HUNTER VALLEY
OPERATIONS

Monthly Environmental Monitoring Report

Hunter Valley Operations

March 2019

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Revision History

Version No.	Person Responsible	Document Status	Date
1.0	**Environment & Community Officer**	**Draft**	**25/01/2019**

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 2019.

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 2019 trend and historical trend are shown in Figure 1.

Table 1: Monthly Rainfall HVO

2019	Monthly Rainfall (mm)	Cumulative Rainfall (mm)
March	154.6	243

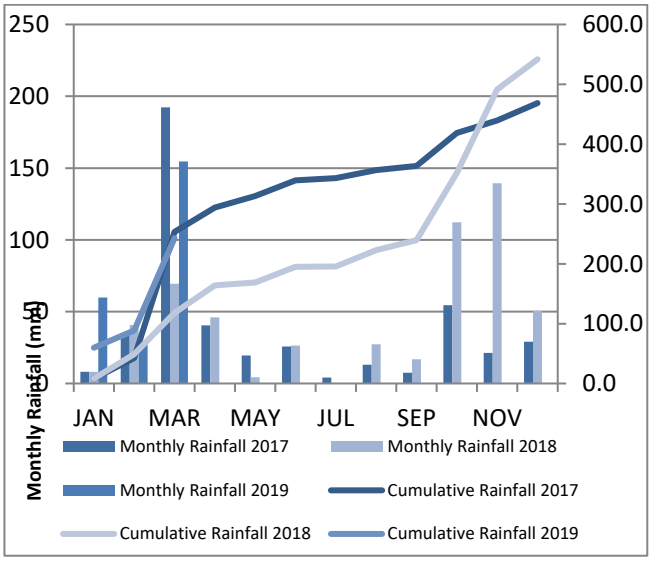

Figure 1: Rainfall Summary 2019

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).

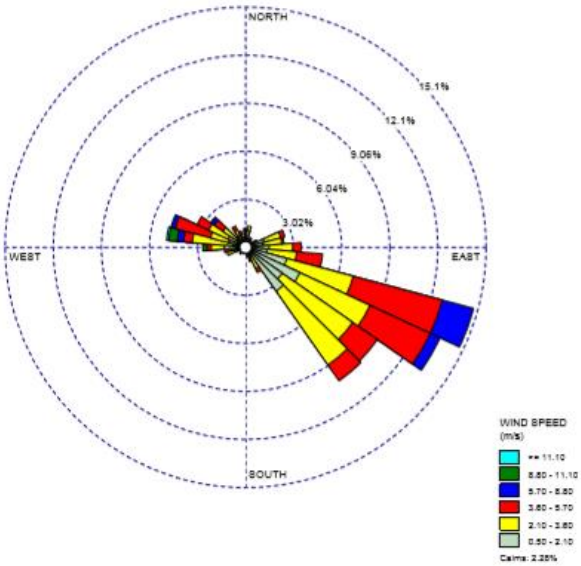

Figure 2: HVO Corporate Wind Rose – March 2019

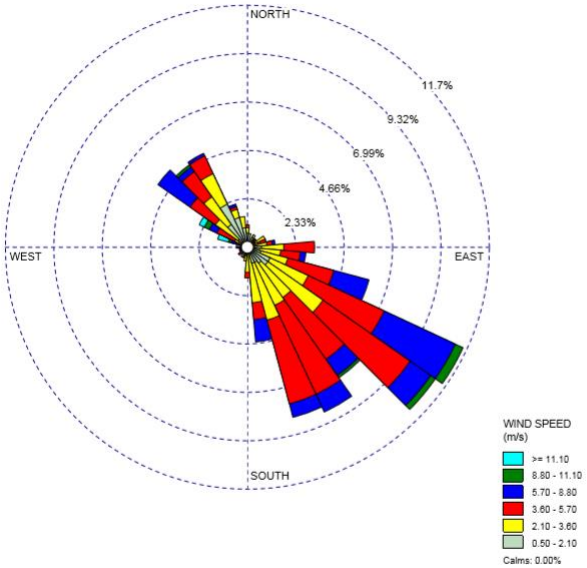

Figure 3: HVO Cheshunt Wind Rose – March 2019

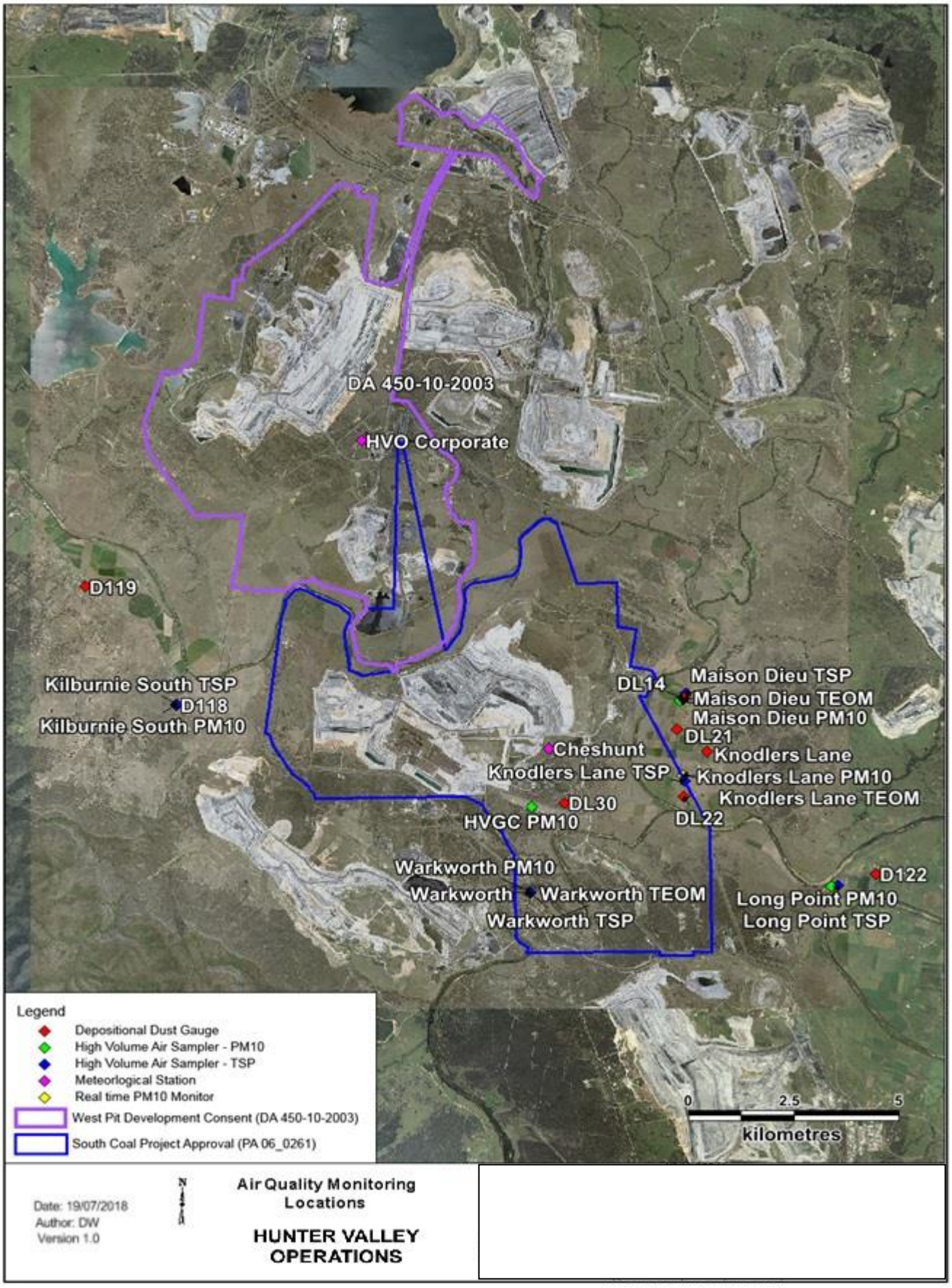

Figure 4: Air Quality Monitoring Location Plan

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, D119, Warkworth and DL22 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, D119 and Warkworth monitor's results indicates no evidence to suggest that these result were contaminated and will be included in the annual average calculation.

Field notes for DL22 state that the sample was contaminated with insects and was brown and turbid.

An assessment of HVO's contribution against the long term impact assessment criteria will be provided in the 2019 Annual Review.

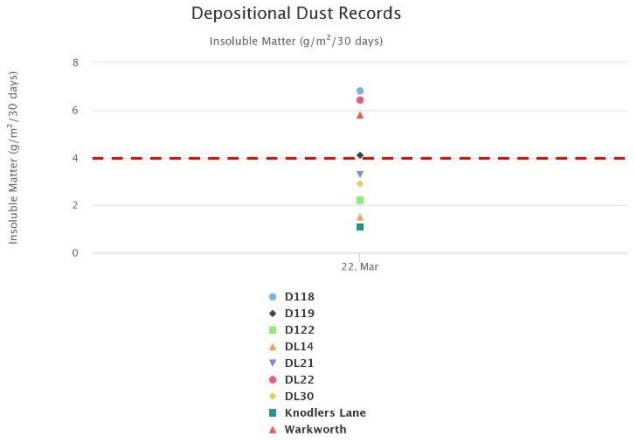

Figure 5: Depositional Dust Results – March 2019

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.

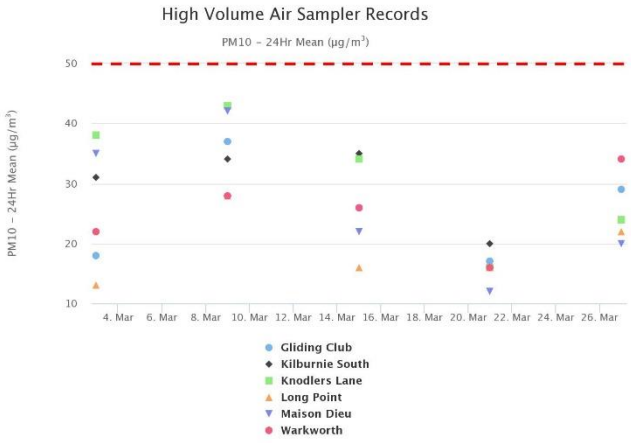

Figure 6: Individual PM_{10} Results – March 2019

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 2019 Annual Review.

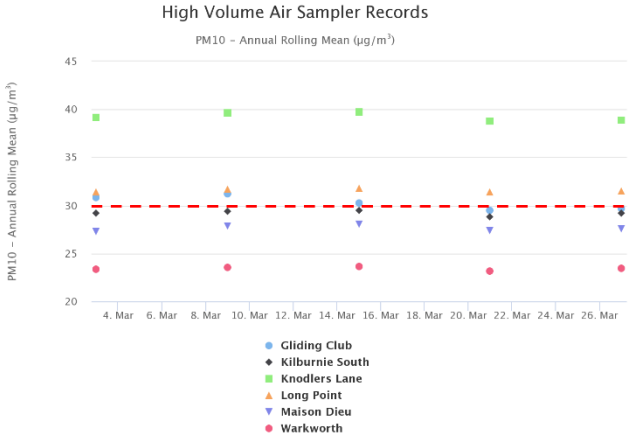

Figure 7: Year to Date Average PM_{10} – March 2019

2.3.2 TSP Results

Figure 8 shows the annual average TSP results compared against the long term impact assessment criteria of 90µg/m^3.

An assessment of HVO's contribution against the long term impact assessment criteria will be provided in the 2019 Annual Review.

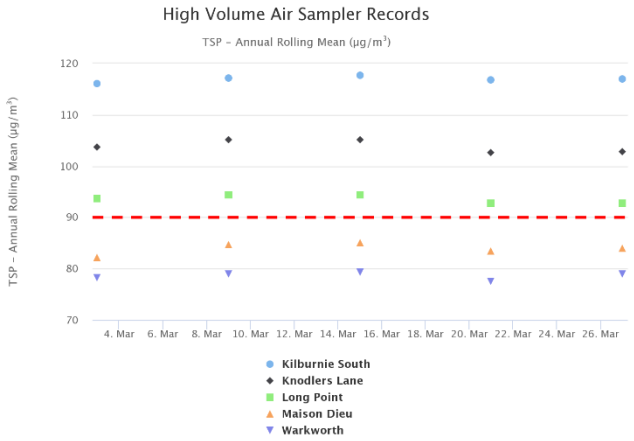

Figure 8: Year to Date Average Total Suspended Particulates – March 2019

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.

Table 2 shows the exceedances for real time PM_{10} monitoring for March.

2.3.4 Real Time Alarms for Air Quality

During March the real time monitoring system generated 140 automated air quality related alarms. 24 were related to adverse weather conditions and 116 alarms relating to PM_{10}.

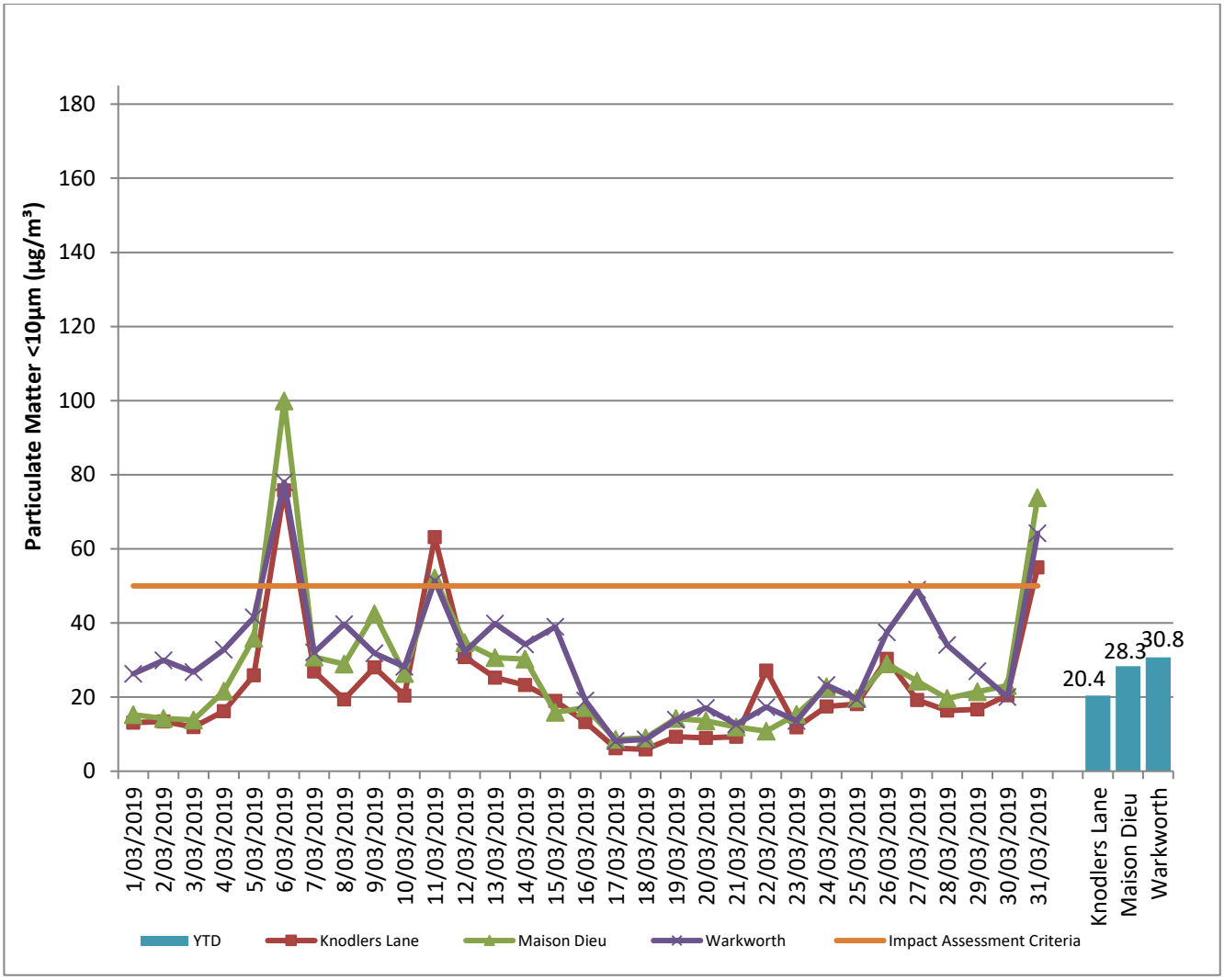

Figure 9: Real Time PM_{10} 24hr average and YTD average – March 2019

Table 2: Real-time PM10 Investigation Results

Date	Site	Total Measured Result (µg/m3)	Estimated contribution from HVO (µg/m3 / %)	Discussion
6/03/2019	Knodlers Lane TEOM	75.8	0.7µg/m3 Or 0.9%	An internal investigation determined HVO maximum potential contribution to be in the order of 0.7ug/m3 or 0.9% of the total measured based on prevailing wind conditions and upwind monitoring results.
6/03/2019	Maison Dieu TEOM	99.9	24.8µg/m3 Or 24.8%	An internal investigation determined HVO maximum potential contribution to be in the order of 24.8ug/m3 or 24.8% of the total measured based on prevailing wind conditions and upwind monitoring results.
6/03/2019	Warkworth TEOM	78.0	2.9µg/m3 Or 3.6%	An internal investigation determined HVO maximum potential contribution to be in the order of 2.9ug/m3 or 3.6% of the total measured based on prevailing wind conditions and upwind monitoring results.
11/03/2019	Maison Dieu TEOM	52.1	9.5µg/m3 Or 18.2%	An internal investigation determined HVO maximum potential contribution to be in the order of 9.5ug/m3 or 18.2% of the total measured based on prevailing wind conditions.
11/03/2019	Knodlers Lane	63.2	15.8 µg/m3 Or 25.1%	An internal investigation determined HVO maximum potential contribution to be in the order of 15.8ug/m3 or 25.1% of the total measured based on prevailing wind conditions.
11/03/2019	Warkworth TEOM	51.4	19.0 µg/m3 Or 36.9%	An internal investigation determined HVO maximum potential contribution to be in the order of 19.0 ug/m3 or 36.9% of the total measured based on prevailing wind conditions.

31/03/2019	Knodlers Lane TEOM	55.0	2.1µg/m3 Or 3.7%	An internal investigation determined HVO contribution to be minimal based on prevailing wind conditions and high background levels.
31/03/2019	Maison Dieu TEOM	73.8	16.8µg/m3 Or 22.7%	An internal investigation determined HVO maximum potential contribution to be in the order of 16.8ug/m3 or 22.7% of the total measured based on prevailing wind conditions and upwind monitoring results.
31/03/2019	Warkworth TEOM	64.2	7.1µg/m3 Or 11.1%	An internal investigation determined HVO maximum potential contribution to be in the order of 19ug/m3 or 29.5% of the total measured based on prevailing wind conditions and upwind monitoring results.

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).

In the absence of licence or applicable ANZECC criteria, the 5th / 95th percentile of the available validated data record for a monitoring station are adopted as the basis for a water quality management guideline trigger as outlined in the Water Management Plan for Electrical Conductivity and pH. The 50mg/L ANZECC criteria has been adopted for TSS. Exceedances of these triggers for Quarter 4 2019 are detailed in Table 3

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

Figure 10 to Figure 12 show the long term surface water trend (2016- current) within HVO mine dams.

Figures 13 to 21 show the long term surface water trend (2016 – current) in surrounding watercourses

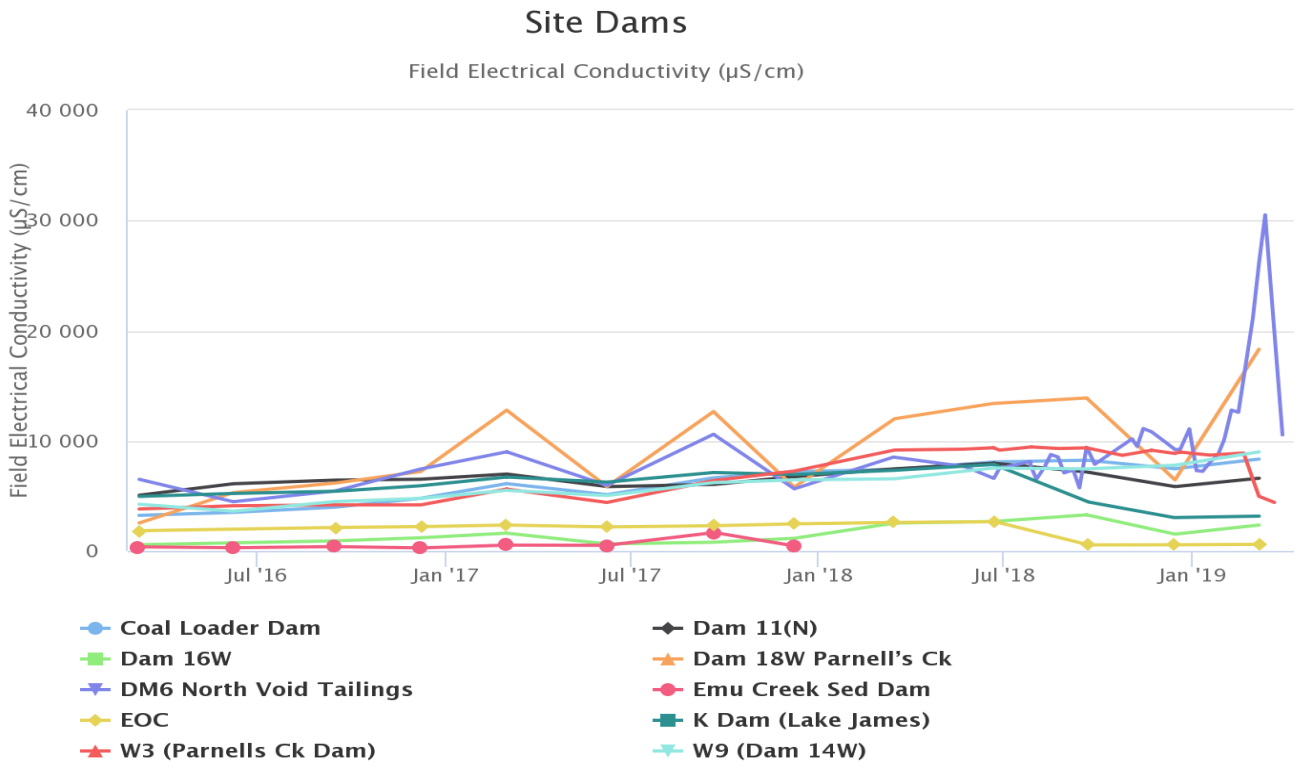

Figure 10: Site Dams Electrical Conductivity Trend – March 2019

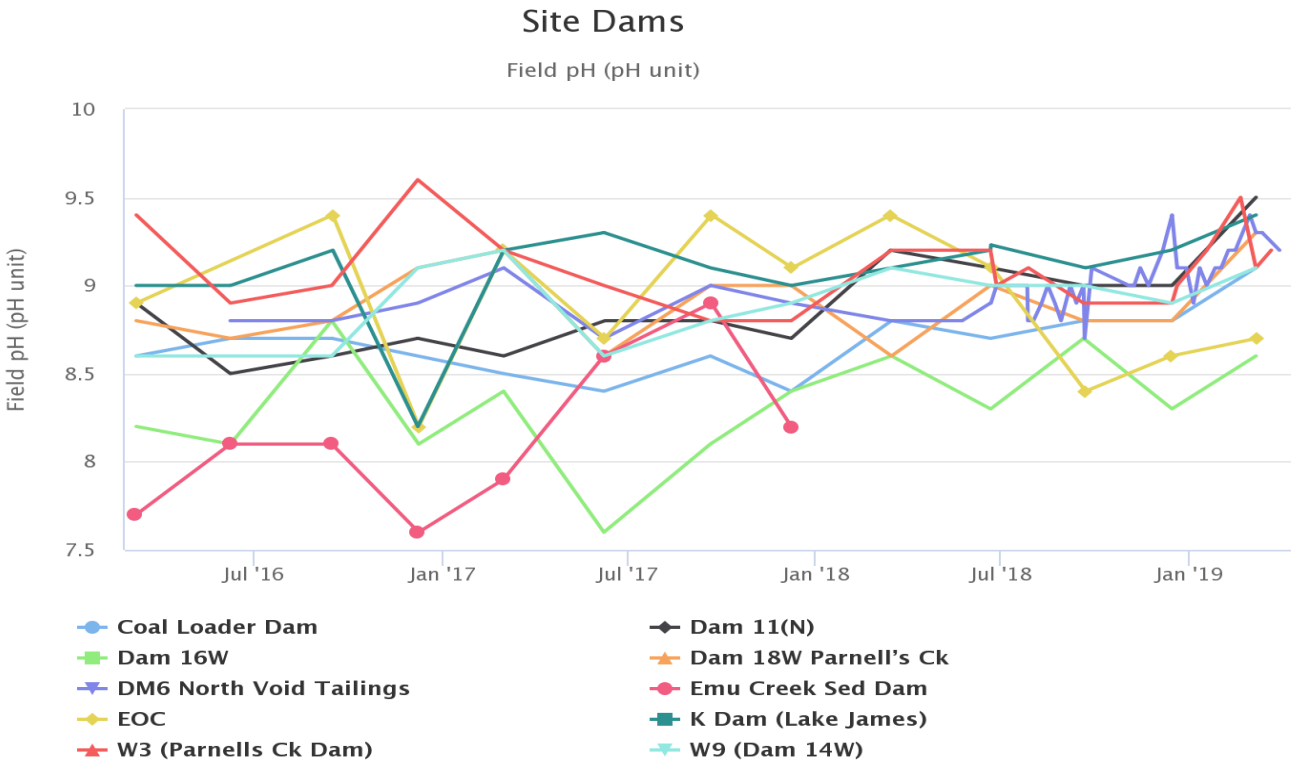

Figure 11: Site Dams pH Trend – March 2019

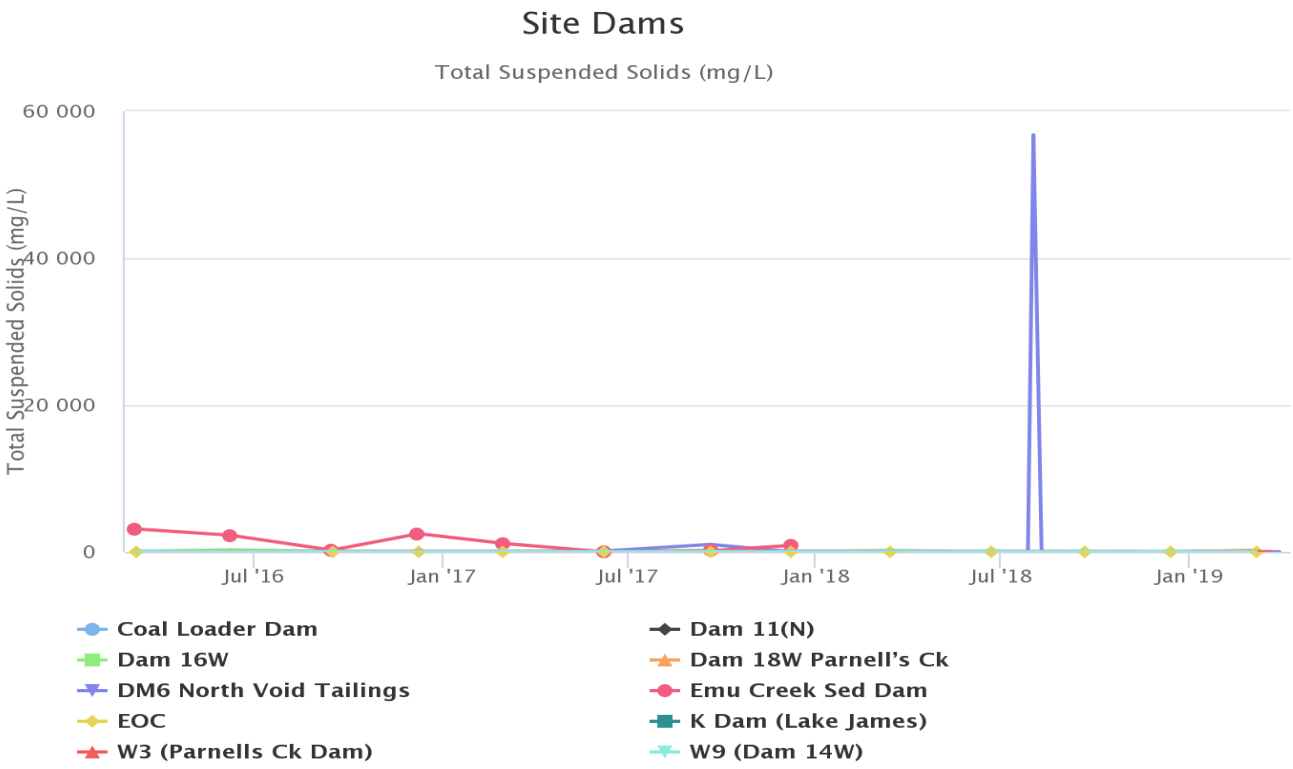

Figure 12: Site Dams Total Suspended Solids Trend – March 2019

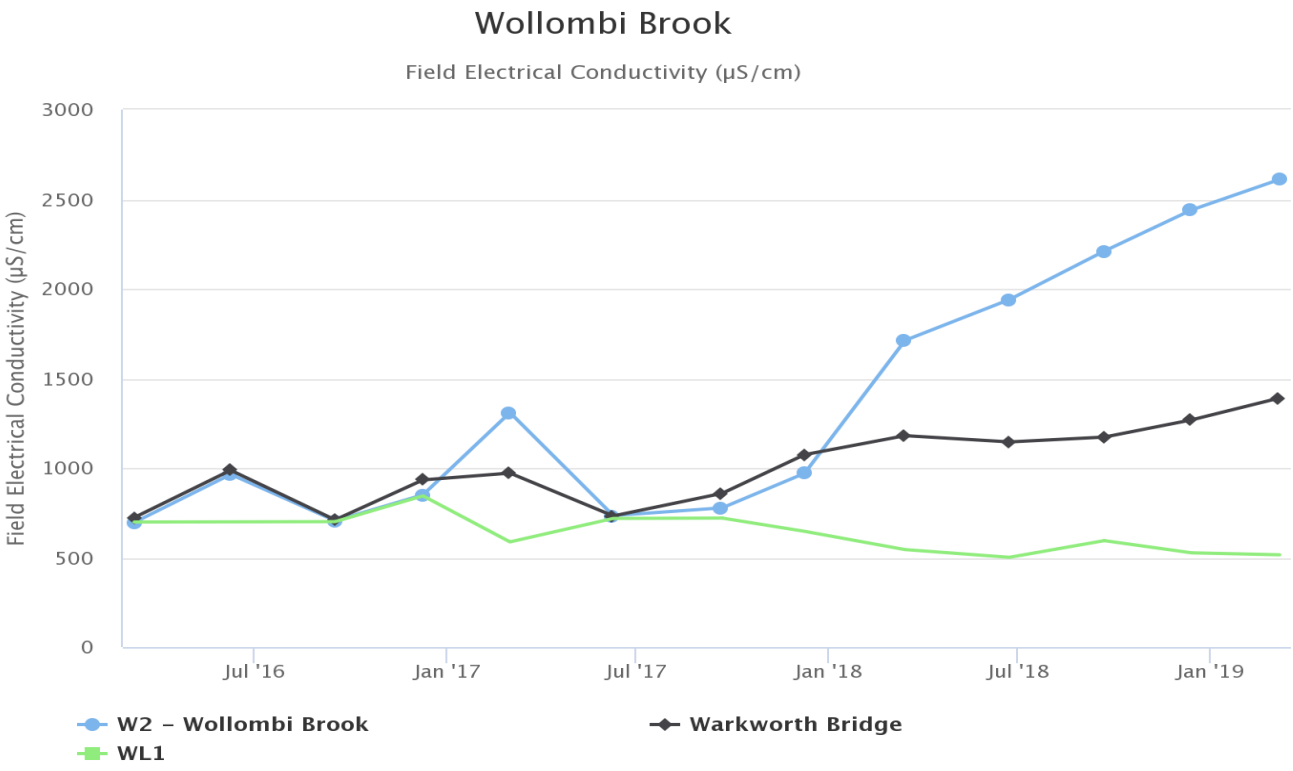

Figure 13: Wollombi Brook Electrical Conductivity Trend – March 2019

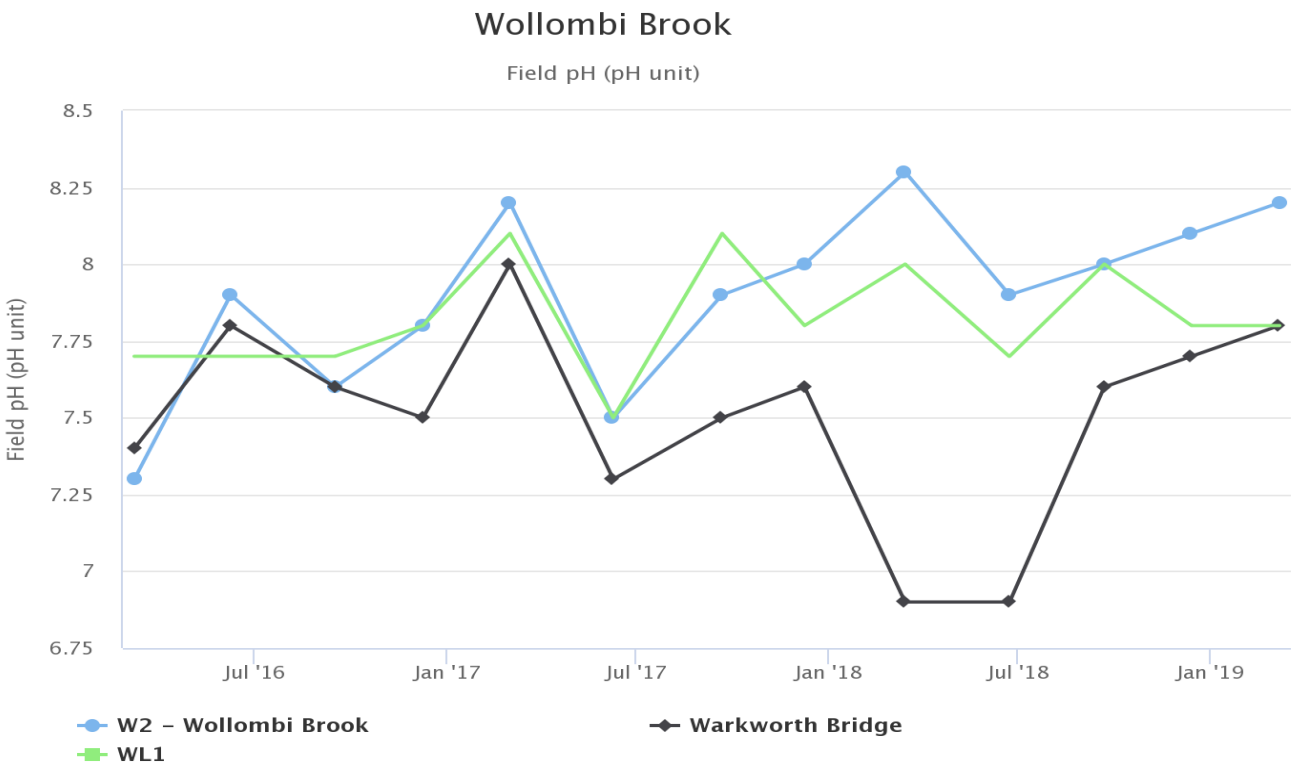

Figure 14: Wollombi Brook pH Trend – March 2019

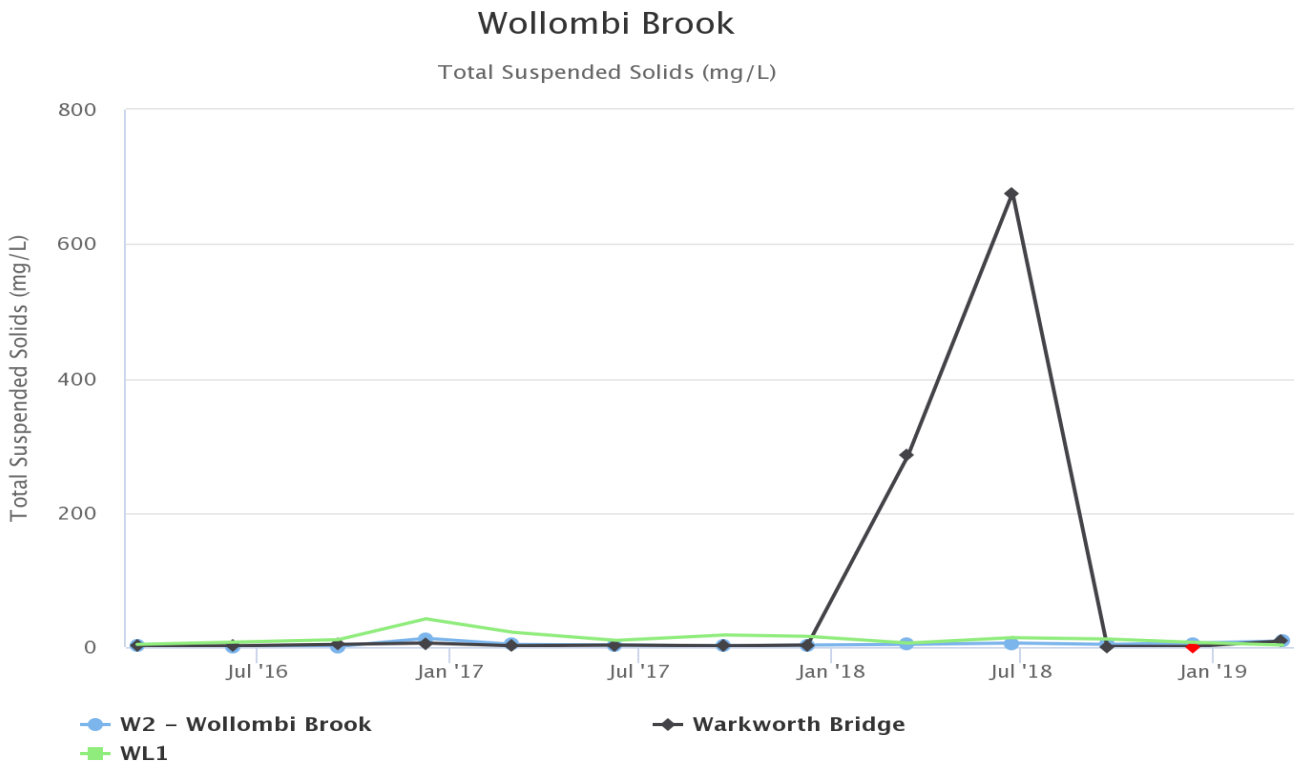

Figure 15: Wollombi Brook Total Suspended Solids Trend – March 2019

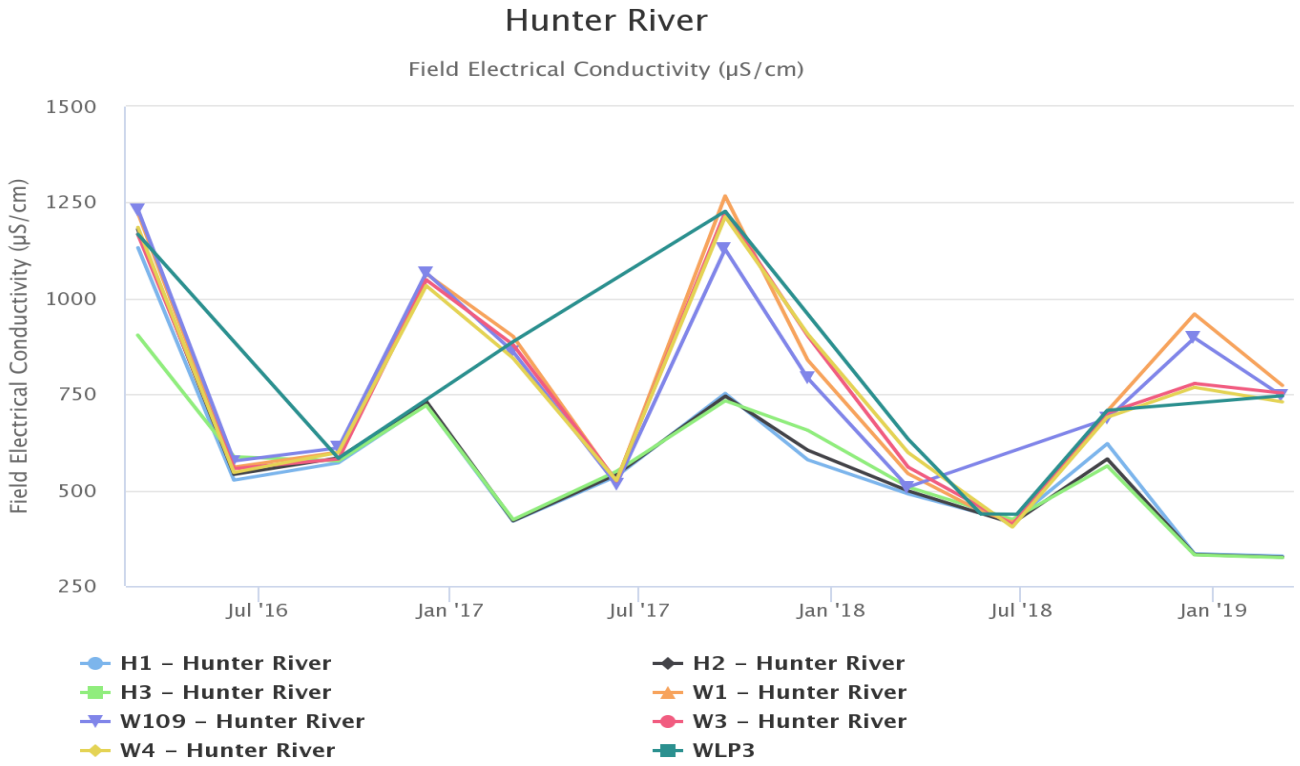

Figure 16: Hunter River Electrical Conductivity Trend – March 2019

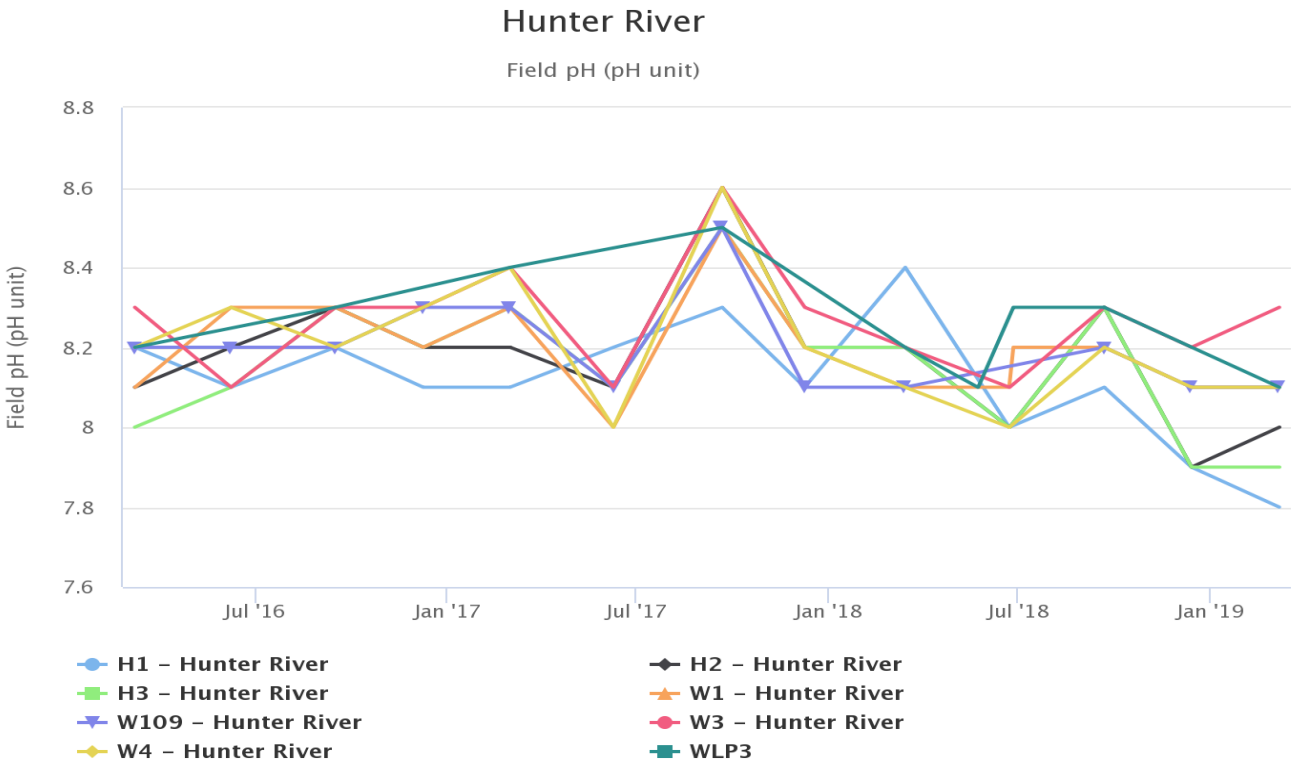

Figure 17: Hunter River pH Trend – March 2019

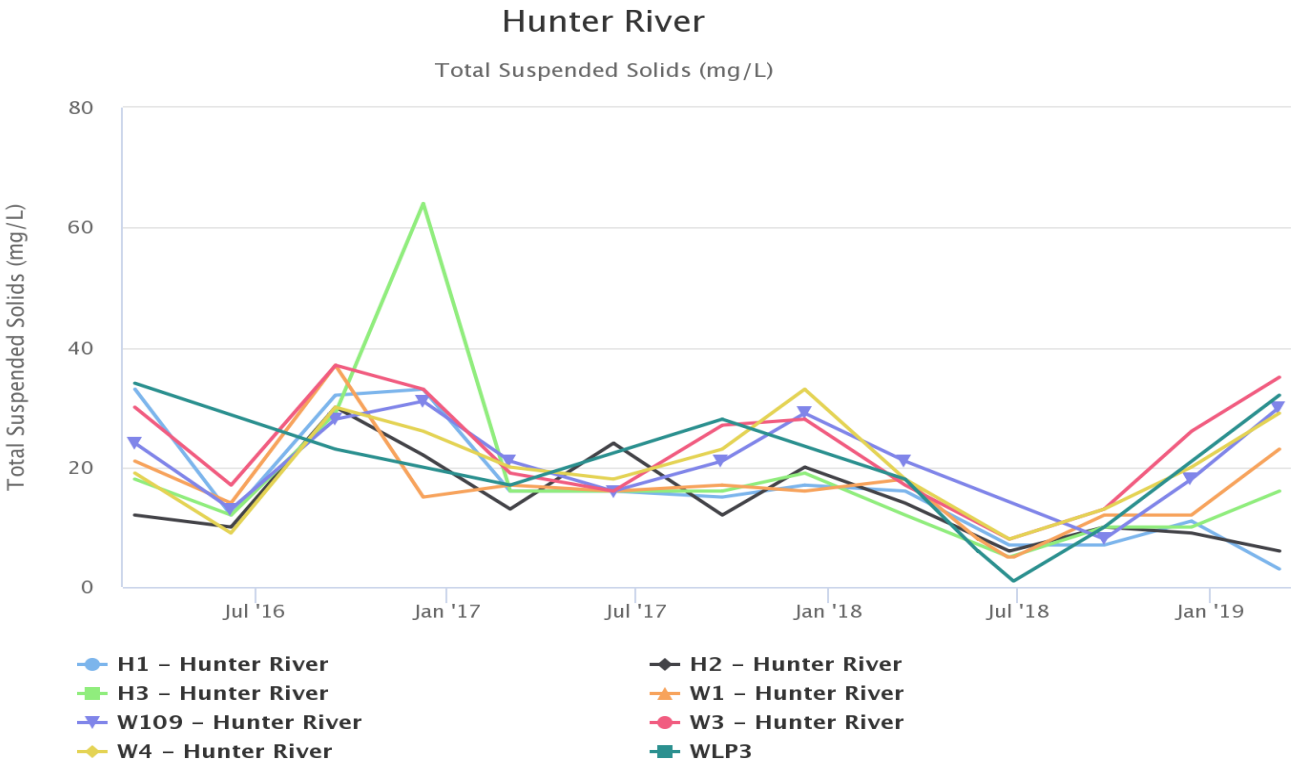

Figure 18: Hunter River Total Suspended Solids – March 2019

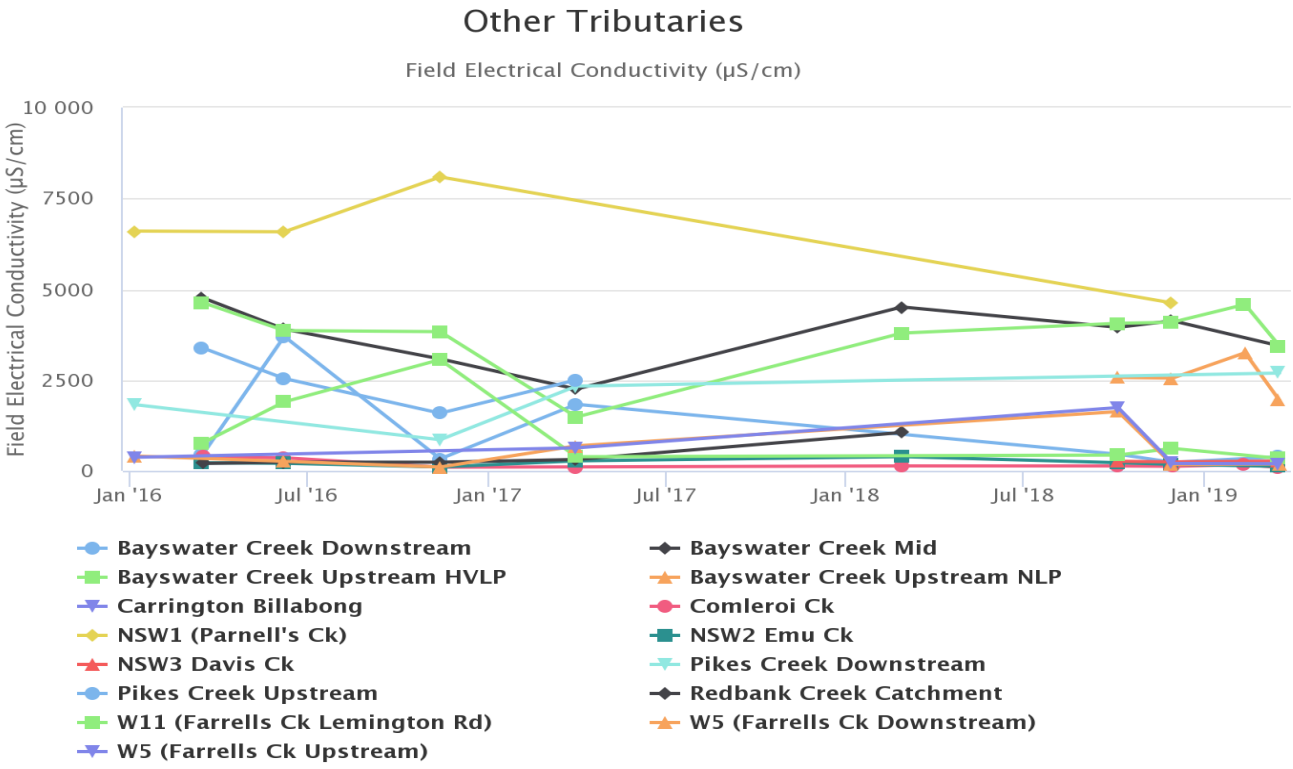

Figure 19: Other Tributaries Electrical Conductivity Trend – March 2019

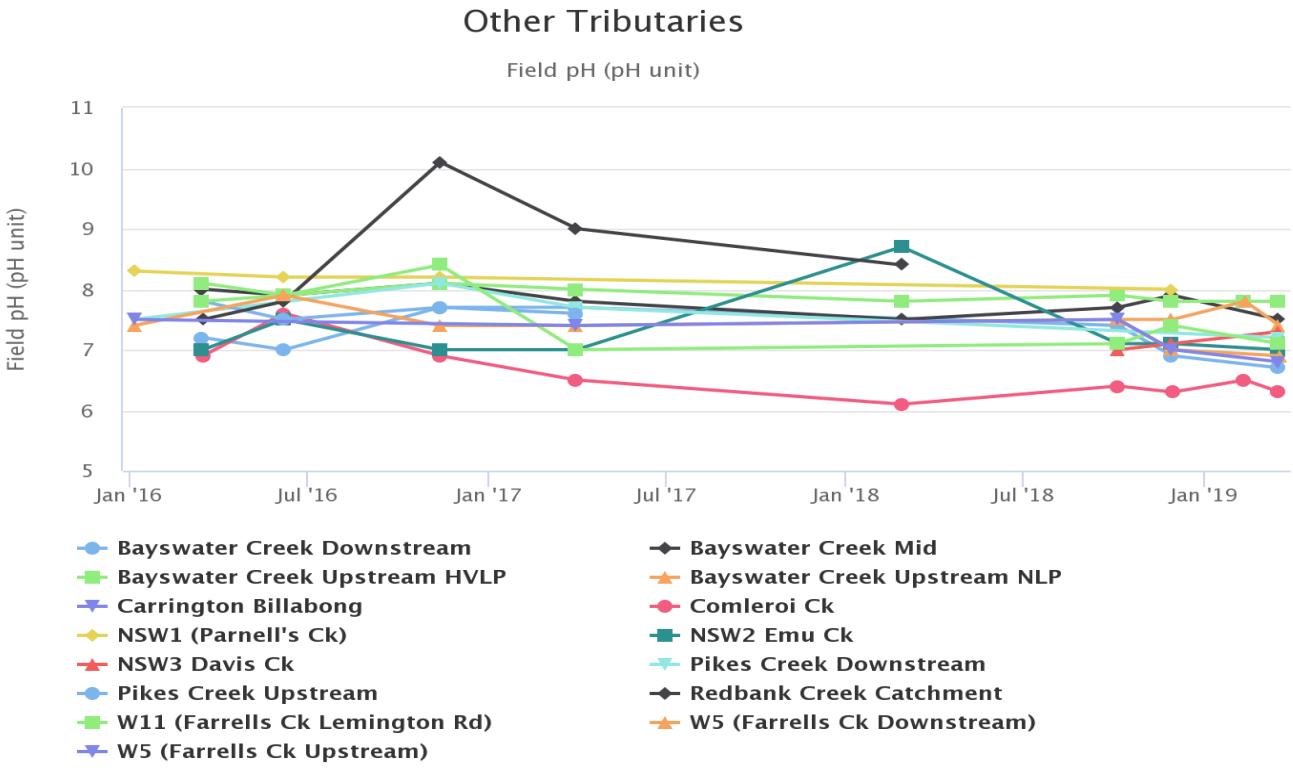

Figure 20: Other Tributaries pH Trend – March 2019

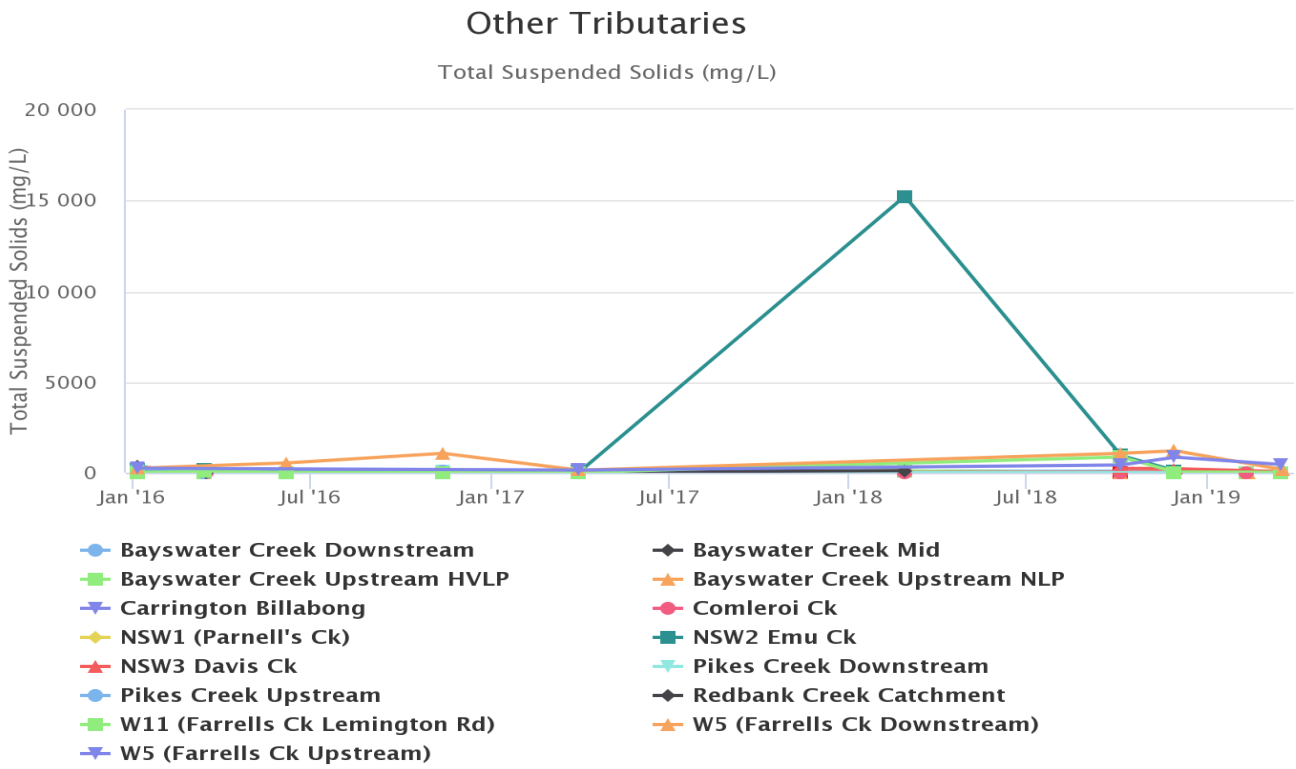

Figure 21: Other Tributaries Total Suspended Solids Trend – March 2019

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 393.2ML 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 3.

Table 3: Surface Water Trigger Limit Summary

Site	Date	Trigger Limit Breached	Action taken in response
H1 Hunter River	7/03/2019	pH 5th Percentile	First Breach of pH 5th Percentile trigger. Watching Brief*.
Warkworth Bridge	7/03/2019	EC 95th Percentile	Sixth exceedance of EC 95th Percentile trigger (1390us/cm). Field observations indicate that sample was taken from a pool of water as there was no flow in the Brook. Downstream monitoring (WL1) indicated a slow flow and lower EC level (515us/cm). Based on this it can be assumed that the sample taken is not representative of flows in the Brook and that there is no impact to suggest mining influence. Maintain watching Brief*.
W2 Wollombi Brook	7/03/2019	EC 95th Percentile	Fifth exceedance of EC 95th Percentile trigger (2610us/cm). Field observations indicate that sample was taken from a pool of water as there was no flow in the Brook. Downstream monitoring (WL1) indicated a slow flow and lower EC level (515us/cm). Based on this it can be assumed that the sample taken is not representative of flows in the Brook and that there is no impact to suggest mining influence. Maintain watching Brief*.
Bayswater Creek Downstream	18/03/2019	pH 5th Percentile	First exceedance of pH 5th Percentile trigger. Watching Brief*
Bayswater Creek Midstream	18/03/2019	pH 5th Percentile.	First exceedance of pH 5th Percentile trigger. Watching Brief*
Pikes Creek Downstream	18/03/2019	pH 5th Percentile.	Watching Brief*
NSW3 Davis Creek	18/03/2019	TSS 50mg/L (ANZECC Guideline)	First exceedance of TSS trigger (67mg/L). Field observations indicate that sample was taken from a pool of water as there was no flow in the creek line. EC (266us/cm) and pH (7.3) results indicate water quality is not affected by mine water. Maintain watching Brief*.
W11 (Farrells Creek Lemington Road)	18/03/2019	pH 5th Percentile	First exceedance of pH 5th Percentile trigger. Watching Brief*
W5 (Farrells Creek Upstream)	18/03/2019	TSS 50mg/L (ANZECC Guideline)	First exceedance of TSS trigger (450 mg/L). Field Observations indicated that there was flow in the creek. Refer to incident section for details.
W5 (Farrells Creek Downstream)	18/03/2019	TSS 50mg/L (ANZECC Guideline)	First exceedance of TSS trigger (177 mg/L). Field Observations indicated that there was flow in the creek. Refer to incident section for details

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

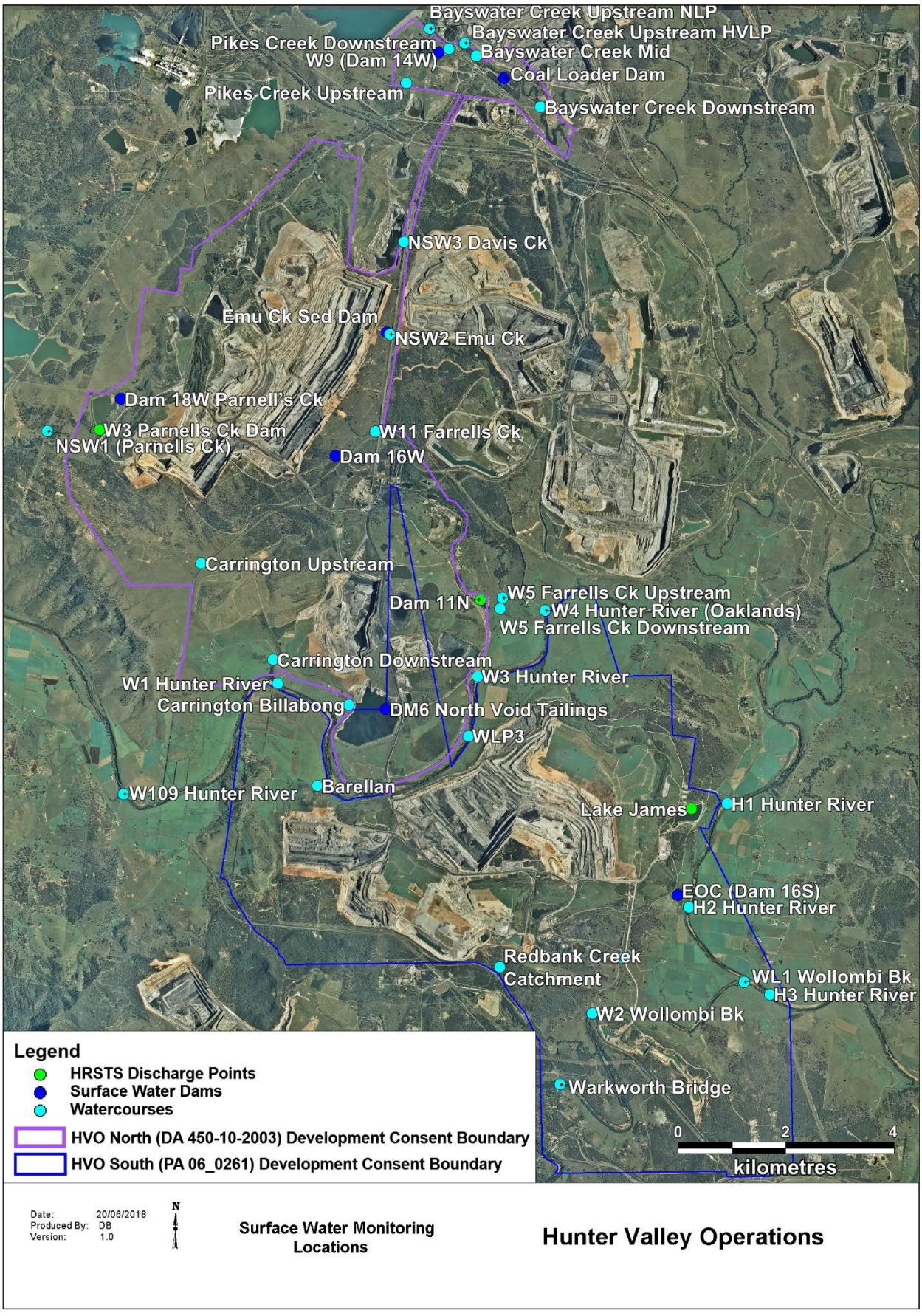

Figure 22: Surface Water Monitoring Location Plan

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 80.

Figure 23 to Figure 79 show the long term trends (2016 – current) for ground water bores monitored at HVO.

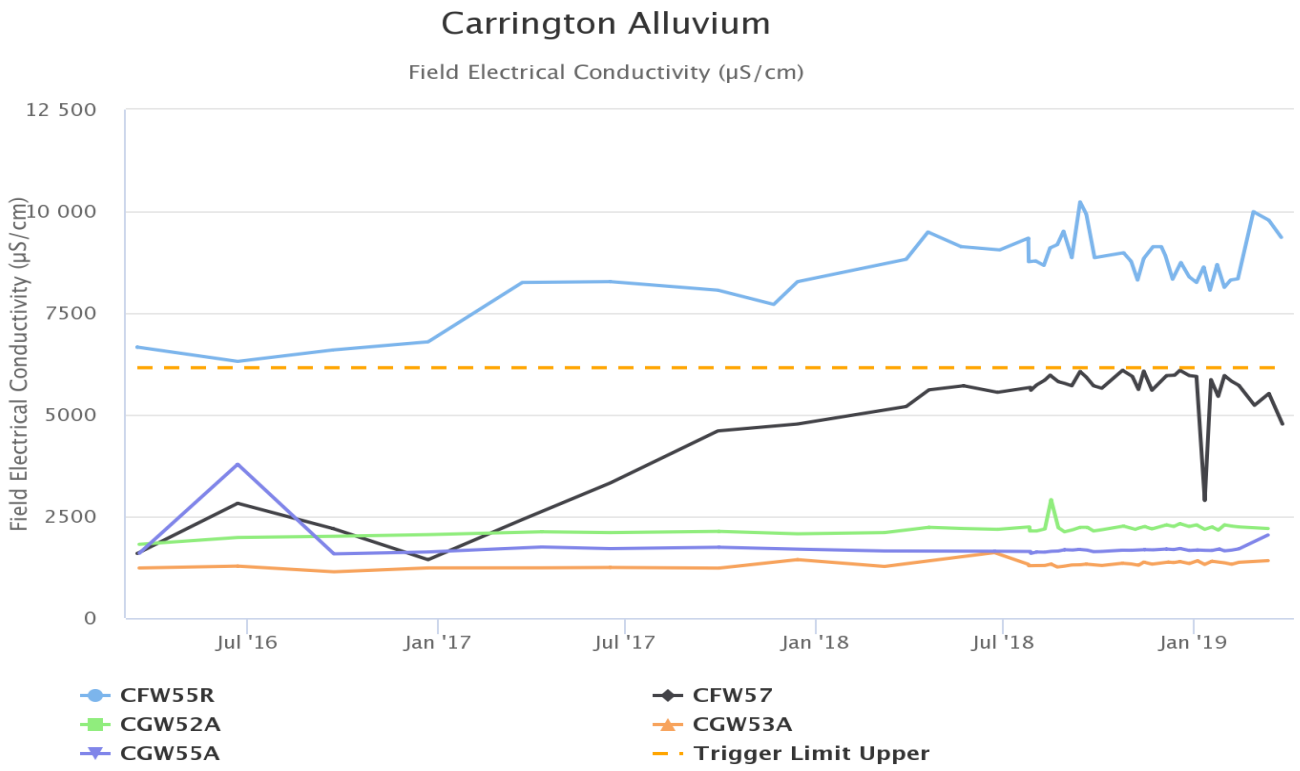

Figure 23: Carrington Alluvium Electrical Conductivity Trend – March 2019

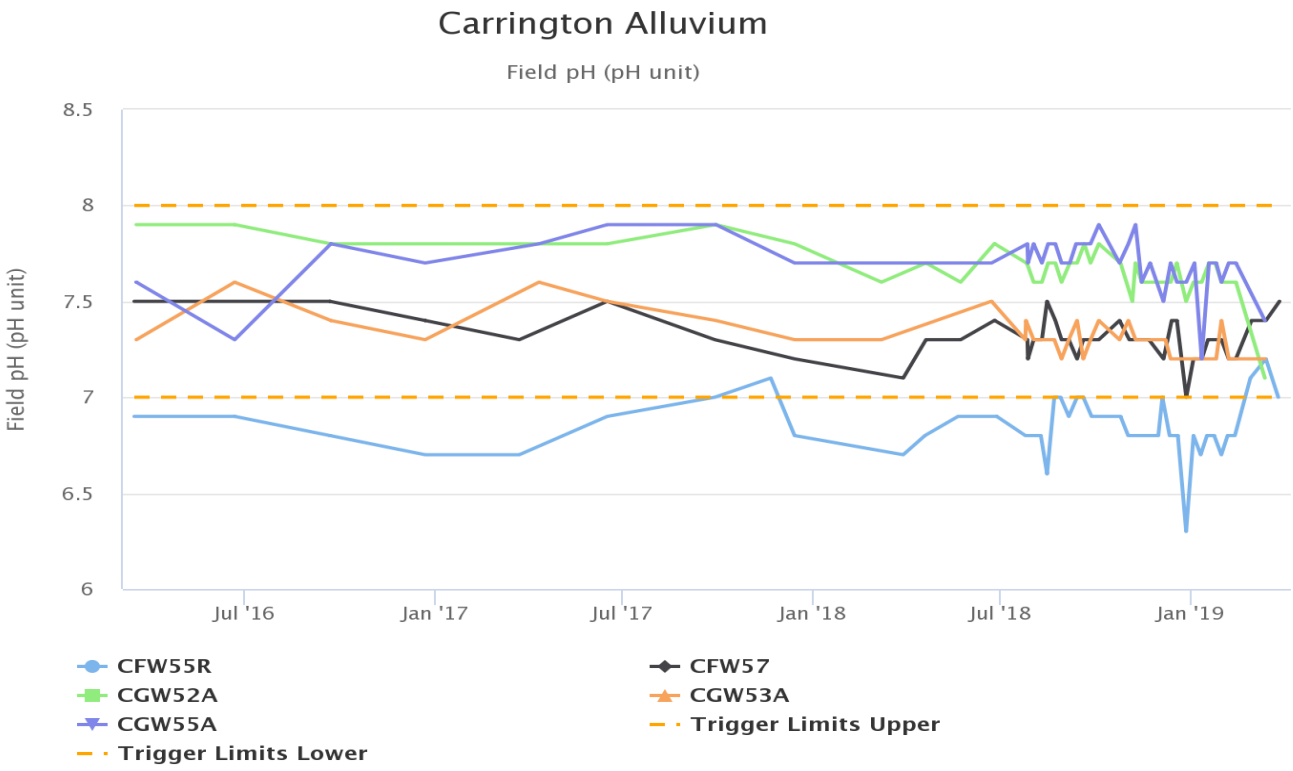

Figure 24: Carrington Alluvium pH Trend – March 2019

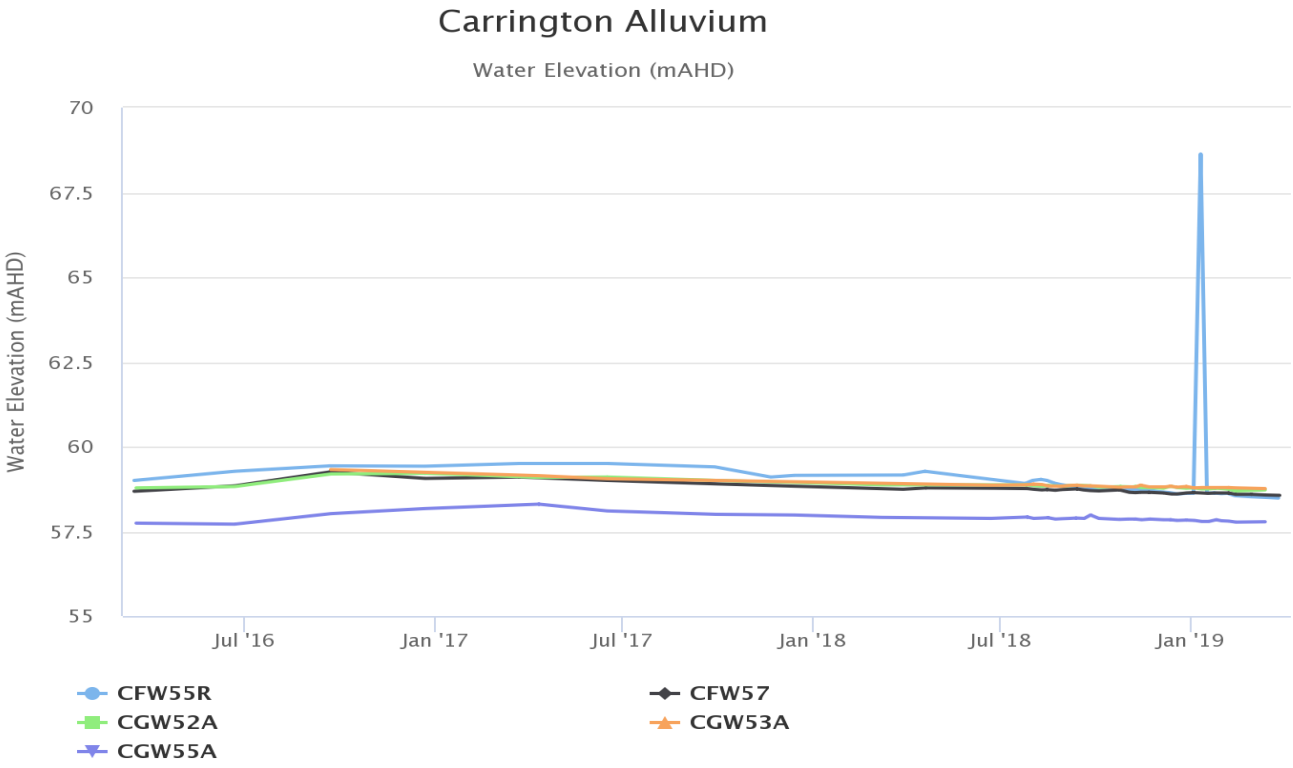

Figure 25: Carrington Alluvium Standing Water Level – March 2019

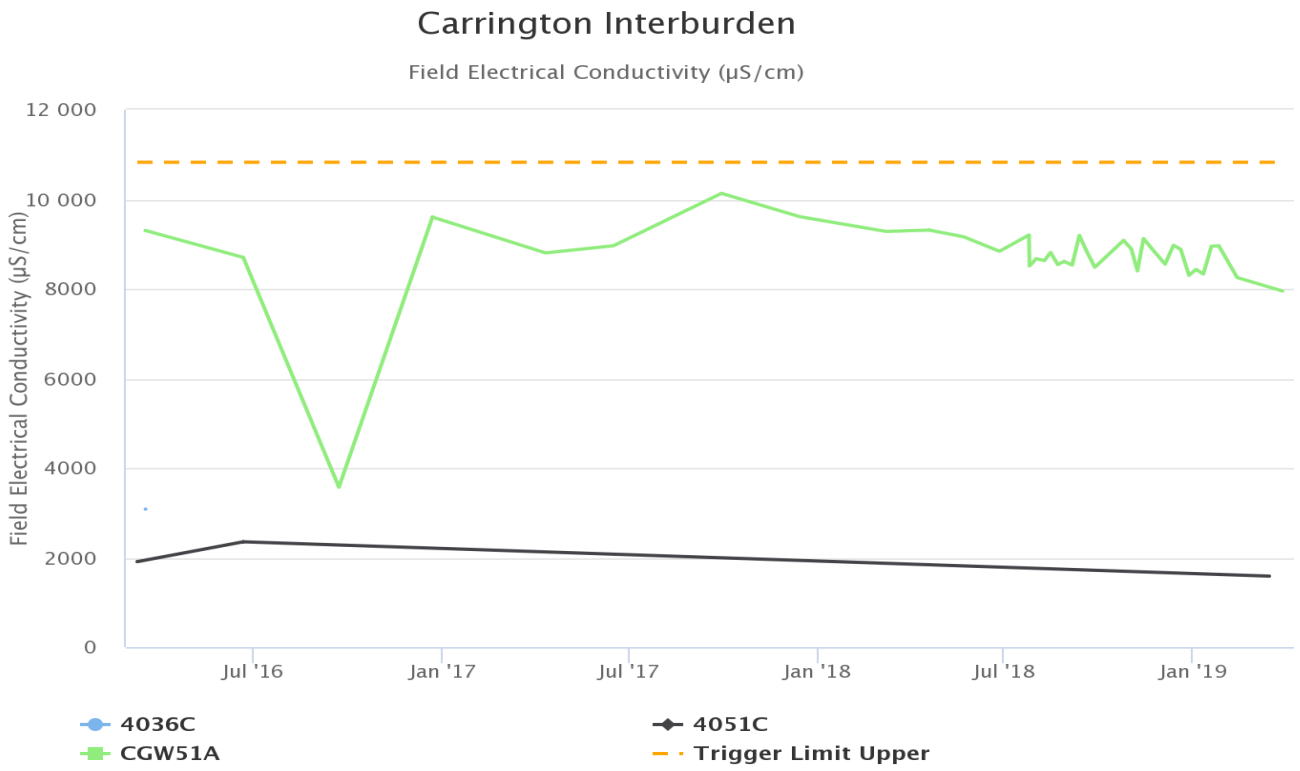

Figure 26: Carrington Interburden Electrical Conductivity Trend – March 2019

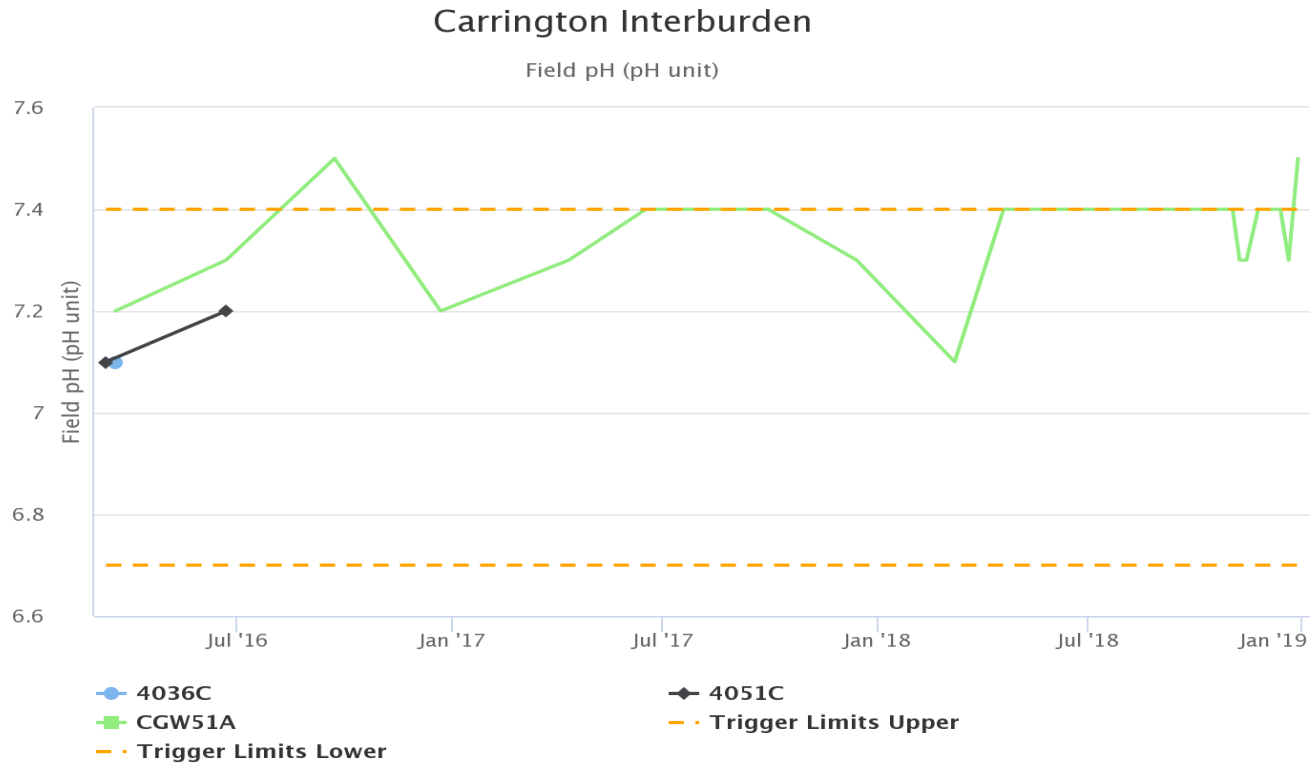

Figure 27: Carrington Interburden pH Trend – March 2019

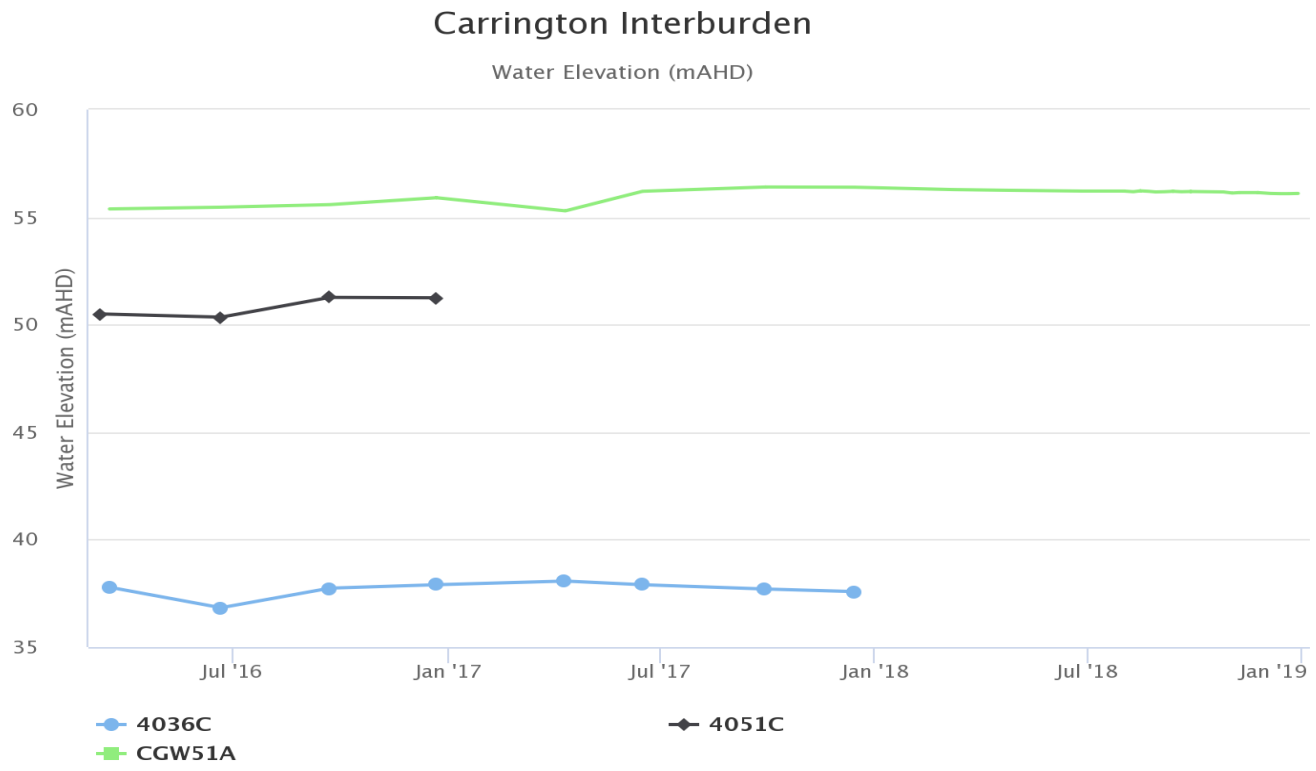

Figure 28: Carrington Interburden Standing Water Level – March 2019

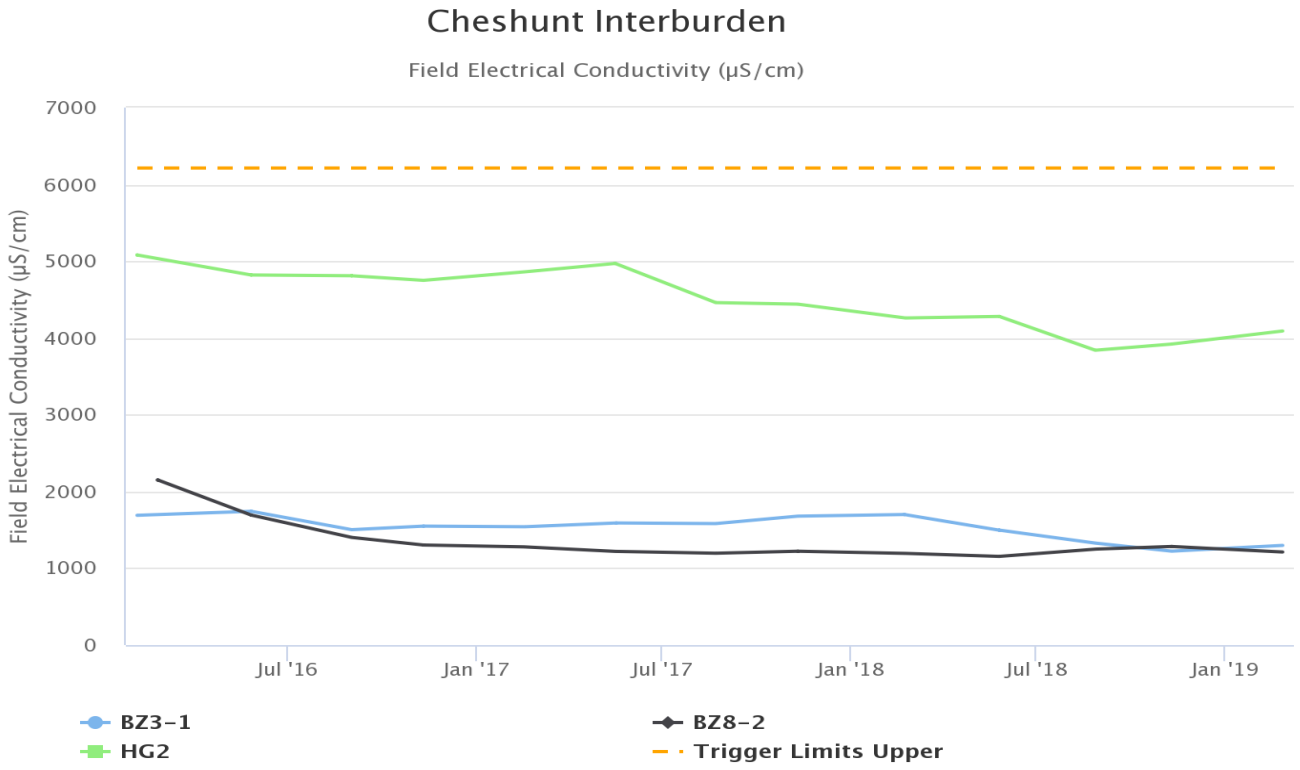

Figure 29: Cheshunt Interburden Electrical Conductivity Trend – March 2019

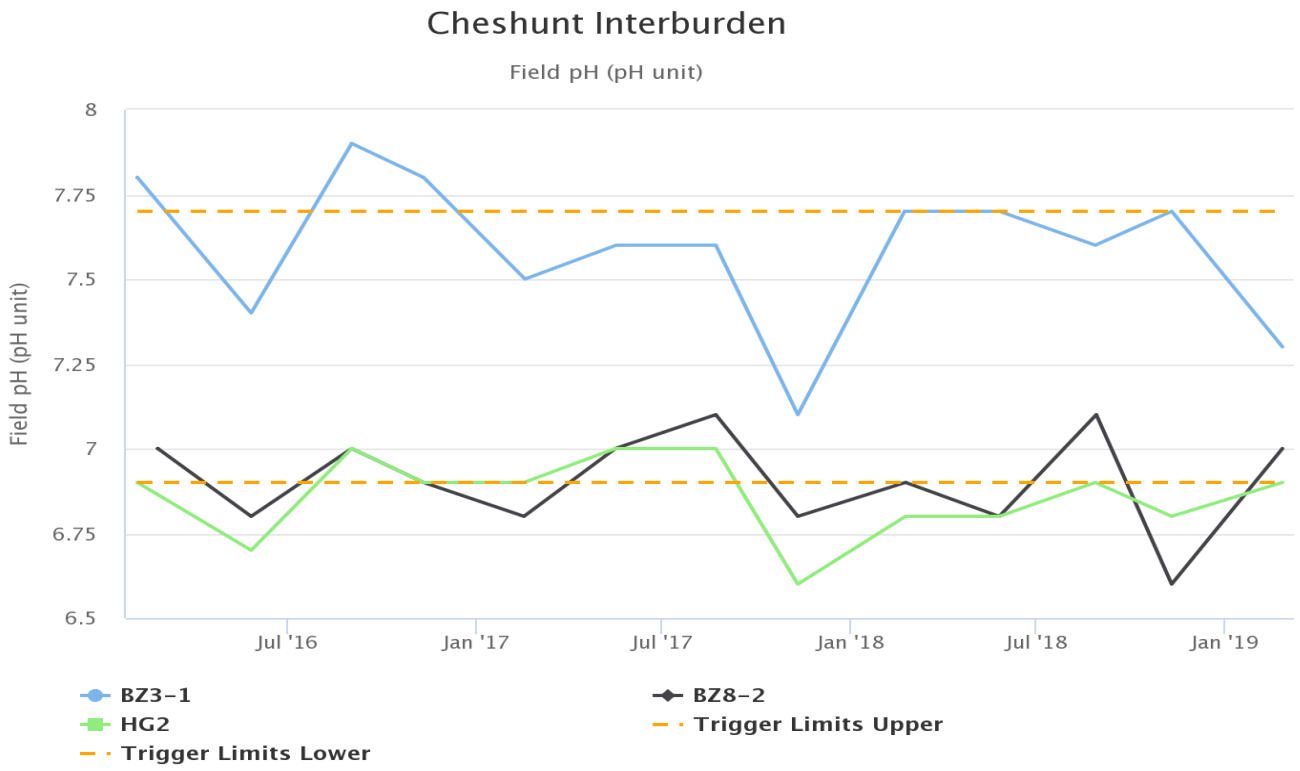

Figure 30: Cheshunt Interburden pH Trend – March 2019

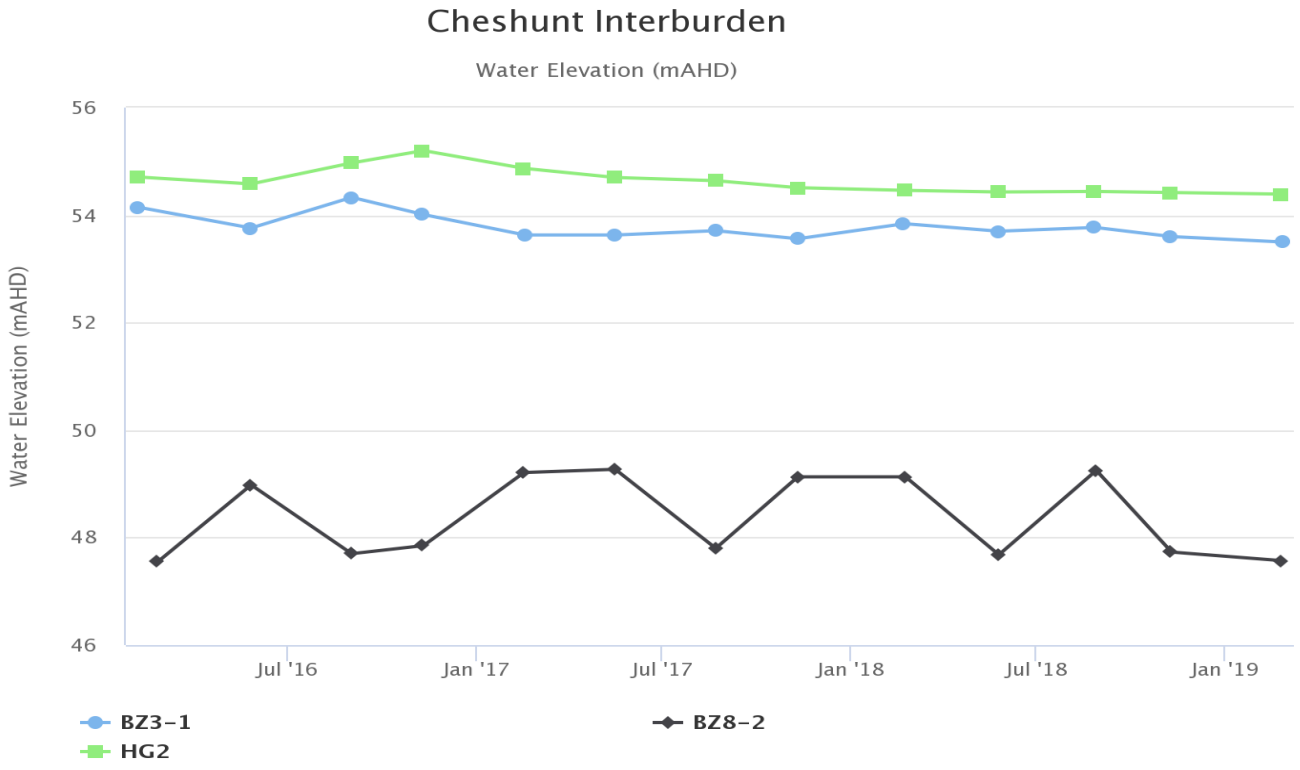

Figure 31: Cheshunt Interburden Standing Water Level – March 2019

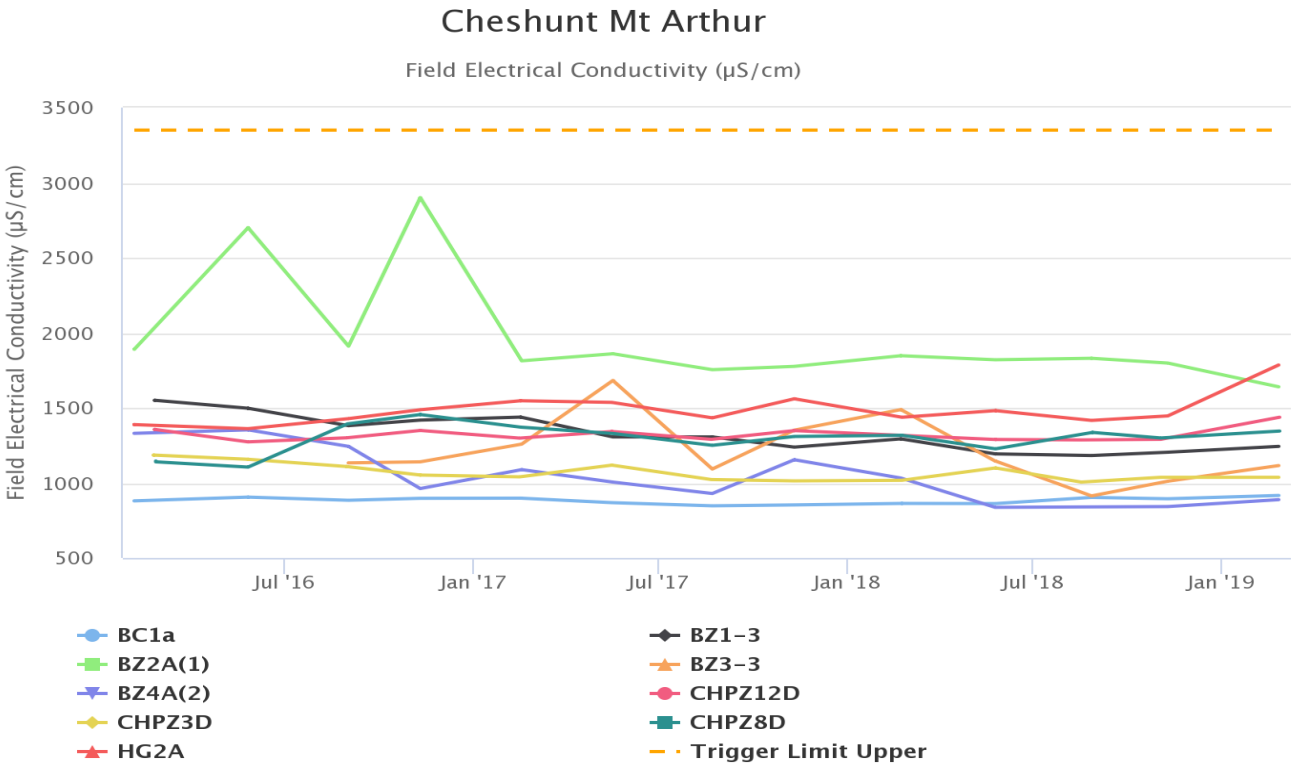

Figure 32: Cheshunt Mt Arthur Electrical Conductivity Trend – March 2019

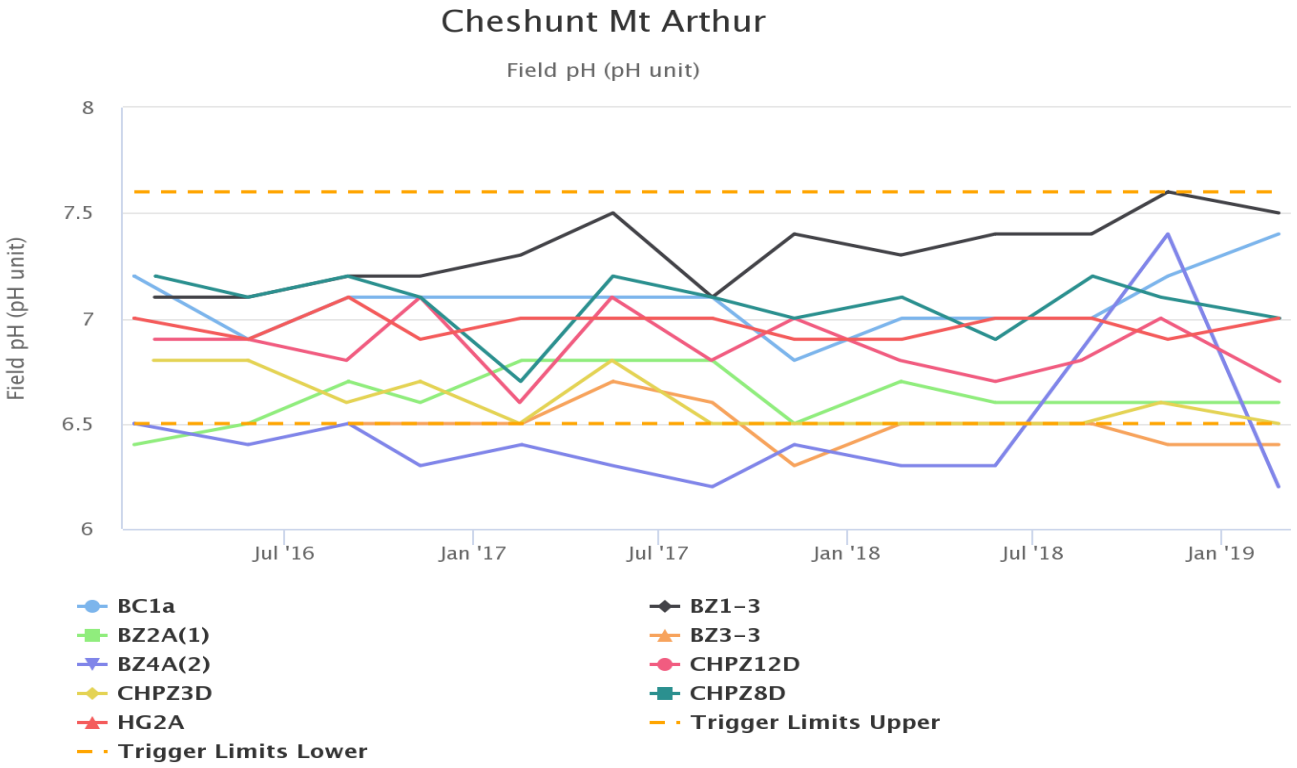

Figure 33: Cheshunt Mt Arthur pH Trend – March 2019

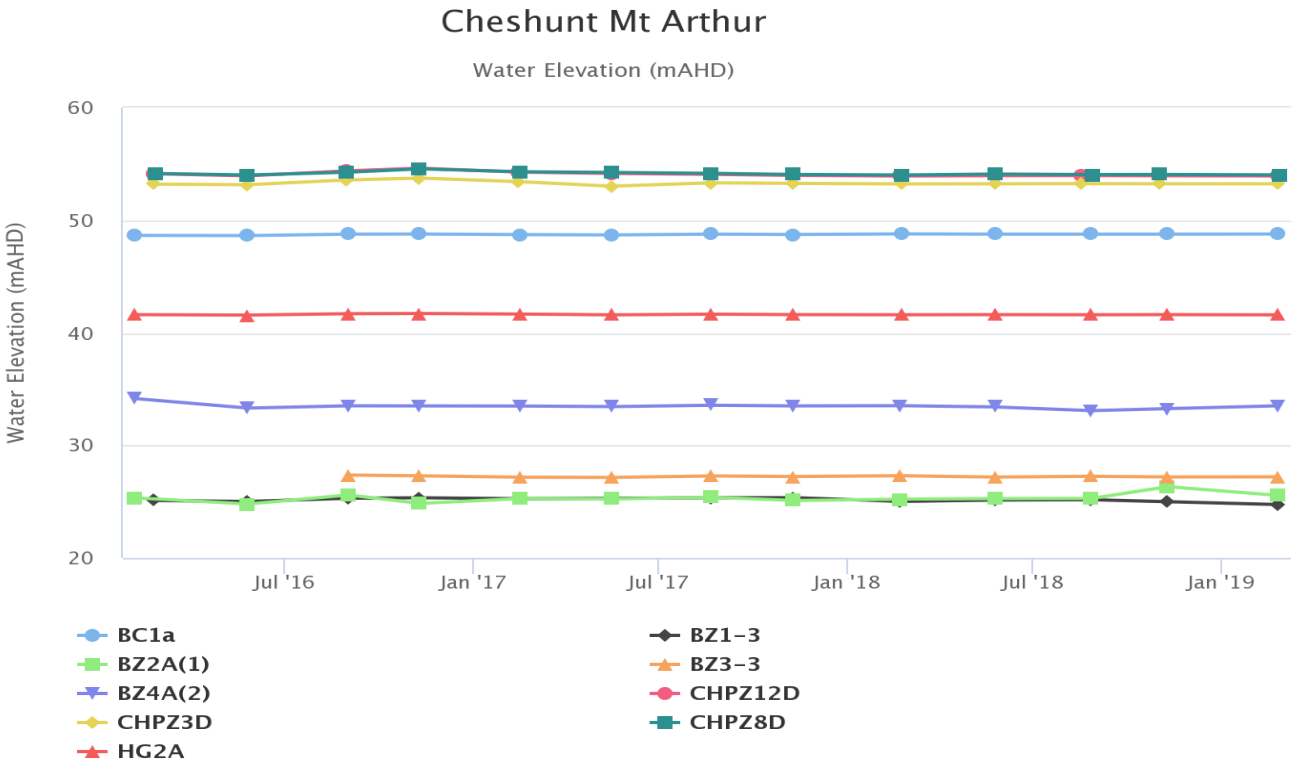

Figure 34: Cheshunt Mt Arthur Standing Water Level – March 2019

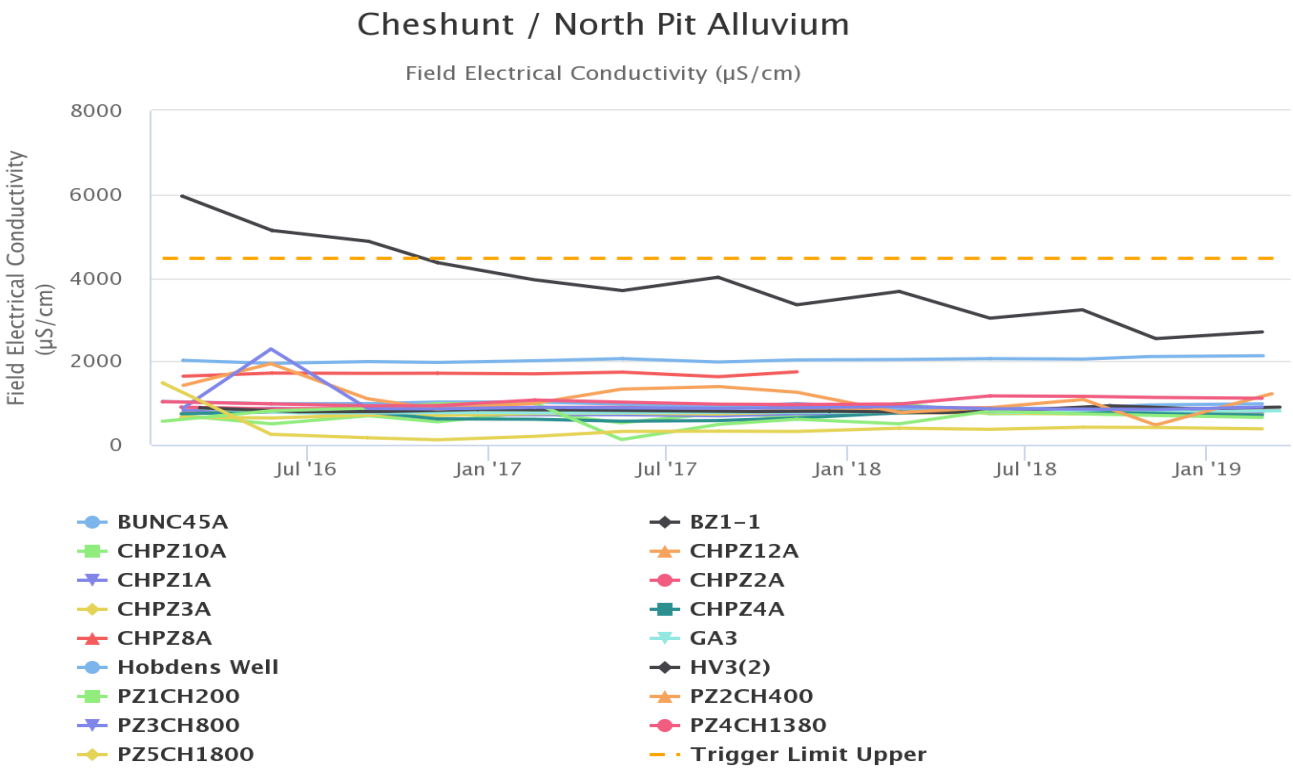

Figure 35: Cheshunt / North Pit Alluvium Electrical Conductivity Trend – March 2019

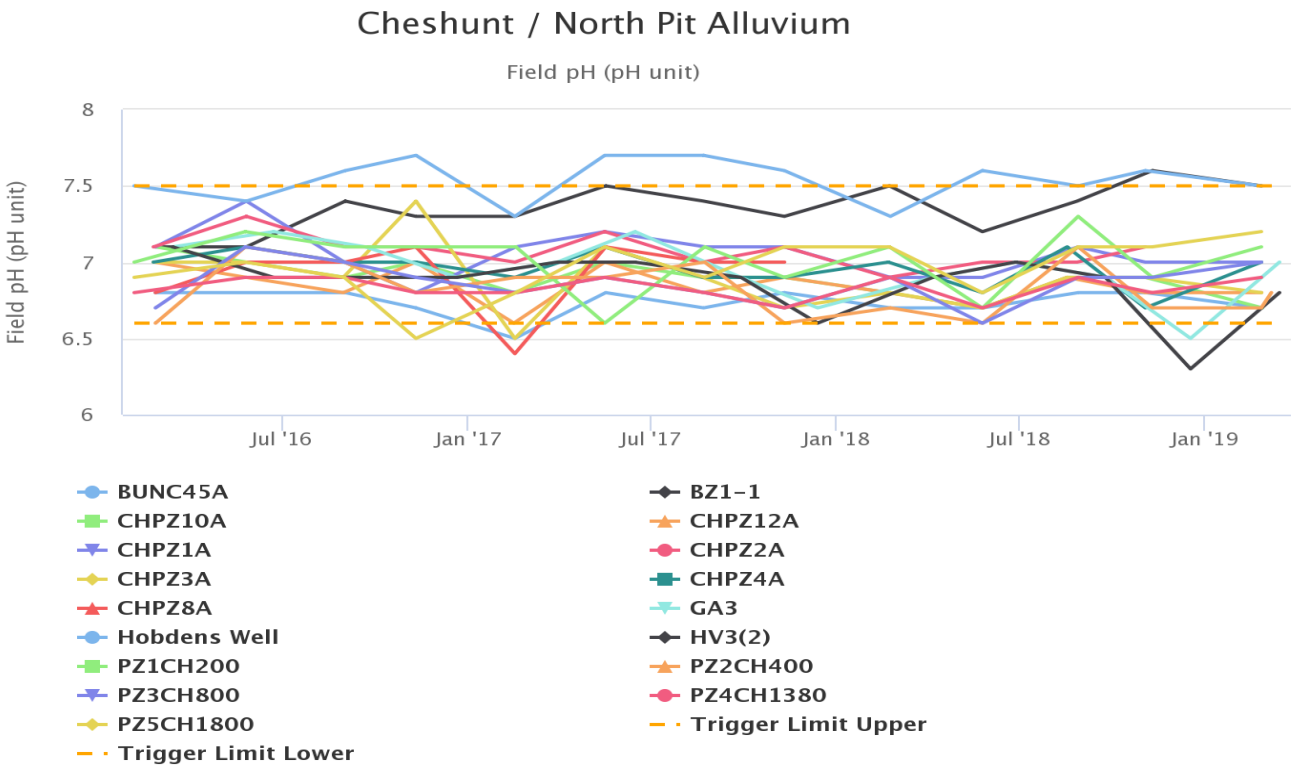

Figure 36: Cheshunt / North Pit Alluvium pH Trend – March 2019

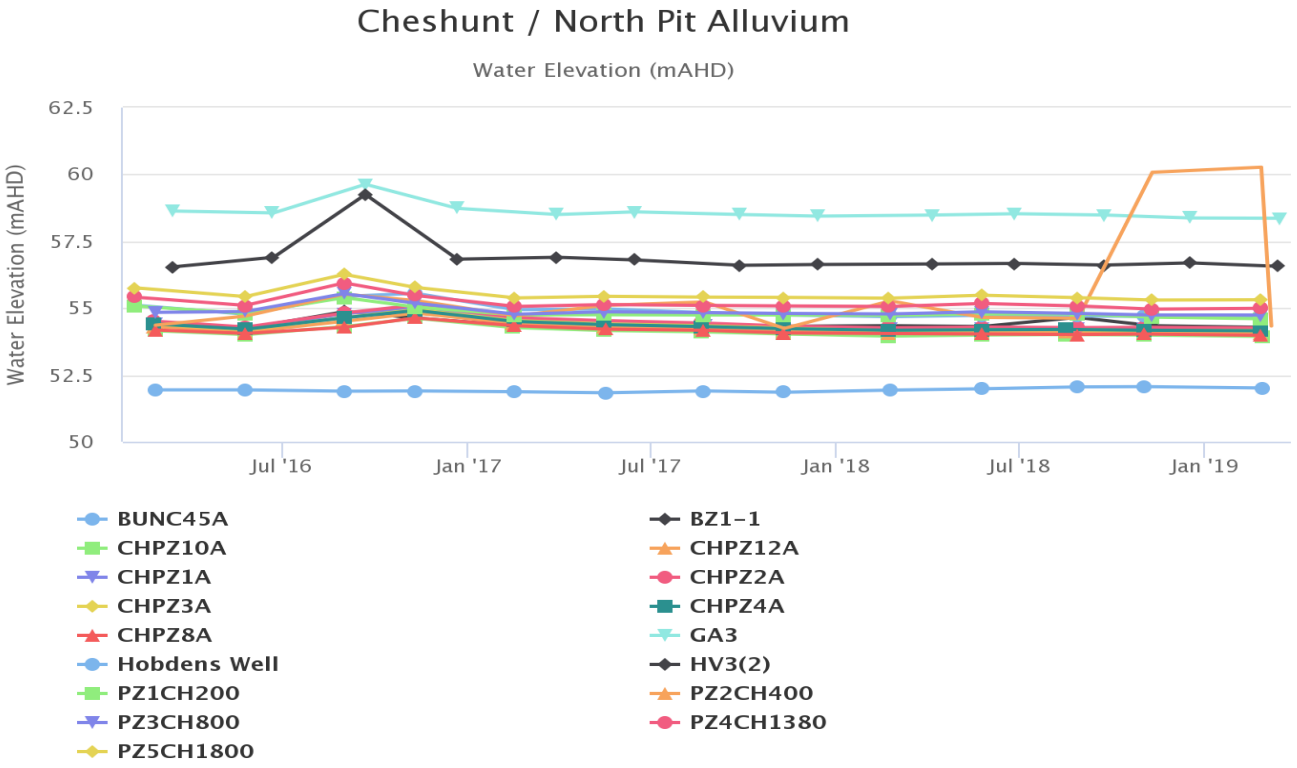

Figure 37: Cheshunt / North Pit Alluvium Standing Water Level – March 2019

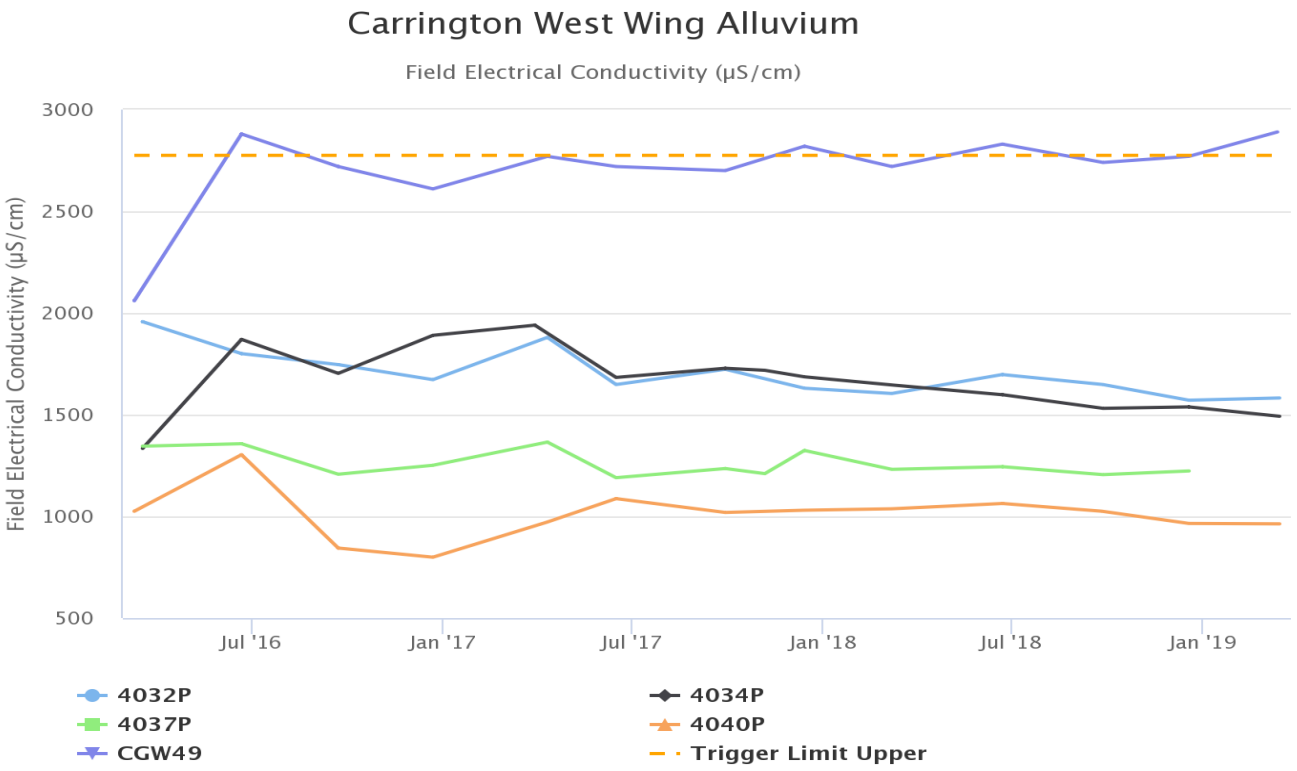

Figure 38: Carrington West Wing Alluvium Electrical Conductivity Trend – March 2019

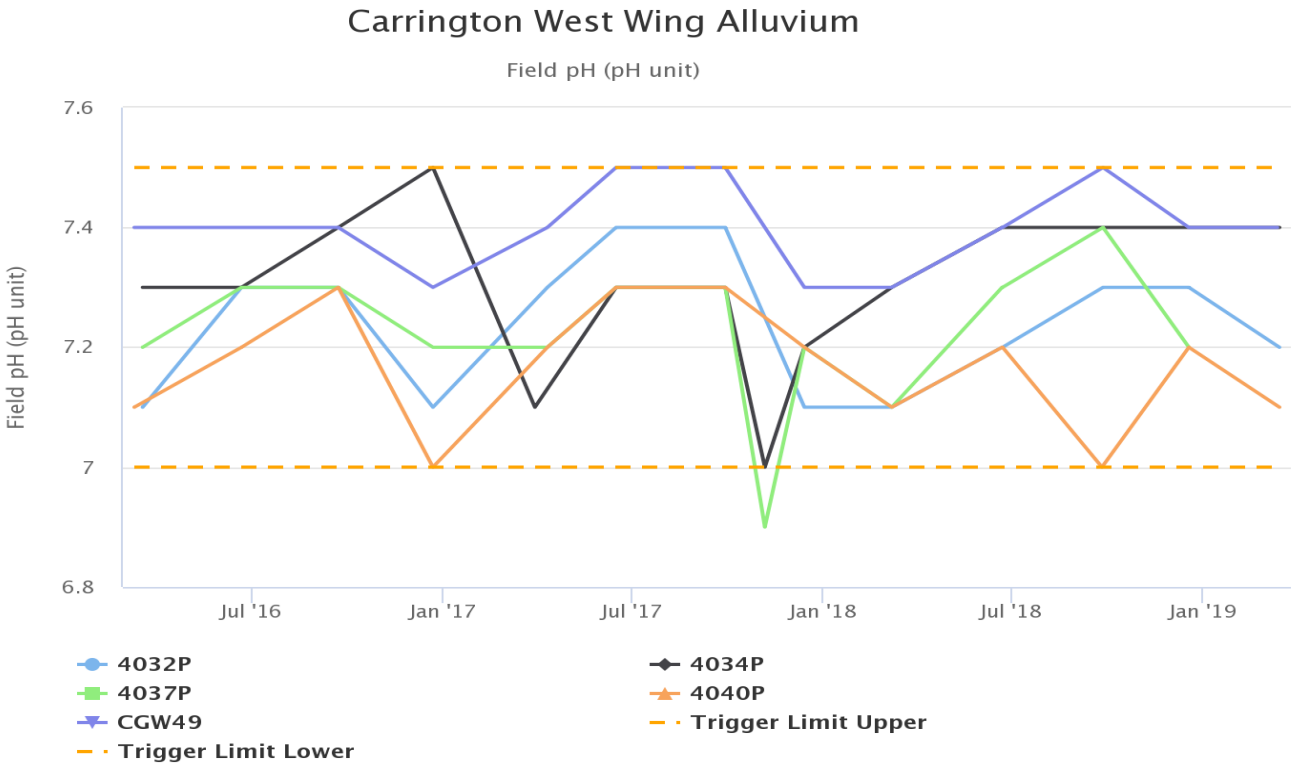

Figure 39: Carrington West Wing Alluvium pH Trend – March 2019

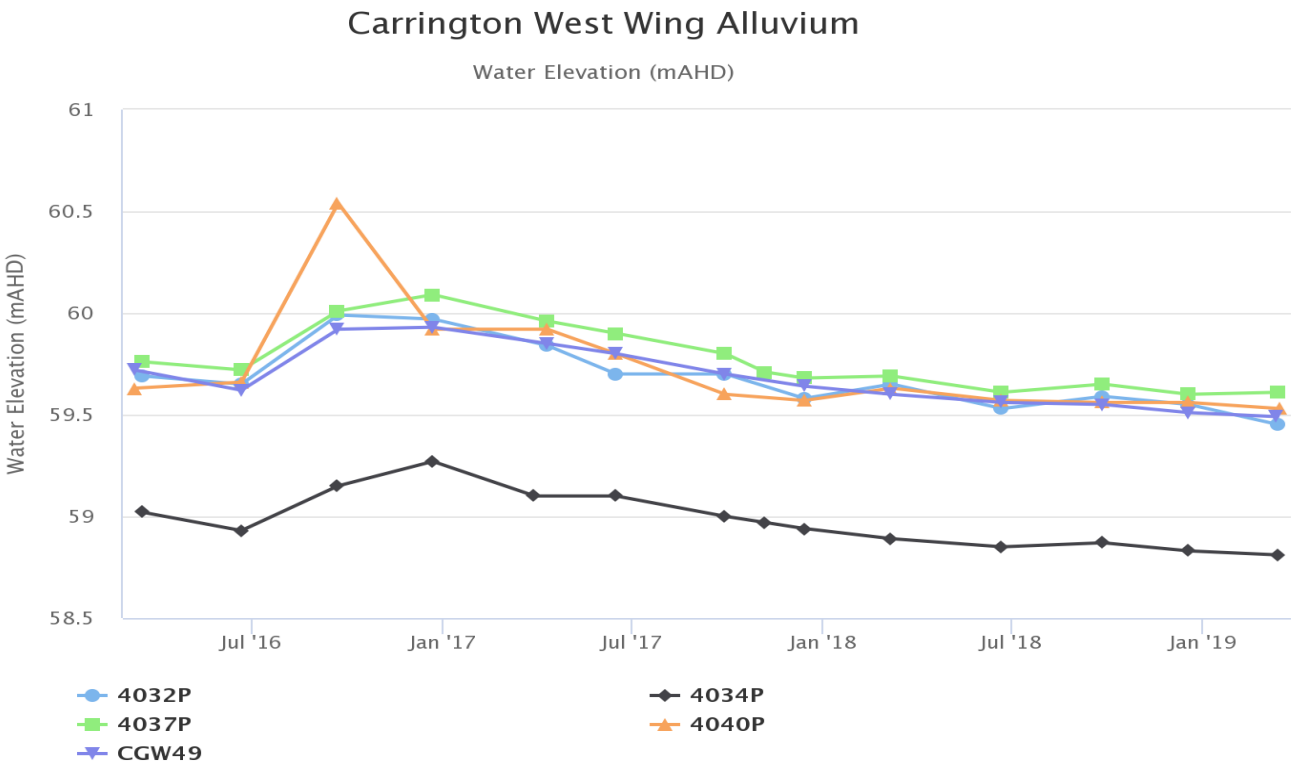

Figure 40: Carrington West Wing Alluvium Standing Water Level – March 2019

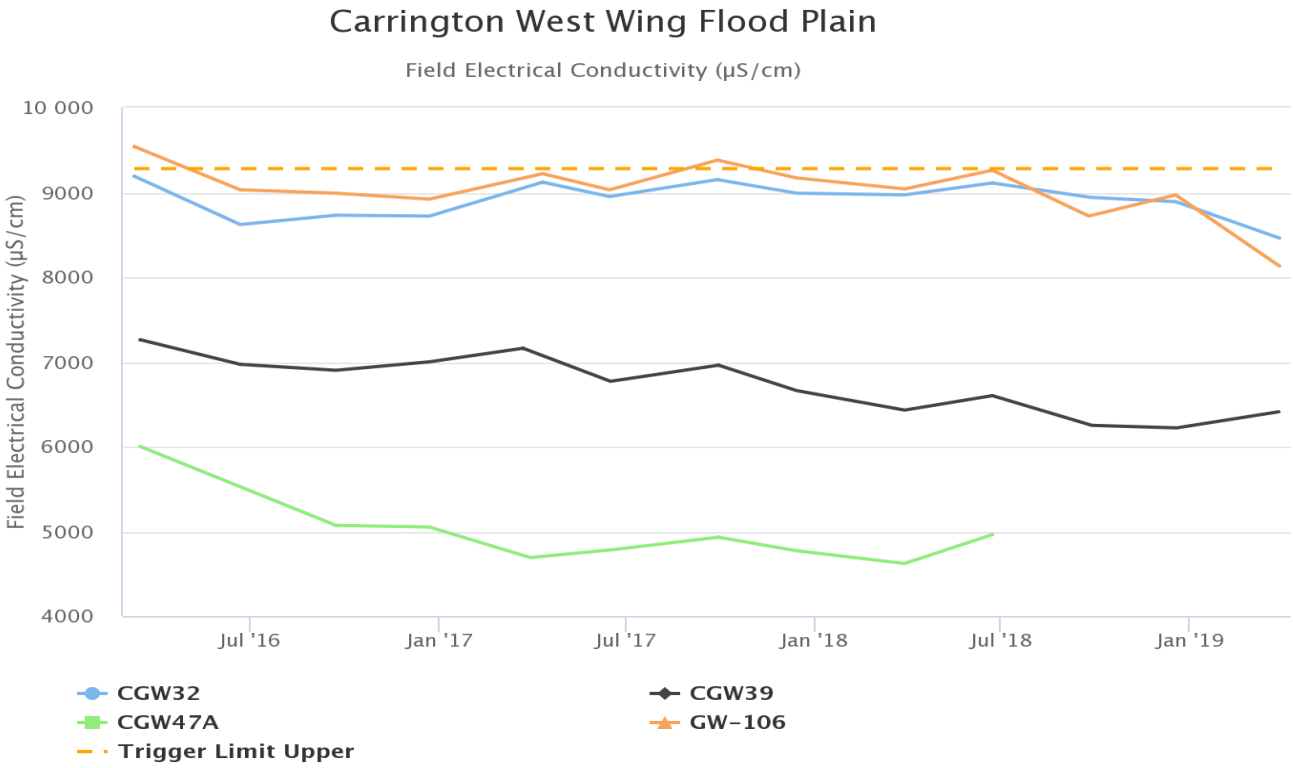

Figure 41: Carrington West Wing Flood Plain Electrical Conductivity Trend – March 2019

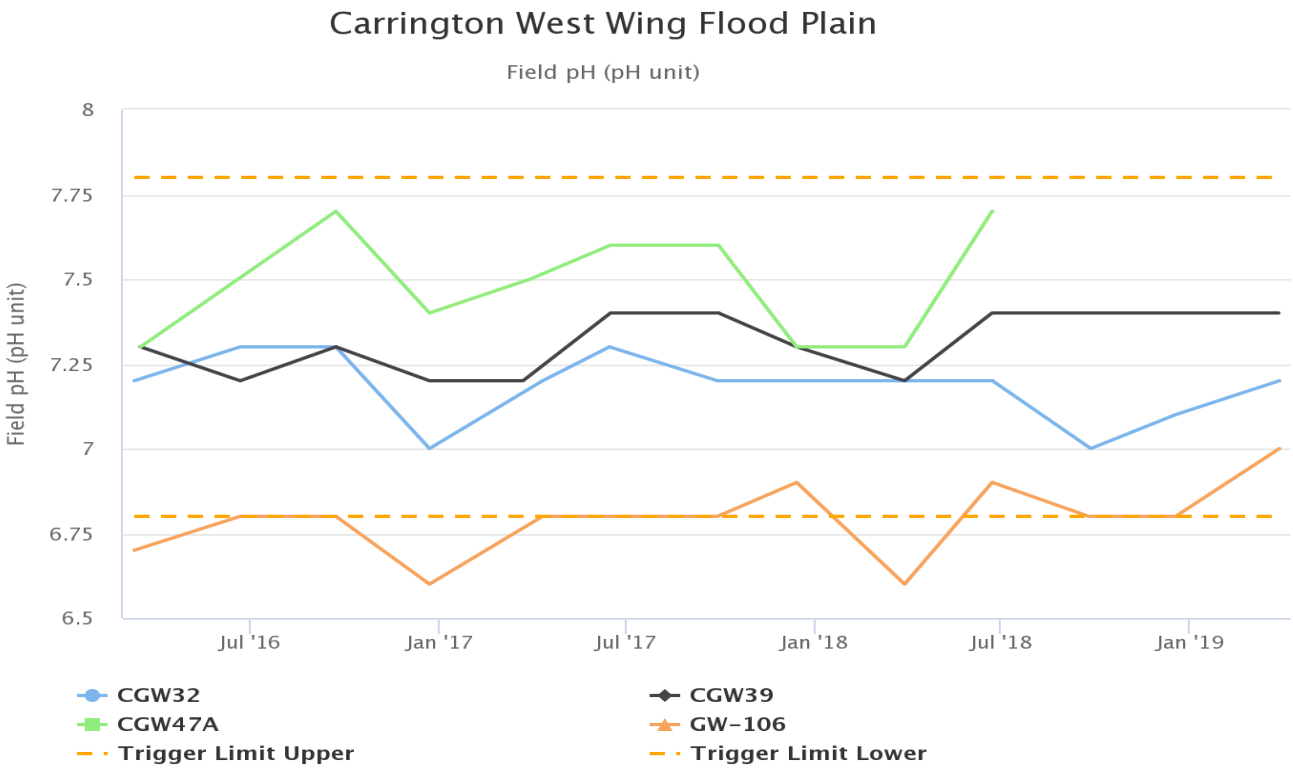

Figure 42: Carrington West Wing Flood Plain pH Trend – March 2019

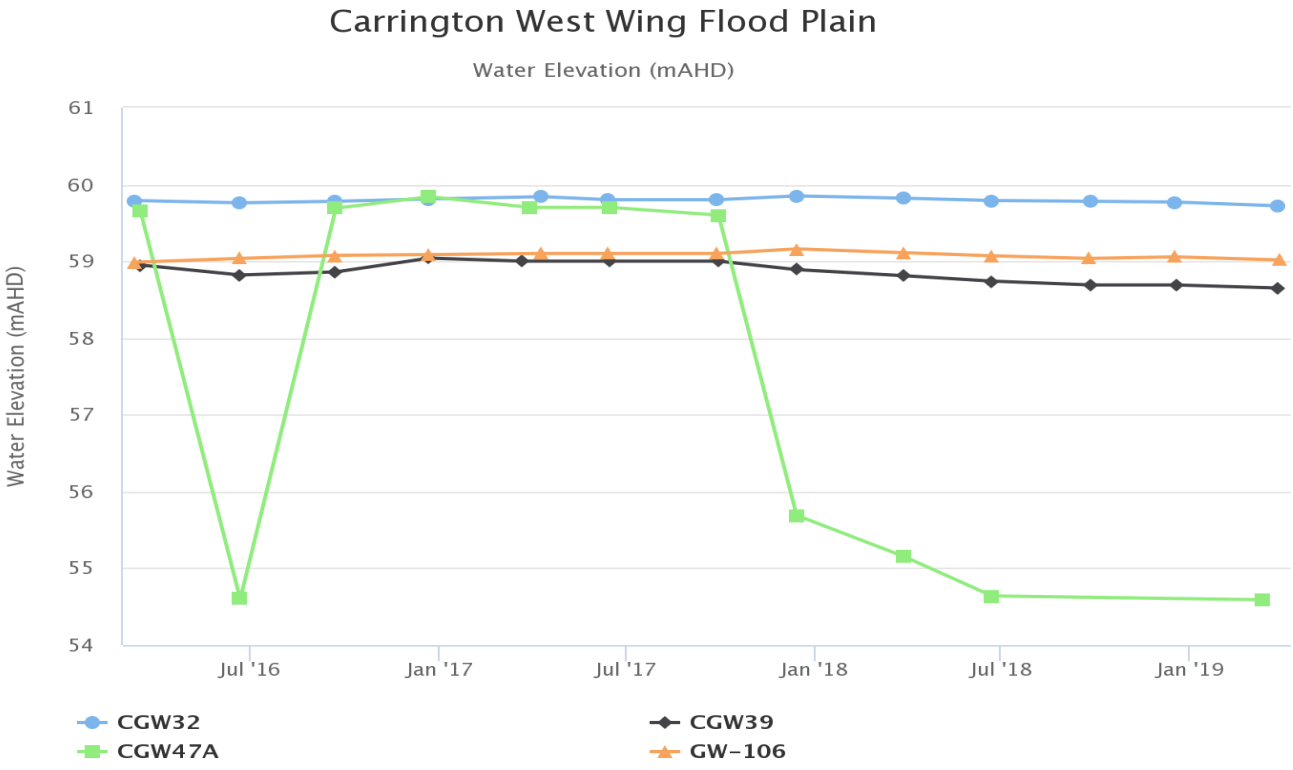

Figure 43: Carrington West Wing Flood Plain Standing Water Level – March 2019

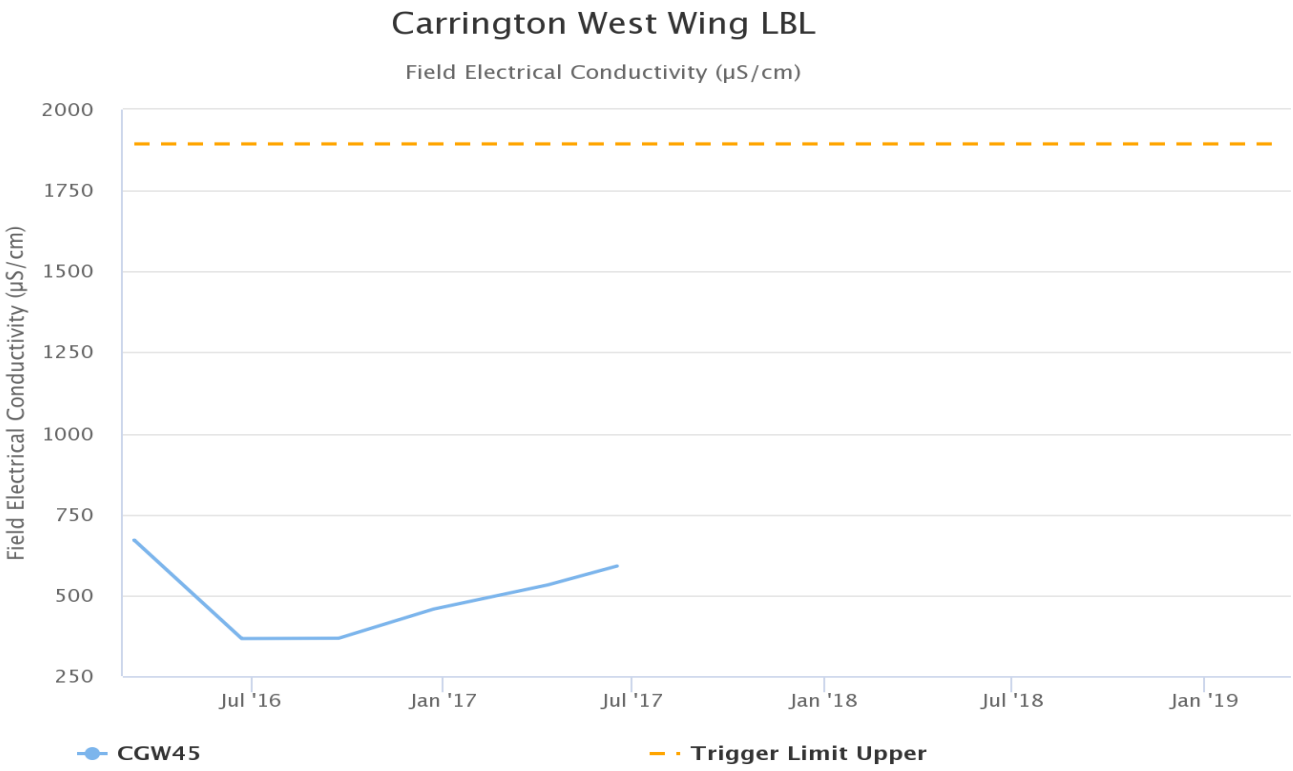

Figure 44: Carrington West Wing LBL Electrical Conductivity Trend – March 2019

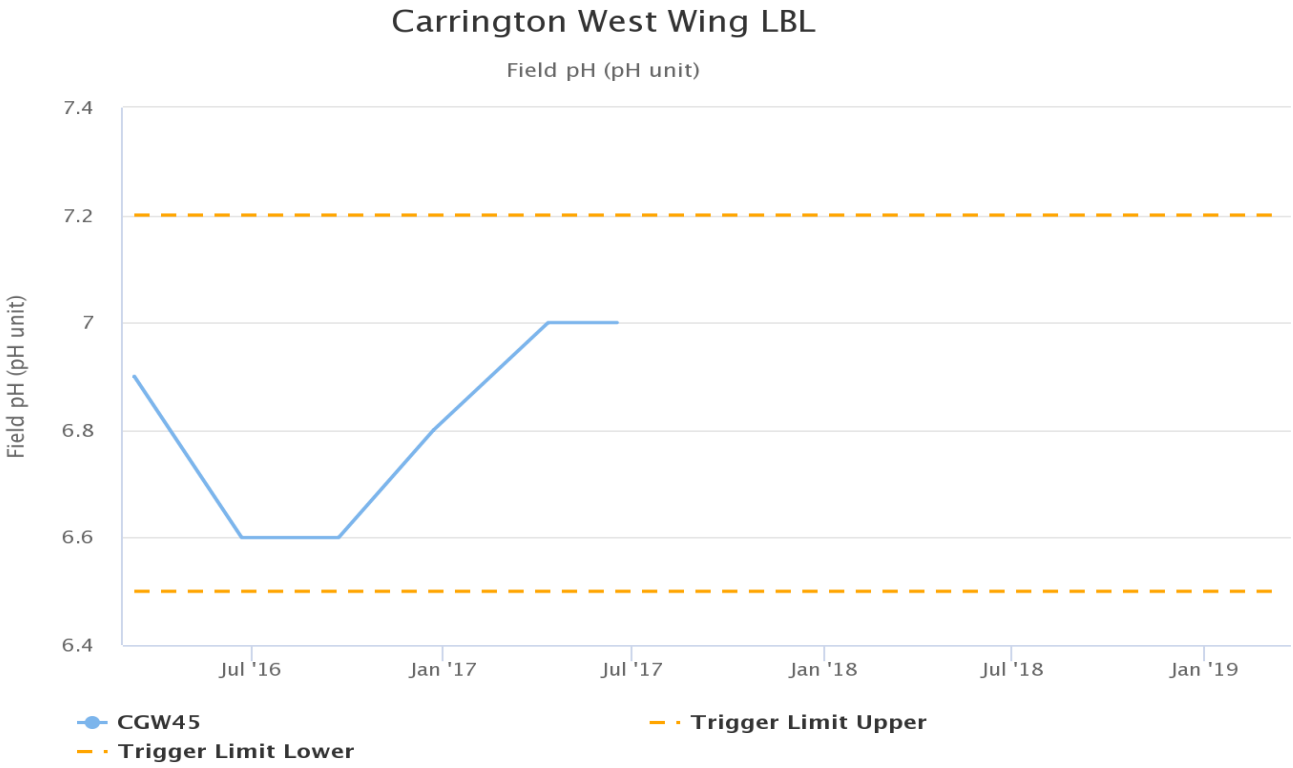

Figure 45: Carrington West Wing LBL pH Trend – March 2019

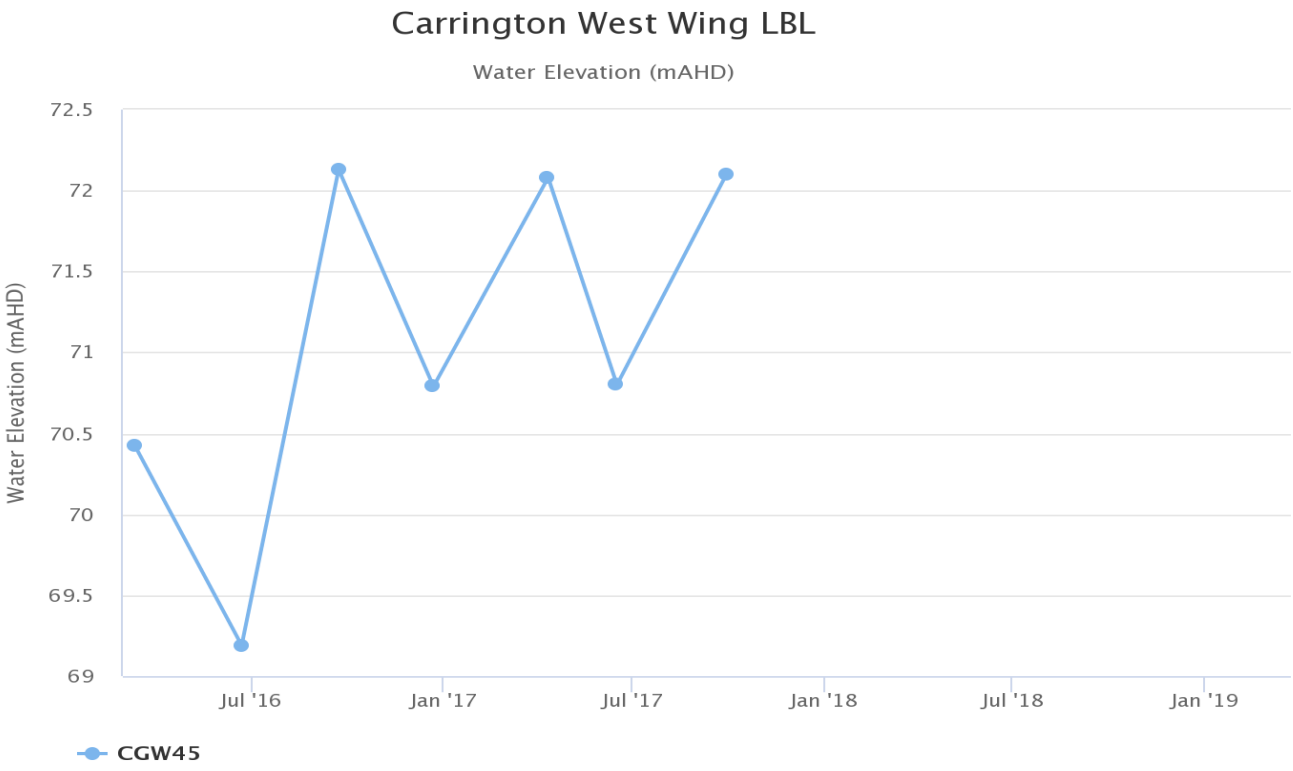

Figure 46: Carrington West Wing LBL Standing Water Level – March 2019

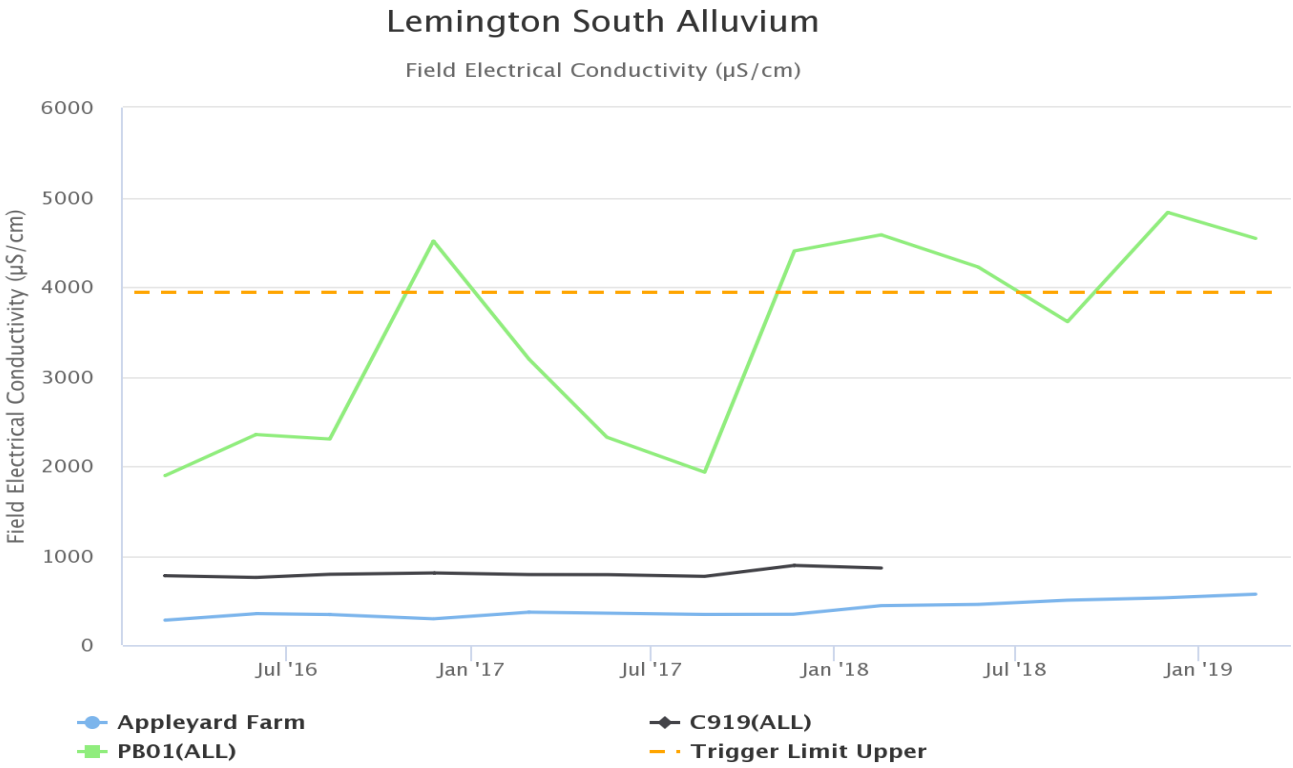

Figure 47: Lemington South Alluvium Electrical Conductivity Trend – March 2019

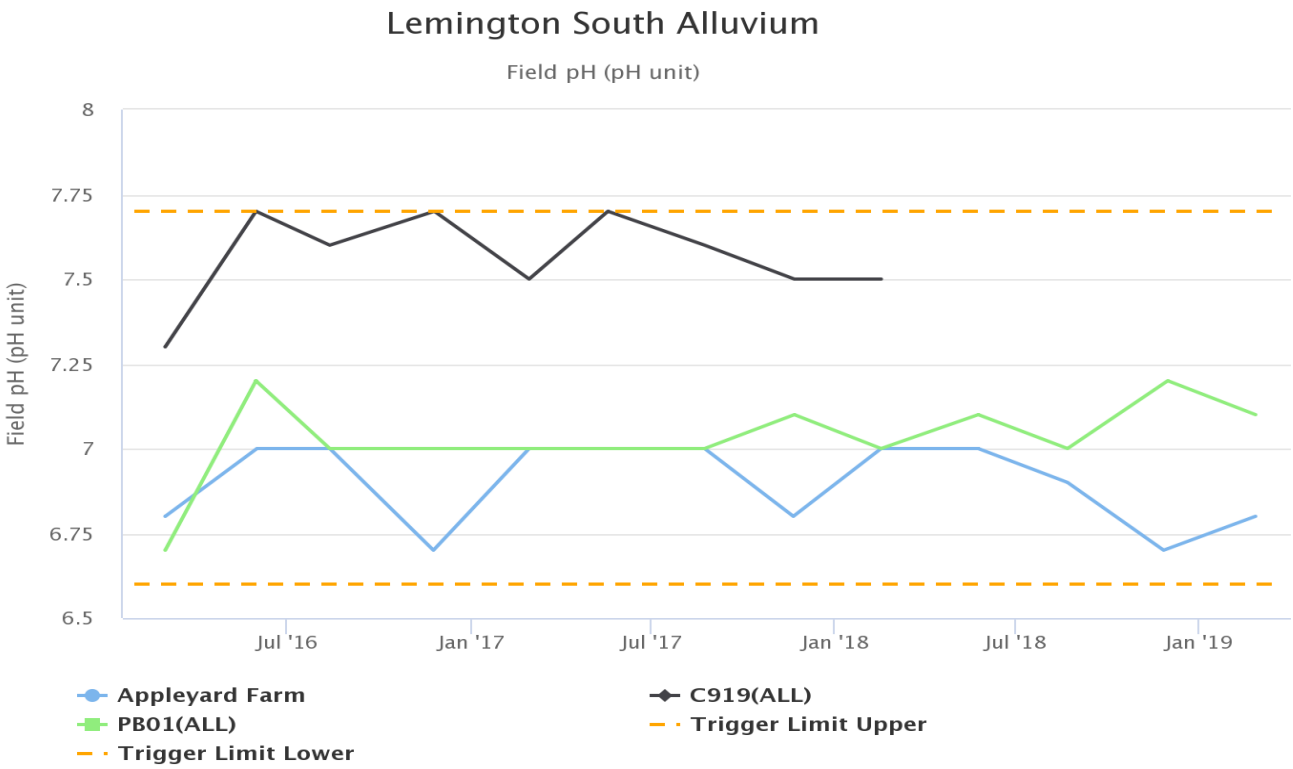

Figure 48: Lemington South Alluvium pH Trend – March 2019

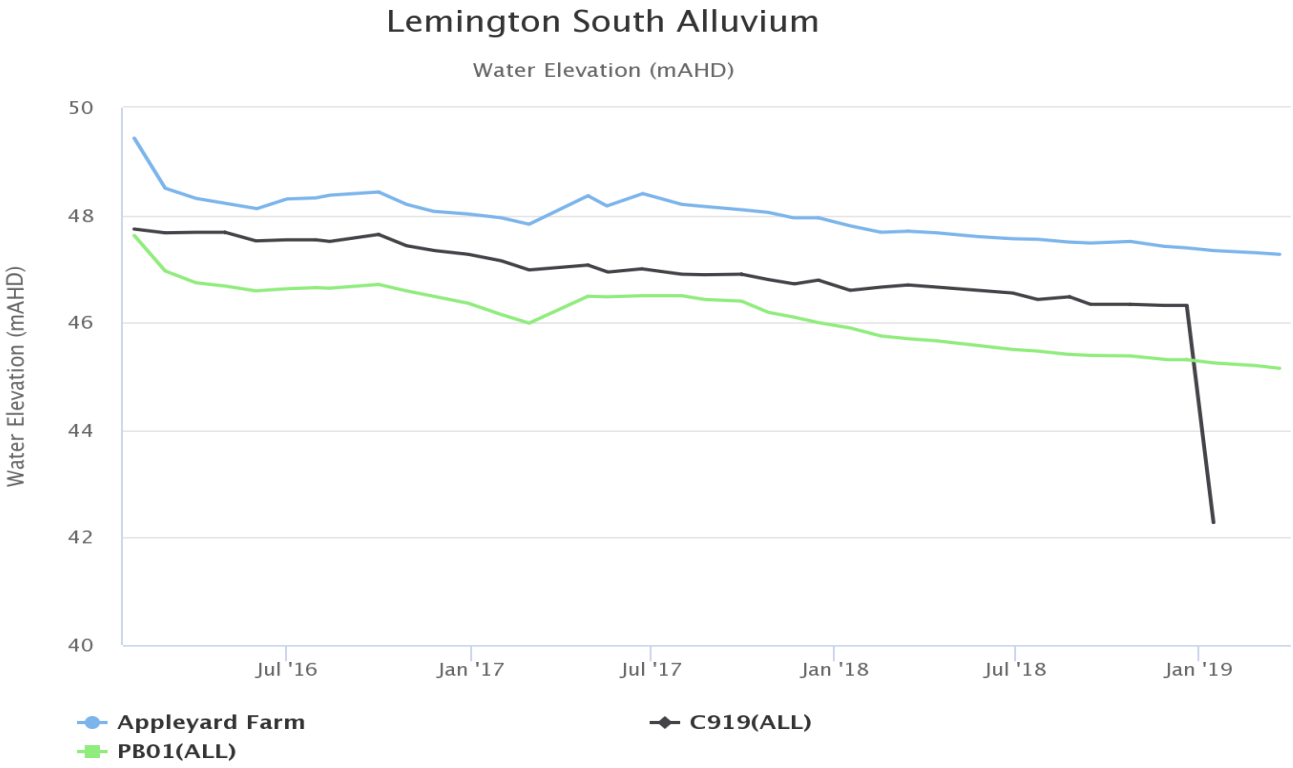

Figure 49: Lemington South Alluvium Standing Water Level Trend – March 2019

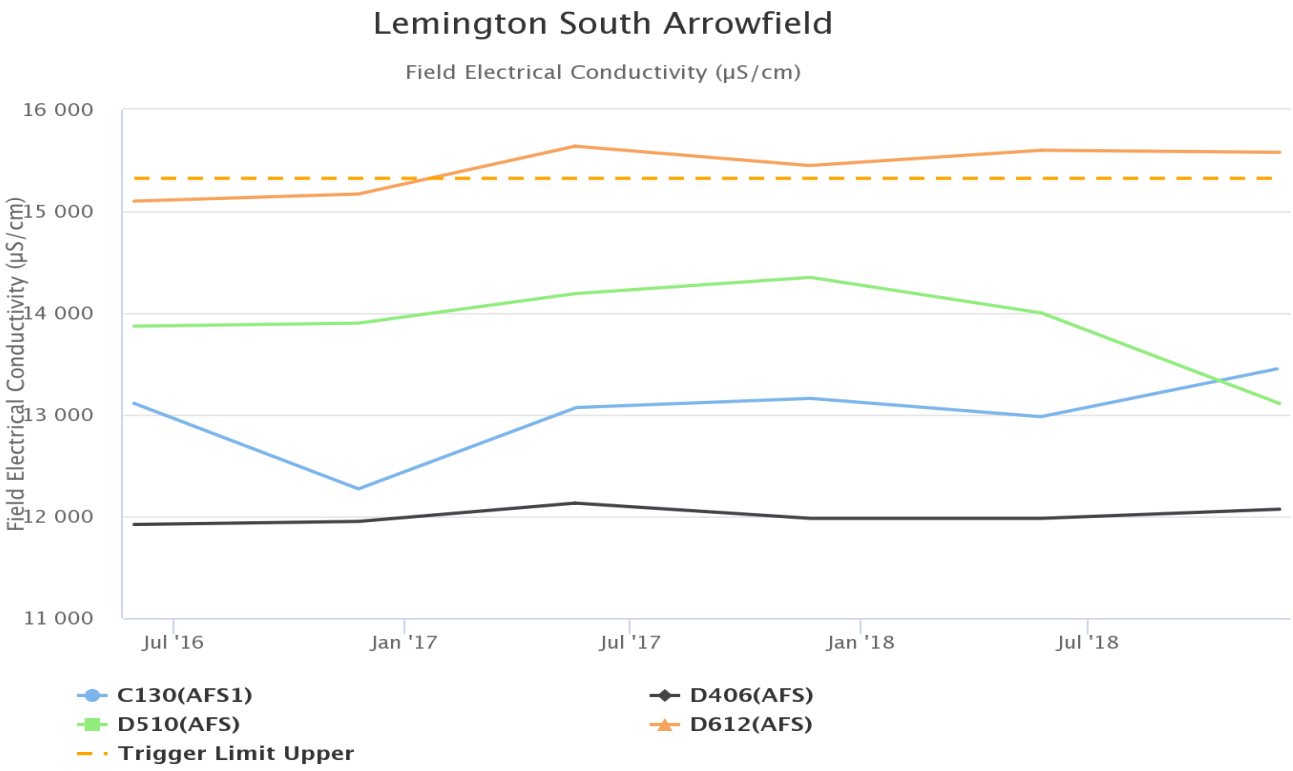

Figure 50: Lemington South Arrowfield Electrical Conductivity Trend – March 2019

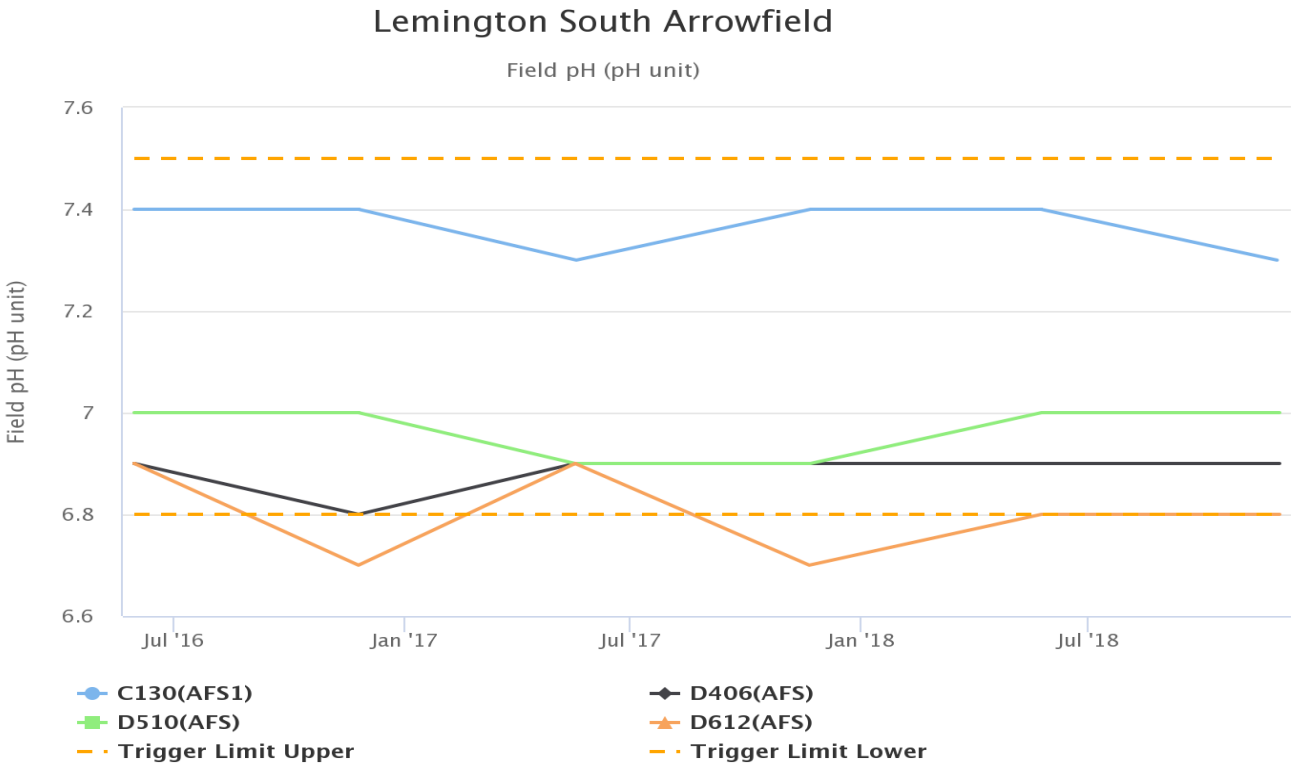

Figure 51: Lemington South Arrowfield pH Trend – March 2019

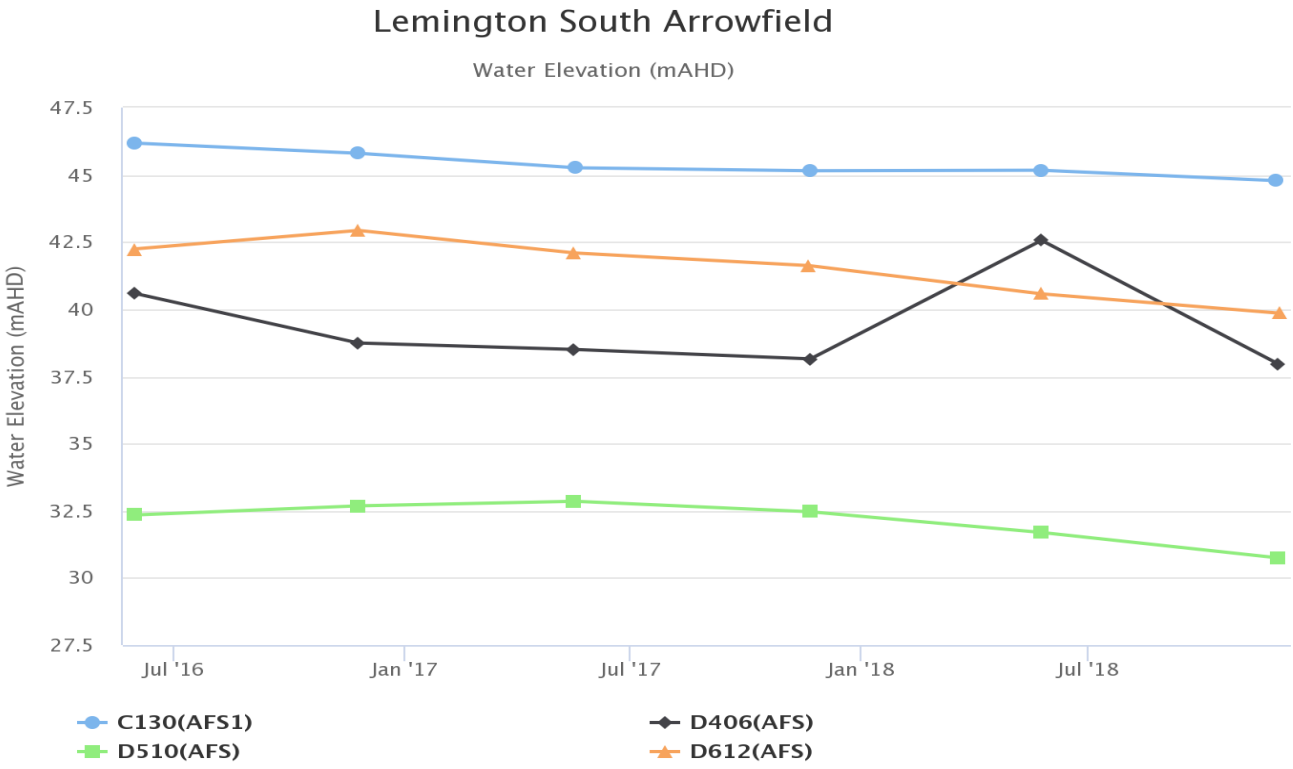

Figure 52: Lemington South Arrowfield Standing Water Level – March 2019

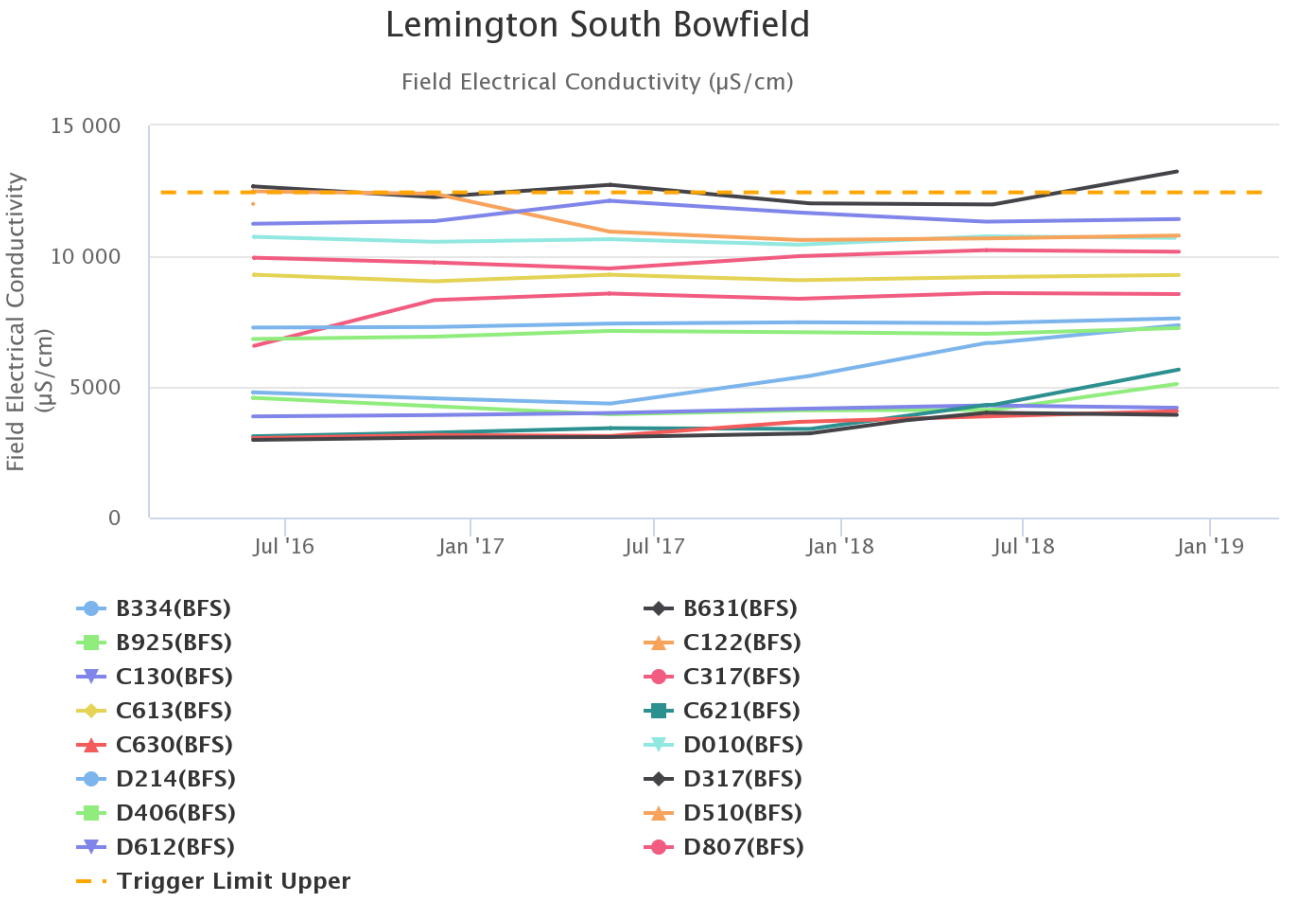

Figure 53: Lemington South Bowfield Electrical Conductivity Trend – March 2019

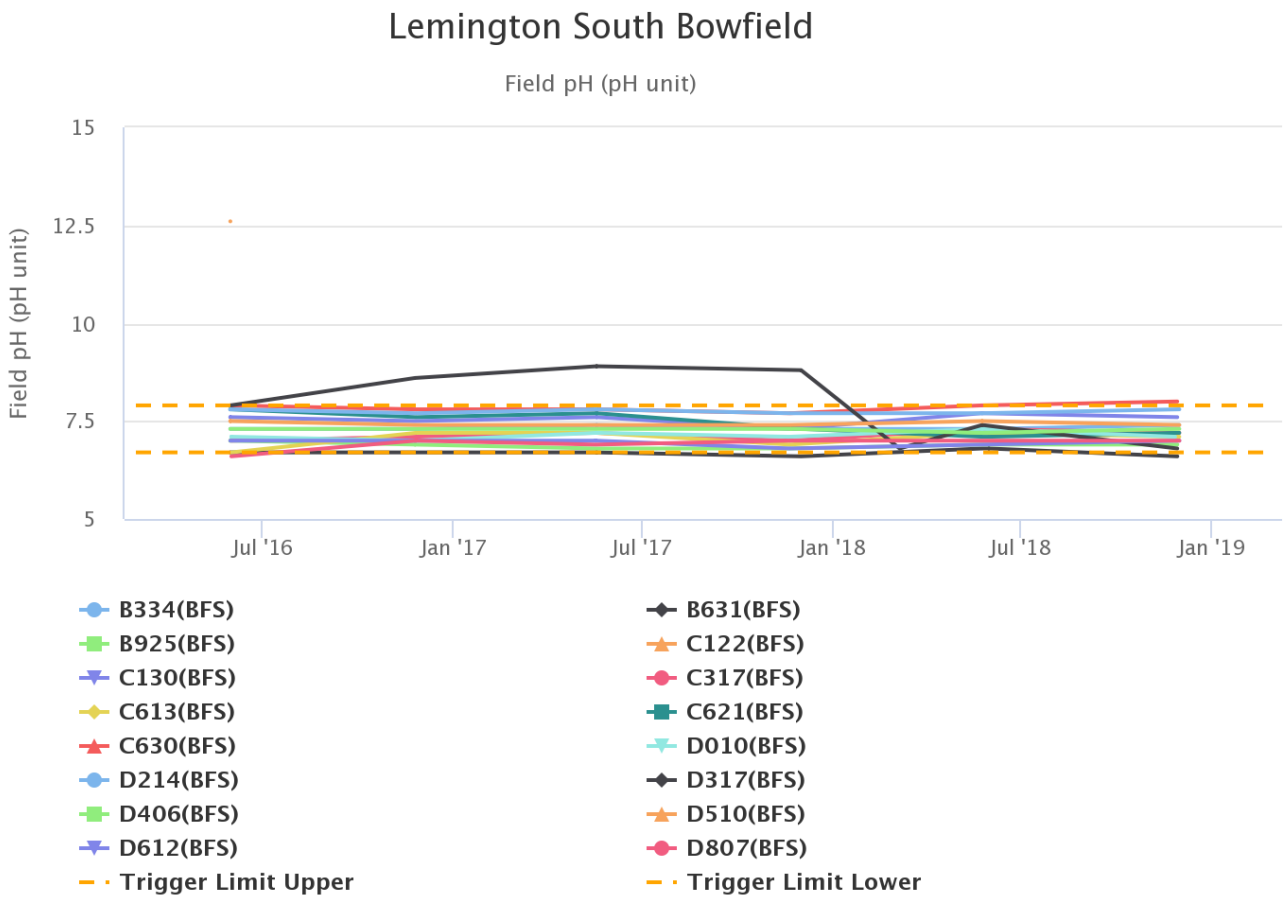

Figure 54: Lemington South Bowfield pH Trend – March 2019

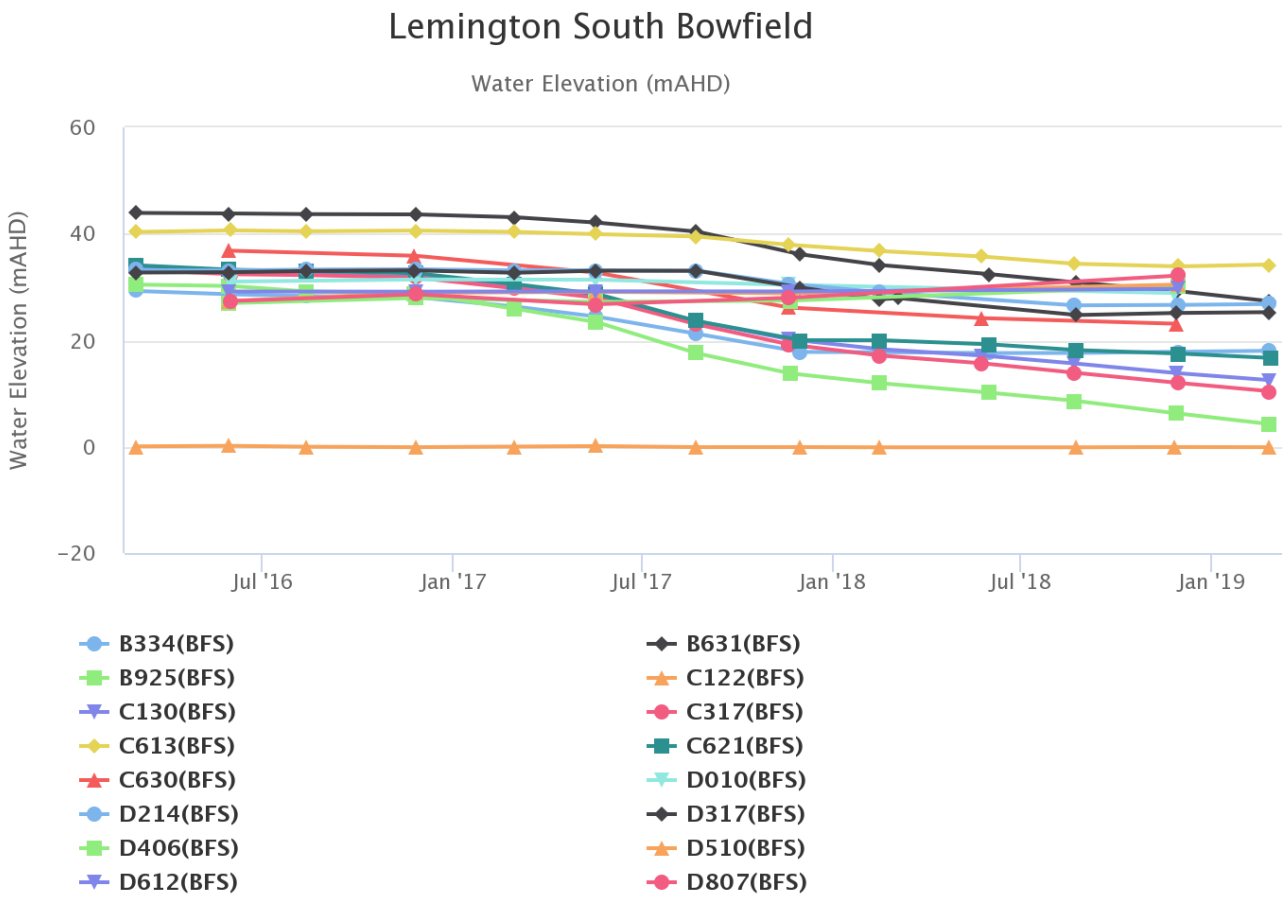

Figure 55: Lemington South Bowfield Standing Water Level – March 2019

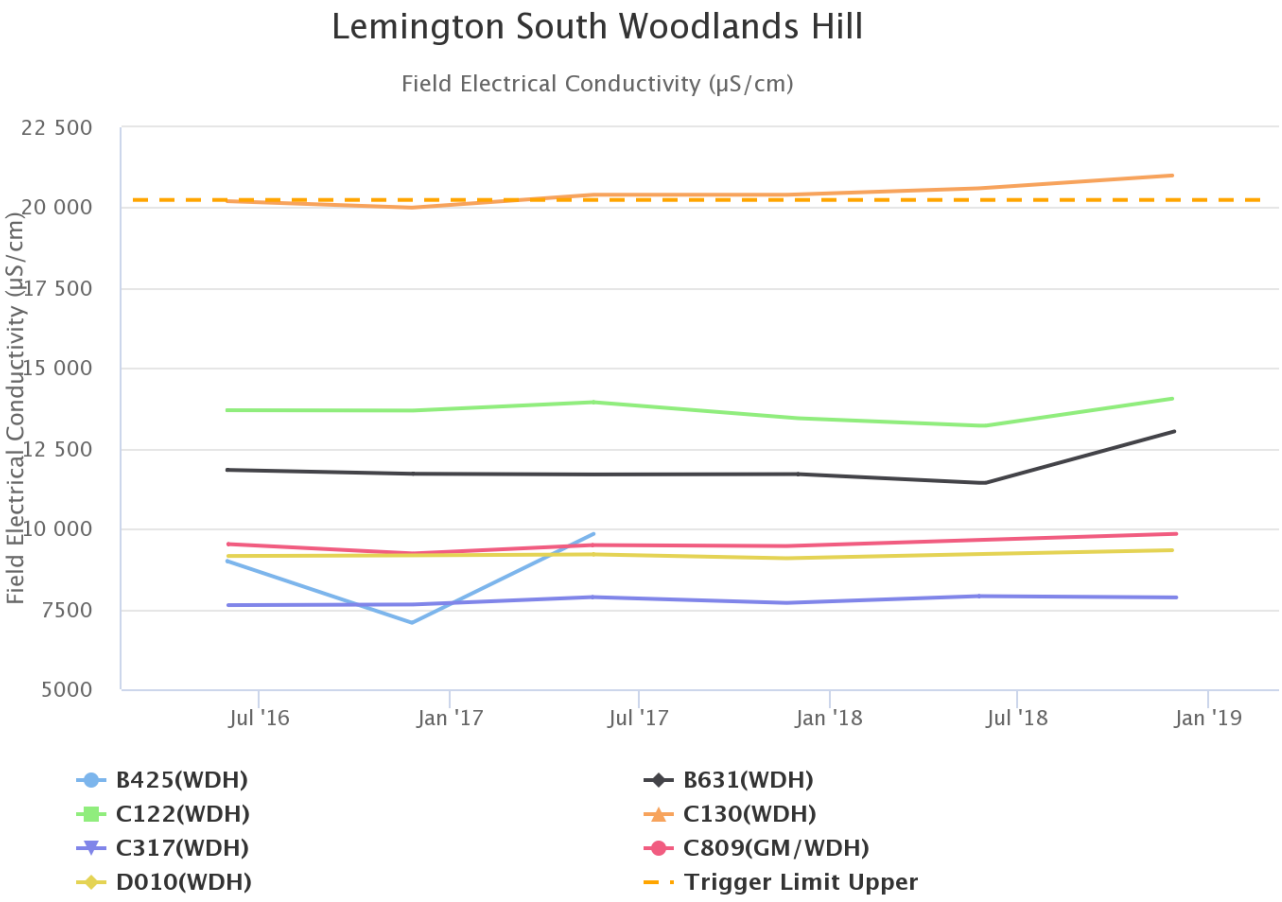

Figure 56: Lemington South Woodlands Hill Electrical Conductivity Trend – March 2019

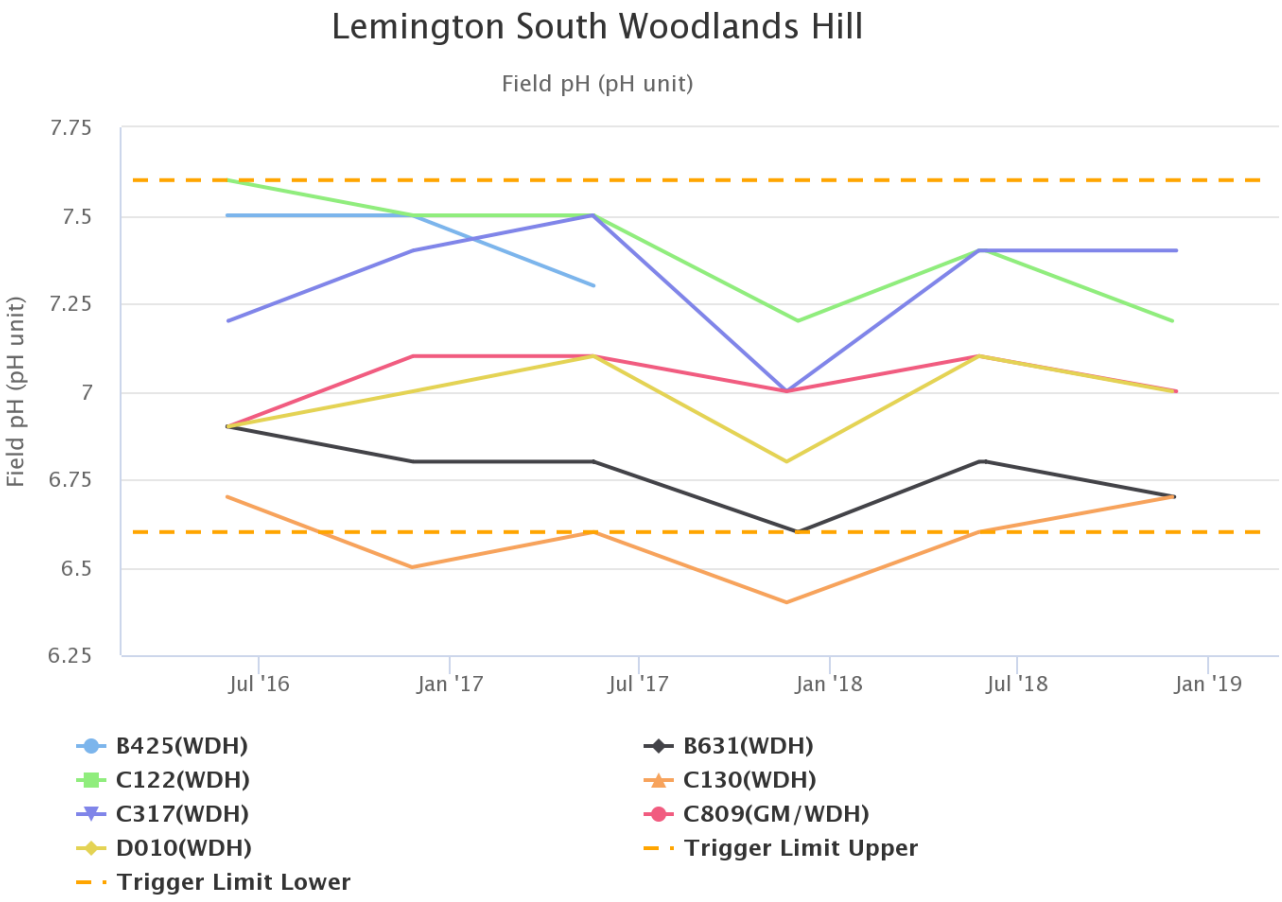

Figure 57: Lemington South Woodlands Hill pH Trend – March 2019

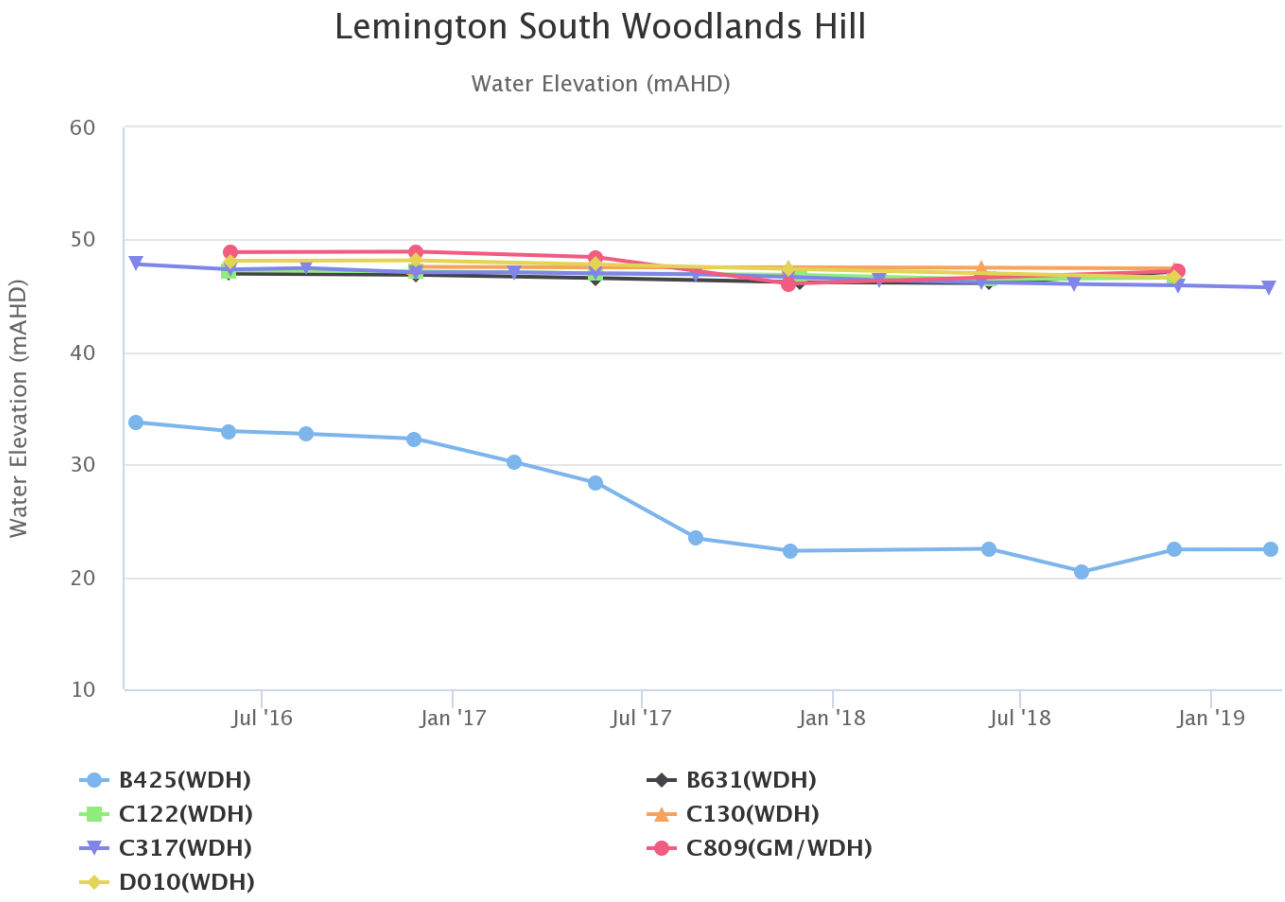

Figure 58: Lemington South Woodlands Hill Standing Water Level – March 2019

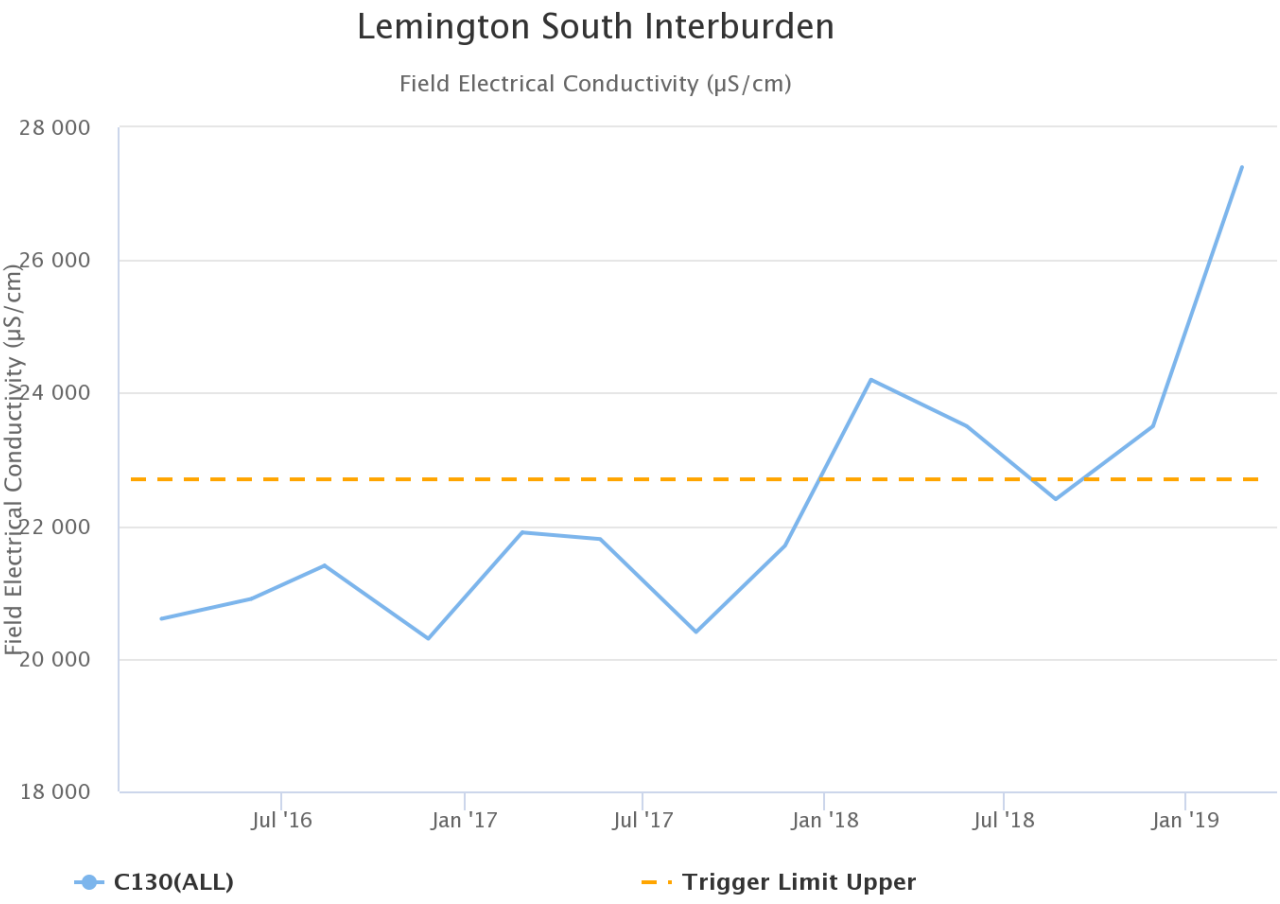

Figure 59: Lemington South Interburden Electrical Conductivity Trend – March 2019

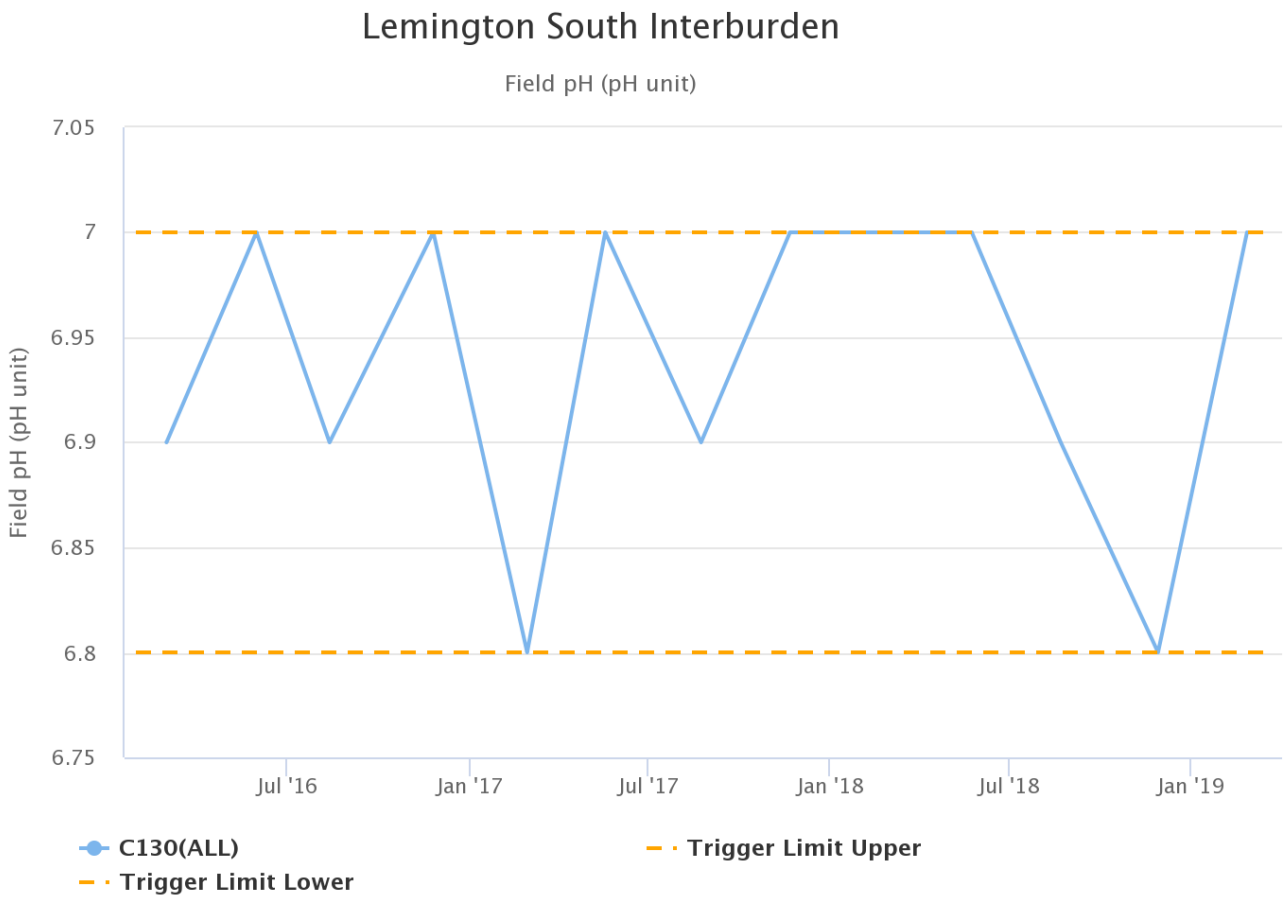

Figure 60: Lemington South Interburden pH Trend – March 2019

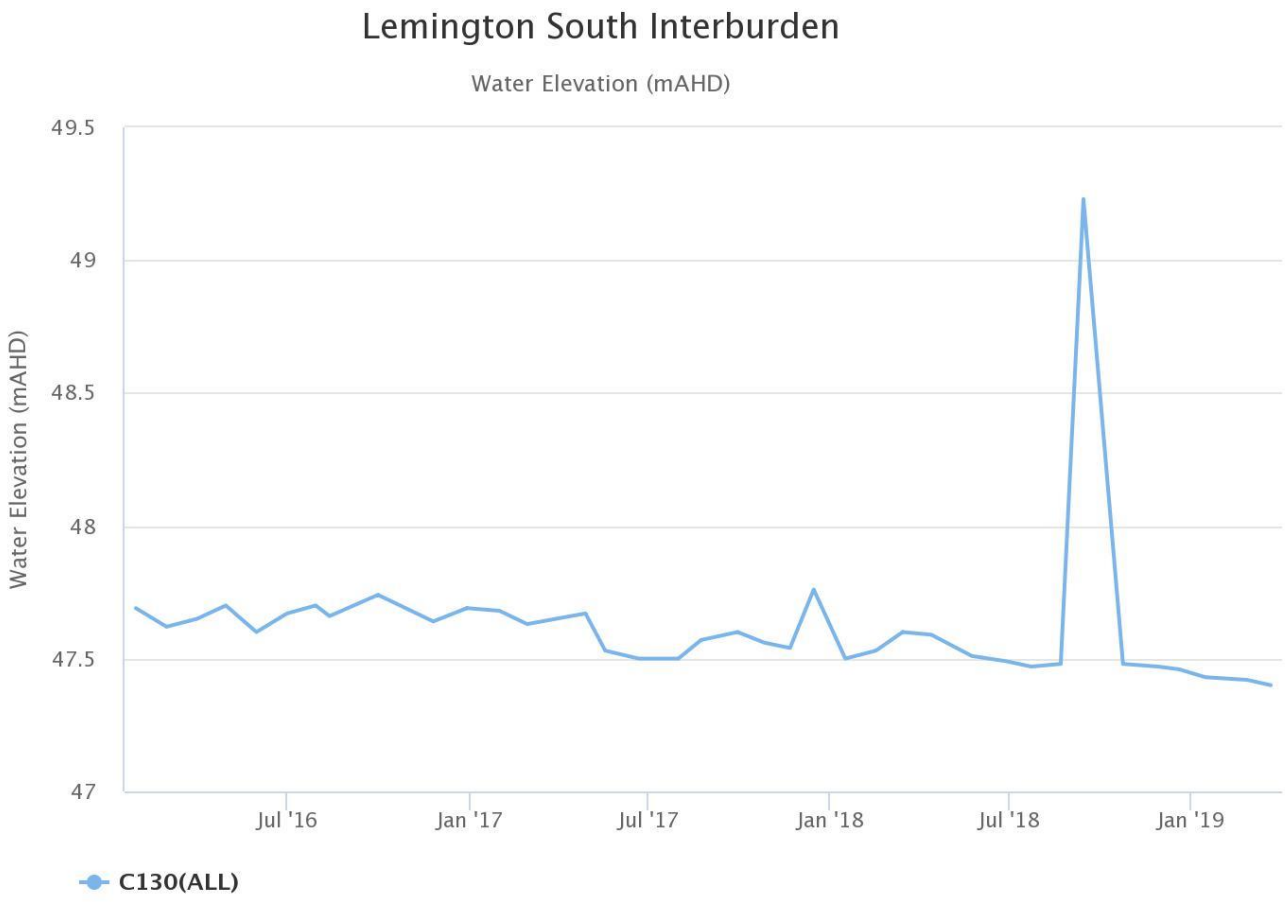

Figure 61: Lemington South Interburden Standing Water Level – March 2019

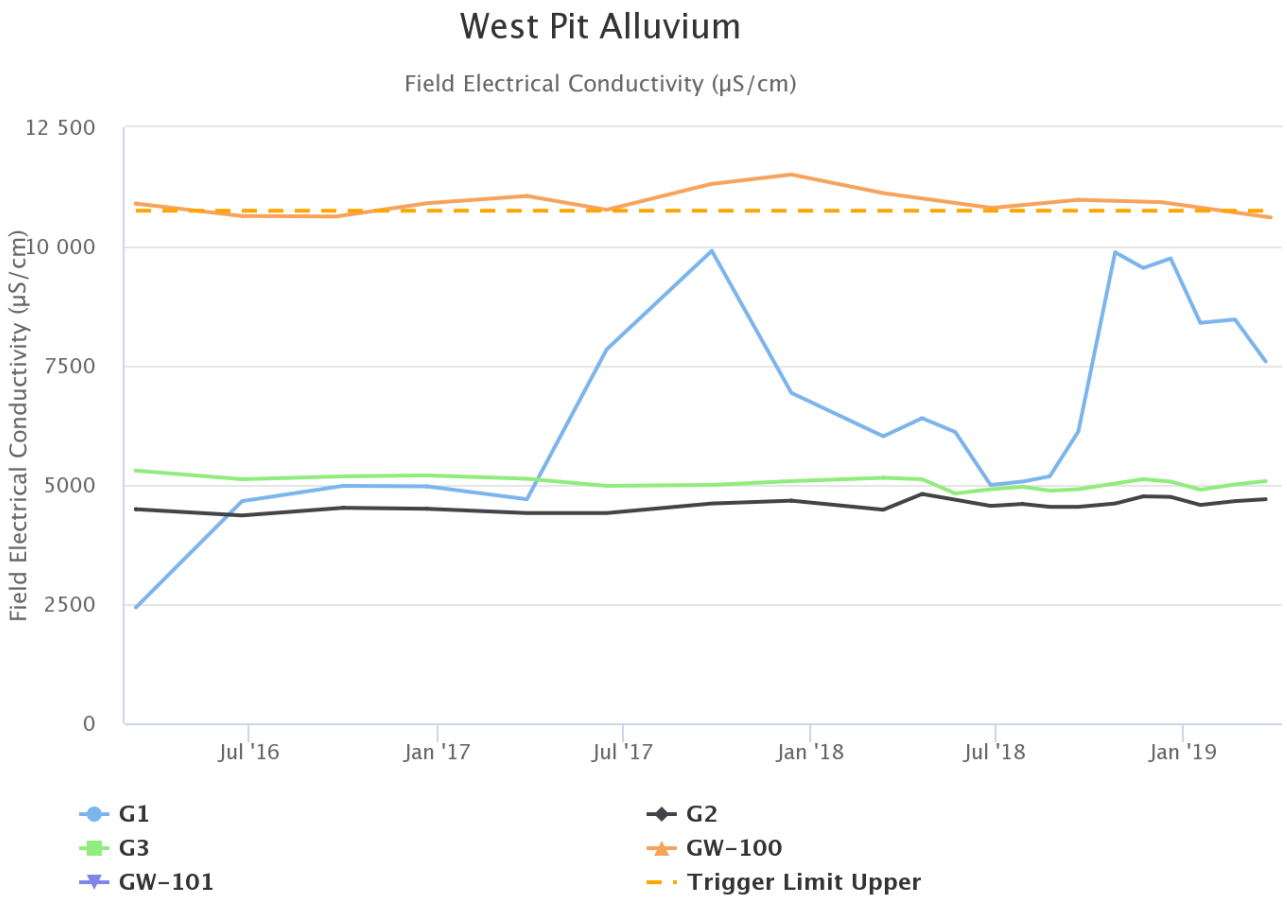

Figure 62: West Pit Alluvium Electrical Conductivity Trend – March 2019

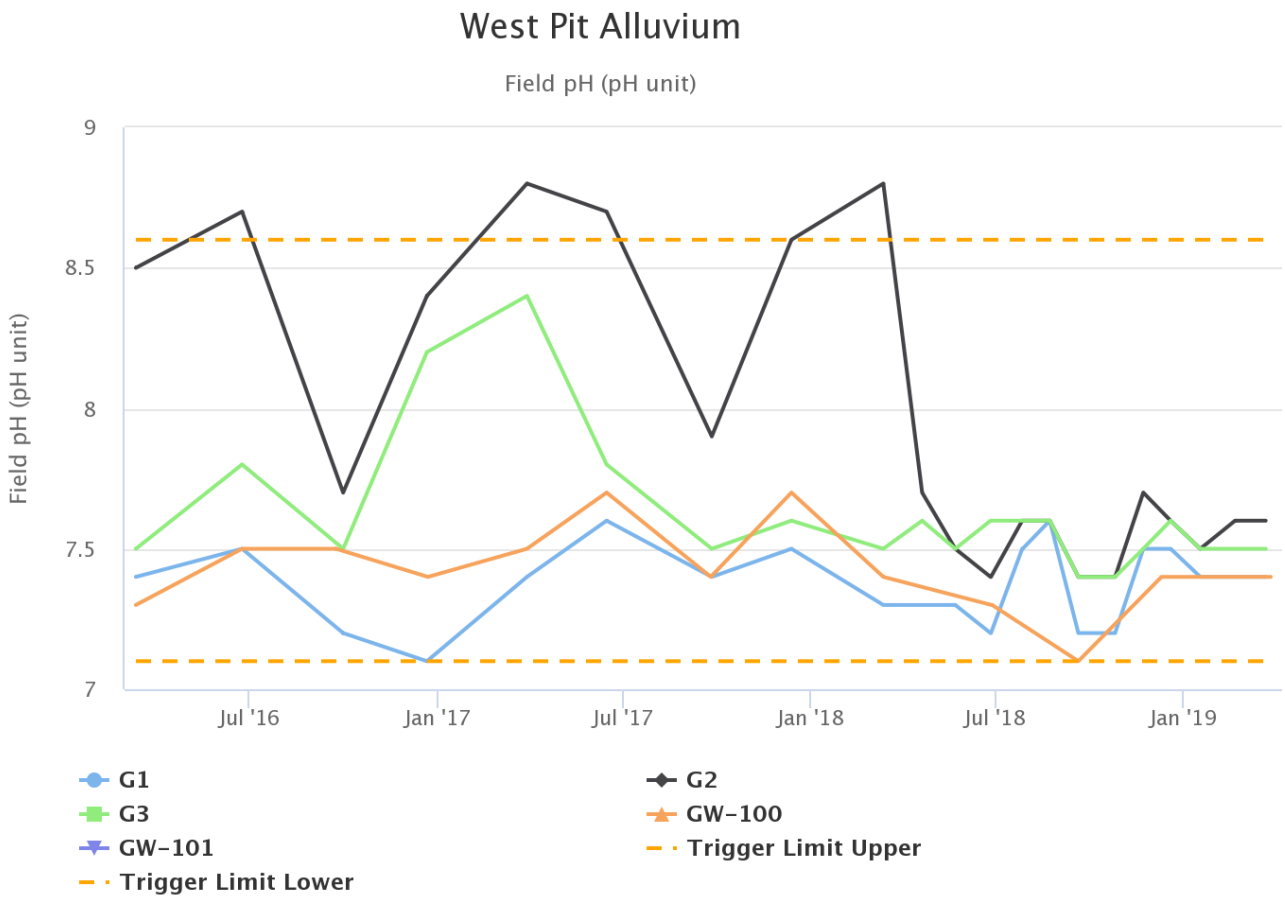

Figure 63: West Pit Alluvium pH Trend – March 2019

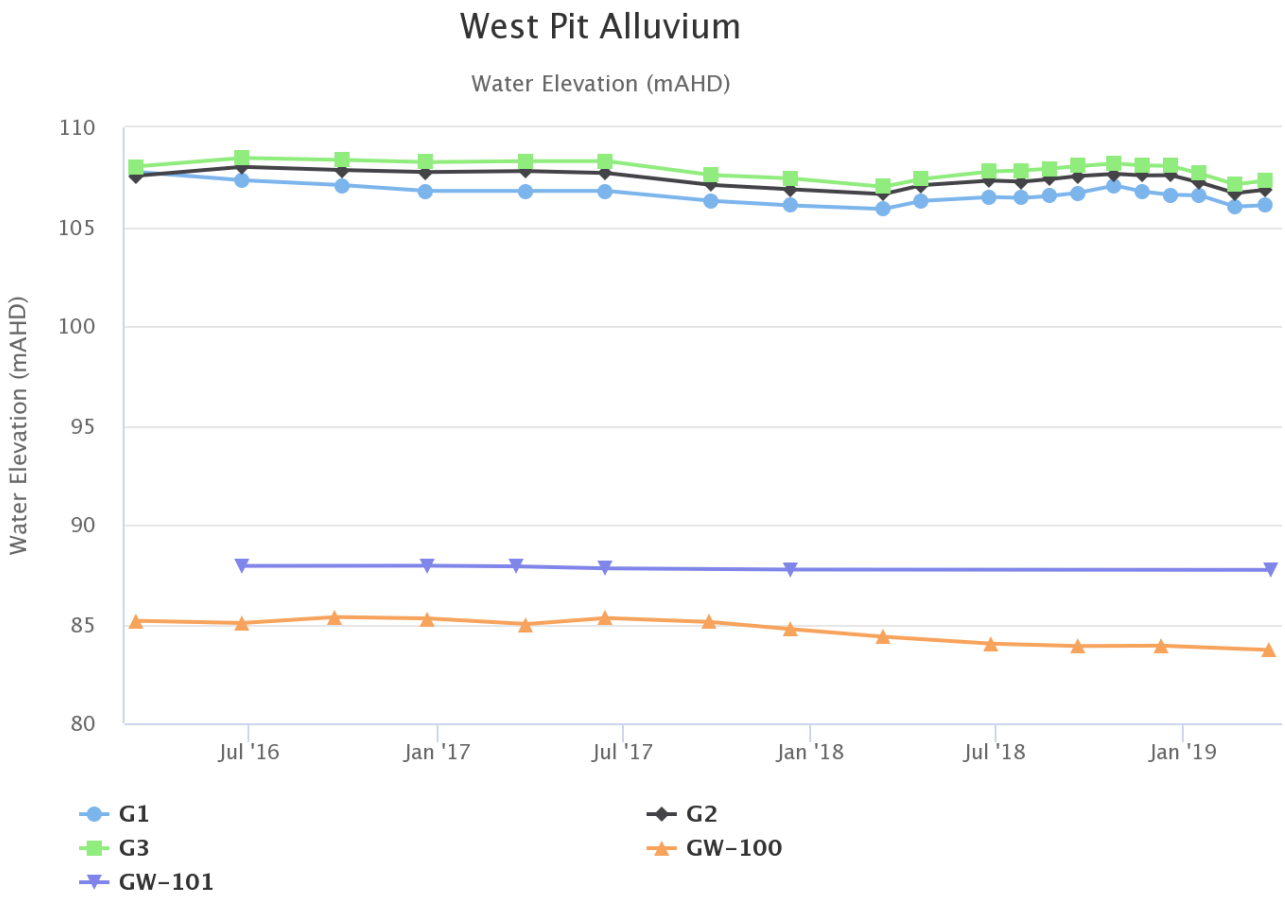

Figure 64: West Pit Alluvium Standing Water Level – March 2019

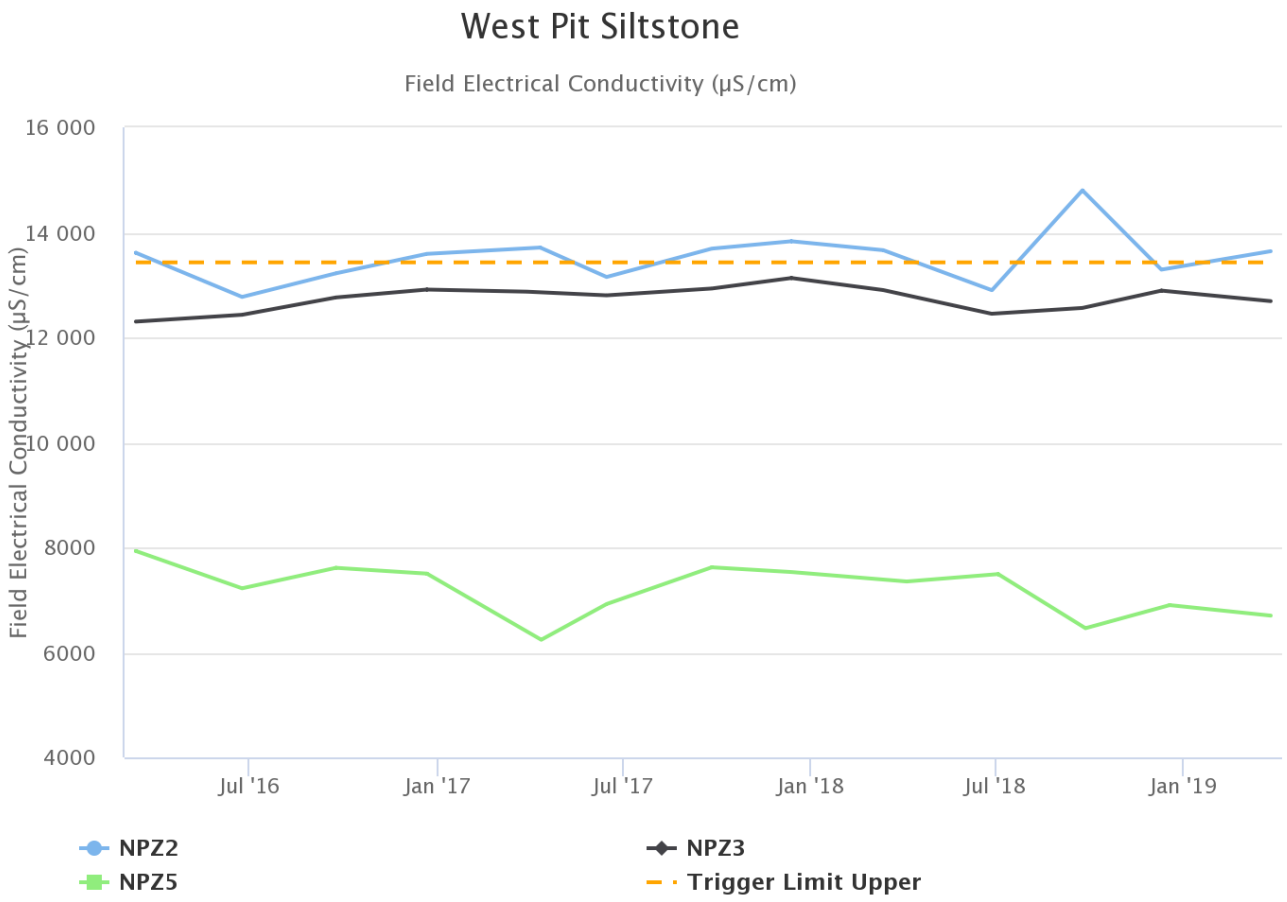

Figure 65: West Pit Siltstone Electrical Conductivity Trend – March 2019

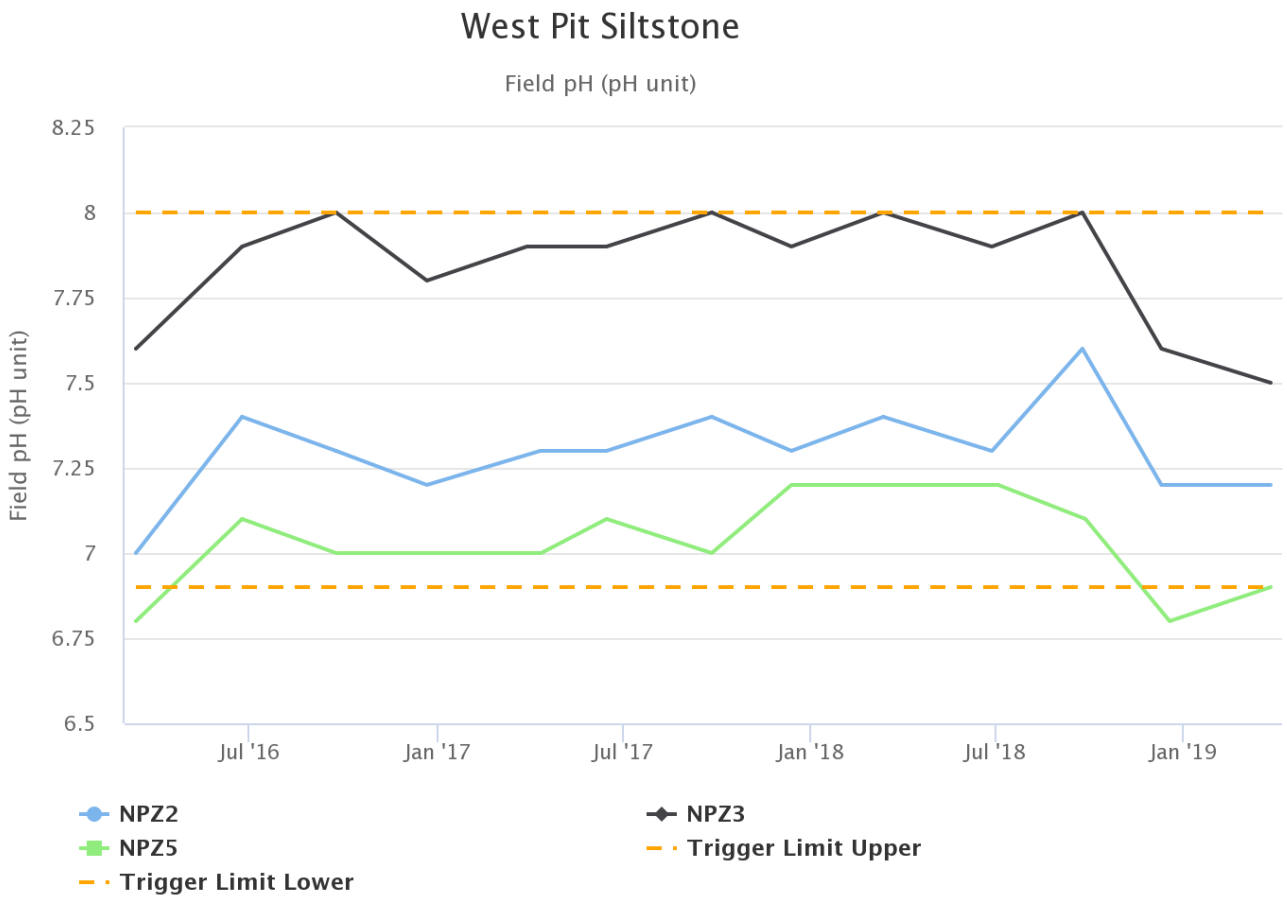

Figure 66: West Pit Siltstone pH Trend – March 2019

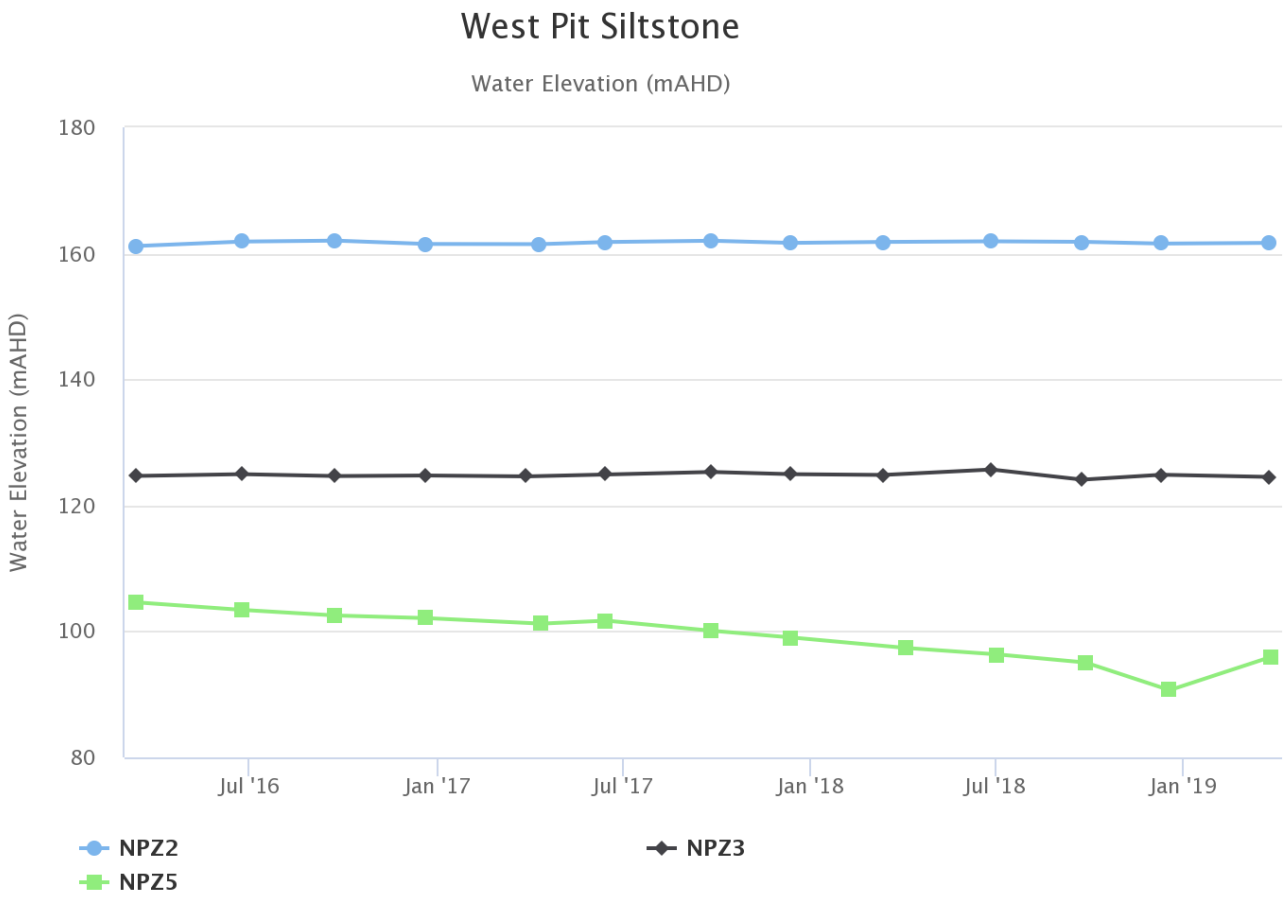

Figure 67: West Pit Siltstone Standing Water Level – March 2019

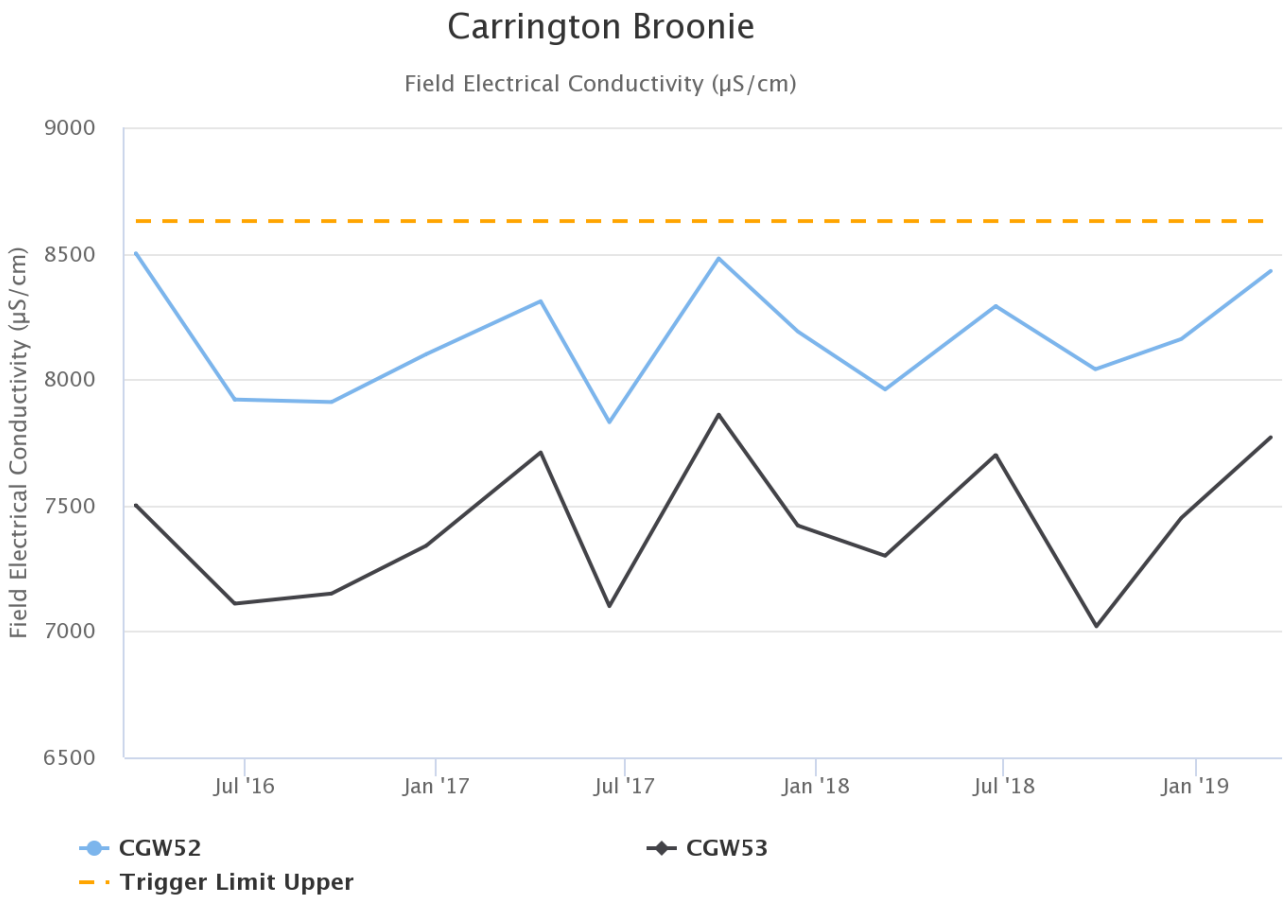

Figure 68: Carrington Broonie Electrical Conductivity Trend – March 2019

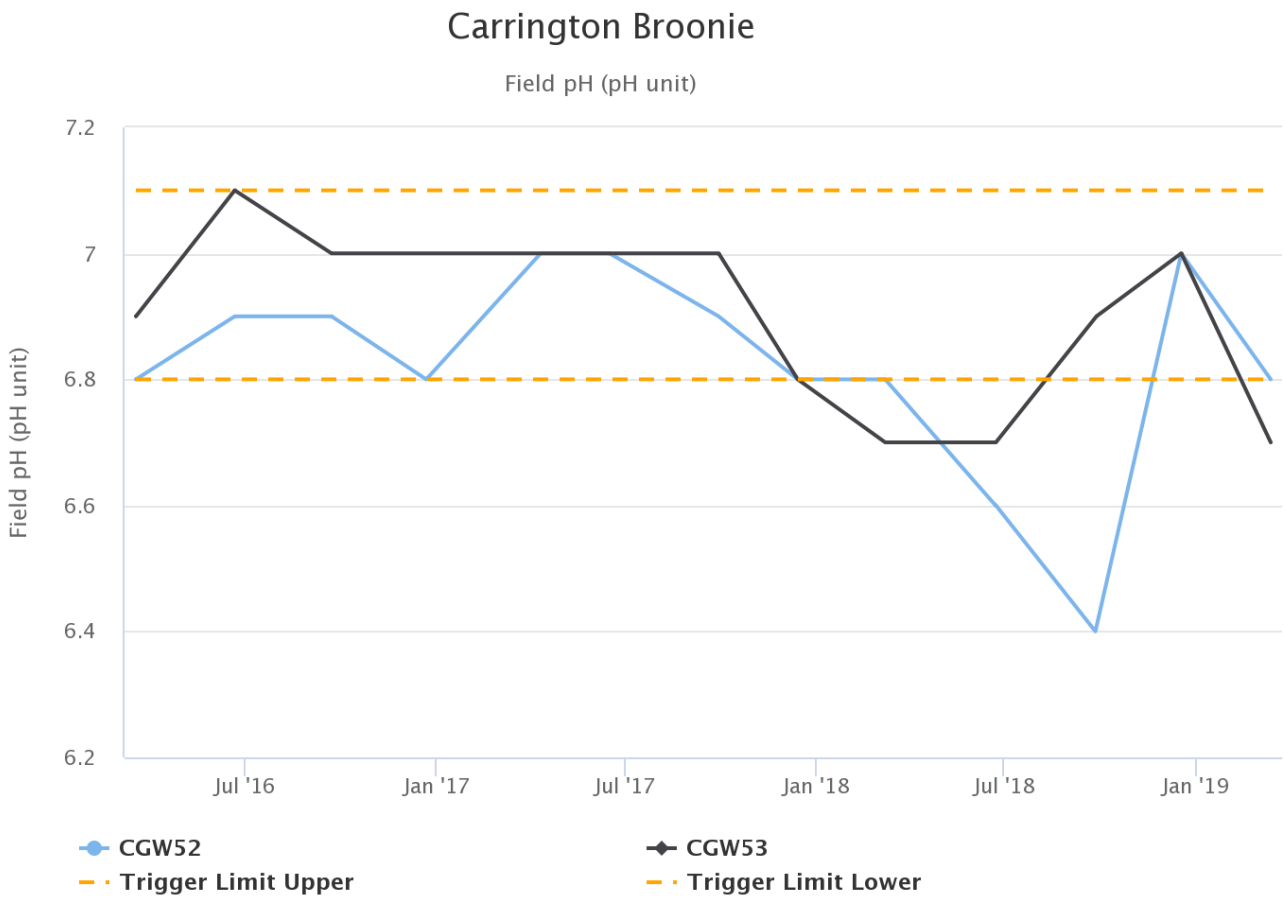

Figure 69: Carrington Broonie pH Trend – March 2019

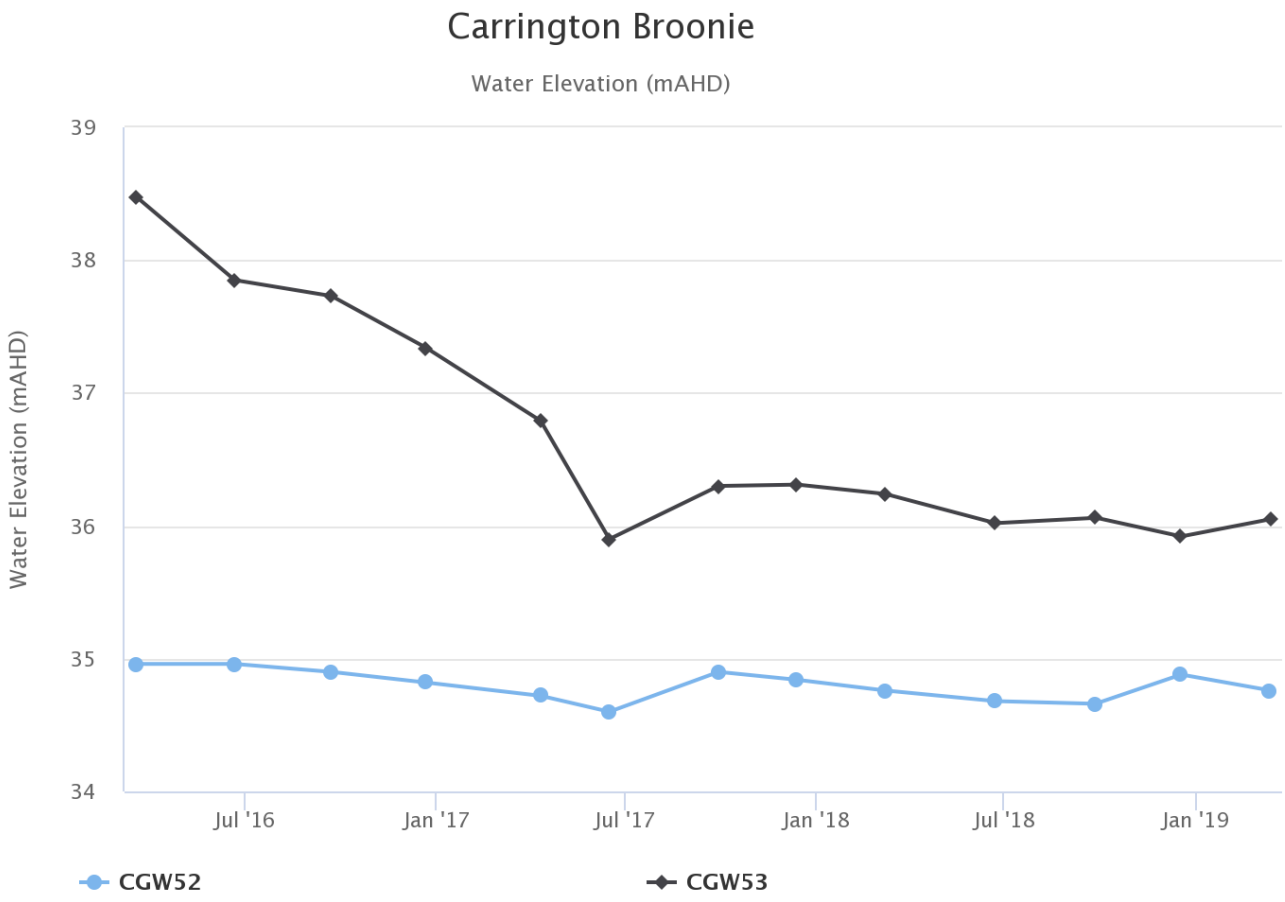

Figure 70: Carrington Broonie Standing Water Level – March 2019

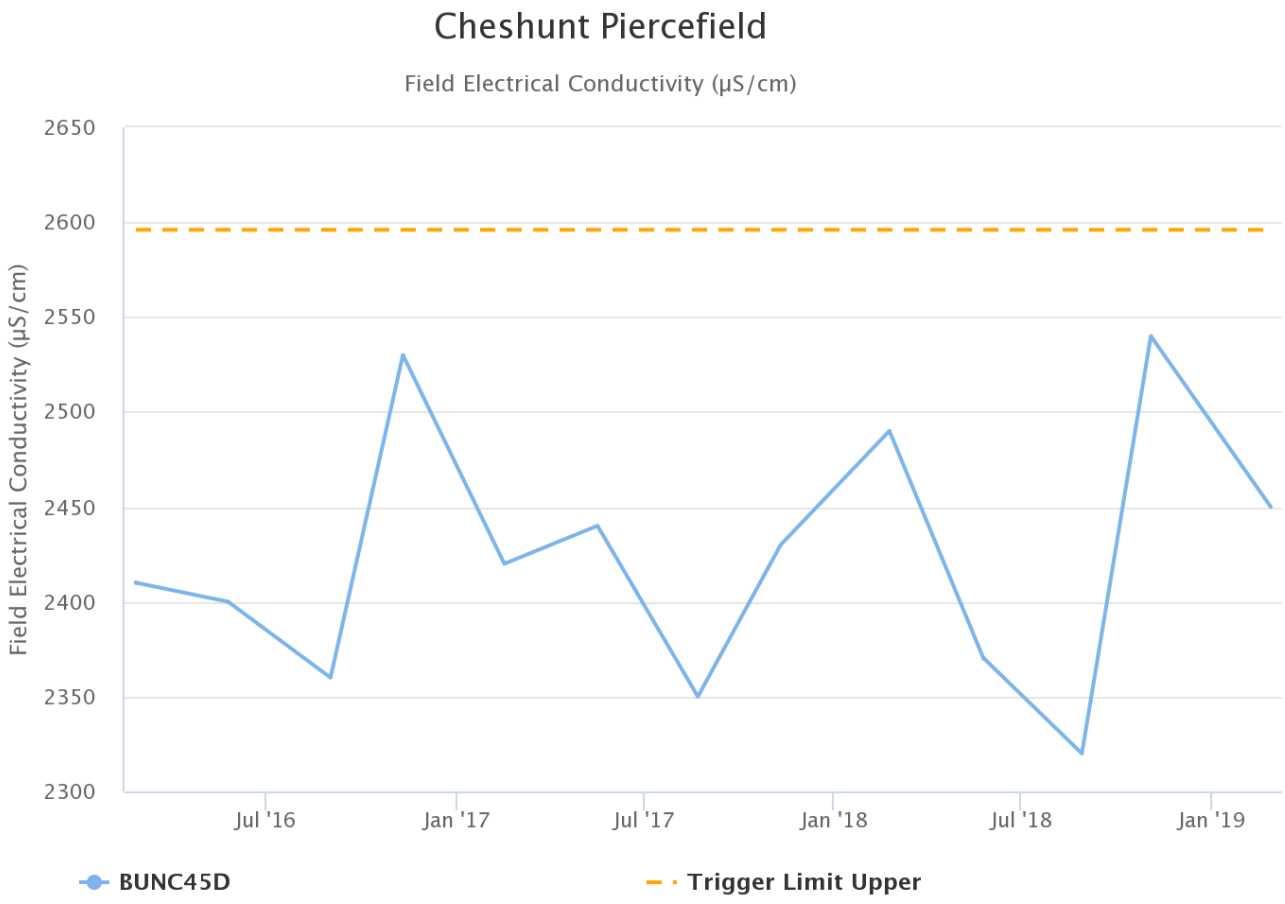

Figure 71: Cheshunt Piercefield Electrical Conductivity Trend – March 2019

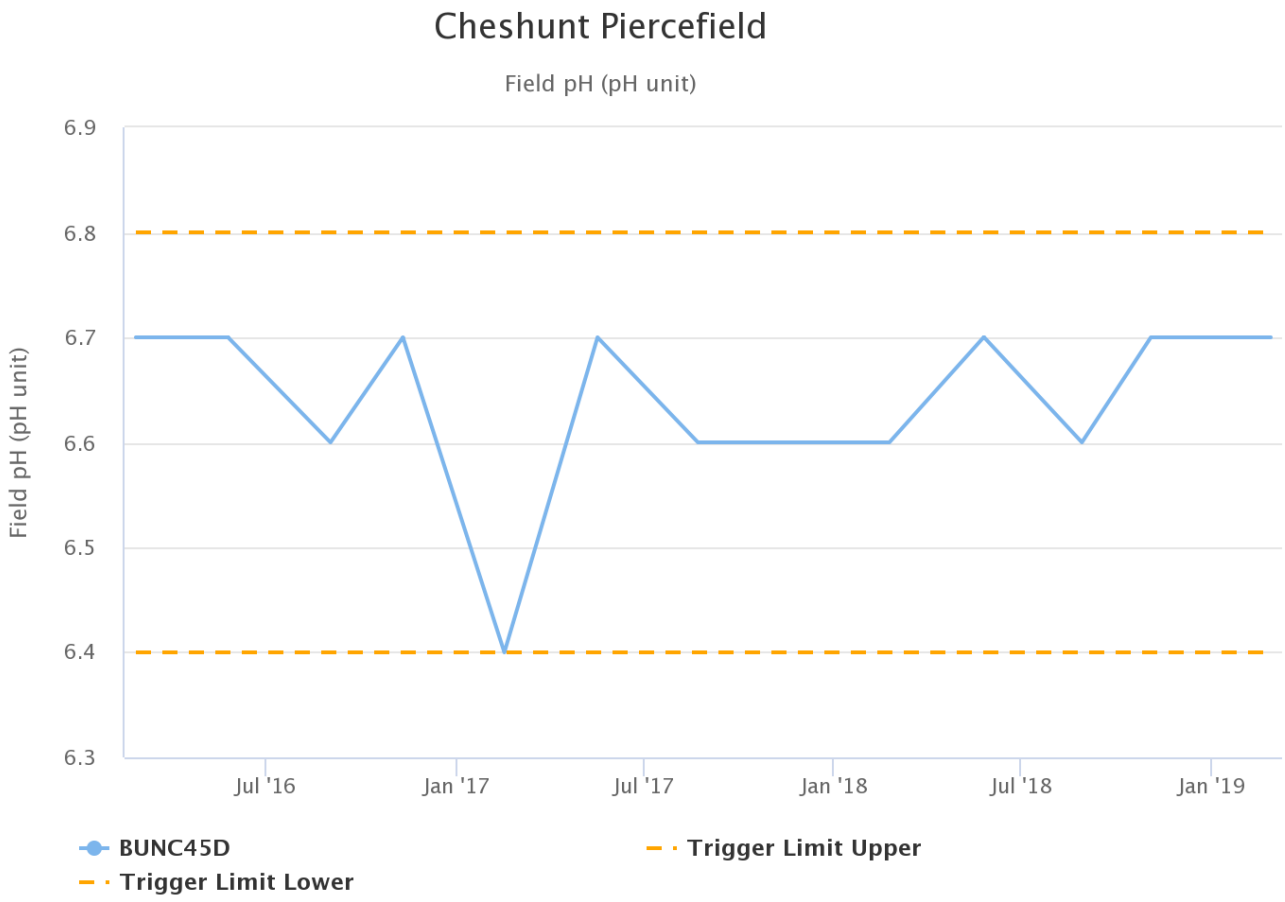

Figure 72: Cheshunt Piercefield pH Trend – March 2019

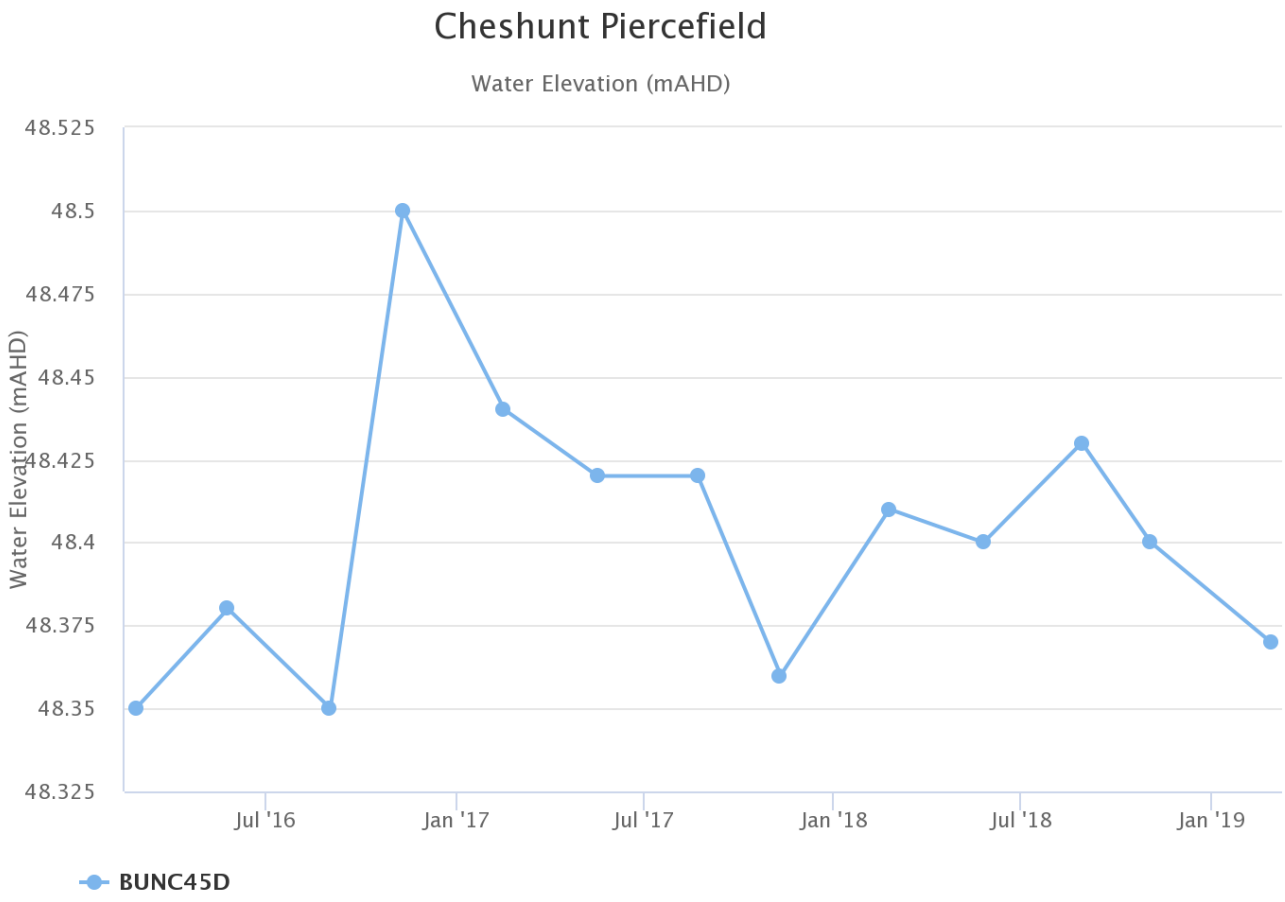

Figure 73: Cheshunt Piercefield Standing Water Level – March 2019

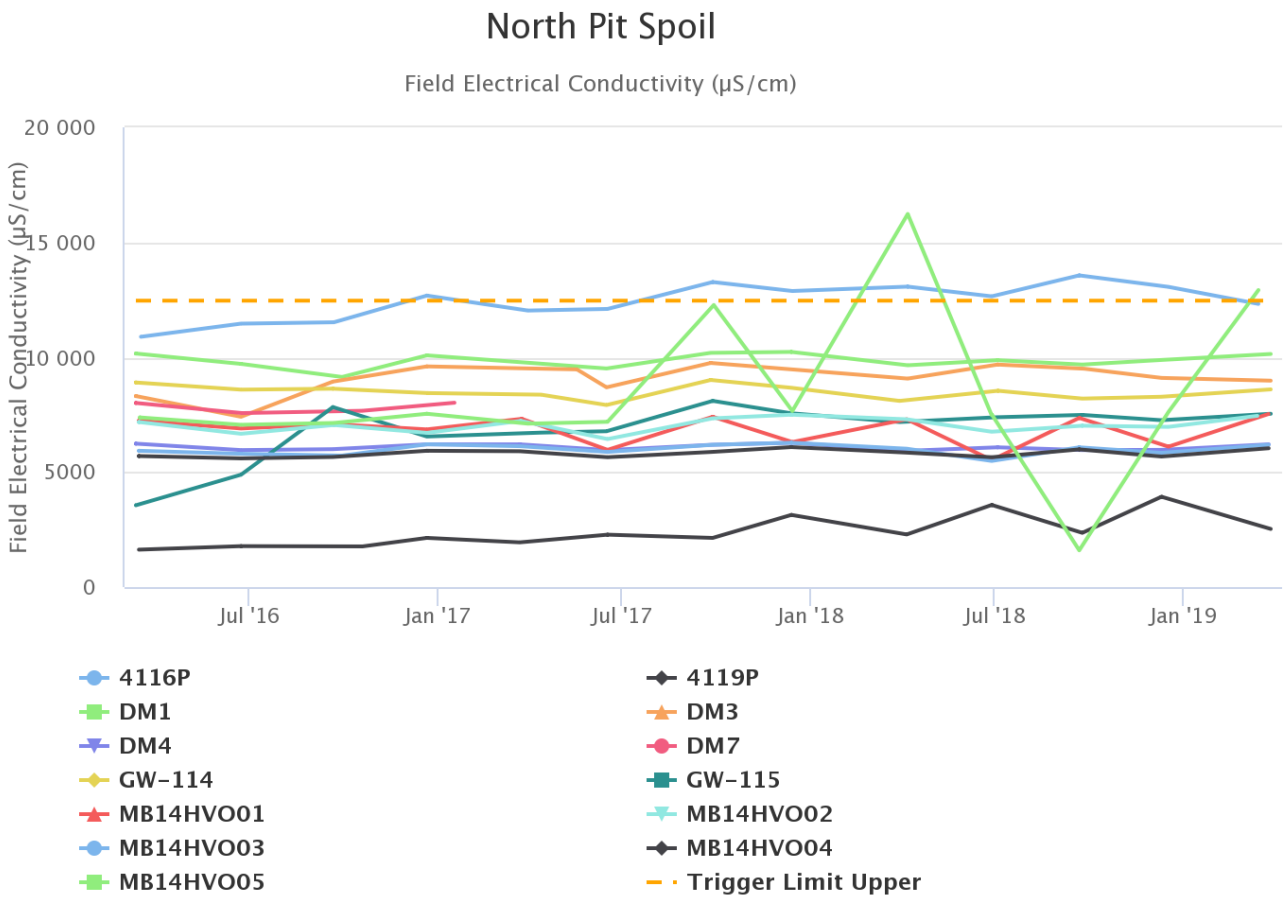

Figure 74: North Pit Spoil Electrical Conductivity Trend – March 2019

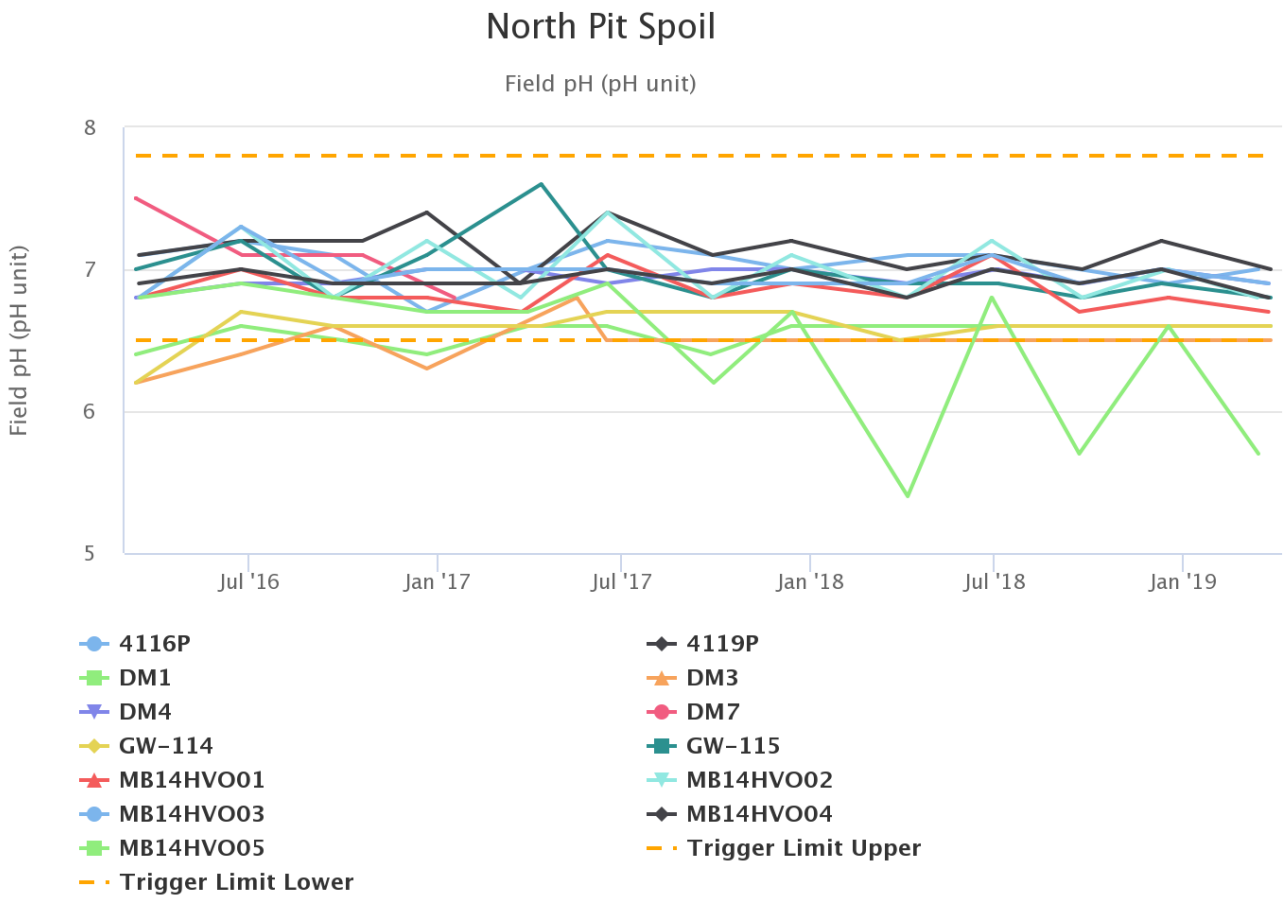

Figure 75: North Pit Spoil pH Trend – March 2019

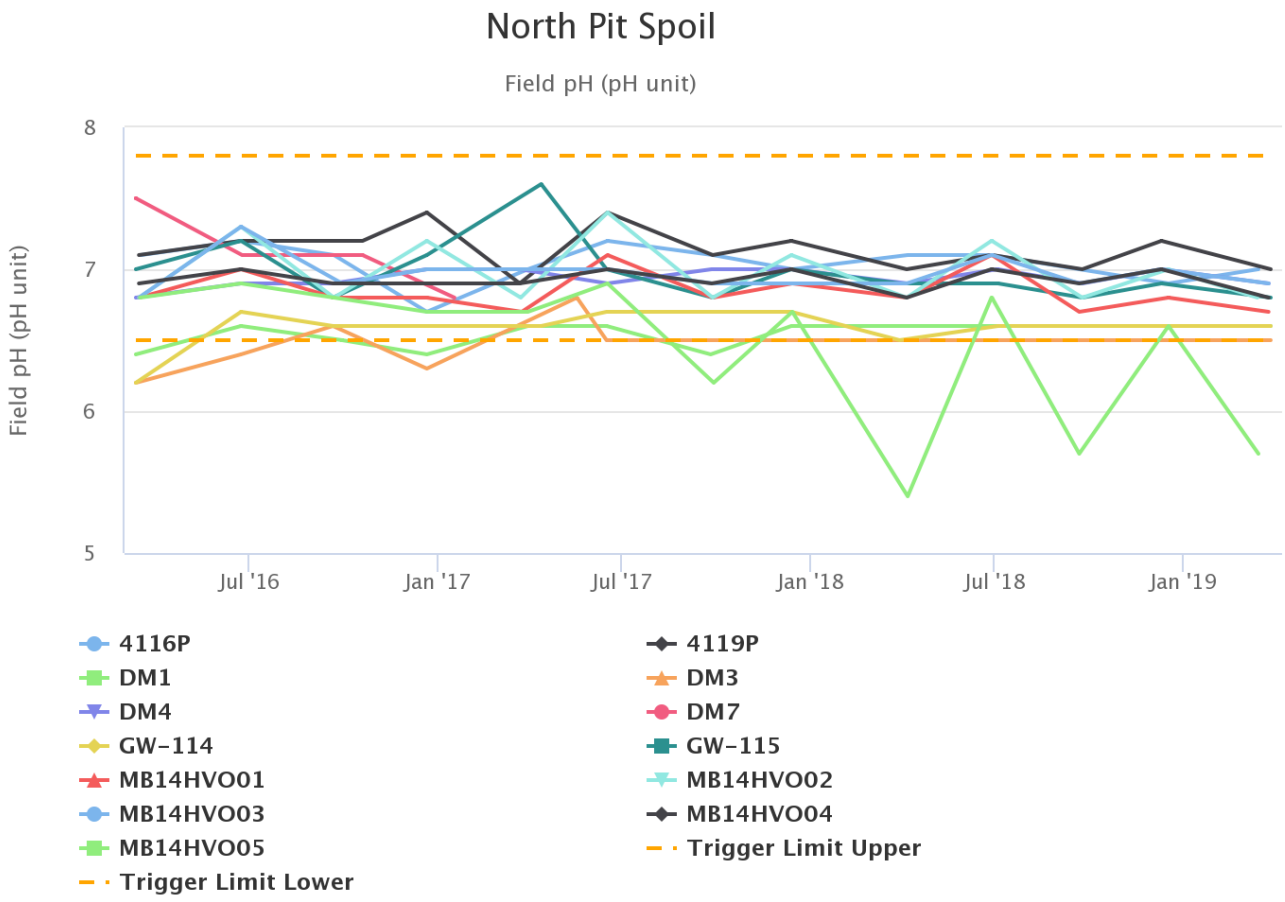

Figure 76: North Pit Spoil Standing Water Level – March 2019

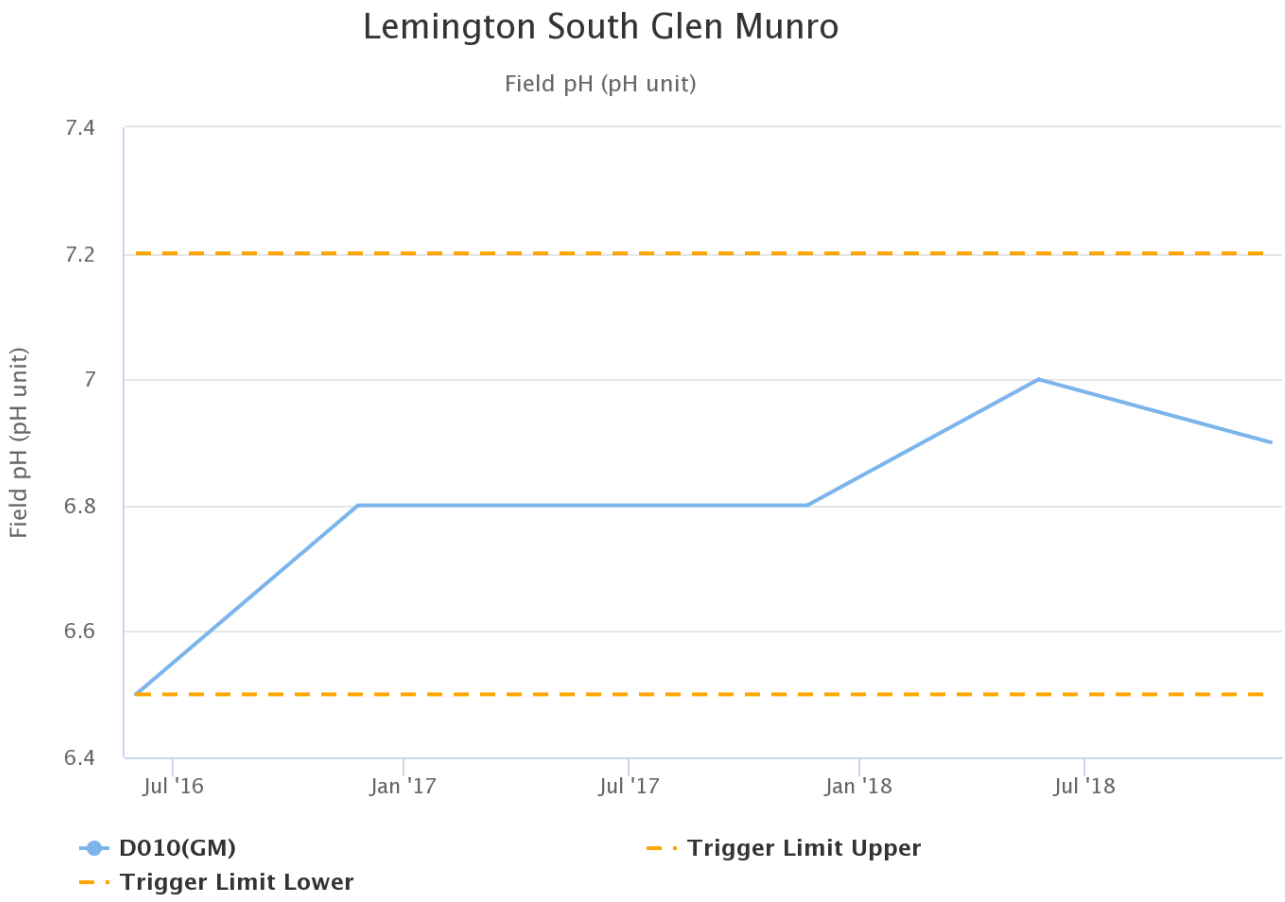

Figure 77: Lemington South Glen Munro pH Trend – March 2019

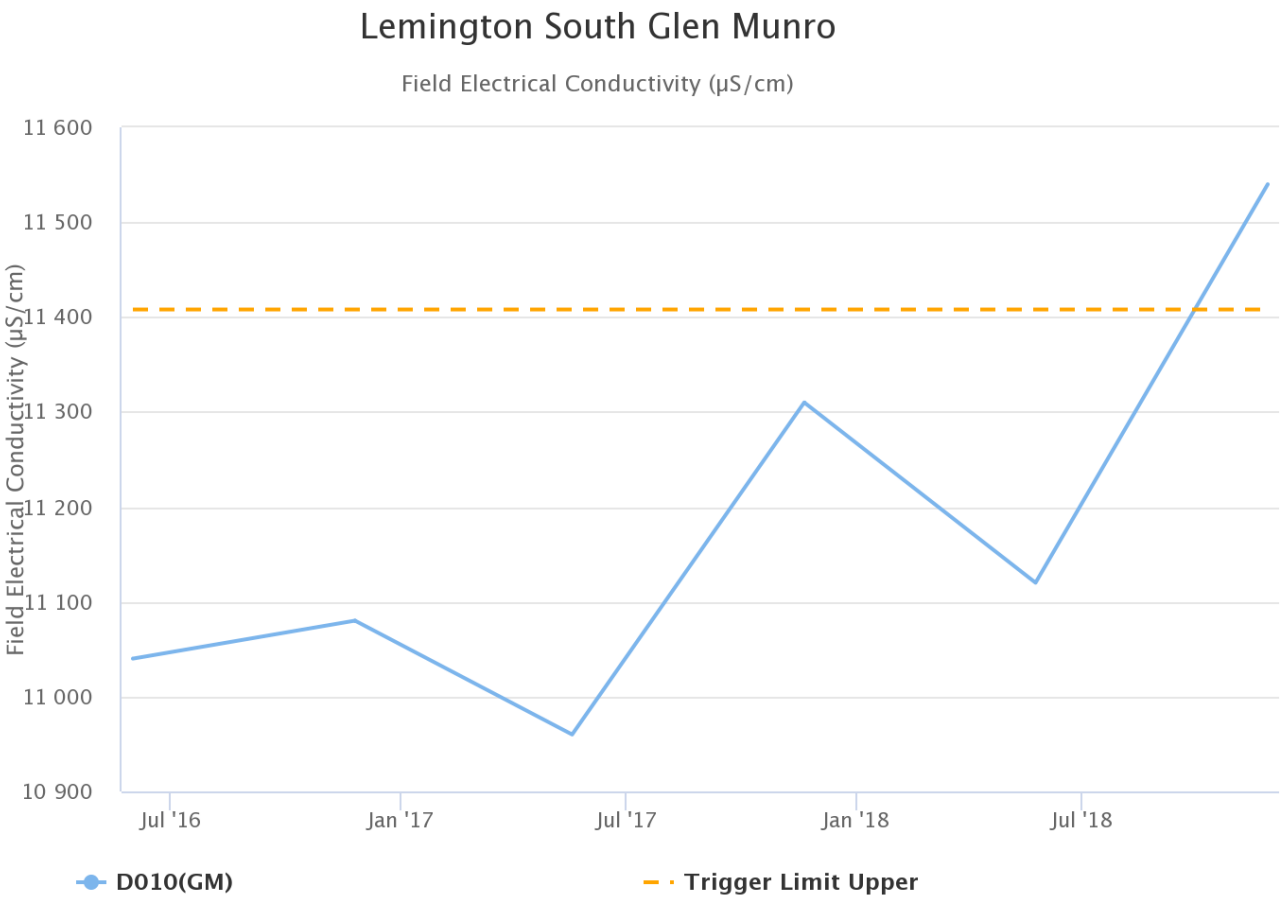

Figure 78: Lemington South Glen Munro Electrical Conductivity Trend – March 2019

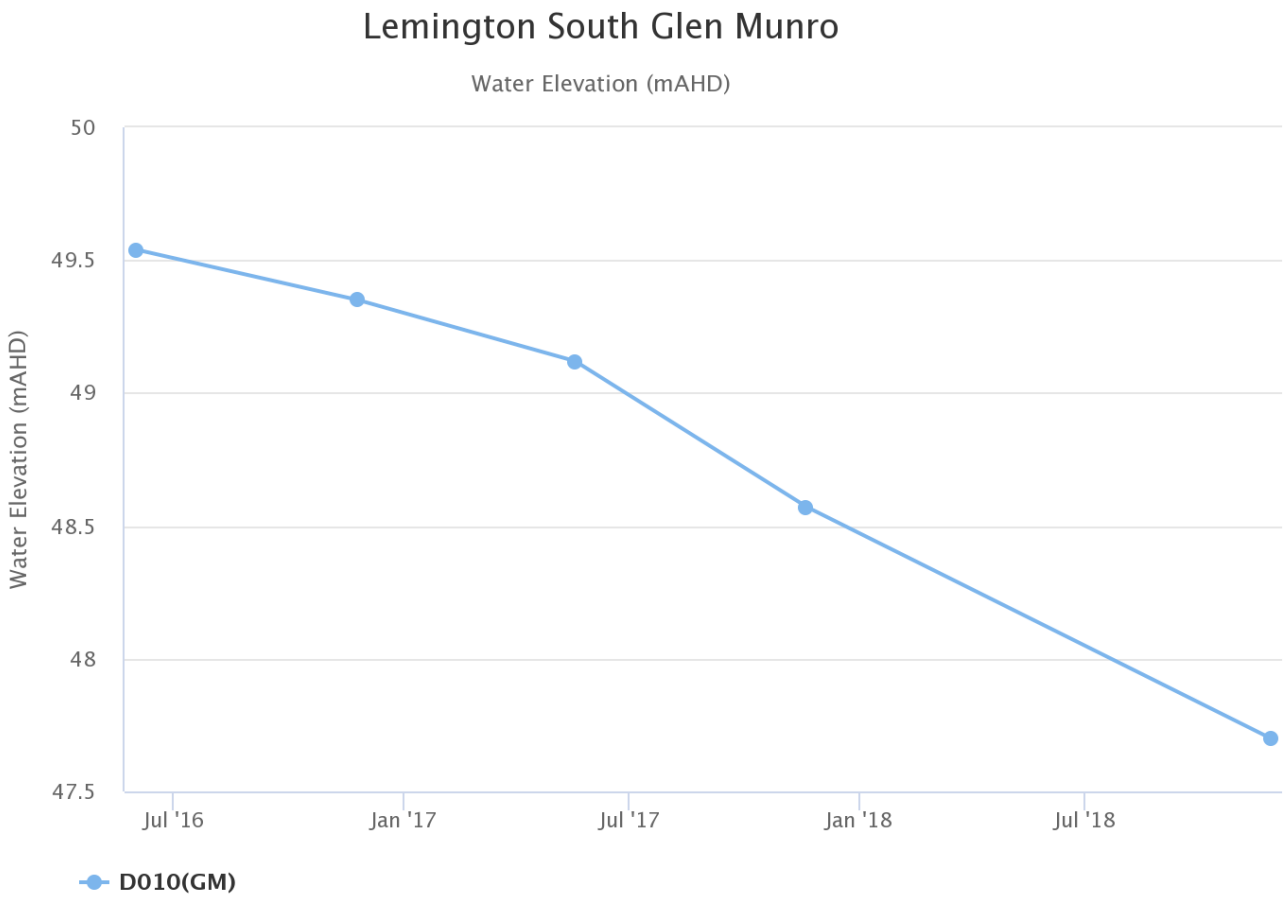

Figure 79: Lemington South Glen Munro Standing Water Level Trend – March 2019

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 – Q1 2019

Site	Date	Trigger Limit Breached	Action Taken in Response
CFW55R	3/1/2019 to 26/3/2019	EC – 95th Percentile	Investigation in progress
BZ4A(2)	25/02/2019	pH – 5th Percentile	First exceedance of pH 5th Percentile trigger.Watching brief*
BZ3-3	25/02/2019	pH – 5th Percentile	Second exceedance of pH 5th Percentile trigger.Watching brief*
PBO1(ALL)	26/02/2019	EC – 95th Percentile	Investigation in progress
C130(ALL)	26/02/2019	EC – 95th Percentile	Second exceedance of EC 95th Percentile trigger.Watching brief*
CGW49	13/03/2019	EC – 95th Percentile	Second exceedance of EC 95th Percentile trigger.Watching brief*
MB14HVO05	15/03/2019	EC – 95th Percentile	First exceedance of EC 95th Percentile trigger.Watching brief*
NPZ2	27/03/2019	EC – 95th Percentile	First exceedance of EC 95th Percentile trigger.Watching brief*

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

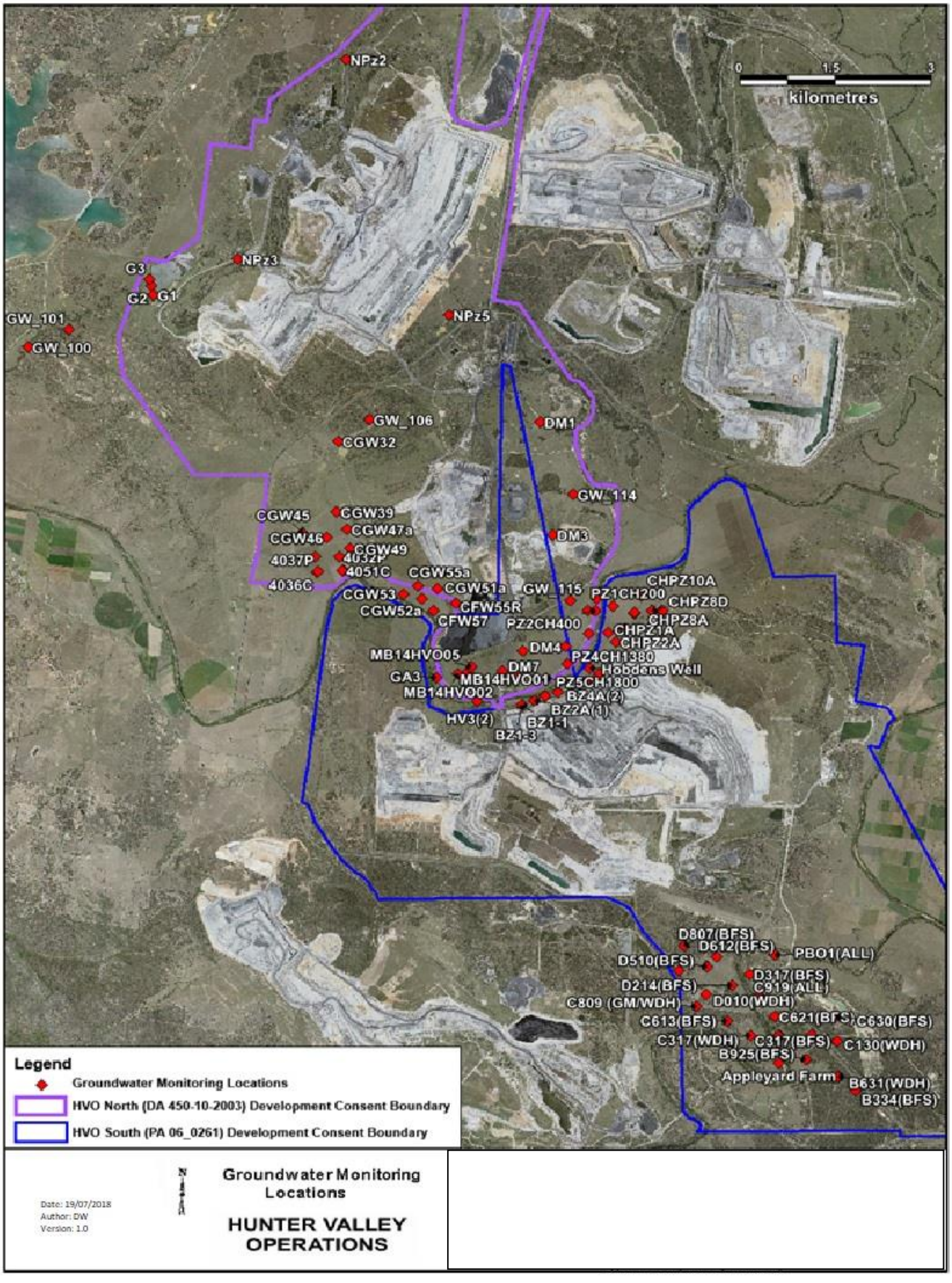

Figure 80: Groundwater Monitoring Location Plan

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 81 and 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.

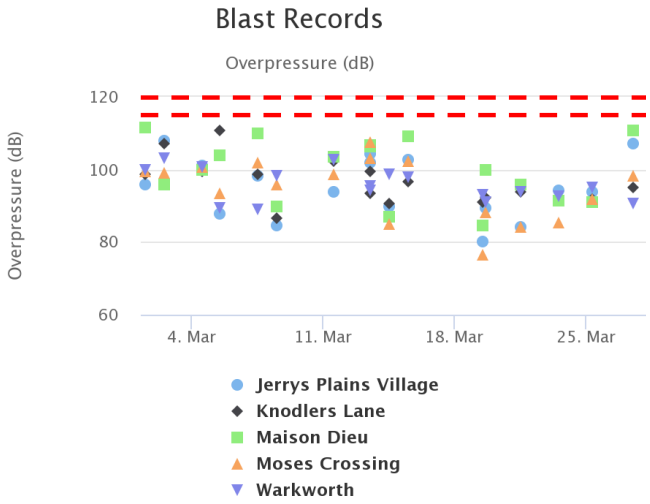

Figure 81: Overpressure Blast Monitoring Results – February 2019

Figure 82: Ground Vibration Blast Monitoring Results – February 2019

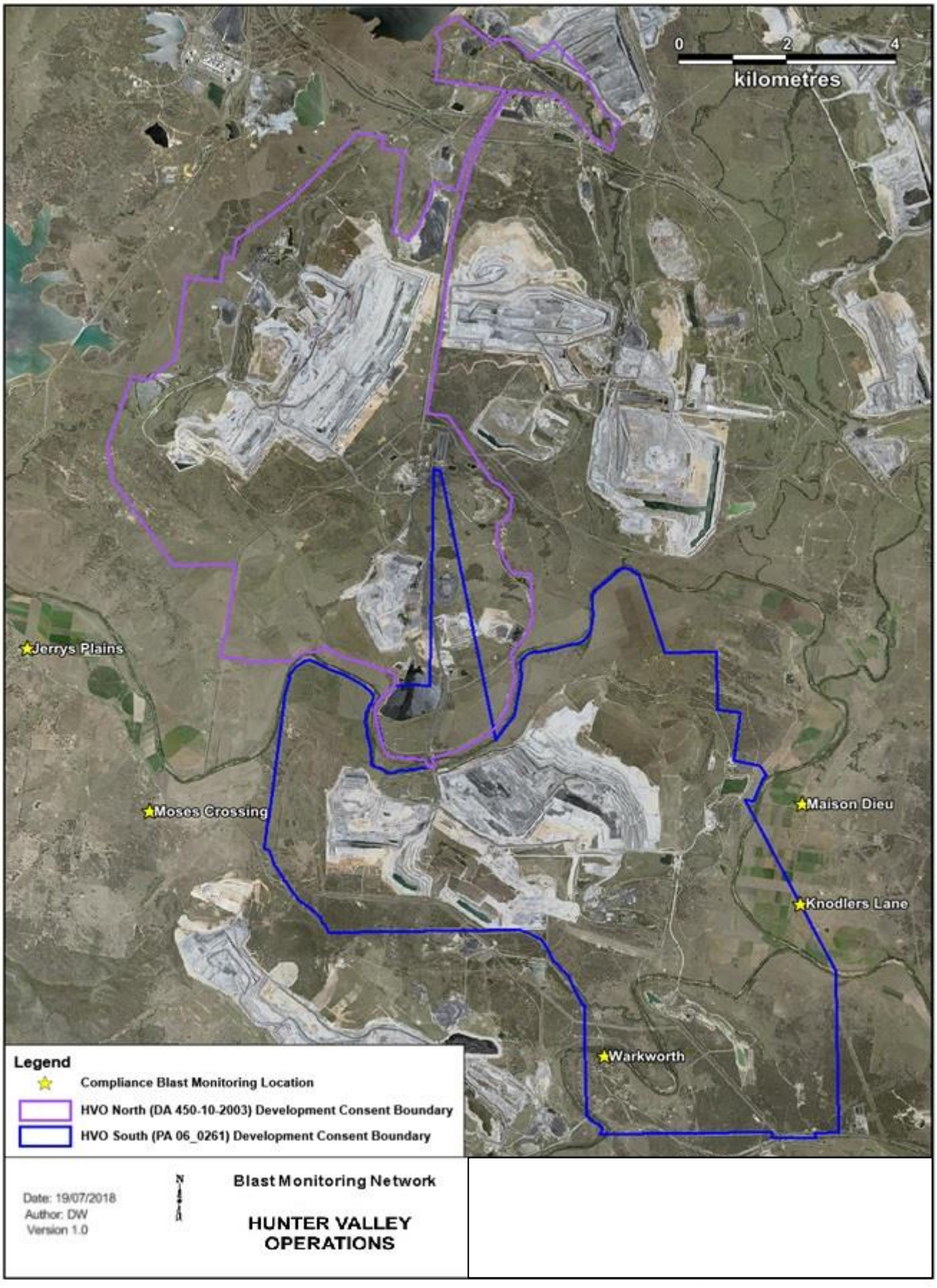

Figure 83: Blast Monitoring Location Plan

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 19 and 20 March 2019 and additional monitoring for HVO North on 21 and 22 March 2019. Monitoring results are detailed in Table 6 to Table 10 . During the reporting period, no exceedances were recorded.

Table 6: $L_{Aeq,\ 15\ minute}$ HVO South - Impact Assessment Criteria – March 2019

Location	Date and Time	Wind Speed (m/s)[1]	VTG[1]	Criterion dB (A)	Criterion Applies?[2]	HVO South L_{Aeq} dB[3,4]	Exceedance[4,5]
Knodlers Lane	20/03/2019 0:02	1.7	0.5	37	Yes	IA	Nil
Maison Dieu	20/03/2019 0:25	1.8	3	37	No	22	NA
Shearers Lane	19/03/2019 23:37	1.6	0.5	41	Yes	<25	Nil
Kilburnie South	19/03/2019 23:00	2	0.5	36	Yes	IA	Nil
Jerrys Plains Village	19/03/2019 21:20	3.1	0.5	35	No	IA	NA
Jerrys Plains East	19/03/2019 21:01	3	0.5	35	No	IA	NA
Long Point Road	19/03/2019 21:00	3.0.	0.5	35	No	IA	NA
HVGC	19/03/2019 23:39	2	0.5	55	Yes	IA	Nil
Kilburnie South	21/03/2019 23:00	2.8	0.5	36	Yes	IA	Nil
Jerrys Plains Village	21/03/2019 22:36	3.8	0.5	35	No	IA	NA
Jerrys Plains East	21/03/2019 22:13	3.6	0.5	35	No	IA	NA

Notes:
1. Atmospheric data is sourced from the HVO Cheshunt (or MTW Charlton Ridge for Long Point) weather station using logged meteorological data;
2. Assumed noise emission limits (see Section 2.2 of this report for more information) 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). Criterion may or may not apply due to rounding of meteorological data values;
3. Estimated or measured LAeq,15minute attributed to HVO South Pit Area;
4. Bold results in red indicate exceedance of criteria; and
5. NA in exceedance column means atmospheric conditions outside specified in approval and so criterion is not applicabl.

Table 7: $L_{A1, 1minute}$ HVO South - Impact Assessment Criteria – March 2019

Location	Date and Time	Wind Speed (m/s)[1]	VTG[1]	Criterion dB (A)	Criterion Applies?[2]	HVO South $L_{A1, 1min}$ dB[3,4]	Exceedance[4,5]
Knodlers Lane	20/03/2019 0:02	1.7	0.5	45	Yes	IA	Nil
Maison Dieu	20/03/2019 0:25	1.8	3	45	No	37	NA
Shearers Lane	19/03/2019 23:37	1.6	0.5	45	Yes	26	Nil
Kilburnie South	19/03/2019 23:00	2	0.5	45	Yes	IA	Nil
Jerrys Plains Village	19/03/2019 21:20	3.1	0.5	45	No	IA	NA
Jerrys Plains East	19/03/2019 21:01	3	0.5	45	No	IA	NA
Long Point Road	19/03/2019 21:00	3.0.	0.5	45	No	IA	NA
HVGC	19/03/2019 23:39	2	0.5	NA	NA	IA	NA
Kilburnie South	21/03/2019 23:00	2.8	0.5	45	Yes	IA	Nil
Jerrys Plains Village	21/03/2019 22:36	3.8	0.5	45	No	IA	NA
Jerrys Plains East	21/03/2019 22:13	3.6	0.5	45	No	IA	NA
Knodlers Lane	20/03/2019 0:02	1.7	0.5	45	Yes	IA	Nil

Notes:
1. Atmospheric data is sourced from the HVO Cheshunt (or MTW Charlton Ridge for Long Point) weather station using logged meteorological data;
2. Assumed noise emission limits (see Section 2.3 of this report for more information) 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). Criterion may or may not apply due to rounding of meteorological data values;
3. These are results for HVO South Pit Area in the absence of all other noise sources;
4. Bold results in red indicate exceedance of criteria;
5. NA in exceedance column means atmospheric conditions outside specified in approval and so criterion is not applicable

Table 8: $L_{Aeq, 15minute}$ HVO North – Impact Assessment Criteria – March 2019

Location	Date and Time	Wind Speed (m/s)[1]	VTG[1]	Criterion dB (A)	Criterion Applies?[2]	HVO North L_{Aeq} dB[3,4]	Exceedance[4,5]
Knodlers Lane	20/03/2019 0:02	0.9	0.5	35	Yes	IA	Nil
Maison Dieu	20/03/2019 0:25	1	3	35	Yes	IA	Nil
Shearers Lane	19/03/2019 23:37	0.9	0.5	35	Yes	IA	Nil
Kilburnie South	19/03/2019 23:00	1.1	0.5	39	Yes	IA	Nil
Jerrys Plains Village	19/03/2019 21:20	0.9	0.5	36	Yes	IA	Nil
Jerrys Plains East	19/03/2019 21:01	1.4	0.5	39	Yes	IA	Nil
Long Point Road	19/03/2019 21:00	1.4	0.5	35	Yes	IA	Nil
HVGC	19/03/2019 23:39	1	0.5	NA	NA	IA	NA
Kilburnie South	21/03/2019 23:00	2.2	-1	39	Yes	IA	Nil
Jerrys Plains Village	21/03/2019 22:36	2.3	0.5	36	Yes	<30	Nil
Jerrys Plains East	21/03/2019 22:13	2.4	-1	39	Yes	IA	Nil
Knodlers Lane	19/03/2019 23:37	0.9	0.5	35	Yes	IA	Nil

Notes:
1. Atmospheric data is sourced from the HVO Corporate (or MTW Charlton Ridge for Long Point) weather station using logged meteorological data;
2. 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. Criterion may or may not apply due to rounding of meteorological data values;
3. Estimated or measured LAeq,15minute attributed to HVO North Pit Area;
4. Bold results in red indicate exceedance of criteria; and
5. NA in exceedance column means atmospheric conditions outside specified in approval and so criterion is not applicable.

Table 9: $L_{Aeq,15minute}$ HVO North - Land Acquisition Criteria – March 2019

Location	Date and Time	Wind Speed (m/s)[1]	VTG[1]	Criterion dB (A)	Criterion Applies?[2]	HVO North L_{Aeq} dB[3,4]	Exceedance[4,5]
Knodlers Lane	20/03/2019 0:02	0.9	0.5	41	Yes	IA	Nil
Maison Dieu	20/03/2019 0:25	1	3	41	Yes	IA	Nil
Shearers Lane	19/03/2019 23:37	0.9	0.5	41	Yes	IA	Nil
Kilburnie South	19/03/2019 23:00	1.1	0.5	41	Yes	IA	Nil
Jerrys Plains Village	19/03/2019 21:20	0.9	0.5	41	Yes	IA	Nil
Jerrys Plains East	19/03/2019 21:01	1.4	0.5	41	Yes	IA	Nil
Long Point Road	19/03/2019 21:00	1.4	0.5	41	Yes	IA	Nil
HVGC	19/03/2019 23:39	1	0.5	NA	NA	IA	NA
Kilburnie South	21/03/2019 23:00	2.2	-1	41	Yes	IA	Nil
Jerrys Plains Village	21/03/2019 22:36	2.3	0.5	41	Yes	<30	Nil
Jerrys Plains East	21/03/2019 22:13	2.4	-1	41	Yes	IA	Nil
Knodlers Lane	20/03/2019 0:02	0.9	0.5	41	Yes	IA	Nil

Notes:
1. Atmospheric data is sourced from the HVO Corporate (or MTW Charlton Ridge for Long Point) weather station using logged meteorological data;

2. 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. Criterion may or may not apply due to rounding of meteorological data values;
3. Estimated or measured LAeq,15minute attributed to HVO North Pit Area;
4. Bold results in red indicate exceedance of criteria; and
5. NA in exceedance column means atmospheric conditions outside specified in approval and so criterion is not applicable.

Table 10: $L_{A1,\ 1Minute}$ HVO North - Impact Assessment Criteria – March 2019

Location	Date and Time	Wind Speed (m/s)[1]	VTG[1]	Criterion dB (A)	Criterion Applies?[2]	HVO North $L_{A1,\ 1min}$ dB[3,4]	Exceedance[4,5]
Knodlers Lane	20/03/2019 0:02	0.9	0.5	46	Yes	IA	Nil
Maison Dieu	20/03/2019 0:25	1	3	46	Yes	IA	Nil
Shearers Lane	19/03/2019 23:37	0.9	0.5	46	Yes	IA	Nil
Kilburnie South	19/03/2019 23:00	1.1	0.5	46	Yes	IA	Nil
Jerrys Plains Village	19/03/2019 21:20	0.9	0.5	46	Yes	IA	Nil
Jerrys Plains East	19/03/2019 21:01	1.4	0.5	46	Yes	IA	Nil
Long Point Road	19/03/2019 21:00	1.4	0.5	46	Yes	IA	Nil
HVGC	19/03/2019 23:39	1	0.5	NA	NA	IA	NA
Kilburnie South	21/03/2019 23:00	2.2	-1	46	Yes	IA	Nil
Jerrys Plains Village	21/03/2019 22:36	2.3	0.5	46	Yes	30	Nil
Jerrys Plains East	21/03/2019 22:13	2.4	-1	46	Yes	IA	Nil
Knodlers Lane	20/03/2019 0:02	0.9	0.5	46	Yes	IA	Nil

Notes:
1. Atmospheric data is sourced from the HVO Corporate or (MTW Charlton Ridge for Long Point) weather station using logged meteorological data;
2. 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. Criterion may or may not apply due to rounding of meteorological data values;
3. These are results for HVO North Pit Area in the absence of all other noise sources;
4. Bold results in red indicate exceedance of criteria; and
5. NA in exceedance column means atmospheric conditions outside specified in approval and so criterion is not applicable

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 2019 no measurements required the penalty to be applied. The assessment for low frequency noise is shown in Table 11.

Table 11: Low Frequency Noise Assessment – March 2019

Location	Date and Time	Measured Site Only LA_{eq} dB (Sth/Nth)	Site Only LC_{eq} dB[1] (Sth/Nth)	Site Only LC_{eq}-LA_{eq} dB [1,2] (Sth/Nth)	Result Max exceedance of ref spectrum dB[1,3] (Sth/Nth)	Penalty dB(A)[1]
Knodlers Lane	20/03/2019 0:02	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA
Maison Dieu	20/03/2019 0:25	22/IA	NA/NA	NA/NA	NA/NA	NA/NA
Shearers Lane	19/03/2019 23:37	<25/IA	NA/NA	NA/NA	NA/NA	NA/NA
Kilburnie South	19/03/2019 23:00	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA
Jerrys Plains Village	19/03/2019 21:20	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA
Jerrys Plains East	19/03/2019 21:01	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA
Long Point Road	19/03/2019 21:00	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA
HVGC	19/03/2019 23:39	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA
Kilburnie South	21/03/2019 23:00	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA
Jerrys Plains Village	21/03/2019 22:36	IA/<30	NA/NA	NA/NA	NA/NA	NA/NA
Jerrys Plains East	21/03/2019 22:13	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA
Knodlers Lane	20/03/2019 0:02	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA

Notes:
1. 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, or where site-only contributions were more than 5 dB less than the relevant LAeq criterion this is noted as NA (not available) and no further assessment has been undertaken;
2. As per NPfI, if LCeq – LAeq ≥ 15 dB further assessment of low frequency noise required; and
3. 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.

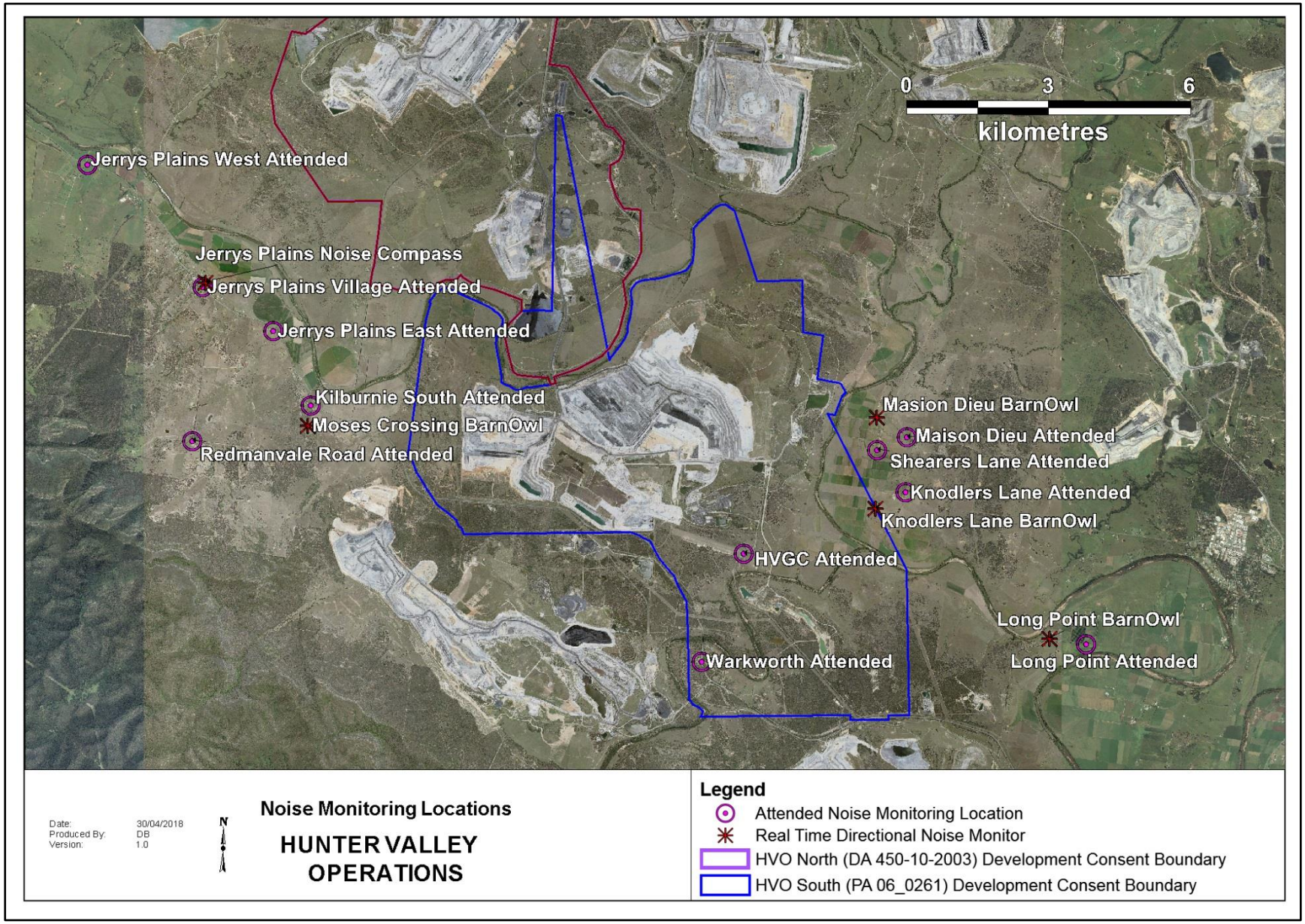

Figure 84: Noise Monitoring Location Plan

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 72 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.

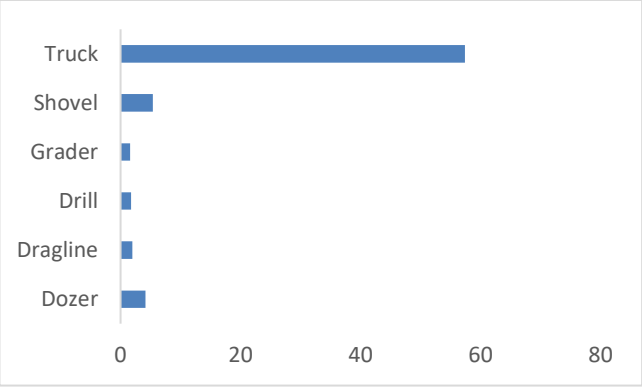

Figure 85: Operational Downtime by Equipment Type – March 2019

8.0 REHABILITATION

During March 4.4 Ha of land was released, 21.6 Ha of land was bulk shaped, 7.1 Ha of land was Topsoiled and 2.2 Ha of land was Rehabilitated.

9.0 COMPLAINTS

During March there was one complaint received from the EPA relating to dust on 6 March. The location of the complaint was described as nearby to HVO. Due to the 6th March being a regional dust day a number of actions were taken by HVO to mitigate dust including working lower in the pit, equipment shutdown and postponing a blast.

Details of complaints received YTD are shown in Table 12.

Table 12: Complaints Summary YTD

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

10.0 ENVIRONMENTAL INCIDENTS

During the reporting period there were six recordable environmental incidents.

1/3/2019 – Minor diesel spill at north light vehicle bowser

A minor spill of up to 10 litres of diesel was found at the re-fuelling area. The spill was contained and cleaned up using a spill kit in the area. All diesel was contained in the bunded area.

2/3/2019 – Truck 712 engine failure oil spill

Truck 712 was driving up a pit ramp when the engine failed and dropped approximately 200L of oil to the ground). The operator stopped and reported incident to supervisor. The area was contained and cleaned up

18/3/2019 – Turbid water entering Farrells Creek from East TSF rehabilitation area

During post rainfall surface water monitoring event, turbid water was identified in Farrell's Creek downstream from HVO. HVO conducted inspections and determined that a source of turbid water from HVO was due to rainfall runoff entraining sediment from an old rehabilitation slope.

Water samples collected and, erosion and sediment controls put in place. The Pollution Incident Response Management Plan was activated and relevant authorities were notified. There has been ongoing rehabilitation work in the area to repair the erosion and restore structures.

19/3/2019 – Class 3 Blast Fume Event

A blast in West Pit was fired and produced a class 3C fume event. The fume particulates were observed to move in the direction of Ravensworth Open Cut before dispersing over mine land.

An additional check has been added to the Pre-blasting Environmental Checklist to review the weather forecast 48 hours in advance to prevent blasting shots that have been exposed to rainfall producing fume.

28/3/2019 – Excavator 306 leaking hydraulic hose

Excavator 306 developed a hydraulic oil leak under the machine caused by a failed hydraulic hose. The operator stopped operation and reported to supervisor and the spill was contained and cleaned up.

30/3/2019 – Turbid water entered Farrells Creek from two sediment dams

During a significant rainfall event resulted (66 mm) turbid water was observed entering Farrells Creek from the overflow of two sediment dams. Regulatory notifications were made and pumps used to lower dam levels. Water monitoring was undertaken which indicated that there was no environmental impact as receiving waters were of poorer quality than the water from the sediment dams. The incident is currently under investigation.

Appendix A: Meteorological Data

Table 13: Meteorological Data - HVO Corporate Meteorological Station – March 2019

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)
1/03/2019	31	12	89	17	1316	114	4	0
2/03/2019	31	13	79	19	1312	120	4	0
3/03/2019	32	12	97	21	921	132	3	0
4/03/2019	34	13	89	14	900	128	2	0
5/03/2019	36	12	96	10	885	164	2	0
6/03/2019	36	16	80	12	1120	237	4	0
7/03/2019	22	12	81	52	247	119	4	0
8/03/2019	33	11	84	22	1132	140	2	0
9/03/2019	35	16	100	21	1292	187	3	17.4
10/03/2019	33	15	100	17	1289	209	2	0
11/03/2019	34	16	84	14	878	185	3	0
12/03/2019	35	14	90	5	914	230	3	0
13/03/2019	27	14	82	42	1256	120	5	0
14/03/2019	33	14	89	16	1308	141	3	0
15/03/2019	27	13	86	38	1268	120	4	0
16/03/2019	21	12	100	62	852	114	2	6.6
17/03/2019	21	12	100	74	579	217	2	27
18/03/2019	24	13	92	49	526	257	2	16
19/03/2019	25	12	98	52	1335	171	1	0.6
20/03/2019	28	12	100	39	1361	129	2	0
21/03/2019	28	12	100	41	1195	144	2	0
22/03/2019	28	13	100	42	1232	142	2	13.6
23/03/2019	23	18	97	81	-7	127	3	4
24/03/2019	34	17	83	31	912	181	2	0
25/03/2019	25	15	99	54	693	257	3	2.8
26/03/2019	26	11	97	22	971	255	4	0.6
27/03/2019	25	8	88	27	1067	120	3	0
28/03/2019	26	9	88	30	963	120	2	0
29/03/2019	28	9	98	31	1284	167	1	0
30/03/2019	24	6	100	30	1173	238	4	66
31/03/2019	21	5	60	26	844	278	4	0