Baseline Condition Report

Anglesea Borefield Bulk Entitlement Review

Prepared for:

Barwon Water

55 - 67 Ryrie Street
Geelong VIC 3220

16 August 2024

Baseline Condition Report

Anglesea Borefield Bulk Entitlement Review

Distribution

Copies	Recipient	Copies	Recipient
1 PDF	Will McCance Environmental Science Lead, Asset Systems & Environment Barwon Water Via email: Will.McCance@barwonwater.vic.gov.au	1 PDF	BlueSphere Project File #31313.01

Authored and Reviewed by:

Role	BlueSphere / Arcadis / Nation Partners / PSK Environmental Personnel	Signature
Author	Jake Hopkins Senior Environmental Engineer	
Author	Dr Silvana Santomartino Principal Environmental Geochemist (CPSS, RSP-ASS)	
Author	Dr Gemma Williams Principial Ecological Risk Specialist	
Author	Dr Carolyn Brumley Technical Director	
Peer Review	Dr Matt Edwards Principal Hydrogeologist	

Revision History

Revision	Date Issued	Document Status
00	9 February 2024	Draft
00	22 March 2024	Revised Draft
01	28 March 2024	Final
02	16 August 2024	Revised Final to account for DEECA/TRP feedback

Prepared by:

BlueSphere Environmental Pty Ltd
113 Ferrars Street
Southbank VIC 3006

Ph: +61 (3) 9699 5286
admin@bluesphere-enviro.com.au

ABN: 84 146 980 761
ACN: 146 980 761

Table of Contents

Glossary 1

Executive Summary i

1 Introduction 1

1.1 Background 1
1.2 Purposes and Objectives 2
1.3 Scope of Work 2
1.4 Structure of Report 2

2 Environmental Setting 4

2.1 Site Description 4
2.1.1 Borefield Operation History 4
2.2 Site Setting 5
2.3 Conceptual Site Model Summary 8

3 Surface Water 10

3.1 Review of Relevant Reports 10
3.1.1 2013 BE Review 10
3.1.2 2023 Annual Surface Water Report 11
3.2 MAP Requirements and Objectives/Rationale 11
3.3 Sampling Methodology 12
3.3.1 Stream Flow and Level Gauging 12
3.3.2 Surface Water Quality Monitoring 12
3.3.3 Rainfall Measurement 12
3.4 Results 12
3.4.1 Data Quality 12
3.4.2 Levels and Flow 12
3.4.3 Water Quality 16
3.4.3.1 pH 16
3.4.3.2 Salinity 17
3.4.3.3 Dissolved Oxygen & Temperature 21
3.4.3.4 Major Ions 21
3.5 Summary 23
3.6 CSM Review 23
3.7 Data Gaps 24

4 Groundwater 25

4.1 Review of relevant reports 25
4.1.1 2013 BE Review 25
4.1.2 Annual Review Reports 26
4.1.3 Groundwater Bore Integrity 26
4.2 MAP Requirements and Objectives/Rationale 26
4.3 Sampling Methodology 27

4.4 Results 27
4.4.1 Standing Water Levels 27
4.4.1.1 Production Bores 28
4.4.1.2 ASA 28
4.4.1.3 UEVF 31
4.4.1.4 LEVF 33
4.4.1.5 Groundwater Flow 35
4.4.1.6 Vertical Hydraulic Gradients 35
4.4.1.7 Saline Intrusion 35
4.4.1.8 Groundwater-Surface Water Levels 36
4.4.2 Salinity 39
4.4.2.1 ASA 39
4.4.2.2 UEVF 39
4.4.2.3 LEVF 39
4.4.3 pH 39
4.4.3.1 ASA 39
4.4.3.2 UEVF 40
4.4.3.3 LEVF 40
4.4.4 Temperature 40
4.4.4.1 ASA 40
4.4.4.2 UEVF 40
4.4.4.3 LEVF 40
4.4.5 Major Ions 40
4.4.5.1 ASA 41
4.4.5.2 UEVF 41
4.4.5.3 LEVF 41
4.4.6 Bromide 43
4.5 Summary 43
4.6 CSM Review 45
4.7 Data Gaps 45

5 Acid Sulfate Soils 46

5.1 Review of Relevant Reports 46
5.1.1 2013 BE Review 46
5.1.2 2014 Acid Sulfate Soil Investigation 46
5.2 MAP Requirements and Objectives/Rationale 46
5.3 Sampling Methodology 47
5.4 Results 47
5.4.1 Anglesea River Swamp 47
5.4.1.1 Actual Acidity 48
5.4.1.2 Retained Acidity 49
5.4.1.3 Acid Neutralising Capacity 49
5.4.1.4 Reduced Inorganic Sulfur 49
5.4.1.5 Acid Volatile Sulfur 50
5.4.1.6 Net Acidity 50
5.4.1.7 Summary – Anglesea River 51
5.4.2 Salt Creek 51

5.4.2.1 Actual Acidity 52
5.4.2.2 Retained Acidity 53
5.4.2.3 Acid Neutralising Capacity 53
5.4.2.4 Reduced Inorganic Sulfur 53
5.4.2.5 Acid Volatile Sulfur 54
5.4.2.6 Net Acidity 54
5.4.2.7 Summary – Salt Creek Swamp 55
5.4.3 Acid Sulfate Soil Monitoring – Surface Water Quality 55
5.4.3.1 Anglesea River Swamp 55
5.4.3.2 Salt Creek Swamp 55
5.4.4 Acid Sulfate Soil Monitoring – Groundwater Quality of the Alluvial Swamp Aquifer 56
5.4.4.1 Anglesea River Swamp 56
5.4.4.2 Salt Creek 56
5.5 Updated Acid Generation Model 56
5.5.1 Anglesea River Swamp 56
5.5.2 Salt Creek Swamp 59
5.6 Data Gaps 60

6 Land Level Monitoring 61

6.1 Review of Relevant Reports 61
6.1.1 2013 BE Review 61
6.1.2 2023 Annual Land Level Report 61
6.2 MAP Requirements and Objectives/Rationale 61
6.3 Results 61
6.4 Summary and Data Gaps 62

7 Ecological Monitoring 63

7.1 Review of Previous Relevant Reports 63
7.1.1 2013 BE Review 63
7.1.1.1 Summary of terrestrial ecology monitoring 63
7.1.1.2 Summary of Aquatic Ecology Monitoring 65
7.1.1.3 Ecological Risk Assessment 65
7.1.2 Annual Ecological Monitoring Reports 67
7.2 Terrestrial Monitoring 68
7.2.1 MAP Requirements and Objectives/Rationale 68
7.2.2 Sampling Methodology 70
7.2.2.1 Vegetation 70
7.2.2.2 Frogs 70
7.2.3 Results 71
7.2.3.1 Vegetation 71
7.2.3.2 Frogs 89
7.2.3.3 Water Quality 91
7.2.4 Summary 92
7.2.5 Data Gaps 92
7.3 Aquatic Monitoring 94
7.3.1 2014 MAP Requirements and Objectives/Rationale 94

7.3.2 Sampling Methodology 94
7.3.2.1 Locations 94
7.3.2.2 Macroinvertebrates 95
7.3.2.3 Fish 97
7.3.2.4 Otway Bush Yabby 98
7.3.3 Results 99
7.3.3.1 Macroinvertebrates 99
7.3.3.2 Fish 101
7.3.3.3 Otway Bush Yabby 105
7.3.3.4 Water quality 106
7.3.4 Summary 108
7.3.5 Data Gaps 111

8 Conclusions 112

9 Limitations 113

10 References 114

List of Tables (Body of Report)

Table 1 Table of Contents Summary 3
Table 2 Summary of Pumping Periods 4
Table 3 Site Setting Summary 5
Table 4 Surface Water and Groundwater Interactions 8
Table 5 Groundwater Bore Integrity Summary 26
Table 6 Sampling Sites – Marshy Creek (after Wong et al. 2020) 48
Table 7 Titratable Actual Acidity (TAA) Concentrations in Anglesea River Swamp (adapted from Wong *et al.* 2020) 48
Table 8 Chromium Reducible Sulfur (S_{CR}) Concentrations in Anglesea River (adapted from Wong et al. 2020) 49
Table 9 Acid Volatile Sulfide (AVS) Concentrations in Anglesea River Swamp (adapted from Wong *et al*. 2020) 50
Table 10 Net Acidity concentrations in Anglesea River Swamp (adapted from Wong et al. 2020) 50
Table 11 Sampling Sites – Salt Creek Swamp 51
Table 12 Titratable Actual Acidity (TAA) Concentrations - Salt Creek Swamp (adapted from Wong *et al*. 2020) 52
Table 13 Retained Acidity concentrations - Salt Creek Swamp (adapted from Wong *et al*. 2020) 53
Table 14 Chromium Reducible Sulfur (S_{CR}) Concentrations - Salt Creek Swamp (adapted from Wong *et al*. 2020) 53
Table 15 Acid Volatile Sulfide (AVS) Concentrations - Salt Creek Swamp (adapted from Wong *et al*. 2020) 54
Table 16 Net Acidity concentrations - Salt Creek Swamp (adapted from Wong *et al*. 2020) 54
Table 17 Ecological Values adopted in the 2013 BE Review 66
Table 18 Summary of Annual Ecological Monitoring Reports 67
Table 19 Summary of 2014 MAP requirements – Terrestrial Monitoring 69
Table 20 EVC Descriptions 71
Table 21 Summary of EVCs and Functional Group Representations 72
Table 22 Summary of Ecology Australia Comments on Floristic Composition 2017 - 2022 73
Table 23 AS1 Vegetation Survey Summary – Lower Anglesea River Swamplands 74
Table 24 AS2 Vegetation Survey Summary – Upper Anglesea River Swamplands 75
Table 25 AS3 Vegetation Survey Summary – Upper Anglesea River Swamplands 77
Table 26 AS4 Vegetation Survey Summary – Upper Anglesea River Swamplands 78
Table 27 ASP7 Vegetation Survey Summary – Upper Anglesea River Swamplands 80
Table 28 AGP2 Vegetation Survey Summary – Lower Anglesea River Swamplands 81
Table 29 LAR1 Vegetation Survey Summary – Anglesea River Estuary 83
Table 30 LAR2 Vegetation Survey Summary – Anglesea River Estuary 84
Table 31 LAR3 Vegetation Survey Summary – Anglesea River Estuary 86
Table 32 LAR4 Vegetation Survey Summary – Anglesea River Estuary 87

Table 33 Water Quality Data Summary – Frog Survey Locations 91
Table 34 Summary of 2014 MAP Aquatic Monitoring Requirements 94
Table 35 Number of Macroinvertebrate Families by Year and Site 99
Table 36 Number of EPT Taxa by Year and Site 100
Table 37 SIGNAL2 and VLAKES Scores by Year and Site 101
Table 38 Southern Pygmy Perch Counts Per Season and Site 102
Table 39 Southern Pygmy Perch Catch Per Unit Effort (CPUE) 103
Table 40 Southern Pygmy Perch Length and Weight 2009 - 2022 104
Table 41 Otway Bush Yabby counts at BCT1 and SC1 105
Table 42 Otway Bush Yabby Length and Weight data BCT1 and SC1 105
Table 43 Summary of pH data by location 107
Table 44 Summary of Electrical Conductivity data by location 107
Table 45 Summary of Dissolved Oxygen by location 107
Table 46 Summary of Aquatic Monitoring Data 108

List of Figures (Body of Report)

Figure 1 Conceptual Cross-Section (GHD, 2024) 7
Figure 2 Surface Water Monitoring Locations 15
Figure 3 pH and EC – Longitudinal Transect Anglesea River / Anglesea River Swamp (December 2022) 19
Figure 4 pH and EC – Longitudinal Transect Breakfast Creek / Salt Creek (December 2022) 20
Figure 5 Surface Water Piper Plot 22
Figure 6 WTOB1 Hydrograph exhibiting several meters of seasonal water level variability 30
Figure 7 SB2 Hydrograph 32
Figure 8 WTOB4 Hydrograph 34
Figure 9 Groundwater Monitoring Locations 38
Figure 10 LEVF Piper Plot 42
Figure 11 Conceptual Site Model at Upper Swamplands, Marshy Creek 58
Figure 12 Summary of Monthly (and Seasonal) Rainfall Data 90
Figure 13 Anglesea River Swamplands (Upper and Lower) Frog Count (pooled data from all sites) and Rainfall Data 90
Figure 14 Anglesea River Estuary Frog Count (pooled data from all sites) and Rainfall Data 91
Figure 15 Summary of the Number of Macroinvertebrate families over 2014 - 2022 100
Figure 16 Summary of CPUE for BCT1 and SC1 sites for the period 2009 - 2022 103
Figure 17 Comparison of the families with pH at BCT1 and SC1 109

List of Figures

Figure F1 Site Location Plan 115
Figure F2 Surface Water Monitoring Bore Location Plan 115
Figure F3 Groundwater Monitoring Location Plan 115
Figure F4 Ecological Monitoring Location Plan 115
Figure F5 Acid Sulfate Soil Sampling Location Plan 115
Figure F6 Survey Mark Location Plan 115
Figure F7 Groundwater Elevation Plan – Quaternary Aquifer 115
Figure F8 Groundwater Elevation Plan – Upper EVF 115
Figure F9 Groundwater Elevation Plan – Lower EVF 115

List of Appendices

Appendix A Surface Water Attachments
Appendix B Groundwater Attachments
Appendix C Acid Sulfate Soil Attachments
Appendix D Land Level Monitoring Attachments
Appendix E Ecological: Terrestrial Attachments
Appendix F Ecological: Aquatic Monitoring Attachments

Glossary

Term	Description
Anglesea Borefield	Collective term for the areas surrounding the northern and southern borefields owned by Barwon water
Anglesea River Estuary	The estuary downstream of the confluence of lower Anglesea River Swamp and Salt Creek Swamp
Arp	Amphibious fluctuation responder – plastic
ASA	Alluvial Swamp Aquifer
ASS	Acid Sulfate Soil
Assessment Area / Investigation Area	The broader area being assessed surrounding the borefields
ATe	Amphibious fluctuation tolerator – emerging
ATl	Amphibious fluctuation tolerator – low-growing
ATw	Amphibious fluctuation tolerator – woody
Barwon Water	Barwon Region Water Corporation
BC	Breakfast Creek
BCT	Breakfast Creek Tributary
BE	Bulk Entitlement
Breakfast Creek	A creek that feed into the Salt Creek Swamp
Breakfast Creek Tributary	A tributary that joins Breakfast Creek
CPUE	Catch per Unit Effort
CSM	Conceptual Site Model
DEECA	Department of Energy, Environment and Climate Action
DO	Dissolved Oxygen
EC	Electrical Conductivity
ERA	Ecological Risk Assessment
EVC	Ecological Vegetation Class
GDE	Groundwater Dependent Ecosystems
GMA	Groundwater Management Area
Investigation Area	The area subject to monitoring and review under the Bulk Entitlement review process

Jan Juc Groundwater Management Area (GMA)	The Jan Juc Groundwater Management Area covers aquifers through the townships of Jan Juc, Fairhaven and Gherang
LEVF	Lower Eastern View Formation
Lower Anglesea River Swamp	The lower portion of the Anglesea River Swamp defined as the area overlying the Anglesea Syncline.
MAP	Monitoring and Assessment Program
MEVF	Middle Eastern View Formation
Mine	Former Anglesea Coal Mine
Monitoring Bore	Groundwater monitoring point
Northern Borefield	The area surrounding the northern borefield owned by Barwon water
PASS	Potential Acid Sulfate Soil
Pit Water Body	The Pit Water Body is the water body that remains within the Mine
Production Bore	Groundwater extraction point
Salt Creek Swamp	The portion of Salt Creek Swamp downstream of the confluence with Breakfast Creek
SC	Salt Creek
Se	Perennial-emergent
SIGNAL	Stream Invertebrate Grade Number – Average Level
Southern Borefield	The area surrounding the southern borefield owned by Barwon water
Tda	Terrestrial Damp
Tdr	Terrestrial Dry
TDS	Total Dissolved Solids
TRP	Technical Review Panel
UAR	Upper Anglesea River
UEVF	Upper Eastern View Formation
Upper Anglesea River	The Anglesea River that is upstream of the Anglesea River Swamp
Upper Anglesea River Swamp	The upper portion of Anglesea River Swamp, defined as the area overlying the Jan Juc syncline
Upper Salt Creek Swamp	The portion of Salt Creek Swamp upstream of the confluence with Breakfast Creek
W1, W2, W3	Wetland 1, Wetland 2, Wetland 3

Executive Summary

BlueSphere Environmental Pty Ltd (BlueSphere), in conjunction with Arcadis, Nation Partners and PSK Environmental, was engaged by Barwon Region Water Corporation (Barwon Water) to undertake a review of the Anglesea Borefield Bulk Entitlement (BE). This Baseline Condition Report forms the first stage of the BE review in response to Barwon Water undertaking extraction from the Anglesea Borefield in November 2019 due to dry climatic conditions. As such, a BE review is required to be completed by November 2024. This report includes the initial review of available data and previous investigations completed for the Anglesea Borefield, focussing predominately on data collected since the implementation of the Monitoring and Assessment Program (MAP) in 2014. The intention of the MAP was to collect surface water, groundwater, acid sulfate soil, subsidence and ecological data to assess any potential impacts caused by operation of the Anglesea Borefield.

Conceptual Site Model

The Conceptual Site Model (CSM) for the Anglesea Borefield has been developed over a number of years since assessment began in 2007. The CSM considers a number of different aspects but is focussed on the following:

- Groundwater-surface water interactions and identification of GDEs;
- Acid generation from Acid Sulfate Soils (ASS) within the creeks; and
- Impact to ecology from groundwater pumping and acid generation.

The CSM that has been developed is complex and reflects that varying hydrological and hydrogeological features are present across the assessment area. The foundation of the CSM is understanding the interaction between groundwater and surface water systems, both of which vary considerably across the investigation area. These interactions are potential contributors to both surface water flow dynamics and potential acid generation and potential impacts to sensitive ecological receptors. This report provides an initial review and assessment of the previously developed CSM in light of the data collected since the implementation of the MAP (2014) with subsequent reports, including the BE Review, outlining the potential impacts associated with future groundwater extraction from the Anglesea Borefield.

Surface Water

The data collected during this period describes conditions that are largely consistent with the existing CSM with the following noted:

- Water levels and/or flow within the surface water bodies across the assessment area are generally strongly correlated with rainfall. The exceptions being some of the wetland locations where the influence from rainfall, particularly during lower intensity rainfall events, appear to be attenuated by the storage capacity within the swamps.
- With respect to surface water - groundwater interactions throughout the assessment area, the data collected during the monitoring period broadly describes variable, but periodically gaining stream conditions in the upper portions of the investigation area (e.g. Breakfast Creek and upper Anglesea River), with predominantly losing stream conditions elsewhere. In the upper portions of both Breakfast Creek and Salt Creek Swamp, baseflow contribution to streams appears to be a seasonal phenomenon, with losing stream conditions prevailing during drier periods.
- The available data suggests that the persistent pools on the Upper and Lower Anglesea River Swamp and Salt Creek Swamp are likely to be losing features, consistent with the current CSM; however, given the distance between pond monitoring locations and ASA bores in some cases, there is considered to be some uncertainty regarding the presence or absence of a baseflow component from the ASA at some of these locations. In at least one example, there is evidence of strong hydraulic connection between the pools and the ASA in the upper portion of the investigation area (e.g. AGP1-B). However, during dry periods, this data does suggest that the hydraulic gradient is downwards from the pool to shallow groundwater, indicating that this pool is not sustained by groundwater during dry periods.

- Lower pH and differing major ion composition, particularly the elevated sulfate, indicates that AV2 and SV2 have been impacted by acid generation via ASS. Additionally, AV2 and to a lesser extent SV2, showed a pronounced increasing trend in salinity in the first half of the monitoring period (i.e. 2009 – 2016), followed by a pronounced decline in the second half (i.e. 2016 – 2022). Lower levels of EC have been reported in recent events at SV2 and AV2, which is likely attributable to the increased rainfall and water levels observed post 2019.

Groundwater

The following was noted with respect to the groundwater portion of the CSM that has previously been reported and the recent data collected in accordance with the MAP:

- The groundwater levels in the ASA were found to be largely driven by changes in rainfall with no apparent correlations with either Barwon Water or the Mine's pumping activities. This is consistent with an expected degree of hydraulic separation between the ASA and UEVF across much of the lower investigation area;
- The LEVF generally exhibits an upward gradient to the UEVF which in turn exhibits an upward gradient to the ASA. The connection between the LEVF and UEVF is limited due to the MEVF, desaturation of the UEVF near the Mine and coal seams and clay layers within the UEVF itself. These gradients are not representative of the entire borefield, as the upstream portion of the Anglesea River is shown to have a downward hydraulic gradient from the ASA to the UEVF. The inter-aquifer interactions are also variable depending on any active pumping periods at the Mine or from Barwon Water and long-term impacts to the UEVF due to historical pumping; and
- Despite no correlation being observed between the ASA groundwater levels and pumping activities during the monitoring period, the potential remains for the ASA to be impacted by pumping in the LEVF, particularly around upper Anglesea River Swamp and the upper extent of Salt Creek Swamp if no suitable controls and/or triggers were in place, subject to the propagation of any pumping induced cone of depression.

Acid Sulfate Soil

The data collected during ASS investigations conducted in 2017 and 2018 has been used to update the conceptual acid generation model in accordance with the MAP with the following noted:

- Within the soil profile investigated, soils in Upper Anglesea River and Anglesea River Swamplands contained actual ASS formed from the past oxidation of sulfides caused by the natural seasonal fluctuations in groundwater levels. Acidity has been mobilised from the actual ASS into the Anglesea River due to leaching upon contact, and from direct surface flow following rainfall events. At the confluence of the Anglesea River Swamplands and Salt Creek Swamp, the surface water is strongly acidic. The surface water contains high concentrations of sulfate and an absence of alkalinity. These findings, coupled with a high sulfate to chloride ratio, indicates that past oxidation of ASS has influenced the surface water quality.
- Within the soil profile investigated, soils at the Upper Anglesea River and Anglesea River Swamplands contain reduced inorganic sulfur (RIS), in the form of pyrite, albeit at low levels. The exception is the Upper Swamplands, where soils were found to contain very high concentrations of RIS at concentrations up to 6877 mol H^+/t. Reduced inorganic sulfur was generally encountered below the water table and to the limit of investigation at approximately 1.3 m below ground level (bgl). It is probable that RIS exists in soil below the depth of investigation. The RIS layer presents the greatest risk from drawdown as oxidation of the RIS layer has the potential to generate additional acidity within the system.
- Within the soil profile investigated, soils in the Salt Creek Swamp contained actual acidity and retained acidity formed from the past oxidation of sulfides caused by the natural seasonal fluctuations in groundwater levels. At the upstream sampling locations, the surface water contained minor levels of total alkalinity and the sulfate to chloride ratio did not indicate influence from ASS; however, as surface water encounters the acidic soil of the Salt Creek Swamp, the alkalinity is consumed, and sulfate concentrations increase as sulfate and acidity are leached out of the soil or mobilised following rainfall.

- At the majority of the sites sampled, the watertable was not encountered within the profile investigated indicating a more oxidised surface soil profile than at the Anglesea River Swamplands, possibly due to the larger seasonal variation in water levels in the ASA at the Salt Creek Swamp relative to the Anglesea River Swamplands.
- The concentrations of RIS identified in the Salt Creek Swamp were significantly lower than concentrations in the Anglesea River Swamplands. The highest concentrations of RIS were detected in the unsaturated zone in the Mid-Swamplands. It is possible that RIS exists in soil below the depth of investigation along the Salt Creek Swamp.

Subsidence

Annual land level monitoring has been completed since 2011, with the network including thirty (30) survey points. Where land levels have been reported to drop by more than the nominal survey error (20 mm), the land levels have rebounded to within acceptable limits in subsequent monitoring events. There is some room for interpretation regarding how the triggers are intended to be applied; however, it is interpreted that the triggers outlined in the MAP have not been met to date, with no clear reducing land level trends observed since monitoring began in 2011.

Ecology

The terrestrial data collected between 2014 and 2022 further confirms the conclusions of the 2013 BE Review (GHD, 2013), including:

- Variability recorded in the vegetation data is likely to be within natural ranges.
- The floristic structure of the EVCs present within the Anglesea River Swamp and the Anglesea River Estuary aligns with the general structure expected of these communities. Whilst some variability was observed, generally the most frequently observed species at the site surveyed were from amphibious or aquatic functional groups, which aligns with the inundation profile of these environments; and
- The frog data shows variability in the presence of frogs at the locations sampled. There is some correlation with rainfall data which aligns with the behaviour and breeding cycle of these animals.

Overall, the terrestrial data indicates that there are a broad range of variables that can influence these environments, and that whilst there is potential for seasonal water fluctuations to impact on the vegetation communities and frog assemblages, the linkage to groundwater drawdown may be less significant than originally anticipated. The risks associated with this potential linkage will be further explored in the Impact Assessment. However, the seasonal availability of water is likely to be a contributing factor in the variable ecological results reported.

Aquatic ecological monitoring data for the period 2014 – 2022 (and including some preliminary data from 2023) also largely confirms the conclusions of the 2013 BE Review (GHD, 2013). These data comprise surveys of aquatic invertebrates and southern pygmy perch, as well as associated water quality data at the time of the surveys, at locations on Salt Creek Swamp, Breakfast Creek, Breakfast Creek Tributary, upper Anglesea River and the Anglesea wetlands. Variability was observed in macroinvertebrate indices and the presence and numbers of southern pygmy perch (where measured) at the monitoring locations. Overall trends in the aquatic ecological data are difficult to discern. Aquatic ecosystem variability is likely due to changes in water quality and quantity, which characterises surface water systems in the Anglesea basin.

1 Introduction

BlueSphere Environmental Pty Ltd (BlueSphere), in conjunction with Arcadis, Nation Partners and PSK Environmental, was engaged by Barwon Region Water Corporation (Barwon Water) to undertake a review of the Anglesea Borefield Bulk Entitlement (BE). This Baseline Condition Report forms the first stage of the BE review and includes the initial review of available data and previous investigations completed for the Anglesea Borefield for the relevant period.

The location of the Anglesea Borefield and key features, including groundwater production bores, are shown on **Figure F1**.

1.1 Background

It is understood that Barwon Water operates the Anglesea Borefield (comprising both the northern and southern borefields), in conjunction with a number of other water sources, that can supplement the existing Greater Geelong water supply. Barwon Water currently operates the Anglesea Borefield under the Bulk Entitlement (Anglesea Groundwater) Order (BE order) 2009 (WSE000084). The northern borefield and southern borefield have been presented on **Figure F1** and are collectively referred to as the Anglesea Borefield, the broader area surrounding the Anglesea Borefield that is the subject of the Bulk Entitlement review process is also shown on **Figure F1** and is been referred to as the 'investigation area'.

Amendments are understood to have been made in 2014 to the BE order which included a requirement for Barwon Water to complete a groundwater resource assessment review within five years of Barwon Water undertaking groundwater extraction. The BE groundwater resource assessment review (herein referred to as the BE Review) was previously completed by GHD in 2013 (GHD, 2013).

Barwon Water undertook extraction from the Anglesea Borefield in November 2019 in response to dry climatic conditions. As such, a BE review is required to be completed by November 2024. The BE Review requires Barwon Water to:

- Consult with interested government agencies on the process for the BE Review and any additional matters to be included in the BE Review; and
- At least 12 months before the review is to be completed, seek approval from the Minister of the process for the Review and any additional matters to be included in the BE Review.

It is understood that the BE Review is to meet the requirements of 'Part 4 - Resource Assessment, 12 Reviews', of the BE order. The BE Review Report will be submitted to the Department of Energy, Environment and Climate Action (DEECA). An independent Technical Review Panel (TRP) has been engaged by DEECA to review the technical reports developed as part of the BE Review.

Barwon Water has been undertaking monitoring of groundwater, surface water, land subsidence, aquatic and terrestrial ecological indicators, and acid sulfate soils (ASS) for the previous 10 years as part of a Monitoring and Assessment Program (MAP). The MAP was informed by an impact assessment and ecological risk assessment (ERA) in 2013 that was completed as part of a review of the Anglesea Borefield BE.

The Anglesea Borefield extracts water from the Lower Eastern View Formation (LEVF) from seven production bores in the Jan Juc Groundwater Management Area (GMA). The current licence allows the extraction of a maximum of 40 ML in any day, 10,000 ML in any year and 35,000 ML in any 5-year period. It is understood that the Anglesea Borefield has been in operation intermittently between 2009 and 2012 for commissioning and testing, and then again in August 2019 to June 2020 in response to dry climatic conditions.

It is understood that the monitoring program Barwon Water has in place is extensive including:

- A groundwater monitoring bore network of up to 42 bores with deep bores (165 – 490 m deep) targeting the Upper and Lower Eastern View Formation (UEVF; LEVF) and shallow bores (<80 m deep) targeting the Alluvial Swamp Aquifer (ASA) as well as the UEVF and LEVF.

- Surface water is monitored on a monthly basis at 11 sites within the Salt Creek and Anglesea River Catchments. Surface water levels and pH are used to inform potential acid sulfate soil impacts.
- Terrestrial monitoring is understood to occur on a 6 monthly basis and includes frog surveys and vegetation surveys;
- Aquatic monitoring is understood to occur on a 6 monthly basis and includes macro invertebrate and fish surveys, along with pool level monitoring and mapping of pools.
- Land survey monitoring occurs on an annual basis across the Jan Juc GMA.
- Acid sulfate soils investigation was completed in 2017 with the information and recommendations obtained used to inform this baseline condition report as part of the BE review.

1.2 Purposes and Objectives

The objectives of the BE Review, which are required to meet the review requirements listed in Clause 12.2 of the BE order; are to inform the Minister about:

- The long-term sustainability of the groundwater resource;
- Protection of the environmental values and health of groundwater dependent ecosystems; and
- Improving resource management arrangements under the BE order.

The specific objectives of this Baseline Condition Report stage are as follows:

- Compile and consolidate the previous 10 years of data in relation to groundwater, surface water, land subsidence, acid sulfate soils and aquatic and terrestrial ecology; and
- Review the available data to support an improved conceptual understanding of the potential environmental receptors and the relationship with groundwater systems in the area of interest.

1.3 Scope of Work

The following scope of works was completed in order to meet the purposes and objectives as outlined in **Section 1.2** for the first stage of the BE review:

- Review of previous BE report (GHD, 2013) and other available reports;
- Collate and review data collected in the previous 10 years by the MAP;
- Outline initial findings from the results provided by the MAP, including a summary of the Conceptual Site Model (CSM) as described in the previous BE Review (GHD, 2013); and
- Identify any data gaps in the existing CSM.

Any recommendations to adjust the existing MAP to better inform future BE reviews will be provided as part of the 2024 BE Review report that will be developed subsequently to this Baseline Condition report.

This report does not include any assessment of compliance with the MAP as this has been addressed in the previous annual reports by Barwon Water. Commentary on the MAP is largely focussed on the background, rationale and context of the MAP contents.

1.4 Structure of Report

This report has been segmented into the key elements of the CSM to enable a detailed review of these sections individually. These sections will be discussed together to form a wholistic CSM as part of the BE Review Report. A summary of the key sections in this report has been provided in **Table 1** below.

Table 1 Table of Contents Summary

Item	Section	Supporting Information
Surface Water	**Section 3**	**Appendix A**
Groundwater	**Section 4**	**Appendix B**
Acid Sulfate Soils	**Section 5**	**Appendix C**
Land Level Monitoring	**Section 6**	**Appendix D**
Ecological Monitoring	**Section 7**	**Appendix E** (Terrestrial Ecology) **Appendix F** (Aquatic Ecology)

The broader Environmental Site Setting has been described in **Section 2** and includes a brief summary of the CSM as described in the previous BE review (GHD, 2013).

2 Environmental Setting

2.1 Site Description

The Anglesea Borefield is located approximately 90 kilometres south-west of Melbourne and, when active, extracts groundwater from the Lower Eastern View Formation (LEVF) from up to seven production bores within the Jan Juc Groundwater Management Area (GMA). Five of the production bores (GW1-GW5) are broadly located along Coal Mine Road and are referred to as the Southern Borefield, the remaining two bores (GW6 and GW7) are located along Forest Road and are referred to as the Northern Borefield. The southern borefield can be operated independently from the northern borefield.

The Anglesea Borefield BE was obtained from the Victorian Government in 2009 for the purpose of augmenting Geelong's urban water supply. This included the installation of the aforementioned production bores, a pre-treatment plant located in the Northern Borefield and a pipeline connecting the Borefield and Wurdiboluc Reservoir which is connected to Geelong's water supply.

Requirements outlined in the BE stipulated that a Monitoring and Assessment Program (MAP) was to be developed, trigger levels were to be established to manage groundwater drawdown in area of Groundwater Dependent Ecosystems (GDEs) and that regular resource assessment reviews were to be completed.

The Anglesea Borefield is situated broadly in proximity to the former open-cut Anglesea Coal Mine (Mine) which is currently being rehabilitated. Historically a coal-fired power station operated immediately east of the Mine. During the operation of the Mine groundwater from the Upper Eastern View Formation (UEVF) was extracted to enable access to the coal seams within the UEVF and for cooling water supply. It is understood that Salt Creek was diverted around the Mine using a concrete lined channel to enable operation of the Mine, with this diversion remaining in place to this day.

2.1.1 Borefield Operation History

The Anglesea Borefield has been intermittently operating since October 2009, comprising various tests, extraction events and monitoring periods. The Borefield has only been in operation to augment Geelong's water supply for a period of approximately one year from August 2019 to June 2020 (Barwon Water, 2023). A summary of the pumping periods and extraction volumes has been provided in **Table 2** below.

Table 2 Summary of Pumping Periods

Timeframe	Extraction Volume (ML)	Pumping Rationale
July 2009 – June 2012	7,617	Intermittent pumping during commissioning and testing
July 2012 – June 2019	0.0	No pumping. Borefield inactive.
July 2019 – June 2020	2,177	Supplementary water supply from August 2019 to June 2020
July 2020 – June 2021	13.5	Pump maintenance throughout the period
July 2021 – June 2022	1,405.6	Pumping test from 27 January 2022 to 30 June 2022
July 2022 – June 2023	388.6	Pumping test from 1-27 July 2022 and pump maintenance

2.2 Site Setting

A summary of the broad environmental setting has been provided in **Table 3** below and discussed in **Section 2.3**. Further discussion of the Site setting will be provided in the subsequent Impact Assessment and BE Review Report.

Table 3 Site Setting Summary

Aspect	Comment
Topography	The investigation area generally slopes down in a south-easterly direction towards the coast. The highest area is noted in the western portion of the Borefield just east of the Otway Ranges. The topography of the area is heavily influenced by the presence of synclines and anticlines which run through the central portion of the Anglesea Borefield.
Rainfall	A number of weather stations with rainfall data are available in the area regionally. Additionally, there are three (3) rainfall gauges that are present within the investigation area that will provide detail regarding the local rainfall in the area. The average annual rainfall for the region was estimated to be approximately 730 mm (GHD, 2013). The average yearly rainfall reported by the Anglesea Borefield rain gauges ranges between 616 mm (ARG3) and 747 mm (ARG2).
Surface Water & Drainage	The investigation area includes a number of surface water features that eventually merge and form the Anglesea River Estuary which has historically been connected to the coast, see **Figure F1** and **Figure F2**. The following key surface water features are noted within the investigation area: • Anglesea River; • Breakfast Creek; • Distillery Creek; • Marshy Creek Swamp; • Painkalac Creek; • Salt Creek Swamp; and • Spring Creek
Geology	The geology of the area has been thoroughly investigated historically due to the presence of relatively shallow coal seams within the UEVF. This coal was the target resource of the historical Anglesea coal mine located within the investigation area. A conceptual cross-section of the geology has been provided in **Figure 1**. The geology of the investigation area is comprised of the UEVF which is comprised of clay, silt, fine to medium grained gravels, fine gravel lenses and brown coal, and the LEVF which consists of clays, silty clays, fine to coarse grained sands and gravels, and thin brown coal seams. The UEVF is generally around 200-250 m thick with the LEVF approximately 200 m thick. These are separated by the MEVF which is generally around 40-60 m thick consisting of mudstone, siltstone and minor sand, gravel and coal seams. Quaternary alluvial deposits are present around Anglesea River, Salt Creek, Breakfast Creek and Marshy Creek. These deposits range up to 30 m in thickness and overlay the UEVF in most cases. Underlying the LEVF is the Otway Group which forms the basement in the region and consists of siltstone, sandstone and mudstone. The thickness of the aforementioned geological units is highly variable and is largely controlled by the Anglesea Syncline, Jan Juc Syncline

	and Bells Beach Anticline which all run east-west through the investigation area, as shown on **Figure F1**. In general, these units are thickest at the Jan Juc and Anglesea synclines and thinnest between these synclines at the Bells Beach Anticline.
Hydrogeology	There are two primary aquifers within the investigation area, these are the UEVF and LEVF. Both of these aquifers comprise low salinity groundwater and are high yielding. Barwon Water's Anglesea Borefield accesses water from the LEVF, whilst the UEVF has historically been accessed by the Mine to facilitate coal mining and power generation activities. The thickness of both aquifers varies across the synclines and anticlines with the Anglesea Borefield production bores (GW1-GW7) positioned within the deeper syncline areas. Outcropping of the LEVF and UEVF is predominately on the western and eastern portions of the Anglesea Borefield, respectively. These outcropping areas are separated by the MEVF which also forms the aquitard that separates the UEVF and LEVF in the region. A shallow aquifer is also present within alluvial deposits along Anglesea River, Salt Creek, Breakfast Creek and Marshy Creek. This aquifer (ASA) is relatively thin in comparison to the regional UEVF and LEVF. The Otway Group forms the bedrock aquifer, however, has not been extensively assessed. Regionally, it is considered that the Otway Group generally produces little water and has a low permeability. The LEVF and UEVF are both recharged by rainfall via outcropping areas within and surrounding the investigation area. There is also an upward gradient from the LEVF to the UEVF that provides the UEVF with a minor component of additional recharge, as upward migration is hampered by the presence of the MEVF that largely separates these aquifers. The LEVF in some areas can generate artesian groundwater conditions due to the confined nature and high pressure of the LEVF. Where the UEVF or LEVF are in direct connection with the ASA, these may present recharge avenues for the ASA and subsequent connection with the surrounding surface water; this is further discussed in **Section 3.1.1**. The Mine dewatering activities within the UEVF have dewatered the UEVF around the mine to allow access to the coal seams. This pumping has created drawdown in the UEVF and, to a lesser extent, the LEVF. Pumping of the UEVF ceased in 2015 after continual operation since the 1970's. As such bores in the surrounding area may, over time, recover to levels beyond those seen since pumping commenced.

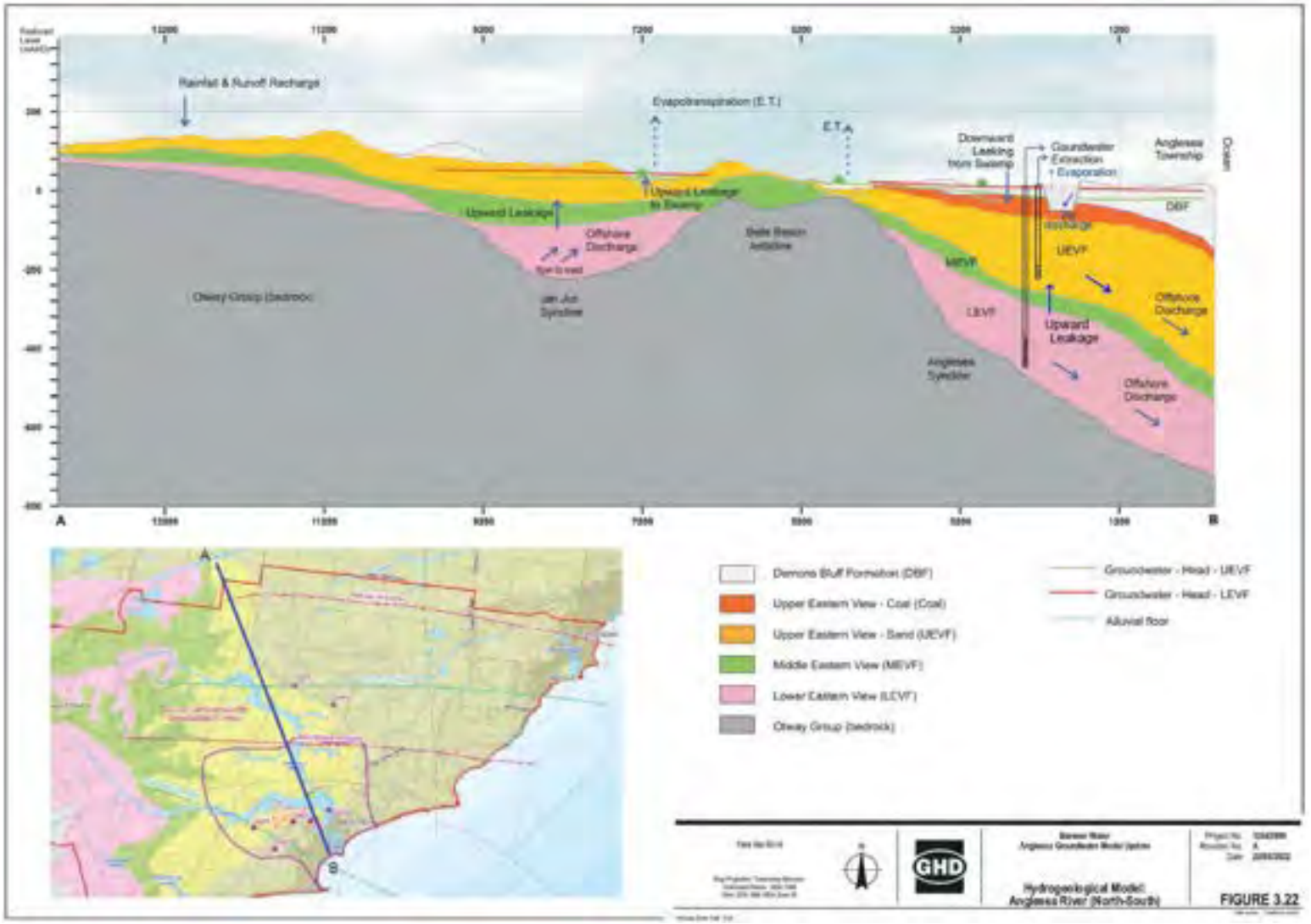


Figure 1 Conceptual Cross-Section (GHD, 2024)

2.3 Conceptual Site Model Summary

The Conceptual Site Model (CSM) has been developed over a number of years since assessment began at the Borefield in 2007. The CSM considers a number of different aspects but is focussed on the following:

- Groundwater-surface water interactions and identification of GDEs;
- Acid generation from PASS within the creeks; and
- Impact to ecology from groundwater pumping and acid generation.

A summary of the historical understanding of groundwater interactions with the Anglesea River, Marshy Creek Swamp, Salt Creek Swamp and Breakfast Creek Tributary (outlined in **Section 3.1.1**) have been provided below in **Table 4**. It is noted, consistent with previous assessments, that this summary represents typical hydraulic relationships and the reality of surface water-groundwater interaction is highly complex with variability spatially and temporally.

Table 4 Surface Water and Groundwater Interactions

Surface Water Body	Groundwater Interaction		
	Prior to BE Review	Following BE Review (GHD, 2013)	Modelling Report (GHD, 2024)
Anglesea River Pools	The pools were considered to be a gaining feature in direct connection with LEVF and dependent on baseflow.	Surface water pools are not dependent on groundwater, pools are a losing feature with limited to no connection between the LEVF and the ASA in these areas.	No change
Upper Anglesea River Swamp	Creek is a gaining feature in direct connection with LEVF and dependent on baseflow.	Dependent on baseflow from the ASA. There is an upward gradient from the UEVF to the ASA which in turn is partially connected to the LEVF across the MEVF.	No change
Lower Anglesea River Swamp	Creek is a gaining feature in direct connection with LEVF and dependent on baseflow.	Not dependent on groundwater baseflow due to low permeability clay and coal largely disconnecting the ASA and UEVF. Considered a losing stream into the ASA.	No change
Breakfast Creek	-	Breakfast Creek is expected to receive baseflow from the LEVF during wet periods and lose water to the LEVF during dry periods instead	No change
Salt Creek Swamp	Gaining feature in direct connection with LEVF and dependent on baseflow.	Losing stream that helps recharge the ASA. Limited to no connection with the ASA and LEVF in the area. Unclear if the LEVF is present beneath the creek line.	ASA largely separated from the UEVF in the lower reaches of the Salt Creek. Potential for greater connection further upstream where upward gradients are present from the UEVF to ASA. Possible impacts in baseflow if drawdown cone within the UEVF extends further upstream.

The understanding of surface water–groundwater interactions across the borefield has evolved since the initial assessments prior to the BE Review in 2013 (GHD, 2013). The original CSM for the borefield indicated that all surface water bodies were dependent on baseflow from the underlying aquifer(s). This has been updated with additional groundwater bores and data collected in the intervening years. The previous BE review (GHD, 2013), provided several updates to the CSM with a number of features no longer considered to be dependent on groundwater baseflow, as summarised above in **Table 4**. A minor change to the CSM was also completed as part of the Anglesea Groundwater Model Update (GHD, 2024) in relation to the connection between the ASA and UEVF along Salt Creek.

A conceptual acid generation model was also developed in 2013 with the BE Review to illustrate likely acid generating and transport mechanisms within the assessment area, primarily the swamps on Salt Creek and Marshy Creek. Sediments in the swamps were conceptualised as being in three layers, with potential Acid Sulfate Soils (ASS) - also known as reduced inorganic sulfur (RIS) - located below the permanent water table and actual ASS located above the water table. GHD stated that wetting and drying cycles promote the oxidation of sediments during the drying phase subsequently releasing acidity into the catchment during flushing events. Other sources of acidity apart from ASS (pyrite) were identified, such as organic acids, sulfur compounds and monosulfides, albeit at a lesser extent.

Based on a review of a preliminary ASS assessment (Glover 2014), GHD concluded that existing and potential acidity was already present within the swamps, influenced by wetting and drying cycles, and that there was a large potential for further oxidation to occur along with additional acid production. Two key hydrogeological responses were identified as having the potential to increase the rate and extent of acid generation: lowering (drawdown) of groundwater levels in the ASA within the swamplands and longer cease-to-flow periods, where there is a longer period of time with no export or dilution of any acid stored in the system.

Further to the hydrogeological and ASS components of the CSM, the ecological outcomes of the 2013 BE Review identified that:

- The water dependent plant communities present at any particular monitoring site have been relatively stable over the monitoring period, and that variability observed in the data is within natural variation;
- Rainfall and water permanence is likely to be driving frog abundance and occupancy across the study area;
- Aquatic ecosystems of the Anglesea basin are likely to be adapted to fluctuations in water quality within a broader range than may be tolerated by aquatic communities in more stable water systems. The variability in macroinvertebrate communities at monitoring locations in the catchment may also reflect water quality and availability, with communities higher in the catchment tending to be more diverse than those in the wetland sites on the Anglesea River.

This CSM is largely based on the geological and hydrogeological features beneath each of the surface water bodies. An assessment to evaluate if the CSM is consistent with observations and results in the long-term, was completed as part of the historical matching and calibration undertaken in the Anglesea Groundwater Model Update (GHD, 2024). An assessment of the CSM against data that has been collated since the previous BE Review (2013) has been provided in subsequent results sections of this report.

3 Surface Water

3.1 Review of Relevant Reports

3.1.1 2013 BE Review

A number of surface water features were outlined and discussed in the previous BE review (GHD, 2013), including the following as depicted on **Figure F2**:

- Upper Anglesea River in the northern portion of the investigation area;
- Anglesea River Swamp formed from flow from the Upper Anglesea River; this includes
  - The upper portion of Anglesea River Swamp, defined as the area overlying the Jan Juc syncline; and
  - The lower portion of Anglesea River Swamp, defined as the area overlying the Anglesea Syncline.
- Salt Creek Swamp through the southern portion of the investigation area; including
  - The upper portion of the Salt Creek Swamp, defined as the upper reach above the confluence of Breakfast Creek; and
  - The Salt Creek Swamp, defined as the southern portion below the confluence of Breakfast Creek.
- Breakfast Creek which has a small tributary (Breakfast Creek Tributary) to the north and subsequently feeds into Salt Creek Swamp;
- Anglesea River Estuary which is downstream of the confluence of Salt Creek Swamp and Lower Anglesea River Swamp;
- Painkalac Creek and Distillery Creek to the west of the investigation area;
- Spring Creek and Thompson Creek located to the east and north-east of the investigation area respectively; and
- Persistent pools adjacent to the Upper Anglesea River, Upper and Lower Anglesea River Swamp, and Salt Creek Swamp.

The previous BE review was predominately focussed on the Upper Anglesea River, Anglesea River Swamp, Salt Creek Swamp and the persistent pools located adjacent to these water bodies. The assessment considered water levels, flow rates, salinity, pH and sulfate data, in relation to the broader CSM including groundwater conditions, ecological considerations and acid sulfate soils.

The persistent pools were previously considered to be dependent on baseflow from the LEVF due to nearby outcropping, however, the BE review (GHD, 2013) reported that this was not the case and that the persistent pools were fed via rainfall and are now considered to be losing features that provide recharge to the ASA and LEVF. This revised understanding was based on additional groundwater level data in the vicinity of the surface water features and surface water level/flow information. As such, it was considered that the previous trigger levels associated with groundwater bores within the State Observation Bore Network (SOBN) were no longer applicable. A summary of the surface water-groundwater CSM as it has been developed historically is provided in **Section 2.3**.

The previous BE review had limited available data on ASS and the acid generating process within the Anglesea Borefield. Data that has since been collected regarding potential ASS has been summarised in **Section 5** with further details regarding the surface water and ASS interaction discussed in **Section 5.6**.

A number of potential risks to the terrestrial and aquatic ecology are present across the investigation area and are dependent on the water level and quality within the aforementioned surface water features. The ecological risk assessment that was conducted as part of the 2013 BE Review considered the potential impact of drawdown on terrestrial and aquatic communities within the Anglesea Borefield. The ecological risk assessment was based on drawdown conditions under both a "Median Climate Change" Scenario and a "Return to Dry" Scenario, both of which included an

assumed continuous pumping rate of 7,000 ML/year over a 43 year period. Potential risks associated with drawdown under these modelled conditions were identified for a number of ecological values within the Anglesea River Swamp, including:

- Acid generation;
- Altered surface water regime; and
- Reduced water table (aquifer levels).

However, a number of key data gaps and uncertainties were identified within the 2013 BE Review that required further assessment to enable a more robust evaluation of risks.

Ecological monitoring has been conducted since 2013 to obtain a clearer understanding of the baseline conditions for terrestrial and ecological communities within the investigation area, and thus provide an indication as to the potential for risks to these communities under future conditions. Further discussion regarding these interactions has been provided in **Section 7**.

3.1.2 2023 Annual Surface Water Report

The most recent annual surface water monitoring report prepared by ALS (ALS, 2023) summarises the sampling conducted across the existing surface water monitoring network. The sampling methodologies adopted have been outlined below in **Section 3.3**.

The field data and results obtained from data loggers installed within select surface water features were compiled, reviewed and quality assured by ALS. The report indicated that the 2022-2023 monitoring period recorded elevated rainfall in comparison to the mean. This additional rainfall resulted in the majority of monitoring locations observed with flowing water. Samples collected along the Upper Anglesea River, Upper and Lower Anglesea River Swamp and Salt Creek Swamp were reported to have decreased cation and overall TDS concentrations, likely due to the additional rainfall during the monitoring period.

A detailed review of all historical results, including those provided in the annual surface water monitoring reports by ALS has been provided below in **Section 3.4**.

3.2 MAP Requirements and Objectives/Rationale

The objective of the MAP is to provide sufficient data to inform decisions regarding the long-term sustainability of groundwater in the Jan Juc GMA and the protection of the associated environmental values.

Surface water monitoring requirements as outlined in the MAP include the following:

- There are seven level and flow monitoring locations along the Anglesea River and Salt Creek (AV1-AV3 and SV1-SV4) to be monitored using continuous water level loggers;
- A further four monitoring locations are required for level monitoring only in surface water pools (AGP2, ASP7, AGP1-B and SGP2-B) using water level loggers, with the exception of ASP7 which was to be assessed monthly during water quality monitoring;
- The aforementioned eleven surface water sampling locations were to be assessed for field and/or laboratory water quality parameters on a monthly to bi-annual basis; and
- A rainfall gauge was requested to be installed in the vicinity of AV2 in lieu of locating a historically flowing artesian bore.

A summary of the surface water sampling locations, rainfall gauges and associated monitoring requirements has been provided in **Table A1**.

The intent of surface water monitoring is to collect data that will support an improved understanding of the potential for risks to terrestrial and aquatic ecological communities that are dependent on surface water flows via collection of baseline water quality and flow conditions during periods of no pumping activity. This can then be compared against surface water data collected throughout active pumping periods to determine if any impact on the quality and/or volume/flow of water is attributable to groundwater extraction. The MAP currently includes monitoring of the following surface water field and laboratory parameters:

- Water level and flow;
- Field parameters – pH, EC, DO top and base, and temperature; and
- Laboratory analysis – Major cations and anions, salinity (TDS and EC) and pH.

An assessment of the impact of groundwater pumping on surface water can be achieved using the surface water parameters outlined above in conjunction with the groundwater monitoring requirements (**Section 4.2**) of the MAP. This surface water data can also be utilised to assist in determining if any acid generation has occurred from the PASS and subsequently any impact to ecological systems.

3.3 Sampling Methodology

The surface water sampling program as described in the most recent annual report (ALS, 2023) has been outlined in the sections below; however, details regarding the sampling methodology adopted has not been provided.

3.3.1 Stream Flow and Level Gauging

Stream flow and level gauging measurements were completed on a monthly basis during the most recent monitoring period (2022 to 2023) and has been done so since the implementation of the MAP in 2014 for surface water locations within the investigation area. The field-based measurements were collected to verify results from the installed data loggers; which collects data on a daily basis.

3.3.2 Surface Water Quality Monitoring

Surface water quality monitoring was completed twice per year by collecting field parameters and completing the requested laboratory analysis. In addition to the bi-annual monitoring, four sampling locations (AV2, AV3, SV2 and SV4) had data loggers installed to continuously measure field parameters which included pH, temperature and electrical conductivity; this data was downloaded on a monthly basis.

3.3.3 Rainfall Measurement

Rainfall gauges are installed at three locations (ARG1, ARG2 and ARG3) within the investigation area. The gauges utilise data loggers and a 0.2 mm tipping bucket to record data. The results collected have been downloaded on a monthly basis.

3.4 Results

3.4.1 Data Quality

The data collected across the monitoring period (2013-2023) is considered to be of adequate quality to meet the MAP objectives including sampling methodology and field and laboratory analysis conducted. However, it is noted that there are some anomalous data which is typical of these large and long-term datasets. A number of factors including calibration, instrument drift, sediment build up and level logger displacement can in some instances confound the interpretation of those results. Overall, the data is considered suitable for use in assessing any seasonal or long-term trends.

3.4.2 Levels and Flow

Water levels and flow rates for monitoring locations within and adjacent (isolated pools) to Salt Creek Swamp and Breakfast Creek (SV1, SV3, SV4, SV2, SGP2-B) have been plotted in **Appendix A**, this includes all data collected in the last 10 years (2013-2023) since the previous BE Review (GHD, 2013). Similarly, the data from Upper Anglesea River, Upper and Lower Anglesea River Swamp (including isolated pools) (AV1, AV3, AV2, AGP2, AGP1-B, ASP7) have been plotted in **Appendix A**. This includes data collected from continuous data loggers that was sourced from Water Measurement Information System (WMIS, DELWP). Water level data is available for all of the aforementioned locations; however, flow data is limited to locations with flowing water (i.e. excludes the isolated pools – SGP2-B, AGP2, AGP1-B and ASP7).

Water level and flow data for Salt Creek Swamp and Breakfast Creek is provided in **Appendix A** with locations presented spatially on **Figure F2** and **Figure 2** below. A summary of these results from 2013-2023 is provided below:

- The water level data provided by the WMIS (DEECA) is in units of metres, however, does not contain details regarding the elevation of the reference or measurement point, as such the data can only be used to infer relative changes.
- SV1, SV3, SV4 and SV2 all show water level trends with increasing and decreasing water levels occurring in similar timeframes, noting that there are dry periods at each location, particularly at SV2. The water level variation is correlated to expected seasonal variation and shows a clear response to periods of increased rainfall. The results for SV1 and SV3 are strongly correlated with SV4 and SV2 exhibiting generally similar responses.
- Periods of active pumping at either the northern or southern borefield do not appear to cause observable deviations from the long term or seasonal variability; however, further interrogation of the rainfall response will need to be conducted as part of the impact assessment process. A long-term trend is also not immediately evident at any of the surface water locations in Salt Creek Swamp or Breakfast Creek. A steady decline in the apparent minimum water level is evident at a number of locations, this is considered likely an element of instrument drift, as discussed in **Section 3.4.1**.
- Trends in flow rate are most similar in SV1 and SV3 which is consistent with both of these locations being in relatively close proximity to each other on Breakfast Creek. SV1 typically reported higher flow rates which were correlated with similar, but lower, flows in SV3. This is consistent with SV1 being further downstream and therefore having a greater catchment area than SV3. Flow rates are generally low or non-existent (i.e. no flow) during the summer months with large spikes present in the winter months, the largest of which are correlated with heavy rainfall events.
- SV4 and SV2 followed the same trend as SV1 and SV3 in regard to the timing of flow events during winter months and low or non-existent (i.e. no flow) during summer months. The highest peak flow rates were typically reported in SV2, however, on average SV4 exhibited consistently higher flows. This is likely due to the storage capacity within Salt Creek Swamp, whereby flows through the upstream gauge (SV4) are generally dampened within the swamp, followed by periodic large flow events to the downstream portions of the catchment when the swamp capacity is exceeded.
- The water level in the surface water pool (SGP2-B) reported the highest range of variability in water level, with a range of over 2.5 m. The water level in SGP2-B followed a broadly similar trend to the remaining locations with rainfall being the key driver. The water level does not appear to present any long-term trend, however, it is noted that the frequency of water levels declining below 2 m has been less in recent years (2021-2023) with water levels being generally more stable during this period, possibly due to differences in the distribution of rainfall seasonally. The water level this location (provided in **Appendix A**) appears to show water levels above 2 m generally result in flowing conditions, with water levels below 2 m resulting in stagnant conditions that are more susceptible to evaporation and/or downward leakage.

Water level and flow data for Anglesea River and Lower and Upper Anglesea River Swamp is provided in **Appendix A** with locations presented spatially on **Figure F2** and **Figure 2** below. A summary of these results is provided below:

- The water level data provided by the WMIS (DEECA) is in units of metres, however, does not contain details regarding the elevation of the reference or measurement point, as such the data can only be used to infer relative changes.
- AV1, AV2 and AV3 all reported broadly consistent trends with generally rising water levels during the winter months and lower to no water in the summer months, noting extended dry periods are present at each of the monitoring locations. AV1, the furthest upstream location, reported the greatest variation in water level with AV2 and AV3 having more subdued responses to rainfall variability. AV1 and AV3 appears to have ceased to flow during drier periods, with an extended timeframe noted in 2015 to 2016, particularly in AV1. Similarly, AV3 and AV2 reported little to no flow during the majority of 2017 and 2018 during a period of limited rainfall.

- AV1 reported marginally higher peak flow rates than AV2, however, AV2 had more consistent flow., This is consistent with their relative positions within the catchment. Increased flow rates generally occurred during similar periods for both locations, which were correlated with high rainfall periods.
- The three (3) monitored water pools, AGP1-B, ASP7 and AGP2 all exhibit similar overall trends with AGP1-B reporting the highest level of variation, with over 2.5 m of difference between the highest and lowest water levels. The water level in AGP1-B has large sharp increases and decreases, however, does not appear to reach a dry state (indicated by an unchanging low water level) apart from a period during 2009 and from 2015 to 2016.
- The water level in AGP2 appears to regularly reach a dry state as part of its seasonal variation; however, this may be a function of logger placement. Based on the analysis presented in Section 4.4.1.8, the data is most likely to be an artefact of logger placement as water levels in AGP2 are substantially higher than those in the nearby ASA. However, the lateral distance (320 m) between AGP2 and the nearest ASA bore (WTOB2) makes a direct comparison of reduced water levels difficult. The water level in ASP7 shows a close correlation with AGP2 with periods of increasing and decreasing levels, however, ASP7 does not appear to reach a dry state.
- Most locations show a change in water level characteristics from early 2021 onwards, towards higher and/or more persistent water levels, which appears to be correlated with changes in the distribution of rainfall over the same time period.



Figure 2 Surface Water Monitoring Locations

3.4.3 Water Quality

3.4.3.1 pH

Continuous logging of pH is recorded in surface water locations SV2 and AV2 available via the WMIS (DELWP). The remaining locations have pH data available from field sampling on a monthly basis. The results of pH data collection from 2013 to 2023 are presented in tabular and graphical formats in **Appendix A.** A comparison of pH levels and EC concentrations (discussed in **Section 3.4.3.2**) through the surface water bodies is provided as **Figure 3** and **Figure 4**.

Observations regarding pH in Breakfast Creek and Salt Creek Swamp are presented below:

- The upstream sampling location, SV3, generally reported a stable and circum-neutral pH with some variability resulting in occasional acidic conditions with a pH of approximately 4.0 pH units;
- SV1, located slightly downstream of SV3, reported largely neutral to slightly acidic conditions, with pH levels generally remaining between 5.0 and 7.0 pH units. The pH level did drop below 5.0 pH units on some occasions, however, was not for extended periods and did not exhibit any clear long-term trends;
- The upper reach of Salt Creek Swamp at SV4, has historically reported a slightly acidic pH of less than 5.0 pH units, particularly during 2011 when the pH dropped below 4.0 pH units on several occasions. Results since 2014 have remained broadly stable between 5.0 and 7.0 pH units with signs of a possible slight upward trend over the period of assessment, most notably from 2020 onwards. This time period (2020 onwards) is characterised by a more sustained (i.e. less seasonal) distribution of rainfall and higher and more sustained levels of flow in the catchment;
- The furthest downstream sample, SV2, located in Salt Creek Swamp reported the lowest (i.e. most acidic) pH levels, most commonly between 3.0 and 4.0 but with variability of up to 7.4 pH units. SV2 has reached a pH level of around 2.0 pH units during the monitoring period with a number of results below 3.0 pH units. There is no clear trend evident in the pH at SV2 during the monitoring period;
- The surface water pool, SGP2-B, has remained largely stable across the monitoring period, noting some higher levels of variability during 2010 to 2012. The conditions ranged from slightly acidic to circum-neutral pH levels. Similar to nearby SV4, there is signs of a possible slight increasing trend in recent years, with fewer instances of low pH events during the latter parts of the monitoring period.

The pH in Breakfast Creek and Salt Creek Swamp appears to be becoming more acidic as you move further downstream, with Breakfast Creek (furthest upstream) remaining at largely circum-neutral pH and SV2 (furthest downstream) having acidic conditions.

Observations regarding pH in Upper Anglesea River, Upper and Lower Anglesea River Swamp are presented below:

- The upstream sampling location, AV1, located in the Upper Anglesea River, reported no clear trend in pH concentrations with variability throughout the monitoring period. The pH levels were generally circum-neutral, noting that the conditions have become slightly acidic on occasion with pH dropping below 5.0 pH units;
- The pH levels in AV3, located in Upper Anglesea River Swamp, are generally acidic to neutral with concentrations ranging from 3.0 to 6.0 pH units generally and dropping below 3.0 in rare instances. There is no clear trend in pH concentrations reported during the monitoring period;
- A generally decreasing trend in pH values was observed in the downstream sampling location, AV2, between 2011 and 2016, before pH values began to stabilise. In recent years, pH values have broadly ranged between 2.5 and 3.5 pH units;
- The pool sampling location, AGP1-B, was generally reported slightly acidic to neutral conditions with pH levels ranging between 4.0 and 7.0 pH units. There were instances of pH dropping below 4.0 pH units, however, this was not reported consistently or with any apparent trend;

- The surface water pool, ASP7, has generally reported acidic conditions with pH levels generally ranging between 3.0 and 4.0 pH units, with pH levels falling below 3.0 pH units on numerous occasions. There does not appear to be any trend evident across the monitoring period; and
- The results at the AGP2 pool indicated an overall downward trend in pH concentrations between 2011 and 2013 with concentrations generally stabilising around 3.0 pH units, noting that there were instances of pH below 3.0 pH units during 2011, however, results varied substantially up to 6.42 pH units during the monitoring period.

3.4.3.2 Salinity

Continuous logging of salinity (electrical conductivity) is recorded in surface water locations SV2, SV4, and AV2 and is available via the WMIS (DELWP). The remaining locations have electrical conductivity (EC) data available from field sampling on a monthly basis. The results of EC are presented in tabular and graphical formats in **Appendix A**. A comparison of pH levels (discussed in **Section 3.4.3.1**) and EC concentrations with distance downstream is provided as **Figure 3** and **Figure 4**.

The EC results for Breakfast Creek and Salt Creek Swamp are summarised below:

- SV1, SV3 and SV4 all reported relatively low EC, generally remaining below 600 µS/cm and above 200 µS/cm, noting that these levels were exceeded in some instances. There are no clear long-term trends in EC, with a general correlation of lower EC during periods of increased water levels and rainfall.
- SV2 reported elevated EC concentrations in comparison to those reported at the upstream sampling locations (SV1, SV3 and SV4). EC was reported up to approximately 3,500 µS/cm, however, was also reported as low as 119 µS/cm. The results do not appear to correlate with any active pumping periods, however, are likely to be linked to rainfall and subsequent flow rates/water levels. EC is generally low following a dry period, before exhibiting an increasing and subsequently decreasing trend with the onset of rainfall. These trends may be representative of increased rainfall generating higher flows and water levels and mobilising salt from within the wetlands.
- SGP2-B reported similar EC concentrations to that in SV1, SV3 and SV4 and generally ranged between 200 µS/cm and 600 µS/cm. Short-term increasing and decreasing trends are evident throughout the monitoring period, however, no long-term trend is apparent.

The EC results for Upper Anglesea River, Upper and Lower Anglesea River Swamp are summarised below:

- AV1 and AV3, which are both located in the upper catchment, reported similar EC concentrations and generally ranged from 400 µS/cm to 1,200 µS/cm. Neither exhibited any observable long-term trend or clear response to water level, rainfall or pumping periods.
- AV2 exhibited ECs with a much larger range of variation in comparison to AV1 and AV3 with concentrations from approximately 1,000 µS/cm to 7,000 µS/cm. EC was shown to have a generally increasing trend from 2010 to 2015 and a broadly decreasing trend trough to 2023. There doesn't appear to be any clear correlation with water levels or rainfall. The rising EC between 2010 and 2015 is correlated with ongoing pumping at the Mine, which ceased in 2015. However, later periods of pumping during 2019 and 2022, by both Barwon Water and the Mine, are correlated with salinity declines from 2019 – 2022.
- The pool monitoring location, ASP7, reported variable EC concentrations, generally ranging from approximately 1,000 µS/cm to 3,000 µS/cm. The concentration of EC did not appear to follow any discernible trend or correlation with rainfall, water level or pumping.
- AGP1-B has reported highly variable EC historically, ranging from <500 µS/cm to approximately 2,500 µS/cm. These concentrations changed substantially over short periods of time. However, this variability has decreased in recent years (since 2015), with each subsequent rise appearing to report a lower peak EC concentration; however, this may be partly an artefact of data collection frequency. This broadly correlates with the cessation of long-term extraction from the UEVF at the Mine and an extended period of measurable water levels in AGP1-B (i.e. limited dry periods).

- AGP2 has been observed to follow a similar trend to that reported in AV2, showing a peak EC concentration during 2016 and a generally decreasing trend through to 2023. These locations are relatively close spatially, and may be subject to similar salt mobilisation processes from the upstream wetlands.

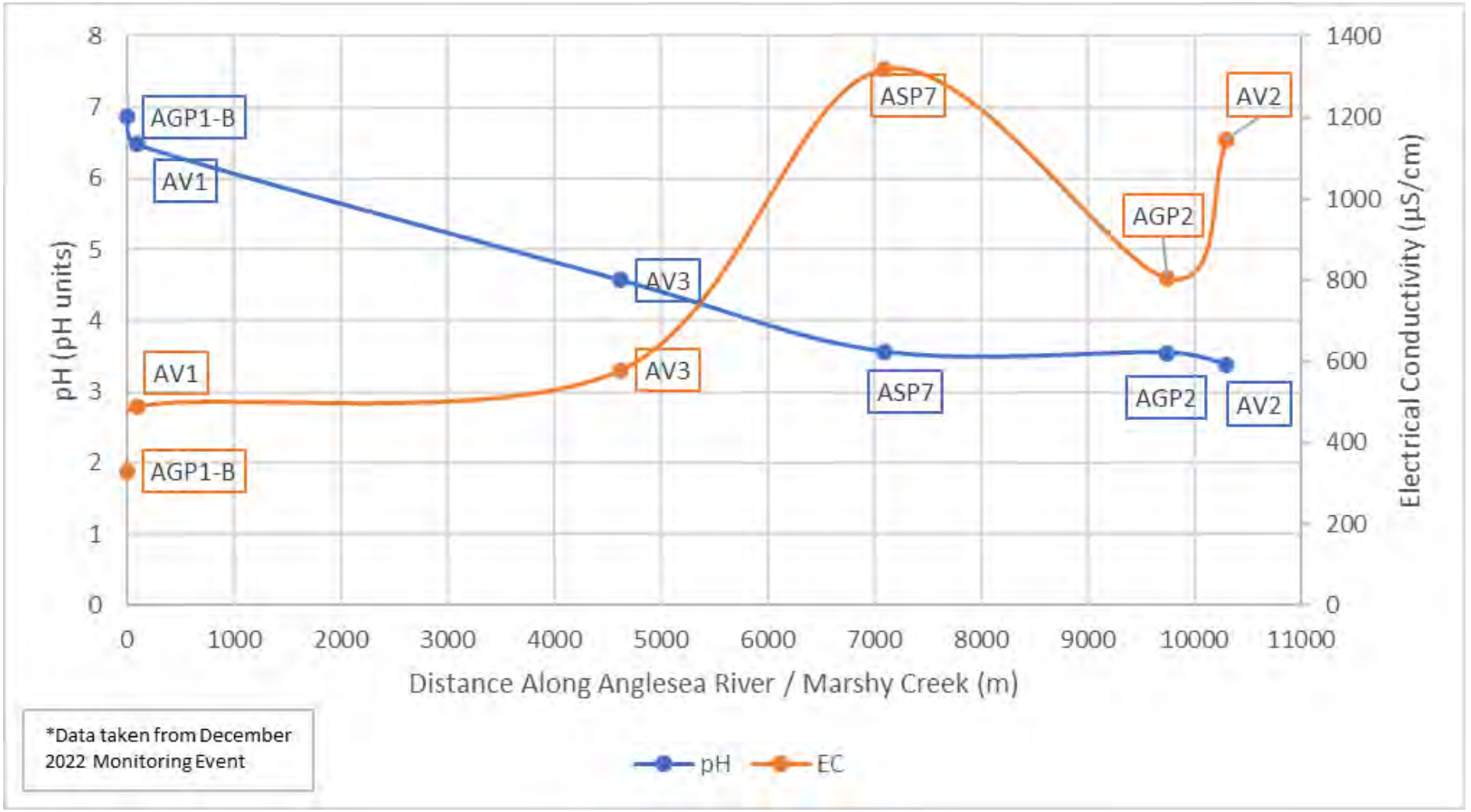


Figure 3 pH and EC – Longitudinal Transect Anglesea River / Anglesea River Swamp (December 2022)

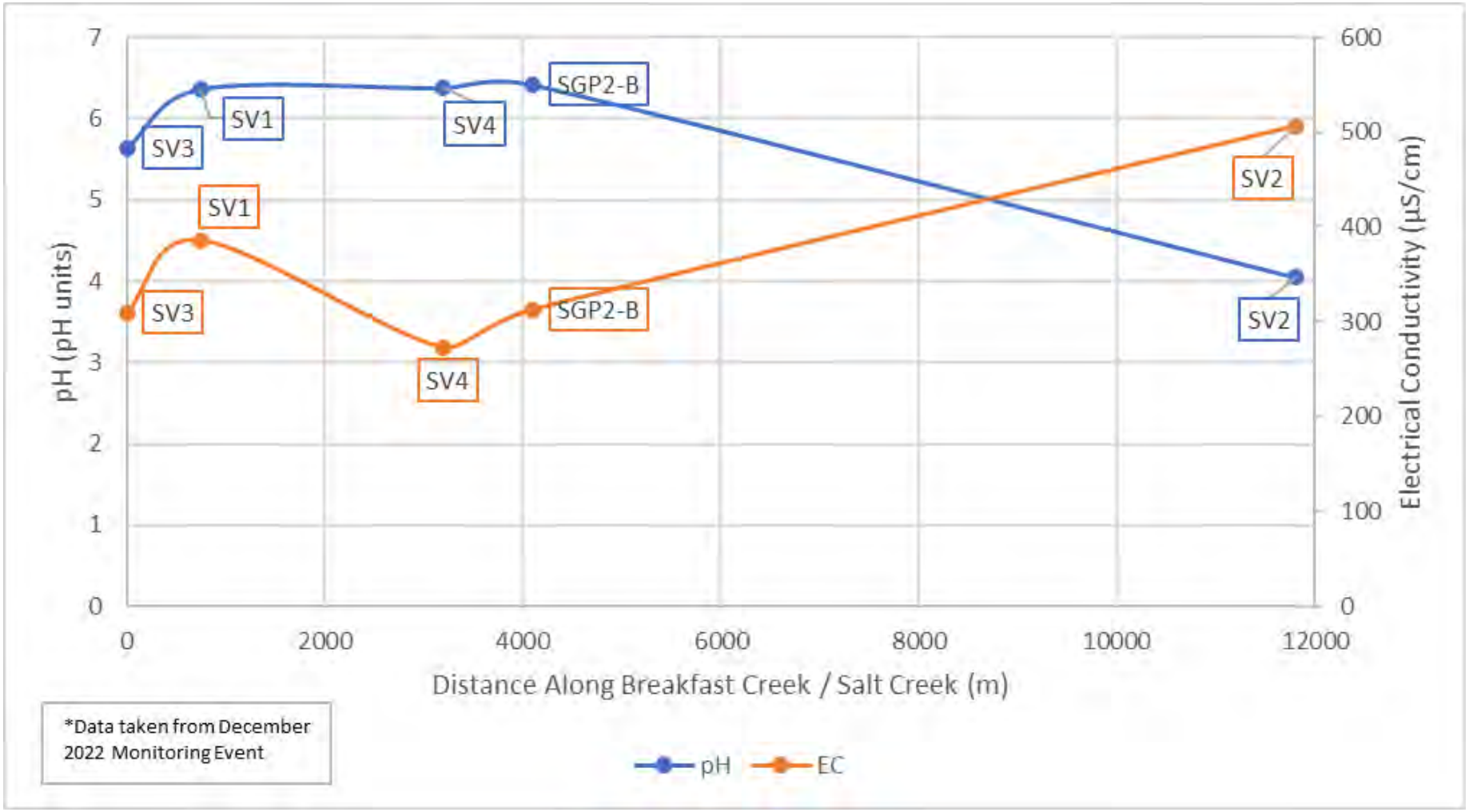


Figure 4 pH and EC – Longitudinal Transect Breakfast Creek / Salt Creek (December 2022)

3.4.3.3 Dissolved Oxygen & Temperature

Continuous logging of temperature is recorded in surface water locations SV2, SV4, AV2 and AV3 and is available via the WMIS (DELWP). The remaining locations have temperature data available from field sampling on a monthly basis. This is also the case for all locations for dissolved oxygen (DO). The results of temperature and DO are presented in tabular and graphical formats in **Appendix A**.

Temperature varied considerably at each location between seasons, locations further upstream at higher elevations generally exhibited lower minimum and maximum temperatures. There were no clear long-term temperature trends, noting the relatively consistent changes on a seasonal basis. This was consistent across all of the surface water monitoring locations.

DO also varied considerably across the monitoring period with oxygen levels generally remaining aerobic and appearing to reach suboxic/anaerobic conditions during periods of reduced water levels and flow. Similar to salinity, increased DO concentrations are observed in recent years likely due to higher water levels and corresponding flow rates.

None of the monitoring locations appear to have temperature or DO concentrations influenced by active pumping periods at the Mine or by Barwon Water. These parameters appear to be predominately influenced by seasonal climatic changes.

3.4.3.4 Major Ions

Analysis of major ions has been completed for AV1-AV3 and SV1-SV4 on a twice-yearly basis. The results have been provided in tabular and graphical format in **Appendix A**. Piper plots have also been prepared for these locations and is available in **Appendix A** and shown below as **Figure 5**.

The following is noted with respect to major ions in Breakfast Creek, Salt Creek Swamp, Upper Anglesea River, Upper and Lower Anglesea River Swamp:

- Surface water monitoring locations excluding SV2 reported broadly similar major ion composition. Consisting of a chloride and bicarbonate dominant anion field and a predominately magnesium, sodium and potassium cation distribution. The results vary across monitoring rounds but are broadly similar. This is consistent with the trend graphs for these locations which show only minor changes in major ion concentrations between monitoring events.
- SV2 reported different major ion proportions to the rest of the surface water sampling locations, and also has the highest variability in ion concentrations which directly correlates with the fluctuating TDS concentrations reported. This location represents the most downstream sampling point along Salt Creek.
- SV2 reported a higher proportion of sulfate and corresponding lower proportions of chloride than the remaining locations. An increased proportion of calcium was reported in the cation field with a lower proportion of magnesium observed.

These results at SV2 potentially indicate impacts from ASS due to the increased proportion of sulfate at the downstream sampling location of Salt Creek Swamp. This is supported by the pH results for SV2 which are the lowest of any surface water sampling point.

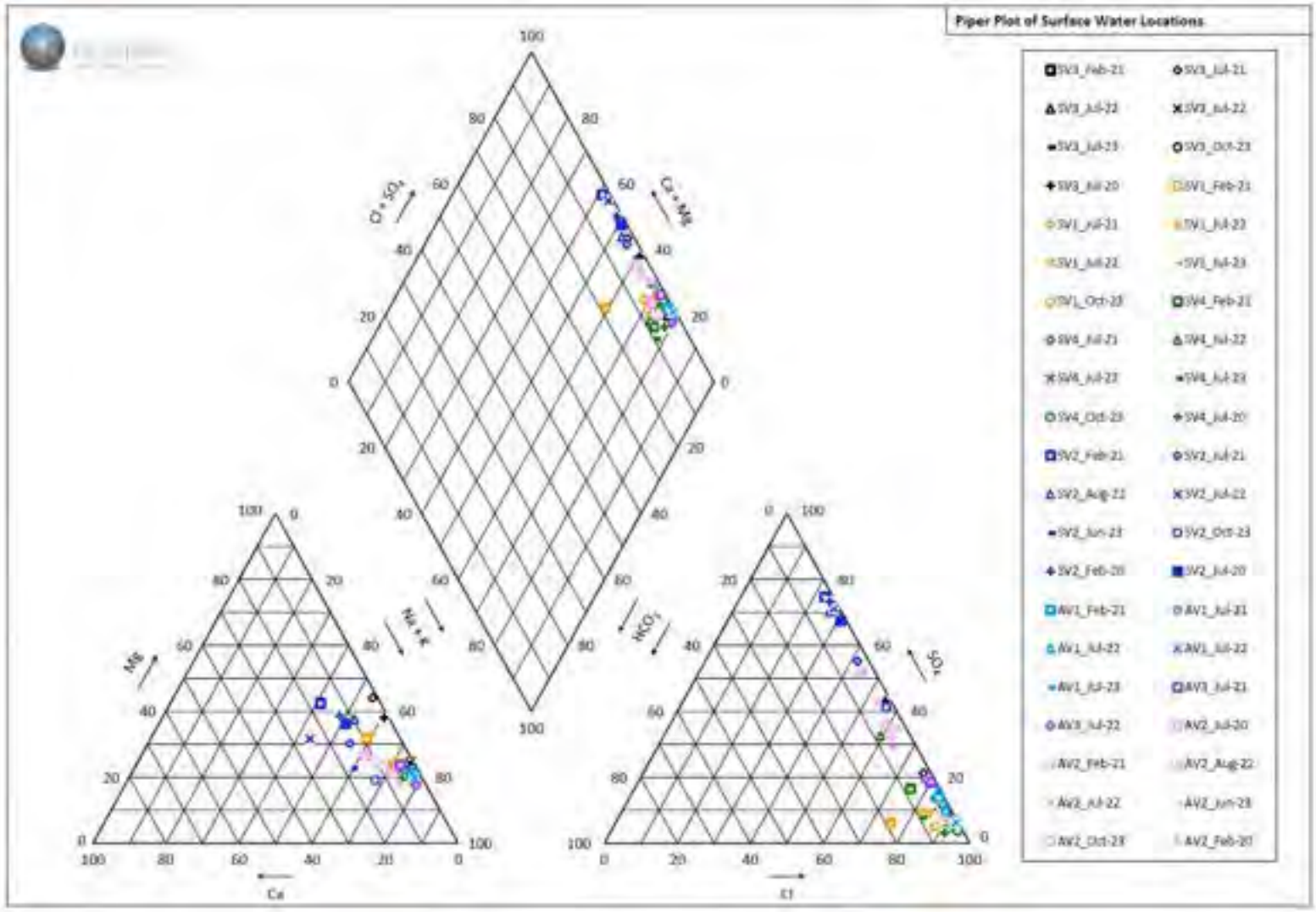


Figure 5 Surface Water Piper Plot

3.5 Summary

The ongoing monitoring of surface water across the Anglesea River, Upper and Lower Anglesea River Swamp, Breakfast Creek, Salt Creek Swamp and surface water pools has been broadly completed in accordance with the requirements outlined in the MAP during the current review period. A summary of the key observations made in relation to the data collected since the previous BE review are provided below:

- Water levels within the surface water sampling locations is highly variable and appear to be primarily influenced by seasonal climatic changes, particularly periods of high and/or sustained rainfall.
- Flow typically follows a similar trend to water levels with increased rates during the winter months corresponding to elevated rainfall and low to no flow conditions present for extended periods during the drier summer months.
- pH values varied across each of the locations but were generally reported from acidic to circum-neutral conditions with substantial variability reported at a number of monitoring locations. Identifiable trends were present at SPG2-B and SV4, both showing a generally increasing trend in pH levels. A general trend of lower pH levels being reported at downstream locations was clearly evident within both Lower Anglesea River Swamp (AV2) and Salt Creek Swamp (SV2) consistently reporting strongly acidic conditions (i.e. commonly <4.0 pH units).
- EC within the surface water pools generally showed high levels of variability with no long-term trends evident. The exceptions to this were AV2 and to a lesser extent SV2, which showed a pronounced increasing trend in salinity in the first half of the monitoring period (i.e. 2009 – 2016), followed by a pronounced decline in the second half (i.e. 2016 – 2022). Similar to trends observed in acidity/pH, elevated but variable levels of EC were periodically reported at the downstream sampling locations within Salt Creek Swamp (SV2) and Lower Anglesea River Swamp (AV2), in contrast to the balance of the catchment which generally reported lower salinity levels. Lower levels of EC have been reported in recent events at SV2 and AV2, which is likely attributable to the increased rainfall and water levels observed post 2019.
- Temperature varied considerably at each location between seasons. Locations further upstream at higher elevations generally exhibited lower minimum and maximum temperatures. There were no clear long-term temperature trends, noting the relatively consistent changes on a seasonal basis. DO also varied considerably across the monitoring period with oxygen levels generally remaining aerobic and appearing to reach suboxic/anaerobic conditions during periods of reduced water levels and flow. Similar to salinity, increased DO concentrations are observed in recent years due to higher water levels and corresponding high flow rates.
- All surface water monitoring locations within the creeks, excluding SV2, reported broadly similar major ion compositions, consisting of a chloride and bicarbonate dominant anion field and a predominately magnesium, sodium and potassium cation distribution. SV2 reported substantially higher proportions of sulfate with corresponding lower chloride, increased calcium and reduced magnesium proportions compared to the remaining locations.
- The lower pH and differing major ion composition, particularly the elevated sulfate, indicates that AV2 and SV2 may have been impacted by acid generation via ASS. The presence of potential ASS has been discussed further in **Section 5**.

3.6 CSM Review

The CSM presented by GHD in the *Anglesea Groundwater Numerical Modelling Update* report (GHD, 2024) and previous BE Review (GHD, 2013) as discussed in **Section 2.3** has been reviewed considering the data that has been collected since the previous BE Review (GHD, 2013). The data collected during this period describes conditions that are largely consistent with the existing CSM with the following noted:

- Water levels and/or flow within the surface water bodies across the assessment area are generally strongly correlated with rainfall. The exceptions being some of the wetland locations where the influence from rainfall, particularly during lower intensity rainfall events, appear to be

attenuated by the storage capacity within the swamps (i.e. rather than lower intensity rainfall events inducing surface water flow, they appear to be lost to storage in the ASA). This is consistent with the updated CSM.

- With respect to surface water groundwater interactions throughout the assessment area, the data collected during the monitoring period describes variable, but periodically gaining stream conditions in the upper portions of the catchment (e.g. Breakfast Creek and Upper Anglesea River Swamp), with predominantly losing stream conditions elsewhere. However, this represents the typical behaviour of the systems at a broad scale and the losing and gaining nature of surface water bodies is likely to vary substantially both temporally and spatially. In the upper portions of both Breakfast Creek and Salt Creek Swamp, baseflow contribution to streams appears to be a seasonal phenomenon, with losing stream conditions prevailing during drier periods.
- The available data suggests that the Anglesea River pools are predominantly losing features, consistent with the current CSM (GHD, 2024); however, there is evidence of strong hydraulic connection with the ASA in the upper catchment (e.g. AGP1-B).
- The potential for ASS to impact downstream quality of Anglesea River Swamp and Salt Creek Swamp is evident with indication of impacts (low pH and elevated sulfate) at both of the downstream locations during the monitoring period. Further discussion regarding the acid generation model has been provided **Section 5.6**.
- The available data suggests that the persistent pools on the Upper Anglesea River, Upper and Lower Anglesea River Swamp, and Salt Creek Swamp are likely to be losing features, consistent with the current CSM (GHD, 2024). However, given the distance between pond monitoring locations and ASA bores in some cases, there is considered to be uncertainty regarding the presence or absence of a baseflow component. In at least one example, there is evidence of strong hydraulic connection between the pools and the ASA in the upper catchment (e.g. AGP1-B). However, during dry periods, this data does suggest that the hydraulic gradient is downwards from the pool to shallow groundwater, indicating that this pool is not sustained by groundwater during dry periods.

3.7 Data Gaps

In accordance with the intent of the MAP to monitor the surface water bodies (Salt Creek Swamp, Breakfast Creek, Upper Anglesea River, Upper and Lower Anglesea River Swamp and surface water pools) to observe any potential impacts associated with pumping in the LEVF, the following data gaps are noted:

- There is limited data available for concentrations of metals in surface water, particularly, in relation to AV2 and SV2 to assess other key potential impacts from ASS.
- The absence of survey data in limited cases (e.g. ASP7) prevents a direct comparison of surface water and groundwater levels, confounding an assessment of surface water – groundwater interaction at these locations;
- A number of other tributaries are present, particularly near the central portion of the assessment area between Marshy Creek and Salt Creek, which initial modelling outputs show as being areas of very shallow watertable. Some of these areas are closer to the borefields than many of the distal monitoring areas in the upper catchments of the Anglesea River and Salt Creek/Breakfast Creek. These do not appear to have been assessed to date and may be potential GDEs and/or potential sources of acid generation from ASS. However, the existing monitoring network may provide appropriate proxies for these other systems; the numerical modelling may assist in further evaluating the possible significance and/or sensitivity of these areas.
- There remains some uncertainty regarding the nature of vertical gradients and surface water – groundwater interactions that would have existed prior to the Mine operations, particularly in the lower catchment area, and the extent to which the ongoing recovery of the UEVF will affect catchment conditions and the application of the MAP in future.

4 Groundwater

4.1 Review of relevant reports

4.1.1 2013 BE Review

The previous BE review (GHD, 2013) included data from the existing state observation bore network (SOBN), as well as the Mine and Barwon Water's monitoring network. The groundwater bores are positioned across the investigation area and have been screened in the ASA, UEVF and LEVF aquifers.

A number of pumping tests have been completed within the LEVF since the commissioning of the Anglesea Borefield. This included constant rate and step tests within the production bores (GW1 and GW3-GW7) that was discussed in the previous BE review (GHD, 2013). Additional pumping tests have been completed since this review, including the 6-month pumping test that was undertaken during January 2022 – July 2022. This data was utilised in the development and calibration of the Anglesea Groundwater Model that has and will be used to predict drawdown within the aquifers and any associated impacts to surface water bodies, ecology, ASS generation and land subsidence.

The modelling results from the previous BE Review (GHD, 2013) utilised a calibration period of 1969 to 2012 with a 43-year forecast period that was used to identify potential risk areas It is noted that the model did not consider when the borefield may be deactivated due to a trigger level being reached. The following is noted with respect to the previous BE Review (GHD, 2013):

- A potential risk of saline intrusion is present; however, no evidence of saline intrusion has been identified to date.
- Drawdown within the outcropping area of the LEVF does not extend to Breakfast Creek or Breakfast Creek Tributary.
- The LEVF is expected to report up to 80 m of drawdown in the confined portion of the aquifer based on an extraction of 7,000 ML a year for the full modelling period (43 years) but varies depending on proximity to the Anglesea Borefield.
- Drawdown with the UEVF is likely to occur with up to 20 m of drawdown modelled near the Jan Juc Syncline based on an extraction of 7,000 ML a year for the full modelling period.
- The ASA along the Upper Anglesea River, Upper and Lower Anglesea River Swamp and Salt Creek Swamp are reported to have up to 1 metre of drawdown generally in response to pumping (7,000 ML a year for five years), noting localised areas of greater drawdown are present.
- Streamflow is expected to be impacted by high-volume, long-term extraction with the most substantial impacts noted near the confluence of Salt Creek Swamp and Lower Anglesea River Swamp. Long-term pumping at a lower extraction rate is expected to reduce (or remove) the impact on streamflow.

Noting that since the 2013 BE Review, the borefield has been used to extract a total of 3,985 ML, with the borefield being used less frequently, and to extract a lower volume, than was contemplated by the 2013 modelling work. Furthermore, the Anglesea Groundwater Model has since been rebuilt using the additional data collected since the previous model and is used in subsequent stages of the project to run similar scenarios to inform the 2024 BE Review.

The impacts of long-term extraction at the Anglesea Borefield on ASS, land subsidence and ecology have been discussed in **Section 5**, **Section 6** and **Section 7,** respectively.

Groundwater level triggers were in place at the time of the BE Review (2013) for SOBN monitoring bores 119347, 112470 and 116460. These triggers were based on protecting the persistent pools, which at the time were thought to be dependent on groundwater baseflow from the LEVF. However, the understanding of the interaction between the persistent pools and LEVF have changed and as such these triggers were considered to no longer be relevant for the protection of GDEs from pumping. Groundwater trigger levels have since been revised for bores P8 and P19 (trigger bores) using P17 as a control bore, as discussed further in **Section 4.1.2**.

4.1.2 Annual Review Reports

The annual groundwater monitoring report produced by Ventia (2023) for sampling completed across 2022 and 2023 included sampling and analysis of 16 groundwater bores. This included seven (7) ASA groundwater bores, three (3) UEVF groundwater bores and six (6) LEVF groundwater bores. The Ventia report (2023) was a largely factual report outlining the sampling methodology and results obtained from groundwater sampling at the Anglesea Borefield.

The annual bulk entitlement report from Barwon Water summarises the groundwater and surface water sampling completed at the Anglesea Borefield. This includes a summary of groundwater extraction completed throughout the year and results obtained during sampling. The history of trigger level exceedances is also included in the Barwon Water annual report (2023) which shows that individually bores P8 and P19 have fallen below the adopted trigger levels on one (1) and five (5) occasions, respectively. This occurred in February 2019 for P8 and from May to October in 2022 for P19; however, this is not considered to meet the trigger level requirements as both triggers need to be met simultaneously. It is also worth noting that active pumping to augment water supply was not occurring during any of the aforementioned periods, although a pumping test was underway through January to July 2022. Taking into account potential temporal lags between pumping and declines in ASA water levels, this extraction period may have contributed to the observations at P19 in May to October 2022, although this is considered unlikely to be significant given the relatively low volumes extracted.

It is also noted that previous groundwater monitoring bores 119349 and 115868, that are part of the SOBN have been decommissioned with bore P21 constructed in 2021 to replace 119349. Plans to construct a replacement groundwater bore for 115868 are underway and will commence once all relevant approvals have been granted.

4.1.3 Groundwater Bore Integrity

Historically, integrity issues with a number of groundwater bores, in particular some that are part of the SOBN have been documented. A detailed assessment of the integrity of several groundwater bores was undertaken by GHD (2023) to determine if certain bores were screened across multiple aquifers; potentially compromising the reliability of data collected from these bores. A summary of the findings from GHD (2023) is provided below in **Table 5**.

Table 5 Groundwater Bore Integrity Summary

Bore ID	Installed Unit	Comment
115867	LEVF	Nested bores appear to be impacted by inter-aquifer flow between the UEVF and LEVF. This may impact the groundwater head and quality in these bores (115867 and 116459)
116459	UEVF	
115868	UEVF	Identified integrity issues within 115868, groundwater heads may not be reliable
121768	UEVF	This bore (121768) is known to have two screens, however, is not screened with the LEVF. Head levels indicate some connection with the LEVF, as such head results may not be indicative of the UEVF

4.2 MAP Requirements and Objectives/Rationale

Groundwater monitoring requirements as outlined in the MAP include the following:

- Groundwater levels are to be monitored in the listed 42 groundwater bores (as outlined in **Table B1**) on a daily basis for the first 6 months following implementation of the MAP. Thereafter groundwater levels are to be monitored monthly, excluding P8, P17 and P19 which will remain daily.

- If an exceedance either of the trigger levels (P8 and P19) is reported, daily monitoring is required in P8, P17 and P19 until trigger level exceedances are no longer observed. If both trigger levels are exceeded simultaneously, any active pumping is to cease immediately.
- Groundwater sampling for 16 bores is to occur twice per year and include the collection of field parameters and laboratory analysis as outlined in the MAP and summarised in **Table B1**.

The trigger levels for groundwater monitoring outlined in the MAP are only pertinent to P8 and P19 as trigger bores. As outlined above in **Section 4.1.2**, Barwon Water's annual groundwater report (Barwon Water, 2023) outlines the periods during which the trigger level exceedances for each bore have been reported, including historical results outside the time period associated with the annual review. However, it is noted that the trigger level must be met in both groundwater bores simultaneously to constitute a trigger level exceedance. This has not occurred to date.

The intent of the MAP groundwater monitoring requirements is to ensure that any impacts to surface water and GDEs, and any instances of saline intrusion and inter-aquifer flow (between LEVF, UEVF and ASA), are identified. The ongoing water level and quality monitoring within the groundwater bore network allows for an assessment of these potential impacts. The MAP currently includes monitoring of the following:

- Water level;
- Field parameters – Salinity, pH and temperature; and
- Laboratory analysis – Major cations and anions, salinity (TDS and EC), pH and bromide (P14 and coastal UEVF bore only).

These monitoring parameters are key to understanding the potential impacts from groundwater extraction from the LEVF, providing insights into possible inter-aquifer mixing and saline intrusion. These results in conjunction with the surface water monitoring requirements (**Section 3.2**) allow for an assessment of the impact of groundwater pumping on surface water flow, quality and GDEs.

4.3 Sampling Methodology

The sampling methodology as outlined in the most recent annual groundwater report (Ventia, 2023) reported that the following sampling methodologies were adopted:

- Foot valve sampling by purging a minimum of three (3) bore volumes was completed for shallow bores in difficult to access areas. This consisted of five monitoring bores (P1, P7B, P8, P16 and P17);
- Low flow sampling was completed for the remaining four shallow bores (WTOB1, WTOB2, WTOB3 and P19)
- Deep sampling is also completed using a low flow methodology, however, also requires the use of a drop-tube to lower the pump to the screened interval. This was utilised for five bores (NB2, P14, P15, SB2 and 119348), with a minor variation for P12 as pumping was not required due to the artesian nature of the bore.
- Bore 116459 was not sampled in the most recent monitoring event, however, it is assumed that the above methodology for deep sampling would typically be adopted.

Purged groundwater was measured for field parameters including electrical conductivity, pH, redox potential, temperature and dissolved oxygen. Samples were taken following stabilisation of field parameters. Water levels have also been recorded of the field sheets. The sampling methodology is considered to be broadly consistent with the requirements of EPA Publication 669.2 (EPA, 2022).

4.4 Results

4.4.1 Standing Water Levels

Standing water levels collected from data loggers across the monitoring network have been compiled with data ranging from 2009 to 2023, the results are presented in **Appendix B**. The groundwater monitoring locations are presented spatially on **Figure F3** and **Figure 9**.

It is noted that abnormally low groundwater levels are reported on occasion in the hydrographs and are typically in the form of a sharp decline before quickly returning to close to previous levels. An example of this is presented on **Figure 6** in 2015 with a large reduction in water level present before increasing back to previous levels. This large and short term change in water level is considered anomalous, likely associated with a sampling event (one of which did occur in April 2015), adjustment of the water level logger or erroneous data collection from the water level logger. Regardless of the source of this error, these results are not considered to be representative of groundwater conditions and have not been discussed further; noting that sharp declines in water level can be present within the UEVF and LEVF due to pumping activities which have been discussed further below.

4.4.1.1 Production Bores

The water levels and flow rates within the production bores screened in the LEVF (GW1-GW7) have been presented in **Appendix B** and summarised below:

- The water levels in all of the production bores clearly show responses to active pumping in the LEVF with steep declines in water level reported during pumping with gradual recovery following the cessation of pumping, which generally follow the characteristics of standard recovery curves, evident when pumping ceases. There is evidence of pumping during the following periods:
  - From 2009 to 2012 there is sporadic pumping in GW1, GW3 (2011-2012), GW4, GW5, GW6 and GW7, all screened within the LEVF. It is unclear if GW2 was pumped during this period as data commences in 2013.
  - The LEVF pumping associated with the water supply use in August 2019 to June 2020 is clearly visible on GW1-GW5 (southern borefield) with gradual recovery occurring until the pumping tests began in January 2022 which continued until July 2022. Recovery of water levels in these bores has continued since July 2022.
  - Measurable flow rates for the southern borefield are only observed during active pumping for the water supply augmentation period and the pumping tests. Small spikes are noted in the intervening periods and are likely associated with the maintenance of the borefield.
  - Water levels in GW6 and GW7 (northern borefield) do not appear to have dropped during the period of active pumping from the LEVF in the southern borefield (August 2019 to June 2020). This is consistent with the flow readings which indicate that GW6 and GW7 were not utilised during this period. A response is shown during the pumping tests between January 2022 and July 2022.
  - Water levels in the southern borefield (GW1-GW5) generally reside around 0 mAHD during periods of non-pumping and drop up to -200 mAHD during pumping from the LEVF. The northern borefield (GW6 and GW7) sits around 40 mAHD outside pumping periods and reduces to up to -60 mAHD when pumping from the LEVF.
- There are also periods in each bore that show near instant drops and/or recoveries of water level (e.g. GW1 between March and August 2017); these likely represent movement/replacement of loggers or erroneous data, as described in **Section 4.4.1**.

4.4.1.2 ASA

The following observations were noted during review of the water level data reported for bores within the ASA aquifer, the groundwater level graphs of the ASA are presented in **Appendix B** with the WTOB1 graph shown below as **Figure 6** as an example:

- Water levels in WTOB1, WTOB2, WTOB3, P1, P8, P17 and P18 remained relatively stable throughout the monitoring period. Seasonal variability due to rainfall is evident in most cases; however, the majority of the bores did not exhibit any observable long-term upward or downward trends within the ASA.
  - There are some apparent anomalous data readings for WTOB3 in August of 2018 which are several metres below the surrounding readings. These results are considered unlikely to be representative of groundwater conditions.

  - Three short periods of decreased water level for WTOB1 are reported in April 2015, July 2016 and February 2017. The cause of these drops in water level is unclear but is considered unlikely to be representative of the groundwater conditions.

- Results for P7B show sharp decreases in August 2012 and August 2015 with sharp increases in August 2013 and August 2019. These changes are not considered to be representative of groundwater conditions in the area and are likely attributed to a calibration or a logger placement issue during these periods. Accounting for this calibration issue, groundwater levels varied seasonally but did not exhibit any clear long-term trend.
- P9 and P10 both reported an overall increasing trend in water level between 2009 and 2023, noting that the change in water level from 2009 to 2023 was relatively small (approximately 0.2 m for both bores). P9 appeared to be influenced more by longer term climatic conditions with a steady increase in water level across the monitoring period. Whereas P10 reported consistent seasonal variation with an upward trend in recent years, likely the result of increased rainfall during the latter part of the monitoring period. Similarly, P13B reported an increased water level in recent years after dropping steadily from 2009 until 2020.

There was no clear response in water levels within the ASA during the known periods of pumping from the UEVF at the Mine, or from water supply augmentation or testing purposes from the LEVF at the Anglesea Borefield. Water levels in the ASA appear to be most strongly influenced by seasonal variation in rainfall with at least 0.5 m of natural seasonal variation in water levels across the assessment area between 2010 and 2023. In several instances, natural seasonal variation within the ASA is observed to be of the order of several metres (e.g. P1. P17, P18, WTOB1 and WTOB2).

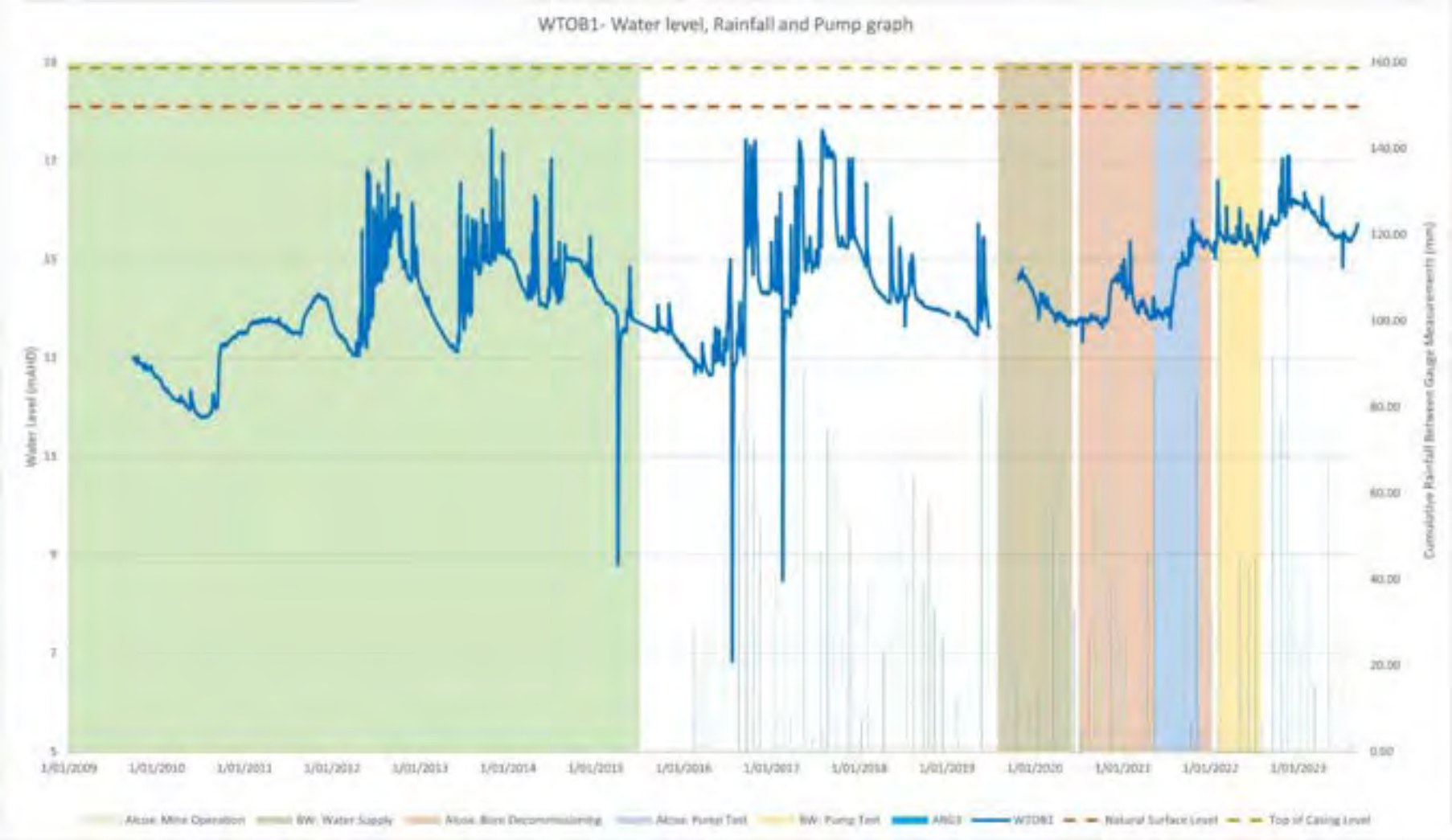


Figure 6 WTOB1 Hydrograph exhibiting several meters of seasonal water level variability

4.4.1.3 UEVF

Water level data within the UEVF have been presented in **Appendix B**, with SB2 provided below in **Figure 7** as an example, and is discussed below:

- Groundwater bore 115869 located to the east of the northern borefield appeared to have little to no response to seasonal changes and appears to have been impacted by the historical pumping from the UEVF at the Mine with a steadily increasing trend observed from 2012 to 2023. Small reductions in water level are also noted during the latter stages of the water supply pumping from the LEVF by Barwon Water (most notably prior to the bore decommissioning program) and during the pumping test at the Mine. The bore decommissioning program was undertaken to decommission any historical bores that were thought be screened across multiple aquifers (namely the UEVF and LEVF) and that therefore provided a direct connection between the UEVF and LEVF.
- Bores located around the northern borefield and in relative proximity to the Anglesea River reported the following:
  - Bore 116458 showed a steadily decreasing water level from 2009 to 2014 before stabilising for the remaining years and also appears to be influenced slightly by seasonal changes. The decreasing water level from 2009 to 2014 appears to be related to climatic conditions or pumping from the UEVF at the Mine.
  - NB2 and 121768 reported decreasing water levels during several periods that may be attributable to pumping impacts in the UEVF from the Mine and the LEVF by Barwon Water. Noting that 121768 may have integrity issues as outlined in **Section 4.1.3**. The periods of decreasing trends in water level coincide with historical pumping periods from the UEVF at the Mine and the most recent pumping test undertaken by Barwon Water from the LEVF in the first half of 2022.
  - P19 reported a largely stable water level through the monitoring period with a likely calibration issue present in December 2010. There is also evidence of subdued seasonal variation.
- Bores 116459 and 115868, both located in proximity to Salt Creek and the Mine, appear to be largely influenced by historical pumping from the UEVF at the Mine, as a strongly decreasing trend in water level is noted initially from 2009 to 2015. A component of this decreasing water level may be associated with climate, as shown in bore 116458, however, given the magnitude of water level decrease it is considered that bores 116459 and 115868 have been influenced by historical pumping from the UEVF up to 2015, noting the bore integrity issues discussed in **Section 4.1.3**. After this time, water levels appear to stabilise and begin increasing through to 2023, however, at a slower rate than would be expected from a standard recovery curve, possibly due to climatic conditions or subsequent phases of groundwater extraction. Seasonal variation, if present, is very subdued and responses to the recent pump test from the UEVF at the Mine are limited. Barwon Water's groundwater pumping activities within the LEVF do not produce a measurable drawdown response at these locations.
- Four bores near the Mine (WB4, WB5, WB9 and WB12) showed a strongly increasing water level trend, characteristic of a typical aquifer recovery curve, in recent years (from mid-2015), clearly attributable to the cessation of pumping from the UEVF at the Mine at this time.
- SB2 and P21 located south of the confluence of Salt Creek Swamp and Lower Anglesea River Swamp also showed characteristic recovery trends likely attributable to the cessation of pumping from the UEVF at the Mine. Evidence of pumping related influences can be seen at SB2, with a response to the recent pumping from the LEVF by Barwon Water (2020) and from the UEVF at the Mine (2021) also evident. However, there was no clear response to water levels in SB2 during Barwon Water's pumping test from the LEVF (2022).

Water levels in the UEVF clearly vary depending on proximity to the borefield and other sources of bulk groundwater extraction (i.e. the Mine). Beyond the influence of these extraction areas, groundwater levels in the UEVF generally remained stable with variability attributable to both long term and seasonal responses to rainfall.



Figure 7 SB2 Hydrograph

4.4.1.4 LEVF

Water levels within the LEVF have been presented in **Appendix B**, an example of this is provided below as **Figure 8** showing WTOB4 and discussed below:

- South of the confluence of Lower Anglesea River Swamp and Salt Creek Swamp, bores SB1 and P14 both show clear responses to pumping from the LEVF during 2009 to 2011, 2019 to 2020 and the first half of 2022. This is consistent with the known active pumping periods from the LEVF by Barwon Water. Recovery is evident in the intervening periods which appears to show an overall increasing trend in water level since monitoring began.
- Bores located in proximity to the northern borefield (119348, NB1 and P12) showed variable responses to pumping. Bore 119348 reported declining water levels when pumping occurred from the LEVF in 2009-2011; however, limited data is available from 2019 onwards. Responses to pumping from the LEVF during activation of the northern borefield in 2009-2011 and 2022 are clearly evident in NB1 and P12. Current water levels in all three bores remain broadly similar to those reported in 2009.
- There are a number of bores located in proximity to Salt Creek and Breakfast Creek in the western portion of the investigation area which is where the LEVF is understood to outcrop:
    - Bores WTOB4, WTOB5, P6 and P16 are all located in the western portion of Salt Creek Swamp or adjacent to Breakfast Creek. These locations show changes in water levels seasonally with no apparent correlations with pumping activity. P6 and WTOB4 both appear to have elevated water levels during recent years, likely due to increased rainfall.
    - Bore P15 located south of the eastern portion of Salt Creek Swamp shows a clear response to the known active pumping periods from the LEVF in the southern borefield with drops in water level to nearly 40 mAHD. Water level in the bore has slowly risen over the years and is currently at approximately 30 mAHD at the end of the monitoring period. P15 is one of the closest groundwater bores (screened in the LEVF) to the southern borefield; particularly extraction bores GW2 and GW5.
    - Bore 113470 is located further west than P15 and is north of Salt Creek. This bore shows a minor response to pumping from the LEVF with water levels dropping to approximately 66 mAHD before recovering to approximately 73 mAHD in late 2023.
    - 116460 is positioned directly west of P15 and does not appear to be responding to pumping in the southern borefield. Overall, the water level has continued to drop during the monitoring period, from approximately 56 mAHD to 47 m AHD. Periods of decline do correlate broadly with periods of pumping from the LEVF, with more stable water levels in between; however, this is considered more likely to be climatically driven. The immediate response to rainfall observed in some bores is not evident at 116460, possibly due to the LEVF being confined at this location.
- A series of bores have been installed in the LEVF along the Upper Anglesea River:
    - Bores located along the western portion of the Anglesea River (113004, P3, P11 and P13) displayed water level responses consistent with seasonal variation with no changes clearly correlated with periods of LEVF pumping in the borefield.
    - Bores 119347 and P12 located near the Upper Anglesea River Swamp and in close proximity (particularly P12) to the northern borefield showed clear responses to LEVF pumping during 2009-2011 and 2022 with recovery evident in the intervening period. The water levels do not appear to have fully recovered from Barwon Water's most recent pumping activities from the LEVF in 2022.

Bores within the LEVF reported variable water levels across the monitoring period. Locations in proximity to the northern and southern borefield showed clear decreases when active pumping was occurring from the LEVF and appeared to recover in the intervening period. A number of locations further from the borefield appear to be more influenced by seasonal and longer-term changes in rainfall with the LEVF outcropping in the western portion of the assessment area.

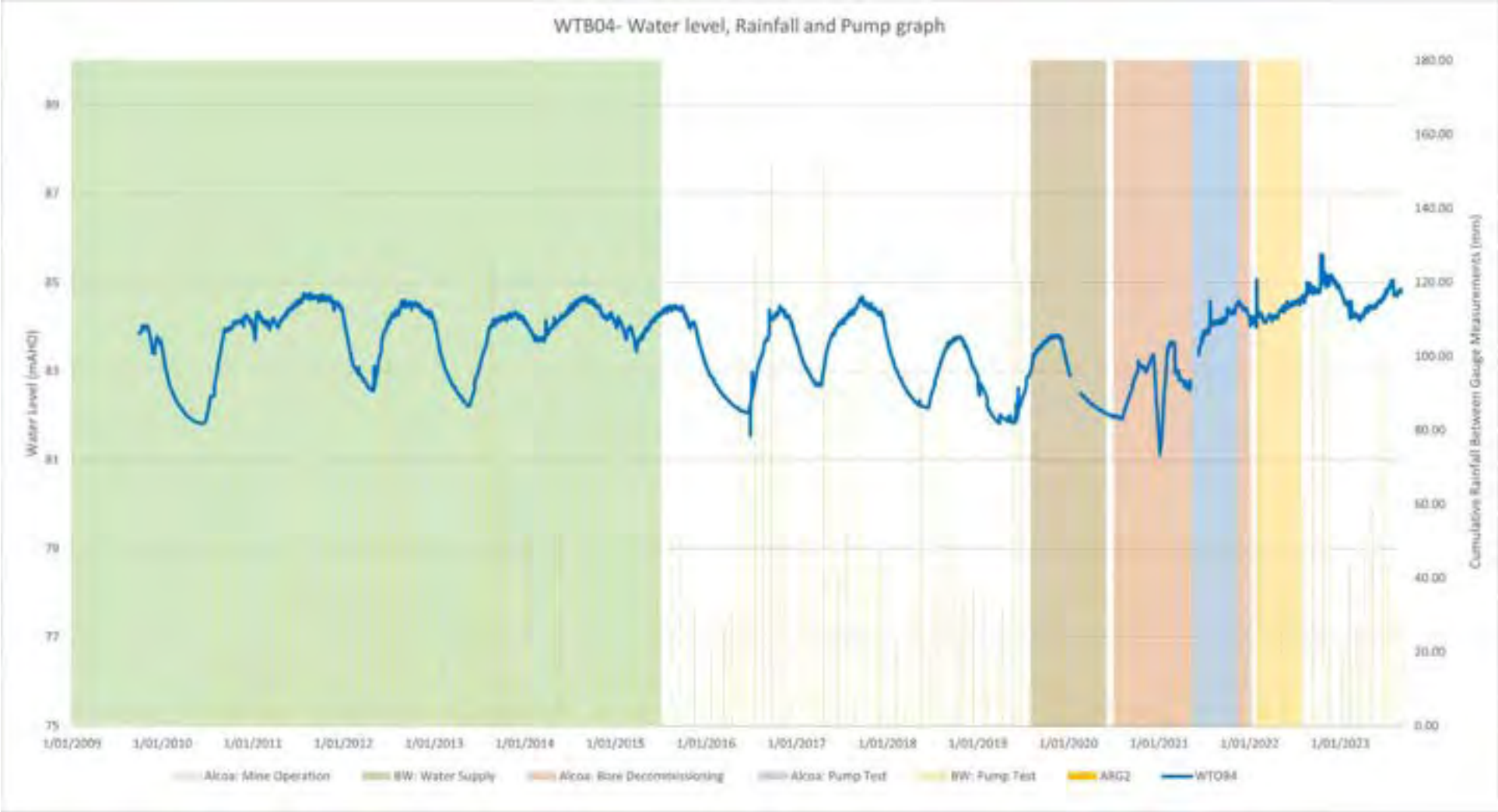


Figure 8 WTOB4 Hydrograph

4.4.1.5 Groundwater Flow

Water table contours, potentiometric surfaces and groundwater flow direction for the ASA, UEVF and LEVF have been presented on **Figure F7**, **Figure F8** and **Figure F9** respectively. These figures are based on data collected on 3 July 2023, this date was selected as it was recently available data and included the highest number of bores with water level data.

The groundwater flow direction in the ASA is shown to be south-easterly to easterly and likely following the alluvial valleys (**Figure F7**). In the upper catchment, evidence suggests discharge from the ASA may occur periodically to the streams or to underlying aquifers, whereas in the lower catchment discharge to the Anglesea River estuary or downward leakage to underlying units is considered more likely. The LEVF (**Figure F9**) shows groundwater flow in a broadly south-easterly direction towards the Anglesea River Estuary. The LEVF may also have a minor component of discharge to the UEVF due to the reduced water levels in the UEVF associated with the historic dewatering at the Mine, which is discussed further in Section **4.4.1.6**. The flow in the UEVF differs from that shown in the LEVF, partly due to the placement of bores within the UEVF aquifer being in the eastern portion of the borefield; however, the direction of flow in the UEVF has a strong southerly component towards reduced water levels from historical pumping at the Mine.

4.4.1.6 Vertical Hydraulic Gradients

Water levels in the following nested bores have been compared to assess the vertical hydraulic gradients across the borefield in **Appendix B**:

- NB1 (LEVF) and NB2 (UEVF);
- P8 (ASA), P12 (LEVF) and P19 (UEVF);
- P13 (LEVF) and P13B (ASA);
- P14 (LEVF) and P21 (UEVF); and
- WTOB1 (ASA) and 116549 (UEVF).

The vertical hydraulic gradients across the investigation area are complex due to the historical pumping activities in the UEVF at the Mine and spatial variability associated with the geology of the area. Generally, the UEVF and LEVF are separated by a substantial, low permeability formation referred to as the MEVF, which constrains the interaction between the aquifers.

During periods of no-pumping, the LEVF generally reports the highest water levels as indicated by the nested bores NB1 and NB2, P8, P12 and P19, and P14 and P21. This indicates an upward gradient from the LEVF to the UEVF through the MEVF. However, the LEVF doesn't always report the highest water level, as the results of P13 and P13B indicate that the ASA has a persistently higher water level than the LEVF and as such a downward gradient exists at this location. The generally observed upward gradient from the LEVF to UEVF through the MEVF can be also reversed during periods of active pumping from the LEVF by Barwon Water, as shown in NB1 and NB2.

Interaction between the UEVF and ASA is also variable with conditions at P8, P12 and P19 indicating an upward gradient from the UEVF to the ASA. Whereas the results in WTOB1 and 116549 indicate a downward gradient from the ASA to the UEVF, which, in this case, has likely been influenced by the historical pumping of the UEVF at the Mine. The natural water levels may tend towards an upward gradient in this area as shown briefly in 2010.

As described above, the degree of connection between the UEVF and LEVF is limited by the MEVF which restricts the upward flow of groundwater. Similarly, the coal seams and clay near the top of the UEVF may restrict any potential flow between the ASA and UEVF. The maintenance of strong vertical gradients between the various units over extended time periods supports the inferred behaviour (i.e. the hydraulic separation) of the intervening low permeability materials.

Further indicators of inter-aquifer mixing based on the analytical results have been discussed below in **Section 4.4.2** to **Section 4.4.6**.

4.4.1.7 Saline Intrusion

Limited data is available for bore P21 that was recently installed in the UEVF adjacent to P14 (LEVF) to assess the potential interaction between the UEVF and LEVF, in addition to assessing the

possibility of saline intrusion associated with the use of the southern borefield. The results presented in **Appendix B** show the water level in P14 responds to pumping from the LEVF associated with Barwon Waters borefield, however, the limited data available for P21 makes it difficult to determine if there is any evidence for saline intrusion. The data that is available for P21 is during the pumping test completed within the LEVF by Barwon Water in 2022. During this period the water level in P14 is above that in P21 prior to the test but falls below P21 mid-way through the testing period. This indicates that an upward hydraulic gradient is present under normal conditions, with this being reversed to a downward gradient during periods of pumping from the LEVF. However, due to the limited available data for P21, it is unclear if these gradients induce any leakage between the LEVF and UEVF through the MEVF or if there is any substantial hydraulic connection between these aquifers in this area.

It is notable in this context that both bores exhibit hydraulic heads below 0 mAHD during pumping periods, with any reduction in hydraulic head in the terrestrial groundwater system likely to impact the saltwater – freshwater interface. The EC at P14 was reported below 1,000 mg/L for the duration of the monitoring period, with no indication of increasing salinity that could be representative of saline intrusion. Further assessment of saline intrusion has been completed below in **Section 4.4.2** to **Section 4.4.6**.

4.4.1.8 Groundwater-Surface Water Levels

Surface water levels discussed in **Section 3.4.2** have been presented with nearby water table groundwater bores in metres Australian Height Datum to determine the likely presence of gaining / losing surface water features across the assessment area. These graphs are presented in **Appendix B**. It is noted that the groundwater bores are not immediately adjacent to the surface water sampling locations in most cases and as such there is some uncertainty associated with a direct comparison of water levels, particularly given the topographical variation of the borefield. Given this limitation, the following observations have been made:

- The groundwater level was reported several metres below the accompanying surface water levels at the following pairs of locations: AGP2 and WTOB2 (ASA), AV3 and WTOB3 (ASA), SV1 and WTOB4 (LEVF), SV2 and WTOB2 (ASA). These results indicate that the surface water bodies are likely losing streams that do not receive baseflow from the underlying aquifer system, at least based on the available data.
- The upstream portion of Salt Creek Swamp and into Breakfast Creek are likely to be receiving baseflow seasonally from the underlying LEVF, and to a lesser extent the ASA, based on the results presented in SV3 and P16 (which is underlain by LEVF), SV4 and P17 (which is underlain by ASA). However, in both instances the upward gradient from groundwater to surface water is only present for part of year, with the gradient reversing in response to periods of lower rainfall. It is noted that the result at SV3 and P16 (LEVF) shows Breakfast Creek as a seasonally gaining stream that directly opposes the observation above at SV1 and WTOB4 (LEVF), which is also in Breakfast Creek but indicates losing stream conditions. This highlights the potential spatial variability in the losing and gaining nature of Breakfast Creek and LEVF.
- The surface water pool, SGP2-B, located near SV4, was plotted with P1 (ASA), which showed a persistent downward gradient between surface water and groundwater, suggesting predominantly losing stream conditions. However, this location (SGP2-B and P1) is confounded somewhat by the aforementioned lateral distance between the locations (approximately 430 m) (i.e. groundwater levels at P1 may not be truly representative of groundwater levels immediately adjacent to SGP2-B).
- Similar to SGP2-B and P1, the water levels in AV1 and P13B (ASA) show the surface water level below the level of groundwater. However, given AV1 and P13B are not directly adjacent to each other, this comparison may not be truly representative of water levels immediately adjacent to SGP2-B.
- A very close relationship was noted between the surface pool, AGP1-B and groundwater bore P18 (ASA) near the Anglesea River. The surface water and ASA appear to be in direct hydraulic connection at this location with near identical and contemporaneous responses to rainfall. The surface water appears to be at a slightly higher elevation throughout the majority of the seasonal cycle, which would suggest predominantly losing conditions, but the small margin generally

observed between the two locations is within the likely survey error. During low water periods the water levels diverge and a clear downwards gradient, and therefore likely losing conditions, exist.

Data from the majority of surface water sampling locations are considered to be consistent with losing stream conditions, noting that the ASA is likely providing baseflow, at least episodically, in the upper portions of Salt Creek, Breakfast Creek and Anglesea River, consistent with the existing CSM. Further, the persistent pools throughout the catchment appear to be predominantly losing features. However, in some instances (i.e. AGP1-B), they are in very close hydraulic connection with the ASA.

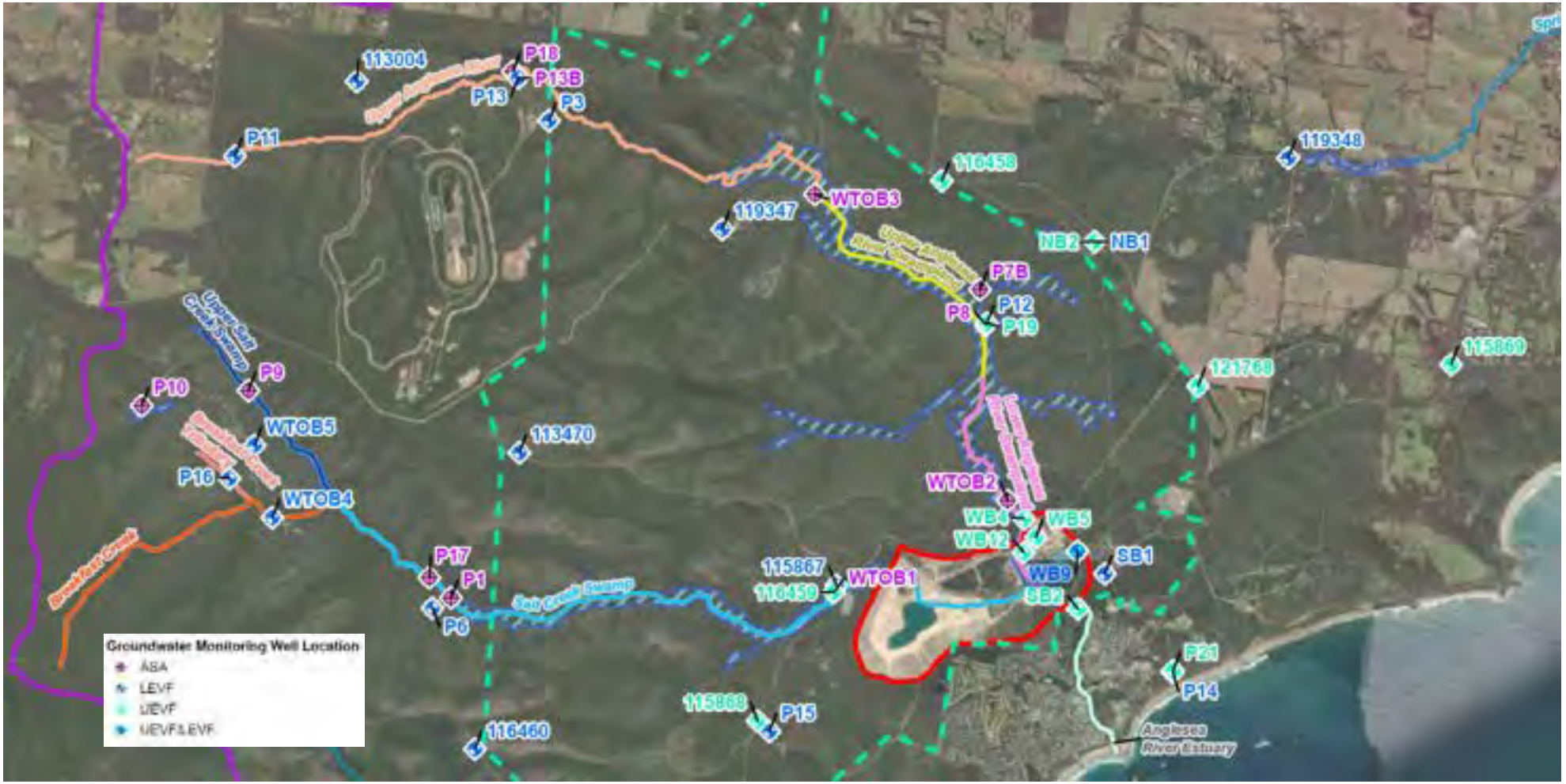


Figure 9 Groundwater Monitoring Locations

4.4.2 Salinity

Analytical results for Total Dissolved Solids (TDS) are included in **Appendix B**, with trend graphs for the ASA, UEVF and LEVF presented in **Appendix B**.

4.4.2.1 ASA

Salinity, measured as TDS, has remained largely consistent for bores within the ASA. Concentrations varied throughout the monitoring period of 2015 to 2023, however, were broadly stable, noting P1 (215 mg/L – 3,600 mg/L) and P8 (1,120 mg/L – 4,180 mg/L) showed higher degrees of variability than the remaining bores. TDS concentrations at the remaining locations were generally reported below 2,000 mg/L (excluding WTOB2), with peaks in P1, P8, P17 and WTOB3 exceeding this concentration.

4.4.2.2 UEVF

Groundwater bores within the UEVF generally reported TDS concentrations below 2,000 mg/L, with the exception of recent results in SB2. TDS in SB2 remained relatively stable from 2012 through to 2018, however, there have been two periods of increasing TDS from 2019 to 2020 and then again from 2022 to 2023 with a sharp decrease noted in between these increasing periods.

The results obtained for NB2 and P19 are broadly consistent from when monitoring began in 2012 and 2015, respectively. NB2 varied from 1,330 mg/L to 1,840 mg/L whilst P19 ranged from 600 mg/L to 823 mg/L. Results from bore 116459 were consistent, however, were limited to a dataset of three results obtained across 2020 and 2021 during a 3-month period. These results may also have been influenced by the integrity of the bore, as discussed in **Section 4.1.3**.

The salinity results did not appear to vary from before to after the bore decommissioning program completed at the Mine during 2019 to 2021.

4.4.2.3 LEVF

TDS results are available for five bores within the LEVF, however, this does not include any of the production bores (GW1-GW7). The results for 119348, P12, P14, P15 and P16 were broadly similar and generally remained below 1,000 mg/L with some variation during the monitoring period.

A singular elevated TDS result (2,890 mg/L) was reported at P15 during July of 2020 which has not been repeated since. The next highest concentration noted at P15 is 1,010 mg/L in January 2022. This result is not considered to represent a long-term trend and was also reported during a period of no active pumping by Barwon Water or at the Mine.

A slight increase in salinity was noted in P16 from when monitoring commenced in 2015 to the current results reported in 2023. A small increase in concentration was noted in August 2019 with concentrations stabilising in future monitoring rounds. This is consistent with the beginning of the borefield pumping to supplement water supply that occurred from August 2019 to June 2020. Given the position of P16 being located adjacent to Breakfast Creek Tributary and away from the coastline, this increasing TDS trend is not considered to represent saline intrusion. These results may be related to inter-aquifer mixing, however, this may not be attributable to Barwon Water pumping given its distance from the northern and southern borefields, or long-term climatic conditions.

4.4.3 pH

Analytical results for pH are included in **Appendix B**, with trend graphs for the ASA, UEVF and LEVF presented in **Appendix B**.

4.4.3.1 ASA

Groundwater bores within the ASA did not exhibit any clear increasing or decreasing trends with respect to pH levels during monitoring from 2015 to 2023. Bores P7B and WTOB2 consistently reported the lowest pH levels with each bore dipping below 4.0 pH units on several occasions. P8 also reported a pH of less than 4.0 pH units on one occasion, however, generally remained between 5.0 and 6.0 pH units, as did P1, WTOB1 and WTOB3. When monitoring was completed for P17 (up until 2019), it usually reported the highest pH, consistently ranging between 6.0 and 7.0 pH units.

The reduced pH levels in P7B, P8, WTOB2 and WTOB3 all occurred during the January 2023 monitoring event with all locations along the Upper and Lower Anglesea River Swamp, these

decreases in pH appear to coincide with a decrease in rainfall and groundwater levels after high levels were reported in November 2022.

Overall, the ASA has broadly reported circum-neutral to slightly acidic conditions, with no apparent long-term trends evident.

4.4.3.2 UEVF

The pH within bores installed in the UEVF has generally been reported between 6.0 and 7.0 pH units, indicating a circum-neutral pH. NB2 and P19 ranged from 6.0-6.6 and 6.0 to 7.0 respectively. The results from 116459 were limited to only three results which varied from 6.1 to 6.7 and may have been influenced by the bore integrity issues noted in **Section 4.1.3**.

The pH results obtained for SB2 were consistently reported around 6.0 pH units with a low of 5.2 noted in 2019. However, a more substantial drop in pH was recorded in the most recent monitoring round (July 2023) with a pH of 3.6 pH units; however, does not currently present a long-term trend. This will need further assessment when subsequent monitoring rounds have been completed.

4.4.3.3 LEVF

Groundwater pH within the LEVF varied between bores, however, each bore reported generally consistent levels of pH, noting that variation exceeded 2 pH units within one bore across the monitoring period. The pH ranged from slightly acidic at P15 and P16 to slightly alkaline in 119348. The remaining bores (P12 and P14) had circum-neutral pH values.

4.4.4 Temperature

Field results for temperature are included in **Appendix B**, with trend graphs for the ASA, UEVF and LEVF presented in **Appendix B**.

4.4.4.1 ASA

Temperature readings collected in the field during purging have been collated for sampling completed in 2021 onwards. The results thus far do no present any clear trend, however, there is some potential evidence of seasonal variation. Results may also be influenced by ambient air temperature during sampling.

4.4.4.2 UEVF

The field temperature readings collected during purging for bores (from 2020 onwards) within the UEVF consistently reported seasonal variation, which may be partly a reflection of ambient air temperature during sampling. NB2 and SB2 show similar responses to the changing climate throughout the year with higher temperature reported during summer and lower temperature during winter. The results for P19 showed a similar trend, however, was more subdued in comparison to NB2 and SB2. Only one result is available for 116459 and was broadly consistent with the results in the remaining UEVF bores, noting the potential bore integrity issues in **Section 4.1.3**.

4.4.4.3 LEVF

The temperature readings collected during purging of bores in the LEVF are variable and appear to correlate with seasonal changes. However, this does not include 119348 which only has two data points, one from 2022 and one from 2023. Additionally, the trend at P12 does not appear to show the expected changes due to seasonal variation, instead a decreasing trend is observed. The temperature reported in P14 during July 2022 is considered to likely be a data transcription error given the result (1°C) is substantially outside historical variation and is unlikely to be representative of groundwater conditions.

4.4.5 Major Ions

The following have been provided in **Appendix B** in relation to major ions and are summarised in the following sections:

- Analytical results;
- Trend graphs for the ASA, UEVF and LEVF; and

- Piper plots, an example of these piper plots is provided below as **Figure 10**, showing the bores within the LEVF.

4.4.5.1 ASA

The distribution of major ions within the ASA as presented on the piper plot (**Appendix B**) shows a broadly similar chemistry for all bores within the ASA with the cation field predominantly comprised of sodium and potassium with the anion field being chloride dominant.

The results presented on the piper plot are consistent with those reported in the trend graphs which show broadly consistent results for each bore between monitoring events with the magnitude of concentrations being proportionally consistent with the overall salinity (TDS) as presented in **Section 4.4.2**.

4.4.5.2 UEVF

Concentrations of major ions remained broadly consistent in NB2 and P19 across the monitoring period. 116459 also largely reported similar results but has a limited available dataset which may not be entirely representative of the UEVF as noted in **Section 4.1.3**. The results reported in NB2 were highly variable and largely followed the trend observed in TDS (as discussed in **Section 4.4.2**). This included an increasing trend from 2019 to 2020 followed by a steep drop and then a steady increase until 2023. Overall, the major ions in SB2 have shown a generally increasing trend over time.

All bores in the UEVF were shown to have similar ionic ratios as presented in **Appendix B**, noting that bore 116549 reported a slightly lower proportion of chloride than the remaining bores. NB2 and 116549 both reported slightly higher ratios of calcium in comparison to the other bores in the UEVF. Overall, the groundwater is indicated to be sodium – chloride dominated.

4.4.5.3 LEVF

Major ions concentrations have been reported to be largely stable across the monitoring period, noting the following:

- Initial decreases in concentrations of calcium and magnesium is evident in 119348, P14 and P15; and
- Highly variable concentrations of ions at P16, particularly sulfate which ranged from 13 mg/L (July 2023) to 78 mg/L (July 2018). The results for sulfate fluctuate from being similar to P15 when concentrations are high to low concentrations that are consistent with 119348, P12 and P14.

The groundwater results within the LEVF report generally similar ionic ratios, however, there are two different types of groundwater present based on the results provided in the piper plot (**Appendix B** and **Figure 10**). This shows that the results for 119348, P12 and P14 differ from those of P15 and P16 in that:

- Higher proportions of sodium and potassium are present in the cation field with lower proportions of magnesium; and
- Reduced proportions of chloride and sulfate correspond with higher proportions of bicarbonate in the anion field.

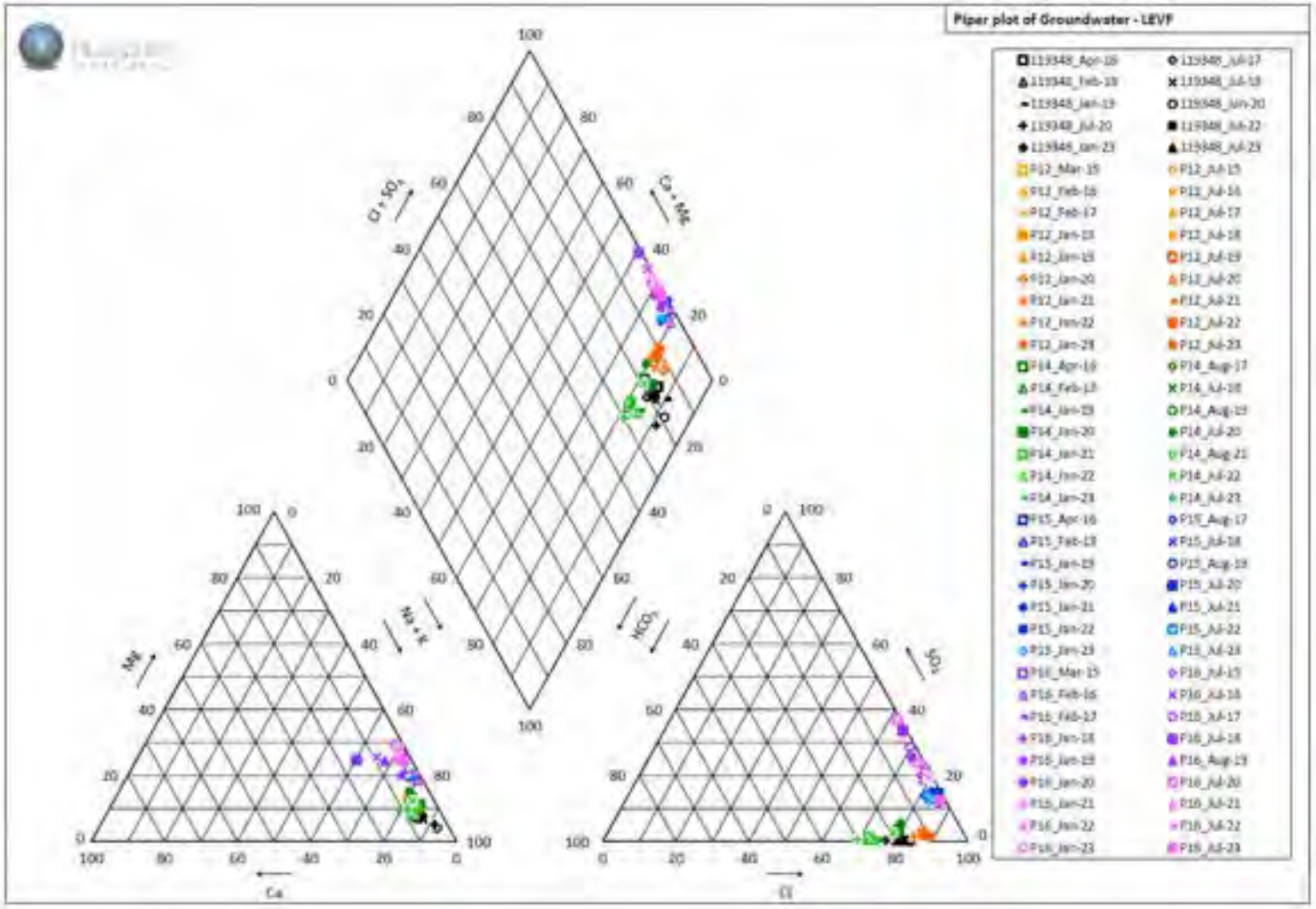


Figure 10 LEVF Piper Plot

4.4.6 Bromide

Analytical results for bromide are included in **Appendix B**, with trend graphs for the UEVF and LEVF presented in **Appendix B**. Bromide analysis, together with other indicators of salinity, such as chloride and TDS, has been included in the MAP as a way of assessing saline intrusion risk at bores in close proximity to the coast. As such, bromide analysis has not been completed for bores within the ASA, similarly the UEVF has only been analysed for bromide on two occasions at P19.

Bromide concentrations in standard seawater are of the order of 67 mg/kg, relative to chloride concentrations of 19,350 mg/kg (Drever, 1997). As such, a Cl/Br ratio of the order of 300 can be expected for typical seawater.

The majority of bores within the LEVF do not have sufficient data to assess any long-term trends with respect to bromide as only 1-2 analytical results are available. However, P14 has been monitored for bromide historically (since 2012) and contains sufficient data to assess long-term trends. The results at P14 indicate a decreasing concentration of bromide with an initial result in of 993 µg/L reported in January 2012 and the most recent result of 385 µg/L reported in July 2023. The result is not consistent with the TDS result for P14 which shows a generally stable trend, with occasional peaks above 1,000 uS/cm.

Analysis of chloride-bromide ratio at P14 showed a highly variable ratio from 349.7 (July 2015) to 752.7 (August 2019). Whilst the highest chloride-bromide ratio was reported during a period of pumping by Barwon Water, the ratio had already been increasing since January 2019. Overall, the Cl-Br ratio appears to rise over the course of the monitoring period at P14. However, this does not indicate a trend towards the composition of seawater, which has a lower ratio. As such, there is no evidence during the monitoring period of saline intrusion at P14, which is consistent with the persistent low and possibly declining TDS at this location.

4.5 Summary

The ongoing monitoring of groundwater within the ASA, UEVF and LEVF at the Anglesea Borefield has been broadly completed in accordance with the requirements outlined in the MAP. The water level trigger levels associated with monitoring bores P8 and P19 were met on occasion in each bore individually; however, the triggers were not met for both bores simultaneously, as such a trigger level exceedance has not occurred.

Water levels in the ASA at the various monitoring locations does not appear to exhibit measurable declines during pumping periods in the northern and southern borefields between 2009 and 2023. There is variability in water levels in the ASA that is attributable to seasonal and longer-term changes in rainfall during the monitoring period. The field parameters and analytical results collected in accordance with the MAP over this period do not indicate any substantial change in the quality of groundwater in the ASA, noting that there is a high degree of variability between sample locations in the ASA, including:

- Salinity, measured as TDS, was generally reported below 2,000 mg/L within the ASA (excluding WTOB2). This generally remained consistent through the monitoring period with minor variations.
- The pH within the ASA is highly variable with P7B and WTOB2 being slightly acidic with pH values reported below 4.0 pH units on multiple occasions. The remaining bores broadly reported pH levels between 5.0 and 7.0 pH units which is considered to be circum-neutral to slightly acidic.
- Temperature readings have been provided for recent years of monitoring; however, do not show any clear trends, noting there is some evidence of seasonal variation that may also be partly attributable to ambient air temperatures during sampling.
- Concentrations and relative proportions of major ions varied between bores which is also reflected the aforementioned TDS concentrations. Each bore remained relatively stable with respect to major ion composition. Proportionally, groundwater from monitoring bores within the ASA all reported similar ionic signatures which is characterised by sodium - chloride dominance.

The UEVF water levels vary pending on proximity to the Mine and Barwon Water borefields. Water levels in the UEVF generally remained stable noting seasonal variation and longer-term responses to rainfall. There were several locations (116459, 115868, WB4, WB5, WB9 and WB12) that exhibited

increases in water levels in recent years which is likely attributable to the cessation of pumping at the Mine, recovery within the LEVF and increases in rainfall. Bores 116458, NB2 and 121768 appear to have been influenced by pumping in the northern borefield with decreases being strongly correlated with periods of pumping. It is noted that bore 116459, 115868 and 121768 may not be entirely representative of conditions in UEVF due bore integrity issues outlined in **Section 4.1.3**. The following was noted in respect to the field parameters and analytical results obtained during the monitoring period:

- Concentrations of TDS are generally reported below 2,000 mg/L. SB2 was reported to show an increasing salinity trend during 2019 to 2020 and 2022 to 2023, which broadly correlates with the recent pumping periods in the Anglesea Borefield.
- The pH within the UEVF is generally consistent and is considered to be circum-neutral with a range between 6.0 and 7.0 pH units in most cases. A decline in pH levels (lowest recorded level of 3.6 pH units) was reported in SB2 which correlates with the aforementioned increases in TDS concentrations and declining water levels.
- Consistent changes in temperature readings were reported in the UEVF in recent years that broadly reflect seasonal variation with no clear longer term trend apparent.
- The results for major ions in the UEVF indicate that the bores generally showed similar ionic compositions, with slightly lower proportions of chloride in 116549 and slightly elevated ratios of calcium in NB2 and 116549. SB2 major ions concentrations increased in-line with the elevated TDS concentrations as noted above. In general, the groundwater major ion signature within the UEVF is sodium – chloride dominated.

Bores within the LEVF reported variable water levels across the monitoring period. Locations in proximity to the northern and southern borefields showed clear decreases when active pumping was occurring and exhibited recovery trends in the intervening period. Locations further from the borefield do not appear to have been influenced by pumping however, appear to be influenced by changes in recharge due to seasonal rainfall variability. The following observations were made in respect to the field parameters and analytical data collected from the LEVF:

- TDS results within the LEVF generally remained below 1,000 mg/L, noting that this was exceeded on two occasions (2015 and 2023) in P15. A small increase in concentration was noted in P16 in August 2019 with concentrations stabilising in future monitoring rounds. This is correlated with the beginning of the Borefield pumping to supplement water supply that occurred from August 2019 to June 2020.
- pH within the LEVF varied between bores; however, each bore reported generally consistent levels of pH, noting that variation exceeded 2.0 pH units within one bore across the monitoring period. The pH ranged from slightly acidic (4.0 pH units to 6.0 pH units) at P15 and P16 to slightly alkaline in 119348 (generally between 8.0 pH units and 9.0 pH units). The remaining bores (P12 and P14) reported circum-neutral pH values generally between 6.0 pH units and 7.0 pH units.
- Temperature readings in the LEVF are variable and likely attributable to seasonal variations. A data point for P14 collected during July 2022 is considered to be erroneous with a temperature of 1°C reported which is substantially outside the historical record for this aquifer.
- Initial decreases in concentrations of calcium and magnesium are evident in 119348, P14 and P15. Highly variable concentrations of ions, particularly sulfate are observed in P16. The results for sulfate fluctuate from being similar to P15 when concentrations are high to low concentrations that are consistent with 119348, P12 and P14.
- The groundwater major ion results within the LEVF report generally similar ionic ratios, however, there are two different types of groundwater evident. The results in 119348, P12 and P14 reported higher proportions of sodium and potassium are present in the cation field with lower proportions of magnesium in comparison to P15 and P16. Additionally, 119348, P12 and P14 reported lower proportions of chloride and sulfate with corresponding higher proportions of bicarbonate in the anion field than P15 and P16.

Bromide has been analysed selectively in coastal locations to monitor the potential for seawater intrusion. LEVF bore P14 has been monitored for bromide since 2012 and contains a good historical record from which to assess long-term trends. The results at P14 indicate a relatively consistent decreasing concentration of bromide, with an increasing trend observed in the chloride-bromide ratio. The increasing trend in the chloride-bromide ratio is interpreted to represent a trend away from a seawater signature (based on the literature, i.e. Drever, 1997). As such, there is no evidence of seawater intrusion into the aquifer at this location.

4.6 CSM Review

The CSM presented by GHD in the Anglesea Groundwater Model Update (2024) as discussed in **Section 2.3** has been reviewed considering the data that has been collected since the previous BE Review (GHD, 2013) with the following noted:

- The groundwater levels in the ASA were found to be largely driven by changes in rainfall with no apparent correlations with either Barwon Water or the Mine's pumping activities. These relationships are presented in the composite plots in **Appendix A** and show the water level trends at nested bores in the ASA, UEVF and LEVF combined. The observed lack of correlation is consistent with an expected degree of hydraulic separation between the ASA and UEVF/LEVF across much of the lower investigation area;
- The LEVF generally exhibits an upward gradient to the UEVF which in turn exhibits an upward gradient to the ASA. The connection between aquifers is limited due to the MEVF, desaturation of the UEVF near the Mine and coal seams and clay layers, such that the presence of an upward gradient may not result in substantial upward leakage between the aquifers. These gradients are not representative of the entire investigation area, as the upstream portion of the Anglesea River is shown to have a downward hydraulic gradient from the ASA to the UEVF. The inter-aquifer interactions are also variable depending on any active pumping periods and long-term impacts to the UEVF due to historical pumping; and
- Despite no correlations being observed between the ASA groundwater levels and pumping activities during the monitoring period, the potential remains for the ASA to be impacted by pumping in the UEVF and LEVF primarily around Upper Anglesea River Swamp and the upper extent of Salt Creek Swamp. However, it is expected that any pumping induced cone of depression would only propagate into these areas under high or prolonged rates of groundwater extraction.

The data collected and analysed during the current monitoring period is considered to be consistent with the existing CSM, noting data gaps outlined in **Section 4.7**.

4.7 Data Gaps

In accordance with the intent of the MAP to monitor the groundwater systems (ASA, UEVF and LEVF) to observe any potential impacts associated with pumping in the LEVF, the following data gap is noted:

- As noted for surface water (**Section 3.7**), there remains some uncertainty regarding the nature of vertical gradients and surface water – groundwater interactions that would have existed prior to the Mine operations, particularly in the lower catchment area, and the extent to which the ongoing recovery of the UEVF will affect catchment conditions and the application of the MAP in future. Numerical modelling may assist in elucidating these future interactions.

5 Acid Sulfate Soils

5.1 Review of Relevant Reports

5.1.1 2013 BE Review

The BE Review (GHD 2013) assessed the risks due to acid generation in the catchment by undertaking a qualitative assessment of the acid generating processes across the catchment at the time. This understanding was based on literature reviews, limited Acid Sulfate Soil (ASS) field data in the Anglesea River by Fiona Glover and Assoc. Prof. John Webb (Glover 2014) and an assessment of short-term water monitoring data collected under the MAP.

A conceptual acid generation model was developed for the project based on the assessment of groundwater and surface interactions in the Anglesea catchment.

The modelling results (GHD, 2013) indicated that the ASA along the Upper Anglesea River, Upper and Lower Anglesea River Swamp and Salt Creek Swamp are reported to have up to 1 metre of drawdown generally in response to pumping (7,000 ML a year for five years), noting localised areas of greater drawdown are present.

The BE Review (GHD 2013) recommended further ASS sampling and analysis to investigate and confirm the acid generation processes, location of potential sources and acid contribution across the catchment and thus improve the level of confidence in the current assessment of potential impacts on the acid generating process associated with extraction.

5.1.2 2014 Acid Sulfate Soil Investigation

Monash University conducted an ASS investigation in the Upper Anglesea River and Anglesea River Swamplands in 2017 and the Salt Creek Swamp in 2018 (Wong et al. 2020) to supplement the work completed by Glover (2014). It is noted that the locations in the Upper Anglesea River were denoted ‘Upper Swamplands Tributary’ by Monash University.

The aim of the 2017 and 2018 ASS investigations was to identify the spatial distribution of sulfidic materials in the Salt Creek Swamp and the Upper Anglesea River and Swamplands and their potential to oxidise and generate acidity. The report also provided recommendations for future monitoring. A summary of the work completed by Wong et al. (2020) is provided herein.

5.2 MAP Requirements and Objectives/Rationale

Acid Sulfate Soil investigation requirements as outlined in the MAP are as follows:

Item 8 ACID SULFATE INVESTIGATIONS

8.1 Further assess the potential role of any drawdown from taking groundwater under the Order in exacerbating the risk of acid generation by:

> *a) undertaking a soil sampling program to complete a Preliminary Acid Sulfate Soil (PASS) investigation of Salt Creek and Anglesea Swamplands;*
>
> *b) during the soil sampling program, assessing the perched groundwater chemistry within the swamplands to quantify the level of acidity currently present;*
>
> *c) providing preliminary estimates of acid runoff from the swampland;*
>
> *d) if possible, determining the contribution to the total acid flux present in the swamplands;*
>
> *e) where necessary, identifying any additional monitoring requirements and developing management options to manage or mitigate any potential impacts of taking groundwater under the Order.*

This study completed by Wong *et al.* (2020) was undertaken to address the requirements for an ASS investigation as part of the requirement for Barwon Water’s MAP for the Anglesea Borefield. The results of the study have been used to update the existing conceptual acid generation model.

In additional to the ASS investigation, groundwater and surface water monitoring has been undertaken with the following ASS parameters included in the analytical suite to assist in understanding the acidity regime within the swamplands: field parameters (pH, EC, DO), sulfate, chloride and total alkalinity.

5.3 Sampling Methodology

Field ASS sampling of the Upper Anglesea River and Swamplands sites was undertaken by Monash University in November 2017 and sampling of the Salt Creek Swamp sites occurred in January 2018 (Wong *et al.* 2020). Sites were located along the course of the two creeks; however, were not established every 100 m, as recommended by the *National Acid Sulfate Soils Guidance: National acid sulfate soils identification and laboratory methods manual* (Sullivan *et al.* 2018) due to limitations in accessing the swamp (Wong *et al.* 2020). Instead, sites were located where access was available. The approximate sampling frequencies utilised were one location every 80 m to 1.1 km at the Anglesea River Swamp and 130 m to 1.1 km at Salt Creek Swamp. The field sampling locations are shown on **Figure F5a** and **Figure F5b**.

Wong *et al.* (2020) sampled the soil using a gouge auger, Russian D-section auger or standard bucket auger. Samples were collected at 0.5 m intervals, or where there was a change in horizon or facies. Samples were placed in a freezer and kept frozen until analysis.

Samples were analysed by Monash University for the following parameters:

- soil pH
- soil EC
- soluble cations and anions
- exchangeable cations
- soil organic carbon (SOC)
- total Nitrogen (N)
- particle size distribution
- Retained Acidity
- Titratable Actual Acidity (TAA)
- Acid Neutralising Capacity (ANC)
- Acid Volatile Sulfur (AVS) (a measure of iron monosulfides [FeS])
- Chromium Reducible Sulfur (SCR) (a measure of pyrite [FeS2])

5.4 Results

The ASS investigation report (Wong *et al.* 2020) did not include a table of laboratory data. This was subsequently provided by Barwon Water for this review. As such, the laboratory data has been tabulated and included in **Appendix C** along with calculations of existing acidity, potential sulfidic acidity, and net acidity.

In accordance with Sullivan *et al.* (2018), the Net Acidity equation is defined as:

$$\text{Net Acidity} = \text{Existing Acidity (Actual Acidity + Retained Acidity)} + \text{Potential Sulfidic Acidity}$$

Potential sulfidic acidity includes acidity from oxidation of pyrite (FeS_2) and iron monosulfides (FeS).

Acid Neutralising Capacity has not been included in the Net Acidity equation given that the samples did not contain any ANC in the form of shells or other carbonates.

5.4.1 Anglesea River Swamp

A total of 28 sites were sampled. Of these, 25 sites were located in the Anglesea River Swamplands (MSC4-MSC28) and three were located in the Upper Anglesea River (MSC1-MSC3), although they

were denoted 'Upper Swamplands Tributary' sites by Monash University. All sites were sampled to a maximum depth of 1.40 m. In total, 108 samples were collected for analysis. In their report, Monash University grouped and discussed the sites according to their location (**Table 6**).

Table 6 Sampling Sites – Marshy Creek (after Wong et al. 2020)

Location	Sampling Sites	Mean Depth to Water (m)
Upper Swamplands Tributary	MSC1–3	0.26
Upper Swamplands	MSC4–11	0.29
Mid-Swamplands Tributary	MSC12–15	Not encountered
Mid-Swamplands	MSC16–19	0.51 (watertable intercepted only at Sites MSC18-19)
Lower Swamplands Tributary	MSC20 and MSC27	MSC20: 0.85 MSC27: 0.40
Lower Swamplands	MSC21-26, MSC28	0.43

Wong *et al.* (2020) stated that site access was impeded by dense vegetation, therefore sites were selected as far as practicable from the swamp's edge. At the time of sampling, the depth of the watertable ranged from the surface to greater than 1.03 m (the limit of investigation at MSC17).

5.4.1.1 Actual Acidity

All 108 samples analysed contained detectable concentrations of TAA ranging from low (7 mol H^+/t) to moderate (604 mol H^+/t). The results indicate that the samples have previously oxidised and have generated acidity. This was expected given the soil pH values which ranged from 2.03 to 4.72 and were generally below 4.

Based on the results, soils from the tributaries (Upper Swamplands Tributary, Mid-Swamplands Tributary and Lower Swamplands Tributary) returned lower levels of TAA than the swamplands (Upper Swamplands, Mid-Swamplands and Lower Swamplands). Wong *et al.* (2020) reported that the soils in the Tributary sites had lower ECs and lower SOC than soils encountered in the swamplands. The highest TAA was reported in a sample MSC25 from the Lower Swamplands at a depth of 0.55-0.76 m.

The TAA results are shown in **Table 7**.

Table 7 Titratable Actual Acidity (TAA) Concentrations in Anglesea River Swamp (adapted from Wong *et al.* 2020)

Sites	No. Samples	Min. TAA (mol H^+/t)	Max. TAA (mol H^+/t)	Mean TAA (mol H^+/t)	Mean Soil pH*
Upper Swamplands Tributary	10	20 mol H^+/t (MSC3 at 0.20 to 0.60 m)	99 mol H^+/t (MSC1 at 0 to 0.1m)	58	3.6
Upper Swamplands	33	23 mol H^+/t (MSC8 at 0.85 to 1.30 m)	415 mol H^+/t (MSC8 at 0 to 0.28 m)	228	3.1
Mid-Swamplands Tributary	14	7 mol H^+/t	423 mol H^+/t	110	3.3

		(MSC14 at 0.60 to 0.83 m)	(MSC14 at 0.60 to 0.83 m)		
Mid-Swamplands	12	53 mol H^+/t (MSC17 at 0.0 to 0.46 m)	511 mol H^+/t (MSC17 at 0.90 to 1.03 m)	260	3.0
Lower Swamplands Tributary	8	65 mol H^+/t (MSC20 at 0.75 to 1.12 m)	560 mol H^+/t (MSC20 at 0 to 0.43 m)	147	3.9
Lower Swamplands	31	50 mol H^+/t (MSC22 at 0.80 to 1.20 m)	604 mol H^+/t (MSC25 at 0.55 to 0.76 m)	337	3.1

* Mean pH calculated using the relationship pH=-log[H^+]

5.4.1.2 Retained Acidity

Of the 108 samples, two samples contained detectable concentrations of retained acidity, albeit at negligible levels of 1 mol H^+/t (Upper Swamplands: MSC8 at 0.85 to 1.30 m) and 6 mol H^+/t (Lower Swamplands Tributary: MSC11 at 0.83 to 1.04 m). The results indicate the absence of relatively insoluble sulfate salts (such as jarosite, natrojarosite, schwertmannite and other iron and aluminium hydroxysulfate minerals).

5.4.1.3 Acid Neutralising Capacity

Acid Neutralising Capacity analysis is triggered when the pH_{KCl} is above 6.5. All samples reported pH_{KCl} less than 6.5; therefore, no ANC analysis was undertaken. The results imply that samples do not contain appreciable levels of ANC.

5.4.1.4 Reduced Inorganic Sulfur

The Chromium Reducible Sulfur (SCR) results indicate that reduced inorganic sulfur (RIS) as pyrite was detected in 52 samples. The range of SCR results are shown in **Table 8**. The results indicate that substantially more RIS was encountered in the Upper Swamplands than at any other location. In the Upper Swamplands, extremely high SCR values (>5000 mol H+/t) were reported in silts from MSC9 and MSC10 from the surface to the limit of investigation of 1.20 m. Appreciable concentrations (>~100 mol H+/t) were also encountered at MSC6 and MSC11, from depths of 1.00 m and 0 m, respectively. In the Lower Swamplands, only one sample (MSC26) from a depth of 0.67 m to 1.05 m returned appreciable concentration of RIS of 324 moles H+/t. Lower levels of RIS (i.e. below 50 mol H+/t) were encountered at five other locations in the Lower Swamplands, below a depth of 0.50 m. The SCR results are shown in **Table 8**.

Table 8 Chromium Reducible Sulfur (S_{CR}) Concentrations in Anglesea River (adapted from Wong et al. 2020)

Sites	Min. S_{CR} (mol H^+/t)	Max . S_{CR} (mol H^+/t)	Mean S_{CR} (mol H^+/t)
Upper Swamplands Tributary	0 mol H^+/t (various)	8 mol H^+/t (MSC3 at 0 to 0.20 m)	<10
Upper Swamplands	0 mol H^+/t (various)	6877 mol H^+/t (MSC9 at 0.25 to 0.50 m)	759
Mid-Swamplands Tributary	0 mol H^+/t (various)	16 mol H^+/t (MSC14 at 0.60 to 0.83 m)	10

Mid-Swamplands	0 mol H^+/t (various)	3 mol H^+/t (MSC16 at 0.15 to 0.35 m)	<10
Lower Swamplands Tributary	0 mol H^+/t (various)	13 mol H^+/t (MSC27 at 0.80 to 0.20 m)	<10
Lower Swamplands	0 mol H^+/t (various)	325 mol H^+/t (MSC26 at 0.67 to 1.05 m)	18

5.4.1.5 Acid Volatile Sulfur

Acid Volatile Sulfide was detected in 18 samples, indicating the presence of iron monosulfides, albeit at low levels. The AVS values are shown in **Table 9**.

Table 9 Acid Volatile Sulfide (AVS) Concentrations in Anglesea River Swamp (adapted from Wong *et al*. 2020)

Sites	Min. AVS (mol H^+/t)	Max. AVS (mol H^+/t)	Mean AVS (mol H^+/t)
Upper Swamplands Tributary	0 mol H^+/t (various)	7 mol H^+/t (MSC1 at 0.42 to 0.65 m)	1.9
Upper Swamplands	0 mol H^+/t (various)	13 mol H^+/t (MSC5 at 0.65 to 0.85 m)	0.9
Mid-Swamplands Tributary	0 mol H^+/t (various)	13 mol H^+/t (MSC13 at 0.45 to 0.50 m)	3.3
Mid-Swamplands	0 mol H^+/t (various)	1 mol H^+/t (MSC16 at 0.15 to 0.35 m)	0.1
Lower Swamplands Tributary	0 mol H^+/t (various)	3 mol H^+/t (MSC20 at 0.75 to 1.12 m)	0.3
Lower Swamplands	0 mol H^+/t (all)	0 mol H^+/t (all)	0

5.4.1.6 Net Acidity

The net acidity exceeded the ‘Action Criteria’ of 18 mol H+/t in all samples collected in Marshy Creek, except for MSC13 at 0.05 m to 0.21 m (18 H+/t). At all locations other than the Upper Swamplands, the net acidity is dominated by actual acidity and not potential sulfidic acidity. The net acidity values are shown in **Table 10**.

Table 10 Net Acidity concentrations in Anglesea River Swamp (adapted from Wong et al. 2020)

Sites	Min. Net Acidity (mol H^+/t)	Max. Net Acidity (mol H^+/t)	Mean Net Acidity (mol H^+/t)

Upper Swamplands Tributary	22 mol H^+/t (MSC3 at 0.20 to 0.60 m)	110 mol H^+/t (MSC1 at 0.0 to 0.10 m)	63
Upper Swamplands	69 mol H^+/t (MSC5 at 0.65 to 0.85 m)	7168 mol H^+/t (MSC9 at 0.25 to 0.50 m)	988
Mid-Swamplands Tributary	18 mol H^+/t (MSC13 at 0.05 to 0.21 m)	424 mol H^+/t (MSC15 at 0 to 0.10 m)	120
Mid-Swamplands	53 mol H^+/t (MSC17 at 0 to 0.46 m)	511 mol H^+/t (MSC17 at 0.90 to 1.03 m)	261
Lower Swamplands Tributary	70 mol H^+/t (MSC27 at 0.30 to 0.70 m)	559 mol H^+/t (MSC20 at 0 to 0.43 m)	151
Lower Swamplands	52 mol H^+/t (MSC22 at 0.80 to 1.20 m)	730 mol H^+/t (MSC26 at 0.67 to 1.05 m)	356

5.4.1.7 Summary – Anglesea River

The soils within the Upper Anglesea River and Anglesea River Swamplands are acidic with pH values generally between 2 and 4 pH units. The results of ASS testing indicate that the soils contain moderate levels of actual acidity, indicating that the soils continue to represent a store of acidity that can mobilise into the waterways following rainfall events and as a result of groundwater-surface water interaction. Negligible retained acidity was detected within the soil samples indicating an absence of less soluble minerals such as jarosite in the soil. Therefore, retained acidity does not represent a source of acidity for soils in the Upper Anglesea River and swamplands. There is no inherent ANC in the soil to buffer any acidity.

The soils within the Upper Anglesea River and Anglesea River Swamplands contain low levels of RIS except at the Upper Swamplands where very high levels of RIS of up to 6877 mol H^+/t was detected throughout the profile assessed. The results indicate that soils in the Upper Swamplands, and particularly in the vicinity of MSC9, MSC10 and MSC11, and to a lesser extent, MSC6, contain pyritic acidity that could mobilise following oxidation and flushing. Low levels of AVS, and hence monosulfides, were encountered in the soil indicating a low risk from future oxidation of existing monosulfides.

5.4.2 Salt Creek

A total of 25 sites were sampled in the Salt Creek Swamp to a maximum depth of 1.42 m. 116 samples were collected. In its report, Monash University grouped and discussed the sites according to their location along Salt Creek (**Table 11**).

Table 11 Sampling Sites – Salt Creek Swamp

Location	Sampling Sites	Mean Depth to Water (m)
Tributary Sites	STC1, 6 and 18	STC1: 0.75 STC6: did not reach watertable STC18: 0.72
Upper Swamplands	STC2-5	0.68
Mid-Swamplands	STC7-17	0.84 (watertable intercepted only at Sites STC7, 8, 9 and 11)

Lower Swamplands	STC19-21	Did not reach watertable
Lower Channel	STC22-25	STC22: did not reach watertable STC23: surface water STC24: did not reach watertable STC25: did not reach watertable

Wong *et al.* (2020) reported that access in the swamplands was hindered by limited track access, poor conditions of the track and dense vegetation. Therefore, sites were selected where access was available. At the time of sampling, the depth of the watertable ranged from the surface to greater than 1.39 m (the limit of investigation at STC12). Unlike the Anglesea River samples, the soils within the Salt Creek swamp were not considered saline. Some sites had high concentrations of SOC, however the SOC concentrations at Salt Creek Swamp were generally lower than the sites sampled at the Anglesea River.

5.4.2.1 Actual Acidity

All 116 samples analysed contained detectable concentrations of TAA ranging from low (3 mol H^+/t) to moderate (610 mol H^+/t). The results indicate that the samples have previously oxidised and have generated acidity. This was expected given the measured soil pH values which ranged from 2.81 to 4.78 pH units. The average TAA results in soils at the Salt Creek Swamp were not dissimilar to those in the Anglesea River Swamplands; however, the soil pH at the Salt Creek Swamp was generally less acidic than the Anglesea River Swamplands.

Based on the results, soils from the Lower Swamplands returned higher concentrations of TAA and lower pH values than soils from Tributary sites, Upper Swamplands, Mid-Swamplands and Lower Channel. The highest TAA value was reported in sample STC21 from the Lower Swamplands at a depth of at 0.25 to 0.45 m.

The TAA results are shown in **Table 12**.

Table 12 Titratable Actual Acidity (TAA) Concentrations - Salt Creek Swamp (adapted from Wong *et al*. 2020)

Sites	No. Samples	Min TAA (mol H^+/t)	Max TAA (mol H^+/t)	Average TAA (mol H+/t)	Mean Soil pH
Tributary sites	16	35 mol H^+/t (STC1 at 0.52 to 0.81 m)	346 mol H^+/t (STC18 at 0.60 to 0.95 m)	180	3.7
Upper Swamplands	18	71 mol H^+/t (STC2 at 0.90 to 1.27 m)	307 mol H^+/t (STC3 at 0.90 to 1.20 m)	215	3.6
Mid-Swamplands	53	33 mol H^+/t (STC7 at 0.58 to 0.80 m)	434 mol H^+/t (STC7 at 0 to 0.12 m)	248	3.4
Lower Swamplands	11	121 mol H^+/t (STC19 at 0 to 0.10 m)	610 mol H^+/t (STC21 at 0.25 to 0.45 m)	276	3.3
Lower Channel	18	3 mol H^+/t	347 mol H^+/t	117	3.7

		(STC25 at 0 to 0.15 m)	(STC22 at 0 to 0.20 m)		

* Average pH calculated using the relationship pH=-log[H^+].

5.4.2.2 Retained Acidity

Of the 116 samples, 80 samples contained detectable concentrations of retained acidity. Samples from the Lower Swamplands did not report any retained acidity. The retained acidity concentrations are shown in **Table 13**.

Table 13 Retained Acidity concentrations - Salt Creek Swamp (adapted from Wong *et al*. 2020)

Sites	Min. Retained Acidity (mol H^+/t)	Max. Retained Acidity (mol H^+/t)	Mean Retained Acidity (mol H^+/t)
Tributary sites	0 mol H^+/t (STC1 at 0.52 to 0.81 m)	96 mol H^+/t (STC18 at 1.10 to 1.20 m)	18
Upper Swamplands	0 mol H^+/t (STC4 at 0.74 to 1.38 m)	19 mol H^+/t (STC5 at 0.50 to 0.65 m)	6
Mid-Swamplands	0 mol H^+/t (various)	64 mol H^+/t (STC11 at 0.90 to 1.10 m)	19
Lower Swamplands	0 mol H^+/t (all)	0 mol H^+/t (all)	0
Lower Channel	0 mol H^+/t (various)	31 mol H^+/t (STC24 at 0.75 to 0.86 m)	5

5.4.2.3 Acid Neutralising Capacity

Acid Neutralising Capacity analysis is triggered when the pH_{KCl} is above 6.5. All samples reported pH_{KCl} <6.5; therefore, no ANC analysis was triggered.

5.4.2.4 Reduced Inorganic Sulfur

The Chromium Reducible Sulfur (S_{CR}) results indicate that RIS, as pyrite, was detected in 33 samples in the Salt Creek Swamp. The results indicate that RIS was generally 'low to moderate' and was generally absent in soil samples from the Upper and Lower Swamplands. The highest S_{CR} value reported was 37 mol H^+/t in sample STC15 at a depth of 0.30 to 0.60 m.

The S_{CR} results are shown in **Table 14.**

Table 14 Chromium Reducible Sulfur (S_{CR}) Concentrations - Salt Creek Swamp (adapted from Wong *et al*. 2020)

Sites	Min. S_{CR} (mol H^+/t)	Max. S_{CR} (mol H^+/t)	Mean S_{CR} (mol H^+/t)
Tributary sites	0 mol H^+/t (various)	19 mol H^+/t (STC18 at 0.30 to 0.60 m)	3
Upper Swamplands	0 mol H^+/t (various)	2 mol H^+/t (STC2 at 0.50 to 0.65 m)	0
Mid-Swamplands	0 mol H^+/t (various)	37 mol H^+/t (STC15 at 0.30 to 0.60 m)	5

Lower Swamplands	0 mol H^+/t (all)	0 mol H^+/t (all)	0
Lower Channel	0 mol H^+/t (various)	15 mol H^+/t (STC25 at 0 to 0.15 m)	5

5.4.2.5 Acid Volatile Sulfur

Acid Volatile Sulfide (AVS) was detected in 16 samples in Salt Creek Swamp, albeit at low levels. The AVS values are shown in **Table 15**.

Table 15 Acid Volatile Sulfide (AVS) Concentrations - Salt Creek Swamp (adapted from Wong *et al*. 2020)

Sites	Min. AVS (mol H^+/t)	Max. AVS (mol H^+/t)	Mean AVS (mol H^+/t)
Tributary Sites	0 mol H^+/t (various)	8 mol H^+/t (STC1 at 0.81 to 1.17 m)	1
Upper Swamplands	0 mol H^+/t (various)	6 mol H^+/t (STC2 at 0.90 to 1.27 m)	0.3
Mid-Swamplands	0 mol H^+/t (various)	3 mol H^+/t (STC10 at 0.70 to 1.05 m)	0.1
Lower Swamplands	0 mol H^+/t (all)	0 mol H^+/t (all)	0
Lower Channel	0 mol H^+/t (various)	15 mol H^+/t (STC25 at 0 to 0.15 m)	14

5.4.2.6 Net Acidity

The Net Acidity exceeded the 'Action Criteria' of 18 mol H^+/t in all samples collected in the Salt Creek Swamp. At all locations, the net acidity is dominated by actual acidity and not potential acidity. The Net Acidity values are shown in **Table 16**.

Table 16 Net Acidity concentrations - Salt Creek Swamp (adapted from Wong *et al*. 2020)

Sites	Min. Net Acidity (mol H^+/t)	Max. Net Acidity (mol H^+/t)	Mean Net Acidity (mol H^+/t)
Tributary sites	38 mol H^+/t (STC1 at 0 to 0.18 m)	422 mol H^+/t (STC18 at 1.10 to 1.20 m)	197
Upper Swamplands	80 mol H^+/t (STC2 at 0.90 to 1.27 m)	311 mol H^+/t (STC3 at 0.90 to 1.20 m)	221
Mid-Swamplands	44 mol H^+/t (STC7 at 0.58 to 0.80 m)	488 mol H^+/t (STC7 at 0 to 0.12 m)	271
Lower Swamplands	121 mol H^+/t (STC19 at 0 to 0.10 m)	610 mol H^+/t (STC21 at 0.25 to 0.45 m)	276

Lower Channel	22 mol H^+/t (STC25 at 0.40 to 0.65 m)	347 mol H^+/t (STC22 at 0 to 0.20 m)	129

5.4.2.7 Summary – Salt Creek Swamp

The soils within Salt Creek Swamp are acidic with pH values generally between 3 and 4 pH units. The results of ASS testing indicate that the soils contain moderate levels of actual acidity, and, at some sites, low to moderate levels of retained acidity. These results indicate that the soils continue to represent a store of acidity; the actual acidity can be rapidly mobilised whilst the retained acidity can be slowly released over time. There is no inherent ANC in the soil to buffer any acidity.

The soils within Salt Creek Swamp contain low to moderate levels of RIS, except at the Upper and Lower Swamplands where RIS was generally absent. The results indicate that the soils contain pyritic acidity that could mobilise following oxidation and flushing, particularly in the mid-Swamplands. Low levels of AVS, and hence monosulfides, were encountered in the soil indicating a low risk from future oxidation of existing monosulfides.

5.4.3 Acid Sulfate Soil Monitoring – Surface Water Quality

5.4.3.1 Anglesea River Swamp

A review of available ASS water quality data from the 2020-2023 *Annual Reports for the Anglesea Borefield Surface Water 3A,3B* (ALS 2020, ALS 2021, ALS 2022, ALS 2023), indicated that the Upper Anglesea River and Anglesea River Swamplands are subject to sporadic flow conditions limiting the transfer of ionic/salt loads between different reaches of the river, with readings being rather more influenced by immediate local factors. The pH indicated that the surface water within the Anglesea River Swamplands increased in acidity towards the confluence of the Anglesea River Swamplands and the Salt Creek Swamp (refer to graphs in **Appendix A**). Surface water upstream, at AGP1-B and AV1, was slightly acidic and became acidic at AV3 and strongly acidic (pH<4) at ASP7, AGP2 and AV2. Over the 14-year monitoring period, the surface water pH at Anglesea River has shown a slight increasing trend (i.e. less acidic) in the upstream locations (AGP1-B and AV1) and a slight decreasing trend (i.e. more acidic) in the downstream location (AGP2 and AV2).

The sulfate (SO_4^{2-}) to chloride (Cl^-) ratios were above 0.5, indicating ASS influence on the surface water, based on interpretations described in Sullivan *et al*. (2018). The results of analysis indicated that surface water did not contain any total alkalinity, therefore, the water did not contain any acid buffering capacity. The SO_4^{2-} to total alkalinity ratios exceeded 0.2, indicting sulfide oxidation and/or consumption of alkalinity.

5.4.3.2 Salt Creek Swamp

A review of available ASS water quality data from the 2020-2023 Annual Reports for the *Anglesea Borefield Surface Water 3A,3B* (ALS 2020, ALS 2021, ALS 2022, ALS 2023), indicates that the Salt Creek Swamp is also subject to sporadic flow conditions. The surface water pH indicated that the surface water within the Salt Creek Swamp increased in acidity towards the confluence of the Salt Creek Swamp and the Anglesea River Swamplands (refer to graphs in **Appendix A**). Surface water upstream, at SV3, SV1 and SV4, was slightly acidic and became acidic to strongly acidic at SV2. The data indicated a considerable decrease in pH between SV4 and SV2.

The SO_4^{2-} to Cl^- ratios at SV2 (downstream) were above 0.5, indicating ASS influence on the surface water. Given that TDS was below 500 mg/L at the upstream locations, the assessment of SO_4^{2-} to Cl^- ratios at upstream locations cannot be meaningfully applied at these locations (Mulvey, 1993).

The results indicated the presence of total alkalinity at upstream surface water monitoring locations, SV3, SV1 and SV4, albeit at low concentrations (<20 mg $CaCO_3$/L). At SV2, no alkalinity was present within the surface water indicating that the water did not contain any acid buffering capacity. The SO_4^{2-} to alkalinity ratios at SV2 exceeded 0.2, indicting sulfide oxidation and/or consumption of alkalinity.

Tannin staining was observed in water at SV4 and SGP2-B indicating that organic acidity may have contributed to acidity at these locations.

5.4.4 Acid Sulfate Soil Monitoring – Groundwater Quality of the Alluvial Swamp Aquifer

5.4.4.1 Anglesea River Swamp

The pH of groundwater in the ASA generally increased in acidity towards the confluence of the Anglesea River Swamplands and the Salt Creek Swamp (refer to graphs in **Appendix A**). The exception was Bore P7B, located nearest to the Mid-Swamplands, where the pH was lower than bore P8 located downstream of bore P7B. This is likely due to influence from highly sulfidic soils in this area. At WTOB3, located in the Upper Anglesea River, the groundwater in the ASA was slightly acidic (pH generally between 5 and 6.5 pH units); at the downstream bore location, WTOB2, located in the Lower Anglesea River Swampland, the pH ranged from acidic to strongly acidic (pH generally between 3.5 and 5 pH units).

The ASA at bore WTOB3 contained low to moderate levels of alkalinity generally ranging between 10 and 30 mg $CaCO_3$/L. The concentrations of alkalinity decreased towards the confluence of the Anglesea River Swamplands and Salt Creek Swamp; at WT0B2, no alkalinity was present within the ASA. The ASA at WTOB2 also reported SO_4^{2-} to Cl^- ratios above 0.5 indicating influence from ASS. SO_4^{2-} to Cl^- ratios at all other locations were below 0.5 and did not indicate influence from ASS.

5.4.4.2 Salt Creek

The laboratory pH of groundwater in the ASA ranged from slightly acidic to neutral at P17 (pH generally between 5 and 7 pH units) and ranged from slightly acidic to acidic at P1 (pH generally between 4.8 and 7 pH units). At WTOB1, located downstream of the mine, the groundwater in the ASA was slightly acidic (pH generally between 5 and 6.5 pH units). The highest pH level recorded in the ASA of 7.14 pH units was at groundwater bore P17, located upstream of the Salt Creek Swamp.

The SO_4^{2-} to Cl^- ratios of the ASA at P17, P1 and WTOB1 were below 0.5 and therefore did not indicate influence from ASS. There is no alkalinity data for the groundwater wells screened in the ASA.

5.5 Updated Acid Generation Model

The conceptual acid generation model for the sediments in Upper Anglesea River and Anglesea River Swamplands, and Salt Creek Swamp, developed for the BE review (2013), have been updated with information provided in the recent investigation (Wong *et al*. 2020) and results of monitoring undertaken by Barwon Water.

5.5.1 Anglesea River Swamp

Within the soil profile investigated, soils in Upper Anglesea River and Anglesea River Swamplands contained existing acidity. The predominant form of acidity was actual acidity formed from past oxidation of sulfides. Data from the current monitoring period at locations P7B, P8, WTOB2 and WTOB3 (refer Graphs in **Appendix B**) indicates a natural seasonal variation of groundwater level in the ASA of generally up to 2.0 m. Seasonal variation of groundwater levels has resulted in the drying and wetting of RIS which has contributed acidity to the soil profile. There was no clear response to water levels within the ASA during the known periods of pumping for water supply augmentation or testing purposes at the Anglesea Borefield (**Section 4.4.1.2**); however, this will be further assessed following a review of the predictive modelling outputs as part of the groundwater pumping impact assessment. Due to increased rainfall post 2020, a decrease in seasonal variation of water levels has been observed in some bores within the ASA.

Given the high concentrations of peat, and thus total organic carbon in the system (Wong *et al*. 2020), and the presence of tannin-stained surface water within the creek (ALS 2023), some acidity is likely to have been contributed from the natural decomposition of *in-situ* organic matter and surface vegetation. The decomposition of organic matter releases humic acid into the environment. As a result of the various sources of acidity in the system, the soil pH indicated strongly and very strongly acidic soil, based on soil acidity categorisation by Hazelton and Murphy (2016).

Actual ASS were encountered both above and below the watertable, i.e., in the vadose zone, and in the saturated zone. Low levels of retained acidity were found within the soils. Despite the general absence of retained acidity, the presence of actual acidity indicates that the soils continue to represent a store of acidity.

Within the soil profile investigated, soils at the Upper Anglesea River and Anglesea River Swamplands contained RIS, in the form of pyrite, albeit at low levels. The exception is the Upper Swamplands, where soils were found to contain very high concentrations of RIS at concentrations up to 6877 mol H^+/t. Reduced inorganic sulfur was generally encountered below the watertable and to the limit of investigation at approximately 1.3 m bgl. The depth of the RIS layer is uncertain and given that this layer was detected at the limit of the investigation, it is possible that it extends below 1.3 m bgl. It may also be present in areas other than the Upper Swamplands at depths below the limit of investigation. Within the Upper Swamplands, the average depth to the watertable was 0.29 m. There are no groundwater bores located in the ASA within the Upper Swamplands; however, water level data from groundwater bores P8 and P7B, located in the Mid Swamplands, indicate that the seasonal water level variation at these locations is approximately 0.8 m and 1.5 m, respectively. The RIS layer presents the greatest risk from desaturation as oxidation of the RIS layer has the potential to generate additional acidity within the system. As identified in the BE Review (2013), the extent of oxidation may be influenced by a number of factors including surface area and depth of exposure of acid generating materials, moisture capacity, groundwater levels, particle size and presence of macropores or preferential pathways.

At the onset of rainfall or rewetting, acidity will be mobilised into the soil matrix and can be released into surface water bodies as either seepage or baseflow or can infiltrate vertically into the groundwater. The concentration and extent of acid generation will depend on the duration of the drying period (oxidation), frequency and intensity of rainfall and any subsequent storage (infiltration), transportation and release either as seepage or baseflow. Despite high concentrations of SO_4^{2-} and organic carbon in the system, iron monosulfides were encountered at low levels only. The conditions for the formation of iron monosulfides, also known as Monosulfidic Black Ooze (MBO), are favourable (Wong *et al*. 2020) and there is a risk of monosulfides forming in the future. Monosulfides can form rapidly under waterlogged conditions, in the order of weeks to months, and are highly reactive. The oxidation of monosulfides can result in the rapid deoxygenation of a waterbody and release of acidity, both of which can have adverse effects on aquatic ecosystems.

The Upper Anglesea River and Anglesea River Swamplands are subject to sporadic flow conditions. Principle inputs to the swamp include rainfall and runoff both as surface flow and/or infiltration. The surface water within the Anglesea River Swamplands is generally slightly acidic at the upstream sampling locations and increases in acidity towards the Anglesea River Swamplands /Salt Creek Swamp confluence as it flows across the swamplands containing actual ASS. Acidity is mobilised from the actual ASS into the Anglesea River Swamplands due to leaching upon contact, and from direct surface flow following rainfall events. At the Anglesea River Swamplands /Salt Creek Swamp confluence, the surface water is strongly acidic. The surface water contains no alkalinity and high concentrations of SO_4^{2-} and, in conjunction with the SO_4^{2-} to Cl^- ratio, indicates that the oxidation of ASS has influenced surface water quality. The surface water at the Anglesea River Swamplands has increased in acidity between 2011 and 2013 at the downstream location, AGP2.

The groundwater quality within the ASA suggests influence from ASS. An assessment of the soluble metal concentrations, conducted by Monash (Wong et al., 2020) on 1:5 soil:water extracts from the Anglesea River, indicate that Al, Cu, Fe, Mn, Ni and Zn concentrations in the soil could be readily mobilised and transported via channels to surface waters and shallow groundwater following rainfall events.

A pictorial conceptual site model (CSM) for the Anglesea River Swamplands is provided in **Figure 11** to illustrate likely acid generating and transport mechanisms within a gaining portion of the swamplands. Whilst the cross-section refers to data associated with the Anglesea River Swamplands, the general concepts are also applicable to Salt Creek Swamp. The pictorial CSM depicts the highest risk zone identified within the Upper Swamplands. Data from sampling locations MSC9, MSC10 and MSC11 (Wong *et al*. 2020) have been utilised in developing the CSM. In other portions of the swampland, the system is interpreted to be losing and as such the pictorial CSM below is not expected to be representative of the catchment as a whole.

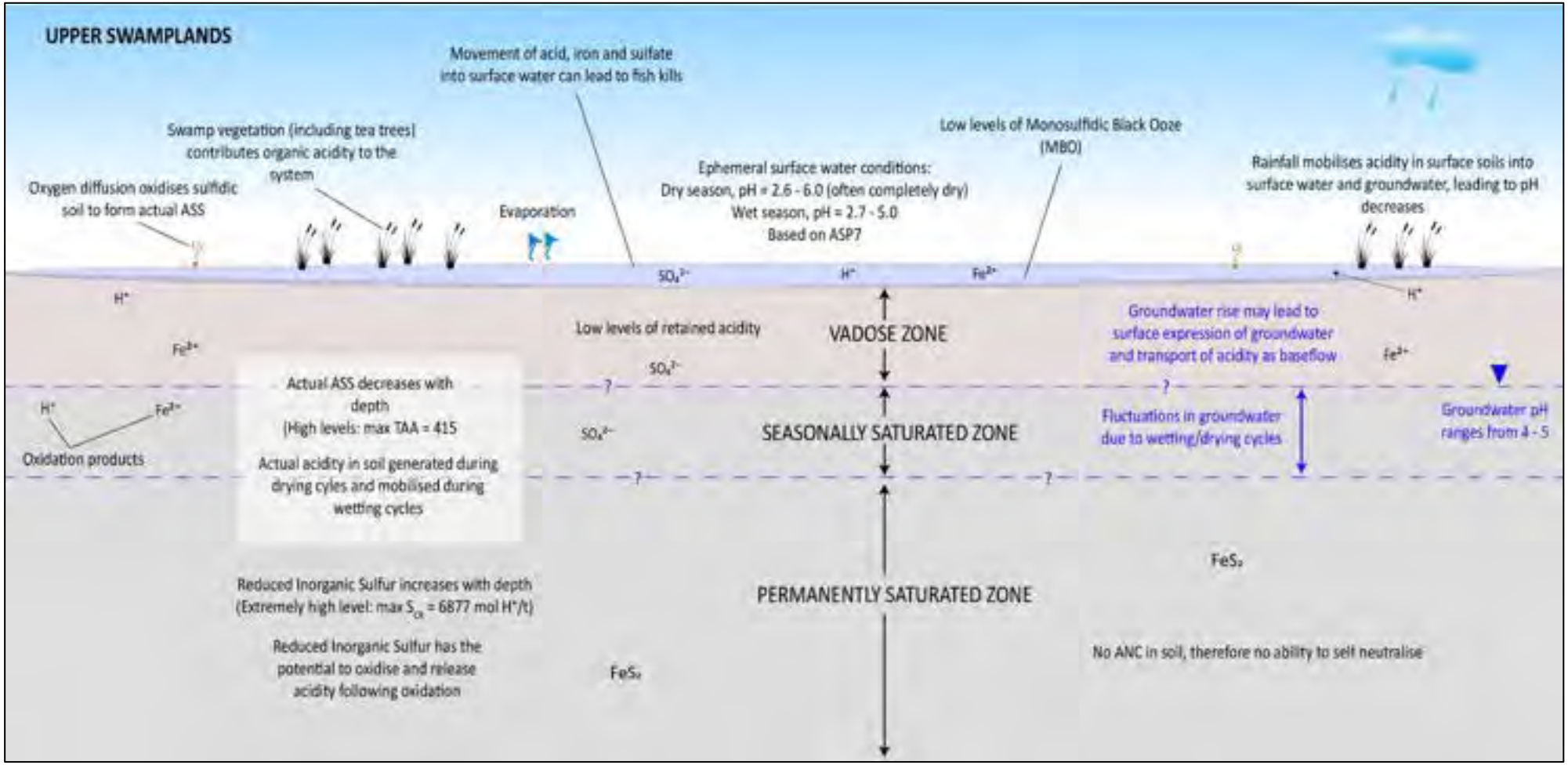


Figure 11 Conceptual Site Model at Upper Swamplands, Marshy Creek

5.5.2 Salt Creek Swamp

Within the soil profile investigated, soils in the Salt Creek Swamp contained existing acidity. Similar to the Anglesea River, the predominant form of acidity was actual acidity formed from past oxidation of sulfides. Data from the current monitoring period at locations P1, P17, WTOB1 (refer Graphs in **Appendix B**) indicates a natural seasonal variation of groundwater level in the ASA at the Salt Creek Swamp of up to 4 m, which is greater than the seasonal variation reported for the Anglesea River. Seasonal variation of groundwater levels results in the drying and wetting of RIS which contributes acidity to the soil profile. There was no clear response to water levels within the ASA during the known periods of pumping for water supply augmentation or testing purposes at the Anglesea Borefield (**Section 4.4.1.2**); however, this will be further assessed following a review of the predictive modelling outputs as part of the groundwater pumping impact assessment. A decrease in seasonal variation of water levels due to rainfall has also been observed in some of the bores within the ASA since 2020.

The soil pH values within the Salt Creek Swamp were marginally higher than soil pH values at the Anglesea River Swamplands. Unlike at the Anglesea River Swamplands, soils within the Salt Creek Swamp were found to contain retained acidity, at low to moderate levels. The exception was the Lower Swamplands, where no retained acidity was encountered. Actual ASS and retained ASS were encountered throughout the profile investigated. Given the high concentrations of peat in the system, and the presence of tannin-stained surface water observed within the creek (ALS 2023), some acidity in the surface water is likely to have been contributed from the natural decomposition of organic matter and release of humic acid. As a result of the various sources of acidity in the system, the soil pH indicated strongly and very strongly acidic soil, based on soil acidity categorisation by Hazelton and Murphy (2016).

At the majority of the sites sampled, the watertable was not encountered within the profile investigated indicating a more oxidised surface soil profile than at the Anglesea River Swamplands, possibly due to the larger seasonal variation in water levels in the ASA at the Salt Creek Swamp relative to the Anglesea River Swamplands. Where encountered, the depth to the watertable was below 0.5 m. Soil generally contained low to moderate levels of RIS, in the form of pyrite acidity; however, RIS was absent in soil samples from the upper and lower swamplands. The concentrations of RIS in the Salt Creek Swamp were significantly lower than concentrations in the Anglesea River Swamplands. The highest concentrations of RIS were detected in the unsaturated zone in the Mid-Swamplands. There are no groundwater bores located in the ASA within the Mid-Swamplands; however, water level data from groundwater bore WTOB1, located in the Lower Channel, indicates that the seasonal water level variation at this location is approximately 4 m. Given the highly acidic system, it is possible that RIS exists in soil below the depth of investigation along the Salt Creek Swamp.

Similar to the Anglesea River Swamplands, iron monosulfides were encountered at low levels only despite high concentrations of sulfate and organic carbon in the system. The conditions are favourable for the formation of iron monosulfides within the Salt Creek Swamp (Wong *et al*. 2020) and there is a risk of them forming rapidly in the future.

The surface water within the Salt Creek Swamp is generally slightly acidic at the upstream sampling locations and increases in acidity towards the Anglesea River Swamplands /Salt Creek Swamp confluence as it flows through the swamplands containing actual ASS. At the confluence, the surface water is acidic to strongly acidic. At the upstream sampling locations, the surface water contains minor levels of total alkalinity and the SO_4^{2-} to Cl^- ratio does not indicate influence from ASS; however, as surface water comes into contact with the acidic soil of the Salt Creek Swamp, the alkalinity is consumed, and SO_4^{2-} concentrations increase as SO_4^{2-} and acidity is leached out of the soil or mobilised following rainfall. The surface water has increased in acidity at the downstream sampling location, SV2, between 2011 and 2016.

Similar to the Anglesea River Swamplands, an assessment of the soluble metal concentrations, conducted by Monash (Wong *et al*. 2020) on 1:5 soil:water extracts from the Salt Creek Swamp, indicate that Al, Cu, Fe, Mn, Ni and Zn concentrations in the soil can be readily mobilised and transported via channels into surface waters and shallow groundwater following rainfall events.

The pictorial CSM for the Salt Creek Swampland has not been developed given that it is similar to the CSM prepared for the Anglesea River Swamplands with the exception that RIS is likely to be present deeper within the soil profile. Nonetheless, the mechanisms for the generation of acidity, and mobilisation and transport of acidity remain largely consistent between the two swamplands.

5.6 Data Gaps

The following data gaps, with respect to ASS, have been identified:

- Investigations have extended to a maximum depth of 1.4 m at the Upper Anglesea River and Anglesea River Swamplands and the Salt Creek Swamp. There is uncertainty regarding the presence and extent of RIS layers beneath this depth at both the Anglesea River and the Salt Creek Swamp. At the Anglesea River Upper Swamplands, very high concentrations of RIS were encountered at the limit of investigation suggesting that the layer may extend to a greater depth. In addition, Wong *et al.* (2020) assumed that the acidity quantified is underestimated due to the challenges in accessing the middle of the swamplands which can contain higher levels of RIS, and therefore, higher volumes of potential acidity may exist. Furthermore, the acidity concentrations laterally across the width of the swamp are unknown. Groundwater drawdown of the ASA may affect oxidation across the swamplands and therefore, predicted groundwater drawdown in the high risk areas will be conducted as part of the impact assessment process to assess the expected water level decreases in the ASA. Additional sampling for ASS may be required at greater depths in areas where predictive groundwater modelling indicates the potential for groundwater pumping related drawdown in the ASA.
- If groundwater pumping related drawdown was to occur in the ASA it may result in the prolonged desaturation of the soils that were previously subject to drying and rewetting. The rate of oxidation of the RIS layer following drawdown is not known. The soils assessed do not contain any ANC and so acidification upon oxidation is likely to be a function of oxygen diffusion into the RIS, soil texture and depth to the RIS layer. A study of reaction kinetics would be required to estimate the proportion of the total acidity that may leach or flush into the environment following desaturation of the ASA, if this is predicted to occur.

6 Land Level Monitoring

6.1 Review of Relevant Reports

6.1.1 2013 BE Review

The BE review (GHD, 2013) outlined that thirty (30) survey points had recently been installed by Barwon Water to assess any potential land subsidence due to groundwater extraction from the northern and southern borefields. These survey points are shown on **Figure F6**. The BE review (GHD, 2013) indicates that the initial readings of the survey network were taken in 2011.

The survey network extends across the investigation area from Torquay to Aireys Inlet with monitoring recommended on an annual basis. Limited results were available for discussion during the previous BE Review (GHD, 2013) as only one annual monitoring event had been completed (2012) at the time of this review.

6.1.2 2023 Annual Land Level Report

The most recent annual report for land level monitoring was provided by Barwon Water (Barwon Water, 2023) and included data collected during January 2023 together with the relevant historic data from 2013 to 2023. Data from the initial establishment of the survey network (2011) and first annual monitoring event (2012) are available in a separate report (GHD, 2012).

6.2 MAP Requirements and Objectives/Rationale

A summary of the survey network locations is provided in **Appendix D**. These locations are consistent with those outlined in the previous report (Barwon Water, 2023). A summary of the locations was not provided in the MAP (2014); however, the monitoring completed is assumed to be consistent with the intent of the MAP.

The MAP outlines the following requirements in relation to land level monitoring:

9.1 The regional subsidence network will be surveyed at the following intervals:

(i) annually when the Corporation is taking groundwater;

(ii) every three years when the Corporation is not taking groundwater.

This frequency will continue as long as any subsidence remains within survey precision (i.e. less than 20 mm cumulative). If recorded subsidence exceeds the survey precision at three survey marks or more then the survey frequency will return to annually.

9.2 The Corporation will undertake land level modelling to assist in predicting the potential land subsidence due to groundwater extraction under the Order. This land level modelling will be completed when land subsidence surveys record land subsidence outside survey precision for two consecutive surveys at three survey marks or more.

The MAP dictates that annual monitoring is to be completed during periods of groundwater extraction and three yearly monitoring when extraction is not occurring. The MAP outlines a subsidence (decreasing land level) trigger level of 20 mm (cumulative i.e. based on the initial monitoring level) for the subsidence monitoring which is equivalent to the survey precision provided.

The MAP notes that subsidence outside this survey precision (20 mm) at three or more locations in one event will trigger annual monitoring. A land level model is to be developed if any three locations record a land subsidence outside of survey precision (20 mm) in two consecutive monitoring rounds. This has been interpreted as when three locations in two successive events report subsidence outside the survey precision (20 mm) from the initial survey result (from 2011).

6.3 Results

The results of the land level monitoring have been tabulated and presented graphically in **Appendix D** with the locations presented spatially on **Figure F6**. A review of the results collected from 2013 onwards has been completed, using the initial survey results from 2011 as the point of comparison for the trigger levels.

Monitoring events 2014 and 2018-2023 reported survey results outside of the prescribed 20 mm subsidence guideline, which necessitated monitoring to be completed on an annual basis even during periods when groundwater was not being extracted. There has been a total of 12 instances where the survey results have indicated subsidence > 20 mm across 5 locations (ALS6, ALS14, ALS16, ALS22 and ALS23). Locations where this has occurred have all indicated recovery/rebound in ground levels in subsequent monitoring rounds.

This indicates that the subsidence results outside survey precision appear to be either part of a natural subsidence and heave (drying and wetting) cycle as there is no evidence of continual subsidence at a location in the dataset or possibly survey error in excess of the nominal 20 mm. All subsidence results outside of this precision have been denoted in orange on the graphs provided in **Appendix D**, with those within acceptable limits denoted in blue.

The only locations that recorded two (or more) consecutive results below 20 mm of the initial survey (2011) were:

- ALS6 (2019, 2020, 2021 and 2022); and
- ALS23 (2022 and 2023).

ALS23 is located approximately halfway up the southern side Salt Creek Swamp, with ALS 6 located to the north-east of the northern borefield. Neither of these locations are in close proximity to the northern or southern borefields.

These results are not considered to represent subsidence from groundwater extraction given the inconsistent nature of the results, spatial distribution and lack of correlation with active pumping periods. The subsidence results exceeding the 20 mm trigger are considered likely to have been a result of factors other than groundwater extraction, including possibly natural wetting and drying cycles and/or potential error inherent in the surveying process in excess of the nominated 20 mm.

6.4 Summary and Data Gaps

Annual land level monitoring has been completed since 2011, with the network including thirty (30) survey points. It is noted that this in excess of the required monitoring in the MAP which stipulates monitoring every three years when groundwater extraction is not occurring, noting that there are triggers for annual monitoring requirements (which have not met).

When subsidence results have been reported outside survey error (20 mm) the land levels have rebounded to within acceptable limits in subsequent monitoring events.

Based on our interpretation that the reference point for the trigger for ongoing monitoring and development of land level model is the initial survey result (2001), which appears appropriate given the objectives, it is considered that the trigger has not been met to date, with no clear reducing land level trends observed since monitoring began in 2011.

7 Ecological Monitoring

7.1 Review of Previous Relevant Reports

7.1.1 2013 BE Review

The 2013 BE Review included a summary and review of aquatic and terrestrial ecological monitoring over the period 2009 to 2013. The purpose of the monitoring review was to identify significant species and establish baseline conditions as part of the initial project impact assessment. The monitoring included a comparison of the ecology across the UEVF and LEVF outcrop areas to attempt to establish if there were different characteristics which could reflect a varying degree of groundwater dependence.

The initial ecological monitoring identified persistent pools in the upper stretches of the Anglesea River and Salt Creek (SC) catchments and “near perennial” flows in the Breakfast Creek Tributary (BCT) in the upper Salt Creek Catchment. The persistence of the pools in these areas suggested possible baseflow dependence and GDEs at these sites. The ongoing MAP monitoring therefore focussed on these areas.

The monitoring undertaken as part of the MAP prior to the 2013 BE review included:

- Terrestrial monitoring: 6 monthly frog surveys and vegetation surveys; and
- Aquatic Monitoring: 6 monthly macroinvertebrate and fish surveys. Also pool level monitoring and mapping of the locations of the pools.

7.1.1.1 Summary of terrestrial ecology monitoring

The terrestrial monitoring program summarised in the 2013 BE Review focussed on two key components of GDEs:

- vegetation and habitat, and frog assemblages to represent water dependent vertebrates.

A total of 14 sites were selected, including 12 potential impact sites and two reference sites.

The program monitored nine ecological vegetation classes (EVCs) over six locations:

- Anglesea River Estuary
  - Estuarine Wetland EVC
- Upper and Lower Anglesea River Swamplands
  - Swamp Scrub EVC and
  - Aquatic Sedgeland EVC
- Upper Anglesea River scour pools
  - Aquatic Herbfield EVC and
  - Fringing Sedgy Riparian Woodland EVC
- Salt Creek Swamps
  - Swamp Scrub EVC
- Salt Creek scour pools
  - Aquatic Herbfield EVC and
  - Fringing Sedgy Riparian Woodland EVC
- Breakfast Creek Tributary
  - Swamp Scrub EVC

Following the outcomes of the 2013 BE Review the MAP was revised to include monitoring of vegetation and frog assemblages at four sites in the Upper Anglesea River Swamplands and two sites in the Lower Anglesea River Swamplands, and four sites in the Anglesea River Estuary. Terrestrial

ecology monitoring within the remaining four areas (Upper Anglesea River scour pools, Salt Creek Swamp, Salt Creek scour pools and Breakfast Creek Tributary) was not included in the monitoring that was undertaken between 2014 and 2022.

Three of the sites (AS1, ASP7 and AGP2) within the Upper and Lower Anglesea River Swamplands that were monitored prior to 2014 were included as part of the ongoing MAP with an additional three locations (AS2-AS4) added for vegetation surveys. Two additional locations (AS5 and AS6) within the Anglesea River Swamplands were also monitored as part of the frog surveys where frog numbers were recorded to be low. The four sites within the Anglesea River Estuary remained unchanged from 2009 through to 2022. A summary of the monitoring sites is shown on **Figure F4a**, **Figure F4b** and **Figure F4c**.

Plant species from each site were classified into Functional Groups with respect to their known or likely water requirements. These are discussed further in **Section 7.2** The Functional Groups adopted for the 2013 BE Review were carried forward into the 2014 MAP.

The 2013 BE Review indicated the following trends in the terrestrial ecological monitoring for the period 2009 – 2012:

- The proportional representation of Functional Groups at each site remained relatively stable at all sites;
- No Functional Groups – including the most water sensitive groups – were lost from any site;
- The variability observed in the data was relatively minor, and was considered to be within natural variation; and
- There were not trends that would distinguish reference sites from sites that were potentially influenced by groundwater pumping activities.

Five frogs were recorded across the study area:

- Common froglet (*Crinea signifera*);
- Southern Brown Tree Frog (*Litoria ewingii*);
- Southern Bull Frog (*Limnodynastes dumerlii*);
- Victorian Smooth Froglet (*Geocrinia Victoriana*); and
- Striped Marsh Frog (*Limnodynastes peroni*).

The 2013 BE Review indicated that assessment of frog diversity and abundance, both within and between sites, revealed no apparent trends. Yearly data revealed fluctuations in both diversity and abundance. However, pooled data for frog abundance showed a seasonal trend occurring with higher numbers of frogs recorded in spring (when compared to autumn), likely due to spring breeding. As a result the MAP was revised to include two frog surveys both occurring in the spring to capture the spring breeding frog data.

The key conclusions of the 2009 – 2012 terrestrial ecological monitoring in the BE Review were:

- The GDE-related EVCs varied considerably in the representation of Functional Groups in terms of water sensitivity;
- The EVCs ranged from relatively resilient terrestrial vegetation to potentially highly sensitive aquatic and amphibious communities;
- The Functional Groups present at any particular site were relatively stable over the monitoring period.
- The variability observed in the data was considered to be within natural variation;
- Rainfall and water permanence was likely to be driving frog abundance and occupancy across the study area; and
- There were no trends or otherwise in the data that suggested impacts from groundwater drawdown.

7.1.1.2 Summary of Aquatic Ecology Monitoring

The 2009 MAP required focus on two environmental values: the southern pygmy perch (*Nannoperca australis*) and aquatic invertebrates. The following monitoring was undertaken and summarised in the 2013 BE Review:

- Assessment of the number and type of macroinvertebrates in Autumn and Spring at sites Upper Anglesea River (UAR)1 and UAR2, BC1, BC2, and BC3, BCT1 and BCT2, SC1, and Wetlands 1, 2 and 3 (W1, W2, W3); shown on Figure 4a.
- At sites BC1, BC2, BC3, BCT1 and BCT2:
  - Establish and map the distribution of southern pygmy perch populations within the Breakfast Creek Tributary;
  - Genetic testing of the southern pygmy perch populations;
  - Monitor the fish within Breakfast Creek Tributary every six months; and
  - Six monthly site inspections and *in-situ* water quality monitoring for pH, electrical conductivity, dissolved oxygen, turbidity and laboratory analysis of major cations and anions.
- At sites UAR1, UAR2 and SC1, map and monitor the pools located within the upper reaches of the Anglesea River and on Salt Creek above the Salt Creek Swamps to determine the hydraulic regime and establish changes over time.
- At wetland sites W1, W2 and W3, map and monitor the shallow wetlands within the lower reaches of the Anglesea River to determine the hydraulic regime and determine changes over time. Water depth to be measured at the sites at six monthly intervals.

The 2013 BE Review found that the population of southern pygmy perch was more abundant in the BCT1 site than the SC site, although there were no genetic differences in southern pygmy perch populations between the Breakfast Creek, BCT1 and SC1 populations. Furthermore, the BCT1 site was considered to receive some groundwater discharge from the ASA to maintain the creek flow and water quality. This site was thought to act as a refuge allowing the fish population to persist during dry periods and from which it can recolonise the more extensive catchment during wetter periods.

The 2013 BE Review noted that the macroinvertebrate data was difficult to analyse and that sites that were expected to differ based on site conditions did not report differences using various analytical techniques. The biota of the pools and wetlands included many colonising taxa, which was interpreted to mean that these habitats are not permanent – either through drying out or acidification. However, the BCT1 site and some of the pools on Salt Creek had fauna different to that in other pools and wetlands, and monitoring confirmed the presence of permanent water, as indicated by the presence of fish and macroinvertebrate taxa that are restricted to permanent streams.

The Breakfast Creek Tributary was identified as the only perennial site and thus important as a refuge for many aquatic species, including fish. The 2013 Review concluded that biological monitoring should be able to detect an impact at BCT1, but will be less sensitive to changes in the non-perennial sites.

7.1.1.3 Ecological Risk Assessment

The 2013 BE Review included an ecological risk assessment (ERA) in accordance with ISO31000 Risk Standard Principles and Guidelines. The AVIRA (Aquatic Values Identification and Risk Assessment) of (Peters, et al., 2009) was used as the framework. The ERA established ecological benchmarks against which to compare the impacts of groundwater extraction under various climate scenarios.

The objective of the ERA was to

"*determine the risk of impacts on aquatic and terrestrial ecological values in Salt Creek, Breakfast Creek and Anglesea River catchments, associated with groundwater extraction under Median and Return to Dry climate scenarios*."

Ecological values for the ERA included all five EVCs, as well as listed facultative fauna, as shown in **Table 17**. In addition, a number of dryland threatened vertebrates that may opportunistically utilise

habitats potentially subject to drawdown were also identified as ecological values (also shown in **Table 17**).

A summary of the ecological values adopted in the ERA in the 2013 BE Review is shown in **Table 17**.

Table 17 Ecological Values adopted in the 2013 BE Review

Value / Asset	Scientific name	Status / Significance*
Threatened fauna species		
Southern brown bandicoot	*Isoodon obesulus obesulus*	*EPBC Act 1999*, Endangered DSE (2013): Near Threatened[1], *FFG Act 1988* Listed
Spot-tailed quoll	*Dasyurus maculatus maculatus*	*EPBC Act 1999*: Endangered DSE (2013): Endangered *FFG Act 1988*: Listed
Rufous bristlebird	*Dasyornis broadbenti caryochrous*	*FFG Act 1988*: Listed DSE (2013): Near threatened
White-footed dunnart	Smithopsis leucopus	*FFG 1988 Act*: Listed DSE (2013): Near threatened
Swamp antechinus	*Antechinus minimus maritimus*	*FFG Act 1988*: Listed DSE (2013): Near threatened
Swamp skink	*Lissolepis coventryi*	*FFG Act 1998*: Listed DSE (2013):Vulnerable
Southern toadlet	*Pseudophryne semimarmorata*	DSE (2013): Vulnerable
Aquatic fauna species		
Southern pygmy perch	*Nannoperca australis*	Significant local population
Fish (in Anglesea estuary)	-	-
Frog assemblages	-	-
Invertebrate fauna		-
Threatened flora species		
Lizard orchid	*Burnettia cuneata*	DSE (2013): Rare
Ecological vegetation classes		
Aquatic herbfield EVC	-	DSE (2013): Vulnerable
Aquatic sedgeland EVC and aquatic herbfield EVC	-	DSE (2013): Vulnerable
Swamp scrub EVC	-	DSE (2013): Vulnerable
Sedgy riparian woodland EVC	-	DSE (2013): Vulnerable
Other values		
Estuarine woodland	-	
Flora (flora community/species in general)	-	
Pool flora	-	
Riparian woodland	-	
Terrestrial fauna	-	

EPBC = E*nvironment Protection Biodiversity Conservation Act 1999;* FFG = *Flora and Fauna Guarantee Act 1988; DSE = Department of Sustainability and Environment*

*At the time of preparation of the 2013 BE Review

[1] Previously, Victoria had multiple lists of threatened species. Amendments to the *Flora and Fauna Guarantee Act* 2020 removed duplication between lists, by establishing the FFG Act Threatened List. With the new list in effect, the Advisory Lists have been revoked.
The southern brown bandicoot, spot-tailed quoll, rufous bristlebird, swamp skink and southern toadlet are listed as Endangered, and the white-footed dunnart and swamp antechinus are listed as Vulnerable on the FFG 1988 Threatened List June 2023, available at:
https://www.environment.vic.gov.au/__data/assets/pdf_file/0021/655410/FFG-Threatened-List-June-2023.pdf

The ERA found the following under the “Median” climate change scenario:

- Very high risks for aquatic sedgeland EVC and aquatic herbfield EVC; and frog assemblages of the Anglesea River Swamplands.
- High risks to the invertebrate assemblage and flora of the Anglesea River Swamplands.
- High risk to the Swamp Scrub EVC of the Anglesea River Swamplands.
- Medium risk to the facultative fauna of the Anglesea River Swamplands, including Swamp skink, Swamp antechinus and southern brown bandicoot.
- Medium risks to the Aquatic herbfield EVC and frog assemblages of the Salt Creek main swamps.
- Medium risk to southern pygmy perch in the Breakfast Creek Tributary.
- Low risks to aquatic and terrestrial ecology within the Anglesea River Estuary.

Risks under a “Return to Dry” climate scenario were the same as or higher than those under the median climate change scenario.

7.1.2 Annual Ecological Monitoring Reports

Annual Ecological Monitoring Reports from 2014 – 2022 formed part of this review. A summary of the reports is provided in **Table 18** below.

Table 18 Summary of Annual Ecological Monitoring Reports

Author/Year	Title	Content
Ecology Australia (2013)	Anglesea Borefield Flora and Fauna Monitoring: 2012/2013	Vegetation and frog assessments at AGP1, AGP2, ARP11, AS1, ASP7, LAR1, LAR2, LAR3, LAR4, SCP9, SCP10, SCP15 and SGP1
GHD (2015)	Anglesea Borefield MAP Aquatic Ecology Report Spring 2014	Macroinvertebrate surveys at BCT1, SC1, W1 Southern pygmy perch surveys in BCT1 and SC1. Water quality measurements at BCT1, SC1 and W1
GHD (2016)	Anglesea Borefield MAP Aquatic Ecology Report Spring 2015	Triennial aquatic monitoring event. Macroinvertebrate surveys at BCT1, BCT2, BC1, BC2, BC3, UAR1, UAR2, W1, W2 and W3. Southern pygmy perch surveys at SC1, BC1
GHD (2017)	Anglesea Aquatic Monitoring Spring 2016	Macroinvertebrate surveys at BCT1, SC1, W1 Southern pygmy perch surveys at BCT1 and SC1.
Ecology Australia (2018)	Anglesea Borefield Ecological Monitoring and Assessment Program 2017	Vegetation assessment at AS1_2014, AS2, AS3, AS4, ASP7, AGP2_2014 Frog surveys and habitat assessment at AS1_2014, AS2, AS3, AS4, AS5, AS6, ASP7 and AGP2_2014. Macroinvertebrate surveys at BCT1, SC1, W3 Southern pygmy perch surveys at BCT1 and SC1. N Water quality measurements at BCT1, SC1 and W1 First note of Otway bush yabby (*Geocharax gracilis*) through the MAP and recommendation to be included in future monitoring.
Ecology Australia (2019)	Anglesea Borefield Ecological Monitoring and Assessment Program 2018	Vegetation assessment at AS1_2014, AS2, AS3, AS4, ASP7, AGP2_2014 Frog surveys and habitat assessment at AS1_2014, AS2, AS3, AS4, AS5, AS6, ASP7 and AGP2_2014. Triennial aquatic monitoring event. Macroinvertebrate surveys at BCT1, BC1, BC2, BC3, UAR1, UAR2, W2/3.

Author/Year	Title	Content
		Southern pygmy perch surveys at SC1, BC1 Otway bush yabby surveys at BC2, BCT1, BCT2, SC1 and UAR1 Water quality monitoring at UAR1, UAR2, BC1, BC2, BC3, BCT1, BCT2, SC1, W1, W2/3
Ecology Australia (2020)	Anglesea Borefield Ecological Monitoring and Assessment Program 2019	Vegetation assessment at AS1_2014, AS2, AS3, AS4, ASP7, AGP2_2014 Frog surveys and habitat assessment at AS1_2014, AS2, AS3, AS4, AS5, AS6, ASP7 and AGP2_2014. Macroinvertebrate surveys at BCT1, SC1, W2/3 Southern pygmy perch surveys at SC1, BC1 Otway bush yabby surveys at BCT1, SC1 and W2/3 Water quality at BCT1, SC1 and W2/3
Ecology Australia (EA, 2021)	Anglesea Borefield Ecological Monitoring and Assessment Program 2020	Vegetation assessment at AS1_2014, AS2, AS3, AS4, ASP7, AGP2_2014 Frog surveys and habitat assessment at AS1_2014, AS2, AS3, AS4, AS5, AS6, ASP7 and AGP2_2014. Macroinvertebrate surveys at BCT1, SC1, W2/3 Southern pygmy perch surveys at SC1, BC1 Otway bush yabby surveys at BCT1, SC1 and W2/3 Water quality at BCT1, SC1 and W2/3
Ecology Australia (2022)	Anglesea Borefield Ecological Monitoring and Assessment Program 2021	Vegetation assessment at AS1_2014, AS2, AS3, AS4, ASP7, AGP2_2014 Frog surveys and habitat assessment at AS1_2014, AS2, AS3, AS4, AS5, AS6, ASP7 and AGP2_2014. Triennial aquatic monitoring event. Macroinvertebrate surveys at BCT1, BC1, BC2, BC3, UAR1, UAR2, W2/3. Southern pygmy perch surveys at SC1, BC1 Otway bush yabby surveys at BC2, BCT1, BCT2, SC1 and UAR1 Water quality monitoring at UAR1, UAR2, BC1, BC2, BC3, BCT1, BCT2, SC1, W1, W2/3
Ecology Australia (2023)	Anglesea Borefield Ecological Monitoring and Assessment Program 2022	Vegetation assessment at AS1_2014, AS2, AS3, AS4, ASP7, AGP2_2014 Frog surveys and habitat assessment at AS1_2014, AS2, AS3, AS4, AS5, AS6, ASP7 and AGP2_2014. Macroinvertebrate surveys at BCT1, SC1, W2/3 Southern pygmy perch surveys at SC1, BC1 Otway bush yabby surveys at BCT1, SC1 and W2/3 Water quality at BCT1, SC1 and W2/3

7.2 Terrestrial Monitoring

7.2.1 MAP Requirements and Objectives/Rationale

The 2014 MAP requirements for terrestrial monitoring included:

- Frog assemblages:
  - For a period of three years (2014-16) the Corporation will, when not taking groundwater, undertake two frog surveys annually in Spring at each of six sites in the Anglesea River Swamplands to establish baseline data.
  - Following the period of three years of baseline data collection (2014-16), the Corporation will, when not taking groundwater, undertake two frog surveys in Spring of every second year at each of the six sites in the Anglesea River Swamplands.

- The Corporation will, when not taking groundwater, undertake two frog surveys in Spring of every second year at each of four sites in the Anglesea Estuary.
- The Corporation will, when taking groundwater, undertake two frog surveys annually in Spring at each of six sites in the Anglesea River Swamplands and four sites in the Anglesea Estuary.

- Vegetation
  - For a period of three years (2014-16), the Corporation will, when not taking groundwater, undertake vegetation assessments annually in Spring at each of six sites in the Anglesea River Swamplands using appropriate permanent transects, photo points and mapping of wetlands to establish baseline data. The survey will determine:
    - Floristic composition of Aquatic Sedgeland / Herbfield, Swamp Scrub and Estuarine Wetland EVCs
    - Hydroecology of the species and EVCs present expressed in terms of Functional Groups
    - Structural attributes
    - Wetland boundaries
  - Following the period of three years of baseline data collection (2014-16), the Corporation will, when not taking groundwater, undertake vegetation assessments in Spring of every second year at each of six sites in the Anglesea River Swamplands.
  - The Corporation will, when not taking groundwater, undertake vegetation assessments annually in Spring of every second year at each of four sites in the Anglesea Estuary.
  - The Corporation will, when taking groundwater, undertake vegetation assessments annual in Spring at each of six sites in the Anglesea River Swamplands and four sites in the Anglesea Estuary.

Terrestrial monitoring requirements are summarised in **Table 19**.

Table 19 Summary of 2014 MAP requirements – Terrestrial Monitoring

Parameter	Timing	Frequency	Locations
During periods of no groundwater extraction:			
Frog assemblages	Spring	Anglesea River Swamplands (Upper and Lower): • Two surveys per year 2014-2016 • Two surveys per year biennially after 2016 Anglesea Estuary: • Two surveys per year biennially	Upper Anglesea River Swamplands: AS2, AS3, AS4, ASP7 (one additional site (AS5) is monitored where very low frog activity is observed) Lower Anglesea River Swamplands: AS1_2014, AGP2, (one additional site (AS6) is monitored where very low frog activity is observed) Anglesea Estuary: LAR1, LAR2, LAR3, LAR4
Vegetation assessments	Spring	Anglesea River Swamplands (Upper and Lower): • Annual surveys for three years (2014-2016) • Biennial surveys after the initial three year period Anglesea Estuary: • Biennially	
During periods of groundwater extraction			

Parameter	Timing	Frequency	Locations
Frog assemblages	Spring	Annually	Upper Anglesea River Swamplands: AS2, AS3, AS4, ASP7 (one additional site (AS5) is monitored where very low frog activity is observed) Lower Anglesea River Swamplands: AS1_2014, AGP2, (one additional site (AS6) is monitored where very low frog activity is observed) Anglesea Estuary: LAR1, LAR2, LAR3, LAR4
Vegetation assessments	Spring	Annually	

7.2.2 Sampling Methodology

7.2.2.1 Vegetation

Vegetation data collection included:

- Floristic composition, EVCs and plant functional group – which involved recording plant species and EVC information in accordance with the Department of Energy, Environment and Climate Action (DEECA, formerly Department of Environment, Land, Water and Planning (DELWP)) benchmarks[2] (2019a) within 1 m^2 quadrats located along established at 2 m intervals along 100m transects within the Anglesea Swamp (50 quadrats per transect) and 30 m long transects at three of the four Anglesea Estuary locations (15 quadrats per transect) and one 14 m transect at LAR1 within the Anglesea Estuary (7 quadrats). Recorded plant species were categorised into relevant plant Functional Groups (FG), with FG and composition analysed to assess hydroecology and structure.
- Hydroecology – which involved assessing the degree of groundwater dependent vegetation across the swamp and estuary, to identify the potential sensitivity of these sites to groundwater drawdown.
- Structural attributes – which involved recording vegetation structure based on the recorded EVCs, dominant plant species and photo points (located at 0 m, 25 m, 50 m and 75 m along each transect).
- Other structural attributes (water depth, bare ground, algal mats) - where water was observed to be present within the swamp the water depth was recorded. Percentage of bare ground was recorded, noting that in the 2020 survey (EA, 2021), the presence of standing water was recorded as bare ground which was different to the approach taken for previous surveys. The presence of algal mats was also recorded for each quadrat.
- Wetland boundaries – where practicable, the boundary of the Anglesea Swamp was mapped as the interface between the Swamp Scrub and Aquatic Sedgeland using aerial imagery and ground-truthing.

7.2.2.2 Frogs

Frog monitoring data collection included:

- Species richness and abundance – visual and aural encounter surveys were undertaken for both diurnal and nocturnal surveys. The surveys involved two ecologists listening for approximately five minutes for the distinctive calls of male frogs. The ecologists recorded the species that they heard and an approximate number of individuals heard calling from each species. The ecologists

[2] https://www.environment.vic.gov.au/biodiversity/bioregions-and-evc-benchmarks

also scanned the vegetation and water surface for visual signs of the presence of frogs. During the nocturnal survey, visual observations were aided by the use of head torches to detect frog eye shine. In addition, during the nocturnal survey frog call playback was used to elicit calling behaviour by male frogs in the area. This involved the use of pre-recorded frog calls of each species through a portable speaker followed by a period of quiet listening. Call response data was used to estimate frog species richness and abundance at each site.

- Habitat attributes – in addition to the habitat data collected as part of the vegetation surveys, the following variables were collected with regard to frog habitat:
  - Wetland permanence (i.e. ephemeral, semi-permanent or permanent);
  - Water quality parameters (e.g. temperature, pH, electrical conductivity etc.); and
  - A general habitat description, including levels of cover of fringing, emergent, submergent and floating vegetation where present.

7.2.3 Results

7.2.3.1 Vegetation

According to the Department of Energy, Environment and Climate Action (DEECA) Bioregions and EVC benchmarks[3] the Anglesea area is located within the Otway Plain and Otway Ranges bioregions. The 2013 BE Review (GHD, 2013)) reported that the Anglesea River Swamp consists of Swamp Scrub and Aquatic Sedgeland Ecological Vegetation Classes (EVCs) whilst the Anglesea River Estuary contains the Estuarine Wetland EVC. Ecology Australia (2017-2022) identified that the Anglesea River Estuary also contains sites with Swamp Riparian Woodland and Heath Woodland. The key features of each EVC are present in **Table 20** to support interpretation of the vegetation survey data. Of note is the information on management of environmental water within these EVCs, and the key linkages to management of groundwater levels to support these groundwater dependent ecosystems (GDEs).

Table 20 EVC Descriptions

EVC	Description (DEECA*)
Upper and Lower Anglesea River Swamplands	
Swamp Scrub	Closed scrub to 8 m tall at low elevations on alluvial deposits along streams or on poorly drained sites with high nutrient and water availability. Soils vary from organic loams to fine silts and peats which are inundated during the wetter months of the year. Vegetation is dominated by Woolly Tea-tree (*Leptospermum lanigerum*) which often forms a dense impenetrable thicket, out-competing other species. Emergent trees (e.g. Swamp Gum (*Eucalyptus ovata*) may sometimes be present. Where light penetrates to ground level, a moss/lichen/liverwort herbaceous ground cover is often present. **Management Considerations** (ARI, 2016)**:** The composition of the ground-layer vegetation of this EVC should be considered in any potential delivery of environmental water. If watering, delivery should occur over the winter-spring period. Water depths should remain very shallow as sustaining elevated inundation for lengthy periods can impact plant species diversity.
Aquatic Sedgeland	Very species-poor vegetation dominated by one to several species of robust inundation-tolerant rhizomatous sedges, typically with culms septate or otherwise including large air-spaces, with vegetation growth extending into virtually permanent water. Widespread, but rare in mountains and drier north. **Management Considerations** (ARI, 2016)**:** Delivery of environmental water is generally unlikely to be particularly relevant to this EVC, with most communities being more dependent on catchment and groundwater protection, apart from relatively durable variants dominated by *Elocharis sphacelate*.
Anglesea River Estuary	

[3] https://www.environment.vic.gov.au/biodiversity/bioregions-and-evc-benchmarks

EVC	Description (DEECA*)
Swamp Riparian Woodland	Woodland to 15 m tall generally occupying low energy streams of the foothills and plains. The lower strata are variously locally dominated by a range of large and medium shrub species on the stream levels in combination with large tussock grasses and sedges in the ground layer. **Management Considerations (ARI, 2016):** If environmental watering is relevant to this EVC, then it will primarily be about replicating patterns of natural flooding events, in conjunction with maintaining the water-table. It is important to allow natural drainage. If inundation is too sustained, the trees can be at risk of drowning.
Estuarine Wetland	Grows on anaerobic peat-rich muds on the edges of estuarine waterbodies such as creeks, rivers and lagoons with intermediate salinity conditions. Vegetation is determined by fluctuating salinity, which varies in time from occasionally fresh to brackish or occasionally saline according to river flood and marine tide events. Dominated by graminoids and halophytic herbs and often fringed by tall scrub layer of Woolly Tea-tree (*Leptospermum lanigerum*) at the landward edge. **Management Considerations (ARI, 2016):** In general, this EVC does not require substantial inundation and delivery of environmental water is largely not relevant. However, management of environmental flows through the estuary may be a relevant consideration.
Heathy Woodland	Spans a variety of geologies but is generally associated with nutrient-poor soils including deep uniform sands (aeolian or outwash) and Tertiary sand/clay which has been altered to form quartzite gravel. Eucalypt-dominated low woodland to 10 m tall lacking a secondary tree layer and generally supporting a diverse array of narrow or ericoid-leaved shrubs except where frequent fire has reduced this to a dense cover of bracken. Geophytes and annuals can be quite common but the ground cover is normally fairly sparse. **Management Considerations (ARI, 2016):** The habitat of this EVC is not relevant to the delivery of environmental water, but rather is dependent on catchment protection, maintenance of groundwater and avoiding unnatural drainage.

* DEECA Ecological Vegetation Class bioregion benchmarks for Otway Plain Bioregion: https://www.environment.vic.gov.au/biodiversity/bioregions-and-evc-benchmarks

The vegetation assessments undertaken to inform the 2013 BE Review (GHD, 2013) identified that, based on the EVCs assigned to these areas, the Anglesea River and Swamp Creek catchments are likely to be dominated by terrestrial and resilient vegetation that can be grouped into two key terrestrial functional groups (terrestrial dry (Tdr) and terrestrial damp (Tda)), a range of amphibious functional groups (i.e. ATi, Ate and ATw that need saturated soils or inundation some or all of the time), and one aquatic functional group (perennial-emergent (Se)). GHD (2013) identified functional groups within each EVC based on information provided in Casanova (2011). **Table 21** summarises the proportion of aggregate functional groups assumed to be present within each EVC (GHD, 2013).

Table 21 Summary of EVCs and Functional Group Representations

Aggregate Functional Group (Codes)	EVC (% species)				
	Swamp Scrub	Aquatic Sedgeland	Swamp Riparian Woodland	Estuarine Wetland	Heathy Woodland
Dry (Tdr, Tda)	63%	0%	82%	36%	100%
Amphibious (ATi, ATe, ATw, ARp)	32%	68%	13%	43%	0%
Aquatic (Se)	5%	32%	5%	21%	0%

Tdr – Terrestrial Dry, Tda – Terrestrial Damp, ATi – Amphibious fluctuation tolerator – low-growing, ATe – Amphibious fluctuation tolerator – emerging, ATw – Amphibious fluctuation tolerator – woody, Arp – Amphibious fluctuation responder – plastic, Se - Perennial-emergent

The vegetation assessment has been conducted by Ecology Australia in accordance with the MAP requirements in spring as follows:

- Anglesea River Swamplands: Annually from 2014 to 2017 and 2019 to 2022.

- Anglesea River Estuary: Annually from 2015 to 2017 and 2019 to 2022.

Table 22 presents a summary of the findings present in the Ecology Australia (2017- 2023) reports. A summary of the vegetation data and key observations for each site within the Anglesea River Swamplands is presented in **Table 23** through **Table 28** and the data for Anglesea River Estuary is present in **Table 29** through **Table 32**.

Table 22 Summary of Ecology Australia Comments on Floristic Composition 2017 - 2022

Location	Floristic Composition	Wetland Boundary*
Upper and Lower Anglesea River Swamplands	Between 28 and 35 native plant species were recorded across all sites in the Anglesea River Swamplands between 2017 and 2022. The vegetation in the swamp remains healthy, with no weeds and little sign of disturbance. In 2019 there was evidence of vehicle access and obvious vegetation and substrate disturbance at ASP7.	There were no material changes to the wetland boundaries represented by the interface(s) of Aquatic Sedgeland and Swamp Scrub.
Anglesea River Estuary	Between 16 and 19 native indigenous plant species, three (3) exotic/weed species and two (2) non-indigenous Victorian plant species were recorded in the Anglesea River Estuary between 2017 and 2022. The vegetation in the estuary is relatively healthy, although weeds were recorded to be present they did not make up the dominant species in any of the transects. Native vegetation was on the whole growing well with good cover.	-

* Note: This attribute was only recorded in the 2017 and 2019 Ecology Australia reports. It is unclear whether notable changes to the wetland boundary were observed in 2020 onwards.

Whilst variability can be noted in the proportion of functional groups represented at each location, the sites were generally dominated by species from both amphibious and aquatic functional groups. With species from dry functional groups noted to be present in distinct areas of each site, generally at one or both ends of the transect or within distinct sections of the transect. Based on review of the data collected between 2014 and 2022 the following trends are noted:

- The proportional representation of each functional group has remained relatively stable at all sites across the monitoring period. One notable exception was at AS4 (Upper Anglesea River Swamplands) where the number of species from the dry functional group was noted to decline in 2019 and did not recover to pre-2019 numbers.
- At location AS2 (Upper Anglesea River Swamplands) a higher number of species from the dry functional groups were observed, however they were observed at a lower frequency along the transect than the amphibious and aquatic species along the transect (**Table 24**).
- Most sites were observed to contain one or two key species that were present at a higher frequency across the transect, with a range of other species more sporadically noted to be present.
- The variability in the data across the monitoring period is considered likely to represent natural variability. With some species showing decline and recovery within a 2-3 year time period.
- There are likely to be a range of factors that influence the species composition within the Anglesea River Swamplands and Anglesea River Estuary.
- Given the findings of the groundwater monitoring within the ASA (**Section 4**), it is considered likely that the vegetation within the Anglesea River Swamplands experiences seasonal variability in availability of groundwater, with fluctuations of the order of metres between wet and dry periods. This combined with the finding that the Anglesea River Swamplands (Pools) are likely losing

features that are in close connection with the ASA (**Section 4.4.1.2**), indicates that the terrestrial communities present in this area experience seasonal water availability variations that are exacerbated during extended dry periods.

- The ASS assessment identified that the soils within the Upper Anglesea River Swamplands are generally acidic, with some stored acidity that can be mobilised following rainfall events and rising groundwater levels (**Section 5**). This combined with the seasonal water availability and fluctuations in groundwater level within the ASA suggest that vegetation communities in this area are likely to be adapted to survive under variable pH conditions in the soil and overlying water.

Table 23 AS1 Vegetation Survey Summary – Lower Anglesea River Swamplands

Transect/Site	AS1
EVC	Aquatic sedgeland
Water Permanence	Ephemeral
Habitat Description	**Ecology Australia, 2010:** Very large swamp, good cover of emergent and floating vegetation within large pools of water (more open than AGP1). *Melaleuca, Gahnia* on hummocks in swamp and fringing *Melaleuca* scrub. Evidence of previous bushfires at the site was noted. **Ecology Australia, 2017:** A shallow (10-15cm), open swamp, interspersed with moderate cover (20-50%) of emergent vegetation, comprising Fine Twig-sedge, Zig-zag Bog-sedge, Southern Water-ribbons and occasional Scented Paperbark. The majority of open water supports high cover (70-100%) of floating filamentous algae. Filamentous algae also observed as submergent vegetation at low levels (20-50%). Dense cover of fringing vegetation (70-100%) surround the swamp, including Scented Paperbark and Prickly Tea-tree. Low levels (<5%) of bare ground and cover of woody debris also occur on the edges of the swamp. **Ecology Australia, 2022:** This mostly open swamp area is fringed with scented paperbark and prickly tea-tree (which constitutes 70-100% of the observed vegetation species). Floating and submergent vegetation were not observed to be present. Emergent rushes (20-50%) are located throughout the swamp. The water level was sufficient (>0.4m) for water quality measurements during both surveys conducted in 2022.
Vegetation Diversity (number of species recorded	This graph presents the total number of species that were observed at AS1 (Lower Anglesea River Swamplands) during each survey, and the proportion of each functional group observed. Between 2014 and 2022 there has been a gradual decline in the number of species observed to be present, however amphibious species have been recorded to be the dominant functional group present at this site across all sample years.

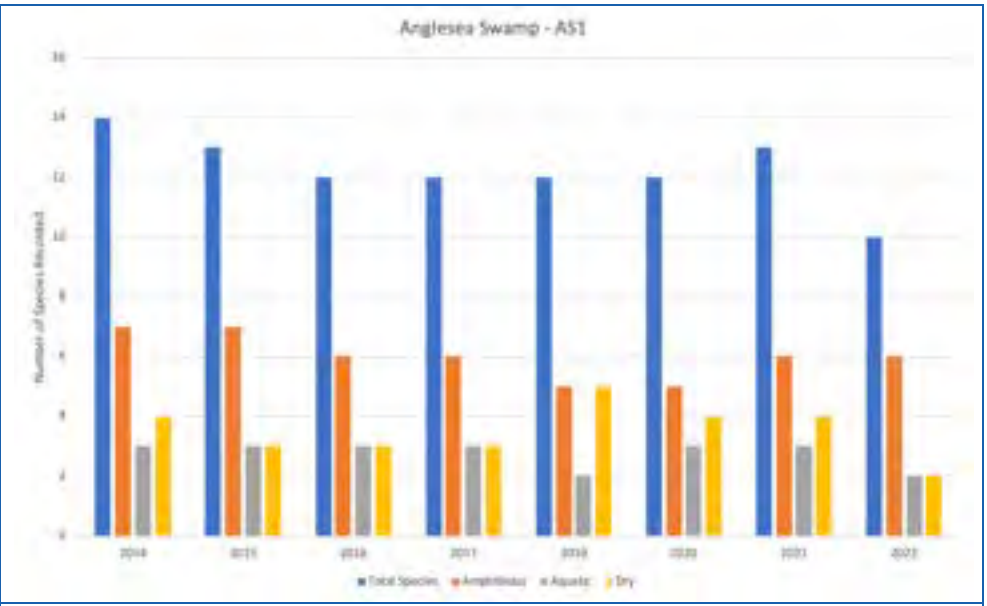
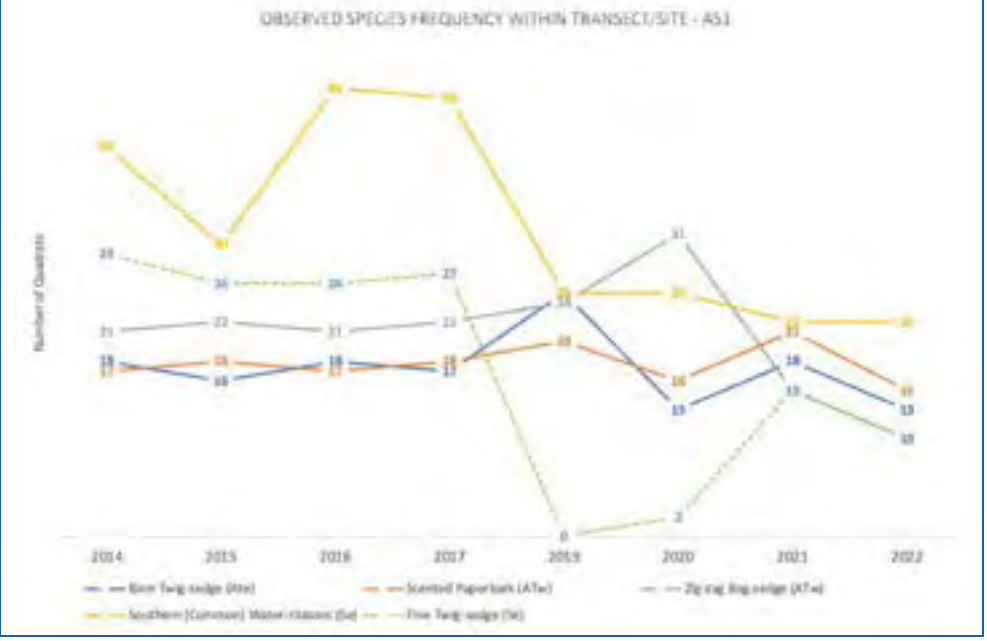
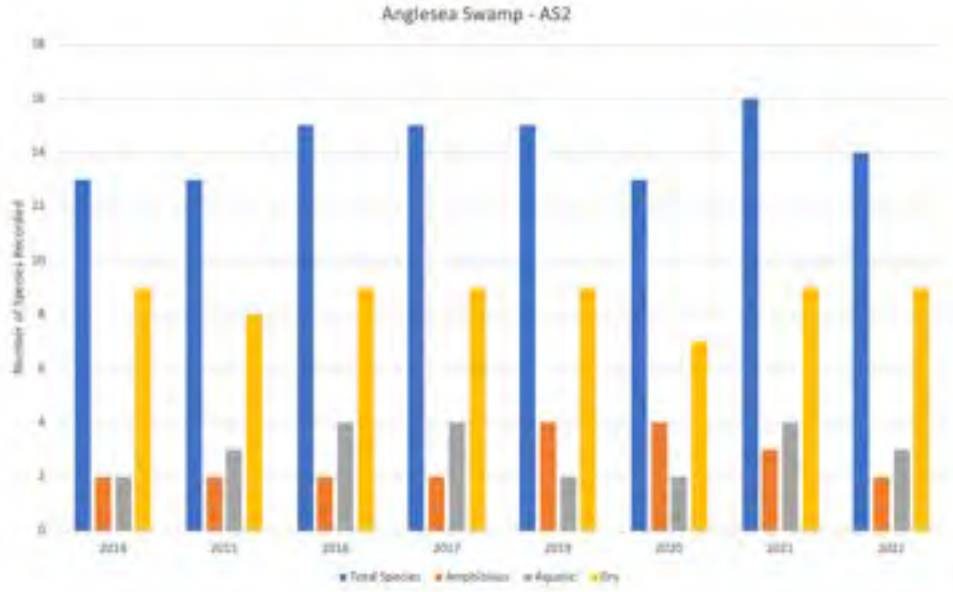
	
Species Frequency (Number of times species were recorded along the transect)	This graph presents the frequency species recorded for those present >20% of the time (i.e. in more than 10 quadrats along the transect). The Southern Water-ribbon (*Cycnogeton procerum sp. aff.*) was generally recorded to be present at the highest frequency along with the Fine Twig-sedge (*Machaerina arthrophylla*) and Zig-Zag Bog-Sedge (*Schoenus brevifolius*). The data shows the Southern Water-ribbon and Fine Twig-sedge were recorded to decline in 2019 with some recovery of the Fine Twig-sedge observed from 2020 onwards, whilst the Southern Water-ribbons remained steady from 2019 onwards. 

Table 24 AS2 Vegetation Survey Summary – Upper Anglesea River Swamplands

Transect/Site	AS2
EVC	Aquatic sedgeland
Water Permanence	Ephemeral
Habitat Description	**Ecology Australia, 2017:**

	Moderate cover of emergent vegetation (50-70%), mostly comprising Zig-zag Bog-sedge, Square Twig sedge and some Southern Water-ribbons, interspersed among pools of shallow (<10cm) open water. Filamentous algae occurs as both submergent (10-20%) and floating (<5%) vegetation. Aquatic vegetation is surrounded by dense (70-100%) cover of fringing vegetation, comprising Scented Paperbark and Manuka, and woodland at further distance from the swamp. **Ecology Australia, 2022:** Swamp dominated by emergent dead and live sedges, with patches of clear open water at varying depth to approximately 20cm. Open water contains 5% floating, 5% submergent vegetation and 70-100% emergent vegetation. The swamp is fringed with 70-90% scrub and tree cover with 20-50% bare soil.
Vegetation Diversity (number of species recorded	This graph presents the total number of species that were observed at AS2 (Upper Anglesea River Swamplands) during each survey, and the proportion of each functional group observed. Overall, the number of species observed during each monitoring round has remained relatively stable but has ranged between 13 and 16 species in total. The total number of species within dry functional group has been observed to be greater than the number of species in the aquatic and amphibious functional groups. 
Species Frequency (Number of times species were recorded along the transect)	This graph presents the frequency species recorded for those present >20% of the time (i.e. in more than 10 quadrats along the transect). Despite a higher number of species recorded from the dry functional group (see above graph), the aquatic species are recorded more frequently at this site with Zig-zag Bog-sedge (*Schoenus brevifolius*) in almost all quadrats (86%-92% of quadrats) surveyed along the 100m transect. A decline in observations of Southern Bristle-sedge was noted in 2019 and 2020, with recovery of that species observed in 2021 and 2022.

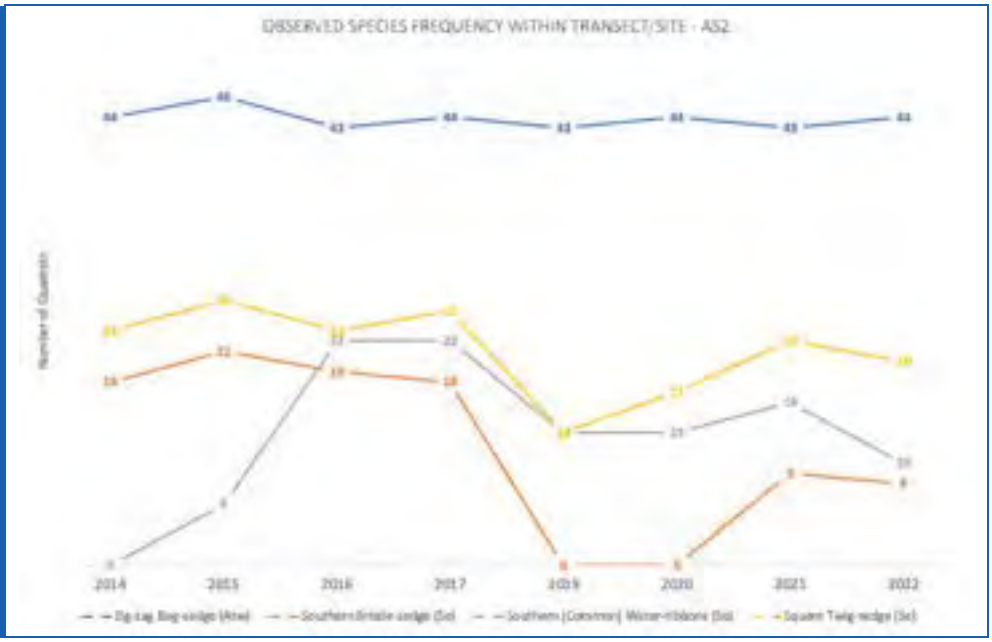
	

Table 25 AS3 Vegetation Survey Summary – Upper Anglesea River Swamplands

Transect/Site	AS3
EVC	Swamp Scrub
Water Permanence	Semi-permanent
Habitat Description	**Ecology Australia, 2017:** Wet swamp with shallow standing water (10-15 cm) and dense emergent cover (70-100%) of Zig-zag Bog Sedge surrounded by thick fringing vegetation (70-100%) dominated by Scented Paperbark, Pink Swamp-heath and Pouched Coral-fern. No floating or submergent vegetation was observed during this monitoring round. **Ecology Australia, 2022:** This site consists of a small (approximately 0.25 ha) clearing in shrub vegetation. Emergent vegetation, mainly Juncus sp., makes up 70-100% of the emerging cover. The shoreline is fringed with Melaleuca species (70-100%). Water was present to a depth of 30cm during the first survey (early November) and dropped slightly to 25cm by the second survey (late November – this survey was for frogs only).
Vegetation Diversity (number of species recorded	This graph presents the total number of species that were observed at AS3 (Upper Anglesea River Swamplands) during each survey, and the proportion of each functional group observed. Overall, there was a gradual decline in the number of species observed between 2015 and 2021, with species numbers increasing again in 2022. This site has been observed to consistently contain a greater number of species in the amphibious functional groups as compared to species from the aquatic and dry functional groups.

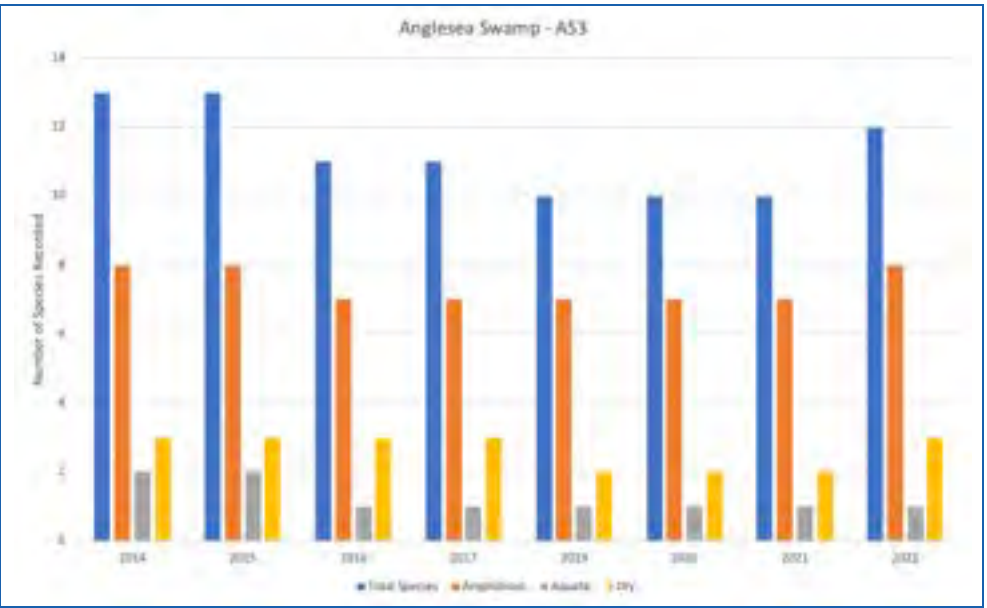
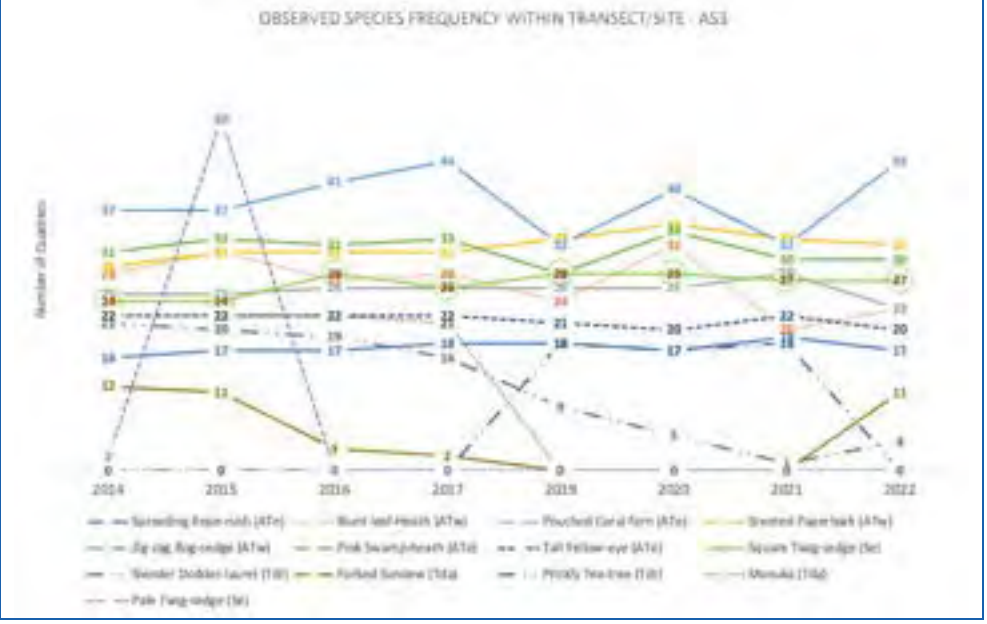
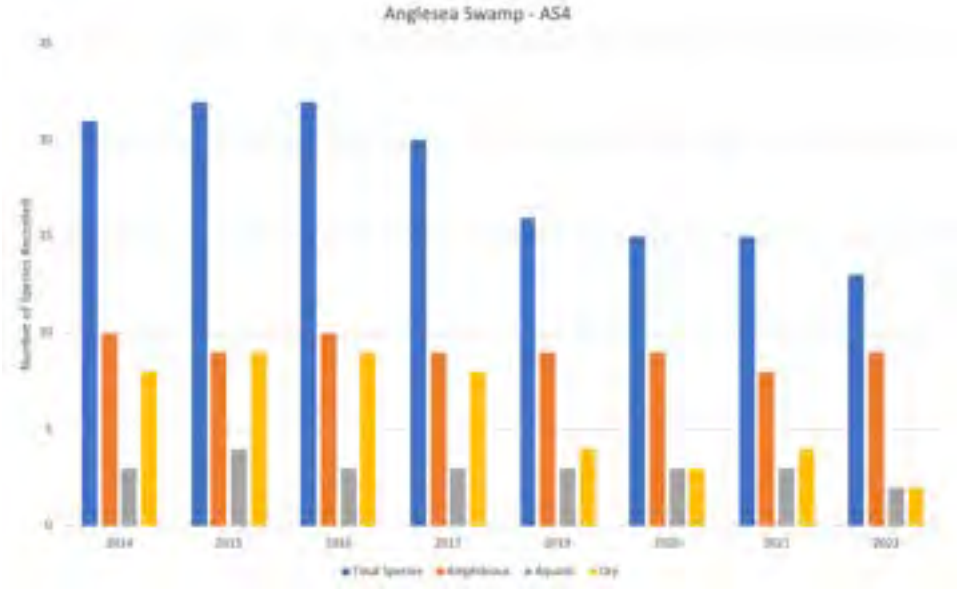
	
Species Frequency (Number of times species were recorded along the transect)	This graph presents the frequency species recorded for those present >20% of the time (i.e. in more than 10 quadrats along the transect). As with AS2, the species most frequently recorded to be the Zig-zag Bog-sedge (Aquatic). However, this site was also dominated by a range of amphibious species. Of note is the recorded presence of the Pale Twig-sedge (*Machaerina acuta*) in all quadrat in 2015 with no observations of this species in the following six monitoring rounds. 

Table 26 AS4 Vegetation Survey Summary – Upper Anglesea River Swamplands

Transect/Site	AS4
EVC	Aquatic sedgeland
Water Permanence	Semi-permanent to permanent
Habitat Description	**Ecology Australia, 2017:** This site did not support standing water in November 2017 and was dry underfoot during both frog surveys. High cover of fringing vegetation (90%) included Pouched Coral-fern,

	Manuka and Scented Paperbark. Low levels (5-10%) of bare ground and small amounts (<5%) of logs and fallen timber were observed. **Ecology Australia, 2022:** Survey site located on the perimeter of the swamp in fringing vegetation. Depth was adequate (0.4m) for water quality monitoring during both surveys. Emergent vegetation of *Juncus sp*. And scented paperbark (20-50%). Submergent vegetation was absent with fringing vegetation consisting of Scented Paperbark. There was evidence of off-road driving in the area at the time of the monitoring (November).
Vegetation Diversity (number of species recorded	This graph presents the total number of species that were observed at AS4 (Upper Anglesea River Swamplands) during each survey, and the proportion of each functional group observed. There was a general decline in the number of species recorded between 2016 and 2022, this decline is proportionate to the reduction in the number of species from the dry functional groups. The species from the amphibious and aquatic functional groups remain relatively stable throughout the monitoring period. 
Species Frequency (Number of times species were recorded along the transect)	This graph presents the frequency species recorded for those present >20% of the time (i.e. in more than 10 quadrats along the transect). The most frequently observed species at this site were those within the amphibious and aquatic functional groups, with the Scented Paperbark (*Melaleuca squarrosa*) observed to be present in between 58% and 92% of the quadrats surveys along the transect. Of note is the presence of Manuka (*Leptospermum scoparium*) which showed a sharp decline in presence from 2019 onwards.

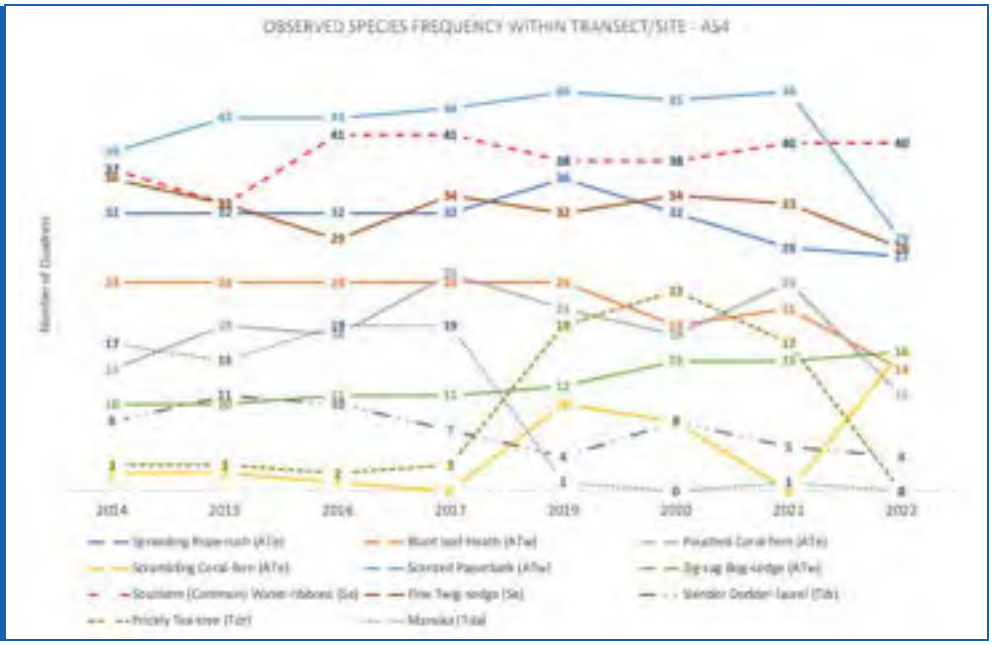
	

Table 27 ASP7 Vegetation Survey Summary – Upper Anglesea River Swamplands

Transect/Site	ASP7
EVC	Aquatic sedgeland
Water Permanence	Ephemeral
Habitat Description	**Ecology Australia, 2010:** Large open swamp. *Melaleuca* on margins and patches in swamp (regenerating). Uniform emergent cover - rushes. Evidence of previous bushfires at the site was noted. **Ecology Australia, 2017:** Dense cover (90%) of emergent vegetation largely comprising dead and live Fine Twig-sedge and Zig-zag Bog-sedge with some Southern Water-ribbons. Small pools of open water, mostly shallow (approximately 0.1m) but with some pockets of deeper water. Dense fringing vegetation (90%) dominated by non-aquatic species such as Scented Paperbark. **Ecology Australia, 2022:** The site consists of a large (approximately 3 ha) clearing within the swamp, comprising 50-70% emergent sedges, fringed with 70-100% cover of mostly scented paperbark. Some submergent (<5%) and floating plants (<5%) were present across both surveys, the swamp had an average depth of 0.4m. The substrate consisted of dead and decomposing vegetation.
Vegetation Diversity (number of species recorded	This graph presents the total number of species that were observed at ASP7 (Upper Anglesea River Swamplands) during each survey, and the proportion of each functional group observed. Species belonging to the amphibious functional group are observed at higher frequency than those in the aquatic and dry functional group during all monitoring rounds.

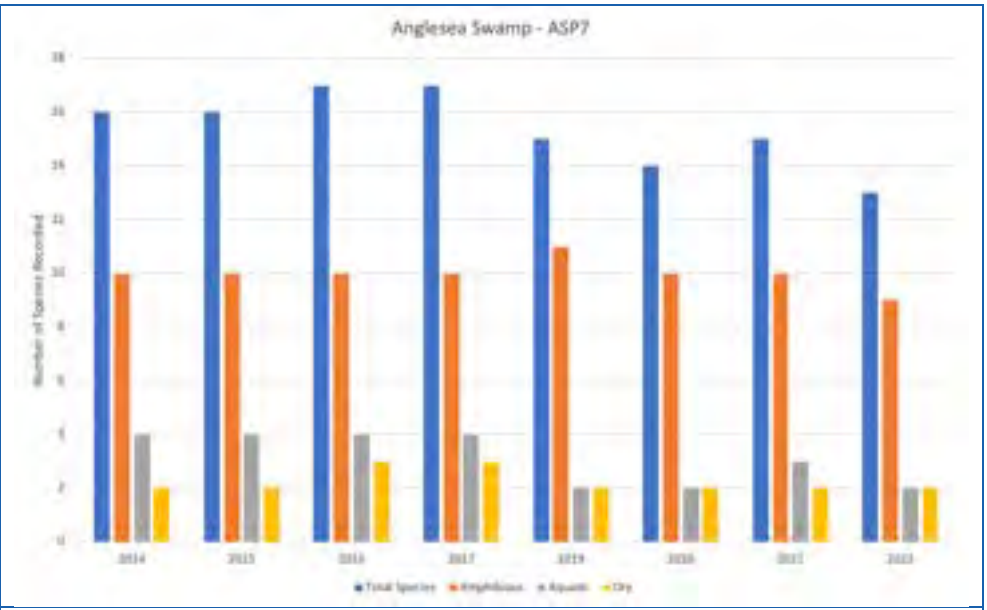
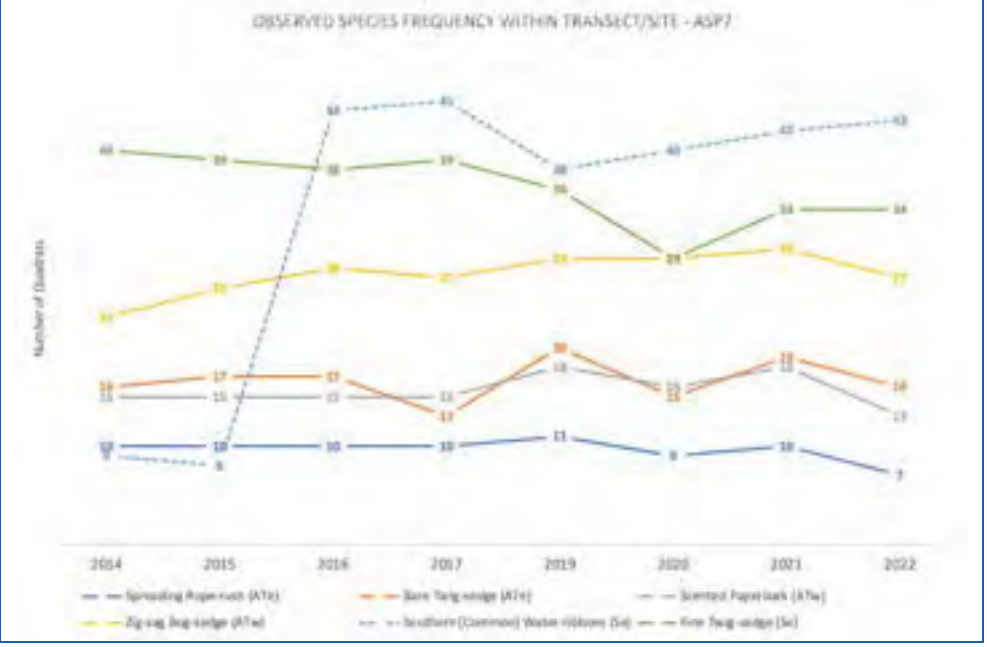
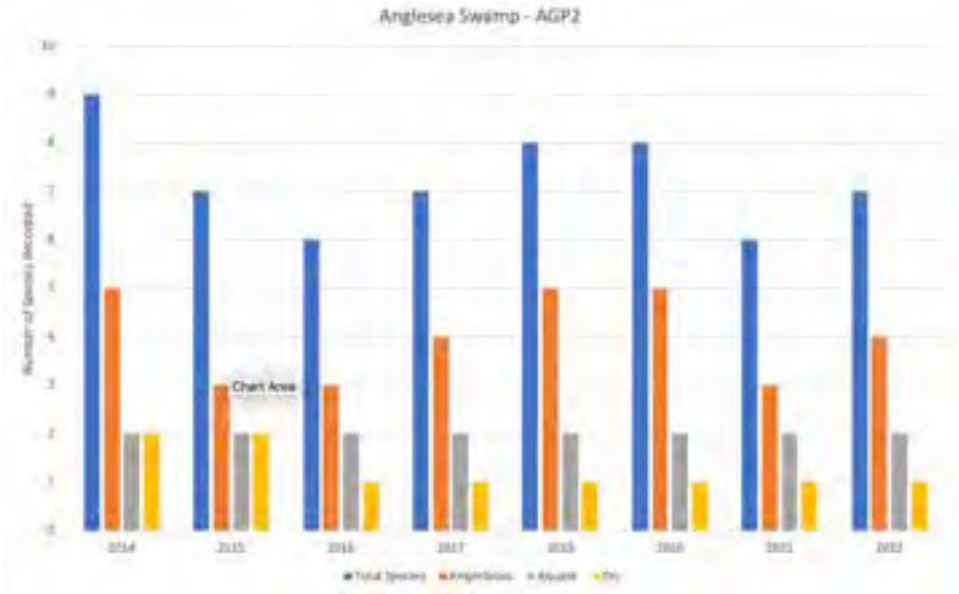
	
Species Frequency (Number of times species were recorded along the transect)	This graph presents the frequency species recorded for those present >20% of the time (i.e. in more than 10 quadrats along the transect). The aquatic species Fine Twig-sedge was noted to be most frequently observed across the site, whilst the Southern Water-ribbons showed a rapid increase in frequency of observation between 2015 and 2016 which was sustained through to 2022. 

Table 28 AGP2 Vegetation Survey Summary – Lower Anglesea River Swamplands

Transect/Site	AGP2
EVC	Aquatic sedgeland
Water Permanence	Ephemeral
Habitat Description	**Ecology Australia, 2010:** Moderate to large swamp, 0.4 m deep, good cover of emergent and floating vegetation and floating algae. Surrounded by burnt Melaleuca scrub. Evidence of previous bushfires at the site was noted. **Ecology Australia, 2017:**

	A deeper swamp (0.3 m) with high levels of emergent vegetation (70-100%) comprising thick tall cover of Tall Rush, Fine Twig-sedge, and interspersed with more open areas supporting dense patches of Sothern Water-ribbons and moderate cover of floating algae (20-50%). High cover of fringing vegetation including dense stands of shrubs including Scented Paperbark. Low cover (<5%) of both logs and fallen timber, and artificial substrates (pipes) along the edges of the swamp. **Ecology Australia, 2022:** A small (approximately 0.25 ha) clearing in tall (up to 4 m) fringing vegetation of scented paperbark and prickly tea-tree (70-100%). Approximately 40% open water with 10-20% cover of floating common water-ribbons, interspersed with emergent rushes (*Juncus spp.*) and patches of scented paperbark. Emergent vegetation consisted of *Gahnia*, common water-ribbon, and rushes (50-70%), with submergent common water-ribbon (5-10%).
Vegetation Diversity (number of species recorded	This graph presents the total number of species that were observed at AGP2 (Lower Anglesea River Swamplands) during each survey, and the proportion of each functional group observed. The number of vegetation species observed has varied over the period 2014 to 2022, with species in the amphibious functional groups being most prominent. A gradual increase in the number of species within the amphibious functional groups observed between 2015 and 2022 was noted. Plants from the dry functional groups were observed to represent between 11% and 22% of the species present. 
Species Frequency (Number of times species were recorded along the transect)	This graph presents the frequency species recorded for those present >20% of the time (i.e. in more than 10 quadrats along the transect). The Southern Water-ribbon was observed most frequently observed along the transect. A decline in the frequency of Tall Rush and Fine Twig-sedge from 2019 onwards.

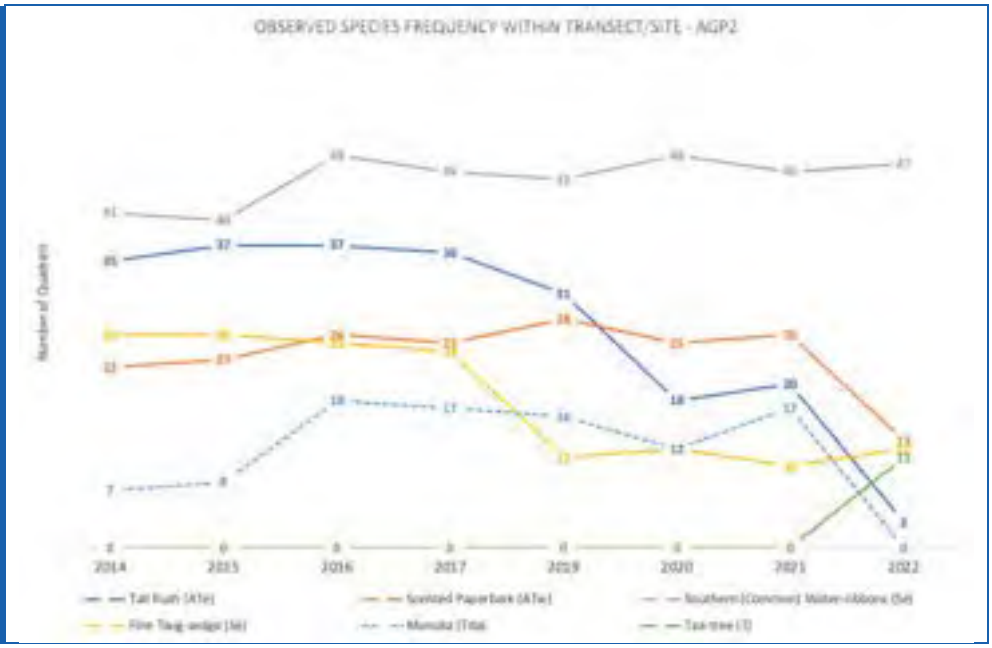


Table 29 LAR1 Vegetation Survey Summary – Anglesea River Estuary

Transect/Site	LAR1
EVC	Swamp Riparian Woodland
Water Permanence	Permanent
Habitat Description	**Ecology Australia, 2010:** Lower Anglesea River, amongst woodland, narrow open water area (less water than LAR 2-4 sites), dominated by Typha and large amount of submerged algae. **Ecology Australia, 2017:** Slow-flowing stream, 2-3 m in width. Dense (70-100%) fringing vegetation comprising Hop Goodenia, Scented Paperbark and Manuka. Low (10-20%) cover of emergent vegetation occurs within 1 m of the bank, including Common Reed, Narrow-leaf Cumbungi and Southern Water-ribbons. Small amounts of filamentous algae occur as submergent vegetation (5-10%) covering rocks and concrete fragments, and floating vegetation (<5%). **Ecology Australia, 2022:** This site is a section of slow-flowing creek up to 0.2 m deep and 3-4 m wide. Submergent vegetation was absent, with 5-10% cover of floating water-ribbons. The creek is fringed with young common reeds, water-ribbons and vegetation in the form of prickly tea-tree, Eucalypts and Goodenia. Common reeds are an emergent vegetation along the banks.
Vegetation Diversity (number of species recorded	This graph presents the total number of species that were observed at LAR1 (Anglesea River Estuary) during each survey, and the proportion of each functional group observed. Based on the EVC for this transect/site this area was expected to be dominated by species in the dry functional groups. However, it can be observed that the number of dry and aquatic species present is relatively stable between 2014 and 2022, but an increase in the number of amphibious species was observed in 2019-2021.

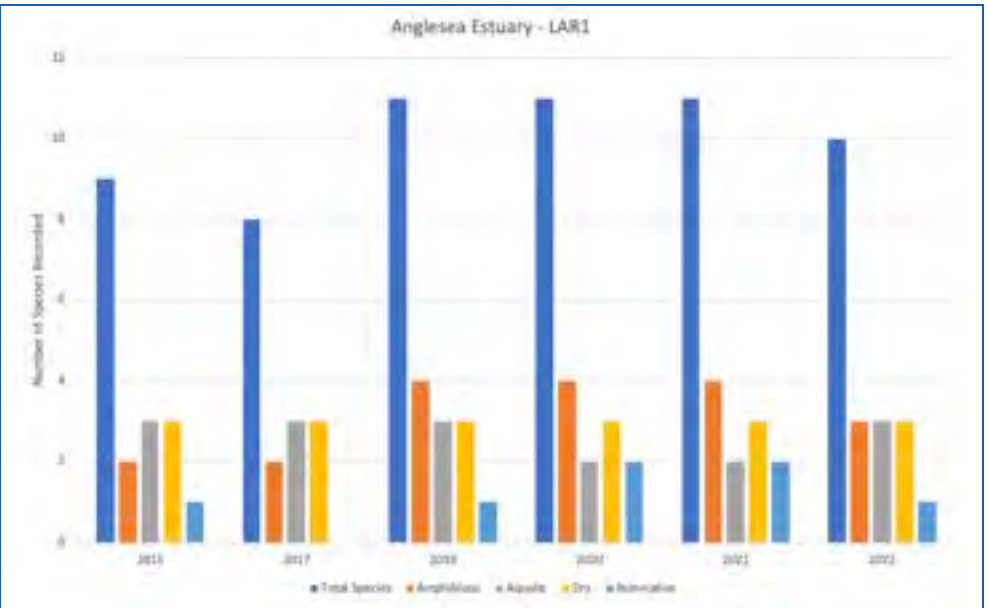
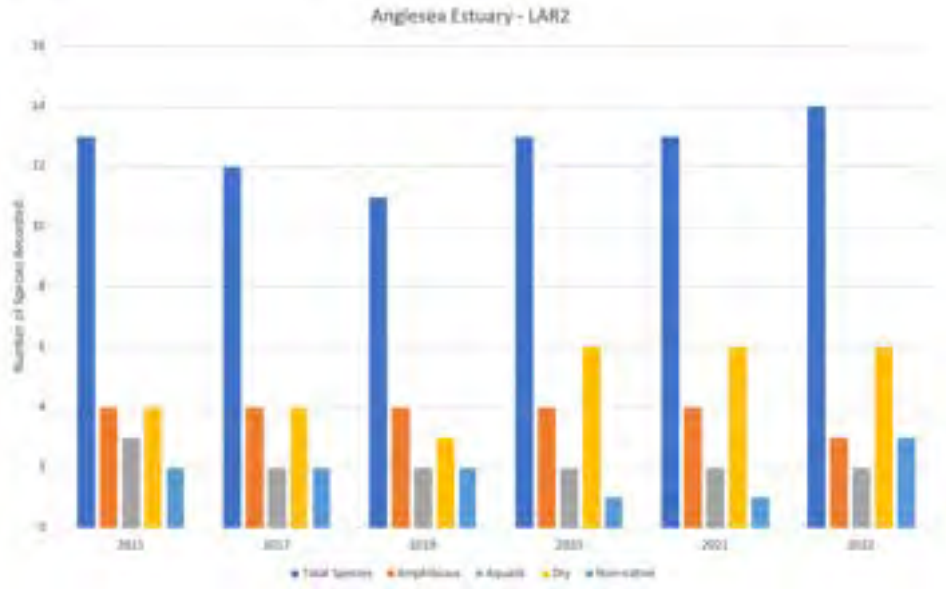
	
Species Frequency (Number of times species were recorded along the transect)	This graph presents the frequency species recorded for those present >20% of the time (i.e. in more than 2 quadrats along the transect (noting that only 7 transects were monitored at LAR1)). The Southern Water-ribbon is the most frequently observed species along this transect, with the Swamp Gum observed at varying frequency across the monitoring years. The non-native Coast Wattle was observed at varying frequency over the monitoring period. 

Table 30 LAR2 Vegetation Survey Summary – Anglesea River Estuary

Transect/Site	LAR2
EVC	Estuarine Wetland
Water Permanence	Permanent
Habitat Description	**Ecology Australia, 2010:** Channel with emergent (either side), largely Phragmites. No trees. **Ecology Australia, 2017:**

	Slow-moving estuary stream, approximately 7m wide, mostly comprising open water with moderate levels of filamentous algae occurring as submergent vegetation (50-70%). Low levels of emergent vegetation (<5%) occurs within 0.5 m of the bank comprising Common Reed, Sea Rush and Southern Water-ribbons. High levels (70-100%) of fringing vegetation occur on both banks. The west bank is fringed by a marsh of rushes, while the east bank supports planted vegetation followed by a boardwalk. Low levels (<5%) of bare ground and fallen timber occur at the site. **Ecology Australia, 2022:** Slow-moving section of creek in estuary with depths of 1-2m and 7-8m wide. This section is fringed with 70-100% cover of Angled Lobelia, Coastal Tussock-grass, Sea Rush and Common Reed. There was no submergent or floating vegetation present. The site is mostly open, supporting less than 5% cover of emergent vegetation. A formed walking path runs along the edge of the waterway.
Vegetation Diversity (number of species recorded	This graph presents the total number of species that were observed at LAR2 (Anglesea River Estuary) during each survey, and the proportion of each functional group observed. The Estuarine Wetland EVC is anticipated to contain relatively equal proportions of species within the dry and amphibious functional groups. This was observed to be the true at this site. 
Species Frequency (Number of times species were recorded along the transect)	This graph presents the frequency species recorded for those present >20% of the time (i.e. in more than 3 quadrats along the transect (noting that this site was monitored at 15 quadrat locations)). The Sea Rush was observed most frequently along the transect, with a decline observe commencing in 2021. The Shiny Swamp-mat was observed to decline in frequency of observation between 2015 to 2022, whilst the Common Reed was observed to steadily increase in frequency over the same time period.

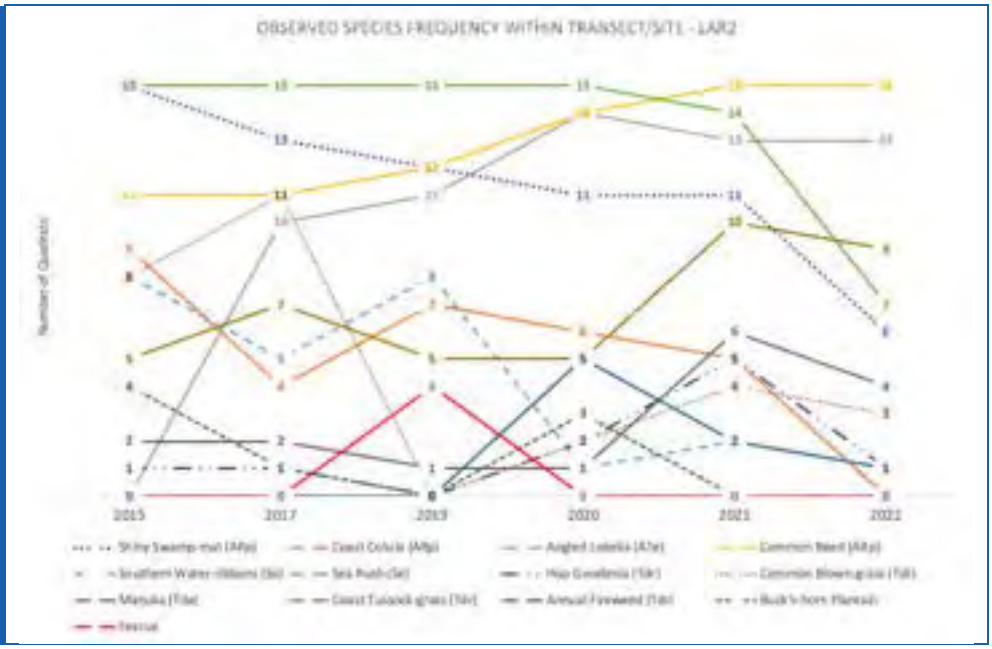


Table 31 LAR3 Vegetation Survey Summary – Anglesea River Estuary

Transect/Site	LAR3
EVC	Estuarine Wetland
Water Permanence	Permanent
Habitat Description	**Ecology Australia, 2010:** Channel, uniform width, with channel on other side of an island of Phragmites with heathy woodland on other side. **Ecology Australia, 2017:** Slow-moving estuary stream, approximately 6m wide, with low (<5%) cover of Common Reed, rushes and Southern Water-ribbons as emergent vegetation near the banks. Moderate submergent cover (20-50%) of filamentous algae along the bottom of the stream. The site supports dense fringing vegetation (70-100%) comprising a marsh of Common Reeds to the east and Sea Rush and Shiny Swamp-mat to the west, with planted woodland vegetation at approximately 4m from the bank. **Ecology Australia, 2022:** This site is dominated by a slow-flowing creek approximately 10-12 m wide and 1-1.5 m deep. There is an absence of emergent and floating vegetation. Emergent vegetation formed <5% of the area. The site is fringed by 70-100% cover dominated by *Juncus*.
Vegetation Diversity (number of species recorded	This graph presents the total number of species that were observed at LAR3 (Anglesea River Estuary) during each survey, and the proportion of each functional group observed. This site/transect generally has a higher number of species from the dry functional group. An increase in the number of species observed in 2020 and 2021 is the result of an increased number of species from the dry functional group as well as an increase in the number of non-native/indigenous species.

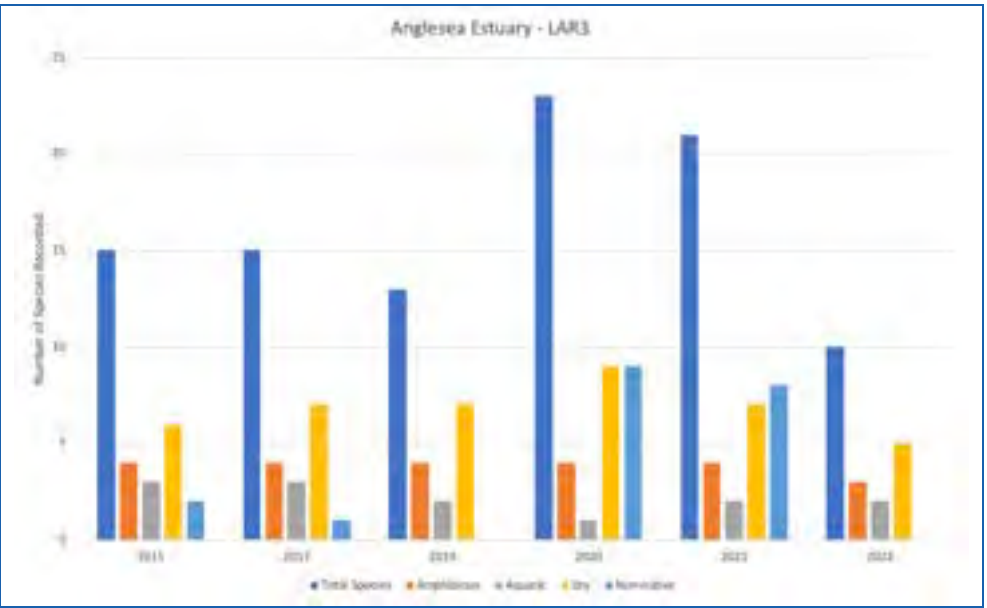
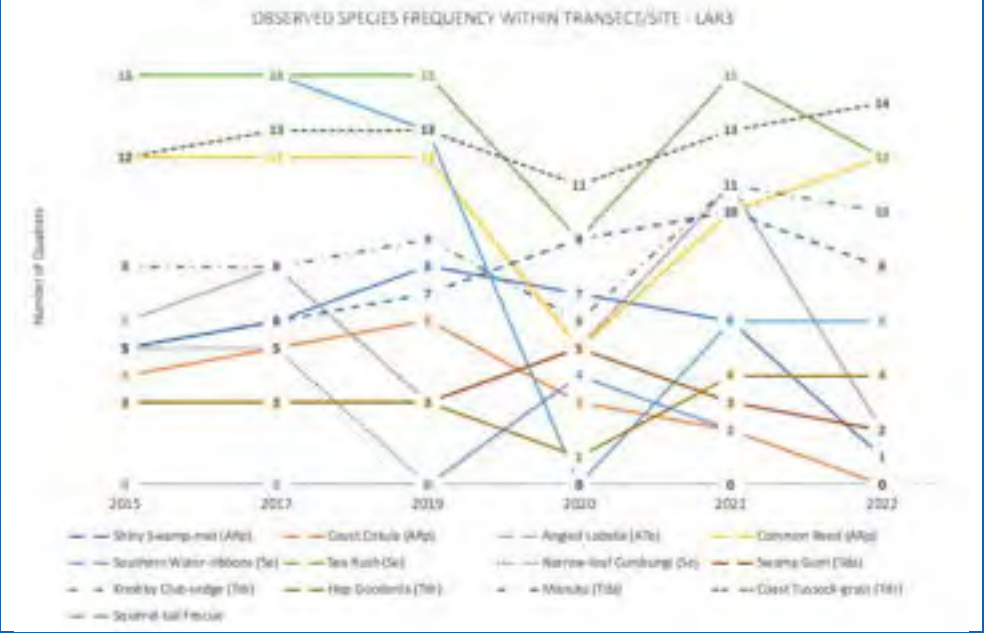
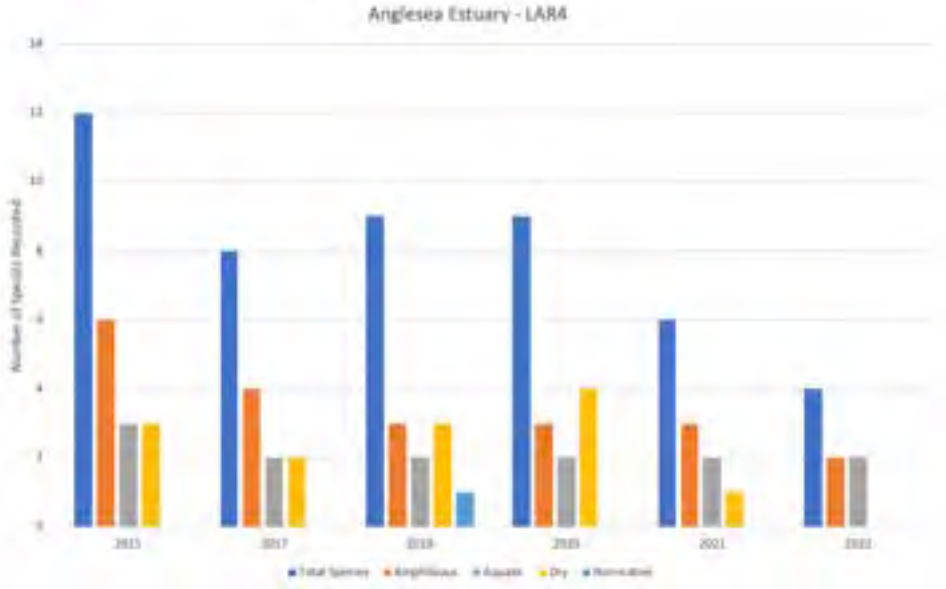
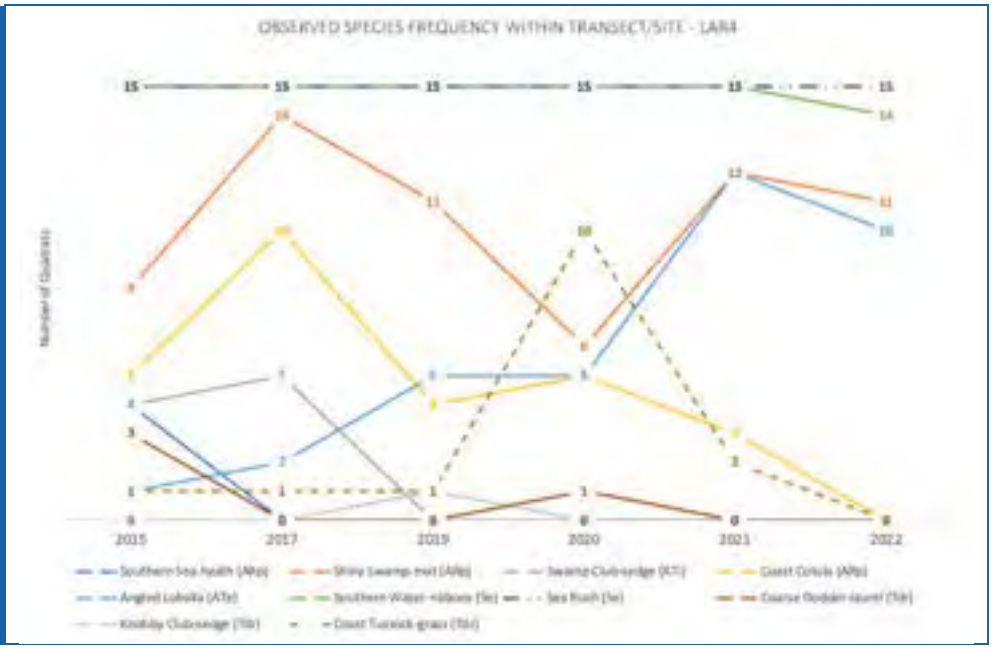
	
Species Frequency (Number of times species were recorded along the transect)	This graph presents the frequency species recorded for those present >20% of the time (i.e. in more than 3 quadrats along the transect (noting that this site was monitored at 15 quadrat locations). The most frequently observed species at the site was the Sea Rush which belongs to the aquatic functional group. There was a notable drop in the frequency that some species were observed in 2019, with some species recovering in 2020 and others observed to further decline into 2022. 

Table 32 LAR4 Vegetation Survey Summary – Anglesea River Estuary

Transect/Site	LAR4
EVC	Heathy Woodland
Water Permanence	Permanent
Habitat Description	**Ecology Australia, 2010:** Channel with riparian vegetation either side, ~2m emergent either side. **Ecology Australia, 2017:**

	Slow-moving 8m wide estuary stream, comprising mostly open with minimal (5-10%) emergent vegetation dominated by Cumbungi and Southern Water-ribbons within 1m of the bank. Submergent filamentous algae occurs at low levels (5-10%) within 2m of the bank. The site is fringed by dense (70-100%) cover of Cumbungi and planted vegetation. **Ecology Australia, 2022:** This section of the creek site is 10-12 m wide and up to 2m deep. The site is fringed by vegetation (70-100%) along the west bank consisting of Goodenia and prickly tea-tree with some other species forming an understorey. The east bank is vegetated with sea rush, dead common reed and coastal tussock-grass. Submergent and floating plants were absent with less than 5% of the area covered with emergent vegetation.
Vegetation Diversity (number of species recorded	This graph presents the total number of species that were observed at LAR4 (Anglesea River Estuary) during each survey, and the proportion of each functional group observed. There are no clear trends in the species data between 2015 and 2022, with plants from each of the amphibious, aquatic and dry functional groups present. It is noted that a decline in species from the dry functional group can be observed in 2021 with no species from the dry functional group recorded in 2022. 
Species Frequency (Number of times species were recorded along the transect)	This graph presents the frequency species recorded for those present >20% of the time (i.e. in more than 3 quadrats along the transect (noting this site was monitored at 15 quadrat locations)). Of note was variability in the frequency of Shiny Swamp-mat with low frequencies observed in 2015 and 2020, but increased numbers observed in all other years. The most frequently observed Southern Water-ribbon and Sea Rush (aquatic species) remained consistent throughout the 2015 – 2022 monitoring rounds.



7.2.3.2 Frogs

The data used in the 2013 BE Review included two frog surveys conducted in spring and autumn. The 2013 BE Review (GHD,2013) concluded that pooled frog data could be generally correlated with seasonal rainfall, with higher frog calls recorded in spring compared to autumn. This was attributed to the majority of species that were recorded being spring breeding frogs (GHD, 2013). The updated MAP was subsequently adjusted to include two surveys both occurring in spring in line with previous observations.

Two frog surveys were conducted in spring (early summer) each year from 2014 – 2022 (except 2018) at eight locations within the Anglesea Swamp land (five locations within the Upper Anglesea River Swamplands, and three locations within the Lower Anglesea River Swamplands). Within the Anglesea River Estuary two frog surveys were conducted every second year between 2015 and 2019 and then each year from 2022 – 2022 at four locations. The survey frequency is in accordance with the MAP requirements.

To support interpretation of the frog data, the monthly rainfall data from the nearest weather station (Wensleydale Vehicle Proving Ground[4]) was compiled (**Figure 12**). The rainfall data indicates that spring and winter 2016 were wet seasons, with a trend of increasing spring rainfall between 2020 and 2022. The spring rainfall pattern correlates with increased frog calls within the Upper and Lower Anglesea Swamplands during the 2016 and 2020-2022 frog surveys (**Figure 13**). A similar pattern was observed in the Anglesea Estuary; however, frog calls were recorded to be low in 2022 compared to 2020 and 2021 (**Figure 14**).

4 http://www.bom.gov.au/jsp/ncc/cdio/weatherData/av?p_nccObsCode=139&p_display_type=dataFile&p_stn_num=087119

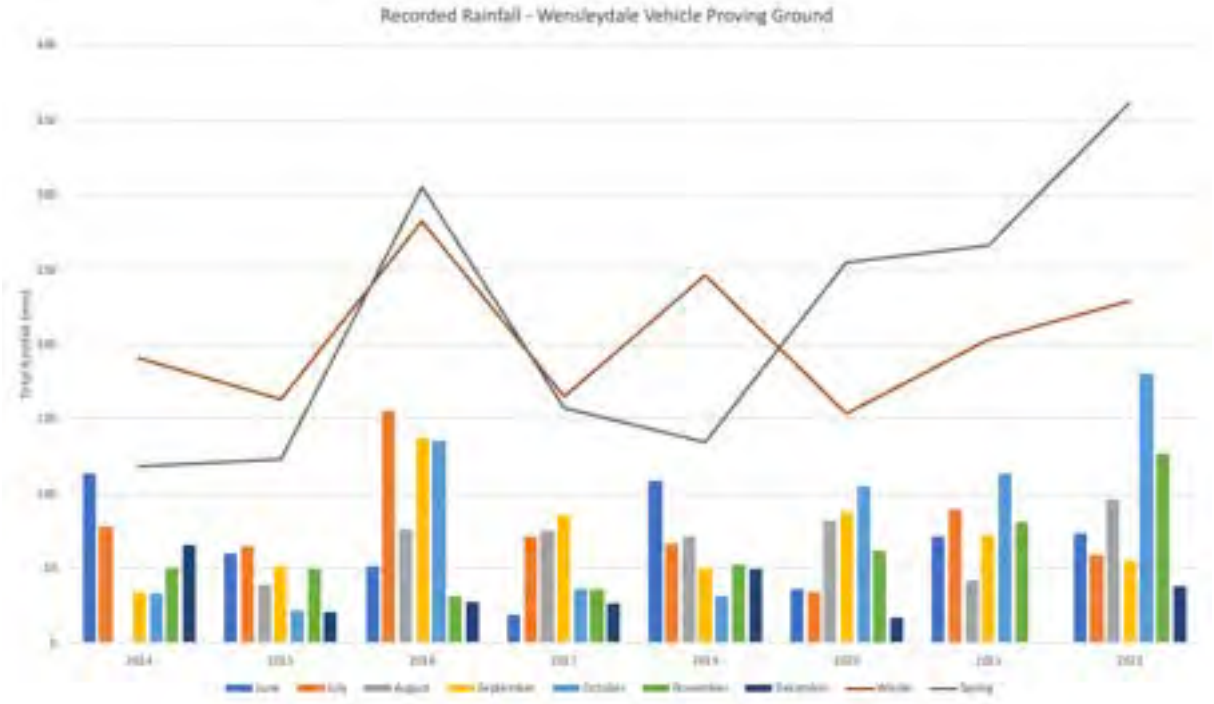


Figure 12 Summary of Monthly (and Seasonal) Rainfall Data

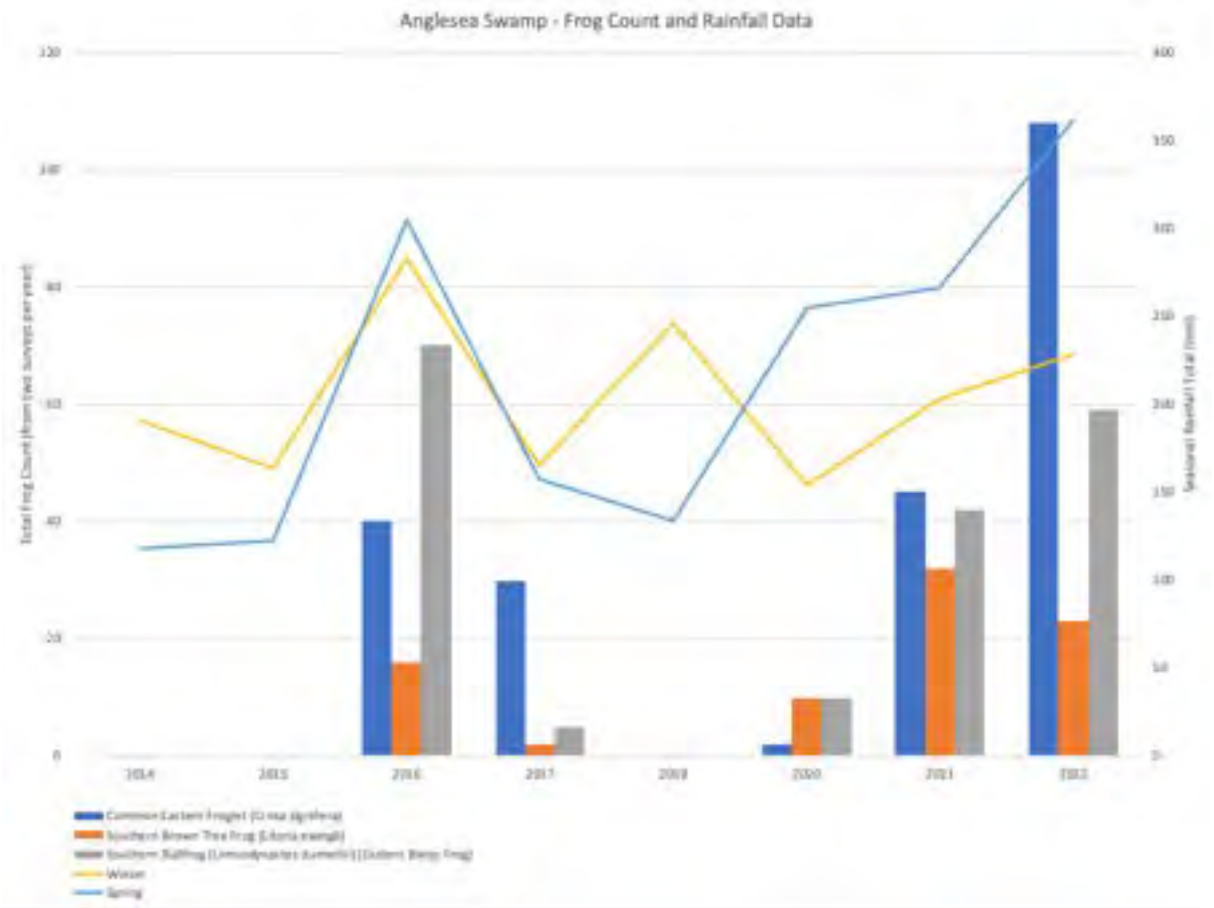


Figure 13 Anglesea River Swamplands (Upper and Lower) Frog Count (pooled data from all sites) and Rainfall Data



Figure 14 Anglesea River Estuary Frog Count (pooled data from all sites) and Rainfall Data

7.2.3.3 Water Quality

Water quality data was collected where sufficient water (≥0.3 m) was present during the frog surveys to enable a water quality probe to be dipped into the water. **Table 33** presents a summary of the water quality data collected during the terrestrial vegetation and frog survey monitoring rounds. It is noted that, whilst this data is limited in nature and provides only point in time information, the pH data collected during the frog surveys is generally consistent with the long-term water quality monitoring outcomes discussed in **Section 3**. It should also be noted that the data presented in **Table 33** shows that there was observed to be an increasing trend in the quantity of water present at each of the Anglesea River Swamplands monitoring locations from 2015 onwards. No clear correlation between quantity of water in the Anglesea River Swamplands and rainfall in the region, or groundwater levels can be drawn based on the available data.

Table 33 Water Quality Data Summary – Frog Survey Locations

Location	Depth of Water (2014 – 2022)	Number of Quadrats with Water (Range)	pH	Salinity
Upper Anglesea River Swamplands				
AS2	0 – 0.42 m	0 (2014-2015) - >35 (2016 – 2022)	3.18 – 4.29	0.04% - 0.3%
AS3	0 – 0.2 m	17 (2014) – >25 (2015 - 2022)	3.43 – 4.6	0.03% - 0.5%
AS4	0 – 0.32 m	2 (2014) – >23 (2015 - 2022)	3.74 – 3.85	0.5%
ASP7	0 – 0.46 m	0 (2014), 3 (2015) - >31 (2016 – 2022)	2.6 – 5.35	0.06% - 0.6%
Lower Anglesea River Swamplands				
AS1	0 – 0.3 m	0 (2014), 4 (2015) - >45 (2016 – 2022)	2.75 – 5.27	0.11% - 0.5%
AGP2	0 – 0.4 m	0 (2014), 2 (2015) - >48 (2016 – 2022)	2.84 – 3.36	0.2% - 0.5%

Location	Depth of Water (2014 – 2022)	Number of Quadrats with Water (Range)	pH	Salinity
Anglesea River Estuary				
LAR1	~ 0.2 m to ~ 0.3 m	Not recorded	2.73 – 3.84	0.13% - 0.79%
LAR2	~2 m	Not recorded	3.38 – 4.12	0.14% - 3.6%
LAR3	~1.5 to ~ 2 m	Not recorded	3.7 – 4.05	0.15% - 1.6%
LAR4	~2 m	Not recorded	3.24 – 3.93	0.16% - 2.7%

* Note: water quality data (pH and salinity) from some survey rounds (2014, 2015, 2016, 2020) was not available at the time of preparation of this table.

7.2.4 Summary

The terrestrial data collected between 2014 and 2022 further confirms the conclusions of the 2013 BE Review (GHD, 2013), including:

- Variability recorded in the vegetation data within both the Anglesea River Swamplands and Anglesea River Estuary is likely to be within natural ranges;
- The floristic structure of the EVCs present within the Anglesea River Swamp and the Anglesea River Estuary aligns with the general structure expected of these communities. Whilst some variability was observed, generally the most frequently observed species at the site surveyed were from amphibious or aquatic functional groups, which aligns with the inundation profile of these environments;
- The frog data shows variability in the presence of frogs at the locations sampled. There is some correlation with rainfall data which aligns with the behaviour and breeding cycle of these animals;

Overall, the terrestrial data indicates that there are a broad range of variables that can influence these environments, and that whilst there is potential for seasonal water fluctuations to impact on the vegetation communities and frog assemblages, the linkage to groundwater drawdown may be less significant than originally anticipated. The risks associated with this potential linkage will be further assessed following a review of the predictive modelling outputs as part of the groundwater pumping impact assessment.

7.2.5 Data Gaps

The terrestrial surveys were conducted in accordance with the MAP requirements with no data gaps identified. However, with regard to the frog data, whilst a correlation can be observed between frog counts and rainfall data, there are some notable limitations to the frog survey methodology that would limit any further interpretation of the frog survey data. These limitations will need to be considered as part of the impact assessment, and include:

- Survey times were limited in nature (e.g. five minutes for diurnal and nocturnal surveys, and unknown time period for call back survey). Whilst every effort was made to find the optimal time for the frog surveys to be conducted, variables other than rainfall (e.g. temperature, humidity, frog movement patterns) may also influence when the frogs can be observed.
- Limiting the frog surveys to spring, may have increased the likelihood of recording frogs of some species, however it has also eliminated the detection of other species.
- Other weather data was not recorded during frog surveys (e.g. humidity, air temperature, time since last rainfall event, frequency of recent rainfall events). The data was not available to enable an understanding of the time of day at which the frog survey was undertaken.
- It was noted that a number of the sites within the Anglesea River Swamplands are ephemeral, however there was no data collected with regard to frequency and duration of dry periods at these

sites to support an understanding of how sensitive the vegetation and frog communities are to dry conditions.

7.3 Aquatic Monitoring

7.3.1 2014 MAP Requirements and Objectives/Rationale

For aquatic monitoring, the updated BE order 2009 MAP (2014) required the following records:

- the number and type of macroinvertebrates in streams using sweep sampling in Spring every third year at sites UAR1, UAR2, BC1, BC2, BC3, BCT1, BCT2, SC1, Wetland 1 (W1) Wetland 2 (W2) and Wetland 3 (W3);
- the number of southern pygmy perch and condition based on the size and weight of a maximum of 30 fish each Spring at sites BCT1 and SC1 via the use of bait trapping;
- the number and type of macroinvertebrates in Spring of each year at sites BCT1 and SC1 via the use sweep sampling; and
- the number and type of macroinvertebrates in Spring of each year at site W3 via the use sweep sampling.

Monitoring locations are shown on **Figure F4a**.

The aquatic monitoring requirements for the 2014 MAP are more detailed than that required prior to 2013, but are similar in essence, in that both required fish and macroinvertebrate surveys. The original MAP (prior to 2013) requirements were six-monthly surveys; from 2014 on-wards, the frequency was dropped to annual surveys (in Spring) for the three main sites (BCT1, SC and W2/3 – or other wetland site) with additional locations surveyed every three years. In addition, monitoring undertaken between 2009 and 2013 required quantitative macroinvertebrate population analysis using artificial substrates. Monitoring undertaken from 2014 onwards under the updated MAP did not require this; only qualitative population analysis was undertaken using the Victorian Rapid Biological Assessment (RBA) method (EPA, 2003).

The 2014 MAP requirements are summarised in **Table 34**.

Table 34 Summary of 2014 MAP Aquatic Monitoring Requirements

Parameter	Timing	Locations
Aquatic macroinvertebrates	Spring, every third year	UAR1, UAR2, BC1, BC2, BC3, BCT1, BCT2, SC1, W1, W2, W3
Aquatic macroinvertebrates	Spring, every year	BCT1, SC1, W3
Southern pygmy perch	Spring, every year	BCT1, SC1
Otway bush yabby*	Spring, every year	BCT1, SC1

*Not required as part of the 2014 MAP, but added in 2018 as a recommendation from the 2017 sampling as this species is listed as Endangered on the Victorian Advisory List of threated invertebrates. It was detected during macroinvertebrate surveys (dip netting), southern pygmy perch surveys (bait trapping) and opportunistic electrofishing (Ecology Australia 2018)

7.3.2 Sampling Methodology

7.3.2.1 Locations

Sites BC1, BC2 and BC3 are located on Breakfast Creek. Site BC1 is located upstream of the LEVF outcrop, where the Otway Group bedrock outcrops in a steep vegetated valley. Site BC2 is located within the LEVF outcrop, upstream of site BC3. The site is located in a broad valley, containing dense vegetation. These sites are subject to ephemeral flow and on occasion are disconnected (BC1 has been observed as a series of pools).

Sites BCT1 and BCT2 are located on the Breakfast Creek Tributary. The Breakfast Creek Tributary lies within the LEVF and is a small and narrow waterway which flows into Breakfast Creek. Site BCT1

sits at the bottom of a steep, densely vegetated valley. The tributary itself is narrow, with a stream width of approximately 0.5 -1.5 m. BCT1 is classified as perennial. Site BCT2 is downstream of site BCT1 and has been reported as dry on one monitoring event (2015).

Site SC1 lies on Salt Creek, which is one of the main tributaries of the Anglesea River. Site SC1 is located in the LEVR area in a moderately sloped, densely vegetated valley. Site SC1 is a large and relatively deep pool with steep banks, that contain dense, overhanging vegetation. Based on observations of this location since 2017, this site is considered likely a permanent refuge.

Sites UAR1 and UAR2 are located on the Upper Anglesea River. They are situated in densely vegetated steep valleys within the LEVF. The River is subject to ephemeral flows and these sites were dry in the 2015 monitoring event.

The wetland sites, W1, W2 and W3 lie within the lower Anglesea River floodplain, where it has formed in alluvial sediments overlying the UEVF. The sites are located in broad, densely vegetated valleys. Some or all of these sites have been dry during monitoring events.

7.3.2.2 Macroinvertebrates

2014 - 2017 (GHD)

Prior to the sampling of macroinvertebrates at each site, water quality was recorded at each site, by measurement of temperature (°C), pH, dissolved oxygen (as percent saturation), and electrical conductivity (µS/cm).

Macroinvertebrate edge samples were collected using the standard 10 m sweep technique as defined by the Victorian RBA methodology (EPA, 2003), using a 250 µm mesh sweep net with a 30 cm x 30 cm opening. A total of 10 m of edge habitat was sampled for each replicate at each site.

The collected samples were live-picked using standard RBA (EPA, 2003) protocols and preserved in a sample jar using 70% ethanol. The overall objectives of the live-picking technique are as follows:

- Obtain 200 animals within 30 minutes;
- If less than 200 animals obtained within 30 minutes, continue for another 10 minutes; and

If during this time, 200 individuals were collected sampling ceased. Alternatively, if less than 200 individuals were collected or new taxa were found in the 10 minutes, picking continued for an additional 10 minutes. This process was repeated until a maximum total live-pick time of 60 minutes was reached.

As live-picking aims to collect as much diversity as possible, the following protocols were applied:

- Abundant and large species were not favoured over cryptic and rare species;
- No more than approximately 30 individuals from each taxon were collected, with the exception of chironomids, where at least 30 individuals are required to be collected to represent all the relevant subfamilies.

Macroinvertebrate samples were processed under a stereo microscope with the majority of individuals identified to family level taxonomic resolution, using published keys listed in Hawking (2000) as per standard RBA protocols (EPA, 2003), with the following exceptions:

- Specimens from the *Chironomidae* (midge fly larvae) were identified to sub-family level;
- Specimens from the classes *Oligochaeta* (worms) and *Acarina* (mites) were not identified past class level;
- Specimens of the orders *Ephemeroptera, Plecoptera, Trichopetra* and *Odonata* were identified to genus level; and
- Aquatic beetles were separated into adult and juvenile forms and counted as separate families.

Macroinvertebrate data was analysed using a variety of biological indices. The use of multiple indices gives the assessment additional reliability, as each of these indices summarise different aspects of the macroinvertebrate community and have different limitations (Tiller & Metzeling, 2002).

Bioindices used were:

- Number of taxa – total number of taxa collected in each sample based on taxonomic resolution used in RBA protocols (EPA, 2003);
- Number of individuals – total number of organisms collected in each sample;
- Number of EPT taxa – number of families from the orders of Ephemeroptera, Plecoptera and Trichoptera. These are taxa generally regarded as the most sensitive to pollution and habitat changes and therefore their presence/absence in a waterbody is a useful indicator of ecological condition;
- Number of EPA Key Families – the number of taxa identified by EPA (2003) as being typical of waterways within the bioregion;
- EPA SIGNAL score – average SIGNAL score of families collected in each sample, using the SIGNAL grades adopted by EPA (2003). Calculated SIGNAL scores indicate the health of a waterbody;
- EPTO genus diversity – This metric can be used when little flow is likely to occur in the stream.

Bioindices were calculated from single season data only, and each sample collected was treated separately. EPA bioassessment objectives are based on combined data for two seasons for most of the indices. Site total bioindices were also calculated by combining all macroinvertebrate data collected at a site.

It is noted that some macroinvertebrate (and fish) surveys occurred in December, even though the MAP requires spring monitoring. However GHD (2015) considered that the weather patterns in early December behaved similarly to spring and were deemed suitable for sampling.

2017 – 2022 (Ecology Australia)

The aquatic sampling methods used by Ecology Australia are based on the revised 2014 MAP requirements and approaches used by GHD (2010–2017), with minor modifications.

At sites where there was insufficient surface water at the original survey point, the survey location was moved downstream. At each site, RBA field sampling and habitat assessment sheets were completed, including in situ water quality measurements.

As per the methods outlined by GHD (2016), triplicate edge samples were collected at each site following the methods outlined in EPA (2003). Ecology Australia noted the presence of additional invertebrates which were observed but not collected (e.g. fast moving).

Macroinvertebrates were identified and enumerated using keys outlined in MDFRC (2013), which provides an update on those outlined in Hawking (2000). The majority of taxa were identified to family level with the exceptions as per the RBA protocols (EPA, 2003). Taxa excluded from the recommended indices were discarded.

Additionally, specimens of the orders Ephemeroptera, Plecoptera, Trichoptera and Odonata (EPTO) were identified to genus level, as per GHD (2015—2017).

Macroinvertebrate data were analysed both at individual sample and site scale (using the combined data from 3 samples). Where available, the results were compared against indices objectives outlined in the Environment Reference Standard (ERS) (GoV, 2021) for rivers and streams in the 'Central Foothills and Coastal Plains' geographic region and for 'shallow inland with outflow' wetlands. Combined data was used for comparisons with previous years to indicate the overall trend of a site and when compared with ERS objectives is indicative only and the results at a sample level should be used when assessing an individual site.

The following indices were used to analyse macroinvertebrate data:

- Number of macroinvertebrate families — total number of taxa based on taxonomic resolution levels described above.
- SIGNAL2— average SIGNAL score for taxa collected in each sample, based on methods of Chessman (1995).

- VLAKES – average VLAKES score for taxa collected in each sample, based on methods of EPA (2010).

The following indices were included in the analysis to show the number of more sensitive taxa and for ease of comparison with past reports, but were not compared to an objective as they are not included as objectives for edge samples within the ERS (GoV, 2021):

- Number of EPT taxa, and
- EPTO genus diversity.

With the exception of VLAKES, the approach adopted by Ecology Australia is consistent with that used by GHD for the period 2015 - 2017.

7.3.2.3 Fish

2014 - 2017 (GHD)

GHD conducted fish surveys were using electrofishing and trapping methods in spring and autumn, at sites known to be inhabited by southern pygmy perch. GHD did not provide the method for electrofishing in their reports.

In addition, bait traps were deployed at sites deemed suitable habitat for southern pygmy perch. It is believed that five bait traps were set each year, however it is not specified in the reports of the surveys conducted 2012–2016 (GHD 2013–2017). Site selection was limited to locations where southern pygmy perch have previously been trapped. Traps were set to ensure a diversity of structural habitat available to fish including:

- Open water;
- Amongst vegetation and woody material.
- Against vegetation and woody material.

The bait traps measured 0.22 m x 0.22 m x 0.4 m, with 2 mm stretched mesh, and had a funnelled opening at each end. They were set baited using cat glow-sticks hung centrally inside the trap.

All traps were set in the afternoon and collected the following morning. All specimens were measured, weighed and photographed then immediately returned to the water to minimise handling time and stress on the fish.

All fish surveys were undertaken under Fisheries Victoria Permit No. 1096 and permit to take protected fish/research permit (Flora and Fauna Guarantee Act 1988) No. 10007230. In accordance with the permits, any non-target fish species were identified in the field, with native individuals returned to the water and pest or noxious fish species euthanized.

2017 – 2022 (Ecology Australia)

The aquatic sampling methods used by Ecology Australia are based on the revised 2014 MAP requirements and approaches used by GHD (2010–2017), with minor modifications.

Surveys targeting southern pygmy perch were undertaken at sites deemed suitable habitat for this species. At sites where there was insufficient surface water at the original survey point, the survey location was moved downstream.

Ten bait traps were set in the afternoon and retrieved in the morning at both sites. This is a modification of the methods used by GHD (2015—2017), where it is believed that five bait traps were set each year, however it is not specified in the reports of the surveys conducted 2012–2016 (GHD 2013–2017). The number of traps was increased with the aim to increase the chances of collecting 30 southern pygmy perch per site.

The bait traps had a mesh size of 2 mm and funnel entrances of 4 cm at each end. They were set baited using 4-inch yellow glow-sticks.

The first 30 southern pygmy perch were measured (total length) to the nearest millimetre, and weighed to the nearest 0.1 gram. Subsequent southern pygmy perch were counted and recorded. Additional taxa of interest detected in bait traps or observed at each site were recorded, with a particular focus on the Otway bush yabby.

Instream habitat assessment was undertaken at all sites surveyed. The habitat assessment consisted of a fish habitat datasheet based on those used by the Arthur Rylah Institute. The habitat assessment included notes on existing sources of disturbance, notes and estimates of biological and physical attributes (e.g. wetted instream cover, riparian shading, aquatic vegetation, substrate composition, flow and depth) and in situ water quality measurement. An outline of some of these habitat descriptors is provided below:

- The percentage cover of various forms of instream habitat (based on the proportion of the wetted area that they covered at the time of assessment).
- The shading estimate as per the EPA Rapid Bioassessment method (EPA, 2003). This is an estimate based on a plan view as it would appear with the sun directly overhead (i.e. midday).
- The flow status estimate is as per the USEPA fieldsheets that are incorporated into the latest iteration of the Victorian EPA Rapid Bioassessment fieldsheets (Version: September 2012). This is an estimate based on the proportion of the channel filled and/or substrate exposed.
- The disturbance rating estimate is based on identification of a number of disturbance sources including levels of bank erosion, riparian vegetation clearance, parallel or adjacent roads, bridges/culverts/fords, rubbish, drain input, water extraction points, stock access, sedimentation, invasive exotic vegetation, barriers to fish passage, channelization and hydrological alterations; together with a severity rating (i.e. high, medium, low) applied to the disturbance sources that were identified at a given site.

Water quality measurements of dissolved oxygen, pH, temperature and conductivity were recorded at each site.

7.3.2.4 Otway Bush Yabby

The Otway bush yabby (*Geocherax tasmanicus*) is a small freshwater crayfish, at the time listed as Endangered on the Victorian Advisory List (DSE, 2009) of threatened invertebrates[5]. It remains listed as Endangered on the *FFG Act* 1988 Threatened Species list.

Observations of the Otway bush yabby were initially made by association with fish and macroinvertebrate surveys in 2017 by Ecology Australia (EA, 2018). At the time, the yabby[6] was detected at two of the three survey locations (BCT1 and SC1) and was also confirmed to occur at the Breakfast Creek Road crossing. The yabbies were detected during the fish survey (bait traps), during the macroinvertebrate survey (dip nets) and by electrofishing.

In 2018, the yabby was again detected at six of the eleven survey locations, including repeat detections at BCT1 and SC1. Based on these results, it was requested by Barwon Water that this species be monitored concurrently with the same effort that was being employed for fish and invertebrates.

Data for the Otway bush yabby were recorded per capture method (with individuals captured both within the bait traps and within sweep samples). All Otway bush yabbies captured using sweep samples were returned to the point of capture before macroinvertebrate samples were live-picked, as described above.

[5] The establishment of the *FFG Act* 1988 Threatened List revoked previous Advisory Lists.
The Otway bush yabby is listed as Endangered on the *FFG Act* 1988 Threatened List June 2023, available at:
https://www.environment.vic.gov.au/__data/assets/pdf_file/0021/655410/FFG-Threatened-List-June-2023.pdf
[6] Initially termed “Otways Cray” in the Ecology Australia report of the 2017 aquatic monitoring event.

7.3.3 Results

7.3.3.1 Macroinvertebrates

Macroinvertebrate data has been reported in a variety of ways, including number of taxa, number of key families, SIGNAL2/VLAKES scores, and numbers of EPT and EPTO organisms.

Over the course of the project, the regulation and guidance around aquatic macroinvertebrates has changed. Prior to 2021, when the ERS (GoV, 2021) came into effect, the State Environment Protection (Waters of Victoria) Policy (SEPP WoV), as varied through Government Gazettes (GoV, 2018), provided the benchmarks for comparison with aquatic macroinvertebrate data.

As the ERS now provides the regulated benchmarks for waters in Victoria, the indicators and objectives for the number of macroinvertebrate families, EPT and SIGNAL2 score, as listed in the ERS for the Central Foothills and Coastal Plains segment were used to compare with the macroinvertebrate data over the period 2014 - 2022. It is noted that this may result in different findings than those previously concluded by both GHD and Ecology Australia.

Number of Families

The number of macroinvertebrate families found at a site can be an indication of the ecological health of a stream, as healthy streams generally have more families (EPA, 2021). However, there is variability even within healthy streams, with larger streams in general, supporting more taxa. Mild nutrient enrichment can also increase taxa, by increasing the food supply.

The ERS (GoV, 2021) objective for the number of macroinvertebrate families for the Central Foothills and Coastal Plains segment for Spring, for combined edge and riffle habitat is 27 (GoV, 2021). Previous reports have used an objective for this metric of 21 (GHD, 2015; GHD, 2016; GHD, 2017; EA, 2018), 26 (EA, 2019; EA, 2020) and 20 (EA, 2023).

For the wetland sites W1, W2 an W3, the metric for the number of invertebrate families from the ERS (GoV, 2021) is 15.

A summary of the number of macroinvertebrate families at BC1, BC2, BC3, BCT1, BCT2, SC1, UAR1, UAR2, W1 and W2/3 is shown in **Table 35**, and graphically in **Figure 15**. The number of macroinvertebrate families at each of the Breakfast Creek, Breakfast Creek Tributary, Salt Creek or Upper Anglesea Estuary locations does not meet the ERS objective of 27 at any site, across all years. Similarly, the number of macroinvertebrate families at the wetland sites (W1-W3) has also not been met at any site, across all years.

Table 35 Number of Macroinvertebrate Families by Year and Site

Year	BC1	BC2	BC3	BCT1	BCT2	SC1	UAR1	UAR2	W1	W2/W3
2014	-	-	-	13	-	8	-	-	-	8
2015	11	10	11	11	Dry	9	Dry	Dry	Dry	Dry
2016	-	-	-	16	-	12	-	-	3	3
2017	-	-	-	15	-	17	-	-	-	5
2018	12	12	11	12	13	13	9	11	Dry	6
2019	-	-	-	8	-	13	-	-	-	6
2020	-	-	-	9*	-	19*	-	-	-	6*
2021	19*	15*	15*	9*	11*	10*	13*	14*	13*	7 / 6*
2022	-	-	-	11	-	15	-	-	-	6

The objective for the number of macroinvertebrate families is 27. NS = not sampled

Green shading indicates attainment of objective; orange shading indicates non-attainment of objective.

*In the reports on the 2020 and 2021 aquatic monitoring, EA reported on the number of taxa, rather than the number of families, but it is assumed that this was in error, and the reported values represent the number of families.

Sites BCT2, UAR1, UAR2, W1, W2 and W3 were dry at the time of the 2015 monitoring, as was site W1 in 2018.

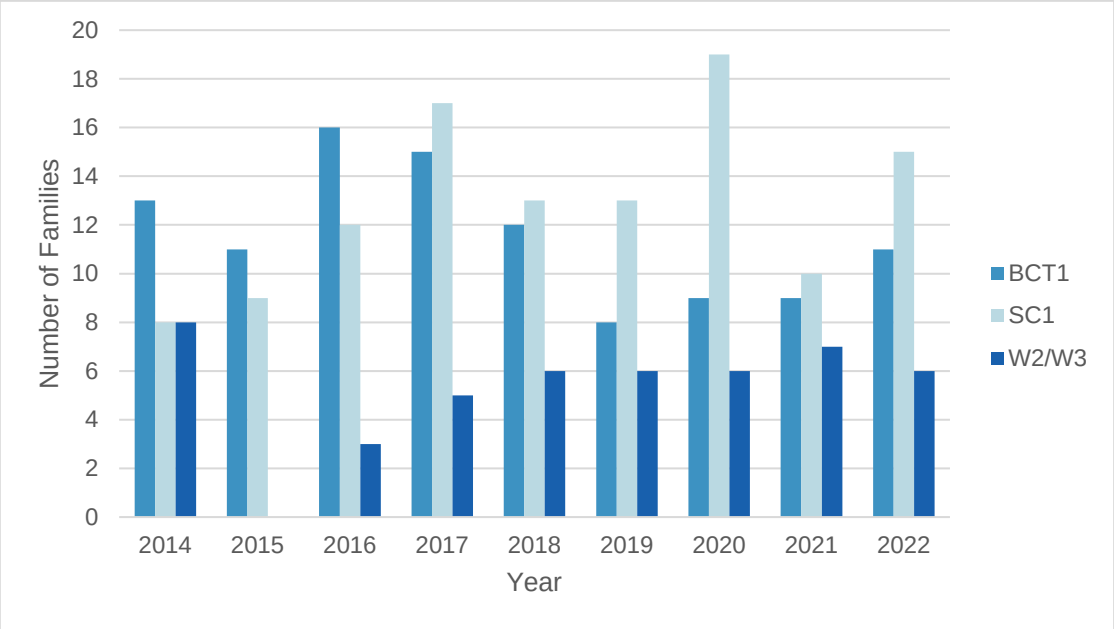


Figure 15 Summary of the Number of Macroinvertebrate families over 2014 - 2022

Number of EPT Taxa

EPT taxa refer to the orders Ephemeroptera, Plecoptera and Trichoptera. These are taxa that are generally regarded as sensitive to pollution and habitat changes, and therefore their presence/absence in a watercourse or waterbody can be a useful indicator of ecological condition.

The number of EPT taxa has an objective in the ERS (GoV, 2021) of 7 for the Central Foothills and Coastal Plains segment (for Spring and for edge+riffle habitat). The objective does not apply to wetlands; and the ERS does not provide an objective for EPT for wetland environments. Ecology Australia has previously applied an objective of 9 (EA, 2019; EA, 2020) for this metric, as well as 6 (EA, 2021; EA, 2022). The source(s) of these metrics is not known.

The counts of EPT taxa compared to the ERS objective are shown in **Table 36**. Across all years and sites, there was a non-attainment of the ERS objective for EPT for the creek sites.

In general, EPT taxa are lower at the SC1 site, compared to the BCT1 site, and counts at the W2/W3 site are very low.

Table 36 Number of EPT Taxa by Year and Site

Year	BC1	BC2	BC3	BCT1	BCT2	SC1	UAR1	UAR2	W1	W2/W3
2014				4		1				1
2015	2	2	1	3	Dry	1	Dry	Dry	Dry	Dry
2016	-	-	-	4	-	1	-	-	-	0
2017	-	-	-	6	-	5	-	-	-	0
2018	2	3	3	5	3	2	1	1	Dry	1
2019	-	-	-	4	-	4	-	-	-	0
2020	-	-	-	5	-	5	-	-	-	0
2021	6	4	4	3	3	1	0	0	0	0
2022	-	-	-	3	-	4	-	-	-	1

The objective for the number of EPT taxa is 7 for the creek sites BC1, BC2, BC3, BCT1, BCT2, SC1, UAR1, and UAR2. There is no objective for the number of EPT taxa for wetlands.

Green shading indicates attainment of the objective; orange shading indicates non-attainment of the objective

SIGNAL Score and VLAKES Scores

The SIGNAL (Stream Invertebrate Grade Number – Average Level) is an index of water quality based on the tolerance of aquatic biota to pollution (Chessman, 1995). Originally termed SIGNAL index, it has now been upgraded to SIGNAL2, for application to the entire of Australia (EPA, 2021).

The SIGNAL index is calculated by summing together the sensitivity grades for each of the families found at a site that have been assigned a grade. The summed grade is then divided by the number of graded families present, to arrive at an 'average level' grade, which is a single number between zero and ten, reflecting the degree of water pollution. Generally high-quality sites have a high SIGNAL index and low-quality sites have a low SIGNAL index (EPA, 2021). While a SIGNAL index is relatively good for assessing organic pollution, its usefulness for toxic impacts and other types of disturbance is less certain.

The ERS (GoV, 2021) provides objectives for the SIGNAL2 index, which, for the Central Foothills and Coastal Plains Spring edge + riffle habitat for creeks is 4.2. In previous reports the SIGNAL2 objective has been reported as 5.3 (GHD, 2015; GHD, 2016; GHD, 2017; EA, 2018), 5.8 (EA, 2019; EA, 2020), and 3.4 (EA, 2021; EA, 2022; EA, 2023).

The SIGNAL2 index applies to rivers and streams, but not lakes and wetlands. For these latter waterbodies, the ERS (GoV, 2021) objective is a metric termed VLAKES, which is applicable to the wetland sites (W1, W2 and W3). EPA Victoria developed the VLAKES index in a similar way to that of the SIGNAL2 index. The VLAKES objective for W1-W3 is 4.7

Macroinvertebrate data for comparison with the SIGNAL2 and VLAKES objectives is shown in **Table 37**. The SIGNAL2 index is achieved at most of the creek sites in most years. The VLAKES metric was met at W2 / W3 in the early years of monitoring (2014 – 2019), but has not been achieved since 2020.

Table 37 SIGNAL2 and VLAKES Scores by Year and Site

Year	BC1	BC2	BC3	BCT1	BCT2	SC1	UAR1	UAR2	W1	W2/W3
2014	-	-	-	6.3	-	5.7	-	-	-	5.6
2015	5.8	4.8	5.2	6.0	Dry	5.2	Dry	Dry	Dry	Dry
2016	-	-	-	5.56	-	5.4	-	-	-	5.0
2017	-	-	-	5.78	-	5.9	-	-	-	5.33
2018	6.0	5.85	5.83	5.22	5.63	5.53	5.73	5.38	Dry	5.44
2019	-	-	-	5.9	-	5.8	-	-	-	5.1
2020	-	-	-	4.8	-	4.3	-	-	-	3.0
2021	5.5	4.7	4.5	4.6	4.5	4.7	2.6	3.3	3.1	3.9 / 3.5
2022	-	-	-	5.5	-	5.0	-	-	-	4.0

The SIGNAL2 objective for sites BC1, BC2, BC3, BC1, BCt2, SC1, UAR1, and UAR2 is 4.2. The VLAKES objective for sites W1 and W2/W3 is 4.7. Green shading indicates attainment of the objective; orange shading indicates non-attainment of the objective.

7.3.3.2 Fish

Results for the southern pygmy perch surveys were reported as counts per site, catch per unit effort (CPUE), length and weight; with the latter two measurements used to assess fish population dynamics, including recruitment. CPUE was not explicitly provided in the GHD monitoring reports, but was estimated from Figures 26 and 27 in the Ecology Australia (2018) report.

Counts

Southern pygmy perch have been recorded at the SC1 site every year since 2009, with the highest numbers of fish in any one year also typically recorded at SC1. Counts at the BCT1 site have varied from year to year; and over the period 2018 – 2022, no southern pygmy perch were recorded at BCT1.

Preliminary results[7] for the Spring 2023 survey indicate the re-appearance of southern pygmy perch at BCT1, with a count of nine fish from the bait trap and one fish recorded via dip net sampling. Similar to previous years, higher numbers of fish were reported in 2023 at SC1, compared to BCT1. A summary of the counts per site and season data over the period 2009 – 2023 is provided in **Table 38**.

Table 38 Southern Pygmy Perch Counts Per Season and Site

Year	Season	BCT1	SC1
2009	Spring	5	5
2010	Autumn	1	10
2010	Spring	3	6
2011	Autumn	2	9
2011	Spring	8	5
2012	Autumn	12	6
2012	Spring	0	9
2013	Autumn	3	4
2013	Spring	1	44
2014	Autumn	3	9
2014	Spring	5	38
2015	Spring	16	120
2016	Spring	19	7
2017	Spring	18	65
2018	Spring	0	56
2019	Spring	0	11
2020	Spring	0	72
2021	Spring	0	27
2022	Spring	0	41
2023	Spring	10	57

Catch Per Unit Effort

CPUE was calculated based on the assumption that five bait traps were utilised by GHD each Spring over the period 2009–2016. It not clear how many of the fish were detected via electrofishing versus bait traps in 2009 and 2010, nor how many bait traps were used between 2012 and 2016 as it is not specified in the monitoring reports over this period. While CPUE is typically measured by units of time, this was not feasible due to the lack of data from previous years, so catch per trap was used instead.

CPUE of southern pygmy perch for both sites peaked around 2015 for SC1 and 2016 for BCT1, and over the last five years has remained fairly constant at site SC1. A summary of the CPUE over the period 2009 to 2022 is provided in **Table 39**. The data are also shown graphically in **Figure 16**.

[7] Results provided via email from Ecology Australia to Barwon Water on 7 December 2023

Table 39 Southern Pygmy Perch Catch Per Unit Effort (CPUE)

Year	CPUE per site		Notes
	BCT1	SC1	
2009	0.40	0.75	Estimated from EA (2018)
2010	0.30	1.00	Estimated from EA (2018)
2011	1.60	0.75	Estimated from EA (2018)
2012	0.00	1.75	Estimated from EA (2018)
2013	0.20	7.50	Estimated from EA (2018)
2014	1.00	13.8	Estimated from EA (2018)
2015	3.25	24.3	Estimated from EA (2018)
2016	3.80	1.25	Estimated from EA (2018)
2017	1.80	8.60	Estimated from EA (2018)
2018	0	5.40	Estimated from EA (2019)
2019	0	1.15	Estimated from EA (2020)
2020	0	7.35	Estimated from EA (2021)
2021	0	2.60	Estimated from EA (2022)
2022	0	4	Estimated from EA (2023)
2023	-	-	Data not available at time of report preparation

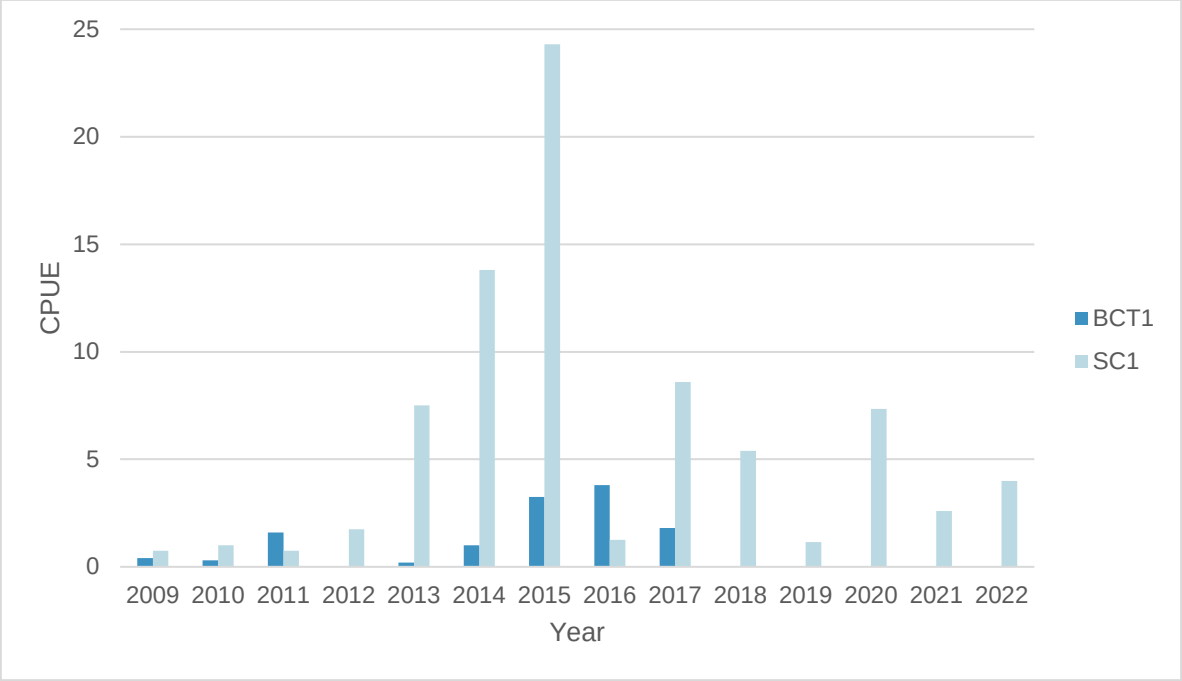


Figure 16 Summary of CPUE for BCT1 and SC1 sites for the period 2009 - 2022

Length and Weight

Length and weight data for southern pygmy perch for both the BCT1 and SC1 sites over the period 2009 – 2022 are provided in **Table 40**.

Table 40 Southern Pygmy Perch Length and Weight 2009 - 2022

Year	Length (mm)			Weight (g)		
	Minimum	Maximum	Mean	Minimum	Maximum	Mean
BCT1						
2009	40*	45*	43*	-	-	-
2010	24*	43*	31*	NR	NR	NR
2011	18*	41*	27*	NR	NR	NR
2012	-	-	-	-	-	-
2013	55*	55*	55*	NR	NR	NR
2014	32	41	35	0.4	0.78	NR
2015	23	52	40.3	0.31	0.71	0.98
2016	25	51	33.6	NR	NR	NR
2017	40	63	52	0.80	3.90	1.99
2018	-	-	-	-	-	-
2019	-	-	-	-	-	-
2020	-	-	-	-	-	-
2021	-	-	-	-	-	-
2022	-	-	-	-	-	-
SC1						
2009	20*	60*	39*	NR	NR	NR
2010	10*	42*	22*	NR	NR	NR
2011	16*	32*	23*	NR	NR	NR
2012	11*	55*	25*	NR	NR	NR
2013	20*	55*	26*	NR	NR	NR
2014	21	65	43	0.43	4.13	1.20
2015	17	68	39.8	0.22	4.37	0.98
2016	25	51	33	NR	NR	NR
2017	25	45	34.5	0.20	1.10	0.58
2018	24	61	41.5	0.20	2.90	0.85
2019	46	68	52.6	NR	NR	NR
2020	23	72	33.8	0.50	4.90	2.14
2021	29	70	42.9	0.80	4.70	1.38
2022	36	69	51.5	0.50	3.50	1.70

NR = not reported. At low CPUE, fish length and weight were not reported or provided *values estimated from graphs in EA reports

The length and weight data for the southern pygmy perch at both sites per year, as well as observations of fish condition, were used to describe the population dynamics of the fish. The data indicate successful recruitment (from other sites) of southern pygmy perch at the SC1 site during 2016, 2017 and 2018, with breeding and/or young of the year recorded at SC1 in 2018, 2020, 2021 and 2022. No recruitment was observed at SC1 in 2019.

For the BCT1 site, different age classes, potentially indicating breeding and/or recruitment, were observed in 2015, 2016 and 2017.

7.3.3.3 Otway Bush Yabby

Data for the Otway bush yabby was reported for the period 2017 onwards. The data consists of counts by sampling method at sites BCT1 and SC1, as well as length of most animals. Records of weights, gender and maturity are incomplete, although some sampling events note the presence of multiple juvenile animals.

Counts

Counts of the Otway bush yabby by both nets, bait traps and additional dip nets at sites BCT1 and SC1 are shown in **Table 41**. Otway bush yabbies were also recorded at BCT2 and W2/3 as part of the macroinvertebrate sampling in 2018 and at the Breakfast Creek road/crossing in 2017.

Table 41 Otway Bush Yabby counts at BCT1 and SC1

Year	BCT1			SC1		
	Dip net	Bait trap	Additional dip net	Dip net	Bait trap	Additional dip net
2017	15	6	-	8	-	-
2018	30	5	28	4	1	6
2019	37	20	-	3	1	-
2020	81	5	-	20	74	-
2021	-	>9*	-	-	9	-
2022	30	16	-	2	-	-
2023	59	17	-	8	2	-

NR = not reported *Count not provided, but indicated to be greater than that surveyed at the SC1 site

Length, Weight, Gender and Maturity

Otway bush yabbies were typically recorded for length, with some individuals also weighed, and their gender and maturity status recorded. It is noted that the weight, gender and maturity data is incomplete.

Table 42 summarises the available length, weight, gender and maturity data available for the Otway bush yabby at sites BCT1 and SC1. Where gender data are reported, the absence of a gender in **Table 42** does not mean that individuals of that gender were not present in the survey; rather it means that records of that gender were not reported in the data sheet. Similarly, the absence of juvenile or adult records for a sampling event, does not mean that either were not present. As the data for weight, gender and maturity classes is incomplete, reliance on this data for trends or patterns over time is not recommended. However, EA (2021) stated that almost all individuals recorded at both BCT1 and SC1 in 2020 were juvenile; this was also the case for the BCT1 site in 2022, indicating that breeding and/or recruitment was occurring prior to those sampling events.

Table 42 Otway Bush Yabby Length and Weight data BCT1 and SC1

Year	Length (mm)			Weight (g)*			Gender	Maturity
	Min	Max	Mean	Min	Max	Mean		
BCT1								
2017	3.5	8	6.1	NR	NR	NR	Male & female	NR
2018	3.5	27	10.8	NR	NR	NR	NR	NR
2019	6	18	13.7	NR	NR	NR	Male & female	Adult & Juvenile
2020	5	21	13.0	2.2	4	3.1		Juvenile
2021	6	23	13.3	NR	NR	NR	Male & female	NR

Year	Length (mm)			Weight (g)*			Gender	Maturity
	Min	Max	Mean	Min	Max	Mean		
2022	4	21	10.0	1	4.3	1.9	Male & female	Juvenile
2022	7	16	11.5	-	-	2	Female	NR
SC1								
2018	12	27	16.7	NR	NR	NR	1 male	NR
2019	-	-	18	NR	NR	NR	Female	NR
2020	6	26	10.4	NR	NR	NR	NR	Juvenile
2022	7	16	11.5	-	-	2	Female	NR

7.3.3.4 Water quality

Water quality, as recorded during the fish and macroinvertebrate sampling events is provided below in **Table 43** for pH, **Table 44** for electrical conductivity and **Table 45** for percentage oxygen saturation. These results for water quality are relatively infrequent point in time measurements associated with the aquatic ecology monitoring, and are likely to vary considerably across any one year, with rainfall events in the catchment. However, across years, they provide some indication of water quality at the fish and macroinvertebrate monitoring locations.

The ERS (GoV, 2021) provides water quality objectives for pH (6.8-8.0 pH units), electrical conductivity (<2,000 µS/cm) and dissolved oxygen (>70 – 130% saturation) for this setting. It is noted that the ERS (GoV, 2021) states that an environmental value does not apply to particular surface waters if the background water quality exceeds (or is less than, in the case of indicators such as pH), the relevant objective and as a result the environmental value cannot be achieved or maintained. For naturally acidic surface water environments, such as those of the Anglesea River, Salt Creek and Breakfast Creek, this means that the ERS objective for pH has limited value in assessing potential "impacts" to these systems.

In general, the ERS pH objective was rarely met at any of the monitoring sites, although a trend towards higher pH was reported in 2021 across most sites. The wetland sites W1, W2 and W3 typically reported lower pH than the creek sites. In addition, pH was higher at the UAR sites, than at sites lower in the Marshy Creek / Anglesea River catchment (**Table 43**).

The more extensive surface water quality dataset (discussed in **Section 3.4.3**) for the BCT location (surface water monitoring location SV3) is generally consistent with the water quality data from the aquatic monitoring. This location has typically reported pH values above 4.5 pH units and frequently above 6.0 pH units. pH is generally stable at this location.

Similarly, surface water monitoring location SV1 on Breakfast Creek, which is just downstream of location SV3, also reports largely neutral pH, generally between 5.0 and 7.0 pH units (**Section 3.4.3**),

Location SV4, further downstream on Salt Creek, and near to aquatic monitoring location SC1, reported a generally stable pH with slightly acidic conditions of less than 5.0 pH units. pH has been reported to range generally between 5.0 and 7.0 pH units with signs of a possible slight trends towards higher pH values over the period of assessment, most notably from 2020 onwards, which is characterised by a more sustained distribution of rainfall and higher and more sustained levels of flow in the catchment. These data are consistent with those shown in **Table 43**.

There are limited data from UAR2 to compare with the surface water monitoring data; however location surface water data from AGP1-B generally reported a pH between 4.0 and 7.0 pH units. A review of this data indicates pH dropped below 4.0 pH units on occasion, but more recent data (2021 onwards) report pH values typically above 5.5 pH units.

Most of the creek sites report low electrical conductivity, meeting the ERS objective and indicative of freshwater environments (**Table 44**). The wetland sites W1 and W2/3 report significantly higher electrical conductivity, possibly due to salt mobilisation processes from the upstream wetlands (refer to discussion in **Section 3.4.3.2**). Trends in EC at SV1 and SV4 in the Salt Creek catchment are not clear, although lower EC may be linked to increased water levels and rainfall.

Dissolved oxygen data reports variable saturation between and within sites, and across years. Patterns are difficult to discern from the data (**Table 45**). Further discussion on the dissolved oxygen data from the more extensive surface water monitoring dataset is provided in **Section 3.4.3.3**.

Table 43 Summary of pH data by location

Year	BC1	BC2	BC3	BCT1	BCT2	SC1	UAR1	UAR2	W1	W2/3
2014				5.96		2.68			2.99	
2015	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2016				6.3		5.8			2.9	
2017				5.39		4.99			2.77	
2018	7.12	5.16	3.15	5.45	4.94	5.23	NR	6.62	Dry	2.61
2019				4.3		4.78				2.36
2020				4.2		4.9				2.4
2021	7.3	6.4	6.81	4.85	4.85	5.85	6.43	5.87	3.27	3.25 / 2.98
2022				2.75		6.21				1.84

The ERS Objective for pH for the Central Foothills and Coastal Plains is 6.8 – 8.0. Refer to above discussion on the ERS (GoV, 2021) objective for pH where this may not be met in background conditions. NR = not reported

Green shading indicates attainment of the objective; orange shading indicates non-attainment of the objective

Table 44 Summary of Electrical Conductivity data by location

Year	BC1	BC2	BC3	BCT1	BCT2	SC1	UAR1	UAR2	W1	W2/3
2014				177		185			3835	
2015	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2016				248		444			2450	
2017				250		314			312	
2018	1930	399	368	291	292	321	NR	844	Dry	4960
2019				394		341				5310
2020				310		285				4130
2021	477	380	488	245	236	264	121	580	2320	3520 / 3460
2022				197		263				868

Data reported in units of µS/cm. NR = not reported

The ERS (GoV, 2021) Objective for electrical for the Central Foothills and Coastal Plains is <2,000 µS/cm.

Green shading indicates attainment of the objective; orange shading indicates non-attainment of the objective

Table 45 Summary of Dissolved Oxygen by location

Year	BC1	BC2	BC3	BCT1	BCT2	SC1	UAR1	UAR2	W1	W2/3
2014				74.9		53.6			9.9	
2015	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2016				89		83			84	
2017				70		38			40	
2018	71.9	51	28.2	57.6	69	62.8	NR	86	Dry	35.9
2019				67.8		45.1				48.3
2020				40.2		35.6				60.5

Year	BC1	BC2	BC3	BCT1	BCT2	SC1	UAR1	UAR2	W1	W2/3
2021	87.5	10.5	62.4	19.9	18	72	86	6.6	24.1	0
2022				101.3		101				10.9

Data reported in units of percentage saturation. NR = not reported
The ERS (GoV, 2021) Objective for electrical for the Central Foothills and Coastal Plains is >70% – 130% saturation.
Green shading indicates attainment of the objective; orange shading indicates non-attainment of the objective

7.3.4 Summary

A summary of the available data associated with the aquatic monitoring is provided in **Table 46** below.

Table 46 Summary of Aquatic Monitoring Data

Requirement	Records	Locations
Aquatic macroinvertebrates	Number of families	Yearly: BCT1, SC1 and W2/W3; Triennial: BC1-BC3, BCT2, UAR1, UAR2, W2, W3
	Number of EPT* taxa	Yearly: BCT1, SC1 and W2/W3; Triennial: BC1-BC3, BCT2, UAR1, UAR2, W2, W3
	SIGNAL and VLAKEs scores	Yearly: BCT1, SC1 and W2/W3; Triennial: BC1-BC3, BCT2, UAR1, UAR2, W2, W3
Southern pygmy perch	Counts	Yearly, Spring and Autumn: 2010- 2014 BCT1, SC1 Yearly, Spring: 2015 – 2022 BCT1, SC1
	CPUE	Yearly: 2012 – 2022 BCT1 and SC1
	Length and weight	Yearly, 2009 – 2022: Length BCT1 and SC1 Inconsistent, 2009 – 2022: Weight BCT1 and SC1
Otway bush yabby**	Counts	Yearly: 2017 – 2022
	Length and weight	Yearly, 2017 – 2022: Length BCT1 and SC1 Inconsistent, 2017 – 2022: Weight BCT1 and SC1
	Gender and maturity	Inconsistent, 2017 – 2022, BCT1 and SC1
Water quality	pH, DO, electrical conductivity	Yearly: BCT1, SC1 and W2/W3; Triennial: BC1-BC3, BCT2, UAR1, UAR2, W2, W3

*Records of EPTO taxa are also provided in the monitoring reports. These have not been reported herein as there is no regulatory objective for EPTO, whereas there is for the EPT taxa
**Not required as part of the MAP, but added to the monitoring program in 2017, given the presence of this species in bait traps and its status as Endangered on the *FFG Act* 1988 Threatened Species list

It is difficult to identify trends in the aquatic monitoring data over the last ten years. This finding is consistent with the previous BE Review (2013) which identified that aquatic ecosystems in the Anglesea basin are characterised by their temporal variability, potentially related to variable water quality and quantity. Further discussion has been provided in the conceptual site model summary in **Section 2.3**.

For the current monitoring period, the following provides a high-level summary of the results:

- Number of macroinvertebrate families: The creek sites (BC1-BC3, BCT1, BCT2, SC1, UAR1 and UAR2) tend to have higher numbers of macroinvertebrate families than the wetland sites. There

appears to be a drop in the number of families recorded at BCT1 over the period 2017 – 2021, that was not entirely replicated at SC1. pH data for BCT1 (as well as SC1) shows a drop in pH over much of this period, which may be the reason for the drop in the number of families. See **Figure 17** below. Correlations between the number of macroinvertebrate families (and other aquatic monitoring indices) with water quality and water level will be further assessed following a review of the predictive modelling outputs as part of the groundwater pumping impact assessment. Overall, as the number of macroinvertebrate families has not meet the ERS (GoV, 2021) objective at any site, site-specific values may be required to reflect the complexity of this environment.

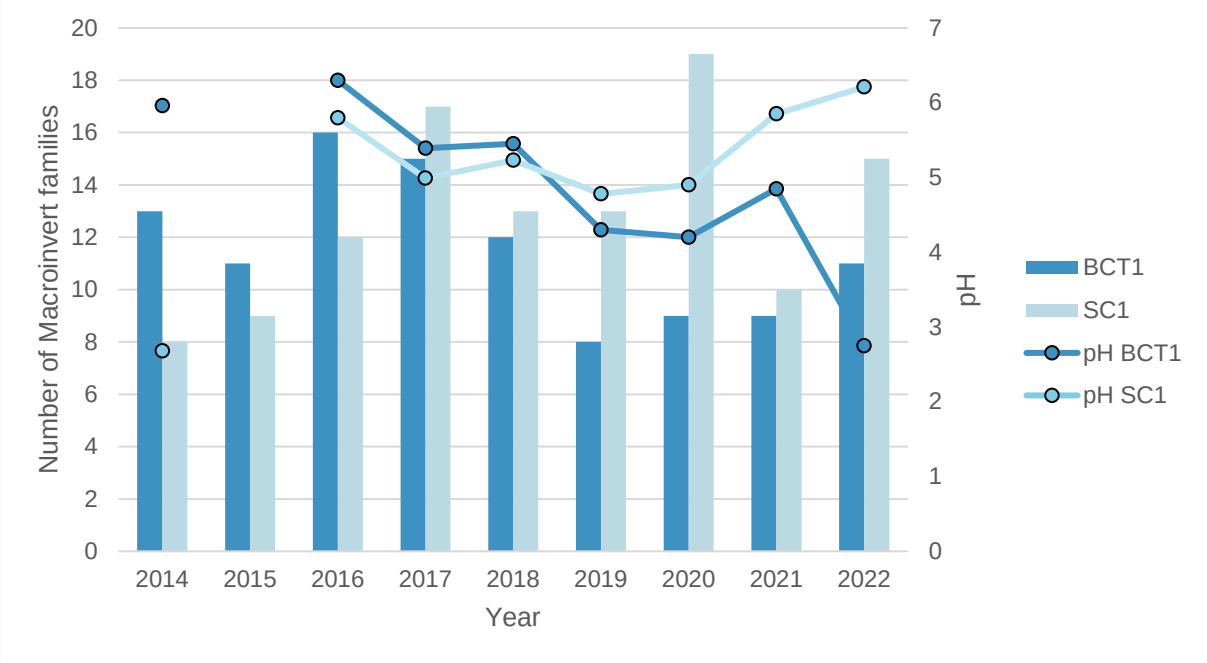


Figure 17 Comparison of the families with pH at BCT1 and SC1

- Number of EPT taxa.
  The number of EPT taxa tends to be lower at SC1 compared to BCT1, but is overall very low, and below the ERS (GoV, 2021) objective, at all sites. Wetland sites were reported to have only one or no EPT taxa, which was lower than the creek sites. No discernible trends across time were noted.
- SIGNAL and VLAKES scores.
  Despite the number of macroinvertebrate families and the EPT taxa objectives largely not being met across sites and years, the ERS (GoV, 2021) objectives for SIGNAL2 and VLAKES were met at all creek sites except for UAR1 and UAR2 in 2021. In addition, site W2/W3 met the VLAKES objective over the period 2014 – 2019. Discernible trends across time were not noted, although there was a potential drop in SIGNAL2 score at BCT1 and SC1 between 2020 and 2022. This was also observed at the W2/W3 site and may be linked to water quality, associated surface water levels and water flows.
  The data reported over the period 2014 - 2022 are largely consistent with the previous BE Review (GHD, 2013). That is, trends in the macroinvertebrate data with respect to SIGNAL score and other pollution indices were not found to be productive. However, the creek sites (BCT1 and SC1) were noted in GHD (2013) to contain fauna indicative of the presence of permanent water: mayflies, gripopterygid stoneflies and fish. In contrast, the wetlands included many taxa that are good colonists: beetles and bugs which can fly, species with eggs that can withstand drying, as well as many small crustaceans. These data were interpreted to indicate that the wetlands did not consist of permanent waterbodies and may dry out as well as become impacted by acidification.

- Counts of southern pygmy perch.
  The data over the last 10 years shows that the SC1 site consistently reported higher numbers of southern pygmy perch than the BCT1 site. As described in section **7.3.2.1**, the SC1 site is a deeper pool and may provide a refuge for these fish in dry years.

  It is noted, however, that the previous BE review (GHD, 2013) reported higher counts of southern pygmy perch at the BCT1 site, than the SC1 site (opposite to what has been reported over the last 10 years). At the time, it was felt that the BCT1 site may have some groundwater contribution that helps to maintain stream flow and water quality, and therefore acts as a refuge allowing the fish to persist during dry periods. As per the Conceptual Site Model summary in **Section 2.3**, the findings from the recent monitoring period are broadly consistent with this assessment, with Breakfast Creek considered to be a predominantly gaining stream and acting as a losing stream in dry periods.

  Based on the interpreted surface water-groundwater interaction at SV4 and P17, the upstream portion of the Salt Creek Swamp and into Breakfast Creek are likely to be receiving baseflow seasonally from the underlying LEVF, and to a lesser extent the ASA. However, in both instances, the upward gradient from groundwater to surface water is only present for part of the year, with the gradient reversing in response to periods of lower rainfall. Hence, water quality and quantity at the SC1 location is likely vary with these changing gradients.

- Groundwater is expected to supplement surface water flow during periods of higher rainfall, but this gradient can reverse when rainfall is low. Given this seasonal variation, it is not clear why counts of southern pygmy perch are higher or lower at SC1 compared with BCT1, and the changes in the numbers of fish may reflect factors outside of water quality and flow (e.g., changes in predation or habitat). A comparison of these two populations, as well as one on Breakfast Creek, found no genetic differences between the three subpopulations (GHD, 2013).
  The numbers and maturity of southern pygmy perch at BCT1 and possibly SC1 may be linked to rainfall. Data from Wensleydale Anglesea Proving Ground[8] reports the lowest average rainfall for September – November (the period leading up the surveys) of 35 mm for 2018, compared with the overall period of 2009 – 2023 (39 -121 mm, average 71 mm). Similarly, 2019 recorded a relatively low average rainfall for September – November of 45 mm. Southern pygmy perch were absent in surveys in BCT1 over the period 2018 – 2022. Conversely, significantly higher rainfall was reported at Wensleydale in 2022 for the September – November period, possibly linked to the re-appearance of the fish at BCT1 in 2023.

- Catch per unit effort of southern pygmy perch.
  Consistent with the fish counts, CPUE was consistently higher at SC1 than BCT1. CPUE at SC1 has remained relatively consistent over the last five years. No other trends in the CPUE data were noted.

- Length of southern pygmy perch.
  The SC1 site has reported both smaller and larger fish than the BCT1 site, and successful recruitment at the SC1 was noted during 2016, 2017 and 2018, as well as breeding and/or young of the year in 2018, 2020, 2021 and 2022. For the BCT1 site different age classes, potentially indicating breeding and/or recruitment, were observed in 2015, 2016 and 2017.

  Counts of Otway bush yabby.
  In contrast to the southern pygmy perch, counts of the Otway bush yabby tended to be higher at the BCT1 site, compared to the SC1 site. The animals have been observed in both dip nets and bait traps, and a difference in counts is not discernible between the two monitoring methods. Yabbies have been recorded at both sites in every monitoring event since 2017 by either or both monitoring methods.
  As Otway bush yabbies were not reported in the previous BE Review (GHD, 2013), a comparison between the two periods of BE Review data cannot be made.

- Length of Otway bush yabby.
  The data on lengths of Otway bush yabby are insufficient to enable trends to be assessed.

[8] Bureau of Meteorology weather station 87119

Juveniles have been reported at both the BCT1 and SC1 sites, with more juvenile observations recorded for BCT1 than SC1, however this may be a sampling artefact (given incomplete records), rather than a difference between sites.

7.3.5 Data Gaps

Based on a review of the aquatic monitoring data over the period 2014 – 2022 (and including some preliminary data from 2023), the requirements of the MAP have been met with respect to surveys of aquatic invertebrates and southern pygmy perch. Where gaps in the macroinvertebrate data exist, these are due to an absence of water at the sample sites at the time of the surveys, rather than an absence of monitoring effort. Missing data due to an absence of water applies to BCT2, UAR1, UAR2, W1 and W2/3 in 2015, and W1 in 2018.

Whilst not a data gap per se, some of the lower wetland data (particularly for wetlands 2 and 3) has been reported as W2/W3 as well as W2 and W3. This is noted by Ecology Australia in their report on the 2022 monitoring (EA, 2023), where they state: "*wetland2/3 combined during annual, wetland 2 and wetland 3 during triennial and wetland 1 annually prior to 2017*". More detailed interpretation of these data and consideration for future monitoring will form part of the groundwater pumping impact assessment.

The inclusion of the Otway bush yabby is an addition to the MAP, and data noting the presence of this species has been consistently recorded at BCT1 and/or SC1 over the period 2017 – 2023. Consideration of the data collection methods and record requirements for yabby length and weight will form part of the groundwater pumping impact assessment.

8 Conclusions

This report has reviewed the surface water, groundwater, acid sulfate soil, land subsidence, terrestrial ecology and aquatic ecology data that has been collected in the preceding 10 years since the implementation of the finalised MAP (2014) which has been undertaken by Barwon Water. The intent of this report was to review the available data and assess the suitability of the existing CSM for the area, in response to the activation of the Anglesea Borefield for water supply in August 2019.

From a hydrogeological perspective, the results reviewed indicate that groundwater levels in the ASA, within which the key potential GDEs are located, continue to be primarily influenced by variability in rainfall. No clear correlation between water level in the ASA and active pumping periods was observed; however, further analysis of the drivers of water level change in the ASA will be undertaken as part of the groundwater pumping impact assessment. Additionally, there does not appear to have been any substantial change in water quality within the ASA from the data collected as part of the MAP. Results of surface water monitoring indicated that most locations appeared to be largely influenced by rainfall with some areas having potential interactions with the underlying ASA. The analytical results were broadly consistent across the assessment area, of note was the lower pH levels and major ion composition at the downstream locations of Marshy Creek and Salt Creek which reflects the potential for impacts from ASS.

The interaction between the ASA and surface water bodies across the assessment area is highly complex and varies spatially and temporally. Generally, surface waters appear to tend towards gaining conditions in the upper catchment and losing conditions in the lower catchment, consistent with the existing CSM. Noting that the hydraulic connection between surface water bodies and the ASA is also highly variable, with some areas expected to be largely separated. The various surface water bodies and their interactions with the ASA have been reviewed to determine the suitability of the existing CSM. The data collected and analysed during the monitoring period was found to be largely consistent with the existing CSM.

Overall, the terrestrial ecological data indicates that there are a broad range of variables that can influence these environments, and that whilst there is potential for seasonal water fluctuations to impact on the vegetation communities and frog assemblages, the linkage to groundwater drawdown may be less significant than originally anticipated. The risks associated with this potential linkage will be further explored as part of the groundwater pumping impact assessment. However, the seasonal availability of water is likely to be a contributing factor in the observed ecological variability.

It is difficult to identify trends in the aquatic monitoring data over the last ten years. This finding is consistent with the previous BE Review (2013) which identified that aquatic ecosystems in the Anglesea basin are characterised by their temporal variability, potentially related to variable water quality and quantity.

The outcomes of this work will be further assessed following a review of the predictive modelling outputs as part of the groundwater pumping impact assessment. This will in turn, be used to inform the BE and MAP review process and help prevent any adverse environmental impacts from occurring as a result of Barwon Water's potential future groundwater pumping activities.

9 Limitations

This report was prepared for the sole use of Barwon Water and should not be relied upon by any other person. None of BlueSphere Environmental Pty Ltd or any of its related entities, employees or directors (each a BlueSphere Person) owes a duty of care (whether in contract, tort, statute or otherwise) to any third party with respect to or in connection with this report and no BlueSphere Person accepts any liability for any loss or damage suffered or costs incurred arising out of or in connection with the use this report by any third party.

The report has been prepared with the objectives and scope of work outlined in the proposal dated September 2023. The work was carried out in accordance with the existing contract between BlueSphere and Barwon Water.

The conclusions and recommendations provided in this report are based on available information (including third party data and reports) and it is possible that different conclusions and recommendations could be made should new information become available, or with changing site conditions over time. These opinions, conclusions and recommendations are subject to uncertainty given the potentially complex nature of any subsurface environment. Variation in soil and groundwater conditions may vary significantly between the specific sampling and testing locations and other locations at the site.

The report will not be updated if anything occurs after the date of this report and BlueSphere Environmental Pty Ltd will not be obliged to inform any person of any matter arising or coming to its attention after that date.

10 References

Barwon Water, 2023a. *Anglesea Groundwater Monitoring Project - 2023,* Geelong: s.n.

Barwon Water, 2023b. *Anglesea Bulk Entitlement Report, Anglesea Groundwater 2022-2023*

Edwards, L. & Woods, B., 2023. *Barwon Water - Anglesea Borefield Project: Groundwater Quality Monitoring Program: 2022 / 2023,* Melbourne: Ventia Utility Services Pty Ltd.

GHD, 2013. *Barwon Water Anglesea Borefield Bulk Entitlement Review: Bulk Entitlement Review Report,* Melbourne: GHD.

GHD, 2023, *Technical Memorandum*, 2 March 2023

GHD, 2024. *Anglesea Groundwater Model Update, Numerical Model Development and Calibration Report, Barwon Water*, 5 February 2024

Glover F. et al., *Characterisation of acid sulfate soils in south-west Victoria, Australia*, 1 January 2014

Government of Victoria, 2014. *Water Act 1989: Bulk Entitlement (Anglesea Groundwater) Order 2009 Monitoring and Assessment Program.* Melbourne: State Government of Victoria.

Halliday, B. T., Kerr, N., Goodman, B. & Bloink, C., 2023. *Anglesea Borefield Ecological Monitoring and Assessment Program 2022,* Fairfield, Victoria: Ecology Australia Pty Ltd.

Metcalf, D., Mullin, B. & Bootland, K., 2023. *Anglesea Borefield Surface Water 3A, 3B,* Scoresby: ALS Hydrographics Annual Report.

Wong, V. N., Claff, S. R. & Driscoll, J., 2020. *Anglesea Acid Sulfate Soil Investigation (Draft),* Melbourne: School of Earth, Atmosphere and Environment, Monash University.

Figures

PROJECT ID	31313.01
DATE	15/07/2024
CREATED BY	WC
UPDATED BY	EA

BlueSphere ENVIRONMENTAL

Legend

- Alcoa Mine Operational Area (approx.)
- Alcoa Mine Licence/Lease
- Jan Juc Groundwater Management Area
- Northern Borefield
- Southern Borefield
- Lake/Reservoir
- Wetlands
- Watercourse
- Anticline
- Syncline
- Elevation Contours (m)
- Production Bore (Northern Bore Field)
- Production Bore (Southern Bore Field)

Watercourse Sections

- Anglesea River Estuary
- Breakfast Creek
- Breakfast Creek Tributary
- Lower Anglesea River Swampland
- Salt Creek Swamp
- Approximate Historical Alignment of Salt Creek
- Upper Anglesea River
- Upper Anglesea River Swampland
- Upper Salt Creek Swamp

Service Layer Credits: World Topographic Map: Esri, HERE, Garmin, FAO, USGS
World Imagery: Earthstar Geographics

N

0 1 2 3 4 5
Kilometers

1:125,000 when printed at A3
GDA2020 MGA Zone 55
Imagery: ESRI

SITE LOCATION PLAN

Anglesea Borefield Bulk Entitlement Review

DRAFT

Figure
F1

Anglesea Borefield
Anglesea, VIC 3230
Barwon Water

Disclaimer: BlueSphere Environmental Pty Ltd. (BlueSphere) does not warrant the accuracy or completeness of information displayed in this map and any person using it does so at their own risk. BlueSphere shall bear no responsibility or liability for any errors, faults, defects or omissions in the information.

G:\BlueSphere\Projects\31313_BW_Anglesea\01\31313_BW_Anglesea.aprx



PROJECT ID 31313.01
DATE 15/07/2024
CREATED BY WC
UPDATED BY EA

BlueSphere ENVIRONMENTAL

Legend

- Alcoa Mine Operational Area (approx.)
- Alcoa Mine Licence/Lease
- Jan Juc Groundwater Management Area
- Lake/Reservoir
- Wetlands
- Watercourse
- Rainfall Gauge Location

Watercourse Sections

- Anglesea River Estuary
- Breakfast Creek
- Breakfast Creek Tributary
- Lower Anglesea River Swampland
- Salt Creek Swamp
- Approximate Historical Alignment of Salt Creek
- Upper Anglesea River
- Upper Anglesea River Swampland
- Upper Salt Creek Swamp

Surface Water Monitoring Location

- Stream Gauge
- Level Gauge

N

0 0.7 1.4 2.1 2.8 3.5
Kilometers

1:90,000 when printed at A3
GDA2020 MGA Zone 55
Imagery: ESRI

SURFACE WATER MONITORING LOCATION PLAN

Anglesea Borefield Bulk Entitlement Review

DRAFT

Figure
F2

Anglesea Borefield
Anglesea, VIC 3230
Barwon Water

Disclaimer: BlueSphere Environmental Pty Ltd. (BlueSphere) does not warrant the accuracy or completeness of information displayed in this map and any person using it does so at their own risk. BlueSphere shall bear no responsibility or liability for any errors, faults, defects or omissions in the information.

G:\BlueSphere\Projects\31313_BW_Anglesea\01\31313_BW_Anglesea.aprx



PROJECT ID	31313.01
DATE	19/03/2024
CREATED BY	WC
UPDATED BY	
APPROVED BY	

BlueSphere ENVIRONMENTAL

Legend

- Alcoa Mine Operational Area (approx.)
- Alcoa Mine Licence/Lease
- Jan Juc Groundwater Management Area
- Lake/Reservoir
- Wetlands
- Watercourse

Watercourse Sections

- Anglesea River Estuary
- Breakfast Creek
- Breakfast Creek Tributary
- Lower Anglesea River Swampland
- Salt Creek Swamp
- Upper Anglesea River
- Upper Anglesea River Swampland
- Upper Salt Creek Swamp

Groundwater Monitoring Well Location

- ASA
- LEVF
- UEVF
- UEVF/LEVF

N

0 0.7 1.4 2.1 2.8 3.5

Kilometers

1:90,000 when printed at A3

GDA2020 MGA Zone 55

Imagery: ESRI

GROUNDWATER MONITORING BORE LOCATION PLAN

Anglesea Borefield Bulk Entitlement Review

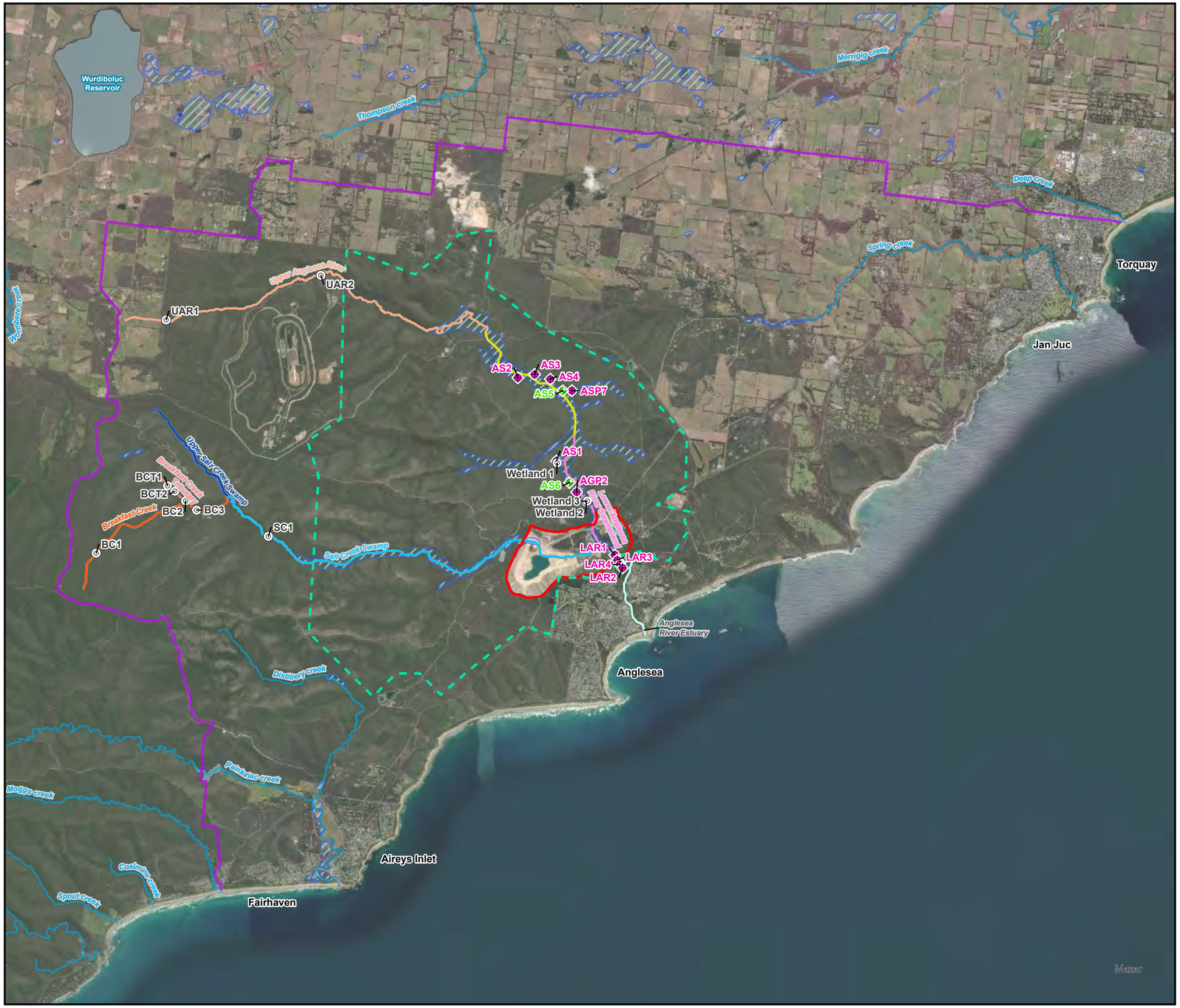
DRAFT

Figure **F3**

Anglesea Borefield
Anglesea, VIC 3230
Barwon Water

Disclaimer: BlueSphere Environmental Pty Ltd. (BlueSphere) does not warrant the accuracy or completeness of information displayed in this map and any person using it does so at their own risk. BlueSphere shall bear no responsibility or liability for any errors, faults, defects or omissions in the information.

G:\BlueSphere\Projects\31313_BW_Anglesea\01\31313_BW_Anglesea.aprx



PROJECT ID	31313.01
DATE	19/03/2024
CREATED BY	WC
UPDATED BY	
APPROVED BY	

BlueSphere ENVIRONMENTAL

Legend

- Alcoa Mine Operational Area (approx.)
- Alcoa Mine Licence/Lease
- Jan Juc Groundwater Management Area
- Lake/Reservoir
- Wetlands
- Watercourse

Watercourse Sections

- Anglesea River Estuary
- Breakfast Creek
- Breakfast Creek Tributary
- Lower Anglesea River Swampland
- Salt Creek Swamp
- Upper Anglesea River
- Upper Anglesea River Swampland
- Upper Salt Creek Swamp

Ecological Monitoring Location

- Aquatic Monitoring
- Terrestrial Monitoring
- Vegetation Monitoring Site

N

0 0.7 1.4 2.1 2.8 3.5

Kilometers

1:90,000 when printed at A3

GDA2020 MGA Zone 55

Imagery: ESRI

ECOLOGICAL MONITORING LOCATION PLAN

Anglesea Borefield Bulk Entitlement Review

DRAFT

Figure **F4a**

Anglesea Borefield
Anglesea, VIC 3230
Barwon Water

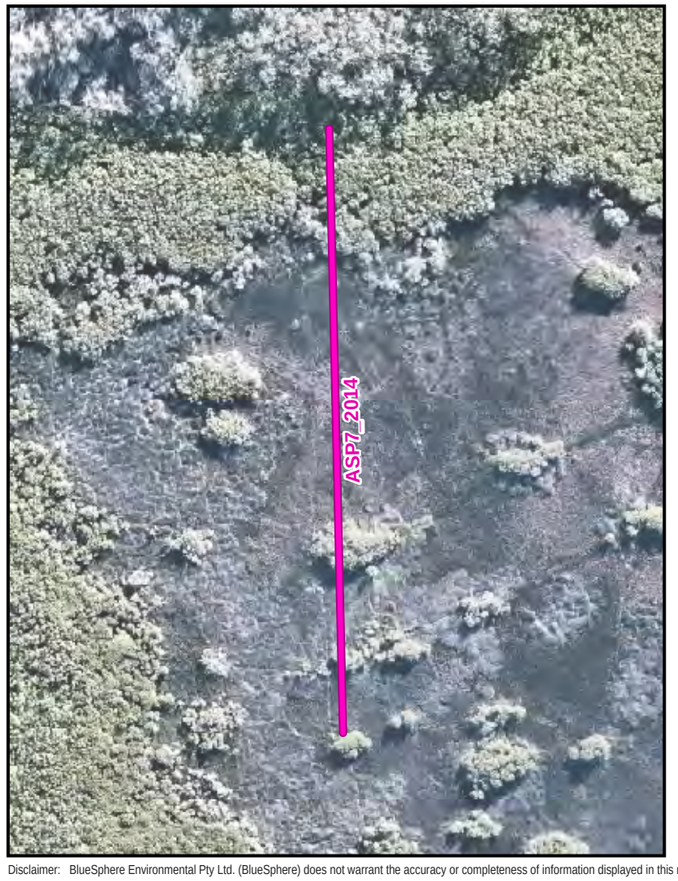
Disclaimer: BlueSphere Environmental Pty Ltd. (BlueSphere) does not warrant the accuracy or completeness of information displayed in this map and any person using it does so at their own risk. BlueSphere shall bear no responsibility or liability for any errors, faults, defects or omissions in the information.

G:\BlueSphere\Projects\31313_BW_Anglesea\01\31313_BW_Anglesea.aprx













PROJECT ID	31313.01
DATE	20/12/2023
CREATED BY	WC
UPDATED BY	
APPROVED BY	

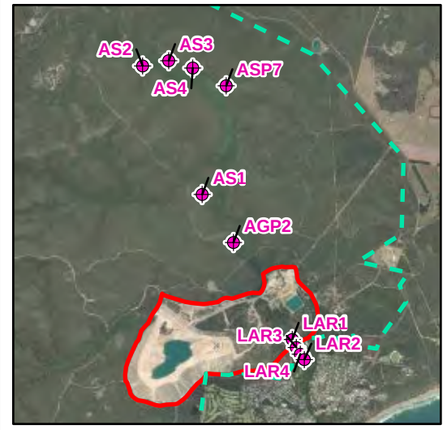
BlueSphere ENVIRONMENTAL

Legend

- Alcoa Mine Operational Area (approx.)
- Alcoa Mine Licence/Lease

Ecological Monitoring Location

- Vegetation Monitoring Site Transect (Ecology Australia, 2017)
- Aquatic Monitoring



Service Layer Credits: World Imagery: Earthstar Geographics

N

0 9 17 26 34 43

Meters

1:1,000 when printed at A3

GDA2020 MGA Zone 55

Imagery: Nearmap 06/07/2023

ECOLOGICAL MONITORING PLAN: ANGLESEA SWAMP LOCATIONS

Anglesea Borefield Bulk Entitlement Review

DRAFT

Figure

F4b

Anglesea Borefield
Anglesea, VIC 3230
Barwon Water

Disclaimer: BlueSphere Environmental Pty Ltd. (BlueSphere) does not warrant the accuracy or completeness of information displayed in this map and any person using it does so at their own risk. BlueSphere shall bear no responsibility or liability for any errors, faults, defects or omissions in the information.

G:\BlueSphere\Projects\31313_BW_Anglesea\01\31313_BW_Anglesea.aprx







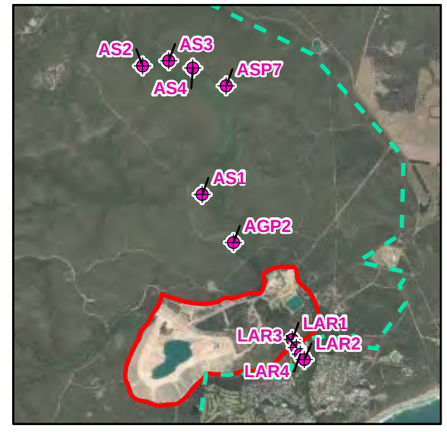


PROJECT ID	31313.01
DATE	20/12/2023
CREATED BY	WC
UPDATED BY	
APPROVED BY	

BlueSphere ENVIRONMENTAL

Legend

- Alcoa Mine Operational Area (approx.)
- Alcoa Mine Licence/Lease
- Vegetation Monitoring Site Transect (Ecology Australia, 2017)



Service Layer Credits: World Imagery: Earthstar Geographics

N

0 4 8 12 16 20

Meters

1:500 when printed at A3

GDA2020 MGA Zone 55

Imagery: Nearmap 06/07/2023

ECOLOGICAL MONITORING PLAN: ANGLESEA ESTUARY LOCATIONS

Anglesea Borefield Bulk Entitlement Review

DRAFT

Figure

F4c

Anglesea Borefield
Anglesea, VIC 3230
Barwon Water

Disclaimer: BlueSphere Environmental Pty Ltd. (BlueSphere) does not warrant the accuracy or completeness of information displayed in this map and any person using it does so at their own risk. BlueSphere shall bear no responsibility or liability for any errors, faults, defects or omissions in the information.

G:\BlueSphere\Projects\31313_BW_Anglesea\01\31313_BW_Anglesea.aprx

PROJECT ID	31313.01
DATE	19/03/2024
CREATED BY	WC
UPDATED BY	
APPROVED BY	

BlueSphere ENVIRONMENTAL

Legend

- Alcoa Mine Operational Area (approx.)
- Alcoa Mine Licence/Lease
- Jan Juc Groundwater Management Area
- Wetlands
- Watercourse
- ASS Investigation Bore

Groundwater Monitoring Well Location

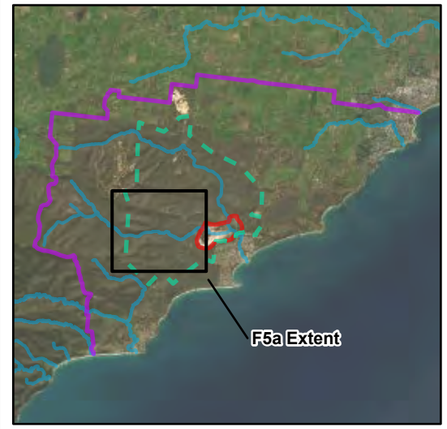
- LEVF
- UEVF
- UEVF/LEVF
- PWT

Surface Water Monitoring Location

- Stream Gauge
- Level Gauge

Salt Creek Swamplands

- Upper Swamplands
- Mid-Swamplands
- Lower Swamplands



Service Layer Credits: World Imagery: Earthstar Geographics
World Imagery: Maxar

N

0 160 320 480 640 800
Meters

1:20,000 when printed at A3
GDA2020 MGA Zone 55
Imagery: ESRI

ACID SULFATE SOIL SAMPLING LOCATION PLAN: SALT CREEK

Anglesea Borefield Bulk Entitlement Review

DRAFT

Figure
F5a

Anglesea Borefield
Anglesea, VIC 3230
Barwon Water

Disclaimer: BlueSphere Environmental Pty Ltd. (BlueSphere) does not warrant the accuracy or completeness of information displayed in this map and any person using it does so at their own risk. BlueSphere shall bear no responsibility or liability for any errors, faults, defects or omissions in the information.

G:\BlueSphere\Projects\31313_BW_Anglesea\01\31313_BW_Anglesea.aprx

PROJECT ID 31313.01
DATE 19/03/2024
CREATED BY WC
UPDATED BY
APPROVED BY

BlueSphere ENVIRONMENTAL

Legend

- Alcoa Mine Operational Area (approx.)
- Alcoa Mine Licence/Lease
- Jan Juc Groundwater Management Area
- Wetlands
- Watercourse
- ASS Investigation Bore

Groundwater Monitoring Well Location

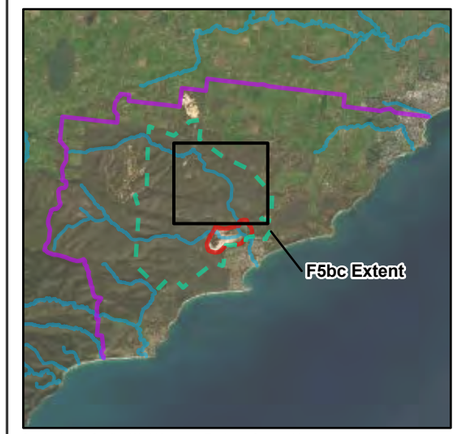
- LEVF
- UEVF
- UEVF/LEVF
- PWT

Surface Water Monitoring Location

- Stream Gauge
- Level Gauge

Anglesea River Swamplands

- Upper Swamplands
- Mid-Swamplands
- Lower Swamplands



Service Layer Credits: World Imagery: Earthstar Geographics
World Imagery: Maxar

N

0 160 320 480 640 800
Meters

1:20,000 when printed at A3
GDA2020 MGA Zone 55
Imagery: ESRI

ACID SULFATE SOIL SAMPLING LOCATION PLAN: MARSHALL CREEK

Anglesea Borefield Bulk Entitlement Review

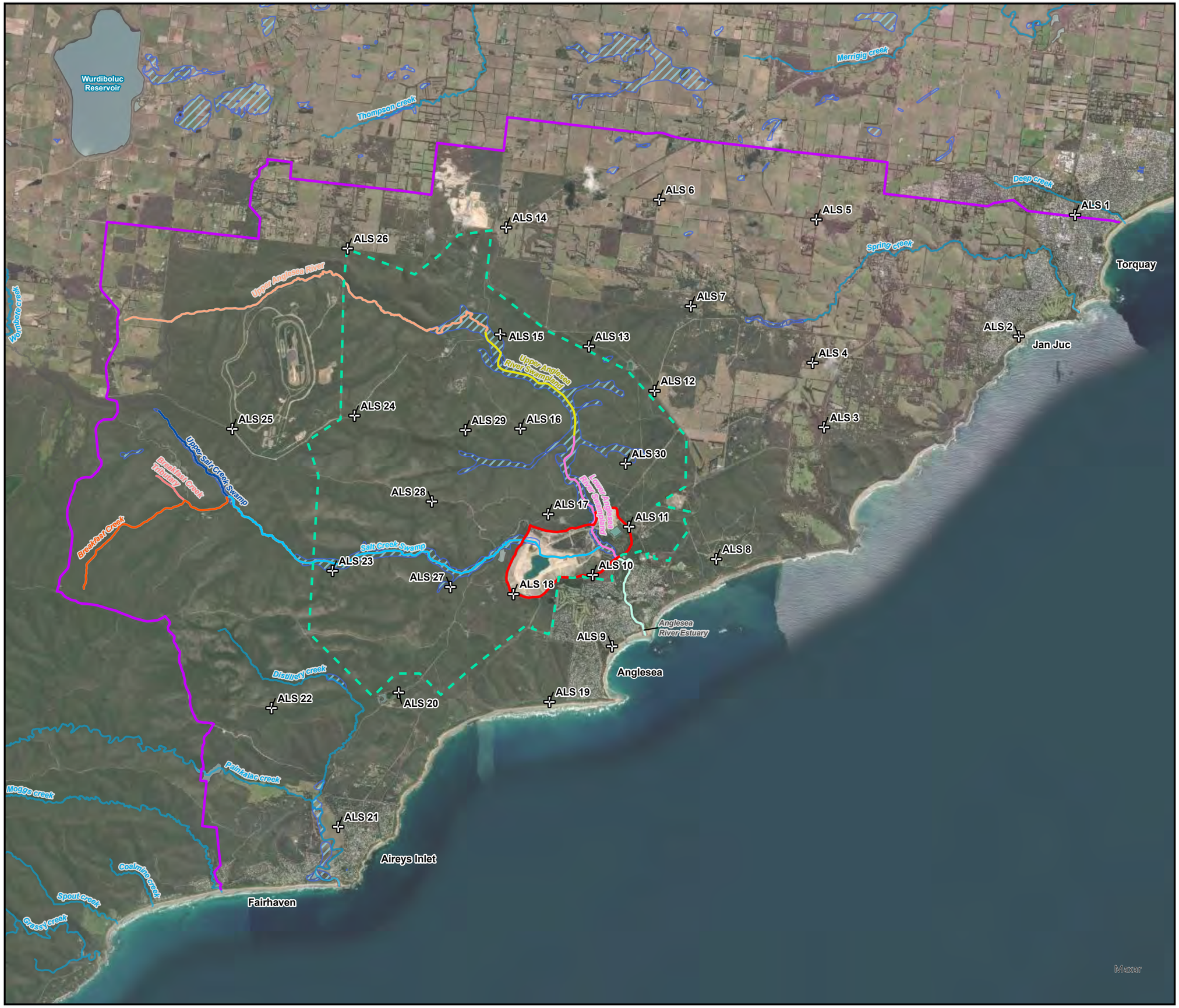
DRAFT

Figure
F5b

Anglesea Borefield
Anglesea, VIC 3230
Barwon Water

Disclaimer: BlueSphere Environmental Pty Ltd. (BlueSphere) does not warrant the accuracy or completeness of information displayed in this map and any person using it does so at their own risk. BlueSphere shall bear no responsibility or liability for any errors, faults, defects or omissions in the information.

G:\BlueSphere\Projects\31313_BW_Anglesea\01\31313_BW_Anglesea.aprx



PROJECT ID	31313.01
DATE	19/03/2024
CREATED BY	WC
UPDATED BY	
APPROVED BY	

BlueSphere ENVIRONMENTAL

Legend

- Alcoa Mine Operational Area (approx.)
- Alcoa Mine Licence/Lease
- Jan Juc Groundwater Management Area
- Wetlands
- Watercourse
- Ground Subsidence Monitoring Location

Watercourse Sections

- Anglesea River Estuary
- Breakfast Creek
- Breakfast Creek Tributary
- Lower Anglesea River Swampland
- Salt Creek Swamp
- Upper Anglesea River
- Upper Anglesea River Swampland
- Upper Salt Creek Swamp

N

0 0.7 1.4 2.1 2.8 3.5

Kilometers

1:90,000 when printed at A3

GDA2020 MGA Zone 55

Imagery: ESRI

GROUND SUBSIDENCE MONITORING LOCATION PLAN

Anglesea Borefield Bulk Entitlement Review

DRAFT

Figure **F6**

Anglesea Borefield
Anglesea, VIC 3230
Barwon Water

Disclaimer: BlueSphere Environmental Pty Ltd. (BlueSphere) does not warrant the accuracy or completeness of information displayed in this map and any person using it does so at their own risk. BlueSphere shall bear no responsibility or liability for any errors, faults, defects or omissions in the information.

G:\BlueSphere\Projects\31313_BW_Anglesea\01\31313_BW_Anglesea.aprx

PROJECT ID	31313.01
DATE	19/03/2024
CREATED BY	WC
UPDATED BY	
APPROVED BY	

BlueSphere ENVIRONMENTAL

Legend

- Alcoa Mine Operational Area (approx.)
- Alcoa Mine Licence/Lease
- Jan Juc Groundwater Management Area
- ASA Zone
- Watercourse
- Groundwater Elevation Contour (AHD)
- Groundwater Elevation Contour (AHD) - Inferred
- ASA Groundwater Monitoring Location

Watercourse Sections

- Anglesea River Estuary
- Breakfast Creek
- Breakfast Creek Tributary
- Lower Anglesea River Swampland
- Salt Creek Swamp
- Upper Anglesea River
- Upper Anglesea River Swampland
- Upper Salt Creek Swamp

Well ID
RWL (AHD)

N

0 0.35 0.7 1.05 1.4 1.75
Kilometers

1:45,000 when printed at A3
GDA2020 MGA Zone 55
Imagery: ESRI

ELEVATION PLAN – ALLUVIAL SWAMP AQUIFER (ASA)

Anglesea Borefield Bulk Entitlement Review

DRAFT

Anglesea Borefield
Anglesea, VIC 3230
Barwon Water

Figure
F7

Disclaimer: BlueSphere Environmental Pty Ltd. (BlueSphere) does not warrant the accuracy or completeness of information displayed in this map and any person using it does so at their own risk. BlueSphere shall bear no responsibility or liability for any errors, faults, defects or omissions in the information.

G:\BlueSphere\Projects\31313_BW_Anglesea\01\31313_BW_Anglesea.aprx



PROJECT ID	31313.01
DATE	19/03/2024
CREATED BY	WC
UPDATED BY	
APPROVED BY	

BlueSphere ENVIRONMENTAL

Legend

- Alcoa Mine Operational Area (approx.)
- Alcoa Mine Licence/Lease
- Jan Juc Groundwater Management Area
- Lake/Reservoir
- Wetlands
- Watercourse
- Groundwater Contours (AHD)
- Groundwater Contours (AHD) - Inferred
- UEVF Groundwater Monitoring Location
- UEVF/LEVF Groundwater Monitoring Location

Watercourse Sections

- Anglesea River Estuary
- Breakfast Creek
- Breakfast Creek Tributary
- Lower Anglesea River Swampland
- Salt Creek Swamp
- Upper Anglesea River
- Upper Anglesea River Swampland
- Upper Salt Creek Swamp

Well ID
RWL (AHD)

N/A = No gauging data available for selected date

N

0 0.7 1.4 2.1 2.8 3.5

Kilometers

1:90,000 when printed at A3

GDA2020 MGA Zone 55

Imagery: ESRI

GROUNDWATER ELEVATION PLAN – UPPER EASTERN VIEW FORMATION (UEVF)

Anglesea Borefield Bulk Entitlement Review

DRAFT

Anglesea Borefield
Anglesea, VIC 3230
Barwon Water

Figure F8

Disclaimer: BlueSphere Environmental Pty Ltd. (BlueSphere) does not warrant the accuracy or completeness of information displayed in this map and any person using it does so at their own risk. BlueSphere shall bear no responsibility or liability for any errors, faults, defects or omissions in the information.

G:\BlueSphere\Projects\31313_BW_Anglesea\01\31313_BW_Anglesea.aprx

PROJECT ID	31313.01
DATE	19/03/2024
CREATED BY	WC
UPDATED BY	
APPROVED BY	

BlueSphere ENVIRONMENTAL

Legend

- Alcoa Mine Operational Area (approx.)
- Alcoa Mine Licence/Lease
- Jan Juc Groundwater Management Area
- Lake/Reservoir
- Wetlands
- Watercourse
- LEVF Groundwater Elevation Contours (AHD)
- LEVF Groundwater Monitoring Location
- UEVF/LEVF Groundwater Monitoring Location

Watercourse Sections

- Anglesea River Estuary
- Breakfast Creek
- Breakfast Creek Tributary
- Lower Anglesea River Swampland
- Salt Creek Swamp
- Upper Anglesea River
- Upper Anglesea River Swampland
- Upper Salt Creek Swamp

Well ID
RWL (AHD)

N/A = No gauging data available for selected date

N

0 0.7 1.4 2.1 2.8 3.5
Kilometers

1:90,000 when printed at A3
GDA2020 MGA Zone 55
Imagery: ESRI

GROUNDWATER ELEVATION PLAN – LOWER EASTERN VIEW FORMATION (LEVF)

Anglesea Borefield Bulk Entitlement Review

DRAFT

Figure
F9

Anglesea Borefield
Anglesea, VIC 3230
Barwon Water

Disclaimer: BlueSphere Environmental Pty Ltd. (BlueSphere) does not warrant the accuracy or completeness of information displayed in this map and any person using it does so at their own risk. BlueSphere shall bear no responsibility or liability for any errors, faults, defects or omissions in the information.

G:\BlueSphere\Projects\31313_BW_Anglesea\01\31313_BW_Anglesea.aprx

Appendix A
Surface Water Attachments

Surface Water – Tables

Table A1 - Surface Water Sampling Locations

Location Code	Site ID	Location Type	Monitoring Zone	Easting	Northing	Elevation (mAHD)	MAP Requirements	
							Monthly Field Testing	Water Quality Sampling (Twice Yearly)
AGP1-B	235271	Level Gauge	Anglesea River	246682	5753606	75.739	✓	×
AGP2	235272	Level Gauge	Marshy Creek - Lower Swamp	253041	5748034	12.468	✓	×
ASP7	235280	Level Gauge	Marshy Creek - Upper Swamp	252903	5750702	-	✓	×
AV1	235270	Stream Gauge	Anglesea River	247044	5753546	74.745	✓	✓
AV2	235260	Stream Gauge	Marshy Creek - Upper Swamp	253472	5747581	14.214	✓	✓
AV3	235277	Stream Gauge	Marshy Creek - Upper Swamp	250783	5751988	38.856	✓	✓
SV1	235273	Stream Gauge	Breakfast Creek	243434	5747656	86.181	✓	✓
SV2	235222	Stream Gauge	Alcoa Mine	253092	5747162	6.052	✓	✓
SV3	235274	Stream Gauge	Breakfast Creek	242895	5748151	95.34	✓	✓
SV4	235276	Stream Gauge	Salt Creek Swamp	245536	5746838	59.891	✓	×
SGP2-B	235275	Level Gauge	Salt Creek Swamp	246194	5746302	-	✓	×

Notes: Elevation is understood to be the invert level of the surface water body

Table A2 - Surface Water Analytical Results

			Field								Inorganics													Sample Preparation
			Field Observations	Depth to Water	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)	Alkalinity (total) as CaCO3	Calcium	Chloride	Electrical Conductivity (lab)	Magnesium	pH (Lab)	Potassium	Sodium	Sulphate	Total Dissolved Solids (Calc.)	Total Dissolved Solids (lab)	Test - Comment 1
			Pool Condition	m	oC	oC	mg/L	mg/L	µS/cm	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	General Comment
EQL											2	2	2	0.5	0.5	1	0.5	0.1	0.5	0.5	0.5		1	
Site ID	**Location Code**	**Date**																						
31313	AV1	04 May 2010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	18 May 2010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	01 Jun 2010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	15 Jun 2010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	29 Jun 2010	Dry	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	12 Jul 2010	Dry	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	27 Jul 2010	Dry	-	-	6.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	11 Aug 2010	Dry	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	23 Aug 2010	Flowing	0.181	7.4	7.9	4.4	4.4	877	5.45	-	-	-	-	-	-	-	-	-	-	-	543.74	-	-
31313	AV1	07 Sep 2010	Flowing	0.31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	21 Sep 2010	Flowing	0.143	10.8	13.3	2.6	2.4	751	6.91	-	-	-	-	-	-	-	-	-	-	-	465.62	-	-
31313	AV1	05 Oct 2010	Flowing	0.114	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	19 Oct 2010	Flowing	0.186	10.4	11	5.39	4.74	689	4.69	-	-	-	-	-	-	-	-	-	-	-	427.18	-	-
31313	AV1	01 Nov 2010	Flowing	0.236	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	16 Nov 2010	`	0.171	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	01 Dec 2010	Flowing	0.187	14.8	18.5	4.1	4	818	4.46	-	-	-	-	-	-	-	-	-	-	-	507.16	-	-
31313	AV1	13 Dec 2010	Flowing	0.121	14.7	14.9	1.7	1.6	693	4.58	-	-	-	-	-	-	-	-	-	-	-	429.66	-	-
31313	AV1	29 Dec 2010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	11 Jan 2011	Flowing	-	16	18.8	2.3	2.3	963	5.12	-	-	-	-	-	-	-	-	-	-	-	597.06	-	Below Gauge
31313	AV1	27 Jan 2011	Flowing	0.14	15.5	19.4	2.5	1.9	692	5.28	-	-	-	-	-	-	-	-	-	-	-	429.04	-	-
31313	AV1	08 Feb 2011	-	0.103	15.1	16.8	3.2	3.3	758	5.07	-	-	-	-	-	-	-	-	-	-	-	469.96	-	-
31313	AV1	21 Feb 2011	Stagnant	-	15	17.4	4.9	4.8	856	5.12	-	-	-	-	-	-	-	-	-	-	-	530.72	-	Below Gauge
31313	AV1	08 Mar 2011	Pool dry	-	-	19.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	21 Mar 2011	Dry	-	-	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	04 Apr 2011	Dry	-	-	14.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	20 Apr 2011	Dry	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	05 May 2011	Dry	-	-	13.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	16 May 2011	Dry	-	-	12.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	31 May 2011	Dry	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	15 Jun 2011	Dry	-	-	7.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	29 Jun 2011	Dry	-	-	5.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	12 Jul 2011	Dry	-	-	7.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	26 Jul 2011	Stagnant	0.251	8.7	7	7.1	7	757	5.6	-	-	-	-	-	-	-	-	-	-	-	469.34	-	-
31313	AV1	09 Aug 2011	Flowing	0.138	8.3	8.5	2.6	2.4	824	6.4	-	-	-	-	-	-	-	-	-	-	-	510.88	-	-
31313	AV1	23 Aug 2011	Flowing	0.156	8.4	12.4	3.1	3.1	900	5.29	-	-	-	-	-	-	-	-	-	-	-	558	-	-
31313	AV1	06 Sep 2011	Flowing	0.114	8.8	15.5	1.9	1.9	920	6.5	-	-	-	-	-	-	-	-	-	-	-	570.4	-	-
31313	AV1	21 Sep 2011	Flowing	0.074	9.6	18.1	1.7	1.7	944	5.3	-	-	-	-	-	-	-	-	-	-	-	585.28	-	-
31313	AV1	04 Oct 2011	Flowing	0.144	9.2	13.5	3.6	3.6	975	5.61	-	-	-	-	-	-	-	-	-	-	-	604.5	-	-
31313	AV1	18 Oct 2011	Flowing	0.056	10.1	23.4	2.11	2.09	963	5.23	-	-	-	-	-	-	-	-	-	-	-	597.06	-	-
31313	AV1	02 Nov 2011	Flowing	0.02	12.3	15.7	0.83	0.83	1,024	5.38	-	-	-	-	-	-	-	-	-	-	-	634.88	-	-
31313	AV1	15 Nov 2011	Flowing	-	11.8	16.7	4.19	4.11	1,077	5.4	-	-	-	-	-	-	-	-	-	-	-	667.74	-	Below Gauge
31313	AV1	01 Dec 2011	Dry	-	-	13.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	13 Dec 2011	Dry	-	-	21.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	28 Dec 2011	Dry	-	-	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	10 Jan 2012	Dry	-	-	15.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	24 Jan 2012	Dry	-	-	34.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	07 Feb 2012	Dry	-	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	14 Feb 2012	Dry	-	-	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	21 Feb 2012	Dry	-	-	17.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	06 Mar 2012	Dry	-	-	15.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	20 Mar 2012	Dry	-	-	16.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	03 Apr 2012	Dry	-	-	16.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	17 Apr 2012	Dry	-	-	15.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	01 May 2012	Dry	-	-	17.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	15 May 2012	Dry	-	-	13.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	29 May 2012	Dry	-	-	14.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	12 Jun 2012	Flowing	0.16	8.8	8.8	4.6	4.6	786	5.44	-	-	-	-	-	-	-	-	-	-	-	487.32	-	-
31313	AV1	15 Jun 2012	-	0.149	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	26 Jun 2012	Flowing	0.251	8.9	6.4	7.4	7.4	718	6.6	-	-	-	-	-	-	-	-	-	-	-	445.16	-	-
31313	AV1	11 Jul 2012	Flowing	0.243	8.9	14.7	5.4	5.6	809	5.49	-	-	-	-	-	-	-	-	-	-	-	501.58	-	-
31313	AV1	24 Jul 2012	Flowing	0.16	9.6	10.5	4.8	4.8	803	5.54	-	-	-	-	-	-	-	-	-	-	-	497.86	-	-
31313	AV1	07 Aug 2012	Flowing	0.152	7.7	7.9	4.9	4.9	822	5.22	-	-	-	-	-	-	-	-	-	-	-	509.64	-	-
31313	AV1	21 Aug 2012	Flowing	0.32	9.4	10.7	6.3	6.3	658	5.22	-	-	-	-	-	-	-	-	-	-	-	407.96	-	-
31313	AV1	04 Sep 2012	Flowing	0.217	9.7	12.8	6	6	827	4.98	-	-	-	-	-	-	-	-	-	-	-	512.74	-	-

Table A2 - Surface Water Analytical Results

			Field								Inorganics													Sample Preparation
			Field Observations	Depth to Water	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)	Alkalinity (total) as CaCO3	Calcium	Chloride	Electrical Conductivity (lab)	Magnesium	pH (Lab)	Potassium	Sodium	Sulphate	Total Dissolved Solids (Calc.)	Total Dissolved Solids (lab)	Test - Comment 1
			Pool Condition	m	oC	oC	mg/L	mg/L	µS/cm	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	General Comment
EQL											2	2	2	0.5	0.5	1	0.5	0.1	0.5	0.5	0.5		1	
Site ID	**Location Code**	**Date**																						
31313	AV1	18 Sep 2012	Flowing	0.156	9.8	14.5	4.1	4.1	834	6.6	-	-	-	-	-	-	-	-	-	-	-	517.08	-	-
31313	AV1	02 Oct 2012	Flowing	0.144	10.3	16.2	2.4	2.9	810	5.41	-	-	-	-	-	-	-	-	-	-	-	502.2	-	-
31313	AV1	16 Oct 2012	Flowing	0.18	11.9	13.2	5.1	5.1	794	5.84	-	-	-	-	-	-	-	-	-	-	-	492.28	-	-
31313	AV1	30 Oct 2012	Flowing	0.116	10.3	18.9	2.2	2.2	868	5.35	-	-	-	-	-	-	-	-	-	-	-	538.16	-	-
31313	AV1	13 Nov 2012	Flowing	-	10.1	10	3.02	3.02	865	5.32	-	-	-	-	-	-	-	-	-	-	-	536.3	-	Below Gauge
31313	AV1	27 Nov 2012	Stagnant	-	-	20.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Below Gauge
31313	AV1	11 Dec 2012	Dry	-	-	19.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	20 Dec 2012	Dry	-	-	19.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	08 Jan 2013	Dry	-	-	19.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	22 Jan 2013	Dry	-	-	21.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	05 Feb 2013	Dry	-	-	18.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	19 Feb 2013	Dry	-	-	19.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	05 Mar 2013	Dry	-	-	19.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	19 Mar 2013	Dry	-	-	14.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	03 Apr 2013	Dry	-	-	15.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	16 Apr 2013	Dry	-	-	16.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	01 May 2013	Dry	-	-	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	14 May 2013	Dry	-	-	10.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	27 May 2013	Dry	-	-	16.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	11 Jun 2013	Dry	-	-	13.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	24 Jun 2013	Dry	-	-	7.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	09 Jul 2013	Dry	-	-	4.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	22 Jul 2013	Flowing	0.282	8.7	8.1	6.7	6.7	531	7.5	-	-	-	-	-	-	-	-	-	-	-	329.22	-	-
31313	AV1	06 Aug 2013	Flowing	0.494	9.8	10.2	6.7	6.7	496	7.18	-	-	-	-	-	-	-	-	-	-	-	307.52	-	-
31313	AV1	19 Aug 2013	Flowing	0.265	8.8	8	6	6	516	7.51	-	-	-	-	-	-	-	-	-	-	-	447.64	-	-
31313	AV1	03 Sep 2013	Flowing	0.171	10.7	13	5.52	5.52	577	6	-	-	-	-	-	-	-	-	-	-	-	357.74	-	-
31313	AV1	16 Sep 2013	Flowing	0.132	11.8	15.2	5.8	5.8	621	6.66	-	-	-	-	-	-	-	-	-	-	-	385.02	-	-
31313	AV1	01 Oct 2013	Flowing	0.297	12.4	16.5	5.7	5.88	563	5.99	-	-	-	-	-	-	-	-	-	-	-	447.64	-	-
31313	AV1	15 Oct 2013	Flowing	0.138	11.1	11.8	4.8	4.8	636	6.31	-	-	-	-	-	-	-	-	-	-	-	394.32	-	-
31313	AV1	29 Oct 2013	Flowing	0.2	13.3	21.5	4.57	4.51	518	5.79	-	-	-	-	-	-	-	-	-	-	-	321.16	-	-
31313	AV1	13 Nov 2013	Flowing	0.154	12.5	13.9	5.9	5.9	667	6.1	-	-	-	-	-	-	-	-	-	-	-	413.54	-	-
31313	AV1	26 Nov 2013	Flowing	0.136	14.8	18	4.21	4.21	537	6	-	-	-	-	-	-	-	-	-	-	-	332.94	-	-
31313	AV1	06 Dec 2013	Flowing	0.057	13.7	17.7	3.5	3.5	645	5.94	-	-	-	-	-	-	-	-	-	-	-	399.9	-	-
31313	AV1	24 Dec 2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	09 Jan 2014	Dry	-	-	15.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	21 Jan 2014	Dry	-	-	16.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	06 Feb 2014	Dry	-	-	17.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	17 Feb 2014	Dry	-	-	16.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	07 Mar 2014	Dry	-	-	11.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	18 Mar 2014	Dry	-	-	13.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	01 Apr 2014	Dry	-	-	17.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	15 Apr 2014	Dry	-	-	15.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	29 Apr 2014	Dry	-	-	15.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	12 May 2014	Dry	-	-	15.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	20 May 2014	Dry	-	-	15.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	10 Jun 2014	Dry	-	-	8.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	27 Jun 2014	Dry	-	-	7.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	08 Jul 2014	Flowing	0.25	10.6	11.5	7.76	7.76	1,351	7.01	-	-	-	-	-	-	-	-	-	-	-	837.62	-	-
31313	AV1	24 Jul 2014	Flowing	0.155	7.9	9.6	5.1	5.1	722	5.5	-	-	-	-	-	-	-	-	-	-	-	447.64	-	-
31313	AV1	06 Aug 2014	Flowing	0.187	9.8	12.3	5.8	5.8	964	6.4	-	-	-	-	-	-	-	-	-	-	-	597.68	-	-
31313	AV1	18 Aug 2014	Flowing	0.148	8.1	8.6	4.2	4.2	677	4.97	-	-	-	-	-	-	-	-	-	-	-	419.74	-	-
31313	AV1	04 Sep 2014	Flowing	0.147	8.6	13.2	3.6	3.6	722	5.2	-	-	-	-	-	-	-	-	-	-	-	447.64	-	-
31313	AV1	18 Sep 2014	Flowing	0.121	8.8	13.5	3.1	3.1	759	5.22	-	-	-	-	-	-	-	-	-	-	-	470.58	-	-
31313	AV1	30 Sep 2014	Flowing	0.076	10.2	12.3	3.2	3.2	843	6.1	-	-	-	-	-	-	-	-	-	-	-	522.66	-	-
31313	AV1	14 Oct 2014	Flowing	0	10.2	8.8	2.98	2.98	801	5.46	-	-	-	-	-	-	-	-	-	-	-	496.62	-	-
31313	AV1	29 Oct 2014	Flowing	-	11.7	15.3	1.98	1.98	847	5.24	-	-	-	-	-	-	-	-	-	-	-	525.14	-	Below Gauge
31313	AV1	10 Nov 2014	Dry	-	-	19.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	01 Dec 2014	Dry	-	-	20.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	08 Dec 2014	Dry	-	-	15.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	07 Jan 2015	Dry	-	-	29.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	20 Jan 2015	Dry	-	-	17.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	04 Feb 2015	Dry	-	-	16.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	17 Feb 2015	Dry	-	-	17.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	04 Mar 2015	Dry	-	-	8.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table A2 - Surface Water Analytical Results

			Field								Inorganics													Sample Preparation
			Field Observations	Depth to Water	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)	Alkalinity (total) as CaCO3	Calcium	Chloride	Electrical Conductivity (lab)	Magnesium	pH (Lab)	Potassium	Sodium	Sulphate	Total Dissolved Solids (Calc.)	Total Dissolved Solids (lab)	Test - Comment 1
			Pool Condition	m	oC	oC	mg/L	mg/L	µS/cm	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	General Comment
EQL											2	2	2	0.5	0.5	1	0.5	0.1	0.5	0.5	0.5		1	
Site ID	**Location Code**	**Date**																						
31313	AV1	30 Mar 2015	Dry	-	-	10.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	27 Apr 2015	Dry	-	-	12.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	20 May 2015	Dry	-	-	13.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	16 Jun 2015	Dry	-	-	13.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	21 Jul 2015	Dry	-	-	3.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	18 Aug 2015	Dry	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	21 Sep 2015	Dry	-	-	13.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	19 Oct 2015	Dry	-	-	18.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	16 Nov 2015	Dry	-	-	19.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	07 Dec 2015	Dry	-	-	19.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	18 Jan 2016	Dry	-	-	31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	15 Feb 2016	Dry	-	-	20.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	15 Mar 2016	Dry	-	-	16.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	13 Apr 2016	Dry	-	-	12.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	16 May 2016	Dry	-	-	6.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	20 Jun 2016	Dry	-	-	12.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	18 Jul 2016	Flowing	0.136	10.4	15.7	4.7	4.7	934	5.1	-	-	-	-	-	-	-	-	-	-	-	579.08	-	-
31313	AV1	17 Aug 2016	Flowing	0.112	10.3	16.2	2.7	2.7	808	4.8	-	-	-	-	-	-	-	-	-	-	-	500.96	-	-
31313	AV1	20 Sep 2016	Flowing	0.29	10	13.7	5.7	5.7	611	5.4	-	-	-	-	-	-	-	-	-	-	-	378.82	-	-
31313	AV1	17 Oct 2016	Flowing	0.204	12.7	13	5.09	5.09	635	5.5	-	-	-	-	-	-	-	-	-	-	-	393.7	-	-
31313	AV1	14 Nov 2016	Flowing	0.124	12.5	16.8	1.5	1.5	630	5	-	-	-	-	-	-	-	-	-	-	-	390.6	-	-
31313	AV1	06 Dec 2016	Stagnant	-	15.7	26.2	1.4	1.4	778	5.4	-	-	-	-	-	-	-	-	-	-	-	482.36	-	Below Gauge
31313	AV1	19 Jan 2017	Dry	-	-	26.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	14 Feb 2017	Dry	-	-	18.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	20 Mar 2017	Dry	-	-	18.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	18 Apr 2017	Stagnant	0.09	14.7	18.2	2.62	2.62	820	5.55	-	-	-	-	-	-	-	-	-	-	-	508.4	-	-
31313	AV1	15 May 2017	Flowing	0.109	11	13.2	1.72	1.72	685	5.38	-	-	-	-	-	-	-	-	-	-	-	424.7	-	-
31313	AV1	21 Jun 2017	Trickle	0.09	10.1	13	1.8	1.79	699	5.6	-	-	-	-	-	-	-	-	-	-	-	433.38	-	-
31313	AV1	27 Jul 2017	Flowing	0.12	8.2	8.6	1.8	1.8	740	6.24	-	-	-	-	-	-	-	-	-	-	-	458.8	-	-
31313	AV1	21 Aug 2017	Flowing	0.25	7.9	8.3	4.8	4.8	614	5.08	-	-	-	-	-	-	-	-	-	-	-	380.68	-	-
31313	AV1	18 Sep 2017	Flowing	0.322	11.2	15.3	6.05	6.05	462	6.3	-	-	-	-	-	-	-	-	-	-	-	286.44	-	-
31313	AV1	17 Oct 2017	Flowing	0.105	15.2	24.5	7.11	7.11	641	5.93	-	-	-	-	-	-	-	-	-	-	-	397.42	-	-
31313	AV1	20 Nov 2017	Flowing	-	15.4	19.7	6.11	6.11	695	5.56	-	-	-	-	-	-	-	-	-	-	-	430.9	-	Below Gauge
31313	AV1	06 Dec 2017	Flowing	-	20.2	26.2	3.1	3.1	736	5.18	-	-	-	-	-	-	-	-	-	-	-	456.32	-	Below Gauge
31313	AV1	10 Jan 2018	Dry	-	-	19.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	18 Jan 2018	Dry	-	-	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	06 Feb 2018	Dry	-	-	19.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	08 Mar 2018	Dry	-	-	15.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	11 Apr 2018	Dry	-	-	19.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	14 May 2018	Dry	-	-	16.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	22 Jun 2018	Dry	-	-	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	18 Jul 2018	Dry	-	-	5.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	13 Aug 2018	Flowing	0.212	9.9	11.5	4.32	4.32	771	6.34	-	-	-	-	-	-	-	-	-	-	-	478.02	-	-
31313	AV1	24 Sep 2018	Stagnant	-	10.4	12.8	2.35	2.35	848	4.9	-	-	-	-	-	-	-	-	-	-	-	525.76	-	Below Gauge
31313	AV1	17 Oct 2018	Dry	-	-	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	07 Nov 2018	Dry	-	-	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	12 Dec 2018	Dry	-	-	27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	13 Feb 2019	Dry	-	-	14.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	13 Mar 2019	Dry	-	-	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	08 Apr 2019	Dry	-	-	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	24 May 2019	Dry	-	-	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	18 Jun 2019	Flowing	0.19	9.1	9	5.7	5.7	467	5.4	-	-	-	-	-	-	-	-	-	-	-	289.54	-	-
31313	AV1	29 Jul 2019	Flowing	0.182	8.6	13	6	6	482	5.4	-	-	-	-	-	-	-	-	-	-	-	298.84	-	-
31313	AV1	17 Sep 2019	Flowing	0.152	10.6	10.8	6.5	3.2	634	5.1	-	-	-	-	-	-	-	-	-	-	-	633	-	-
31313	AV1	15 Oct 2019	Flowing	0.099	10.5	14.4	1.4	1.4	697	5.3	-	-	-	-	-	-	-	-	-	-	-	432.14	-	-
31313	AV1	14 Nov 2019	Flowing	0.04	13.2	15.4	8.2	8.2	789	6.5	-	-	-	-	-	-	-	-	-	-	-	489.18	-	-
31313	AV1	12 Dec 2019	Dry	-	-	16.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	13 Jan 2020	Dry	-	-	24.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	10 Feb 2020	Dry	-	-	24.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	17 Mar 2020	Dry	-	-	16.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	15 Apr 2020	Dry	-	-	15.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	13 May 2020	Dry	-	-	10.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	12 Jun 2020	Dry	-	-	5.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	14 Jul 2020	Dry	-	-	12.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table A2 - Surface Water Analytical Results

			Field								Inorganics													Sample Preparation
			Field Observations	Depth to Water	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)	Alkalinity (total) as CaCO3	Calcium	Chloride	Electrical Conductivity (lab)	Magnesium	pH (Lab)	Potassium	Sodium	Sulphate	Total Dissolved Solids (Calc.)	Total Dissolved Solids (lab)	Test - Comment 1
			Pool Condition	m	oC	oC	mg/L	mg/L	µS/cm	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	General Comment
EQL											2	2	2	0.5	0.5	1	0.5	0.1	0.5	0.5	0.5		1	
Site ID	**Location Code**	**Date**																						
31313	AV1	12 Aug 2020	Dry	-	-	11.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	08 Sep 2020	Stagnant	0.07	11	15.9	5.93	5.93	964	5.23	-	-	-	-	-	-	-	-	-	-	-	597.68	-	-
31313	AV1	13 Oct 2020	Flowing	0.19	15.1	17.3	8.61	8.61	555	7.45	-	-	-	-	-	-	-	-	-	-	-	344.1	-	-
31313	AV1	10 Nov 2020	Flowing	0.052	13.5	27.6	7.2	7.2	722	6.21	-	-	-	-	-	-	-	-	-	-	-	447.64	-	-
31313	AV1	10 Dec 2020	Stagnant	-	12.2	13.2	6.61	6.61	282	6.28	-	-	-	-	-	-	-	-	-	-	-	174.84	-	Below Gauge
31313	AV1	11 Jan 2021	Flowing	0.117	16.7	30.4	7.2	7.2	636	6.9	-	-	-	-	-	-	-	-	-	-	-	394.32	-	-
31313	AV1	09 Feb 2021	Flowing	0.092	15.3	16.5	7.31	7.37	764	6.21	5	<2	5	2.5	200	740	15	5.5	2.8	100	44	473.68	470	-
31313	AV1	10 Mar 2021	Dry	-	-	13.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	14 Apr 2021	Dry	-	-	14.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	11 May 2021	Dry	-	-	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	03 Jun 2021	Flowing	0.094	9.6	10	6.1	6.1	943	5.7	-	-	-	-	-	-	-	-	-	-	-	584.66	-	-
31313	AV1	12 Jul 2021	Flowing	0.13	7.3	6.7	6.64	6.64	728	5.27	4	<2	4	2.2	200	720	14	5.7	2.2	100	32	451.36	400	-
31313	AV1	09 Aug 2021	Flowing	0.141	8.3	9.2	8.59	8.59	595	6.02	-	-	-	-	-	-	-	-	-	-	-	368.9	-	-
31313	AV1	08 Sep 2021	Flowing	0.13	9.3	10.1	3.25	3.25	680	5.47	-	-	-	-	-	-	-	-	-	-	-	421.6	-	-
31313	AV1	12 Oct 2021	Flowing	0.124	13	17.2	6.88	6.88	629	4.89	-	-	-	-	-	-	-	-	-	-	-	389.98	-	-
31313	AV1	04 Nov 2021	Flowing	0.564	13.4	11.2	9.1	9.1	382	5.59	-	-	-	-	-	-	-	-	-	-	-	236.84	-	-
31313	AV1	01 Dec 2021	Flowing	0.111	13.1	20.9	7.65	7.65	484	5.6	-	-	-	-	-	-	-	-	-	-	-	300.08	-	-
31313	AV1	06 Jan 2022	Flowing	-	18.4	23.4	6.75	6.75	822	5.6	-	-	-	-	-	-	-	-	-	-	-	509.64	-	Below Gauge
31313	AV1	07 Feb 2022	Flowing	0.101	18	26.6	5.87	5.8	580	5.91	-	-	-	-	-	-	-	-	-	-	-	359.6	-	-
31313	AV1	08 Mar 2022	Flowing	0.098	15.5	15	6.97	6.7	665	5.6	-	-	-	-	-	-	-	-	-	-	-	412.3	-	-
31313	AV1	27 Apr 2022	Flowing	0.058	12.5	13	9.21	9.21	211	6.21	-	-	-	-	-	-	-	-	-	-	-	130.82	-	-
31313	AV1	11 May 2022	Flowing	0.102	10.7	12.5	6.82	6.82	707	6.84	-	-	-	-	-	-	-	-	-	-	-	438.34	-	-
31313	AV1	08 Jun 2022	Flowing	0.28	8.5	8.2	9.21	9.21	768	5.8	-	-	-	-	-	-	-	-	-	-	-	476.16	-	-
31313	AV1	02 Jul 2022	-	-	-	-	-	-	-	-	4	2	4	1.9	160	570	12	5.5	2.8	93	24	-	370	-
31313	AV1	07 Jul 2022	Flowing	0.119	7.7	8	11.01	11.01	795	6.64	2	2	2	2.4	220	720	15	5.4	2.4	110	20	492.9	420	-
31313	AV1	02 Aug 2022	Flowing	0.182	8.8	10.5	9.97	9.97	684	7.4	-	-	-	-	-	-	-	-	-	-	-	424.08	-	-
31313	AV1	14 Sep 2022	Flowing	0.148	7.6	6	11.09	11.1	814	7.04	-	-	-	-	-	-	-	-	-	-	-	504.68	-	-
31313	AV1	20 Oct 2022	Flowing	0.233	14.9	18.6	8.91	8.91	652	6.67	-	-	-	-	-	-	-	-	-	-	-	404.24	-	-
31313	AV1	16 Nov 2022	Flowing	0.467	12.5	12.3	8.55	8.55	246	5.74	-	-	-	-	-	-	-	-	-	-	-	152.52	-	-
31313	AV1	05 Dec 2022	Flowing	0.151	16.3	17.1	8.16	8.16	489	6.48	-	-	-	-	-	-	-	-	-	-	-	303.18	-	-
31313	AV1	10 Jan 2023	Flowing	-	15.4	17.8	7.96	7.96	705	6.41	-	-	-	-	-	-	-	-	-	-	-	437.1	-	Below Gauge
31313	AV1	06 Feb 2023	Dry	-	-	14.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	09 Mar 2023	Dry	-	-	10.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	11 Apr 2023	Dry	-	-	10.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	08 May 2023	Dry	-	-	6.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	02 Jun 2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV1	19 Jun 2023	Stagnant	0.072	9.8	7.2	7.92	7.9	321	5.16	-	-	-	-	-	-	-	-	-	-	-	199.02	-	-
31313	AV1	07 Jul 2023	-	-	-	-	-	-	-	-	3	<2	3	2.3	200	710	13	5.4	2.4	84	52	-	420	-
31313	AV1	10 Jul 2023	Flowing	0.138	10.6	10.4	8.5	8.5	785	6.1	-	-	-	-	-	-	-	-	-	-	-	486.7	-	-
31313	AV1	07 Aug 2023	Flowing	0.122	8.9	8	9.71	9.71	867	5.6	-	-	-	-	-	-	-	-	-	-	-	537.54	-	-
31313	AV1	06 Sep 2023	Flowing	0.107	8.6	8.1	8.11	8.1	883	5.3	-	-	-	-	-	-	-	-	-	-	-	547.46	-	-

Table A2 - Surface Water Analytical Results

			Field								Inorganics													Sample Preparation
			Field Observations	Depth to Water	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO - Bottom of Water	Electrical Conductivity (field)	pH (Field)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)	Alkalinity (total) as CaCO3	Calcium	Chloride	Electrical Conductivity (lab)	Magnesium	pH (Lab)	Potassium	Sodium	Sulphate	Total Dissolved Solids (Calc.)	Total Dissolved Solids (lab)	Test - Comment 1
			Pool Condition	m	oC	oC	mg/L	mg/L	µS/cm	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	General Comment
EQL											2	2	2	0.5	0.5	1	0.5	0.1	0.5	0.5	0.5		1	
Site ID	**Location Code**	**Date**																						
31313	AV2	02 Feb 2010	-	-	-	na	2.45	2.3	2,550	3.3	-	-	-	-	-	-	-	-	-	-	-	1,658	-	-
31313	AV2	31 Mar 2010	Stagnant	-	-	na	2.05	0.68	3,087	6.04	-	-	-	-	-	-	-	-	-	-	-	2,028	-	-
31313	AV2	01 Jun 2010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	30 Jun 2010	Flowing	0.187	10.9	10.9	4.81	4.62	2,930	3.7	-	-	-	-	-	-	-	-	-	-	-	1,816.6	-	-
31313	AV2	28 Jul 2010	Flowing	0.166	15.2	15.2	9.31	7.4	2,660	3.5	-	-	-	-	-	-	-	-	-	-	-	1,649.2	-	-
31313	AV2	11 Aug 2010	Flowing	0.248	9.7	9.7	9.47	8.85	2,150	3.8	-	-	-	-	-	-	-	-	-	-	-	1,333	-	-
31313	AV2	30 Aug 2010	Flowing	0.218	16.8	16.8	9.7	10	2,080	3.66	-	-	-	-	-	-	-	-	-	-	-	1,289.6	-	-
31313	AV2	07 Sep 2010	Flowing	0.301	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	21 Sep 2010	Flowing	0.212	14.4	14.4	7.1	7.1	1,898	3.91	-	-	-	-	-	-	-	-	-	-	-	1,176.76	-	-
31313	AV2	19 Oct 2010	Flowing	0.238	19.9	19.9	8.63	4.27	1,893	2.68	-	-	-	-	-	-	-	-	-	-	-	1,173.66	-	-
31313	AV2	01 Dec 2010	Flowing	0.176	19.1	19.1	2.3	0.8	1,998	2.77	-	-	-	-	-	-	-	-	-	-	-	1,238.76	-	-
31313	AV2	13 Dec 2010	Flowing	0.138	21.4	21.4	3.01	1	1,720	2.89	-	-	-	-	-	-	-	-	-	-	-	1,066.4	-	-
31313	AV2	11 Jan 2011	Flowing	0.121	21.2	21.2	8.4	0.8	2,190	3.8	-	-	-	-	-	-	-	-	-	-	-	1,357.8	-	-
31313	AV2	08 Feb 2011	Flowing	0.131	21.1	21.1	2.6	0.9	1,601	3.96	-	-	-	-	-	-	-	-	-	-	-	992.62	-	-
31313	AV2	21 Feb 2011	Flowing	0.124	17.9	17.9	1.6	1.1	1,655	3.75	-	-	-	-	-	-	-	-	-	-	-	1,026.1	-	-
31313	AV2	08 Mar 2011	Flowing	0.113	25	25	10.2	3.2	1,905	3.24	-	-	-	-	-	-	-	-	-	-	-	1,181.1	-	-
31313	AV2	04 Apr 2011	Flowing	0.119	16.3	16.3	7	6.8	1,912	3.1	-	-	-	-	-	-	-	-	-	-	-	1,185.44	-	-
31313	AV2	20 Apr 2011	Flowing	0.13	16.4	16.4	10.8	10.2	1,981	3.8	-	-	-	-	-	-	-	-	-	-	-	1,228.22	-	-
31313	AV2	05 May 2011	Flowing	0.122	12.4	12.4	2.9	1.7	2,080	3.26	-	-	-	-	-	-	-	-	-	-	-	1,289.6	-	-
31313	AV2	31 May 2011	Flowing	0.17	13.2	13.2	3.1	3.1	2,179	3.38	-	-	-	-	-	-	-	-	-	-	-	1,350.98	-	-
31313	AV2	15 Jun 2011	Flowing	0.16	14.2	14.2	5.1	5.1	2,250	3.92	-	-	-	-	-	-	-	-	-	-	-	1,395	-	-
31313	AV2	29 Jun 2011	Flowing	0.159	15.5	15.5	10.2	10.1	2,270	3.21	-	-	-	-	-	-	-	-	-	-	-	1,407.4	-	-
31313	AV2	26 Jul 2011	Flowing	0.26	13.7	13.7	8.2	8.2	1,869	3.54	-	-	-	-	-	-	-	-	-	-	-	1,158.78	-	-
31313	AV2	09 Aug 2011	Flowing	0.189	13.4	13.4	3.5	3.4	1,800	3.45	-	-	-	-	-	-	-	-	-	-	-	1,116	-	-
31313	AV2	23 Aug 2011	Flowing	0.198	20.2	20.2	3.63	3.6	1,863	3.45	-	-	-	-	-	-	-	-	-	-	-	1,155.06	-	-
31313	AV2	21 Sep 2011	Flowing	0.138	18.3	18.3	2	2	1,914	3.6	-	-	-	-	-	-	-	-	-	-	-	1,186.68	-	-
31313	AV2	04 Oct 2011	Flowing	0.174	24.9	24.9	2.9	2.9	1,990	3.69	-	-	-	-	-	-	-	-	-	-	-	1,233.8	-	-
31313	AV2	18 Oct 2011	Flowing	0.143	27.1	27.1	1.21	1.2	1,941	3.41	-	-	-	-	-	-	-	-	-	-	-	1,203.42	-	-
31313	AV2	15 Nov 2011	Flowing	0.121	30.8	30.8	1.19	1.19	1,932	3.67	-	-	-	-	-	-	-	-	-	-	-	1,197.84	-	-
31313	AV2	01 Dec 2011	Flowing	0.152	16.4	16.4	1.37	1.37	2,110	3.81	-	-	-	-	-	-	-	-	-	-	-	1,308.2	-	-
31313	AV2	14 Dec 2011	Flowing	0.118	22.9	22.9	0.9	1	2,210	4.11	-	-	-	-	-	-	-	-	-	-	-	1,370.2	-	-
31313	AV2	11 Jan 2012	Stagnant	-	11	11	0.96	0.96	2,400	6.15	-	-	-	-	-	-	-	-	-	-	-	1,488	-	Below Gauge
31313	AV2	08 Feb 2012	Dry	-	18 -	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Below Gauge
31313	AV2	14 Feb 2012	Dry	-	17 -	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Below Gauge
31313	AV2	21 Feb 2012	Dry	-	23 -	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Below Gauge
31313	AV2	07 Mar 2012	Dry	-	15.2 -	15.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Below Gauge
31313	AV2	04 Apr 2012	Dry	-	25.2 -	25.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	17 Apr 2012	Dry	-	17.6 -	17.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	24 Apr 2012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	02 May 2012	Dry	-	20.3 -	20.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	30 May 2012	Dry	-	15.1 -	15.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	12 Jun 2012	Flowing	0.2	15.7	15.7	9.78	9.78	3,100	3.64	-	-	-	-	-	-	-	-	-	-	-	1,922	-	-
31313	AV2	25 Jun 2012	Flowing	0.25	13.5	13.5	5.79	5.8	3,060	3.41	-	-	-	-	-	-	-	-	-	-	-	1,897.2	-	-
31313	AV2	23 Jul 2012	Flowing	0.24	11.3	11.3	6.7	6.7	2,560	3.65	-	-	-	-	-	-	-	-	-	-	-	1,587.2	-	-
31313	AV2	07 Aug 2012	Flowing	0.235	13.1	13.1	6.4	6.4	2,420	3.54	-	-	-	-	-	-	-	-	-	-	-	1,500.4	-	-
31313	AV2	20 Aug 2012	Flowing	0.229	7.4	7.4	6.52	5.34	2,360	3.53	-	-	-	-	-	-	-	-	-	-	-	1,463.2	-	-
31313	AV2	18 Sep 2012	Flowing	0.197	10.3	10.3	6.7	6.7	2,310	3.74	-	-	-	-	-	-	-	-	-	-	-	1,432.2	-	-
31313	AV2	16 Oct 2012	Flowing	0.188	11.1	11.1	4.7	4.7	2,320	3.39	-	-	-	-	-	-	-	-	-	-	-	1,438.4	-	-
31313	AV2	12 Nov 2012	Flowing	0.146	22.7	22.7	2.89	2.89	2,490	3.52	-	-	-	-	-	-	-	-	-	-	-	1,543.8	-	-
31313	AV2	11 Dec 2012	Stagnant	0.048	16.1	16.1	1.09	1.09	2,480	3.52	-	-	-	-	-	-	-	-	-	-	-	1,537.6	-	-
31313	AV2	08 Jan 2013	Stagnant	-	17.4	17.4	0.86	0.86	2,800	4.5	-	-	-	-	-	-	-	-	-	-	-	1,736	-	Below Gauge
31313	AV2	04 Feb 2013	Dry	-	24.2 -	24.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	05 Mar 2013	Dry	-	10.2 -	10.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	03 Apr 2013	Dry	-	11.7 -	11.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	30 Apr 2013	Dry	-	22.89 -	22.89	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	27 May 2013	Dry	-	14.8 -	14.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	25 Jun 2013	Dry	-	8.2 -	8.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	23 Jul 2013	Flowing	0.221	13.8	13.8	2.2	2.2	5,300	3.3	-	-	-	-	-	-	-	-	-	-	-	3,286	-	-
31313	AV2	20 Aug 2013	Flowing	0.384	13.8	13.8	4.9	4.9	3,590	3.03	-	-	-	-	-	-	-	-	-	-	-	2,225.8	-	-
31313	AV2	16 Sep 2013	Flowing	0.24	15.2	15.2	6.3	6.3	3,050	3.05	-	-	-	-	-	-	-	-	-	-	-	1,891	-	-
31313	AV2	14 Oct 2013	Flowing	0.24	14.3	14.3	4.5	4.5	3,270	3.06	-	-	-	-	-	-	-	-	-	-	-	2,027.4	-	-
31313	AV2	13 Nov 2013	Flowing	0.241	14.1	14.1	4.2	4.2	2,890	3.1	-	-	-	-	-	-	-	-	-	-	-	1,791.8	-	-
31313	AV2	06 Dec 2013	Flowing	0.18	15.7	15.7	7.6	7.6	3,040	3.25	-	-	-	-	-	-	-	-	-	-	-	1,884.8	-	-
31313	AV2	10 Jan 2014	Flowing	0.148	21	21	6.3	6.3	3,520	3.23	-	-	-	-	-	-	-	-	-	-	-	2,182.4	-	-

			Field								Inorganics													Sample Preparation
			Field Observations	Depth to Water	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO - Bottom of Water	Electrical Conductivity (field)	pH (Field)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)	Alkalinity (total) as CaCO3	Calcium	Chloride	Electrical Conductivity (lab)	Magnesium	pH (Lab)	Potassium	Sodium	Sulphate	Total Dissolved Solids (Calc.)	Total Dissolved Solids (lab)	Test - Comment 1
			Pool Condition	m	oC	oC	mg/L	mg/L	µS/cm	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	General Comment
EQL											2	2	2	0.5	0.5	1	0.5	0.1	0.5	0.5	0.5		1	
Site ID	Location Code	Date																						
31313	AV2	06 Feb 2014	Flowing	-	35.5	35.5	1.75	1.75	3,999	3.09	-	-	-	-	-	-	-	-	-	-	-	2,479.38	-	Below Gauge
31313	AV2	07 Mar 2014	Flowing	-	18.1	18.1	0.97	0.97	3,980	3.66	-	-	-	-	-	-	-	-	-	-	-	2,467.6	-	Below Gauge
31313	AV2	01 Apr 2014	Dry	-	13.1 -	13.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	29 Apr 2014	Dry	-	15.2 -	15.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	20 May 2014	Dry	-	18.9 -	18.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	26 Jun 2014	Dry	-	10.5 -	10.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	23 Jul 2014	Flowing	0.192	8.9	8.9	2.3	2.3	5,110	2.9	-	-	-	-	-	-	-	-	-	-	-	3,168.2	-	-
31313	AV2	18 Aug 2014	Flowing	0.203	9	9	6.3	6.3	4,539	2.82	-	-	-	-	-	-	-	-	-	-	-	2,814.18	-	-
31313	AV2	17 Sep 2014	Flowing	0.188	13.2	13.2	7.65	7.6	4,370	3.02	-	-	-	-	-	-	-	-	-	-	-	2,709.4	-	-
31313	AV2	13 Oct 2014	Flowing	0.153	13.9	13.9	6.3	6.3	4,500	3	-	-	-	-	-	-	-	-	-	-	-	2,790	-	-
31313	AV2	10 Nov 2014	Stagnant	0.067	16.1	16.1	2.6	2.6	4,710	3	-	-	-	-	-	-	-	-	-	-	-	2,920.2	-	-
31313	AV2	08 Dec 2014	Stagnant	-	24.9	24.9	0.3	0.3	4,830	2.9	-	-	-	-	-	-	-	-	-	-	-	2,994.6	-	Below Gauge
31313	AV2	07 Jan 2015	Dry	-	29.2 -	29.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	05 Feb 2015	Dry	-	16.2 -	16.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	04 Mar 2015	Dry	-	18.2 -	18.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	30 Mar 2015	Dry	-	16.8 -	16.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	27 Apr 2015	Dry	-	13.7 -	13.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	20 May 2015	Dry	-	11.1 -	11.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	16 Jun 2015	Dry	-	13.2 -	13.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	21 Jul 2015	Dry	-	11 -	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	17 Aug 2015	Flowing	0.2	11.3	11.3	5.6	5.6	6,580	4.81	-	-	-	-	-	-	-	-	-	-	-	4,079.6	-	-
31313	AV2	22 Sep 2015	Flowing	0.183	8.8	8.8	6.1	6.1	5,800	3.4	-	-	-	-	-	-	-	-	-	-	-	3,596	-	-
31313	AV2	19 Oct 2015	Flowing	0.151	12.6	12.6	8.9	8.9	6,277	2.7	-	-	-	-	-	-	-	-	-	-	-	3,891.74	-	-
31313	AV2	16 Nov 2015	Stagnant	0.111	18	18	5.2	5.2	6,260	3	-	-	-	-	-	-	-	-	-	-	-	3,881.2	-	-
31313	AV2	07 Dec 2015	Stagnant	-	18.9	18.9	4.7	4.7	6,320	2.89	-	-	-	-	-	-	-	-	-	-	-	3,918.4	-	Below Gauge
31313	AV2	18 Jan 2016	Dry	-	32.1 -	32.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	15 Feb 2016	Dry	-	9.9 -	9.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	15 Mar 2016	Dry	-	20.1 -	20.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	13 Apr 2016	Dry	-	16.9 -	16.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	16 May 2016	Dry	-	20.1 -	20.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	20 Jun 2016	Dry	-	14.7 -	14.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	18 Jul 2016	Dry	-	11.9 -	11.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	17 Aug 2016	Flowing	0.174	14.4	14.4	5	5	7,020	2.71	-	-	-	-	-	-	-	-	-	-	-	4,352.4	-	-
31313	AV2	19 Sep 2016	Flowing	0.395	13	13	5.3	5.3	2,830	2.7	-	-	-	-	-	-	-	-	-	-	-	1,754.6	-	-
31313	AV2	17 Oct 2016	Flowing	0.244	13.5	13.5	8.21	8.21	3,350	2.8	-	-	-	-	-	-	-	-	-	-	-	2,077	-	-
31313	AV2	14 Nov 2016	Flowing	0.17	15.3	15.3	2.1	2.1	3,259	2.8	-	-	-	-	-	-	-	-	-	-	-	2,020.58	-	-
31313	AV2	06 Dec 2016	Flowing	0.121	18	18	1.9	1.9	3,580	2.9	-	-	-	-	-	-	-	-	-	-	-	2,219.6	-	-
31313	AV2	19 Jan 2017	Stagnant	-	19.8	19.8	1.4	1.2	3,981	2.91	-	-	-	-	-	-	-	-	-	-	-	2,468.22	-	Below Gauge
31313	AV2	15 Feb 2017	Stagnant	-	13.9	13.9	1.2	1.2	4,930	3.01	-	-	-	-	-	-	-	-	-	-	-	3,056.6	-	Below Gauge
31313	AV2	20 Mar 2017	Dry	-	13.7 -	13.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	18 Apr 2017	Flowing	0.106	18.2	18.2	8.45	8.45	3,980	3.21	-	-	-	-	-	-	-	-	-	-	-	2,467.6	-	-
31313	AV2	15 May 2017	Flowing	0.167	8.9	8.9	4.42	4.42	3,590	2.94	-	-	-	-	-	-	-	-	-	-	-	2,225.8	-	-
31313	AV2	20 Jun 2017	Flowing	0.124	11.8	11.8	5.1	5	3,457	2.95	-	-	-	-	-	-	-	-	-	-	-	2,143.34	-	-
31313	AV2	25 Jul 2017	Flowing	0.131	11.1	11.1	6.01	6.01	3,690	3.12	-	-	-	-	-	-	-	-	-	-	-	2,287.8	-	-
31313	AV2	21 Aug 2017	Flowing	0.14	8.7	8.7	4.09	4.09	3,560	2.5	-	-	-	-	-	-	-	-	-	-	-	2,207.2	-	-
31313	AV2	18 Sep 2017	Flowing	0.254	16.3	16.3	7.91	7.91	2,740	3.16	-	-	-	-	-	-	-	-	-	-	-	1,698.8	-	-
31313	AV2	18 Oct 2017	Flowing	0.096	26.2	26.2	6.91	6.91	2,860	3.61	-	-	-	-	-	-	-	-	-	-	-	1,773.2	-	-
31313	AV2	21 Nov 2017	Flowing	0.05	25.9	25.9	6.12	6.12	3,110	2.96	-	-	-	-	-	-	-	-	-	-	-	1,928.2	-	-
31313	AV2	06 Dec 2017	Flowing	0.038	23.2	23.2	4.41	4.27	3,120	2.96	-	-	-	-	-	-	-	-	-	-	-	1,934.4	-	-
31313	AV2	10 Jan 2018	Flowing	-	19.5	19.5	4.5	4.5	3,670	3.67	-	-	-	-	-	-	-	-	-	-	-	2,275.4	-	Below Gauge
31313	AV2	06 Feb 2018	Dry	-	13.7 -	13.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	08 Mar 2018	Dry	-	13.7 -	13.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	12 Apr 2018	Dry	-	22.4 -	22.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	15 May 2018	Dry	-	16.2 -	16.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	22 Jun 2018	Dry	-	7.4 -	7.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	19 Jul 2018	Dry	-	7.4 -	7.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	14 Aug 2018	Dry	-	11 -	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	24 Sep 2018	Flowing	0.112	11.8	11.8	9.1	9.1	5,546	2.7	-	-	-	-	-	-	-	-	-	-	-	3,438.52	-	-
31313	AV2	17 Oct 2018	Flowing	0.075	15	15	6.3	6.3	5,210	2.6	-	-	-	-	-	-	-	-	-	-	-	3,230.2	-	-
31313	AV2	07 Nov 2018	Flowing	0.025	12	12	7.3	7.3	4,688	2.6	-	-	-	-	-	-	-	-	-	-	-	2,906.56	-	-
31313	AV2	12 Dec 2018	Stagnant	-	22	22	1.5	1.5	6,140	2.7	-	-	-	-	-	-	-	-	-	-	-	3,806.8	-	Below Gauge
31313	AV2	14 Jan 2019	Stagnant	-	20.3	20.3	7.7	7.7	5,730	3	-	-	-	-	-	-	-	-	-	-	-	3,552.6	-	Below Gauge
31313	AV2	18 Jan 2019	Stagnant	-	22	22	0.3	0.3	6,664	2.7	-	-	-	-	-	-	-	-	-	-	-	4,131.68	-	Below Gauge
31313	AV2	12 Feb 2019	Dry	-	9.9 -	9.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table A2 - Surface Water Analytical Results

			Field								Inorganics													Sample Preparation
			Field Observations	Depth to Water	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO - Bottom of Water	Electrical Conductivity (field)	pH (Field)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)	Alkalinity (total) as CaCO3	Calcium	Chloride	Electrical Conductivity (lab)	Magnesium	pH (Lab)	Potassium	Sodium	Sulphate	Total Dissolved Solids (Calc.)	Total Dissolved Solids (lab)	Test - Comment 1
			Pool Condition	m	oC	oC	mg/L	mg/L	µS/cm	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	General Comment
EQL											2	2	2	0.5	0.5	1	0.5	0.1	0.5	0.5	0.5		1	
Site ID	Location Code	Date																						
31313	AV2	13 Mar 2019	Dry	-	13 -	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	08 Apr 2019	Dry	-	13 -	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	24 May 2019	Dry	-	14 -	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	18 Jun 2019	Flowing	-	11.5	11.5	1.9	1.9	5,790	3.2	-	-	-	-	-	-	-	-	-	-	-	3,589.8	-	Below Gauge
31313	AV2	29 Jul 2019	Flowing	0.117	12.5	12.5	6	6	6,266	2.9	-	-	-	-	-	-	-	-	-	-	-	3,884.92	-	-
31313	AV2	01 Aug 2019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	16 Sep 2019	Flowing	0.142	11	11	7.2	7.2	4,960	2.6	-	-	-	-	-	-	-	-	-	-	-	4,970	-	-
31313	AV2	15 Oct 2019	Flowing	0.089	19.6	19.6	5.5	5.5	4,880	2.7	-	-	-	-	-	-	-	-	-	-	-	3,025.6	-	-
31313	AV2	13 Nov 2019	Flowing	0.078	13.8	13.8	7.5	7.5	4,910	2.6	-	-	-	-	-	-	-	-	-	-	-	3,044.2	-	-
31313	AV2	13 Dec 2019	Flowing	0.028	16.2	16.2	8.8	8.8	5,210	2.9	-	-	-	-	-	-	-	-	-	-	-	3,230.2	-	-
31313	AV2	10 Feb 2020	Stagnant	-	23.1	23.1	7.22	7.22	5,430	2.69	2	2	2	80	1,100	5,600	110	2.7	10	510	1,700	3,366.6	4,200	Below Gauge
31313	AV2	18 Mar 2020	Stagnant	-	19.1	19.1	5.78	5.78	5,400	2.84	-	-	-	-	-	-	-	-	-	-	-	3,348	-	Below Gauge
31313	AV2	14 Apr 2020	Flowing	0.038	14.7	14.7	8.09	8.09	5,310	2.81	-	-	-	-	-	-	-	-	-	-	-	3,292.2	-	-
31313	AV2	14 May 2020	Flowing	0.04	8	8	7	7	5,420	2.7	-	-	-	-	-	-	-	-	-	-	-	3,360.4	-	-
31313	AV2	10 Jun 2020	Flowing	0.061	11.4	11.4	8.7	8.7	5,440	2.7	-	-	-	-	-	-	-	-	-	-	-	3,372.8	-	-
31313	AV2	13 Jul 2020	Flowing	0.088	9.3	9.3	5.45	5.45	5,160	2.8	<2	<2	<2	83	950	5,100	110	2.7	9.8	470	1,500	3,199.2	2,700	-
31313	AV2	11 Aug 2020	Flowing	0.092	9.1	9.1	6.49	6.49	5,210	2.8	-	-	-	-	-	-	-	-	-	-	-	3,230.2	-	-
31313	AV2	07 Sep 2020	Flowing	0.119	22	22	7.87	7.87	4,660	2.75	-	-	-	-	-	-	-	-	-	-	-	2,889.2	-	-
31313	AV2	15 Oct 2020	Flowing	0.176	17.7	17.7	7.14	7.14	4,400	2.9	-	-	-	-	-	-	-	-	-	-	-	2,728	-	-
31313	AV2	11 Nov 2020	Flowing	0.127	20.3	20.3	6.79	6.79	4,180	2.97	-	-	-	-	-	-	-	-	-	-	-	2,591.6	-	-
31313	AV2	10 Dec 2020	Flowing	0.05	18.3	18.3	7.17	7.17	4,240	3.75	-	-	-	-	-	-	-	-	-	-	-	2,628.8	-	-
31313	AV2	12 Jan 2021	Flowing	0.052	20.6	20.6	6.44	6.44	4,360	3.18	-	-	-	-	-	-	-	-	-	-	-	2,703.2	-	-
31313	AV2	08 Feb 2021	Flowing	0.027	20.9	20.9	6.49	6.49	4,350	3.01	<2	<2	<2	59	870	4,400	83	2.8	9	420	960	2,697	2,700	-
31313	AV2	09 Mar 2021	Flowing	-	15.4	15.4	5.18	5.18	4,630	2.9	-	-	-	-	-	-	-	-	-	-	-	2,870.6	-	Below Gauge
31313	AV2	15 Apr 2021	Stagnant	-	18.1	18.1	8.25	8.25	4,700	3.18	-	-	-	-	-	-	-	-	-	-	-	2,914	-	Below Gauge
31313	AV2	10 May 2021	Stagnant	-	14	14	9.49	9.49	4,030	3.7	-	-	-	-	-	-	-	-	-	-	-	2,498.6	-	Below Gauge
31313	AV2	04 Jun 2021	Flowing	-	10.1	10.1	8.12	8.12	4,930	2.76	-	-	-	-	-	-	-	-	-	-	-	3,056.6	-	Below Gauge
31313	AV2	13 Jul 2021	Flowing	0.11	12.9	12.9	7.4	7.4	4,290	2.99	-	-	-	-	-	-	-	-	-	-	-	2,659.8	-	-
31313	AV2	11 Aug 2021	Flowing	0.141	10.2	10.2	8.3	8.3	3,970	2.8	-	-	-	-	-	-	-	-	-	-	-	2,461.4	-	-
31313	AV2	09 Sep 2021	Flowing	0.1	17	17	7.22	7.22	3,920	2.9	-	-	-	-	-	-	-	-	-	-	-	2,430.4	-	-
31313	AV2	11 Oct 2021	Flowing	0.078	12.7	12.7	6.64	6.64	3,890	2.67	-	-	-	-	-	-	-	-	-	-	-	2,411.8	-	-
31313	AV2	03 Nov 2021	Flowing	0.121	20.8	20.8	5.48	5.48	3,640	2.7	-	-	-	-	-	-	-	-	-	-	-	2,256.8	-	-
31313	AV2	02 Dec 2021	Flowing	0.104	20.6	20.6	4.65	4.65	3,180	2.86	-	-	-	-	-	-	-	-	-	-	-	1,971.6	-	-
31313	AV2	06 Jan 2022	Flowing	0.008	24.1	24.1	5.75	5.75	3,290	2.83	-	-	-	-	-	-	-	-	-	-	-	2,039.8	-	-
31313	AV2	08 Feb 2022	Flowing	0.077	27	27	3.74	3.74	3,470	2.73	-	-	-	-	-	-	-	-	-	-	-	2,151.4	-	-
31313	AV2	09 Mar 2022	Flowing	0.03	15.3	15.3	4.06	4.06	3,610	3.05	-	-	-	-	-	-	-	-	-	-	-	2,238.2	-	-
31313	AV2	26 Apr 2022	Flowing	0.006	17	17	8.4	8.4	3,650	3.65	-	-	-	-	-	-	-	-	-	-	-	2,263	-	-
31313	AV2	12 May 2022	Flowing	0.011	13.5	13.5	8.95	8.95	3,720	2.91	-	-	-	-	-	-	-	-	-	-	-	2,306.4	-	-
31313	AV2	09 Jun 2022	Flowing	0.033	8	8	11.2	11.2	3,840	3	-	-	-	-	-	-	-	-	-	-	-	2,380.8	-	-
31313	AV2	07 Jul 2022	Flowing	0.063	12.2	12.2	10.1	10.1	3,860	2.87	2	2	2	43	1,600	3,600	75	2.8	9.7	380	1,200	2,393.2	2,100	-
31313	AV2	02 Aug 2022	-	-	-	-	-	-	-	-	2	2	2	39	710	3,500	66	2.8	11	390	510	-	2,100	-
31313	AV2	03 Aug 2022	Flowing	0.081	11.3	11.3	10.71	10.71	3,700	3.15	-	-	-	-	-	-	-	-	-	-	-	2,294	-	-
31313	AV2	15 Sep 2022	Flowing	0.118	14.8	14.8	10.11	10.11	1,696	3.24	-	-	-	-	-	-	-	-	-	-	-	1,051.52	-	-
31313	AV2	21 Oct 2022	Flowing	0.24	20.8	20.8	9.75	9.75	1,809	3.11	-	-	-	-	-	-	-	-	-	-	-	1,121.58	-	-
31313	AV2	16 Nov 2022	Flowing	0.685	12.8	12.8	8.94	8.94	1,614	3.24	-	-	-	-	-	-	-	-	-	-	-	1,000.68	-	-
31313	AV2	05 Dec 2022	Flowing	0.142	17.5	17.5	5.55	5.55	1,145	3.38	-	-	-	-	-	-	-	-	-	-	-	709.9	-	-
31313	AV2	10 Jan 2023	Flowing	-	23.4	23.4	5.47	5.47	1,480	3.33	-	-	-	-	-	-	-	-	-	-	-	917.6	-	Below Gauge
31313	AV2	06 Feb 2023	Stagnant	-	16.2	16.2	7.87	7.87	1,738	3.28	-	-	-	-	-	-	-	-	-	-	-	1,077.56	-	Below Gauge
31313	AV2	09 Mar 2023	Dry	-	15.5 -	15.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	11 Apr 2023	Dry	-	17 -	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	08 May 2023	Dry	-	12.9 -	12.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	02 Jun 2023	-	-	-	-	-	-	-	-	<2	<2	<2	15	340	1,700	22	3	15	160	210	-	780	-
31313	AV2	19 Jun 2023	Dry	-	8.2 -	8.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV2	10 Jul 2023	Flowing	0.057	14.2	14.2	8.92	8.92	2,780	3.16	-	-	-	-	-	-	-	-	-	-	-	1,723.6	-	-
31313	AV2	07 Aug 2023	Flowing	0.04	13.2	13.2	10.91	10.91	2,810	3.06	-	-	-	-	-	-	-	-	-	-	-	1,742.2	-	-
31313	AV2	07 Sep 2023	Flowing	0.04	13.4	13.4	10.71	10.71	2,870	3.25	-	-	-	-	-	-	-	-	-	-	-	1,779.4	-	-
31313	AV2	07 Oct 2023	-	-	-	-	-	-	-	-	<2	<2	<2	26	530	2,600	43	2.9	8	270	430	-	1,300	-

Table A2 - Surface Water Analytical Results

			Field								Inorganics													
			Field Observations	Depth to Water	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)	Alkalinity (total) as CaCO3	Calcium	Chloride	Electrical Conductivity (Lab)	Magnesium	pH (Lab)	Potassium	Sodium	Sulphate	Total Dissolved Solids (Calc.)	Total Dissolved Solids (Lab)
			Pool Condition	m	oC	oC	mg/L	mg/L	µS/cm	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL											2	2	2	0.5	0.5	1	0.5	0.1	0.5	0.5	0.5		1
Site ID	**Location Code**	**Date**																						
31313	AV3	26 Jul 2011	Dry	-	-	6.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	09 Aug 2011	Dry	-	-	8.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	23 Aug 2011	Dry	-	-	2.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	06 Sep 2011	Dry	-	-	15.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	21 Sep 2011	Dry	-	-	12.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	04 Oct 2011	Dry	-	-	13.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	18 Oct 2011	Dry	-	-	18.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	02 Nov 2011	Dry	-	-	12.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	15 Nov 2011	Dry	-	-	11.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	01 Dec 2011	Dry	-	-	13.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	13 Dec 2011	Dry	-	-	16.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	10 Jan 2012	Dry	-	-	14.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	24 Jan 2012	Dry	-	-	34.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	07 Feb 2012	Dry	-	-	15.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	14 Feb 2012	Dry	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	21 Feb 2012	Dry	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	06 Mar 2012	Dry	-	-	14.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	20 Mar 2012	Dry	-	-	15.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	03 Apr 2012	Dry	-	-	16.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	17 Apr 2012	Dry	-	-	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	27 Apr 2012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	01 May 2012	Dry	-	-	16.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	15 May 2012	Dry	-	-	12.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	29 May 2012	Dry	-	-	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	05 Jun 2012	Flowing	0.395	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	12 Jun 2012	Flowing	0.111	7.7	5.2	11.41	-	1,086	3.14	-	-	-	-	-	-	-	-	-	-	-	673.32	-
31313	AV3	15 Jun 2012	-	0.096	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	26 Jun 2012	Flowing	0.138	9.7	6.2	10.3	-	1,073	4.7	-	-	-	-	-	-	-	-	-	-	-	665.26	-
31313	AV3	11 Jul 2012	Flowing	0.137	9.2	10.6	9.3	-	1,126	4.35	-	-	-	-	-	-	-	-	-	-	-	698.12	-
31313	AV3	24 Jul 2012	Flowing	0.116	9	9.7	8.2	-	1,134	4.53	-	-	-	-	-	-	-	-	-	-	-	703.08	-
31313	AV3	07 Aug 2012	Flowing	0.119	9.1	7.5	6.8	-	1,037	4.9	-	-	-	-	-	-	-	-	-	-	-	642.94	-
31313	AV3	21 Aug 2012	Flowing	0.161	9.1	10.9	8.5	-	884	4.01	-	-	-	-	-	-	-	-	-	-	-	548.08	-
31313	AV3	04 Sep 2012	Flowing	0.132	9.8	11.3	6.9	-	997	3.27	-	-	-	-	-	-	-	-	-	-	-	618.14	-
31313	AV3	18 Sep 2012	Flowing	0.114	11.9	10.3	9.2	-	1,367	4.85	-	-	-	-	-	-	-	-	-	-	-	847.54	-
31313	AV3	02 Oct 2012	Flowing	0.112	15.9	16.2	8.2	-	933	4.38	-	-	-	-	-	-	-	-	-	-	-	578.46	-
31313	AV3	16 Oct 2012	Flowing	0.118	13.5	13.1	5.7	-	967	4.71	-	-	-	-	-	-	-	-	-	-	-	599.54	-
31313	AV3	30 Oct 2012	Stagant	0.035	12.6	17.7	2.6	-	1,151	4.41	-	-	-	-	-	-	-	-	-	-	-	713.62	-
31313	AV3	13 Nov 2012	Dry	-	-	9.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	27 Nov 2012	Dry	-	-	15.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	11 Dec 2012	Dry	-	-	17.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	20 Dec 2012	Dry	-	-	20.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	08 Jan 2013	Dry	-	-	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	22 Jan 2013	Dry	-	-	16.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	04 Feb 2013	Dry	-	-	20.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	19 Feb 2013	Dry	-	-	19.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	05 Mar 2013	Dry	-	-	16.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	03 Apr 2013	Dry	-	-	15.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	16 Apr 2013	Dry	-	-	14.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	29 Apr 2013	Dry	-	-	18.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	01 May 2013	Dry	-	-	13.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	14 May 2013	Dry	-	-	10.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	27 May 2013	Dry	-	-	16.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	11 Jun 2013	Dry	-	-	13.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	24 Jun 2013	Dry	-	-	6.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	09 Jul 2013	Dry	-	-	4.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	22 Jul 2013	Flowing	0.151	8.5	7.8	8.2	-	916	4.4	-	-	-	-	-	-	-	-	-	-	-	567.92	-
31313	AV3	06 Aug 2013	Flowing	0.231	10	9.5	7.8	-	793	4.5	-	-	-	-	-	-	-	-	-	-	-	491.66	-
31313	AV3	19 Aug 2013	Flowing	0.14	8.9	9.2	7.8	-	764	5.76	-	-	-	-	-	-	-	-	-	-	-	473.68	-
31313	AV3	03 Sep 2013	Flowing	0.119	12.1	13.9	7.79	-	743	5.28	-	-	-	-	-	-	-	-	-	-	-	460.66	-
31313	AV3	16 Sep 2013	Flowing	0.101	13.6	15.5	8.7	-	758	4.98	-	-	-	-	-	-	-	-	-	-	-	469.96	-
31313	AV3	01 Oct 2013	Flowing	0.12	16.2	17	4.8	-	760	4.23	-	-	-	-	-	-	-	-	-	-	-	471.2	-
31313	AV3	14 Oct 2013	Flowing	0.105	14.4	14	8.8	-	787	4.98	-	-	-	-	-	-	-	-	-	-	-	487.94	-
31313	AV3	15 Oct 2013	-	0.104	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	29 Oct 2013	Flowing	0.128	14.9	16.5	9.1	-	758	4.36	-	-	-	-	-	-	-	-	-	-	-	469.96	-
31313	AV3	13 Nov 2013	Flowing	0.105	14.7	14.9	7.1	-	743	5.4	-	-	-	-	-	-	-	-	-	-	-	460.66	-

Table A2 - Surface Water Analytical Results

			Field								Inorganics													
			Field Observations	Depth to Water	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)	Alkalinity (total) as CaCO3	Calcium	Chloride	Electrical Conductivity (Lab)	Magnesium	pH (Lab)	Potassium	Sodium	Sulphate	Total Dissolved Solids (Calc.)	Total Dissolved Solids (Lab)
			Pool Condition	m	oC	oC	mg/L	mg/L	µS/cm	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL											2	2	2	0.5	0.5	1	0.5	0.1	0.5	0.5	0.5		1
Site ID	**Location Code**	**Date**																						
31313	AV3	26 Nov 2013	Flowing	0.103	14.2	16.7	7.25	-	836	4.16	-	-	-	-	-	-	-	-	-	-	-	518.32	-
31313	AV3	06 Dec 2013	Dry	-	-	16.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	09 Jan 2014	Dry	-	-	15.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	21 Jan 2014	Dry	-	-	16.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	06 Feb 2014	Dry	-	-	16.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	17 Feb 2014	Dry	-	-	17.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	07 Mar 2014	Dry	-	-	10.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	18 Mar 2014	Dry	-	-	13.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	01 Apr 2014	Dry	-	-	16.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	15 Apr 2014	Dry	-	-	15.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	12 May 2014	Dry	-	-	15.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	20 May 2014	Dry	-	-	15.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	10 Jun 2014	Dry	-	-	8.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	26 Jun 2014	Dry	-	-	10.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	08 Jul 2014	Dry	-	-	10.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	23 Jul 2014	Dry	-	-	10.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	06 Aug 2014	Dry	-	-	9.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	18 Aug 2014	Dry	-	-	8.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	04 Sep 2014	Dry	-	-	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	17 Sep 2014	Dry	-	-	13.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	30 Sep 2014	Dry	-	-	11.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	13 Oct 2014	Dry	-	-	13.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	29 Oct 2014	Dry	-	-	14.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	10 Nov 2014	Dry	-	-	19.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	01 Dec 2014	Dry	-	-	19.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	08 Dec 2014	Dry	-	-	19.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	07 Jan 2015	Dry	-	-	32.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	20 Jan 2015	Dry	-	-	17.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	04 Feb 2015	Dry	-	-	17.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	17 Feb 2015	Dry	-	-	16.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	24 Feb 2015	Dry	-	-	7.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	30 Mar 2015	Dry	-	-	10.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	27 Apr 2015	Dry	-	-	11.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	20 May 2015	Dry	-	-	11.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	16 Jun 2015	Stagant	0.08	11.4	13.2	5.29	-	70	6.6	-	-	-	-	-	-	-	-	-	-	-	43.4	-
31313	AV3	20 Jul 2015	Dry	-	-	8.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	17 Aug 2015	Dry	-	-	10.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	21 Sep 2015	Dry	-	-	11.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	19 Oct 2015	Dry	-	-	16.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	16 Nov 2015	Dry	-	-	18.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	07 Dec 2015	Dry	-	-	18.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	18 Jan 2016	Dry	-	-	33.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	15 Feb 2016	Dry	-	-	15.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	15 Mar 2016	Dry	-	-	15.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	13 Apr 2016	Dry	-	-	13.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	16 May 2016	Dry	-	-	8.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	20 Jun 2016	Dry	-	-	11.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	18 Jul 2016	Dry	-	-	12.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	17 Aug 2016	Dry	-	-	15.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	19 Sep 2016	Flowing	0.178	12.3	17.4	9.89	-	962	4.04	-	-	-	-	-	-	-	-	-	-	-	596.44	-
31313	AV3	17 Oct 2016	Flowing	0.13	15	13.3	7.42	-	1,028	4.08	-	-	-	-	-	-	-	-	-	-	-	637.36	-
31313	AV3	14 Nov 2016	Trickle	0.118	14.16	16.4	9.26	-	904	4.03	-	-	-	-	-	-	-	-	-	-	-	560.48	-
31313	AV3	06 Dec 2016	Dry	-	-	18.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	18 Jan 2017	Dry	-	-	23.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	14 Feb 2017	Dry	-	-	16.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	20 Mar 2017	Dry	-	-	18.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	18 Apr 2017	Dry	-	-	18.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	15 May 2017	Flowing	0.072	11.1	13.2	7.03	-	818	4.34	-	-	-	-	-	-	-	-	-	-	-	507.16	-
31313	AV3	20 Jun 2017	Dry	-	-	17.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	25 Jul 2017	Dry	-	-	16.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	21 Aug 2017	Flowing	0.156	7.5	8.2	9.31	-	1,000	3.7	-	-	-	-	-	-	-	-	-	-	-	620	-
31313	AV3	19 Sep 2017	Flowing	0.162	9.6	9.9	10.53	-	650	4.72	-	-	-	-	-	-	-	-	-	-	-	403	-
31313	AV3	17 Oct 2017	Flowing	0.073	20.3	26.3	4.62	-	793	4.82	-	-	-	-	-	-	-	-	-	-	-	491.66	-
31313	AV3	20 Nov 2017	Dry	-	-	16.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	06 Dec 2017	Dry	-	-	25.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table A2 - Surface Water Analytical Results

			Field								Inorganics													
			Field Observations	Depth to Water	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)	Alkalinity (total) as CaCO3	Calcium	Chloride	Electrical Conductivity (Lab)	Magnesium	pH (Lab)	Potassium	Sodium	Sulphate	Total Dissolved Solids (Calc.)	Total Dissolved Solids (Lab)
			Pool Condition	m	oC	oC	mg/L	mg/L	µS/cm	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL											2	2	2	0.5	0.5	1	0.5	0.1	0.5	0.5	0.5		1
Site ID	**Location Code**	**Date**																						
31313	AV3	11 Jan 2018	Dry	-	-	24.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	05 Feb 2018	Dry	-	-	26.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	08 Mar 2018	Dry	-	-	15.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	11 Apr 2018	Dry	-	-	15.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	14 May 2018	Dry	-	-	11.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	22 Jun 2018	Dry	-	-	16.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	18 Jul 2018	Dry	-	-	8.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	13 Aug 2018	Dry	-	-	7.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	24 Sep 2018	Dry	-	-	13.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	17 Oct 2018	Dry	-	-	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	07 Nov 2018	Dry	-	-	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	12 Dec 2018	Dry	-	-	31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	18 Jan 2019	Dry	-	-	32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	12 Feb 2019	Dry	-	-	11.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	13 Mar 2019	Dry	-	-	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	09 Apr 2019	Dry	-	-	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	24 May 2019	Dry	-	-	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	18 Jun 2019	Flowing	0.132	9.5	11	8.9	-	982	4	-	-	-	-	-	-	-	-	-	-	-	608.84	-
31313	AV3	29 Jul 2019	Flowing	0.137	9.2	15	9.6	-	804	4.1	-	-	-	-	-	-	-	-	-	-	-	498.48	-
31313	AV3	16 Sep 2019	Trickle	0.11	12.5	11	9.51	-	812	4.1	-	-	-	-	-	-	-	-	-	-	-	809	-
31313	AV3	15 Oct 2019	Dry	-	-	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	13 Nov 2019	Dry	-	-	15.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	12 Dec 2019	Dry	-	-	16.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	13 Jan 2020	Dry	-	-	23.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	10 Feb 2020	Dry	-	-	18.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	17 Mar 2020	Dry	-	-	18.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	14 Apr 2020	Dry	-	-	16.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	13 May 2020	Dry	-	-	8.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	12 Jun 2020	Dry	-	-	5.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	13 Jul 2020	Dry	-	-	11.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	11 Aug 2020	Dry	-	-	12.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	07 Sep 2020	Dry	-	-	24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	13 Oct 2020	Flowing	0.138	14.2	15	8.76	-	837	5.4	-	-	-	-	-	-	-	-	-	-	-	518.94	-
31313	AV3	10 Nov 2020	Dry	-	-	28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	09 Dec 2020	Dry	-	-	18.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	11 Jan 2021	Trickle	0.107	19.8	32.5	6.88	-	916	5.3	-	-	-	-	-	-	-	-	-	-	-	567.92	-
31313	AV3	09 Feb 2021	Dry	-	-	18.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	09 Mar 2021	Dry	-	-	14.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	14 Apr 2021	Dry	-	-	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	10 May 2021	Dry	-	-	12.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	03 Jun 2021	Dry	-	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	12 Jul 2021	Stagant	0.103	7	6.4	9.51	-	1,003	4.35	<2	<2	<2	6.4	250	-	23	4.1	5	130	78	621.86	560
31313	AV3	09 Aug 2021	Flowing	0.12	7	6.5	10.53	-	310	4.24	-	-	-	-	-	-	-	-	-	-	-	192.2	-
31313	AV3	08 Sep 2021	Dry	-	-	11.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	11 Oct 2021	Trickle	0.121	9.8	8.5	8.63	-	901	3.95	-	-	-	-	-	-	-	-	-	-	-	558.62	-
31313	AV3	03 Nov 2021	Flowing	0.152	20.8	25.2	7.34	-	860	3	-	-	-	-	-	-	-	-	-	-	-	533.2	-
31313	AV3	01 Dec 2021	Trickle	0.12	15.6	22.6	7.36	-	568	4.17	-	-	-	-	-	-	-	-	-	-	-	352.16	-
31313	AV3	06 Jan 2022	Dry	-	-	20.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	07 Feb 2022	Trickle	0.119	16.8	21.9	5.55	-	701	4.06	-	-	-	-	-	-	-	-	-	-	-	418	-
31313	AV3	08 Mar 2022	Dry	-	-	20.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	26 Apr 2022	Dry	-	-	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	11 May 2022	Dry	-	-	12.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	09 Jun 2022	Dry	-	-	7.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	02 Jul 2022	-	-	-	-	-	-	-	-	2	2	2	2.9	160	660	11	4	4.6	92	54	-	270
31313	AV3	07 Jul 2022	Dry	-	-	5.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	02 Aug 2022	Flowing	0.12	8.8	9	10.71	-	1,032	4.26	-	-	-	-	-	-	-	-	-	-	-	639.84	-
31313	AV3	14 Sep 2022	Flowing	0.118	6.1	4.3	12.05	-	851	4.5	-	-	-	-	-	-	-	-	-	-	-	527.62	-
31313	AV3	20 Oct 2022	Flowing	0.146	11.1	15	9.51	-	646	4.34	-	-	-	-	-	-	-	-	-	-	-	400.52	-
31313	AV3	16 Nov 2022	Flowing	0.248	10.2	9.8	10.22	-	647	5.64	-	-	-	-	-	-	-	-	-	-	-	401.14	-
31313	AV3	05 Dec 2022	Flowing	0.12	16.6	15.4	7.89	-	578	4.57	-	-	-	-	-	-	-	-	-	-	-	358.36	-
31313	AV3	10 Jan 2023	Dry	-	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	06 Feb 2023	Dry	-	-	14.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	09 Mar 2023	Dry	-	-	10.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	11 Apr 2023	Dry	-	-	10.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	08 May 2023	Dry	-	-	6.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table A2 - Surface Water Analytical Results

			Field								Inorganics													
			Field Observations	Depth to Water	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)	Alkalinity (total) as CaCO3	Calcium	Chloride	Electrical Conductivity (Lab)	Magnesium	pH (Lab)	Potassium	Sodium	Sulphate	Total Dissolved Solids (Calc.)	Total Dissolved Solids (Lab)
			Pool Condition	m	oC	oC	mg/L	mg/L	µS/cm	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL											2	2	2	0.5	0.5	1	0.5	0.1	0.5	0.5	0.5		1
Site ID	**Location Code**	**Date**																					
31313	AV3	02 Jun 2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	19 Jun 2023	Dry	-	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	10 Jul 2023	Dry	-	-	9.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	07 Aug 2023	Dry	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	06 Sep 2023	Dry	-	-	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	AV3	07 Oct 2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table A2 - Surface Water Analytical Results

			Inorganics	Field							
			Total Dissolved Solids (Calc.)	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Depth to Water	Field Observations
			mg/L	°C	°C	mg/L	mg/L	µS/cm	-	m	Pool Condition
EQL											
Site ID	**Location Code**	**Date**									
31313	AGP1-B	14 Jul 2009	1,419.8	9.2	11.8	1.3	-	2,290	3.73	0.13	Stagnant
31313	AGP1-B	28 Jul 2009	1,537.6	11.3	16.9	1.77	-	2,480	4.22	0.055	Stagnant
31313	AGP1-B	11 Aug 2009	1,094.92	11	13.1	2.19	-	1,766	4.76	-	Stagnant
31313	AGP1-B	25 Aug 2009	789.88	9.8	12.3	2.2	-	1,274	6.89	-	Stagnant
31313	AGP1-B	08 Sep 2009	819.64	10.8	13.7	4.8	-	1,322	3.7	0.093	Stagnant
31313	AGP1-B	23 Sep 2009	678.9	13.8	17.9	1.14	-	1,095	4.27	0.099	Stagnant
31313	AGP1-B	06 Oct 2009	969.06	12.8	15.9	1.87	-	1,563	4.65	0.341	Stagnant
31313	AGP1-B	20 Oct 2009	991.38	14.8	26.9	2.4	-	1,599	4.4	0.731	Stagnant
31313	AGP1-B	04 Nov 2009	1,083.76	14.2	17.9	2.54	-	1,748	4.8	0.933	Stagnant
31313	AGP1-B	17 Nov 2009	1,040.98	16.1	19.5	3.53	-	1,679	4.88	0.991	Stagnant
31313	AGP1-B	01 Dec 2009	714.24	16.2	21.8	2.8	-	1,152	5.05	1.209	Stagnant
31313	AGP1-B	17 Dec 2009	839.48	17.2	17.9	4.55	-	1,354	5.42	1.398	Stagnant
31313	AGP1-B	29 Dec 2009	-	-	-	-	-	-	-	-	-
31313	AGP1-B	14 Jan 2010	1,052.14	15.7	17	1.8	-	1,697	4.9	1.5	Stagnant
31313	AGP1-B	27 Jan 2010	1,158.78	16.6	-	1.91	-	1,869	5.83	1.406	Stagnant
31313	AGP1-B	10 Feb 2010	1,147	21.5	31.6	1.5	-	1,850	5.9	1.256	Stagnant
31313	AGP1-B	25 Feb 2010	949.84	14.8	18.3	0.9	-	1,532	5.9	1.114	Stagnant
31313	AGP1-B	11 Mar 2010	1,108.56	13.9	17.4	1.5	-	1,788	5.6	0.998	Stagnant
31313	AGP1-B	24 Mar 2010	1,218.3	13.8	22.8	0.9	-	1,965	5.62	0.846	Stagnant
31313	AGP1-B	31 Mar 2010	1,449	12	-	1.02	-	2,232	6.56	-	Stagnant
31313	AGP1-B	06 Apr 2010	1,205.9	14.3	16.9	1.9	-	1,945	5.4	0.711	Stagnant
31313	AGP1-B	20 Apr 2010	1,388.8	15	25.6	2.2	-	2,240	4.74	0.588	Stagnant
31313	AGP1-B	04 May 2010	1,235.66	12.2	15.1	0.9	-	1,993	4.9	0.472	Stagnant
31313	AGP1-B	18 May 2010	1,217.06	7.8	12.6	3.2	-	1,963	4.72	0.374	Stagnant
31313	AGP1-B	01 Jun 2010	1,158.16	8.7	13.3	2.55	0.45	1,868	5.96	0.349	Stagnant
31313	AGP1-B	15 Jun 2010	1,058.34	7.3	12.1	1.58	0.69	1,707	5.8	0.303	Stagnant
31313	AGP1-B	29 Jun 2010	1,119.72	7.4	10.1	1.43	0.62	1,806	5.2	0.277	Stagnant
31313	AGP1-B	12 Jul 2010	1,230.08	6.8	10.5	2.41	0.89	1,984	5.1	0.246	Stagnant
31313	AGP1-B	27 Jul 2010	1,177.38	5.1	8.3	5.03	0.86	1,899	5.55	0.233	Stagnant
31313	AGP1-B	11 Aug 2010	1,109.18	8.6	11.1	4.28	1.23	1,789	5.1	0.307	Stagnant
31313	AGP1-B	23 Aug 2010	396.8	6.5	9.7	1.59	2.56	640	5.47	1.848	Stagnant
31313	AGP1-B	07 Sep 2010	258.54	8.9	11	6.61	4.32	417	5.57	2.579	Stagnant
31313	AGP1-B	21 Sep 2010	288.92	10.3	13.3	6.5	3.5	466	5.21	2.328	Stagnant
31313	AGP1-B	05 Oct 2010	328.6	11	14	6.8	2	530	5.6	2.258	Stagnant
31313	AGP1-B	19 Oct 2010	371.38	10.1	11.4	5.7	1.3	599	5.08	2.294	Stagnant
31313	AGP1-B	01 Nov 2010	403.62	11.3	15.6	5.43	2.64	651	4.98	2.301	Stagnant
31313	AGP1-B	16 Nov 2010	474.3	12.5	14.7	3.3	1.3	765	5.55	2.313	Stagnant
31313	AGP1-B	01 Dec 2010	533.2	16.9	19.2	3.6	0.6	860	5.06	2.322	Stagnant
31313	AGP1-B	13 Dec 2010	503.44	14.5	19	2.5	0.8	812	5.17	2.28	Stagnant
31313	AGP1-B	29 Dec 2010	-	-	-	-	-	-	-	-	-
31313	AGP1-B	11 Jan 2011	633.02	18.2	20	3.2	0.5	1,021	6.12	2.168	Stagnant
31313	AGP1-B	27 Jan 2011	282.72	16.6	18.7	1.6	1	456	5.58	2.394	Stagnant

Table A2 - Surface Water Analytical Results

			Inorganics	Field							
			Total Dissolved Solids (Calc.)	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Depth to Water	Field Observations
			mg/L	°C	°C	mg/L	mg/L	µS/cm	-	m	Pool Condition
31313	AGP1-B	08 Feb 2011	319.92	15.4	17	1.6	1.1	516	5.32	2.293	Stagnant
31313	AGP1-B	21 Feb 2011	325.5	15.3	17.2	1.2	1	525	5.23	2.241	Stagnant
31313	AGP1-B	08 Mar 2011	372.62	16.1	18.5	0.9	0.2	601	5.89	2.161	Stagnant
31313	AGP1-B	21 Mar 2011	399.9	16	20.3	2.4	0.1	645	5.43	2.175	Stagnant
31313	AGP1-B	04 Apr 2011	460.04	12.5	14	1	1.1	742	5.9	2.101	Stagnant
31313	AGP1-B	20 Apr 2011	477.4	12.6	15	1.2	1	770	5.1	2.037	Stagnant
31313	AGP1-B	05 May 2011	517.08	10.6	13.2	1.1	0.7	834	5.9	1.971	Stagnant
31313	AGP1-B	16 May 2011	537.54	9.2	11.3	1	0.6	867	5.93	1.929	Stagnant
31313	AGP1-B	31 May 2011	544.98	8.5	8.8	1.7	0.9	879	5.4	1.921	Stagnant
31313	AGP1-B	15 Jun 2011	555.52	7.3	6.8	1.2	0.8	896	5.31	1.873	Stagnant
31313	AGP1-B	29 Jun 2011	580.94	6.9	8.7	2.1	1	937	5.41	1.854	Stagnant
31313	AGP1-B	12 Jul 2011	545.6	8.7	13.2	1.9	1.2	880	5.8	1.837	Stagnant
31313	AGP1-B	26 Jul 2011	460.04	7.2	7	4.4	1.5	742	6.51	2.059	Stagnant
31313	AGP1-B	09 Aug 2011	538.16	7.9	8.4	4.1	2.8	868	6.5	2.231	Stagnant
31313	AGP1-B	23 Aug 2011	580.32	7.8	13.3	4.38	0.6	936	5.98	2.315	Stagnant
31313	AGP1-B	06 Sep 2011	654.72	8.8	15.5	2.8	1	1,056	6.2	2.314	Stagnant
31313	AGP1-B	21 Sep 2011	716.72	10.1	13.9	3.4	2.4	1,156	6.1	2.291	Stagnant
31313	AGP1-B	04 Oct 2011	748.96	8.4	17.9	4.1	2.6	1,208	6.06	2.298	Stagnant
31313	AGP1-B	18 Oct 2011	853.12	10	22.8	5.35	2.1	1,376	6.1	2.254	Stagnant
31313	AGP1-B	02 Nov 2011	878.54	13.2	15.1	2.2	1.71	1,417	5.9	2.218	Stagnant
31313	AGP1-B	15 Nov 2011	923.18	13.4	16.8	1.8	1.7	1,489	5.92	2.198	Stagnant
31313	AGP1-B	26 Jun 2012	377.58	8.4	-	2.61	1.54	609	6.83	2.5	Stagnant
31313	AGP1-B	11 Jul 2012	371.38	7.4	10.1	4.9	0.6	599	5.52	2.45	Stagnant
31313	AGP1-B	24 Jul 2012	390.6	8.7	10.3	6.7	0.8	630	5.73	2.419	Stagnant
31313	AGP1-B	07 Aug 2012	472.44	7.3	-	6.2	1.1	762	6.31	2.38	Stagnant
31313	AGP1-B	21 Aug 2012	372.62	9.5	10.7	8	7.8	601	5.09	2.62	Stagnant
31313	AGP1-B	04 Sep 2012	484.84	11.9	12.7	5.9	4.2	782	4.55	2.45	Stagnant
31313	AGP1-B	18 Sep 2012	522.04	12.1	14	7	4.8	842	7.06	2.371	Stagnant
31313	AGP1-B	02 Oct 2012	485.46	10.9	15.9	5	1.9	783	5.91	2.33	Stagnant
31313	AGP1-B	16 Oct 2012	527.62	13	14.1	6.2	1.1	851	6.29	2.34	Stagnant
31313	AGP1-B	30 Oct 2012	620	14.1	10.7	5.8	2.3	1,000	5.98	2.27	Stagnant
31313	AGP1-B	13 Nov 2012	668.98	11	12.2	6.09	4.01	1,079	6.11	2.203	Stagnant
31313	AGP1-B	27 Nov 2012	632.4	16.9	20.3	5.51	1.35	1,020	6.28	2.157	Stagnant
31313	AGP1-B	11 Dec 2012	706.8	17.1	20.5	5.92	2.11	1,140	6.93	2.106	Stagnant
31313	AGP1-B	20 Dec 2012	738.42	15.6	20.1	2	1.1	1,191	6.01	2.089	Stagnant
31313	AGP1-B	08 Jan 2013	774.38	19.5	21	4.39	1.1	1,249	5.85	1.892	Stagnant
31313	AGP1-B	22 Jan 2013	878.54	15.4	17.3	1.78	0.75	1,417	6.07	1.702	Stagnant
31313	AGP1-B	05 Feb 2013	930	16.7	25	4.7	4.7	1,500	6.13	1.511	Stagnant
31313	AGP1-B	19 Feb 2013	1,031.68	18.4	19.9	3.9	3.9	1,664	6.29	1.329	Stagnant
31313	AGP1-B	05 Mar 2013	1,161.26	18.9	22.3	4.43	4.47	1,873	6.37	1.142	Stagnant
31313	AGP1-B	19 Mar 2013	1,000.06	13.3	13.1	3.27	3.23	1,613	7.38	0.981	Stagnant
31313	AGP1-B	03 Apr 2013	914.5	15.4	16.6	3.5	3.5	1,475	6.15	0.813	Stagnant
31313	AGP1-B	16 Apr 2013	1,073.22	16	16	1.58	1.58	1,731	6.73	0.679	Stagnant
31313	AGP1-B	01 May 2013	1,107.32	11.3	16.4	3.4	3.4	1,786	6.41	0.536	Stagnant
31313	AGP1-B	14 May 2013	1,033.54	9.2	10.4	8.3	8.3	1,667	7.1	0.44	Stagnant

Table A2 - Surface Water Analytical Results

			Inorganics	Field							
			Total Dissolved Solids (Calc.)	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Depth to Water	Field Observations
			mg/L	°C	°C	mg/L	mg/L	µS/cm	-	m	Pool Condition
31313	AGP1-B	27 May 2013	1,034.78	13.5	16.5	5.9	5.9	1,669	7.01	0.379	Stagnant
31313	AGP1-B	11 Jun 2013	973.4	9.5	13.1	4.5	4.5	1,570	6.55	0.35	Stagnant
31313	AGP1-B	24 Jun 2013	766.32	7.1	7.3	7.6	7.6	1,236	6.81	0.486	Stagnant
31313	AGP1-B	09 Jul 2013	666.5	5	4	8.5	5.5	1,075	8.01	0.44	Stagnant
31313	AGP1-B	22 Jul 2013	372	8.2	7.8	5.9	6.4	600	7.4	2.222	Stagnant
31313	AGP1-B	06 Aug 2013	340.38	10.9	10.1	7.5	6.3	549	6.78	2.641	Flowing
31313	AGP1-B	19 Aug 2013	393.7	8.5	7.7	8.8	8	635	6.41	2.498	Flowing
31313	AGP1-B	03 Sep 2013	275.9	11.7	13.2	7.1	4.5	445	6.34	2.435	Flowing
31313	AGP1-B	16 Sep 2013	349.06	12.6	13.4	8.9	5.9	563	6.91	2.328	Flowing
31313	AGP1-B	01 Oct 2013	300.08	13	11.5	3.69	3.89	484	5.83	2.381	Stagnant
31313	AGP1-B	15 Oct 2013	366.42	11.9	11.1	8.4	5.2	591	5.85	2.339	Flowing
31313	AGP1-B	29 Oct 2013	383.78	13.5	15.9	4.89	2.58	619	6.47	2.389	Stagnant
31313	AGP1-B	13 Nov 2013	429.66	13.4	12.9	7	4	693	6.8	2.31	Flowing
31313	AGP1-B	26 Nov 2013	414.78	16.2	21	6.7	6.59	669	6.17	2.292	Flowing
31313	AGP1-B	06 Dec 2013	440.82	15.5	17.9	5.7	4.2	711	5.92	2.22	Stagnant
31313	AGP1-B	24 Dec 2013	-	-	-	-	-	-	-	-	-
31313	AGP1-B	09 Jan 2014	480.5	19.5	22.8	4.9	4.7	775	6.01	2.106	Stagnant
31313	AGP1-B	21 Jan 2014	474.92	18.8	19.2	4.81	2.35	766	6.34	2.01	Stagnant
31313	AGP1-B	06 Feb 2014	502.2	19.2	21.2	5.11	2.47	810	6.44	1.835	Stagnant
31313	AGP1-B	17 Feb 2014	548.7	18.2	16.9	2.62	2.62	885	6.61	1.693	Stagnant
31313	AGP1-B	07 Mar 2014	758.88	16.1	16.4	4.95	4.95	1,224	6.47	1.448	Stagnant
31313	AGP1-B	18 Mar 2014	764.46	14.4	16.4	4.32	4.32	1,233	6.46	1.324	Stagnant
31313	AGP1-B	01 Apr 2014	723.54	17.3	24	4.07	4.07	1,167	6.74	1.194	Stagnant
31313	AGP1-B	15 Apr 2014	710.52	14.6	15.1	2.17	2.17	1,146	6.41	1.09	Stagnant
31313	AGP1-B	29 Apr 2014	703	1.6	17.1	1.7	1.51	1,135	6.41	1.006	Stagnant
31313	AGP1-B	12 May 2014	639.22	15	15	2.23	2.23	1,031	6.3	0.978	Stagnant
31313	AGP1-B	20 May 2014	651	12.4	17.1	1.6	1.6	1,050	5.32	0.928	Stagnant
31313	AGP1-B	10 Jun 2014	610.7	11.3	12.1	4.15	4.15	985	6.3	0.86	Stagnant
31313	AGP1-B	27 Jun 2014	454.46	7.9	7.9	4.61	4.61	733	6.43	0.9	Stagnant
31313	AGP1-B	08 Jul 2014	693.78	10.8	11.3	5.52	5.52	1,119	6.81	1.041	Stagnant
31313	AGP1-B	24 Jul 2014	525.14	6.6	10.5	6.77	5.52	847	6	1.491	Stagnant
31313	AGP1-B	06 Aug 2014	491.04	9.9	10.1	8.41	8.43	792	6.8	1.79	Stagnant
31313	AGP1-B	18 Aug 2014	626.2	8	8	3.5	3.4	1,010	5.52	1.996	Stagnant
31313	AGP1-B	04 Sep 2014	639.84	7.6	11.3	7.6	7.7	1,032	6	2.152	Stagnant
31313	AGP1-B	18 Sep 2014	714.24	8.7	11.4	8.7	7.2	1,152	5.88	2.178	Stagnant
31313	AGP1-B	30 Sep 2014	760.74	11.4	10.1	5.25	4.31	1,227	6.23	2.175	Stagnant
31313	AGP1-B	14 Oct 2014	787.4	10.8	12.7	5.45	4.7	1,270	6.23	2.168	Stagnant
31313	AGP1-B	29 Oct 2014	861.8	12.6	15	3.45	2.6	1,390	6.1	2.122	Stagnant
31313	AGP1-B	10 Nov 2014	864.9	16	21.1	3.1	3.1	1,395	6.6	2.044	Stagnant
31313	AGP1-B	01 Dec 2014	921.94	16.1	20.7	3.27	1.3	1,487	6.3	1.919	Stagnant
31313	AGP1-B	08 Dec 2014	846.92	11.5	15	0.7	0.9	1,366	6.9	1.922	Stagnant
31313	AGP1-B	07 Jan 2015	907.06	21.1	30.1	0.9	0.9	1,463	6.2	1.62	Stagnant
31313	AGP1-B	20 Jan 2015	851.26	14.4	20.9	0.7	0.8	1,373	5.9	1.562	Stagnant
31313	AGP1-B	04 Feb 2015	941.78	15.2	15.2	2	2	1,519	5.9	1.363	Stagnant
31313	AGP1-B	17 Feb 2015	819.02	18.4	19.6	1.5	1.5	1,321	5.6	1.236	Stagnant

Table A2 - Surface Water Analytical Results

			Inorganics	Field							
			Total Dissolved Solids (Calc.)	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Depth to Water	Field Observations
			mg/L	°C	°C	mg/L	mg/L	µS/cm	-	m	Pool Condition
31313	AGP1-B	04 Mar 2015	877.3	12.6	11.5	2.09	2.09	1,415	6.4	1.072	Stagnant
31313	AGP1-B	30 Mar 2015	951.08	12.4	12.2	3.8	3.8	1,534	5.6	0.786	Stagnant
31313	AGP1-B	27 Apr 2015	911.4	11.9	12.4	6.64	6.64	1,470	6	0.556	Stagnant
31313	AGP1-B	15 May 2015	334.8	12.2	15.4	3.28	3.28	540	5.88	2.349	Stagnant
31313	AGP1-B	20 May 2015	725.4	13	12.4	6.12	6.12	1,170	5.36	0.49	Stagnant
31313	AGP1-B	16 Jun 2015	618.76	13.8	13.5	6.79	6.79	998	5.8	0.428	Stagnant
31313	AGP1-B	21 Jul 2015	559.86	5.7	9.8	5.24	5.24	903	5.9	0.367	Stagnant
31313	AGP1-B	18 Aug 2015	713	5.9	3.8	6.7	6.7	1,150	6.6	0.297	Stagnant
31313	AGP1-B	21 Sep 2015	919.46	14.1	14.1	5.55	5.55	1,483	6.6	0.234	Stagnant
31313	AGP1-B	19 Oct 2015	1,532.64	16.9	22.1	2.32	2.32	2,472	5.6	0.089	Stagnant
31313	AGP1-B	16 Nov 2015	1,767	17.4	22.3	2.39	2.39	2,850	6.6	0.029	Stagnant
31313	AGP1-B	07 Dec 2015	-	-	19.8	-	-	-	-	-	Dry
31313	AGP1-B	18 Jan 2016	-	-	32.2	-	-	-	-	-	Dry
31313	AGP1-B	14 Feb 2016	637.98	17.9	15.2	1.31	0.8	1,029	6.58	1.658	Stagnant
31313	AGP1-B	15 Feb 2016	-	-	21	-	-	-	-	-	Dry
31313	AGP1-B	15 Mar 2016	-	-	16.9	-	-	-	-	-	Dry
31313	AGP1-B	13 Apr 2016	-	-	13.7	-	-	-	-	-	Dry
31313	AGP1-B	16 May 2016	-	-	8.3	-	-	-	-	-	Dry
31313	AGP1-B	20 Jun 2016	-	-	12.2	-	-	-	-	-	Dry
31313	AGP1-B	18 Jul 2016	944.26	11.9	15.2	2.4	2.4	1,523	3.5	0.078	Stagnant
31313	AGP1-B	17 Aug 2016	1,217.06	10.8	14.7	3.7	3.2	1,963	4.7	1.147	Stagnant
31313	AGP1-B	20 Sep 2016	310.62	12.2	13.3	5.85	5.82	501	5.2	2.538	Flowing
31313	AGP1-B	17 Oct 2016	422.22	13.4	13.2	7.96	7.96	681	5.78	2.398	Flowing
31313	AGP1-B	14 Nov 2016	389.98	13.5	17.8	4.43	1.37	629	5.4	2.303	Flowing
31313	AGP1-B	06 Dec 2016	530.1	19.7	26.3	5.7	2.2	855	6.5	2.178	Stagnant
31313	AGP1-B	19 Jan 2017	648.52	17.6	25.7	1.46	0.4	1,046	6.9	1.865	Stagnant
31313	AGP1-B	20 Mar 2017	791.74	15.9	19.7	2.02	0.91	1,277	6.07	1.246	Stagnant
31313	AGP1-B	18 Apr 2017	643.56	16.1	20.2	3.81	3.81	1,038	6.05	1.058	Stagnant
31313	AGP1-B	21 Jun 2017	376.34	9.9	12.6	3.7	1.1	607	6.2	2.298	Stagnant
31313	AGP1-B	25 Jul 2017	456.94	7.8	21	4.87	4.87	737	6.89	2.333	Stagnant
31313	AGP1-B	21 Aug 2017	399.28	6.6	8.6	6.5	4.8	644	6	2.421	Stagnant
31313	AGP1-B	18 Sep 2017	292.02	15.1	15.2	10.11	3.21	471	6.89	2.631	Stagnant
31313	AGP1-B	17 Oct 2017	396.8	20.4	24.1	7.21	3.34	640	7.22	2.314	Stagnant
31313	AGP1-B	20 Nov 2017	548.08	19.1	19.8	6.56	6.56	884	6.53	2.2	Stagnant
31313	AGP1-B	06 Dec 2017	581.56	20.5	19.8	5.81	2.11	938	6.37	2.186	Stagnant
31313	AGP1-B	10 Jan 2018	755.78	14.1	18.6	4.35	2.89	1,219	6.48	1.882	Stagnant
31313	AGP1-B	06 Feb 2018	774.38	20.6	25.6	5.72	3.21	1,249	4.49	1.574	Stagnant
31313	AGP1-B	08 Mar 2018	846.3	16.7	18.2	3.07	3.07	1,365	5.9	1.148	Stagnant
31313	AGP1-B	11 Apr 2018	923.8	19.4	19.8	4.03	4.03	1,490	5.8	0.781	Stagnant
31313	AGP1-B	14 May 2018	733.46	13.8	10.7	5.11	5.11	1,183	7.34	0.705	Stagnant
31313	AGP1-B	22 Jun 2018	512.74	6.8	14.8	6.3	5.1	827	5.6	0.621	Stagnant
31313	AGP1-B	18 Jul 2018	547.46	6.4	5.6	4.72	4.11	883	7.23	0.541	Stagnant
31313	AGP1-B	13 Aug 2018	636.12	11.4	11.2	6.37	4.21	1,026	5.7	1.216	Stagnant
31313	AGP1-B	24 Sep 2018	838.86	13.1	11.3	6.2	0.5	1,353	5.7	1.799	Stagnant
31313	AGP1-B	17 Oct 2018	856.84	15	21	2	0.7	1,382	5.7	1.937	Stagnant

Table A2 - Surface Water Analytical Results

			Inorganics	Field							
			Total Dissolved Solids (Calc.)	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Depth to Water	Field Observations
			mg/L	°C	°C	mg/L	mg/L	µS/cm	-	m	Pool Condition
31313	AGP1-B	07 Nov 2018	814.06	14.2	18	4.4	0.2	1,313	5.9	1.975	Stagnant
31313	AGP1-B	12 Dec 2018	892.8	28	28	2	0.2	1,440	6.1	1.772	Stagnant
31313	AGP1-B	21 Jan 2019	899	17.5	21.5	1.1	0.4	1,450	6.2	1.412	Stagnant
31313	AGP1-B	13 Feb 2019	916.36	13.8	13.9	1.4	0.4	1,478	6	1.093	Stagnant
31313	AGP1-B	13 Mar 2019	948.6	14.7	20	0.7	0.6	1,530	5.7	0.722	Stagnant
31313	AGP1-B	08 Apr 2019	957.9	14.3	17	0.7	0.7	1,545	6	0.496	Stagnant
31313	AGP1-B	24 May 2019	641.7	12.6	17	4.6	0.5	1,035	4.9	0.661	Stagnant
31313	AGP1-B	18 Jun 2019	329.84	8.5	10	5.2	0.6	532	5.3	2.553	Flowing
31313	AGP1-B	29 Jul 2019	467.48	7.4	13	4	0.4	754	5.6	2.45	Flowing
31313	AGP1-B	01 Aug 2019	-	-	-	-	-	-	-	-	-
31313	AGP1-B	17 Sep 2019	593.34	11.8	-	6.24	0.2	957	5.493	2.34	Stagnant
31313	AGP1-B	15 Oct 2019	621.24	12	15	5.97	0.3	1,002	6.2	2.28	Stagnant
31313	AGP1-B	14 Nov 2019	624.34	15.2	15.9	9.54	2.67	1,007	6.6	2.262	Stagnant
31313	AGP1-B	12 Dec 2019	688.82	15.4	16.2	7.31	1.67	1,111	7.1	2.153	Stagnant
31313	AGP1-B	13 Jan 2020	738.42	20.7	22.4	6.62	2.11	1,191	6.21	1.97	Stagnant
31313	AGP1-B	10 Feb 2020	695.02	18.2	19.3	4.87	4.87	1,121	6	1.671	Stagnant
31313	AGP1-B	17 Mar 2020	685.1	15.7	17.6	7.55	7.55	1,105	7.39	1.382	Stagnant
31313	AGP1-B	15 Apr 2020	630.54	15.1	15.1	7.69	2.38	1,017	5.942	1.2	Stagnant
31313	AGP1-B	13 May 2020	633.64	11	10.1	8.76	8.76	1,022	5.39	1.08	Stagnant
31313	AGP1-B	12 Jun 2020	689.44	7.2	5.6	7.61	2.31	1,112	6.01	0.955	Stagnant
31313	AGP1-B	14 Jul 2020	563.58	8.2	12.3	8.92	2.21	909	6	0.889	Stagnant
31313	AGP1-B	12 Aug 2020	538.78	9.5	11	9.35	2.86	869	5.7	0.842	Stagnant
31313	AGP1-B	08 Sep 2020	528.86	12.7	14.5	8.94	2.75	853	6.2	1.181	Stagnant
31313	AGP1-B	13 Oct 2020	217	10.7	17.5	9.5	7.62	350	7.6	2.522	Stagnant
31313	AGP1-B	10 Nov 2020	293.88	11.1	28.3	8.04	3.21	474	6.71	2.27	Stagnant
31313	AGP1-B	10 Dec 2020	174.84	11.2	13	7.83	3.27	282	6.4	2.212	Stagnant
31313	AGP1-B	06 Jan 2021	435.86	16.8	24	6.62	2.35	703	6.5	2.242	Stagnant
31313	AGP1-B	11 Jan 2021	487.32	12.3	31.8	7.31	2.71	786	6.22	2.39	Stagnant
31313	AGP1-B	09 Feb 2021	608.22	16.6	16.5	6.39	2.83	981	6.3	2.274	Stagnant
31313	AGP1-B	10 Mar 2021	732.22	13.1	15.5	6.85	3.22	1,181	5.8	2.102	Stagnant
31313	AGP1-B	14 Apr 2021	748.34	13.8	14.9	6.91	3.1	1,207	6.77	1.954	Stagnant
31313	AGP1-B	11 May 2021	625.58	10	9.8	10.09	3.21	1,009	5.4	1.94	Stagnant
31313	AGP1-B	03 Jun 2021	766.94	9	10.1	7.47	2.31	1,237	6.92	2.19	Stagnant
31313	AGP1-B	12 Jul 2021	813.44	7.2	6.9	6.77	2.33	1,312	5.48	2.438	Stagnant
31313	AGP1-B	09 Aug 2021	258.54	9.4	11	8.49	2.11	417	6.01	2.482	Stagnant
31313	AGP1-B	08 Sep 2021	399.9	10	14.4	7.39	7.39	645	5.95	2.362	Stagnant
31313	AGP1-B	12 Oct 2021	469.34	16.2	17.5	6.82	2.11	757	5.26	2.479	Stagnant
31313	AGP1-B	04 Nov 2021	252.96	13.6	12.1	9.42	2.7	408	5.6	2.742	Stagnant
31313	AGP1-B	01 Dec 2021	300.08	11.5	20.9	7.02	2.11	484	5.94	2.424	Stagnant
31313	AGP1-B	07 Feb 2022	214.52	19.1	24.2	6.51	2.66	346	6.26	2.49	Stagnant
31313	AGP1-B	08 Mar 2022	429.04	15.1	15.1	8.1	8.1	692	6.4	2.356	Stagnant
31313	AGP1-B	27 Apr 2022	388.74	15.1	17.1	7.28	7.28	627	6.21	2.316	Stagnant
31313	AGP1-B	11 May 2022	455.08	10.3	12.8	7.71	3.11	734	5.88	2.355	Stagnant
31313	AGP1-B	08 Jun 2022	479.88	8.5	17.2	9.21	9.21	774	5.8	2.412	Stagnant
31313	AGP1-B	07 Jul 2022	566.68	7.6	18.7	10.91	10.91	914	6.14	2.431	Stagnant

Table A2 - Surface Water Analytical Results

			Inorganics	Field							
			Total Dissolved Solids (Calc.)	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Depth to Water	Field Observations
			mg/L	°C	°C	mg/L	mg/L	µS/cm	-	m	Pool Condition
31313	AGP1-B	02 Aug 2022	546.22	9.8	10.6	10.11	10.11	881	7.07	2.49	Stagnant
31313	AGP1-B	14 Sep 2022	674.56	7.5	14	8.92	8.92	1,088	6.21	2.474	Stagnant
31313	AGP1-B	20 Oct 2022	244.9	10.5	18.5	7.17	2.11	395	5.98	2.62	Stagnant
31313	AGP1-B	16 Nov 2022	244.28	12.8	12.8	8.2	2.87	394	5.83	2.657	Stagnant
31313	AGP1-B	05 Dec 2022	204.6	16.7	17.2	8.57	2.82	330	6.87	2.55	Stagnant
31313	AGP1-B	10 Jan 2023	241.18	17.6	18.7	7.33	2.75	389	6.67	2.296	Stagnant
31313	AGP1-B	06 Feb 2023	535.06	14.4	15.1	3.66	1.22	863	6.19	2.258	Stagnant
31313	AGP1-B	09 Mar 2023	354.02	13.2	10.5	7.22	2.11	571	6.93	2.04	Stagnant
31313	AGP1-B	11 Apr 2023	491.66	10.8	10.8	6.61	2.32	793	6.62	1.854	Stagnant
31313	AGP1-B	08 May 2023	370.76	8.5	7.2	7.36	7.36	598	6.26	1.868	Stagnant
31313	AGP1-B	19 Jun 2023	245.52	9.2	7.8	5.46	5.46	396	5.8	1.918	Stagnant
31313	AGP1-B	10 Jul 2023	421.6	9.9	10.5	7.94	3.21	680	6.76	2.18	Stagnant
31313	AGP1-B	07 Aug 2023	494.76	9.2	8.5	8.62	2.11	798	6.41	2.38	Stagnant
31313	AGP1-B	06 Sep 2023	554.9	8.9	11.8	8.96	2.71	895	5.8	2.375	Stagnant

Table A2 - Surface Water Analytical Results

			Inorganics	Field								Sample Preparation
			Total Dissolved Solids (Calc.)	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Depth to Water	Field Observations	Test - Comment 1
			mg/L	ºC	ºC	mg/L	mg/L	µS/cm	-	m	Pool Conditio	General Comment
EQL												
Site ID	**Location Code**	**Date**										
31313	AGP2	01 Jun 2010	1,649.2	17	17	4.35	4.35	2,660	3.91	0.308	Flowing	-
31313	AGP2	30 Jun 2010	1,308.2	11.9	11.9	7.4	7.2	2,110	4.67	0.459	Flowing	-
31313	AGP2	28 Jul 2010	1,302	14	14	9.8	8.6	2,100	3.74	0.445	Flowing	-
31313	AGP2	11 Aug 2010	1,155.68	10.1	10.1	5.1	4.58	1,864	4.1	0.501	Flowing	-
31313	AGP2	23 Aug 2010	1,058.34	16	16	8.72	8.72	1,707	3.6	0.479	Flowing	-
31313	AGP2	21 Sep 2010	951.7	15.6	15.6	7.36	7.36	1,535	3.7	0.473	Flowing	-
31313	AGP2	20 Oct 2010	951.08	2.4	2.4	5.4	5.4	1,534	2.16	0.481	Flowing	-
31313	AGP2	02 Dec 2010	1,046.56	20.3	20.3	4	2.2	1,688	2.58	0.444	Flowing	-
31313	AGP2	13 Dec 2010	952.94	21.9	21.9	3.1	2	1,537	2.61	0.419	Flowing	-
31313	AGP2	11 Jan 2011	1,125.3	22.2	22.2	2.9	0.5	1,815	5.63	0.298	Flowing	-
31313	AGP2	08 Feb 2011	973.4	25.7	25.7	4.5	4.6	1,570	5.07	0.416	Flowing	-
31313	AGP2	21 Feb 2011	1,032.3	18.7	18.7	5.8	5.8	1,665	4.95	0.414	Flowing	-
31313	AGP2	08 Mar 2011	1,164.98	27.3	27.3	4	2.4	1,879	3.49	0.366	Flowing	-
31313	AGP2	04 Apr 2011	1,293.32	17.1	17.1	5.8	5.2	2,086	3.4	0.39	Flowing	-
31313	AGP2	20 Apr 2011	1,218.92	16.4	16.4	3.4	3.2	1,966	3.2	0.401	Flowing	-
31313	AGP2	05 May 2011	1,252.4	13.4	13.4	3.7	3.6	2,020	3.34	0.401	flowing	-
31313	AGP2	31 May 2011	1,019.28	13.1	13.1	8.6	8.4	1,644	3.98	0.438	Flowing	-
31313	AGP2	15 Jun 2011	1,131.5	14.1	14.1	2.4	2.4	1,825	5.11	0.438	Flowing	-
31313	AGP2	29 Jun 2011	1,119.1	14.8	14.8	0.8	0.6	1,805	3.92	0.429	Flowing	-
31313	AGP2	26 Jul 2011	929.38	13.1	13.1	5.9	4.9	1,499	3.73	0.481	Flowing	-
31313	AGP2	09 Aug 2011	944.26	14.1	14.1	8.8	8.8	1,523	4.8	0.439	Flowing	-
31313	AGP2	23 Aug 2011	1,001.92	18.4	18.4	7.5	6.3	1,616	3.63	0.452	Flowing	-
31313	AGP2	21 Sep 2011	1,143.28	18.2	18.2	7.1	6.7	1,844	3.6	0.428	Flowing	-
31313	AGP2	04 Oct 2011	1,111.04	26	26	6.3	6.3	1,792	3.81	0.434	Flowing	-
31313	AGP2	18 Oct 2011	1,151.34	27.4	27.4	7.5	7.5	1,857	3.28	0.421	Flowing	-
31313	AGP2	15 Nov 2011	1,122.82	29.7	29.7	0.8	0.6	1,811	3.91	0.402	Flowing	-
31313	AGP2	01 Dec 2011	1,289.6	21.3	21.3	8.7	8.7	2,080	3.49	0.421	Flowing	-
31313	AGP2	14 Dec 2011	1,388.8	22.6	22.6	4	4	2,240	3.41	0.392	Trickle	-
31313	AGP2	11 Jan 2012	1,481.8	12.9	12.9	0.2	-	2,390	6.42	0.118	Stagnant	-
31313	AGP2	08 Feb 2012	-	23 -	23	-	-	-	-	-	Dry	-
31313	AGP2	21 Feb 2012	-	25.1 -	25.1	-	-	-	-	-	Dry	-
31313	AGP2	07 Mar 2012	-	14.4 -	14.4	-	-	-	-	-	Dry	-
31313	AGP2	04 Apr 2012	-	25 -	25	-	-	-	-	-	Dry	-
31313	AGP2	17 Apr 2012	-	17.2 -	17.2	-	-	-	-	-	Dry	-
31313	AGP2	02 May 2012	-	16.6 -	16.6	-	-	-	-	-	Dry	-
31313	AGP2	30 May 2012	-	15.2 -	15.2	-	-	-	-	-	Dry	-
31313	AGP2	12 Jun 2012	1,810.4	15.8	15.8	6.78	6.78	2,920	4.03	0.423	Flowing	-
31313	AGP2	25 Jun 2012	1,562.4	13.1	13.1	7.32	7.32	2,520	3.97	0.458	Flowing	-
31313	AGP2	23 Jul 2012	1,373.92	11.5	11.5	7.5	7.5	2,216	4.11	0.458	Flowing	-
31313	AGP2	07 Aug 2012	1,252.4	13.9	13.9	7.2	7.2	2,020	3.84	0.451	Flowing	-
31313	AGP2	20 Aug 2012	1,146.38	7.2	7.2	7.6	7.5	1,849	3.79	0.445	Flowing	-

Table A2 - Surface Water Analytical Results

			Inorganics	Field								Sample Preparation
			Total Dissolved Solids (Calc.)	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Depth to Water	Field Observations	Test - Comment 1
			mg/L	ºC	ºC	mg/L	mg/L	µS/cm	-	m	Pool Conditio	General Comment
31313	AGP2	18 Sep 2012	1,238.76	10.2	10.2	6.4	6.4	1,998	4.26	0.431	Flowing	-
31313	AGP2	16 Oct 2012	1,217.68	13.2	13.2	5.3	5.3	1,964	3.71	0.42	Flowing	-
31313	AGP2	12 Nov 2012	1,407.4	25.4	25.4	3.8	3.8	2,270	3.53	0.354	Flowing	-
31313	AGP2	11 Dec 2012	1,500.4	17.3	17.3	2.36	2.36	2,420	5.74	0.28	Stagnant	-
31313	AGP2	08 Jan 2013	-	18 -	18	-	-	-	-	-	Dry	-
31313	AGP2	04 Feb 2013	-	22.1 -	22.1	-	-	-	-	-	Dry	-
31313	AGP2	05 Mar 2013	-	17 -	17	-	-	-	-	-	Dry	-
31313	AGP2	03 Apr 2013	-	13.3 -	13.3	-	-	-	-	-	Dry	-
31313	AGP2	30 Apr 2013	-	21.4 -	21.4	-	-	-	-	-	Dry	-
31313	AGP2	27 May 2013	-	15 -	15	-	-	-	-	-	Dry	-
31313	AGP2	25 Jun 2013	-	12.2 -	12.2	-	-	-	-	-	Dry	-
31313	AGP2	23 Jul 2013	3,056.6	13.3	13.3	3.2	3.2	4,930	3.1	0.395	Flowing	-
31313	AGP2	20 Aug 2013	1,643	12.5	12.5	6.5	6.5	2,650	3.17	0.486	Flowing	-
31313	AGP2	16 Sep 2013	1,469.4	15.2	15.2	7.2	7.2	2,370	3.1	0.403	Flowing	-
31313	AGP2	14 Oct 2013	1,475.6	12.5	12.5	7.1	7.1	2,380	3.15	0.416	Flowing	-
31313	AGP2	13 Nov 2013	1,500.4	13.9	13.9	7.8	7.8	2,420	3.1	0.428	Flowing	-
31313	AGP2	06 Dec 2013	1,494.2	16.7	16.7	5.6	5.6	2,410	3.22	0.351	Flowing	-
31313	AGP2	10 Jan 2014	1,804.2	24.1	24.1	3.4	3.4	2,910	3.13	0.212	Stagnant	-
31313	AGP2	06 Feb 2014	-	35.1 -	35.1	-	-	-	-	-	Dry	-
31313	AGP2	07 Mar 2014	-	17.3 -	17.3	-	-	-	-	-	Dry	-
31313	AGP2	01 Apr 2014	-	16.4 -	16.4	-	-	-	-	-	Dry	-
31313	AGP2	29 Apr 2014	-	15.1 -	15.1	-	-	-	-	-	Dry	-
31313	AGP2	20 May 2014	-	17.9 -	17.9	-	-	-	-	-	Dry	-
31313	AGP2	26 Jun 2014	-	11 -	11	-	-	-	-	-	Dry	-
31313	AGP2	23 Jul 2014	2,380.8	12.1	12.1	3.9	3.9	3,840	3.2	0.352	Flowing	-
31313	AGP2	18 Aug 2014	2,086.92	12.2	12.2	8.4	8.4	3,366	2.76	0.357	Flowing	-
31313	AGP2	17 Sep 2014	2,027.4	14.6	14.6	8.8	8.8	3,270	3.02	0.336	Flowing	-
31313	AGP2	13 Oct 2014	2,015	13.2	13.2	6.25	6.25	3,250	2.95	0.229	Flowing	-
31313	AGP2	10 Nov 2014	-	18 -	18	-	-	-	-	-	Dry	-
31313	AGP2	08 Dec 2014	-	22.1 -	22.1	-	-	-	-	-	Dry	-
31313	AGP2	07 Jan 2015	-	30.1 -	30.1	-	-	-	-	-	Dry	-
31313	AGP2	05 Feb 2015	-	19.1 -	19.1	-	-	-	-	-	Dry	-
31313	AGP2	04 Mar 2015	-	18 -	18	-	-	-	-	-	Dry	-
31313	AGP2	30 Mar 2015	-	20.2 -	20.2	-	-	-	-	-	Dry	-
31313	AGP2	27 Apr 2015	-	13.4 -	13.4	-	-	-	-	-	Dry	-
31313	AGP2	20 May 2015	-	17.5 -	17.5	-	-	-	-	-	Dry	-
31313	AGP2	16 Jun 2015	-	13.1 -	13.1	-	-	-	-	-	Dry	-
31313	AGP2	21 Jul 2015	3,624.52	14.9	14.9	3.7	3.7	5,846	2.9	0.322	Dry	-
31313	AGP2	17 Aug 2015	2,839.6	10.7	10.7	6.1	6.1	4,580	4.6	0.318	Flowing	-
31313	AGP2	22 Sep 2015	2,938.8	9.2	9.2	7.1	7.1	4,740	3.2	0.294	Flowing	-
31313	AGP2	19 Oct 2015	-	12.8 -	12.8	-	-	-	-	-	Dry	-
31313	AGP2	16 Nov 2015	-	18.1 -	18.1	-	-	-	-	-	Dry	-
31313	AGP2	07 Dec 2015	-	18.9 -	18.9	-	-	-	-	-	Dry	-
31313	AGP2	18 Jan 2016	-	32.5 -	32.5	-	-	-	-	-	Dry	-

Table A2 - Surface Water Analytical Results

			Inorganics	Field								Sample Preparation
			Total Dissolved Solids (Calc.)	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Depth to Water	Field Observations	Test - Comment 1
			mg/L	ºC	ºC	mg/L	mg/L	µS/cm	-	m	Pool Conditio	General Comment
31313	AGP2	15 Feb 2016	-	11.8 -	11.8	-	-	-	-	-	Dry	-
31313	AGP2	15 Mar 2016	-	20.5 -	20.5	-	-	-	-	-	Dry	-
31313	AGP2	13 Apr 2016	-	16.8 -	16.8	-	-	-	-	-	Dry	-
31313	AGP2	16 May 2016	-	20.1 -	20.1	-	-	-	-	-	Dry	-
31313	AGP2	20 Jun 2016	-	17.1 -	17.1	-	-	-	-	-	Dry	-
31313	AGP2	18 Jul 2016	-	11.8 -	11.8	-	-	-	-	-	Dry	-
31313	AGP2	17 Aug 2016	3,643.12	15.3	15.3	4.9	4.9	5,876	2.7	0.302	Flowing	-
31313	AGP2	19 Sep 2016	1,258.6	13.5	13.5	5	5	2,030	2.8	0.49	Flowing	-
31313	AGP2	17 Oct 2016	3,658	16	16	5.6	5.6	5,900	2.9	0.39	Flowing	-
31313	AGP2	14 Nov 2016	1,448.94	15.1	15.1	5.1	5.1	2,337	3	0.341	Flowing	-
31313	AGP2	06 Dec 2016	1,581	26.8	26.8	7.5	7.5	2,550	3	0.228	Flowing	-
31313	AGP2	19 Jan 2017	-	26.3 -	26.3	-	-	-	-	-	Dry	-
31313	AGP2	15 Feb 2017	-	13.8 -	13.8	-	-	-	-	-	Dry	-
31313	AGP2	20 Mar 2017	-	13.8 -	13.8	-	-	-	-	-	Dry	-
31313	AGP2	18 Apr 2017	1,773.2	18.2	18.2	8.78	8.78	2,860	3.58	0.072	Flowing	-
31313	AGP2	15 May 2017	1,568.6	13.8	13.8	5.15	5.15	2,530	2.99	0.34	Flowing	-
31313	AGP2	20 Jun 2017	1,463.2	18.7	18.7	8.2	8.2	2,360	2.8	0.305	Flowing	-
31313	AGP2	25 Jul 2017	1,581	10.3	10.3	8.3	8.3	2,550	3.18	0.328	Flowing	-
31313	AGP2	21 Aug 2017	1,655.4	9.8	9.8	9.8	9.8	2,670	3.2	0.343	Flowing	-
31313	AGP2	18 Sep 2017	1,200.32	16.3	16.3	7.98	7.98	1,936	3.2	0.437	Flowing	-
31313	AGP2	18 Oct 2017	1,516.52	26.8	26.8	4.26	4.26	2,446	3.36	0.318	Flowing	-
31313	AGP2	20 Nov 2017	1,793.04	26.2	26.2	3.11	3.11	2,892	3.56	0.27	Flowing	-
31313	AGP2	06 Dec 2017	1,376.4	22.3	22.3	6.06	6.06	2,220	2.99	0.257	Flowing	-
31313	AGP2	10 Jan 2018	-	19.2 -	19.2	-	-	-	-	-	Dry	-
31313	AGP2	06 Feb 2018	-	19.2 -	19.2	-	-	-	-	-	Dry	-
31313	AGP2	08 Mar 2018	-	19.2 -	19.2	-	-	-	-	-	Dry	-
31313	AGP2	12 Apr 2018	-	25 -	25	-	-	-	-	-	Dry	-
31313	AGP2	15 May 2018	-	16.8 -	16.8	-	-	-	-	-	Dry	-
31313	AGP2	22 Jun 2018	-	9.1 -	9.1	-	-	-	-	-	Dry	-
31313	AGP2	19 Jul 2018	-	11.1 -	11.1	-	-	-	-	-	Dry	-
31313	AGP2	14 Aug 2018	1,724.22	11.1	11.1	5.21	5.21	2,781	3.27	0.223	Flowing	-
31313	AGP2	24 Sep 2018	2,373.36	13.5	13.5	7	7	3,828	2.9	0.14	Flowing	-
31313	AGP2	17 Oct 2018	-	19.4 -	19.4	-	-	-	-	-	Trickle	Below Gauge
31313	AGP2	07 Nov 2018	-	13 -	13	-	-	-	-	-	Dry	-
31313	AGP2	12 Dec 2018	-	24 -	24	-	-	-	-	-	Dry	-
31313	AGP2	18 Jan 2019	-	22 -	22	-	-	-	-	-	Dry	-
31313	AGP2	12 Feb 2019	-	9.9 -	9.9	-	-	-	-	-	Dry	-
31313	AGP2	13 Mar 2019	-	16 -	16	-	-	-	-	-	Dry	-
31313	AGP2	08 Apr 2019	-	16 -	16	-	-	-	-	-	Dry	-
31313	AGP2	24 May 2019	-	15 -	15	-	-	-	-	-	Dry	-
31313	AGP2	18 Jun 2019	2,923.92	11	11	3.5	3.5	4,716	2.7	0.232	Flowing	-
31313	AGP2	29 Jul 2019	2,635	14	14	7.9	7.9	4,250	2.7	0.32	Flowing	-
31313	AGP2	01 Aug 2019	-	-	-	-	-	-	-	-	-	-
31313	AGP2	16 Sep 2019	3,870	11	11	9.9	9.9	3,860	2.6	0.346	Flowing	-

Table A2 - Surface Water Analytical Results

			Inorganics	Field								Sample Preparation
			Total Dissolved Solids (Calc.)	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Depth to Water	Field Observations	Test - Comment 1
			mg/L	ºC	ºC	mg/L	mg/L	µS/cm	-	m	Pool Conditio	General Comment
31313	AGP2	16 Oct 2019	2,312.6	12.8	12.8	6	6	3,730	2.8	0.258	Flowing	-
31313	AGP2	13 Nov 2019	3,870	18.7	18.7	8.6	8.6	3,660	2.8	0.216	Flowing	-
31313	AGP2	13 Dec 2019	-	16.8 -	16.8	-	-	-	-	-	Dry	-
31313	AGP2	14 Jan 2020	-	19.3 -	19.3	-	-	-	-	-	Dry	-
31313	AGP2	10 Feb 2020	-	19.3 -	19.3	-	-	-	-	-	Dry	-
31313	AGP2	18 Mar 2020	-	22.5 -	22.5	-	-	-	-	-	Dry	-
31313	AGP2	14 Apr 2020	2,436.6	16.2	16.2	9.58	9.58	3,930	3.18	0.08	Flowing	-
31313	AGP2	14 May 2020	2,641.2	7.6	7.6	10.6	10.6	4,260	3.03	-	Flowing	Below Gauge
31313	AGP2	10 Jun 2020	2,523.4	11.3	11.3	10.1	10.1	4,070	2.98	0.266	Flowing	-
31313	AGP2	13 Jul 2020	2,318.8	11.5	11.5	10.1	10.1	3,740	2.94	0.31	Flowing	-
31313	AGP2	13 Aug 2020	2,349.8	9.5	9.5	7.84	7.84	3,790	2.98	0.303	Flowing	-
31313	AGP2	08 Sep 2020	2,225.8	18.9	18.9	9.73	9.73	3,590	2.79	0.305	Flowing	-
31313	AGP2	15 Oct 2020	1,977.8	17.2	17.2	8.7	8.7	3,190	2.99	0.356	Flowing	-
31313	AGP2	11 Nov 2020	1,971.6	22	22	8	8	3,180	3.14	0.291	Flowing	-
31313	AGP2	10 Dec 2020	1,977.8	18.3	18.3	8.86	8.86	3,190	3.75	0.208	Flowing	-
31313	AGP2	12 Jan 2021	2,170	20.9	20.9	7.7	7.7	3,500	3.3	0.084	Flowing	-
31313	AGP2	08 Feb 2021	2,046	22.9	22.9	5.8	5.8	3,300	3.03	0.052	Flowing	-
31313	AGP2	09 Mar 2021	-	25.1 -	25.1	-	-	-	-	-	Dry	-
31313	AGP2	15 Apr 2021	-	15.2 -	15.2	-	-	-	-	-	Dry	-
31313	AGP2	10 May 2021	2,070.8	14	14	6.63	6.63	3,340	3.38	0.14	Flowing	-
31313	AGP2	04 Jun 2021	2,101.8	10.2	10.2	8.95	8.95	3,390	2.89	0.288	Flowing	-
31313	AGP2	13 Jul 2021	2,443.42	9	9	9.11	9.11	3,941	3.01	0.353	Flowing	-
31313	AGP2	11 Aug 2021	1,866.2	9.9	9.9	9.77	9.77	3,010	2.9	0.374	Flowing	-
31313	AGP2	09 Sep 2021	1,971.6	23.4	23.4	8.85	8.85	3,180	2.89	0.335	Flowing	-
31313	AGP2	11 Oct 2021	1,779.4	9.5	9.5	8.73	8.73	2,870	2.75	0.33	Flowing	-
31313	AGP2	03 Nov 2021	1,587.2	21.7	21.7	6.92	6.92	2,560	2.9	0.377	Flowing	-
31313	AGP2	02 Dec 2021	1,494.2	20.7	20.7	5.03	5.03	2,410	3.02	0.358	Flowing	-
31313	AGP2	06 Jan 2022	1,705	24.2	24.2	8.42	8.42	2,750	3.01	0.198	Flowing	-
31313	AGP2	08 Feb 2022	1,760.8	25.8	25.8	6.42	6.42	2,840	2.72	0.355	Flowing	-
31313	AGP2	09 Mar 2022	1,928.2	17.6	17.6	8.23	8.23	3,110	3.1	0.288	Flowing	-
31313	AGP2	26 Apr 2022	1,829	17.5	17.5	6.81	6.81	2,950	2.91	0.202	Flowing	-
31313	AGP2	12 May 2022	1,829	13	13	8.95	8.95	2,950	2.98	0.252	Flowing	-
31313	AGP2	09 Jun 2022	1,785.6	8.2	8.2	10.56	10.56	2,880	2.96	0.319	Flowing	-
31313	AGP2	07 Jul 2022	1,742.2	12.8	12.8	8.61	8.61	2,810	2.9	0.348	Flowing	-
31313	AGP2	03 Aug 2022	1,748.4	13.3	13.3	11.05	11.05	2,820	3.01	0.372	Flowing	-
31313	AGP2	15 Sep 2022	1,543.8	16.5	16.5	11.21	11.21	2,490	3.07	0.381	Flowing	-
31313	AGP2	21 Oct 2022	842.58	20.6	20.6	9.81	9.81	1,359	3.25	0.434	Flowing	-
31313	AGP2	16 Nov 2022	525.14	12.8	12.8	8.66	8.66	847	3.4	0.554	Flowing	-
31313	AGP2	05 Dec 2022	499.1	17.3	17.3	6.8	6.8	805	3.55	0.389	Flowing	-
31313	AGP2	10 Jan 2023	923.18	22.3	22.3	8.71	8.71	1,489	3.8	0.238	Flowing	-
31313	AGP2	06 Feb 2023	-	16.8 -	16.8	-	-	-	-	-	Dry	-
31313	AGP2	09 Mar 2023	-	16.8 -	16.8	-	-	-	-	-	Dry	-
31313	AGP2	11 Apr 2023	-	10.7 -	10.7	-	-	-	-	-	Dry	-
31313	AGP2	08 May 2023	-	7.4 -	7.4	-	-	-	-	-	Dry	-

Table A2 - Surface Water Analytical Results

			Inorganics	Field								Sample Preparation
			Total Dissolved Solids (Calc.)	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Depth to Water	Field Observations	Test - Comment 1
			mg/L	ºC	ºC	mg/L	mg/L	µS/cm	-	m	Pool Conditio	General Comment
31313	AGP2	19 Jun 2023	848.78	8.5	8.5	6.43	6.43	1,369	2.8	0.308	Flowing	-
31313	AGP2	10 Jul 2023	1,308.2	10.7	10.7	8.92	8.92	2,110	3.4	0.318	Flowing	-
31313	AGP2	07 Aug 2023	1,314.4	9.1	9.1	10.91	10.91	2,120	3.28	0.288	Flowing	-
31313	AGP2	07 Sep 2023	1,395	13.1	13.1	9.35	9.35	2,250	3.3	0.248	Flowing	-

Table A2 - Surface Water Analytical Results

			Inorganics	Field								Sample Preparation
			Total Dissolved Solids (Calc.)	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Depth to Water	Field Observations	Test - Comment 1
			mg/L	ºC	ºC	mg/L	mg/L	µS/cm	-	m	Pool Conditio	General Comment
EQL												
Site ID	**Location Code**	**Date**										
31313	ASP7	20 Jun 2016	1,457	13.8	13.8	5.14	5.14	2,350	3.57	-	Stagnant	Below Gauge
31313	ASP7	18 Jul 2016	1,351.6	14.8	14.8	3.9	3.9	2,180	3.7	0.023	Stagnant	-
31313	ASP7	17 Aug 2016	1,334.86	15.8	15.8	5.3	5.3	2,153	3.7	0.026	Stagnant	-
31313	ASP7	19 Sep 2016	914.5	14.6	14.6	5.24	5.24	1,475	3.42	0.311	Stagnant	-
31313	ASP7	18 Oct 2016	1,061.44	16.2	16.2	4.6	4.6	1,712	3.2	0.22	Stagnant	-
31313	ASP7	14 Nov 2016	930.62	15.6	15.6	5.54	5.54	1,501	5.24	0.14	Stagnant	-
31313	ASP7	07 Dec 2016	1,791.8	19.3	19.3	5.5	5.5	2,890	4.3	0.002	Stagnant	-
31313	ASP7	14 Jan 2017	-	17.2 -	17.2	-	-	-	-	-	Dry	-
31313	ASP7	15 Feb 2017	-	19.2 -	19.2	-	-	-	-	-	Dry	-
31313	ASP7	20 Mar 2017	-	19.2 -	19.2	-	-	-	-	-	Dry	-
31313	ASP7	18 Apr 2017	1,061.44	19	19	7.83	7.83	1,712	3.06	-	Stagnant	Below Gauge
31313	ASP7	15 May 2017	236.90000000000	13.4	13.4	6.29	6.29	1,995	3.46	0.115	Stagnant	-
31313	ASP7	20 Jun 2017	1,152.58	16.5	16.5	8.6	8.6	1,859	3.2	0.058	Stagnant	-
31313	ASP7	25 Jul 2017	192.88000000000	7	7	5.48	5.48	1,924	3.56	0.094	Stagnant	-
31313	ASP7	22 Aug 2017	934.34	15.1	15.1	5.05	5.05	1,507	3.99	0.12	Stagnant	-
31313	ASP7	19 Sep 2017	876.68	9.2	9.2	5.63	5.63	1,414	3.89	0.28	Stagnant	-
31313	ASP7	18 Oct 2017	980.22	19.2	19.2	5.41	5.41	1,581	4.33	0.1	Stagnant	-
31313	ASP7	21 Nov 2017	1,222.02	19.8	19.8	2.37	2.37	1,971	6.01	0.019	Stagnant	-
31313	ASP7	07 Dec 2017	1,438.4	14.3	14.3	2.32	2.32	2,320	4.86	0.013	Stagnant	-
31313	ASP7	11 Jan 2018	-	17.2 -	17.2	-	-	-	-	-	Dry	-
31313	ASP7	05 Feb 2018	-	26.8 -	26.8	-	-	-	-	-	Dry	-
31313	ASP7	08 Mar 2018	-	15.4 -	15.4	-	-	-	-	-	Dry	-
31313	ASP7	11 Apr 2018	-	17.2 -	17.2	-	-	-	-	-	Dry	-
31313	ASP7	14 May 2018	-	11.6 -	11.6	-	-	-	-	-	Dry	-
31313	ASP7	22 Jun 2018	1,837.68	11	11	4.2	4.2	2,964	3.73	-	Stagnant	Below Gauge
31313	ASP7	19 Jul 2018	1,686.4	8.2	8.2	7.95	7.95	2,720	3.76	-	Stagnant	Below Gauge
31313	ASP7	13 Aug 2018	1,742.82	7.2	7.2	5.3	5.3	2,811	3.71	-	Stagnant	Below Gauge
31313	ASP7	25 Sep 2018	1,744.68	11	11	6.3	6.3	2,814	3.2	-	Stagnant	Below Gauge
31313	ASP7	17 Oct 2018	-	18.5 -	18.5	-	-	-	-	-	Stagnant	Below Gauge
31313	ASP7	07 Nov 2018	-	19 -	19	-	-	-	-	-	Stagnant	Below Gauge
31313	ASP7	12 Dec 2018	-	26 -	26	-	-	-	-	-	Dry	-
31313	ASP7	18 Jan 2019	-	23 -	23	-	-	-	-	-	Dry	-
31313	ASP7	12 Feb 2019	-	12.5 -	12.5	-	-	-	-	-	Dry	-
31313	ASP7	13 Mar 2019	-	16 -	16	-	-	-	-	-	Dry	-
31313	ASP7	08 Apr 2019	-	17 -	17	-	-	-	-	-	Dry	-
31313	ASP7	24 May 2019	-	19 -	19	-	-	-	-	-	Dry	-
31313	ASP7	18 Jun 2019	1,789.32	11	11	6.5	6.5	2,886	3	-	Stagnant	Below Gauge
31313	ASP7	29 Jul 2019	440.88000000000	14	14	7.1	7.1	2,324	3.2	-	Stagnant	Below Gauge
31313	ASP7	17 Sep 2019	1,667.8	10.7	10.7	9.8	9.8	2,690	2.7	0.06	Stagnant	-
31313	ASP7	15 Oct 2019	1,897.2	14.2	14.2	4.2	4.2	3,060	2.8	-	Stagnant	Below Gauge
31313	ASP7	13 Nov 2019	2,077	15.4	15.4	8.6	8.6	3,350	3.1	-	Stagnant	Below Gauge

Table A2 - Surface Water Analytical Results

			Inorganics	Field								Sample Preparation
			Total Dissolved Solids (Calc.)	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Depth to Water	Field Observations	Test - Comment 1
			mg/L	ºC	ºC	mg/L	mg/L	µS/cm	-	m	Pool Conditio	General Comment
31313	ASP7	13 Dec 2019	-	23 -	23	-	-	-	-	-	Dry	-
31313	ASP7	13 Jan 2020	-	23 -	23	-	-	-	-	-	Dry	-
31313	ASP7	10 Feb 2020	-	18.5 -	18.5	-	-	-	-	-	Dry	-
31313	ASP7	17 Mar 2020	-	15.2 -	15.2	-	-	-	-	-	Dry	-
31313	ASP7	14 Apr 2020	1,674	16.1	16.1	8.61	8.61	2,700	3.42	-	Stagnant	Below Gauge
31313	ASP7	15 May 2020	1,605.8	8.6	8.6	7.44	7.44	2,590	3.49	-	Stagnant	Below Gauge
31313	ASP7	12 Jun 2020	1,649.2	5	5	12.39	12.39	2,660	4.58	-	Stagnant	Below Gauge
31313	ASP7	14 Jul 2020	1,407.4	9.1	9.1	9.91	9.91	2,270	3.04	-	Stagnant	Below Gauge
31313	ASP7	13 Aug 2020	1,438.4	9.5	9.5	9.93	9.93	2,320	3.07	0.01	Stagnant	-
31313	ASP7	08 Sep 2020	1,407.4	19.3	19.3	8.42	8.42	2,270	2.83	0.016	Stagnant	-
31313	ASP7	11 Oct 2020	1,401.2	22.5	22.5	7.74	7.74	2,260	3.22	0.018	Stagnant	-
31313	ASP7	13 Oct 2020	1,271	14.7	14.7	8.77	8.77	2,050	3.11	0.107	Stagnant	-
31313	ASP7	09 Dec 2020	1,705	18.6	18.6	6.45	6.45	2,750	3.11	-	Stagnant	Below Gauge
31313	ASP7	21 Jan 2021	1,711.2	17.9	17.9	7.7	7.7	2,760	3.23	-	Stagnant	Below Gauge
31313	ASP7	11 Feb 2021	-	22.5 -	22.5	-	-	-	-	-	Dry	-
31313	ASP7	09 Mar 2021	-	15.5 -	15.5	-	-	-	-	-	Dry	-
31313	ASP7	15 Apr 2021	-	14.2 -	14.2	-	-	-	-	-	Dry	-
31313	ASP7	10 May 2021	1,686.4	12.7	12.7	8.71	8.71	2,720	3.69	-	Stagnant	Below Gauge
31313	ASP7	04 Jun 2021	1,574.8	9.9	9.9	9.1	9.1	2,540	2.9	-	Stagnant	Below Gauge
31313	ASP7	14 Jul 2021	1,464.44	7.5	7.5	9.86	9.86	2,362	3.04	0.048	Stagnant	-
31313	ASP7	09 Aug 2021	1,320.6	7.9	7.9	10.72	10.72	2,130	3.12	0.132	Stagnant	-
31313	ASP7	09 Sep 2021	1,376.4	13.2	13.2	7.6	7.6	2,220	3.02	0.059	Stagnant	-
31313	ASP7	11 Oct 2021	1,333	9	9	9.92	9.92	2,150	2.58	0.058	Stagnant	-
31313	ASP7	03 Nov 2021	1,261.7	25.2	25.2	7.34	7.34	2,035	3.98	0.152	Stagnant	-
31313	ASP7	01 Dec 2021	1,240	25.6	25.6	5.9	5.9	2,000	3.16	0.11	Stagnant	-
31313	ASP7	13 Jan 2022	1,316.26	31.1	31.1	4.31	4.31	2,123	3.05	-	Stagnant	Below Gauge
31313	ASP7	08 Feb 2022	1,301	18.4	18.4	8.94	8.94	2,160	3.17	0.136	Stagnant	-
31313	ASP7	09 Mar 2022	1,636.8	15.1	15.1	8.91	8.91	2,640	3.23	0.028	Stagnant	-
31313	ASP7	26 Apr 2022	1,971.6	17	17	3.81	3.81	3,180	4.96	-	Stagnant	Below Gauge
31313	ASP7	12 May 2022	1,773.2	14.4	14.4	6.92	6.92	2,860	2.9	-	Stagnant	Below Gauge
31313	ASP7	09 Jun 2022	1,463.2	7.5	7.5	11.2	11.2	2,360	3.01	0.06	Stagnant	-
31313	ASP7	08 Jul 2022	1,450.8	9.1	9.1	11.2	11.2	2,340	3	0.06	Stagnant	-
31313	ASP7	03 Aug 2022	238.14000000000	12.1	12.1	11.7	11.7	1,997	3.06	0.098	Stagnant	-
31313	ASP7	15 Sep 2022	1,051.52	14.8	14.8	10.11	10.11	1,696	3.24	0.142	Stagnant	-
31313	ASP7	20 Oct 2022	835.76	14.1	14.1	9.11	9.11	1,348	3.3	0.198	Stagnant	-
31313	ASP7	17 Nov 2022	711.76	11.8	11.8	7.43	7.43	1,148	3.86	0.342	Stagnant	-
31313	ASP7	06 Dec 2022	818.4	22	22	6.38	6.38	1,320	3.56	0.188	Stagnant	-
31313	ASP7	11 Jan 2023	127.16000000000	26	26	7.42	7.42	1,818	5.86	0.088	Stagnant	-
31313	ASP7	06 Feb 2023	1,661.6	19.1	19.1	6.52	6.52	2,680	3.64	-	Stagnant	Below Gauge
31313	ASP7	10 Mar 2023	-	20.2 -	20.2	-	-	-	-	-	Dry	-
31313	ASP7	11 Apr 2023	-	17.1 -	17.1	-	-	-	-	-	Dry	-
31313	ASP7	08 May 2023	1,543.8	12.7	12.7	7.92	7.92	2,490	3.39	-	Stagnant	Below Gauge
31313	ASP7	20 Jun 2023	179.86000000000	9.3	9.3	10.1	10.1	1,903	3.2	0.12	Stagnant	-
31313	ASP7	11 Jul 2023	1,230.08	11.1	11.1	9.22	9.22	1,984	3.27	0.114	Stagnant	-

Table A2 - Surface Water Analytical Results

			Inorganics	Field								Sample Preparation
			Total Dissolved Solids (Calc.)	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Depth to Water	Field Observations	Test - Comment 1
			mg/L	ºC	ºC	mg/L	mg/L	µS/cm	-	m	Pool Conditio	General Comment
31313	ASP7	07 Aug 2023	1,271	3.1	3.1	10.71	10.71	2,050	3.28	0.096	Stagnant	-
31313	ASP7	07 Sep 2023	1,407.4	3.3	3.3	9.12	9.12	2,270	3.3	0.052	Stagnant	-

Table A2 - Surface Water Analytical Results

			Field								Inorganics													Sample Preparation
			Field Observations	Depth to Water	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)	Alkalinity (total) as CaCO3	Calcium	Chloride	Electrical Conductivity (Lab)	Magnesium	pH (Lab)	Potassium	Sodium	Sulphate	Total Dissolved Solids (Calc.)	Total Dissolved Solids (Lab)	Test - Comment 1
			Pool Condition	m	oC	oC	mg/L	mg/L	µS/cm	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	General Comment
EQL											2	2	2	0.5	0.5	1	0.5	0.1	0.5	0.5	0.5		1	
Site ID	**Location Code**	**Date**																						
31313	SV1	20 Apr 2010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	04 May 2010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	18 May 2010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	01 Jun 2010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	15 Jun 2010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	29 Jun 2010	Flowing	0.13	9.2	9.2	6.81	6.81	524	6.1	-	-	-	-	-	-	-	-	-	-	-	324.88	-	-
31313	SV1	12 Jul 2010	Flowing	0.127	12.5	12.5	6.72	6.72	513	6	-	-	-	-	-	-	-	-	-	-	-	318.06	-	-
31313	SV1	21 Jul 2010	Flowing	0.142	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	27 Jul 2010	Flowing	0.14	8.1	8.1	6.4	6.35	447	4.58	-	-	-	-	-	-	-	-	-	-	-	277.14	-	-
31313	SV1	11 Aug 2010	Flowing	0.168	9.9	9.9	8.62	7.79	384	6.8	-	-	-	-	-	-	-	-	-	-	-	238.08	-	-
31313	SV1	23 Aug 2010	Flowing	0.238	12.4	12.4	8.05	7.8	404	5.82	-	-	-	-	-	-	-	-	-	-	-	250.48	-	-
31313	SV1	07 Sep 2010	Flowing	0.349	10.1	10.1	10.1	9.4	384	5.6	-	-	-	-	-	-	-	-	-	-	-	238.08	-	-
31313	SV1	21 Sep 2010	Flowing	0.187	13.3	13.3	8.5	8.6	357	4.17	-	-	-	-	-	-	-	-	-	-	-	221.34	-	-
31313	SV1	05 Oct 2010	Flowing	0.161	13.5	13.5	9	9	330	4.95	-	-	-	-	-	-	-	-	-	-	-	204.6	-	-
31313	SV1	19 Oct 2010	Flowing	0.236	14.2	14.2	8.23	8.56	453	5.62	-	-	-	-	-	-	-	-	-	-	-	280.86	-	-
31313	SV1	01 Nov 2010	Flowing	0.249	15.2	15.2	9.2	8.8	406	5.41	-	-	-	-	-	-	-	-	-	-	-	251.72	-	-
31313	SV1	16 Nov 2010	Flowing	0.214	14.2	14.2	7.1	6.8	655	5.81	-	-	-	-	-	-	-	-	-	-	-	406.1	-	-
31313	SV1	01 Dec 2010	Flowing	0.224	19.1	19.1	6.8	6.8	530	5.31	-	-	-	-	-	-	-	-	-	-	-	328.6	-	-
31313	SV1	13 Dec 2010	Flowing	0.156	18.8	18.8	6.8	6.6	278	5.41	-	-	-	-	-	-	-	-	-	-	-	172.36	-	-
31313	SV1	29 Dec 2010	Flowing	0.136	21.5	21.5	2.7	2.8	313	5.74	-	-	-	-	-	-	-	-	-	-	-	194.06	-	-
31313	SV1	11 Jan 2011	Flowing	0.119	20.2	20.2	0.4	0.4	359	6.04	-	-	-	-	-	-	-	-	-	-	-	222.58	-	-
31313	SV1	27 Jan 2011	Flowing	0.189	20.5	20.5	5.4	5.2	273	5.62	-	-	-	-	-	-	-	-	-	-	-	169.26	-	-
31313	SV1	08 Feb 2011	Flowing	0.134	17.1	17.1	1.5	1.4	306	5.41	-	-	-	-	-	-	-	-	-	-	-	189.72	-	-
31313	SV1	21 Feb 2011	Flowing	0.149	17.3	17.3	1.1	1	299	6.28	-	-	-	-	-	-	-	-	-	-	-	185.38	-	-
31313	SV1	08 Mar 2011	Flowing	0.109	19.7	19.7	0.4	0.4	384	6.4	-	-	-	-	-	-	-	-	-	-	-	238.08	-	-
31313	SV1	21 Mar 2011	Flowing	0.128	20.1	20.1	0.6	0.6	398	5.83	-	-	-	-	-	-	-	-	-	-	-	246.76	-	-
31313	SV1	04 Apr 2011	Flowing	0.11	14.1	14.1	0.9	0.9	310	6	-	-	-	-	-	-	-	-	-	-	-	192.2	-	-
31313	SV1	20 Apr 2011	Flowing	0.122	16.2	16.2	0.6	0.5	280	6.4	-	-	-	-	-	-	-	-	-	-	-	173.6	-	-
31313	SV1	05 May 2011	Flowing	0.134	13	13	4.9	4.8	269	5.89	-	-	-	-	-	-	-	-	-	-	-	166.78	-	-
31313	SV1	16 May 2011	Flowing	0.15	13	13	5.6	5.1	253	5.83	-	-	-	-	-	-	-	-	-	-	-	156.86	-	-
31313	SV1	31 May 2011	Flowing	0.166	14.4	14.4	3.2	3.2	315	5.2	-	-	-	-	-	-	-	-	-	-	-	195.3	-	-
31313	SV1	15 Jun 2011	Flowing	0.18	10.8	10.8	4.9	4.9	241	6.5	-	-	-	-	-	-	-	-	-	-	-	149.42	-	-
31313	SV1	29 Jun 2011	Flowing	0.178	11.6	11.6	2.3	2.3	252	6.2	-	-	-	-	-	-	-	-	-	-	-	156.24	-	-
31313	SV1	12 Jul 2011	Flowing	0.2	14	14	5.6	5.6	260	5.8	-	-	-	-	-	-	-	-	-	-	-	161.2	-	-
31313	SV1	26 Jul 2011	Flowing	0.299	9.1	9.1	8	8	377	6.36	-	-	-	-	-	-	-	-	-	-	-	233.74	-	-
31313	SV1	09 Aug 2011	Flowing	0.174	9.1	9.1	7.1	6.9	252	5.4	-	-	-	-	-	-	-	-	-	-	-	156.24	-	-
31313	SV1	23 Aug 2011	Flowing	0.191	5.7	5.7	7.5	7	351	5.47	-	-	-	-	-	-	-	-	-	-	-	217.62	-	-
31313	SV1	06 Sep 2011	Flowing	0.155	14.2	14.2	1	1	307	5.81	-	-	-	-	-	-	-	-	-	-	-	190.34	-	-
31313	SV1	21 Sep 2011	Flowing	0.157	17.9	17.9	6.3	6.3	242	5.8	-	-	-	-	-	-	-	-	-	-	-	150.04	-	-
31313	SV1	04 Oct 2011	Flowing	0.197	15.8	15.8	7	7	259	6.8	-	-	-	-	-	-	-	-	-	-	-	160.58	-	-
31313	SV1	18 Oct 2011	Flowing	0.157	23.2	23.2	3.5	3.5	239	6.6	-	-	-	-	-	-	-	-	-	-	-	148.18	-	-
31313	SV1	02 Nov 2011	Flowing	0.162	16.6	16.6	5.35	5.35	242	5.8	-	-	-	-	-	-	-	-	-	-	-	150.04	-	-
31313	SV1	15 Nov 2011	Flowing	0.146	18	18	5.26	5.26	237	6.3	-	-	-	-	-	-	-	-	-	-	-	146.94	-	-
31313	SV1	01 Dec 2011	Flowing	0.152	16.3	16.3	8.4	8.4	237	6.4	-	-	-	-	-	-	-	-	-	-	-	146.94	-	-
31313	SV1	13 Dec 2011	Stagnant	0.145	18	18	2.5	2.6	236	5.93	-	-	-	-	-	-	-	-	-	-	-	146.32	-	-
31313	SV1	28 Dec 2011	Stagnant	0.118	22.1	22.1	5.2	5.2	256	6.23	-	-	-	-	-	-	-	-	-	-	-	158.72	-	-
31313	SV1	07 Jan 2012	Dry	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	10 Jan 2012	Stagnant	0.059	16.6	16.6	0.9	0.9	297	6.21	-	-	-	-	-	-	-	-	-	-	-	184.14	-	-
31313	SV1	24 Jan 2012	Dry	-	30.9 -	30.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Below Gauge
31313	SV1	14 Feb 2012	Dry	-	20 -	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	06 Mar 2012	Dry	-	19.1 -	19.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	20 Mar 2012	Dry	-	20.1 -	20.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	03 Apr 2012	Dry	-	20.4 -	20.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	17 Apr 2012	Dry	-	15.4 -	15.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	01 May 2012	Dry	-	18.3 -	18.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	15 May 2012	Flowing	0.146	14	14	5.42	5.42	265	5.92	-	-	-	-	-	-	-	-	-	-	-	164.3	-	-
31313	SV1	29 May 2012	Flowing	0.158	15.1	15.1	5.31	5.31	267	5.25	-	-	-	-	-	-	-	-	-	-	-	165.54	-	-
31313	SV1	12 Jun 2012	Flowing	0.232	8.7	8.7	8.81	8.81	314	5.07	-	-	-	-	-	-	-	-	-	-	-	194.68	-	-
31313	SV1	15 Jun 2012	-	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	26 Jun 2012	Flowing	0.319	8.2	8.2	9.5	9.5	416	6.5	-	-	-	-	-	-	-	-	-	-	-	257.92	-	-
31313	SV1	11 Jul 2012	Flowing	0.389	14.4	14.4	9.8	10	539	6.19	-	-	-	-	-	-	-	-	-	-	-	334.18	-	-
31313	SV1	24 Jul 2012	Flowing	0.201	10.3	10.3	8.2	8.2	391	5.98	-	-	-	-	-	-	-	-	-	-	-	242.42	-	-
31313	SV1	07 Aug 2012	Flowing	0.199	7.8	7.8	7.8	7.8	412	4.87	-	-	-	-	-	-	-	-	-	-	-	255.44	-	-
31313	SV1	21 Aug 2012	Flowing	0.348	15.1	15.1	9.6	9.6	435	5.92	-	-	-	-	-	-	-	-	-	-	-	269.7	-	-

Table A2 - Surface Water Analytical Results

			Field								Inorganics													Sample Preparation
			Field Observations	Depth to Water	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)	Alkalinity (total) as CaCO3	Calcium	Chloride	Electrical Conductivity (Lab)	Magnesium	pH (Lab)	Potassium	Sodium	Sulphate	Total Dissolved Solids (Calc.)	Total Dissolved Solids (Lab)	Test - Comment 1
			Pool Condition	m	oC	oC	mg/L	mg/L	µS/cm	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	General Comment
EQL											2	2	2	0.5	0.5	1	0.5	0.1	0.5	0.5	0.5		1	
Site ID	**Location Code**	**Date**																						
31313	SV1	04 Sep 2012	Flowing	0.256	16.6	16.6	7	7	426	4.34	-	-	-	-	-	-	-	-	-	-	-	264.12	-	-
31313	SV1	18 Sep 2012	Flowing	0.2	14.3	14.3	6.6	6.6	449	6.14	-	-	-	-	-	-	-	-	-	-	-	278.38	-	-
31313	SV1	02 Oct 2012	Flowing	0.227	11.8	11.8	8.1	8.1	510	6.13	-	-	-	-	-	-	-	-	-	-	-	316.2	-	-
31313	SV1	16 Oct 2012	Flowing	0.194	14.9	14.9	7.1	7.1	423	6.33	-	-	-	-	-	-	-	-	-	-	-	262.26	-	-
31313	SV1	27 Oct 2012	Flowing	0.166	19.1	19.1	5.68	5.31	241	5.9	-	-	-	-	-	-	-	-	-	-	-	149.42	-	-
31313	SV1	30 Oct 2012	Flowing	0.159	20.8	20.8	5.5	5.5	300	5.58	-	-	-	-	-	-	-	-	-	-	-	186	-	-
31313	SV1	13 Nov 2012	Flowing	0.14	13.7	13.7	5.2	5.2	307	5.72	-	-	-	-	-	-	-	-	-	-	-	190.34	-	-
31313	SV1	11 Dec 2012	Flowing	0.136	22.8	22.8	4.48	4.48	239	6.5	-	-	-	-	-	-	-	-	-	-	-	148.18	-	-
31313	SV1	20 Dec 2012	Flowing	0.148	15.6	15.6	5.1	5.1	233	5.59	-	-	-	-	-	-	-	-	-	-	-	144.46	-	-
31313	SV1	08 Jan 2013	Flowing	0.11	21.8	21.8	2.28	2.28	271	6.28	-	-	-	-	-	-	-	-	-	-	-	168.02	-	-
31313	SV1	22 Jan 2013	Dry	-	21.7 -	21.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	05 Feb 2013	Dry	-	24.1 -	24.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	19 Feb 2013	Dry	-	19.1 -	19.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	05 Mar 2013	Dry	-	23.4 -	23.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	19 Mar 2013	Dry	-	12.9 -	12.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	03 Apr 2013	Dry	-	16.7 -	16.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	16 Apr 2013	Dry	-	16.5 -	16.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	01 May 2013	Dry	-	16.1 -	16.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	14 May 2013	Dry	-	7.8 -	7.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	27 May 2013	Flowing	0.13	15.7	15.7	4.95	4.95	330	7.8	-	-	-	-	-	-	-	-	-	-	-	204.6	-	-
31313	SV1	11 Jun 2013	Flowing	0.141	13.2	13.2	5.9	5.9	278	7.4	-	-	-	-	-	-	-	-	-	-	-	172.36	-	-
31313	SV1	24 Jun 2013	Flowing	0.169	11	11	5.52	5.52	441	6.9	-	-	-	-	-	-	-	-	-	-	-	273.42	-	-
31313	SV1	09 Jul 2013	Flowing	0.175	5.1	5.1	7.15	7.15	379	7.3	-	-	-	-	-	-	-	-	-	-	-	234.98	-	-
31313	SV1	22 Jul 2013	Flowing	0.23	9.2	9.2	7	7	400	7.4	-	-	-	-	-	-	-	-	-	-	-	248	-	-
31313	SV1	06 Aug 2013	Flowing	0.626	10.7	10.7	8.4	8.4	366	7.8	-	-	-	-	-	-	-	-	-	-	-	226.92	-	-
31313	SV1	19 Aug 2013	Flowing	0.269	7.7	7.7	7.2	7.2	397	7.63	-	-	-	-	-	-	-	-	-	-	-	246.14	-	-
31313	SV1	03 Sep 2013	Flowing	0.228	13.8	13.8	6	6	331	6.59	-	-	-	-	-	-	-	-	-	-	-	205.22	-	-
31313	SV1	17 Sep 2013	Flowing	0.498	14.3	14.3	7.8	7.8	370	7.1	-	-	-	-	-	-	-	-	-	-	-	229.4	-	-
31313	SV1	01 Oct 2013	Flowing	0.505	12.9	12.9	12.4	12.4	325	6.51	-	-	-	-	-	-	-	-	-	-	-	201.5	-	-
31313	SV1	15 Oct 2013	Flowing	0.2	13.1	13.1	6.8	6.8	340	6.55	-	-	-	-	-	-	-	-	-	-	-	210.8	-	-
31313	SV1	29 Oct 2013	Flowing	0.28	13.5	13.5	7.87	7.8	395	6.79	-	-	-	-	-	-	-	-	-	-	-	244.9	-	-
31313	SV1	13 Nov 2013	Flowing	0.391	13.9	13.9	8.1	8.1	576	6.8	-	-	-	-	-	-	-	-	-	-	-	357.12	-	-
31313	SV1	26 Nov 2013	Flowing	0.23	21.3	21.3	6.71	6.7	444	6.52	-	-	-	-	-	-	-	-	-	-	-	275.28	-	-
31313	SV1	09 Dec 2013	Flowing	0.19	18.7	18.7	5.89	5.89	527	6.41	-	-	-	-	-	-	-	-	-	-	-	326.74	-	-
31313	SV1	24 Dec 2013	Flowing	0.185	14.8	14.8	4.9	5	236	5.5	-	-	-	-	-	-	-	-	-	-	-	146.32	-	-
31313	SV1	09 Jan 2014	Flowing	0.172	23	23	3.8	3.8	357	6.91	-	-	-	-	-	-	-	-	-	-	-	221.34	-	-
31313	SV1	21 Jan 2014	Flowing	0.169	19	19	3.01	3.01	310	6.63	-	-	-	-	-	-	-	-	-	-	-	192.2	-	-
31313	SV1	06 Feb 2014	Flowing	0.14	23.1	23.1	2.79	2.79	334	7.4	-	-	-	-	-	-	-	-	-	-	-	207.08	-	-
31313	SV1	17 Feb 2014	Flowing	0.149	16.9	16.9	4.11	4.11	430	6.77	-	-	-	-	-	-	-	-	-	-	-	266.6	-	-
31313	SV1	07 Mar 2014	Flowing	0.14	15.8	15.8	2.63	2.63	255	6.72	-	-	-	-	-	-	-	-	-	-	-	158.1	-	-
31313	SV1	18 Mar 2014	Flowing	0.15	13.8	13.8	5.31	5.31	235	6.7	-	-	-	-	-	-	-	-	-	-	-	145.7	-	-
31313	SV1	01 Apr 2014	Flowing	0.148	24.2	24.2	5.74	5.74	232	6.52	-	-	-	-	-	-	-	-	-	-	-	143.84	-	-
31313	SV1	15 Apr 2014	Flowing	0.182	15.1	15.1	3.44	3.44	224	6.18	-	-	-	-	-	-	-	-	-	-	-	138.88	-	-
31313	SV1	29 Apr 2014	Flowing	0.173	16.2	16.2	6.8	6.8	231	5.3	-	-	-	-	-	-	-	-	-	-	-	143	-	-
31313	SV1	12 May 2014	Flowing	0.18	15.6	15.6	7.9	7.9	223	5.5	-	-	-	-	-	-	-	-	-	-	-	138.26	-	-
31313	SV1	20 May 2014	Flowing	0.165	16.7	16.7	6.78	6.78	227	4.94	-	-	-	-	-	-	-	-	-	-	-	140.74	-	-
31313	SV1	10 Jun 2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	27 Jun 2014	Flowing	0.32	8.2	8.2	6.97	6.97	515	7.6	-	-	-	-	-	-	-	-	-	-	-	319.3	-	-
31313	SV1	08 Jul 2014	Flowing	0.234	11.1	11.1	7.69	7.69	439	7.7	-	-	-	-	-	-	-	-	-	-	-	272.18	-	-
31313	SV1	24 Jul 2014	Flowing	0.215	12.5	12.5	10.07	10.07	460	6.02	-	-	-	-	-	-	-	-	-	-	-	285.2	-	-
31313	SV1	06 Aug 2014	Flowing	0.251	10.4	10.4	9.84	9.84	445	6.7	-	-	-	-	-	-	-	-	-	-	-	275.9	-	-
31313	SV1	18 Aug 2014	Flowing	0.21	8.7	8.7	8.56	8.56	346	5.54	-	-	-	-	-	-	-	-	-	-	-	214.52	-	-
31313	SV1	04 Sep 2014	Flowing	0.2	13.7	13.7	9.2	9.2	298	5.5	-	-	-	-	-	-	-	-	-	-	-	184.76	-	-
31313	SV1	17 Sep 2014	Flowing	0.195	13.8	13.8	7.6	7.6	236.9	5.41	-	-	-	-	-	-	-	-	-	-	-	146.878	-	-
31313	SV1	30 Sep 2014	Flowing	0.17	10.8	10.8	5.8	5.8	232	5.69	-	-	-	-	-	-	-	-	-	-	-	143.84	-	-
31313	SV1	14 Oct 2014	Flowing	0.178	12.1	12.1	6.7	6.7	210	5.8	-	-	-	-	-	-	-	-	-	-	-	130.2	-	-
31313	SV1	29 Oct 2014	Flowing	0.16	18.6	18.6	5.52	5.52	215	5.82	-	-	-	-	-	-	-	-	-	-	-	133.3	-	-
31313	SV1	11 Nov 2014	Flowing	0.149	14.3	14.3	3.3	3.3	218	6.5	-	-	-	-	-	-	-	-	-	-	-	135.16	-	-
31313	SV1	01 Dec 2014	Flowing	0.14	24.6	24.6	3.27	3.27	218	5.6	-	-	-	-	-	-	-	-	-	-	-	135.16	-	-
31313	SV1	08 Dec 2014	Flowing	0.286	17.1	17.1	6.2	6.2	212	5.51	-	-	-	-	-	-	-	-	-	-	-	131.44	-	-
31313	SV1	08 Jan 2015	Flowing	0.132	25.2	25.2	3.8	3.8	255	6.14	-	-	-	-	-	-	-	-	-	-	-	158.1	-	-
31313	SV1	20 Jan 2015	Flowing	0.14	21.6	21.6	2.4	2.4	226	5.7	-	-	-	-	-	-	-	-	-	-	-	140.12	-	-
31313	SV1	04 Feb 2015	Flowing	0.121	17.6	17.6	0.6	0.6	293	6.3	-	-	-	-	-	-	-	-	-	-	-	181.66	-	-
31313	SV1	17 Feb 2015	Flowing	0.135	21.2	21.2	3.4	3.4	235	5.8	-	-	-	-	-	-	-	-	-	-	-	145.7	-	-

Table A2 - Surface Water Analytical Results

			Field								Inorganics													Sample Preparation
			Field Observations	Depth to Water	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)	Alkalinity (total) as CaCO3	Calcium	Chloride	Electrical Conductivity (Lab)	Magnesium	pH (Lab)	Potassium	Sodium	Sulphate	Total Dissolved Solids (Calc.)	Total Dissolved Solids (Lab)	Test - Comment 1
			Pool Condition	m	oC	oC	mg/L	mg/L	µS/cm	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	General Comment
EQL											2	2	2	0.5	0.5	1	0.5	0.1	0.5	0.5	0.5		1	
Site ID	**Location Code**	**Date**																						
31313	SV1	04 Mar 2015	Flowing	0.148	13.2	13.2	1.8	1.8	258	6.3	-	-	-	-	-	-	-	-	-	-	-	159.96	-	-
31313	SV1	31 Mar 2015	Flowing	0.134	19.6	19.6	3.2	3.2	254	5.9	-	-	-	-	-	-	-	-	-	-	-	157.48	-	-
31313	SV1	28 Apr 2015	Flowing	0.158	10.2	10.2	3.8	3.8	254	6.55	-	-	-	-	-	-	-	-	-	-	-	157.48	-	-
31313	SV1	20 May 2015	Flowing	0.202	18.9	18.9	7.5	7.5	226	5.6	-	-	-	-	-	-	-	-	-	-	-	140.12	-	-
31313	SV1	16 Jun 2015	Flowing	0.232	13.8	13.8	4.6	4.6	225	7.3	-	-	-	-	-	-	-	-	-	-	-	139.5	-	-
31313	SV1	20 Jul 2015	Flowing	0.185	3.7	3.7	8.56	8.56	223	6.2	-	-	-	-	-	-	-	-	-	-	-	138.26	-	-
31313	SV1	18 Aug 2015	Flowing	0.188	6.9	6.9	7	7	301	6.5	-	-	-	-	-	-	-	-	-	-	-	186.62	-	-
31313	SV1	21 Sep 2015	Flowing	0.169	16.4	16.4	7.17	7.17	223	7.36	-	-	-	-	-	-	-	-	-	-	-	138.26	-	-
31313	SV1	20 Oct 2015	Flowing	0.103	16.2	16.2	2.3	2.3	276	6	-	-	-	-	-	-	-	-	-	-	-	171.12	-	-
31313	SV1	17 Nov 2015	Flowing	0.109	16.1	16.1	3.1	3.1	380	6.6	-	-	-	-	-	-	-	-	-	-	-	235.6	-	-
31313	SV1	07 Dec 2015	Dry	-	19.1 -	19.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	21 Jan 2016	Dry	-	16.8 -	16.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	16 Feb 2016	Dry	-	15 -	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	15 Mar 2016	Dry	-	20.1 -	20.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	06 Apr 2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	13 Apr 2016	Dry	-	14.7 -	14.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	17 May 2016	Dry	-	12.8 -	12.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	21 Jun 2016	Dry	-	8.2 -	8.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	19 Jul 2016	Flowing	0.198	12	12	5.9	5.9	431	5.9	-	-	-	-	-	-	-	-	-	-	-	267.22	-	-
31313	SV1	18 Aug 2016	Flowing	0.163	9.9	9.9	6.5	6.4	520	5.4	-	-	-	-	-	-	-	-	-	-	-	322.4	-	-
31313	SV1	20 Sep 2016	Flowing	0.299	13.9	13.9	6.2	6.2	404	5.9	-	-	-	-	-	-	-	-	-	-	-	250.48	-	-
31313	SV1	18 Oct 2016	Flowing	0.297	9.8	9.8	8.9	8.9	491	6.3	-	-	-	-	-	-	-	-	-	-	-	304.42	-	-
31313	SV1	14 Nov 2016	Flowing	0.165	17.8	17.8	6.1	6.1	418	5.7	-	-	-	-	-	-	-	-	-	-	-	259.16	-	-
31313	SV1	07 Dec 2016	Flowing	0.13	9.4	9.4	2.6	2.6	312	5.8	-	-	-	-	-	-	-	-	-	-	-	193.44	-	-
31313	SV1	18 Jan 2017	Stagnant	-	21.9	21.9	1.1	1.1	395	6.1	-	-	-	-	-	-	-	-	-	-	-	244.9	-	Below Gauge
31313	SV1	14 Feb 2017	Dry	-	15 -	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Below Gauge
31313	SV1	20 Mar 2017	Dry	-	16.8 -	16.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	19 Apr 2017	Flowing	0.11	12.3	12.3	2.84	2.84	373	5.63	-	-	-	-	-	-	-	-	-	-	-	231.26	-	-
31313	SV1	16 May 2017	Flowing	0.134	7.3	7.3	5.41	5.41	310	5.76	-	-	-	-	-	-	-	-	-	-	-	192.2	-	-
31313	SV1	21 Jun 2017	Flowing	0.136	13.7	13.7	5.28	5.28	268	5.51	-	-	-	-	-	-	-	-	-	-	-	166.16	-	-
31313	SV1	24 Jul 2017	Flowing	0.17	8.2	8.2	6.29	6.29	660	6.02	-	-	-	-	-	-	-	-	-	-	-	409.2	-	-
31313	SV1	21 Aug 2017	Flowing	0.262	8.4	8.4	9.93	9.93	373	5.39	-	-	-	-	-	-	-	-	-	-	-	231.26	-	-
31313	SV1	18 Sep 2017	Flowing	0.334	13.4	13.4	6.98	6.98	326	7.05	-	-	-	-	-	-	-	-	-	-	-	202.12	-	-
31313	SV1	17 Oct 2017	Flowing	0.15	20.9	20.9	5.37	5.37	338	5.85	-	-	-	-	-	-	-	-	-	-	-	209.56	-	-
31313	SV1	20 Nov 2017	Flowing	0.131	22.7	22.7	4.59	4.53	306	6.01	-	-	-	-	-	-	-	-	-	-	-	189.72	-	-
31313	SV1	07 Dec 2017	Flowing	0.13	10.5	10.5	4.11	4.11	273	6.06	-	-	-	-	-	-	-	-	-	-	-	169.26	-	-
31313	SV1	10 Jan 2018	Dry	-	12.8 -	12.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	06 Feb 2018	Dry	-	12.8 -	12.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	09 Mar 2018	Dry	-	15.5 -	15.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	11 Apr 2018	Dry	-	14.7 -	14.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	14 May 2018	Dry	-	12.1 -	12.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	22 Jun 2018	Flowing	0.153	14.8	14.8	6.6	6.6	384	5.1	-	-	-	-	-	-	-	-	-	-	-	238.08	-	-
31313	SV1	18 Jul 2018	Flowing	0.14	7.5	7.5	3.71	3.71	381	5.75	-	-	-	-	-	-	-	-	-	-	-	236.22	-	-
31313	SV1	13 Aug 2018	Flowing	0.221	11.3	11.3	6.9	6.9	477	6.8	-	-	-	-	-	-	-	-	-	-	-	295.74	-	-
31313	SV1	25 Sep 2018	Flowing	0.131	11	11	4.8	4.8	336	5.2	-	-	-	-	-	-	-	-	-	-	-	208.32	-	-
31313	SV1	18 Oct 2018	Flowing	0.111	14.7	14.7	1.9	1.9	350	5.3	-	-	-	-	-	-	-	-	-	-	-	217	-	-
31313	SV1	07 Nov 2018	Flowing	0.095	12	12	1.6	1.6	348	5.8	-	-	-	-	-	-	-	-	-	-	-	215.76	-	-
31313	SV1	13 Dec 2018	Dry	-	15 -	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	21 Jan 2019	Dry	-	20 -	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	12 Feb 2019	Dry	-	11.3 -	11.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	14 Mar 2019	Dry	-	8 -	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	08 Apr 2019	Dry	-	17 -	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	27 May 2019	Dry	-	10 -	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	18 Jun 2019	Flowing	0.167	10	10	5.8	5.8	534	5.5	-	-	-	-	-	-	-	-	-	-	-	331.08	-	-
31313	SV1	30 Jul 2019	Flowing	0.177	9	9	7.2	7.2	437	5.8	-	-	-	-	-	-	-	-	-	-	-	270.94	-	-
31313	SV1	01 Aug 2019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	17 Sep 2019	Flowing	0.186	12	12	11	11	547	5.7	-	-	-	-	-	-	-	-	-	-	-	542	-	-
31313	SV1	15 Oct 2019	Flowing	0.121	14.4	14.4	6	6	381	5.7	-	-	-	-	-	-	-	-	-	-	-	236.22	-	-
31313	SV1	14 Nov 2019	Flowing	0.12	15.4	15.4	9.1	9.1	390	7	-	-	-	-	-	-	-	-	-	-	-	241.8	-	-
31313	SV1	12 Dec 2019	Stagnant	-	14.8	14.8	3.65	3.65	454	6.9	-	-	-	-	-	-	-	-	-	-	-	281.48	-	Below Gauge
31313	SV1	13 Jan 2020	Dry	-	24.3 -	24.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	10 Feb 2020	Dry	-	18 -	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	17 Mar 2020	Dry	-	18.2 -	18.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	15 Apr 2020	Dry	-	15.3 -	15.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table A2 - Surface Water Analytical Results

			Field								Inorganics													Sample Preparation
			Field Observations	Depth to Water	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)	Alkalinity (total) as CaCO3	Calcium	Chloride	Electrical Conductivity (Lab)	Magnesium	pH (Lab)	Potassium	Sodium	Sulphate	Total Dissolved Solids (Calc.)	Total Dissolved Solids (Lab)	Test - Comment 1
			Pool Condition	m	oC	oC	mg/L	mg/L	µS/cm	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	General Comment
EQL											2	2	2	0.5	0.5	1	0.5	0.1	0.5	0.5	0.5		1	
Site ID	**Location Code**	**Date**																						
31313	SV1	13 May 2020	Dry	-	15 -	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	12 Jun 2020	Dry	-	5.5 -	5.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	13 Jul 2020	Dry	-	11.4 -	11.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	12 Aug 2020	Flowing	0.13	12.1	12.1	5.39	5.39	555	5.13	-	-	-	-	-	-	-	-	-	-	-	344.1	-	-
31313	SV1	08 Sep 2020	Flowing	0.116	14.8	14.8	8.92	8.92	411	5.21	-	-	-	-	-	-	-	-	-	-	-	254.82	-	-
31313	SV1	14 Oct 2020	Flowing	0.198	15.1	15.1	9.95	9.95	458	7.31	-	-	-	-	-	-	-	-	-	-	-	283.96	-	-
31313	SV1	10 Nov 2020	Trickle	0.11	24.5	24.5	5.89	5.89	385	5.59	-	-	-	-	-	-	-	-	-	-	-	238.7	-	-
31313	SV1	09 Dec 2020	Trickle	0.08	11.2	11.2	9.87	9.87	391	6.12	-	-	-	-	-	-	-	-	-	-	-	242.42	-	-
31313	SV1	11 Jan 2021	Flowing	0.137	27.3	27.3	7.17	7.17	343	6.8	-	-	-	-	-	-	-	-	-	-	-	212.66	-	-
31313	SV1	09 Feb 2021	Flowing	0.101	18.5	18.5	5.7	5.7	416	5.87	32	<2	32	6.6	92	390	14	6.3	2.3	48	<10	257.92	360	-
31313	SV1	10 Mar 2021	Dry	-	16.2 -	16.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	14 Apr 2021	Dry	-	14.2 -	14.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	11 May 2021	Dry	-	11.6 -	11.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV1	03 Jun 2021	Trickle	0.11	12	12	7.12	7.12	513	5.93	-	-	-	-	-	-	-	-	-	-	-	318.06	-	-
31313	SV1	14 Jul 2021	Trickle	0.196	9.7	9.7	10.16	10.16	538	5.44	16	<2	16	6.9	140	540	14	6.5	1.8	73	<20	333.56	380	-
31313	SV1	10 Aug 2021	Flowing	0.208	10.2	10.2	10.49	10.49	404	6.3	-	-	-	-	-	-	-	-	-	-	-	250.48	-	-
31313	SV1	08 Sep 2021	Trickle	0.161	14.7	14.7	7.45	7.45	380	5.93	-	-	-	-	-	-	-	-	-	-	-	235.6	-	-
31313	SV1	12 Oct 2021	Trickle	0.2	15.5	15.5	9.51	9.51	367	5.4	-	-	-	-	-	-	-	-	-	-	-	227.54	-	-
31313	SV1	04 Nov 2021	Flowing	0.513	12.5	12.5	10.42	10.42	381	6.2	-	-	-	-	-	-	-	-	-	-	-	236.22	-	-
31313	SV1	01 Dec 2021	Flowing	0.158	26.5	26.5	7.29	7.29	290	5.91	-	-	-	-	-	-	-	-	-	-	-	179.8	-	-
31313	SV1	06 Jan 2022	Flowing	0.176	22.8	22.8	7.83	7.83	283	6.5	-	-	-	-	-	-	-	-	-	-	-	175.46	-	-
31313	SV1	07 Feb 2022	Flowing	0.164	25.5	25.5	6.59	6.59	262	6.2	-	-	-	-	-	-	-	-	-	-	-	162.44	-	-
31313	SV1	08 Mar 2022	Flowing	0.158	15.1	15.1	7.1	7.1	335	6.4	-	-	-	-	-	-	-	-	-	-	-	207.7	-	-
31313	SV1	27 Apr 2022	Flowing	0.171	16.2	16.2	7.66	7.66	360	6.44	-	-	-	-	-	-	-	-	-	-	-	223.2	-	-
31313	SV1	11 May 2022	Flowing	0.178	13.5	13.5	8.05	8.05	272	6.6	-	-	-	-	-	-	-	-	-	-	-	168.64	-	-
31313	SV1	08 Jun 2022	Flowing	0.236	8	8	8.91	8.91	444	5.8	-	-	-	-	-	-	-	-	-	-	-	275.28	-	-
31313	SV1	02 Jul 2022	-	-	-	-	-	-	-	-	9	2	9	2	65	250	6.6	6	1.4	39	10	-	160	-
31313	SV1	07 Jul 2022	Flowing	0.192	10.2	10.2	8.71	8.71	284	5.77	3	2	3	1.9	74	270	6.5	5.8	1	35	10	176.08	200	-
31313	SV1	02 Aug 2022	Flowing	0.214	12.1	12.1	9.87	9.87	266	6.28	-	-	-	-	-	-	-	-	-	-	-	164.92	-	-
31313	SV1	14 Sep 2022	Flowing	0.222	14.5	14.5	8.72	8.72	386	7.2	-	-	-	-	-	-	-	-	-	-	-	239.32	-	-
31313	SV1	21 Oct 2022	Flowing	0.258	13.8	13.8	9.85	9.85	503	6.98	-	-	-	-	-	-	-	-	-	-	-	311.86	-	-
31313	SV1	17 Nov 2022	Flowing	0.337	10.4	10.4	9.54	9.54	417	6.52	-	-	-	-	-	-	-	-	-	-	-	258.54	-	-
31313	SV1	06 Dec 2022	Flowing	0.23	15.6	15.6	9.44	9.44	386	6.37	-	-	-	-	-	-	-	-	-	-	-	239.32	-	-
31313	SV1	11 Jan 2023	Flowing	0.183	17.9	17.9	5.1	5.1	280	6.07	-	-	-	-	-	-	-	-	-	-	-	173.6	-	-
31313	SV1	07 Feb 2023	Flowing	0.195	15.7	15.7	7.55	7.55	388	6.14	-	-	-	-	-	-	-	-	-	-	-	240.56	-	-
31313	SV1	10 Mar 2023	Flowing	0.178	14.7	14.7	7.45	7.45	297	6.8	-	-	-	-	-	-	-	-	-	-	-	184.14	-	-
31313	SV1	12 Apr 2023	Flowing	0.23	12.2	12.2	9.2	9.2	288	6.03	-	-	-	-	-	-	-	-	-	-	-	178.56	-	-
31313	SV1	09 May 2023	Flowing	0.218	8.8	8.8	9.2	9.2	349	5.6	-	-	-	-	-	-	-	-	-	-	-	216.38	-	-
31313	SV1	20 Jun 2023	Flowing	0.265	8.5	8.5	10.36	10.36	351	5.97	-	-	-	-	-	-	-	-	-	-	-	217.62	-	-
31313	SV1	02 Jul 2023	-	-	-	-	-	-	-	-	6	<2	6	1.5	81	250	5.9	6	1.4	35	<5	-	160	-
31313	SV1	10 Jul 2023	Flowing	0.258	10.6	10.6	8.82	8.82	498	6.6	-	-	-	-	-	-	-	-	-	-	-	308.76	-	-
31313	SV1	11 Aug 2023	Flowing	0.224	7	7	8.92	8.92	323	6.19	-	-	-	-	-	-	-	-	-	-	-	200.26	-	-
31313	SV1	06 Sep 2023	Flowing	0.217	10.1	10.1	8.72	7.72	293	5.02	-	-	-	-	-	-	-	-	-	-	-	181.66	-	-
31313	SV1	07 Oct 2023	-	-	-	-	-	-	-	-	14	<2	14	3.1	130	370	10	5	1.2	54	<10	-	250	-

Table A2 - Surface Water Analytical Results

			Field								Inorganics													Sample Preparation
			Field Observations	Depth to Water	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)	Alkalinity (total) as CaCO3	Calcium	Chloride	Electrical Conductivity (Lab)	Magnesium	pH (Lab)	Potassium	Sodium	Sulphate	Total Dissolved Solids (Calc.)	Total Dissolved Solids (Lab)	Test - Comment 1
			Pool Condition	m	oC	oC	mg/L	mg/L	µS/cm	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	General Comment
EQL											2	2	2	0.5	0.5	1	0.5	0.1	0.5	0.5	0.5		1	
Site ID	**Location Code**	**Date**																						
31313	SV2	01 Jun 2010	Stagnant	-	14.5	17.7	10.42	10.42	481	4.96	-	-	-	-	-	-	-	-	-	-	-	298.22	-	Below Gauge
31313	SV2	30 Jun 2010	Stagnant	-	9.5	9.1	8.9	10.2	311	5.7	-	-	-	-	-	-	-	-	-	-	-	192.82	-	Below Gauge
31313	SV2	28 Jul 2010	Stagnant	-	9.1	12.3	9.01	9.44	331	5	-	-	-	-	-	-	-	-	-	-	-	205.22	-	Below Gauge
31313	SV2	11 Aug 2010	Stagnant	0.006	9.1	8.8	9.87	9.42	387	5.6	-	-	-	-	-	-	-	-	-	-	-	239.94	-	-
31313	SV2	30 Aug 2010	Stagnant	-	16	16.7	11	9.5	455	6.92	-	-	-	-	-	-	-	-	-	-	-	282.1	-	Below Gauge
31313	SV2	07 Sep 2010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Below Gauge
31313	SV2	21 Sep 2010	Stagnant	-	14.2	15.7	11.1	11.1	2,480	6.1	-	-	-	-	-	-	-	-	-	-	-	1,537.6	-	Below Gauge
31313	SV2	05 Oct 2010	-	0.03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV2	19 Oct 2010	Flowing	0.028	18.3	17.6	8	8	2,500	2.8	-	-	-	-	-	-	-	-	-	-	-	1,550	-	-
31313	SV2	16 Nov 2010	Flowing	0.018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV2	01 Dec 2010	Flowing	0.01	17.3	19.1	7	6	2,290	2.79	-	-	-	-	-	-	-	-	-	-	-	1,419.8	-	-
31313	SV2	13 Dec 2010	Flowing	-	21.1	20.1	7.2	6	2,180	2.29	-	-	-	-	-	-	-	-	-	-	-	1,351.6	-	Below Gauge
31313	SV2	11 Jan 2011	Flowing	-	22.2	20.2	8	7.8	2,420	4.03	-	-	-	-	-	-	-	-	-	-	-	1,500.4	-	Below Gauge
31313	SV2	08 Feb 2011	Flowing	0.018	23.1	21	1.8	4.8	1,468	3.38	-	-	-	-	-	-	-	-	-	-	-	910.16	-	-
31313	SV2	21 Feb 2011	Flowing	-	19.6	18.2	8.8	8.5	1,483	3.54	-	-	-	-	-	-	-	-	-	-	-	919.46	-	Below Gauge
31313	SV2	08 Mar 2011	Flowing	-	23.1	27.3	9.1	7.1	1,597	3.53	-	-	-	-	-	-	-	-	-	-	-	990.14	-	Below Gauge
31313	SV2	04 Apr 2011	Flowing	-	20.6	16.9	10.8	10.7	1,216	3.71	-	-	-	-	-	-	-	-	-	-	-	753.92	-	Below Gauge
31313	SV2	20 Apr 2011	Flowing	-	17.7	16.2	10.6	10.7	1,108	3.62	-	-	-	-	-	-	-	-	-	-	-	686.96	-	Below Gauge
31313	SV2	06 May 2011	Flowing	-	12.1	11.3	7.9	9.1	1,150	3.73	-	-	-	-	-	-	-	-	-	-	-	713	-	Below Gauge
31313	SV2	31 May 2011	Flowing	-	12.1	13.1	9.7	9.6	1,057	3.91	-	-	-	-	-	-	-	-	-	-	-	655.34	-	Below Gauge
31313	SV2	15 Jun 2011	Flowing	-	12.1	14.3	8	8	1,120	4.18	-	-	-	-	-	-	-	-	-	-	-	694.4	-	Below Gauge
31313	SV2	29 Jun 2011	Flowing	-	10.3	15.3	10.1	10.1	932	3.75	-	-	-	-	-	-	-	-	-	-	-	577.84	-	Below Gauge
31313	SV2	26 Jul 2011	Stagnant	0.005	10.7	13.1	10.7	10.7	485	5.73	-	-	-	-	-	-	-	-	-	-	-	300.7	-	-
31313	SV2	09 Aug 2011	Flowing	-	11.7	14.3	8	8	484	4.69	-	-	-	-	-	-	-	-	-	-	-	300.08	-	Below Gauge
31313	SV2	23 Aug 2011	Flowing	-	15.8	18.8	8.89	9.66	461	4.53	-	-	-	-	-	-	-	-	-	-	-	285.82	-	Below Gauge
31313	SV2	21 Sep 2011	Flowing	0.004	6.2	18.9	10	10	1,741	3.9	-	-	-	-	-	-	-	-	-	-	-	1,079.42	-	-
31313	SV2	04 Oct 2011	Flowing	-	20	23.1	9	9	1,423	4.02	-	-	-	-	-	-	-	-	-	-	-	882.26	-	Below Gauge
31313	SV2	18 Oct 2011	Flowing	-	23.2	27.1	6.64	6.64	1,324	3.88	-	-	-	-	-	-	-	-	-	-	-	820.88	-	Below Gauge
31313	SV2	15 Nov 2011	Flowing	-	27.6	30.1	9.45	9.46	1,638	3.78	-	-	-	-	-	-	-	-	-	-	-	1,015.56	-	Below Gauge
31313	SV2	01 Dec 2011	Flowing	-	23.5	16.5	8.6	8.6	1,383	4.14	-	-	-	-	-	-	-	-	-	-	-	857.46	-	Below Gauge
31313	SV2	14 Dec 2011	Flowing	-	20	20.2	9.6	8.1	1,791	3.7	-	-	-	-	-	-	-	-	-	-	-	1,110.42	-	Below Gauge
31313	SV2	11 Jan 2012	Dry	-	-	11.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV2	08 Feb 2012	Dry	-	-	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV2	21 Feb 2012	Dry	-	-	23.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV2	07 Mar 2012	Dry	-	-	16.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV2	04 Apr 2012	Dry	-	-	24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV2	17 Apr 2012	Dry	-	-	17.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV2	24 Apr 2012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV2	02 May 2012	Flowing	-	14.8	15.1	8.5	8.5	644	4.2	-	-	-	-	-	-	-	-	-	-	-	399.28	-	Below Gauge
31313	SV2	30 May 2012	Flowing	-	15.9	17.3	8.1	8.1	233	5.8	-	-	-	-	-	-	-	-	-	-	-	144.46	-	Below Gauge
31313	SV2	12 Jun 2012	Flowing	0.087	11.1	15.3	8.26	8.26	1,607	3.77	-	-	-	-	-	-	-	-	-	-	-	996.34	-	-
31313	SV2	25 Jun 2012	Flowing	0.04	11.5	13.1	9.72	9.7	1,548	3.91	-	-	-	-	-	-	-	-	-	-	-	959.76	-	-
31313	SV2	23 Jul 2012	Flowing	0.054	10	11.4	10.2	10.2	1,548	3.86	-	-	-	-	-	-	-	-	-	-	-	959.76	-	-
31313	SV2	07 Aug 2012	Flowing	0.038	9.7	13.8	9.3	9.3	1,455	3.81	-	-	-	-	-	-	-	-	-	-	-	902.1	-	-
31313	SV2	20 Aug 2012	Flowing	0.034	11.1	9.7	10.11	9.96	1,392	3.83	-	-	-	-	-	-	-	-	-	-	-	863.04	-	-
31313	SV2	18 Sep 2012	Flowing	0.046	11.5	10.3	9.9	9.9	1,261	4.06	-	-	-	-	-	-	-	-	-	-	-	781.82	-	-
31313	SV2	16 Oct 2012	Flowing	0.018	15.7	13	7.5	7.5	1,333	3.71	-	-	-	-	-	-	-	-	-	-	-	826.46	-	-
31313	SV2	12 Nov 2012	Flowing	0.017	18	23.4	6.3	6.3	2,345	3.61	-	-	-	-	-	-	-	-	-	-	-	1,453.9	-	-
31313	SV2	11 Dec 2012	Flowing	-	20.3	16.3	6.37	6.37	2,570	3.69	-	-	-	-	-	-	-	-	-	-	-	1,593.4	-	Below Gauge
31313	SV2	08 Jan 2013	Flowing	-	21.8	17.6	3.98	3.98	3,140	3.63	-	-	-	-	-	-	-	-	-	-	-	1,946.8	-	Below Gauge
31313	SV2	04 Feb 2013	Flowing	-	28.2	26.7	1.1	1.1	3,610	3.86	-	-	-	-	-	-	-	-	-	-	-	2,238.2	-	Below Gauge
31313	SV2	05 Mar 2013	Dry	-	-	16.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV2	03 Apr 2013	Dry	-	-	12.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV2	30 Apr 2013	Dry	-	-	19.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV2	27 May 2013	Dry	-	-	14.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV2	25 Jun 2013	Dry	-	9.8	11.8	10.27	10.27	464	7.4	-	-	-	-	-	-	-	-	-	-	-	287.68	-	Below Gauge
31313	SV2	23 Jul 2013	Flowing	-	11.4	13.8	5.4	5.4	250	6.9	-	-	-	-	-	-	-	-	-	-	-	155	-	Below Gauge
31313	SV2	20 Aug 2013	Flowing	0.1	12.1	13.9	8.3	8.3	1,400	3.84	-	-	-	-	-	-	-	-	-	-	-	868	-	-
31313	SV2	16 Sep 2013	Flowing	0.04	13.8	15.2	8.4	8.4	1,149	3.87	-	-	-	-	-	-	-	-	-	-	-	712.38	-	-
31313	SV2	14 Oct 2013	Flowing	0.069	12.2	11.8	8.3	8.3	1,099	3.82	-	-	-	-	-	-	-	-	-	-	-	681.38	-	-
31313	SV2	13 Nov 2013	Flowing	0.044	15.5	13.7	12.6	12.6	866	4.03	-	-	-	-	-	-	-	-	-	-	-	536.92	-	-
31313	SV2	06 Dec 2013	Flowing	0.02	14.7	15.6	5.2	5.2	1,090	3.77	-	-	-	-	-	-	-	-	-	-	-	675.8	-	-
31313	SV2	10 Jan 2014	Flowing	-	21.9	20.8	2.9	2.9	1,425	3.71	-	-	-	-	-	-	-	-	-	-	-	883.5	-	Below Gauge
31313	SV2	06 Feb 2014	Dry	-	-	12.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table A2 - Surface Water Analytical Results

			Field								Inorganics													Sample Preparation
			Field Observations	Depth to Water	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)	Alkalinity (total) as CaCO3	Calcium	Chloride	Electrical Conductivity (Lab)	Magnesium	pH (Lab)	Potassium	Sodium	Sulphate	Total Dissolved Solids (Calc.)	Total Dissolved Solids (Lab)	Test - Comment 1
			Pool Condition	m	oC	oC	mg/L	mg/L	µS/cm	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	General Comment
EQL											2	2	2	0.5	0.5	1	0.5	0.1	0.5	0.5	0.5		1	
Site ID	**Location Code**	**Date**																						
31313	SV2	07 Mar 2014	Dry	-	-	18.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV2	01 Apr 2014	Dry	-	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV2	29 Apr 2014	Flowing	-	15.6	15.5	8.45	8.45	1,340	3.87	-	-	-	-	-	-	-	-	-	-	-	268	-	Below Gauge
31313	SV2	20 May 2014	Flowing	-	17.8	17.8	9.72	9.72	1,626	4.17	-	-	-	-	-	-	-	-	-	-	-	1,008.12	-	Below Gauge
31313	SV2	26 Jun 2014	Flowing	-	11.9	10.3	9.51	9.51	1,101	4.2	-	-	-	-	-	-	-	-	-	-	-	682.62	-	Below Gauge
31313	SV2	23 Jul 2014	Flowing	-	8.5	8.6	8.2	8.2	547	5.2	-	-	-	-	-	-	-	-	-	-	-	339.14	-	Below Gauge
31313	SV2	18 Aug 2014	Flowing	0.08	10.1	8.5	10.58	10.58	1,158	3.6	-	-	-	-	-	-	-	-	-	-	-	717.96	-	-
31313	SV2	17 Sep 2014	Flowing	0.052	14.5	13.2	9.8	9.75	1,230	3.85	-	-	-	-	-	-	-	-	-	-	-	762.6	-	-
31313	SV2	13 Oct 2014	Flowing	-	18	13.1	7.74	7.74	1,381	3.73	-	-	-	-	-	-	-	-	-	-	-	856.22	-	Below Gauge
31313	SV2	10 Nov 2014	Flowing	-	17	17	6.1	6.1	1,954	3.6	-	-	-	-	-	-	-	-	-	-	-	1,211.48	-	Below Gauge
31313	SV2	08 Dec 2014	Flowing	-	23.8	22.7	7.8	7.8	2,200	3.5	-	-	-	-	-	-	-	-	-	-	-	1,364	-	Below Gauge
31313	SV2	07 Jan 2015	Dry	-	-	18.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV2	05 Feb 2015	Flowing	-	17	15.1	7.6	7.6	1,088	4.3	-	-	-	-	-	-	-	-	-	-	-	674.56	-	Below Gauge
31313	SV2	04 Mar 2015	Flowing	-	20.2	20.2	9.6	9.6	1,356	3.7	-	-	-	-	-	-	-	-	-	-	-	840.72	-	Below Gauge
31313	SV2	30 Mar 2015	Flowing	-	18	18.3	9.7	9.7	1,333	3.73	-	-	-	-	-	-	-	-	-	-	-	826.46	-	Below Gauge
31313	SV2	27 Apr 2015	Dry	-	-	13.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV2	20 May 2015	Flowing	-	12.2	12.5	10	10	1,236	4.4	-	-	-	-	-	-	-	-	-	-	-	766.32	-	Below Gauge
31313	SV2	16 Jun 2015	Flowing	-	10.9	13.2	5.1	5.1	889	4.1	-	-	-	-	-	-	-	-	-	-	-	551.18	-	Below Gauge
31313	SV2	20 Jun 2015	Flowing	-	14.4	16.7	7.61	7.61	593	4.14	-	-	-	-	-	-	-	-	-	-	-	367.66	-	Below Gauge
31313	SV2	21 Jul 2015	Flowing	-	8.3	14.1	11.2	11.2	584	4.3	-	-	-	-	-	-	-	-	-	-	-	362.08	-	Below Gauge
31313	SV2	17 Aug 2015	Flowing	-	10.1	10.3	4.17	4.17	745	5.8	-	-	-	-	-	-	-	-	-	-	-	461.9	-	Below Gauge
31313	SV2	22 Sep 2015	Flowing	-	10.8	9.2	5.2	5.2	707	4.5	-	-	-	-	-	-	-	-	-	-	-	438.34	-	Below Gauge
31313	SV2	19 Oct 2015	Flowing	-	15	12.8	9.1	9.1	1,111	3.7	-	-	-	-	-	-	-	-	-	-	-	688.82	-	Below Gauge
31313	SV2	16 Nov 2015	Dry	-	-	17.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV2	07 Dec 2015	Dry	-	-	18.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV2	18 Jan 2016	Dry	-	-	32.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV2	15 Feb 2016	Dry	-	-	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV2	15 Mar 2016	Dry	-	-	26.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV2	13 Apr 2016	Dry	-	-	16.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV2	16 May 2016	Flowing	-	20.2	20.2	8.6	8.6	780	5.21	-	-	-	-	-	-	-	-	-	-	-	483.6	-	Below Gauge
31313	SV2	18 Jul 2016	Flowing	-	10.4	11.6	7.5	7.5	248	6.5	-	-	-	-	-	-	-	-	-	-	-	153.76	-	Below Gauge
31313	SV2	17 Aug 2016	Flowing	-	12.1	13	9.7	9.7	234	4.7	-	-	-	-	-	-	-	-	-	-	-	145.08	-	Below Gauge
31313	SV2	19 Sep 2016	Flowing	0.14	14.5	14.8	7	7	1,305	3.6	-	-	-	-	-	-	-	-	-	-	-	809.1	-	-
31313	SV2	17 Oct 2016	Flowing	0.07	14.7	16.1	8.41	8.41	1,354	3.6	-	-	-	-	-	-	-	-	-	-	-	839.48	-	-
31313	SV2	14 Nov 2016	Flowing	0.039	14.7	14.6	9.4	9.4	1,138	3.7	-	-	-	-	-	-	-	-	-	-	-	705.56	-	-
31313	SV2	06 Dec 2016	Flowing	0.011	22.6	19.1	2.5	2.5	1,352	3.5	-	-	-	-	-	-	-	-	-	-	-	838.24	-	-
31313	SV2	19 Jan 2017	Flowing	-	21	25.5	7.45	7.45	2,197	3.4	-	-	-	-	-	-	-	-	-	-	-	1,362.14	-	Below Gauge
31313	SV2	15 Feb 2017	Flowing	-	16.6	14.2	6.33	6.33	2,850	3.52	-	-	-	-	-	-	-	-	-	-	-	1,767	-	Below Gauge
31313	SV2	20 Mar 2017	Dry	-	-	16.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV2	18 Apr 2017	Flowing	-	13.2	15.5	8.16	8.16	282	4.51	-	-	-	-	-	-	-	-	-	-	-	174.84	-	Below Gauge
31313	SV2	15 May 2017	Flowing	0.046	11.2	9	10.87	10.87	1,167	3.83	-	-	-	-	-	-	-	-	-	-	-	723.54	-	-
31313	SV2	20 Jun 2017	Stagnant	-	11.1	12.6	9.65	9.54	1,136	3.9	-	-	-	-	-	-	-	-	-	-	-	704.32	-	Below Gauge
31313	SV2	25 Jul 2017	Flowing	-	12.3	11.8	10.02	10.02	1,054	4.16	-	-	-	-	-	-	-	-	-	-	-	653.48	-	Below Gauge
31313	SV2	21 Aug 2017	Flowing	0.025	9.9	9.1	10.33	10.33	641	4.06	-	-	-	-	-	-	-	-	-	-	-	397.42	-	-
31313	SV2	18 Sep 2017	Flowing	0.08	13.6	16.4	8.9	8.9	953	4.05	-	-	-	-	-	-	-	-	-	-	-	590.86	-	-
31313	SV2	18 Oct 2017	Flowing	0.024	22.3	26.5	5.81	5.81	973	4.61	-	-	-	-	-	-	-	-	-	-	-	603.26	-	-
31313	SV2	21 Nov 2017	Flowing	-	25.8	27.1	9.18	9.18	1,128	3.56	-	-	-	-	-	-	-	-	-	-	-	699.36	-	Below Gauge
31313	SV2	06 Dec 2017	Flowing	-	25.8	24.3	4.37	4.37	1,192	3.55	-	-	-	-	-	-	-	-	-	-	-	739.04	-	Below Gauge
31313	SV2	10 Jan 2018	Dry	-	-	19.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV2	06 Feb 2018	Dry	-	-	26.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV2	08 Mar 2018	Dry	-	-	26.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV2	12 Apr 2018	Dry	-	-	23.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV2	15 May 2018	Flowing	-	14.5	16.7	4.05	4.05	830	4.02	-	-	-	-	-	-	-	-	-	-	-	514.6	-	Below Gauge
31313	SV2	22 Jun 2018	Flowing	-	7.7	8.3	8.4	8.4	167	4.95	-	-	-	-	-	-	-	-	-	-	-	103.54	-	Below Gauge
31313	SV2	19 Jul 2018	Flowing	-	9.1	11	10.1	10.1	232	4.98	-	-	-	-	-	-	-	-	-	-	-	143.84	-	Below Gauge
31313	SV2	14 Aug 2018	Flowing	-	10.6	8.2	8.09	8.09	239	4.81	-	-	-	-	-	-	-	-	-	-	-	148.18	-	Below Gauge
31313	SV2	24 Sep 2018	Flowing	-	13.8	10.8	11	11	308	4.2	-	-	-	-	-	-	-	-	-	-	-	190.96	-	Below Gauge
31313	SV2	17 Oct 2018	Flowing	-	17	16	8.6	8.6	390	4	-	-	-	-	-	-	-	-	-	-	-	241.8	-	Below Gauge
31313	SV2	07 Nov 2018	Flowing	-	18.3	13	10.1	10.1	488	3.9	-	-	-	-	-	-	-	-	-	-	-	302.56	-	Below Gauge
31313	SV2	12 Dec 2018	Dry	-	-	26.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV2	18 Jan 2019	Dry	-	-	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV2	12 Feb 2019	Dry	-	-	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV2	13 Mar 2019	Dry	-	-	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV2	08 Apr 2019	Dry	-	-	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table A2 - Surface Water Analytical Results

			Field								Inorganics													Sample Preparation
			Field Observations	Depth to Water	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)	Alkalinity (total) as CaCO3	Calcium	Chloride	Electrical Conductivity (Lab)	Magnesium	pH (Lab)	Potassium	Sodium	Sulphate	Total Dissolved Solids (Calc.)	Total Dissolved Solids (Lab)	Test - Comment 1
			Pool Condition	m	oC	oC	mg/L	mg/L	µS/cm	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	General Comment
EQL											2	2	2	0.5	0.5	1	0.5	0.1	0.5	0.5	0.5		1	
Site ID	**Location Code**	**Date**																						
31313	SV2	24 May 2019	Stagnant	-	13.2	14	7	7	120	4.4	-	-	-	-	-	-	-	-	-	-	74.4	-	Below Gauge
31313	SV2	18 Jun 2019	Stagnant	-0.02	9.6	12	7.3	7.3	119	4.9	-	-	-	-	-	-	-	-	-	-	73.78	-	-
31313	SV2	29 Jul 2019	Stagnant	-0.03	8.5	13	8.8	8.8	163	4.6	-	-	-	-	-	-	-	-	-	-	101.06	-	-
31313	SV2	01 Aug 2019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV2	16 Sep 2019	Flowing	0.024	12.8	12	10.7	10.7	1,424	3.65	-	-	-	-	-	-	-	-	-	-	1,435	-	-
31313	SV2	15 Oct 2019	Flowing	-	19.3	15.3	9.5	9.5	1,657	3.6	-	-	-	-	-	-	-	-	-	-	1,027.34	-	Below Gauge
31313	SV2	13 Nov 2019	Stagnant	-	13.3	15.7	10.3	10.3	1,773	3.5	-	-	-	-	-	-	-	-	-	-	1,099.26	-	Below Gauge
31313	SV2	13 Dec 2019	Stagnant	-	16.4	16.3	10.1	10.1	2,950	3.6	-	-	-	-	-	-	-	-	-	-	1,829	-	Below Gauge
31313	SV2	14 Jan 2020	Dry	-	-	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV2	10 Feb 2020	Stagnant	-	23.7	22	8.2	8.2	1,540	3.6	2	2	2	24	160	1,600	43	3.6	8.7	97	954.8	1,200	Below Gauge
31313	SV2	18 Mar 2020	Stagnant	-	23.4	19.2	9.02	9.02	1,868	1.98	-	-	-	-	-	-	-	-	-	-	1,158.16	-	Below Gauge
31313	SV2	14 Apr 2020	Stagnant	-	15.3	15.4	9.77	9.77	560	4.3	-	-	-	-	-	-	-	-	-	-	347.2	-	Below Gauge
31313	SV2	14 May 2020	Stagnant	-	11.4	9.2	10.9	10.9	697	4.2	-	-	-	-	-	-	-	-	-	-	432.14	-	Below Gauge
31313	SV2	10 Jun 2020	Stagnant	-	10.7	11.4	11.09	11.09	628	4	-	-	-	-	-	-	-	-	-	-	389.36	-	Below Gauge
31313	SV2	13 Jul 2020	Stagnant	-	11.1	11.5	11.26	11.26	615	4.2	2	2	2	11	71	580	19	4.2	4.4	48	210	381.3	310	Below Gauge
31313	SV2	11 Aug 2020	Stagnant	-	8.6	9.4	11.34	11.34	613	4.5	-	-	-	-	-	-	-	-	-	-	-	380.06	-	Below Gauge
31313	SV2	07 Sep 2020	Stagnant	-	16	24.1	9.83	9.83	212	4.7	-	-	-	-	-	-	-	-	-	-	-	131.44	-	Below Gauge
31313	SV2	15 Oct 2020	Stagnant	-	15.5	17.1	8.96	8.96	248	6.1	-	-	-	-	-	-	-	-	-	-	-	153.76	-	Below Gauge
31313	SV2	11 Nov 2020	Trickle	0.018	21.6	22.5	8.35	8.35	1,759	4.12	-	-	-	-	-	-	-	-	-	-	-	1,090.58	-	-
31313	SV2	10 Dec 2020	Stagnant	-	22	18.1	8.78	8.78	1,395	4.39	-	-	-	-	-	-	-	-	-	-	-	864.9	-	Below Gauge
31313	SV2	06 Jan 2021	Flowing	-	26.5	24.7	8.29	8.29	1,192	3.51	-	-	-	-	-	-	-	-	-	-	-	739.04	-	Below Gauge
31313	SV2	12 Jan 2021	Stagnant	-	26.1	22.1	8.53	8.53	1,576	3.31	-	-	-	-	-	-	-	-	-	-	-	977.12	-	Below Gauge
31313	SV2	08 Feb 2021	Stagnant	-	20.5	20.5	8.94	8.94	1,001	5.07	<2	<2	<2	21	87	990	33	3.7	6	57	380	620.62	580	Below Gauge
31313	SV2	09 Mar 2021	Stagnant	-	19.2	15.6	10.25	10.25	1,543	4.06	-	-	-	-	-	-	-	-	-	-	-	956.66	-	Below Gauge
31313	SV2	15 Apr 2021	Stagnant	-	-	17.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV2	10 May 2021	Stagnant	-	14.7	15	9.31	9.31	151	4.91	-	-	-	-	-	-	-	-	-	-	-	93.62	-	Below Gauge
31313	SV2	04 Jun 2021	Stagnant	-	14.8	10.2	10.8	10.8	287	4.4	-	-	-	-	-	-	-	-	-	-	-	177.94	-	Below Gauge
31313	SV2	13 Jul 2021	Stagnant	-	9.4	12.9	7.4	7.4	288	2.99	<2	<2	<2	5.3	38	250	6.7	4.4	2	22	68	178.56	160	Below Gauge
31313	SV2	11 Aug 2021	Flowing	0.067	5.8	11.3	10.51	10.51	1,468	3.72	-	-	-	-	-	-	-	-	-	-	-	910.16	-	-
31313	SV2	09 Sep 2021	Trickle	0.016	14.6	16.8	9.9	9.9	1,469	3.78	-	-	-	-	-	-	-	-	-	-	-	910.78	-	-
31313	SV2	11 Oct 2021	Flowing	0.091	8.4	13	10.79	10.79	1,241	3.72	-	-	-	-	-	-	-	-	-	-	-	769.42	-	-
31313	SV2	03 Nov 2021	Flowing	0.05	13.1	19.1	9.1	9.1	1,173	3.6	-	-	-	-	-	-	-	-	-	-	-	727.26	-	-
31313	SV2	02 Dec 2021	Flowing	0.056	17.7	20.6	9.07	9.07	910	3.74	-	-	-	-	-	-	-	-	-	-	-	564.2	-	-
31313	SV2	08 Feb 2022	Flowing	0.079	24.3	27.1	7.01	7.01	854	3.56	-	-	-	-	-	-	-	-	-	-	-	529.48	-	-
31313	SV2	09 Mar 2022	Flowing	0.014	18.8	17	8.93	8.93	949	3.79	-	-	-	-	-	-	-	-	-	-	-	588.38	-	-
31313	SV2	26 Apr 2022	Flowing	-	16	17.1	8.88	8.88	1,010	3.96	-	-	-	-	-	-	-	-	-	-	-	626.2	-	Below Gauge
31313	SV2	12 May 2022	Flowing	-	14.4	13.5	10.69	10.69	1,103	3.79	-	-	-	-	-	-	-	-	-	-	-	683.86	-	Below Gauge
31313	SV2	09 Jun 2022	Flowing	-	10.5	8.1	10.12	10.12	771	3.8	-	-	-	-	-	-	-	-	-	-	-	478.02	-	Below Gauge
31313	SV2	07 Jul 2022	Flowing	-	10.5	12.5	11.03	11.03	750	4.24	2	2	2	18	65	570	14	4.2	2.5	35	230	465	350	Below Gauge
31313	SV2	02 Aug 2022	-	-	-	-	-	-	-	-	2	2	2	7.6	84	840	18	3.6	3.2	46	300	-	460	-
31313	SV2	03 Aug 2022	Flowing	-	11	11.7	10.85	10.85	509	4.19	-	-	-	-	-	-	-	-	-	-	-	315.58	-	Below Gauge
31313	SV2	15 Sep 2022	Flowing	0.057	13.8	11.2	10.11	10.11	948	3.77	-	-	-	-	-	-	-	-	-	-	-	587.76	-	-
31313	SV2	21 Oct 2022	Flowing	0.109	16	21.1	9.93	9.93	699	3.92	-	-	-	-	-	-	-	-	-	-	-	433.38	-	-
31313	SV2	16 Nov 2022	Flowing	0.19	15	13.3	9.81	9.81	604	3.98	-	-	-	-	-	-	-	-	-	-	-	374.48	-	-
31313	SV2	05 Dec 2022	Flowing	0.078	16.4	16.5	9.74	9.74	506	4.05	-	-	-	-	-	-	-	-	-	-	-	313.72	-	-
31313	SV2	10 Jan 2023	Flowing	-0.026	24.8	24.2	8.07	8.07	717	3.8	-	-	-	-	-	-	-	-	-	-	-	444.54	-	-
31313	SV2	06 Feb 2023	Stagnant	-	18.4	16.5	8.9	8.9	557	4	-	-	-	-	-	-	-	-	-	-	-	345.34	-	Below Gauge
31313	SV2	09 Mar 2023	Stagnant	-	20.4	14.7	8.92	8.92	845	3.11	-	-	-	-	-	-	-	-	-	-	-	523.9	-	Below Gauge
31313	SV2	11 Apr 2023	Stagnant	-	-	17.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV2	08 May 2023	Stagnant	-	11.1	13	10.4	10.4	445	4.59	-	-	-	-	-	-	-	-	-	-	-	275.9	-	Below Gauge
31313	SV2	02 Jun 2023	-	-	-	-	-	-	-	-	<2	<2	<2	12	83	540	9.4	3.9	6.7	43	130	-	280	-
31313	SV2	19 Jun 2023	Stagnant	0.043	10.9	7.6	9.9	9.9	387	4.61	-	-	-	-	-	-	-	-	-	-	-	239.94	-	-
31313	SV2	10 Jul 2023	Stagnant	0.057	9.4	14.3	9.12	9.12	365	4.62	-	-	-	-	-	-	-	-	-	-	-	226.3	-	-
31313	SV2	07 Aug 2023	Stagnant	-	8.4	15.1	11.1	11.1	396	4.75	-	-	-	-	-	-	-	-	-	-	-	245.52	-	Below Gauge
31313	SV2	07 Sep 2023	Stagnant	-	8.8	13.5	10.22	10.22	443	4.3	-	-	-	-	-	-	-	-	-	-	-	274.66	-	Below Gauge
31313	SV2	07 Oct 2023	-	-	-	-	-	-	-	-	<2	<2	<2	5.8	58	300	5.1	4.6	4.1	32	57	-	190	-

Table A2 - Surface Water Analytical Results

			Field								Inorganics													Sample Preparation
			Field Observations	Depth to Water	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)	Alkalinity (total) as CaCO3	Calcium	Chloride	Electrical Conductivity (Lab)	Magnesium	pH (Lab)	Potassium	Sodium	Sulphate	Total Dissolved Solids (Calc.)	Total Dissolved Solids (Lab)	Test - Comment 1
			Pool Condition	m	oC	oC	mg/L	mg/L	µS/cm	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	General Comment
EQL											2	2	2	0.5	0.5	1	0.5	0.1	0.5	0.5	0.5		1	
Site ID	**Location Code**	**Date**																						
31313	SV3	17 Nov 2009	Trickle	0.12	11.2	-	7.3	-	294	5.4	-	-	-	-	-	-	-	-	-	-	-	182.28	-	-
31313	SV3	01 Dec 2009	Trickle	0.178	11.8	-	5	-	284	5.2	-	-	-	-	-	-	-	-	-	-	-	176.08	-	-
31313	SV3	17 Dec 2009	Trickle	0.124	12	-	7.3	-	285	5.4	-	-	-	-	-	-	-	-	-	-	-	176.7	-	-
31313	SV3	29 Dec 2009	Stagnant	0.121	11.2	-	6.9	-	265	5.6	-	-	-	-	-	-	-	-	-	-	-	164.3	-	-
31313	SV3	14 Jan 2010	Stagnant	0.109	13.4	-	5.8	-	273	4.9	-	-	-	-	-	-	-	-	-	-	-	169.26	-	-
31313	SV3	27 Jan 2010	Stagnant	0.101	12.7	-	3.1	-	275	5.6	-	-	-	-	-	-	-	-	-	-	-	170.5	-	-
31313	SV3	02 Feb 2010	-	0.09	14.7	-	2	1.75	276	5.31	-	-	-	-	-	-	-	-	-	-	-	182	-	-
31313	SV3	09 Feb 2010	Stagnant	0.102	14.9	-	1.1	-	208	5.8	-	-	-	-	-	-	-	-	-	-	-	128.96	-	-
31313	SV3	25 Feb 2010	Stagnant	0.102	13.3	-	1.6	-	267	5.4	-	-	-	-	-	-	-	-	-	-	-	165.54	-	-
31313	SV3	11 Mar 2010	Stagnant	0.113	12.9	-	4.03	-	242	5.5	-	-	-	-	-	-	-	-	-	-	-	150.04	-	-
31313	SV3	24 Mar 2010	Stagnant	0.101	12	-	1.55	-	259	6.11	-	-	-	-	-	-	-	-	-	-	-	160.58	-	-
31313	SV3	31 Mar 2010	-	0.1	10.3	-	2.57	2.77	284	7.33	-	-	-	-	-	-	-	-	-	-	-	183	-	-
31313	SV3	06 Apr 2010	Stagnant	0.101	12.3	19	1.3	-	239	5.9	-	-	-	-	-	-	-	-	-	-	-	148.18	-	-
31313	SV3	20 Apr 2010	Stagnant	0.103	12.3	14.9	3.88	-	253	6	-	-	-	-	-	-	-	-	-	-	-	156.86	-	-
31313	SV3	04 May 2010	Stagnant	0.114	10.7	18.1	6.4	5.4	304	6.1	-	-	-	-	-	-	-	-	-	-	-	188.48	-	-
31313	SV3	18 May 2010	Stagnant	0.114	7.7	4.4	9.54	8.27	311	5.55	-	-	-	-	-	-	-	-	-	-	-	192.82	-	-
31313	SV3	01 Jun 2010	Trickle	0.149	11	15.5	7.53	7.18	386	5.51	-	-	-	-	-	-	-	-	-	-	-	239.32	-	-
31313	SV3	15 Jun 2010	Trickle	0.14	9.9	10.8	6.52	6.38	358	5.2	-	-	-	-	-	-	-	-	-	-	-	221.96	-	-
31313	SV3	29 Jun 2010	Trickle	0.138	9.4	10.2	8.02	7.87	337	5.4	-	-	-	-	-	-	-	-	-	-	-	208.94	-	-
31313	SV3	12 Jul 2010	Trickle	0.134	9.2	12.8	8.76	7.52	340	5.1	-	-	-	-	-	-	-	-	-	-	-	210.8	-	-
31313	SV3	27 Jul 2010	Trickle	0.14	8.4	11.1	7.94	7.3	334	5.16	-	-	-	-	-	-	-	-	-	-	-	207.08	-	-
31313	SV3	11 Aug 2010	Flowing	0.16	8.8	10	9.7	9.7	340	5.3	-	-	-	-	-	-	-	-	-	-	-	210.8	-	-
31313	SV3	23 Aug 2010	Flowing	0.191	8.4	11.3	5.98	6.61	238	4.86	-	-	-	-	-	-	-	-	-	-	-	147.56	-	-
31313	SV3	07 Sep 2010	Flowing	0.274	8.7	9.4	9.1	8.7	294	5.3	-	-	-	-	-	-	-	-	-	-	-	182.28	-	-
31313	SV3	21 Sep 2010	Flowing	0.169	9.3	13.2	8.3	8.2	295	4.18	-	-	-	-	-	-	-	-	-	-	-	182.9	-	-
31313	SV3	05 Oct 2010	Flowing	0.148	9.4	13.8	7.6	7.4	286	5.1	-	-	-	-	-	-	-	-	-	-	-	177.32	-	-
31313	SV3	19 Oct 2010	Flowing	0.188	9.3	13	8.6	7.8	272	4.12	-	-	-	-	-	-	-	-	-	-	-	168.64	-	-
31313	SV3	01 Nov 2010	Flowing	0.198	9.6	14.3	9	6	259	5.1	-	-	-	-	-	-	-	-	-	-	-	160.58	-	-
31313	SV3	16 Nov 2010	Flowing	0.172	10.1	14.7	6.5	6.7	252	4.58	-	-	-	-	-	-	-	-	-	-	-	156.24	-	-
31313	SV3	01 Dec 2010	Flowing	0.165	11.8	19.4	7	6.3	244	4.24	-	-	-	-	-	-	-	-	-	-	-	151.28	-	-
31313	SV3	13 Dec 2010	Trickle	0.144	11.9	16.9	6.8	6.7	186	4.13	-	-	-	-	-	-	-	-	-	-	-	115.32	-	-
31313	SV3	29 Dec 2010	Trickle	0.131	12.1	23.4	3.1	3.2	259	4.32	-	-	-	-	-	-	-	-	-	-	-	160.58	-	-
31313	SV3	11 Jan 2011	Flowing	0.146	13	19.4	4.3	5.3	239	5.41	-	-	-	-	-	-	-	-	-	-	-	148.18	-	-
31313	SV3	27 Jan 2011	Flowing	0.162	13.6	17.4	6.2	5.9	220	5.03	-	-	-	-	-	-	-	-	-	-	-	136.4	-	-
31313	SV3	08 Feb 2011	Trickle	0.13	13.4	19.6	6.5	6.5	237	5.01	-	-	-	-	-	-	-	-	-	-	-	146.94	-	-
31313	SV3	21 Feb 2011	Flowing	0.139	13.4	16.5	6.3	6.3	239	5.11	-	-	-	-	-	-	-	-	-	-	-	148.18	-	-
31313	SV3	08 Mar 2011	Stagnant	0.119	13.1	19	5.9	2.4	226	5.96	-	-	-	-	-	-	-	-	-	-	-	140.12	-	-
31313	SV3	21 Mar 2011	Trickle	0.129	13	18.4	8.1	7.9	235	5.83	-	-	-	-	-	-	-	-	-	-	-	145.7	-	-
31313	SV3	04 Apr 2011	Trickle	0.123	12.3	14.9	7.8	7.8	226	5.6	-	-	-	-	-	-	-	-	-	-	-	140.12	-	-
31313	SV3	20 Apr 2011	Trickle	0.125	12	15.8	6.2	6.1	219	5.7	-	-	-	-	-	-	-	-	-	-	-	135.78	-	-
31313	SV3	05 May 2011	Trickle	0.131	12.1	16.3	8	7.4	211	5	-	-	-	-	-	-	-	-	-	-	-	130.82	-	-
31313	SV3	16 May 2011	Flowing	0.145	10.8	11.5	7.3	7.1	210	5.19	-	-	-	-	-	-	-	-	-	-	-	130.2	-	-
31313	SV3	31 May 2011	Flowing	0.147	9.8	13.8	6.8	6.7	223	5.21	-	-	-	-	-	-	-	-	-	-	-	138.26	-	-
31313	SV3	15 Jun 2011	Flowing	0.15	9.1	10.9	7	6.9	231	5.42	-	-	-	-	-	-	-	-	-	-	-	143.22	-	-
31313	SV3	29 Jun 2011	Flowing	0.15	8.3	10	7.9	7.8	247	5.23	-	-	-	-	-	-	-	-	-	-	-	153.14	-	-
31313	SV3	12 Jul 2011	Flowing	0.161	9	10.5	12.7	12.7	236	5.18	-	-	-	-	-	-	-	-	-	-	-	146.32	-	-
31313	SV3	26 Jul 2011	Flowing	0.234	8.6	9.3	9.8	9.8	209	5.74	-	-	-	-	-	-	-	-	-	-	-	129.58	-	-
31313	SV3	09 Aug 2011	Flowing	0.159	7.9	8	7.5	7.5	218	5.3	-	-	-	-	-	-	-	-	-	-	-	135.16	-	-
31313	SV3	23 Aug 2011	Flowing	0.171	7.8	7.3	8	7.18	224	5.11	-	-	-	-	-	-	-	-	-	-	-	138.88	-	-
31313	SV3	06 Sep 2011	Flowing	0.149	8.1	13.8	7.7	7.7	224	6.51	-	-	-	-	-	-	-	-	-	-	-	138.88	-	-
31313	SV3	21 Sep 2011	Flowing	0.147	8.8	17.9	8.5	8.5	219	5.3	-	-	-	-	-	-	-	-	-	-	-	135.78	-	-
31313	SV3	04 Oct 2011	Flowing	0.174	8.2	15.9	6	6	219	5.46	-	-	-	-	-	-	-	-	-	-	-	135.78	-	-
31313	SV3	18 Oct 2011	Flowing	0.142	9.1	20.8	4.4	4.4	224	5.1	-	-	-	-	-	-	-	-	-	-	-	138.88	-	-
31313	SV3	02 Nov 2011	Flowing	0.146	10.8	15.9	6.5	6.5	219	5.44	-	-	-	-	-	-	-	-	-	-	-	135.78	-	-
31313	SV3	15 Nov 2011	Trickle	0.139	10.4	18.7	2.4	2.4	207	5.6	-	-	-	-	-	-	-	-	-	-	-	128.34	-	-
31313	SV3	01 Dec 2011	Trickle	0.141	11.1	16.3	6.1	6.1	217	6.4	-	-	-	-	-	-	-	-	-	-	-	134.54	-	-
31313	SV3	13 Dec 2011	Flowing	0.145	11.3	13.2	6	6.4	218	5.11	-	-	-	-	-	-	-	-	-	-	-	135.16	-	-
31313	SV3	28 Dec 2011	Trickle	0.127	12.6	21	6.5	6.5	215	5.22	-	-	-	-	-	-	-	-	-	-	-	133.3	-	-
31313	SV3	10 Jan 2012	Trickle	0.126	12.2	16.8	6.2	6.2	218	5.8	-	-	-	-	-	-	-	-	-	-	-	135.16	-	-
31313	SV3	24 Jan 2012	Stagnant	0.113	13	20.4	6.2	6.4	227	5.39	-	-	-	-	-	-	-	-	-	-	-	140.74	-	-
31313	SV3	07 Feb 2012	Stagnant	0.122	12.9	16.7	5.06	5	215	5.56	-	-	-	-	-	-	-	-	-	-	-	133.3	-	-
31313	SV3	14 Feb 2012	-	0.131	-	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV3	21 Feb 2012	Stagnant	0.119	13.4	21.1	4.6	4.6	222	5.21	-	-	-	-	-	-	-	-	-	-	-	137.64	-	-
31313	SV3	06 Mar 2012	Stagnant	0.128	13.7	21	5.4	5.4	228	5.36	-	-	-	-	-	-	-	-	-	-	-	141.36	-	-

Table A2 - Surface Water Analytical Results

			Field								Inorganics													Sample Preparation
			Field Observations	Depth to Water	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)	Alkalinity (total) as CaCO3	Calcium	Chloride	Electrical Conductivity (Lab)	Magnesium	pH (Lab)	Potassium	Sodium	Sulphate	Total Dissolved Solids (Calc.)	Total Dissolved Solids (Lab)	Test - Comment 1
			Pool Condition	m	oC	oC	mg/L	mg/L	µS/cm	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	General Comment
EQL											2	2	2	0.5	0.5	1	0.5	0.1	0.5	0.5	0.5		1	
Site ID	**Location Code**	**Date**																						
31313	SV3	20 Mar 2012	Stagnant	0.12	14.9	20.2	6.3	6.3	228	5.43	-	-	-	-	-	-	-	-	-	-	-	141.36	-	-
31313	SV3	03 Apr 2012	Stagnant	0.116	15.5	23.1	7	7	209	6.31	-	-	-	-	-	-	-	-	-	-	-	129.58	-	-
31313	SV3	17 Apr 2012	Stagnant	0.115	12.3	15.4	7.3	7.3	241	6.72	-	-	-	-	-	-	-	-	-	-	-	149.42	-	-
31313	SV3	01 May 2012	Stagnant	0.122	10.2	16.9	7.6	7.6	220	5.49	-	-	-	-	-	-	-	-	-	-	-	136.4	-	-
31313	SV3	15 May 2012	Flowing	0.147	13.2	14.9	8.1	8.1	270	6.12	-	-	-	-	-	-	-	-	-	-	-	167.4	-	-
31313	SV3	29 May 2012	Flowing	0.15	10.1	14.7	7.81	7.81	236	6.07	-	-	-	-	-	-	-	-	-	-	-	146.32	-	-
31313	SV3	12 Jun 2012	Flowing	0.215	8.9	9.1	7.93	7.93	254	6.71	-	-	-	-	-	-	-	-	-	-	-	157.48	-	-
31313	SV3	26 Jun 2012	Flowing	0.226	8.9	8.9	9.6	9.6	252	6.1	-	-	-	-	-	-	-	-	-	-	-	156.24	-	-
31313	SV3	11 Jul 2012	Flowing	0.244	8.3	10.2	9.1	9.7	221	4.97	-	-	-	-	-	-	-	-	-	-	-	137.02	-	-
31313	SV3	24 Jul 2012	Flowing	0.184	9.7	10.2	8.4	8.4	249	5.72	-	-	-	-	-	-	-	-	-	-	-	154.38	-	-
31313	SV3	07 Aug 2012	Flowing	0.178	8.4	8	7.9	7.9	281	4.51	-	-	-	-	-	-	-	-	-	-	-	174.22	-	-
31313	SV3	21 Aug 2012	Flowing	0.255	12.1	13	9.1	9.1	263	5.09	-	-	-	-	-	-	-	-	-	-	-	163.06	-	-
31313	SV3	04 Sep 2012	Flowing	0.208	11.1	16.9	7.8	7.8	260	4.19	-	-	-	-	-	-	-	-	-	-	-	161.2	-	-
31313	SV3	18 Sep 2012	Flowing	0.178	9	16.9	7.4	7.4	248	6.41	-	-	-	-	-	-	-	-	-	-	-	153.76	-	-
31313	SV3	02 Oct 2012	Flowing	0.187	8.8	12.2	8.9	8.9	229	5.11	-	-	-	-	-	-	-	-	-	-	-	141.98	-	-
31313	SV3	16 Oct 2012	Flowing	0.18	10.3	15.1	8.2	8.2	217	5.58	-	-	-	-	-	-	-	-	-	-	-	134.54	-	-
31313	SV3	30 Oct 2012	Stagnant	0.154	11.6	21.1	7.7	7.7	239	5.35	-	-	-	-	-	-	-	-	-	-	-	148.18	-	-
31313	SV3	13 Nov 2012	Trickle	0.141	11.5	13.9	7.9	7.9	233	5.52	-	-	-	-	-	-	-	-	-	-	-	144.46	-	-
31313	SV3	27 Nov 2012	Flowing	0.157	11.1	16	8	6.88	214	5.16	-	-	-	-	-	-	-	-	-	-	-	132.68	-	-
31313	SV3	11 Dec 2012	Trickle	0.136	13.8	21	7.1	7.1	219	5.89	-	-	-	-	-	-	-	-	-	-	-	135.78	-	-
31313	SV3	20 Dec 2012	Trickle	0.145	11.6	18.2	7.4	6.7	214	5.08	-	-	-	-	-	-	-	-	-	-	-	132.68	-	-
31313	SV3	08 Jan 2013	Trickle	0.138	16.5	23.1	5.86	5.86	230	5.17	-	-	-	-	-	-	-	-	-	-	-	142.6	-	-
31313	SV3	22 Jan 2013	Trickle	0.125	11.3	19.7	6.72	5.03	199	5.37	-	-	-	-	-	-	-	-	-	-	-	123.38	-	-
31313	SV3	05 Feb 2013	Trickle	0.13	11.4	22.8	7.1	7.1	201	5.41	-	-	-	-	-	-	-	-	-	-	-	124.62	-	-
31313	SV3	19 Feb 2013	Stagnant	0.112	14.1	18.6	5	5	258	5.87	-	-	-	-	-	-	-	-	-	-	-	159.96	-	-
31313	SV3	05 Mar 2013	Stagnant	0.11	16.2	26.1	7.12	7.12	338	6.87	-	-	-	-	-	-	-	-	-	-	-	209.56	-	-
31313	SV3	19 Mar 2013	Stagnant	0.12	16	16.1	6.45	6.45	407	7.2	-	-	-	-	-	-	-	-	-	-	-	252.34	-	-
31313	SV3	03 Apr 2013	Stagnant	0.122	14.1	16.7	7.5	7.5	229	6.74	-	-	-	-	-	-	-	-	-	-	-	141.98	-	-
31313	SV3	16 Apr 2013	Stagnant	0.118	12.1	15.3	7.8	7.8	251	7.8	-	-	-	-	-	-	-	-	-	-	-	155.62	-	-
31313	SV3	01 May 2013	Stagnant	0.128	11.4	15.3	8.1	8.1	226	7.52	-	-	-	-	-	-	-	-	-	-	-	140.12	-	-
31313	SV3	14 May 2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV3	27 May 2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV3	11 Jun 2013	Trickle	0.14	9.7	13.2	7.3	7.3	266	6.9	-	-	-	-	-	-	-	-	-	-	-	164.92	-	-
31313	SV3	24 Jun 2013	Flowing	0.16	9.8	11.1	9.18	9.18	450	8.1	-	-	-	-	-	-	-	-	-	-	-	279	-	-
31313	SV3	09 Jul 2013	Flowing	0.162	8.8	5.7	10.1	10.1	446	7.4	-	-	-	-	-	-	-	-	-	-	-	276.52	-	-
31313	SV3	22 Jul 2013	Flowing	0.2	9	11.3	6.9	6.9	344	5.9	-	-	-	-	-	-	-	-	-	-	-	213.28	-	-
31313	SV3	06 Aug 2013	Flowing	0.39	12.6	10.8	7.8	7.8	352	6.05	-	-	-	-	-	-	-	-	-	-	-	218.24	-	-
31313	SV3	19 Aug 2013	Flowing	0.247	9	7.3	8.2	8.2	260	6.44	-	-	-	-	-	-	-	-	-	-	-	161.2	-	-
31313	SV3	03 Sep 2013	Flowing	0.2	13.4	13.4	9.31	9.31	248	6.4	-	-	-	-	-	-	-	-	-	-	-	153.76	-	-
31313	SV3	17 Sep 2013	Flowing	0.272	13.2	14.8	8.7	8.7	254	6.52	-	-	-	-	-	-	-	-	-	-	-	157.48	-	-
31313	SV3	01 Oct 2013	Flowing	0.268	12.3	13.7	10.9	11.13	239	5	-	-	-	-	-	-	-	-	-	-	-	148.18	-	-
31313	SV3	15 Oct 2013	Flowing	0.18	13.5	13.9	8.6	8.5	273	5.62	-	-	-	-	-	-	-	-	-	-	-	169.26	-	-
31313	SV3	29 Oct 2013	Flowing	0.216	13.2	16.8	8.34	8.18	237	4.93	-	-	-	-	-	-	-	-	-	-	-	146.94	-	-
31313	SV3	13 Nov 2013	Flowing	0.26	14.1	13.8	8.5	8.4	333	6.7	-	-	-	-	-	-	-	-	-	-	-	206.46	-	-
31313	SV3	26 Nov 2013	Flowing	0.185	16.2	20.8	7.72	7.72	340	5.5	-	-	-	-	-	-	-	-	-	-	-	210.8	-	-
31313	SV3	09 Dec 2013	Flowing	0.197	15.8	16.8	6.82	6.87	422	6.15	-	-	-	-	-	-	-	-	-	-	-	261.64	-	-
31313	SV3	24 Dec 2013	Flowing	0.168	14.6	14.4	5.5	5.2	224	5.23	-	-	-	-	-	-	-	-	-	-	-	138.88	-	-
31313	SV3	09 Jan 2014	Flowing	0.16	20.2	22.7	5.11	5.12	233	5.43	-	-	-	-	-	-	-	-	-	-	-	144.46	-	-
31313	SV3	21 Jan 2014	Trickle	0.149	18.3	19.4	4.42	4.42	224	6.15	-	-	-	-	-	-	-	-	-	-	-	138.88	-	-
31313	SV3	06 Feb 2014	Trickle	0.14	19	25.2	3.38	3.38	215	6.32	-	-	-	-	-	-	-	-	-	-	-	133.3	-	-
31313	SV3	17 Feb 2014	Trickle	0.138	18.6	19.3	6.55	6.5	211	6.1	-	-	-	-	-	-	-	-	-	-	-	130.82	-	-
31313	SV3	07 Mar 2014	Stagnant	0.13	15.3	17.4	6.87	6.87	211	6.44	-	-	-	-	-	-	-	-	-	-	-	130.82	-	-
31313	SV3	18 Mar 2014	Trickle	0.137	13.8	14.7	7.15	7.15	206	6.43	-	-	-	-	-	-	-	-	-	-	-	127.72	-	-
31313	SV3	01 Apr 2014	Trickle	0.146	15.6	24.1	6.71	6.71	213	6.34	-	-	-	-	-	-	-	-	-	-	-	132.06	-	-
31313	SV3	15 Apr 2014	Flowing	0.16	13.8	14.9	5.59	5.59	229	7.24	-	-	-	-	-	-	-	-	-	-	-	141.98	-	-
31313	SV3	29 Apr 2014	Flowing	0.179	12.4	15.5	8.5	8.5	214	5.3	-	-	-	-	-	-	-	-	-	-	-	132	-	-
31313	SV3	12 May 2014	Flowing	0.164	10.2	13.4	9.2	9.2	220	5.8	-	-	-	-	-	-	-	-	-	-	-	136	-	-
31313	SV3	20 May 2014	Trickle	0.152	11.8	18.6	8.9	8.9	218	4.92	-	-	-	-	-	-	-	-	-	-	-	135.16	-	-
31313	SV3	10 Jun 2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV3	27 Jun 2014	Flowing	0.2	9.9	8.5	8.32	8.32	269	5.8	-	-	-	-	-	-	-	-	-	-	-	166.78	-	-
31313	SV3	08 Jul 2014	Flowing	0.199	10.4	10.1	7.61	7.61	218	6.98	-	-	-	-	-	-	-	-	-	-	-	135.16	-	-
31313	SV3	24 Jul 2014	Flowing	0.18	7.5	12.4	12.32	12.32	221	5.9	-	-	-	-	-	-	-	-	-	-	-	137.02	-	-
31313	SV3	06 Aug 2014	Flowing	0.197	8.2	11.2	9.96	9.96	240	5.76	-	-	-	-	-	-	-	-	-	-	-	148.8	-	-
31313	SV3	18 Aug 2014	Flowing	0.177	8.5	8.7	10.2	10.2	209	5.01	-	-	-	-	-	-	-	-	-	-	-	129.58	-	-

Table A2 - Surface Water Analytical Results

			Field								Inorganics													Sample Preparation
			Field Observations	Depth to Water	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)	Alkalinity (total) as CaCO3	Calcium	Chloride	Electrical Conductivity (Lab)	Magnesium	pH (Lab)	Potassium	Sodium	Sulphate	Total Dissolved Solids (Calc.)	Total Dissolved Solids (Lab)	Test - Comment 1
			Pool Condition	m	oC	oC	mg/L	mg/L	µS/cm	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	General Comment
EQL											2	2	2	0.5	0.5	1	0.5	0.1	0.5	0.5	0.5		1	
Site ID	**Location Code**	**Date**																						
31313	SV3	04 Sep 2014	Flowing	0.177	8.3	13.1	10.6	10.6	207	5.19	-	-	-	-	-	-	-	-	-	-	-	128.34	-	-
31313	SV3	17 Sep 2014	Flowing	0.169	9.9	11	9.68	9.68	204	5.19	-	-	-	-	-	-	-	-	-	-	-	126.48	-	-
31313	SV3	30 Sep 2014	Flowing	0.149	10.4	10.8	8.21	8.21	199	5.7	-	-	-	-	-	-	-	-	-	-	-	123.38	-	-
31313	SV3	14 Oct 2014	Flowing	0.154	10.6	12.1	9.4	9.4	197	5.7	-	-	-	-	-	-	-	-	-	-	-	122.14	-	-
31313	SV3	29 Oct 2014	Trickle	0.141	12	16.6	8.91	8.88	199	5.76	-	-	-	-	-	-	-	-	-	-	-	123.38	-	-
31313	SV3	11 Nov 2014	Stagnant	0.13	12	12	7.7	7.7	195	6	-	-	-	-	-	-	-	-	-	-	-	120.9	-	-
31313	SV3	01 Dec 2014	Stagnant	0.132	14.7	23.4	7.9	7.9	203	5.6	-	-	-	-	-	-	-	-	-	-	-	125.86	-	-
31313	SV3	08 Dec 2014	Flowing	0.243	14.2	17.5	8.3	8.3	214	5.45	-	-	-	-	-	-	-	-	-	-	-	132.68	-	-
31313	SV3	08 Jan 2015	Stagnant	0.128	16.9	29.2	7.7	7.7	212	6	-	-	-	-	-	-	-	-	-	-	-	131.44	-	-
31313	SV3	20 Jan 2015	Stagnant	0.133	13.9	22.4	8.3	8.3	214	6	-	-	-	-	-	-	-	-	-	-	-	132.68	-	-
31313	SV3	04 Feb 2015	Trickle	0.137	14.2	17.5	8.5	8.5	220	6.1	-	-	-	-	-	-	-	-	-	-	-	136.4	-	-
31313	SV3	17 Feb 2015	Stagnant	0.132	16.6	20.3	7.8	7.8	232	6.5	-	-	-	-	-	-	-	-	-	-	-	143.84	-	-
31313	SV3	04 Mar 2015	Stagnant	0.12	12.7	14.8	6.9	6.9	220	6.3	-	-	-	-	-	-	-	-	-	-	-	136.4	-	-
31313	SV3	31 Mar 2015	Stagnant	0.119	13.3	19.2	8.2	8.2	219	6.8	-	-	-	-	-	-	-	-	-	-	-	135.78	-	-
31313	SV3	28 Apr 2015	Stagnant	0.132	10.3	10.3	8.9	8.9	224	6.3	-	-	-	-	-	-	-	-	-	-	-	138.88	-	-
31313	SV3	20 May 2015	Stagnant	0.164	13.4	14.8	9	9	222	5.6	-	-	-	-	-	-	-	-	-	-	-	137.64	-	-
31313	SV3	16 Jun 2015	Flowing	0.195	10.2	13.5	8.91	8.91	227	6	-	-	-	-	-	-	-	-	-	-	-	140.74	-	-
31313	SV3	20 Jul 2015	Stagnant	0.15	3.9	3.8	12.1	12.1	221	6.2	-	-	-	-	-	-	-	-	-	-	-	137.02	-	-
31313	SV3	18 Aug 2015	Stagnant	0.149	6.9	6.8	8.3	8.3	249	7.2	-	-	-	-	-	-	-	-	-	-	-	154.38	-	-
31313	SV3	21 Sep 2015	Stagnant	0.138	16.8	16.8	7.4	7.4	238	7.2	-	-	-	-	-	-	-	-	-	-	-	147.56	-	-
31313	SV3	20 Oct 2015	Stagnant	0.12	13.5	21.2	7	7	272	6.2	-	-	-	-	-	-	-	-	-	-	-	168.64	-	-
31313	SV3	17 Nov 2015	Stagnant	0.111	17.2	17.2	8	8	324	6.3	-	-	-	-	-	-	-	-	-	-	-	200.88	-	-
31313	SV3	07 Dec 2015	Stagnant	0.105	16.9	22.3	5.6	5.6	481	7.1	-	-	-	-	-	-	-	-	-	-	-	298.22	-	-
31313	SV3	21 Jan 2016	Stagnant	0.102	16.8	16.8	2.2	2.2	325	7.2	-	-	-	-	-	-	-	-	-	-	-	201.5	-	-
31313	SV3	16 Feb 2016	Stagnant	0.09	13.2	15.9	2.9	2.9	295	6.6	-	-	-	-	-	-	-	-	-	-	-	182.9	-	-
31313	SV3	15 Mar 2016	Stagnant	0.102	15.4	20.1	2.4	2.4	453	7.5	-	-	-	-	-	-	-	-	-	-	-	280.86	-	-
31313	SV3	13 Apr 2016	Stagnant	0.101	14.5	15.4	3.5	3.5	228	6.8	-	-	-	-	-	-	-	-	-	-	-	141.36	-	-
31313	SV3	17 May 2016	Stagnant	0.12	12.5	15.2	5.6	5.6	353	7	-	-	-	-	-	-	-	-	-	-	-	218.86	-	-
31313	SV3	21 Jun 2016	Stagnant	0.122	10.5	15.2	5.85	5.85	411	5.4	-	-	-	-	-	-	-	-	-	-	-	254.82	-	-
31313	SV3	19 Jul 2016	Stagnant	0.147	10.4	14.9	8.8	8.8	366	6	-	-	-	-	-	-	-	-	-	-	-	226.92	-	-
31313	SV3	18 Aug 2016	Stagnant	0.14	8.4	13.4	9.4	9.4	308	5.3	-	-	-	-	-	-	-	-	-	-	-	190.96	-	-
31313	SV3	20 Sep 2016	Flowing	0.222	12.5	13.3	7.82	7.82	260	5.3	-	-	-	-	-	-	-	-	-	-	-	161.2	-	-
31313	SV3	18 Oct 2016	Flowing	0.2	11.2	13.4	9.1	9.1	262	5.3	-	-	-	-	-	-	-	-	-	-	-	162.44	-	-
31313	SV3	14 Nov 2016	Stagnant	0.142	11.6	20.9	8.6	8.6	233	5.5	-	-	-	-	-	-	-	-	-	-	-	144.46	-	-
31313	SV3	07 Dec 2016	Stagnant	0.121	12.5	13.5	7.5	7.5	367	5.6	-	-	-	-	-	-	-	-	-	-	-	227.54	-	-
31313	SV3	18 Jan 2017	Stagnant	0.102	14.7	20.6	5.9	5.9	240	5.9	-	-	-	-	-	-	-	-	-	-	-	148.8	-	-
31313	SV3	14 Feb 2017	Stagnant	0.098	13.6	16.8	2.91	2.91	238	5.8	-	-	-	-	-	-	-	-	-	-	-	147.56	-	-
31313	SV3	20 Mar 2017	Stagnant	0.096	15.1	19	1.74	1.74	323	6.24	-	-	-	-	-	-	-	-	-	-	-	200.26	-	-
31313	SV3	19 Apr 2017	Stagnant	0.108	15	15.4	7.61	7.61	272	5.82	-	-	-	-	-	-	-	-	-	-	-	168.64	-	-
31313	SV3	16 May 2017	Stagnant	0.121	8.5	7.2	8.64	8.64	271	5.64	-	-	-	-	-	-	-	-	-	-	-	168.02	-	-
31313	SV3	21 Jun 2017	Stagnant	0.124	9.2	12.6	8.9	8.9	246	5.24	-	-	-	-	-	-	-	-	-	-	-	152.52	-	-
31313	SV3	24 Jul 2017	Trickle	0.138	8.1	8.2	5.17	5.17	260	5.61	-	-	-	-	-	-	-	-	-	-	-	161.2	-	-
31313	SV3	22 Aug 2017	Flowing	0.162	7	6.9	8.85	8.85	246	4.11	-	-	-	-	-	-	-	-	-	-	-	152.52	-	-
31313	SV3	18 Sep 2017	Flowing	0.237	10.7	12.7	6.28	6.28	273	6.21	-	-	-	-	-	-	-	-	-	-	-	169.26	-	-
31313	SV3	17 Oct 2017	Trickle	0.13	14.9	24.2	6.96	6.96	257	6.47	-	-	-	-	-	-	-	-	-	-	-	159.34	-	-
31313	SV3	20 Nov 2017	Stagnant	0.114	16.1	22.4	8.12	8.12	250	5.92	-	-	-	-	-	-	-	-	-	-	-	155	-	-
31313	SV3	07 Dec 2017	Stagnant	0.113	11.7	10.2	7.26	7.26	262	5.98	-	-	-	-	-	-	-	-	-	-	-	162.44	-	-
31313	SV3	10 Jan 2018	Stagnant	0.08	15.1	16	3.45	3.45	345	6.1	-	-	-	-	-	-	-	-	-	-	-	213.9	-	-
31313	SV3	06 Feb 2018	Stagnant	0.08	17.3	20.4	4.17	4.17	216	6.84	-	-	-	-	-	-	-	-	-	-	-	133.92	-	-
31313	SV3	09 Mar 2018	Stagnant	-0.049	15	19.9	2.8	2.8	249	6.4	-	-	-	-	-	-	-	-	-	-	-	154.38	-	-
31313	SV3	11 Apr 2018	Stagnant	0.047	17.3	20.2	1.74	1.74	287	6.58	-	-	-	-	-	-	-	-	-	-	-	177.94	-	-
31313	SV3	14 May 2018	Stagnant	0.113	11.9	15.9	4.32	4.32	406	6.38	-	-	-	-	-	-	-	-	-	-	-	251.72	-	-
31313	SV3	25 Jun 2018	Stagnant	0.138	10	9.3	6.27	6.27	338	7.11	-	-	-	-	-	-	-	-	-	-	-	209.56	-	-
31313	SV3	18 Jul 2018	Stagnant	0.127	9.5	8.8	9.2	9.2	404	5.64	-	-	-	-	-	-	-	-	-	-	-	250.48	-	-
31313	SV3	13 Aug 2018	Flowing	0.16	11.2	11.2	7.56	7.56	381	5.81	-	-	-	-	-	-	-	-	-	-	-	236.22	-	-
31313	SV3	25 Sep 2018	Stagnant	0.112	9.4	11.5	8.2	8.2	280	4.9	-	-	-	-	-	-	-	-	-	-	-	173.6	-	-
31313	SV3	18 Oct 2018	Stagnant	0.107	11.5	15.6	6.5	6.5	277	4.6	-	-	-	-	-	-	-	-	-	-	-	171.74	-	-
31313	SV3	08 Nov 2018	Stagnant	0.107	10.8	13	7.7	7.7	258	5	-	-	-	-	-	-	-	-	-	-	-	159.96	-	-
31313	SV3	13 Dec 2018	Stagnant	0.087	14	15	3.9	3.9	249	5.5	-	-	-	-	-	-	-	-	-	-	-	154.38	-	-
31313	SV3	21 Jan 2019	Stagnant	0.03	16.2	21.5	0.8	0.8	255	6	-	-	-	-	-	-	-	-	-	-	-	158.1	-	-
31313	SV3	12 Feb 2019	Stagnant	-	-	13.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV3	14 Mar 2019	Stagnant	-	-	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV3	08 Apr 2019	Stagnant	-	-	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV3	27 May 2019	Stagnant	0.06	11.1	11	5.2	5.2	531	4.3	-	-	-	-	-	-	-	-	-	-	-	329.22	-	-

Table A2 - Surface Water Analytical Results

			Field								Inorganics													Sample Preparation
			Field Observations	Depth to Water	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)	Alkalinity (total) as CaCO3	Calcium	Chloride	Electrical Conductivity (Lab)	Magnesium	pH (Lab)	Potassium	Sodium	Sulphate	Total Dissolved Solids (Calc.)	Total Dissolved Solids (Lab)	Test - Comment 1
			Pool Condition	m	oC	oC	mg/L	mg/L	µS/cm	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	General Comment
EQL											2	2	2	0.5	0.5	1	0.5	0.1	0.5	0.5	0.5		1	
Site ID	**Location Code**	**Date**																						
31313	SV3	19 Jun 2019	Stagnant	0.122	9.7	7	7.5	7.5	459	4.6	-	-	-	-	-	-	-	-	-	-	-	284.58	-	-
31313	SV3	30 Jul 2019	Stagnant	0.121	9.4	10	7.5	7.5	362	4.5	-	-	-	-	-	-	-	-	-	-	-	224.44	-	-
31313	SV3	01 Aug 2019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV3	17 Sep 2019	Stagnant	0.12	12	-	10.6	10.6	334	5.1	-	-	-	-	-	-	-	-	-	-	-	335	-	-
31313	SV3	15 Oct 2019	Stagnant	0.09	10.3	15.5	6.9	6.9	333	4.8	-	-	-	-	-	-	-	-	-	-	-	206.46	-	-
31313	SV3	14 Nov 2019	Stagnant	0.096	11.8	15.6	8.4	8.4	343	6	-	-	-	-	-	-	-	-	-	-	-	212.66	-	-
31313	SV3	12 Dec 2019	Stagnant	0.078	11.8	12.2	8.31	8.31	348	6.68	-	-	-	-	-	-	-	-	-	-	-	215.76	-	-
31313	SV3	13 Jan 2020	-	-	-	18.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV3	10 Feb 2020	-	-	-	18.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV3	17 Mar 2020	-	-	-	14.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV3	15 Apr 2020	-	-	13.3	18.2	8.4	8.4	505	5.4	-	-	-	-	-	-	-	-	-	-	-	313.1	-	Below Gauge
31313	SV3	13 May 2020	Stagnant	0.081	12.1	11.3	9.8	9.8	466	5.6	-	-	-	-	-	-	-	-	-	-	-	288.92	-	-
31313	SV3	12 Jun 2020	Stagnant	0.076	7.5	5.6	8.71	8.71	231	6.2	-	-	-	-	-	-	-	-	-	-	-	143.22	-	-
31313	SV3	13 Jul 2020	Stagnant	0.082	11.5	11.5	9.54	9.54	435	5	2	2	2	0.8	76	400	15	4.8	0.6	45	80	269.7	240	-
31313	SV3	12 Aug 2020	Stagnant	0.088	8.5	12.2	8.92	8.92	442	5.4	-	-	-	-	-	-	-	-	-	-	-	274.04	-	-
31313	SV3	08 Sep 2020	Stagnant	0.08	12.8	14.5	10.09	10.09	368	4.9	-	-	-	-	-	-	-	-	-	-	-	228.16	-	-
31313	SV3	14 Oct 2020	Trickle	0.141	13.6	15.8	9.86	9.86	367	7.2	-	-	-	-	-	-	-	-	-	-	-	227.54	-	-
31313	SV3	10 Nov 2020	Stagnant	0.082	11.4	23.9	9.63	9.63	527	6.22	-	-	-	-	-	-	-	-	-	-	-	326.74	-	-
31313	SV3	09 Dec 2020	Stagnant	0.111	12.1	15.2	7.27	7.27	352	5.98	-	-	-	-	-	-	-	-	-	-	-	218.24	-	-
31313	SV3	11 Jan 2021	Stagnant	0.1	13.45	26.5	8.15	8.15	314	6.27	-	-	-	-	-	-	-	-	-	-	-	194.68	-	-
31313	SV3	09 Feb 2021	Stagnant	0.068	15.7	26.5	4.69	4.69	341	6.31	<2	<2	<2	0.5	77	330	10	5.1	0.5	57	<5	211.42	270	-
31313	SV3	10 Mar 2021	-	-	-	16.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV3	14 Apr 2021	-	-	-	13.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV3	11 May 2021	Stagnant	0.08	11.9	11.8	8.96	8.96	372	6.23	-	-	-	-	-	-	-	-	-	-	-	230.64	-	-
31313	SV3	03 Jun 2021	Stagnant	0.097	12.7	14.1	9.47	9.47	344	6.15	-	-	-	-	-	-	-	-	-	-	-	213.28	-	-
31313	SV3	14 Jul 2021	Stagnant	0.115	9.7	9.9	9.18	9.18	318	4.92	2	<2	2	0.5	72	300	9.5	4.9	0.5	22	27	197.16	260	-
31313	SV3	10 Aug 2021	Trickle	0.14	8.5	9.5	11.63	11.63	718	5.4	-	-	-	-	-	-	-	-	-	-	-	445.16	-	-
31313	SV3	08 Sep 2021	Stagnant	0.102	9.7	16.8	9.01	9.01	267	4.95	-	-	-	-	-	-	-	-	-	-	-	165.54	-	-
31313	SV3	12 Oct 2021	Trickle	0.157	12.5	14.5	9.47	9.47	262	4.5	-	-	-	-	-	-	-	-	-	-	-	162.44	-	-
31313	SV3	04 Nov 2021	Flowing	0.322	13.5	15.6	10.02	10.02	225	5.3	-	-	-	-	-	-	-	-	-	-	-	139.5	-	-
31313	SV3	01 Dec 2021	Stagnant	0.128	12.4	28	8.21	8.21	311	5.74	-	-	-	-	-	-	-	-	-	-	-	192.82	-	-
31313	SV3	06 Jan 2022	Flowing	0.15	13.6	24	6.98	6.98	264	6.4	-	-	-	-	-	-	-	-	-	-	-	163.68	-	-
31313	SV3	07 Feb 2022	Trickle	0.133	17.5	27.1	7.08	7.08	230	6.32	-	-	-	-	-	-	-	-	-	-	-	142.6	-	-
31313	SV3	08 Mar 2022	Trickle	0.128	14.9	13.5	9.51	9.51	251	6.47	-	-	-	-	-	-	-	-	-	-	-	155.62	-	-
31313	SV3	27 Apr 2022	Stagnant	0.119	15.5	16.9	8.11	8.11	338	5.83	-	-	-	-	-	-	-	-	-	-	-	209.56	-	-
31313	SV3	11 May 2022	Trickle	0.128	11.8	13.5	9.5	9.5	283	4.47	-	-	-	-	-	-	-	-	-	-	-	175.46	-	-
31313	SV3	08 Jun 2022	Flowing	0.188	9.7	8.8	8.33	8.33	263	4.92	-	-	-	-	-	-	-	-	-	-	-	163.06	-	-
31313	SV3	02 Jul 2022	-	-	-	-	-	-	-	-	2	2	2	0.4	57	220	5.3	5	1.2	35	10	-	120	-
31313	SV3	07 Jul 2022	Trickle	0.152	9.8	10.1	10.02	10.02	278	5.74	2	2	2	0.4	62	230	5.2	5.1	0.5	30	10	172.36	180	-
31313	SV3	02 Aug 2022	Trickle	0.176	7.4	10.1	9.37	9.37	317	6.55	-	-	-	-	-	-	-	-	-	-	-	196.54	-	-
31313	SV3	14 Sep 2022	Flowing	0.184	8.6	14.1	8.99	8.99	274	6.1	-	-	-	-	-	-	-	-	-	-	-	169.88	-	-
31313	SV3	21 Oct 2022	Flowing	0.22	11.4	13.5	10.01	10.01	251	5.85	-	-	-	-	-	-	-	-	-	-	-	155.62	-	-
31313	SV3	17 Nov 2022	Flowing	0.272	11.4	9.9	10.51	10.51	253	5.78	-	-	-	-	-	-	-	-	-	-	-	156.86	-	-
31313	SV3	06 Dec 2022	Trickle	0.176	12.5	14	8.99	8.99	310	5.64	-	-	-	-	-	-	-	-	-	-	-	192.2	-	-
31313	SV3	11 Jan 2023	Trickle	0.134	14.8	24.2	8.73	8.73	237	6.63	-	-	-	-	-	-	-	-	-	-	-	146.94	-	-
31313	SV3	07 Feb 2023	Trickle	0.14	13.3	15	8.82	8.82	331	6.04	-	-	-	-	-	-	-	-	-	-	-	205.22	-	-
31313	SV3	10 Mar 2023	Trickle	0.127	13.6	13.8	8.14	8.14	262	5.52	-	-	-	-	-	-	-	-	-	-	-	162.44	-	-
31313	SV3	12 Apr 2023	Flowing	0.18	12	11.7	9.97	9.97	303	6.68	-	-	-	-	-	-	-	-	-	-	-	187.86	-	-
31313	SV3	09 May 2023	Trickle	0.16	9.9	8.7	8.92	8.92	255	5.98	-	-	-	-	-	-	-	-	-	-	-	158.1	-	-
31313	SV3	20 Jun 2023	Flowing	0.283	9.9	9.2	10.5	10.5	203	5.45	-	-	-	-	-	-	-	-	-	-	-	125.86	-	-
31313	SV3	02 Jul 2023	-	-	-	-	-	-	-	-	2	<2	2	1.9	73	220	6.3	5.3	1.52	38	<10	-	160	-
31313	SV3	10 Jul 2023	Flowing	0.264	10	10.8	8.11	8.11	292	6.01	-	-	-	-	-	-	-	-	-	-	-	181.04	-	-
31313	SV3	11 Aug 2023	Trickle	0.193	8.2	7.2	8.61	8.61	457	6.8	-	-	-	-	-	-	-	-	-	-	-	283.34	-	-
31313	SV3	06 Sep 2023	Trickle	0.168	8.5	10.5	8.82	8.82	117	5.08	-	-	-	-	-	-	-	-	-	-	-	72.54	-	-
31313	SV3	07 Oct 2023	-	-	-	-	-	-	-	-	<2	<2	<2	0.4	77	240	5	5.1	0.7	31	<10	-	160	-

Table A2 - Surface Water Analytical Results

			Field								Inorganics													Sample Preparation
			Field Observations	Depth to Water	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)	Alkalinity (total) as CaCO3	Calcium	Chloride	Electrical Conductivity (lab)	Magnesium	pH (Lab)	Potassium	Sodium	Sulphate	Total Dissolved Solids (Calc.)	Total Dissolved Solids (lab)	Test - Comment 1
			Pool Condition	m	oC	oC	mg/L	mg/L	µS/cm	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	General Comment
EQL											2	2	2	0.5	0.5	1	0.5	0.1	0.5	0.5	0.5		1	
Site ID	**Location Code**	**Date**																						
31313	SV4	01 Jun 2010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	15 Jun 2010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	30 Jun 2010	Stagnant	0.082	9.2	9.2	1.5	1.2	398	5.9	-	-	-	-	-	-	-	-	-	-	-	246.76	-	-
31313	SV4	12 Jul 2010	Stagnant	0.033	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	27 Jul 2010	Flowing	0.128	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	11 Aug 2010	Flowing	0.204	9.1	9.1	5.57	5.57	236	5.7	-	-	-	-	-	-	-	-	-	-	-	146.32	-	-
31313	SV4	23 Aug 2010	Flowing	0.284	15.5	15.5	4.58	4.28	400	4.68	-	-	-	-	-	-	-	-	-	-	-	248	-	-
31313	SV4	07 Sep 2010	Flowing	0.439	12.6	12.6	7.1	7.1	326	5.3	-	-	-	-	-	-	-	-	-	-	-	202.12	-	-
31313	SV4	21 Sep 2010	Flowing	0.22	13.1	13.1	6.3	6.1	388	3.94	-	-	-	-	-	-	-	-	-	-	-	240.56	-	-
31313	SV4	05 Oct 2010	Stagnant	0.181	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	19 Oct 2010	Flowing	0.281	15.7	15.7	6.28	6.12	441	3.96	-	-	-	-	-	-	-	-	-	-	-	273.42	-	-
31313	SV4	01 Nov 2010	Flowing	0.227	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	16 Nov 2010	Flowing	0.26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	01 Dec 2010	Flowing	0.258	17	17	4.7	4.6	516	3.72	-	-	-	-	-	-	-	-	-	-	-	319.92	-	-
31313	SV4	13 Dec 2010	Flowing	0.175	20.9	20.9	4.6	4.1	374	4.37	-	-	-	-	-	-	-	-	-	-	-	231.88	-	-
31313	SV4	29 Dec 2010	Stagnant	0.098	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	11 Jan 2011	Stagnant	-	21.6	21.6	0.8	0.4	602	4.58	-	-	-	-	-	-	-	-	-	-	-	373.24	-	Below Gauge
31313	SV4	27 Jan 2011	Flowing	0.216	21.5	21.5	4.8	4.6	297	4.77	-	-	-	-	-	-	-	-	-	-	-	184.14	-	-
31313	SV4	08 Feb 2011	Flowing	0.118	20.8	20.8	6.2	6	356	4.75	-	-	-	-	-	-	-	-	-	-	-	220.72	-	-
31313	SV4	21 Feb 2011	Flowing	0.12	17.9	17.9	1.3	1.5	410	4.97	-	-	-	-	-	-	-	-	-	-	-	254.2	-	-
31313	SV4	08 Mar 2011	Stagnant	-	24.6	24.6	0.2	0.2	480	5.27	-	-	-	-	-	-	-	-	-	-	-	297.6	-	Below Gauge
31313	SV4	21 Mar 2011	Flowing	0.117	21.6	21.6	2.3	0.3	384	5.11	-	-	-	-	-	-	-	-	-	-	-	238.08	-	-
31313	SV4	04 Apr 2011	Stagnant	-	16.3	16.3	1.8	1.8	446	4.6	-	-	-	-	-	-	-	-	-	-	-	276.52	-	Below Gauge
31313	SV4	20 Apr 2011	Flowing	0.13	15.7	15.7	2	2	374	5.31	-	-	-	-	-	-	-	-	-	-	-	231.88	-	-
31313	SV4	05 May 2011	Flowing	0.133	15	15	1.7	1	377	4.3	-	-	-	-	-	-	-	-	-	-	-	233.74	-	-
31313	SV4	16 May 2011	Flowing	0.164	12.6	12.6	4.4	3.8	353	4.31	-	-	-	-	-	-	-	-	-	-	-	218.86	-	-
31313	SV4	31 May 2011	Flowing	0.178	13.4	13.4	6.6	6.5	288	4.72	-	-	-	-	-	-	-	-	-	-	-	178.56	-	-
31313	SV4	15 Jun 2011	Flowing	0.188	11.2	11.2	6	6	302	4.98	-	-	-	-	-	-	-	-	-	-	-	187.24	-	-
31313	SV4	29 Jun 2011	Flowing	0.191	8.2	8.2	7.9	7.9	283	4.65	-	-	-	-	-	-	-	-	-	-	-	175.46	-	-
31313	SV4	12 Jul 2011	Flowing	0.218	11	11	6.8	6.7	301	5.01	-	-	-	-	-	-	-	-	-	-	-	186.62	-	-
31313	SV4	26 Jul 2011	Flowing	0.348	9.2	9.2	1.9	0.9	328	5.34	-	-	-	-	-	-	-	-	-	-	-	203.36	-	-
31313	SV4	09 Aug 2011	Flowing	0.209	9.6	9.6	6.3	6.3	304	5.6	-	-	-	-	-	-	-	-	-	-	-	188.48	-	-
31313	SV4	23 Aug 2011	Flowing	0.221	19	19	7.58	7.48	315	5.49	-	-	-	-	-	-	-	-	-	-	-	195.3	-	-
31313	SV4	06 Sep 2011	Flowing	0.181	14.5	14.5	5	5	331	5.15	-	-	-	-	-	-	-	-	-	-	-	205.22	-	-
31313	SV4	21 Sep 2011	Flowing	0.182	18.1	18.1	6.8	6.8	319	4.9	-	-	-	-	-	-	-	-	-	-	-	197.78	-	-
31313	SV4	04 Oct 2011	Flowing	0.24	20.8	20.8	6	6	286	5.46	-	-	-	-	-	-	-	-	-	-	-	177.32	-	-
31313	SV4	19 Oct 2011	Flowing	0.177	7.6	7.6	2.32	2.29	299	5.12	-	-	-	-	-	-	-	-	-	-	-	185.38	-	-
31313	SV4	02 Nov 2011	Flowing	0.18	16.3	16.3	3.31	3.31	291	5.2	-	-	-	-	-	-	-	-	-	-	-	180.42	-	-
31313	SV4	15 Nov 2011	Flowing	0.159	26.2	26.2	5.59	5.49	347	5.1	-	-	-	-	-	-	-	-	-	-	-	215.14	-	-
31313	SV4	01 Dec 2011	Flowing	0.175	15.2	15.2	6.23	6.21	299	4.71	-	-	-	-	-	-	-	-	-	-	-	185.38	-	-
31313	SV4	13 Dec 2011	Flowing	0.146	13	13	2.8	2.4	301	5.08	-	-	-	-	-	-	-	-	-	-	-	186.62	-	-
31313	SV4	28 Dec 2011	Flowing	0.068	20.1	20.1	2.2	2.2	346	4.5	-	-	-	-	-	-	-	-	-	-	-	214.52	-	-
31313	SV4	10 Jan 2012	Stagnant	-	18.1	18.1	2	1.7	455	5.1	-	-	-	-	-	-	-	-	-	-	-	282.1	-	Below Gauge
31313	SV4	24 Jan 2012	Dry	-	21.8 -	21.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Below Gauge
31313	SV4	07 Feb 2012	Dry	-	16.2 -	16.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Below Gauge
31313	SV4	14 Feb 2012	Dry	-	17.2 -	17.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Below Gauge
31313	SV4	21 Feb 2012	Dry	-	23 -	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	06 Mar 2012	Dry	-	23 -	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	20 Mar 2012	Dry	-	24.1 -	24.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	03 Apr 2012	Dry	-	23.2 -	23.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	17 Apr 2012	Dry	-	17.5 -	17.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	26 Apr 2012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	01 May 2012	Dry	-	20 -	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	15 May 2012	Flowing	0.15	16	16	3.52	3.51	312	5.67	-	-	-	-	-	-	-	-	-	-	-	193.44	-	-
31313	SV4	29 May 2012	Flowing	0.18	14.9	14.9	6.51	6.51	277	6.01	-	-	-	-	-	-	-	-	-	-	-	171.74	-	-
31313	SV4	12 Jun 2012	Flowing	0.305	14.2	14.2	6.95	6.95	299	6.54	-	-	-	-	-	-	-	-	-	-	-	185.38	-	-
31313	SV4	15 Jun 2012	-	0.268	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	26 Jun 2012	Flowing	0.384	8.2	8.2	7.3	7.3	341	6.2	-	-	-	-	-	-	-	-	-	-	-	211.42	-	-
31313	SV4	11 Jul 2012	Flowing	0.409	13.5	13.5	7.8	7.7	324	5.2	-	-	-	-	-	-	-	-	-	-	-	200.88	-	-
31313	SV4	24 Jul 2012	Flowing	0.244	11.2	11.2	6.3	6.3	352	5.09	-	-	-	-	-	-	-	-	-	-	-	218.24	-	-
31313	SV4	07 Aug 2012	Flowing	0.237	10.8	10.8	7.9	7.9	375	4.51	-	-	-	-	-	-	-	-	-	-	-	232.5	-	-
31313	SV4	21 Aug 2012	Flowing	0.416	13.2	13.2	8.2	8.2	342	5.09	-	-	-	-	-	-	-	-	-	-	-	212.04	-	-
31313	SV4	04 Sep 2012	Flowing	0.301	18.3	18.3	7.9	7.9	364	4.25	-	-	-	-	-	-	-	-	-	-	-	225.68	-	-
31313	SV4	18 Sep 2012	Flowing	0.236	14.5	14.5	6.3	6.3	366	6.61	-	-	-	-	-	-	-	-	-	-	-	226.92	-	-

			Field								Inorganics													Sample Preparation
			Field Observations	Depth to Water	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)	Alkalinity (total) as CaCO3	Calcium	Chloride	Electrical Conductivity (Lab)	Magnesium	pH (Lab)	Potassium	Sodium	Sulphate	Total Dissolved Solids (Calc.)	Total Dissolved Solids (Lab)	Test - Comment 1
			Pool Condition	m	oC	oC	mg/L	mg/L	µS/cm	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	General Comment
EQL											2	2	2	0.5	0.5	1	0.5	0.1	0.5	0.5	0.5		1	
Site ID	**Location Code**	**Date**																						
31313	SV4	02 Oct 2012	Flowing	0.255	14	14	5.7	5.7	345	5.09	-	-	-	-	-	-	-	-	-	-	-	213.9	-	-
31313	SV4	16 Oct 2012	Flowing	0.233	17.1	17.1	6.1	6.1	387	5.32	-	-	-	-	-	-	-	-	-	-	-	239.94	-	-
31313	SV4	30 Oct 2012	Flowing	0.183	21.1	21.1	6.4	6.4	368	5.03	-	-	-	-	-	-	-	-	-	-	-	228.16	-	-
31313	SV4	13 Nov 2012	Flowing	0.148	16.8	16.8	4.26	4.26	343	5.1	-	-	-	-	-	-	-	-	-	-	-	212.66	-	-
31313	SV4	27 Nov 2012	Flowing	0.124	15.1	15.1	3.3	1.7	363	4.88	-	-	-	-	-	-	-	-	-	-	-	225.06	-	-
31313	SV4	11 Dec 2012	Flowing	0.132	21.1	21.1	5.1	5.1	281	5.3	-	-	-	-	-	-	-	-	-	-	-	174.22	-	-
31313	SV4	20 Dec 2012	Flowing	0.157	13.1	13.1	3.6	2.8	280	4.91	-	-	-	-	-	-	-	-	-	-	-	173.6	-	-
31313	SV4	08 Jan 2013	Stagnant	-	26.6	26.6	0.18	0.18	461	5.63	-	-	-	-	-	-	-	-	-	-	-	285.82	-	Below Gauge
31313	SV4	22 Jan 2013	Dry	-	22.1 -	22.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	05 Feb 2013	Dry	-	24.2 -	24.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	19 Feb 2013	Dry	-	18.2 -	18.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	05 Mar 2013	Dry	-	27.2 -	27.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	19 Mar 2013	Dry	-	16.6 -	16.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	03 Apr 2013	Dry	-	18.2 -	18.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	16 Apr 2013	Dry	-	16.6 -	16.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	30 Apr 2013	Dry	-	24 -	24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	14 May 2013	Dry	-	8.4 -	8.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	27 May 2013	Dry	-	14.8 -	14.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	11 Jun 2013	Flowing	0.12	12.6	12.6	4.6	4.5	442	5.65	-	-	-	-	-	-	-	-	-	-	-	274.04	-	-
31313	SV4	24 Jun 2013	Flowing	0.19	12.2	12.2	6.86	6.86	431	6.6	-	-	-	-	-	-	-	-	-	-	-	267.22	-	-
31313	SV4	09 Jul 2013	Flowing	0.179	7.3	7.3	5.91	5.91	451	6.9	-	-	-	-	-	-	-	-	-	-	-	279.62	-	-
31313	SV4	23 Jul 2013	Flowing	0.278	12	12	5.7	5.7	289	6.5	-	-	-	-	-	-	-	-	-	-	-	179.18	-	-
31313	SV4	06 Aug 2013	Flowing	-	11.1	11.1	6.21	6.21	398	6.71	-	-	-	-	-	-	-	-	-	-	-	246.76	-	Above Gauge
31313	SV4	19 Aug 2013	Flowing	0.355	7.5	7.5	7.3	6.8	276	6.68	-	-	-	-	-	-	-	-	-	-	-	171.12	-	-
31313	SV4	03 Sep 2013	Flowing	0.261	17.4	17.4	6.9	6.9	302	5.85	-	-	-	-	-	-	-	-	-	-	-	187.24	-	-
31313	SV4	17 Sep 2013	Flowing	0.315	15.9	15.9	8.1	8.1	308	6.08	-	-	-	-	-	-	-	-	-	-	-	190.96	-	-
31313	SV4	01 Oct 2013	Flowing	0.604	11.8	11.8	8.8	8.5	345	5.59	-	-	-	-	-	-	-	-	-	-	-	213.9	-	-
31313	SV4	15 Oct 2013	Flowing	0.216	13.8	13.8	9.2	9.2	302	5.81	-	-	-	-	-	-	-	-	-	-	-	187.24	-	-
31313	SV4	29 Oct 2013	Flowing	0.303	11.6	11.6	5.7	5.7	309	5.34	-	-	-	-	-	-	-	-	-	-	-	191.58	-	-
31313	SV4	13 Nov 2013	Flowing	0.36	13.7	13.7	6.53	6.53	280	6.4	-	-	-	-	-	-	-	-	-	-	-	173.6	-	-
31313	SV4	26 Nov 2013	Flowing	0.253	24.2	24.2	6.06	6.06	281	5.84	-	-	-	-	-	-	-	-	-	-	-	174.22	-	-
31313	SV4	09 Dec 2013	Flowing	0.2	16.8	16.8	5.89	5.89	272	5.91	-	-	-	-	-	-	-	-	-	-	-	168.64	-	-
31313	SV4	24 Dec 2013	Flowing	0.18	12.9	12.9	3.4	3.5	292	5.56	-	-	-	-	-	-	-	-	-	-	-	181.04	-	-
31313	SV4	09 Jan 2014	Flowing	0.159	24.8	24.8	3.1	3.2	281	5.82	-	-	-	-	-	-	-	-	-	-	-	174.22	-	-
31313	SV4	21 Jan 2014	Stagnant	0.06	20.1	20.1	1.93	1.93	312	5.87	-	-	-	-	-	-	-	-	-	-	-	180.42	-	-
31313	SV4	06 Feb 2014	Dry	-	26.2 -	26.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	17 Feb 2014	Dry	-	21.9 -	21.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	07 Mar 2014	Dry	-	17.1 -	17.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	18 Mar 2014	Dry	-	14.9 -	14.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	01 Apr 2014	Dry	-	25.1 -	25.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	15 Apr 2014	Flowing	0.171	12.3	12.3	2.58	2.58	291	5.84	-	-	-	-	-	-	-	-	-	-	-	180.42	-	-
31313	SV4	29 Apr 2014	Flowing	0.175	17.1	17.1	4.3	4.3	258	4.97	-	-	-	-	-	-	-	-	-	-	-	146.32	-	-
31313	SV4	12 May 2014	Flowing	0.192	15.2	15.2	5.1	5.1	229	5.1	-	-	-	-	-	-	-	-	-	-	-	141.98	-	-
31313	SV4	20 May 2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	10 Jun 2014	Flowing	0.179	13.7	13.7	4.38	4.38	241	5.1	-	-	-	-	-	-	-	-	-	-	-	149.42	-	-
31313	SV4	27 Jun 2014	Flowing	0.302	8.2	8.2	7.11	7.1	364	5.8	-	-	-	-	-	-	-	-	-	-	-	225.68	-	-
31313	SV4	08 Jul 2014	Flowing	0.254	10.5	10.5	6.58	6.58	283	6.41	-	-	-	-	-	-	-	-	-	-	-	175.46	-	-
31313	SV4	24 Jul 2014	Flowing	0.235	12.9	12.9	8.8	8.8	413	5.35	-	-	-	-	-	-	-	-	-	-	-	256.06	-	-
31313	SV4	06 Aug 2014	Flowing	0.274	12.3	12.3	9.13	9.13	325	6	-	-	-	-	-	-	-	-	-	-	-	201.5	-	-
31313	SV4	18 Aug 2014	Flowing	0.230	11	11	6.9	6.8	316	4.8	-	-	-	-	-	-	-	-	-	-	-	195.92	-	-
31313	SV4	04 Sep 2014	Flowing	0.222	13.1	13.1	7.5	7.5	309	4.9	-	-	-	-	-	-	-	-	-	-	-	191.58	-	-
31313	SV4	18 Sep 2014	Flowing	0.197	12.8	12.8	7.2	7.18	272	5.05	-	-	-	-	-	-	-	-	-	-	-	168.64	-	-
31313	SV4	30 Sep 2014	Flowing	0.170	11	11	5.16	5.16	269	5.6	-	-	-	-	-	-	-	-	-	-	-	166.78	-	-
31313	SV4	14 Oct 2014	Flowing	0.172	12	12	5.7	6.1	261	5.35	-	-	-	-	-	-	-	-	-	-	-	161.82	-	-
31313	SV4	29 Oct 2014	Flowing	0.142	18.1	18.1	6.3	6.2	278	5.45	-	-	-	-	-	-	-	-	-	-	-	172.36	-	-
31313	SV4	11 Nov 2014	Flowing	0.064	17.7	17.7	1.7	1.7	292	5.7	-	-	-	-	-	-	-	-	-	-	-	181.04	-	-
31313	SV4	01 Dec 2014	Flowing	0.125	26.4	26.4	2.5	2.6	260	5	-	-	-	-	-	-	-	-	-	-	-	161.2	-	-
31313	SV4	08 Dec 2014	Flowing	0.328	17.8	17.8	6.12	6.1	238	5.2	-	-	-	-	-	-	-	-	-	-	-	147.56	-	-
31313	SV4	07 Jan 2015	Dry	-	31.1 -	31.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	20 Jan 2015	Flowing	0.122	25.3	25.3	1.79	1.9	238	5.1	-	-	-	-	-	-	-	-	-	-	-	147.56	-	-
31313	SV4	04 Feb 2015	Stagnant	-	19.7	19.7	0.9	0.9	403	5.47	-	-	-	-	-	-	-	-	-	-	-	249.86	-	Below Gauge
31313	SV4	17 Feb 2015	Flowing	0.14	20.8	20.8	2.3	2.3	250	5.1	-	-	-	-	-	-	-	-	-	-	-	155	-	-
31313	SV4	04 Mar 2015	Stagnant	-	16.5	16.5	1.6	1.6	285	5.4	-	-	-	-	-	-	-	-	-	-	-	176.7	-	Below Gauge
31313	SV4	31 Mar 2015	DRY	-	25 -	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table A2 - Surface Water Analytical Results

			Field								Inorganics													Sample Preparation
			Field Observations	Depth to Water	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)	Alkalinity (total) as CaCO3	Calcium	Chloride	Electrical Conductivity (Lab)	Magnesium	pH (Lab)	Potassium	Sodium	Sulphate	Total Dissolved Solids (Calc.)	Total Dissolved Solids (Lab)	Test - Comment 1
			Pool Condition	m	oC	oC	mg/L	mg/L	µS/cm	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	General Comment
EQL											2	2	2	0.5	0.5	1	0.5	0.1	0.5	0.5	0.5		1	
Site ID	**Location Code**	**Date**																						
31313	SV4	28 Apr 2015	Flowing	0.136	13.4	13.4	4.5	4.5	283	5.4	-	-	-	-	-	-	-	-	-	-	-	175.46	-	-
31313	SV4	21 May 2015	Flowing	0.213	12	12	8.4	8.4	236	5.6	-	-	-	-	-	-	-	-	-	-	-	146.32	-	-
31313	SV4	17 Jun 2015	Flowing	0.221	13.2	13.2	7.3	7.3	213	5.7	-	-	-	-	-	-	-	-	-	-	-	132.06	-	-
31313	SV4	20 Jul 2015	Flowing	0.187	9.3	9.3	8.9	8.9	208	5.8	-	-	-	-	-	-	-	-	-	-	-	128.96	-	-
31313	SV4	18 Aug 2015	Flowing	0.17	9	9	9	9	288	6.2	-	-	-	-	-	-	-	-	-	-	-	178.56	-	-
31313	SV4	21 Sep 2015	Flowing	0.159	16.3	16.3	8.7	8.7	247	6.7	-	-	-	-	-	-	-	-	-	-	-	153.14	-	-
31313	SV4	20 Oct 2015	Flowing	-	20	20	2.1	2.1	270	5.6	-	-	-	-	-	-	-	-	-	-	-	167.4	-	Below Gauge
31313	SV4	17 Nov 2015	Stagnant	0.01	23.5	23.5	3.21	3.21	265	6.1	-	-	-	-	-	-	-	-	-	-	-	164.3	-	-
31313	SV4	07 Dec 2015	Dry	-	14.9 -	14.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	21 Jan 2016	Dry	-	24.1 -	24.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	16 Feb 2016	Dry	-	19.4 -	19.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	15 Mar 2016	Dry	-	20 -	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	07 Apr 2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	13 Apr 2016	Dry	-	15.2 -	15.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	17 May 2016	Dry	-	15.1 -	15.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	21 Jun 2016	Flowing	0.112	12.3	12.3	4.7	4.7	294	5.4	-	-	-	-	-	-	-	-	-	-	-	182.28	-	-
31313	SV4	19 Jul 2016	Flowing	0.184	17	17	5.9	5.9	385	5.2	-	-	-	-	-	-	-	-	-	-	-	238.7	-	-
31313	SV4	20 Sep 2016	Flowing	0.344	16.7	16.7	8.3	8.3	315	5.4	-	-	-	-	-	-	-	-	-	-	-	195.3	-	-
31313	SV4	18 Oct 2016	Flowing	0.291	15.1	15.1	7.9	7.9	450	5.4	-	-	-	-	-	-	-	-	-	-	-	279	-	-
31313	SV4	15 Nov 2016	Flowing	0.172	10	10	9.9	9.9	347	5.4	-	-	-	-	-	-	-	-	-	-	-	215.14	-	-
31313	SV4	07 Dec 2016	Flowing	0.104	15.7	15.7	4.4	4.4	312	5.4	-	-	-	-	-	-	-	-	-	-	-	193.44	-	-
31313	SV4	18 Jan 2017	Pool	-	18.1	18.1	1.2	1.2	478	5.7	-	-	-	-	-	-	-	-	-	-	-	296.36	-	Below Gauge
31313	SV4	14 Feb 2017	Flowing	-	17.2	17.2	2.64	0.63	354	5.2	-	-	-	-	-	-	-	-	-	-	-	219.48	-	Below Gauge
31313	SV4	20 Mar 2017	Dry	-	15.2 -	15.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	19 Apr 2017	Flowing	0.14	19.3	19.3	6.77	6.77	302	5.69	-	-	-	-	-	-	-	-	-	-	-	187.24	-	-
31313	SV4	16 May 2017	Flowing	0.16	9	9	8.41	8.41	278	5.67	-	-	-	-	-	-	-	-	-	-	-	172.36	-	-
31313	SV4	21 Jun 2017	Flowing	0.153	10.2	10.2	5.65	5.5	249	5.6	-	-	-	-	-	-	-	-	-	-	-	154.38	-	-
31313	SV4	24 Jul 2017	Flowing	0.19	8.2	8.2	5.97	5.94	367	5.22	-	-	-	-	-	-	-	-	-	-	-	227.54	-	-
31313	SV4	18 Aug 2017	Flowing	0.17	20.3	20.3	5.1	5.1	357	5.1	-	-	-	-	-	-	-	-	-	-	-	221.34	-	-
31313	SV4	22 Aug 2017	Flowing	0.278	8.9	8.9	8.9	8.5	299	6	-	-	-	-	-	-	-	-	-	-	-	185.38	-	-
31313	SV4	19 Sep 2017	Flowing	0.34	8.9	8.9	8.08	8.08	204	6.26	-	-	-	-	-	-	-	-	-	-	-	126.48	-	-
31313	SV4	18 Oct 2017	Flowing	0.156	18.3	18.3	7.66	7.66	274	6.32	-	-	-	-	-	-	-	-	-	-	-	169.88	-	-
31313	SV4	20 Nov 2017	Flowing	0.134	24.2	24.2	5.76	5.76	286	5.64	-	-	-	-	-	-	-	-	-	-	-	177.32	-	-
31313	SV4	07 Dec 2017	Flowing	0.14	15.5	15.5	5.36	5.36	249	6.25	-	-	-	-	-	-	-	-	-	-	-	154.38	-	-
31313	SV4	11 Jan 2018	Flowing	-	15	15	3	3	415	6.05	-	-	-	-	-	-	-	-	-	-	-	257.3	-	Below Gauge
31313	SV4	06 Feb 2018	Dry	-	18.7 -	18.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	09 Mar 2018	Dry	-	18.7 -	18.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	11 Apr 2018	Dry	-	21.2 -	21.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	15 May 2018	Flowing	0.154	11.2	11.2	6.89	6.89	283	6.63	-	-	-	-	-	-	-	-	-	-	-	175.46	-	-
31313	SV4	25 Jun 2018	Flowing	0.153	8.6	8.6	5.34	5.34	218	5.95	-	-	-	-	-	-	-	-	-	-	-	135.16	-	-
31313	SV4	18 Jul 2018	Flowing	0.16	10.3	10.3	7.32	7.32	230	6.75	-	-	-	-	-	-	-	-	-	-	-	142.6	-	-
31313	SV4	13 Aug 2018	Flowing	0.249	11.2	11.2	8.38	8.38	380	5.68	-	-	-	-	-	-	-	-	-	-	-	235.6	-	-
31313	SV4	25 Sep 2018	Flowing	0.13	11.9	11.9	5.1	4.9	275	5.3	-	-	-	-	-	-	-	-	-	-	-	170.5	-	-
31313	SV4	18 Oct 2018	Flowing	0.139	17	17	4.9	4.9	260	5.2	-	-	-	-	-	-	-	-	-	-	-	161.2	-	-
31313	SV4	08 Nov 2018	Flowing	0.118	14	14	4.5	4.5	247	5.4	-	-	-	-	-	-	-	-	-	-	-	153.14	-	-
31313	SV4	13 Dec 2018	Stagnant	-	17.3	17.3	2.3	2.3	323	5.6	-	-	-	-	-	-	-	-	-	-	-	200.26	-	Below Gauge
31313	SV4	21 Jan 2019	Dry	-	25 -	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	13 Feb 2019	Dry	-	10 -	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	14 Mar 2019	Dry	-	18 -	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	09 Apr 2019	Dry	-	13 -	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31313	SV4	27 May 2019	Flowing	0.13	9	9	3.9	3.9	222	5.2	-	-	-	-	-	-	-	-	-	-	-	137.64	-	-
31313	SV4	19 Jun 2019	Flowing	0.183	5	5	6.7	6.6	298	5.2	-	-	-	-	-	-	-	-	-	-	-	184.76	-	-
31313	SV4	30 Jul 2019	Flowing	0.187	11	11	6.8	6.8	323	5.2	-	-	-	-	-	-	-	-	-	-	-	200.26	-	-
31313	SV4	17 Sep 2019	Flowing	0.186	14.2	14.2	10.1	10.1	312	5.4	-	-	-	-	-	-	-	-	-	-	-	314	-	-
31313	SV4	16 Oct 2019	Flowing	0.121	14.5	14.5	4.8	4.8	298	5.4	-	-	-	-	-	-	-	-	-	-	-	184.76	-	-
31313	SV4	14 Nov 2019	Flowing	0.122	15.8	15.8	8.7	8.7	261	6.1	-	-	-	-	-	-	-	-	-	-	-	161.82	-	-
31313	SV4	13 Dec 2019	Flowing	BELOW	11.2	11.2	8.07	8	368	6.6	-	-	-	-	-	-	-	-	-	-	-	228.16	-	Below Gauge
31313	SV4	13 Jan 2020	Dry	-	10 n/a	10	n/a	n/a	n/a	n/a	-	-	-	-	-	-	-	-	-	-	-	n/a	-	-
31313	SV4	10 Feb 2020	Dry	-	10 n/a	10	n/a	n/a	n/a	n/a	-	-	-	-	-	-	-	-	-	-	-	n/a	-	-
31313	SV4	17 Mar 2020	Stagnant	-	20.1	20.1	6.34	6.34	337	6.2	-	-	-	-	-	-	-	-	-	-	-	208.94	-	-
31313	SV4	15 Apr 2020	Stagnant	0.09	19.9	19.9	8.62	8.62	222	5.2	-	-	-	-	-	-	-	-	-	-	-	137.64	-	-
31313	SV4	13 May 2020	Flowing	0.12	11.2	11.2	9.2	9.2	236	6.9	-	-	-	-	-	-	-	-	-	-	-	146.32	-	-
31313	SV4	12 Jun 2020	Flowing	0.11	3.4	3.4	8.75	8.75	228	6.45	-	-	-	-	-	-	-	-	-	-	-	141.36	-	-
31313	SV4	14 Jul 2020	Flowing	0.122	12.2	12.2	9.85	9.85	232	5.64	5	2	5	1.2	64	200	3.9	5.8	0.9	31	3	143.84	140	-

Table A2 - Surface Water Analytical Results

			Field								Inorganics													Sample Preparation
			Field Observations	Depth to Water	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)	Alkalinity (total) as CaCO3	Calcium	Chloride	Electrical Conductivity (Lab)	Magnesium	pH (Lab)	Potassium	Sodium	Sulphate	Total Dissolved Solids (Calc.)	Total Dissolved Solids (Lab)	Test - Comment 1
			Pool Condition	m	oC	oC	mg/L	mg/L	µS/cm	-	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	General Comment
EQL											2	2	2	0.5	0.5	1	0.5	0.1	0.5	0.5	0.5		1	
Site ID	Location Code	Date																						
31313	SV4	13 Aug 2020	Flowing	0.144	12.1	12.1	8.21	8.21	245	6.5	-	-	-	-	-	-	-	-	-	-	-	151.9	-	-
31313	SV4	08 Sep 2020	Flowing	0.106	15.7	15.7	10.02	10.02	199	5.68	-	-	-	-	-	-	-	-	-	-	-	123.38	-	-
31313	SV4	14 Oct 2020	Flowing	0.24	18	18	9.97	9.97	281	7.55	-	-	-	-	-	-	-	-	-	-	-	174.22	-	-
31313	SV4	10 Nov 2020	Flowing	0.092	23	23	8.65	8.65	271	6.89	-	-	-	-	-	-	-	-	-	-	-	168.02	-	-
31313	SV4	09 Dec 2020	Flowing	0.101	17.8	17.8	7.37	7.37	255	6.938	-	-	-	-	-	-	-	-	-	-	-	158.1	-	-
31313	SV4	11 Jan 2021	Flowing	0.176	23.8	23.8	8.46	8.46	308	6.2	-	-	-	-	-	-	-	-	-	-	-	190.96	-	-
31313	SV4	09 Feb 2021	Flowing	0.08	21.1	21.1	7.23	7.23	251	6.58	10	<2	10	1.8	68	250	5.6	5.9	1.3	38	<20	155.62	210	-
31313	SV4	10 Mar 2021	Flowing	BELOW	15.8	15.8	5.51	5.51	373	6	-	-	-	-	-	-	-	-	-	-	-	231.26	-	Below Gauge
31313	SV4	14 Apr 2021	Flowing	0.075	16.9	16.9	7.8	7.8	261	6.11	-	-	-	-	-	-	-	-	-	-	-	161.82	-	-
31313	SV4	11 May 2021	Flowing	0.192	11.4	11.4	9.25	9.25	222	6.11	-	-	-	-	-	-	-	-	-	-	-	137.64	-	-
31313	SV4	03 Jun 2021	Flowing	0.122	15.5	15.5	8.21	8.21	239	6.15	-	-	-	-	-	-	-	-	-	-	-	148.18	-	-
31313	SV4	12 Jul 2021	Flowing	0.17	8.6	8.6	9.32	9.32	337	5.81	4	<2	4	2.1	91	330	6.7	5.5	1.1	42	<20	208.94	220	-
31313	SV4	10 Aug 2021	Flowing	0.212	11.9	11.9	10.22	10.22	301	6.38	-	-	-	-	-	-	-	-	-	-	-	186.62	-	-
31313	SV4	08 Sep 2021	Flowing	0.163	16.3	16.3	9.31	9.31	281	5.91	-	-	-	-	-	-	-	-	-	-	-	174.22	-	-
31313	SV4	12 Oct 2021	Flowing	0.212	14	14	10.15	10.15	296	5.41	-	-	-	-	-	-	-	-	-	-	-	183.52	-	-
31313	SV4	04 Nov 2021	Flowing	0.796	17.3	17.3	9.53	9.53	249	5.3	-	-	-	-	-	-	-	-	-	-	-	154.38	-	-
31313	SV4	01 Dec 2021	Flowing	0.152	29.9	29.9	8.76	8.76	264	5.78	-	-	-	-	-	-	-	-	-	-	-	163.68	-	-
31313	SV4	06 Jan 2022	Flowing	0.22	24.5	24.5	6.21	6.21	250	6.03	-	-	-	-	-	-	-	-	-	-	-	155	-	-
31313	SV4	08 Feb 2022	Flowing	0.152	26	26	7.6	7.6	270	6.47	-	-	-	-	-	-	-	-	-	-	-	167.4	-	-
31313	SV4	08 Mar 2022	Flowing	0.17	15.2	15.2	7.71	7.71	231	6.2	-	-	-	-	-	-	-	-	-	-	-	143.22	-	-
31313	SV4	27 Apr 2022	Flowing	0.146	17.2	17.2	8.5	8.5	302	6.27	-	-	-	-	-	-	-	-	-	-	-	187.24	-	-
31313	SV4	17 May 2022	Flowing	0.14	12.9	12.9	8.01	8.01	260	6.61	-	-	-	-	-	-	-	-	-	-	-	161.2	-	-
31313	SV4	08 Jun 2022	Flowing	0.3	7.6	7.6	9.98	9.98	228	6.2	-	-	-	-	-	-	-	-	-	-	-	141.36	-	-
31313	SV4	02 Jul 2022	-	-	-	-	-	-	-	-	13	2	13	2	67	250	6.5	6.1	1.7	39	50	-	200	-
31313	SV4	07 Jul 2022	Flowing	0.178	12.7	12.7	8.71	8.71	300	6.24	4	2	4	1.7	75	250	5.6	6	1.1	34	5	186	190	-
31313	SV4	03 Aug 2022	Flowing	0.21	13.4	13.4	8.93	8.93	275	6.31	-	-	-	-	-	-	-	-	-	-	-	170.5	-	-
31313	SV4	14 Sep 2022	Flowing	0.223	15	15	8.91	8.91	248	6.8	-	-	-	-	-	-	-	-	-	-	-	153.76	-	-
31313	SV4	21 Oct 2022	Flowing	0.27	15.4	15.4	9.72	9.72	264	6.42	-	-	-	-	-	-	-	-	-	-	-	163.68	-	-
31313	SV4	21 Nov 2022	Flowing	ABOVE	8.3	8.3	9.81	9.81	220	6.11	-	-	-	-	-	-	-	-	-	-	-	136.4	-	Above Gauge
31313	SV4	06 Dec 2022	Flowing	0.211	17	17	8.79	8.79	273	6.38	-	-	-	-	-	-	-	-	-	-	-	169.26	-	-
31313	SV4	11 Jan 2023	Flowing	0.138	20	20	8.71	8.71	280	6.45	-	-	-	-	-	-	-	-	-	-	-	173.6	-	-
31313	SV4	07 Feb 2023	Flowing	0.15	16.6	16.6	8.01	8.01	269	6.3	-	-	-	-	-	-	-	-	-	-	-	166.78	-	-
31313	SV4	10 Mar 2023	Flowing	0.136	15.8	15.8	8.77	8.77	269	6.92	-	-	-	-	-	-	-	-	-	-	-	166.78	-	-
31313	SV4	12 Apr 2023	Flowing	0.21	15	15	8.62	8.62	272	6.8	-	-	-	-	-	-	-	-	-	-	-	168.64	-	-
31313	SV4	09 May 2023	Flowing	0.188	9.8	9.8	9.11	9.11	262	6.11	-	-	-	-	-	-	-	-	-	-	-	162.44	-	-
31313	SV4	20 Jun 2023	Flowing	0.3	7.9	7.9	11.22	11.22	268	6.55	-	-	-	-	-	-	-	-	-	-	-	166.16	-	-
31313	SV4	02 Jul 2023	-	-	-	-	-	-	-	-	13	<2	13	0.4	81	250	4.7	6.4	0.6	32	<10	-	160	-
31313	SV4	10 Jul 2023	Flowing	0.277	10.4	10.4	8.91	8.91	301	6.61	-	-	-	-	-	-	-	-	-	-	-	186.62	-	-
31313	SV4	11 Aug 2023	Flowing	0.23	7.5	7.5	8.72	8.72	309	6.71	-	-	-	-	-	-	-	-	-	-	-	191.58	-	-
31313	SV4	06 Sep 2023	Flowing	0.213	6.9	6.9	8.92	8.92	289	6.28	-	-	-	-	-	-	-	-	-	-	-	179.18	-	-
31313	SV4	07 Oct 2023	-	-	-	-	-	-	-	-	2	<2	2	1.4	96	260	5.4	5.8	1.1	33	<5	-	180	-

Table A2 - Surface Water Analytical Results

			Inorganics	Field								Sample Preparation
			Total Dissolved Solids (Calc.)	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Depth to Water	Field Observations	Test - Comment 1
			mg/L	oC	oC	mg/L	mg/L	µS/cm	-	m	Pool Conditio	General Comment
EQL												
Site ID	**Location Code**	**Date**										
31313	SGP2-B	15 Jun 2009	216.38	6.4 -	-	1.7	-	349	6.56	-	Stagnant	-
31313	SGP2-B	30 Jun 2009	544.98	9.4	16.8	3.23	-	879	4.52	-	Stagnant	-
31313	SGP2-B	14 Jul 2009	249.24	8.5	8.3	4.4	-	402	4.6	-	Flowing	-
31313	SGP2-B	28 Jul 2009	232.5	8.4	14.8	1.63	-	375	4.69	-	Flowing	-
31313	SGP2-B	11 Aug 2009	217	8.7	13.2	2.61	-	350	4.69	-	Flowing	-
31313	SGP2-B	25 Aug 2009	184.14	8.8	12.7	4.66	-	297	6.93	-	Flowing	-
31313	SGP2-B	08 Sep 2009	191.58	9.7	13.3	5.1	-	309	5.7	2.149	Flowing	-
31313	SGP2-B	23 Sep 2009	199.02	9.6	9.9	5.21	-	321	5.01	2.150	Flowing	-
31313	SGP2-B	06 Oct 2009	246.14	9.9	11.4	4.45	-	397	4.78	2.140	Flowing	-
31313	SGP2-B	20 Oct 2009	262.26	11	19	4.9	-	423	5.1	2.138	Flowing	-
31313	SGP2-B	04 Nov 2009	291.4	12.4	13.8	1.66	-	470	4.48	2.097	Flowing	-
31313	SGP2-B	17 Nov 2009	292.64	14.2	14.4	1.94	-	472	4.5	1.841	Stagnant	-
31313	SGP2-B	01 Dec 2009	261.64	14.1	19.2	1.03	-	422	4.5	2.136	Flowing	-
31313	SGP2-B	17 Dec 2009	238.08	14.9	17.8	1.69	-	384	4.63	2.008	Stagnant	-
31313	SGP2-B	29 Dec 2009	238.7	14.5	21.9	1.6	-	385	4.2	2.008	Stagnant	-
31313	SGP2-B	14 Jan 2010	250.48	15.6	20.9	2.5	-	404	4.3	1.600	Stagnant	-
31313	SGP2-B	27 Jan 2010	252.96	14.7	19	1.77	-	408	5.98	1.349	Stagnant	-
31313	SGP2-B	09 Feb 2010	212.66	18.9	27.3	1.9	-	343	5.7	1.157	Stagnant	-
31313	SGP2-B	25 Feb 2010	208.94	15.6	19.1	1.4	-	337	5	0.988	Stagnant	-
31313	SGP2-B	11 Mar 2010	239.94	14.7	18.2	1.6	-	387	5.23	0.974	Stagnant	-
31313	SGP2-B	24 Mar 2010	261.02	12.7	13.5	1.03	-	421	6.38	0.867	Stagnant	-
31313	SGP2-B	06 Apr 2010	251.72	13.4	17.4	1.2	-	406	6.1	0.820	Stagnant	-
31313	SGP2-B	20 Apr 2010	256.06	13.4	13.9	1.18	-	413	6.58	0.774	Stagnant	-
31313	SGP2-B	04 May 2010	236.84	11.3	15.8	1	-	382	6.2	0.791	Stagnant	-
31313	SGP2-B	18 May 2010	231.26	7.4	2.6	1.25	-	373	6.6	0.728	Stagnant	-
31313	SGP2-B	01 Jun 2010	227.54	9.8	16.2	1.51	1.45	367	6.97	0.728	Stagnant	-
31313	SGP2-B	15 Jun 2010	223.82	7.4	7.8	1.7	1.5	361	6.1	0.717	Stagnant	-
31313	SGP2-B	30 Jun 2010	234.98	8.8	8.8	1.8	1.2	379	6.4	1.955	Stagnant	-
31313	SGP2-B	12 Jul 2010	146.94	8.9	13.1	1.8	0.9	237	6.1	1.961	Stagnant	-
31313	SGP2-B	27 Jul 2010	182.28	7.2	12.9	1.9	1.2	294	4.88	2.076	Flowing	-
31313	SGP2-B	11 Aug 2010	140.74	8.2	9.1	2.45	1.2	227	5.2	2.149	Flowing	-
31313	SGP2-B	23 Aug 2010	246.14	8.3	15.5	4.46	4.96	397	4.73	2.195	Flowing	-
31313	SGP2-B	07 Sep 2010	205.22	9.2	12.8	7.31	6.54	331	5.1	2.376	Flowing	-
31313	SGP2-B	21 Sep 2010	239.94	9.3	13.1	5.2	7	387	3.9	2.137	Flowing	-
31313	SGP2-B	05 Oct 2010	231.88	10.3	13.1	3	1.6	374	4.8	2.118	Flowing	-
31313	SGP2-B	19 Oct 2010	270.32	10.6	16.7	6.13	5.08	436	4.07	2.190	Flowing	-
31313	SGP2-B	01 Nov 2010	262.26	11.8	13.6	5.2	3.8	423	5.01	2.142	Flowing	-
31313	SGP2-B	16 Nov 2010	252.96	11.8	12.8	5.1	4.8	408	4.31	2.172	Flowing	-
31313	SGP2-B	01 Dec 2010	316.2	14.1	18.8	6.3	5.2	510	4.08	2.172	Flowing	-
31313	SGP2-B	13 Dec 2010	236.84	15.3	21.3	2.8	2.1	382	4.12	2.117	Flowing	-
31313	SGP2-B	29 Dec 2010	331.7	12.8	21.1	0.9	2.1	535	4.4	2.078	Stagnant	-

Table A2 - Surface Water Analytical Results

			Inorganics	Field								Sample Preparation
			Total Dissolved Solids (Calc.)	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Depth to Water	Field Observations	Test - Comment 1
			mg/L	oC	oC	mg/L	mg/L	µS/cm	-	m	Pool Conditio	General Comment
31313	SGP2-B	11 Jan 2011	308.76	17.5	21.5	0.9	0.8	498	4.97	1.878	Stagnant	-
31313	SGP2-B	27 Jan 2011	184.14	15.7	24.7	3.9	4.3	297	4.82	2.128	Flowing	-
31313	SGP2-B	08 Feb 2011	214.52	15.8	24.7	4.3	2.5	346	4.61	2.087	Flowing	-
31313	SGP2-B	21 Feb 2011	240.56	15.4	18.1	2.4	0.4	388	4.44	2.068	Flowing	-
31313	SGP2-B	08 Mar 2011	260.4	16	23.8	0.2	0.2	420	5.55	1.880	Stagnant	-
31313	SGP2-B	21 Mar 2011	237.46	14.6	21.8	0.4	0.4	383	4.98	2.065	Flowing	-
31313	SGP2-B	04 Apr 2011	260.4	12.5	16.2	0.9	1.4	420	5.71	1.963	Stagnant	-
31313	SGP2-B	20 Apr 2011	230.64	13.8	15.2	1.8	0.8	372	5.2	2.080	Flowing	-
31313	SGP2-B	05 May 2011	237.46	11.5	12.6	1.7	1.2	383	4.2	2.090	Flowing	-
31313	SGP2-B	16 May 2011	222.58	10.7	13.1	3.7	1.7	359	4.26	2.102	Flowing	-
31313	SGP2-B	31 May 2011	176.7	11.2	13.5	4.5	2.1	285	4.75	2.112	Flowing	-
31313	SGP2-B	15 Jun 2011	182.28	9.5	11.4	3.7	1.1	294	5.46	2.126	Flowing	-
31313	SGP2-B	29 Jun 2011	177.94	8	9.1	6.8	6.6	287	4.71	2.120	Flowing	-
31313	SGP2-B	12 Jul 2011	184.14	9.2	14.1	3.4	1.3	297	4.92	2.148	Flowing	-
31313	SGP2-B	26 Jul 2011	202.74	9.6	9.3	1.5	1	327	6.03	2.259	Flowing	-
31313	SGP2-B	09 Aug 2011	189.1	9.7	9	4.3	1.9	305	5.6	2.219	Flowing	-
31313	SGP2-B	23 Aug 2011	194.06	8.7	15.2	6.08	5.82	313	4.93	2.140	Flowing	-
31313	SGP2-B	06 Sep 2011	202.74	9.3	14.3	6.5	4.9	327	5.9	2.129	Flowing	-
31313	SGP2-B	21 Sep 2011	199.64	10.2	18.1	6	4.7	322	4.7	2.121	Flowing	-
31313	SGP2-B	04 Oct 2011	176.7	9.7	20.5	2.5	2.5	285	5.12	2.157	Flowing	-
31313	SGP2-B	19 Oct 2011	187.86	9.4	8.1	2.2	2.22	303	4.91	2.108	Flowing	-
31313	SGP2-B	02 Nov 2011	192.82	12.5	14.2	3.11	2.53	311	5.14	2.117	Flowing	-
31313	SGP2-B	15 Nov 2011	199.64	20.7	23.2	3.9	1.9	322	5.1	2.098	Flowing	-
31313	SGP2-B	01 Dec 2011	177.94	15	16.8	3.1	1.9	287	5.89	2.114	Flowing	-
31313	SGP2-B	13 Dec 2011	187.24	13.1	13	2.9	0.4	302	4.7	2.096	Flowing	-
31313	SGP2-B	28 Dec 2011	200.26	14.7	13	1	0.8	323	5.3	2.060	Flowing	-
31313	SGP2-B	03 Jan 2012	-	-	-	-	-	-	-	1.989	Stagnant	-
31313	SGP2-B	10 Jan 2012	222.58	13.8	20	1.1	0.7	359	4.8	1.861	Stagnant	-
31313	SGP2-B	17 Jan 2012	-	-	-	-	-	-	-	1.759	Stagnant	-
31313	SGP2-B	24 Jan 2012	254.82	15.2	21	0.8	0.5	411	6.16	1.610	Stagnant	-
31313	SGP2-B	25 Jan 2012	-	-	-	-	-	-	-	1.594	Stagnant	-
31313	SGP2-B	31 Jan 2012	-	-	-	-	-	-	-	1.488	Stagnant	-
31313	SGP2-B	07 Feb 2012	299	14.7 -	-	0.1	0.1	482	6.5	1.389	Stagnant	-
31313	SGP2-B	14 Feb 2012	-	-	-	-	-	-	-	1.340	Stagnant	-
31313	SGP2-B	21 Feb 2012	299	22.6 -	-	3.1	1	451	6.3	1.258	Stagnant	-
31313	SGP2-B	28 Feb 2012	-	-	-	-	-	-	-	1.178	Stagnant	-
31313	SGP2-B	06 Mar 2012	270.94	18.9	23	2.8	0.9	437	6.21	1.156	Stagnant	-
31313	SGP2-B	13 Mar 2012	-	-	-	-	-	-	-	1.088	Stagnant	-
31313	SGP2-B	20 Mar 2012	265.98	19.9	24.6	5.1	5.1	429	6.41	1.019	Stagnant	-
31313	SGP2-B	27 Mar 2012	-	-	-	-	-	-	-	0.967	Stagnant	-
31313	SGP2-B	03 Apr 2012	255.44	18.9	24.3	4.5	4.5	412	6.15	0.915	Stagnant	-
31313	SGP2-B	10 Apr 2012	-	-	-	-	-	-	-	0.880	Stagnant	-
31313	SGP2-B	17 Apr 2012	254.2	14.3 -	-	4.6	4.6	410	6.11	0.838	Stagnant	-
31313	SGP2-B	24 Apr 2012	-	-	-	-	-	-	-	0.865	Stagnant	-

Table A2 - Surface Water Analytical Results

			Inorganics	Field								Sample Preparation
			Total Dissolved Solids (Calc.)	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Depth to Water	Field Observations	Test - Comment 1
			mg/L	oC	oC	mg/L	mg/L	µS/cm	-	m	Pool Conditio	General Comment
31313	SGP2-B	01 May 2012	216.38	15.6 -	-	3.2	1.8	349	5.61	0.846	Stagnant	-
31313	SGP2-B	08 May 2012	-	-	-	-	-	-	-	1.967	Flowing	-
31313	SGP2-B	15 May 2012	200.26	15.7	16.1	3.6	1.2	323	5.82	2.028	Flowing	-
31313	SGP2-B	22 May 2012	-	-	-	-	-	-	-	2.061	Flowing	-
31313	SGP2-B	29 May 2012	172.36	11.4	14.1	6.7	1.2	278	6.13	2.085	Flowing	-
31313	SGP2-B	05 Jun 2012	-	-	-	-	-	-	-	-	Flowing	Above Gauge
31313	SGP2-B	12 Jun 2012	177.32	9.2	14.3	8.14	7.61	286	6.81	2.817	Flowing	-
31313	SGP2-B	19 Jun 2012	-	-	-	-	-	-	-	2.137	Flowing	-
31313	SGP2-B	26 Jun 2012	212.04	10	10	7.62	6.11	342	6.43	2.298	Flowing	-
31313	SGP2-B	11 Jul 2012	204.6	8.7	14.3	7.8	7.3	330	5.1	2.337	Flowing	-
31313	SGP2-B	24 Jul 2012	264.74	10.5	11.2	7	6.5	427	5.86	2.126	Flowing	-
31313	SGP2-B	07 Aug 2012	264.12	11.5	10.9	7	6.8	426	4.53	2.124	Flowing	-
31313	SGP2-B	21 Aug 2012	218.24	14.7	12.9	8.7	8.7	352	5.21	2.346	Flowing	-
31313	SGP2-B	04 Sep 2012	274.04	14.3	18.4	7.6	7.6	442	4.65	2.180	Flowing	-
31313	SGP2-B	18 Sep 2012	376.34	14.4	14.4	8.1	8.1	607	6.71	2.121	Flowing	-
31313	SGP2-B	02 Oct 2012	212.04	9.5	13.3	6.8	6.4	342	5.3	2.421	Flowing	-
31313	SGP2-B	16 Oct 2012	244.28	17.3	10.7	7.7	7.2	394	5.4	2.118	Flowing	-
31313	SGP2-B	30 Oct 2012	246.14	14.1	20.8	6.1	5.8	397	5.16	2.094	Flowing	-
31313	SGP2-B	13 Nov 2012	251.1	15.5	16.8	6.01	4.08	405	5.6	2.075	Flowing	-
31313	SGP2-B	27 Nov 2012	224.44	14.2	16	0.58	0.59	362	4.88	2.062	Flowing	-
31313	SGP2-B	11 Dec 2012	215.14	16.3	16.3	3.25	3.13	347	5.11	2.069	Flowing	-
31313	SGP2-B	20 Dec 2012	172.98	13.4	13.2	3.1	0.8	279	4.99	2.081	Flowing	-
31313	SGP2-B	08 Jan 2013	206.46	15.6	26.2	3.25	0.68	333	6.11	1.738	Flowing	-
31313	SGP2-B	22 Jan 2013	224.44	13.6	22.1	0.46	0.27	362	6.23	1.451	Stagnant	-
31313	SGP2-B	05 Feb 2013	217.62	14.1	24.7	0.52	0.51	351	6.21	1.255	Stagnant	-
31313	SGP2-B	19 Feb 2013	259.16	14.7	18.1	4.6	0.7	418	6.45	1.075	Stagnant	-
31313	SGP2-B	05 Mar 2013	391.22	24.1	27.1	5.39	5.31	631	6.24	0.935	Stagnant	-
31313	SGP2-B	19 Mar 2013	360.22	17.6	16.7	4.35	4.35	581	6.73	0.856	Stagnant	-
31313	SGP2-B	03 Apr 2013	311.24	16	17.3	3.4	3.5	502	7	0.780	Stagnant	-
31313	SGP2-B	16 Apr 2013	328.6	16.2	15.5	2.68	2.68	530	6.99	0.720	Stagnant	-
31313	SGP2-B	30 Apr 2013	285.82	9.9	18	0.6	0.6	461	6.77	0.667	Stagnant	-
31313	SGP2-B	14 May 2013	257.92	9.1	8.4	0.7	0.6	416	6.39	0.619	Stagnant	-
31313	SGP2-B	27 May 2013	293.88	13.1	8.4	4.4	4.1	474	6.54	0.619	Stagnant	-
31313	SGP2-B	11 Jun 2013	272.8	12.3	12.9	5.5	2.9	440	6.05	1.880	Flowing	-
31313	SGP2-B	24 Jun 2013	261.64	11.1	11	7.19	4.25	422	6.06	2.072	Flowing	-
31313	SGP2-B	09 Jul 2013	274.04	9.3	7.1	7.41	5.22	442	7.11	2.082	Flowing	-
31313	SGP2-B	23 Jul 2013	180.42	8.9	12	5.1	5.1	291	7.1	2.168	Flowing	-
31313	SGP2-B	06 Aug 2013	252.96	12.1	11	7.6	7.6	408	6.8	-	Flowing	Above Gauge
31313	SGP2-B	19 Aug 2013	261.64	9.8	7.2	8.1	8.1	422	6.72	2.260	Flowing	-
31313	SGP2-B	03 Sep 2013	236.22	10.2	17.3	7.8	7.8	381	5.77	2.127	Flowing	-
31313	SGP2-B	17 Sep 2013	212.04	13.6	15.9	6.3	6.3	342	6.55	2.200	Flowing	-
31313	SGP2-B	01 Oct 2013	208.32	11.9	11.3	7.66	7.86	336	6.36	2.656	Flowing	-
31313	SGP2-B	15 Oct 2013	263.5	13	13.8	7.81	7.6	425	5.56	2.089	Flowing	-
31313	SGP2-B	29 Oct 2013	192.2	12.2	12.2	5.66	4.82	310	5.82	2.181	Flowing	-

Table A2 - Surface Water Analytical Results

			Inorganics	Field								Sample Preparation
			Total Dissolved Solids (Calc.)	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Depth to Water	Field Observations	Test - Comment 1
			mg/L	oC	oC	mg/L	mg/L	µS/cm	-	m	Pool Conditio	General Comment
31313	SGP2-B	13 Nov 2013	202.74	13	13.7	6.23	5.1	327	6.1	2.279	Flowing	-
31313	SGP2-B	26 Nov 2013	220.1	14	24.3	6.47	5.21	355	5.26	2.127	Flowing	-
31313	SGP2-B	09 Dec 2013	215.14	14.7	16.8	6.51	6.51	347	5.73	2.087	Flowing	-
31313	SGP2-B	24 Dec 2013	182.28	13.5	13.6	2.6	0.6	294	5.31	2.068	Flowing	-
31313	SGP2-B	09 Jan 2014	201.5	25.2	24.9	6	3.7	325	6.2	2.055	Flowing	-
31313	SGP2-B	21 Jan 2014	261.64	17.5	20.5	4.7	1.97	422	6.32	1.967	Flowing	-
31313	SGP2-B	06 Feb 2014	239.94	24.2	31.2	2.24	2.24	387	5.9	1.510	Flowing	-
31313	SGP2-B	17 Feb 2014	237.46	20.5	21.8	2.85	2.85	383	6.14	1.300	Flowing	-
31313	SGP2-B	07 Mar 2014	224.44	15	18.3	2.79	2.79	362	6.56	1.038	Flowing	-
31313	SGP2-B	18 Mar 2014	227.54	15.5	14.9	2.81	2.81	367	6.08	0.940	Flowing	-
31313	SGP2-B	01 Apr 2014	249.24	14.8	25.2	1.97	1.97	402	6.1	0.850	Flowing	-
31313	SGP2-B	15 Apr 2014	203.98	14.3	12.5	4.45	4.45	329	5.53	2.038	Flowing	-
31313	SGP2-B	29 Apr 2014	161.82	12.3	17.1	3.86	3.07	261	5.1	2.045	Flowing	-
31313	SGP2-B	20 May 2014	-	-	-	-	-	-	-	-	-	-
31313	SGP2-B	10 Jun 2014	141	10.5	13	6.12	4.23	231	5.6	2.054	Flowing	-
31313	SGP2-B	27 Jun 2014	202.74	13.3	10.2	7.69	4.11	327	6.4	2.192	Flowing	-
31313	SGP2-B	08 Jul 2014	211.42	11.2	10.4	5.84	2.31	341	6.51	2.117	Flowing	-
31313	SGP2-B	24 Jul 2014	247.38	7.5	12.9	8.9	8.82	399	5.36	2.097	Flowing	-
31313	SGP2-B	06 Aug 2014	199.64	8.6	12.3	7.79	5.24	322	5.6	2.140	Flowing	-
31313	SGP2-B	18 Aug 2014	195.92	8.1	10.2	7.25	6.9	316	4.9	2.092	Flowing	-
31313	SGP2-B	04 Sep 2014	192.82	8.5	12.6	7.85	7.52	311	4.98	2.080	Flowing	-
31313	SGP2-B	18 Sep 2014	170.5	8.9	12.8	6.98	6.5	275	5.15	2.066	Flowing	-
31313	SGP2-B	30 Sep 2014	165.54	10.7	12.5	6.92	6.31	267	5.12	2.041	Flowing	-
31313	SGP2-B	14 Oct 2014	163.68	10.7	13.2	5.65	5.45	264	5.3	2.050	Flowing	-
31313	SGP2-B	29 Oct 2014	171.12	11.4	18	6.1	5.9	276	5.5	2.027	Flowing	-
31313	SGP2-B	11 Nov 2014	173.6	12.7	17.7	1.9	1.9	280	5.6	1.941	Flowing	-
31313	SGP2-B	01 Dec 2014	159.34	13	26.2	2.4	1.4	257	4.8	2.006	Flowing	-
31313	SGP2-B	08 Dec 2014	148.8	13.3	17.8	6.1	5.9	240	5.3	2.248	Flowing	-
31313	SGP2-B	08 Jan 2015	192.2	17.5	29.2	4.5	0.4	310	5.9	1.566	Flowing	-
31313	SGP2-B	20 Jan 2015	146.94	14.2	21.1	1.25	1.41	237	5.3	1.989	Flowing	-
31313	SGP2-B	04 Feb 2015	186	14.9	19.1	0.7	0.7	300	5.48	1.626	Flowing	-
31313	SGP2-B	17 Feb 2015	156.24	16.1	20.6	2.1	1.6	252	5.2	2.006	Flowing	-
31313	SGP2-B	04 Mar 2015	171.74	15.5	14.2	1.2	1.2	277	5.8	1.820	Stagnant	-
31313	SGP2-B	31 Mar 2015	142.6	12.6	24	1.2	1.2	230	5.8	1.338	Stagnant	-
31313	SGP2-B	28 Apr 2015	151.9	11.3	13.3	3.72	3.11	245	5.8	2.002	Flowing	-
31313	SGP2-B	12 May 2015	141	10.4	17.7	5.4	5.4	228	5.2	2.060	Flowing	-
31313	SGP2-B	21 May 2015	147.56	10.2	11.3	8	8	238	5.8	2.085	Flowing	-
31313	SGP2-B	17 Jun 2015	137.02	13.1	13.1	7.4	7.6	221	6.7	2.103	Flowing	-
31313	SGP2-B	20 Jul 2015	130.2	6.4	9.2	8.4	8.2	210	6	2.064	Flowing	-
31313	SGP2-B	18 Aug 2015	143.84	8.6	9.1	8.2	8.2	232	6.8	2.050	Flowing	-
31313	SGP2-B	21 Sep 2015	156.86	12.2	16.2	5.7	5.7	253	7.1	2.040	Flowing	-
31313	SGP2-B	20 Oct 2015	148.8	12.3	19.5	2.3	2.3	240	5.5	1.860	Stagnant	-
31313	SGP2-B	17 Nov 2015	163.06	23.1	19.5	7.1	7.1	263	6.2	1.911	Stagnant	-
31313	SGP2-B	07 Dec 2015	192.82	13	24.2	6.6	6.6	311	6.1	1.493	Stagnant	-

Table A2 - Surface Water Analytical Results

			Inorganics	Field								Sample Preparation
			Total Dissolved Solids (Calc.)	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Depth to Water	Field Observations	Test - Comment 1
			mg/L	oC	oC	mg/L	mg/L	µS/cm	-	m	Pool Conditio	General Comment
31313	SGP2-B	21 Jan 2016	236.84	18	18.1	2.5	2.5	382	7	0.880	Stagnant	-
31313	SGP2-B	16 Feb 2016	183.52	19.5	19.5	1	1	296	6.2	0.728	Stagnant	-
31313	SGP2-B	15 Mar 2016	265.98	19.3	22.2	7.3	7.3	429	6.9	0.625	Stagnant	-
31313	SGP2-B	13 Apr 2016	192.2	14.1	15	2.9	2.9	310	6.8	0.538	Stagnant	-
31313	SGP2-B	17 May 2016	261.02	12.6	16.8	1.61	1.61	421	6.9	0.582	Stagnant	-
31313	SGP2-B	21 Jun 2016	169.88	11.9	10.3	7.8	4.7	274	5.1	1.900	Stagnant	-
31313	SGP2-B	19 Jul 2016	238.7	10.2	10.3	5.8	4.7	385	5.6	2.040	Stagnant	-
31313	SGP2-B	18 Aug 2016	261.64	9.3	18.3	5.1	2.9	422	5.7	2.019	Stagnant	-
31313	SGP2-B	20 Sep 2016	245.52	14.1	16.5	7.9	3.4	396	5.3	2.255	Flowing	-
31313	SGP2-B	18 Oct 2016	292.02	13.1	15.1	7.8	2.9	471	5.4	2.142	Flowing	-
31313	SGP2-B	15 Nov 2016	299.46	11.2	10.1	8.37	1.29	483	5.2	1.996	Flowing	-
31313	SGP2-B	07 Dec 2016	316.82	11.8	24	7.7	1	511	5.6	1.940	Stagnant	-
31313	SGP2-B	18 Jan 2017	255.44	15.8	18	2.2	0.8	412	5.6	1.552	Stagnant	-
31313	SGP2-B	14 Feb 2017	247.38	10.8	15.7	1.58	0.4	399	5.4	1.800	Stagnant	-
31313	SGP2-B	20 Mar 2017	261.64	12.5	19.3	1.62	0.8	422	5.69	1.080	Stagnant	-
31313	SGP2-B	19 Apr 2017	228.16	16.9	19.8	2.66	0.97	368	5.87	1.968	Flowing	-
31313	SGP2-B	16 May 2017	218.24	10.9	8.9	3.01	0.077	352	5.83	1.980	Flowing	-
31313	SGP2-B	21 Jun 2017	154.38	9.16	10.3	4.7	2.1	249	5.69	1.990	Flowing	-
31313	SGP2-B	25 Jul 2017	291.4	9.9	10.1	3.21	0.87	470	6.31	2.033	Stagnant	-
31313	SGP2-B	22 Aug 2017	184.14	7.3	8.9	3.84	1.67	297	5.42	2.172	Flowing	-
31313	SGP2-B	19 Sep 2017	205.22	7.2	6.4	4.11	2.01	331	5.39	2.267	Flowing	-
31313	SGP2-B	18 Oct 2017	163.68	12.1	18.4	4.45	1.91	264	5.94	2.010	Flowing	-
31313	SGP2-B	20 Nov 2017	187.24	12	24.5	4.69	1.52	302	5.72	1.982	Flowing	-
31313	SGP2-B	07 Dec 2017	202.74	15.1	15.1	5.17	2.69	327	6.01	2.006	Flowing	-
31313	SGP2-B	11 Jan 2018	225.68	15.1	14.9	2.16	2.16	364	6.01	1.600	Flowing	-
31313	SGP2-B	06 Feb 2018	261.02	19.5	20.6	2.02	2.02	421	6.1	1.178	Flowing	-
31313	SGP2-B	09 Mar 2018	265.98	20.1	24.6	1.97	1.97	429	5.92	0.798	Flowing	-
31313	SGP2-B	11 Apr 2018	298.22	20.5	22.3	4.32	4.32	481	6.07	0.619	Flowing	-
31313	SGP2-B	15 May 2018	306.9	10.2	11.5	6.72	6.72	495	6.2	1.973	Flowing	-
31313	SGP2-B	25 Jun 2018	164.3	8.6	8.6	5.15	3.45	265	6.41	1.978	Flowing	-
31313	SGP2-B	18 Jul 2018	146.94	9.9	8.8	6.88	6.88	237	6.43	2.011	Flowing	-
31313	SGP2-B	13 Aug 2018	307.52	8	11.1	8.07	8	496	6.23	2.112	Flowing	-
31313	SGP2-B	25 Sep 2018	259.78	8.8	11	5	2.8	419	5.8	1.998	Flowing	-
31313	SGP2-B	18 Oct 2018	155.62	12	16	4.04	0.8	251	4.8	1.990	Flowing	-
31313	SGP2-B	08 Nov 2018	154.38	11.4	14	4	1.1	249	5.2	1.960	Flowing	-
31313	SGP2-B	13 Dec 2018	177.94	17.8	17	2.3	0.7	287	5.5	1.710	Stagnant	-
31313	SGP2-B	21 Jan 2019	257.3	15.7	25.5	0.7	0.5	415	5.9	1.205	Stagnant	-
31313	SGP2-B	13 Feb 2019	171.12	12.9	10.1	0.6	0.6	276	5.8	0.833	Stagnant	-
31313	SGP2-B	14 Mar 2019	201.5	11.6	17	0.4	0.4	325	5.9	-	Stagnant	Below Gauge
31313	SGP2-B	09 Apr 2019	206.46	12	13	0.9	0.9	333	5.9	-	Stagnant	Below Gauge
31313	SGP2-B	27 May 2019	140.12	10.5	8	3.9	0.7	226	5.2	1.958	Stagnant	-
31313	SGP2-B	19 Jun 2019	204.6	9.5	6	6.4	6.6	330	5.2	2.022	Flowing	-
31313	SGP2-B	30 Jul 2019	200.26	7.9	10.5	7.1	6.8	323	5.2	2.02	Flowing	-
31313	SGP2-B	10 Aug 2019	-	-	-	-	-	-	-	-	-	-

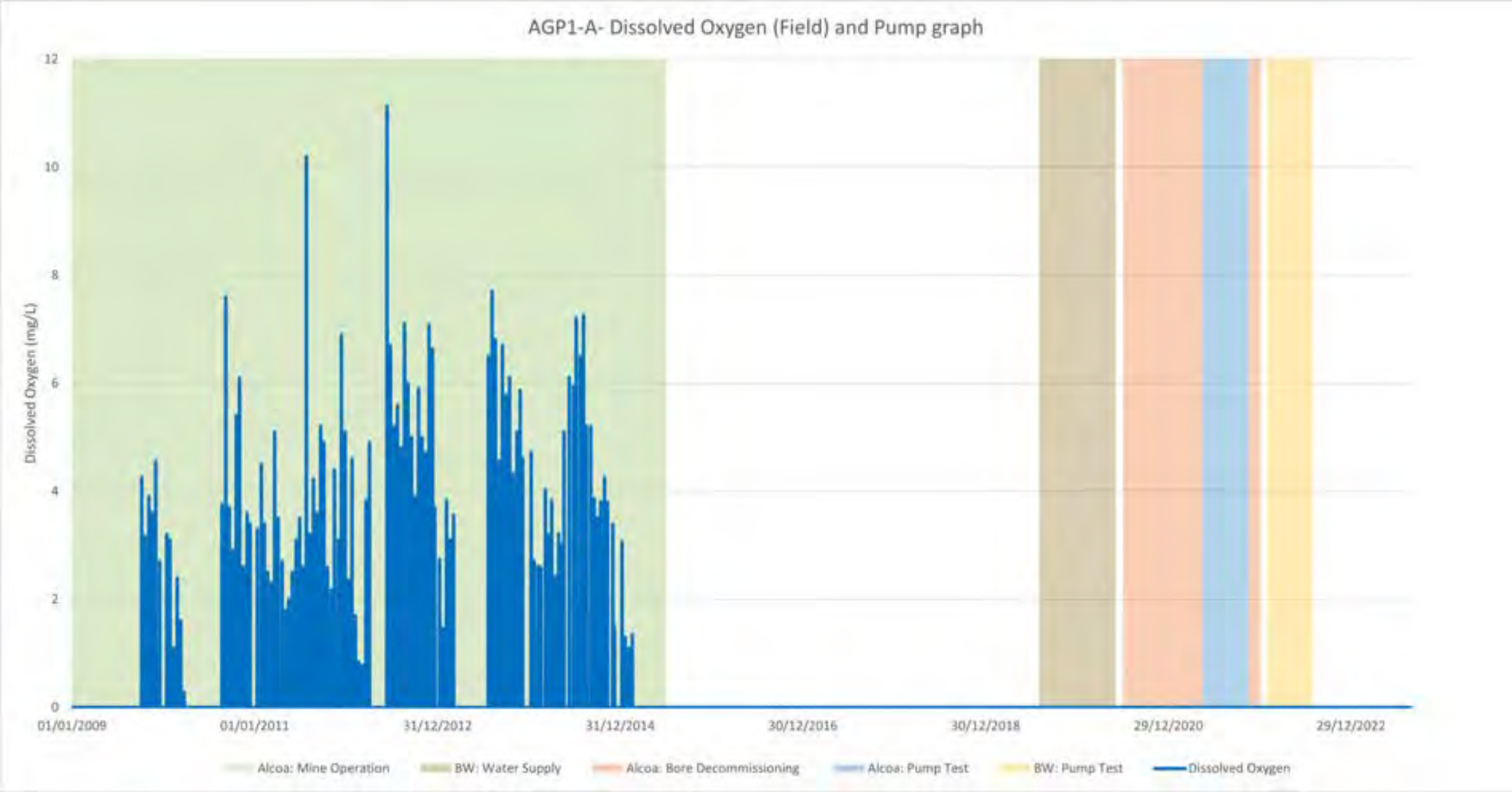
Table A2 - Surface Water Analytical Results

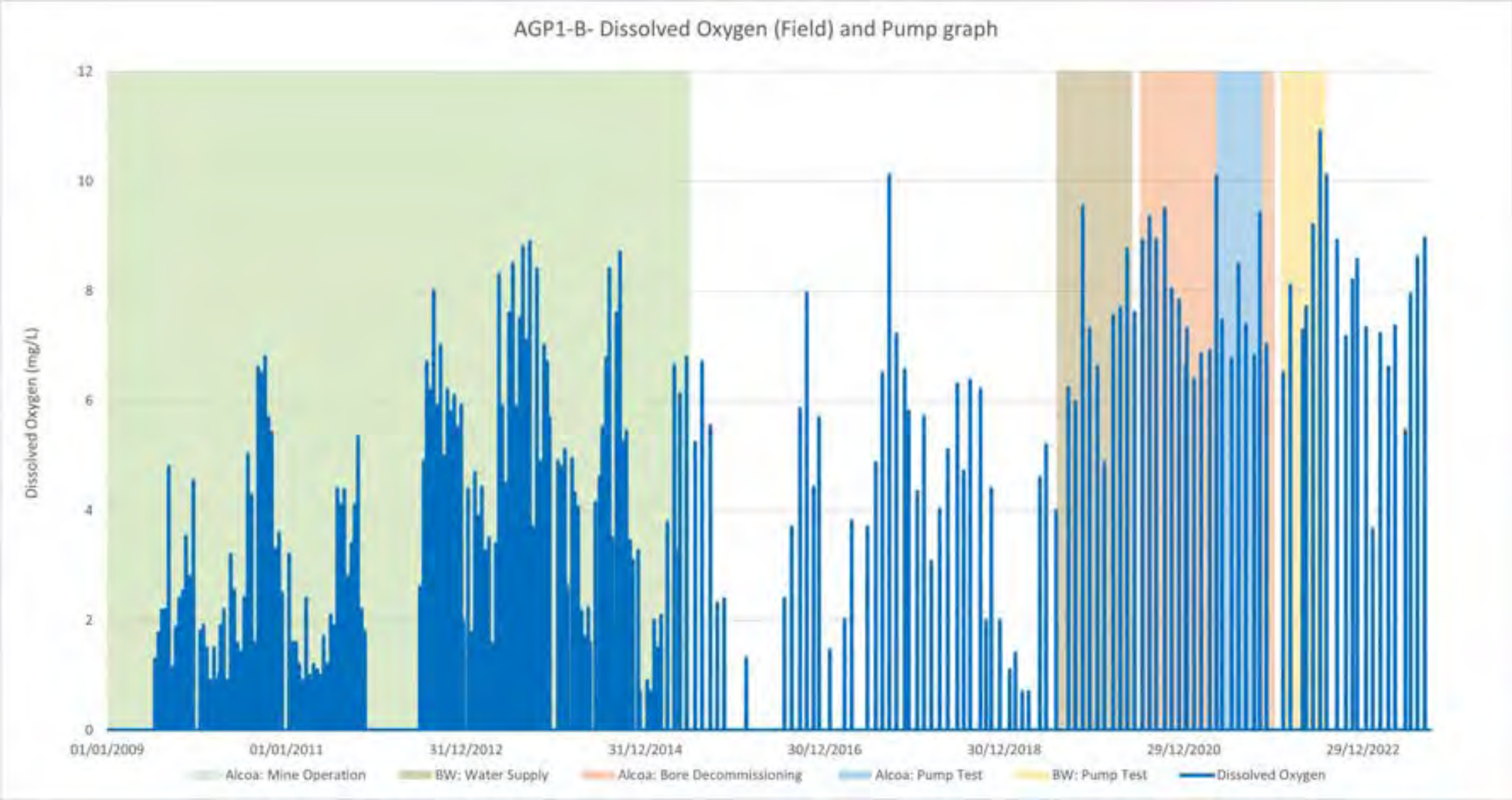
			Inorganics	Field								Sample Preparation
			Total Dissolved Solids (Calc.)	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Depth to Water	Field Observations	Test - Comment 1
			mg/L	oC	oC	mg/L	mg/L	µS/cm	-	m	Pool Conditio	General Comment
31313	SGP2-B	17 Sep 2019	201.5	10.8	14.2	10.2	3.1	325	5.3	2.011	Flowing	-
31313	SGP2-B	16 Oct 2019	184.14	11	14.5	4.8	2.1	297	5.4	1.971	Flowing	-
31313	SGP2-B	14 Nov 2019	205.22	13.7	15.9	9.5	3.6	331	6.1	1.977	Flowing	-
31313	SGP2-B	13 Dec 2019	230.02	11.8	11	8.35	1.61	371	7	1.75	Stagnant	-
31313	SGP2-B	13 Jan 2020	248.62	23.5	23.4	4.77	4.77	401	5.54	1.068	Stagnant	-
31313	SGP2-B	10 Feb 2020	204.6	18	18.5	4.08	4.08	330	5.49	0.86	Stagnant	-
31313	SGP2-B	17 Mar 2020	424.08	13.8	20.2	6.83	3.21	684	6.66	1.02	Stagnant	-
31313	SGP2-B	15 Apr 2020	149.42	13.3	18.2	8.73	8.73	241	5.84	1.918	Flowing	-
31313	SGP2-B	13 May 2020	147.56	11.3	11.2	9.5	3.25	238	6.3	1.94	Flowing	-
31313	SGP2-B	12 Jun 2020	176.7	7.1	3.5	11.35	3.21	285	6.2	1.932	Flowing	-
31313	SGP2-B	14 Jul 2020	132.68	11.7	12.1	10.25	2.97	214	5.92	1.959	Flowing	-
31313	SGP2-B	13 Aug 2020	137.64	8.4	12.1	10.31	3.3	222	6.01	1.995	Flowing	-
31313	SGP2-B	08 Sep 2020	161.2	12.7	14.5	9.8	3.11	260	6	1.956	Flowing	-
31313	SGP2-B	14 Oct 2020	223.82	10.8	17.9	9.78	3.25	361	7.6	2.072	Flowing	-
31313	SGP2-B	10 Nov 2020	181.04	11.8	23.3	9.04	2.93	292	7.5	1.919	Flowing	-
31313	SGP2-B	09 Dec 2020	164.3	12	17.9	8.78	3.22	265	7.4	1.93	Flowing	-
31313	SGP2-B	06 Jan 2021	164.3	12.5	24	7.69	2.11	265	6.21	2.04	Flowing	-
31313	SGP2-B	11 Jan 2021	172.98	13.62	23.9	8.42	3.21	279	6.12	2.004	Flowing	-
31313	SGP2-B	09 Feb 2021	166.16	13.5	20.2	7.11	2.31	268	6.73	1.905	Flowing	-
31313	SGP2-B	10 Mar 2021	199.02	13.2	15.6	6.32	2.21	321	6.58	1.542	Flowing	-
31313	SGP2-B	14 Apr 2021	168.64	12.6	16.7	6.87	3.11	272	6.52	1.887	Flowing	-
31313	SGP2-B	11 May 2021	152.52	11.5	11.6	7.86	2.71	246	6.27	2.012	Flowing	-
31313	SGP2-B	03 Jun 2021	176.08	9.5	15.6	7.66	3.22	284	6.16	1.966	Flowing	-
31313	SGP2-B	12 Jul 2021	212.04	6.8	8.5	8.68	4.22	342	5.49	2.014	Flowing	-
31313	SGP2-B	10 Aug 2021	217.62	8.8	10.5	8.71	3.11	351	5.97	2.033	Flowing	-
31313	SGP2-B	08 Sep 2021	172.98	9.7	16	6.05	6.05	279	5.93	1.993	Flowing	-
31313	SGP2-B	12 Oct 2021	378.2	10.2	14.5	9.65	3.21	610	4.8	2.042	Flowing	-
31313	SGP2-B	04 Nov 2021	154.38	11.2	17.2	9.71	2.11	249	6	2.853	Flowing	-
31313	SGP2-B	01 Dec 2021	169.26	13.5	29.2	8.2	2.1	273	5.82	1.974	Flowing	-
31313	SGP2-B	08 Feb 2022	159.34	15.1	24.5	8.06	8.06	257	6.1	1.964	Flowing	-
31313	SGP2-B	08 Mar 2022	176.7	15.1	14.8	6.68	6.68	285	6.73	1.99	Flowing	-
31313	SGP2-B	27 Apr 2022	184.76	12.8	17.1	8.49	8.49	298	6.39	1.971	Flowing	-
31313	SGP2-B	17 May 2022	187.24	11	13	8.11	3.21	302	6.52	1.967	Flowing	-
31313	SGP2-B	08 Jun 2022	149.42	7.6	7.7	11.03	2.31	241	6.65	2.132	Flowing	-
31313	SGP2-B	07 Jul 2022	184.76	8.4	12.5	9.25	9.25	298	6.27	2.073	Flowing	-
31313	SGP2-B	02 Aug 2022	300.08	9.8	12.5	8.32	2.11	484	6.29	2.066	Flowing	-
31313	SGP2-B	14 Sep 2022	163.06	10.3	15.1	8.61	2.85	263	6.72	2.05	Flowing	-
31313	SGP2-B	21 Oct 2022	177.94	10.4	15.2	10.11	2.71	287	6.37	2.1	Flowing	-
31313	SGP2-B	21 Nov 2022	127.72	11.1	8.2	9.97	9.97	206	6.19	-	Flowing	Above Gauge
31313	SGP2-B	06 Dec 2022	194.06	12.2	17.1	9.29	9.59	313	6.42	2.048	Flowing	-
31313	SGP2-B	11 Jan 2023	192.82	16.5	19.5	7.52	2.11	311	6.9	1.951	Flowing	-
31313	SGP2-B	07 Feb 2023	249.86	14.9	16.7	8.22	2.71	403	5.8	1.991	Flowing	-
31313	SGP2-B	10 Mar 2023	167.4	15.8	15.6	6.91	6.91	270	7	1.969	Flowing	-
31313	SGP2-B	12 Apr 2023	192.82	15.6	14.9	8.47	3.11	311	6.6	2.057	Flowing	-

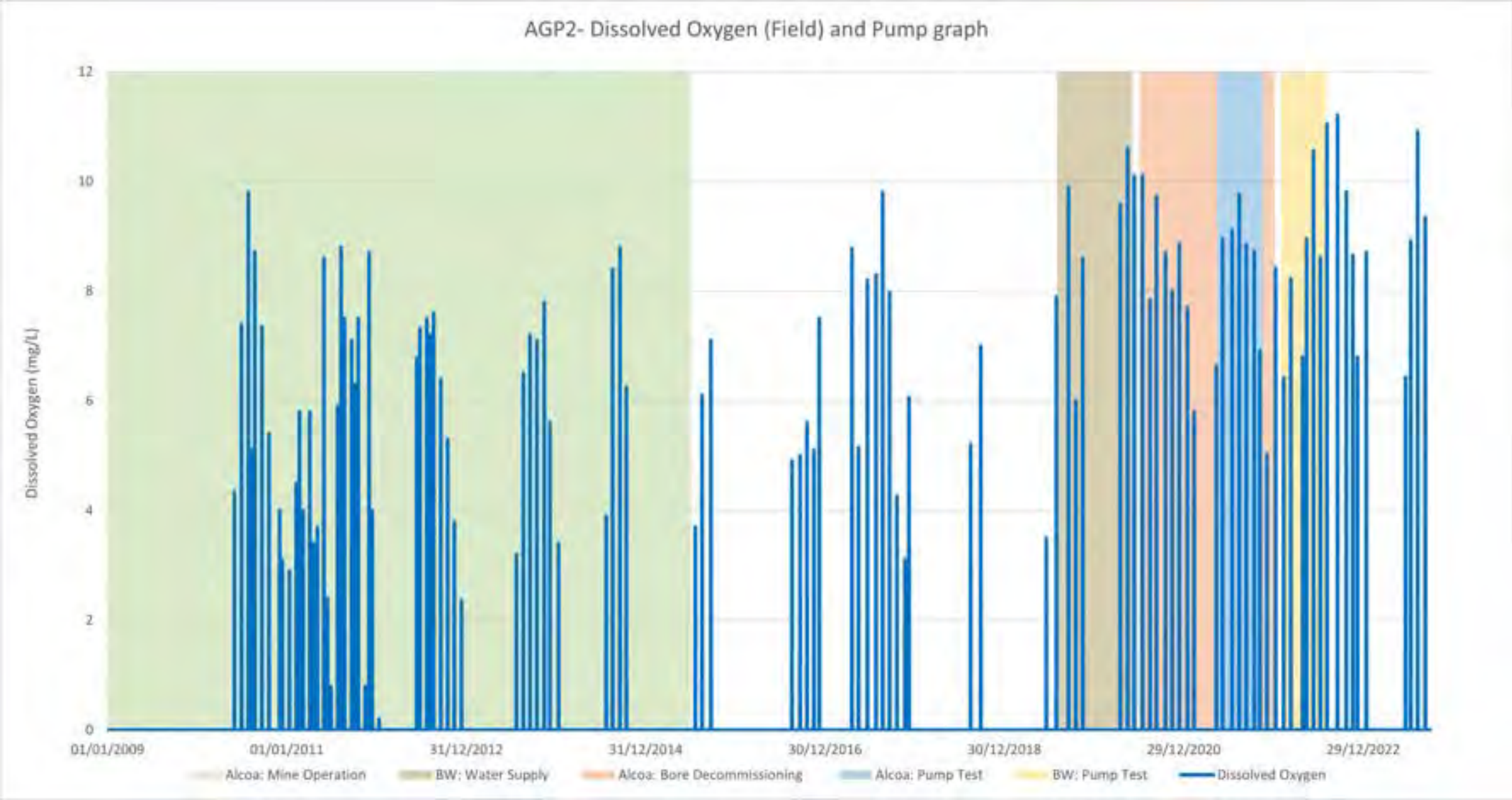
Table A2 - Surface Water Analytical Results

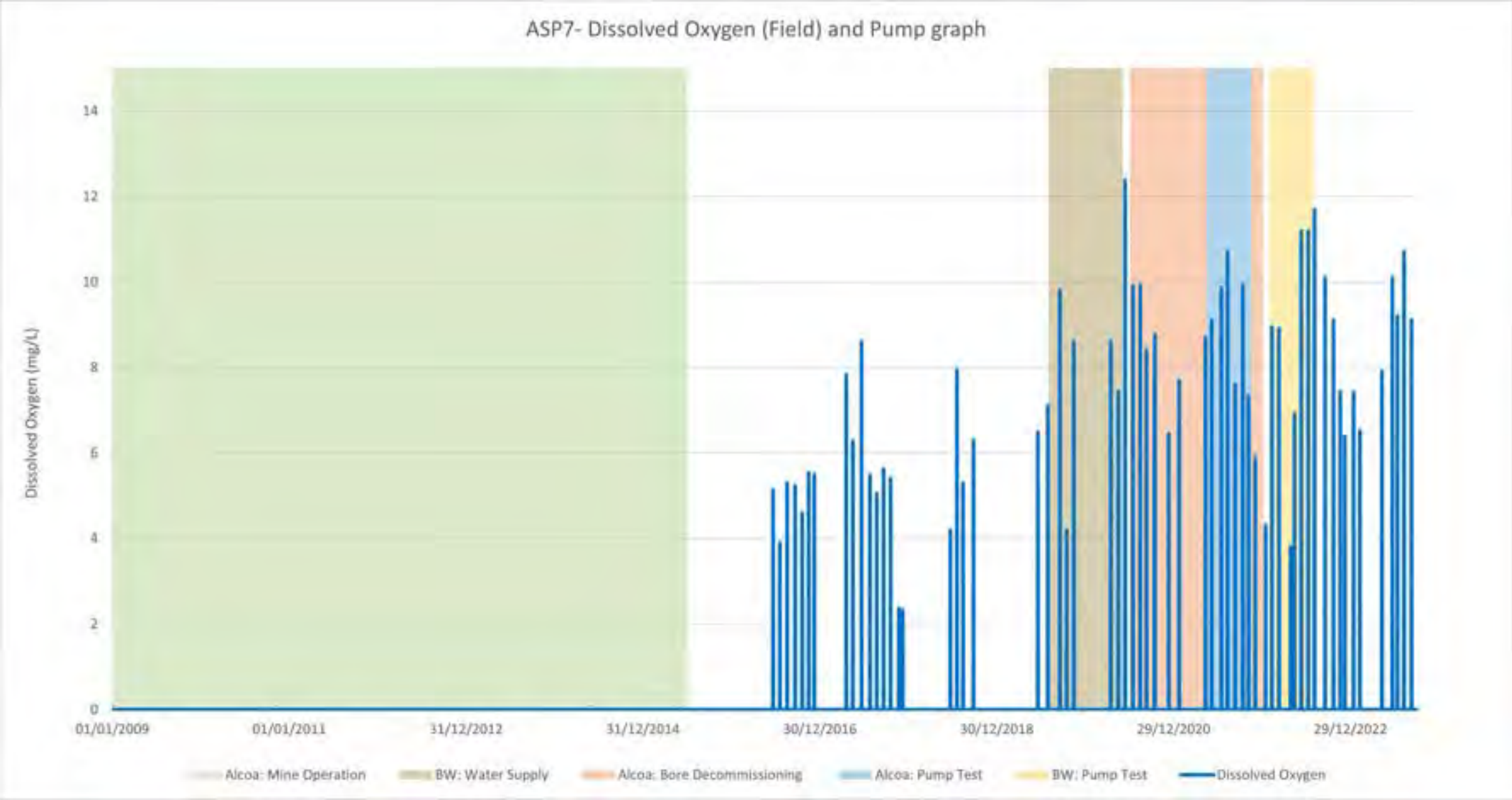
			Inorganics	Field								Sample Preparation
			Total Dissolved Solids (Calc.)	Temperature - Top of Water	Temperature - Bottom of Water	DO - Top of Water	DO -Bottom of Water	Electrical Conductivity (field)	pH (Field)	Depth to Water	Field Observations	Test - Comment 1
			mg/L	oC	oC	mg/L	mg/L	µS/cm	-	m	Pool Conditio	General Comment
31313	SGP2-B	09 May 2023	186.62	10.2	9.1	8.71	2.12	301	5.9	2.028	Flowing	-
31313	SGP2-B	20 Jun 2023	148.8	8.1	8	11	3.4	240	6.5	2.1	Flowing	-
31313	SGP2-B	10 Jul 2023	232.5	9.4	10.5	7.92	3.11	375	6.54	2.095	Flowing	-
31313	SGP2-B	11 Aug 2023	228.16	7.9	7.5	7.76	3.41	368	6.83	2.042	Flowing	-
31313	SGP2-B	06 Sep 2023	267.84	6.8	6.9	7.67	3.11	432	6.9	2.02	Flowing	-

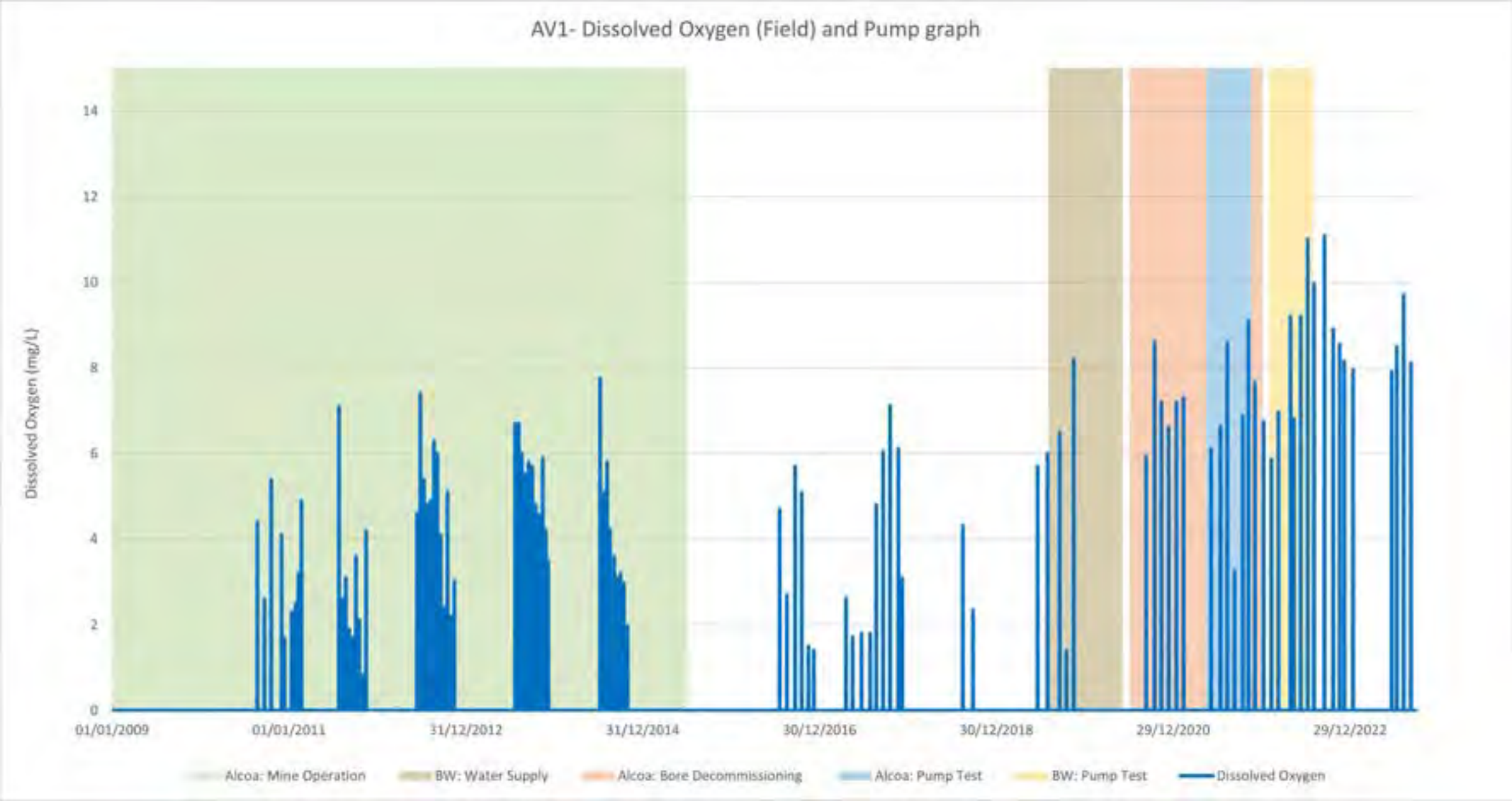
Surface Water – Field Parameter Graphs

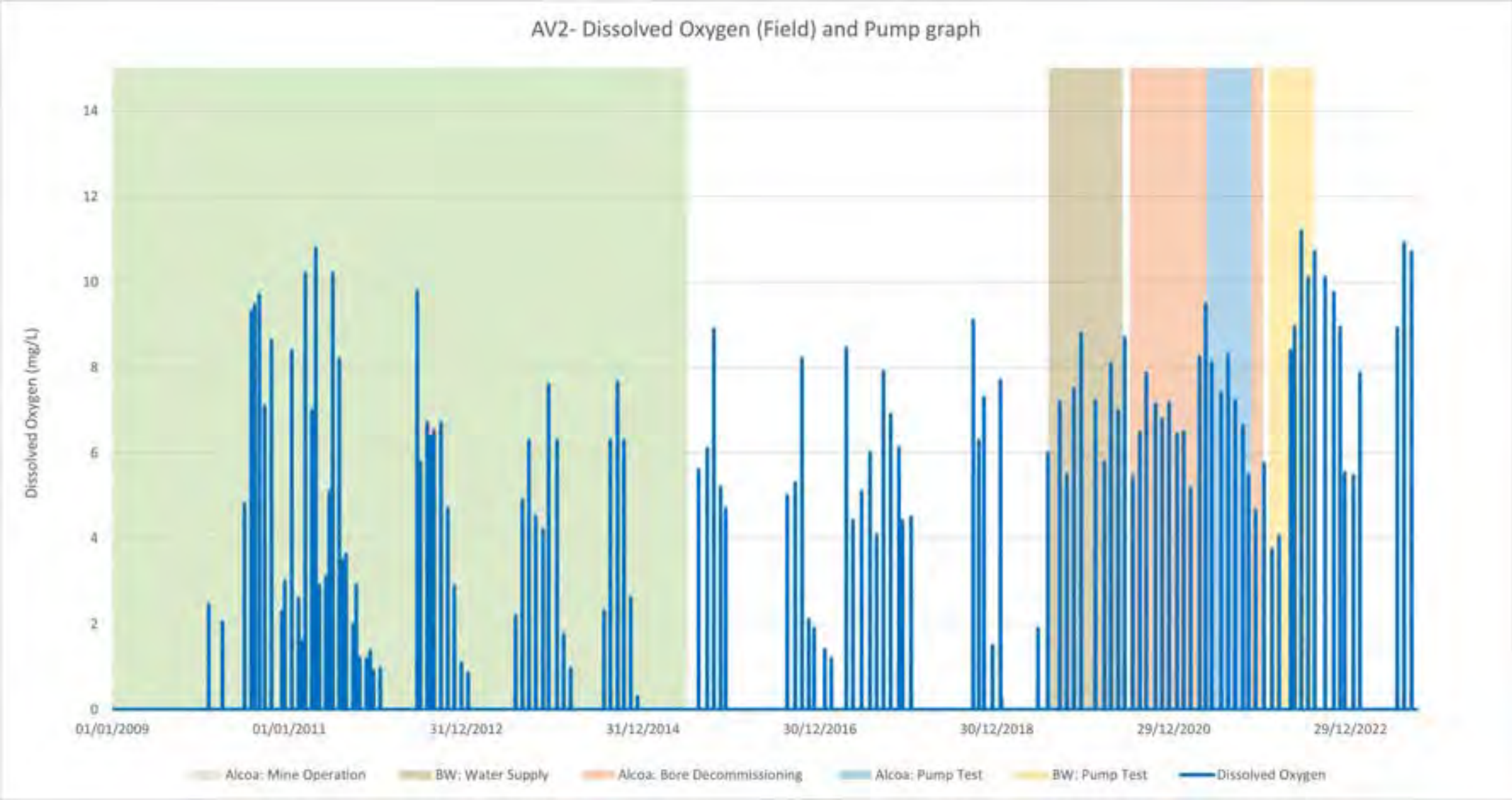

AGP1-A- Dissolved Oxygen (Field) and Pump graph
Dissolved Oxygen (mg/L)
12
10
8
6
4
2
0
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
Dissolved Oxygen

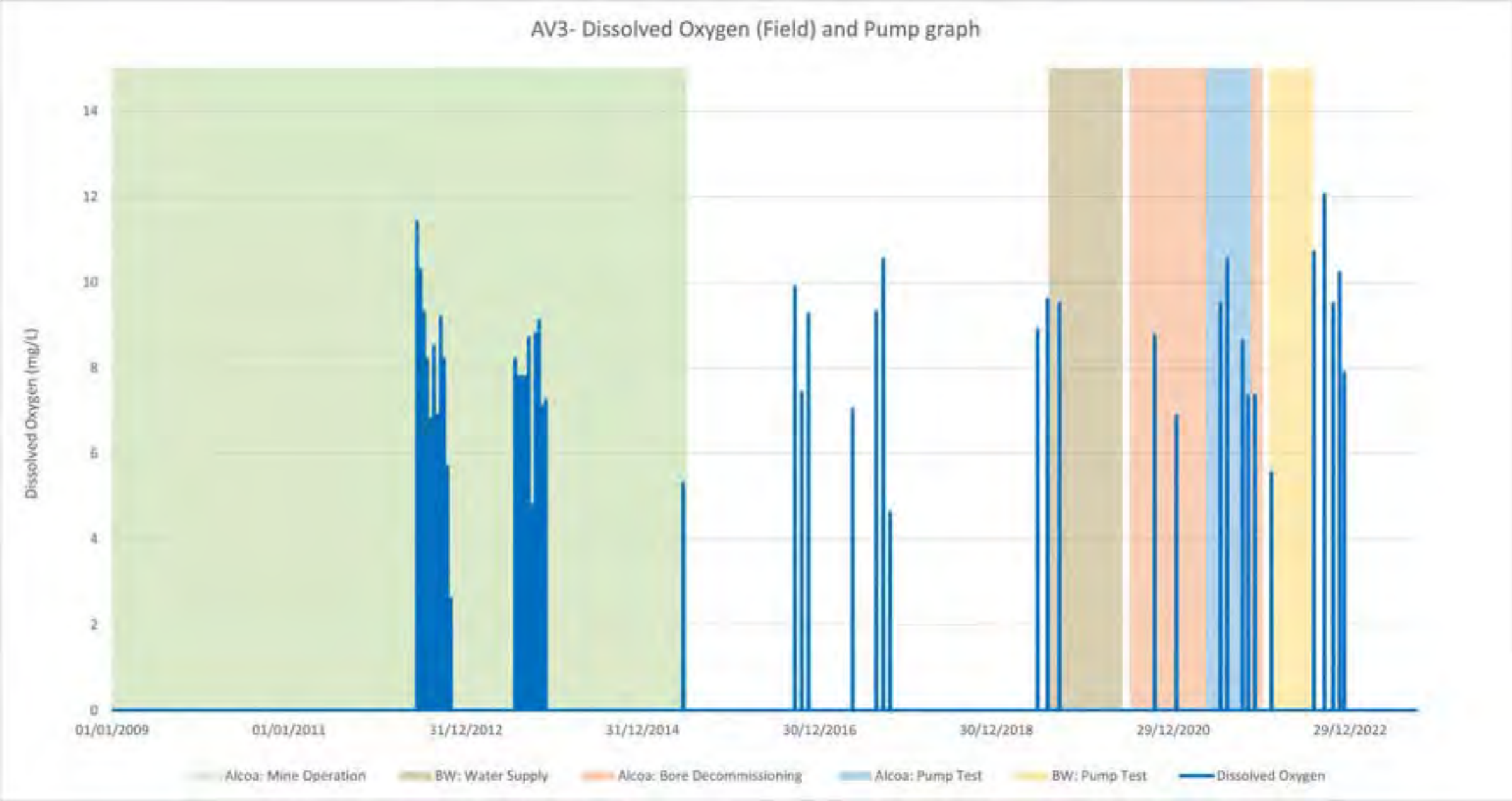

AGP1-B- Dissolved Oxygen (Field) and Pump graph
Dissolved Oxygen (mg/L)
12
10
8
6
4
2
0
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
Dissolved Oxygen

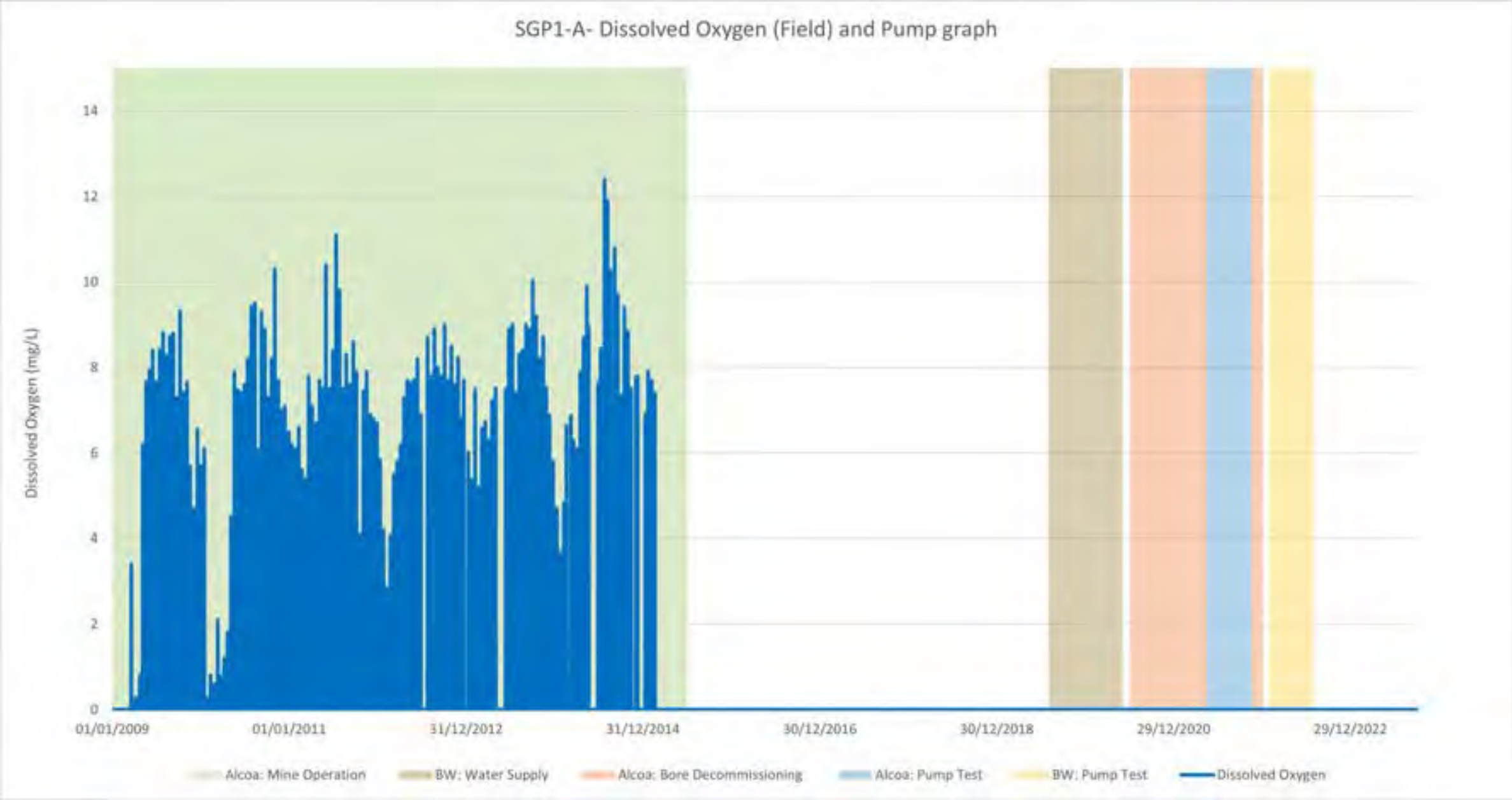

AGP2- Dissolved Oxygen (Field) and Pump graph
Dissolved Oxygen (mg/L)
12
10
8
6
4
2
0
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
Dissolved Oxygen

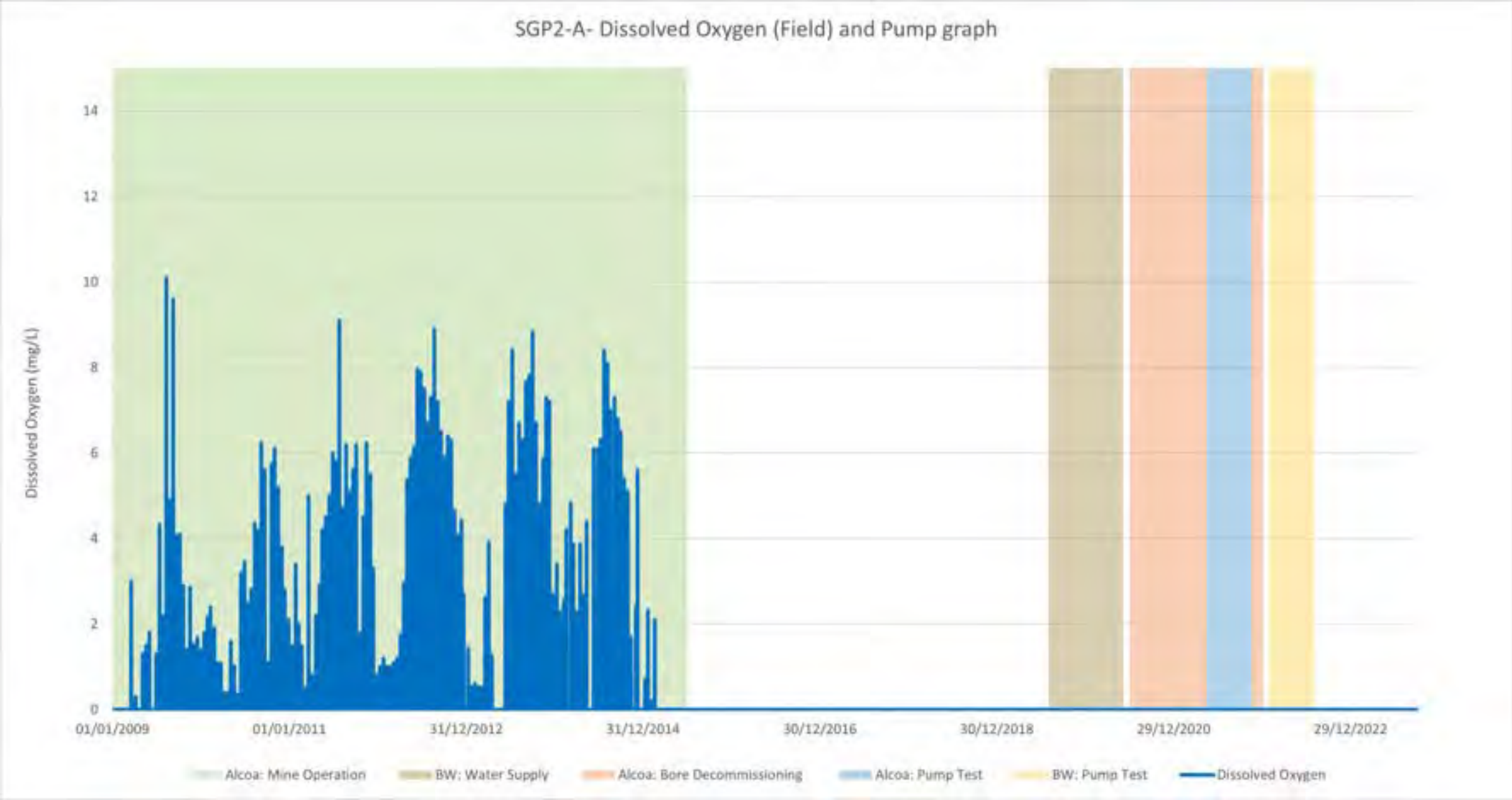

ASP7- Dissolved Oxygen (Field) and Pump graph
Dissolved Oxygen (mg/L)
0
2
4
6
8
10
12
14
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
Dissolved Oxygen

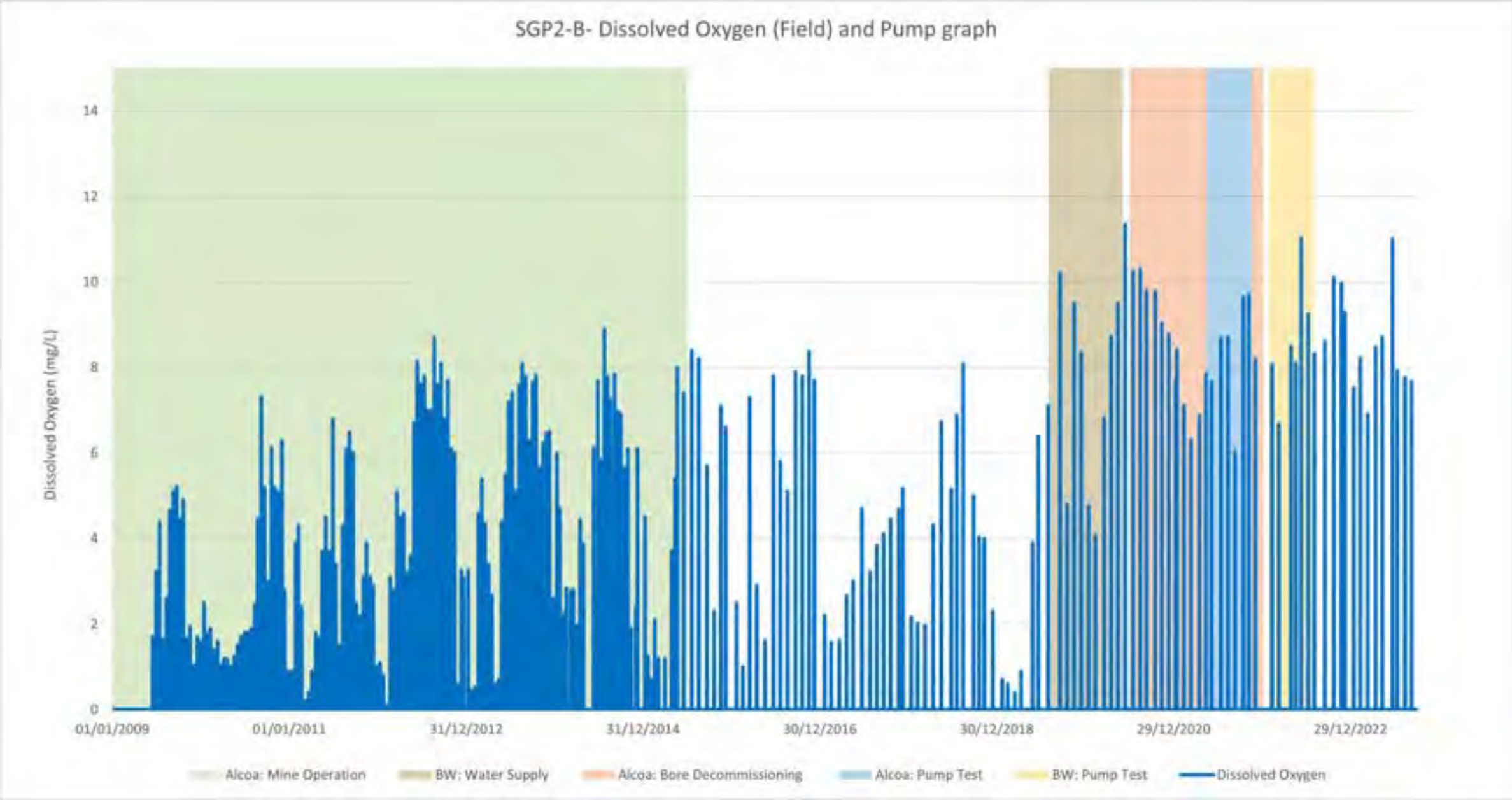

AV1- Dissolved Oxygen (Field) and Pump graph
Dissolved Oxygen (mg/L)
0
2
4
6
8
10
12
14
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
Dissolved Oxygen

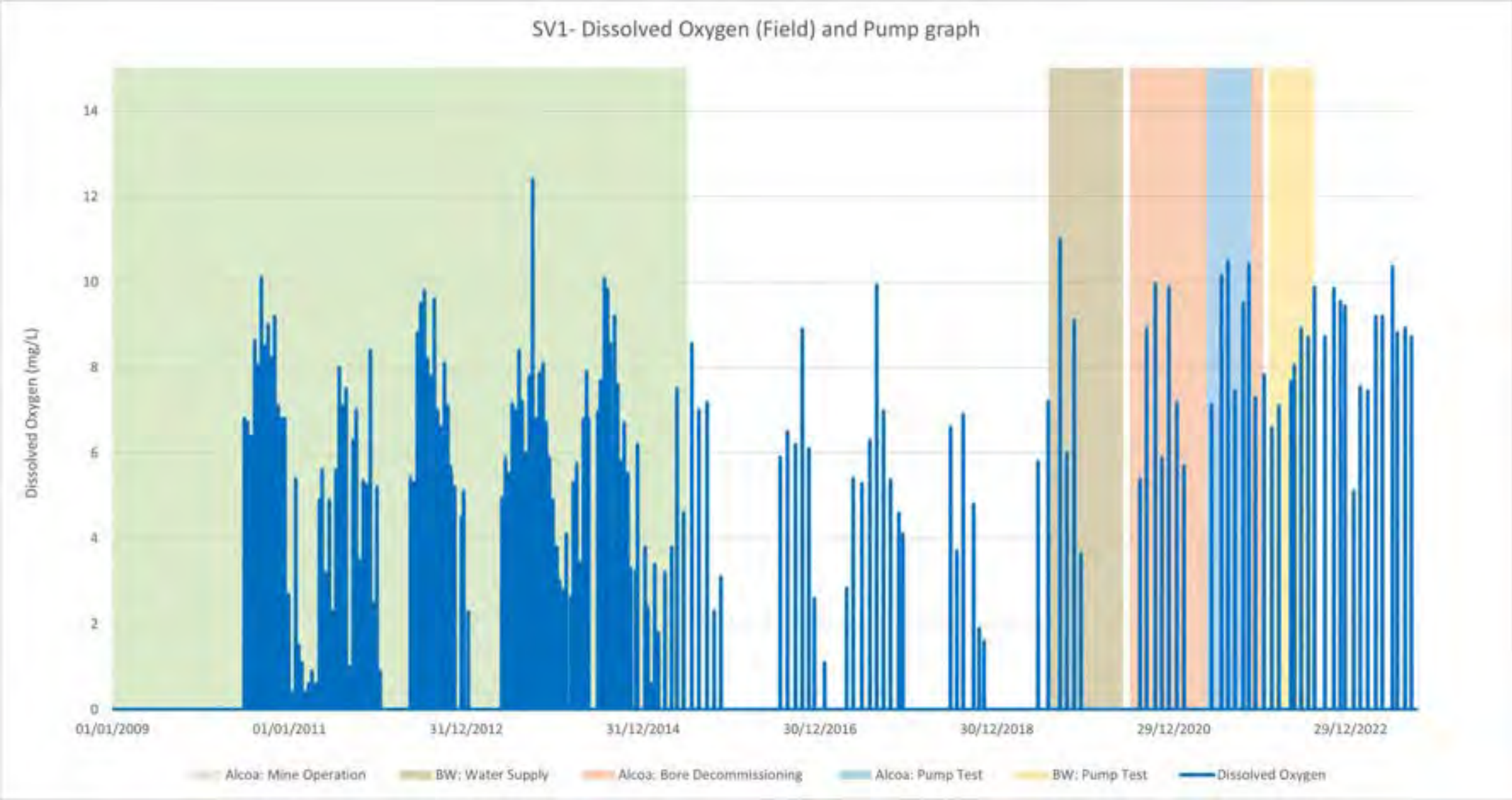

AV2- Dissolved Oxygen (Field) and Pump graph
Dissolved Oxygen (mg/L)
0
2
4
6
8
10
12
14
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
Dissolved Oxygen

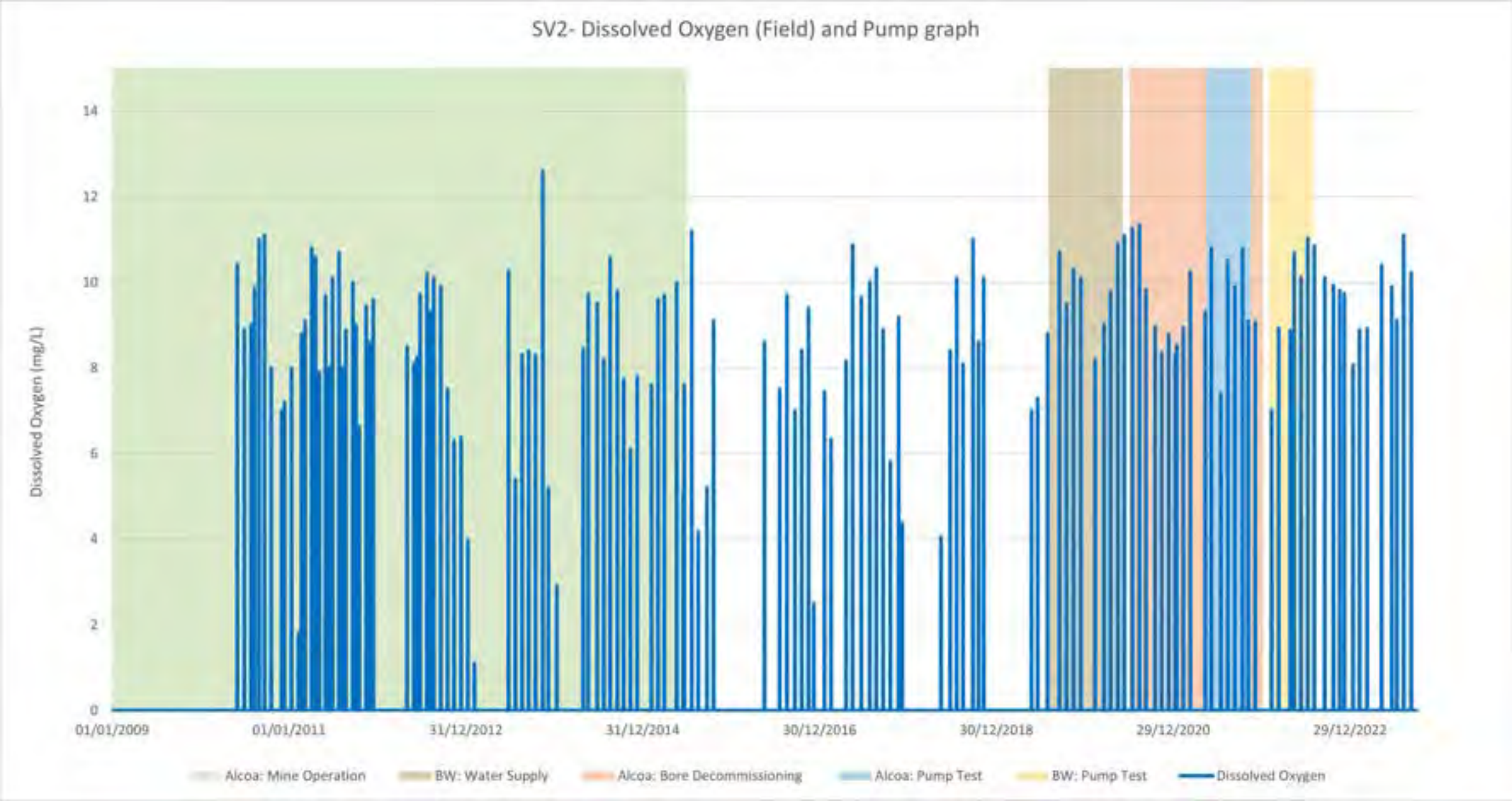

AV3- Dissolved Oxygen (Field) and Pump graph
Dissolved Oxygen (mg/L)
0
2
4
6
8
10
12
14
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
Dissolved Oxygen

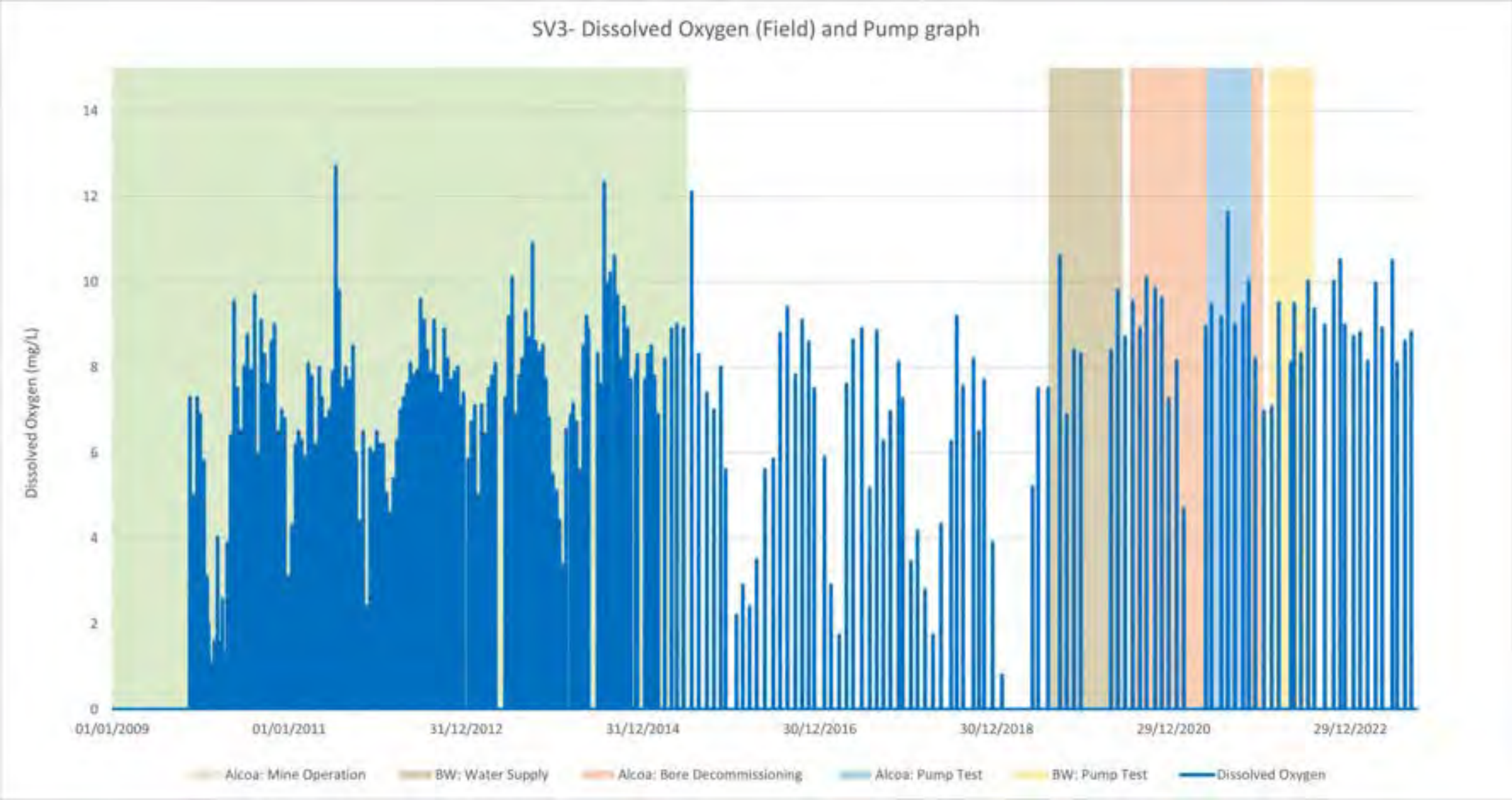

SGP1-A- Dissolved Oxygen (Field) and Pump graph
Dissolved Oxygen (mg/L)
0
2
4
6
8
10
12
14
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
Dissolved Oxygen

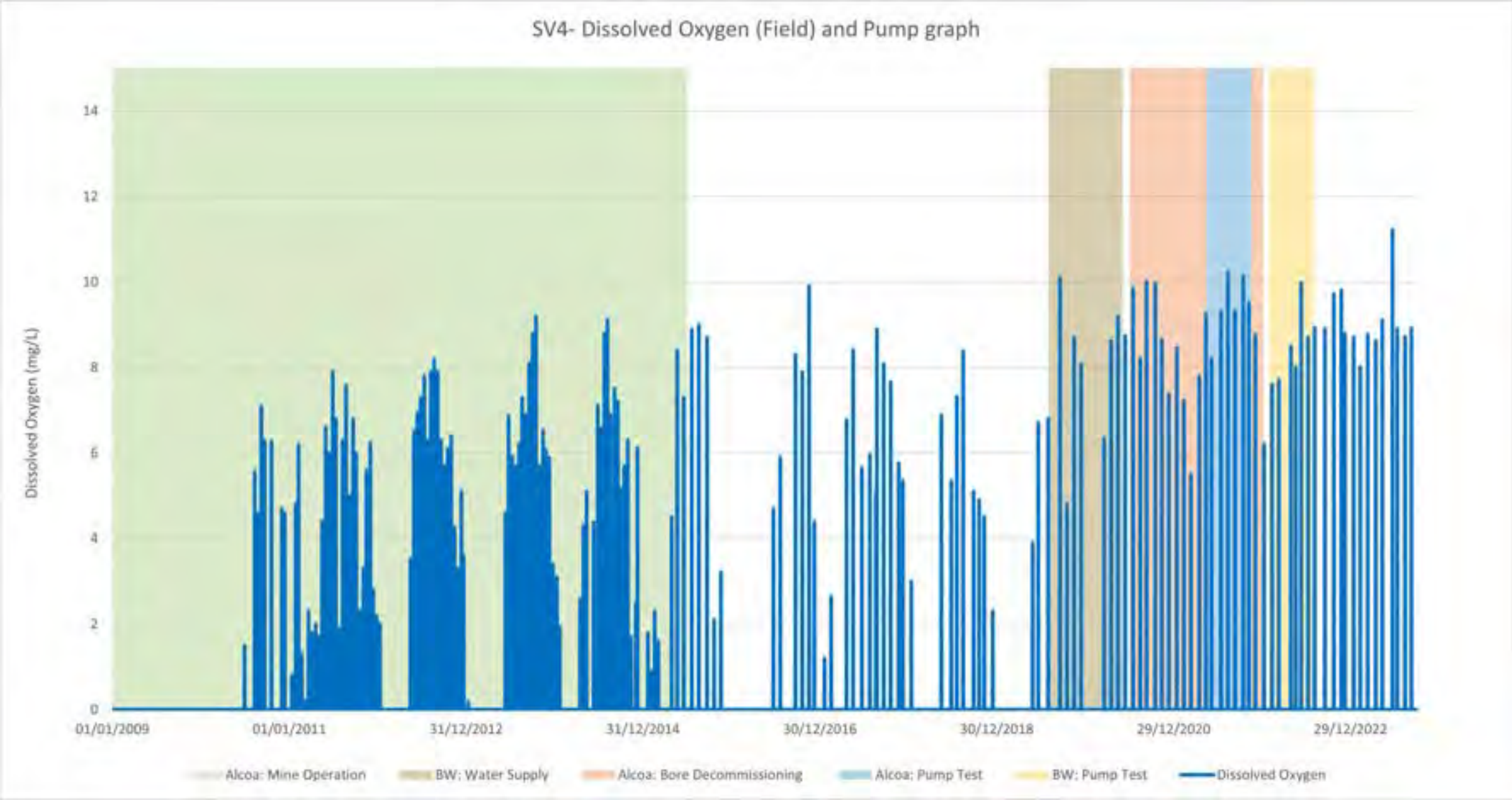

SGP2-A- Dissolved Oxygen (Field) and Pump graph
Dissolved Oxygen (mg/L)
0
2
4
6
8
10
12
14
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
Dissolved Oxygen

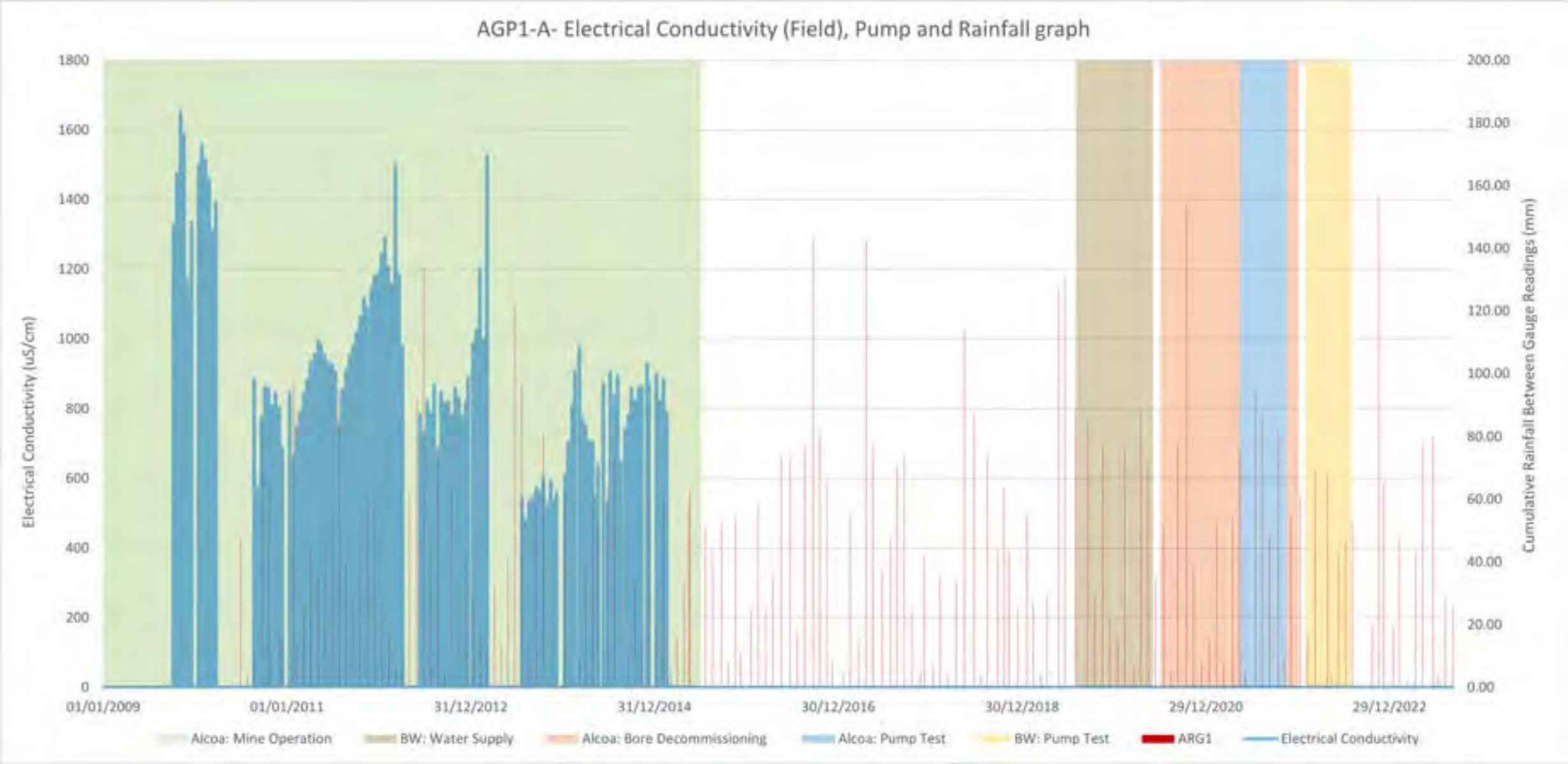

SGP2-B- Dissolved Oxygen (Field) and Pump graph
Dissolved Oxygen (mg/L)
0
2
4
6
8
10
12
14
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
Dissolved Oxygen

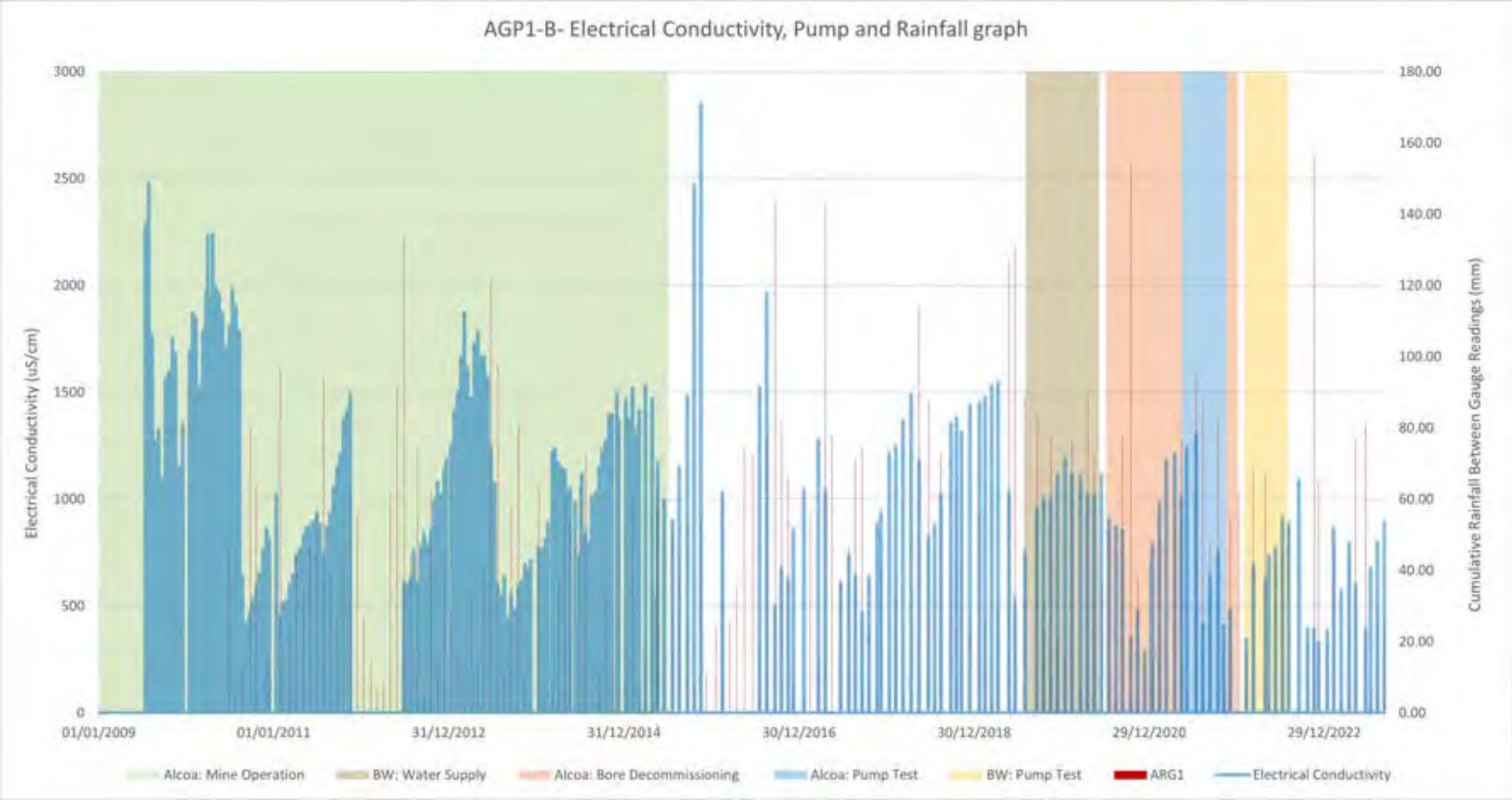

SV1- Dissolved Oxygen (Field) and Pump graph
Dissolved Oxygen (mg/L)
0
2
4
6
8
10
12
14
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
Dissolved Oxygen

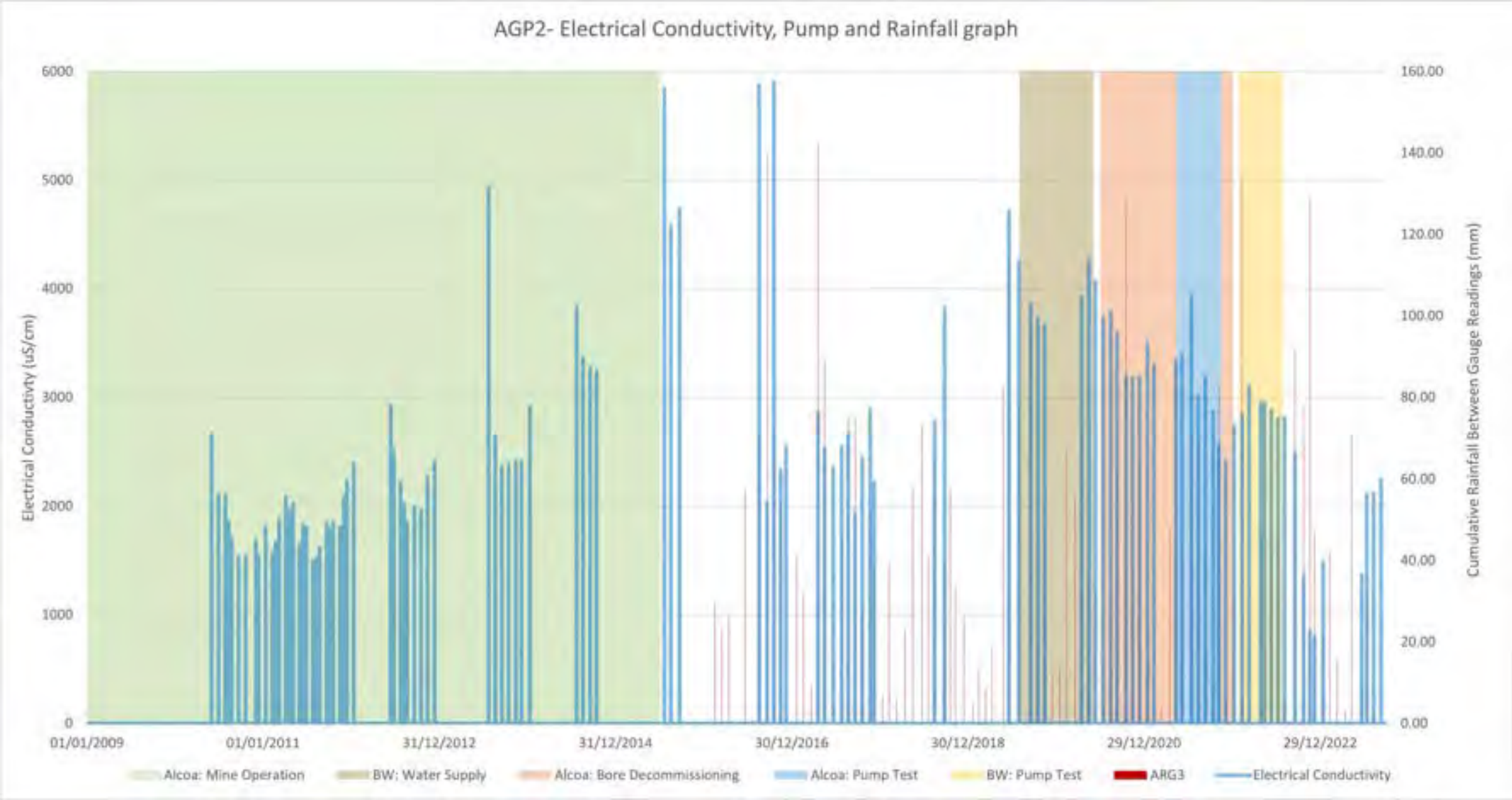

SV2- Dissolved Oxygen (Field) and Pump graph
Dissolved Oxygen (mg/L)
0
2
4
6
8
10
12
14
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
Dissolved Oxygen

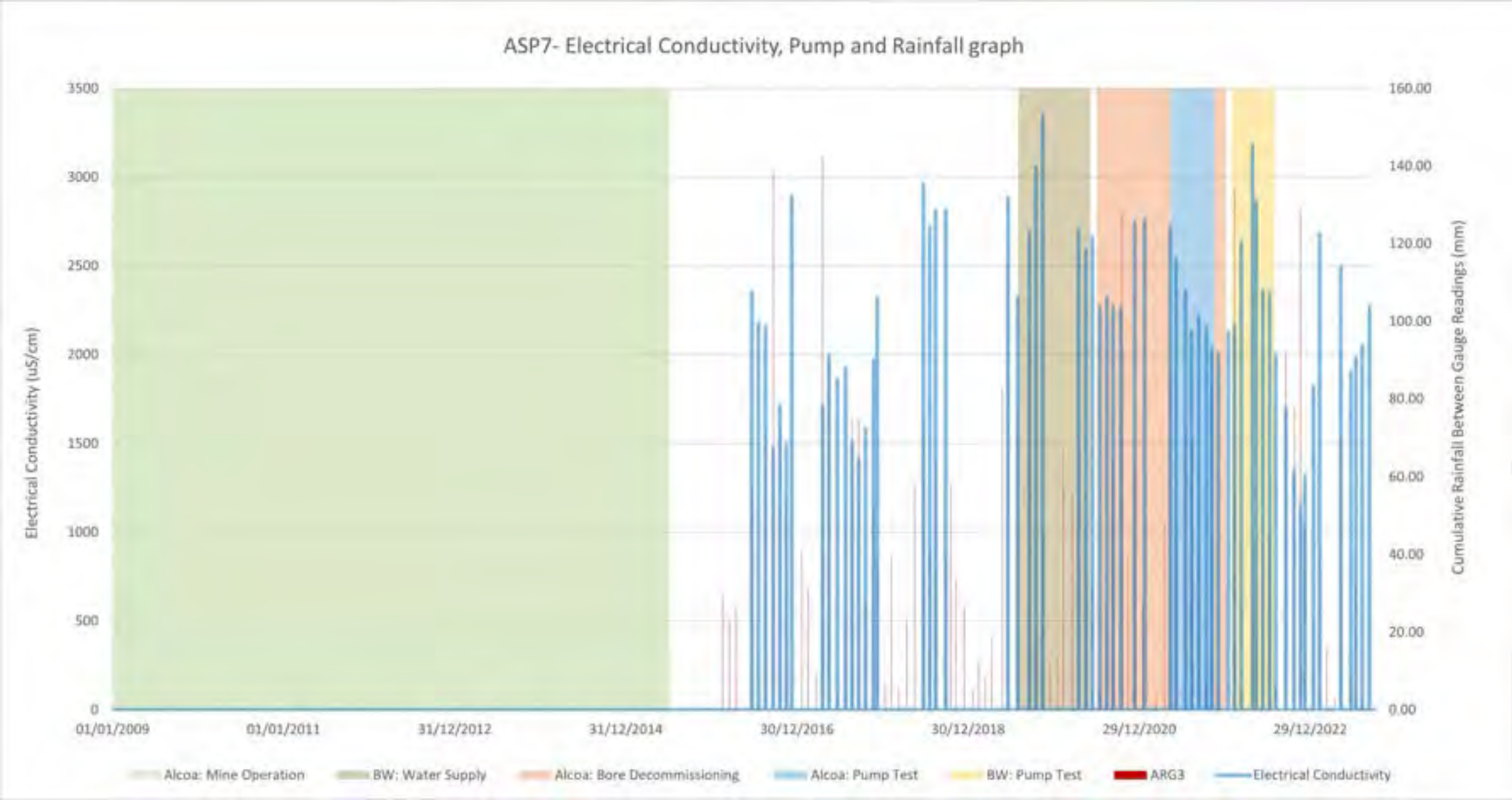

SV3- Dissolved Oxygen (Field) and Pump graph
Dissolved Oxygen (mg/L)
0
2
4
6
8
10
12
14
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
Dissolved Oxygen

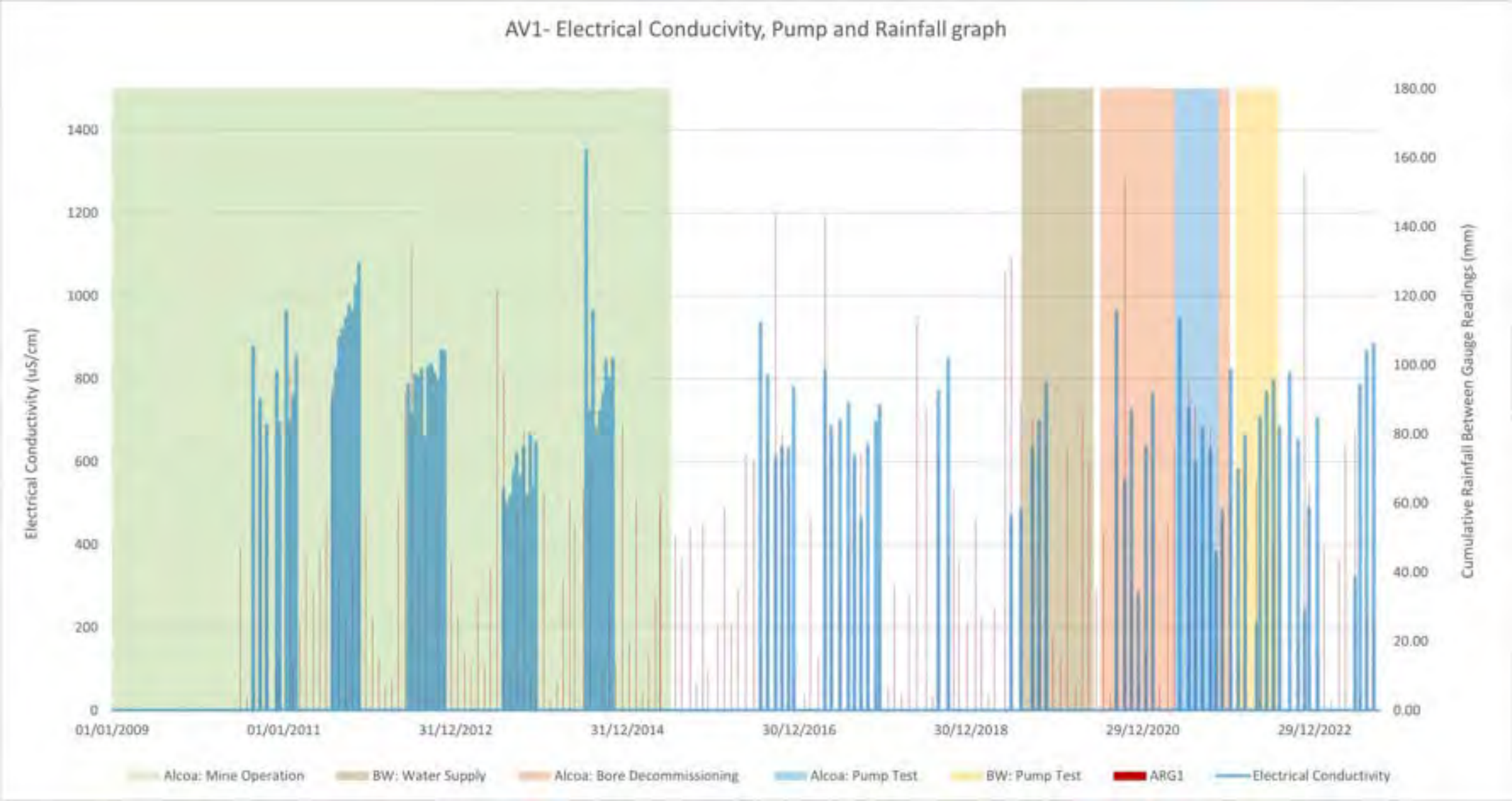

SV4- Dissolved Oxygen (Field) and Pump graph
Dissolved Oxygen (mg/L)
0
2
4
6
8
10
12
14
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
Dissolved Oxygen

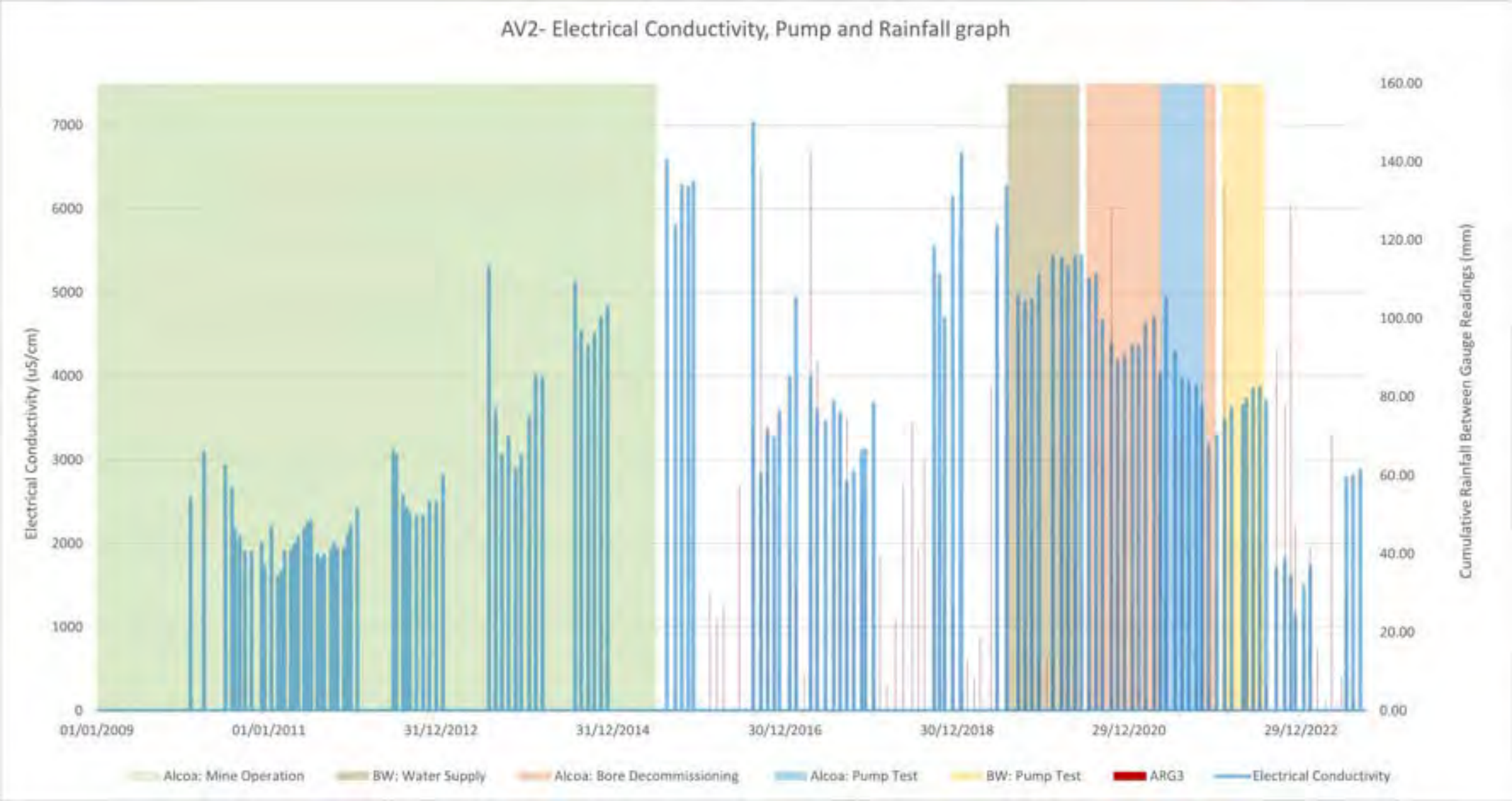

AGP1-A- Electrical Conductivity (Field), Pump and Rainfall graph
Electrical Conductivity (uS/cm)
Cumulative Rainfall Between Gauge Readings (mm)
1800
1600
1400
1200
1000
800
600
400
200
0
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG1
Electrical Conductivity

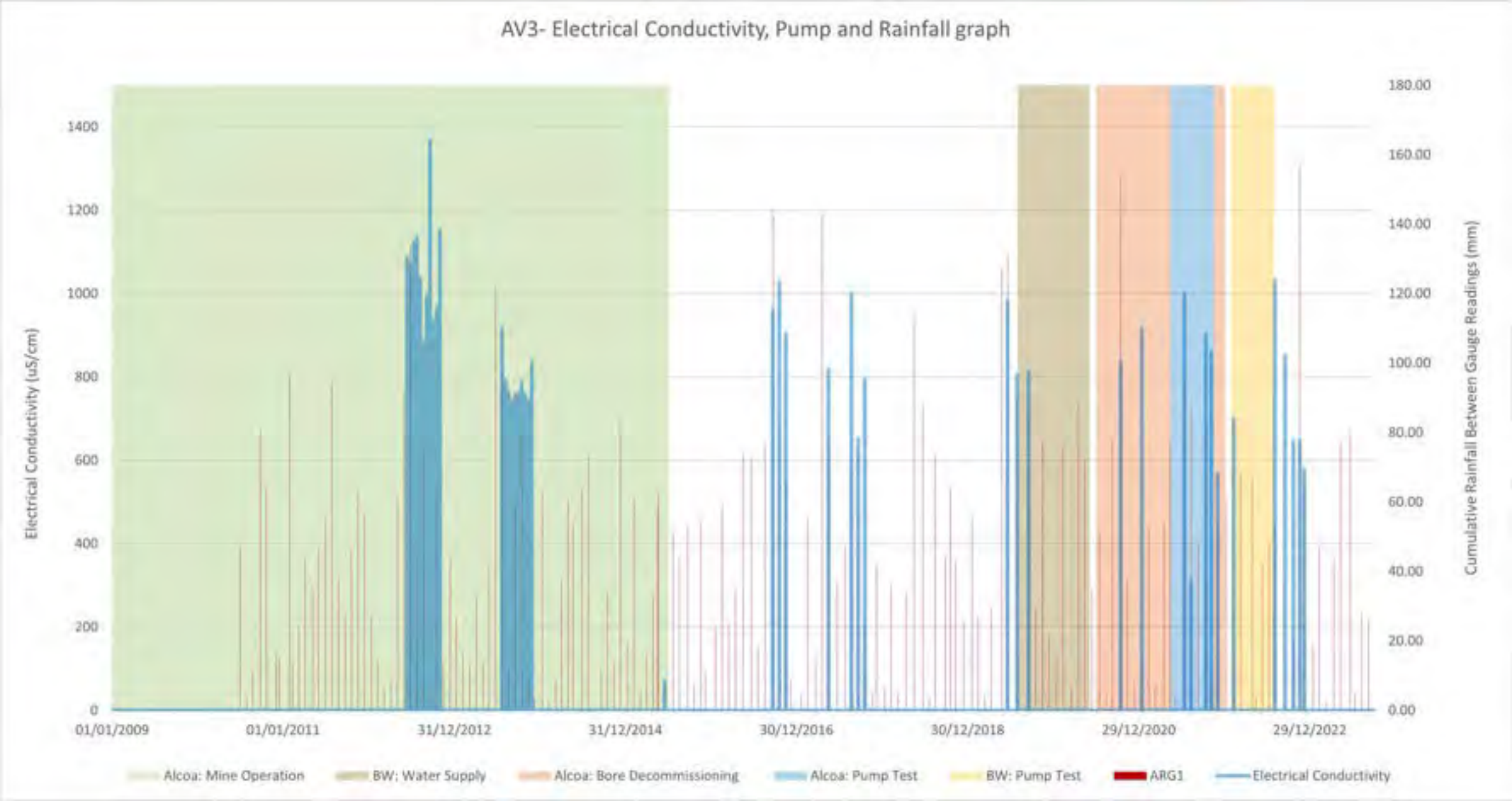

AGP1-B- Electrical Conductivity, Pump and Rainfall graph
Electrical Conductivity (uS/cm)
Cumulative Rainfall Between Gauge Readings (mm)
3000
2500
2000
1500
1000
500
0
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG1
Electrical Conductivity

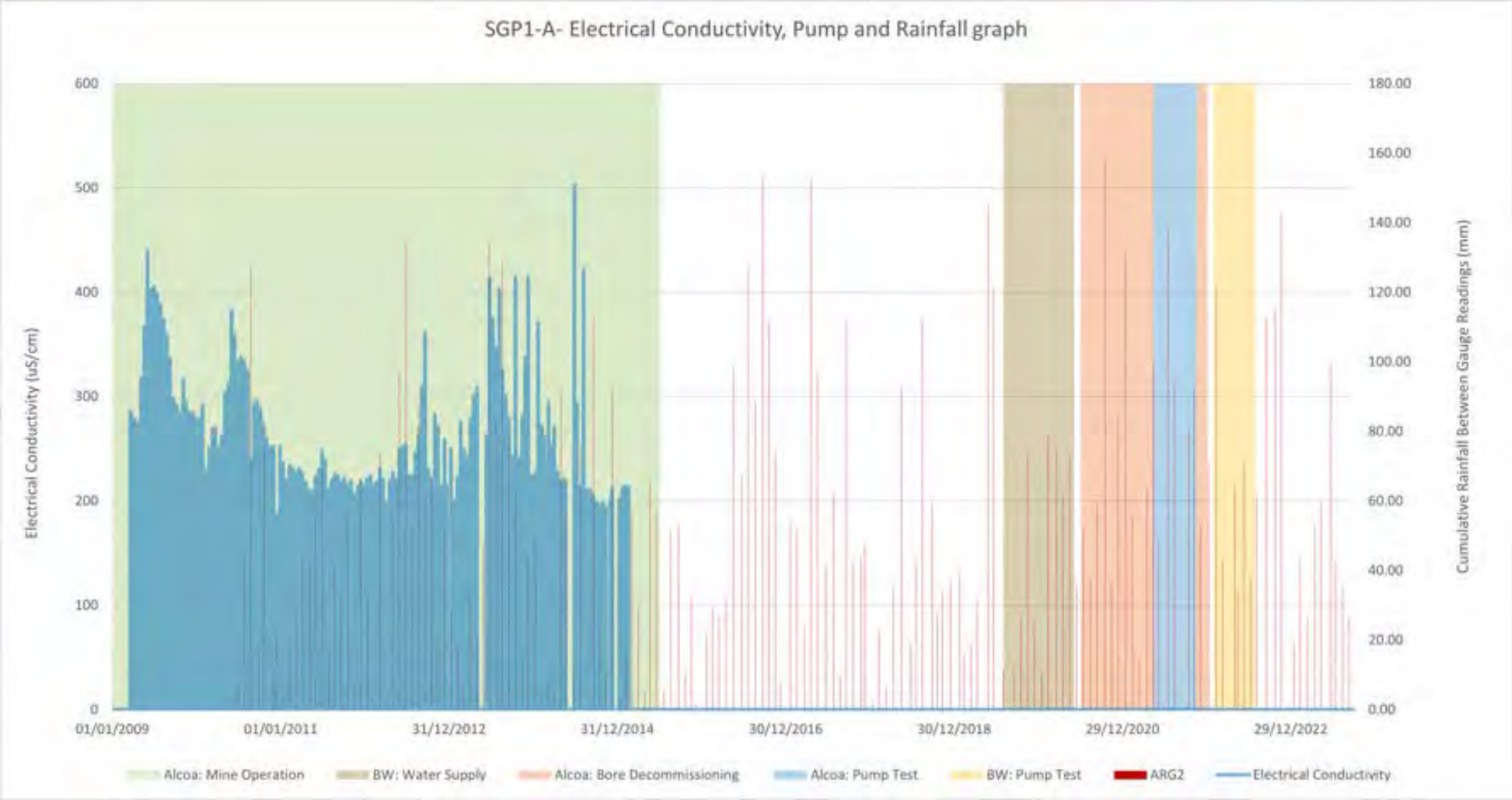

AGP2- Electrical Conductivity, Pump and Rainfall graph
Electrical Conductivity (uS/cm)
Cumulative Rainfall Between Gauge Readings (mm)
6000
5000
4000
3000
2000
1000
0
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG3
Electrical Conductivity

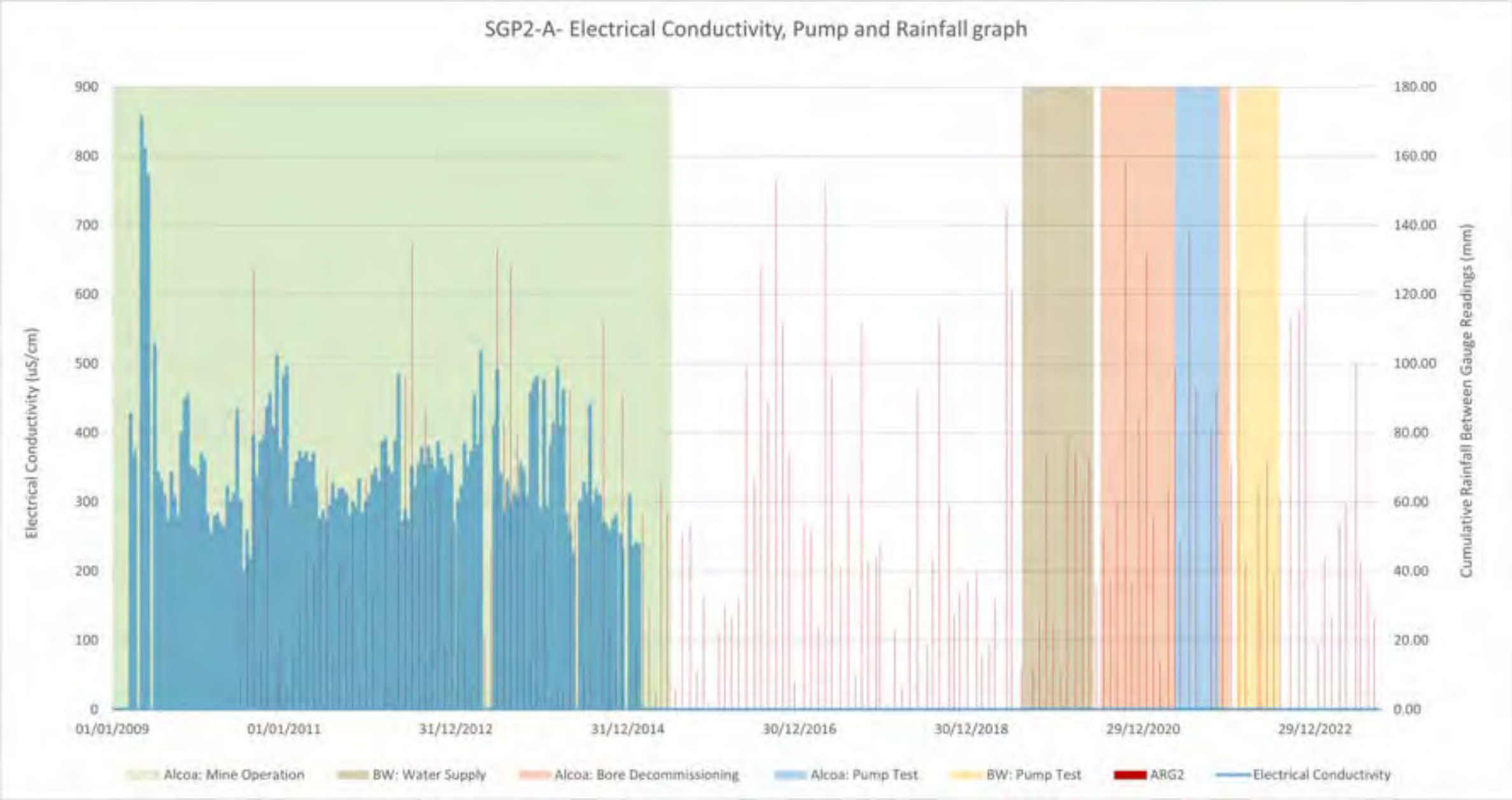

ASP7- Electrical Conductivity, Pump and Rainfall graph
Electrical Conductivity (uS/cm)
Cumulative Rainfall Between Gauge Readings (mm)
3500
3000
2500
2000
1500
1000
500
0
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG3
Electrical Conductivity

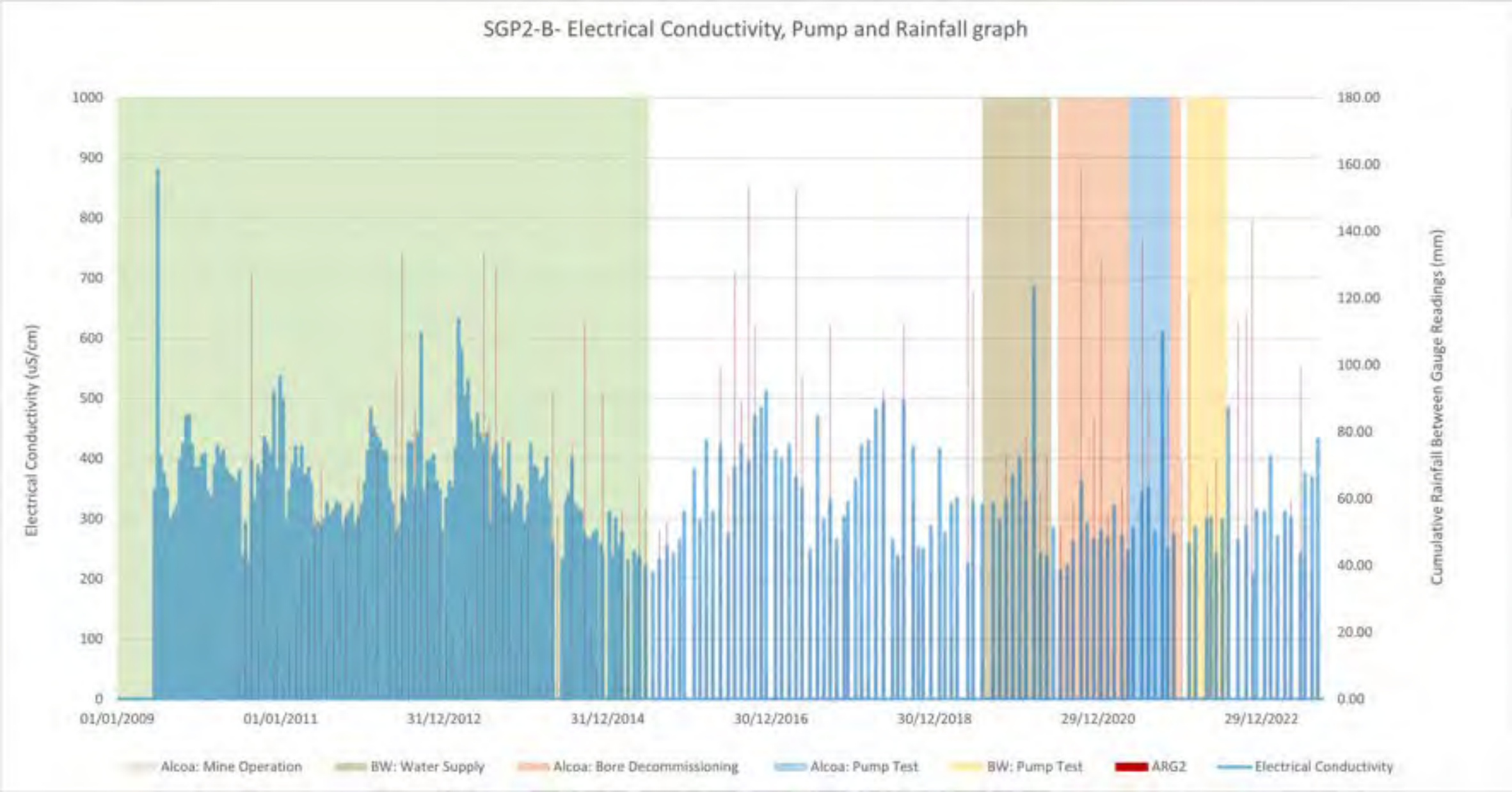

AV1- Electrical Conducivity, Pump and Rainfall graph
Electrical Conductivity (uS/cm)
Cumulative Rainfall Between Gauge Readings (mm)
0
200
400
600
800
1000
1200
1400
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG1
Electrical Conductivity

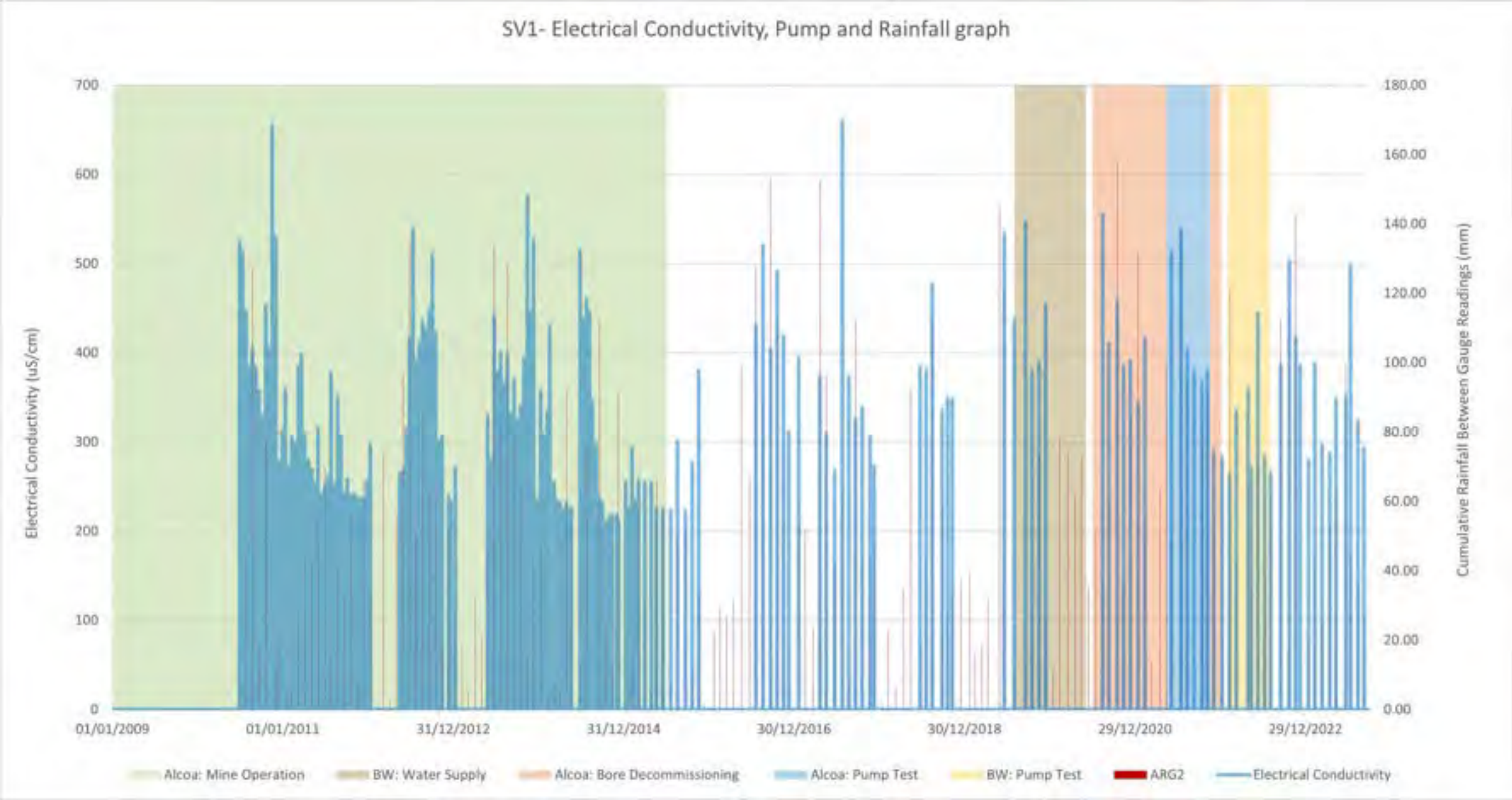

AV2- Electrical Conductivity, Pump and Rainfall graph
Electrical Conductivity (uS/cm)
Cumulative Rainfall Between Gauge Readings (mm)
0
1000
2000
3000
4000
5000
6000
7000
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG3
Electrical Conductivity

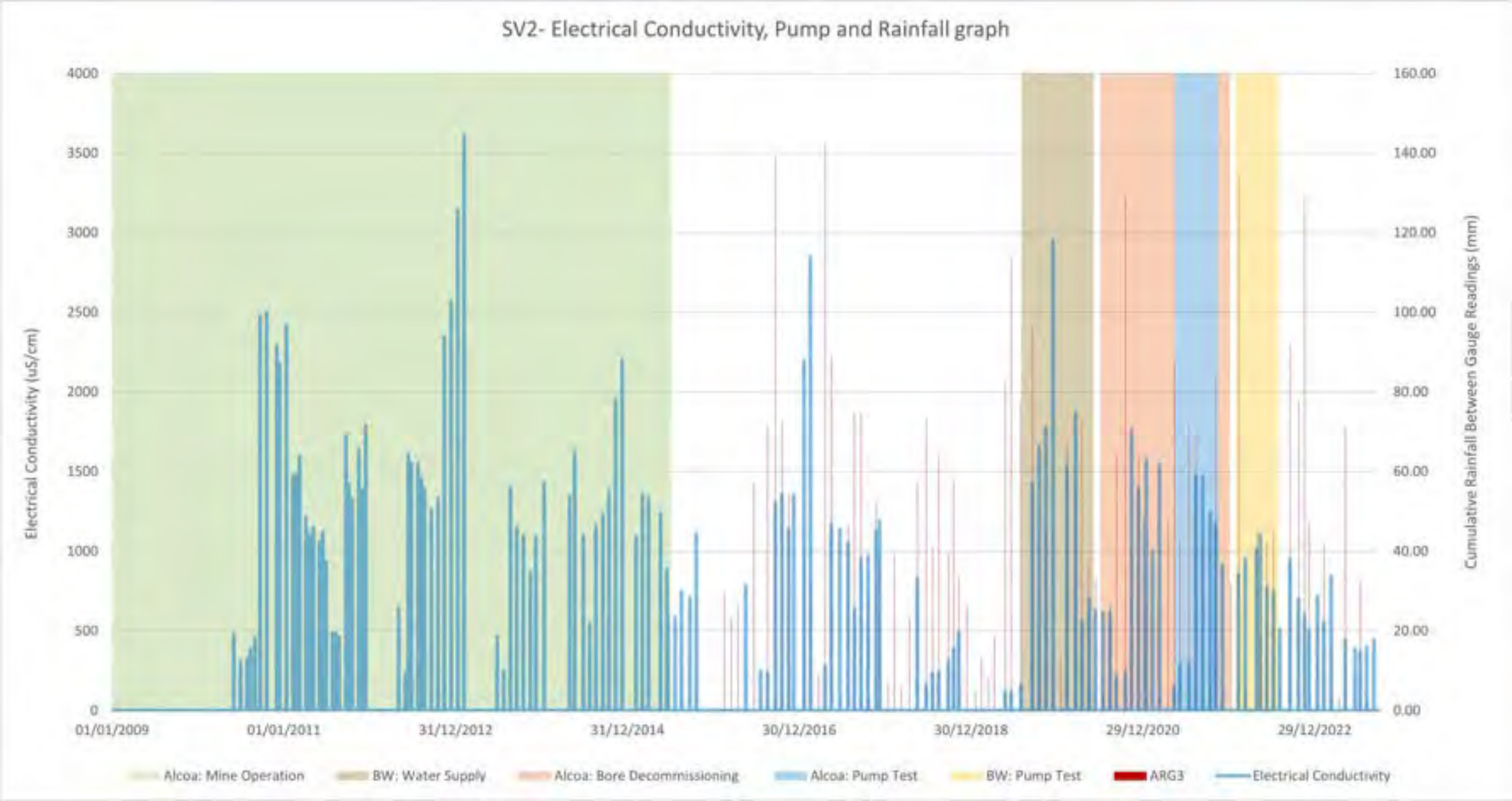

AV3- Electrical Conductivity, Pump and Rainfall graph
Electrical Conductivity (uS/cm)
Cumulative Rainfall Between Gauge Readings (mm)
0
200
400
600
800
1000
1200
1400
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG1
Electrical Conductivity

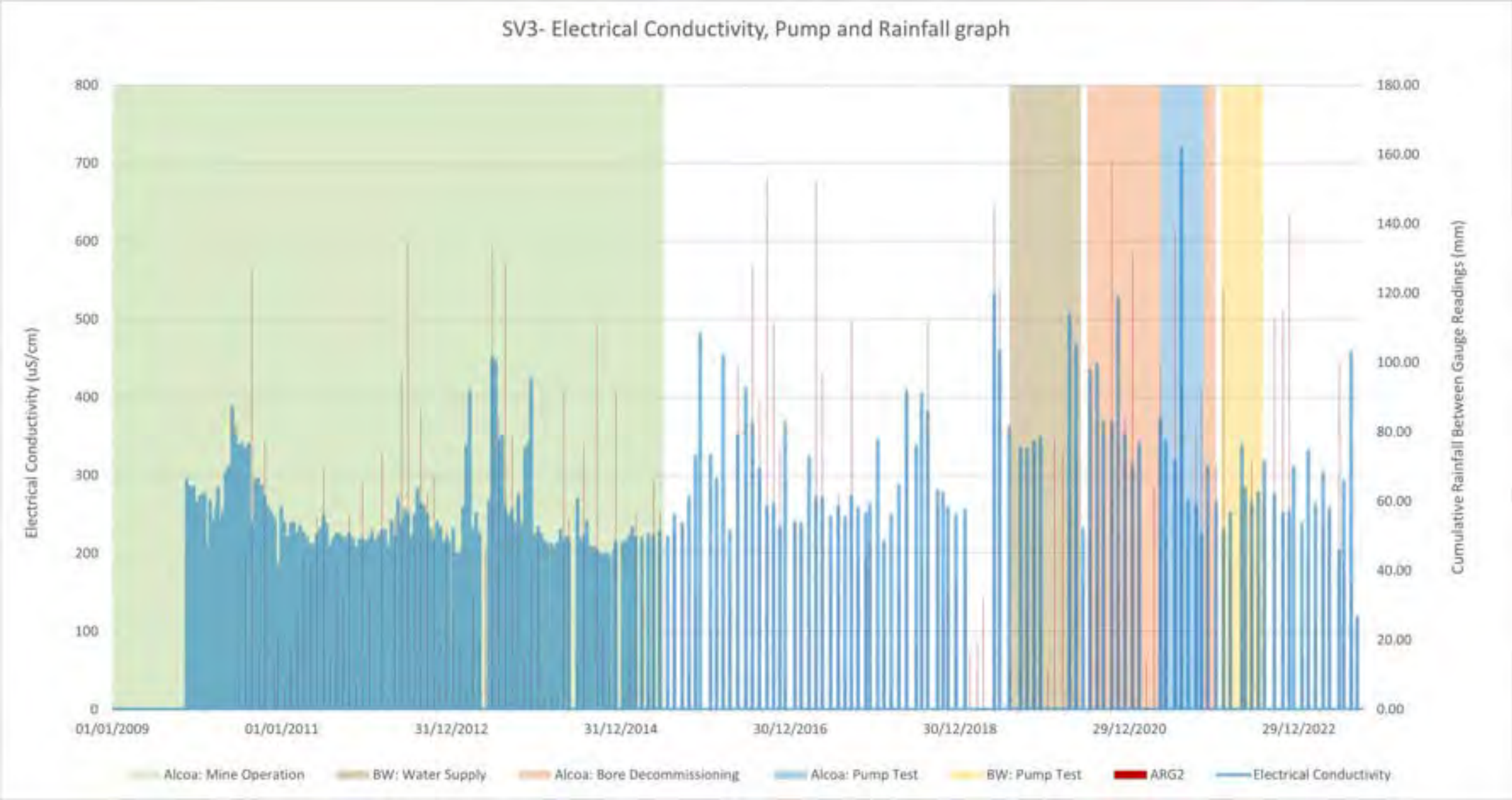

SGP1-A- Electrical Conductivity, Pump and Rainfall graph
Electrical Conductivity (uS/cm)
Cumulative Rainfall Between Gauge Readings (mm)
600
500
400
300
200
100
0
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG2
Electrical Conductivity

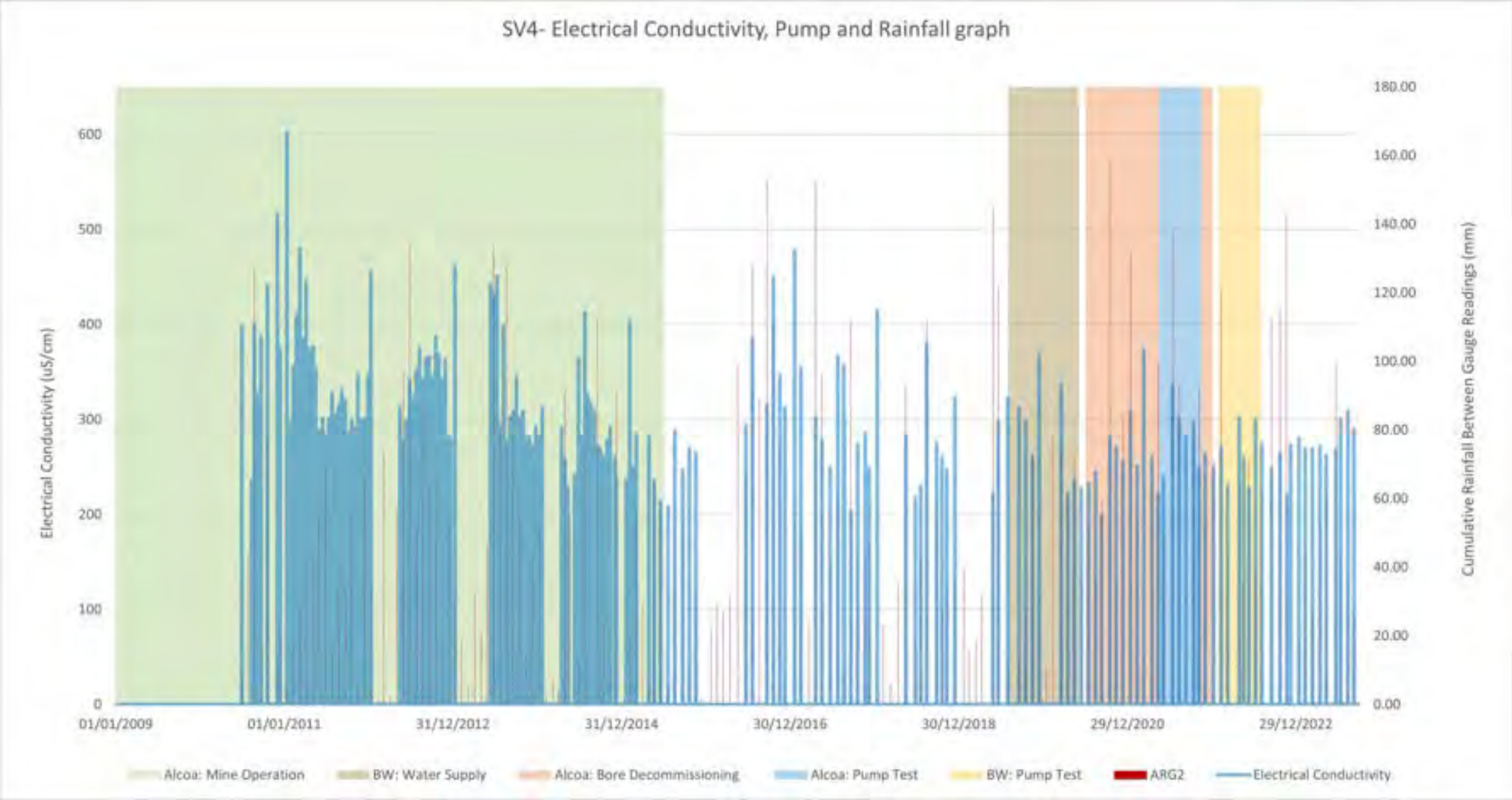

SGP2-A- Electrical Conductivity, Pump and Rainfall graph
Electrical Conductivity (uS/cm)
Cumulative Rainfall Between Gauge Readings (mm)
900
800
700
600
500
400
300
200
100
0
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG2
Electrical Conductivity

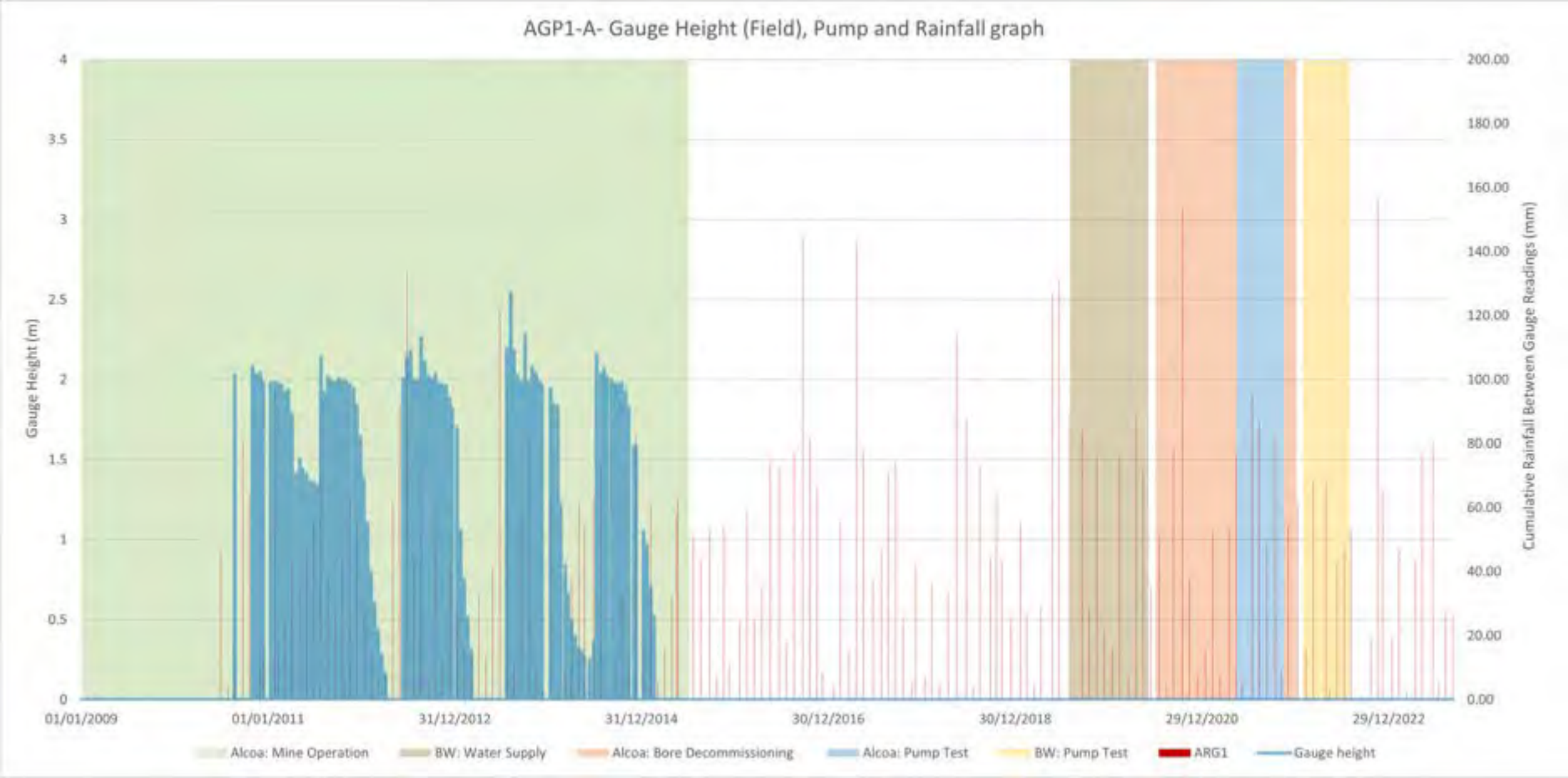

SGP2-B- Electrical Conductivity, Pump and Rainfall graph
Electrical Conductivity (uS/cm)
Cumulative Rainfall Between Gauge Readings (mm)
1000
900
800
700
600
500
400
300
200
100
0
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG2
Electrical Conductivity

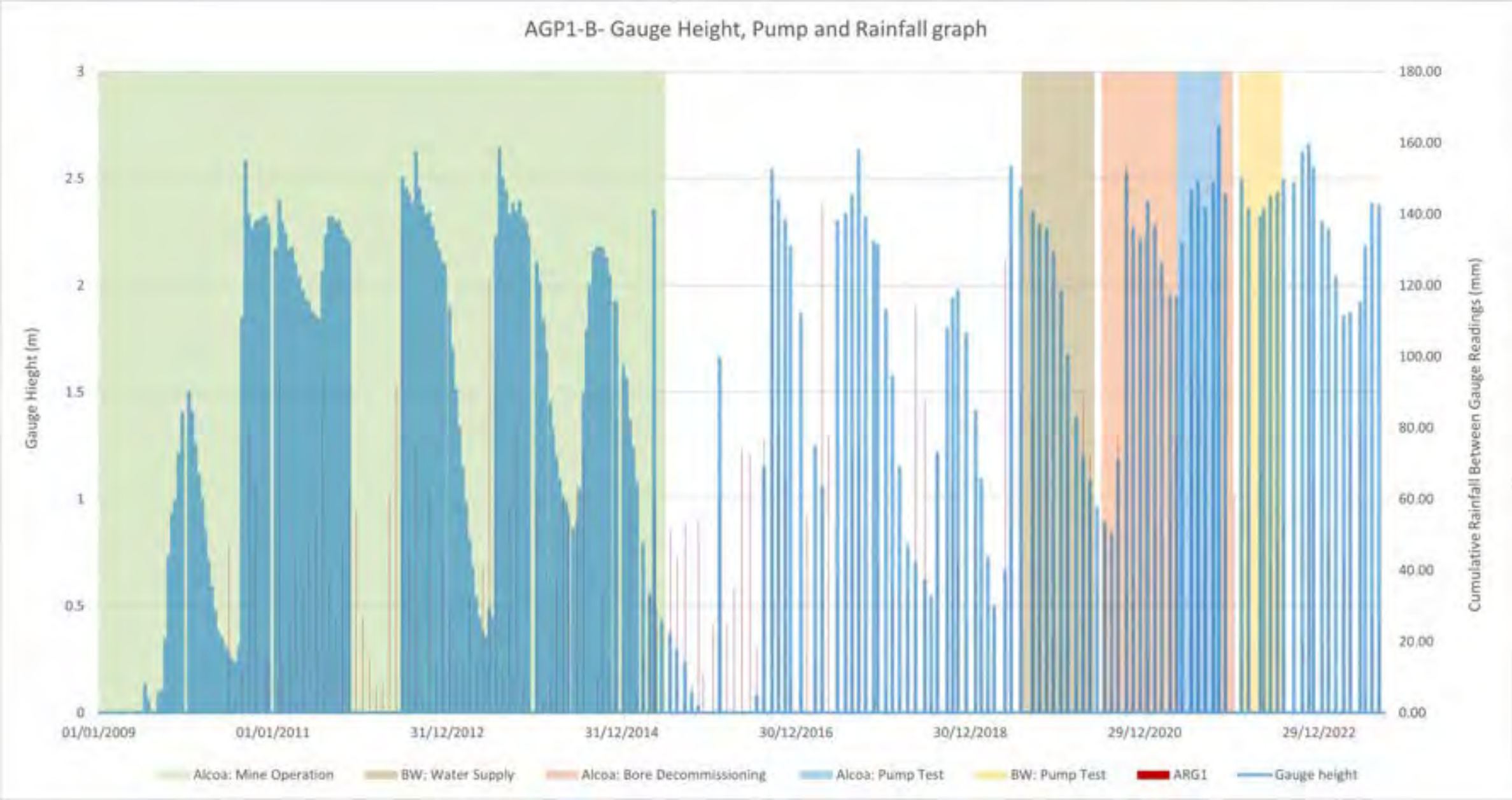

SV1- Electrical Conductivity, Pump and Rainfall graph
Electrical Conductivity (uS/cm)
Cumulative Rainfall Between Gauge Readings (mm)
700
600
500
400
300
200
100
0
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG2
Electrical Conductivity

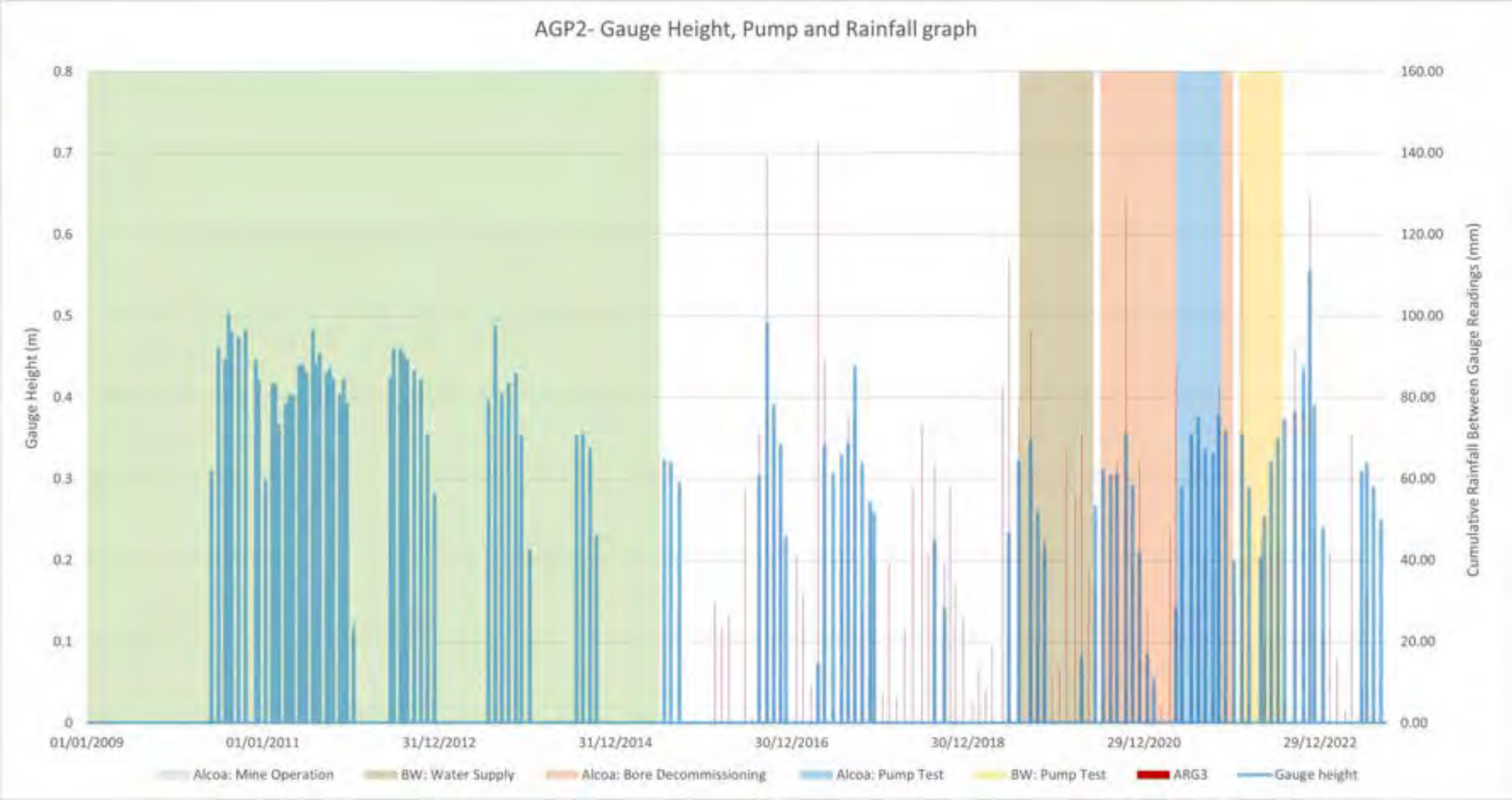

SV2- Electrical Conductivity, Pump and Rainfall graph
Electrical Conductivity (uS/cm)
Cumulative Rainfall Between Gauge Readings (mm)
4000
3500
3000
2500
2000
1500
1000
500
0
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG3
Electrical Conductivity

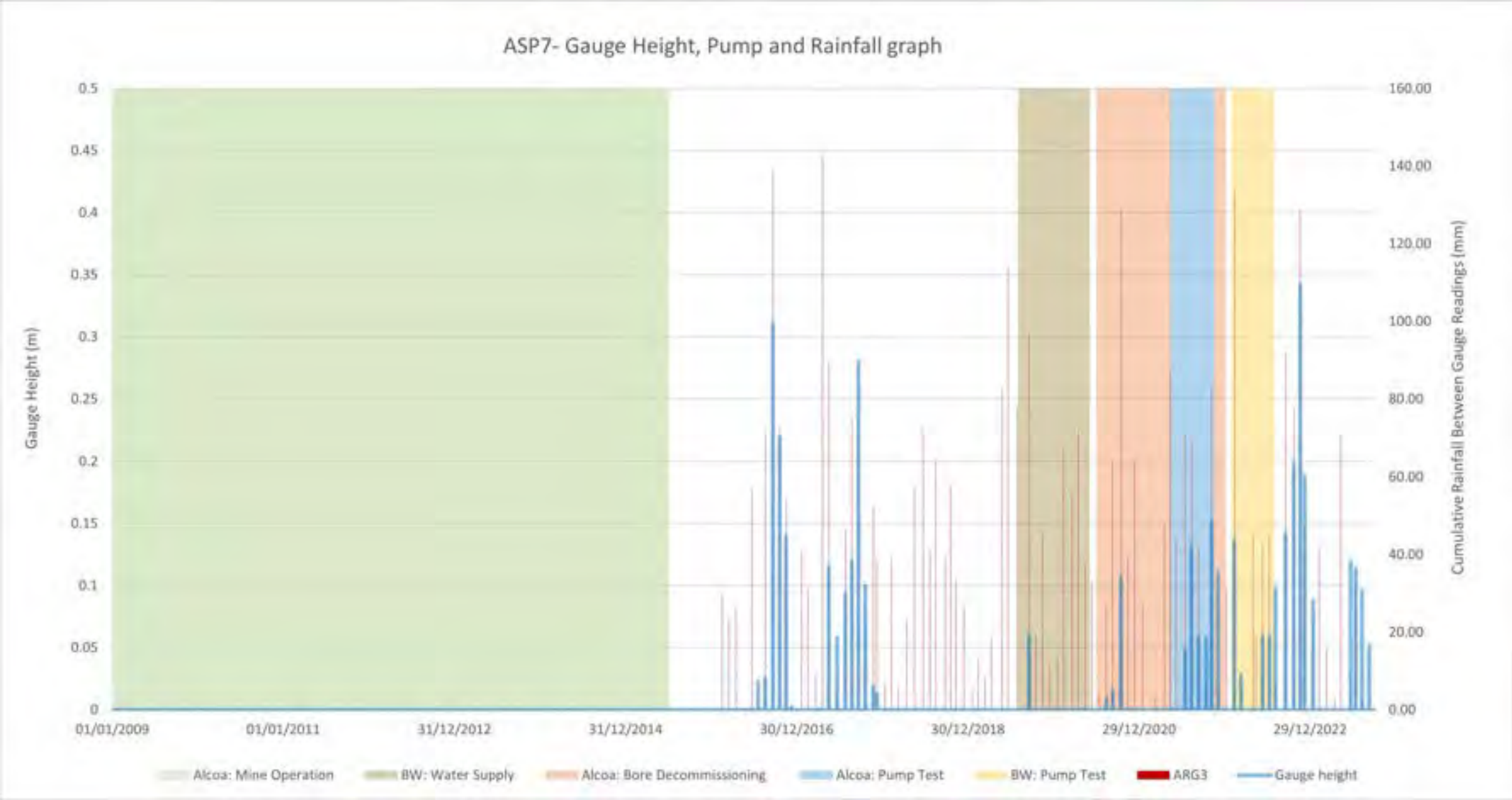

SV3- Electrical Conductivity, Pump and Rainfall graph
Electrical Conductivity (uS/cm)
Cumulative Rainfall Between Gauge Readings (mm)
800
700
600
500
400
300
200
100
0
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG2
Electrical Conductivity

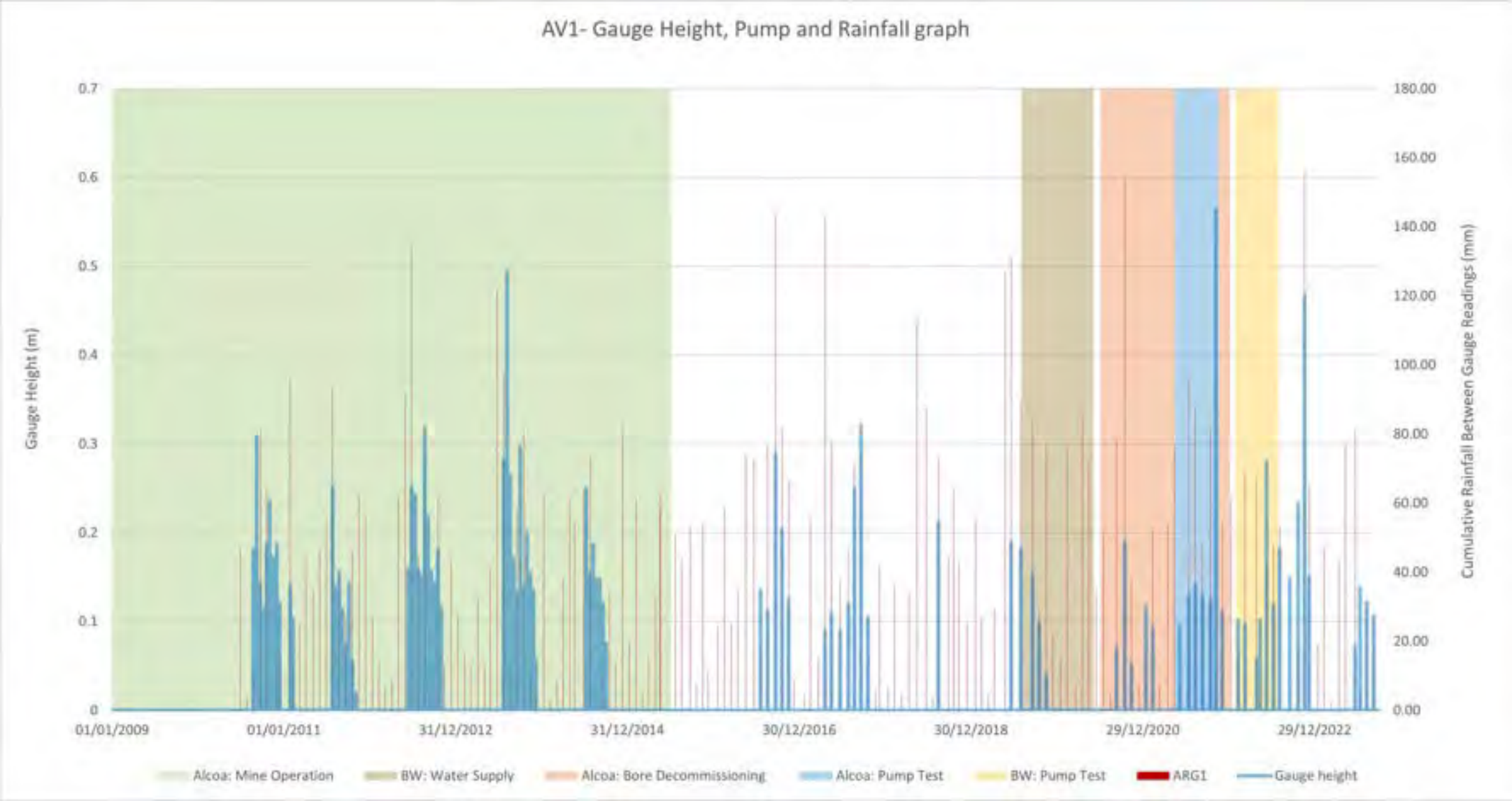

SV4- Electrical Conductivity, Pump and Rainfall graph
Electrical Conductivity (uS/cm)
0
100
200
300
400
500
600
Cumulative Rainfall Between Gauge Readings (mm)
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG2
Electrical Conductivity

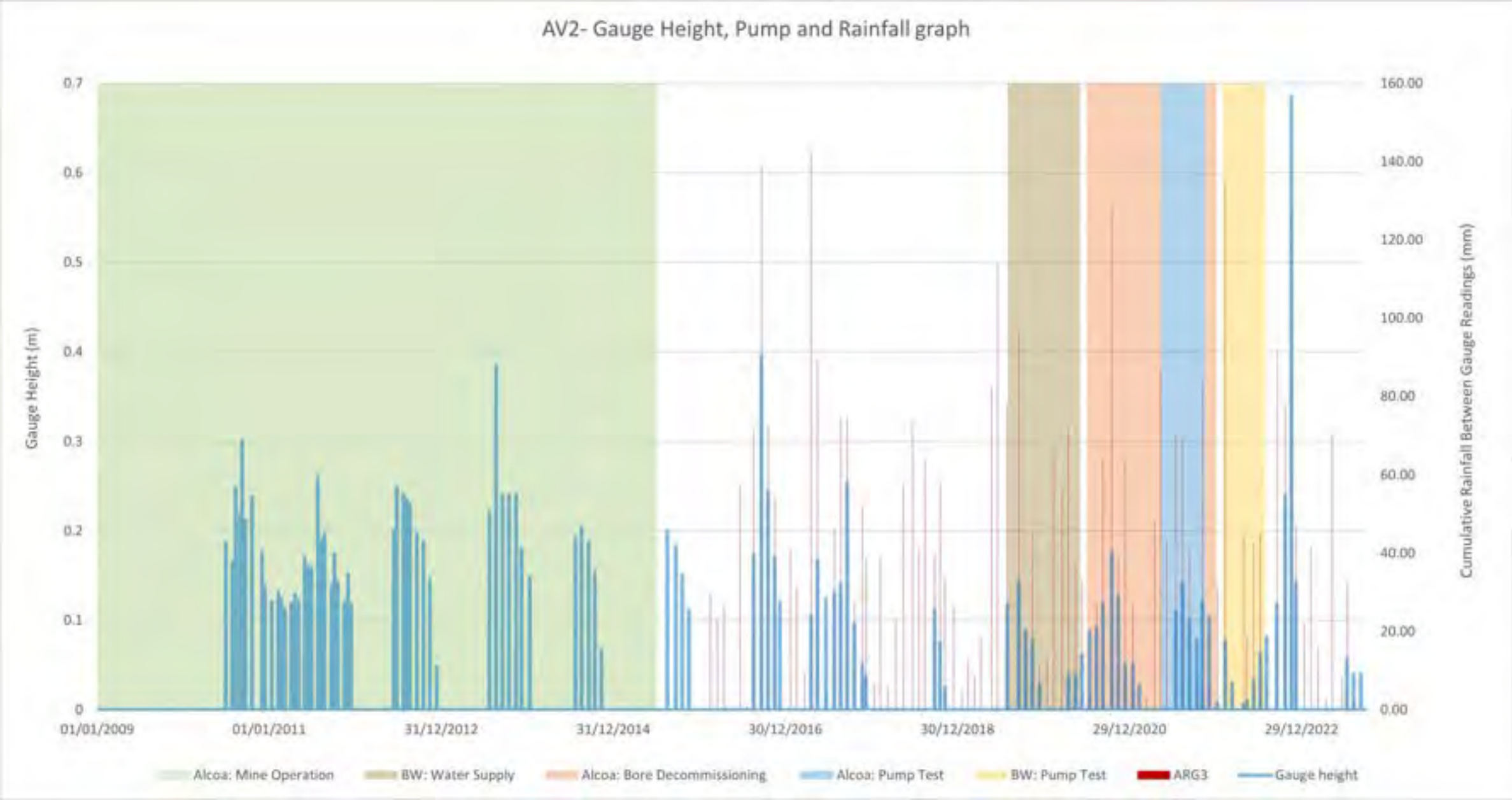

AGP1-A- Gauge Height (Field), Pump and Rainfall graph
Gauge Height (m)
Cumulative Rainfall Between Gauge Readings (mm)
4
3.5
3
2.5
2
1.5
1
0.5
0
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG1
Gauge height

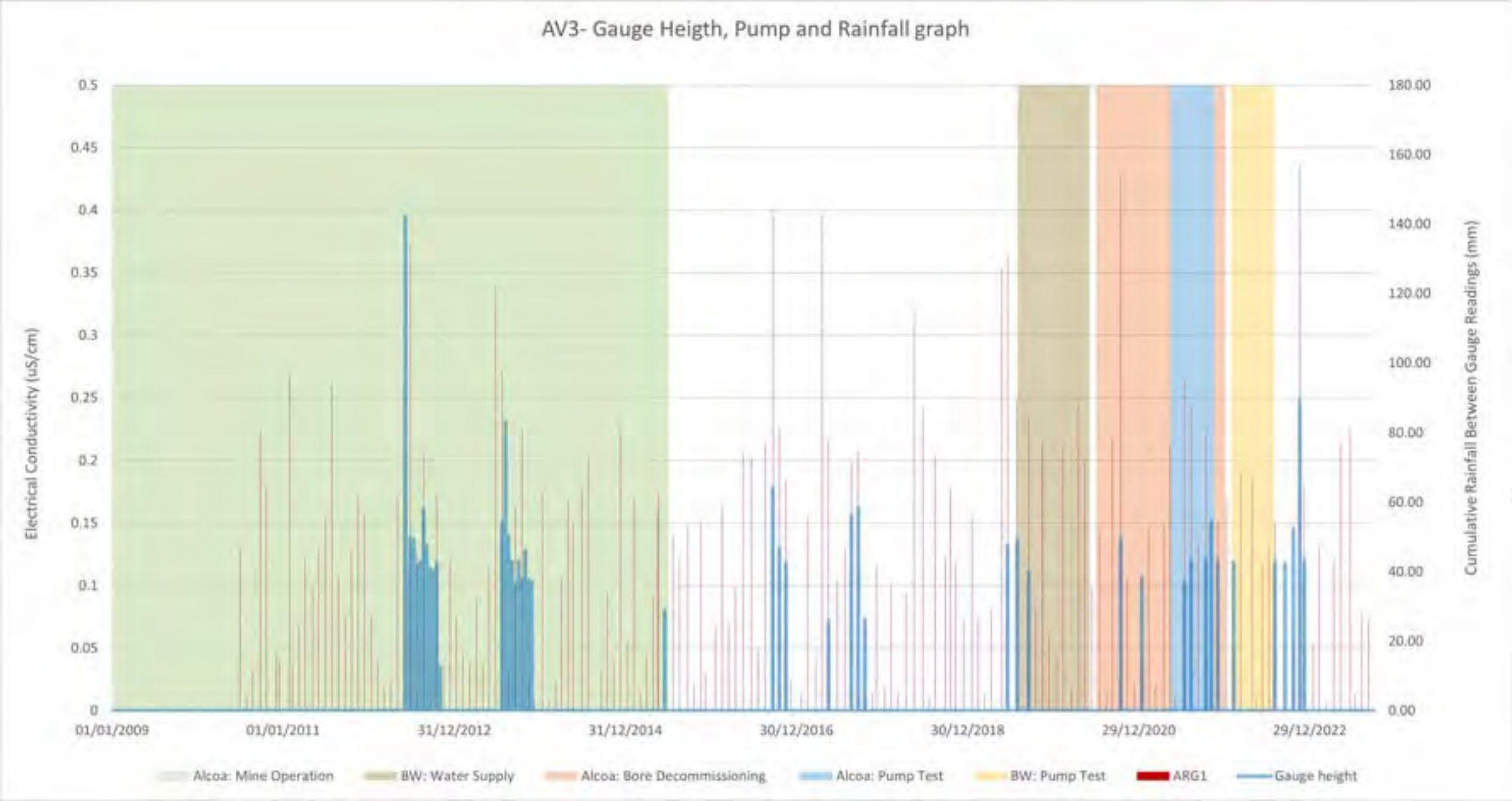

AGP1-B- Gauge Height, Pump and Rainfall graph
Gauge Hieght (m)
Cumulative Rainfall Between Gauge Readings (mm)
3
2.5
2
1.5
1
0.5
0
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG1
Gauge height

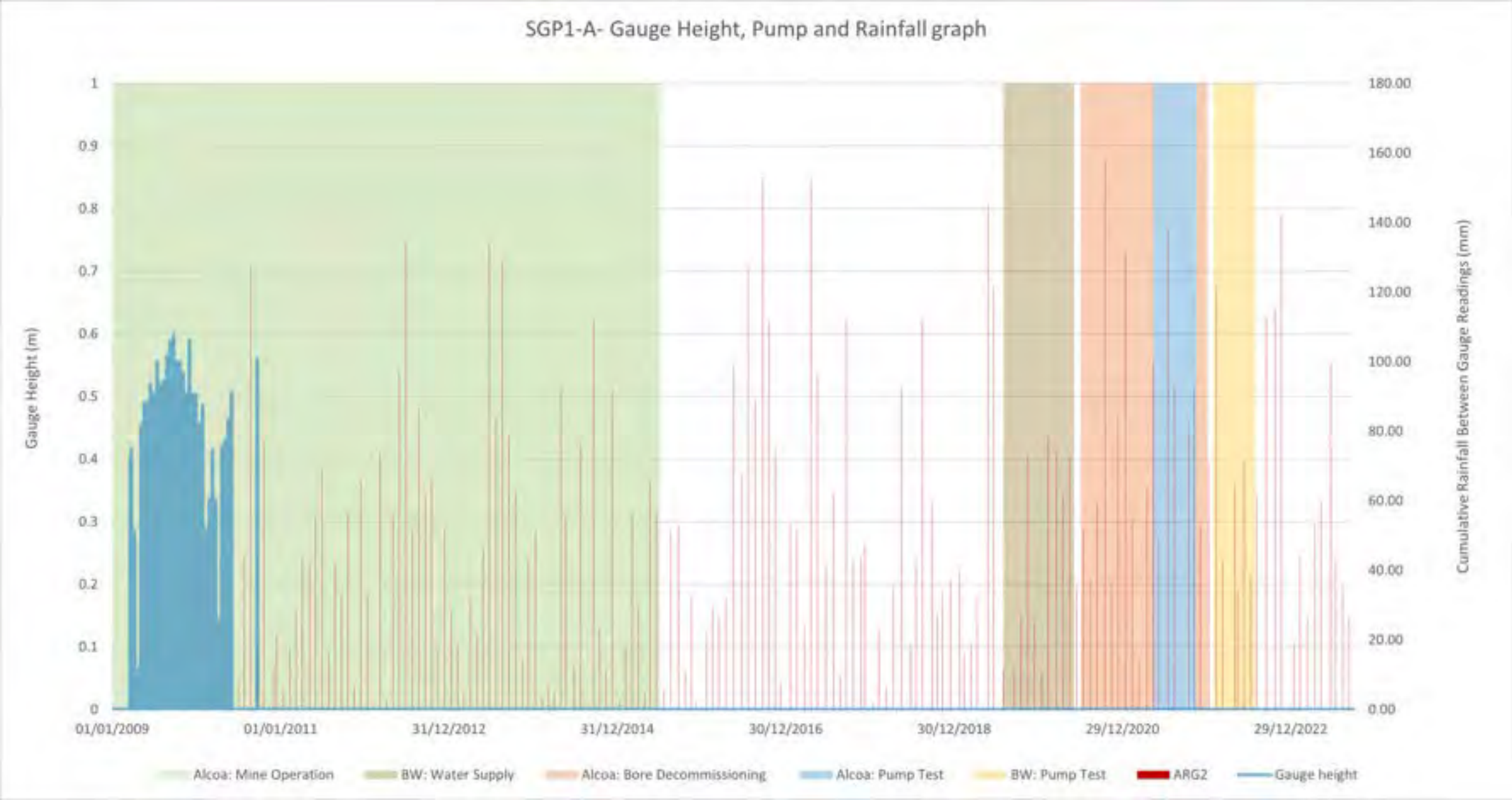

AGP2- Gauge Height, Pump and Rainfall graph
Gauge Height (m)
Cumulative Rainfall Between Gauge Readings (mm)
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG3
Gauge height

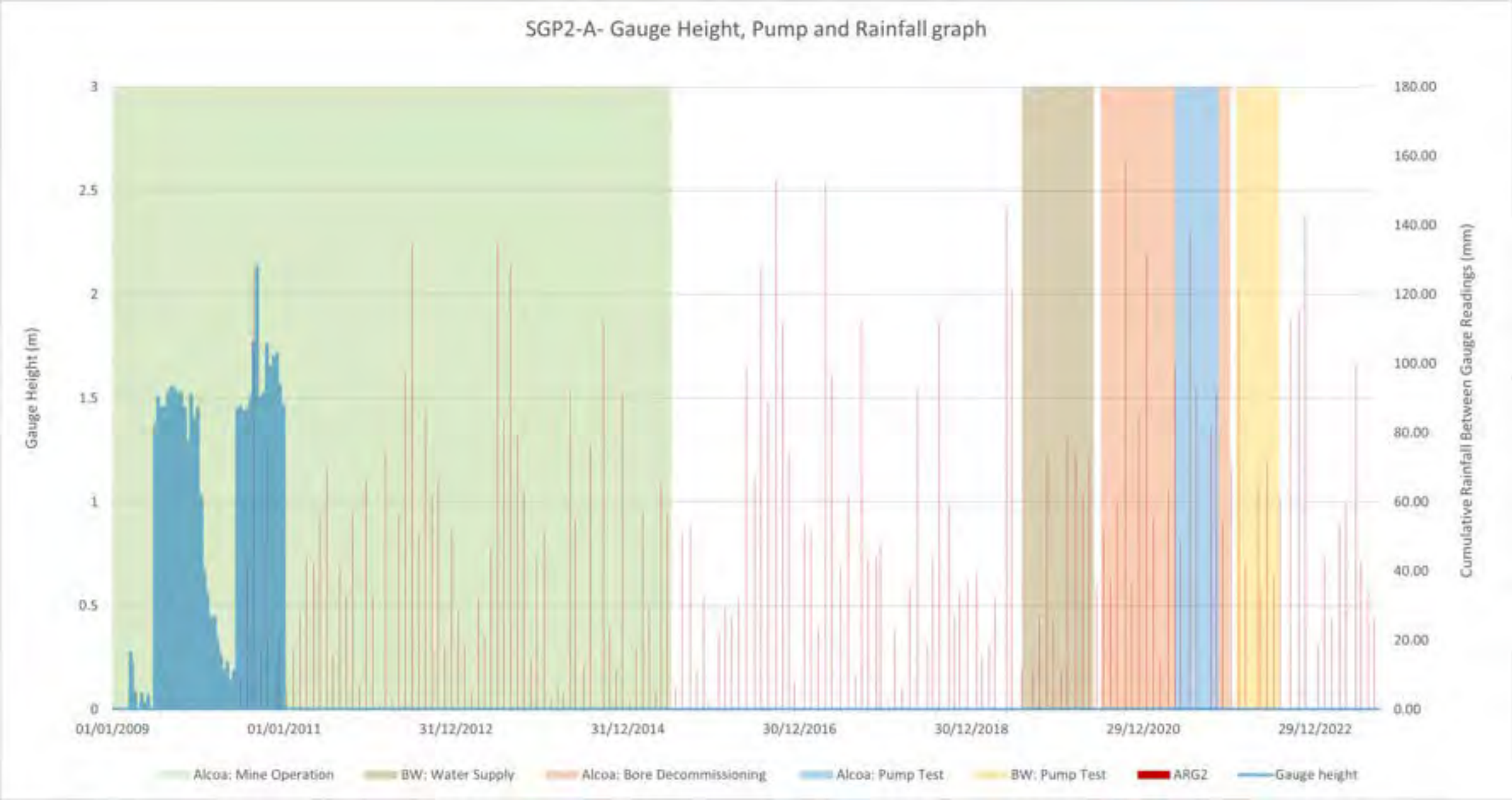

ASP7- Gauge Height, Pump and Rainfall graph
Gauge Height (m)
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
Cumulative Rainfall Between Gauge Readings (mm)
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG3
Gauge height

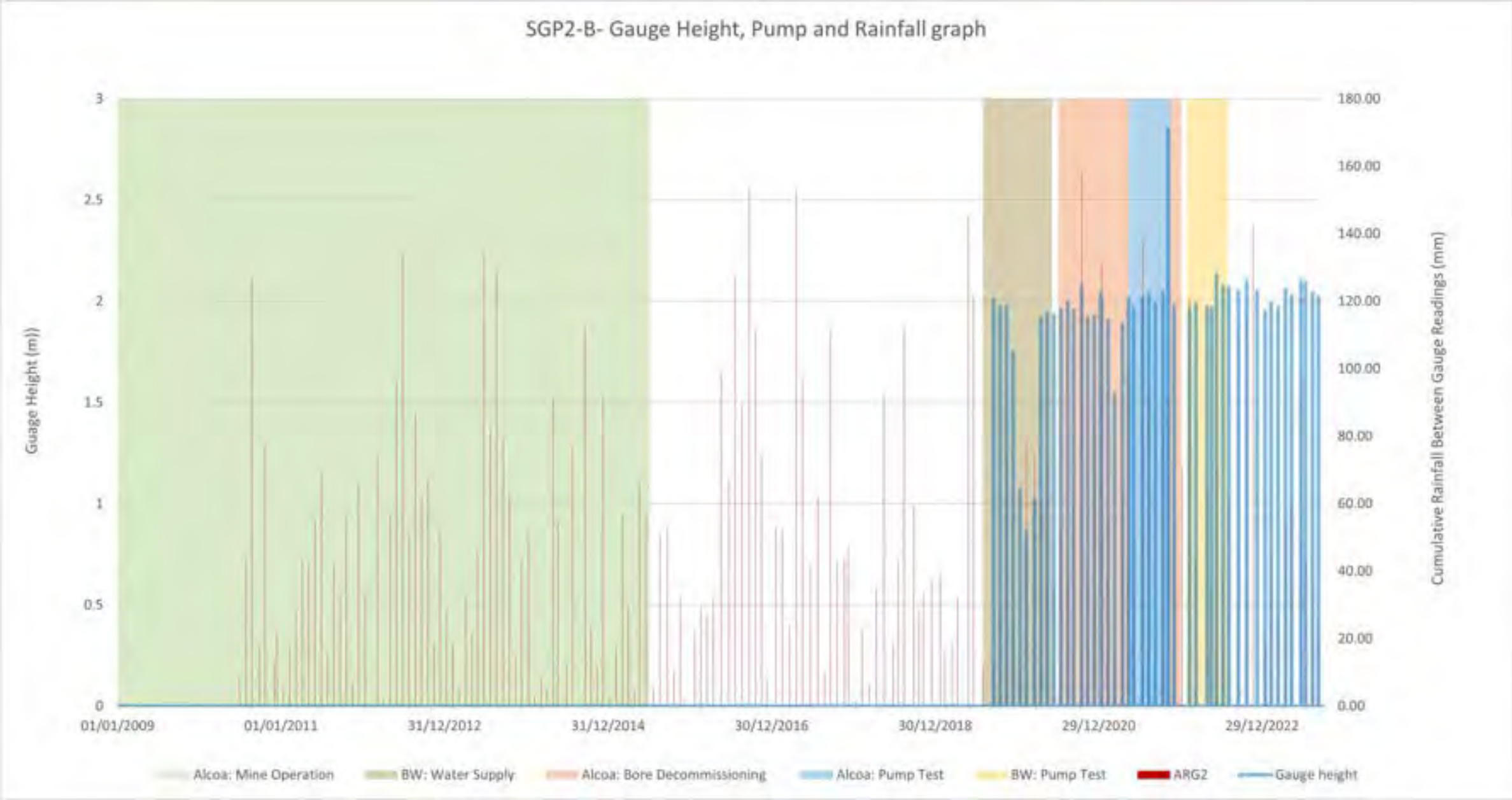

AV1- Gauge Height, Pump and Rainfall graph
Gauge Height (m)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Cumulative Rainfall Between Gauge Readings (mm)
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG1
Gauge height

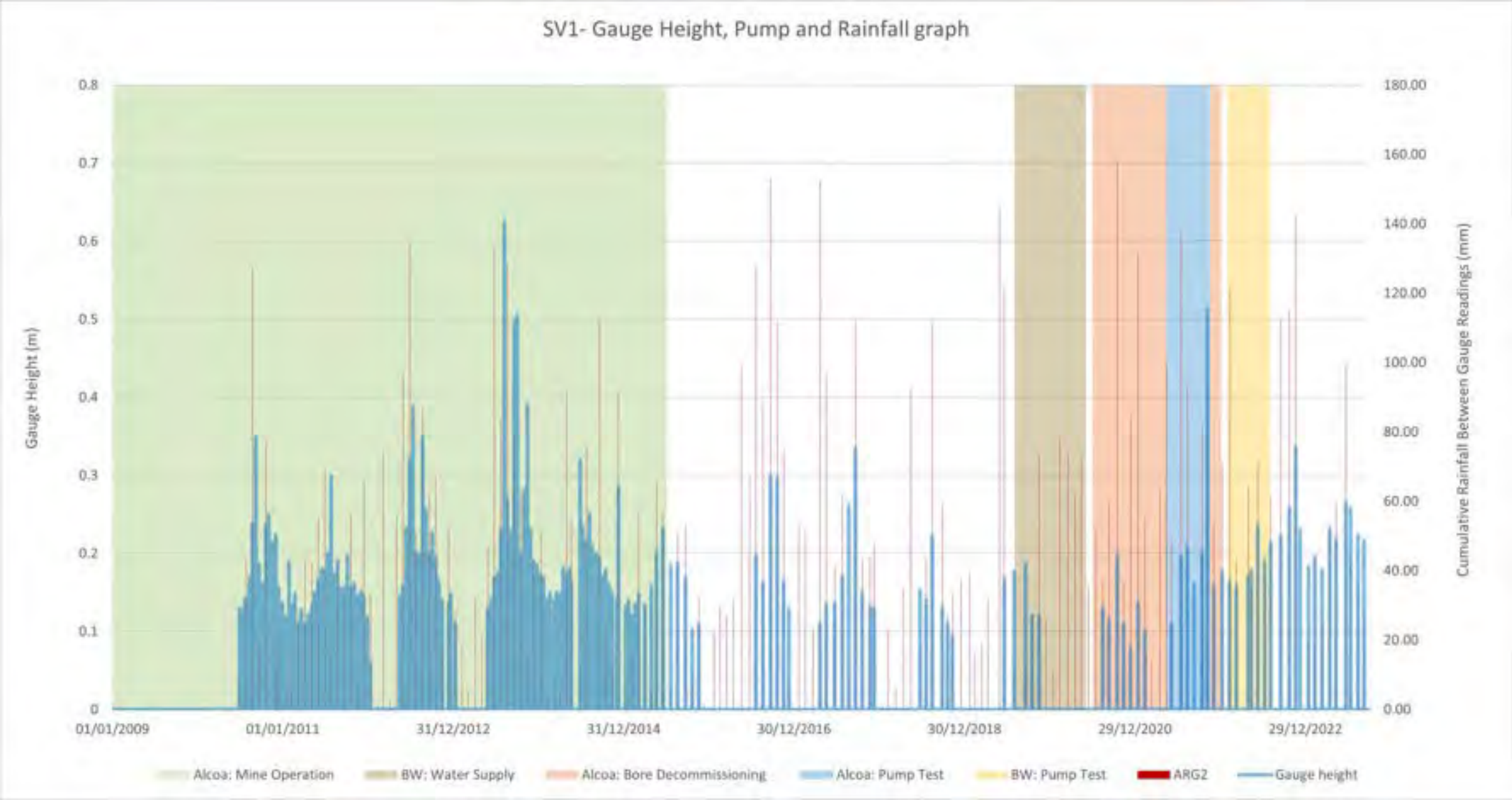

AV2- Gauge Height, Pump and Rainfall graph
Gauge Height (m)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Cumulative Rainfall Between Gauge Readings (mm)
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG3
Gauge height

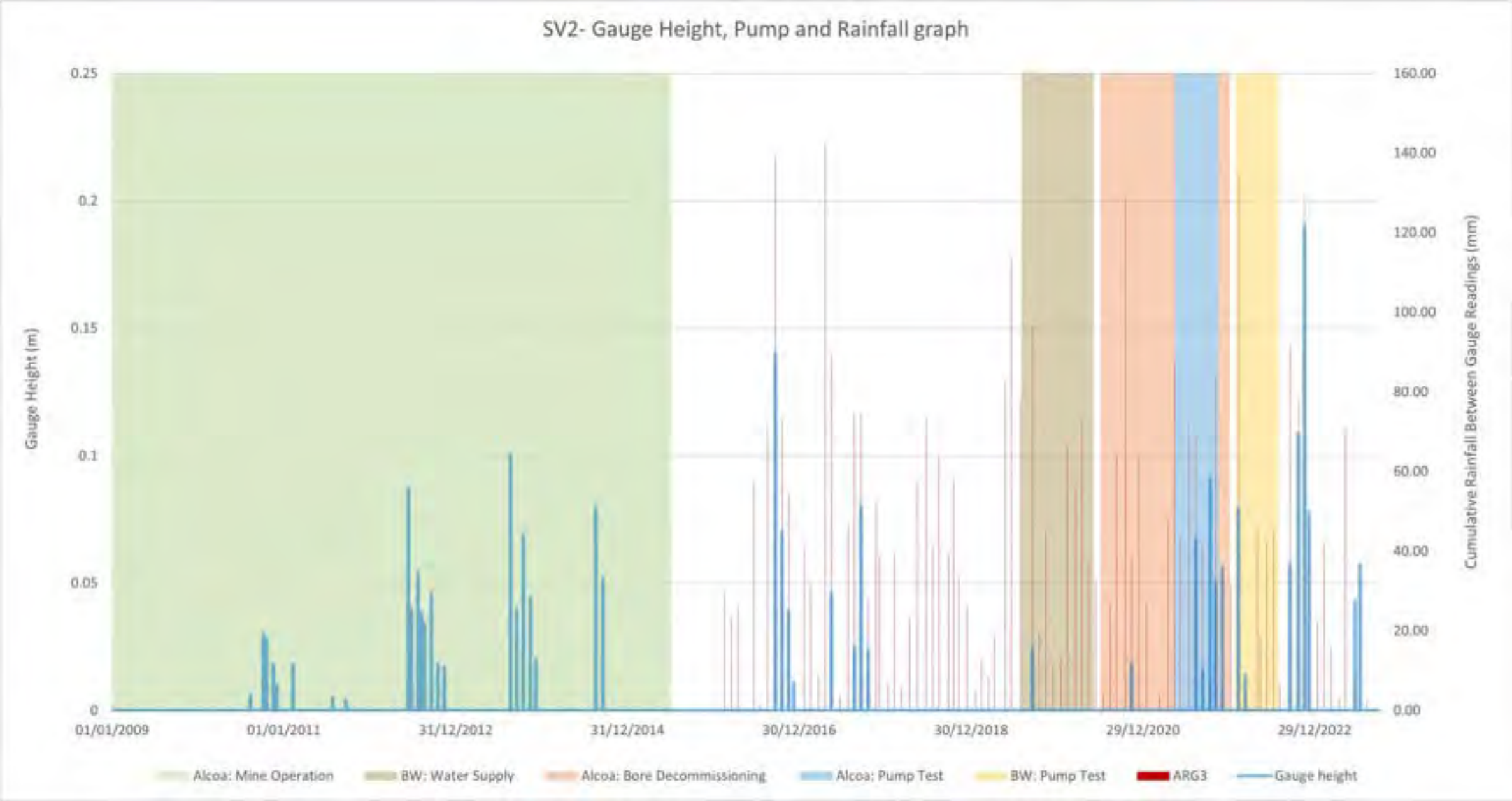

AV3- Gauge Heigth, Pump and Rainfall graph
Electrical Conductivity (uS/cm)
Cumulative Rainfall Between Gauge Readings (mm)
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG1
Gauge height

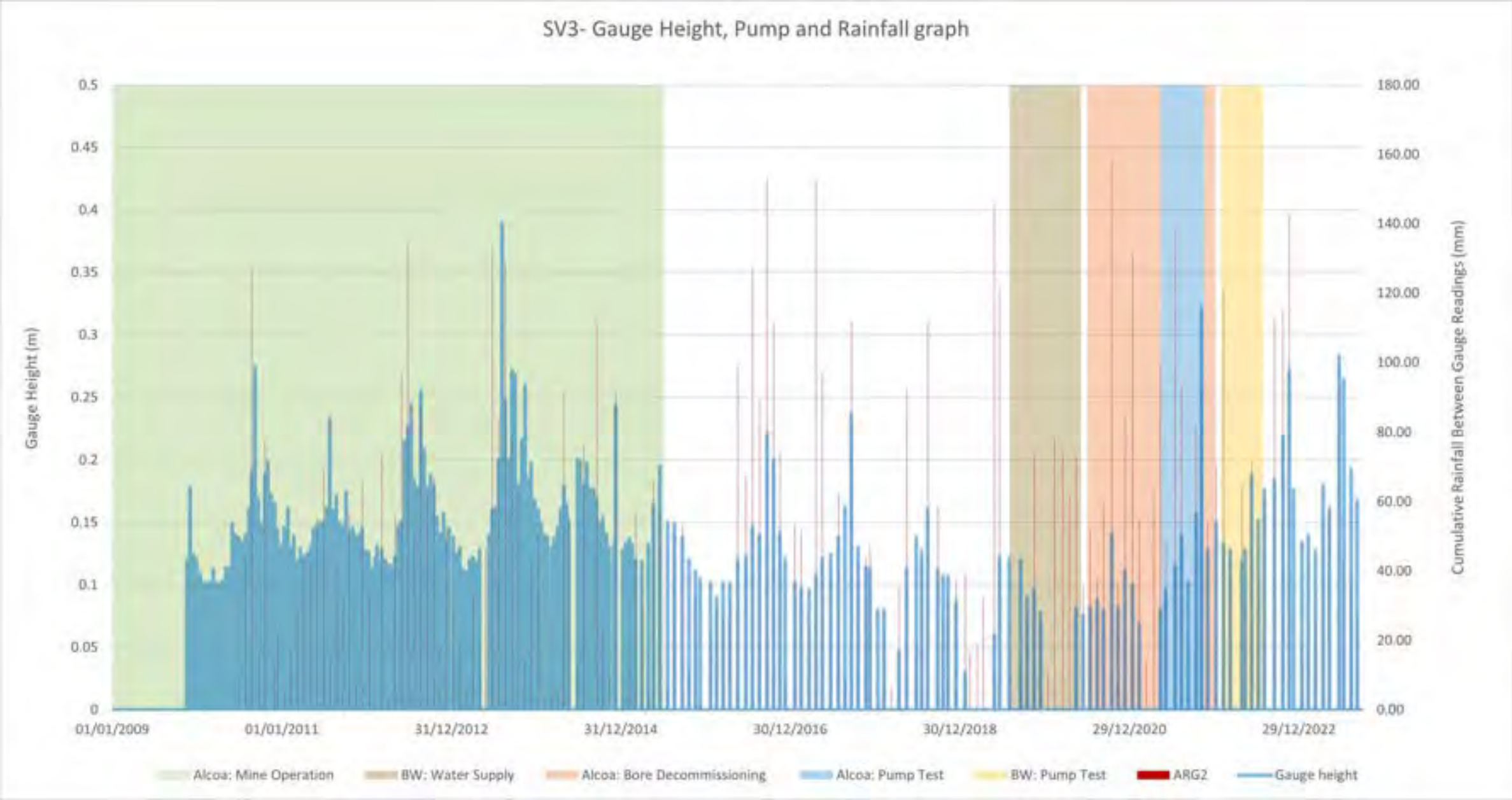

SGP1-A- Gauge Height, Pump and Rainfall graph
Gauge Height (m)
Cumulative Rainfall Between Gauge Readings (mm)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG2
Gauge height

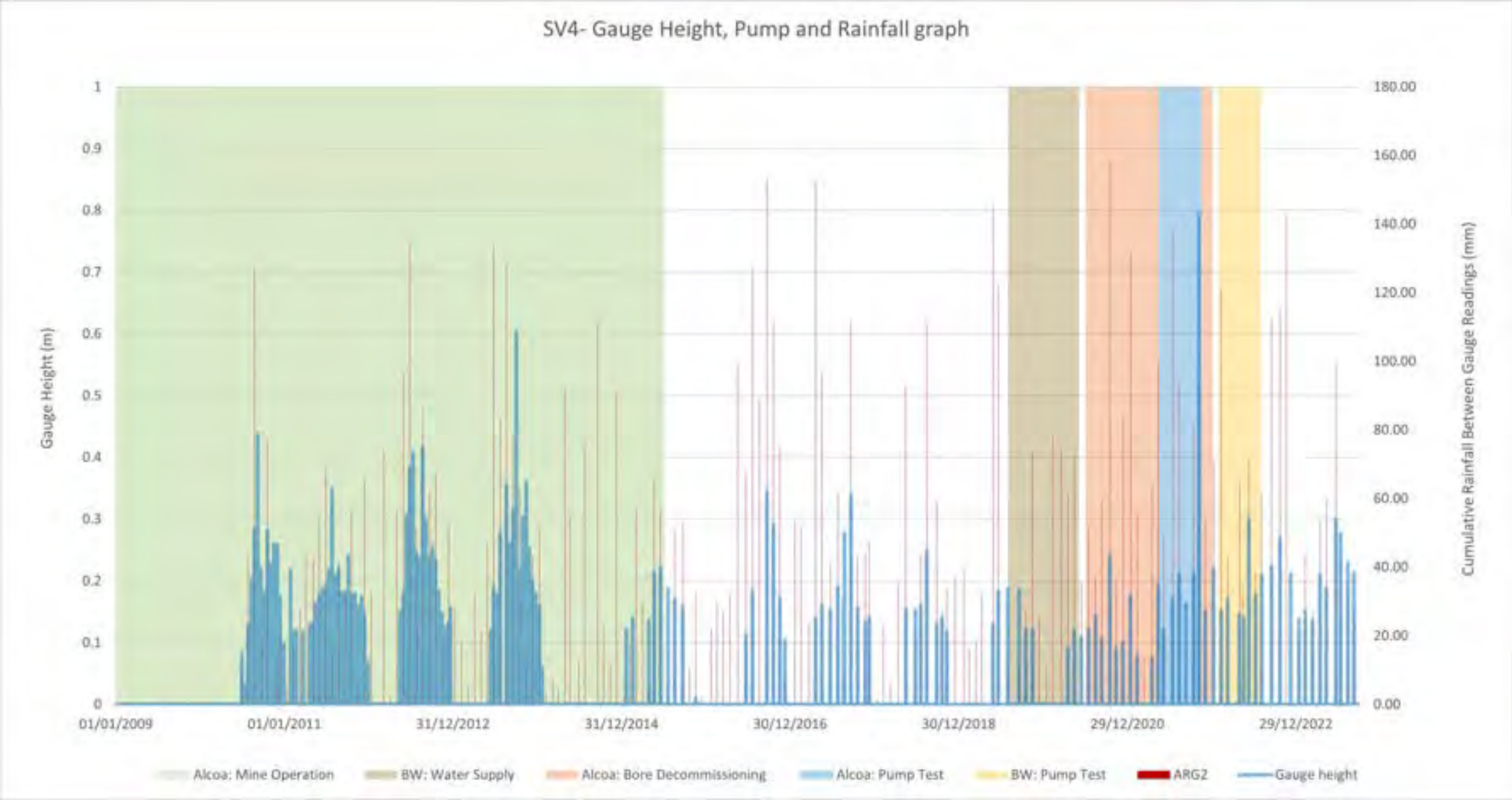

SGP2-A- Gauge Height, Pump and Rainfall graph
Gauge Height (m)
Cumulative Rainfall Between Gauge Readings (mm)
3
2.5
2
1.5
1
0.5
0
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG2
Gauge height

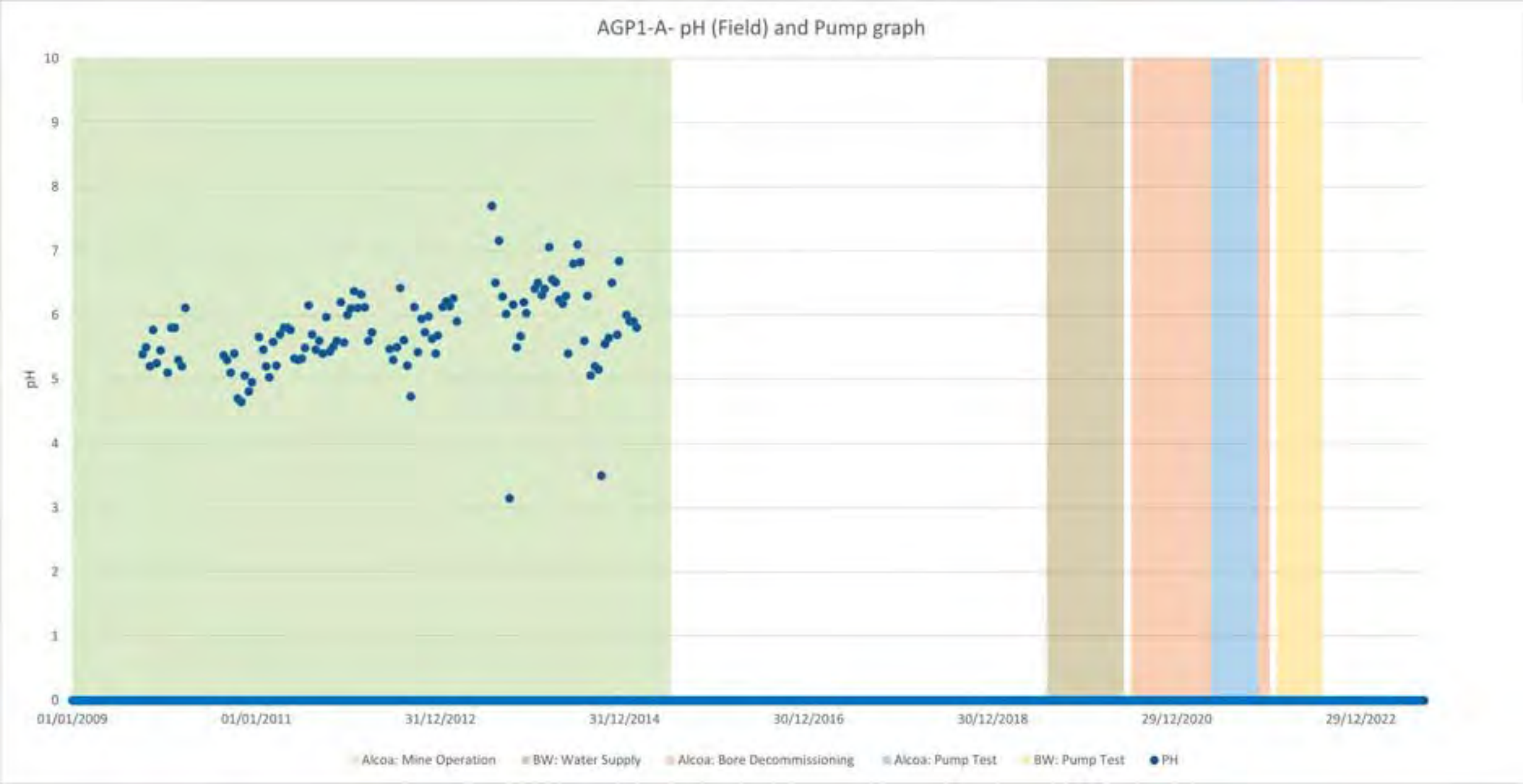

SGP2-B- Gauge Height, Pump and Rainfall graph
Guage Height (m))
Cumulative Rainfall Between Gauge Readings (mm)
3
2.5
2
1.5
1
0.5
0
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG2
Gauge height

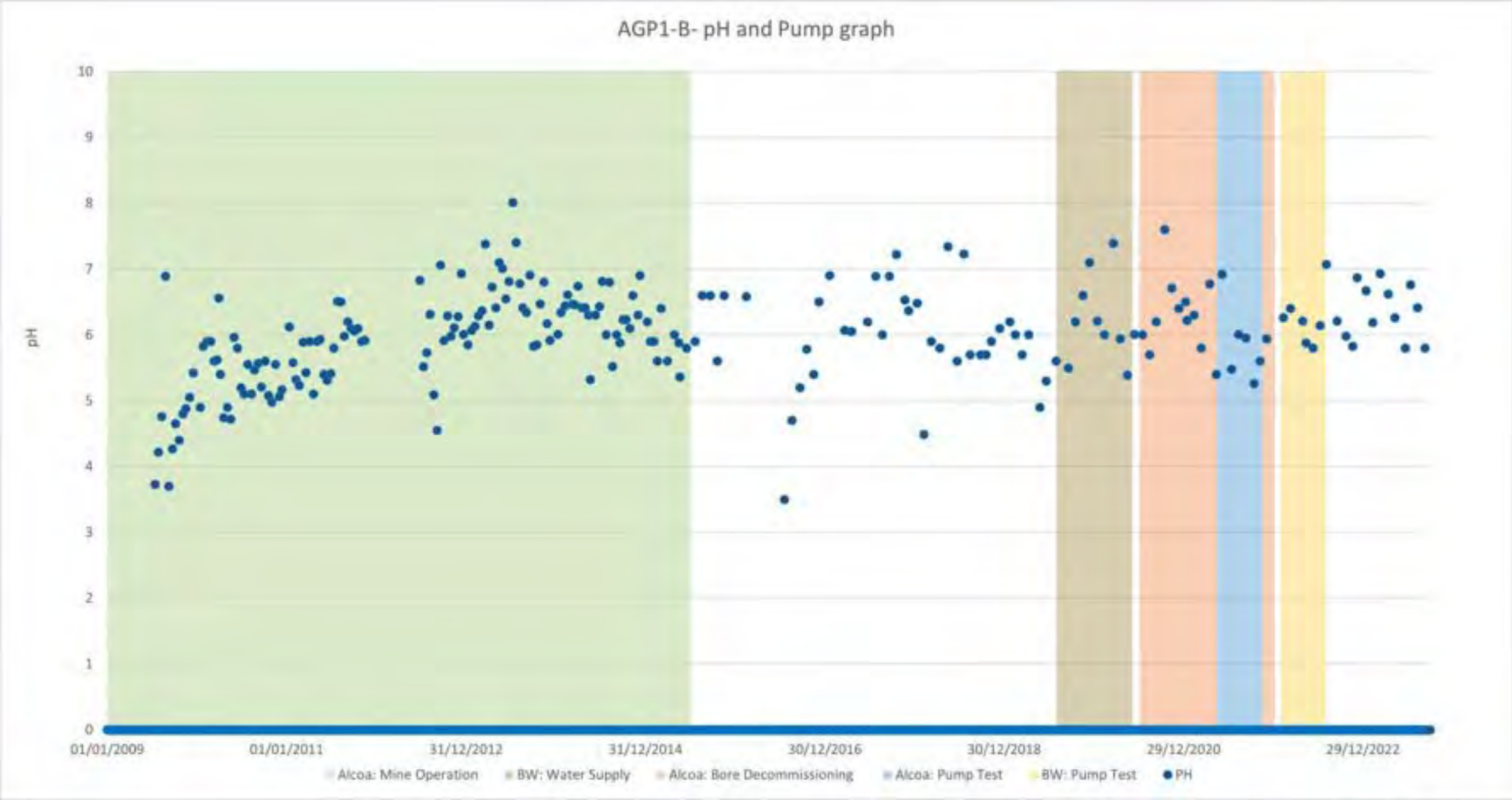

SV1- Gauge Height, Pump and Rainfall graph
Gauge Height (m)
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Cumulative Rainfall Between Gauge Readings (mm)
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG2
Gauge height

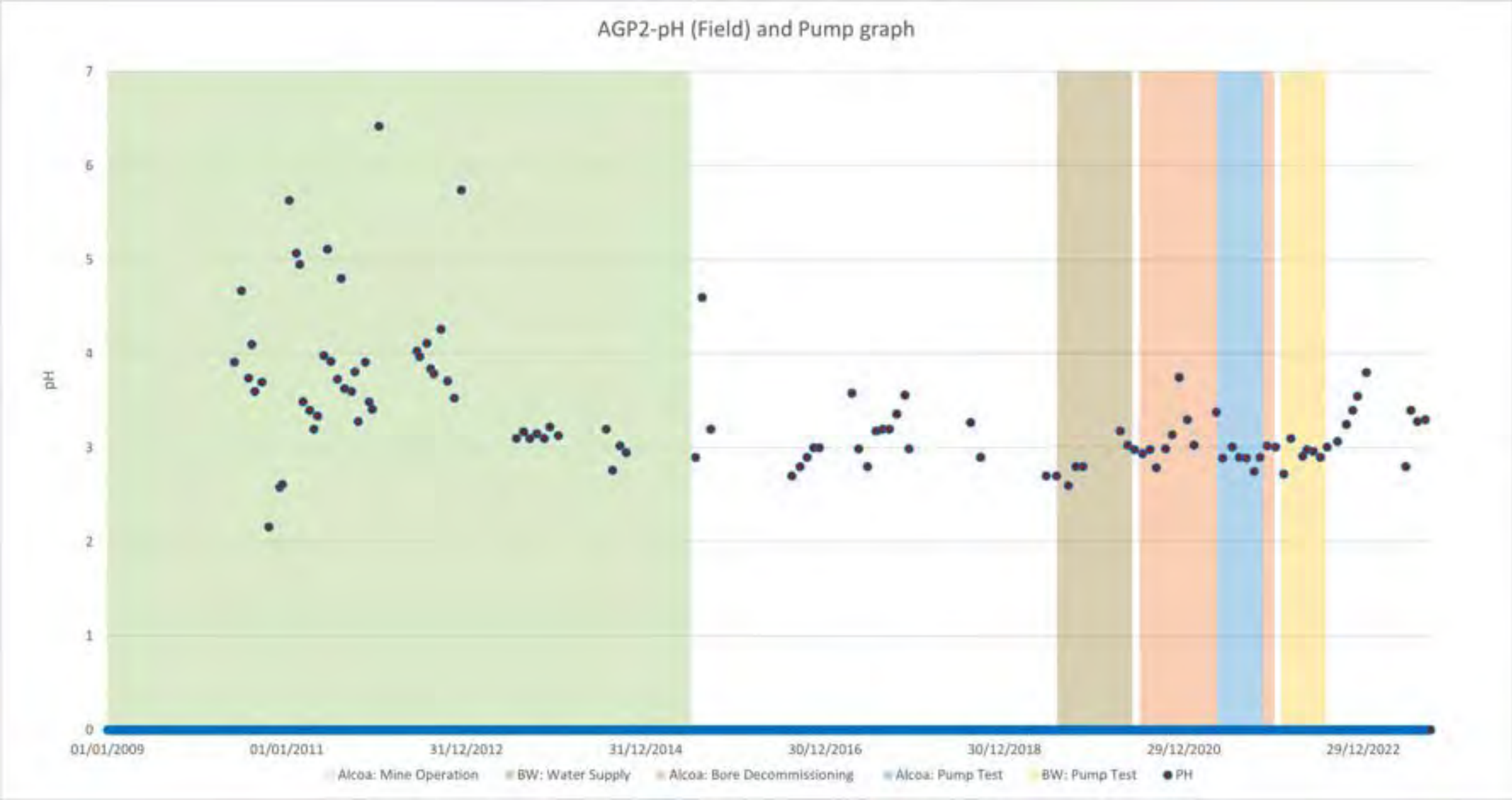

SV2- Gauge Height, Pump and Rainfall graph
Gauge Height (m)
0.25
0.2
0.15
0.1
0.05
0
Cumulative Rainfall Between Gauge Readings (mm)
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG3
Gauge height

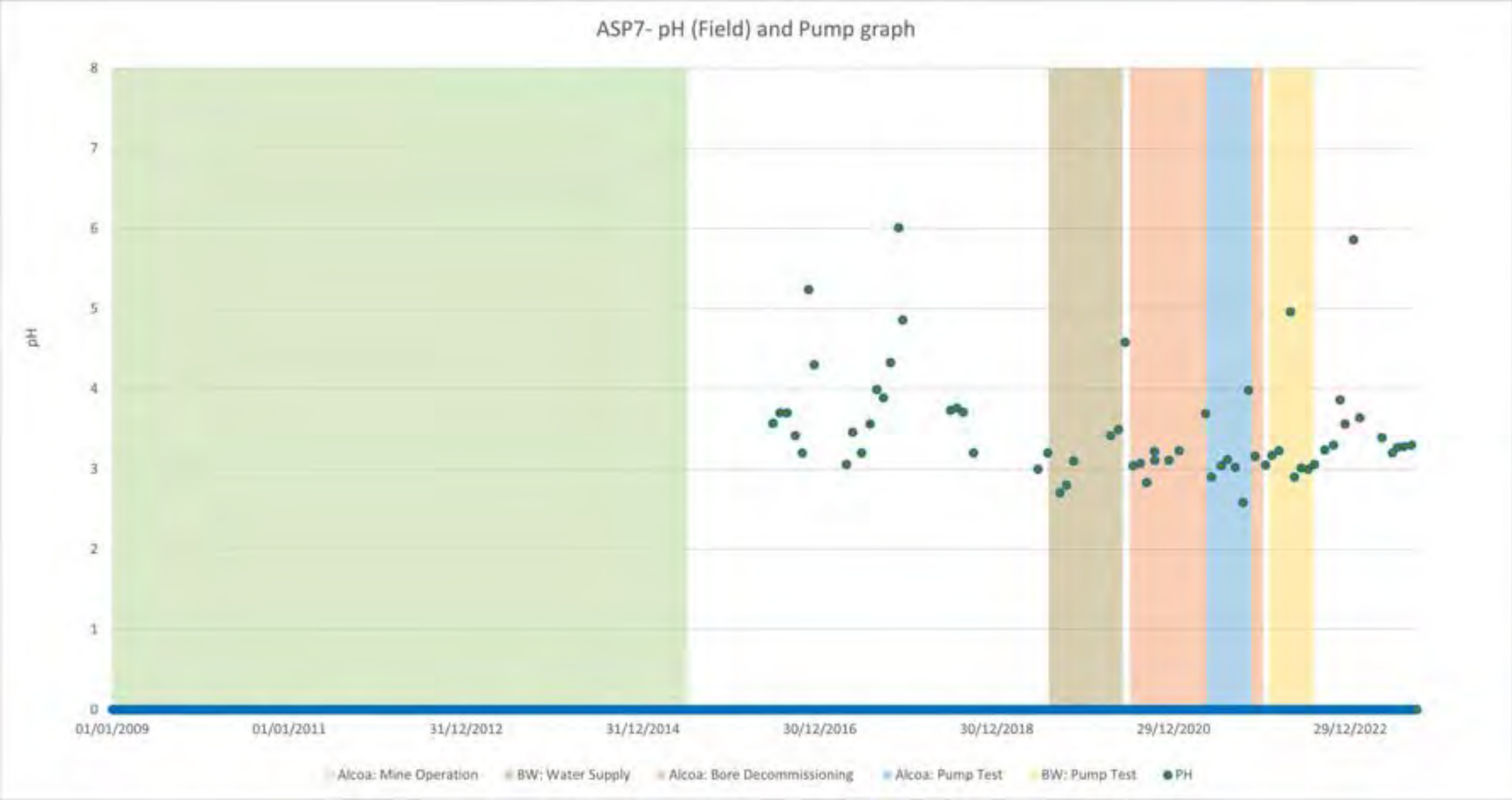

SV3- Gauge Height, Pump and Rainfall graph
Gauge Height (m)
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
Cumulative Rainfall Between Gauge Readings (mm)
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG2
Gauge height

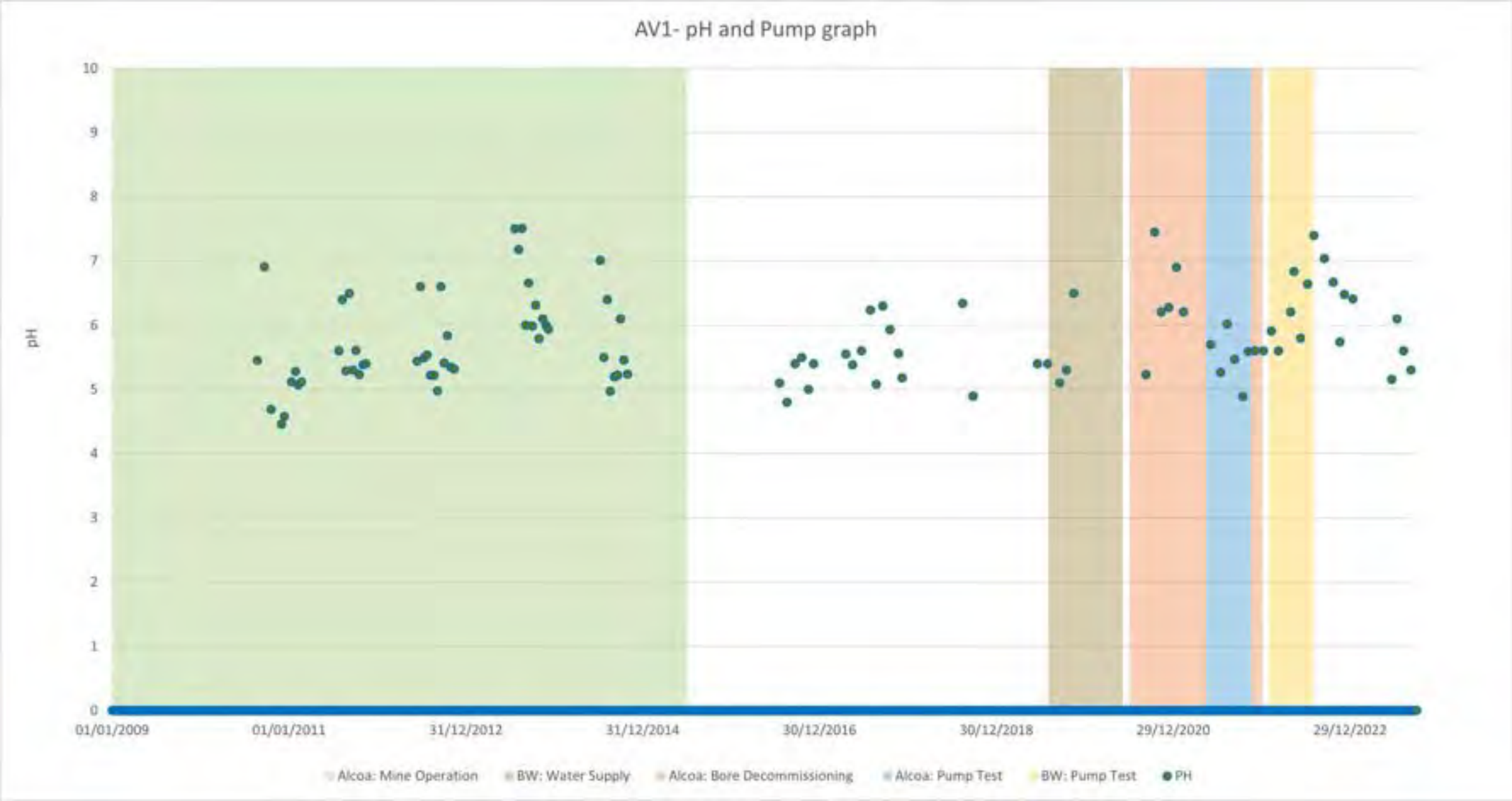

SV4- Gauge Height, Pump and Rainfall graph
Gauge Height (m)
Cumulative Rainfall Between Gauge Readings (mm)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG2
Gauge height

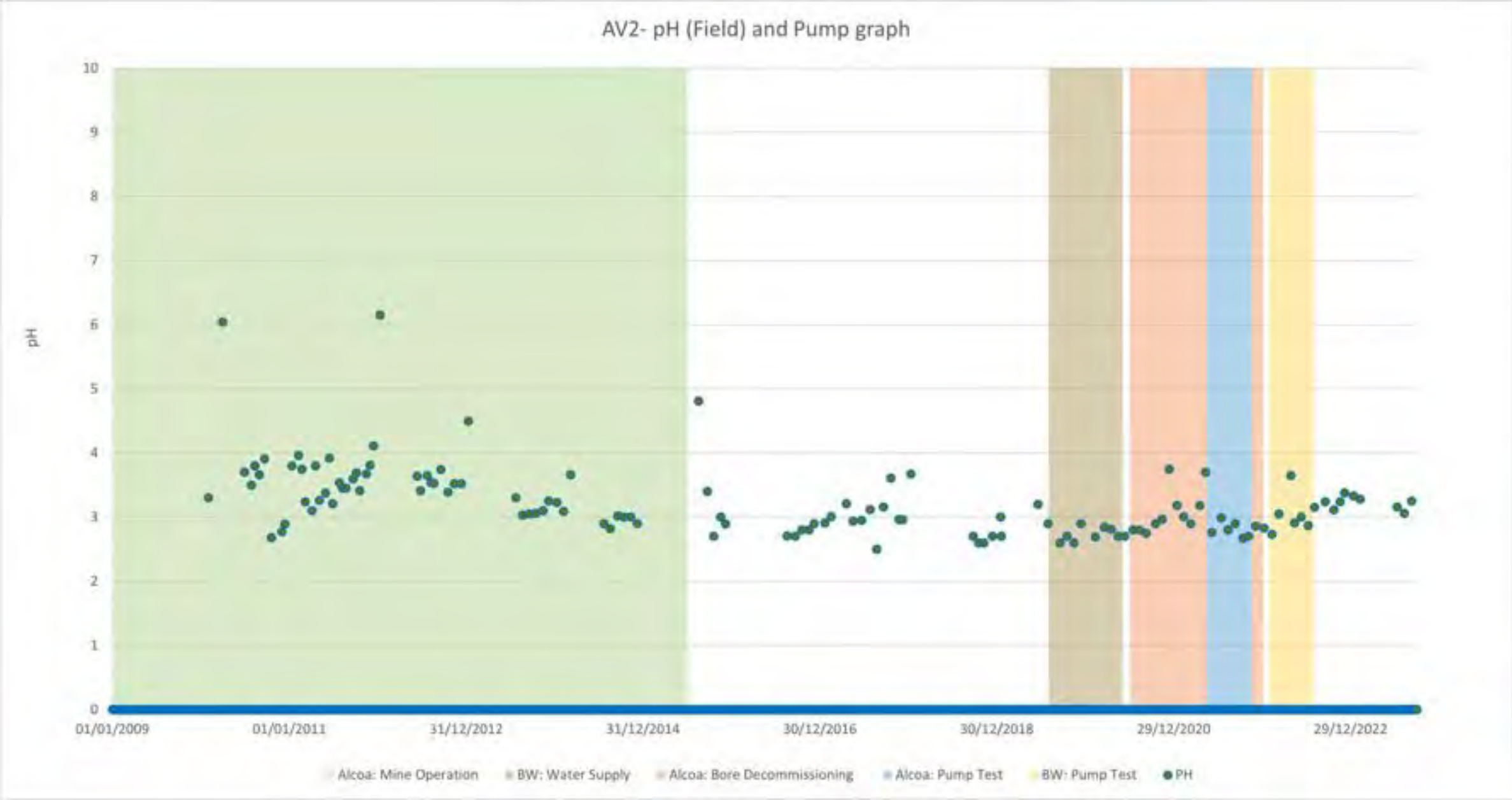

AGP1-A- pH (Field) and Pump graph
pH
10
9
8
7
6
5
4
3
2
1
0
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
PH


AGP1-B- pH and Pump graph
pH
10
9
8
7
6
5
4
3
2
1
0
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
PH

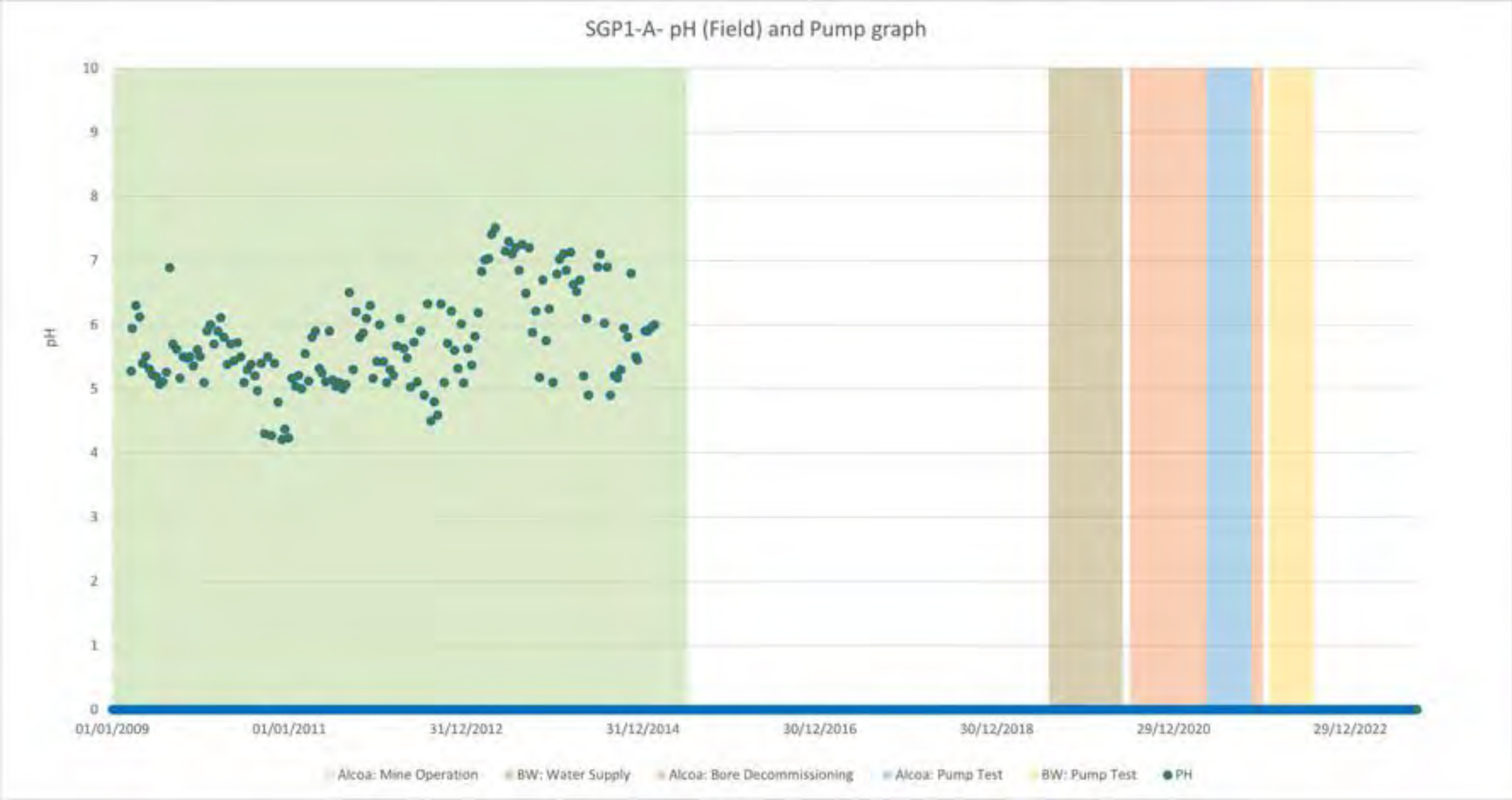

AGP2-pH (Field) and Pump graph
pH
7
6
5
4
3
2
1
0
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
PH

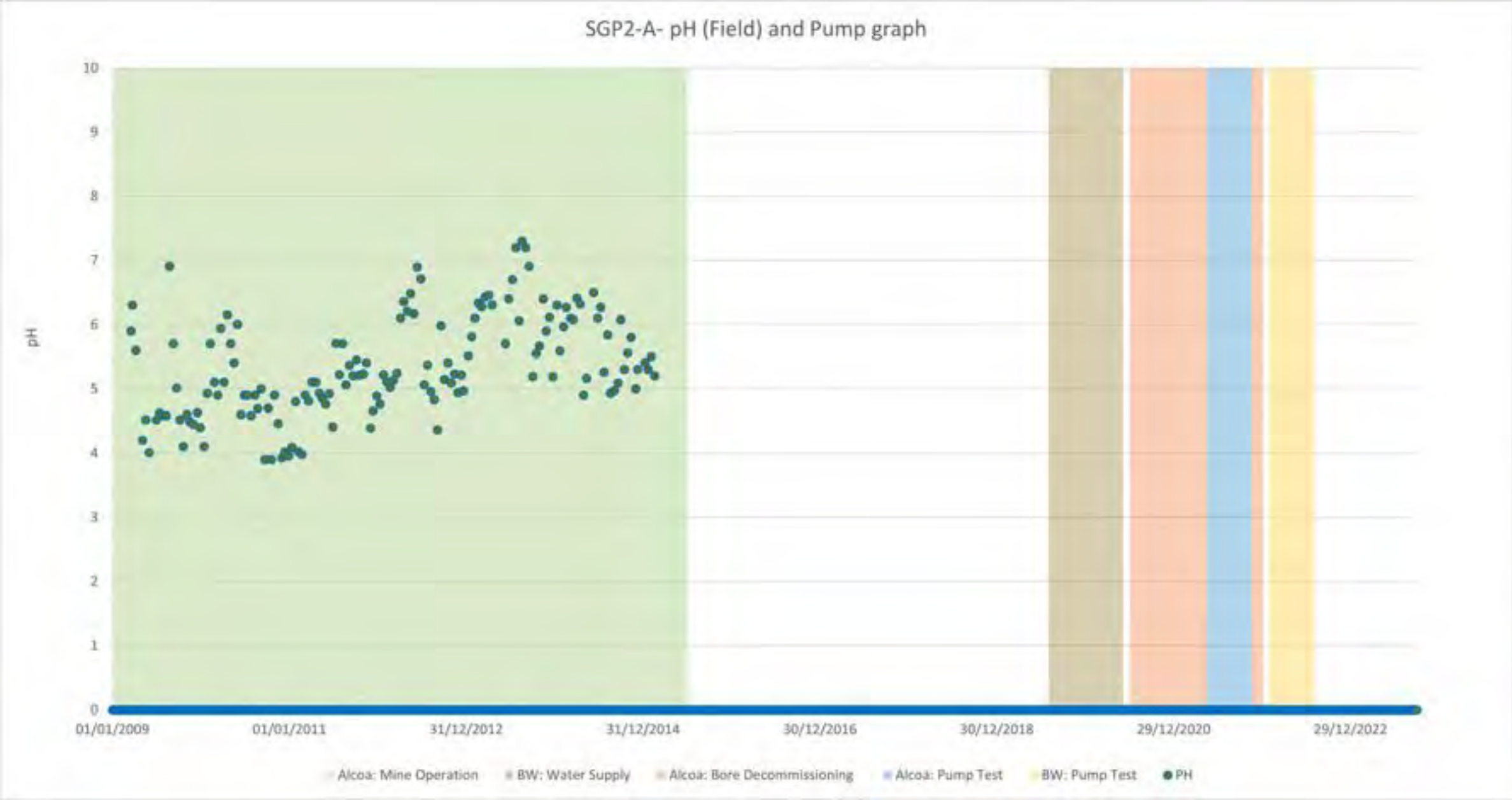

ASP7- pH (Field) and Pump graph
pH
8
7
6
5
4
3
2
1
0
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
PH

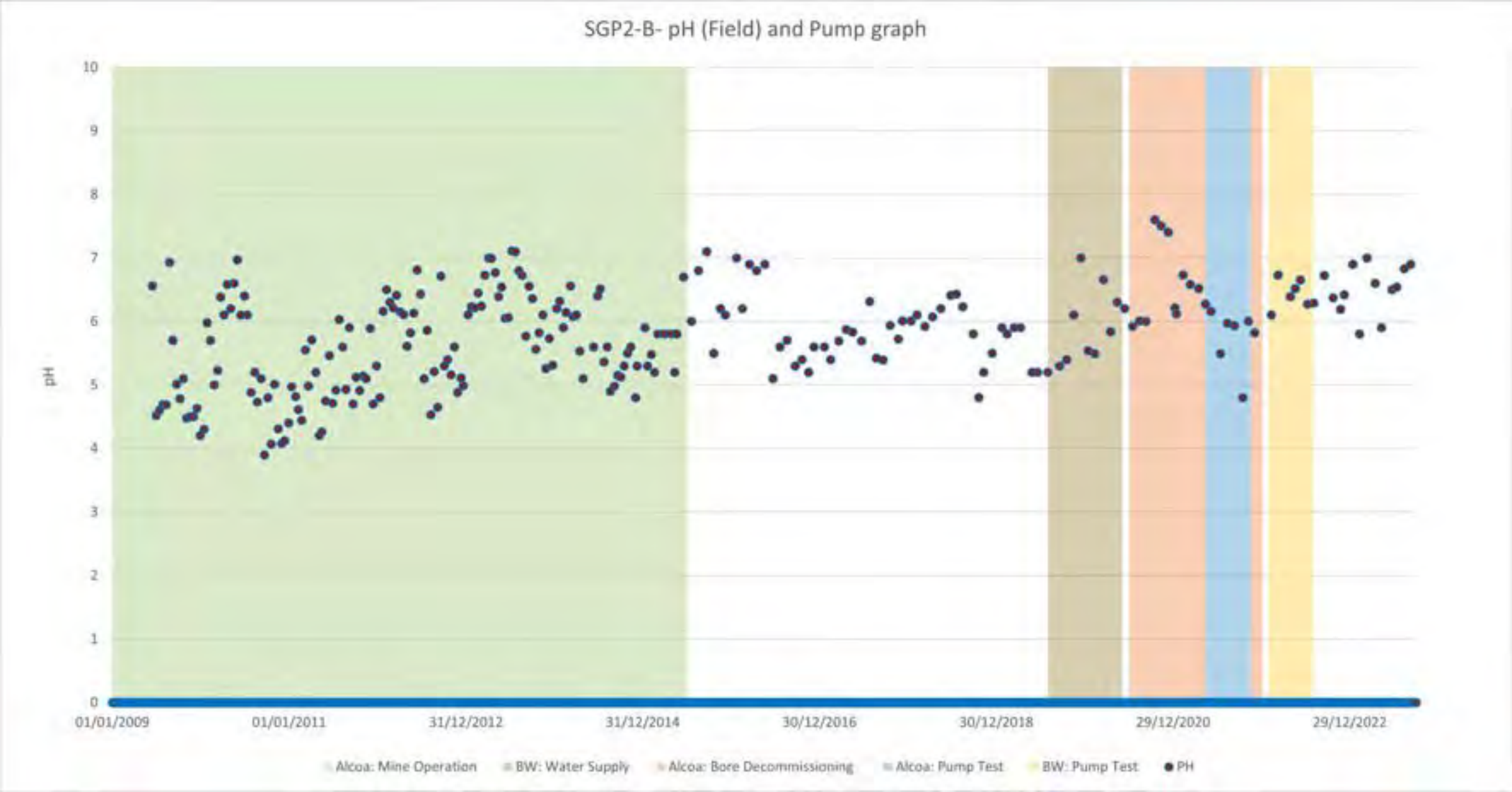

AV1- pH and Pump graph
pH
10
9
8
7
6
5
4
3
2
1
0
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
PH

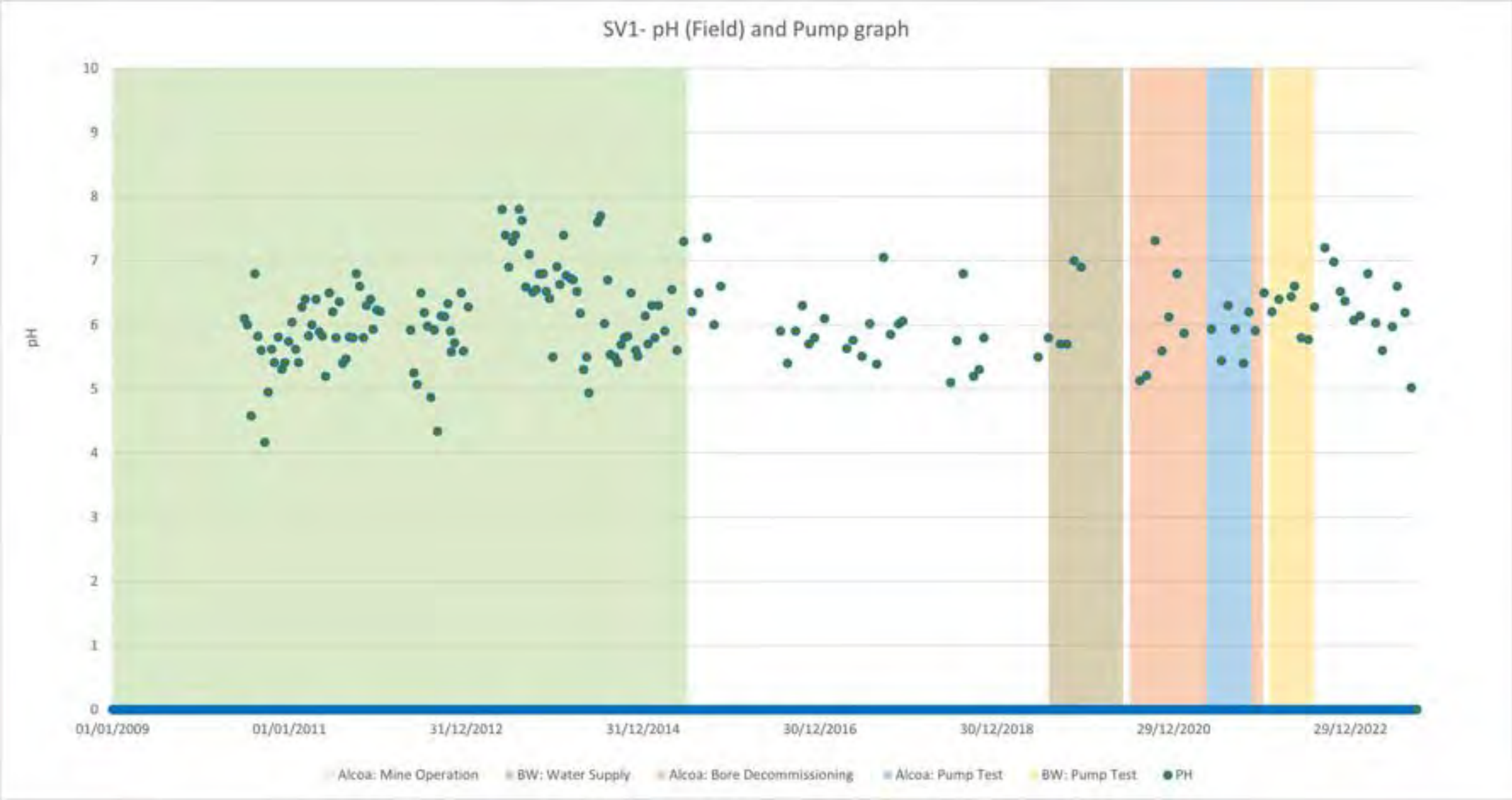

AV2- pH (Field) and Pump graph
pH
10
9
8
7
6
5
4
3
2
1
0
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
PH

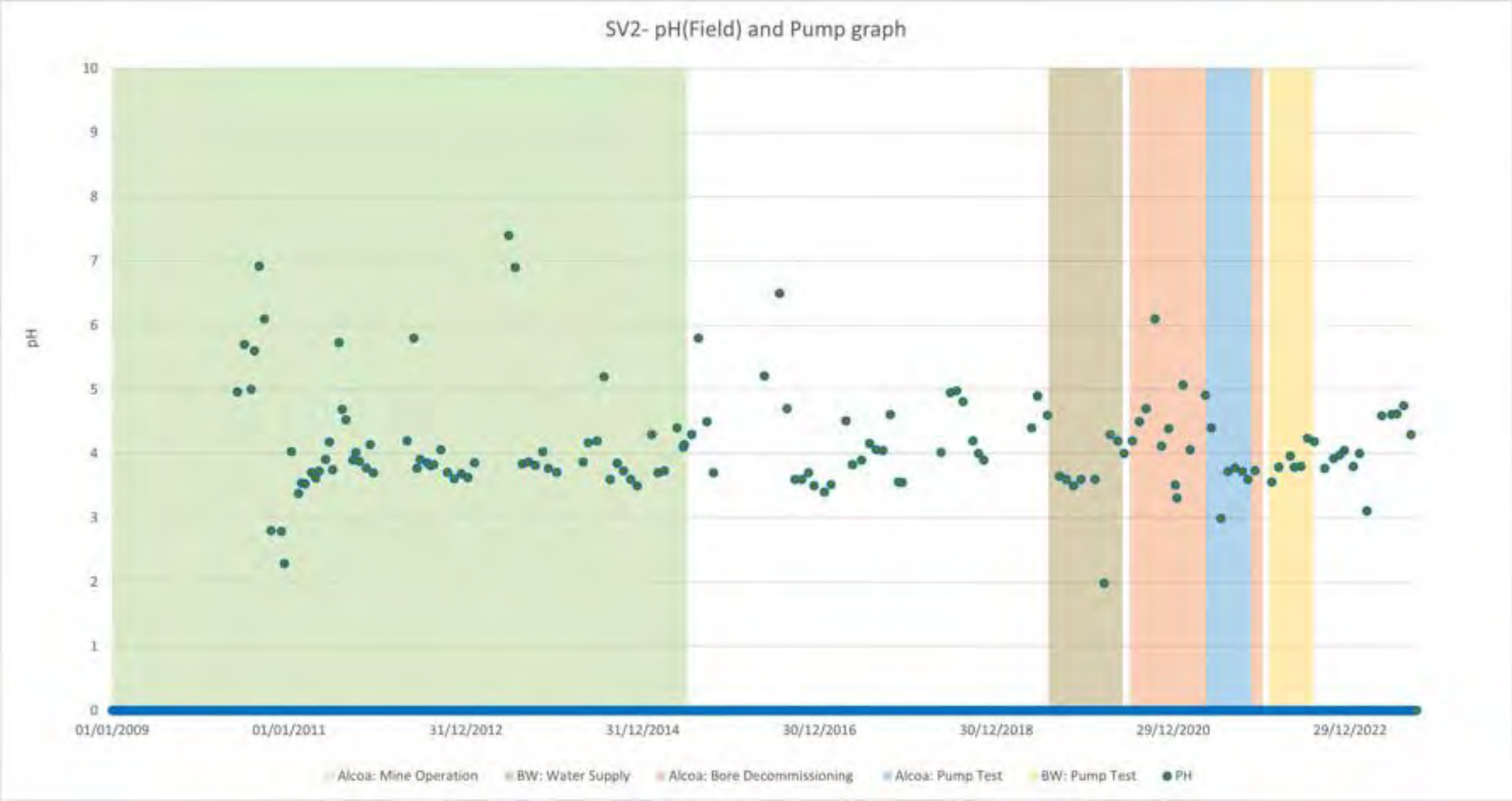

AV3- pH (Field) and Pump graph
pH
10
9
8
7
6
5
4
3
2
1
0
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
PH

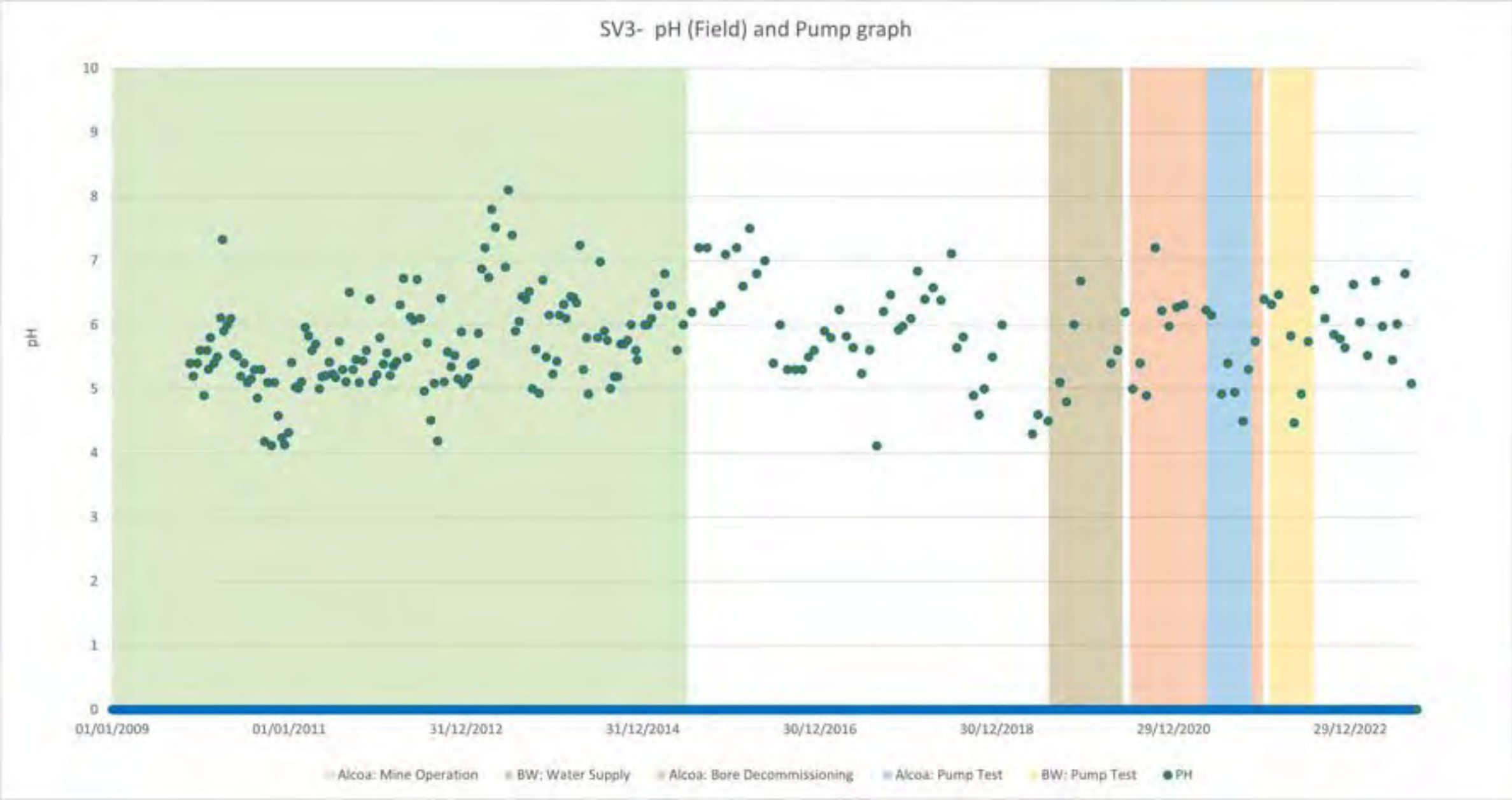

SGP1-A- pH (Field) and Pump graph
pH
10
9
8
7
6
5
4
3
2
1
0
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
PH

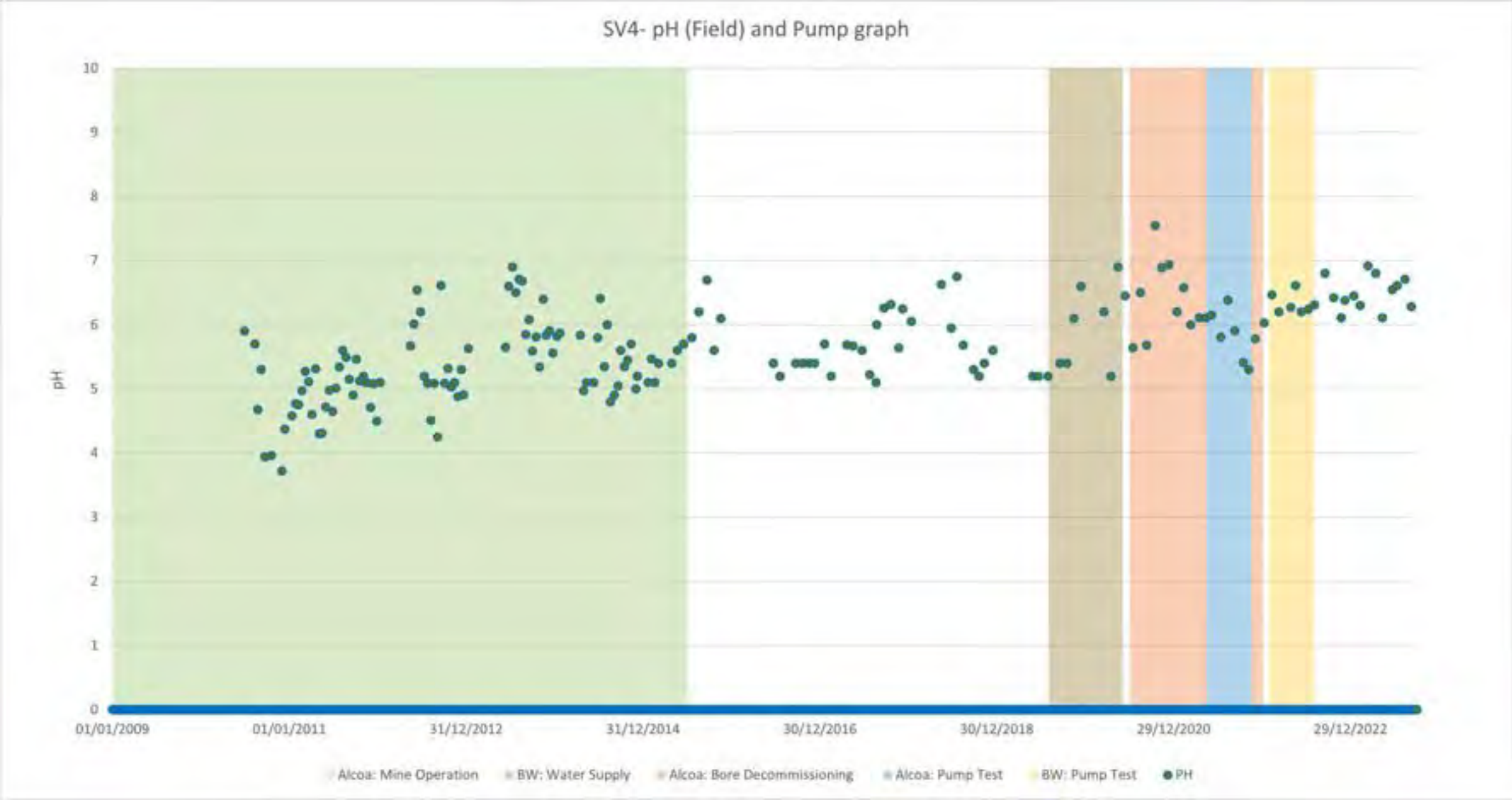

SGP2-A- pH (Field) and Pump graph
pH
10
9
8
7
6
5
4
3
2
1
0
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
PH

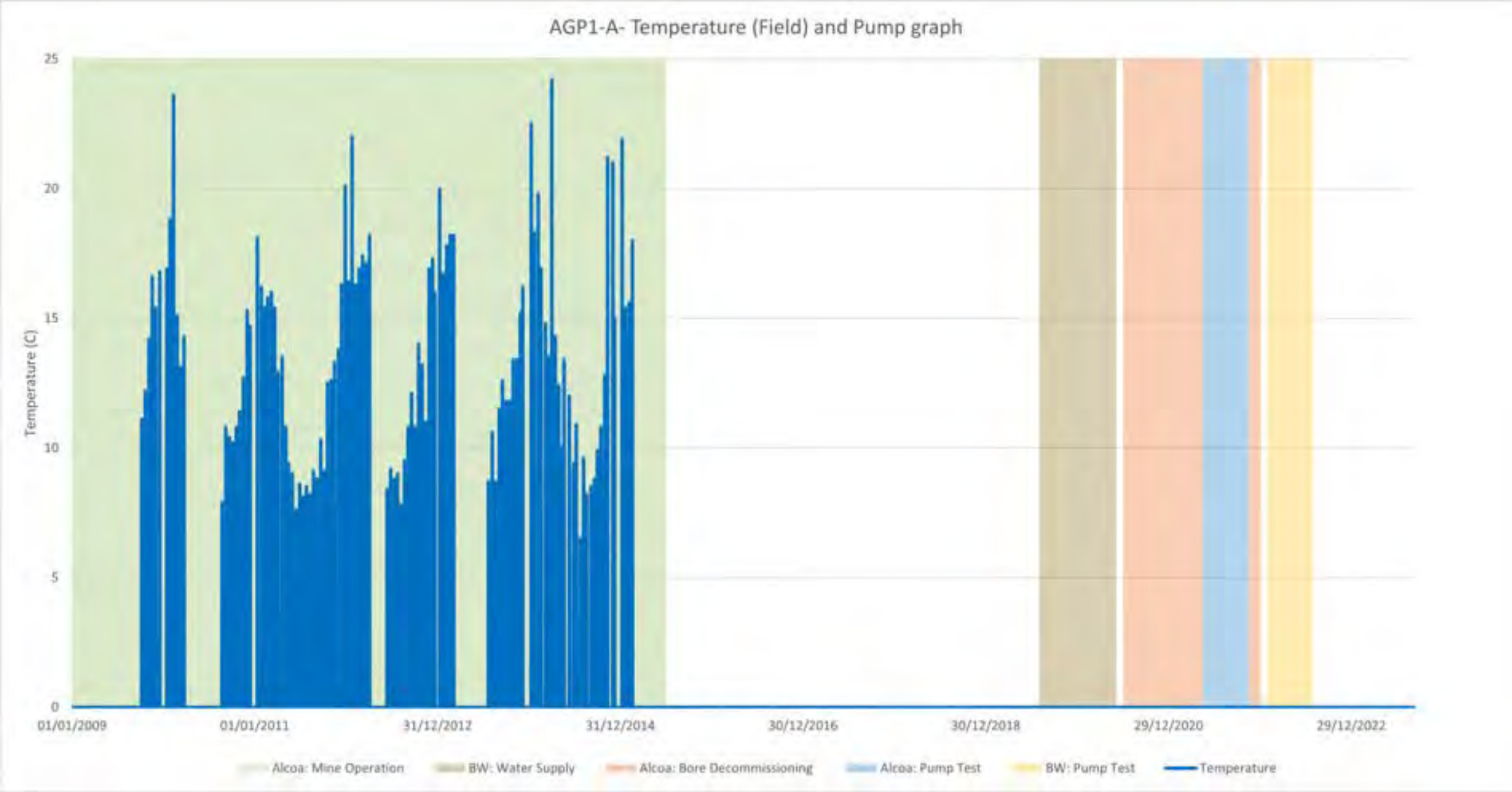

SGP2-B- pH (Field) and Pump graph
pH
10
9
8
7
6
5
4
3
2
1
0
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
PH

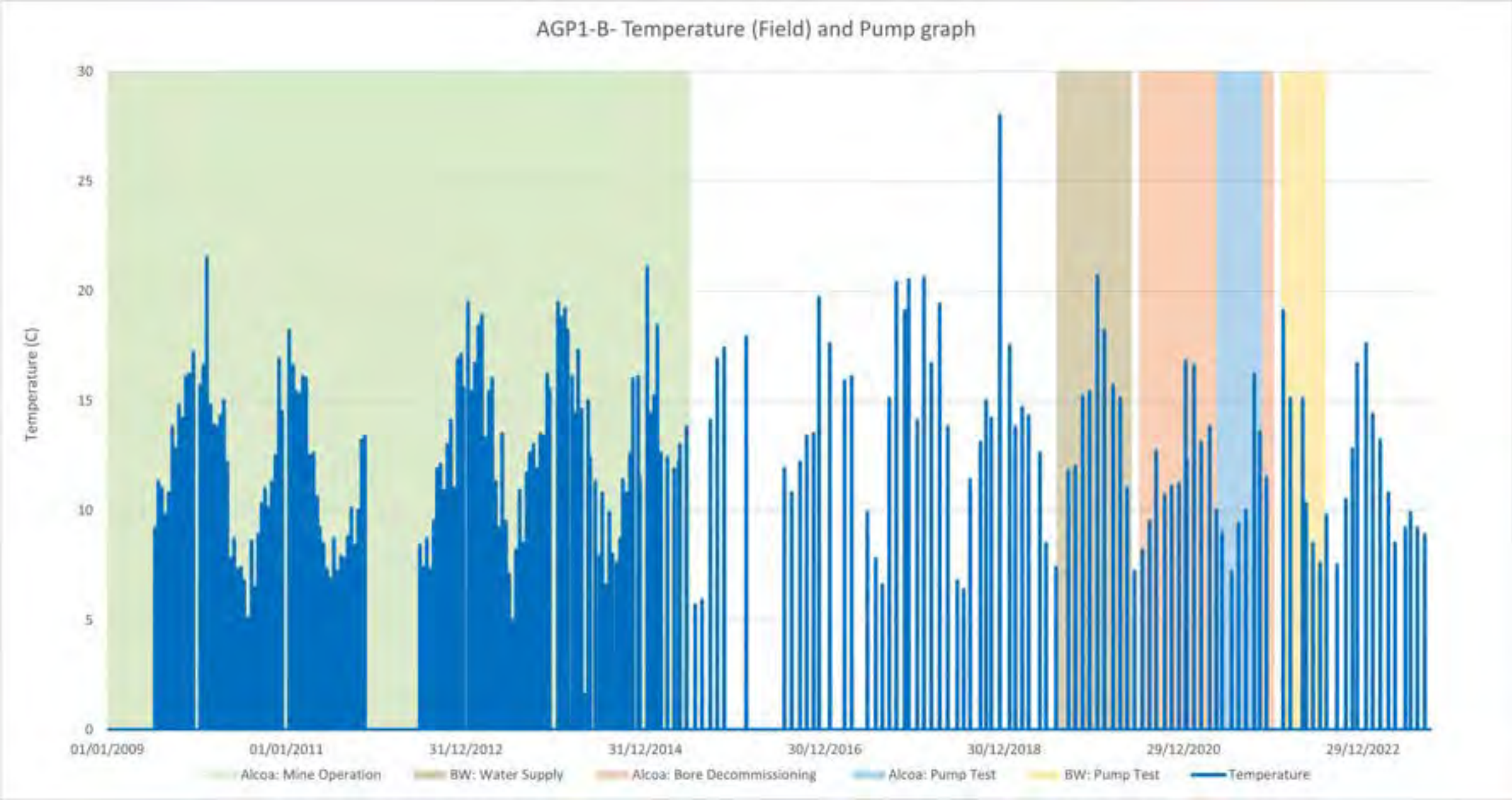

SV1- pH (Field) and Pump graph
pH
10
9
8
7
6
5
4
3
2
1
0
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
PH

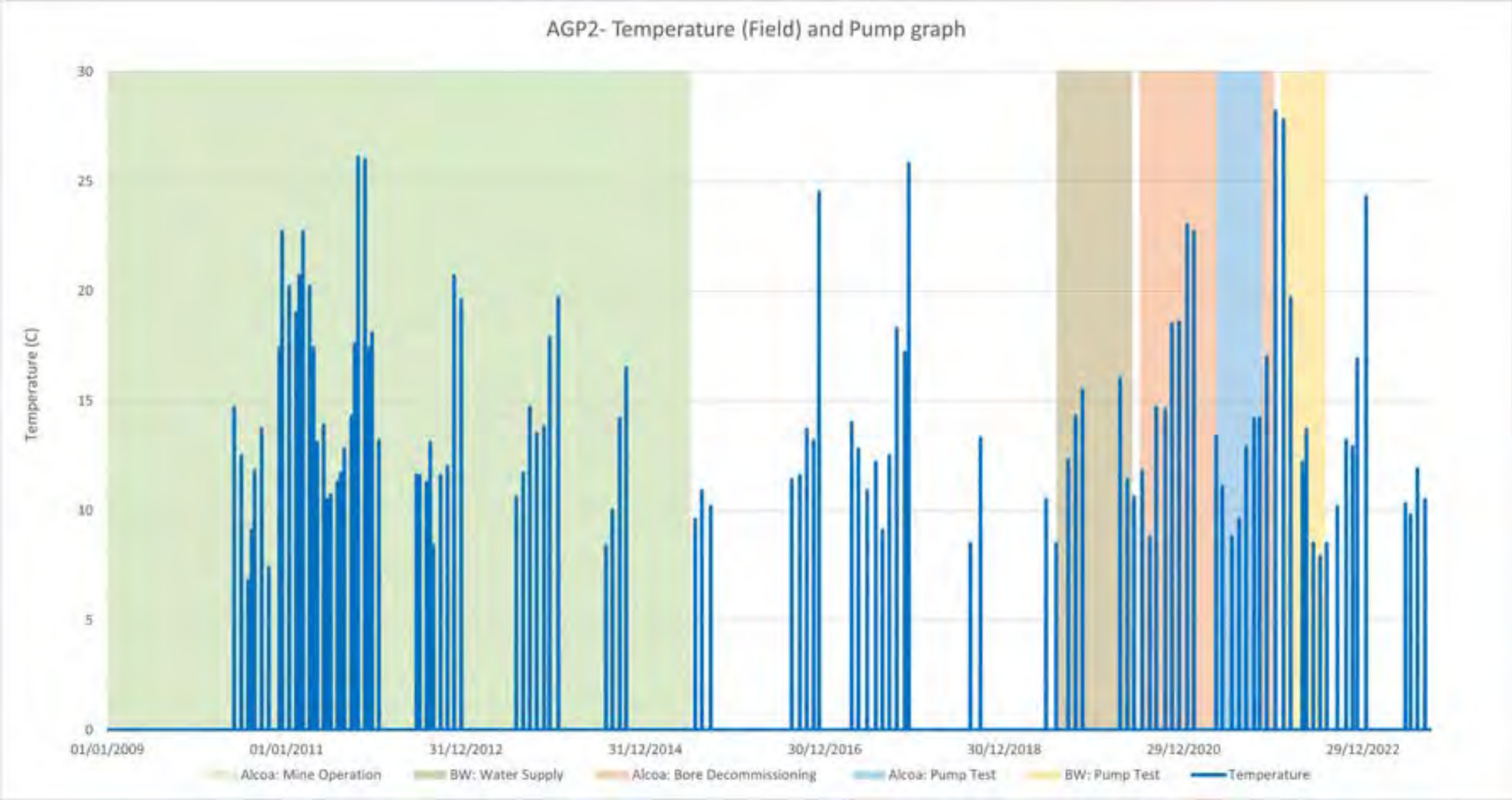

SV2- pH(Field) and Pump graph
pH
10
9
8
7
6
5
4
3
2
1
0
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
PH

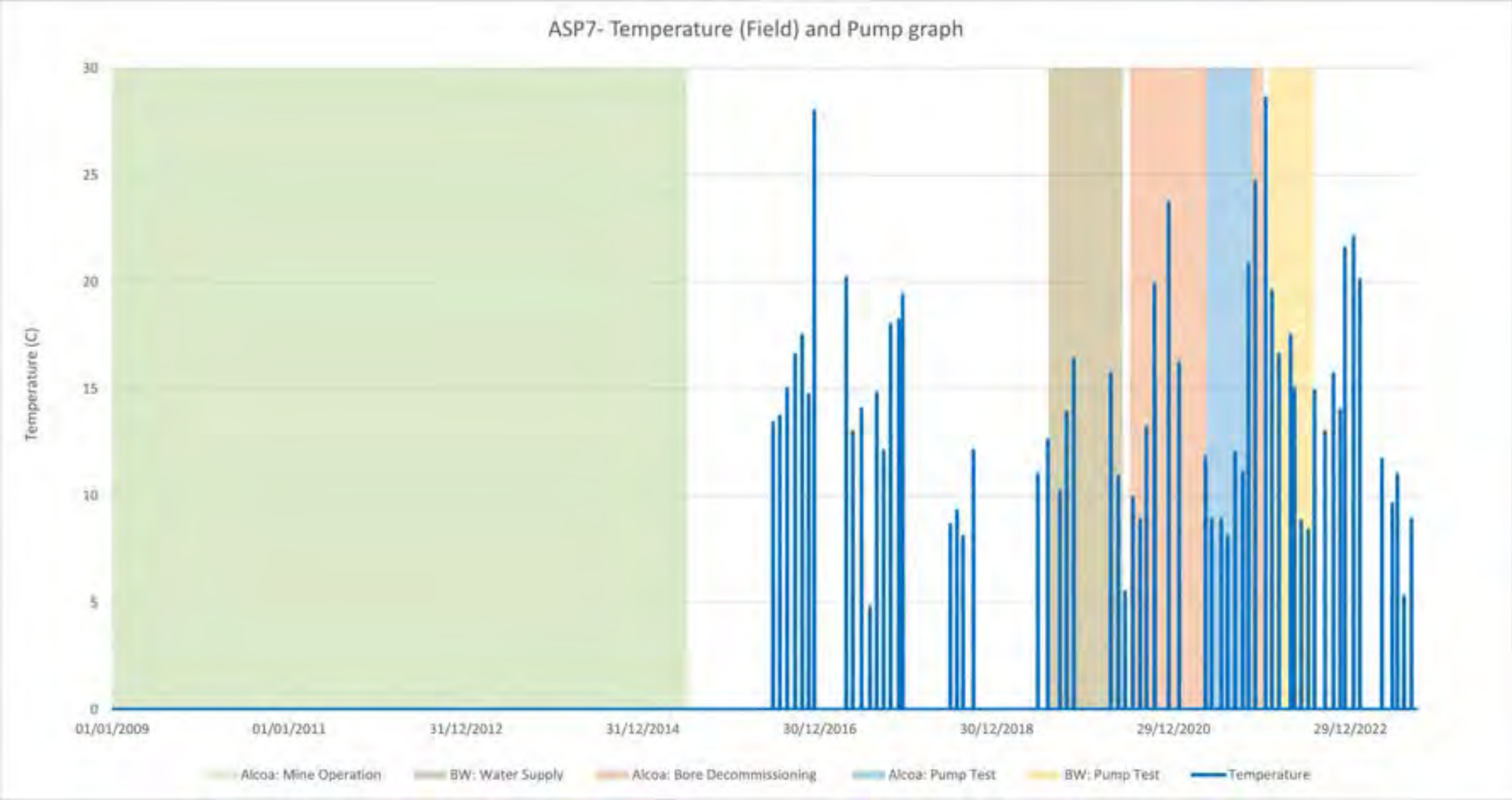

SV3- pH (Field) and Pump graph
pH
10
9
8
7
6
5
4
3
2
1
0
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
PH

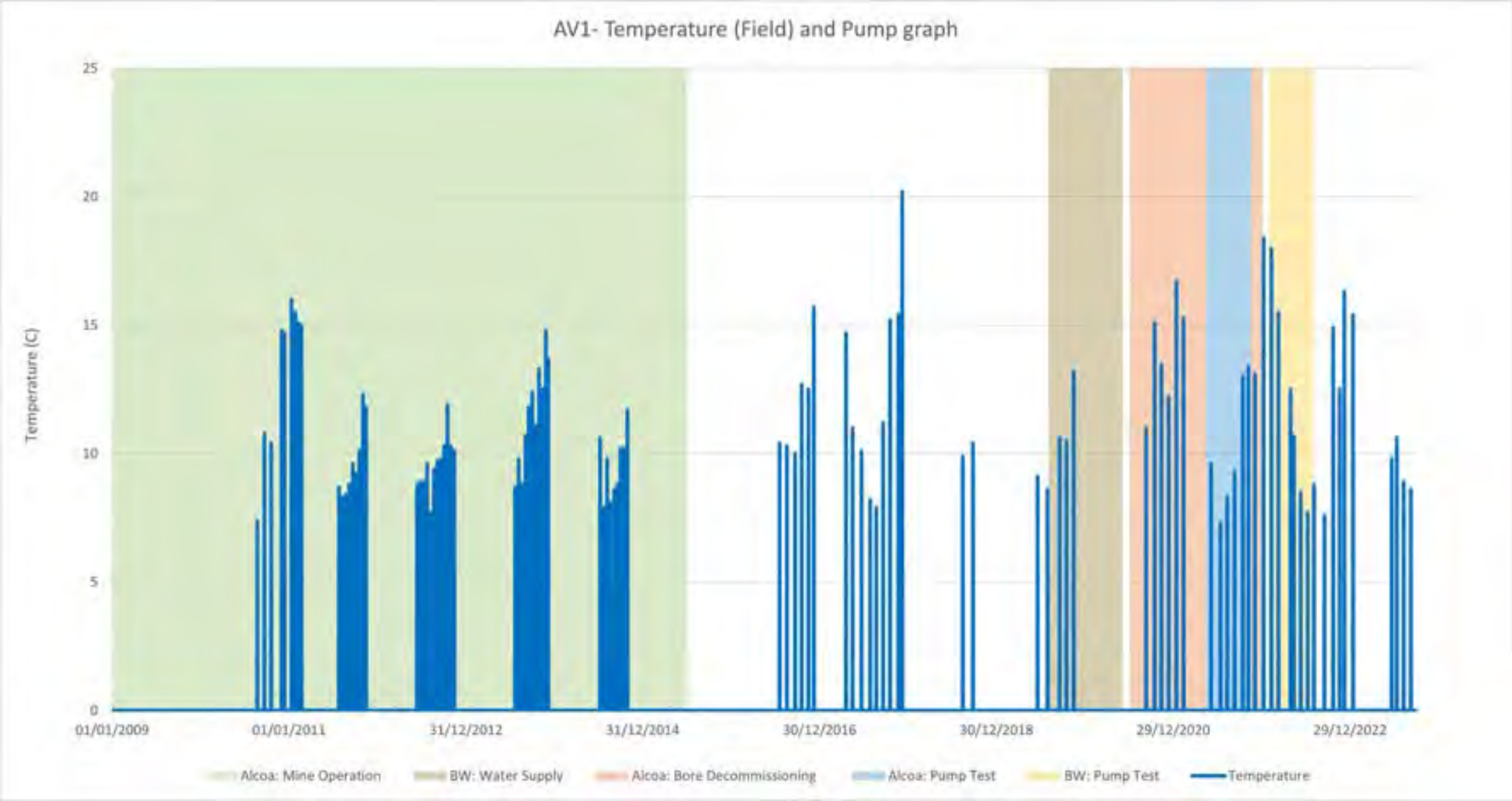

SV4- pH (Field) and Pump graph
pH
10
9
8
7
6
5
4
3
2
1
0
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
PH

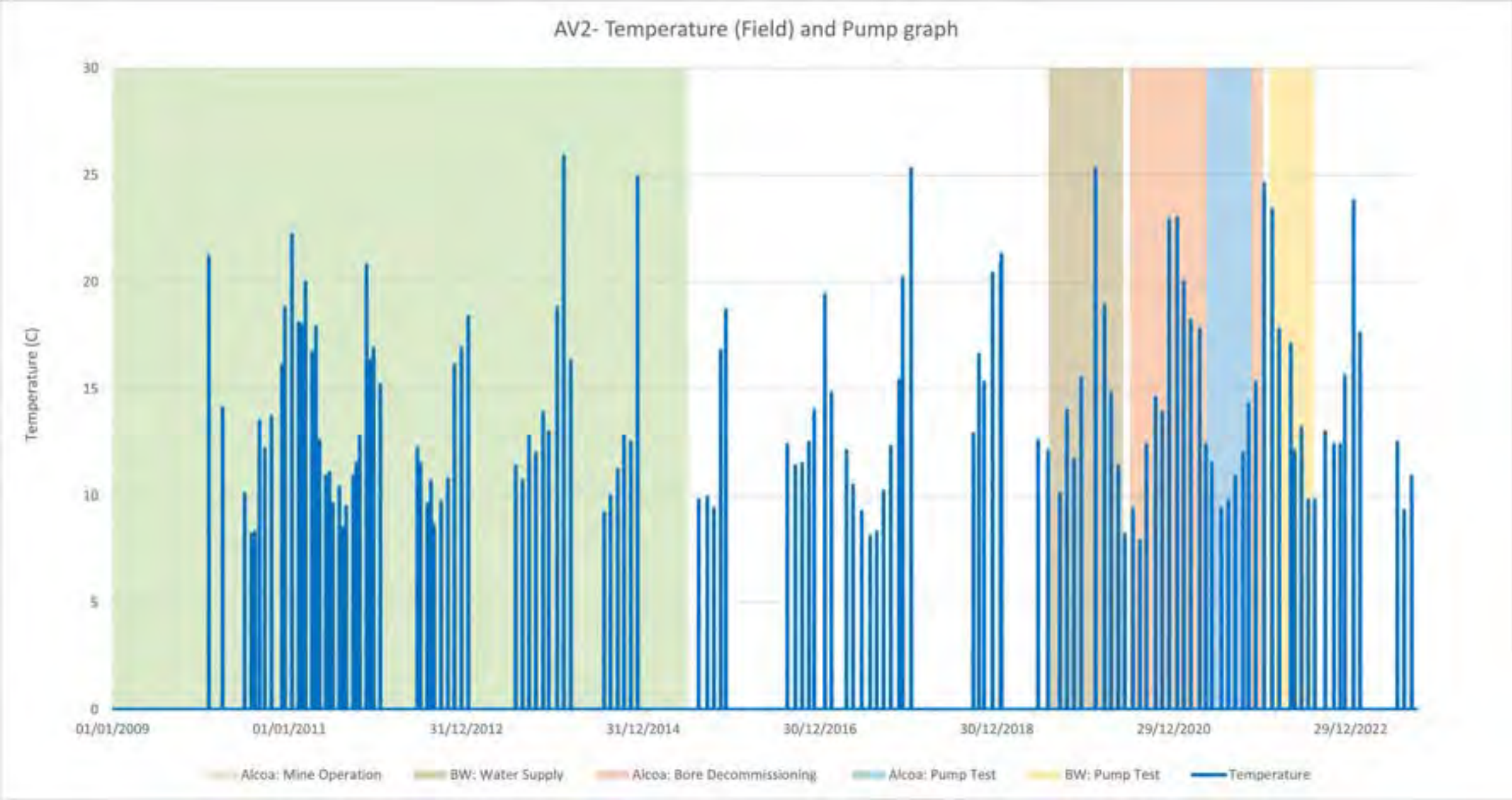

AGP1-A- Temperature (Field) and Pump graph
Temperature (C)
25
20
15
10
5
0
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
Temperature

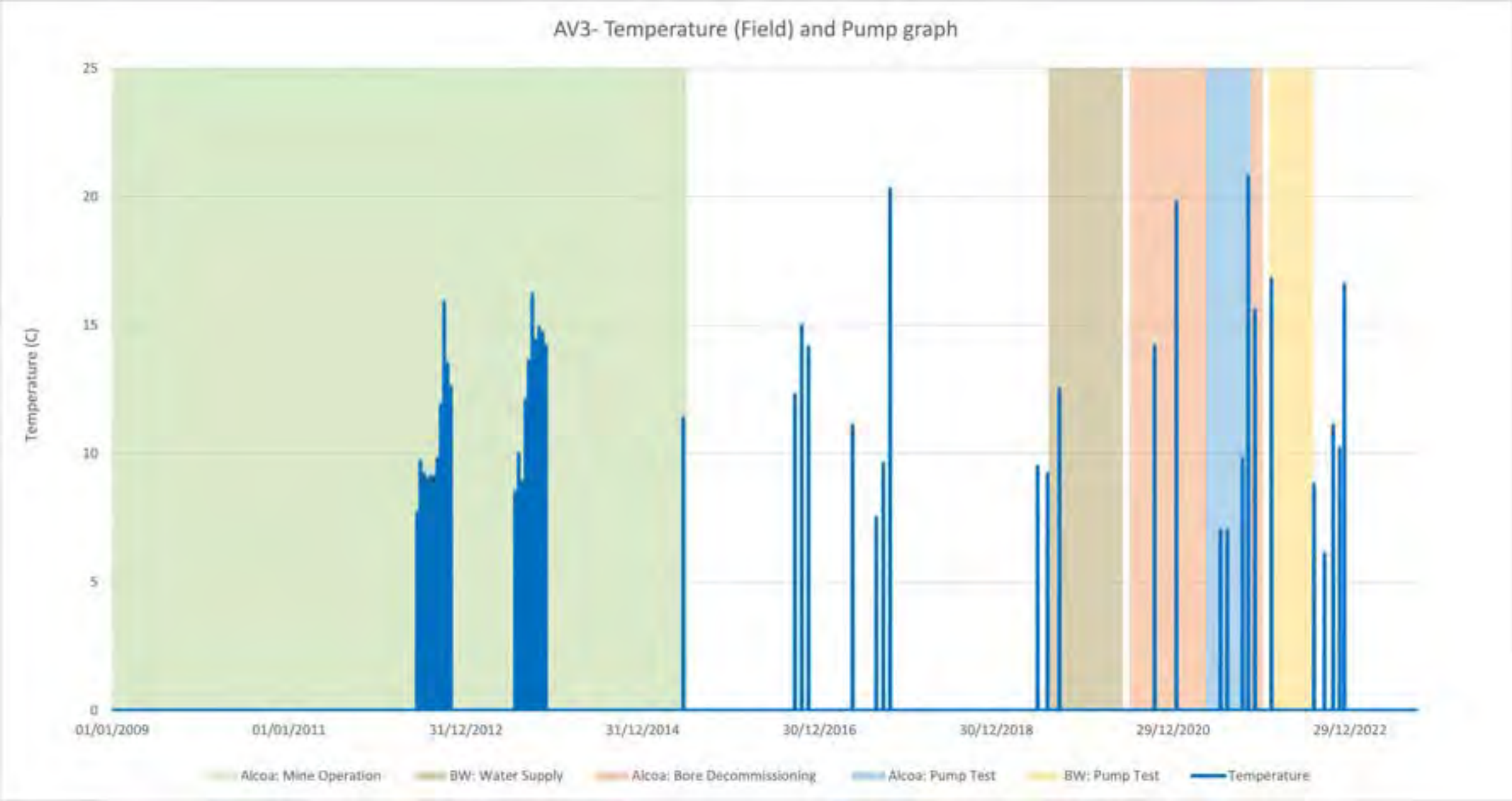

AGP1-B- Temperature (Field) and Pump graph
Temperature (C)
30
25
20
15
10
5
0
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
Temperature

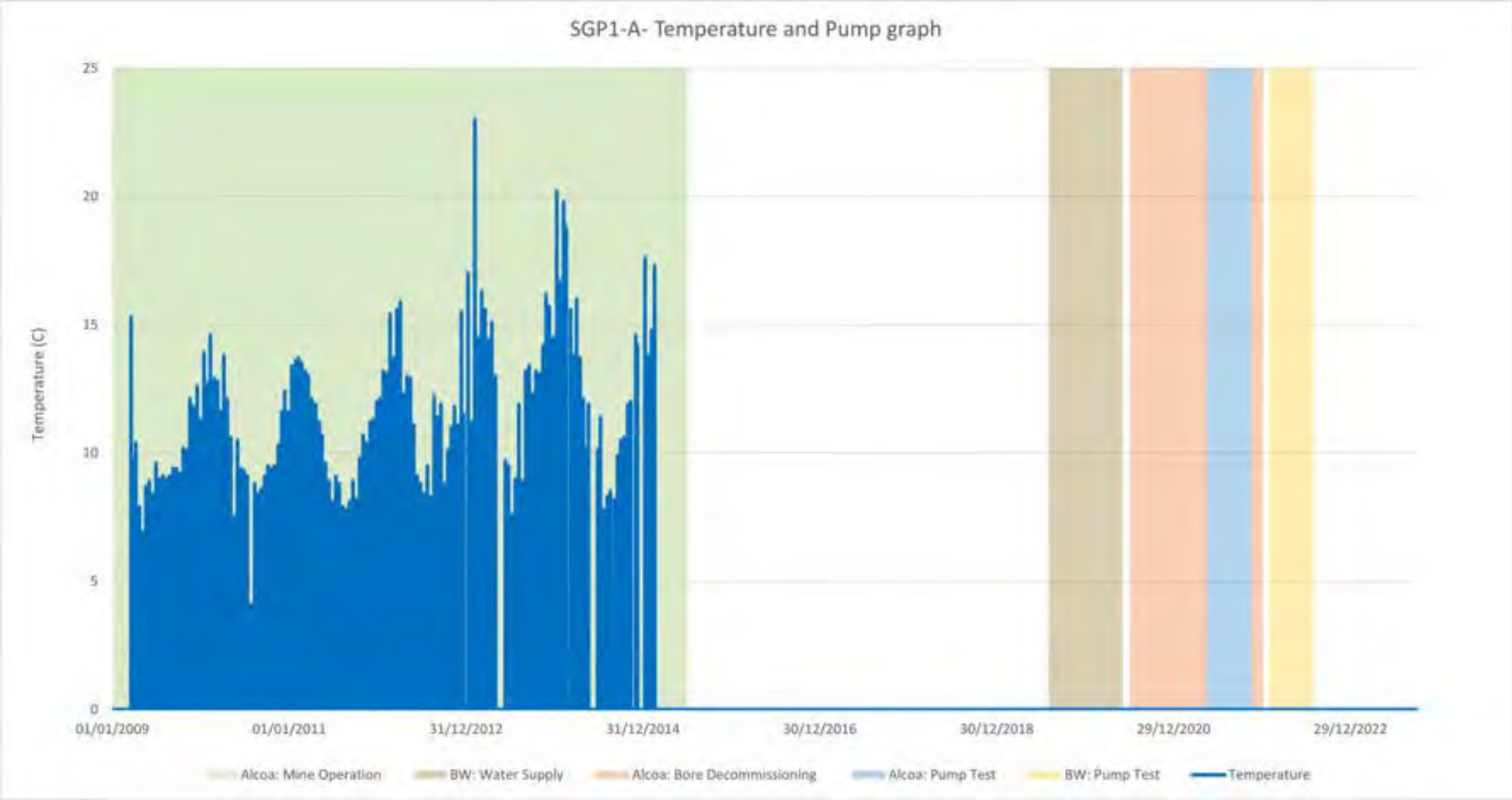

AGP2- Temperature (Field) and Pump graph
Temperature (C)
30
25
20
15
10
5
0
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
Temperature

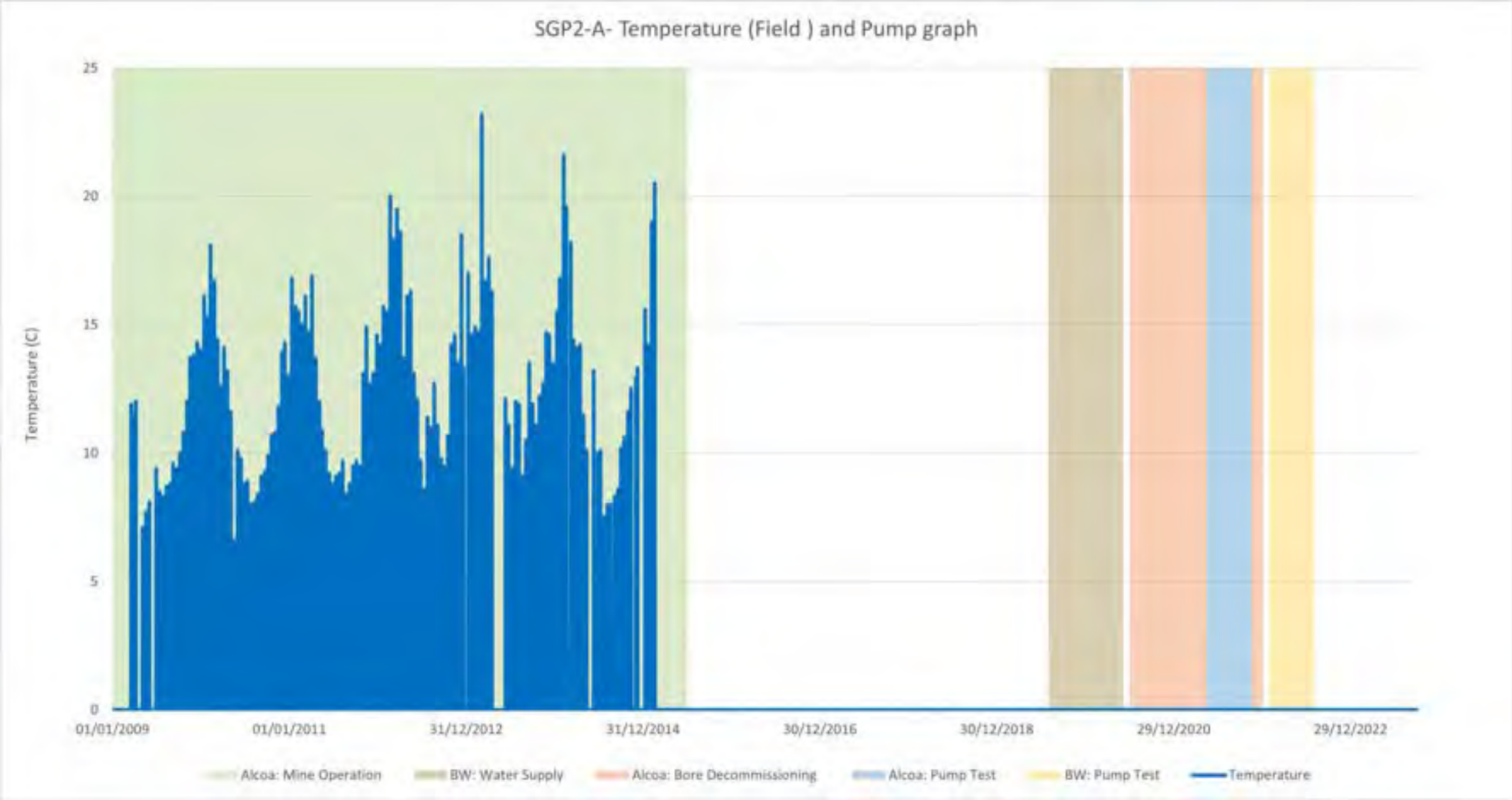

ASP7- Temperature (Field) and Pump graph
Temperature (C)
30
25
20
15
10
5
0
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
Temperature

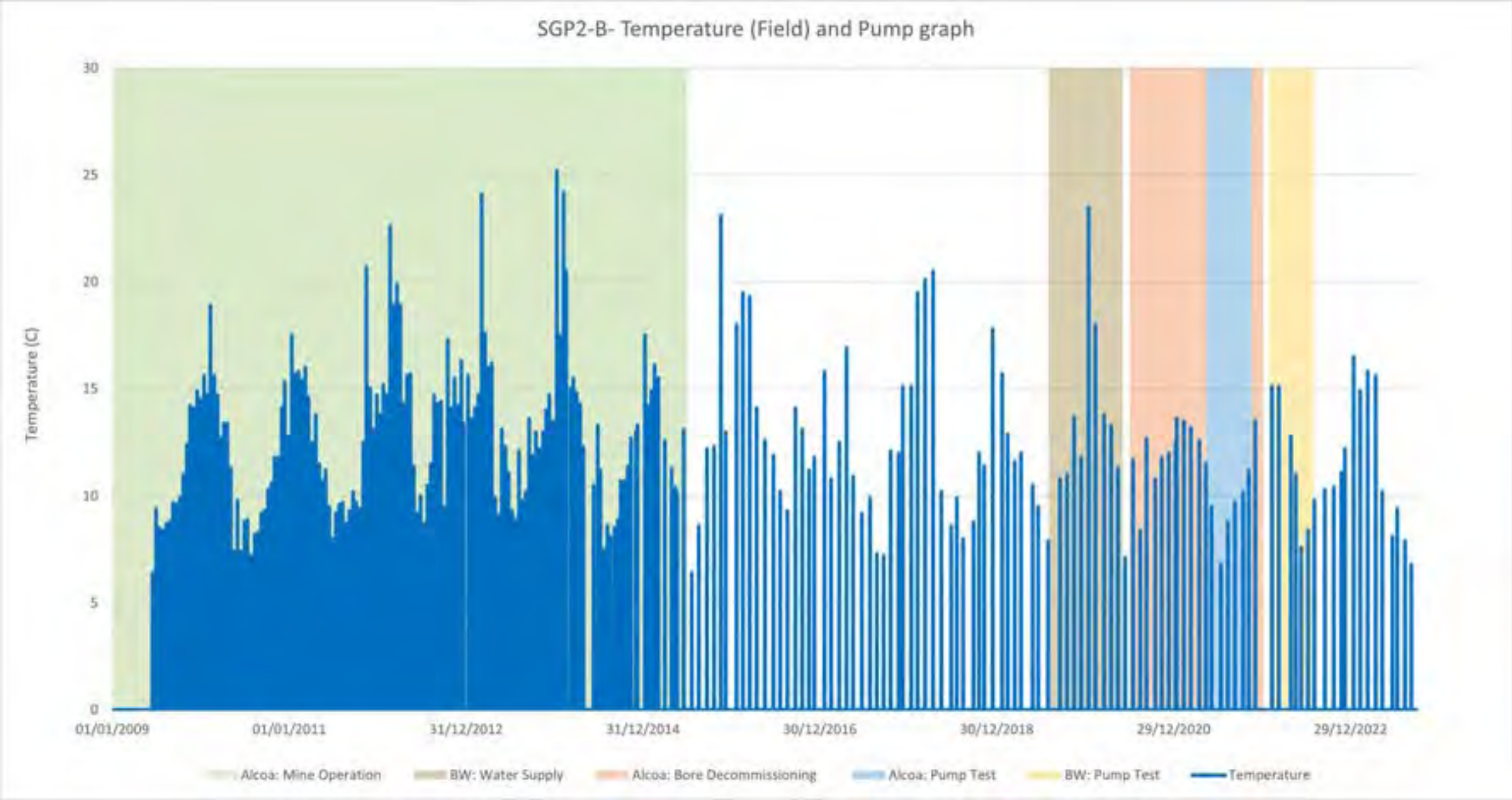

AV1- Temperature (Field) and Pump graph
Temperature (C)
25
20
15
10
5
0
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
Temperature

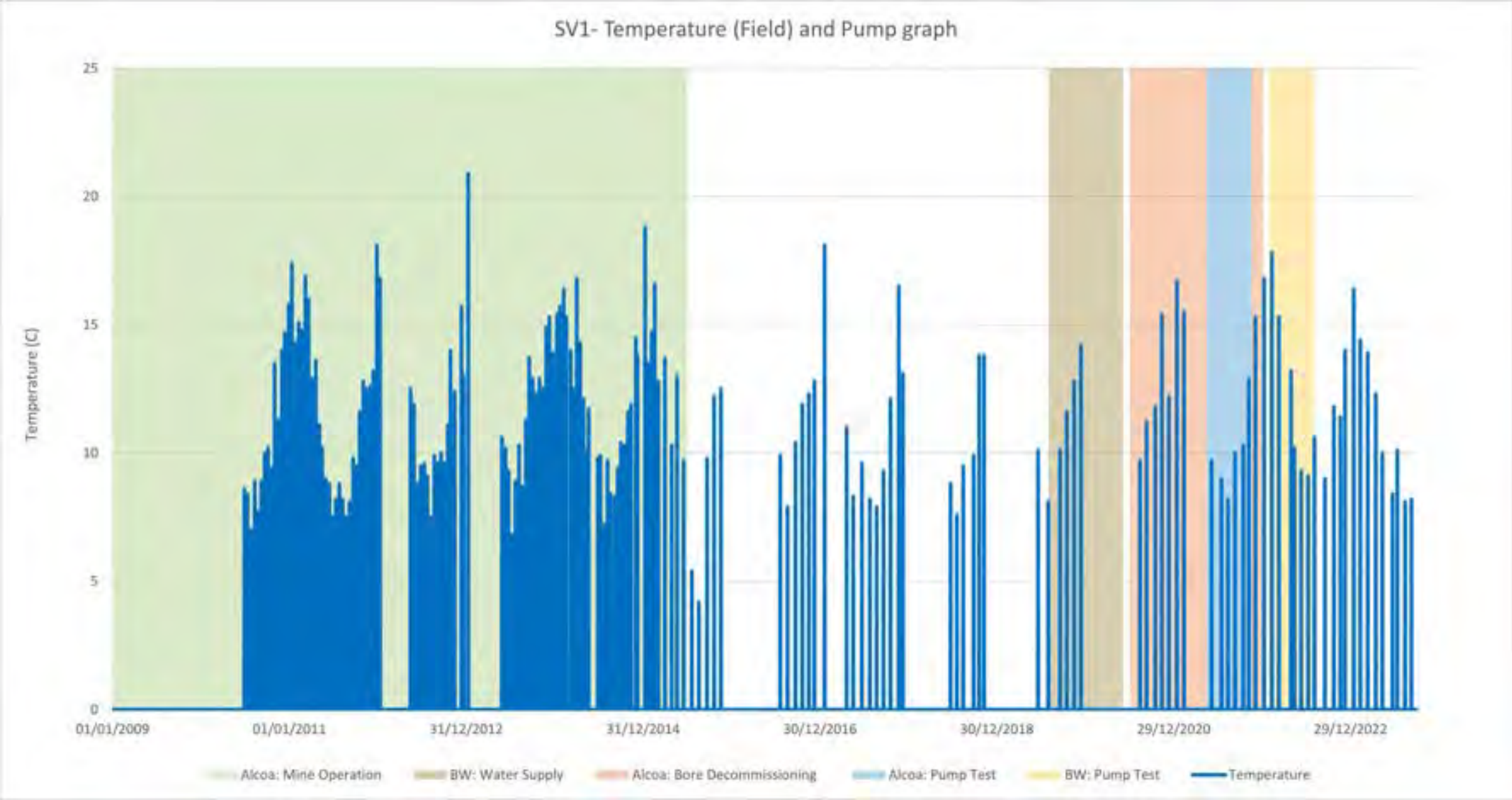

AV2- Temperature (Field) and Pump graph
Temperature (C)
30
25
20
15
10
5
0
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
Temperature

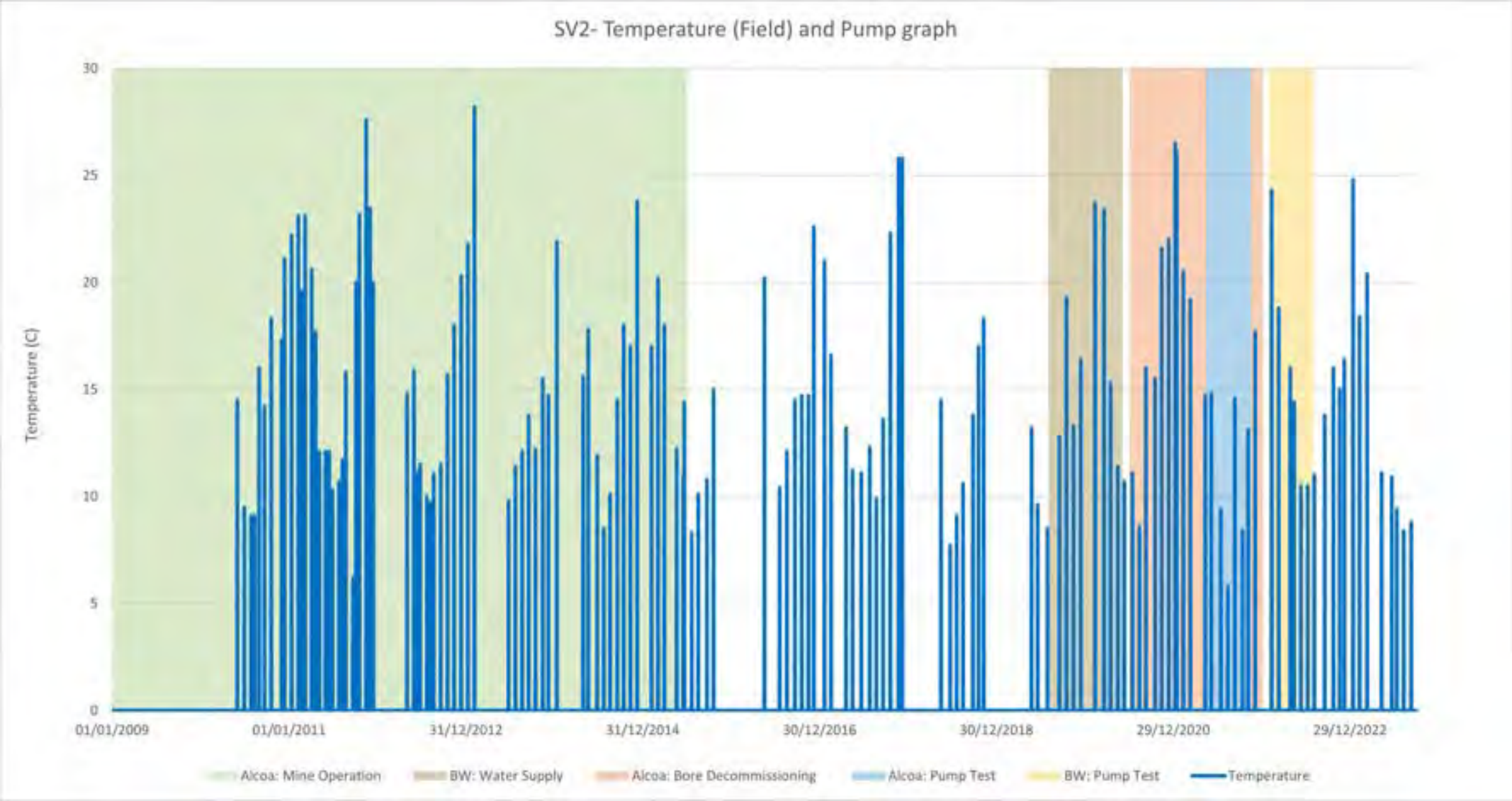

AV3- Temperature (Field) and Pump graph
Temperature (C)
25
20
15
10
5
0
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
Temperature

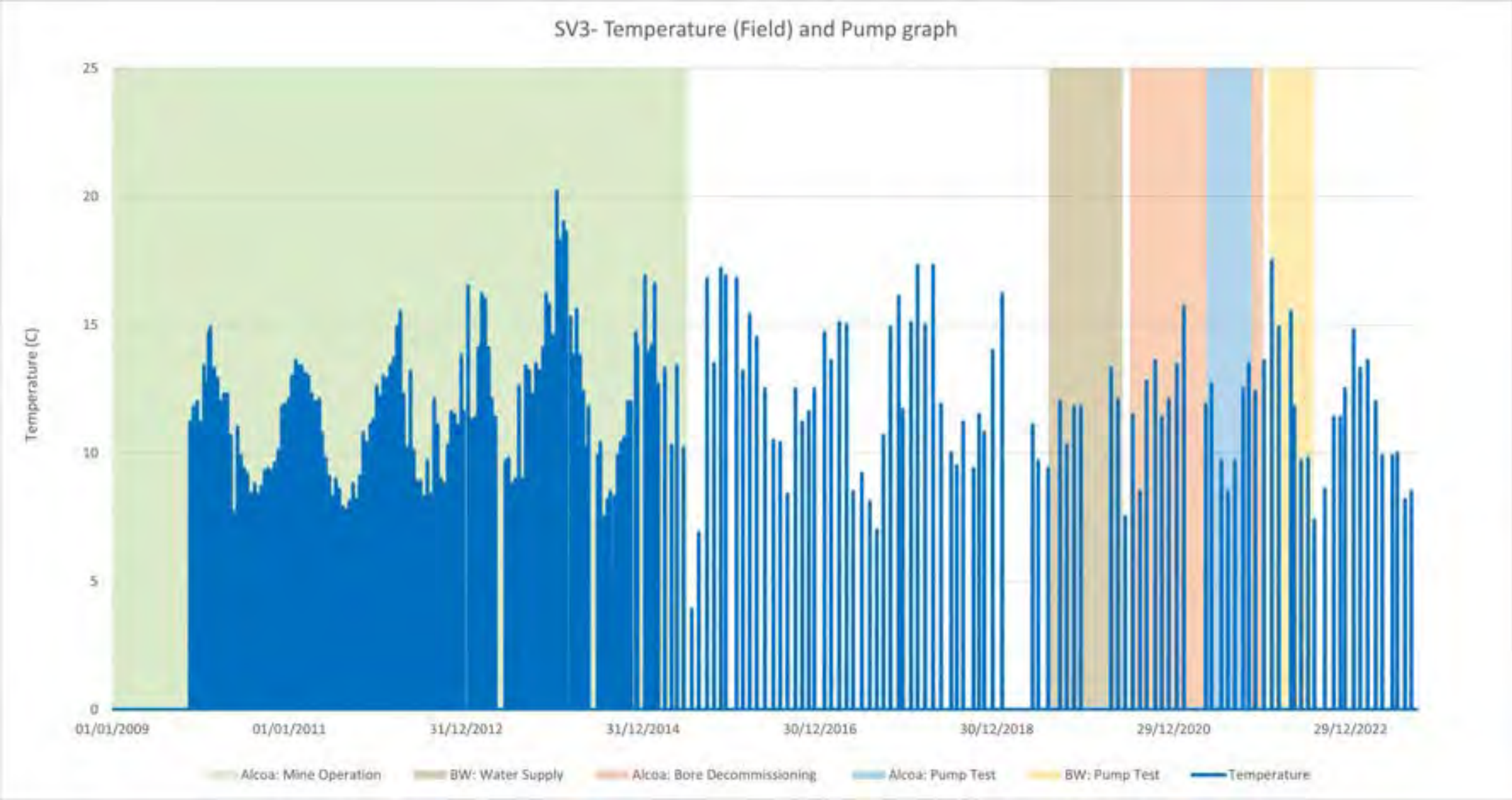

SGP1-A- Temperature and Pump graph
Temperature (C)
25
20
15
10
5
0
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
Temperature

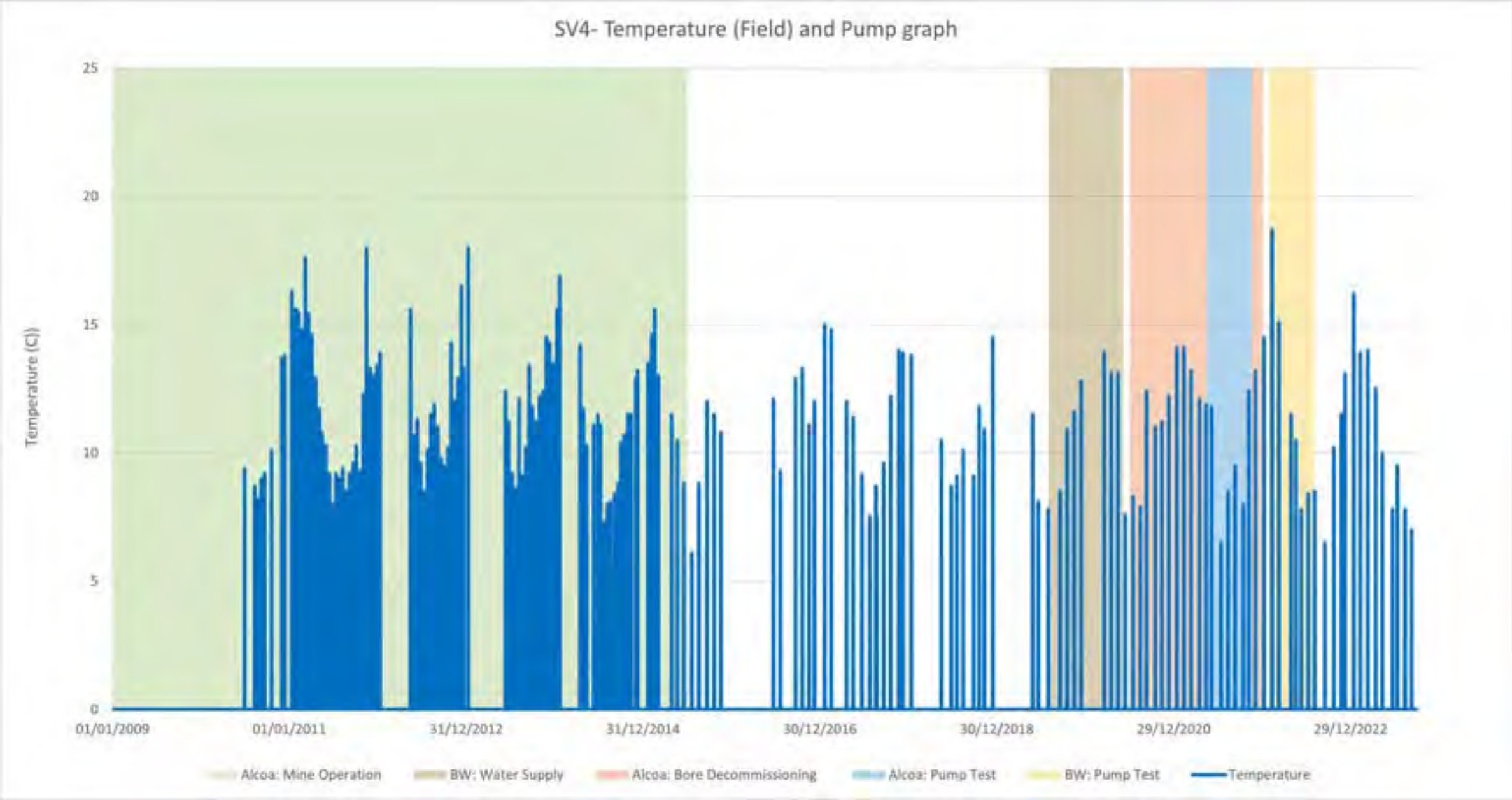

SGP2-A- Temperature (Field) and Pump graph
Temperature (C)
25
20
15
10
5
0
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
Temperature


SGP2-B- Temperature (Field) and Pump graph
Temperature (C)
30
25
20
15
10
5
0
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
Temperature


SV1- Temperature (Field) and Pump graph
Temperature (C)
25
20
15
10
5
0
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
Temperature

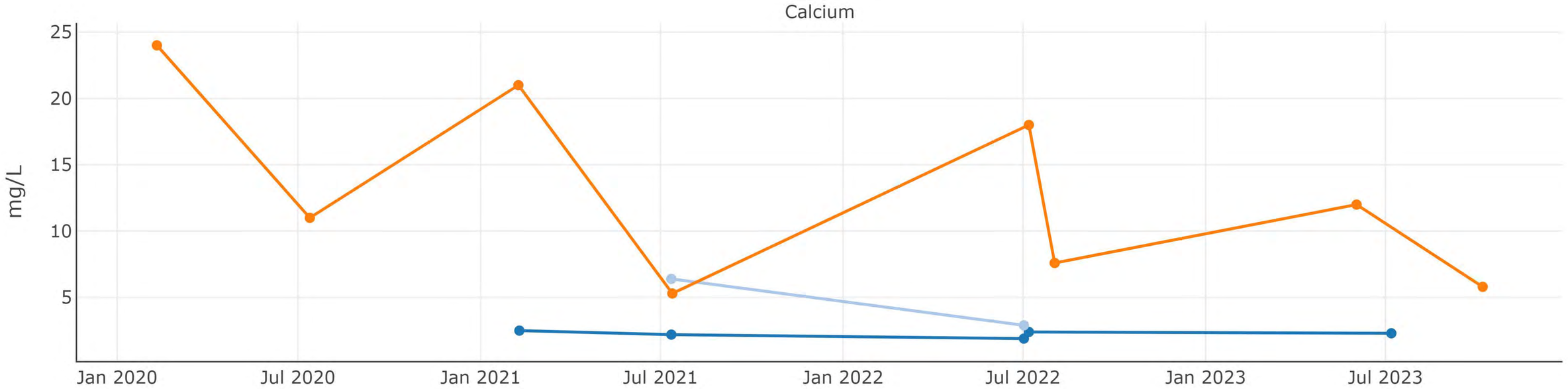

SV2- Temperature (Field) and Pump graph
Temperature (C)
30
25
20
15
10
5
0
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
Temperature

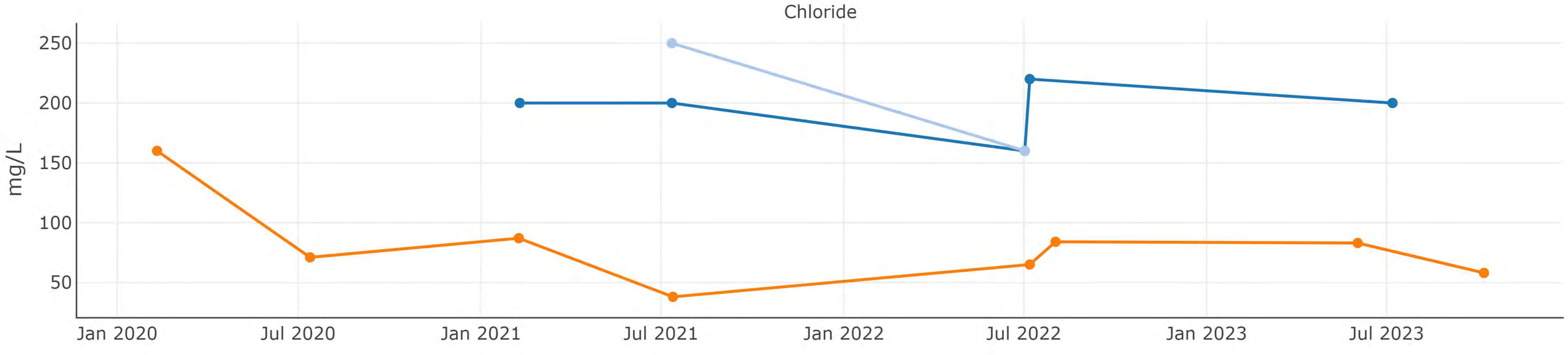

SV3- Temperature (Field) and Pump graph
Temperature (C)
25
20
15
10
5
0
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
Temperature

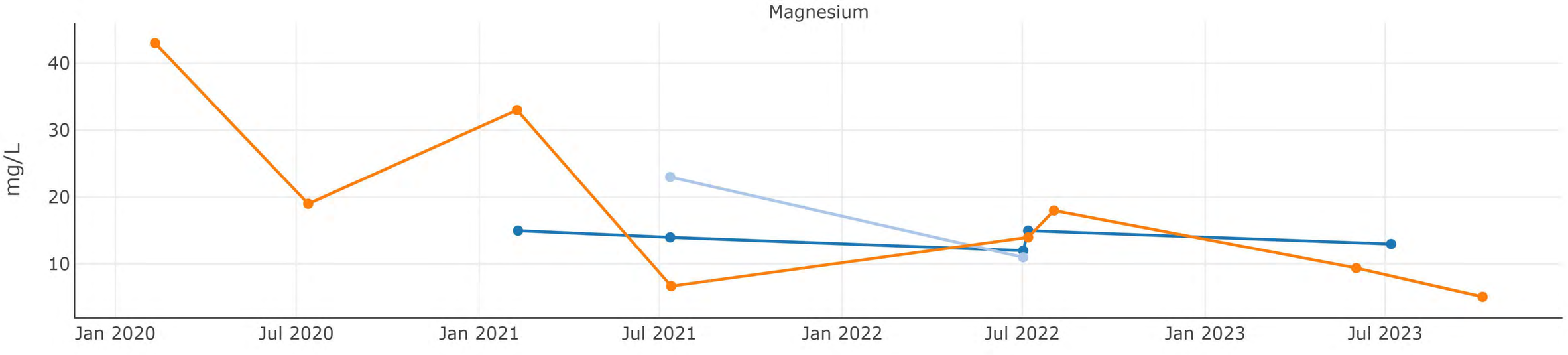

SV4- Temperature (Field) and Pump graph
Temperature (C))
25
20
15
10
5
0
01/01/2009
01/01/2011
31/12/2012
31/12/2014
30/12/2016
30/12/2018
29/12/2020
29/12/2022
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
Temperature

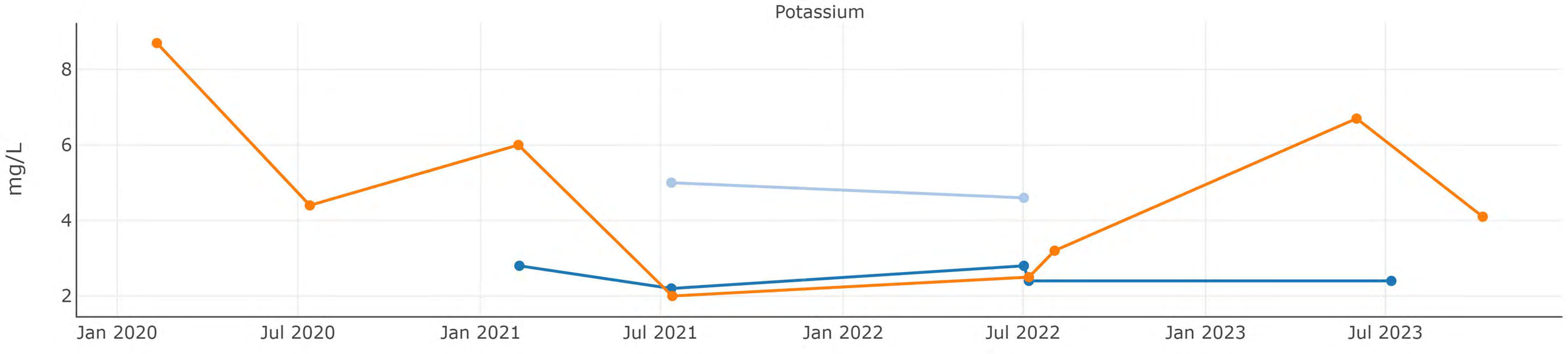
Surface Water – Analytical Chemistry Graphs

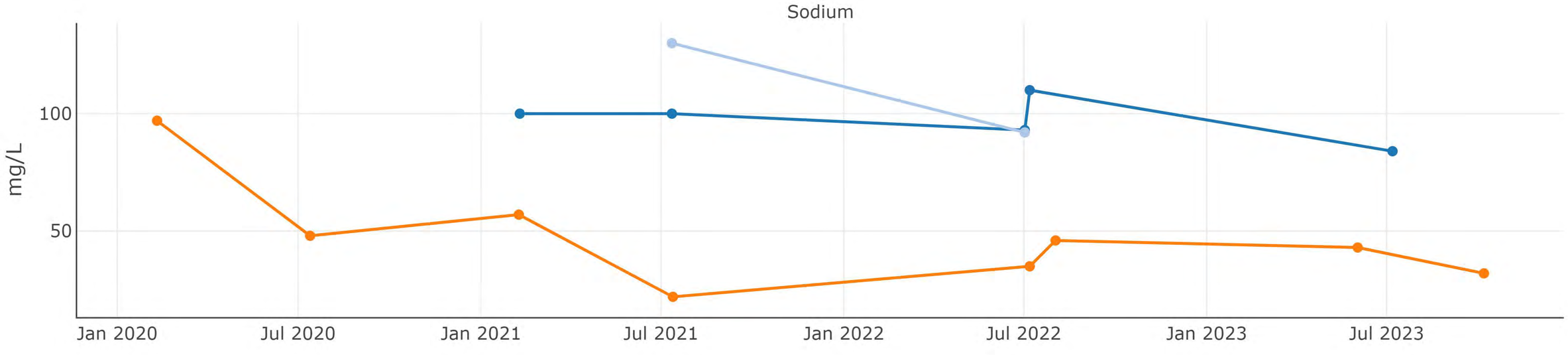
Chemistry Graph
AV1
AV3
SV2

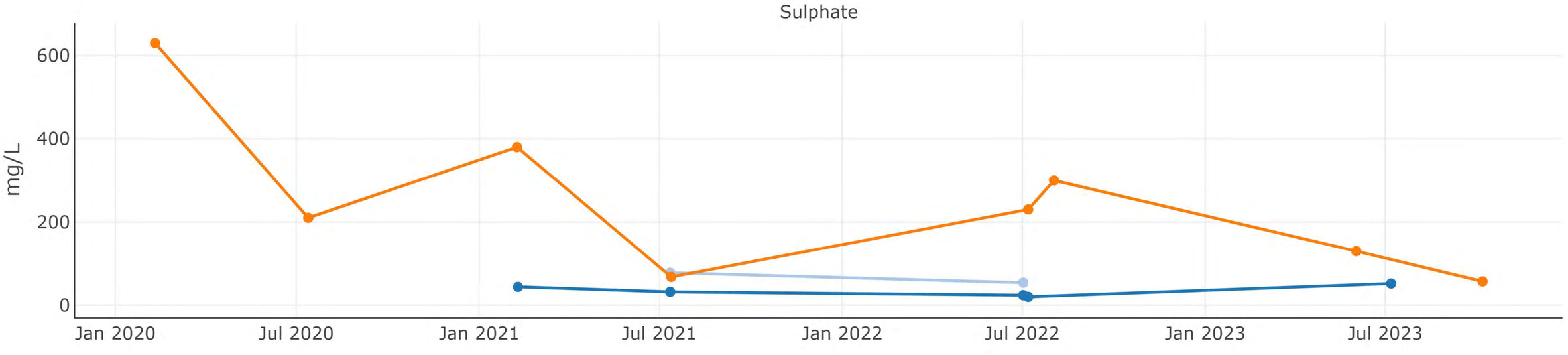

Calcium
mg/L
25
20
15
10
5
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Jul 2022
Jan 2023
Jul 2023

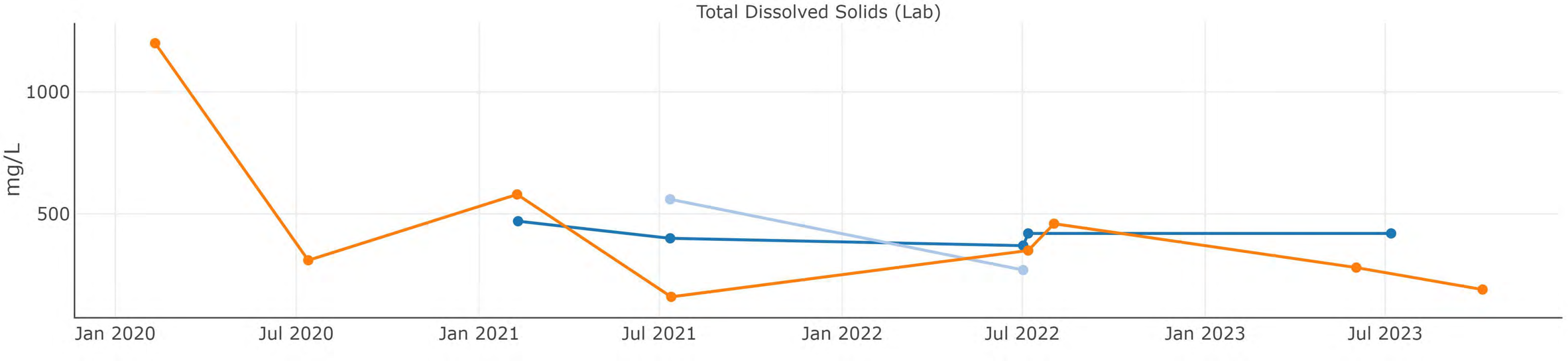

Chloride
mg/L
250
200
150
100
50
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Jul 2022
Jan 2023
Jul 2023


Magnesium
mg/L
40
30
20
10
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Jul 2022
Jan 2023
Jul 2023

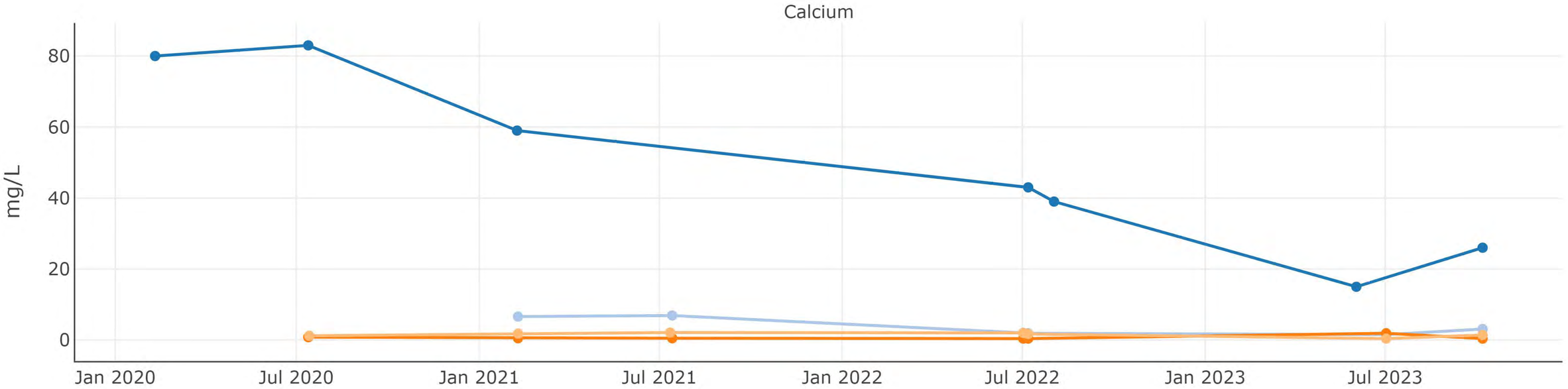

Potassium
mg/L
8
6
4
2
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Jul 2022
Jan 2023
Jul 2023

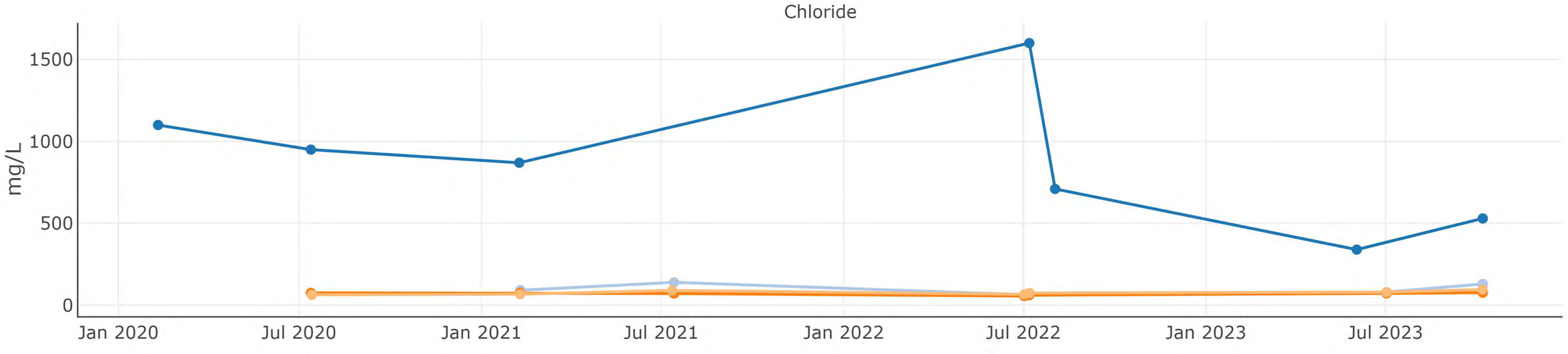

Sodium
mg/L
100
50
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Jul 2022
Jan 2023
Jul 2023

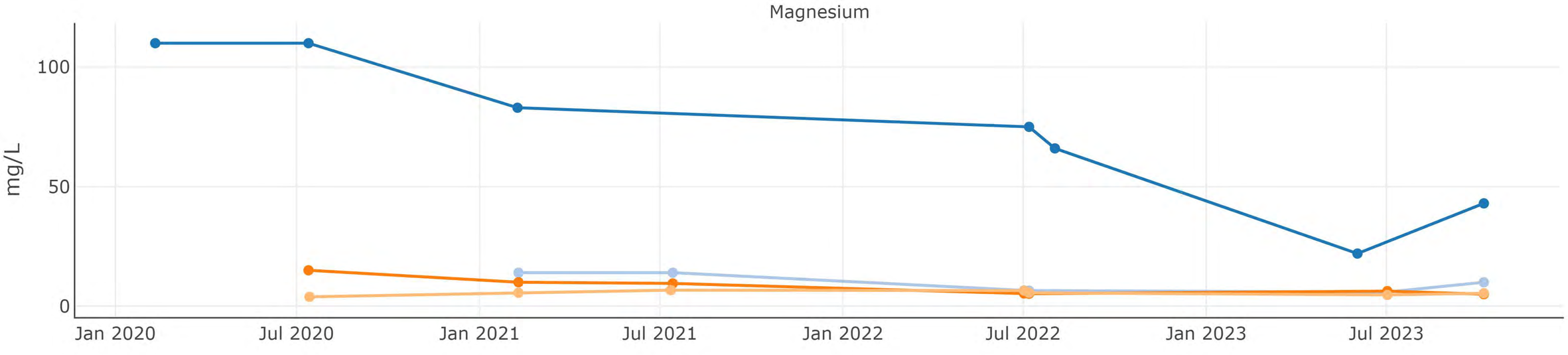

Sulphate
mg/L
600
400
200
0
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Jul 2022
Jan 2023
Jul 2023

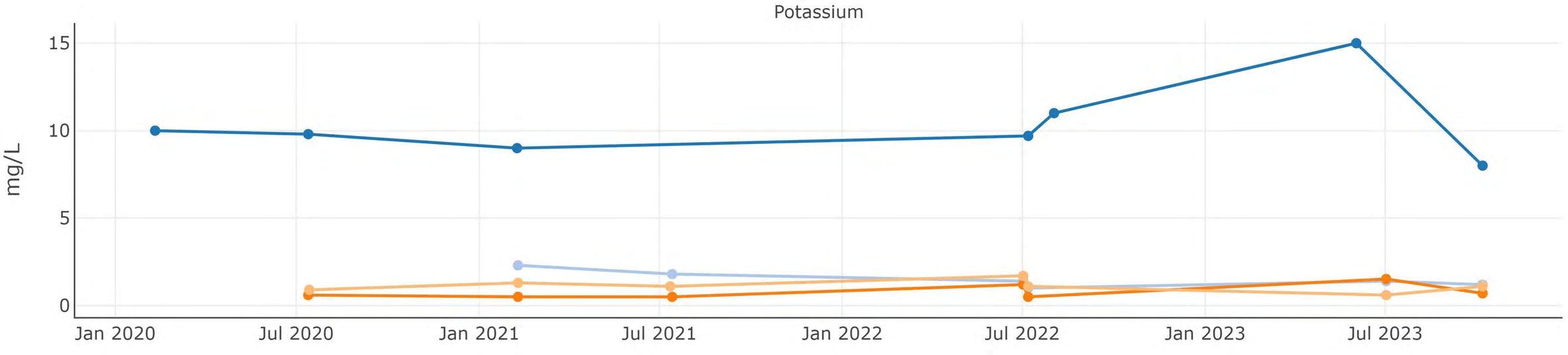

Total Dissolved Solids (Lab)
mg/L
1000
500
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Jul 2022
Jan 2023
Jul 2023

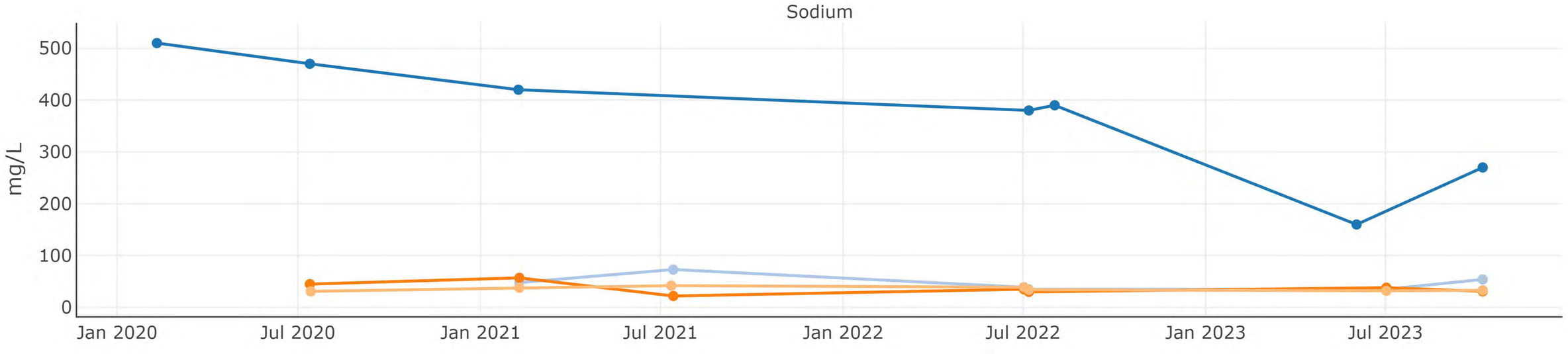
Chemistry Graph
AV2
SV1
SV3
SV4

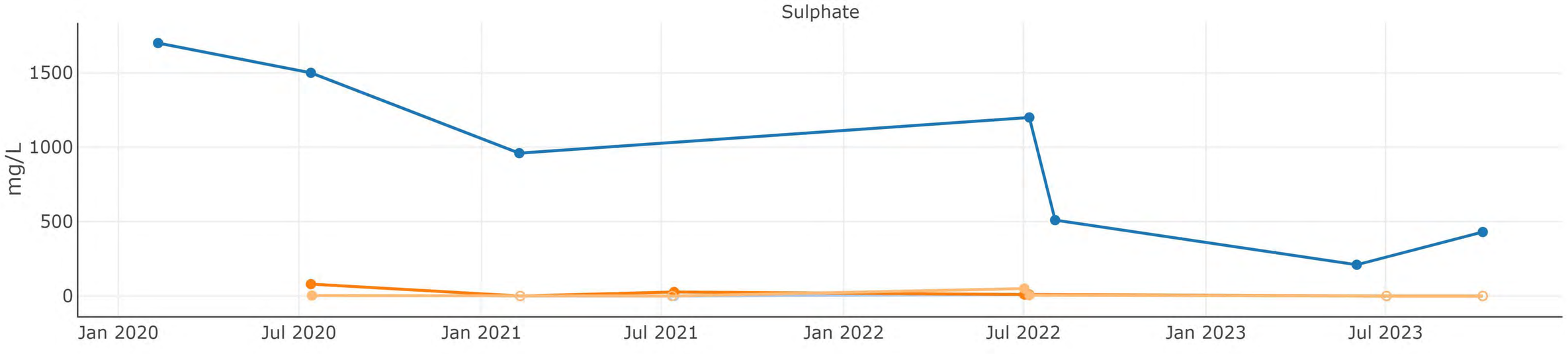

Calcium
mg/L
80
60
40
20
0
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Jul 2022
Jan 2023
Jul 2023

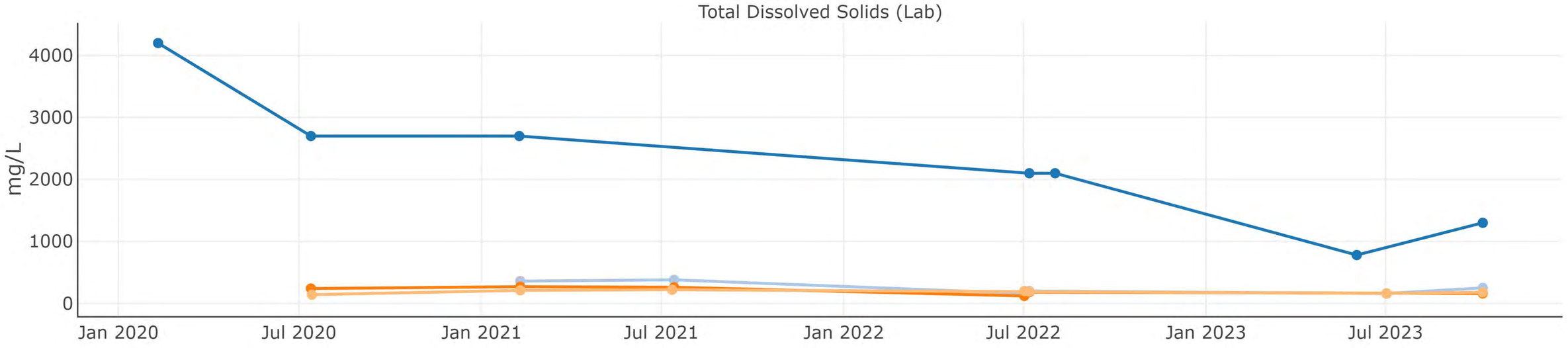

Chloride
mg/L
1500
1000
500
0
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Jul 2022
Jan 2023
Jul 2023


Magnesium
mg/L
100
50
0
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Jul 2022
Jan 2023
Jul 2023

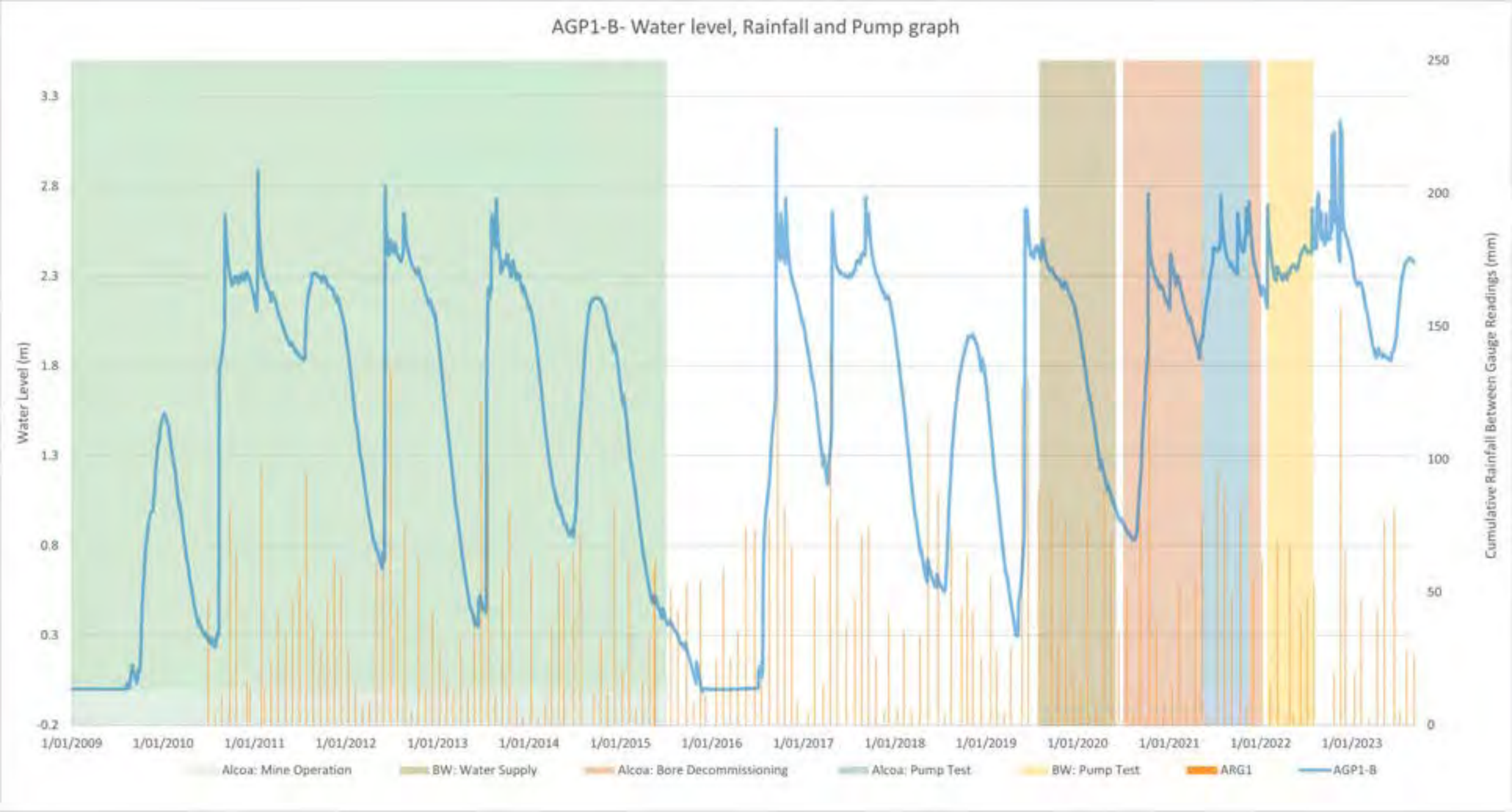

Potassium
mg/L
15
10
5
0
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Jul 2022
Jan 2023
Jul 2023

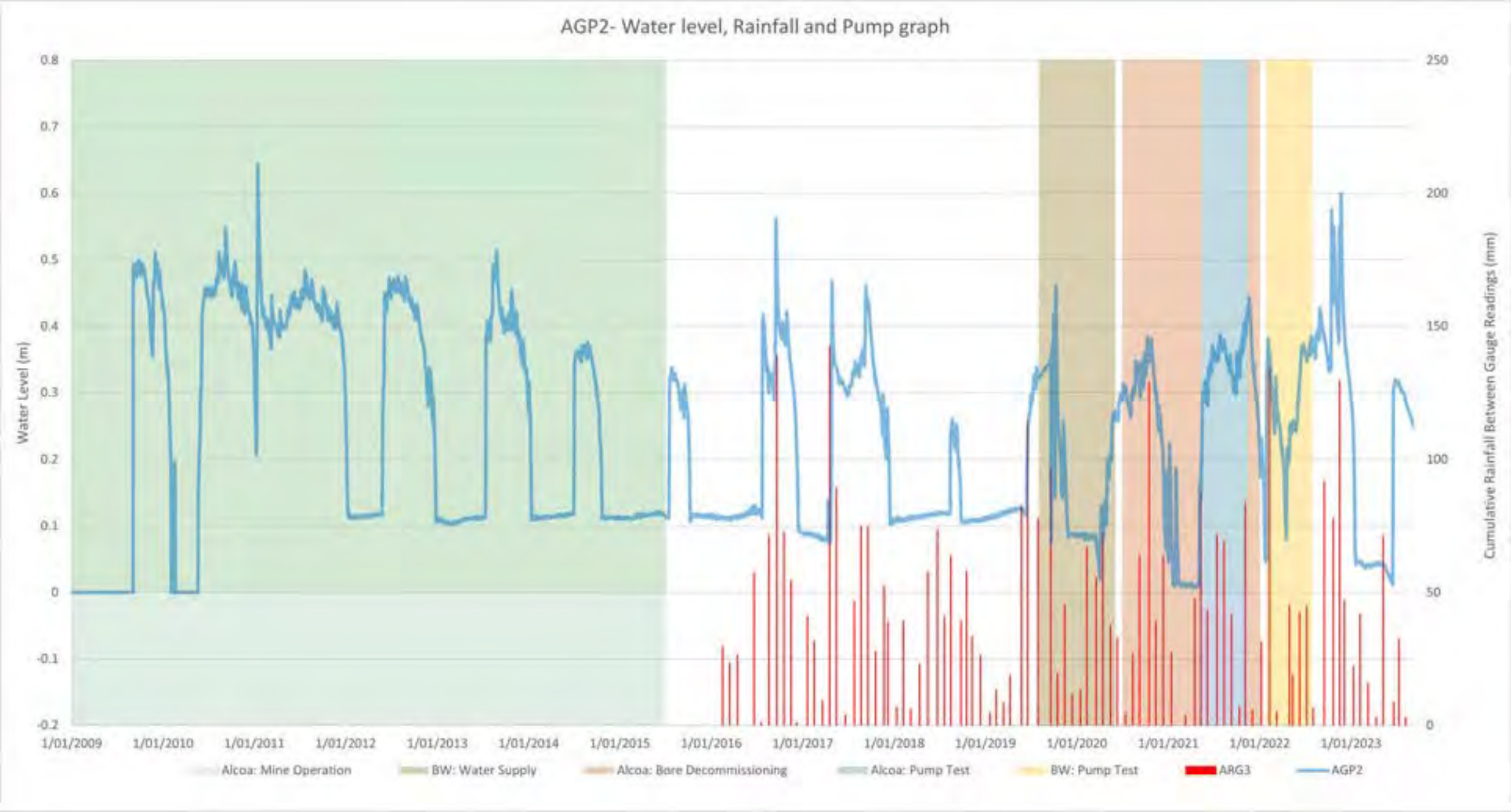

Sodium
mg/L
500
400
300
200
100
0
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Jul 2022
Jan 2023
Jul 2023

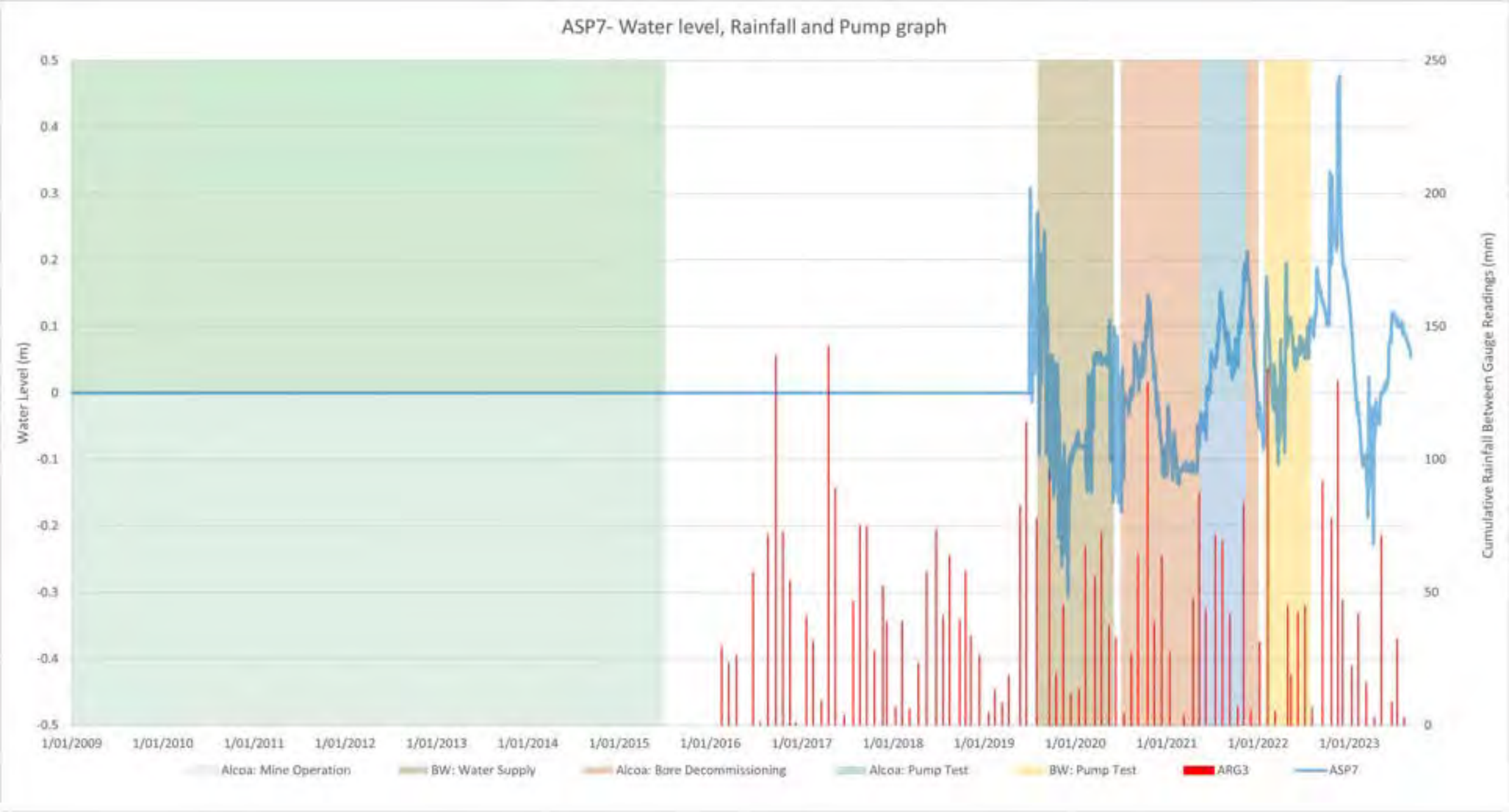

Sulphate
mg/L
1500
1000
500
0
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Jul 2022
Jan 2023
Jul 2023

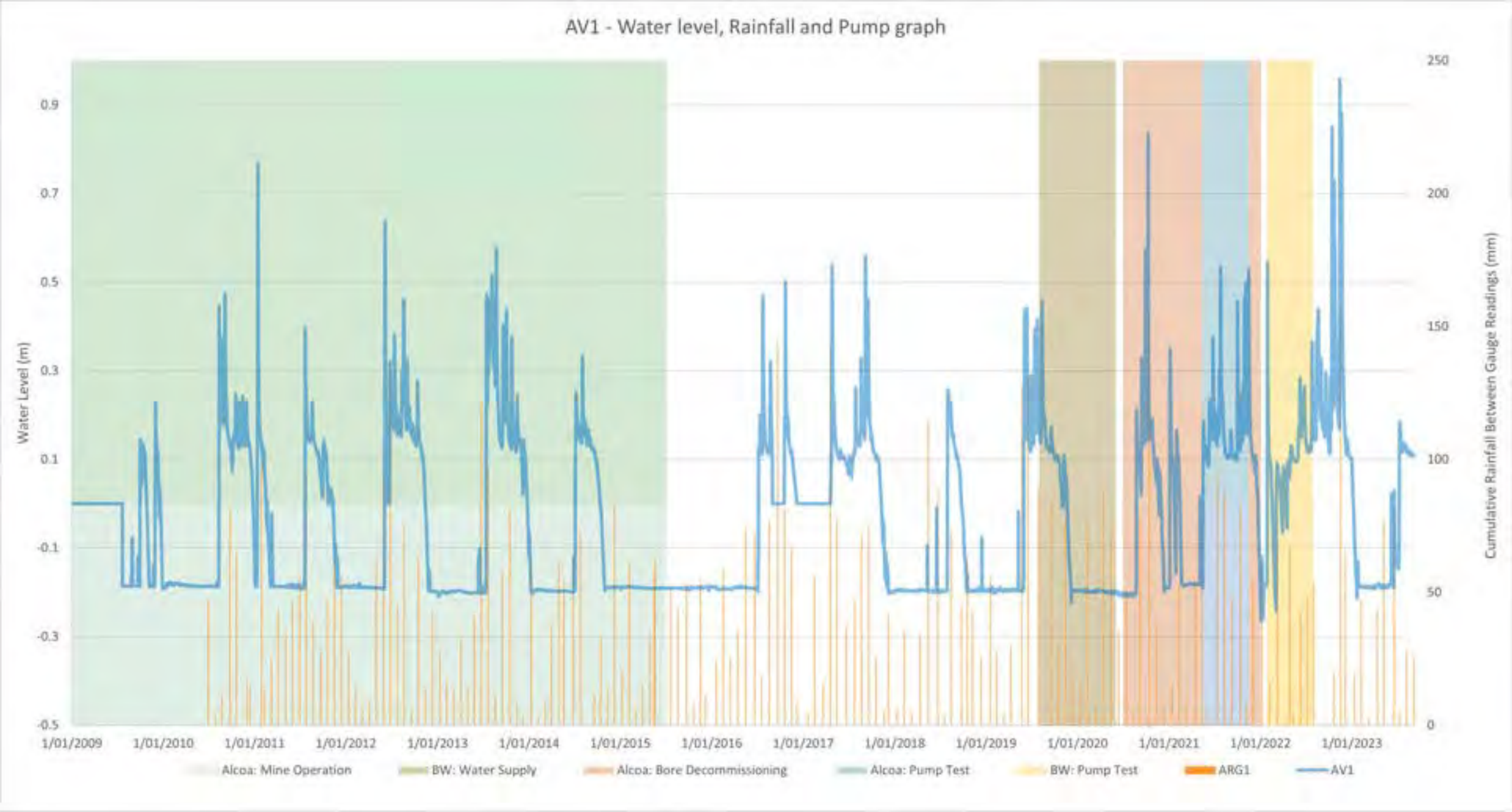

Total Dissolved Solids (Lab)
mg/L
4000
3000
2000
1000
0
Jan 2020
Jul 2020
Jan 2021
Jul 2021
Jan 2022
Jul 2022
Jan 2023
Jul 2023

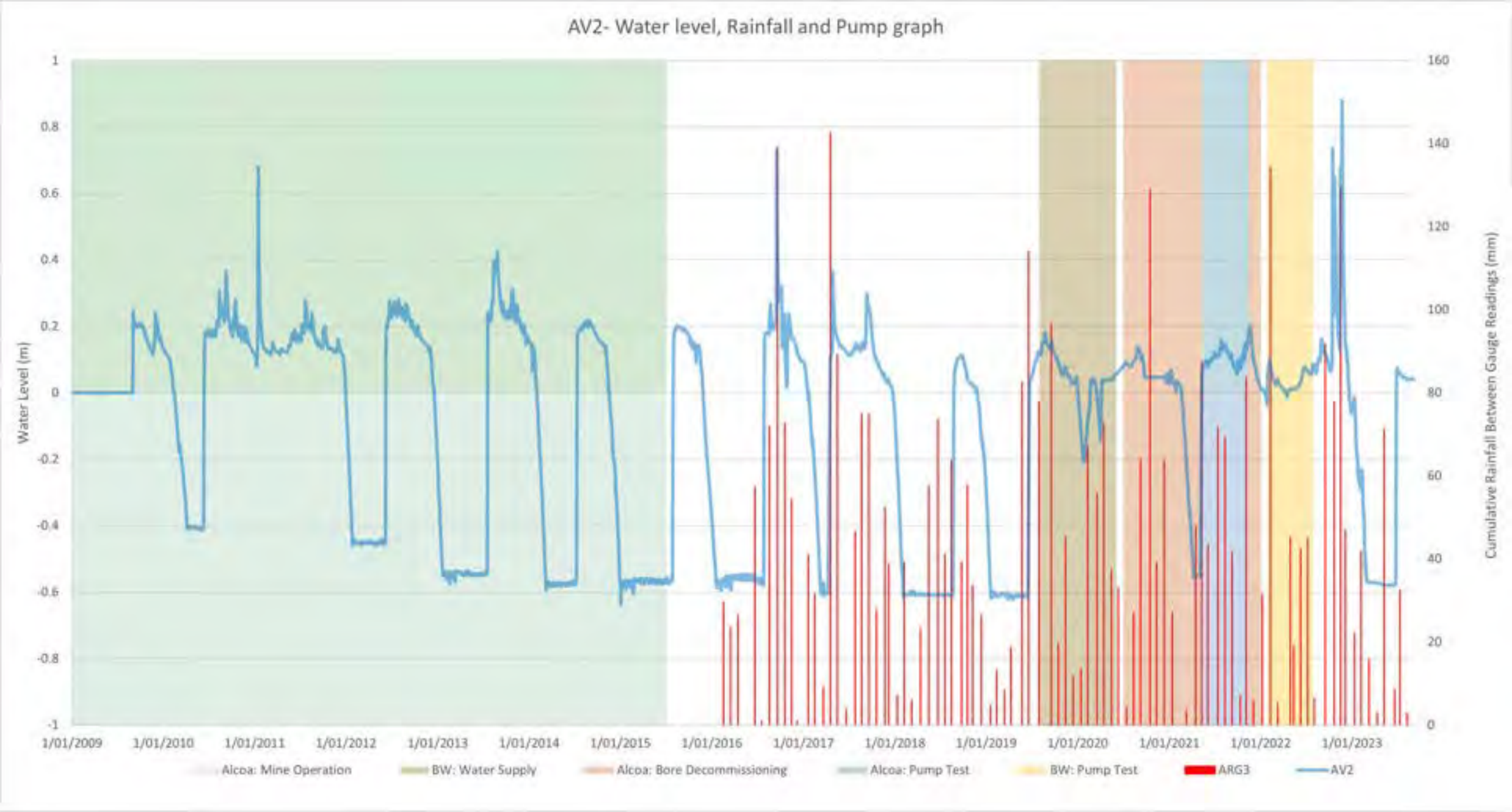
Surface Water – WMIS Graphs

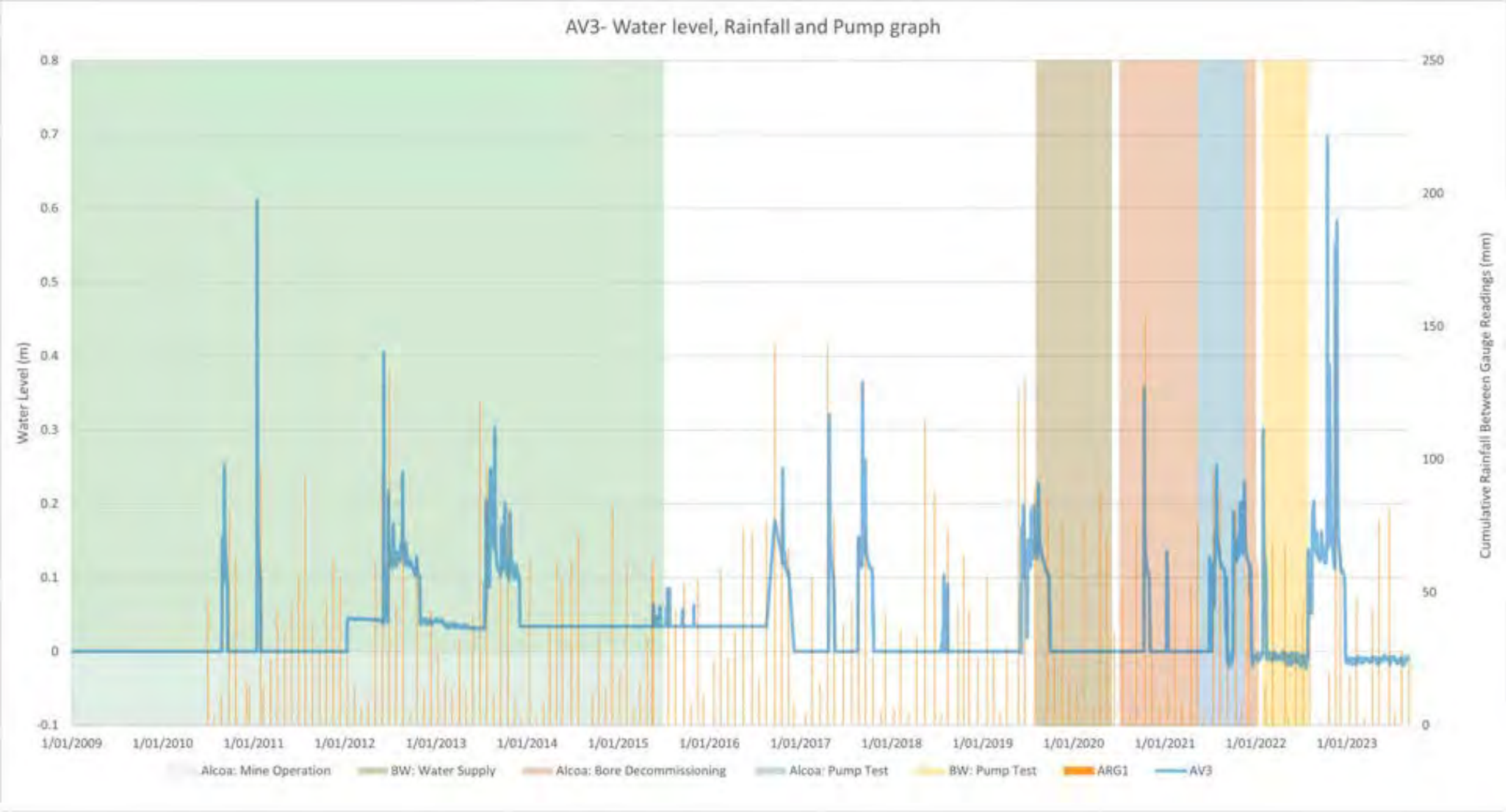

AGP1-B- Water level, Rainfall and Pump graph
Water Level (m)
3.3
2.8
2.3
1.8
1.3
0.8
0.3
-0.2
Cumulative Rainfall Between Gauge Readings (mm)
250
200
150
100
50
0
1/01/2009
1/01/2010
1/01/2011
1/01/2012
1/01/2013
1/01/2014
1/01/2015
1/01/2016
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG1
AGP1-B

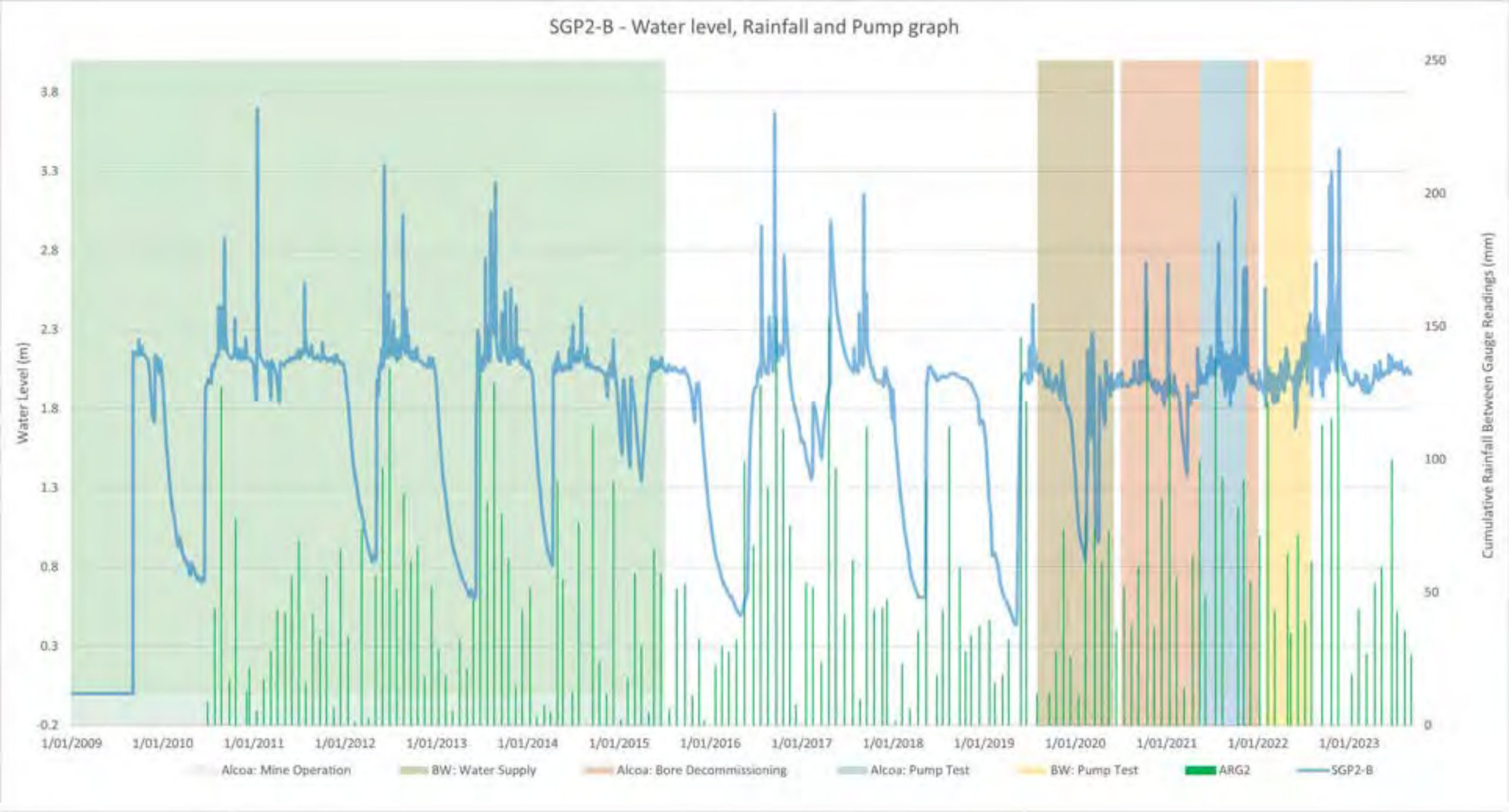

AGP2- Water level, Rainfall and Pump graph
Water Level (m)
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
Cumulative Rainfall Between Gauge Readings (mm)
250
200
150
100
50
0
1/01/2009
1/01/2010
1/01/2011
1/01/2012
1/01/2013
1/01/2014
1/01/2015
1/01/2016
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG3
AGP2

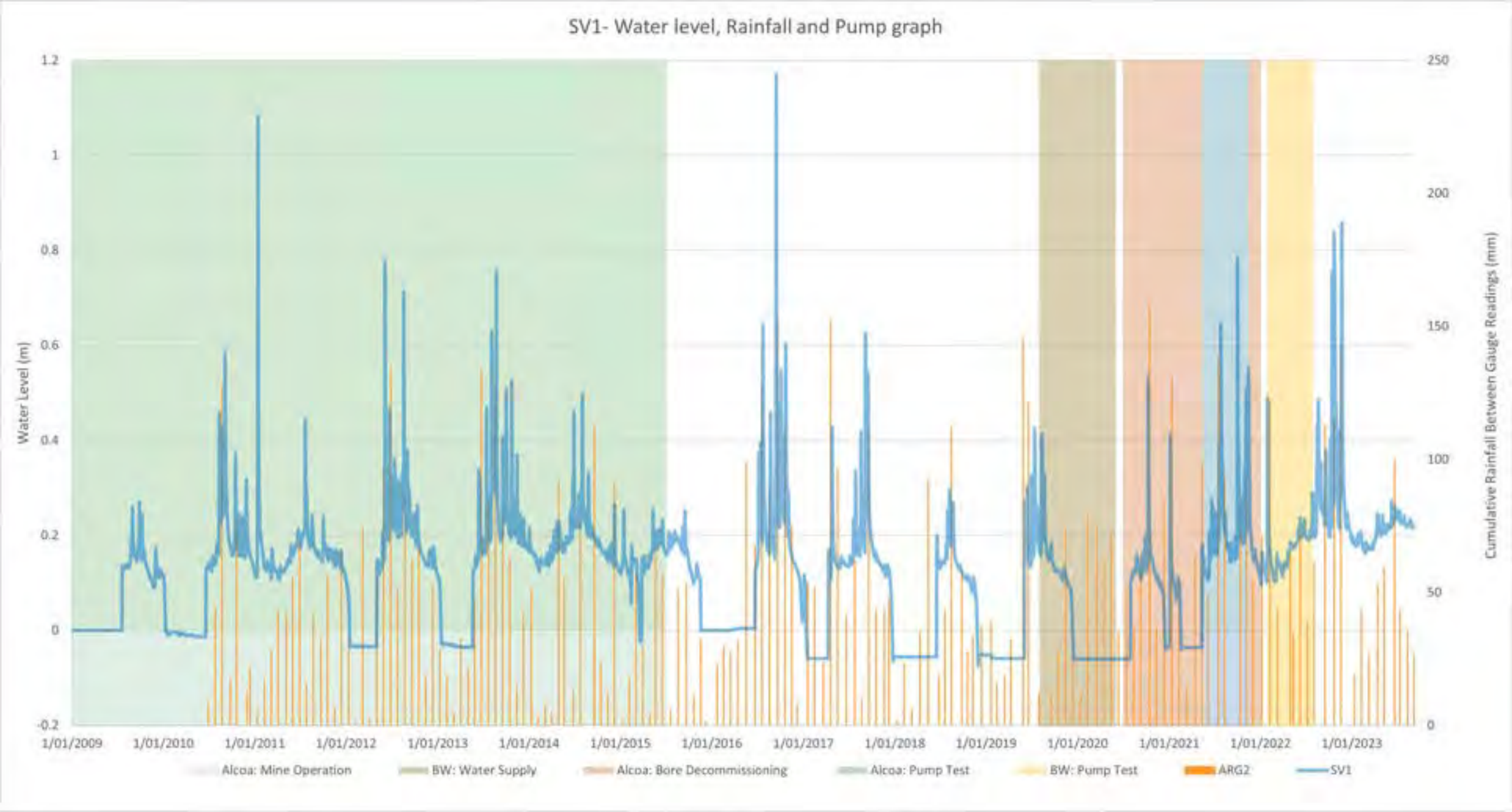

ASP7- Water level, Rainfall and Pump graph
Water Level (m)
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
-0.5
Cumulative Rainfall Between Gauge Readings (mm)
250
200
150
100
50
0
1/01/2009
1/01/2010
1/01/2011
1/01/2012
1/01/2013
1/01/2014
1/01/2015
1/01/2016
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG3
ASP7

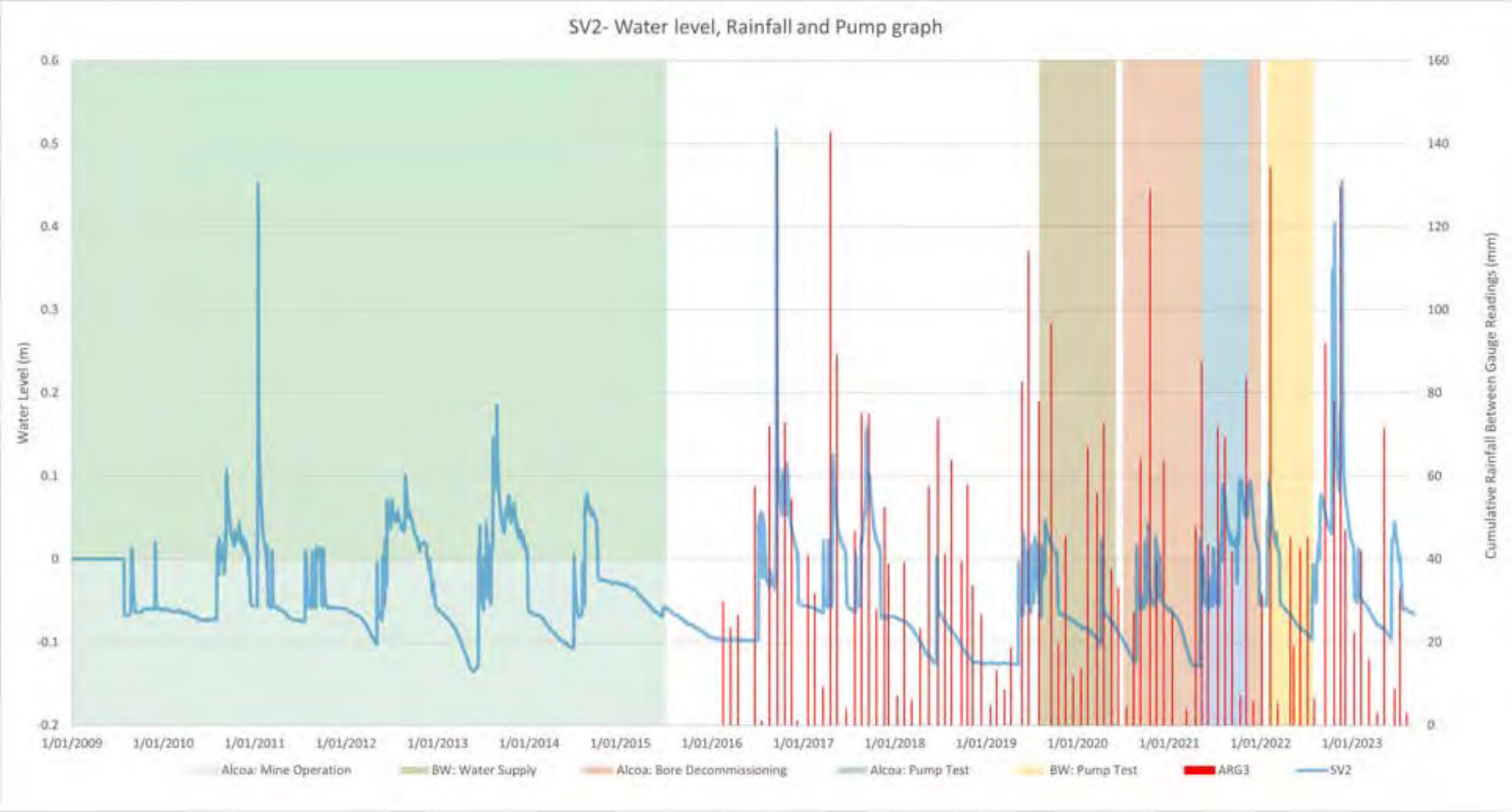

AV1 - Water level, Rainfall and Pump graph
Water Level (m)
0.9
0.7
0.5
0.3
0.1
-0.1
-0.3
-0.5
250
200
150
100
50
0
Cumulative Rainfall Between Gauge Readings (mm)
1/01/2009
1/01/2010
1/01/2011
1/01/2012
1/01/2013
1/01/2014
1/01/2015
1/01/2016
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG1
AV1

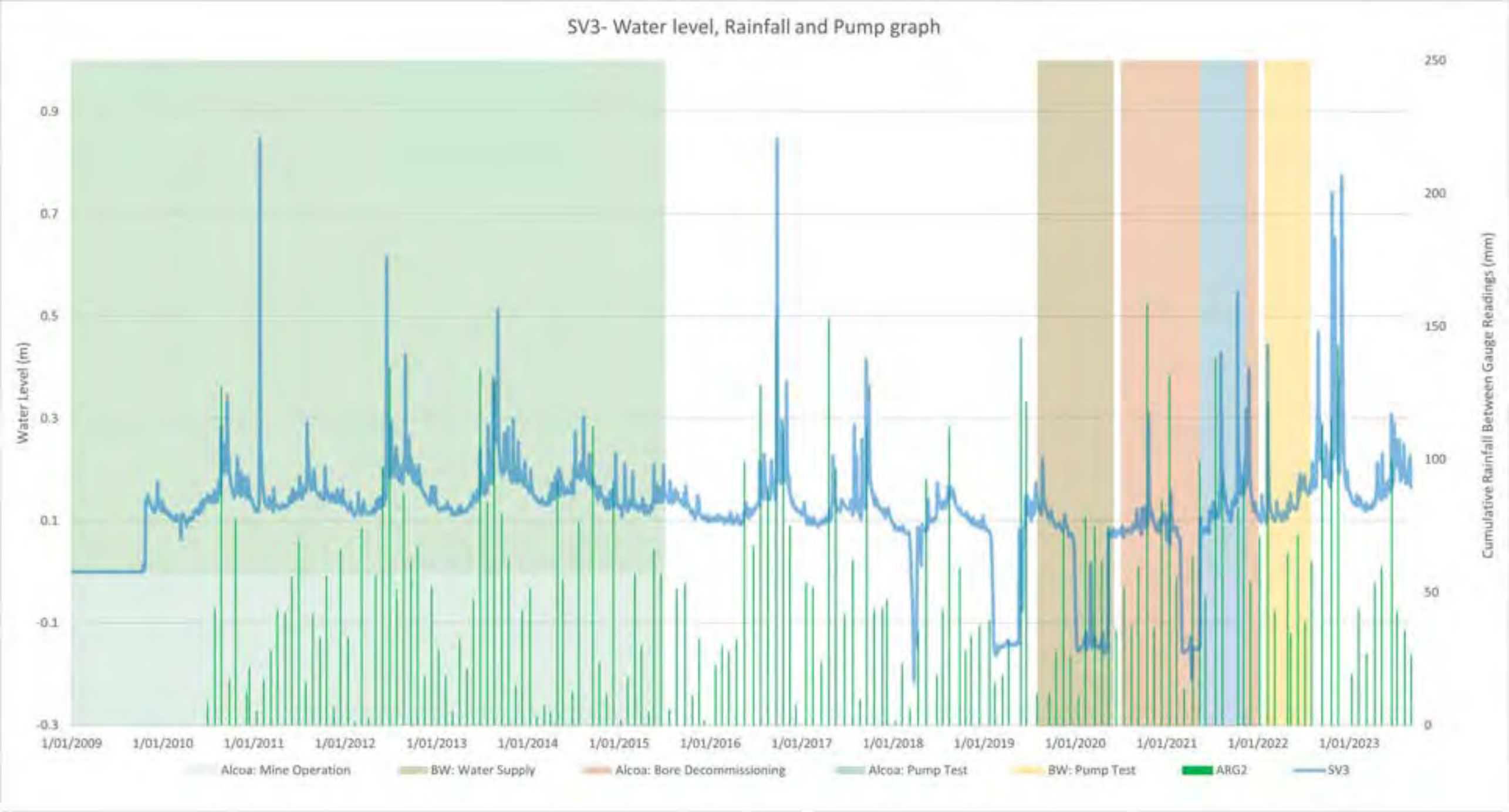

AV2- Water level, Rainfall and Pump graph
Water Level (m)
Cumulative Rainfall Between Gauge Readings (mm)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
160
140
120
100
80
60
40
20
0
1/01/2009
1/01/2010
1/01/2011
1/01/2012
1/01/2013
1/01/2014
1/01/2015
1/01/2016
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG3
AV2

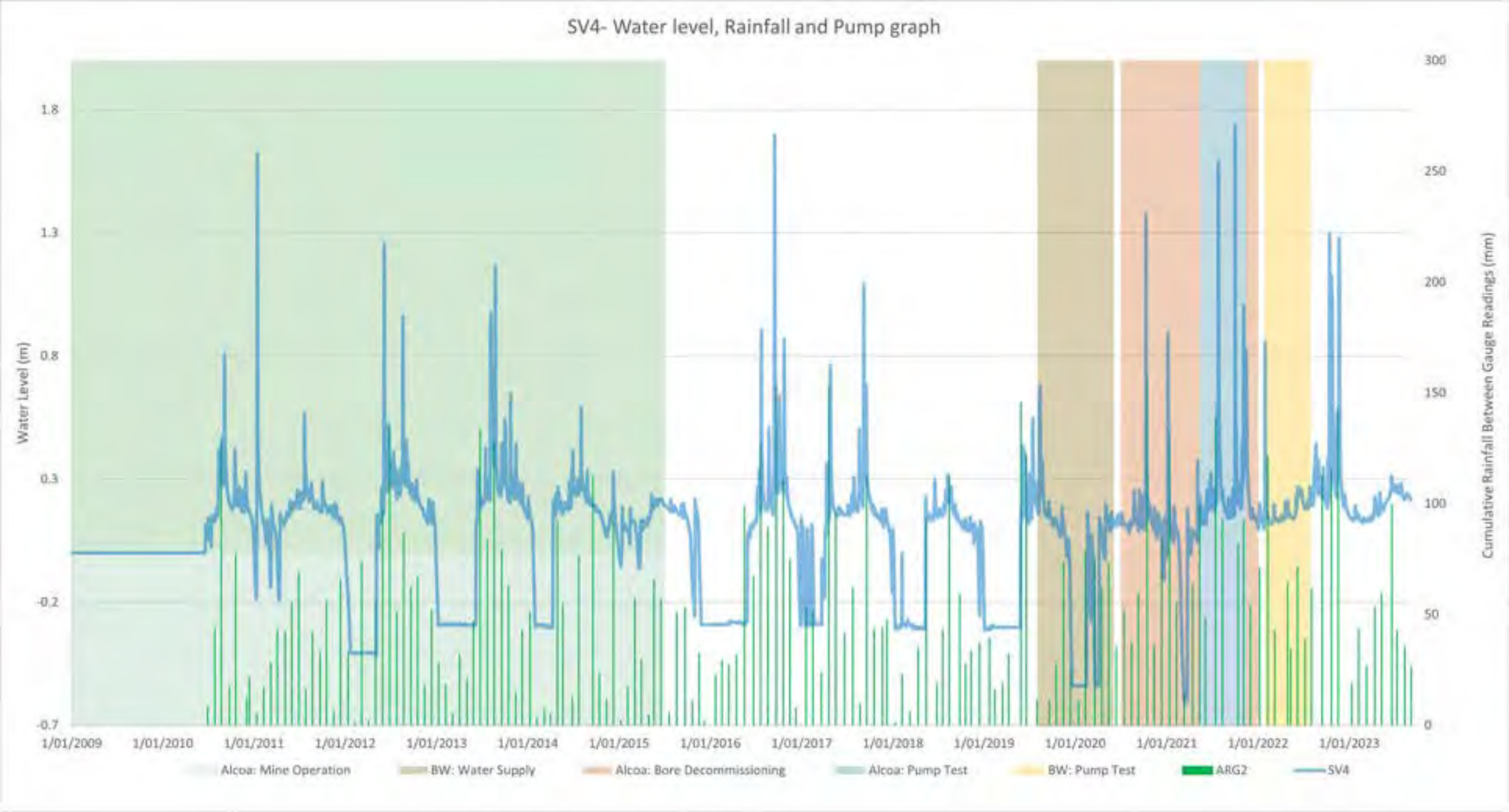

AV3- Water level, Rainfall and Pump graph
Water Level (m)
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
Cumulative Rainfall Between Gauge Readings (mm)
250
200
150
100
50
0
1/01/2009
1/01/2010
1/01/2011
1/01/2012
1/01/2013
1/01/2014
1/01/2015
1/01/2016
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG1
AV3

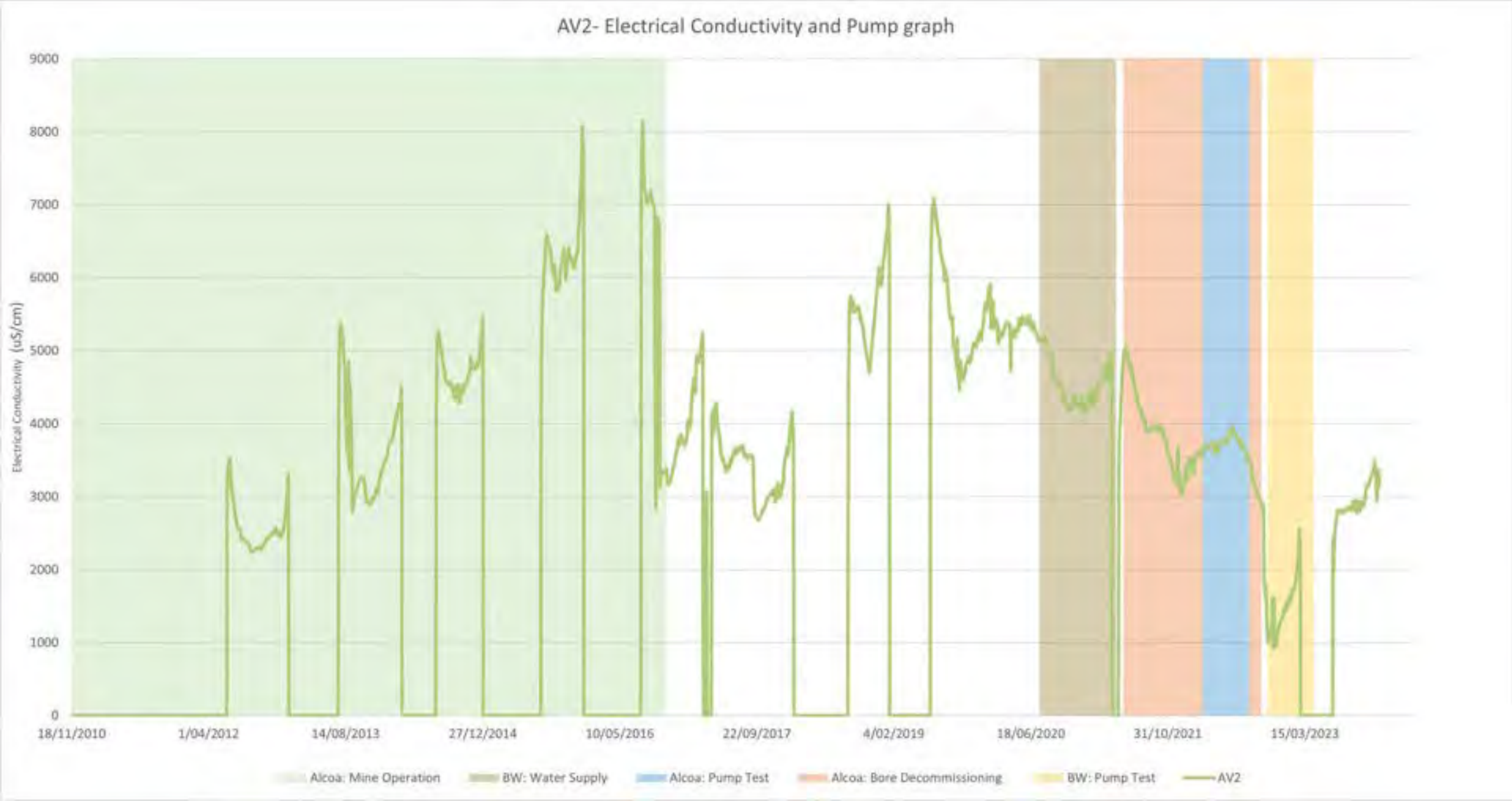

SGP2-B - Water level, Rainfall and Pump graph
Water Level (m)
3.8
3.3
2.8
2.3
1.8
1.3
0.8
0.3
-0.2
Cumulative Rainfall Between Gauge Readings (mm)
250
200
150
100
50
0
1/01/2009
1/01/2010
1/01/2011
1/01/2012
1/01/2013
1/01/2014
1/01/2015
1/01/2016
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG2
SGP2-B

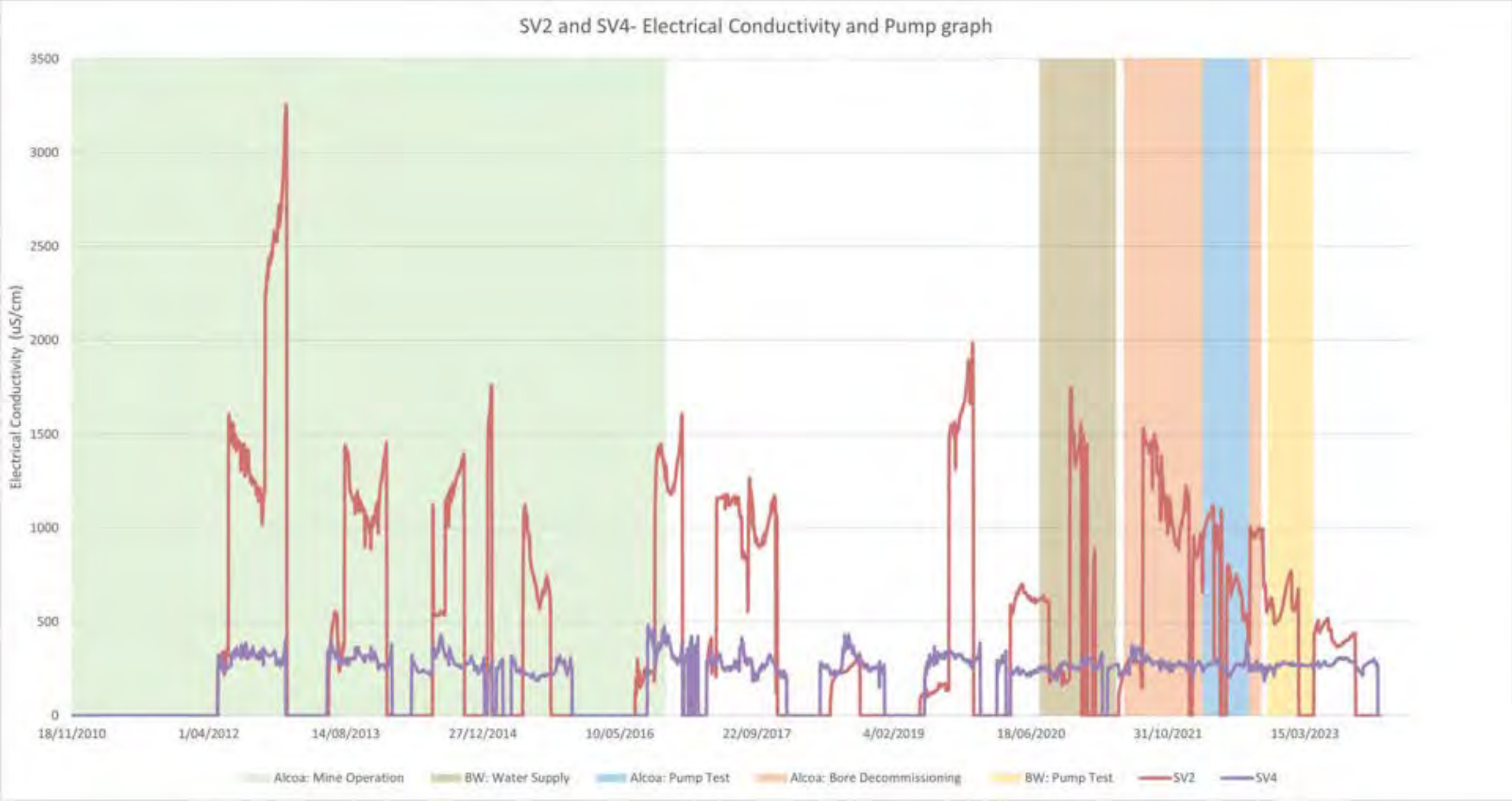

SV1- Water level, Rainfall and Pump graph
Water Level (m)
1.2
1
0.8
0.6
0.4
0.2
0
-0.2
Cumulative Rainfall Between Gauge Readings (mm)
250
200
150
100
50
0
1/01/2009
1/01/2010
1/01/2011
1/01/2012
1/01/2013
1/01/2014
1/01/2015
1/01/2016
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG2
SV1

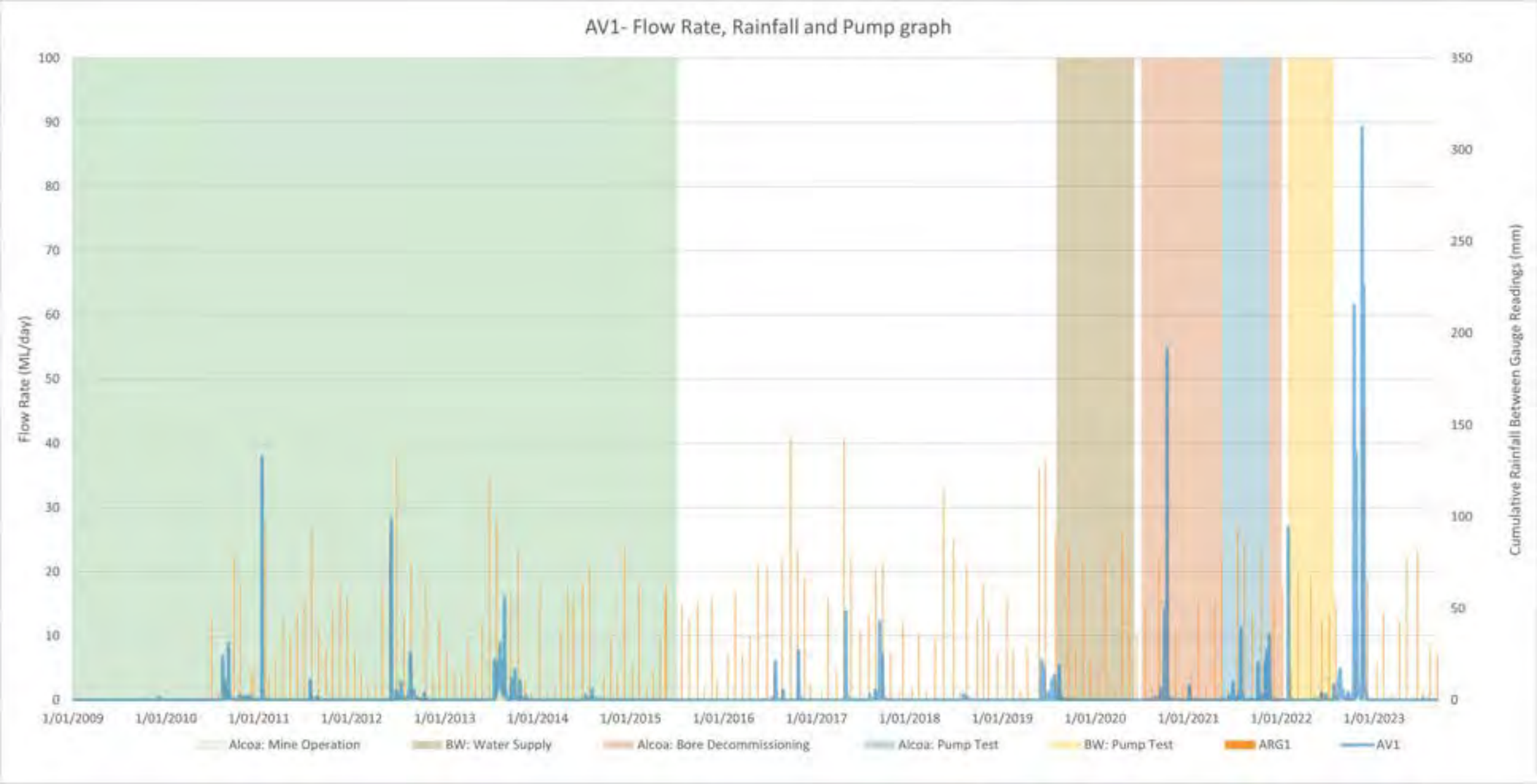

SV2- Water level, Rainfall and Pump graph
Water Level (m)
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
Cumulative Rainfall Between Gauge Readings (mm)
160
140
120
100
80
60
40
20
0
1/01/2009
1/01/2010
1/01/2011
1/01/2012
1/01/2013
1/01/2014
1/01/2015
1/01/2016
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG3
SV2

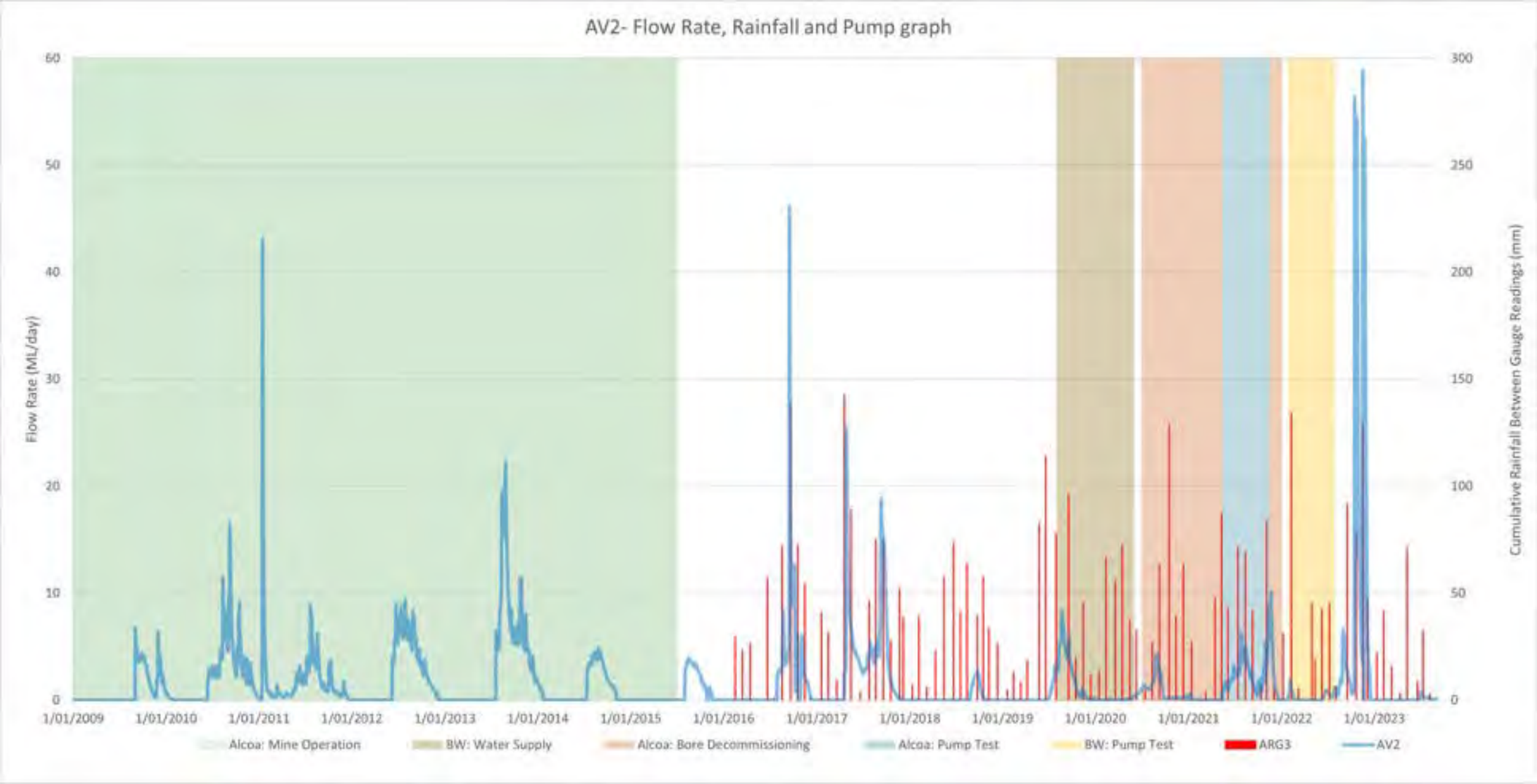

SV3- Water level, Rainfall and Pump graph
Water Level (m)
0.9
0.7
0.5
0.3
0.1
-0.1
-0.3
Cumulative Rainfall Between Gauge Readings (mm)
250
200
150
100
50
0
1/01/2009
1/01/2010
1/01/2011
1/01/2012
1/01/2013
1/01/2014
1/01/2015
1/01/2016
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG2
SV3

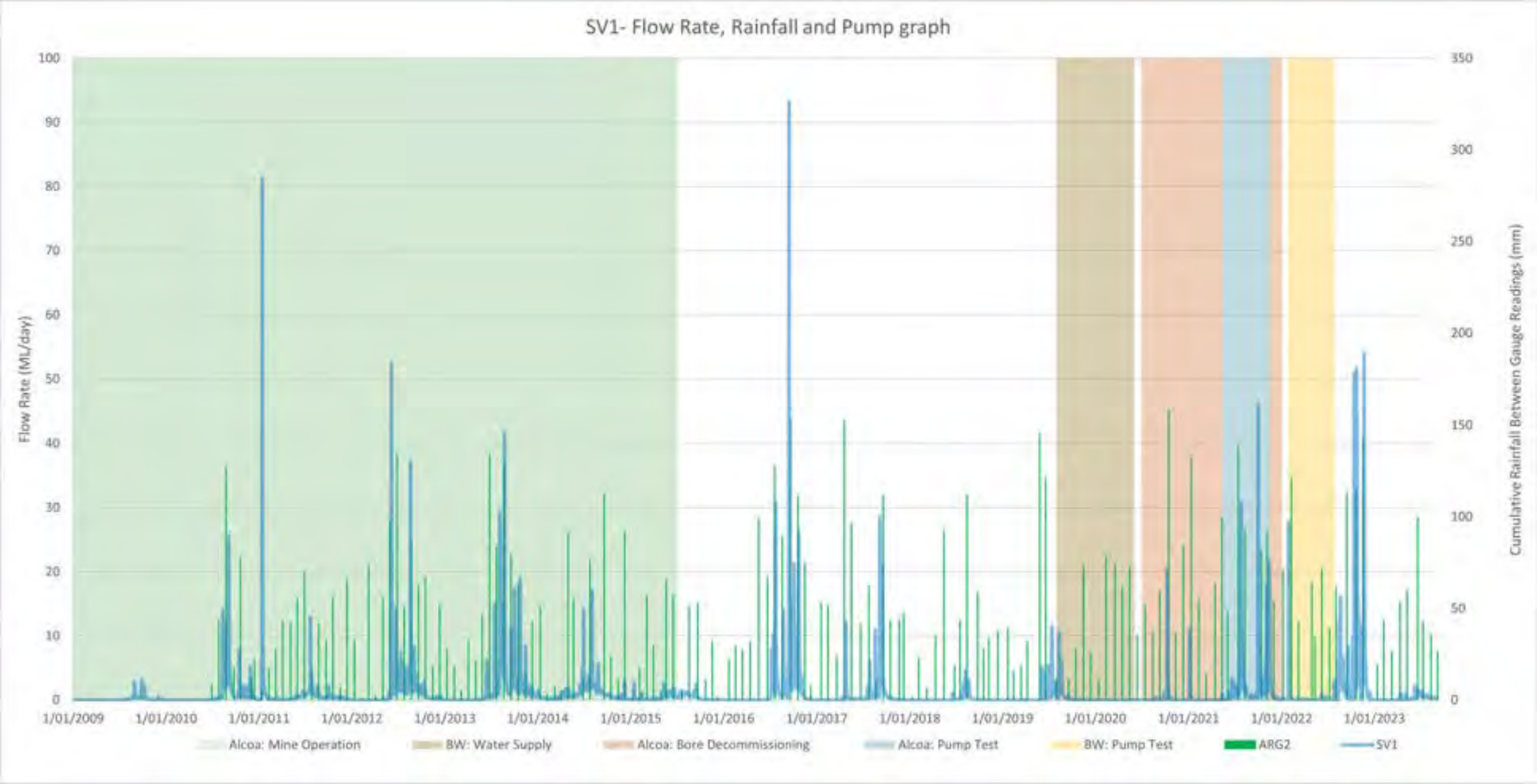

SV4- Water level, Rainfall and Pump graph
Water Level (m)
1.8
1.3
0.8
0.3
-0.2
-0.7
Cumulative Rainfall Between Gauge Readings (mm)
300
250
200
150
100
50
0
1/01/2009
1/01/2010
1/01/2011
1/01/2012
1/01/2013
1/01/2014
1/01/2015
1/01/2016
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG2
SV4

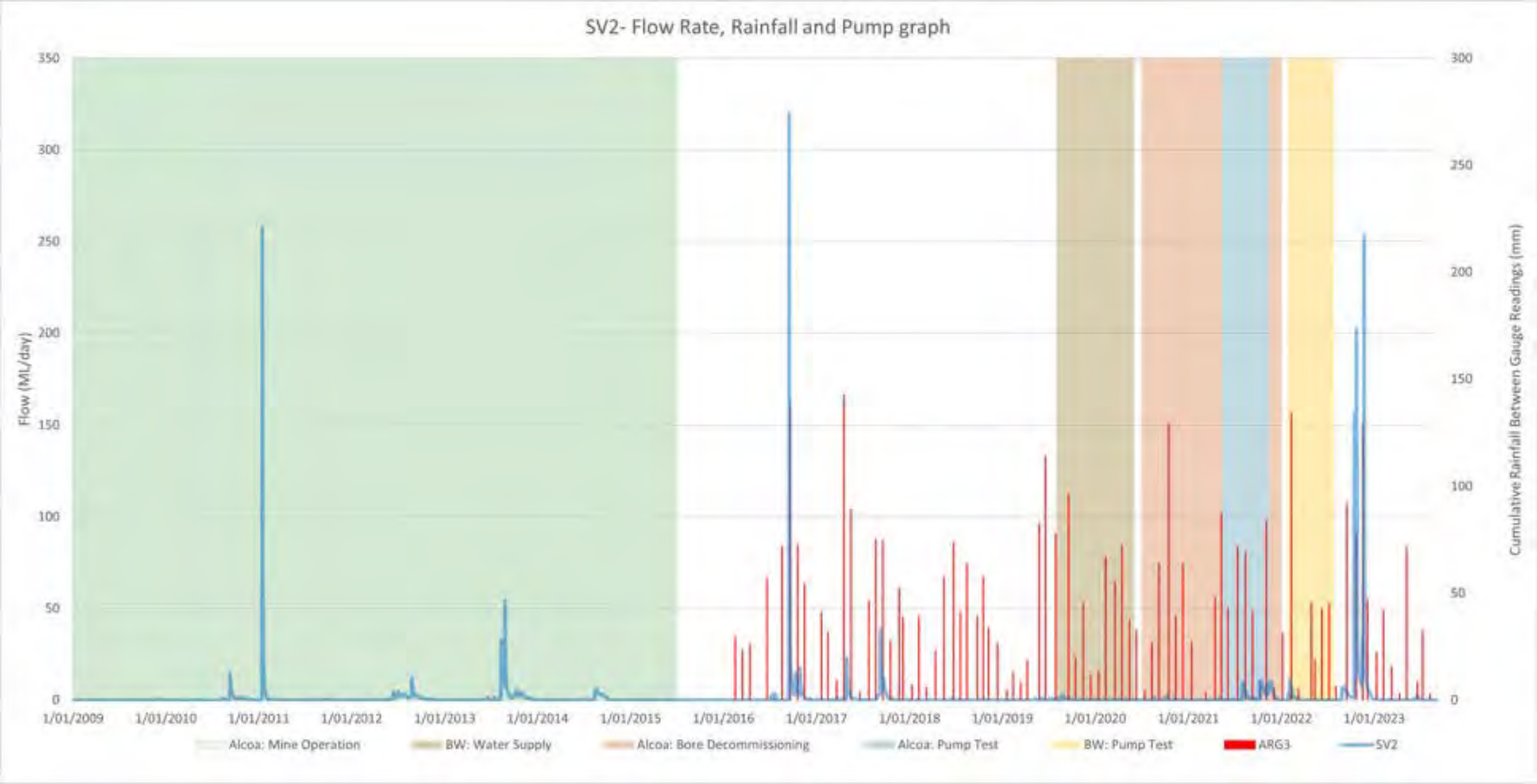

AV2- Electrical Conductivity and Pump graph
Electrical Conductivity (uS/cm)
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
18/11/2010
1/04/2012
14/08/2013
27/12/2014
10/05/2016
22/09/2017
4/02/2019
18/06/2020
31/10/2021
15/03/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Pump Test
Alcoa: Bore Decommissioning
BW: Pump Test
AV2

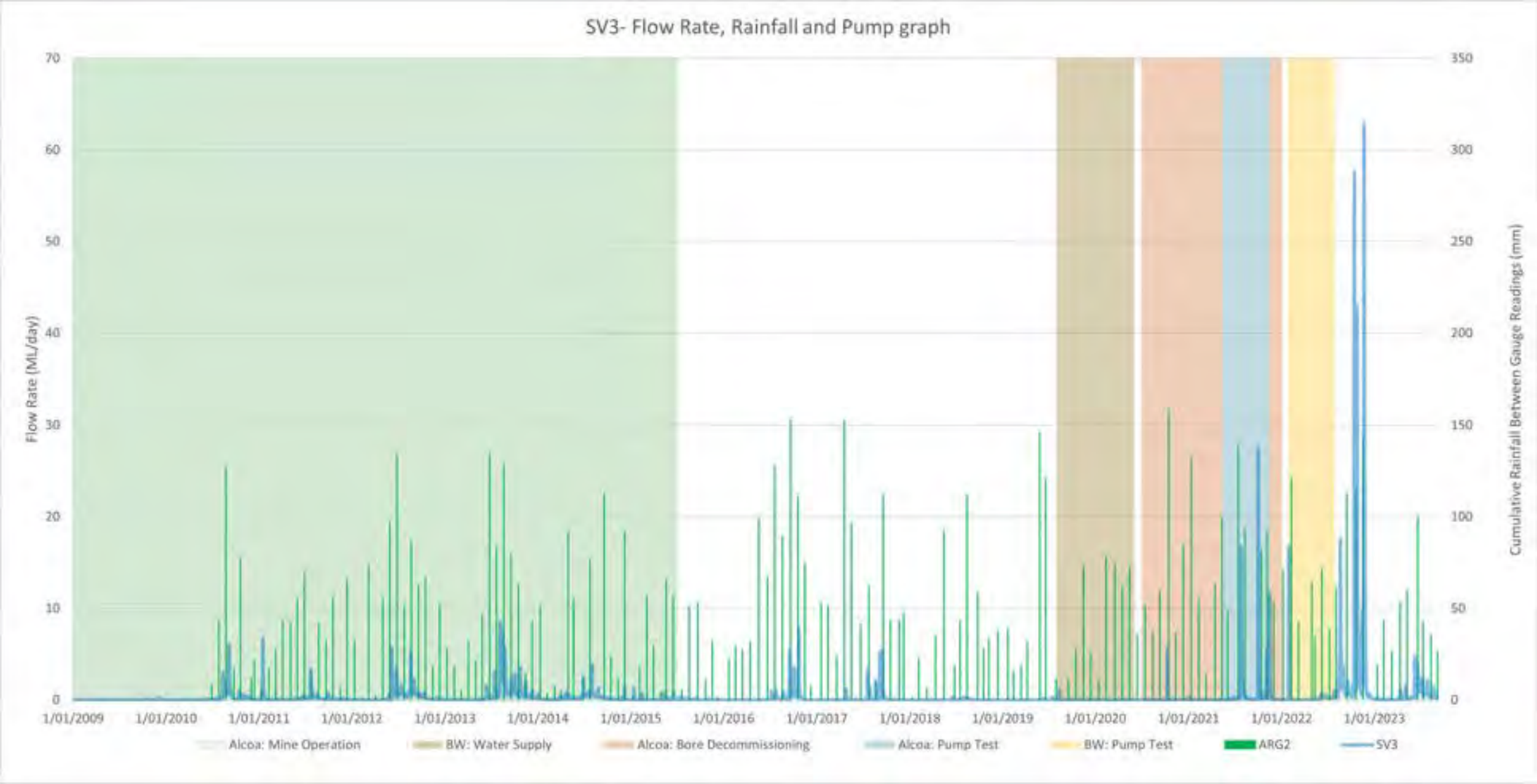

SV2 and SV4- Electrical Conductivity and Pump graph
Electrical Conductivity (uS/cm)
3500
3000
2500
2000
1500
1000
500
0
18/11/2010
1/04/2012
14/08/2013
27/12/2014
10/05/2016
22/09/2017
4/02/2019
18/06/2020
31/10/2021
15/03/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Pump Test
Alcoa: Bore Decommissioning
BW: Pump Test
SV2
SV4

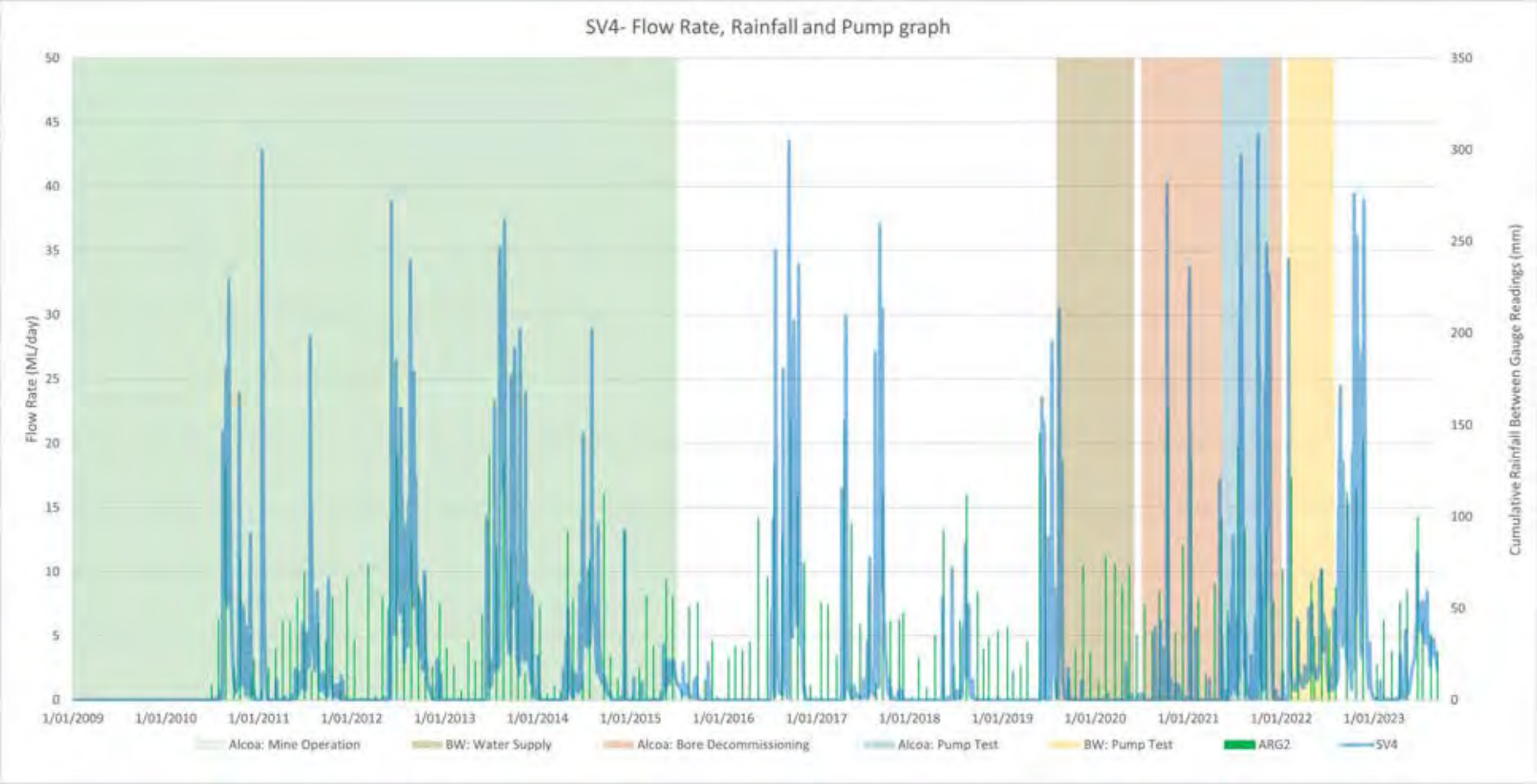

AV1- Flow Rate, Rainfall and Pump graph
Flow Rate (ML/day)
Cumulative Rainfall Between Gauge Readings (mm)
100
90
80
70
60
50
40
30
20
10
0
350
300
250
200
150
100
50
0
1/01/2009
1/01/2010
1/01/2011
1/01/2012
1/01/2013
1/01/2014
1/01/2015
1/01/2016
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG1
AV1

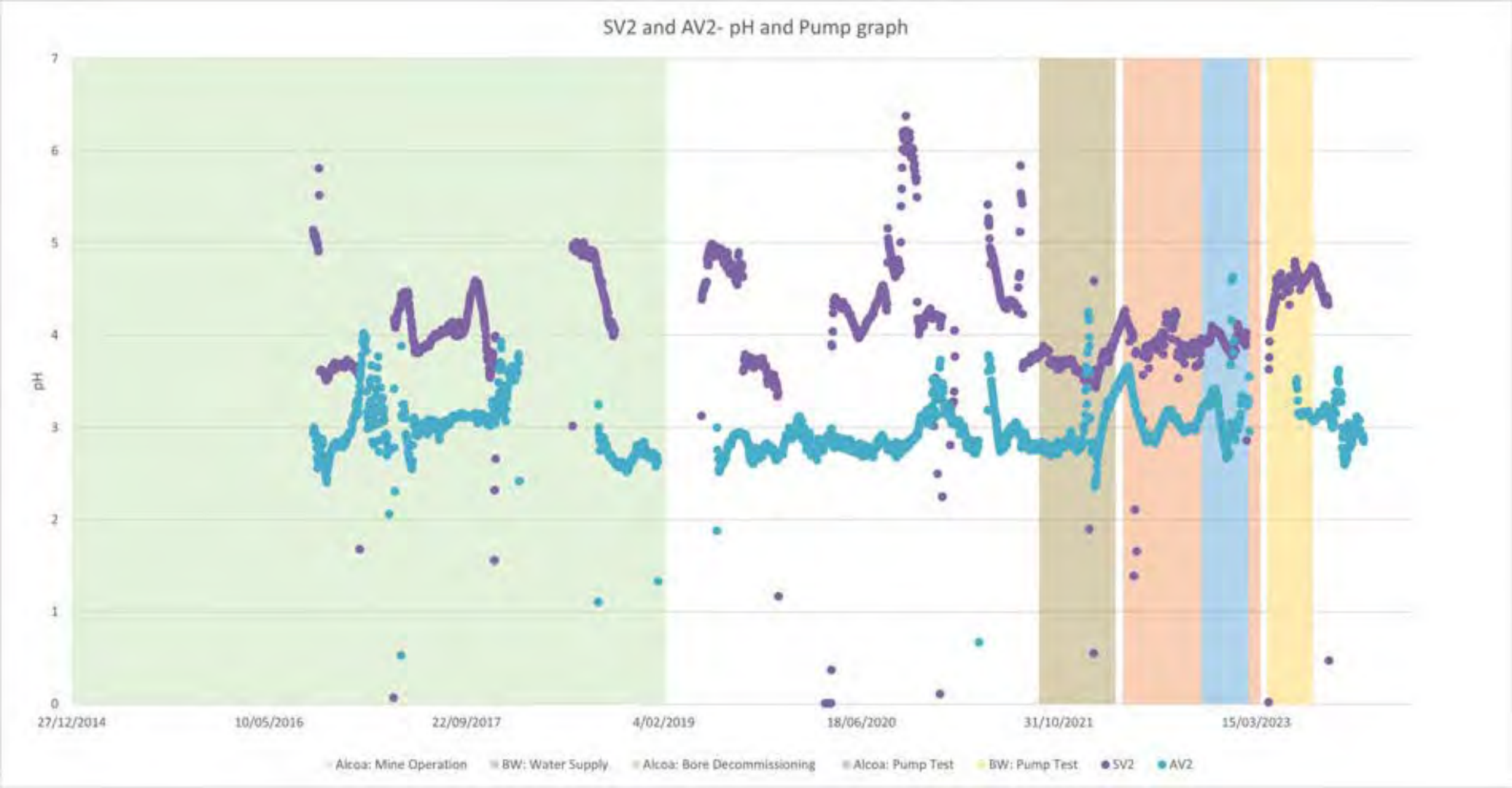

AV2- Flow Rate, Rainfall and Pump graph
Flow Rate (ML/day)
Cumulative Rainfall Between Gauge Readings (mm)
0
10
20
30
40
50
60
0
50
100
150
200
250
300
1/01/2009
1/01/2010
1/01/2011
1/01/2012
1/01/2013
1/01/2014
1/01/2015
1/01/2016
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG3
AV2

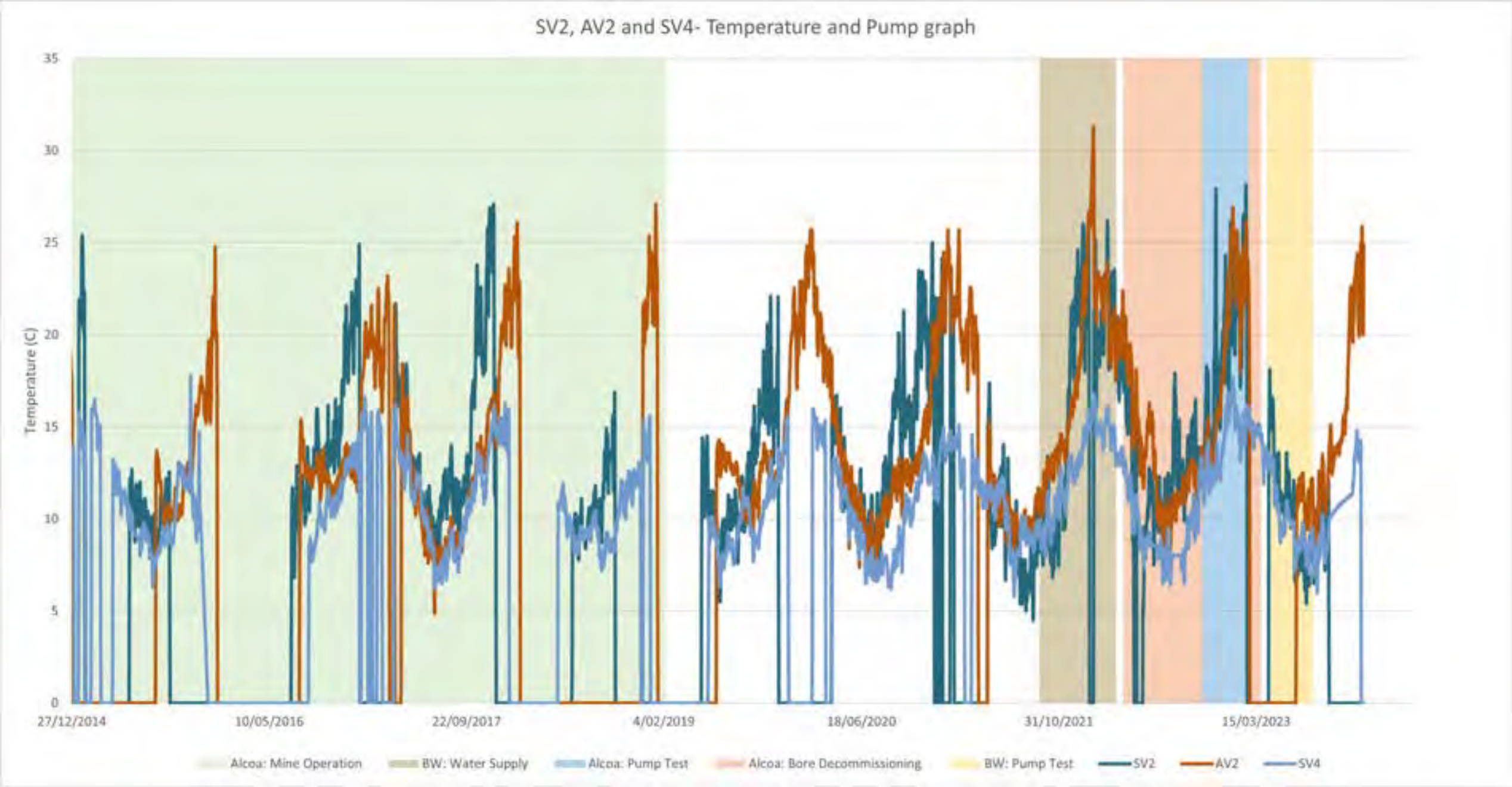

SV1- Flow Rate, Rainfall and Pump graph
Flow Rate (ML/day)
Cumulative Rainfall Between Gauge Readings (mm)
100
90
80
70
60
50
40
30
20
10
0
350
300
250
200
150
100
50
0
1/01/2009
1/01/2010
1/01/2011
1/01/2012
1/01/2013
1/01/2014
1/01/2015
1/01/2016
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG2
SV1


SV2- Flow Rate, Rainfall and Pump graph
Flow (ML/day)
Cumulative Rainfall Between Gauge Readings (mm)
350
300
250
200
150
100
50
0
300
250
200
150
100
50
0
1/01/2009
1/01/2010
1/01/2011
1/01/2012
1/01/2013
1/01/2014
1/01/2015
1/01/2016
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG3
SV2


SV3- Flow Rate, Rainfall and Pump graph
Flow Rate (ML/day)
Cumulative Rainfall Between Gauge Readings (mm)
0
10
20
30
40
50
60
70
0
50
100
150
200
250
300
350
1/01/2009
1/01/2010
1/01/2011
1/01/2012
1/01/2013
1/01/2014
1/01/2015
1/01/2016
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG2
SV3


SV4- Flow Rate, Rainfall and Pump graph
Flow Rate (ML/day)
Cumulative Rainfall Between Gauge Readings (mm)
0
5
10
15
20
25
30
35
40
45
50
0
50
100
150
200
250
300
350
1/01/2009
1/01/2010
1/01/2011
1/01/2012
1/01/2013
1/01/2014
1/01/2015
1/01/2016
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG2
SV4

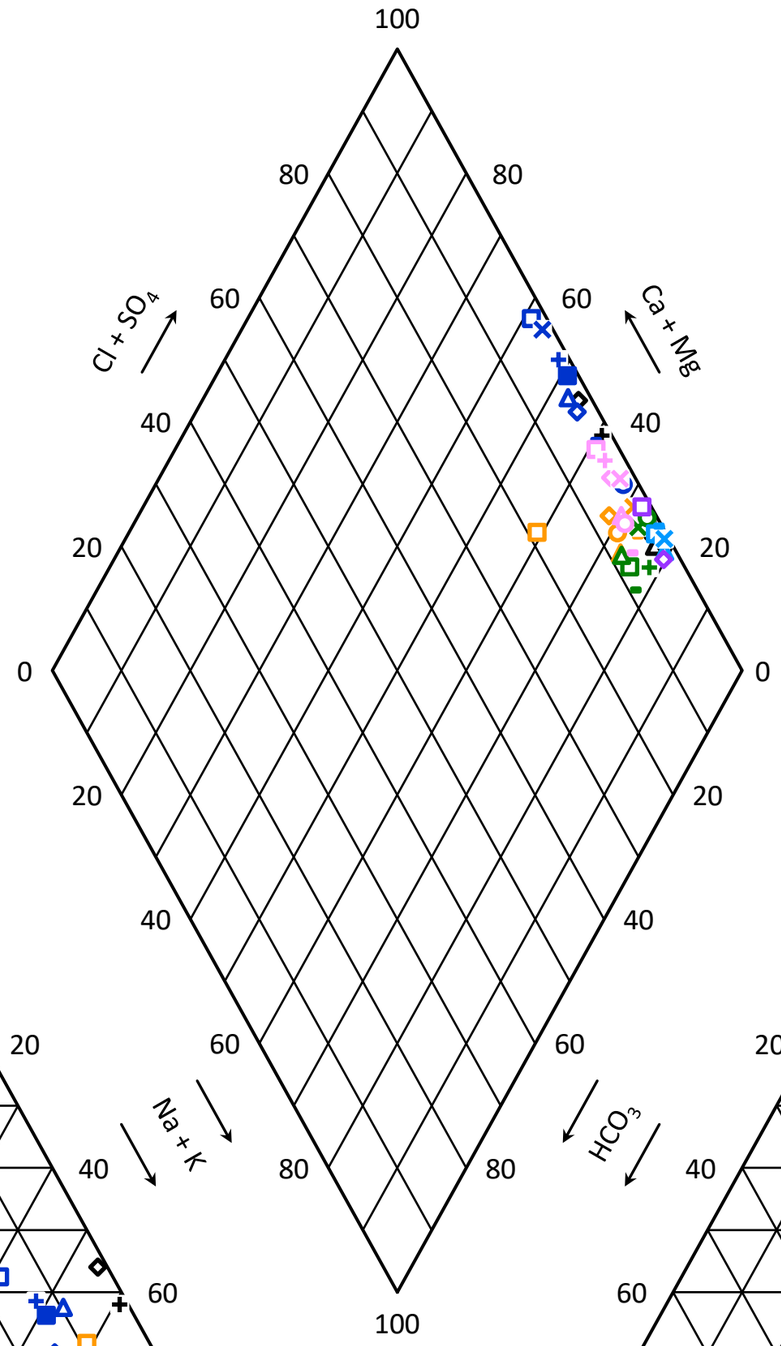

SV2 and AV2- pH and Pump graph
pH
7
6
5
4
3
2
1
0
27/12/2014
10/05/2016
22/09/2017
4/02/2019
18/06/2020
31/10/2021
15/03/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
SV2
AV2

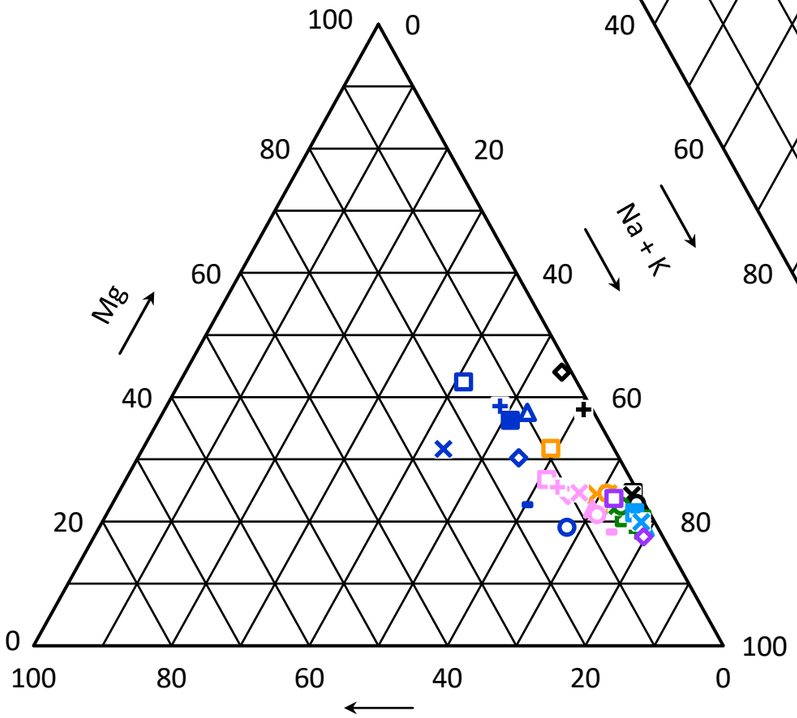

SV2, AV2 and SV4- Temperature and Pump graph
Temperature (C)
35
30
25
20
15
10
5
0
27/12/2014
10/05/2016
22/09/2017
4/02/2019
18/06/2020
31/10/2021
15/03/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Pump Test
Alcoa: Bore Decommissioning
BW: Pump Test
SV2
AV2
SV4

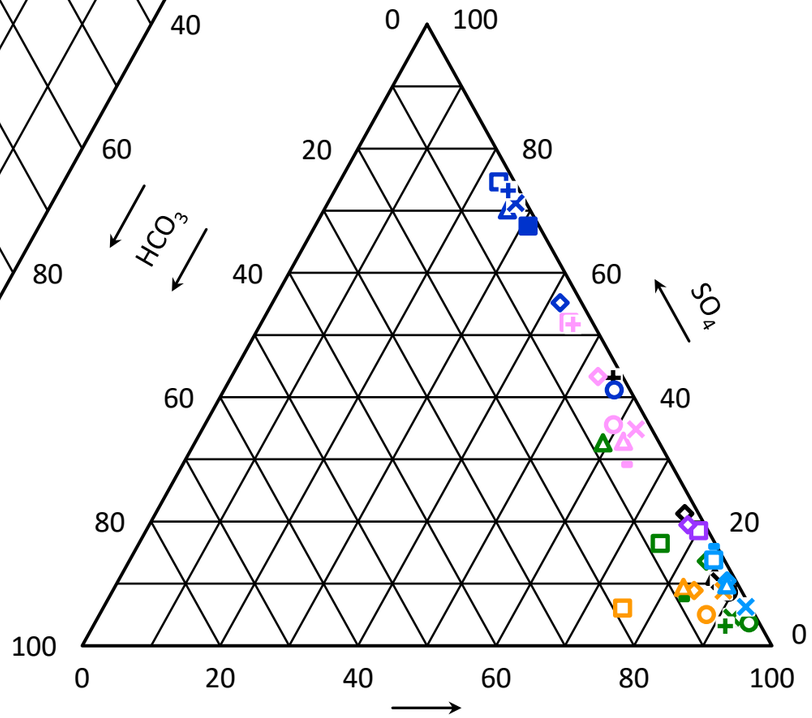
Surface Water – Piper Plots

BlueSphere ENVIRONMENTAL

Piper Plot of Surface Water Locations







- SV3_Feb-21
- SV3_Jul-21
- SV3_Jul-22
- SV3_Jul-22
- SV3_Jul-23
- SV3_Oct-23
- SV3_Jul-20
- SV1_Feb-21
- SV1_Jul-21
- SV1_Jul-22
- SV1_Jul-22
- SV1_Jul-23
- SV1_Oct-23
- SV4_Feb-21
- SV4_Jul-21
- SV4_Jul-22
- SV4_Jul-22
- SV4_Jul-23
- SV4_Oct-23
- SV4_Jul-20
- SV2_Feb-21
- SV2_Jul-21
- SV2_Aug-22
- SV2_Jul-22
- SV2_Jun-23
- SV2_Oct-23
- SV2_Feb-20
- SV2_Jul-20
- AV1_Feb-21
- AV1_Jul-21
- AV1_Jul-22
- AV1_Jul-22
- AV1_Jul-23
- AV3_Jul-21
- AV3_Jul-22
- AV2_Jul-20
- AV2_Feb-21
- AV2_Aug-22
- AV2_Jul-22
- AV2_Jun-23
- AV2_Oct-23
- AV2_Feb-20

Appendix B
Groundwater Attachments

Groundwater – Tables

Table B1 - Groundwater Monitoring Locations

Bore Details					Bore Construction Detals						MAP Requirements	
Location	Location Type	Monitoring Unit	Monitoring Zone	Ownership	Easting	Northing	Top of Casing (mAHD)	Top Screen Depth (mbgl)	Bottom Screen Depth (mbgl)	Base Depth (mbgl)	Water Level Monitoring	Water Quality Sampling
113004	Observation Bore	LEVF	Anglesea River	SOBN	244592	5753480	180.267	-	-	100.6	✓	×
113470	Observation Bore	LEVF	-	SOBN	246772	5748506	202.879	-	-	206.6	✓	×
115867 [1]	Observation Bore	LEVF	-	SOBN	251016	5746730	22.47			-	×	×
115868 [2]	Observation Bore	UEVF	-	SOBN	249963	5744912	83.165	-	-	245.4	✓	×
115869	Observation Bore	UEVF	-	SOBN	259256	5749686	105.374	-	-	167.2	✓	×
116458	Observation Bore	UEVF	-	SOBN	252433	5752147	113.372	-	-	116	✓	×
116459 [1]	Observation Bore	UEVF	Salt Creek Swamp	SOBN	250981	5746636	18.913	-	-	253	✓	×
116460	Observation Bore	LEVF	-	SOBN	246175	5744537	218.129	-	-	304	✓	×
119347	Observation Bore	LEVF	Anglesea River	SOBN	249491	5751498	84.804	-	-	226	✓	×
119348	Observation Bore	LEVF	-	SOBN	257074	5752452	50.982	-	-	322	✓	✓
121768 [3]	Observation Bore	UEVF	-	SOBN	255864	5749398	113.72	-	-	120	✓	×
122149	Observation Bore	-	-	-	-	-	-	-	-	-	✓	×
GW1	Production Bore	LEVF	Southern Borefield	Barwon Water	252659	5745938	-	510	654	666	✓	×
GW2	Production Bore	LEVF	Southern Borefield	Barwon Water	251840	5744691	-	538	660	672	✓	×
GW3	Production Bore	LEVF	Southern Borefield	Barwon Water	253462	5745996	-	426	584	596	✓	×
GW4	Production Bore	LEVF	Southern Borefield	Barwon Water	254271	5746465	-	288	456	468	✓	×
GW5	Production Bore	LEVF	Southern Borefield	Barwon Water	250880	5745681	-	386	580	589	✓	×
GW6	Production Bore	LEVF	Northern Borefield	Barwon Water	254480	5751261	-	192	252	264	✓	×
GW7	Production Bore	LEVF	Northern Borefield	Barwon Water	252768	5752089	-	237	305	317	✓	×
P1	Observation Bore	ASA	Salt Creek Swamp	Barwon Water	245854	5746562	58.964	0.5	5.89	5.89	✓	✓
P3	Observation Bore	LEVF	Anglesea River	Barwon Water	247168	5752954	111.648	25	130	142	✓	×
P6	Observation Bore	LEVF	Salt Creek Swamp	Barwon Water	245608	5746425	75.622	7	15	27	✓	×
P7B	Observation Bore	ASA	Marshy Creek - Upper Swamp	Barwon Water	252943	5750691	-	2	3.3	3.3	✓	✓^
P8	Trigger Bore	ASA	Marshy Creek - Upper Swamp	Barwon Water	253020	5750213	29.017	0.36	2.73	3.62	✓	✓
P9	Observation Bore	ASA	Upper Salt Creek Swamp	Barwon Water	243141	5749338	111.29	0.3	5.23	5.23	✓	×
P10	Observation Bore	ASA	Breakfast Creek	Barwon Water	241711	5749134	142.145	0.41	4.69	4.69	✓	×
P11	Observation Bore	LEVF	Anglesea River	Barwon Water	242958	5752478	133.44	0.77	2.77	2.77	✓	×
P12	Observation Bore	LEVF	Marshy Creek - Upper Swamp	Barwon Water	253035	5750242	33.53	40	81	87	✓	✓
P13	Observation Bore	LEVF	Anglesea River	Barwon Water	246753	5753527	95.326	36	116	128	✓	×
P13B	Observation Bore	ASA	Anglesea River	Barwon Water	246756	5753526	95.855	15	27	27	✓	×
P14	Observation Bore	LEVF	-	Barwon Water	255524	5745565	26.456	394	492	504	✓	✓
P15	Observation Bore	LEVF	-	Barwon Water	250122	5744773	94.712	363	460	466	✓	✓
P16	Observation Bore	LEVF	Breakfast Creek	Barwon Water	242887	5748160	97.385	0.3	2.86	2.86	✓	✓
P17	Control Bore	ASA	Salt Creek Swamp	Barwon Water	245564	5746833	61.61	0.3	5.37	5.37	✓	✓
P18	Observation Bore	ASA	Anglesea River	Barwon Water	246686	5753613	79.469	0.25	5.35	5.35	✓	×
P19	Trigger Bore	UEVF	Marshy Creek - Upper Swamp	Barwon Water	253035	5750242	33.315	19	22	22	✓	✓
P21	Observation Bore	UEVF	-	Barwon Water	255532	5745588	26.047	-	-	286	✓*	✓*
NB1	Observation Bore	LEVF	Northern Borefield	Barwon Water	254482	5751333	101.76	213.3	275.2	300	✓	×
NB2	Observation Bore	UEVF	Northern Borefield	Barwon Water	254480	5751333	101.82	159	162	165	✓	✓

Table B1 - Groundwater Monitoring Locations

SB1	Observation Bore	LEVF	Southern Borefield	Barwon Water	254616	5746883	11.023	266	376	460	✓	×
SB2	Observation Bore	UEVF	Southern Borefield	Barwon Water	254256	5746415	3.93	223.5	226.6	230	✓	✓
WB4	Observation Bore	UEVF	Marshy Creek - Lower Swamp	Alcoa	253534	5747619	9.46	108.2	195	222.5	✓	×
WB5	Observation Bore	UEVF	-	Alcoa	253693	5747370	10.38	132	216.6	220.1	✓	×
WB9	Observation Bore	UEVF/LEVF	-	Alcoa	254248	5747185	6.36	-	-	268.2	✓	×
WB12	Observation Bore	UEVF	Marshy Creek - Lower Swamp	Alcoa	253527	5747169	6.45	-	-	-	✓	×
WTOB1	Observation Bore	ASA	Salt Creek Swamp	Barwon Water	250990	5746642	18.89	1.7	13.7	13.7	✓	✓
WTOB2	Observation Bore	ASA	Marshy Creek - Lower Swamp	Barwon Water	253313	5747866	11.05	1.6	6.6	6.6	✓	✓
WTOB3	Observation Bore	ASA	Marshy Creek - Upper Swamp	Barwon Water	250732	5751967	42.29	7.4	13.4	13.4	✓	✓
WTOB4	Observation Bore	LEVF	Breakfast Creek	Barwon Water	243462	5747636	89.37	1.1	7.1	7.1	✓	×
WTOB5	Observation Bore	LEVF	Upper Salt Creek Swamp	Barwon Water	243224	5748605	159.32	38	68	72	✓	×

Notes:
LEVF - Lower East View Formation
UEVF - Upper Eastern View Formation
ASA - Alluvial Swamp Aquifer
MAP - Monitoring and Assessment Program (2014)
* Replacement for Coastal Bore 119349 outlined in MAP
^ P7B was utilised in place of P7
1. Nested bores appear to be impacted by inter-aquifer flow between the UEVF and LEVF.
2. Identified integrity issues within 115868, groundwater heads may not be reliable
3. This bore (121768) is known to have two screens, however, is not screened with the LEVF. Head levels indicate some connection with the LEVF, as such head results may not be indicative of the UEVF

Table B2 - Groundwater Analytical Results

					Field											
					Temperature (Field)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Bromide	Calcium	Cations Total	Chloride	Electrical Conductivity (Lab)
					oC	mg/L	mg/L	mg/L	mg/L	meq/L	µg/L	mg/L	meq/L	mg/L	µS/cm
EQL					0.1	1	1	1	1	0.01	10	1	0.01	1	1
Location Code	**Location Type**	**Monitoring Zone**	**Date**	**Monitoring Unit**											
116459	Observation Bore	Salt Creek Swamp	08 Dec 2020	UEVF	16.0	82	<1	<1	82	8.01	-	3	6.28	212	775
116459	Observation Bore	Salt Creek Swamp	14 Jan 2021	UEVF	-	90	<1	<1	90	8.08	-	4	6.54	210	804
116459	Observation Bore	Salt Creek Swamp	04 Feb 2021	UEVF	-	87	<1	<1	87	8.22	-	4	6.52	218	847
119348	Observation Bore		12 Jan 2012	LEVF	-	117	<1	<1	117	13.8	-	34	12.8	404	1,450.0
119348	Observation Bore		26 Jul 2012	LEVF	-	119	<1	<1	119	14.1	-	19	13.3	416	1,510.0
119348	Observation Bore		08 Jan 2013	LEVF	-	118	<1	<1	118	13.6	-	20	12.4	397	1,400.0
119348	Observation Bore		25 Jul 2013	LEVF	-	113	<1	<1	113	13.6	-	19	13.7	402	1,310.0
119348	Observation Bore		24 Mar 2015	LEVF	-	119	<1	<1	119	13.3	-	18	12.3	388	1,360.0
119348	Observation Bore		13 Jul 2015	LEVF	-	109	<1	<1	109	13.9	-	18	11.9	416	1,540.0
119348	Observation Bore		03 Dec 2015	LEVF	-	114	<1	<1	114	13.6	-	18	12.2	402	1,510.0
119348	Observation Bore		13 Apr 2016	LEVF	-	110	<1	<1	110	13.8	-	16	12.2	410	1,410.0
119348	Observation Bore		25 Aug 2016	LEVF	-	109	<1	<1	109	13.6	-	17	13.6	405	1,420.0
119348	Observation Bore		22 Feb 2017	LEVF	-	108	<1	<1	108	13.3	-	14	11.4	396	1,130.0
119348	Observation Bore		26 Jul 2017	LEVF	-	147	<1	<1	147	14.1	-	20	12.3	396	1,410.0
119348	Observation Bore		01 Feb 2018	LEVF	-	120	<1	<1	120	13.6	-	15	10.5	399	1,370.0
119348	Observation Bore		11 Jul 2018	LEVF	-	132	<1	<1	132	14.1	-	13	11.1	405	1,440.0
119348	Observation Bore		22 Jan 2019	LEVF	-	110	3	<1	112	14.2	-	11	11.6	423	1,280.0
119348	Observation Bore		21 Jan 2020	LEVF	-	122	26	<1	148	14.6	-	8	12.0	412	1,440.0
119348	Observation Bore		21 Jul 2020	LEVF	-	137	28	<1	164	14.5	-	8	11.4	397	1,480.0
119348	Observation Bore		25 Jul 2022	LEVF	23.10	120	<1	<1	120	13.1	844	13	11.1	380	1,400.0
119348	Observation Bore		25 Jan 2023	LEVF	-	125	<1	<1	125	13.9	776	15	11.0	402	1,430.0
119348	Observation Bore		31 Jul 2023	LEVF	23.6	119	<1	<1	119	12.4	-	16	12.0	354	1,300.0
NB2	Observation Bore	Northern Borefield	13 Jan 2012	UEVF	-	71	<1	<1	71	25.0	-	84	23.2	744	2,620.0
NB2	Observation Bore	Northern Borefield	25 Jul 2012	UEVF	-	62	<1	<1	62	25.5	-	79	23.4	764	2,750.0
NB2	Observation Bore	Northern Borefield	09 Jan 2013	UEVF	-	74	<1	<1	74	24.6	-	82	23.4	726	2,610.0
NB2	Observation Bore	Northern Borefield	26 Jul 2013	UEVF	-	67	<1	<1	67	25.2	-	79	22.9	743	2,490.0
NB2	Observation Bore	Northern Borefield	25 Mar 2015	UEVF	-	58	<1	<1	58	24.2	-	74	22.6	723	2,500.0
NB2	Observation Bore	Northern Borefield	14 Jul 2015	UEVF	-	71	<1	<1	71	25.6	-	76	22.3	760	2,760.0
NB2	Observation Bore	Northern Borefield	04 Dec 2015	UEVF	-	67	<1	<1	67	24.6	-	77	22.7	729	2,770.0
NB2	Observation Bore	Northern Borefield	14 Apr 2016	UEVF	-	68	<1	<1	68	24.9	-	75	22.8	739	2,550.0
NB2	Observation Bore	Northern Borefield	26 Aug 2016	UEVF	-	76	<1	<1	76	24.8	-	76	24.8	732	2,600.0
NB2	Observation Bore	Northern Borefield	23 Feb 2017	UEVF	-	68	<1	<1	68	25.6	-	71	21.0	759	2,400.0
NB2	Observation Bore	Northern Borefield	20 Jul 2017	UEVF	-	68	<1	<1	68	23.3	-	75	20.7	683	2,470.0
NB2	Observation Bore	Northern Borefield	30 Jan 2018	UEVF	-	71	<1	<1	71	25.1	-	74	20.0	744	2,350.0
NB2	Observation Bore	Northern Borefield	03 Jul 2018	UEVF	-	81	<1	<1	81	25.1	-	74	20.7	744	2,410.0
NB2	Observation Bore	Northern Borefield	21 Jan 2019	UEVF	-	68	<1	<1	68	26.4	-	72	19.2	804	2,280.0
NB2	Observation Bore	Northern Borefield	08 Aug 2019	UEVF	-	57	<1	<1	57	24.6	-	72	20.2	737	2,440.0
NB2	Observation Bore	Northern Borefield	16 Jan 2020	UEVF	-	68	<1	<1	68	25.4	-	73	20.8	762	2,520.0
NB2	Observation Bore	Northern Borefield	16 Jul 2020	UEVF	-	91	<1	<1	91	25.4	-	70	20.6	742	2,530.0

					Field										
					Temperature (Field)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Bromide	Calcium	Cations Total	Chloride	Electrical Conductivity (Lab)
					oC	mg/L	mg/L	mg/L	mg/L	meq/L	µg/L	mg/L	meq/L	mg/L	µS/cm
NB2	Observation Bore	Northern Borefield	11 Jan 2021	UEVF	25.7	85	<1	<1	85	24.0	-	72	20.7	696	2,440.0
NB2	Observation Bore	Northern Borefield	21 Jul 2021	UEVF	15.6	74	<1	<1	74	24.0	-	74	20.4	711	2,600.0
NB2	Observation Bore	Northern Borefield	19 Jan 2022	UEVF	20.3	77	<1	<1	77	24.9	-	67	20.5	736	2,570.0
NB2	Observation Bore	Northern Borefield	13 Jul 2022	UEVF	14.5	71	<1	<1	71	24.6	-	81	22.1	719	2,280.0
NB2	Observation Bore	Northern Borefield	24 Jan 2023	UEVF	22.0	50	<1	<1	50	25.2	-	78	21.2	761	2,470.0
NB2	Observation Bore	Northern Borefield	04 Jul 2023	UEVF	12.63	65	<1	<1	65	23.5	-	75	20.7	701	2,460.0
P1	Observation Bore	Salt Creek Swamp	31 Mar 2015	PWT	-	25	<1	<1	25	5.02	-	3	4.58	150	591
P1	Observation Bore	Salt Creek Swamp	20 Jul 2015	PWT	-	9	<1	<1	9	2.54	-	1	2.15	75	325
P1	Observation Bore	Salt Creek Swamp	16 Feb 2016	PWT	-	52	<1	<1	52	6.68	-	3	5.50	178	715
P1	Observation Bore	Salt Creek Swamp	19 Jul 2016	PWT	-	6	<1	<1	6	4.10	-	3	3.51	116	428
P1	Observation Bore	Salt Creek Swamp	14 Feb 2017	PWT	-	63	<1	<1	63	5.70	-	5	4.86	134	703
P1	Observation Bore	Salt Creek Swamp	24 Jul 2017	PWT	-	1	<1	<1	1	3.61	-	4	3.62	103	410
P1	Observation Bore	Salt Creek Swamp	31 Jan 2018	PWT	-	42	<1	<1	42	4.49	-	6	4.39	120	495
P1	Observation Bore	Salt Creek Swamp	09 Jul 2018	PWT	-	<1	<1	<1	<1	2.67	-	3	2.61	77	338
P1	Observation Bore	Salt Creek Swamp	23 Jan 2019	PWT	-	20	<1	<1	20	4.27	-	3	3.66	124	392
P1	Observation Bore	Salt Creek Swamp	06 Aug 2019	PWT	-	4	<1	<1	4	3.47	-	2	2.78	98	371
P1	Observation Bore	Salt Creek Swamp	15 Jan 2020	PWT	-	28	<1	<1	28	4.80	-	3	4.42	132	510
P1	Observation Bore	Salt Creek Swamp	15 Jul 2020	PWT	-	4	<1	<1	4	2.19	-	1	2.22	69	339
P1	Observation Bore	Salt Creek Swamp	19 Jan 2021	PWT	-	8	<1	<1	8	3.54	-	3	3.10	103	384
P1	Observation Bore	Salt Creek Swamp	15 Jul 2021	PWT	12.7	7	<1	<1	7	4.22	-	2	3.61	130	441
P1	Observation Bore	Salt Creek Swamp	17 Jan 2022	PWT	15	25	<1	<1	25	2.95	523	1	3.00	87	340
P1	Observation Bore	Salt Creek Swamp	12 Jul 2022	PWT	11.3	15	<1	<1	15	2.96	-	1	2.78	89	364
P1	Observation Bore	Salt Creek Swamp	23 Jan 2023	PWT	16.4	36	<1	<1	36	3.12	-	3	3.34	85	378
P1	Observation Bore	Salt Creek Swamp	05 Jul 2023	PWT	11.81	27	<1	<1	27	3.93	-	4	3.95	110	483
P7B	Observation Bore	Marshy Creek - Upper Swamp	01 Apr 2015	PWT	-	<1	<1	<1	<1	12.3	-	15	10.2	371	1,300.0
P7B	Observation Bore	Marshy Creek - Upper Swamp	21 Jul 2015	PWT	-	<1	<1	<1	<1	12.8	-	16	10.8	377	1,510.0
P7B	Observation Bore	Marshy Creek - Upper Swamp	17 Feb 2016	PWT	-	<1	<1	<1	<1	8.49	-	7	8.86	262	902
P7B	Observation Bore	Marshy Creek - Upper Swamp	19 Jul 2016	PWT	-	<1	<1	<1	<1	8.45	-	6	7.18	259	895
P7B	Observation Bore	Marshy Creek - Upper Swamp	14 Feb 2017	PWT	-	<1	<1	<1	<1	8.04	-	6	6.88	246	1,020.0
P7B	Observation Bore	Marshy Creek - Upper Swamp	20 Jul 2017	PWT	-	<1	<1	<1	<1	8.33	-	7	7.51	254	908
P7B	Observation Bore	Marshy Creek - Upper Swamp	29 Jan 2018	PWT	-	<1	<1	<1	<1	8.33	-	6	6.40	254	885
P7B	Observation Bore	Marshy Creek - Upper Swamp	02 Jul 2018	PWT	-	<1	<1	<1	<1	8.12	-	6	6.62	251	810
P7B	Observation Bore	Marshy Creek - Upper Swamp	23 Jan 2019	PWT	-	<1	<1	<1	<1	8.30	-	5	6.37	261	739
P7B	Observation Bore	Marshy Creek - Upper Swamp	31 Jul 2019	PWT	-	<1	<1	<1	<1	8.15	-	6	6.53	249	850
P7B	Observation Bore	Marshy Creek - Upper Swamp	14 Jan 2020	PWT	-	<1	<1	<1	<1	8.25	-	5	7.39	254	884
P7B	Observation Bore	Marshy Creek - Upper Swamp	14 Jul 2020	PWT	-	<1	<1	<1	<1	8.00	-	6	6.53	249	919
P7B	Observation Bore	Marshy Creek - Upper Swamp	12 Jan 2021	PWT	13.9	<1	<1	<1	<1	8.76	-	6	6.83	272	867
P7B	Observation Bore	Marshy Creek - Upper Swamp	14 Jul 2021	PWT	12.6	<1	<1	<1	<1	7.83	-	6	6.53	240	834
P7B	Observation Bore	Marshy Creek - Upper Swamp	17 Jan 2022	PWT	14.8	<1	<1	<1	<1	7.96	485	6	6.66	246	880
P7B	Observation Bore	Marshy Creek - Upper Swamp	11 Jul 2022	PWT	-	<1	<1	<1	<1	7.58	-	6	6.92	231	853
P7B	Observation Bore	Marshy Creek - Upper Swamp	19 Jan 2023	PWT	13.5	<1	<1	<1	<1	13.6	774	15	9.79	418	1,520.0
P7B	Observation Bore	Marshy Creek - Upper Swamp	03 Jul 2023	PWT	12.6	<1	<1	<1	<1	11.7	-	17	10.2	356	1,340.0

					Field										
					Temperature (Field)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Bromide	Calcium	Cations Total	Chloride	Electrical Conductivity (Lab)
					oC	mg/L	mg/L	mg/L	mg/L	meq/L	µg/L	mg/L	meq/L	mg/L	µS/cm
P8	Trigger Bore	Marshy Creek - Upper Swamp	01 Apr 2015	PWT	-	12	<1	<1	12	21.1	-	37	17.3	644	2,240.0
P8	Trigger Bore	Marshy Creek - Upper Swamp	21 Jul 2015	PWT	-	<1	<1	<1	<1	22.9	-	41	19.2	707	2,590.0
P8	Trigger Bore	Marshy Creek - Upper Swamp	17 Feb 2016	PWT	-	15	<1	<1	15	21.8	-	44	20.7	662	2,150.0
P8	Trigger Bore	Marshy Creek - Upper Swamp	19 Jul 2016	PWT	-	7	<1	<1	7	23.2	-	46	21.6	715	2,250.0
P8	Trigger Bore	Marshy Creek - Upper Swamp	14 Feb 2017	PWT	-	14	<1	<1	14	21.2	-	42	18.5	643	2,410.0
P8	Trigger Bore	Marshy Creek - Upper Swamp	20 Jul 2017	PWT	-	2	<1	<1	2	21.0	-	40	17.6	642	2,280.0
P8	Trigger Bore	Marshy Creek - Upper Swamp	29 Jan 2018	PWT	-	12	<1	<1	12	23.8	-	43	17.4	679	2,160.0
P8	Trigger Bore	Marshy Creek - Upper Swamp	02 Jul 2018	PWT	-	2	<1	<1	2	21.5	-	41	18.2	666	2,110.0
P8	Trigger Bore	Marshy Creek - Upper Swamp	23 Jan 2019	PWT	-	<1	<1	<1	<1	22.0	-	40	18.4	683	1,950.0
P8	Trigger Bore	Marshy Creek - Upper Swamp	31 Jul 2019	PWT	-	<1	<1	<1	<1	21.7	-	42	17.8	672	2,130.0
P8	Trigger Bore	Marshy Creek - Upper Swamp	14 Jan 2020	PWT	-	2	<1	<1	2	21.8	-	34	19.1	675	2,200.0
P8	Trigger Bore	Marshy Creek - Upper Swamp	14 Jul 2020	PWT	-	4	<1	<1	4	22.1	-	44	18.8	689	2,360.0
P8	Trigger Bore	Marshy Creek - Upper Swamp	12 Jan 2021	PWT	15	3	<1	<1	3	22.5	-	46	20.0	704	2,410.0
P8	Trigger Bore	Marshy Creek - Upper Swamp	14 Jul 2021	PWT	11	<1	<1	<1	<1	22.6	-	44	19.7	701	2,410.0
P8	Trigger Bore	Marshy Creek - Upper Swamp	17 Jan 2022	PWT	15	6	<1	<1	6	-	1,180	42	18.5	646	2,345.0
P8	Trigger Bore	Marshy Creek - Upper Swamp	11 Jul 2022	PWT	-	11	<1	<1	11	20.7	-	43	19.1	634	2,240.0
P8	Trigger Bore	Marshy Creek - Upper Swamp	19 Jan 2023	PWT	14.0	<1	<1	<1	<1	22.0	1,230	41	18.0	686	2,240.0
P8	Trigger Bore	Marshy Creek - Upper Swamp	03 Jul 2023	PWT	11.82	7	<1	<1	7	20.7	-	43	18.5	637	2,240.0
P12	Observation Bore	Marshy Creek - Upper Swamp	31 Mar 2015	LEVF	-	70	<1	<1	70	11.3	-	10	9.70	344	1,200.0
P12	Observation Bore	Marshy Creek - Upper Swamp	21 Jul 2015	LEVF	-	64	<1	<1	64	11.3	-	11	10.2	350	1,260.0
P12	Observation Bore	Marshy Creek - Upper Swamp	16 Feb 2016	LEVF	-	80	<1	<1	80	11.8	-	11	9.87	355	1,180.0
P12	Observation Bore	Marshy Creek - Upper Swamp	19 Jul 2016	LEVF	-	81	<1	<1	81	12.1	-	11	9.99	362	1,170.0
P12	Observation Bore	Marshy Creek - Upper Swamp	14 Feb 2017	LEVF	-	66	<1	<1	66	11.1	-	11	9.34	339	1,310.0
P12	Observation Bore	Marshy Creek - Upper Swamp	25 Jul 2017	LEVF	-	81	<1	<1	81	11.5	-	11	9.80	346	1,400.0
P12	Observation Bore	Marshy Creek - Upper Swamp	29 Jan 2018	LEVF	-	78	<1	<1	78	11.7	-	12	8.98	355	1,150.0
P12	Observation Bore	Marshy Creek - Upper Swamp	02 Jul 2018	LEVF	-	80	<1	<1	80	12.2	-	11	9.17	371	1,130.0
P12	Observation Bore	Marshy Creek - Upper Swamp	23 Jan 2019	LEVF	-	64	<1	<1	64	11.7	-	8	8.66	365	1,050.0
P12	Observation Bore	Marshy Creek - Upper Swamp	31 Jul 2019	LEVF	-	75	<1	<1	75	11.6	-	11	8.96	354	1,150.0
P12	Observation Bore	Marshy Creek - Upper Swamp	14 Jan 2020	LEVF	-	68	<1	<1	68	11.5	-	9	9.67	355	1,170.0
P12	Observation Bore	Marshy Creek - Upper Swamp	14 Jul 2020	LEVF	-	80	<1	<1	80	11.6	-	10	8.86	346	1,200.0
P12	Observation Bore	Marshy Creek - Upper Swamp	12 Jan 2021	LEVF	19.1	79	<1	<1	79	11.8	-	10	9.06	356	1,160.0
P12	Observation Bore	Marshy Creek - Upper Swamp	14 Jul 2021	LEVF	18.6	82	<1	<1	82	11.5	-	11	9.05	343	1,100.0
P12	Observation Bore	Marshy Creek - Upper Swamp	17 Jan 2022	LEVF	19.1	68	<1	<1	68	11.5	579	10	9.10	353	1,180.0
P12	Observation Bore	Marshy Creek - Upper Swamp	11 Jul 2022	LEVF	-	59	<1	<1	59	10.6	-	12	9.68	325	1,160.0
P12	Observation Bore	Marshy Creek - Upper Swamp	19 Jan 2023	LEVF	17.65	56	<1	<1	56	11.4	613	12	8.97	359	1,210.0
P12	Observation Bore	Marshy Creek - Upper Swamp	17 Jul 2023	LEVF	11.10	49	<1	<1	49	10.2	-	12	9.31	319	1,130.0
P14	Observation Bore		13 Jan 2012	LEVF	-	28	<1	<1	28	15.1	993	22	13.8	435	1,580.0
P14	Observation Bore		25 Jul 2012	LEVF	-	14	<1	<1	14	14.1	960	13	12.7	409	1,540.0
P14	Observation Bore		09 Jan 2013	LEVF	-	77	<1	<1	77	9.74	635	12	8.89	270	1,040.0
P14	Observation Bore		26 Jul 2013	LEVF	-	51	<1	<1	51	8.79	558	10	8.50	254	883
P14	Observation Bore		25 Mar 2015	LEVF	-	71	<1	<1	71	7.78	392	8	6.87	216	816
P14	Observation Bore		13 Jul 2015	LEVF	-	76	<1	<1	76	8.04	632	8	6.61	221	932

					Field										
					Temperature (Field)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Bromide	Calcium	Cations Total	Chloride	Electrical Conductivity (Lab)
					oC	mg/L	mg/L	mg/L	mg/L	meq/L	µg/L	mg/L	meq/L	mg/L	µS/cm
P14	Observation Bore		04 Dec 2015	LEVF	-	76	<1	<1	76	7.97	540	9	7.05	219	907
P14	Observation Bore		14 Apr 2016	LEVF	-	73	<1	<1	73	7.95	578	8	6.96	222	848
P14	Observation Bore		26 Aug 2016	LEVF	-	73	<1	<1	73	7.94	366	9	7.33	221	838
P14	Observation Bore		23 Feb 2017	LEVF	-	74	<1	<1	74	7.60	435	6	6.20	209	776
P14	Observation Bore		03 Aug 2017	LEVF	-	133	<1	<1	133	10.3	549	16	9.09	270	978
P14	Observation Bore		06 Feb 2018	LEVF	-	138	<1	<1	138	10.5	504	17	8.45	272	1,060.0
P14	Observation Bore		10 Jul 2018	LEVF	-	154	<1	<1	154	10.8	513	16	8.83	272	1,110.0
P14	Observation Bore		22 Jan 2019	LEVF	-	132	<1	<1	132	10.8	424	13	9.07	288	989
P14	Observation Bore		08 Aug 2019	LEVF	-	152	<1	<1	152	10.9	368	14	8.66	277	1,050.0
P14	Observation Bore		21 Jan 2020	LEVF	-	68	<1	<1	68	7.86	317	6	6.61	221	800
P14	Observation Bore		20 Jul 2020	LEVF	-	65	<1	<1	65	8.30	347	7	6.51	232	806
P14	Observation Bore		13 Jan 2021	LEVF	19.3	125	<1	<1	125	9.36	385	9	7.65	239	990
P14	Observation Bore		17 Aug 2021	LEVF	17.0	143	<1	<1	143	10.8	447	14	7.79	279	1,240.0
P14	Observation Bore		27 Jan 2022	LEVF	21.9	121	<1	<1	121	9.57	465	12	8.18	252	1,050.0
P14	Observation Bore		18 Jul 2022	LEVF	1	80	<1	<1	80	8.29	-	8	6.70	230	859
P14	Observation Bore		30 Jan 2023	LEVF	18.6	124	<1	<1	124	9.84	441	14	8.28	258	1,020.0
P14	Observation Bore		20 Jul 2023	LEVF	15.4	140	<1	<1	140	9.36	385	15	8.59	231	944
P15	Observation Bore		12 Jan 2012	LEVF	-	11	<1	<1	11	8.54	-	22	8.66	256	924
P15	Observation Bore		26 Jul 2012	LEVF	-	10	<1	<1	10	8.86	-	5	8.05	262	992
P15	Observation Bore		08 Jan 2013	LEVF	-	9	<1	<1	9	8.76	-	5	8.07	260	931
P15	Observation Bore		24 Mar 2015	LEVF	-	8	<1	<1	8	8.53	-	5	7.22	254	881
P15	Observation Bore		14 Jul 2015	LEVF	-	12	<1	<1	12	8.77	-	4	6.96	258	1,020.0
P15	Observation Bore		03 Dec 2015	LEVF	-	11	<1	<1	11	8.61	-	5	7.31	254	998
P15	Observation Bore		13 Apr 2016	LEVF	-	12	<1	<1	12	8.84	-	4	7.32	263	934
P15	Observation Bore		25 Aug 2016	LEVF	-	14	<1	<1	14	8.74	-	5	7.84	257	933
P15	Observation Bore		22 Feb 2017	LEVF	-	13	<1	<1	13	8.62	-	4	6.82	252	886
P15	Observation Bore		02 Aug 2017	LEVF	-	23	<1	<1	23	9.15	-	5	7.18	263	939
P15	Observation Bore		01 Feb 2018	LEVF	-	15	<1	<1	15	8.85	-	4	6.64	259	907
P15	Observation Bore		11 Jul 2018	LEVF	-	15	<1	<1	15	8.98	-	4	7.02	264	920
P15	Observation Bore		29 Jan 2019	LEVF	23.2	22	<1	<1	22	9.33	-	5	7.61	271	760
P15	Observation Bore		14 Aug 2019	LEVF	-	12	<1	<1	12	8.44	-	4	6.58	248	886
P15	Observation Bore		20 Jan 2020	LEVF	-	12	<1	<1	12	9.13	-	4	7.19	271	943
P15	Observation Bore		22 Jul 2020	LEVF	-	4	<1	<1	4	8.90	-	5	7.05	267	890
P15	Observation Bore		14 Jan 2021	LEVF	-	12	<1	<1	12	9.02	-	4	7.11	267	938
P15	Observation Bore		22 Jul 2021	LEVF	13.8	11	<1	<1	11	8.83	-	4	7.17	258	1,070.0
P15	Observation Bore		24 Jan 2022	LEVF	20.4	6	<1	<1	6	8.75	-	4	7.54	261	952
P15	Observation Bore		19 Jul 2022	LEVF	14.5	17	<1	<1	17	8.42	-	4	6.88	249	853
P15	Observation Bore		31 Jan 2023	LEVF	22.2	14	<1	<1	14	8.47	-	5	7.48	252	940
P15	Observation Bore		18 Jul 2023	LEVF	16.0	17	<1	<1	17	8.77	-	5	7.82	254	876
P16	Observation Bore	Breakfast Creek	31 Mar 2015	LEVF	-	<1	<1	<1	<1	3.09	-	<1	3.05	86	388
P16	Observation Bore	Breakfast Creek	20 Jul 2015	LEVF	-	1	<1	<1	1	2.49	-	<1	2.15	69	326
P16	Observation Bore	Breakfast Creek	16 Feb 2016	LEVF	-	4	<1	<1	4	3.09	-	1	3.14	86	371

					Field										
					Temperature (Field)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Bromide	Calcium	Cations Total	Chloride	Electrical Conductivity (Lab)
					oC	mg/L	mg/L	mg/L	mg/L	meq/L	µg/L	mg/L	meq/L	mg/L	µS/cm
P16	Observation Bore	Breakfast Creek	19 Jul 2016	LEVF	-	1	<1	<1	1	4.02	-	7	3.87	94	463
P16	Observation Bore	Breakfast Creek	14 Feb 2017	LEVF	-	2	<1	<1	2	2.91	-	2	2.77	79	384
P16	Observation Bore	Breakfast Creek	24 Jul 2017	LEVF	-	<1	<1	<1	<1	2.94	-	2	3.03	74	351
P16	Observation Bore	Breakfast Creek	31 Jan 2018	LEVF	-	4	<1	<1	4	2.78	-	2	2.73	76	339
P16	Observation Bore	Breakfast Creek	09 Jul 2018	LEVF	-	<1	<1	<1	<1	4.78	-	13	4.34	112	556
P16	Observation Bore	Breakfast Creek	21 Jan 2019	LEVF	-	3	<1	<1	3	3.06	-	3	2.89	94	306
P16	Observation Bore	Breakfast Creek	12 Aug 2019	LEVF	-	<1	<1	<1	<1	4.33	-	6	4.04	101	481
P16	Observation Bore	Breakfast Creek	15 Jan 2020	LEVF	-	<1	<1	<1	<1	4.31	-	3	4.00	113	499
P16	Observation Bore	Breakfast Creek	15 Jul 2020	LEVF	-	<1	<1	<1	<1	4.58	-	3	4.30	102	536
P16	Observation Bore	Breakfast Creek	19 Jan 2021	LEVF	-	<1	<1	<1	<1	7.18	-	3	5.85	205	630
P16	Observation Bore	Breakfast Creek	15 Jul 2021	LEVF	12	<1	<1	<1	<1	5.02	-	3	4.70	139	556
P16	Observation Bore	Breakfast Creek	18 Jan 2022	LEVF	14.7	<1	<1	<1	<1	5.43	-	2	5.22	155	651
P16	Observation Bore	Breakfast Creek	12 Jul 2022	LEVF	11.3	<1	<1	<1	<1	3.68	-	<1	3.53	98	454
P16	Observation Bore	Breakfast Creek	18 Jan 2023	LEVF	15.0	4	<1	<1	4	5.07	101	2	4.60	134	608
P16	Observation Bore	Breakfast Creek	05 Jul 2023	LEVF	11.85	1	<1	<1	1	2.18	-	<1	2.27	67	298
P17	Control Bore	Salt Creek Swamp	15 Jan 2010	PWT	-	160	<1	<1	160	11.6	-	27	10.5	295	1,270.0
P17	Control Bore	Salt Creek Swamp	15 Jul 2010	PWT	-	171	<1	<1	171	13.4	-	33	10.9	352	1,370.0
P17	Control Bore	Salt Creek Swamp	19 Jan 2011	PWT	-	134	<1	<1	134	12.2	-	24	9.43	313	1,150.0
P17	Control Bore	Salt Creek Swamp	15 Jul 2011	PWT	13.6	167	<1	<1	167	15.6	-	34	12.4	414	1,650.0
P17	Control Bore	Salt Creek Swamp	17 Jan 2012	PWT	14.9	162	<1	<1	162	12.2	671	25	9.91	316	1,280.0
P17	Control Bore	Salt Creek Swamp	12 Jul 2012	PWT	12.8	184	<1	<1	184	13.3	-	37	11.8	340	1,420.0
P17	Control Bore	Salt Creek Swamp	23 Jan 2013	PWT	16.4	132	<1	<1	132	10.2	-	23	8.97	269	1,080.0
P17	Control Bore	Salt Creek Swamp	05 Jul 2013	PWT	13.69	173	<1	<1	173	12.8	-	27	11.3	328	1,400.0
P17	Control Bore	Salt Creek Swamp	31 Mar 2015	PWT	-	84	<1	<1	84	11.1	-	21	9.98	334	1,260.0
P17	Control Bore	Salt Creek Swamp	20 Jul 2015	PWT	-	114	<1	<1	114	13.6	-	34	12.8	361	1,460.0
P17	Control Bore	Salt Creek Swamp	16 Feb 2016	PWT	-	132	<1	<1	132	12.8	-	32	11.4	356	1,290.0
P17	Control Bore	Salt Creek Swamp	19 Jul 2016	PWT	-	12	<1	<1	12	24.1	-	50	21.9	626	2,270.0
P17	Control Bore	Salt Creek Swamp	14 Feb 2017	PWT	-	105	<1	<1	105	11.7	-	26	9.98	309	1,310.0
P17	Control Bore	Salt Creek Swamp	24 Jul 2017	PWT	-	120	<1	<1	120	13.2	-	29	12.3	352	1,310.0
P17	Control Bore	Salt Creek Swamp	31 Jan 2018	PWT	-	129	<1	<1	129	11.4	-	31	9.52	302	1,150.0
P17	Control Bore	Salt Creek Swamp	09 Jul 2018	PWT	-	133	<1	<1	133	13.3	-	34	10.7	328	1,350.0
P17	Control Bore	Salt Creek Swamp	23 Jan 2019	PWT	-	142	<1	<1	142	13.1	-	26	9.58	363	1,110.0
P17	Control Bore	Salt Creek Swamp	06 Aug 2019	PWT	-	116	<1	<1	116	11.6	-	21	9.30	312	1,080.0
P19	Trigger Bore	Marshy Creek - Upper Swamp	01 Apr 2015	UEVF	-	52	<1	<1	52	12.3	-	11	10.5	381	1,310.0
P19	Trigger Bore	Marshy Creek - Upper Swamp	21 Jul 2015	UEVF	-	65	<1	<1	65	12.7	-	11	11.0	388	1,420.0
P19	Trigger Bore	Marshy Creek - Upper Swamp	16 Feb 2016	UEVF	-	63	<1	<1	63	12.6	-	13	11.6	386	1,290.0
P19	Trigger Bore	Marshy Creek - Upper Swamp	19 Jul 2016	UEVF	-	67	<1	<1	67	12.7	-	11	10.7	387	1,220.0
P19	Trigger Bore	Marshy Creek - Upper Swamp	14 Feb 2017	UEVF	-	51	<1	<1	51	11.9	-	12	10.2	369	1,360.0
P19	Trigger Bore	Marshy Creek - Upper Swamp	25 Jul 2017	UEVF	-	70	<1	<1	70	12.7	-	13	10.7	383	1,500.0
P19	Trigger Bore	Marshy Creek - Upper Swamp	29 Jan 2018	UEVF	-	61	<1	<1	61	12.7	-	13	9.82	392	1,250.0
P19	Trigger Bore	Marshy Creek - Upper Swamp	02 Jul 2018	UEVF	-	62	<1	<1	62	12.8	-	11	9.59	397	1,190.0
P19	Trigger Bore	Marshy Creek - Upper Swamp	23 Jan 2019	UEVF	-	44	<1	<1	44	12.5	-	9	9.19	398	1,010.0

					Field										
					Temperature (Field)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Bromide	Calcium	Cations Total	Chloride	Electrical Conductivity (Lab)
					oC	mg/L	mg/L	mg/L	mg/L	meq/L	µg/L	mg/L	meq/L	mg/L	µS/cm
P19	Trigger Bore	Marshy Creek - Upper Swamp	31 Jul 2019	UEVF	-	47	<1	<1	47	12.0	-	11	9.53	378	1,200.0
P19	Trigger Bore	Marshy Creek - Upper Swamp	14 Jan 2020	UEVF	-	56	<1	<1	56	12.2	-	9	10.0	381	1,230.0
P19	Trigger Bore	Marshy Creek - Upper Swamp	14 Jul 2020	UEVF	-	64	<1	<1	64	12.1	-	10	9.17	372	1,230.0
P19	Trigger Bore	Marshy Creek - Upper Swamp	12 Jan 2021	UEVF	16.2	73	<1	<1	73	12.4	-	10	9.42	347	1,190.0
P19	Trigger Bore	Marshy Creek - Upper Swamp	14 Jul 2021	UEVF	14.95	69	<1	<1	69	12.5	-	11	9.36	381	1,140.0
P19	Trigger Bore	Marshy Creek - Upper Swamp	17 Jan 2022	UEVF	16.3	58	<1	<1	58	11.9	615	10	9.41	371	1,230.0
P19	Trigger Bore	Marshy Creek - Upper Swamp	11 Jul 2022	UEVF	-	53	<1	<1	53	12.1	-	14	10.8	370	1,320.0
P19	Trigger Bore	Marshy Creek - Upper Swamp	19 Jan 2023	UEVF	15.7	34	<1	<1	34	12.8	730	14	10.4	406	1,420.0
P19	Trigger Bore	Marshy Creek - Upper Swamp	17 Jul 2023	UEVF	14.40	35	<1	<1	35	11.0	-	13	9.94	348	1,240.0
SB2	Observation Bore	Southern Borefield	12 Jan 2012	UEVF	-	16	<1	<1	16	20.6	-	29	22.1	618	2,230.0
SB2	Observation Bore	Southern Borefield	26 Jul 2012	UEVF	-	8	<1	<1	8	19.9	-	16	17.8	613	2,220.0
SB2	Observation Bore	Southern Borefield	08 Jan 2013	UEVF	-	16	<1	<1	16	19.3	-	18	17.6	588	2,090.0
SB2	Observation Bore	Southern Borefield	25 Jul 2013	UEVF	-	6	<1	<1	6	19.7	-	19	17.9	595	1,940.0
SB2	Observation Bore	Southern Borefield	24 Mar 2015	UEVF	-	9	<1	<1	9	20.5	-	15	17.3	617	2,110.0
SB2	Observation Bore	Southern Borefield	13 Jul 2015	UEVF	-	14	<1	<1	14	21.8	-	14	17.0	646	2,420.0
SB2	Observation Bore	Southern Borefield	03 Dec 2015	UEVF	-	24	<1	<1	24	19.6	-	17	16.9	589	2,200.0
SB2	Observation Bore	Southern Borefield	13 Apr 2016	UEVF	-	34	<1	<1	34	20.2	-	16	16.6	603	2,120.0
SB2	Observation Bore	Southern Borefield	25 Aug 2016	UEVF	-	35	<1	<1	35	20.4	-	17	18.1	603	2,100.0
SB2	Observation Bore	Southern Borefield	22 Feb 2017	UEVF	-	47	<1	<1	47	26.0	-	22	21.8	759	2,590.0
SB2	Observation Bore	Southern Borefield	25 Jul 2017	UEVF	-	55	<1	<1	55	20.8	-	17	16.6	601	2,540.0
SB2	Observation Bore	Southern Borefield	30 Jan 2018	UEVF	-	48	<1	<1	48	21.2	-	19	15.2	632	2,120.0
SB2	Observation Bore	Southern Borefield	03 Jul 2018	UEVF	-	55	<1	<1	55	22.4	-	18	15.8	659	2,050.0
SB2	Observation Bore	Southern Borefield	21 Jan 2019	UEVF	-	3	<1	<1	3	25.2	-	21	17.9	779	2,380.0
SB2	Observation Bore	Southern Borefield	06 Aug 2019	UEVF	-	52	<1	<1	52	29.2	-	25	22.3	871	2,810.0
SB2	Observation Bore	Southern Borefield	16 Jan 2020	UEVF	-	50	<1	<1	50	42.1	-	42	36.0	1,250.0	4,300.0
SB2	Observation Bore	Southern Borefield	21 Jul 2020	UEVF	-	59	<1	<1	59	54.9	-	56	50.0	1,640.0	5,680.0
SB2	Observation Bore	Southern Borefield	13 Oct 2020	UEVF	-	56	<1	<1	56	22.4	-	19	15.9	661	2,290.0
SB2	Observation Bore	Southern Borefield	04 Nov 2020	UEVF	-	56	<1	<1	56	19.4	-	19	16.8	578	2,210.0
SB2	Observation Bore	Southern Borefield	08 Dec 2020	UEVF	16.4	54	<1	<1	54	21.2	-	17	16.0	627	2,090.0
SB2	Observation Bore	Southern Borefield	11 Jan 2021	UEVF	22.7	58	<1	<1	58	20.9	-	18	16.3	598	2,100.0
SB2	Observation Bore	Southern Borefield	04 Feb 2021	UEVF	-	56	<1	<1	56	22.1	-	19	16.8	650	2,180.0
SB2	Observation Bore	Southern Borefield	21 Jul 2021	UEVF	15.6	49	<1	<1	49	24.0	-	22	18.6	708	2,530.0
SB2	Observation Bore	Southern Borefield	19 Jan 2022	UEVF	18.7	58	<1	<1	58	32.5	-	27	26.1	959	3,390.0
SB2	Observation Bore	Southern Borefield	13 Jul 2022	UEVF	15.4	45	<1	<1	45	39.4	-	44	36.3	1,170.0	3,820.0
SB2	Observation Bore	Southern Borefield	24 Jan 2023	UEVF	19.0	<1	<1	<1	<1	42.0	-	45	36.3	1,280.0	4,280.0
SB2	Observation Bore	Southern Borefield	04 Jul 2023	UEVF	16.34	42	<1	<1	42	29.7	-	30	25.2	889	3,170.0
WTOB1	Observation Bore	Salt Creek Swamp	01 Apr 2015	PWT	-	8	<1	<1	8	9.88	-	4	8.61	284	1,070.0
WTOB1	Observation Bore	Salt Creek Swamp	20 Jul 2015	PWT	-	15	<1	<1	15	9.92	-	4	8.98	273	1,120.0
WTOB1	Observation Bore	Salt Creek Swamp	17 Feb 2016	PWT	-	30	<1	<1	30	5.58	-	2	5.51	144	592
WTOB1	Observation Bore	Salt Creek Swamp	20 Jul 2016	PWT	-	27	<1	<1	27	7.92	-	<1	5.17	204	793
WTOB1	Observation Bore	Salt Creek Swamp	15 Feb 2017	PWT	-	31	<1	<1	31	9.32	-	6	7.87	253	1,070.0
WTOB1	Observation Bore	Salt Creek Swamp	19 Jul 2017	PWT	-	68	<1	<1	68	10.1	-	10	8.74	254	978

					Field										
					Temperature (Field)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Bromide	Calcium	Cations Total	Chloride	Electrical Conductivity (Lab)
					oC	mg/L	mg/L	mg/L	mg/L	meq/L	µg/L	mg/L	meq/L	mg/L	µS/cm
WTOB1	Observation Bore	Salt Creek Swamp	31 Jan 2018	PWT	-	54	<1	<1	54	11.0	-	10	8.45	296	1,080.0
WTOB1	Observation Bore	Salt Creek Swamp	09 Jul 2018	PWT	-	33	<1	<1	33	11.1	-	7	9.19	332	1,200.0
WTOB1	Observation Bore	Salt Creek Swamp	16 Jan 2019	PWT	-	37	<1	<1	37	11.1	-	6	9.17	327	997
WTOB1	Observation Bore	Salt Creek Swamp	12 Aug 2019	PWT	-	12	<1	<1	12	11.2	-	6	9.35	332	1,180.0
WTOB1	Observation Bore	Salt Creek Swamp	15 Jan 2020	PWT	-	16	<1	<1	16	10.0	-	5	8.30	296	1,010.0
WTOB1	Observation Bore	Salt Creek Swamp	15 Jul 2020	PWT	-	22	<1	<1	22	7.37	-	3	6.15	202	822
WTOB1	Observation Bore	Salt Creek Swamp	13 Jan 2021	PWT	16.2	25	<1	<1	25	9.62	-	5	7.67	277	987
WTOB1	Observation Bore	Salt Creek Swamp	15 Jul 2021	PWT	15.1	23	<1	<1	23	7.06	-	3	5.42	195	685
WTOB1	Observation Bore	Salt Creek Swamp	18 Jan 2022	PWT	15.3	14	<1	<1	14	11.8	-	5	10.2	371	1,290.0
WTOB1	Observation Bore	Salt Creek Swamp	12 Jul 2022	PWT	14.4	11	<1	<1	11	13.6	-	7	11.4	423	1,480.0
WTOB1	Observation Bore	Salt Creek Swamp	23 Jan 2023	PWT	16.5	32	<1	<1	32	11.2	-	6	9.70	336	1,220.0
WTOB1	Observation Bore	Salt Creek Swamp	03 Jul 2023	PWT	16.50	29	<1	<1	29	12.0	-	7	10.6	364	1,350.0
WTOB2	Observation Bore	Marshy Creek - Lower Swamp	01 Apr 2015	PWT	-	<1	<1	<1	<1	28.2	-	58	24.4	720	2,750.0
WTOB2	Observation Bore	Marshy Creek - Lower Swamp	21 Jul 2015	PWT	-	<1	<1	<1	<1	32.9	-	72	27.0	838	3,410.0
WTOB2	Observation Bore	Marshy Creek - Lower Swamp	17 Feb 2016	PWT	-	2	<1	<1	2	25.2	-	48	26.2	714	2,580.0
WTOB2	Observation Bore	Marshy Creek - Lower Swamp	20 Jul 2016	PWT	-	<1	<1	<1	<1	37.6	-	81	32.0	927	3,510.0
WTOB2	Observation Bore	Marshy Creek - Lower Swamp	15 Feb 2017	PWT	-	<1	<1	<1	<1	37.0	-	79	30.2	906	4,120.0
WTOB2	Observation Bore	Marshy Creek - Lower Swamp	19 Jul 2017	PWT	-	<1	<1	<1	<1	41.5	-	87	32.8	940	3,730.0
WTOB2	Observation Bore	Marshy Creek - Lower Swamp	31 Jan 2018	PWT	-	<1	<1	<1	<1	34.9	-	67	24.6	865	3,320.0
WTOB2	Observation Bore	Marshy Creek - Lower Swamp	09 Jul 2018	PWT	-	<1	<1	<1	<1	38.2	-	71	28.6	934	3,900.0
WTOB2	Observation Bore	Marshy Creek - Lower Swamp	16 Jan 2019	PWT	-	<1	<1	<1	<1	34.7	-	70	27.8	857	3,150.0
WTOB2	Observation Bore	Marshy Creek - Lower Swamp	12 Aug 2019	PWT	-	<1	<1	<1	<1	40.7	-	79	29.7	940	3,850.0
WTOB2	Observation Bore	Marshy Creek - Lower Swamp	15 Jan 2020	PWT	-	<1	<1	<1	<1	35.0	-	68	28.6	824	3,320.0
WTOB2	Observation Bore	Marshy Creek - Lower Swamp	15 Jul 2020	PWT	-	<1	<1	<1	<1	38.4	-	66	28.6	890	3,700.0
WTOB2	Observation Bore	Marshy Creek - Lower Swamp	13 Jan 2021	PWT	14.20	<1	<1	<1	<1	35.5	-	54	25.1	877	3,260.0
WTOB2	Observation Bore	Marshy Creek - Lower Swamp	22 Jul 2021	PWT	10.3	<1	<1	<1	<1	36.5	-	62	28.6	902	3,660.0
WTOB2	Observation Bore	Marshy Creek - Lower Swamp	17 Jan 2022	PWT	14.10	<1	<1	<1	<1	31.5	1,300	55	25.9	800	3,340.0
WTOB2	Observation Bore	Marshy Creek - Lower Swamp	11 Jul 2022	PWT	-	<1	<1	<1	<1	30.4	-	58	27.2	795	3,120.0
WTOB2	Observation Bore	Marshy Creek - Lower Swamp	19 Jan 2023	PWT	15.5	<1	<1	<1	<1	33.2	1,530	54	25.1	888	3,200.0
WTOB3	Observation Bore	Marshy Creek - Upper Swamp	01 Apr 2015	PWT	-	8	<1	<1	8	16.5	-	5	13.8	526	1,780.0
WTOB3	Observation Bore	Marshy Creek - Upper Swamp	21 Jul 2015	PWT	-	14	<1	<1	14	16.7	-	6	16.2	527	1,880.0
WTOB3	Observation Bore	Marshy Creek - Upper Swamp	17 Feb 2016	PWT	-	24	<1	<1	24	16.8	-	6	15.7	527	1,730.0
WTOB3	Observation Bore	Marshy Creek - Upper Swamp	20 Jul 2016	PWT	-	13	<1	<1	13	16.9	-	5	14.7	536	1,690.0
WTOB3	Observation Bore	Marshy Creek - Upper Swamp	15 Feb 2017	PWT	-	22	<1	<1	22	16.6	-	5	14.0	519	1,410.0
WTOB3	Observation Bore	Marshy Creek - Upper Swamp	19 Jul 2017	PWT	-	14	<1	<1	14	16.8	-	5	14.1	527	1,630.0
WTOB3	Observation Bore	Marshy Creek - Upper Swamp	29 Jan 2018	PWT	-	25	<1	<1	25	17.0	-	5	12.8	532	1,610.0
WTOB3	Observation Bore	Marshy Creek - Upper Swamp	02 Jul 2018	PWT	-	26	<1	<1	26	17.1	-	5	13.2	533	1,540.0
WTOB3	Observation Bore	Marshy Creek - Upper Swamp	16 Jan 2019	PWT	-	17	<1	<1	17	17.1	-	5	14.4	546	1,580.0
WTOB3	Observation Bore	Marshy Creek - Upper Swamp	31 Jul 2019	PWT	-	16	<1	<1	16	16.2	-	5	12.8	508	1,640.0
WTOB3	Observation Bore	Marshy Creek - Upper Swamp	14 Jan 2020	PWT	-	14	<1	<1	14	16.3	-	3	13.4	515	1,670.0
WTOB3	Observation Bore	Marshy Creek - Upper Swamp	14 Jul 2020	PWT	-	24	<1	<1	24	16.1	-	5	12.9	498	1,670.0
WTOB3	Observation Bore	Marshy Creek - Upper Swamp	12 Jan 2021	PWT	15.1	25	<1	<1	25	15.7	-	5	13.0	484	1,630.0

Table B2 - Groundwater Analytical Results

					Field										
					Temperature (Field)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Bromide	Calcium	Cations Total	Chloride	Electrical Conductivity (Lab)
					oC	mg/L	mg/L	mg/L	mg/L	meq/L	µg/L	mg/L	meq/L	mg/L	µS/cm
WTOB3	Observation Bore	Marshy Creek - Upper Swamp	14 Jul 2021	PWT	14.4	27	<1	<1	27	15.5	-	5	12.6	485	1,530.0
WTOB3	Observation Bore	Marshy Creek - Upper Swamp	18 Jan 2022	PWT	14.7	15	<1	<1	15	14.8	-	5	13.2	472	1,620.0
WTOB3	Observation Bore	Marshy Creek - Upper Swamp	11 Jul 2022	PWT	-	14	<1	<1	14	14.2	-	5	13.2	442	1,560.0
WTOB3	Observation Bore	Marshy Creek - Upper Swamp	19 Jan 2023	PWT	14.9	8	<1	<1	8	15.7	862	5	12.2	501	1,730.0
WTOB3	Observation Bore	Marshy Creek - Upper Swamp	03 Jul 2023	PWT	14.30	20	<1	<1	20	14.1	-	5	12.5	439	1,640.0
WTOB3	Observation Bore	Marshy Creek - Upper Swamp	05 Jul 2023	PWT	12.40	<1	<1	<1	<1	31.2	-	53	27.2	834	3,330.0

					Inorganics										
					Ionic Balance	Magnesium	Nitrate (as N)	Nitrite (as N)	Nitrite + Nitrate as N	pH (Lab)	Potassium	Sodium	Sulphate	Sulfate as SO4 - Turbidimetric	Total Dissolved Solids (Lab)
					%	mg/L	mg/L	mg/L	mg/L	-	mg/L	mg/L	mg/L	mg/L	mg/L
EQL					0.01	1	0.01	0.01	0.01	0.01	1	1	1	1	5
Location Code	**Location Type**	**Monitoring Zone**	**Date**	**Monitoring Unit**											
116459	Observation Bore	Salt Creek Swamp	08 Dec 2020	UEVF	12.1	14	-	-	-	6.11	16	105	-	19	387
116459	Observation Bore	Salt Creek Swamp	14 Jan 2021	UEVF	10.5	16	-	-	-	6.50	18	105	-	17	428
116459	Observation Bore	Salt Creek Swamp	04 Feb 2021	UEVF	11.5	15	-	-	-	6.73	17	107	-	16	458
119348	Observation Bore		12 Jan 2012	LEVF	3.59	20	-	-	-	-	22	205	2	-	954
119348	Observation Bore		26 Jul 2012	LEVF	2.92	11	-	-	-	-	23	250	<1	-	860
119348	Observation Bore		08 Jan 2013	LEVF	4.38	10	-	-	-	-	25	229	<1	-	802
119348	Observation Bore		25 Jul 2013	LEVF	0.52	12	<0.01	<0.01	<0.01	-	28	255	<1	-	838
119348	Observation Bore		24 Mar 2015	LEVF	3.97	11	<0.01	<0.01	<0.01	-	23	228	<1	-	746
119348	Observation Bore		13 Jul 2015	LEVF	7.81	11	0.02	<0.01	0.02	-	24	218	<1	-	862
119348	Observation Bore		03 Dec 2015	LEVF	5.66	11	0.03	<0.01	0.03	-	24	224	<1	-	814
119348	Observation Bore		13 Apr 2016	LEVF	6.00	11	<0.01	<0.01	<0.01	6.79	23	228	-	<1	749
119348	Observation Bore		25 Aug 2016	LEVF	0.18	12	<0.01	<0.01	<0.01	-	22	257	-	1	818
119348	Observation Bore		22 Feb 2017	LEVF	7.83	10	0.02	<0.01	0.02	-	22	214	-	<1	695
119348	Observation Bore		26 Jul 2017	LEVF	6.80	11	-	-	-	7.98	26	224	-	<1	743
119348	Observation Bore		01 Feb 2018	LEVF	13.0	9	-	-	-	8.06	26	192	-	<1	754
119348	Observation Bore		11 Jul 2018	LEVF	11.6	9	-	-	-	7.69	26	209	-	<1	740
119348	Observation Bore		22 Jan 2019	LEVF	9.81	7	-	-	-	8.33	25	227	-	<1	738
119348	Observation Bore		21 Jan 2020	LEVF	9.68	6	-	-	-	9.00	26	241	-	2	860
119348	Observation Bore		21 Jul 2020	LEVF	12.0	7	-	-	-	8.14	27	223	-	<1	810
119348	Observation Bore		25 Jul 2022	LEVF	8.26	10	-	-	-	8.09	25	207	-	<1	766
119348	Observation Bore		25 Jan 2023	LEVF	11.5	10	-	-	-	7.86	27	201	-	2	815
119348	Observation Bore		31 Jul 2023	LEVF	1.57	11	-	-	-	7.95	26	221	-	<1	787
NB2	Observation Bore	Northern Borefield	13 Jan 2012	UEVF	3.60	59	-	-	-	-	28	310	124	-	1,580.0
NB2	Observation Bore	Northern Borefield	25 Jul 2012	UEVF	4.39	56	-	-	-	-	19	330	132	-	1,510.0
NB2	Observation Bore	Northern Borefield	09 Jan 2013	UEVF	2.56	56	-	-	-	-	21	325	127	-	1,580.0
NB2	Observation Bore	Northern Borefield	26 Jul 2013	UEVF	4.82	55	0.02	<0.01	0.02	-	23	319	142	-	1,580.0
NB2	Observation Bore	Northern Borefield	25 Mar 2015	UEVF	3.55	56	<0.01	<0.01	<0.01	-	19	317	129	-	1,840.0
NB2	Observation Bore	Northern Borefield	14 Jul 2015	UEVF	7.00	55	0.02	<0.01	0.02	-	20	309	133	-	1,640.0
NB2	Observation Bore	Northern Borefield	04 Dec 2015	UEVF	4.16	56	0.10	<0.01	0.10	-	20	315	131	-	1,600.0
NB2	Observation Bore	Northern Borefield	14 Apr 2016	UEVF	4.34	56	<0.01	<0.01	<0.01	6.00	19	321	-	128	1,620.0
NB2	Observation Bore	Northern Borefield	26 Aug 2016	UEVF	0.04	60	0.02	<0.01	0.02	-	19	359	-	129	1,560.0
NB2	Observation Bore	Northern Borefield	23 Feb 2017	UEVF	9.93	52	0.02	<0.01	0.02	-	19	292	-	138	1,600.0
NB2	Observation Bore	Northern Borefield	20 Jul 2017	UEVF	5.95	51	-	-	-	6.32	19	282	-	129	1,370.0
NB2	Observation Bore	Northern Borefield	30 Jan 2018	UEVF	11.1	51	-	-	-	6.48	23	266	-	128	1,500.0
NB2	Observation Bore	Northern Borefield	03 Jul 2018	UEVF	9.72	52	-	-	-	6.10	21	280	-	122	1,330.0
NB2	Observation Bore	Northern Borefield	21 Jan 2019	UEVF	15.8	48	-	-	-	6.40	20	257	-	116	1,660.0
NB2	Observation Bore	Northern Borefield	08 Aug 2019	UEVF	9.74	51	-	-	-	6.02	21	274	-	129	1,490.0
NB2	Observation Bore	Northern Borefield	16 Jan 2020	UEVF	10.0	52	-	-	-	6.27	22	283	-	124	1,640.0
NB2	Observation Bore	Northern Borefield	16 Jul 2020	UEVF	10.5	53	-	-	-	6.02	22	280	-	129	1,410.0

					Inorganics										
					Ionic Balance	Magnesium	Nitrate (as N)	Nitrite (as N)	Nitrite + Nitrate as N	pH (Lab)	Potassium	Sodium	Sulphate	Sulfate as SO4 - Turbidimetric	Total Dissolved Solids (Lab)
					%	mg/L	mg/L	mg/L	mg/L	-	mg/L	mg/L	mg/L	mg/L	mg/L
NB2	Observation Bore	Northern Borefield	11 Jan 2021	UEVF	7.22	52	-	-	-	6.38	22	283	-	127	1,410.0
NB2	Observation Bore	Northern Borefield	21 Jul 2021	UEVF	8.13	52	-	-	-	6.33	21	273	-	118	1,340.0
NB2	Observation Bore	Northern Borefield	19 Jan 2022	UEVF	9.79	54	-	-	-	6.04	20	280	-	126	1,630.0
NB2	Observation Bore	Northern Borefield	13 Jul 2022	UEVF	5.28	57	-	-	-	6.59	22	295	-	139	1,620.0
NB2	Observation Bore	Northern Borefield	24 Jan 2023	UEVF	8.60	55	-	-	-	6.35	21	282	-	132	1,400.0
NB2	Observation Bore	Northern Borefield	04 Jul 2023	UEVF	6.32	52	-	-	-	6.32	21	279	-	116	1,550.0
P1	Observation Bore	Salt Creek Swamp	31 Mar 2015	PWT	4.68	4	0.01	<0.01	0.01	5.88	2	93	14	-	1,040.0
P1	Observation Bore	Salt Creek Swamp	20 Jul 2015	PWT	-	3	0.02	<0.01	0.02	5.92	1	42	12	-	434
P1	Observation Bore	Salt Creek Swamp	16 Feb 2016	PWT	9.74	3	<0.01	<0.01	<0.01	6.63	4	115	30	-	3,370.0
P1	Observation Bore	Salt Creek Swamp	19 Jul 2016	PWT	7.80	9	0.01	<0.01	0.01	5.88	2	59	-	34	283
P1	Observation Bore	Salt Creek Swamp	14 Feb 2017	PWT	7.94	6	0.02	<0.01	0.02	6.38	3	93	-	32	2,230.0
P1	Observation Bore	Salt Creek Swamp	24 Jul 2017	PWT	0.10	5	-	-	-	4.97	2	68	-	33	820
P1	Observation Bore	Salt Creek Swamp	31 Jan 2018	PWT	1.20	7	-	-	-	5.91	3	79	-	13	542
P1	Observation Bore	Salt Creek Swamp	09 Jul 2018	PWT	1.20	6	-	-	-	4.75	2	44	-	24	215
P1	Observation Bore	Salt Creek Swamp	23 Jan 2019	PWT	7.76	5	-	-	-	5.89	2	70	-	18	392
P1	Observation Bore	Salt Creek Swamp	06 Aug 2019	PWT	-	4	-	-	-	5.37	<1	54	-	30	637
P1	Observation Bore	Salt Creek Swamp	15 Jan 2020	PWT	4.13	5	-	-	-	5.76	3	87	-	25	413
P1	Observation Bore	Salt Creek Swamp	15 Jul 2020	PWT	0.58	3	-	-	-	5.13	2	43	-	8	505
P1	Observation Bore	Salt Creek Swamp	19 Jan 2021	PWT	6.74	4	-	-	-	5.32	2	59	-	23	1,500.0
P1	Observation Bore	Salt Creek Swamp	15 Jul 2021	PWT	7.87	5	-	-	-	5.40	2	70	-	20	780
P1	Observation Bore	Salt Creek Swamp	17 Jan 2022	PWT	0.88	2	-	-	-	5.59	2	63	-	<1	3,600.0
P1	Observation Bore	Salt Creek Swamp	12 Jul 2022	PWT	3.00	3	-	-	-	6.01	2	56	-	7	1,080.0
P1	Observation Bore	Salt Creek Swamp	23 Jan 2023	PWT	3.43	8	-	-	-	6.47	2	57	-	<1	567
P1	Observation Bore	Salt Creek Swamp	05 Jul 2023	PWT	0.25	8	-	-	-	6.34	2	70	-	14	372
P7B	Observation Bore	Marshy Creek - Upper Swamp	01 Apr 2015	PWT	8.94	24	0.02	<0.01	0.02	4.10	5	170	86	-	761
P7B	Observation Bore	Marshy Creek - Upper Swamp	21 Jul 2015	PWT	8.23	25	0.01	<0.01	0.01	3.62	6	180	103	-	847
P7B	Observation Bore	Marshy Creek - Upper Swamp	17 Feb 2016	PWT	2.08	16	0.01	<0.01	0.01	4.07	4	163	53	-	557
P7B	Observation Bore	Marshy Creek - Upper Swamp	19 Jul 2016	PWT	8.16	15	0.02	<0.01	0.02	4.22	3	128	-	55	608
P7B	Observation Bore	Marshy Creek - Upper Swamp	14 Feb 2017	PWT	7.80	14	0.02	<0.01	0.02	4.32	3	123	-	53	441
P7B	Observation Bore	Marshy Creek - Upper Swamp	20 Jul 2017	PWT	5.15	15	-	-	-	4.81	4	134	-	56	506
P7B	Observation Bore	Marshy Creek - Upper Swamp	29 Jan 2018	PWT	13.1	14	-	-	-	4.30	3	112	-	56	584
P7B	Observation Bore	Marshy Creek - Upper Swamp	02 Jul 2018	PWT	10.2	14	-	-	-	4.57	3	117	-	50	616
P7B	Observation Bore	Marshy Creek - Upper Swamp	23 Jan 2019	PWT	13.1	13	-	-	-	3.96	2	115	-	45	460
P7B	Observation Bore	Marshy Creek - Upper Swamp	31 Jul 2019	PWT	11.0	14	-	-	-	4.22	3	115	-	54	940
P7B	Observation Bore	Marshy Creek - Upper Swamp	14 Jan 2020	PWT	5.46	14	-	-	-	4.06	3	136	-	52	460
P7B	Observation Bore	Marshy Creek - Upper Swamp	14 Jul 2020	PWT	10.1	14	-	-	-	4.35	3	115	-	47	494
P7B	Observation Bore	Marshy Creek - Upper Swamp	12 Jan 2021	PWT	12.4	15	-	-	-	4.11	3	120	-	52	475
P7B	Observation Bore	Marshy Creek - Upper Swamp	14 Jul 2021	PWT	9.06	14	-	-	-	4.26	3	115	-	51	586
P7B	Observation Bore	Marshy Creek - Upper Swamp	17 Jan 2022	PWT	8.92	15	-	-	-	4.20	3	116	-	49	790
P7B	Observation Bore	Marshy Creek - Upper Swamp	11 Jul 2022	PWT	4.56	15	-	-	-	4.24	3	122	-	51	476
P7B	Observation Bore	Marshy Creek - Upper Swamp	19 Jan 2023	PWT	16.4	24	-	-	-	3.81	6	159	-	89	833
P7B	Observation Bore	Marshy Creek - Upper Swamp	03 Jul 2023	PWT	6.90	26	-	-	-	4.50	6	163	-	82	760

					Inorganics										
					Ionic Balance	Magnesium	Nitrate (as N)	Nitrite (as N)	Nitrite + Nitrate as N	pH (Lab)	Potassium	Sodium	Sulphate	Sulfate as SO4 - Turbidimetric	Total Dissolved Solids (Lab)
					%	mg/L	mg/L	mg/L	mg/L	-	mg/L	mg/L	mg/L	mg/L	mg/L
P8	Trigger Bore	Marshy Creek - Upper Swamp	01 Apr 2015	PWT	9.95	45	0.03	<0.01	0.03	5.59	13	262	131	-	1,520.0
P8	Trigger Bore	Marshy Creek - Upper Swamp	21 Jul 2015	PWT	8.66	51	0.02	<0.01	0.02	5.03	13	291	141	-	1,760.0
P8	Trigger Bore	Marshy Creek - Upper Swamp	17 Feb 2016	PWT	2.67	48	<0.01	<0.01	<0.01	5.53	16	325	137	-	1,620.0
P8	Trigger Bore	Marshy Creek - Upper Swamp	19 Jul 2016	PWT	3.61	54	<0.01	<0.01	<0.01	5.42	14	334	-	141	1,280.0
P8	Trigger Bore	Marshy Creek - Upper Swamp	14 Feb 2017	PWT	6.72	47	0.02	<0.01	0.02	5.75	14	280	-	132	2,000.0
P8	Trigger Bore	Marshy Creek - Upper Swamp	20 Jul 2017	PWT	8.76	47	-	-	-	5.08	12	264	-	139	2,260.0
P8	Trigger Bore	Marshy Creek - Upper Swamp	29 Jan 2018	PWT	15.7	48	-	-	-	5.53	17	249	-	213	1,900.0
P8	Trigger Bore	Marshy Creek - Upper Swamp	02 Jul 2018	PWT	8.29	50	-	-	-	4.98	15	268	-	128	1,300.0
P8	Trigger Bore	Marshy Creek - Upper Swamp	23 Jan 2019	PWT	8.74	46	-	-	-	4.21	16	282	-	131	1,330.0
P8	Trigger Bore	Marshy Creek - Upper Swamp	31 Jul 2019	PWT	10.0	48	-	-	-	4.76	15	261	-	134	1,120.0
P8	Trigger Bore	Marshy Creek - Upper Swamp	14 Jan 2020	PWT	6.55	42	-	-	-	5.06	16	311	-	129	1,340.0
P8	Trigger Bore	Marshy Creek - Upper Swamp	14 Jul 2020	PWT	8.18	53	-	-	-	5.12	14	273	-	126	1,280.0
P8	Trigger Bore	Marshy Creek - Upper Swamp	12 Jan 2021	PWT	5.96	54	-	-	-	4.98	17	295	-	126	1,880.0
P8	Trigger Bore	Marshy Creek - Upper Swamp	14 Jul 2021	PWT	7.01	54	-	-	-	4.82	16	290	-	137	1,120.0
P8	Trigger Bore	Marshy Creek - Upper Swamp	17 Jan 2022	PWT	-	50	-	-	-	5.33	16	274	-	126	1,640.0
P8	Trigger Bore	Marshy Creek - Upper Swamp	11 Jul 2022	PWT	3.98	52	-	-	-	5.45	16	282	-	124	4,180.0
P8	Trigger Bore	Marshy Creek - Upper Swamp	19 Jan 2023	PWT	9.90	49	-	-	-	3.59	15	266	-	127	1,390.0
P8	Trigger Bore	Marshy Creek - Upper Swamp	03 Jul 2023	PWT	5.74	49	-	-	-	5.41	15	274	-	126	1,210.0
P12	Observation Bore	Marshy Creek - Upper Swamp	31 Mar 2015	LEVF	7.49	13	0.01	<0.01	0.01	6.67	22	174	8	-	680
P12	Observation Bore	Marshy Creek - Upper Swamp	21 Jul 2015	LEVF	4.94	13	0.02	<0.01	0.02	6.83	24	184	7	-	695
P12	Observation Bore	Marshy Creek - Upper Swamp	16 Feb 2016	LEVF	8.83	13	0.01	<0.01	0.01	6.13	25	175	8	-	740
P12	Observation Bore	Marshy Creek - Upper Swamp	19 Jul 2016	LEVF	9.55	13	0.02	<0.01	0.02	6.49	23	179	-	13	643
P12	Observation Bore	Marshy Creek - Upper Swamp	14 Feb 2017	LEVF	8.47	13	<0.01	<0.01	<0.01	6.68	23	164	-	9	678
P12	Observation Bore	Marshy Creek - Upper Swamp	25 Jul 2017	LEVF	8.19	14	-	-	-	6.33	24	172	-	8	688
P12	Observation Bore	Marshy Creek - Upper Swamp	29 Jan 2018	LEVF	13.3	14	-	-	-	6.54	26	151	-	8	629
P12	Observation Bore	Marshy Creek - Upper Swamp	02 Jul 2018	LEVF	14.3	13	-	-	-	6.67	25	159	-	8	634
P12	Observation Bore	Marshy Creek - Upper Swamp	23 Jan 2019	LEVF	15.1	11	-	-	-	6.75	24	155	-	8	676
P12	Observation Bore	Marshy Creek - Upper Swamp	31 Jul 2019	LEVF	13.1	13	-	-	-	6.28	25	154	-	8	560
P12	Observation Bore	Marshy Creek - Upper Swamp	14 Jan 2020	LEVF	8.81	12	-	-	-	6.41	26	174	-	8	663
P12	Observation Bore	Marshy Creek - Upper Swamp	14 Jul 2020	LEVF	13.3	13	-	-	-	6.45	23	154	-	10	718
P12	Observation Bore	Marshy Creek - Upper Swamp	12 Jan 2021	LEVF	13.2	13	-	-	-	6.53	26	157	-	10	585
P12	Observation Bore	Marshy Creek - Upper Swamp	14 Jul 2021	LEVF	11.8	14	-	-	-	6.53	27	153	-	8	580
P12	Observation Bore	Marshy Creek - Upper Swamp	17 Jan 2022	LEVF	11.6	14	-	-	-	6.32	26	156	-	8	674
P12	Observation Bore	Marshy Creek - Upper Swamp	11 Jul 2022	LEVF	4.44	15	-	-	-	6.21	26	165	-	11	625
P12	Observation Bore	Marshy Creek - Upper Swamp	19 Jan 2023	LEVF	12.0	14	-	-	-	7.14	27	150	-	8	684
P12	Observation Bore	Marshy Creek - Upper Swamp	17 Jul 2023	LEVF	4.41	14	-	-	-	6.93	25	159	-	9	714
P14	Observation Bore		13 Jan 2012	LEVF	4.50	38	-	-	-	-	42	195	108	-	890
P14	Observation Bore		25 Jul 2012	LEVF	5.34	30	-	-	-	-	33	200	109	-	900
P14	Observation Bore		09 Jan 2013	LEVF	4.56	14	-	-	-	-	41	140	28	-	618
P14	Observation Bore		26 Jul 2013	LEVF	1.68	14	0.03	<0.01	0.03	-	50	128	29	-	614
P14	Observation Bore		25 Mar 2015	LEVF	6.25	11	<0.01	<0.01	<0.01	-	44	102	13	-	536
P14	Observation Bore		13 Jul 2015	LEVF	9.78	10	0.02	<0.01	0.02	-	44	98	14	-	516

					Inorganics										
					Ionic Balance	Magnesium	Nitrate (as N)	Nitrite (as N)	Nitrite + Nitrate as N	pH (Lab)	Potassium	Sodium	Sulphate	Sulfate as SO4 - Turbidimetric	Total Dissolved Solids (Lab)
					%	mg/L	mg/L	mg/L	mg/L	-	mg/L	mg/L	mg/L	mg/L	mg/L
P14	Observation Bore		04 Dec 2015	LEVF	6.10	12	0.02	<0.01	0.02	-	46	102	13	-	584
P14	Observation Bore		14 Apr 2016	LEVF	6.63	11	<0.01	<0.01	<0.01	6.09	46	103	-	11	466
P14	Observation Bore		26 Aug 2016	LEVF	4.02	12	<0.01	<0.01	<0.01	-	45	109	-	12	468
P14	Observation Bore		23 Feb 2017	LEVF	10.1	9	0.05	<0.01	0.05	-	42	94	-	11	524
P14	Observation Bore		03 Aug 2017	LEVF	6.33	11	-	-	-	6.63	37	148	-	2	536
P14	Observation Bore		06 Feb 2018	LEVF	10.7	10	-	-	-	6.99	37	134	-	2	885
P14	Observation Bore		10 Jul 2018	LEVF	9.89	10	-	-	-	6.74	37	144	-	1	561
P14	Observation Bore		22 Jan 2019	LEVF	8.72	9	-	-	-	7.13	35	156	-	2	566
P14	Observation Bore		08 Aug 2019	LEVF	11.4	10	-	-	-	6.75	36	143	-	2	666
P14	Observation Bore		21 Jan 2020	LEVF	8.64	9	-	-	-	6.35	41	104	-	13	472
P14	Observation Bore		20 Jul 2020	LEVF	12.1	12	-	-	-	5.98	44	93	-	22	724
P14	Observation Bore		13 Jan 2021	LEVF	10.0	10	-	-	-	6.50	42	122	-	6	480
P14	Observation Bore		17 Aug 2021	LEVF	16.0	10	-	-	-	6.72	36	123	-	2	615
P14	Observation Bore		27 Jan 2022	LEVF	7.82	8	-	-	-	6.96	36	138	-	2	586
P14	Observation Bore		18 Jul 2022	LEVF	10.6	10	-	-	-	6.56	46	99	-	10	441
P14	Observation Bore		30 Jan 2023	LEVF	8.59	11	-	-	-	6.83	40	130	-	4	646
P14	Observation Bore		20 Jul 2023	LEVF	4.27	10	-	-	-	6.92	38	139	-	2	805
P15	Observation Bore		12 Jan 2012	LEVF	0.67	26	-	-	-	-	13	117	53	-	476
P15	Observation Bore		26 Jul 2012	LEVF	4.84	17	-	-	-	-	12	140	61	-	595
P15	Observation Bore		08 Jan 2013	LEVF	4.16	18	-	-	-	-	13	138	60	-	554
P15	Observation Bore		24 Mar 2015	LEVF	8.35	17	0.02	<0.01	0.02	-	12	121	58	-	506
P15	Observation Bore		14 Jul 2015	LEVF	11.5	17	0.02	<0.01	0.02	-	14	115	60	-	640
P15	Observation Bore		03 Dec 2015	LEVF	8.20	18	0.01	<0.01	0.01	-	14	120	59	-	568
P15	Observation Bore		13 Apr 2016	LEVF	9.45	18	<0.01	<0.01	<0.01	5.51	13	122	-	57	554
P15	Observation Bore		25 Aug 2016	LEVF	5.40	19	0.04	<0.01	0.04	-	13	131	-	58	522
P15	Observation Bore		22 Feb 2017	LEVF	11.6	16	0.12	<0.01	0.12	-	12	115	-	60	522
P15	Observation Bore		02 Aug 2017	LEVF	12.0	17	-	-	-	5.61	14	119	-	61	-
P15	Observation Bore		01 Feb 2018	LEVF	14.3	17	-	-	-	6.09	15	107	-	60	551
P15	Observation Bore		11 Jul 2018	LEVF	12.2	18	-	-	-	5.57	15	114	-	59	502
P15	Observation Bore		29 Jan 2019	LEVF	10.2	18	-	-	-	6.00	14	127	-	60	568
P15	Observation Bore		14 Aug 2019	LEVF	12.4	16	-	-	-	5.58	16	107	-	58	504
P15	Observation Bore		20 Jan 2020	LEVF	11.9	18	-	-	-	5.33	18	116	-	60	520
P15	Observation Bore		22 Jul 2020	LEVF	11.6	18	-	-	-	5.16	14	114	-	62	2,890.0
P15	Observation Bore		14 Jan 2021	LEVF	11.8	18	-	-	-	5.41	15	116	-	60	533
P15	Observation Bore		22 Jul 2021	LEVF	10.4	18	-	-	-	5.76	14	118	-	64	518
P15	Observation Bore		24 Jan 2022	LEVF	7.41	18	-	-	-	5.47	15	126	-	61	1,010.0
P15	Observation Bore		19 Jul 2022	LEVF	10.1	17	-	-	-	5.84	16	112	-	51	512
P15	Observation Bore		31 Jan 2023	LEVF	6.22	19	-	-	-	5.47	14	122	-	52	514
P15	Observation Bore		18 Jul 2023	LEVF	5.74	20	-	-	-	5.64	14	128	-	61	579
P16	Observation Bore	Breakfast Creek	31 Mar 2015	LEVF	0.72	10	0.08	<0.01	0.08	4.83	2	50	32	-	281
P16	Observation Bore	Breakfast Creek	20 Jul 2015	LEVF	-	7	0.09	<0.01	0.09	5.11	2	35	25	-	219
P16	Observation Bore	Breakfast Creek	16 Feb 2016	LEVF	0.78	7	<0.01	<0.01	<0.01	5.20	3	56	28	-	505

					Inorganics										
					Ionic Balance	Magnesium	Nitrate (as N)	Nitrite (as N)	Nitrite + Nitrate as N	pH (Lab)	Potassium	Sodium	Sulphate	Sulfate as SO4 - Turbidimetric	Total Dissolved Solids (Lab)
					%	mg/L	mg/L	mg/L	mg/L	-	mg/L	mg/L	mg/L	mg/L	mg/L
P16	Observation Bore	Breakfast Creek	19 Jul 2016	LEVF	2.01	12	0.30	<0.01	0.30	5.00	2	57	-	65	308
P16	Observation Bore	Breakfast Creek	14 Feb 2017	LEVF	2.50	7	0.02	<0.01	0.02	5.00	2	47	-	31	265
P16	Observation Bore	Breakfast Creek	24 Jul 2017	LEVF	1.45	8	-	-	-	4.59	2	51	-	41	510
P16	Observation Bore	Breakfast Creek	31 Jan 2018	LEVF	1.05	7	-	-	-	5.20	2	46	-	27	466
P16	Observation Bore	Breakfast Creek	09 Jul 2018	LEVF	4.90	13	-	-	-	4.67	2	59	-	78	411
P16	Observation Bore	Breakfast Creek	21 Jan 2019	LEVF	2.94	7	-	-	-	5.18	3	48	-	17	308
P16	Observation Bore	Breakfast Creek	12 Aug 2019	LEVF	3.50	12	-	-	-	4.38	2	62	-	71	850
P16	Observation Bore	Breakfast Creek	15 Jan 2020	LEVF	3.78	12	-	-	-	4.01	3	64	-	54	314
P16	Observation Bore	Breakfast Creek	15 Jul 2020	LEVF	3.23	13	-	-	-	4.64	3	69	-	82	703
P16	Observation Bore	Breakfast Creek	19 Jan 2021	LEVF	10.2	21	-	-	-	4.31	4	89	-	67	570
P16	Observation Bore	Breakfast Creek	15 Jul 2021	LEVF	3.36	15	-	-	-	4.60	2	75	-	53	664
P16	Observation Bore	Breakfast Creek	18 Jan 2022	LEVF	1.96	18	-	-	-	4.37	3	82	-	51	604
P16	Observation Bore	Breakfast Creek	12 Jul 2022	LEVF	2.06	9	-	-	-	4.82	2	63	-	44	727
P16	Observation Bore	Breakfast Creek	18 Jan 2023	LEVF	4.84	16	-	-	-	4.59	2	72	-	58	504
P16	Observation Bore	Breakfast Creek	05 Jul 2023	LEVF	2.06	7	-	-	-	5.06	<1	39	-	13	534
P17	Control Bore	Salt Creek Swamp	15 Jan 2010	PWT	4.96	21	-	-	-	6.49	5	167	-	2	676
P17	Control Bore	Salt Creek Swamp	15 Jul 2010	PWT	10.3	24	-	-	-	6.92	5	164	-	2	853
P17	Control Bore	Salt Creek Swamp	19 Jan 2011	PWT	13.0	20	-	-	-	6.77	4	149	-	35	808
P17	Control Bore	Salt Creek Swamp	15 Jul 2011	PWT	11.5	30	-	-	-	6.53	4	187	-	30	906
P17	Control Bore	Salt Creek Swamp	17 Jan 2012	PWT	10.4	20	-	-	-	6.65	4	159	-	3	1,050.0
P17	Control Bore	Salt Creek Swamp	12 Jul 2012	PWT	5.69	26	-	-	-	6.76	5	178	-	1	1,130.0
P17	Control Bore	Salt Creek Swamp	23 Jan 2013	PWT	6.54	18	-	-	-	7.14	3	144	-	<1	769
P17	Control Bore	Salt Creek Swamp	05 Jul 2013	PWT	6.07	23	-	-	-	6.99	4	184	-	5	778
P17	Control Bore	Salt Creek Swamp	31 Mar 2015	PWT	5.31	18	0.02	<0.01	0.02	-	4	169	<1	-	2,120.0
P17	Control Bore	Salt Creek Swamp	20 Jul 2015	PWT	2.88	28	<0.01	0.01	0.01	6.38	4	201	55	-	801
P17	Control Bore	Salt Creek Swamp	16 Feb 2016	PWT	5.90	20	0.06	<0.01	0.06	7.08	5	185	8	-	738
P17	Control Bore	Salt Creek Swamp	19 Jul 2016	PWT	4.78	40	0.05	<0.01	0.05	6.51	2	369	-	297	1,330.0
P17	Control Bore	Salt Creek Swamp	14 Feb 2017	PWT	7.86	19	<0.01	<0.01	<0.01	5.89	3	162	-	42	2,210.0
P17	Control Bore	Salt Creek Swamp	24 Jul 2017	PWT	3.53	25	-	-	-	6.73	3	200	-	41	936
P17	Control Bore	Salt Creek Swamp	31 Jan 2018	PWT	8.87	20	-	-	-	6.29	4	143	-	13	722
P17	Control Bore	Salt Creek Swamp	09 Jul 2018	PWT	10.6	23	-	-	-	7.06	4	162	-	66	736
P17	Control Bore	Salt Creek Swamp	23 Jan 2019	PWT	15.4	18	-	-	-	6.50	4	154	-	<1	1,210.0
P17	Control Bore	Salt Creek Swamp	06 Aug 2019	PWT	11.1	18	-	-	-	6.84	3	154	-	25	777
P19	Trigger Bore	Marshy Creek - Upper Swamp	01 Apr 2015	UEVF	7.76	18	<0.01	<0.01	<0.01	-	20	183	23	-	763
P19	Trigger Bore	Marshy Creek - Upper Swamp	21 Jul 2015	UEVF	7.13	18	0.02	<0.01	0.02	6.40	22	194	23	-	764
P19	Trigger Bore	Marshy Creek - Upper Swamp	16 Feb 2016	UEVF	4.35	18	<0.01	<0.01	<0.01	6.97	25	202	22	-	823
P19	Trigger Bore	Marshy Creek - Upper Swamp	19 Jul 2016	UEVF	8.50	17	<0.01	<0.01	<0.01	6.09	21	189	-	21	698
P19	Trigger Bore	Marshy Creek - Upper Swamp	14 Feb 2017	UEVF	7.56	17	<0.01	<0.01	<0.01	6.33	22	176	-	22	639
P19	Trigger Bore	Marshy Creek - Upper Swamp	25 Jul 2017	UEVF	8.37	18	-	-	-	6.62	22	185	-	24	711
P19	Trigger Bore	Marshy Creek - Upper Swamp	29 Jan 2018	UEVF	12.9	18	-	-	-	6.30	25	162	-	22	738
P19	Trigger Bore	Marshy Creek - Upper Swamp	02 Jul 2018	UEVF	14.4	16	-	-	-	6.27	23	164	-	18	665
P19	Trigger Bore	Marshy Creek - Upper Swamp	23 Jan 2019	UEVF	15.2	14	-	-	-	6.19	23	161	-	18	715

					Inorganics										
					Ionic Balance	Magnesium	Nitrate (as N)	Nitrite (as N)	Nitrite + Nitrate as N	pH (Lab)	Potassium	Sodium	Sulphate	Sulfate as SO4 - Turbidimetric	Total Dissolved Solids (Lab)
					%	mg/L	mg/L	mg/L	mg/L	-	mg/L	mg/L	mg/L	mg/L	mg/L
P19	Trigger Bore	Marshy Creek - Upper Swamp	31 Jul 2019	UEVF	11.5	16	-	-	-	6.38	24	162	-	19	600
P19	Trigger Bore	Marshy Creek - Upper Swamp	14 Jan 2020	UEVF	9.60	14	-	-	-	6.01	24	180	-	15	703
P19	Trigger Bore	Marshy Creek - Upper Swamp	14 Jul 2020	UEVF	13.8	15	-	-	-	6.31	22	158	-	16	787
P19	Trigger Bore	Marshy Creek - Upper Swamp	12 Jan 2021	UEVF	13.5	15	-	-	-	6.28	25	162	-	54	667
P19	Trigger Bore	Marshy Creek - Upper Swamp	14 Jul 2021	UEVF	14.4	16	-	-	-	6.28	26	157	-	19	673
P19	Trigger Bore	Marshy Creek - Upper Swamp	17 Jan 2022	UEVF	11.7	16	-	-	-	6.34	25	160	-	14	733
P19	Trigger Bore	Marshy Creek - Upper Swamp	11 Jul 2022	UEVF	5.44	21	-	-	-	6.23	25	179	-	29	720
P19	Trigger Bore	Marshy Creek - Upper Swamp	19 Jan 2023	UEVF	9.97	21	-	-	-	6.09	26	169	-	30	800
P19	Trigger Bore	Marshy Creek - Upper Swamp	17 Jul 2023	UEVF	4.95	18	-	-	-	6.68	23	166	-	22	783
SB2	Observation Bore	Southern Borefield	12 Jan 2012	UEVF	3.41	56	-	-	-	-	34	348	137	-	1,200.0
SB2	Observation Bore	Southern Borefield	26 Jul 2012	UEVF	5.66	48	-	-	-	-	34	280	119	-	1,280.0
SB2	Observation Bore	Southern Borefield	08 Jan 2013	UEVF	4.55	49	-	-	-	-	37	270	115	-	1,270.0
SB2	Observation Bore	Southern Borefield	25 Jul 2013	UEVF	4.82	53	0.01	<0.01	0.01	-	47	261	133	-	1,260.0
SB2	Observation Bore	Southern Borefield	24 Mar 2015	UEVF	8.36	52	<0.01	<0.01	<0.01	-	35	262	139	-	1,130.0
SB2	Observation Bore	Southern Borefield	13 Jul 2015	UEVF	12.2	51	0.02	<0.01	0.02	-	36	258	156	-	1,350.0
SB2	Observation Bore	Southern Borefield	03 Dec 2015	UEVF	7.48	52	0.01	<0.01	0.01	-	37	249	122	-	1,240.0
SB2	Observation Bore	Southern Borefield	13 Apr 2016	UEVF	9.80	50	<0.01	<0.01	<0.01	-	35	249	-	123	1,250.0
SB2	Observation Bore	Southern Borefield	25 Aug 2016	UEVF	5.84	53	<0.01	<0.01	<0.01	5.82	35	276	-	127	1,240.0
SB2	Observation Bore	Southern Borefield	22 Feb 2017	UEVF	8.80	58	0.04	<0.01	0.04	-	37	345	-	177	1,450.0
SB2	Observation Bore	Southern Borefield	25 Jul 2017	UEVF	11.5	48	-	-	-	-	36	249	-	134	1,190.0
SB2	Observation Bore	Southern Borefield	30 Jan 2018	UEVF	16.4	48	-	-	-	6.02	40	213	-	114	1,190.0
SB2	Observation Bore	Southern Borefield	03 Jul 2018	UEVF	17.4	48	-	-	-	6.08	37	229	-	130	1,160.0
SB2	Observation Bore	Southern Borefield	21 Jan 2019	UEVF	16.8	52	-	-	-	6.22	38	267	-	150	1,440.0
SB2	Observation Bore	Southern Borefield	06 Aug 2019	UEVF	13.5	62	-	-	-	5.22	41	342	-	174	1,560.0
SB2	Observation Bore	Southern Borefield	16 Jan 2020	UEVF	7.73	90	-	-	-	6.18	49	581	-	279	2,360.0
SB2	Observation Bore	Southern Borefield	21 Jul 2020	UEVF	4.61	118	-	-	-	6.07	61	827	-	357	3,200.0
SB2	Observation Bore	Southern Borefield	13 Oct 2020	UEVF	17.0	48	-	-	-	6.11	34	233	-	128	1,340.0
SB2	Observation Bore	Southern Borefield	04 Nov 2020	UEVF	7.03	51	-	-	-	6.07	37	247	-	94	1,190.0
SB2	Observation Bore	Southern Borefield	08 Dec 2020	UEVF	14.0	50	-	-	-	6.07	34	233	-	115	1,090.0
SB2	Observation Bore	Southern Borefield	11 Jan 2021	UEVF	12.2	50	-	-	-	6.16	38	238	-	137	1,110.0
SB2	Observation Bore	Southern Borefield	04 Feb 2021	UEVF	13.6	52	-	-	-	6.19	39	244	-	129	1,270.0
SB2	Observation Bore	Southern Borefield	21 Jul 2021	UEVF	12.7	55	-	-	-	6.13	38	276	-	148	1,310.0
SB2	Observation Bore	Southern Borefield	19 Jan 2022	UEVF	10.9	73	-	-	-	6.00	39	408	-	205	1,870.0
SB2	Observation Bore	Southern Borefield	13 Jul 2022	UEVF	3.98	91	-	-	-	5.90	51	583	-	262	2,390.0
SB2	Observation Bore	Southern Borefield	24 Jan 2023	UEVF	7.26	92	-	-	-	6.29	50	579	-	281	2,460.0
SB2	Observation Bore	Southern Borefield	04 Jul 2023	UEVF	8.09	67	-	-	-	3.55	42	394	-	180	1,820.0
WTOB1	Observation Bore	Salt Creek Swamp	01 Apr 2015	PWT	6.88	13	0.01	<0.01	0.01	5.09	3	167	82	-	2,860.0
WTOB1	Observation Bore	Salt Creek Swamp	20 Jul 2015	PWT	4.95	11	0.10	0.01	0.11	5.50	2	180	92	-	730
WTOB1	Observation Bore	Salt Creek Swamp	17 Feb 2016	PWT	0.62	7	0.02	<0.01	0.02	5.41	2	110	44	-	976
WTOB1	Observation Bore	Salt Creek Swamp	20 Jul 2016	PWT	21.0	2	<0.01	<0.01	<0.01	5.66	<1	115	-	78	2,220.0
WTOB1	Observation Bore	Salt Creek Swamp	15 Feb 2017	PWT	8.41	10	<0.01	<0.01	<0.01	5.62	2	154	-	75	1,660.0
WTOB1	Observation Bore	Salt Creek Swamp	19 Jul 2017	PWT	7.37	13	-	-	-	5.97	3	163	-	77	716

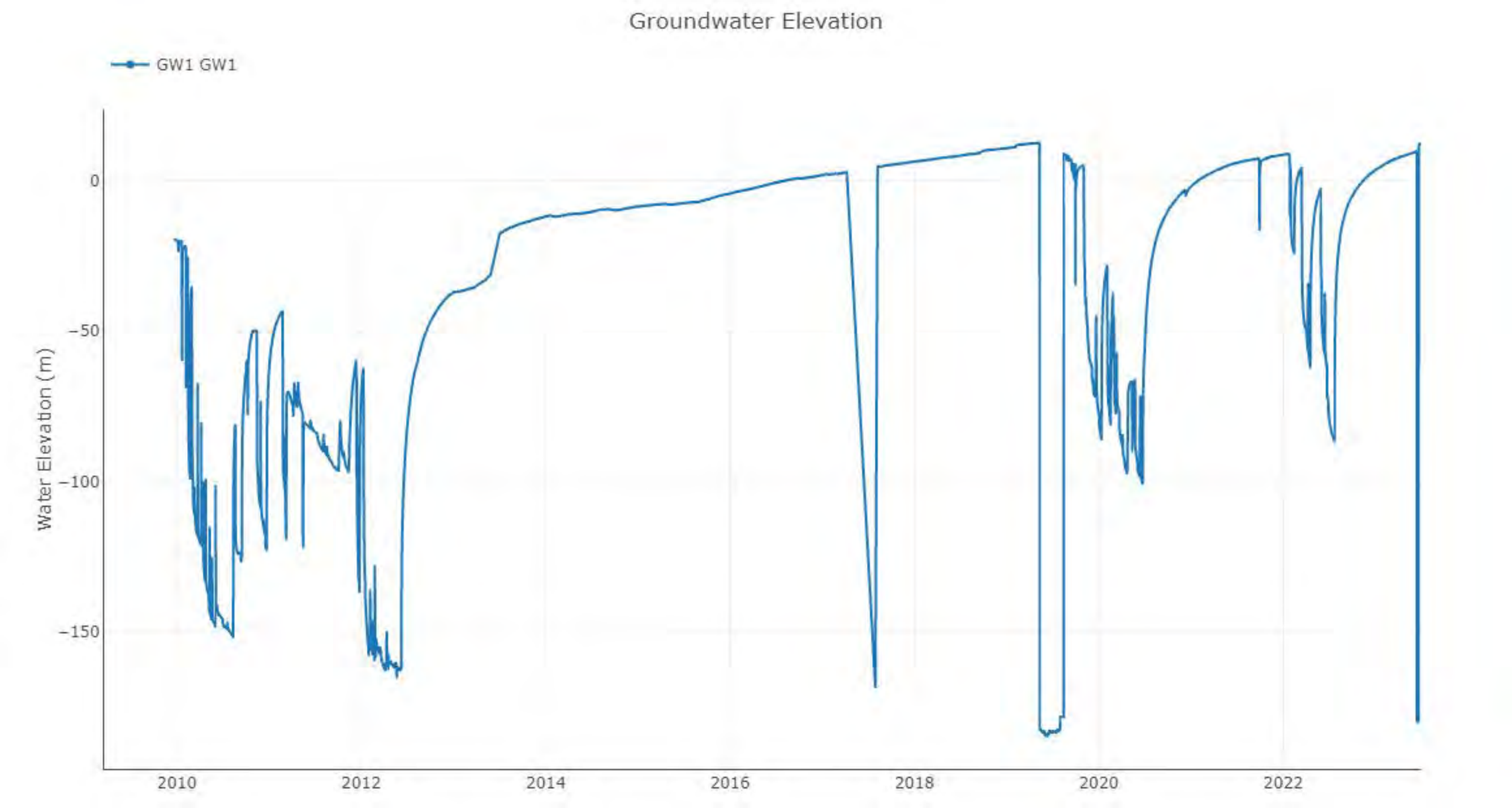
Table B2 - Groundwater Analytical Results

					Inorganics										
					Ionic Balance	Magnesium	Nitrate (as N)	Nitrite (as N)	Nitrite + Nitrate as N	pH (Lab)	Potassium	Sodium	Sulphate	Sulfate as SO4 - Turbidimetric	Total Dissolved Solids (Lab)
					%	mg/L	mg/L	mg/L	mg/L	-	mg/L	mg/L	mg/L	mg/L	mg/L
WTOB1	Observation Bore	Salt Creek Swamp	31 Jan 2018	PWT	13.3	14	-	-	-	6.50	4	154	-	78	931
WTOB1	Observation Bore	Salt Creek Swamp	09 Jul 2018	PWT	9.43	19	-	-	-	5.60	4	165	-	52	776
WTOB1	Observation Bore	Salt Creek Swamp	16 Jan 2019	PWT	9.37	17	-	-	-	5.59	3	170	-	53	1,020.0
WTOB1	Observation Bore	Salt Creek Swamp	12 Aug 2019	PWT	9.14	16	-	-	-	5.25	3	176	-	78	2,350.0
WTOB1	Observation Bore	Salt Creek Swamp	15 Jan 2020	PWT	9.52	16	-	-	-	5.40	3	153	-	66	852
WTOB1	Observation Bore	Salt Creek Swamp	15 Jul 2020	PWT	8.98	11	-	-	-	5.37	2	116	-	59	778
WTOB1	Observation Bore	Salt Creek Swamp	13 Jan 2021	PWT	11.3	14	-	-	-	5.41	2	143	-	63	900
WTOB1	Observation Bore	Salt Creek Swamp	15 Jul 2021	PWT	13.2	10	-	-	-	5.46	2	101	-	53	718
WTOB1	Observation Bore	Salt Creek Swamp	18 Jan 2022	PWT	7.61	19	-	-	-	5.81	2	191	-	53	1,010.0
WTOB1	Observation Bore	Salt Creek Swamp	12 Jul 2022	PWT	8.77	22	-	-	-	5.25	3	211	-	70	1,390.0
WTOB1	Observation Bore	Salt Creek Swamp	23 Jan 2023	PWT	7.24	18	-	-	-	5.69	2	181	-	53	1,090.0
WTOB1	Observation Bore	Salt Creek Swamp	03 Jul 2023	PWT	6.35	20	-	-	-	5.77	3	196	-	57	879
WTOB2	Observation Bore	Marshy Creek - Lower Swamp	01 Apr 2015	PWT	7.18	64	<0.01	<0.01	<0.01	4.31	24	359	377	-	1,610.0
WTOB2	Observation Bore	Marshy Creek - Lower Swamp	21 Jul 2015	PWT	9.89	74	0.01	<0.01	0.01	4.32	25	383	445	-	2,210.0
WTOB2	Observation Bore	Marshy Creek - Lower Swamp	17 Feb 2016	PWT	2.03	60	<0.01	<0.01	<0.01	5.04	32	416	241	-	1,630.0
WTOB2	Observation Bore	Marshy Creek - Lower Swamp	20 Jul 2016	PWT	8.07	83	<0.01	<0.01	<0.01	4.60	27	470	-	551	2,200.0
WTOB2	Observation Bore	Marshy Creek - Lower Swamp	15 Feb 2017	PWT	10.2	81	<0.01	<0.01	<0.01	4.57	26	434	-	551	2,290.0
WTOB2	Observation Bore	Marshy Creek - Lower Swamp	19 Jul 2017	PWT	11.7	86	-	-	-	4.16	29	474	-	719	1,760.0
WTOB2	Observation Bore	Marshy Creek - Lower Swamp	31 Jan 2018	PWT	17.2	68	-	-	-	4.17	29	344	-	505	2,160.0
WTOB2	Observation Bore	Marshy Creek - Lower Swamp	09 Jul 2018	PWT	14.3	76	-	-	-	4.13	29	416	-	570	2,200.0
WTOB2	Observation Bore	Marshy Creek - Lower Swamp	16 Jan 2019	PWT	11.1	70	-	-	-	4.23	28	410	-	507	2,130.0
WTOB2	Observation Bore	Marshy Creek - Lower Swamp	12 Aug 2019	PWT	15.6	79	-	-	-	3.87	31	424	-	680	2,850.0
WTOB2	Observation Bore	Marshy Creek - Lower Swamp	15 Jan 2020	PWT	10.0	72	-	-	-	3.91	30	426	-	564	1,970.0
WTOB2	Observation Bore	Marshy Creek - Lower Swamp	15 Jul 2020	PWT	14.6	76	-	-	-	4.08	28	422	-	638	2,110.0
WTOB2	Observation Bore	Marshy Creek - Lower Swamp	13 Jan 2021	PWT	17.0	64	-	-	-	4.08	29	378	-	516	1,980.0
WTOB2	Observation Bore	Marshy Creek - Lower Swamp	22 Jul 2021	PWT	12.2	74	-	-	-	3.90	30	428	-	533	2,700.0
WTOB2	Observation Bore	Marshy Creek - Lower Swamp	17 Jan 2022	PWT	9.81	67	-	-	-	4.11	30	388	-	431	1,930.0
WTOB2	Observation Bore	Marshy Creek - Lower Swamp	11 Jul 2022	PWT	5.45	70	-	-	-	4.20	30	410	-	383	1,920.0
WTOB2	Observation Bore	Marshy Creek - Lower Swamp	19 Jan 2023	PWT	13.8	65	-	-	-	3.46	31	375	-	392	2,060.0
WTOB3	Observation Bore	Marshy Creek - Upper Swamp	01 Apr 2015	PWT	8.76	28	0.01	<0.01	0.01	5.59	2	258	71	-	945
WTOB3	Observation Bore	Marshy Creek - Upper Swamp	21 Jul 2015	PWT	1.57	30	0.02	<0.01	0.02	6.11	3	306	73	-	1,220.0
WTOB3	Observation Bore	Marshy Creek - Upper Swamp	17 Feb 2016	PWT	3.39	29	<0.01	<0.01	<0.01	5.69	3	298	71	-	1,170.0
WTOB3	Observation Bore	Marshy Creek - Upper Swamp	20 Jul 2016	PWT	6.76	27	<0.01	<0.01	<0.01	5.80	2	281	-	72	1,080.0
WTOB3	Observation Bore	Marshy Creek - Upper Swamp	15 Feb 2017	PWT	8.43	28	<0.01	<0.01	<0.01	6.69	2	262	-	72	996
WTOB3	Observation Bore	Marshy Creek - Upper Swamp	19 Jul 2017	PWT	8.75	28	-	-	-	5.81	2	264	-	79	921
WTOB3	Observation Bore	Marshy Creek - Upper Swamp	29 Jan 2018	PWT	14.1	28	-	-	-	5.86	3	234	-	73	1,040.0
WTOB3	Observation Bore	Marshy Creek - Upper Swamp	02 Jul 2018	PWT	13.0	28	-	-	-	6.01	3	242	-	74	1,120.0
WTOB3	Observation Bore	Marshy Creek - Upper Swamp	16 Jan 2019	PWT	8.76	28	-	-	-	5.99	3	270	-	67	998
WTOB3	Observation Bore	Marshy Creek - Upper Swamp	31 Jul 2019	PWT	11.5	27	-	-	-	5.71	3	237	-	74	880
WTOB3	Observation Bore	Marshy Creek - Upper Swamp	14 Jan 2020	PWT	9.85	18	-	-	-	5.80	2	269	-	72	840
WTOB3	Observation Bore	Marshy Creek - Upper Swamp	14 Jul 2020	PWT	10.8	28	-	-	-	5.92	3	237	-	74	975
WTOB3	Observation Bore	Marshy Creek - Upper Swamp	12 Jan 2021	PWT	9.27	27	-	-	-	5.90	3	241	-	74	1,070.0

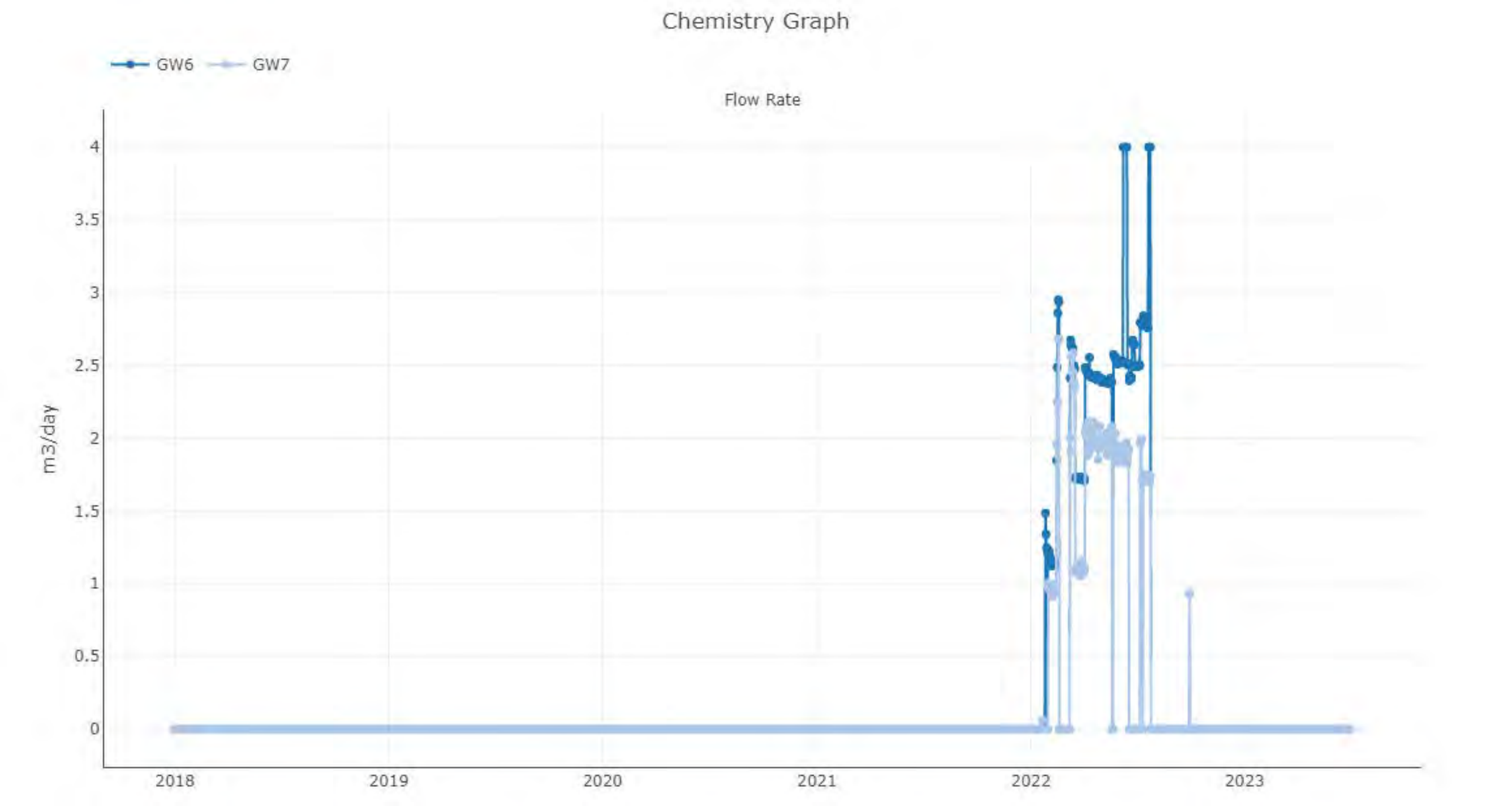
Table B2 - Groundwater Analytical Results

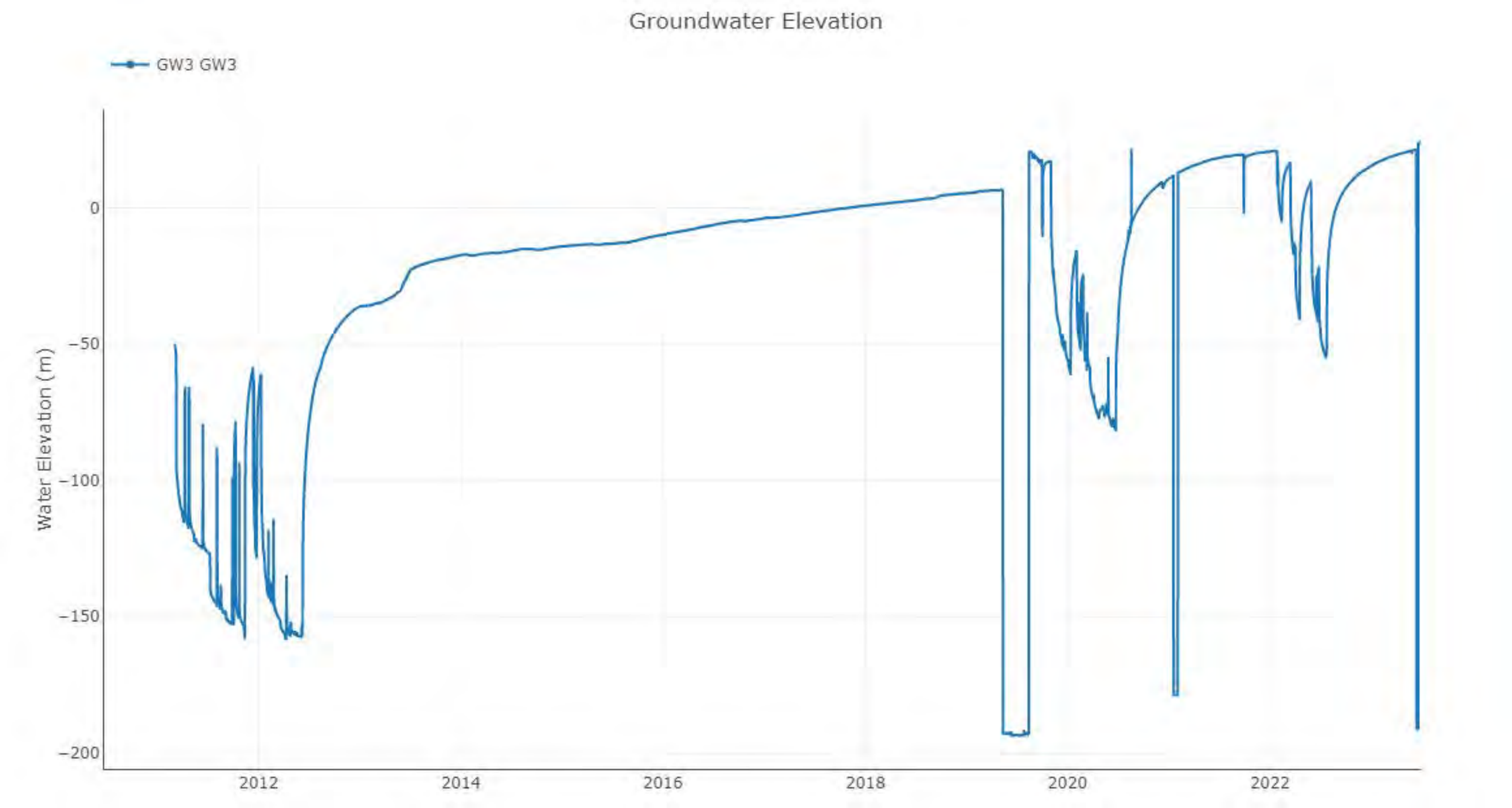
					Inorganics										
					Ionic Balance	Magnesium	Nitrate (as N)	Nitrite (as N)	Nitrite + Nitrate as N	pH (Lab)	Potassium	Sodium	Sulphate	Sulfate as SO4 - Turbidimetric	Total Dissolved Solids (Lab)
					%	mg/L	mg/L	mg/L	mg/L	-	mg/L	mg/L	mg/L	mg/L	mg/L
WTOB3	Observation Bore	Marshy Creek - Upper Swamp	14 Jul 2021	PWT	10.1	27	-	-	-	5.98	3	232	-	61	922
WTOB3	Observation Bore	Marshy Creek - Upper Swamp	18 Jan 2022	PWT	5.95	28	-	-	-	5.91	3	242	-	58	886
WTOB3	Observation Bore	Marshy Creek - Upper Swamp	11 Jul 2022	PWT	3.68	28	-	-	-	5.62	3	242	-	68	893
WTOB3	Observation Bore	Marshy Creek - Upper Swamp	19 Jan 2023	PWT	12.5	26	-	-	-	5.34	3	225	-	70	995
WTOB3	Observation Bore	Marshy Creek - Upper Swamp	03 Jul 2023	PWT	6.24	25	-	-	-	6.20	3	232	-	65	923
WTOB3	Observation Bore	Marshy Creek - Upper Swamp	05 Jul 2023	PWT	6.91	68	-	-	-	4.22	31	417	-	369	2,140.0

Groundwater – Production Bore Graphs

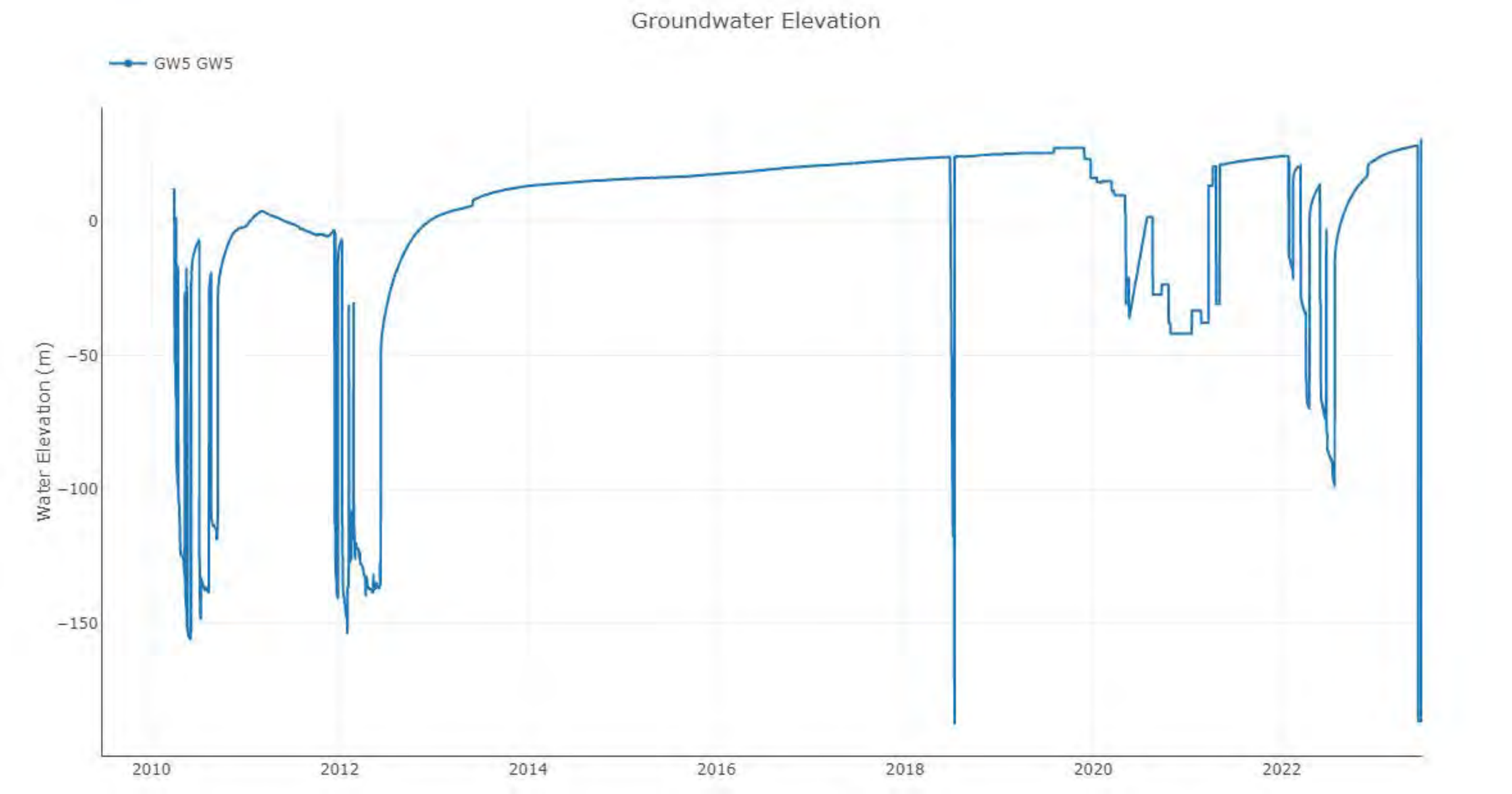

Groundwater Elevation
GW1 GW1
Water Elevation (m)
0
−50
−100
−150
2010
2012
2014
2016
2018
2020
2022


Groundwater Elevation
GW2 GW2
Water Elevation (m)
0
−50
−100
−150
−200
2014
2016
2018
2020
2022

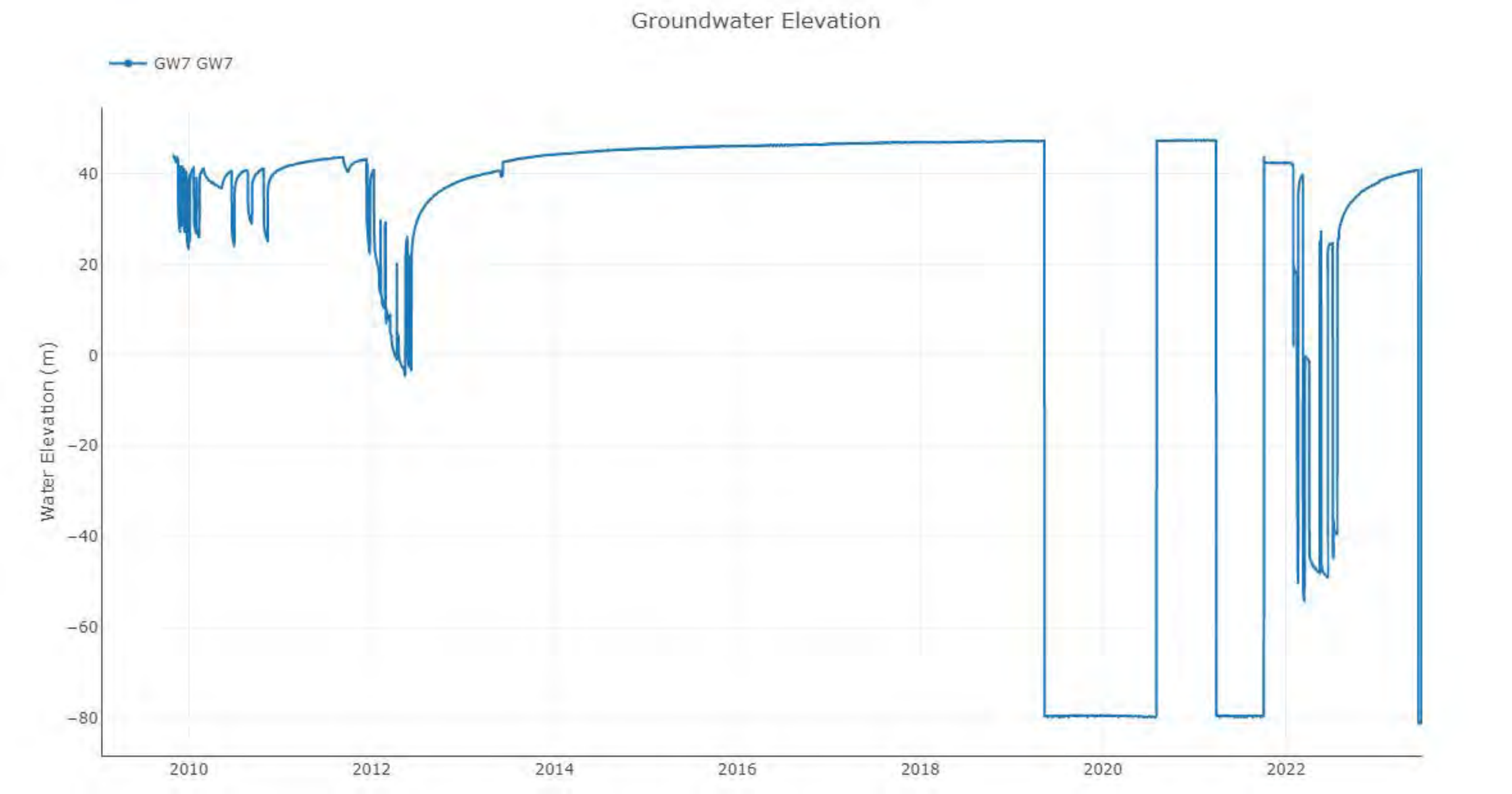

Chemistry Graph
GW6
GW7
Flow Rate
m3/day
4
3.5
3
2.5
2
1.5
1
0.5
0
2018
2019
2020
2021
2022
2023

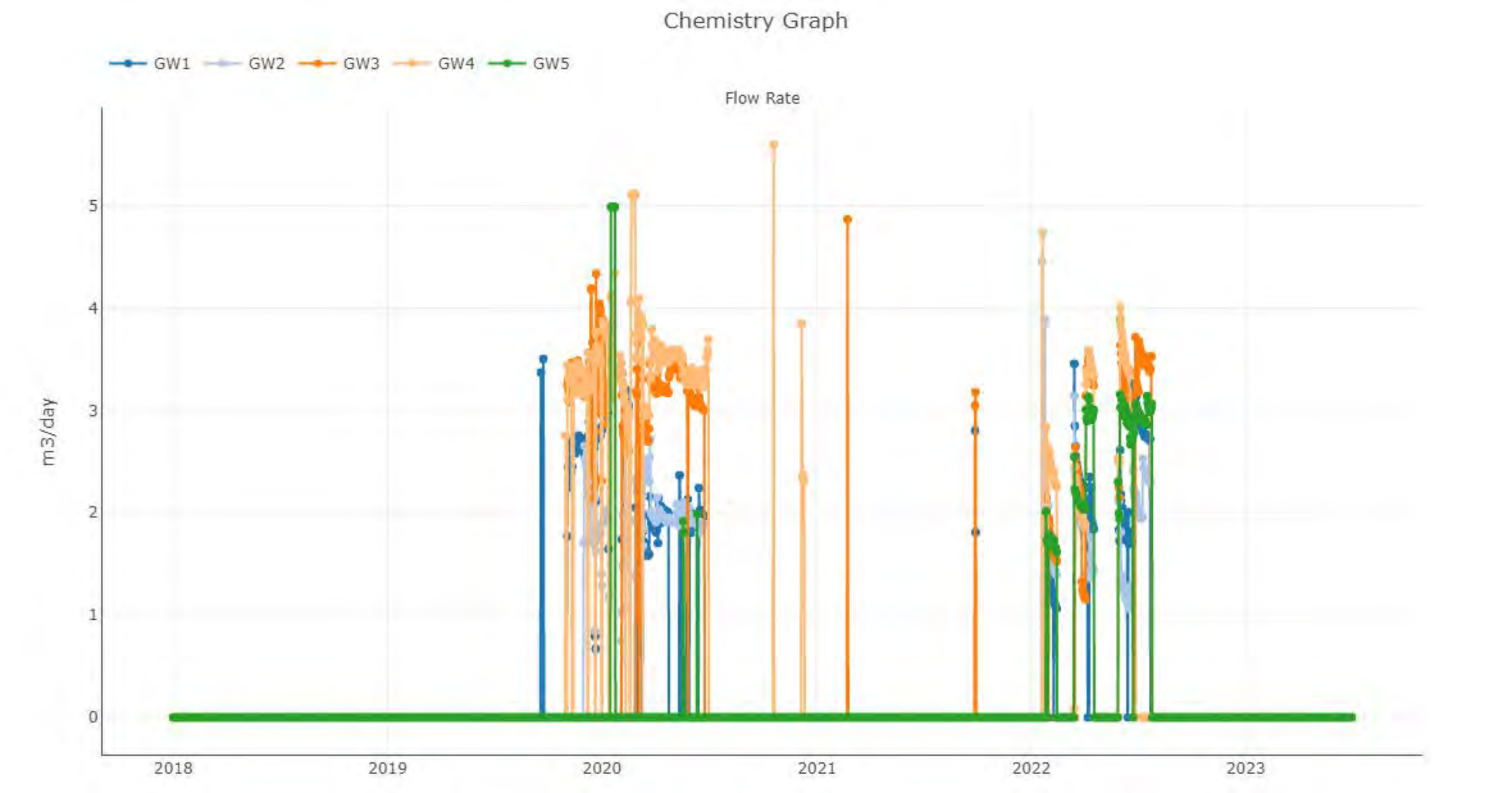

Groundwater Elevation
GW3 GW3
Water Elevation (m)
0
−50
−100
−150
−200
2012
2014
2016
2018
2020
2022


Groundwater Elevation
GW4 GW4
Water Elevation (m)
50
0
−50
−100
−150
−200
2010
2012
2014
2016
2018
2020
2022


Groundwater Elevation
GW5 GW5
Water Elevation (m)
0
−50
−100
−150
2010
2012
2014
2016
2018
2020
2022

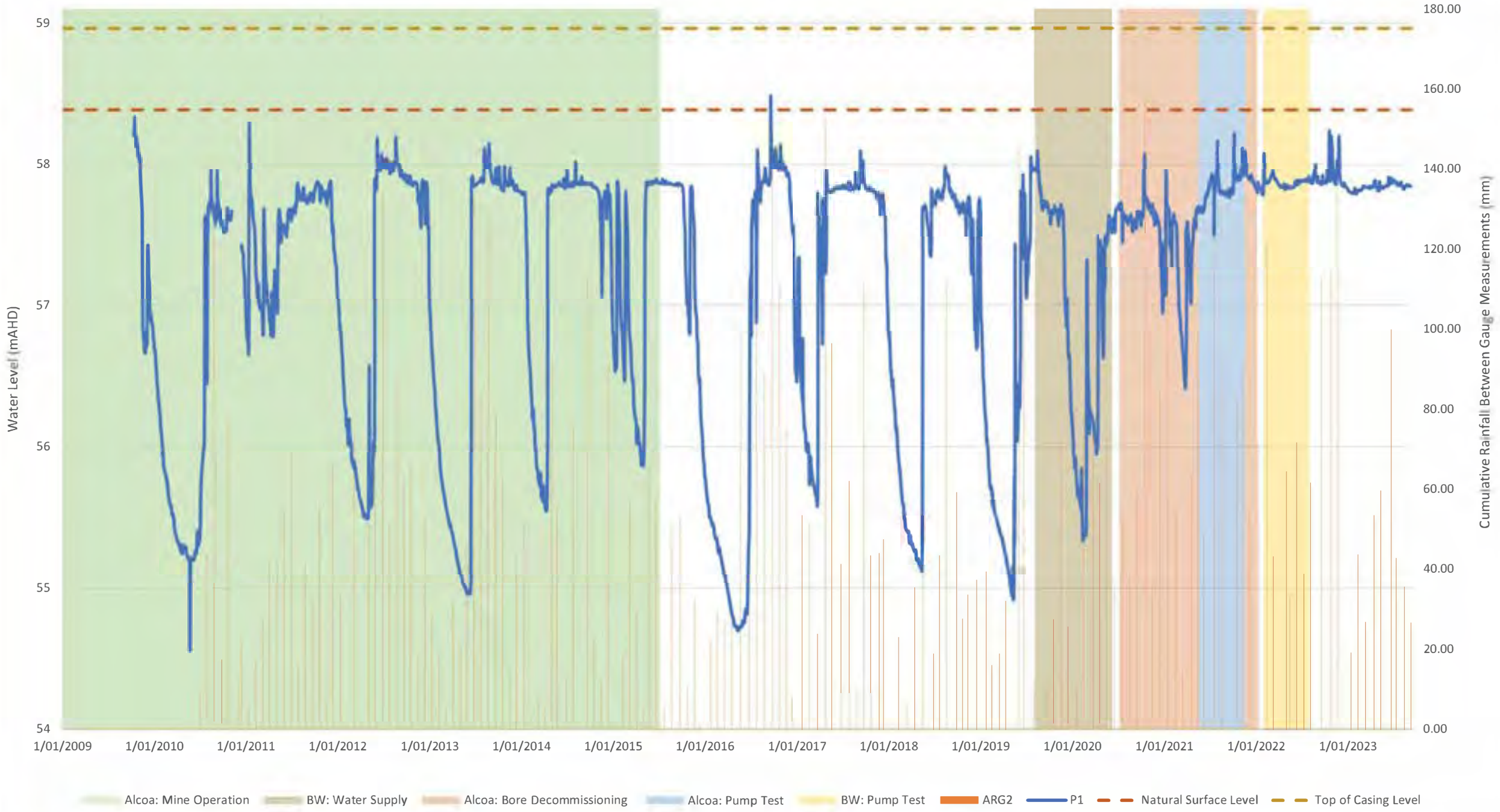

Groundwater Elevation
GW6 GW6
Water Elevation (m)
80
60
40
20
0
−20
−40
2010
2012
2014
2016
2018
2020
2022


Groundwater Elevation
GW7 GW7
Water Elevation (m)
40
20
0
−20
−40
−60
−80
2010
2012
2014
2016
2018
2020
2022

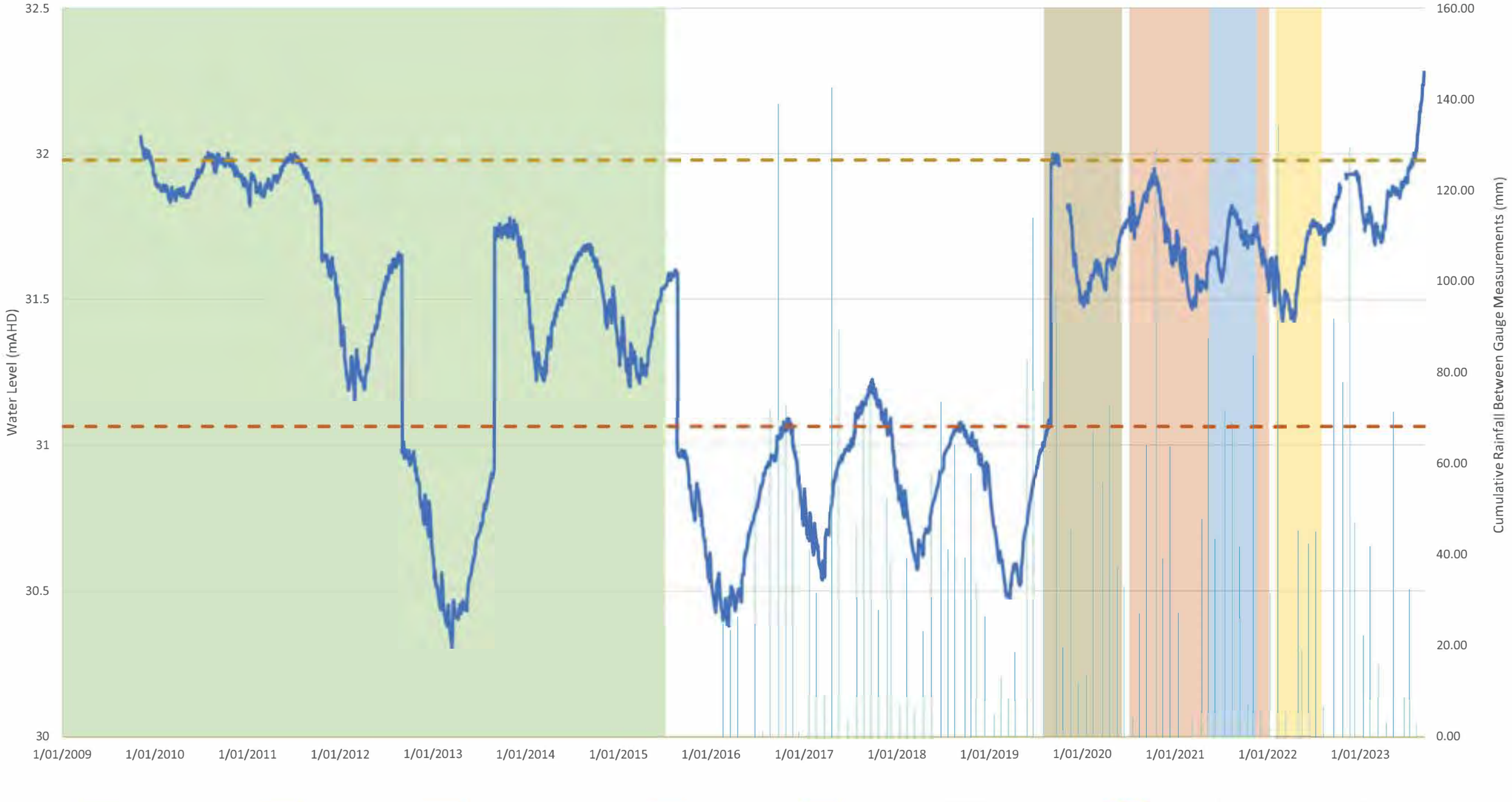

Chemistry Graph
GW1
GW2
GW3
GW4
GW5
Flow Rate
m3/day
0
1
2
3
4
5
2018
2019
2020
2021
2022
2023

Groundwater – Level Graphs

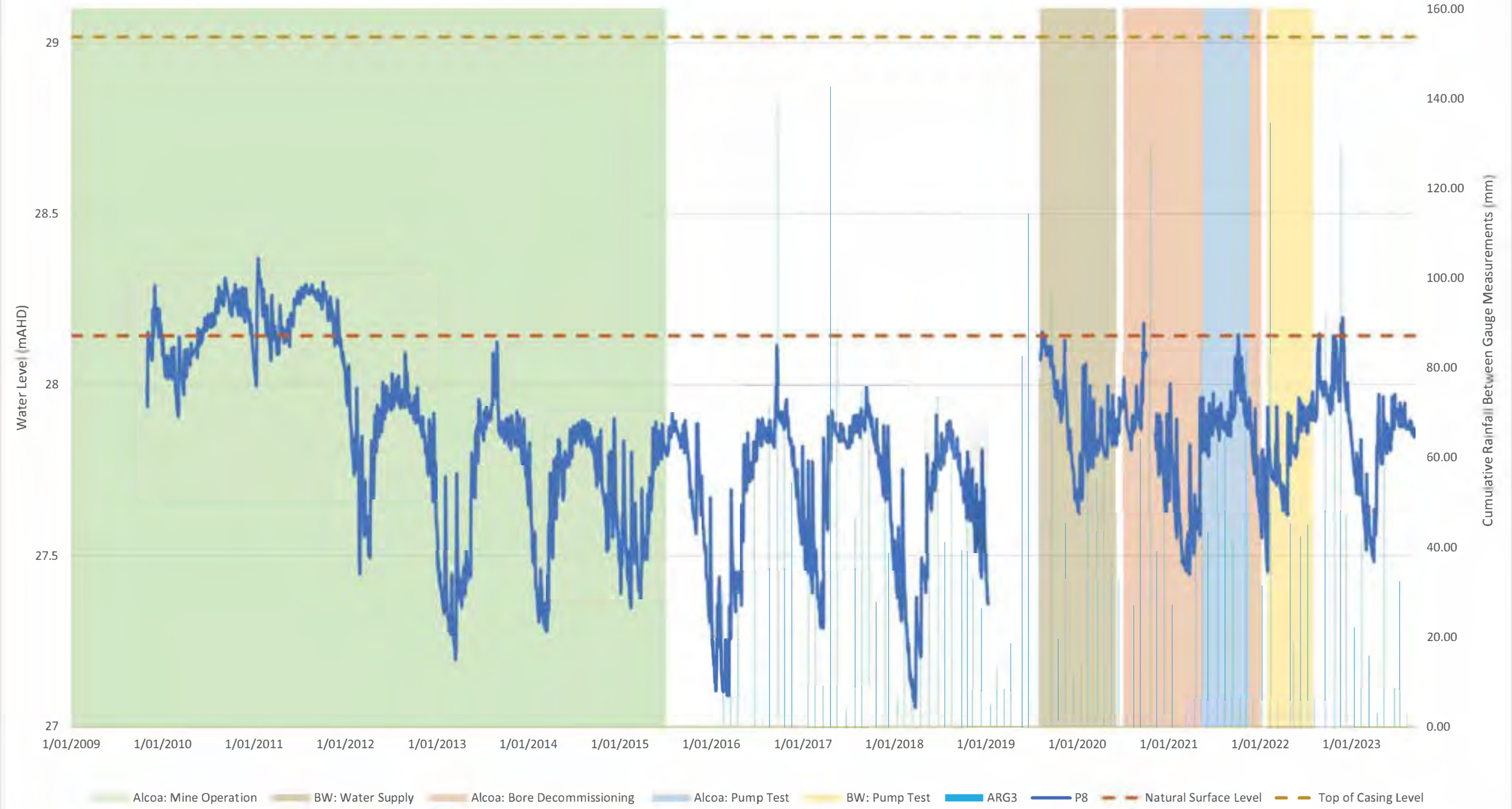
P1 (ASA)- Water level, Rainfall and Pump graph



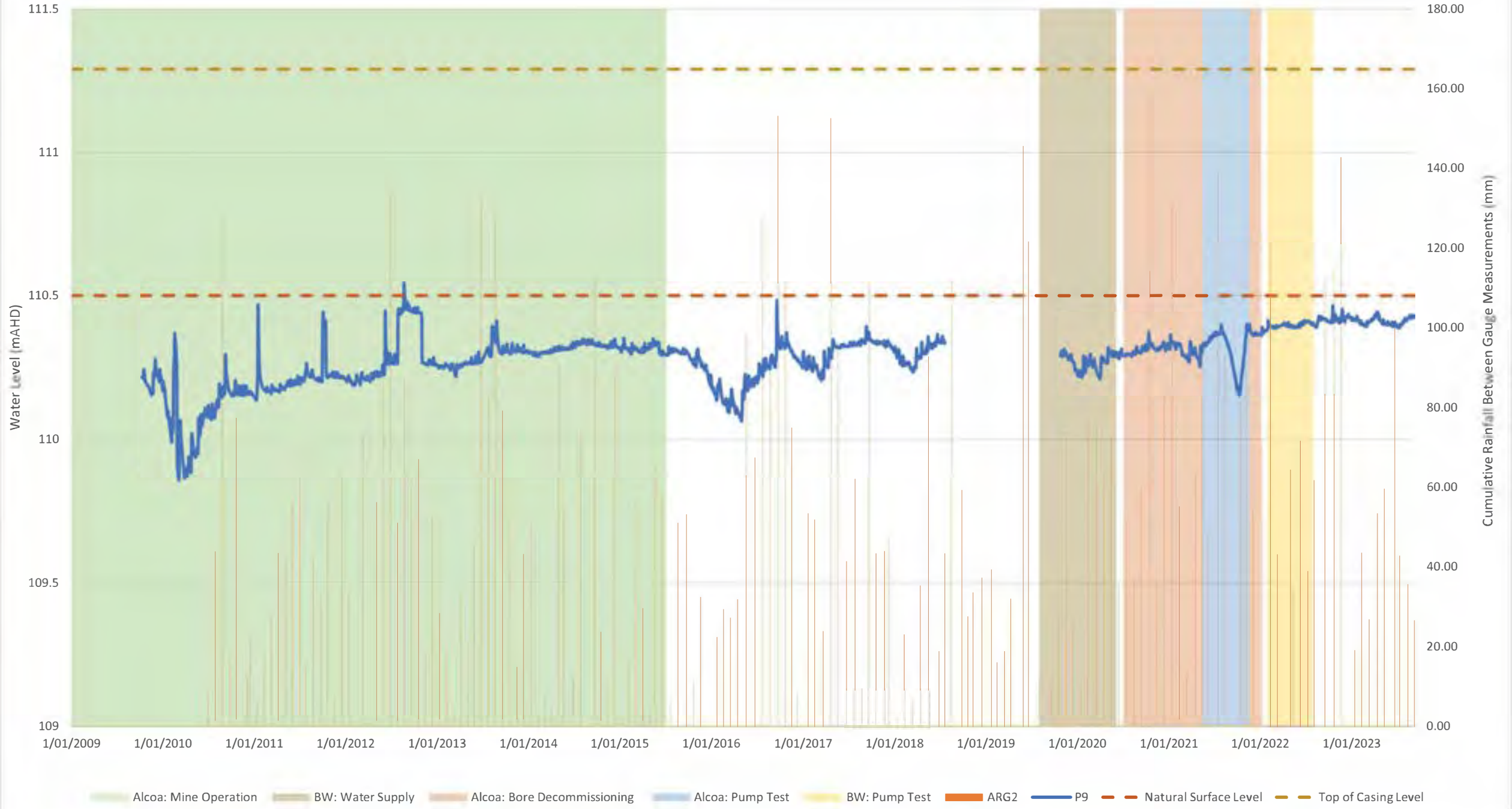
P7B (ASA) - Water level, Rainfall and Pump graph

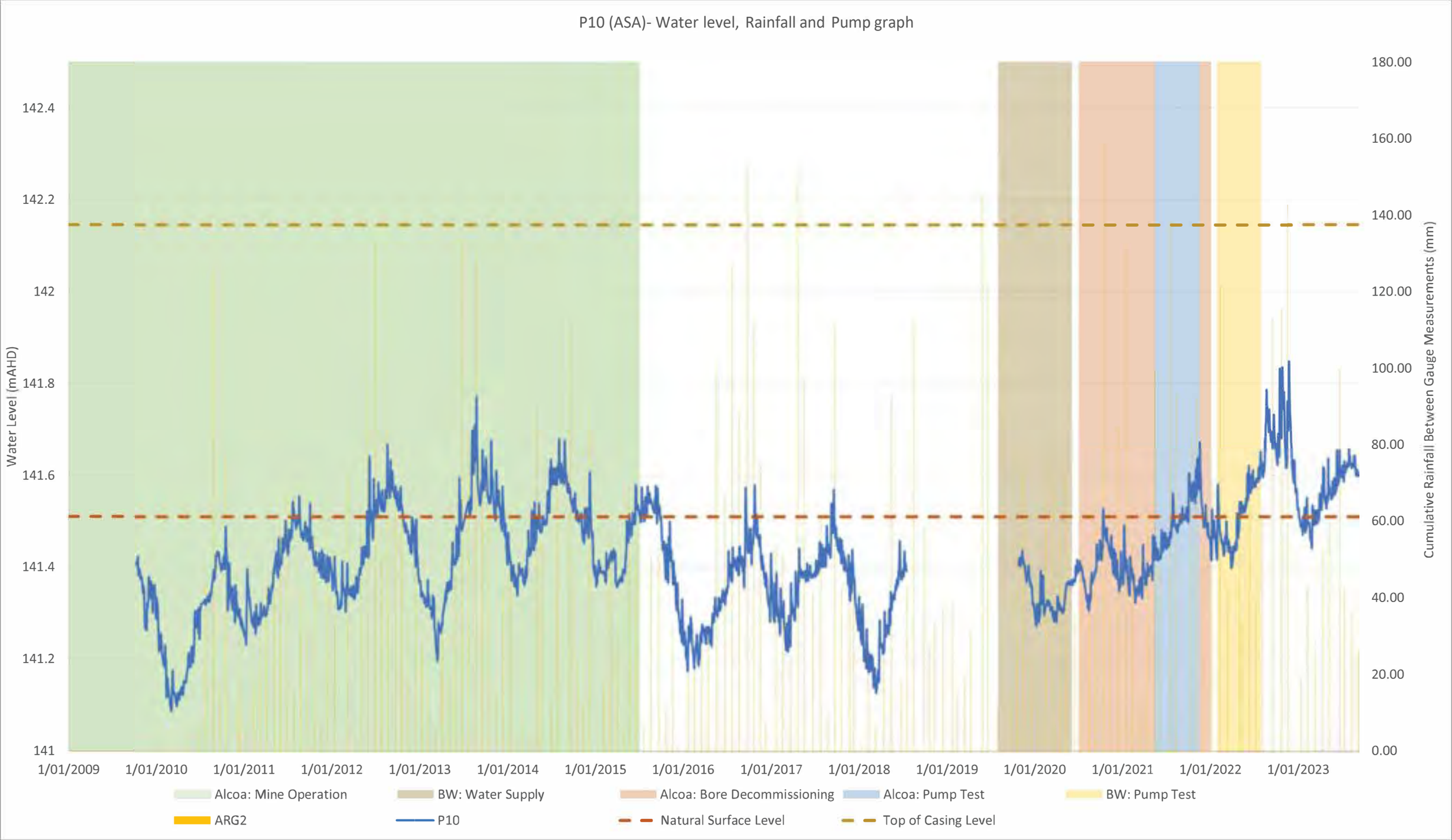


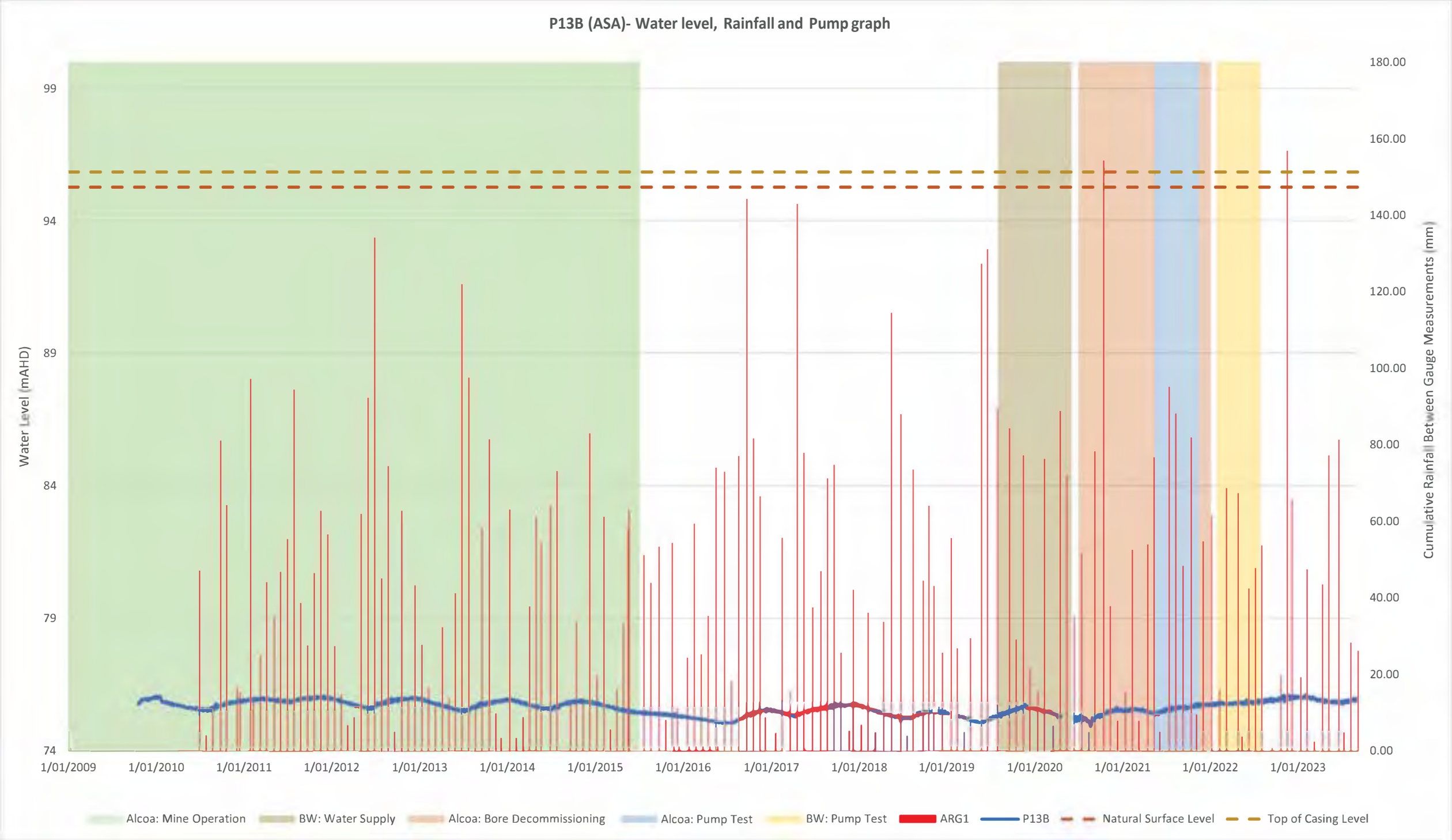
P8 (ASA) - Water level, Rainfall and Pump graph



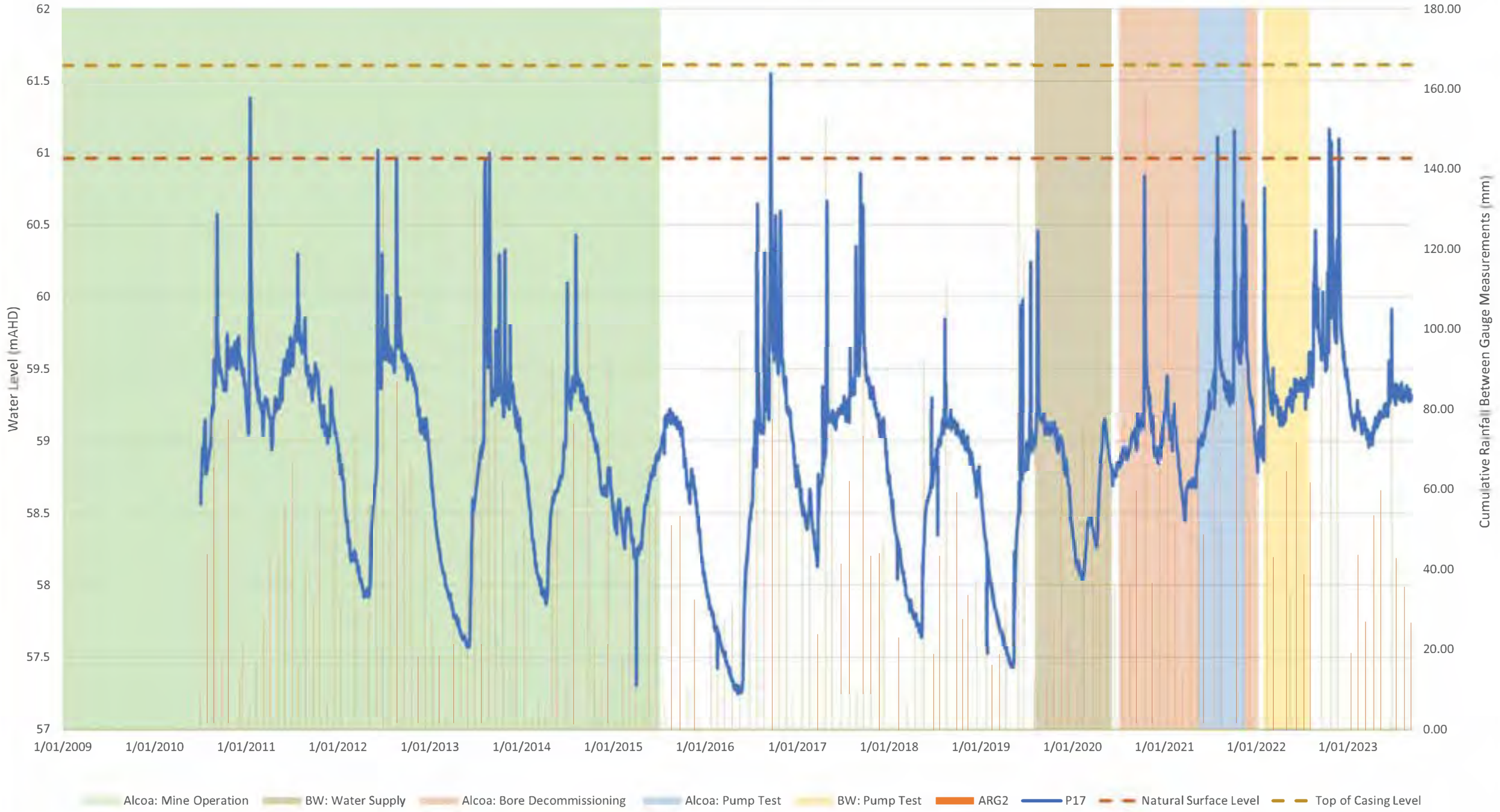
P9 (ASA)- Water level, Rainfall and Pump graph

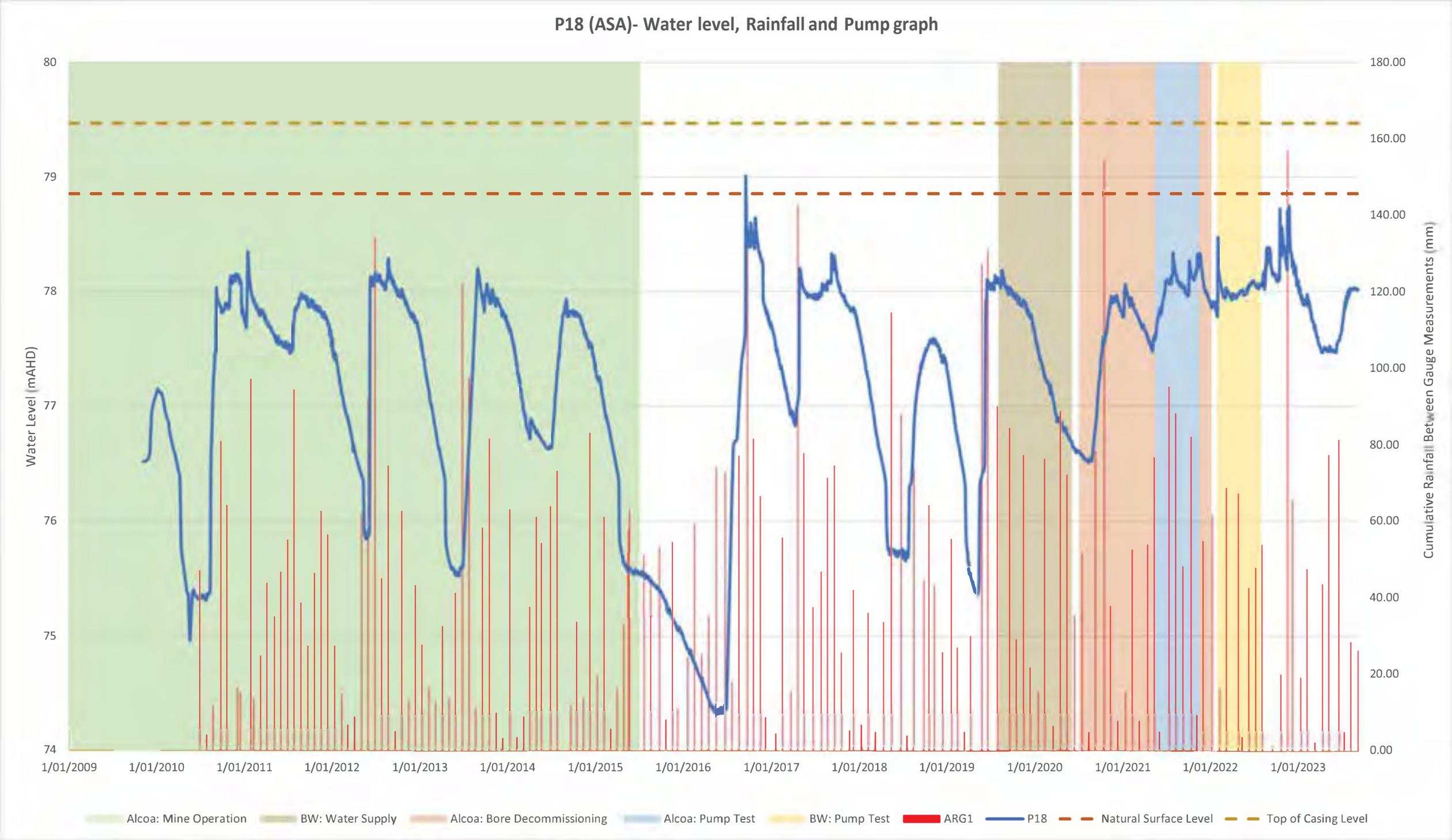



P10 (ASA)- Water level, Rainfall and Pump graph
Water Level (mAHD)
142.4
142.2
142
141.8
141.6
141.4
141.2
141
Cumulative Rainfall Between Gauge Measurements (mm)
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/01/2009
1/01/2010
1/01/2011
1/01/2012
1/01/2013
1/01/2014
1/01/2015
1/01/2016
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG2
P10
Natural Surface Level
Top of Casing Level

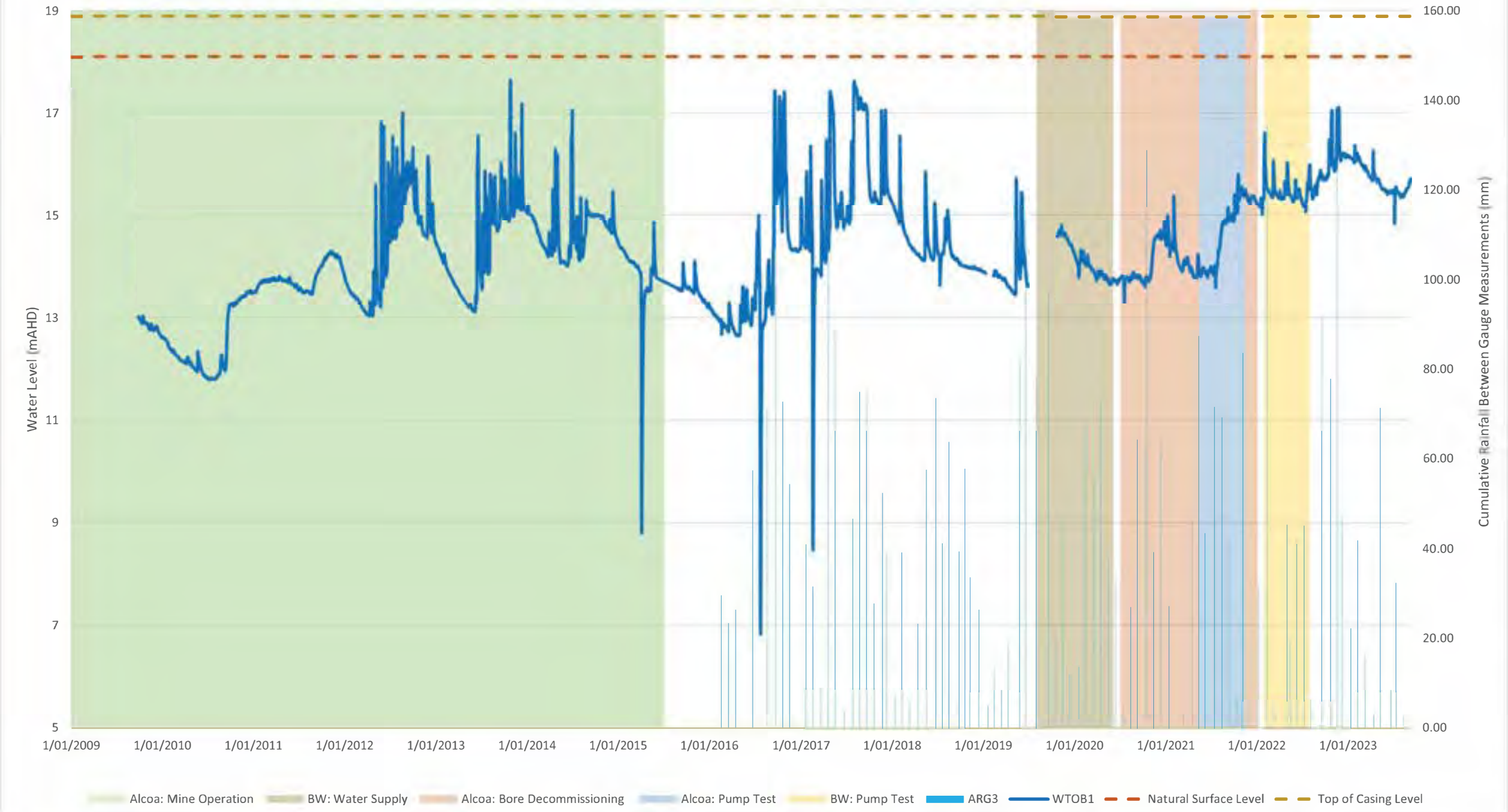

P13B (ASA)- Water level, Rainfall and Pump graph
Water Level (mAHD)
99
94
89
84
79
74
Cumulative Rainfall Between Gauge Measurements (mm)
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/01/2009
1/01/2010
1/01/2011
1/01/2012
1/01/2013
1/01/2014
1/01/2015
1/01/2016
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG1
P13B
Natural Surface Level
Top of Casing Level

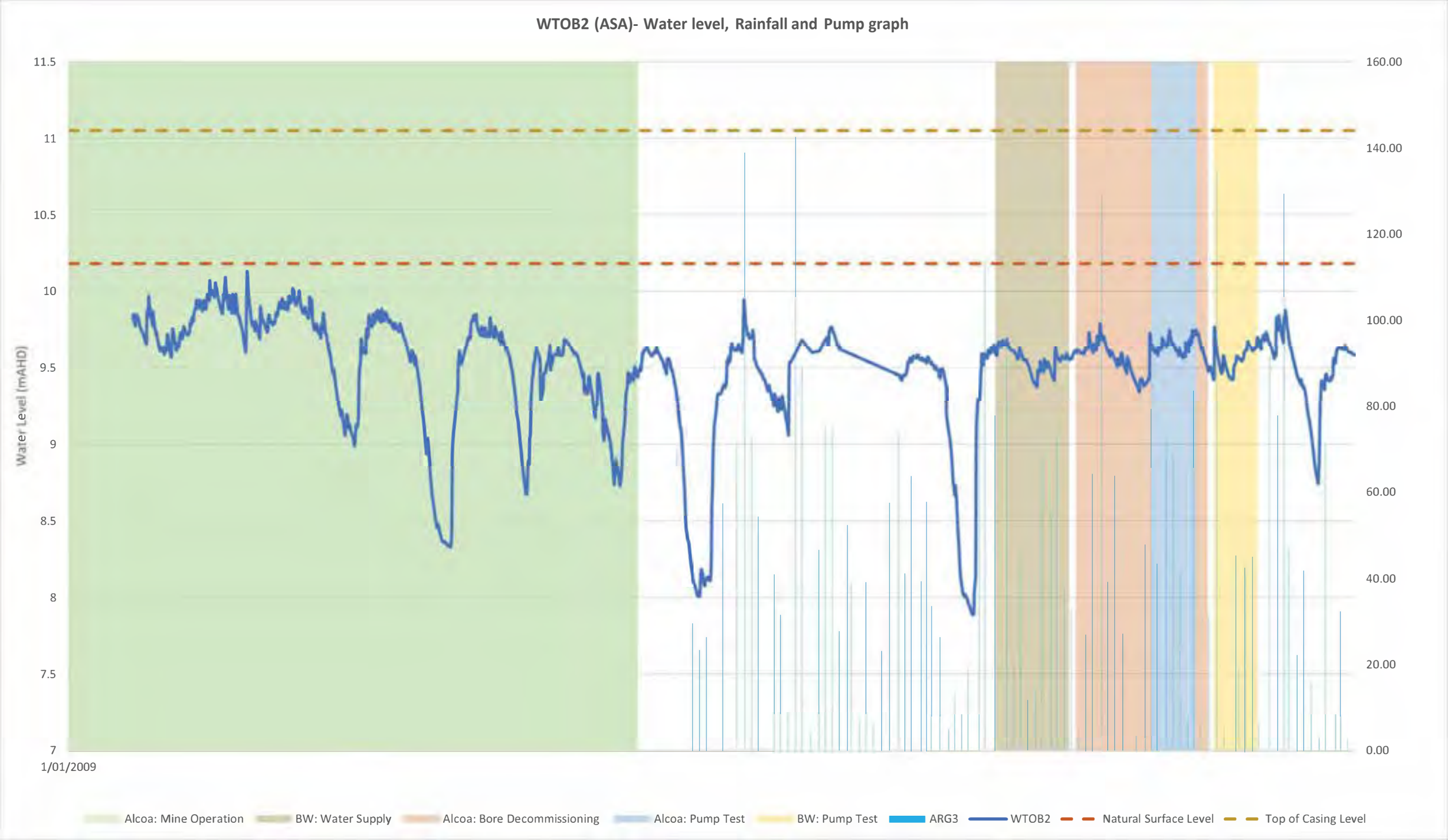
P17 (ASA)- Water level, Rainfall and Pump graph



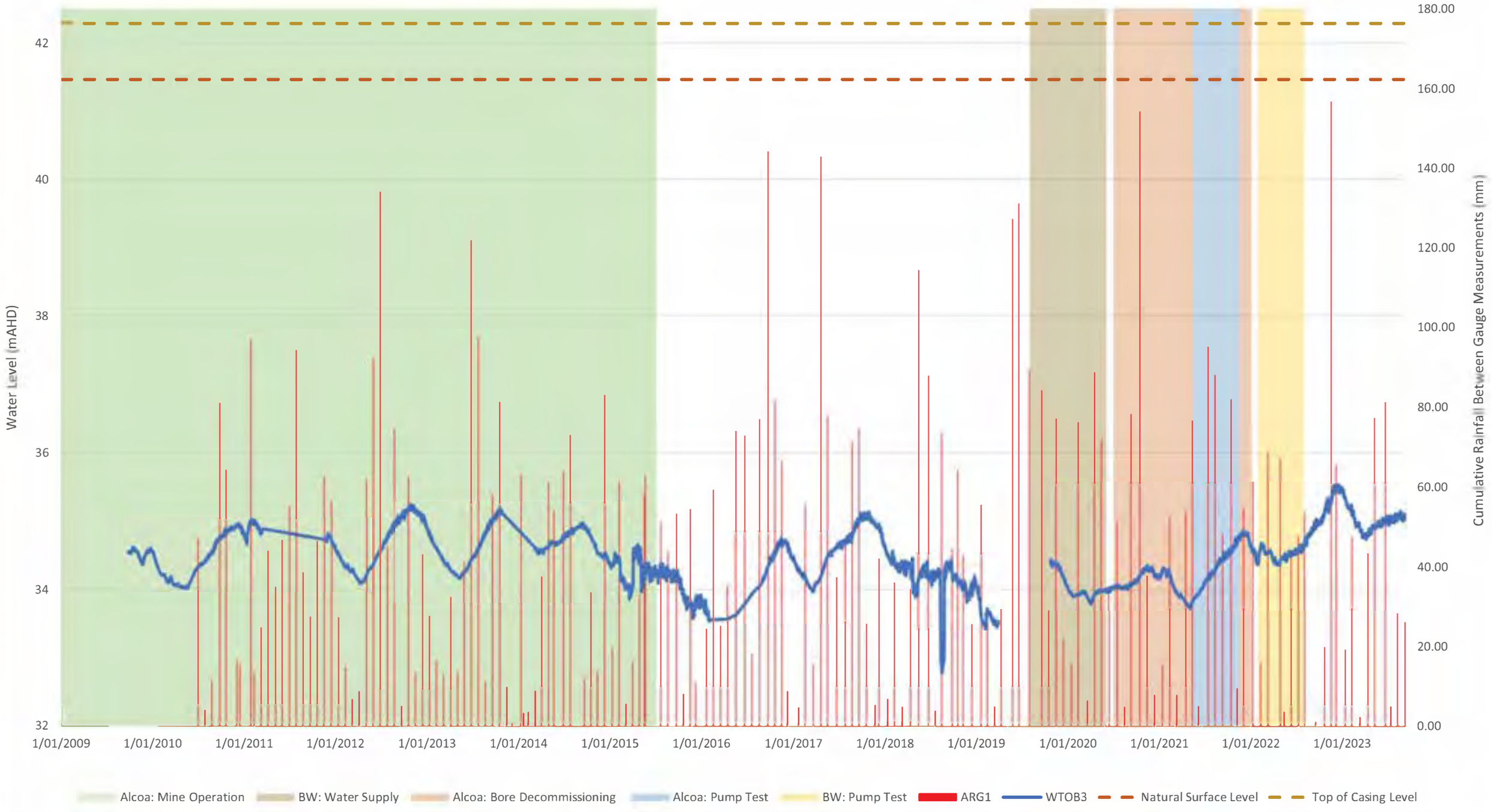

P18 (ASA)- Water level, Rainfall and Pump graph
Water Level (mAHD)
Cumulative Rainfall Between Gauge Measurements (mm)
80
79
78
77
76
75
74
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/01/2009
1/01/2010
1/01/2011
1/01/2012
1/01/2013
1/01/2014
1/01/2015
1/01/2016
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG1
P18
Natural Surface Level
Top of Casing Level

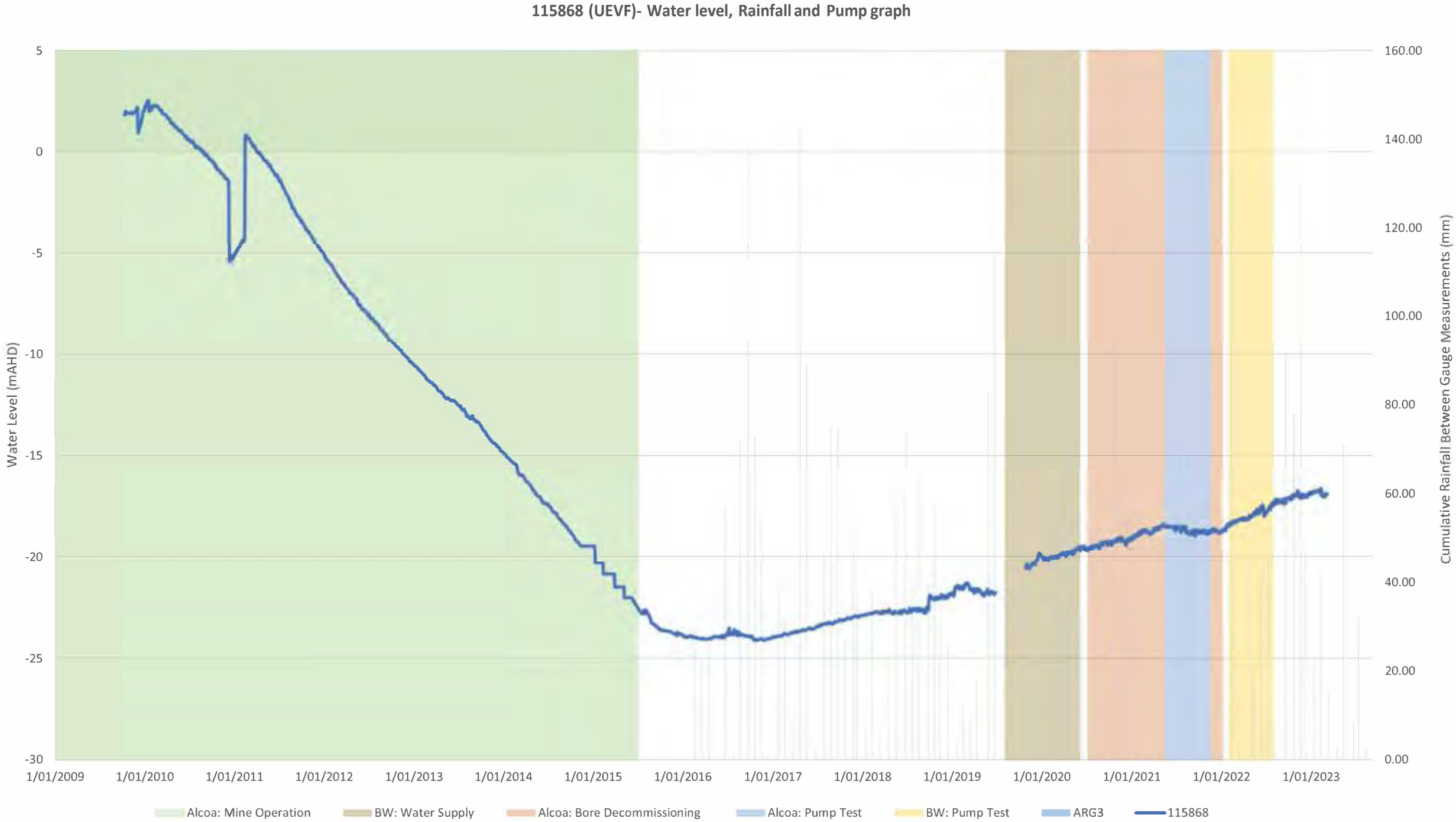
WTOB1 (ASA)- Water level, Rainfall and Pump graph



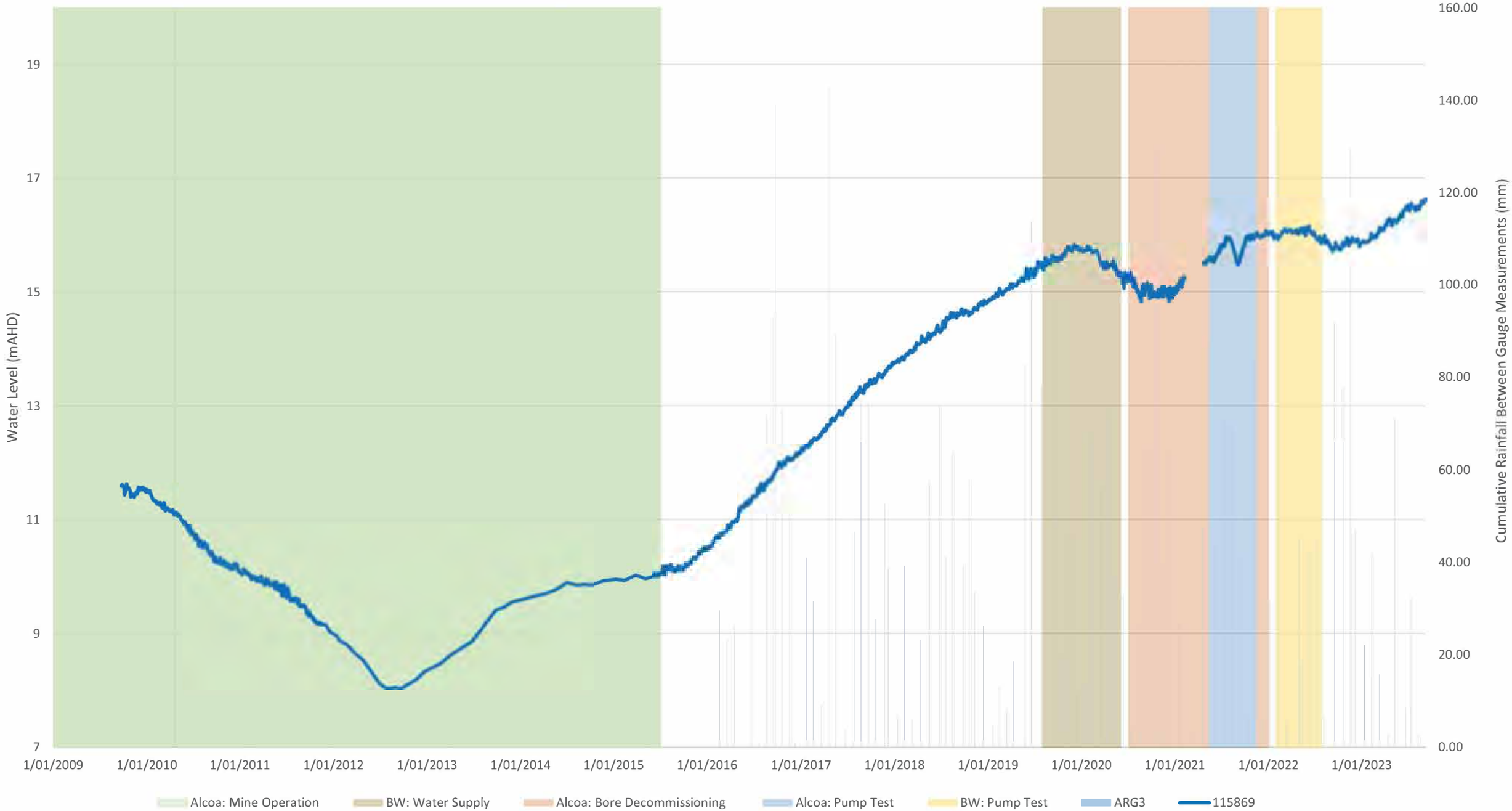

WTOB2 (ASA)- Water level, Rainfall and Pump graph
Water Level (mAHD)
11.5
11
10.5
10
9.5
9
8.5
8
7.5
7
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/01/2009
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG3
WTOB2
Natural Surface Level
Top of Casing Level

WTOB3 (ASA)- Water level, Rainfall and Pump graph

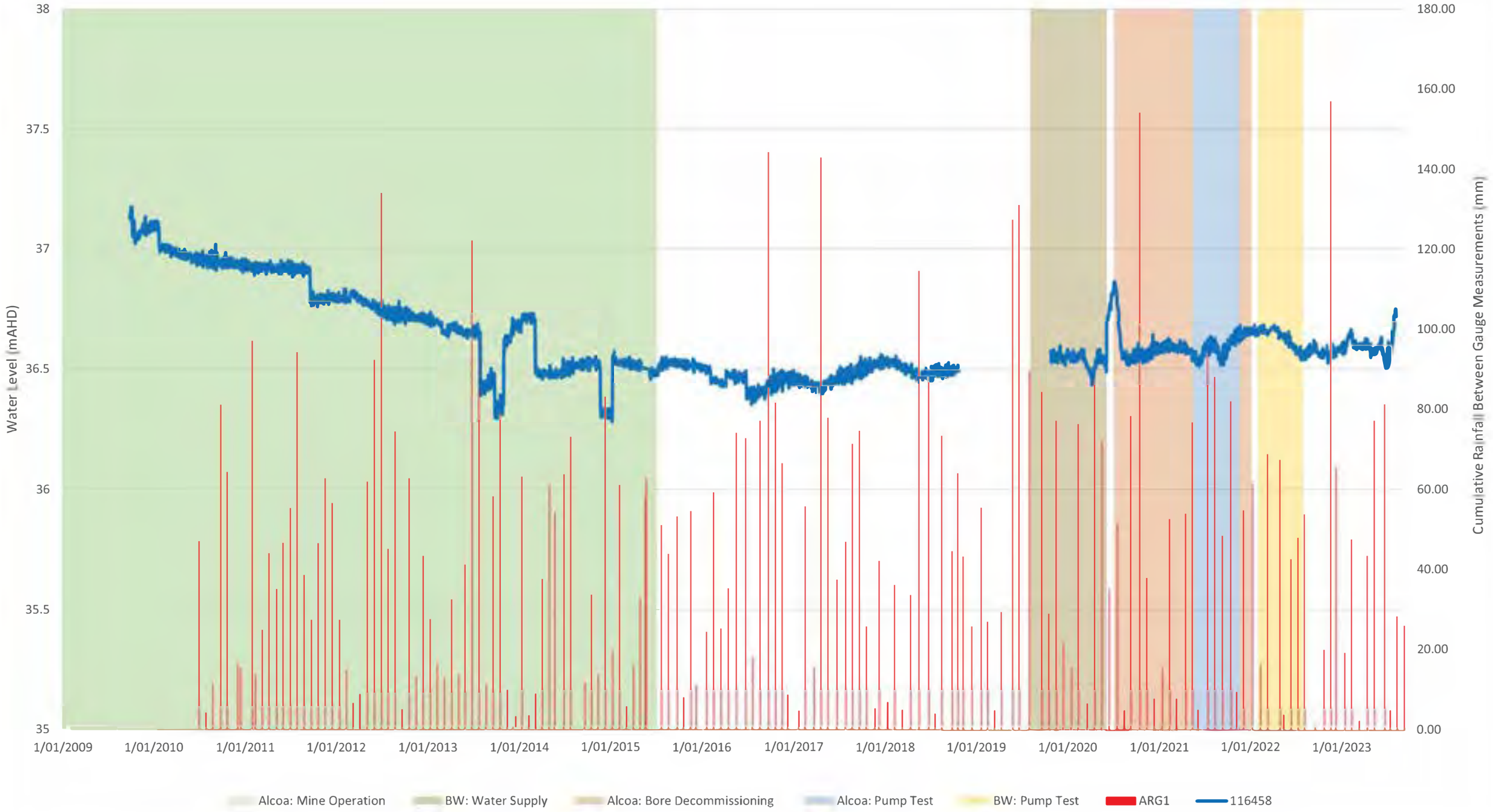


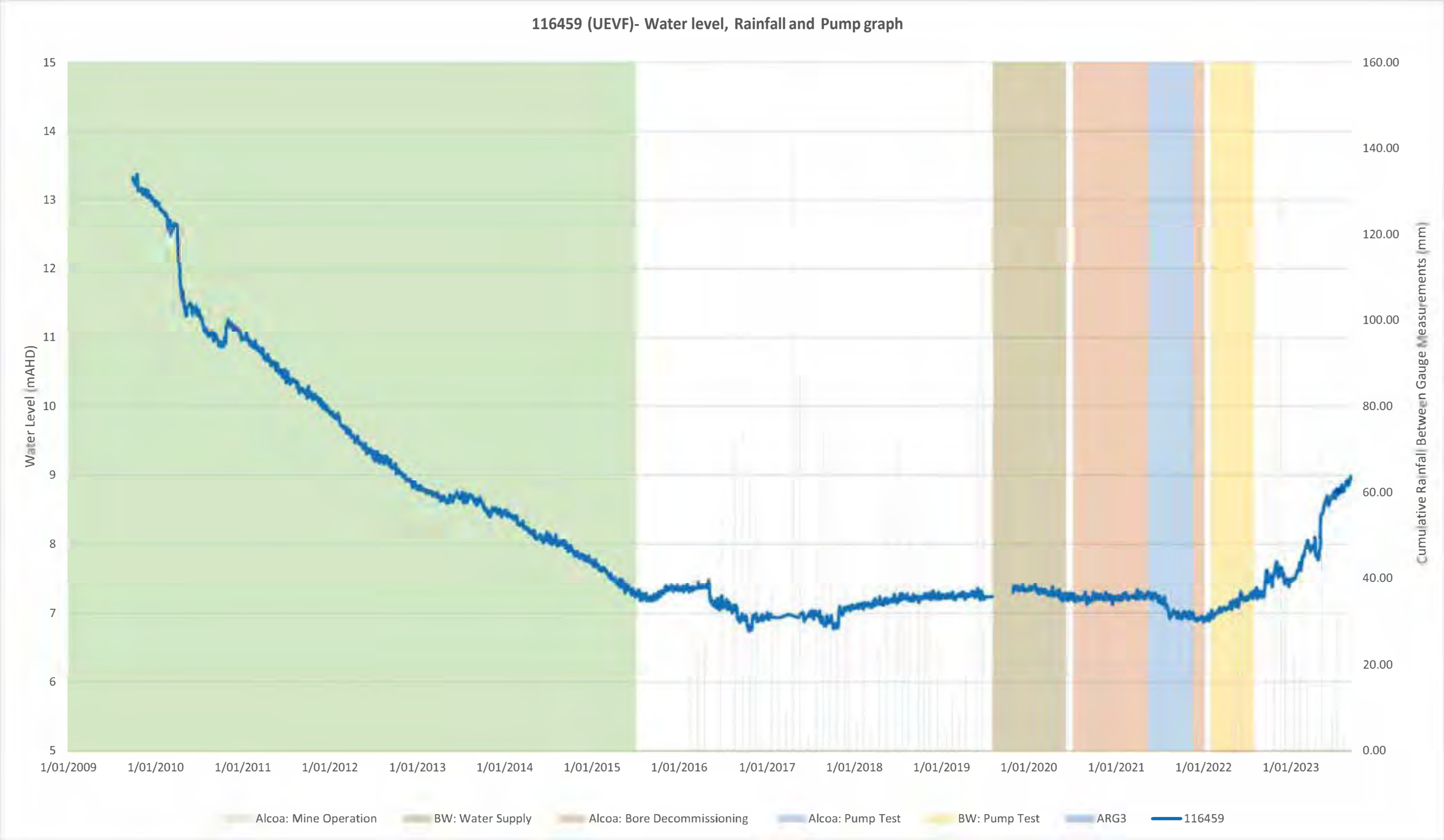

115868 (UEVF)- Water level, Rainfall and Pump graph
Water Level (mAHD)
5
0
-5
-10
-15
-20
-25
-30
Cumulative Rainfall Between Gauge Measurements (mm)
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/01/2009
1/01/2010
1/01/2011
1/01/2012
1/01/2013
1/01/2014
1/01/2015
1/01/2016
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG3
115868

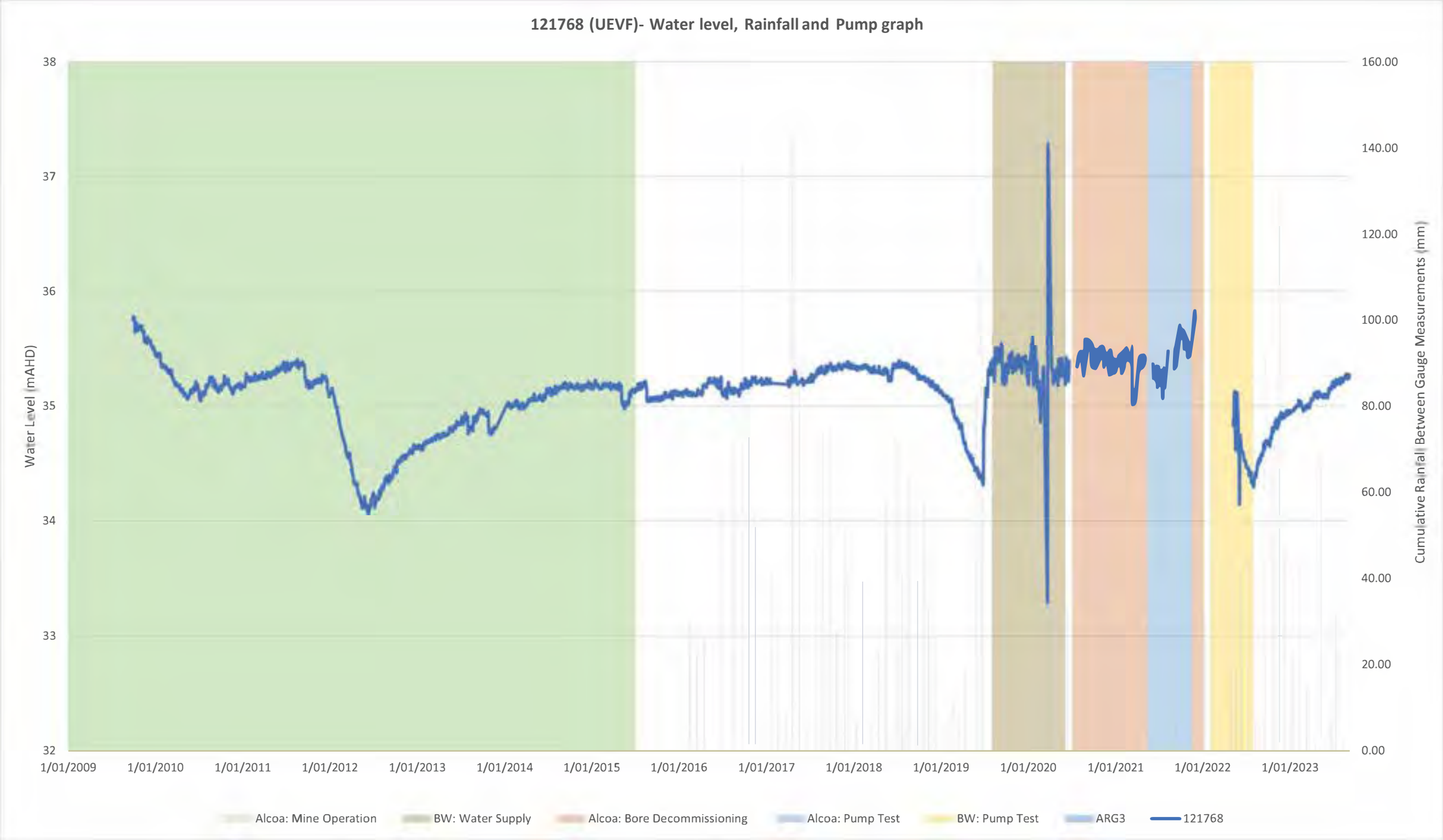
115869 (UEVF)- Water level, Rainfall and Pump graph

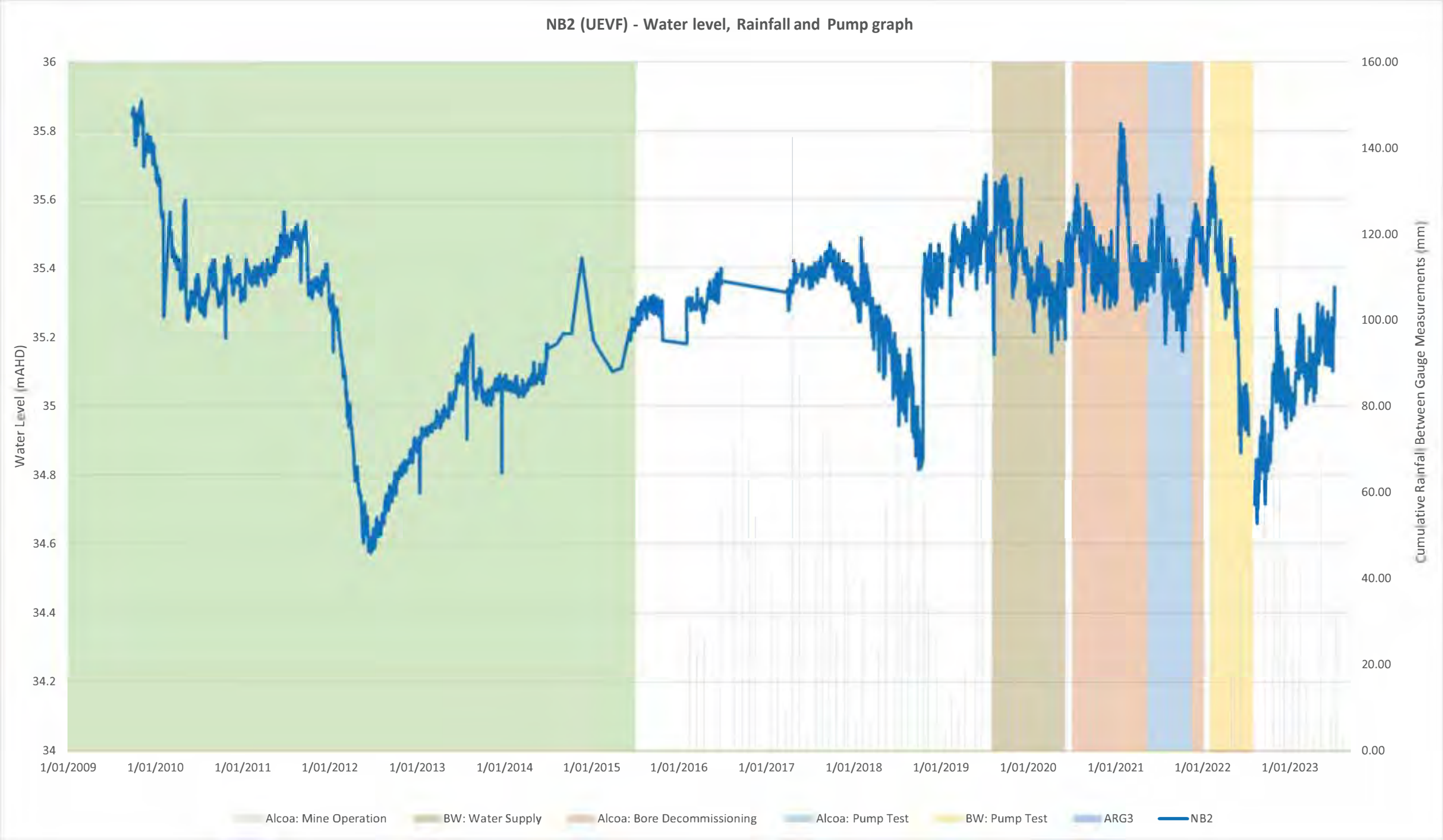


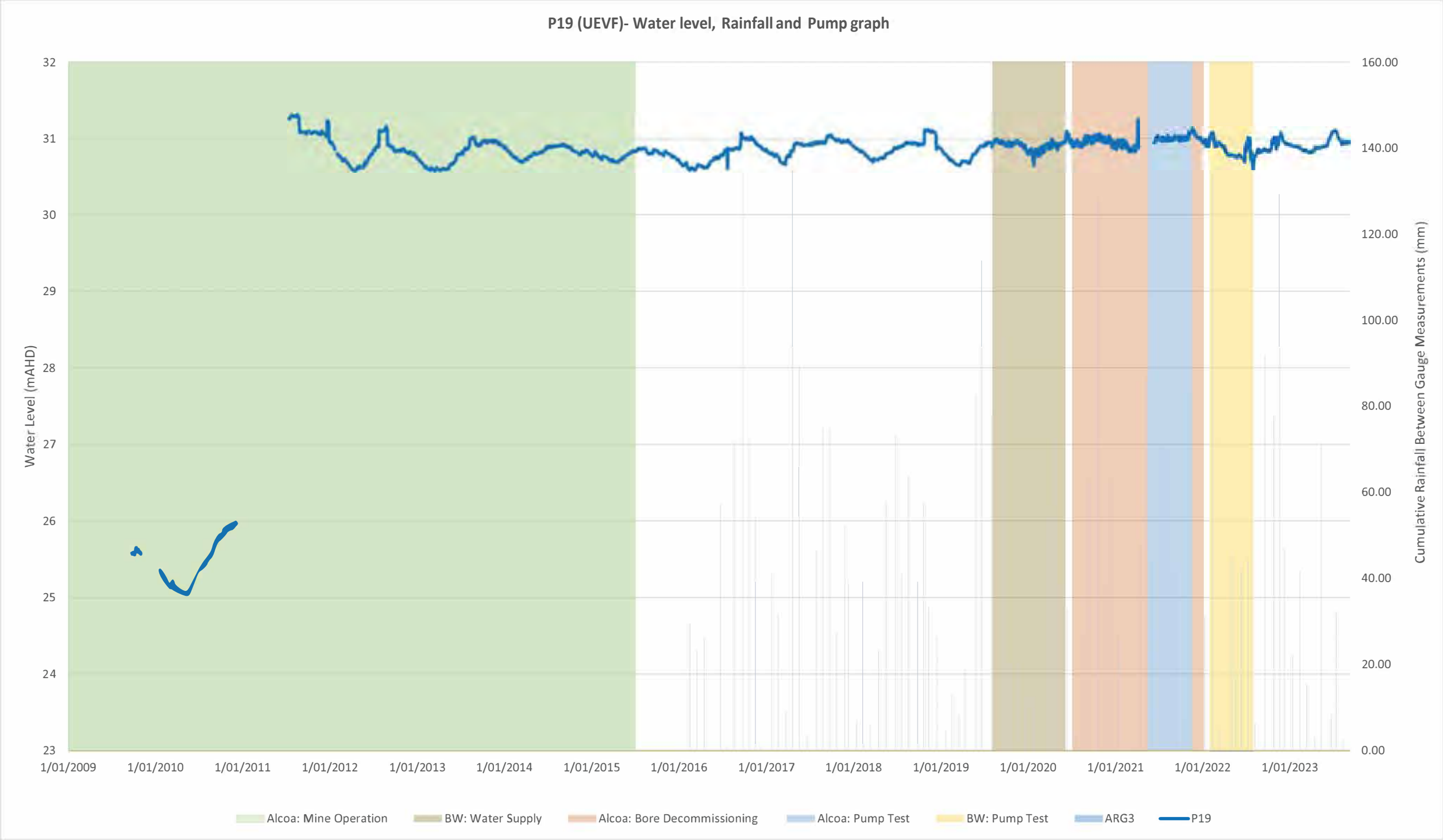
116458 (UEVF)- Water level, Rainfall and Pump graph

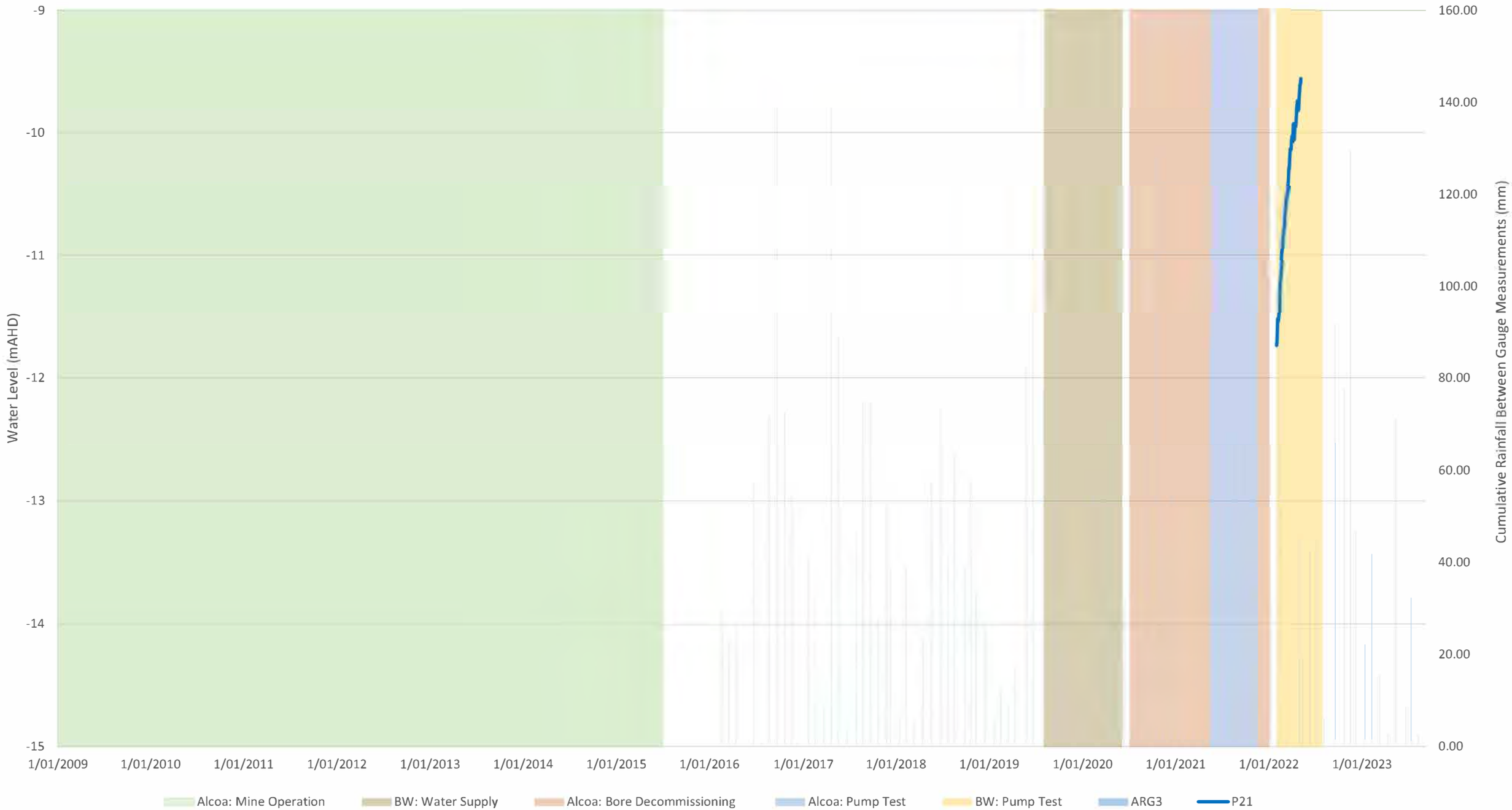


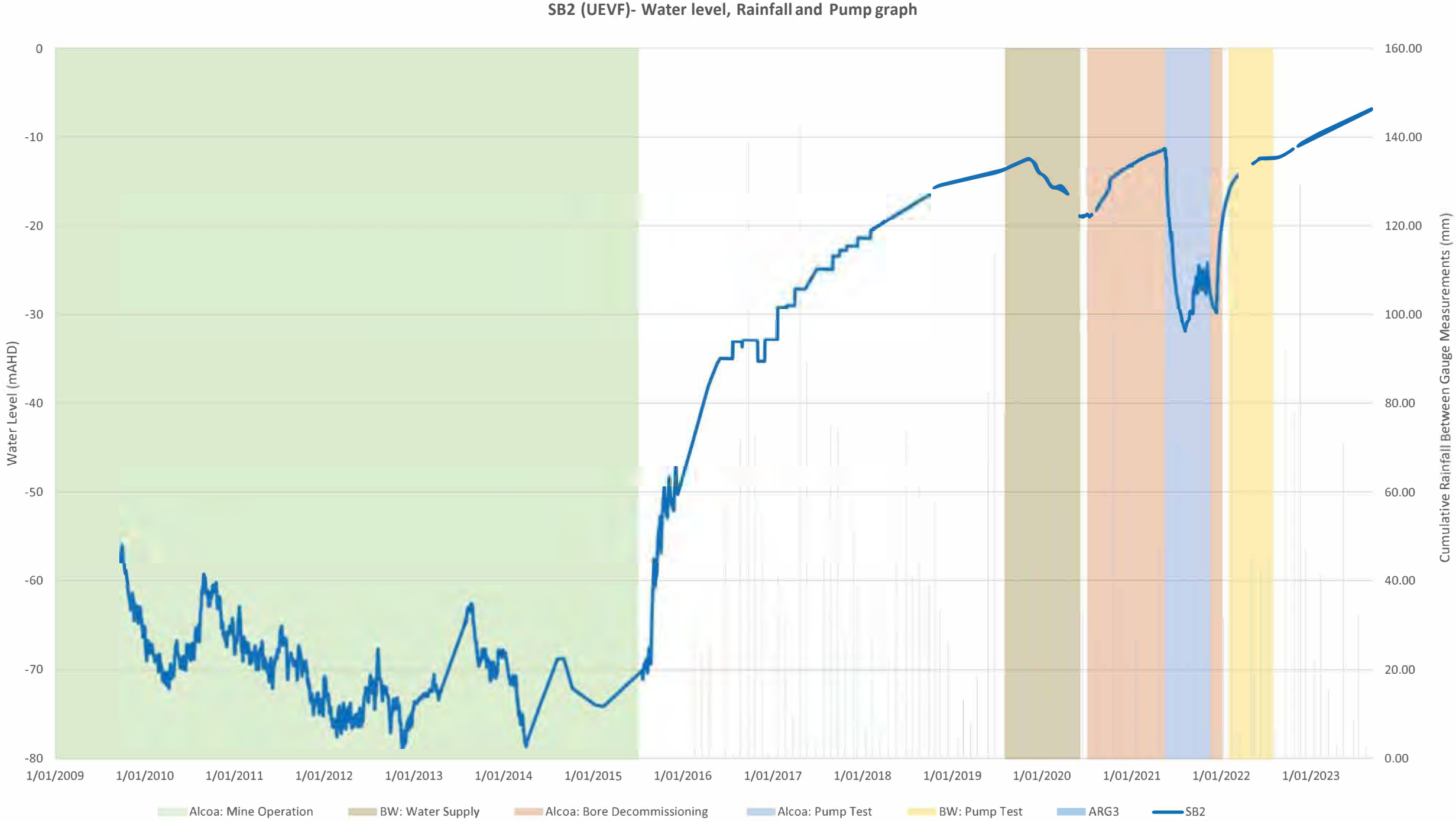

116459 (UEVF)- Water level, Rainfall and Pump graph
Water Level (mAHD)
Cumulative Rainfall Between Gauge Measurements (mm)
15
14
13
12
11
10
9
8
7
6
5
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/01/2009
1/01/2010
1/01/2011
1/01/2012
1/01/2013
1/01/2014
1/01/2015
1/01/2016
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG3
116459


121768 (UEVF)- Water level, Rainfall and Pump graph
Water Level (mAHD)
38
37
36
35
34
33
32
Cumulative Rainfall Between Gauge Measurements (mm)
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/01/2009
1/01/2010
1/01/2011
1/01/2012
1/01/2013
1/01/2014
1/01/2015
1/01/2016
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG3
121768

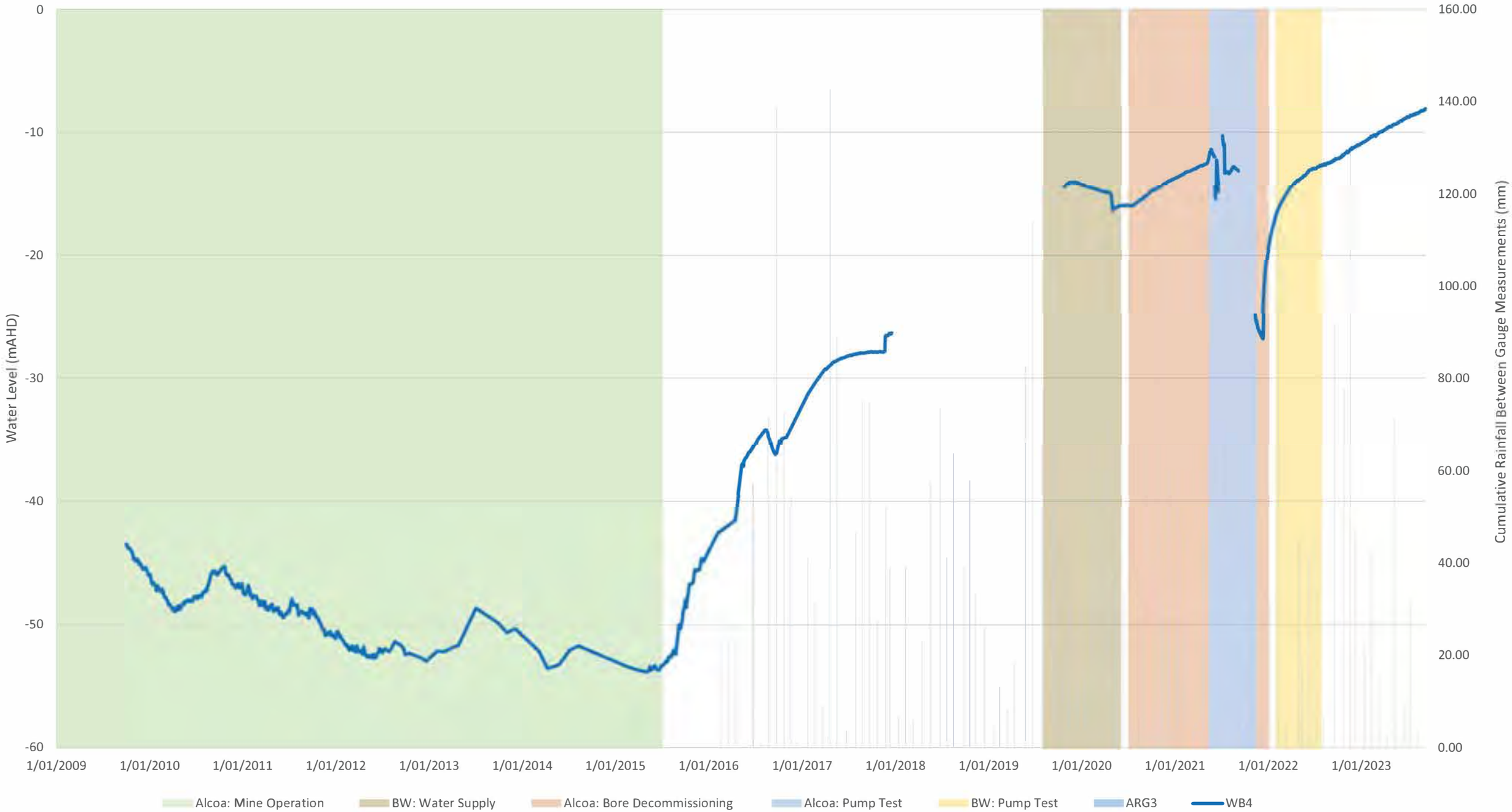

NB2 (UEVF) - Water level, Rainfall and Pump graph
Water Level (mAHD)
36
35.8
35.6
35.4
35.2
35
34.8
34.6
34.4
34.2
34
Cumulative Rainfall Between Gauge Measurements (mm)
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/01/2009
1/01/2010
1/01/2011
1/01/2012
1/01/2013
1/01/2014
1/01/2015
1/01/2016
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG3
NB2

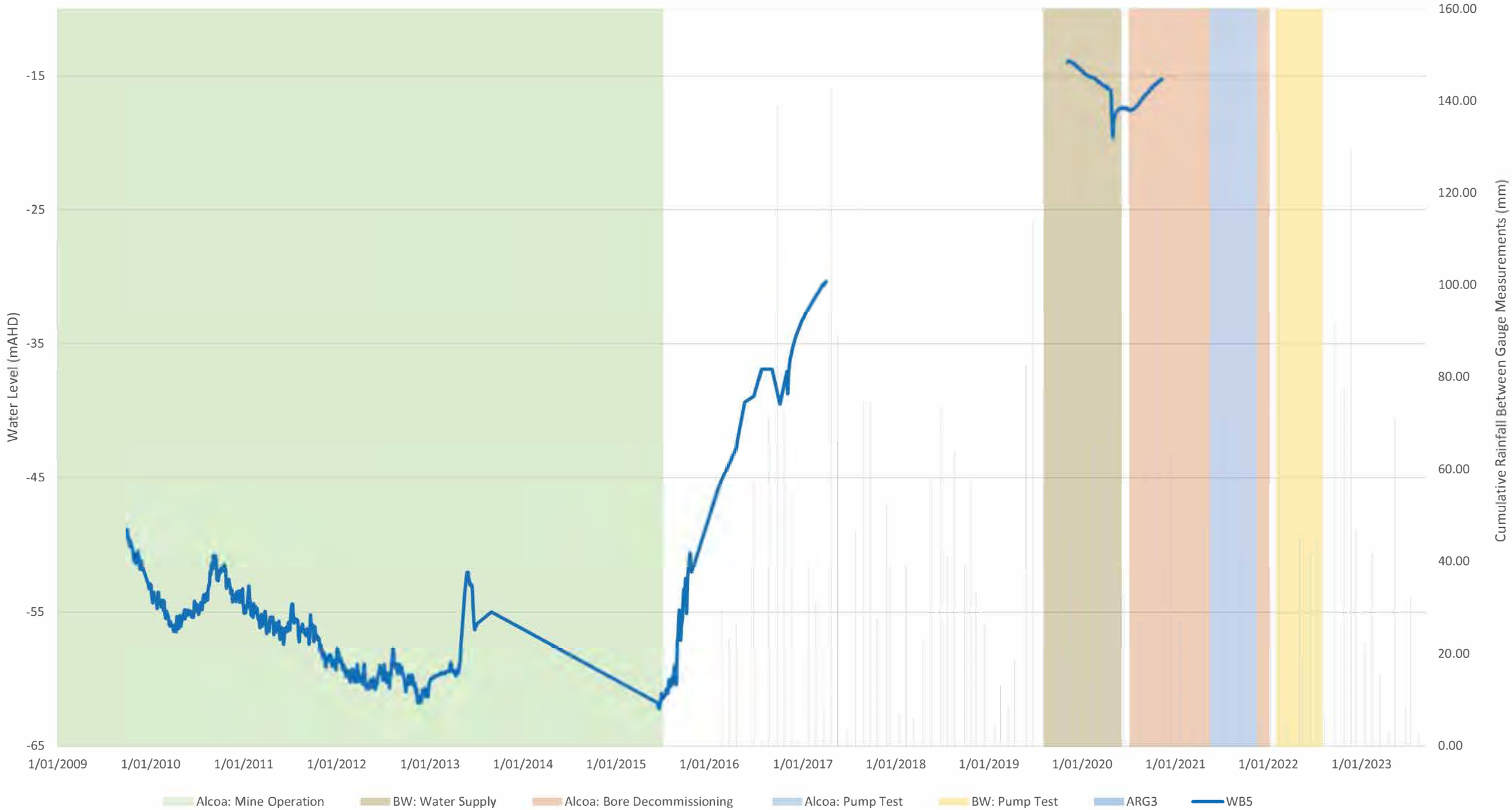

P19 (UEVF)- Water level, Rainfall and Pump graph
Water Level (mAHD)
Cumulative Rainfall Between Gauge Measurements (mm)
32
31
30
29
28
27
26
25
24
23
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/01/2009
1/01/2010
1/01/2011
1/01/2012
1/01/2013
1/01/2014
1/01/2015
1/01/2016
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG3
P19

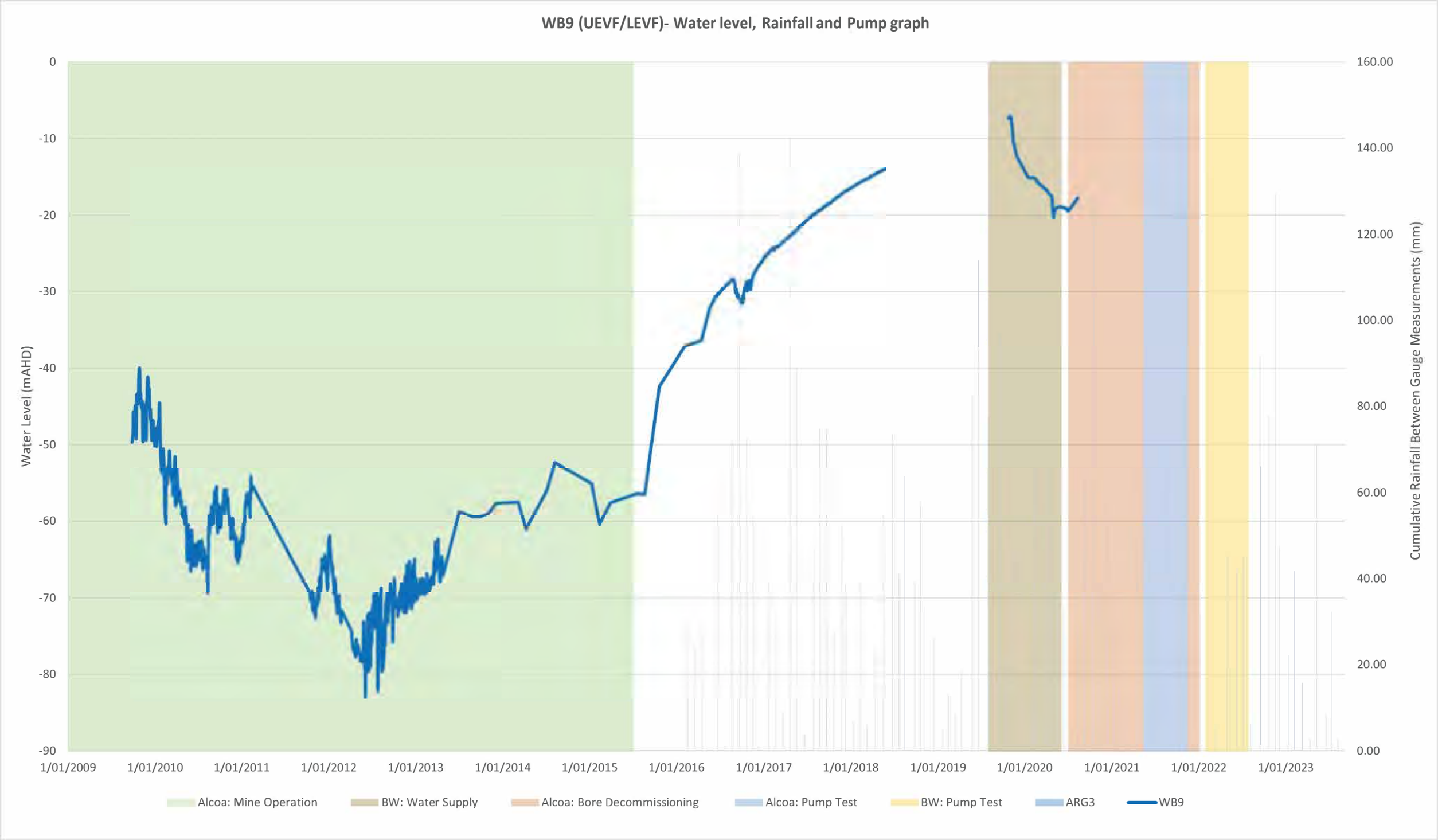

P21 (UEVF)- Water level, Rainfall and Pump graph
Water Level (mAHD)
-9
-10
-11
-12
-13
-14
-15
Cumulative Rainfall Between Gauge Measurements (mm)
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/01/2009
1/01/2010
1/01/2011
1/01/2012
1/01/2013
1/01/2014
1/01/2015
1/01/2016
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG3
P21

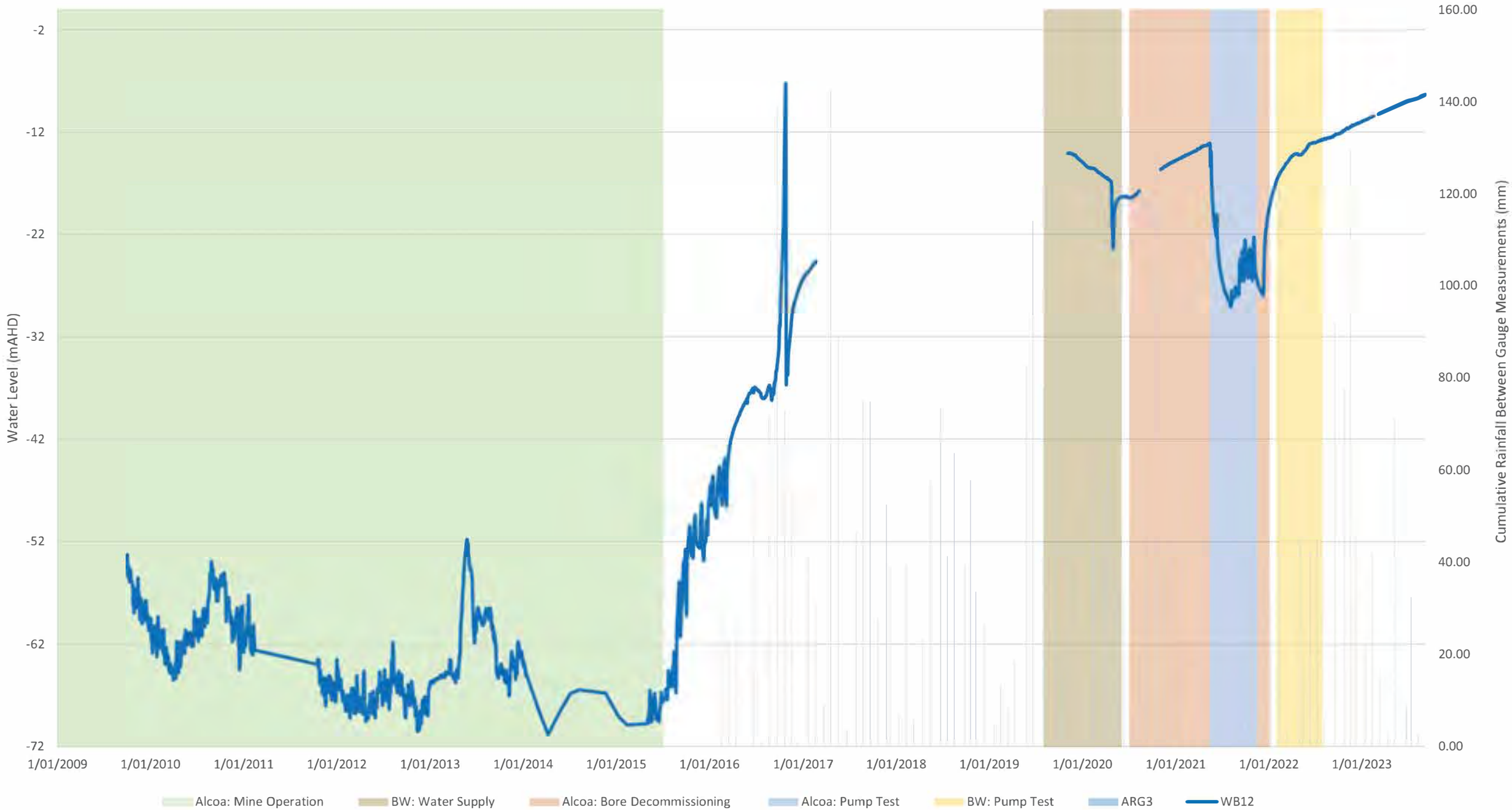

SB2 (UEVF)- Water level, Rainfall and Pump graph
Water Level (mAHD)
Cumulative Rainfall Between Gauge Measurements (mm)
0
-10
-20
-30
-40
-50
-60
-70
-80
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/01/2009
1/01/2010
1/01/2011
1/01/2012
1/01/2013
1/01/2014
1/01/2015
1/01/2016
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG3
SB2

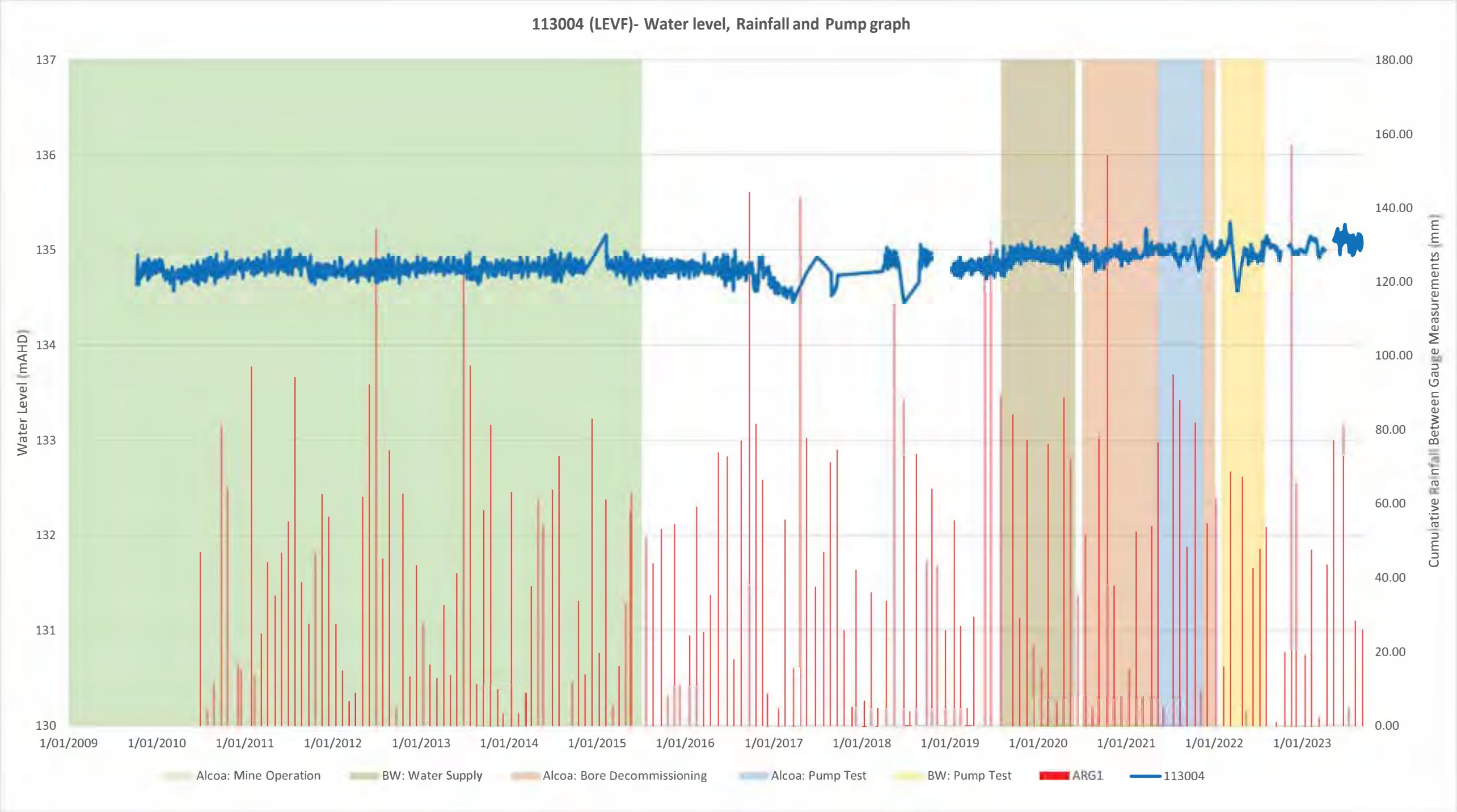
WB4 (UEVF)- Water level, Rainfall and Pump graph



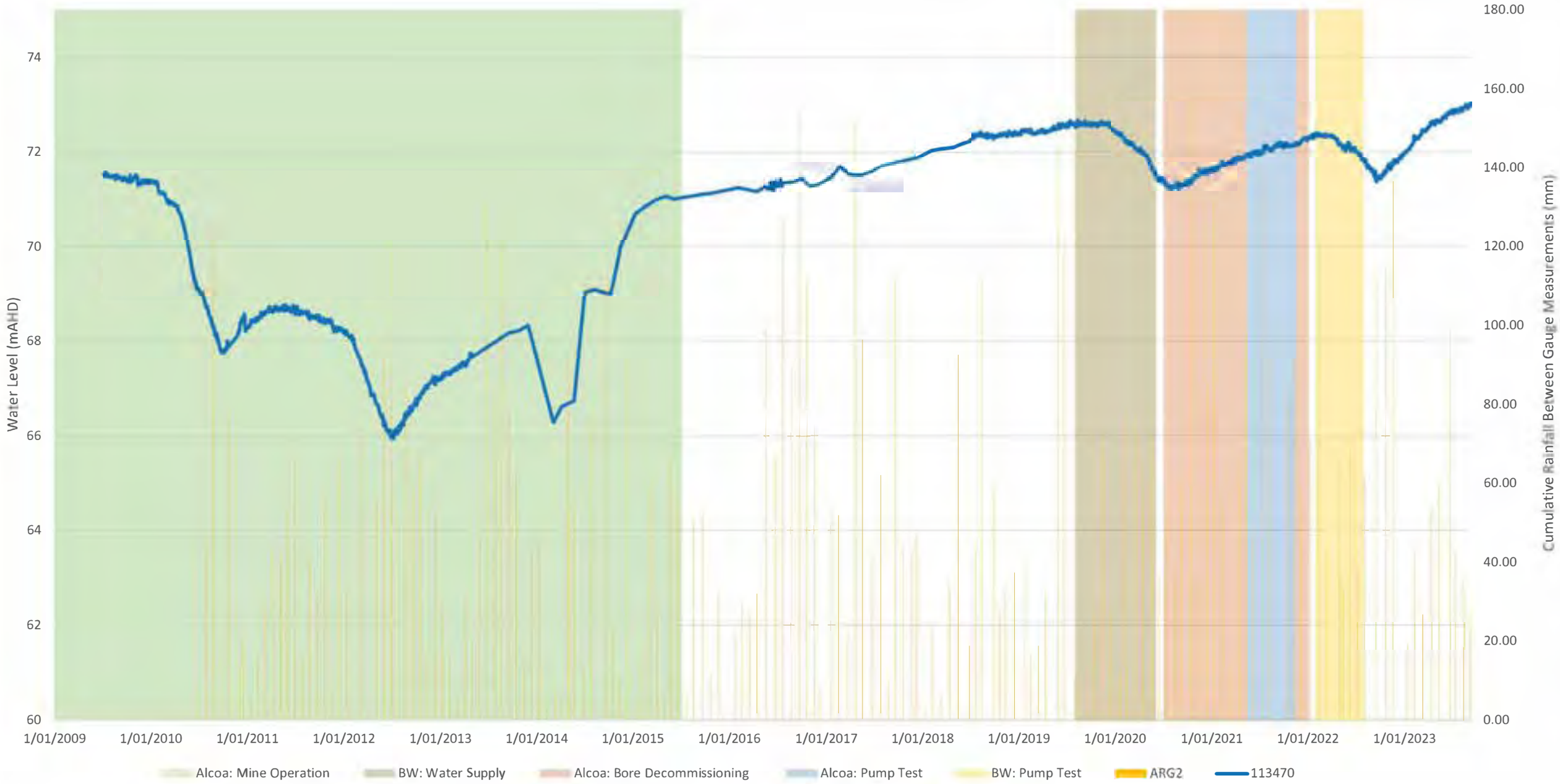

WB5 (UEVF)- Water level, Rainfall and Pump graph
Water Level (mAHD)
-15
-25
-35
-45
-55
-65
Cumulative Rainfall Between Gauge Measurements (mm)
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/01/2009
1/01/2010
1/01/2011
1/01/2012
1/01/2013
1/01/2014
1/01/2015
1/01/2016
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG3
WB5

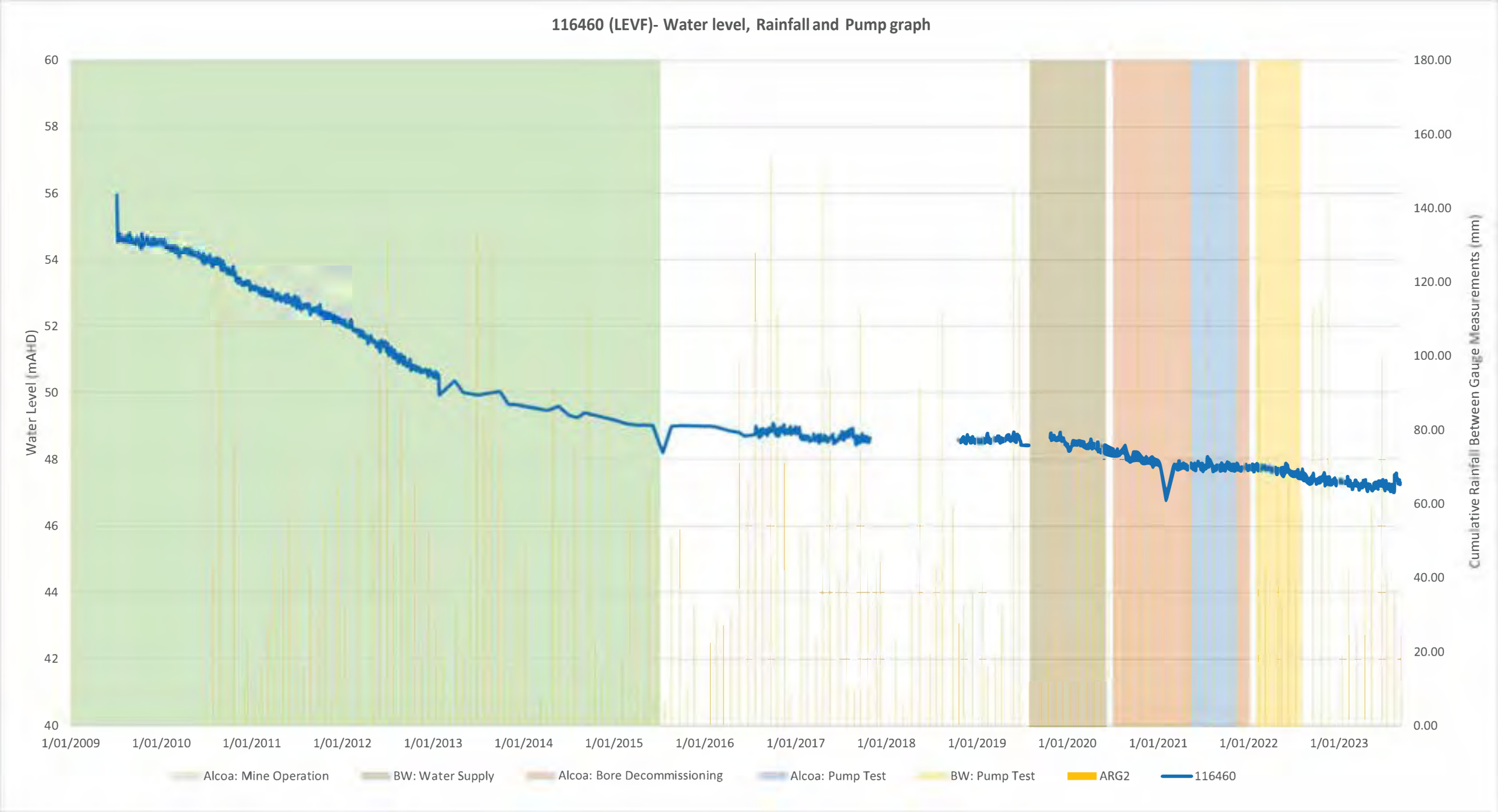

WB9 (UEVF/LEVF)- Water level, Rainfall and Pump graph
Water Level (mAHD)
Cumulative Rainfall Between Gauge Measurements (mm)
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/01/2009
1/01/2010
1/01/2011
1/01/2012
1/01/2013
1/01/2014
1/01/2015
1/01/2016
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG3
WB9

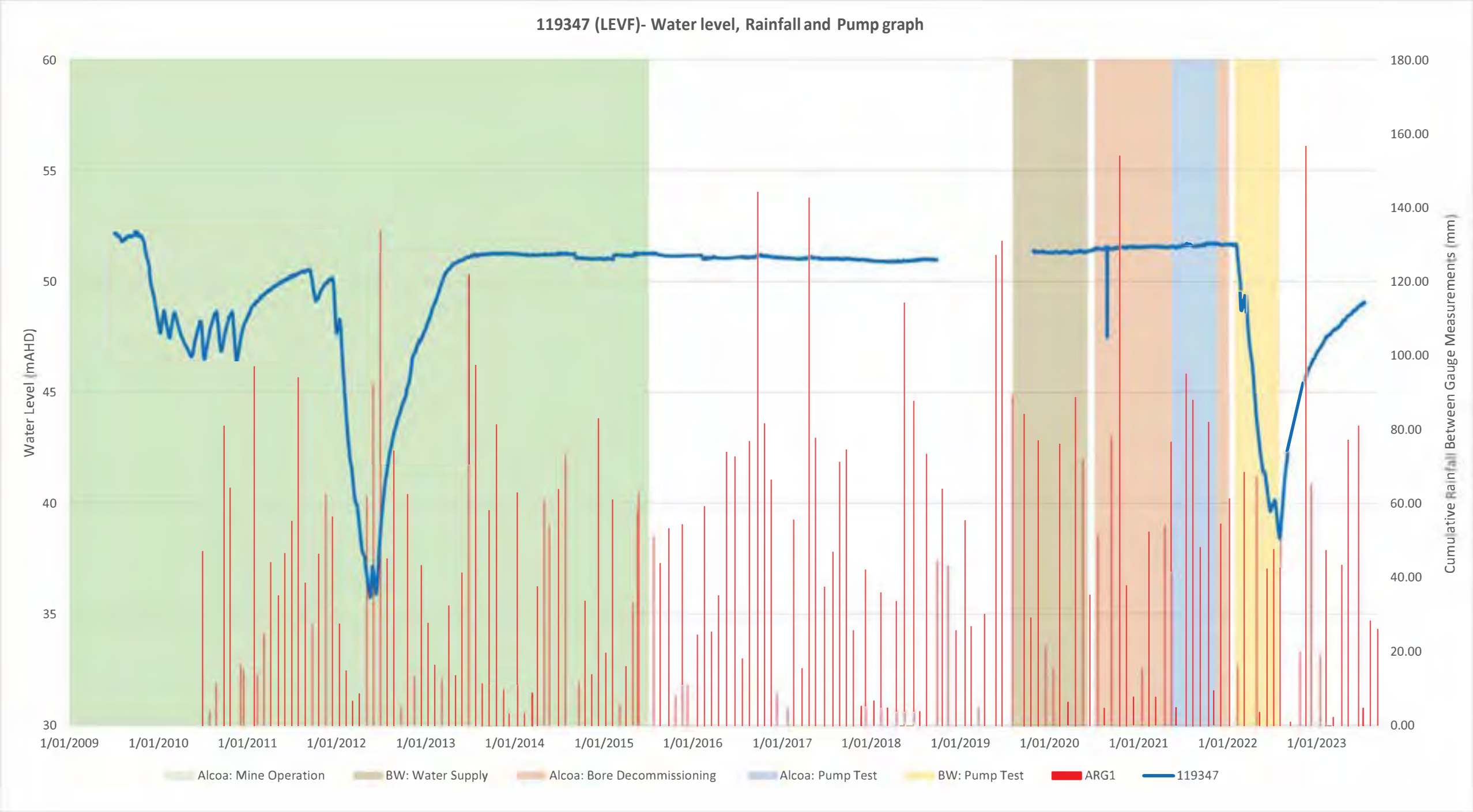

WB12 (UEVF)- Water level, Rainfall and Pump graph
Water Level (mAHD)
-2
-12
-22
-32
-42
-52
-62
-72
Cumulative Rainfall Between Gauge Measurements (mm)
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/01/2009
1/01/2010
1/01/2011
1/01/2012
1/01/2013
1/01/2014
1/01/2015
1/01/2016
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG3
WB12


113004 (LEVF)- Water level, Rainfall and Pump graph
Water Level (mAHD)
137
136
135
134
133
132
131
130
Cumulative Rainfall Between Gauge Measurements (mm)
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/01/2009
1/01/2010
1/01/2011
1/01/2012
1/01/2013
1/01/2014
1/01/2015
1/01/2016
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG1
113004

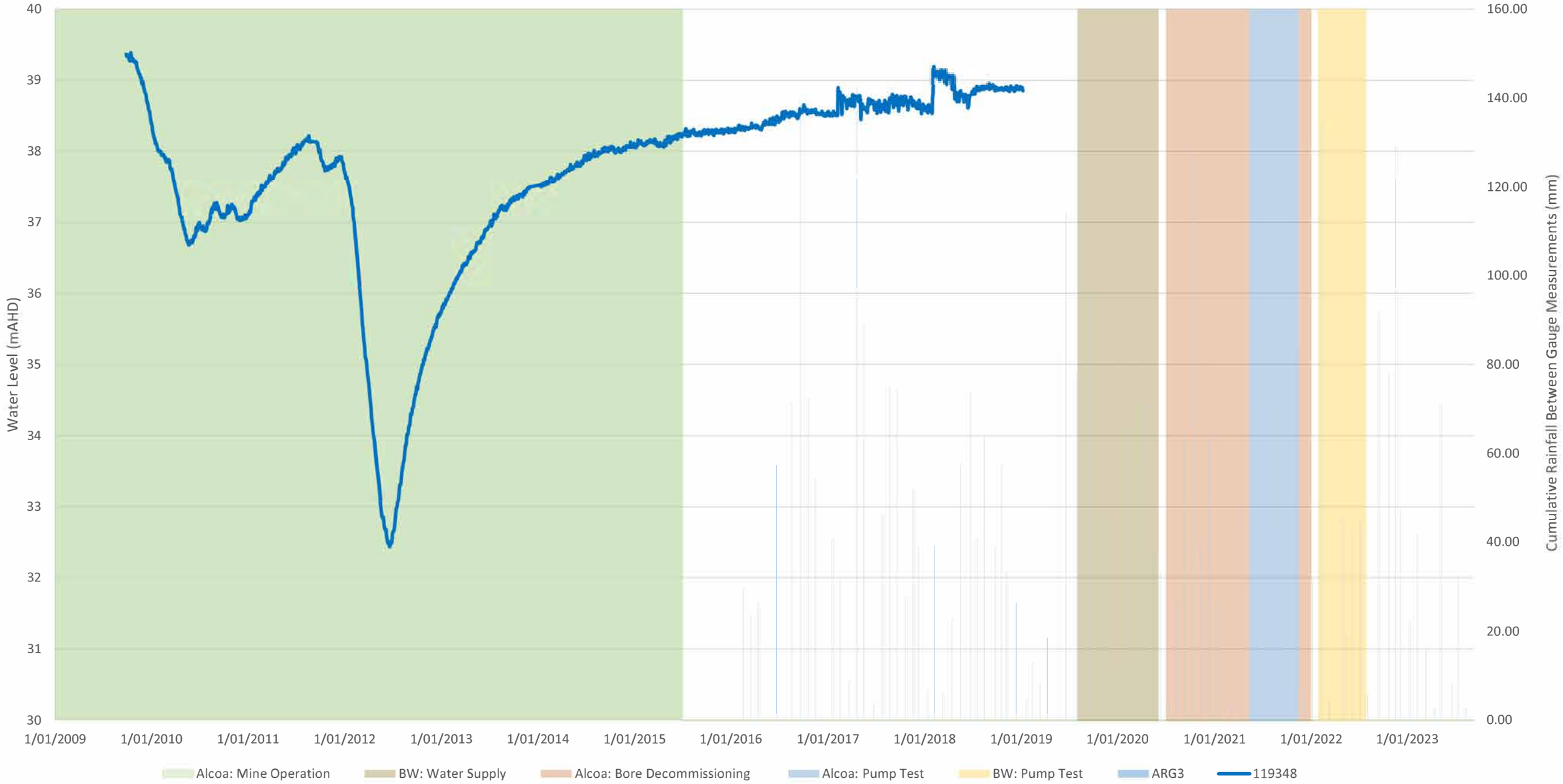
113470 (LEVF)- Water level, Rainfall and Pump graph



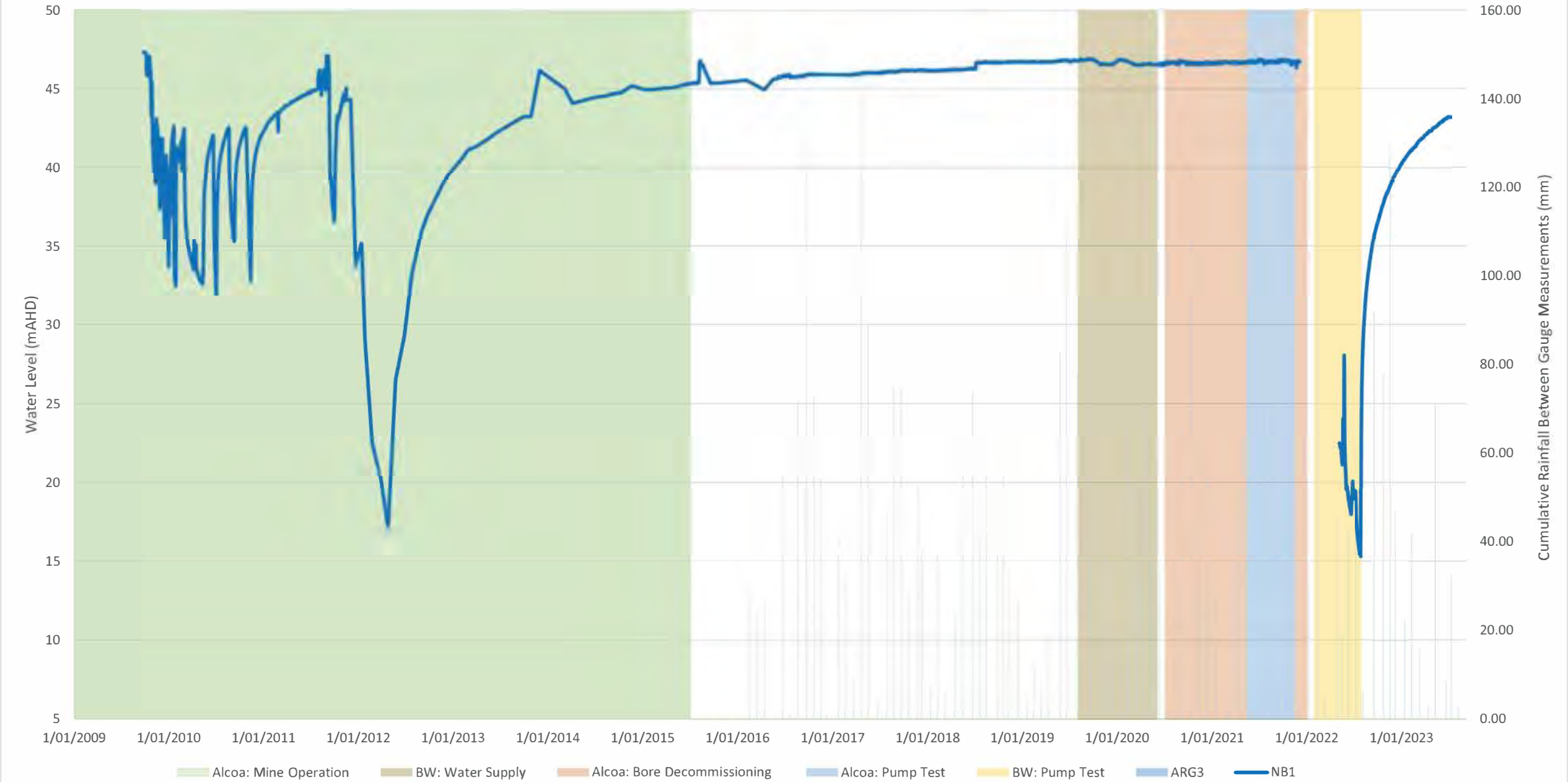

116460 (LEVF)- Water level, Rainfall and Pump graph
Water Level (mAHD)
60
58
56
54
52
50
48
46
44
42
40
Cumulative Rainfall Between Gauge Measurements (mm)
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/01/2009
1/01/2010
1/01/2011
1/01/2012
1/01/2013
1/01/2014
1/01/2015
1/01/2016
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG2
116460

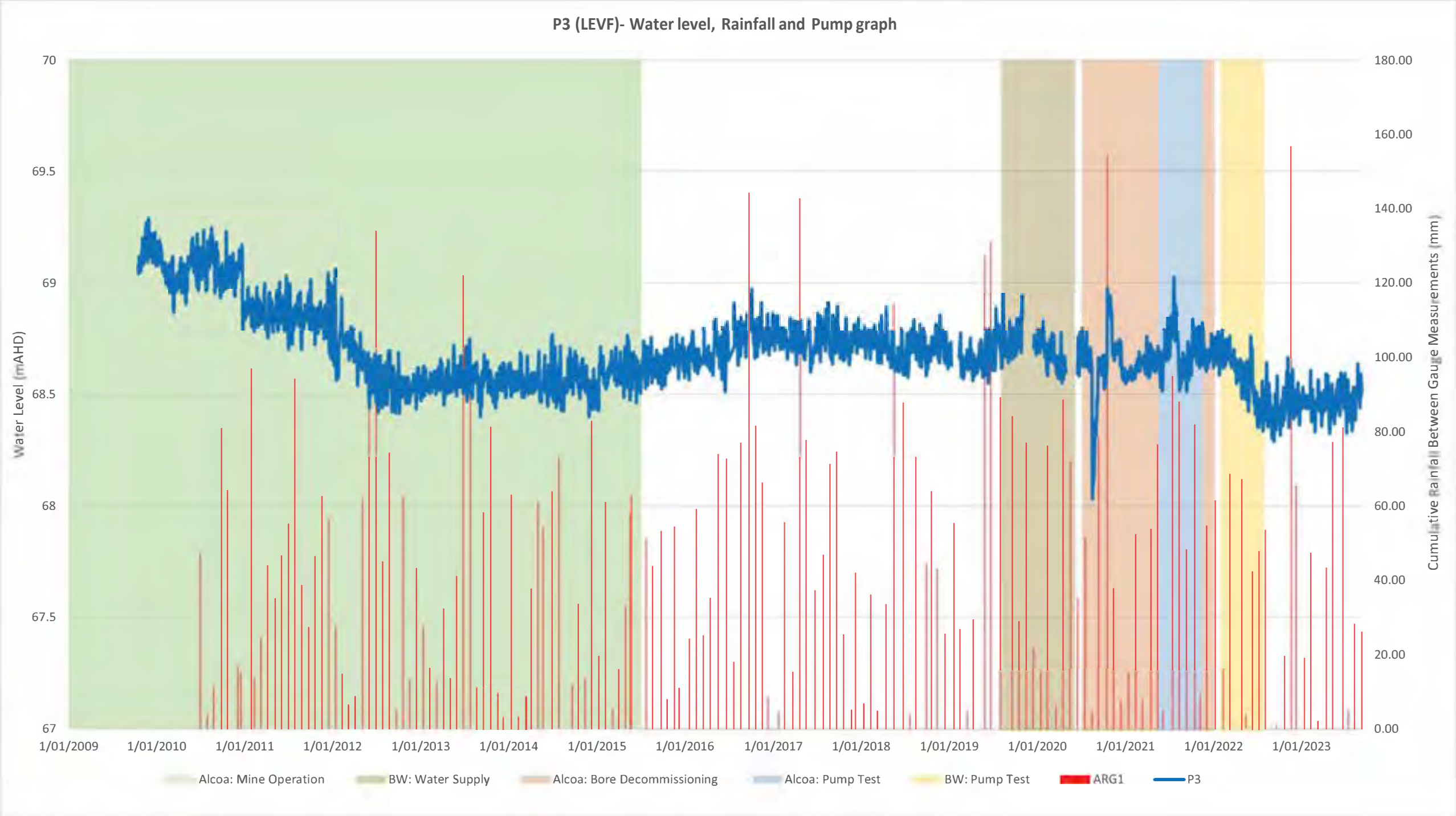

119347 (LEVF)- Water level, Rainfall and Pump graph
Water Level (mAHD)
Cumulative Rainfall Between Gauge Measurements (mm)
60
55
50
45
40
35
30
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/01/2009
1/01/2010
1/01/2011
1/01/2012
1/01/2013
1/01/2014
1/01/2015
1/01/2016
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG1
119347

119348 (LEVF)- Water level, Rainfall and Pump graph



NB1 (LEVF)- Water level, Rainfall and Pump graph

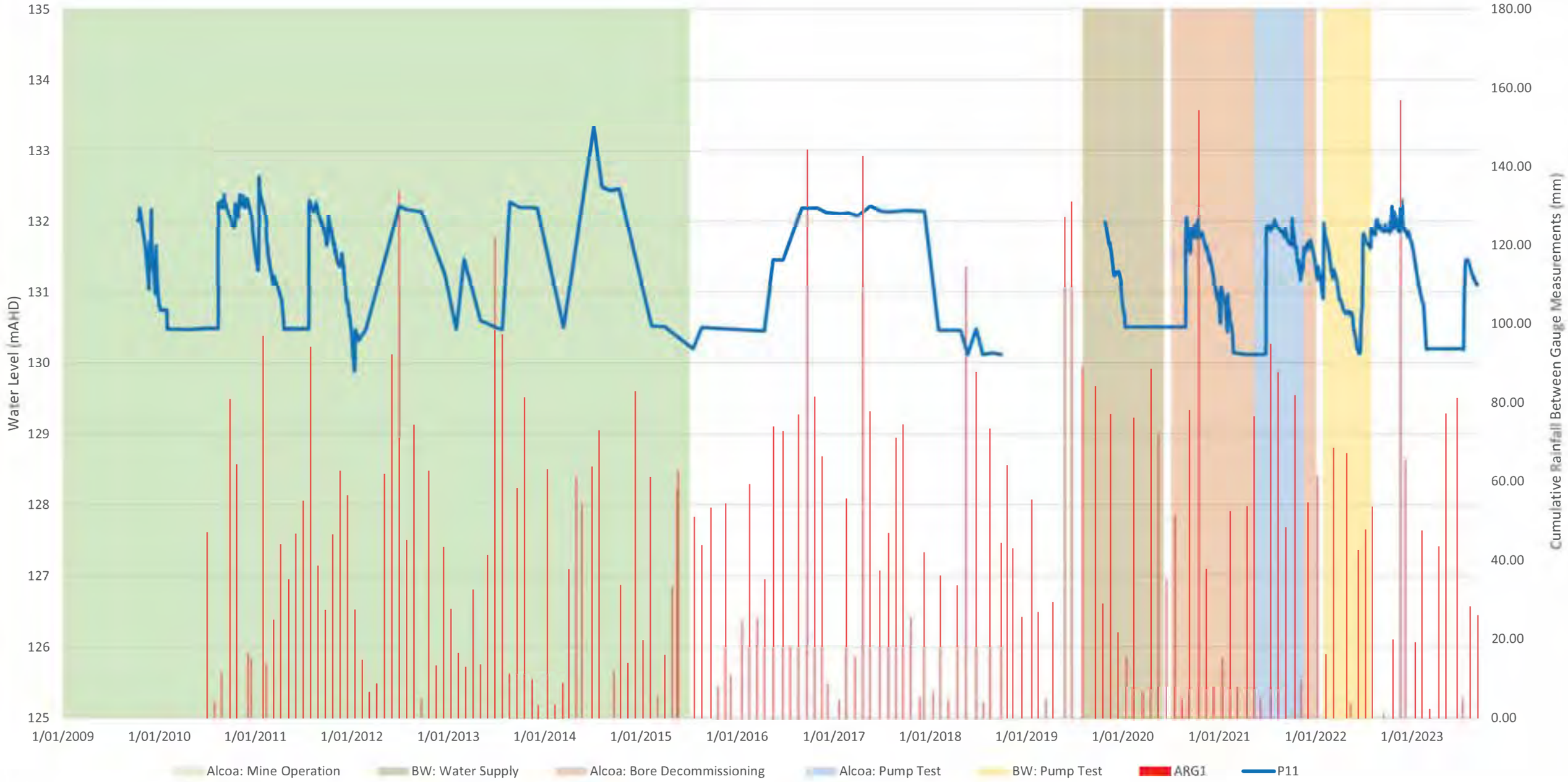


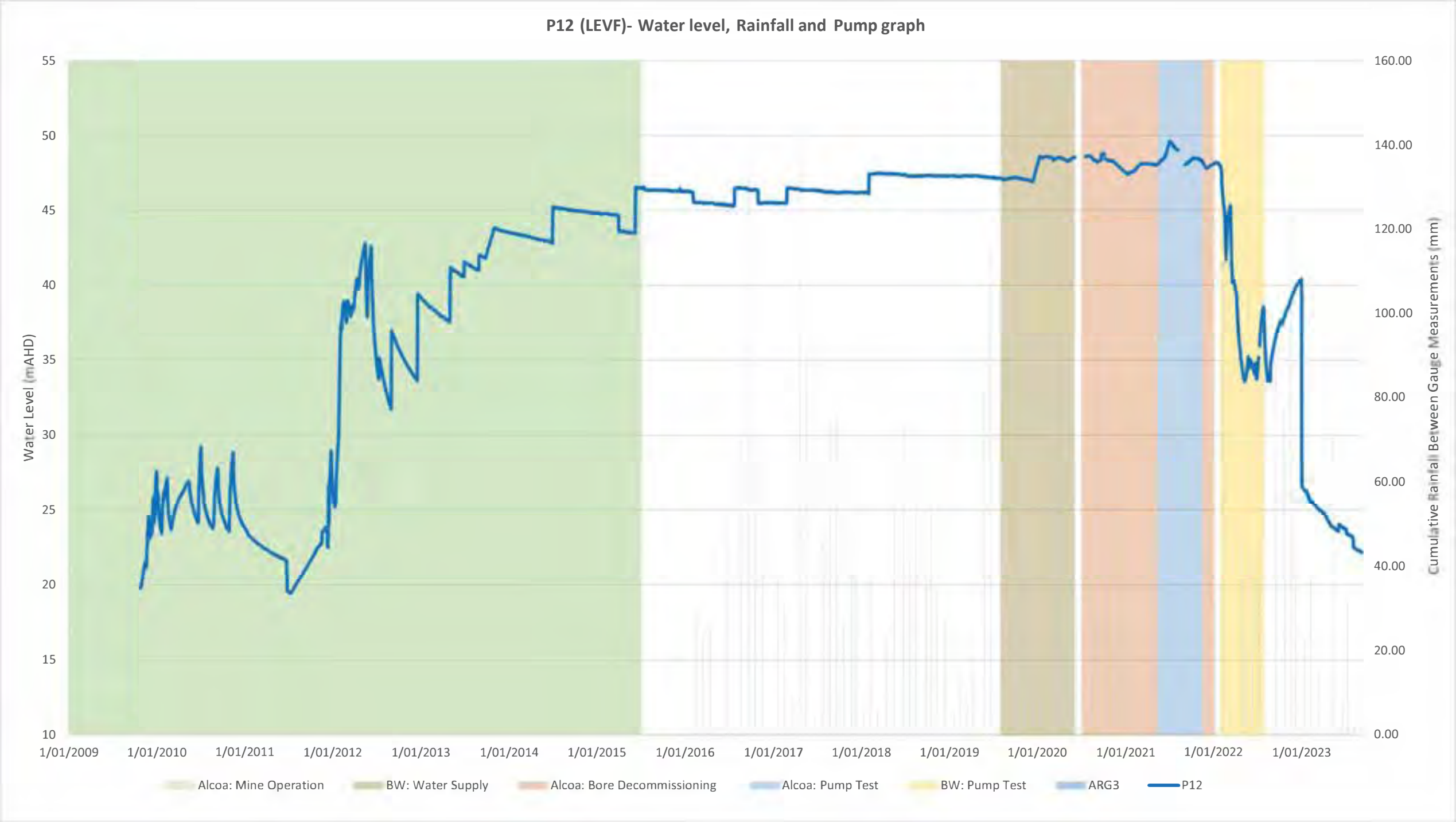

P3 (LEVF)- Water level, Rainfall and Pump graph
Water Level (mAHD)
Cumulative Rainfall Between Gauge Measurements (mm)
70
69.5
69
68.5
68
67.5
67
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/01/2009
1/01/2010
1/01/2011
1/01/2012
1/01/2013
1/01/2014
1/01/2015
1/01/2016
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG1
P3

P6 (LEVF)- Water level, Rainfall and Pump graph

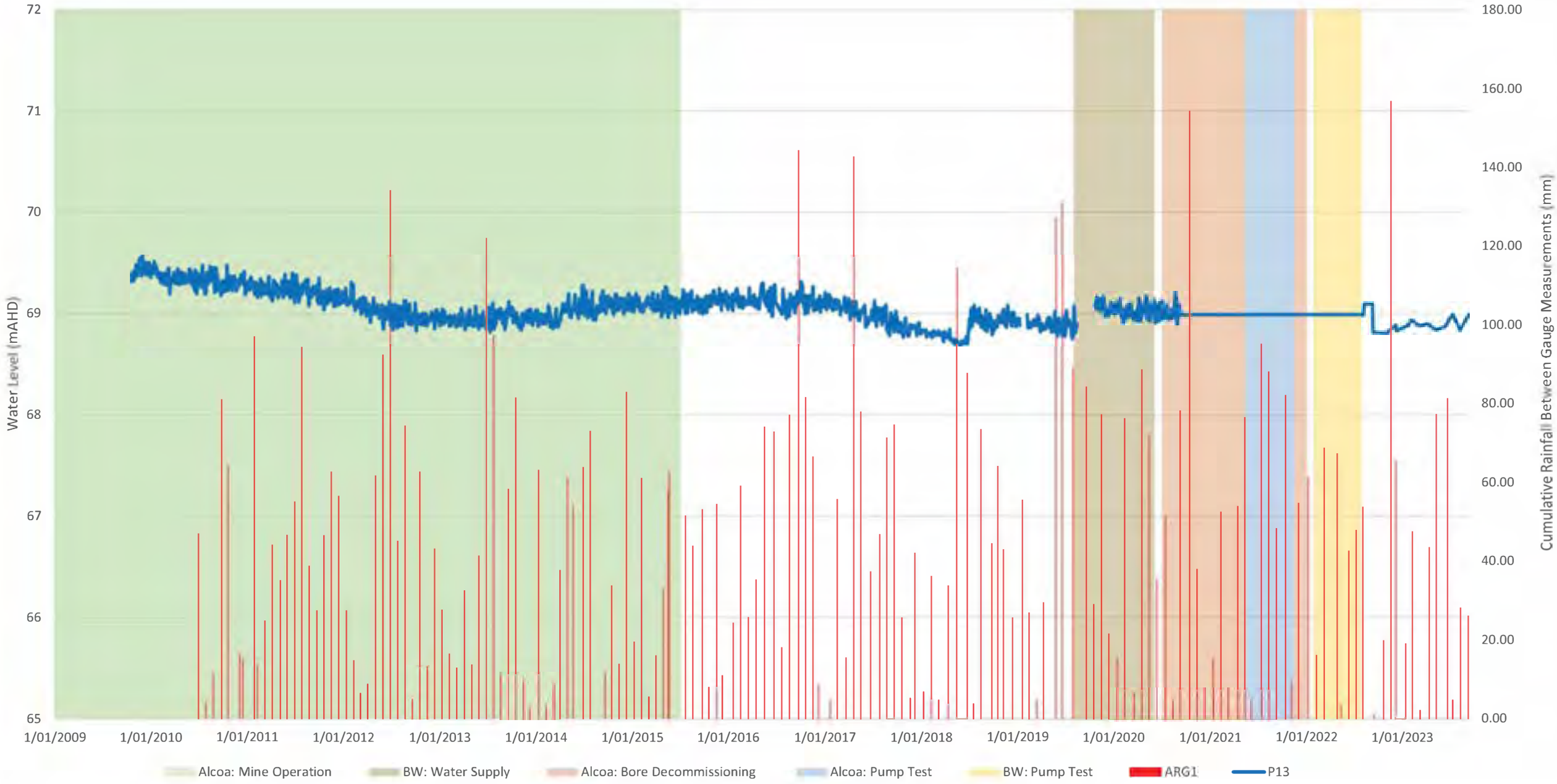


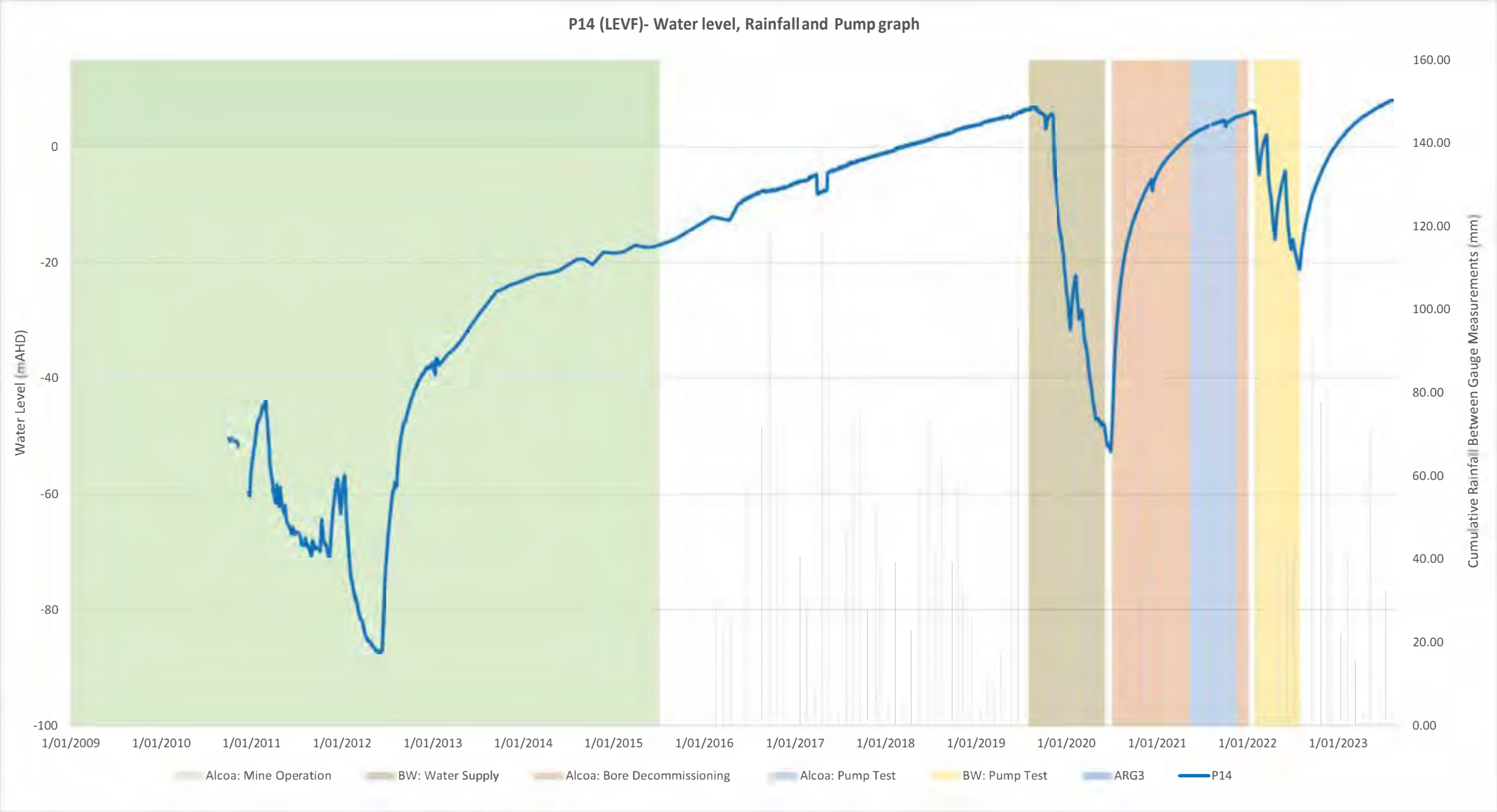
P11 (LEVF)- Water level, Rainfall and Pump graph

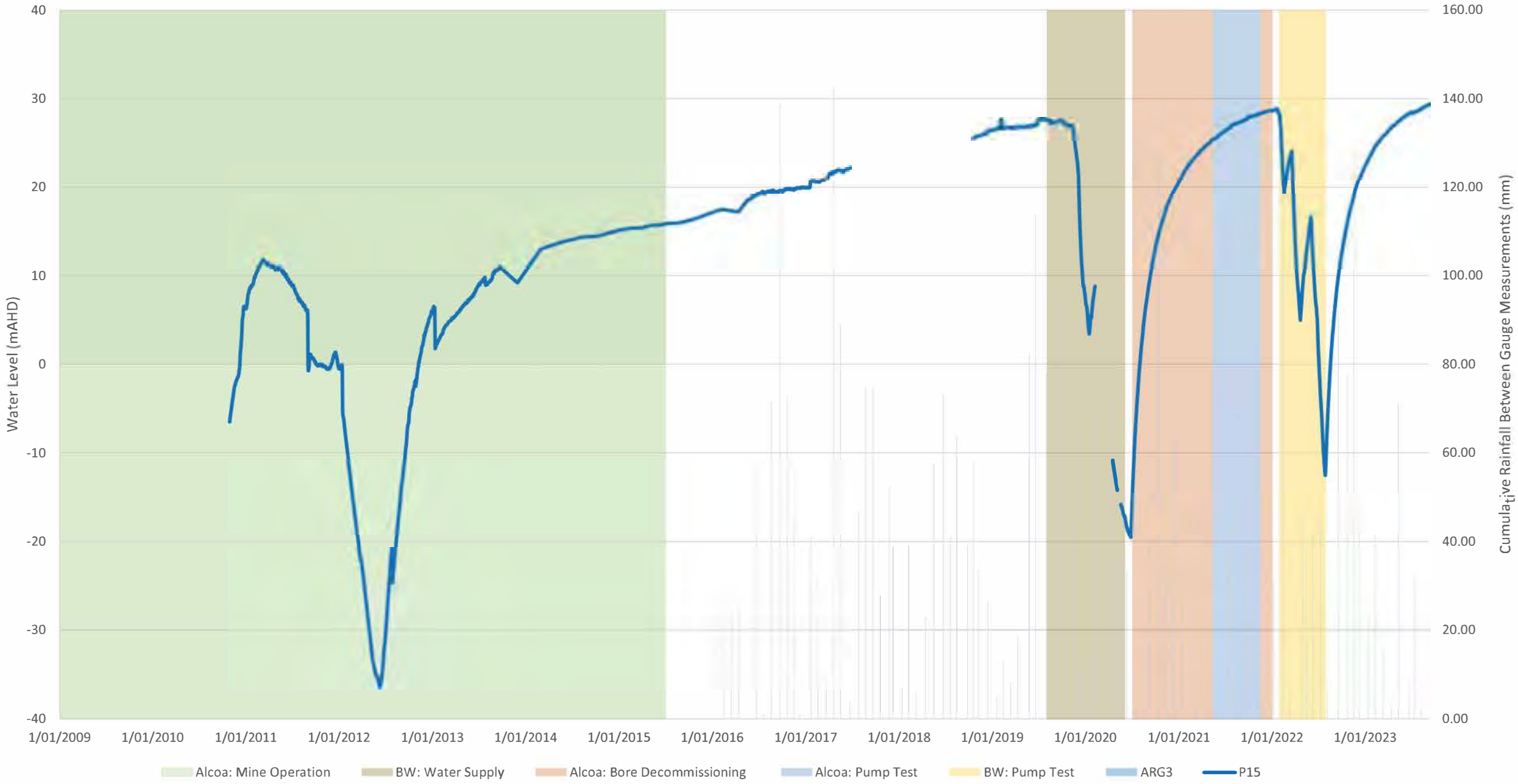



P12 (LEVF)- Water level, Rainfall and Pump graph
Water Level (mAHD)
Cumulative Rainfall Between Gauge Measurements (mm)
55
50
45
40
35
30
25
20
15
10
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/01/2009
1/01/2010
1/01/2011
1/01/2012
1/01/2013
1/01/2014
1/01/2015
1/01/2016
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG3
P12

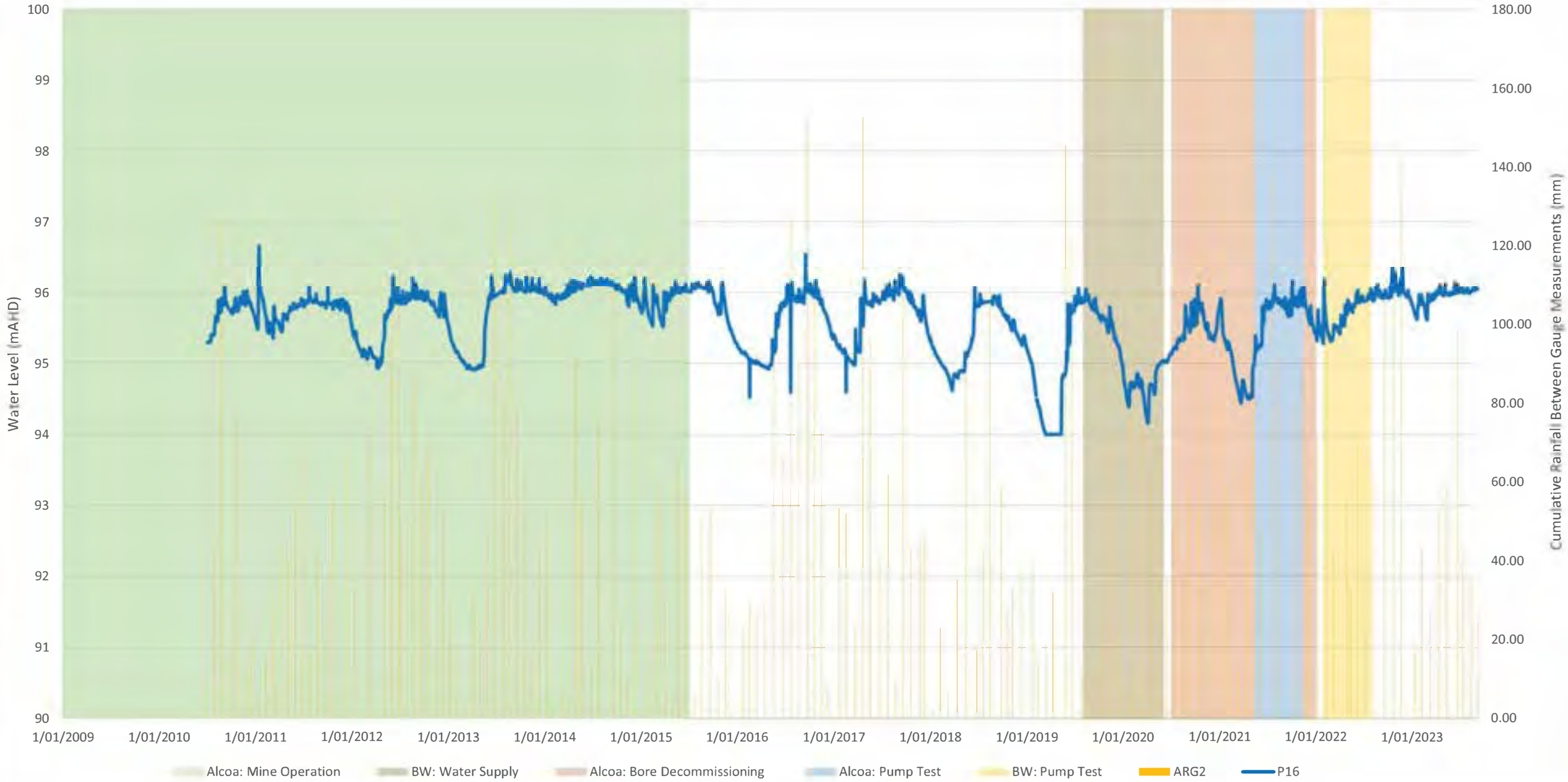
P13 (LEVF)- Water level, Rainfall and Pump graph

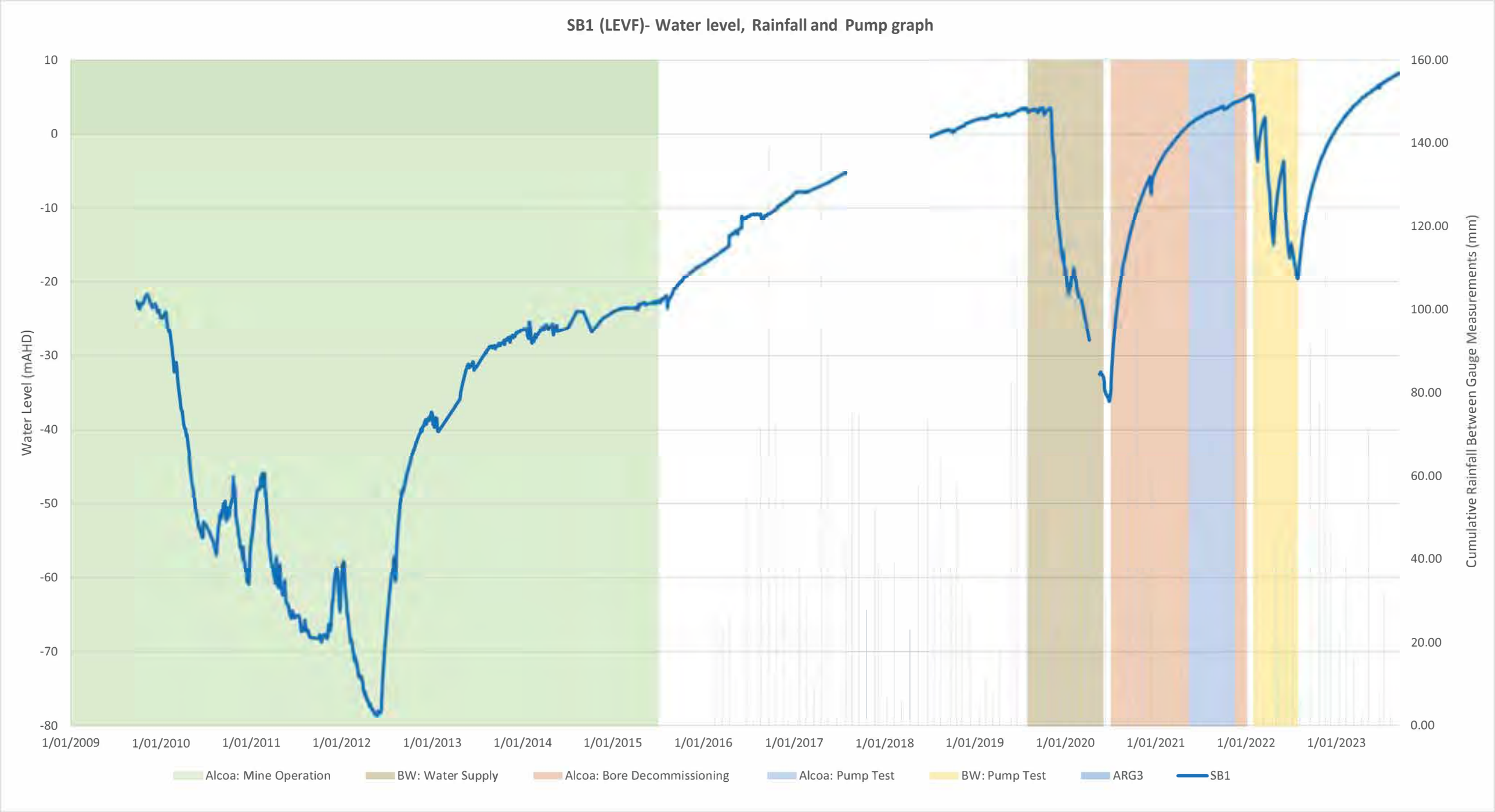



P14 (LEVF)- Water level, Rainfall and Pump graph
Water Level (mAHD)
0
-20
-40
-60
-80
-100
Cumulative Rainfall Between Gauge Measurements (mm)
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/01/2009
1/01/2010
1/01/2011
1/01/2012
1/01/2013
1/01/2014
1/01/2015
1/01/2016
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG3
P14

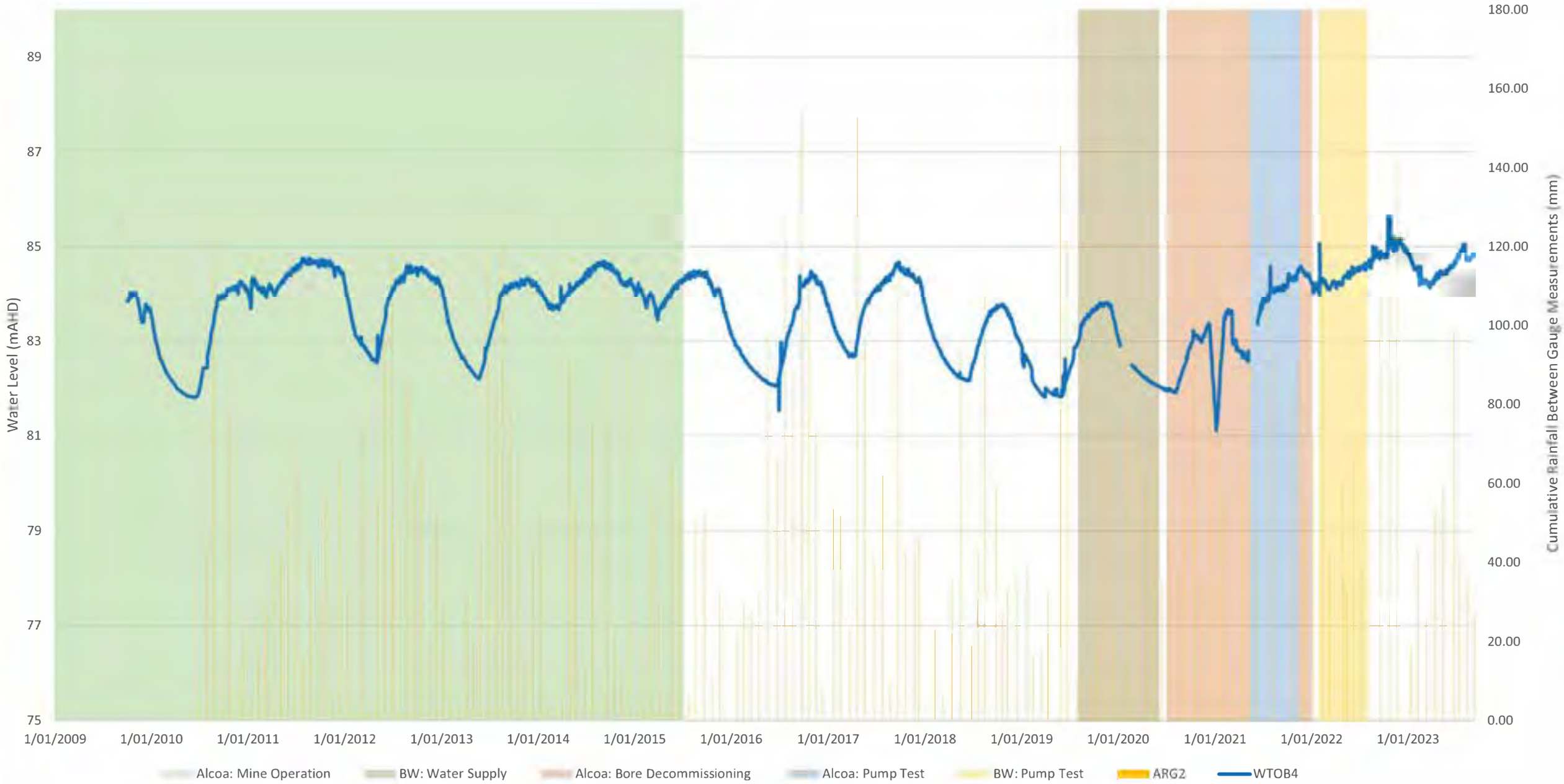

P15 (LEVF)- Water level, Rainfall and Pump graph
Water Level (mAHD)
Cumulative Rainfall Between Gauge Measurements (mm)
40
30
20
10
0
-10
-20
-30
-40
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/01/2009
1/01/2010
1/01/2011
1/01/2012
1/01/2013
1/01/2014
1/01/2015
1/01/2016
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG3
P15

P16 (LEVF)- Water level, Rainfall and Pump graph

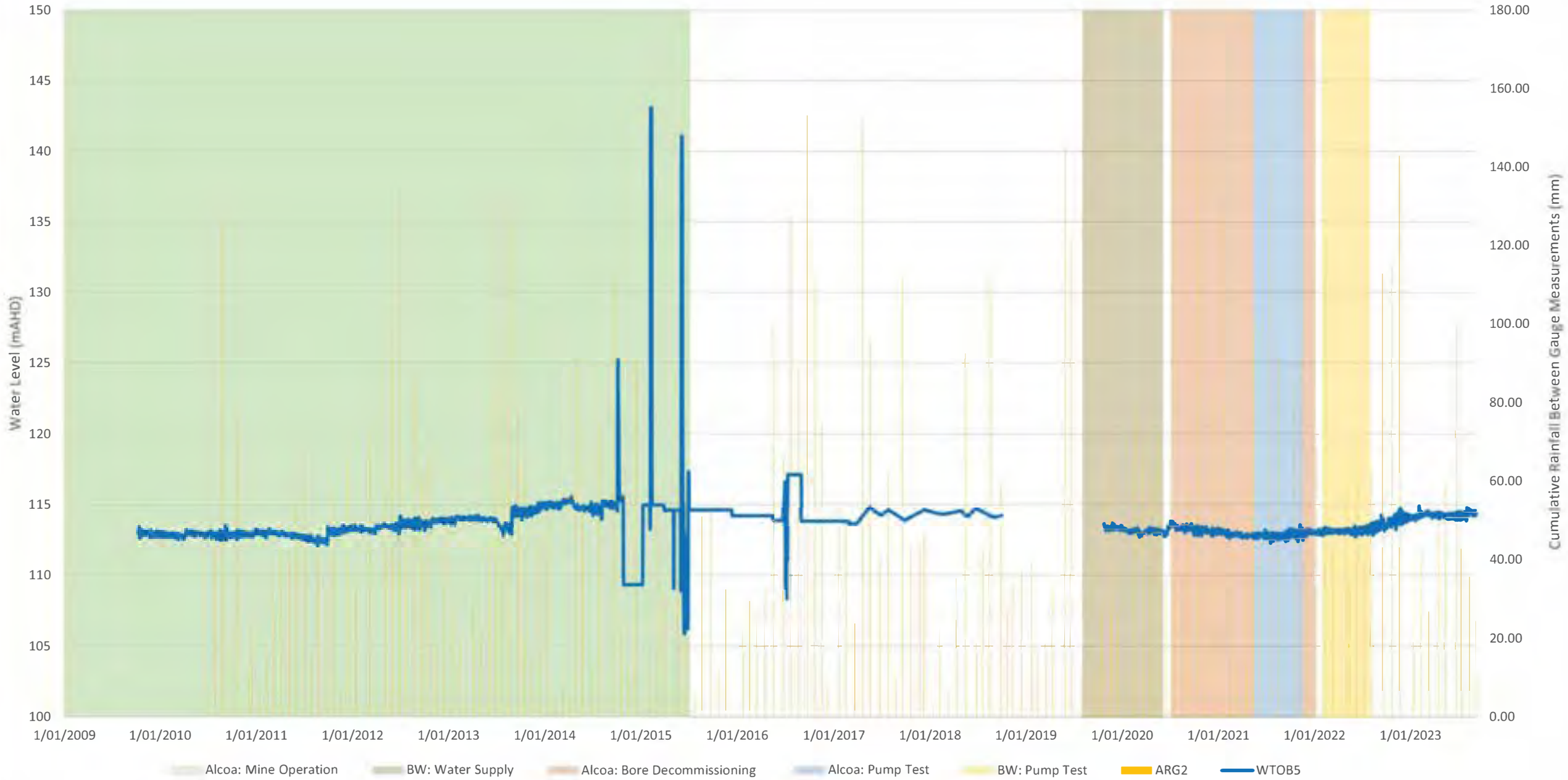



SB1 (LEVF)- Water level, Rainfall and Pump graph
Water Level (mAHD)
Cumulative Rainfall Between Gauge Measurements (mm)
10
0
-10
-20
-30
-40
-50
-60
-70
-80
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/01/2009
1/01/2010
1/01/2011
1/01/2012
1/01/2013
1/01/2014
1/01/2015
1/01/2016
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG3
SB1

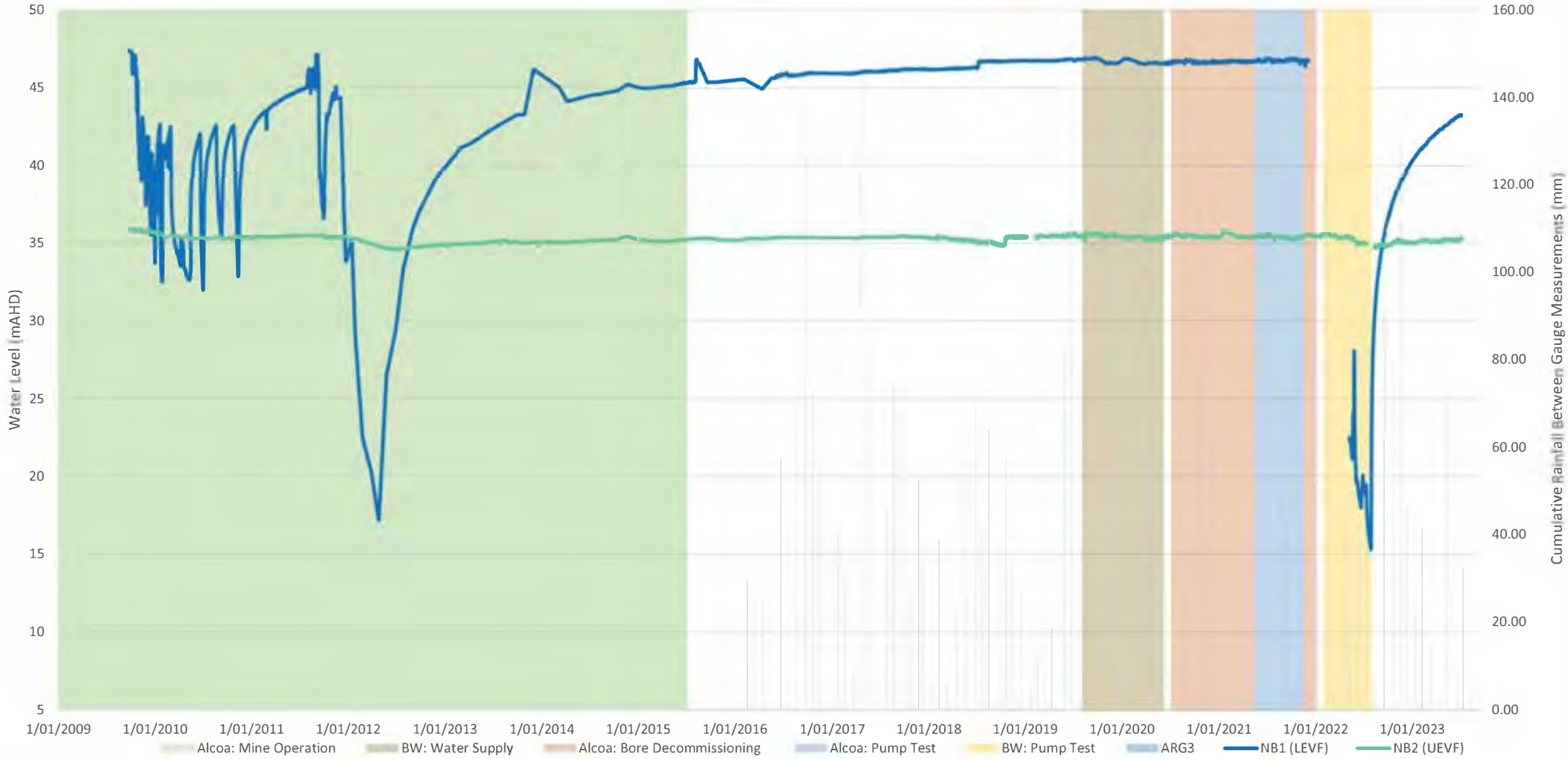
WTB04 (LEVF)- Water level, Rainfall and Pump graph



WTBO5 (LEVF)- Water level, Rainfall and Pump graph

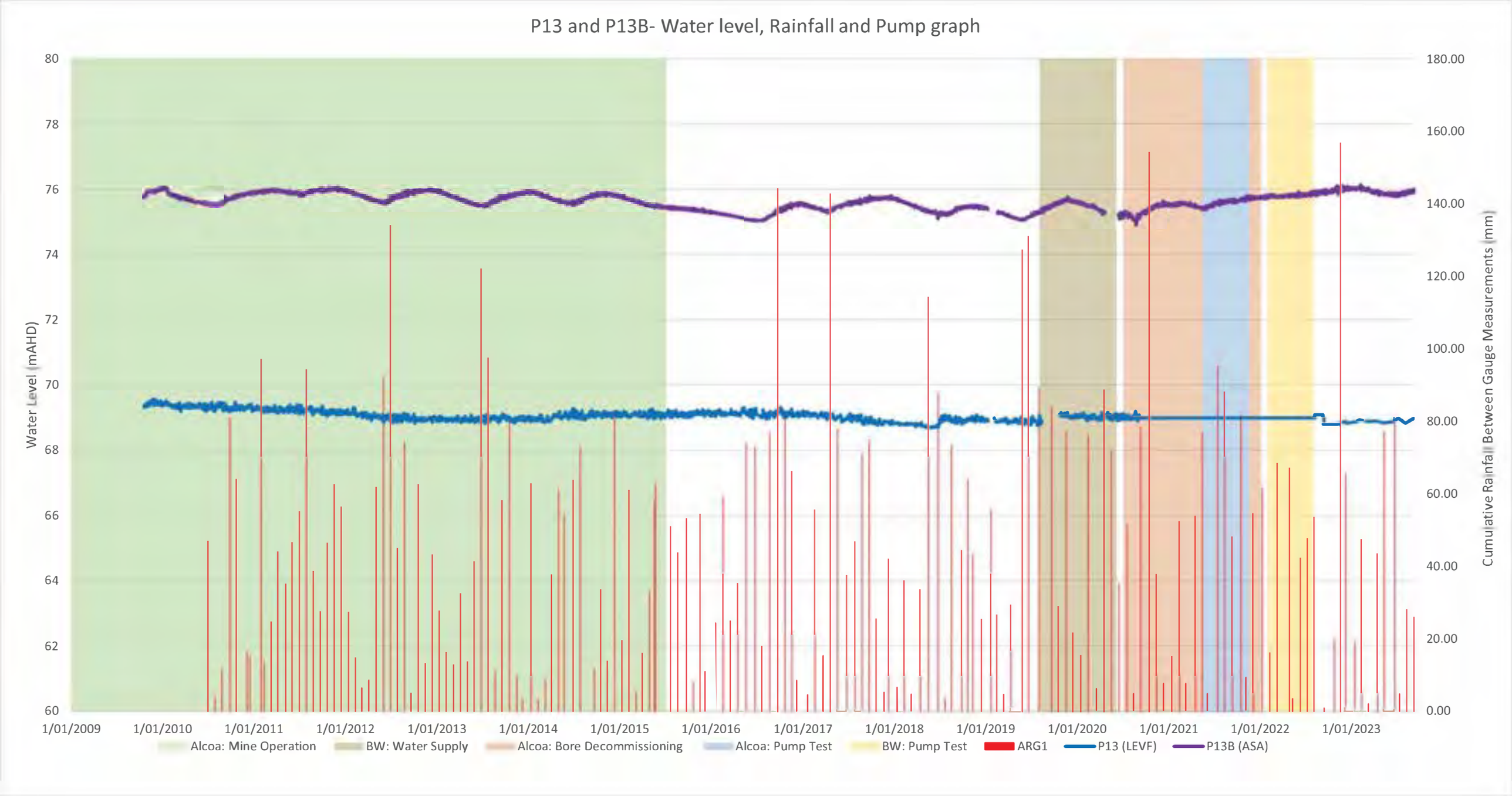


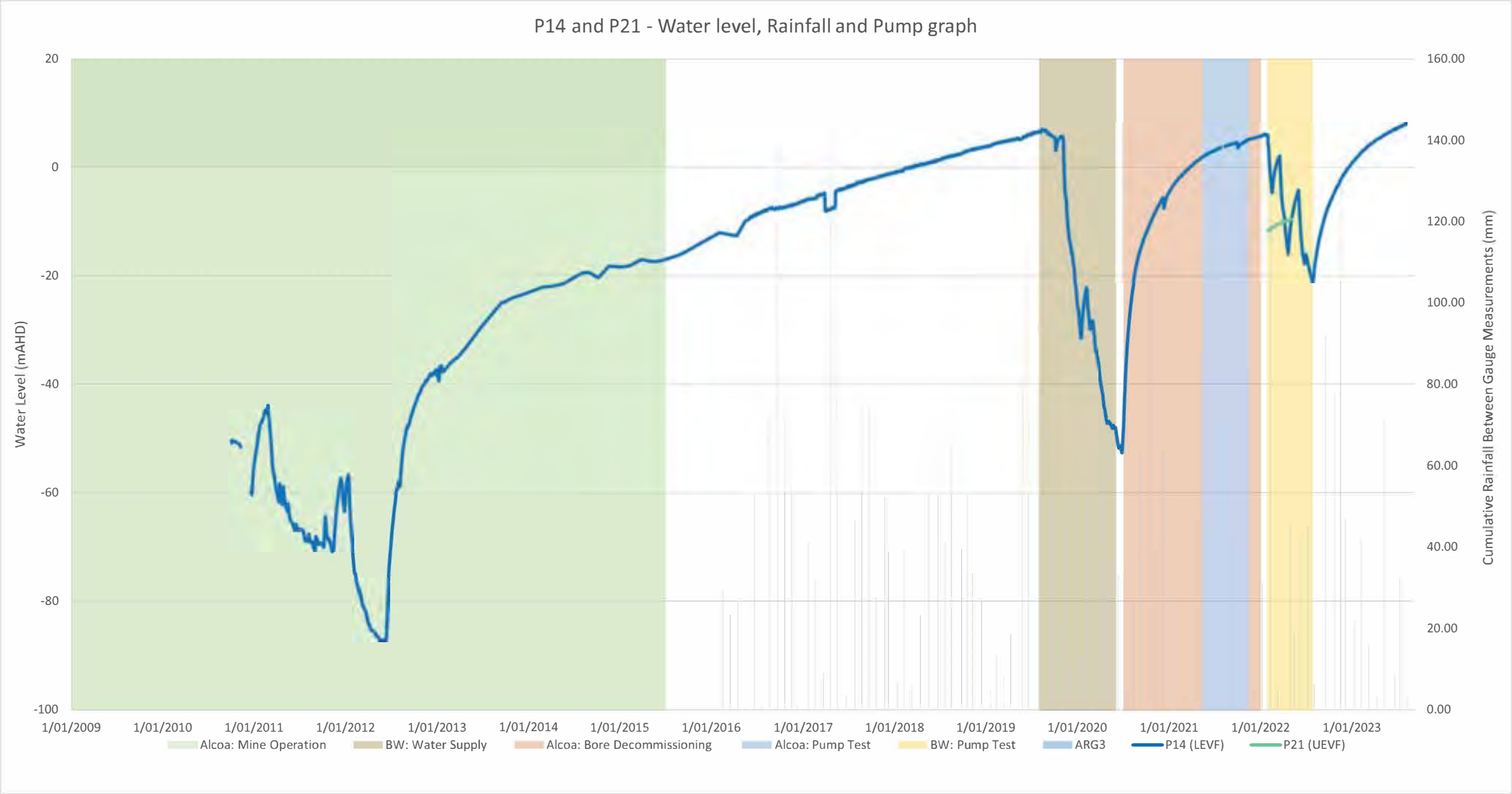
NB1 and NB2 - Water level, Rainfall and Pump graph

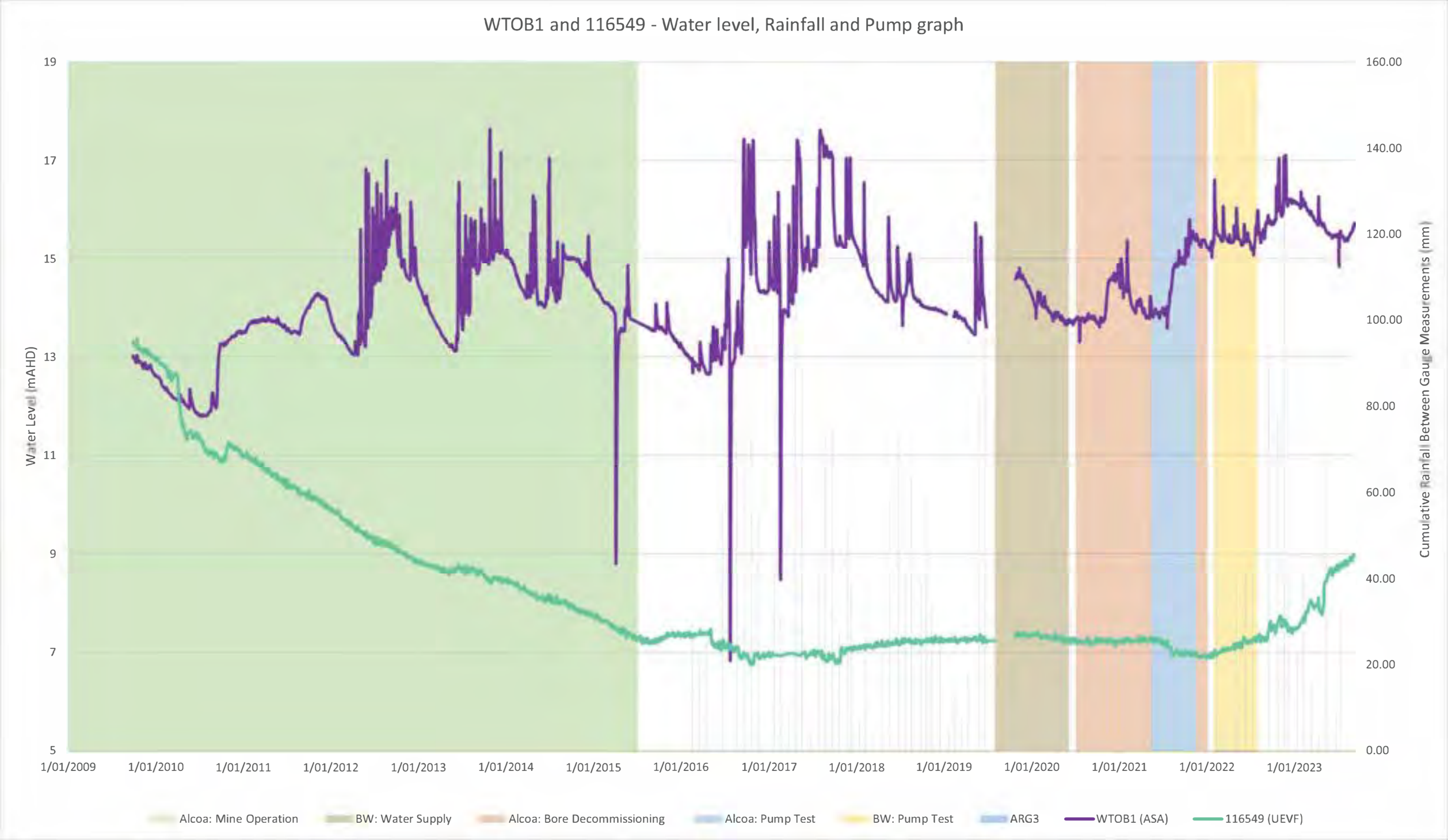


P8, P12 and P19 - Water level, Rainfall and Pump graph



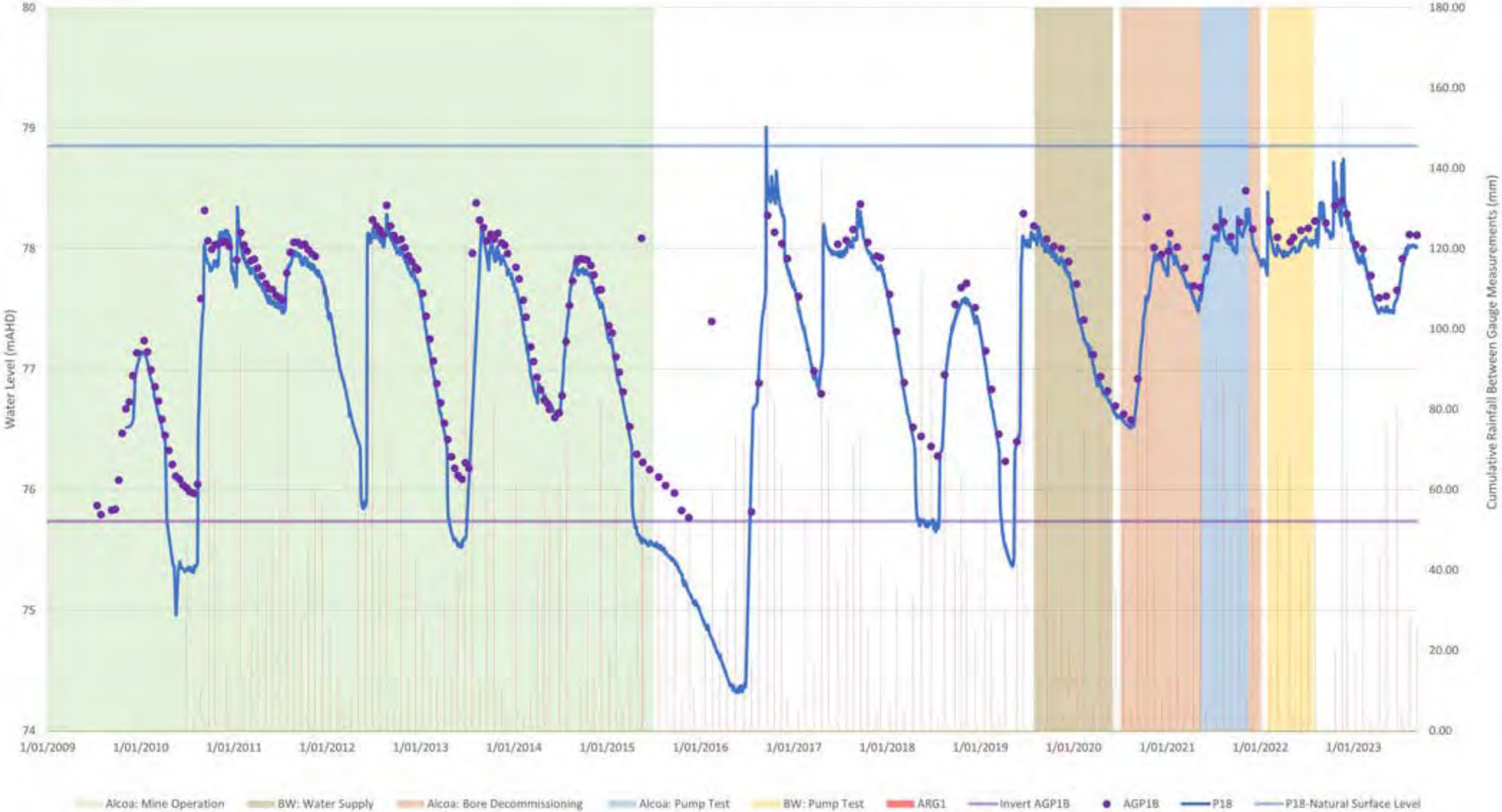

P13 and P13B- Water level, Rainfall and Pump graph
Water Level (mAHD)
Cumulative Rainfall Between Gauge Measurements (mm)
80
78
76
74
72
70
68
66
64
62
60
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/01/2009
1/01/2010
1/01/2011
1/01/2012
1/01/2013
1/01/2014
1/01/2015
1/01/2016
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG1
P13 (LEVF)
P13B (ASA)


P14 and P21 - Water level, Rainfall and Pump graph
Water Level (mAHD)
Cumulative Rainfall Between Gauge Measurements (mm)
20
0
-20
-40
-60
-80
-100
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/01/2009
1/01/2010
1/01/2011
1/01/2012
1/01/2013
1/01/2014
1/01/2015
1/01/2016
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG3
P14 (LEVF)
P21 (UEVF)

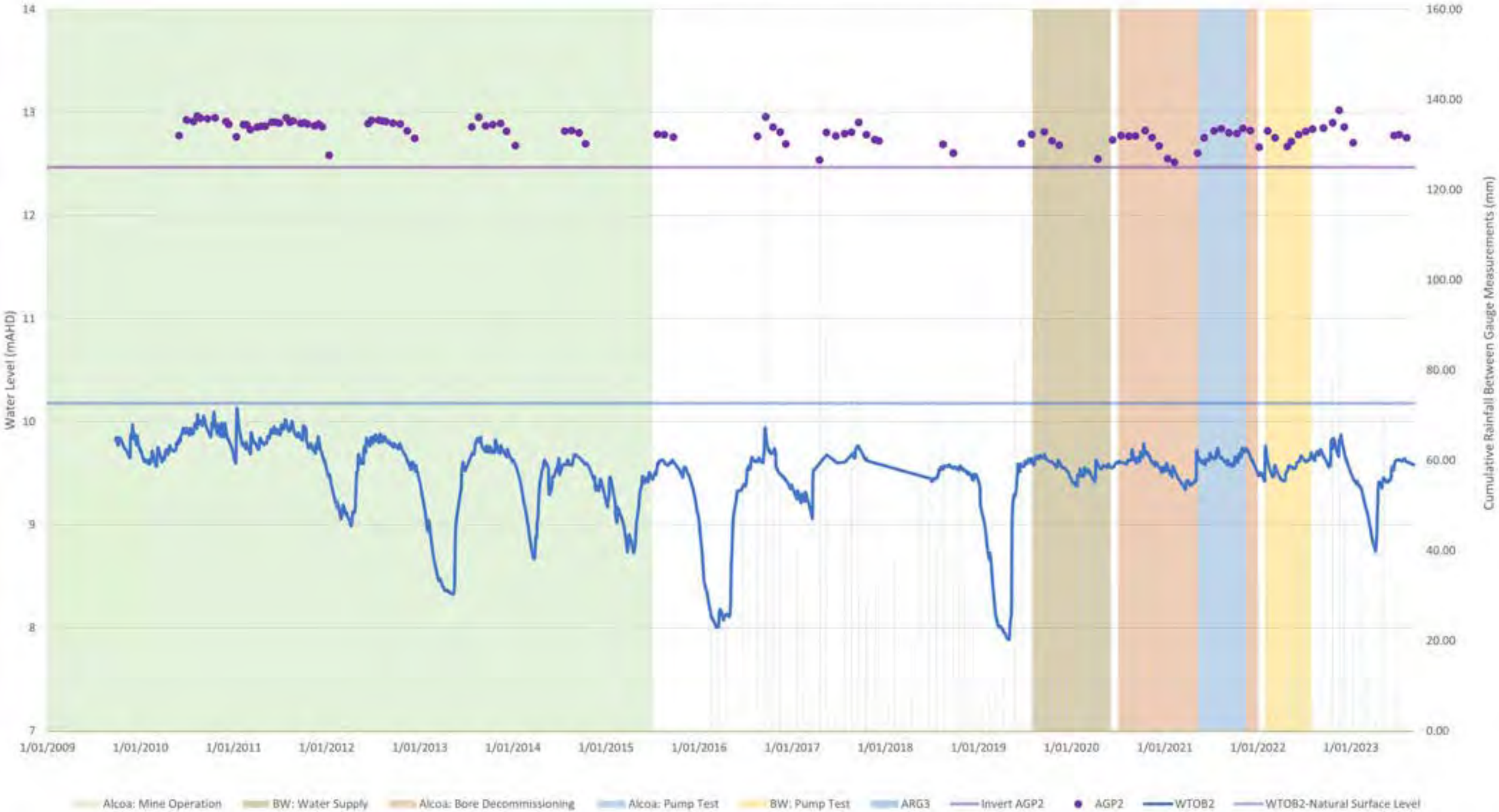

WTOB1 and 116549 - Water level, Rainfall and Pump graph
Water Level (mAHD)
Cumulative Rainfall Between Gauge Measurements (mm)
19
17
15
13
11
9
7
5
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
1/01/2009
1/01/2010
1/01/2011
1/01/2012
1/01/2013
1/01/2014
1/01/2015
1/01/2016
1/01/2017
1/01/2018
1/01/2019
1/01/2020
1/01/2021
1/01/2022
1/01/2023
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG3
WTOB1 (ASA)
116549 (UEVF)

Groundwater – Surface Water Level Graphs

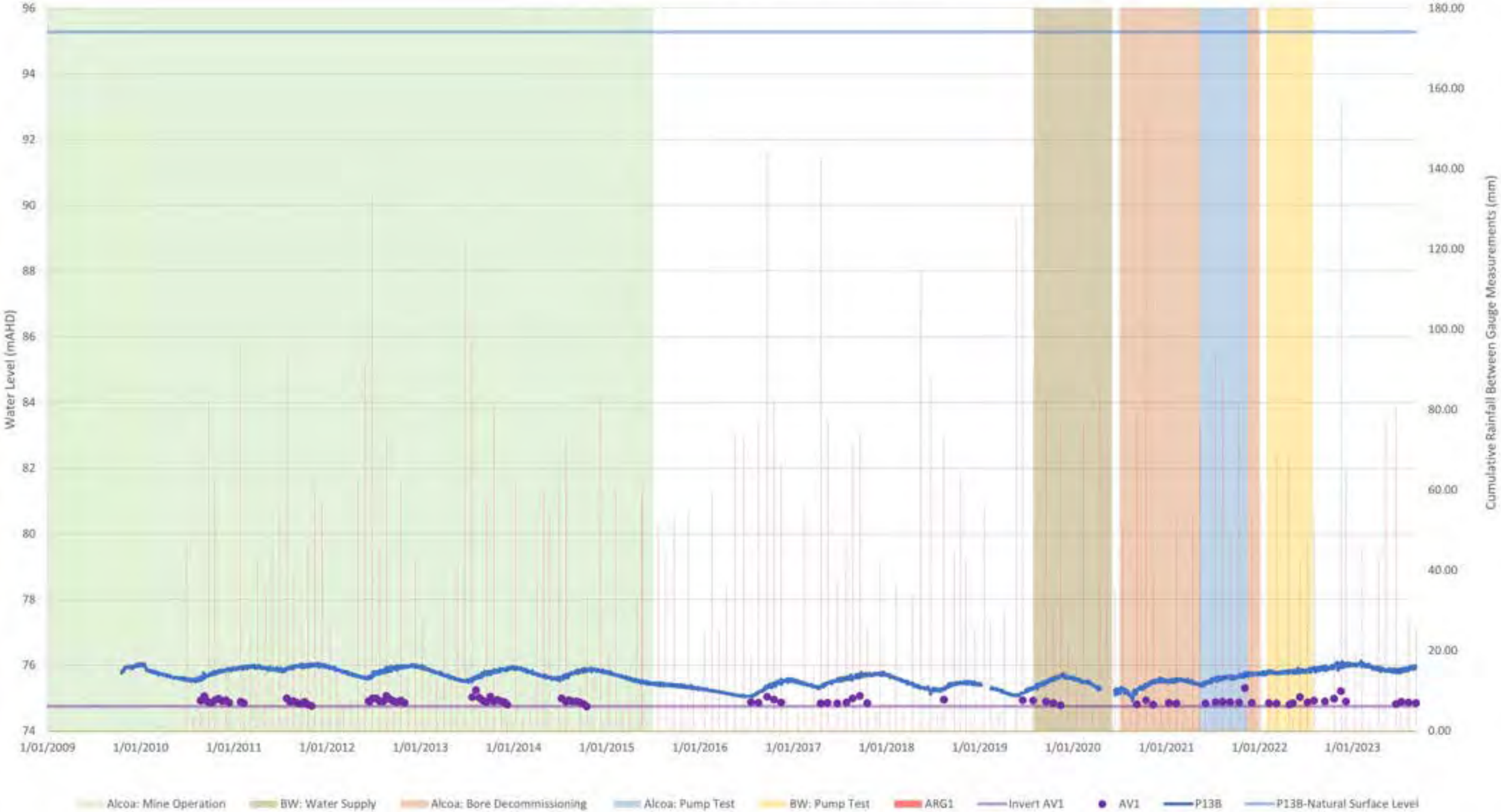
P18 and AGP1-B - Water level, Rainfall and Pump graph



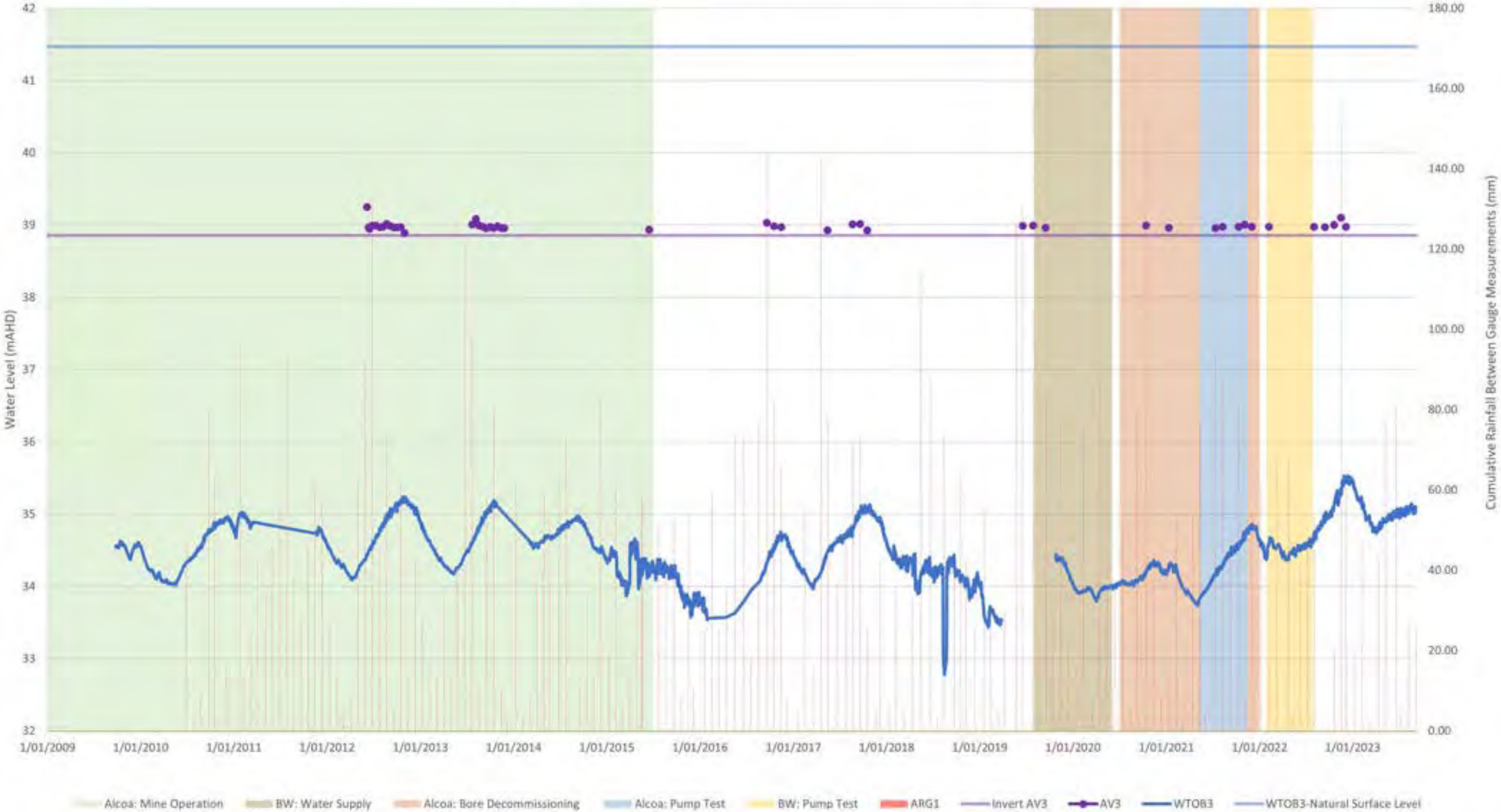
WTOB2 and AGP2 - Water level, Rainfall and Pump graph



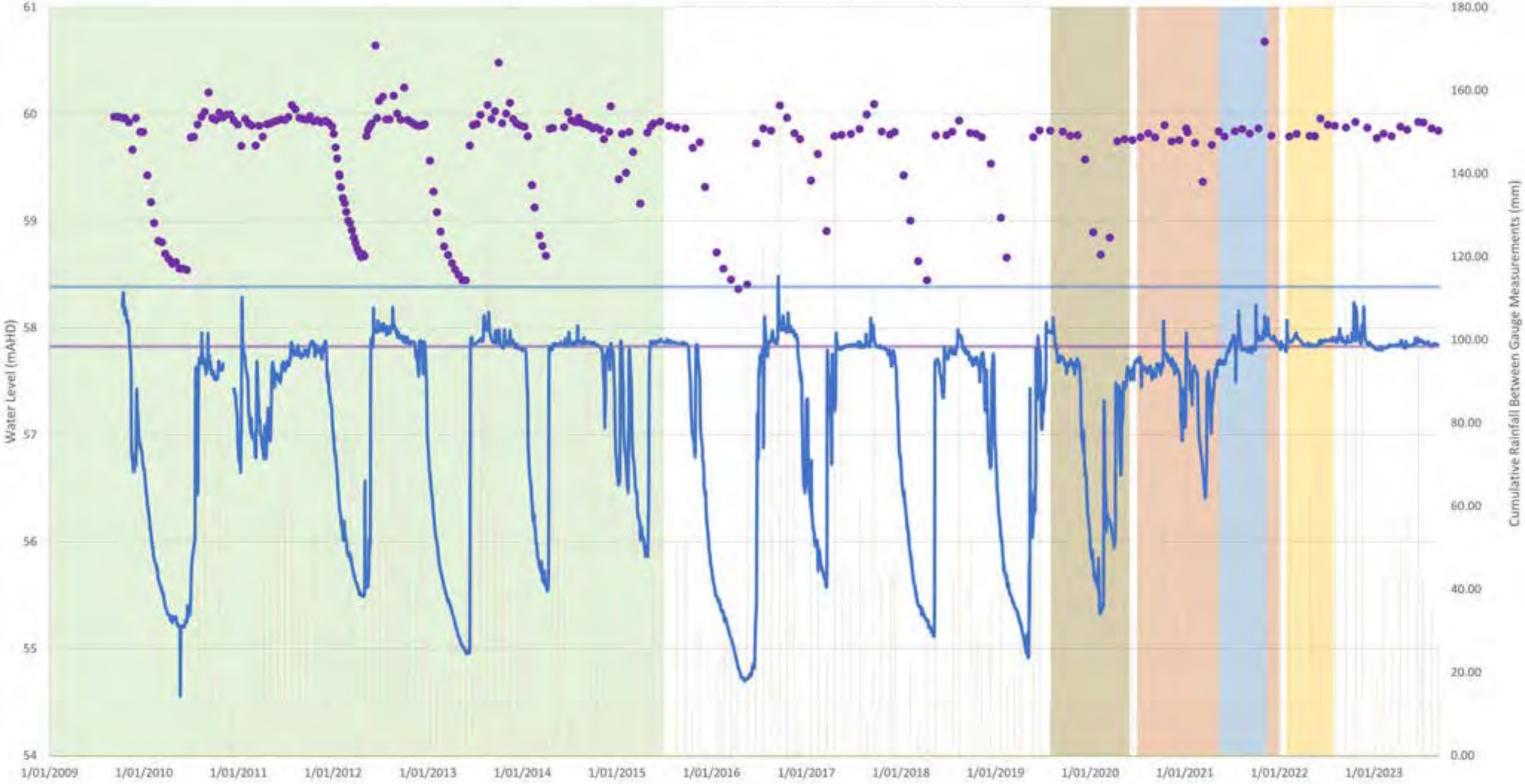
P13B and AV1 - Water level, Rainfall and Pump graph



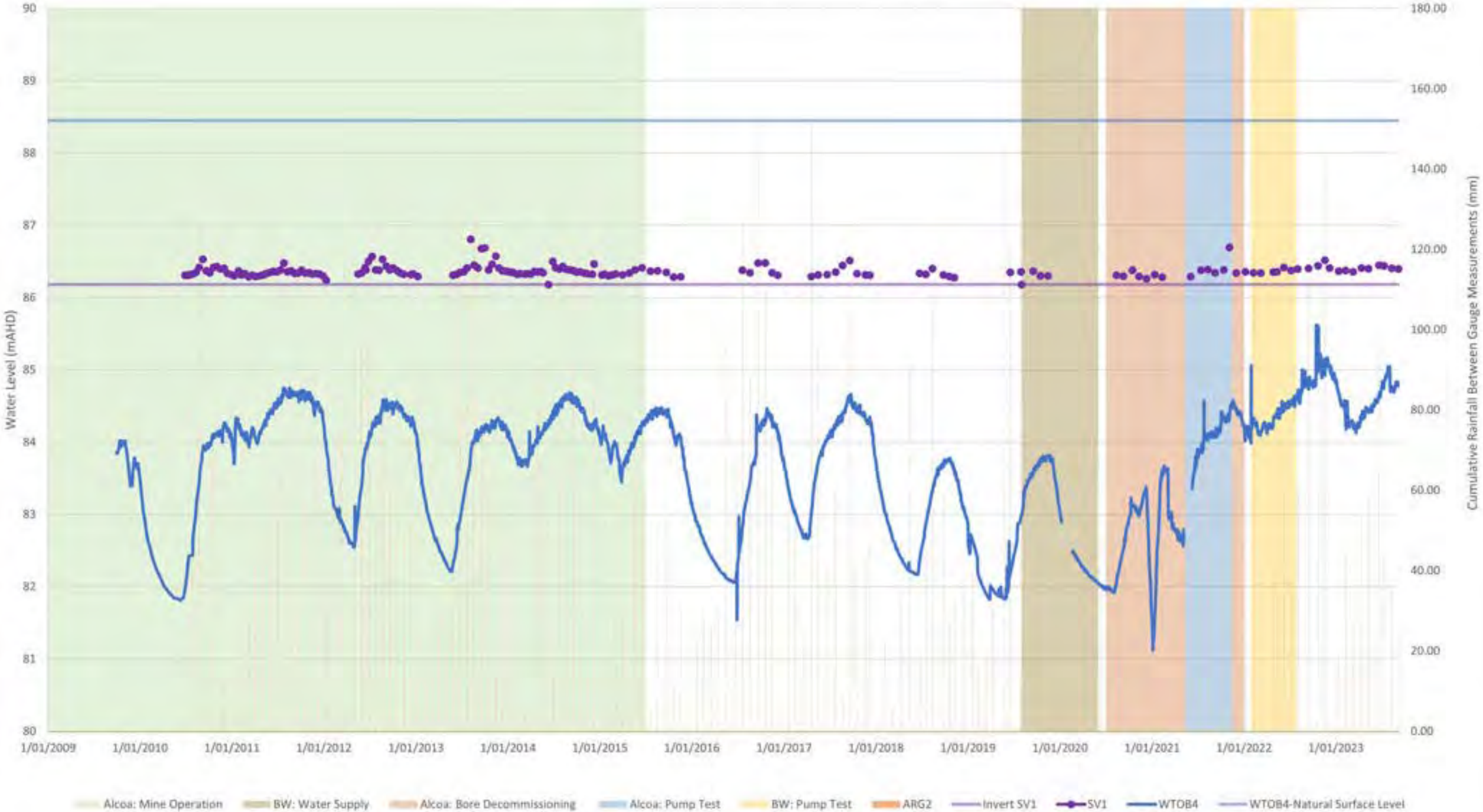
WTOB3 and AV3 - Water level, Rainfall and Pump graph



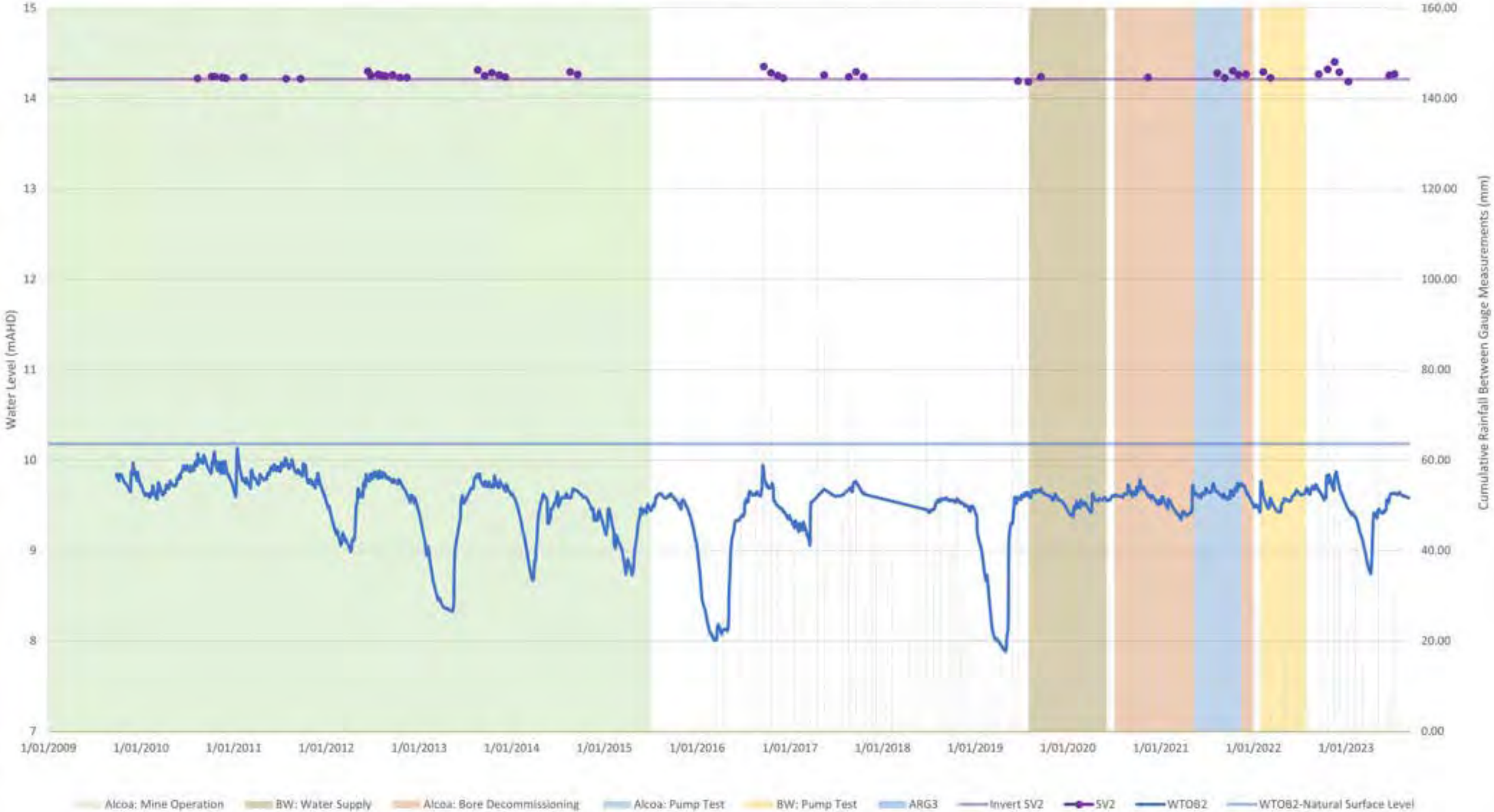
P1 and SGP2-B - Water level, Rainfall and Pump graph



WTOB4 and SV1 - Water level, Rainfall and Pump graph



WTOB2 and SV2 - Water level, Rainfall and Pump graph



P16 and SV3 - Water level, Rainfall and Pump graph

Water Level (mAHD)

97
96.5
96
95.5
95
94.5
94

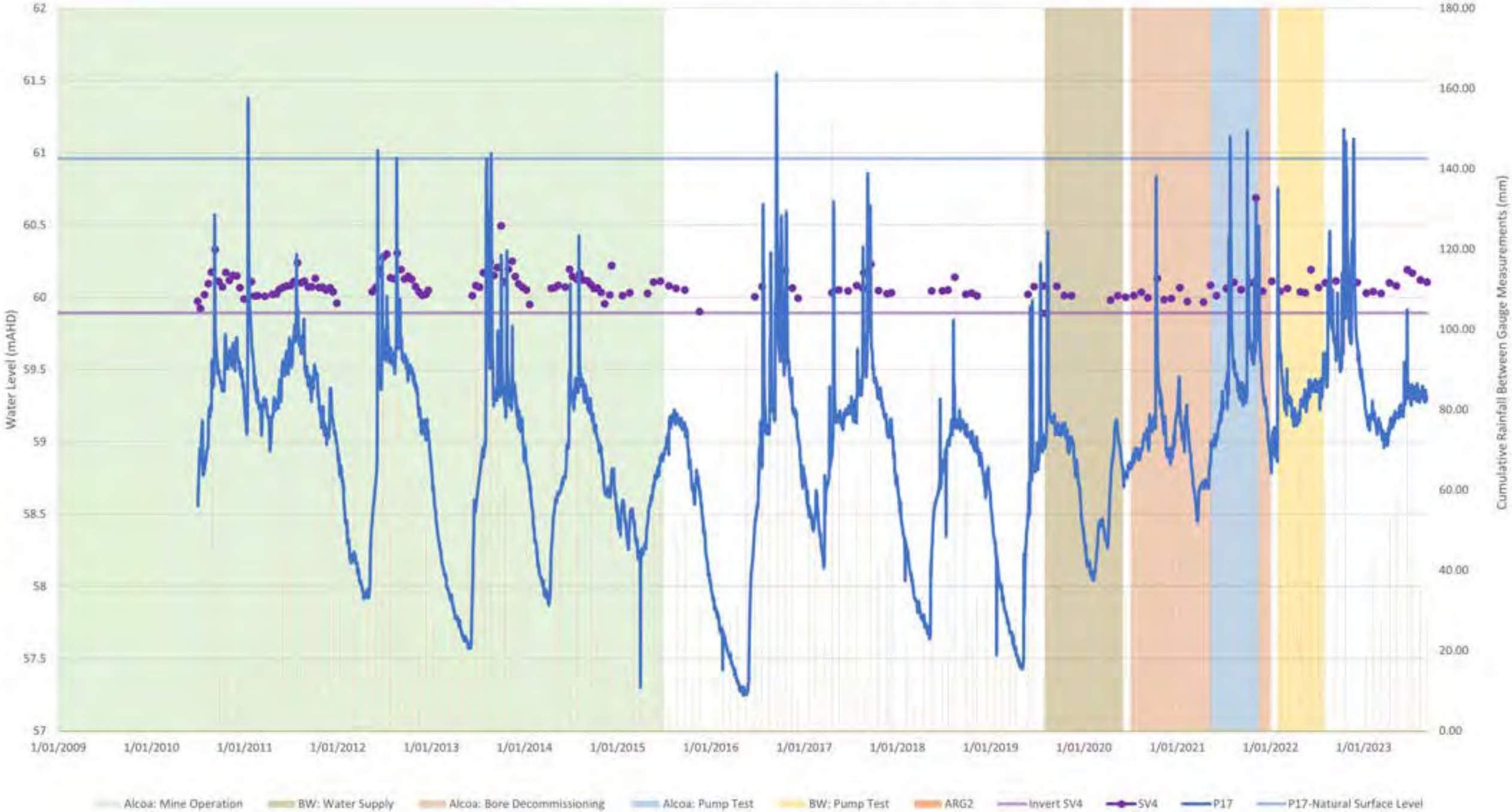
Cumulative Rainfall Between Gauge Measurements (mm)

180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00

1/01/2009 1/01/2010 1/01/2011 1/01/2012 1/01/2013 1/01/2014 1/01/2015 1/01/2016 1/01/2017 1/01/2018 1/01/2019 1/01/2020 1/01/2021 1/01/2022 1/01/2023

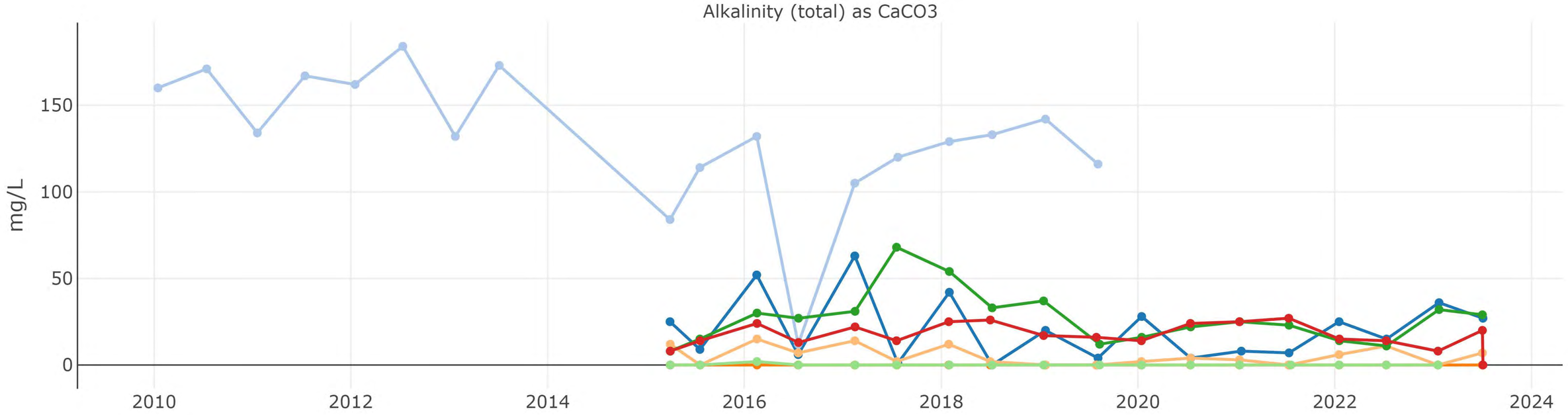
Alcoa: Mine Operation
BW: Water Supply
Alcoa: Bore Decommissioning
Alcoa: Pump Test
BW: Pump Test
ARG2
Invert SV3
SV3
P16
P16-Natural Surface Level

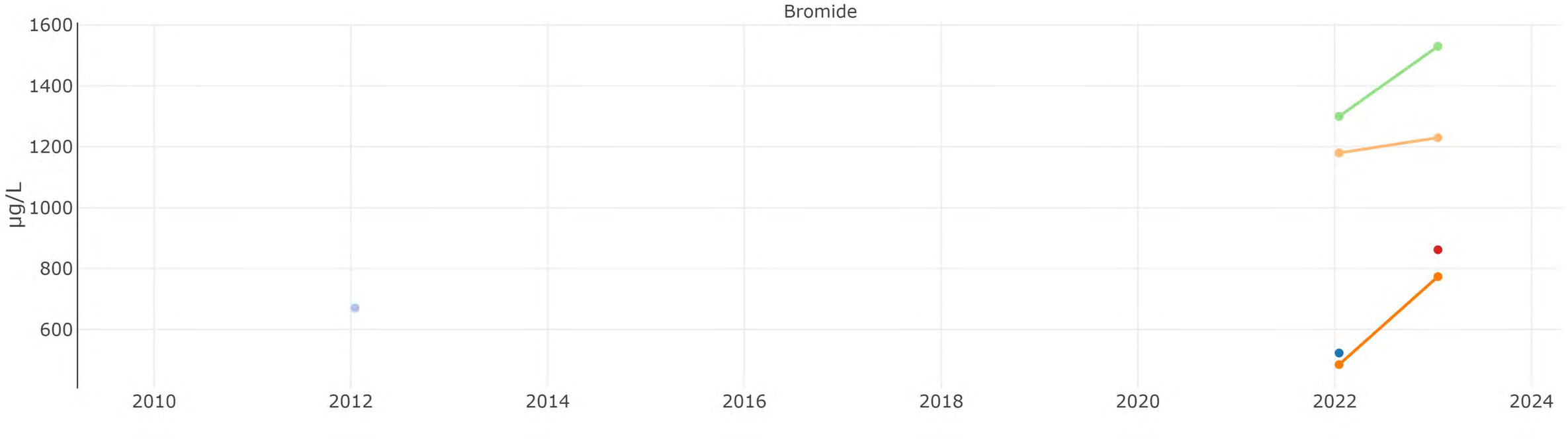
P17 and SV4 - Water level, Rainfall and Pump graph

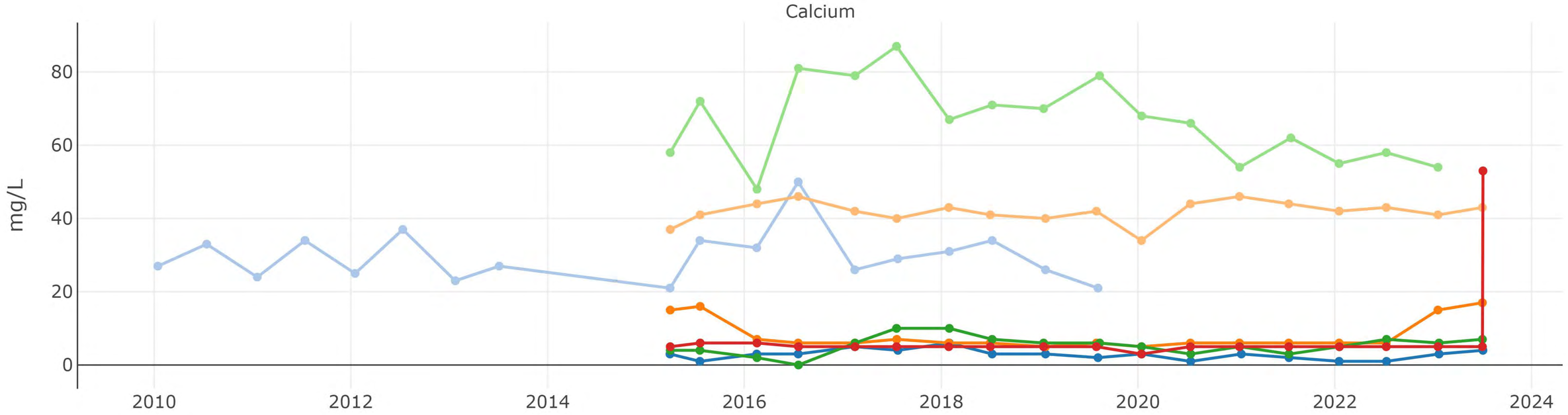


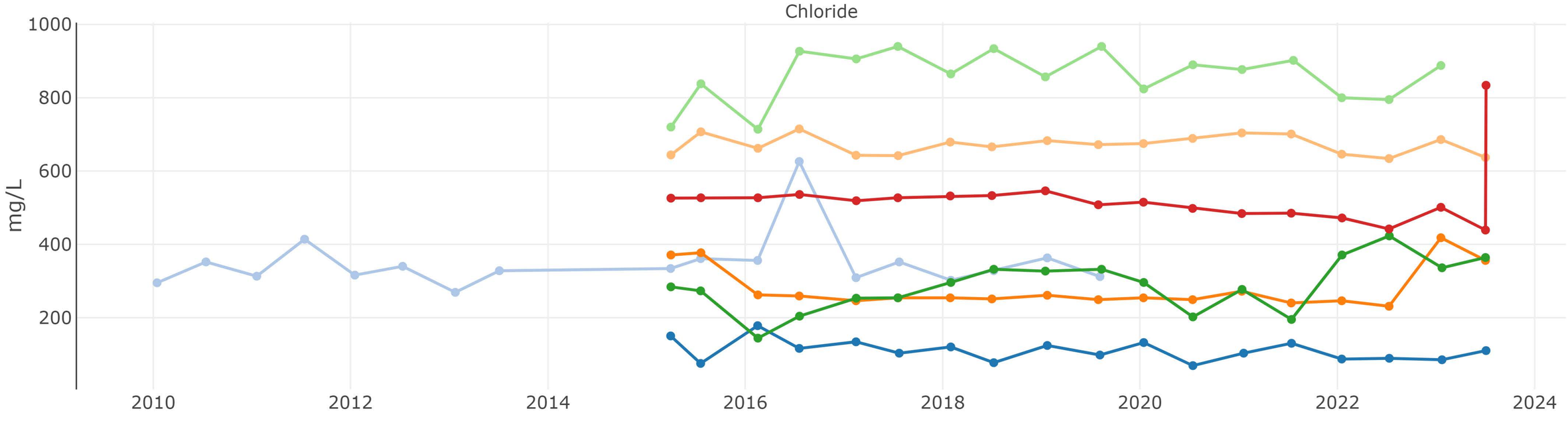
Groundwater – Analytical Chemistry Graphs

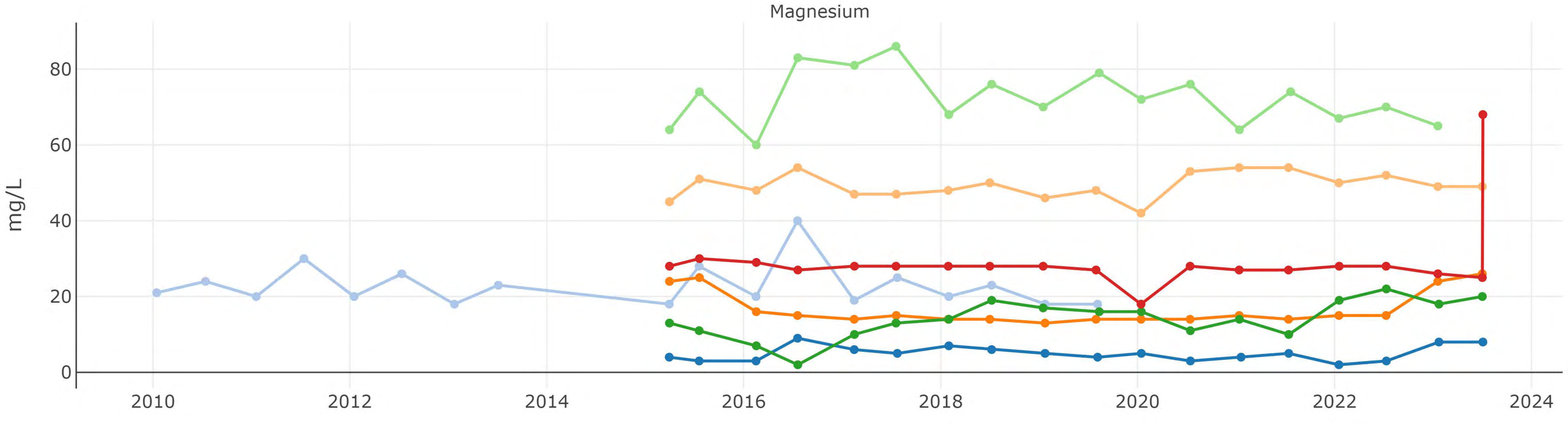
Chemistry Graph
P1
P17
P7B
P8
WTOB1
WTOB2
WTOB3

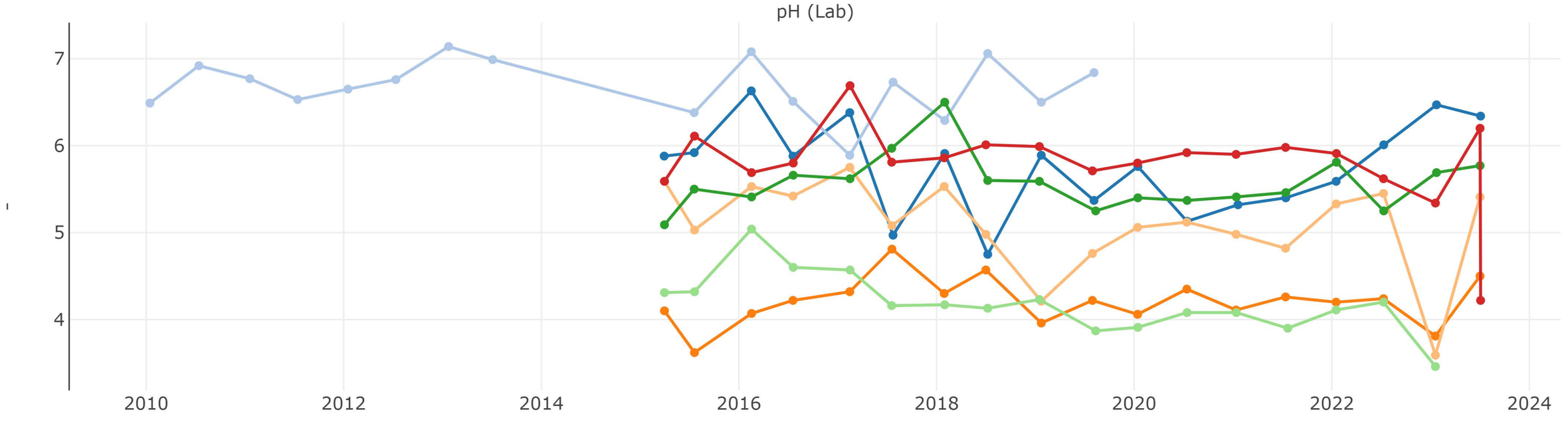

Alkalinity (total) as CaCO3
mg/L
150
100
50
0
2010
2012
2014
2016
2018
2020
2022
2024

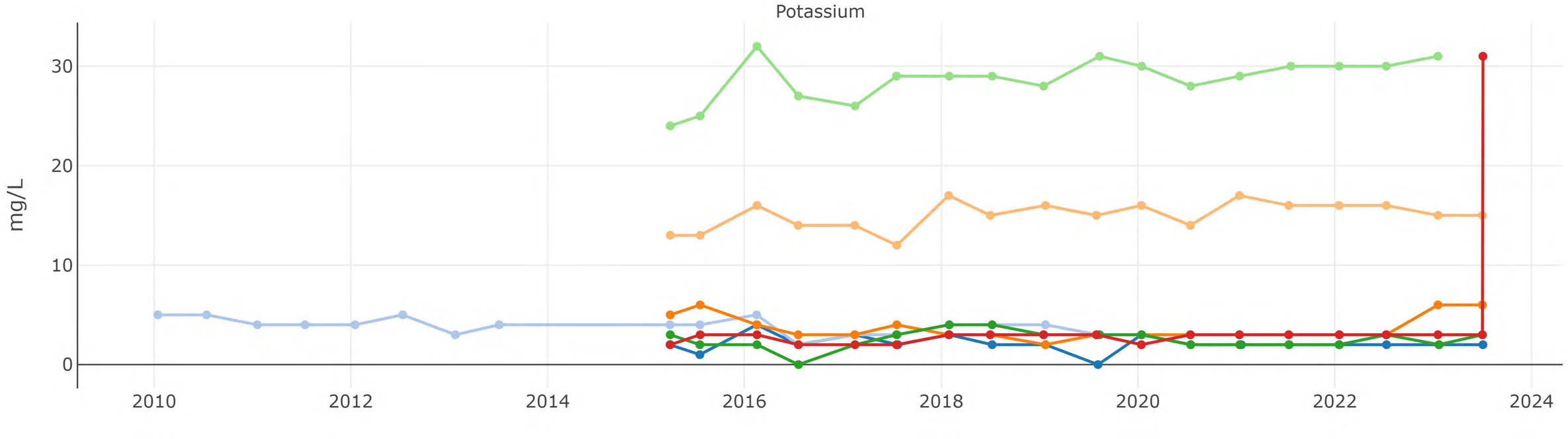

Bromide
1600
1400
1200
1000
800
600
µg/L
2010
2012
2014
2016
2018
2020
2022
2024

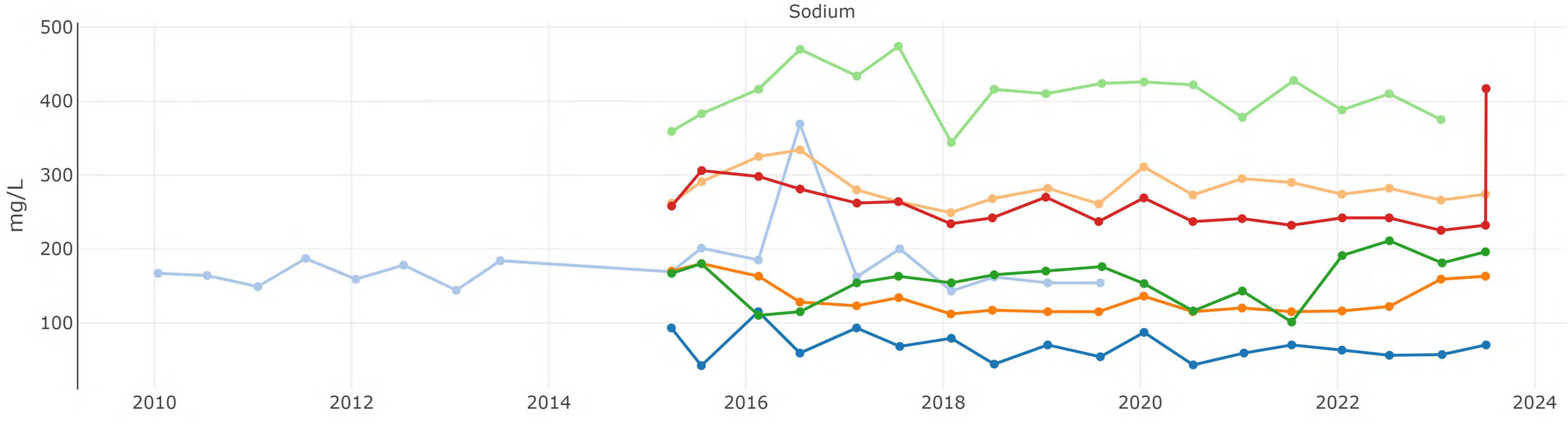

Calcium
mg/L
80
60
40
20
0
2010
2012
2014
2016
2018
2020
2022
2024

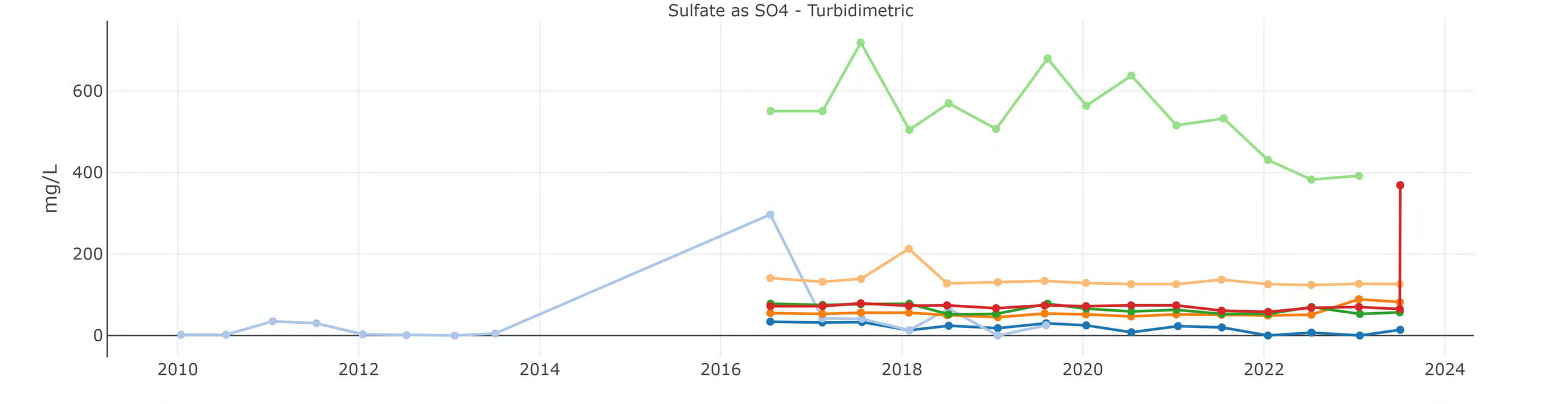

Chloride
1000
800
600
400
200
mg/L
2010
2012
2014
2016
2018
2020
2022
2024

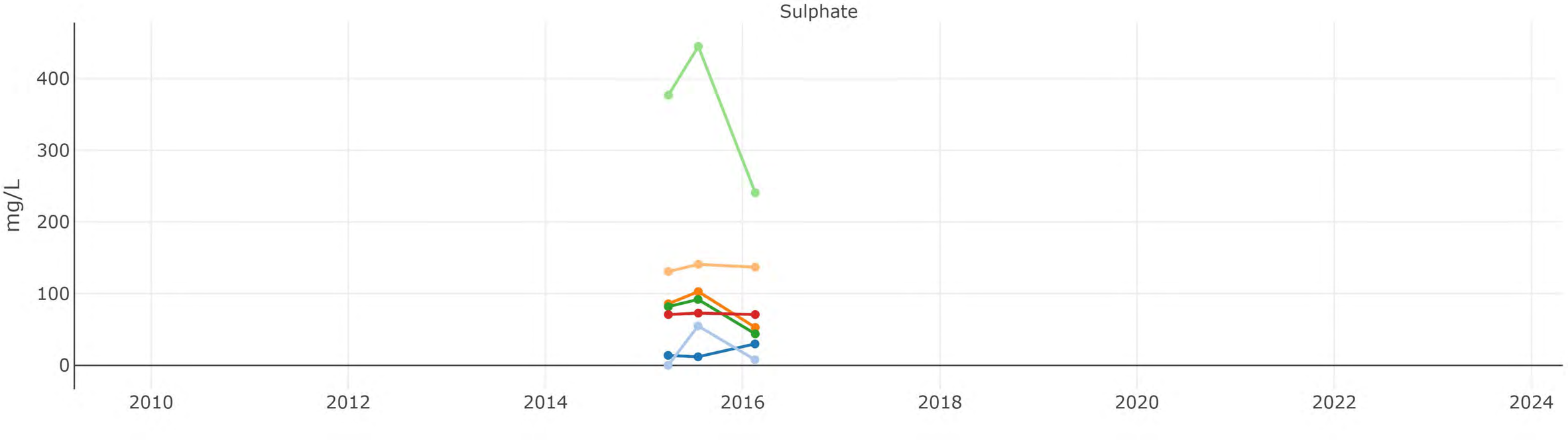

Magnesium
mg/L
80
60
40
20
0
2010
2012
2014
2016
2018
2020
2022
2024

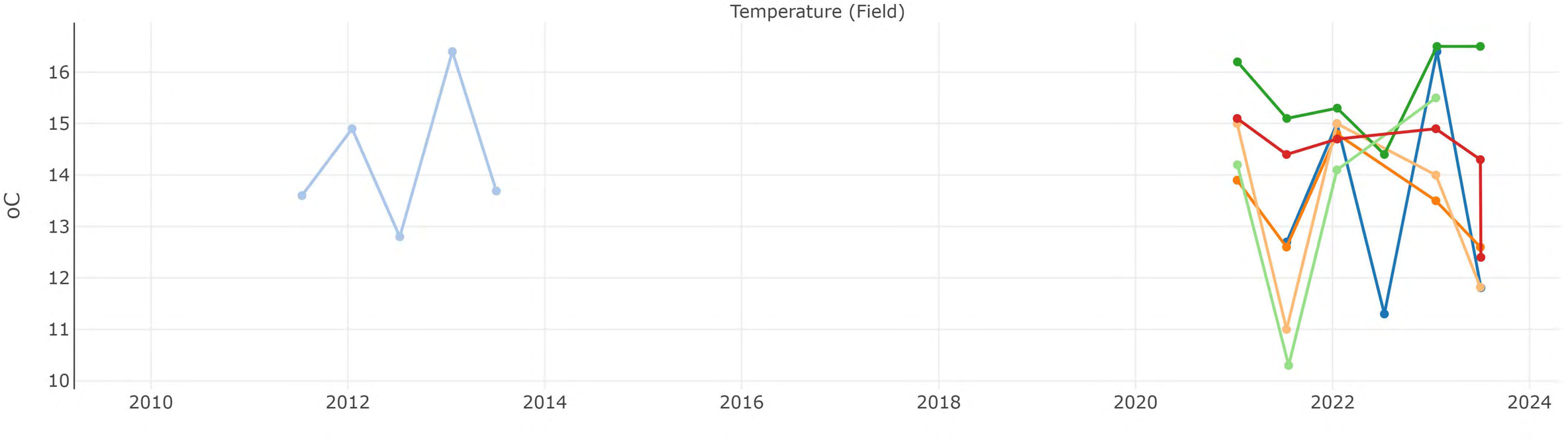

pH (Lab)
7
6
5
4
2010
2012
2014
2016
2018
2020
2022
2024

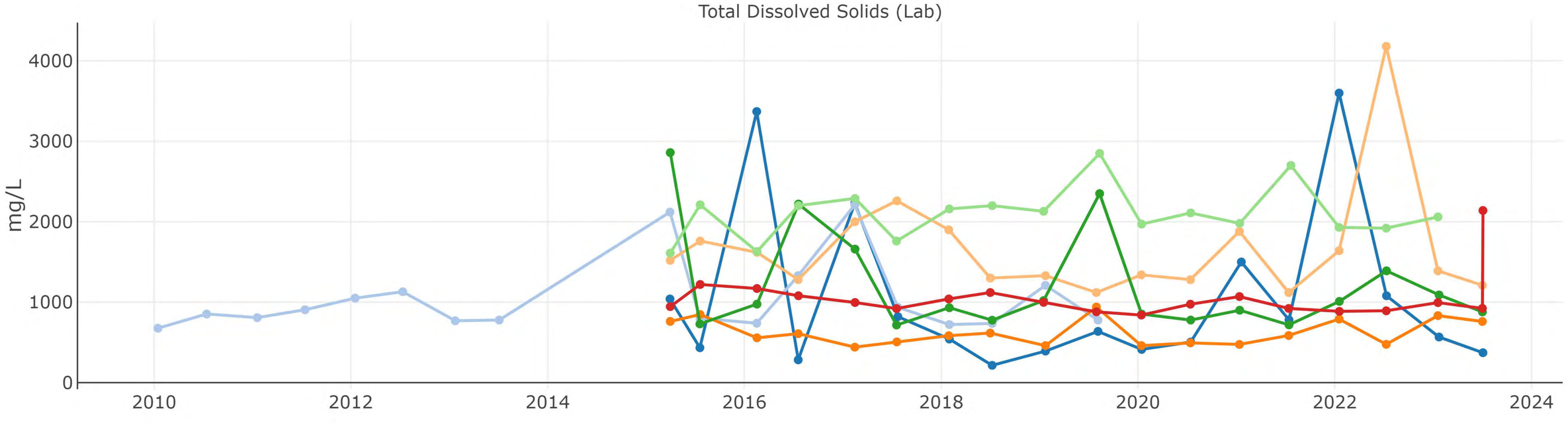

Potassium
mg/L
30
20
10
0
2010
2012
2014
2016
2018
2020
2022
2024


Sodium
500
400
300
200
100
mg/L
2010
2012
2014
2016
2018
2020
2022
2024

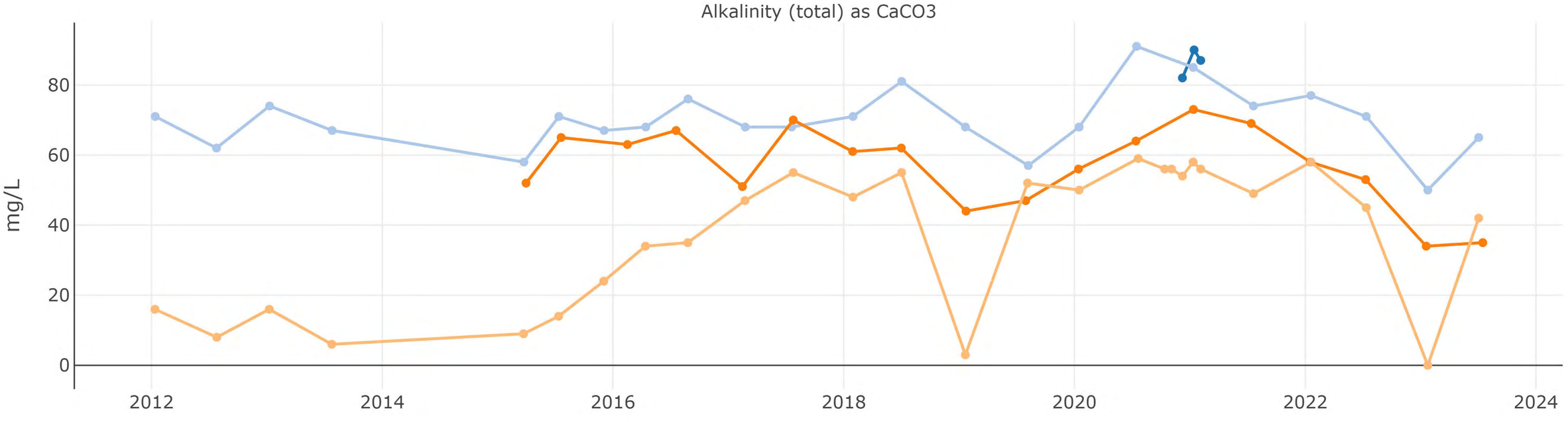

Sulfate as SO4 - Turbidimetric
mg/L
600
400
200
0
2010
2012
2014
2016
2018
2020
2022
2024

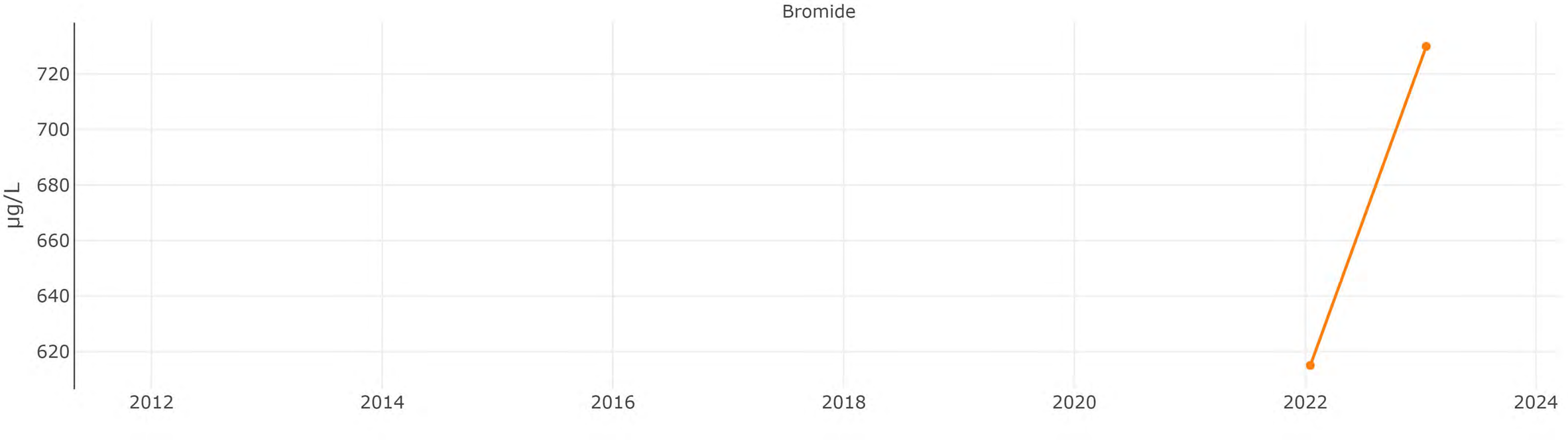

Sulphate
mg/L
400
300
200
100
0
2010
2012
2014
2016
2018
2020
2022
2024

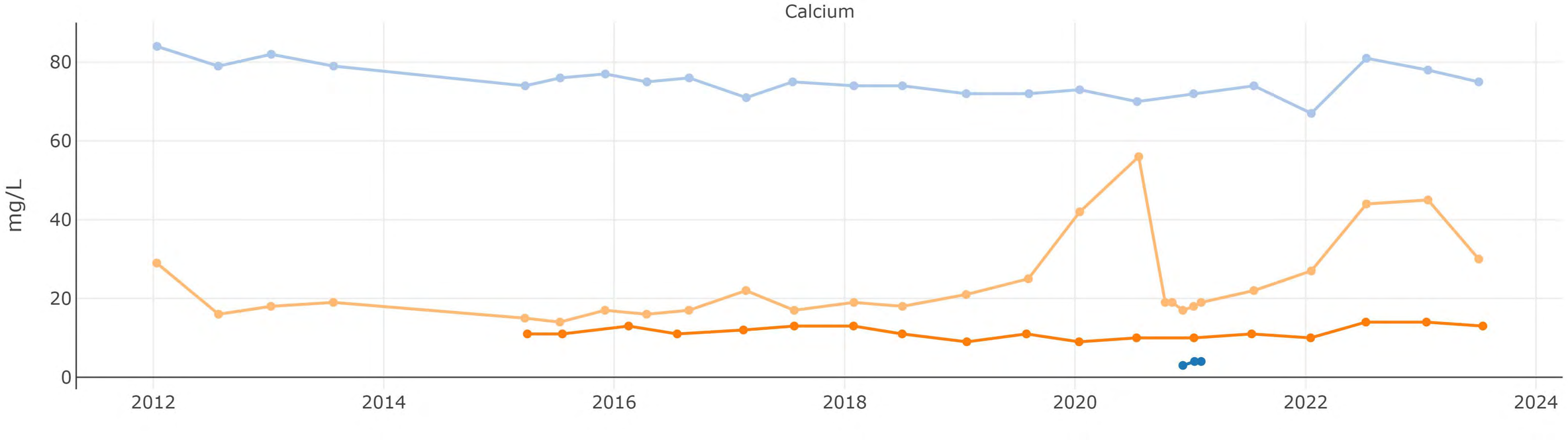

Temperature (Field)
oC
16
15
14
13
12
11
10
2010
2012
2014
2016
2018
2020
2022
2024

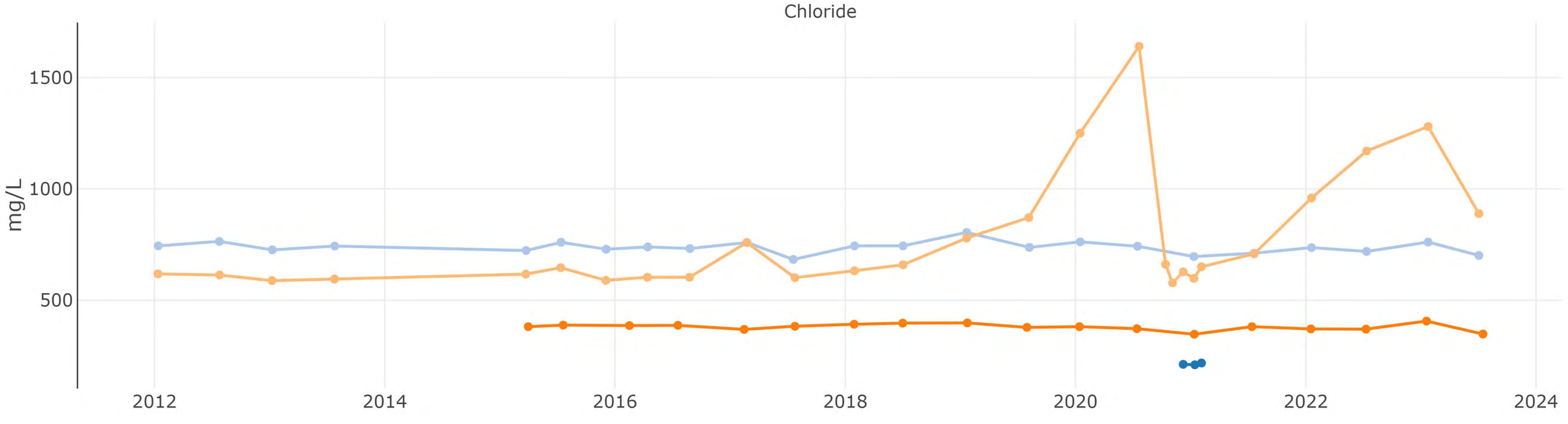

Total Dissolved Solids (Lab)
mg/L
4000
3000
2000
1000
0
2010
2012
2014
2016
2018
2020
2022
2024

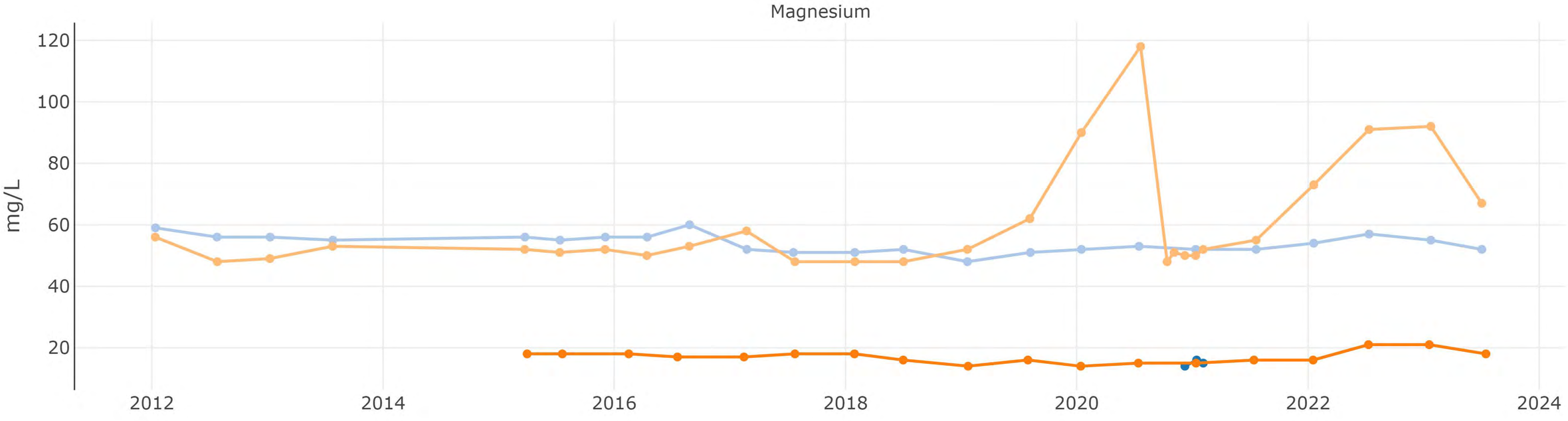
Chemistry Graph
116459
NB2
P19
SB2

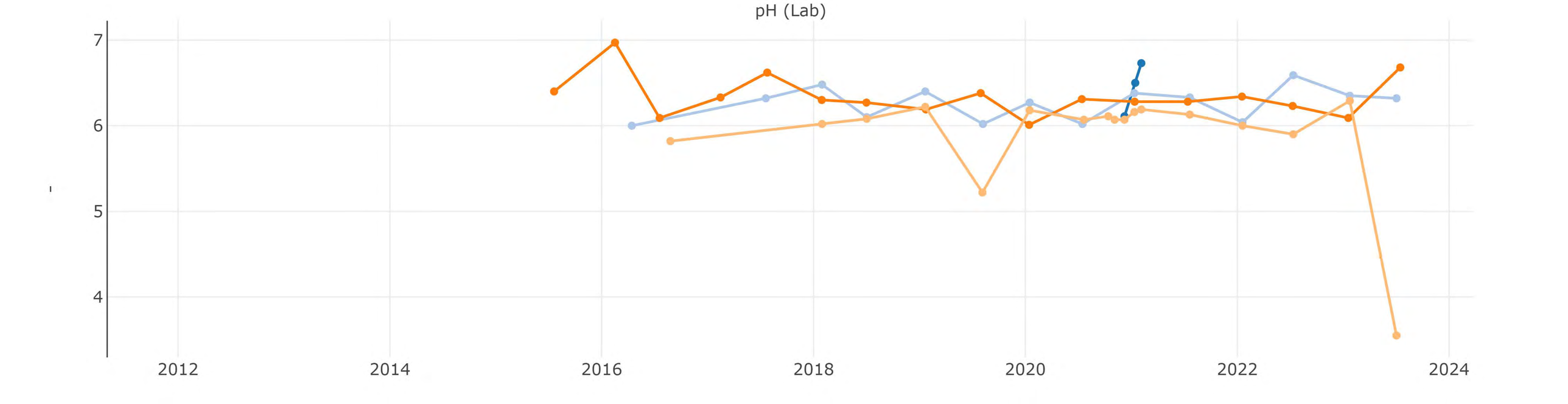

Alkalinity (total) as CaCO3
mg/L
0
20
40
60
80
2012
2014
2016
2018
2020
2022
2024

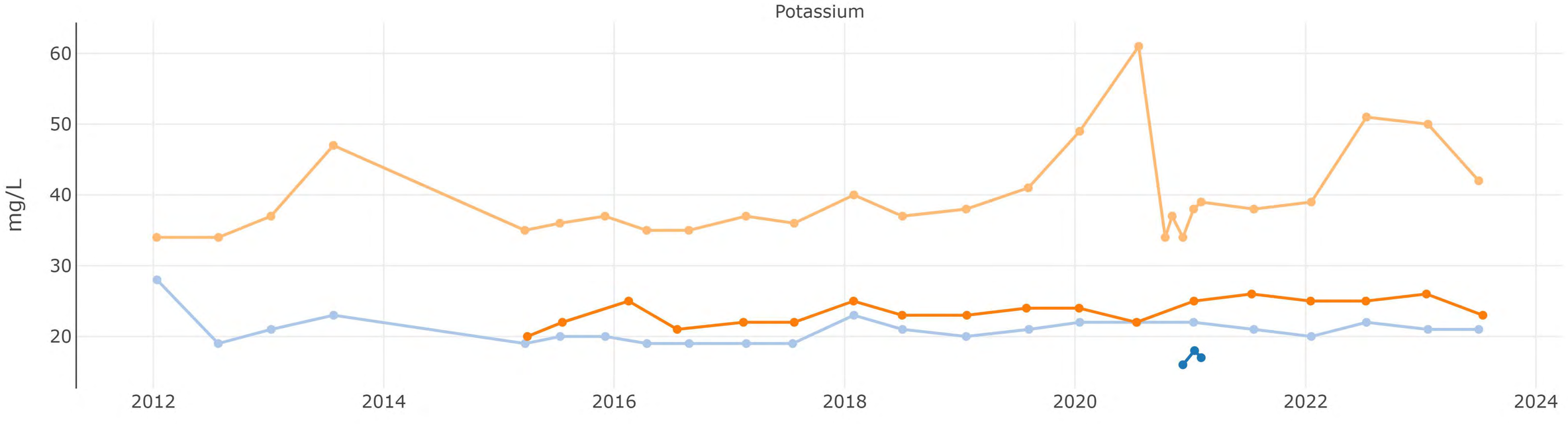

Bromide
µg/L
720
700
680
660
640
620
2012
2014
2016
2018
2020
2022
2024

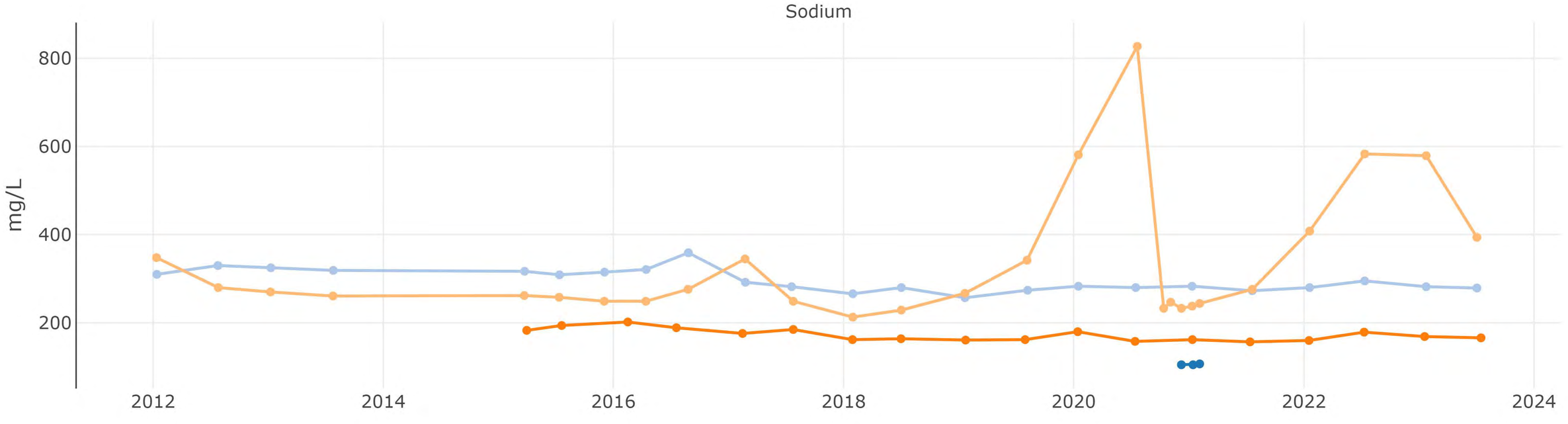

Calcium
mg/L
80
60
40
20
0
2012
2014
2016
2018
2020
2022
2024

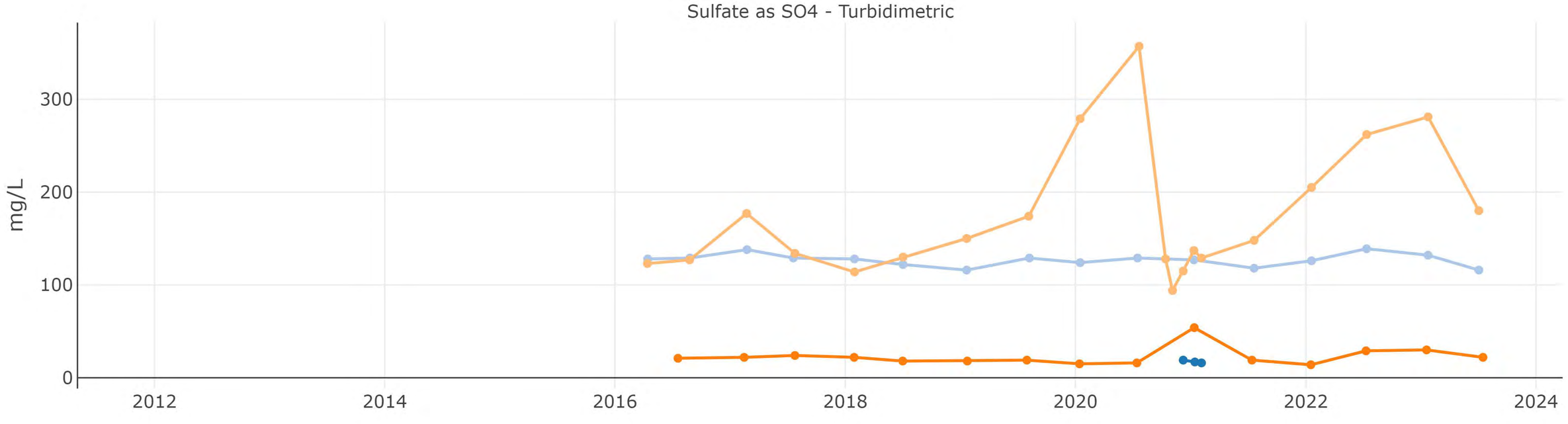

Chloride
mg/L
1500
1000
500
2012
2014
2016
2018
2020
2022
2024

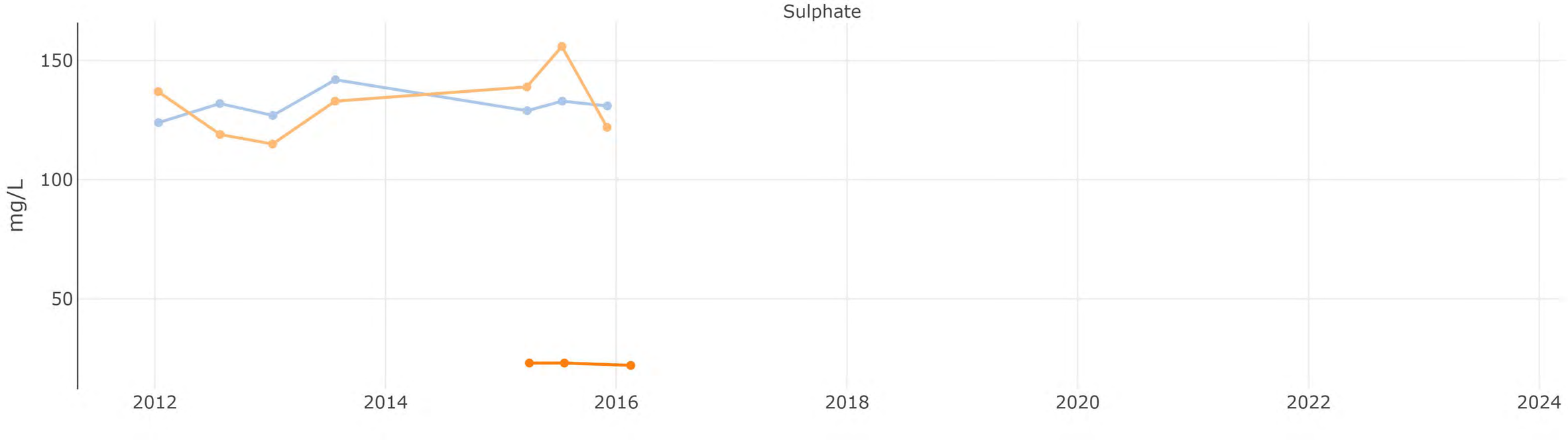

Magnesium
mg/L
120
100
80
60
40
20
2012
2014
2016
2018
2020
2022
2024

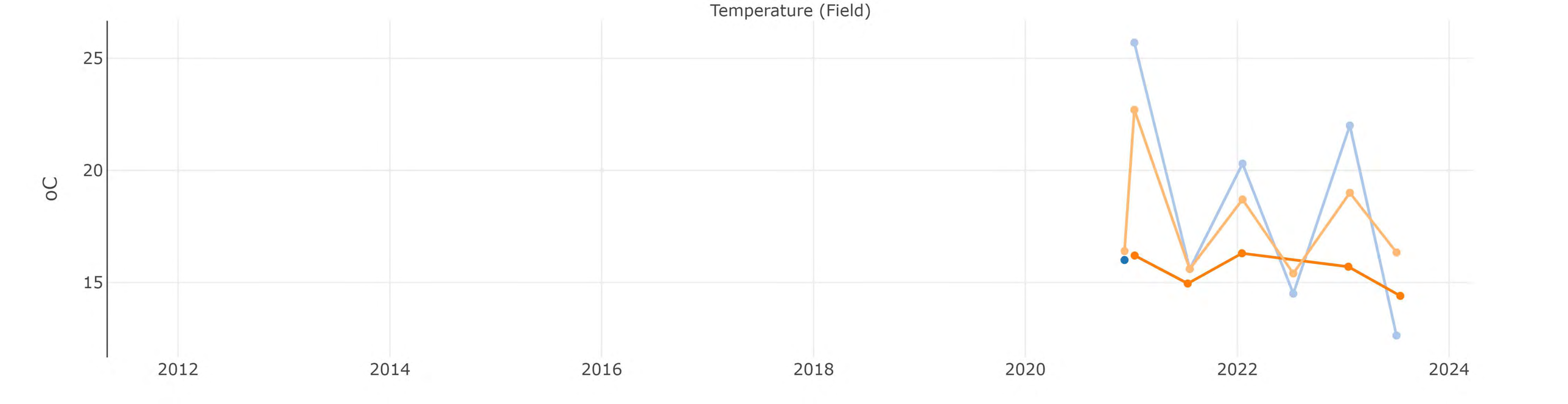

pH (Lab)
7
6
5
4
2012
2014
2016
2018
2020
2022
2024

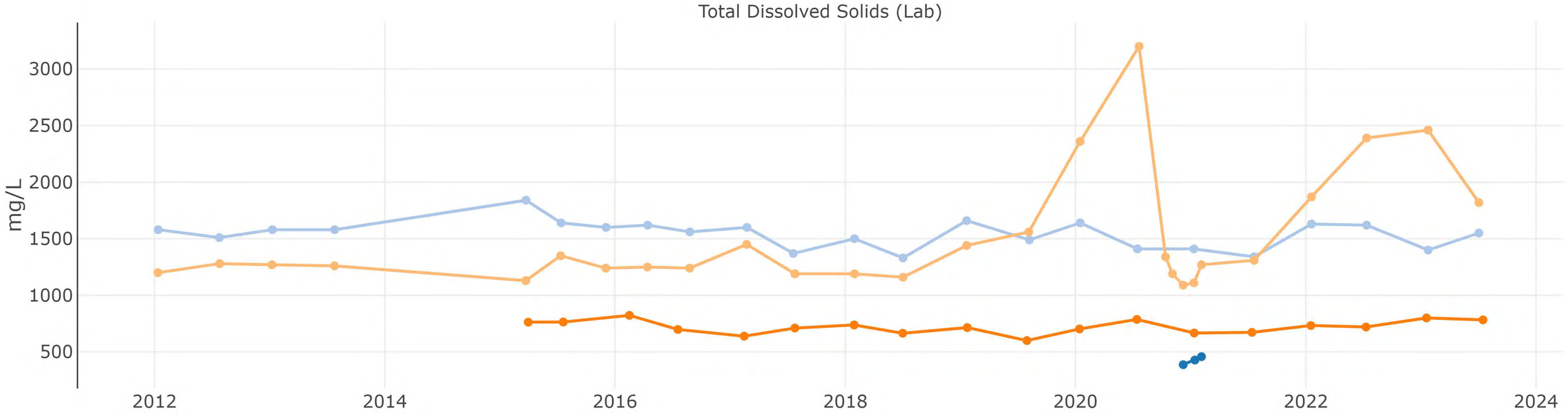

Potassium
mg/L
60
50
40
30
20
2012
2014
2016
2018
2020
2022
2024


Sodium
mg/L
800
600
400
200
2012
2014
2016
2018
2020
2022
2024

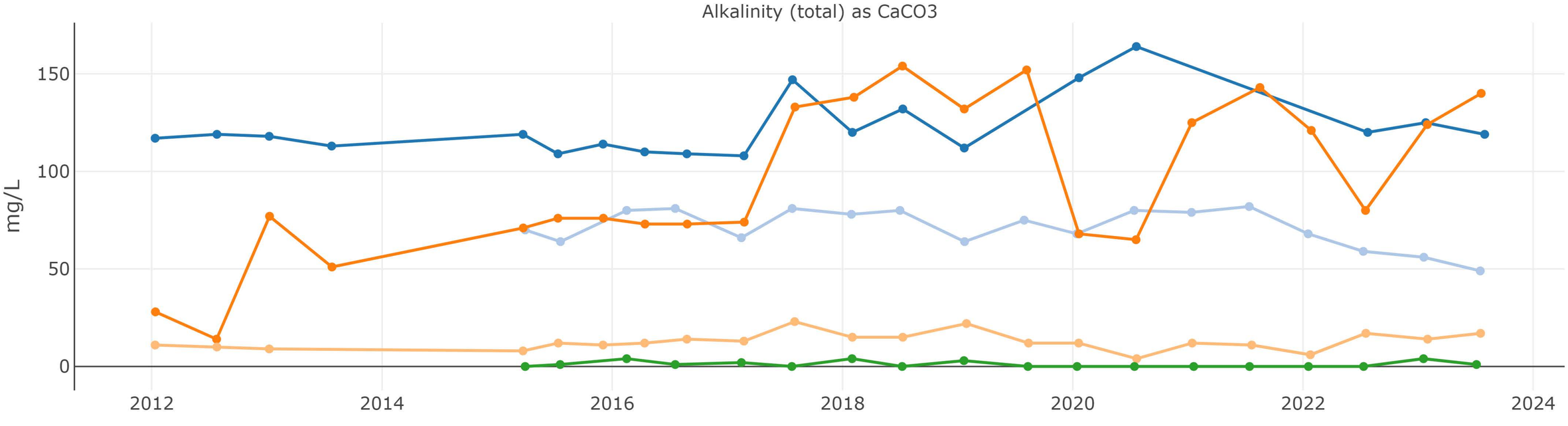

Sulfate as SO4 - Turbidimetric
mg/L
300
200
100
0
2012
2014
2016
2018
2020
2022
2024

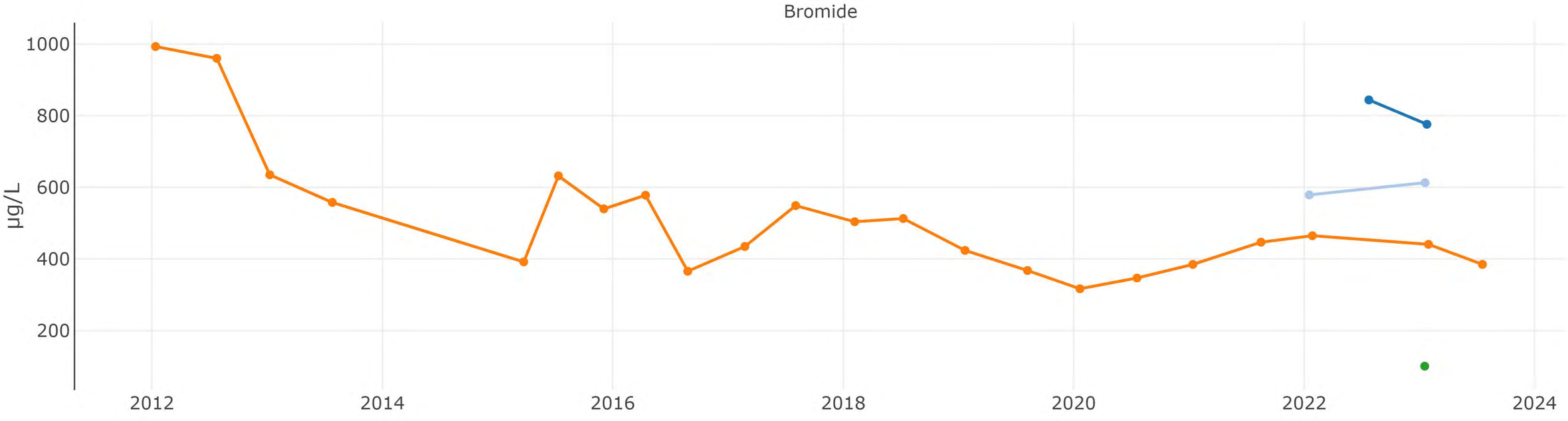

Sulphate
150
100
50
mg/L
2012
2014
2016
2018
2020
2022
2024

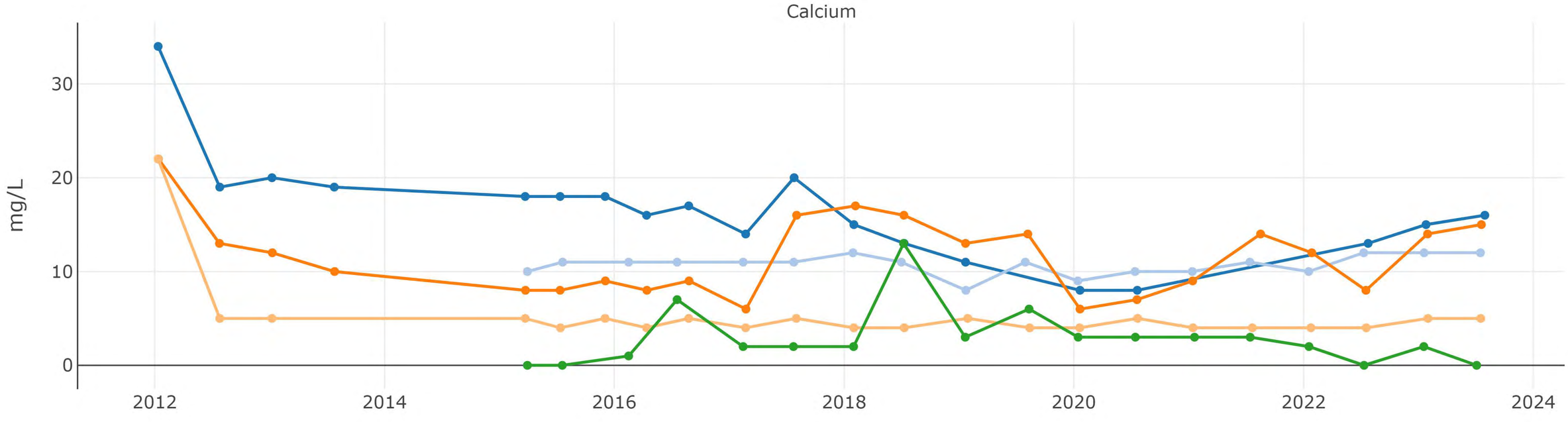

Temperature (Field)
oC
25
20
15
2012
2014
2016
2018
2020
2022
2024

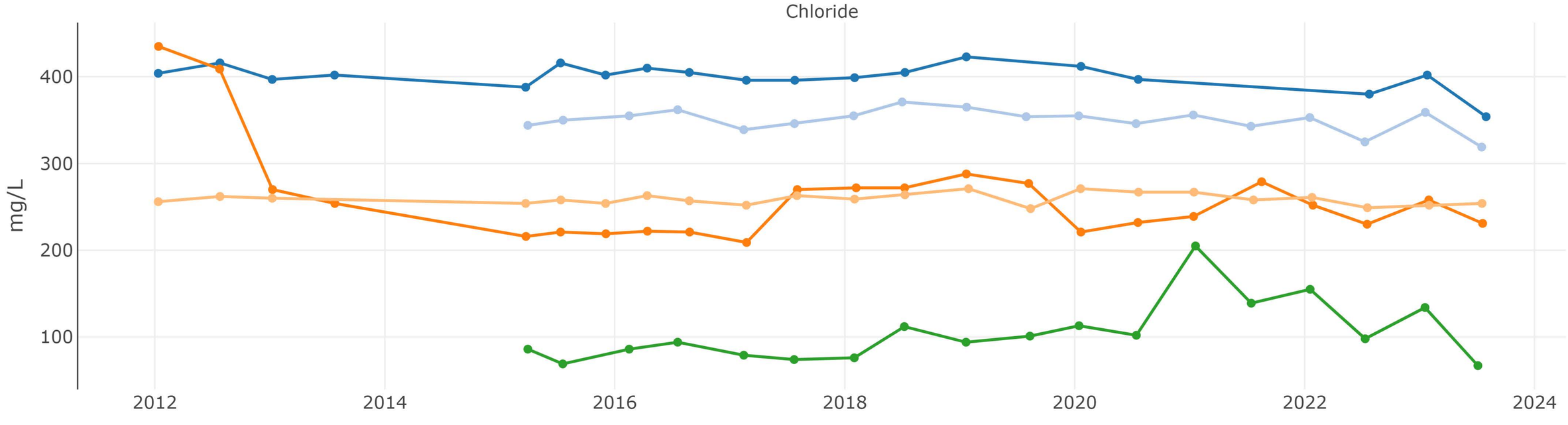

Total Dissolved Solids (Lab)
mg/L
3000
2500
2000
1500
1000
500
2012
2014
2016
2018
2020
2022
2024

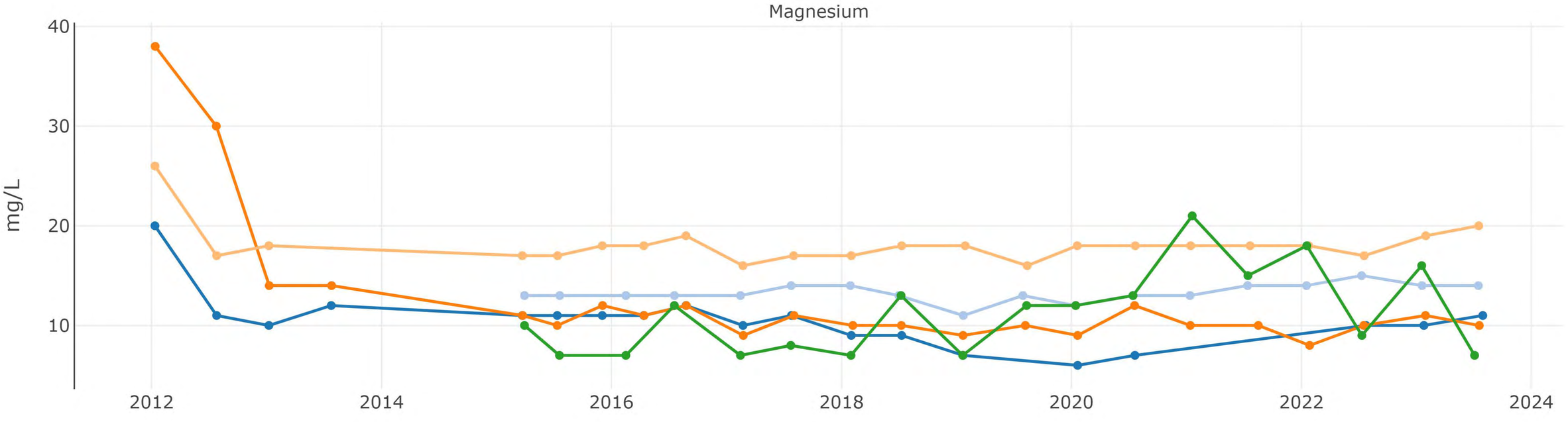
Chemistry Graph
119348
P12
P14
P15
P16

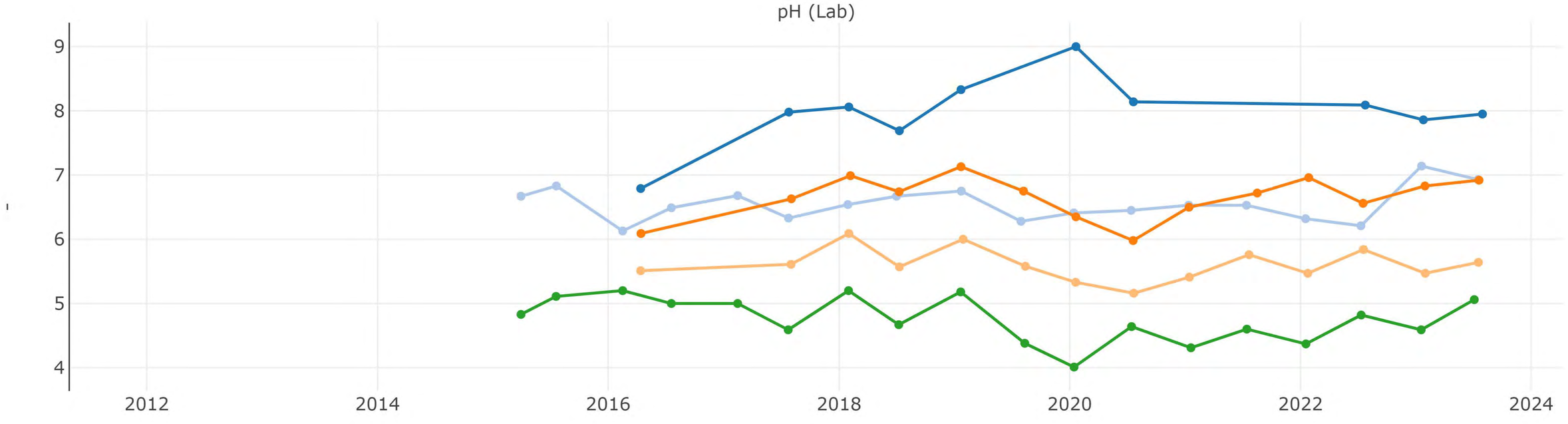

Alkalinity (total) as CaCO3
mg/L
150
100
50
0
2012
2014
2016
2018
2020
2022
2024

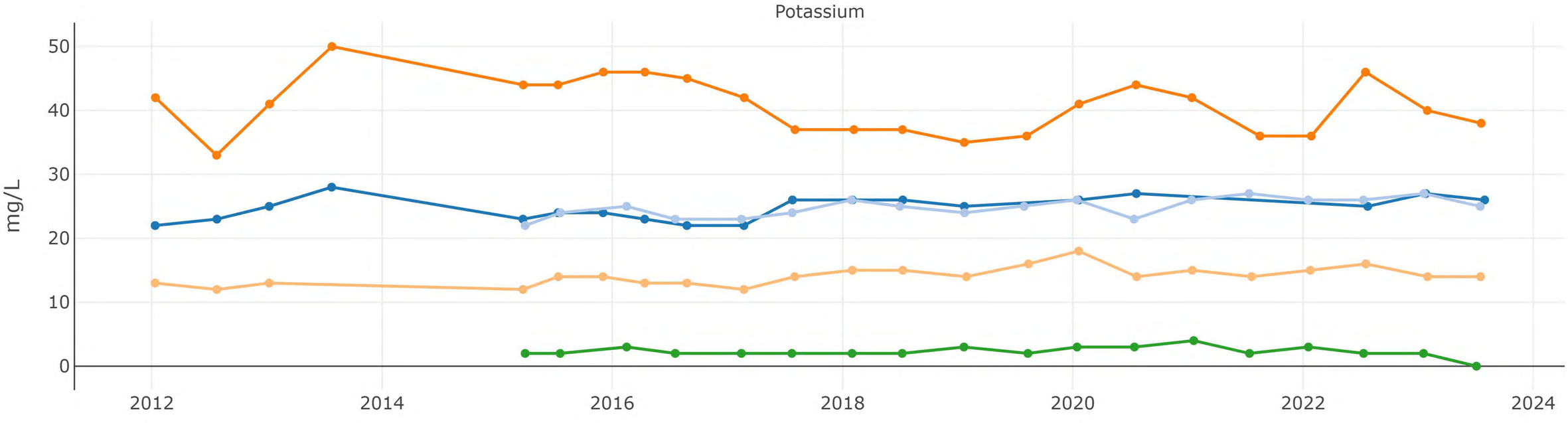

Bromide
µg/L
1000
800
600
400
200
2012
2014
2016
2018
2020
2022
2024

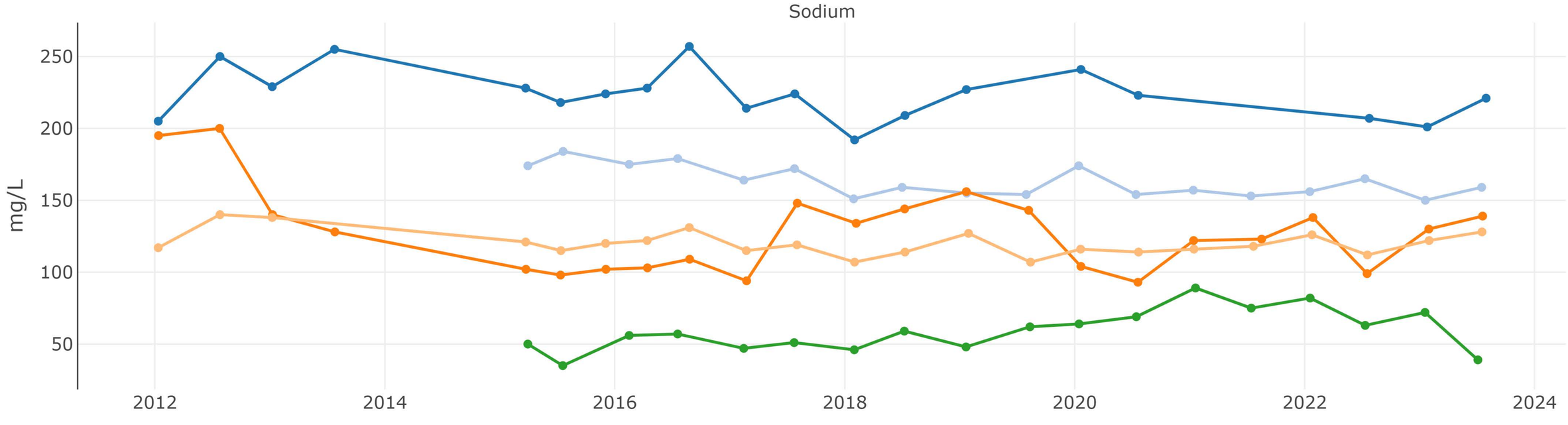

Calcium
mg/L
30
20
10
0
2012
2014
2016
2018
2020
2022
2024

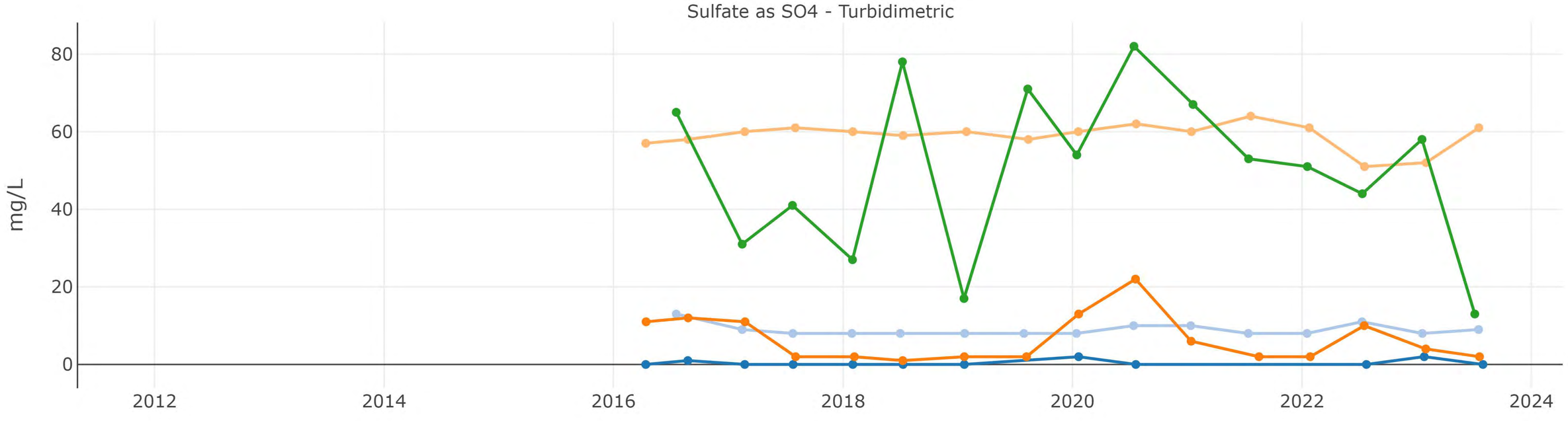

Chloride
mg/L
400
300
200
100
2012
2014
2016
2018
2020
2022
2024

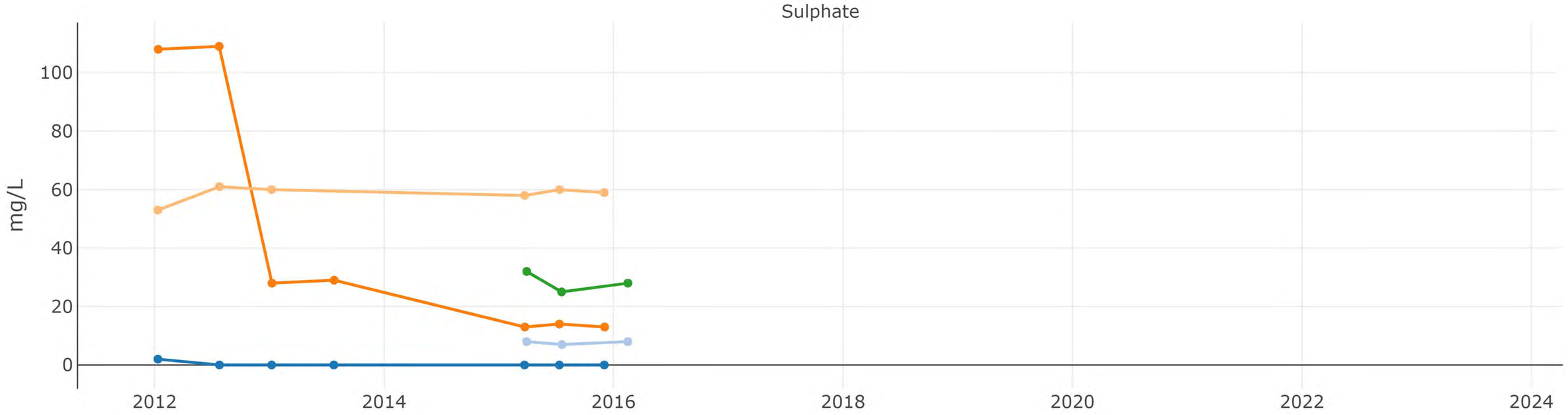

Magnesium
mg/L
40
30
20
10
2012
2014
2016
2018
2020
2022
2024

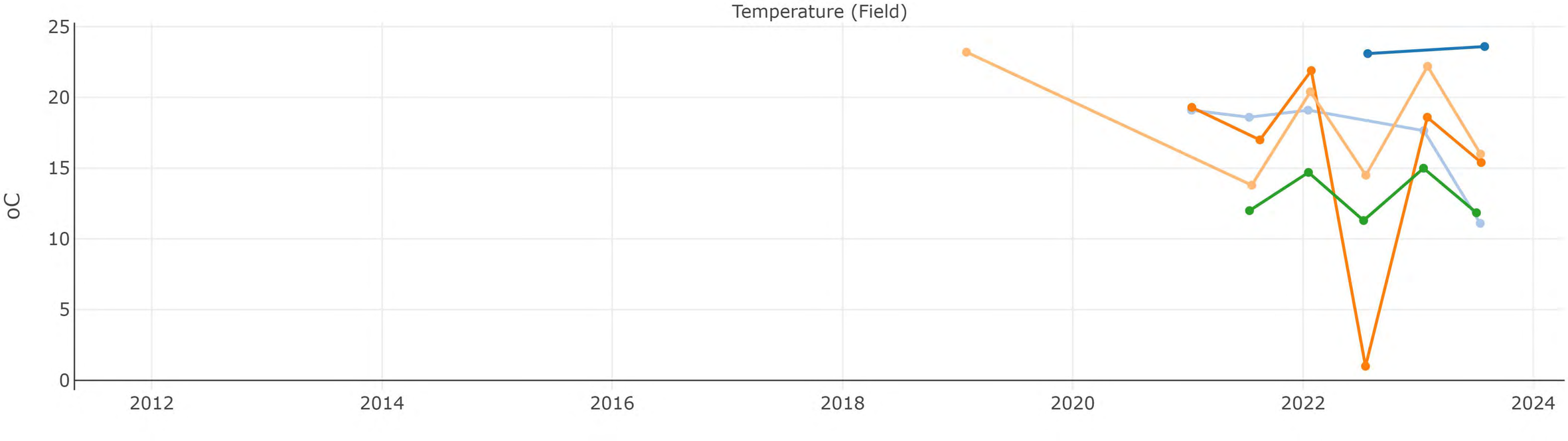

pH (Lab)
9
8
7
6
5
4
2012
2014
2016
2018
2020
2022
2024

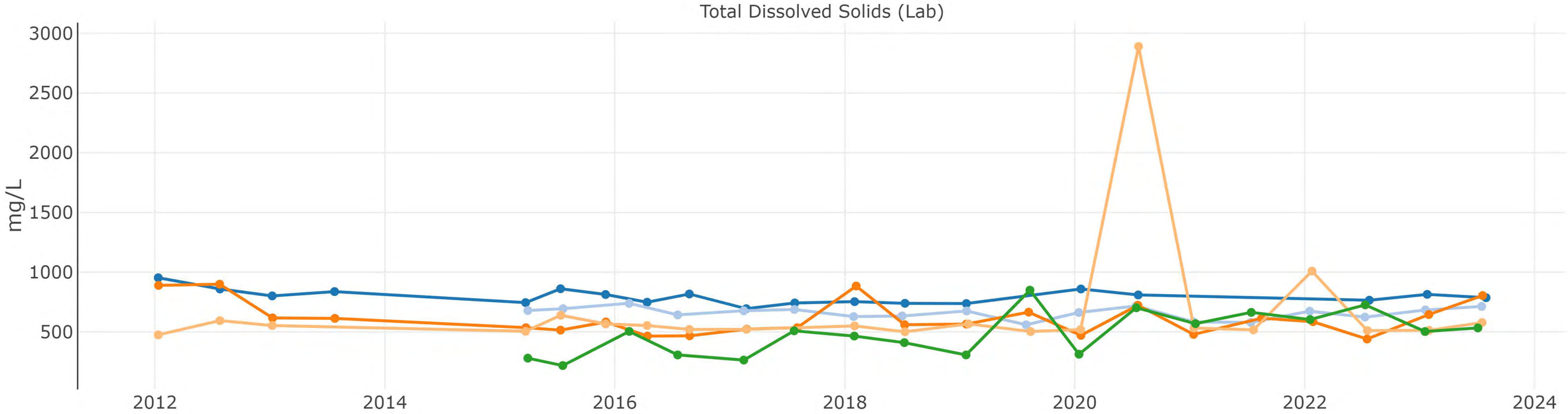

Potassium
mg/L
50
40
30
20
10
0
2012
2014
2016
2018
2020
2022
2024

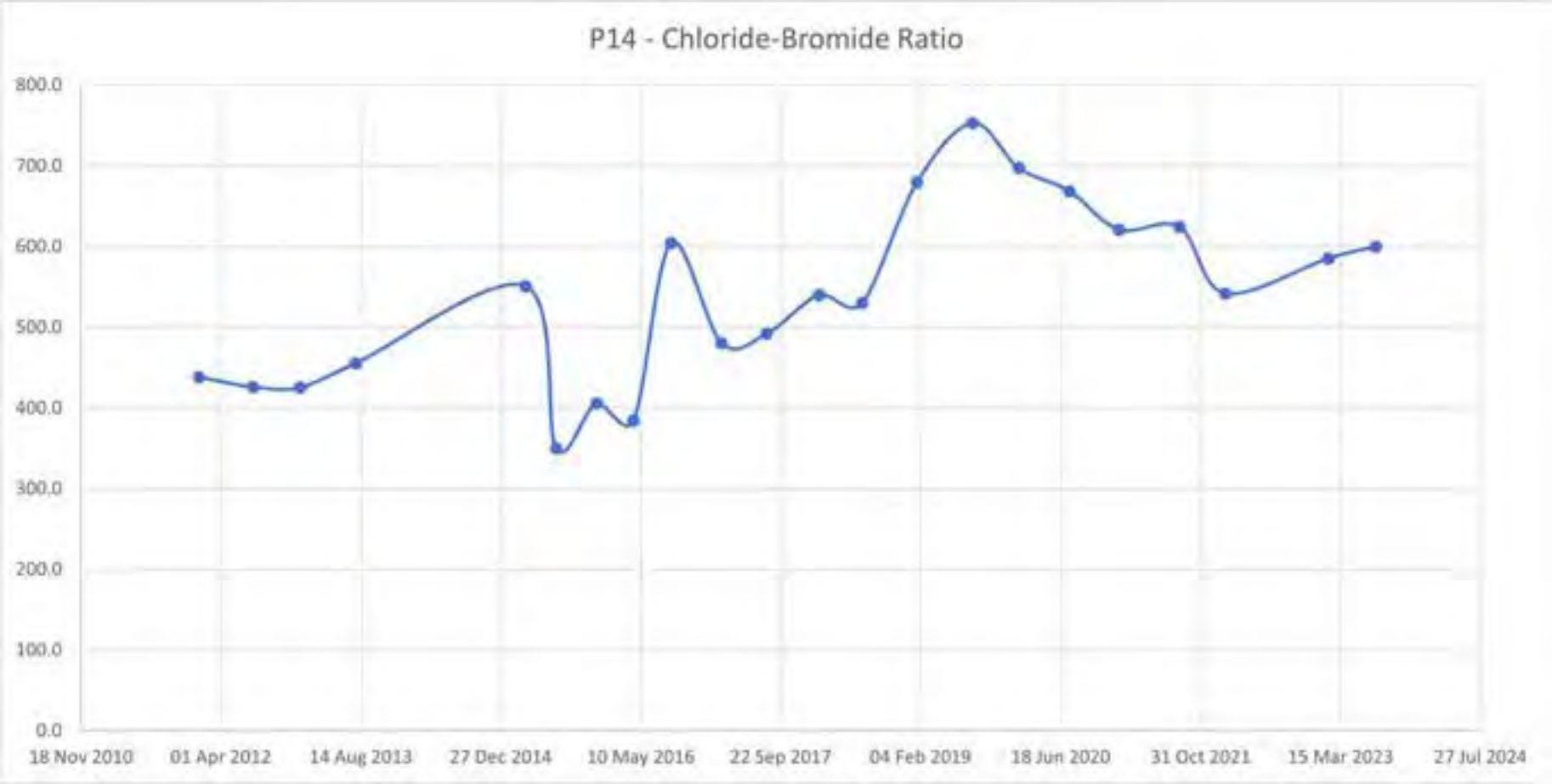

Sodium
mg/L
250
200
150
100
50
2012
2014
2016
2018
2020
2022
2024


Sulfate as SO4 - Turbidimetric
mg/L
80
60
40
20
0
2012
2014
2016
2018
2020
2022
2024


Sulphate
mg/L
100
80
60
40
20
0
2012
2014
2016
2018
2020
2022
2024

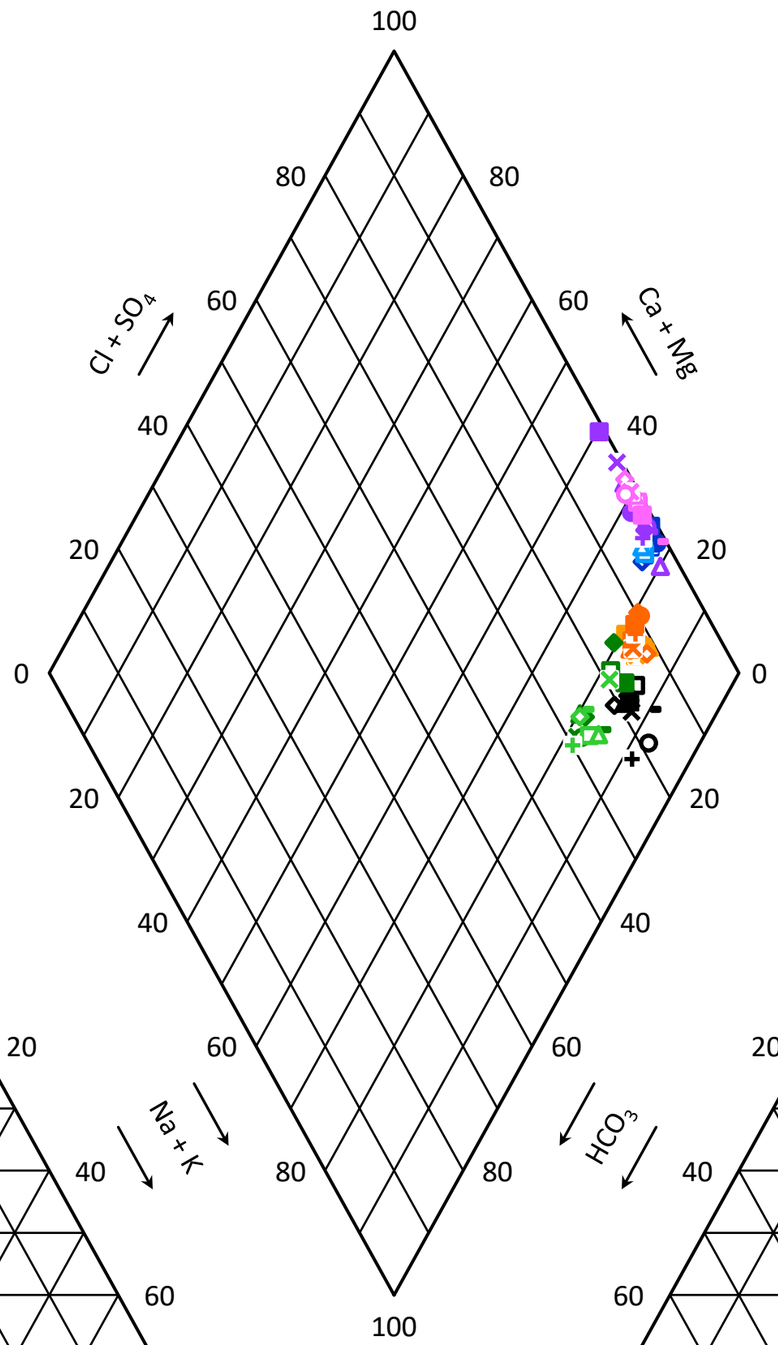

Temperature (Field)
oC
25
20
15
10
5
0
2012
2014
2016
2018
2020
2022
2024

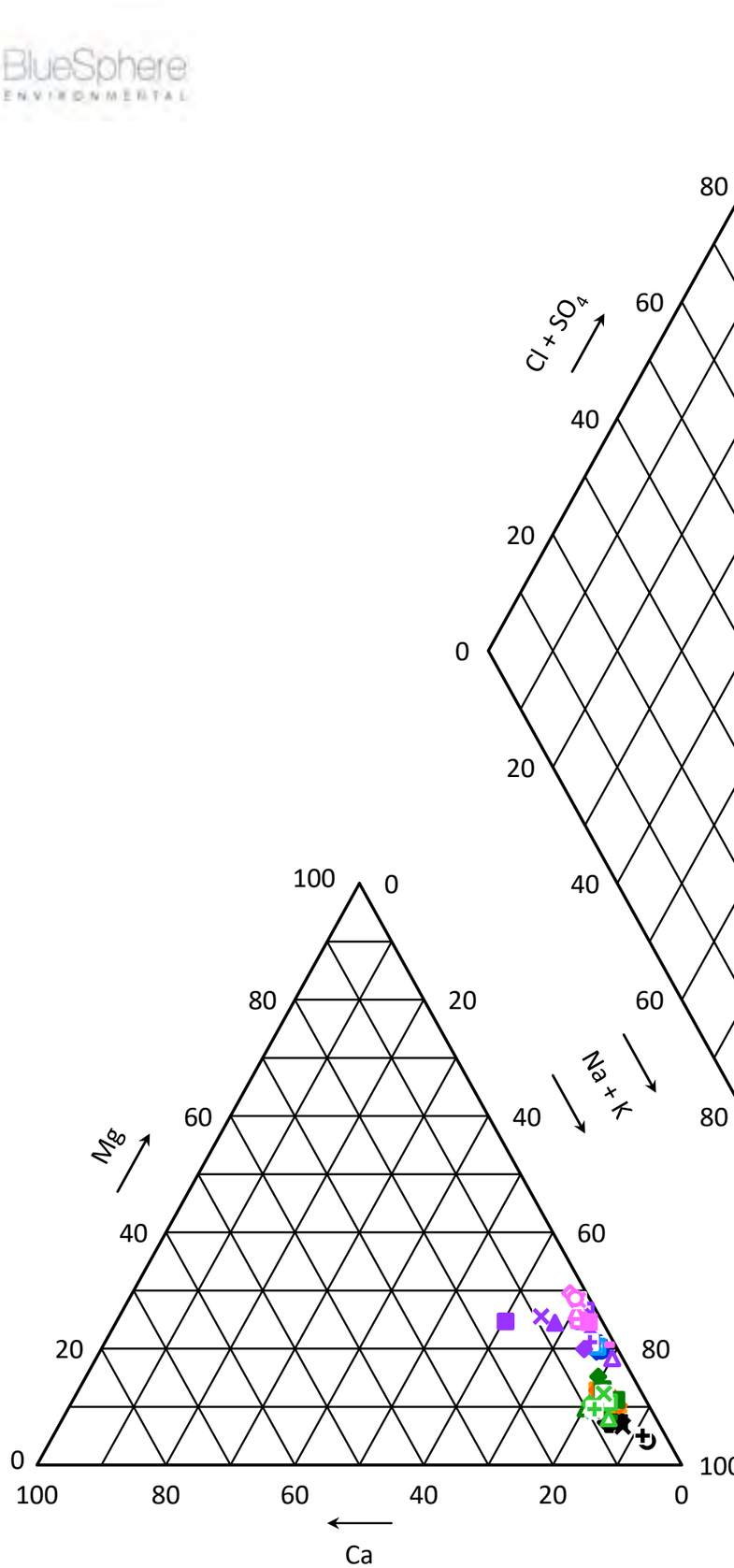

Total Dissolved Solids (Lab)
mg/L
3000
2500
2000
1500
1000
500
2012
2014
2016
2018
2020
2022
2024

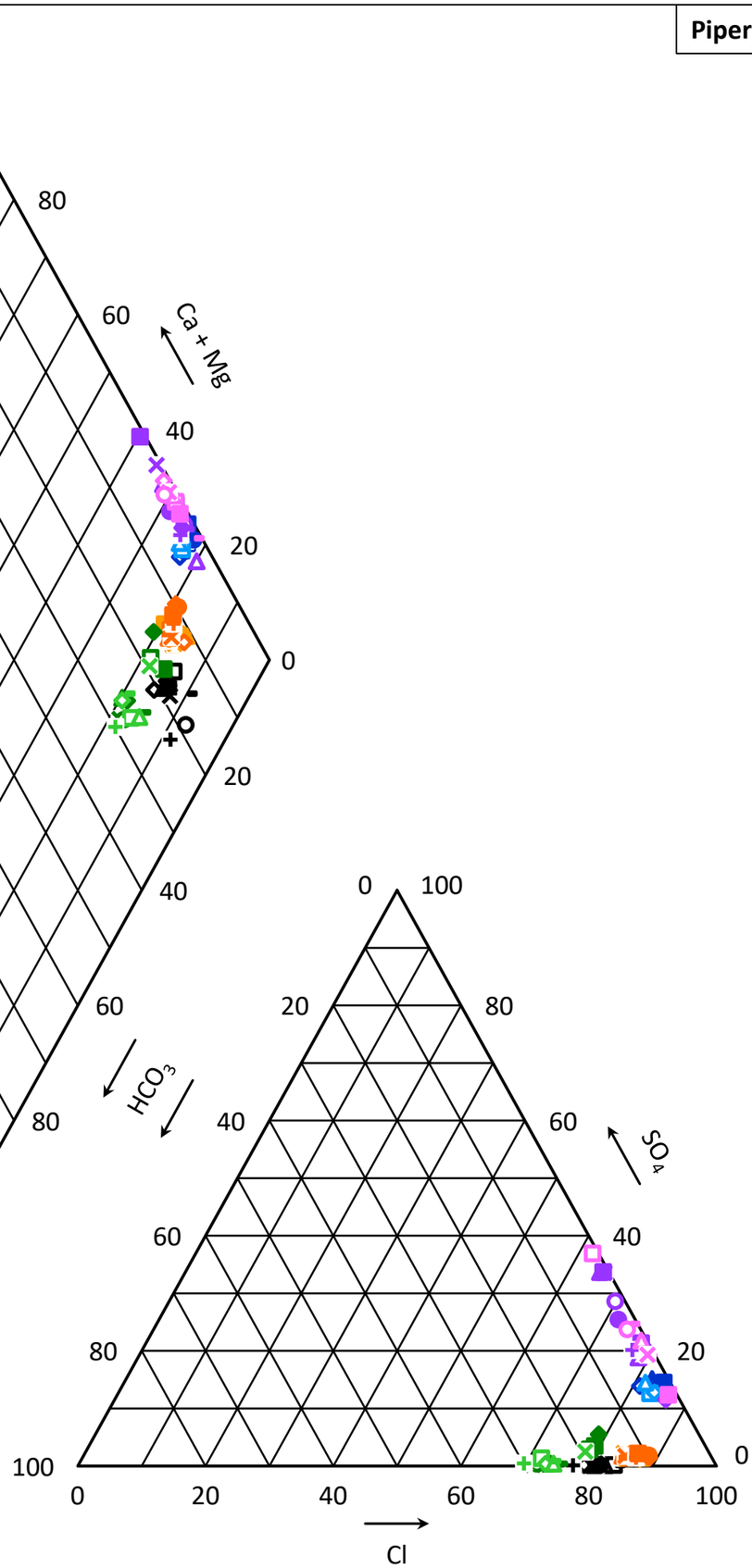

P14 - Chloride-Bromide Ratio
800.0
700.0
600.0
500.0
400.0
300.0
200.0
100.0
0.0
18 Nov 2010
01 Apr 2012
14 Aug 2013
27 Dec 2014
10 May 2016
22 Sep 2017
04 Feb 2019
18 Jun 2020
31 Oct 2021
15 Mar 2023
27 Jul 2024

Groundwater – Piper Plots

Piper plot of Groundwater - LEVF



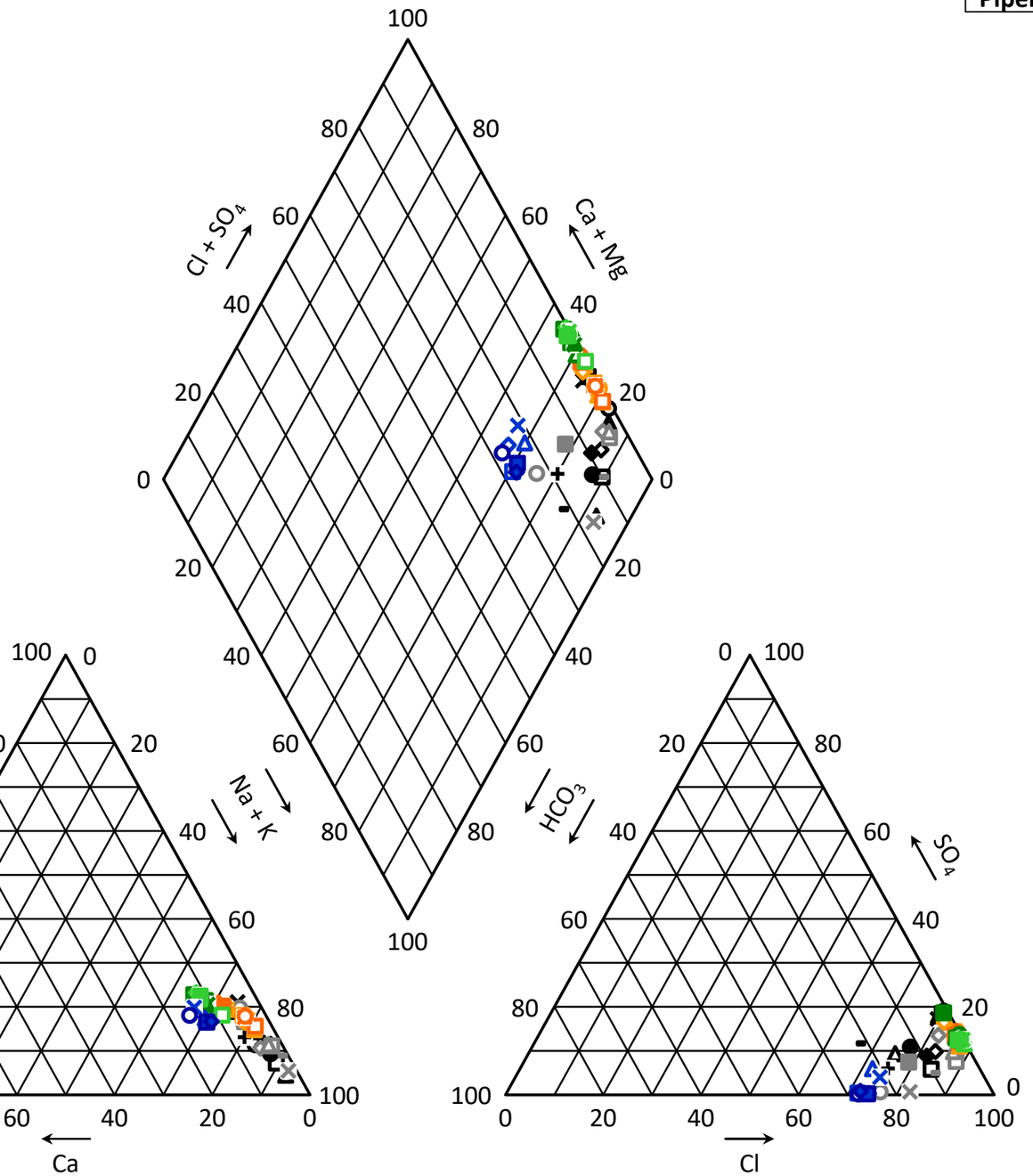




- 119348_Apr-16
- 119348_Jul-17
- 119348_Feb-18
- 119348_Jul-18
- 119348_Jan-19
- 119348_Jan-20
- 119348_Jul-20
- 119348_Jul-22
- 119348_Jan-23
- 119348_Jul-23
- P12_Mar-15
- P12_Jul-15
- P12_Feb-16
- P12_Jul-16
- P12_Feb-17
- P12_Jul-17
- P12_Jan-18
- P12_Jul-18
- P12_Jan-19
- P12_Jul-19
- P12_Jan-20
- P12_Jul-20
- P12_Jan-21
- P12_Jul-21
- P12_Jan-22
- P12_Jul-22
- P12_Jan-23
- P12_Jul-23
- P14_Apr-16
- P14_Aug-17
- P14_Feb-18
- P14_Jul-18
- P14_Jan-19
- P14_Aug-19
- P14_Jan-20
- P14_Jul-20
- P14_Jan-21
- P14_Aug-21
- P14_Jan-22
- P14_Jul-22
- P14_Jan-23
- P14_Jul-23
- P15_Apr-16
- P15_Aug-17
- P15_Feb-18
- P15_Jul-18
- P15_Jan-19
- P15_Aug-19
- P15_Jan-20
- P15_Jul-20
- P15_Jan-21
- P15_Jul-21
- P15_Jan-22
- P15_Jul-22
- P15_Jan-23
- P15_Jul-23
- P16_Mar-15
- P16_Jul-15
- P16_Feb-16
- P16_Jul-16
- P16_Feb-17
- P16_Jul-17
- P16_Jan-18
- P16_Jul-18
- P16_Jan-19
- P16_Aug-19
- P16_Jan-20
- P16_Jul-20
- P16_Jan-21
- P16_Jul-21
- P16_Jan-22
- P16_Jul-22
- P16_Jan-23
- P16_Jul-23

BlueSphere ENVIRONMENTAL

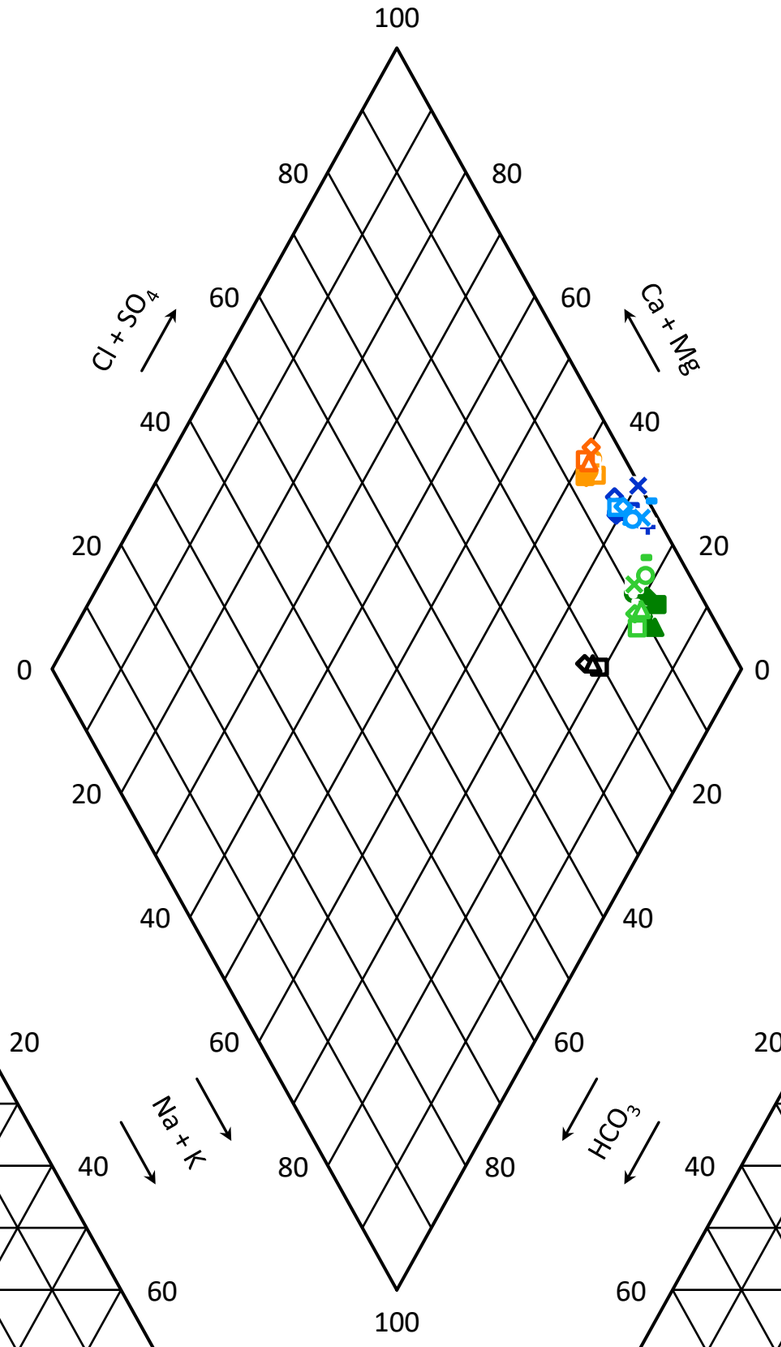
Piper plot of Groundwater - ASA

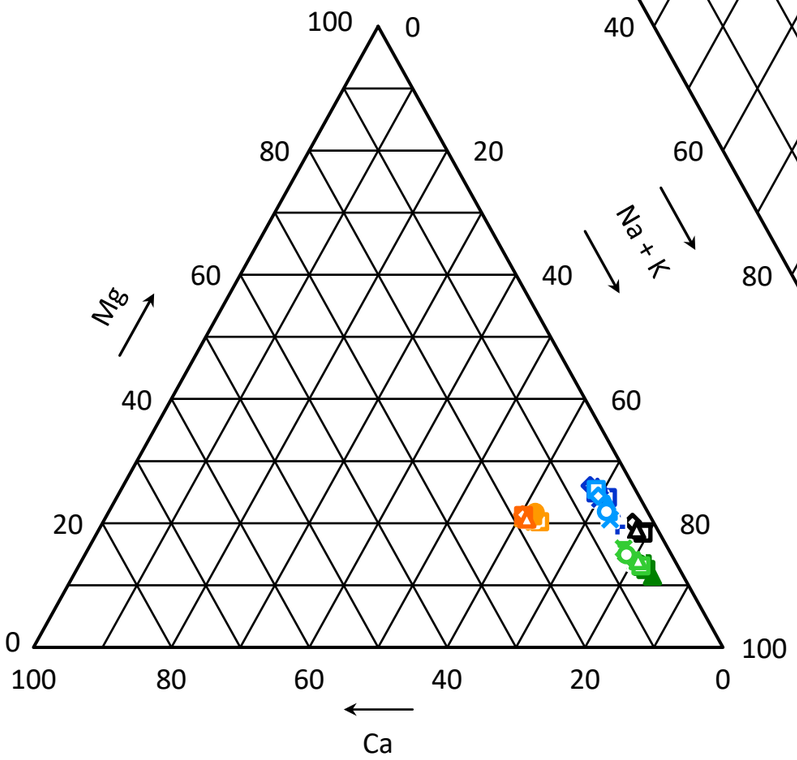


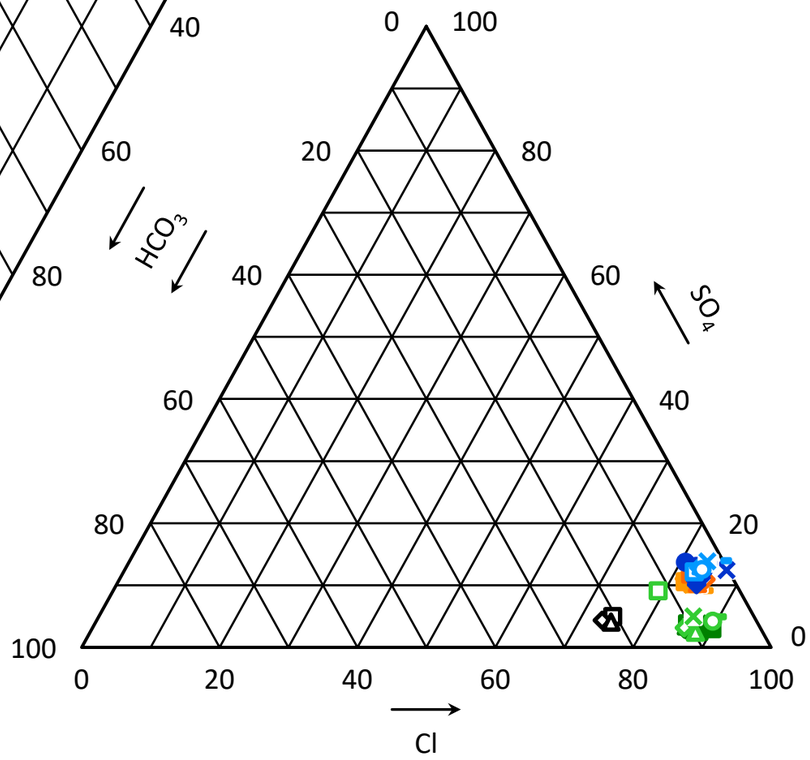
P1_Mar-15	P1_Jul-15
P1_Feb-16	P1_Jul-16
P1_Feb-17	P1_Jul-17
P1_Jan-18	P1_Jul-18
P1_Jan-19	P1_Aug-19
P1_Jan-20	P1_Jul-20
P1_Jan-21	P1_Jul-21
P1_Jan-22	P1_Jul-22
P1_Jan-23	P1_Jul-23
P7B_Apr-15	P7B_Jul-15
P7B_Feb-16	P7B_Jul-16
P7B_Feb-17	P7B_Jul-17
P7B_Jan-18	P7B_Jul-18
P7B_Jan-19	P7B_Jul-19
P7B_Jan-20	P7B_Jul-20
P7B_Jan-21	P7B_Jul-21
P7B_Jan-22	P7B_Jul-22
P7B_Jan-23	P7B_Jul-23
P8_Apr-15	P8_Jul-15
P8_Feb-16	P8_Jul-16
P8_Feb-17	P8_Jul-17
P8_Jan-18	P8_Jul-18
P8_Jan-19	P8_Jul-19
P8_Jan-20	P8_Jul-20
P8_Jan-21	P8_Jul-21
P8_Jan-22	P8_Jul-22
P8_Jan-23	P8_Jul-23
P17_Jan-10	P17_Jul-10
P17_Jan-11	P17_Jul-11
P17_Jan-12	P17_Jul-12
P17_Jan-13	P17_Jul-13

BlueSphere ENVIRONMENTAL

Piper plot of Groundwater - UEVF







- 116459_Dec-20
- 116459_Jan-21
- 116459_Feb-21
- NB2_Apr-16
- NB2_Jul-17
- NB2_Jan-18
- NB2_Jul-18
- NB2_Jan-19
- NB2_Aug-19
- NB2_Jan-20
- NB2_Jul-20
- NB2_Jan-21
- NB2_Jul-21
- NB2_Jan-22
- NB2_Jul-22
- NB2_Jan-23
- NB2_Jul-23
- P19_Jul-15
- P19_Feb-16
- P19_Jul-16
- P19_Feb-17
- P19_Jul-17
- P19_Jan-18
- P19_Jul-18
- P19_Jan-19
- P19_Jul-19
- P19_Jan-20
- P19_Jul-20
- P19_Jan-21
- P19_Jul-21
- P19_Jan-22
- P19_Jul-22
- P19_Jan-23
- P19_Jul-23
- SB2_Aug-16
- SB2_Jan-18
- SB2_Jul-18
- SB2_Jan-19
- SB2_Aug-19
- SB2_Jan-20
- SB2_Jul-20
- SB2_Oct-20
- SB2_Nov-20
- SB2_Dec-20
- SB2_Jan-21
- SB2_Feb-21
- SB2_Jul-21
- SB2_Jan-22
- SB2_Jul-22
- SB2_Jan-23
- SB2_Jul-23

Appendix C
Acid Sulfate Soil Attachments

Table C1 - Field and Analytical Results of Marshy Creek Soil Sampling Locations (after Wong et al. 2020).

	Depth				Field Parameters			Soluble Metals														Exchangeable				Organics		Acid Sulfate Soil Parameters						Particle Size		
Sample Location	Depth from (cm)	Depth from (m)	Depth to (cm)	Depth to (m)	Average depth (m)	EC (µS/cm)	pH	H+	Aluminium (mg/kg)	Arsenic (mg/kg)	Chromium (mg/kg)	Copper (mg/kg)	Iron (mg/kg)	Manganese (mg/kg)	Nickel (mg/kg)	Zinc (mg/kg)	Boron (mg/kg)	Cobalt (mg/kg)	Barium (mg/kg)	Calcium (mg/kg)	Magnesium (mg/kg)	Potassium (mg/kg)	Sodium (mg/kg)	Chloride (mg/kg)	Sulfur (mg/kg)	Calcium (cmol+/kg)	Magnesium (cmol+/kg)	Potassium (cmol+/kg)	Sodium (cmol+/kg)	Aluminium (cmol+/kg)	Organic Carbon (%)	Total Nitrogen (%)	Titratable Actual Acidity (mol H+/t)	Retained Acidity (mol H+/t)	Existing Acidity (mol H+/t)	Acid Volatile Sulfur (mol H+/t)	Chromium Reducible Sulfur (%-S) (mol H+/t)	Chromium Reducible Sulfur (%-S) (%S)	Potential Sulfidic Acidity (mol H+/t)	Acid Neutralising Capacity (mol H+/t)	Net Acidity (mol H+/t)	Clay (< 2um; %)	Silt (2-62.5 um; %)	Sand (62.5 - 2000um; %)
UPPER SWAMPLANDS TRIBUTARY																																						
MSC1	0	0	10	0.1	0.05	228	3.44	-0.54	28.43	0.022	0.042	0.049	18.05	1.087	0.677	2.179	0.430	0.493	0.188	11.81	63.3	44.90	232.9	235.8	99.3	0.31	1.69	0.33	1.00	3.13	11.00	0.49	98	-	98	3.1	8.0	0.0	11.1	-	110	30.8	69.2	0.0
MSC1	10	0.1	42	0.42	0.26	105.5	3.34	-0.52	3.179	0.004	0.012	0.032	3.968	0.491	0.133	0.348	0.200	0.088	0.119	5.52	25.99	20.49	94.2	94.9	53.5	0.17	0.73	0.19	0.45	1.80	2.91	0.11	51	-	51	0.0	1.4	0.0	1.4	-	53	10.9	33.6	55.5
MSC1	42	0.42	65	0.65	0.535	104.2	3.04	-0.48	1.583	0.002	0.006	0.030	7.53	0.416	0.183	0.525	0.144	0.139	0.081	5.66	25.49	14.38	79.0	76.9	54.3	0.13	0.58	0.13	0.36	1.11	0.89	0.04	39	-	39	7.4	7.3	0.0	14.7	-	54	8.7	21.9	69.4
MSC2	0	0	18	0.18	0.09	57.6	3.42	-0.53	7.10	0.008	0.036	0.037	8.54	0.242	0.027	0.142	0.223	0.018	0.133	8.21	12.87	8.02	56.7	48.31	15.10	0.48	1.01	0.18	0.35	3.16	3.07	0.16	89	-	89	0.0	0.0	0.0	0.0	-	89	29.0	71.0	0.0
MSC2	18	0.18	28	0.28	0.23	46.4	3.57	-0.55	6.87	0.005	0.048	0.011	9.61	0.019	0.007	0.099	0.136	0.007	0.052	2.876	4.329	2.273	66.5	32.94	9.20	0.49	1.30	<0.12	0.41	2.84	1.87	0.14	87	-	87	0.0	0.0	0.0	0.0	-	87	27.2	72.8	0.0
MSC2	28	0.28	40	0.4	0.34	49.2	3.64	-0.56	5.90	0.006	0.026	0.009	7.04	0.029	0.005	0.009	0.141	0.006	0.045	3.891	6.41	1.729	67.4	44.40	11.94	1.10	2.18	0.20	0.70	2.83	4.35	0.21	99	-	99	0.0	0.0	0.0	0.0	-	99	20.2	79.5	0.3
MSC2	40	0.4	65	0.65	0.525	34.2	3.96	-0.60	8.31	0.004	0.036	0.008	6.70	0.018	0.006	0.005	0.096	0.004	0.056	2.605	5.67	0.910	49.59	24.22	5.59	0.46	1.36	<0.12	0.33	1.27	1.31	0.07	36	-	36	0.0	5.1	0.0	5.1	-	41	13.4	68.1	18.5
MSC3	0	0	20	0.2	0.1	66.8	3.54	-0.55	4.743	0.004	0.014	0.055	13.39	3.581	1.391	0.123	0.417	0.199	0.154	0.125	3.522	12.89	15.67	65.8	55.1	33.55	0.17	0.68	0.17	0.32	1.53	0.87	0.05	34	-	34	7.1	8.2	0.0	15.3	-	49	17.2	51.1	31.7
MSC3	20	0.2	60	0.6	0.4	123.2	3.87	-0.59	2.608	0.001	0.004	0.027	1.137	3.543	0.060	0.106	0.223	0.172	0.050	2.427	15.84	7.43	151.5	73.8	76.9	0.33	3.45	0.23	1.01	0.35	1.53	0.08	20	-	20	1.0	0.0	0.0	1.0	-	21	45.5	54.5	0.0
UPPER SWAMPLANDS																																						
MSC4	0	0	14	0.14	0.07	686	3.33	-0.52	20.87	0.018	0.040	0.059	4.461	8.68	0.411	0.975	0.464	0.616	0.220	21.29	154.1	64.9	867	1090	294.5	0.54	3.75	0.63	5.24	7.96	19.80	0.83	217	-	217	0.0	0.0	0.0	0.0	-	217	7.7	25.7	66.6
MSC4	14	0.14	30	0.3	0.22	713	3.46	-0.54	13.90	0.017	0.029	0.051	2.735	1.203	0.383	0.893	0.394	0.347	0.172	18.17	144.6	41.78	943	1181	266.9	0.27	2.19	0.44	5.28	6.23	18.30	0.82	202	-	202	0.0	0.0	0.0	0.0	-	202	24.4	75.6	0.0
MSC4	30	0.3	40	0.4	0.35	606	3.34	-0.52	11.20	0.011	0.036	0.030	4.397	0.596	0.266	0.669	0.392	0.222	0.154	14.36	114.8	22.33	805	897	224.7	0.34	3.27	0.38	4.83	6.07	12.40	0.54	168	-	168	0.0	0.0	0.0	0.0	-	168	30.5	69.5	0.0
MSC4	40	0.4	65	0.65	0.525	407	3.03	-0.48	2.023	0.003	0.025	0.020	3.108	0.284	0.081	0.295	0.288	0.099	0.108	8.95	62.4	11.16	495.2	477.8	192.1	0.32	3.64	0.34	3.24	4.01	2.52	0.12	100	-	100	0.0	0.0	0.0	0.0	-	100	15.0	82.3	2.7
MSC4	65	0.65	85	0.85	0.75	375	2.99	-0.48	1.480	0.003	0.014	0.018	1.755	0.398	0.073	0.141	0.156	0.121	0.102	10.86	64.2	10.29	444.3	512	154.0	0.32	2.86	0.27	2.56	2.85	1.29	0.07	73	-	73	1.0	0.0	0.0	1.0	-	74	14.0	85.2	0.8
MSC5	0	0	35	0.35	0.175	408	2.2	-0.34	121.0	0.066	0.103	0.086	136.1	1.801	0.892	2.177	0.775	0.816	0.237	23.75	264.3	98.4	1128	1854	419.9	0.19	2.68	0.42	5.42	11.23	30.70	1.23	379	-	379	0.0	0.0	0.0	0.0	-	379	14.0	83.2	2.8
MSC5	35	0.35	65	0.65	0.5	940	2.39	-0.38	64.1	0.022	0.041	0.038	22.32	0.774	0.715	1.009	0.226	0.689	0.154	11.77	201.7	19.18	1077	1511	381.4	0.09	1.71	0.15	4.63	7.10	10.70	0.44	147	-	147	0.0	0.0	0.0	0.0	-	147	20.8	78.1	1.1
MSC5	65	0.65	85	0.85	0.75	392	2.51	-0.42	27.21	0.006	0.023	0.028	16.15	0.455	0.260	0.659	0.121	0.292	0.181	8.61	85.7	6.42	388.5	486.8	187.6	0.08	0.79	<0.12	1.65	2.43	1.76	0.06	43	-	43	13.2	13.6	0.0	26.8	-	69	25.7	74.3	0.0
MSC6	0	0	32	0.32	0.16	651	2.51	-0.40	113.1	0.026	0.054	0.031	82.9	3.242	0.863	2.436	0.910	0.588	0.448	40.43	430.8	110.7	2466	3725	509	0.29	4.30	0.42	13.24	11.23	30.80	1.42	368	-	368	0.0	0.0	0.0	0.0	-	368	23.8	76.2	0.0
MSC6	32	0.32	53	0.53	0.425	633	2.32	-0.37	141.9	0.014	0.047	0.027	198.6	7.30	1.283	3.238	0.692	0.969	0.466	65.2	532	52.2	3067	4747	781	0.71	6.87	0.18	8.53	5.17	32.90	1.57	296	-	296	0.0	0.0	0.0	0.0	-	296	13.3	53.3	33.4
MSC6	53	0.53	100	1	0.765	271.1	2.92	-0.47	47.73	0.016	0.027	0.022	114.8	16.49	1.126	2.970	1.138	2.251	0.574	219.2	761	34.87	2093	2928	1206	2.88	9.74	0.21	9.73	3.28	29.10	1.40	240	-	240	0.0	0.0	0.2	0.0	-	240	11.0	38.4	50.6
MSC6	100	1	130	1.3	1.15	1727	2.75	-0.44	85.2	0.456	0.034	0.001	375.2	18.02	3.466	3.841	1.266	8.63	0.413	494.4	1247	50.4	1458	1397	2803	1.10	5.25	<0.12	4.97	3.10	29.80	1.04	169	-	169	0.0	464.4	0.7	464.4	-	634	20.3	79.7	0.0
MSC7	0	0	24	0.24	0.12	771	2.64	-0.42	37.33	0.025	0.053	0.013	18.83	1.168	0.222	0.561	0.590	0.358	0.246	31.14	248.5	55.8	1230	1963	282.3	0.51	4.50	0.60	7.11	9.53	24.50	1.14	345	-	345	0.0	0.0	0.0	0.0	-	345	16.3	81.5	2.2
MSC7	24	0.24	60	0.6	0.42	765	2.03	-0.31	78.3	0.083	0.080	0.024	74.3	1.996	0.450	0.453	0.254	0.703	0.376	20.14	227.7	25.81	1341	1935	525	0.17	2.10	0.18	6.99	10.11	31.00	1.19	347	-	347	0.0	0.0	0.0	0.0	-	347	26.7	73.3	0.0
MSC7	60	0.6	82	0.82	0.71	940	2.1	-0.32	271.3	0.602	0.056	0.002	375.3	5.45	8.48	2.066	0.216	20.41	0.279	121.9	294.5	20.64	686	804	1355	0.23	1.03	<0.12	1.66	6.70	15.80	0.46	217	-	217	0.0	7.0	0.0	7.0	-	224	10.7	82.8	7.0
MSC7	82	0.82	95	0.95	0.885	399	3.28	-0.52	2.524	0.493	0.008	0.002	8.02	2.112	0.652	0.140	0.167	2.444	0.352	48.31	180.3	10.83	263.5	223.0	372.1	0.96	4.52	0.14	1.53	1.37	5.36	0.14	57	-	57	0.0	54.6	0.1	54.6	-	112	13.6	77.8	8.6
MSC8	0	0	28	0.28	0.14	648	2.63	-0.42	57.5	0.023	0.042	0.012	32.01	0.526	0.135	0.194	0.350	0.127	0.229	6.80	132.9	26.51	825	931	295.0	<0.05	2.10	<0.12	5.30	10.25	28.70	1.23	415	-	415	0.0	0.0	0.0	0.0	-	415	9.0	82.1	8.9
MSC8	28	0.28	85	0.85	0.565	835	2.87	-0.46	60.4	0.384	0.029	0.010	35.07	6.16	0.469	0.799	0.775	0.918	0.550	108.1	498.6	22.51	1073	1293	853	1.50	6.51	0.22	4.48	2.57	25.40	1.07	137	-	137	0.0	29.0	0.0	29.0	-	165	10.2	73.5	16.3
MSC8	85	0.85	130	1.3	1.075	121.5	3.74	-0.57	9.026	0.169	0.008	0.001	2.023	0.569	0.003	0.012	0.135	0.003	0.035	10.72	42.76	10.73	176.4	109.8	130.8	0.44	2.12	0.17	0.74	0.62	1.83	0.07	23	1	24	12.0	43.1	0.1	55.1	-	79	12.0	56.7	31.3
MSC9	0	0	25	0.25	0.125	786	3.7	-0.57	19.10	0.048	0.011	0.056	2.268	0.980	0.097	0.180	0.518	0.053	0.291	30.19	191.8	41.94	1114	1578	218.6	0.48	2.53	0.24	3.19	8.45	29.30	1.16	275	-	275	0.0	329.3	0.5	329.3	-	605	11.9	78.4	9.7
MSC9	25	0.25	50	0.5	0.375	416	3.27	-0.51	335.1	0.089	0.012	0.009	136.2	3.989	13.65	7.07	0.685	12.39	0.946	83.5	269.2	56.9	1343	1857	1024	0.30	1.39	0.18	2.94	11.08	33.10	1.13	291	-	291	0.0	6876.9	11.0	6876.9	-	7168	7.7	85.6	6.7
MSC9	50	0.5	75	0.75	0.625	846	3.49	-0.54	178.4	0.095	0.008	0.007	78.6	2.832	11.34	3.769	0.647	11.57	0.692	61.4	241.0	74.1	1455	2071	606	<0.05	0.36	0.29	3.54	10.99	35.20	1.18	260	-	260	0.6	1516.8	2.4	1517.5	-	1778	12.1	57.5	30.4
MSC9	75	0.75	120	1.2	0.975	781	3.54	-0.55	97.8	0.092	0.005	0.003	17.97	2.122	4.215	1.724	0.588	5.48	0.471	45.89	173.0	41.79	1095	1715	312.6	0.12	0.49	0.16	2.10	10.23	38.10	1.04	232	-	232	0.6	910.6	1.5	911.2	-	1143	9.9	66.9	23.2
MSC10	0	0	18	0.18	0.09	202.1	3.38	-0.59	20.21	0.005	0.013	0.004	20.35	2.851	0.148	0.363	0.674	0.064	0.252	133.5	84.0	1900	2977	400.5	1.47	4.00	0.42	10.37	7.00	34.00	1.07	283	-	283	0.0	92.3	0.1	92.3	-	375	3.6	36.4	60.0
MSC10	18	0.18	28	0.28	0.23	1474	3.92	-0.59	252.4	0.005	0.010	0.002	26.26	4.523	0.396	0.585	0.637	0.241	0.379	208.9	462.2	68.5	1976	2987	703	1.71	3.65	0.30	6.49	6.61	24.70	0.96	246	-	246	0.0	364.9	0.6	364.9	-	611	4.0	54.9	41.1
MSC10	28	0.28	55	0.55	0.415	2430	3.43	-0.54	721	0.087	0.021	0.001	490.9	13.53	21.34	13.28	0.741	8.79	0.549	628	688	77.5	2311	2926	2999	0.77	1.30	0.16	2.59	12.15	27.50	0.90	288	-	288	0.0	2902.1	4.7	2902.1	-	3190	7.6	77.6	14.8
MSC10	55	0.55	80	0.8	0.675	958	3.46	-0.54	486.9	0.023	0.037	0.023	107.4	11.72	21.68	8.18	0.610	11.72	0.574	534	608	74.0	2033	2531	2417	0.73	1.32	0.18	2.48	13.75	26.10	0.86	261	-	261	0.0	4626.6	7.4	4626.6	-	4888	23.1	74.7	2.2
MSC10	80	0.8	110	1.1	0.95	951	3.37	-0.53	74.9	0.064	0.013	0.004	0.003	837	1.19	57.0	25.58	0.363	0.646	0.461	45.5	586	79.0	2321	2922	3866	0.56	1.20	0.14	3.05	16.91	26.50	0.79	321	-	321	0.0	5847.4	9.4	5848.4	-	6176	35.3	64.7	0.0
MSC11	0	0	25	0.25	0.125	363	3.59	-0.56	40.68	0.013	0.023	0.021	70.4	1.142	0.107	0.273	0.245	0.048	0.089	10.25	39.48	98.1	380.7	514	126.8	0.65	1.65	1.00	2.79	9.68	27.40	1.19	386	-	386	0.0	189.6	0.3	189.6	-	575	6.1	46.5	47.4
MSC11	25	0.25	50	0.5	0.375	331	3.57	-0.55	32.99	0.073	0.016	0.010	4.995	0.296	0.090	0.217	0.268	0.030	0.181	7.17	48.82	47.41	467.6	664	134.7	0.22	1.08	0.39	2.94	13.79	31.40	1.39	359	-	359	0.0	102.3	0.2	102.3	-	461	17.3	76.3	6.4
MSC11	50	0.5	83	0.83	0.665	438	3.66	-0.56	74.9	0.064	0.016	0.006	32.73	0.746	0.315	0.728	0.282	0.080	0.480	0.443	5.76	17.45	4.160	86.4	93.0	152.1	0.06	0.15	<0.12	0.47	4.47	3.41	0.13	55	6	62	0.0	381.1	0.6	381.1	-	443	28.5	71.5	0.0
MSC11	104	1.04	129	1.29	1.165	53	4.17	-0.62	3.992	0.033	0.006	0.002	2.156	0.033	0.060	0.047	0.081	0.049	0.327	3.165	8.08	2.801	59.7	84.9	28.26	<0.05	0.10	<0.12	0.34	1.94	1.28	0.07	37	-	37	0.0	44.3	0.1	44.3	-	81	12.9	79.5	7.6
MID SWAMPLANDS TRIBUTARY																																						
MSC12	0	0	16	0.16	0.08	41.1	3.86	-0.59	34.99	0.006	0.020	0.038	41.80	2.764	0.034	0.166	0.459	0.016	0.208	50.3	43.50	107.3	110.6	330.7	19.00	2.32	1.69	0.55	0.65	3.40	16.80	0.50	96	-	96	0.0	7.5	0.0	7.5	-	103	11.8	69.7	18.5
MSC12	16	0.16	40	0.4	0.28	100.1	3.94	-0.60	14.57	0.004	0.016	0.018	14.36	0.305	0.023	0.065	0.158	0.007	0.095	9.38	13.02	19.61	83.8	90.5	34.39	0.74	0.68	0.25	0.50	2.57	5.05	0.16	79	-	79	0.0	7.5	0.0	7.5	-	87	5.4	31.6	63.0
MSC12	40	0.4	66	0.66	0.53	112.4	3.58	-0.55	8.633	0.001	0.004	0.006	7.499	0.063	0.010	0.031	0.173	0.003	0.023	7.85	12.84	7.62	85.7	90.6	48.69	0.28	0.57	0.18	0.48	1.89	1.10	0.06	55	-	55	0.0	5.6	0.0	5.6	-	60	7.2	27.3	65.5
MSC13	0	0	5	0.05	0.025	75	3.74	-0.57	7.16	0.020	0.037	0.020	7.68	0.239	0.015	0.056	0.448	0.011	0.274	19.96	15.17	25.69	54.7	43.93	30.57	1.54	1.39	0.30	0.34	1.08	3.03	0.16	40	-	40	6.8	10.8	0.0	17.6	-	58	11.2	46.7	42.1
MSC13	5	0.05	21	0.21	0.13	30	4.24	-0.63	5.31	0.014	0.024	0.025	7.11	0.025	0.008	0.014	0.150	0.003	0.115	3.593	4.044	4.681	45.02	35.34	2.422	2.80	0.95	0.13	0.28	0.37	0.55	0.03	13	-	13	1.7	3.5	0.0	5.2	-	18	14.2	51.6	34.2
MSC13	21	0.21	45	0.45	0.33	114.7	4.31	-0.63	46.69	0.028	0.110	0.048	20.61	0.048	0.024	0.003	0.475	0.017	0.311	6.45	7.99	7.99	178.5	140.1	64.8	0.62	4.82	0.40	1.80	0.75	0.68	0.03	25	-	25	4.9	8.2	0.0	13.1	-	38	18.0	38.0	44.0
MSC13	45	0.45	50	0.5	0.475	139.5	4.01	-0.60	0.177	0.001	0.001	0.003	0.308	0.002	0.001	0.010	0.374	0.001	0.007	0.729	3.924	2.112	191.6	63.1	105.9	0.46	4.50	0.27	1.90	0.63	0.49	<0.02	24	-	24	13.0	14.0	0.0	27.0	-	51	17.8	54.0	28.2
MSC14	0	0	35	0.35	0.175	1046	2.27	-0.36	55.7	0.049	0.038	0.019	44.81	1.259	0.083	0.605	0.492	0.056	0.132	63.1	188.1	80.9	1290	2014	235.0	0.77	2.38	0.53	6.65	1.89	21.70	0.52	234	-	234	0.0	0.0	0.0	0.0	-	234	6.0	32.8	61.2
MSC14	35	0.35	60	0.6	0.475	2018	2.82	-0.45	2.382	0.004	0.005	0.013	4.047	0.125	0.013	0.053	0.080	0.006	0.026	10.31	23.60	7.02	208.4	299.1	34.31	0.12	0.25	<0.12	0.92	0.19	1.42	<0.02	18	-	18	9.8	7.1	0.0	16.9	-	34	10.2	43.0	46.8
MSC14	60	0.6	83	0.83	0.715	1315	2.95	-0.47	1.494	0.004	0.007	0.026	2.088	0.178	0.013	0.077	0.075	0.007	0.024	11.33	16.66	10.18	119.4	200.2	29.12	0.10	0.14	<0.12	0.43	0.23	0.50	<0.02	7	-	7	10.0	16.4	0.0	26.4	-	34	12.1	43.7	44.2
MSC15	0	0	10	0.1	0.05	1451	2.64	-0.42	66.9	0.007	0.034	0.009	77.4	2.416	0.192	0.550	0.723	0.166	0.214	255.7	311.3	55.0	1750	2354	775	1.46	2.19	0.22	5.39	10.99	18.90	0.90	423	-	423	0.0	0.0	0.0	0.0	-	423	14.6	70.7	14.7
MSC15	10	0.1	55	0.55	0.325	480	2.71	-0.43	220.5	0.015	0.026	0.004	923	15.84	1.792	3.244	3.357	1.443	0.310	2179	1326	73.1	2702	3515	4859	4.56	4.87	0.19	5.97	2.20	29.50	1.10	213	-	213	0.0	0.0	0.0	0.0	-	213	3.2	15.3	81.5
MSC15	55	0.55	100	1	0.775	1684	3.09	-0.49	36.08	0.007	0.010	0.003	161.7	8.01	0.276	0.782	1.701	0.365	0.812	682	49.07	1482	1915	1844	2.15	2.35	0.13	2.52	1.15	19.00	0.73	159	-	159	0.0	3.5	0.0	3.5	-	162	5.4	23.6	71.0
MSC15	100	1	110	1.1	1.05	1280	3.19	-0.50	27.96	0.006	0.012	0.003	120.0	6.71	0.190	0.421	1.700	0.213	0.540	624	606	42.80	1146	1400	1592	5.73	7.28	0.27	7.05	0.60	15.60	0.55	157	-	157	0.0	11.9	0.0	11.9	-	169	51.1	48.9	0.0
MID SWAMPLANDS																																						
MSC16	0	0	15	0.15	0.075	622	2.97	-0.47	6.84	0.004	0.014	0.009	4.092	0.780	0.030	0.121	0.588	0.011	0.052	99.6	104.7	30.41	651	936	216.6	1.23	1.65	0.31	3.32	2.43	5.17	0.20	123	-	123	0.0	0.0	0.0	0.0	-	123	23.8	65.2	11.0
MSC16	15	0.15	35	0.35	0.25	435	2.94	-0.47	4.628	0.002	0.009	0.012	4.460	0.266	0.021	0.103	0.546	0.007	0.029	66.2	71.8	19.63	375.2	564	159.2	0.87	1.30	0.27	2.24	1.81	1.64	0.07	87	-	87	1.5	2.6	0.0	4.1	-	92	17.5	74.4	8.1
MSC16	35	0.35	64	0.64	0.495	179.1	3.53	-0.55	5.61	0.001	0.006	0.017	2.059	0.186	0.018	0.142	0.668	0.005	0.053	59.9	71.0	30.32	468.6	759	123.0	0.81	1.35	0.33	2.45	2.49	1.18	0.05	155	-	155	0.0	0.0	0.0	0.0	-	155	9.5	71.1	19.5
MSC17	0	0	46	0.46	0.23	333	2.97	-0.47	10.48	0.005	0.029	0.023	22.35	0.568	0.093	0.210	0.158	0.050	0.173	60.2	43.20	12.91	207.8	307.5	158.5	0.39	0.47	<0.12	1.23	0.71	1.47	0.04	53	-	53	0.0	0.0	0.0	0.0	-	53	29.6	70.4	0.0
MSC17	46	0.46	90	0.9	0.68	570	2.79	-0.45	10.58	0.003	0.011	0.011	23.99	0.862	0.053	0.192	0.347	0.021	0.206	110.0	110.2	23.47	685

Angiesea Borelield

Baseline Condition Report

Barwon Water

Table C2 - Field and Analytical Results of Salt Creek Soil Sampling Locations (after Wong et al. 2020).

Sample Location	Depth				Field Parameters			Soluble Metals													Exchangeable					Organics		Acid Sulfate Soil Parameters						Particle Size		
	Depth from (cm)	Depth from (m)	Depth to (cm)	Depth to (m)	Average depth (m)	EC (uS/cm)	pH	H+	Aluminium (mg/kg)	Arsenic (mg/kg)	Chromium (mg/kg)	Copper (mg/kg)	Iron (mg/kg)	Manganese (mg/kg)	Nickel (mg/kg)	Zinc (mg/kg)	Boron (mg/kg)	Cobalt (mg/kg)	Barium (mg/kg)	Calcium (mg/kg)	Magnesium (mg/kg)	Potassium (mg/kg)	Sodium (mg/kg)	Chloride (mg/kg)	Sulfur (mg/kg)	Calcium (cmol+/kg)	Magnesium (cmol+/kg)	Potassium (cmol+/kg)	Sodium (cmol+/kg)	Aluminium (cmol+/kg)	Organic Carbon (%)	Total Nitrogen (%)	Titratable Actual Acidity (mol H+/t)	Retained Acidity (mol H+/t)	Existing Acidity (mol H+/t)	Acid Volatile Sulfur (mol H+/t)	Chromium Reducible Sulfur (S_{CR}) (mol H+/t)	Potential Sulfidic Acidity (mol H+/t)	Acid Neutralising Capacity (mol H+/t)	Net Acidity (mol H+/t)	Clay (< 2um; %)	Silt (2-62.5 um; %)	Sand (62.5 - 2000um; %)
TRUBUTARY SITES																																					
STC1	0	0	18	0.18	0.09	60	4.44	-0.65	15.68	0.012	0.029	0.037	12.71	0.051	0.020	0.024	0.171	0.008	0.129	1.950	18.22	12.67	51.5	49.09	14.87	0.13	1.27	0.16	0.23	1.76	3.15	0.14	37	1	38	0.0	0.0	0.0	-	38.0	7.8	36.1	56.1
STC1	18	0.18	28	0.28	0.23	74.5	4.38	-0.66	16.68	0.015	0.038	0.022	21.75	0.049	0.024	0.039	0.183	0.009	0.112	2.129	21.94	13.25	61.5	48.38	18.09	0.16	1.90	0.21	0.38	2.56	5.84	0.28	71	2	73	0.0	0.0	0.0	-	72.9	12.9	75.5	11.6
STC1	28	0.28	52	0.52	0.4	72.1	4.34	-0.66	13.58	0.015	0.034	0.020	11.04	0.036	0.016	0.032	0.198	0.006	0.090	1.818	18.07	12.97	77.4	49.64	19.10	0.15	2.02	0.22	0.45	3.89	8.26	0.39	103	2	105	0.0	0.0	0.0	-	104.9	16.7	80.0	3.3
STC1	52	0.52	81	0.81	0.665	24.5	4.5	-0.65	7.60	0.008	0.023	0.013	3.655	0.004	0.004	0.009	0.098	0.001	0.036	0.357	3.582	3.226	30.77	27.48	2.000	0.05	0.89	0.14	0.19	1.26	2.34	0.07	35	0	35	7.7	9.2	16.9	-	52.0	9.9	62.0	28.1
STC1	81	0.81	117	1.17	0.99	31	4.45	-0.65	14.47	0.013	0.057	0.017	3.502	0.003	0.005	0.037	0.122	0.001	0.047	0.525	5.08	3.938	41.33	25.08	7.74	0.06	1.30	0.20	0.34	2.98	1.40	0.06	67	2	68	8.3	11.1	19.4	-	87.8	13.2	61.3	25.5
STC6	0	0	10	0.1	0.05	98.6	4.21	-0.62	20.74	0.014	0.047	0.027	0.030	5.65	0.358	0.079	0.220	0.138	0.072	0.176	1.779	22.08	34.63	98.0	53.1	37.21	0.30	2.34	0.47	0.68	4.83	14.00	0.67	164	4	168	0.0	0.0	0.0	-	168.4	17.6	81.4	1.0
STC6	10	0.1	29	0.29	0.195	70	4.51	-0.65	14.33	0.009	0.025	0.040	9.33	0.076	0.130	0.200	0.270	0.040	0.090	1.185	17.53	22.03	79.3	57.9	25.66	0.14	1.98	0.49	0.72	5.47	11.40	0.50	182	5	187	0.0	0.0	0.0	-	187.1	22.1	77.8	0.1
STC6	29	0.29	46	0.46	0.375	59.8	4.39	-0.66	8.76	0.009	0.023	0.033	6.20	0.055	0.092	0.079	0.266	0.024	0.050	0.980	13.51	14.83	66.5	42.87	24.45	0.07	0.99	0.25	0.40	4.49	8.78	0.39	146	6	152	0.0	0.0	0.0	-	152.1	15.9	83.7	0.4
STC6	46	0.46	59	0.59	0.525	60.7	4.37	-0.66	8.43	0.007	0.023	0.036	6.08	0.030	0.070	0.075	0.224	0.020	0.047	0.573	9.47	9.15	54.1	47.76	17.79	0.05	0.72	0.13	0.25	3.85	4.83	0.16	131	4	135	0.0	0.0	0.0	-	134.6	14.7	83.3	2.0
STC6	59	0.59	86	0.86	0.725	32.6	3.26	-0.51	5.66	0.007	0.016	0.031	4.500	0.011	0.040	0.057	0.174	0.015	0.063	0.326	5.50	6.88	44.26	24.30	12.17	0.29	1.42	0.21	0.37	0.28	1.55	0.07	68	2	69	3.5	4.4	7.8	-	77.3	16.5	83.5	0.0
STC18	0	0	30	0.3	0.15	272	3.03	-0.48	128.2	0.018	0.069	0.014	154.1	0.652	1.017	2.530	0.425	0.279	0.135	6.78	11.59	14.44	44.37	51.1	318.8	0.06	0.14	0.30	0.29	10.05	8.51	0.38	250	0	250	0.0	0.0	0.0	-	250.2	21.0	78.5	0.5
STC18	30	0.3	60	0.6	0.45	371	2.81	-0.45	135.6	0.030	0.130	0.018	242.6	0.770	1.427	3.382	0.437	0.352	0.126	7.55	14.19	19.65	64.9	78.3	429.4	0.09	0.14	0.27	0.42	10.52	15.70	0.53	326	0	326	0.0	18.7	18.7	-	344.7	16.5	81.3	2.2
STC18	60	0.6	95	0.95	0.775	338	2.83	-0.45	160.8	0.038	0.109	0.014	101.4	0.776	1.646	3.779	0.397	0.399	0.134	8.47	13.43	16.87	65.4	78.2	404.2	0.06	0.12	0.22	0.39	12.34	14.00	0.51	346	0	346	0.0	0.0	0.0	-	345.9	19.5	79.7	0.8
STC18	95	0.95	110	1.1	1.025	327	2.39	-0.37	134.2	0.042	0.093	0.019	70.2	0.671	1.809	4.071	0.395	0.416	0.152	9.32	13.16	15.35	70.8	91.2	449.0	0.05	0.10	0.24	0.40	13.68	13.40	0.54	340	0	340	0.0	0.0	0.0	-	339.5	20.2	78.9	0.9
STC18	110	1.1	120	1.2	1.15	363	3.08	-0.49	260.0	0.050	0.093	0.022	55.9	0.539	1.606	4.219	0.288	0.418	0.133	9.93	11.68	12.01	82.1	94.3	535	0.06	0.09	0.23	0.47	12.57	6.96	0.29	326	96	422	0.0	0.0	0.0	-	422.2	25.6	74.4	0.0
STC18	120	1.2	130	1.3	1.25	303	2.87	-0.46	136.5	0.022	0.070	0.014	81.0	0.425	1.412	3.066	0.380	0.369	0.112	7.43	10.30	9.29	55.1	51.6	352.6	<0.05	0.11	0.24	0.38	12.01	6.65	0.25	288	90	377	0.0	0.0	0.0	-	377.5	20.1	79.4	0.5
UPPER SWAMPLANDS																																					
STC2	0	0	25	0.25	0.125	100.1	4.42	-0.61	25.93	0.014	0.042	0.029	19.20	0.260	0.036	0.576	0.225	0.222	0.018	0.166	4.001	32.14	21.83	104.3	44.06	42.30	0.26	3.32	0.35	0.86	2.89	13.90	0.67	150	11	161	0.0	0.0	0.0	-	161.1	7.8	59.6	32.6
STC2	25	0.25	72	0.72	0.485	100.7	4.06	-0.61	18.99	0.022	0.032	0.023	10.42	0.109	0.025	0.026	0.203	0.011	0.137	1.591	25.41	14.92	125.9	95.4	52.4	0.09	2.72	0.29	0.99	7.32	17.40	0.83	197	5	203	0.0	0.0	0.0	-	202.7	19.8	78.8	1.4
STC2	72	0.72	90	0.9	0.81	59.5	4.35	-0.62	13.22	0.022	0.028	0.015	4.451	0.038	0.013	0.019	0.143	0.005	0.057	0.675	11.96	7.53	73.0	49.14	16.52	0.06	1.75	0.23	0.57	4.07	8.62	0.36	105	2	106	0.0	0.0	0.0	-	106.4	10.0	57.7	32.3
STC2	90	0.9	127	1.27	1.085	54.8	4.18	-0.62	9.68	0.017	0.023	0.014	5.18	0.051	0.010	0.023	0.125	0.005	0.046	0.766	9.57	6.36	67.7	31.19	15.65	0.09	2.40	0.21	0.52	2.52	6.08	0.22	71	2	73	6.1	1.5	7.7	-	80.4	8.9	51.1	40.0
STC3	0	0	22	0.22	0.11	214.8	3.28	-0.52	54.6	0.017	0.088	0.029	44.63	0.546	0.161	0.453	0.422	0.095	0.348	6.44	34.38	64.87	147.2	164.6	109.2	0.13	1.11	0.44	0.89	10.92	18.40	0.80	253	10	263	0.0	0.0	0.0	-	262.9	23.6	76.0	0.4
STC3	22	0.22	59	0.59	0.405	188.8	3.26	-0.51	42.14	0.032	0.037	0.024	30.58	0.395	0.149	0.409	0.253	0.090	0.407	5.92	37.82	22.82	164.2	180.1	120.1	0.16	1.31	0.33	1.08	13.01	20.70	0.93	289	8	297	0.0	0.0	0.0	-	297.1	21.4	78.1	0.5
STC3	59	0.59	90	0.9	0.745	217.8	3.34	-0.52	18.17	0.051	0.018	0.019	2.562	0.237	0.096	0.395	0.239	0.069	0.448	4.451	26.83	15.75	181.4	185.2	91.3	0.15	1.52	0.28	1.20	14.01	20.70	0.91	286	4	291	0.0	0.0	0.0	-	290.6	19.3	80.3	0.4
STC3	90	0.9	120	1.2	1.05	121.5	3.37	-0.53	16.76	0.047	0.015	0.015	2.015	0.237	0.099	0.332	0.225	0.076	0.422	3.954	28.87	13.39	172.0	166.7	103.6	0.17	1.76	0.34	1.25	13.90	22.90	0.98	307	4	311	0.0	0.0	0.0	-	311.3	23.5	76.5	0.0
STC3	120	1.2	142	1.42	1.31	217.8	3.4	-0.53	31.46	0.031	0.026	0.026	10.87	0.446	0.118	0.366	0.331	0.091	0.421	7.52	43.61	24.26	194.0	208.4	120.3	0.37	2.46	0.19	0.79	10.81	21.40	0.90	261	4	264	0.0	0.0	0.0	-	264.2	19.2	80.3	0.5
STC4	0	0	13	0.13	0.065	188	3.28	-0.52	41.63	0.017	0.026	0.028	13.44	0.303	0.231	1.201	0.626	0.094	0.281	5.28	31.65	47.00	119.8	120.5	103.6	0.16	1.45	0.39	0.79	10.58	20.70	0.99	275	6	281	0.0	0.0	0.0	-	281.1	21.0	78.5	0.5
STC4	13	0.13	50	0.5	0.315	208.1	3.09	-0.49	20.82	0.018	0.014	0.011	1.746	0.134	0.245	1.256	0.270	0.078	0.297	2.701	42.54	10.40	150.9	172.8	128.6	0.08	1.47	0.20	1.18	13.90	24.70	0.88	221	2	223	0.0	0.0	0.0	-	223.3	23.4	76.6	0.0
STC4	50	0.5	74	0.74	0.62	248	3.06	-0.49	24.84	0.019	0.017	0.011	2.005	0.290	0.374	2.199	0.253	0.117	0.380	4.102	63.9	11.91	196.8	218.2	167.7	0.08	1.35	0.27	1.09	14.12	25.20	0.85	250	3	253	0.0	0.0	0.0	-	252.7	18.8	80.5	0.7
STC4	74	0.74	115	1.15	0.945	130.6	3.05	-0.48	19.22	0.019	0.014	0.008	1.076	0.234	0.441	2.439	0.224	0.120	0.318	4.493	67.3	13.15	172.6	196.3	167.3	0.10	1.29	<0.12	0.99	12.68	24.30	0.86	286	0	286	0.0	0.0	0.0	-	285.7	24.2	75.8	0.0
STC4	115	1.15	138	1.38	1.265	315	3.79	-0.58	27.994	0.027	0.026	0.007	0.679	0.432	0.132	0.114	0.258	0.036	0.143	15.77	156.2	24.46	198.9	193.3	289.3	0.31	3.75	0.23	0.68	8.39	18.10	0.65	179	0	179	0.0	0.0	0.0	-	178.9	27.1	72.9	0.0
STC5	0	0	25	0.25	0.125	151.5	4.09	-0.61	16.72	0.017	0.044	0.046	10.2	0.401	0.165	0.238	0.874	0.194	0.368	12.78	70.8	45.56	237.5	279.3	21.3	0.34	3.44	0.56	1.23	8.77	14.10	0.76	237	12	249	0.0	0.0	0.0	-	248.8	23.2	76.8	0.08
STC5	25	0.25	50	0.5	0.375	189.8	3.8	-0.58	16.34	0.010	0.027	0.015	53.1	0.543	0.158	0.308	0.264	0.193	0.357	8.28	40.80	31.15	196.0	227.9	99.3	0.18	0.67	0.89	1.17	8.66	9.13	0.49	196	5	201	0.0	0.0	0.0	-	201.1	25.9	74.1	0.0
STC5	50	0.5	65	0.65	0.575	118.5	4.04	-0.61	8.92	0.007	0.017	0.015	6.96	0.301	0.082	0.168	0.183	0.105	0.276	5.23	36.60	15.38	132.8	164.0	62.1	0.11	0.42	0.46	0.75	6.01	6.65	0.39	135	19	154	0.0	0.0	0.0	-	154.1	23.6	75.6	0.8
STC5	65	0.65	92	0.92	0.785	58.2	4.04	-0.61	5.15	0.006	0.016	0.006	3.224	0.162	0.040	0.069	0.508	0.119	0.206	3.036	13.57	8.51	76.0	64.5	33.29	0.15	0.76	0.26	0.46	3.91	4.03	0.23	166	4	170	0.0	24.6	24.6	-	145.4	24.1	75.9	0.08
MID-SWAMPLANDS																																					
STC7	0	0	12	0.12	0.06	282	3.29	-0.52	133.5	0.010	0.070	0.036	153.7	1.038	2.015	3.945	0.450	0.717	0.246	6.62	34.25	154.5	94.3	152.4	276.9	<0.05	0.06	<0.06	<0.12	<0.065	1.56	21.60	0.81	434	54	488	0.0	0.0	0.0	-	488.3	10.1	64.1	25.8
STC7	12	0.12	23	0.23	0.175	255	3.04	-0.48	194.0	0.010	0.066	0.022	92.0	0.895	3.556	5.86	0.359	0.978	0.162	5.71	21.47	52.5	72.0	95.3	213.0	0.34	0.26	4.58	4.19	0.15	377	52	429	0.0	0.0	0.0	-	428.9	16.9	82.6	0.5
STC7	23	0.23	58	0.58	0.405	222	3.13	-0.50	73.0	0.017	0.027	0.014	25.15	0.866	2.255	4.536	0.143	0.666	0.127	5.44	14.81	17.90	35.57	42.97	202.7	<0.05	0.18	0.15	0.25	0.32	3.87	0.14	154	3	157	0.0	5.6	5.6	-	162.6	5.7	32.5	61.8
STC7	58	0.58	88	0.88	0.73	146.5	3.41	-0.53	34.67	0.016	0.016	0.007	17.91	0.528	1.096	2.423	0.082	0.335	0.134	3.398	7.38	9.18	19.89	25.06	106.9	<0.05	0.03	<0.06	0.14	1.04	2.02	0.05	33	1	34	3.0	7.3	10.3	-	44.1	-	-	-
STC8	0	0	30	0.3	0.15	155.6	3.26	-0.51	60.6	0.012	0.071	0.034	94.8	0.976	0.658	1.547	0.342	0.263	0.415	7.30	20.07	57.0	29.87	89.0	105.8	0.08	0.27	0.36	0.15	3.15	15.80	0.61	312	18	330	0.0	0.0	0.0	-	330.1	12.6	78.9	8.5
STC8	30	0.3	53	0.53	0.415	176.7	3.28	-0.52	39.40	0.009	0.051	0.022	74.9	0.921	0.926	2.044	0.260	0.435	0.260	9.15	24.80	35.27	41.25	76.8	134.9	0.08	0.26	0.31	0.17	0.34	12.60	0.46	258	22	280	0.0	0.0	0.0	-	279.8	12.8	66.9	20.3
STC8	53	0.53	80	0.8	0.715	140.3	3.3	-0.52	31.77	0.014	0.044	0.022	21.17	0.784	0.553	1.598	0.222	0.314	0.146	6.42	21.17	18.72	55.2	74.7	89.3	0.05	0.25	0.18	0.24	1.86	5.54	0.19	152	4	156	2.7	27.8	30.5	-	156.2	27.8	72.1	0.0
STC8	0	0	16	0.16	0.08	203.9	3.7	-0.57	51.4	0.008	0.036	0.050	47.44	6.03	0.400	0.877	0.719	0.202	0.250	36.77	31.87	106.9	71.0	119.7	103.6	0.36	0.26	0.21	0.14	2.10	19.30	0.81	287	25	313	0.0	0.0	0.0	-	312.5	24.8	75.0	0.2
STC8	16	0.16	25	0.25	0.205	163.5	3.56	-0.55	41.88	0.007	0.030	0.040	34.5	1.542	0.443	0.956	0.519	0.174	0.220	10.96	14.70	53.6	38.42	62.4	84.9	0.23	0.25	0.40	0.23	0.92	15.10	0.64	272	13	285	0.0	0.0	0.0	-	285.2	13.2	82.9	5.2
STC10	0	0	8	0.08	0.04	65.1	3.73	-0.57	46.92	0.007	0.044	0.040	41.89	2.699	0.240	0.408	0.548	0.129	0.227	13.48	52.2	45.31	99.1	114.3	4.850	0.32	1.13	0.18	0.37	0.95	17.10	0.83	280	12	292	0.0	0.0	0.0	-	292.0	13.8	74.4	11.8
STC10	8	0.08	30	0.3	0.22	85	3.82	-0.58	22.34	0.026	0.029	0.023	20.45	0.368	0.167	0.151	0.298	0.297	0.070	0.165	2.456	17.42	22.84	34.3	47.67	42.85	0.09	0.43	0.17	0.33	1.84	15.70	0.57	219	8	227	0.0	0.0	0.0	-	226.8	6.9	69.0	24.1
STC10	30	0.3	70	0.7	0.53	62.1	3.93	-0.59	12.98	0.022	0.028	0.014	2.888	0.097	0.141	0.210	0.281	0.057	0.180	1.205	9.81	23.07	47.32	40.02	32.18	<0.05	0.28	0.26	0.34	6.45	9.20	0.41	163	4	167	0.0	0.0	0.0	-	167.5	16.3	76.4	7.3
STC10	70	0.7	105	1.05	0.875	57.5	3.78	-0.58	7.10	0.012	0.016	0.008	3.279	0.166	0.180	0.287	0.188	0.115	0.197	1.393	11.86	13.37	42.90	46.17	35.17	<0.05	0.34	0.16	0.26	3.85	5.48	0.21	127	3	130	3.3	3.5	6.8	-	136.3	11.5	67.9	20.6
STC10	0	0	13	0.13	0.065	35.3	3.65	-0.56	5.32	0.013	0.024	0.016	3.127	0.166	0.155	0.701	0.327	0.104	0.157	10.21	13.00	18.44	26.38	44.80	56.7	0.11	0.68	0.25	0.54	13.01	13.60	0.52	248	13	261	0.0	0.0	0.0	-	260.9	19.5	78.7	1.8
STC11	30	0.3	60	0.6	0.45	133.8	3.54	-0.55	22.78	0.011	0.033	0.034	34.62	10.72	0.513	1.125	0.333	0.399	0.269	18.49	23.55	32.94	38.46	38.95	97.0	0.44	0.71	0.50	0.27	14.23	11.50	0.70	288	11	298	0.0	0.0	0.0	-	298.4	18.8	79.8	1.4
STC11	60	0.6	90	0.9	0.75	81.7	3.29	-0.52	41.50	0.009	0.046	0.028	128.6	1.344	0.884	1.694	0.360	0.407	0.239	16.42	38.21	27.21	97.0	78.0	224.6	0.22	0.66	0.33	0.54	13.23	13.80	0.70	301	21	322	0.0	0.0	0.0	-	322.2	19.1	80.5	0.4
STC11	90	0.9	110	1.1	1	286	3.08	-0.49	51.3	0.009	0.047	0.031	182.7	2.584	1.752	2.822	1.930	0.535	0.542	13.46	45.27	47.49	39.33	85.8	110.3	0.27	0.45	0.15	0.69	9.30	10.45	0.44	300	64	365	0.0	0.0	0.0	-	364.6	16.6	82.7	0.7
STC11	110	1.1	130	1.3	1.2	270	3.32	-0.49	34.49	0.007	0.036	0.037	140.5	1.116	0.748	1.513	0.276	0.357	0.198	14.57	37.33	23.12	84.2	93.2	235.1	0.16	0.57	0.23	0.48	7.53	8.49	0.36	243	28	272	0.0	0.0	0.0	-	271.6	28.0	72.0	0.0
STC12	0	0	5	0.05	0.025	1	3.15	-0.50	16.94	0.008	0.042	0.056	10.42	0.109	0.067	0.026	0.274	0.793	0.062	1.159	125.2	63.2	253.1	116.4	326.2	45.82	9.95	4.90	1.65	0.67	1.52	29.20	1.12	74	5	79	0.0	0.0	0.0	-	79.1	22.4	75.8	0.0
STC12	5	0.05	10	0.1	0.075	258	4.52	-0.66	34.90	0.009	0.029	0.055	15.64	11.08	0.207	0.297	0.654	0.180	0.657	109.5	66.5	156.5	68.8	140.3	26.73	13.07	7.83	1.47	0.62	4.06	29.00	1.46	188	15	203	0.0	0.0	0.0	-	203.2	17.5	81.4	1.1
STC12	10	0.1	30	0.3	0.2	68.5	4.88	-0.69	4.823	0.006	0.011	0.034	4.230	2.498	0.038	0.077	0.300	0.041	0.123	18.84	28.07	35.82	36.55	48.77	22.28	1.01	1.28	1.24	0.33	1.92	3.73	0.23	63	0	63	0.0	0.0	0.0	-	63.0	5.0	18.8	76.2
STC12	30	0.3	60	0.6	0.45	87	4.87	-0.69	4.004	0.006	0.010	0.031	3.729	2.308	0.055	0.077	0.243	0.066	0.102	20.99	39.39	39.17	40.76	43.19	62.4	0.64	0.99	1.16	0.35	3.19	4.32	0.27	89	4	93	0.0	0.0	0.0	-	93.1	11.5	35.4	53.1
STC12	60	0.6	80	0.8	0.7	213.1	3.62	-0.56	23.45	0.007	0.025	0.032	58.4	3.494	0.478	0.881	0.351	0.353	0.334	27.41	44.70	50.1	50.8	52.0	135.6	0.52	1.19	0.54	0.35	14.12	13.30	0.80	325	13	338	0.0	0.0	0.0	-	337.5	24.6	75.4	0.0
STC12	80	0.8	100	1	0.9	340	3.11	-0.49	43.37	0.009	0.037	0.038	205.6	2.030	0.702	1.374	0.374	0.401	0.244	24.41	45.23	37.45	98.1	140.5	297.5	0.30	0.84	0.38	0.57	11.79	17.50	0.94	386	48	434	0.0	0.0	0.0	-	434.3	11.5	68.5	0.0
STC12	100	1	130	1.3	1.195	293	3.12	-0.49	32.68	0.010	0.038	0.016	162.2	1.404	0.562	1.009	0.396	0.289	0.253	18.96	34.11	33.82	82.0	102.4	222.6	0.23	0.84	0.43	0.61	14.57	14.90	0.79	328	35	363	0.0	0.0	0.0	-	363.0	18.3	81.7	0.0
STC13	0	0	30	0.3	0.15	253	3.33	-0.52	45.06	0.012	0.054	0.026	31.56	2.295	0.574	0.844	0.488	0.261	0.427	20.25	25.01	59.6	28.68	64.51	72.9	0.31	0.48	0.48	0.17	9.94	14.10	0.76	214	6	220	0.0	13.8	13.8	-	234.3	19.5	80.1	0.4
STC13	30	0.3	60

Appendix D
Land Level Monitoring Attachments

Table D1 - Land Subsidance Monitoring Locations

Location Code	Location Type	Monitoring Zone	Easting	Northing	Initial Survey Result (2011) (mAHD)	- 20 mm Threshold
ALS 1	Ground Subsidance Monitoring	Eastern Region	265597	5755070	42.909	42.889
ALS 2	Ground Subsidance Monitoring	Eastern Region	264180	5752011	35.220	35.200
ALS 3	Ground Subsidance Monitoring	Eastern Region	259272	5749721	107.070	107.050
ALS 4	Ground Subsidance Monitoring	Eastern Region	258985	5751346	87.047	87.027
ALS 5	Ground Subsidance Monitoring	Eastern Region	259082	5754953	88.067	88.047
ALS 6	Ground Subsidance Monitoring	Northern Borefield	255123	5755450	88.991	88.971
ALS 7	Ground Subsidance Monitoring	Northern Borefield	255918	5752770	90.810	90.790
ALS 8	Ground Subsidance Monitoring	Anglesea	256557	5746402	92.143	92.123
ALS 9	Ground Subsidance Monitoring	Anglesea	253932	5744207	55.543	55.523
ALS 10	Ground Subsidance Monitoring	Alcoa Mine	253444	5746003	42.477	42.457
ALS 11	Ground Subsidance Monitoring	Marshy Creek - Lower Swamp	254362	5747217	10.749	10.729
ALS 12	Ground Subsidance Monitoring	Northern Borefield	255003	5750638	109.785	109.765
ALS 13	Ground Subsidance Monitoring	Northern Borefield	253351	5751758	111.158	111.138
ALS 14	Ground Subsidance Monitoring	Marshy Creek - Upper Swamp	251266	5754752	119.741	119.721
ALS 15	Ground Subsidance Monitoring	Marshy Creek - Upper Swamp	251116	5752060	42.753	42.733
ALS 16	Ground Subsidance Monitoring	Central Region	251625	5749685	115.423	115.403
ALS 17	Ground Subsidance Monitoring	Central Region	252323	5747532	85.608	85.588
ALS 18	Ground Subsidance Monitoring	Salt Creek Swamp	251448	5745522	62.277	62.257
ALS 19	Ground Subsidance Monitoring	Anglesea	252356	5742809	13.756	13.736
ALS 20	Ground Subsidance Monitoring	Western Region	248558	5743042	55.195	55.175
ALS 21	Ground Subsidance Monitoring	Western Region	247035	5739662	5.990	5.970
ALS 22	Ground Subsidance Monitoring	Western Region	245354	5742651	222.461	222.441

Table D1 - Land Subsidance Monitoring Locations

ALS 23	Ground Subsidance Monitoring	Breakfast Creek	246893	5746108	74.771	74.751
ALS 24	Ground Subsidance Monitoring	Anglesea River	247445	5750016	195.465	195.445
ALS 25	Ground Subsidance Monitoring	Central Region	244367	5749680	222.027	222.007
ALS 26	Ground Subsidance Monitoring	Central Region	247272	5754224	156.630	156.610
ALS 27	Ground Subsidance Monitoring	Salt Creek Swamp	249860	5745700	33.491	33.471
ALS 28	Ground Subsidance Monitoring	Central Region	249393	5747853	130.864	130.844
ALS 29	Ground Subsidance Monitoring	Central Region	250239	5749649	104.542	104.522
ALS 30	Ground Subsidance Monitoring	Marshy Creek - Lower Swamp	254275	5748807	48.641	48.621

Table D2 - Land Subsidance Monitoring Data

Location Code	Sample ID	Elevation (m AHD)	- 20 mm threshold
ALS 1	ALS 1_2013	42.908	42.889
ALS 1	ALS 1_2014	42.915	42.889
ALS 1	ALS 1_2015	42.914	42.889
ALS 1	ALS 1_2016	42.914	42.889
ALS 1	ALS 1_2017	42.92	42.889
ALS 1	ALS 1_2018	42.922	42.889
ALS 1	ALS 1_2019	42.914	42.889
ALS 1	ALS 1_2020	42.912	42.889
ALS 1	ALS 1_2021	42.904	42.889
ALS 1	ALS 1_2022	42.924	42.889
ALS 1	ALS 1_2023	42.939	42.889
ALS 2	ALS 2_2013	35.236	35.200
ALS 2	ALS 2_2014	35.239	35.200
ALS 2	ALS 2_2015	35.243	35.200
ALS 2	ALS 2_2016	35.229	35.200
ALS 2	ALS 2_2017	35.229	35.200
ALS 2	ALS 2_2018	35.234	35.200
ALS 2	ALS 2_2019	35.232	35.200
ALS 2	ALS 2_2020	35.234	35.200
ALS 2	ALS 2_2021	35.2203	35.200
ALS 2	ALS 2_2022	35.242	35.200
ALS 2	ALS 2_2023	35.2468	35.200
ALS 3	ALS 3_2013	107.086	107.050
ALS 3	ALS 3_2014	107.07	107.050
ALS 3	ALS 3_2015	107.085	107.050
ALS 3	ALS 3_2016	107.07	107.050
ALS 3	ALS 3_2017	107.085	107.050
ALS 3	ALS 3_2018	107.082	107.050
ALS 3	ALS 3_2019	107.064	107.050
ALS 3	ALS 3_2020	107.067	107.050
ALS 3	ALS 3_2021	107.072	107.050
ALS 3	ALS 3_2022	107.067	107.050
ALS 3	ALS 3_2023	107.097	107.050
ALS 4	ALS 4_2013	87.045	87.027
ALS 4	ALS 4_2014	87.05	87.027
ALS 4	ALS 4_2015	87.054	87.027
ALS 4	ALS 4_2016	87.05	87.027
ALS 4	ALS 4_2017	87.062	87.027
ALS 4	ALS 4_2018	87.061	87.027
ALS 4	ALS 4_2019	87.051	87.027
ALS 4	ALS 4_2020	87.052	87.027
ALS 4	ALS 4_2021	87.044	87.027
ALS 4	ALS 4_2022	87.052	87.027
ALS 4	ALS 4_2023	87.0669	87.027
ALS 5	ALS 5_2013	88.075	88.047
ALS 5	ALS 5_2014	88.068	88.047

ALS 5	ALS 5_2015	88.071	88.047
ALS 5	ALS 5_2016	88.07	88.047
ALS 5	ALS 5_2017	88.076	88.047
ALS 5	ALS 5_2018	88.076	88.047
ALS 5	ALS 5_2019	88.063	88.047
ALS 5	ALS 5_2020	88.059	88.047
ALS 5	ALS 5_2021	88.052	88.047
ALS 5	ALS 5_2022	88.0771	88.047
ALS 5	ALS 5_2023	88.0721	88.047
ALS 6	ALS 6_2013	88.994	88.971
ALS 6	ALS 6_2014	88.983	88.971
ALS 6	ALS 6_2015	88.98	88.971
ALS 6	ALS 6_2016	88.982	88.971
ALS 6	ALS 6_2017	88.985	88.971
ALS 6	ALS 6_2018	88.979	88.971
ALS 6	ALS 6_2019	88.965	88.971
ALS 6	ALS 6_2020	88.96	88.971
ALS 6	ALS 6_2021	88.956	88.971
ALS 6	ALS 6_2022	88.968	88.971
ALS 6	ALS 6_2023	88.9769	88.971
ALS 7	ALS 7_2013	90.818	90.790
ALS 7	ALS 7_2014	90.819	90.790
ALS 7	ALS 7_2015	90.82	90.790
ALS 7	ALS 7_2016	90.821	90.790
ALS 7	ALS 7_2017	90.823	90.790
ALS 7	ALS 7_2018	90.823	90.790
ALS 7	ALS 7_2019	90.814	90.790
ALS 7	ALS 7_2020	90.809	90.790
ALS 7	ALS 7_2021	90.801	90.790
ALS 7	ALS 7_2022	90.814	90.790
ALS 7	ALS 7_2023	90.8199	90.790
ALS 8	ALS 8_2013	92.178	92.123
ALS 8	ALS 8_2014	92.167	92.123
ALS 8	ALS 8_2015	92.168	92.123
ALS 8	ALS 8_2016	92.174	92.123
ALS 8	ALS 8_2017	92.196	92.123
ALS 8	ALS 8_2018	92.199	92.123
ALS 8	ALS 8_2019	92.207	92.123
ALS 8	ALS 8_2020	92.193	92.123
ALS 8	ALS 8_2021	92.204	92.123
ALS 8	ALS 8_2022	92.211	92.123
ALS 8	ALS 8_2023	92.2219	92.123
ALS 9	ALS 9_2013	55.578	55.523
ALS 9	ALS 9_2014	55.565	55.523
ALS 9	ALS 9_2015	55.578	55.523
ALS 9	ALS 9_2016	55.58	55.523
ALS 9	ALS 9_2017	55.594	55.523
ALS 9	ALS 9_2018	55.588	55.523
ALS 9	ALS 9_2019	55.596	55.523
ALS 9	ALS 9_2020	55.601	55.523

ALS 9	ALS 9_2021	55.591	55.523
ALS 9	ALS 9_2022	55.607	55.523
ALS 9	ALS 9_2023	55.613	55.523
ALS 10	ALS 10_2013	42.489	42.457
ALS 10	ALS 10_2014	42.51	42.457
ALS 10	ALS 10_2015	42.522	42.457
ALS 10	ALS 10_2016	42.534	42.457
ALS 10	ALS 10_2017	42.552	42.457
ALS 10	ALS 10_2018	42.566	42.457
ALS 10	ALS 10_2019	42.576	42.457
ALS 10	ALS 10_2020	42.564	42.457
ALS 10	ALS 10_2021	42.574	42.457
ALS 10	ALS 10_2022	42.573	42.457
ALS 10	ALS 10_2023	42.5896	42.457
ALS 11	ALS 11_2013	10.77	10.729
ALS 11	ALS 11_2014	10.776	10.729
ALS 11	ALS 11_2015	10.774	10.729
ALS 11	ALS 11_2016	10.797	10.729
ALS 11	ALS 11_2017	10.813	10.729
ALS 11	ALS 11_2018	10.828	10.729
ALS 11	ALS 11_2019	10.849	10.729
ALS 11	ALS 11_2020	10.851	10.729
ALS 11	ALS 11_2021	10.8449	10.729
ALS 11	ALS 11_2022	10.847	10.729
ALS 11	ALS 11_2023	10.8571	10.729
ALS 12	ALS 12_2013	109.8	109.765
ALS 12	ALS 12_2014	109.81	109.765
ALS 12	ALS 12_2015	109.801	109.765
ALS 12	ALS 12_2016	109.799	109.765
ALS 12	ALS 12_2017	109.807	109.765
ALS 12	ALS 12_2018	109.816	109.765
ALS 12	ALS 12_2019	109.8	109.765
ALS 12	ALS 12_2020	109.811	109.765
ALS 12	ALS 12_2021	109.798	109.765
ALS 12	ALS 12_2022	109.804	109.765
ALS 12	ALS 12_2023	109.805	109.765
ALS 13	ALS 13_2013	111.164	111.138
ALS 13	ALS 13_2014	111.159	111.138
ALS 13	ALS 13_2015	111.159	111.138
ALS 13	ALS 13_2016	111.162	111.138
ALS 13	ALS 13_2017	111.16	111.138
ALS 13	ALS 13_2018	111.159	111.138
ALS 13	ALS 13_2019	111.159	111.138
ALS 13	ALS 13_2020	111.154	111.138
ALS 13	ALS 13_2021	111.152	111.138
ALS 13	ALS 13_2022	111.14	111.138
ALS 13	ALS 13_2023	111.1528	111.138
ALS 14	ALS 14_2013	119.738	119.721
ALS 14	ALS 14_2014	119.715	119.721
ALS 14	ALS 14_2015	119.722	119.721

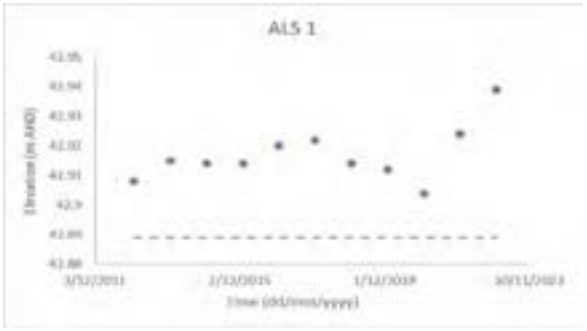
ALS 14	ALS 14_2016	119.729	119.721
ALS 14	ALS 14_2017	119.724	119.721
ALS 14	ALS 14_2018	119.73	119.721
ALS 14	ALS 14_2019	119.729	119.721
ALS 14	ALS 14_2020	119.733	119.721
ALS 14	ALS 14_2021	119.719	119.721
ALS 14	ALS 14_2022	119.728	119.721
ALS 14	ALS 14_2023	119.734	119.721
ALS 15	ALS 15_2013	42.777	42.733
ALS 15	ALS 15_2014	42.764	42.733
ALS 15	ALS 15_2015	42.761	42.733
ALS 15	ALS 15_2016	42.763	42.733
ALS 15	ALS 15_2017	42.772	42.733
ALS 15	ALS 15_2018	42.766	42.733
ALS 15	ALS 15_2019	42.771	42.733
ALS 15	ALS 15_2020	42.772	42.733
ALS 15	ALS 15_2021	42.76	42.733
ALS 15	ALS 15_2022	42.766	42.733
ALS 15	ALS 15_2023	42.7686	42.733
ALS 16	ALS 16_2013	115.426	115.403
ALS 16	ALS 16_2014	115.419	115.403
ALS 16	ALS 16_2015	115.428	115.403
ALS 16	ALS 16_2016	115.429	115.403
ALS 16	ALS 16_2017	115.426	115.403
ALS 16	ALS 16_2018	115.425	115.403
ALS 16	ALS 16_2019	115.415	115.403
ALS 16	ALS 16_2020	115.42	115.403
ALS 16	ALS 16_2021	115.416	115.403
ALS 16	ALS 16_2022	115.398	115.403
ALS 16	ALS 16_2023	115.4247	115.403
ALS 17	ALS 17_2013	85.625	85.588
ALS 17	ALS 17_2014	85.625	85.588
ALS 17	ALS 17_2015	85.62	85.588
ALS 17	ALS 17_2016	85.637	85.588
ALS 17	ALS 17_2017	85.65	85.588
ALS 17	ALS 17_2018	85.661	85.588
ALS 17	ALS 17_2019	85.66	85.588
ALS 17	ALS 17_2020	85.66	85.588
ALS 17	ALS 17_2021	85.666	85.588
ALS 17	ALS 17_2022	85.667	85.588
ALS 17	ALS 17_2023	85.6762	85.588
ALS 18	ALS 18_2013	62.295	62.257
ALS 18	ALS 18_2014	62.292	62.257
ALS 18	ALS 18_2015	62.305	62.257
ALS 18	ALS 18_2016	62.299	62.257
ALS 18	ALS 18_2017	62.321	62.257
ALS 18	ALS 18_2018	62.325	62.257
ALS 18	ALS 18_2019	62.338	62.257
ALS 18	ALS 18_2020	62.327	62.257
ALS 18	ALS 18_2021	62.3395	62.257

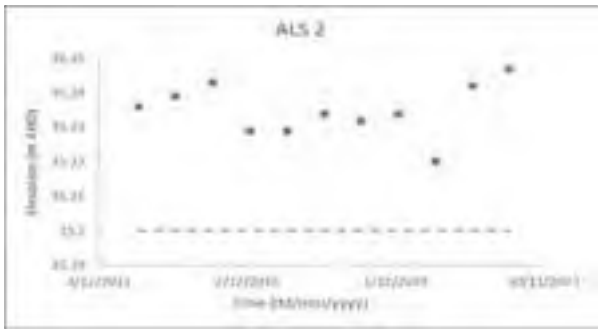
ALS 18	ALS 18_2022	62.327	62.257
ALS 18	ALS 18_2023	62.3398	62.257
ALS 19	ALS 19_2013	13.759	13.736
ALS 19	ALS 19_2014	13.757	13.736
ALS 19	ALS 19_2015	13.762	13.736
ALS 19	ALS 19_2016	13.767	13.736
ALS 19	ALS 19_2017	13.772	13.736
ALS 19	ALS 19_2018	13.782	13.736
ALS 19	ALS 19_2019	13.797	13.736
ALS 19	ALS 19_2020	13.78	13.736
ALS 19	ALS 19_2021	13.779	13.736
ALS 19	ALS 19_2022	13.799	13.736
ALS 19	ALS 19_2023	13.7928	13.736
ALS 20	ALS 20_2013	55.208	55.175
ALS 20	ALS 20_2014	55.21	55.175
ALS 20	ALS 20_2015	55.229	55.175
ALS 20	ALS 20_2016	55.221	55.175
ALS 20	ALS 20_2017	55.231	55.175
ALS 20	ALS 20_2018	55.223	55.175
ALS 20	ALS 20_2019	55.238	55.175
ALS 20	ALS 20_2020	55.231	55.175
ALS 20	ALS 20_2021	55.2199	55.175
ALS 20	ALS 20_2022	55.222	55.175
ALS 20	ALS 20_2023	55.2183	55.175
ALS 21	ALS 21_2013	6.01	5.970
ALS 21	ALS 21_2014	6.007	5.970
ALS 21	ALS 21_2015	6.015	5.970
ALS 21	ALS 21_2016	6.005	5.970
ALS 21	ALS 21_2017	6.014	5.970
ALS 21	ALS 21_2018	6.013	5.970
ALS 21	ALS 21_2019	6.028	5.970
ALS 21	ALS 21_2020	6.028	5.970
ALS 21	ALS 21_2021	6.009	5.970
ALS 21	ALS 21_2022	6.027	5.970
ALS 21	ALS 21_2023	6.031	5.970
ALS 22	ALS 22_2013	222.464	222.441
ALS 22	ALS 22_2014	222.466	222.441
ALS 22	ALS 22_2015	222.47	222.441
ALS 22	ALS 22_2016	222.466	222.441
ALS 22	ALS 22_2017	222.463	222.441
ALS 22	ALS 22_2018	222.47	222.441
ALS 22	ALS 22_2019	222.46	222.441
ALS 22	ALS 22_2020	222.457	222.441
ALS 22	ALS 22_2021	222.4772	222.441
ALS 22	ALS 22_2022	222.444	222.441
ALS 22	ALS 22_2023	222.4382	222.441
ALS 23	ALS 23_2013	74.751	74.751
ALS 23	ALS 23_2014	74.75	74.751
ALS 23	ALS 23_2015	74.752	74.751
ALS 23	ALS 23_2016	74.756	74.751

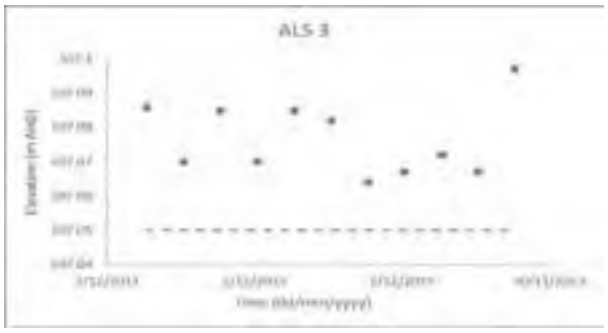
ALS 23	ALS 23_2017	74.762	74.751
ALS 23	ALS 23_2018	74.746	74.751
ALS 23	ALS 23_2019	74.758	74.751
ALS 23	ALS 23_2020	74.753	74.751
ALS 23	ALS 23_2021	74.752	74.751
ALS 23	ALS 23_2022	74.736	74.751
ALS 23	ALS 23_2023	74.7489	74.751
ALS 24	ALS 24_2013	195.488	195.445
ALS 24	ALS 24_2014	195.478	195.445
ALS 24	ALS 24_2015	195.483	195.445
ALS 24	ALS 24_2016	195.471	195.445
ALS 24	ALS 24_2017	195.479	195.445
ALS 24	ALS 24_2018	195.479	195.445
ALS 24	ALS 24_2019	195.472	195.445
ALS 24	ALS 24_2020	195.471	195.445
ALS 24	ALS 24_2021	195.467	195.445
ALS 24	ALS 24_2022	195.46	195.445
ALS 24	ALS 24_2023	195.4799	195.445
ALS 25	ALS 25_2013	222.041	222.007
ALS 25	ALS 25_2014	222.043	222.007
ALS 25	ALS 25_2015	222.047	222.007
ALS 25	ALS 25_2016	222.032	222.007
ALS 25	ALS 25_2017	222.038	222.007
ALS 25	ALS 25_2018	222.037	222.007
ALS 25	ALS 25_2019	222.03	222.007
ALS 25	ALS 25_2020	222.036	222.007
ALS 25	ALS 25_2021	222.0307	222.007
ALS 25	ALS 25_2022	222.017	222.007
ALS 25	ALS 25_2023	222.02	222.007
ALS 26	ALS 26_2013	156.629	156.610
ALS 26	ALS 26_2014	156.615	156.610
ALS 26	ALS 26_2015	156.619	156.610
ALS 26	ALS 26_2016	156.613	156.610
ALS 26	ALS 26_2017	156.614	156.610
ALS 26	ALS 26_2018	156.628	156.610
ALS 26	ALS 26_2019	156.611	156.610
ALS 26	ALS 26_2020	156.618	156.610
ALS 26	ALS 26_2021	156.617	156.610
ALS 26	ALS 26_2022	156.627	156.610
ALS 26	ALS 26_2023	156.6248	156.610
ALS 27	ALS 27_2013	33.517	33.471
ALS 27	ALS 27_2014	33.523	33.471
ALS 27	ALS 27_2015	33.523	33.471
ALS 27	ALS 27_2016	33.524	33.471
ALS 27	ALS 27_2017	33.541	33.471
ALS 27	ALS 27_2018	33.526	33.471
ALS 27	ALS 27_2019	33.545	33.471
ALS 27	ALS 27_2020	33.531	33.471
ALS 27	ALS 27_2021	33.529	33.471
ALS 27	ALS 27_2022	33.538	33.471

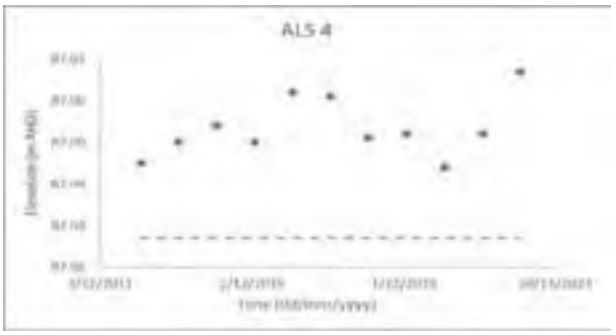
ALS 27	ALS 27_2023	33.5331	33.471
ALS 28	ALS 28_2013	130.876	130.844
ALS 28	ALS 28_2014	130.857	130.844
ALS 28	ALS 28_2015	130.868	130.844
ALS 28	ALS 28_2016	130.852	130.844
ALS 28	ALS 28_2017	130.871	130.844
ALS 28	ALS 28_2018	130.864	130.844
ALS 28	ALS 28_2019	130.872	130.844
ALS 28	ALS 28_2020	130.859	130.844
ALS 28	ALS 28_2021	130.8528	130.844
ALS 28	ALS 28_2022	130.853	130.844
ALS 28	ALS 28_2023	130.8689	130.844
ALS 29	ALS 29_2013	104.558	104.522
ALS 29	ALS 29_2014	104.541	104.522
ALS 29	ALS 29_2015	104.563	104.522
ALS 29	ALS 29_2016	104.56	104.522
ALS 29	ALS 29_2017	104.556	104.522
ALS 29	ALS 29_2018	104.551	104.522
ALS 29	ALS 29_2019	104.549	104.522
ALS 29	ALS 29_2020	104.551	104.522
ALS 29	ALS 29_2021	104.544	104.522
ALS 29	ALS 29_2022	104.545	104.522
ALS 29	ALS 29_2023	104.5543	104.522
ALS 30	ALS 30_2013	48.672	48.621
ALS 30	ALS 30_2014	48.681	48.621
ALS 30	ALS 30_2015	48.667	48.621
ALS 30	ALS 30_2016	48.67	48.621
ALS 30	ALS 30_2017	48.678	48.621
ALS 30	ALS 30_2018	48.673	48.621
ALS 30	ALS 30_2019	48.673	48.621
ALS 30	ALS 30_2020	48.663	48.621
ALS 30	ALS 30_2021	48.674	48.621
ALS 30	ALS 30_2022	48.659	48.621
ALS 30	ALS 30_2023	48.6754	48.621

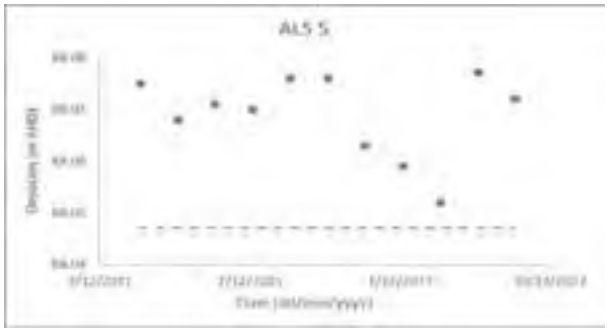
• = Within threshold, X = Below 20 mm threshold											
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
ALS 1	•	•	•	•	•	•	•	•	•	•	•
ALS 2	•	•	•	•	•	•	•	•	•	•	•
ALS 3	•	•	•	•	•	•	•	•	•	•	•
ALS 4	•	•	•	•	•	•	•	•	•	•	•
ALS 5	•	•	•	•	•	•	•	•	•	•	•
ALS 6	•	•	•	•	•	•	X	X	X	X	•
ALS 7	•	•	•	•	•	•	•	•	•	•	•
ALS 8	•	•	•	•	•	•	•	•	•	•	•
ALS 9	•	•	•	•	•	•	•	•	•	•	•
ALS 10	•	•	•	•	•	•	•	•	•	•	•
ALS 11	•	•	•	•	•	•	•	•	•	•	•
ALS 12	•	•	•	•	•	•	•	•	•	•	•
ALS 13	•	•	•	•	•	•	•	•	•	•	•
ALS 14	•	X	•	•	•	•	•	•	X	•	•
ALS 15	•	•	•	•	•	•	•	•	•	•	•
ALS 16	•	•	•	•	•	•	•	•	•	X	•
ALS 17	•	•	•	•	•	•	•	•	•	•	•
ALS 18	•	•	•	•	•	•	•	•	•	•	•
ALS 19	•	•	•	•	•	•	•	•	•	•	•
ALS 20	•	•	•	•	•	•	•	•	•	•	•
ALS 21	•	•	•	•	•	•	•	•	•	•	•
ALS 22	•	•	•	•	•	•	•	•	•	•	X
ALS 23	•	X	•	•	•	X	•	•	•	X	X
ALS 24	•	•	•	•	•	•	•	•	•	•	•
ALS 25	•	•	•	•	•	•	•	•	•	•	•
ALS 26	•	•	•	•	•	•	•	•	•	•	•
ALS 27	•	•	•	•	•	•	•	•	•	•	•
ALS 28	•	•	•	•	•	•	•	•	•	•	•
ALS 29	•	•	•	•	•	•	•	•	•	•	•
ALS 30	•	•	•	•	•	•	•	•	•	•	•

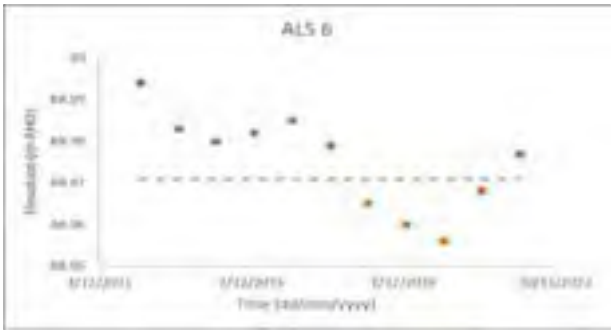

ALS 1

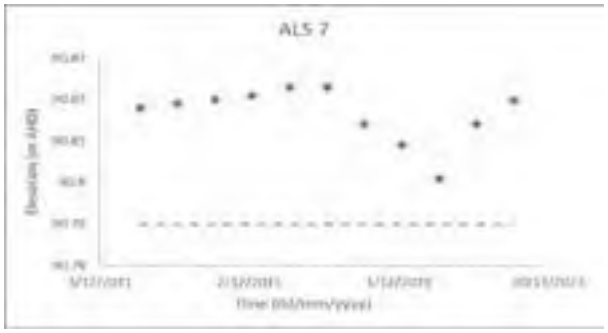

ALS 2

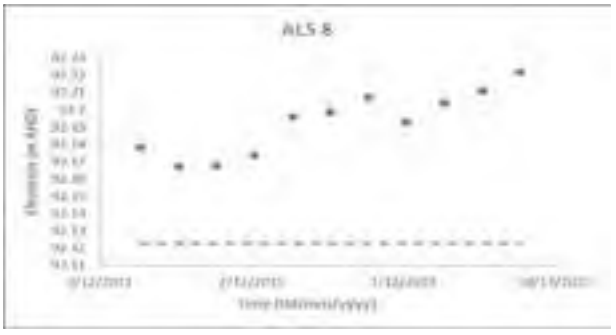

ALS 3

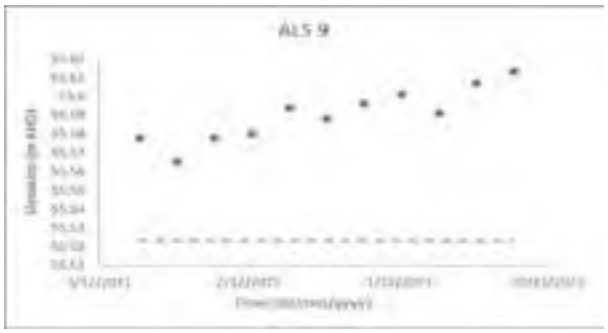

ALS 4

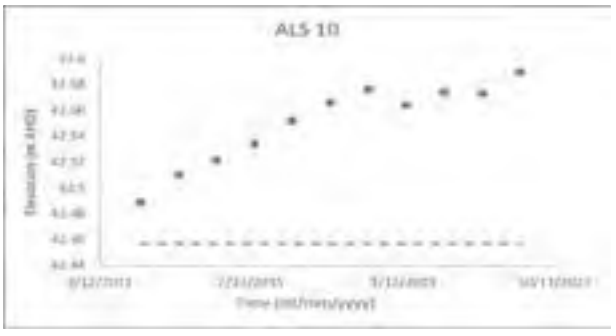

ALS 5

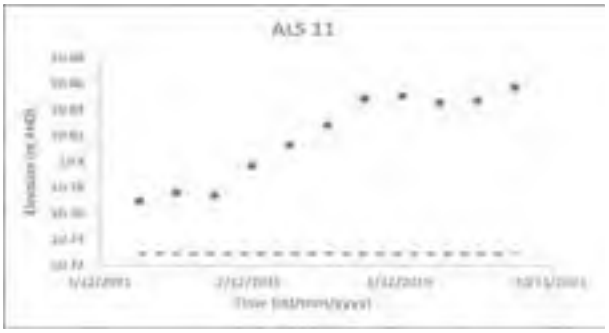

ALS 6

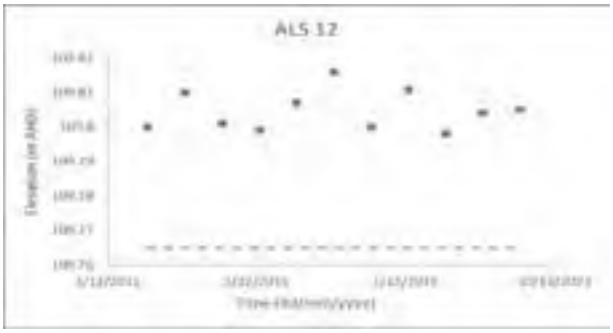

ALS 7

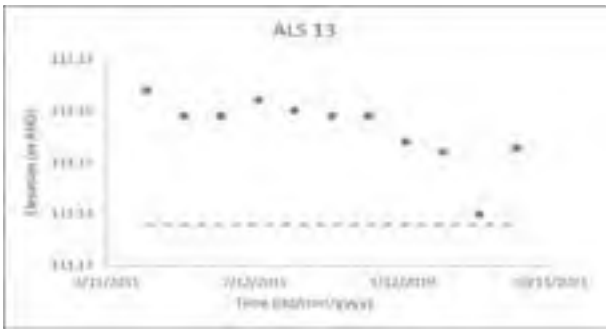

ALS 8

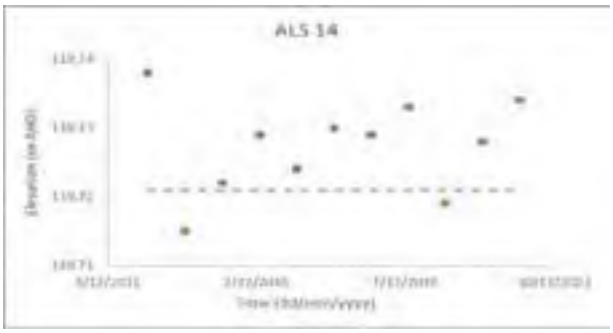

ALS 9

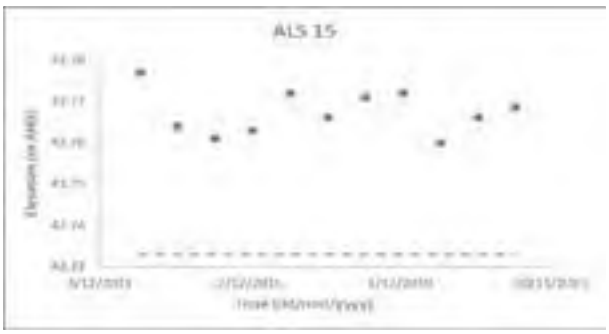

ALS 10

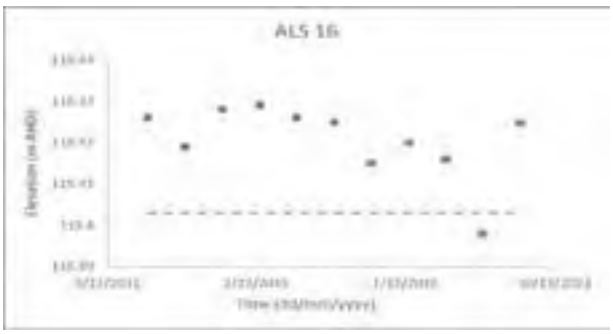

ALS 11

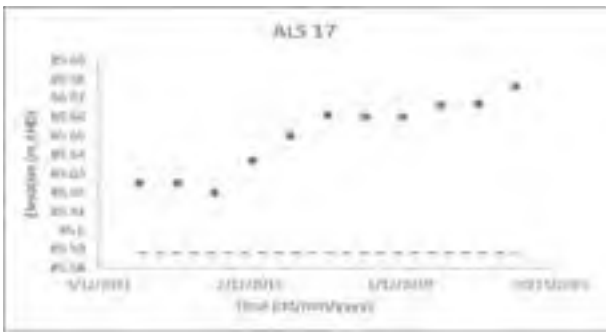

ALS 12

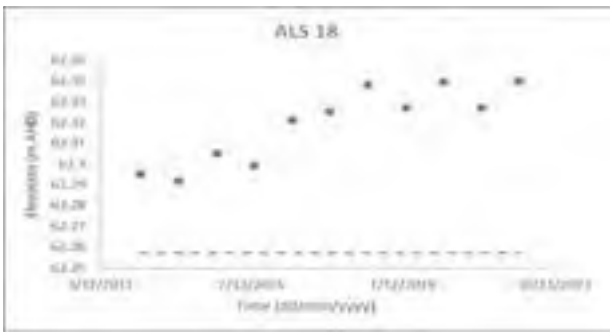

ALS 13

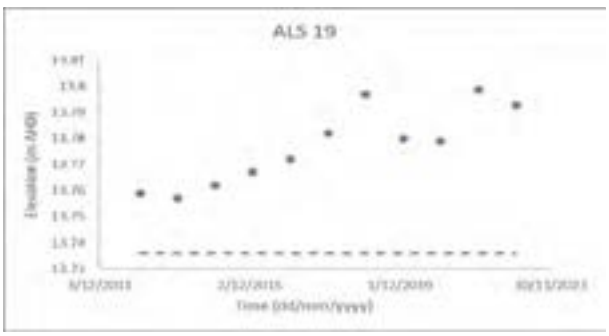

ALS 14

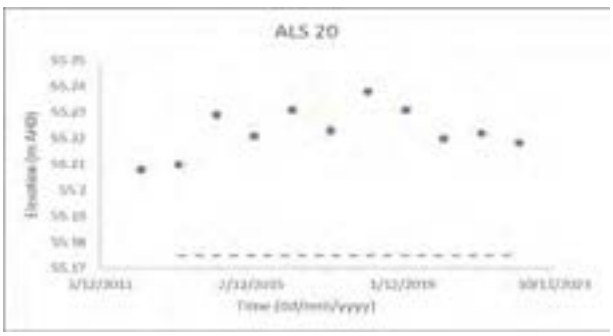

ALS 15

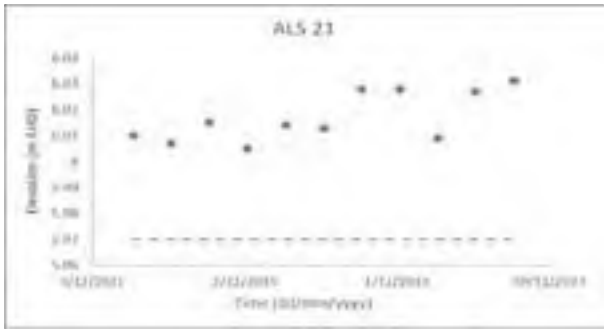

ALS 16

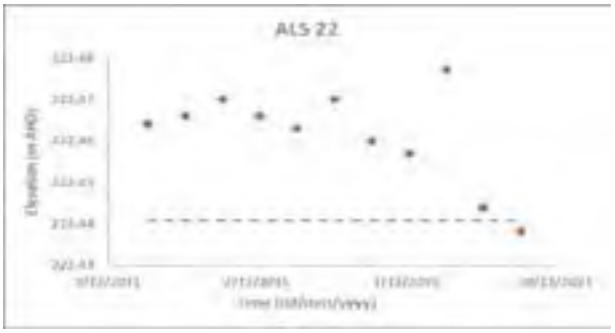

ALS 17

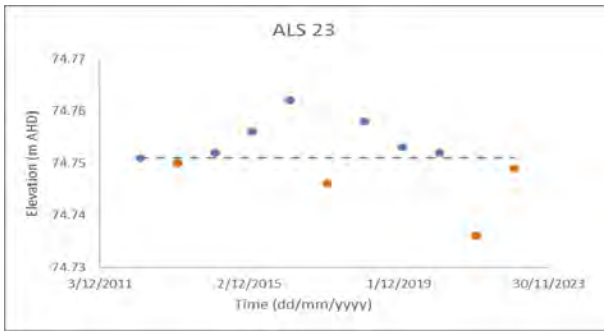

ALS 18

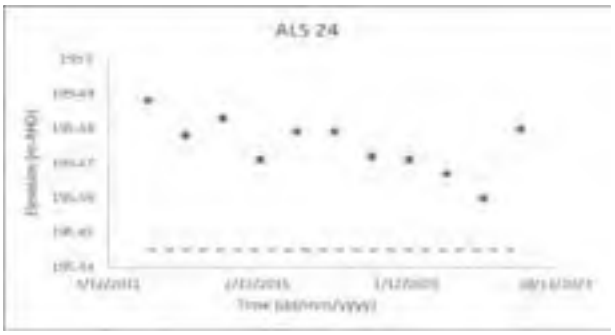

ALS 19

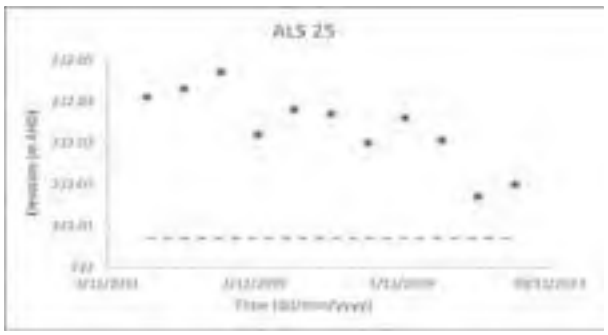

ALS 20

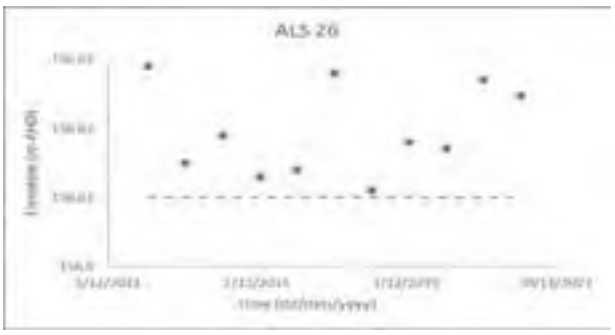

ALS 21

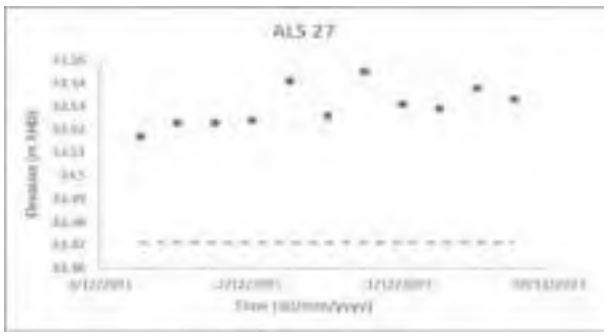

ALS 22

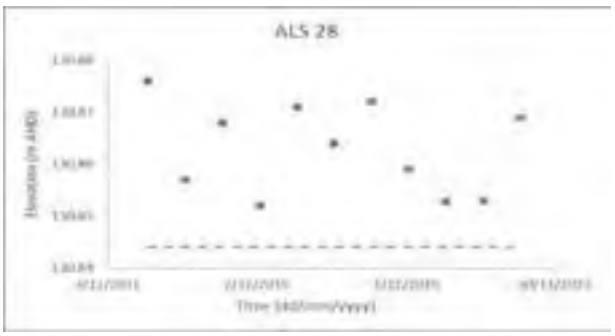

ALS 23
74.77
74.76
74.75
74.74
74.73
Elevation (m AHD)
3/12/2011
2/12/2015
1/12/2019
30/11/2023
Time (dd/mm/yyyy)

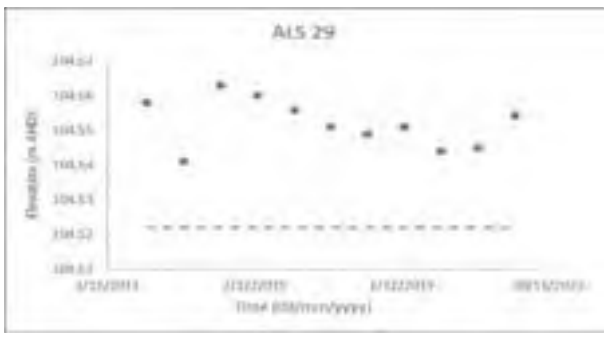

ALS 24

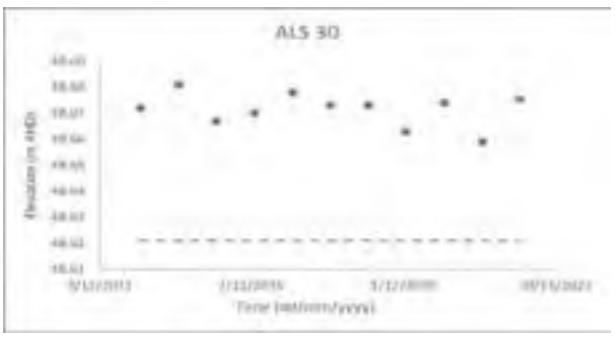

ALS 25


ALS 26


ALS 27


ALS 28


ALS 29


ALS 30

Appendix E
Ecological: Terrestrial Attachments

Anglesea River Swamp - Vegetation Survey Results Summary 2014 - 2022

Note: Species highlighted in green have been identified to be present in >20% of the quadrats (>10 quadrats) surveyed along the transect at any time between 2014 and 2022.

AS1	Common Name	Functional Group Code	Functional Group	2014	2015	2016	2017	2019	2020	2021	2022
Empodisma minus	Spreading Rope-rush	ATe	Amphibious	3	1	1	1	1	2	1	1
Gahnia sieberiana	Red-fruit Saw-sedge	ATe	Amphibious	1	1	0	0	0	0	0	0
Gleichenia dicarpa	Pouched Coral-fern	ATe	Amphibious	2	1	1	1	1	1	1	1
Isolepis inundata	Swamp club-sedge	ATi	Amphibious	6	4	3	3	0	0	1	3
Machaerina juncea	Bare Twig-sedge (Ate)	ATe	Amphibious	18	16	18	17	25	13	18	13
Melaleuca squarrosa	Scented Paperbark (ATw)	ATw	Amphibious	17	18	17	18	20	16	21	15
Schoenus brevifolius	Zig-zag Bog-sedge (ATw)	ATw	Amphibious	21	22	21	22	24	31	15	10
Cycnogeton procerum sp. aff.	Southern (Common) Water-ribbons (Se)	Se	Aquatic	40	30	46	45	25	25	22	22
Eleocharis sphacelata	Tall Spike-sedge	Se	Aquatic	10	5	2	2	2	4	2	0
Machaerina arthrophylla	Fine Twig-sedge (Se)	Se	Aquatic	29	26	26	27	0	2	15	10
Gahnia radula	Thatch Saw-sedge	Tdr	Dry	0	0	0	0	1	0	0	0
Cassytha glabella	Slender Dodder-laurel	Tdr	Dry	3	3	3	3	3	3	2	0
Leptospermum continentale	Prickly Tea-tree	Tdr	Dry	5	5	5	5	3	2	2	0
Leptospermum scoparium	Manuka	Tda	Dry	1	0	1	1	4	5	5	0
Leptospermum sp.	Tea-tree	T	Dry	0	0	0	0	0	0	0	3
Pteridium esculentum subsp. esculentum	Bracken	Tdr	Dry	1	1	0	0	1	1	1	1
			Total Species	14	13	12	12	12	12	13	10
			Total Amphibious	7	7	6	6	5	5	6	6
			Total Aquatic	3	3	3	3	2	3	3	2
			Total Dry	4	3	3	3	5	4	4	2

AS2	Common Name	Functional Group Code	Functional Group	2014	2015	2016	2017	2019	2020	2021	2022
Gahnia sieberiana	Red-fruit Saw-sedge	ATe	Amphibious	0	0	0	0	1	1	1	0
Juncus procerus	Tall Rush	ATe	Amphibious	0	0	0	0	7	8	0	0
Melaleuca squarrosa	Scented Paperbark	ATw	Amphibious	4	5	5	5	3	6	2	3
Schoenus brevifolius	Zig-zag Bog-sedge (Atw)	ATw	Amphibious	44	46	43	44	43	44	43	44
Chorizandra australis	Southern Bristle-sedge (Se)	Se	Aquatic	18	21	19	18	0	0	9	8
Cryptostylis subulata	Large Tongue-orchid	Se	Aquatic	0	0	1	1	0	0	1	0
Cycnogeton procerum sp. aff.	Southern (Common) Water-ribbons (Se)	Se	Aquatic	0	6	22	22	13	13	16	10
Machaerina tetragona	Square Twig-sedge (Se)	Se	Aquatic	23	26	23	25	13	17	22	20
Banksia marginata	Silver Banksia	Tdr	Dry	1	1	1	1	1	0	1	0
Cassytha pubescens	Downy Dodder-laurel	Tdr	Dry	0	0	0	0	1	0	1	1
Dillwynia cinerascens	Grey Parrot-pea	Tdr	Dry	1	2	1	1	0	0	0	0
Eucalyptus falciformis	Western Peppermint	Tdr	Dry	3	3	3	3	4	4	4	2
Gahnia radula	Thatch Saw-sedge	Tdr	Dry	3	3	3	3	3	3	3	2
Leptospermum scoparium	Manuka	Tda	Dry	5	5	4	4	6	4	3	0
Leptospermum sp.	Tea-tree	T	Dry	0	0	0	0	0	0	0	3
Opercularia varia	Variable Stinkweed	Tdr	Dry	1	0	1	1	4	2	2	2
Platylobium obtusangulum	Common Flat-pea	Tdr	Dry	1	1	1	1	1	1	1	1
Pteridium esculentum subsp. esculentum	Bracken	Tdr	Dry	1	2	1	1	2	2	2	1
Rhytidosporum procumbens	White Marianth	Tdr	Dry	1	1	1	1	1	2	1	2
Thelymitra sp.	Sun-orchid	Tdr	Dry	0	0	0	0	0	0	0	1
			Total Species	13	13	15	15	15	13	16	14
			Amphibious	2	2	2	2	4	4	3	2
			Aquatic	2	3	4	4	2	2	4	3
			Dry	9	8	9	9	9	7	9	9

AS3	Common Name	Functional Group Code	Functional Group	2014	2015	2016	2017	2019	2020	2021	2022
Empodisma minus	Spreading Rope-rush (ATe)	ATe	Amphibious	16	17	17	18	18	17	19	17
Epacris obtusifolia	Blunt leaf-Heath (ATw)	ATw	Amphibious	28	31	27	28	24	32	20	23
Gleichenia dicarpa	Pouched Coral-fern (ATe)	ATe	Amphibious	25	25	26	26	26	26	28	23
Gleichenia microphylla	Scrambling Coral-fern	ATe	Amphibious	1	1	0	0	0	0	0	5
Melaleuca squarrosa	Scented Paperbark (ATw)	ATw	Amphibious	29	31	31	31	33	35	33	32
Schoenus brevifolius	Zig-zag Bog-sedge (ATw)	ATw	Amphibious	37	37	41	44	32	40	32	44
Sprengelia incarnata	Pink Swamp-heath (ATe)	ATe	Amphibious	31	33	32	33	28	34	30	30
Xyris operculata	Tall Yellow-eye (ATe)	ATe	Amphibious	22	22	22	22	21	20	22	20
Machaerina acuta	Pale Twig-sedge (Se)	Se	Aquatic	2	50	0	0	0	0	0	0
Machaerina tetragona	Square Twig-sedge (Se)	Se	Aquatic	24	24	28	26	28	28	27	27
Cassytha glabella	Slender Dodder-laurel (Tdr)	Tdr	Dry	21	20	19	16	9	5	1	4
Drosera binata	Forked Sundew (Tda)	Tda	Dry	12	11	3	2	0	0	0	11
Leptospermum continentale	Prickly Tea-tree (Tdr)	Tdr	Dry	0	0	0	0	18	17	18	0
Leptospermum scoparium	Manuka (Tda)	Tda	Dry	22	22	22	21	0	0	0	0
Leptospermum sp.	Tea-tree (T)	T	Dry	0	0	0	0	0	0	0	18
			Total Species	13	13	11	11	10	10	10	12
			Amphibious	8	8	7	7	7	7	7	8
			Aquatic	2	2	1	1	1	1	1	1
			Dry	3	3	3	3	2	2	2	3

AS4	Common Name	Functional Group Code	Functional Group	2014	2015	2016	2017	2019	2020	2021	2022
Empodisma minus	Spreading Rope-rush (ATe)	ATe	Amphibious	32	32	32	32	36	32	28	27
Epacris obtusifolia	Blunt leaf-Heath (ATw)	Atw	Amphibious	24	24	24	24	24	19	21	14
Gahnia sieberiana	Red-fruit Saw-sedge	ATe	Amphibious	5	7	8	10	10	7	9	6
Gleichenia dicarpa	Pouched Coral-fern (ATe)	ATe	Amphibious	14	19	18	25	21	18	24	11
Gleichenia microphylla	Scrambling Coral-fern (ATe)	ATe	Amphibious	2	2	1	0	10	8	0	16
Lepidosperma longitudinale	Pithy Sword-sedge	ATe	Amphibious	3	3	4	4	2	3	3	4
Leptospermum lanigerum	Woolly Tea-tree	ATw	Amphibious	1	0	1	1	0	0	0	0
Melaleuca squarrosa	Scented Paperbark (ATw)	ATw	Amphibious	39	43	43	44	46	45	46	29
Schoenus brevifolius	Zig-zag Bog-sedge (ATw)	ATw	Amphibious	10	10	11	11	12	15	15	16
Sprengelia incarnata	Pink Swamp-heath	ATe	Amphibious	5	6	5	4	4	4	3	2
Cycnogeton procerum sp. aff.	Southern (Common) Water-ribbons (Se)	Se	Aquatic	37	33	41	41	38	38	40	40
Machaerina acuta	Pale Twig-sedge	Se	Aquatic	0	1	0	0	0	0	0	0
Machaerina arthrophylla	Fine Twig-sedge (Se)	Se	Aquatic	36	33	29	34	32	34	33	28
Machaerina tetragona	Square Twig-sedge	Se	Aquatic	1	1	6	1	1	1	2	0
Banksia marginata	Silver Banksia	Tdr	Dry	1	1	1	1	1	1	1	0
Cassytha glabella	Slender Dodder-laurel (Tdr)	Tdr	Dry	8	11	10	7	4	8	5	4
Comesperma ericinum	Heath Milkwort	Tdr	Dry	1	1	1	1	0	0	0	0
Daucus glochidiatus	Australian Carrot	Tdr	Dry	3	3	3	0	0	0	0	0
Drosera binata	Forked Sundew	Tda	Dry	4	3	5	3	0	0	0	0
Hibbertia fasciculata var. prostrata	Bundled Guinea-flower	Tdr	Dry	0	2	0	0	0	0	0	0
Leptospermum continentale	Prickly Tea-tree (Tdr)	Tdr	Dry	3	3	2	3	19	23	17	0
Leptospermum scoparium	Manuka (Tda)	Tda	Dry	17	15	19	19	1	0	1	0
Leptospermum sp.	Tea-tree	T	Dry	0	0	0	0	0	0	0	10
Pultenaea dentata	Bush-pea	Tdr	Dry	0	3	1	1	0	0	0	0
Pultenaea gunnii	Golden Bush-pea	Tdr	Dry	1	0	2	1	0	0	0	0
			Total Species	21	22	22	20	16	15	15	13
			Amphibious	10	9	10	9	9	9	8	9
			Aquatic	3	4	3	3	3	3	3	2
			Dry	8	9	9	8	4	3	4	2

ASP7	Common Name	Functional Group Code	Functional Group	2014	2015	2016	2017	2019	2020	2021	2022
Empodisma minus	Spreading Rope-rush (ATe)	ATe	Amphibious	10	10	10	10	11	9	10	7
Epacris obtusifolia	Blunt leaf-Heath	ATw	Amphibious	3	3	4	3	2	4	2	4
Gahnia sieberiana	Red-fruit Saw-sedge	ATe	Amphibious	1	1	1	2	2	1	2	1
Gleichenia dicarpa	Pouched Coral-fern	ATe	Amphibious	2	3	2	2	2	2	2	2
Lepidosperma longitudinale	Pithy Sword-sedge	ATe	Amphibious	8	9	8	8	6	5	7	7
Leptospermum lanigerum	Woolly Tea-tree	ATw	Amphibious	3	3	3	3	2	2	2	2
Machaerina juncea	Bare Twig-sedge (ATe)	ATe	Amphibious	16	17	17	13	20	15	19	16
Melaleuca squarrosa	Scented Paperbark (ATw)	ATw	Amphibious	15	15	15	15	18	16	18	13
Schoenus brevifolius	Zig-zag Bog-sedge (ATw)	ATw	Amphibious	23	26	28	27	29	29	30	27
Sprengelia incarnata	Pink Swamp-heath	ATe	Amphibious	0	0	0	0	1	1	0	0
Xyris operculata	Tall Yellow-eye	ATe	Amphibious	2	2	5	2	2	0	2	0
Chorizandra australis	Southern Bristle-sedge	Se	Aquatic	3	3	5	2	0	0	1	0
Cycnogeton procerum sp. aff.	Southern (Common) Water-ribbons (Se)	Se	Aquatic	9	8	44	45	38	40	42	43
Machaerina arthrophylla	Fine Twig-sedge (Se)	Se	Aquatic	40	39	38	39	36	29	34	34
Machaerina tetragona	Square Twig-sedge	Se	Aquatic	1	1	1	1	0	0	0	0
Cassytha glabella	Slender Dodder-laurel	Tdr	Dry	4	3	1	1	1	1	2	2
Leptospermum continentale	Prickly Tea-tree	Tdr	Dry	3	3	3	3	7	6	9	0
Leptospermum scoparium	Manuka	Tda	Dry	0	0	1	1	0	0	0	0
Leptospermum sp.	Tea-tree	T	Dry	0	0	0	0	0	0	0	5
			Total Species	16	16	17	17	15	14	15	13
			Amphibious	10	10	10	10	11	10	10	9
			Aquatic	4	4	4	4	2	2	3	2
			Dry	2	2	3	3	2	2	2	2

AGP2	Common Name	Functional Group Code	Functional Group	2014	2015	2016	2017	2019	2020	2021	2022
Empodisma minus	Spreading Rope-rush	ATe	Amphibious	3	2	2	2	2	1	0	0
Gahnia sieberiana	Red-fruit Saw-sedge	ATe	Amphibious	0	0	0	1	3	1	3	2
Gleichenia dicarpa	Pouched Coral-fern	ATe	Amphibious	1	0	0	0	0	0	0	0
Gleichenia microphylla	Scrambling Coral-fern	ATe	Amphibious	1	0	0	0	0	0	0	0
Isolepis inundata	swamp club-sedge	ATi	Amphibious	0	0	0	0	0	0	0	4
Juncus procerus	Tall Rush (ATe)	ATe	Amphibious	35	37	37	36	31	18	20	3
Lepidosperma longitudinale	Pithy Sword-sedge	ATe	Amphibious	0	0	0	0	4	1	0	0
Melaleuca squarrosa	Scented Paperbark (ATw)	ATw	Amphibious	22	23	26	25	28	25	26	13
Cycnogeton procerum sp. aff.	Southern (Common) Water-ribbons (Se)	Se	Aquatic	41	40	48	46	45	48	46	47
Machaerina arthrophylla	Fine Twig-sedge (Se)	Se	Aquatic	26	26	25	24	11	12	10	12
Leptospermum continentale	Prickly Tea-tree	Tdr	Dry	8	8	0	0	0	0	0	0
Leptospermum scoparium	Manuka (Tda)	Tda	Dry	7	8	18	17	16	12	17	0
Leptospermum sp.	Tea-tree (T)	T	Dry	0	0	0	0	0	0	0	11
			Total Species	9	7	6	7	8	8	6	7
			Amphibious	5	3	3	4	5	5	3	4
			Aquatic	2	2	2	2	2	2	2	2
			Dry	2	2	1	1	1	1	1	1

Anglesea River Estuary - Vegetation Survey Results Summary 2015 - 2022

Note: Species highlighted in green have been identified to be present in >20% of the quadrats (>10 quadrats) surveyed along the transect at any time between 2014 and 2022.

LAR1	Common Name	Functional Group Code	Functional Group	2015	2017	2019	2020	2021	2022
Gahnia sieberiana	Red-fruit Saw-sedge	ATe	Amphibious	3	2	2	2	2	1
Goodenia radicans	Shiny Swamp-mat	ARp	Amphibious			1	1	0	0
Isolepis inundata	Swamp Club-sedge	ATi	Amphibious				0	2	1
Lobelia anceps	Angled Lobelia	ATe	Amphibious			1	1	3	1
Phragmites australis	Common Reed	ARp	Amphibious	2	2	2	3	2	0
Cycnogeton procerum sp. aff.	Southern Water-ribbons (Se)	Se	Aquatic	6	7	6	7	6	5
Juncus kraussii subsp. australiensis	Sea Rush (Se)	Se	Aquatic	2	3	3	4	3	1
Typha domingensis	Narrow-leaf Cumbungi (Se)	Se	Aquatic	5	4	2	0	0	2
Eucalyptus ovata subsp. ovata	Swamp Gum (Tda)	Tda	Dry	3	4	6	7	7	2
Goodenia ovata	Hop Goodenia (Tdr)	Tdr	Dry	4	4	3	3	4	2
Leptospermum scoparium	Manuka (Tda)	Tda	Dry	3	5	4	4	3	3
Acacia longifolia subsp. sophorae	Coast Wattle		Non-native	2	0	3	5	3	1
Holcus lanatus	Yorkshire Fog		Non-native				1	1	0
			Total Species	9	8	11	11	11	10
			Amphibious	2	2	4	4	4	3
			Aquatic	3	3	3	2	2	3
			Dry	3	3	3	3	3	3
			Non-native	1	0	1	2	2	1

LAR2	Common Name	Functional Group Code	Functional Group	2015	2017	2019	2020	2021	2022
Goodenia radicans	Shiny Swamp-mat (ARp)	Arp	Amphibious	15	13	12	11	11	6
Isolepis inundata	Swamp Club-sedge	ATi	Amphibious	1	0	0	0	0	0
Leptinella longipes	Coast Cotula (ARp)	ARp	Amphibious	9	4	7	6	5	0
Lobelia anceps	Angled Lobelia (ATe)	Ate	Amphibious	0	10	11	14	13	13
Phragmites australis	Common Reed (ARp)	ARp	Amphibious	11	11	12	14	15	15
Cycnogeton procerum sp. aff.	Southern Water-ribbons (Se)	Se	Aquatic	8	5	8	1	2	1
Juncus kraussii subsp. australiensis	Sea Rush (Se)	Se	Aquatic	15	15	15	15	14	7
Typha domingensis	Narrow-leaf Cumbungi	Se	Aquatic	1	0	0	0	0	0
Goodenia ovata	Hop Goodenia (Tdr)	Tdr	Dry	1	1	0	2	5	1
Lachnagrostis filiformis	Common Blown-grass (Tdr)	Tdr	Dry	8	11	0	2	4	3
Leptospermum scoparium	Manuka (Tda)	Tda	Dry	2	2	1	1	6	4
Myoporum insulare	Common Boobialla	Tda	Dry			1	2	2	2
Poa poiformis var. poiformis	Coast Tussock-grass (Tdr)	Tdr	Dry	5	7	5	5	10	9
Senecio glomeratus	Annual Fireweed (Tdr)	Tdr	Dry	0	0	0	5	2	1
Plantago coronopus	Buck's-horn Plantain		Non-native	4	1	0	3	0	0
Symphotrichum subulatum	Aster-weed		Non-native	3	1	1	0	1	1

Vulpia sp.	Fescue	Non-native	0	0	4	0	0	0
Rytidosperma sp.	Wallaby-grass	Non-native						3
Gladiolus spp.	Gladiolus	Non-native						1
		Total Species	13	12	11	13	13	14
		Amphibious	4	4	4	4	4	3
		Aquatic	3	2	2	2	2	2
		Dry	4	4	3	6	6	6
		Non-native	2	2	2	1	1	3

LAR3	Common Name	Functional Group Code	Functional Group	2015	2017	2019	2020	2021	2022
Goodenia radicans	Shiny Swamp-mat (ARp)	ARp	Amphibious	5	6	8	7	6	1
Leptinella longipes	Coast Cotula (ARp)	ARp	Amphibious	4	5	6	3	2	0
Lobelia anceps	Angled Lobelia (ATe)	ATe	Amphibious	6	8	3	5	11	2
Phragmites australis	Common Reed (ARp)	ARp	Amphibious	12	12	12	5	10	12
Cycnogeton procerum sp. aff.	Southern Water-ribbons (Se)	Se	Aquatic	15	15	13	0	6	6
Juncus kraussii subsp. australiensis	Sea Rush (Se)	Se	Aquatic	15	15	15	9	15	12
Typha domingensis	Narrow-leaf Cumbungi (Se)	Se	Aquatic	5	5	0	0	0	0
Acacia verticillata	Prickly Moses	Tdr	Dry				1	0	0
Eucalyptus ovata subsp. ovata	Swamp Gum (Tda)	Tda	Dry	3	3	3	5	3	2
Ficinia nodosa	Knobby Club-sedge (Tdr)	Tdr	Dry	8	8	9	6	11	10
Goodenia ovata	Hop Goodenia (Tdr)	Tdr	Dry	3	3	3	1	4	4
Lachnagrostis filiformis	Common Blown-grass	Tdr	Dry	1	0	0	1	0	0
Leptospermum continentale	Prickly Tea-tree	Tdr	Dry			2	0	1	0
Leptospermum scoparium	Manuka (Tda)	Tda	Dry	5	6	7	9	10	8
Myoporum insulare	Common Boobialla	Tda	Dry				1	0	0
Poa poiformis var. poiformis	Coast Tussock-grass (Tdr)	Tdr	Dry	12	13	13	11	13	14
Schoenus apogon	Common Bog-sedge	Tda	Dry		1				
Senecio glomeratus	Annual Fireweed	Tdr	Dry		1	1	1	2	0
Acacia longifolia subsp. longifolia	Sallow Wattle		Non-native			0	3	2	
Aira elegantissima	Delicate Hair-grass		Non-native			0	3	1	
Anthoxanthum odoratum	Sweet Vernal-grass		Non-native				2	1	
Erigeron spp.	Fleabane		Non-native					2	
Gladiolus spp.	Gladiolus		Non-native					1	
Holcus lanatus	Yorkshire Fog		Non-native	2	1	0	1	1	
Hypochaeris radicata	Cat's Ears		Non-native				2	0	
Lotus sp.	Lotus		Non-native				1	0	
Plantago coronopus	Buck's-horn Plantain		Non-native				2	1	
Sonchus oleraceus	Sow Thistle		Non-native				1	0	
Symphotrichum subulatum	Aster-weed		Non-native	1	0	0	0	0	
Vulpia bromoides	Squirrel-tail Fescue		Non-native	0	0	0	4	2	
			Total Species	15	15	13	23	21	10

Amphibious	4	4	4	4	4	3
Aquatic	3	3	2	1	2	2
Dry	6	7	7	9	7	5
Non-native	2	1	0	9	8	0

LAR4	Common Name	Functional Group Code	Functional Group	2015	2017	2019	2020	2021	2022
Frankenia pauciflora var. gunnii	Southern Sea-heath (ARp)	ARp	Amphibious	4	0	0	0	0	0
Goodenia radicans	Shiny Swamp-mat (ARp)	ARp	Amphibious	8	14	11	6	12	11
Isolepis inundata	Swamp Club-sedge (ATi)	ATi	Amphibious	4	5	0	0	0	0
Leptinella longipes	Coast Cotula (ARp)	ARp	Amphibious	5	10	4	5	3	0
Lobelia anceps	Angled Lobelia (ATe)	ATe	Amphibious	1	2	5	5	12	10
Phragmites australis	Common Reed	ARp	Amphibious	1	0	0	0	0	0
Cycnogeton procerum sp. aff.	Southern Water-ribbons (Se)	Se	Aquatic	15	15	15	15	15	14
Juncus kraussii subsp. australiensis	Sea Rush (Se)	Se	Aquatic	15	15	15	15	15	15
Typha domingensis	Narrow-leaf Cumbungi	Se	Aquatic	1	0	0	0	0	0
Cassytha melantha	Coarse Dodder-laurel (Tdr)	Tdr	Dry	3	0	0	1	0	0
Ficinia nodosa	Knobby Club-sedge (Tdr)	Tdr	Dry	0	0	1	0	0	0
Goodenia ovata	Hop Goodenia	Tdr	Dry	1	1	2	3	0	0
Poa poiformis var. poiformis	Coast Tussock-grass (Tdr)	Tdr	Dry	1	1	1	10	2	0
Leptospermum scoparium	Manuka	Tda	Dry				3	0	0
Symphotrichum subulatum	Aster-weed		Non-native			1	0	0	
			Total Species	12	8	9	9	6	4
			Amphibious	6	4	3	3	3	2
			Aquatic	3	2	2	2	2	2
			Dry	3	2	3	4	1	0
			Non-native	0	0	1	0	0	0

Rainfall Data from Nearest Weather Station

Wensleydale (Anglesea (Vehicle Proving Ground)

Monthly Rainfall	2014	2015	2016	2017	2019	2020	2021	2022
June	113	60	52	19	108	37	71	73
July	78	65	155	72	66	35	90	59
August	Not recorded	39	76	75	71	82	42	96
Total Winter Rainfall (Sum June-August)	191	163	283	165	246	154	203	229
September	34.2	51.2	137.6	85.4	50.4	87.8	72.4	54.8
October	33.4	21.6	135.6	36	31.2	105.2	113	180.4
November	50.6	50	31.8	35.8	52.6	61.5	80.6	126.4
Total Spring Rainfall (Sum September-November)	118	123	305	157	134	255	266	362
December	65.4	21.2	28	26.6	49.8	16.8	Not recorded	38.4

http://www.bom.gov.au/jsp/ncc/cdio/weatherData/av?p_nccObsCode=139&p_display_type=dataFile&p_stn_num=087119

Frog Survey Results

Anglesea River Swamp

Note: Cells highlighted in blue are where frogs were detected during that sampling round at the sample location

Common Froglet (Crinia signifera)

	Spring 2014	Spring 2015	Spring 2015	Spring 2016	Spring 2016	October 2017	November 2017	October 2019	December 2019	November 2020	November 2020	November 2021	December 2021	November 2022	November 2022
								Before borefield operation	After borefield operation						
AS1	0	0	0	0	0	0	0	0	0	0	0	0	0	15	2
AS2	0	0	0	15	15	15	15	0	0	0	0	15	15	15	15
AS3	0	0	0	2	3	0	0	0	0	0	0	2	3	0	7
AS4	0	0	0	0	0	0	0	0	0	0	0	2	3	0	0
ASP7	0	0	0	2	3	0	0	0	0	0	2	2	3	4	8
AGP2	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0
AS5	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3
AS6	0	0	0	0	0	0	0	0	0	0	0	0	0	15	15
Total Count	0	0	0	19	21	15	15	0	0	0	2	21	24	58	50

Southern Brown Tree Frog (Litoria ewingii)

	Spring 2014	Spring 2015	Spring 2015	Spring 2016	Spring 2016	October 2017	November 2017	October 2019	December 2019	November 2020	November 2020	November 2021	December 2021	November 2022	November 2022
								Before borefield operation	After borefield operation						
AS1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
AS2	0	0	0	0	0	1	1	0	0	0	0	2	2	4	3
AS3	0	0	0	5	3	0	0	0	0	5	0	5	2	7	3
AS4	0	0	0	0	0	0	0	0	0	0	0	5	3	0	0
ASP7	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0
AGP2	0	0	0	0	0	0	0	0	0	0	0	1	1	2	0
AS5	0	0	0	5	3	0	0	0	0	0	5	5	2	0	2
AS6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Count	0	0	0	10	6	1	1	0	0	5	5	20	12	13	10

Southern Bullfrog (Limnodynastes dumerilii) (Eastern Banjo Frog)

	Spring 2014	Spring 2015	Spring 2015	Spring 2016	Spring 2016	October 2017	November 2017	October 2019	December 2019	November 2020	November 2020	November 2021	December 2021	November 2022	November 2022
								Before borefield operation	After borefield operation						
AS1	0	0	0	0	0	0	0	0	0	0	0	0	0	7	12
AS2	0	0	0	20	20	2	3	0	0	0	0	8	8	5	15
AS3	0	0	0	15	15	0	0	0	0	5	5	8	8	7	3
AS4	0	0	0	0	0	0	0	0	0	0	0	3	3	0	0
ASP7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
AGP2	0	0	0	0	0	0	0	0	0	0	0	1	1	4	0
AS5	0	0	0	0	0	0	0	0	0	0	0	1	1	3	0
AS6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Total Count	0	0	0	35	35	2	3	0	0	5	5	21	21	26	33

Anglesea River Estuary

Note: Cells highlighted in blue are where frogs were detected during that sampling round at the sample location

Common Froglet (Crinia signifera)

	Spring 2015	Spring 2015	October 2017	November 2017	October 2019	December 2019	November 2020	November 2020	November 2021	December 2021	November 2022	November 2022
					Before borefield operation	After borefield operation						
LAR1	0	0	0	0	0	0	5	5	0	0	0	0
LAR2	2	3	0	0	0	0	0	0	0	0	0	0
LAR3	0	0	0	0	0	0	0	0	0	0	0	0
LAR4	2	3	0	0	0	0	0	0	0	0	0	0
Total Count	4	6	0	0	0	0	5	5	0	0	0	0

Southern Brown Tree Frog (Litoria ewingii)

	Spring 2015	Spring 2015	October 2017	November 2017	October 2019	December 2019	November 2020	November 2020	November 2021	December 2021	November 2022	November 2022
					Before borefield operation	After borefield operation						
LAR1	0	0	0	0	0	0	5	5	2	2	1	0
LAR2	0	0	0	0	0	0	0	0	2	2	0	0
LAR3	0	0	0	0	0	0	0	0	1	1	0	0
LAR4	0	0	0	0	0	0	5	5	1	1	0	0
Total Count	0	0	0	0	0	0	10	10	6	6	1	0

Southern Bullfrog (Limnodynastes dumerilii) (Eastern Banjo Frog)

	Spring 2015	Spring 2015	October 2017	November 2017	October 2019	December 2019	November 2020	November 2020	November 2021	December 2021	November 2022	November 2022
					Before borefield operation	After borefield operation						
LAR1	0	0	0	0	0	0	5	5	7	7	0	0
LAR2	0	0	0	0	0	0	5	5	0	0	0	0
LAR3	1	1	0	0	0	0	5	5	7	7	0	0
LAR4	0	0	1	1	0	0	5	5	0	0	0	0
Total Count	1	1	1	1	0	0	20	20	14	14	0	0

Appendix F
Ecological: Aquatic Monitoring Attachments

Table F1 - 2022 Macroinvertebrate data

Species		W2/3				BCT1				SC1			
Family	Genus	E1	E2	E3	T	E1	E2	E3	T	E1	E2	E3	T
Acarina	sp.							1	1				
Chironominae	sp.		7		7								
Corixidae	sp.	1			1								
Culicidae	sp.	6		2	8								
Dytiscidae	sp.	3		1	4		1		1	1	1	3	5
Gripopterygidae	*Illiesoperla*					13	13	23	49			1	1
Hydrobiosidae	*Taschorema* complex					1		1	2				
Janiridae	sp.	3			3						1		1
Leptoceridae	Unidentified	2			2								
Leptoceridae	*Triplectides*					3	1	1	5		4		4
Leptophlebiidae	*Nousia*										1		1
Nannochoristidae	sp.					1		1	2		4	1	5
Oligochaeta	sp.										1		1
Orthocladiinae	sp.										1	2	3
Paramelitidae	sp.									3	4	8	15
Polycentropodidae	*Plectrocnemia*										1		1
Scirtidae	sp.	64	2	10	76	3	1		4	3			3
Simuliidae	sp.					2		9	11			4	4
Talitridae	sp.					1			1				
Tanypodinae	sp.					1		2	3		18	6	24
Tipulidae	sp.									1		1	2
Veliidae	sp.					1		1	2	4	3	5	12

Table F2 - 2021 Macroinvertebrate data

Taxa		BC1				BC2				BC3				BCT1				BCT2				SC	
Family/sub-family	Genus	1	2	3	T	1	2	3	T	1	2	3	T	1	2	3	T	1	2	3	T	1	2
Acarina	sp.			1	1											1	1					2	1
Carabidae	sp.										1		1										
Ceinidae	sp.																						
Ceratopogonidae	sp.			1	1																		
Chironomidae	sp.													0		1	1						
Chironominae	sp.	5	10		15	1			1			2	2		4		4		6	3	9		
Corixidae	sp.																						
Culicidae	sp.										1		1	3			3						
Curculionidae	sp.																		1		1		
Diptera	sp.																		1		1		
Dixidae	sp.			1	1																		
Dolichopodidae	sp.																						
Dugesiidae	sp.																						
Dytiscidae	sp.	8	3	11	22	5	9	3	17	8	7	2	17	1			1			1	1	1	21
Dytiscidae	sp.									2			2										
Elmidae	sp.					1			1														
Eusiridae	sp.																					5	4
Glacidorbidae	sp.																						1
Gripopterygidae	leptoperla									2			2		3	3	3	6	6	13	25		
Hydraenidae	sp.																						
Hydrobiosidae	Taschorema complex	1			1					1			1		1		1		1		1		
Hydrochidae	sp.			1	1	1			1													1	5
Hydrophilidae	sp.			1	1						1		1										
Hygrobiidae	sp.																						
Janiridae	sp.							1	1					5		3	8	1			1		
Koonungidae	sp.					1			1														
Lepidoptera	sp.																						1
Leptoceridae	Leptorussa					1			1			2	2										
Leptoceridae	Triplectidina			2	2																		
Leptoceridae	Tripletides	44	39	27	110	1		1	2					3		2	5	1	2	8	11		
Leptoceridae	sp.			103	103																		
Leptophlebiidae	Ataloplebia		1		1																		
Leptophlebiidae	Nebiosphlebia		56		56																		
Leptophlebiidae	Nousia			30	30	54		23	77		74	56	130										
Leptophlebiidae	Nousia									78			78										
Leptophlebiidae	sp.	32			32		49		49													3	
Lestidae	sp.																						
Nanophyidae	sp.																						
Noteridae	sp.																						
Notonectidae	sp.																						
Odonata	sp.																						
Oligochaeta	sp.						2		2			2	2										
Orthocladiinae	sp.			1	1							2	2										
Paramelitidae	sp.																						
Planorbidae	sp.																						
Polycentropodidae	Neurecipsis													1		1	2						
Scirtidae	sp.	5		3	8	15	11	9	35	2	10	9	21					1			1	8	4
Simuliidae	sp.	1	4		5	1	1	2	4	2	3	1	6		1	1	2		1		1		
Tanypodinae	sp.	1	4		5	2			2	3	4	1	8									1	1
Telephlebiidae	Austrochna	1	3		4																		
Telephlebiidae	sp.			2	2																		
Tipulidae	sp.	1			1	1			1		1		1										
Tipuloidea	sp.						2		2														
Trichoptera	sp.						2		2														
Veliidae	sp.														1				1		1	7	11

Table F2 - 2021 Macroinvertebrate data

Taxa		C1		UAR2				UAR1				W1				W2				W3			
Family/sub-family	Genus	3	T	1	2	3	T	1	2	3	T	1	2	3	T	1	2	3	T	1	2	3	T
Acarina	sp.	1	4											1	1								
Carabidae	sp.							1	2		3												
Ceinidae	sp.			1		1	2			7	7												
Ceratopogonidae	sp.											1	2		3	2			2				
Chironomidae	sp.							15	9		24	19	25		44	1	10	3	14				
Chironominae	sp.			2	3	1	6			3	3												
Corixidae	sp.											43	51	67	161								
Culicidae	sp.				1		1		1		1	55	39	25	119	5	7	1	13	4		4	8
Curculionidae	sp.													1	1								
Diptera	sp.																						
Dixidae	sp.																						
Dolichopodidae	sp.							1	1		2												
Dugesiidae	sp.									1	1												
Dytiscidae	sp.	1	23		11	5	16	1	2	24	27	4		15	19								
Dytiscidae	sp.																						
Elmidae	sp.			1	1		2									1			1				
Eusiridae	sp.		9		12		12																
Glacidorbidae	sp.		1																				
Gripopterygidae	leptoperla																						
Hydraenidae	sp.																	1	1				
Hydrobiosidae	Taschorema complex																						
Hydrochidae	sp.		6			3	3	1			1									1			1
Hydrophilidae	sp.			1		2	3		2		2											1	1
Hygrobiidae	sp.													1	1								
Janiridae	sp.																						
Koonungidae	sp.			3	12	3	18																
Lepidoptera	sp.		1																				
Leptoceridae	Leptorussa																						
Leptoceridae	Triplectidina																						
Leptoceridae	Tripletides																						
Leptoceridae	sp.																						
Leptophlebiidae	Ataloplebia																						
Leptophlebiidae	Nebiosphlebia																						
Leptophlebiidae	Nousia																						
Leptophlebiidae	Nousia																						
Leptophlebiidae	sp.		3																				
Lestidae	sp.					1	1																
Nanophyidae	sp.																			1			1
Noteridae	sp.											1			1								
Notonectidae	sp.			1			1			1	1	1			1								
Odonata	sp.															1			1				
Oligochaeta	sp.								2		2												
Orthocladiinae	sp.																						
Paramelitidae	sp.			4			4																
Planorbidae	sp.				1	3	4																
Polycentropodidae	Neurecipsis																						
Scirtidae	sp.		12							21	21	10	5	2	17	8	30	22	60	31	21	6	58
Simuliidae	sp.																						
Tanypodinae	sp.		2																				
Telephlebiidae	Austrochna					1	1																
Telephlebiidae	sp.																						
Tipulidae	sp.													10	10					1		1	2
Tipuloidea	sp.																						
Trichoptera	sp.																						
Veliidae	sp.	1	19									1			1								

Table F3 - 2020 Macroinvertebrate data

Taxa	W3				BCT				SC1			
	E1	E2	E3	Total	E1	E2	E3	Total	E1	E2	E3	Total
Acarina									1			1
Amphipoda									4			4
Ceratopogonidae	1			1								
Chironominae			7	7			2	2	3	1	28	32
Culicidae	19			19			4	4			1	1
Curculionidae											1	1
Dytiscidae	4		4	8	8		1	9	3		36	39
Gripopterygidae					1			1				
Hydrochidae										1	1	2
Hydrophilidae	1			1							1	1
Koonungidae											4	4
Leptoceridae (Lectrides)											1	1
Leptoceridae (Leptorussa)							6	6				
Leptoceridae (Triplectides)					2	1	6	9			1	1
Leptophlebiidae									1		2	3
Leptophlebiidae (Ulmerophlebia)					1			1	1	4	2	7
Oligochaeta							1	1				
Paramelitidae									4	14	24	42
Polycentropodidae (Plectrocnemia)					2			2	1			1
Scirtidae	10	6	27	43						1	1	2
Tanypodinae									3			3
Tipulidae									1			1
Veliidae									18		9	27

Table F4 - 2019 Macroinvertebrate data

Taxa	BCT1 E1	BCT1 E2	BCT1 Total	SC1 E1	SC1 E2	SC1 E3	SC1 Total	W2/3 E1	W2/3 E2	W2/3 E3	W2/3 Tota	Total
Acarina	6		6	4	2	6	12					18
Carabidae (adult)				1			1					1
Ceratopogonidae									2		2	2
Chironominae				2		3	5					5
Crambidae		1	1									1
Culicidae	8		8			30	30	63		26	89	127
Curculionidae (adult)								1	1		2	2
Dytiscidae (adult)				1	8	9	18	1	2	1	4	22
Dytiscidae (larvae)		1	1	5		13	18					19
Gripopterygidae *Dinatoperla/Leptoperla*				6			6					6
Gripopterygidae *Leptoperla*		4	4									4
Gyrinidae (adult)								1			1	1
Hydraenidae (adult)						2	2		1		1	3
Hydrobiosidae *Taschorema* complex				1			1					1
Hydrochidae (adult)						1	1					1
Hydrophilidae (adult)				1		2	3		7		7	10
Janiridae	1		1									1
Koonungidae					2	4	6					6
Leptoceridae *Triplectides*	13	2	15									15
Leptophlebiidae (a mix of damaged and immature specimens)				3			3					3
Leptophlebiidae *Nousia*		2	2									2
Leptophlebiidae *Thraulophlebia*	7	8	15	29	1	18	48					63
Oligochaeta	2		2	7			7			1	1	10
Orthocladiinae	2		2	5		5	10					12
Paramelitidae				17		6	23					23
Parastacidae *Geocharax tasmanicus*	4	33	37	1	1	1	3					40
Polycentropodidae *Plectrocnemia*	1	3	4	4			4					8
Scirtidae (larvae)	4		4	1	7	1	8	15	25	27	67	79
Veliidae					1	12	13					13

Table F5 - 2018 Macroinvertebrate data

Taxa	BC1-E1	BC1-E2	BC1-E3	total	BC2-E1	BC2-E2	BC2-E3	total	BC3-E1	BC3-E2	BC3-E3	total	BCT1-E1	BCT1-E2	BCT1-E3	total	BCT2-E1	BCT2-E2
Acarina	1	1		2		1	1	2	2			2	3	2	1	6		1
Ceinidae																		
Ceratopogonidae														1		1		
Chironominae	1	32	1	34	18	26	18	62	2	6	20	28	3	13	4	20	4	1
Dixidae			1	1														
Dytiscidae A	5	15	4	24	6	14	17	37	9	12	8	29					2	
Ecnomidae - Ecnomina														3		3		
Geocharax gracilis					2	2	2	6					12	11	7	30	8	8
Gripopterygidae - Dinotoperla													5	3	3	11	4	4
Dytiscidae L	3		1	4	3	5	6	14	15	12	12	39					3	
Hydrophilidae A	2		1	3														
Leptoceridae - Leptorussa	84	32	48	164	1		3	4	4	1	1	6						
Leptoceridae - Triplectides					1	2		3					11	17	17	45	9	2
Leptoceridae - Triplectides/Triplectidina	32		9	41														
Leptophlebiidae - Nousia		38	37	75	4	13	14	31	14	26	21	61		1		1	8	5
Leptophlebiidae - Ulmerophlebia	7			7														
Notonectidae																		
Oligochaeta		1		1	9	1	5	15		4	3	7	1	1		2	4	1
Orthocladiinae					2	1	7	10	8		2	10	2	1	1	4	5	5
Leptoceridae	1			1														
Polycentropodidae - Neureclipsis					1	3	1	5	1			1			1	1		
Scirtidae L		1		1	1	3	3	7	1	2	3	6					2	2
Simuliidae																		
Leptophlebiidae	1			1														
Tanypodinae			1	1	5		2	7		2	1	3		4		4	8	9
Tipulidae										1		1						
Veliidae																		2
Argiolestidae - Austroargiolestes		1		1									1	2		3		
Culicidae	3	13	17	33	14	18	36	68	32	25	24	81		2		2	11	26
Curculionidae A																		
Gordiidae																		1
Hydraenidae A	1		1	2					1			1						
Hydrochidae A					1	1		2	4	1		5						
Janiridae						1		1						1		1		
Koonungidae																		
Lestidae - Austrolestes																		
Nannochoristidae													2			2		
Paramelitidae															1	1	1	
Phreatoicidae																		
Podonominae																		
Pyralidae					1			1										
Sphaeriidae		3		3														
Talitridae														1		1		
Telephlebiidae - Austroaeschna		1		1									3			3		

Table F5 - 2018 Macroinvertebrate data

Taxa	BCT2-E3	total	SC1-E1	SC1-E2	SC1-E3	total	UAR1-E1	UAR1-E2	UAR1-E3	total	UAR2-E1	UAR2-E2	UAR2-E3	total	W2-E1	W2-E2	W2-E3	total
Acarina		1	3	1	2	6	1			1	1	1	2	4				
Ceinidae							47	36	53	136	1	2	1	4				
Ceratopogonidae																		
Chironominae	1	6	3	1	7	11	1	1	1	3			1	1				
Dixidae																		
Dytiscidae A		2	3	2	6	11	9	14	6	29	15	11	11	37	3	1	5	9
Ecnomidae - Ecnomina																		
Geocharax gracilis	11	27	4			4	5	4	5	14	5	5	5	15				
Gripopterygidae - Dinotoperla	3	11																
Dytiscidae L					1	1	2			2	3	5	6	14				
Hydrophilidae A	1	4	1	1		2					4	3	1	8			1	1
Leptoceridae - Leptorussa				1		1	5	6	5	16		1	2	3		1		1
Leptoceridae - Triplectides	12	23		1		1												
Leptoceridae - Triplectides/Triplectidina																		
Leptophlebiidae - Nousia	18	31		1		1												
Leptophlebiidae - Ulmerophlebia																		
Notonectidae																1		1
Oligochaeta	1	6			5	5					2		1	3				
Orthocladiinae	3	13	3	3	1	7	1			1								
Leptoceridae																		
Polycentropodidae - Neureclipsis																		
Scirtidae L	1	5			1	1	15	7	7	29	28	21	8	57	30	5	16	51
Simuliidae				1		1												
Leptophlebiidae																		
Tanypodinae		17			2	2					2	2	1	5				
Tipulidae																		
Veliidae	1	3	20	4	14	38	1			1			4	4		1		1
Argiolestidae - Austroargiolestes																		
Culicidae	8	45			1	1	44	40	32	116	13	8	15	36	60	27	23	110
Curculionidae A															18		11	29
Gordiidae		1																
Hydraenidae A			1		1	2	1	1		2	1			1			1	1
Hydrochidae A			6	3	1	10	23	7	11	41	9	11	8	28				
Janiridae	3	3											2	2				
Koonungidae					3	3	3	11	4	18								
Lestidae - Austrolestes							11	3	9	23	3	2	1	6				
Nannochoristidae																		
Paramelitidae		1	3	1	5	9						1		1				
Phreatoicidae											9	6	7	22				
Podonominae													1	1				
Pyralidae																		
Sphaeriidae																		
Talitridae																		
Telephlebiidae - Austroaeschna																		

Table F6 - 2017 Macroinvertebrate data

Class/Order	Family/Subfamily	Genus	BCT1-1	BCT1-2	BCT1-3	Total	SC1-1	SC1-2	SC1-3	Total	W3-1	W3-2	W3-3	Total
Acarina			2	4	7	13		4	3	7				
Amphipoda	Paramelitidae				1	1		1		1				
Amphipoda				2		2								
Anaspidacea	Koonungidae						12	5		17				
Coleoptera	Chrysomeliidae (L)		1			1								
Coleoptera	Dytiscidae (A)		1			1	10	8	1	19	3		3	6
Coleoptera	Hydrochidae (A)						2	2		4				
Coleoptera	Hydrophilidae (A)		1		1	2		1	1	2	2		1	3
Coleoptera	Scirtidae (L)						2			2	32	18	43	93
Decapoda	Parastacidae	*Geocharax gracilis*	6	3	6	15		2	6	8				
Diptera	Ceratopogoninae		1			1			1	1				
Diptera	Chironomidae							1		1				
Diptera	Chironominae		4	1	10	15	8	9	4	21	4		6	10
Diptera	Culicidae										16	12	17	45
Diptera	Orthocladiinae			2	1	3	18	4		22				
Diptera	Psychodidae		1			1			1	1				
Diptera	Simuliidae		1		13	14	10	34	1	45				
Diptera	Tanypodinae						1	2		3	1			1
Ephemeroptera	Caenidae	*Tasmanocoenis*						2		2				
Ephemeroptera	Leptophlebiidae	*Thraulophlebia*	1	1		2	12	10		22				
Ephemeroptera	Leptophlebiidae	*Ulmerophlebia*			1	1								
Ephemeroptera	Leptophlebiidae							4		4				
Hemiptera	Veliidae		1	1		2	12	13	1	26				
Isopoda	Janiridae	*Heterias*	1			1			1	1				
Lepidoptera	Crambidae						1			1				
Mecoptera	Nannochoristidae	*Nannochorista*	1			1			1	1				
Odonata	Argiolestidae	*Austroargiolestes*		1		1								
Odonata	Telephlebiidae	*Austroaeschna*		1	2	3								
Odonata	Telephlebiidae/Brachytronidae		3	1		4								
Oligochaeta				1		1	3	2		5				
Plecoptera	Gripopterygidae	*Illiesoperla*	1	1	3	5	1			1				
Plecoptera	Gripopterygidae		49		47	96	2	1		3				
Trichoptera	Ecnomidae	*Dateronomina*	1		1	2								
Trichoptera	Hydrobiosidae	*Taschorema* complex						1		1				
Trichoptera	Leptoceridae	*Triplectides*	6	14	8	28		10		10				

Table F7 - Southern Pygmy Perch and Otway Bush Yabby Catch Results

SiteCode	DateVisited	Year	GearType	Replicate Nur	TaxaCode	Scientific Name	Common name	Abundance	inTimeStamp
17-074_BCT1	10-Oct-17	2017	Bait trap	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	1	13/10/2022 16:52
17-074_BCT1	10-Oct-17	2017	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	6	13/10/2022 16:52
17-074_BCT1	10-Oct-17	2017	Bait trap	2	Nan aus	*Nannoperca australis*	Southern pygmy perch	5	13/10/2022 16:52
17-074_BCT1	10-Oct-17	2017	Bait trap	4	Nan aus	*Nannoperca australis*	Southern pygmy perch	4	13/10/2022 16:52
17-074_BCT1	10-Oct-17	2017	Bait trap	6	Geo gra	*Geocharax gracilis*	Otway bush yabby	1	13/10/2022 16:52
17-074_BCT1	10-Oct-17	2017	Bait trap	6	Nan aus	*Nannoperca australis*	Southern pygmy perch	2	13/10/2022 16:52
17-074_BCT1	10-Oct-17	2017	Bait trap	7	Geo gra	*Geocharax gracilis*	Otway bush yabby	3	13/10/2022 16:52
17-074_BCT1	10-Oct-17	2017	Bait trap	7	Nan aus	*Nannoperca australis*	Southern pygmy perch	1	13/10/2022 16:52
17-074_BCT1	10-Oct-17	2017	Bait trap	8	Geo gra	*Geocharax gracilis*	Otway bush yabby	1	13/10/2022 16:52
17-074_SC1	10-Oct-17	2017	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	3	13/10/2022 16:52
17-074_SC1	10-Oct-17	2017	Bait trap	2	Nan aus	*Nannoperca australis*	Southern pygmy perch	3	13/10/2022 16:52
17-074_SC1	10-Oct-17	2017	Bait trap	3	Nan aus	*Nannoperca australis*	Southern pygmy perch	11	13/10/2022 16:52
17-074_SC1	10-Oct-17	2017	Bait trap	4	Nan aus	*Nannoperca australis*	Southern pygmy perch	14	13/10/2022 16:52
17-074_SC1	10-Oct-17	2017	Bait trap	6	Nan aus	*Nannoperca australis*	Southern pygmy perch	5	13/10/2022 16:52
17-074_SC1	10-Oct-17	2017	Bait trap	7	Nan aus	*Nannoperca australis*	Southern pygmy perch	17	13/10/2022 16:52
17-074_SC1	10-Oct-17	2017	Bait trap	9	Nan aus	*Nannoperca australis*	Southern pygmy perch	6	13/10/2022 16:52
17-074_SC1	10-Oct-17	2017	Bait trap	10	Nan aus	*Nannoperca australis*	Southern pygmy perch	6	13/10/2022 16:52
18-058_BCT1	18-Oct-18	2018	Bait trap	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	1	6/12/2019 9:47
18-058_BCT1	18-Oct-18	2018	Bait trap	2	Geo gra	*Geocharax gracilis*	Otway bush yabby	1	6/12/2019 9:47
18-058_BCT1	18-Oct-18	2018	Bait trap	3	Geo gra	*Geocharax gracilis*	Otway bush yabby	1	6/12/2019 9:47
18-058_BCT1	18-Oct-18	2018	Bait trap	4	Geo gra	*Geocharax gracilis*	Otway bush yabby	1	6/12/2019 9:47
18-058_BCT1	18-Oct-18	2018	Bait trap	5	Geo gra	*Geocharax gracilis*	Otway bush yabby	1	6/12/2019 9:47
18-058_BCT1	18-Oct-18	2018	Dip net	13	Geo gra	*Geocharax gracilis*	Otway bush yabby	28	6/12/2019 9:47
18-058_BCT1	18-Oct-18	2018	Observation	14	Ang aus	*Anguilla australis*	Short-finned eel		6/12/2019 9:47
18-058_SC1	19-Oct-18	2018	Bait trap	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	1	6/12/2019 9:47
18-058_SC1	19-Oct-18	2018	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	21	6/12/2019 9:47
18-058_SC1	19-Oct-18	2018	Bait trap	2	Nan aus	*Nannoperca australis*	Southern pygmy perch	2	6/12/2019 9:47
18-058_SC1	19-Oct-18	2018	Bait trap	4	Nan aus	*Nannoperca australis*	Southern pygmy perch	10	6/12/2019 9:47
18-058_SC1	19-Oct-18	2018	Bait trap	5	Nan aus	*Nannoperca australis*	Southern pygmy perch	5	6/12/2019 9:47
18-058_SC1	19-Oct-18	2018	Bait trap	6	Nan aus	*Nannoperca australis*	Southern pygmy perch	4	6/12/2019 9:47
18-058_SC1	19-Oct-18	2018	Bait trap	7	Nan aus	*Nannoperca australis*	Southern pygmy perch	2	6/12/2019 9:47
18-058_SC1	19-Oct-18	2018	Bait trap	9	Nan aus	*Nannoperca australis*	Southern pygmy perch	5	6/12/2019 9:47
18-058_SC1	19-Oct-18	2018	Bait trap	10	Nan aus	*Nannoperca australis*	Southern pygmy perch	7	6/12/2019 9:47
18-058_SC1	19-Oct-18	2018	Dip net	11	Geo gra	*Geocharax gracilis*	Otway bush yabby	6	6/12/2019 9:47
19-038_20_BrCk	29-Oct-20	2020	Bait trap	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	5	2/02/2021 9:41
19-038_20_BrCk	29-Oct-20	2020	Dip net	2	Geo gra	*Geocharax gracilis*	Otway bush yabby	34	2/02/2021 9:41
19-038_20_BrCk	29-Oct-20	2020	Dip net	3	Geo gra	*Geocharax gracilis*	Otway bush yabby	12	2/02/2021 9:41
19-038_20_BrCk	29-Oct-20	2020	Dip net	4	Geo gra	*Geocharax gracilis*	Otway bush yabby	35	2/02/2021 9:41
19-038_20_SaCk	05-Nov-20	2020	Bait trap	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	2	2/02/2021 9:41
19-038_20_SaCk	05-Nov-20	2020	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	72	2/02/2021 9:41
19-038_20_SaCk	05-Nov-20	2020	Dip net	2	Geo gra	*Geocharax gracilis*	Otway bush yabby	3	2/02/2021 9:41
19-038_20_SaCk	05-Nov-20	2020	Dip net	3	Geo gra	*Geocharax gracilis*	Otway bush yabby	2	2/02/2021 9:41
19-038_20_SaCk	05-Nov-20	2020	Dip net	4	Geo gra	*Geocharax gracilis*	Otway bush yabby	15	2/02/2021 9:41
19-038_2022_BCT1	17-Nov-22	2022	Dip net	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	30	21/11/2022 8:56
19-038_2022_BCT1	17-Nov-22	2022	Bait trap	2	Geo gra	*Geocharax gracilis*	Otway bush yabby	16	21/11/2022 8:56
19-038_2022_SC1	18-Nov-22	2022	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	37	21/11/2022 8:56
19-038_2022_SC1	18-Nov-22	2022	Dip net	2	Geo gra	*Geocharax gracilis*	Otway bush yabby	2	21/11/2022 8:56
19-038_2022_SC1	18-Nov-22	2022	Dip net	2	Nan aus	*Nannoperca australis*	Southern pygmy perch	4	21/11/2022 8:56
19-038_21_BCT1	09-Nov-21	2021	Bait trap	1	Cri sp	*Crinia sp*	Common toadlet	5	22/02/2022 17:44
19-038_21_BCT1	09-Nov-21	2021	Bait trap	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	9	22/02/2022 17:44
19-038_21_SC1	16-Nov-21	2021	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	27	22/02/2022 17:44
19-038_BCT1	30-Oct-19	2019	Bait trap	12	Geo gra	*Geocharax gracilis*	Otway bush yabby	3	6/12/2019 10:55
19-038_BCT1	30-Oct-19	2019	Dip net	13	Geo gra	*Geocharax gracilis*	Otway bush yabby	5	6/12/2019 10:55
19-038_BCT1	30-Oct-19	2019	Dip net	14	Geo gra	*Geocharax gracilis*	Otway bush yabby	12	6/12/2019 10:55
19-038_SC1	30-Oct-19	2019	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	5	6/12/2019 10:55
19-038_SC1	30-Oct-19	2019	Bait trap	2	Nan aus	*Nannoperca australis*	Southern pygmy perch	4	6/12/2019 10:55
19-038_SC1	30-Oct-19	2019	Bait trap	3	Geo vic	*Geocrinia victoriana*	Eastern smooth frog	3	6/12/2019 10:55
19-038_SC1	30-Oct-19	2019	Bait trap	3	Nan aus	*Nannoperca australis*	Southern pygmy perch	1	6/12/2019 10:55
19-038_SC1	30-Oct-19	2019	Bait trap	5	Geo vic	*Geocrinia victoriana*	Eastern smooth frog	1	6/12/2019 10:55
19-038_SC1	30-Oct-19	2019	Bait trap	5	Nan aus	*Nannoperca australis*	Southern pygmy perch	1	6/12/2019 10:55
19-038_SC1	30-Oct-19	2019	Bait trap	6	Geo gra	*Geocharax gracilis*	Otway bush yabby	1	6/12/2019 10:55
19-038_SC1	30-Oct-19	2019	Bait trap	6	Geo vic	*Geocrinia victoriana*	Eastern smooth frog	1	6/12/2019 10:55
19-038_SC1	30-Oct-19	2019	Bait trap	7	Geo vic	*Geocrinia victoriana*	Eastern smooth frog	3	6/12/2019 10:55
19-038_SC1	30-Oct-19	2019	Bait trap	8	Geo vic	*Geocrinia victoriana*	Eastern smooth frog	1	6/12/2019 10:55
19-038_SC1	30-Oct-19	2019	Bait trap	9	Geo vic	*Geocrinia victoriana*	Eastern smooth frog	3	6/12/2019 10:55
19-038_SC1	30-Oct-19	2019	Bait trap	10	Geo vic	*Geocrinia victoriana*	Eastern smooth frog	5	6/12/2019 10:55

Table F8 - Southern Pygmy Perch and Otway Bush Yabby Biological Data

SiteCode	DateVisited	Year	GearType	eplicateNu	TaxaCode	Scientific name	Common name	Length	Weight	Sex	MaturityCondition	Condition	Comments
17-074_BCT1	10-Oct-17	2017	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	61	3.1	M			
17-074_BCT1	10-Oct-17	2017	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	53	2.2	M			
17-074_BCT1	10-Oct-17	2017	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	49	1.3	F			
17-074_BCT1	10-Oct-17	2017	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	53	2	M			
17-074_BCT1	10-Oct-17	2017	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	45	1.2	F			
17-074_BCT1	10-Oct-17	2017	Bait trap	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	7		M			
17-074_BCT1	10-Oct-17	2017	Bait trap	2	Nan aus	*Nannoperca australis*	Southern pygmy perch	52	2.1	F			
17-074_BCT1	10-Oct-17	2017	Bait trap	2	Nan aus	*Nannoperca australis*	Southern pygmy perch	56	2.3	M			
17-074_BCT1	10-Oct-17	2017	Bait trap	2	Nan aus	*Nannoperca australis*	Southern pygmy perch	57	2.4	F			
17-074_BCT1	10-Oct-17	2017	Bait trap	2	Nan aus	*Nannoperca australis*	Southern pygmy perch	57	2.3	M			
17-074_BCT1	10-Oct-17	2017	Bait trap	2	Nan aus	*Nannoperca australis*	Southern pygmy perch	63	3.9	M			
17-074_BCT1	10-Oct-17	2017	Bait trap	4	Nan aus	*Nannoperca australis*	Southern pygmy perch	50	1.7	M			
17-074_BCT1	10-Oct-17	2017	Bait trap	4	Nan aus	*Nannoperca australis*	Southern pygmy perch	44	1	M			
17-074_BCT1	10-Oct-17	2017	Bait trap	4	Nan aus	*Nannoperca australis*	Southern pygmy perch	48	1.4	M			
17-074_BCT1	10-Oct-17	2017	Bait trap	4	Nan aus	*Nannoperca australis*	Southern pygmy perch	45	1.2	M			
17-074_BCT1	10-Oct-17	2017	Bait trap	6	Nan aus	*Nannoperca australis*	Southern pygmy perch	40	0.8	M			
17-074_BCT1	10-Oct-17	2017	Bait trap	6	Nan aus	*Nannoperca australis*	Southern pygmy perch	59	2.8	F	Gravid		
17-074_BCT1	10-Oct-17	2017	Bait trap	6	Geo gra	*Geocharax gracilis*	Otway bush yabby	5		F			
17-074_BCT1	10-Oct-17	2017	Bait trap	7	Nan aus	*Nannoperca australis*	Southern pygmy perch	42	1	M			
17-074_BCT1	10-Oct-17	2017	Bait trap	7	Geo gra	*Geocharax gracilis*	Otway bush yabby	3.5					
17-074_BCT1	10-Oct-17	2017	Bait trap	7	Geo gra	*Geocharax gracilis*	Otway bush yabby	6		F			
17-074_BCT1	10-Oct-17	2017	Bait trap	7	Geo gra	*Geocharax gracilis*	Otway bush yabby	7		M			
17-074_BCT1	10-Oct-17	2017	Bait trap	8	Geo gra	*Geocharax gracilis*	Otway bush yabby	8		M			
17-074_BCT1	10-Oct-17	2017	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	62	3.2	M			
17-074_SC1	10-Oct-17	2017	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	37	0.6				
17-074_SC1	10-Oct-17	2017	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	37	0.7				
17-074_SC1	10-Oct-17	2017	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	33	0.4				
17-074_SC1	10-Oct-17	2017	Bait trap	2	Nan aus	*Nannoperca australis*	Southern pygmy perch	30	0.4				
17-074_SC1	10-Oct-17	2017	Bait trap	2	Nan aus	*Nannoperca australis*	Southern pygmy perch	33	0.5				
17-074_SC1	10-Oct-17	2017	Bait trap	2	Nan aus	*Nannoperca australis*	Southern pygmy perch	34	0.6				
17-074_SC1	10-Oct-17	2017	Bait trap	3	Nan aus	*Nannoperca australis*	Southern pygmy perch	39	0.8				
17-074_SC1	10-Oct-17	2017	Bait trap	3	Nan aus	*Nannoperca australis*	Southern pygmy perch	40	0.8				
17-074_SC1	10-Oct-17	2017	Bait trap	3	Nan aus	*Nannoperca australis*	Southern pygmy perch	36	0.6				
17-074_SC1	10-Oct-17	2017	Bait trap	3	Nan aus	*Nannoperca australis*	Southern pygmy perch	36	0.7	F			
17-074_SC1	10-Oct-17	2017	Bait trap	3	Nan aus	*Nannoperca australis*	Southern pygmy perch	33	0.6				
17-074_SC1	10-Oct-17	2017	Bait trap	3	Nan aus	*Nannoperca australis*	Southern pygmy perch	28	0.3				
17-074_SC1	10-Oct-17	2017	Bait trap	3	Nan aus	*Nannoperca australis*	Southern pygmy perch	33	0.5				
17-074_SC1	10-Oct-17	2017	Bait trap	3	Nan aus	*Nannoperca australis*	Southern pygmy perch	31	0.5				
17-074_SC1	10-Oct-17	2017	Bait trap	3	Nan aus	*Nannoperca australis*	Southern pygmy perch	35	0.7				
17-074_SC1	10-Oct-17	2017	Bait trap	3	Nan aus	*Nannoperca australis*	Southern pygmy perch	37	0.8				
17-074_SC1	10-Oct-17	2017	Bait trap	3	Nan aus	*Nannoperca australis*	Southern pygmy perch	41	0.9				
17-074_SC1	10-Oct-17	2017	Bait trap	4	Nan aus	*Nannoperca australis*	Southern pygmy perch	42	0.9				
17-074_SC1	10-Oct-17	2017	Bait trap	4	Nan aus	*Nannoperca australis*	Southern pygmy perch	25	0.3				
17-074_SC1	10-Oct-17	2017	Bait trap	4	Nan aus	*Nannoperca australis*	Southern pygmy perch	26	0.2				
17-074_SC1	10-Oct-17	2017	Bait trap	4	Nan aus	*Nannoperca australis*	Southern pygmy perch	33	0.6				
17-074_SC1	10-Oct-17	2017	Bait trap	4	Nan aus	*Nannoperca australis*	Southern pygmy perch	34	0.5				
17-074_SC1	10-Oct-17	2017	Bait trap	4	Nan aus	*Nannoperca australis*	Southern pygmy perch	45	1.1				
17-074_SC1	10-Oct-17	2017	Bait trap	4	Nan aus	*Nannoperca australis*	Southern pygmy perch	31	0.4				
17-074_SC1	10-Oct-17	2017	Bait trap	4	Nan aus	*Nannoperca australis*	Southern pygmy perch	34	0.5				
17-074_SC1	10-Oct-17	2017	Bait trap	4	Nan aus	*Nannoperca australis*	Southern pygmy perch	29	0.3				
17-074_SC1	10-Oct-17	2017	Bait trap	4	Nan aus	*Nannoperca australis*	Southern pygmy perch	38	0.6				
17-074_SC1	10-Oct-17	2017	Bait trap	4	Nan aus	*Nannoperca australis*	Southern pygmy perch	31	0.4				
17-074_SC1	10-Oct-17	2017	Bait trap	4	Nan aus	*Nannoperca australis*	Southern pygmy perch	33	0.5				
17-074_SC1	10-Oct-17	2017	Bait trap	4	Nan aus	*Nannoperca australis*	Southern pygmy perch	39	0.8			F (Fin condition poor)	Caudal
17-074_SC1	10-Oct-17	2017	Bait trap	4	Nan aus	*Nannoperca australis*	Southern pygmy perch	37	0.6				
18-058_BCT1	18-Oct-18	2018	Bait trap	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	11					
18-058_BCT1	18-Oct-18	2018	Bait trap	2	Geo gra	*Geocharax gracilis*	Otway bush yabby	16					
18-058_BCT1	18-Oct-18	2018	Bait trap	3	Geo gra	*Geocharax gracilis*	Otway bush yabby	16					
18-058_BCT1	18-Oct-18	2018	Bait trap	4	Geo gra	*Geocharax gracilis*	Otway bush yabby	18					
18-058_BCT1	18-Oct-18	2018	Bait trap	5	Geo gra	*Geocharax gracilis*	Otway bush yabby	18					
18-058_BCT1	18-Oct-18	2018	Dip net	13	Geo gra	*Geocharax gracilis*	Otway bush yabby	6					
18-058_BCT1	18-Oct-18	2018	Dip net	13	Geo gra	*Geocharax gracilis*	Otway bush yabby	11					
18-058_BCT1	18-Oct-18	2018	Dip net	13	Geo gra	*Geocharax gracilis*	Otway bush yabby	6					
18-058_BCT1	18-Oct-18	2018	Dip net	13	Geo gra	*Geocharax gracilis*	Otway bush yabby	11					
18-058_BCT1	18-Oct-18	2018	Dip net	13	Geo gra	*Geocharax gracilis*	Otway bush yabby	13					
18-058_BCT1	18-Oct-18	2018	Dip net	13	Geo gra	*Geocharax gracilis*	Otway bush yabby	13					
18-058_BCT1	18-Oct-18	2018	Dip net	13	Geo gra	*Geocharax gracilis*	Otway bush yabby	20					
18-058_BCT1	18-Oct-18	2018	Dip net	13	Geo gra	*Geocharax gracilis*	Otway bush yabby	15					
18-058_BCT1	18-Oct-18	2018	Dip net	13	Geo gra	*Geocharax gracilis*	Otway bush yabby	18					
18-058_BCT1	18-Oct-18	2018	Dip net	13	Geo gra	*Geocharax gracilis*	Otway bush yabby	15					
18-058_BCT1	18-Oct-18	2018	Dip net	13	Geo gra	*Geocharax gracilis*	Otway bush yabby	3.5					
18-058_BCT1	18-Oct-18	2018	Dip net	13	Geo gra	*Geocharax gracilis*	Otway bush yabby	6					
18-058_BCT1	18-Oct-18	2018	Dip net	13	Geo gra	*Geocharax gracilis*	Otway bush yabby	8					
18-058_BCT1	18-Oct-18	2018	Dip net	13	Geo gra	*Geocharax gracilis*	Otway bush yabby	13					
18-058_BCT1	18-Oct-18	2018	Dip net	13	Geo gra	*Geocharax gracilis*	Otway bush yabby	9					
18-058_BCT1	18-Oct-18	2018	Dip net	13	Geo gra	*Geocharax gracilis*	Otway bush yabby	9					
18-058_BCT1	18-Oct-18	2018	Dip net	13	Geo gra	*Geocharax gracilis*	Otway bush yabby	5					
18-058_BCT1	18-Oct-18	2018	Dip net	13	Geo gra	*Geocharax gracilis*	Otway bush yabby	5.5					
18-058_BCT1	18-Oct-18	2018	Dip net	13	Geo gra	*Geocharax gracilis*	Otway bush yabby	9					
18-058_BCT1	18-Oct-18	2018	Dip net	13	Geo gra	*Geocharax gracilis*	Otway bush yabby	5					
18-058_BCT1	18-Oct-18	2018	Dip net	13	Geo gra	*Geocharax gracilis*	Otway bush yabby	8					
18-058_BCT1	18-Oct-18	2018	Dip net	13	Geo gra	*Geocharax gracilis*	Otway bush yabby	5					
18-058_BCT1	18-Oct-18	2018	Dip net	13	Geo gra	*Geocharax gracilis*	Otway bush yabby	4					
18-058_BCT1	18-Oct-18	2018	Dip net	13	Geo gra	*Geocharax gracilis*	Otway bush yabby	4					
18-058_BCT1	18-Oct-18	2018	Dip net	13	Geo gra	*Geocharax gracilis*	Otway bush yabby	5					
18-058_BCT1	18-Oct-18	2018	Dip net	13	Geo gra	*Geocharax gracilis*	Otway bush yabby	6					
18-058_BCT1	18-Oct-18	2018	Dip net	13	Geo gra	*Geocharax gracilis*	Otway bush yabby	3.5					
18-058_BCT1	18-Oct-18	2018	Dip net	13	Geo gra	*Geocharax gracilis*	Otway bush yabby	5					
18-058_BCT1	18-Oct-18	2018	Dip net	13	Geo gra	*Geocharax gracilis*	Otway bush yabby	5					
18-058_BCT1	18-Oct-18	2018	Dip net	13	Geo gra	*Geocharax gracilis*	Otway bush yabby	5					
18-058_SC1	19-Oct-18	2018	Bait trap	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	17		M			
18-058_SC1	19-Oct-18	2018	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	47	1.3	M			
18-058_SC1	19-Oct-18	2018	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	41	0.8	M			

Table F8 - Southern Pygmy Perch and Otway Bush Yabby Biological Data

SiteCode	DateVisited	Year	GearType	eplicateNu	TaxaCode	Scientific name	Common name	Length	Weight	Sex	MaturityCondition	Condition	Comments
18-058_SC1	19-Oct-18	2018	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	44	1.1	F			
18-058_SC1	19-Oct-18	2018	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	40	0.8	M			
18-058_SC1	19-Oct-18	2018	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	42	0.9	F			
18-058_SC1	19-Oct-18	2018	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	42	0.9	M			
18-058_SC1	19-Oct-18	2018	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	47	1.5	F			
18-058_SC1	19-Oct-18	2018	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	38	0.6	M			
18-058_SC1	19-Oct-18	2018	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	37	0.6	F			
18-058_SC1	19-Oct-18	2018	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	40	0.7	M			
18-058_SC1	19-Oct-18	2018	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	27	0.2	J			
18-058_SC1	19-Oct-18	2018	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	26	0.2	J			
18-058_SC1	19-Oct-18	2018	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	29	0.3	J			
18-058_SC1	19-Oct-18	2018	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	27	0.3	J			
18-058_SC1	19-Oct-18	2018	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	46	1	F			
18-058_SC1	19-Oct-18	2018	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	27	0.3	J			
18-058_SC1	19-Oct-18	2018	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	46	1.2	M			
18-058_SC1	19-Oct-18	2018	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	38	0.7	F			
18-058_SC1	19-Oct-18	2018	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	31	0.3	J			
18-058_SC1	19-Oct-18	2018	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	41	0.8	M			
18-058_SC1	19-Oct-18	2018	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	39	0.8	F			
18-058_SC1	19-Oct-18	2018	Bait trap	2	Nan aus	*Nannoperca australis*	Southern pygmy perch	42	1	M			
18-058_SC1	19-Oct-18	2018	Bait trap	2	Nan aus	*Nannoperca australis*	Southern pygmy perch	38	0.8	M			
18-058_SC1	19-Oct-18	2018	Bait trap	4	Nan aus	*Nannoperca australis*	Southern pygmy perch	49	1.7	F			
18-058_SC1	19-Oct-18	2018	Bait trap	4	Nan aus	*Nannoperca australis*	Southern pygmy perch	39	0.8	M			
18-058_SC1	19-Oct-18	2018	Bait trap	4	Nan aus	*Nannoperca australis*	Southern pygmy perch	41	1	M			
18-058_SC1	19-Oct-18	2018	Bait trap	4	Nan aus	*Nannoperca australis*	Southern pygmy perch	44	1	M			
18-058_SC1	19-Oct-18	2018	Bait trap	4	Nan aus	*Nannoperca australis*	Southern pygmy perch	36	0.7	M			
18-058_SC1	19-Oct-18	2018	Bait trap	4	Nan aus	*Nannoperca australis*	Southern pygmy perch	29	0.3	J			
18-058_SC1	19-Oct-18	2018	Bait trap	4	Nan aus	*Nannoperca australis*	Southern pygmy perch	46	1.1	M			
18-058_SC1	19-Oct-18	2018	Bait trap	4	Nan aus	*Nannoperca australis*	Southern pygmy perch	40	0.8	M			
18-058_SC1	19-Oct-18	2018	Bait trap	4	Nan aus	*Nannoperca australis*	Southern pygmy perch	47	1.3	M			
18-058_SC1	19-Oct-18	2018	Bait trap	4	Nan aus	*Nannoperca australis*	Southern pygmy perch	40	0.8	M			
18-058_SC1	19-Oct-18	2018	Bait trap	4	Nan aus	*Nannoperca australis*	Southern pygmy perch	47	1.3	M			
18-058_SC1	19-Oct-18	2018	Bait trap	4	Nan aus	*Nannoperca australis*	Southern pygmy perch	48	1.3	M			
18-058_SC1	19-Oct-18	2018	Bait trap	5	Nan aus	*Nannoperca australis*	Southern pygmy perch	40	0.8	F			
18-058_SC1	19-Oct-18	2018	Bait trap	5	Nan aus	*Nannoperca australis*	Southern pygmy perch	61	2.9	M			
18-058_SC1	19-Oct-18	2018	Bait trap	5	Nan aus	*Nannoperca australis*	Southern pygmy perch	29	0.4	J			
18-058_SC1	19-Oct-18	2018	Bait trap	5	Nan aus	*Nannoperca australis*	Southern pygmy perch	49	1.6	M			
18-058_SC1	19-Oct-18	2018	Bait trap	5	Nan aus	*Nannoperca australis*	Southern pygmy perch	43	1.1	F			
18-058_SC1	19-Oct-18	2018	Bait trap	6	Nan aus	*Nannoperca australis*	Southern pygmy perch	41	0.8	M			
18-058_SC1	19-Oct-18	2018	Bait trap	6	Nan aus	*Nannoperca australis*	Southern pygmy perch	27	0.2	J			
18-058_SC1	19-Oct-18	2018	Bait trap	6	Nan aus	*Nannoperca australis*	Southern pygmy perch	24	0.2	M			
18-058_SC1	19-Oct-18	2018	Bait trap	6	Nan aus	*Nannoperca australis*	Southern pygmy perch	41	0.9	F			
18-058_SC1	19-Oct-18	2018	Bait trap	7	Nan aus	*Nannoperca australis*	Southern pygmy perch	44	1	M			
18-058_SC1	19-Oct-18	2018	Bait trap	7	Nan aus	*Nannoperca australis*	Southern pygmy perch	27	0.3	F			
18-058_SC1	19-Oct-18	2018	Bait trap	9	Nan aus	*Nannoperca australis*	Southern pygmy perch	41	0.8	F			
18-058_SC1	19-Oct-18	2018	Bait trap	9	Nan aus	*Nannoperca australis*	Southern pygmy perch	37	0.6	J			
18-058_SC1	19-Oct-18	2018	Bait trap	9	Nan aus	*Nannoperca australis*	Southern pygmy perch	27	0.3	F			
18-058_SC1	19-Oct-18	2018	Bait trap	9	Nan aus	*Nannoperca australis*	Southern pygmy perch	40	0.8	M			
18-058_SC1	19-Oct-18	2018	Bait trap	9	Nan aus	*Nannoperca australis*	Southern pygmy perch	41	0.8	M			
18-058_SC1	19-Oct-18	2018	Bait trap	10	Nan aus	*Nannoperca australis*	Southern pygmy perch	46	1.1	M			
18-058_SC1	19-Oct-18	2018	Bait trap	10	Nan aus	*Nannoperca australis*	Southern pygmy perch	39	0.7	F			
18-058_SC1	19-Oct-18	2018	Bait trap	10	Nan aus	*Nannoperca australis*	Southern pygmy perch	43	1.2	M			
18-058_SC1	19-Oct-18	2018	Bait trap	10	Nan aus	*Nannoperca australis*	Southern pygmy perch	46	1.3	F			
18-058_SC1	19-Oct-18	2018	Bait trap	10	Nan aus	*Nannoperca australis*	Southern pygmy perch	51	1.8	F			
18-058_SC1	19-Oct-18	2018	Bait trap	10	Nan aus	*Nannoperca australis*	Southern pygmy perch	40	0.7	J			
18-058_SC1	19-Oct-18	2018	Bait trap	10	Nan aus	*Nannoperca australis*	Southern pygmy perch	28	0.2	M			
18-058_SC1	19-Oct-18	2018	Dip net	11	Geo gra	*Geocharax gracilis*	Otway bush yabby	27					
18-058_SC1	19-Oct-18	2018	Dip net	11	Geo gra	*Geocharax gracilis*	Otway bush yabby	18					
18-058_SC1	19-Oct-18	2018	Dip net	11	Geo gra	*Geocharax gracilis*	Otway bush yabby	15					
18-058_SC1	19-Oct-18	2018	Dip net	11	Geo gra	*Geocharax gracilis*	Otway bush yabby	13					
18-058_SC1	19-Oct-18	2018	Dip net	11	Geo gra	*Geocharax gracilis*	Otway bush yabby	15					
18-058_SC1	19-Oct-18	2018	Dip net	11	Geo gra	*Geocharax gracilis*	Otway bush yabby	12					
19-038_BCT1	30-Oct-19	2019	Bait trap	12	Geo gra	*Geocharax gracilis*	Otway bush yabby	18		F			
19-038_BCT1	30-Oct-19	2019	Bait trap	12	Geo gra	*Geocharax gracilis*	Otway bush yabby	18		F			
19-038_BCT1	30-Oct-19	2019	Bait trap	12	Geo gra	*Geocharax gracilis*	Otway bush yabby	13		F			
19-038_BCT1	30-Oct-19	2019	Dip net	14	Geo gra	*Geocharax gracilis*	Otway bush yabby				Adult		
19-038_BCT1	30-Oct-19	2019	Dip net	14	Geo gra	*Geocharax gracilis*	Otway bush yabby				Juvenile		
19-038_BCT1	30-Oct-19	2019	Dip net	13	Geo gra	*Geocharax gracilis*	Otway bush yabby	16		M			
19-038_BCT1	30-Oct-19	2019	Dip net	13	Geo gra	*Geocharax gracilis*	Otway bush yabby	16		F			
19-038_BCT1	30-Oct-19	2019	Dip net	13	Geo gra	*Geocharax gracilis*	Otway bush yabby	17		M			
19-038_BCT1	30-Oct-19	2019	Dip net	13	Geo gra	*Geocharax gracilis*	Otway bush yabby	17		M			
19-038_BCT1	30-Oct-19	2019	Dip net	13	Geo gra	*Geocharax gracilis*	Otway bush yabby	14		F			
19-038_BCT1	30-Oct-19	2019	Dip net	14	Geo gra	*Geocharax gracilis*	Otway bush yabby	12		F			
19-038_BCT1	30-Oct-19	2019	Dip net	14	Geo gra	*Geocharax gracilis*	Otway bush yabby	12		F			
19-038_BCT1	30-Oct-19	2019	Dip net	14	Geo gra	*Geocharax gracilis*	Otway bush yabby	12		M			
19-038_BCT1	30-Oct-19	2019	Dip net	14	Geo gra	*Geocharax gracilis*	Otway bush yabby	11		F			
19-038_BCT1	30-Oct-19	2019	Dip net	14	Geo gra	*Geocharax gracilis*	Otway bush yabby	10		M			
19-038_BCT1	30-Oct-19	2019	Dip net	14	Geo gra	*Geocharax gracilis*	Otway bush yabby	6			Juvenile		
19-038_SC1	30-Oct-19	2019	Bait trap	6	Geo gra	*Geocharax gracilis*	Otway bush yabby	18		F			
19-038_SC1	30-Oct-19	2019	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	53		M			
19-038_SC1	30-Oct-19	2019	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	48		M			
19-038_SC1	30-Oct-19	2019	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	47		F			
19-038_SC1	30-Oct-19	2019	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	46		M			
19-038_SC1	30-Oct-19	2019	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	52		F			
19-038_SC1	30-Oct-19	2019	Bait trap	2	Nan aus	*Nannoperca australis*	Southern pygmy perch	52		F			
19-038_SC1	30-Oct-19	2019	Bait trap	2	Nan aus	*Nannoperca australis*	Southern pygmy perch	52		M			
19-038_SC1	30-Oct-19	2019	Bait trap	2	Nan aus	*Nannoperca australis*	Southern pygmy perch	68		F			
19-038_SC1	30-Oct-19	2019	Bait trap	2	Nan aus	*Nannoperca australis*	Southern pygmy perch	47		F			
19-038_SC1	30-Oct-19	2019	Bait trap	3	Nan aus	*Nannoperca australis*	Southern pygmy perch	57		M			
19-038_SC1	30-Oct-19	2019	Bait trap	5	Nan aus	*Nannoperca australis*	Southern pygmy perch	57		F			
19-038_20_BrCk	29-Oct-20	2020	Bait trap	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	5			Juvenile		
19-038_20_BrCk	29-Oct-20	2020	Bait trap	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	11			Juvenile		
19-038_20_BrCk	29-Oct-20	2020	Bait trap	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	11			Juvenile		
19-038_20_BrCk	29-Oct-20	2020	Bait trap	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	17			Juvenile		
19-038_20_BrCk	29-Oct-20	2020	Bait trap	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	21	2.2	M			
19-038_20_SaCk	05-Nov-20	2020	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	29					

Table F8 - Southern Pygmy Perch and Otway Bush Yabby Biological Data

SiteCode	DateVisited	Year	GearType	eplicateNu	TaxaCode	Scientific name	Common name	Length	Weight	Sex	MaturityCondition	Condition	Comments
19-038_20_SaCk	05-Nov-20	2020	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	31					
19-038_20_SaCk	05-Nov-20	2020	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	72	4.9	F			
19-038_20_SaCk	05-Nov-20	2020	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	68	4.2	F			
19-038_20_SaCk	05-Nov-20	2020	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	29					
19-038_20_SaCk	05-Nov-20	2020	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	26					
19-038_20_SaCk	05-Nov-20	2020	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	26					
19-038_20_SaCk	05-Nov-20	2020	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	27					
19-038_20_SaCk	05-Nov-20	2020	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	32					
19-038_20_SaCk	05-Nov-20	2020	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	40	1.6	M			
19-038_20_SaCk	05-Nov-20	2020	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	34					
19-038_20_SaCk	05-Nov-20	2020	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	66	3.5	M			
19-038_20_SaCk	05-Nov-20	2020	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	32					
19-038_20_SaCk	05-Nov-20	2020	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	36	0.5	M			
19-038_20_SaCk	05-Nov-20	2020	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	30					
19-038_20_SaCk	05-Nov-20	2020	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	39	0.7	M			
19-038_20_SaCk	05-Nov-20	2020	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	29					
19-038_20_SaCk	05-Nov-20	2020	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	23					
19-038_20_SaCk	05-Nov-20	2020	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	31					
19-038_20_SaCk	05-Nov-20	2020	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	36	0.6	F			
19-038_20_SaCk	05-Nov-20	2020	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	26					
19-038_20_SaCk	05-Nov-20	2020	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	25					
19-038_20_SaCk	05-Nov-20	2020	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	24					
19-038_20_SaCk	05-Nov-20	2020	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	29					
19-038_20_SaCk	05-Nov-20	2020	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	37	1.1	F			
19-038_20_SaCk	05-Nov-20	2020	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	32					
19-038_20_SaCk	05-Nov-20	2020	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	28					
19-038_20_SaCk	05-Nov-20	2020	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	24					
19-038_20_SaCk	05-Nov-20	2020	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	34					
19-038_20_SaCk	05-Nov-20	2020	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	24					
19-038_20_SaCk	05-Nov-20	2020	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	30					
19-038_20_SaCk	05-Nov-20	2020	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	24					
19-038_20_SaCk	05-Nov-20	2020	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	30					
19-038_20_SaCk	05-Nov-20	2020	Bait trap	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	23		M			
19-038_20_SaCk	05-Nov-20	2020	Bait trap	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	7			Juvenile		
19-038_20_SaCk	05-Nov-20	2020	Dip net	2	Geo gra	*Geocharax gracilis*	Otway bush yabby	11			Juvenile		
19-038_20_SaCk	05-Nov-20	2020	Dip net	2	Geo gra	*Geocharax gracilis*	Otway bush yabby	10			Juvenile		
19-038_20_SaCk	05-Nov-20	2020	Dip net	2	Geo gra	*Geocharax gracilis*	Otway bush yabby	10			Juvenile		
19-038_20_SaCk	05-Nov-20	2020	Dip net	3	Geo gra	*Geocharax gracilis*	Otway bush yabby	8			Juvenile		
19-038_20_SaCk	05-Nov-20	2020	Dip net	3	Geo gra	*Geocharax gracilis*	Otway bush yabby	11			Juvenile		
19-038_20_SaCk	05-Nov-20	2020	Dip net	4	Geo gra	*Geocharax gracilis*	Otway bush yabby	9			Juvenile		
19-038_20_SaCk	05-Nov-20	2020	Dip net	4	Geo gra	*Geocharax gracilis*	Otway bush yabby	9			Juvenile		
19-038_20_SaCk	05-Nov-20	2020	Dip net	4	Geo gra	*Geocharax gracilis*	Otway bush yabby	11			Juvenile		
19-038_20_SaCk	05-Nov-20	2020	Dip net	4	Geo gra	*Geocharax gracilis*	Otway bush yabby	9			Juvenile		
19-038_20_SaCk	05-Nov-20	2020	Dip net	4	Geo gra	*Geocharax gracilis*	Otway bush yabby	9			Juvenile		
19-038_20_SaCk	05-Nov-20	2020	Dip net	4	Geo gra	*Geocharax gracilis*	Otway bush yabby	12			Juvenile		
19-038_20_SaCk	05-Nov-20	2020	Dip net	4	Geo gra	*Geocharax gracilis*	Otway bush yabby	8			Juvenile		
19-038_20_SaCk	05-Nov-20	2020	Dip net	4	Geo gra	*Geocharax gracilis*	Otway bush yabby	7			Juvenile		
19-038_20_SaCk	05-Nov-20	2020	Dip net	4	Geo gra	*Geocharax gracilis*	Otway bush yabby	9			Juvenile		
19-038_20_SaCk	05-Nov-20	2020	Dip net	4	Geo gra	*Geocharax gracilis*	Otway bush yabby	11			Juvenile		
19-038_20_SaCk	05-Nov-20	2020	Dip net	4	Geo gra	*Geocharax gracilis*	Otway bush yabby	6			Juvenile		
19-038_20_SaCk	05-Nov-20	2020	Dip net	4	Geo gra	*Geocharax gracilis*	Otway bush yabby	8			Juvenile		
19-038_20_SaCk	05-Nov-20	2020	Dip net	4	Geo gra	*Geocharax gracilis*	Otway bush yabby	9			Juvenile		
19-038_20_SaCk	05-Nov-20	2020	Dip net	4	Geo gra	*Geocharax gracilis*	Otway bush yabby	6			Juvenile		
19-038_20_SaCk	05-Nov-20	2020	Dip net	4	Geo gra	*Geocharax gracilis*	Otway bush yabby	26	4	F			
19-038_21_BCT1	09-Nov-21	2021	Bait trap	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	21		M			OTWAY BUSH YABBY
19-038_21_BCT1	09-Nov-21	2021	Bait trap	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	23		M			
19-038_21_BCT1	09-Nov-21	2021	Bait trap	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	14		M			
19-038_21_BCT1	09-Nov-21	2021	Bait trap	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	16		F			
19-038_21_BCT1	09-Nov-21	2021	Bait trap	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	10					
19-038_21_BCT1	09-Nov-21	2021	Bait trap	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	10					
19-038_21_BCT1	09-Nov-21	2021	Bait trap	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	11					
19-038_21_BCT1	09-Nov-21	2021	Bait trap	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	9					
19-038_21_BCT1	09-Nov-21	2021	Bait trap	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	6					
19-038_21_SC1	16-Nov-21	2021	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	70	4.7	F	Running ripe		
19-038_21_SC1	16-Nov-21	2021	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	70	3.7	M			
19-038_21_SC1	16-Nov-21	2021	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	49	1.6	M			
19-038_21_SC1	16-Nov-21	2021	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	41	0.8	M			
19-038_21_SC1	16-Nov-21	2021	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	49	1.6	M			
19-038_21_SC1	16-Nov-21	2021	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	41	0.8	M			
19-038_21_SC1	16-Nov-21	2021	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	44	1	F			
19-038_21_SC1	16-Nov-21	2021	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	46	1.2	M			
19-038_21_SC1	16-Nov-21	2021	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	48	1.4	M			
19-038_21_SC1	16-Nov-21	2021	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	45	1.3	M			
19-038_21_SC1	16-Nov-21	2021	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	41	1.2	M			
19-038_21_SC1	16-Nov-21	2021	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	47	1.2	M			
19-038_21_SC1	16-Nov-21	2021	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	44	1	M			
19-038_21_SC1	16-Nov-21	2021	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	39	1	F	Running ripe		
19-038_21_SC1	16-Nov-21	2021	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	42	0.9	F			
19-038_21_SC1	16-Nov-21	2021	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	43	1.1	M			
19-038_21_SC1	16-Nov-21	2021	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	47	1.3	M			
19-038_21_SC1	16-Nov-21	2021	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	41	0.9	M			
19-038_21_SC1	16-Nov-21	2021	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	37	0.8	M			
19-038_21_SC1	16-Nov-21	2021	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	41	0.9	F			
19-038_21_SC1	16-Nov-21	2021	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	42	1	F			
19-038_21_SC1	16-Nov-21	2021	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	41	1	M			
19-038_21_SC1	16-Nov-21	2021	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	42	1	M			
19-038_21_SC1	16-Nov-21	2021	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	39		M			
19-038_21_SC1	16-Nov-21	2021	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	39		M			
19-038_21_SC1	16-Nov-21	2021	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	33		F			
19-038_21_SC1	16-Nov-21	2021	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	29		F			
19-038_21_SC1	16-Nov-21	2021	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	29		F			
19-038_21_SC1	16-Nov-21	2021	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	30		F			
19-038_2022_BCT1	17-Nov-22	2022	Dip net	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	19	4.3	M			otway bush yabby
19-038_2022_BCT1	17-Nov-22	2022	Dip net	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	16	2	M			1 claw
19-038_2022_BCT1	17-Nov-22	2022	Dip net	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	13	1.6		Juvenile		
19-038_2022_BCT1	17-Nov-22	2022	Dip net	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	11	1.3		Juvenile		1 claw
19-038_2022_BCT1	17-Nov-22	2022	Dip net	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	10	1		Juvenile		
19-038_2022_BCT1	17-Nov-22	2022	Dip net	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	10	1		Juvenile		

Table F8 - Southern Pygmy Perch and Otway Bush Yabby Biological Data

SiteCode	DateVisited	Year	GearType	eplicateNu	TaxaCode	Scientific name	Common name	Length	Weight	Sex	MaturityCondition	Condition	Comments
19-038_2022_BCT1	17-Nov-22	2022	Dip net	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	9			Juvenile		
19-038_2022_BCT1	17-Nov-22	2022	Dip net	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	9			Juvenile		
19-038_2022_BCT1	17-Nov-22	2022	Dip net	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	8			Juvenile		
19-038_2022_BCT1	17-Nov-22	2022	Dip net	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	8			Juvenile		
19-038_2022_BCT1	17-Nov-22	2022	Dip net	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	7			Juvenile		
19-038_2022_BCT1	17-Nov-22	2022	Dip net	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	9			Juvenile		
19-038_2022_BCT1	17-Nov-22	2022	Dip net	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	9			Juvenile		
19-038_2022_BCT1	17-Nov-22	2022	Dip net	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	7			Juvenile		
19-038_2022_BCT1	17-Nov-22	2022	Dip net	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	10			Juvenile		
19-038_2022_BCT1	17-Nov-22	2022	Dip net	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	9			Juvenile		
19-038_2022_BCT1	17-Nov-22	2022	Dip net	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	5			Juvenile		
19-038_2022_BCT1	17-Nov-22	2022	Dip net	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	4			Juvenile		
19-038_2022_BCT1	17-Nov-22	2022	Dip net	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	10			Juvenile		
19-038_2022_BCT1	17-Nov-22	2022	Dip net	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	7			Juvenile		
19-038_2022_BCT1	17-Nov-22	2022	Dip net	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	8			Juvenile		
19-038_2022_BCT1	17-Nov-22	2022	Dip net	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	6			Juvenile		
19-038_2022_BCT1	17-Nov-22	2022	Dip net	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	5			Juvenile		
19-038_2022_BCT1	17-Nov-22	2022	Dip net	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	7			Juvenile		
19-038_2022_BCT1	17-Nov-22	2022	Dip net	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	8			Juvenile		
19-038_2022_BCT1	17-Nov-22	2022	Dip net	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	10			Juvenile		
19-038_2022_BCT1	17-Nov-22	2022	Dip net	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	7			Juvenile		
19-038_2022_BCT1	17-Nov-22	2022	Dip net	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	5			Juvenile		
19-038_2022_BCT1	17-Nov-22	2022	Dip net	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	8			Juvenile		
19-038_2022_BCT1	17-Nov-22	2022	Dip net	1	Geo gra	*Geocharax gracilis*	Otway bush yabby	6			Juvenile		
19-038_2022_BCT1	17-Nov-22	2022	Bait trap	2	Geo gra	*Geocharax gracilis*	Otway bush yabby	21	2.9	M			
19-038_2022_BCT1	17-Nov-22	2022	Bait trap	2	Geo gra	*Geocharax gracilis*	Otway bush yabby	19	2.4	F			
19-038_2022_BCT1	17-Nov-22	2022	Bait trap	2	Geo gra	*Geocharax gracilis*	Otway bush yabby	17	2.2	M			No claws
19-038_2022_BCT1	17-Nov-22	2022	Bait trap	2	Geo gra	*Geocharax gracilis*	Otway bush yabby	16	1.3				
19-038_2022_BCT1	17-Nov-22	2022	Bait trap	2	Geo gra	*Geocharax gracilis*	Otway bush yabby	15	1.3				
19-038_2022_BCT1	17-Nov-22	2022	Bait trap	2	Geo gra	*Geocharax gracilis*	Otway bush yabby	16	1.8				
19-038_2022_BCT1	17-Nov-22	2022	Bait trap	2	Geo gra	*Geocharax gracilis*	Otway bush yabby	9					
19-038_2022_BCT1	17-Nov-22	2022	Bait trap	2	Geo gra	*Geocharax gracilis*	Otway bush yabby	11					
19-038_2022_BCT1	17-Nov-22	2022	Bait trap	2	Geo gra	*Geocharax gracilis*	Otway bush yabby	10					
19-038_2022_BCT1	17-Nov-22	2022	Bait trap	2	Geo gra	*Geocharax gracilis*	Otway bush yabby	12					
19-038_2022_BCT1	17-Nov-22	2022	Bait trap	2	Geo gra	*Geocharax gracilis*	Otway bush yabby	11					
19-038_2022_BCT1	17-Nov-22	2022	Bait trap	2	Geo gra	*Geocharax gracilis*	Otway bush yabby	10					
19-038_2022_BCT1	17-Nov-22	2022	Bait trap	2	Geo gra	*Geocharax gracilis*	Otway bush yabby	11					
19-038_2022_BCT1	17-Nov-22	2022	Bait trap	2	Geo gra	*Geocharax gracilis*	Otway bush yabby	8					
19-038_2022_BCT1	17-Nov-22	2022	Bait trap	2	Geo gra	*Geocharax gracilis*	Otway bush yabby	7					
19-038_2022_BCT1	17-Nov-22	2022	Bait trap	2	Geo gra	*Geocharax gracilis*	Otway bush yabby	9					
19-038_2022_SC1	18-Nov-22	2022	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	64	3	M			
19-038_2022_SC1	18-Nov-22	2022	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	69	3	f			
19-038_2022_SC1	18-Nov-22	2022	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	54	2.1	m			
19-038_2022_SC1	18-Nov-22	2022	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	53	1.9	f			
19-038_2022_SC1	18-Nov-22	2022	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	47	1.6	m			
19-038_2022_SC1	18-Nov-22	2022	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	61	2.8	m			
19-038_2022_SC1	18-Nov-22	2022	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	63	3.4	f	Running ripe		
19-038_2022_SC1	18-Nov-22	2022	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	55	2.2	M			
19-038_2022_SC1	18-Nov-22	2022	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	45	1.6	f			
19-038_2022_SC1	18-Nov-22	2022	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	54	2.2	f			
19-038_2022_SC1	18-Nov-22	2022	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	55	2.2	f			
19-038_2022_SC1	18-Nov-22	2022	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	50	1.8	m			
19-038_2022_SC1	18-Nov-22	2022	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	56	2.2	f			
19-038_2022_SC1	18-Nov-22	2022	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	49	1.7	m			
19-038_2022_SC1	18-Nov-22	2022	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	42	1	m			
19-038_2022_SC1	18-Nov-22	2022	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	53	1.7	m			
19-038_2022_SC1	18-Nov-22	2022	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	44	0.8	m			
19-038_2022_SC1	18-Nov-22	2022	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	60	2.2	m			
19-038_2022_SC1	18-Nov-22	2022	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	66	3.5	m			
19-038_2022_SC1	18-Nov-22	2022	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	61	2.1	m			
19-038_2022_SC1	18-Nov-22	2022	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	52	1.7	m			
19-038_2022_SC1	18-Nov-22	2022	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	39	0.5	f			
19-038_2022_SC1	18-Nov-22	2022	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	55	1.6	m			
19-038_2022_SC1	18-Nov-22	2022	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	49	1.1	m			
19-038_2022_SC1	18-Nov-22	2022	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	57	2	f			
19-038_2022_SC1	18-Nov-22	2022	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	49	1.1	m			
19-038_2022_SC1	18-Nov-22	2022	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	50	1.3	m			
19-038_2022_SC1	18-Nov-22	2022	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	44	0.7	m			
19-038_2022_SC1	18-Nov-22	2022	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	60	2.1	f			
19-038_2022_SC1	18-Nov-22	2022	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	43	0.8	m			
19-038_2022_SC1	18-Nov-22	2022	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	41	0.8	f			
19-038_2022_SC1	18-Nov-22	2022	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	45	1	m			
19-038_2022_SC1	18-Nov-22	2022	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	56	2.1	m			
19-038_2022_SC1	18-Nov-22	2022	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	50	1.4	m			
19-038_2022_SC1	18-Nov-22	2022	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	36	0.6	m			
19-038_2022_SC1	18-Nov-22	2022	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	45	1	m			
19-038_2022_SC1	18-Nov-22	2022	Bait trap	1	Nan aus	*Nannoperca australis*	Southern pygmy perch	46	1.1	m			
19-038_2022_SC1	18-Nov-22	2022	Dip net	2	Nan aus	*Nannoperca australis*	Southern pygmy perch	57	2.2	m			
19-038_2022_SC1	18-Nov-22	2022	Dip net	2	Nan aus	*Nannoperca australis*	Southern pygmy perch	53	1.8	f			
19-038_2022_SC1	18-Nov-22	2022	Dip net	2	Nan aus	*Nannoperca australis*	Southern pygmy perch	41	0.8	m			
19-038_2022_SC1	18-Nov-22	2022	Dip net	2	Nan aus	*Nannoperca australis*	Southern pygmy perch	43	0.9	m			
19-038_2022_SC1	18-Nov-22	2022	Dip net	2	Geo gra	*Geocharax gracilis*	Otway bush yabby	16	2	F			
19-038_2022_SC1	18-Nov-22	2022	Dip net	2	Geo gra	*Geocharax gracilis*	Otway bush yabby	7					