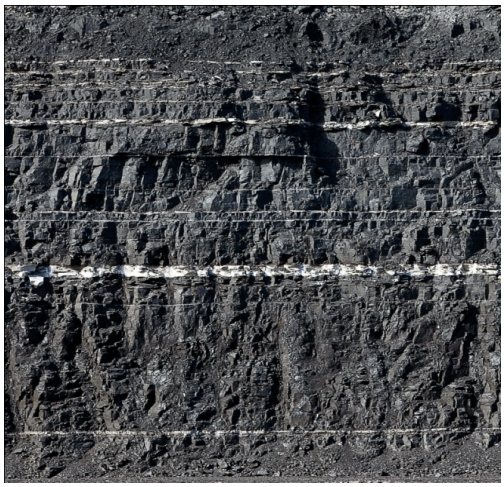
HUNTER VALLEY OPERATIONS



Monthly Environmental Monitoring Report

Hunter Valley Operations

September 2018

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Revision History

Version No.	Person Responsible	Document Status	Date
1.0	**Environment & Community Officer**	**Draft**	**3/01/2019**
1.1	**Environment & Community Coordinator**	**Final**	**8/01/2019**

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 September to 30th September 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)
September	16.8	239.6

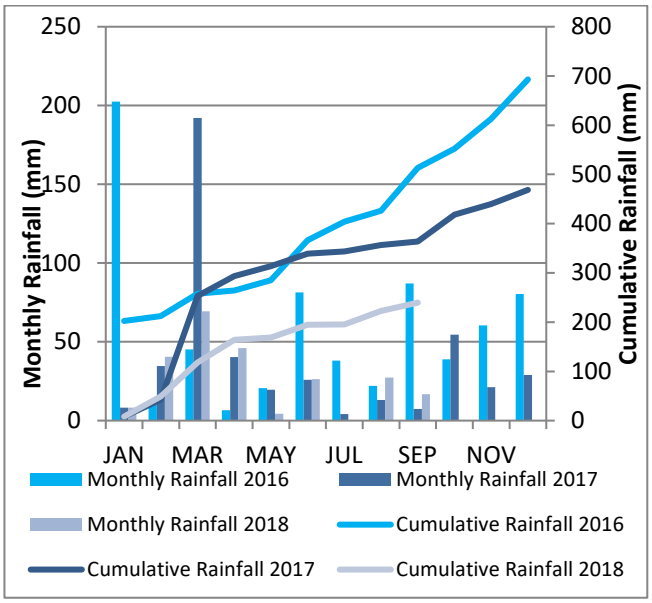

Figure 1: Rainfall Summary 2018

2.1.2 Wind Speed and Direction

North Westerly and South Easterly winds were dominant during September as shown in Figure 2 (HVO Corporate) and Figure 3 (HVO Cheshunt).

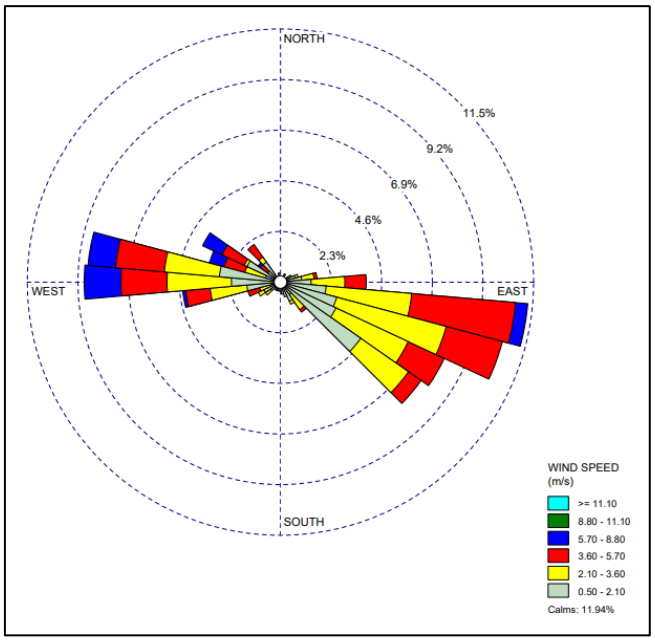

Figure 2: HVO Corporate Wind Rose – September 2018

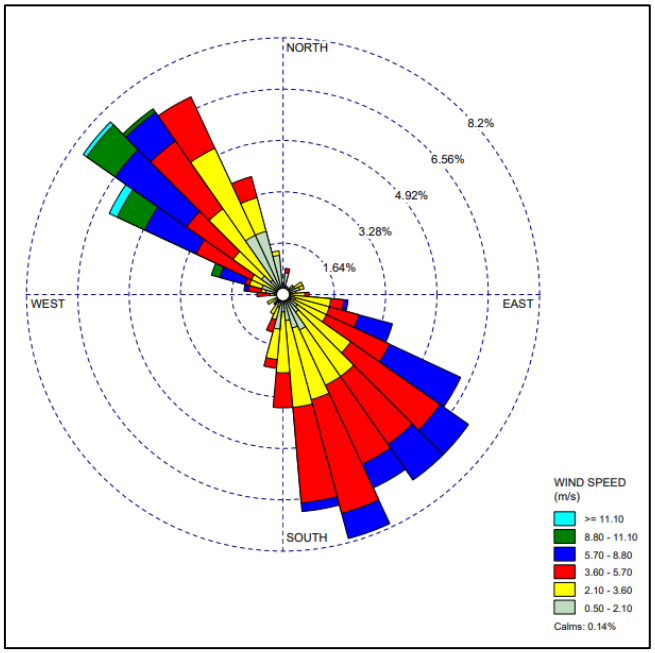

Figure 3: HVO Cheshunt Wind Rose – September 2018

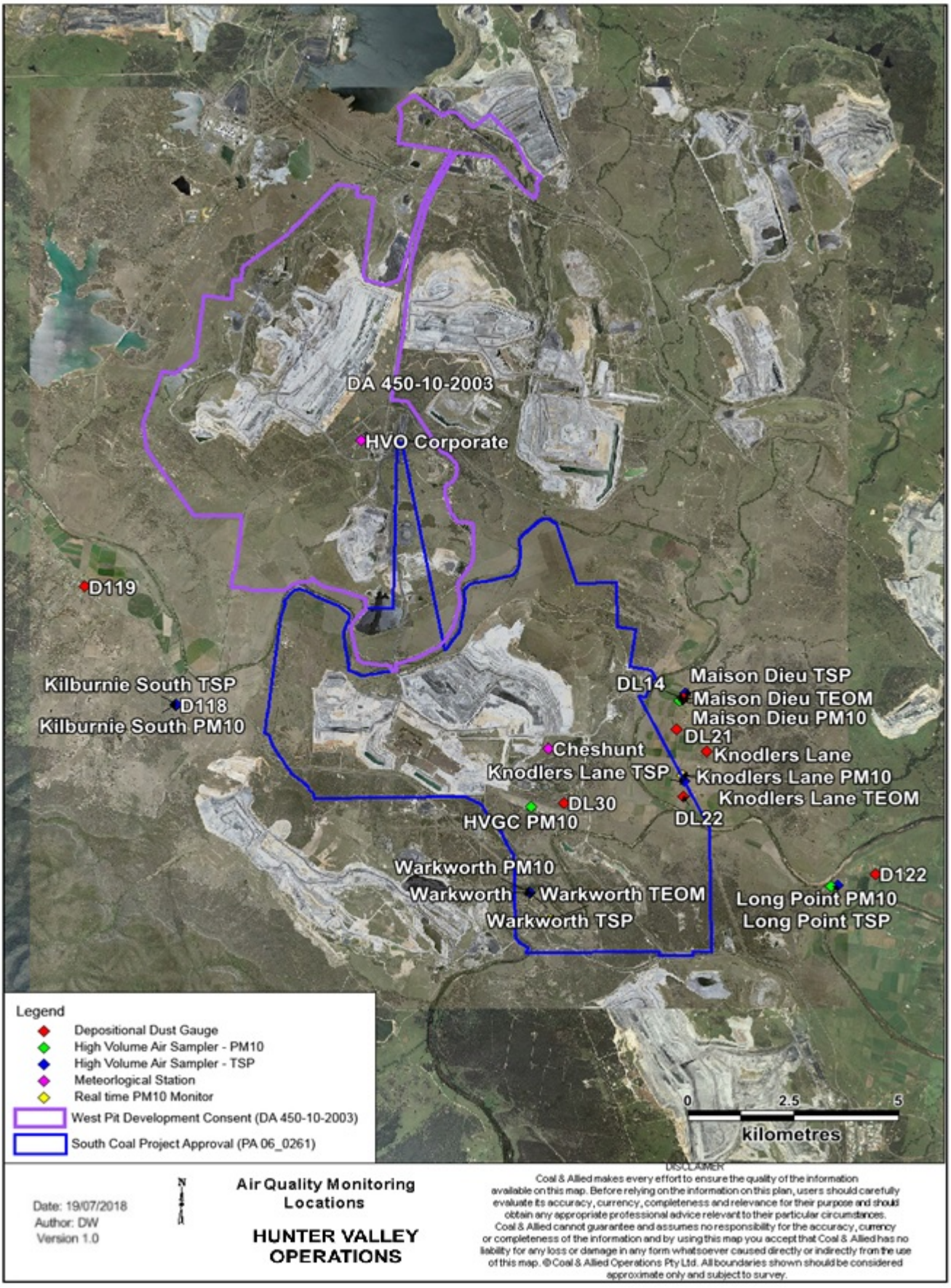

Figure 4: Air Quality Monitoring Location Plan

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 DL22, D118, DL30 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 DL22 and DL30 monitor's results indicate that the sample was contaminated with bird droppings and insects. Accordingly, this result will not be included in the annual average calculation.

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.

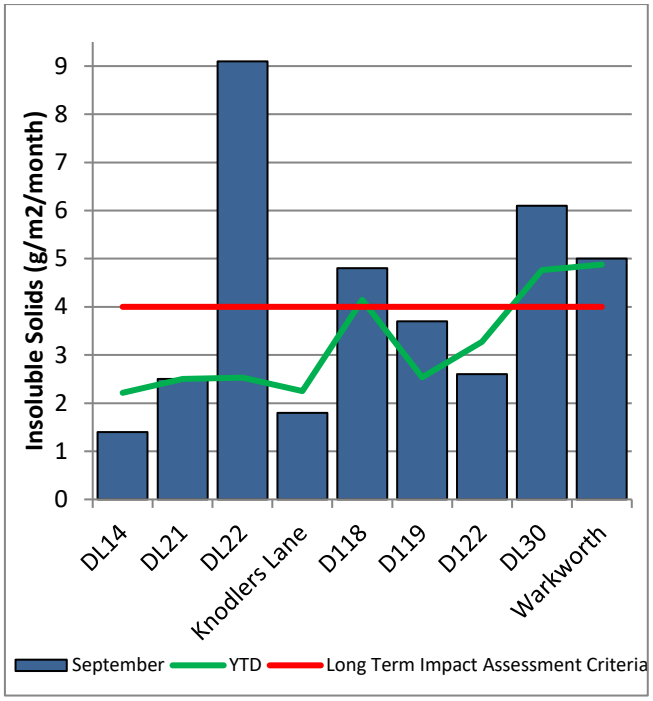

Figure 5: Depositional Dust Results – September 2018

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/m^3.

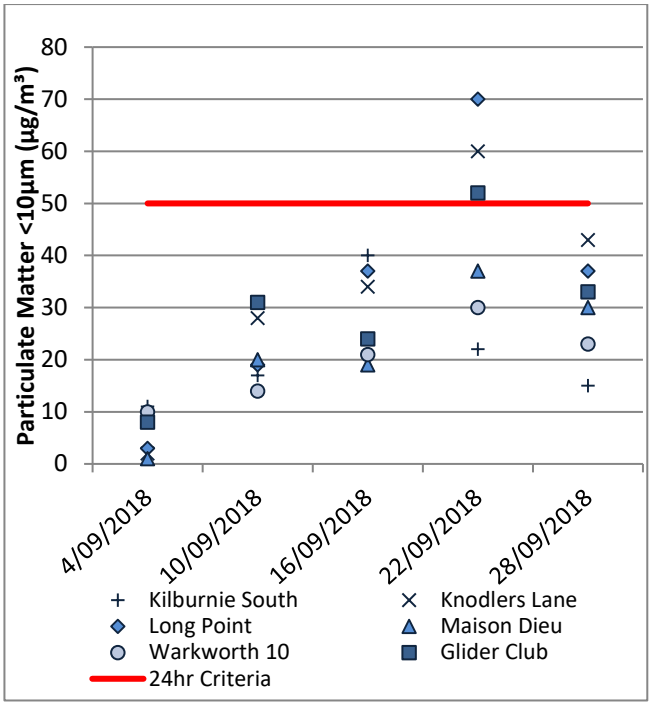

Figure 6: Individual PM_{10} Results – September 2018

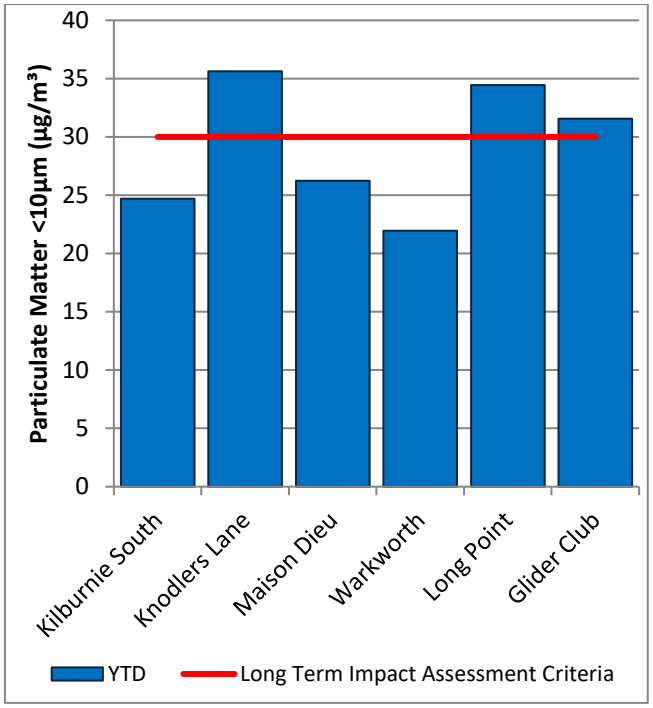

Figure 7: Year to Date Average PM_{10} – September 2018

On 22 September 2018 three HVAS PM_{10} units recorded elevated 24 hour averages: Glider Club (52µg/m^3), Knodlers Lane (60µg/m^3) and Long Point (70µg/m^3). HVO's maximum contribution was calculated to be the following:

- Glider Club: 31.0 µg/m^3 or 51.7% of the measured result;
- Knodlers Lane: 38.0 µg/m^3 or 63.3% of the measured result;
- Long Point: <38.0 µg/m^3 or <54.3% of the measured result.

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.

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.

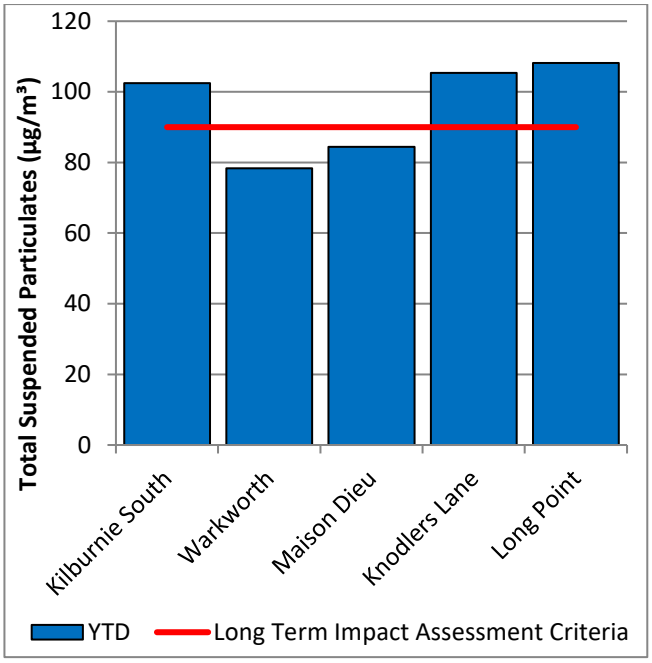

Figure 8: Year to Date Average Total Suspended Particulates – September 2018

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 September the real time monitoring system generated 148 automated air quality related alarms. 20 were related to adverse weather conditions and 128 alarms relating to PM_{10}.

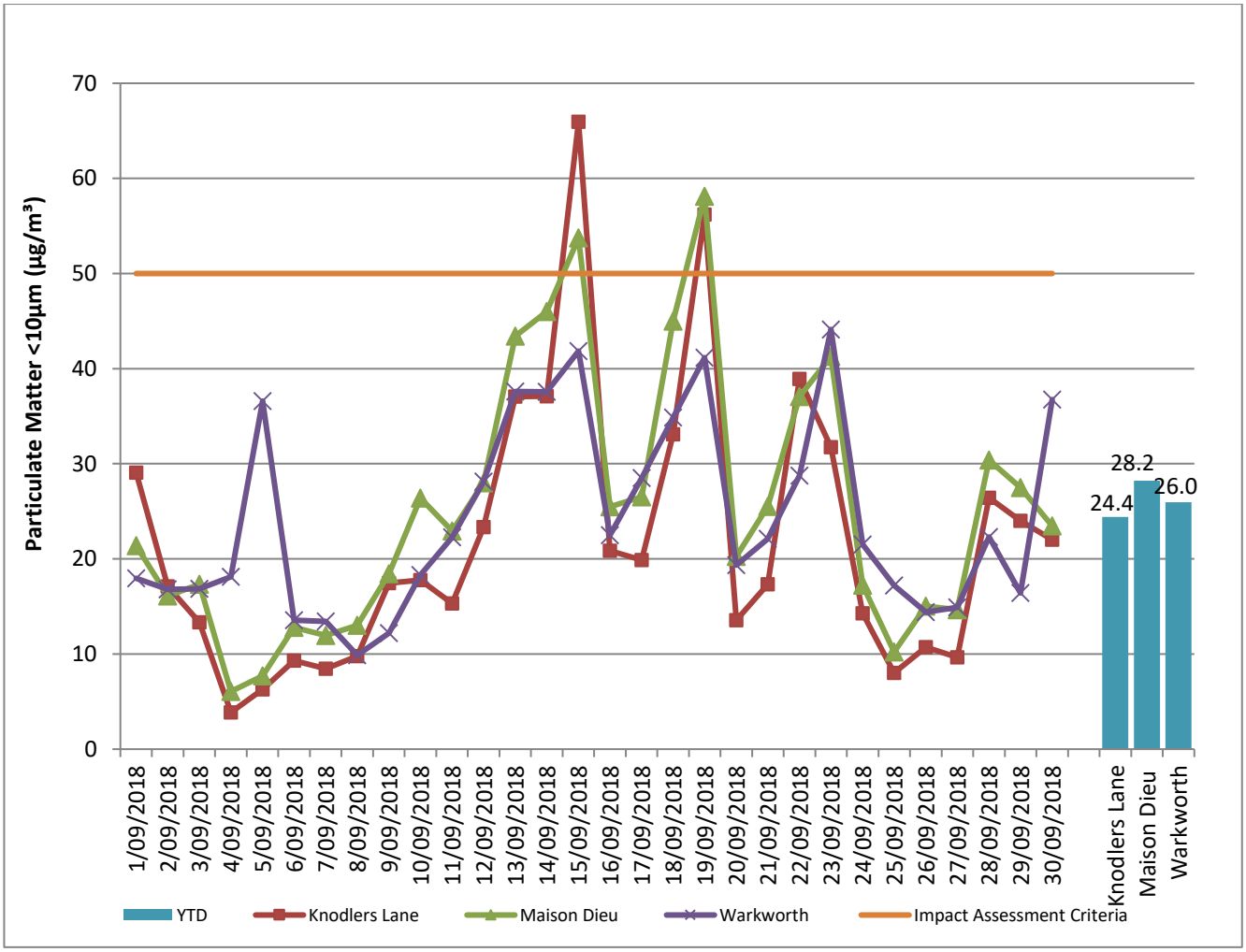

Figure 9: Real Time PM_{10} 24hr average and YTD average – September 2018

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
15/09/2018	Maison Dieu TEOM	53.8	17.3	An internal investigation determined HVO maximum potential contribution to be in the order of 17.3ug/m3 or 32.2% of the total measured based on prevailing wind conditions and upwind monitoring results.
15/09/2018	Knodlers Lane TEOM	65.9	29.5	An internal investigation determined HVO maximum potential contribution to be in the order of 29.5ug/m3 or 44.8% of the total measured based on prevailing wind

				conditions and upwind monitoring results.
19/09/2018	Maison Dieu TEOM	58.1	19.0	An internal investigation determined HVO maximum potential contribution to be in the order of 19.0ug/m3 or 32.8% of the total measured based on prevailing wind conditions and upwind monitoring results.
19/09/2018	Knodlers Lane TEOM	56.6	21.3	An internal investigation determined HVO maximum potential contribution to be in the order of 21.3ug/m3 or 37.6% 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 3 2018 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 (2015 – current) within HVO mine dams. Figure 13 to Figure 21 show the long term surface water trend (2015 – current) in surrounding watercourses.

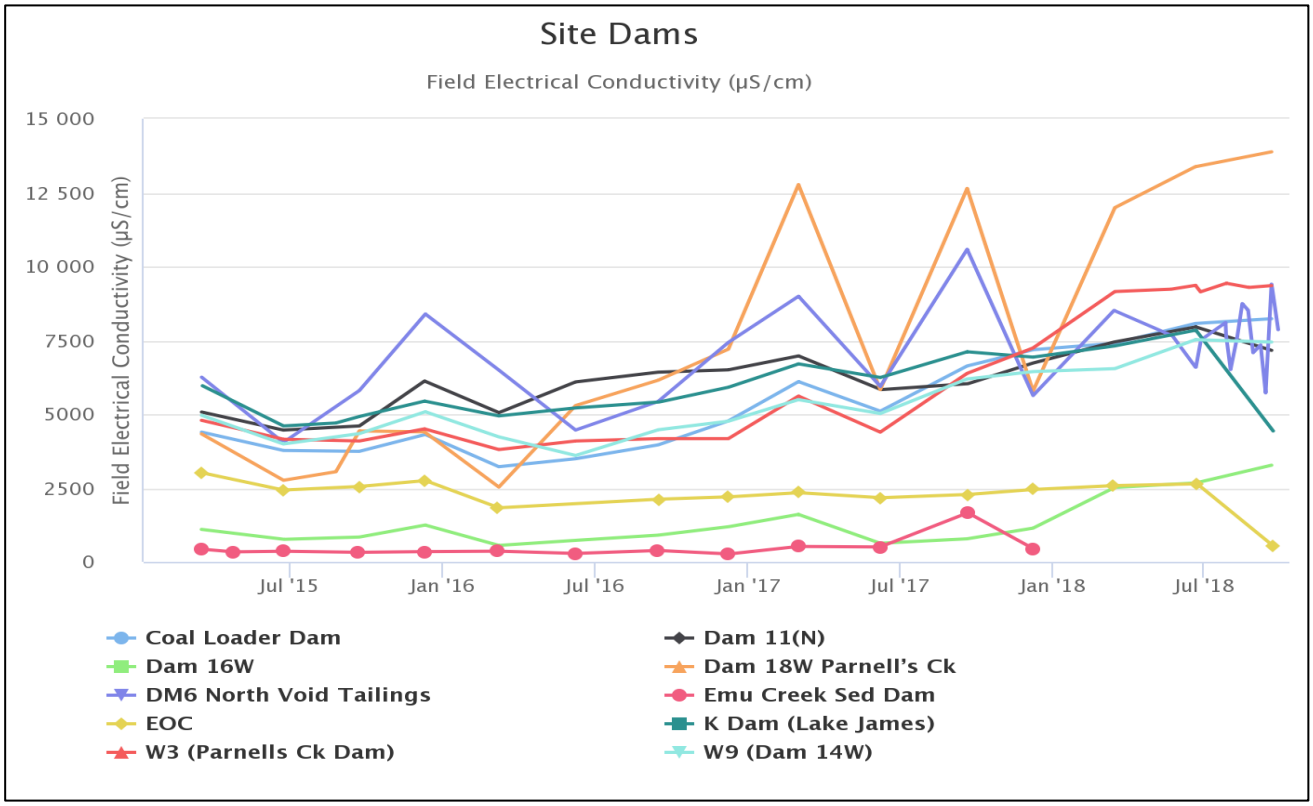

Figure 10: Site Dams Electrical Conductivity Trend – September 2018

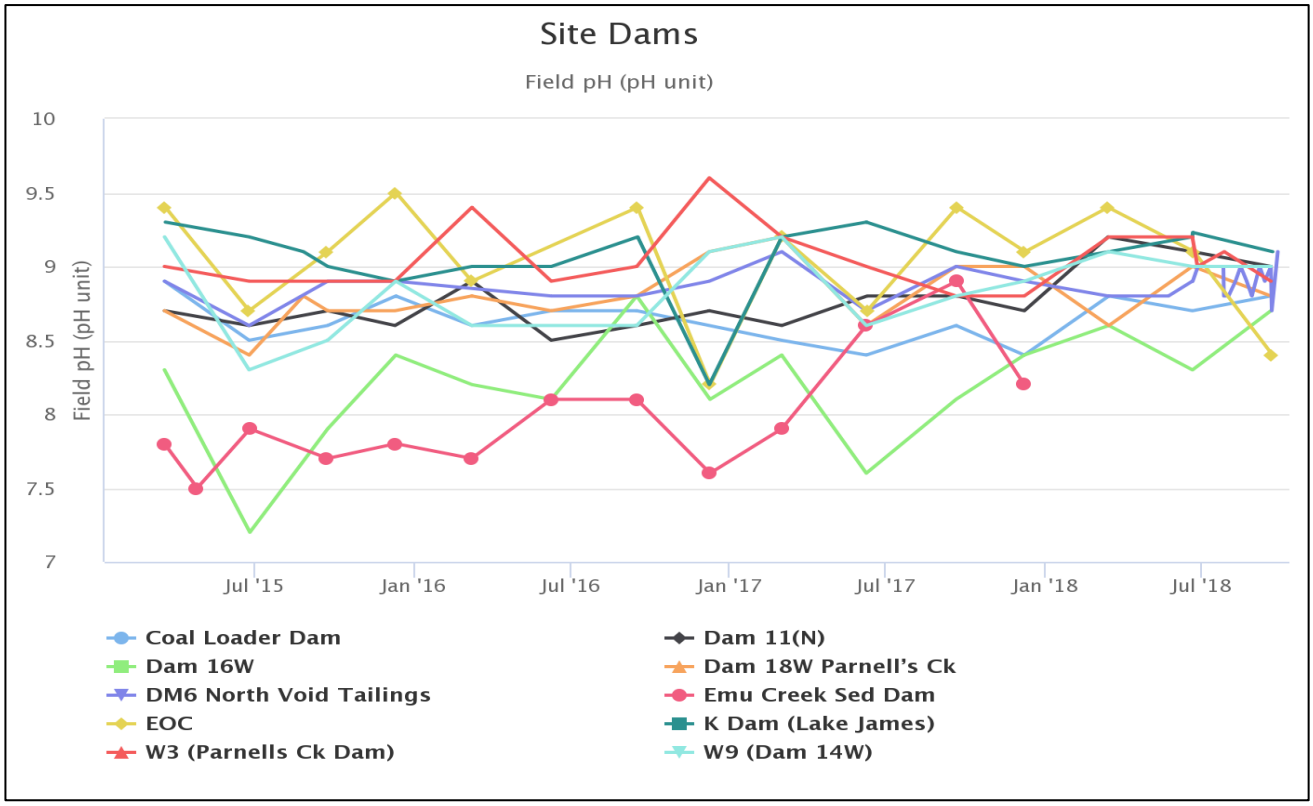

Figure 11: Site Dams pH Trend – September 2018

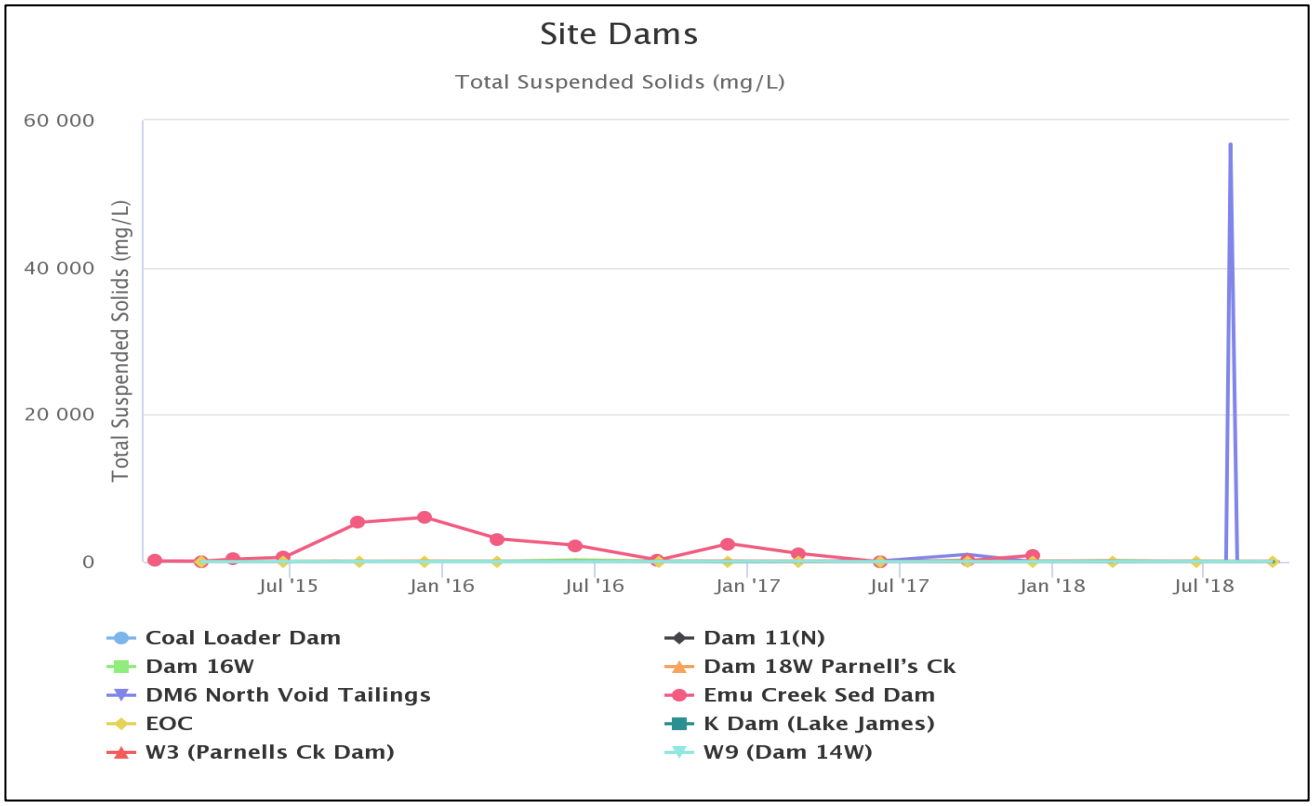

Figure 12: Site Dams Total Suspended Solids Trend – June 2018

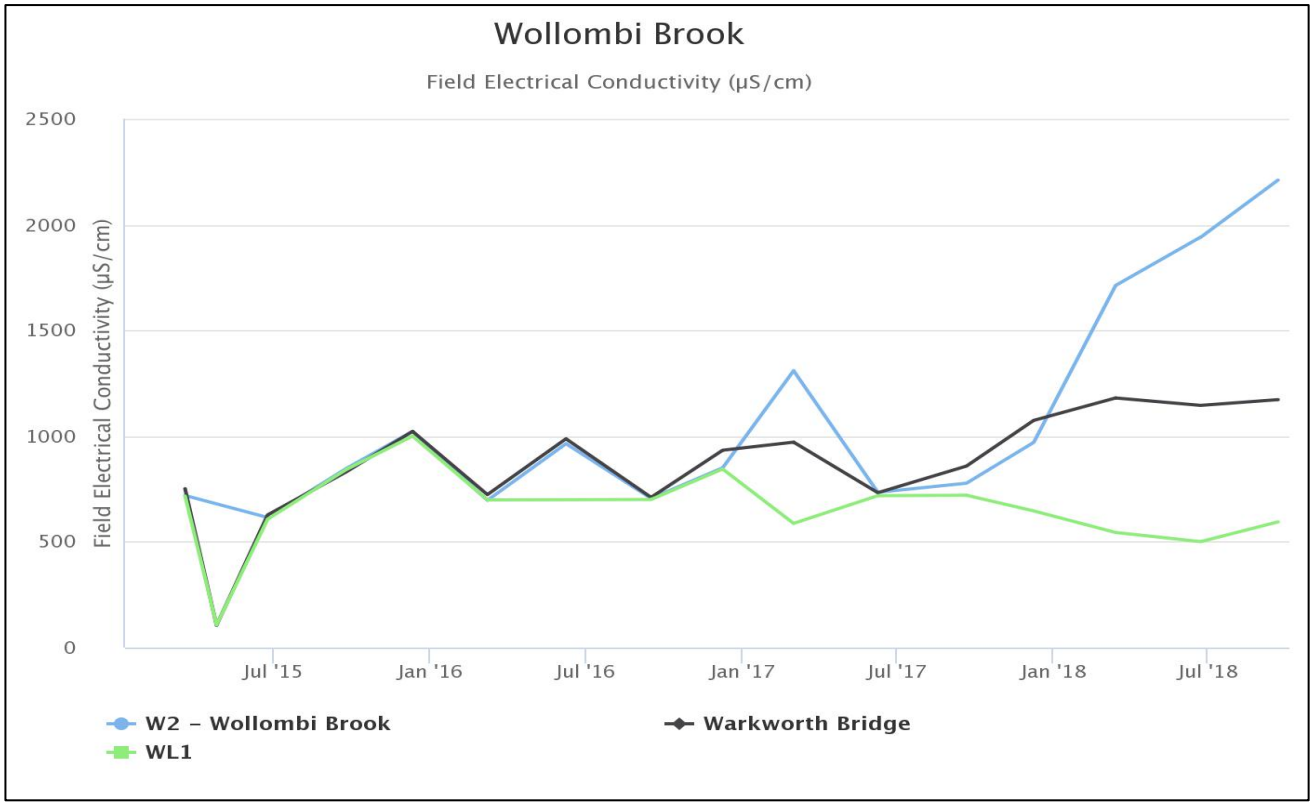

Figure 13: Wollombi Brook Electrical Conductivity Trend – September 2018

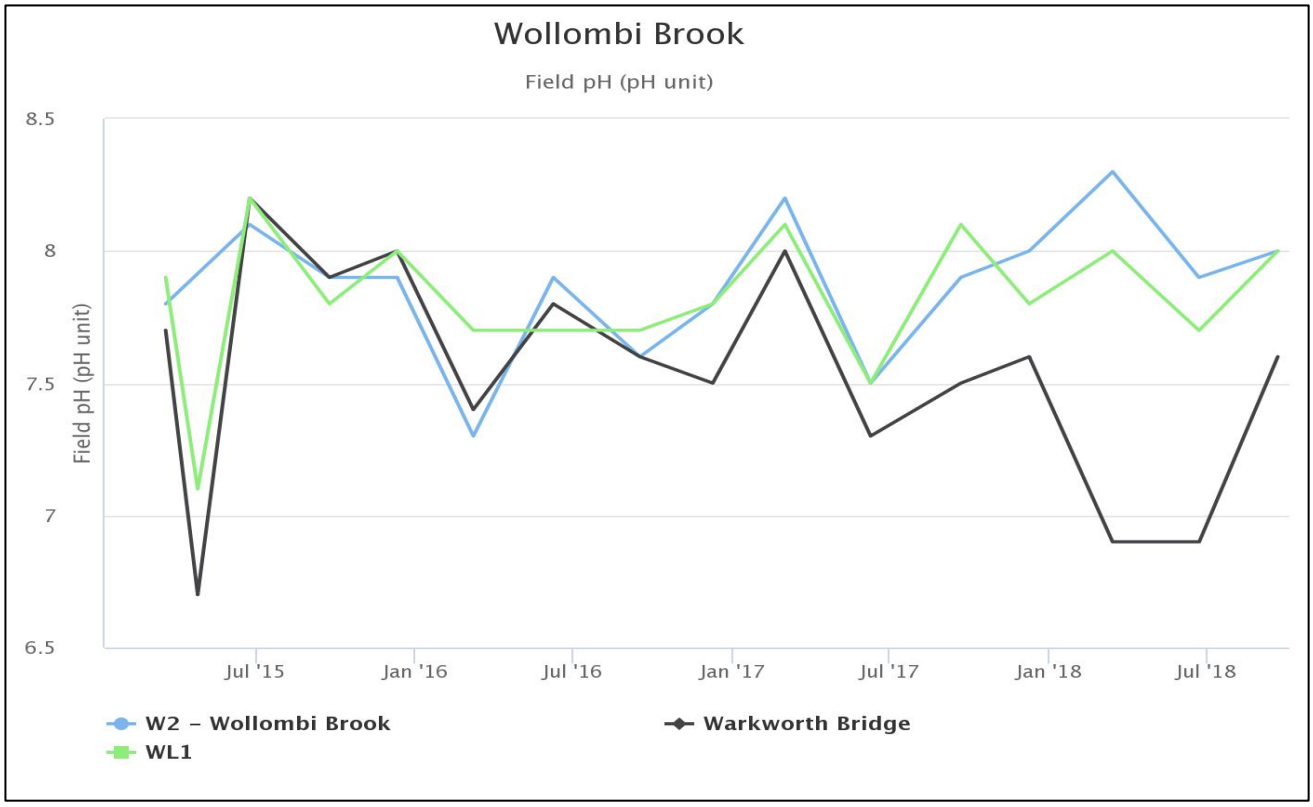

Figure 14: Wollombi Brook pH Trend – September 2018

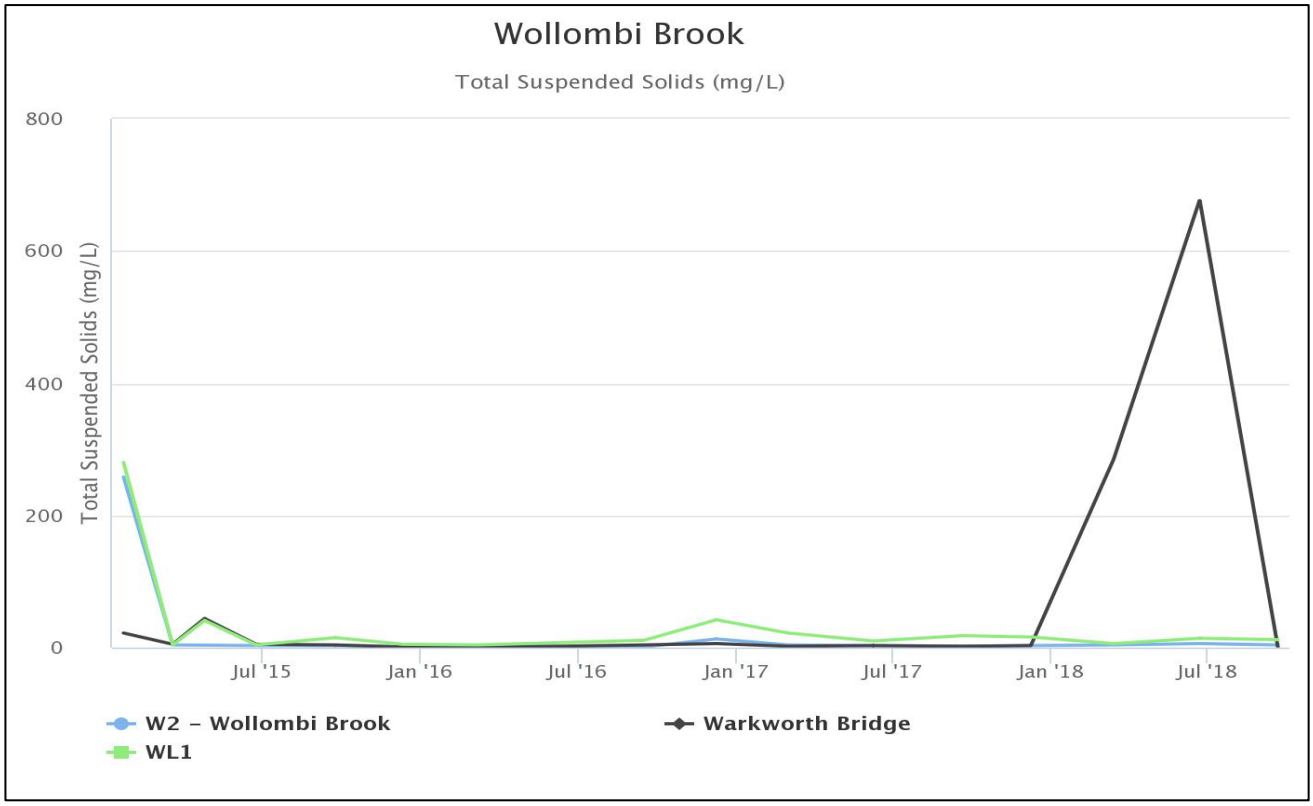

Figure 15: Wollombi Brook Total Suspended Solids Trend – September 2018

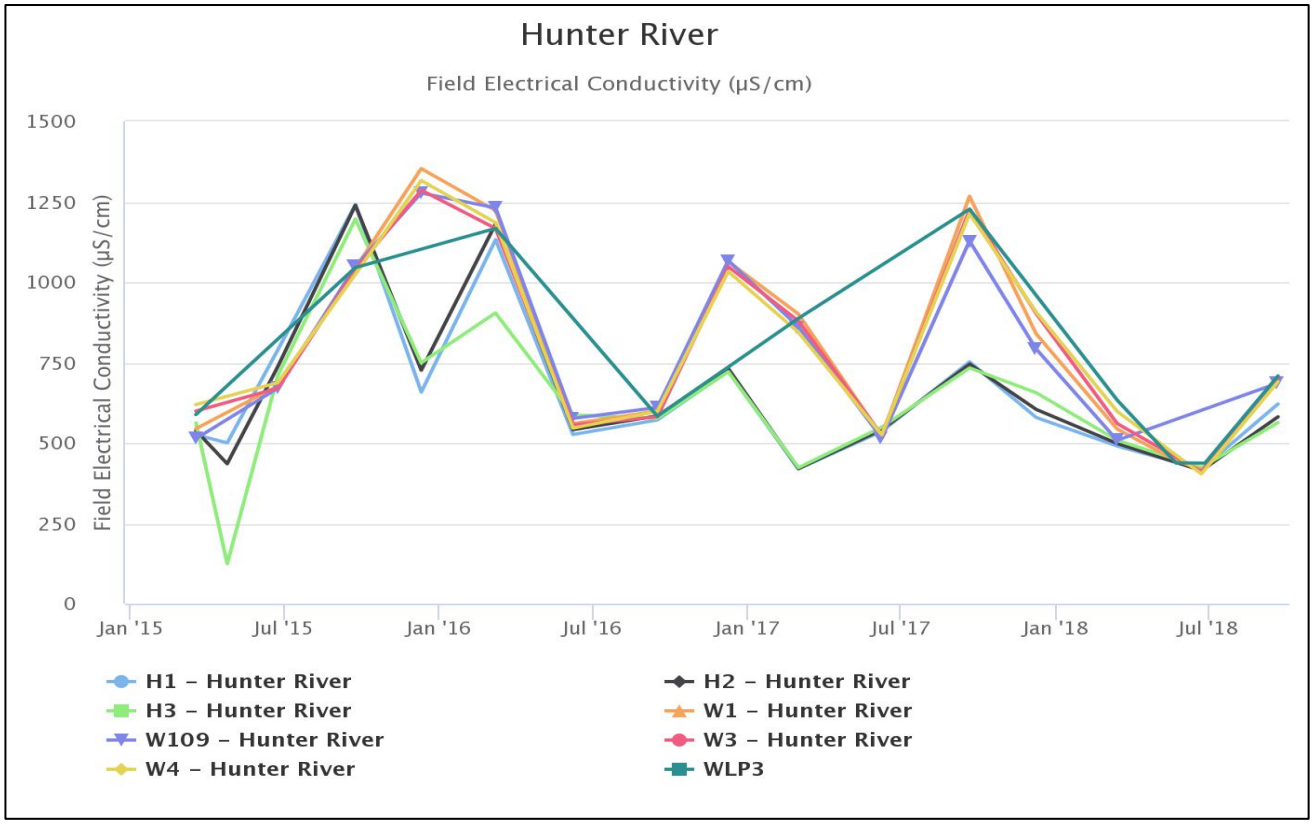

Figure 16: Hunter River Electrical Conductivity Trend – September 2018

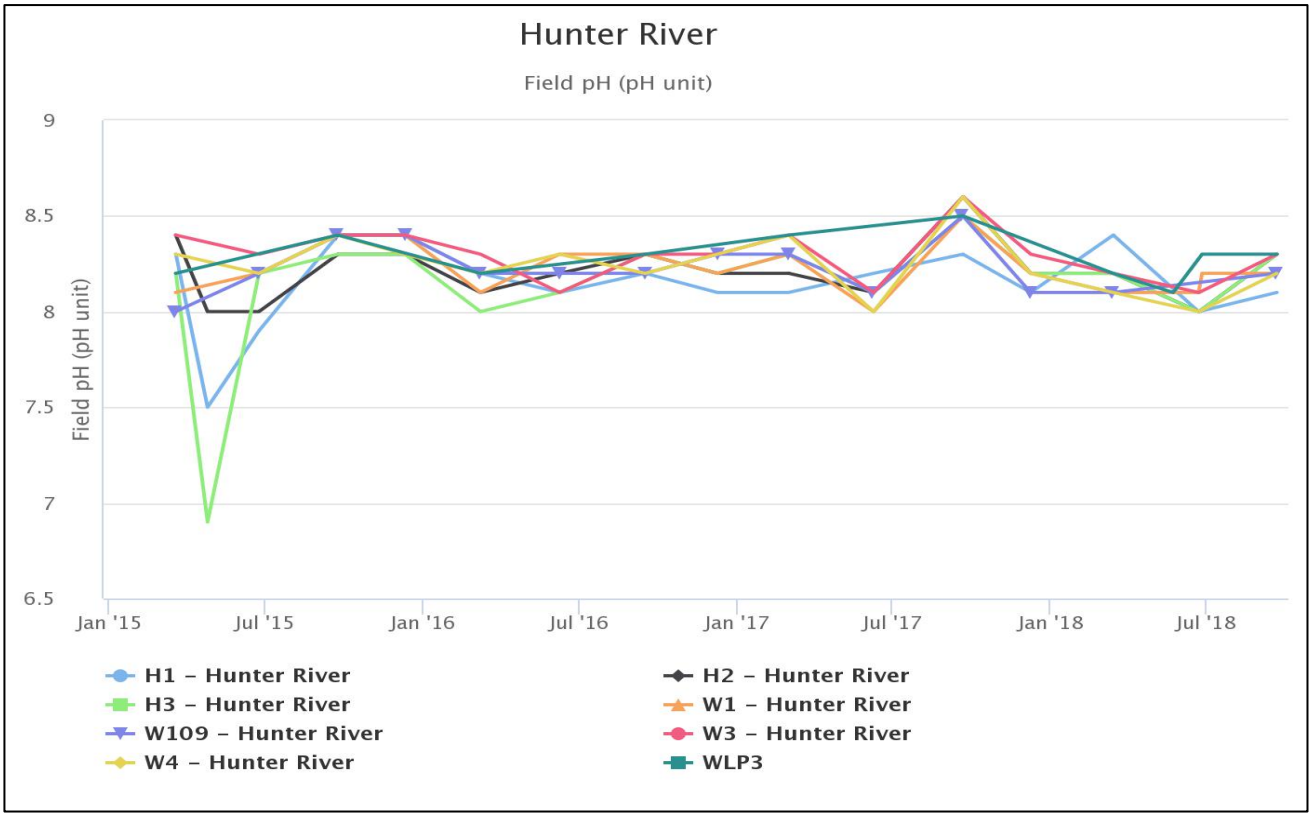

Figure 17: Hunter River pH Trend – September 2018

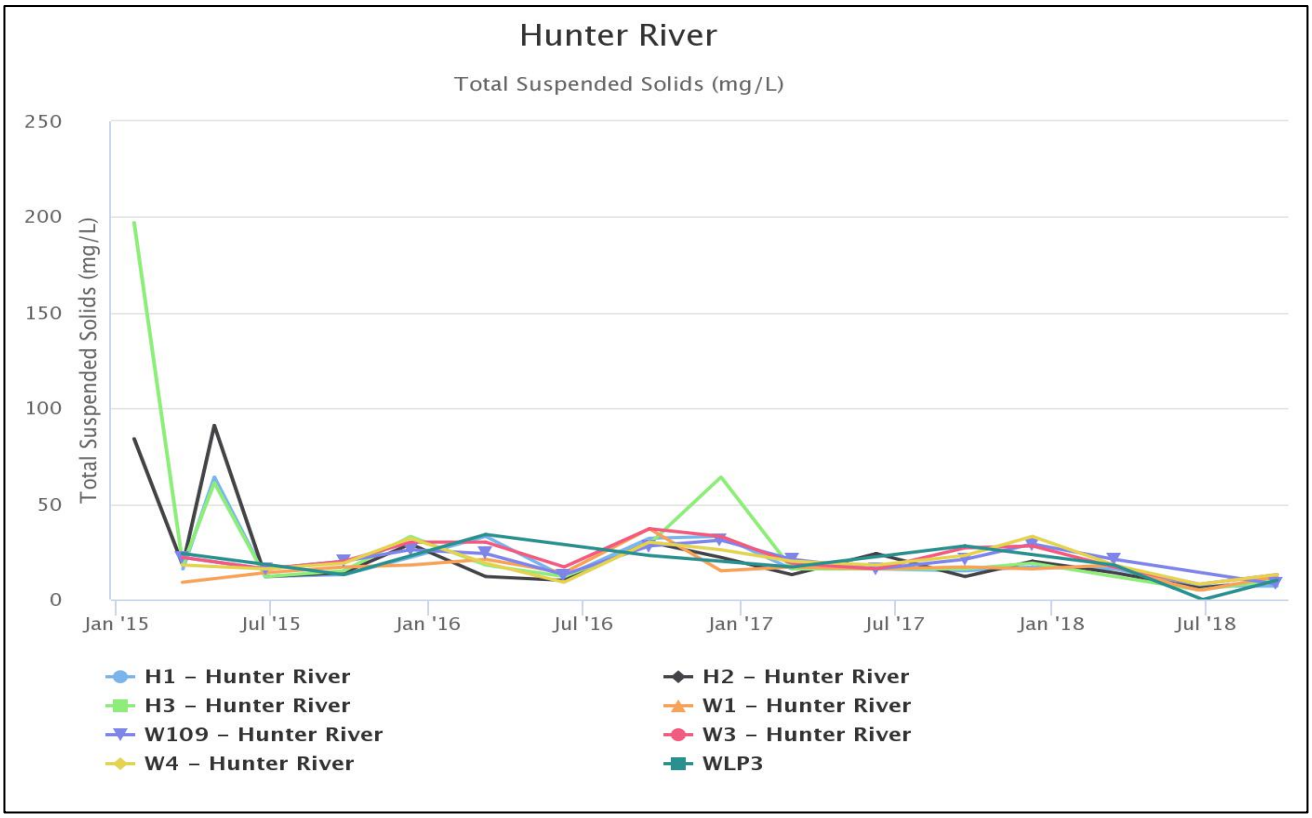

Figure 18: Hunter River Total Suspended Solids – September 2018

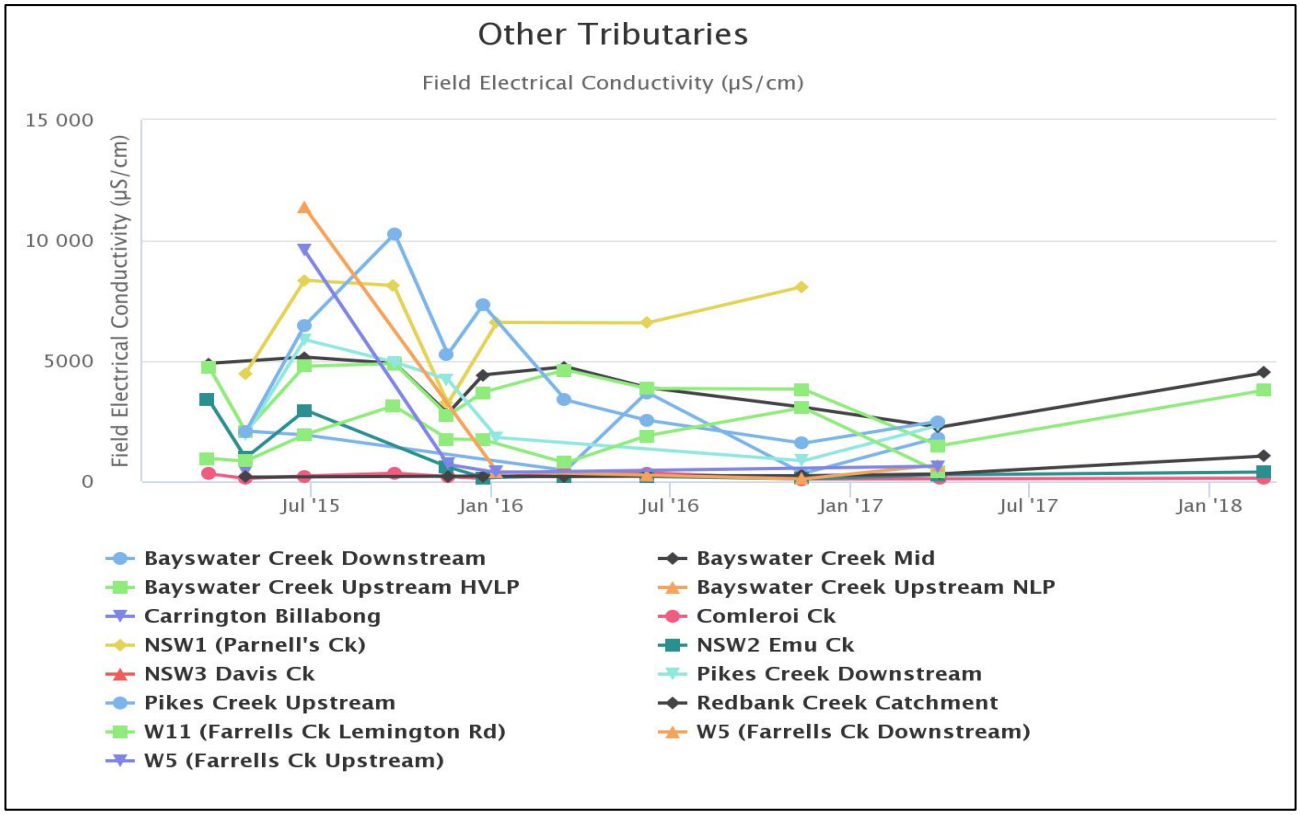

Figure 19: Other Tributaries Electrical Conductivity Trend – September 2018

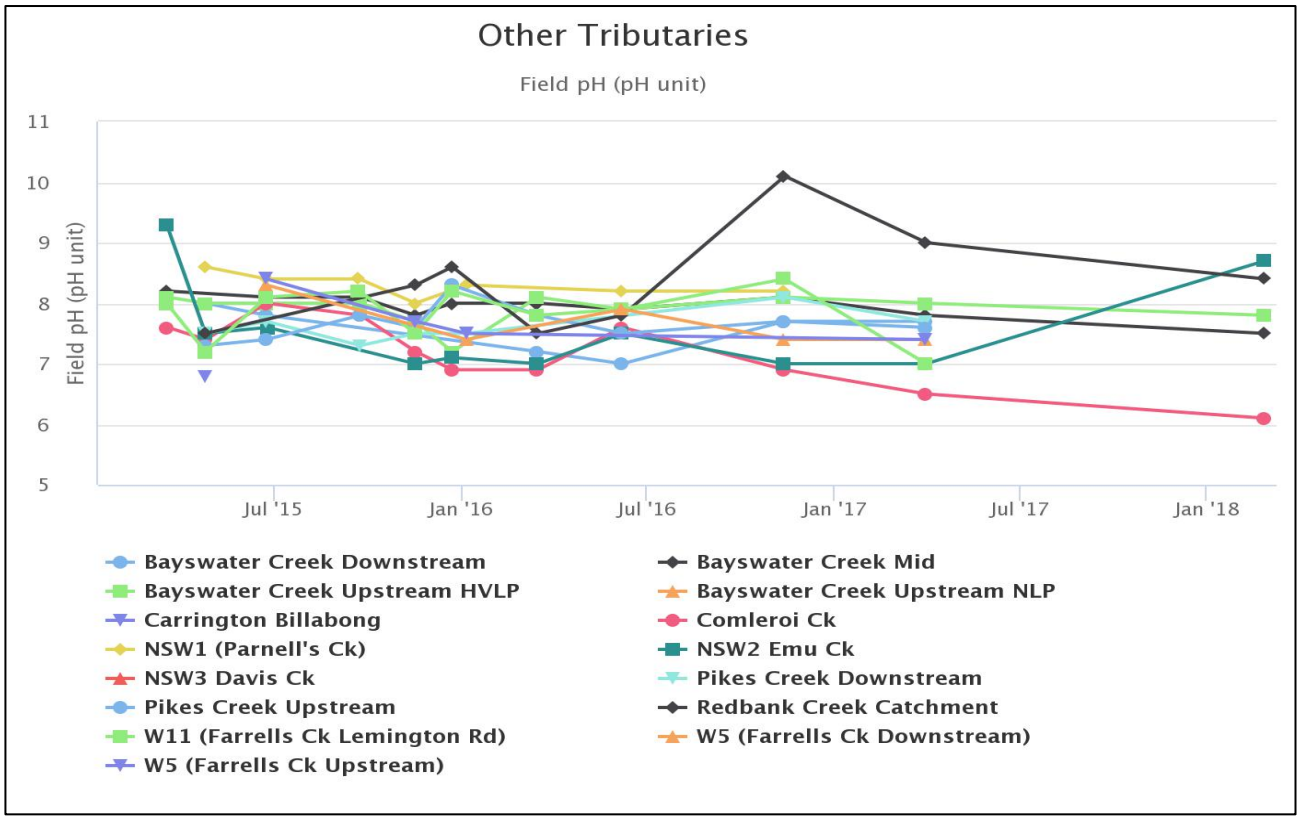

Figure 20: Other Tributaries pH Trend – September 2018

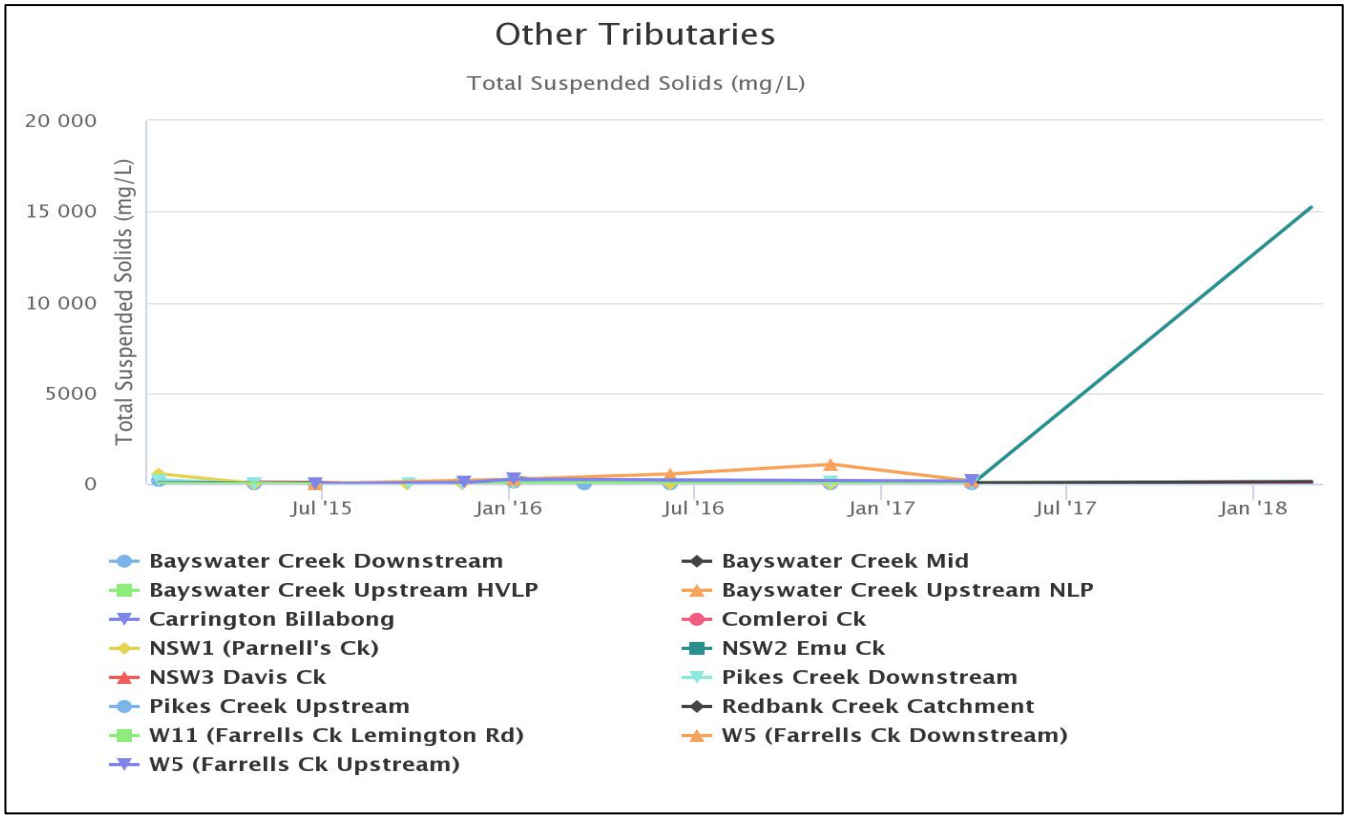

Figure 21: Other Tributaries Total Suspended Solids Trend – September 2018

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.

Trigger limits that have been breached during Quarter 3 2018 are summarised in Table 3.

Table 3: Surface Water Trigger Limit Summary

Site	Date	Trigger Limit Breached	Action taken in response
W2	21/09/2018	EC – 95th Percentile	Third consecutive exceedance of EC trigger (2210µs/cm) Investigation identified that sample was collected from turbid pooling water in the Wollombi Brook as there was no flow. Samples taken downstream in the Wollombi Brook recorded EC level at 594µs/cm. Maintain watching brief.
Warkworth Bridge	21/09/2018	EC -95th Percentile	Fourth consecutive exceedance of EC trigger (1172µs/cm). Investigation identified that sample was collected from turbid pooling water in the Wollombi Brook as there was no flow. Samples

	taken downstream in the Wollombi Brook recorded EC level at 594µs/cm. Maintain watching brief.

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

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 413.3ML 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.

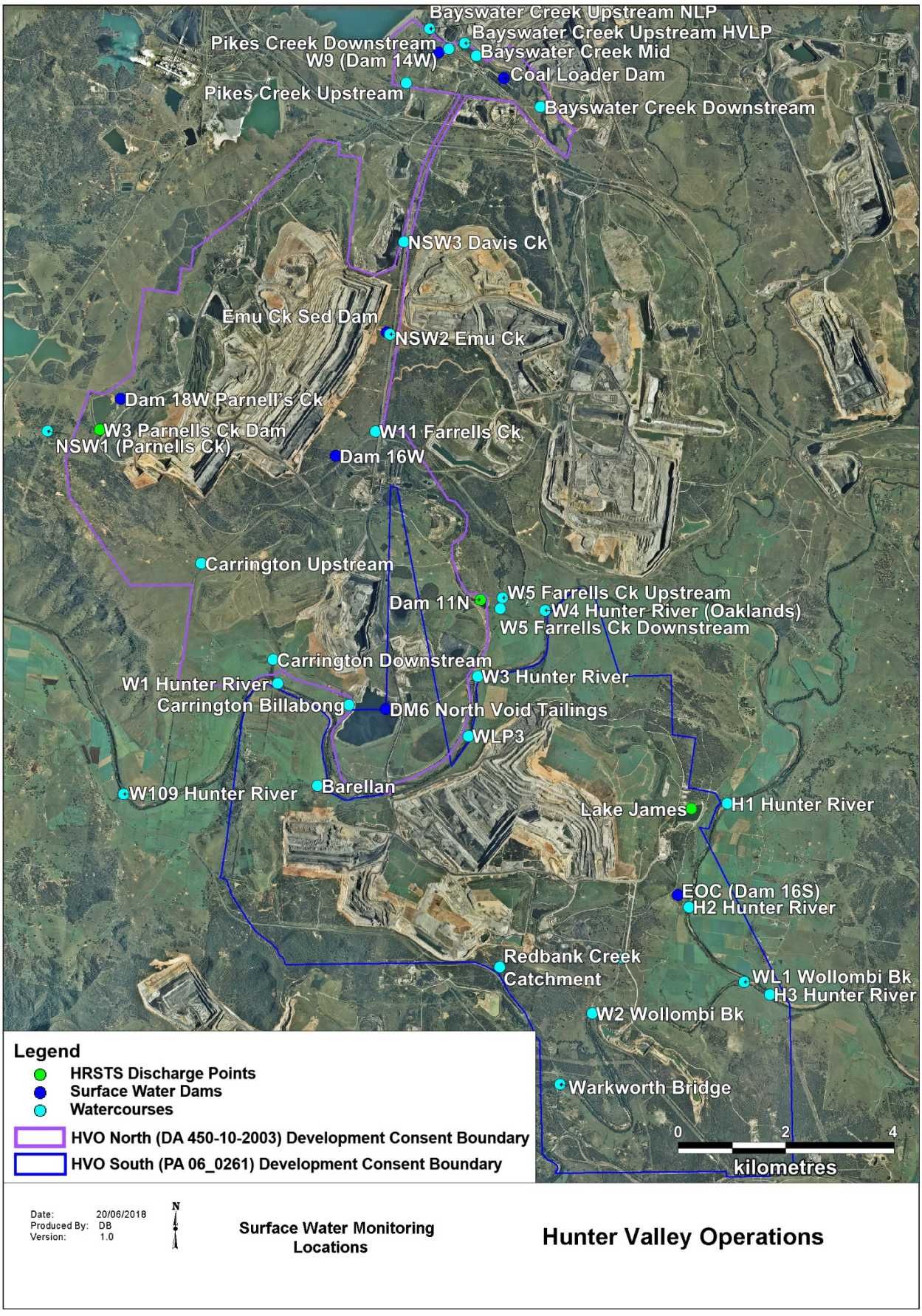

Figure 22: Surface Water Monitoring Location Plan

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.

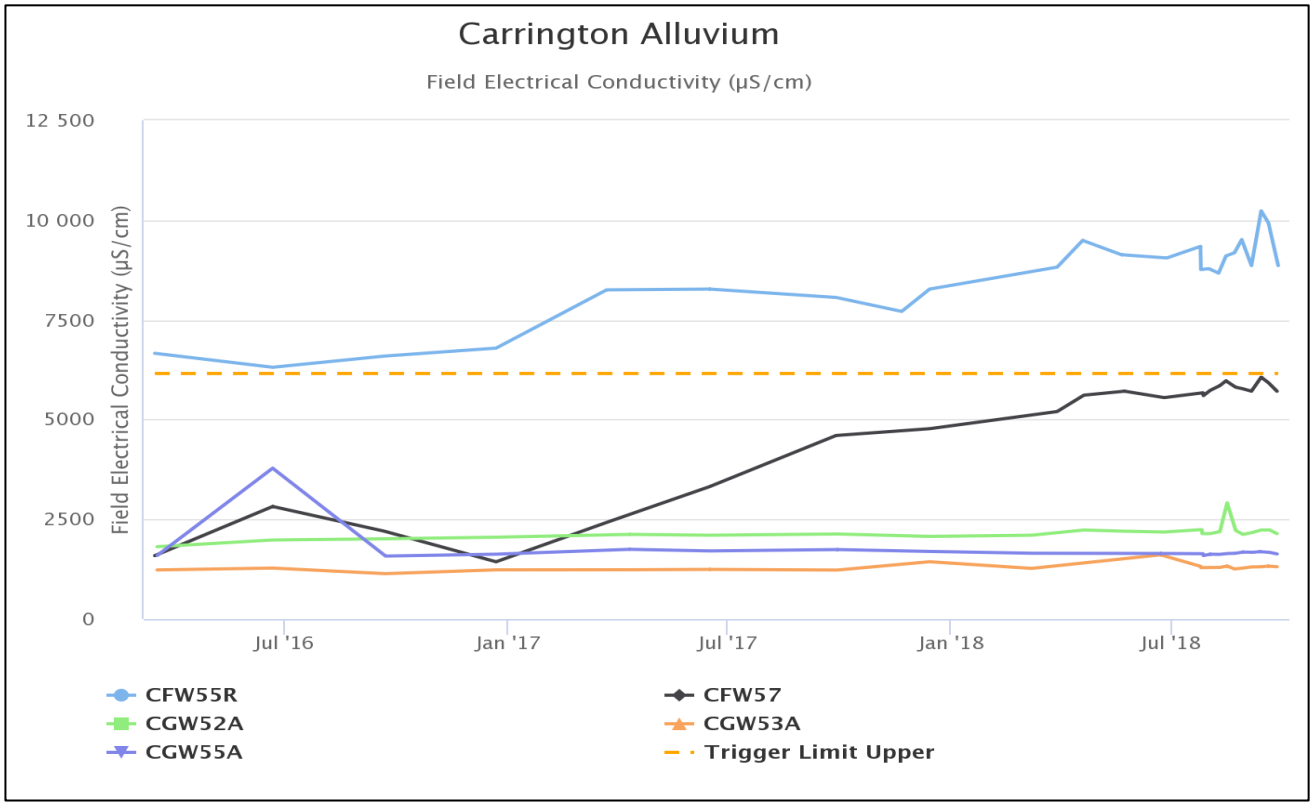

Figure 23: Carrington Alluvium Electrical Conductivity Trend – September 2018

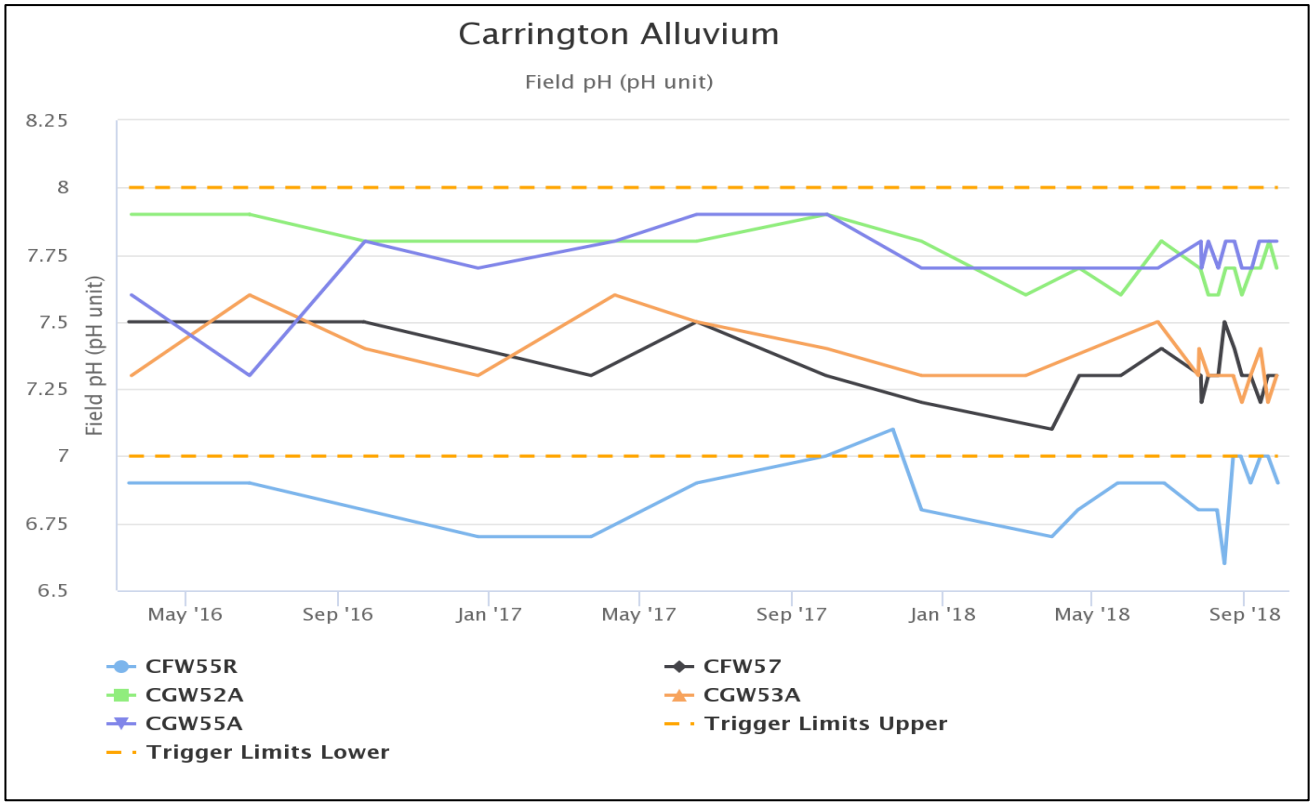

Figure 24: Carrington Alluvium pH Trend – September 2018

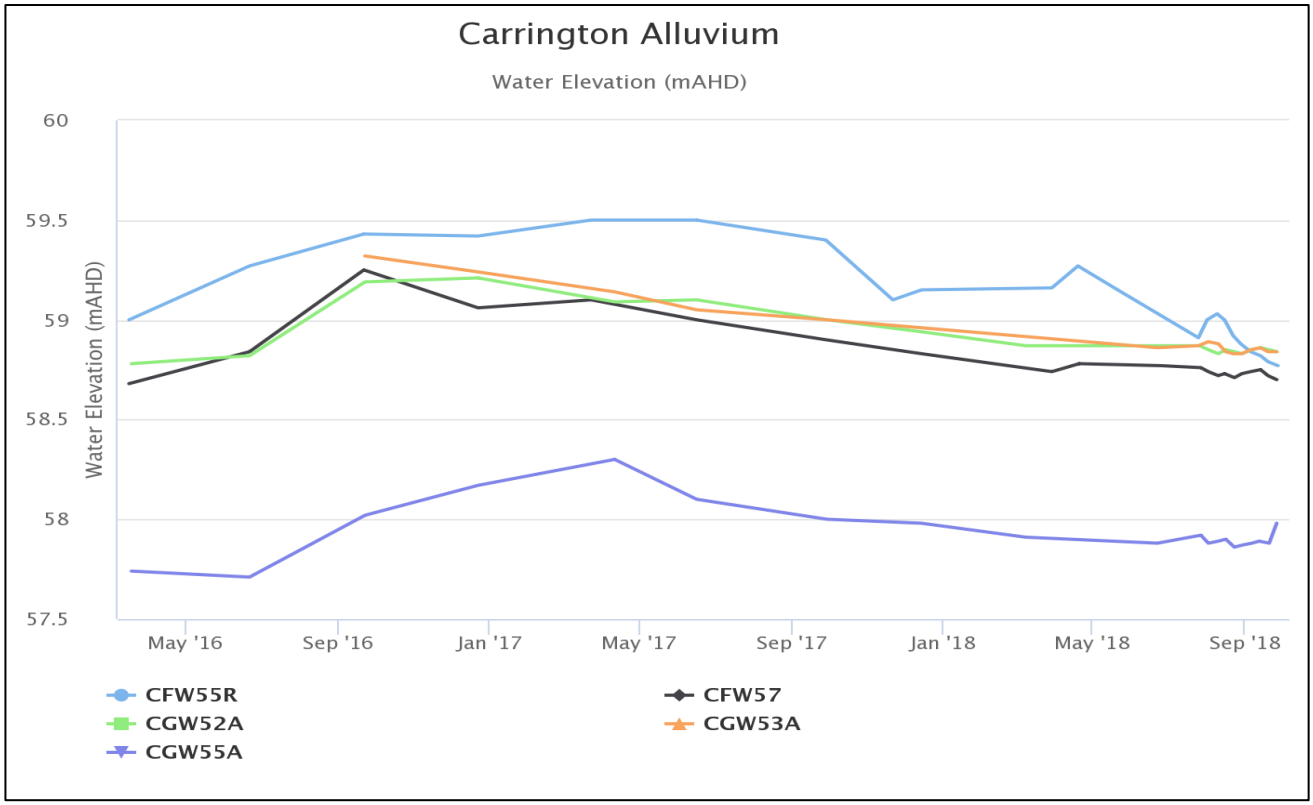

Figure 25: Carrington Alluvium Standing Water Level – September 2018

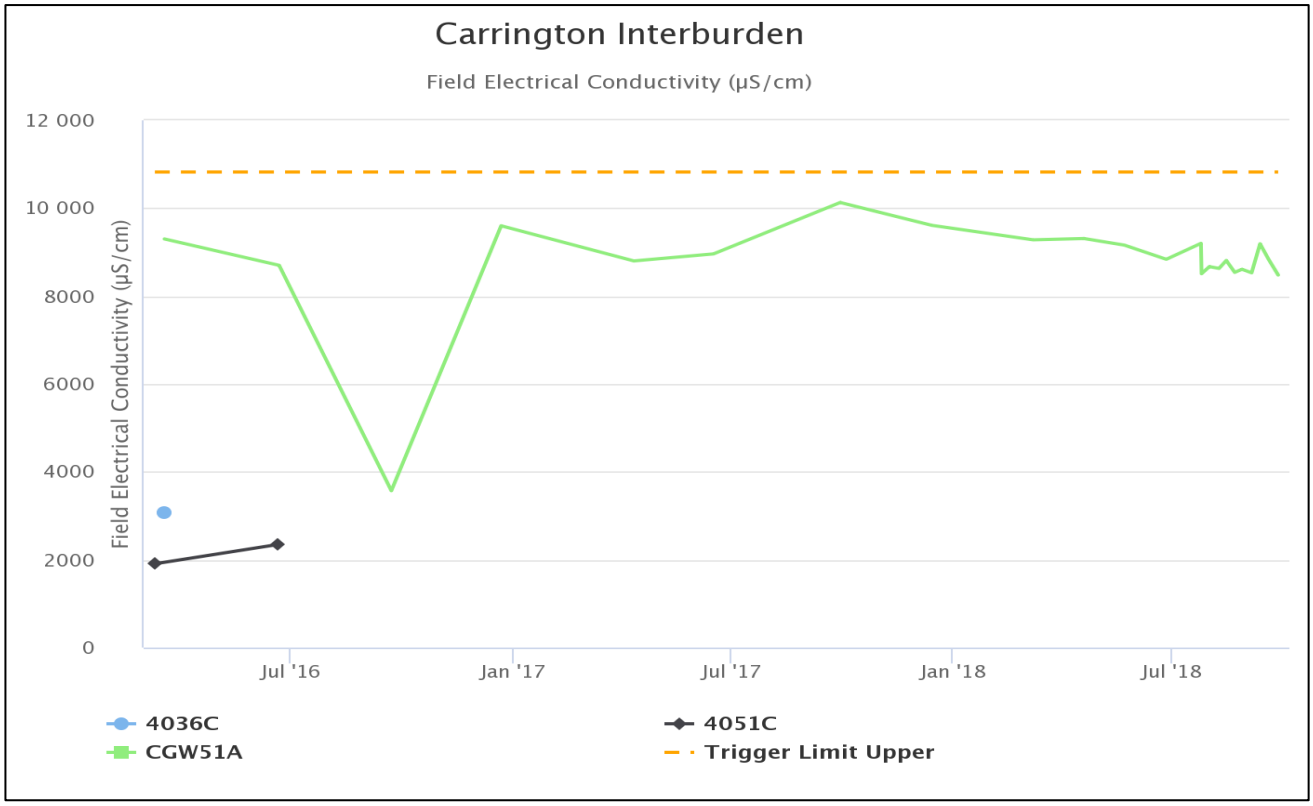

Figure 26: Carrington Interburden Electrical Conductivity Trend – September 2018

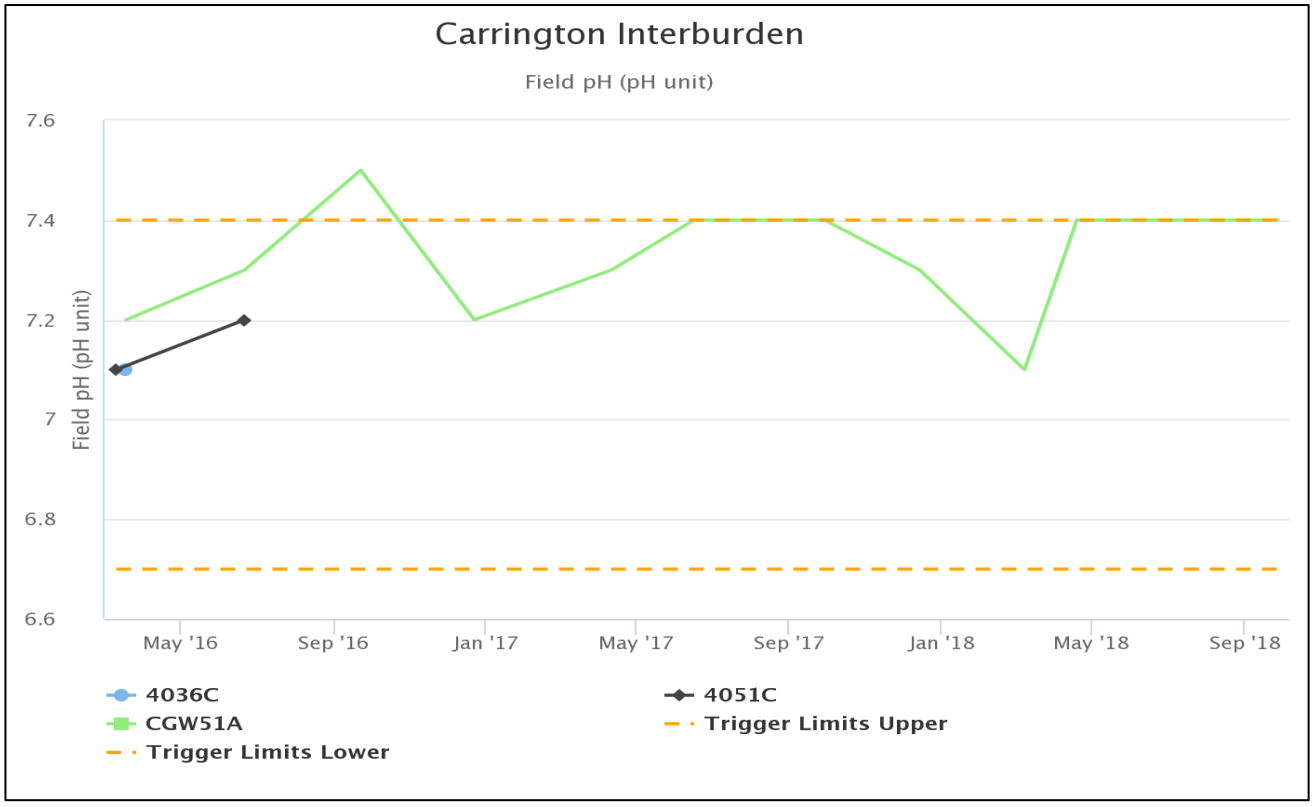

Figure 27: Carrington Interburden pH Trend – September 2018

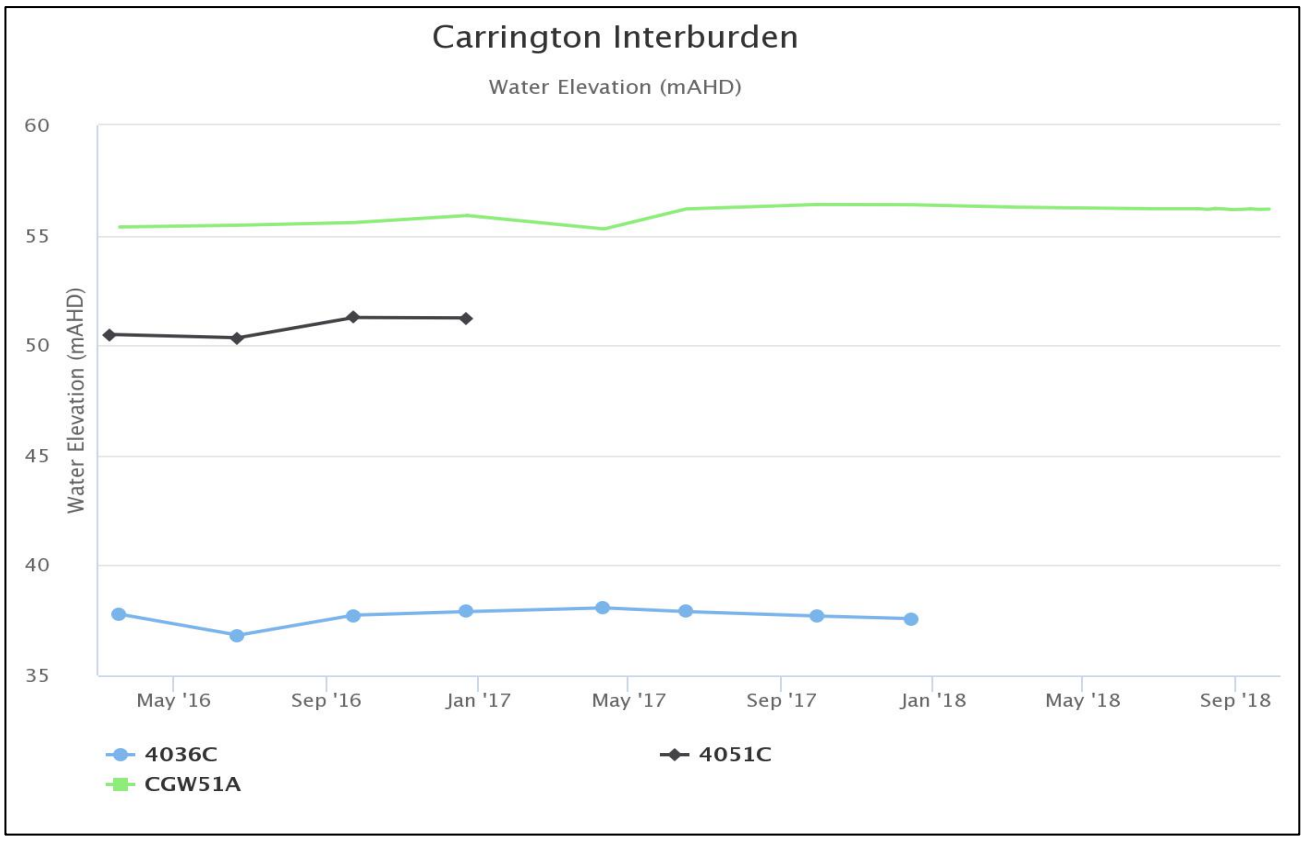

Figure 28: Carrington Interburden Standing Water Level – September 2018

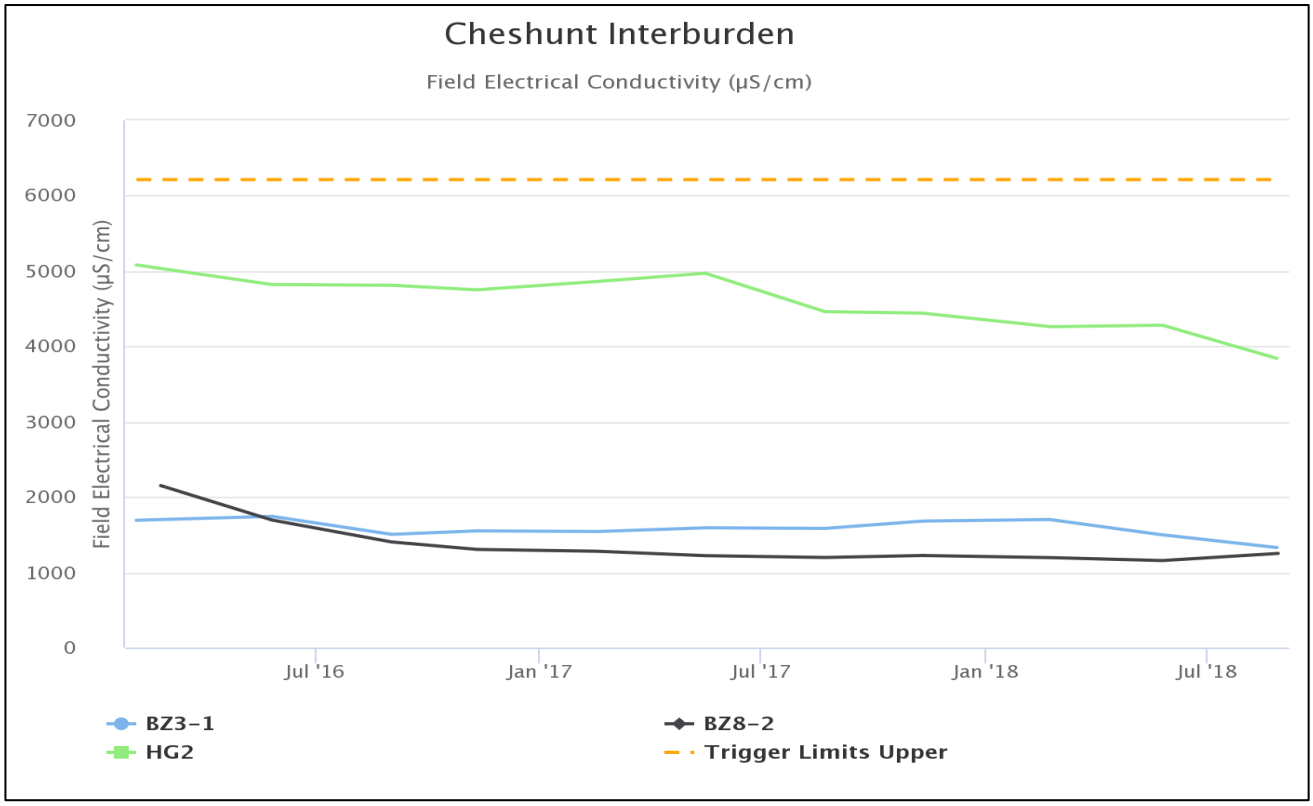

Figure 29: Cheshunt Interburden Electrical Conductivity Trend – September 2018

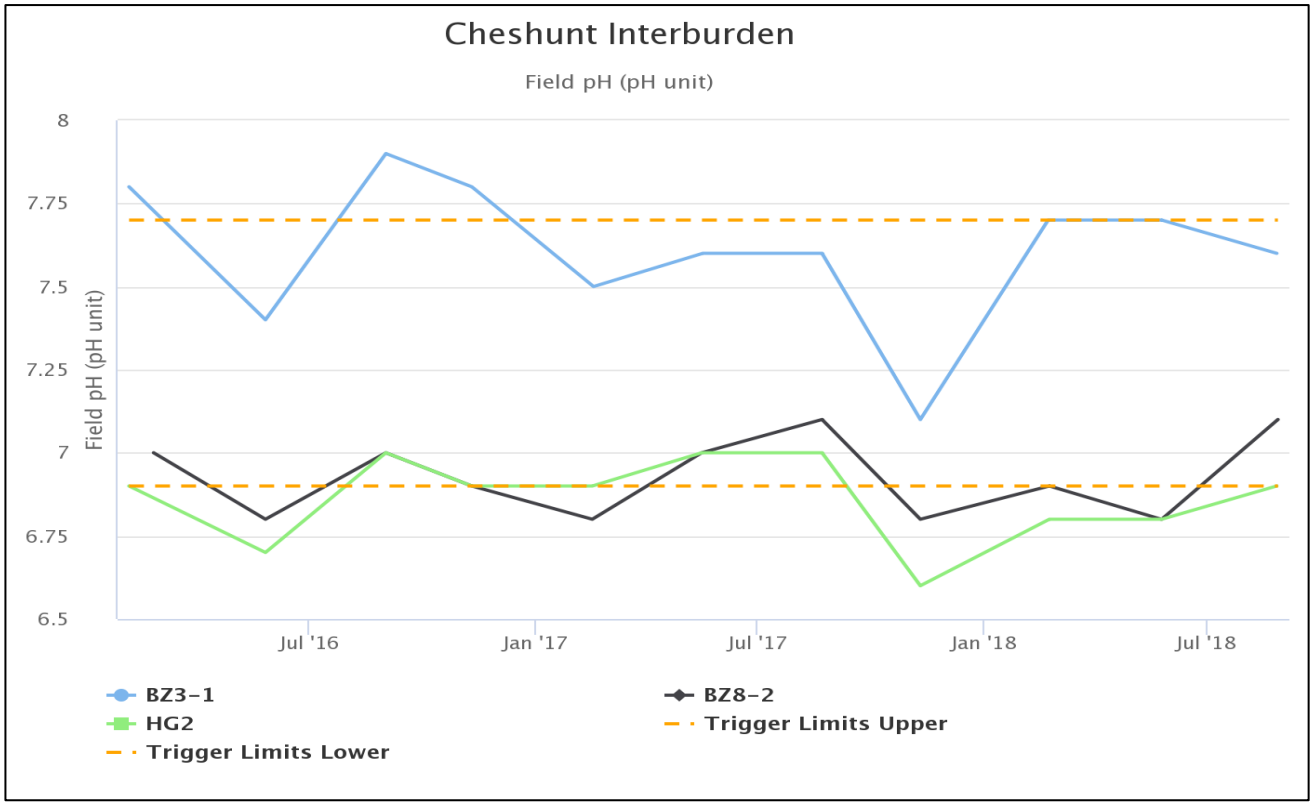

Figure 30: Cheshunt Interburden pH Trend – September 2018

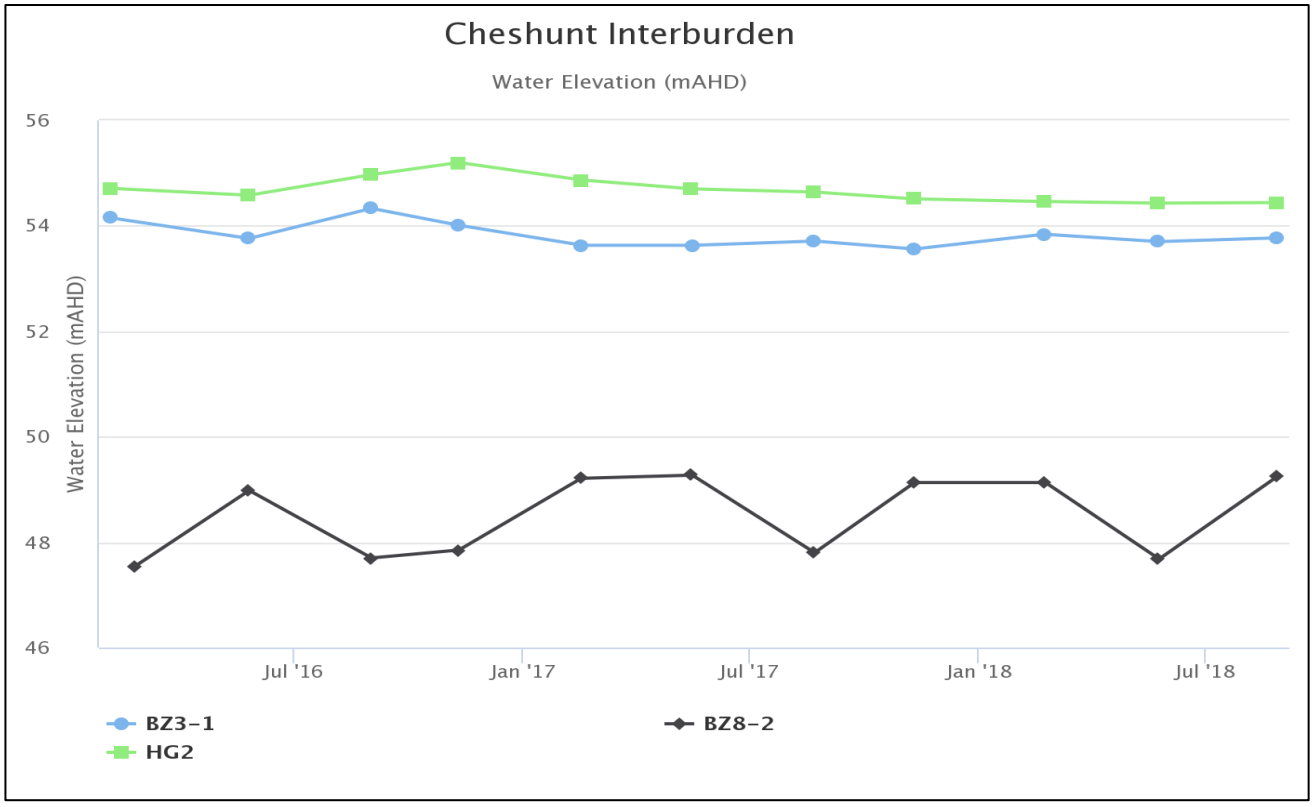

Figure 31: Cheshunt Interburden Standing Water Level – September 2018

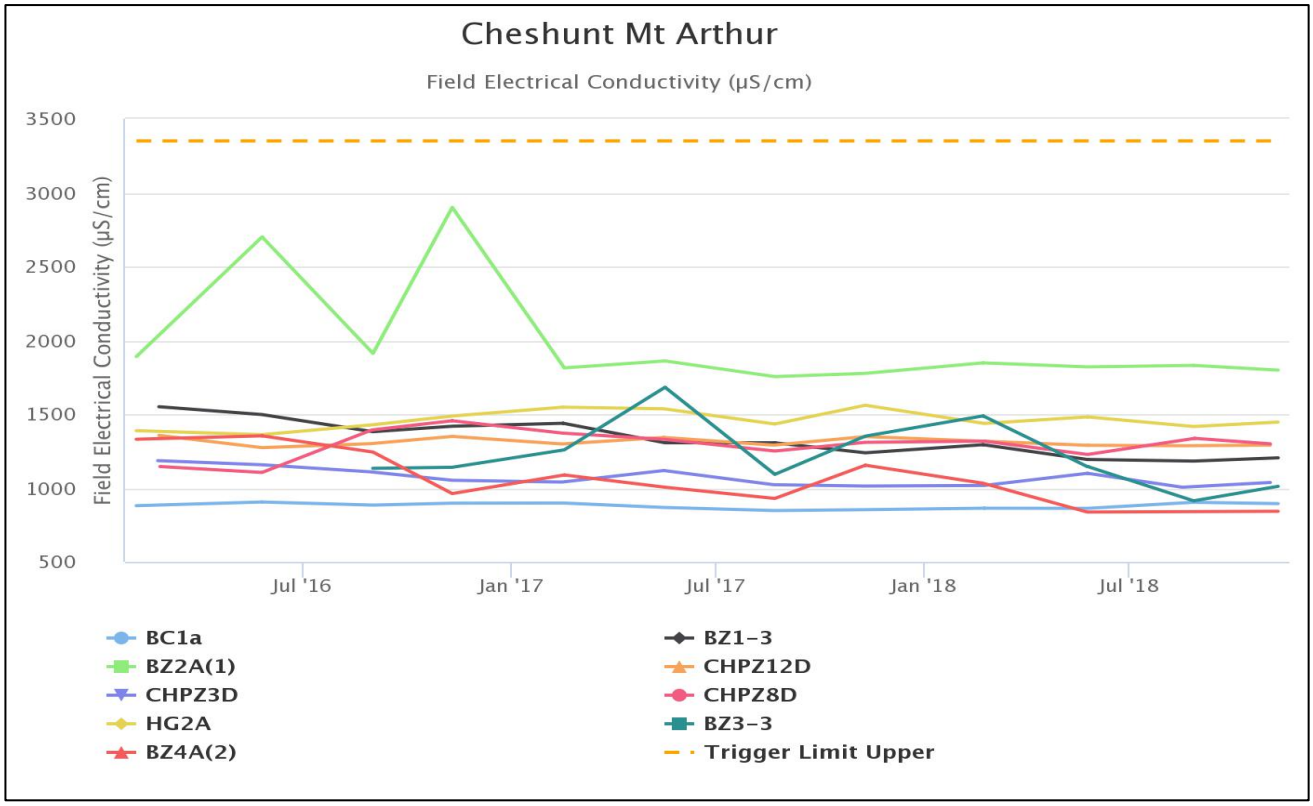

Figure 32: Cheshunt Mt Arthur Electrical Conductivity Trend – September 2018

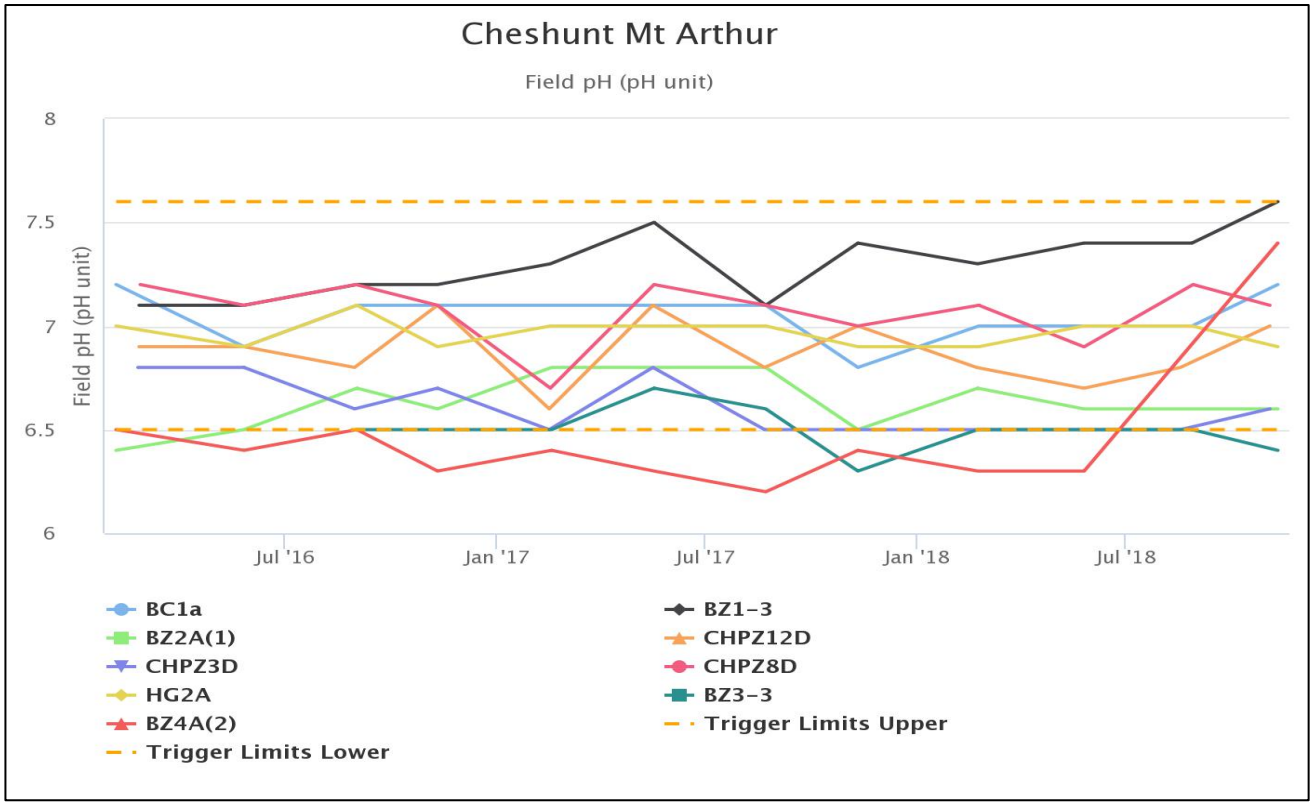

Figure 33: Cheshunt Mt Arthur pH Trend – September 2018

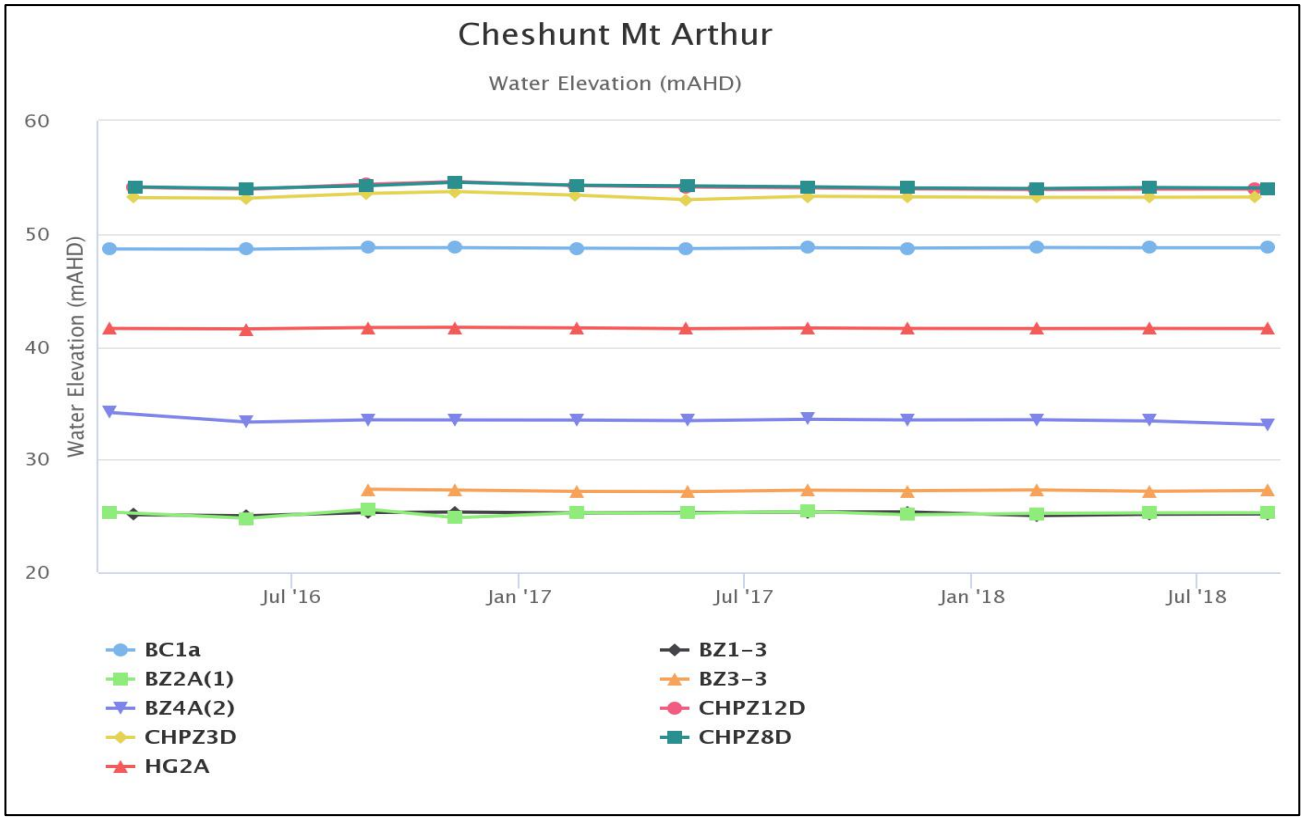

Figure 34: Cheshunt Mt Arthur Standing Water Level – September 2018

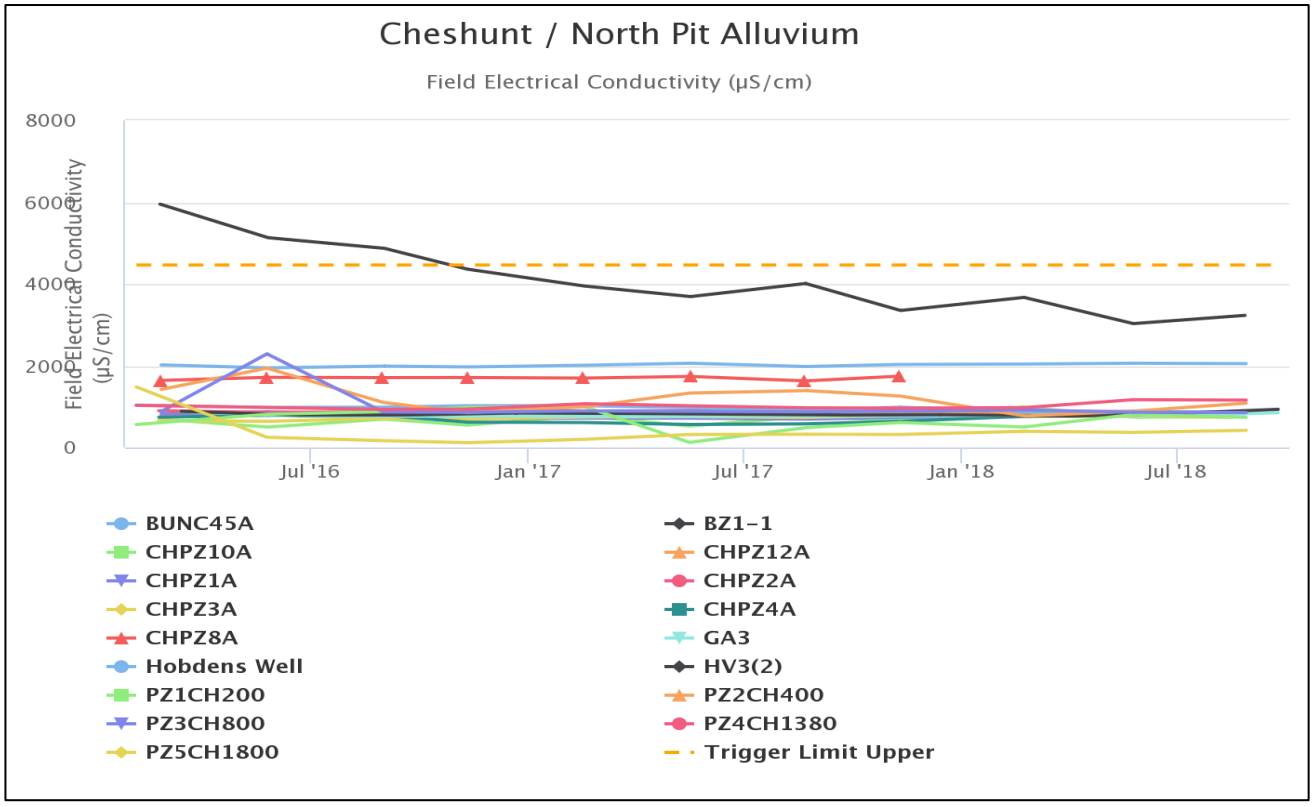

Figure 35: Cheshunt / North Pit Alluvium Electrical Conductivity Trend – September 2018

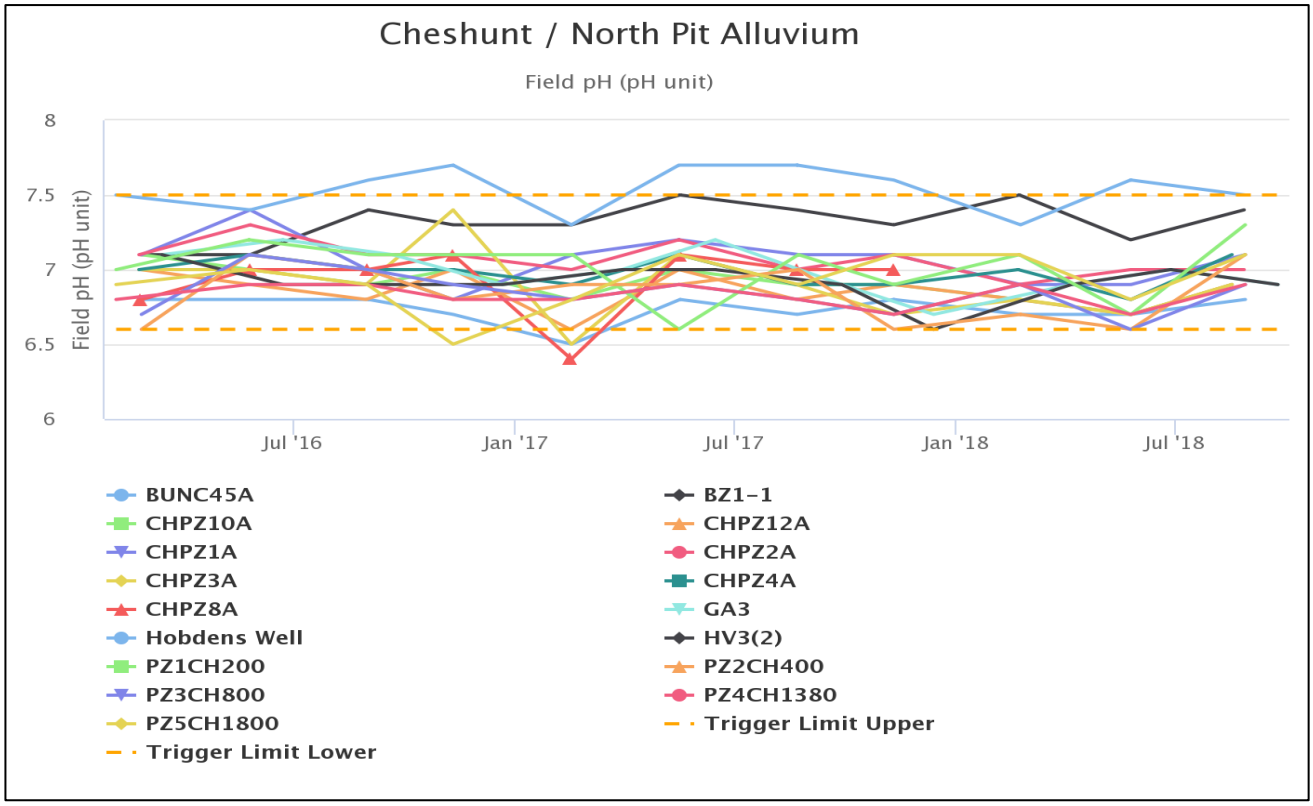

Figure 36: Cheshunt / North Pit Alluvium pH Trend – September 2018

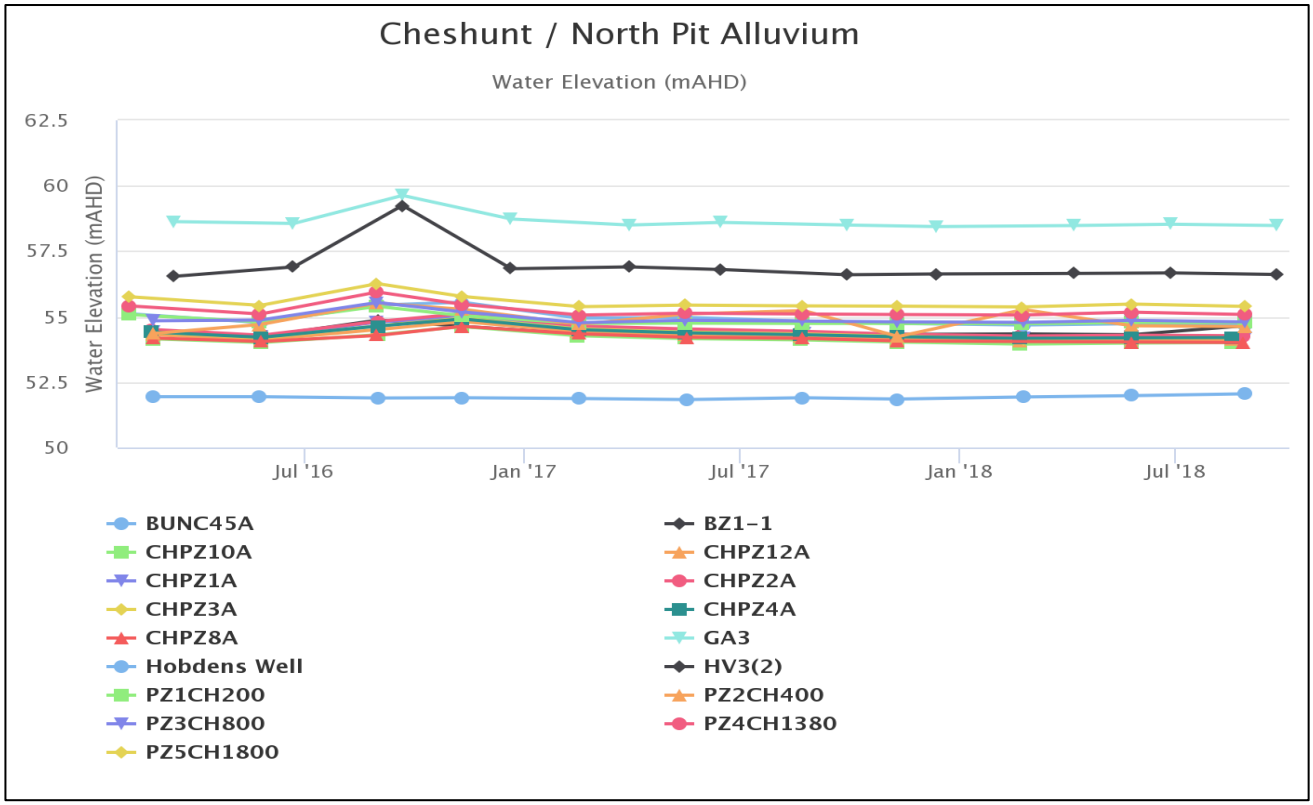

Figure 37: Cheshunt / North Pit Alluvium Standing Water Level – September 2018

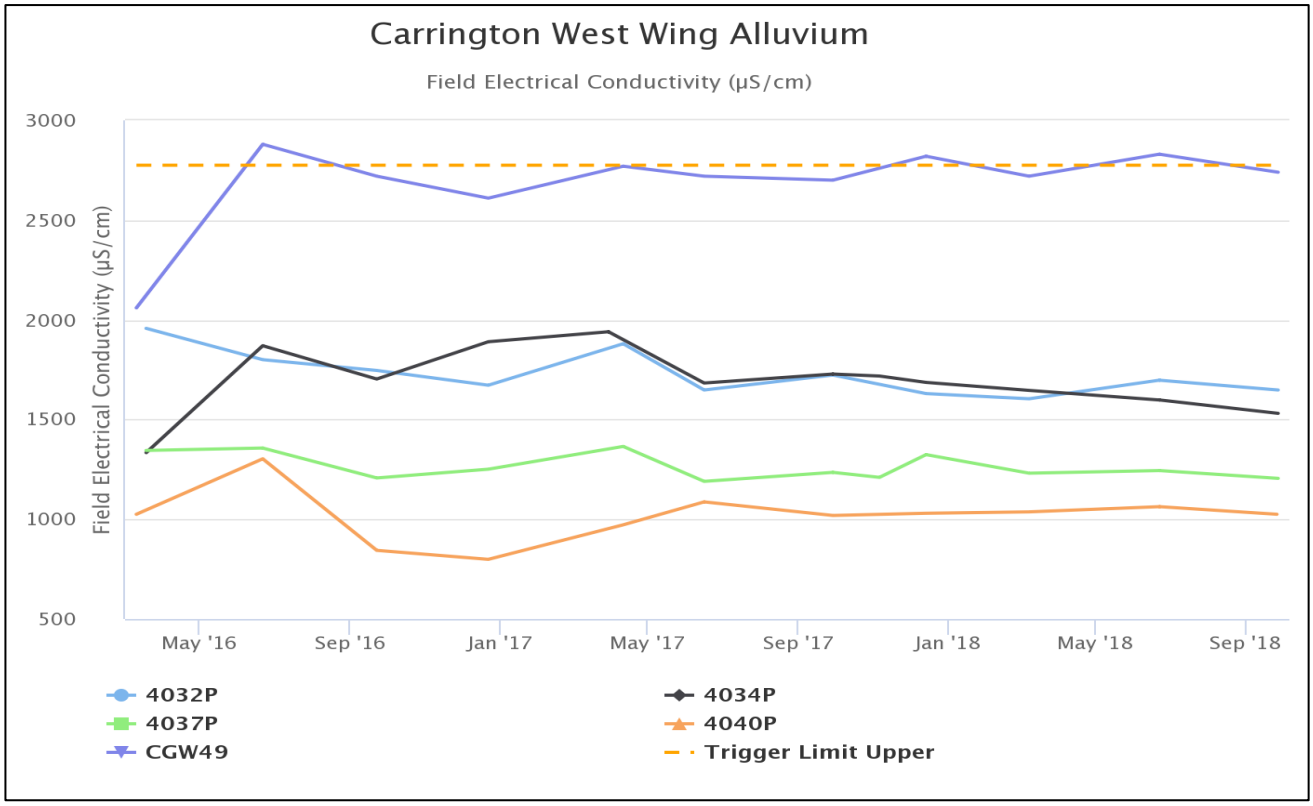

Figure 38: Carrington West Wing Alluvium Electrical Conductivity Trend – September 2018

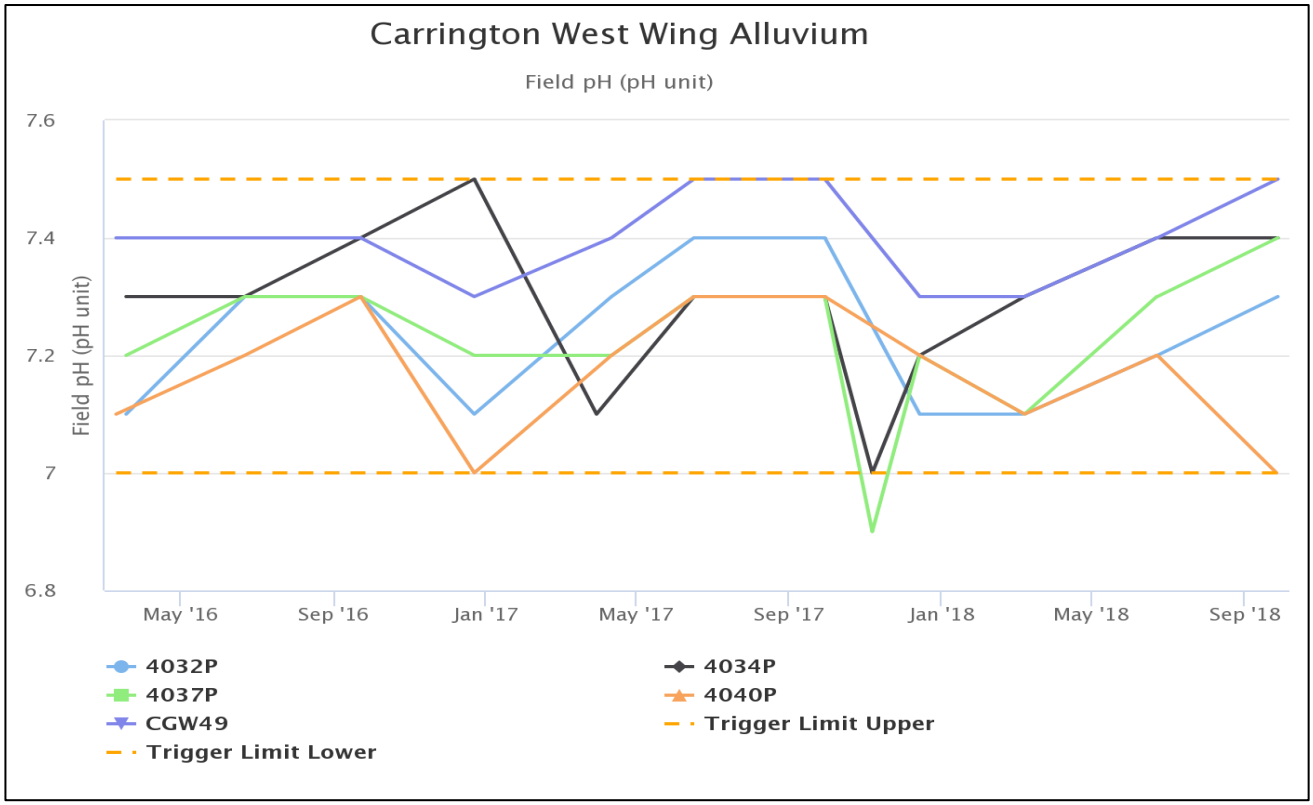

Figure 39: Carrington West Wing Alluvium pH Trend – September 2018

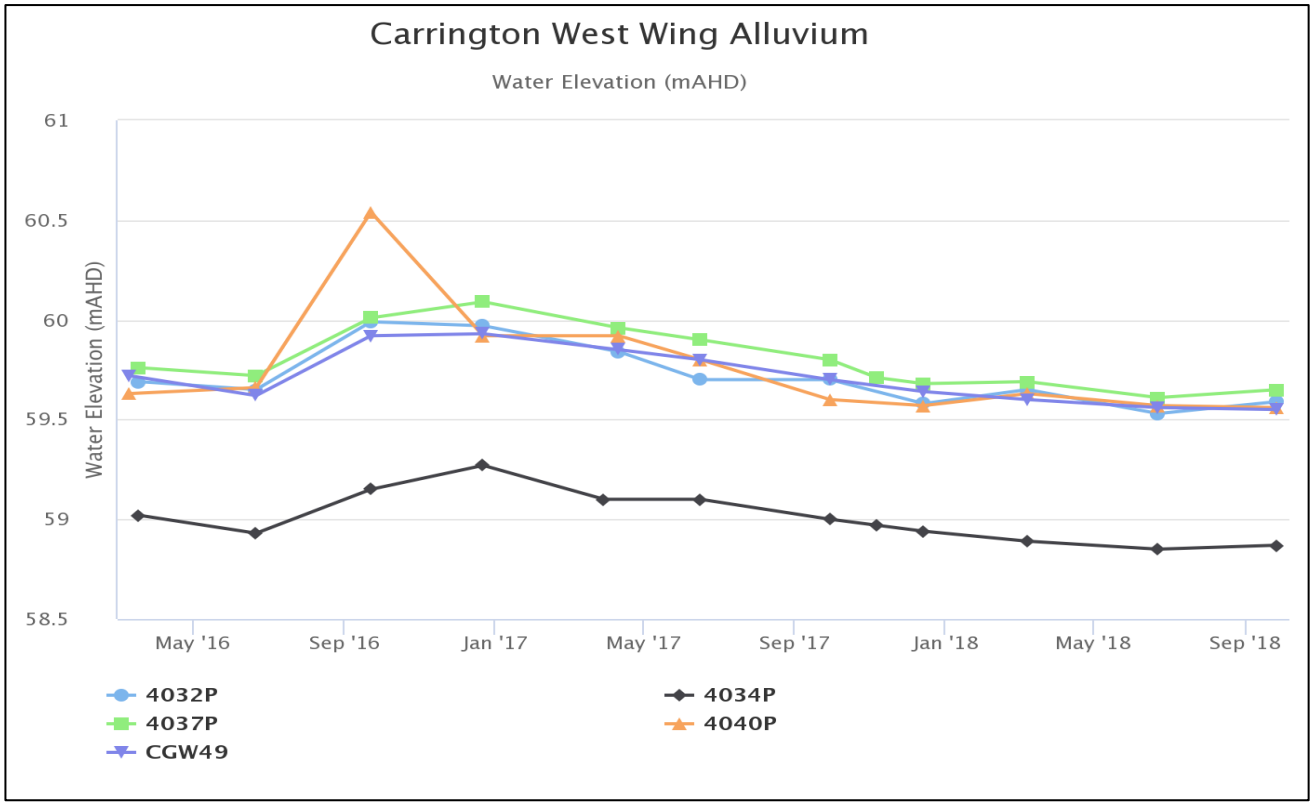

Figure 40: Carrington West Wing Alluvium Standing Water Level – September 2018

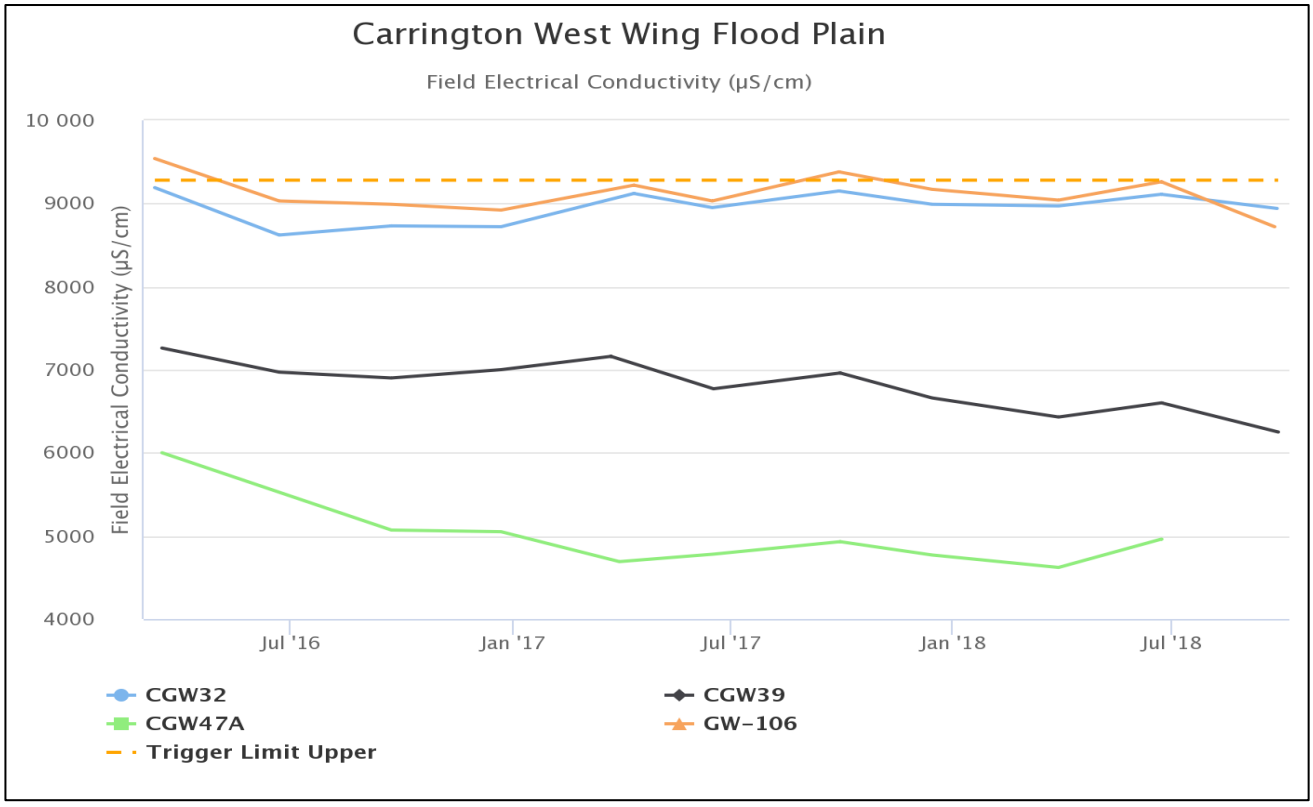

Figure 41: Carrington West Wing Flood Plain Electrical Conductivity Trend – September 2018

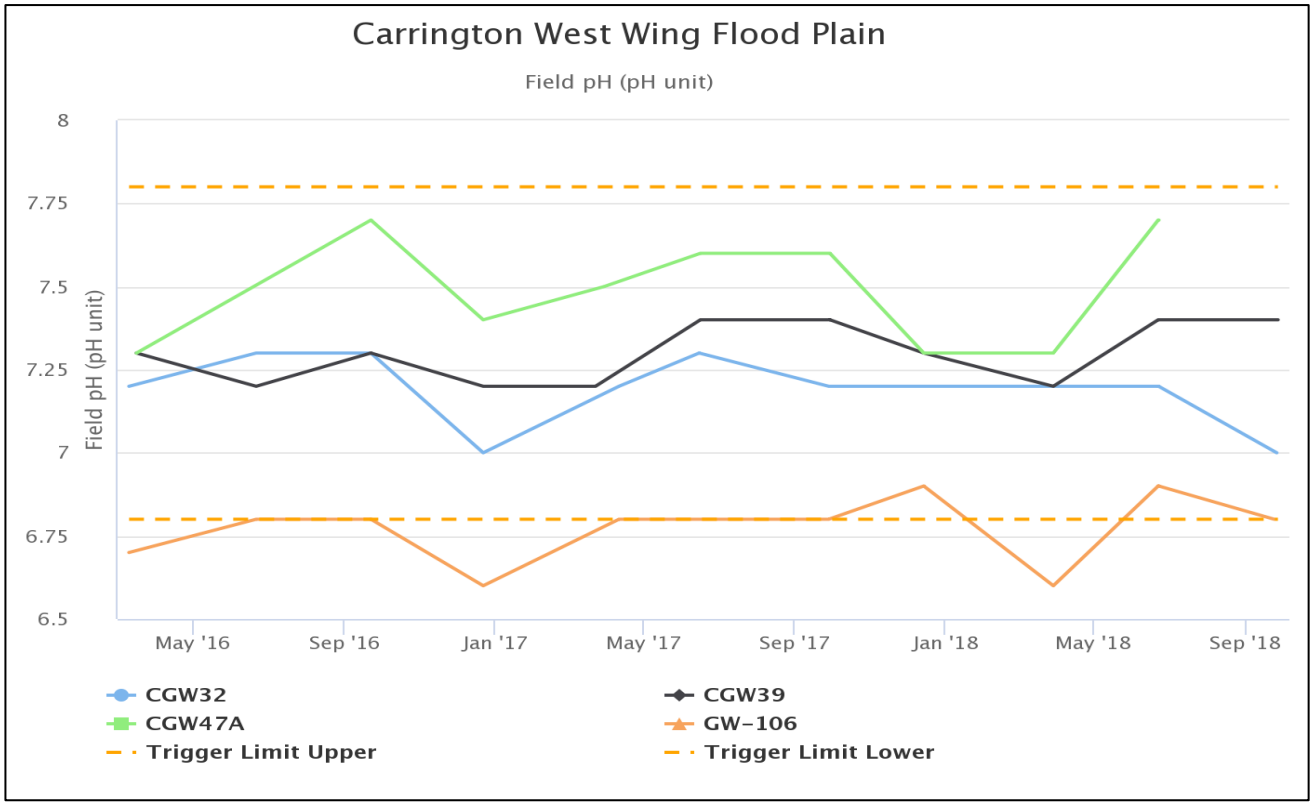

Figure 42: Carrington West Wing Flood Plain pH Trend – September 2018

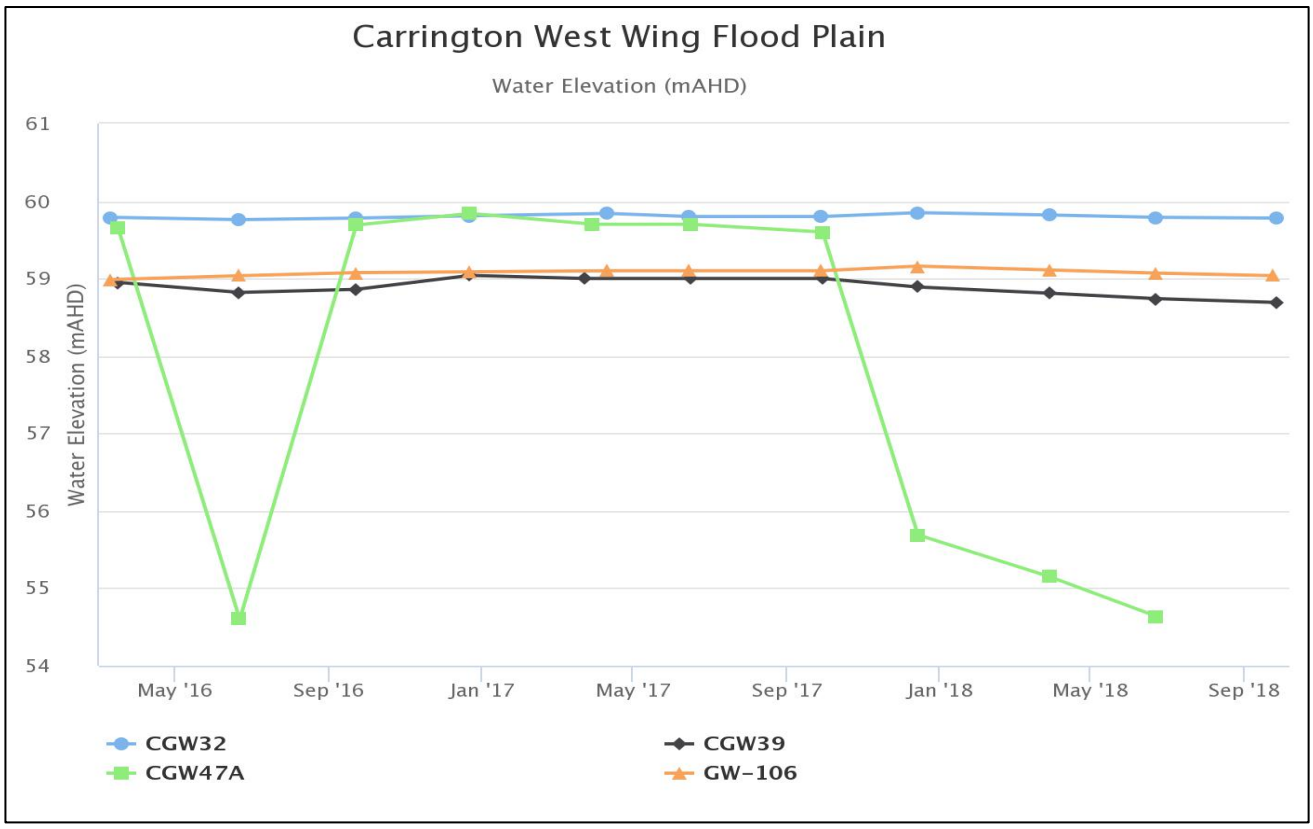

Figure 43: Carrington West Wing Flood Plain Standing Water Level – September 2018

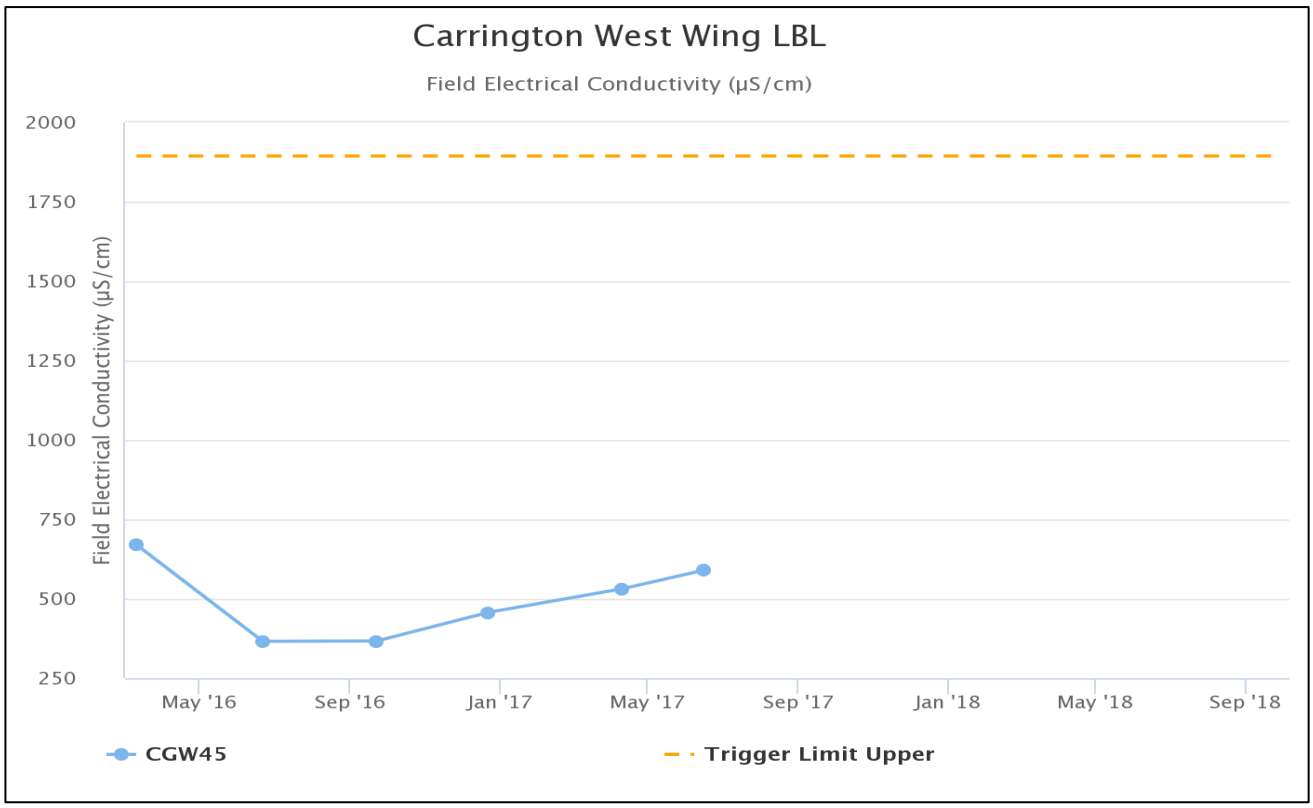

Figure 44: Carrington West Wing LBL Electrical Conductivity Trend – September 2018

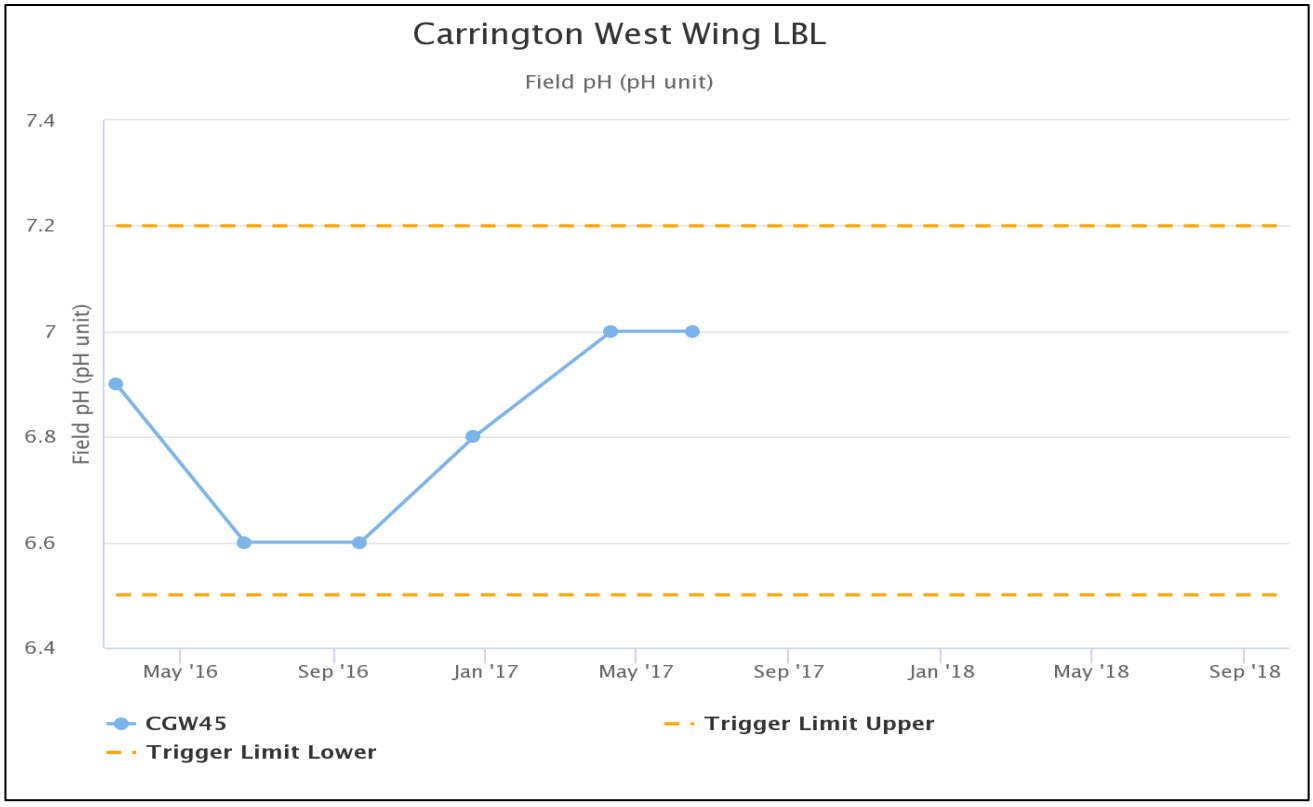

Figure 45: Carrington West Wing LBL pH Trend – September 2018

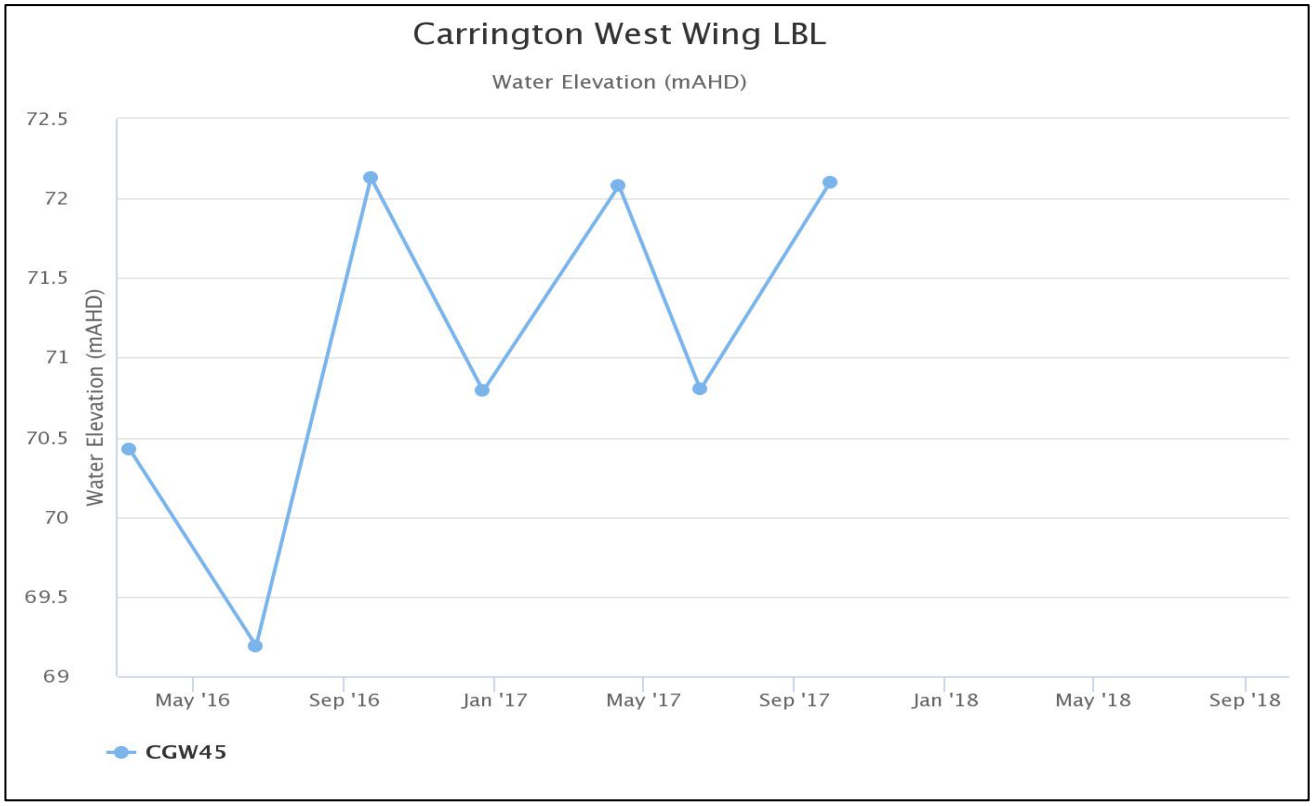

Figure 46: Carrington West Wing LBL Standing Water Level – September 2018

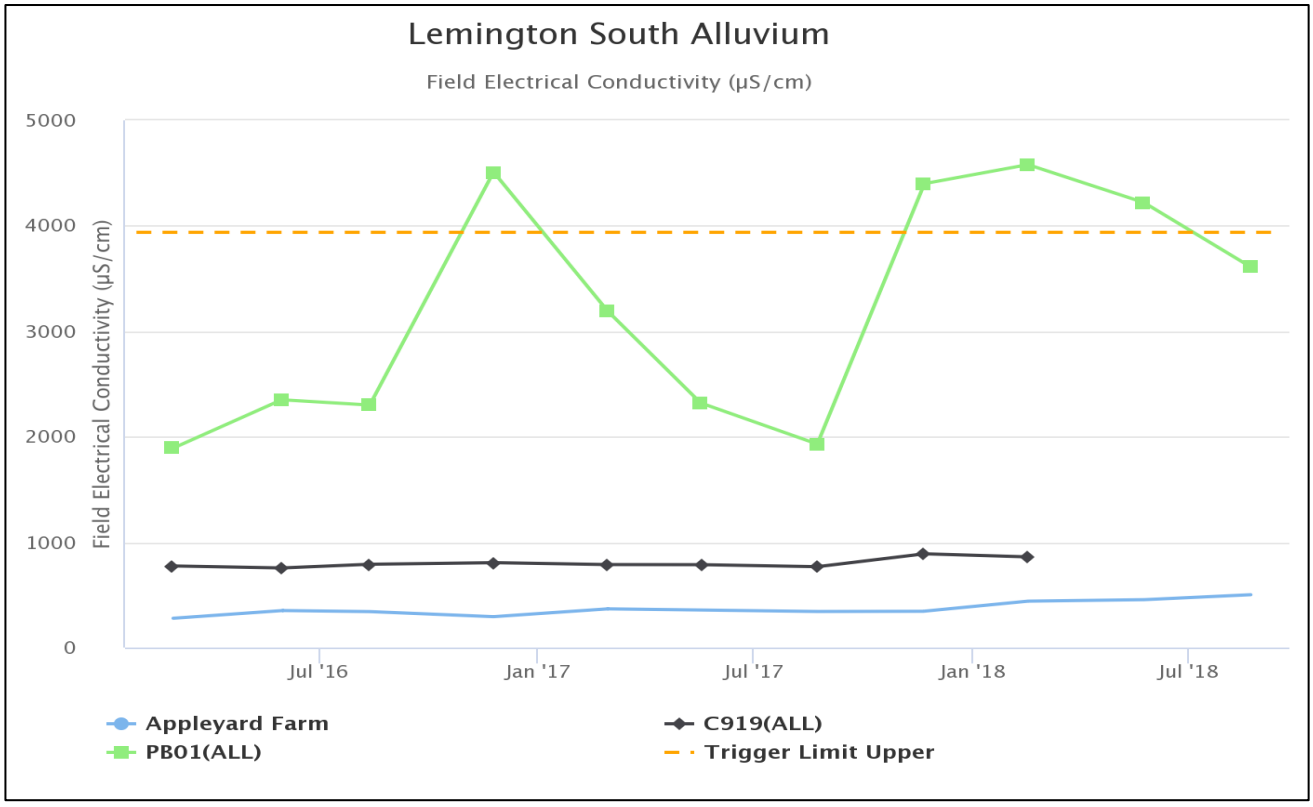

Figure 47: Lemington South Alluvium Electrical Conductivity Trend – September 2018

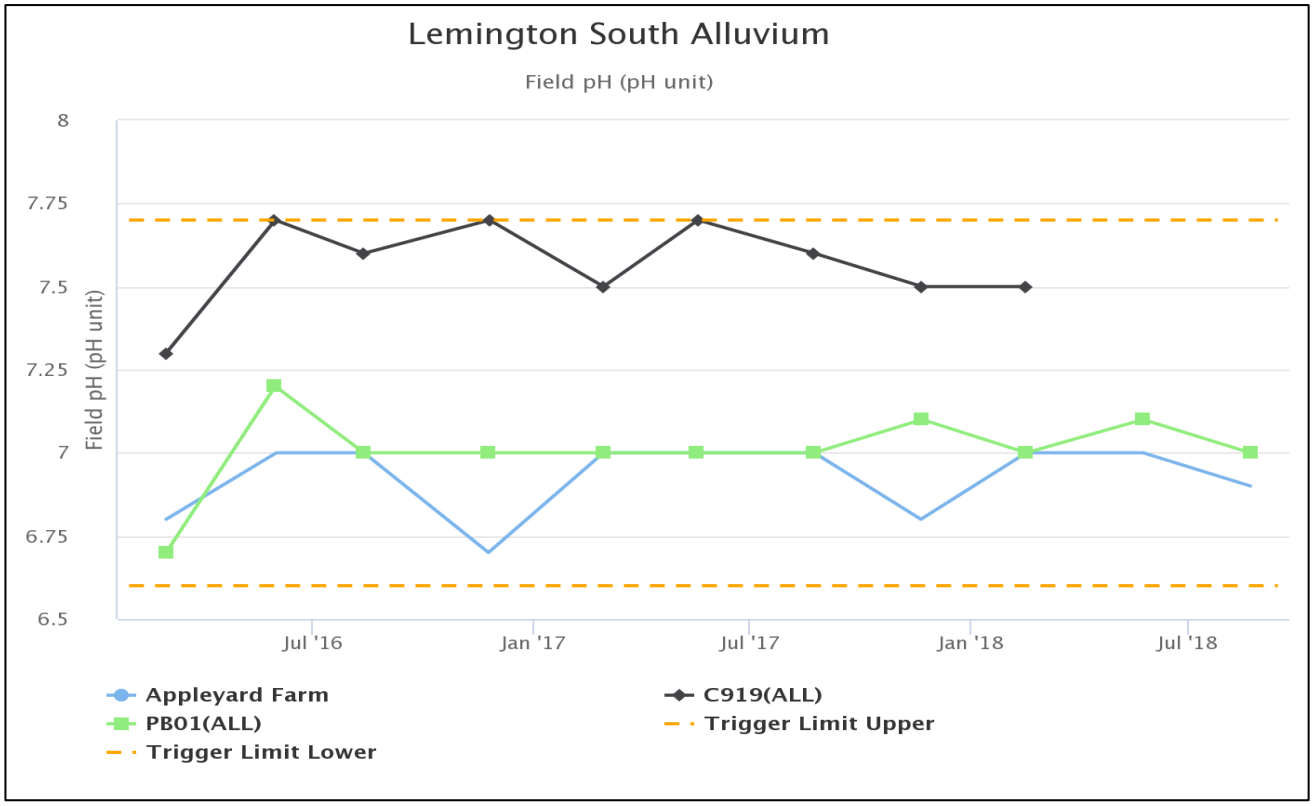

Figure 48: Lemington South Alluvium pH Trend – September 2018

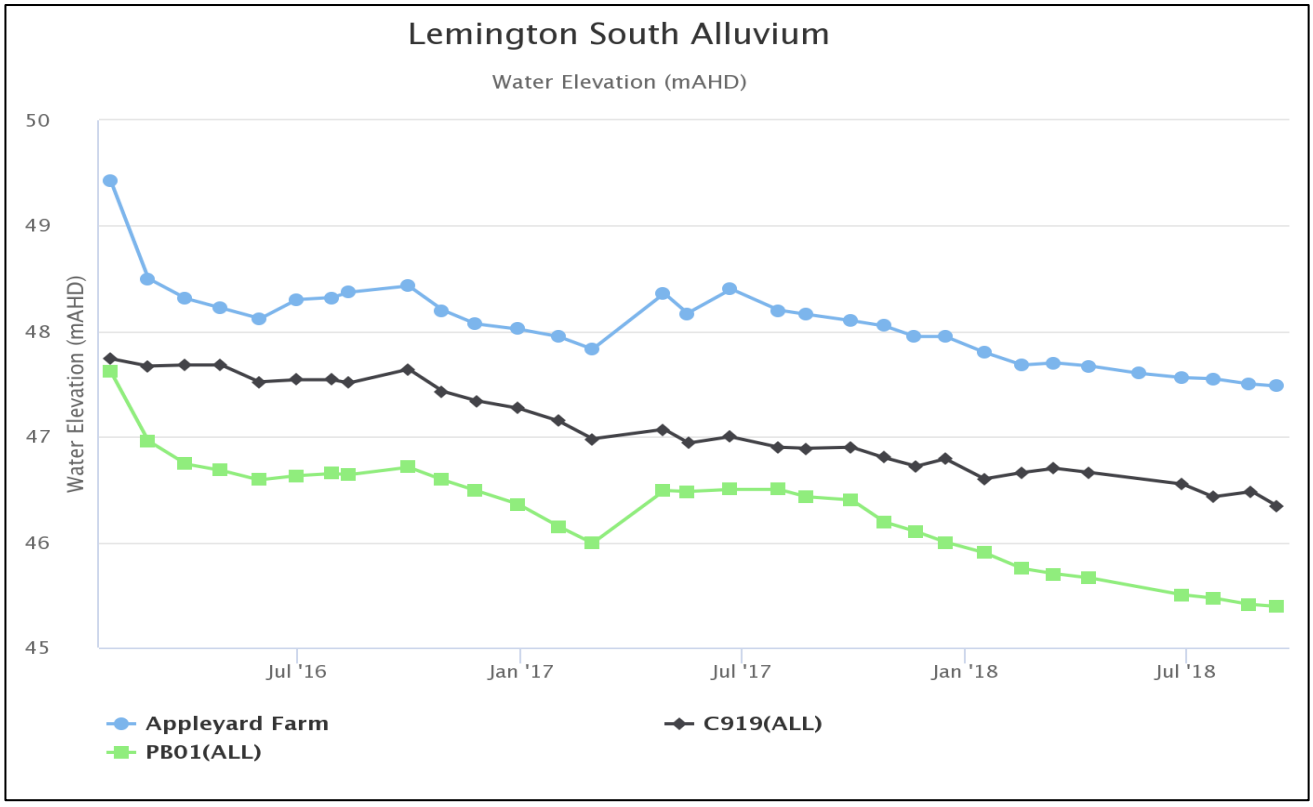

Figure 49: Lemington South Alluvium Standing Water Level Trend – September 2018

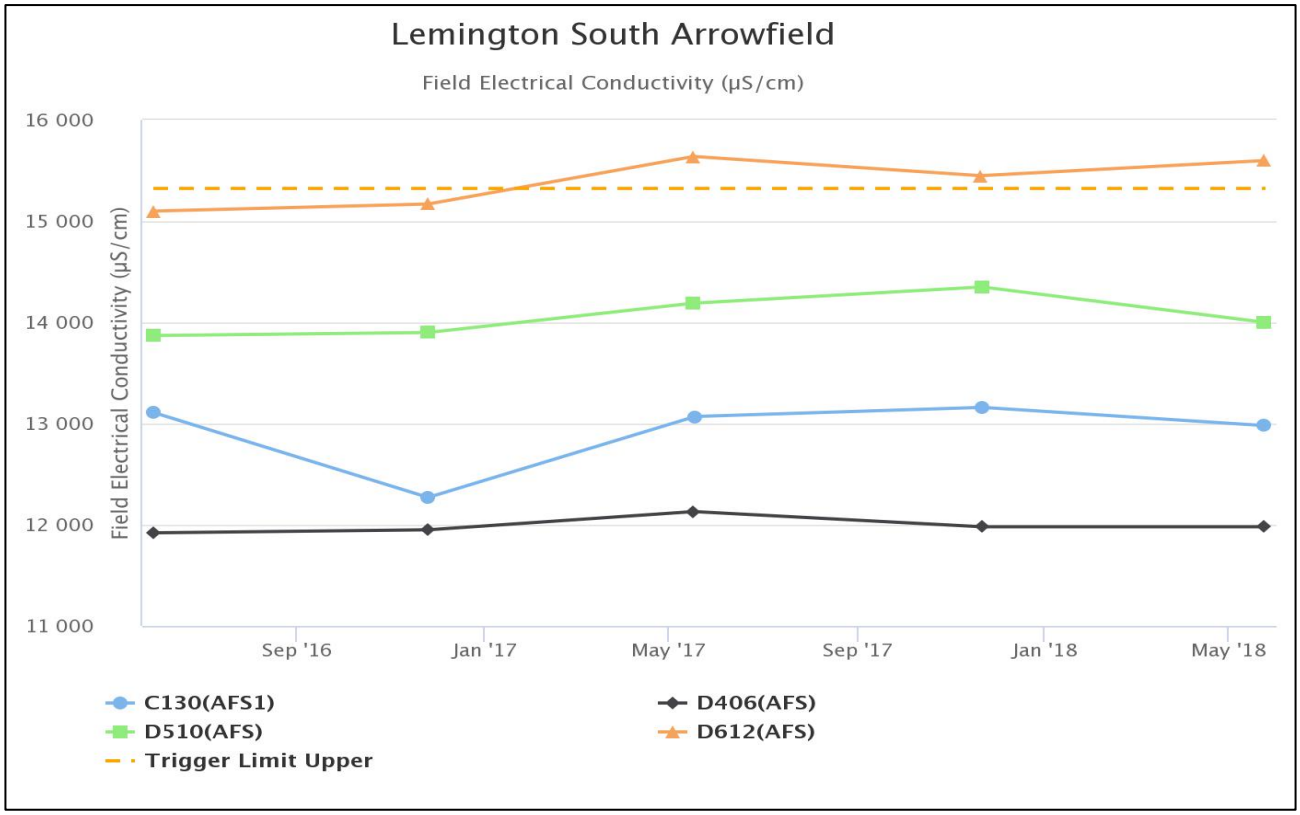

Figure 50: Lemington South Arrowfield Electrical Conductivity Trend – September 2018

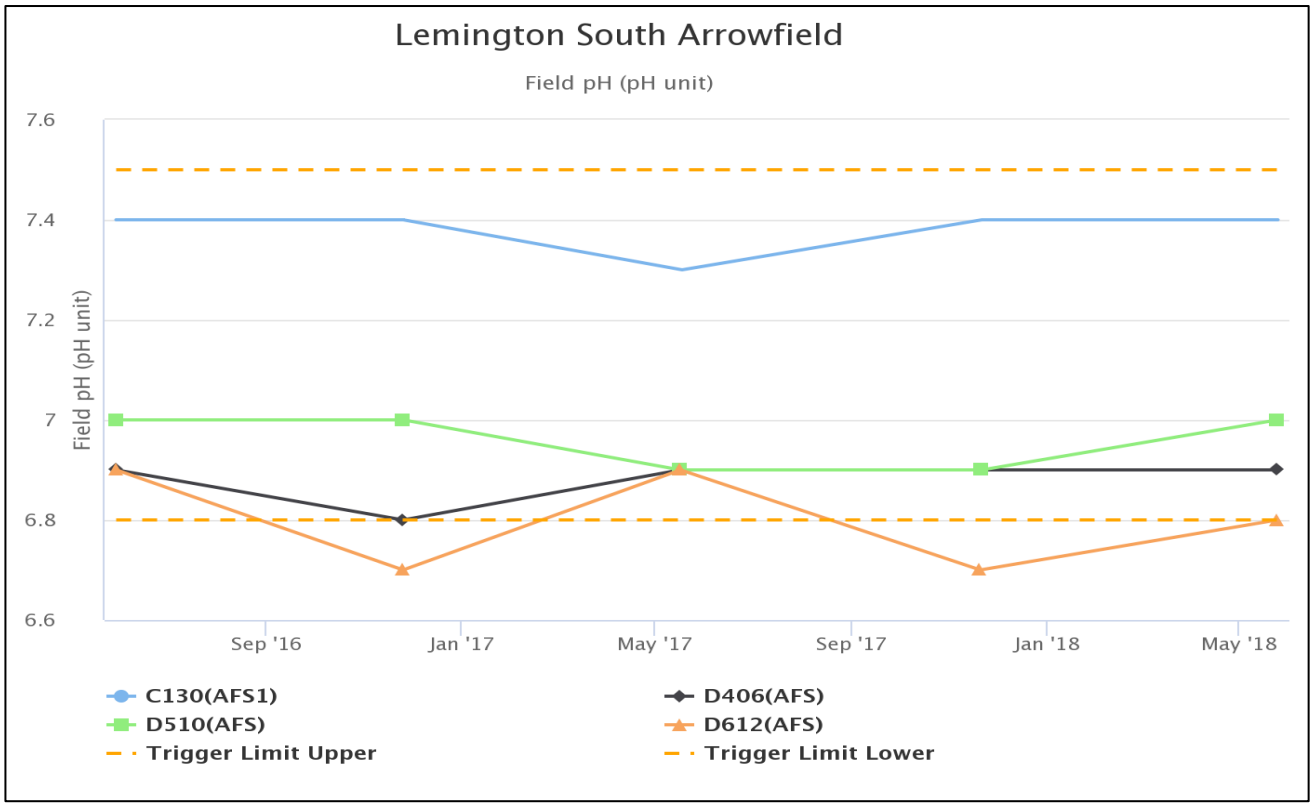

Figure 51: Lemington South Arrowfield pH Trend – September 2018

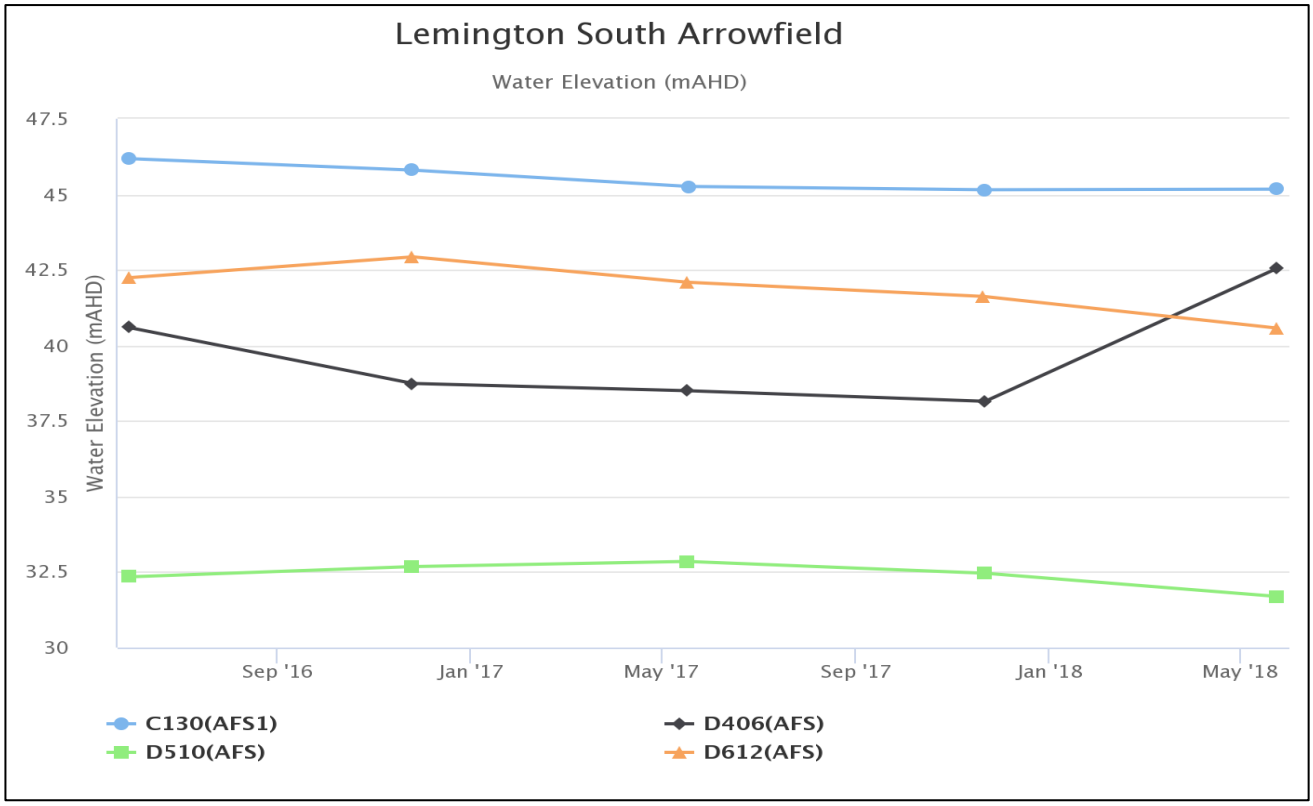

Figure 52: Lemington South Arrowfield Standing Water Level – September 2018

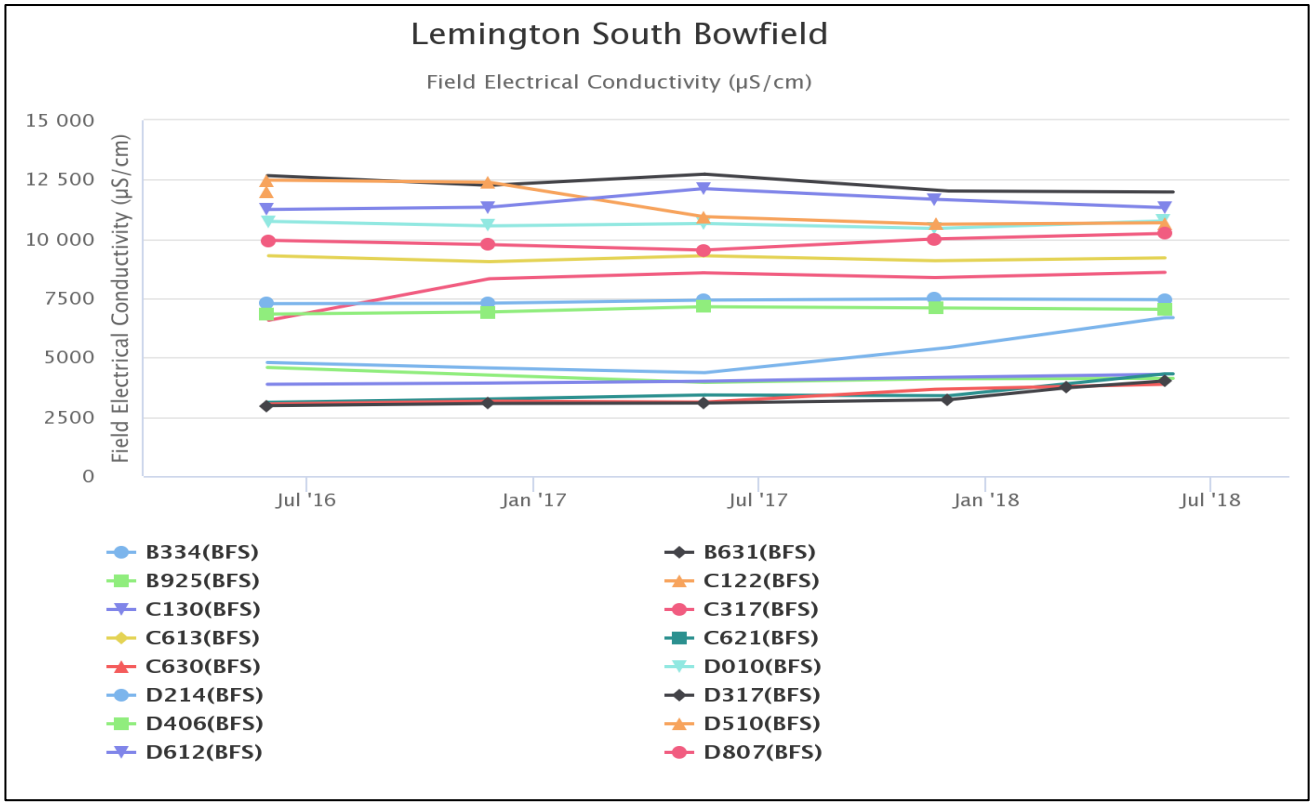

Figure 53: Lemington South Bowfield Electrical Conductivity Trend – September 2018

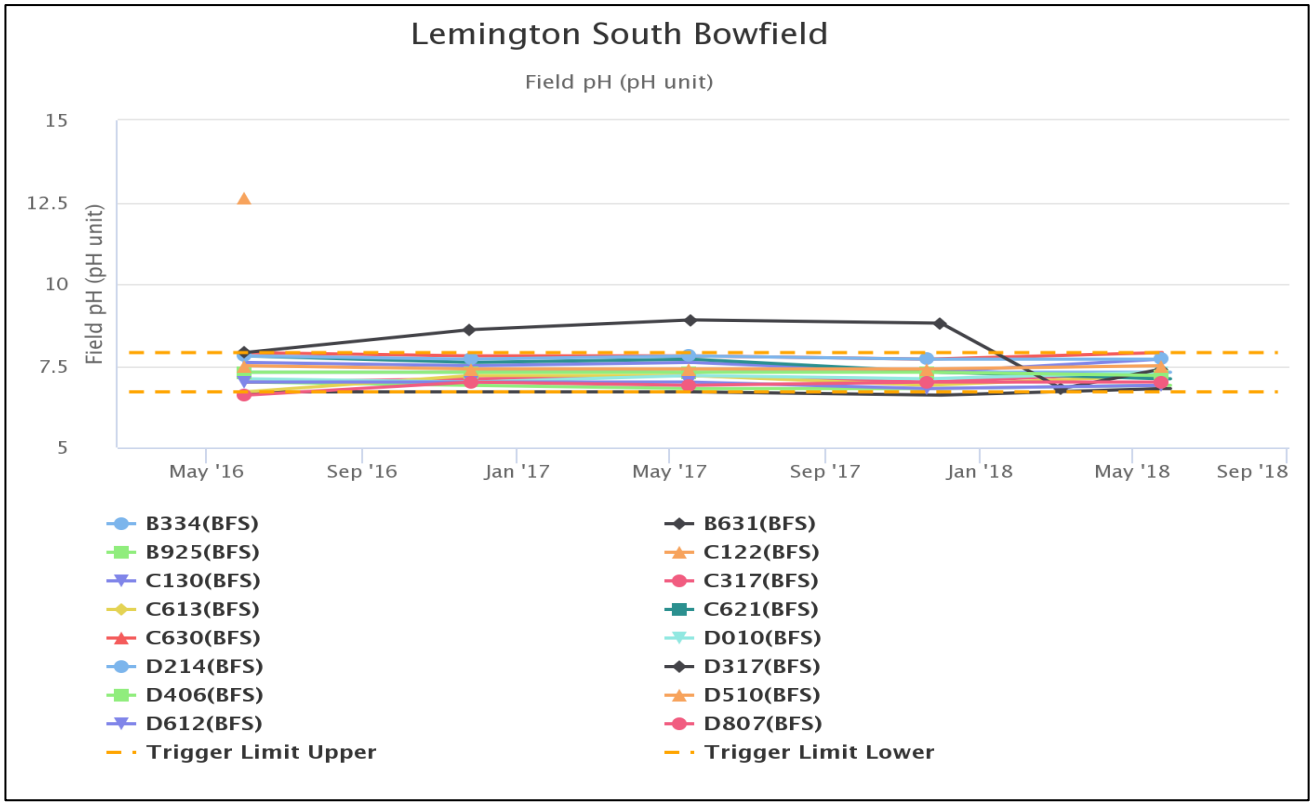

Figure 54: Lemington South Bowfield pH Trend – September 2018

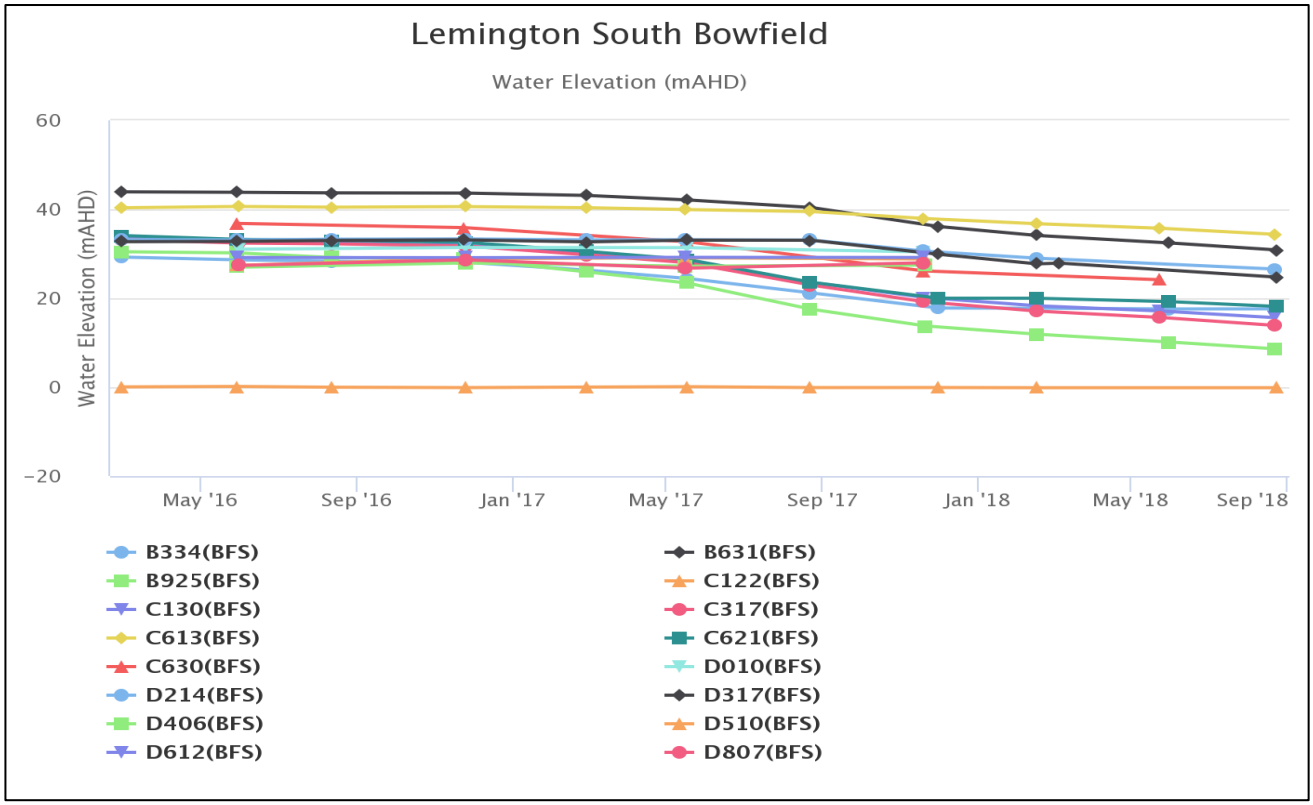

Figure 55: Lemington South Bowfield Standing Water Level – September 2018

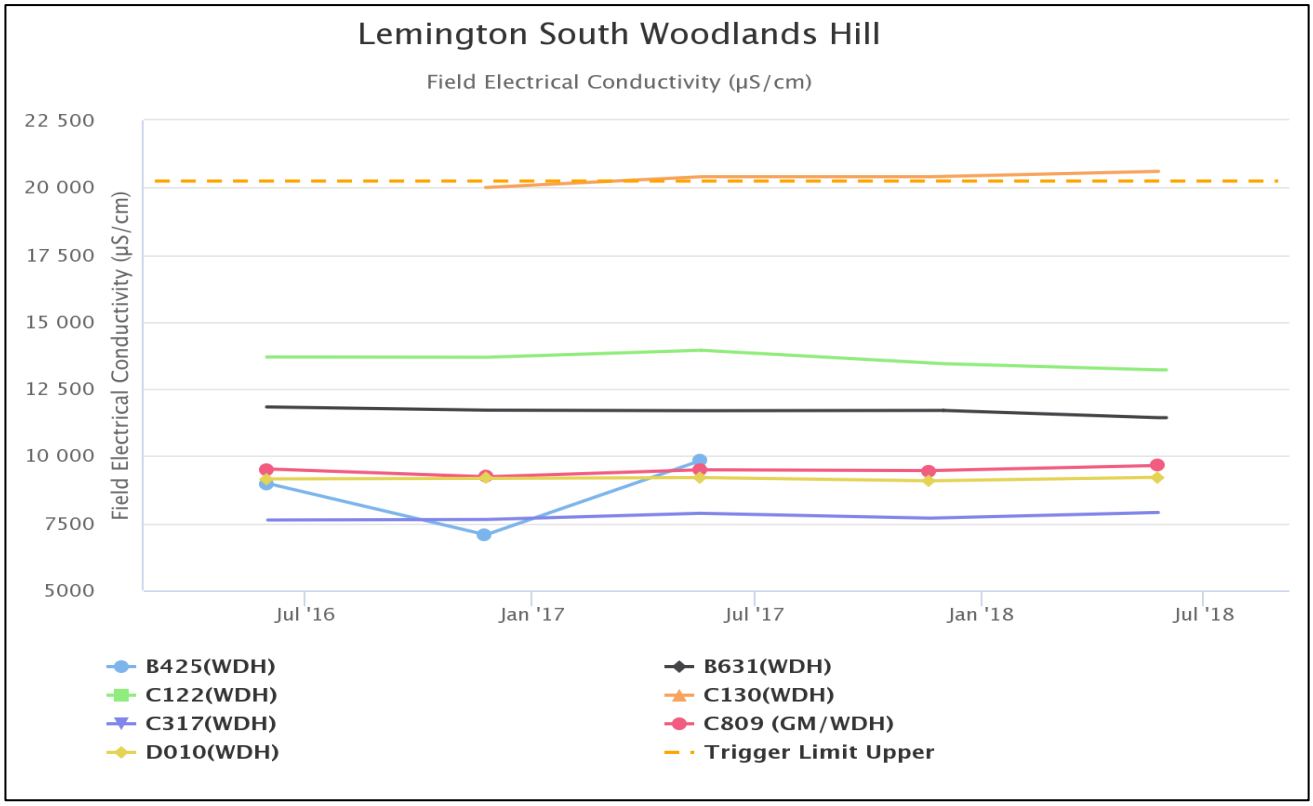

Figure 56: Lemington South Woodlands Hill Electrical Conductivity Trend – September 2018

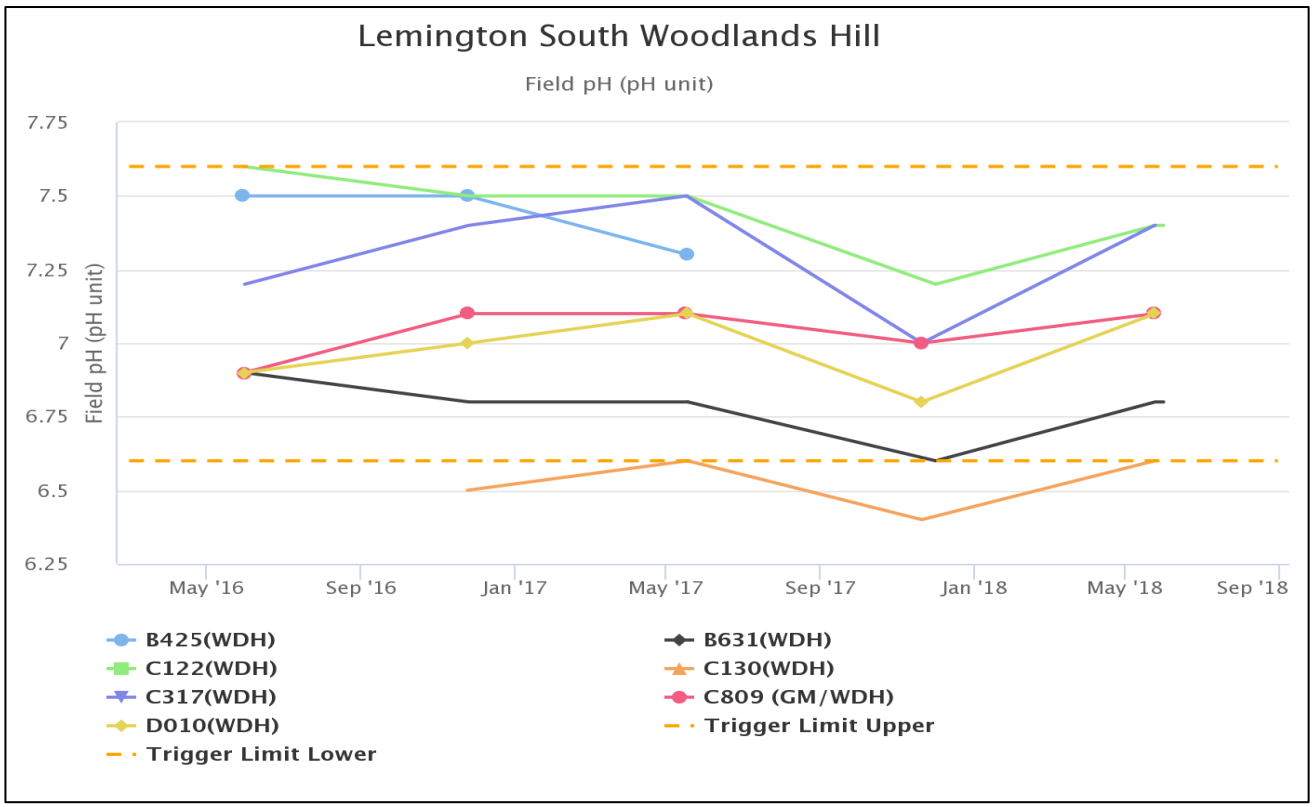

Figure 57: Lemington South Woodlands Hill pH Trend – September 2018

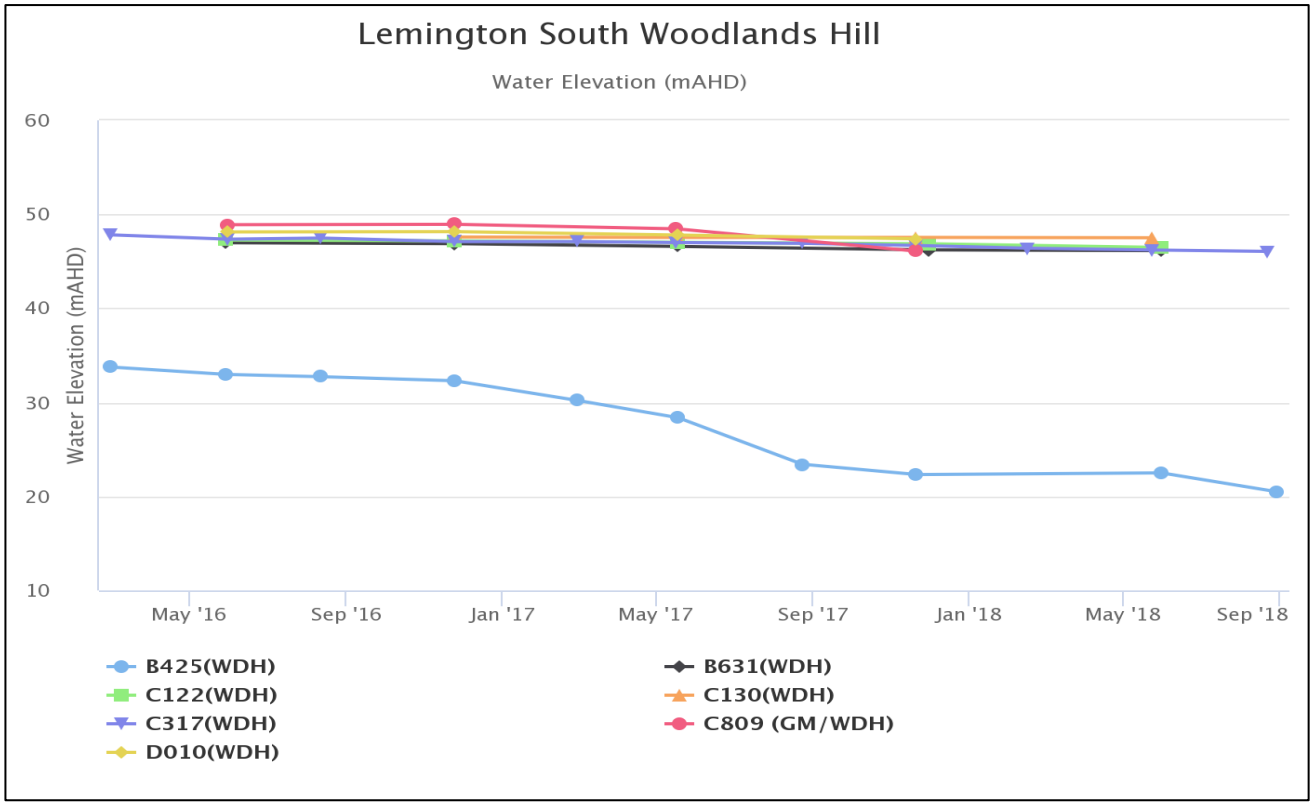

Figure 58: Lemington South Woodlands Hill Standing Water Level – September 2018

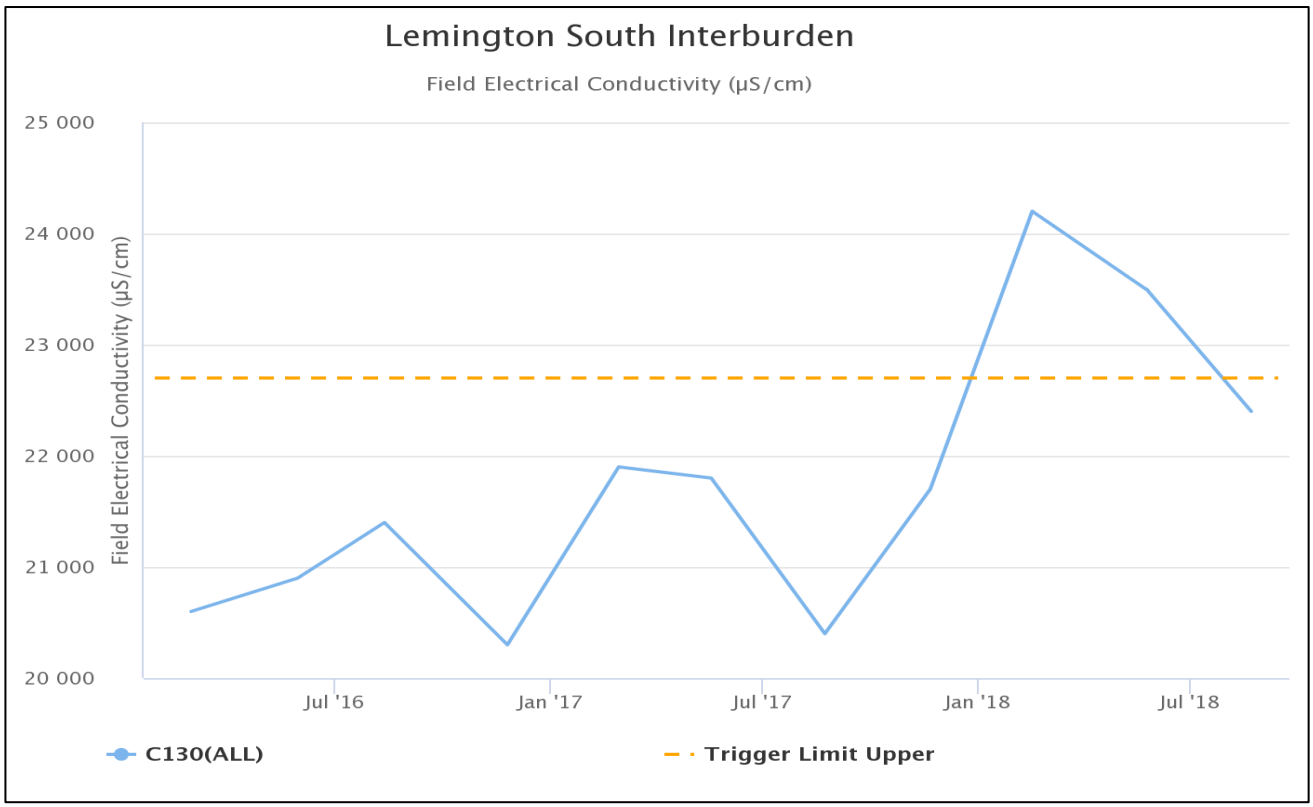

Figure 59: Lemington South Interburden Electrical Conductivity Trend – September 2018

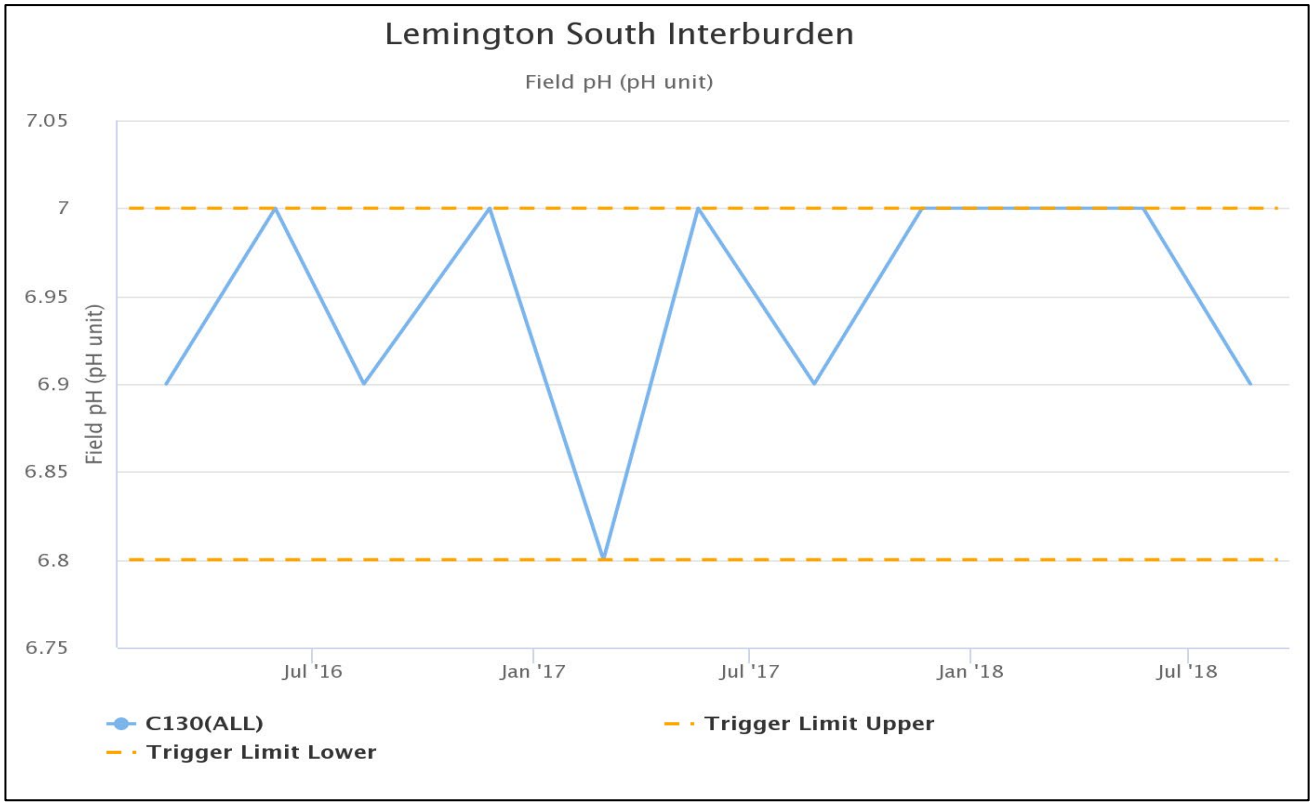

Figure 60: Lemington South Interburden pH Trend – September 2018

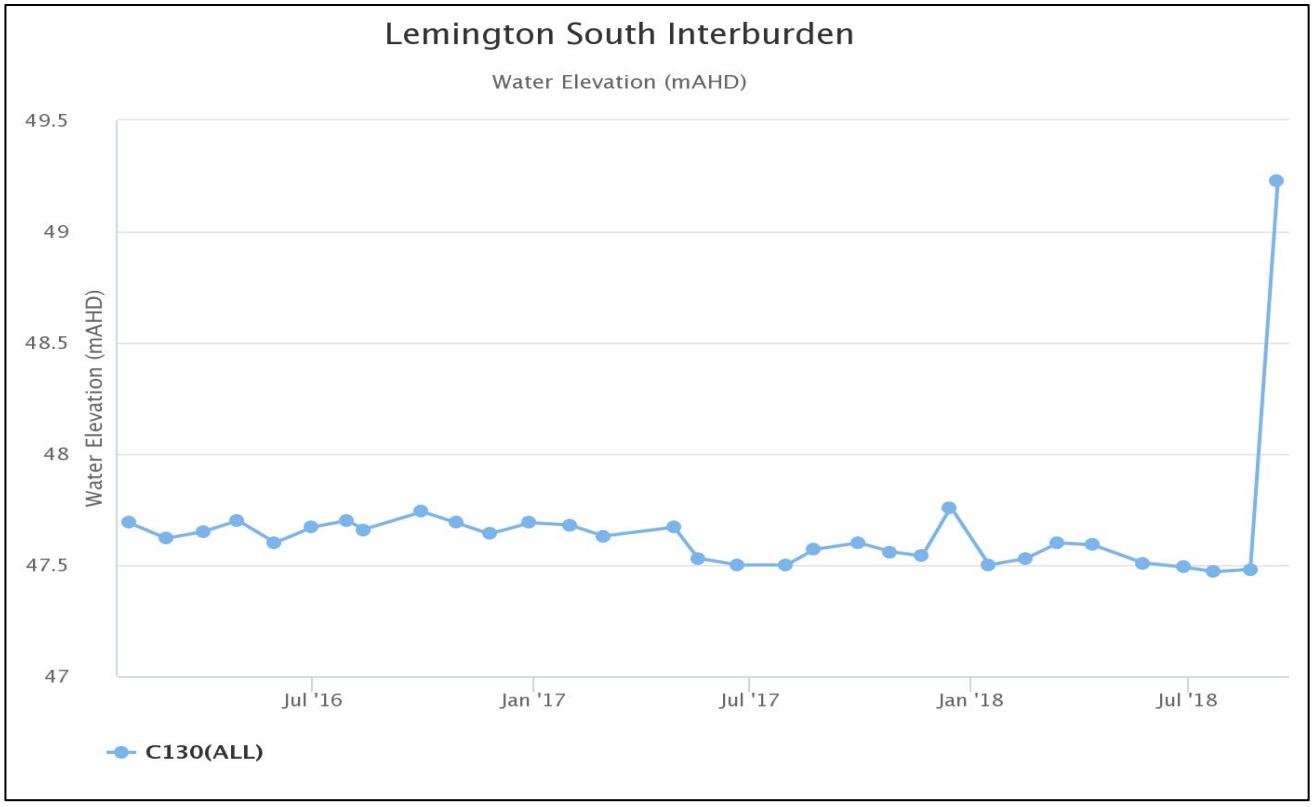

Figure 61: Lemington South Interburden Standing Water Level – September 2018

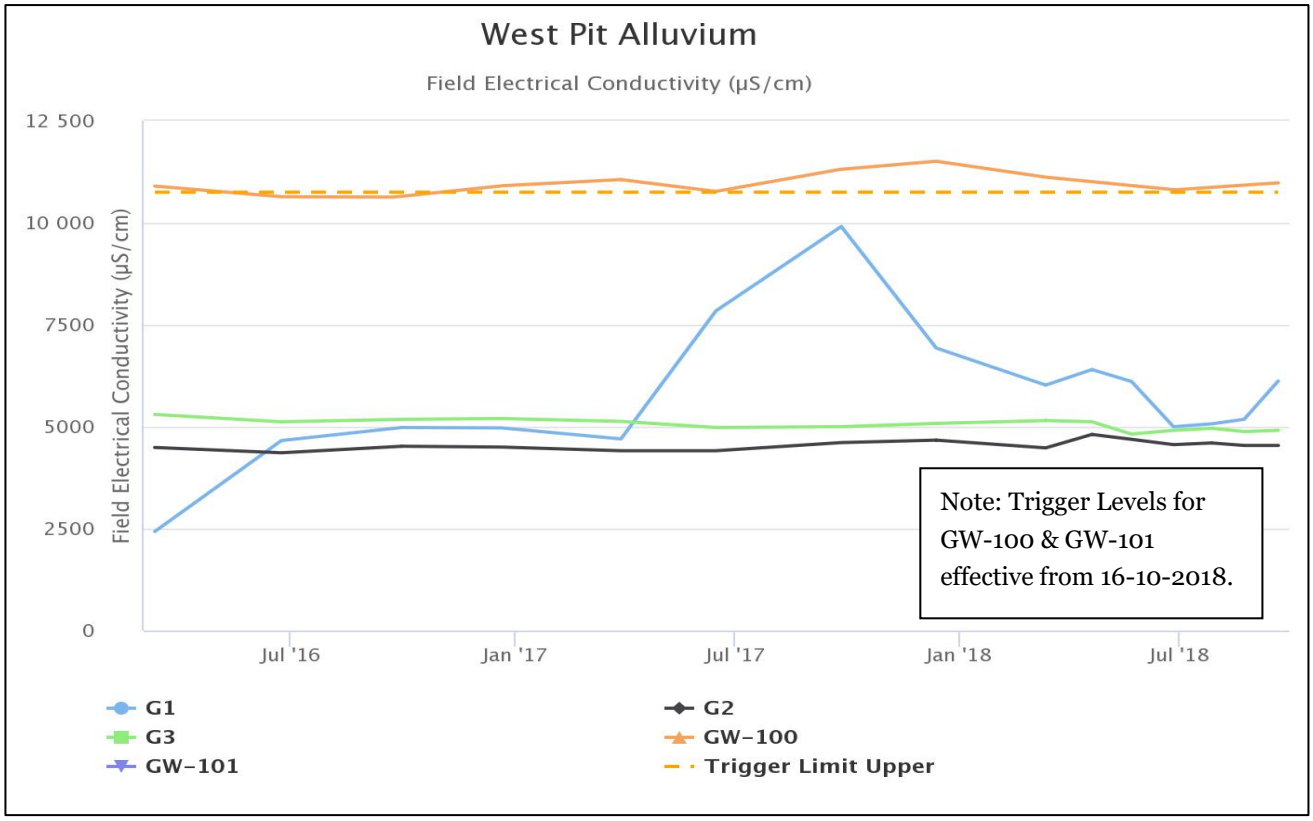

Figure 62: West Pit Alluvium Electrical Conductivity Trend – September 2018

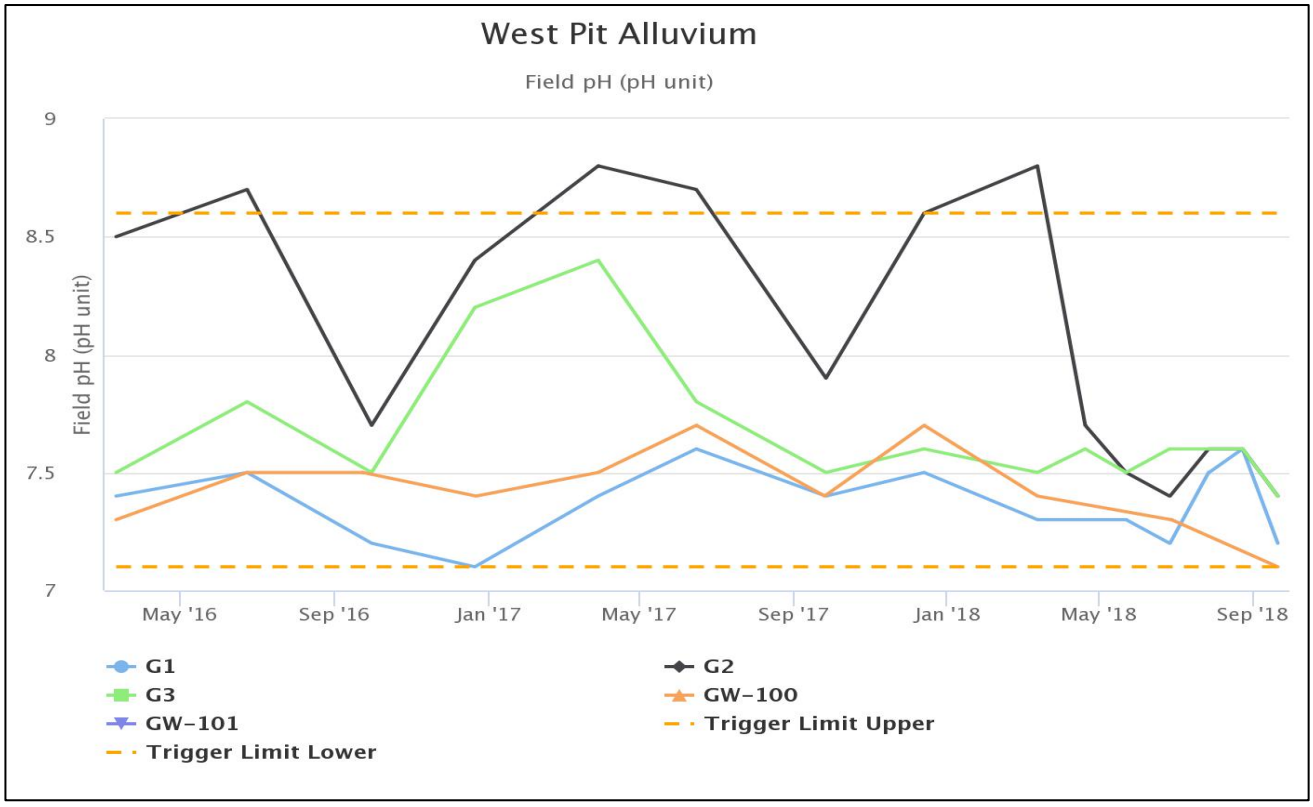

Figure 63: West Pit Alluvium pH Trend – September 2018

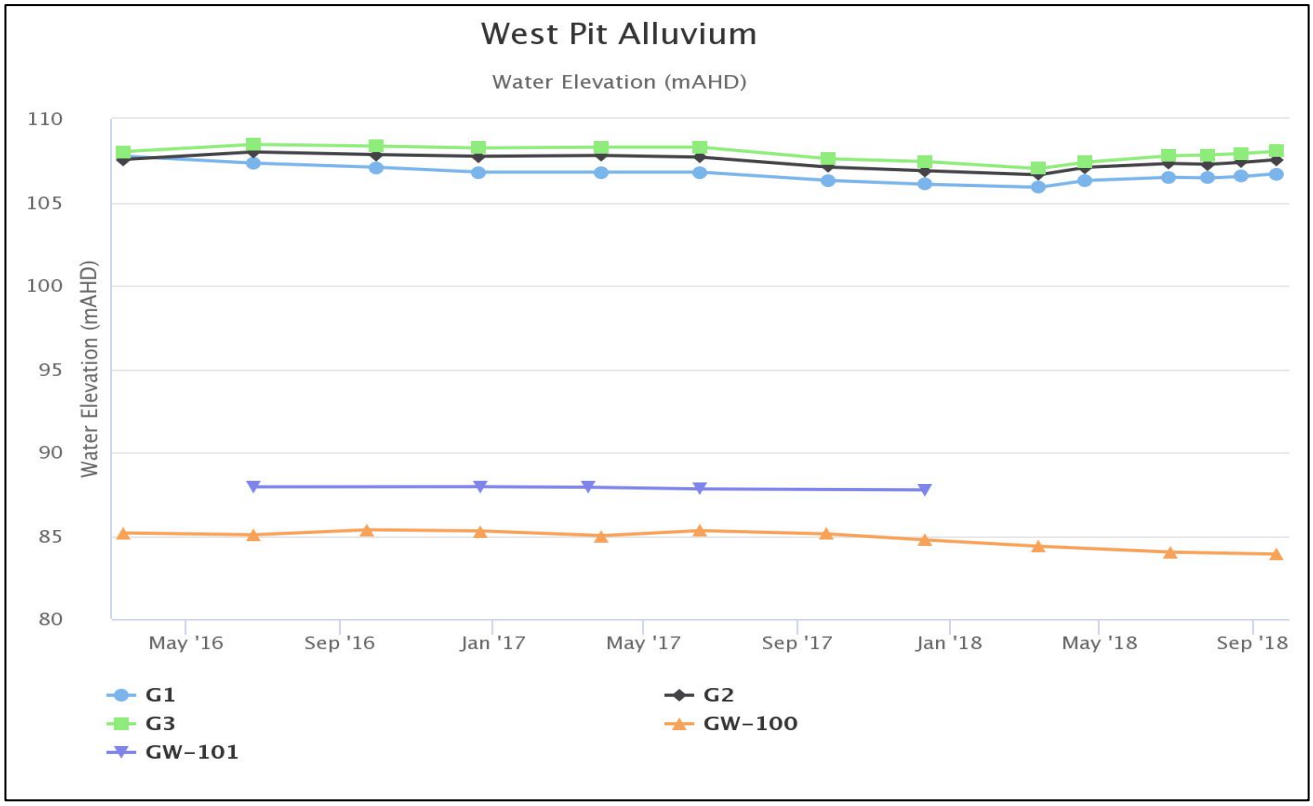

Figure 64: West Pit Alluvium Standing Water Level – September 2018

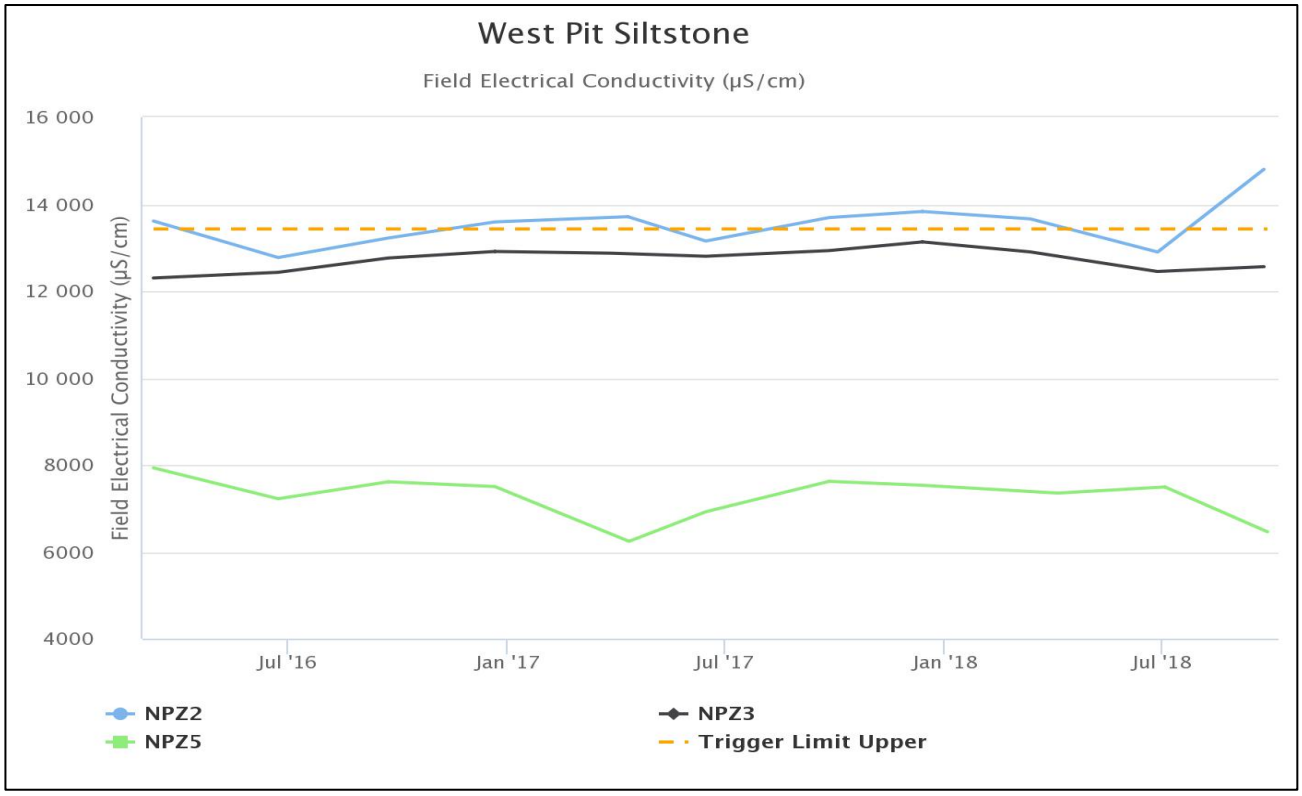

Figure 65: West Pit Siltstone Electrical Conductivity Trend – September 2018

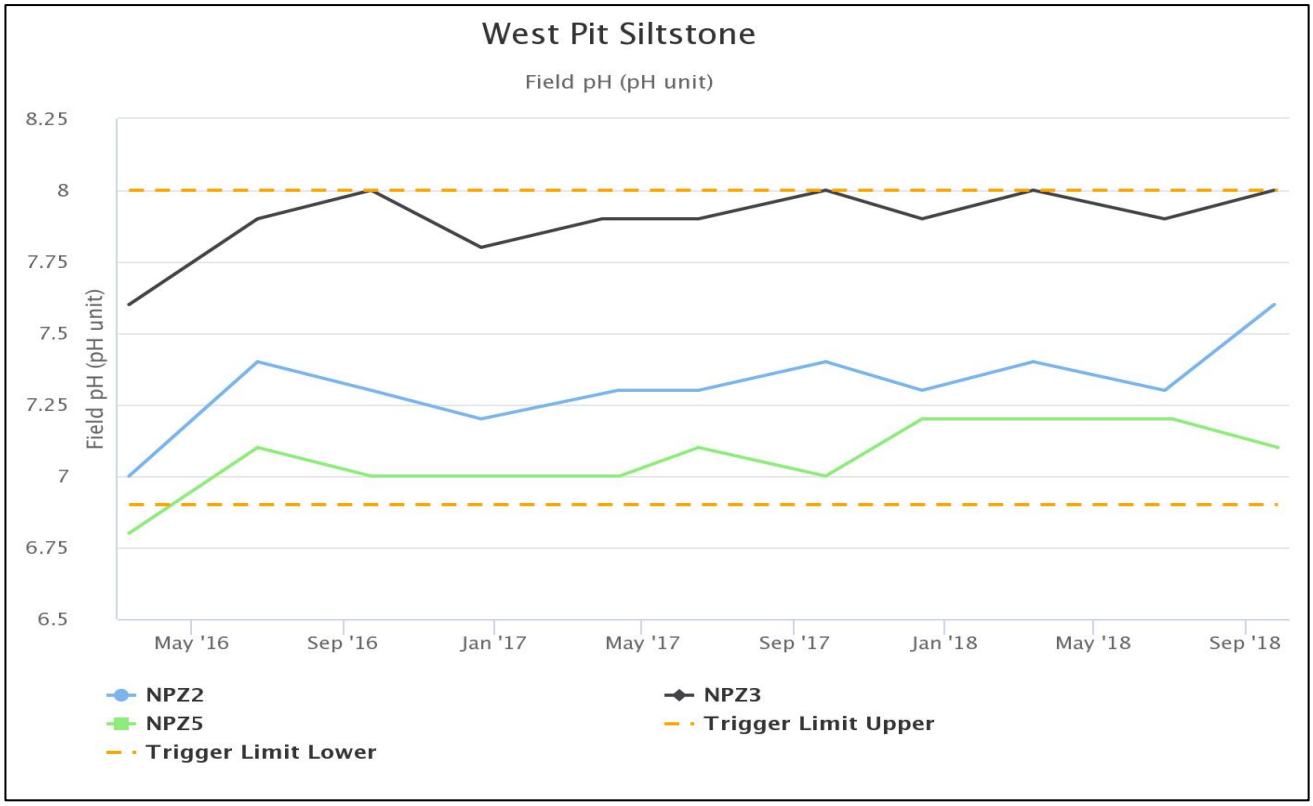

Figure 66: West Pit Siltstone pH Trend – September 2018

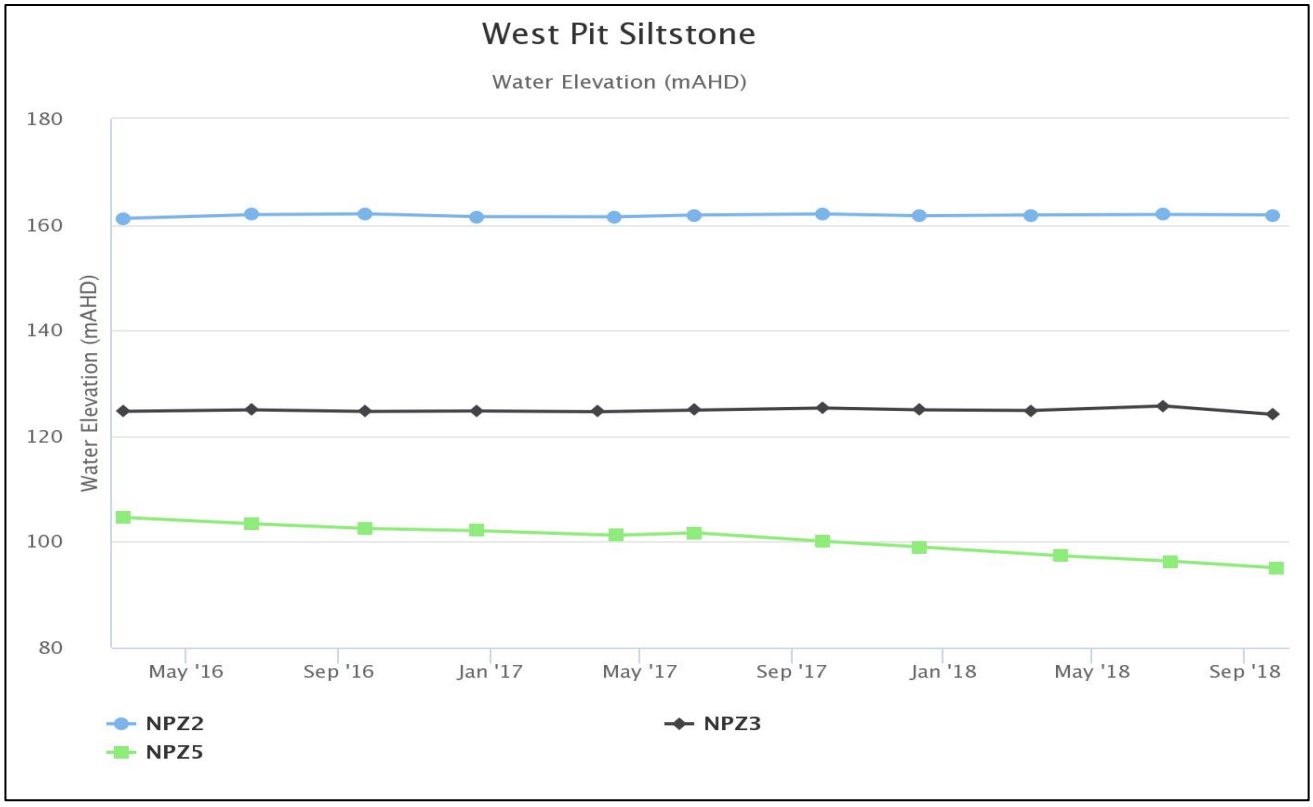

Figure 67: West Pit Siltstone Standing Water Level – September 2018

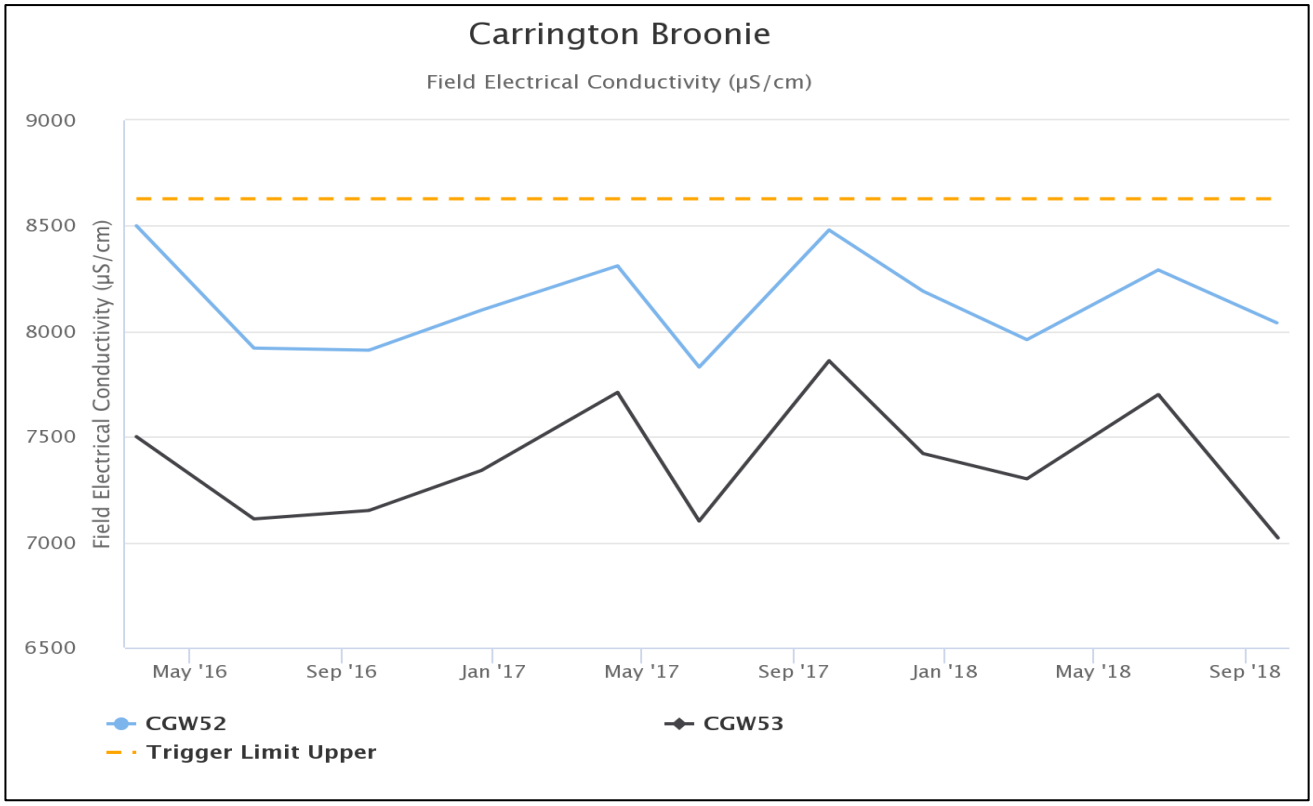

Figure 68: Carrington Broonie Electrical Conductivity Trend – September 2018

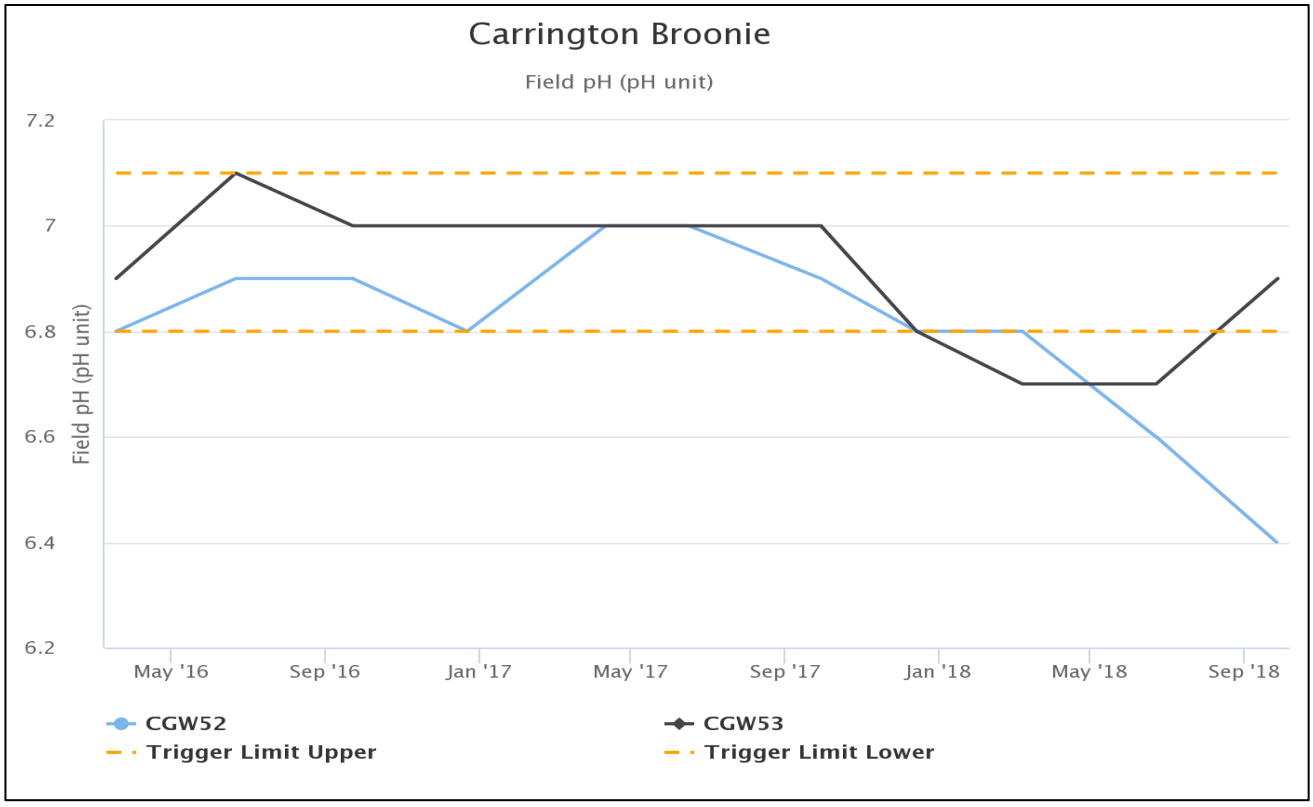

Figure 69: Carrington Broonie pH Trend – September 2018

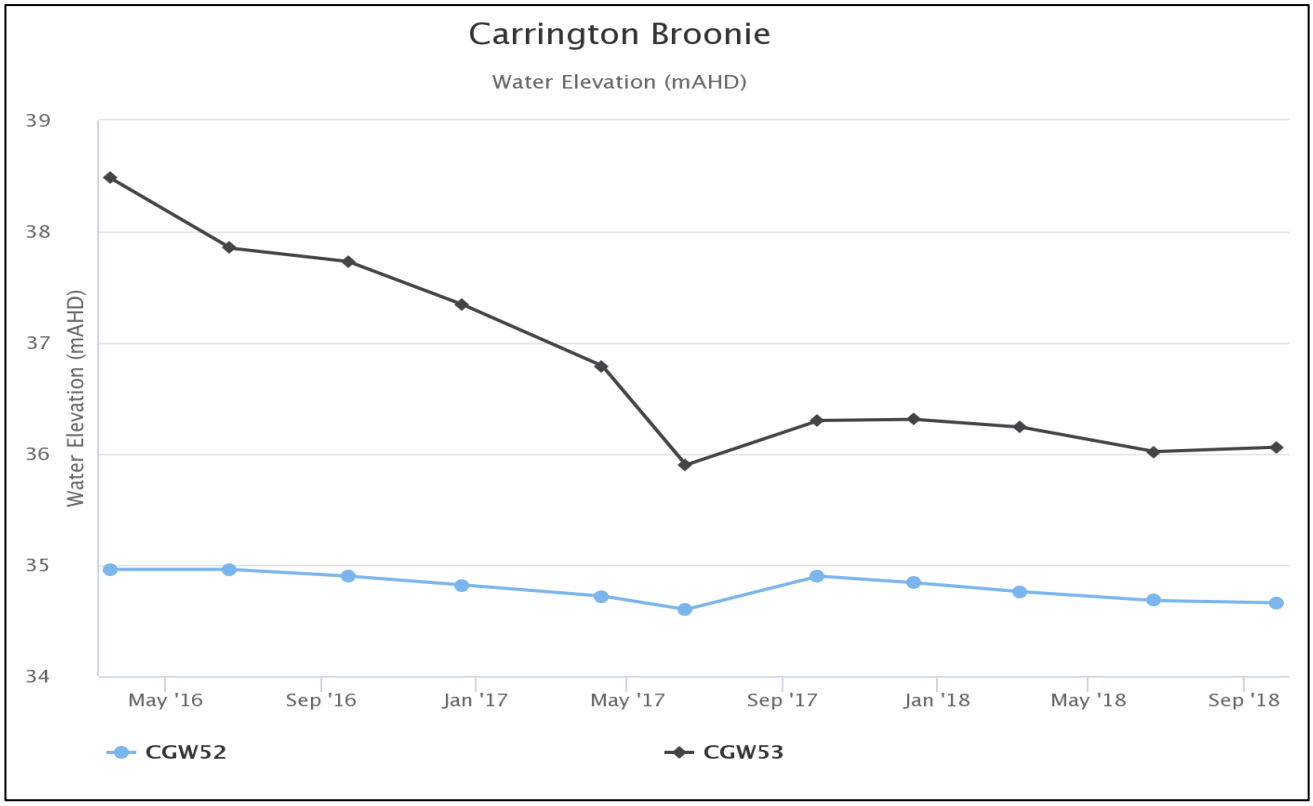

Figure 70: Carrington Broonie Standing Water Level – September 2018

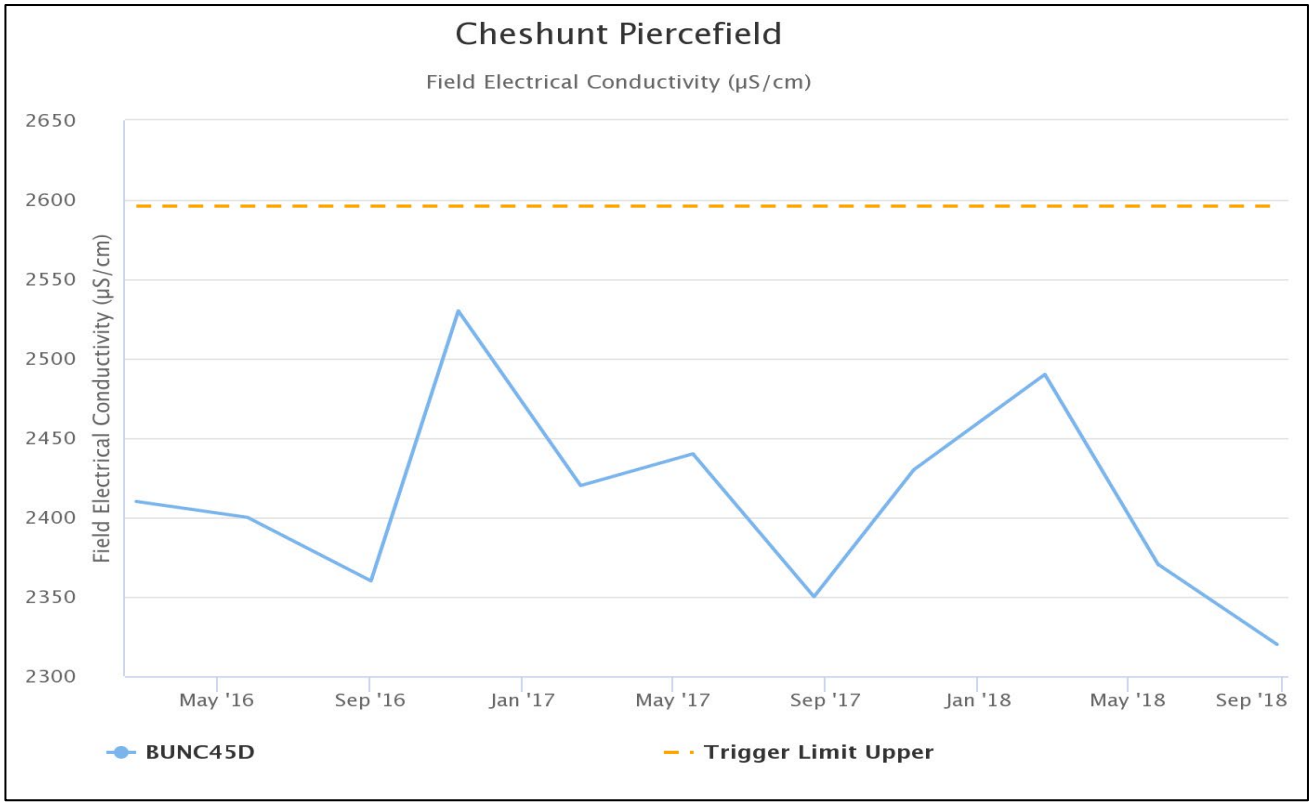

Figure 71: Cheshunt Piercefield Electrical Conductivity Trend – September 2018

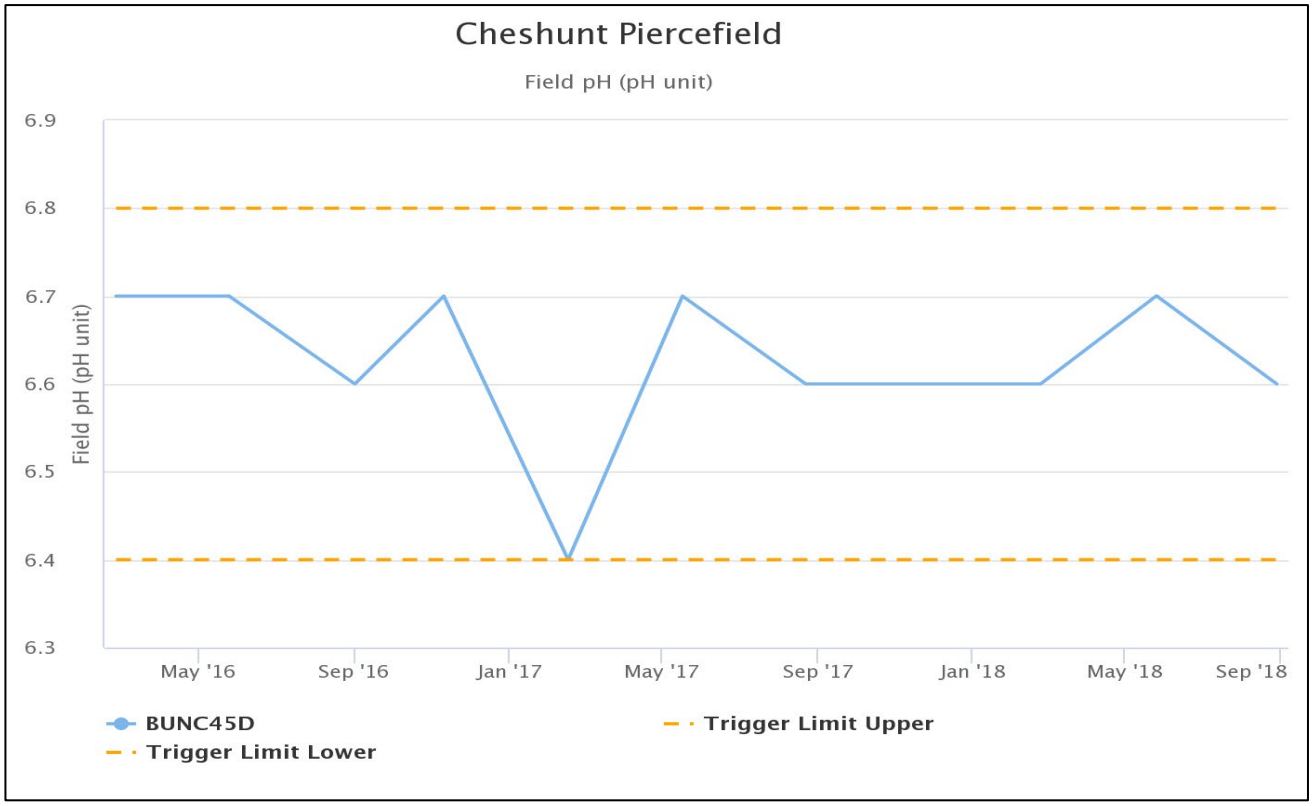

Figure 72: Cheshunt Piercefield pH Trend – September 2018

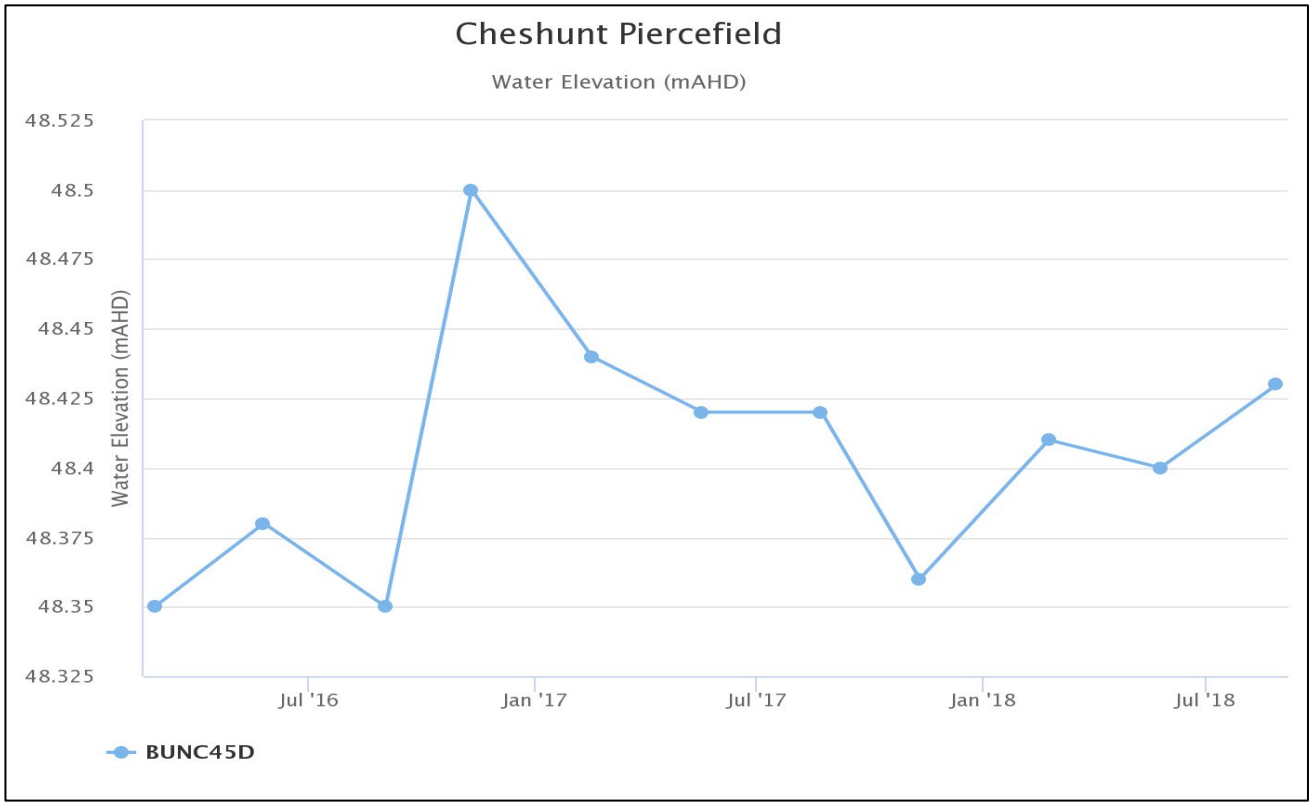

Figure 73: Cheshunt Piercefield Standing Water Level – September 2018

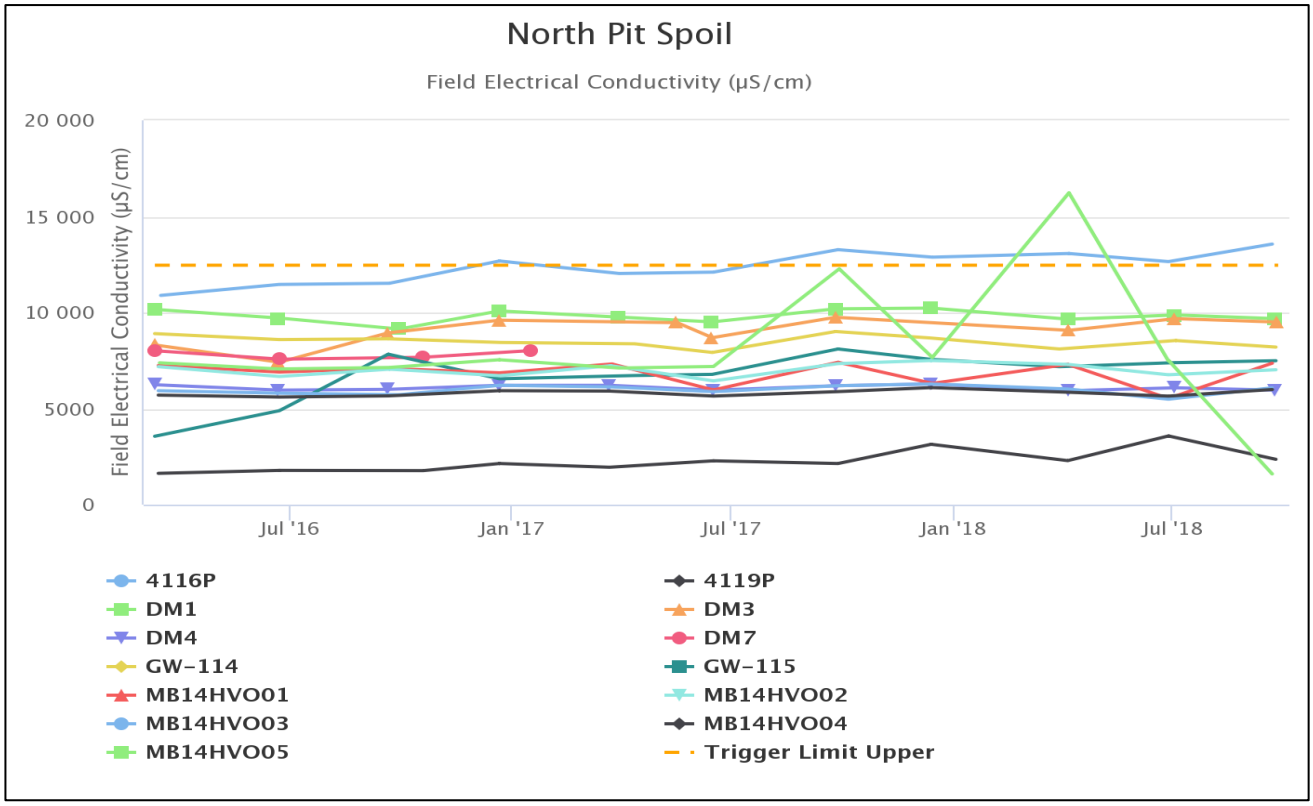

Figure 74: North Pit Spoil Electrical Conductivity Trend – September 2018

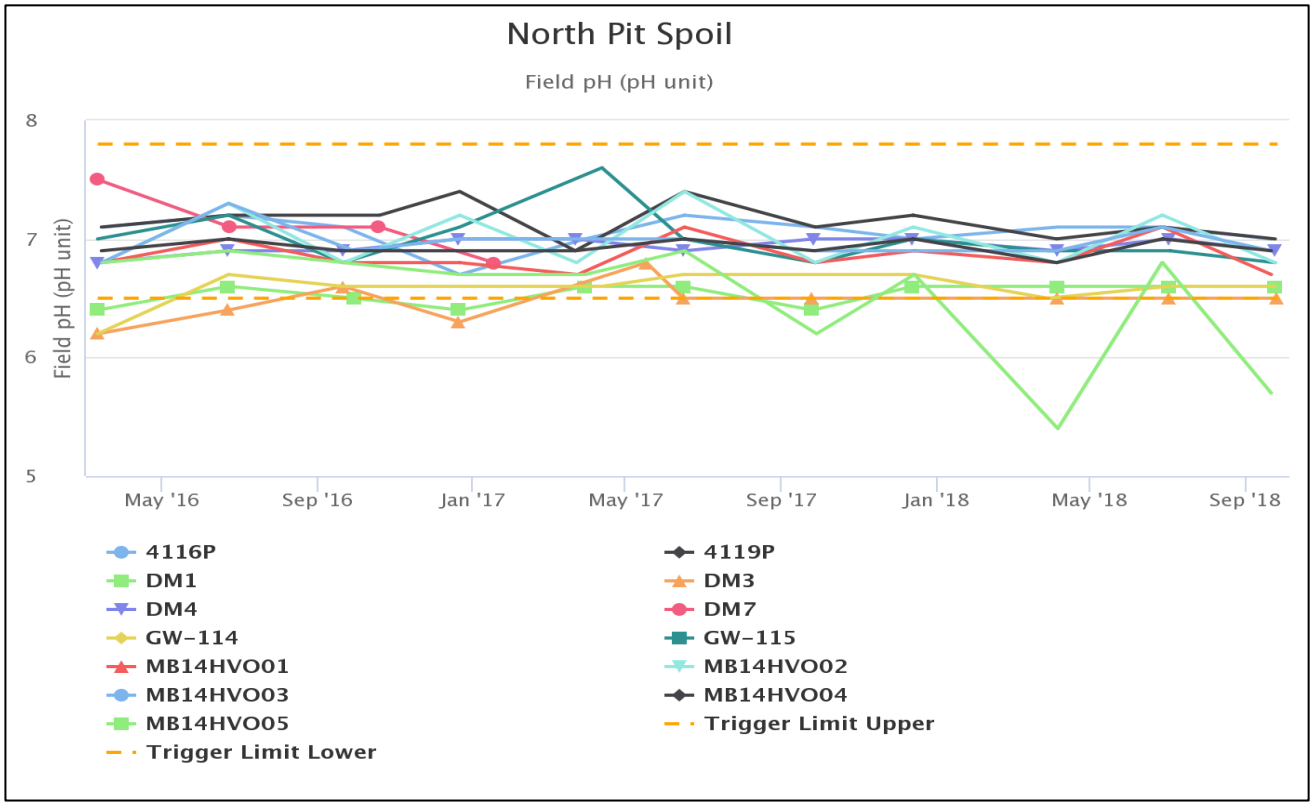

Figure 75: North Pit Spoil pH Trend – September 2018

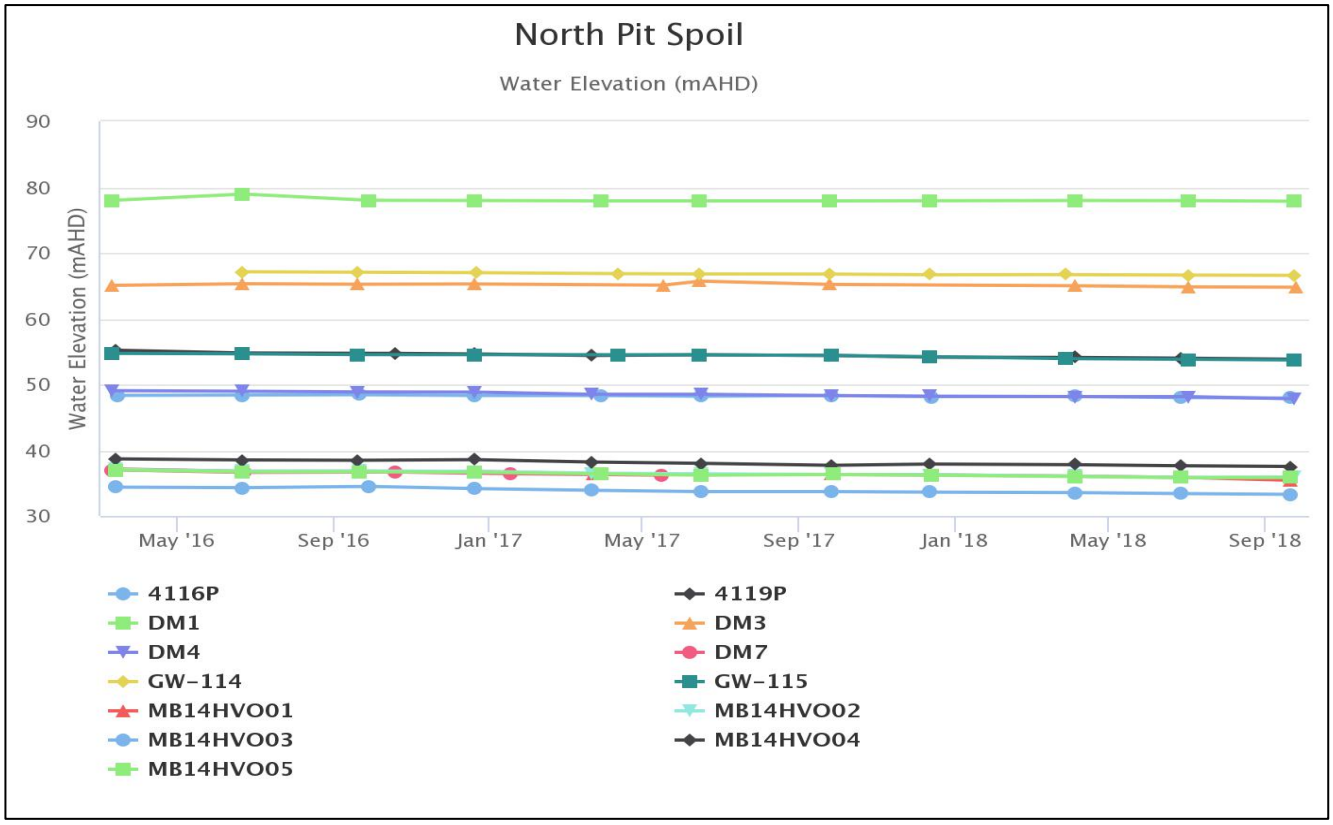

Figure 76: North Pit Spoil Standing Water Level – September 2018

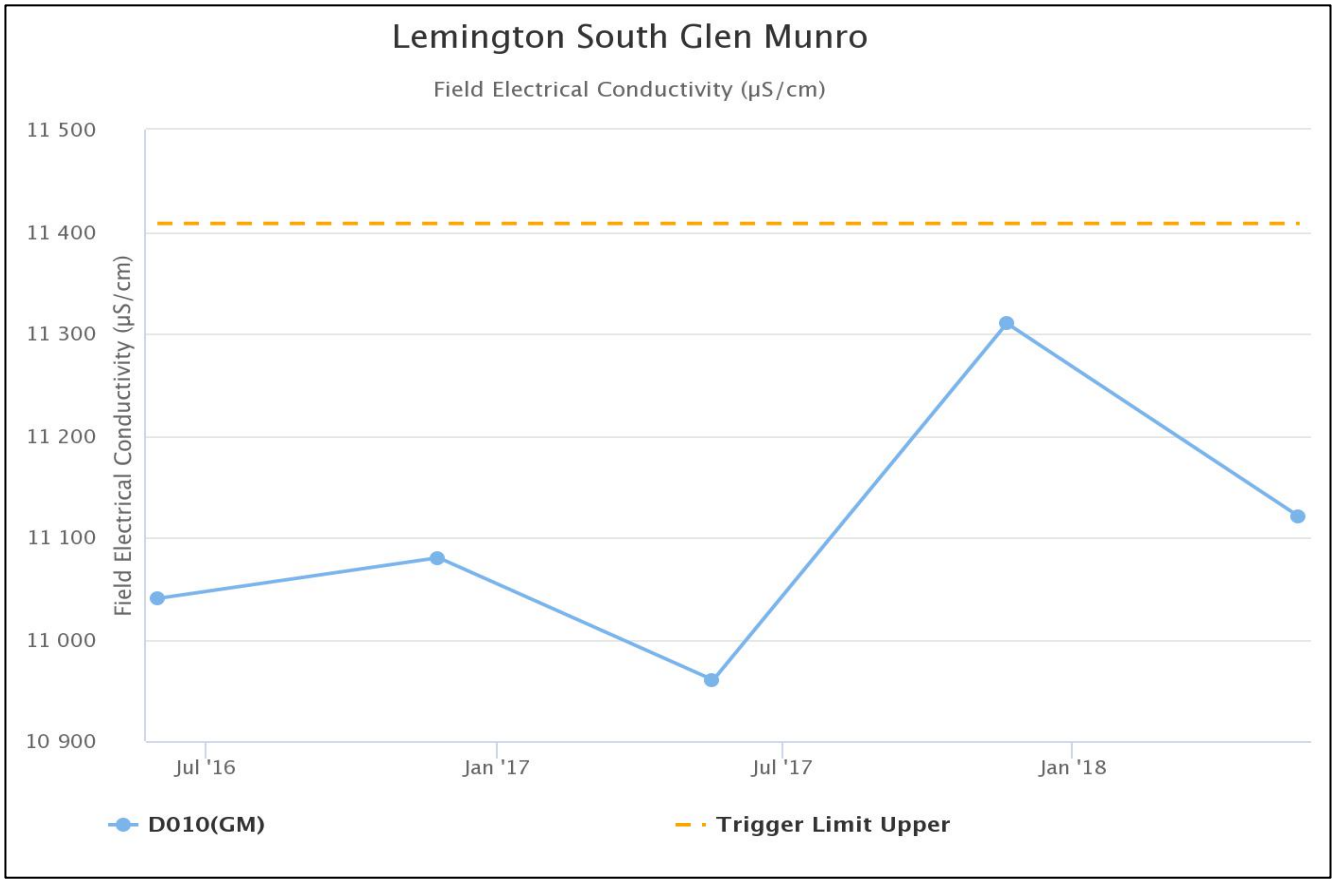

Figure 77: Lemington South Glen Munro EC September 2018

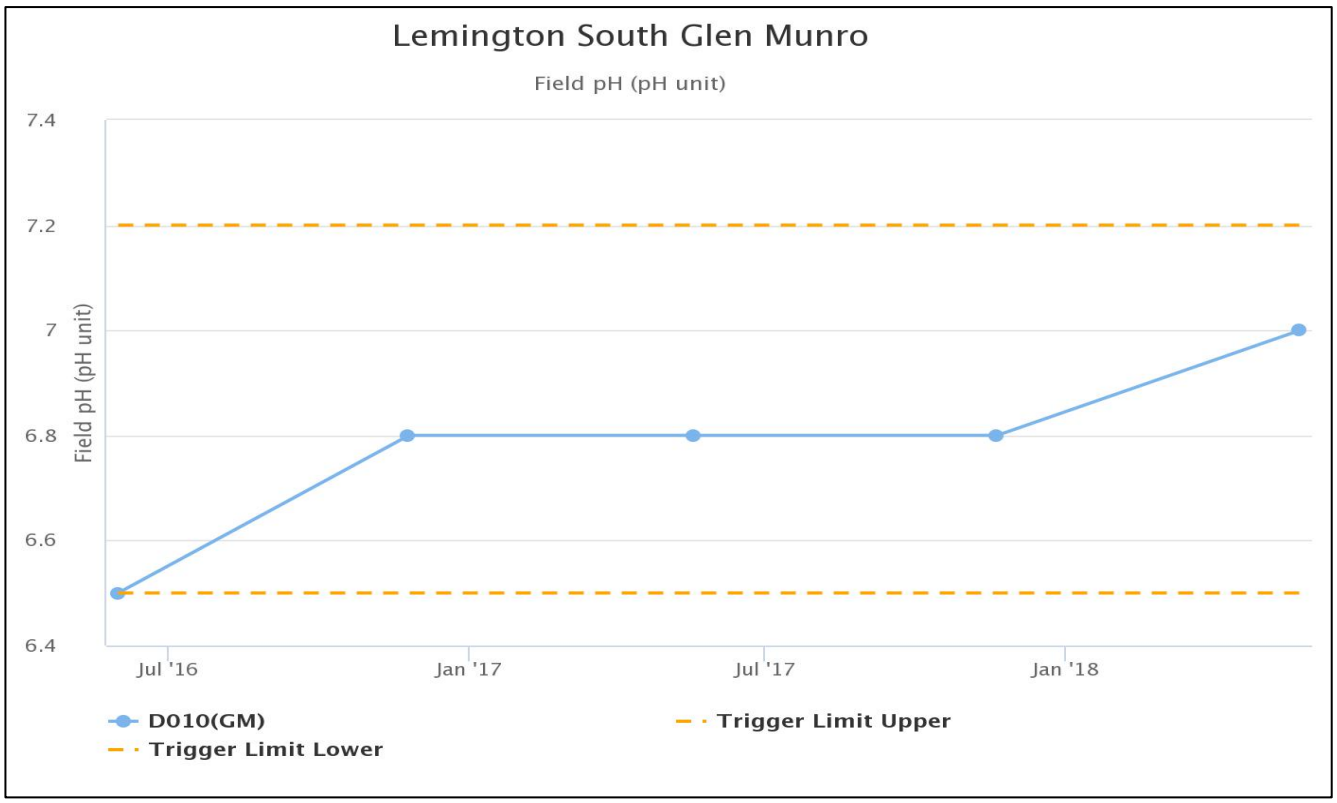

Figure 78: Lemington South Glen Munro pH - September 2018

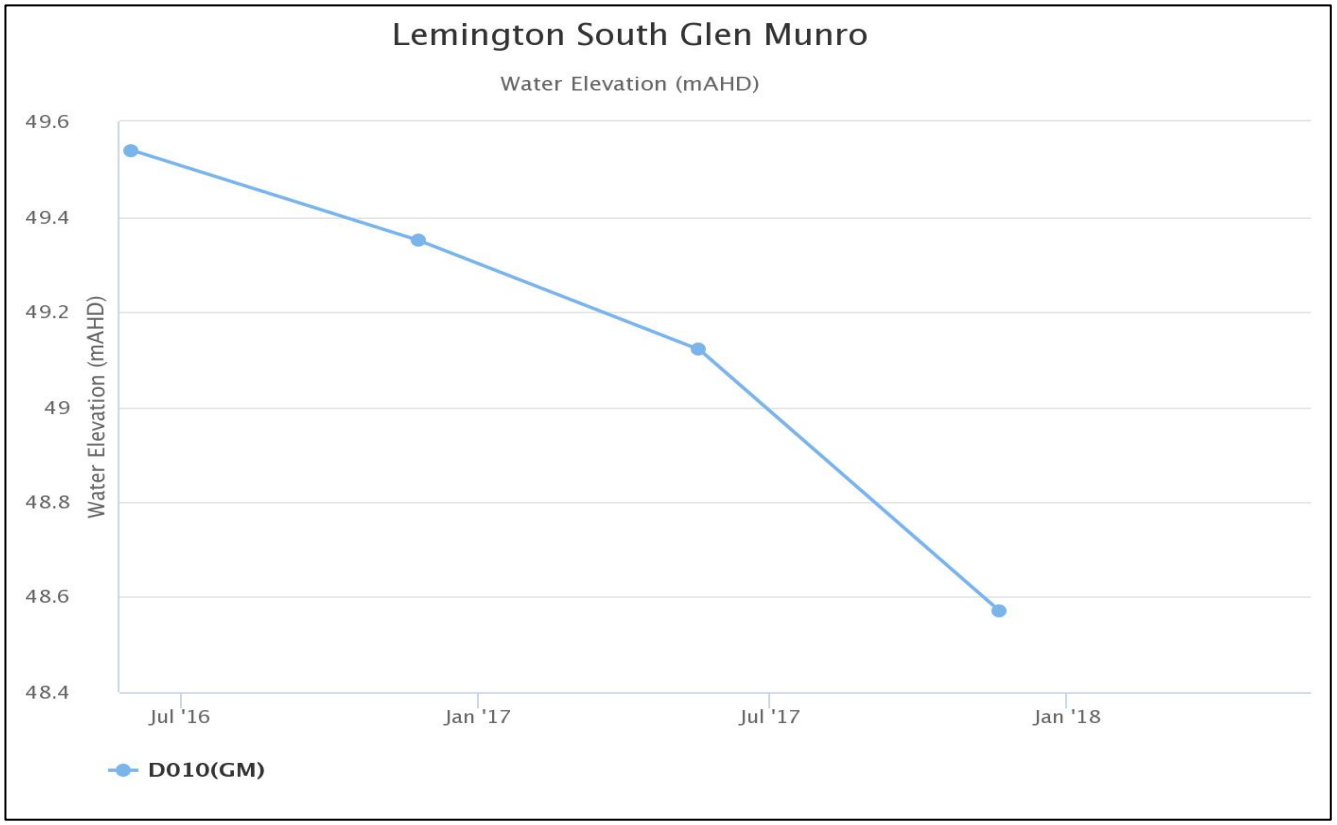

Figure 79: Lemington South Glen Munro Standing Water Level - September 2018

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 – Q3 2018

Site	Date	Trigger Limit Breached	Action Taken in Response
CFW55R	25/07/2018	EC – 95th Percentile	Investigation in progress.
CFW55R	01/08/2018	EC – 95th Percentile	
CFW55R	19/09/2018	EC – 95th Percentile	
CFW55R	25/07/2018	PH – 5th Percentile	Investigation in progress.
CFW55R	01/08/2018	PH – 5th Percentile	
CFW55R	19/09/2018	PH – 5th Percentile	
MB14HVO05	21/09/2018	pH – 5th Percentile	2nd consecutive exceedance. Watching Brief*
CGW52	26/09/2018	pH – 5th Percentile	1st exceedance. Watching Brief*
4116P	21/09/2018	EC – 95th Percentile	Investigation in progress
NPz2	24/09/2018	EC – 95th Percentile	Investigation in progress
NPz3	24/09/2018	pH – 95th Percentile	1st exceedance. Watching Brief*

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

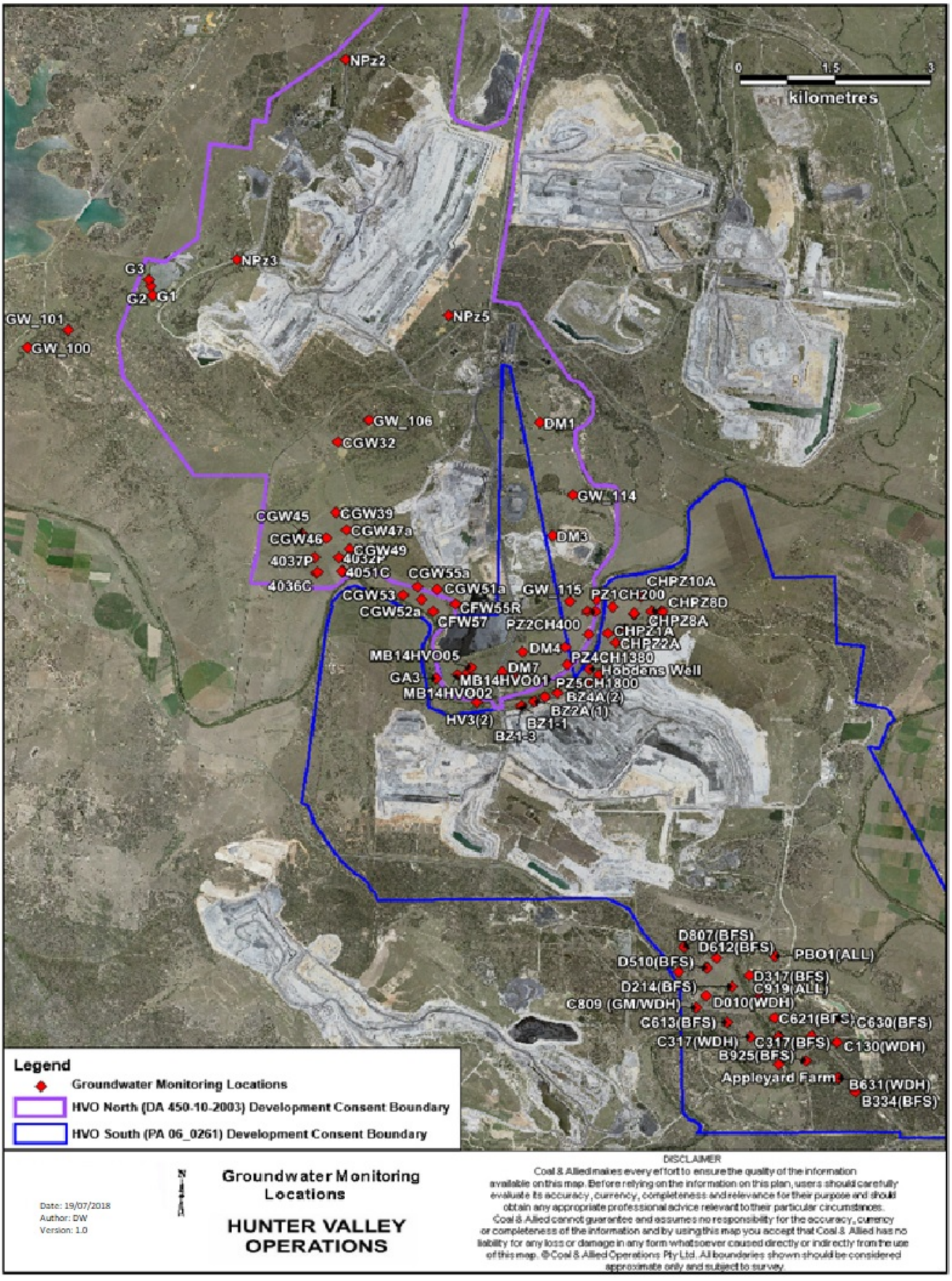

Figure 80: Groundwater Monitoring Location Plan

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 September, 20 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.

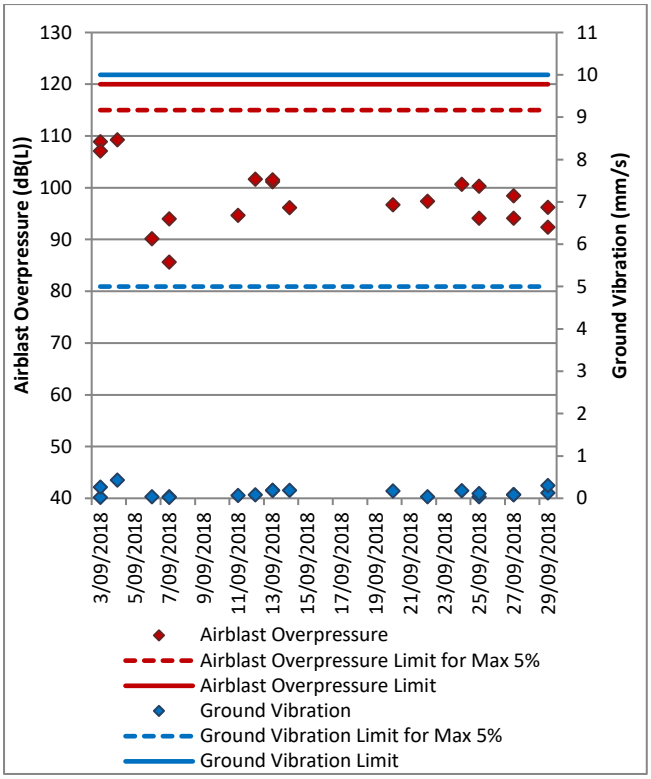

Figure 81: Moses Crossing Blast Monitoring Results – September 2018

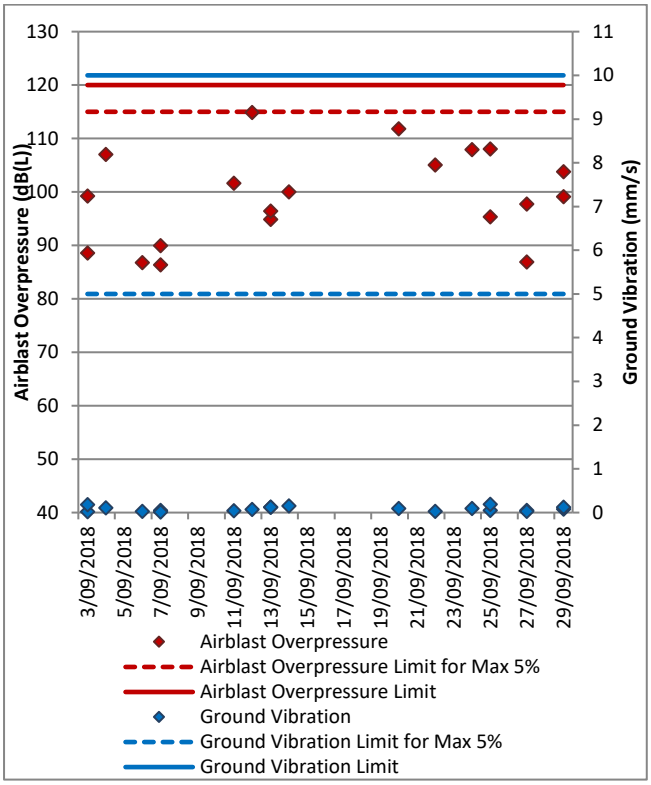

Figure 82: Jerrys Plains Blast Monitoring Results – September 2018

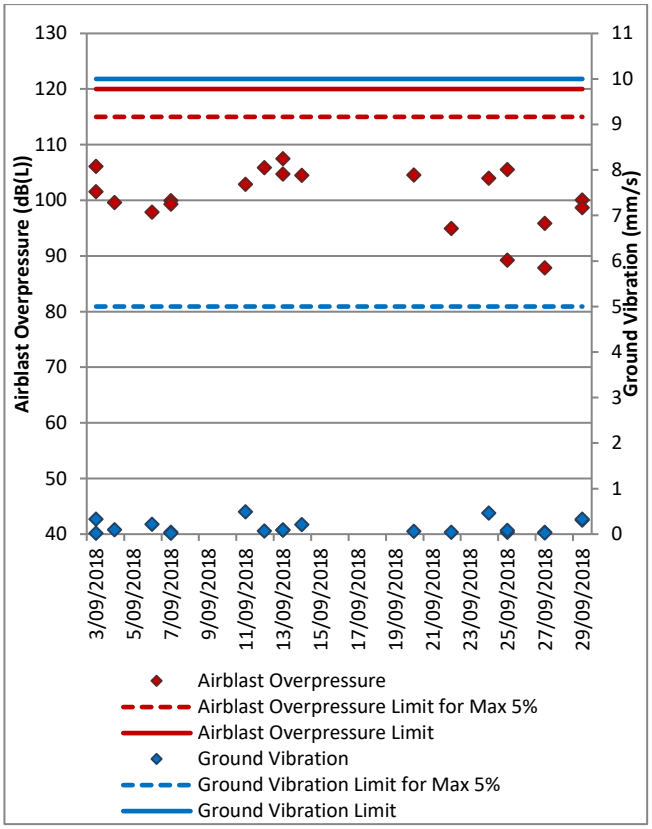

Figure 83: Maison Dieu Blast Monitoring Results – September 2018

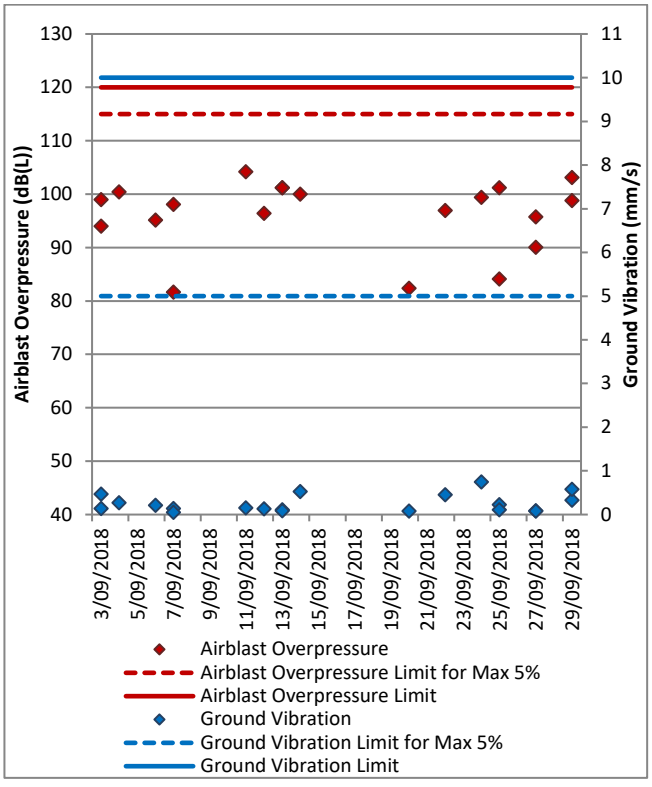

Figure 84: Warkworth Blast Monitoring Results – September 2018

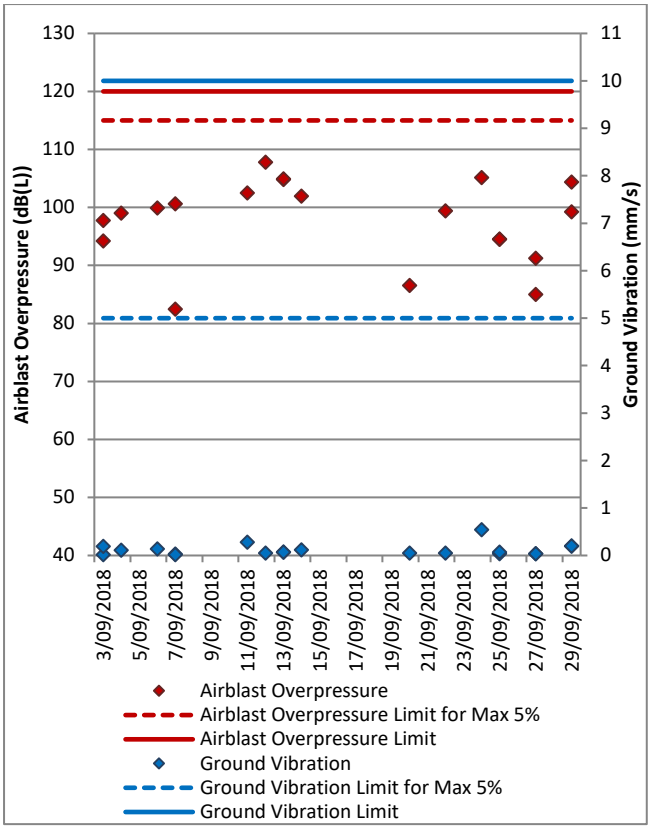

Figure 85: Knodlers Lane Blast Monitoring Results – September 2018

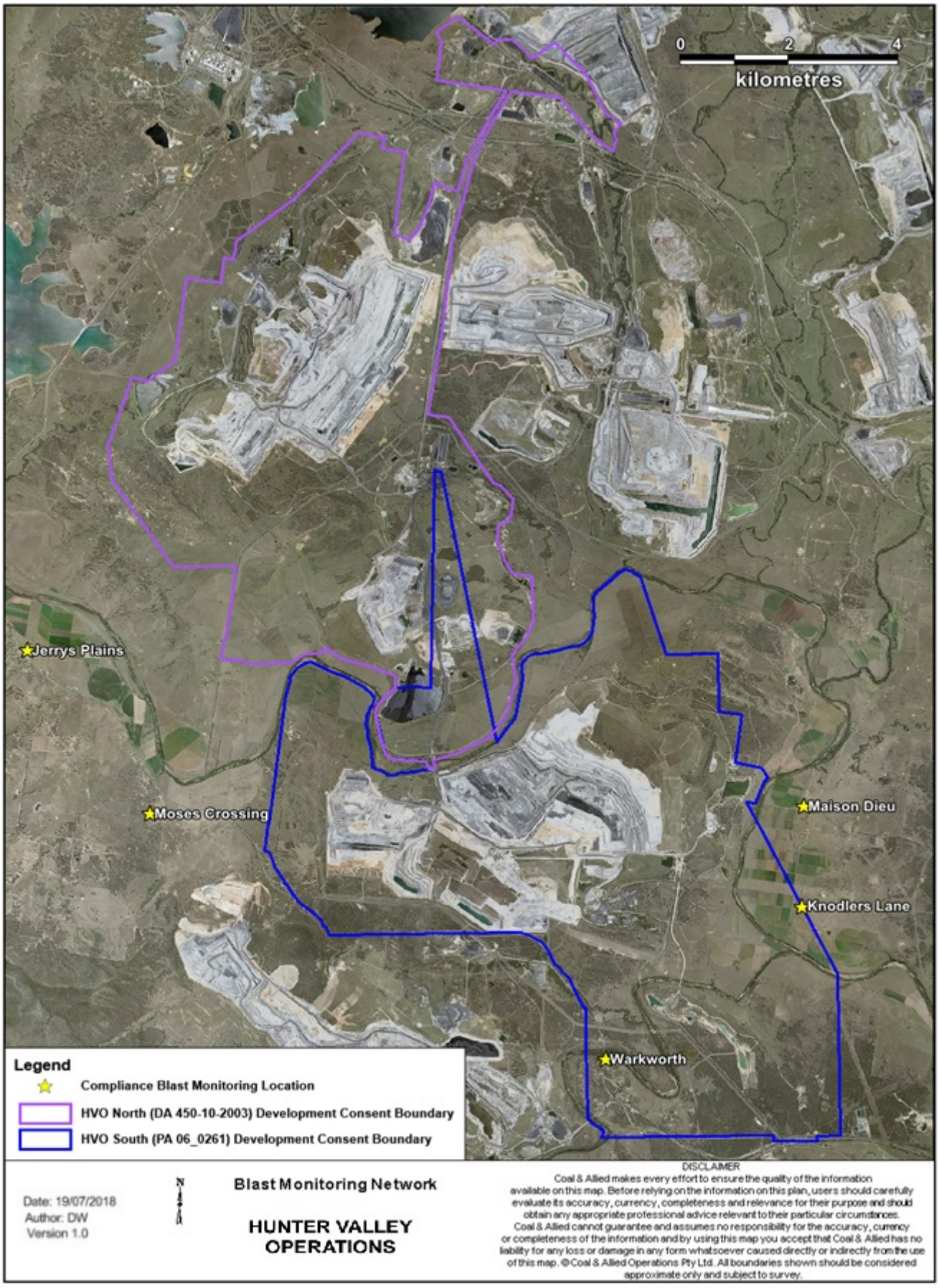

Figure 86: Blast Monitoring Location Plan

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 5, 6 and 11 September 2018. Monitoring results are detailed in Table 6 to Table 11 . During the reporting period, there was one noise exceedance recorded. See section **10.0 Environmental Incidents** of this report for more information.

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

Location	Date and Time	Wind Speed (m/s)[1]	VTG[1]	Criterion dB (A)	Criterion Applies?[2]	HVO South L_{Aeq} dB3[3,4]	Exceedance[4,5]
Knodlers Lane	6/09/2018 1:36	2.4	-1	37	Yes	IA	Nil
Maison Dieu	6/09/2018 0:51	2.4	0.5	37	Yes	<25	Nil
Shearers Lane	6/09/2018 1:13	2.4	0.5	41	Yes	IA	Nil
Kilburnie South	5/09/2018 23:59	2.3	0.5	36	Yes	NM	Nil
Jerrys Plains Village	5/09/2018 21:26	3.7	0.5	35	No	IA	NA
Jerrys Plains Village[6]	5/09/2018 22:31	3.8	0.5	35	No	IA	NA
Jerrys Plains Village[7]	11/09/2018 21:53	3	0.5	35	No	IA	NA
Jerrys East	5/09/2018 21:02	4.2	-1	35	No	IA	NA
Long Point	5/09/2018 21:00	3	0.5	35	No	IA	NA
HVGC	6/09/2018 0:53	2.3	0.5	55	Yes	31	Nil
Redmanvale Road	5/09/2018 23:03	2.7	-1	35	Yes	<25	Nil
Jerrys Plains West	5/09/2018 22:06	3.6	0.5	35	No	IA	NA

Notes:
1. Atmospheric data is sourced from the HVO Cheshunt or HVO Corp. 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 atributed to HVO South Pit Area;
4. Bold results in red indicate exceedance of criteria;
5. NA in exceedance column means atmospheric conditions outside specifed in approval and so criterion is not applicable;
6. Re-measure; and
7. Follow-up Monitoring.

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

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	6/09/2018 1:36	2.4	-1	41	Yes	IA	Nil
Maison Dieu	6/09/2018 0:51	2.4	0.5	41	Yes	<25	Nil
Shearers Lane	6/09/2018 1:13	2.4	0.5	41	Yes	IA	Nil
Kilburnie South	5/09/2018 23:59	2.3	0.5	41	Yes	NM	Nil
Jerrys Plains Village	5/09/2018 21:26	3.7	0.5	40	No	IA	NA
Jerrys Plains Village[6]	5/09/2018 22:31	3.8	0.5	40	No	IA	NA
Jerrys Plains Village[7]	11/09/2018 21:53	3	0.5	40	No	IA	NA
Jerrys East	5/09/2018 21:02	4.2	-1	40	No	IA	NA
Long Point	5/09/2018 21:00	3	0.5	40	No	IA	NA
HVGC	6/09/2018 0:53	2.3	0.5	NA	NA	31	NA
Redmanvale Road	5/09/2018 23:03	2.7	-1	40	Yes	<25	Nil
Jerrys Plains West	5/09/2018 22:06	3.6	0.5	40	No	IA	NA

Notes:
1. Atmospheric data is sourced from the HVO Cheshunt or HVO Corp. 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 atributed to HVO South Pit Area;
4. Bold results in red indicate exceedance of criteria;
5. NA in exceedance column means atmospheric conditions outside specifed in approval and so criterion is not applicable;
6. Re-measure; and
7. Follow-up Monitoring.

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

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	6/09/2018 1:36	2.4	-1	45	Yes	IA	Nil
Maison Dieu	6/09/2018 0:51	2.4	0.5	45	Yes	<25	Nil
Shearers Lane	6/09/2018 1:13	2.4	0.5	45	Yes	IA	Nil
Kilburnie South	5/09/2018 23:59	2.3	0.5	45	Yes	40	Nil
Jerrys Plains Village	5/09/2018 21:26	3.7	0.5	45	No	IA	NA
Jerrys Plains Village[6]	5/09/2018 22:31	3.8	0.5	45	No	IA	NA
Jerrys Plains Village[7]	11/09/2018 21:53	3	0.5	45	No	IA	NA
Jerrys East	5/09/2018 21:02	4.2	-1	45	No	IA	NA
Long Point	5/09/2018 21:00	3	0.5	45	No	IA	NA
HVGC	6/09/2018 0:53	2.3	0.5	NA	NA	34	NA
Redmanvale Road	5/09/2018 23:03	2.7	-1	45	Yes	30	Nil
Jerrys Plains West	5/09/2018 22:06	3.6	0.5	45	No	IA	NA

Notes:
1. Atmospheric data is sourced from the HVO Cheshunt or HVO Corp. 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. 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 specifed in approval and so criterion is not applicable;
6. Re-measure; and
7. Follow-up Monitoring.

.

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

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	6/09/2018 1:36	0.3	0.5	35	Yes	IA	Nil
Maison Dieu	6/09/2018 0:51	0.9	-1	35	Yes	IA	Nil
Shearers Lane	6/09/2018 1:13	0.4	-1	35	Yes	IA	Nil
Kilburnie South	5/09/2018 23:59	1.5	0.5	39	Yes	<35	Nil
Jerrys Plains Village	5/09/2018 21:26	2.6	-1	36	Yes	**39[6]**	**3[6]**
Jerrys Plains Village[7]	5/09/2018 22:31	2	0.5	36	Yes	34	Nil
Jerrys Plains Village[8]	11/09/2018 21:53	1.1	-1	36	Yes	34	Nil
Jerrys East	5/09/2018 21:02	4	-1	39	No	35	NA
Long Point	5/09/2018 21:00	3	0.5	35	Yes	IA	Nil
HVGC	6/09/2018 0:53	0.4	-1	NA	NA	IA	NA
Redmanvale Road	5/09/2018 23:03	0.5	35	Yes	<30	Nil	Nil
Jerrys Plains West	5/09/2018 22:06	3	-1	35	Yes	31	Nil

Notes:
1. Atmospheric data is sourced from the HVO Corporate or HVO Corp. 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;
5. NA in exceedance column means atmospheric conditions outside specified in approval and so criterion is not applicable;
6. Includes low-frequency penalty;
7. Re-measure; and
8. Follow-up monitoring.

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

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	6/09/2018 1:36	0.3	0.5	41	Yes	IA	Nil
Maison Dieu	6/09/2018 0:51	0.9	-1	41	Yes	IA	Nil
Shearers Lane	6/09/2018 1:13	0.4	-1	41	Yes	IA	Nil
Kilburnie South	5/09/2018 23:59	1.5	0.5	41	Yes	<35	Nil
Jerrys Plains Village	5/09/2018 21:26	2.6	-1	41	Yes	39	Nil
Jerrys Plains Village[6]	5/09/2018 22:31	2	0.5	41	Yes	34	Nil
Jerrys Plains Village[7]	11/09/2018 21:53	1.1	-1	41	Yes	34	Nil
Jerrys East	5/09/2018 21:02	4	-1	41	No	35	NA
Long Point	5/09/2018 21:00	3	0.5	41	Yes	IA	Nil
HVGC	6/09/2018 0:53	0.4	-1	NA	NA	IA	NA
Redmanvale Road	5/09/2018 23:03	2.2	0.5	41	Yes	<30	Nil
Jerrys Plains West	5/09/2018 22:06	3	-1	41	Yes	31	Nil

Notes:
1. Atmospheric data is sourced from the HVO Corporate or HVO Corp. 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;
5. NA in exceedance column means atmospheric conditions outside specified in approval and so criterion is not applicable;
6. Re-measure; and
7.. Follow-up monitoring.

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

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	6/09/2018 1:36	0.3	0.5	46	Yes	IA	Nil
Maison Dieu	6/09/2018 0:51	0.9	-1	46	Yes	IA	Nil
Shearers Lane	6/09/2018 1:13	0.4	-1	46	Yes	IA	Nil
Kilburnie South	5/09/2018 23:59	1.5	0.5	46	Yes	38	Nil
Jerrys Plains Village	5/09/2018 21:26	2.6	-1	46	Yes	45	Nil
Jerrys Plains Village[4]	5/09/2018 22:31	2	0.5	46	Yes	39	Nil
Jerrys Plains Village[5]	11/09/2018 21:53	1.1	-1	46	Yes	44	Nil
Jerrys East	5/09/2018 21:02	4	-1	46	No	39	NA
Long Point	5/09/2018 21:00	3	0.5	46	Yes	IA	Nil
HVGC	6/09/2018 0:53	0.4	-1	NA	NA	IA	NA
Redmanvale Road	5/09/2018 23:03	2.2	0.5	46	Yes	<30	Nil
Jerrys Plains West	5/09/2018 22:06	3	-1	46	Yes	39	Nil

Notes:
1. Atmospheric data is sourced from the HVO Corporate or MTW Charlton Ridge 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 specifed in approval and so criterion is not applicable;
6. Re-measure; and
7. Follow-up monitoring.

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 September 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 – September 2018

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	6/09/2018 1:36	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA
Maison Dieu	6/09/2018 0:51	<25/IA	NA/NA	NA/NA	NA/NA	NA/NA
Shearers Lane	6/09/2018 1:13	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA
Kilburnie South	5/09/2018 23:59	NM/<35	NA/NA	NA/NA	NA/NA	NA/NA
Jerrys Plains Village	5/09/2018 21:26	IA/37	NA/54	NA/17	NA/1	NA/2

Jerrys Plains Village[4]	5/09/2018 22:31	IA/34	NA/52	NA/18	NA/Nil	NA/Nil
Jerrys Plains Village[5]	11/09/2018 21:53	IA/34	NA/52	NA/18	NA/Nil	NA/Nil
Jerrys East	5/09/2018 21:02	IA/35	NA/NA	NA/NA	NA/NA	NA/NA
Long Point	5/09/2018 21:00	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA
HVGC	6/09/2018 0:53	31/IA	49/NA	18/NA	Nil/NA	Nil/NA
Redmanvale Road	5/09/2018 23:03	<25/<30	NA/NA	NA/NA	NA/NA	NA/NA
Jerrys Plains West	5/09/2018 22:06	IA/31	NA/51	NA/20	NA/Nil	NA/Nil

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, 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 as detailed in Sections 2.4 and 3.3 of this report; 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;
4. Re-measure; and
5. Follow-up measurement.

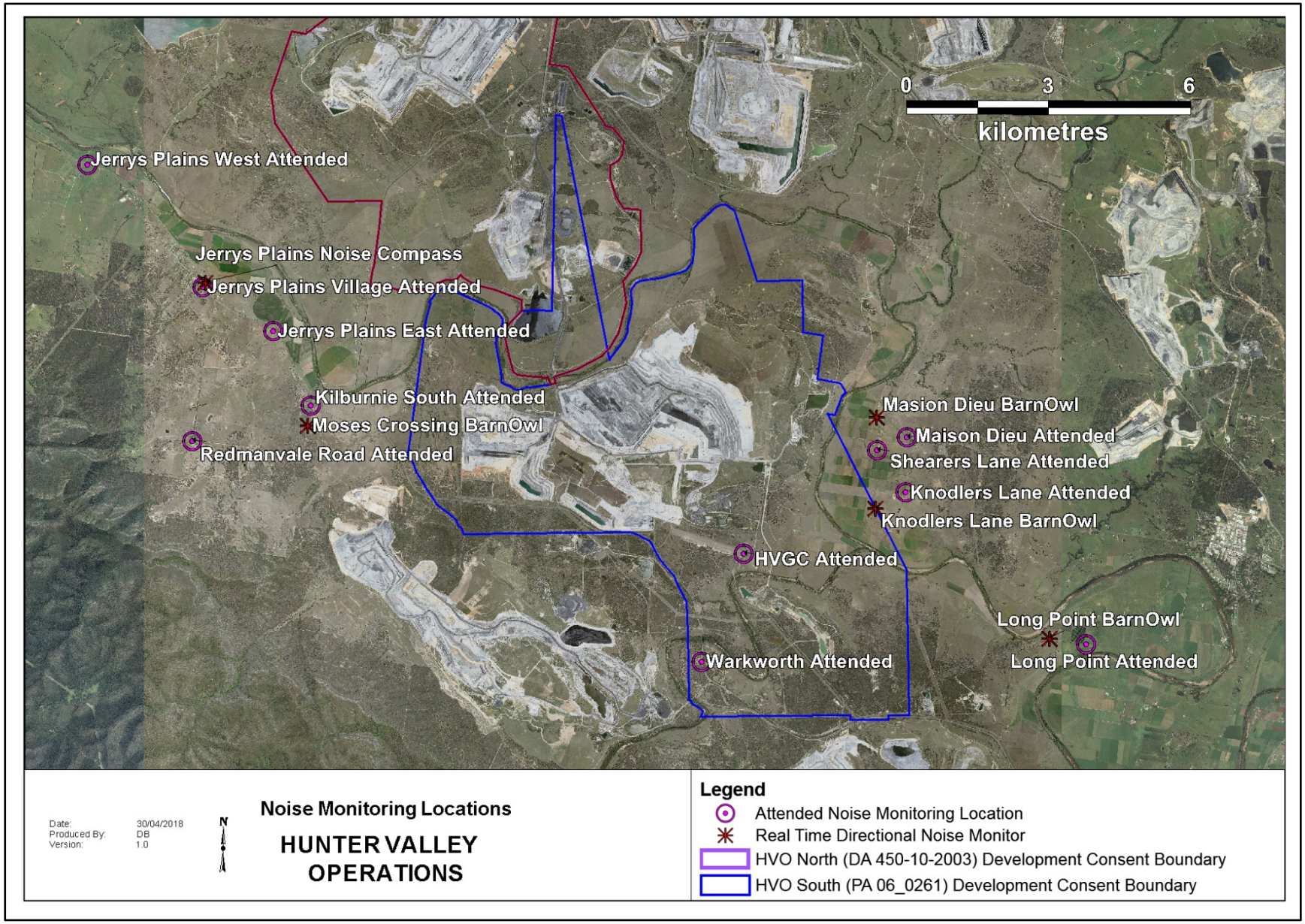

Figure 87: Noise Monitoring Location Plan

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 September, a total of 397 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.

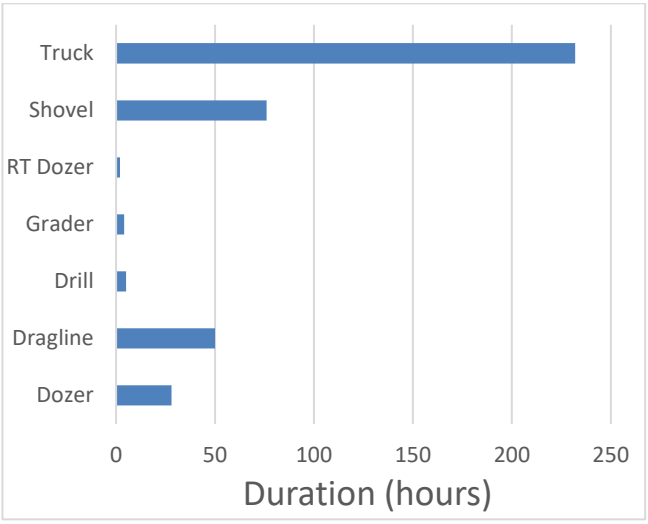

Figure 88: Operational Downtime by Equipment Type – September 2018

8.0 REHABILITATION

During September 3.6 Ha of land was released, 16.1 Ha of land was bulk shaped, 2.1 Ha of land was Topsoiled and 22.0 Ha of land was Rehabilitated. Year to date progress can be viewed in Figure 86.

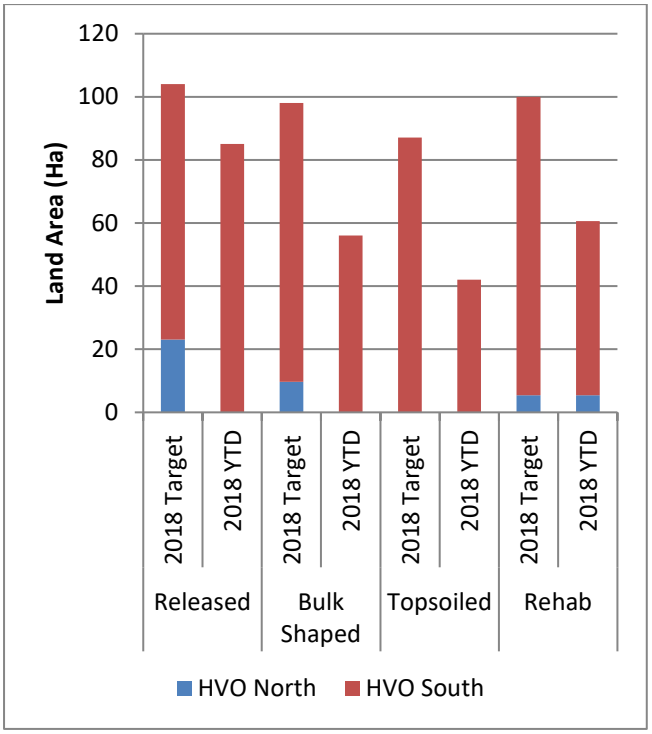

Figure 89: Rehabilitation YTD – September 2018

9.0 COMPLAINTS

During September one complaint was 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	-	-	1	-	-	1
May	4	1	2	-	-	7
June	1	-	1	-	1	3
July	-	-	2	-	-	2
August	1	-	-	-	-	1
September	1	-	-	-	-	1
October	-	-	-	-	-	-
November	-	-	-	-	-	-
December	-	-	-	-	-	-
Total	8	3	10	-	2	23

Figure 90: Complaints Graph – September 2018

10.0 ENVIRONMENTAL INCIDENTS

During the reporting period there was one recordable environmental incidents.

05 September 2018 – Noise Exceedance

Noise Exceedance measured at the Jerrys Plains Village attended monitoring location in relation to haul truck noise from HVO West Pit. As per the Noise Management Plan, the monitoring consultant contacted dispatch and advised of the exceedance, within 75 minutes a re-measure was undertaken which came under the criteria. HVO Contribution on the re-measure which came under the criteria. A follow up measurement was required and undertaken within 7 days on 11 September 2018 which also resulted in a compliant measurement. The result was reported to the Department of Planning & Environment.

Appendix A: Meteorological Data

Table 14: Meteorological Data - HVO Corporate Meteorological Station – September 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)
1/09/2018	18	9	92	36	831	284	5.0	0.0
2/09/2018	18	8	78	32	1143	172	2.6	0.0
3/09/2018	16	4	100	46	1147	111	2.9	0.8
4/09/2018	16	8	100	61	994	115	3.3	2.0
5/09/2018	20	8	87	40	1088	109	3.6	0.0
6/09/2018	22	6	99	34	1082	129	1.1	2.4
7/09/2018	18	9	100	78	684	157	1.1	5.6
8/09/2018	17	8	100	67	1022	139	1.9	0.4
9/09/2018	22	5	99	21	812	273	3.3	0.2
10/09/2018	22	8	90	24	797	174	1.9	0.0
11/09/2018	26	5	100	19	747	154	0.8	0.0
12/09/2018	28	8	92	17	787	251	2.7	0.0
13/09/2018	26	11	85	38	563	112	4.1	0.0
14/09/2018	29	11	90	11	817	227	1.3	0.0
15/09/2018	32	9	69	3	836	270	4.7	0.0
16/09/2018	18	5	59	4	883	167	3.1	0.0
17/09/2018	20	1	79	25	899	130	1.6	0.0
18/09/2018	26	7	92	15	834	258	2.6	0.0
19/09/2018	28	9	73	8	1144	244	4.0	0.0
20/09/2018	18	5	84	34	1149	114	2.0	0.0
21/09/2018	23	2	90	12	837	197	1.3	0.0
22/09/2018	25	9	70	9	956	261	2.9	0.0
23/09/2018	25	8	80	14	825	167	2.6	0.0
24/09/2018	16	6	90	54	1085	112	3.9	0.0
25/09/2018	20	5	100	30	1065	110	2.9	0.0
26/09/2018	15	2	100	56	950	145	1.3	5.4
27/09/2018	22	4	100	23	1120	151	0.8	0.0
28/09/2018	31	6	89	6	882	-	2.5	0.0
29/09/2018	24	7	65	11	917	222	4.0	0.0
30/09/2018	21	3	87	22	1233	114	2.7	0.0

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