HUNTER VALLEY
OPERATIONS

Monthly Environmental Monitoring Report

September 2019

CONTENTS

FIGURES

TABLES

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 1 September to 30 September 2019.

2.0 AIR QUALITY

2.1 Meteorological Monitoring

HVO maintains two meteorological stations; 'HVO 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 trends are shown in Figure 1.

Table 1: Rainfall data - September 2019

2019	Monthly Rainfall (mm)	Cumulative Rainfall (mm)
September	*20.6*	*318.8*

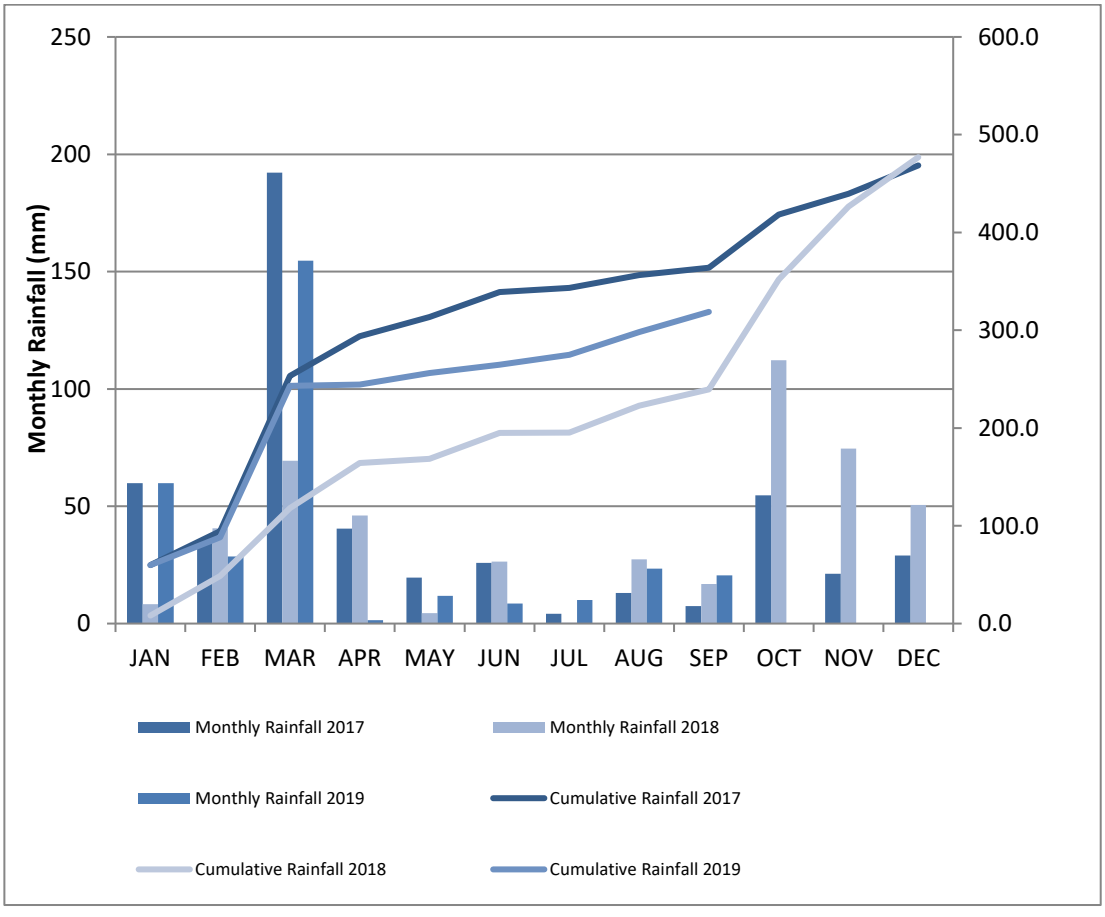

Figure 1: Rainfall Summary 2019

2.1.2 Wind Speed and Direction

North-westerly winds were dominant during September as shown in Figure 2 (HVO Corporate) and Figure 3 (HVO Cheshunt).

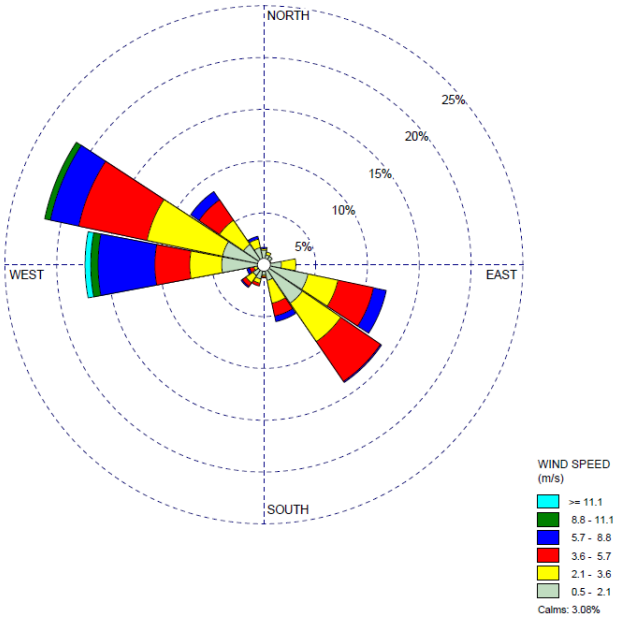

Figure 2: HVO Corporate Wind Rose – September 2019

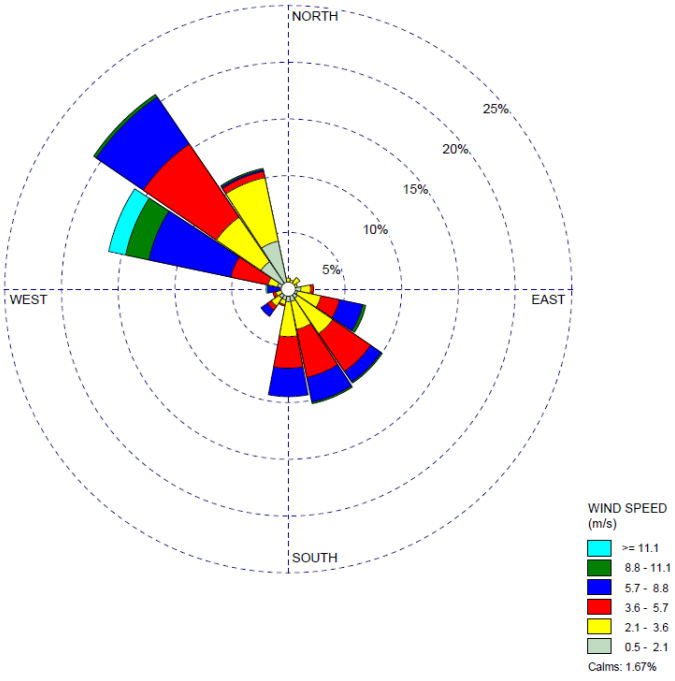

Figure 3: HVO Cheshunt Wind Rose – September 2019

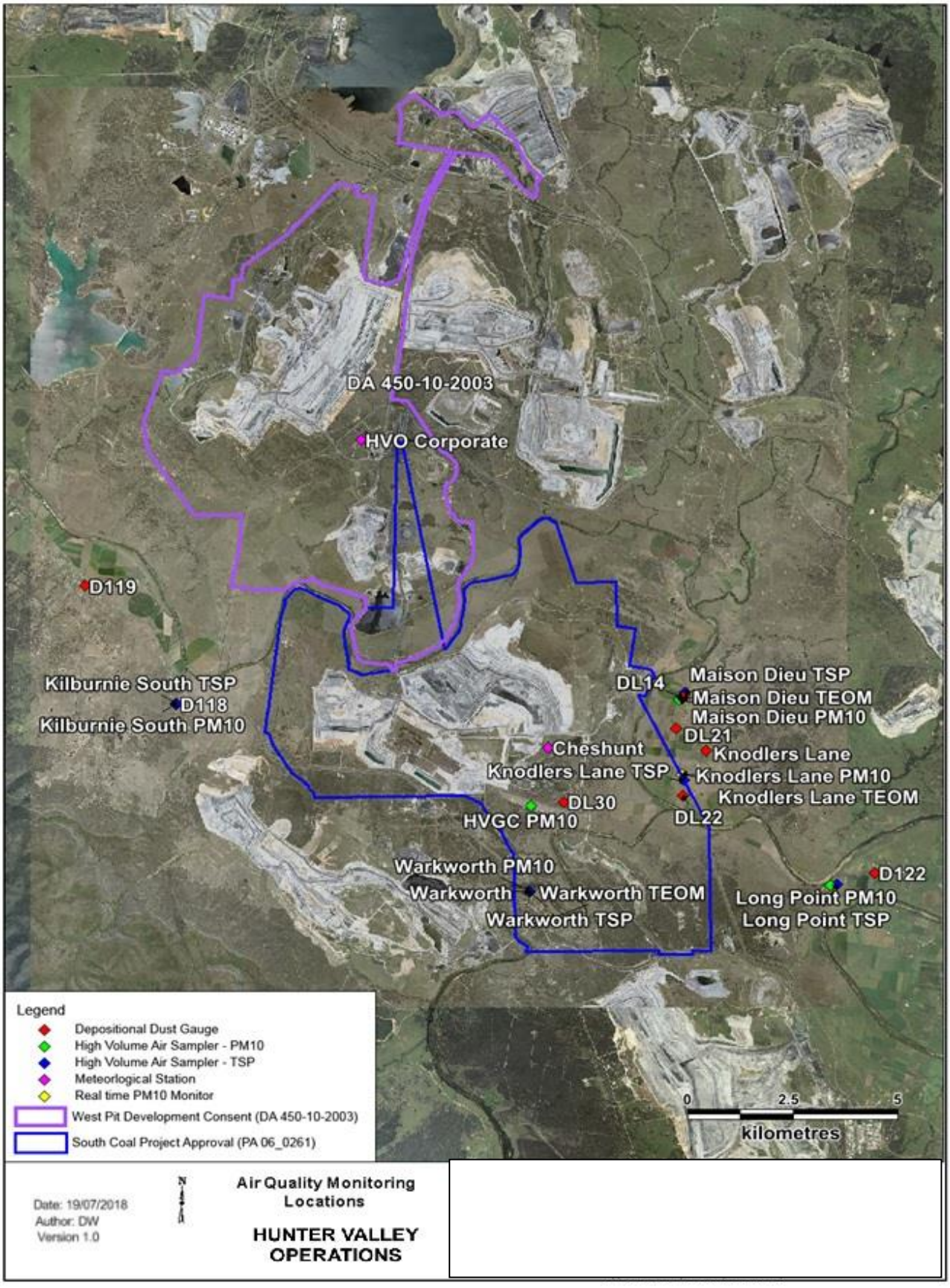

Figure 4: Air Quality Monitoring Location Plan

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 annual impact assessment criteria.

During the reporting period the DL30, DL118 and Warkworth monitors recorded a monthly result above the long term impact assessment criteria of 4.0 g/m^2 per month.

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

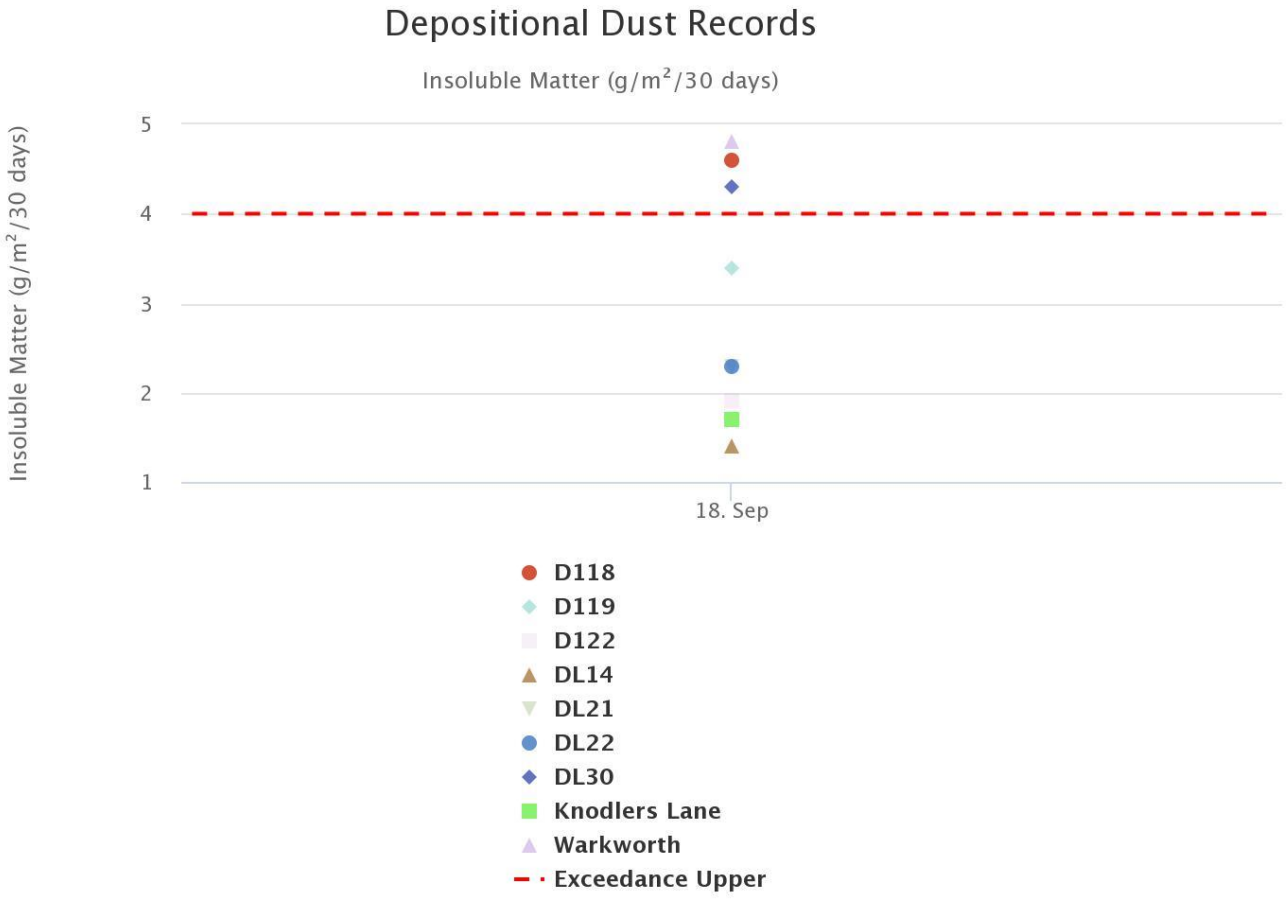

Figure 5: Depositional Dust Results – September 2019

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/m^3. During the reporting period the Kilburnie South monitor recorded an exceedance above the short term impact assessment criteria of 50 µg/m^3.

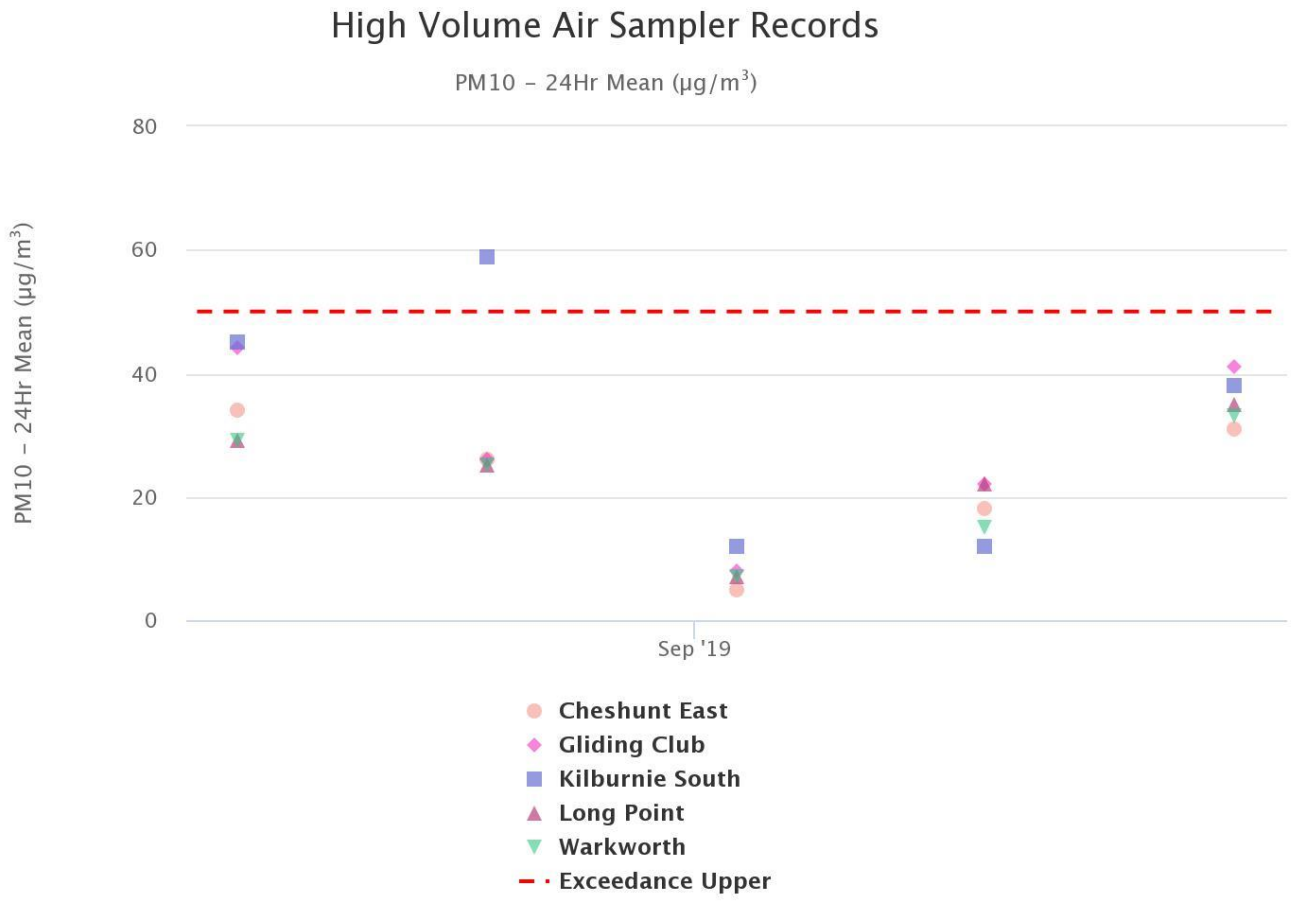

Figure 6: Individual PM_{10} Results – September 2019

Figure 7 shows the year to date annual average PM10 results. During the reporting period, the Kilburnie South and Gliding Club monitors recorded an exceedance above the PM10 Annual Rolling Mean of 30µg/m3. An assessment of HVO's contribution against the long term impact assessment criteria will be provided in the 2019 Annual Review.

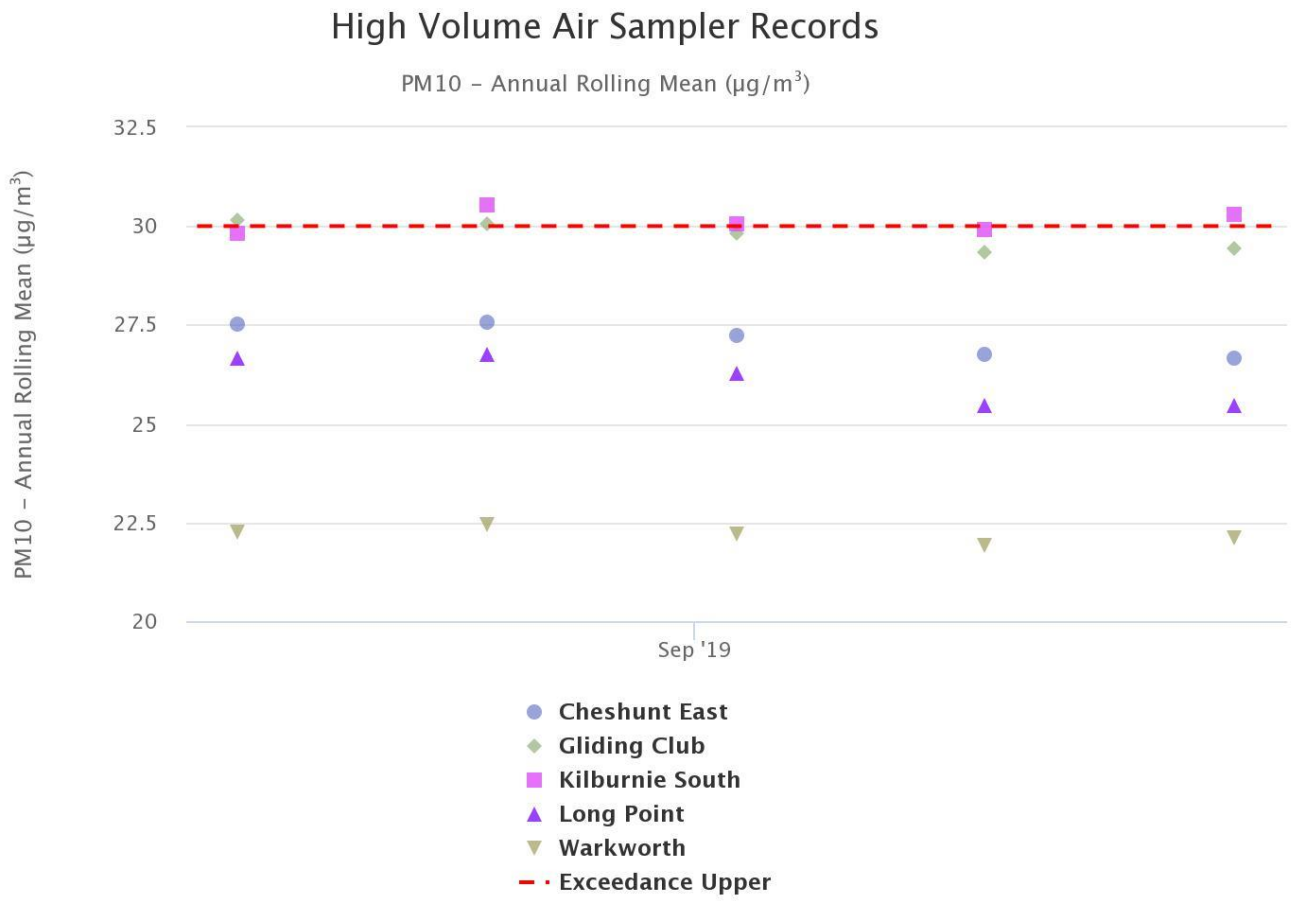

Figure 7: Year to Date Average PM_{10} – as at end of September 2019

2.3.2 TSP Results

Figure 8 shows the annual average TSP results compared against the long term impact assessment criteria of 90µg/m³. During the reporting period, the Kilburnie South monitor recorded exceedances above 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 2019 Annual Review.

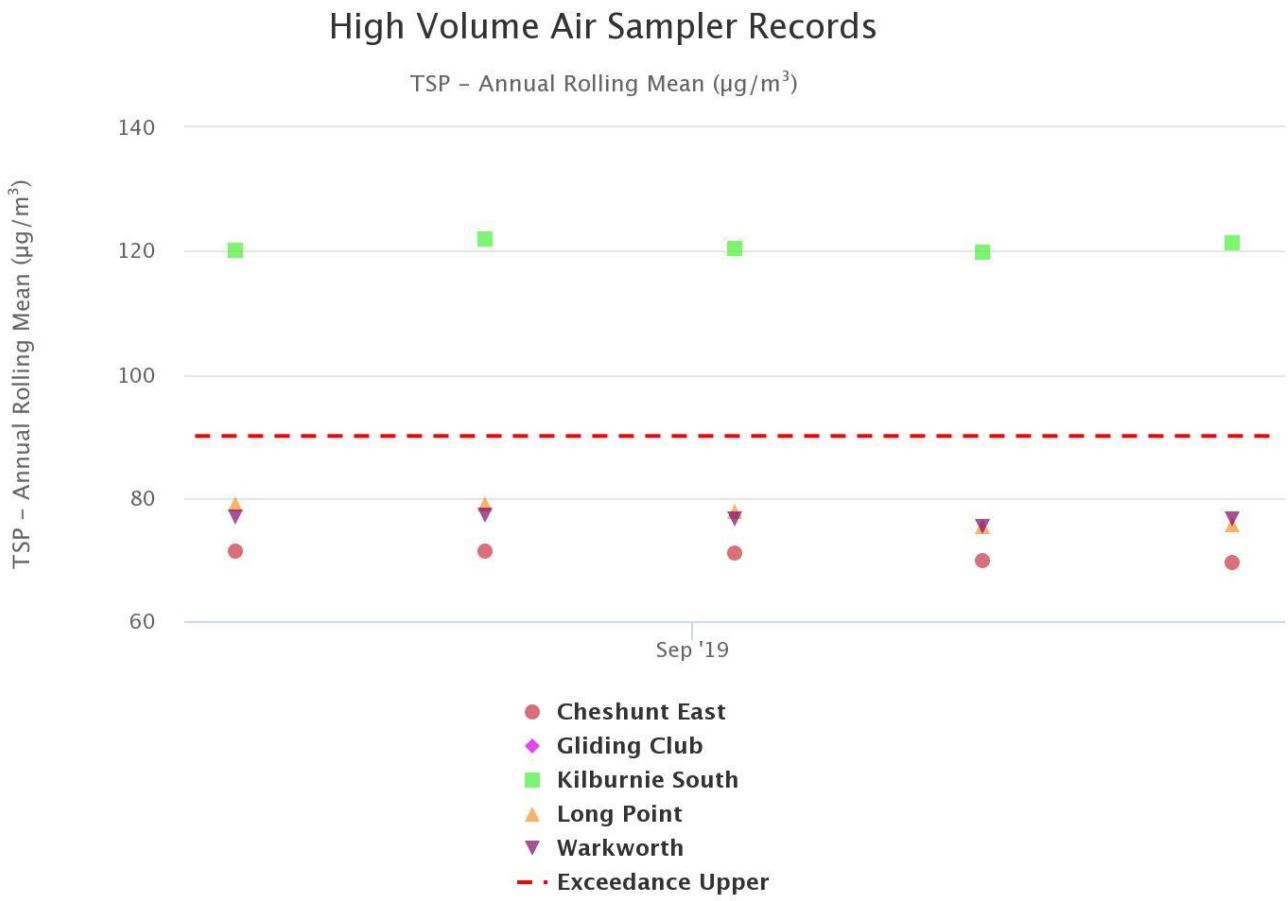

Figure 8: Year to Date Average Total Suspended Particulates – as at end of September 2019

2.3.3 Real Time PM10 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 help achieve 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 PM10 result and the year to date 24 hour PM_{10} annual average.

During the reporting period, the Maison Dieu, Knodlers Lane, Jerrys Plain and Warkworth monitors exceeded the daily 24 hour average PM10 result (50µg/m³).

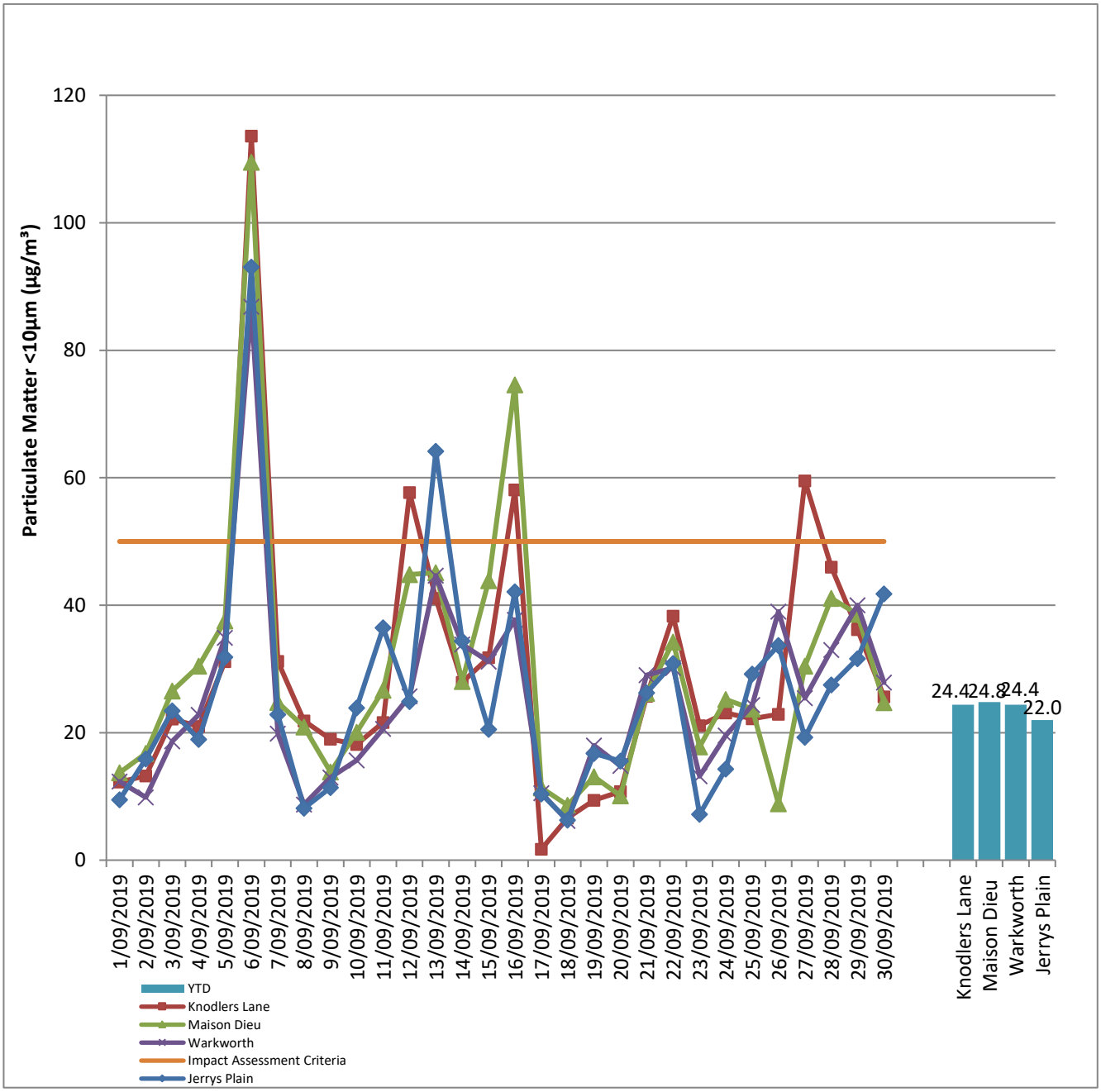

Figure 9: Real Time PM_{10} 24hr average and YTD average – September 2019

Table 2: Real-time PM10 Investigation Results

Date	Site	Total Measured Result (µg/m3)	Estimated contribution from HVO (µg/m3 / %)	Discussion
06/09/2019	Jerrys Plain North TEOM	93.1	N/A	An internal investigation determined HVO could not have been a significant contributor as wind direction was from HVO for only 9% of the time during the 24 hour period.
06/09/2019	Jerrys Plain South TEOM	93.1	N/A	An internal investigation determined HVO could not have been a significant contributor as wind direction was from HVO for only 2% of the time during the 24 hour period.
06/09/2019	Knodlers Lane TEOM	113.6	33.8µg/m3 Or 29%	An internal investigation determined HVO maximum potential contribution to be in the order of 33.8ug/m3 or 29% of the total measured based on prevailing wind conditions.
06/09/2019	Maison Dieu TEOM	109.5	29.7µg/m3 Or 27%	An internal investigation determined HVO maximum potential contribution to be in the order of 29.7ug/m3 or 27% of the total measured based on prevailing wind conditions.
06/09/2019	Warkworth TEOM	86.8	7.0µg/m3 Or 8%	An internal investigation determined HVO maximum potential contribution to be in the order of 7.0ug/m3 or 8% of the total measured based on prevailing wind conditions.
12/09/2019	Knodlers Lane TEOM	57.7	38.0µg/m3 Or 65%	An internal investigation determined HVO maximum potential contribution to be in the

				order of 19.7ug/m3 or 35% of the total measured based on prevailing wind conditions.
13/09/2019	Jerrys Plain North TEOM	64.2	4.3µg/m3A	An internal investigation determined HVO maximum potential contribution to be in the order of 4.3ug/m3 of the total measured based on prevailing wind conditions.
13/09/2019	Jerrys Plain South TEOM	64.2	N/A	HVO Could not have been a contributor as wind direction was from HVO for 12% of the time during the day.
16/09/2019	Knodlers Lane TEOM	58.1	33.6µg/m3 Or 57%	An internal investigation determined HVO maximum potential contribution to be in the order of 33.6ug/m3 or 57% of the total measured based on prevailing wind conditions.
16/09/2019	Maison Dieu TEOM	74.6	7.4µg/m3 Or 9%	An internal investigation determined HVO maximum potential contribution to be in the order of 7.4ug/m3 or 9% of the total measured based on prevailing wind conditions.
27/09/2019	Knodlers Lane TEOM	59.5	44.4µg/m3 Or 74%	An internal investigation determined HVO maximum potential contribution to be in the order of 44.4ug/m3 or 74% of the total measured based on prevailing wind conditions.

2.3.4 Real Time Alarms for Air Quality

During September the real time monitoring system generated 252 automated air quality related alarms. 131 alarms were related to adverse weather conditions and 121 alarms relating to PM_{10}.

3.0 WATER QUALITY

HVO maintains a network of surface water and groundwater monitoring sites.

3.1 Surface Water

Surface water courses are sampled on a quarterly sampling regime. Water quality is evaluated through the parameters of pH, Electrical Conductivity (EC) and Total Suspended Solids (TSS). The location of surface water monitoring locations is shown in Figure 10.

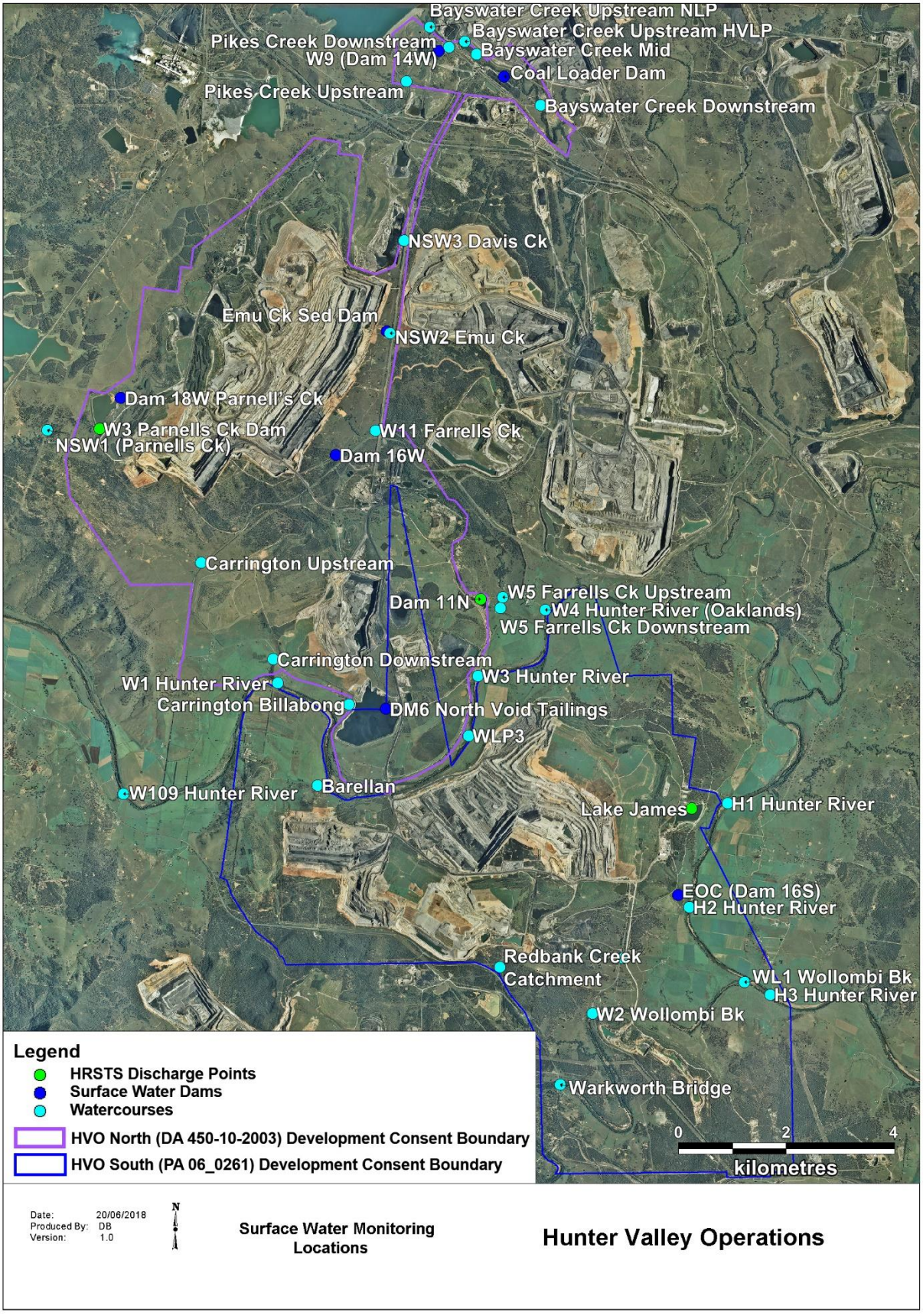

Figure 10: HVO Surface Water Monitoring Locations

Figure 11 to Figure 13 show the long term surface water trend (2016- current) within HVO mine dams. Figures 14 to 22 show the long term surface water trend (2016 – current) in surrounding watercourses.

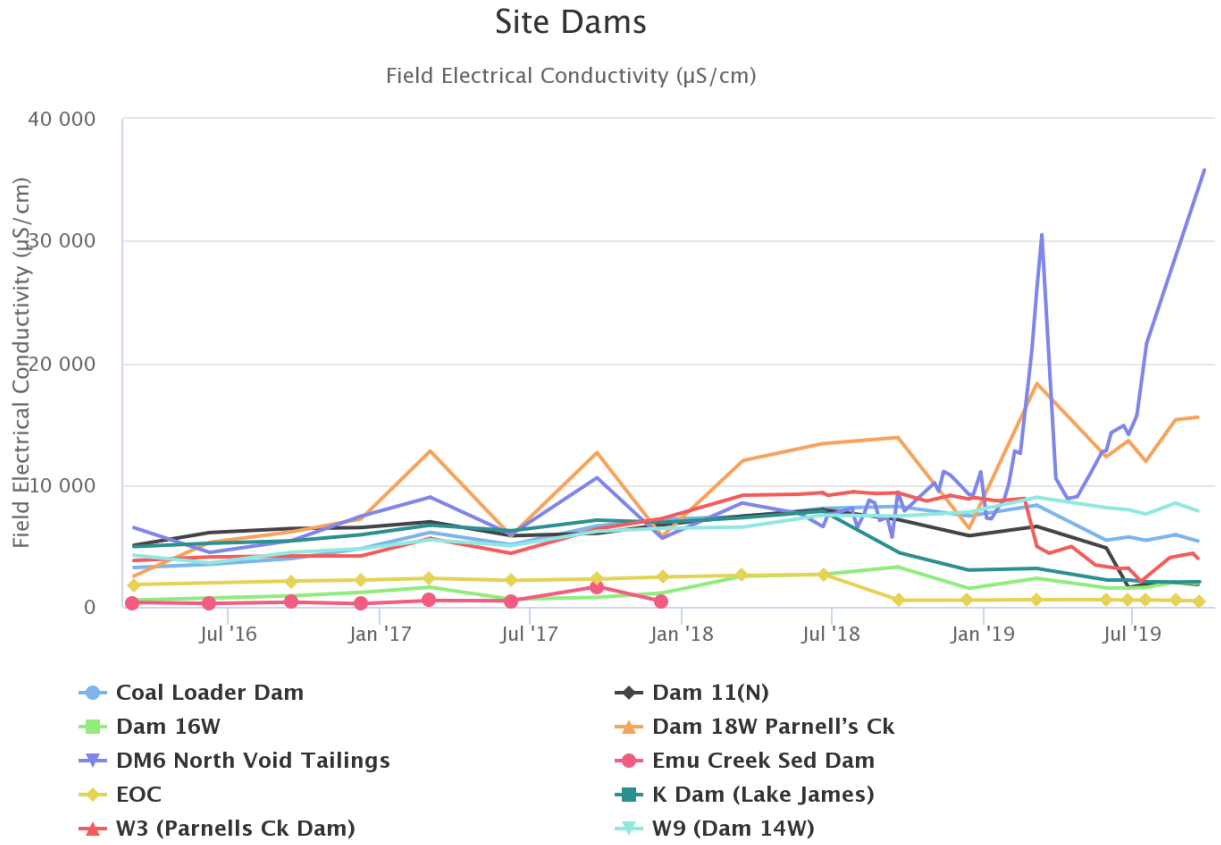

Figure 11: Site Dams Electrical Conductivity Trend – September 2019

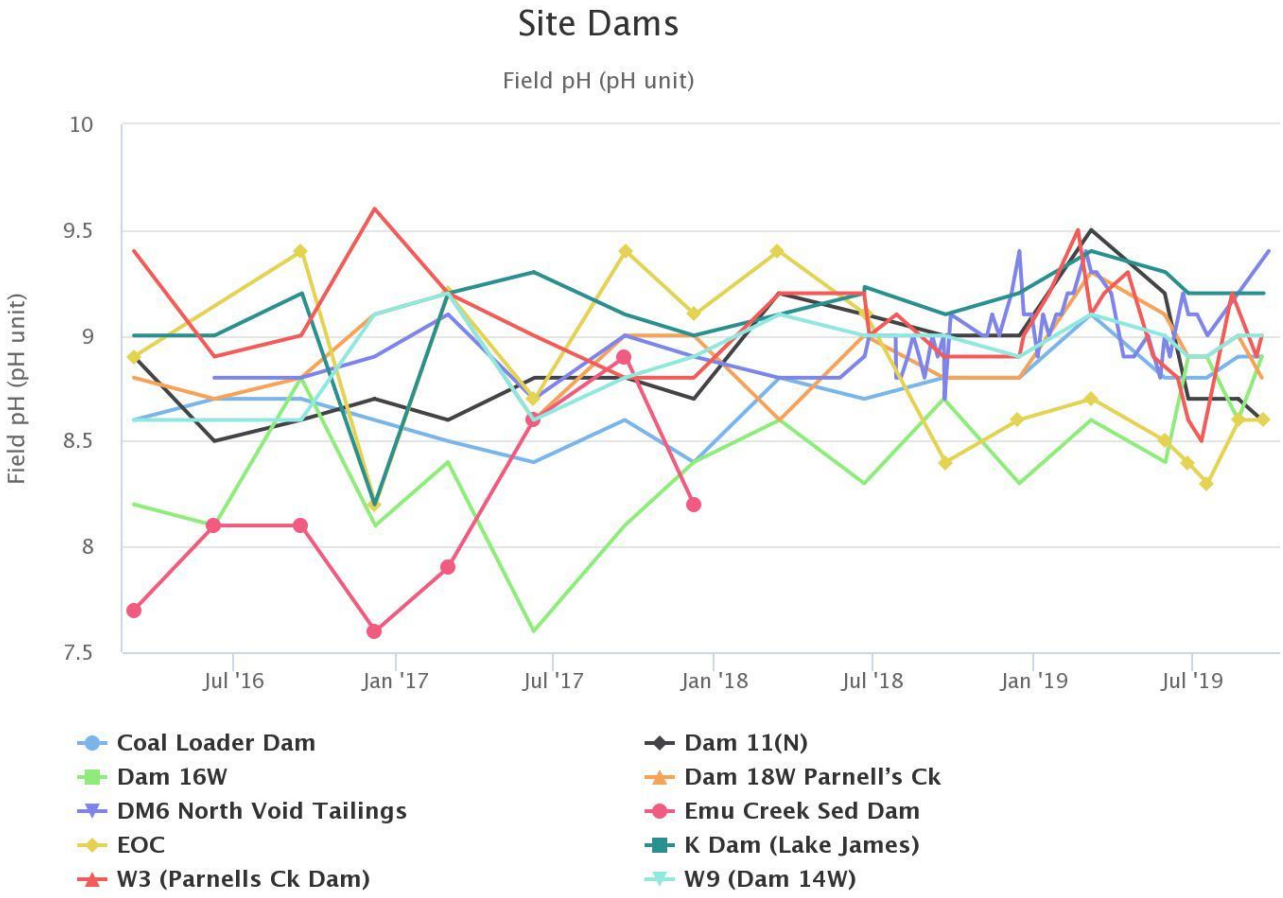

Figure 12: Site Dams pH Trend – September 2019

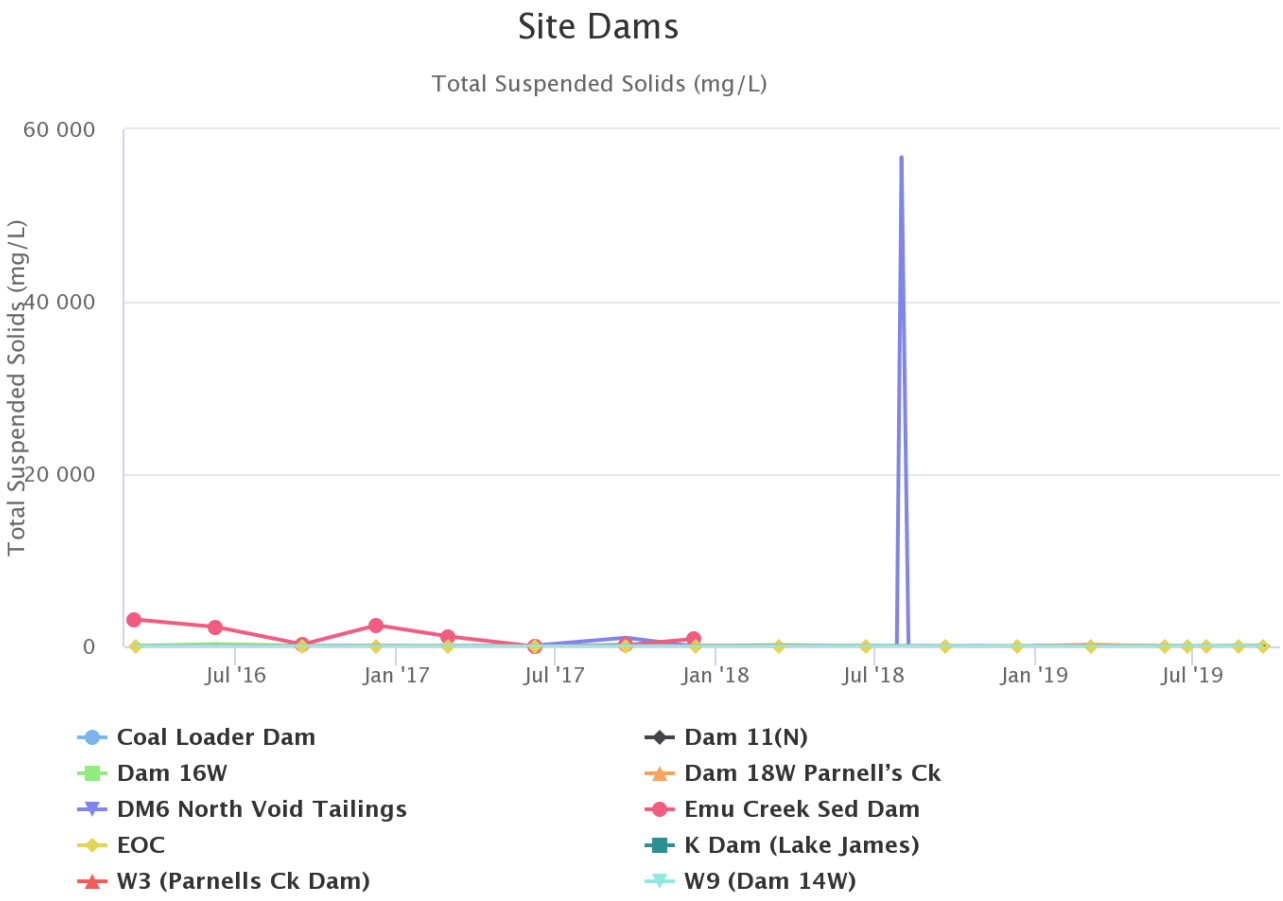

Figure 13: Site Dams Total Suspended Solids Trend – September 2019

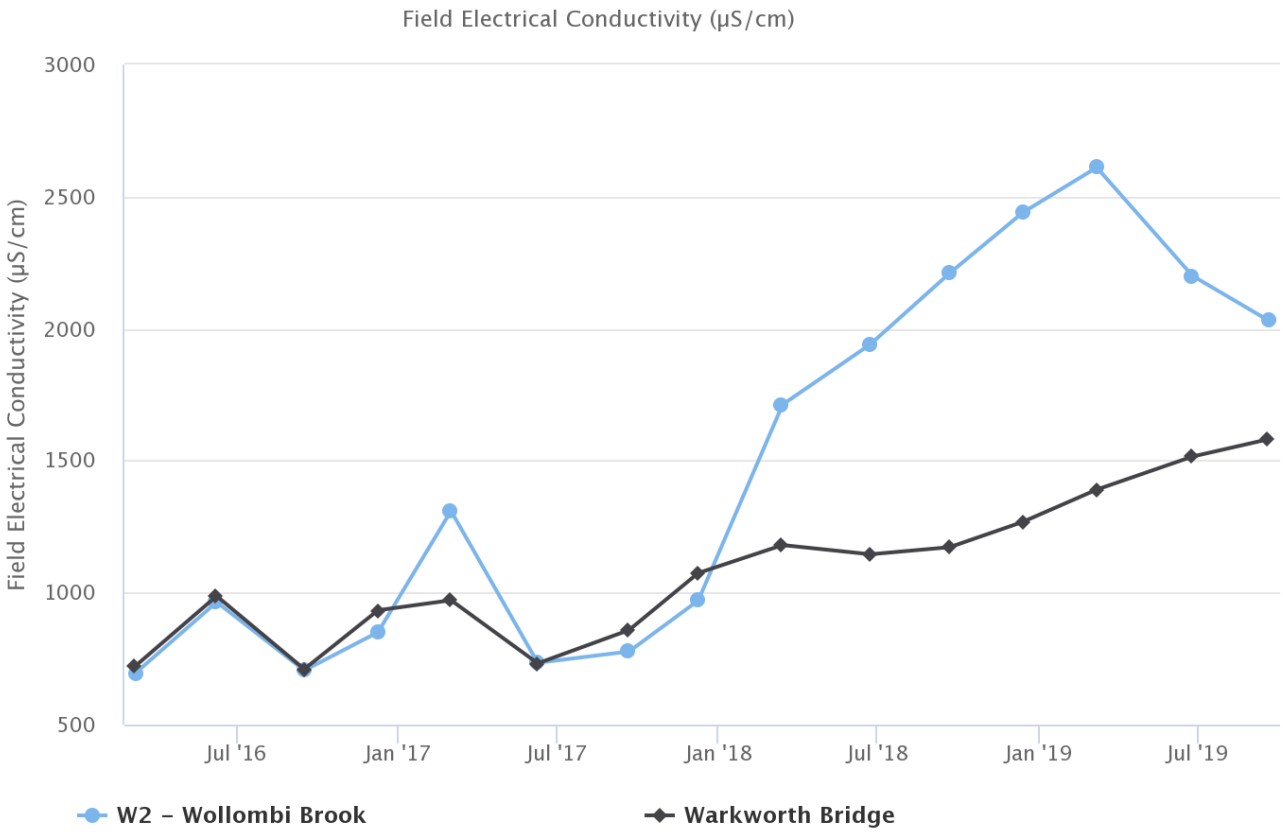

Figure 14: Wollombi Brook Electrical Conductivity Trend – September 2019

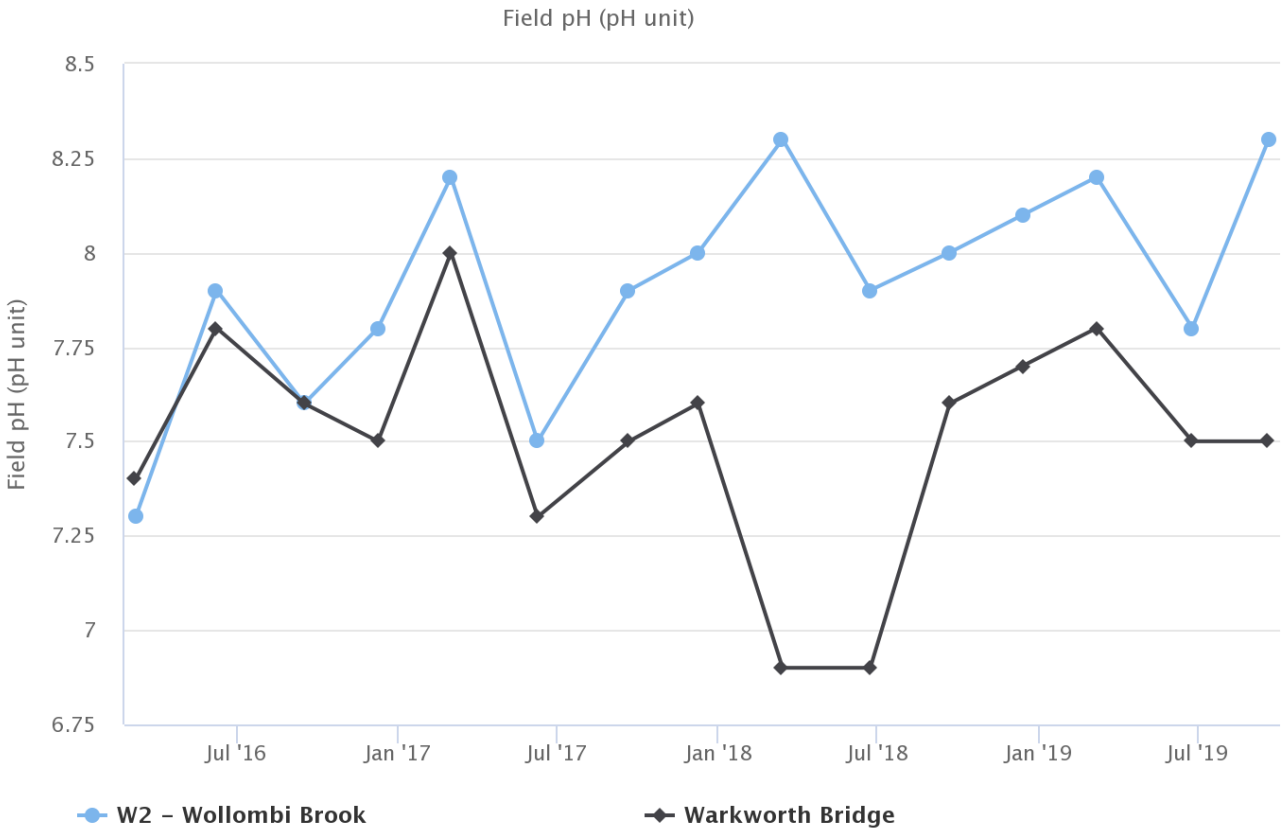

Figure 15: Wollombi Brook pH Trend – September 2019

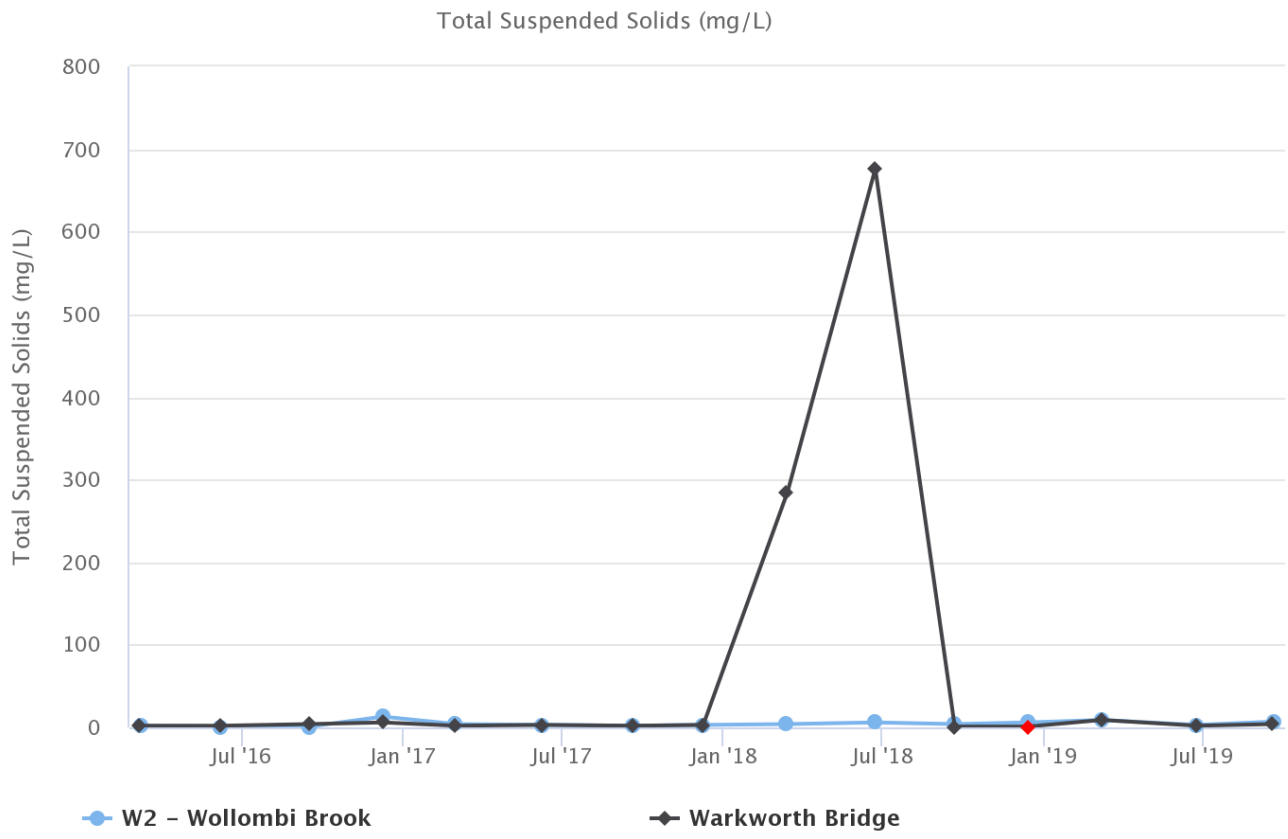

Figure 16: Wollombi Brook Total Suspended Solids Trend – September 2019

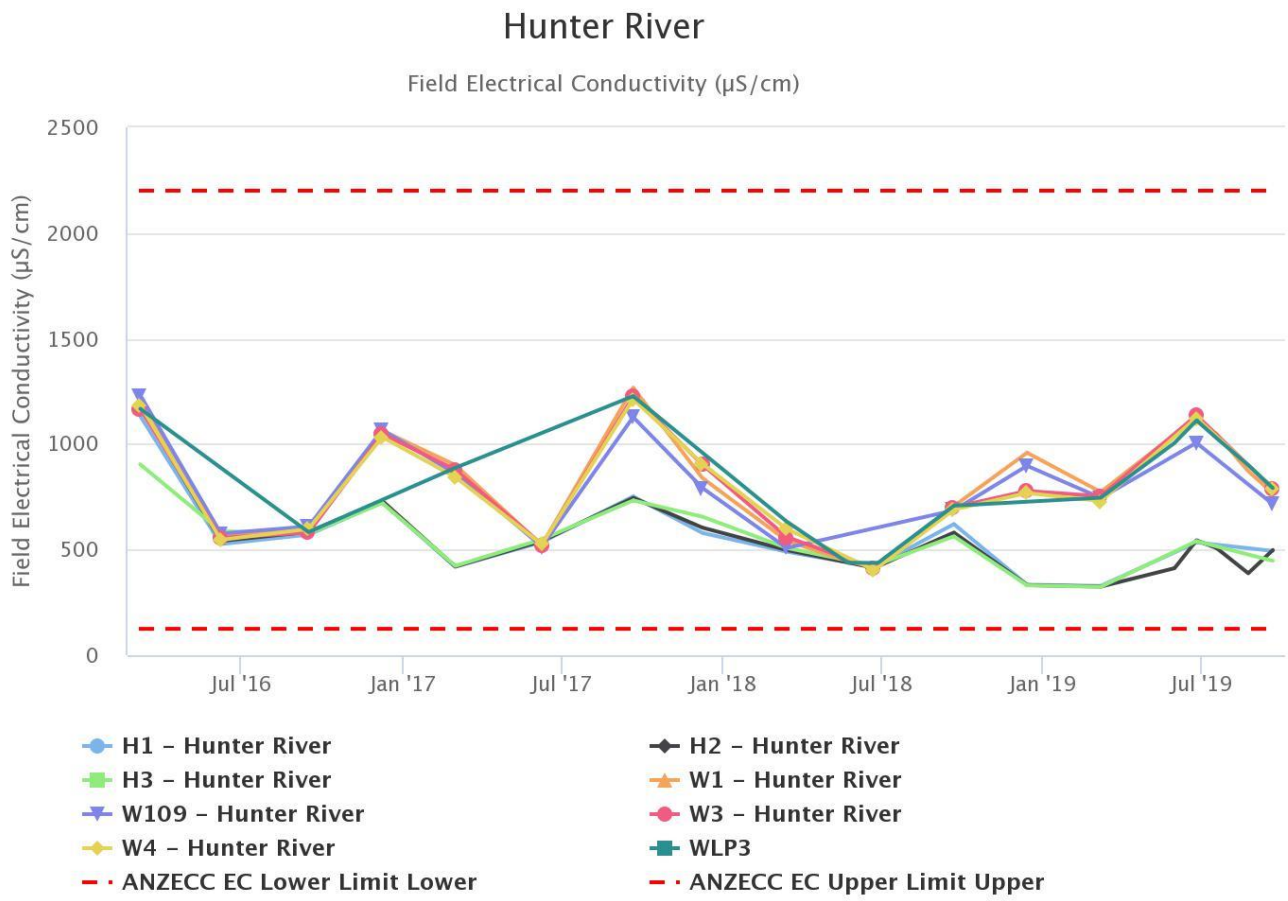

Figure 17: Hunter River Electrical Conductivity Trend – September 2019

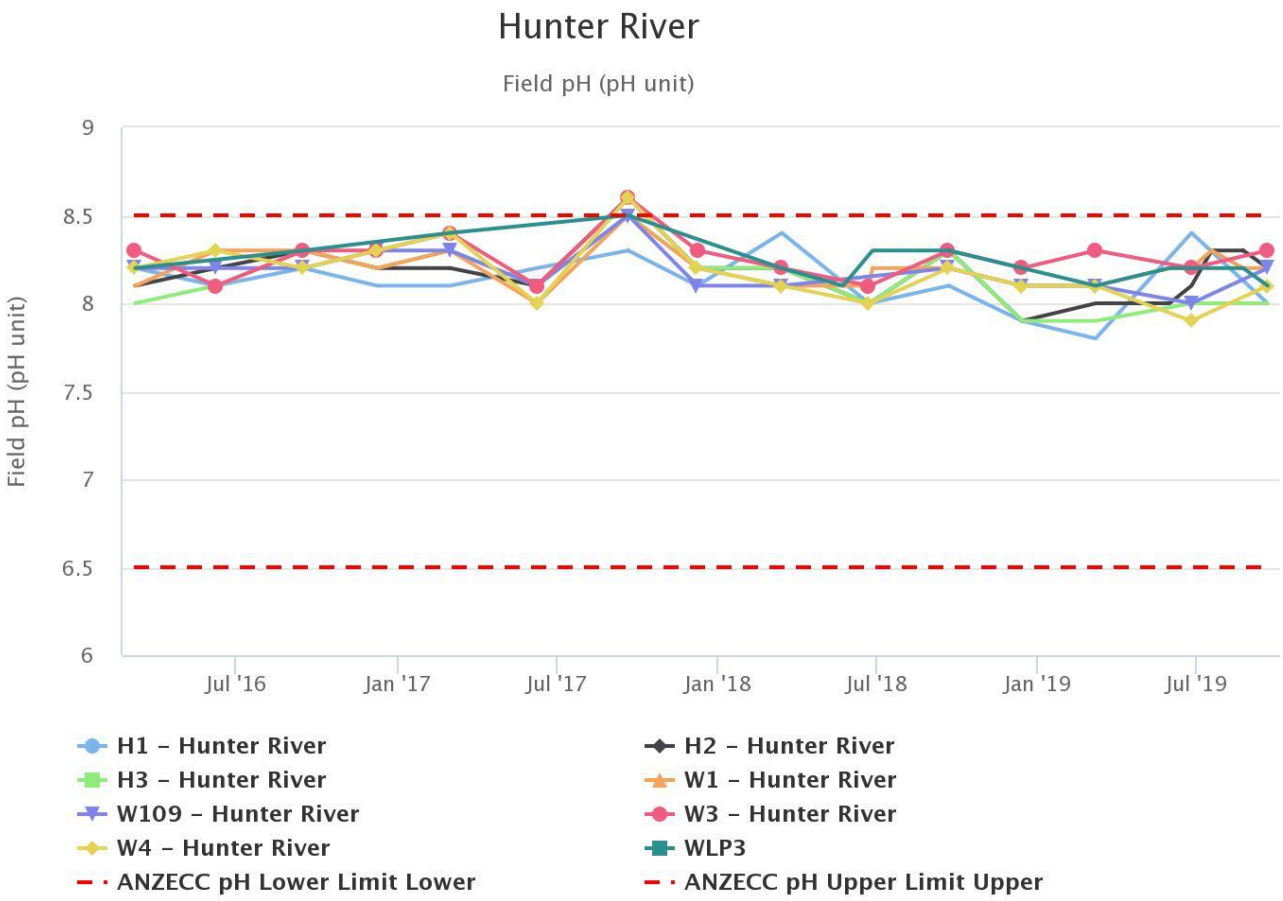

Figure 18: Hunter River pH Trend – September 2019

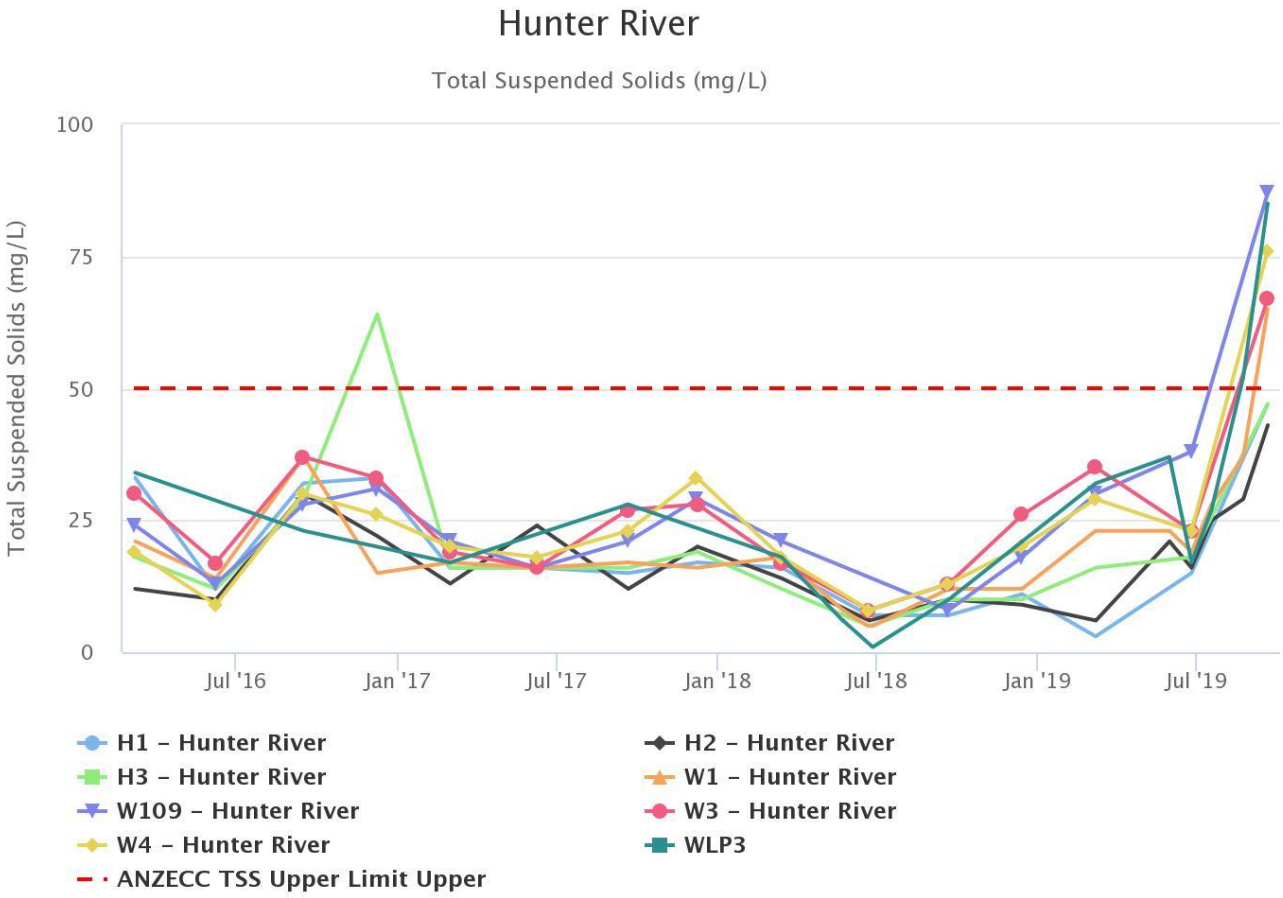

Figure 19: Hunter River Total Suspended Solids – September 2019

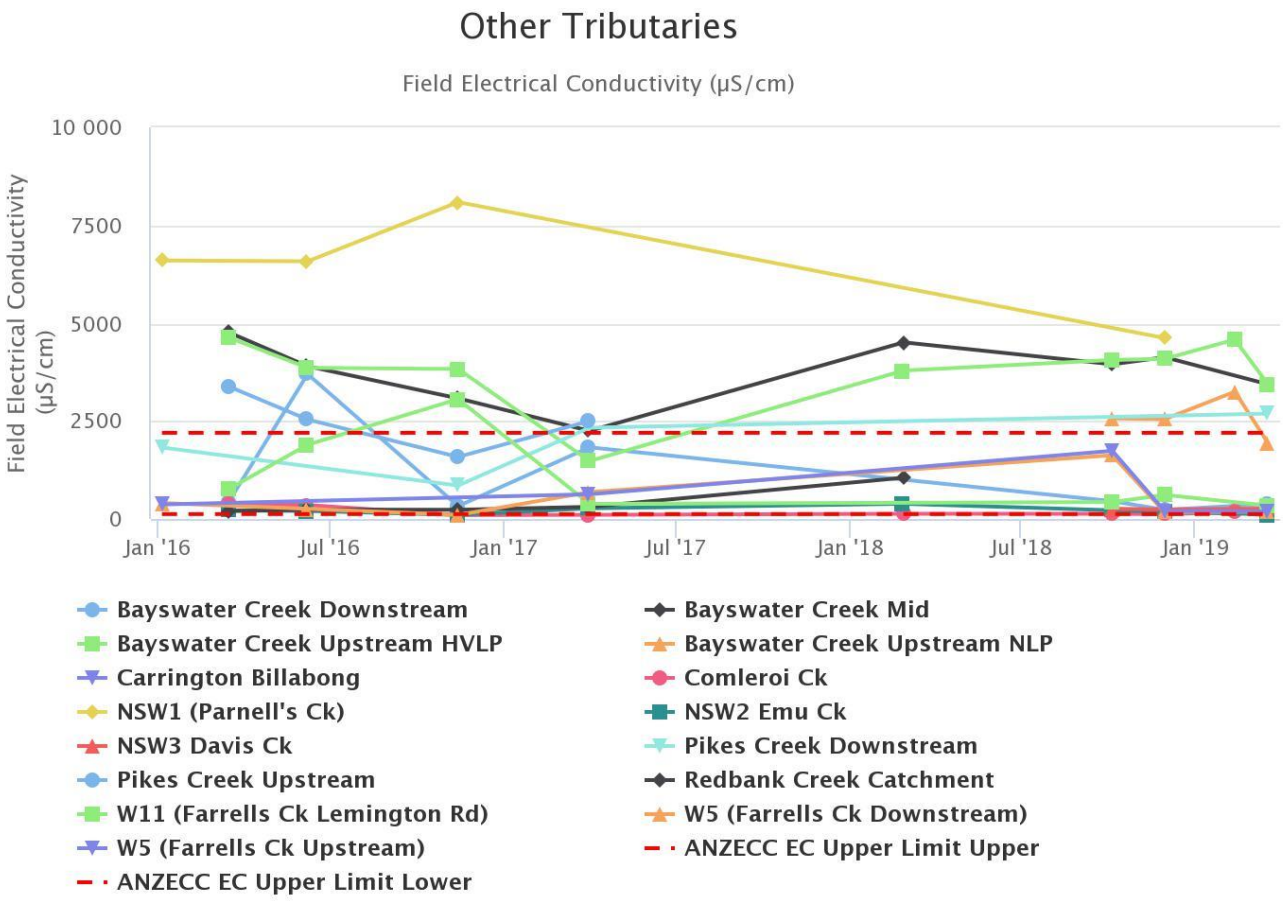

Figure 20: Other Tributaries Electrical Conductivity Trend – September 2019

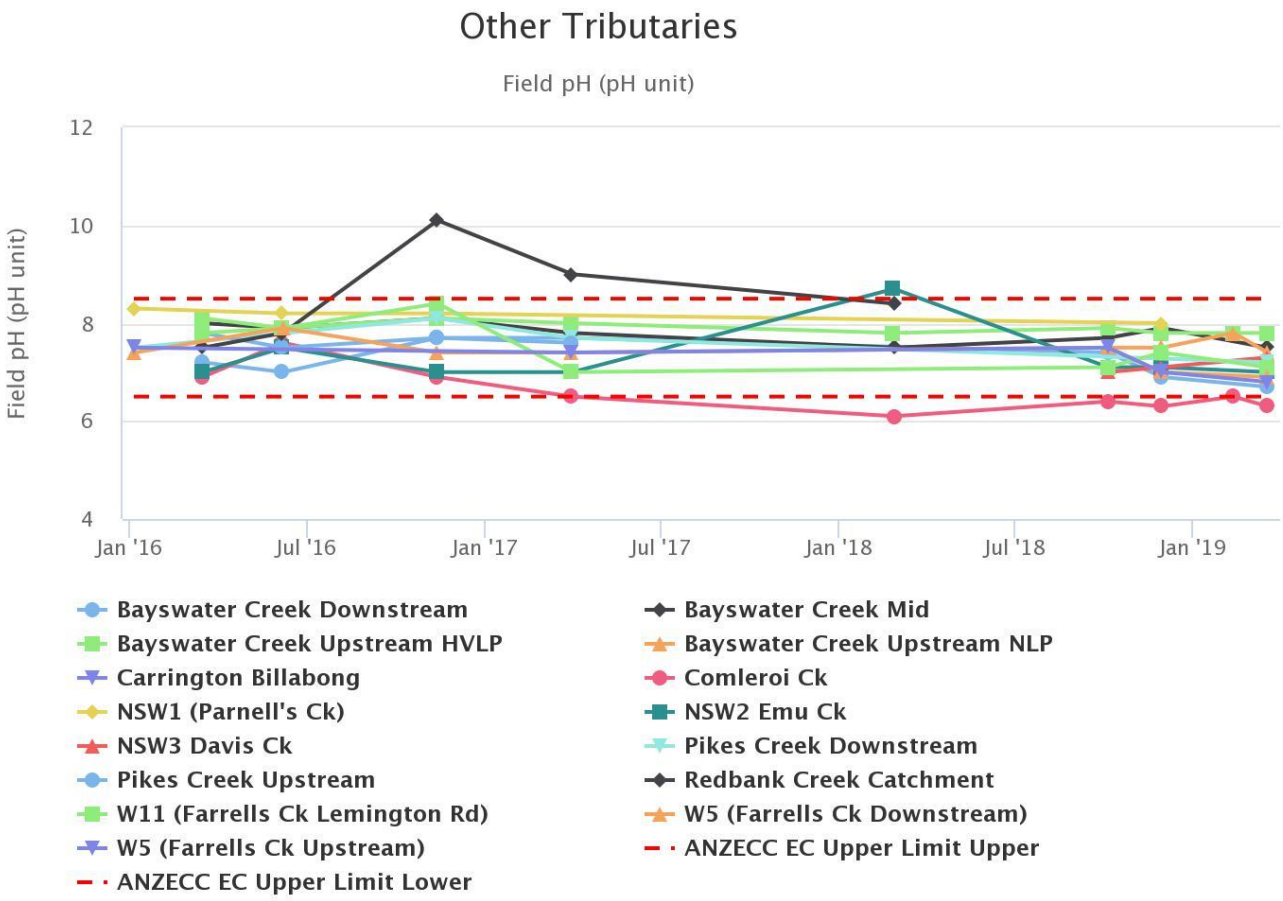

Figure 21: Other Tributaries pH Trend – September 2019

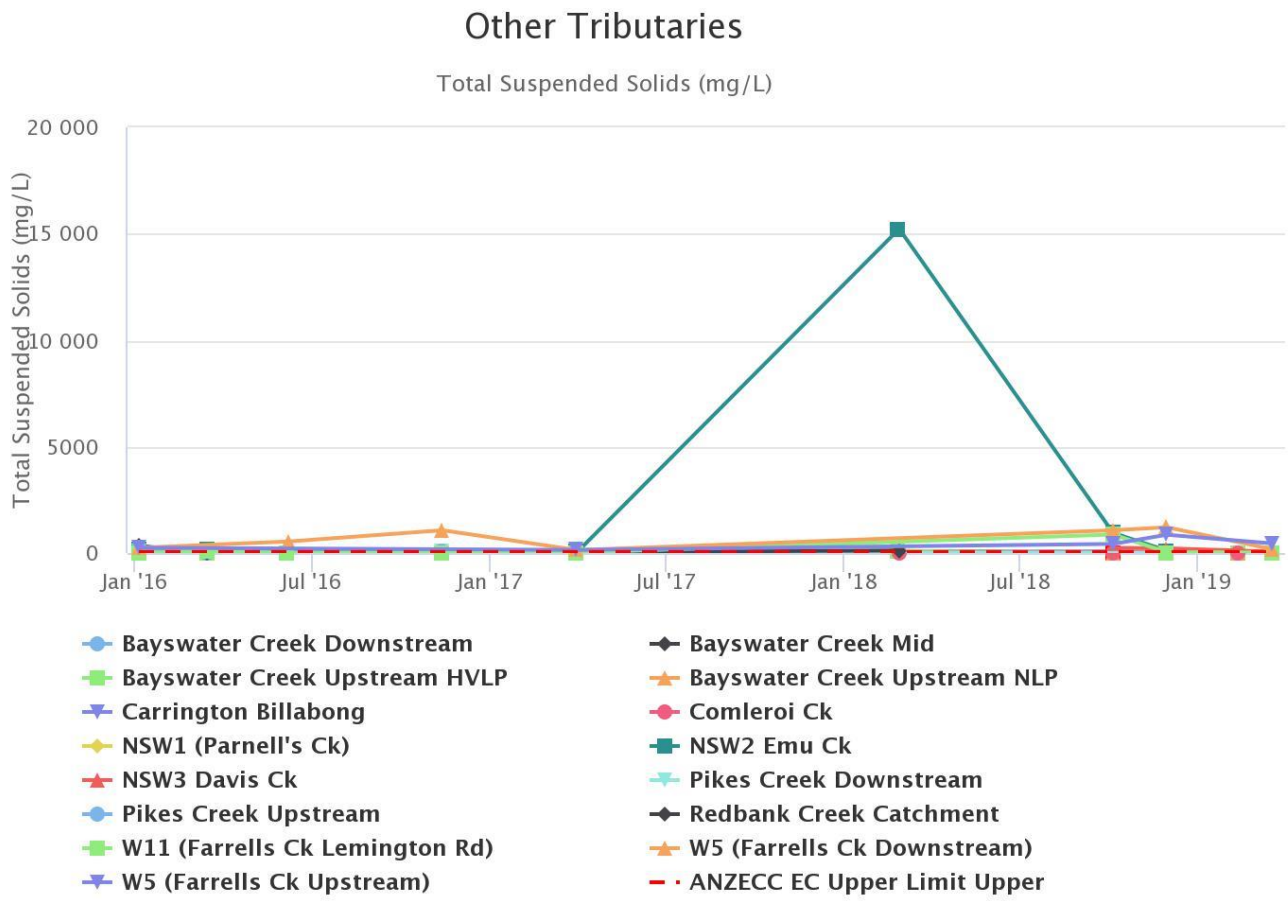

Figure 22: Other Tributaries Total Suspended Solids Trend – September 2019

3.2 Site Water Use

Under water allocation licences issued by the Water NSW, HVO is permitted to extract water from the Hunter River. During the reporting period, HVO extracted 377 ML of water from the Hunter River.

3.3 HRSTS Discharge

HVO participates in the Hunter River Salinity Trading Scheme (HRSTS), allowing 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.

3.4 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 – Q3 2019

Site	Date	Trigger Limit Breached	Action taken in response
W109 - Hunter River	19/09/2019 10:15	TSS	First breach of TSS Trigger. Monitoring indicates improved water quality at locations downstream of HVO's potential influence. Results are generally consistent with observations and water quality expected in the Hunter River following rainfall on 18-19 September 2019. No evidence to suggested elevated TSS is associated with mining influence. Maintain watching Brief*.
W1 - Hunter River	19/09/2019 9:50	TSS	First breach of TSS Trigger. Monitoring indicates improved water quality at locations downstream of HVO's potential influence. Results are generally consistent with observations and water quality expected in the Hunter River following rainfall on 18-19 September 2019. No evidence to suggested elevated TSS is associated with mining influence. Maintain watching Brief*
W4 - Hunter River	19/09/2019 8:25	TSS	First breach of TSS Trigger. Monitoring indicates improved water quality at locations downstream of HVO's potential influence. Results are generally consistent with observations and water quality expected in the Hunter River following rainfall on 18-19 September 2019. No evidence to suggested elevated TSS is associated with mining influence. Maintain watching Brief*
W3 - Hunter River	19/09/2019 13:40	TSS	First breach of TSS Trigger. Monitoring indicates improved water quality at locations downstream of HVO's potential influence. Results are generally consistent with observations and water quality expected in the Hunter River following rainfall on 18-19 September 2019. No evidence to suggested elevated TSS is associated with mining influence. Maintain watching Brief*
Warkworth Bridge	19/09/2019 11:35	EC 95th Percentile	Continued exceedance of EC 95th Percentile trigger (1581us/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 (521us/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	19/09/2019 12:45	EC 95th Percentile	Continued exceedance of EC 95th Percentile trigger (2030us/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 (521us/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*.

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

3.4 Groundwater Monitoring Results

Groundwater monitoring is undertaken on a quarterly basis in accordance with the HVO Water Management Plan and Ground Water Monitoring Programme. Groundwater monitoring sites are shown in Figure 23. Figure 24 to Figure 80 show the long term trends (2016 – current) for ground water bores monitored at HVO.

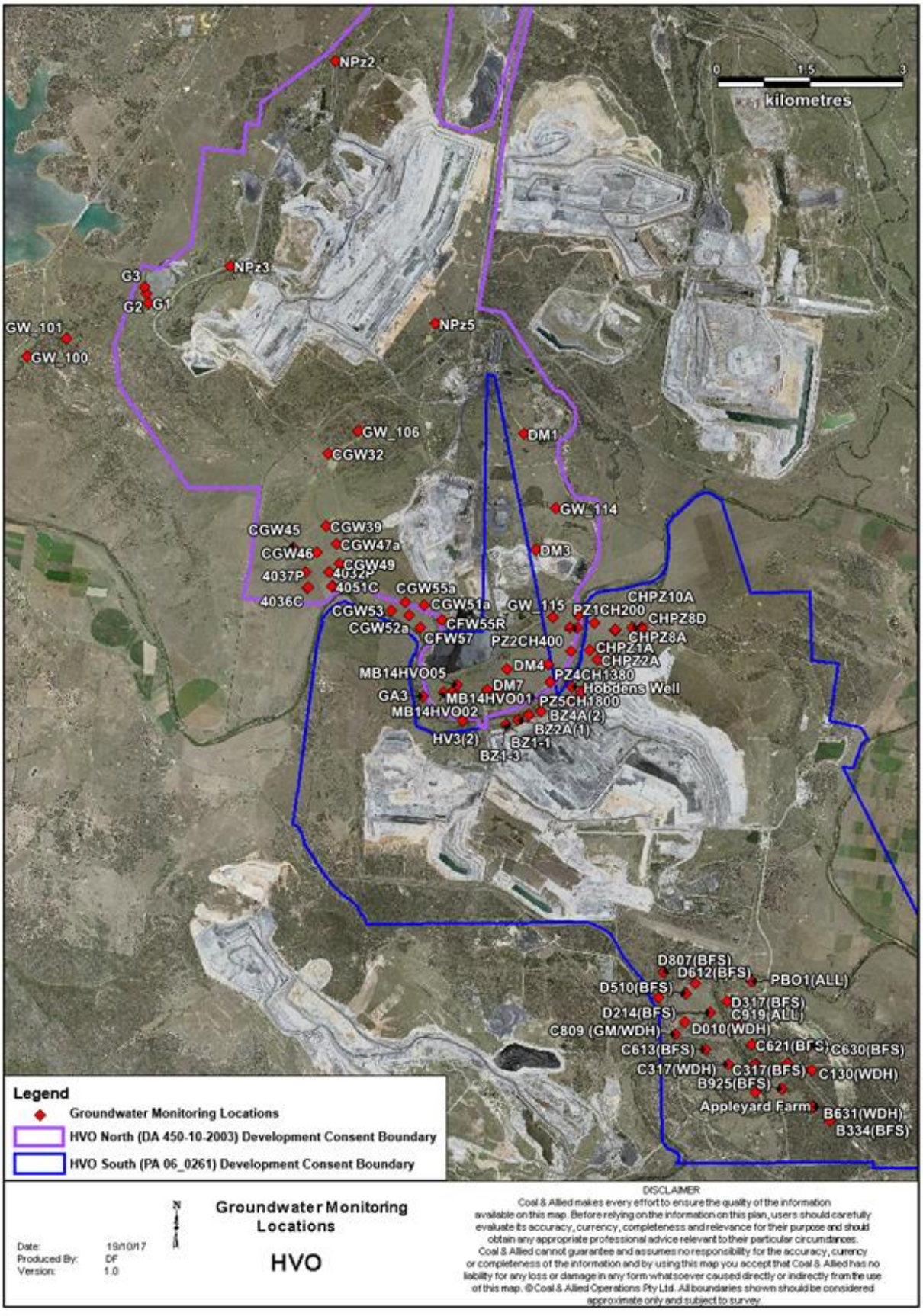

Figure 23: Groundwater Monitoring Locations at HVO

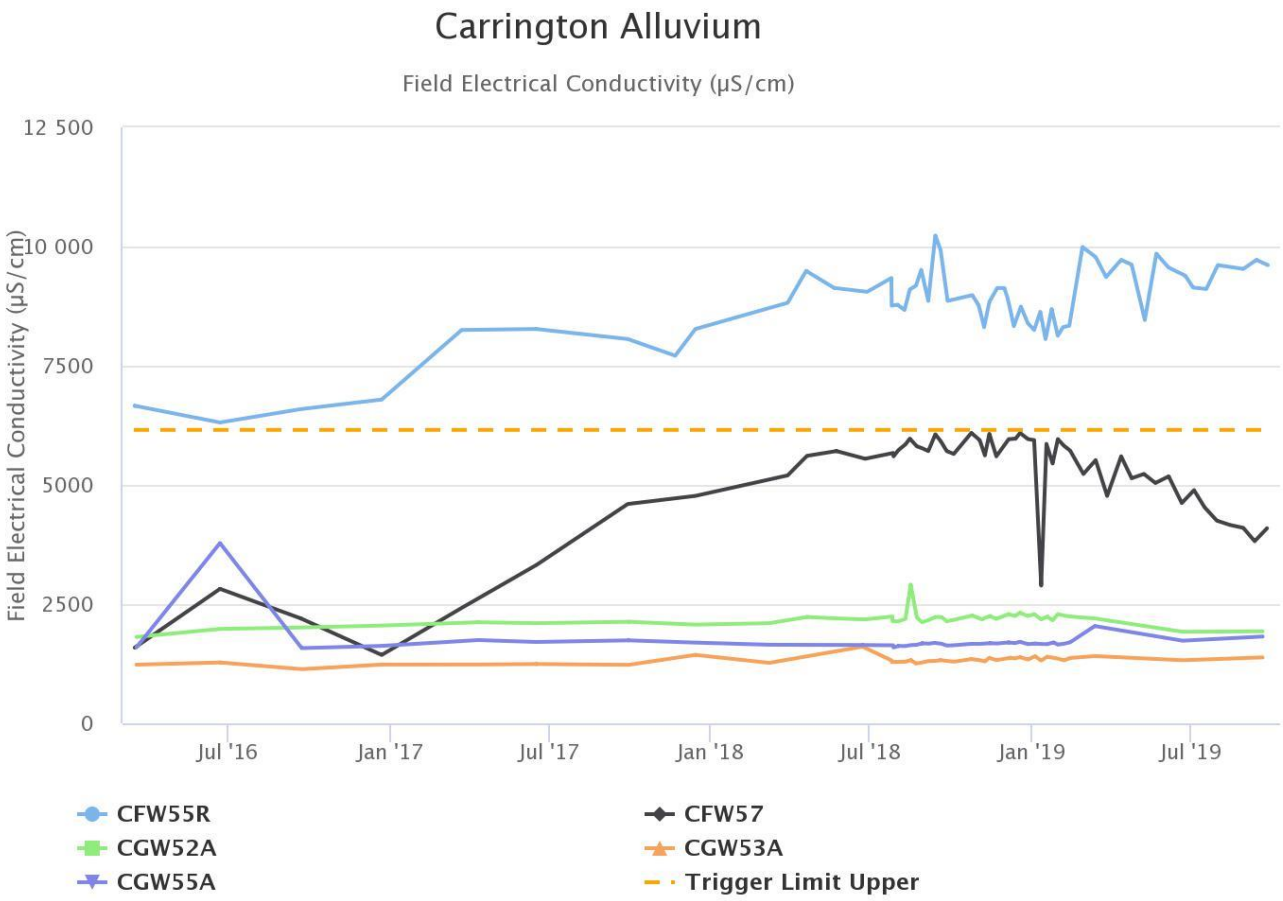

Figure 24: Carrington Alluvium Electrical Conductivity Trend – September 2019

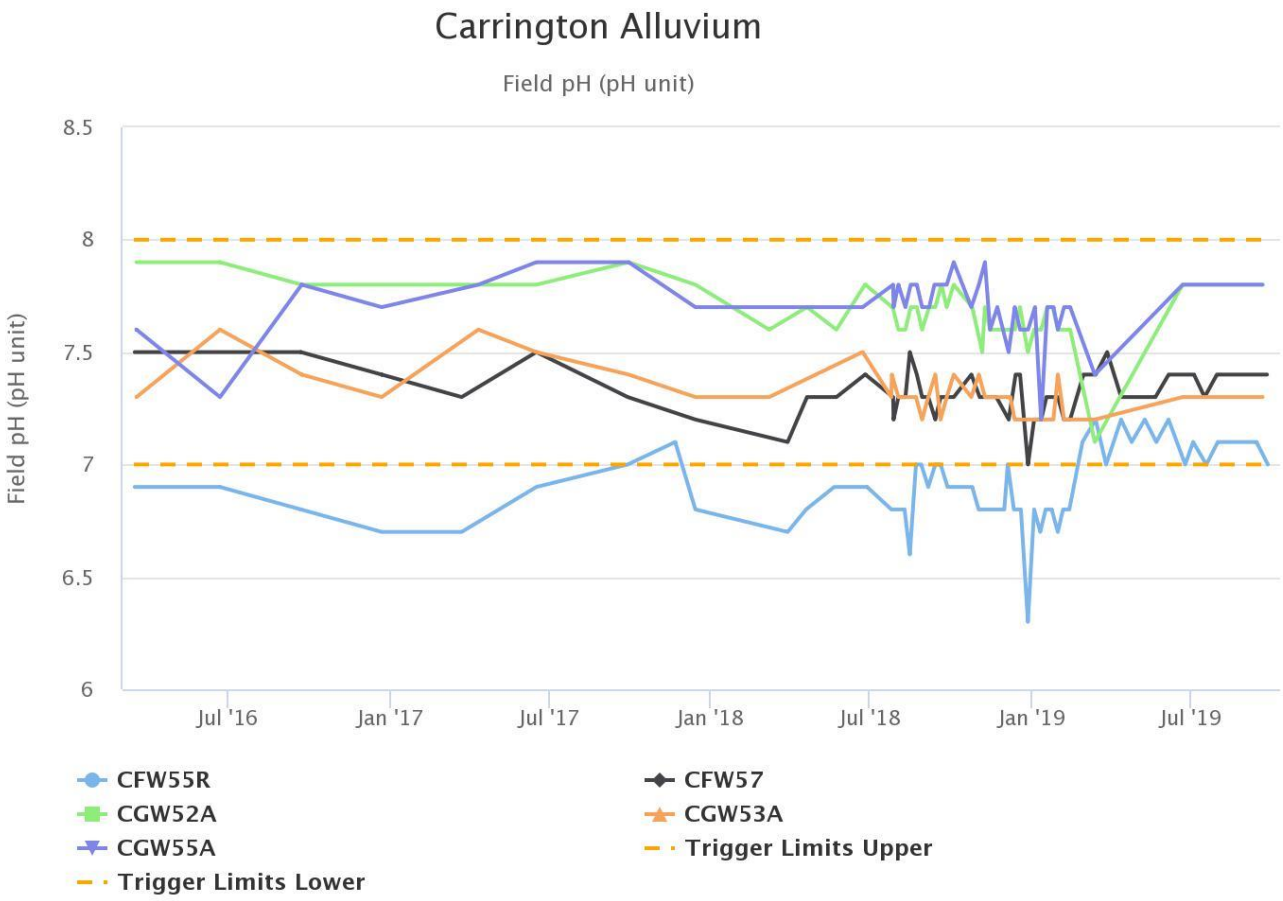

Figure 25: Carrington Alluvium pH Trend – September 2019

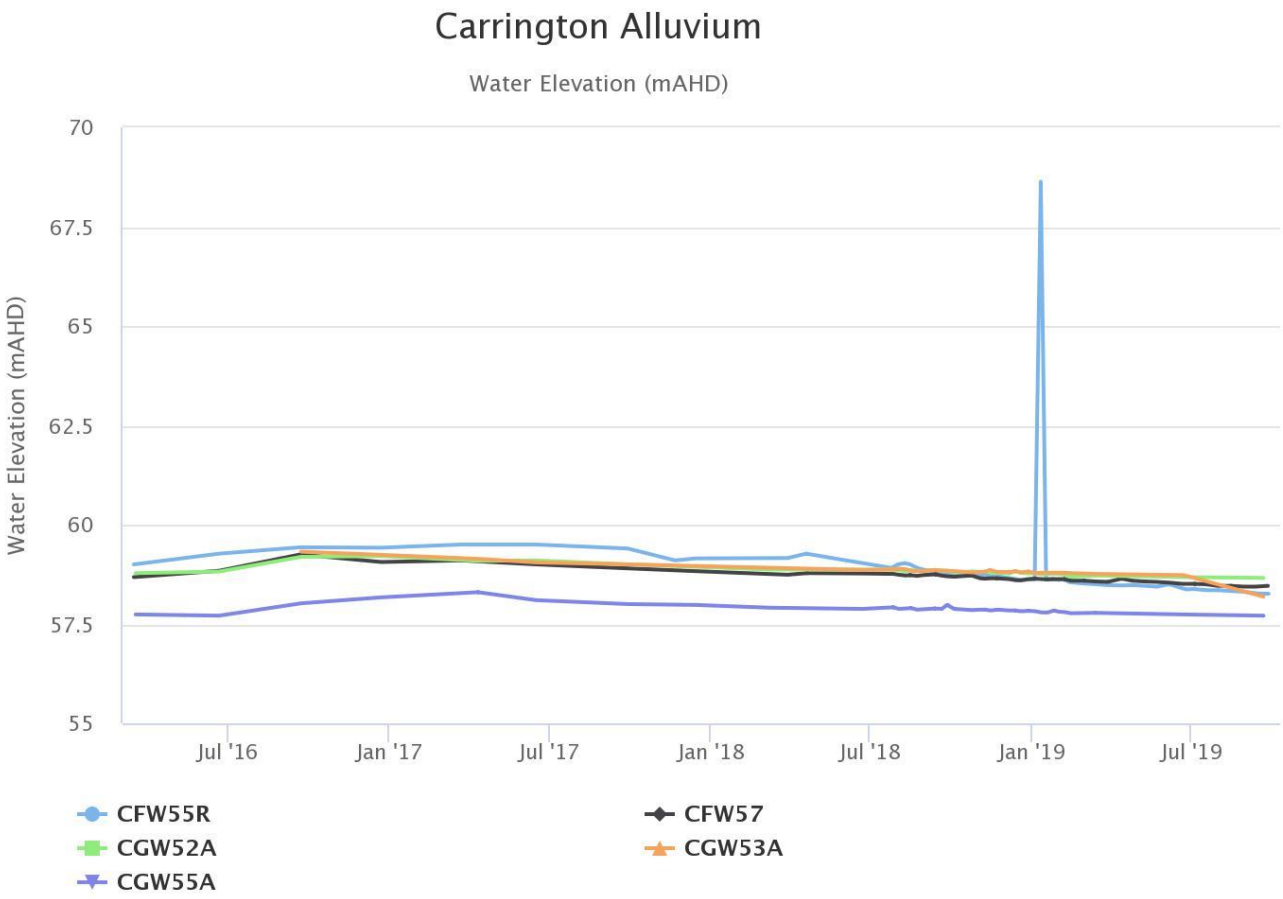

Figure 26: Carrington Alluvium Standing Water Level – September 2019

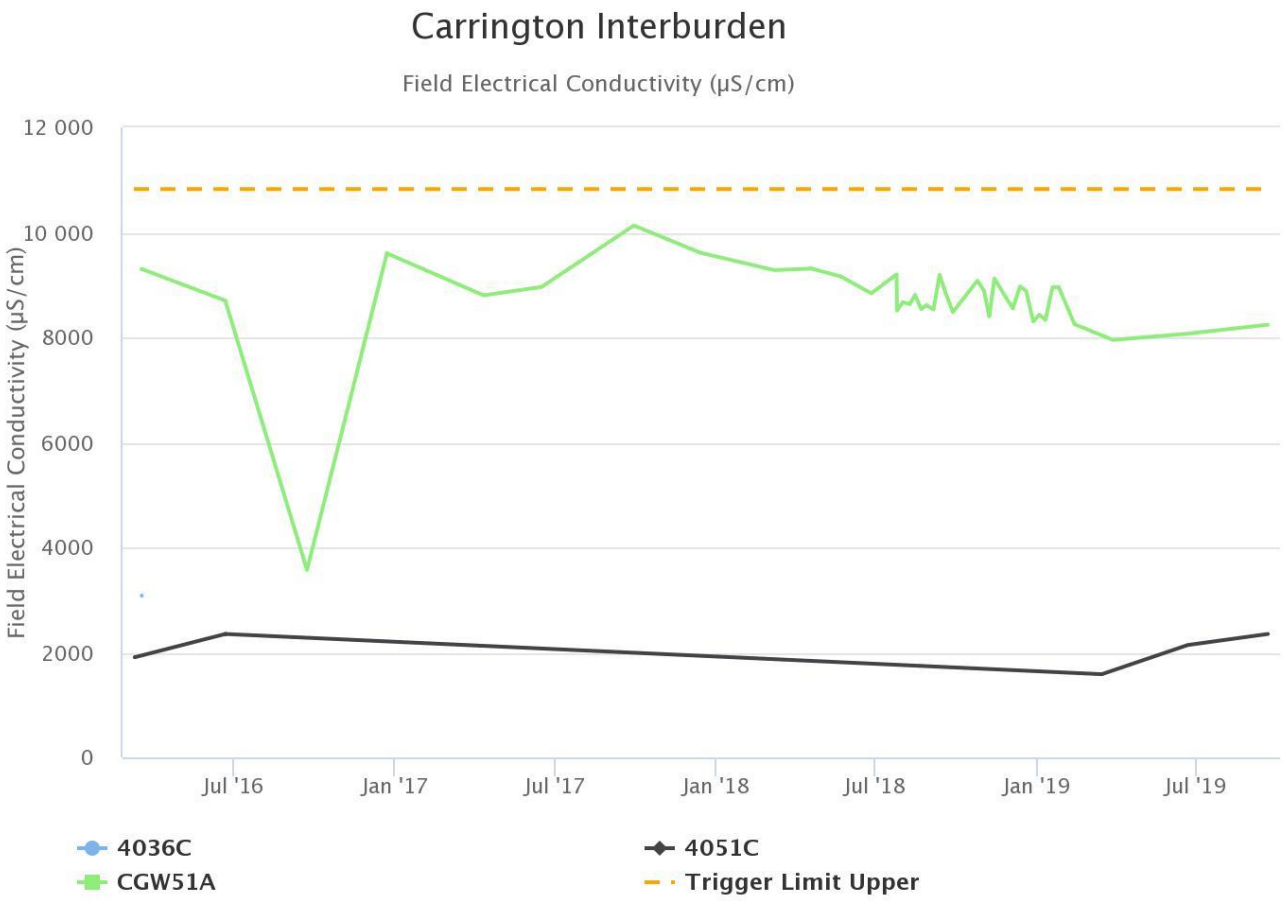

Figure 27: Carrington Interburden Electrical Conductivity Trend – September 2019

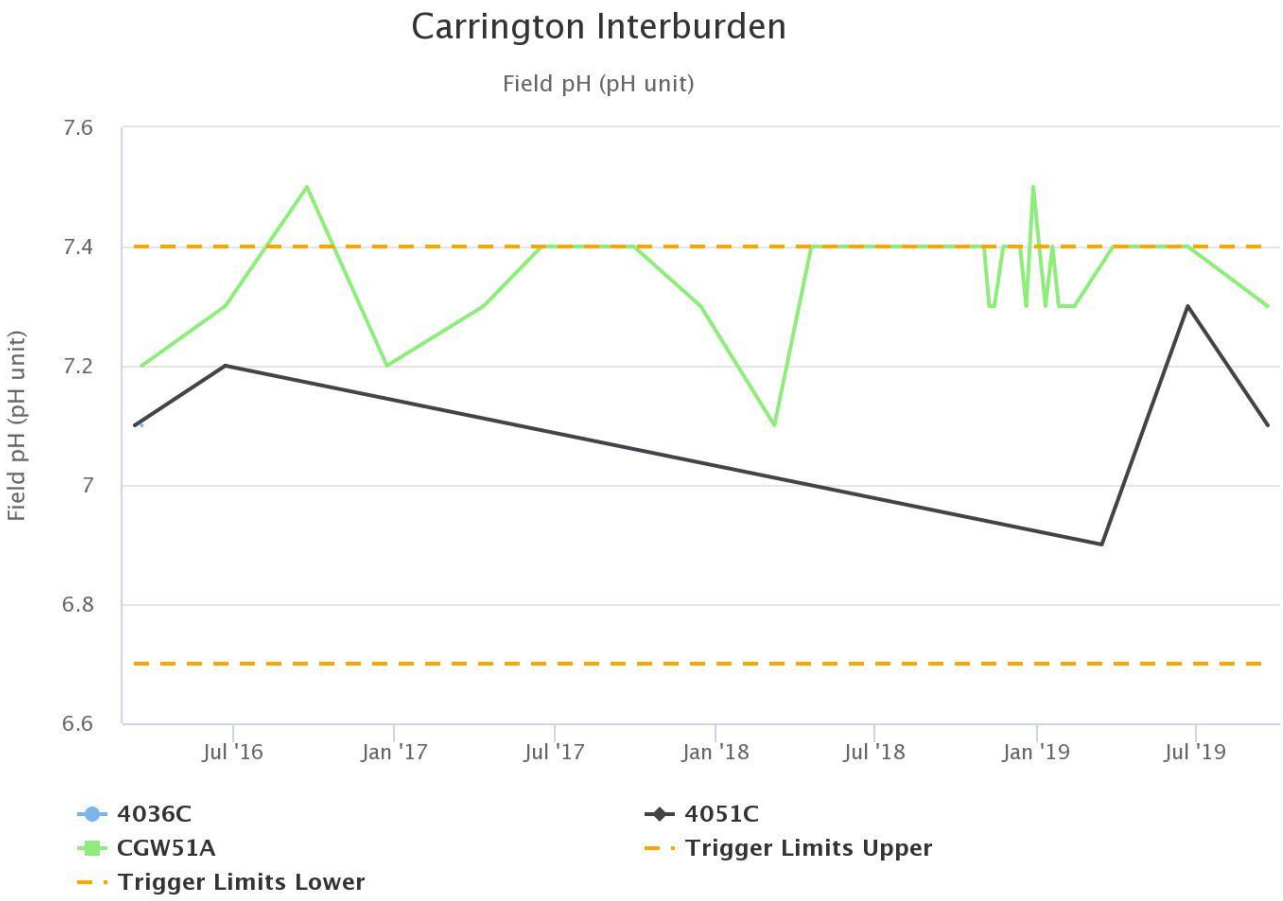

Figure 28: Carrington Interburden pH Trend – September 2019

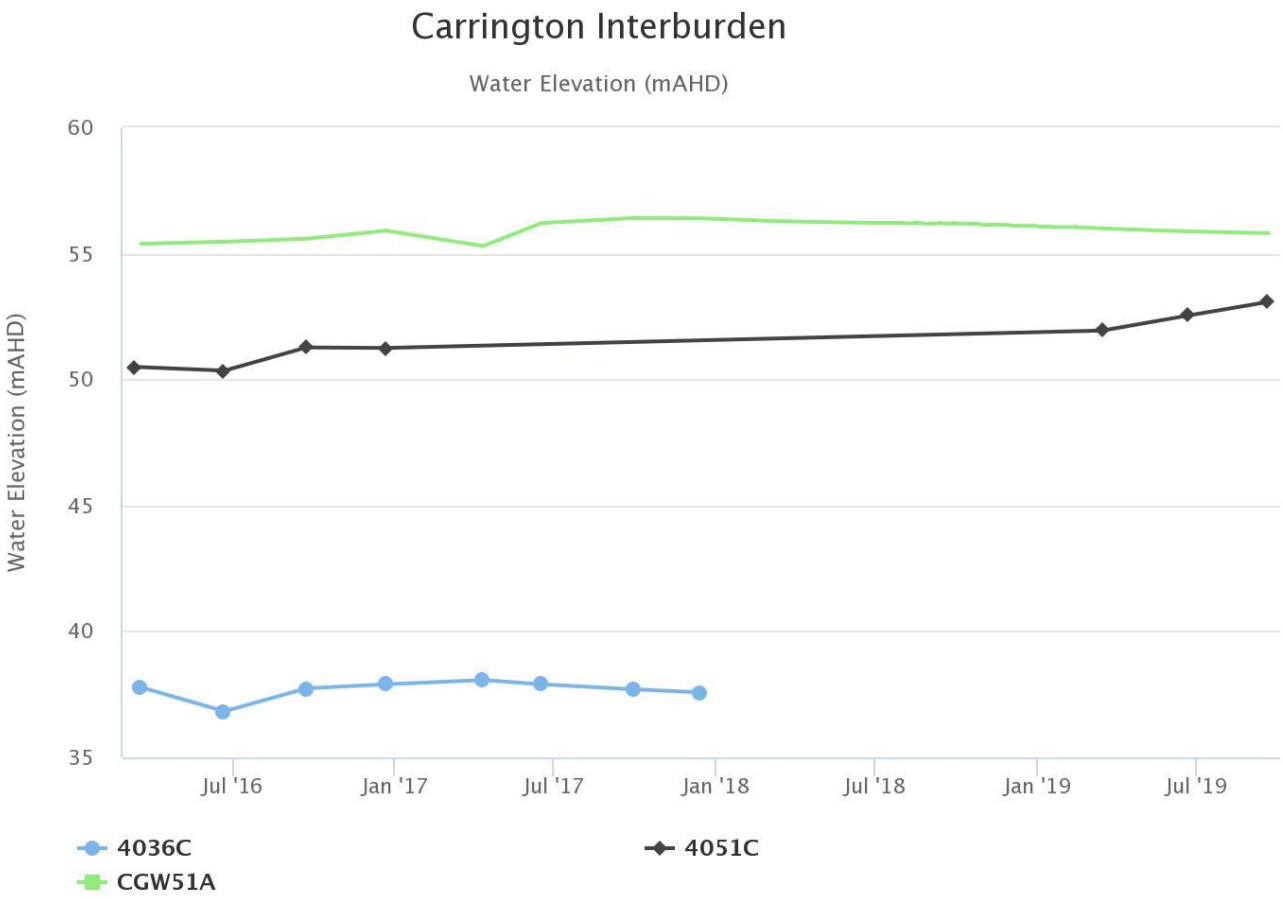

Figure 29: Carrington Interburden Standing Water Level – September 2019

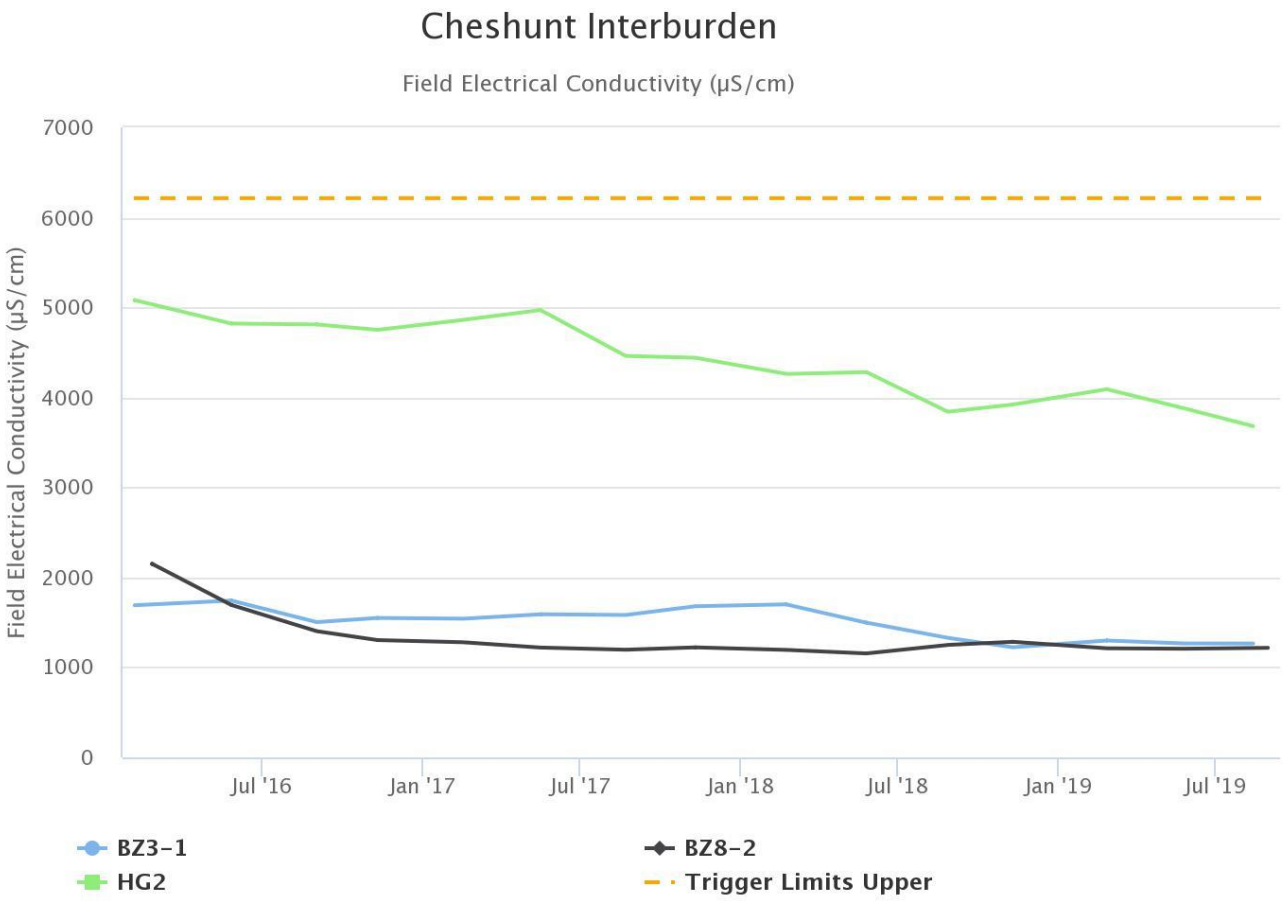

Figure 30: Cheshunt Interburden Electrical Conductivity Trend – September 2019

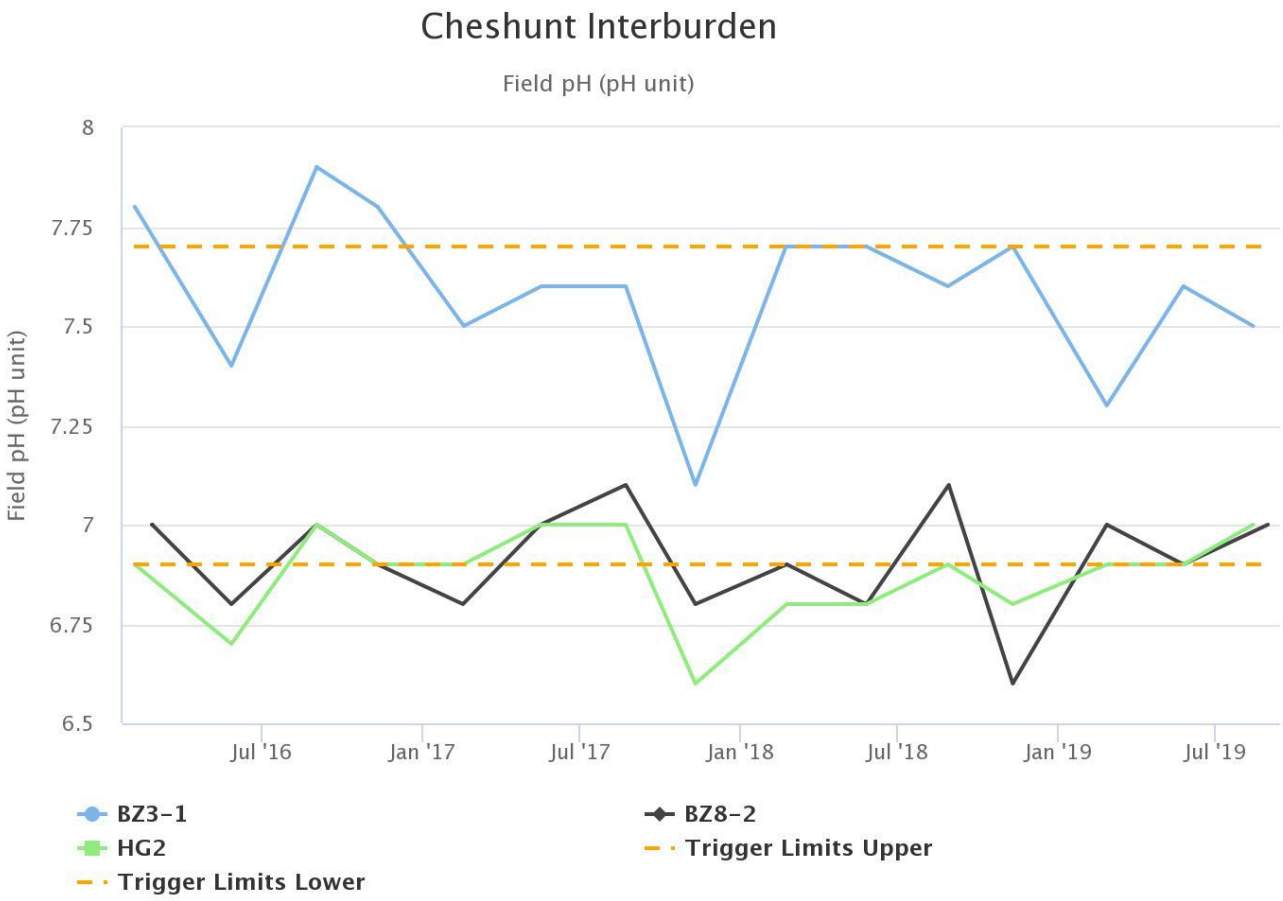

Figure 31: Cheshunt Interburden pH Trend – September 2019

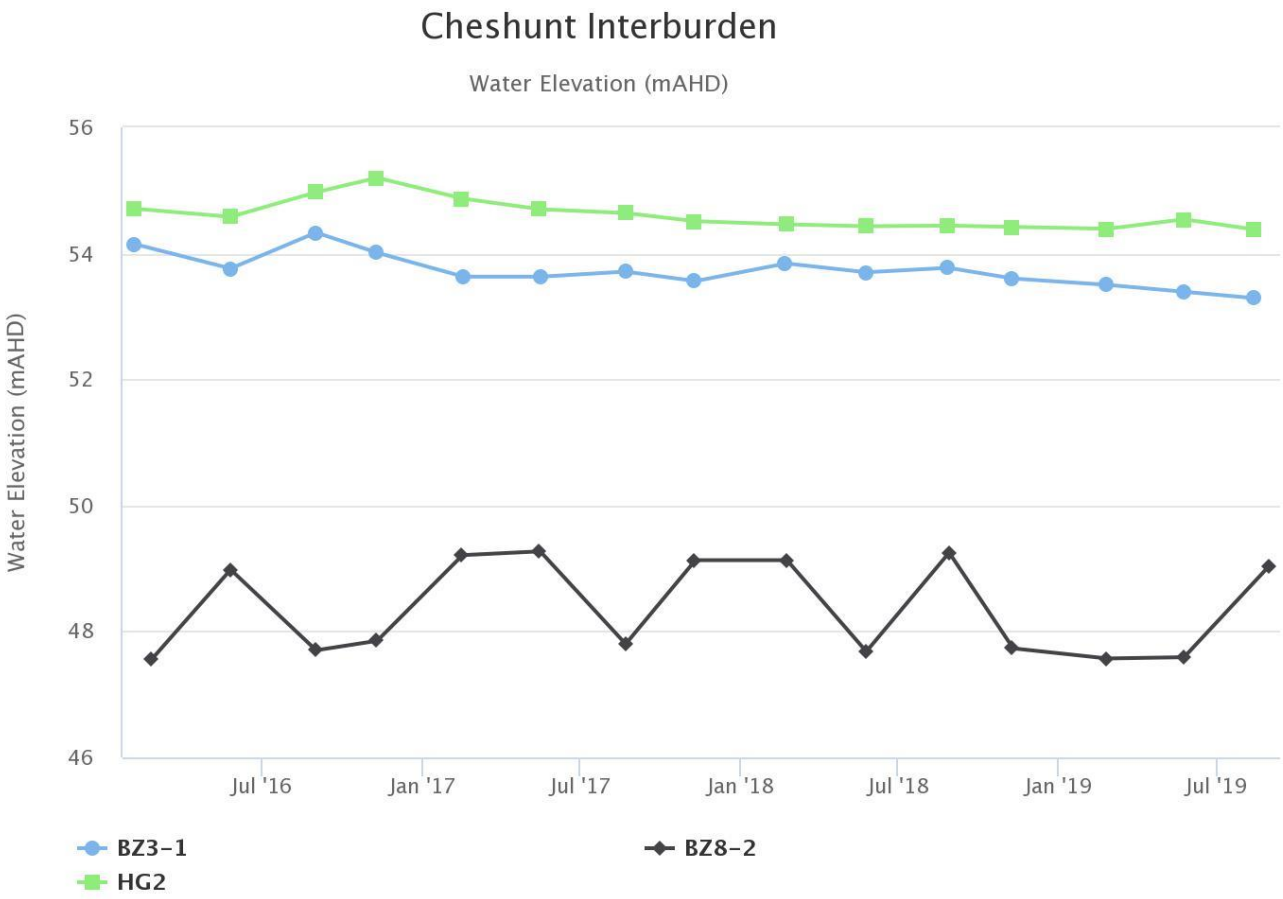

Figure 32: Cheshunt Interburden Standing Water Level – September 2019

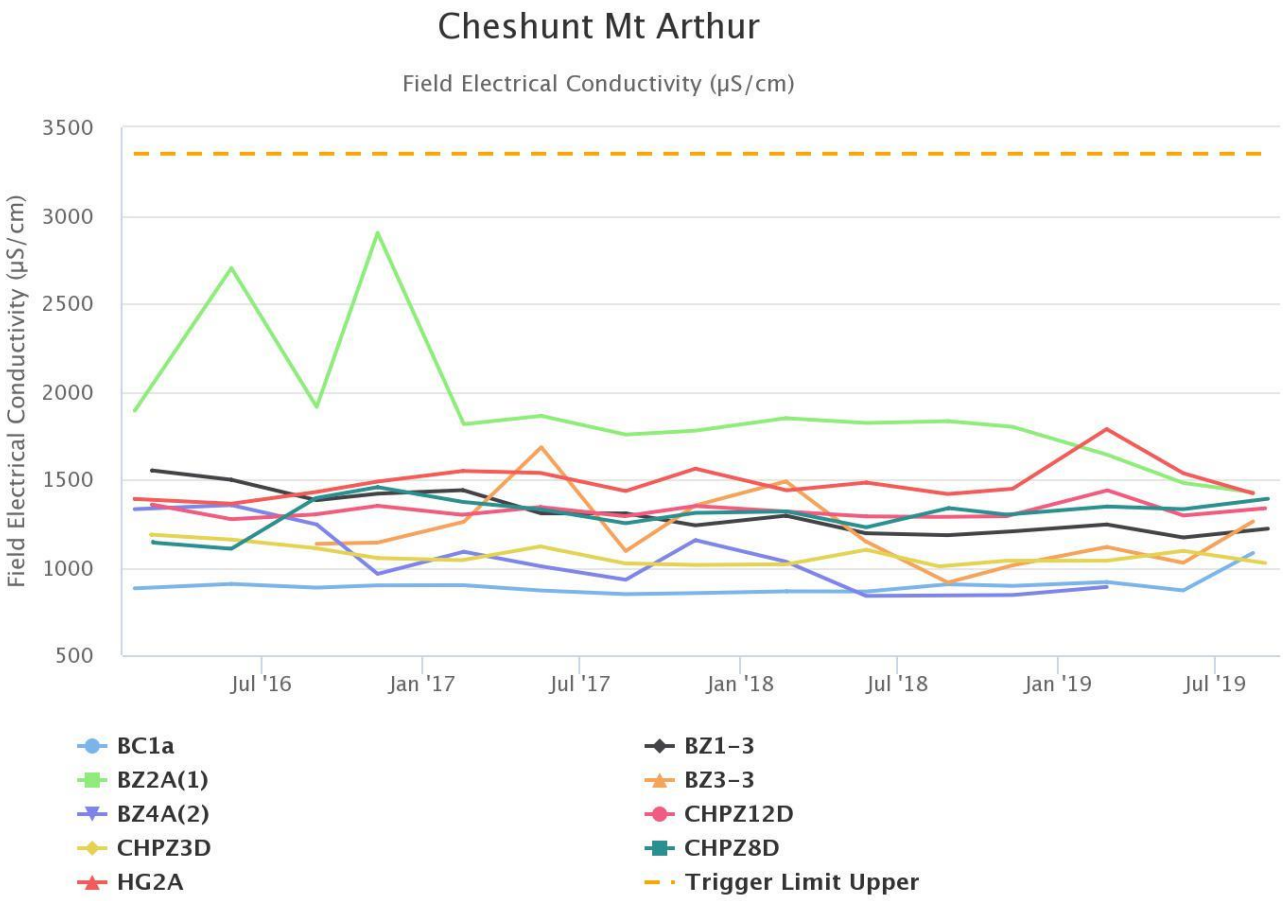

Figure 33: Cheshunt Mt Arthur Electrical Conductivity Trend – September 2019

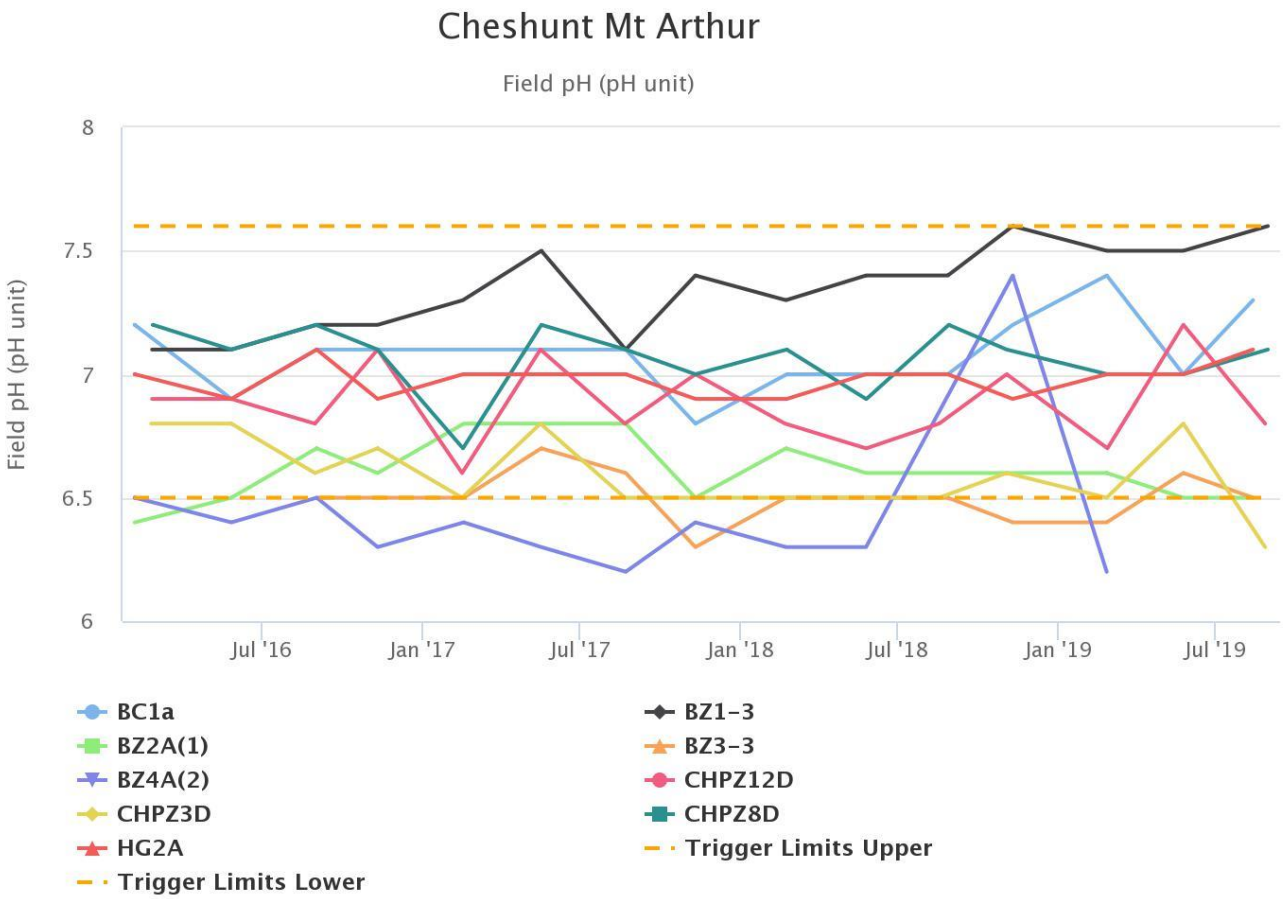

Figure 34: Cheshunt Mt Arthur pH Trend – September 2019

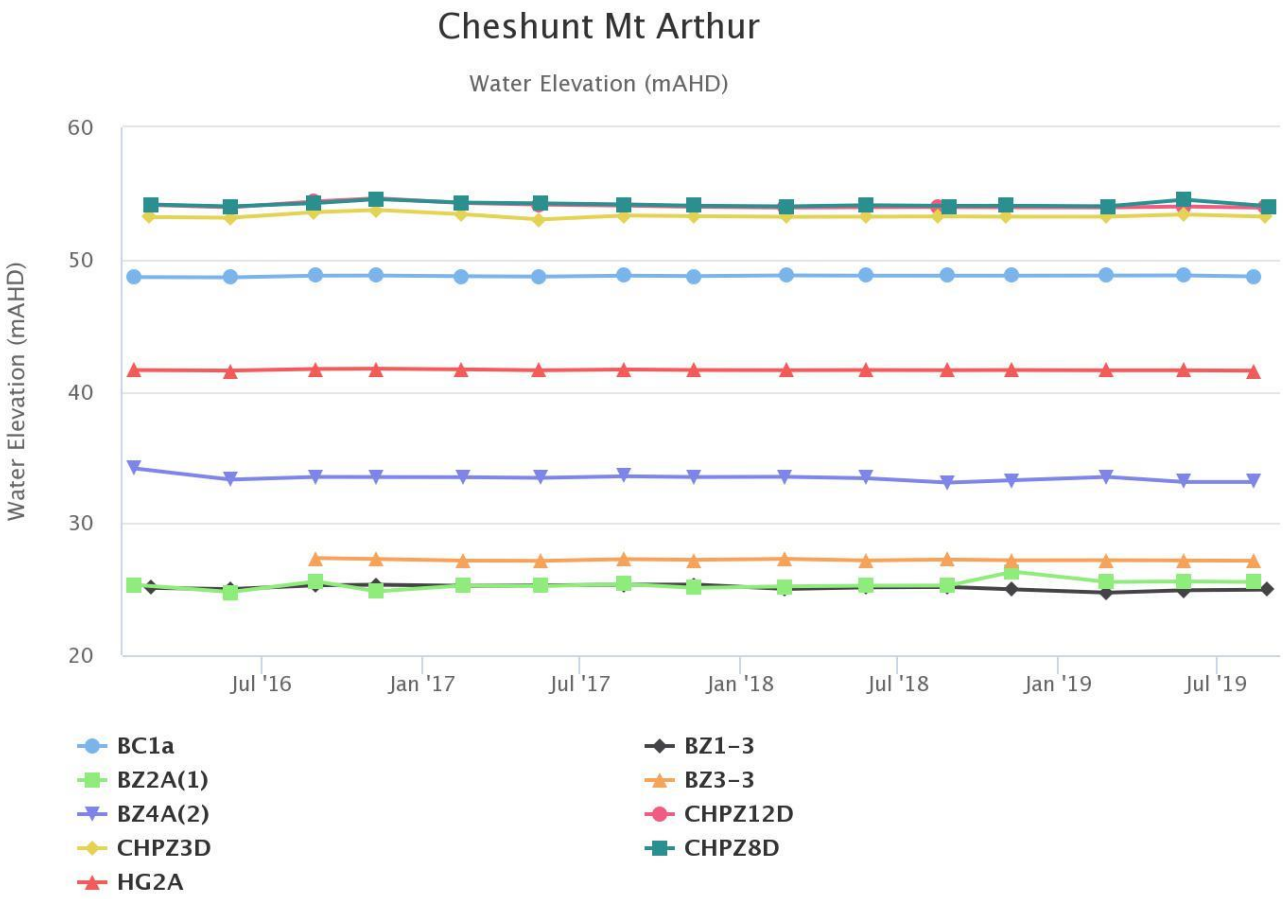

Figure 35: Cheshunt Mt Arthur Standing Water Level – September 2019

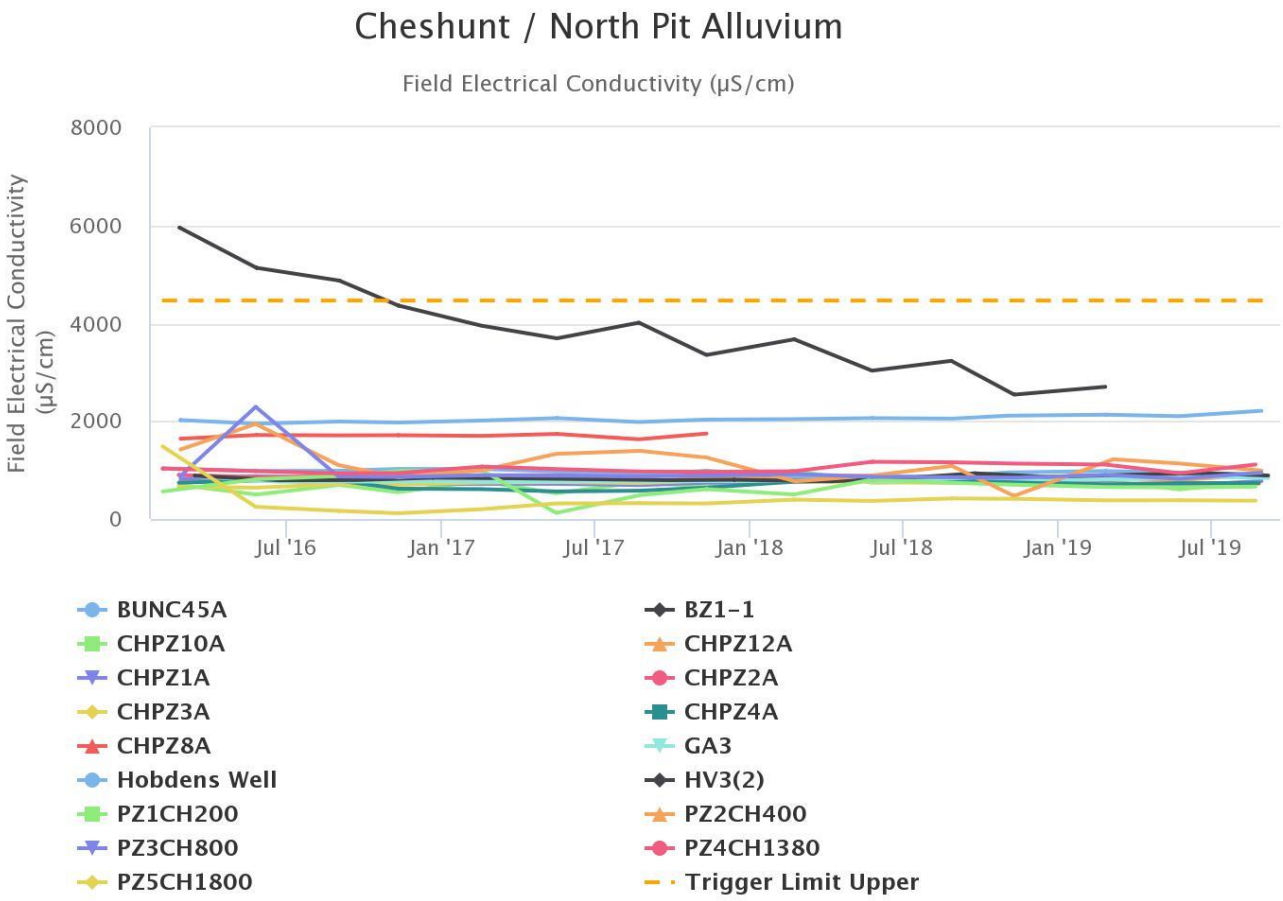

Figure 36: Cheshunt / North Pit Alluvium Electrical Conductivity Trend – September 2019

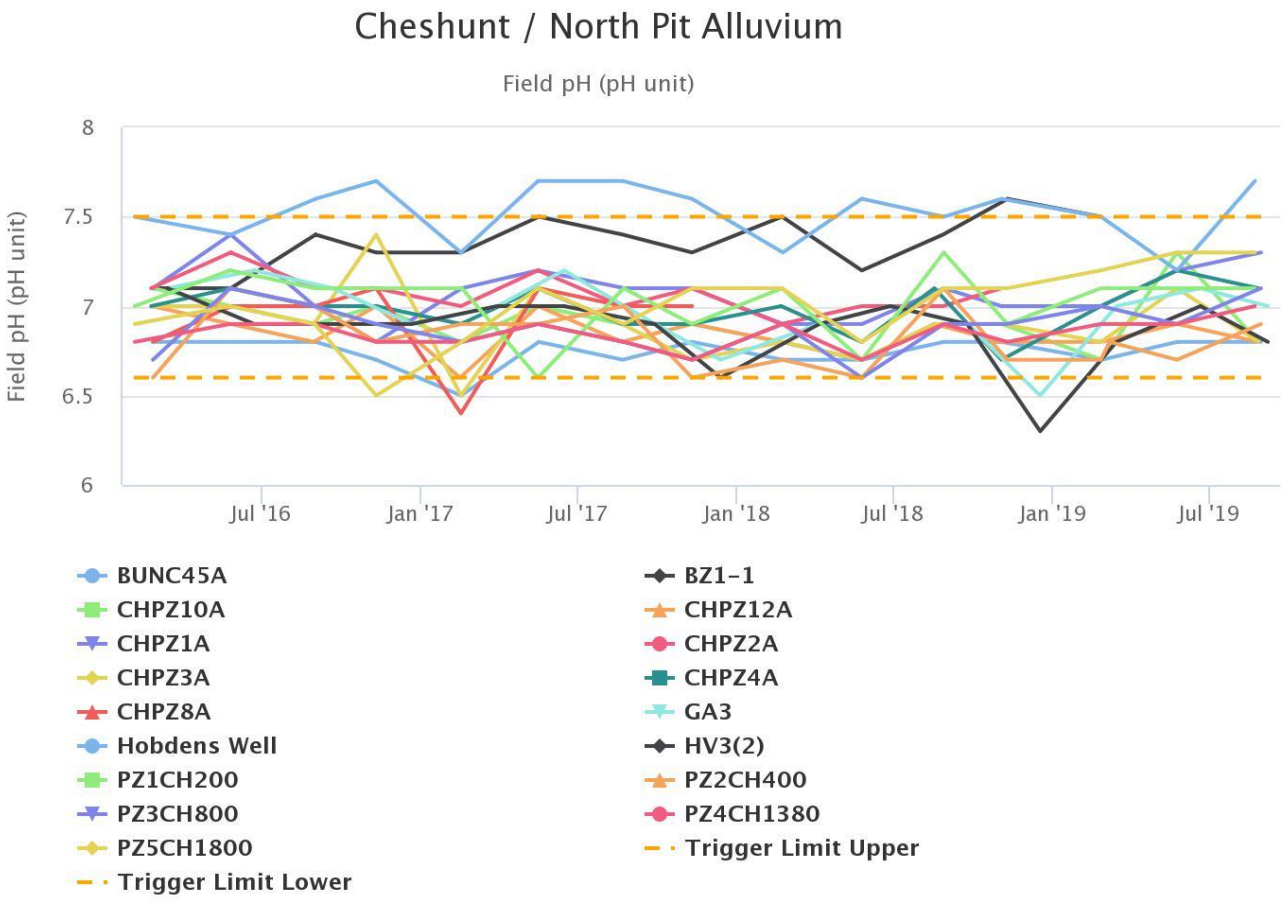

Figure 37: Cheshunt / North Pit Alluvium pH Trend – September 2019

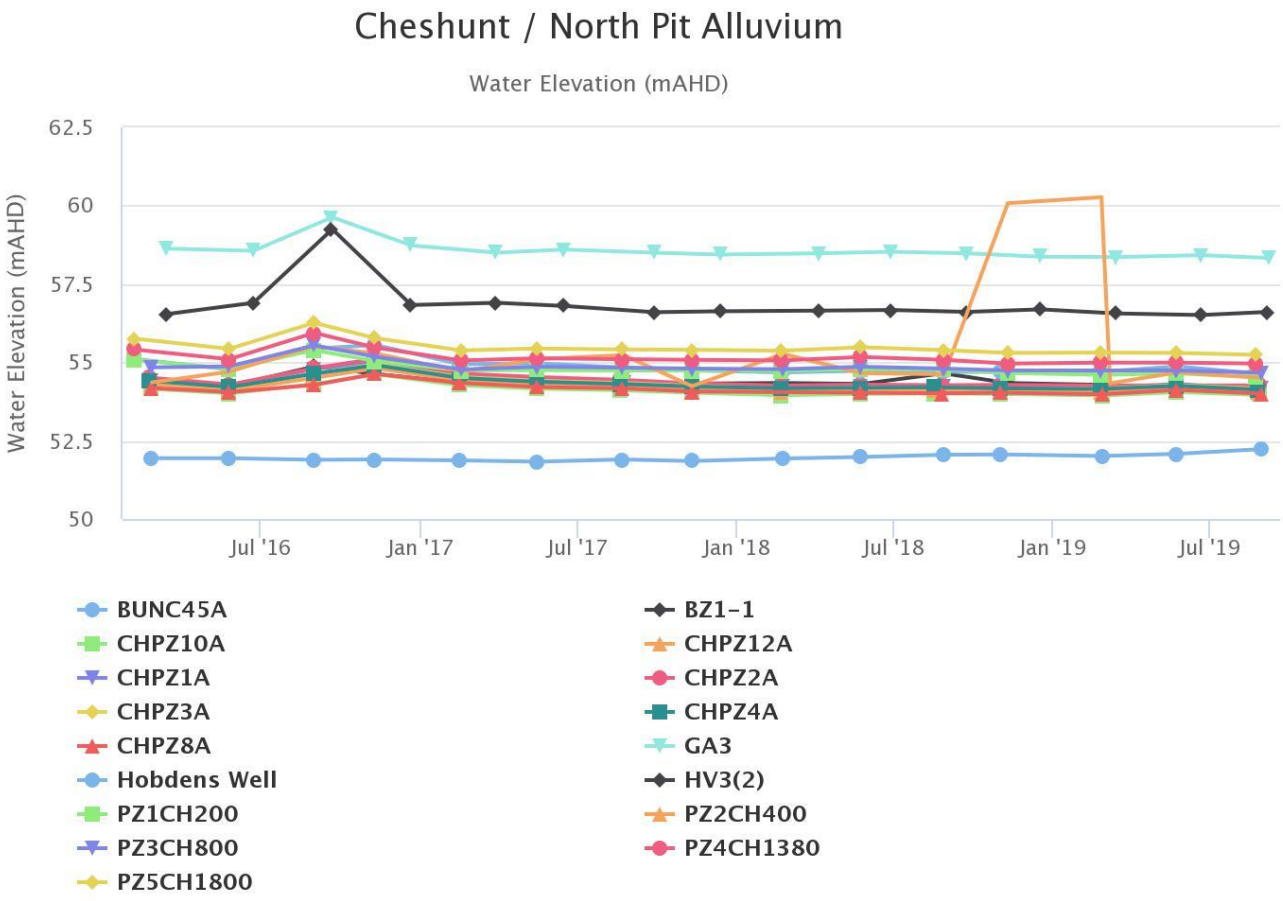

Figure 38: Cheshunt / North Pit Alluvium Standing Water Level – September 2019

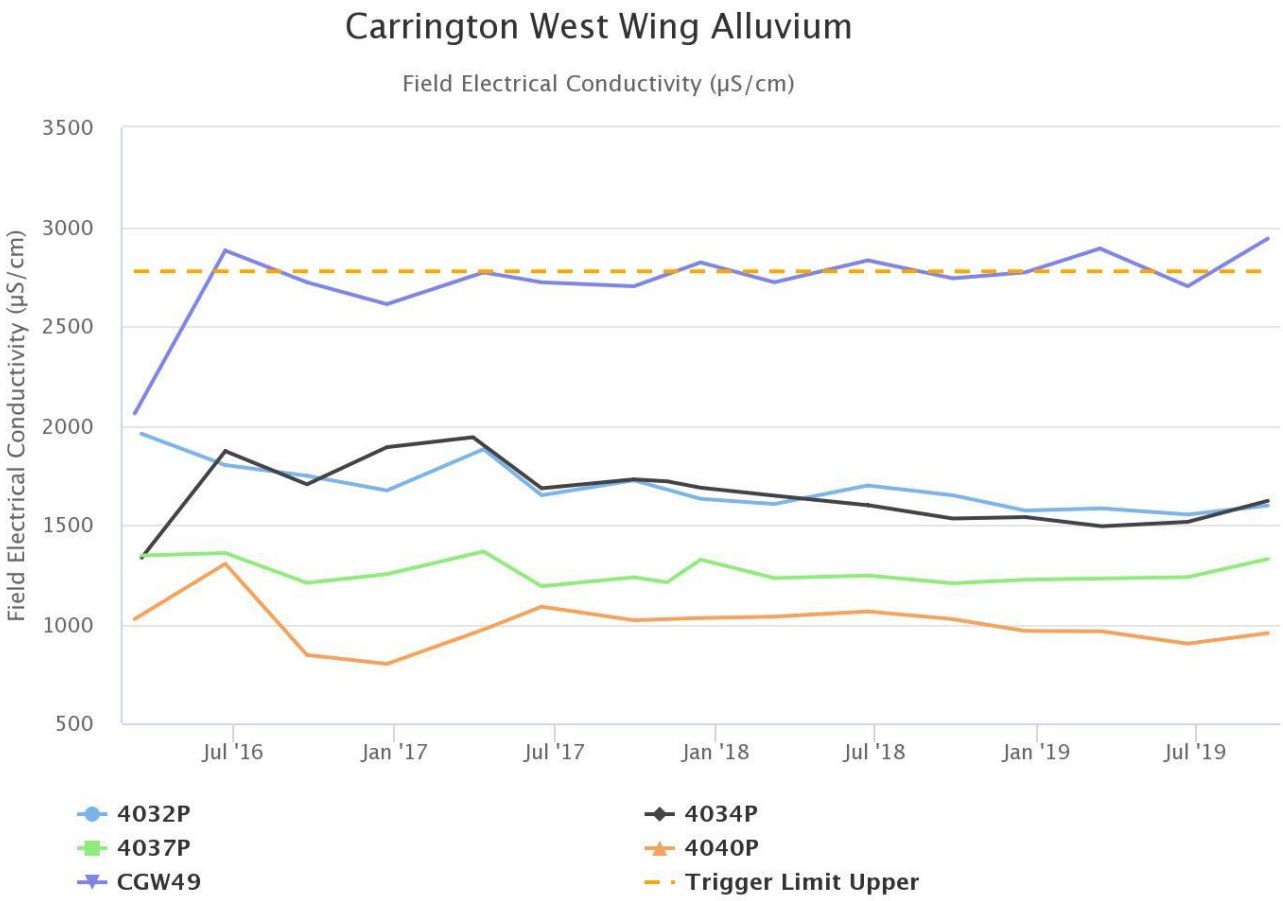

Figure 39: Carrington West Wing Alluvium Electrical Conductivity Trend – September 2019

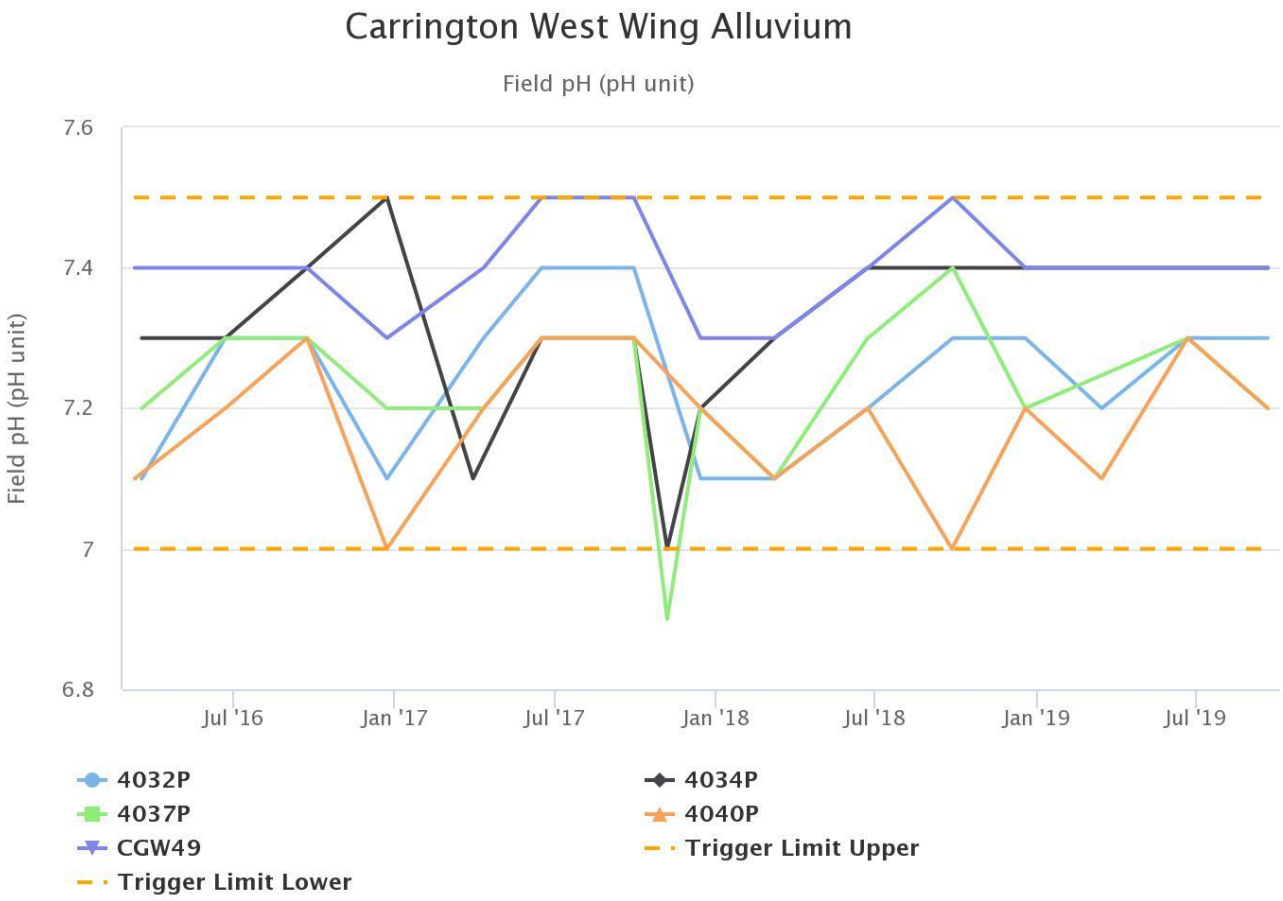

Figure 40: Carrington West Wing Alluvium pH Trend – September 2019

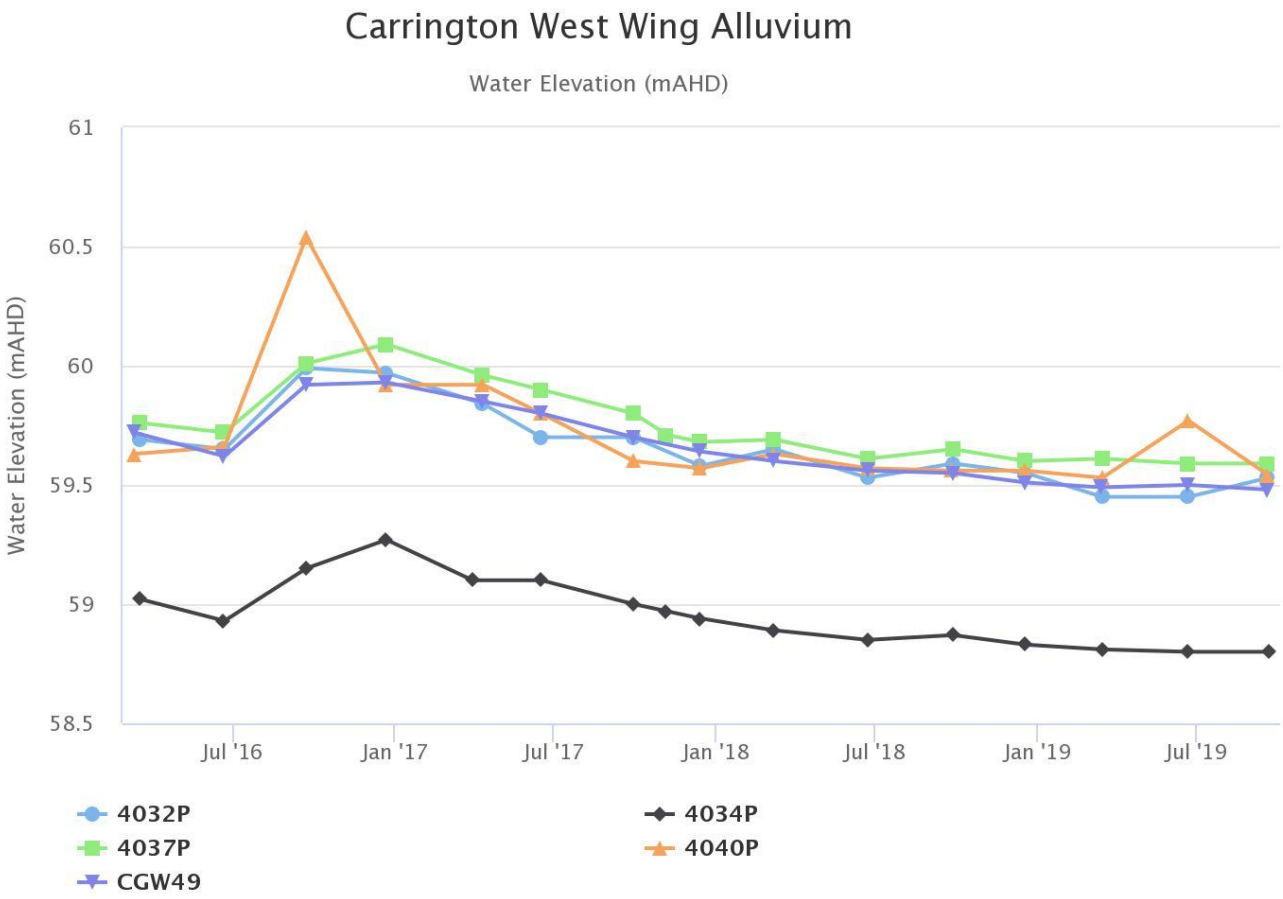

Figure 41: Carrington West Wing Alluvium Standing Water Level – September 2019

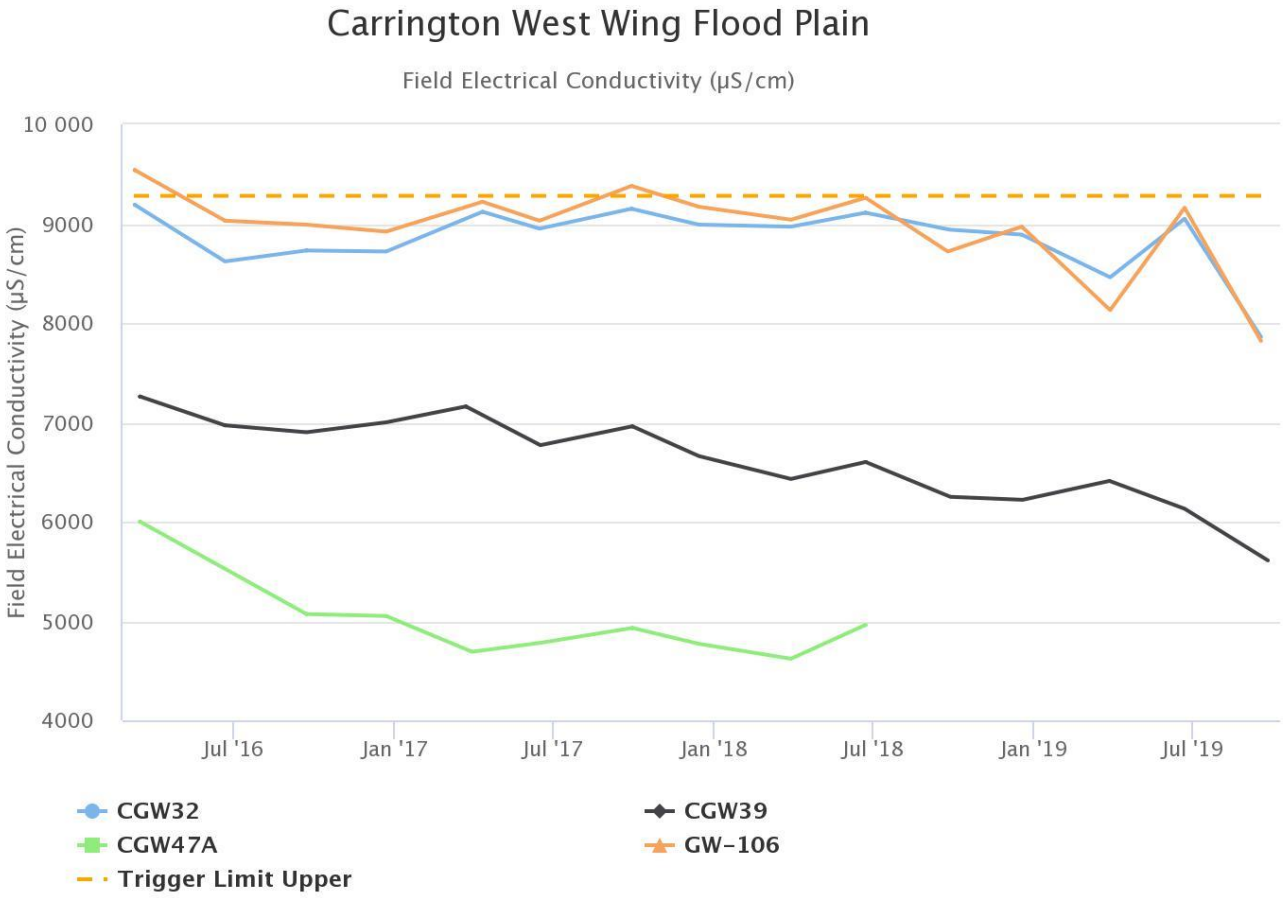

Figure 42: Carrington West Wing Flood Plain Electrical Conductivity Trend – September 2019

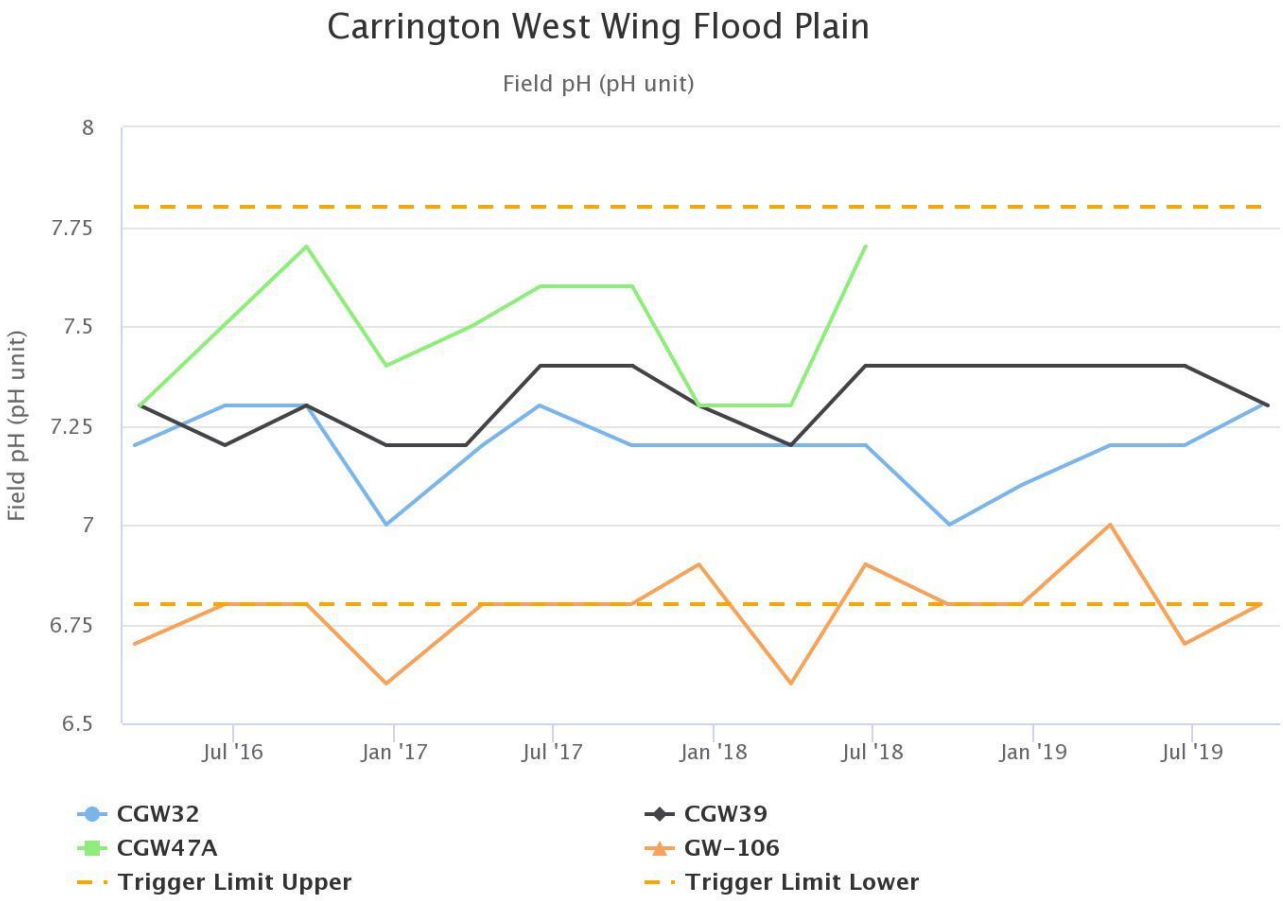

Figure 43: Carrington West Wing Flood Plain pH Trend – September 2019

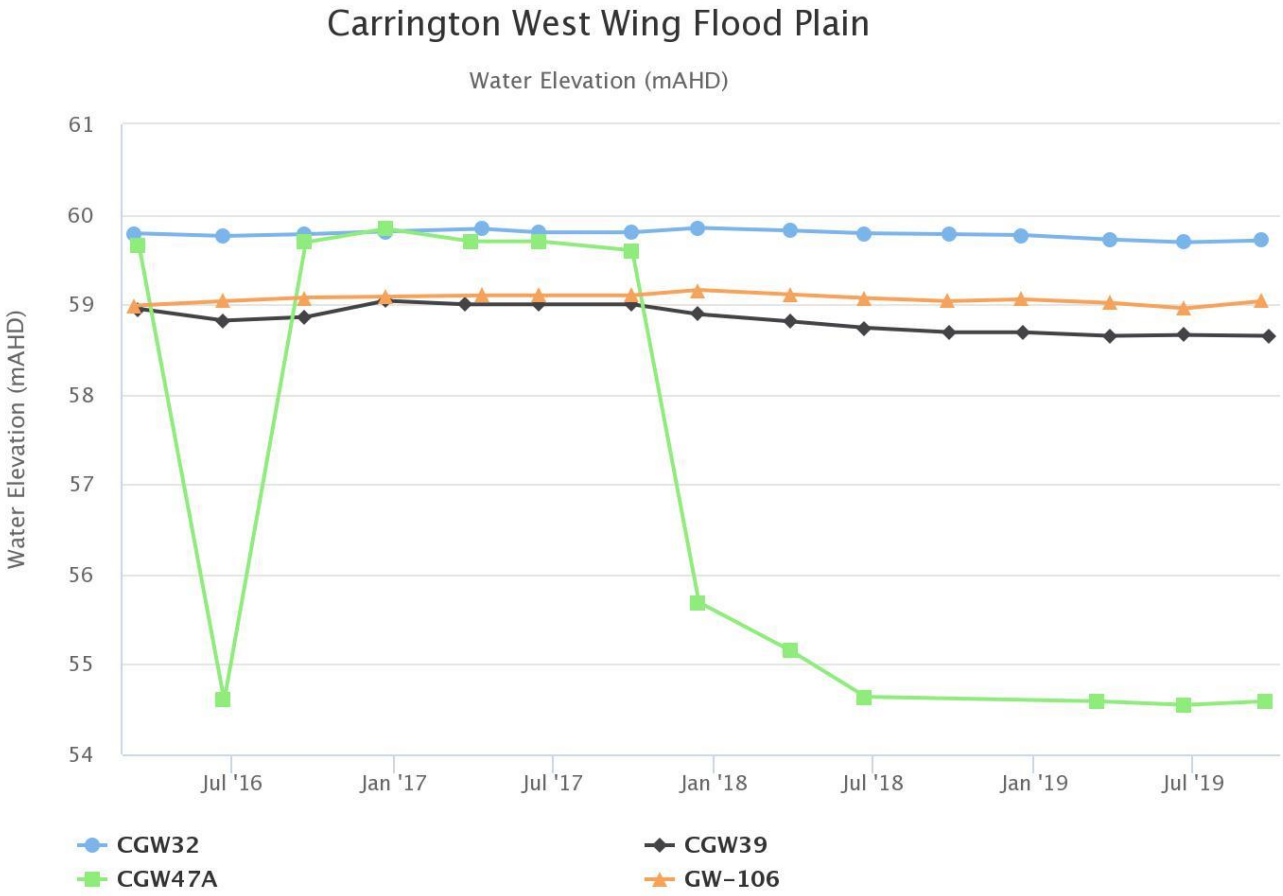

Figure 44: Carrington West Wing Flood Plain Standing Water Level – September 2019

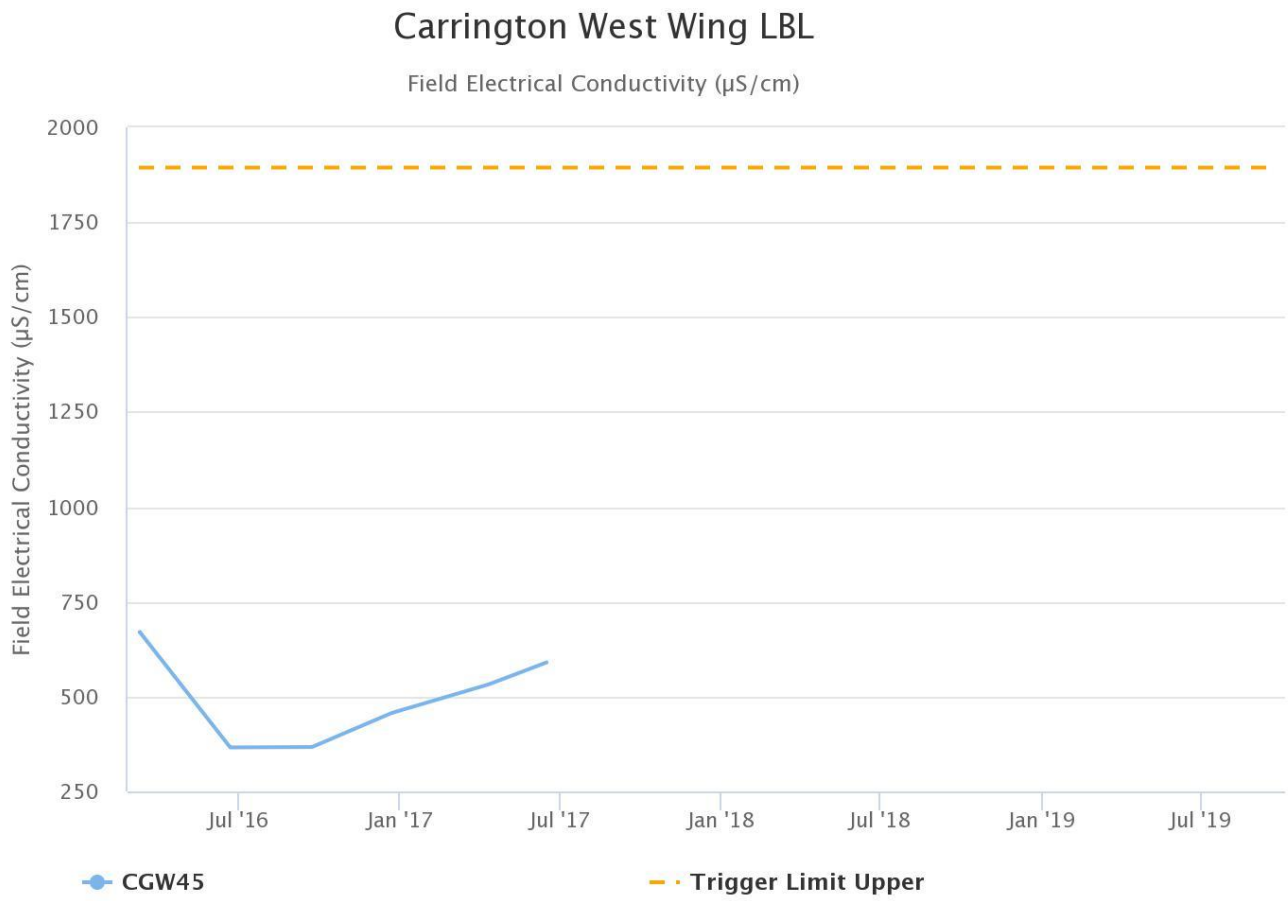

Figure 45: Carrington West Wing LBL Electrical Conductivity Trend – September 2019*

*CGW45 has been blocked since June 2018 hence why no data is shown Figure 45.

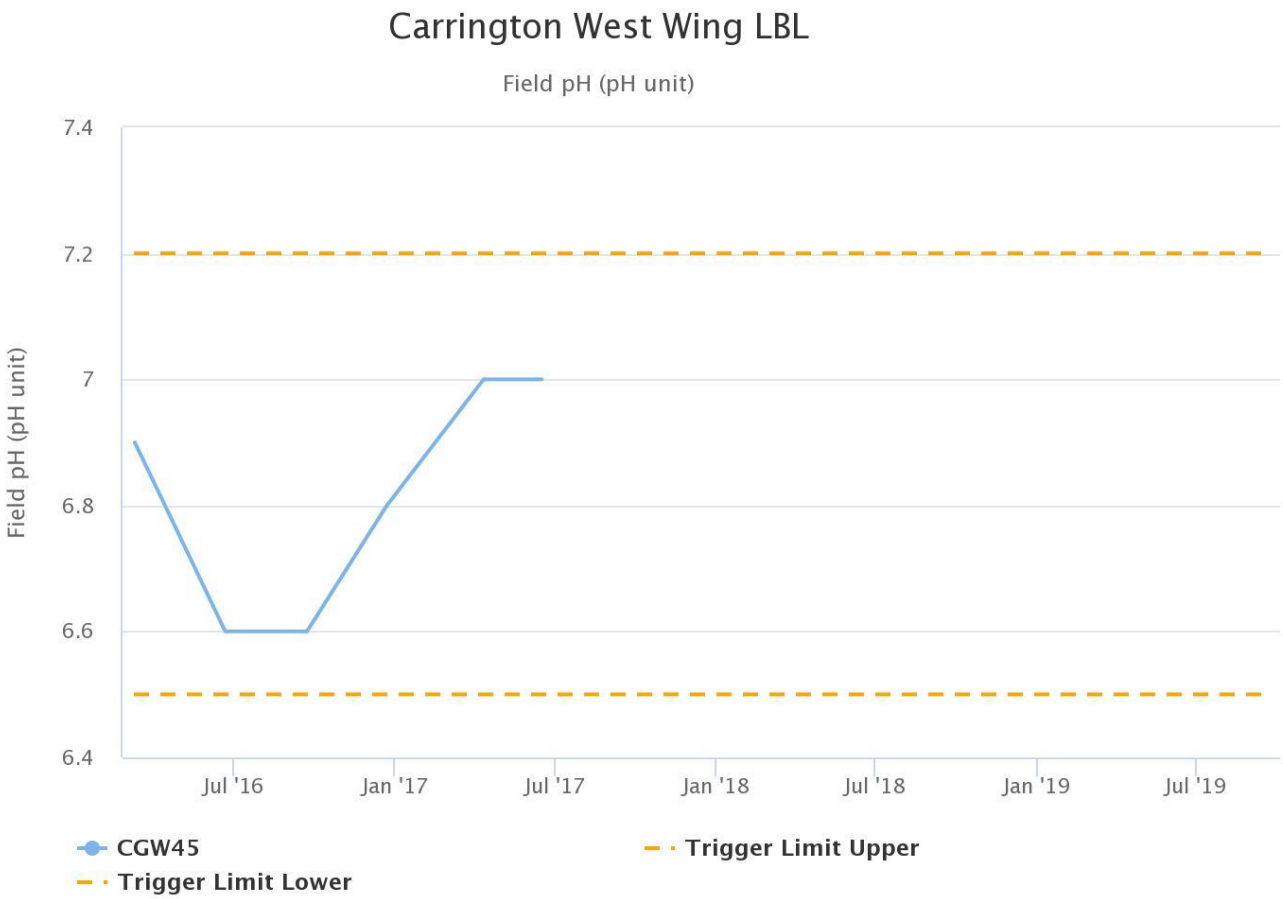

Figure 46: Carrington West Wing LBL pH Trend – September 2019

*CGW45 has been blocked since June 2018 hence why no data is shown Figure 46.

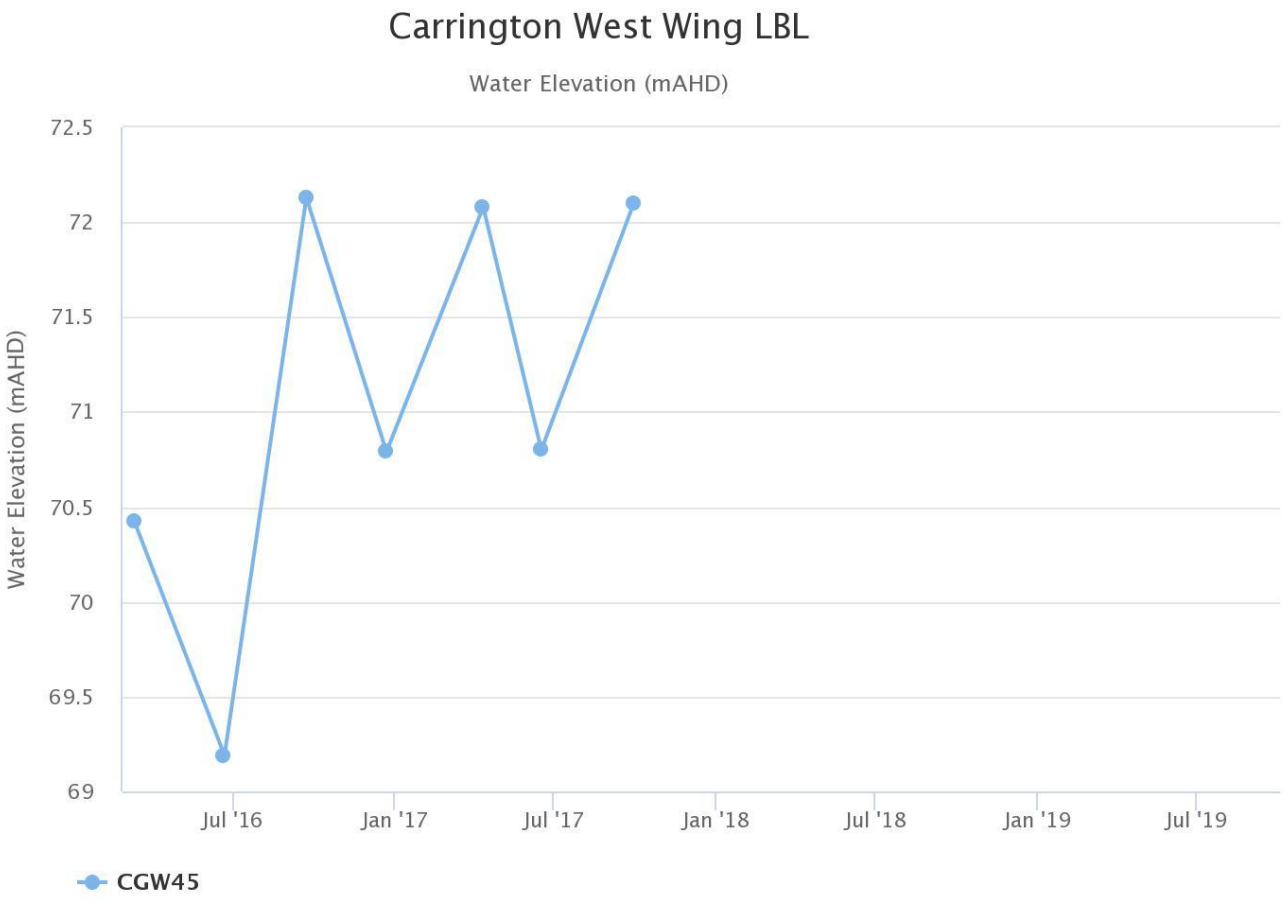

Figure 47: Carrington West Wing LBL Standing Water Level – September 2019

*CGW45 has been blocked since June 2018 hence why no data is shown Figure 47.

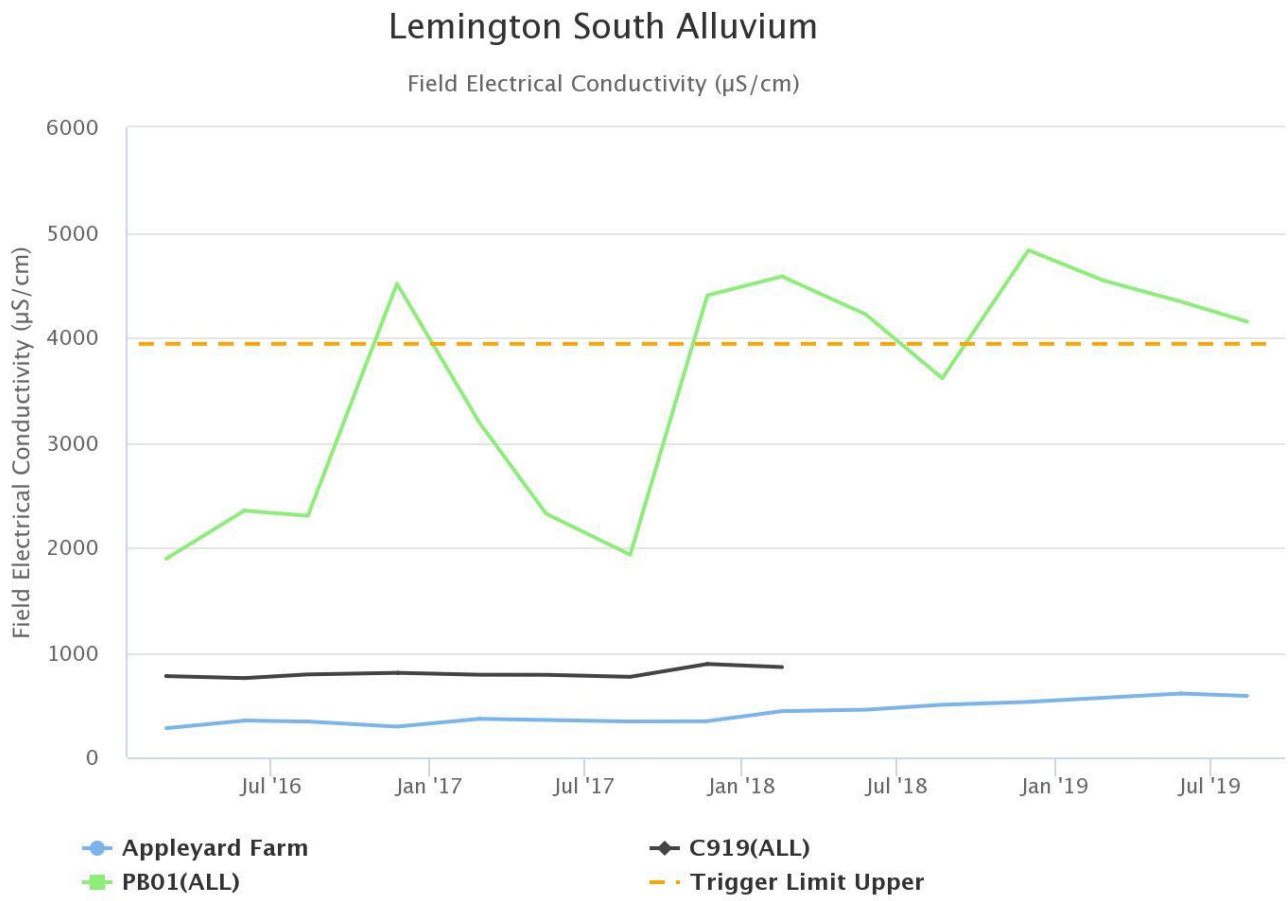

Figure 48: Lemington South Alluvium Electrical Conductivity Trend – September 2019

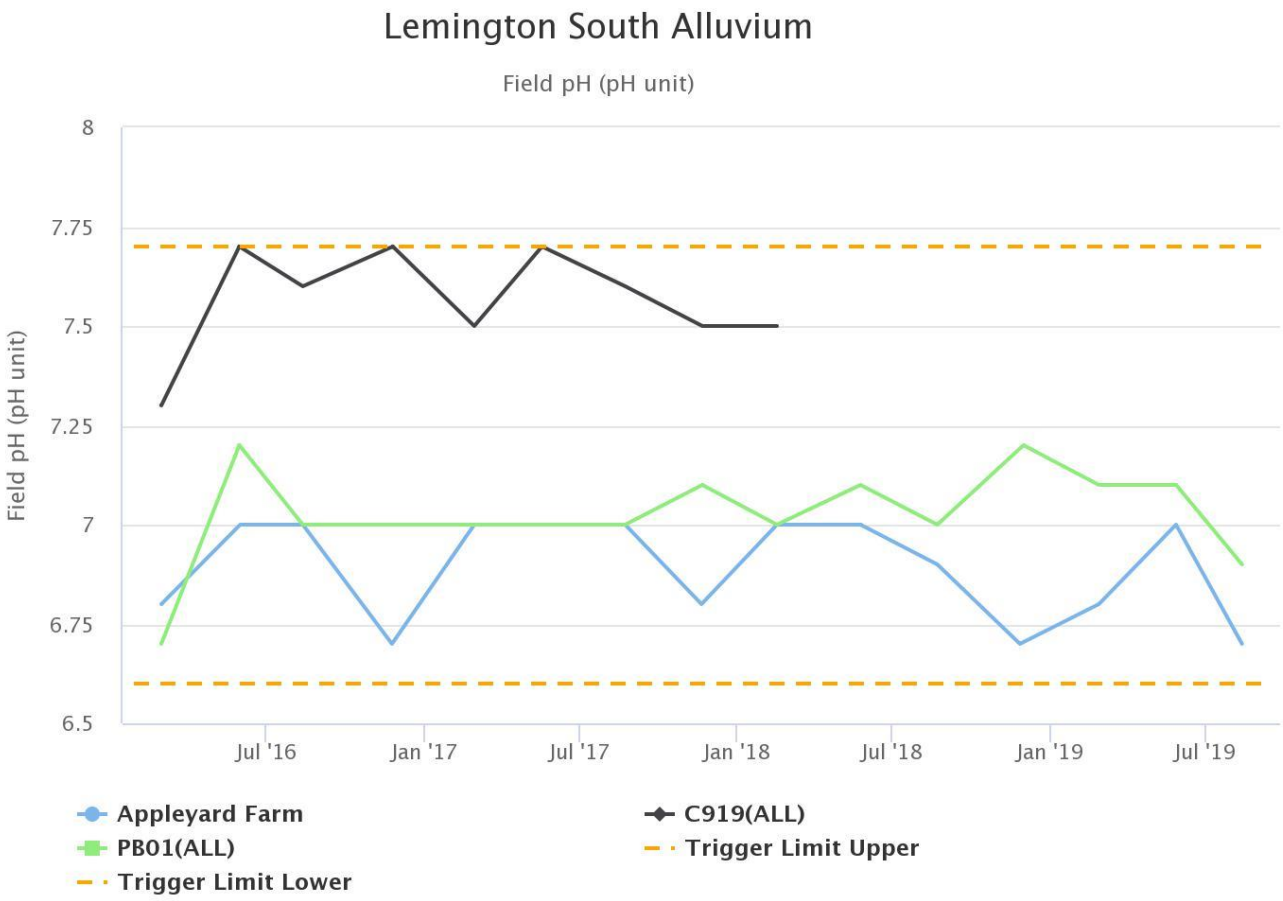

Figure 49: Lemington South Alluvium pH Trend – September 2019

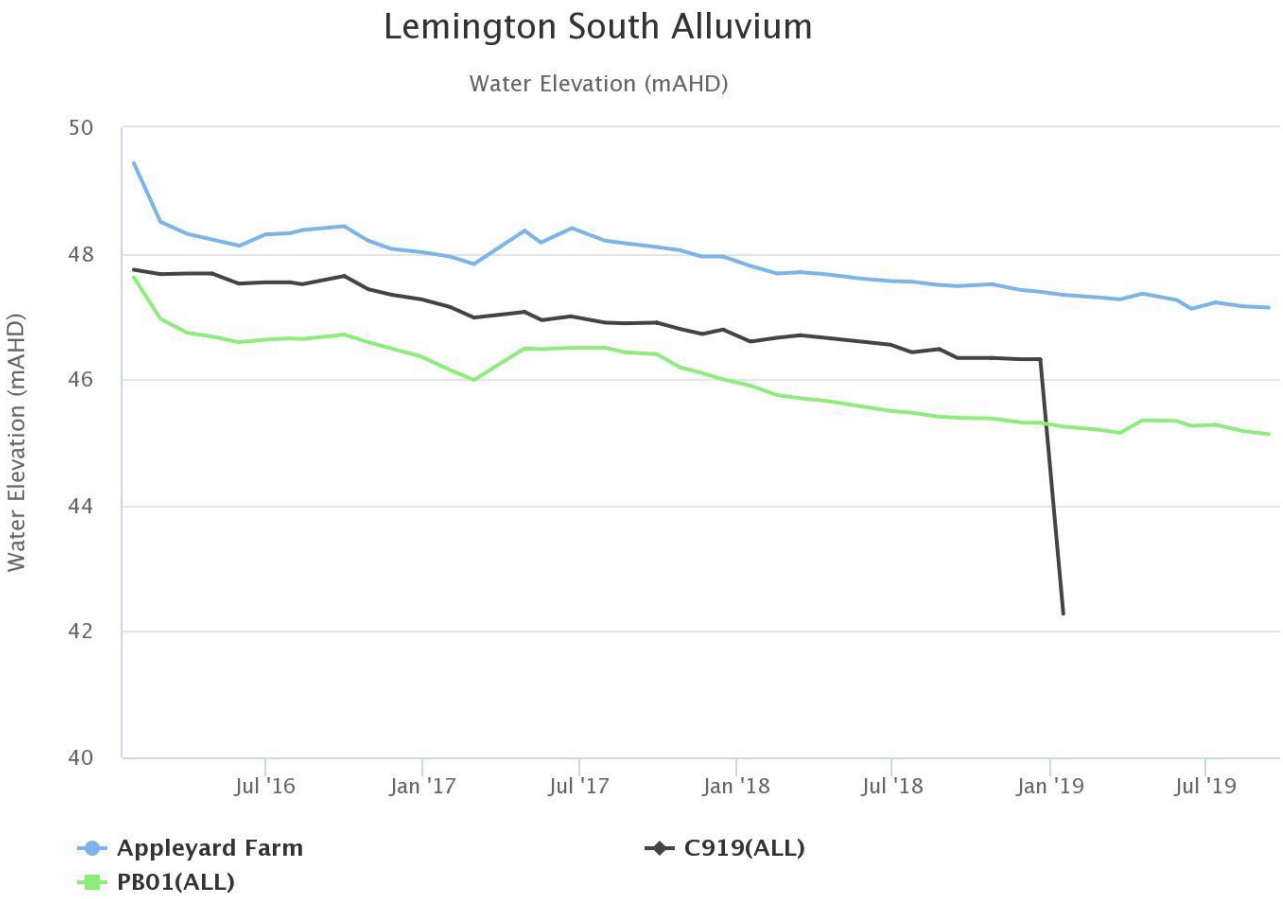

Figure 50: Lemington South Alluvium Standing Water Level Trend – September 2019*

*C919(ALL) has been dry from February to June 2019

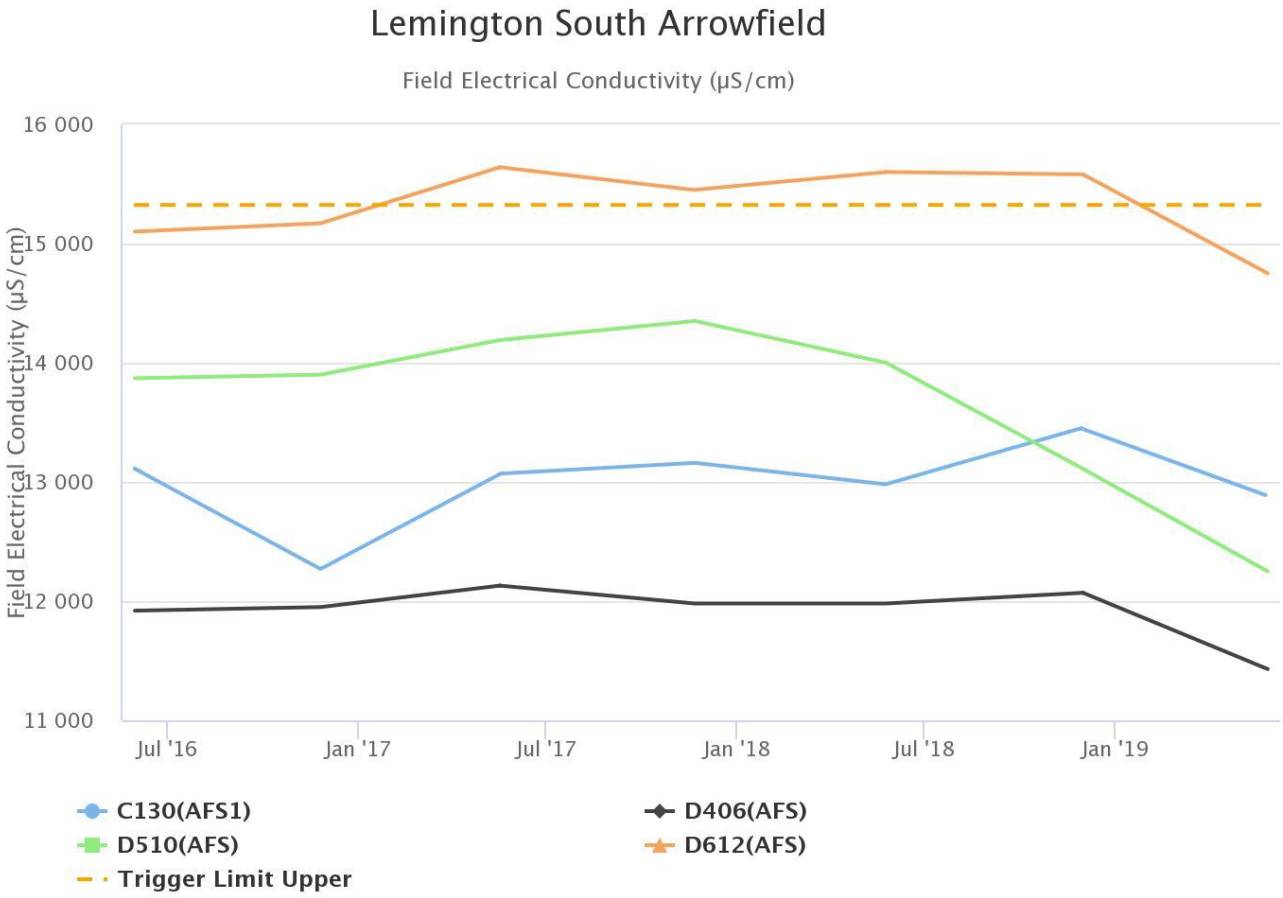

Figure 51: Lemington South Arrowfield Electrical Conductivity Trend – September 2019

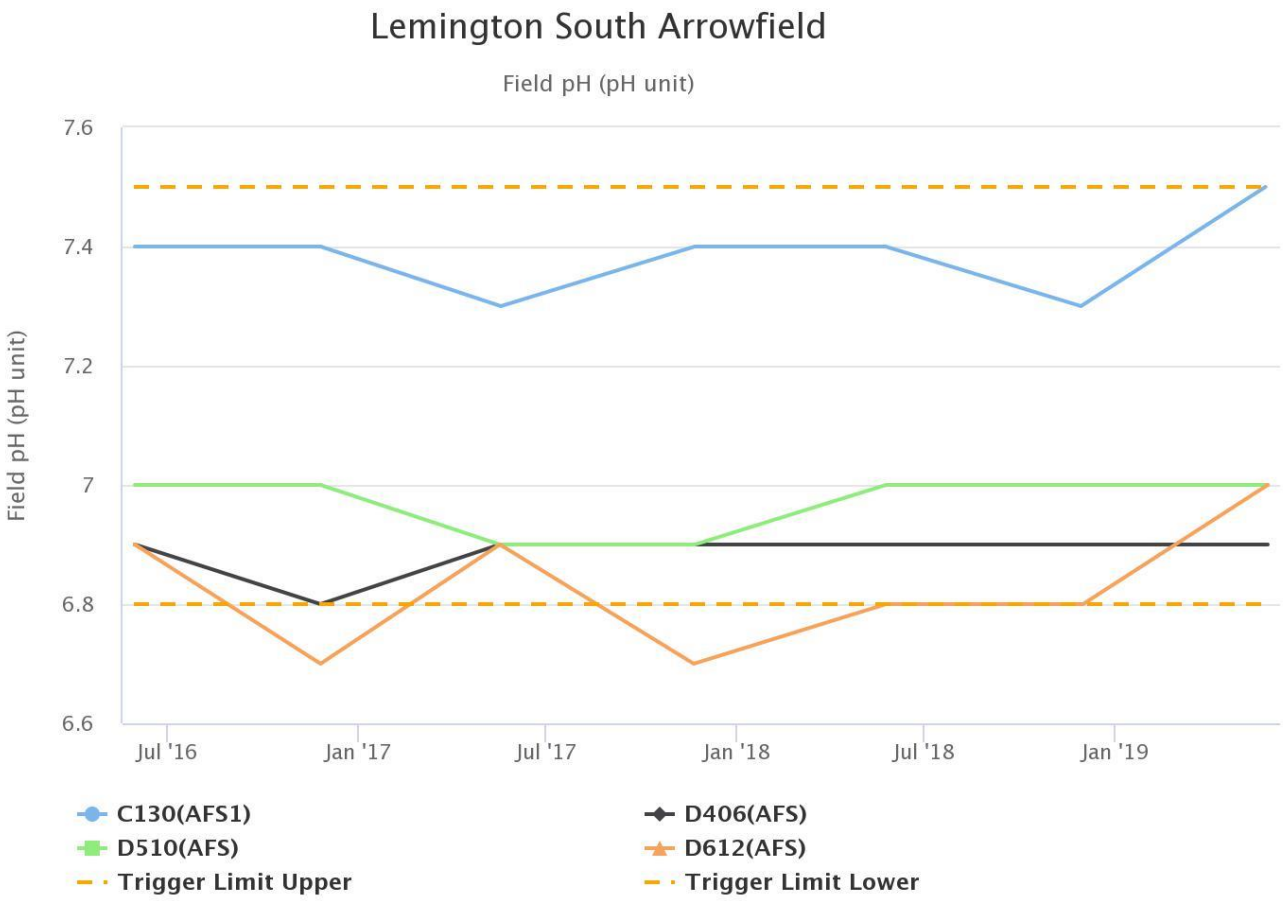

Figure 52: Lemington South Arrowfield pH Trend – September 2019

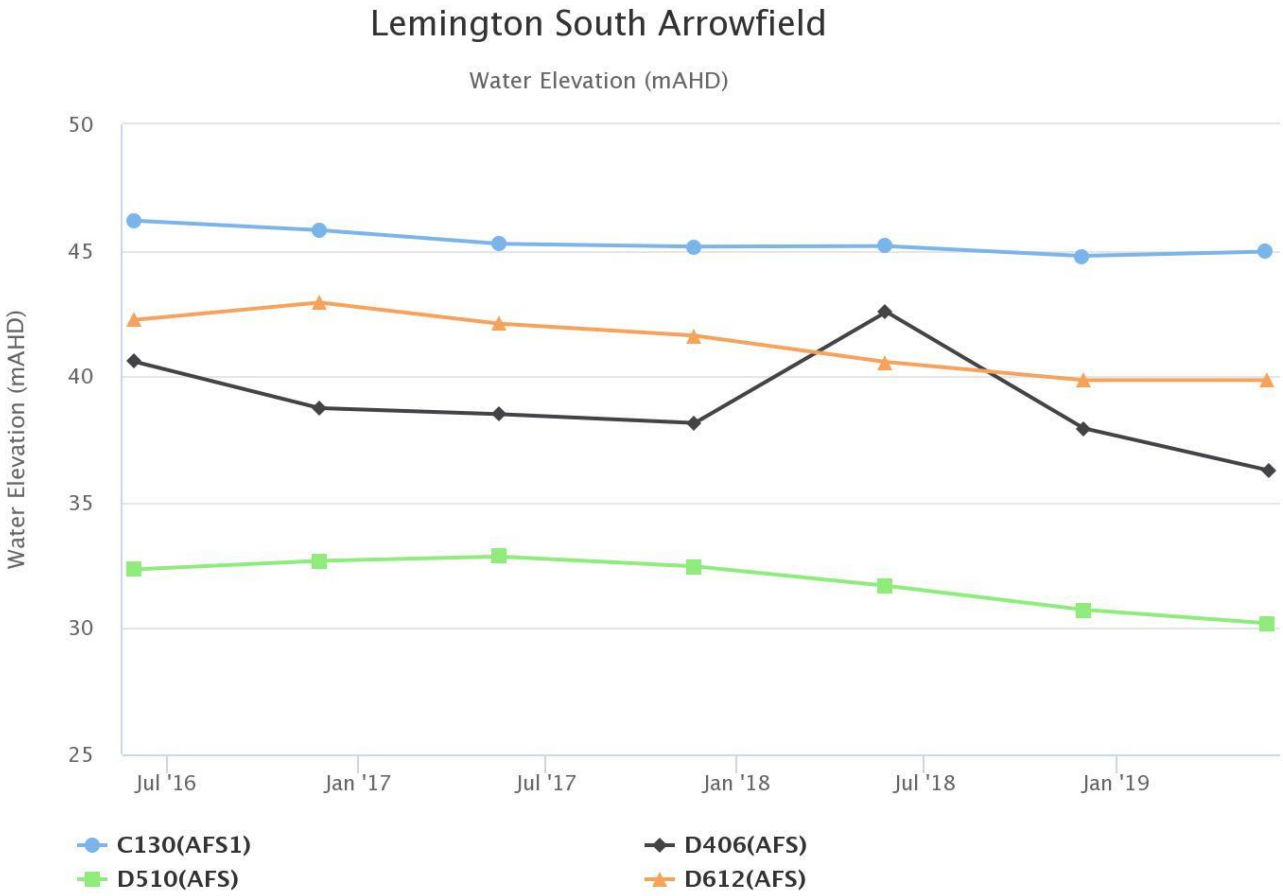

Figure 53: Lemington South Arrowfield Standing Water Level – September 2019

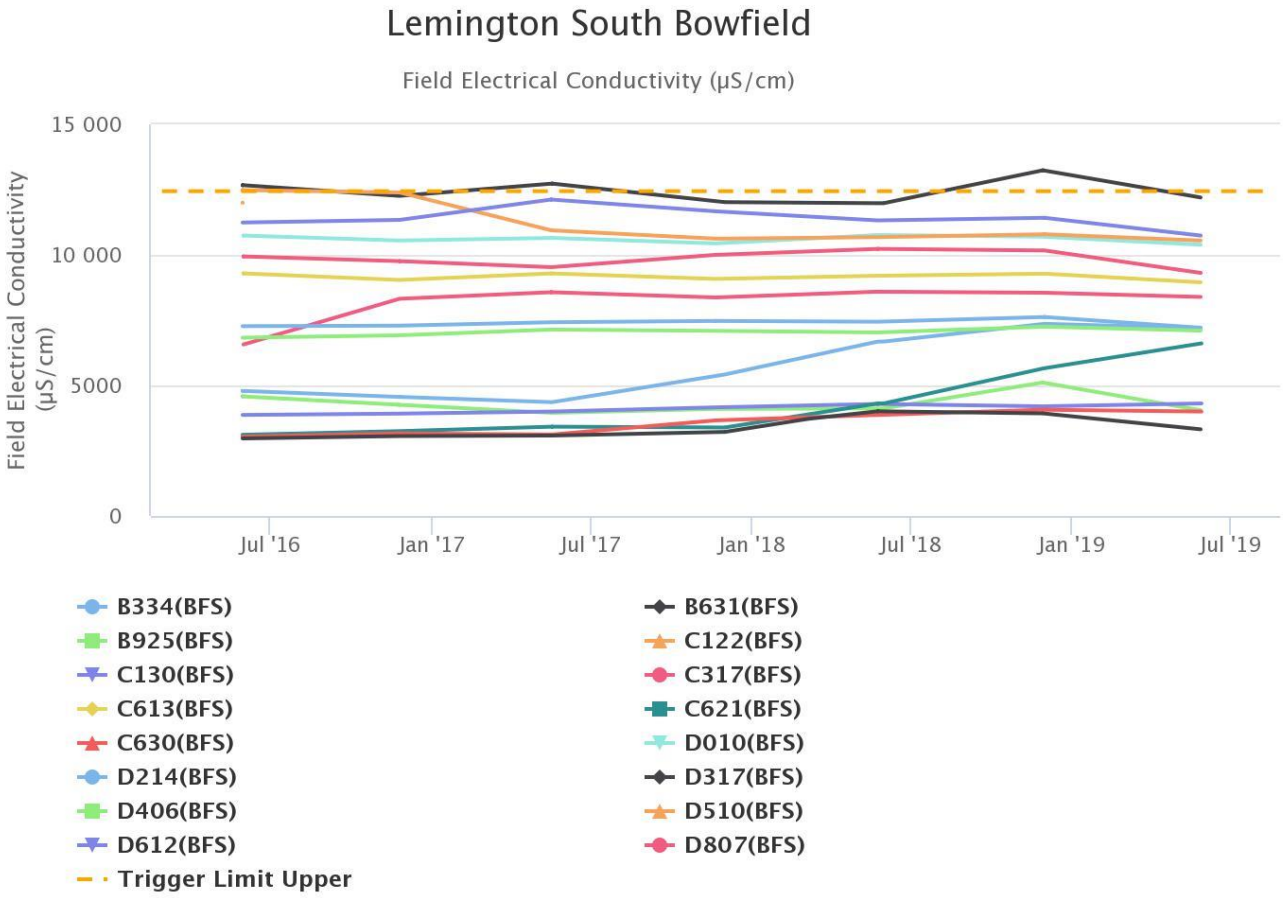

Figure 54: Lemington South Bowfield Electrical Conductivity Trend – September 2019

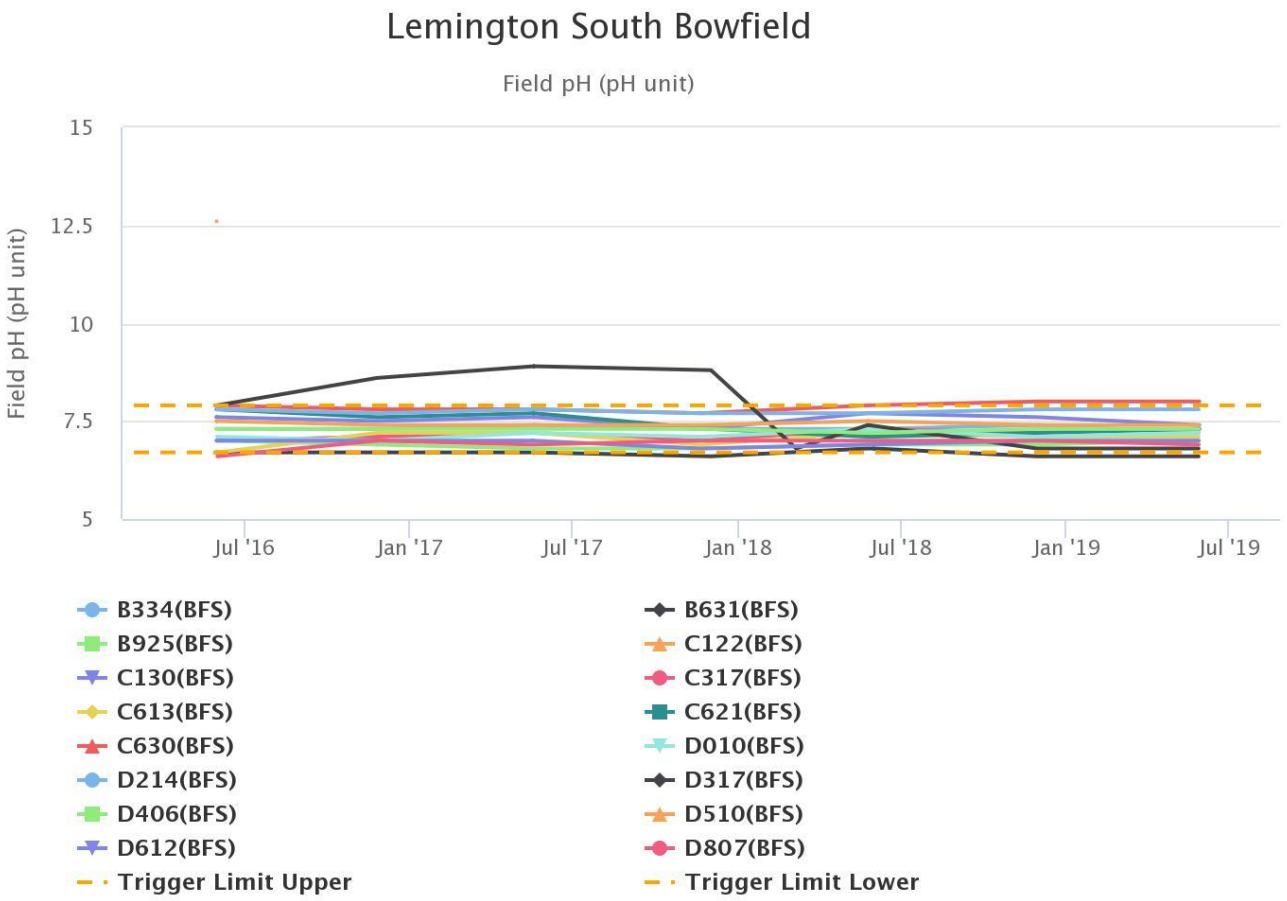

Figure 55: Lemington South Bowfield pH Trend – September 2019

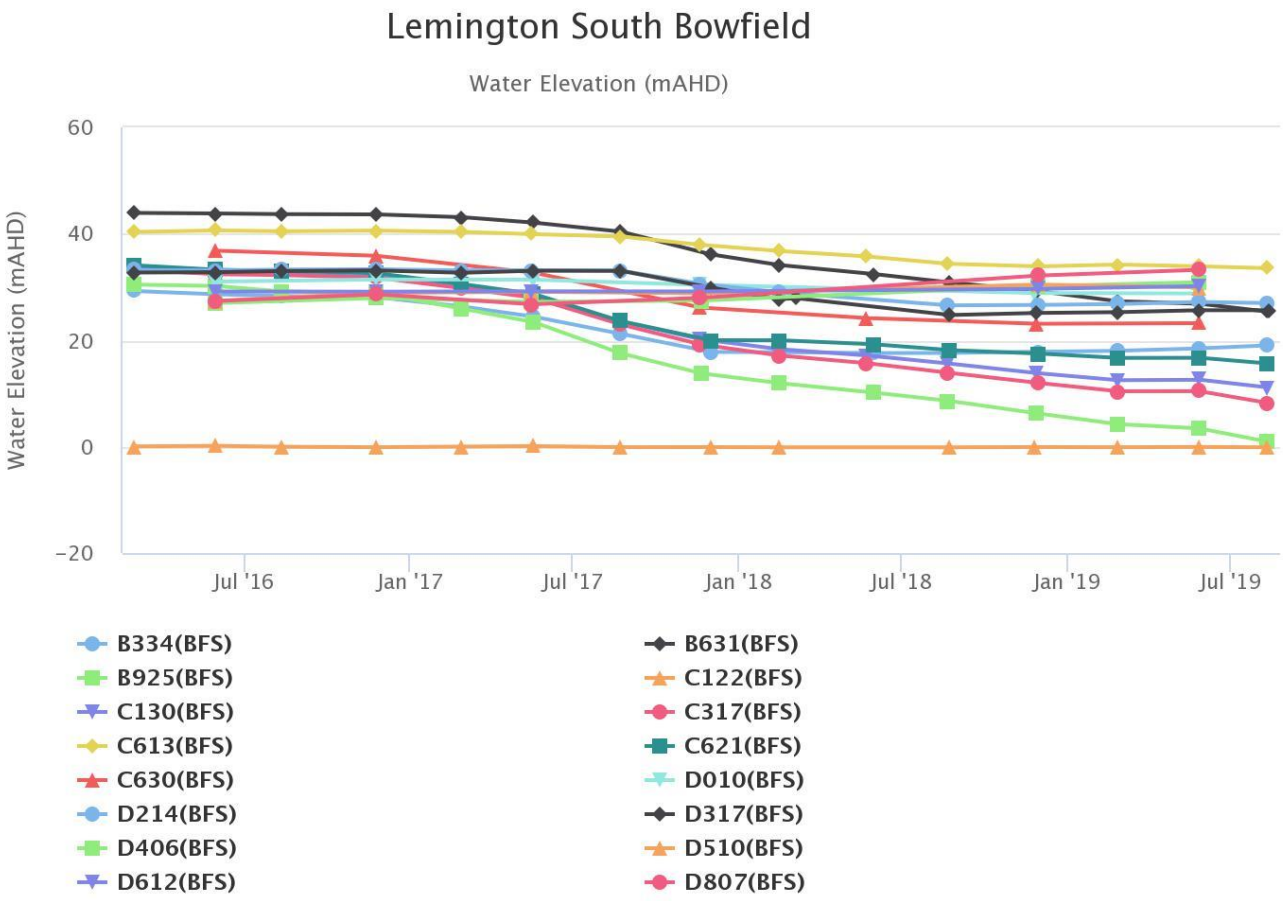

Figure 56: Lemington South Bowfield Standing Water Level – September 2019

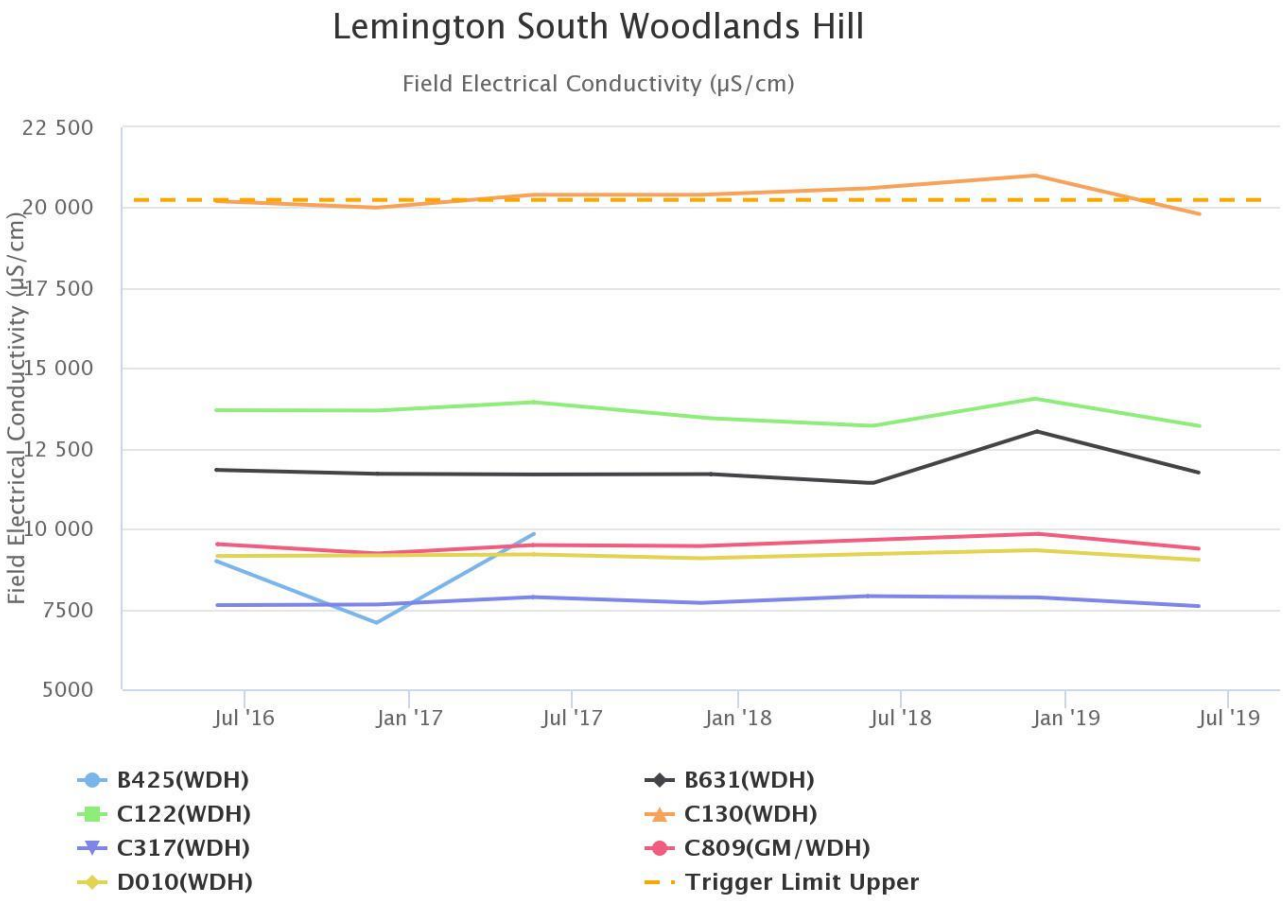

Figure 57: Lemington South Woodlands Hill Electrical Conductivity Trend – September 2019

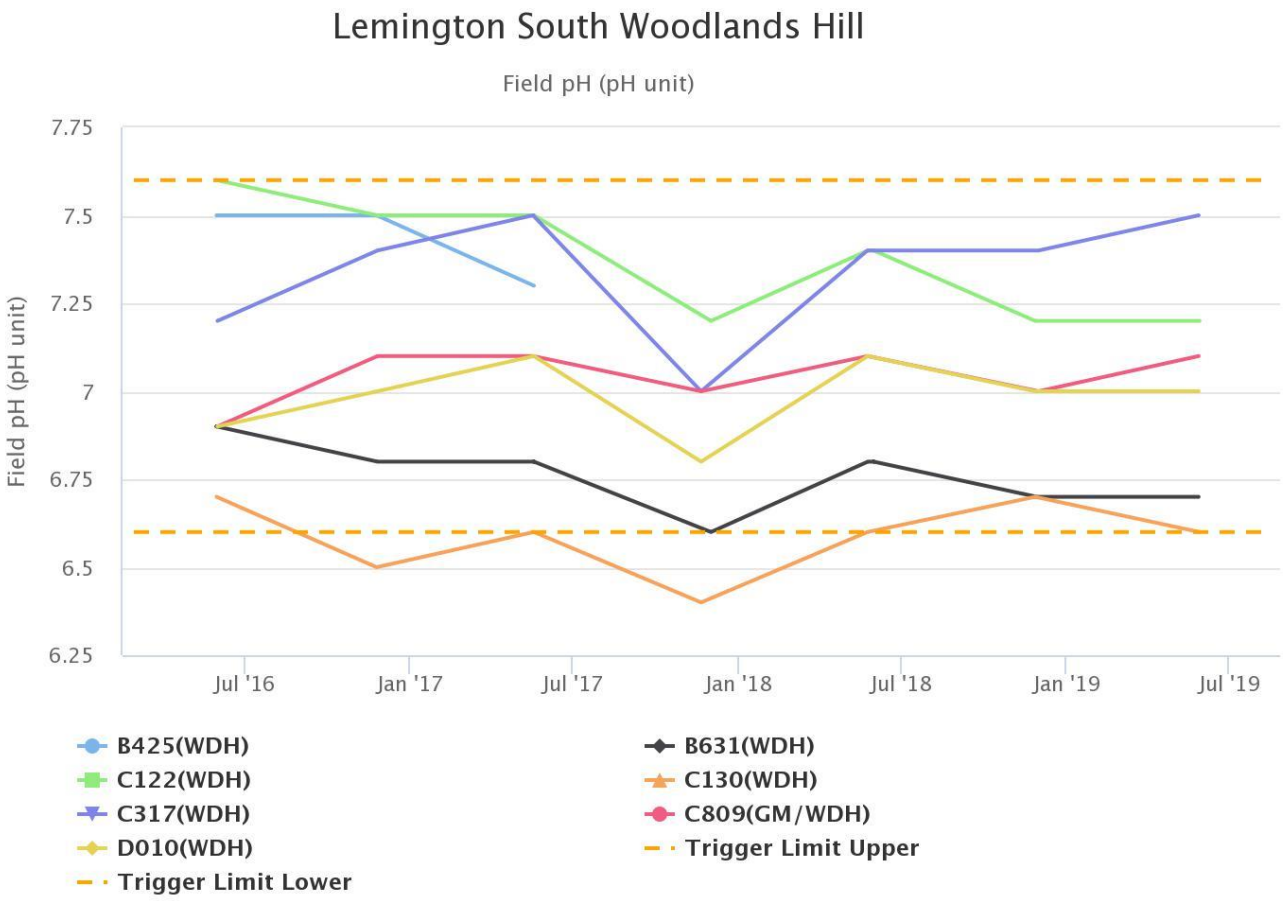

Figure 58: Lemington South Woodlands Hill pH Trend – September 2019

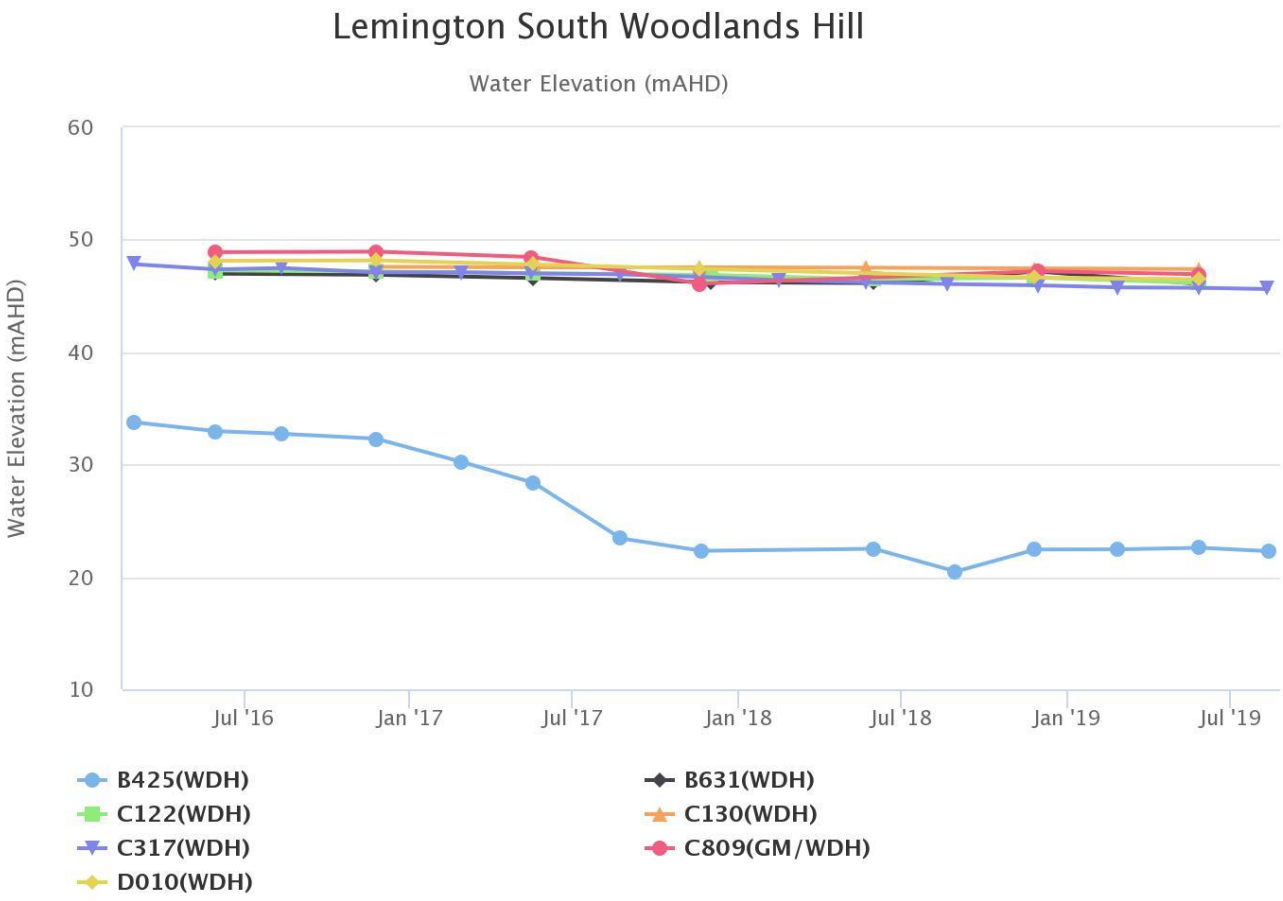

Figure 59: Lemington South Woodlands Hill Standing Water Level – September 2019

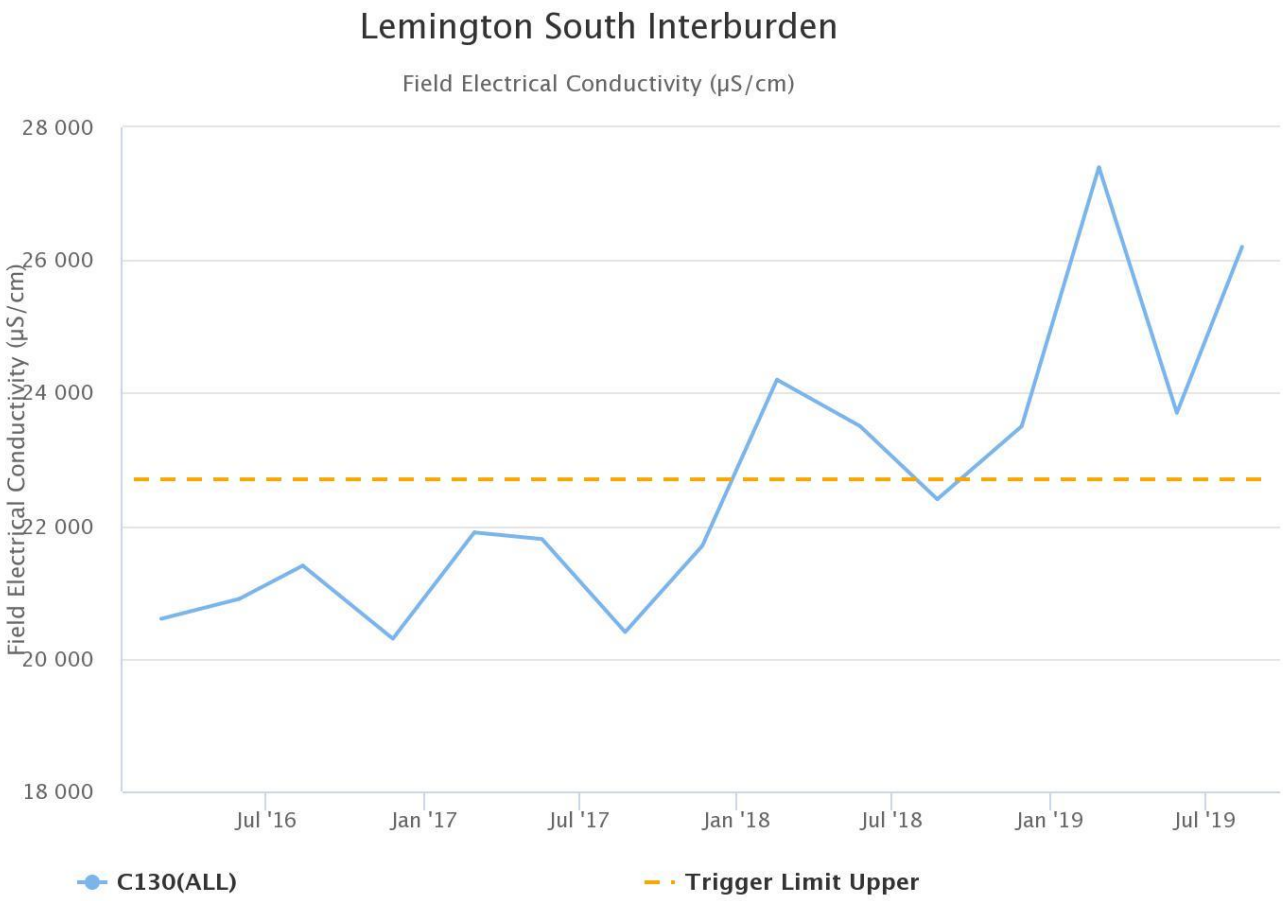

Figure 60: Lemington South Interburden Electrical Conductivity Trend – September 2019

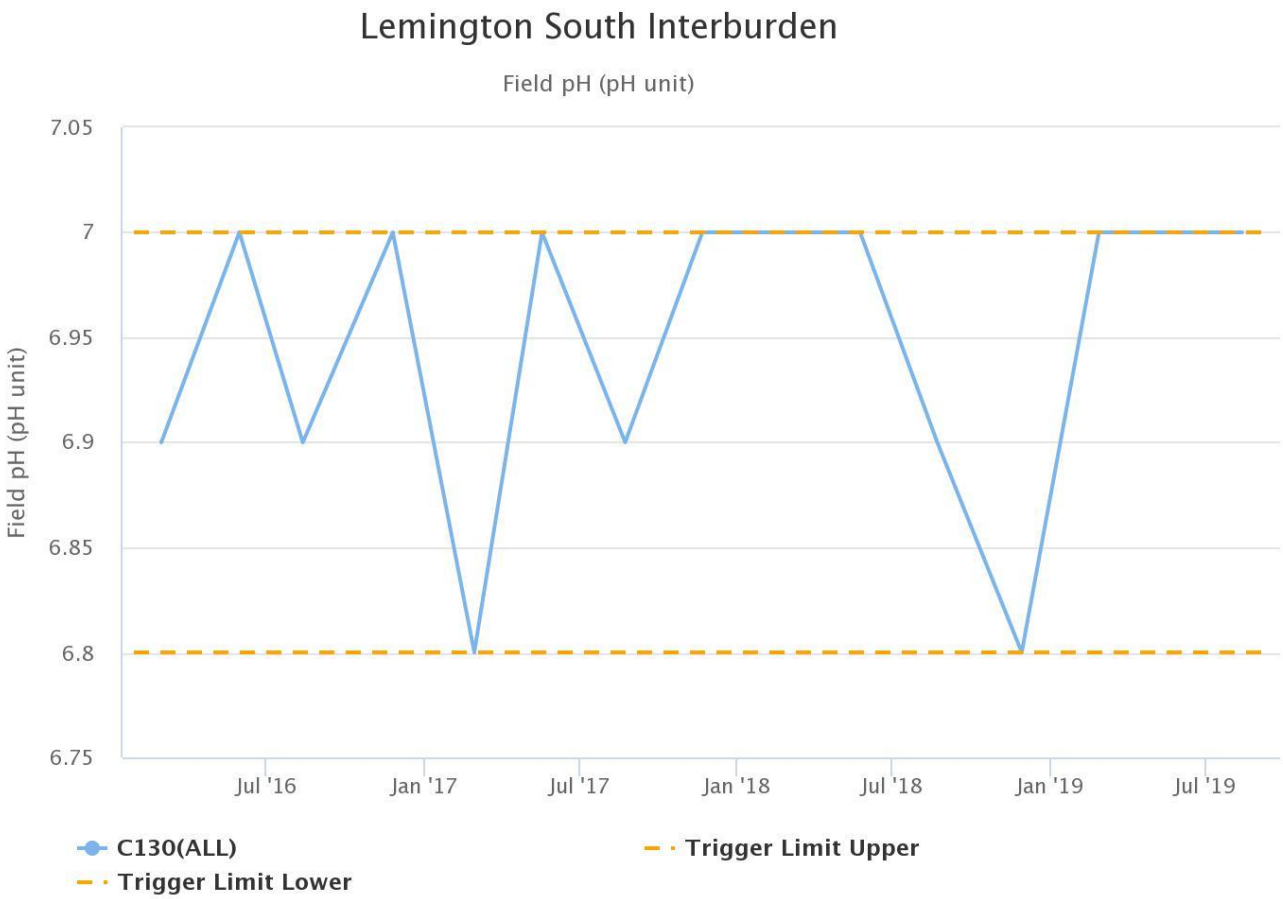

Figure 61: Lemington South Interburden pH Trend – September 2019

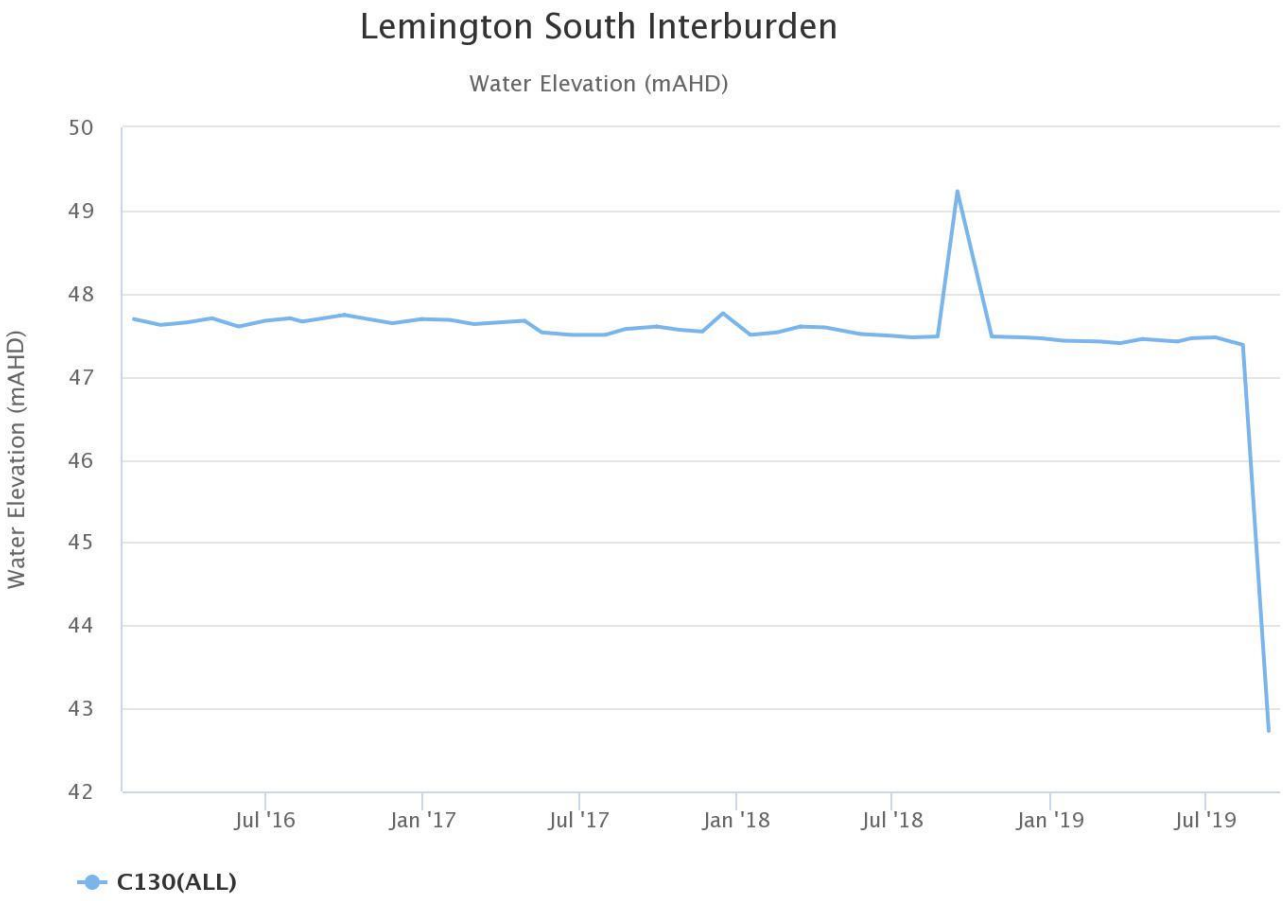

Figure 62: Lemington South Interburden Standing Water Level – September 2019

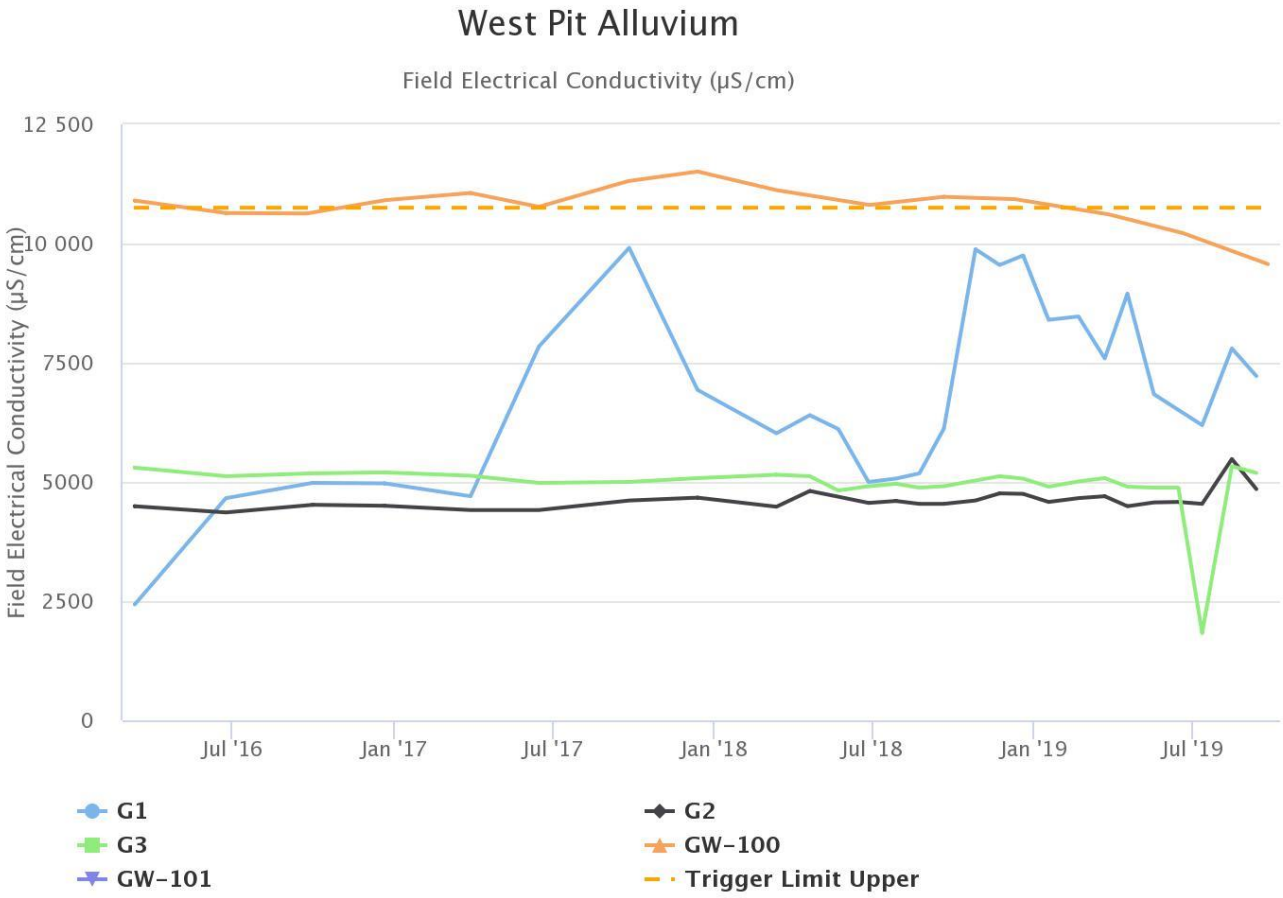

Figure 63: West Pit Alluvium Electrical Conductivity Trend – September 2019

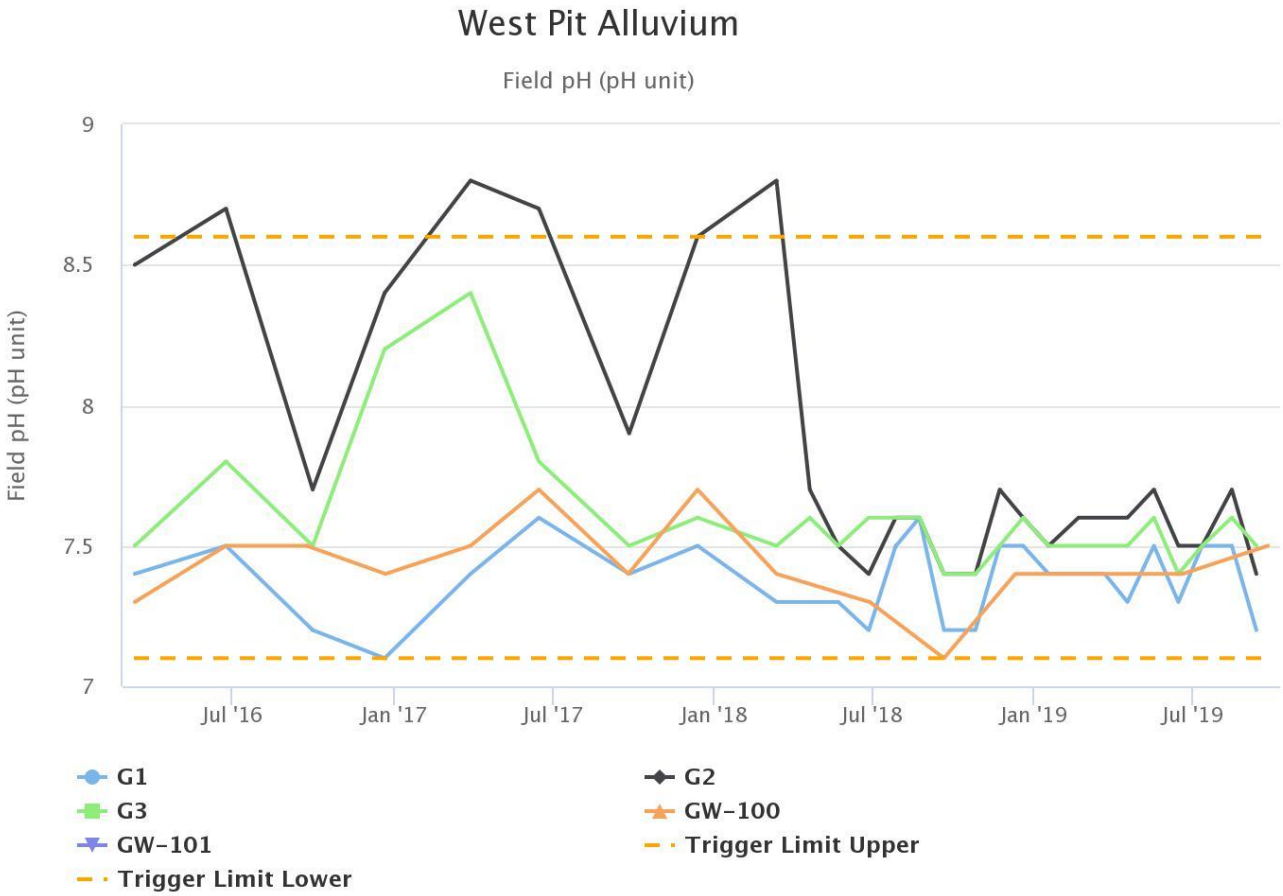

Figure 64: West Pit Alluvium pH Trend – September 2019

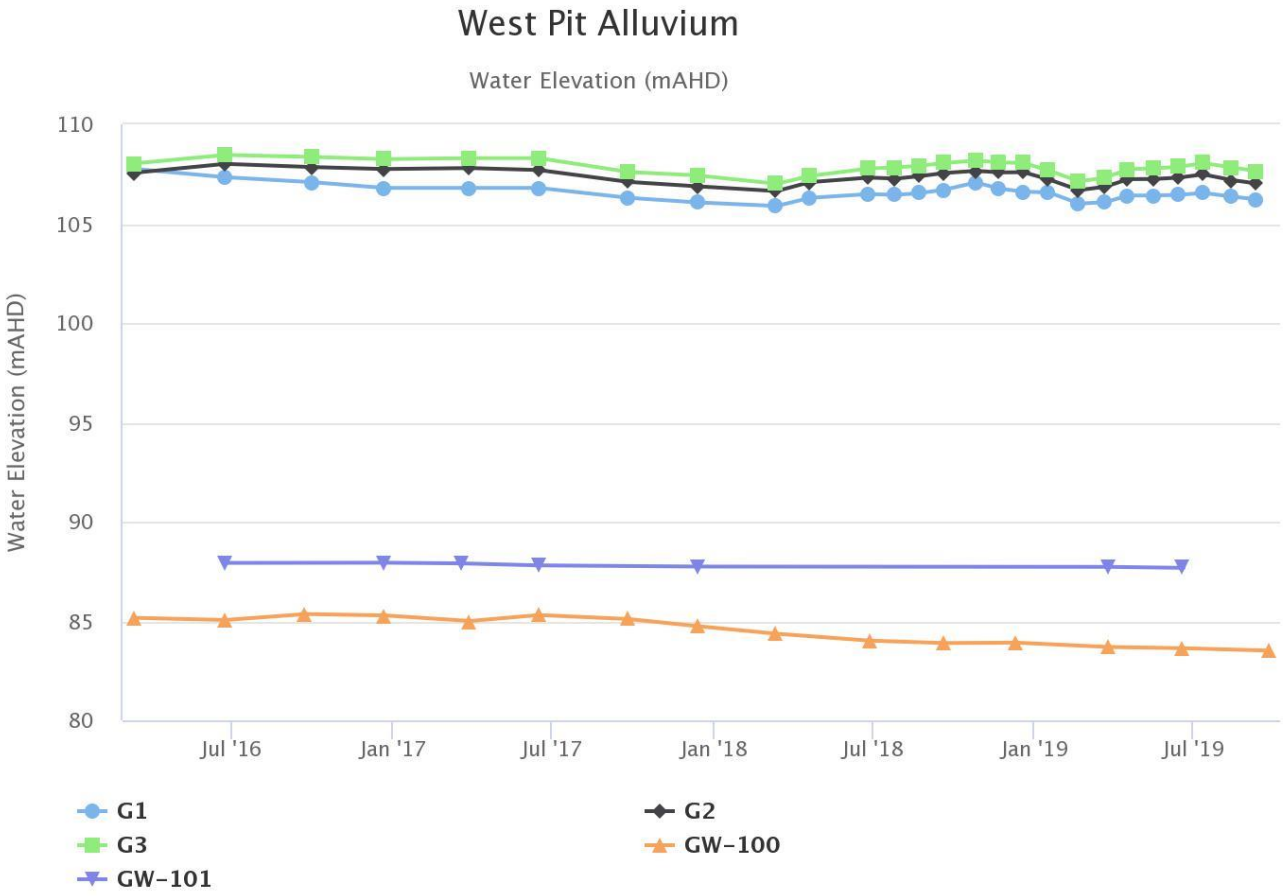

Figure 65: West Pit Alluvium Standing Water Level – September 2019

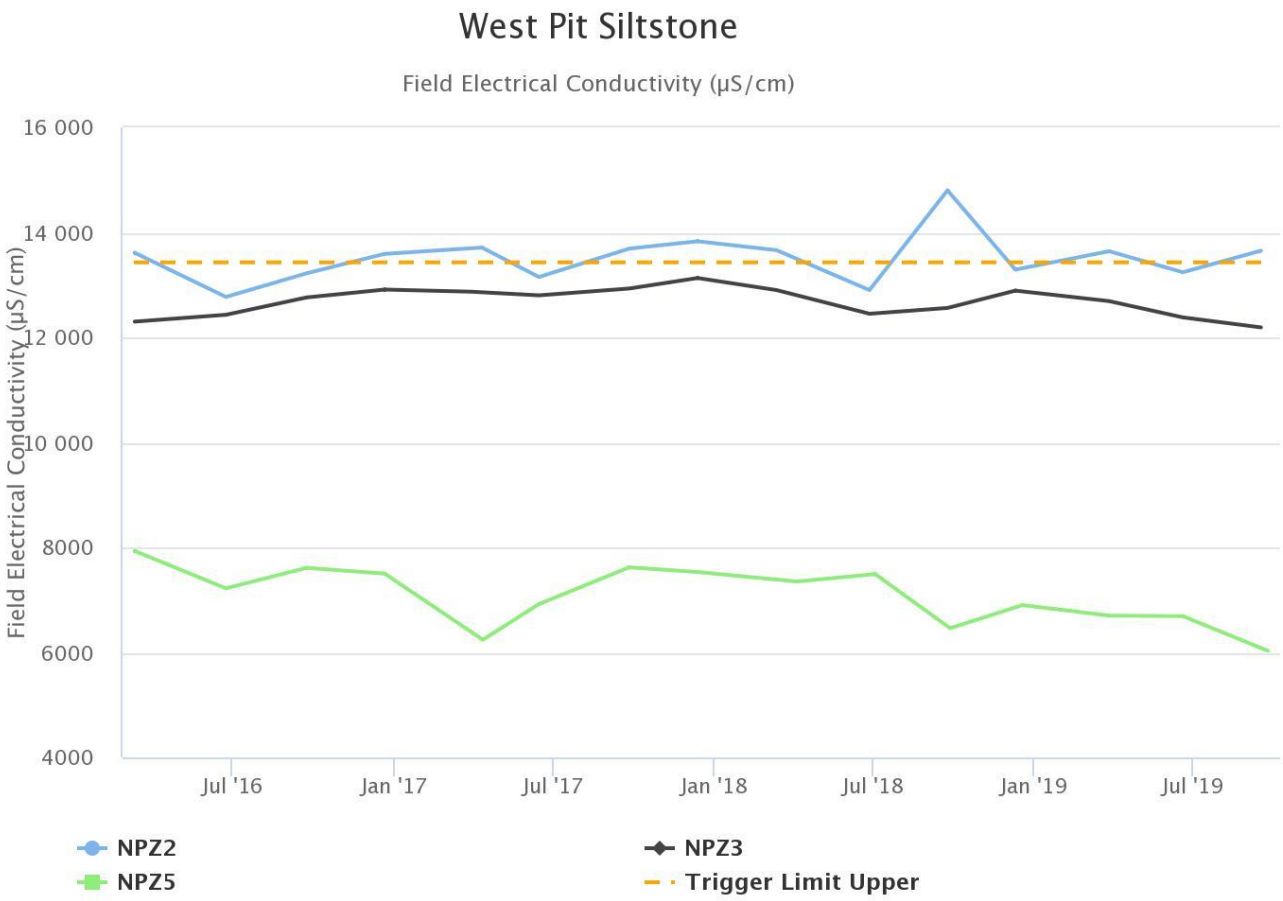

Figure 66: West Pit Siltstone Electrical Conductivity Trend – September 2019

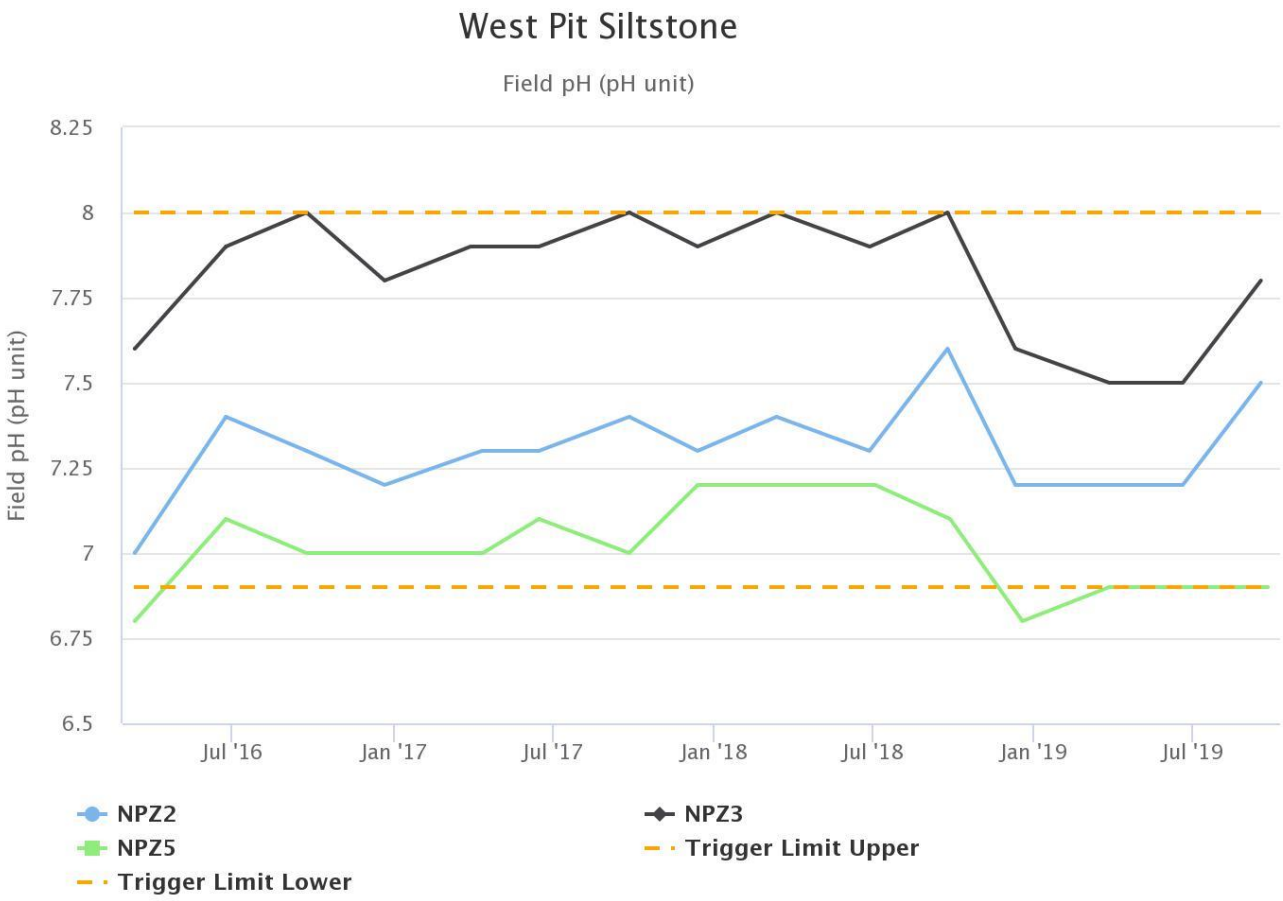

Figure 67: West Pit Siltstone pH Trend – September 2019

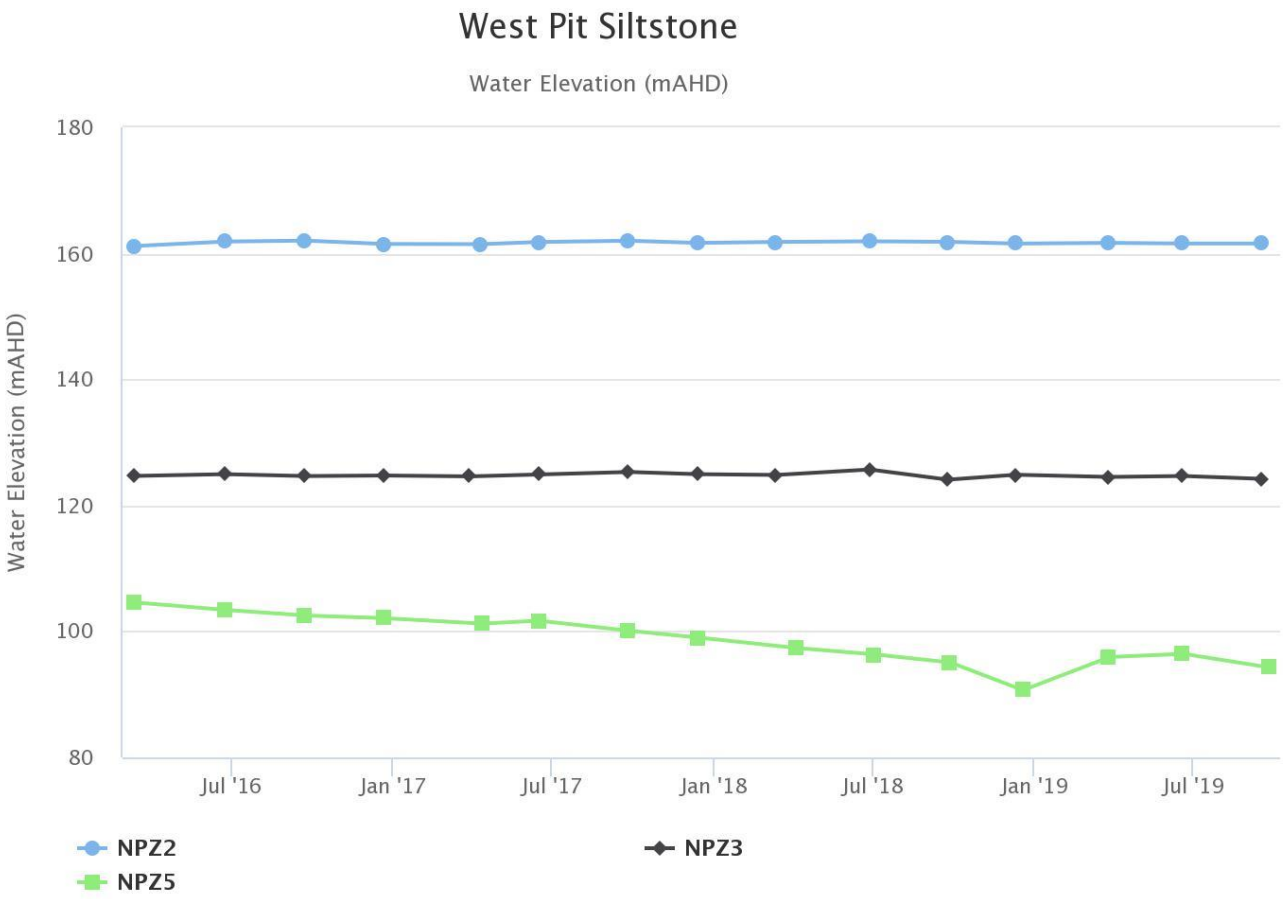

Figure 68: West Pit Siltstone Standing Water Level – September 2019

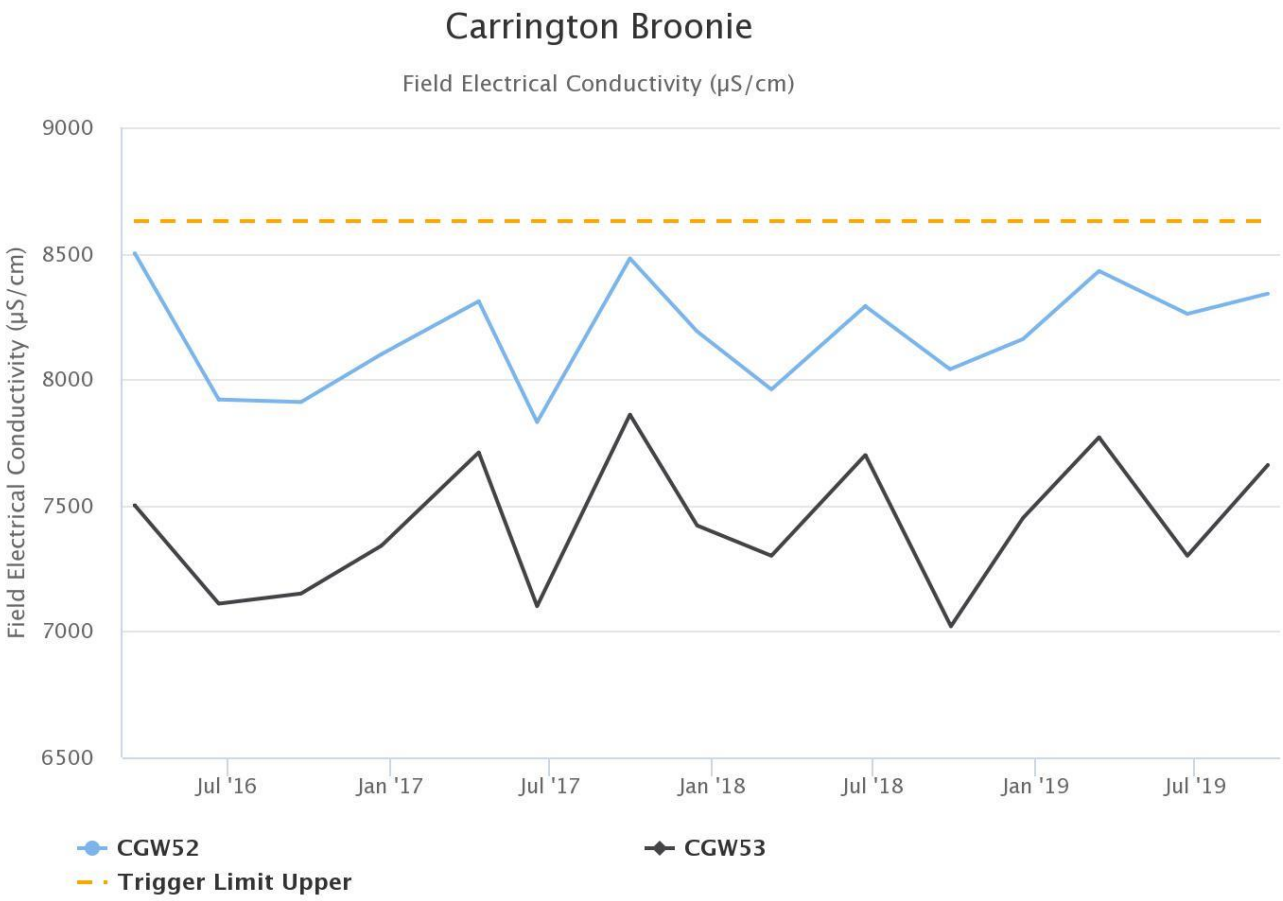

Figure 69: Carrington Broonie Electrical Conductivity Trend – September 2019

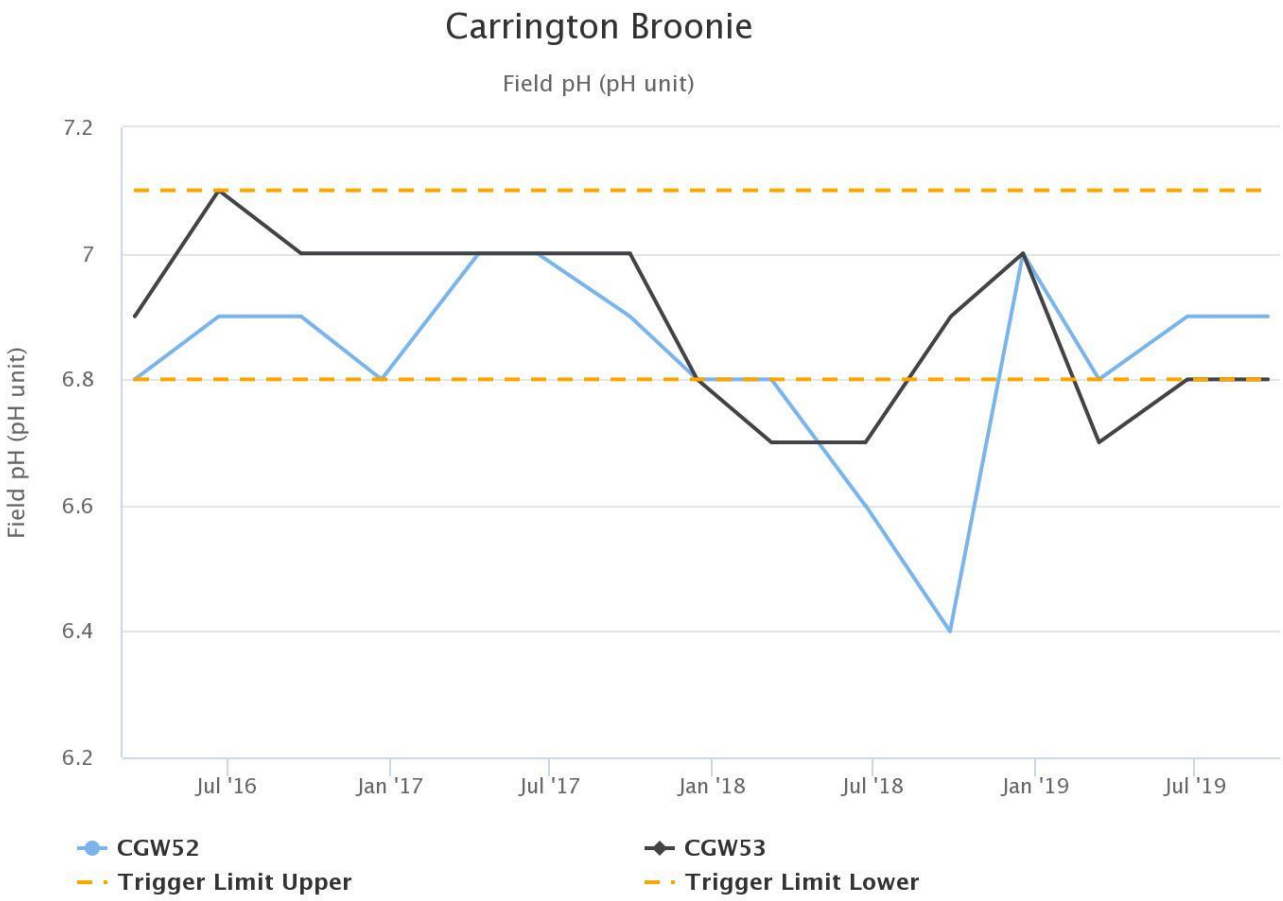

Figure 70: Carrington Broonie pH Trend – September 2019

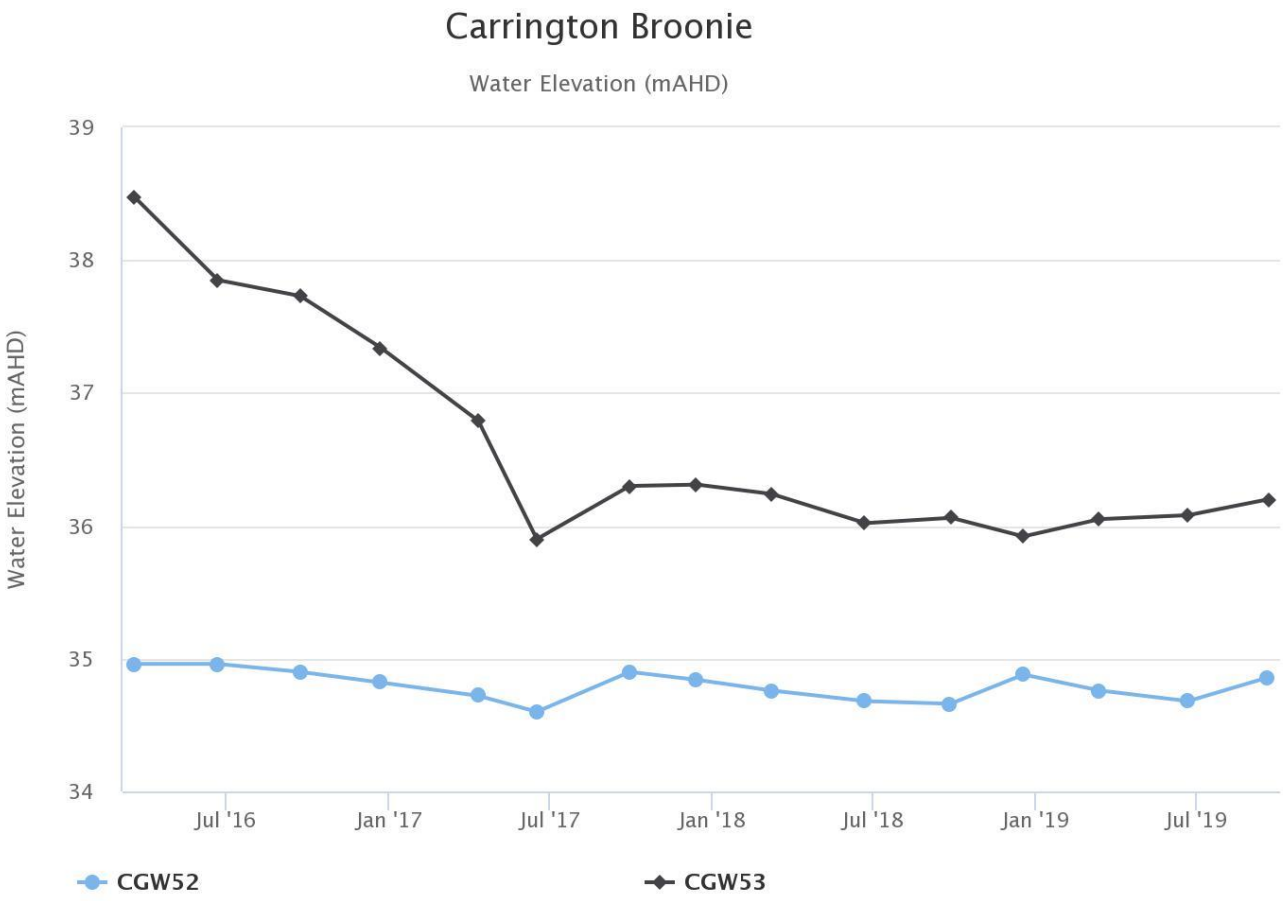

Figure 71: Carrington Broonie Standing Water Level – September 2019

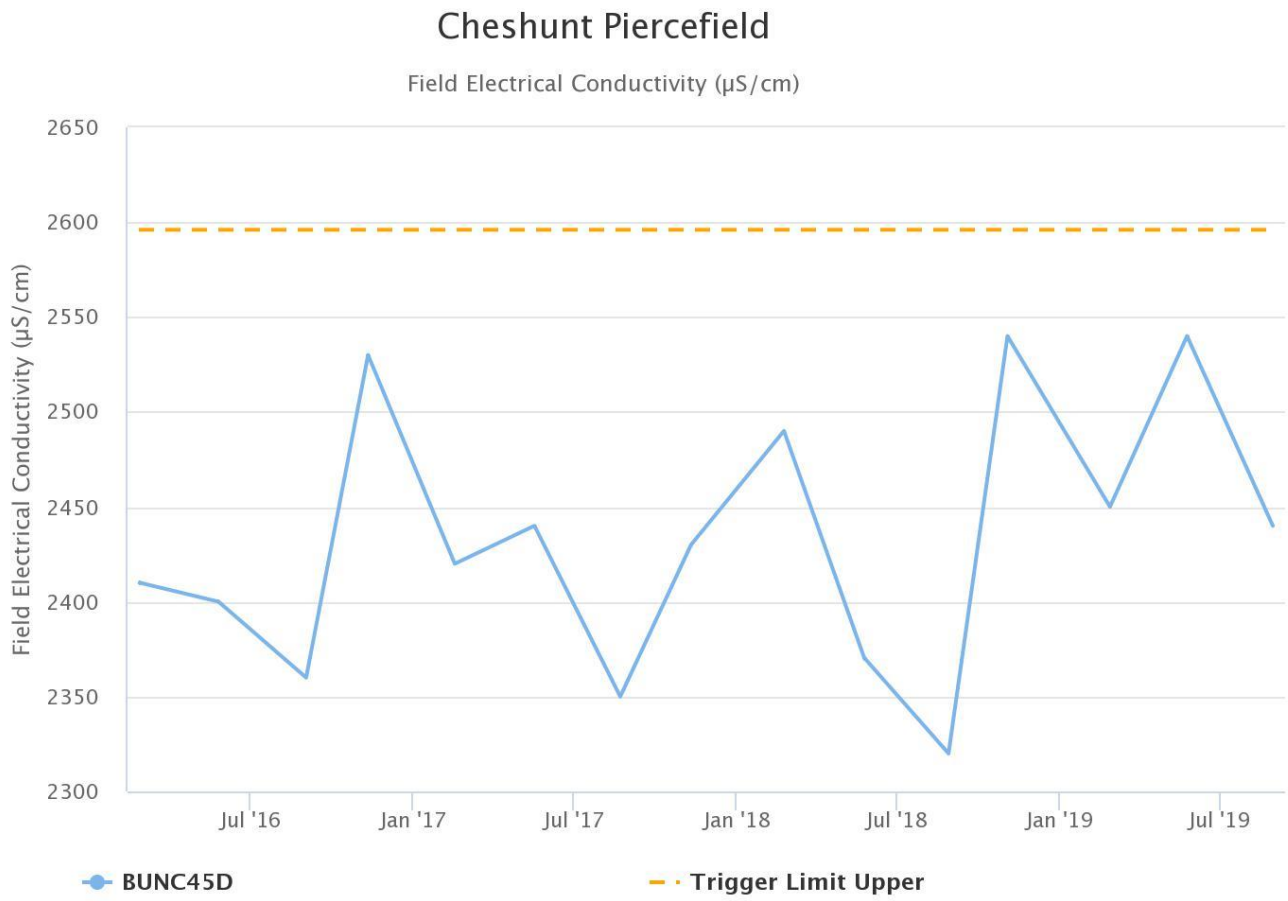

Figure 72: Cheshunt Piercefield Electrical Conductivity Trend – September 2019

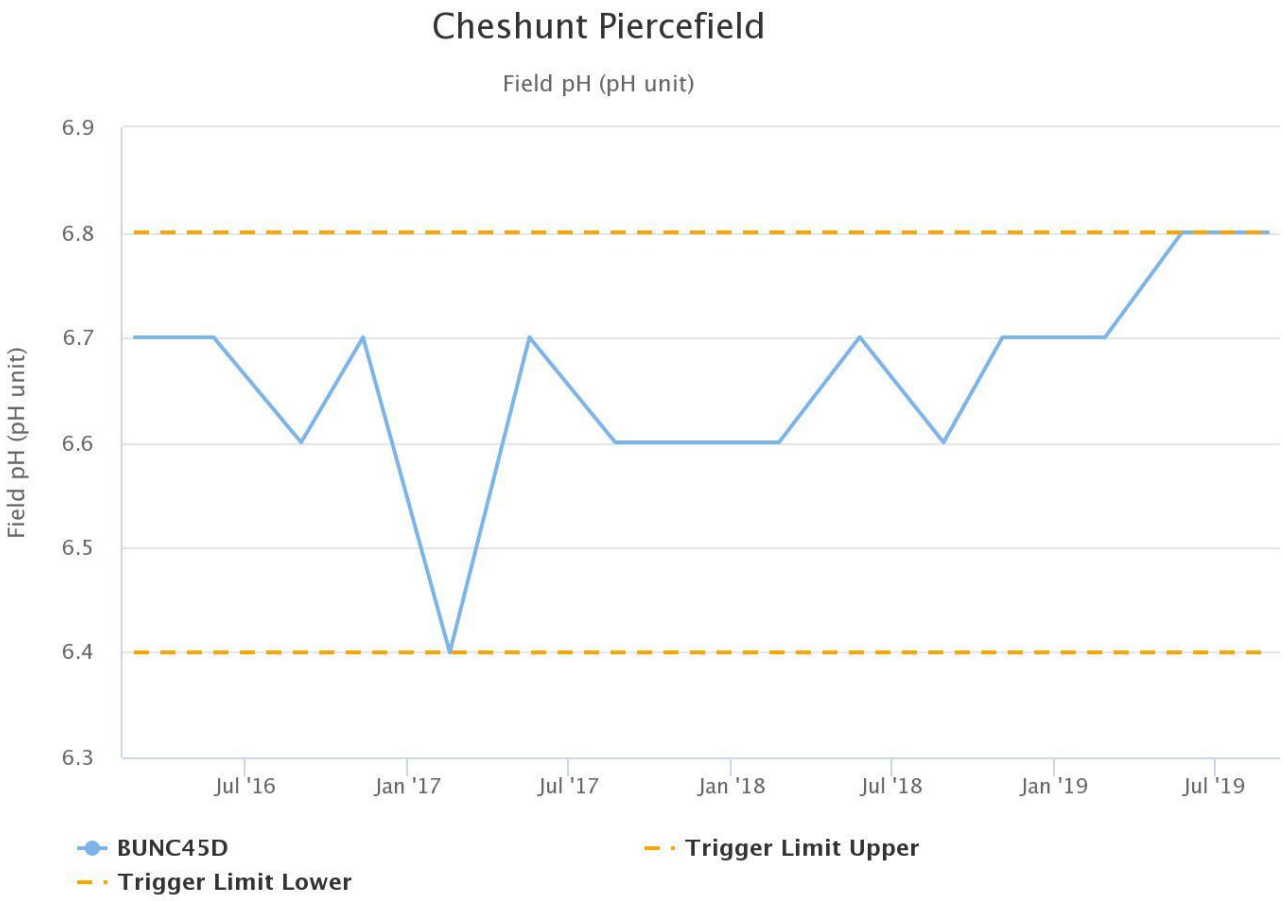

Figure 73: Cheshunt Piercefield pH Trend – September 2019

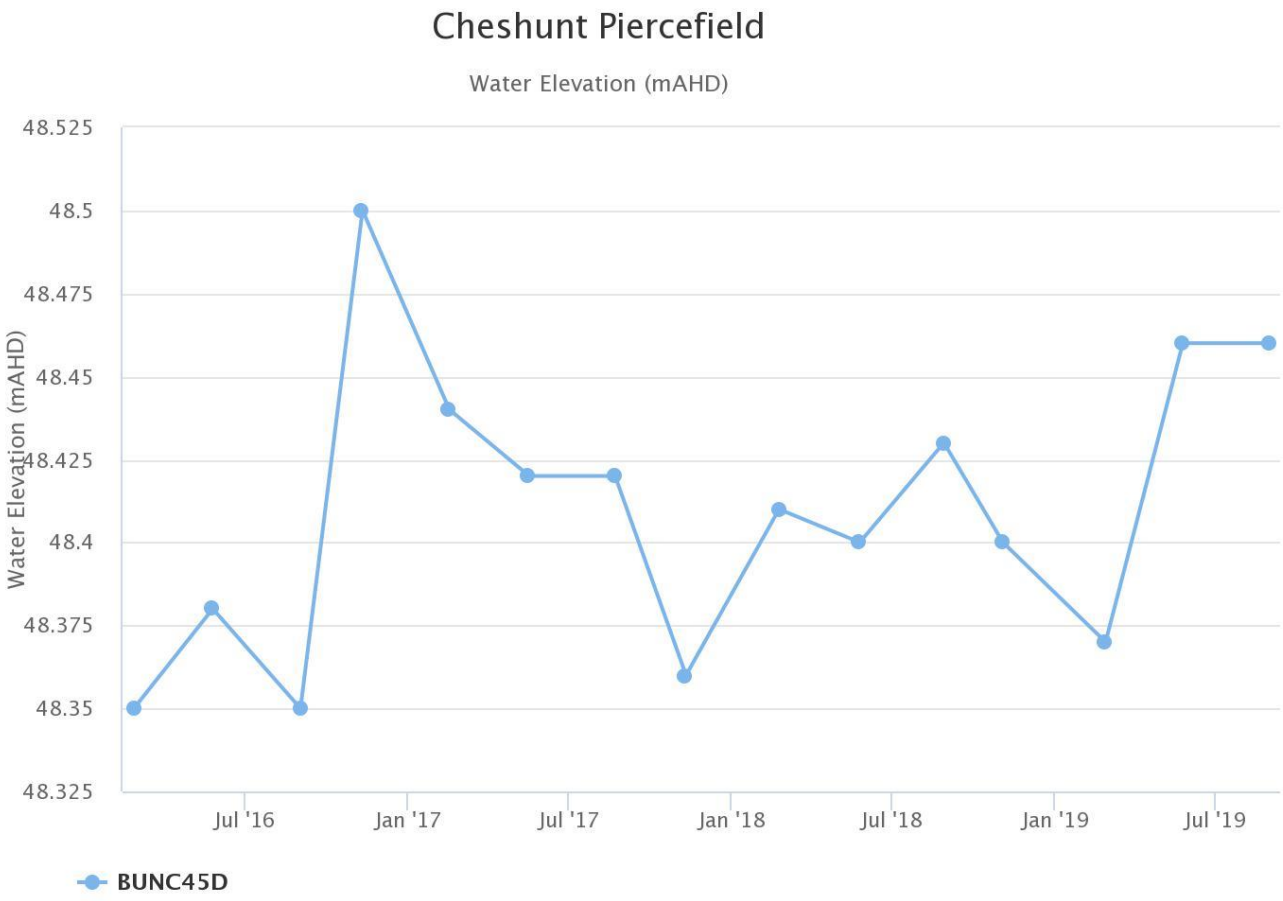

Figure 74: Cheshunt Piercefield Standing Water Level – September 2019

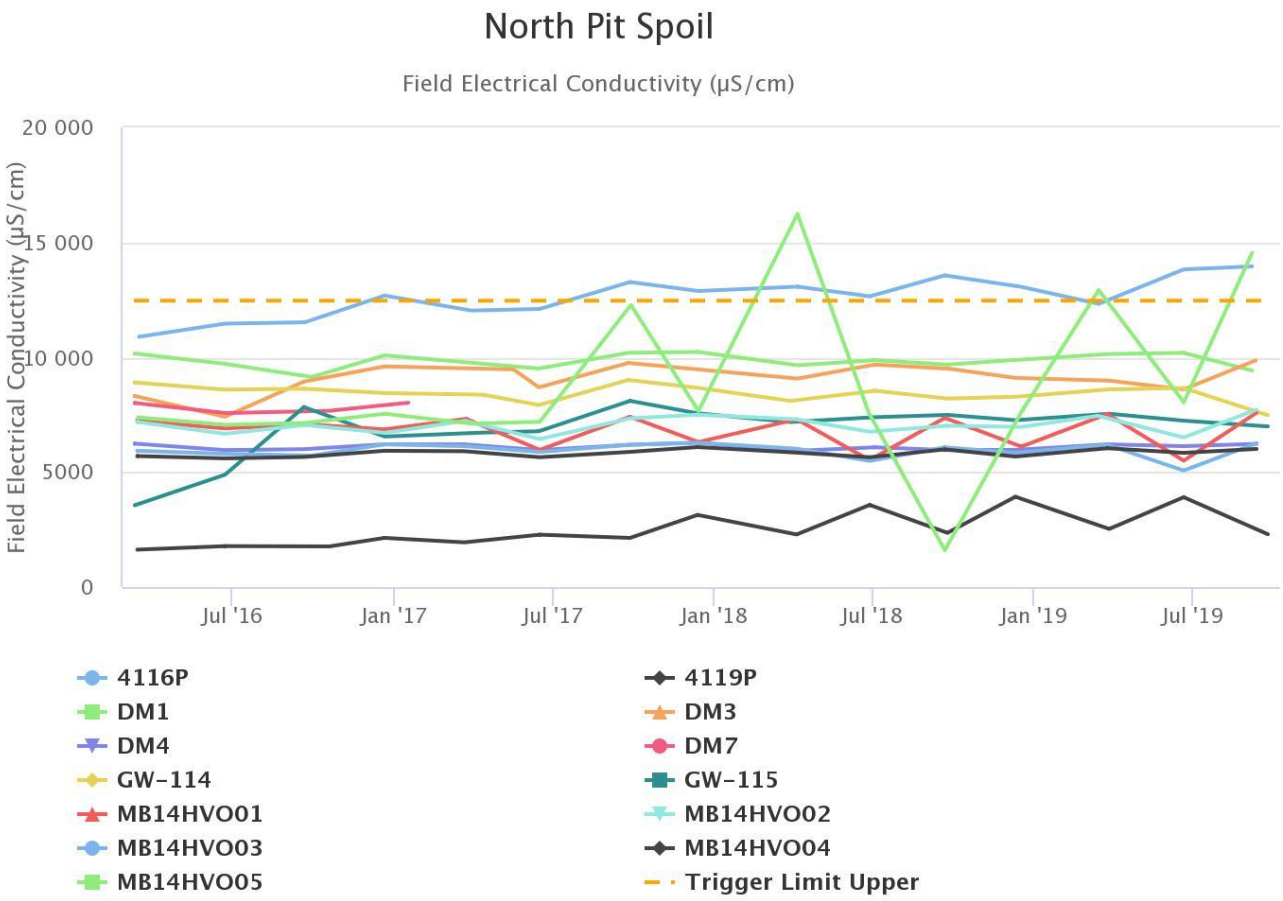

Figure 75: North Pit Spoil Electrical Conductivity Trend – September 2019

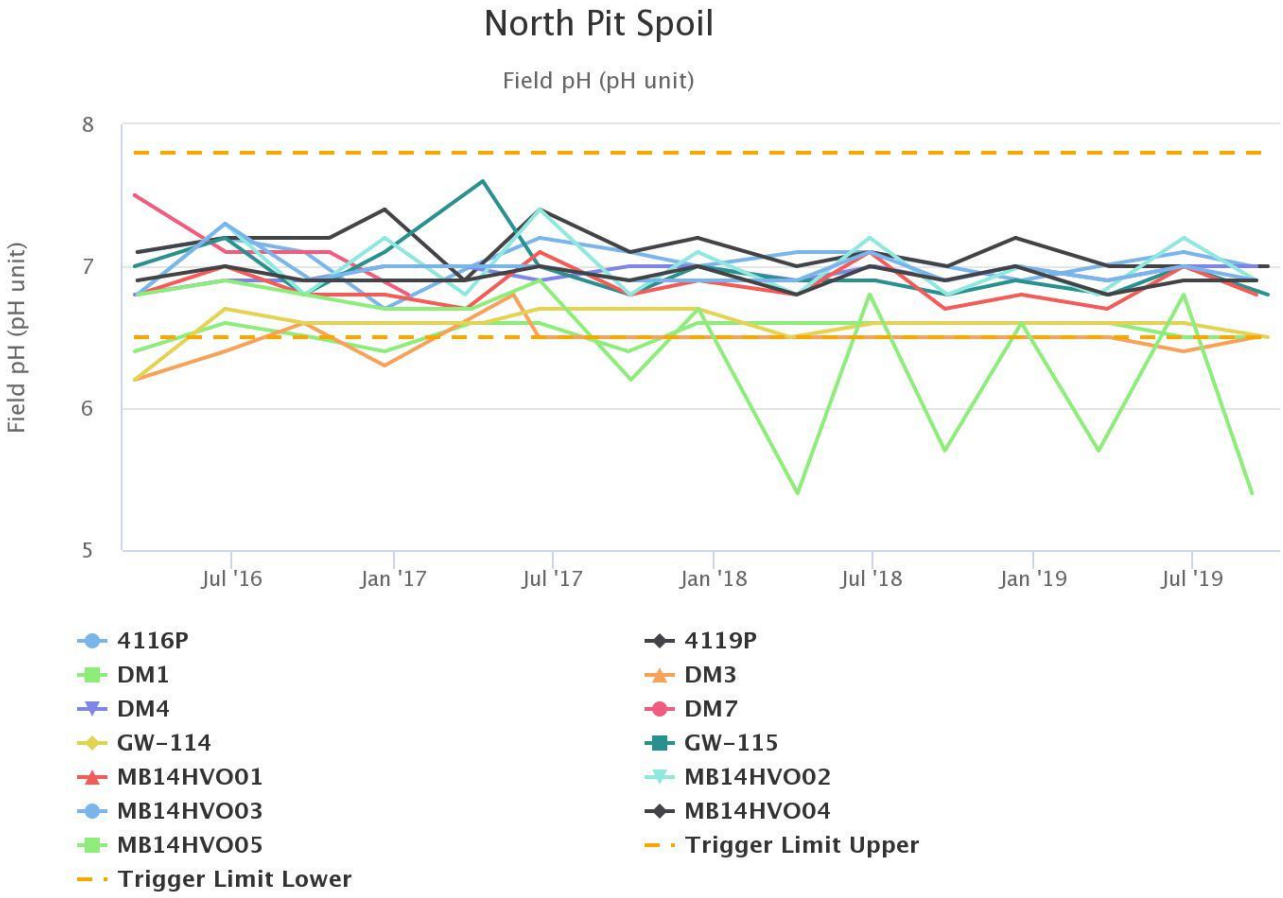

Figure 76: North Pit Spoil pH Trend – June 2019

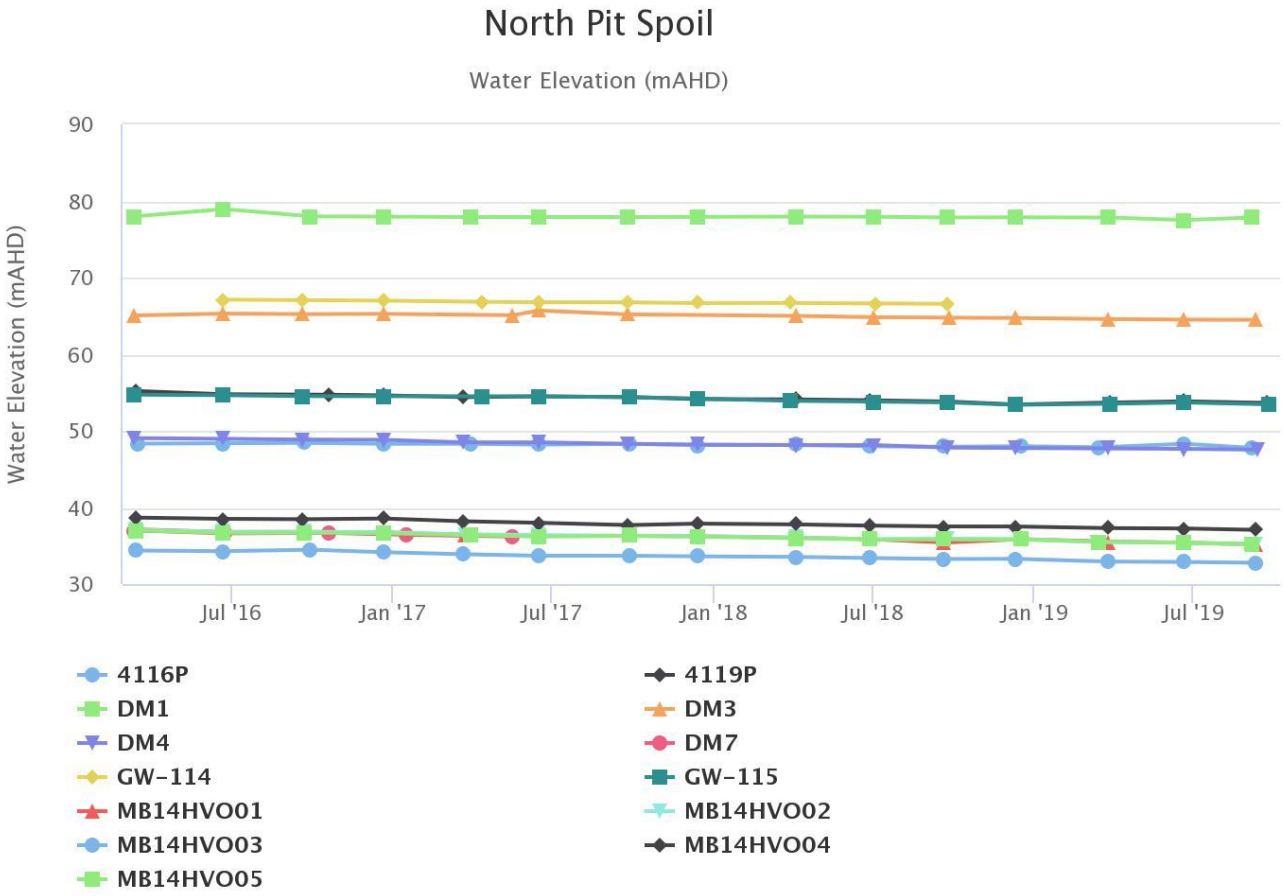

Figure 77: North Pit Spoil Standing Water Level – September 2019

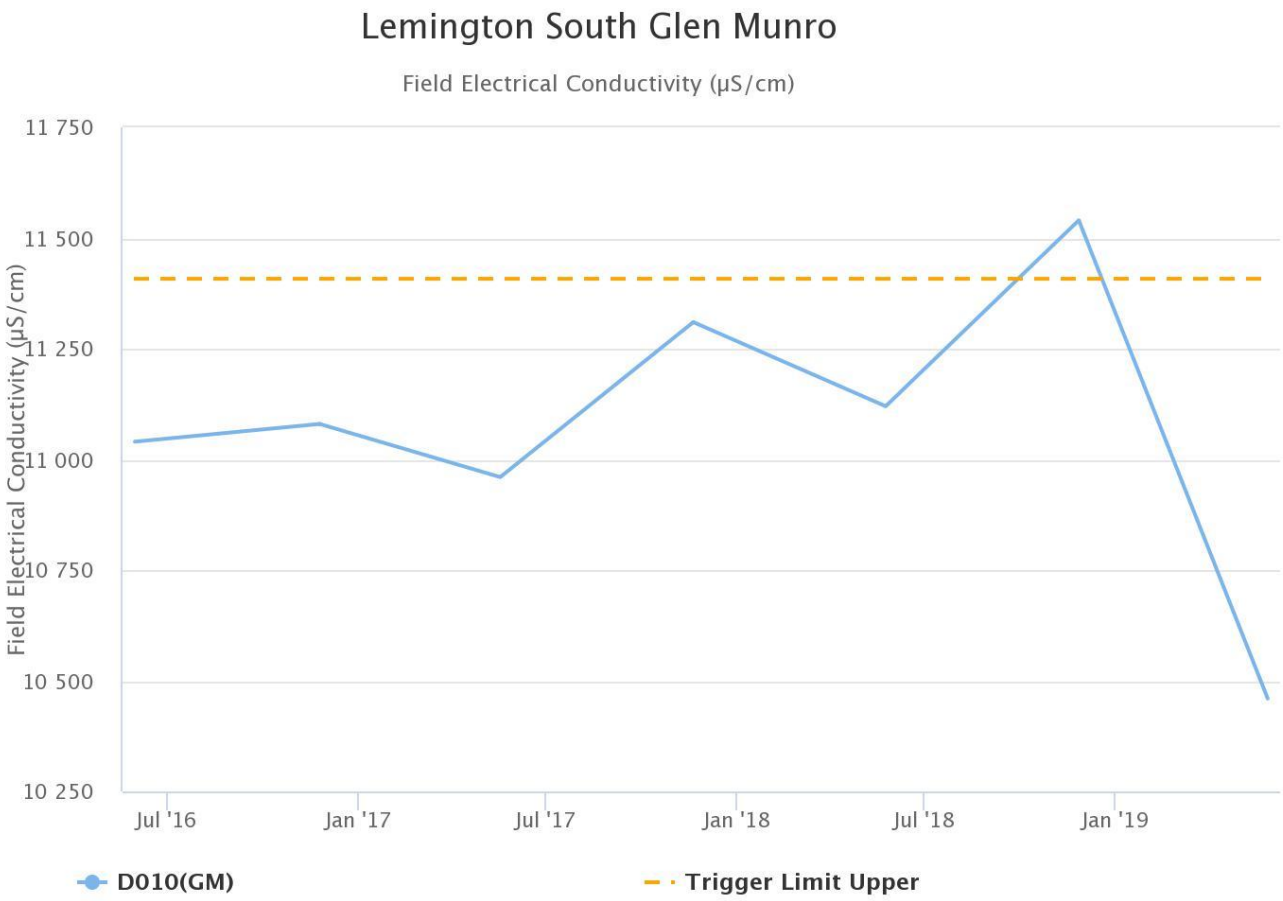

Figure 78: Lemington South Glen Munro Electrical Conductivity Trend – September 2019

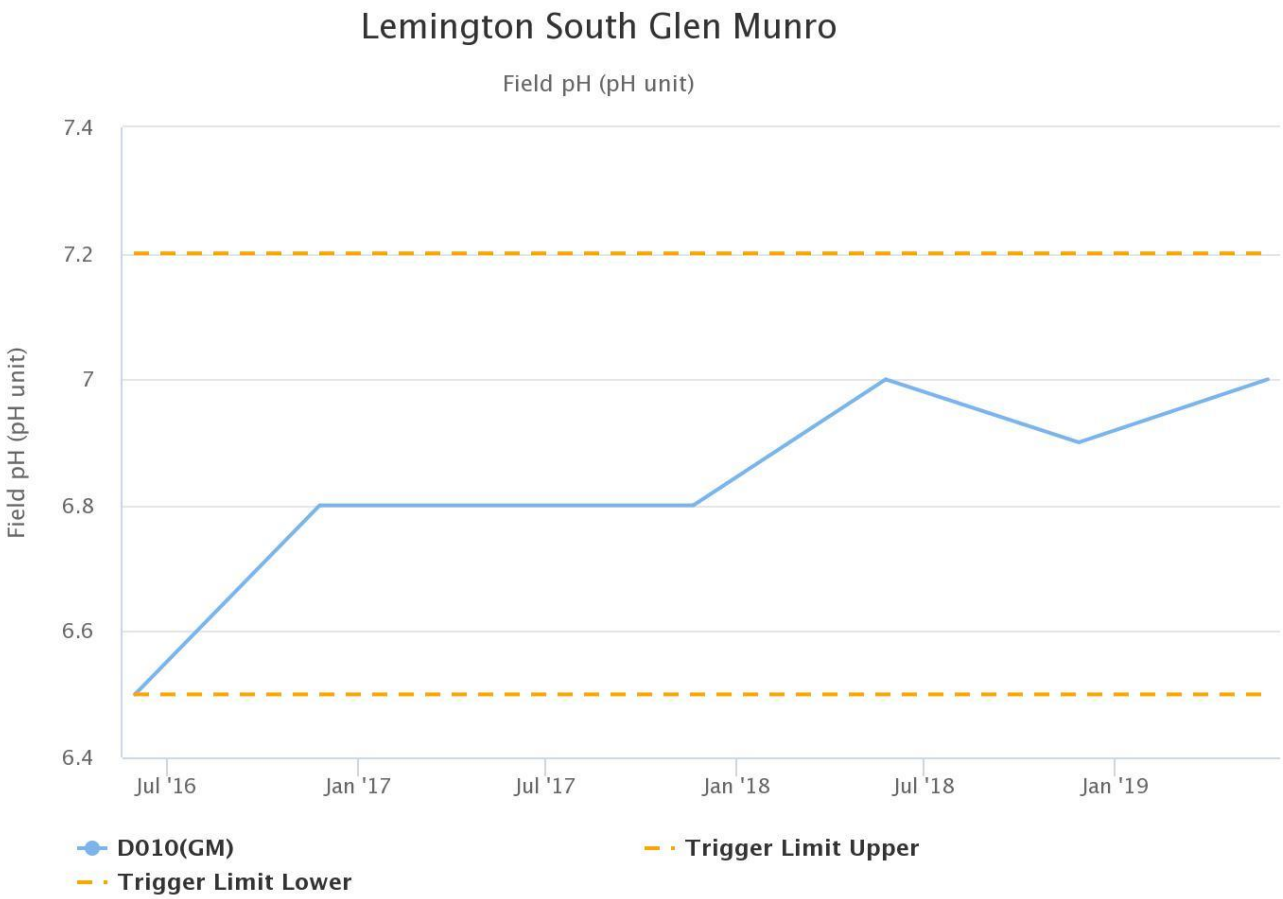

Figure 79: Lemington South Glen Munro pH Trend – September 2019

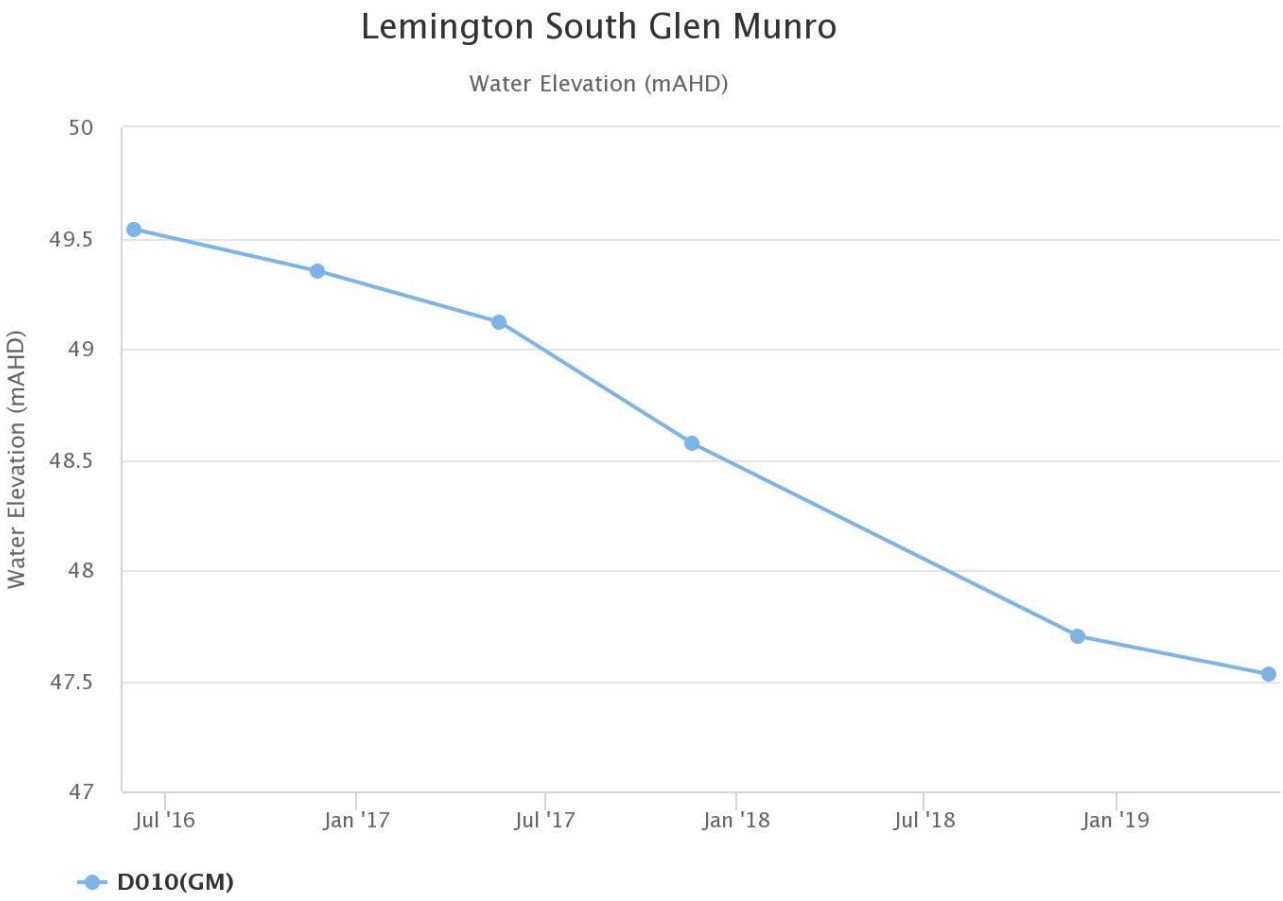

Figure 80: Lemington South Glen Munro Standing Water Level Trend – September 2019

3.5 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 2019

Site	Date	Trigger Limit Breached	Action Taken in Response
CFW55R	13/09/2019 11:35	EC – 95th Percentile	Investigation in progress
CFW55R	26/09/2019 10:25	EC – 95th Percentile	Investigation in progress
4051C	20/09/2019 12:30	EC – 95th Percentile	Second exceedance
4116P	6/09/2019 10:10	EC – 95th Percentile	Second exceedance
MB14HVO05	6/09/2019 11:10	EC – 95th Percentile	Watching Brief
CHPZ3D	4/07/2019 12:48	EC – 95th Percentile	Watching Brief
Hobdens Well	3/07/2019 13:10	EC – 95th Percentile	Watching Brief

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

4.0 BLASTING

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. Blasting criteria are summarised in Table 5.

Table 5: Blasting Criteria

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%*

4.1 Blast Monitoring Results

During September, 21 blasts were initiated at HVO. Figure 81 and Figure 82 show the blast monitoring results for the reporting period against the impact assessment criteria.

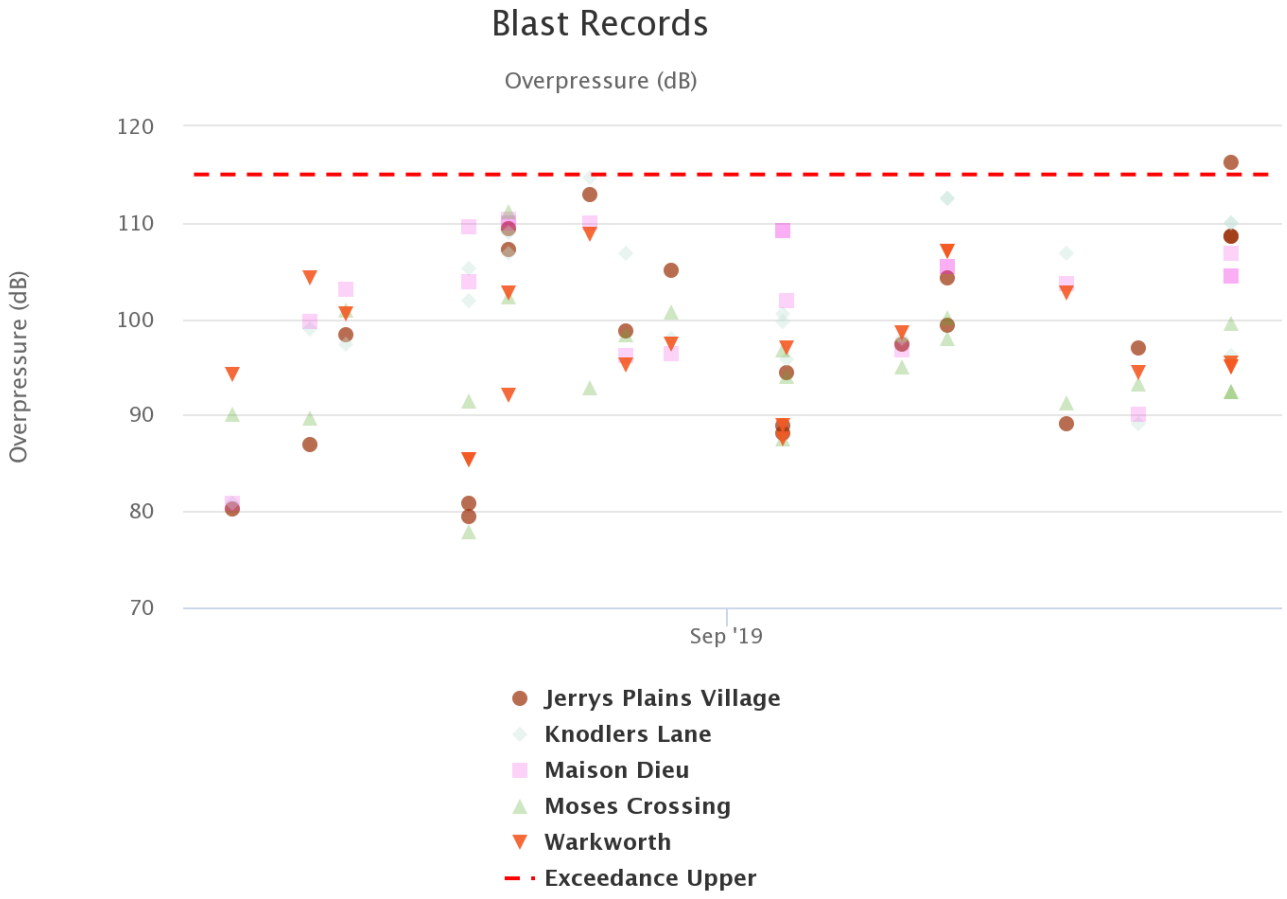

Figure 81: Overpressure Blast Monitoring Results – September 2019

*Note that the Jerrys Plain Village exceedance recorded on 28th September is currently being investigated at the time of writing of this report.

Figure 82: Ground Vibration Blast Monitoring Results – September 2019

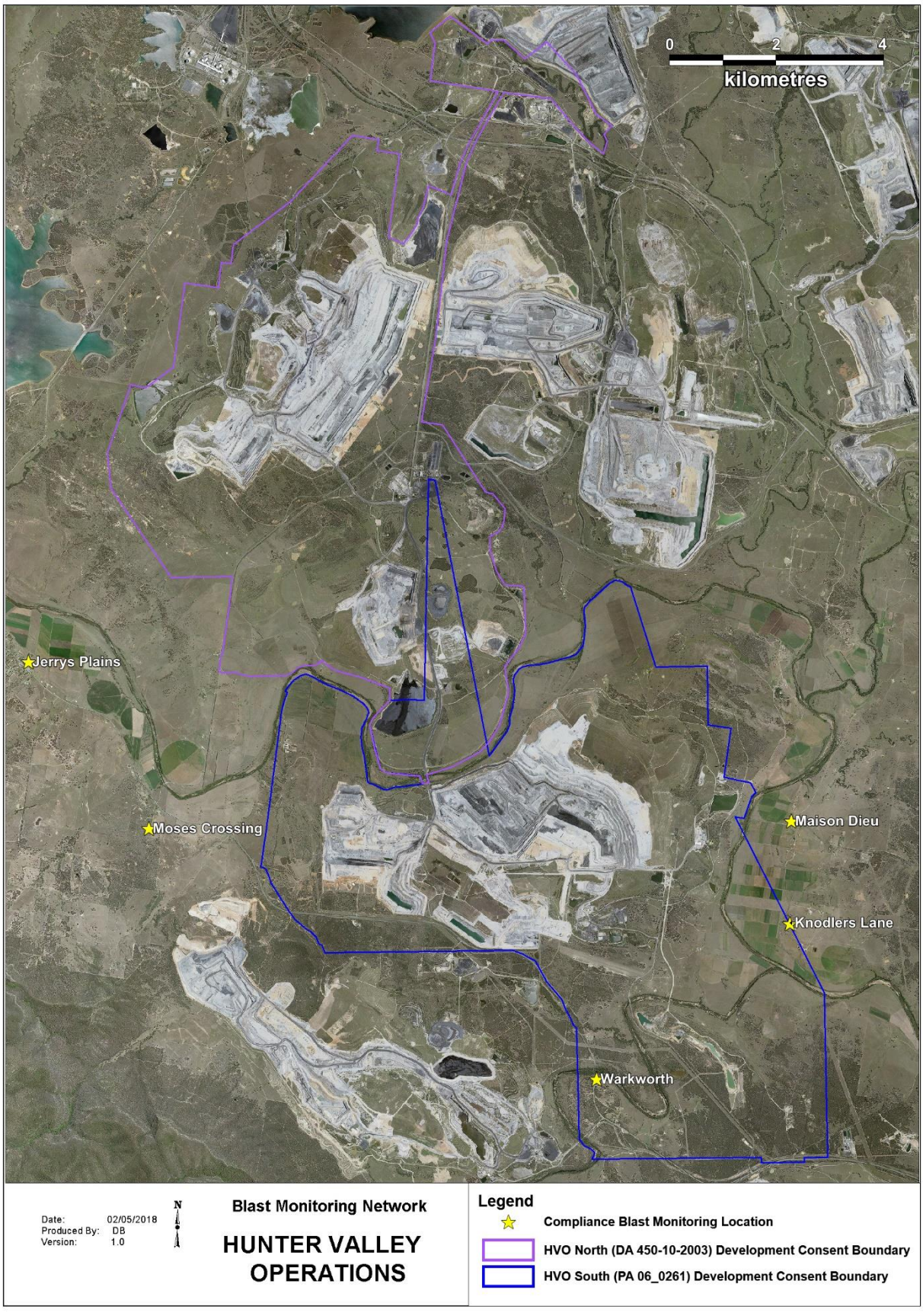

Figure 83: Blast Monitoring Location Plan

5.0 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.

5.1 Attended Noise Monitoring Results

Attended monitoring was conducted at receiver locations surrounding HVO on the night of 4/5 and 11/12 September 2019 with no non-compliances recorded. Monitoring results are detailed in Table 6 to Table 10.

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

Location	Date and Time	Wind Speed (m/s)[1]	Stability Class[1]	Criterion dB (A)	Criterion Applies?[2]	HVO South L_{Aeq} dB[3,4]	Exceedance[4,5]
Knodlers Lane	*11/09/2019 21:46*	*3.6*	*E*	*39*	*No*	*35*	*NA*
Maison Dieu	*11/09/2019 21:23*	*3.8*	*E*	*39*	*No*	*IA*	*NA*
Shearers Lane	*11/09/2019 21:00*	*4.1*	*E*	*41*	*No*	*<25*	*NA*
Kilburnie South	*11/09/2019 22:55*	*1.9*	*E*	*39*	*Yes*	*37*	*Nil*
Jerrys Plains Village	*11/09/2019 21:23*	*3.9*	*E*	*35*	*No*	*IA*	*NA*
Jerrys Plains East	*11/09/2019 21:00*	*4.1*	*E*	*35*	*No*	*IA*	*NA*
Long Point Road	*11/09/2019 21:00*	*4.1*	*E*	*35*	*No*	*IA*	*NA*
HVGC	*11/09/2019 23:32*	*1.3*	*E*	*55*	*Yes*	*31*	*Nil*

Notes:
1. Atmospheric data is sourced from the HVO Cheshunt (or MTW Charlton Ridge for Long Point) AWS using logged meteorological data;
2. Noise criteria apply for wind speeds up to 3 metres per second (at a height of 10m), or during stability class G conditions. Criterion may or may not apply due to rounding of meteorological data values. Refer to Sections 2.3 and 3.3 for more information;
3. Site-only LAeq,15minute attributed to HVO South Pit Area, including modifying factors if applicable;
4. Bold results in red indicate exceedance of relevant criterion; and
5. NA in exceedance column means atmospheric conditions outside specified in approval and so criterion is not applicable.

Table 7: LA1, 1 minute HVO South - Impact Assessment Criteria – September 2019

Location	Date and Time	Wind Speed (m/s)[1]	Stability Class[1]	Criterion dB (A)	Criterion Applies?[2]	HVO South $L_{A1,\ 1min}$ dB[3,4]	Exceedance[4,5]
Knodlers Lane	*11/09/2019 21:46*	*3.6*	*E*	*45*	*No*	*40*	*NA*
Maison Dieu	*11/09/2019 21:23*	*3.8*	*E*	*45*	*No*	*IA*	*NA*
Shearers Lane	*11/09/2019 21:00*	*4.1*	*E*	*45*	*No*	*35*	*NA*
Kilburnie South	*11/09/2019 22:55*	*1.9*	*E*	*45*	*Yes*	*43*	*Nil*
Jerrys Plains Village	*11/09/2019 21:23*	*3.9*	*E*	*45*	*No*	*IA*	*NA*
Jerrys Plains East	*11/09/2019 21:00*	*4.1*	*E*	*45*	*No*	*IA*	*NA*
Long Point Road	*11/09/2019 21:00*	*4.1*	*E*	*45*	*No*	*IA*	*Nil*
HVGC	*11/09/2019 23:32*	*1.3*	*E*	*NA*	*Yes*	*33*	*Nil*

Notes:
1. Atmospheric data is sourced from the HVO Cheshunt (or MTW Charlton Ridge for Long Point) AWS using logged meteorological data;
2. Noise criteria apply for wind speeds up to 3 metres per second (at a height of 10m), or during stability class G conditions. Criterion may or may not apply due to rounding of meteorological data values. Refer to Sections 2.3 and 3.3 for more information;
3. Site-only LA1,1minute attributed to HVO South Pit Area;
4. Bold results in red indicate exceedance of relevant criterion; and
5. NA in criterion column indicates no criterion is applicable at this location. NA in exceedance column means atmospheric conditions outside specified in approval and so criterion is not applicable.

Table 8: LAeq, 15 minute HVO North – Impact Assessment Criteria – September 2019

Location	Date and Time	Wind Speed (m/s)[1]	Stability Class[1]	Criterion dB (A)	Criterion Applies?[2]	HVO South L_{Aeq} dB[3,4]	Exceedance[4,5]
Kilburnie South	*4/09/2019 21:39*	*2.1*	*E*	*39*	*Yes*	*IA*	*Nil*
Jerrys Plains Village	*4/09/2019 21:01*	*1.6*	*F*	*36*	*Yes*	*IA*	*Nil*
Jerrys Plains East	*4/09/2019 21:19*	*1.9*	*E*	*39*	*Yes*	*IA*	*Nil*
Knodlers Lane	*11/09/2019 21:46*	*2.2*	*D*	*35*	*Yes*	*IA*	*Nil*
Maison Dieu	*11/09/2019 21:23*	*2.2*	*E*	*35*	*Yes*	*IA*	*Nil*
Shearers Lane	*11/09/2019 21:00*	*2.5*	*D*	*35*	*Yes*	*IA*	*Nil*
Kilburnie South	*11/09/2019 22:55*	*0.9*	*E*	*39*	*Yes*	*IA*	*Nil*
Jerrys Plains Village	*11/09/2019 21:23*	*2.3*	*E*	*36*	*Yes*	*36*	*Nil*
Jerrys Plains East	*11/09/2019 21:00*	*2.5*	*D*	*39*	*Yes*	*35*	*Nil*
Long Point Road	*11/09/2019 21:00*	*2.5*	*D*	*35*	*Yes*	*IA*	*Nil*
HVGC	*11/09/2019 23:32*	*0.9*	*D*	*NA*	*Yes*	*IA*	*Nil*

Notes:
1. Atmospheric data is sourced from the HVO Corporate (or MTW Charlton Ridge for Long Point) AWS 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 stability class G conditions. Criterion may or may not apply due to rounding of meteorological data values;
3. Site-only LAeq,15minute attributed to HVO North Pit Area, including modifying factors if applicable;
4. Bold results in red indicate exceedance of criteria; and
5. NA in criterion column indicates no criterion is applicable at this location. NA in exceedance column means atmospheric conditions outside specified in approval and so criterion is not applicable.

Table 9: LAeq,15 minute HVO North - Land Acquisition Criteria – September 2019

Location	Date and Time	Wind Speed (m/s)[1]	Stability Class[1]	Criterion dB (A)	Criterion Applies?[2]	HVO North L_{Aeq} dB[3,4]	Exceedance[4,5]
Kilburnie South	*4/09/2019 21:39*	*2.1*	*E*	*41*	*Yes*	*IA*	*Nil*
Jerrys Plains Village	*4/09/2019 21:01*	*1.6*	*F*	*41*	*Yes*	*IA*	*Nil*
Jerrys Plains East	*4/09/2019 21:19*	*1.9*	*E*	*41*	*Yes*	*IA*	*Nil*
Knodlers Lane	*11/09/2019 21:46*	*2.2*	*D*	*41*	*Yes*	*IA*	*Nil*
Maison Dieu	*11/09/2019 21:23*	*2.2*	*E*	*41*	*Yes*	*IA*	*Nil*
Shearers Lane	*11/09/2019 21:00*	*2.5*	*D*	*41*	*Yes*	*IA*	*Nil*
Kilburnie South	*11/09/2019 22:55*	*0.9*	*E*	*41*	*Yes*	*IA*	*Nil*
Jerrys Plains Village	*11/09/2019 21:23*	*2.3*	*E*	*41*	*Yes*	*36*	*Nil*
Jerrys Plains East	*11/09/2019 21:00*	*2.5*	*D*	*41*	*Yes*	*35*	*Nil*
Long Point Road	*11/09/2019 21:00*	*2.5*	*D*	*41*	*Yes*	*IA*	*Nil*
HVGC	*11/09/2019 23:32*	*0.9*	*D*	*NA*	*Yes*	*IA*	*Nil*

Notes:
1. Atmospheric data is sourced from the HVO Corporate (or MTW Charlton Ridge for Long Point) AWS 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 stability class G conditions. Criterion may or may not apply due to rounding of meteorological data values;
3. Site-only LAeq,15minute attributed to HVO North Pit Area, including modifying factors if applicable;
4. Bold results in red indicate exceedance of relevant criterion; and
5. NA in criterion column indicates no criterion is applicable at this location. NA in exceedance column means atmospheric conditions outside specified in approval and so criterion is not applicable.

Table 10: LA1, 1 Minute HVO North - Impact Assessment Criteria – September 2019

Location	*Date and Time*	*Wind Speed (m/s)[1]*	Stability Class[1]	*Criterion dB (A)*	*Criterion Applies?[2]*	*HVO North $L_{A1, 1min}$ dB[3,4]*	*Exceedance[4,5]*
Kilburnie South	*4/09/2019 21:39*	*2.1*	*E*	*46*	*Yes*	*IA*	*Nil*
Jerrys Plains Village	*4/09/2019 21:01*	*1.6*	*F*	*46*	*Yes*	*IA*	*Nil*
Jerrys Plains East	*4/09/2019 21:19*	*1.9*	*E*	*46*	*Yes*	*IA*	*Nil*
Knodlers Lane	*11/09/2019 21:46*	*2.2*	*D*	*46*	*Yes*	*IA*	*Nil*
Maison Dieu	*11/09/2019 21:23*	*2.2*	*E*	*46*	*Yes*	*IA*	*Nil*
Shearers Lane	*11/09/2019 21:00*	*2.5*	*D*	*46*	*Yes*	*IA*	*Nil*
Kilburnie South	*11/09/2019 22:55*	*0.9*	*E*	*46*	*Yes*	*IA*	*Nil*
Jerrys Plains Village	*11/09/2019 21:23*	*2.3*	*E*	*46*	*Yes*	*41*	*Nil*
Jerrys Plains East	*11/09/2019 21:00*	*2.5*	*D*	*46*	*Yes*	*39*	*Nil*
Long Point Road	*11/09/2019 21:00*	*2.5*	*D*	*46*	*Yes*	*IA*	*Nil*
HVGC	*11/09/2019 23:32*	*0.9*	*D*	*NA*	*Yes*	*IA*	*Nil*

Notes:
1. Atmospheric data is sourced from the HVO Corporate (or MTW Charlton Ridge for Long Point) AWS 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 stability class G conditions. Criterion may or may not apply due to rounding of meteorological data values;
3. Site-only LA1,1minute attributed to HVO North Pit Area;
4. Bold results in red indicate exceedance of relevant criterion; and
5. NA in criterion column indicates no criterion is applicable at this location. NA in exceedance column means atmospheric conditions outside specified in approval and so criterion is not applicable.

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5.2 NPfI 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 2019 no penalties were applied. The assessment for low frequency noise is shown in Table 11.

Table 11: Low Frequency Noise Assessment – September 2019

Location	*Date and Time*	*Measured Site Only LA_{eq} dB (Sth/Nth)*	*Site Only LC_{eq} dB[1] (Sth/Nth)*	*Site-Only LCeq – LAeq dB[1,2] (Sth/Nth)*	*Result Max exceedance of ref spectrum dB[1,3] (Sth/Nth)*	*Penalty dB(A) [1] (Sth/Nth)*
Kilburnie South	*4/09/2019 21:39*	*IA/NA*	*No/No*	*NA/NA*	*NA/NA*	*NA/NA*
Jerrys Plains Village	*4/09/2019 21:01*	*IA/NA*	*No/No*	*NA/NA*	*NA/NA*	*NA/NA*
Jerrys Plains East	*4/09/2019 21:19*	*IA/NA*	*No/No*	*NA/NA*	*NA/NA*	*NA/NA*
Knodlers Lane	*11/09/2019 21:46*	*IA/35*	*No/No*	*NA/NA*	*NA/NA*	*NA/NA*
Maison Dieu	*11/09/2019 21:23*	*IA/IA*	*No/No*	*NA/NA*	*NA/NA*	*NA/NA*
Shearers Lane	*11/09/2019 21:00*	*IA/<25*	*No/No*	*NA/NA*	*NA/NA*	*NA/NA*
Kilburnie South	*11/09/2019 22:55*	*IA/37*	*No/No*	*NA/NA*	*NA/NA*	*NA/NA*
Jerrys Plains Village	*11/09/2019 21:23*	*36/IA*	*Yes/No*	*53/IA*	*17/NA*	*Nil/NA*
Jerrys Plains East	*11/09/2019 21:00*	*35/IA*	*Yes/No*	*54/IA*	*19/NA*	***2/****NA*
Long Point Road	*11/09/2019 21:00*	*IA/IA*	*No/No*	*NA/NA*	*NA/NA*	*NA/NA*
HVGC	*11/09/2019 23:32*	*IA/31*	*No/No*	*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 as detailed in Sections 2.4 and 3.4 of this report;
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; and
4. Bold results indicate that NPfI low-frequency modifying factor has been triggered and application of correction is required.

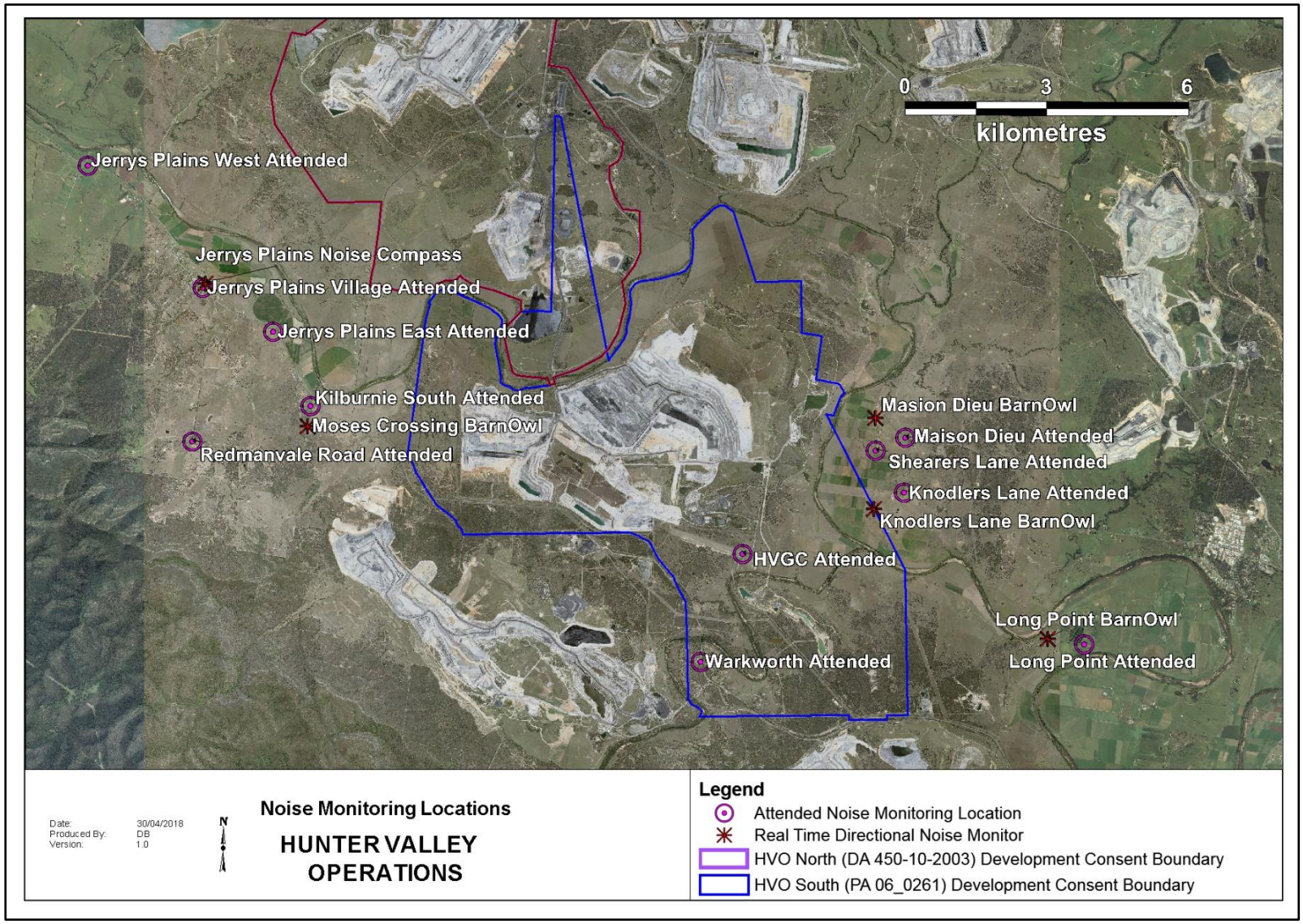

Figure 84: Noise Monitoring Location Plan

5.2.1 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 5.1, and that real time monitoring data includes non-mine noise sources such as dogs, cows, or more commonly, road traffic.

6.0 OPERATIONAL DOWNTIME

During September, a total of 738 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.

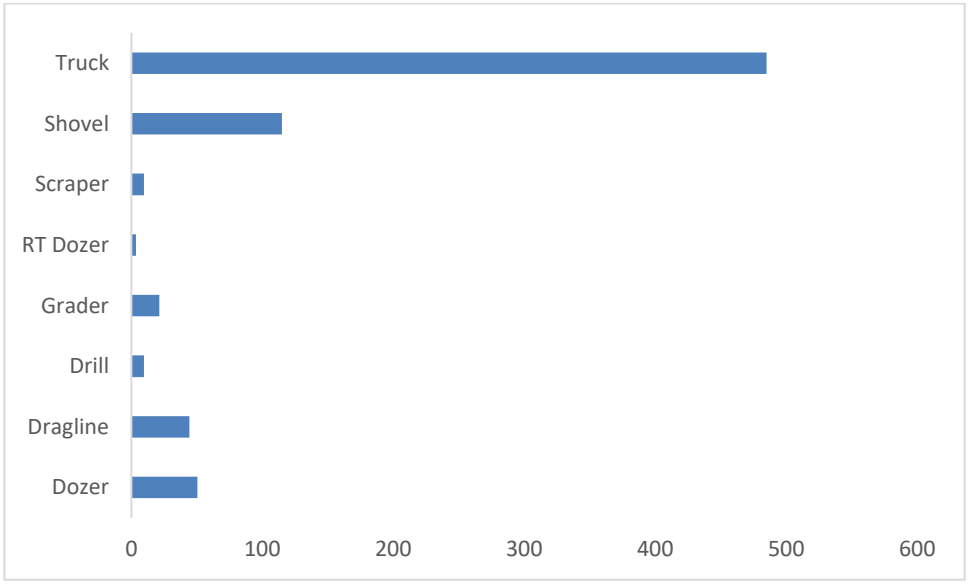

Figure 85: Operational Downtime by Equipment Type – September2019

7.0 REHABILITATION

During September, 25.48 Ha of land was released, 9.55 Ha of land was bulk shaped and 9.25 Ha of land was rehabilitated. Year to date progress can be viewed in Figure 86.

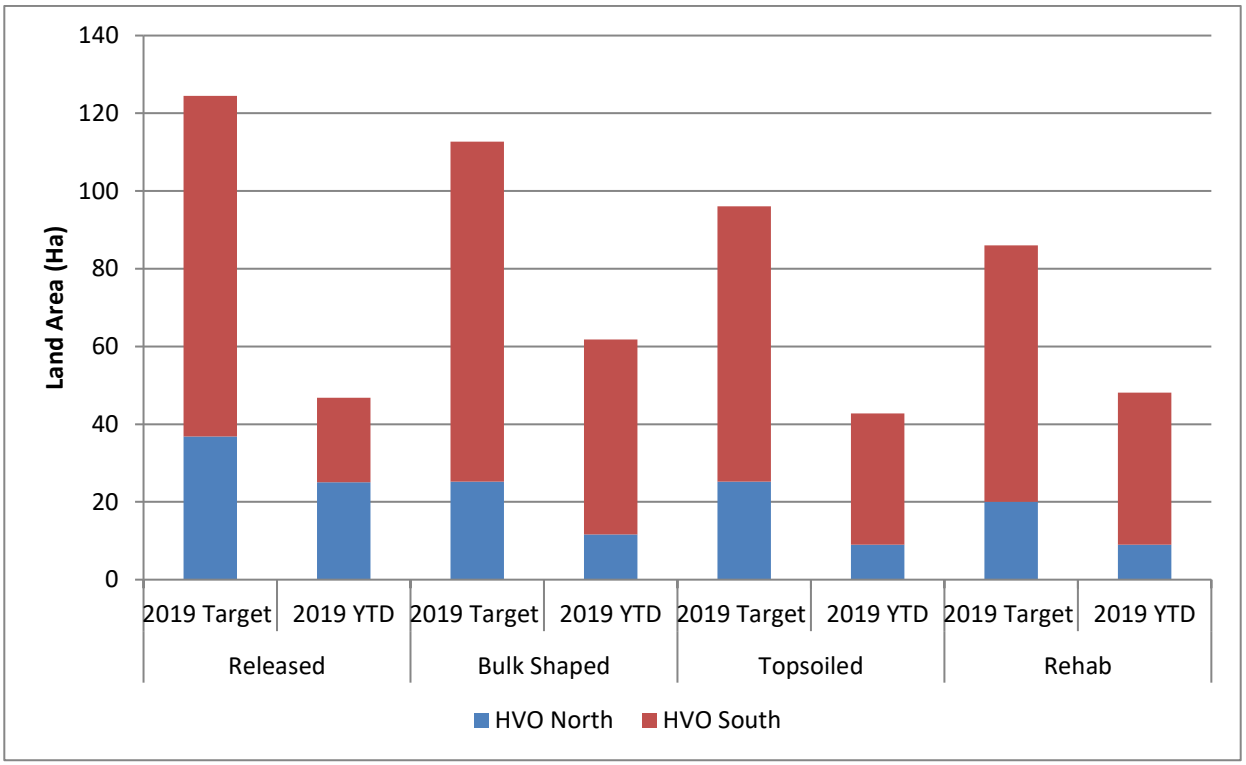

Figure 86: Rehabilitation YTD – September 2019

8.0 COMPLAINTS

No complaints were received during September 2019. Details of complaints received YTD are shown in Table 12 below.

Table 12: Complaints Summary YTD 2019

Month	Noise	Dust	Blast	Lighting	Other	Total
January	-	-	-	-	-	-
February	-	-	-	-	-	-
March	-	*1*	-	-	-	*1*
April	-	*1*	-	-	-	*1*
May	-	*2*	-	-	-	*2*
June	-	*1*	-	-	*1*	*2*
July	-	-	-	-	-	-
August	-	-	-	-	*1*	*1*
September	-	-	-	-	-	-
October						
November						
December						
Total	*0*	*5*	*0*	*0*	*2*	*7*

9.0 ENVIRONMENTAL INCIDENT

During the reporting period there were no reportable environmental incidents.

APPENDIX A: METEOROLOGICAL DATA

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

Date	Air Temp Max (°C)	Air Temp Min (°C)	Relative Humidity Max (%)	Relative Humidity Min (%)	Solar Radiation Maximum (W/Sq. M)	Wind Dir. Avg (°)	Wind Speed Avg (m/sec)	Rainfall (mm)
1/09/2019	20.7	7.9	100	30.26	737.7	224	1.7	0
2/09/2019	20.7	5.0	100	30.2	737.7	224.1	1.6	0
3/09/2019	20.1	5.8	93.1	-84	326.1	123.4	2.4	0
4/09/2019	25.0	5.5	100	-15.6	1146	250.5	2.7	0
5/09/2019	28.3	6.8	82.9	-13.0	736	251.2	3.1	0
6/09/2019	23.9	6.0	97.9	-11.3	722.2	117.4	2.8	0
7/09/2019	28.8	6.2	100	-29.4	778	NAN	5.2	0
8/09/2019	13.9	8.0	76.7	-3.0	872	288.6	8.1	0
9/09/2019	16.3	8.6	57.8	-4.2	760.3	287.3	5.6	0
10/09/2019	14.7	5.6	60.6	-6.6	1066	246.1	4.6	0
11/09/2019	15.0	3.6	91.6	6.8	1033	157	2.3	0
12/09/2019	18.9	3.5	98.4	-1.6	768.1	201.4	1.3	0
13/09/2019	23.2	3.0	100	-17.9	867	279.6	3.8	0
14/09/2019	21.7	3.0	94.8	-12.1	826	177.6	2.3	0
15/09/2019	21.2	3.7	93.8	-15.6	502	120	3.2	0
16/09/2019	25.3	5.5	100	-23.0	783.3	266.2	2.4	0
17/09/2019	27.6	8.9	79.1	-31.3	1045	249.6	3.8	0
18/09/2019	12.4	5.5	110.7	42.8	284.9	187.9	3.1	16.2
19/09/2019	12.5	6.9	97.5	21.8	597.2	154	3.4	4.2
20/09/2019	19.1	3.7	100	-3.6	1079	121.4	2.8	0
21/09/2019	21.5	8.3	100	-15.6	894	129.3	2.6	0
22/09/2019	24.5	8.1	81.2	-3.06	780	242.1	2.5	0
23/09/2019	22	4.6	100	16.97	1133	265	3.8	0.2
24/09/2019	19.2	4.3	100	-14.9	890	262.9	3.4	0
25/09/2019	19.7	11.0	78.8	-20.8	872	225.9	1.8	0
26/09/2019	17.8	11.2	84.7	7.2	97.7	131.8	3.3	0
27/09/2019	21.9	9.6	100	-2.0	950	150.6	2.1	0
28/09/2019	23.8	9.1	110.3	-17.9	883	289	3.7	0
29/09/2019	24.7	6.4	83.2	-22.2	856	212.8	4.3	0
30/09/2019	23.0	7.9	95.9	-10.2	1018	194.6	2.2	0

*NAN – data not available