Monthly Environmental Monitoring Report

Yancoal Hunter Valley Operations

March 2018

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Revision History

Version No.	Person Responsible	Document Status	Date
1.0	**Environmental Graduate**	**Draft**	**09/02/2018**
1.1	**Environmental Specialist**	**Final**	**17/07/2018**

1.0 INTRODUCTION

This report has been compiled to provide a monthly summary of environmental monitoring results for Hunter Valley Operations (HVO). This report includes all monitoring data collected for the period 1st March to 31st March 2018.

2.0 AIR QUALITY

2.1 Meteorological Monitoring

HVO maintains two meteorological stations; ‘Corporate’ and ‘Cheshunt’ (Refer to Figure 4: Air Quality Monitoring Location Plan).

2.1.1 Rainfall

Rainfall for the period is summarised in Table **1**, the 2018 trend and historical trend are shown in Figure 1.

Table 1: Monthly Rainfall HVO

2018	Monthly Rainfall (mm)	Cumulative Rainfall (mm)
March	69.4	118.2

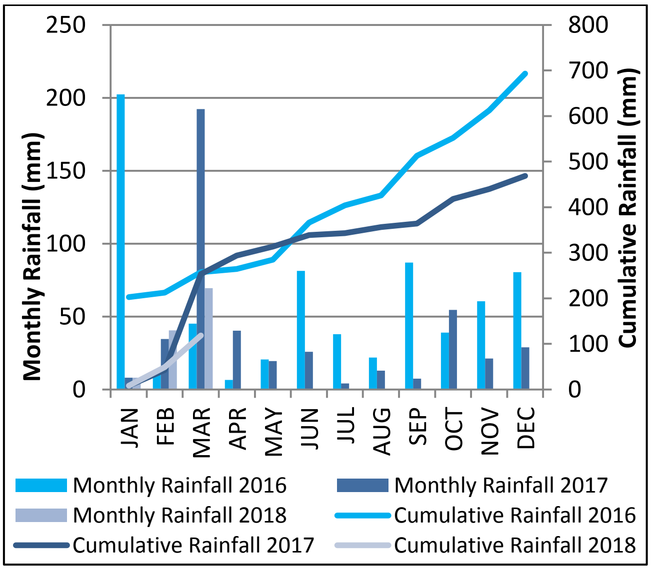

Figure 1: Rainfall Summary 2018

2.1.2 Wind Speed and Direction

South-Easterly winds were dominant during March as shown in Figure 2 (HVO Corporate) and Figure 3 (HVO Cheshunt).

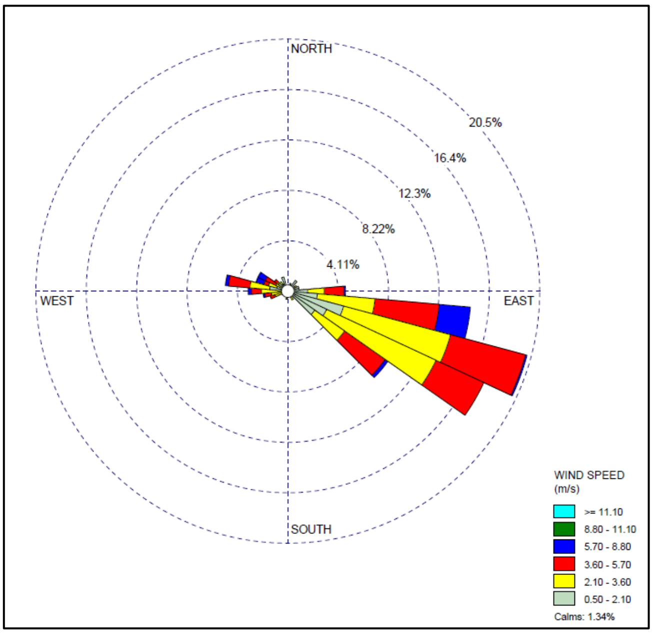

Figure 2: HVO Corporate Wind Rose – March 2018

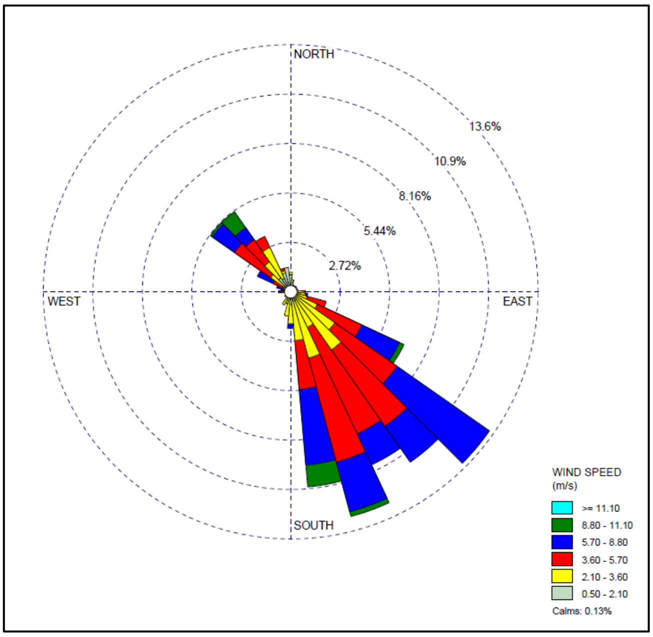

Figure 3: HVO Cheshunt Wind Rose – March 2018

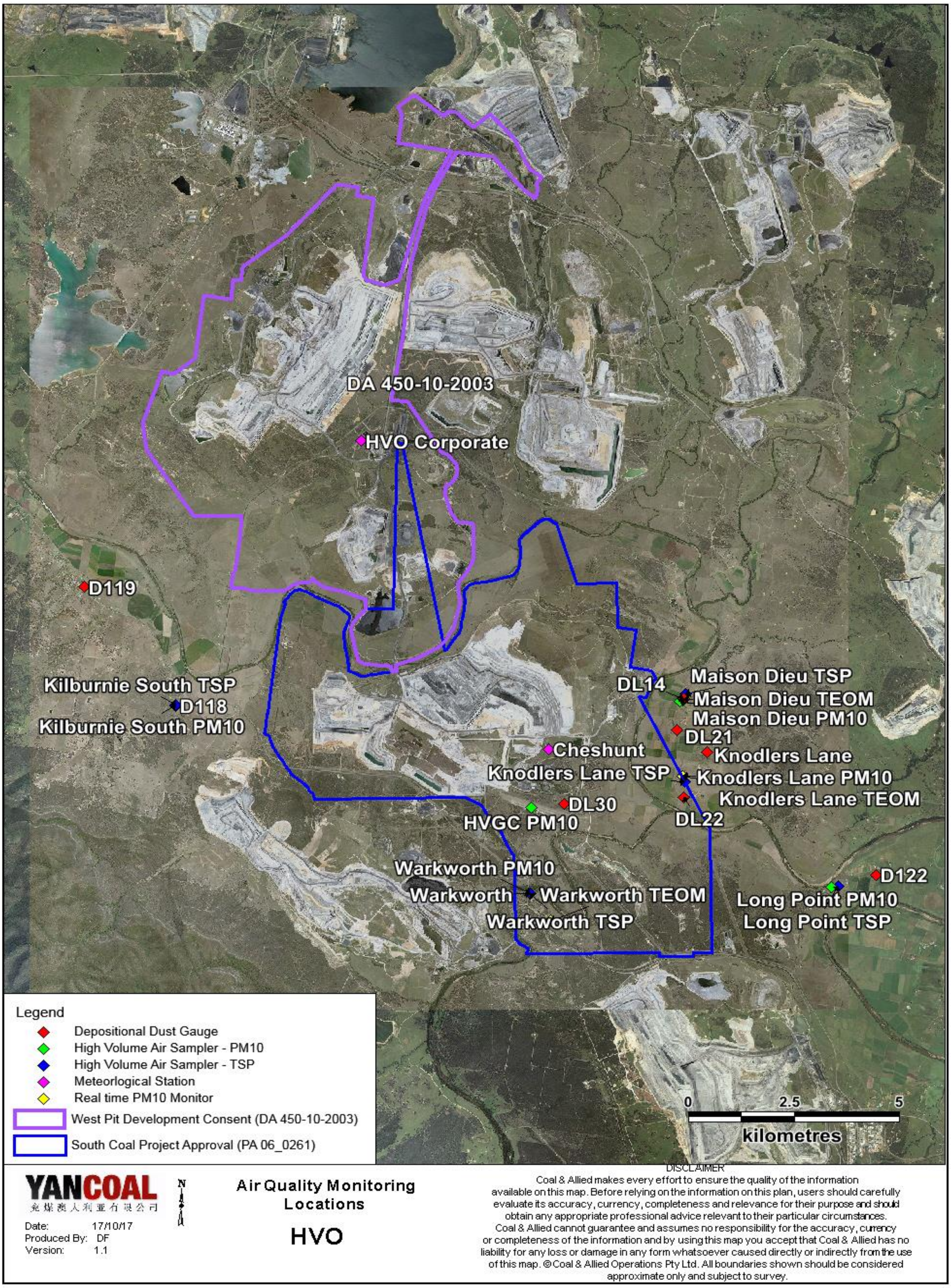

Figure 4: Air Quality Monitoring Location Plan

2.2 Depositional Dust

To monitor regional air quality, HVO operates and maintains a network of nine depositional dust gauges, situated on private and mine owned land surrounding HVO.

Figure 5 displays insoluble solids results from depositional dust gauges during the reporting period compared against the year-to-date average and the annual impact assessment criteria.

During the reporting period the D118 and Warkworth monitors recorded monthly results above the long term impact assessment criteria of 4.0 g/m^2 per month.

The field notes associated with the D118 and Warkworth monitor's result indicates no evidence to suggest that the result was contaminated. Accordingly, this result will be included in the annual average calculation.

An assessment of HVO's contribution against the long term impact assessment criteria will be provided in the 2018 Annual Review.

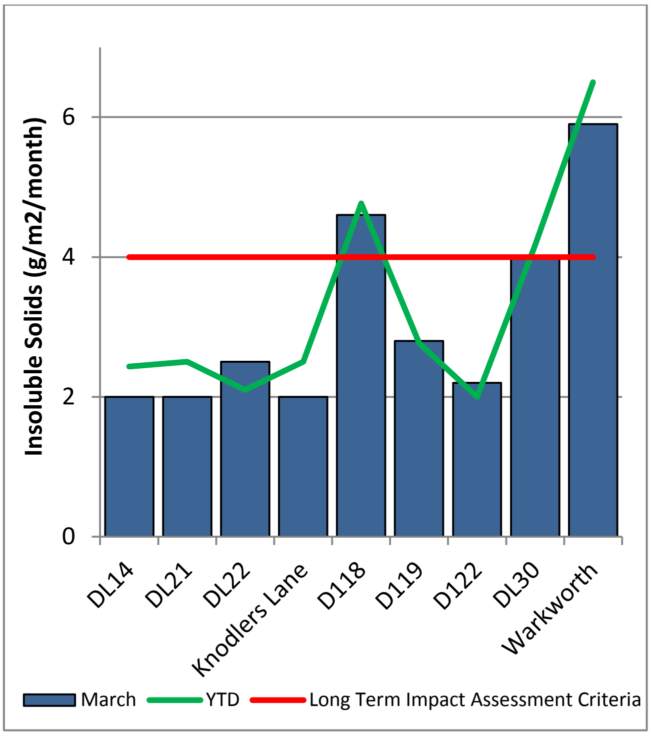

Figure 5: Depositional Dust Results – March 2018

2.3 Suspended Particulates

Suspended particulates are measured by a network of High Volume Air Samplers (HVAS) measuring Total Suspended Particulates (TSP) and Particulate Matter <10µm (PM_{10}). The location of these monitors can be found in Figure 4. Each HVAS was run for 24 hours on a six-day cycle.

2.3.1 HVAS PM_{10} Results

Figure 6 shows individual PM_{10} results at each monitoring station against the short term impact assessment criteria of 50 µg/m3.

On 14/03/2018, the HVAS PM_{10} unit at the Glider Club recorded results which was greater than the short term (24hr) PM_{10} impact assessment criteria; (79µg/m^3).

Investigation determined that HVO could not have contributed to the total measured on this day as at no time did the wind blow from the direction of HVO. Accordingly, no further action is required (as per approved Air Quality Monitoring Programme).

On 20/03/2017 three HVAS PM_{10} units recorded results which were greater than the short term (24hr) PM_{10} impact assessment criteria; Knodlers Lane (76 µg/m^3), Kilburnie South (62 µg/m^3) and Glider Club (62 µg/m^3).

Investigation determined that HVO's maximum calculated contribution at each monitor to be:

- Knodlers Lane - 31.5 µg/m^3; or 50.8 % of the measured result.
- Kilburnie South - 7 µg/m^3; or 11.3% of the measured result.
- Glider Club –3 µg/m^3; or 4.8 % of the measured result.

Accordingly, no further action is required (as per approved Air Quality Monitoring Programme).

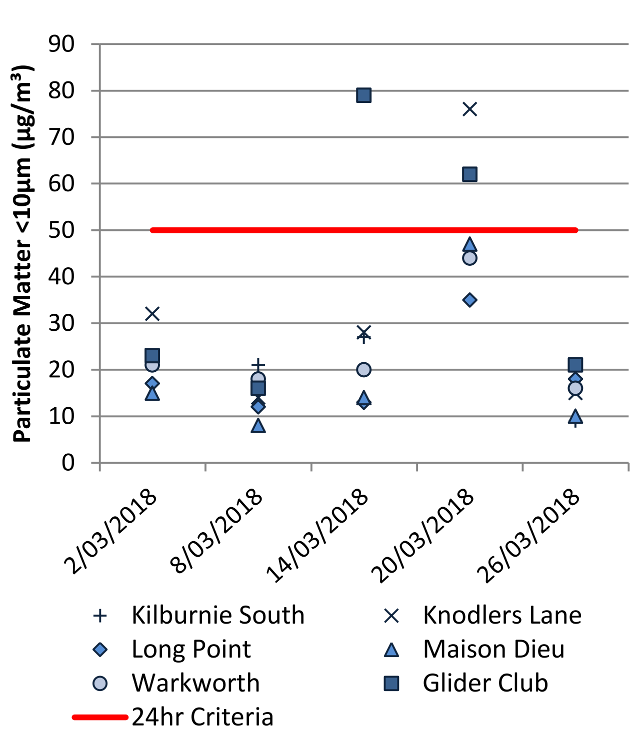

Figure 6: Individual PM_{10} Results – March 2018

Figure 7 shows the year to date annual average PM_{10} results.

An assessment of HVO's contribution against the long term impact assessment criteria will be provided in the 2018 Annual Review.

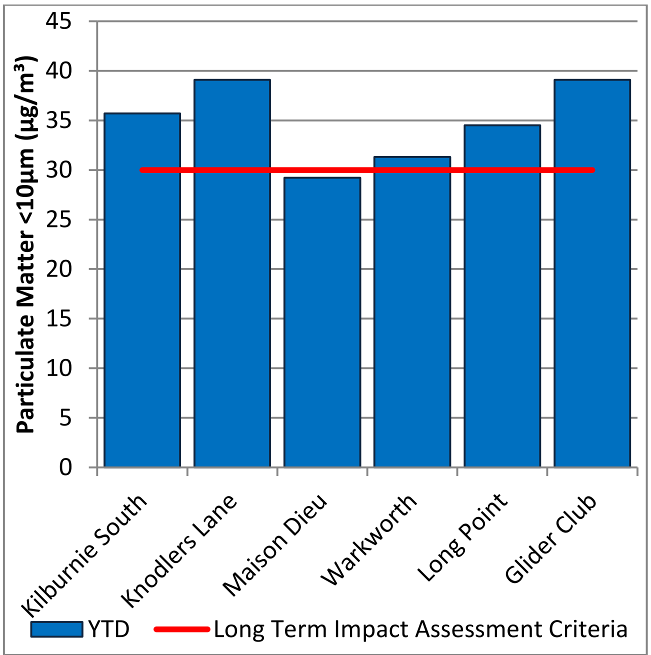

Figure 7: Year to Date Average PM_{10} – March 2018

2.3.2 TSP Results

Figure 8 shows the annual average TSP results compared against the long term impact assessment criteria of 90µg/m³. An assessment of HVO's contribution against the long term impact assessment criteria will be provided in the 2018 Annual Review.

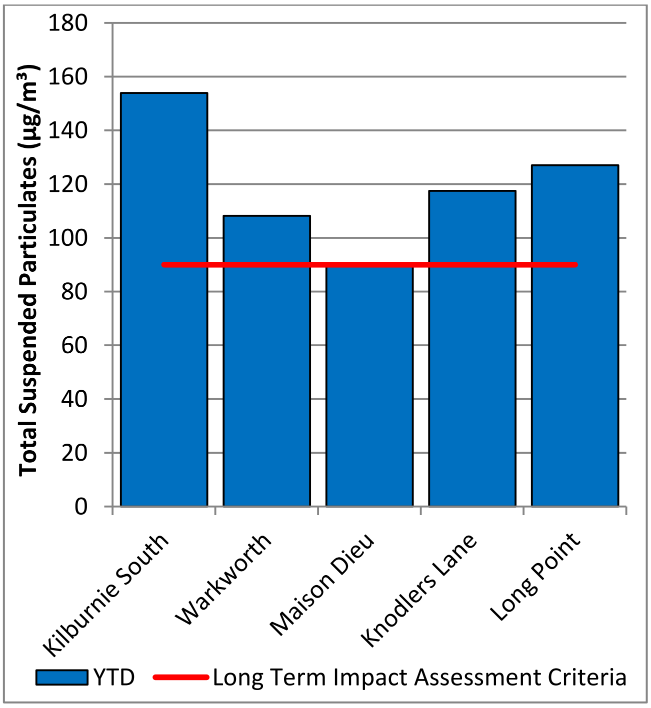

Figure 8: Year to Date Average Total Suspended Particulates – March 2018

2.3.3 Real Time PM_{10} Results

Hunter Valley Operations maintains a network of real time PM_{10} monitors. The real time air quality monitoring stations continuously log information and transmit data to a central database, generating alarms when particulate matter levels exceed internal trigger limits. Results from real time PM_{10} monitoring are used as a reactive measure to guide mining operations to ensure compliance with the relevant conditions of the project approval.

Results for real time dust sampling is shown in Figure 9, including the daily 24 hour average PM_{10} result and the year to date 24 hour PM_{10} annual average.

2.3.4 Real Time Alarms for Air Quality

During March the real time monitoring system generated 84 automated air quality related alarms. 36 were related to adverse weather conditions and 48 alarms relating to $PM_{10.}$

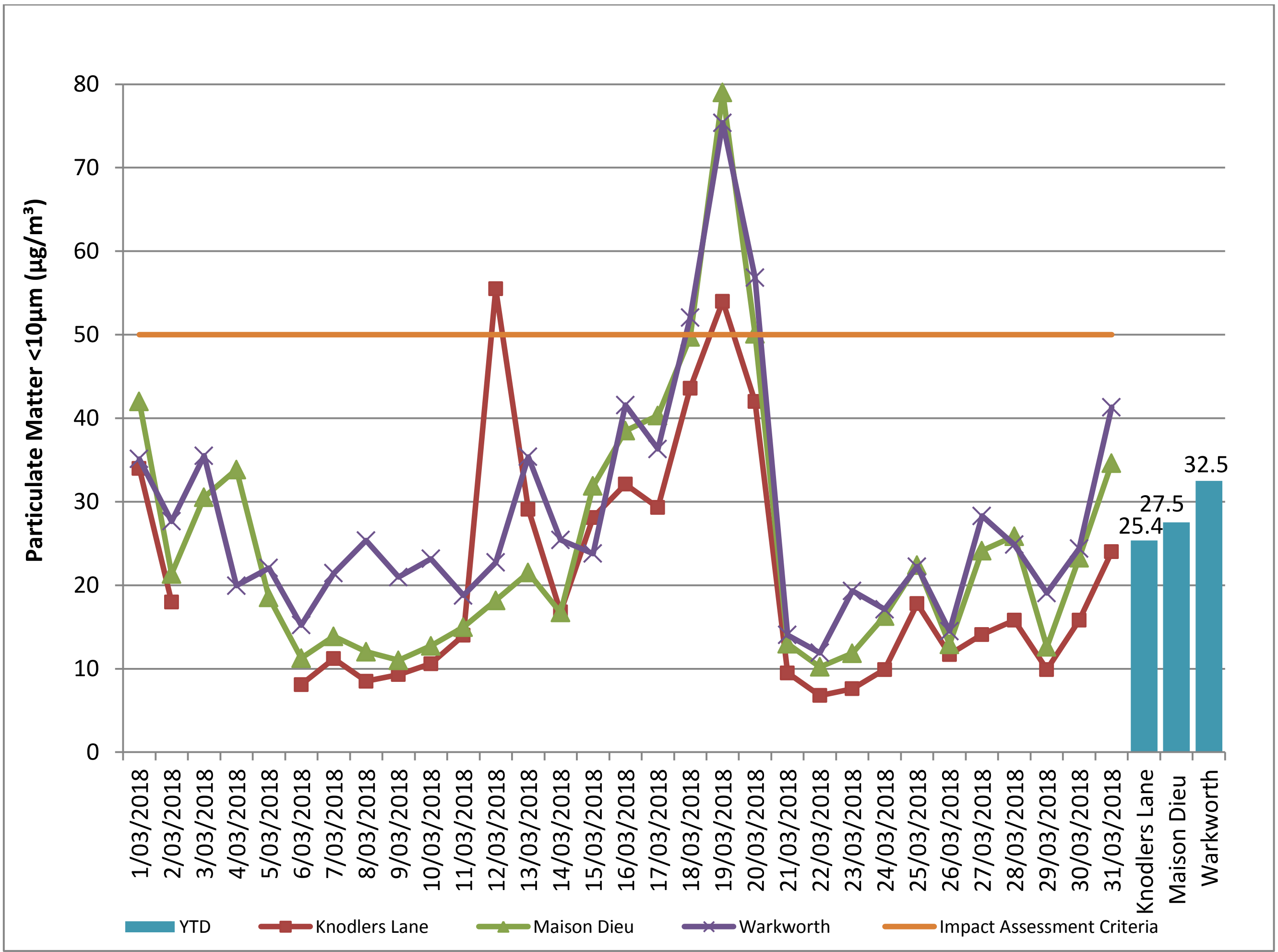

Figure 9: Real Time PM_{10} 24hr average and YTD average – March 2018

Table 2: Real-time PM10 Investigation Results

Date	Site	24hr PM_{10} result ($\mu g/m^3$)	Estimated contribution from HVO ($\mu g/m^3$)	Discussion
12/03/2018	Knodlers Lane TEOM	55.5	0.6	An analysis of meteorological data has calculated the maximum potential HVO contribution to the result to be in the order of 0.6µg/m^3 or 1% of the measured result. As the calculated contribution was less than 75% of the measured result HVO is considered to be a significant contributor to the result as described in the HVO Air Quality

				Management Plan.
18/03/2018	Warkworth OEH TEOM	52.1	22.5	An analysis of meteorological data has calculated the maximum potential HVO contribution to the result to be in the order of 22.5µg/m^3 or 43.1% of the measured result. As the calculated contribution was less than 75% of the measured result HVO is not considered to be a significant contributor to the result as described in the HVO Air Quality Management Plan.
19/03/2018	Knodlers Lane TEOM	54.0	16.5	An analysis of meteorological data has calculated the maximum potential HVO contribution to the result to be in the order of 16.5µg/m^3 or 30.6% of the measured result. As the calculated contribution was less than 75% of the measured result HVO is not considered to be a significant contributor to the result as described in the HVO Air Quality Management Plan.
19/03/2018	Maison Dieu TEOM	79.0	14.8	An analysis of meteorological data has calculated the maximum potential HVO contribution to the result to be in the order of 14.8 µg/m^3 or 18.7% of the measured result. As the calculated contribution was less than 75% of the measured result HVO is not considered to be a significant contributor to the result as described in the HVO Air Quality Management Plan.
19/03/2018	Warkworth OEH TEOM	75.4	16.7	An analysis of meteorological data has calculated the maximum potential HVO contribution to the result to be in the order of 16.7µg/m^3 or 22.1% of the measured result. As the calculated contribution was less than 75% of the measured result HVO is not considered to be a significant contributor to the result as described in the HVO Air Quality Management Plan.
20/03/2018	Warkworth OEH TEOM	57.2	3.2	An analysis of meteorological data has calculated the maximum potential HVO contribution to the result to be in the order of 3.2µg/m^3 or 5.6% of the measured result. As the calculated contribution was less than 75% of the measured result HVO is not considered to be a significant contributor to the result as described in the HVO Air Quality Management Plan

3.0 SURFACE WATER

3.1.1 Surface Water Monitoring

Surface water courses are sampled on a quarterly or rain event sampling regime. Water quality is evaluated through the parameters of pH, Electrical Conductivity (EC) and Total Suspended Solids (TSS).

Watercourses are assessed against ANZECC Guidelines for Fresh and Marine Water Quality (2000) for:

- pH (6.5 to 8.5);
- Electrical Conductivity (125 to 2200µS/cm); and
- Total Suspended Solids (maximum 50mg/L)

The location of Surface Water monitoring locations is shown in Figure 22**.**

Figure 10 to Figure 12 show the long term surface water trend (2015 – current) within HVO mine dams. Figure 13 to Figure 21 show the long term surface water trend (2015 – current) in surrounding watercourses.

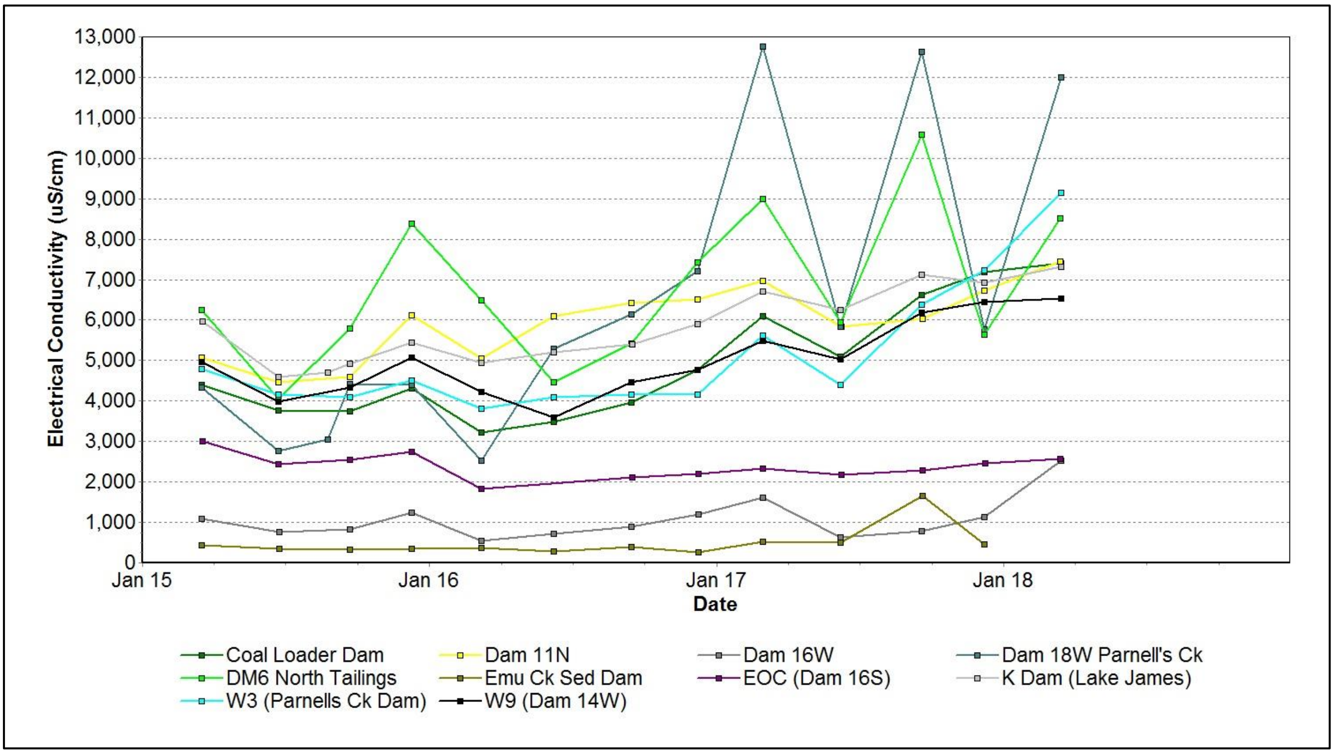

Figure 10: Site Dams Electrical Conductivity Trend – March 2018

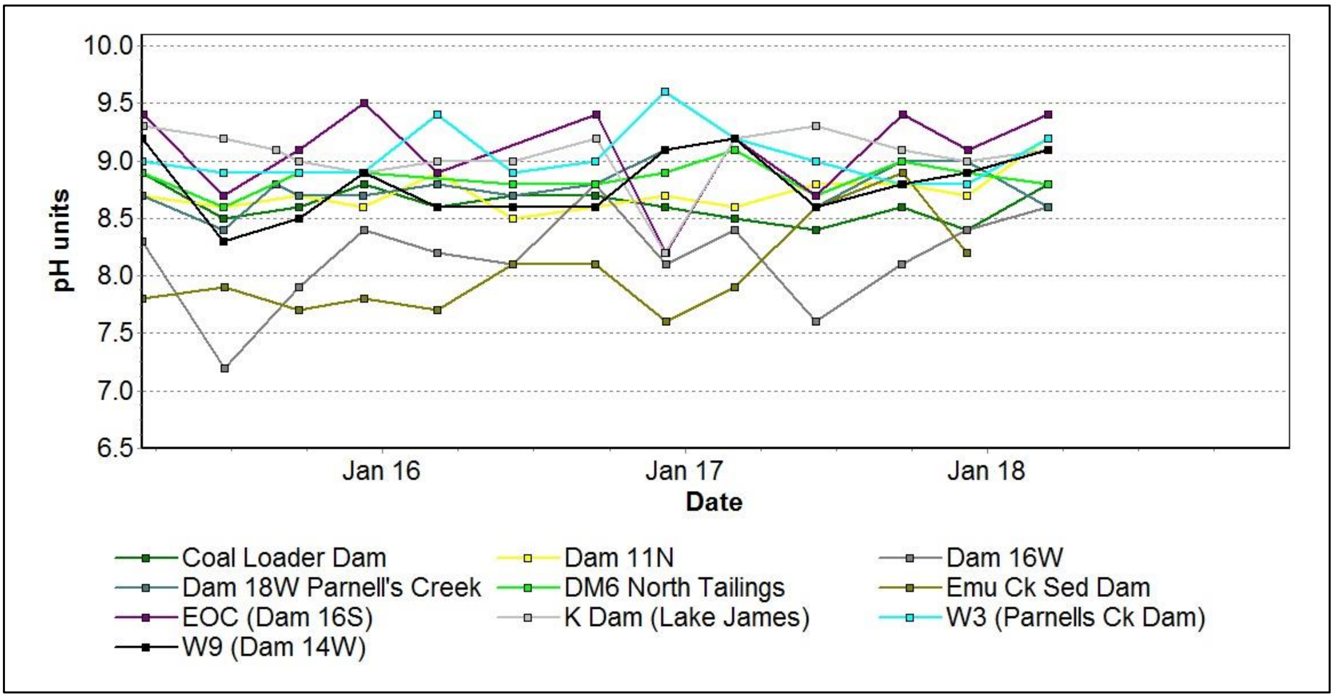

Figure 11: Site Dams pH Trend – March 2018

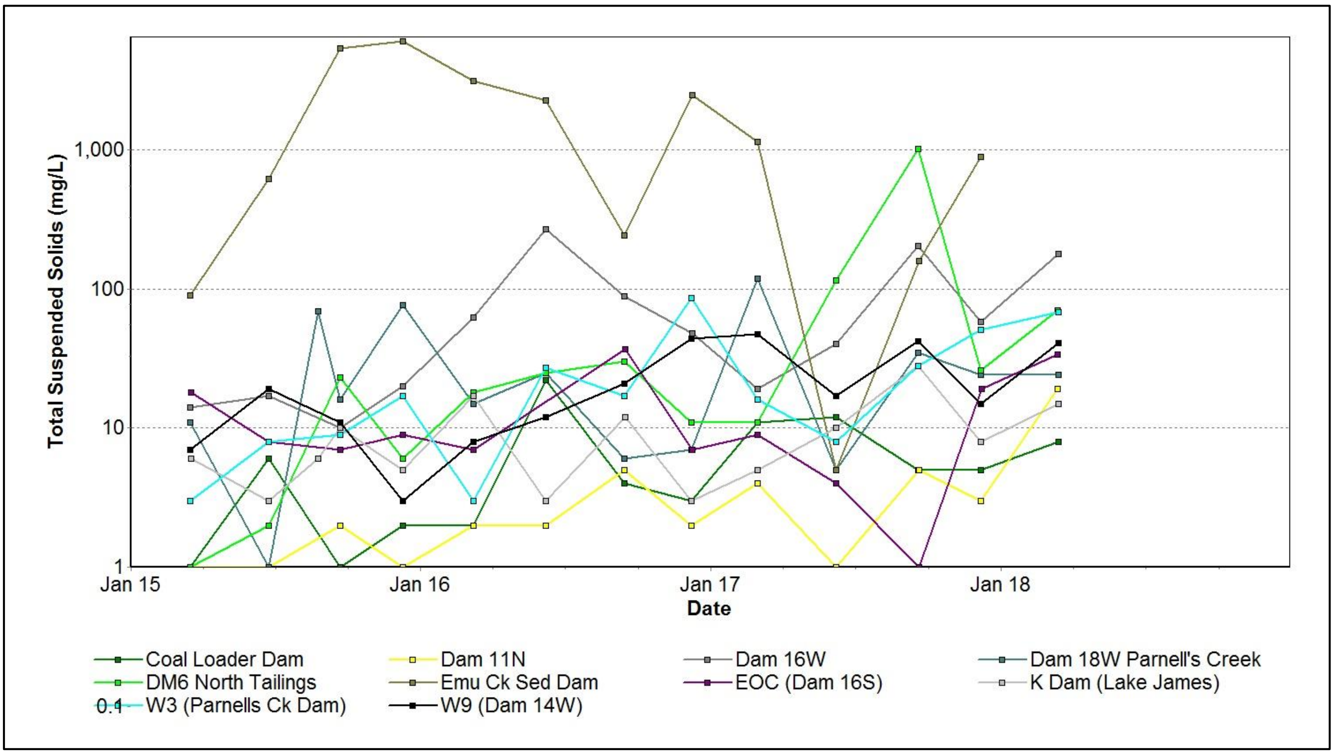

Figure 12: Site Dams Total Suspended Solids Trend – March 2018

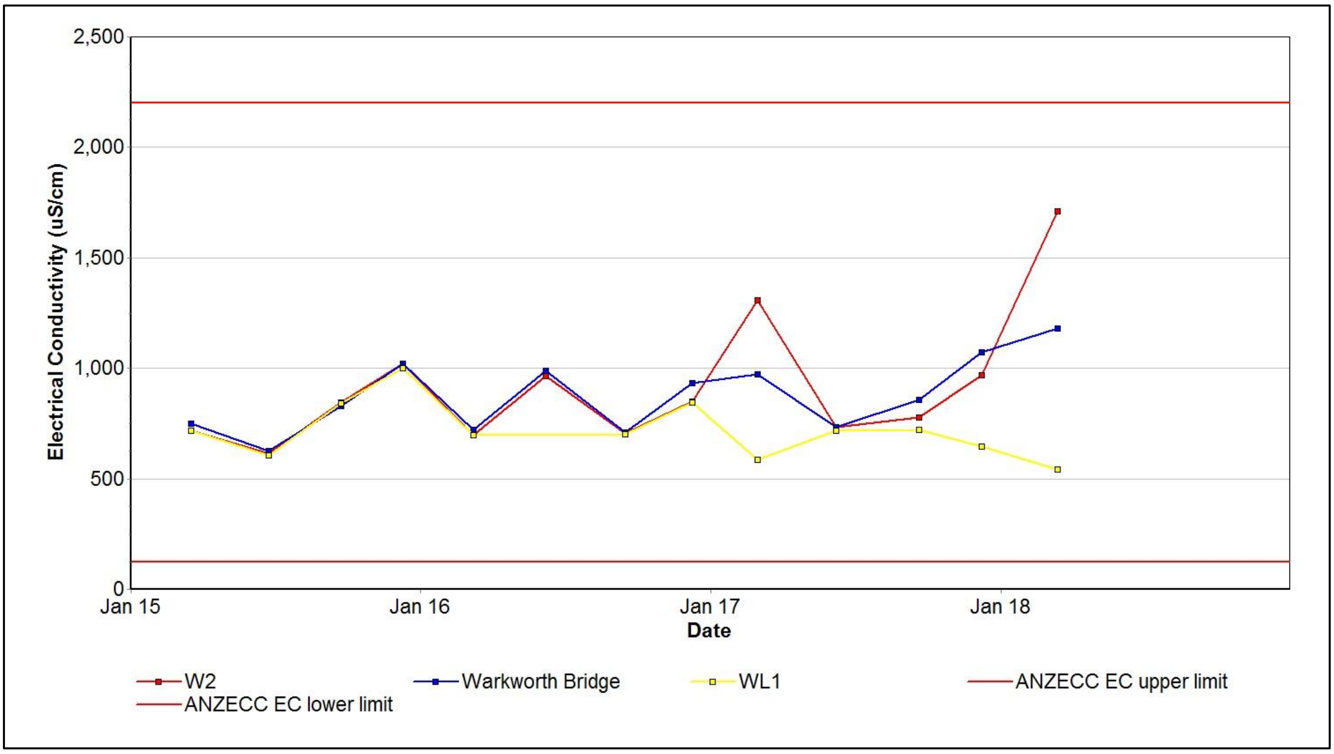

Figure 13: Wollombi Brook Electrical Conductivity Trend – March 2018

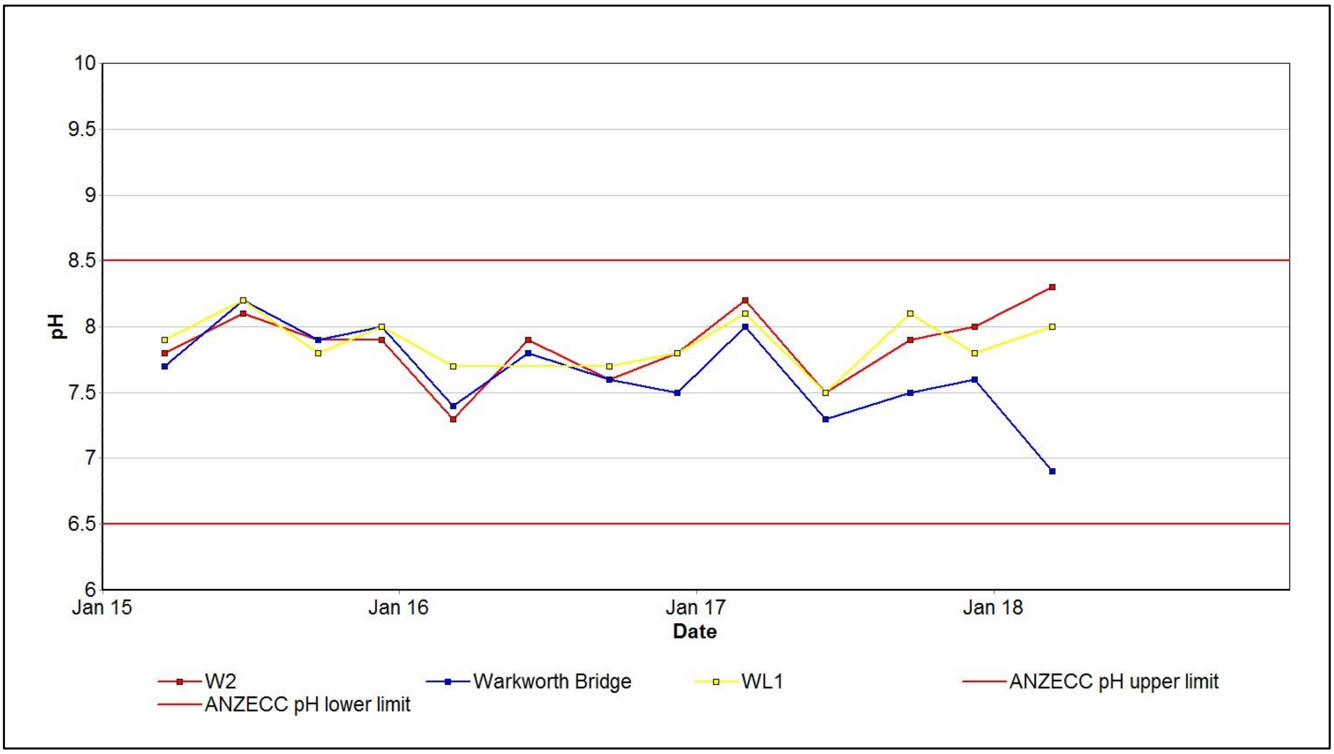

Figure 14: Wollombi Brook pH Trend – March 2018

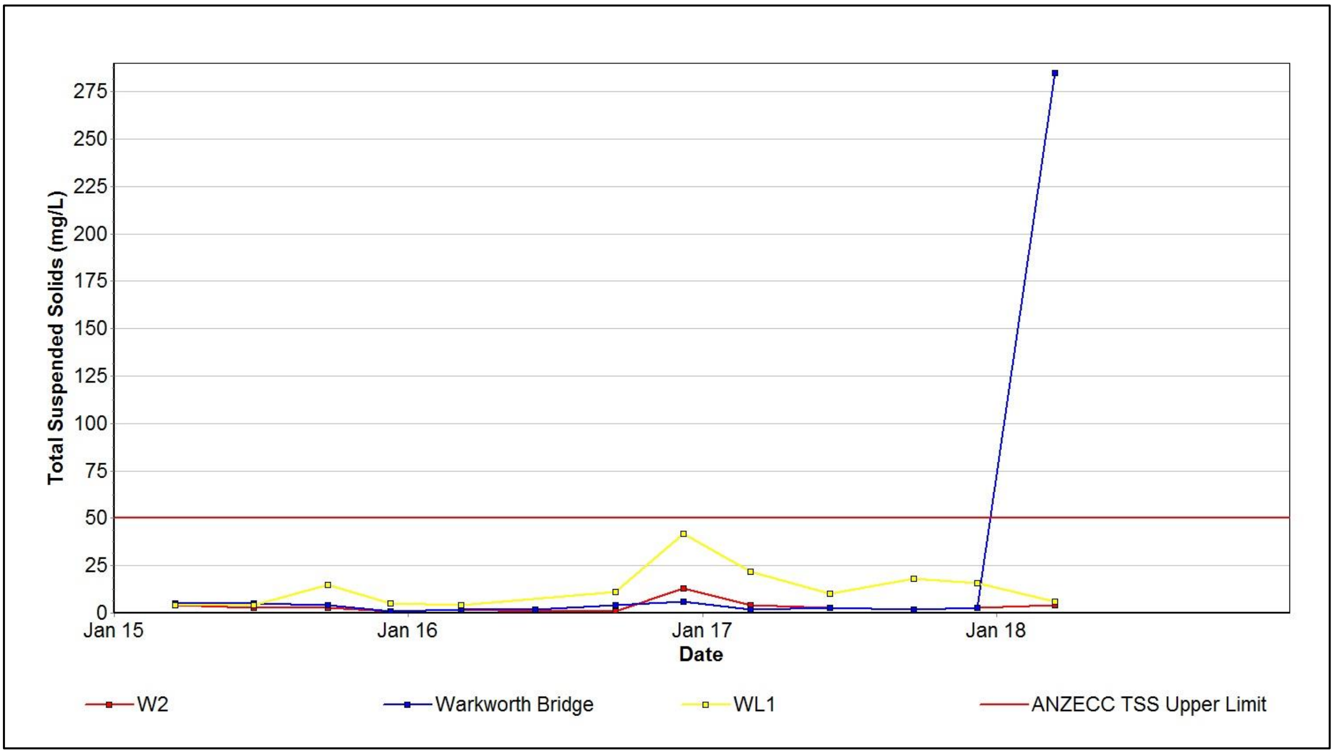

Figure 15: Wollombi Brook Total Suspended Solids Trend – March 2018

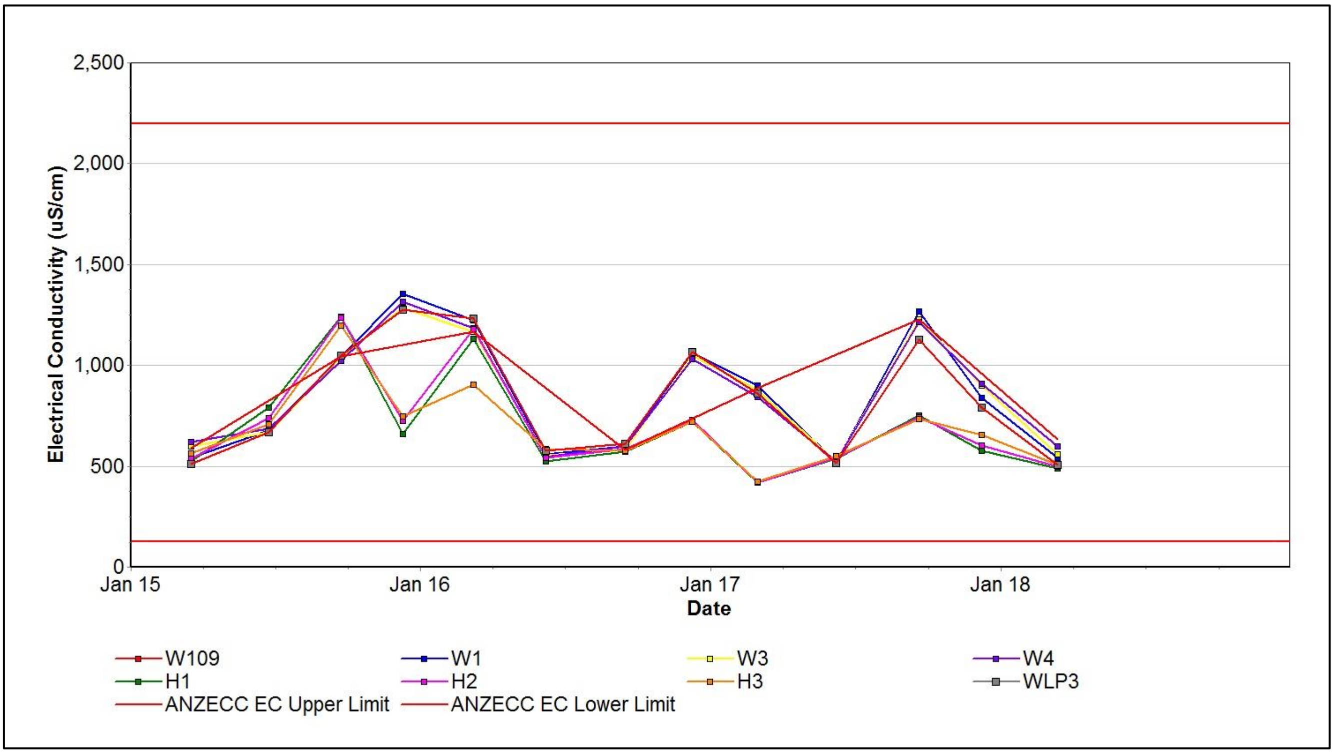

Figure 16: Hunter River Electrical Conductivity Trend – March 2018

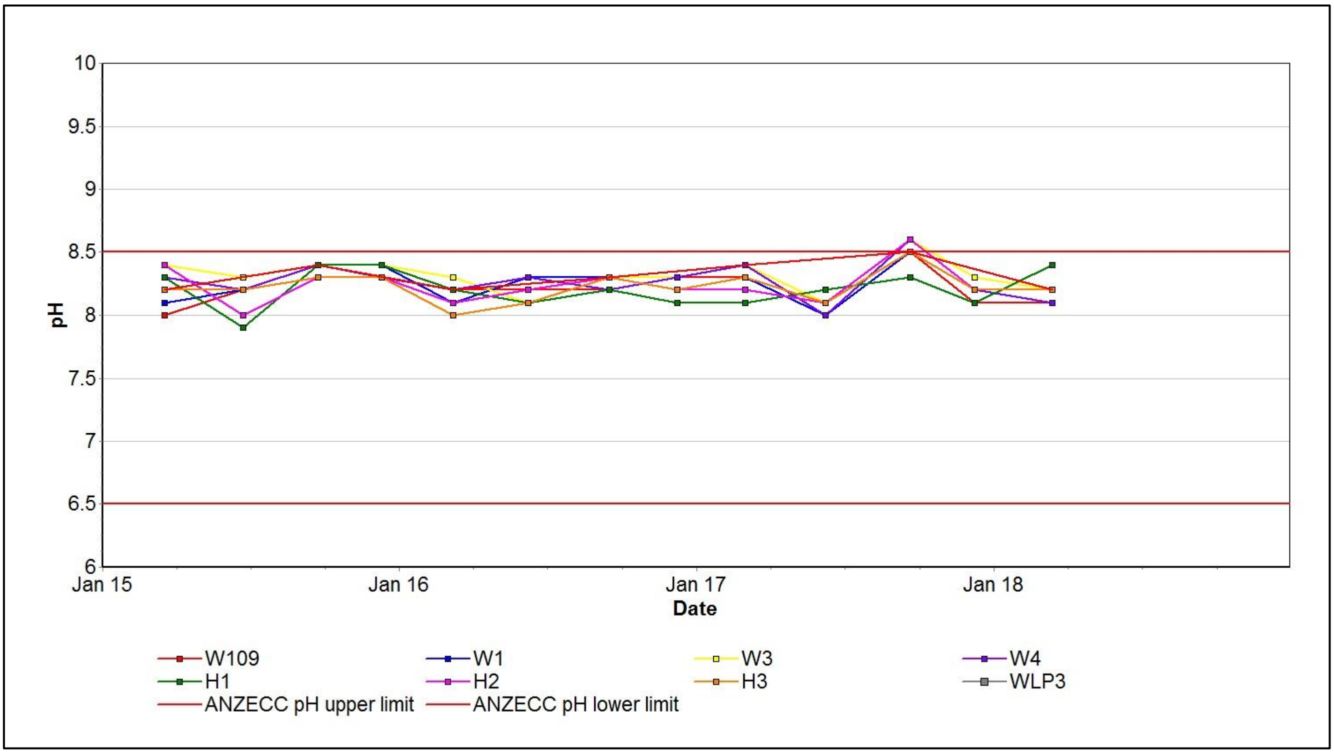

Figure 17: Hunter River pH Trend – March 2018

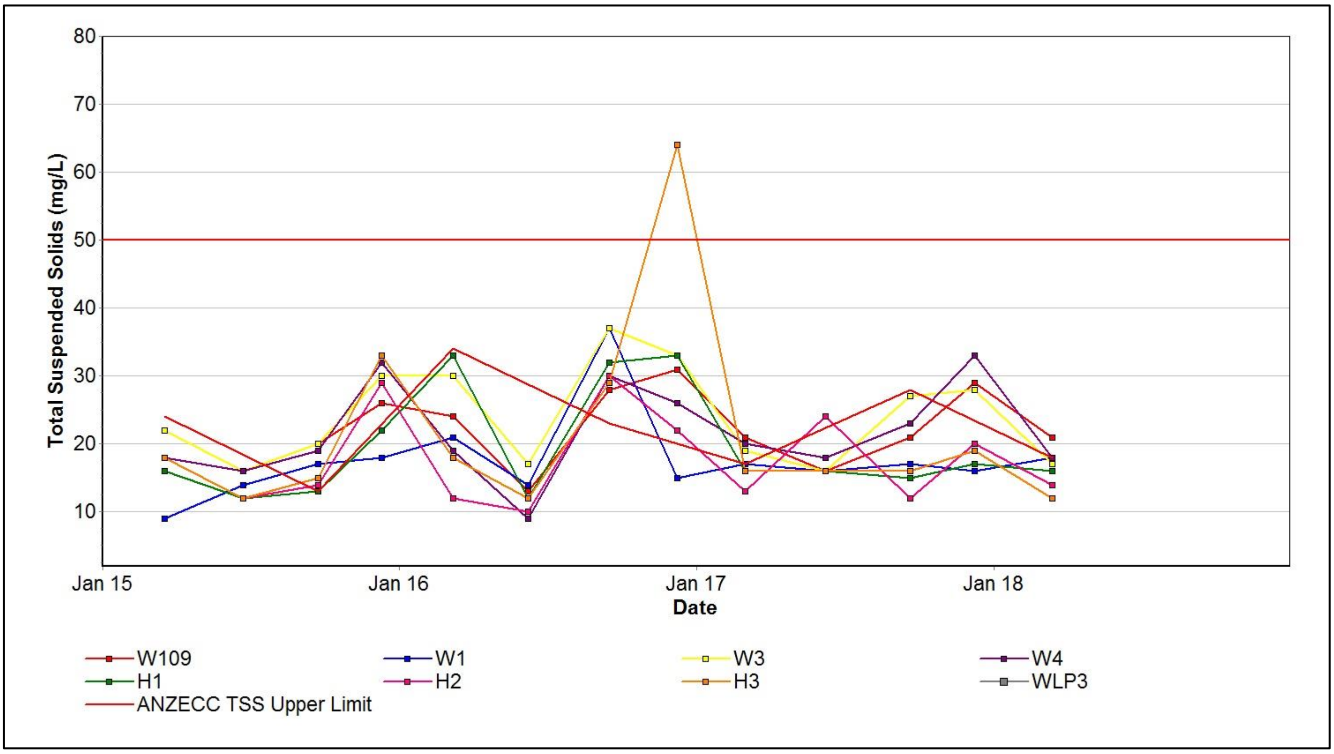

Figure 18: Hunter River Total Suspended Solids – March 2018

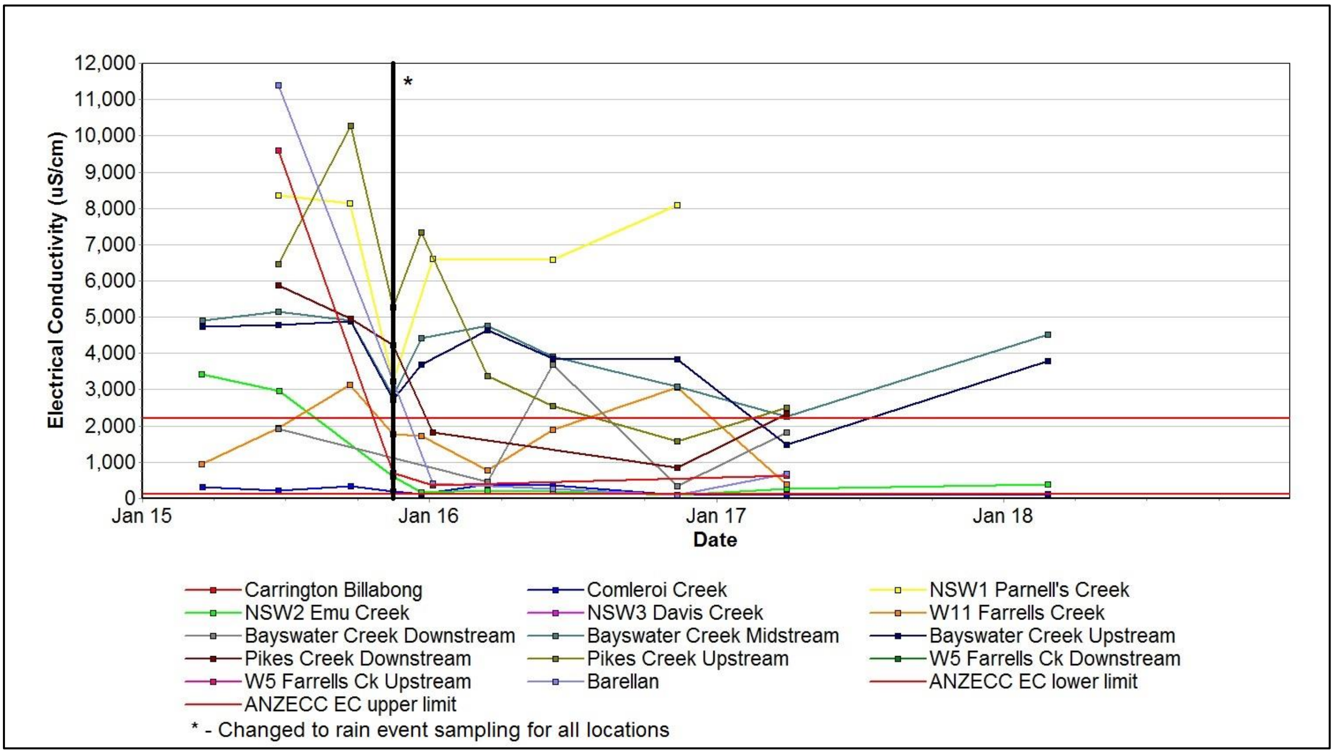

Figure 19: Other Tributaries Electrical Conductivity Trend – March 2018

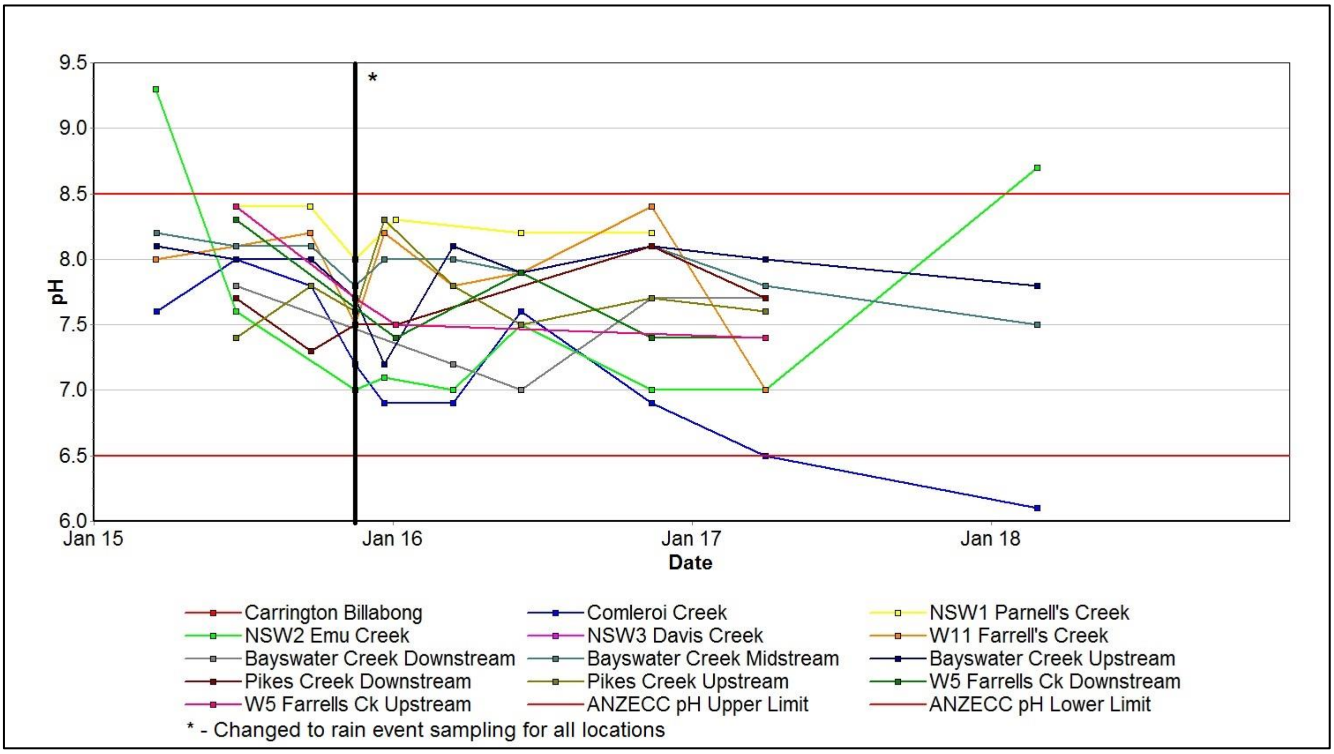

Figure 20: Other Tributaries pH Trend – March 2018

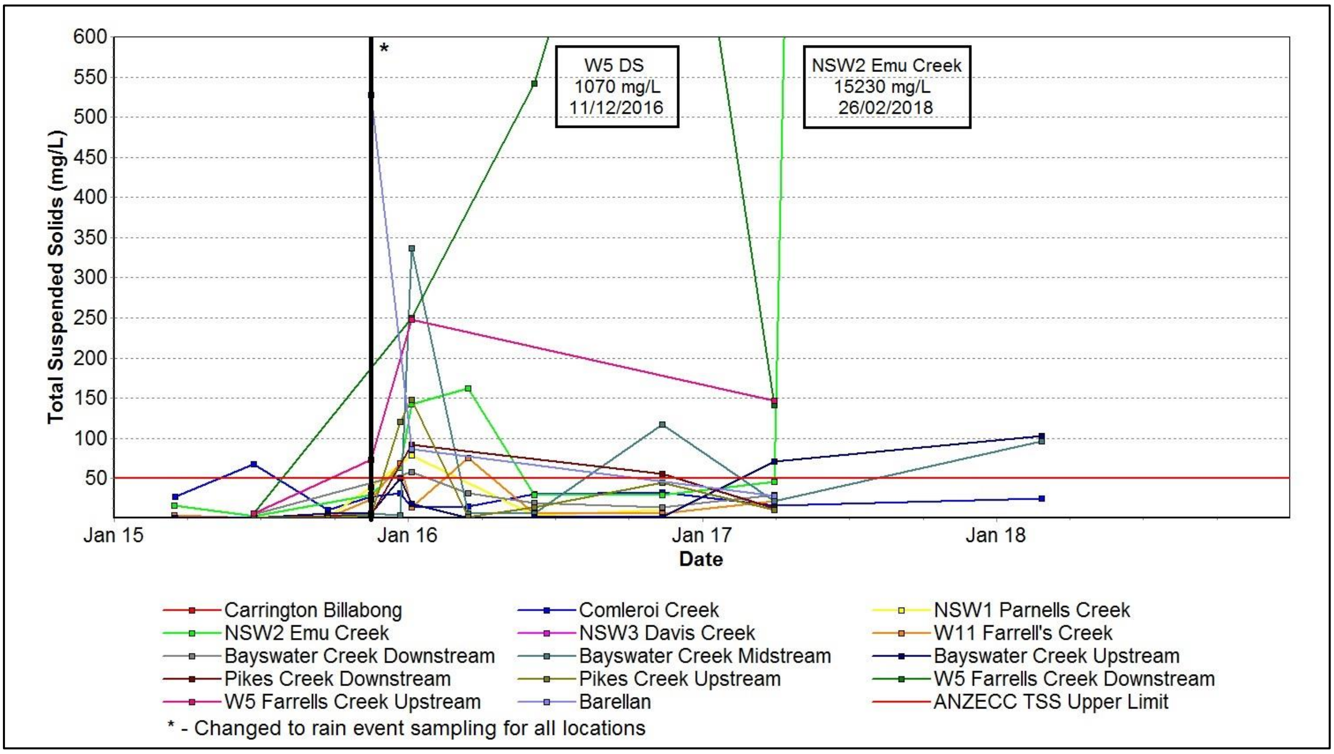

Figure 21: Other Tributaries Total Suspended Solids Trend – March 2018

3.1.2 Site Water Use

Under water allocation licences issued by the NSW Office of Water, HVO is permitted to extract water from the Hunter River. During the reporting period, HVO extracted approximately 69.2ML of water from the Hunter River.

3.1.3 HRSTS Discharge

HVO participates in the HRSTS, allowing it to discharge from licensed discharge points Dam 11N (to Farrell's Creek), Lake James (to the Hunter River) and Parnell's Dam (to Parnell's Creek). Discharges can only take place subject to HRSTS regulations.

During the reporting period no water was discharged under the HRSTS.

3.1.4 Surface Water Trigger Limits

Internal trigger limits have been developed to assess monitoring data on an on-going basis, and to highlight potentially adverse surface water impacts. The process for evaluating monitoring results against the internal triggers and subsequent responses are outlined in the HVO Water Management Plan.

Current internal trigger limits that have been breached are summarised in Table 2.

Table 3: Surface Water Trigger Limit Summary

Site	Date	Trigger Limit Breached	Action taken in response
W2	14/03/2018	EC – 95th Percentile	Watching Brief*
W2	14/03/2018	pH – 95th Percentile	Watching Brief*
Warkworth Bridge	14/03/2018	EC – 95th Percentile	Watching Brief*
Warkworth Bridge	14/03/2018	pH – 5th Percentile	Watching Brief*
Warkworth Bridge	14/03/2018	TSS – 50mg/L (ANZECC criteria)	Investigation commenced
Bayswater Creek Upstream	26/02/2018	TSS – 50mg/L (ANZECC criteria)	Investigation commenced
Bayswater Creek Midstream	26/02/2018	pH – 5th Percentile	Watching Brief*
Bayswater Creek Midstream	26/02/2018	TSS – 50mg/L (ANZECC criteria)	Investigation commenced
Comleroi Ck	26/02/2018	pH – 5th Percentile	Watching Brief*
NSW 2 EMU Creek	26/02/2018	TSS – 50mg/L (ANZECC criteria)	Investigation commenced

* = Watching Brief established pending outcomes of subsequent monitoring events. No further action required.

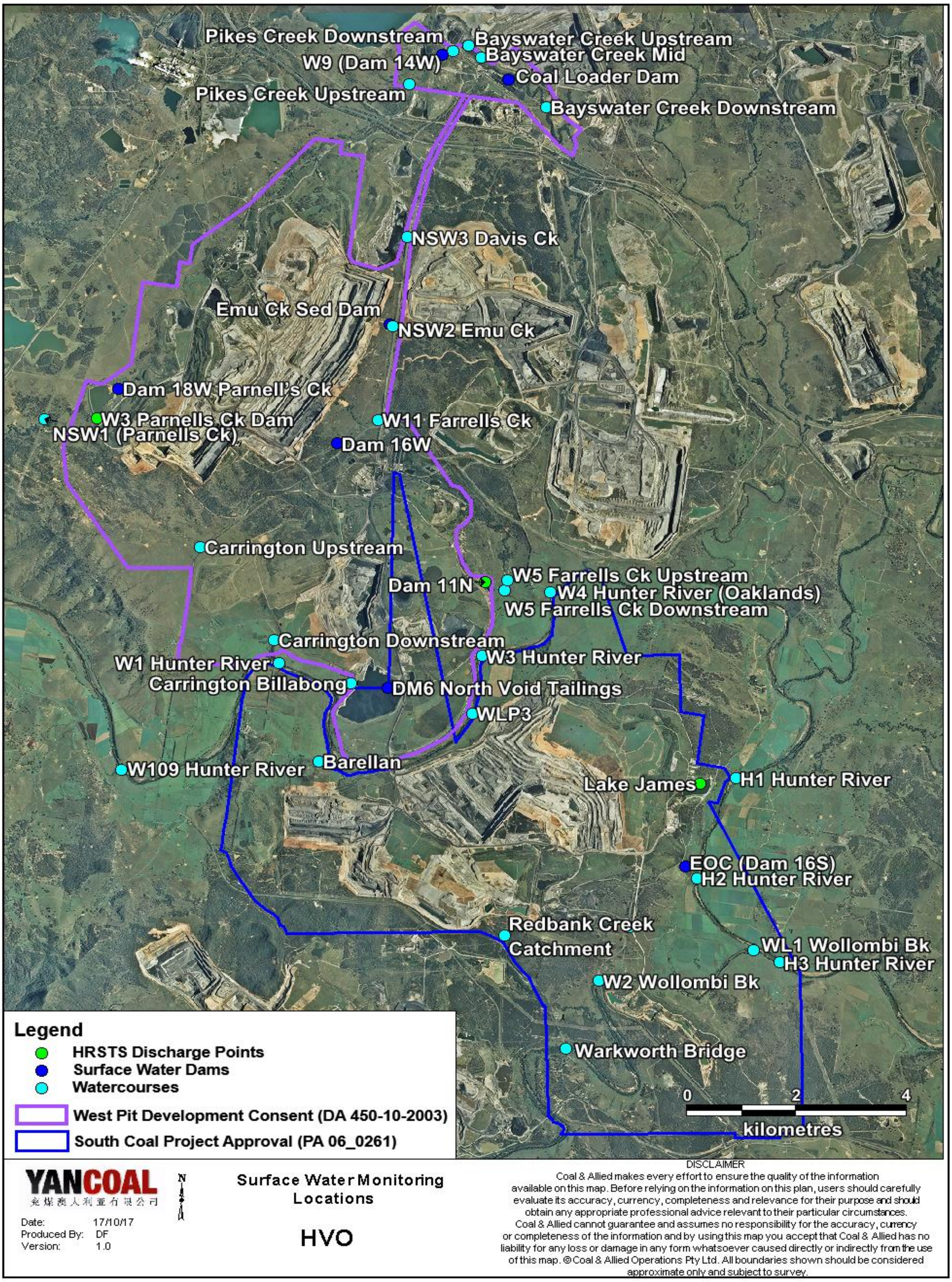

Figure 22: Surface Water Monitoring Location Plan

4.0 GROUNDWATER

4.1.1 Groundwater Monitoring

Groundwater monitoring is undertaken on a quarterly basis in accordance with the HVO Water Management Plan and Ground Water Monitoring Programme. Monitoring sites are shown in Figure 77.

Figure 23 to Figure 76 show the long term trends (2015 – current) for ground water bores monitored at HVO.

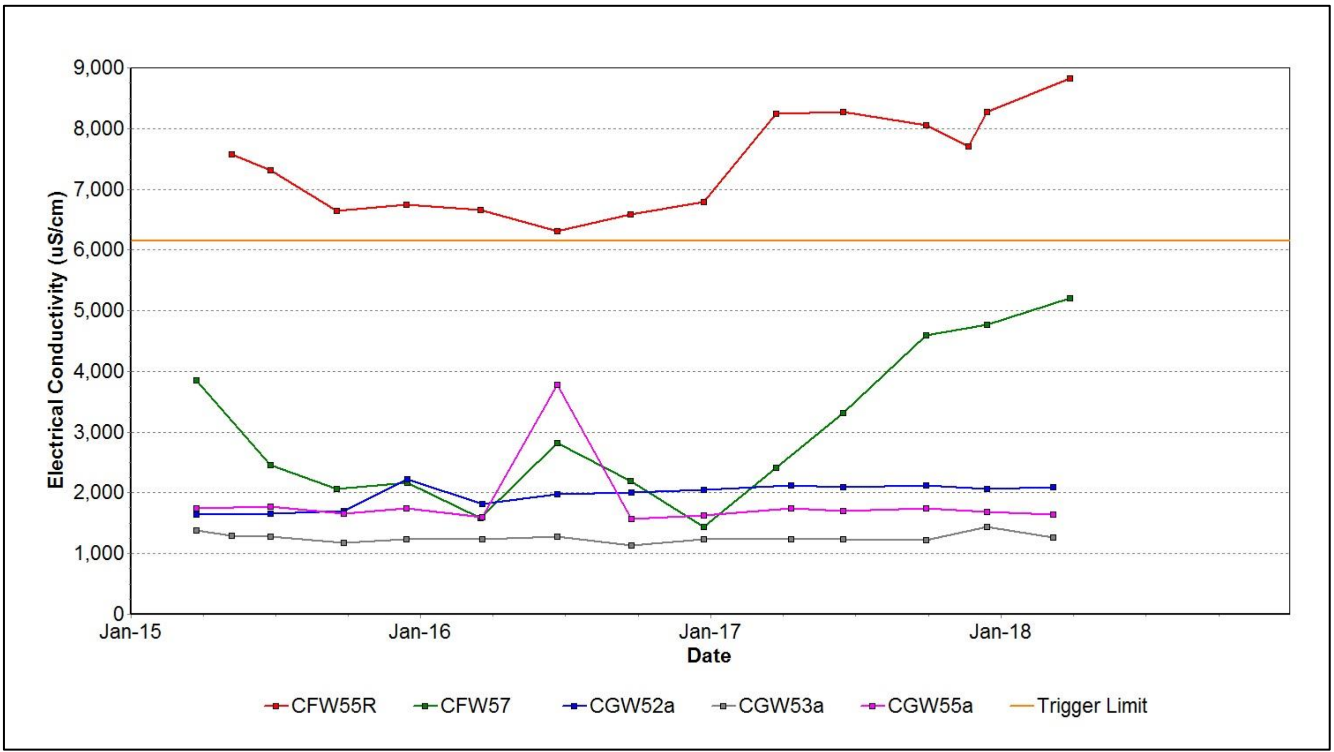

Figure 23: Carrington Alluvium Electrical Conductivity Trend – March 2018

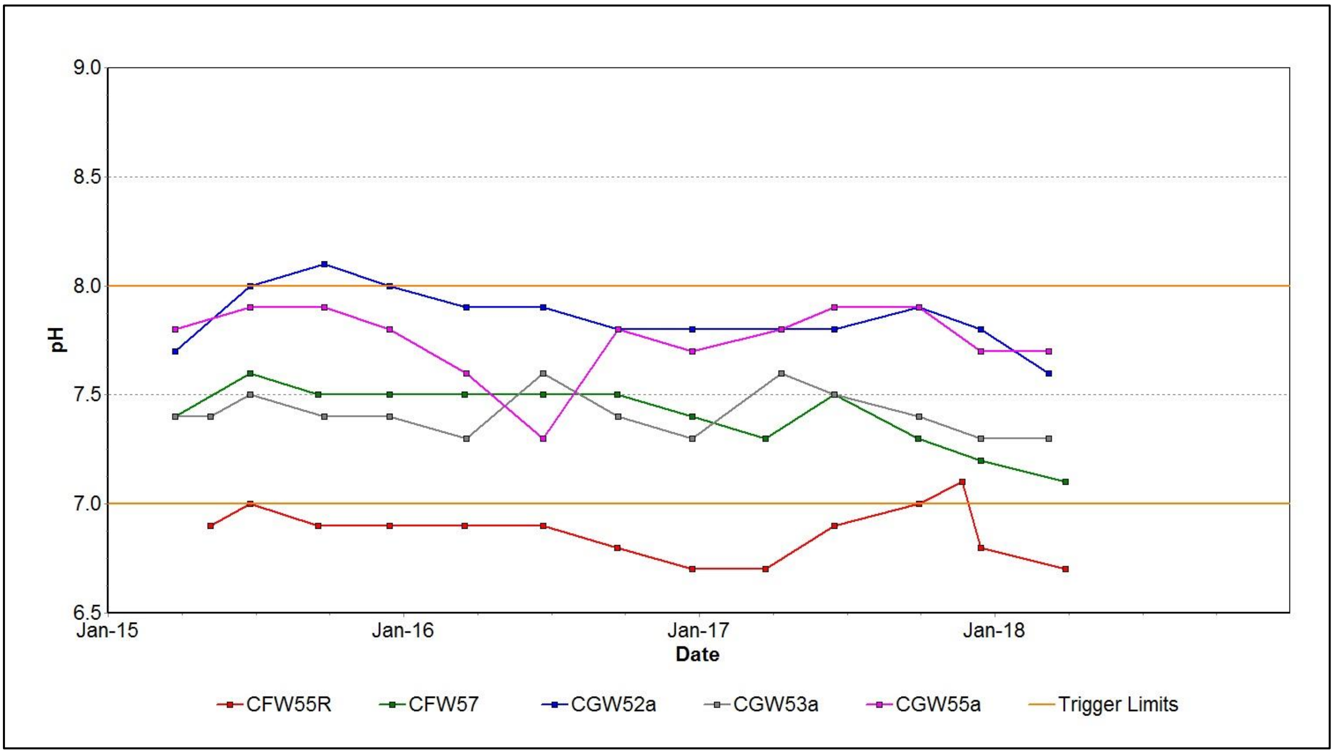

Figure 24: Carrington Alluvium pH Trend – March 2018

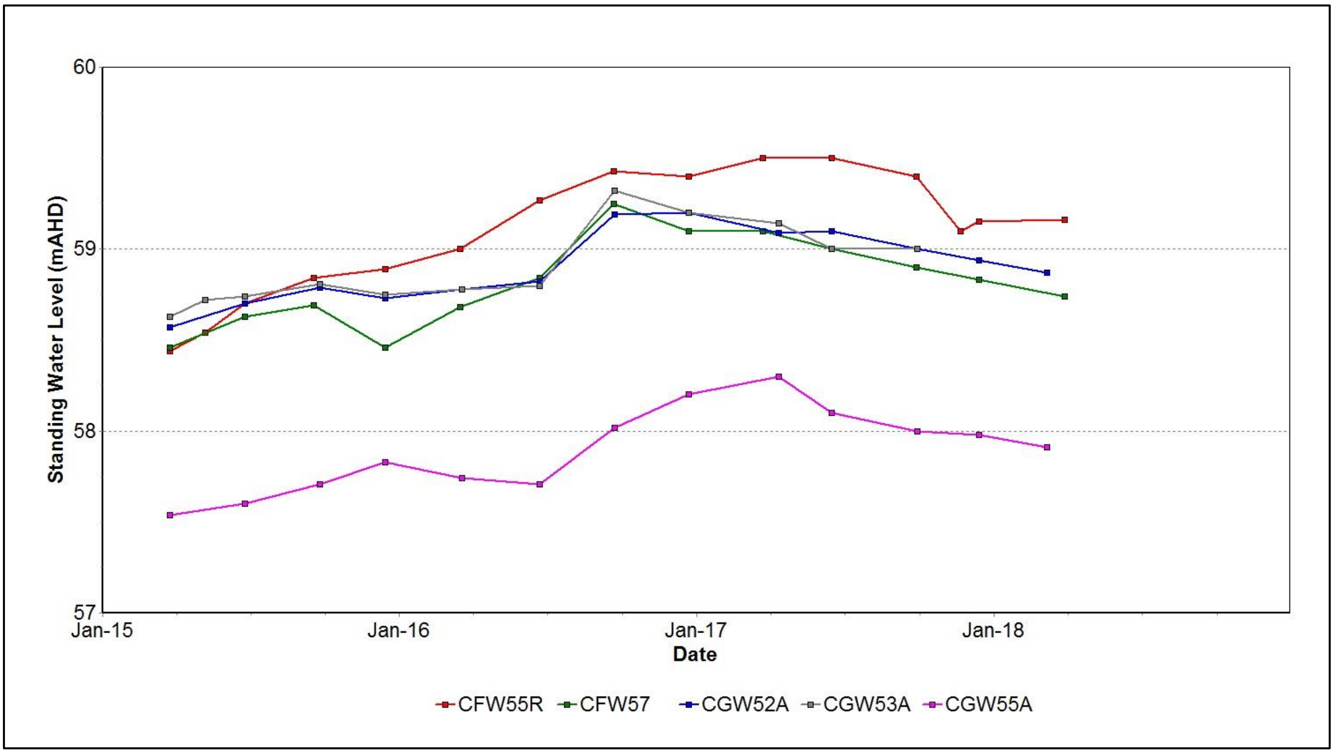

Figure 25: Carrington Alluvium Standing Water Level – March 2017

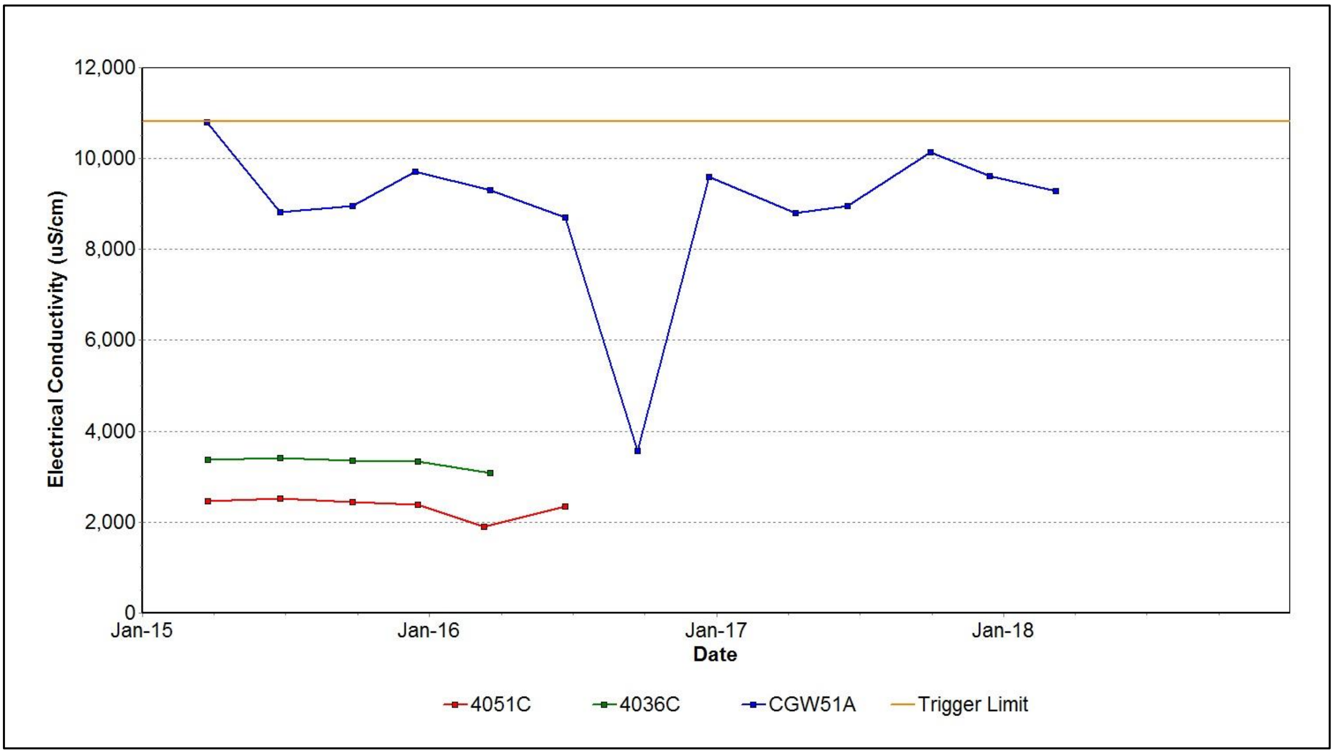

Figure 26: Carrington Interburden Electrical Conductivity Trend – March 2018

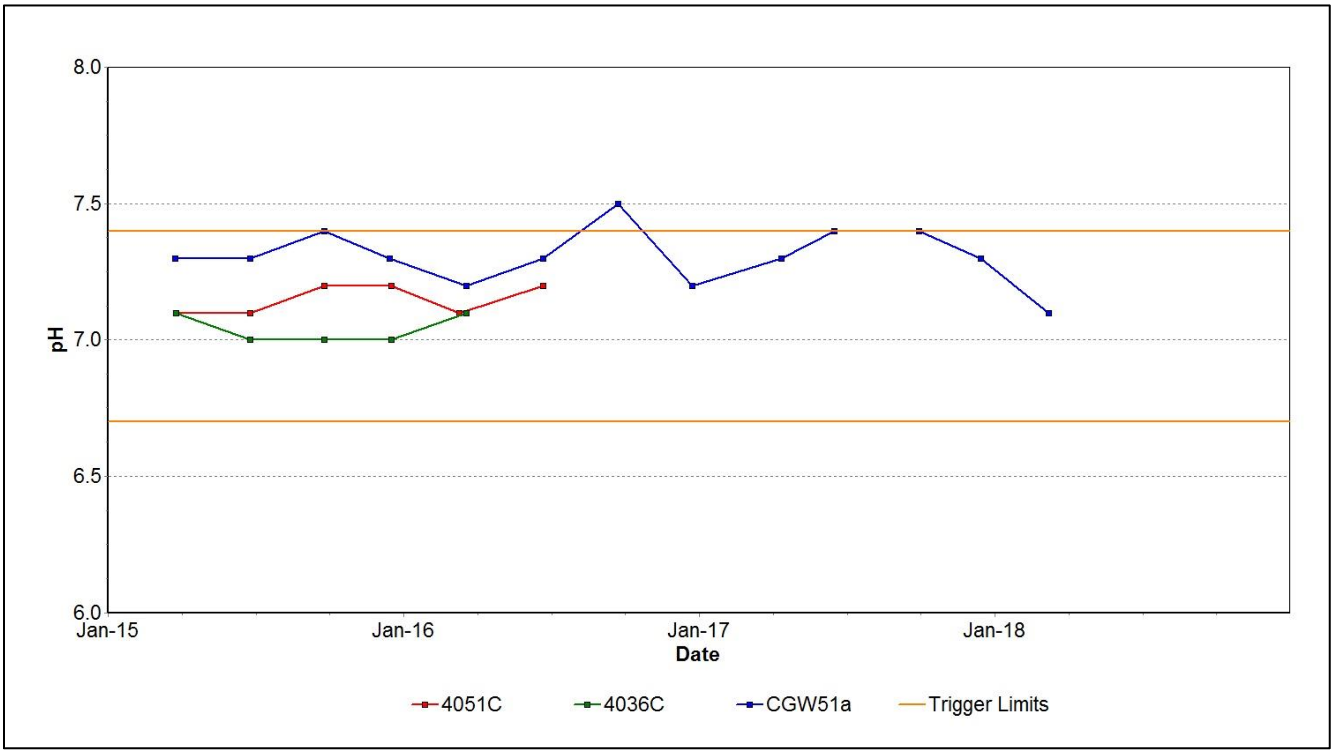

Figure 27: Carrington Interburden pH Trend – March 2018

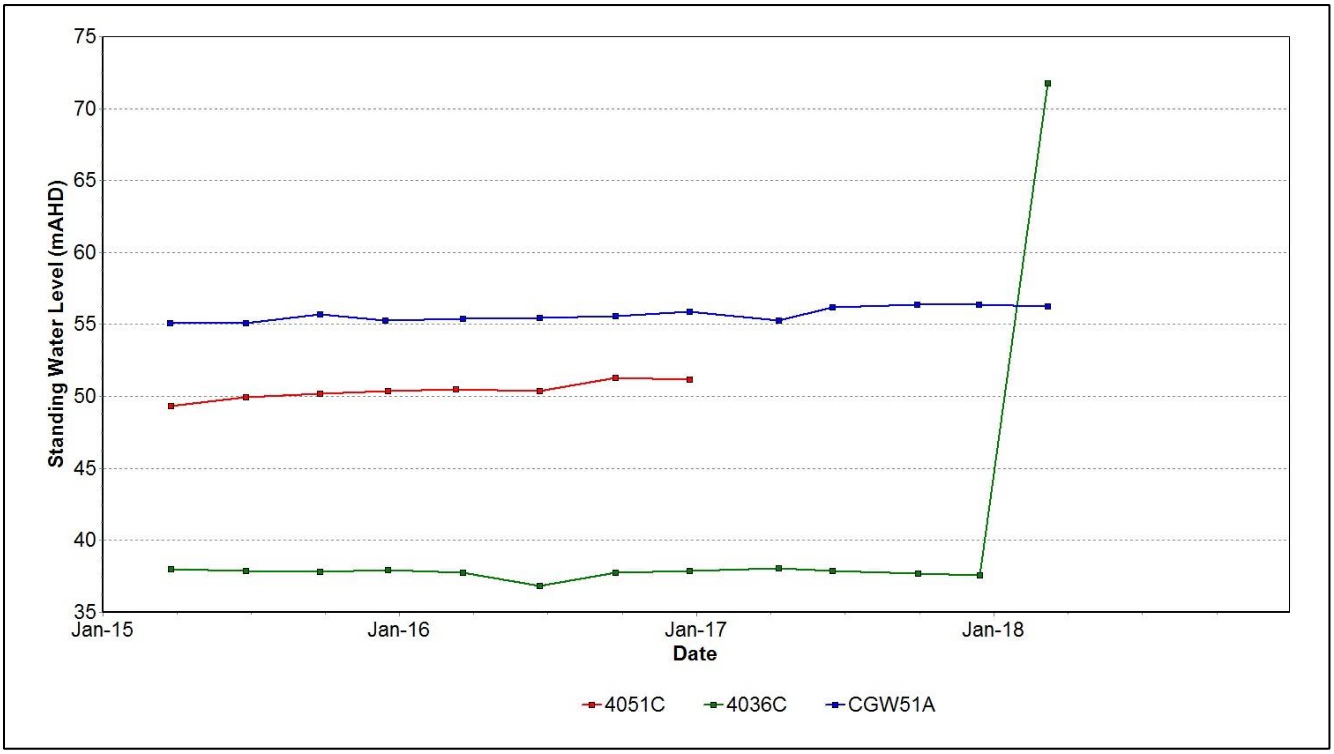

Figure 28: Carrington Interburden Standing Water Level – March 2018

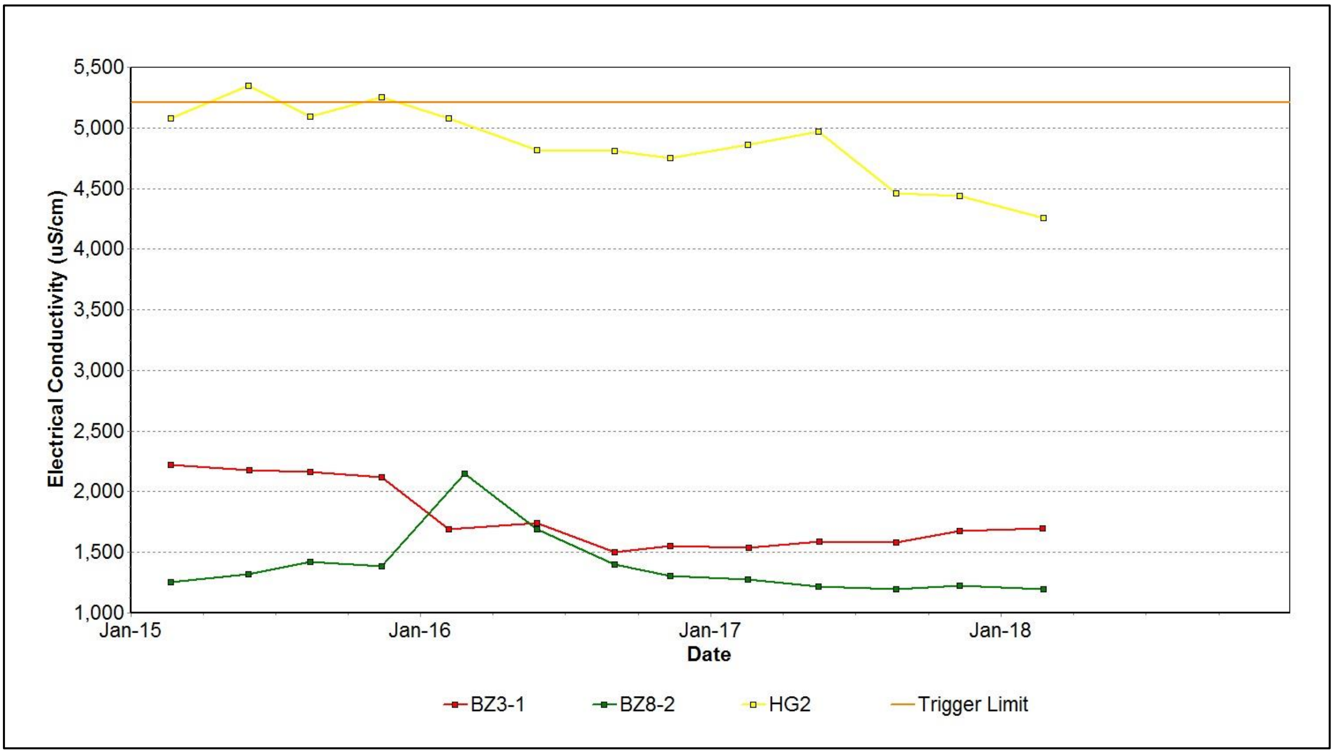

Figure 29: Cheshunt Interburden Electrical Conductivity Trend – March 2018

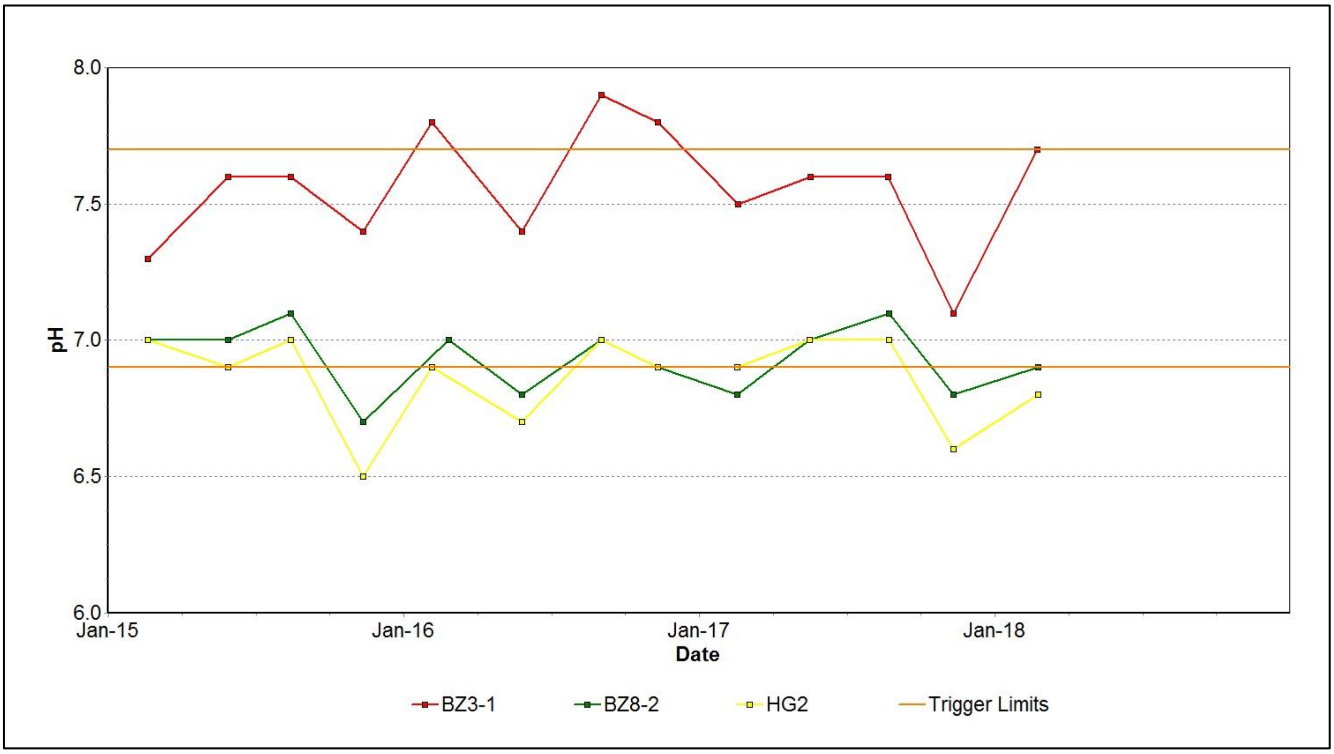

Figure 30: Cheshunt Interburden pH Trend – March 2018

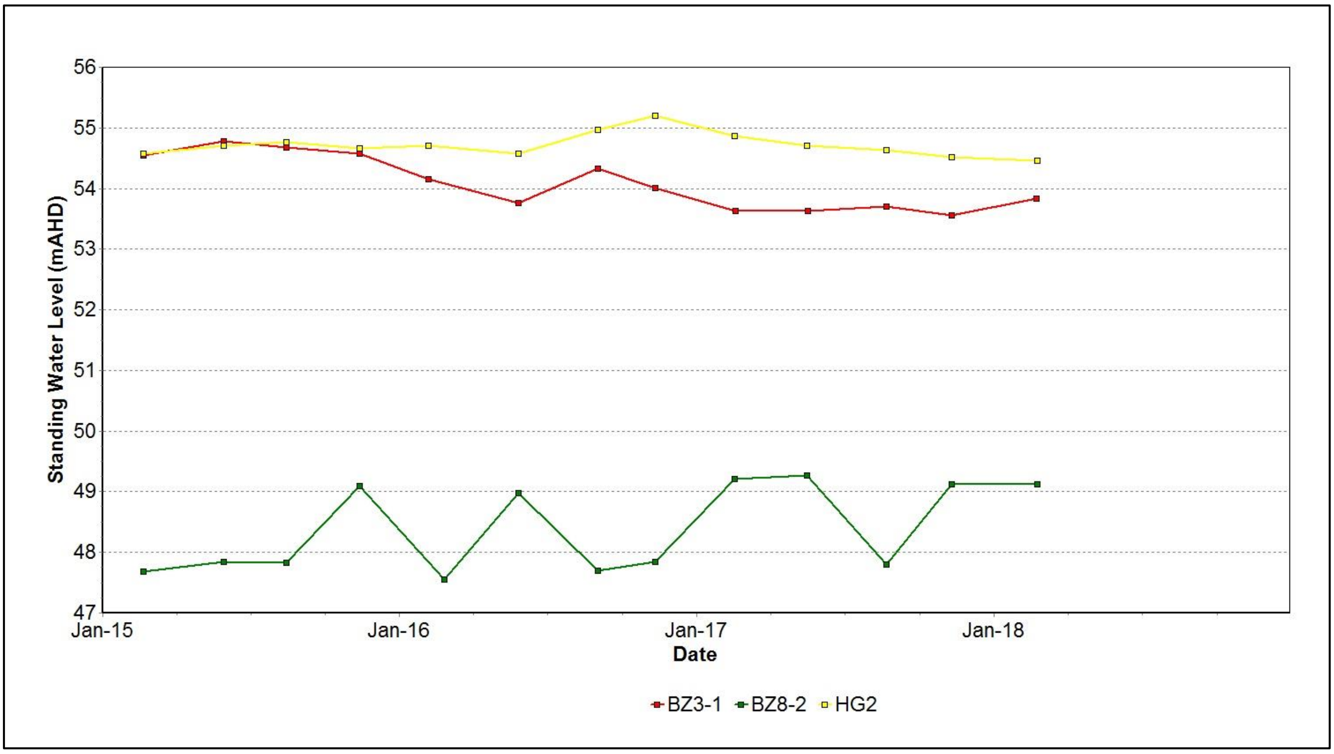

Figure 31: Cheshunt Interburden Standing Water Level – March 2018

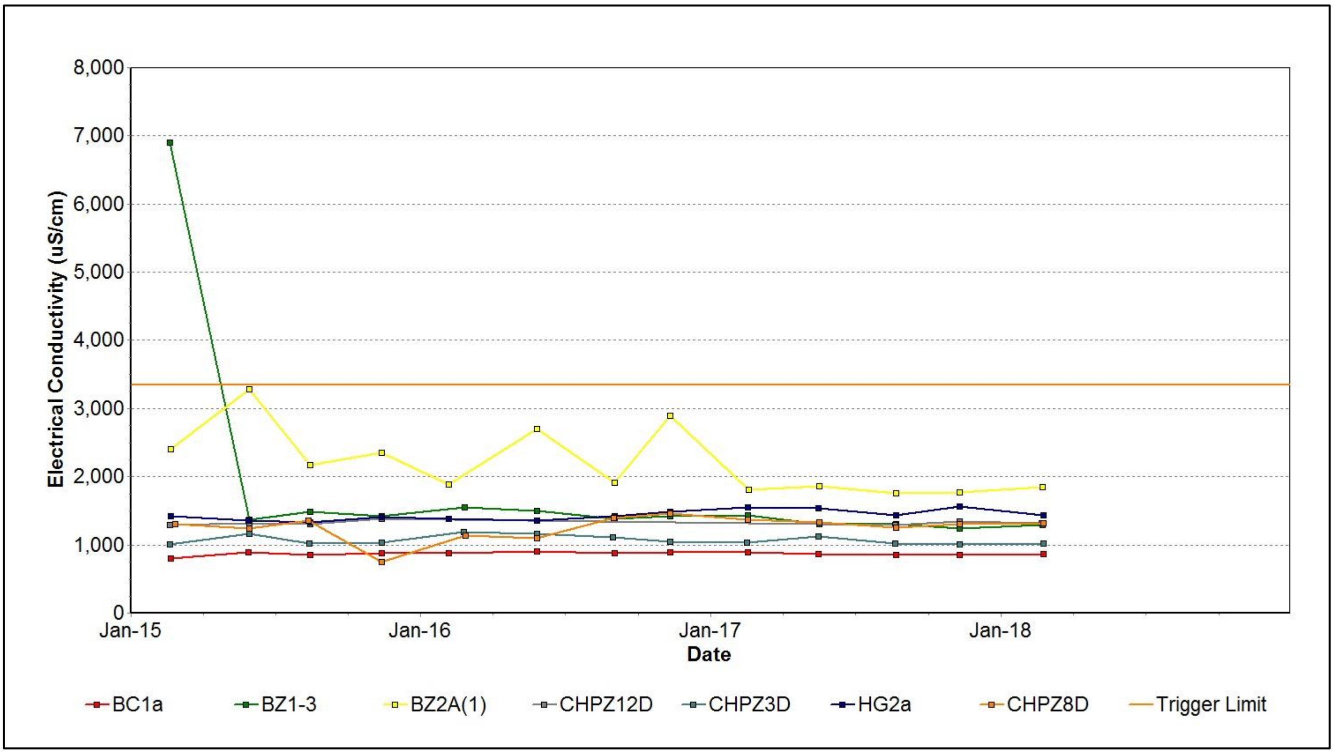

Figure 32: Cheshunt Mt Arthur Electrical Conductivity Trend – March 2018

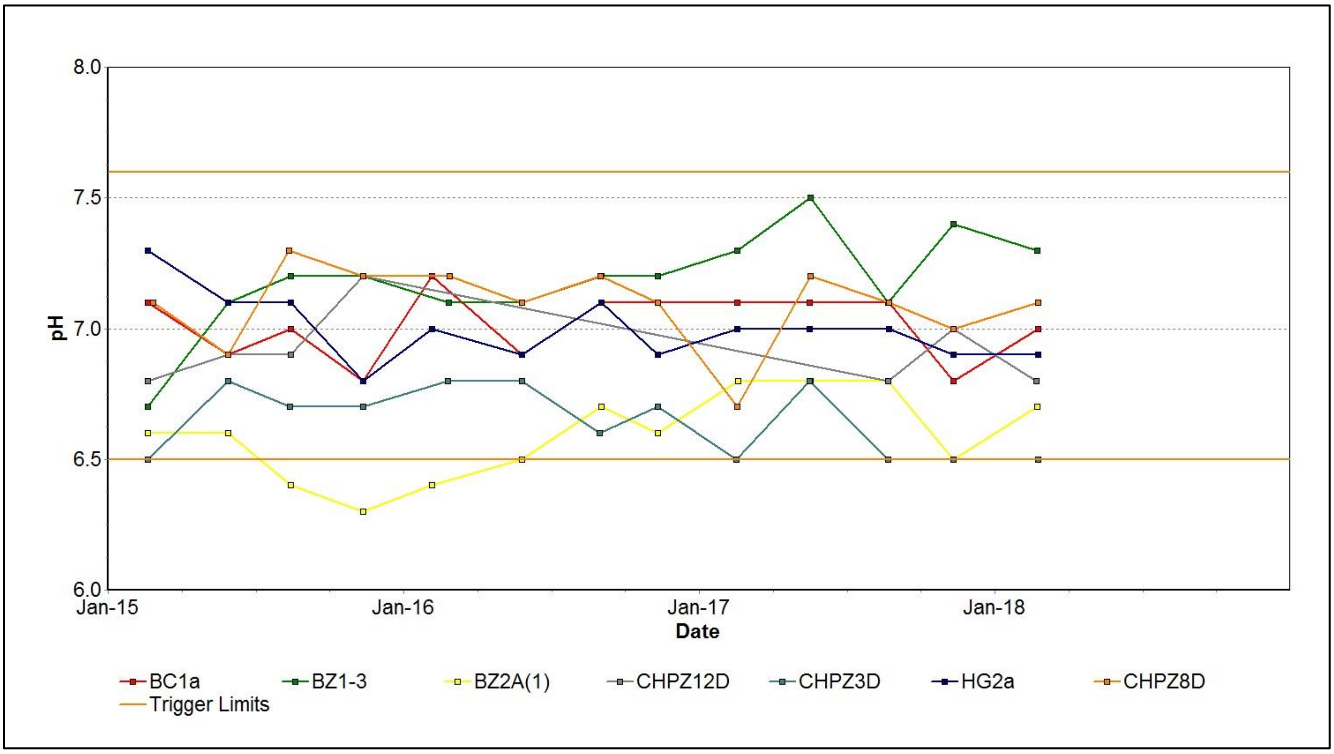

Figure 33: Cheshunt Mt Arthur pH Trend – March 2018

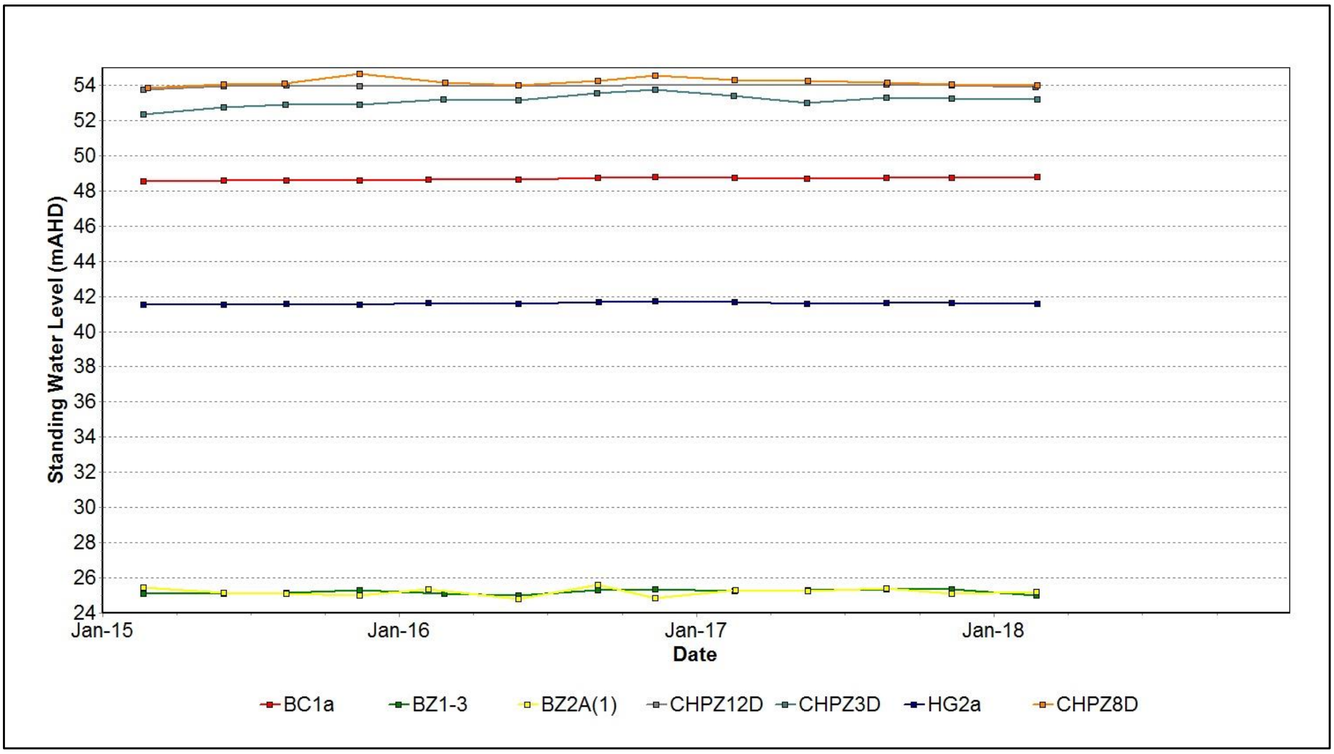

Figure 34: Cheshunt Mt Arthur Standing Water Level – March 2018

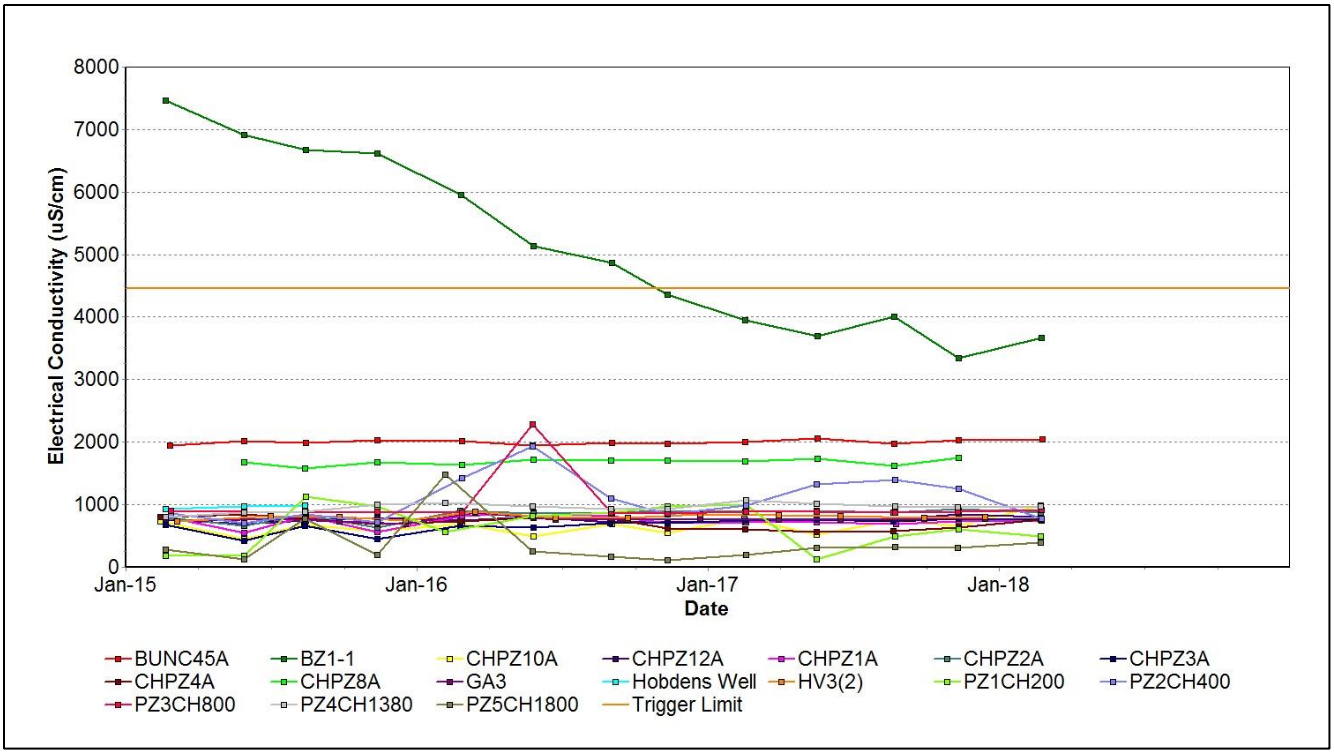

Figure 35: Cheshunt / North Pit Alluvium Electrical Conductivity Trend – March 2018

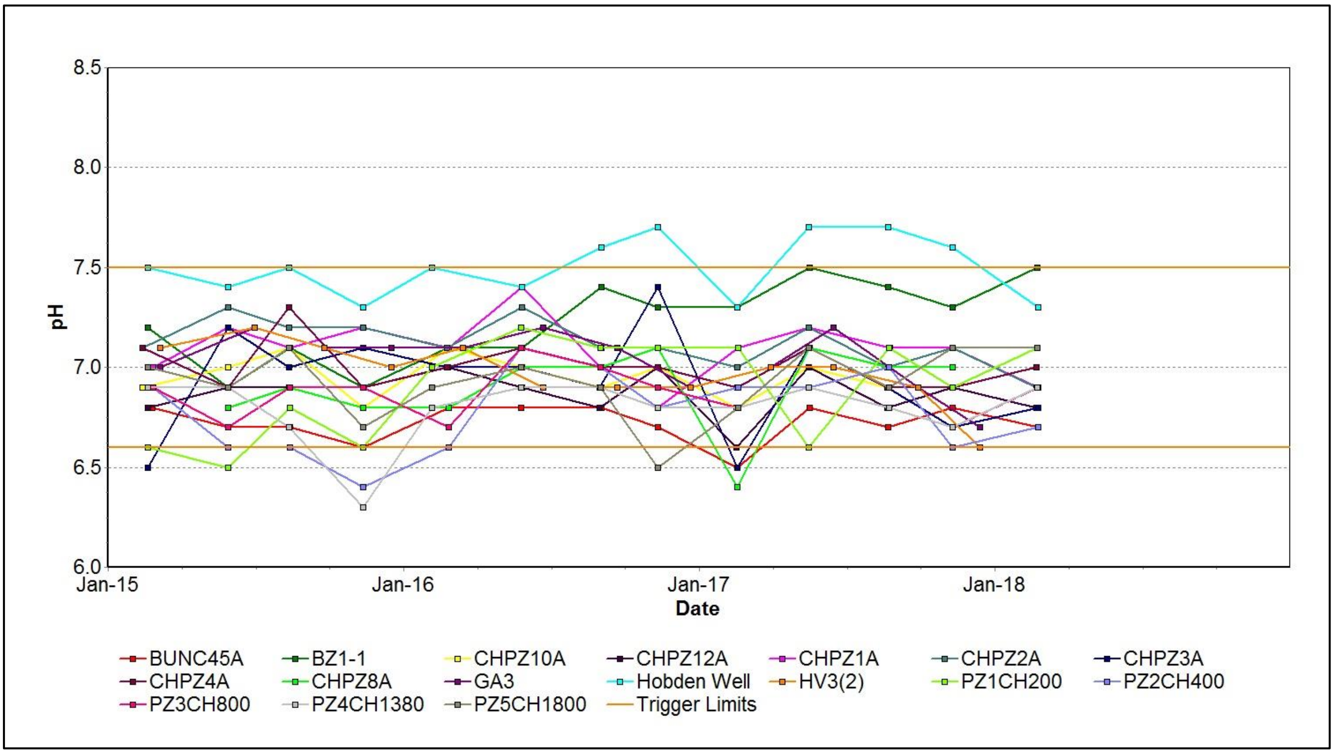

Figure 36: Cheshunt / North Pit Alluvium pH Trend – March 2018

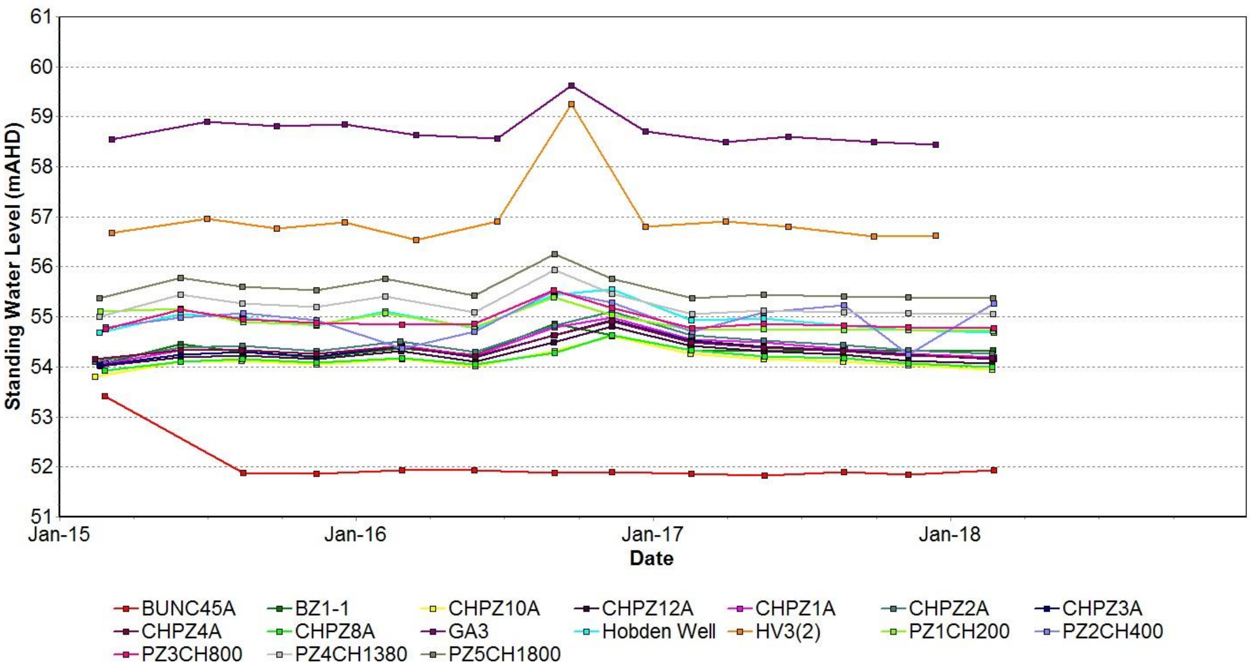

Figure 37: Cheshunt / North Pit Alluvium Standing Water Level – March 2018

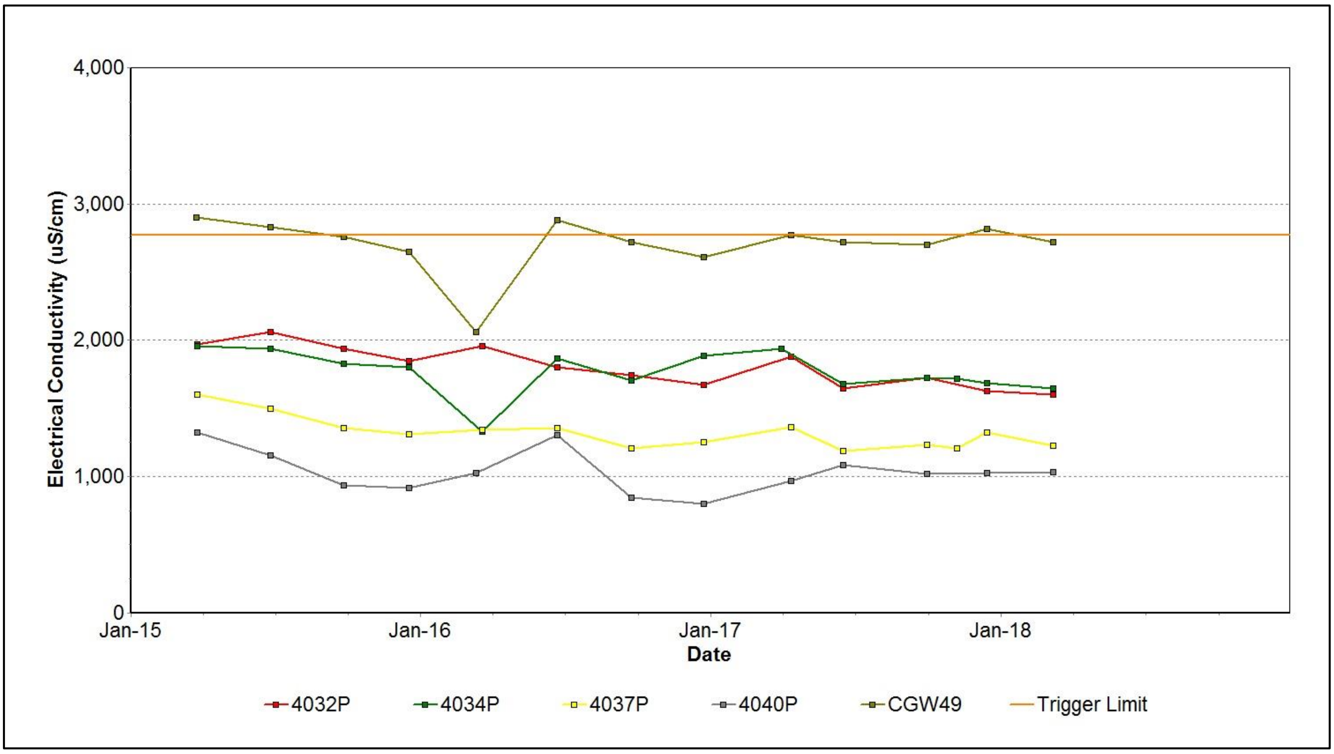

Figure 38: Carrington West Wing Alluvium Electrical Conductivity Trend – March 2018

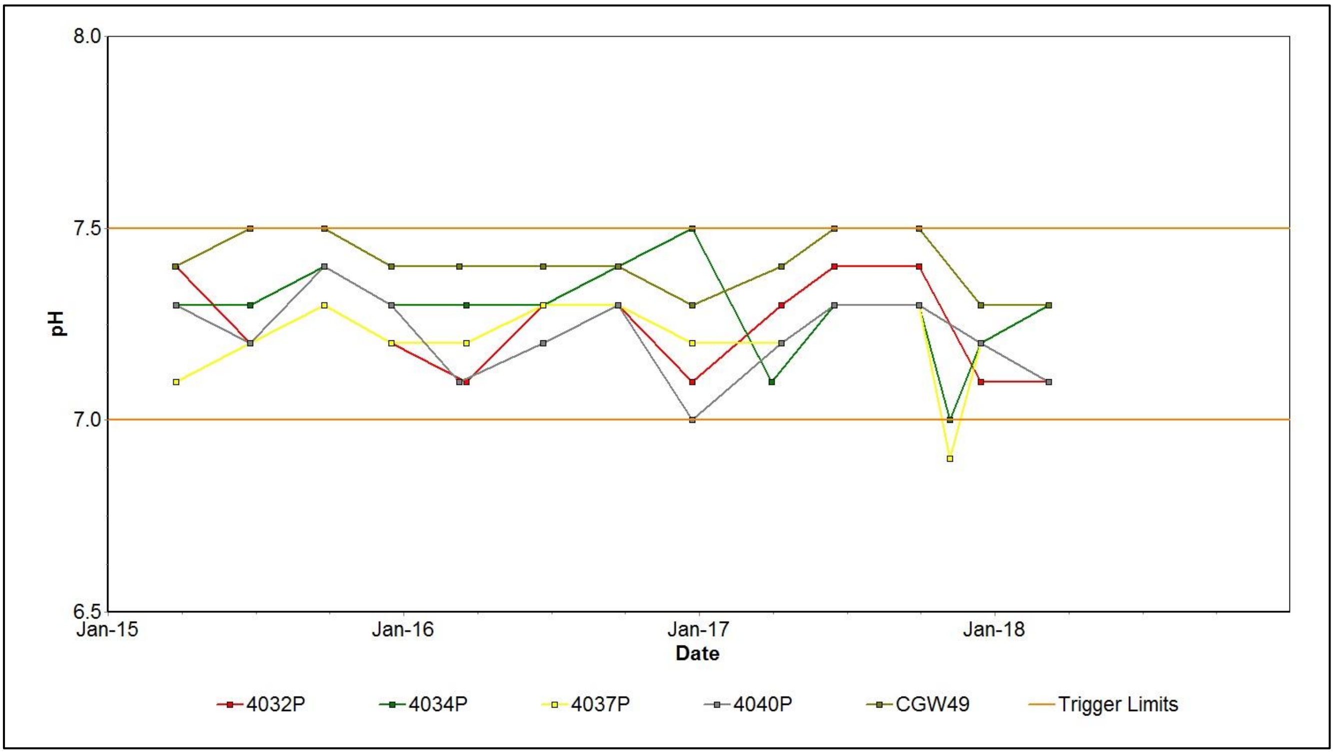

Figure 39: Carrington West Wing Alluvium pH Trend – March 2018

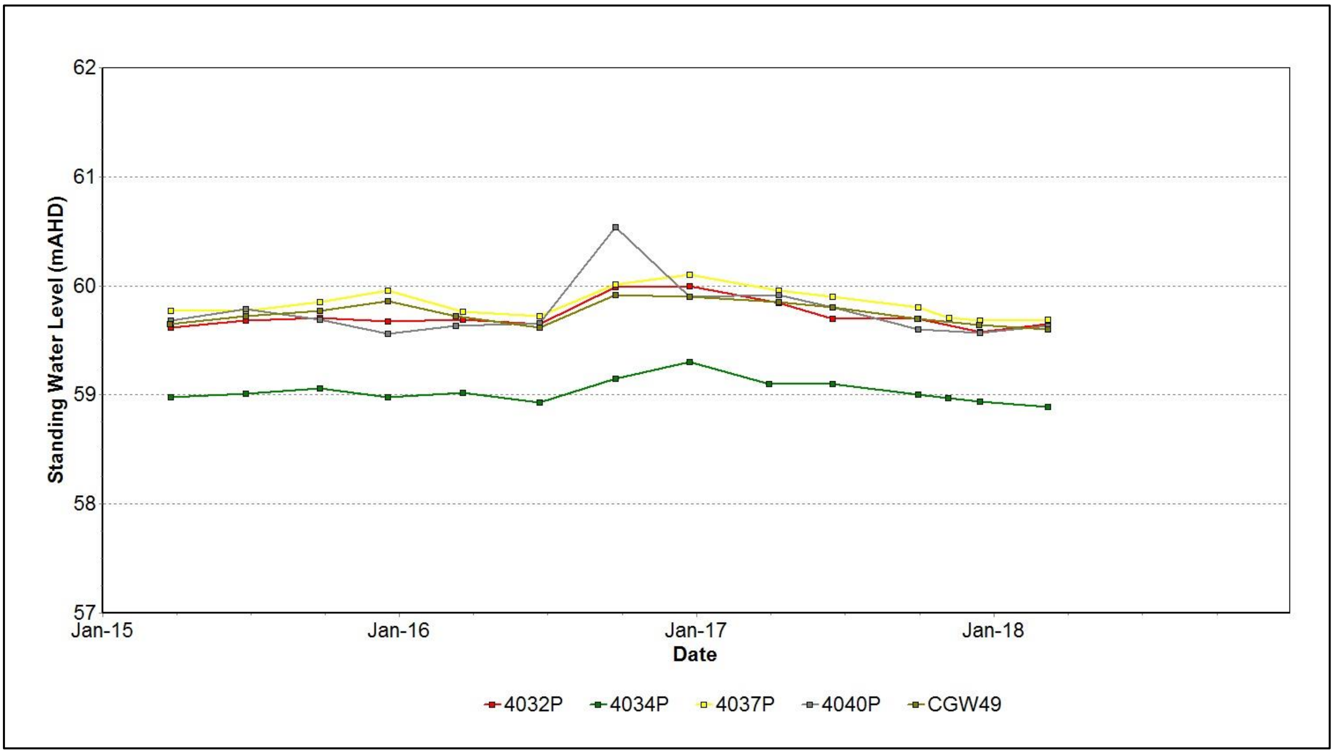

Figure 40: Carrington West Wing Alluvium Standing Water Level – March 2018

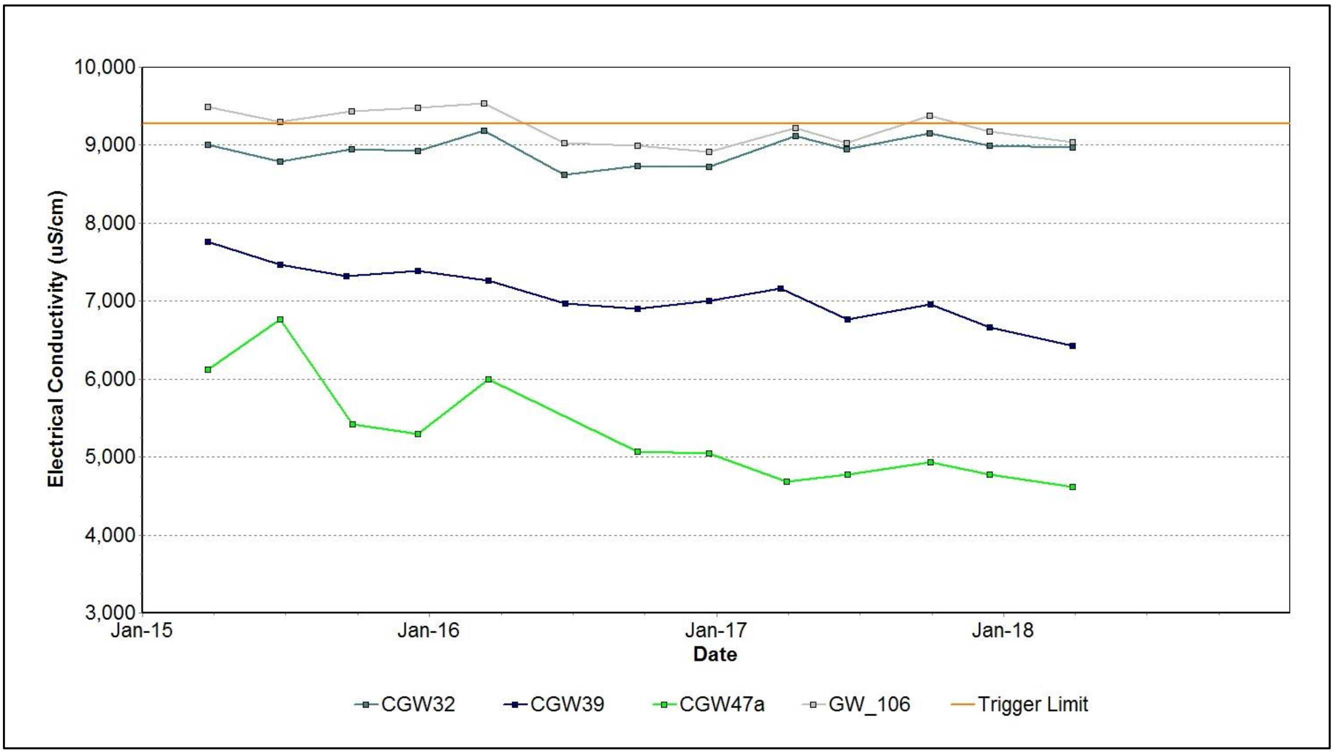

Figure 41: Carrington West Wing Flood Plain Electrical Conductivity Trend – March 2018

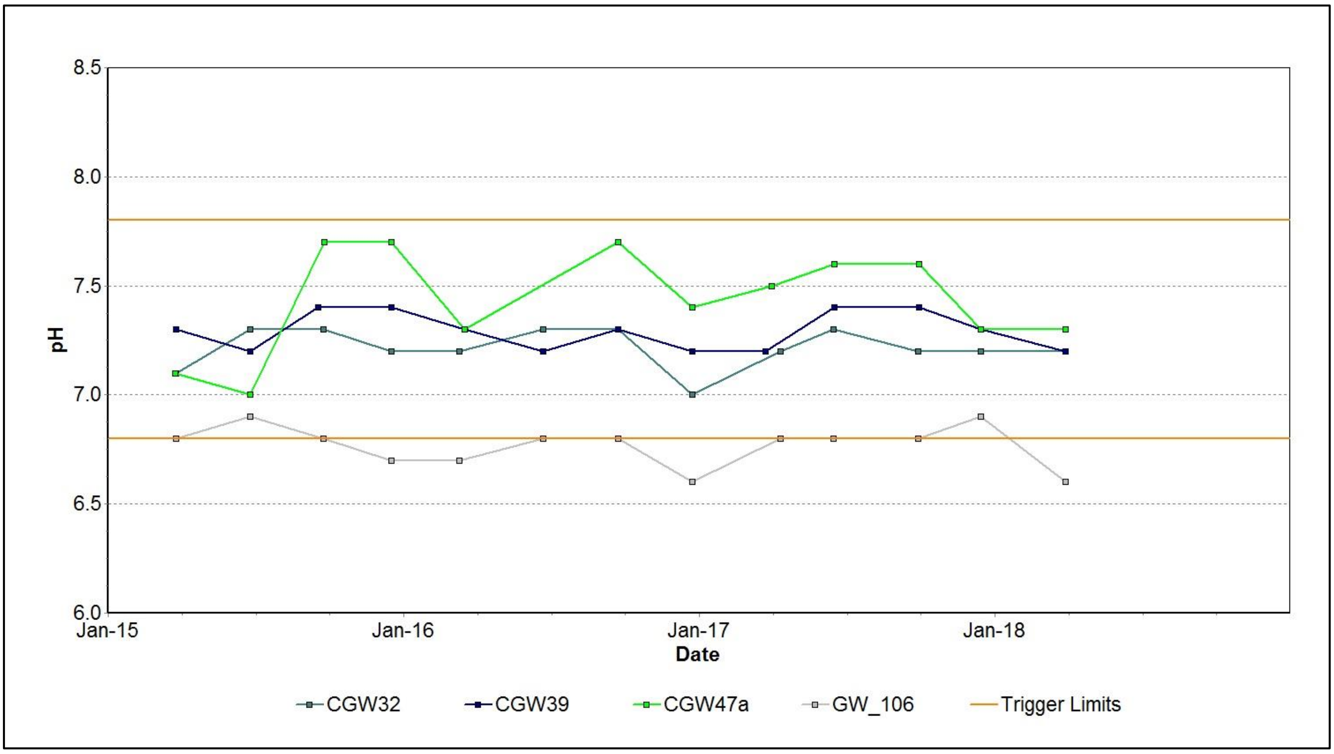

Figure 42: Carrington West Wing Flood Plain pH Trend – March 2018

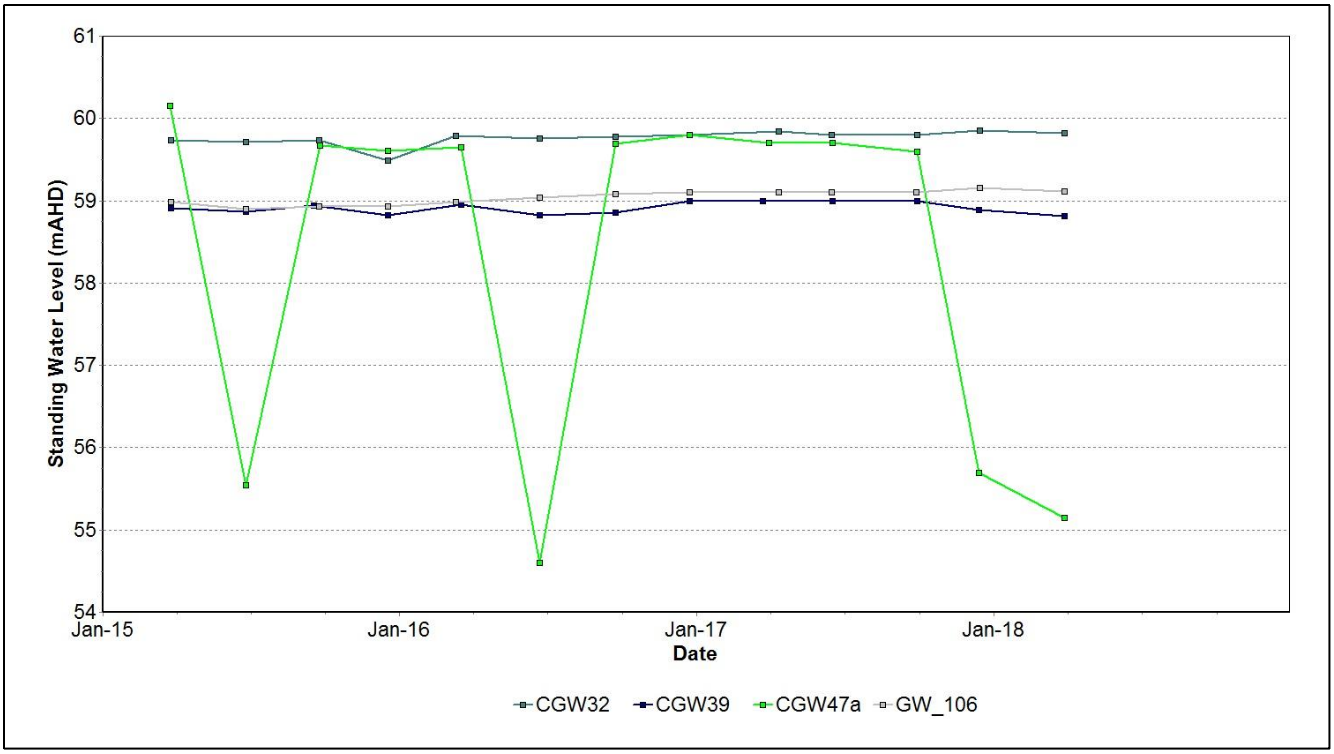

Figure 43: Carrington West Wing Flood Plain Standing Water Level – March 2018

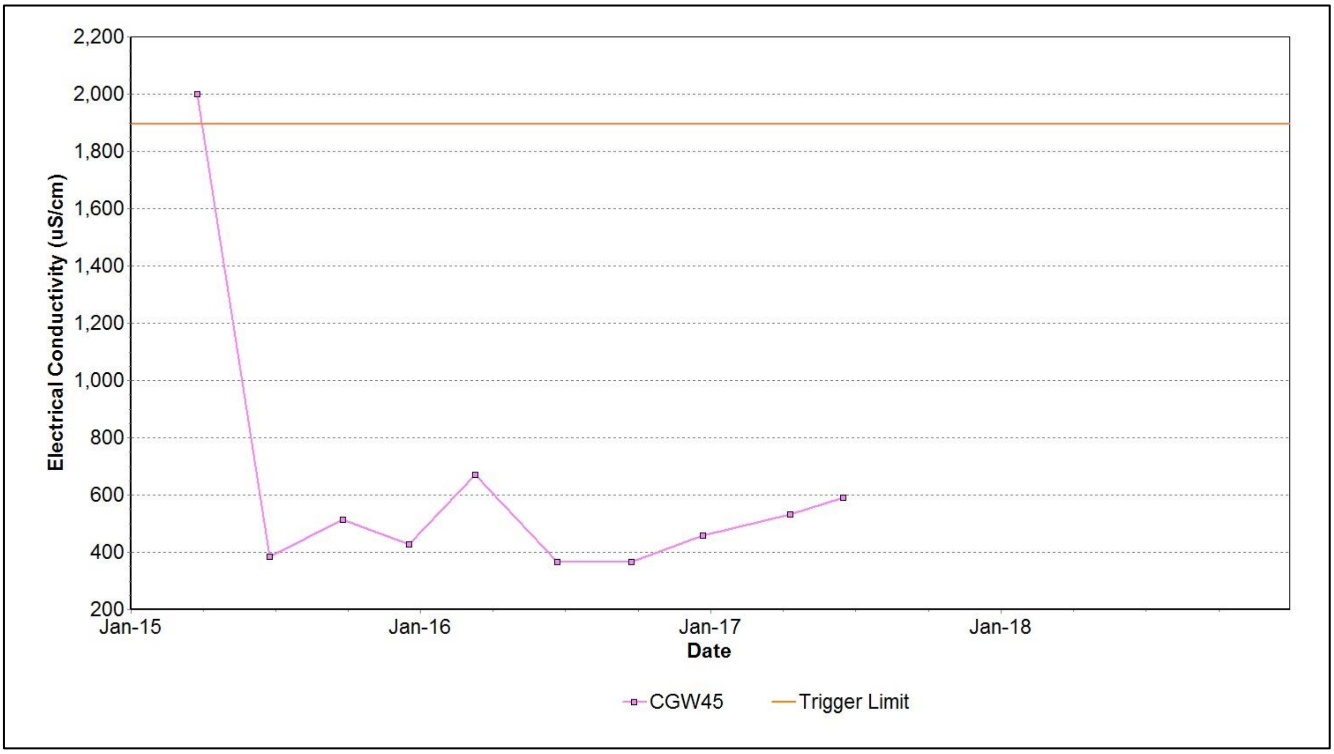

Figure 44: Carrington West Wing LBL Electrical Conductivity Trend – March 2018

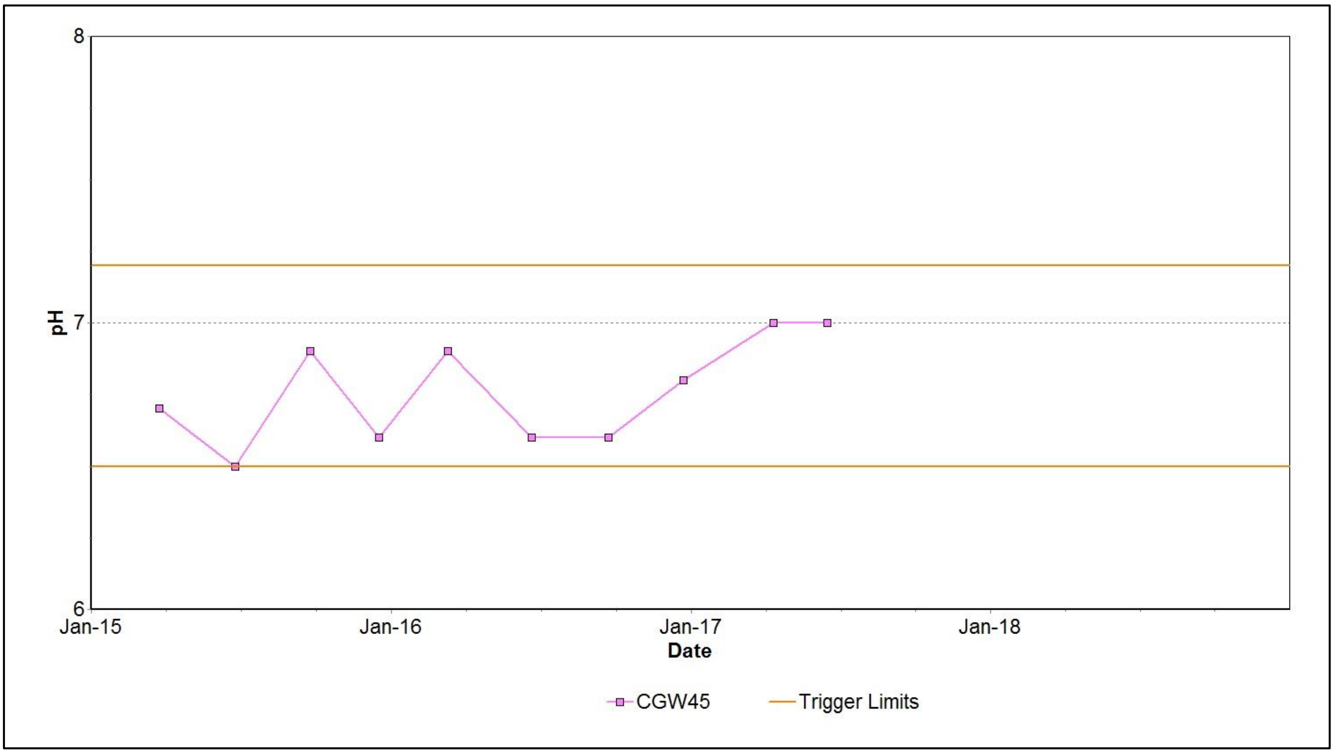

Figure 45: Carrington West Wing LBL pH Trend – March 2018

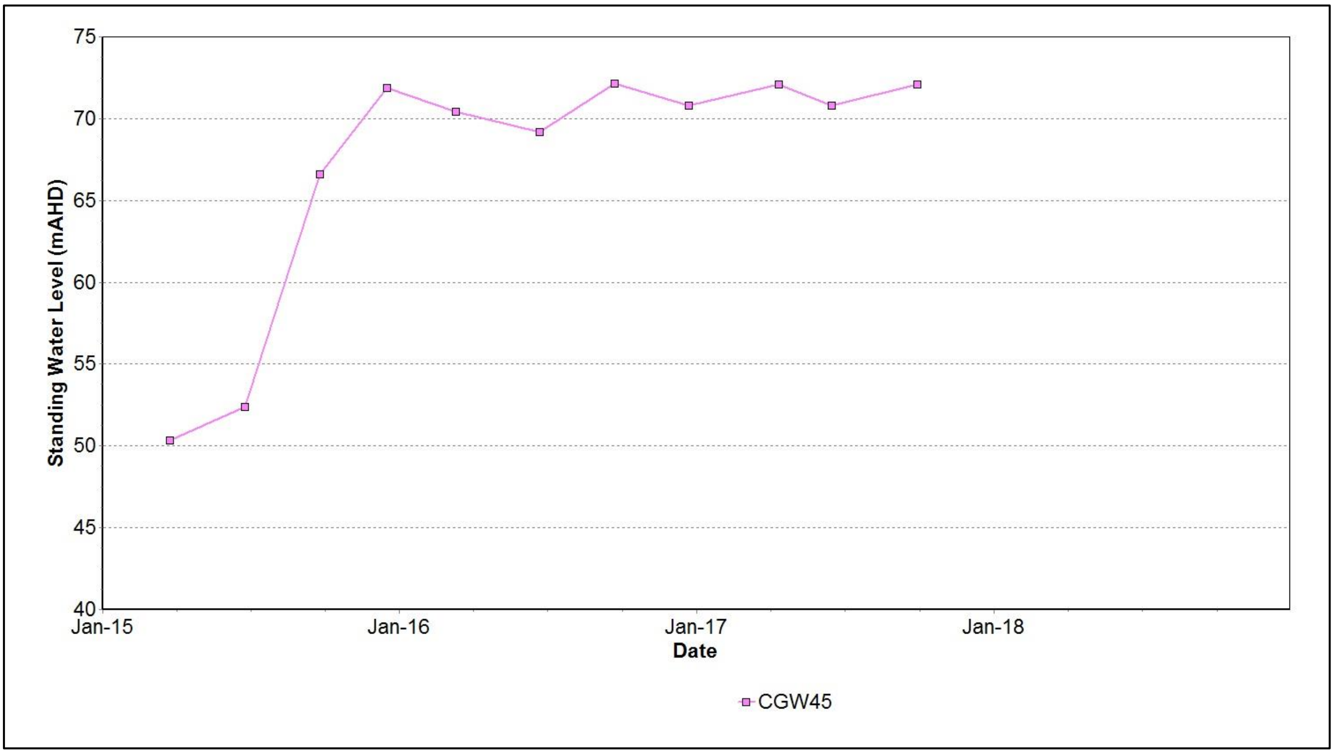

Figure 46: Carrington West Wing LBL Standing Water Level – March 2018

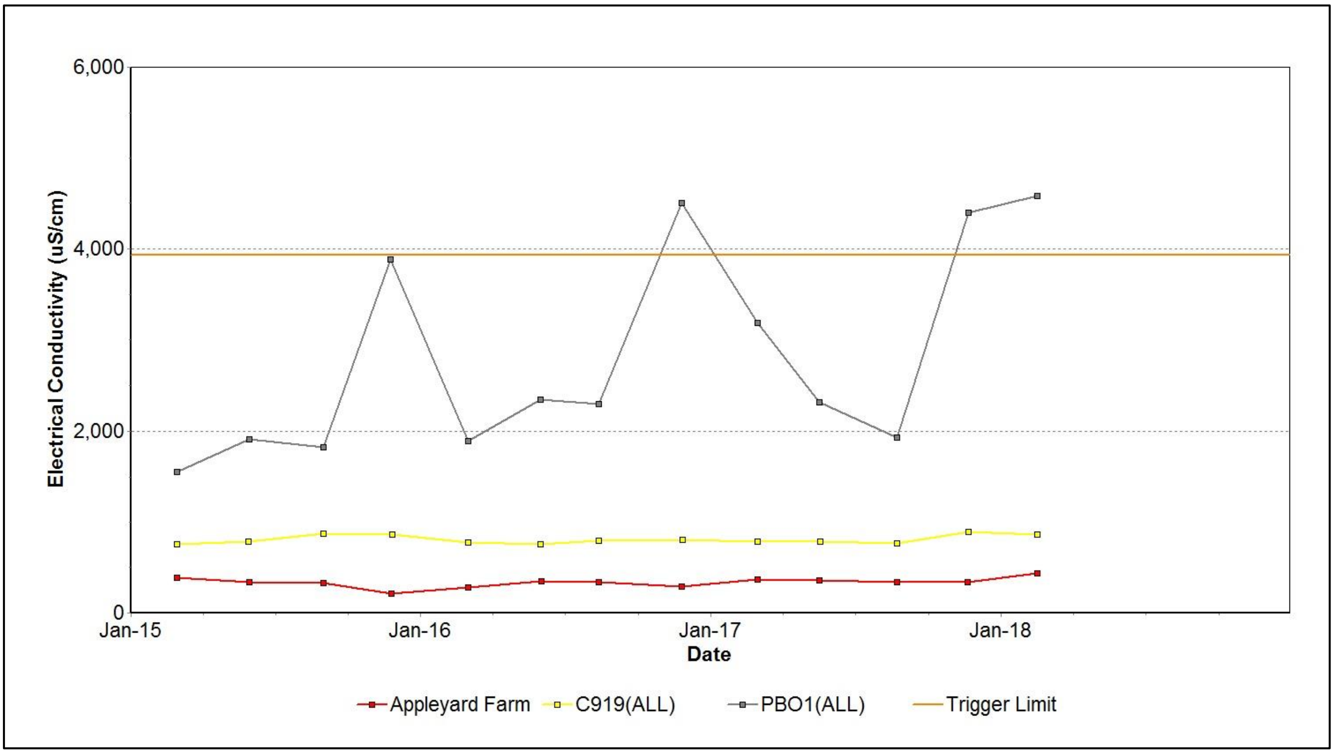

Figure 47: Lemington South Alluvium Electrical Conductivity Trend – March 2018

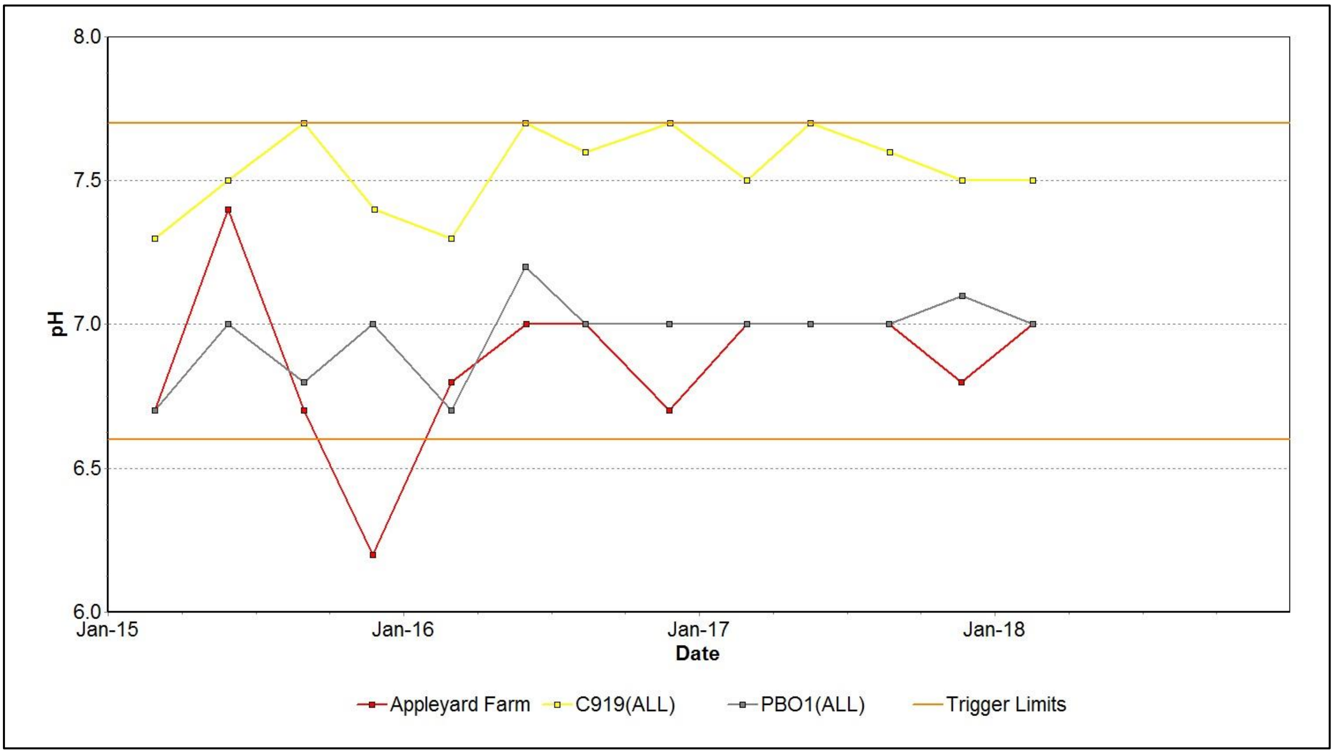

Figure 48: Lemington South Alluvium pH Trend – March 2018

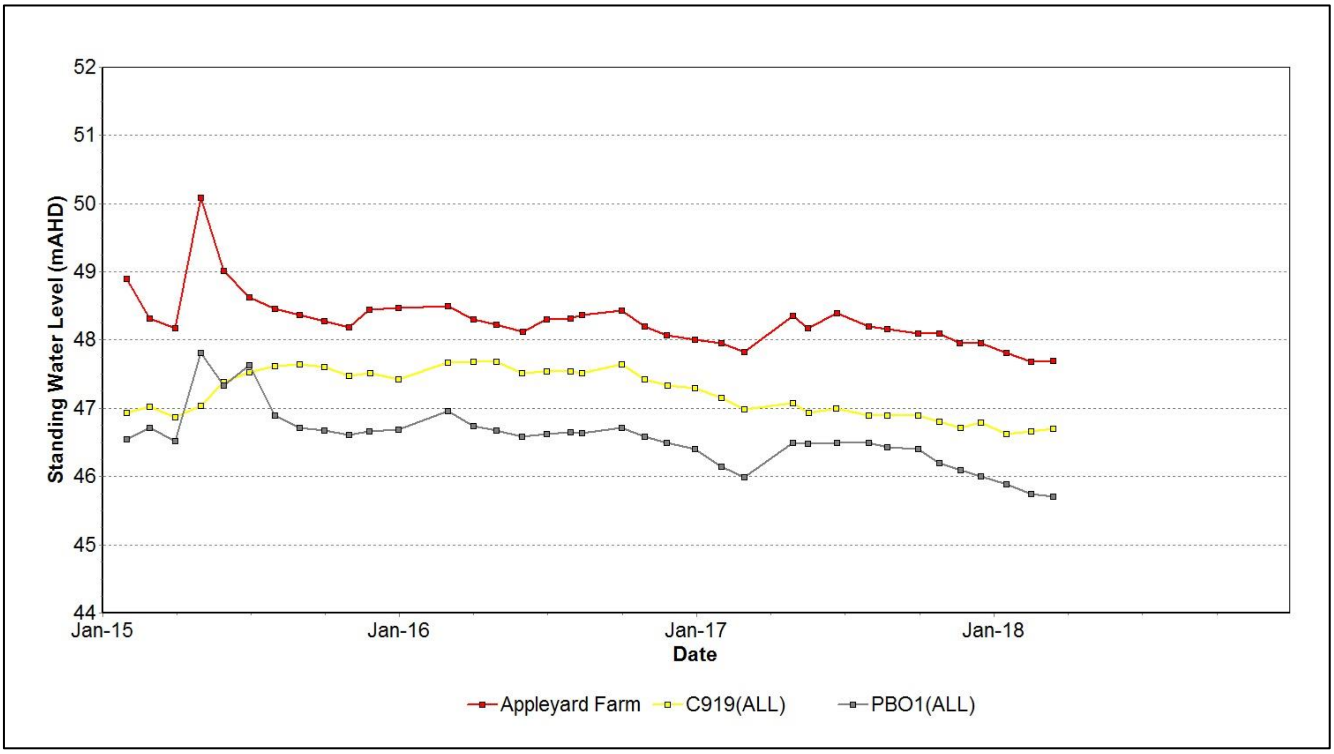

Figure 49: Lemington South Alluvium Standing Water Level Trend – March 2018

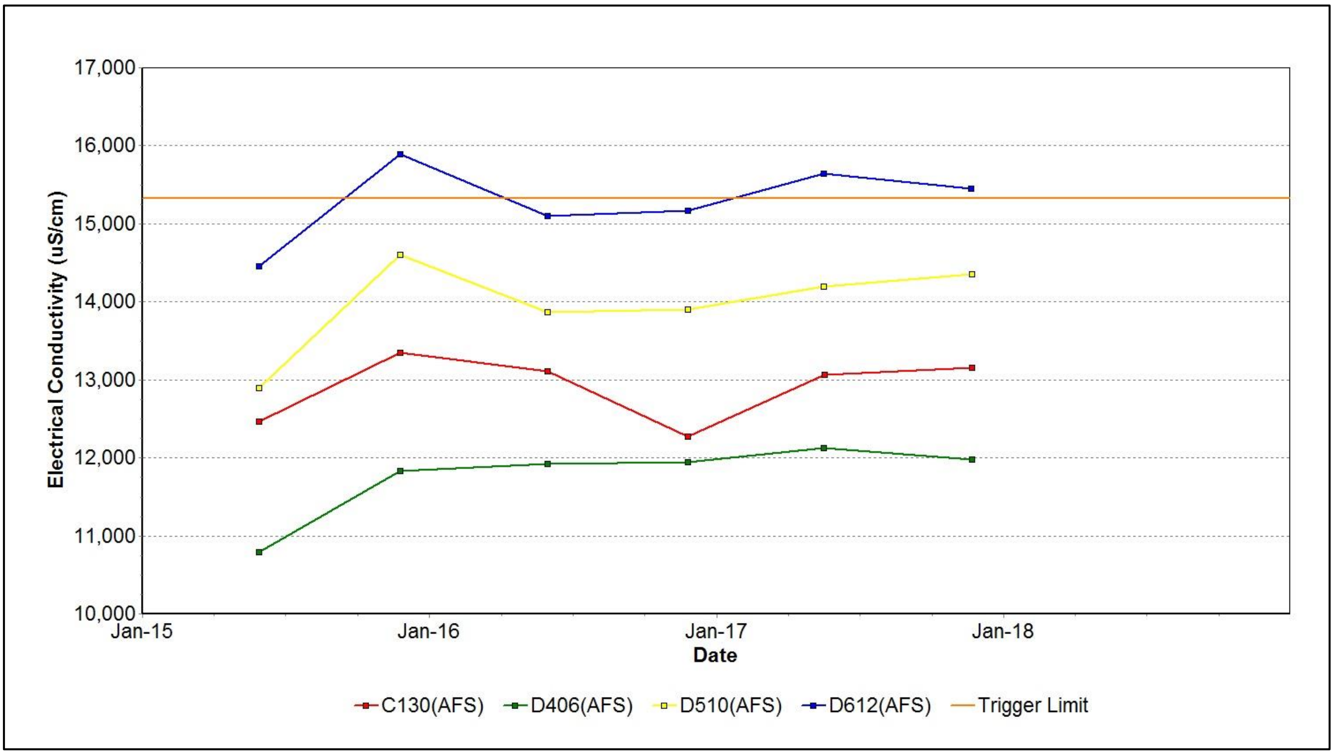

Figure 50: Lemington South Arrowfield Electrical Conductivity Trend – March 2018

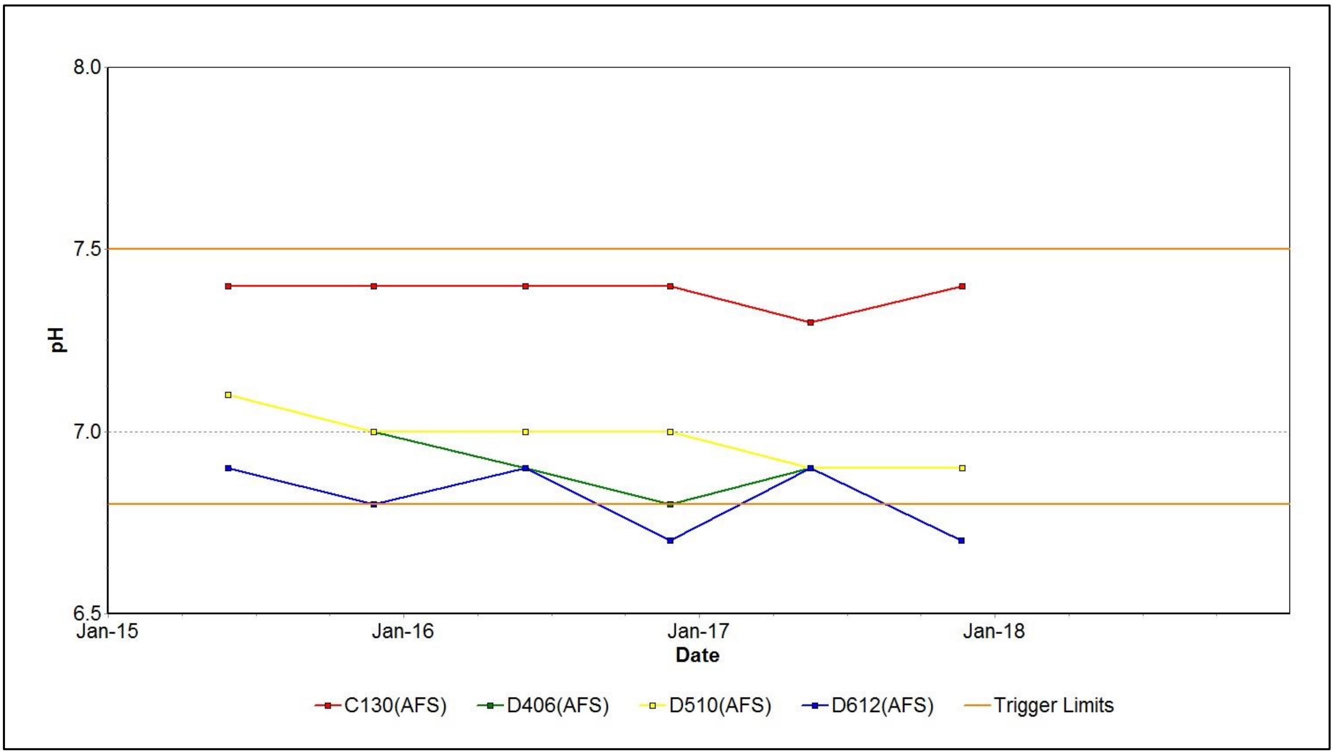

Figure 51: Lemington South Arrowfield pH Trend – March 2018

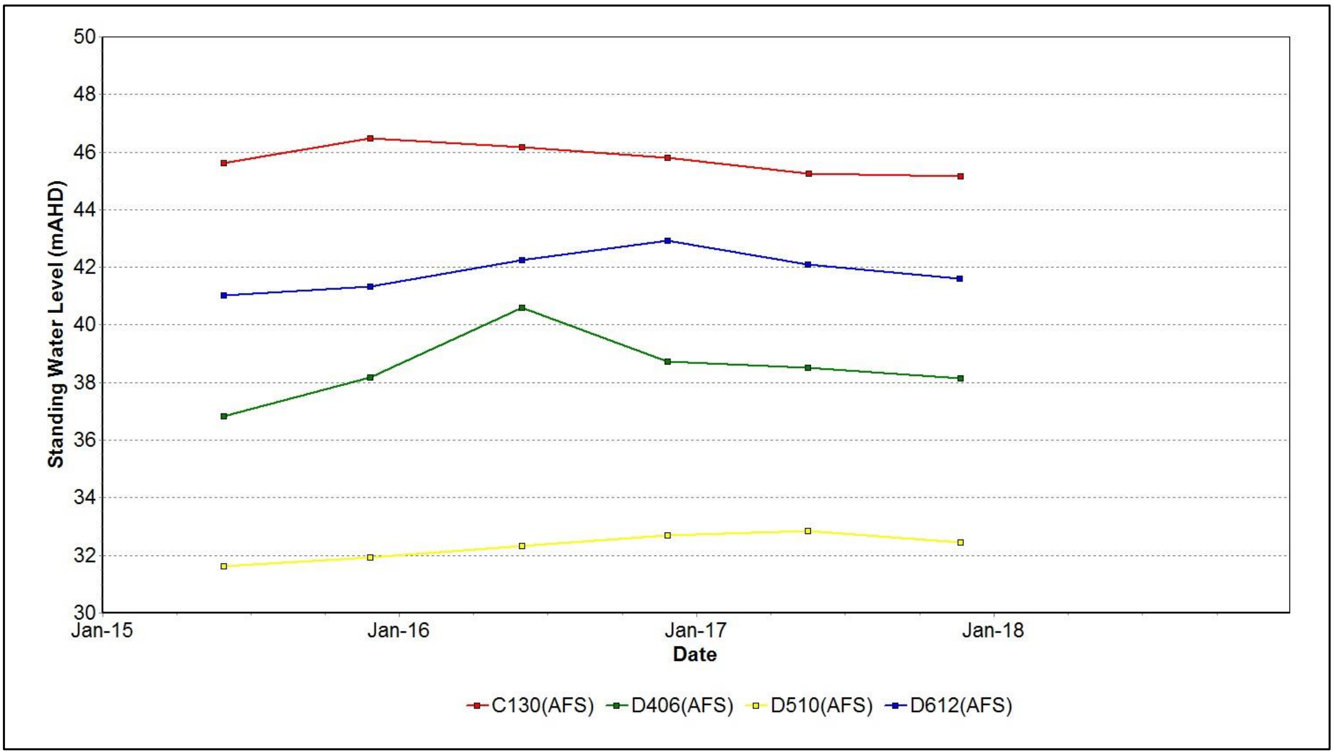

Figure 52: Lemington South Arrowfield Standing Water Level – March 2018

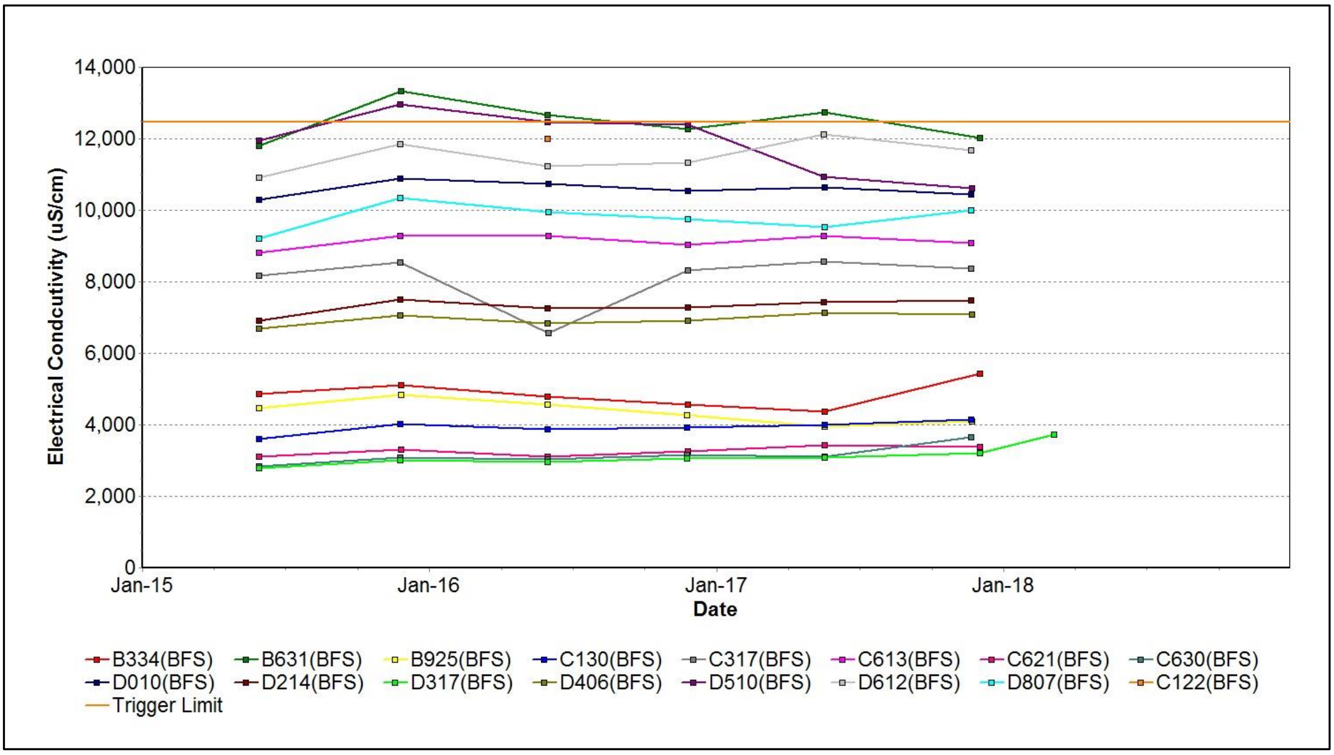

Figure 53: Lemington South Bowfield Electrical Conductivity Trend – March 2018

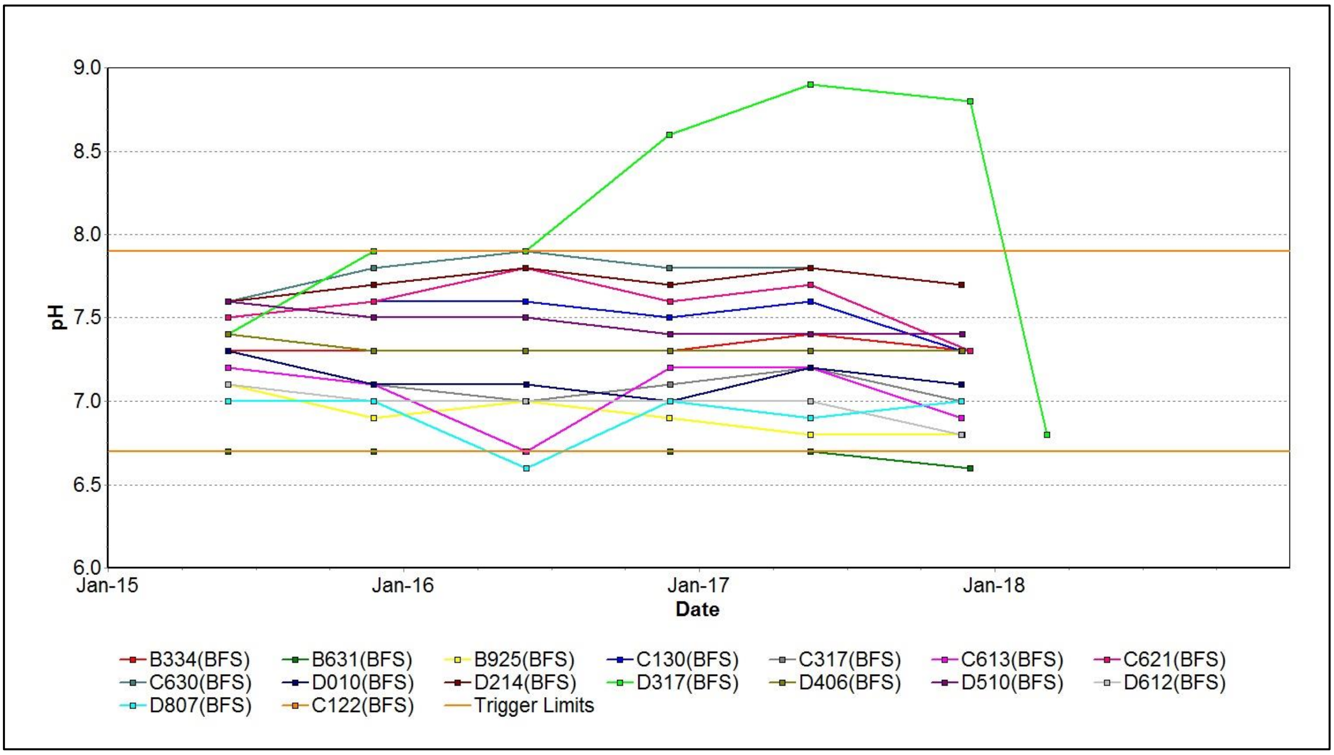

Figure 54: Lemington South Bowfield pH Trend – March 2018

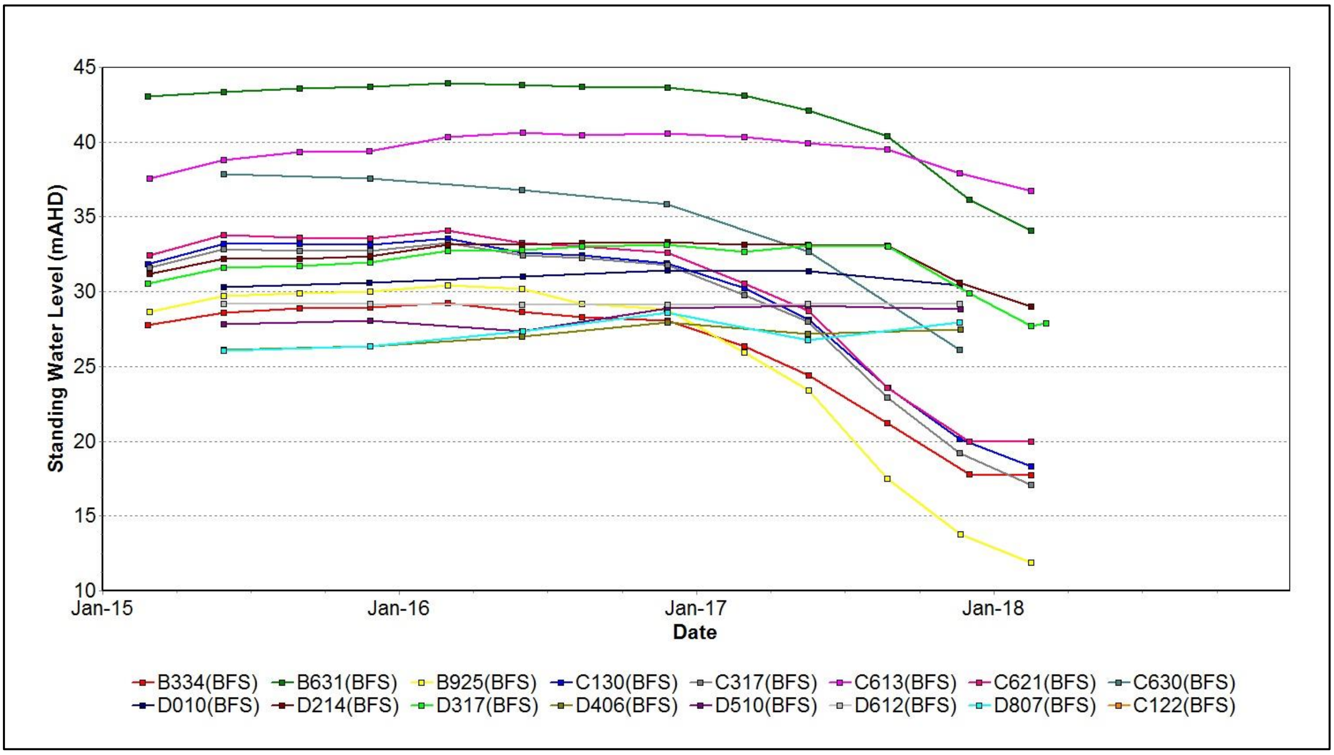

Figure 55: Lemington South Bowfield Standing Water Level – March 2018

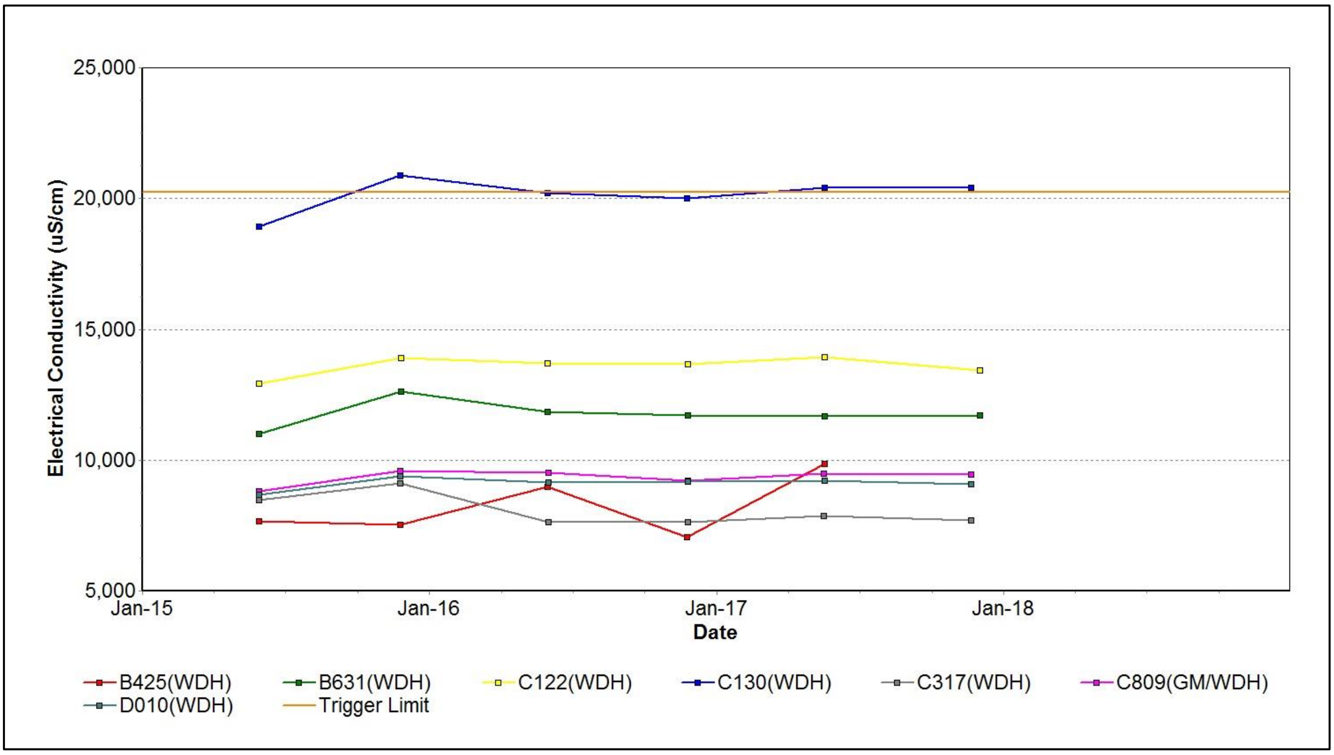

Figure 56: Lemington South Woodlands Hill Electrical Conductivity Trend – March 2018

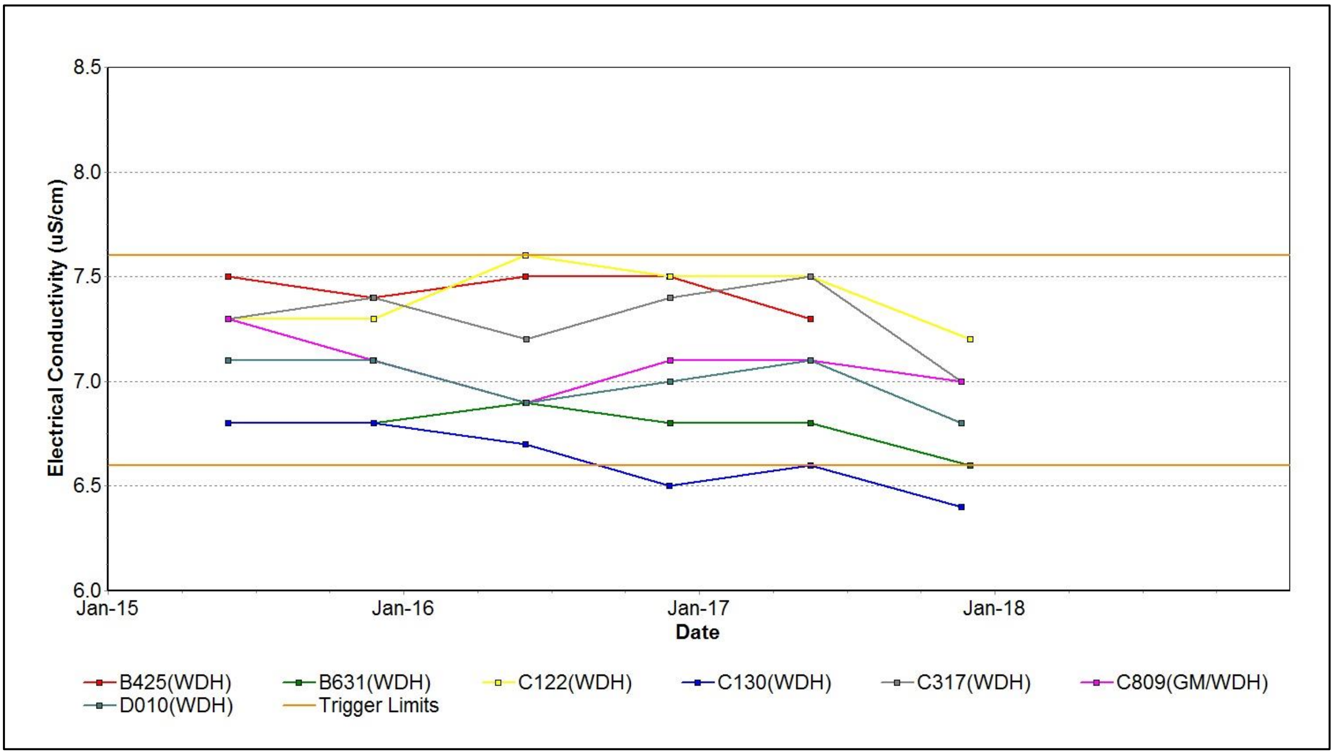

Figure 57: Lemington South Woodlands Hill pH Trend – March 2018

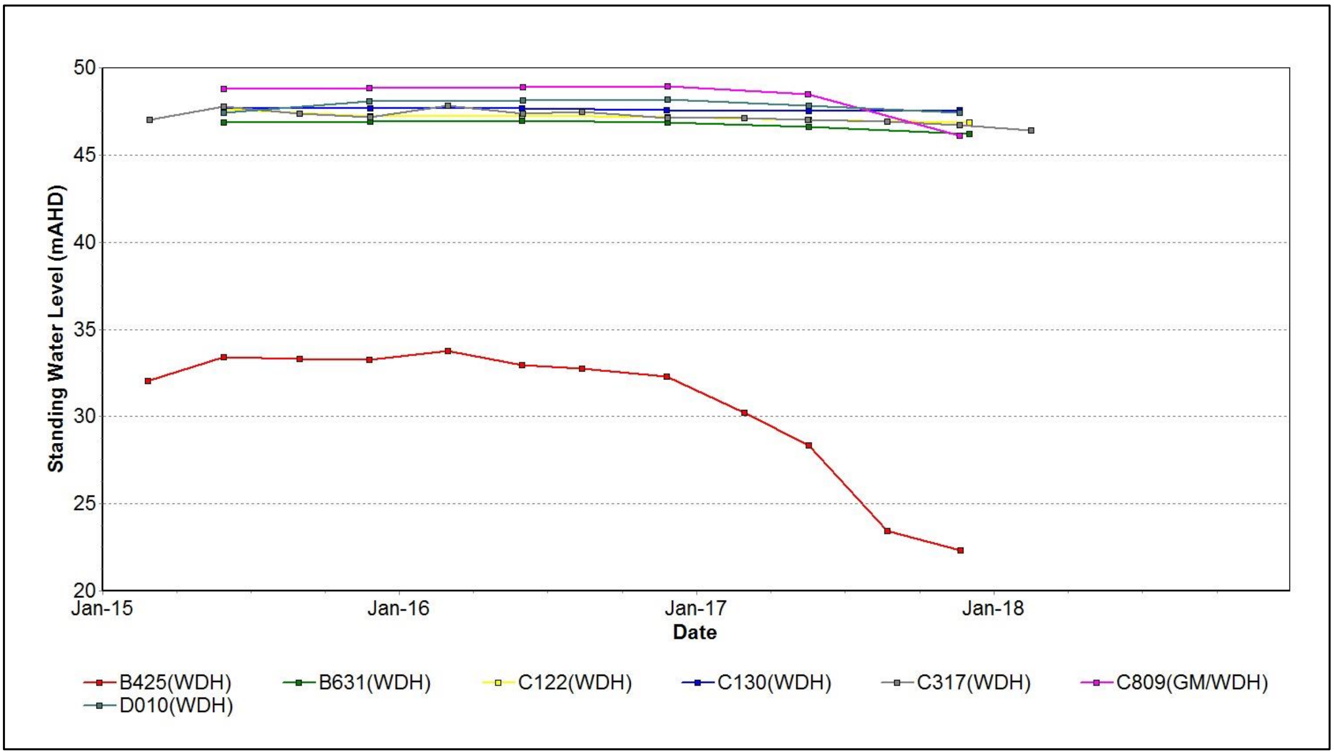

Figure 58: Lemington South Woodlands Hill Standing Water Level – March 2018

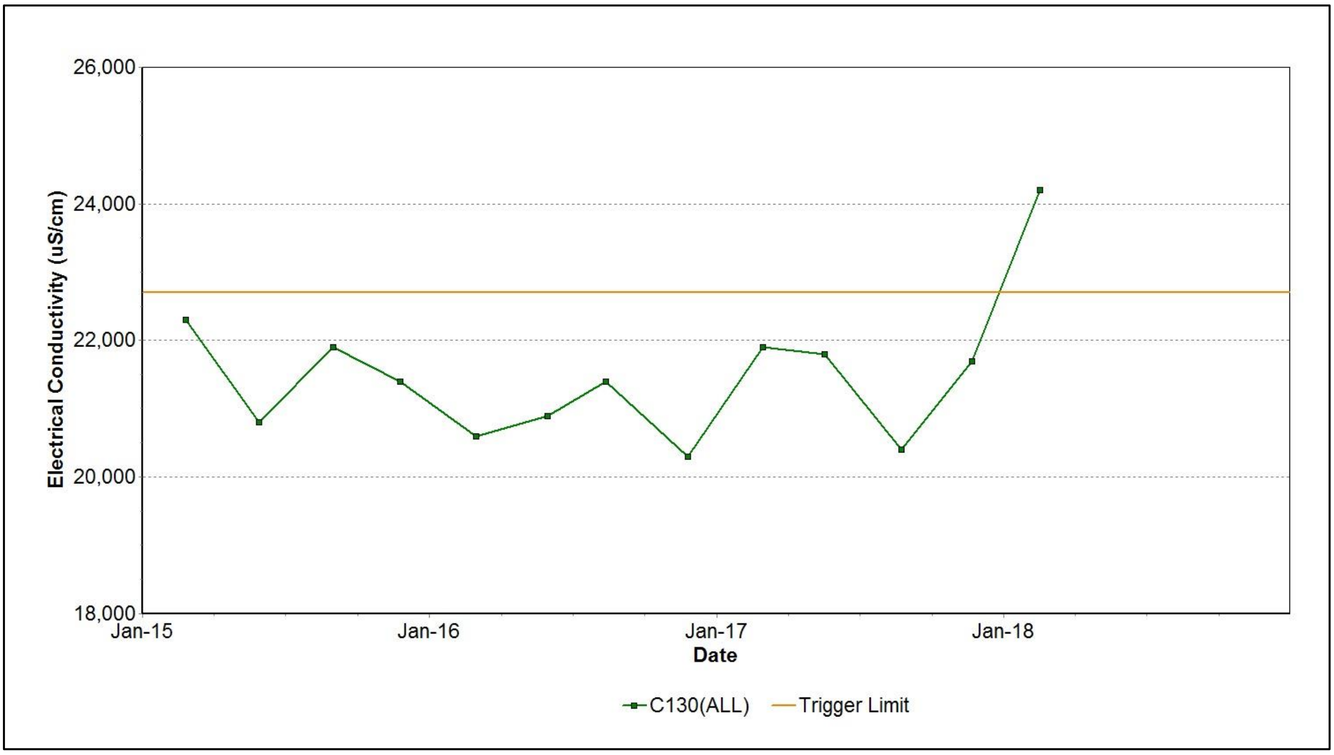

Figure 59: Lemington South Interburden Electrical Conductivity Trend – March 2018

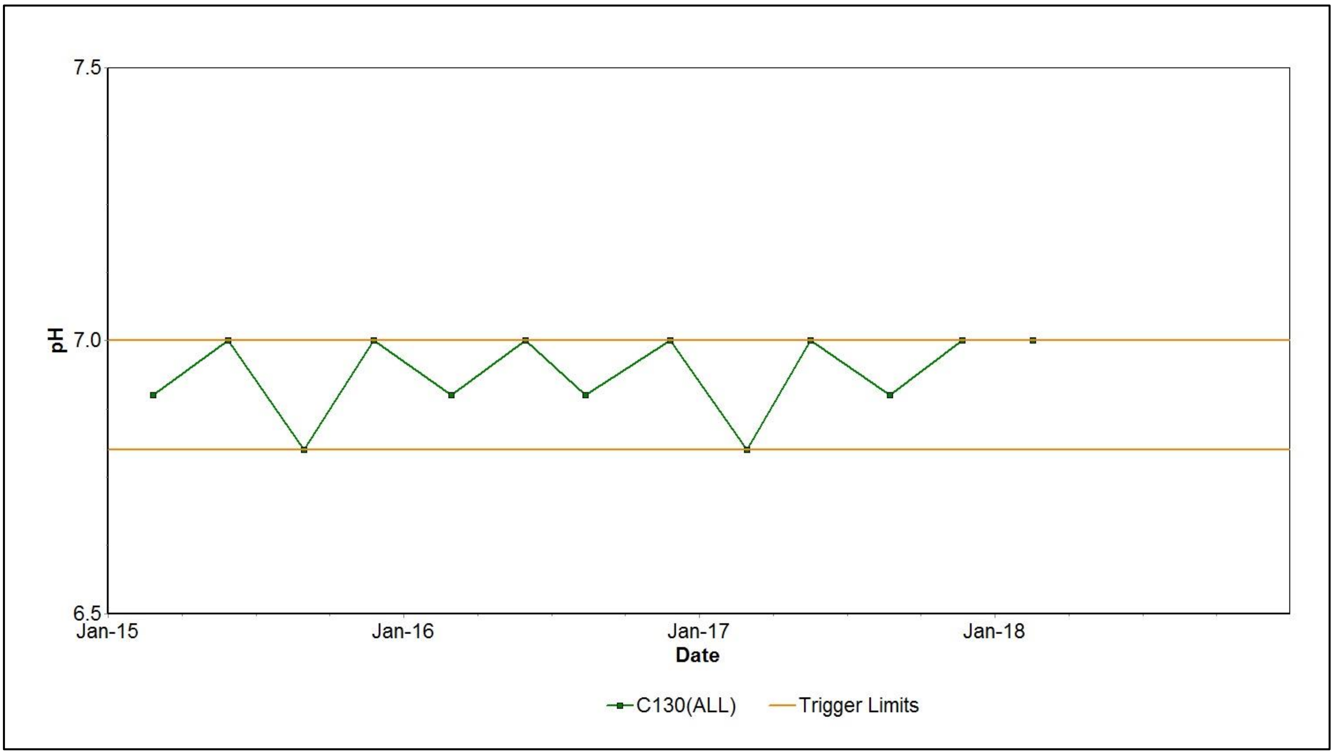

Figure 60: Lemington South Interburden pH Trend – March 2018

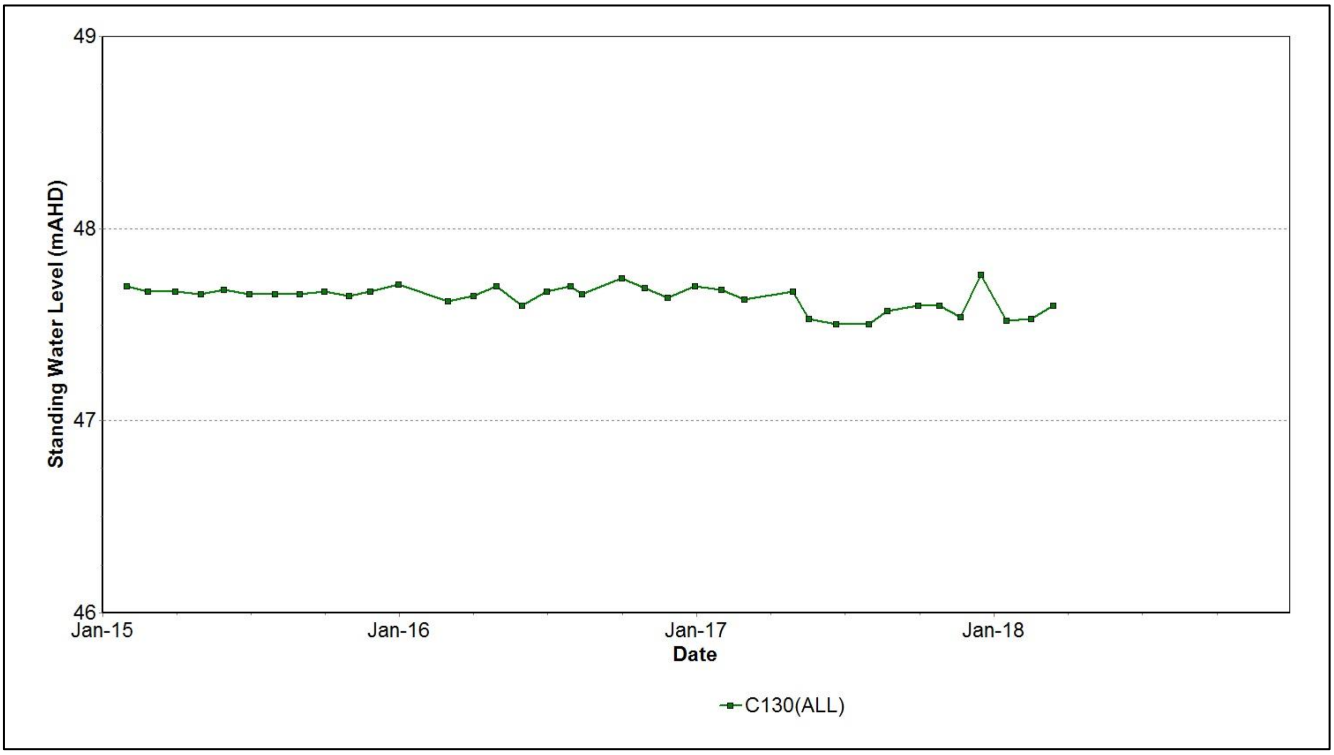

Figure 61: Lemington South Interburden Standing Water Level – March 2018

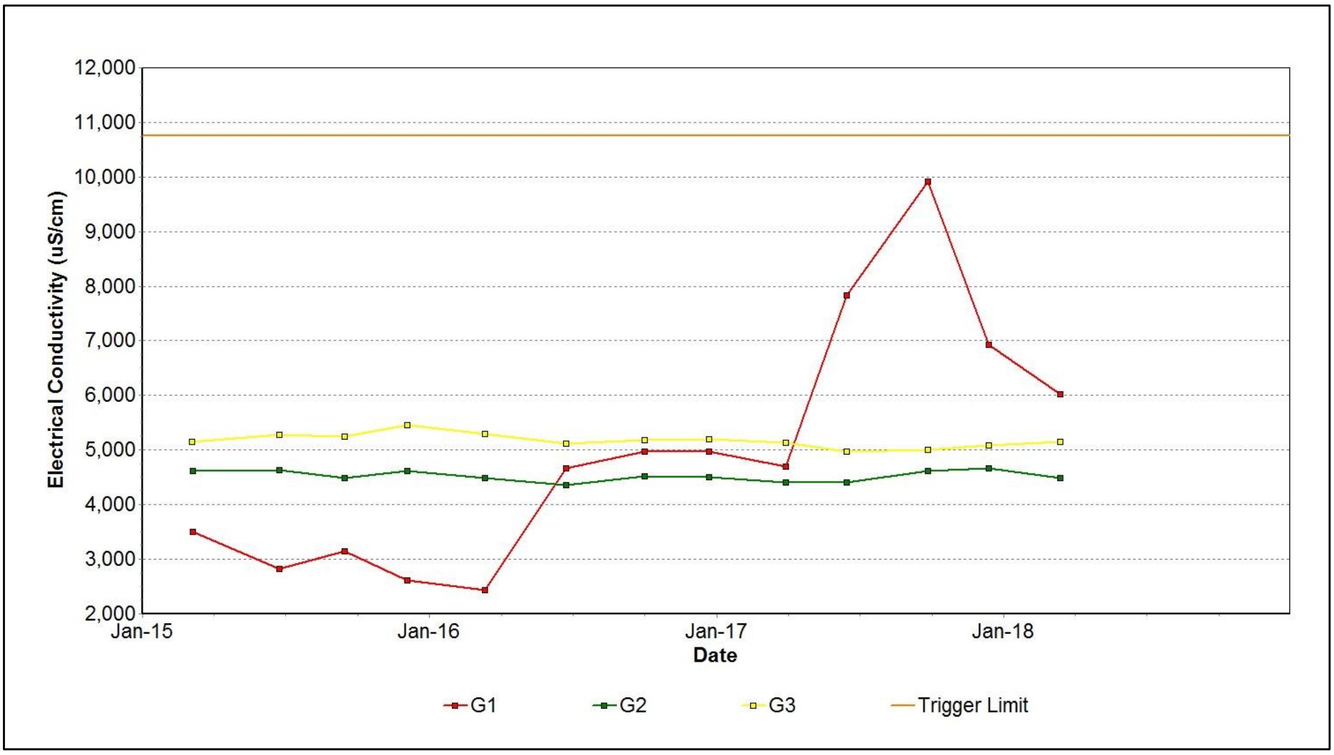

Figure 62: West Pit Alluvium Electrical Conductivity Trend – March 2018

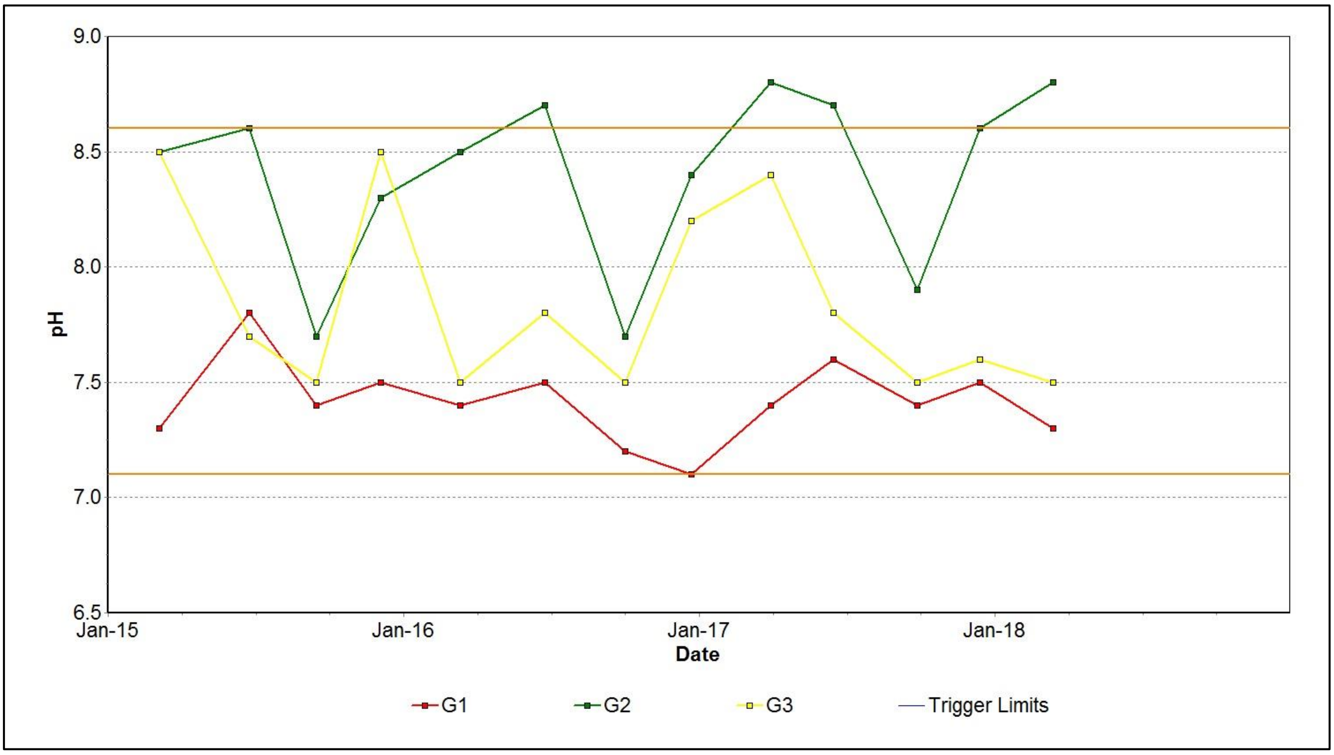

Figure 63: West Pit Alluvium pH Trend – March 2018

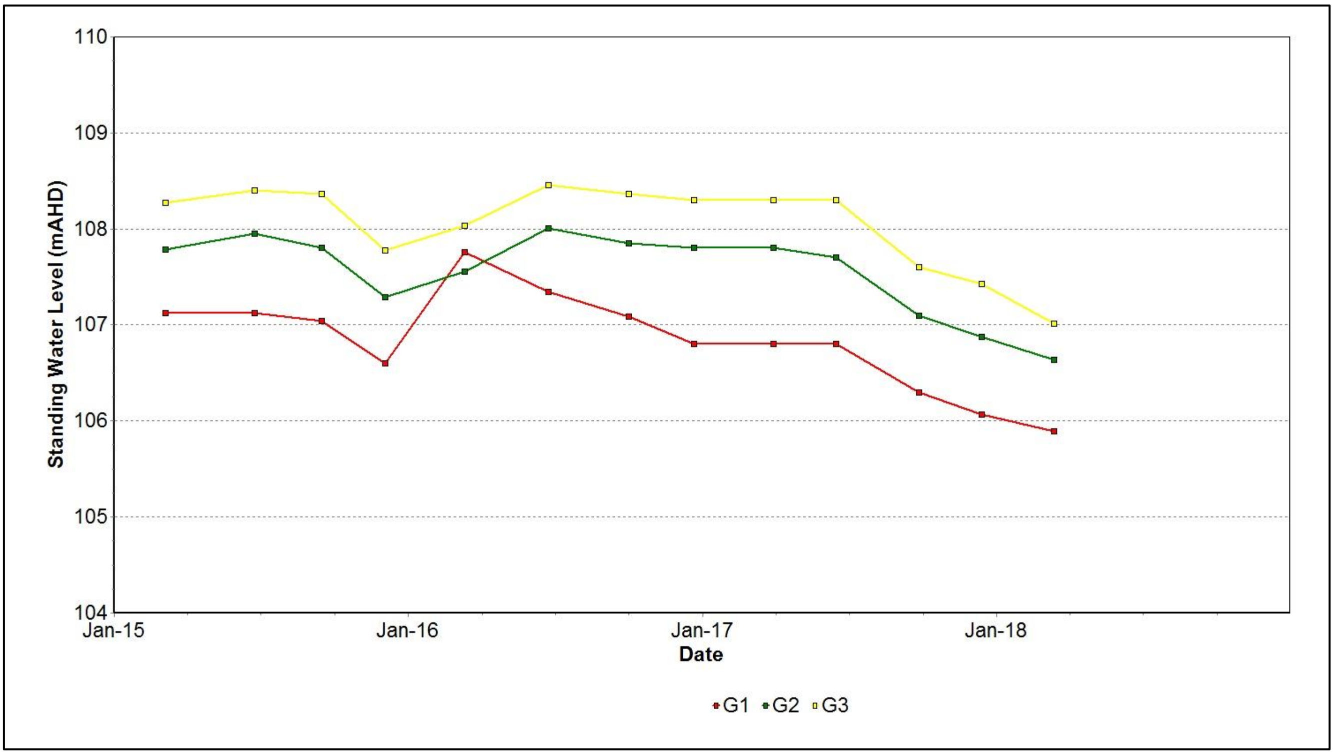

Figure 64: West Pit Alluvium Standing Water Level – March 2018

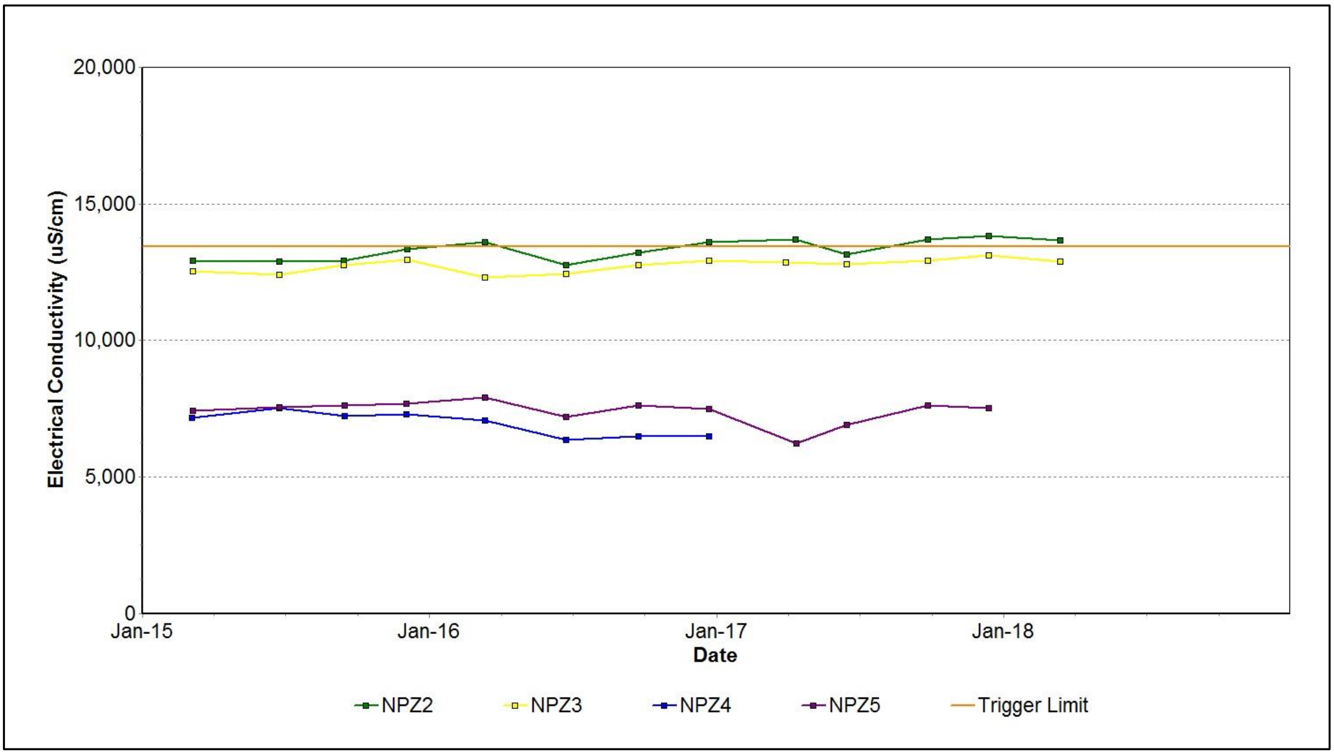

Figure 65: West Pit Siltstone Electrical Conductivity Trend – March 2018

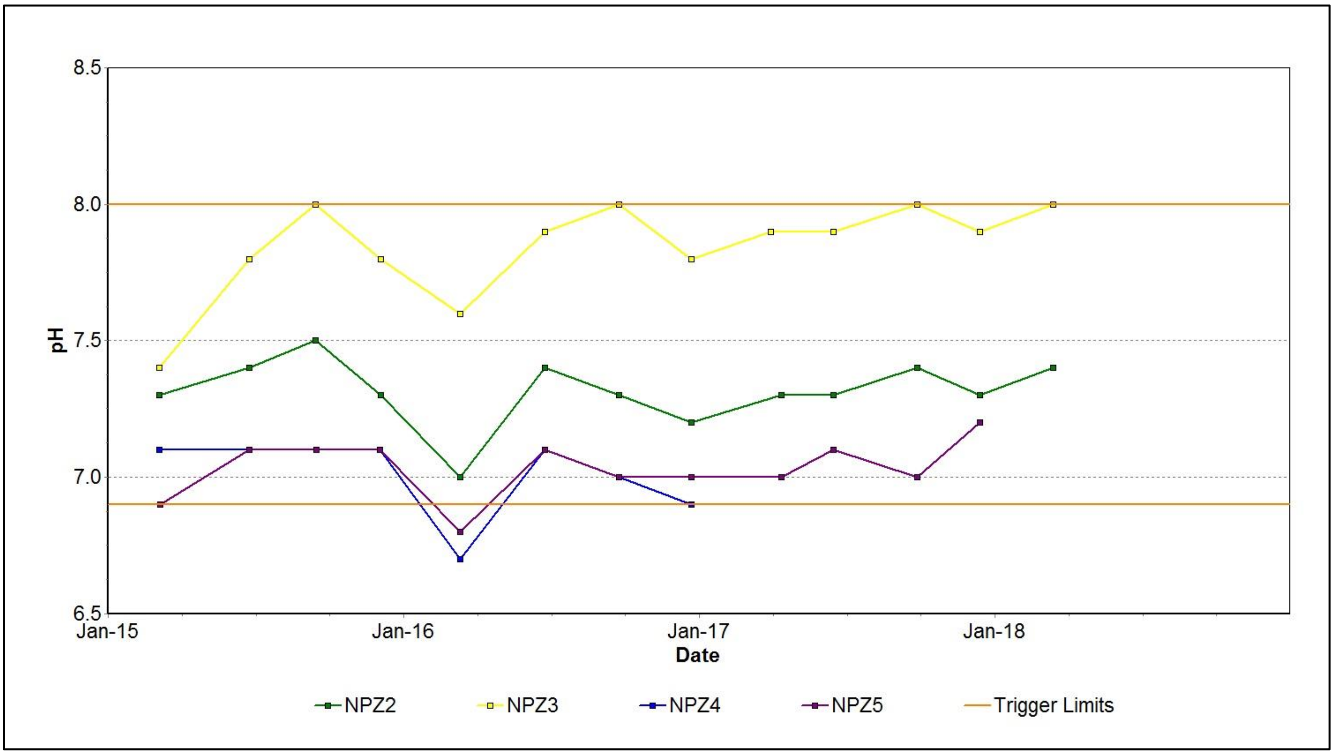

Figure 66: West Pit Siltstone pH Trend – March 2018

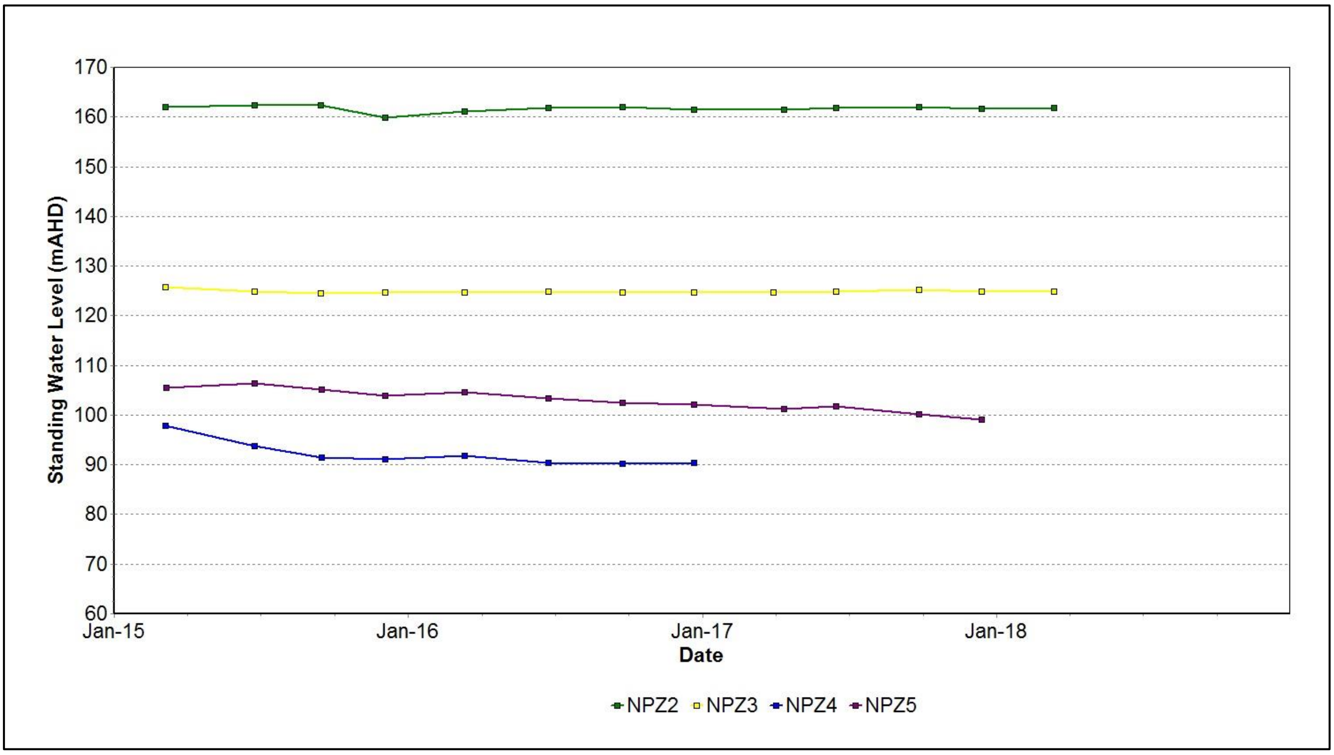

Figure 67: West Pit Siltstone Standing Water Level – March 2018

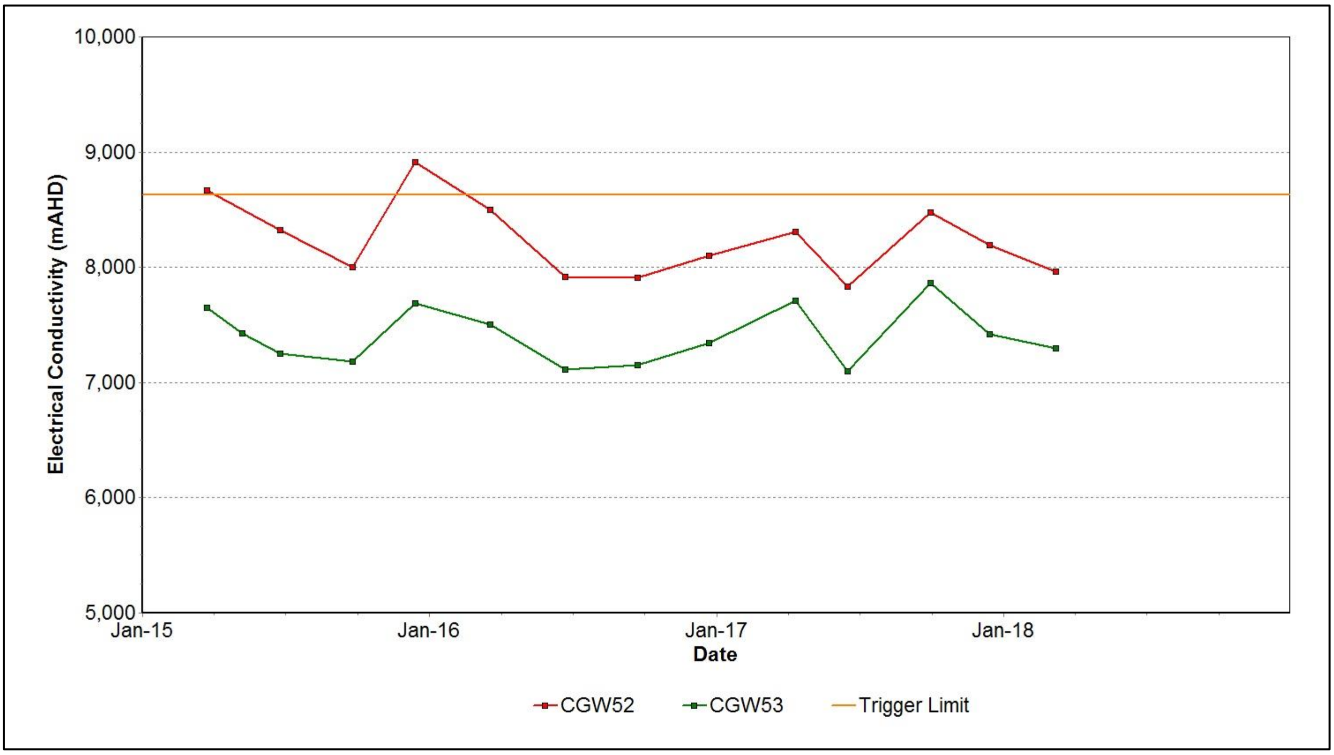

Figure 68: Carrington Broonie Electrical Conductivity Trend – March 2018

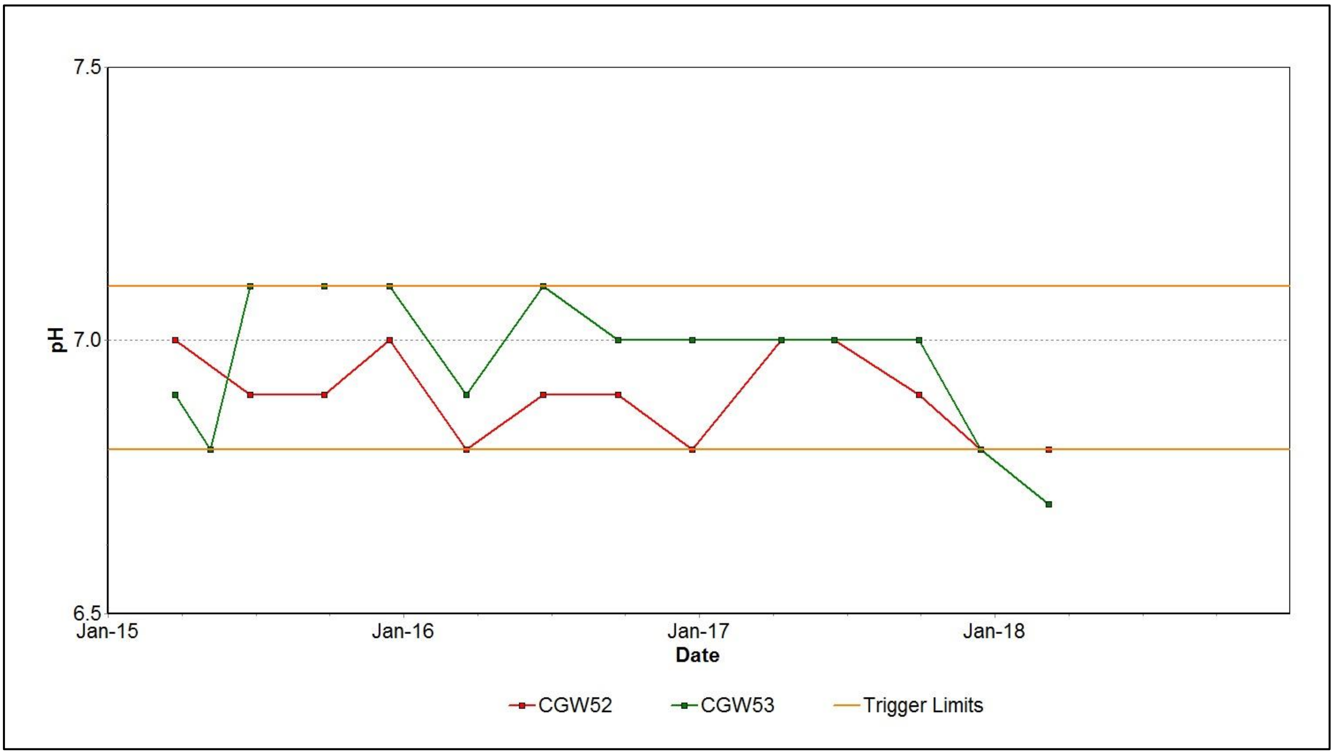

Figure 69: Carrington Broonie pH Trend – March 2018

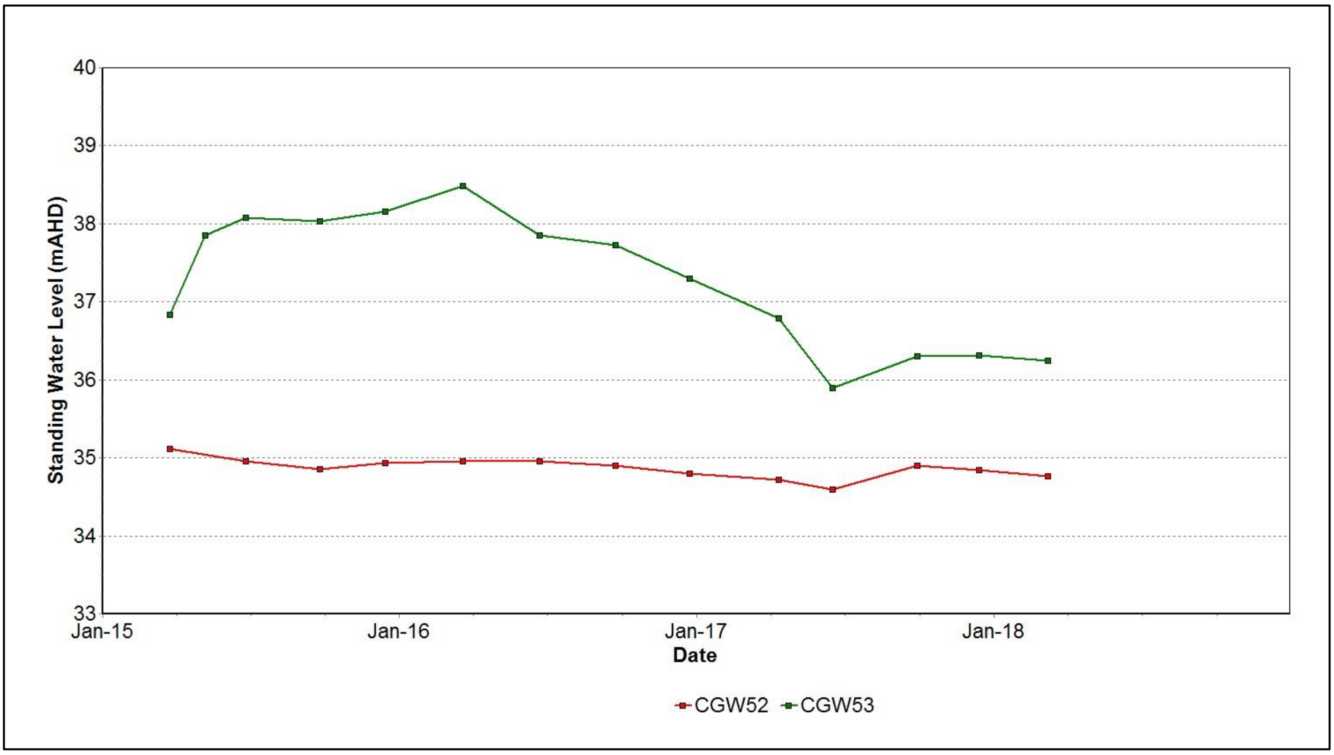

Figure 70: Carrington Broonie Standing Water Level – March 2018

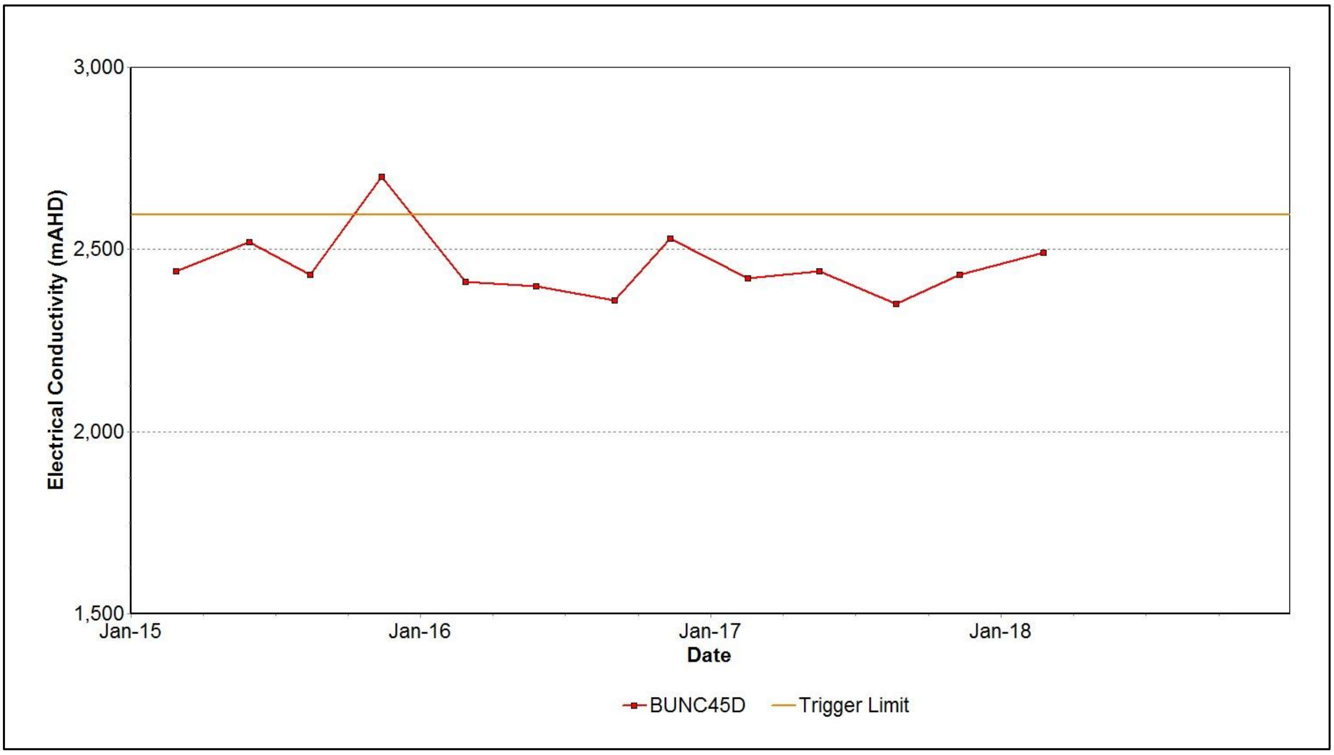

Figure 71: Cheshunt Piercefield Electrical Conductivity Trend – March 2018

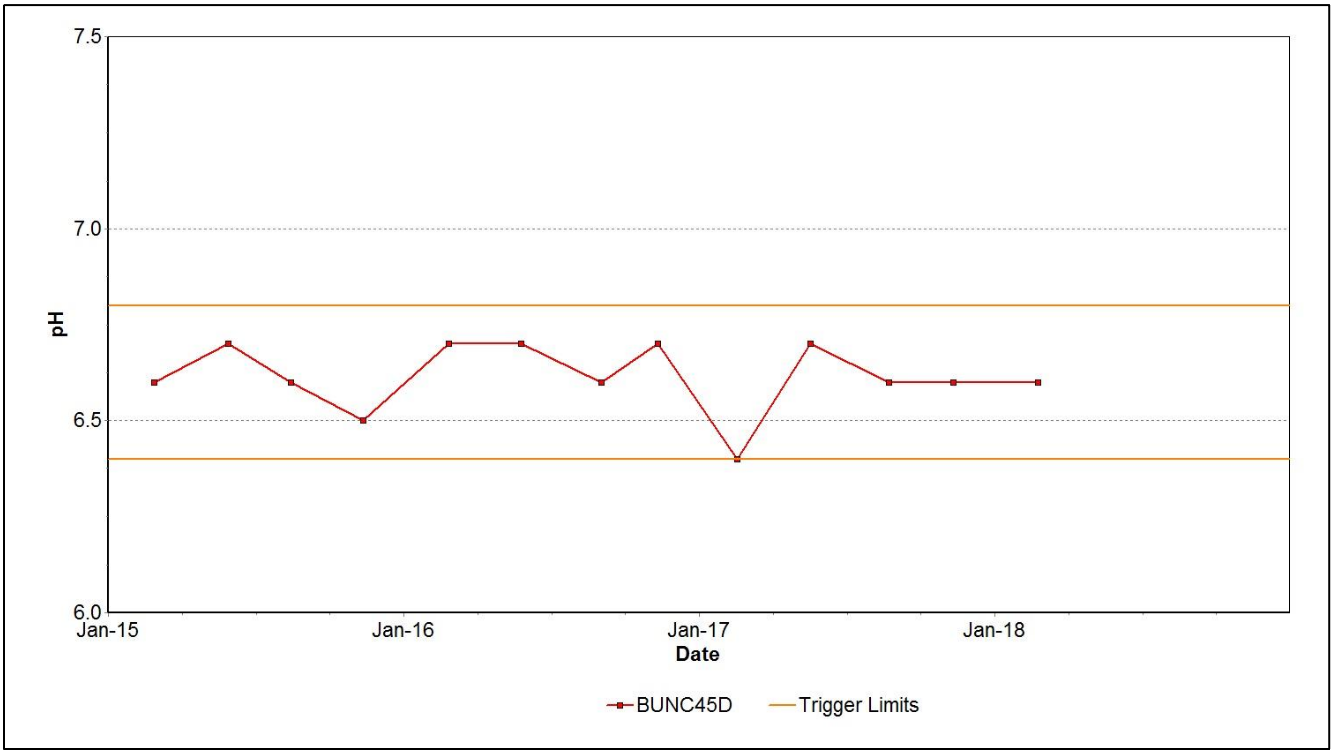

Figure 72: Cheshunt Piercefield pH Trend – March 2018

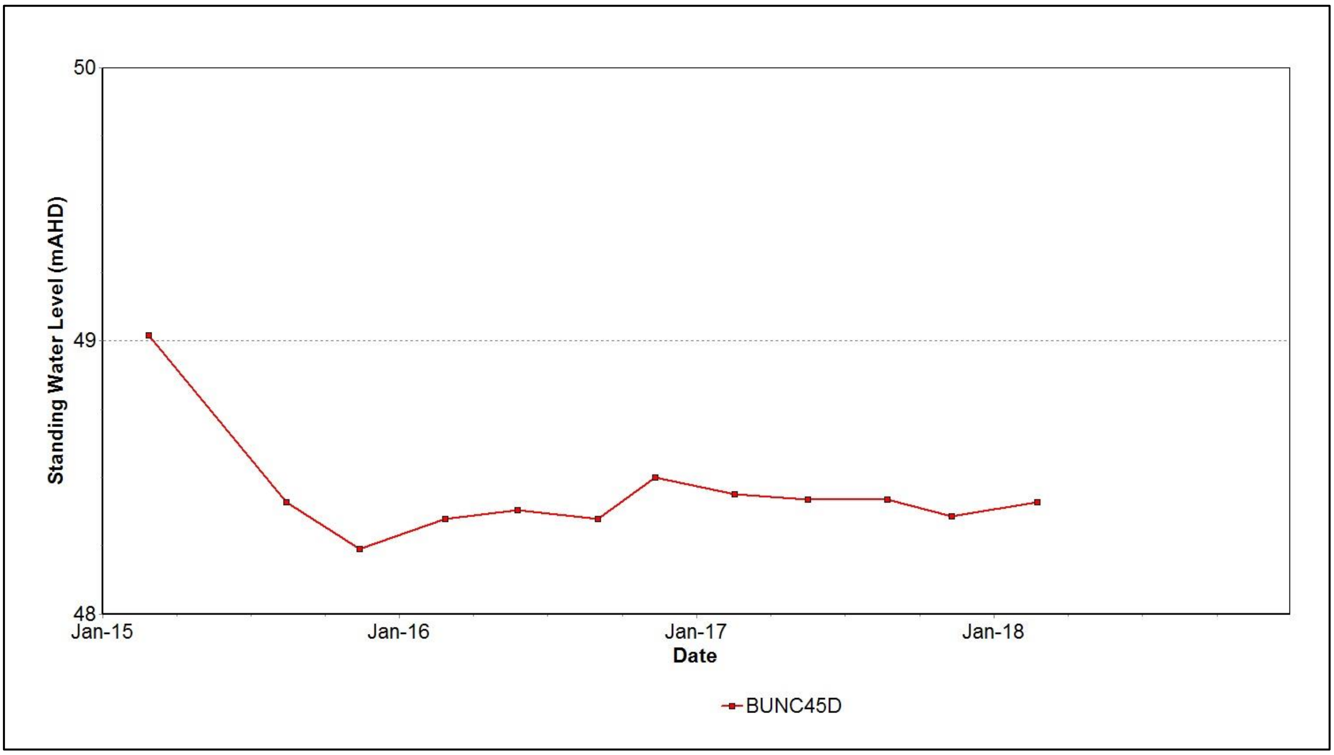

Figure 73: Cheshunt Piercefield Standing Water Level – March 2018

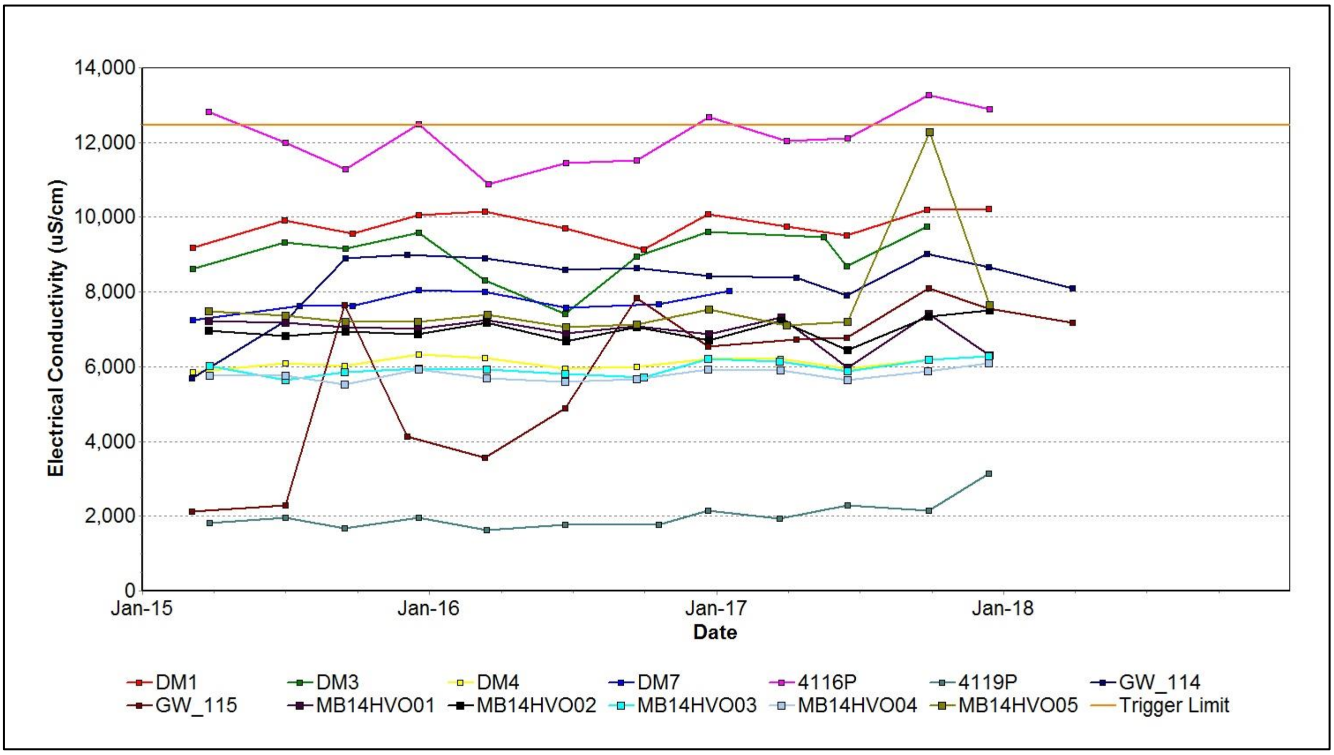

Figure 74: North Pit Spoil Electrical Conductivity Trend – March 2018

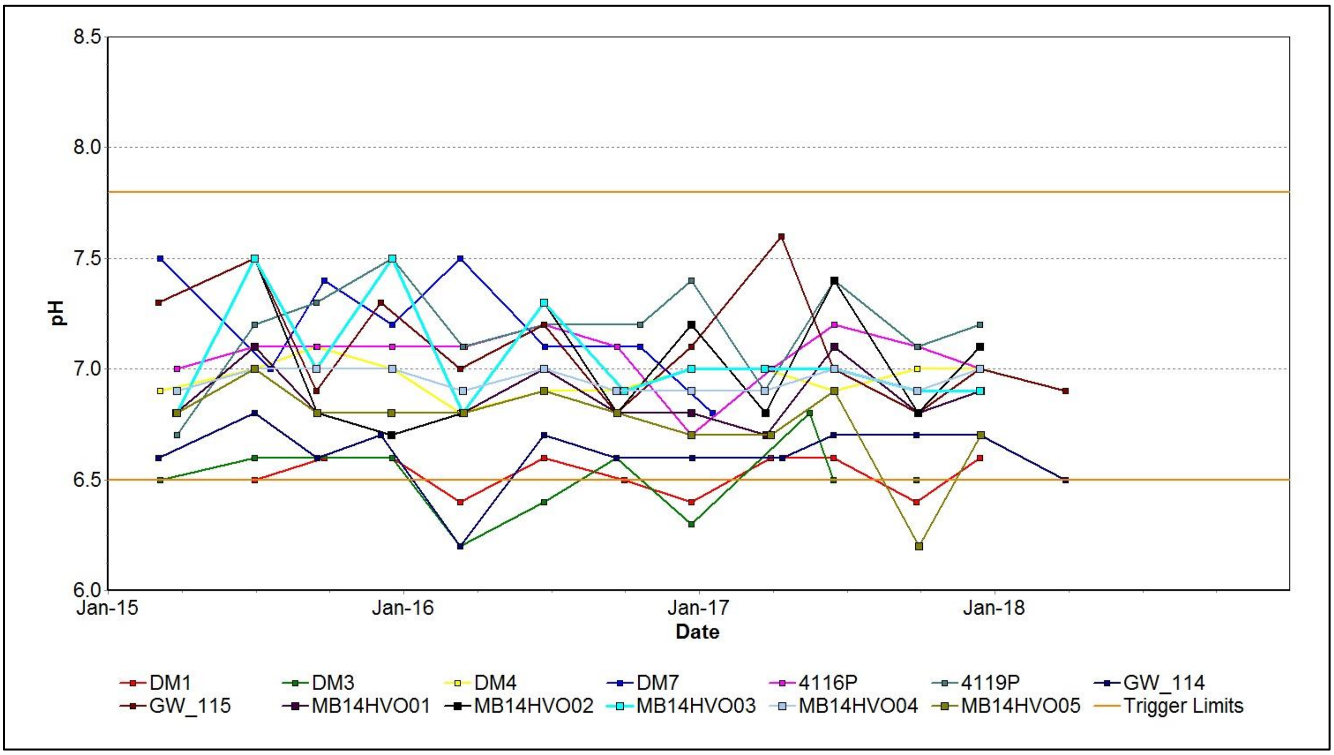

Figure 75: North Pit Spoil pH Trend – March 2018

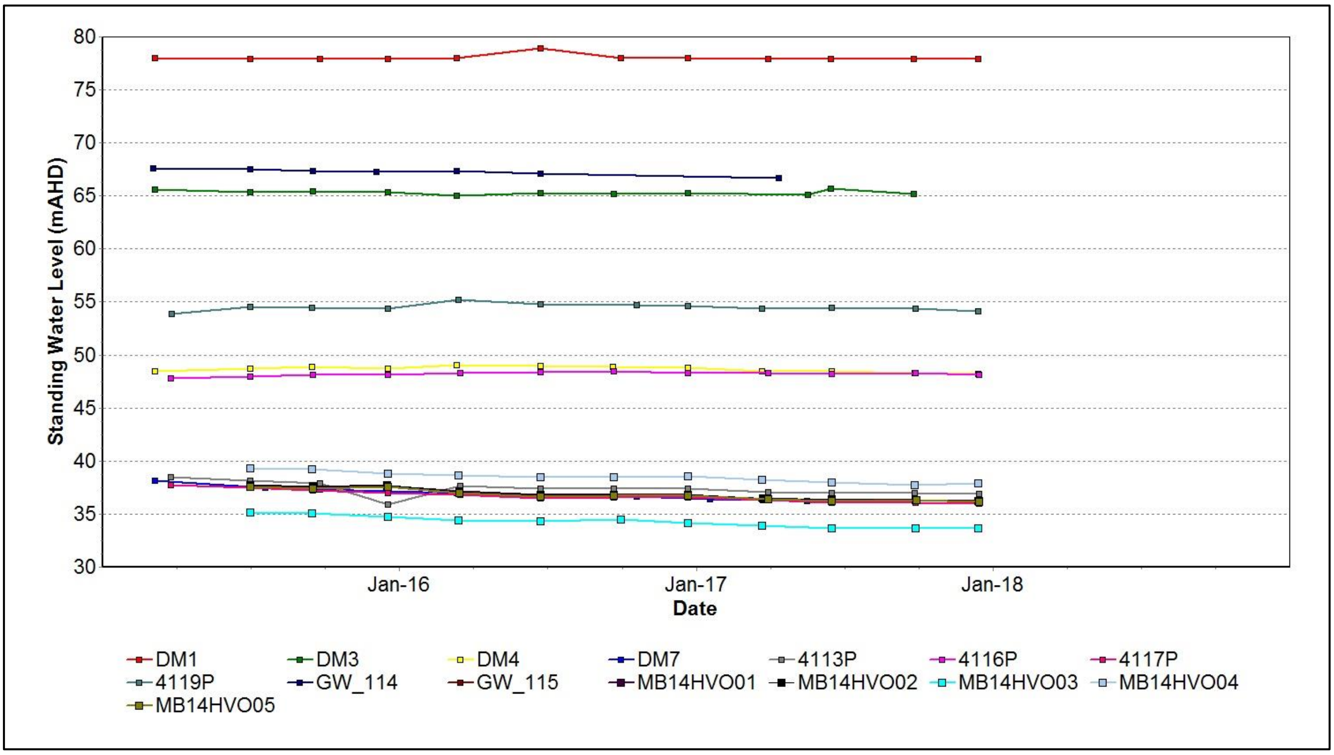

Figure 76: North Pit Spoil Standing Water Level – March 2018

4.2.1 Groundwater Trigger Tracking

Internal trigger limits have been developed to assess monitoring data on an on-going basis, and to highlight potentially adverse groundwater impacts. The process for evaluating monitoring results against the internal triggers and subsequent responses are outlined in the HVO Water Management Plan.

Current internal trigger limits breaches are summarised in **Table 4**.

Table 4: Groundwater Triggers - 2018

Site	Date	Trigger Limit Breached	Action Taken in Response
CFW55R	29/03/2018	EC – 95^{th} Percentile	Investigation Commenced
PB01(ALL)	21/11/2017	EC – 95^{th} Percentile	Watching Brief*
PB01(ALL)	16/02/2018	EC – 95^{th} Percentile	Watching Brief*
NPz2	13/03/2018	EC – 95^{th} Percentile	Watching Brief*
GW-100	13/03/2018	EC – 95^{th} Percentile	Watching Brief*

C130(ALL)	16/02/2018	EC – 95th Percentile	Watching Brief*
PB01(ALL)	16/02/2018	EC – 95th Percentile	Watching Brief*
BZ3-1	22/02/2018	pH – 95th Percentile	Watching Brief*
G2	13/12/2017	PH – 95th Percentile	Watching Brief*
G2	13/03/2018	PH – 95th Percentile	Watching Brief*
NPz3	13/03/2018	pH – 95th Percentile	Watching Brief*
BZ4A(2)	22/02/2018	PH – 5th Percentile	Watching Brief*
CFW55R	14/12/2017	PH – 5th Percentile	Watching Brief*
CFW55R	29/03/2018	PH – 5th Percentile	Watching Brief*
CGW53	8/03/2018	pH – 5th Percentile	Watching Brief*
GW_106	29/03/2018	pH – 5th Percentile	Watching Brief*
HG2	23/02/2018	pH – 5th Percentile	Watching Brief*

* = Watching brief established pending outcomes of subsequent monitoring events. No specific actions required.

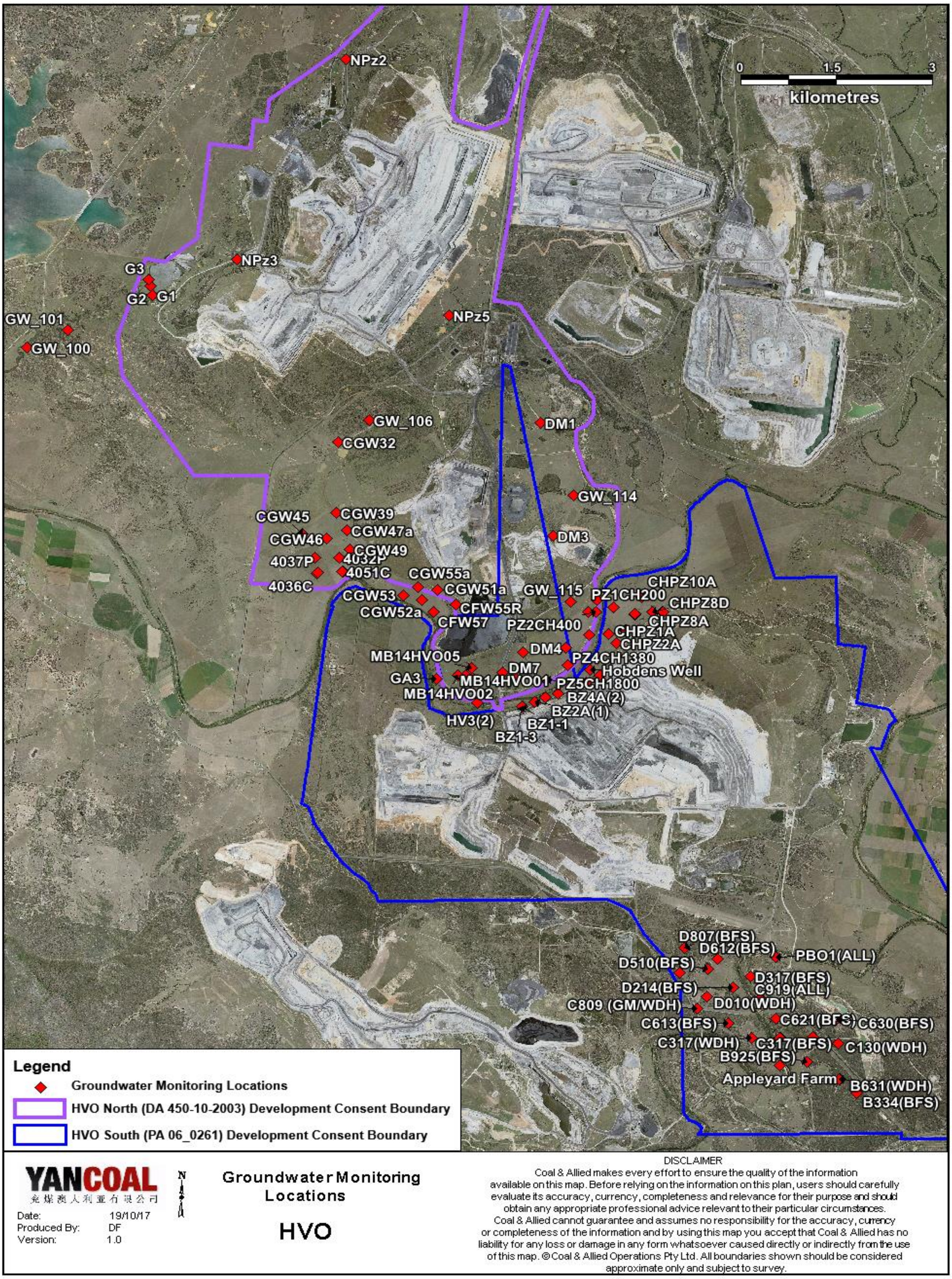

Figure 77: Groundwater Monitoring Location Plan

5.0 BLASTING

5.1.1 Blast Monitoring

HVO have a network of five blast monitoring units. These are located at nearby privately owned residences and function as regulatory compliance monitors. The location of these monitors can be found in Figure 83.

During March, 19 blasts were initiated at HVO. Figure 78 through to Figure 82 show the blast monitoring results for the reporting period against the impact assessment criteria. The criteria are summarised in Table 5.

Table 5: Blasting Limits

Airblast Overpressure (dB(L))	Comments
115	5% of the total number of blasts in a 12 month period
120	0%
Ground Vibration (mm/s)	**Comments**
5	5% of the total number of blasts in a 12 month period
10	0%

During the reporting period there were no exceedances of the airblast overpressure or ground vibration criteria.

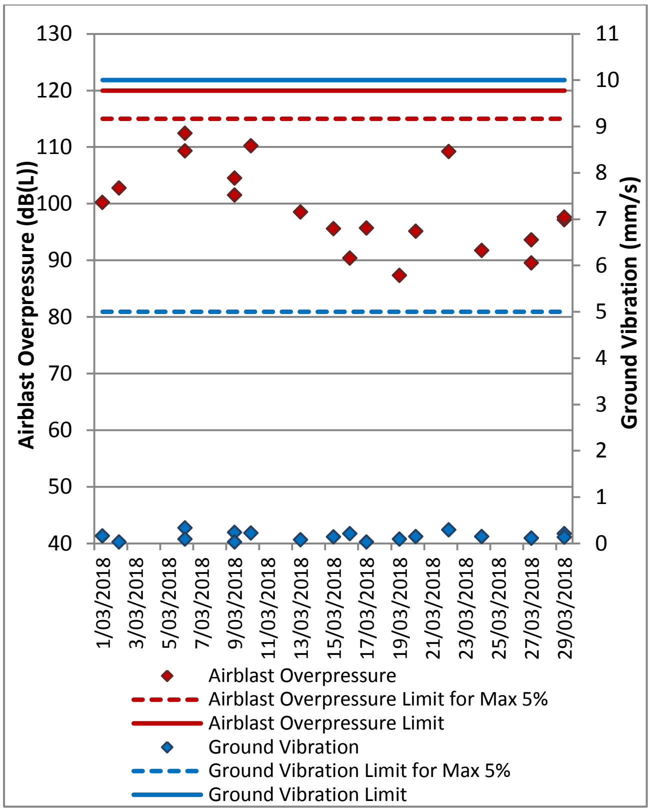

Figure 78: Moses Crossing Blast Monitoring Results – March 2018

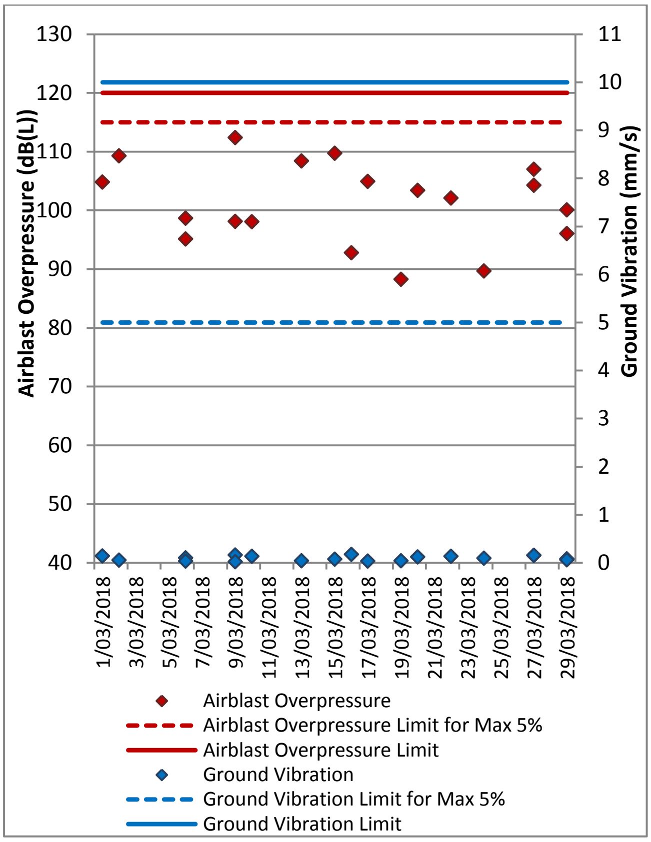

Figure 79: Jerrys Plains Blast Monitoring Results – March 2018

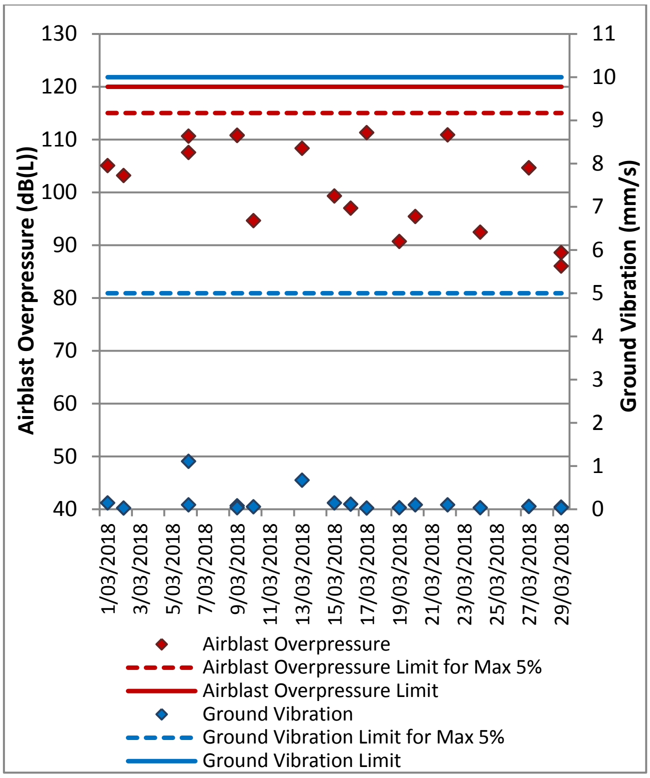

Figure 80: Maison Dieu Blast Monitoring Results – March 2018

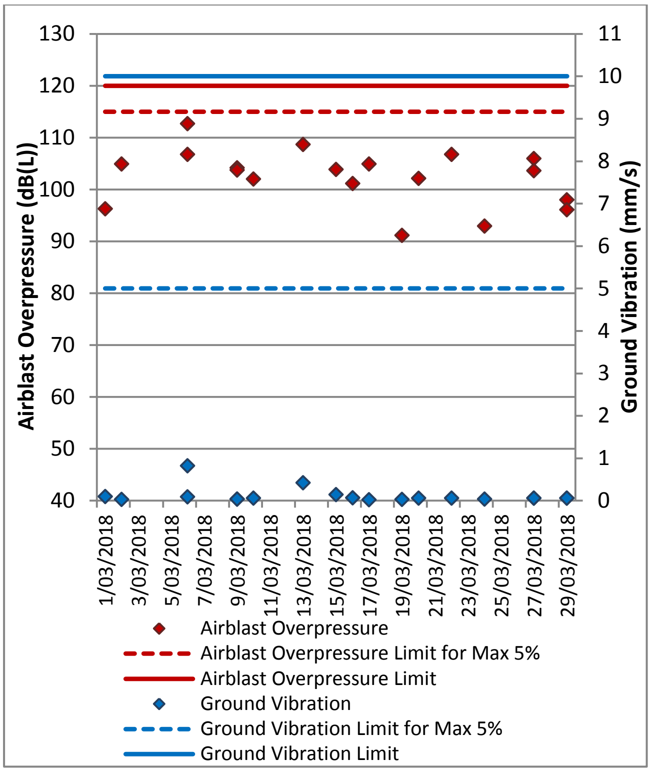

Figure 82: Knodlers Lane Blast Monitoring Results – March 2018

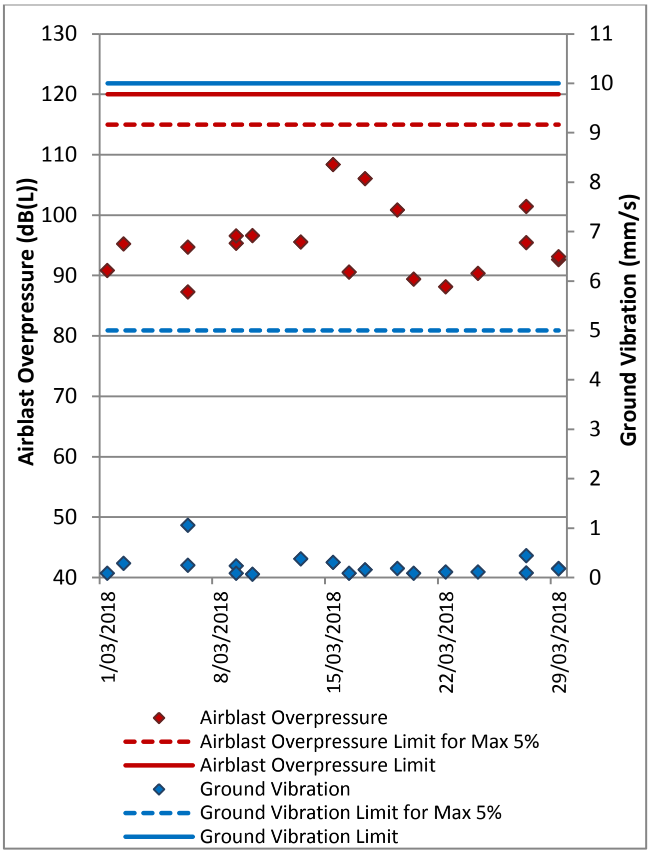

Figure 81: Warkworth Blast Monitoring Results – March 2018

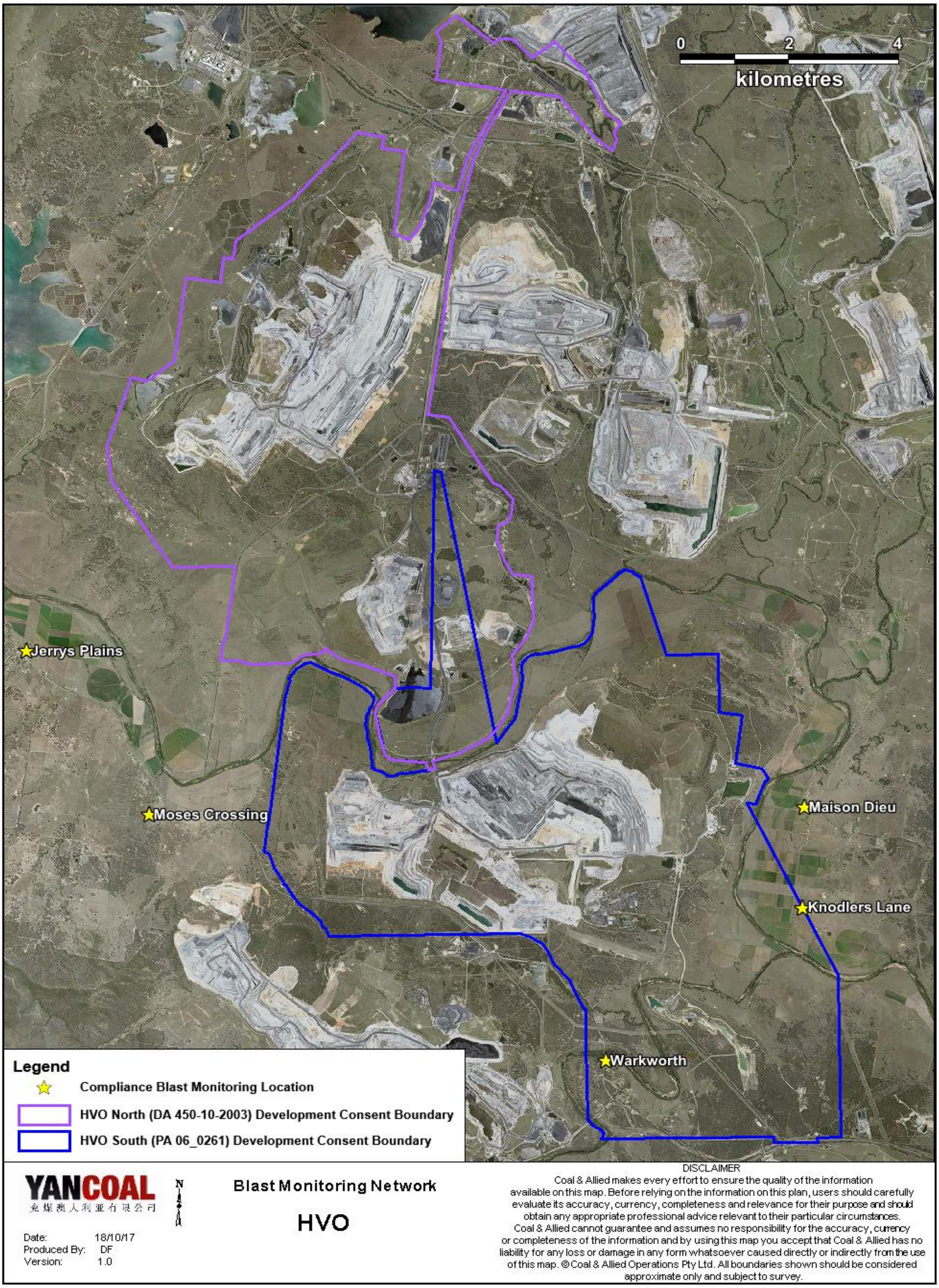

Figure 83: Blast Monitoring Location Plan

6.0 NOISE

Routine attended noise monitoring is carried out at defined locations around HVO as described in the HVO Noise Monitoring Programme. The purpose of the noise surveys is to quantify and describe the acoustic environment around the site and compare results with specified limits. Unattended monitoring (real time noise monitoring) also occurs at five sites surrounding HVO. The attended noise monitoring locations are displayed in Figure 84

6.1 Attended Noise Monitoring Results

Attended monitoring was conducted at receiver locations surrounding HVO on the night shift of 8th March 2018. Monitoring results are detailed in Table 6 to Table 11 .

Table 6: $L_{Aeq,\ 15\ minute}$ HVO South - Impact Assessment Criteria – March 2018

Location	Date and Time	Wind Speed (m/s)[5]	VTG[5]	Criterion dB (A)	Criterion Applies?[1,6]	HVO South L_{Aeq} dB[2,4]	Exceedance[3]
Knodlers Lane	8/03/2018 21:52	5.6	-1	37	No	IA	NA
Maison Dieu	8/03/2018 22:13	4.5	-1	37	No	IA	NA
Shearers Lane	8/03/2018 21:27	5.1	-1	41	No	IA	NA
Kilburnie South	8/03/2018 23:38	4.6	-1	36	No	26	NA
Jerrys Plains Village	8/03/2018 22:11	4.5	-1	35	No	IA	NA
Jerrys Plains East	8/03/2018 21:50	5.6	-1	35	No	IA	NA
Long Point Road	8/03/2018 0:30	4.1	-1	35	No	IA	NA
HVGC	9/03/2018 0:08	4.5	-1	55	No	IA	NA

Table 7: $L_{Aeq,\ 15\ minute}$ HVO South - Land Acquisition Criteria – March 2018

Location	Date and Time	Wind Speed (m/s)[5]	VTG[5]	Criterion dB (A)	Criterion Applies?[1,6]	HVO South L_{Aeq} dB[2,4]	Exceedance[3]
Knodlers Lane	8/03/2018 21:52	5.6	-1	41	No	IA	NA
Maison Dieu	8/03/2018 22:13	4.5	-1	41	No	IA	NA
Shearers Lane	8/03/2018 21:27	5.1	-1	41	No	IA	NA
Kilburnie South	8/03/2018 23:38	4.6	-1	41	No	26	NA
Jerrys Plains Village	8/03/2018 22:11	4.5	-1	40	No	IA	NA
Jerrys Plains East	8/03/2018 21:50	5.6	-1	40	No	IA	NA
Long Point Road	8/03/2018 0:30	4.1	-1	40	No	IA	NA
HVGC	9/03/2018 0:08	4.5	-1	55	No	IA	NA

Table 8: $L_{A1, 1minute}$ HVO South - Impact Assessment Criteria – March 2018

Location	Date and Time	Wind Speed (m/s)[5]	VTG[5]	Criterion dB (A)	Criterion Applies?[1,6]	HVO South $L_{A1, 1min}$ dB[2,4]	Exceedance[3]
Knodlers Lane	8/03/2018 21:52	5.6	-1	45	No	IA	NA
Maison Dieu	8/03/2018 22:13	4.5	-1	45	No	IA	NA
Shearers Lane	8/03/2018 21:27	5.1	-1	45	No	IA	NA
Kilburnie South	8/03/2018 23:38	4.6	-1	45	No	45	NA
Jerrys Plains Village	8/03/2018 22:11	4.5	-1	45	No	IA	NA
Jerrys Plains East	8/03/2018 21:50	5.6	-1	45	No	IA	NA
Long Point Road	8/03/2018 0:30	4.1	-1	45	No	IA	NA
HVGC	9/03/2018 0:08	4.5	-1	NA	NA	IA	NA

Notes
1. Noise emission limits apply for wind speeds up to 3 metres per second (at a height of 10m), or temperature inversion conditions of up to 3 degrees/100m (at a height of 10m);
2. Estimated or measured $L_{Aeq,15minute}$ dB attributed to HVO South Pit Area;
3. NA in exceedance column means atmospheric conditions outside specified in approval and so criterion is not applicable;
4. Bolded results in red indicate exceedance of criteria;
5. Atmospheric data is sourced from the HVO Corporate weather station using logged met data;
6. Criterion may or may not apply due to rounding of meteorological data value

Table 9: $L_{Aeq, 15minute}$ HVO North – Impact Assessment Criteria – March 2018

Location	Date and Time	Wind Speed (m/s)[5]	VTG[5]	Criterion dB (A)	Criterion Applies?[1,6]	HVO North L_{Aeq} dB[2,4]	Exceedance[3]
Knodlers Lane	8/03/2018 21:52	2.9	-1	35	Yes	IA	Nil
Maison Dieu	8/03/2018 22:13	2.6	-1	35	Yes	IA	Nil
Shearers Lane	8/03/2018 21:27	2.6	-1	35	Yes	IA	Nil
Kilburnie South	8/03/2018 23:38	2.3	0.5	39	Yes	IA	Nil
Jerrys Plains Village	8/03/2018 22:11	2.6	-1	36	Yes	IA	Nil
Jerrys Plains East	8/03/2018 21:50	2.9	-1	39	Yes	IA	Nil
Long Point Road	8/03/2018 0:30	4.1	-1	35	Yes	IA	Nil
HVGC	9/03/2018 0:08	1.8	-1	NA	Yes	IA	Nil

Table 10: $L_{Aeq,15minute}$ HVO North - Land Acquisition Criteria – March 2018

Location	Date and Time	Wind Speed (m/s)[5]	VTG[5]	Criterion dB (A)	Criterion Applies?[1,6]	HVO North L_{Aeq} dB[2,4]	Exceedance[3]
Knodlers Lane	8/03/2018 21:52	2.9	-1	41	No	IA	Nil
Maison Dieu	8/03/2018 22:13	2.6	-1	41	No	IA	Nil
Shearers Lane	8/03/2018 21:27	2.6	-1	41	No	IA	Nil
Kilburnie South	8/03/2018 23:38	2.3	0.5	41	No	IA	Nil
Jerrys Plains Village	8/03/2018 22:11	2.6	-1	41	No	IA	Nil
Jerrys Plains East	8/03/2018 21:50	2.9	-1	41	No	IA	Nil
Long Point Road	8/03/2018 0:30	4.1	-1	41	Yes	IA	Nil
HVGC	9/03/2018 0:08	1.8	-1	NA	NA	IA	Nil

Table 11: $L_{A1, 1Minute}$ HVO North - Impact Assessment Criteria – March 2018

Location	Date and Time	Wind Speed (m/s)[5]	VTG[5]	Criterion dB (A)	Criterion Applies?[1,6]	HVO North $L_{A1, 1min}$ dB[2,4]	Exceedance[3]
Knodlers Lane	8/03/2018 21:52	2.9	-1	46	Yes	IA	Nil
Maison Dieu	8/03/2018 22:13	2.6	-1	46	Yes	IA	Nil
Shearers Lane	8/03/2018 21:27	2.6	-1	46	Yes	IA	Nil
Kilburnie South	8/03/2018 23:38	2.3	0.5	46	Yes	IA	Nil
Jerrys Plains Village	8/03/2018 22:11	2.6	-1	46	Yes	IA	Nil
Jerrys Plains East	8/03/2018 21:50	2.9	-1	46	Yes	IA	Nil
Long Point Road	8/03/2018 0:30	4.1	-1	46	Yes	IA	Nil
HVGC	9/03/2018 0:08	1.8	3	NA	No	IA	Nil

Notes
1. Noise emission limits apply under all meteorological conditions, except during periods of rain or hail, when average winds speed at microphone heights exceeds 5 metres per second, when wind speeds greater than 3 metres per second are measured at 10m above ground level, or during temperature inversion conditions greater than 3 degrees C/100m;2. Estimated or measured LAeq,15minute dB attributed to HVO North Area;
3. NA in exceedance column means atmospheric conditions outside specified in approval and so criterion is not applicable;
4. Bolded results in red indicate exceedance of criteria;
5. Atmospheric data is sourced from the HVO Corporate weather station using logged met data;
6. Criterion may or may not apply due to rounding of meteorological data value

5.2 Low Frequency Assessment

In accordance with the requirements of the EPA's Noise Policy for Industry (NPfI), the applicability of the low frequency modification penalty has been assessed. During March 2018 no measurements required the penalty to be applied. The assessment for low frequency noise is shown in Table 11.

Table 12: Low Frequency Noise Assessment – March 2018

Location	Date and Time	Measured Site Only LA_{eq} dB (Sth/Nth)	Site Only LC_{eq} dB[4] (Sth/Nth)	Site Only LC_{eq}-LA_{eq} dB [1,4] (Sth/Nth)	Result Max exceedance of ref spectrum dB[2,3,4] (Sth/Nth)	Penalty dB(A)	Exceedance
Knodlers Lane	8/03/2018 21:52	IA/IA	NA/NA	NA/NA	NA/NA	0	Nil
Maison Dieu	8/03/2018 22:13	IA/IA	NA/NA	NA/NA	NA/NA	0	Nil
Shearers Lane	8/03/2018 21:27	IA/IA	NA/NA	NA/NA	NA/NA	0	Nil
Kilburnie South	8/03/2018 23:38	26/IA	NA/NA	NA/NA	NA/NA	0	Nil
Jerrys Plains Village	8/03/2018 22:11	IA/IA	NA/NA	NA/NA	NA/NA	0	Nil
Jerrys Plains East	8/03/2018 21:50	IA/IA	NA/NA	NA/NA	NA/NA	0	Nil
Long Point Road	8/03/2018 0:30	IA/IA	NA/NA	NA/NA	NA/NA	0	Nil
HVGC	9/03/2018 0:08	IA/IA	NA/NA	NA/NA	NA/NA	0	Nil

Notes:
1. As per NPfI, if LCeq – LAeq >= 15 dB further assessment of low frequency noise required.
2. As per NPfI, compare measured spectrum against reference spectrum to determine if the low frequency modifying factor is triggered and application of penalty is required;
3. Bold results and penalties in red are where the relevant modifying factor trigger was exceeded; and
4. Where it is not possible to determine the site only result due to the presence of other low frequency noise sources occurring during the measurement, or where criteria were not applicable due to meteorological conditions, this is noted as NA (not available) and no further assessment has been undertaken.

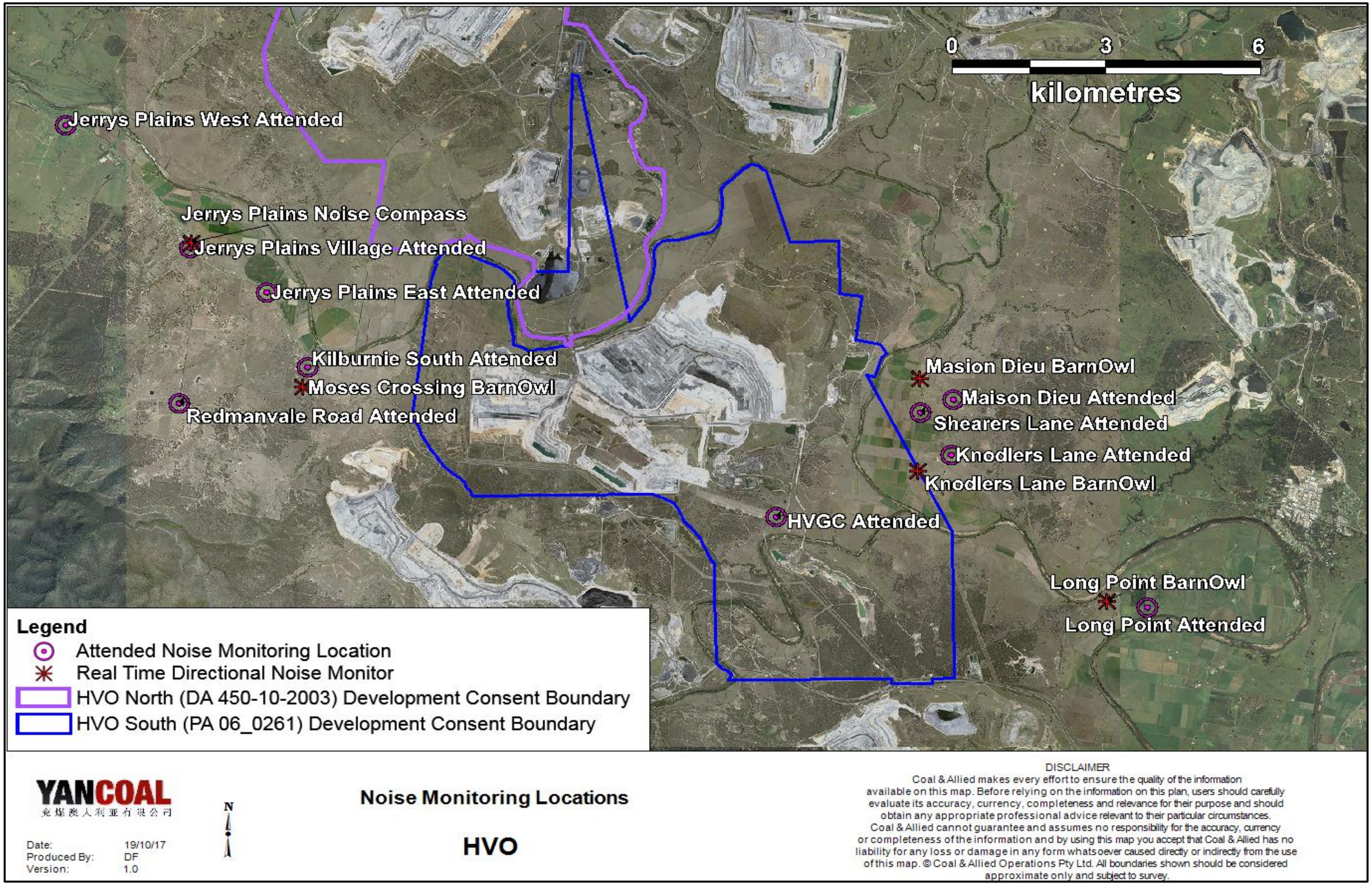

Figure 84: Noise Monitoring Location Plan

6.2 Real Time Noise Monitoring

HVO utilises a network of real-time directional noise monitors to manage noise impacts on a continuous basis. Noise alarms are in place at five monitoring locations (Knodlers Lane, Maison Dieu, Jerrys Plains, Moses Crossing, and Long Point), which alert HVO staff to elevated noise levels likely to be attributable to HVO. Noise alarms are investigated and responded to with the appropriate level of operational modification. Changes in response to a noise alarm can include replacing equipment with quieter (noise attenuated) units, changing or relocating tasks, and shutting down equipment.

It should be noted that this assessment does not compliment or conflict with attended noise monitoring detailed in Section 6.1, and that real time monitoring data includes non-mine noise sources such as dogs, cows, or more commonly, road traffic.

7.0 OPERATIONAL DOWNTIME

During March, a total of 85.0 hours of equipment downtime was logged in response to real time monitoring and visual inspections for environmental reasons such as dust, noise and meteorological conditions. Operational downtime by equipment type is shown in Figure 85.

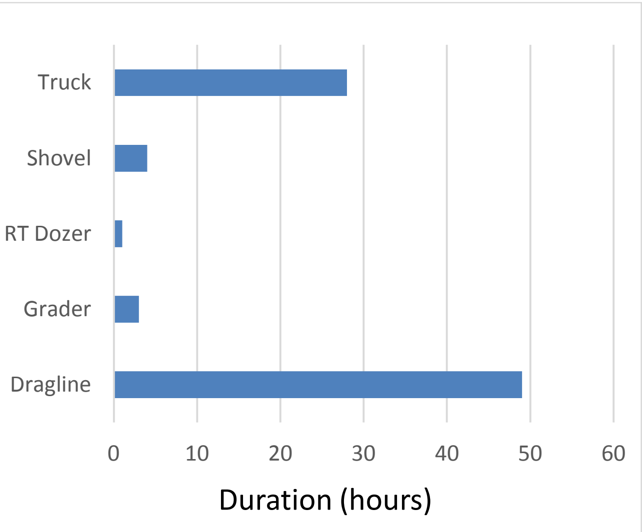

Figure 85: Operational Downtime by Equipment Type – March 2018

8.0 REHABILITATION

During March 6.6 Ha of land was released and 3.8 Ha of land was bulk shaped. Year to date progress can be viewed in Figure 86.

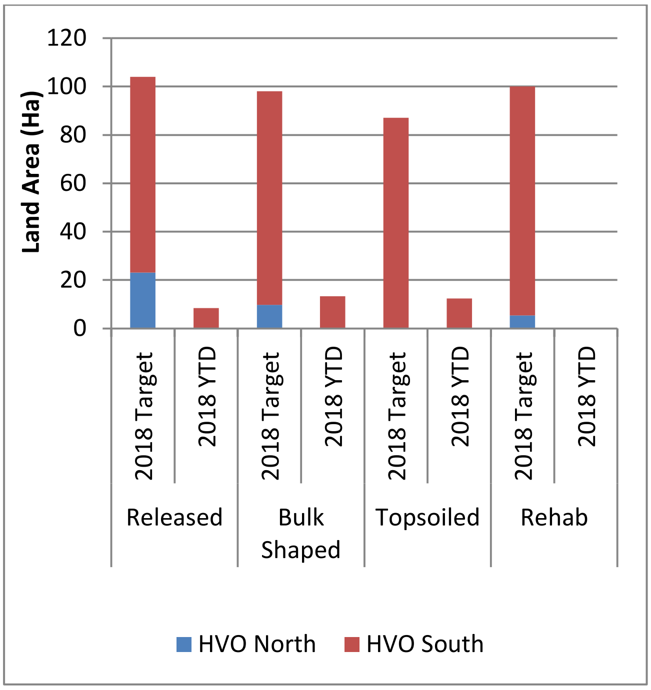

Figure 86: Rehabilitation YTD – March 2018

9.0 COMPLAINTS

During March no complaints were received. Details of complaints received YTD are shown in Table 13.

Table 13: Complaints Summary YTD

	Noise	Dust	Blast	Lighting	Other	Total
January	-	2	4	-	-	6
February	1	-	-	-	1	2
March	-	-	-	-	-	0
April	-	-	-	-	-	-
May	-	-	-	-	-	-
June	-	-	-	-	-	-
July	-	-	-	-	-	-
August	-	-	-	-	-	-
September	-	-	-	-	-	-
October	-	-	-	-	-	-
November	-	-	-	-	-	-
December	-	-	-	-	-	-
Total	1	2	4	-	1	8

Figure 87: Complaints Graph – March 2018

10.0 ENVIRONMENTAL INCIDENTS

During the reporting period there were no reportable environmental incidents.

Appendix A: Meteorological Data

Table 14: Meteorological Data - HVO Corporate Meteorological Station – March 2018

Date	Air Temperature Maximum (°C)	Air Temperature Minimum (°C)	Relative Humidity Maximum (%)	Relative Humidity Minimum (%)	Solar Radiation Maximum (W/Sq. M)	Wind Direction Average (°)	Wind Speed Average (m/sec)	Rainfall(mm)
1/03/2018	29	17	70	36	996	155	4.3	0.0
2/03/2018	28	14	97	41	1383	107	3.1	0.0
3/03/2018	35	13	99	18	926	170	1.9	0.0
4/03/2018	35	16	100	27	1262	186	2.4	18.8
5/03/2018	25	16	100	61	1172	111	2.3	1.6
6/03/2018	22	13	100	58	1154	116	3.6	2.4
7/03/2018	25	13	97	35	1528	112	4.3	0.0
8/03/2018	25	11	94	39	1400	109	3.7	0.0
9/03/2018	25	13	86	40	1503	110	3.4	0.0
10/03/2018	27	13	86	30	1474	108	3.1	0.0
11/03/2018	28	11	100	29	1220	132	1.8	0.0
12/03/2018	28	11	99	31	1066	125	2.0	0.0
13/03/2018	28	14	92	40	1140	108	3.4	0.0
14/03/2018	30	14	99	32	919	113	2.2	0.0
15/03/2018	34	15	100	19	1163	237	2.4	0.0
16/03/2018	30	18	86	39	1071	107	3.1	0.0
17/03/2018	37	17	88	9	854	202	2.7	0.0
18/03/2018	38	17	80	11	853	264	3.3	0.0
19/03/2018	39	17	80	9	840	173	2.2	0.0
20/03/2018	30	17	89	29	1000	120	2.9	0.0
21/03/2018	21	15	100	70	231	125	4.7	20.4
22/03/2018	20	13	100	69	1179	126	4.6	4.4
23/03/2018	21	13	100	78	989	115	3.5	2.2
24/03/2018	29	13	100	39	905	151	1.5	0.0
25/03/2018	32	15	99	24	963	-	3.9	0.2
26/03/2018	25	12	100	27	879	262	4.0	19.4
27/03/2018	25	10	84	35	1151	110	2.7	0.0
28/03/2018	29	11	100	37	825	-	1.5	0.0
29/03/2018	27	14	100	45	1166	119	1.6	0.0
30/03/2018	32	15	100	19	812	174	1.6	0.0
31/03/2018	27	16	99	51	1039	109	2.9	0.0

“-“ Indicates that data was not available due to technical issues.