5 – Nov 2008

Additional Comments:

Water pooling from ice melt at Quansit hut

Erosion / gully channel between sandpile * Quansit hut

Some small woody debris about ring rod

MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

All parts of this inspection report should be completed. Adverse conditions should be described. Additional information may be put on attached pages

INSPECTION DETAILS

Inspector Name: [redacted]

Inspector Position: Environmental Sampler

Inspection Date/Time: 17/12/21 2:30 P

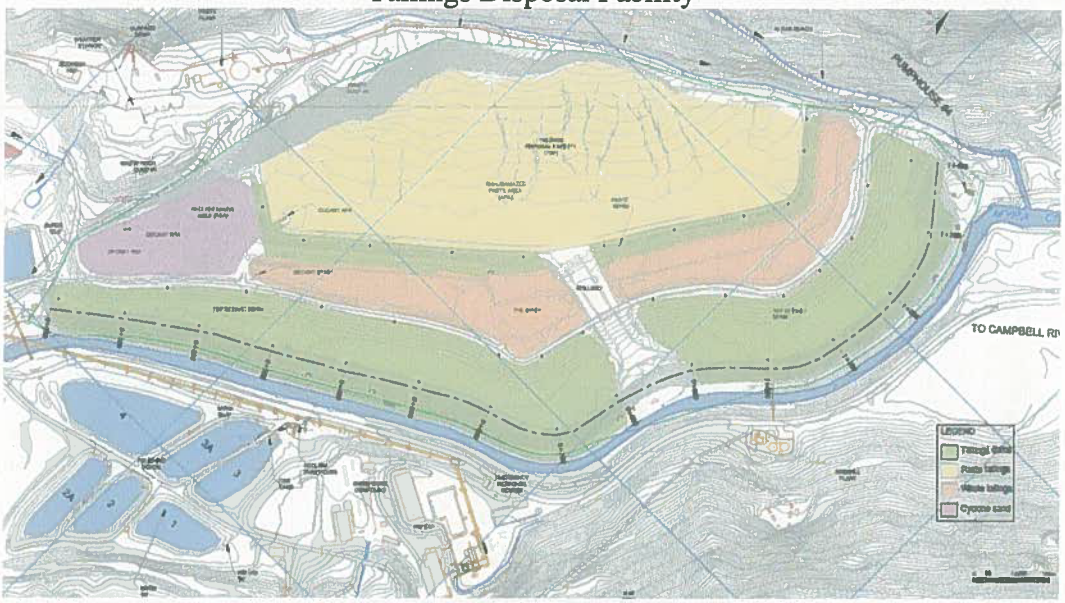
Weather Conditions: Clear, -2°C

Reason for Inspection:

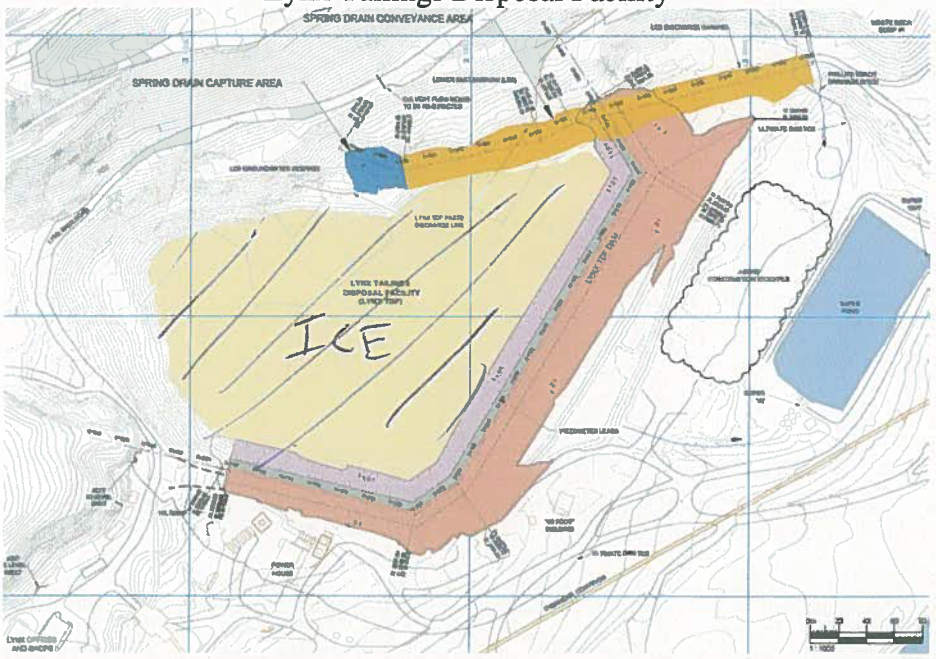
- **Routine** ☑
- **Special Condition** ☐

ADDITIONAL COMMENTS

Tailings Disposal Facility



Lynx Tailings Disposal Facility



MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

INSPECTOR NAME: [redacted] DATE: 17/12/21

INSPECTION POINT / ITEMS	CONDITION						
	RATING						REMARKS / DESCRIPTIONS
Tailings Dam Crest	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Cracks - Transverse	✓						
Surface Cracks - Longitudinal	✓						
Settlement / Depressions	✓						
Erosion or Gully Channels	✓						
Spillway Inspection	**S**	**F**	**P**	**U**	**N**	**NA**	
Invert opening clear?	✓						
Riprap coverage adequate?	✓						
Tailings Dam Slope and Toe	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Erosion	✓						
Surface Settlement / Depressions	✓						
Sinkholes	✓						
Cracks / Slope Movement/Bulging	✓						
Seepage / Wet Areas	✓						
Other Unusual Conditions							
Amalgamated Paste Area	**S**	**F**	**P**	**U**	**N**	**NA**	
Active Tailings Placement? If yes, show on map						✓	
Pond Water Elevation (Top of decant is 3390.3)	✓						
Depth of water at decant inlet and clarity	✓						
Inlet opening clear?	✓						
Sand Storage Area–Pond to Crest Distance > 10 m?						✓	
TDF Strip	**S**	**F**	**P**	**U**	**N**	**NA**	
Distance between water and outer embankment > 20m?	✓						
Decant inlet opening clear?	✓						
Depth of water at decant inlet and clarity?	✓						
Lynx Diversion Ditch	**S**	**F**	**P**	**U**	**N**	**NA**	
Ditch Clear? No infill material?	✓						
Any Ditch Damage?	✓						
Signs of Ditch Overtopping?	✓						
Flow Conditions in Ditch (m^3/s)	✓						Moderate
Paste Berm Crest	**S**	**F**	**P**	**U**	**N**	**NA**	
Surface Cracks - Transverse	✓						
Surface Cracks - Longitudinal	✓						
Settlement / Depressions	✓						
Erosion or Gully Channels	✓						
Lynx TDF	**S**	**F**	**P**	**U**	**N**	**NA**	
Sink holes or depressions evident in the tailings?	✓						
Sump pump currently pumping?					✓		
Ponded water evident on paste tails? if yes, how deep?						✓	
Is water flowing into the pit? If yes, show on map						✓	
Evidence of slope failure into the Lynx TDF?	✓						
Active Tailings Placement? if yes, show on map						✓	

*** RATING LEGEND (see next page)**

S = Satisfactory (Meets the intended purpose)

F = Fair (Meets intended purpose, but some maintenance needed)

P = Poor (May not meet intended purpose, repair or modify)

U = Unsatisfactory (Will not meet intended purpose, repair or modify)

N = Not inspected

Additional Comments:

Some material in strip looks like it could impede flow

RING NET CLEAR

MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

All parts of this inspection report should be completed. Adverse conditions should be described. Additional information may be put on attached pages

INSPECTION DETAILS

Inspector Name: [redacted]

Inspector Position: Env. Sampler

Inspection Date/Time: 10:40 12/27/17

Weather Conditions: -1, Cloudy light snow

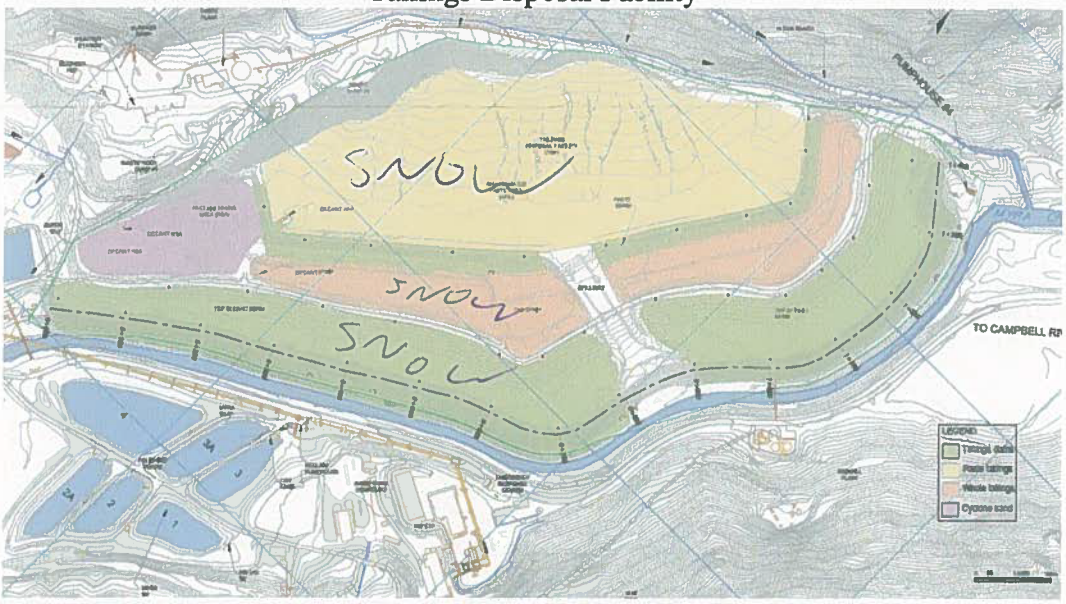
Reason for Inspection:

Routine ☑

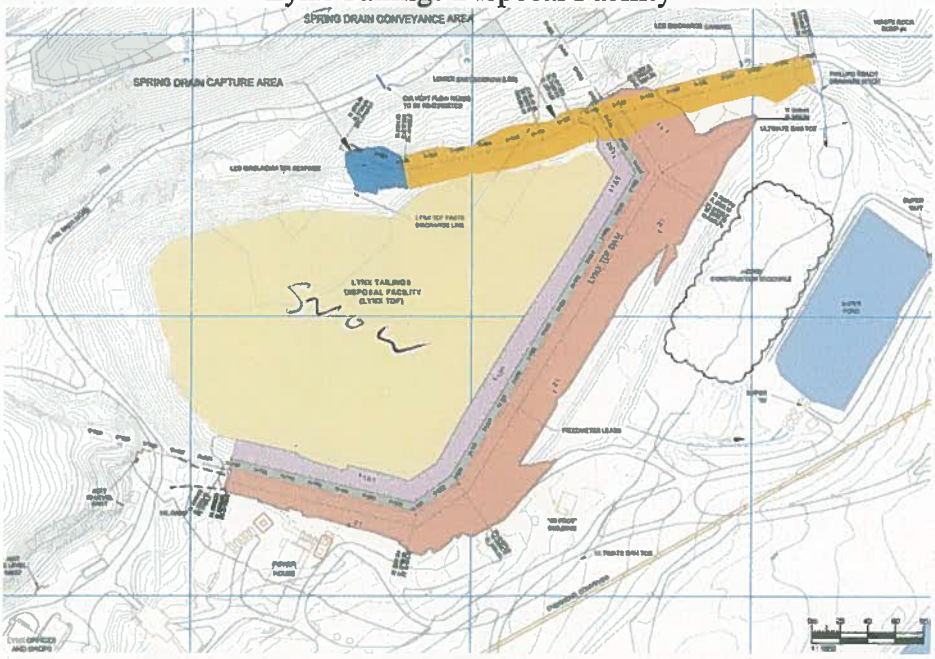
Special Condition ☐

ADDITIONAL COMMENTS

Tailings Disposal Facility



Lynx Tailings Disposal Facility



MYRA FALLS TAILINGS DISPOSAL FACILITY – INSPECTION REPORT

INSPECTOR NAME: [redacted] DATE: Dec 27 2017

INSPECTION POINT / ITEMS	CONDITION						
	RATING						REMARKS / DESCRIPTIONS
Tailings Dam Crest	S	F	P	U	N	NA	
Surface Cracks - Transverse					✓		SNOW COVER
Surface Cracks - Longitudinal					✓		↓
Settlement / Depressions					✓		
Erosion or Gully Channels	✓						
Spillway Inspection	S	F	P	U	N	NA	
Invert opening clear?	✓						
Riprap coverage adequate?	✓						
Tailings Dam Slope and Toe	S	F	P	U	N	NA	
Surface Erosion					✓		SNOW COVER
Surface Settlement / Depressions					✓		↓
Sinkholes					✓		
Cracks / Slope Movement/Bulging					✓		
Seepage / Wet Areas	✓						SNOW COVER
Other Unusual Conditions							
Amalgamated Paste Area	S	F	P	U	N	NA	
Active Tailings Placement? If yes, show on map						✓	
Pond Water Elevation (Top of decant is 3390.3)						✓	
Depth of water at decant inlet and clarity						✓	
Inlet opening clear?	✓						
Sand Storage Area–Pond to Crest Distance > 10 m?						✓	
TDF Strip	S	F	P	U	N	NA	
Distance between water and outer embankment > 20m?	✓						
Decant inlet opening clear?	✓						
Depth of water at decant inlet and clarity?	✓						No water
Lynx Diversion Ditch	S	F	P	U	N	NA	
Ditch Clear? No infill material?	✓						
Any Ditch Damage?	✓						
Signs of Ditch Overtopping?	✓						
Flow Conditions in Ditch (m^3/s)	✓						Very slow small channel in snow
Paste Berm Crest	S	F	P	U	N	NA	
Surface Cracks - Transverse					✓		SNOW COVER
Surface Cracks - Longitudinal					✓		↓
Settlement / Depressions					✓		
Erosion or Gully Channels	✓				✓		
Lynx TDF	S	F	P	U	N	NA	
Sink holes or depressions evident in the tailings?					✓		SNOW COVERED
Sump pump currently pumping?					✓		↓
Ponded water evident on paste tails? if yes, how deep?						✓	
Is water flowing into the pit? If yes, show on map						✓	
Evidence of slope failure into the Lynx TDF?	✓						
Active Tailings Placement? if yes, show on map						✓	

*** RATING LEGEND (see next page)**

S = Satisfactory (Meets the intended purpose)

F = Fair (Meets intended purpose, but some maintenance needed)

P = Poor (May not meet intended purpose, repair or modify)

U = Unsatisfactory (Will not meet intended purpose, repair or modify)

N = Not inspected

Additional Comments:

Version 5 – Nov 2008

Appendix D

Amec Foster Wheeler Dam Inspections
(included on digital copy)

MYRA FALLS MINE
TAILINGS FACILITY FIELD REVIEW REPORT

Date of Field Review:	2018-01-20	Date of Memo:	2018-03-06
File No.:	NX14001B	Client:	Nyrstar Myra Falls Ltd.
Engineer:	Dan Hughes-Games, P.Eng.	To:	Nicole Pesonen
With:	n/a	Cc:	
Weather:	Overcast, approx. 1 C. Melting snow cover on site.		

Summary

- The Old TDF and Lynx TDF facilities were inspected by Amec Foster Wheeler.
- Action Items:
  1. Improve snow clearing practices, particularly on the Old TDF, to enable adequate level of detail in weekly inspections and to allow emergency access to key drainage structures.
  2. Relocate pumping electrical equipment in Lynx TDF to higher ground or lower water levels to increase the storage volume before the electrical equipment becomes submerged.
- Action items communicated via email to N.Pesonen on 23 January 2017.

End of Summary

The Old TDF and Lynx TDF are inspected by Amec Foster Wheeler on a monthly basis as part of the engineering reconnaissance of the tailings facilities. During the inspection, Amec Foster Wheeler notes conditions in and around the facilities, with emphasis on water management, dam stability, and seepage conditions.

Old TDF:

- Snow clearing on the Old TDF was insufficient to access the decants for surveillance and maintenance. Clearing was adequate on the Paste Plant Hill/LLDD Road. Minimum clearing should consist of the Paste Plant Hill, LLDD road, APA Paste Berm, and OEB (aka Strip road).
- Given that the snow was not cleared and there are no apparent vehicle tracks or footprints in the snow, it seems likely that weekly inspections as required in the OMS have either been skipped or have not been sufficiently detailed.

Amec Foster Wheeler Environment & Infrastructure
4385 Boban Drive
Nanaimo, BC V9T 5V9
Tel +1 250 758 1887
Fax +1 250 758 1899
amecfw.com

- Surface drainage channels were at typical winter levels; however, known groundwater discharge features were very active.
- The “boils” along the toe of the east side of the APA berm buttress were very active, with approximately twice as much flow as previously observed.
- The DDSD had all snow melted downstream of it, suggesting recent flow.
- The Strip tailings about 20 m downstream of the DDSD were in a near-quick condition and too soft to walk on (which is a bit unusual, foot access in the strip is generally safe even in the winter). This is consistent with the boils being active and shows high porewater pressures in that part of the facility.
- In general, tailing surfaces where accessible were soft and easily disturbed by walking on them.
- Water levels in the APA appeared to be minimal, without evidence of recent high levels (melted snow, stranded ice, etc.).
- East Decant accessed from LLDD on foot. Decant was functioning adequately.
- West Decant not accessed due to time restrictions and lack of snow clearing.
- Water levels in the East Strip were minimal. Melted snow around the perimeter of the East Strip suggested the recent maximum water level was relatively low.
- West Strip not accessed due to lack of snow clearing.
- Pumphouse 4 springs were active. No additional seeps or springs were observed on the outside of the seismic upgrade.

Lynx TDF:

- Snow clearing was adequate for basic access.
- Water levels in Lynx TDF were relatively high. The pump laydown area (pumps and electrical equipment) had less than 1 m clearance from the pond surface. Potential rapid accumulation of water in a storm event could render the electrical equipment inundated and/or inaccessible (for example if the Upper Lynx Diversion Ditch breached). The equipment should be relocated to higher ground or the water levels should be lowered.
- The sinkhole area was not ice-covered and observed.
- The upstream cracks were snow-covered and not observed.
- Springs around the LEB and rear of Lynx Pit were highly active (possibly due to snow melting on Waste Dump 2). This includes discharge from the “toppling area” estimated a few 10’s of L/s total, with evidence of erosion suggesting that the total discharge was much greater at some point, maybe up to about 100 L/s. Difficult to conclusively estimate.
- Spring discharge was also observed on the remains of an old ramp at the north end of the pit (on Waste Dump 3B).
- Springs in the east end of the Lynx Panels were at normal high discharge levels.
- Seeps on the dam face were relatively inactive.
- Water was accumulating in the Lynx Panels area without a drainage outlet.

Diversion Ditches:

- Cascade Interim Debris Retention Structure was free of significant debris/alluvium accumulation. The debris net was free of obstructions.

- The LLDD was functioning normally.
- One set of subdrains near the middle of LLDD showed signs of having been active recently (all snow melted downstream of the outlet). The drains were dry at the time of inspection. The flow from the drain reported to one of the gullies on the APA and then towards the East Decant. No indications of significant activity was noted at any other subdrains.
- Springs around the former Alder Reach were very active. The area should be reviewed for performance with respect to stability/erosion in the late spring/early summer (after freshet).
- The Upper Lynx Diversion Ditch and Arnica Diversion Ditch were not inspected because the roads on Waste Dump 2 had not been cleared of snow (this is normal for winter inspections). These areas should be thoroughly inspected during the first monthly inspection that the access is snow-free.

The recommendations herein are based on Amec Foster Wheeler's observation of surface conditions at the time of the field review and are subject to revision upon the availability of new information.

This report has been prepared for the exclusive use of Nyrstar Myra Falls for specific application to the area described 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 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 engineering practices. No other warranty, express or implied, is made.

Photographs



Photo 1: Pumping area in Lynx TDF showing electrical equipment (the hut) close to pond elevation.



Photo 2: Seepage at the toe of Waste Dump 2, above the Lynx Springs Drain platform.



Photo 3: Spring flow in the east end of the Panels at the toe of Lynx Dam.



Photo 4: Old TDF Surge Pond with water level at the low level outlet elevation.



Photo 5: LLDD at base of Cascade Reach, free of debris/alluvium.



Photo 6: Cascade Interim Debris Barrier, free of debris.



Photo 7: Old TDF from Waste Dump 6. No significant water ponding. Snow melted in gullies, likely from spring flow.



Photo 8: Snow melted in head of gully below subdrain, midpoint of APA.



Photo 9: Snow melted in East Strip at DDSD outlet.



Photo 10: Boils in East Strip near toe of APA Berm at southeast corner. Stake is about 0.5 m high for scale.

MYRA FALLS MINE
TAILINGS FACILITY FIELD REVIEW REPORT

Date of Field Review:	2017-02-20	Date of Memo:	2018-03-06
File No.:	NX14001B	Client:	Nyrstar Myra Falls Ltd.
Engineer:	Dan Hughes-Games, P.Eng.	To:	Nicole Pesonen
With:	n/a	Cc:	
Weather:	2 C, sunny with high patchy clouds. Waste dumps mainly snow free, patchy snow elsewhere on site.		

Summary

- The Old TDF and Lynx TDF facilities were inspected by Amec Foster Wheeler.
- Action Items:
  1. Re-establish haul ramp ditch above Lynx TDF/Waste Dump 3 to direct water to Waste Dump 2. Prevent redirection of water over slope crest into Waste Dump 3.
  2. Improve surface water drainage along the APA Berm toe between the DDSD and the southeast corner of the berm.
  3. Check the boils at the APA berm toe southeast corner on wet days to gain information on when they occur.
  4. Review piezometer information in APA east abutment area.
- Actions communicated during weekly meeting of 28 February 2017.

End of Summary

The Old TDF and Lynx TDF are inspected by Amec Foster Wheeler on a monthly basis as part of the engineering reconnaissance of the tailings facilities. During the inspection, Amec Foster Wheeler notes conditions in and around the facilities, with emphasis on water management, dam stability, and seepage conditions.

Old TDF:

- Minimal standing water in APA and Strip.
- Boils at East Strip are not flowing but standing water is present at the surface. One new boil between previously observed boils. Reviewed the toe between DDSD and East Decant for other boils, found none.
- Seeps and melting snow on APA Berm within about 30 m of the DDSD, suggests shallow groundwater and/or advected heat due to groundwater. Recommend reviewing piezometer records for the area. Recommend improving surface drainage through

Amec Foster Wheeler Environment & Infrastructure
4385 Boban Drive
Nanaimo, BC V9T 5V9
Tel +1 250 758 1887
Fax +1 250 758 1899
amecfw.com

construction spoils left on the APA Berm toe. Recommend checking boils for flow on wet days.

Lynx TDF:

- Lynx TDF partly snow covered
- Dredging deposited at the usual input near west abutment area
- Minor flow from springs in topple area, above “Back Road”.
- Typical minor seepage above Lynx Springs Drain platform
- No major surface water inflows
- Water level slightly below Lynx Springs Drain platform, pumping electrical still on bench with limited clearance from pond.
- The usual sinkhole is not observable due to ice and snow cover.
- No active seepage at dam toe or in Panels.
- Drove to crest of Waste Dump 3. Water has been redirected to dump crest. Recommend restoring ditching to direct water towards Waste Dump 2.
- Walked up to slump reported by Nyrstar, at upper edge of Waste Dump 2 between Lynx TDF and the Upper Lynx Diversion. Noted a very minor slump of surficial material, apparently natural ground that has been oversteepened by past borrow activity. Slump is likely related to freeze thaw of the surface on an oversteep slope.
- Noted a relict debris fan (vegetated with mature alders) at the margin of the dump. Bedrock controlled minor drainage above the fan. Recommend reviewing lidar for probable source.

Diversion Ditches:

- Upper diversion ditches not inspected due to snow cover on Waste Dump 2 roads (normal for this time of year).
- Cascade debris structure clear. No debris in net.
- LLDD clear and functioning.
- LLDD subdrains all dry.
- Observed water trapped on old LLDD shotcrete channel invert, above the new LLDD.
- Alder Reach waterfalls flowing.

The recommendations herein are based on Amec Foster Wheeler’s observation of surface conditions at the time of the field review and are subject to revision upon the availability of new information.

This report has been prepared for the exclusive use of Nyrstar Myra Falls for specific application to the area described 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 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 engineering practices. No other warranty, express or implied, is made.

Photographs



Photo 1: Snow covered Lynx TDF.



Photo 2: Pump electrical equipment close to pond level.



Photo 3: Point of water redirection into Waste Dump 3.



Photo 4: Small slump at upper margin of Waste Dump 2. Appears to be a minor slide of thawed material from an existing oversteep slope.



Photo 5: Small relict debris fan at upper margin of Waste Dump 2.



Photo 6: Cascade interim debris barrier, free of debris.



Photo 7: LLDD clear and functioning.



Photo 8: Seepage and surface water trapped on old LLDD shotcrete invert where not removed.



Photo 9: Snow covered Old TDF. Snow is melted in some of the larger gullies, likely due to spring flow from top of APA.



Photo 10: Alder Reach waterfalls.

MYRA FALLS MINE
TAILINGS FACILITY FIELD REVIEW REPORT

Date of Field Review:	2017-03-21	Date of Memo:	2018-03-19
File No.:	NX14001B	Client:	Nyrstar Myra Falls Ltd.
Engineer:	Dan Hughes-Games, P.Eng.	To:	Nicole Pesonen
With:	n/a	Cc:	
Weather:	0 C and snowing in the morning, increasing to 3 C and changing to rain by mid afternoon.		

Summary

- The Old TDF and Lynx TDF facilities were inspected by Amec Foster Wheeler.
- Action Items:
  1. Repairs to snowplow and log damage in LLDD should be undertaken as soon as practical, if possible, prior to freshet. Measures should be taken to prevent further snowplow damage.
  2. Erosion protection measures should be implemented for active LLDD subdrains, if practical. Construction plans included a surface ditch parallel to the LLDD access road but this was not completed.
  3. Repair APA Operations spillway inlet with filter compatible materials as outlined in its design if the facility closure plan is not implemented.

End of Summary

The Old TDF and Lynx TDF are inspected by Amec Foster Wheeler on a monthly basis as part of the engineering reconnaissance of the tailings facilities. During the inspection, Amec Foster Wheeler notes conditions in and around the facilities, with emphasis on water management, dam stability, and seepage conditions.

Old TDF:

- Low water levels in the Old TDF Surge Pond, low level outlet is slightly open.
- Low flow in West Strip Channel. Runoff flowing overland in West Strip in old channel, merging with new channel near Plane A. Low water levels in the East Strip. APA surface mainly snow covered. Minimal pond at APA East Decant with modest flow through the decant. Flow around old APA Decant into new West Decant. Minor flow through the old APA Decant, mainly from seepage.

Amec Foster Wheeler Environment & Infrastructure
4385 Boban Drive
Nanaimo, BC V9T 5V9
Tel +1 250 758 1887
Fax +1 250 758 1899
amecfw.com

- Inspected a leak reported by Nyrstar from the APA through the Operations Spillway and into the West Strip. Leaking in similar location as prior years due to lack of filter in spillway inlet. Local area of leak had been plugged with typical well graded mine waste (prior repairs were with made with only tailings). Recommend proper repairs across full width of spillway inlet with filter compatible materials.
- Active gully erosion noted from pair of subdrains near LLDD 0+400 (edge of laydown/turnaround area), where high flows have been noted during storms.
- No flow from DDSD or East Strip boils. APA Berm snow free for approximately 30 m adjacent to DDSD, potentially indicating groundwater flux.
- Seismic upgrade berm mainly snow covered. Few minor areas of standing water, one near 1+000.
- Spring behind Pumphouse 4 is active. “Pumphouse 4 Spring” (per RGC naming, further up slope) is not active. No standing water in pumphouse area.

Lynx TDF:

- Water level approximately 0.5 m below the Lynx Springs Drain platform and pump electrical equipment area. Some ice adjacent to the south arm, but ice-free elsewhere. Dredging deposited from normal location near west abutment.
- Seeps on mid/lower dam face benches appear damp, but no active runoff from the area.
- No flow from springs in Panel 15. Estimated less than 1 L/s flowing from springs at natural ground contact at Panel 14/15 boundary.
- Modest flow in Lynx Springs Drain.
- Crest of dam mainly snow covered. Could not inspect for cracks.
- Lynx Backroad closed due to rockfall activity (typical activity for this time of year). Springs at topple area are not flowing.

Diversion Ditches:

- LLDD flowing and clear with only a few small sticks in channel. Cascade debris structure clear of debris.
- Snowplow damage noted near crest of concrete cloth liner at top of Pumphouse 4 hill, near terminal section of LLDD. LLDD liner damage from 2016 at end of Alder Reach remains unrepaired. Damaged areas should be repaired as soon as practical.
- No significant flow from LLDD subdrains. Trickle from one drain across from Alder Reach.

The recommendations herein are based on Amec Foster Wheeler’s observation of surface conditions at the time of the field review and are subject to revision upon the availability of new information.

This report has been prepared for the exclusive use of Nyrstar Myra Falls for specific application to the area described 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 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 engineering practices. No other warranty, express or implied, is made.

Photographs



Photo 1: Mine waste “plugs” on leaks at the APA Operations Spillway inlet. The spillway inlet must be repaired with appropriate filters when weather conditions permit.



Photo 2: Discharge area from the APA leak, in the TDF Strip adjacent to the west side of the spillway (the spillway leaks).



Photo 3: Minimal water in the East Strip.



Photo 4: Melted snow and ongoing gully erosion on the APA tailings, near the edge of the LLDD road.



Photo 5: Overview of Lynx TDF showing partially frozen pond and deposition of tan-coloured dredgate across the extent of the pond.

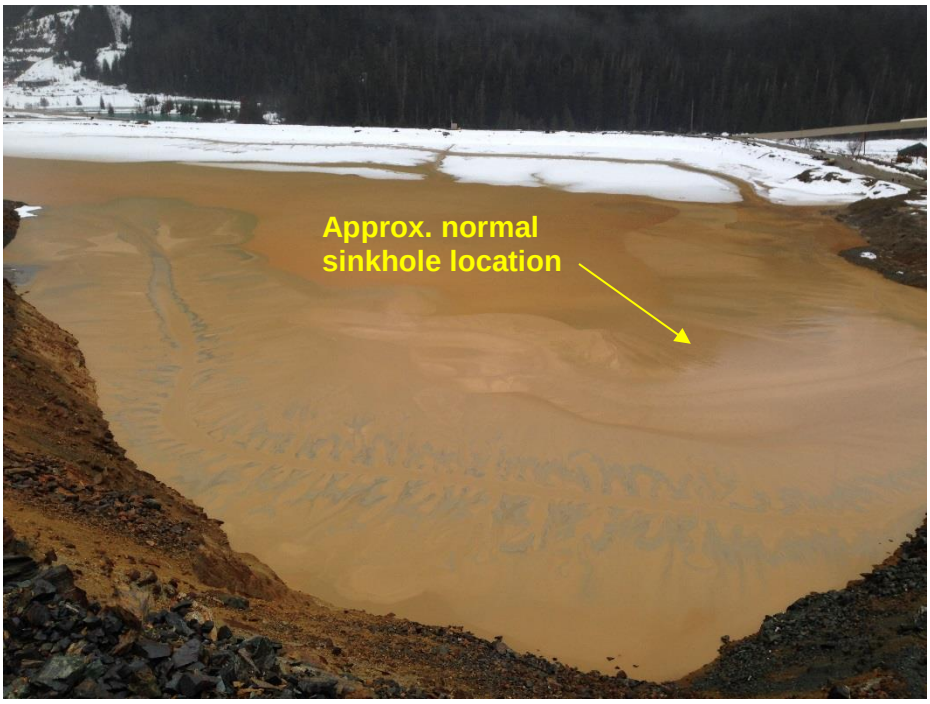


Photo 6: Photo from the Back Road overlook showing dredgate deposition patterns and lack of the usual sinkhole.



Photo 7: View of Lynx TDF foundation area looking west. No unusual seepage noted. Drainage of the area was effective at the time of the inspection.



Photo 8: View of Waste Rock Dump 3 and adjacent area of potential bedrock toppling above Lynx TDF.



Photo 9: Log damage to the left-hand side slope of the LLDD channel near the base of Alder Reach.



Photo 10: Snowplow damage to right-hand crest of LLDD channel.

MYRA FALLS MINE
TAILINGS FACILITY FIELD REVIEW REPORT

Date of Field Review:	2017-04-20	Date of Memo:	2018-03-25
File No.:	NX14001B	Client:	Nyrstar Myra Falls Ltd.
Engineer:	Dan Hughes-Games, P.Eng.	To:	Nicole Pesonen
With:	n/a	Cc:	
Weather:	Mixed sun and cloud, few showers, heavy at times.		

Summary

- The Old TDF and Lynx TDF facilities were inspected by Amec Foster Wheeler.
- Action Items:
  1. Drain or pump standing water from the toe of Lynx TDF Dam in the future foundation area.
  2. Repair erosion damage to the lower end of Arnica Reach diversion ditch.

End of Summary

The Old TDF and Lynx TDF are inspected by Amec Foster Wheeler on a monthly basis as part of the engineering reconnaissance of the tailings facilities. During the inspection, Amec Foster Wheeler notes conditions in and around the facilities, with emphasis on water management, dam stability, and seepage conditions.

Old TDF:

- APA, East Strip, and Surge Pond, all at normal minimum water levels. Surge Pond LLO is open. Surface flow in some of the gullies on the APA surface.
- Springs at APA Berm southwest corners (aka “boils”) are active, with relatively low discharge compared to prior observations. DDSD not flowing.
- Seismic upgrade berm has puddles in the usual locations.
- Most flow at the southwest corner of the APA is entering the old decant through an eroded gap in the tailings. Minor flow is reaching the new decant.
- Interim spot repairs at the APA Operations spillway inlet appear to be preventing further active leaking.
- Springs behind and around Pumphouse 4 (PH4) and on the adjacent PH4 hill road were active.

Amec Foster Wheeler Environment & Infrastructure
4385 Boban Drive
Nanaimo, BC V9T 5V9
Tel +1 250 758 1887
Fax +1 250 758 1899
amecfw.com

Lynx TDF:

- Normal pond levels in impoundment. Minor surface inflows from WRD 3B and hillside above Lynx Springs Drain platform. Treatment pond dredging slurry discharge from west abutment at the usual location.
- The usual sinkhole location was covered by fresh dredging deposition. Sinkhole not observed.
- Minor seepage at normal locations on benches on South Arm downstream side. Normal seepage at Panel 15. Some accumulation of surface water in Panels 14/15 from these flows. Foundation area should be drained or pumped.
- Groundwater discharge noted at topple area above Lynx Back Road.

Diversion Ditches:

- Cascade debris basin and net are clear of wood and alluvium. Modest flow in LLDD.
- LLDD concrete cloth section is clear and functioning.
- Groundwater and surface water noted on slope around old LLDD shotcrete. Flow is collected on shotcrete remnants and minor surface flows spill over new LLD cut slope at a number of locations. Some erosion evident.
- LLDD subdrains generally dry except one drain at the top of the PH4 hill was discharging an estimated 0.2 L/s.
- Upper Arnica reach not inspected due to time and access constraints.
- Upper Arnica reach had surface flow at the waterfall at its terminus. All flow infiltrated in head of Lower Arnica reach, before the end of the landing at the end of the ULDD.
- Lower Arnica reach shows indications of erosion damage to channel in terminal 50 m before the discharge point to Arnica Creek.
- ULDD is clear and functioning from end of culvert section above Lynx 5L down to the end of WRD 2. Minor woody debris in a few spots. Remainder of ULDD not inspected due to access and time constraints.

The recommendations herein are based on Amec Foster Wheeler's observation of surface conditions at the time of the field review and are subject to revision upon the availability of new information.

This report has been prepared for the exclusive use of Nyrstar Myra Falls for specific application to the area described 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 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 engineering practices. No other warranty, express or implied, is made.

Photographs



Photo 1: Overview of APA from WRD 6, looking southeast.



Photo 2: Spot repairs (brown mine waste fill) to leaks at APA Operations Spillway appear to be preventing further active leaking.



Photo 3: Indications of surface flow from old LLDD shotcrete remnants, causing erosion on slope above new LLDD.



Photo 4: Seepage from spring in haul road adjacent to Pumphouse 4.



Photo 5: Panorama showing Lynx TDF as viewed from the Lynx Back Road.



Photo 6: Upstream slope of Lynx Dam south arm, looking west from southeast corner. Settlement/deformation along crest is unchanged from previous inspections.

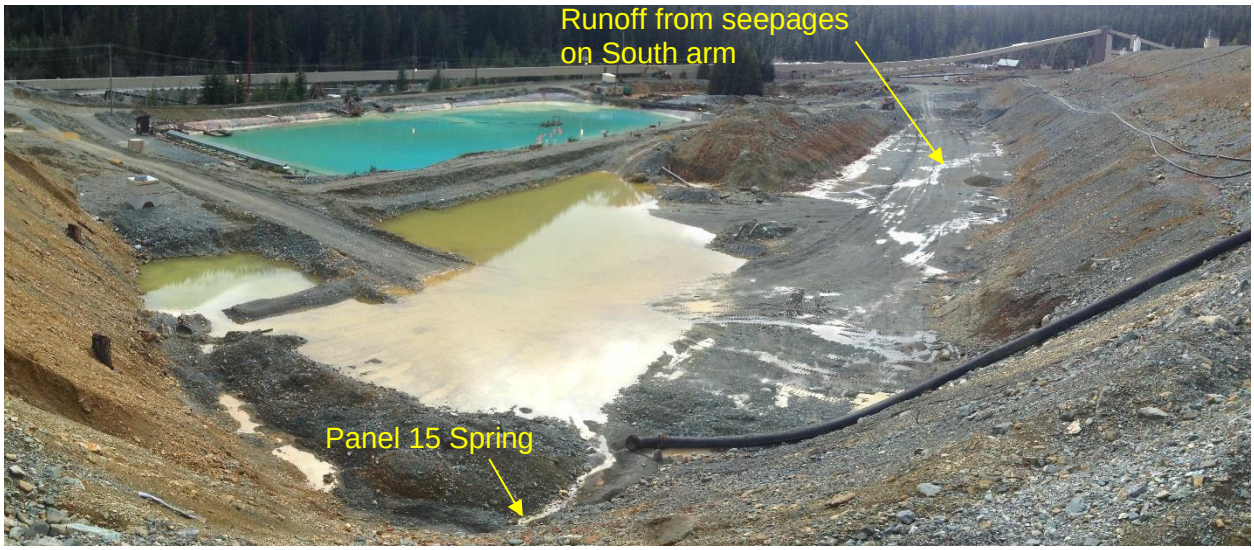


Photo 7: Panorama showing ponding water and surface flows along Lynx Toe. Taken from lower A-Ramp looking west.



Photo 8: Flow in ULDD above WRD 2.



Photo 9: Surface flow on waterfall at terminus of upper Arnica Diversion. None of this flow was reaching the lower reach – it all infiltrates in the ditch invert.



Photo 10: Erosion damage at terminal end of lower Arnica Reach diversion.

MYRA FALLS MINE
TAILINGS FACILITY FIELD REVIEW REPORT

Date of Field Review:	2017-05-18	Date of Memo:	2018-03-25
File No.:	NX14001B	Client:	Nyrstar Myra Falls Ltd.
Engineer:	Dan Hughes-Games, P.Eng.	To:	Nicole Pesonen
With:	n/a	Cc:	
Weather:	Mainly cloudy, some very light rainshowers.		

Summary

- The Old TDF and Lynx TDF facilities were inspected by Amec Foster Wheeler.
- Action Items:
  1. No additional action items were identified as a result of this inspection.

End of Summary

The Old TDF and Lynx TDF are inspected by Amec Foster Wheeler on a monthly basis as part of the engineering reconnaissance of the tailings facilities. During the inspection, Amec Foster Wheeler notes conditions in and around the facilities, with emphasis on water management, dam stability, and seepage conditions.

Old TDF:

- Minimal water within impoundment areas. No surface flow through decants. Surge Pond is at LLO level.
- Puddles at usual locations on Seismic Upgrade Berm.
- Excavated hand-dug test pits at some of the spring locations (aka “boils”) at the toe of the southeast corner of the APA Berm. Found coarse sand washed of fines to a depth of about 0.5 m overlying waste rock. The waste rock is likely the buried toe of the original APA Berm toe buttress. Coarse sand is likely derived from washing of the mine waste that makes up the buttress.
- Vegetation on the outer slope of the Seismic Upgrade Berm has greened up.
- Minor erosion damage noted to sand slope above West Strip Channel near the entrance to the Surge Pond.

Amec Foster Wheeler Environment & Infrastructure
4385 Boban Drive
Nanaimo, BC V9T 5V9
Tel +1 250 758 1887
Fax +1 250 758 1899
amecfw.com

Lynx TDF:

- Impoundment water level was at normal levels. Most of the surface is water covered. Few small beach exposures near the west abutment and along the west arm.
- Treatment pond dredging slurry deposited from the west abutment at the usual location.
- Normal sinkhole was not evident – location was covered by fresh dredging slurry.
- Normal flow at Lynx Springs Drain.
- No flow from Panel 15 Spring. No flow from seeps on south arm face, but damp at normal seep locations.
- Minimal water in Panel 14/15 area of dam foundation.

Diversion Ditches:

- Cascade debris basin and LLDD clear of debris/alluvium.
- Normal freshet flows in LLDD.
- No flow from LLDD subdrains.
- Springs on Pumphouse 4 hill road surface and upslope ditch, below the terminal bedrock reach of the LLDD.
- Upper diversions were not inspected.

The recommendations herein are based on Amec Foster Wheeler's observation of surface conditions at the time of the field review and are subject to revision upon the availability of new information.

This report has been prepared for the exclusive use of Nyrstar Myra Falls for specific application to the area described 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 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 engineering practices. No other warranty, express or implied, is made.

Photographs



Photo 1: Overview of APA looking southeast. Minimal surface water.



Photo 2: Surge pond viewed from WRD 1. Pond level is at LLO.



Photo 3: Looking east from west decant area. No surface water.

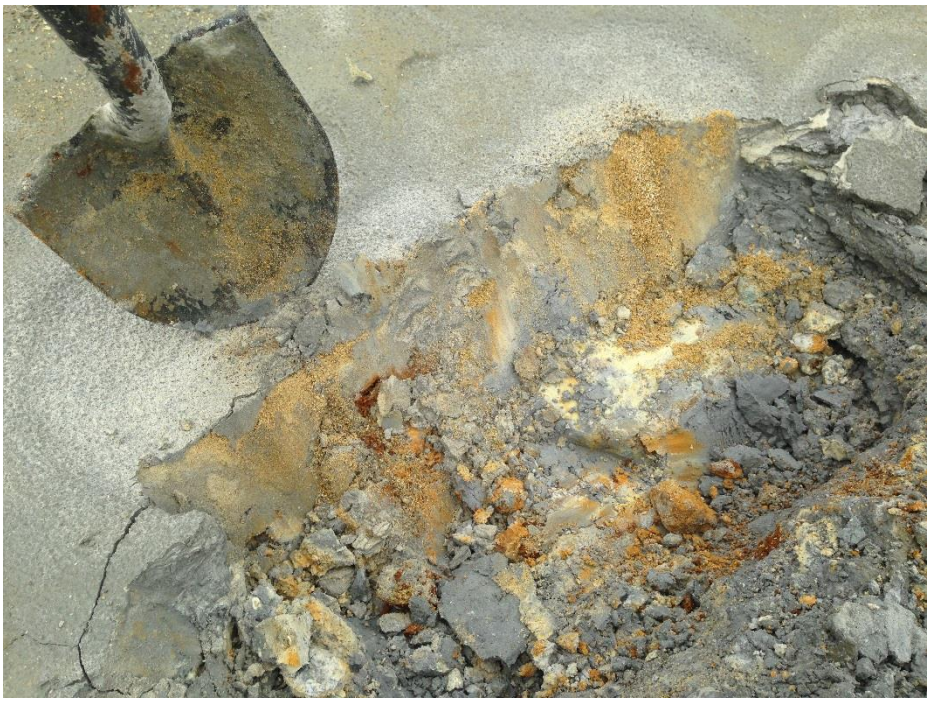


Photo 4: Hand dug test pit in East Strip tailings at spring location at southeast corner. Washed sand is apparent at spring location. Base of test pit is on underlying rockfill.



Photo 5: Photo of seismic upgrade berm across from Backfill plant, looking down from Outer Embankment Berm Road. Typical puddles are visible.



Photo 6: Panorama of Lynx TDF impoundment from 10L portal overlook, looking southeast.



Photo 7: Clear water at southeast corner of the impoundment. Pumping systems visible in the background.



Photo 8: Looking west along Lynx dam south arm toe. Minimal ponding present. No flow from surface seeps at dam toe.



Photo 9: Example typical loose anchor head on LLDD concrete cloth liner. A number of loose heads were noted.



Photo 10: Seepage on upslope edge of road, Pumphouse 4 hill.

MYRA FALLS MINE
TAILINGS FACILITY FIELD REVIEW REPORT

Date of Field Review:	2017-06-20	Date of Memo:	2018-03-25
File No.:	NX14001B	Client:	Nyrstar Myra Falls Ltd.
Engineer:	Dan Hughes-Games, P.Eng.	To:	Nicole Pesonen
With:	n/a	Cc:	
Weather:	Sunny, warm, windy.		

Summary

- The Old TDF and Lynx TDF facilities were inspected by Amec Foster Wheeler.
- Action Items:
  1. No action items were identified as a result of this inspection.

End of Summary

The Old TDF and Lynx TDF are inspected by Amec Foster Wheeler on a monthly basis as part of the engineering reconnaissance of the tailings facilities. During the inspection, Amec Foster Wheeler notes conditions in and around the facilities, with emphasis on water management, dam stability, and seepage conditions.

Old TDF:

- APA paste surface is dry, minimal pond at east decant. No pond or surface flow at west decant. East strip is dry. West strip has minor puddles likely due to recent rainfall on the liner.
- Surge pond operating at low level outlet.
- Construction excavation at APA Berm toe at east arm encountered wet fill and shallow groundwater.
- Puddles on Seismic Upgrade berm are dry.
- Volunteer conifer saplings noted on Seismic Upgrade Berm 6:1 slope, the surface of which was left uncompacted for closure.

Lynx TDF:

- Minimal supernatant pond, mainly along south arm of dam and in southeast corner.
- Treatment pond dredging slurry deposited from west abutment, at usual location.

Amec Foster Wheeler Environment & Infrastructure
4385 Boban Drive
Nanaimo, BC V9T 5V9
Tel +1 250 758 1887
Fax +1 250 758 1899
amecfw.com

- Normal sinkhole not evident, area is covered by recent dredging.
- No significant seepage, puddles, or ponding of water at the dam toe.

Diversion Ditches:

- LLDD and Cascade debris basin are clear of debris and functioning normally. LLDD flows are moderate due to freshet.
- LLDD subdrains are dry.
- Alder Reach waterfalls are down to a trickle.
- Upper diversions were not inspected due to time constraints.

The recommendations herein are based on Amec Foster Wheeler's observation of surface conditions at the time of the field review and are subject to revision upon the availability of new information.

This report has been prepared for the exclusive use of Nyrstar Myra Falls for specific application to the area described 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 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 engineering practices. No other warranty, express or implied, is made.

Photographs



Photo 1: Looking northwest from APA east decant. Surface is mainly dry except a thin covering of water in the lower right of the photo.



Photo 2: Southeast corner of the Seismic Upgrade Berm, viewed from the Outer Embankment Road.



Photo 3: Cohort of volunteer conifer saplings on the Seismic Upgrade Berm 6:1 slope, just below the Outer Embankment Road.



Photo 4: Vegetation on Old TDF Seismic Upgrade Berm outer slope.



Photo 5: Lynx TDF viewed from the Lynx Back Road. Generally absent supernatant pond over treatment pond dredging slimes.



Photo 6: Minor pond in southeast corner of Lynx TDF. Pumps visible in background.



Photo 7: Generally dry conditions along Lynx Dam toe.



Photo 8: Looking down at Lynx Springs Drain discharge, where it is collected into 2 x 250 mm pipes. Low flow in Springs Drain.



Photo 9: Falls at the base of Cascade Reach. Moderate flows due to freshet.



Photo 10: Looking east from base of Cascade Reach towards debris net (just out of view around the corner in the distance). Channel is clear of alluvium or debris.

MYRA FALLS MINE
TAILINGS FACILITY FIELD REVIEW REPORT

Date of Field Review:	2017-07-20	Date of Memo:	2018-03-25
File No.:	NX14001B	Client:	Nyrstar Myra Falls Ltd.
Engineer:	Dan Hughes-Games, P.Eng.	To:	Nicole Pesonen
With:	n/a	Cc:	
Weather:	Mainly sunny. Warm, windy.		

Summary

- The Old TDF and Lynx TDF facilities were inspected by Amec Foster Wheeler.
- Action Items:
  1. Consider replacing non-stainless hardware securing the Surge Pond liner to the decant tower.

End of Summary

The Old TDF and Lynx TDF are inspected by Amec Foster Wheeler on a monthly basis as part of the engineering reconnaissance of the tailings facilities. During the inspection, Amec Foster Wheeler notes conditions in and around the facilities, with emphasis on water management, dam stability, and seepage conditions.

This inspection was brief, due to the prevailing dry conditions and time demands presented by construction meetings.

Old TDF:

- Facility is mainly dry, except isolated puddles in liner areas (West Strip Channel, Surge Pond). Surge pond water level is below the low level outlet.
- Work is underway on the APA Berm toe buttress.
- Surge pond decant tower – noted some of the bolts retaining the liner against the tower are not stainless and have corroded since installation in 2016. Design specifications called for corrosion resistant hardware.
- No significant issues were noted.

Amec Foster Wheeler Environment & Infrastructure
4385 Boban Drive
Nanaimo, BC V9T 5V9
Tel +1 250 758 1887
Fax +1 250 758 1899
amecfw.com

Lynx TDF:

- Treatment pond dredging has been suspended for construction. A thin veneer of supernatant water was present on the impoundment surface, with shallow water along part of the south arm and in the southeast corner.
- A beach of dessicated treatment pond dredging is present around most of the perimeter, except at the southeast corner. Water could be observed flowing very slowly into the desiccation cracks at the margin of the pond, indicating infiltration around the perimeter.
- Normal seeps along the downstream face of the dam were dry and no other seeps were noted.
- The typical sinkhole was not observable. The dredging deposition surface around the usual sinkhole location appeared smooth.
- Foundation excavation and backfilling for dam raise construction was under way.
- Riprap has been stockpiled at the toe in Panel 14.

Diversion Ditches:

- Brushing work has been carried out on the ULDD. Brushing satisfies previous recommendations. Channel is clear.
- Cascade Debris Basin and ULDD clear of debris and functioning normally. Flow rate in LLDD is low to moderate, still at the tail end of freshet.
- Arnica diversions not inspected.

The recommendations herein are based on Amec Foster Wheeler's observation of surface conditions at the time of the field review and are subject to revision upon the availability of new information.

This report has been prepared for the exclusive use of Nyrstar Myra Falls for specific application to the area described 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 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 engineering practices. No other warranty, express or implied, is made.

Photographs



Photo 1: APA looking southeast from WRD 6.



Photo 2: APA looking southwest from WRD 6.



Photo 3: Dry conditions in the East Strip.



Photo 4: Surge Pond looking west.



Photo 5: Some of the studs and bolts securing the liner battens to the decant tower in the Surge Pond are non-stainless and have corroded since installation.



Photo 6: Lynx TDF surface viewed from above the Lynx Springs Drain. Sinkhole is absent.



Photo 7: Toe of Lynx TDF looking west from A-Ramp. Dry conditions. Riprap stockpiled in Panel 14.



Photo 8: Larger brush and trees have been removed from ULDD.



Photo 9: LLDD looking downstream from top of Diversion Ditch Hill (WRD 6).



Photo 10: Looking downstream along the toe of the Old TDF from the main gate.

MYRA FALLS MINE
TAILINGS FACILITY FIELD REVIEW REPORT

Date of Field Review:	2017-08-17	Date of Memo:	2018-03-25
File No.:	NX14001B	Client:	Nyrstar Myra Falls Ltd.
Engineer:	Dan Hughes-Games, P.Eng.	To:	Nicole Pesonen
With:	n/a	Cc:	
Weather:	Sunny and hot. Windy.		

Summary

- The Old TDF and Lynx TDF facilities were inspected by Amec Foster Wheeler.
- Action Items:
  1. Replace loose anchors in the LLDD, trim off loose anchors after replacement.
  2. Repair concrete-to-bedrock transition at terminal end of LLDD, where concrete has been undercut by erosion of loose bedrock.
  3. Clear minor rockfall debris from LLDD bedrock section.
  4. Remove excess fill from Old TDF Surge Pond spillway invert, and resurvey to confirm design grades.

End of Summary

The Old TDF and Lynx TDF are inspected by Amec Foster Wheeler on a monthly basis as part of the engineering reconnaissance of the tailings facilities. During the inspection, Amec Foster Wheeler notes conditions in and around the facilities, with emphasis on water management, dam stability, and seepage conditions.

Old TDF:

- APA, East/West strip, Surge Pond, and upgrade berm are all mainly dry. Tailings/soil areas are dry/dessicated. Liner areas have small amounts of moisture from precip directly on the liner areas.
- Tailings have been excavated and pulled up over APA Berm upstream slope from APA Operations Spillway to East Decant (part of the buttressing project desing).
- Preparations underway for grouting of pipes thought the APA Berm at the East Strip and at the West Decant.

Amec Foster Wheeler Environment & Infrastructure
4385 Boban Drive
Nanaimo, BC V9T 5V9
Tel +1 250 758 1887
Fax +1 250 758 1899
amecfw.com

- Road maintenance activities have resulted in approximately 0.3 m of fill being placed in the Old TDF Surge Pond spillway invert. This needs to be restored back to design grades and surveyed for record confirmation.

Lynx TDF:

- No observed surface water inputs to the impoundment. Supernatant pond has dried up. Dredging slimes surface appears dry but is not solid.
- Outline of sinkhole visible in normal location as an area of wetter dredging slimes. The wetter area consists of two circular outlines which partly overlap to form an “8” shape. The larger lobe of the “8” appears to be about the approximate typical size and location of the sinkhole, when it has been apparent in the past.
- Preparatory work is underway for raising of the upstream side of the dam.
- Work continues to construct the raise at the toe. Moisture is noted in the fills in the key-in cuts along the east portions of the south arm of the dam.
- Low flow at the Springs Drain.

Diversion Ditches:

- Low flow rate in LLDD. Detailed inspection of the ditch invert.
- Terminal concrete cloth to bedrock transition consists of a poured concrete apron. Flows over the winter have eroded loose bedrock from below the concrete to bedrock transition. This should be repaired as soon as practicable.
- A small rockfall has occurred in the bedrock section of the ditch. It is not impeding the ditch but loose rock should be cleared.
- The inspection noted at least 12 loose anchor heads on the concrete cloth, some of which are accumulating sticks and debris. Loose heads should be replaced, and the cables cut and holes sealed.

The recommendations herein are based on Amec Foster Wheeler’s observation of surface conditions at the time of the field review and are subject to revision upon the availability of new information.

This report has been prepared for the exclusive use of Nyrstar Myra Falls for specific application to the area described 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 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 engineering practices. No other warranty, express or implied, is made.

Photographs



Photo 1: APA surface looking east from WRD 6.



Photo 2: Tailings excavated and pulled up onto APA Berm upstream crest (as part of the buttressing project) in order to reduce infiltration into the berm.



Photo 3: Looking west at the Surge Pond. Small pond near the decant tower. Bottom of pond is covered in slimes.



Photo 4: Fill placed in Surge Pond spillway invert. Field book for scale. Fill must be removed and invert resurveyed for design confirmation.



Photo 5: Lynx TDF from highwall overlook. Twin depressions at arrow at normal sinkhole location visible due to reflection off the damp surface (not visible from other angles).



Photo 6: View of Lynx TDF from Back Road overlook. Note sinkhole/depression outline is not visible.



Photo 7: Moisture in existing dam fills in Panel 14, exposed by key-in cut. Foreground is new dam lifts. Slope is existing dam fills.



Photo 8: Undermined concrete at LLDD liner terminus.



Photo 9: Typical loose anchor head catching sticks and debris. Loose heads should be replaced and removed, holes should be sealed per the manufacturer's instructions.



Photo 10: View through the debris net looking at channel in debris basin area. Basin is free of debris and significant alluvium.

MYRA FALLS MINE
TAILINGS FACILITY FIELD REVIEW REPORT

Date of Field Review:	2017-09-27	Date of Memo:	2018-03-25
File No.:	NX14001B	Client:	Nyrstar Myra Falls Ltd.
Engineer:	Dan Hughes-Games, P.Eng.	To:	Nicole Pesonen
With:	n/a	Cc:	
Weather:	Sunny, hot, dry.		

Summary

- The Old TDF and Lynx TDF facilities were inspected by Amec Foster Wheeler.
- Action Items:
  1. No action items were identified as a result of this inspection. Some actions from prior inspections remain unaddressed.

End of Summary

The Old TDF and Lynx TDF are inspected by Amec Foster Wheeler on a monthly basis as part of the engineering reconnaissance of the tailings facilities. During the inspection, Amec Foster Wheeler notes conditions in and around the facilities, with emphasis on water management, dam stability, and seepage conditions.

Old TDF:

- Tailings facility generally dry. Very shallow water in Surge Pond, more than prior month. LLO is open and water is below the LLO invert.
- Grouting the Old APA Decant was unsuccessful. The decant tower and upper half of the pipeline through the APA Berm remain unsealed. Recommended mitigative measures will be developed at a later time.

Lynx TDF:

- Construction is well underway with partial completion of upstream fill, raising of south arm, removal of powerhouse and foundation preparation on downstream side of west arm and in west abutment area.
- Impoundment is mainly dry. Dessicated surface along west and south arms. Smooth surface in centre of impoundment. Small/shallow pond near Springs Drain at pumping area.

Amec Foster Wheeler Environment & Infrastructure
4385 Boban Drive
Nanaimo, BC V9T 5V9
Tel +1 250 758 1887
Fax +1 250 758 1899
amecfw.com

- Few pock marks in dredging slimes surface along upstream face of the dam – these are from equipment operators throwing boulders into the slimes.
- Springs drain has very low flow. Flow has been diverted to the A-Ramp ditch via a 2" electric pump. Pipes from springs drain to Superpond inlet ditch have been removed to allow dam raising.

Diversion Ditches:

- Low flow in LLDD. Cascade debris basin is clear.
- Upper diversions not inspected due to construction-related access considerations through WRD 2.

The recommendations herein are based on Amec Foster Wheeler's observation of surface conditions at the time of the field review and are subject to revision upon the availability of new information.

This report has been prepared for the exclusive use of Nyrstar Myra Falls for specific application to the area described 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 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 engineering practices. No other warranty, express or implied, is made.

Photographs



Photo 1: APA Berm looking east from APA Operations Spillway showing completed toe buttress.



Photo 2: APA Berm looking west from APA Operations Spillway showing completed toe buttress.



Photo 3: Surge Pond viewed from WRD 6.



Photo 4: Looking down Old APA Decant. Decant pipeline grouting was not successful.



Photo 5: Lynx Dam raise construction progress. The lighter tan coloured fill is the raise, the darker tan coloured strip at the top of the dam is the pre-existing embankment.



Photo 6: Looking north along west arm towards WRD 3. The foreground consists of the upstream shell raise lower lifts.



Photo 7: Very low flow in springs drain. Water is diverted through a 2” pump line.



Photo 8: “Dry” surface of Lynx TDF. Small pond visible in distance. Smooth surface to left is fluid treatment pond dredging slimes. Dessicated surface in foreground is weak/wet material. Crater is from an equipment operator throwing a boulder into the slimes.



Photo 9: Head of LLDD at Cascade Reach. Clear of debris and alluvium.



Photo 10: LLDD looking down Diversion Ditch Hill Road from top of WRD 6.

MYRA FALLS MINE
TAILINGS FACILITY FIELD REVIEW REPORT

Date of Field Review:	2017-10-17	Date of Memo:	2018-03-26
File No.:	NX14001B	Client:	Nyrstar Myra Falls Ltd.
Engineer:	Dan Hughes-Games, P.Eng.	To:	Nicole Pesonen
With:	n/a	Cc:	
Weather:	Mainly clear, some high overcast. 13 C. 109 mm of rain on Oct 16, 41 mm of rain Oct 17 (weather data) 200 mm of rain measured in preceding 36 hours in a bucket at 10L portal		

Summary

- The Old TDF and Lynx TDF facilities were inspected by Amec Foster Wheeler.
- Action Items:
  1. Restore full pumping capability in Lynx TDF as soon as practicable in preparation for winter water management.
  2. Repair erosion damage to Lower Arnica Reach as a matter of routine maintenance.

End of Summary

The Old TDF and Lynx TDF are inspected by Amec Foster Wheeler on a monthly basis as part of the engineering reconnaissance of the tailings facilities. During the inspection, Amec Foster Wheeler notes conditions in and around the facilities, with emphasis on water management, dam stability, and seepage conditions.

Old TDF:

- Old TDF surface is wet from recent rain. Minor ponding in the usual areas – southeast APA, East strip. Surge pond is below outlet sill but mostly full. Unimpeded flow through East and West Decants, spillway pipes.
- DDSD not flowing, flow not observed at LLDD subdrains.
- Some puddles on new APA buttress.
- Puddles in normal locations on Seismic Upgrade Berm

Lynx TDF:

- Lynx TDF surface inundated by runoff water. Shallow pond present across most of surface. No major surface water inflows. Water levels are appropriate.

Amec Foster Wheeler Environment & Infrastructure
4385 Boban Drive
Nanaimo, BC V9T 5V9
Tel +1 250 758 1887
Fax +1 250 758 1899
amecfw.com

- Diesel pump in place but not active. Electric pumps are not set up. Full pumping capacity should be reinstated as soon as practicable.
- Springs drain minor flows. Peak flows during preceding day's storm flooded out through construction excavation when generator for pump ran out of fuel. Water flowed from construction excavation over the face of the dam and into Panel 15.
- Panel 15 at the dam toe inundated with a moderate amount of water (up to about 1 m depth) from Lynx Springs Drain overflow and from Panel 15 Spring, as well as from haul road runoff from the west.
- No significant seepage from dam toe apart from Panel 15 Spring.
- Standing water in construction excavation outside dam crest at west abutment. Runoff is from haul road into WRD 3.

Diversion Ditches:

- Inspected Upper and Lower Arnica ditches. Ditches have been brushed. They are clear and flowing. Both appear to have intermittent losses to groundwater (varying flow rates along the profile).
- Erosion damage at the lower end of Lower Arnica identified in the spring has not been repaired.
- ULDD is clear and flowing.
- Cascade debris basin and LLDD clear and flowing.

The recommendations herein are based on Amec Foster Wheeler's observation of surface conditions at the time of the field review and are subject to revision upon the availability of new information.

This report has been prepared for the exclusive use of Nyrstar Myra Falls for specific application to the area described 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 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 engineering practices. No other warranty, express or implied, is made.

Photographs



Photo 1: Looking east from the west decant. Thin veneer of water on the tailings surface. Modest flow along APA Berm to West Decant.



Photo 2: Old APA Decant (partly decommissioned) has filled with water to pond level.



Photo 3: Excavated ditch along east end of APA Berm has filled with water, shallow pond is present at the East Decant.



Photo 4: Moderate water level in Old TDF Surge Pond, but below outlet sill. Unknown if the LLO valve is open or not.



Photo 5: Panoramic view of Lynx TDF showing shallow pond across the impoundment.



Photo 6: Pump area at the east end of Lynx TDF. Diesel pump is on standby. Electric pumps are not connected.



Photo 7: View of WRD 3 from Lynx Dam showing surface erosion and minor sloughing due to heavy rain during the preceding day.



Photo 8: Water ponded in Panel 15 from a combination of surface runoff from haul roads, overflow from the Lynx Springs Drain, and flow from Panel 15 Spring.



Photo 9: Debris in “Stream 1” at the upper end of Arnica Diversion. Debris appears similar to aftermath of December 2014 flooding (no change). Stream 1 reports to the ULDD.



Photo 10: Downstream terminus of Lower Arnica Reach. Erosion damage noted in the spring has not been repaired.

MYRA FALLS MINE
TAILINGS FACILITY FIELD REVIEW REPORT

Date of Field Review:	2017-11-28	Date of Memo:	2018-03-26
File No.:	NX14001B	Client:	Nyrstar Myra Falls Ltd.
Engineer:	Dan Hughes-Games, P.Eng.	To:	Nicole Pesonen
With:	n/a	Cc:	
Weather:	Overcast and raining, 5 C. 33 mm of rain on day of inspection. 332 mm in preceding week, 588 mm in preceding 2 weeks.		

Summary

- The Old TDF and Lynx TDF facilities were inspected by Amec Foster Wheeler.
- Action Items:
  1. Consider mitigating sediment transport in A-Ramp and Paste Plant Hill Road ditches.
  2. Mitigate runoff over slope from Paste Plant Hill Road at the end of WRD 6.
  3. Improve pumping and water control in Panel 15 at the toe of Lynx TDF in order to reduce piezometric levels at the dam toe and reduce risks to Super Pond.
  4. Alter staff gauge in Lynx TDF to correlate to elevation data and dam freeboard requirements.
  5. Move Lynx TDF pumping equipment to higher ground such that it will not get flooded out within the operating range of the impoundment.
  6. Debris net at Cascade Debris Basin requires clearing as soon as practicable.

Recommendations communicated at regular weekly project meetings of November 28 and December 12.

End of Summary

The Old TDF and Lynx TDF are inspected by Amec Foster Wheeler on a monthly basis as part of the engineering reconnaissance of the tailings facilities. During the inspection, Amec Foster Wheeler notes conditions in and around the facilities, with emphasis on water management, dam stability, and seepage conditions.

Old TDF:

- Water management structures are functioning as intended. Decants and spillway culverts are unimpeded and flowing. Shallow pond at East Decant and in East Strip (as normal for wet conditions).

Amec Foster Wheeler Environment & Infrastructure
4385 Boban Drive
Nanaimo, BC V9T 5V9
Tel +1 250 758 1887
Fax +1 250 758 1899
amecfw.com

- East strip springs (aka “boils”) were active. No flow from the DSDD. Several LLDD subdrains had flow, but not the ones previously observed to have high flow.
- Surge pond LLO was open and flowing. Surge Pond water level was level with the stability buttress.
- Runoff from A-Ramp and Paste Plant hill roads is introducing a lot of sediment near the decant tower in the surge pond.
- Uncontrolled runoff from Paste Plant Hill Road at the end of WRD 6 is causing erosion of the dump slope and deposition of sand/gravel at the east end of the Surge Pond.
- Local ponding outside West Strip channel, between channel and APA buttress.
- Puddles and surface runoff from Seismic Upgrade Berm in the normal locations. No significant damage from continued runoff.

Lynx TDF:

- Water level in the impoundment was normal. Impoundment surface is covered by up to about 1 m of water. A single diesel pump was in place for pumping control. Two electric pumps are present but not connected. Configure electric pumps for pumping the impoundment as soon as practicable for winter water management.
- Staff gauge in Lynx TDF is measured in feet and is not correlated to elevation datum. Recommend installing elevation-based water level monitoring.
- Lynx pumping equipment is very close to normal operating water level and would be flooded if the pit water level rose appreciably. Pumps should be relocated to higher ground.
- Lynx Spring Drain has returned to normal winter flows. Construction water management has had issues controlling the flow leading to runoff from the Springs Drain, through the construction excavation, and down the face of the dam raise. The runoff on the face has caused surficial erosion damage and deposited sand and gravel at the dam toe.
- Panel 15 area is deeply inundated from a combination of haul road runoff, Springs Drain runoff, and flow from the Panel 15 Spring Drain. Pumping has not kept up with the flow. The area should be dewatered for dam safety reasons.
- Runoff from WRD 2 changed drainage patterns is flowing down on the Springs Drain platform just upstream of the East Abutment. The water is flowing through the pump area.

Diversion Ditches:

- Cascade Debris Basin has accumulated approximately 1.2 m depth of wood debris in the net, ponding about 0.4 m of water upstream of the net. Minor amounts of alluvium deposited near the base of Cascade Reach. The net should be cleared as soon as practicable. The alluvium can be cleared as part of regular maintenance.
- LLDD is clear and functioning. No surface flow over LLDD cut slope. Few subdrains with minor flows. Subdrains previously observed to have high discharges were dry.
- Waterfalls at Alder Reach are active. Some water infiltrates before entering LLDD.
- Upper diversions not inspected.

The recommendations herein are based on Amec Foster Wheeler's observation of surface conditions at the time of the field review and are subject to revision upon the availability of new information.

This report has been prepared for the exclusive use of Nyrstar Myra Falls for specific application to the area described 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 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 engineering practices. No other warranty, express or implied, is made.

Photographs



Photo 1: East end of APA. Minimal ponding.



Photo 2: West end of APA. No significant ponding.





Photo 3: Flow into the West Decant. Discharge from the West Decant pipeline into the Surge Pond.



Photo 4: Flow from A-Ramp ditch into sump at culvert headwall. Paste Plant Hill Road ditch enters from right of frame. Discharge into Old TDF Surge Pond near decant tower.



Photo 5: Old TDF Surge Pond decant tower. Left, looking down at towards the LLO. Right, looking down inside the decant at the LLO flow.



Photo 6: East end of Surge Pond. Water level is level with stability buttress.



Photo 7: Water flowing over face of WRD 1 below Paste Plant Hill Road at the west end of WRD 6. Erosion of material from face and deposition at base of slope.



Photo 8: Overview of Lynx TDF.

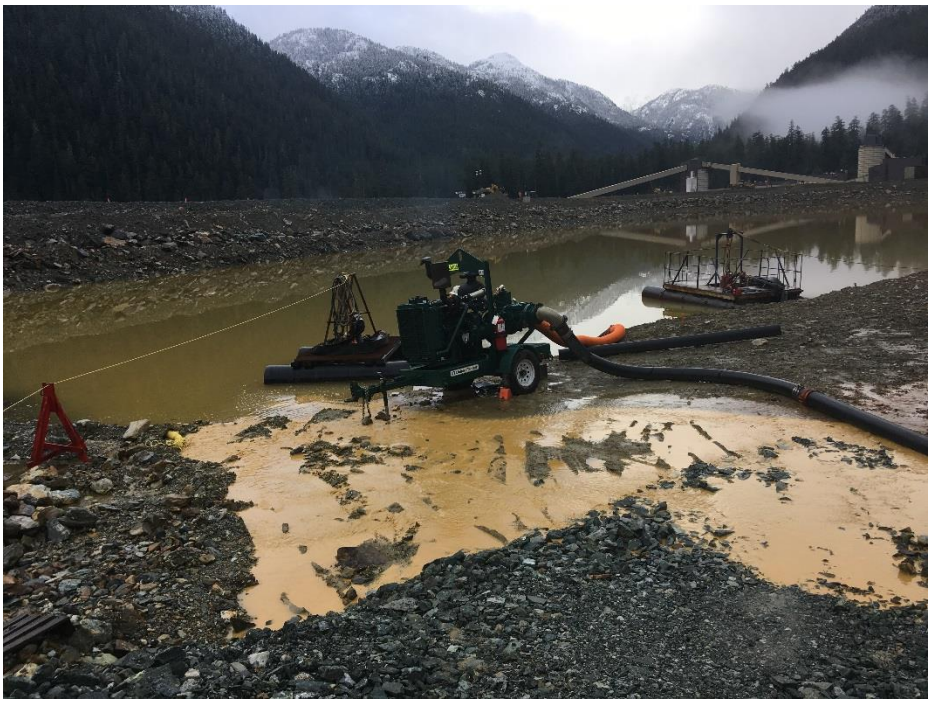


Photo 9: Diesel pump set up on edge of pond without significant freeboard. Electric pumps are not hooked up to power or discharge lines. Runoff in foreground is from WRD 2.

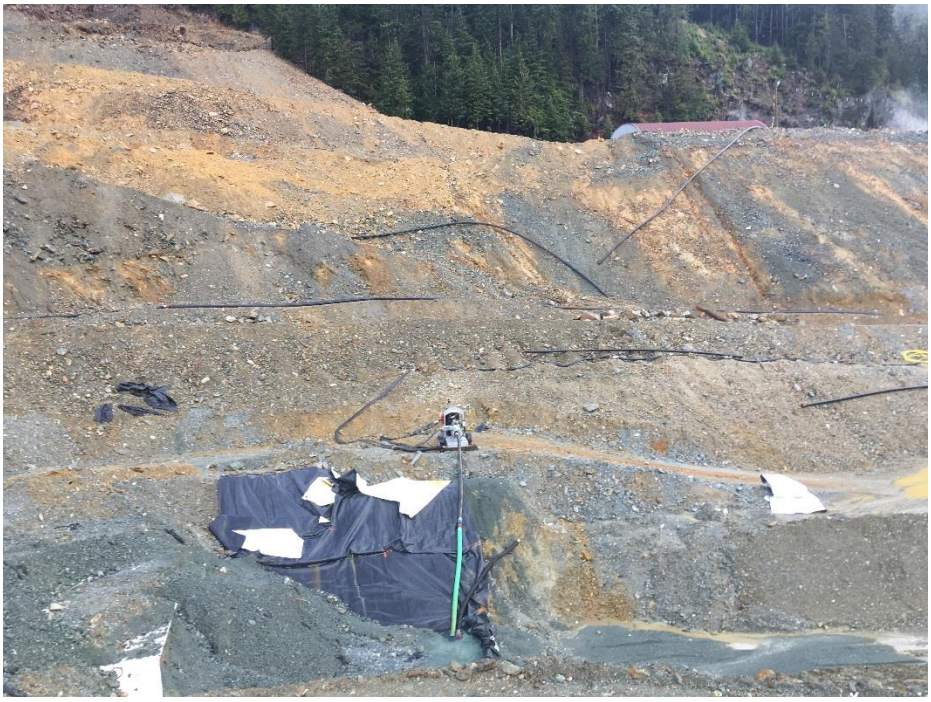


Photo 10: Single pump set up at Lynx Springs Drain.



Photo 11: Pumps set up at the Panel 15 Spring. Drain discharge is in the mid photo. Erosion of the dam slope is visible in the background and on ramp at right.



Photo 12: Panorama looking down from Lynx Dam at foundation area. Flooding in Panels 14/15. Runoff from springs drain construction is visible at the left.



Photo 13: Wood debris accumulated on Cascade Debris Basin net. Debris should be cleaned as soon as practical.

MYRA FALLS MINE
TAILINGS FACILITY FIELD REVIEW REPORT

Date of Field Review:	2012-12-20	Date of Memo:	2018-03-26
File No.:	NX14001B	Client:	Nyrstar Myra Falls Ltd.
Engineer:	Dan Hughes-Games, P.Eng.	To:	Nicole Pesonen
With:	n/a	Cc:	
Weather:	Clear. -2 C. Dusting of frost/light snow. Weather data indicates 30 mm precipitation in previous 7 days. TDFs are in the shadow of Mt. Myra and don't receive sunlight.		

Summary

- The Old TDF and Lynx TDF facilities were inspected by Amec Foster Wheeler.
- Action Items:
  1. Open windrows along APA Berm toe road in East Strip to reduce ponding of water.
  2. Check excavations along Lynx foundation area to confirm they do not encroach on conveyor foundation bearing soils.
  3. Configure electric pumps for dewatering of Lynx TDF for winter water management.
  4. Add discharge capacity and increase height of check dam at Lynx Springs Drain.

Actions communicated to verbally to Nyrstar.

End of Summary

The Old TDF and Lynx TDF are inspected by Amec Foster Wheeler on a monthly basis as part of the engineering reconnaissance of the tailings facilities. During the inspection, Amec Foster Wheeler notes conditions in and around the facilities, with emphasis on water management, dam stability, and seepage conditions.

Old TDF:

- Minor ponding at APA southeast corner and in East Strip. Decants and spillway culverts are unimpeded but not flowing due to low water levels.
- Water in old APA decant has receded to ~2.5 m depth below surface. Was at surface in October and November inspections.
- Surge pond drained to LLO invert elevation. LLO partially open. No significant flow due to low water level.

Amec Foster Wheeler Environment & Infrastructure
4385 Boban Drive
Nanaimo, BC V9T 5V9
Tel +1 250 758 1887
Fax +1 250 758 1899
amecfw.com

- Some ponding on the toe road, on original APA Berm buttress, adjacent to toe of new upgraded APA Berm buttress.
- Springs (aka “boils”) in East Strip are not flowing. DDSD is not flowing. LLDD subdrains not active.
- Puddles on Seismic Upgrade Berm at usual locations.

Lynx TDF:

- Water level in the impoundment is appropriate. Thin cover of ice over most of pond.
- Minor surface inflows at Springs Drain platform from WRD 2.
- Diesel pump has been relocated away from potential inundation area but suction line does not reach the pond, which would limit the available drawdown. Electric pumps are not connected to power or discharge lines.
- The typical sinkhole is visible at the usual location, but estimated at about double the normal diameter. Appears very shallow. Increase in size may be due to lower strength of recent dredging solids relative to tailings, resulting in flatter side slopes.
- Second sinkhole is visible in the former Lower East Borrow area, approximately half way between the upstream end of the springs drain and the south arm of the dam. Appears to be about 6 to 8 m in diameter with well defined sides. First observed earlier in the month during construction reviews.
- Minor crack observed parallel to dam crest near the mid-point of the Zone J filter, near the slope inclinometer (BH14-08). Crack is open < 1 cm and shows no apparent vertical offset. Corresponds to the area of largest mudwave during construction earlier in the year.
- Springs drain check dam constructed. Single 250 mm pipe discharge is present. Recommend adding a second 250 mm pipe and raising the check dam to increase inlet head pressure.
- Seepage not observed from downstream dam face. Panel 15 Spring not flowing. Moderate amount of water in Panel 14/15 depression. Panel area should be pumped out.
- Construction excavations around the toe of Lynx Dam come close to conveyor foundations. Foundations should be checked to confirm they are not undercut and there is adequate foundation support.

Diversion Ditches:

- Cascade Debris Basin net has been cleared and is unobstructed. Alluvium near base of Cascade Reach has been removed from the channel and spread over the riprap on the access bench.
- LLDD is clear and flowing with low to moderate flows.
- Upper diversions not inspected due to ice on access roads through WRD 2.

The recommendations herein are based on Amec Foster Wheeler’s observation of surface conditions at the time of the field review and are subject to revision upon the availability of new information.

This report has been prepared for the exclusive use of Nyrstar Myra Falls for specific application to the area described 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 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 engineering practices. No other warranty, express or implied, is made.

Photographs



Photo 1: Overview of APA from top of WRD 6. No significant ponding or surface water flow.



Photo 2: Overview of west end of APA. No significant ponding or surface water flow.



Photo 3: Typical gullies in APA paste surface. Nominally 2.5 m deep, 6-8 m wide.

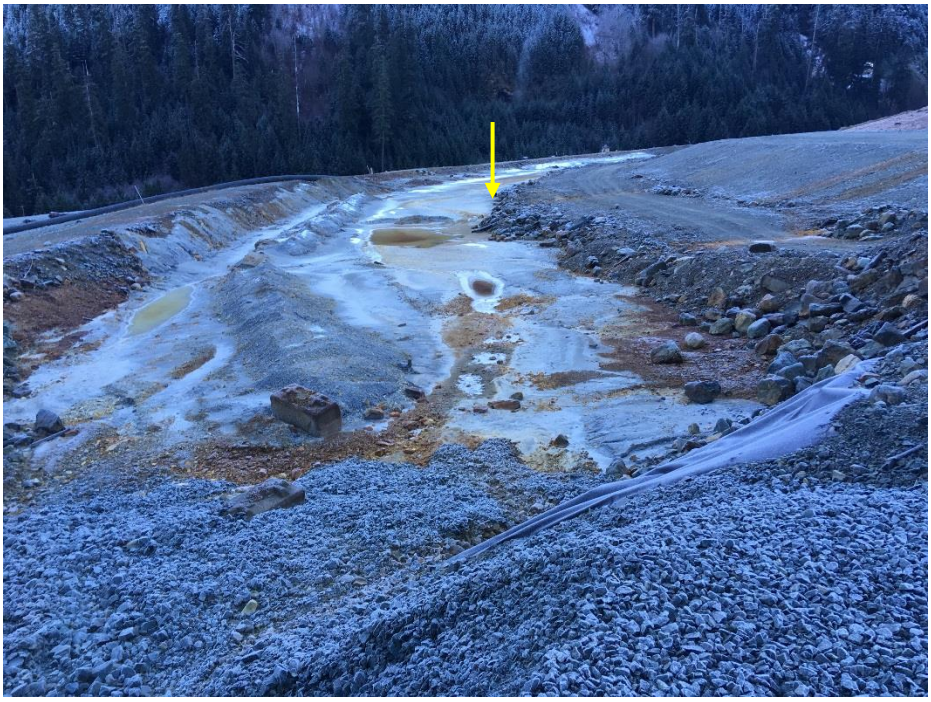


Photo 4: East Strip viewed from DDSD. No surface flow, no significant ponding. Springs at toe of APA buttress (near arrow) are not active.



Photo 5: View of Lynx TDF from east abutment. Diesel pump line does not reach pond. Electric pumps are not connected. Approximate location of second sinkhole at arrow.



Photo 6: View of Lynx TDF from highwall. Red – approximate outline of new sinkhole. Yellow – approximate normal size and location of old sinkhole. Blue arrow – crater from boulder impact from WRD 3 removal work.



Photo 7: Pond in Panel 14/15 at toe of slope below Lynx Springs Drain. Pond should be minimized through pumping or drainage improvements.



Photo 8: Interim Lynx Springs Drain terminus. All erodible layers have been wrapped in geotextile. Checkdam directs water into a 250 mm pipe. Recommend upgrading pipe flow capacity by at least double, and raising the height of the checkdam.



Photo 9: Panorama showing WRD 3 as viewed from Lynx Pit highwall. Erosion and slumping has moved material towards Lynx TDF. Slopes are not accurately represented due to stitching algorithm, Photo is intended for reference only.



Photo 10: Cascade debris net, cleared of debris noted in November inspection.



Photo 11: LLDD clear and functional. Low to moderate flow.