HUNTER VALLEY OPERATIONS

Quarterly Environmental Monitoring Report

March 2020

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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 1st to 31st March 2020.

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 2020 trend and historical trends are shown in Figure 1.

Table 1: Rainfall data - March 2020

2020	Monthly Rainfall (mm)	Cumulative Rainfall (mm)
March	*83.4*	*269.6*

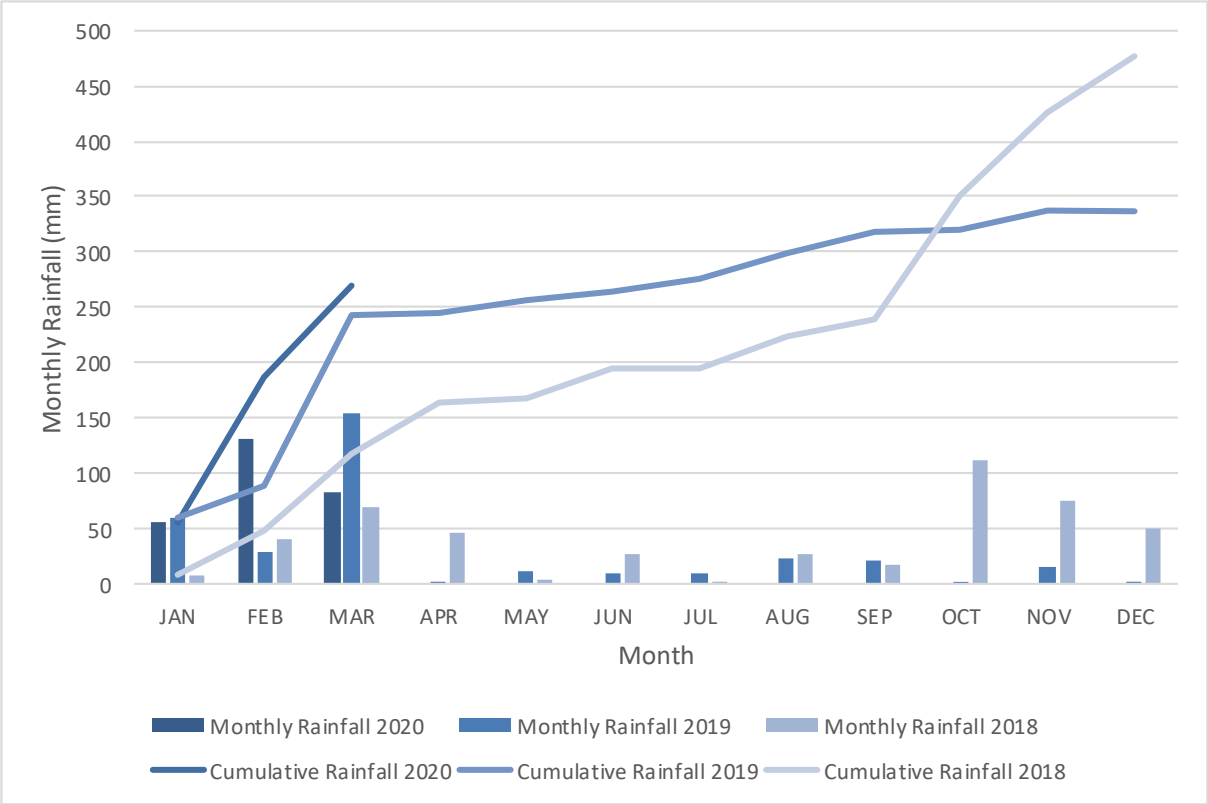


Figure 1: Rainfall Summary 2020

2.1.2 Wind Speed and Direction

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

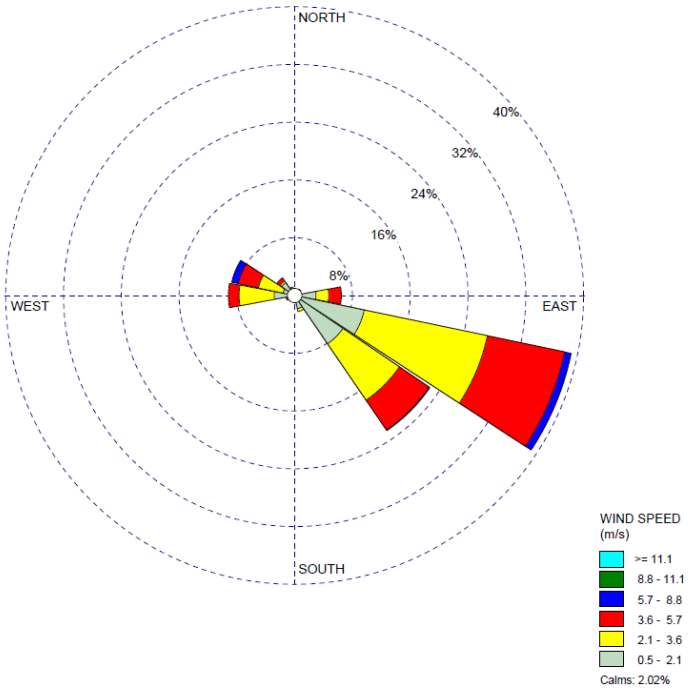


Figure 2: HVO Corporate Wind Rose – March 2020

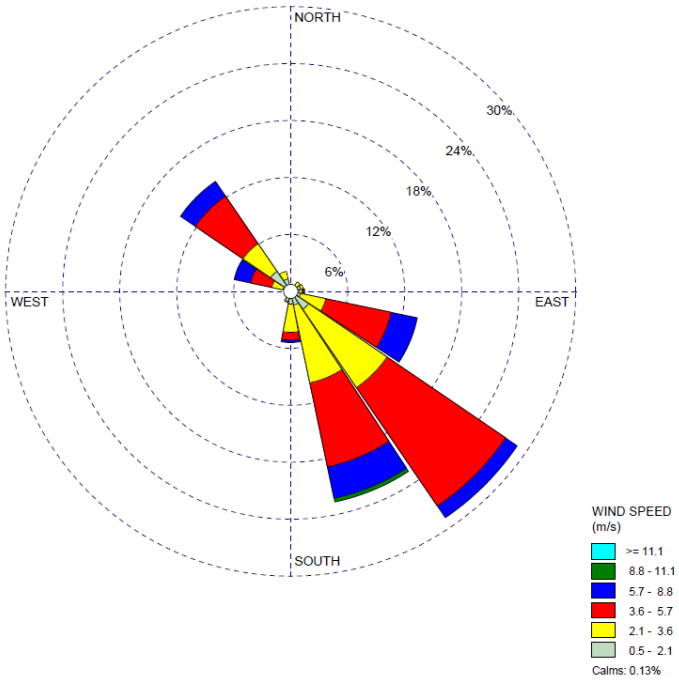


Figure 3: HVO Cheshunt Wind Rose – March 2020

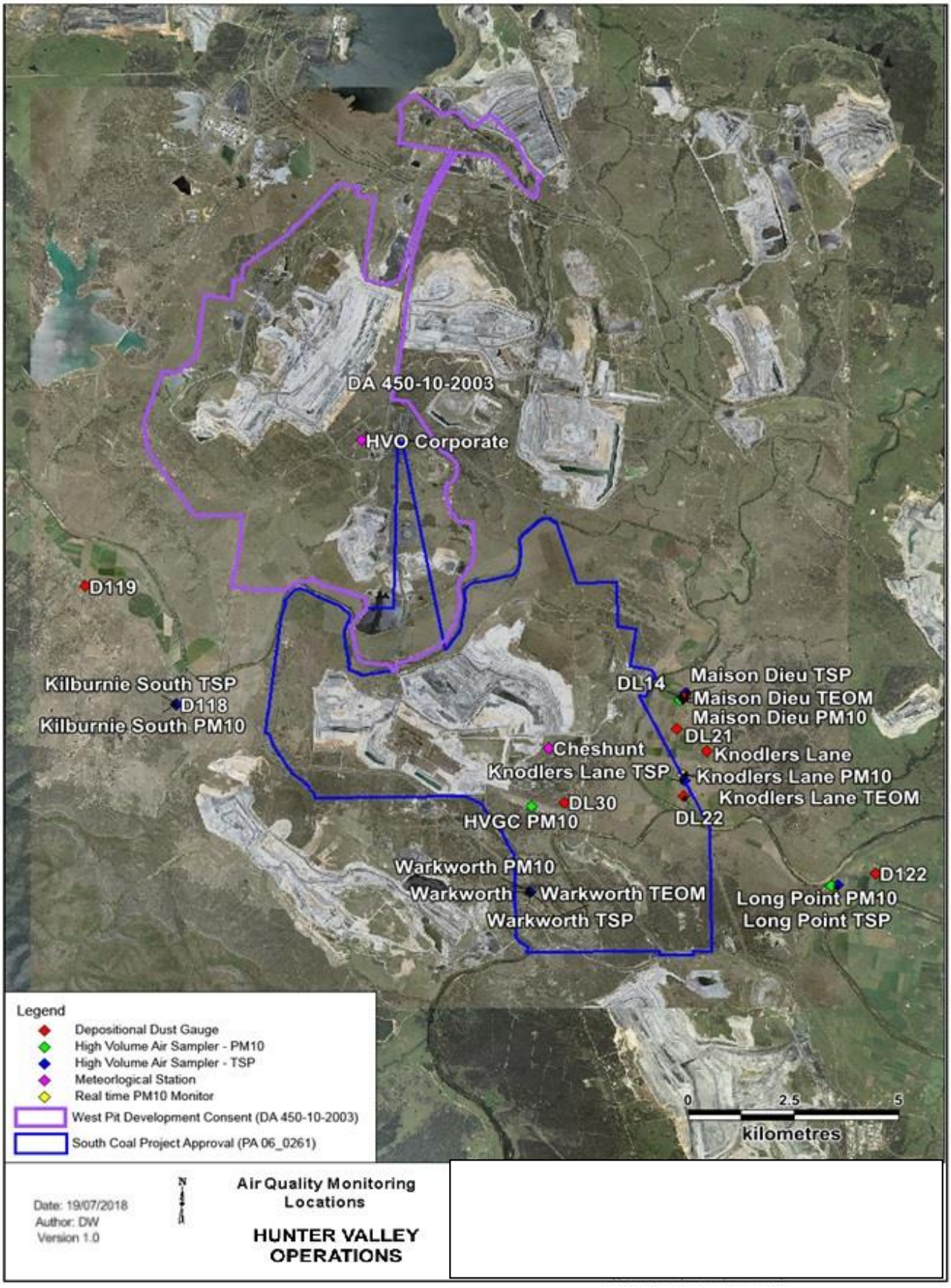


Figure 4: Air Quality Monitoring Location Plan

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, DL21, DL122 and Warkworth monitors recorded a monthly result above the long term impact assessment criteria of 4.0 g/m^2 per month. The D122 result was identified as contaminated.

An assessment of HVO's contribution against the long term impact assessment criteria will be provided in the 2020 Annual Review.

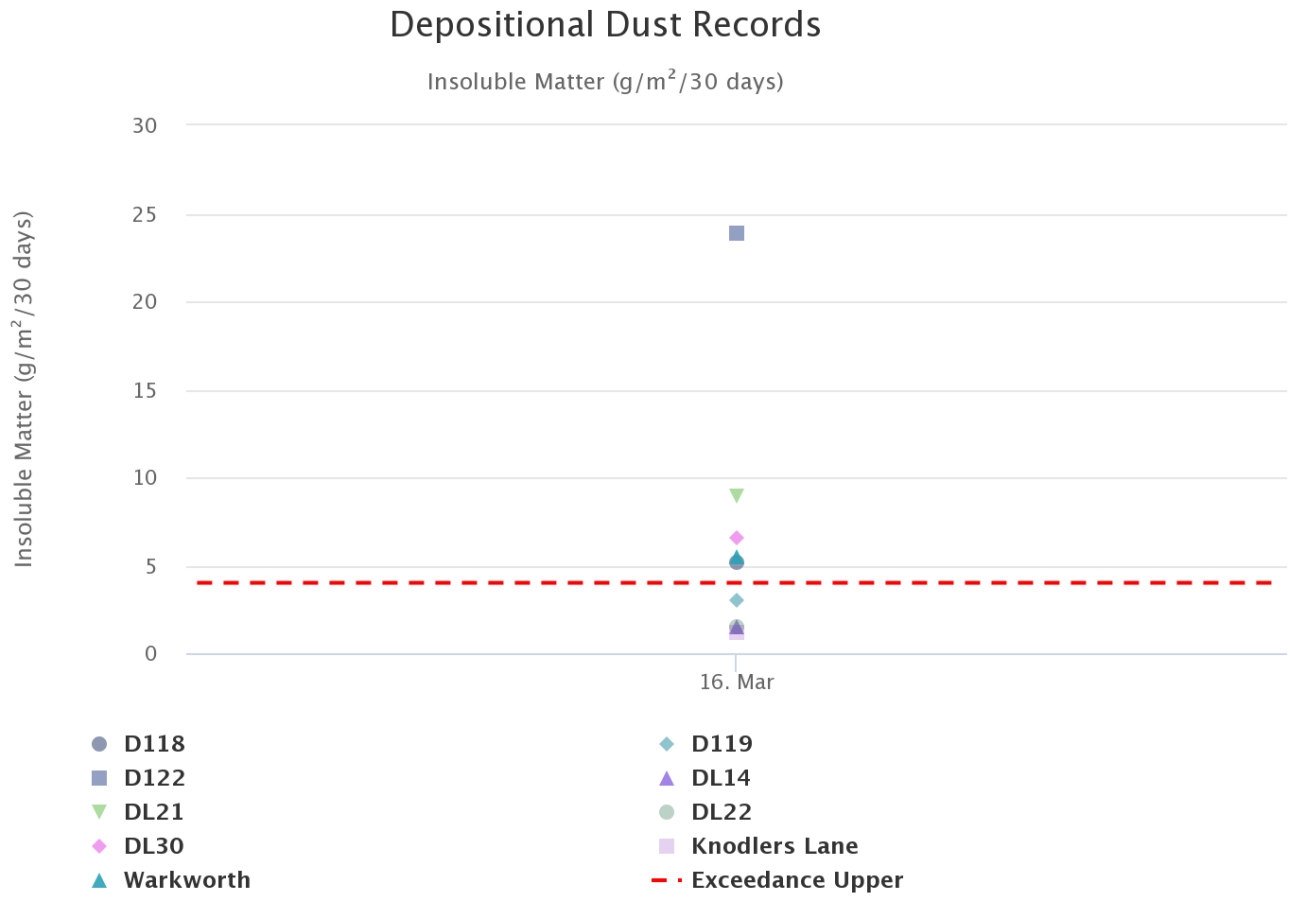


Figure 5: Depositional Dust Results – March 2020

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 Kilburnie South and Maison Dieu HVAS also monitor Particulate Matter <2.5µm ($PM_{2.5}$). The location of these monitors can be found in Figure 4. Each HVAS runs for 24 hours on a six-day cycle.

2.3.1 HVAS PM_{10} Results

Performance against Short Term Impact Assessment Criteria

Figure 6 shows individual PM_{10} results at each monitoring station against the short term impact assessment criteria of 50 µg/m³. During the reporting period, no monitors recorded an exceedance above the short term impact assessment criteria of 50 µg/m³.

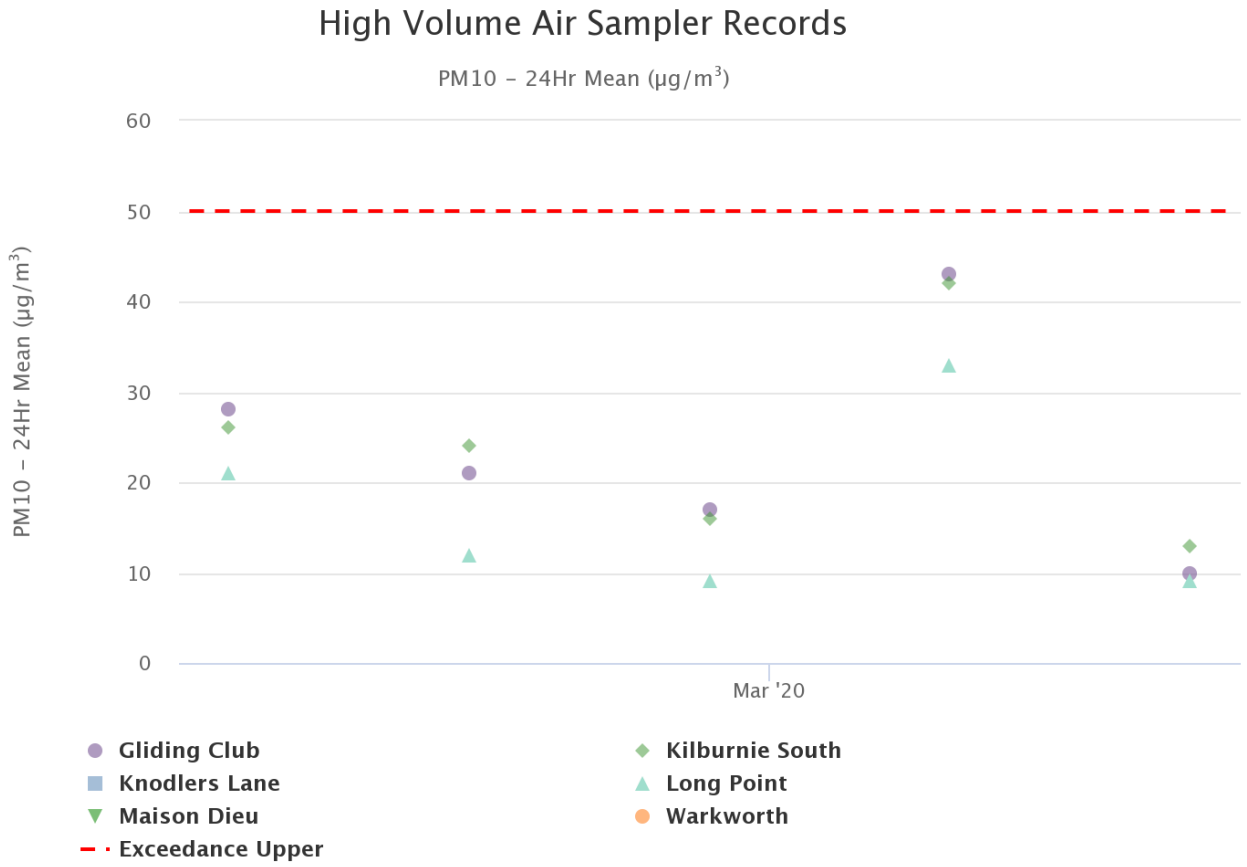


Figure 6: Individual PM_{10} Results – March 2020

Performance against Long Term Impact Assessment Criteria

Figure 7 shows the year to date annual average PM_{10} results. During the reporting period all monitors recorded an annual average above the PM_{10} Annual Rolling Mean of 30µg/m³.

This is likely to be due to the result being an average of the January - March period which historically has higher ambient dust levels, and will decrease over the remainder of the reporting period. However, an assessment of HVO's contribution against the long term impact assessment criteria will be provided in the 2020 Annual Review.

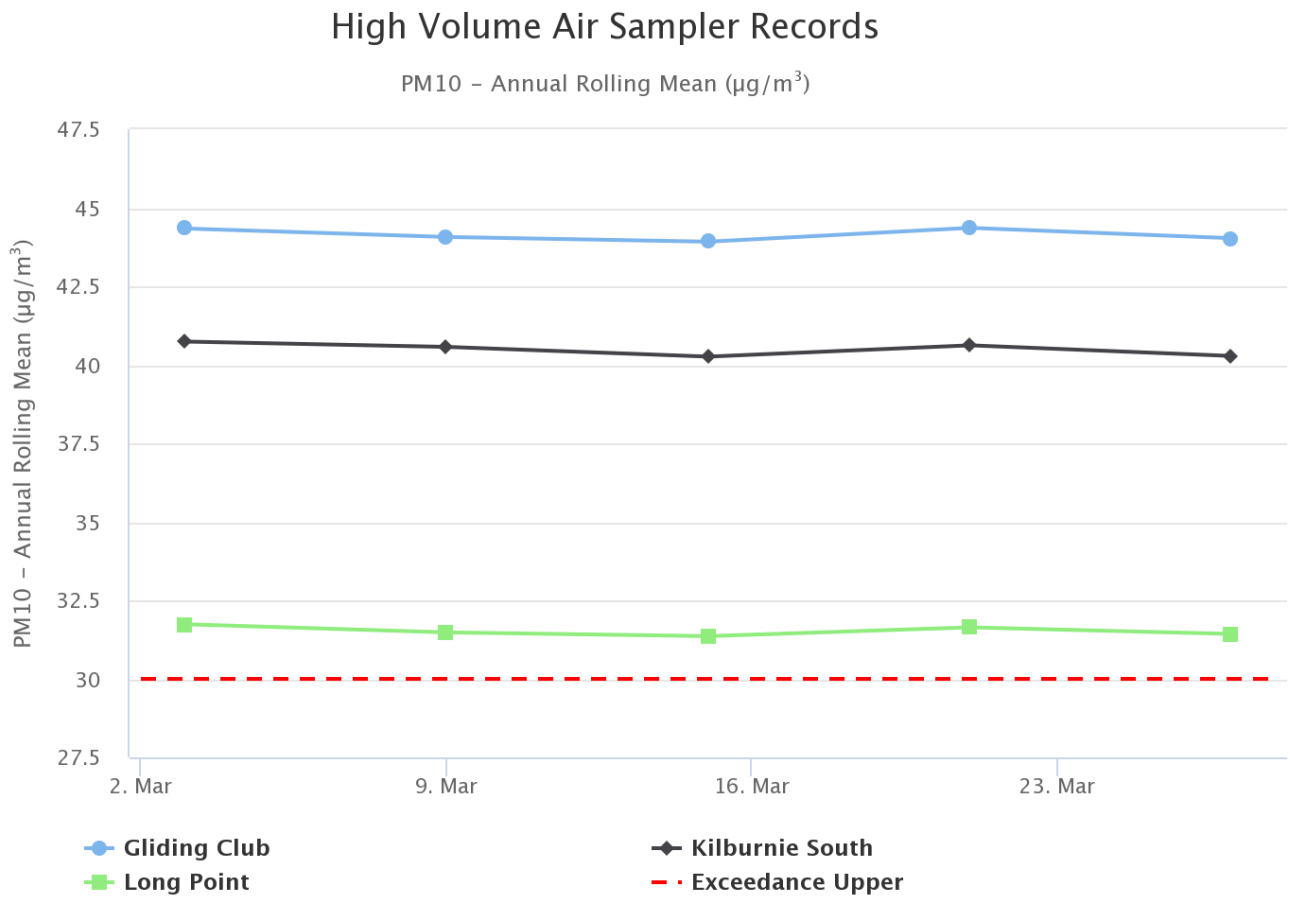


Figure 7: Year to Date Average PM_{10} – as at end of March 2020

2.3.2 HVAS $PM_{2.5}$ Results

HVO monitors $PM_{2.5}$ at two HVAS locations i.e. Kilburnie South and Maison Dieu.

Performance against Short Term Impact Assessment Criteria

Figure 8 shows individual $PM_{2.5}$ results at each monitoring station against the HVO South short term impact assessment criteria of 25 µg/m³.

During the reporting period, no monitors recorded an exceedance above the short term impact assessment criteria of 25 µg/m³.

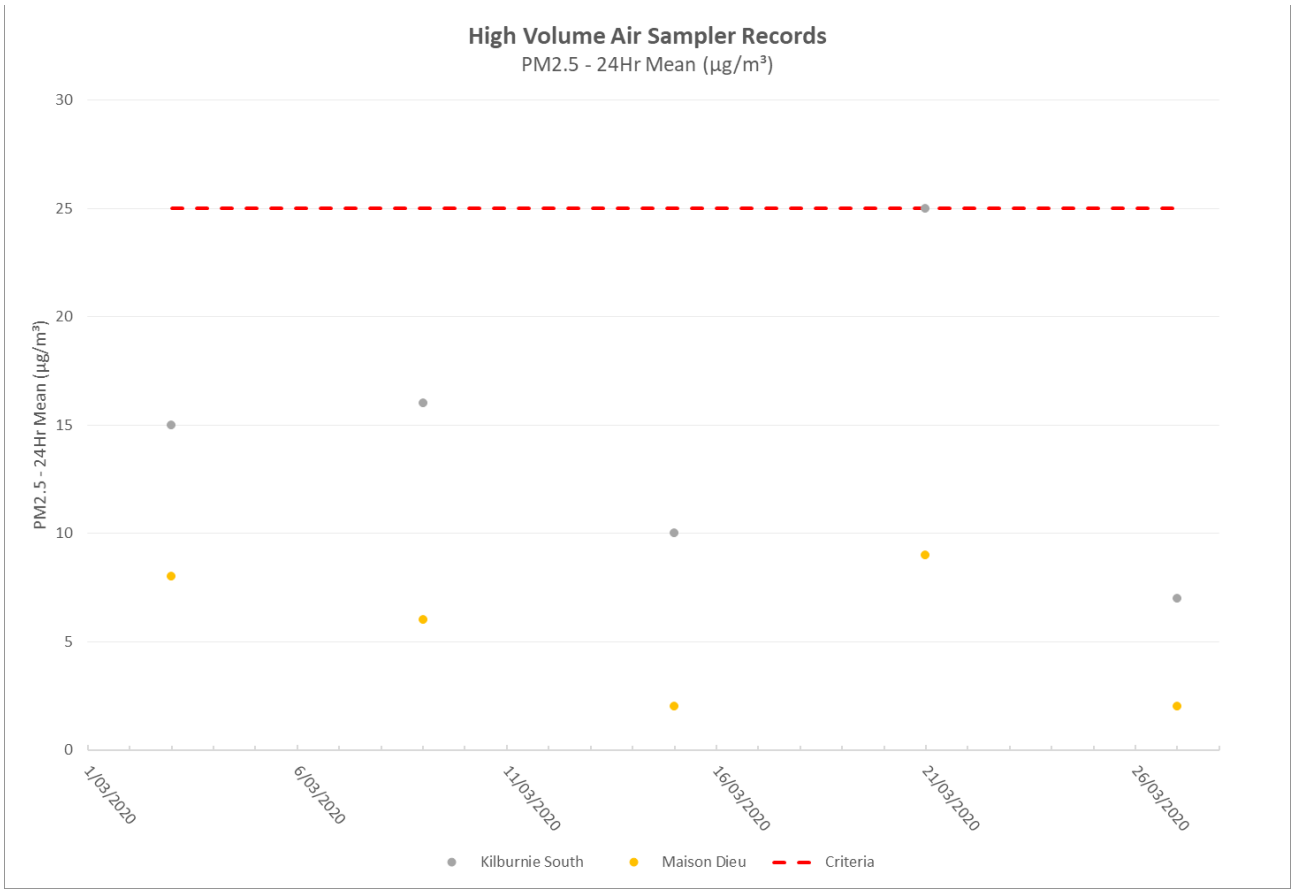


Figure 8: Individual $PM_{2.5}$ Results – March 2020

Performance against Long Term Impact Assessment Criteria

Figure 9 shows the year to date annual average $PM_{2.5}$ results. During the reporting period, all monitors recorded an annual average above the $PM_{2.5}$ Annual Rolling Mean of 8µg/m³.

This is likely to be due to the result being an average of the January - March period which historically has higher ambient dust levels, and will decrease over the remainder of the reporting period. However, an assessment of HVO's contribution against the long term impact assessment criteria will be provided in the 2020 Annual Review.

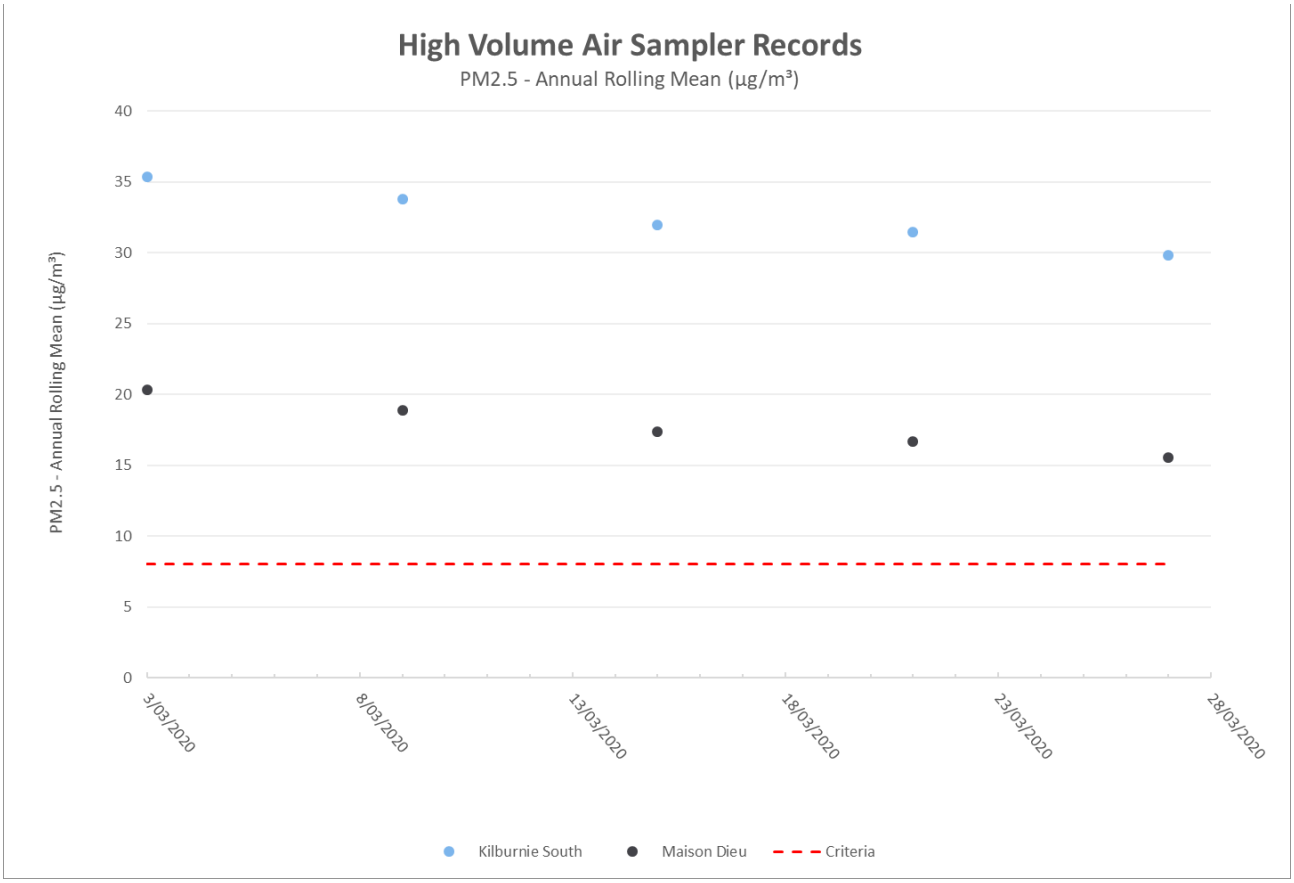


Figure 9: Year to Date Average $PM_{2.5}$ – as at end of March 2020

2.3.3 TSP Results

Performance against Long Term Impact Assessment Criteria

Figure 10 shows the annual average TSP results compared against the long term impact assessment criteria of 90µg/m³.

During the reporting period, the Kilburnie South, Warkworth, Knodlers Lane and Maison Dieu monitors' annual average was above the long term impact assessment criteria of 90µg/m³.

This is likely to be due to the result being an average of the January - March period which historically has higher ambient dust levels, and will decrease over the remainder of the reporting period. However, an assessment of HVO's contribution against the long term impact assessment criteria will be provided in the 2020 Annual Review.

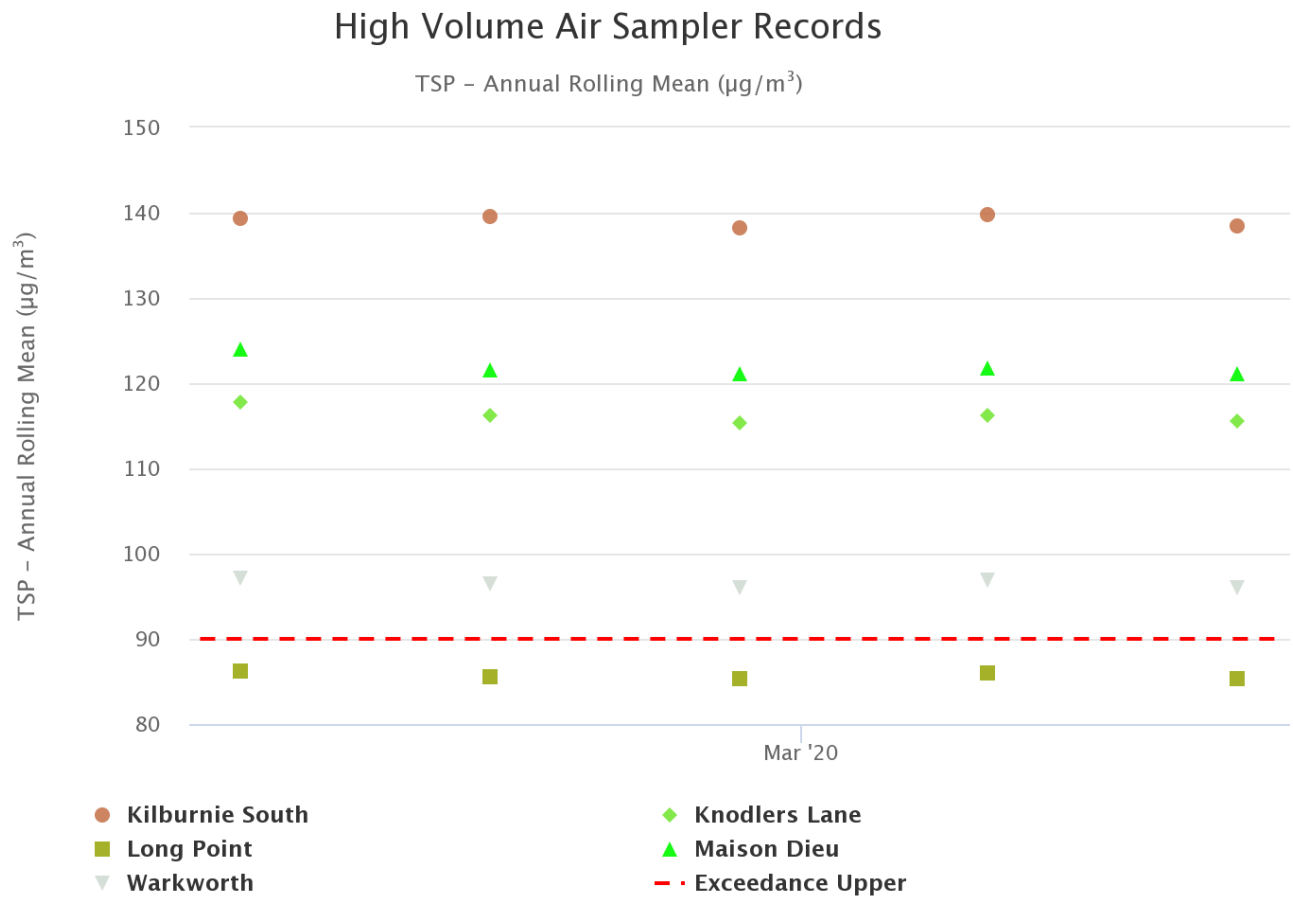


Figure 10: Year to Date Average Total Suspended Particulates – as at end of March 2020

2.3.4 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 11, including the daily 24 hour average PM10 result and the year to date 24 hour PM_{10} annual average.

During the reporting period, no monitors exceeded the daily 24 hour average PM_{10} result (50µg/m³).

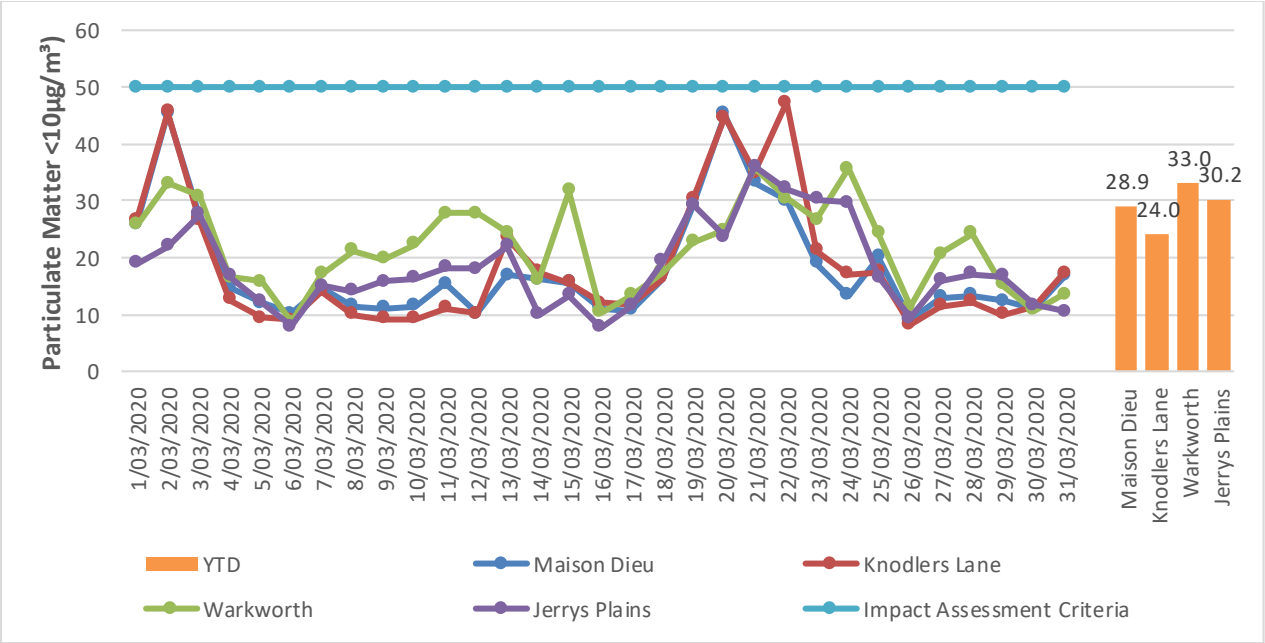


Figure 11: Real Time PM_{10} 24hr average and YTD average – March 2020

2.3.5 Real Time Alarms for Air Quality

During March the real time monitoring system generated 89 automated air quality related alarms. 19 alarms were related to adverse weather conditions and 70 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 12.

Figure 13 to Figure 15 show the long term surface water trend (2016- current) within HVO mine dams. Figure 16 to Figure 24 show the long term surface water trend (2016 – current) in surrounding watercourses.

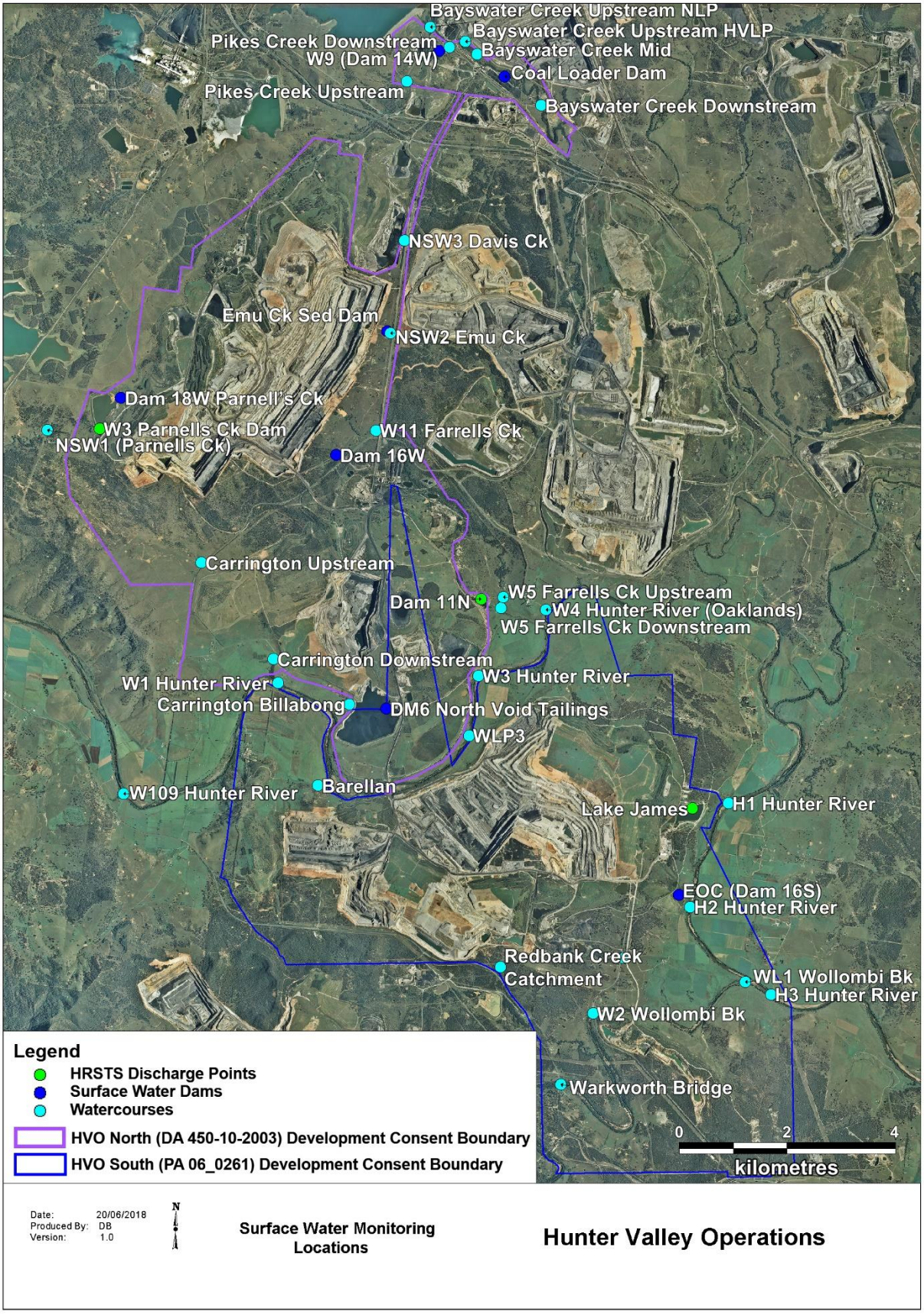


Figure 12: HVO Surface Water Monitoring Locations

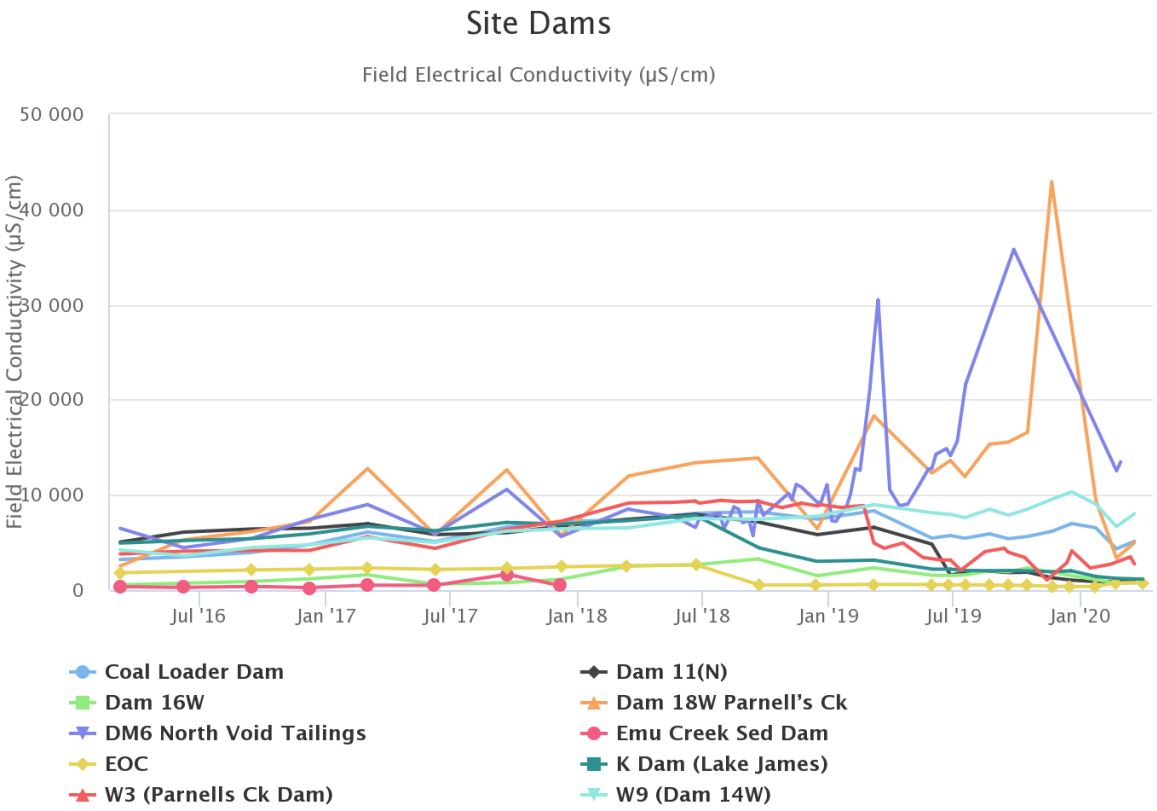


Figure 13: Site Dams Electrical Conductivity Trend – March 2020

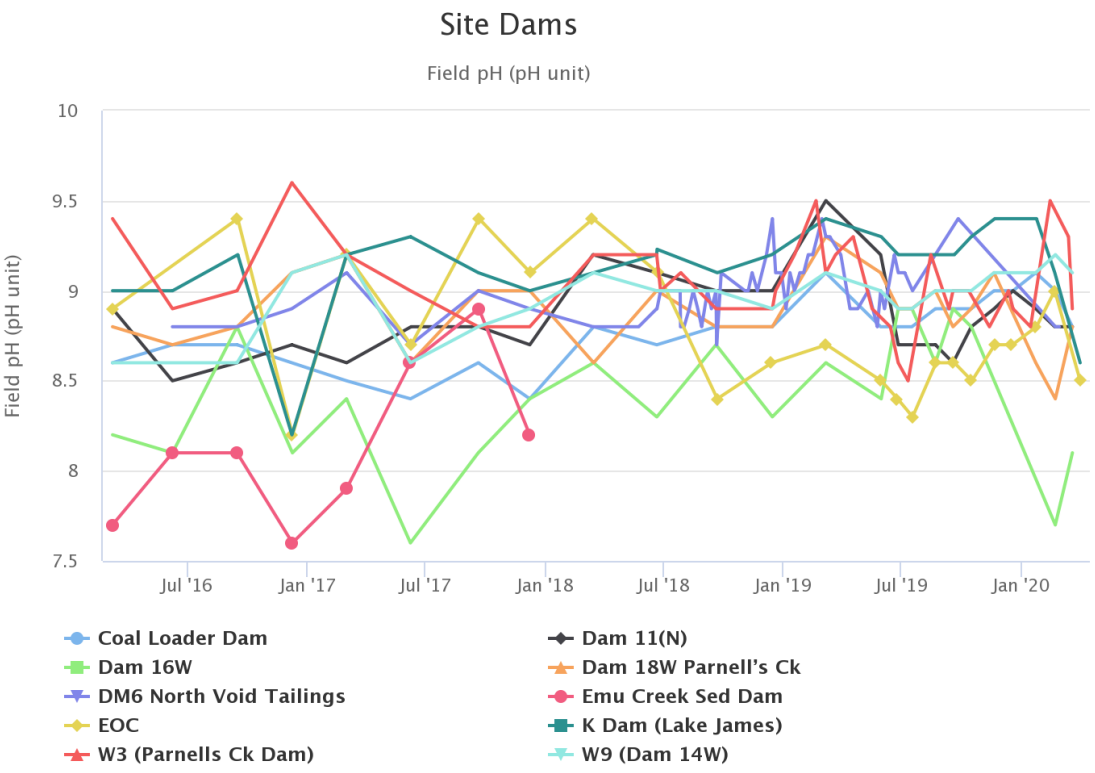


Figure 14: Site Dams pH Trend – March 2020

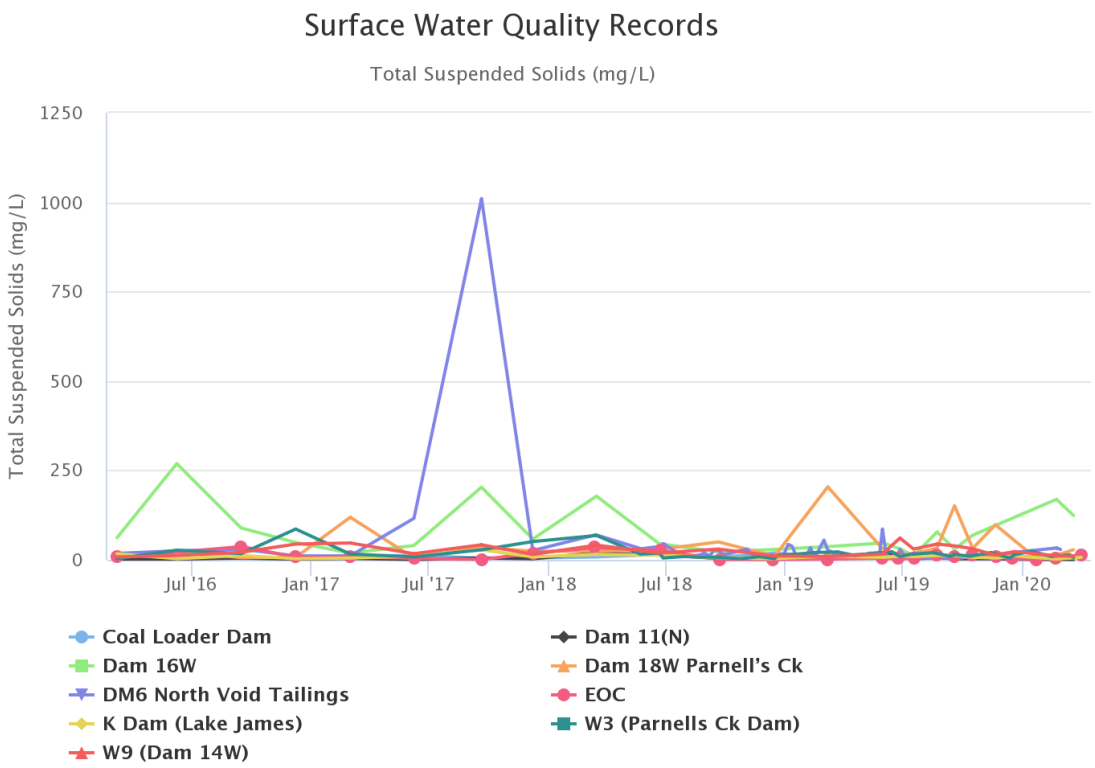


Figure 15: Site Dams Total Suspended Solids Trend – March 2020

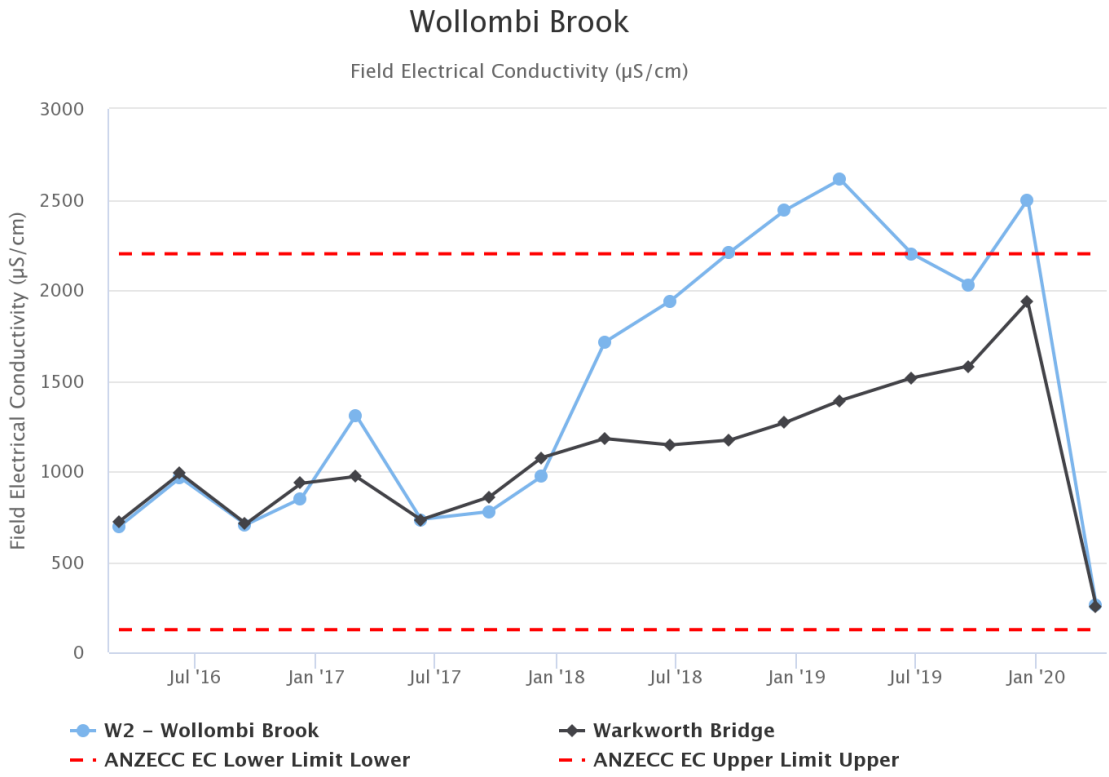


Figure 16: Wollombi Brook Electrical Conductivity Trend – March 2020

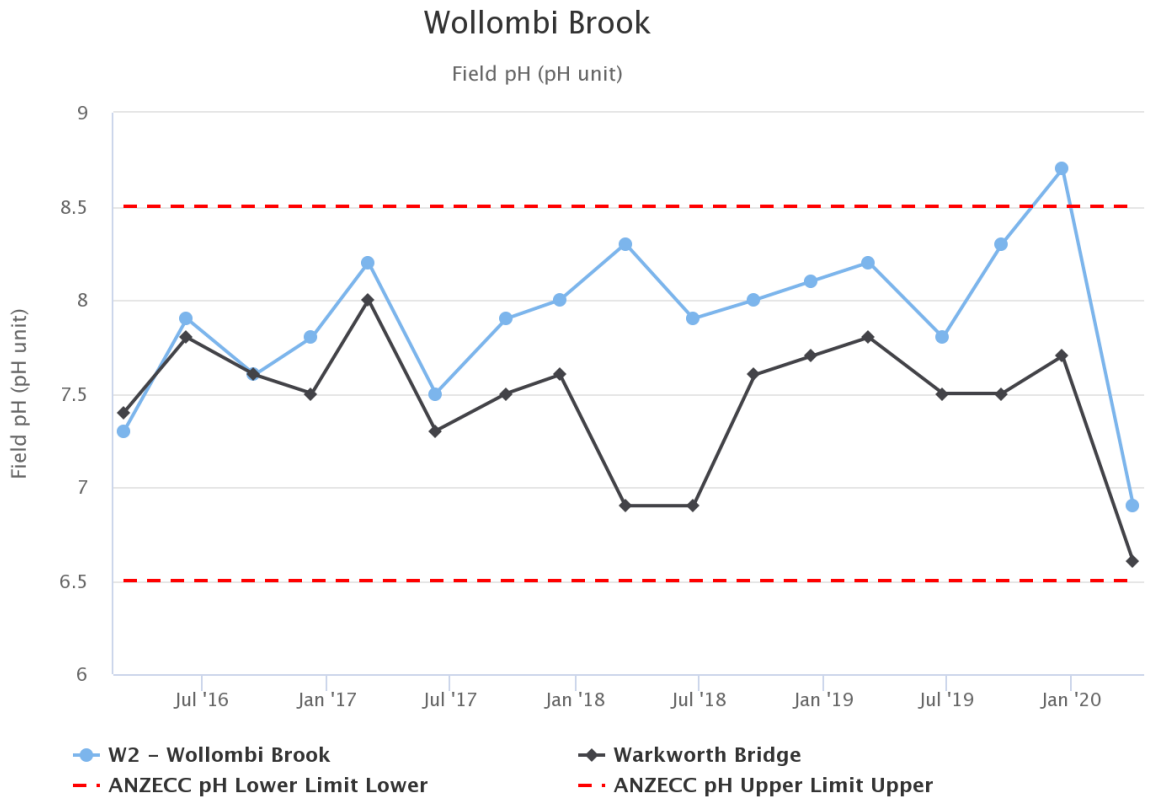


Figure 17: Wollombi Brook pH Trend – March 2020

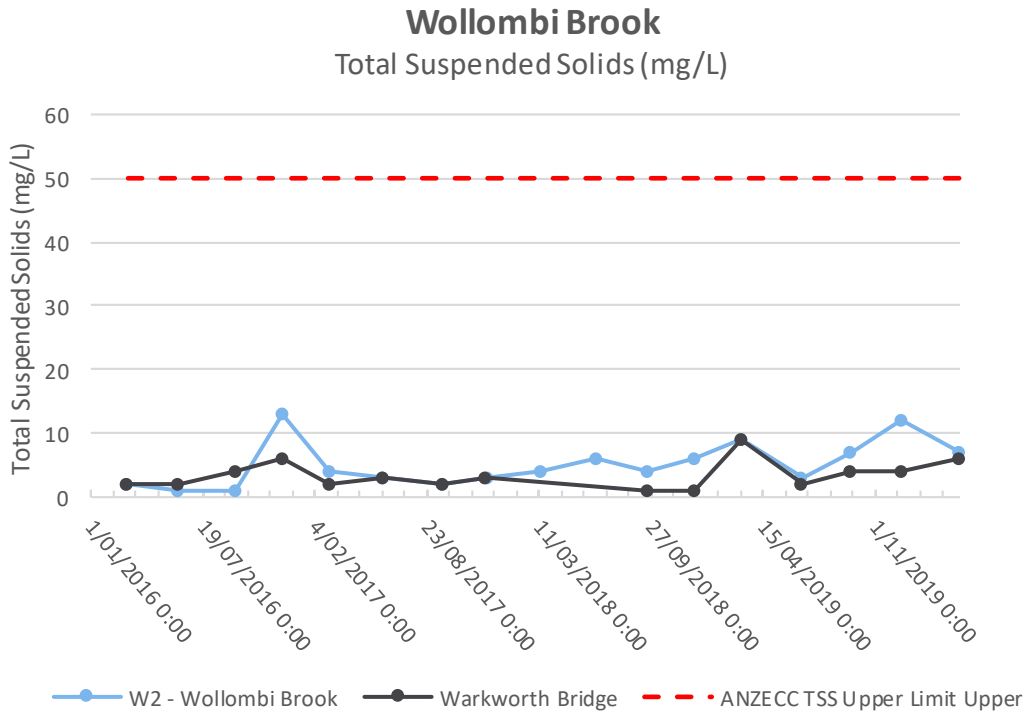


Figure 18: Wollombi Brook Total Suspended Solids Trend – March 2020

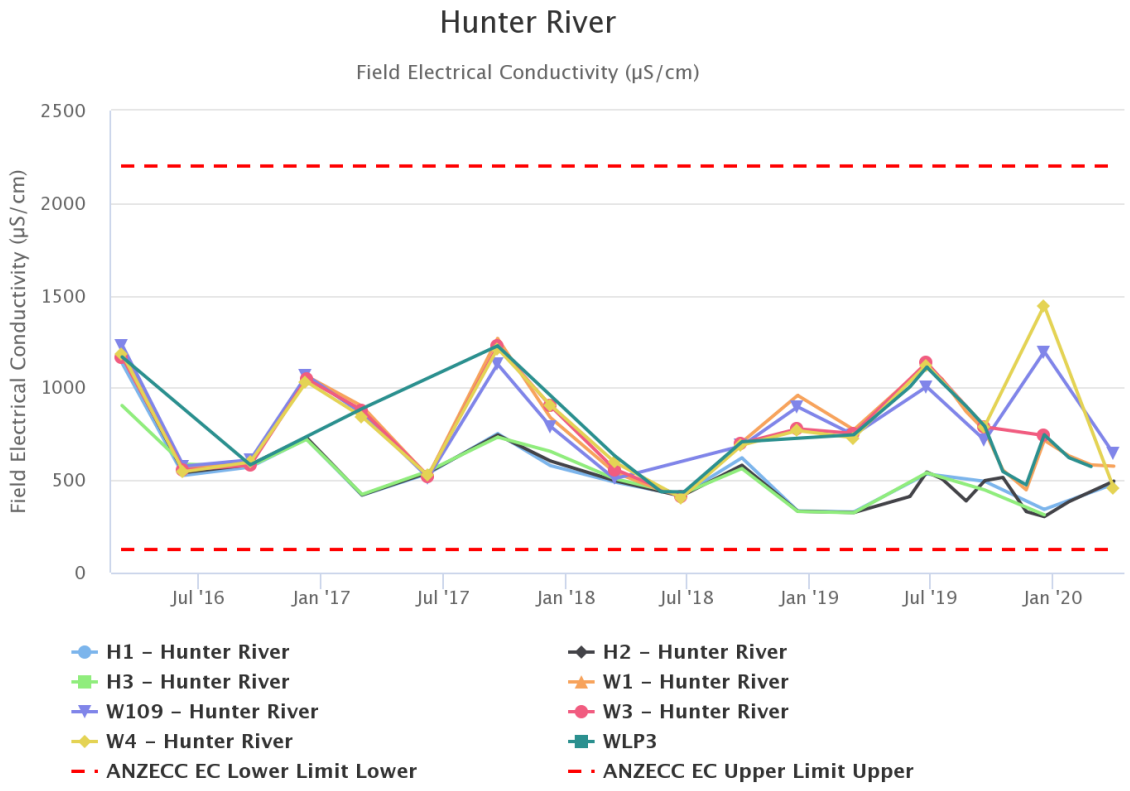


Figure 19: Hunter River Electrical Conductivity Trend – March 2020

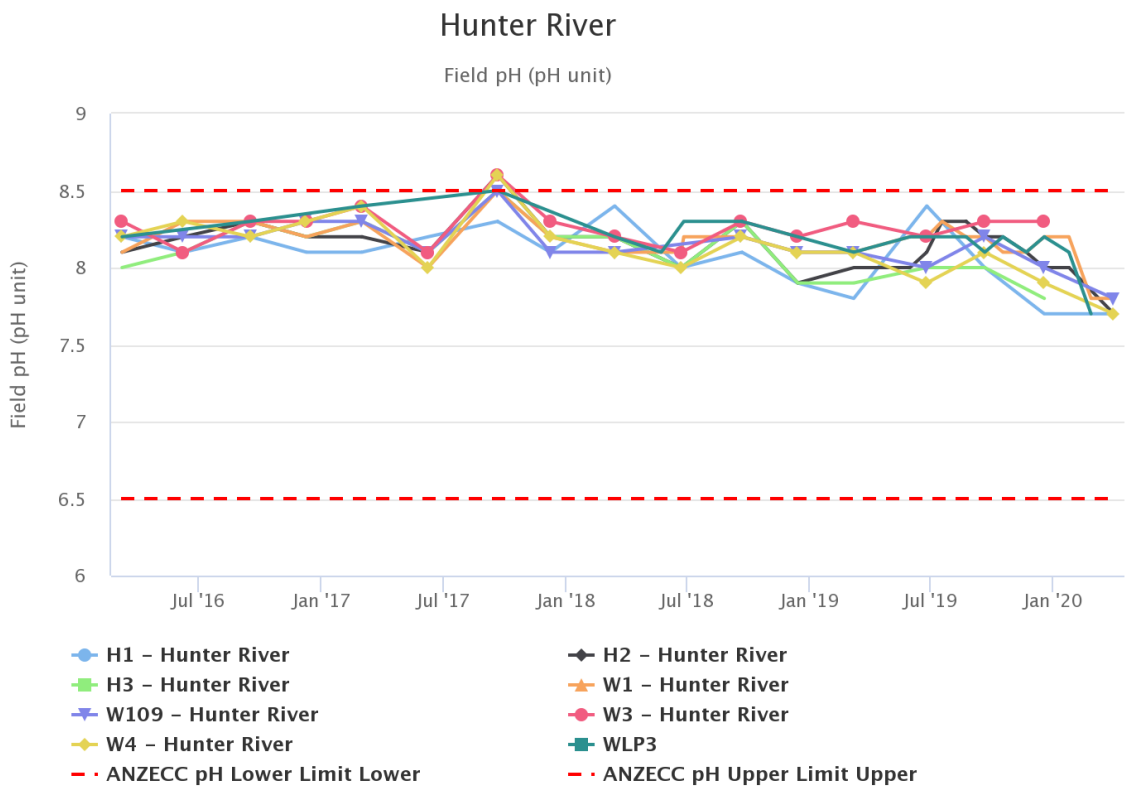


Figure 20: Hunter River pH Trend – March 2020

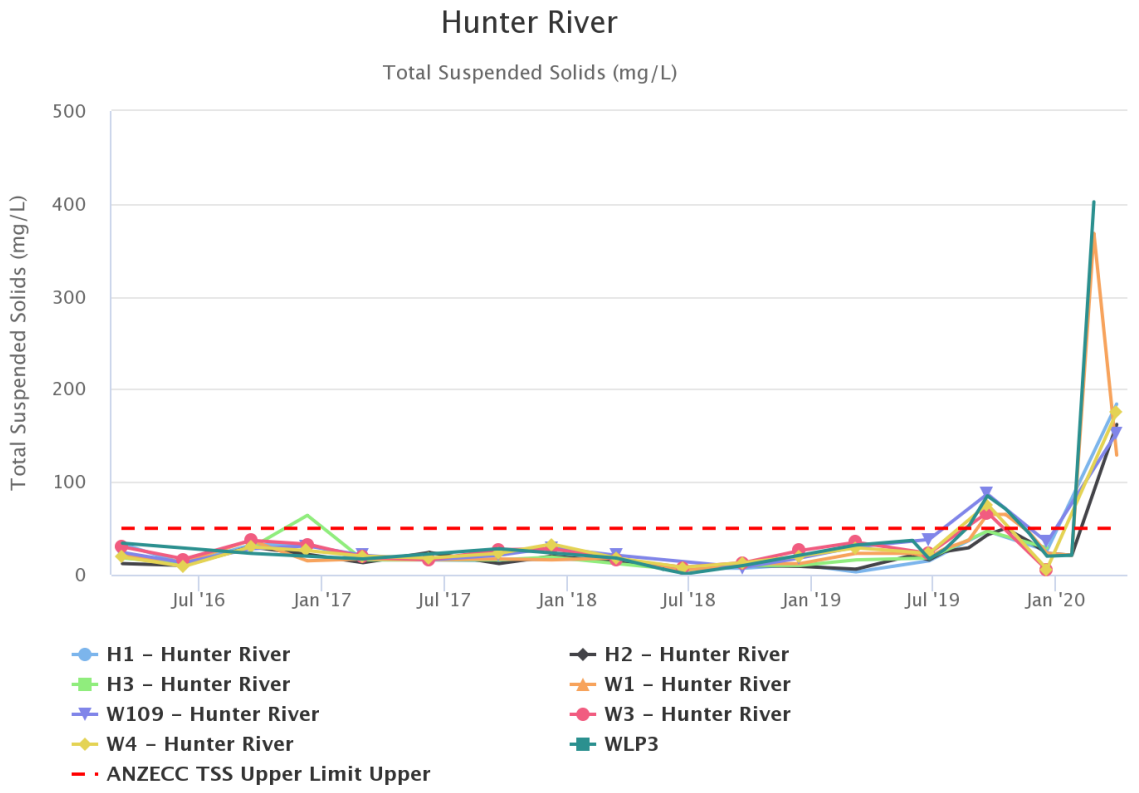


Figure 21: Hunter River Total Suspended Solids – March 2020

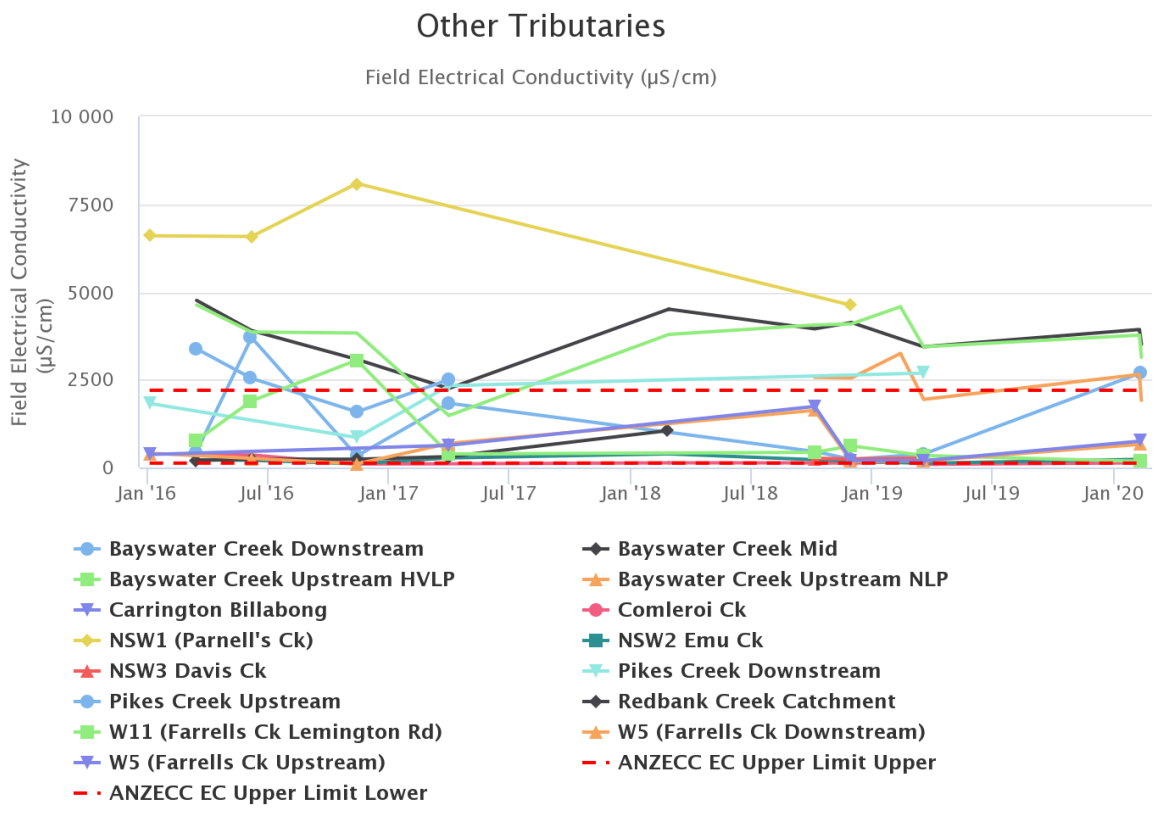


Figure 22: Other Tributaries Electrical Conductivity Trend – March 2020

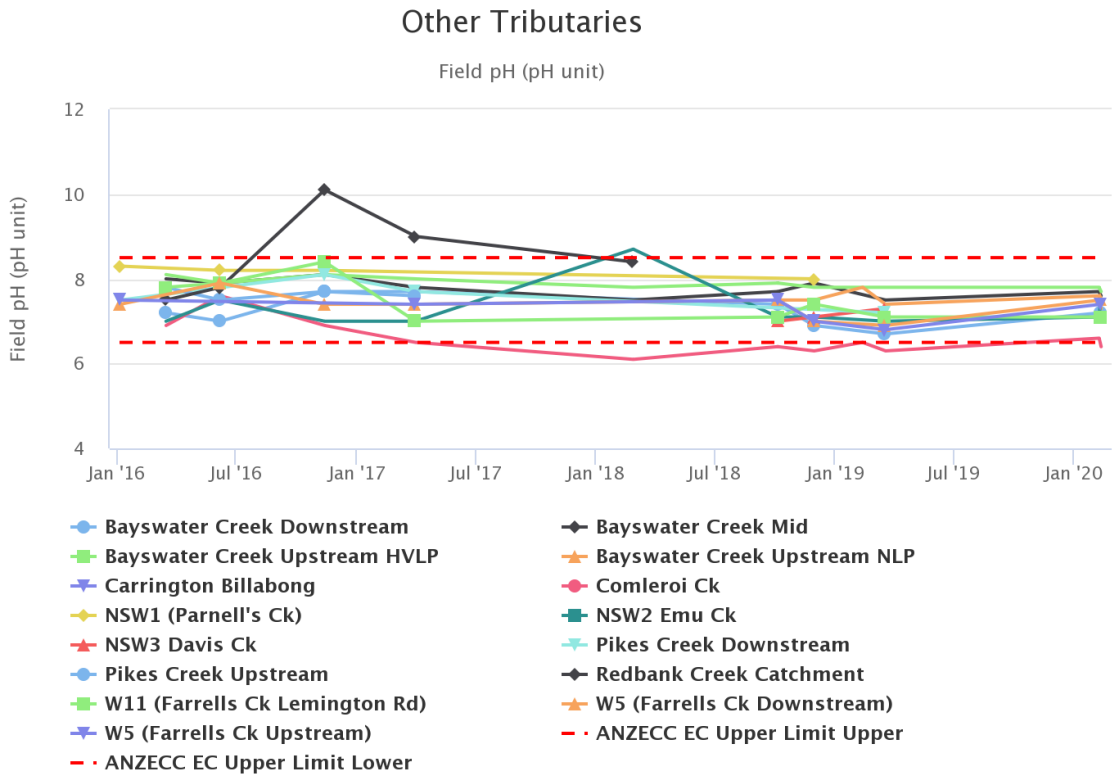


Figure 23: Other Tributaries pHTrend – March 2020

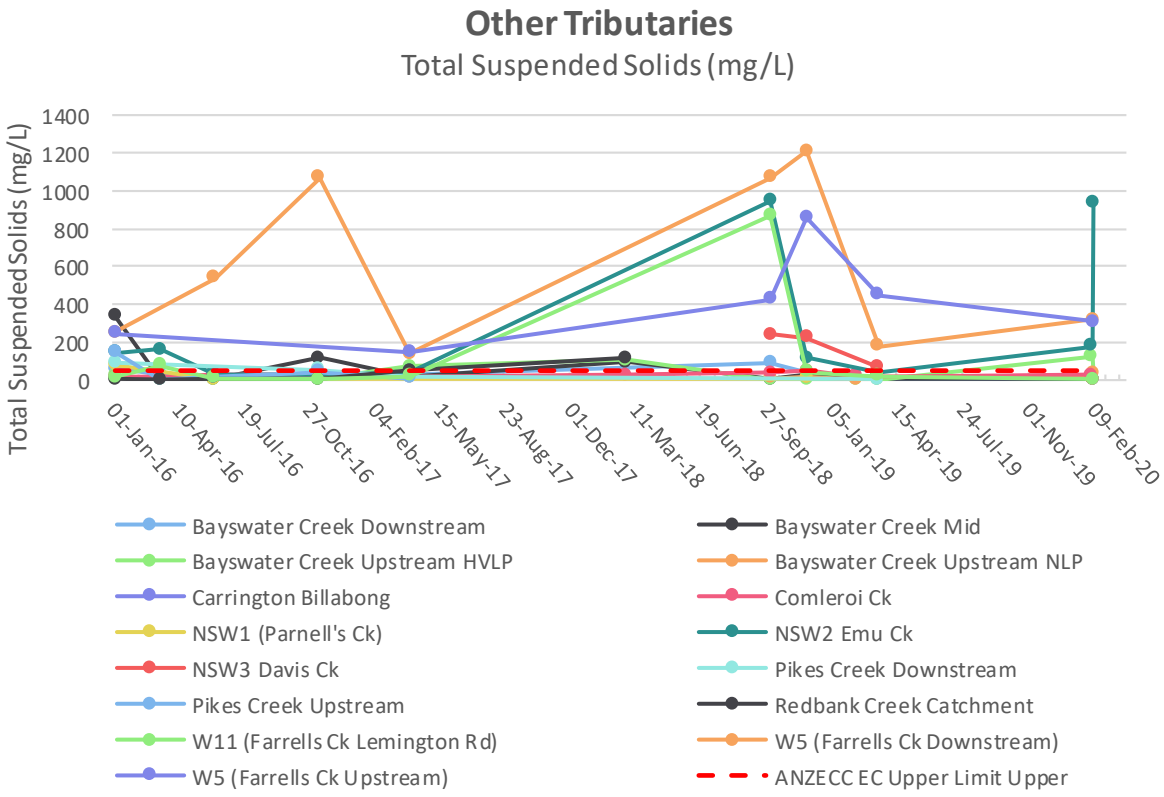


Figure 24: Other Tributaries Total Suspended Solids Trend – March 2020

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 260.3 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 2.

Table 2: Surface Water Trigger Limit Summary – Q1 2020

Site	Date	Trigger Limit Breached	Action taken in response
WL1	23/01/2020	TSS	Watching Brief
Dam 16W	18/01/2020	TSS	First breach – watching brief established
W109 – Hunter River	30/03/2020	pH	First breach – watching brief established
W109 – Hunter River	30/03/2020	TSS	First breach – watching brief established
W1 – Hunter River	30/03/2020	pH	First breach – watching brief established
W1 – Hunter River	30/03/2020	TSS	First breach – watching brief established
W4 – Hunter River	30/03/2020	pH	Second breach – maintain watching brief
W4 – Hunter River	30/03/2020	TSS	First breach – watching brief established
H1 – Hunter River	30/03/2020	pH	Second breach – maintain watching brief
H1 – Hunter River	30/03/2020	TSS	First breach – watching brief established
H2 – Hunter River	30/03/2020	pH	First breach – watching brief established
H2 – Hunter River	30/03/2020	TSS	First breach – watching brief established
Warkworth Bridge	30/03/2020	pH	First breach – watching brief established
W2 – Wollombi Brook	30/03/2020	pH	First breach – watching brief established

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

3.5 Groundwater Monitoring Results

Groundwater monitoring 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 25. Figure 26 to Figure 82 show the long term trends (2016 – current) for ground water bores monitored at HVO.

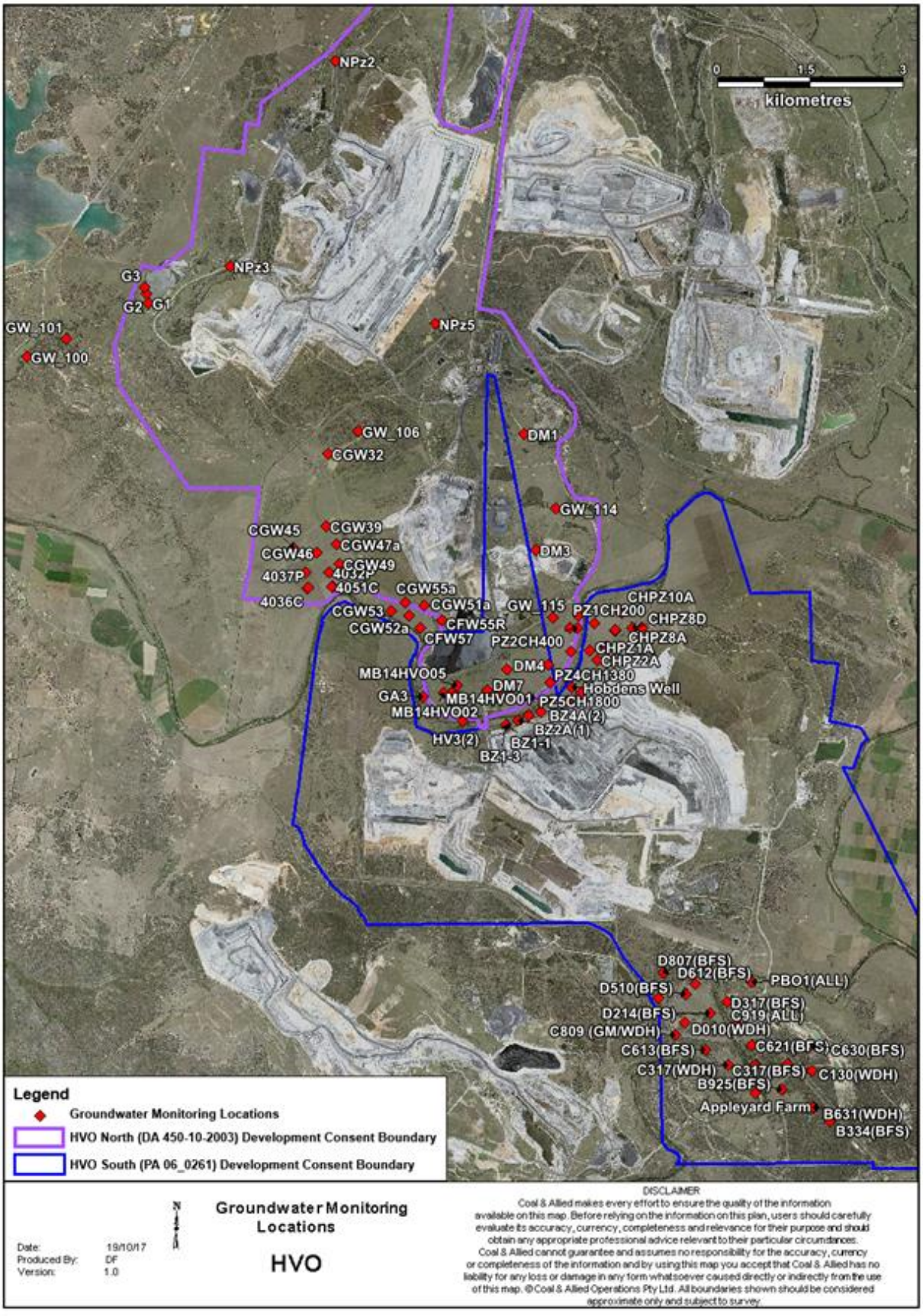


Figure 25: Groundwater Monitoring Locations at HVO

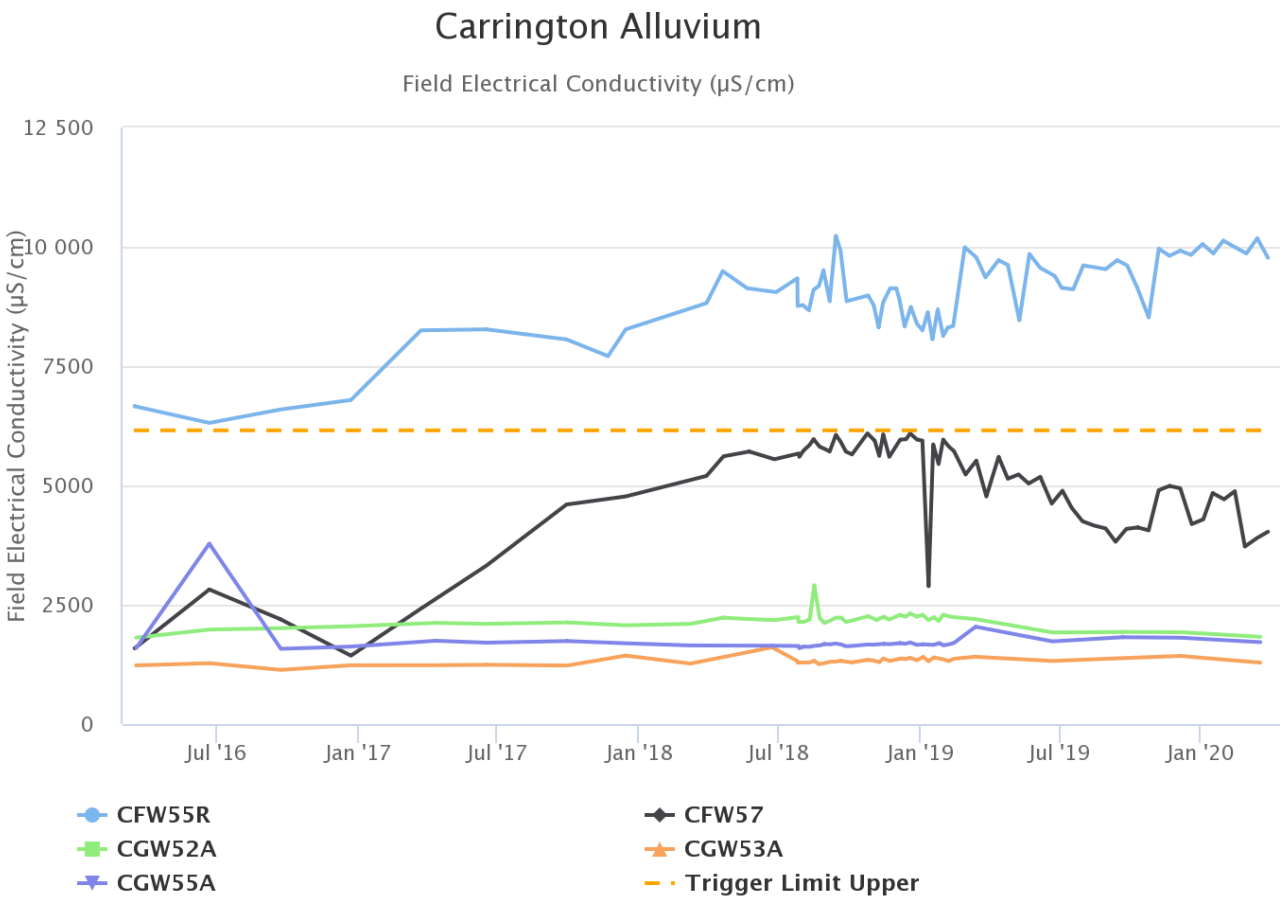


Figure 26: Carrington Alluvium Electrical Conductivity Trend – March 2020

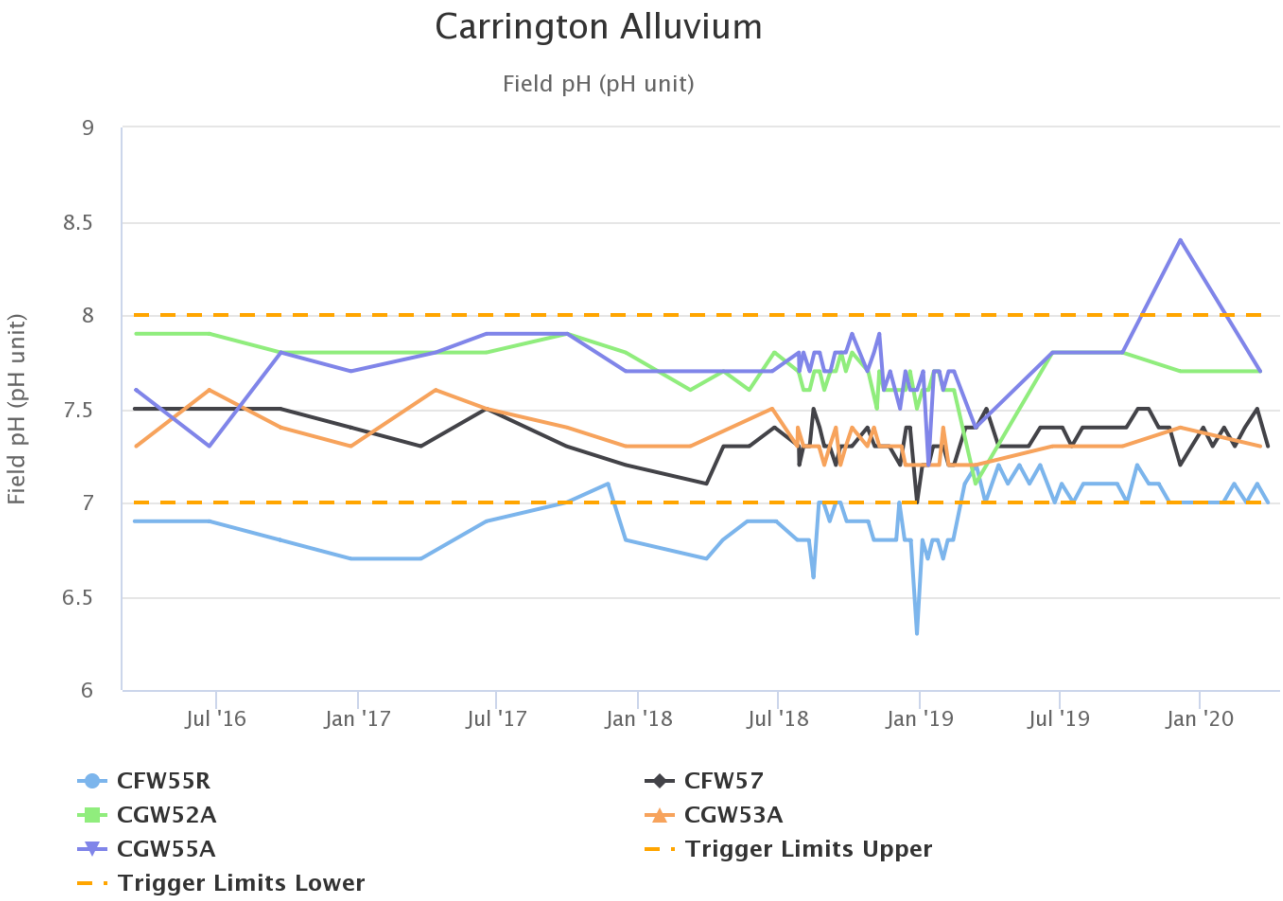


Figure 27: Carrington Alluvium pH Trend – March 2020

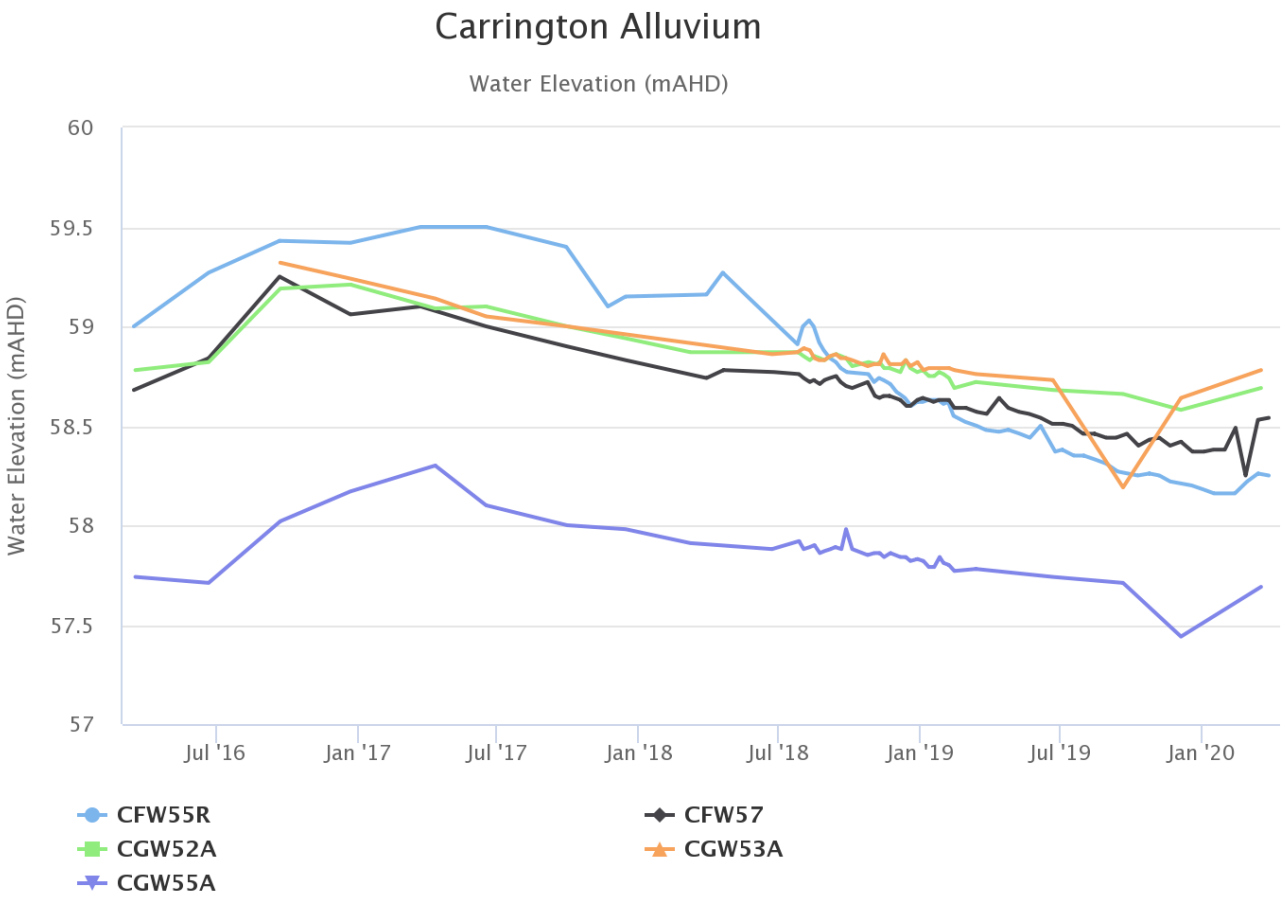
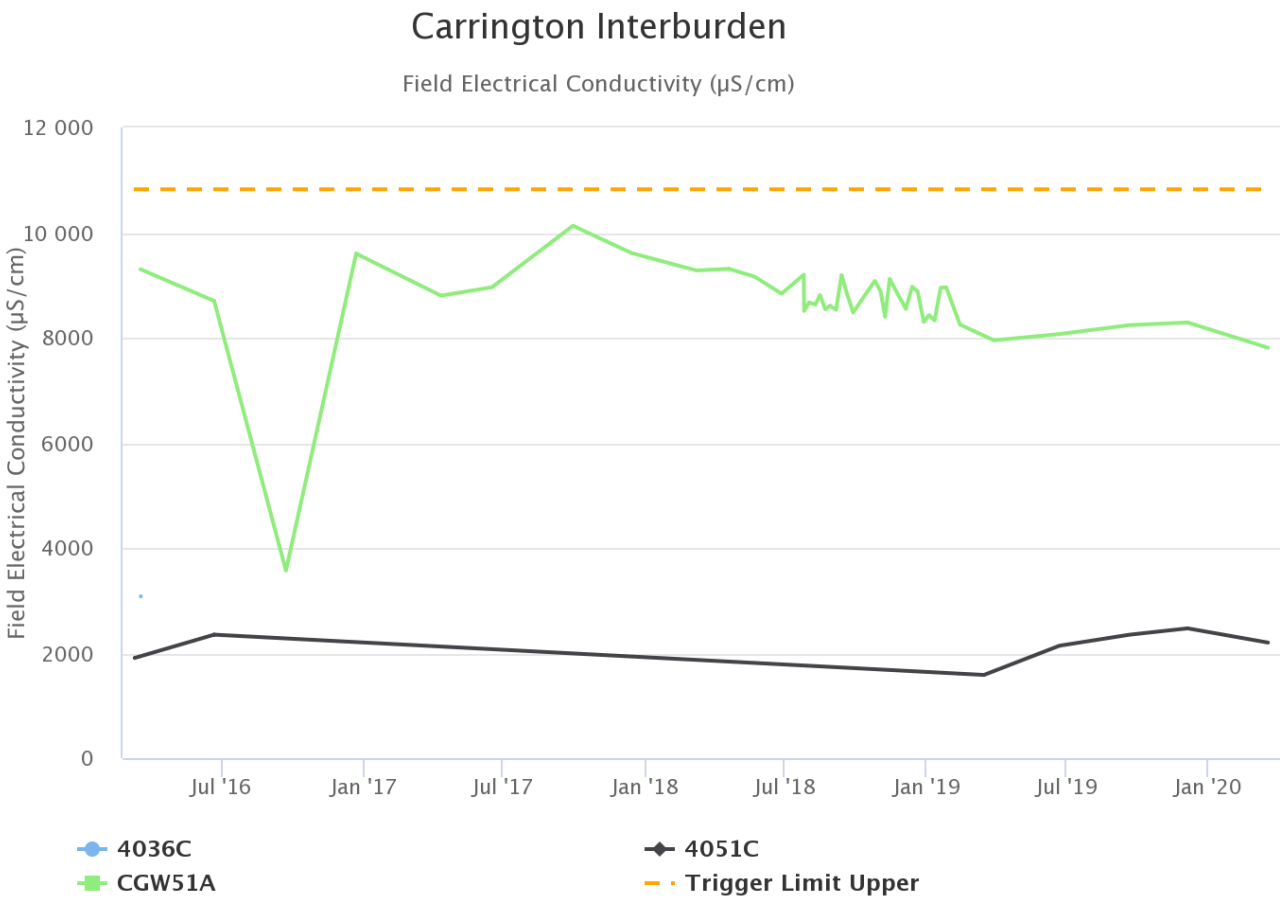
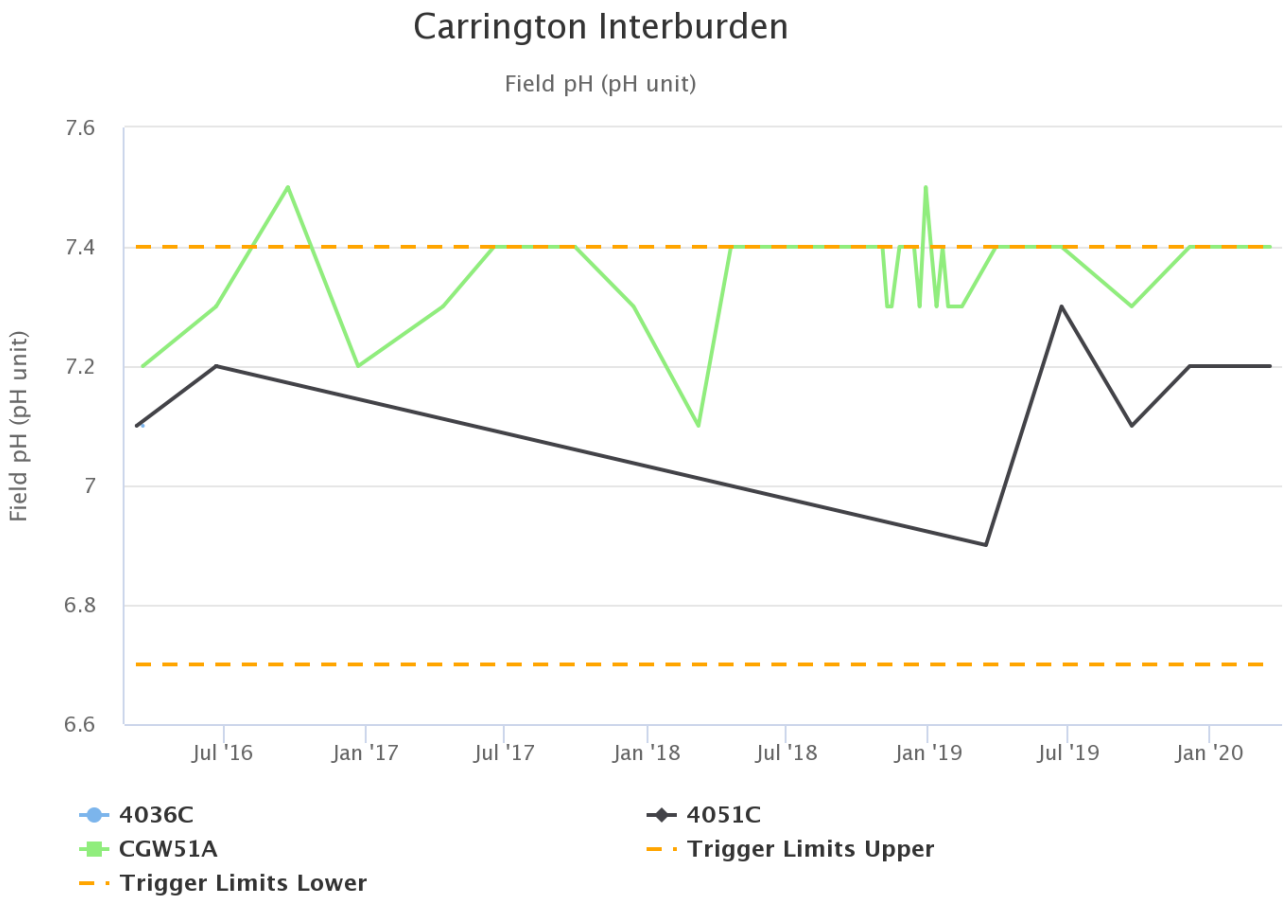


Figure 28: Carrington Alluvium Standing Water Level – March 2020



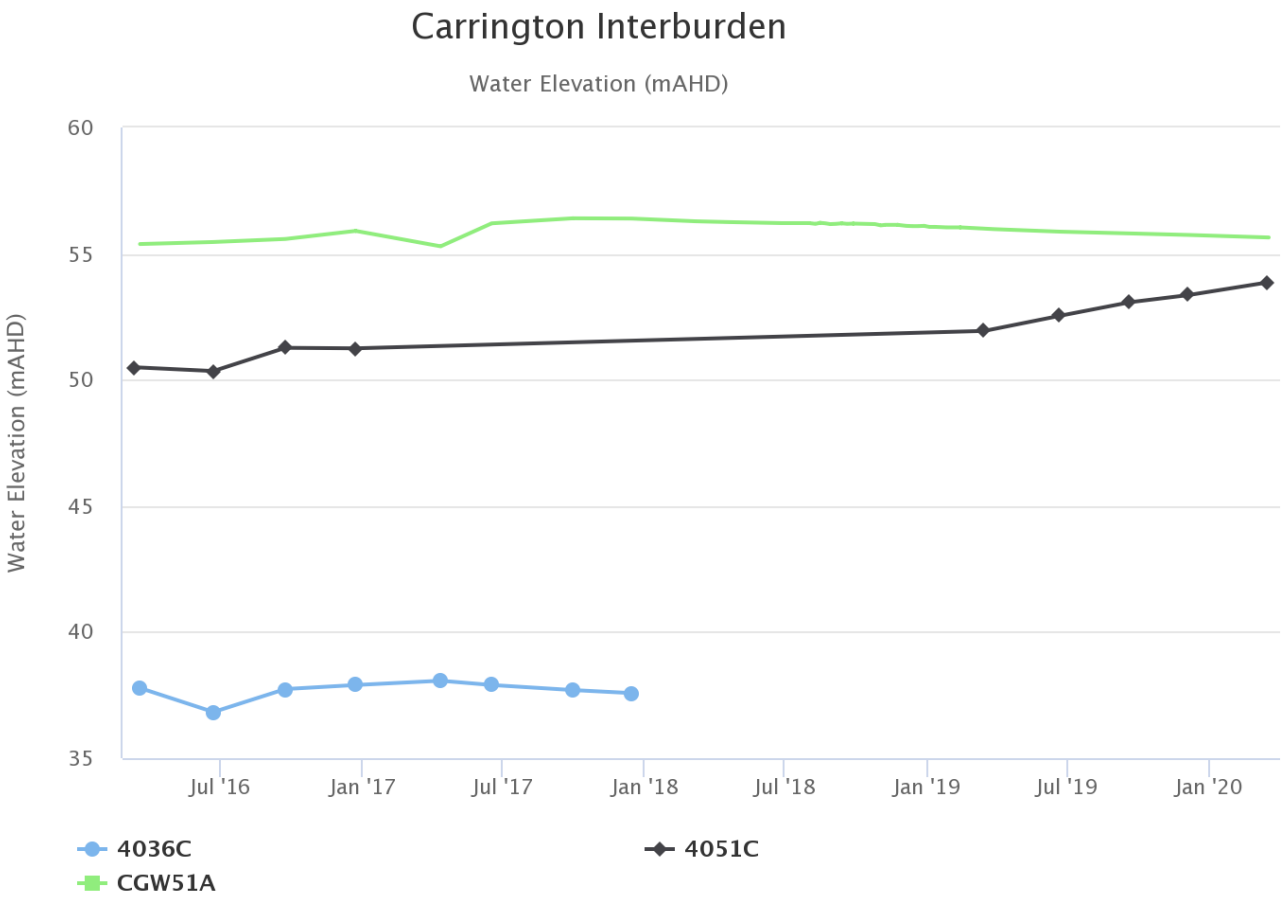
Note that 4036C has been dry since June 2018

Figure 29: Carrington Interburden Electrical Conductivity Trend – March 2020



Note that 4036C has been dry since June 2018

Figure 30: Carrington Interburden pH Trend – March 2020



Note that 4036C has been dry since June 2018

Figure 31: Carrington Interburden Standing Water Level – March 2020

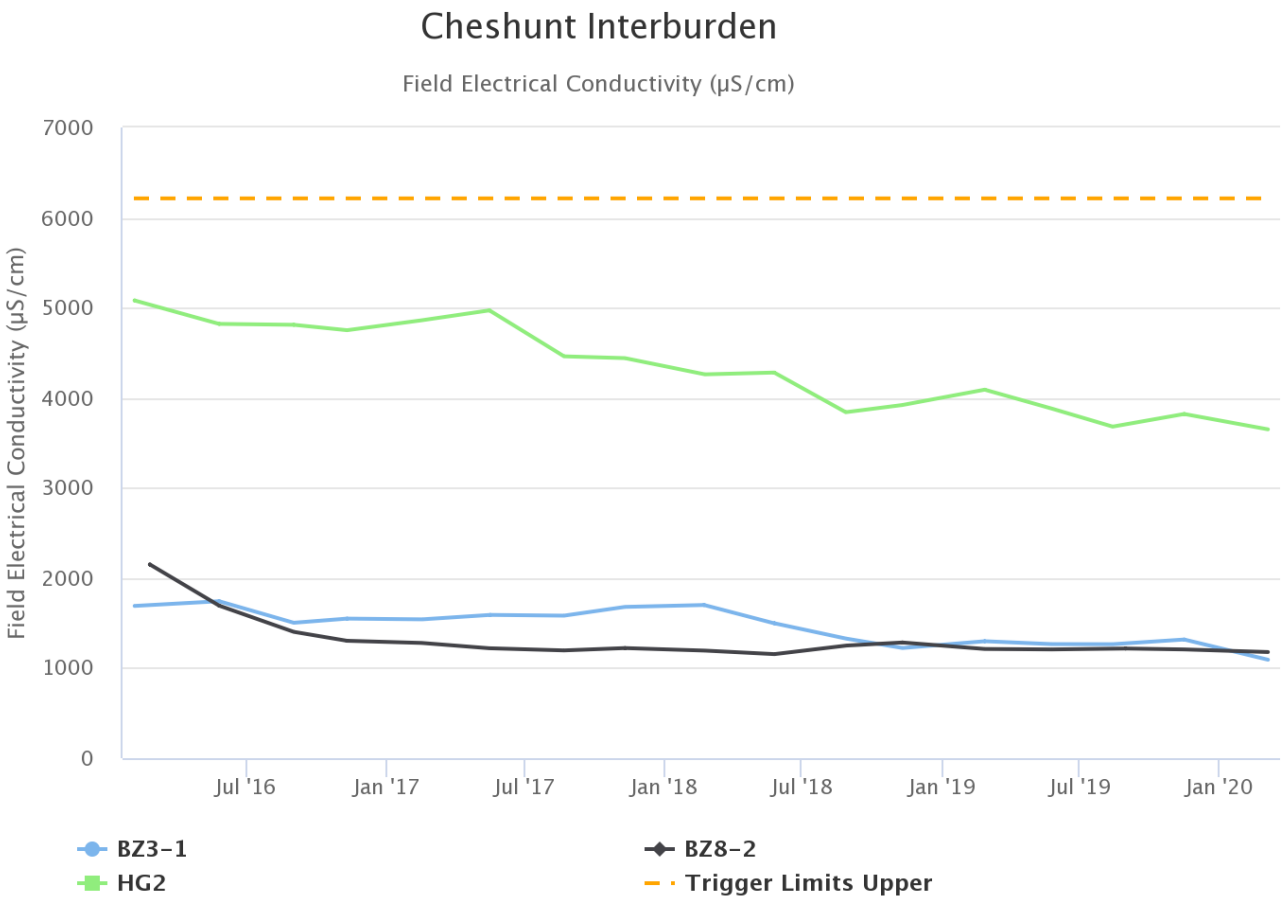


Figure 32: Cheshunt Interburden Electrical Conductivity Trend – March 2020

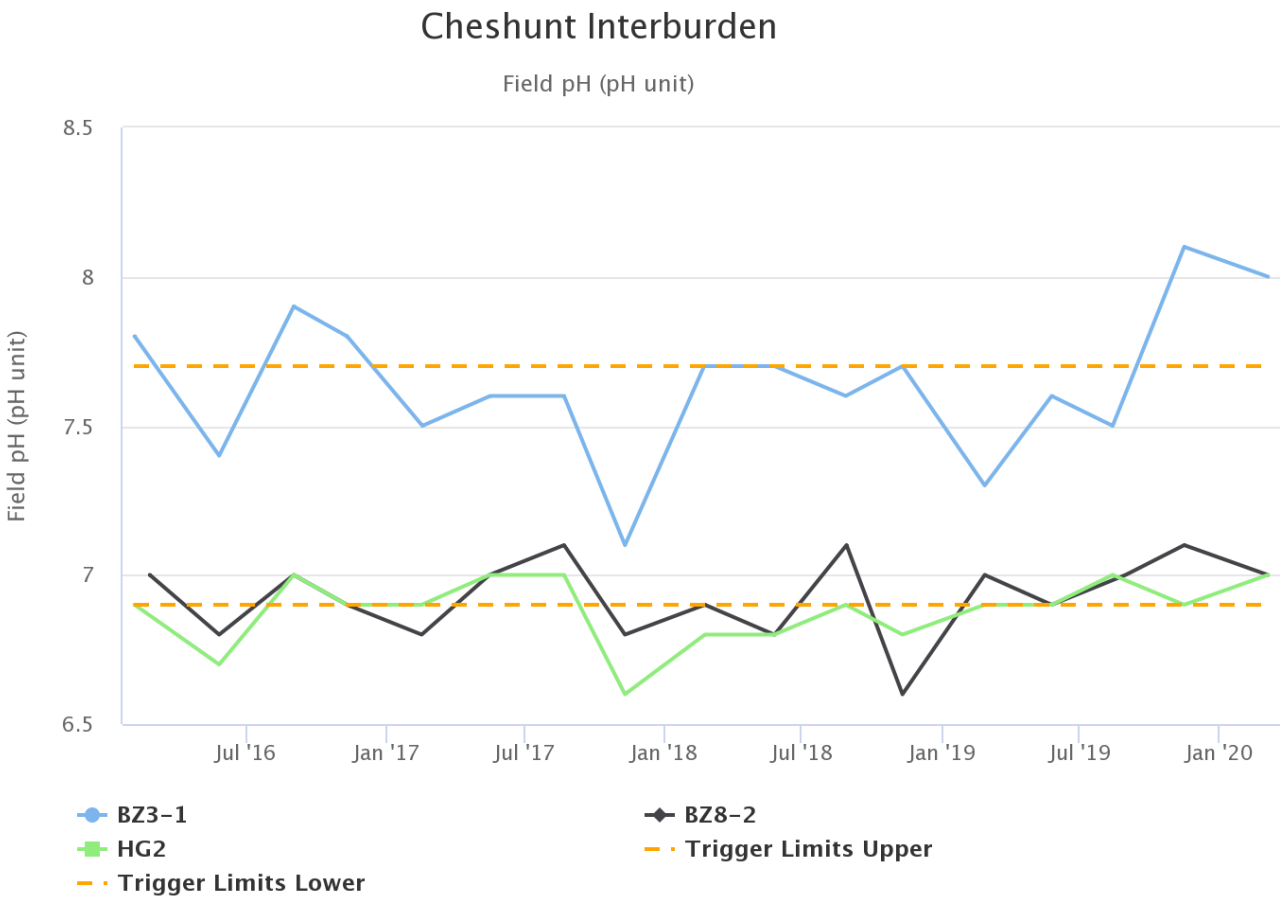


Figure 33: Cheshunt Interburden pH Trend – March 2020

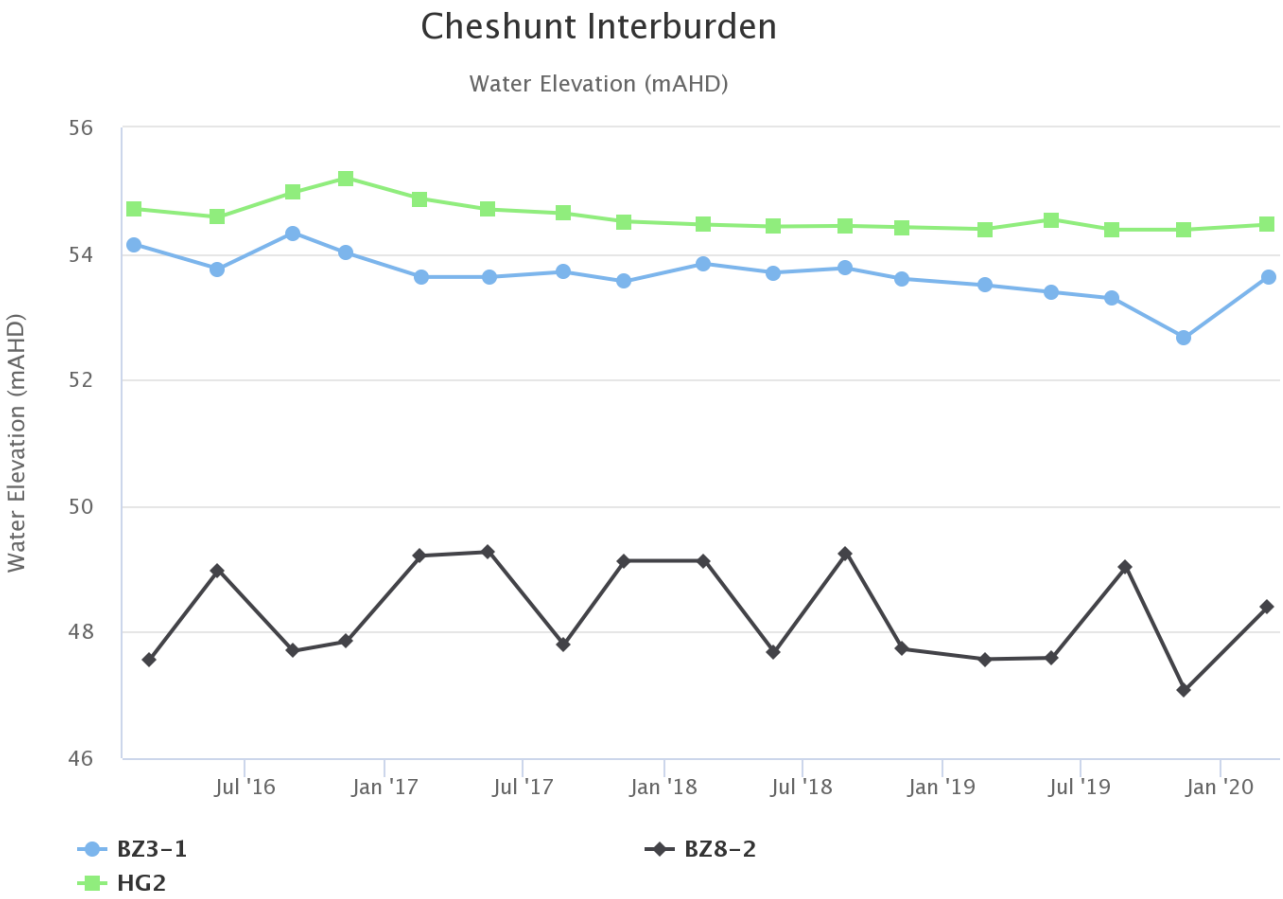


Figure 34: Cheshunt Interburden Standing Water Level – March 2020

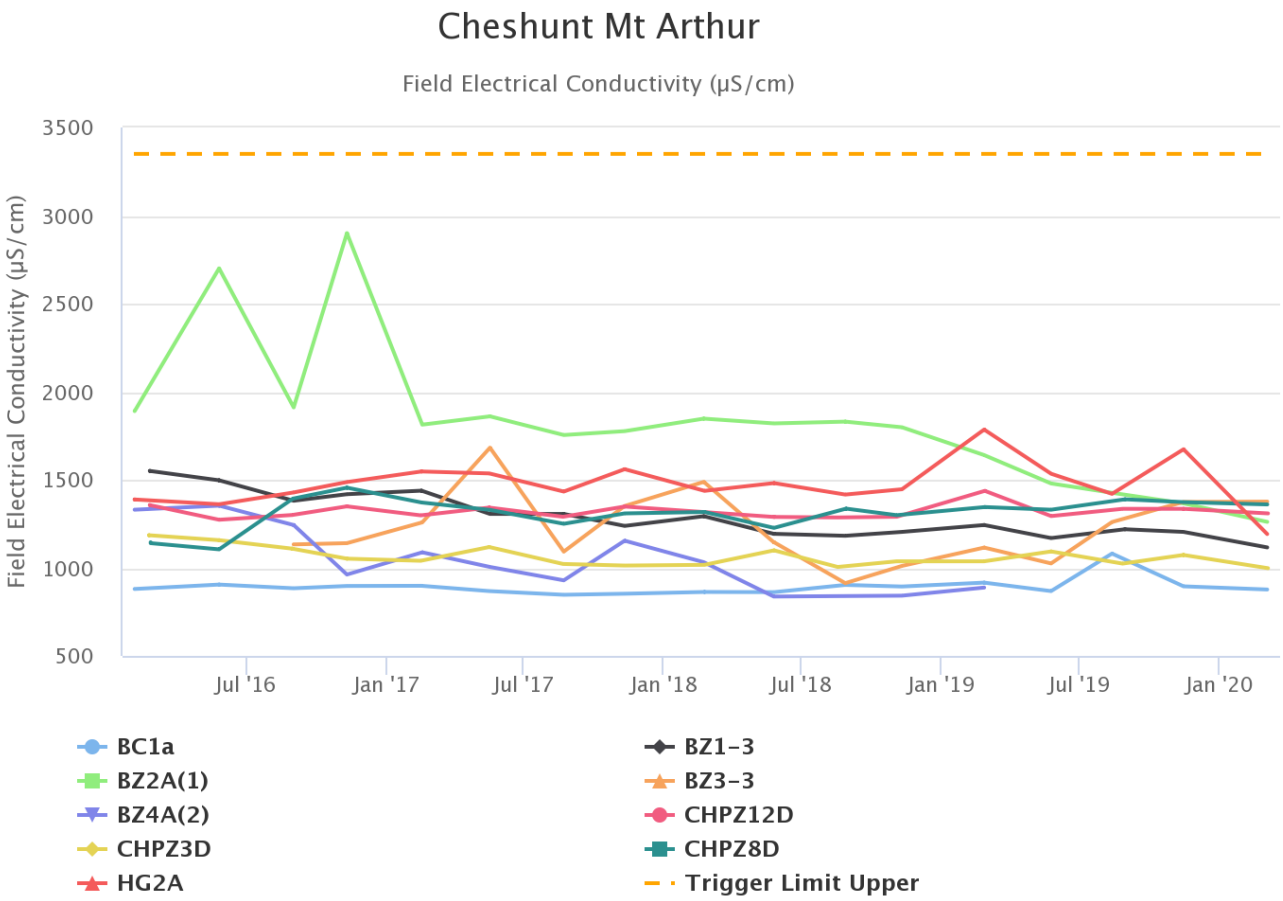
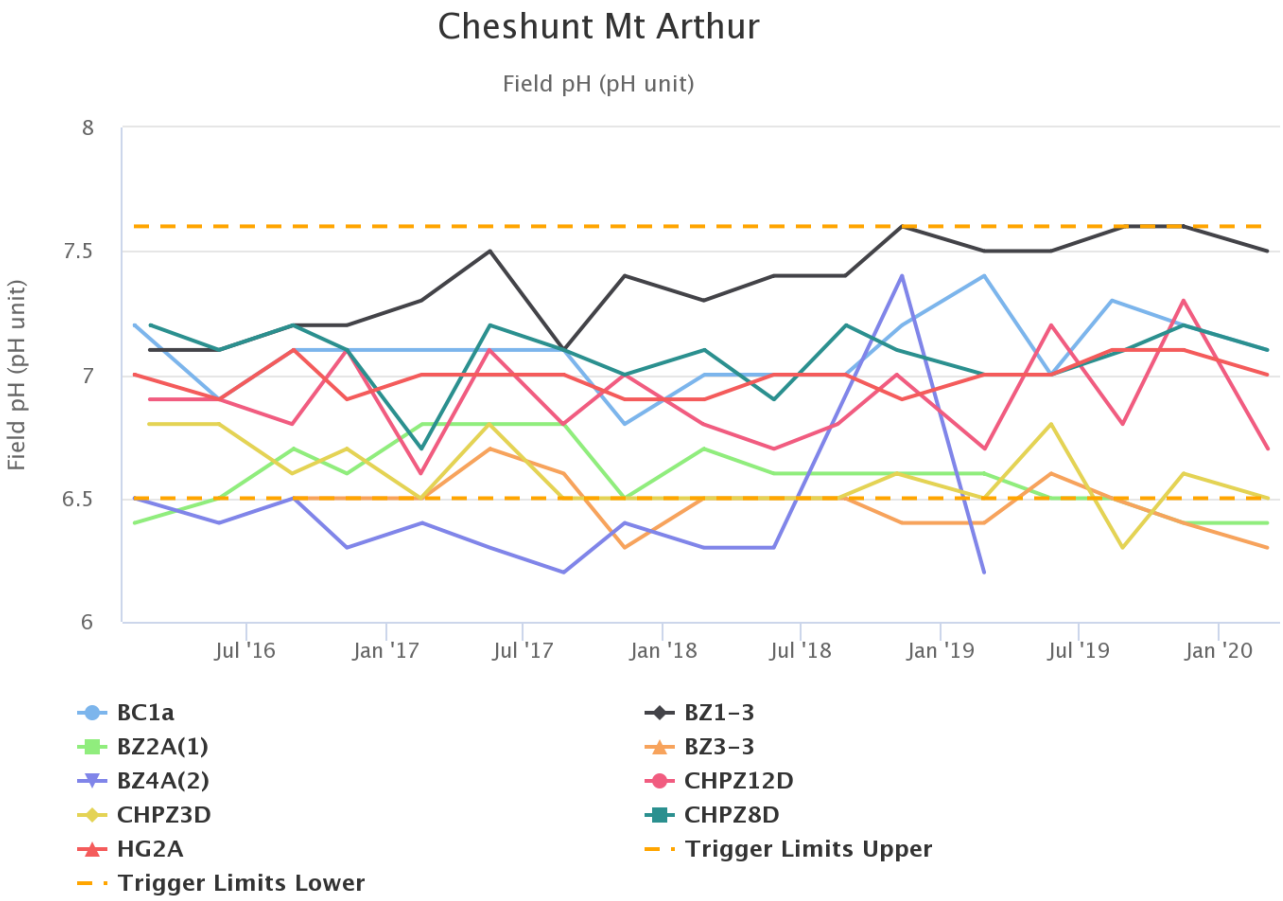


Figure 35: Cheshunt Mt Arthur Electrical Conductivity Trend – March 2020



Note insufficient water recorded for November 2019 sample

Figure 36: Cheshunt Mt Arthur pH Trend – March 2020

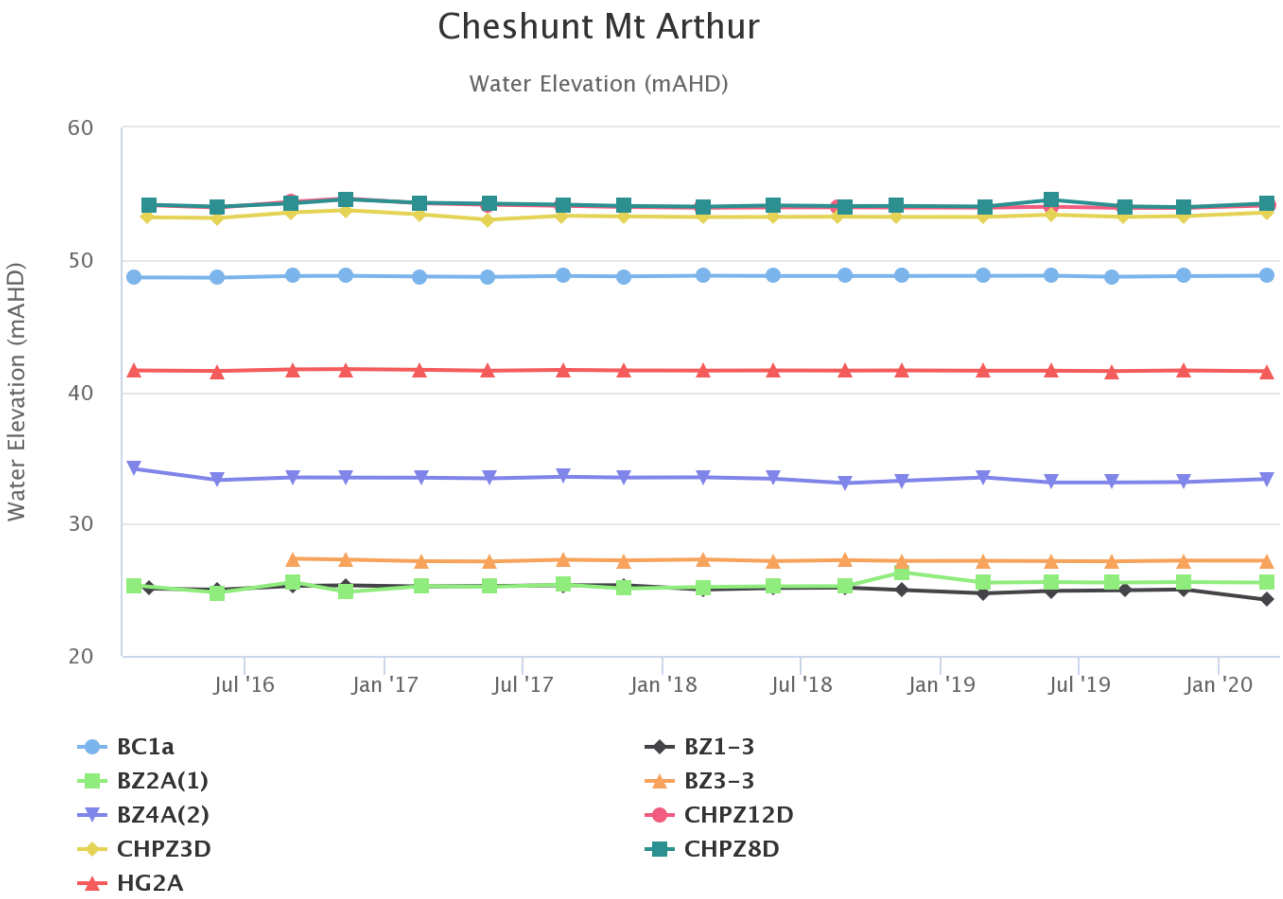


Figure 37: Cheshunt Mt Arthur Standing Water Level – March 2020

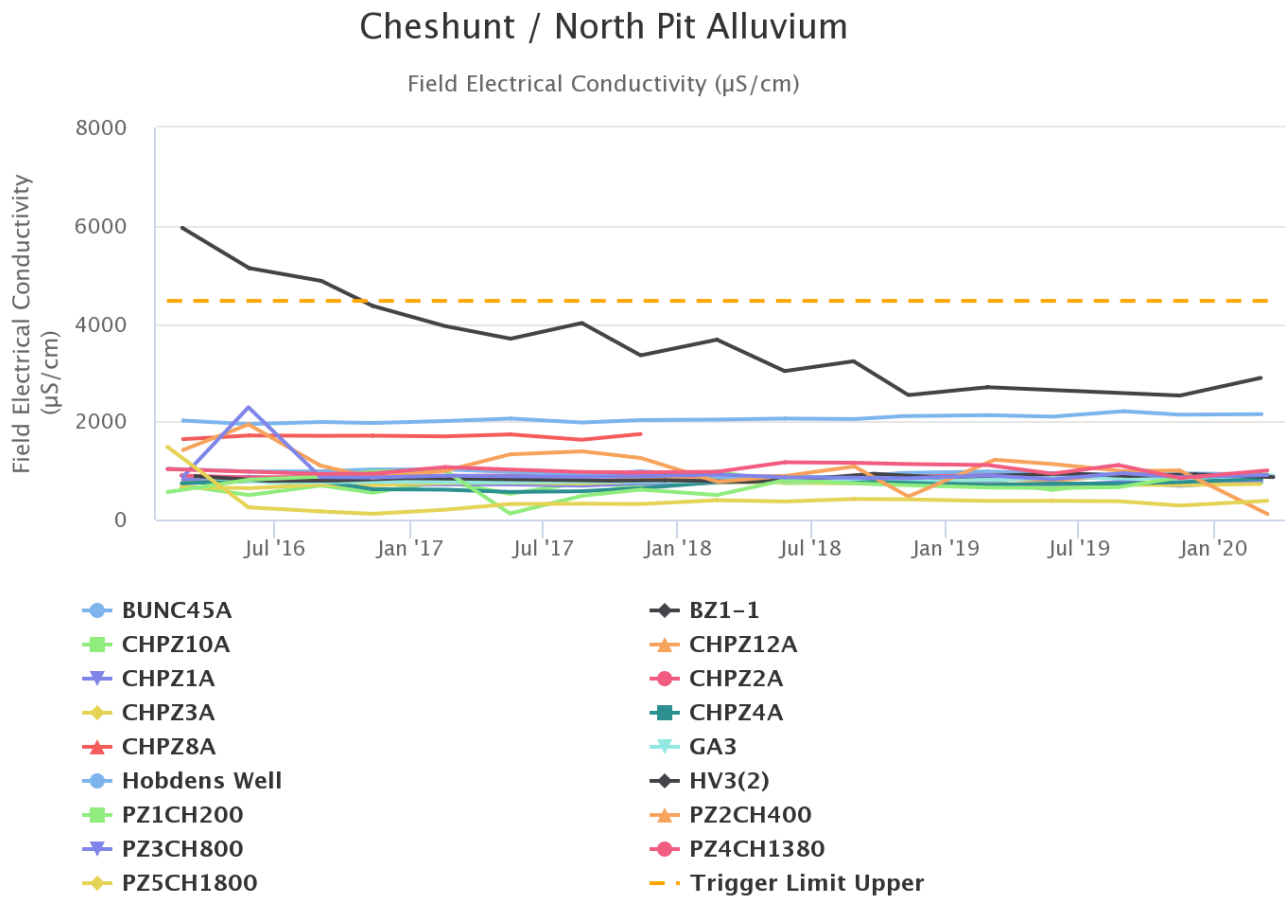


Figure 38: Cheshunt / North Pit Alluvium Electrical Conductivity Trend – March 2020

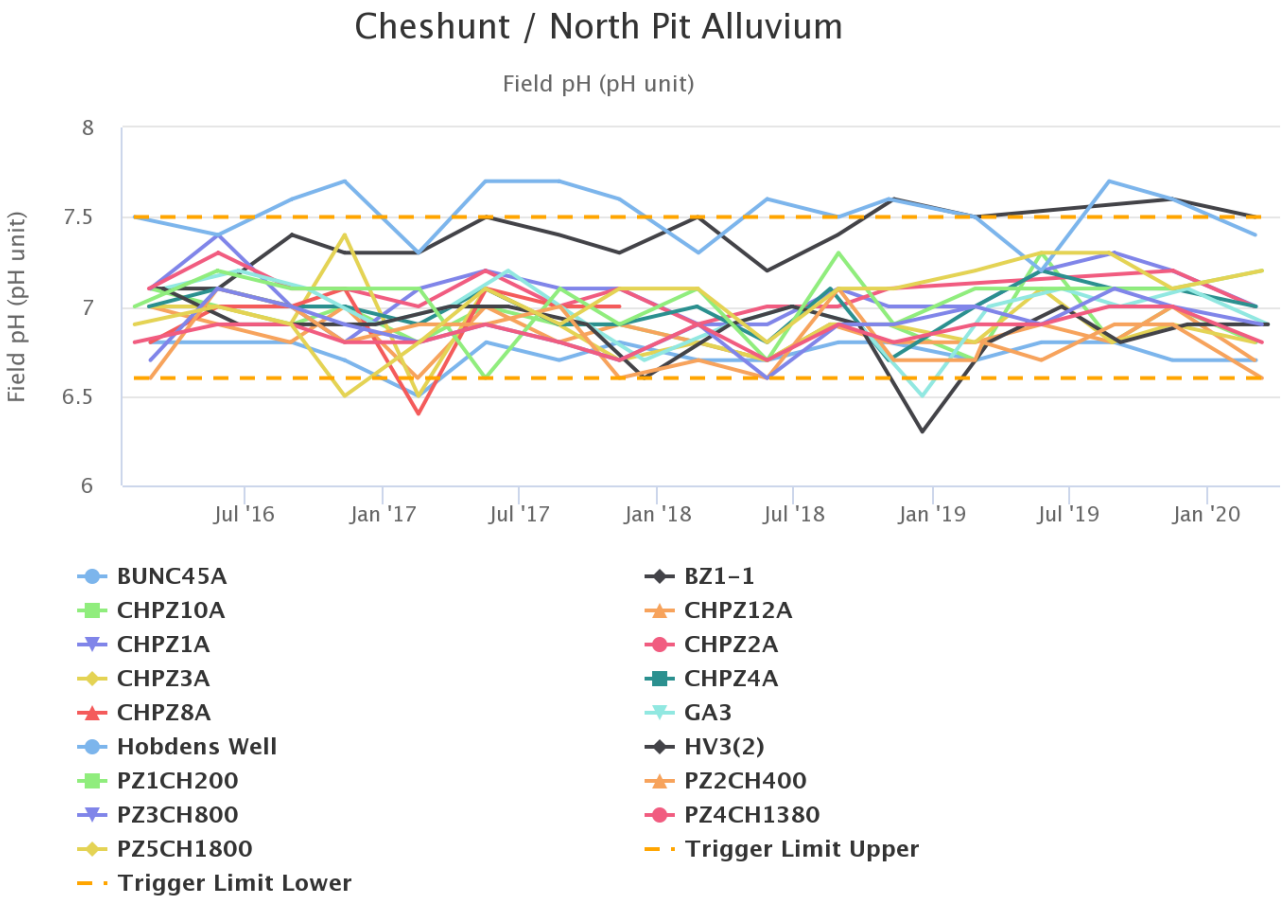


Figure 39: Cheshunt / North Pit Alluvium pH Trend – March 2020

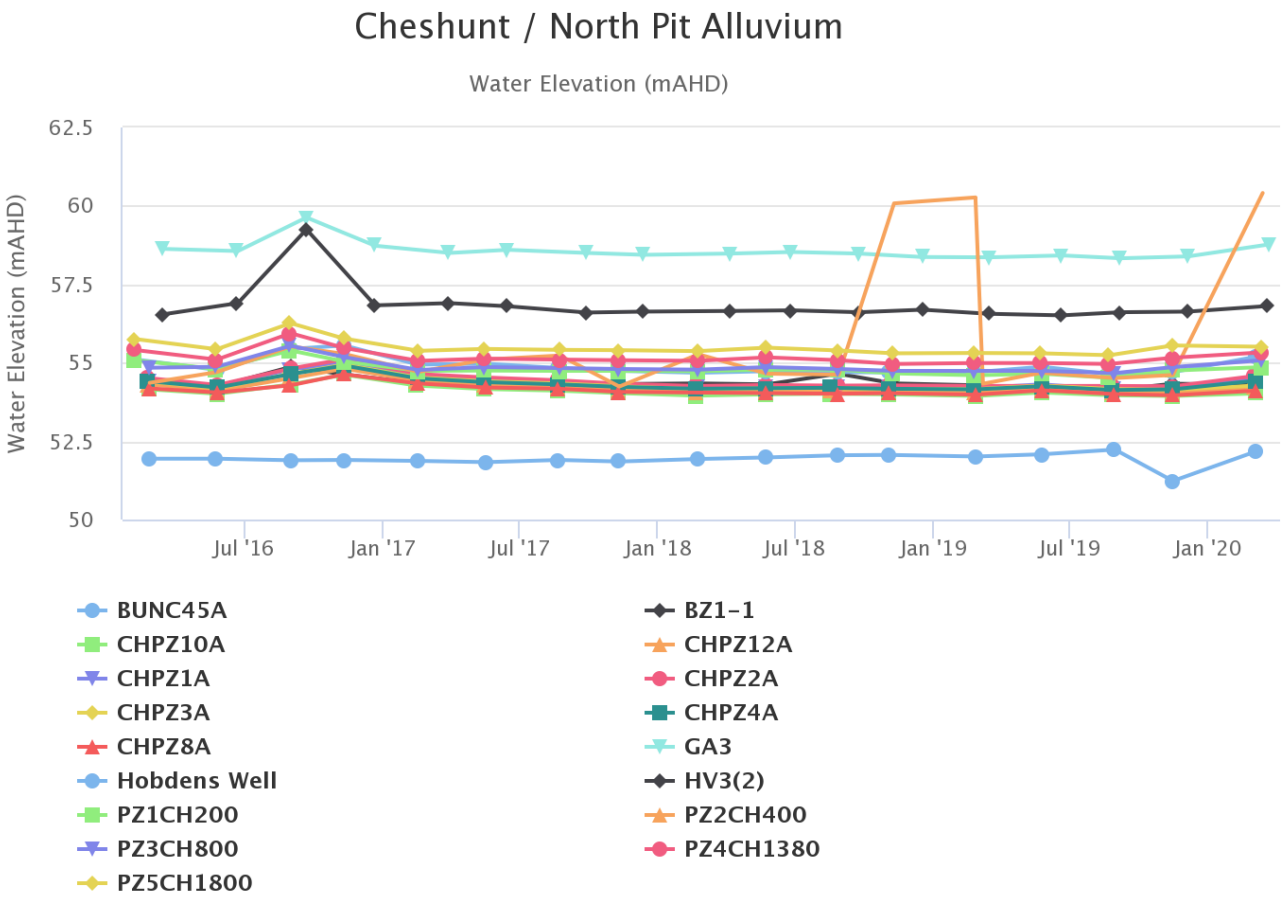


Figure 40: Cheshunt / North Pit Alluvium Standing Water Level – March 2020

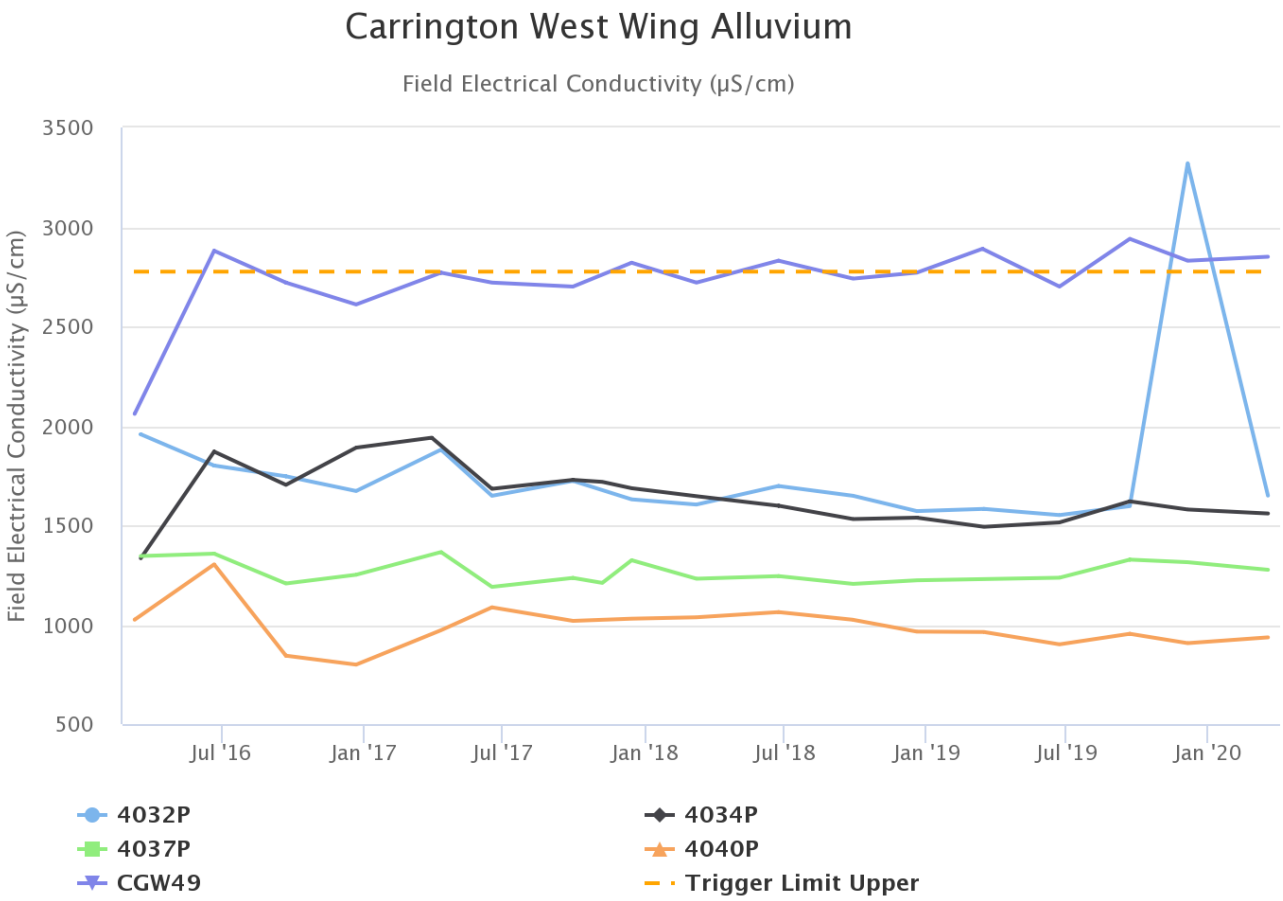


Figure 41: Carrington West Wing Alluvium Electrical Conductivity Trend – March 2020

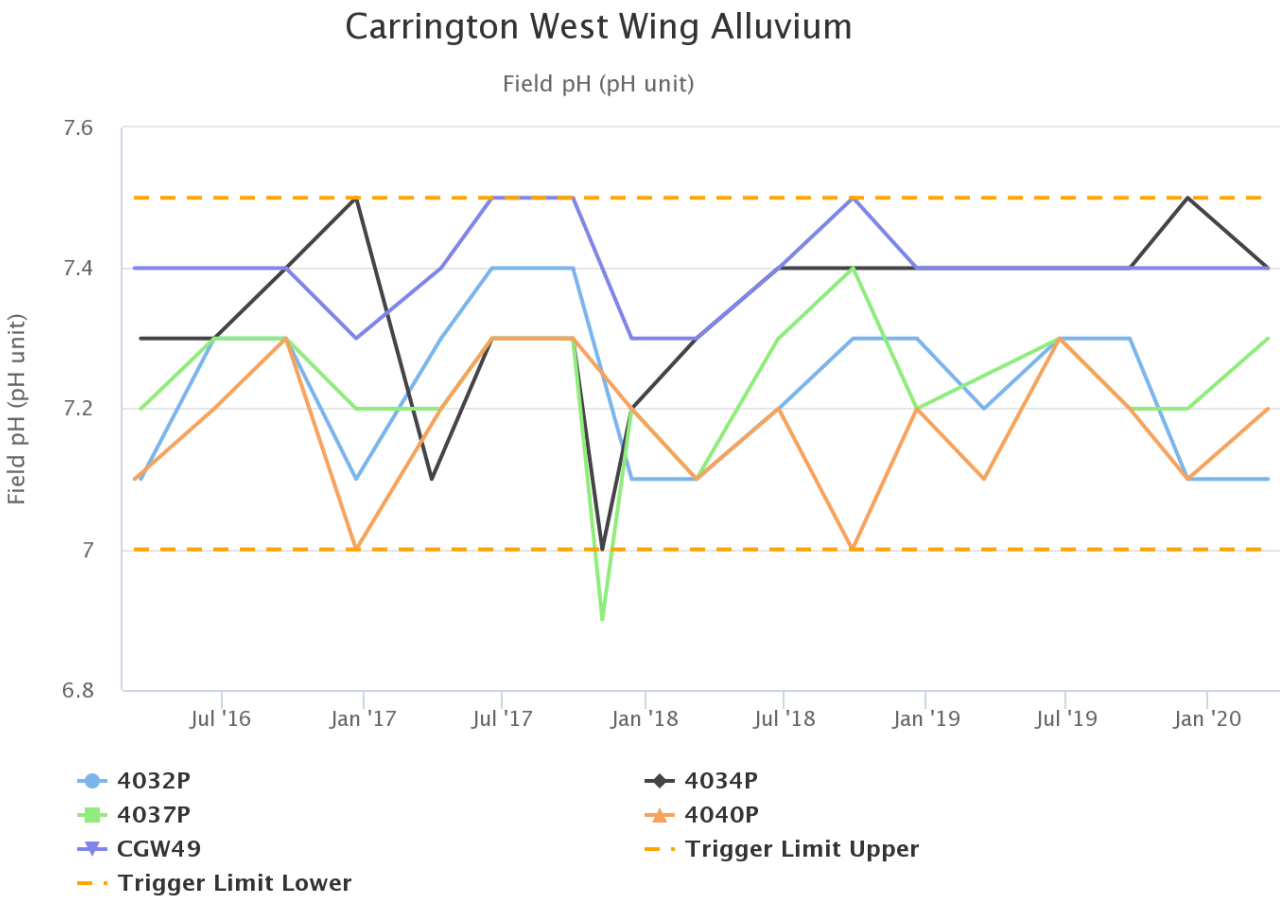


Figure 42: Carrington West Wing Alluvium pH Trend – March 2020

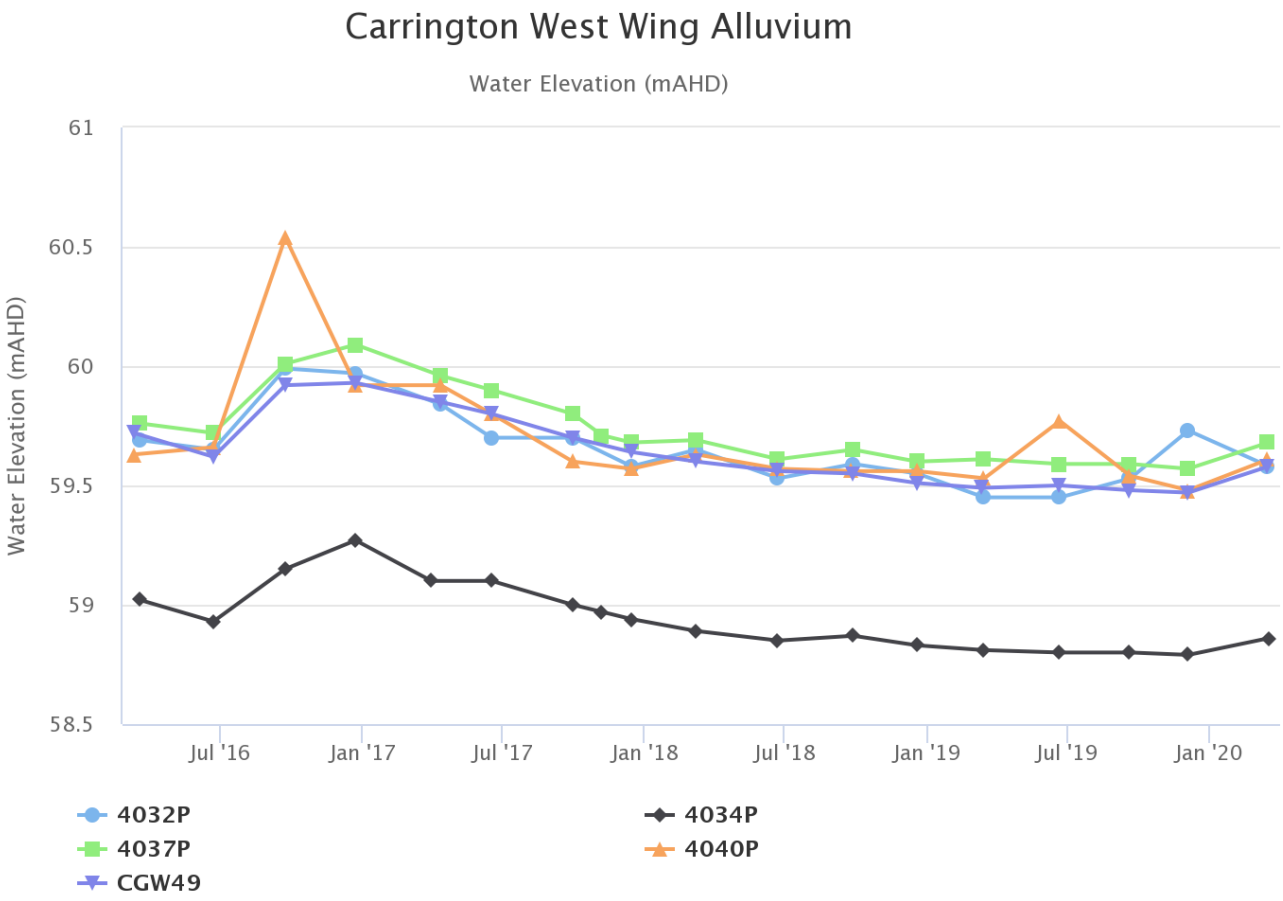


Figure 43: Carrington West Wing Alluvium Standing Water Level – March 2020

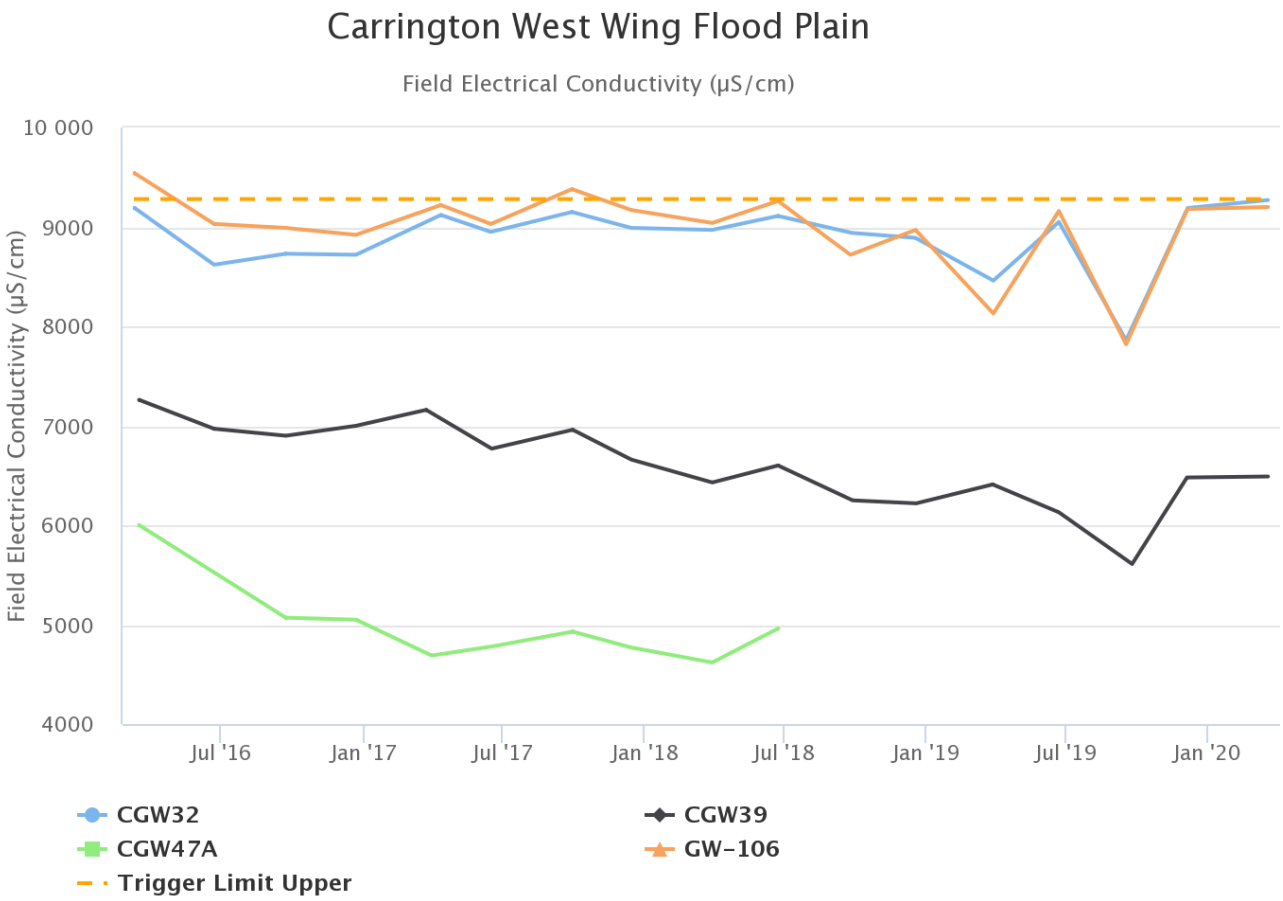
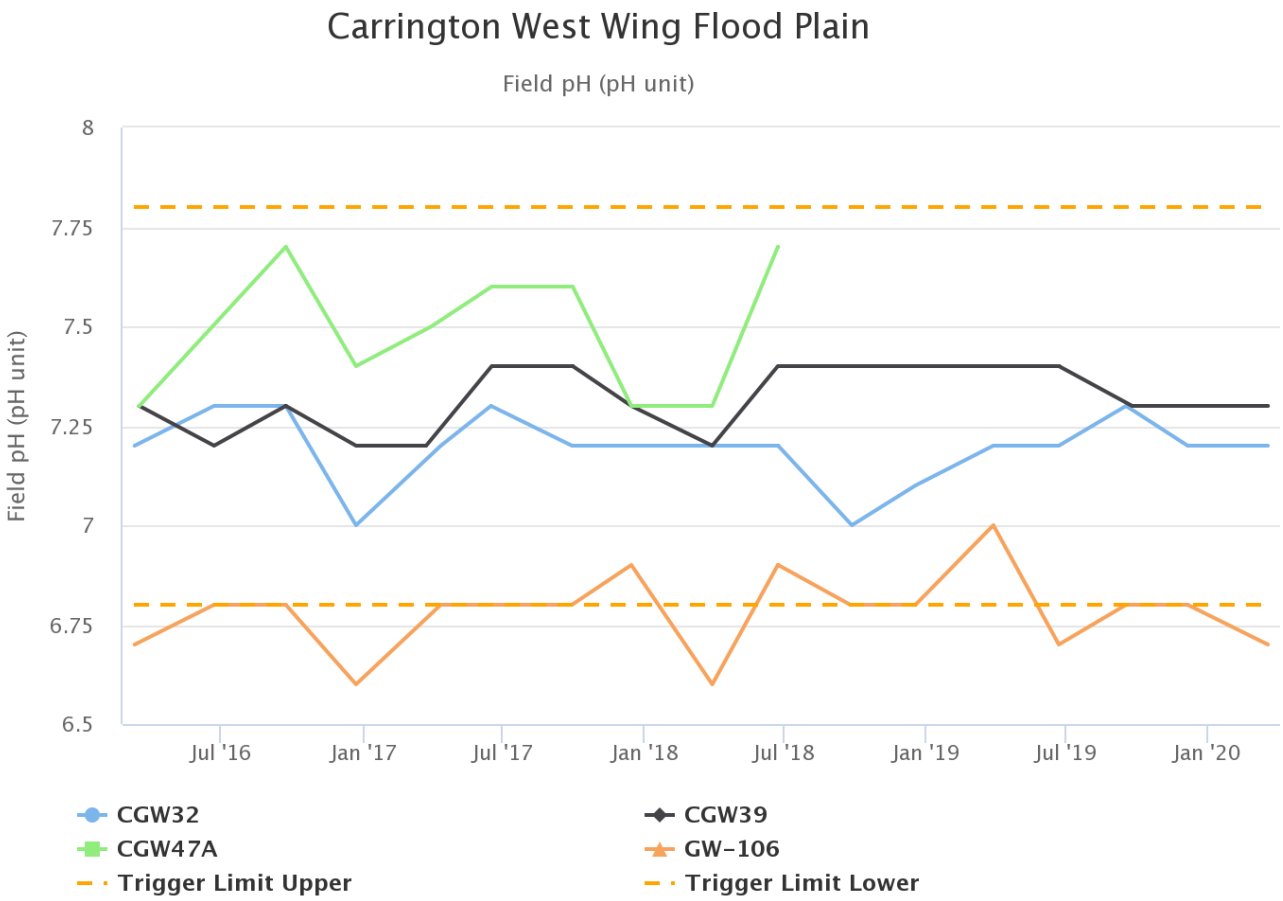


Figure 44: Carrington West Wing Flood Plain Electrical Conductivity Trend – March 2020



Note that insufficient water recorded for December sample for CGW47A

Figure 45: Carrington West Wing Flood Plain pH Trend – March 2020

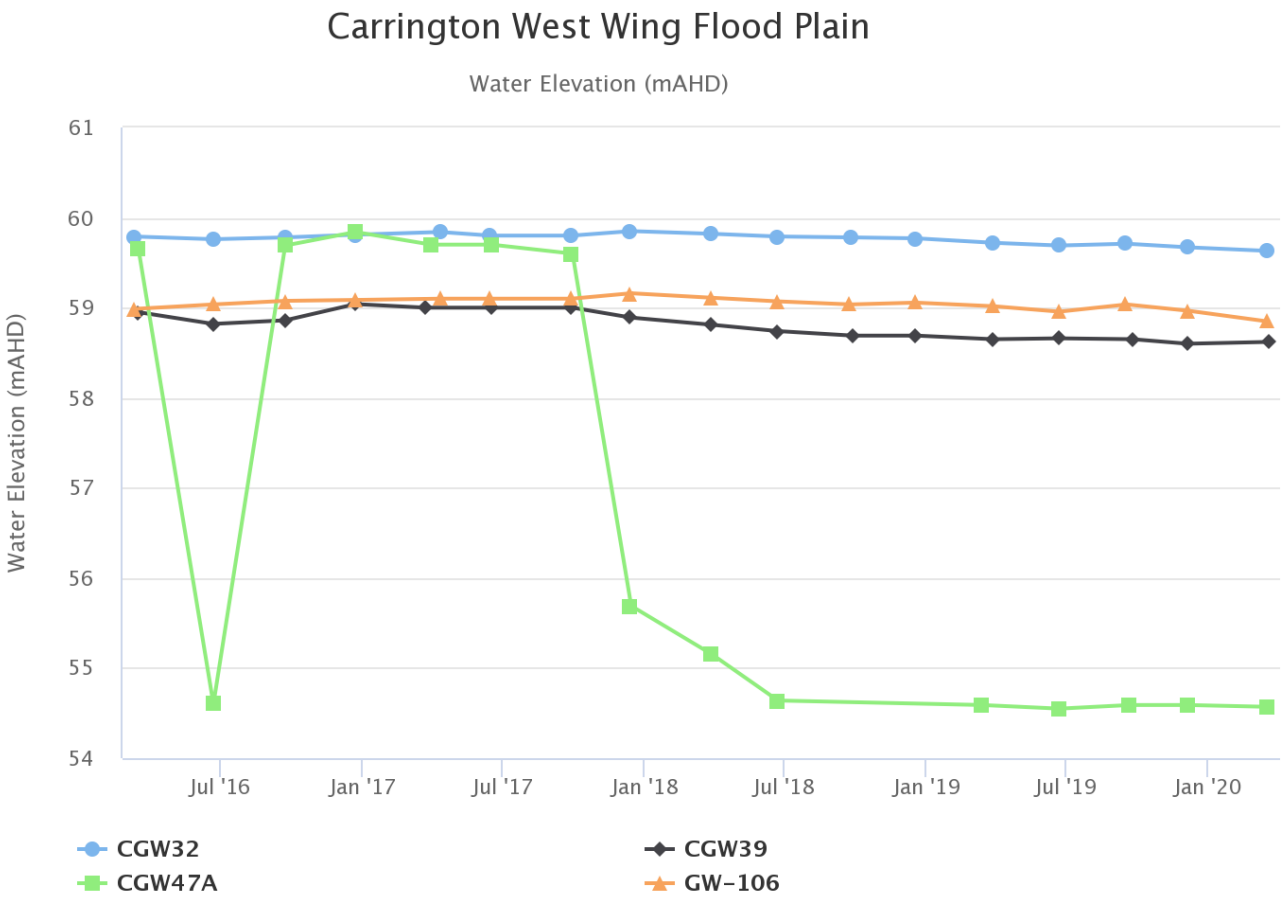
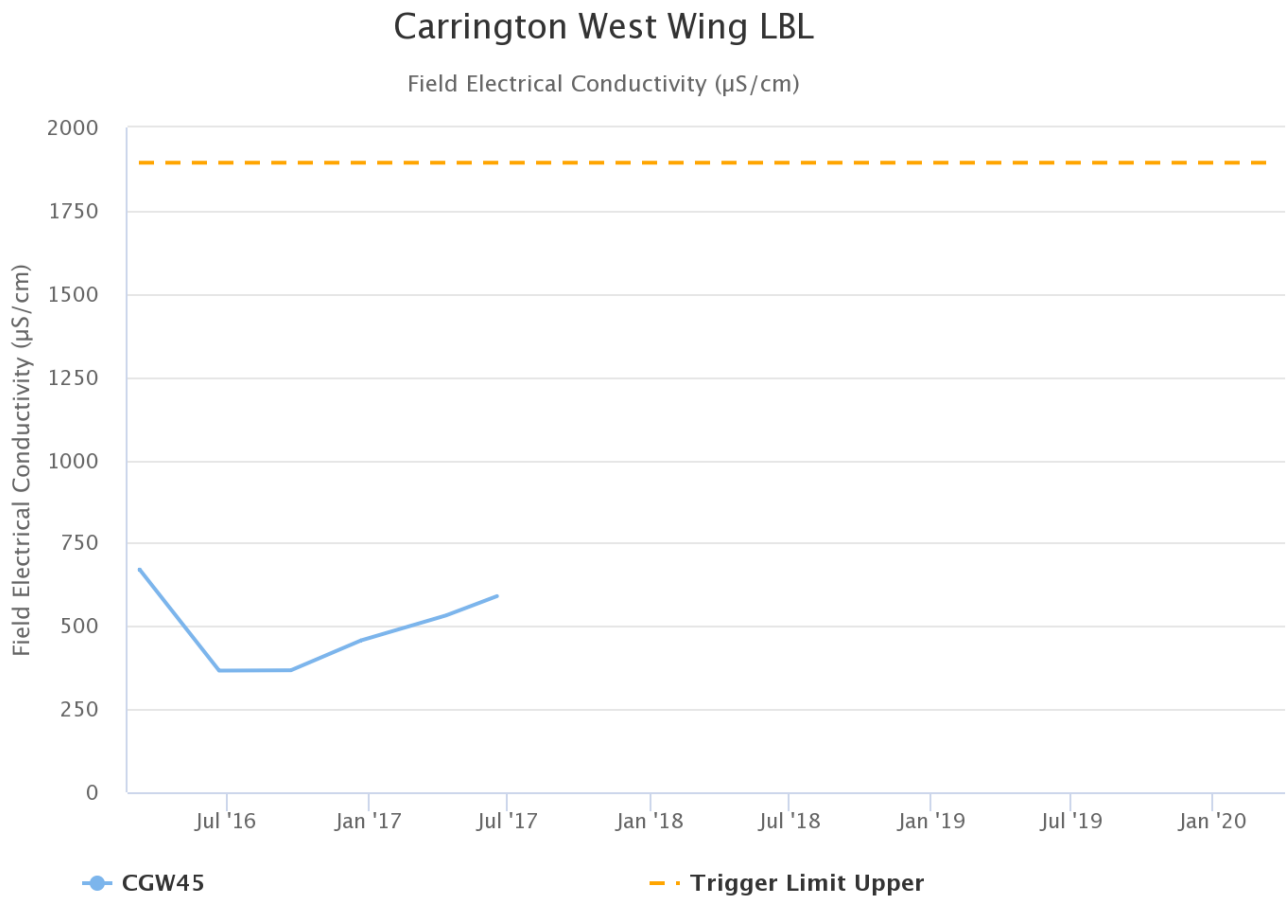
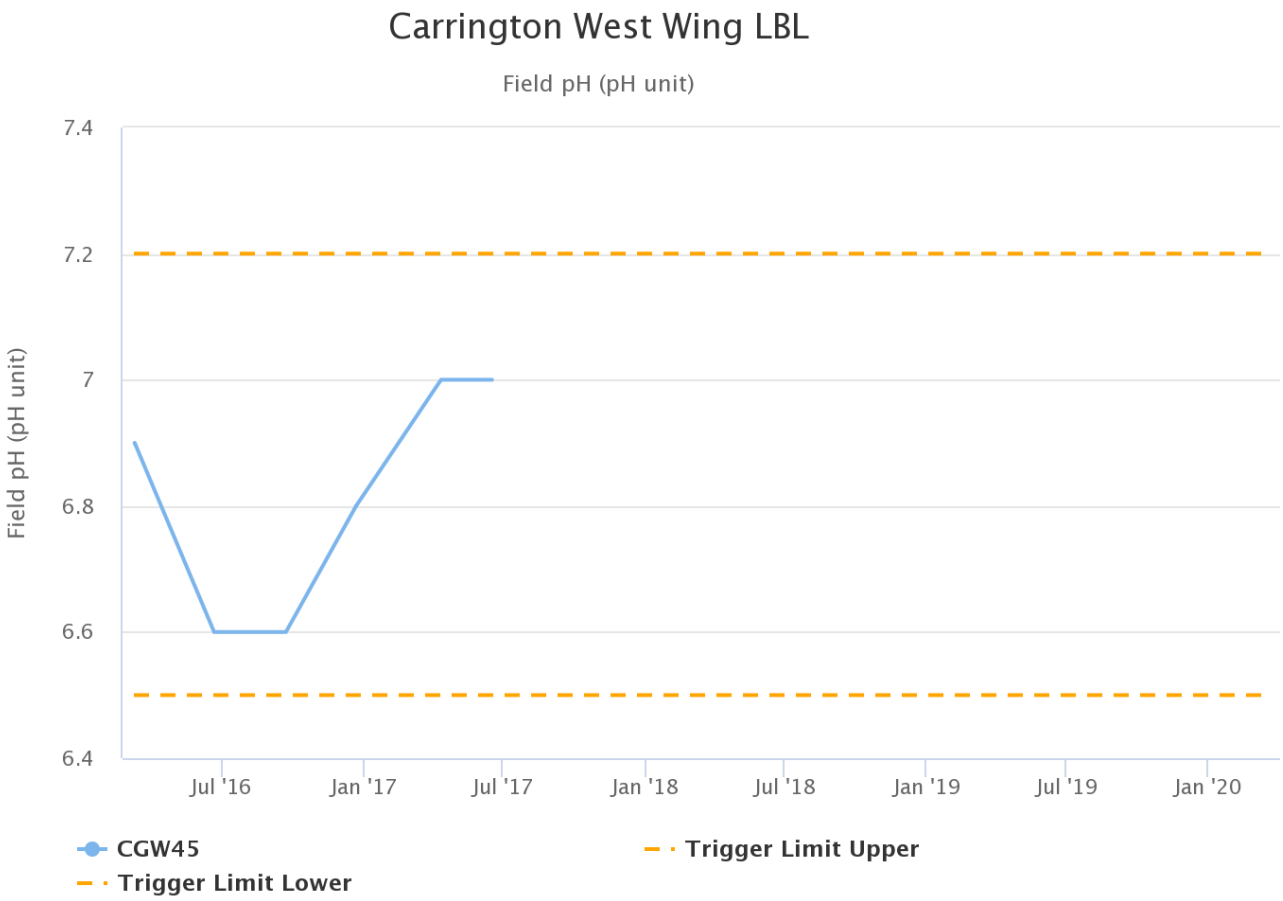


Figure 46: Carrington West Wing Flood Plain Standing Water Level – March 2020



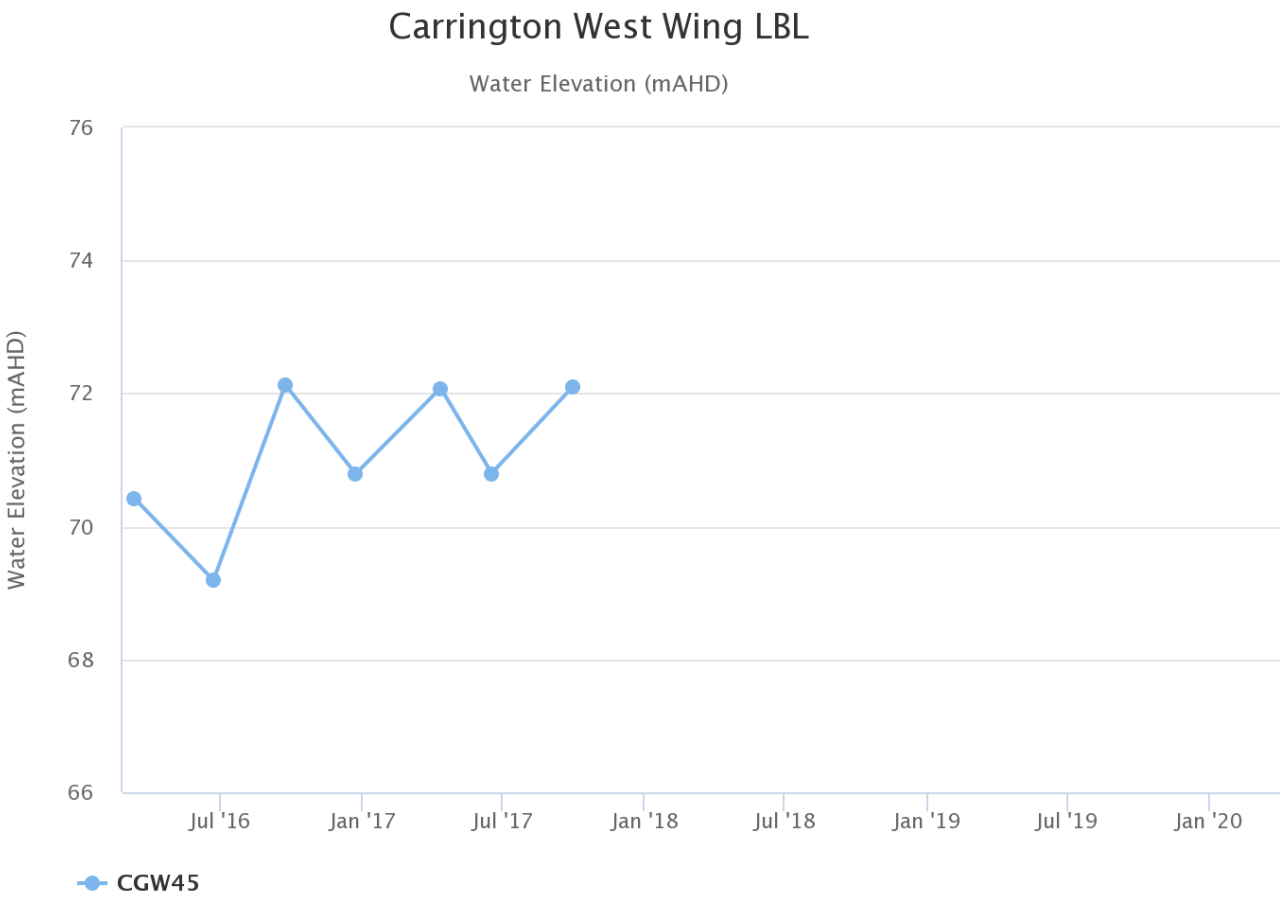
*CGW45 has been blocked since June 2017 hence why no data is shown in Figure 47 after this date.

Figure 47: Carrington West Wing LBL Electrical Conductivity Trend – March 2020



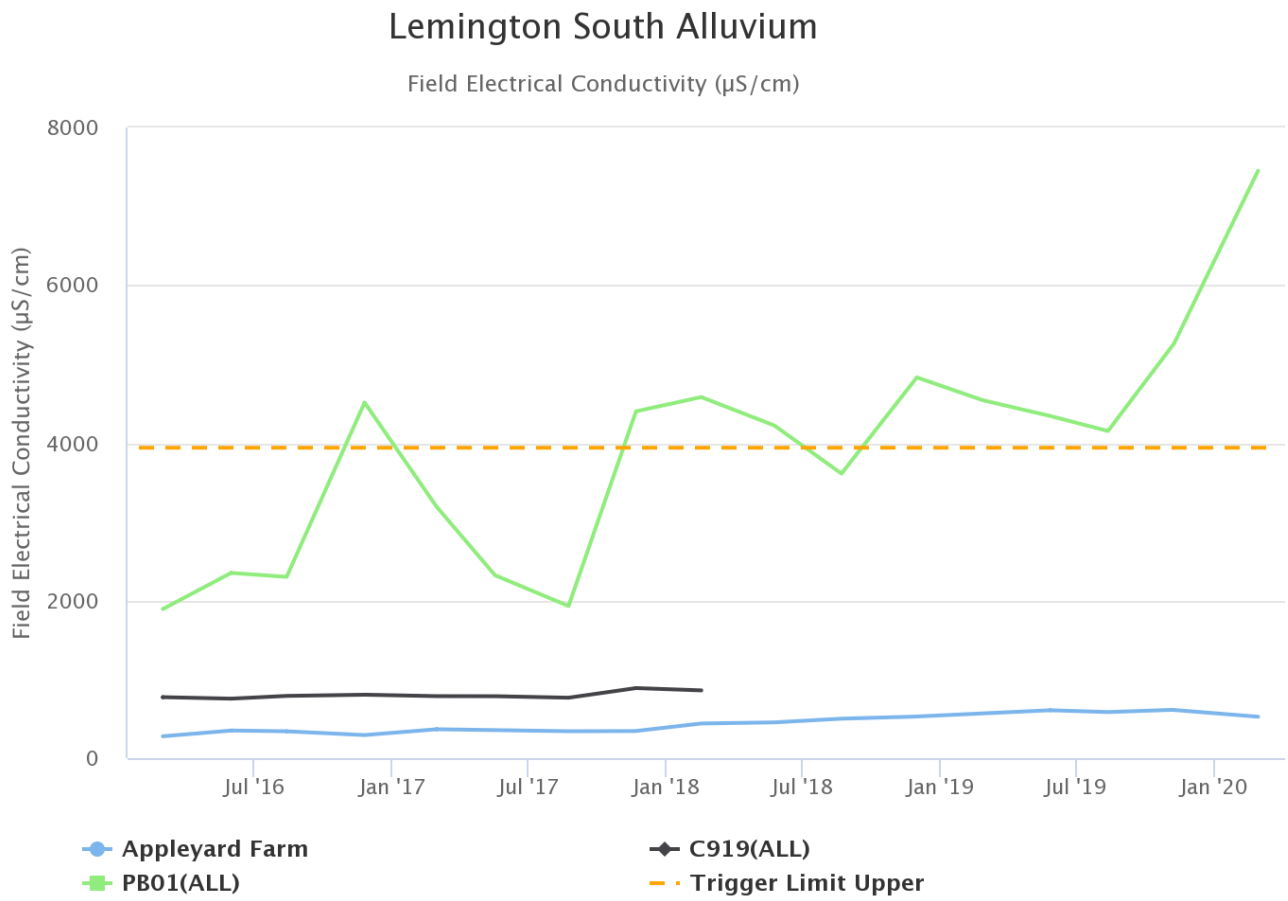
*CGW45 has been blocked since June 2017 hence why no data is shown Figure 48 after this date.

Figure 48: Carrington West Wing LBL pH Trend – March 2020



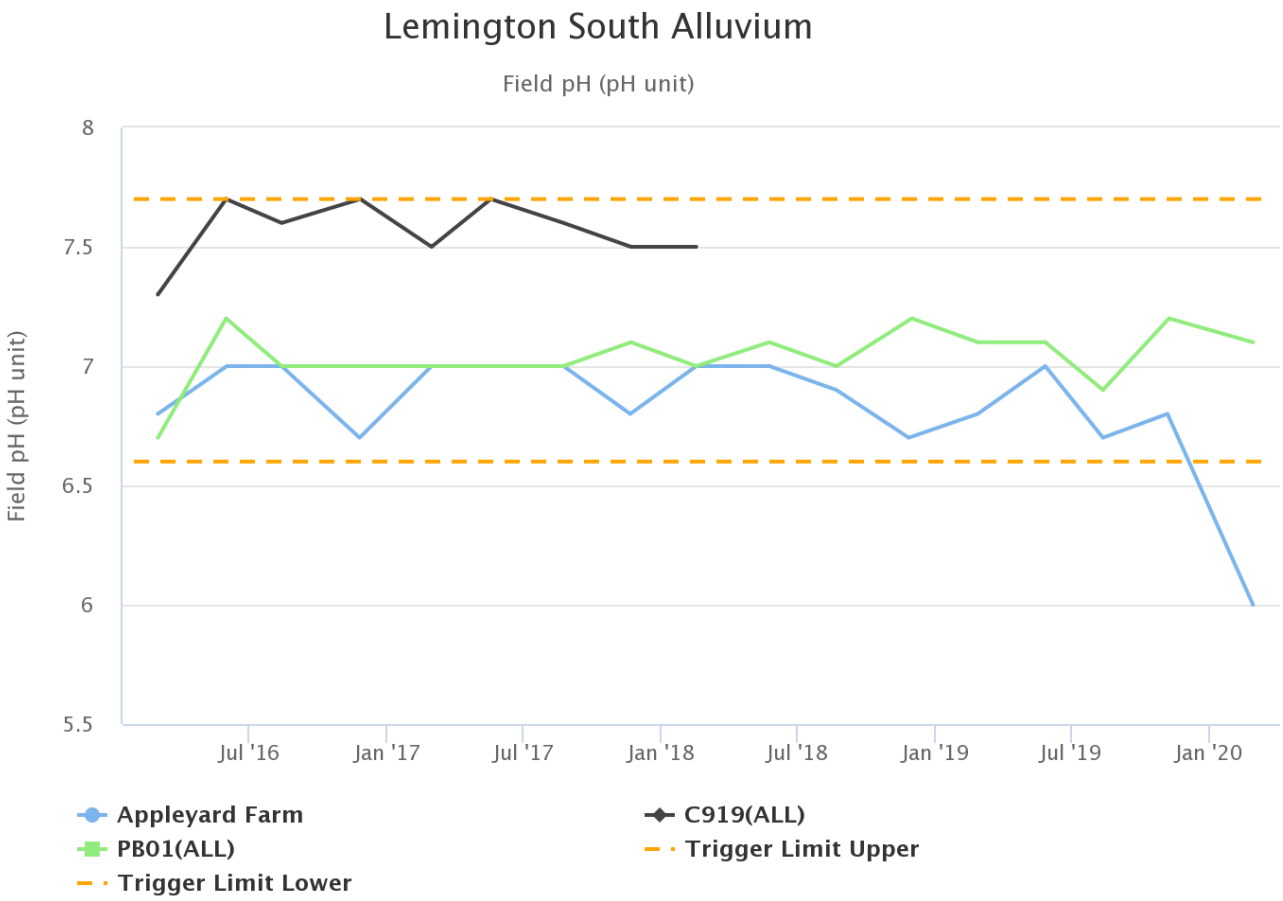
*CGW45 has been blocked since June 2017 hence why no data is shown Figure 49 after this date.

Figure 49: Carrington West Wing LBL Standing Water Level – March 2020



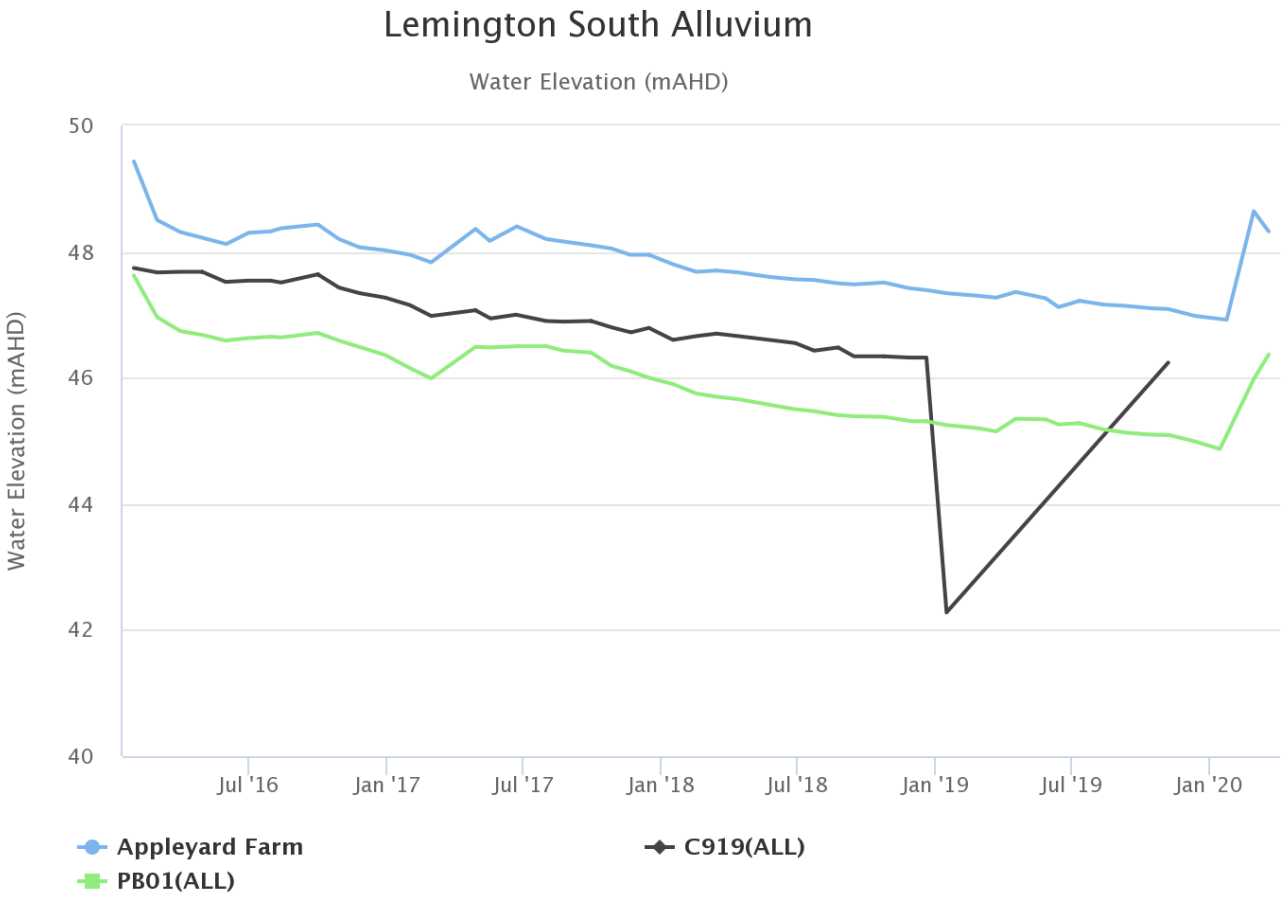
Note that C919 (ALL) is dry

Figure 50: Lemington South Alluvium Electrical Conductivity Trend – March 2020



Note that C919 (ALL) is dry

Figure 51: Lemington South Alluvium pH Trend – March 2020



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

Figure 52: Lemington South Alluvium Standing Water Level Trend – March 2020

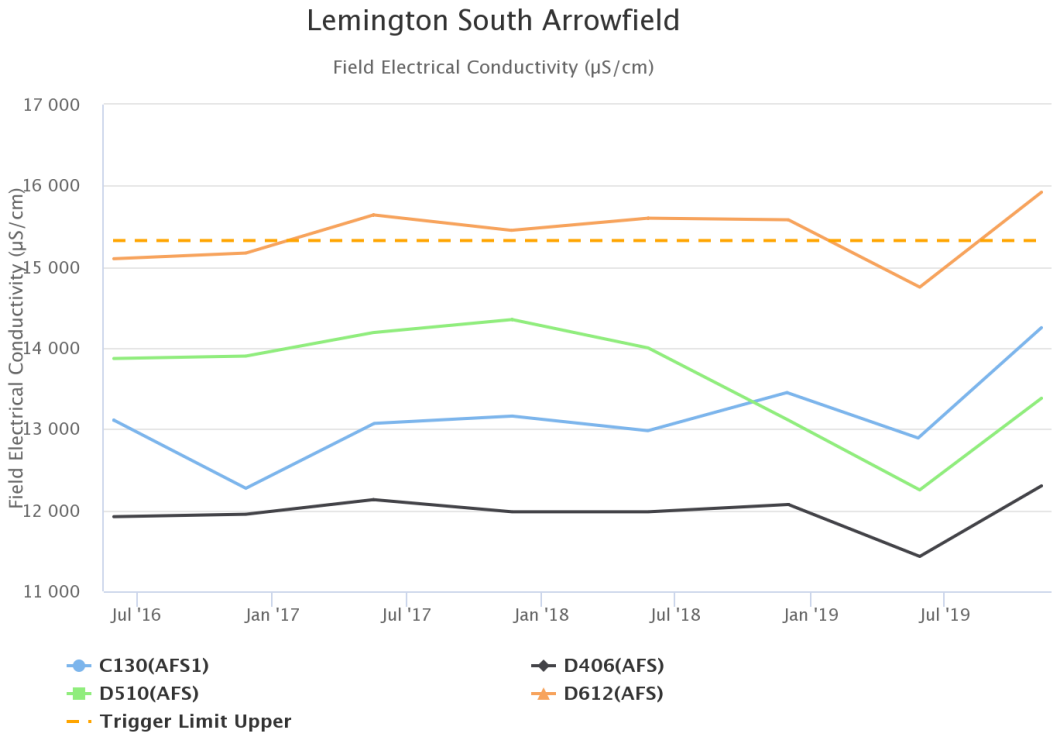


Figure 53: Lemington South Arrowfield Electrical Conductivity Trend – March 2020

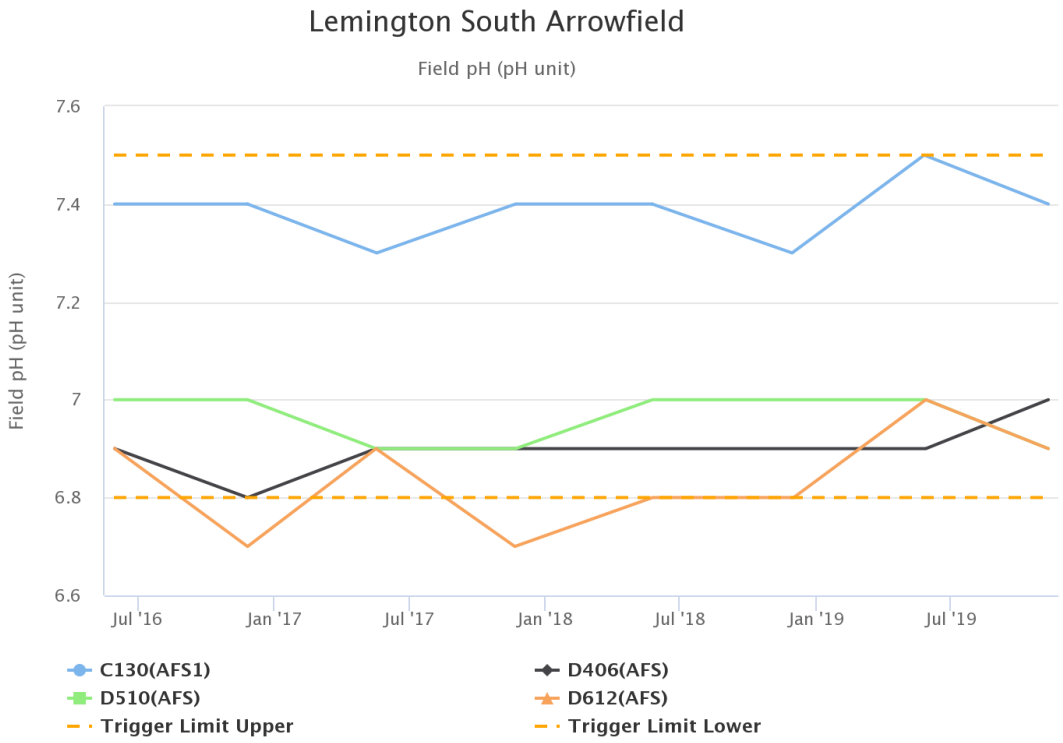


Figure 54: Lemington South Arrowfield pH Trend – March 2020

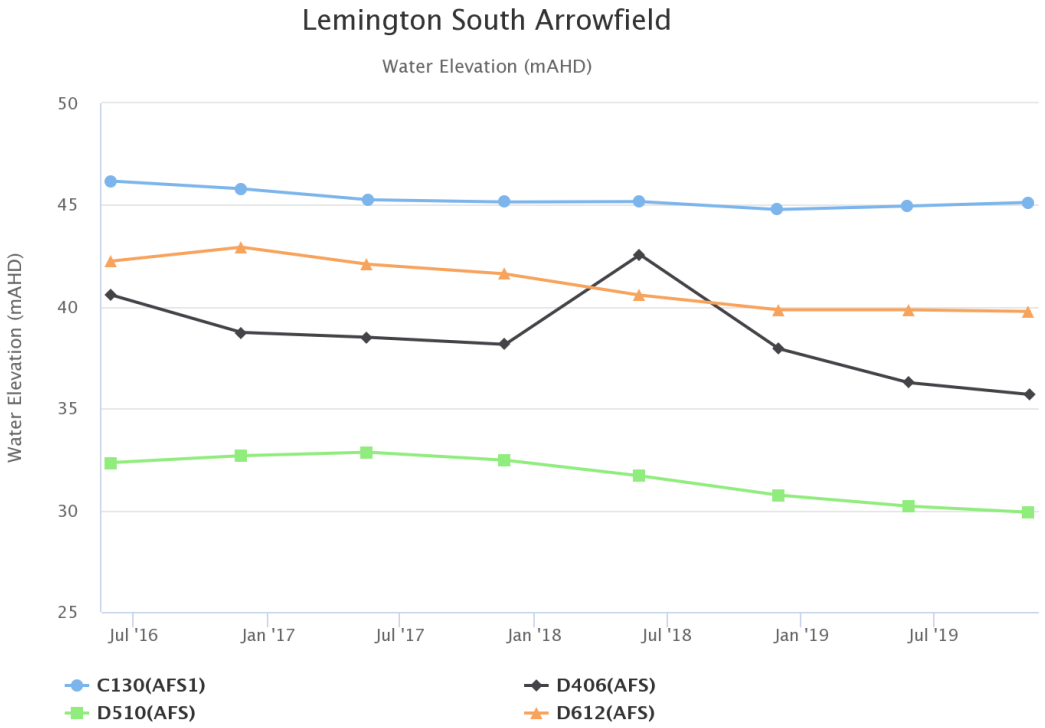


Figure 55: Lemington South Arrowfield Standing Water Level – March 2020

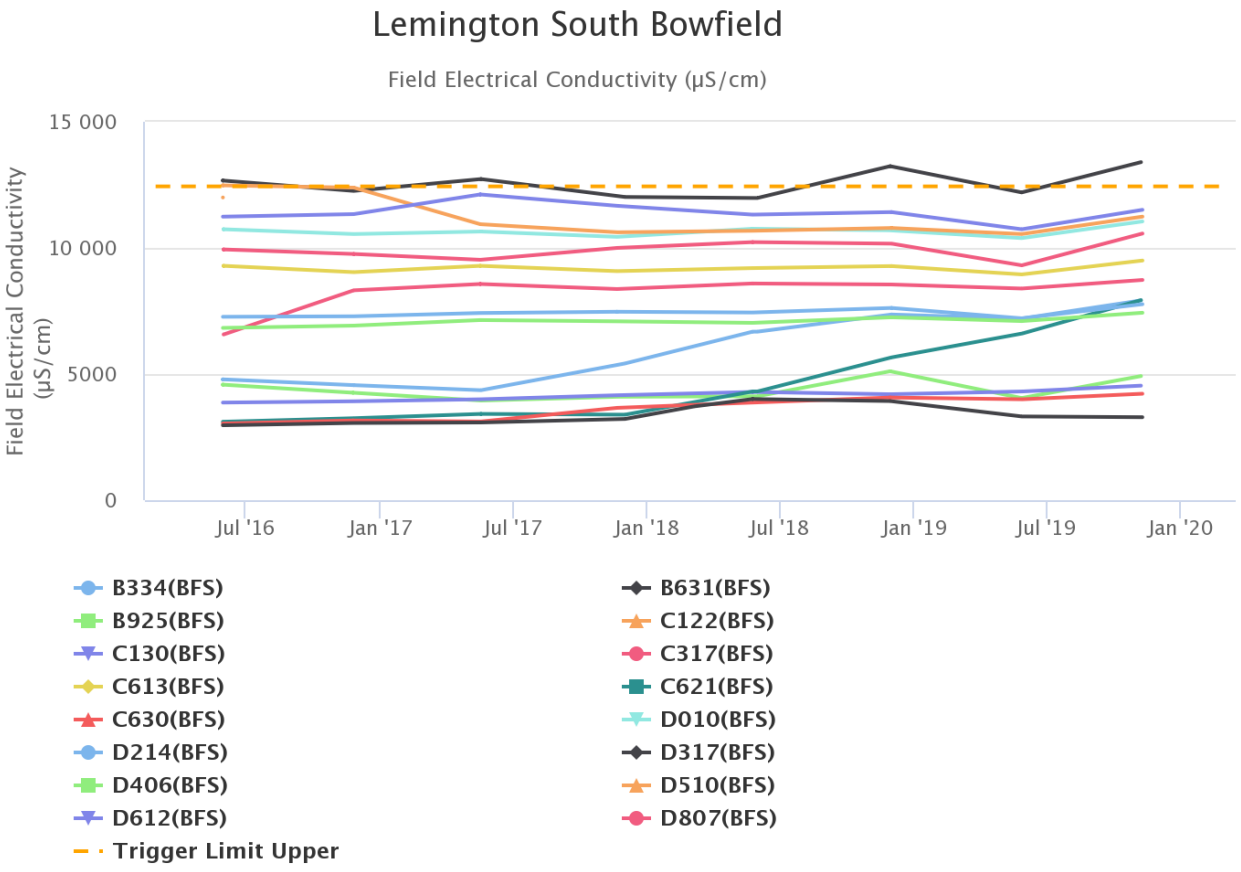


Figure 56: Lemington South Bowfield Electrical Conductivity Trend – March 2020

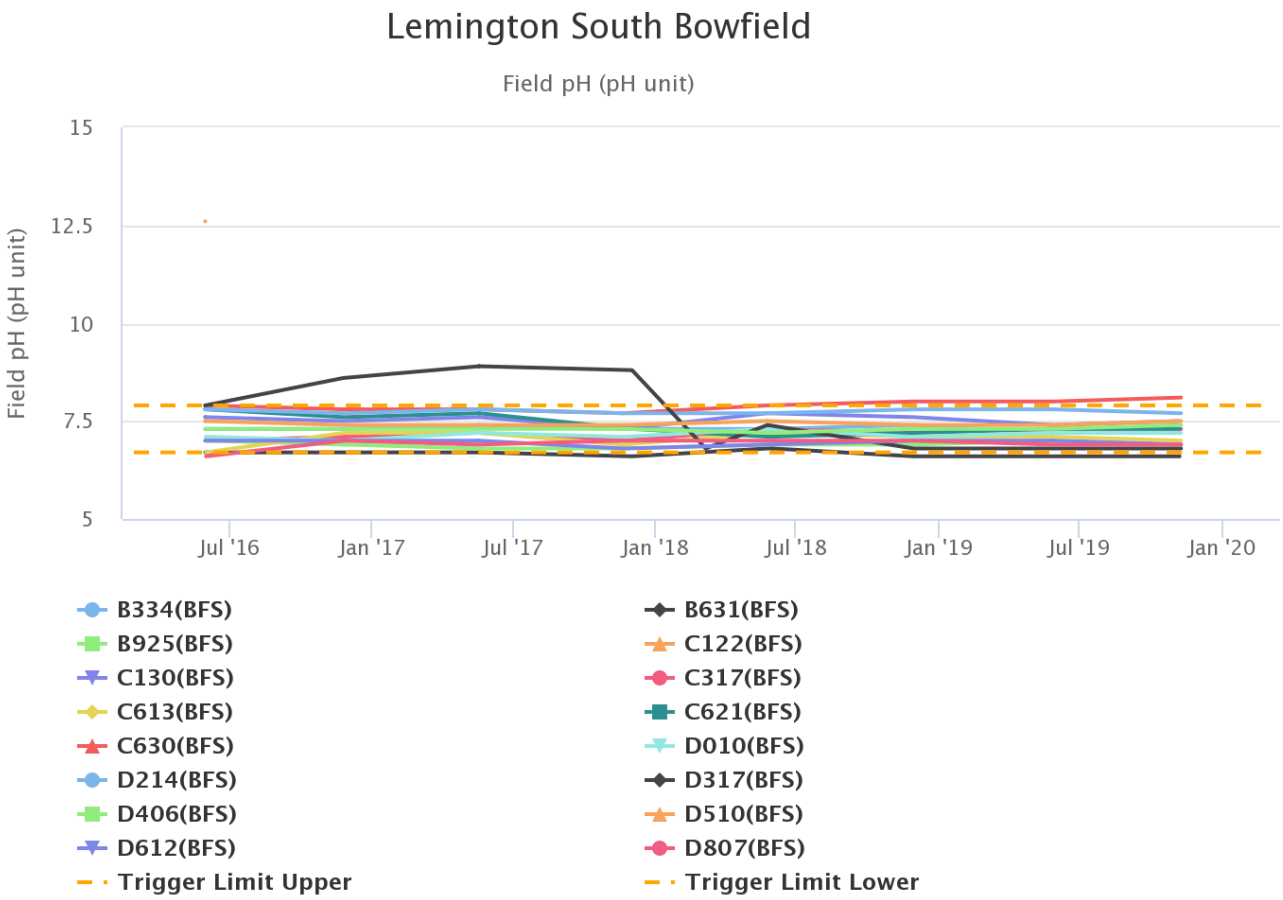


Figure 57: Lemington South Bowfield pH Trend – March 2020

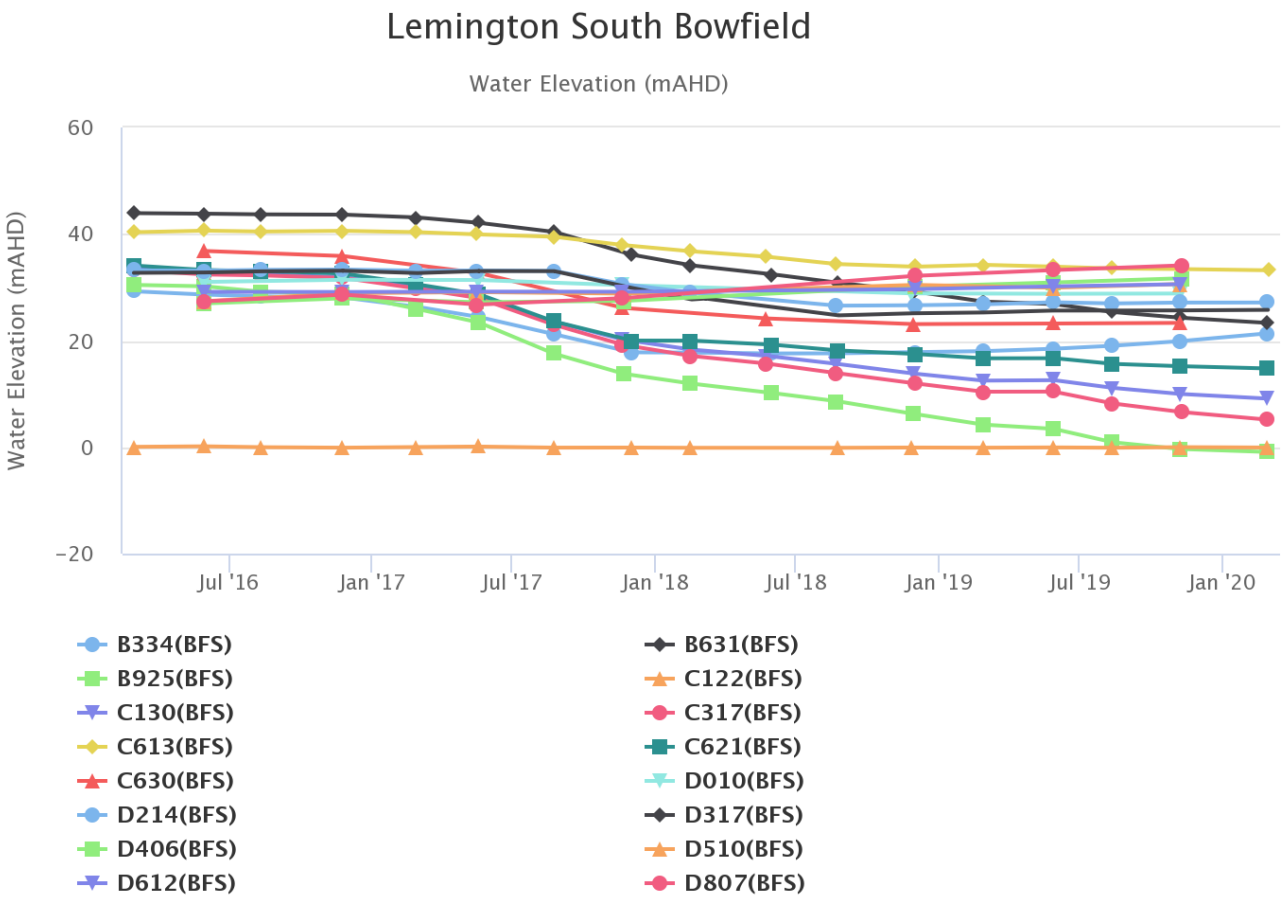


Figure 58: Lemington South Bowfield Standing Water Level – March 2020

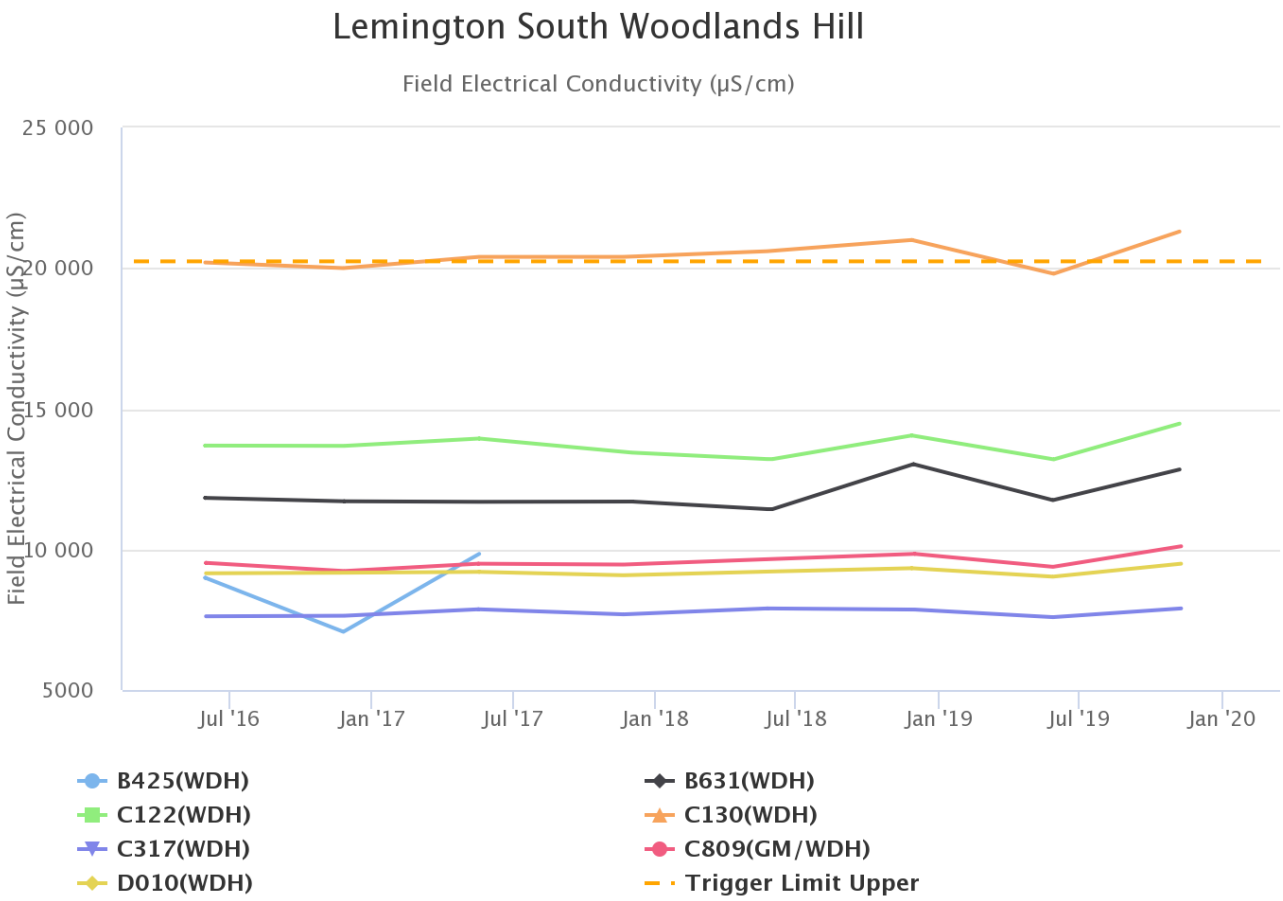


Figure 59: Lemington South Woodlands Hill Electrical Conductivity Trend – March 2020

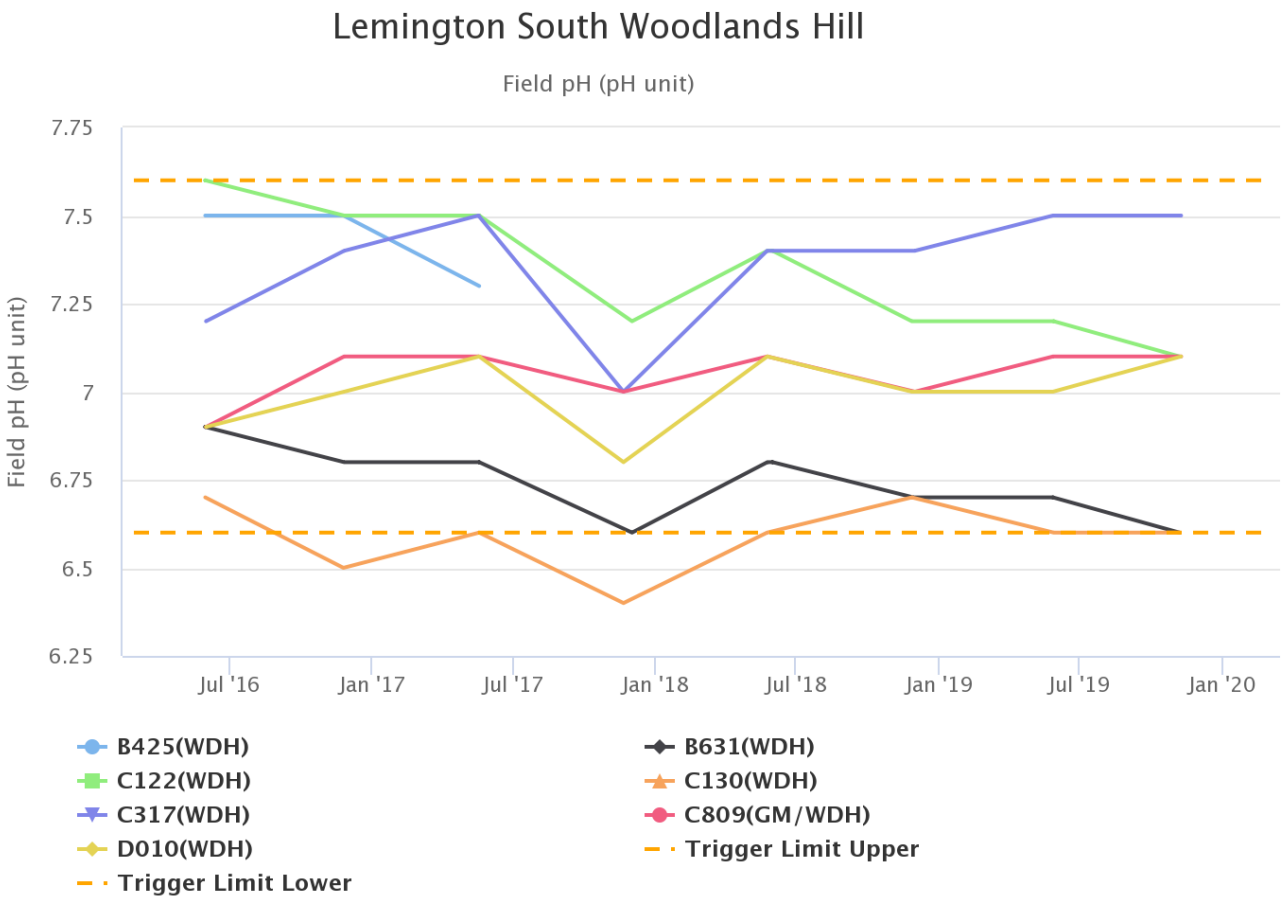


Figure 60: Lemington South Woodlands Hill pH Trend – March 2020

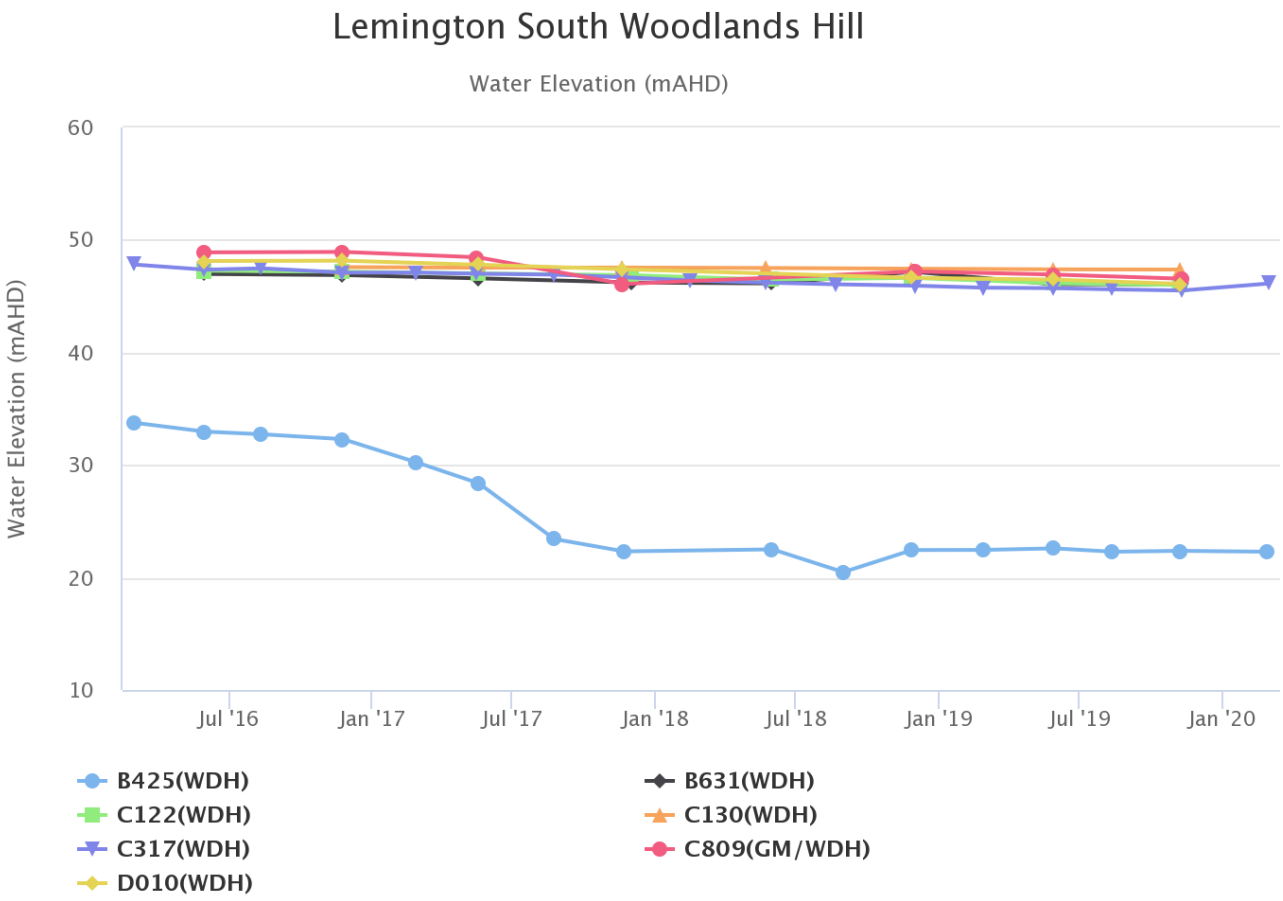


Figure 61: Lemington South Woodlands Hill Standing Water Level – March 2020

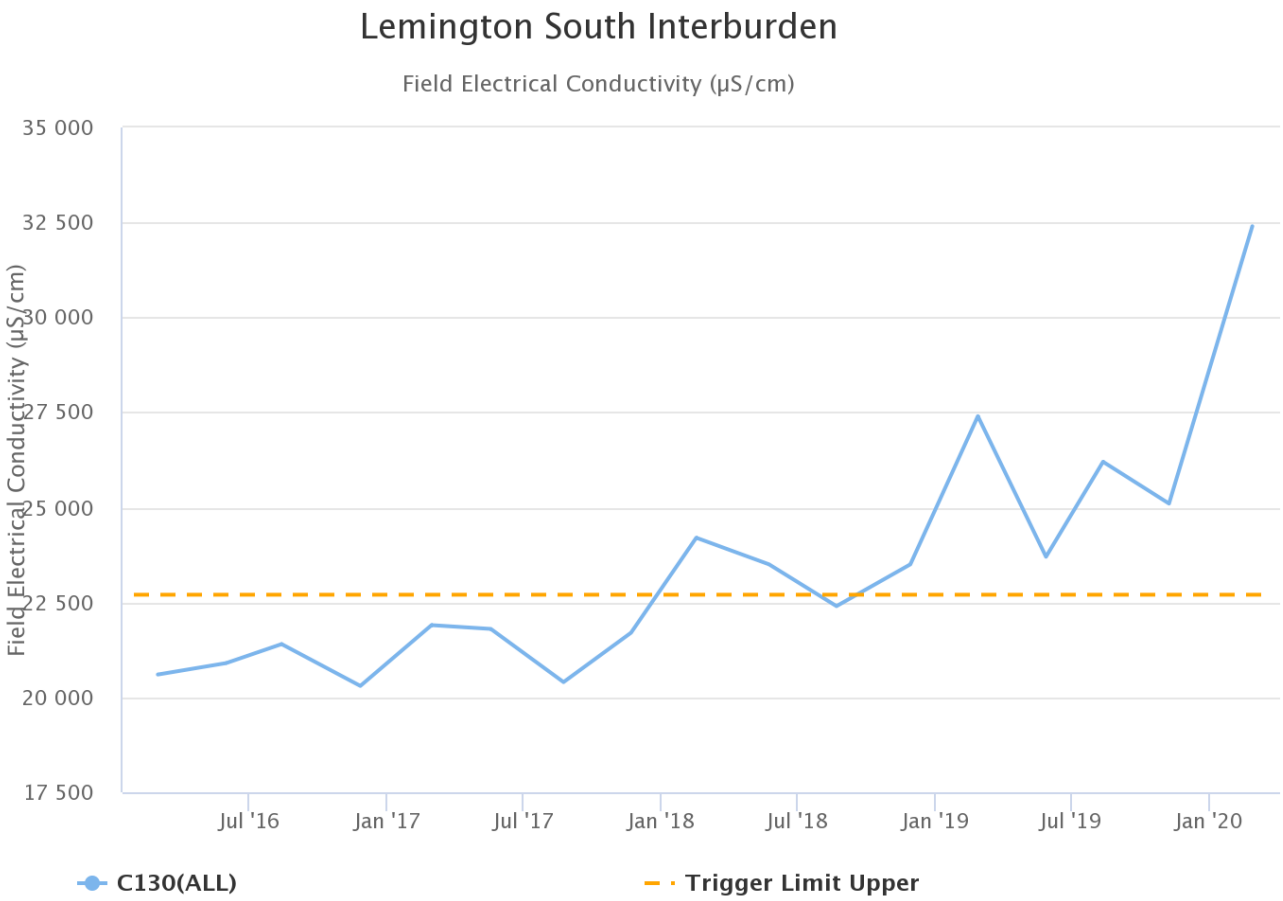


Figure 62: Lemington South Interburden Electrical Conductivity Trend – March 2020

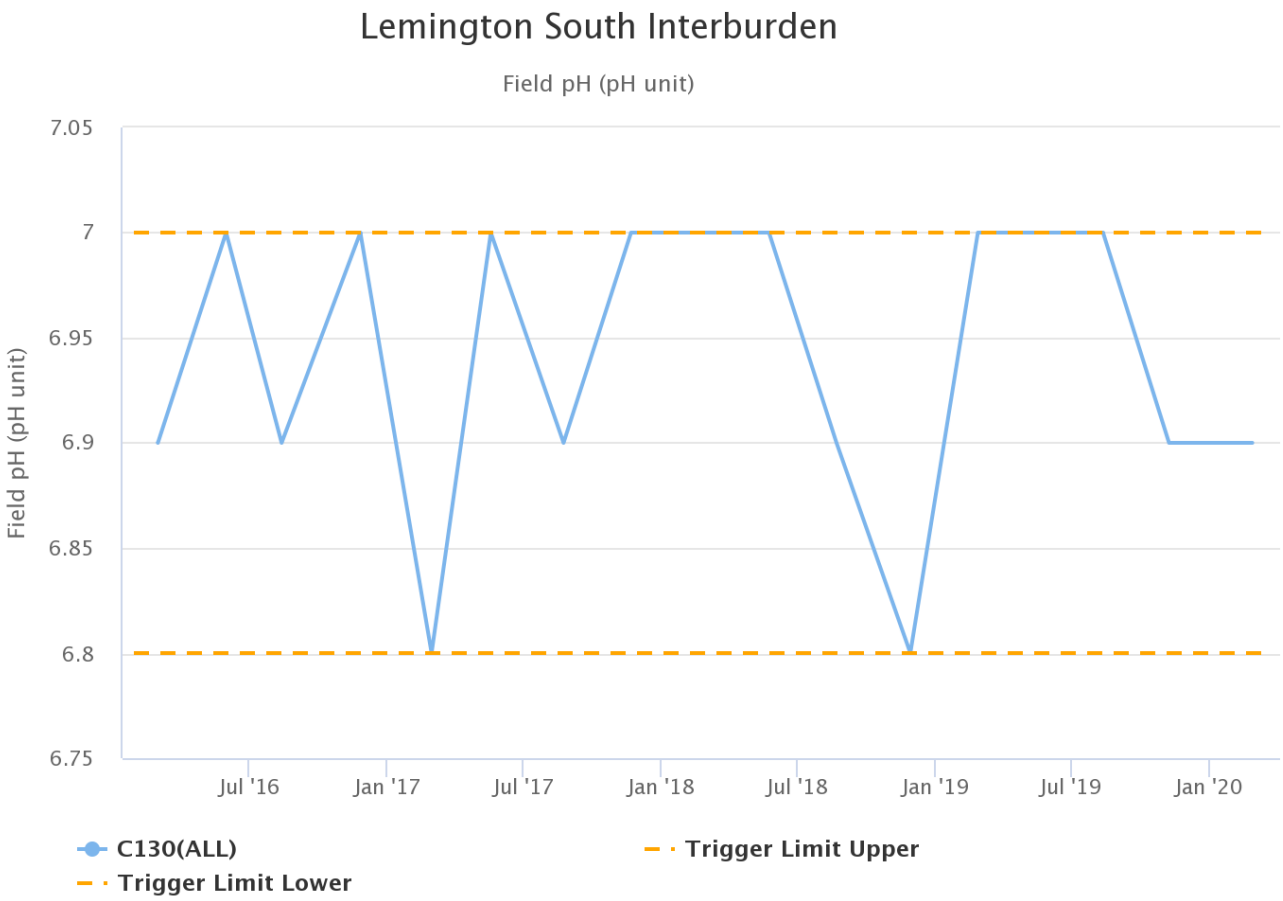


Figure 63: Lemington South Interburden pH Trend – March 2020

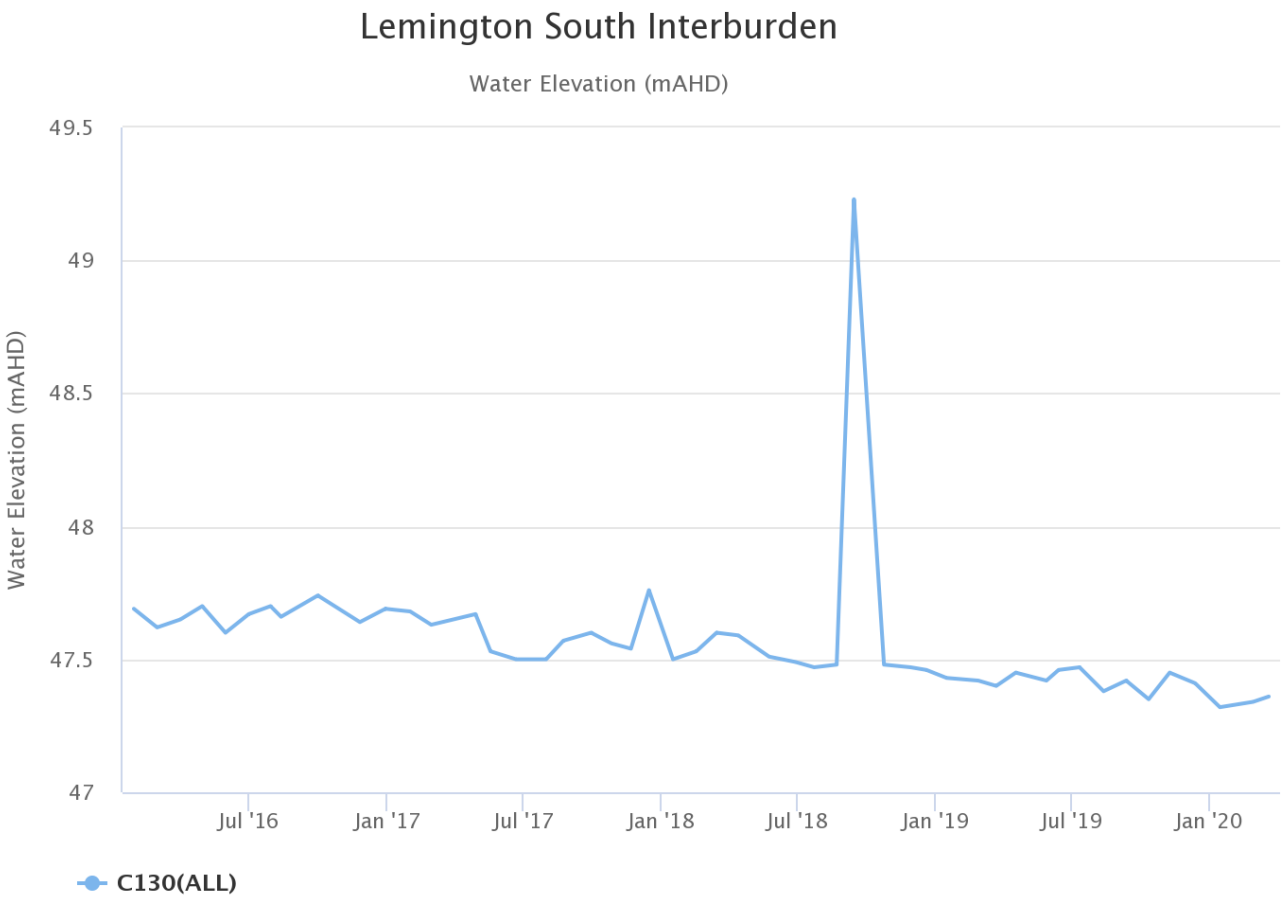


Figure 64: Lemington South Interburden Standing Water Level – March 2020

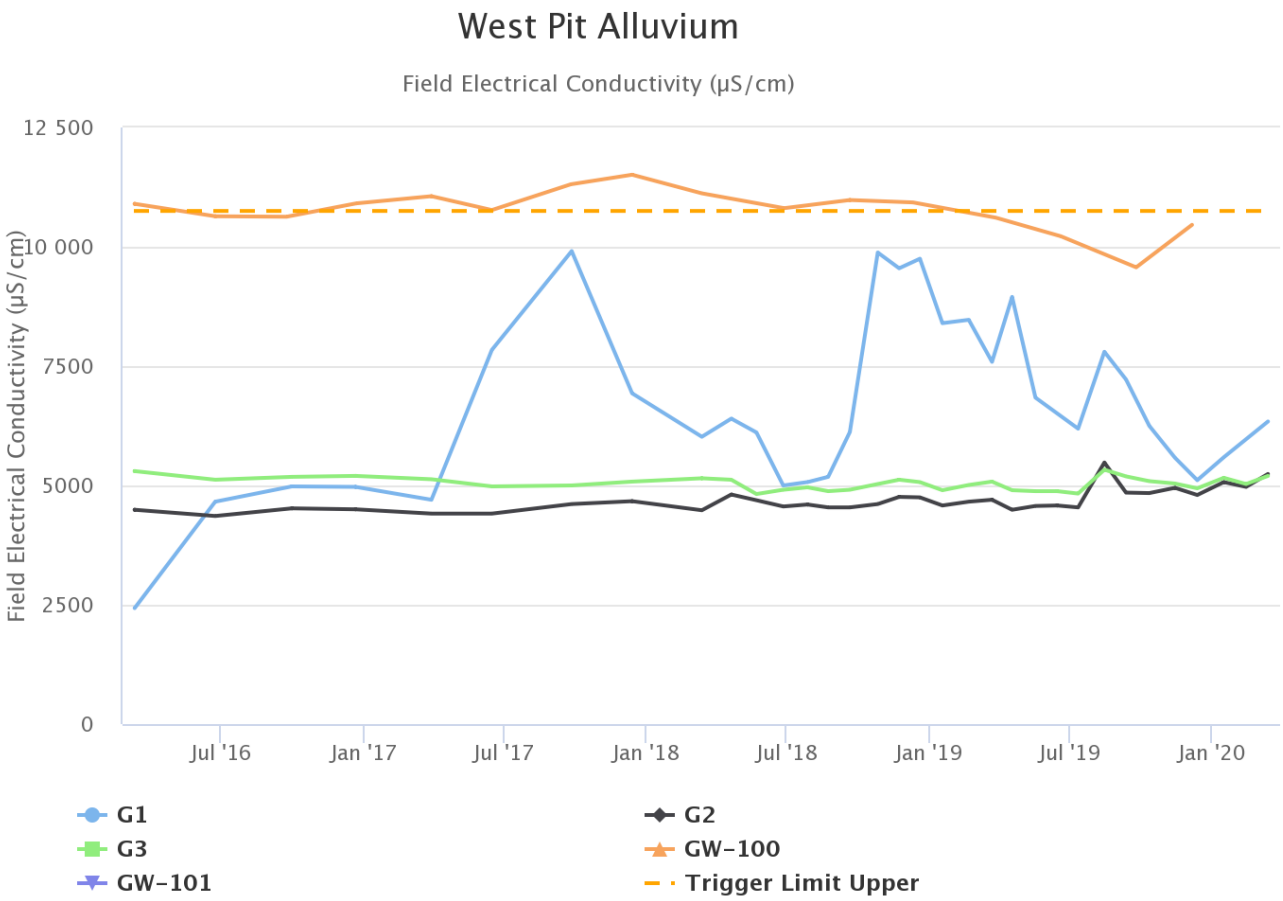


Figure 65: West Pit Alluvium Electrical Conductivity Trend – March 2020

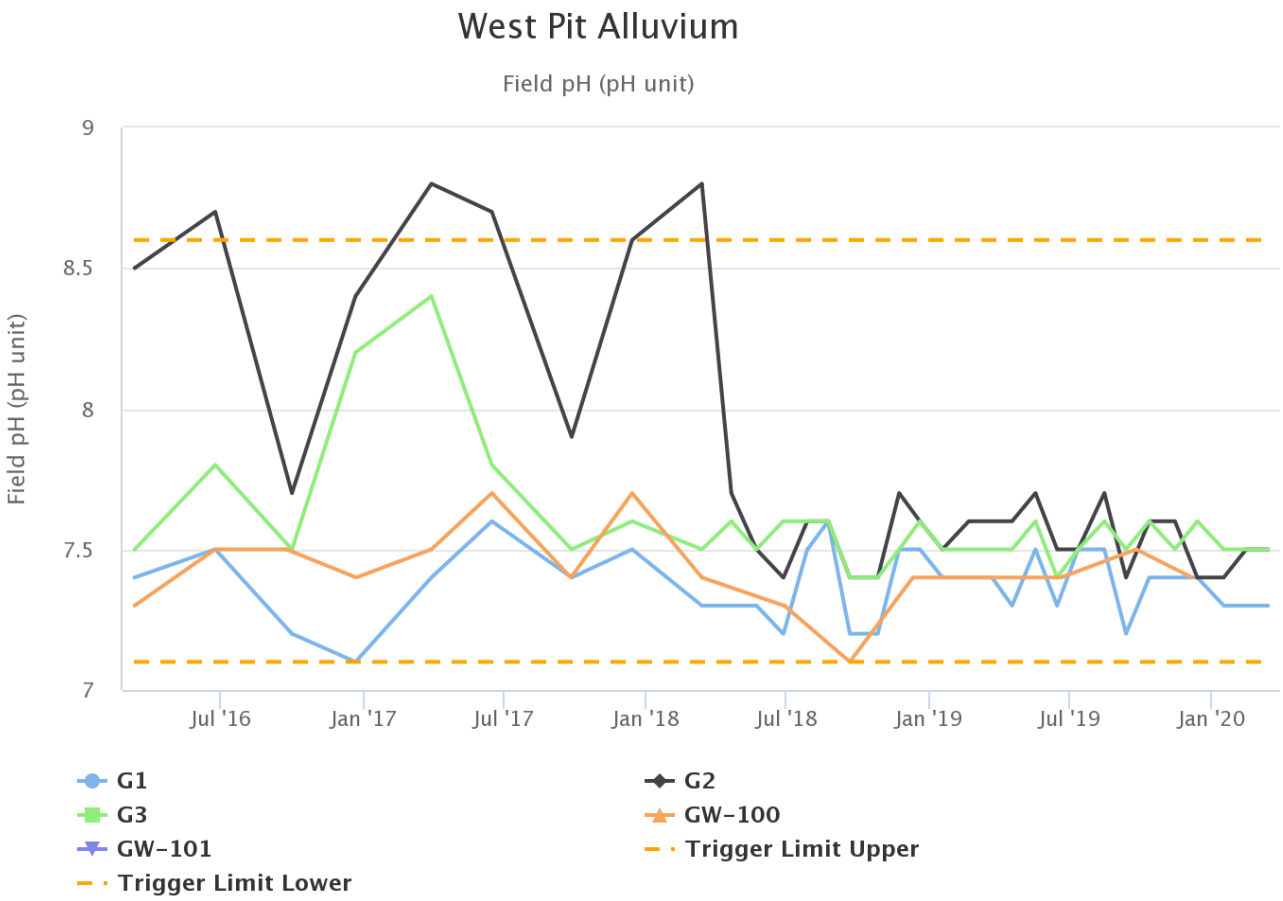
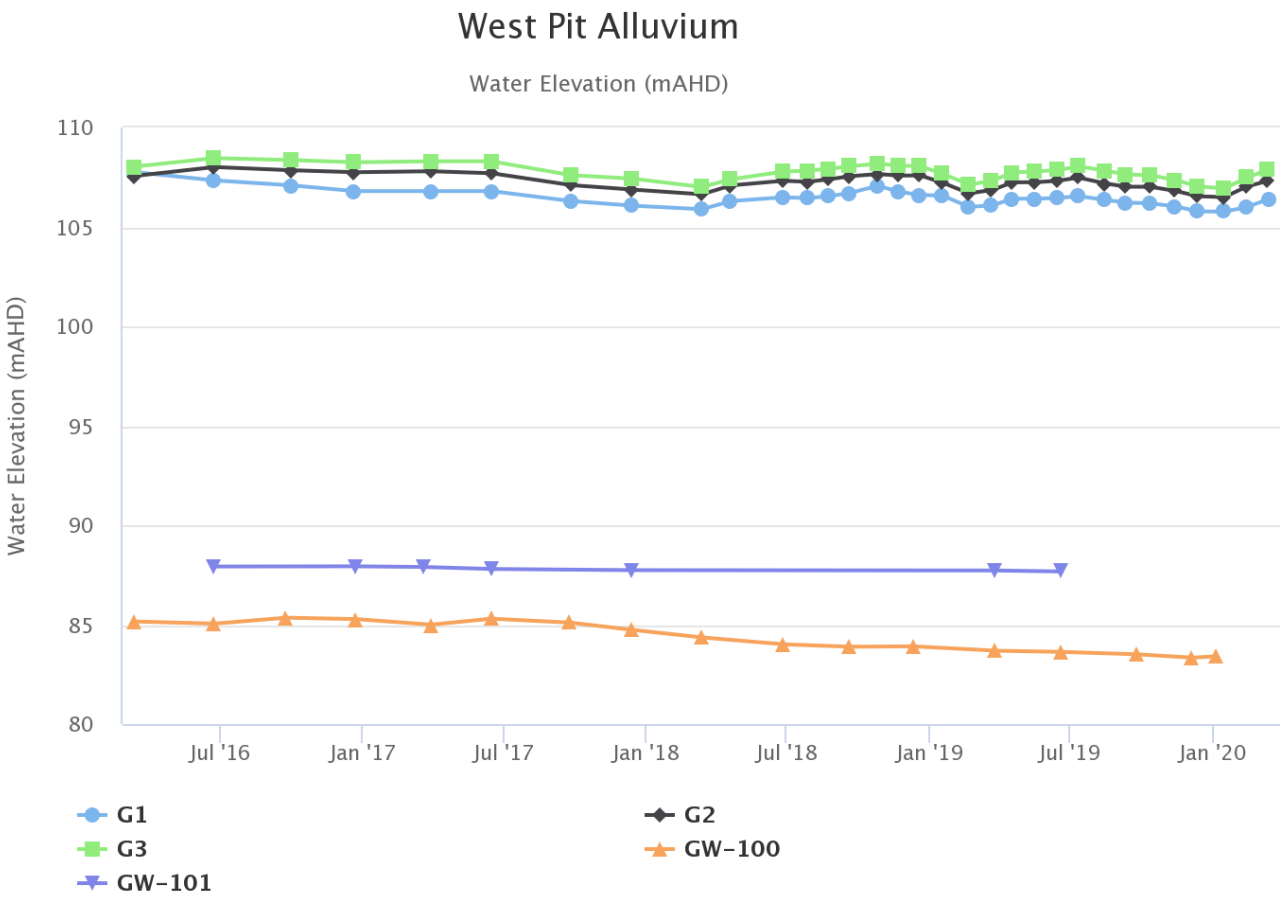


Figure 66: West Pit Alluvium pH Trend – March 2020



Note that Bore GW101 dry after June 2019

Figure 67: West Pit Alluvium Standing Water Level – March 2020

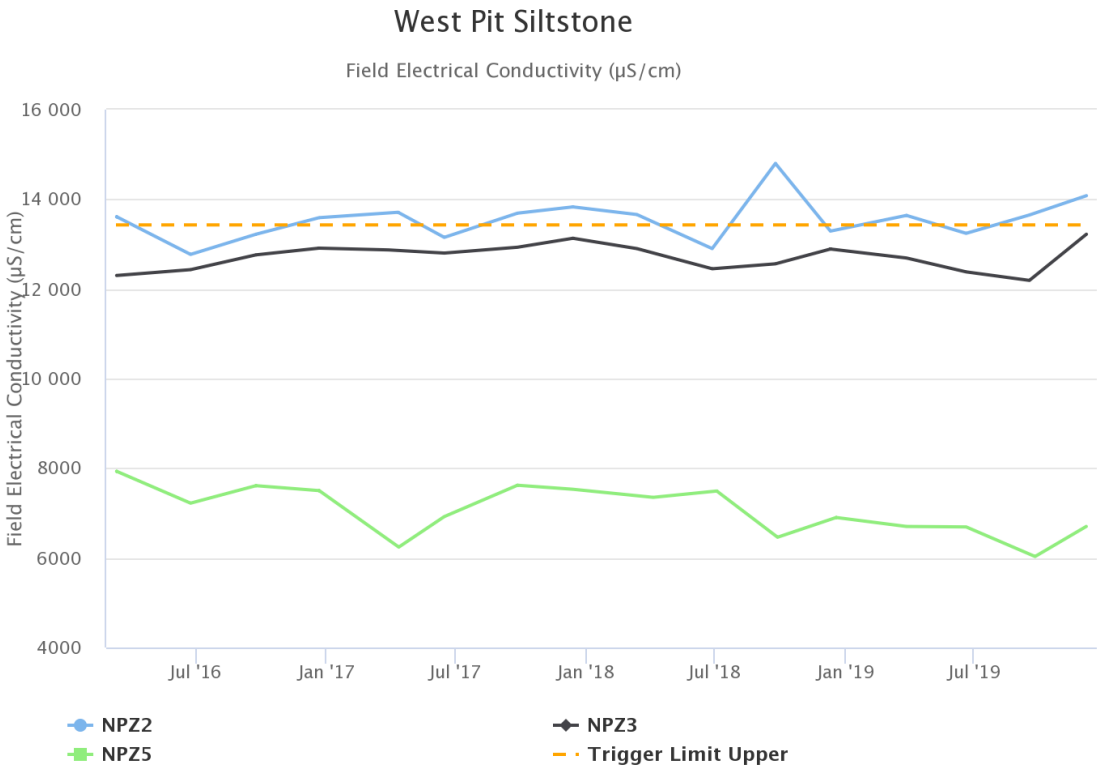


Figure 68: West Pit Siltstone Electrical Conductivity Trend – March 2020

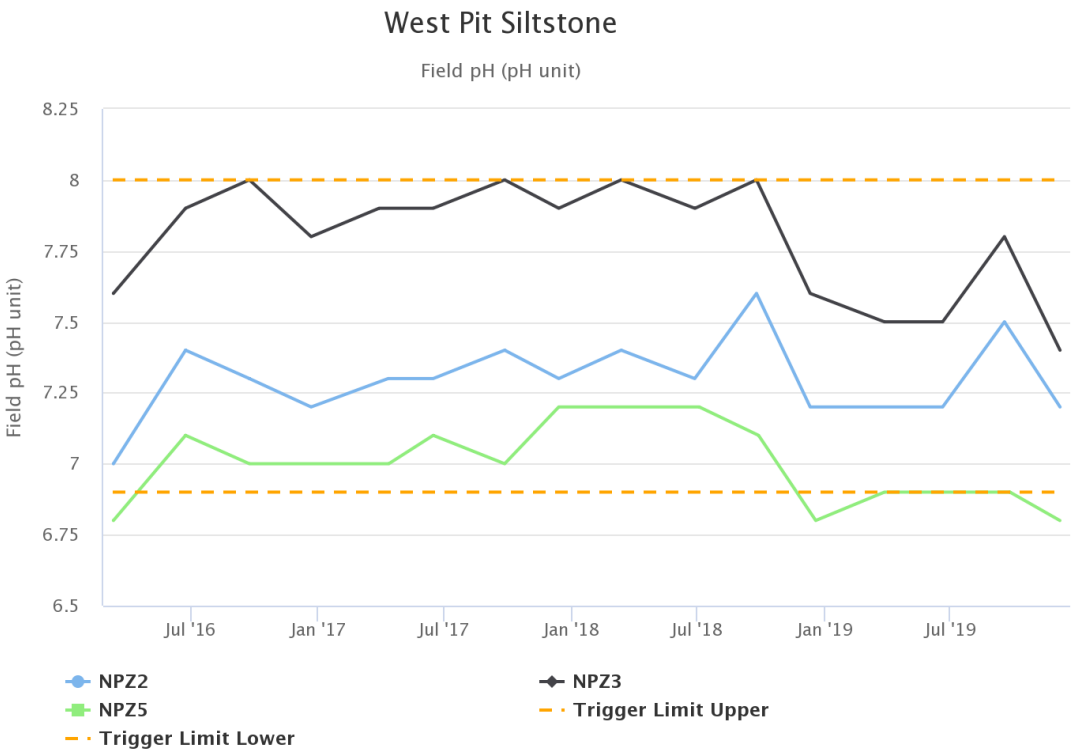


Figure 69: West Pit Siltstone pH Trend – March 2020

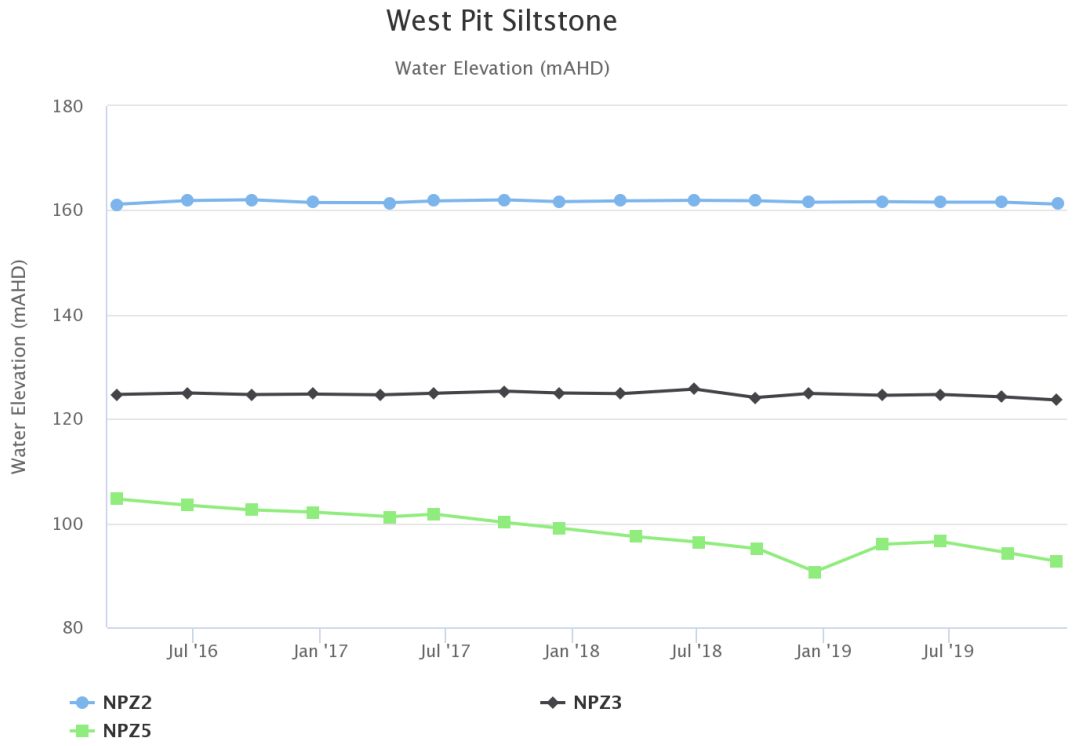


Figure 70: West Pit Siltstone Standing Water Level – March 2020

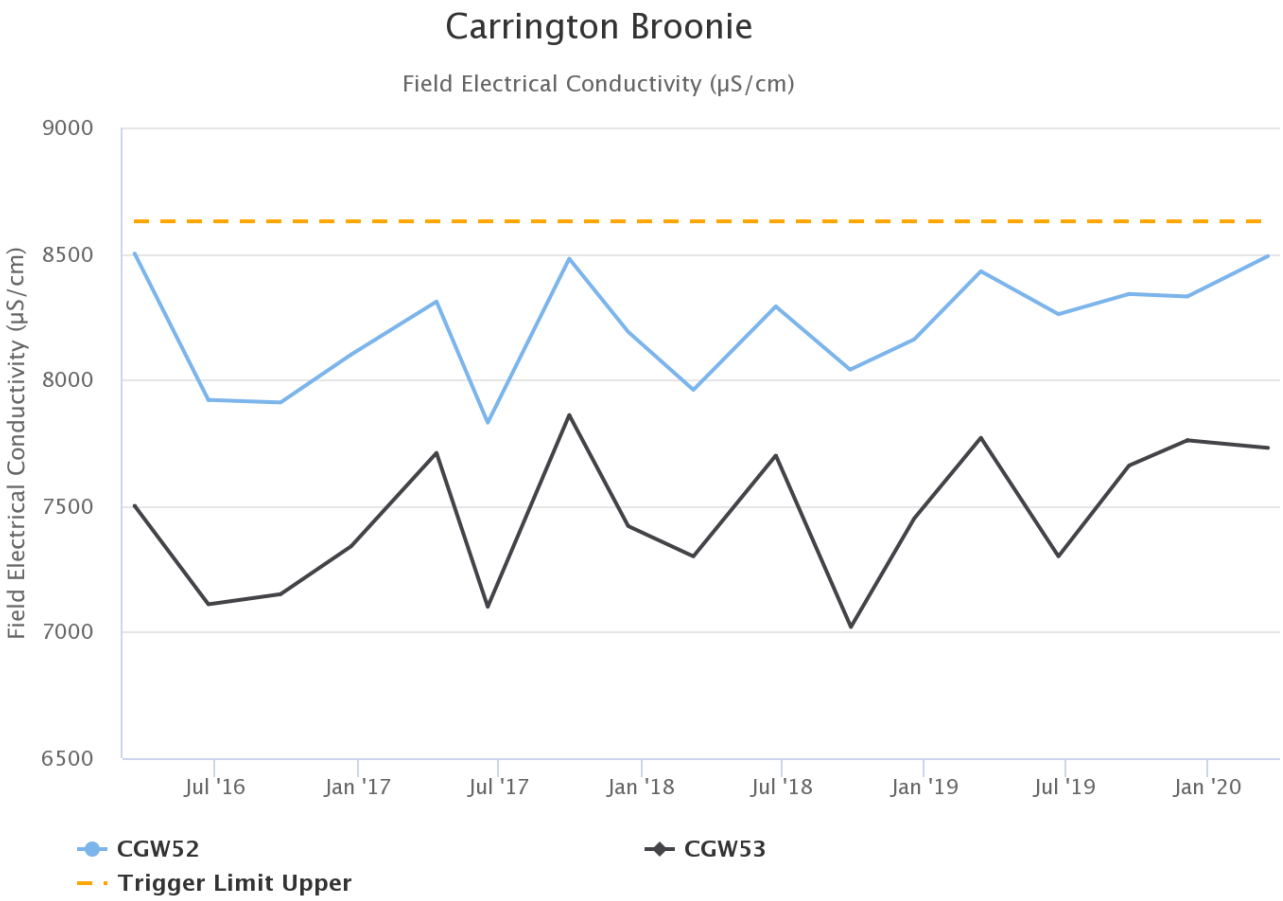


Figure 71: Carrington Broonie Electrical Conductivity Trend – March 2020

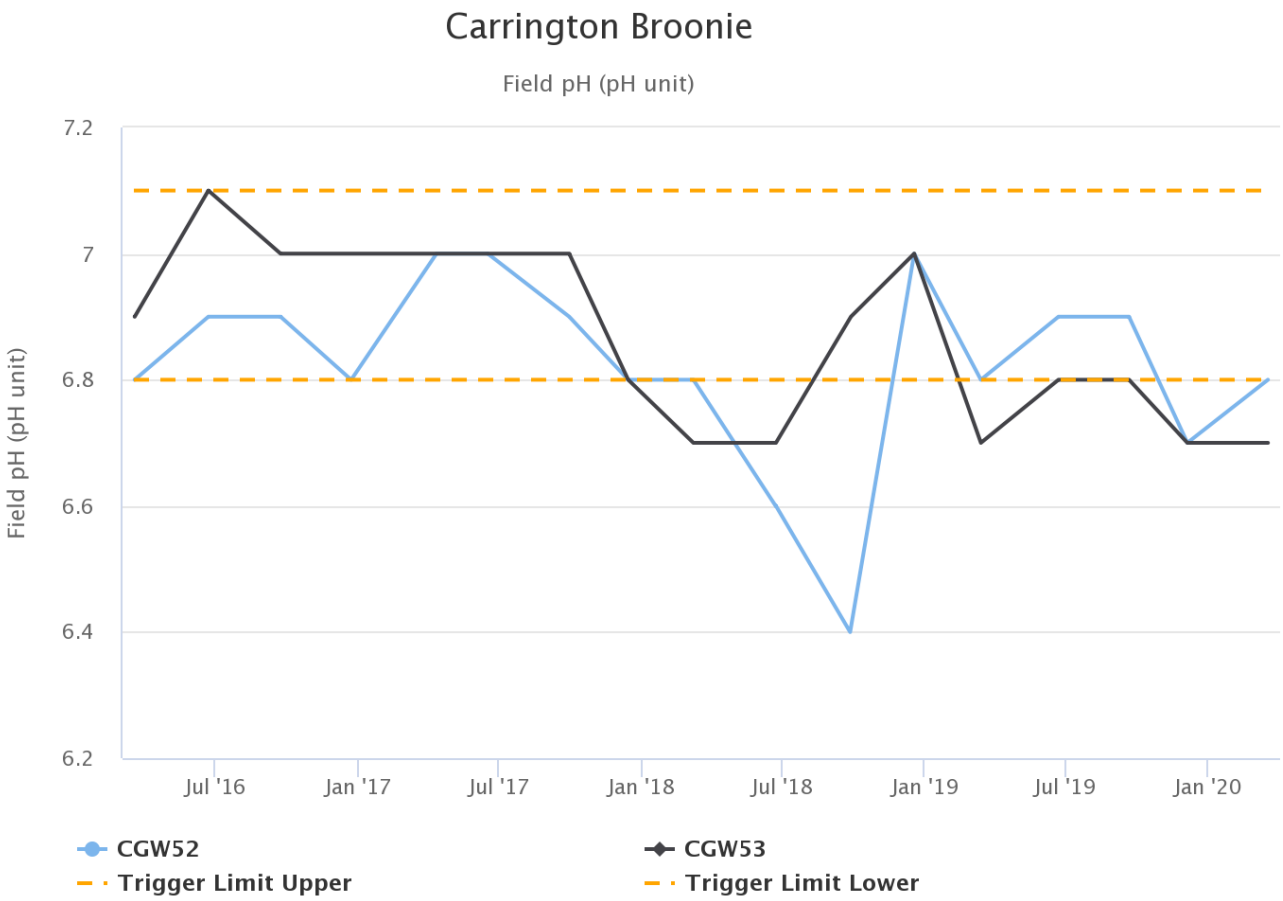


Figure 72: Carrington Broonie pH Trend – March 2020

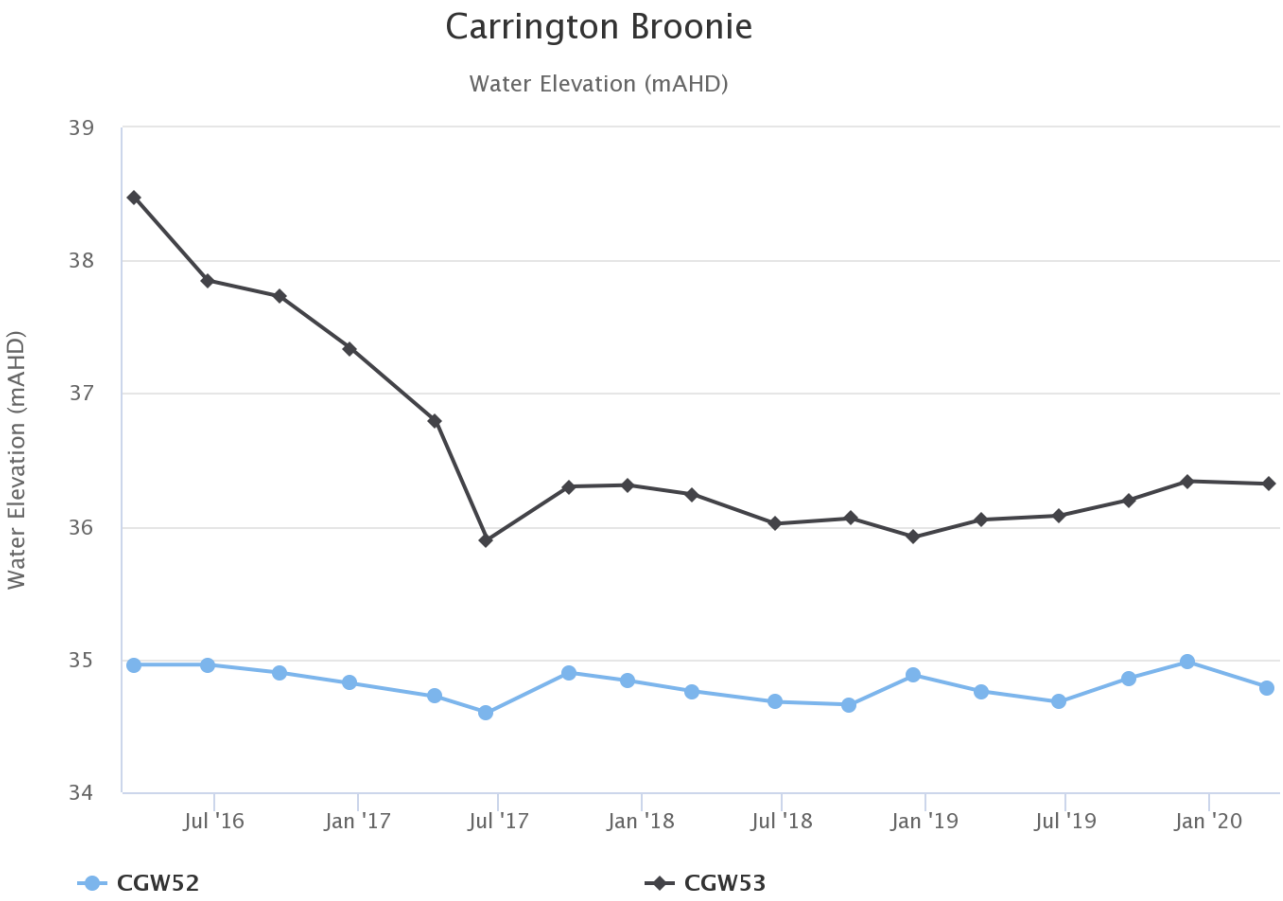


Figure 73: Carrington Broonie Standing Water Level – March 2020

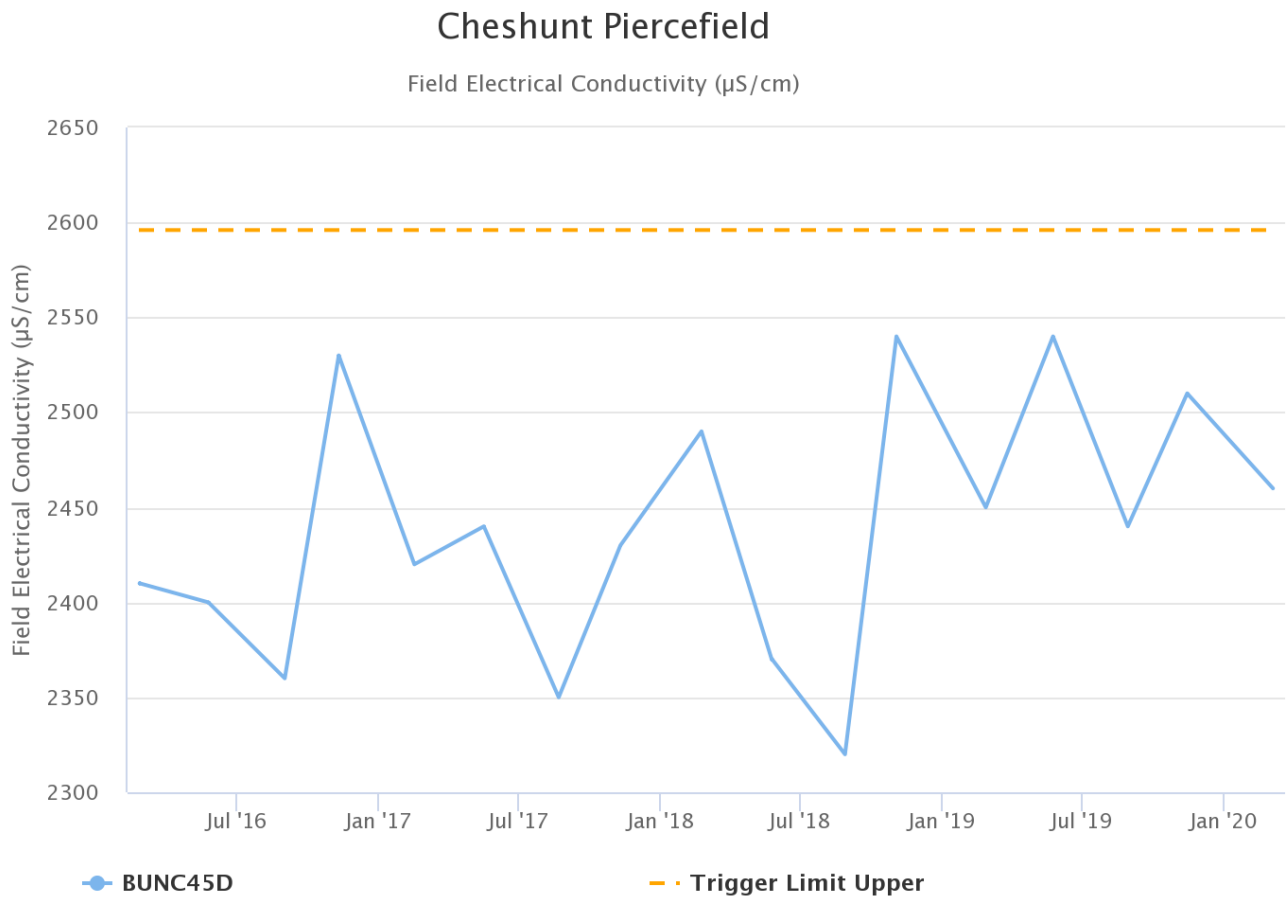


Figure 74: Cheshunt Piercefield Electrical Conductivity Trend – March 2020

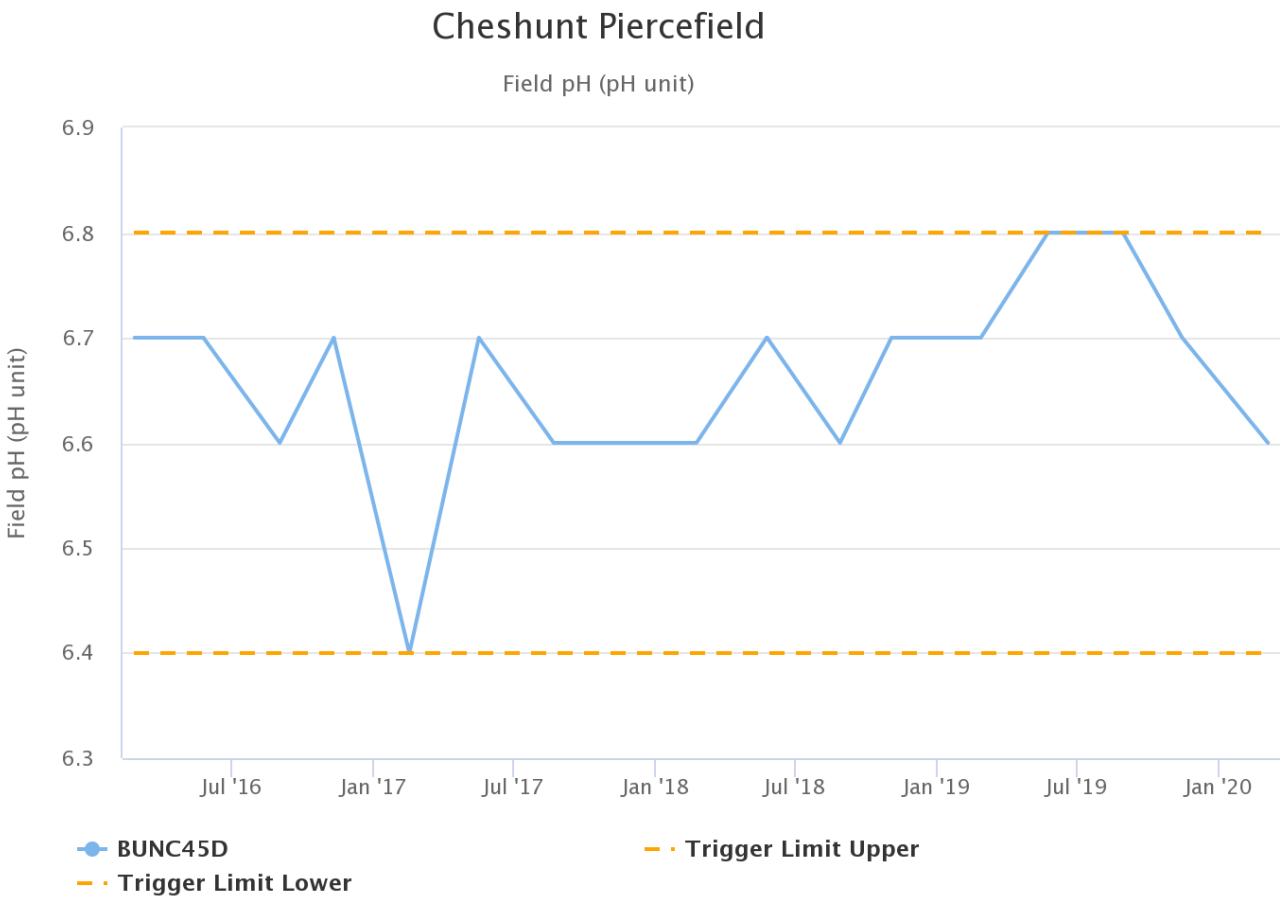


Figure 75: Cheshunt Piercefield pH Trend – March 2020

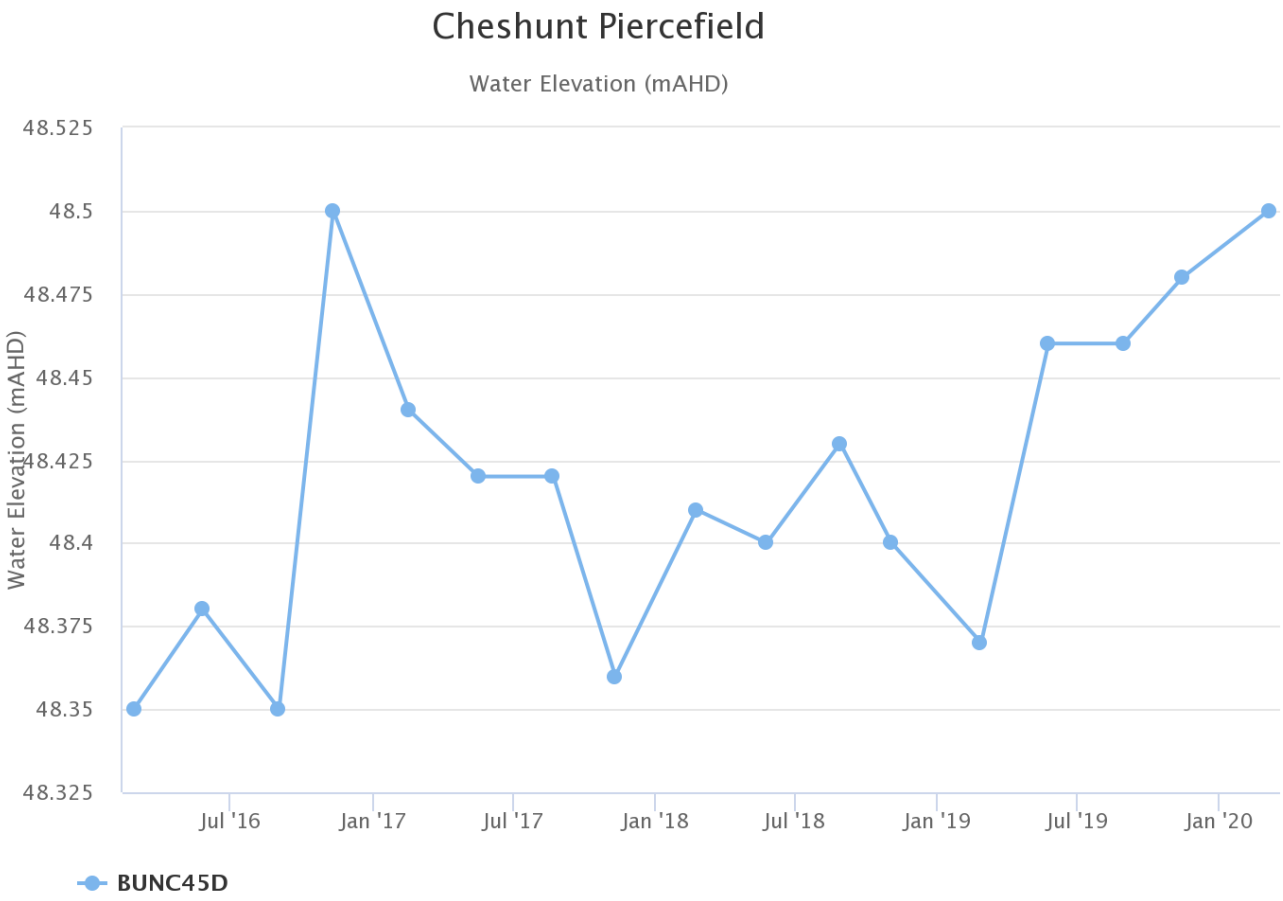


Figure 76: Cheshunt Piercefield Standing Water Level – March 2020

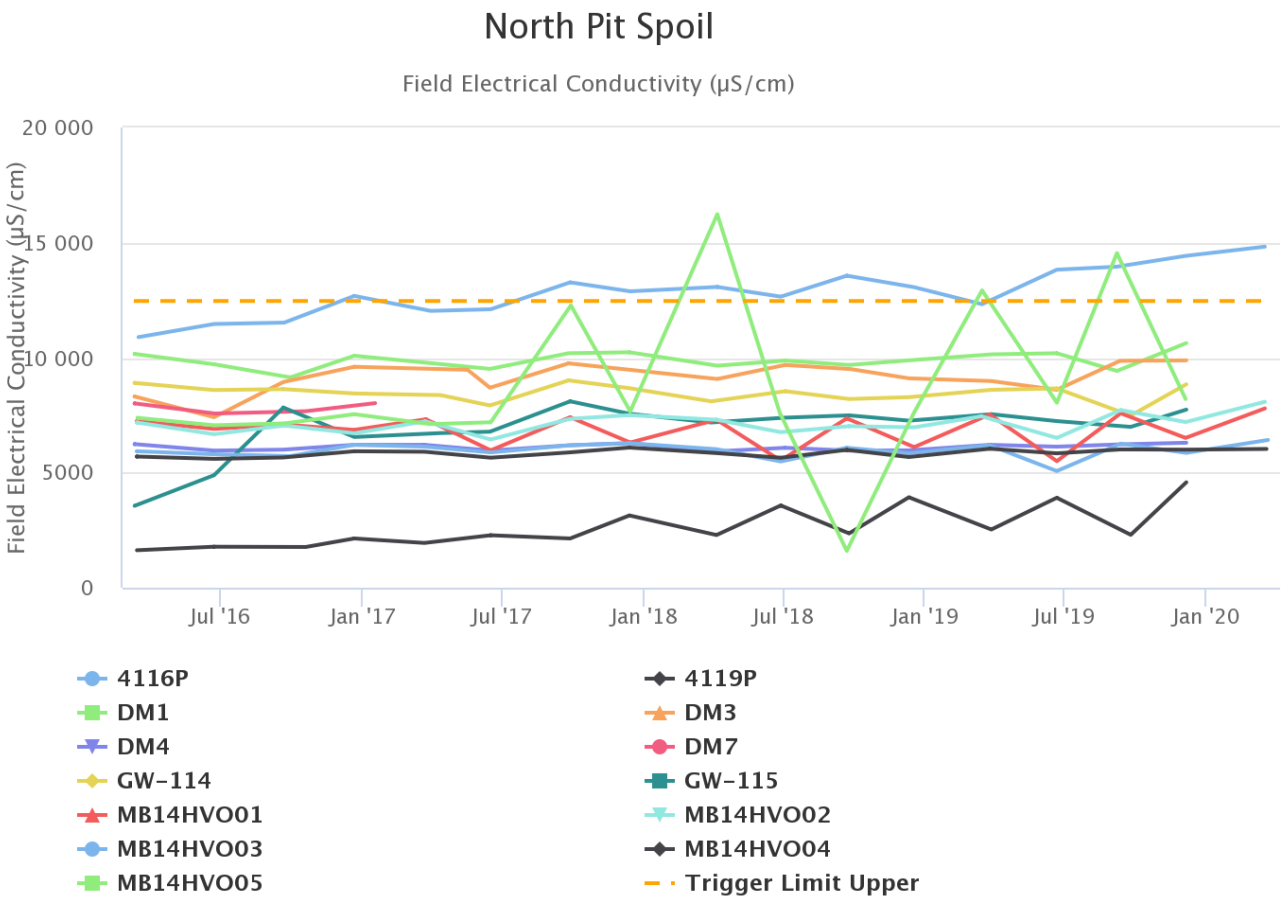


Figure 77: North Pit Spoil Electrical Conductivity Trend – March 2020

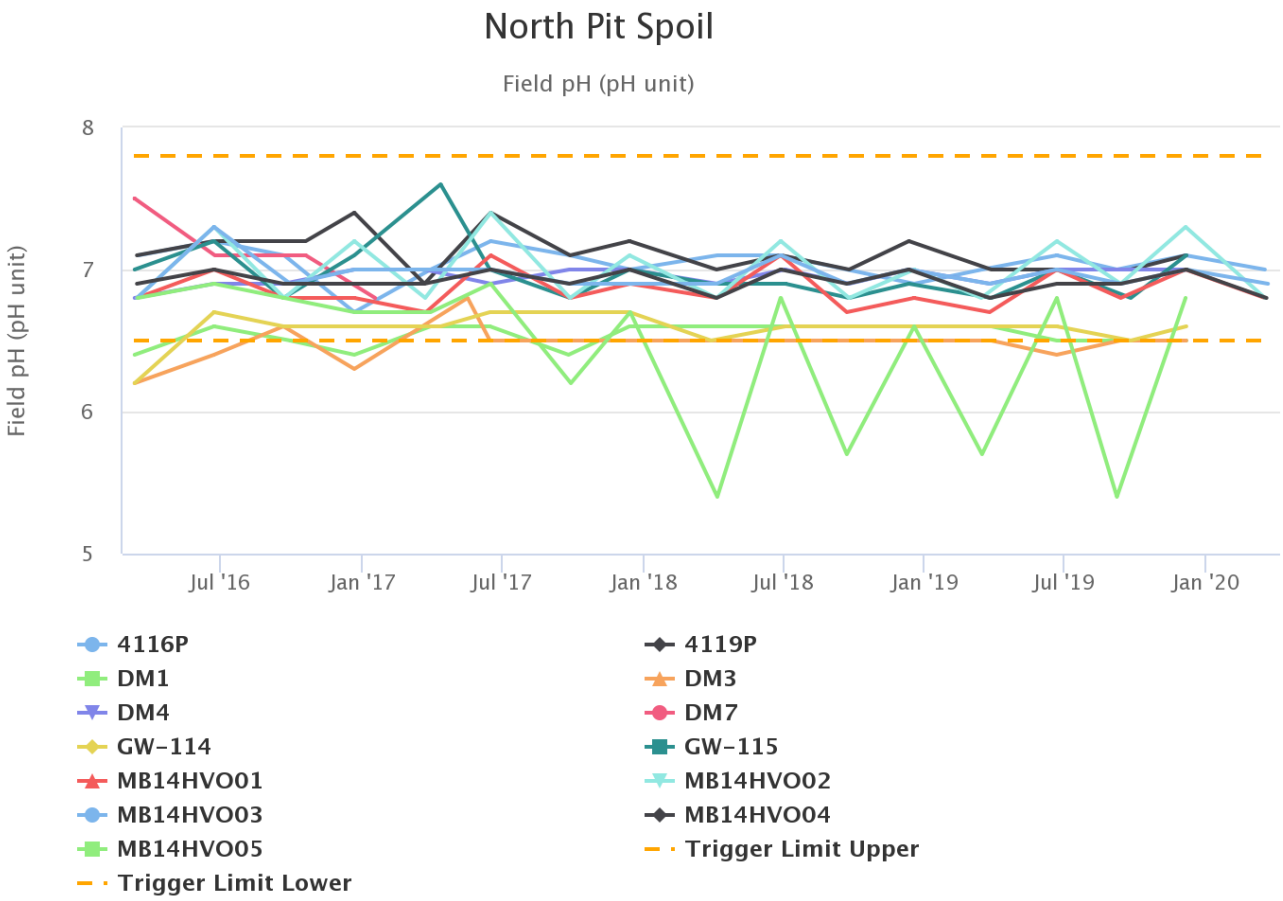


Figure 78: North Pit Spoil pH Trend – March 2020

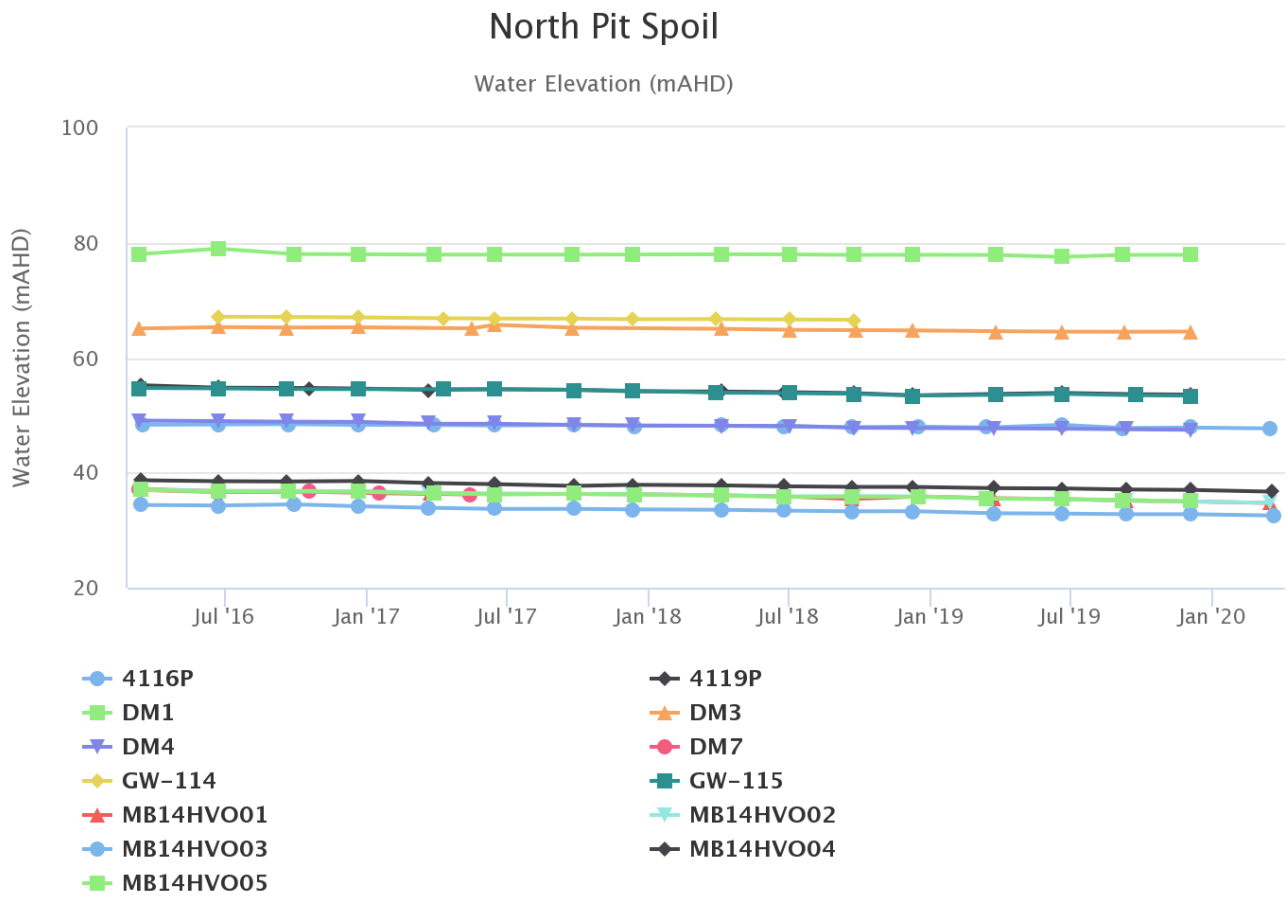


Figure 79: North Pit Spoil Standing Water Level – March 2020

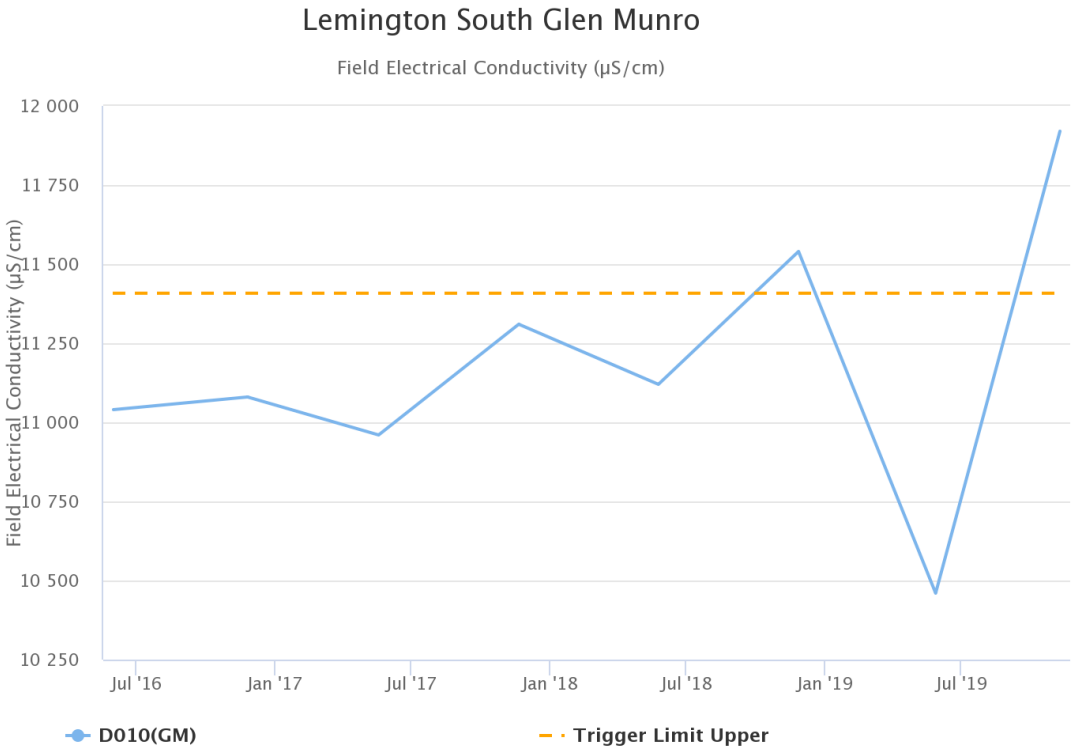


Figure 80: Lemington South Glen Munro Electrical Conductivity Trend – March 2020

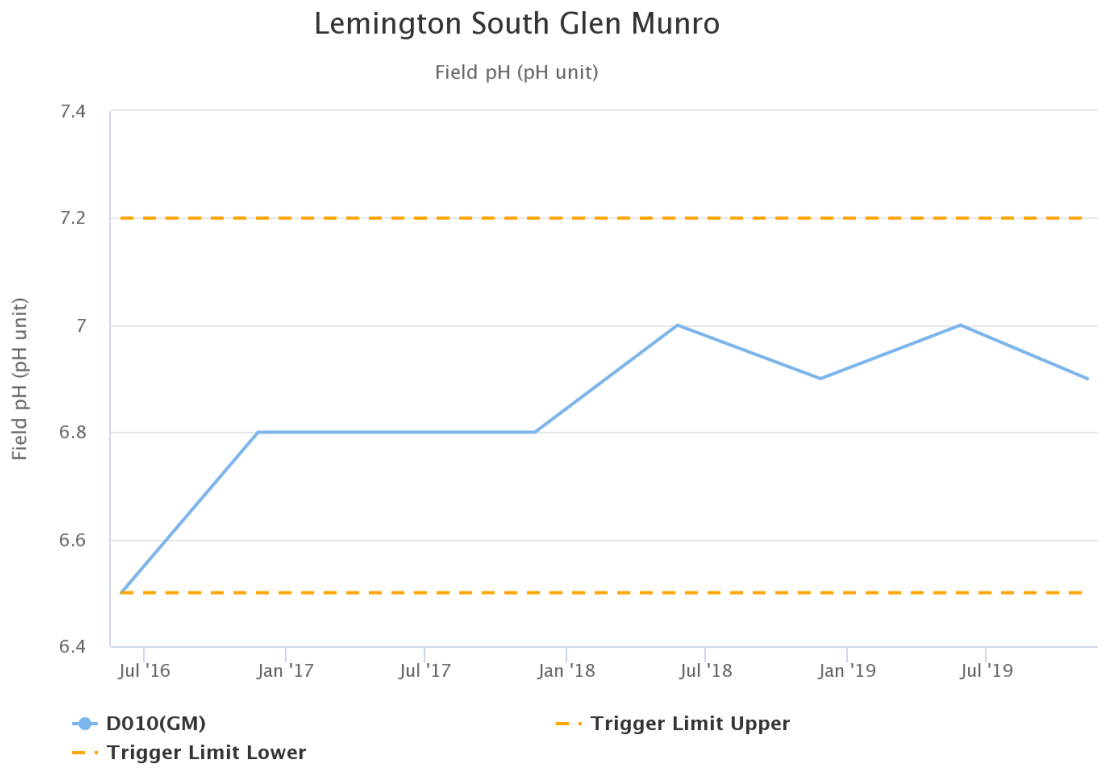


Figure 81: Lemington South Glen Munro pH Trend – March 2020

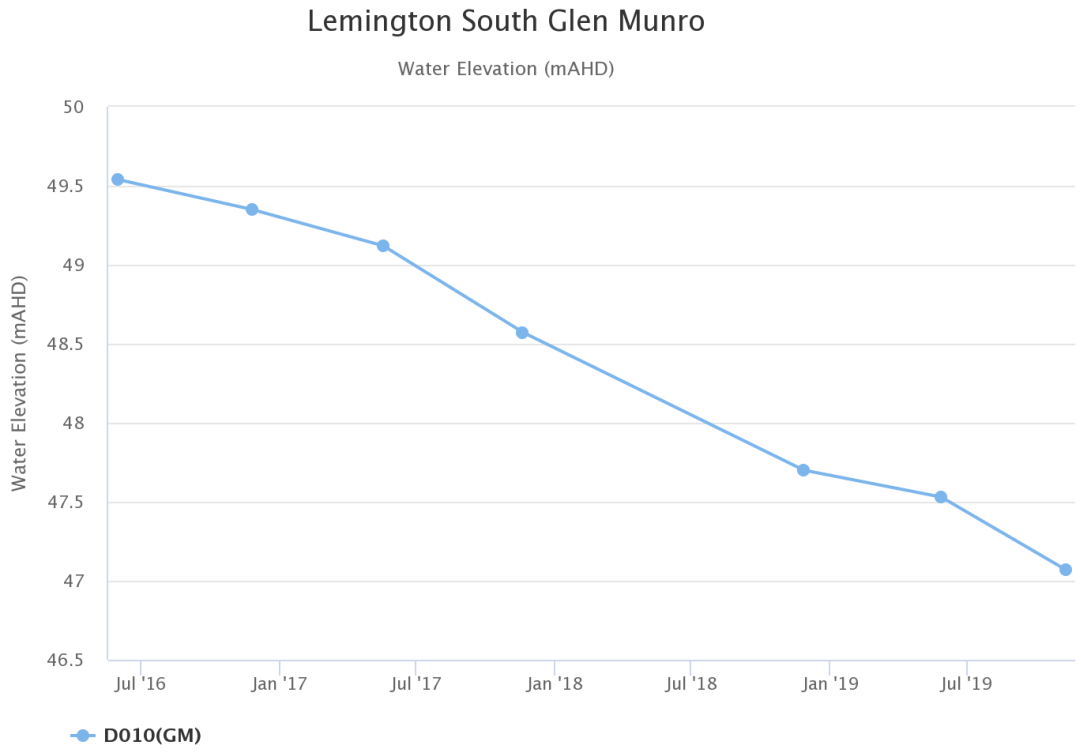


Figure 82: Lemington South Glen Munro Standing Water Level Trend – March 2020

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 3.

Table 3: Groundwater Triggers – Q1 2020

Site	Date	Trigger Limit Breached	Action Taken in Response
CFW55R	2/01/2020	EC – 95th percentile	Investigation in progress
CFW55R	16/01/2020	EC – 95th percentile	Investigation in progress
CFW55R	29/01/2020	EC – 95th percentile	Investigation in progress
CFW55R	12/02/2020	EC – 95th percentile	Investigation in progress
C130(ALL)	27/02/2020	EC – 95th percentile	Investigation in progress
CFW55R	28/02/2020	EC – 95th percentile	Investigation in progress
Appleyard Farm	28/02/2020	pH – 5th percentile	First exceedance – watching brief established*

* = 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 85. Blasting criteria are summarised in Table 4.

Table 4: 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 March, 10 blasts were initiated at HVO. Figure 83 and Figure 84 show the blast monitoring results for the reporting period against the impact assessment criteria.

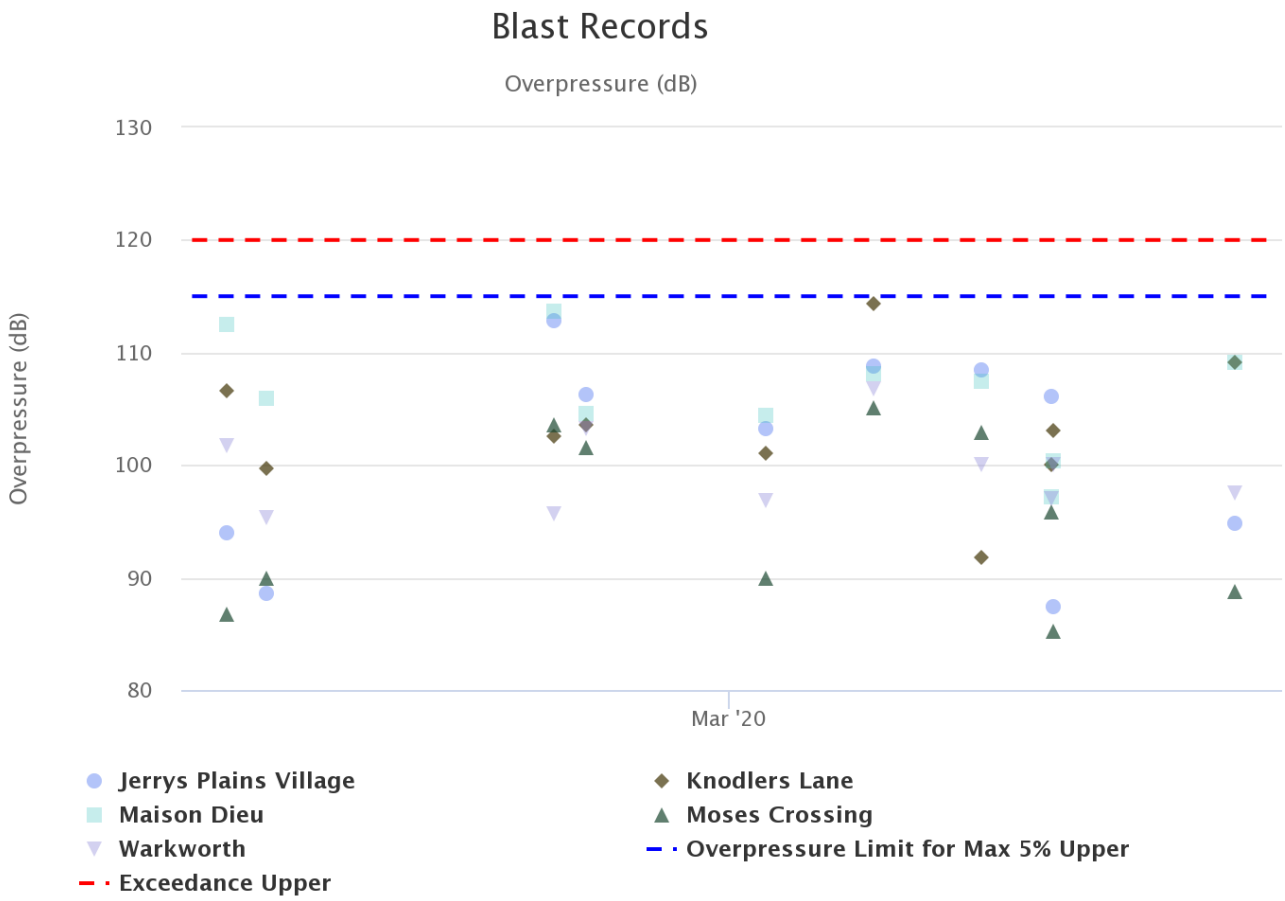


Figure 83: Overpressure Blast Monitoring Results – March 2020

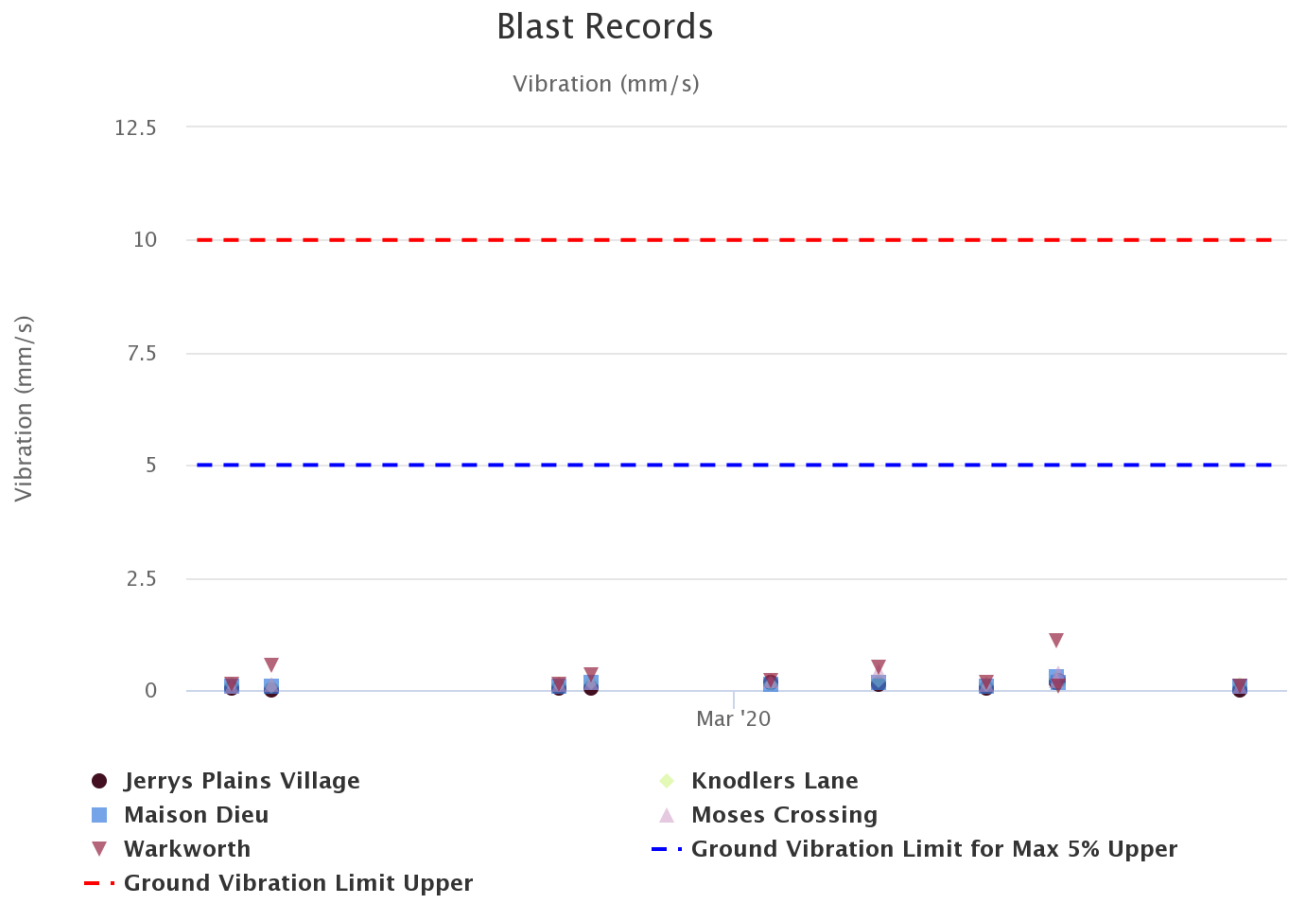


Figure 84: Ground Vibration Blast Monitoring Results – March 2020

Figure 85: 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 86.

5.1 Attended Noise Monitoring Results

Attended monitoring was conducted at receiver locations surrounding HVO on the night of the 23rd and 26th March 2020 with no non-compliances recorded. Monitoring results are detailed in Table 5 to Table 9.

Table 5: $L_{Aeq,\ 15\ minute}$ HVO South - Impact Assessment Criteria – March 2020

Location	Date and Time	Wind Speed (m/s)[1]	Stability Class[1]	Criterion dB (A)	Criterion Applies?[2]	HVO South L_{Aeq} dB[3,4,6,7]	Exceedance[4,5]
Knodlers Lane	*23/03/2020 21:43*	*4.2*	*E*	*39*	*No*	*IA*	*NA*
Maison Dieu	*23/03/2020 21:22*	*4.2*	*D*	*39*	*No*	*IA*	*NA*
Shearers Lane	*23/03/2020 21:01*	*4.1*	*D*	*41*	*No*	*IA*	*NA*
Kilburnie South	*23/03/2020 23:02*	*3.8*	*E*	*39*	*No*	*33*	*NA*
Jerrys Plains Village	*23/03/2020 21:22*	*4.2*	*D*	*35*	*No*	*IA*	*NA*
Jerrys Plains East	*23/03/2020 21:00*	*4.1*	*D*	*35*	*No*	*IA*	*NA*
Long Point Road	*23/03/2020 21:01*	*3.6*	*D*	*35*	*No*	*IA*	*NA*
HVGC	*23/03/2020 23:33*	*4.0*	*E*	*55*	*No*	*IA*	*NA*

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;
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;
5. NA in exceedance column means atmospheric conditions outside specified in approval and so criterion is not applicable;
6. IA means inaudible, there was no site noise at the monitoring location; and
7. NM means not measurable, noise was audible but could not be quantified.

Table 6: LA1, 1 minute HVO South - Impact Assessment Criteria – March 2020

Location	Date and Time	Wind Speed (m/s)[1]	Stability Class[1]	Criterion dB (A)	Criterion Applies?[2]	HVO South $L_{A1,\ 1min}$ dB[3,4,6,7]	Exceedance[4,5]
Knodlers Lane	*23/03/2020 21:43*	*4.2*	*E*	*45*	*No*	*IA*	*NA*
Maison Dieu	*23/03/2020 21:22*	*4.2*	*D*	*45*	*No*	*IA*	*NA*
Shearers Lane	*23/03/2020 21:01*	*4.1*	*D*	*45*	*No*	*IA*	*NA*
Kilburnie South	*23/03/2020 23:02*	*3.8*	*E*	*45*	*No*	*39*	*NA*
Jerrys Plains Village	*23/03/2020 21:22*	*4.2*	*D*	*45*	*No*	*IA*	*NA*
Jerrys Plains East	*23/03/2020 21:00*	*4.1*	*D*	*45*	*No*	*IA*	*NA*
Long Point Road	*23/03/2020 21:01*	*3.6*	*D*	*45*	*No*	*IA*	*NA*
HVGC	*23/03/2020 23:33*	*4.0*	*E*	*NA*	*No*	*IA*	*NA*

Notes:
1. Atmospheric data is sourced fromthe 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;
3. Site-only LA1,1minute attributed to HVO South Pit Area;
4. Bold results in red indicate exceedance of relevant criterion;
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;
6. IA means inaudible, there was no site noise at the monitoring location; and
7. NM means not measurable, noise was audible but could not be quantified.

Table 7: LAeq, 15 minute HVO North – Impact Assessment Criteria – March 2020

Location	Date and Time	Wind Speed (m/s)[1]	Stability Class[1]	Criterion dB (A)	Criterion Applies?[2]	HVO North L_{Aeq} dB[3,4,6,7]	Exceedance[4,5]
Knodlers Lane	*23/03/2020 21:43*	*2.6*	*E*	*35*	*Yes*	*IA*	*Nil*
Maison Dieu	*23/03/2020 21:22*	*2.9*	*E*	*35*	*Yes*	*IA*	*Nil*
Shearers Lane	*23/03/2020 21:01*	*3.6*	*D*	*35*	*No*	*IA*	*NA*
Kilburnie South	*23/03/2020 23:02*	*3.0*	*D*	*39*	*Yes*	*IA*	*Nil*
Jerrys Plains Village	*23/03/2020 21:22*	*2.9*	*E*	*36*	*Yes*	*NM*	*Nil*
Jerrys Plains East	*23/03/2020 21:00*	*3.6*	*D*	*39*	*No*	*IA*	*NA*
Long Point Road	*23/03/2020 21:01*	*3.6*	*D*	*35*	*No*	*IA*	*NA*
HVGC	*23/03/2020 23:33*	*2.7*	*E*	*NA*	*Yes*	*IA*	*Nil*
Kilburnie South	*26/03/2020 21:00*	*1.2*	*E*	*39*	*Yes*	*IA*	*Nil*
Jerrys Plains Village	*26/03/2020 21:27*	*1.2*	*F*	*36*	*Yes*	*<30*	*Nil*
Jerrys Plains East	*26/03/2020 21:57*	*1.9*	*E*	*39*	*Yes*	*<30*	*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;
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;
6. IA means inaudible, there was no site noise at the monitoring location; and
7. NM means not measurable, noise was audible but could not be quantified.

Table 8: LAeq,15 minute HVO North - Land Acquisition Criteria – March 2020

Location	Date and Time	Wind Speed (m/s)[1]	Stability Class[1]	Criterion dB (A)	Criterion Applies?[2]	HVO North L_{Aeq} dB[3,4,6,7]	Exceedance[4,5]
Knodlers Lane	*23/03/2020 21:43*	*2.6*	*E*	*41*	*Yes*	*IA*	*Nil*
Maison Dieu	*23/03/2020 21:22*	*2.9*	*E*	*41*	*Yes*	*IA*	*Nil*
Shearers Lane	*23/03/2020 21:01*	*3.6*	*D*	*41*	*No*	*IA*	*NA*
Kilburnie South	*23/03/2020 23:02*	*3.0*	*D*	*41*	*Yes*	*IA*	*Nil*
Jerrys Plains Village	*23/03/2020 21:22*	*2.9*	*E*	*41*	*Yes*	*NM*	*Nil*
Jerrys Plains East	*23/03/2020 21:00*	*3.6*	*D*	*41*	*No*	*IA*	*NA*
Long Point Road	*23/03/2020 21:01*	*3.6*	*D*	*41*	*No*	*IA*	*NA*
HVGC	*23/03/2020 23:33*	*2.7*	*E*	*NA*	*Yes*	*IA*	*Nil*
Kilburnie South	*26/03/2020 21:00*	*1.2*	*E*	*41*	*Yes*	*IA*	*Nil*
Jerrys Plains Village	*26/03/2020 21:27*	*1.2*	*F*	*41*	*Yes*	*<30*	*Nil*
Jerrys Plains East	*26/03/2020 21:57*	*1.9*	*E*	*41*	*Yes*	*<30*	*Nil*

Notes:
1. Atmospheric data is sourced fromthe 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 10ma bove 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;
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;
6. IA means inaudible, there was no site noise at the monitoring location; and
7. NM means not measurable, noise was audible but could not be quantified.

Table 9: LA1, 1 Minute HVO North - Impact Assessment Criteria – March 2020

Location	Date and Time	Wind Speed (m/s)[1]	Stability Class[1]	Criterion dB (A)	Criterion Applies?[2]	HVO North $L_{A1, 1min}$ dB[3,4,6,7]	Exceedance[4,5]
Knodlers Lane	23/03/2020 21:43	2.6	E	46	Yes	IA	Nil
Maison Dieu	23/03/2020 21:22	2.9	E	46	Yes	IA	Nil
Shearers Lane	23/03/2020 21:01	3.6	D	46	No	IA	NA
Kilburnie South	23/03/2020 23:02	3.0	D	46	Yes	IA	Nil
Jerrys Plains Village	23/03/2020 21:22	2.9	E	46	Yes	NM	Nil
Jerrys Plains East	23/03/2020 21:00	3.6	D	46	No	IA	NA
Long Point Road	23/03/2020 21:01	3.6	D	46	No	IA	NA
HVGC	23/03/2020 23:33	2.7	E	NA	Yes	IA	Nil
Kilburnie South	26/03/2020 21:00	1.2	E	46	Yes	IA	Nil
Jerrys Plains Village	26/03/2020 21:27	1.2	F	46	Yes	35	Nil
Jerrys Plains East	26/03/2020 21:57	1.9	E	46	Yes	<30	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;
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;
6. IA means inaudible, there was no site noise at the monitoring location; and
7. NM means not measurable, noise was audible but could not be quantified.

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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 March 2020 no penalties were applied. The assessment for low frequency noise is shown in Table 10.

Table 10: Low Frequency Noise Assessment – March 2020

Location	Date and Time	Measured Site Only LA_{eq} dB (Sth/Nth)[4,5]	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) [1,6] (Sth/Nth)
Knodlers Lane	23/03/2020 21:43	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA
Maison Dieu	23/03/2020 21:22	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA
Shearers Lane	23/03/2020 21:01	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA
Kilburnie South	23/03/2020 23:02	IA/33	NA/NA	NA/NA	NA/NA	NA/NA
Jerrys Plains Village	23/03/2020 21:22	NM/IA	NA/NA	NA/NA	NA/NA	NA/NA
Jerrys Plains East	23/03/2020 21:00	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA
Long Point Road	23/03/2020 21:01	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA
HVGC	23/03/2020 23:33	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA
Kilburnie South	26/03/2020 21:00	IA/34	NA/NA	NA/NA	NA/NA	NA/NA
Jerrys Plains Village	26/03/2020 21:27	<30/IA	NA/NA	NA/NA	NA/NA	NA/NA
Jerrys Plains East	26/03/2020 21:57	<30/IA	NA/NA	NA/NA	NA/NA	NA/NA

Notes:

1. Where it is not possible to determine the site-only result due to the presence of other low-frequency noise sources occurring during the measurement, or where criteria were not applicable due to meteorological conditions, or where site-only contributions were more than 5 dB less than the relevant LAeq criterion this is noted as NA (not available) and no further assessment has been undertaken;

2. As per NPfI, if LCeq – LAeq ≥ 15 dB further assessment of low-frequency noise required;

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. IA means inaudible, there was no site noise at the monitoring location;

5. NM means not measurable, noise was audible but could not be quantified; and

6. Bold results indicate that NPfI low-frequency modifying factor has been triggered and application of correction is required.

5.3 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.

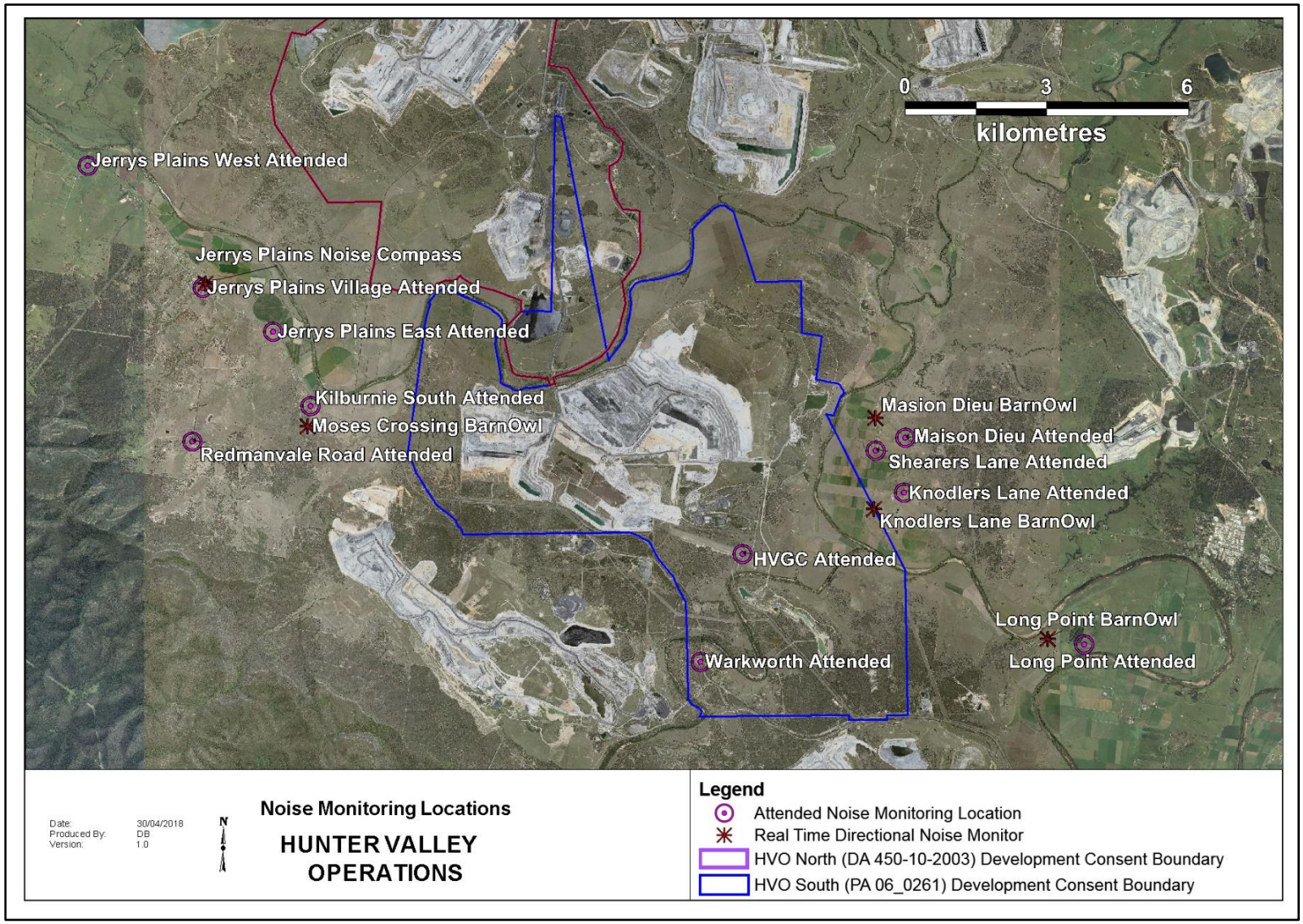

Figure 86: Noise Monitoring Location Plan

6.0 OPERATIONAL DOWNTIME

During March, a total of 1.94 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 87. Note that these delays are instances where operations were completely stopped, and does not include occasions where operations were changed / modified but not stopped (e.g. changed from exposed dump to in-pit dump).

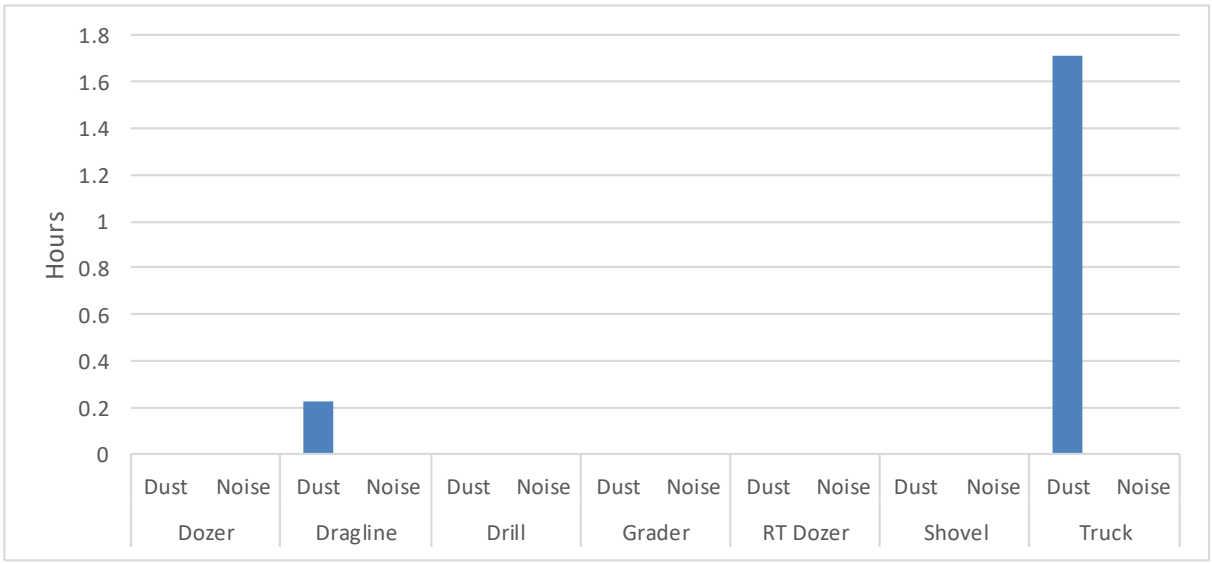

Figure 87: Operational Downtime by Equipment Type – March 2020

7.0 REHABILITATION

During March, 0.38 Ha of land was bulk shaped, and no land was rehabilitated, released or topsoiled. Year to date progress can be viewed in Figure 88.

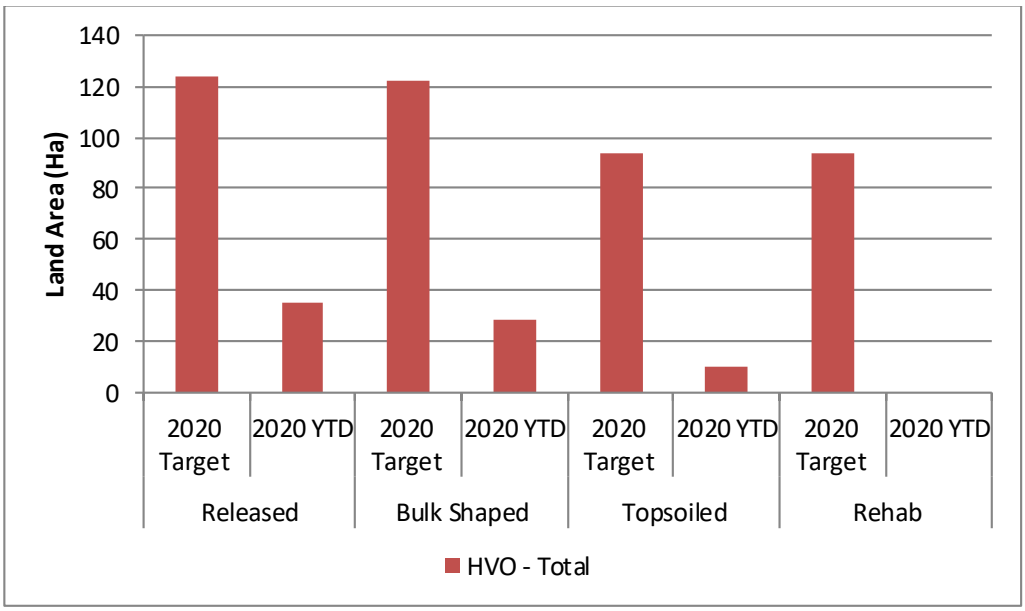

Figure 88: Rehabilitation YTD – March 2020

8.0 COMPLAINTS

No complaints were received during March 2020. No complaints have been received for 2020. Details of complaints received are shown in Table 11 below.

Table 11: Complaints Summary 2020

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

9.0 ENVIRONMENTAL INCIDENTS

During the reporting period there were no reportable environmental incidents.

APPENDIX A: METEOROLOGICAL DATA

Table 12: Meteorological Data - HVO Corporate Meteorological Station – March 2020

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)
1/03/2020	32.98	13.79	108.8	29.04	935	200	2.151	0
2/03/2020	34.73	18.11	87.9	24.7	342.7	192.3	4.159	0
3/03/2020	22.25	14.33	109.3	81.9	282.2	116.8	3.292	0.6
4/03/2020	25.53	14.3	112.1	72.22	694.8	118.5	3.427	0
5/03/2020	21.53	14.87	113.5	90.3	196.9	134.2	1.664	28
6/03/2020	29.04	17.2	112.4	55.53	1425	229.8	4.467	4
7/03/2020	22.18	12.59	100	78.72	1297	113.8	2.858	1.8
8/03/2020	22.59	11.86	100	65.19	1401	109.2	2.888	0
9/03/2020	23.06	11.51	100	60.7	1274	109.4	3.115	0
10/03/2020	24.76	11.28	100	48.67	1324	110.5	2.853	0
11/03/2020	24.8	12.15	99.9	52.47	1261	110	4.624	0
12/03/2020	24.99	11.14	96.9	38.28	1234	116.9	3.849	0
13/03/2020	25.99	9.06	100	41.52	984	130.6	1.396	0
14/03/2020	19.95	7.89	111.8	75.31	784.7	170.1	2.588	8
15/03/2020	21.7	8.43	100	61.33	1319	123.1	3.353	0
16/03/2020	22.07	10.54	110.9	68.08	1480	133.8	3.235	1.4
17/03/2020	21.1	13.5	109.7	69.1	669.6	113.7	1.791	0.6
18/03/2020	26.89	8.76	112	38.73	1375	145.9	1.572	0.2
19/03/2020	27.34	17.4	61.82	30.94	842	211.8	0.964	0
20/03/2020	32.49	13.69	71.44	26.45	849	281.5	3.784	0
21/03/2020	27.2	12.85	108.1	45.19	935	137.5	3.129	0
22/03/2020	31.04	12.78	109.5	27.8	946	212.3	2.546	0
23/03/2020	23.27	11.78	97.1	56.95	1169	109.5	3.497	0
24/03/2020	25.02	11.52	97.5	53.23	934	119.7	2.656	0
25/03/2020	23.79	10.5	112.4	64.9	634.2	199.5	1.395	15.8
26/03/2020	18.04	10.2	112.1	90.2	314.4	126.3	2.681	15.6
27/03/2020	22.19	9.66	110.9	57.21	1271	114.6	2.818	0.2
28/03/2020	21.85	7.824	111.5	65.04	1296	117	2.217	0
29/03/2020	27.03	11.21	111.7	56.36	958	134.3	1.376	0
30/03/2020	21.73	11.94	111.8	77.78	507.8	254.6	2.358	7
31/03/2020	28.36	10.54	109.3	45.81	835	228.4	2.107	0.2