HUNTER VALLEY
OPERATIONS

MONTHLY ENVIRONMENTAL MONITORING REPORT JUNE 2023

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REVIEW
[Planned Review Date]

OWNER
Superintendent - Environment and Community

FIGURES

TABLES

1 | 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 30th June 2023 (the 'Reporting Period').

2 | AIR QUALITY

2.1 | METEOROLOGICAL MONITORING

HVO maintains two meteorological stations: 'HVO Corporate' and 'Cheshunt' (refer to Figure 4).

2.1.1 | RAINFALL

Rainfall for the period is summarised in Table 1. The 2021, 2022 and 2023 trends are shown in Figure 1.

Table 1 – 'HVO Corporate' Rainfall data for the reporting period

2023	Monthly Rainfall (mm)	Cumulative Rainfall (mm)
June	10.8	250.40

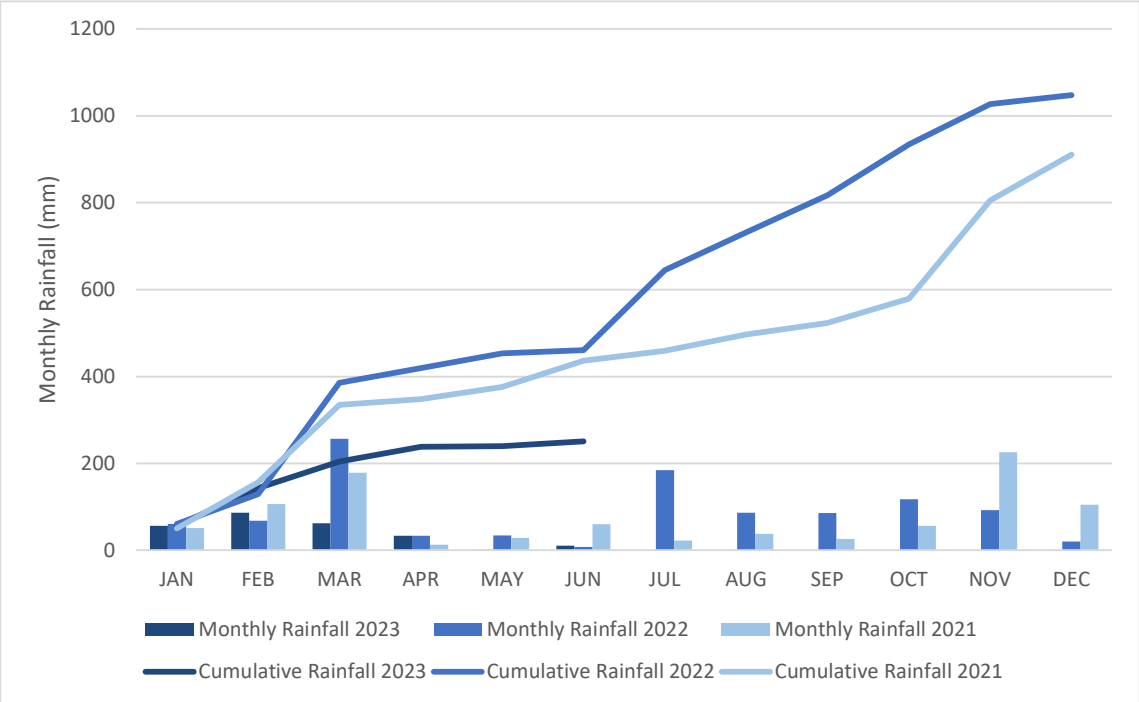

Figure 1 - Rainfall Summary 2023

2.1.2 | WIND SPEED AND DIRECTION

Westerly winds were prevailing during the reporting period at HVO Corporate AWS as shown in Figure 2, whilst north-westerly winds were prevailing at HVO Cheshunt AWS as shown in Figure 3

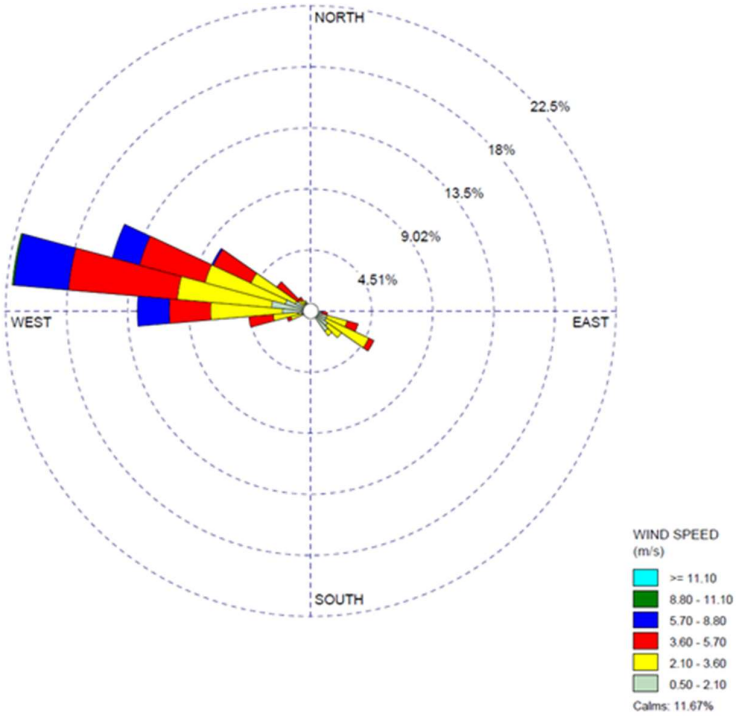

Figure 2 – 'HVO Corporate' Wind Rose for the Reporting Period

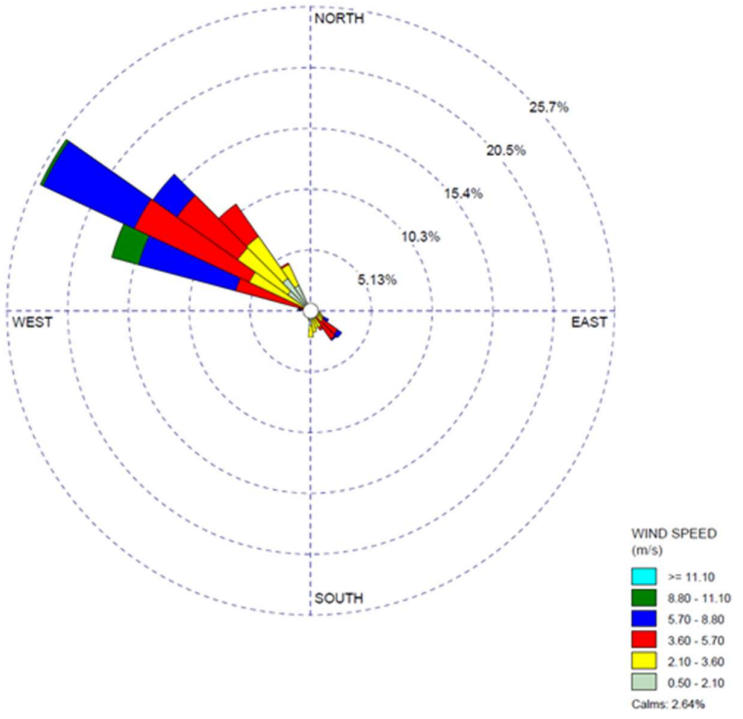

Figure 3 – 'HVO Cheshunt' Wind Rose for the Reporting Period

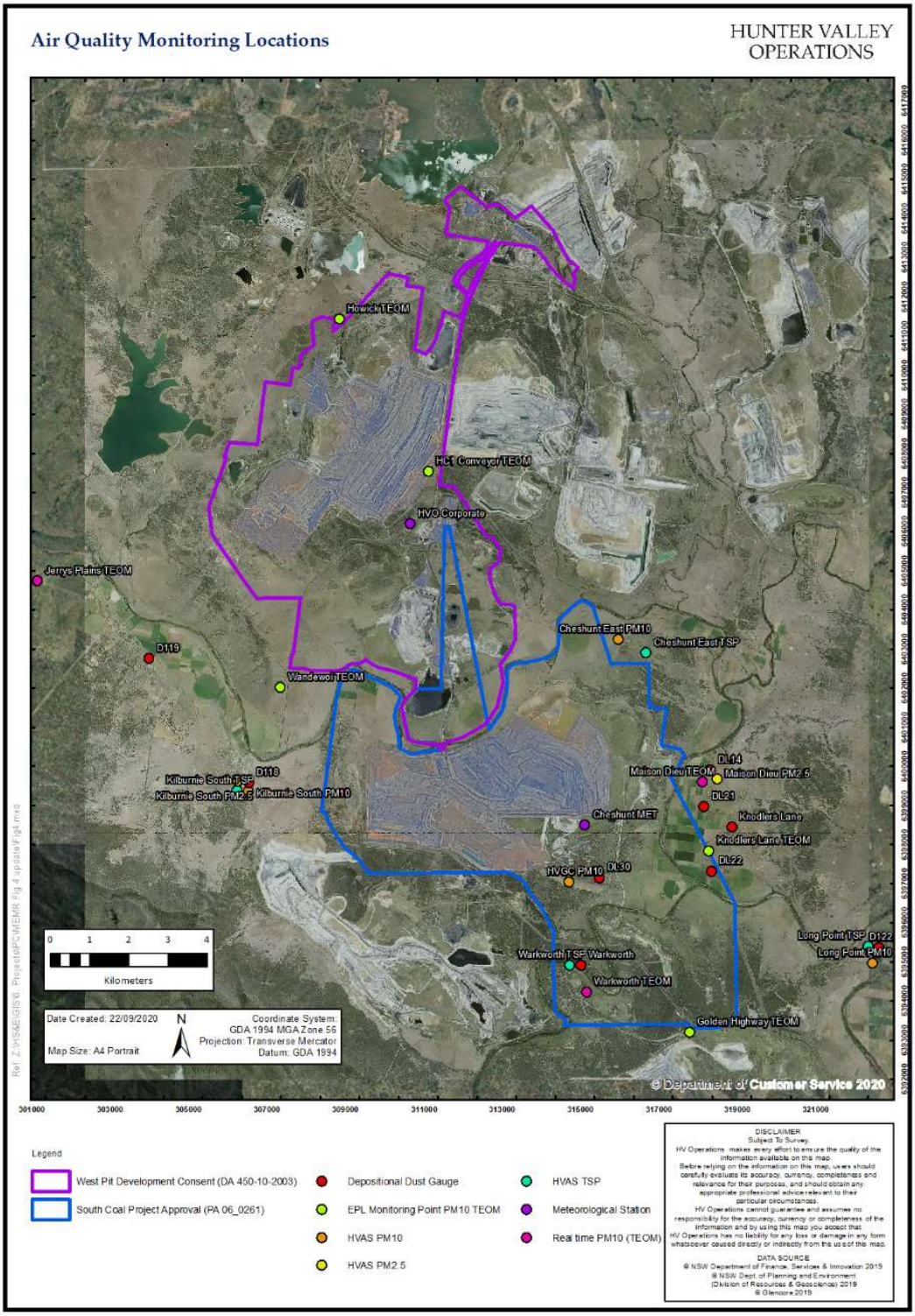

Figure 4 – Air Quality Monitoring Location Plan

2.2 | DEPOSITIONAL DUST

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

Figure 5 displays insoluble solids results from depositional dust gauges during the reporting period compared against the annual impact assessment criteria. Any monthly results deemed to be contaminated (due to presence of bird droppings, insects, etc.) are not displayed. An assessment of HVO's contribution against the long-term impact assessment criteria will be provided in the 2023 Annual Review.

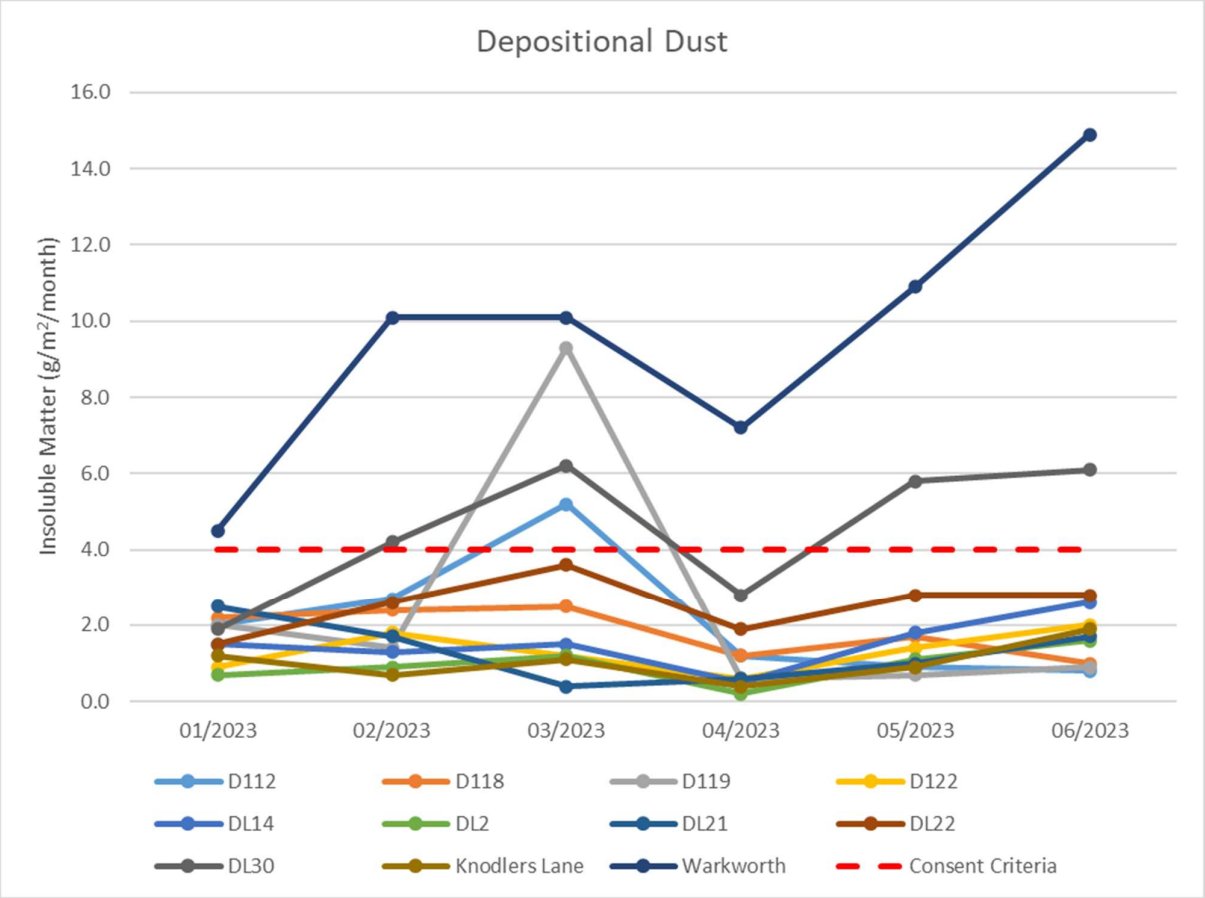

Figure 5 - Depositional Dust Results for the Reporting Period

2.3 | SUSPENDED PARTICLES

Suspended particles are measured by a network of High Volume Air Samplers (HVAS) measuring Total Suspended Particulates (TSP) and Particulate Matter <10µm (PM10). The Kilburnie South and Maison Dieu HVAS also monitor Particulate Matter <2.5µm (PM2.5). The location of these monitors is presented in Figure 4. Each HVAS runs for 24-hours on a six-day cycle.

2.3.1 | HVAS PM_{10} RESULTS

2.3.1.1 | PERFORMANCE AGAINST SHORT TERM IMPACT ASSESSMENT CRITERIA

Figure 6 shows individual PM10 results at each monitoring station against the short-term (24 hour) impact assessment criteria of 50µg/m^3. An exceedance was recorded on 22 June at Gliding Club of 50.5µg/m^3. Internal investigations into these results deemed HVO's contribution to be below the short-term impact assessment criteria.

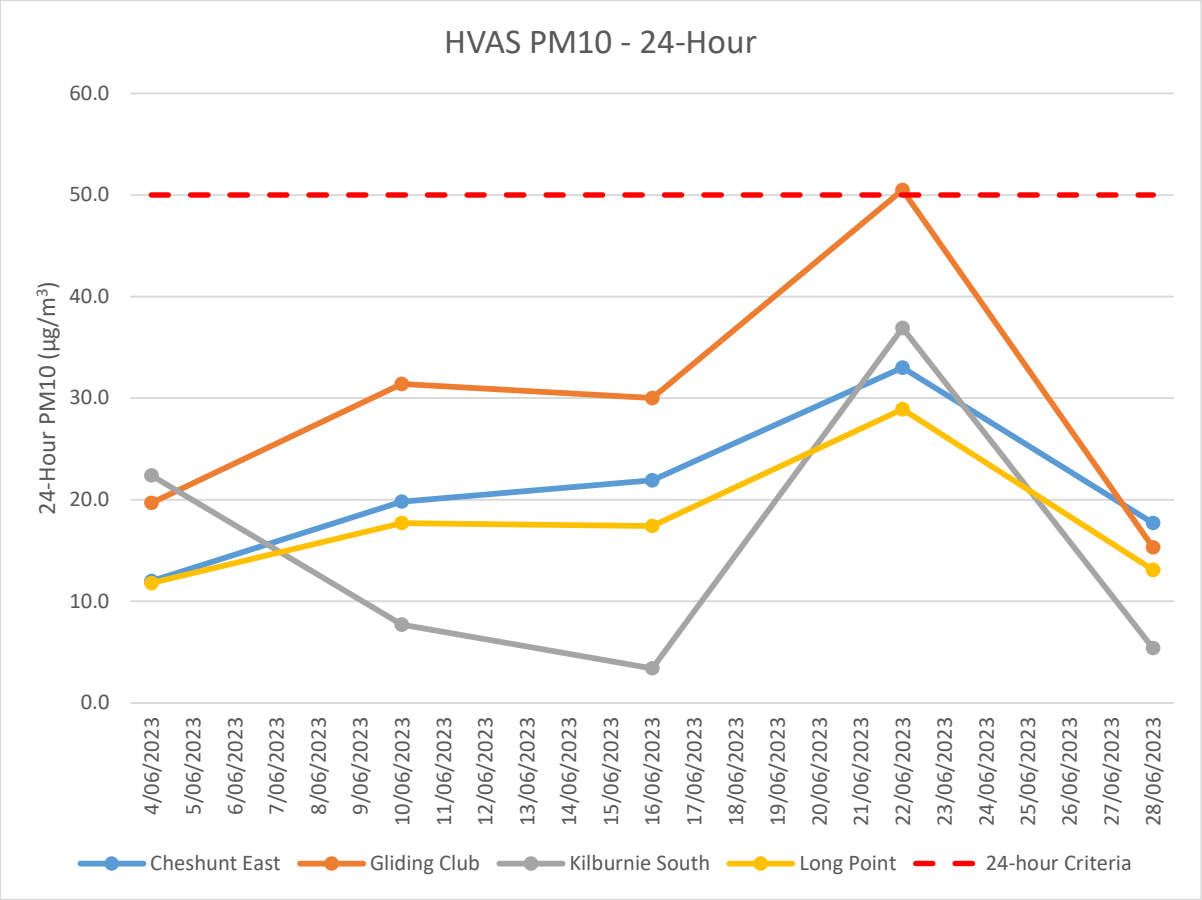

Figure 6 – Individual PM_{10} Results for the Reporting Period

2.3.1.2 | PERFORMANCE AGAINST LONG TERM IMPACT ASSESSMENT CRITERIA

Figure 7 shows the year-to-date annual average PM_{10} results. All monitors were below the relevant long term (annual) impact assessment criteria during the reporting period. An assessment of HVO's contribution against the long-term impact assessment criteria will be provided in the 2023 Annual Review.

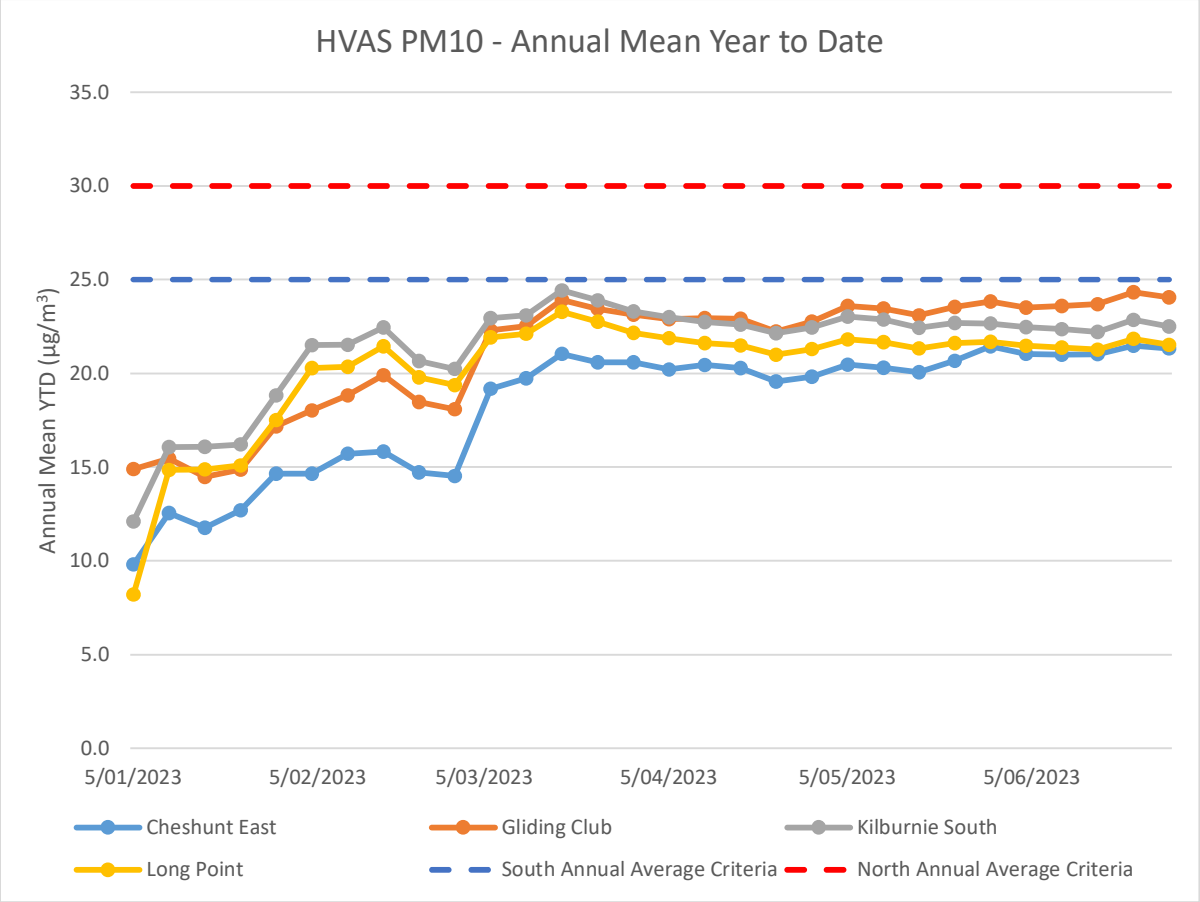

Figure 7 – Year to Date Average PM_{10} as at end of the Reporting Period

2.3.2 | HVAS $PM_{2.5}$ RESULTS

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

2.3.2.1 | HVAS $PM_{2.5}$ RESULTS

Figure 8 shows individual PM2.5 results at each monitoring station against the HVO South short-term (24 hour) impact assessment criteria of 25µg/m3.

All monitors reported concentrations below the relevant short-term impact assessment criteria during the reporting period.

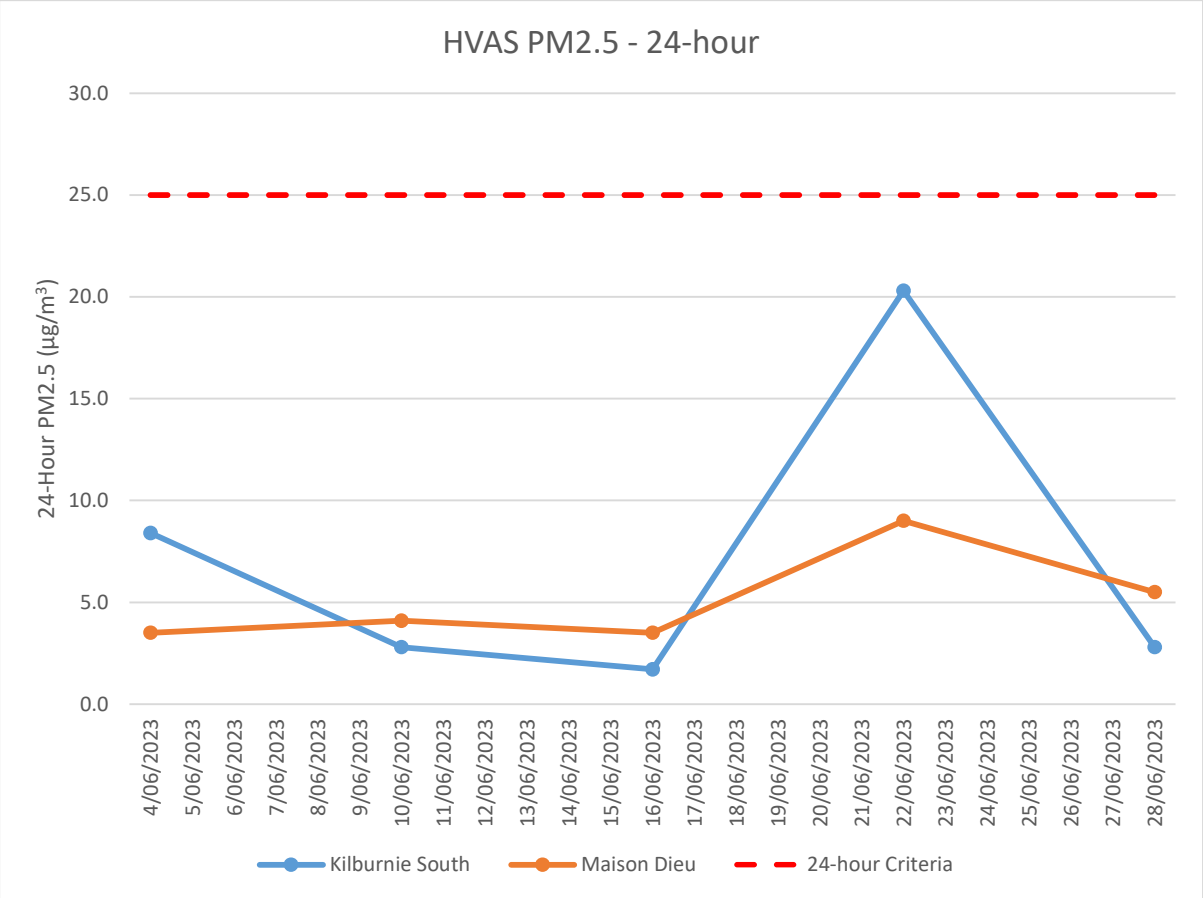

Figure 8 - Results for the Reporting Period

2.3.2.2 | PERFORMANCE AGAINST LONG TERM IMPACT ASSESSMENT CRITERIA

Figure 9 shows the year-to-date annual average $PM_{2.5}$ results. During the reporting period, both the Maison Dieu monitor and Kilburnie South monitors annual average year to date results were above the $PM_{2.5}$ Annual Rolling Mean criteria of 8µg/m3.

An assessment of HVO's contribution against the long-term impact assessment criteria will be provided in the 2023 Annual Review.

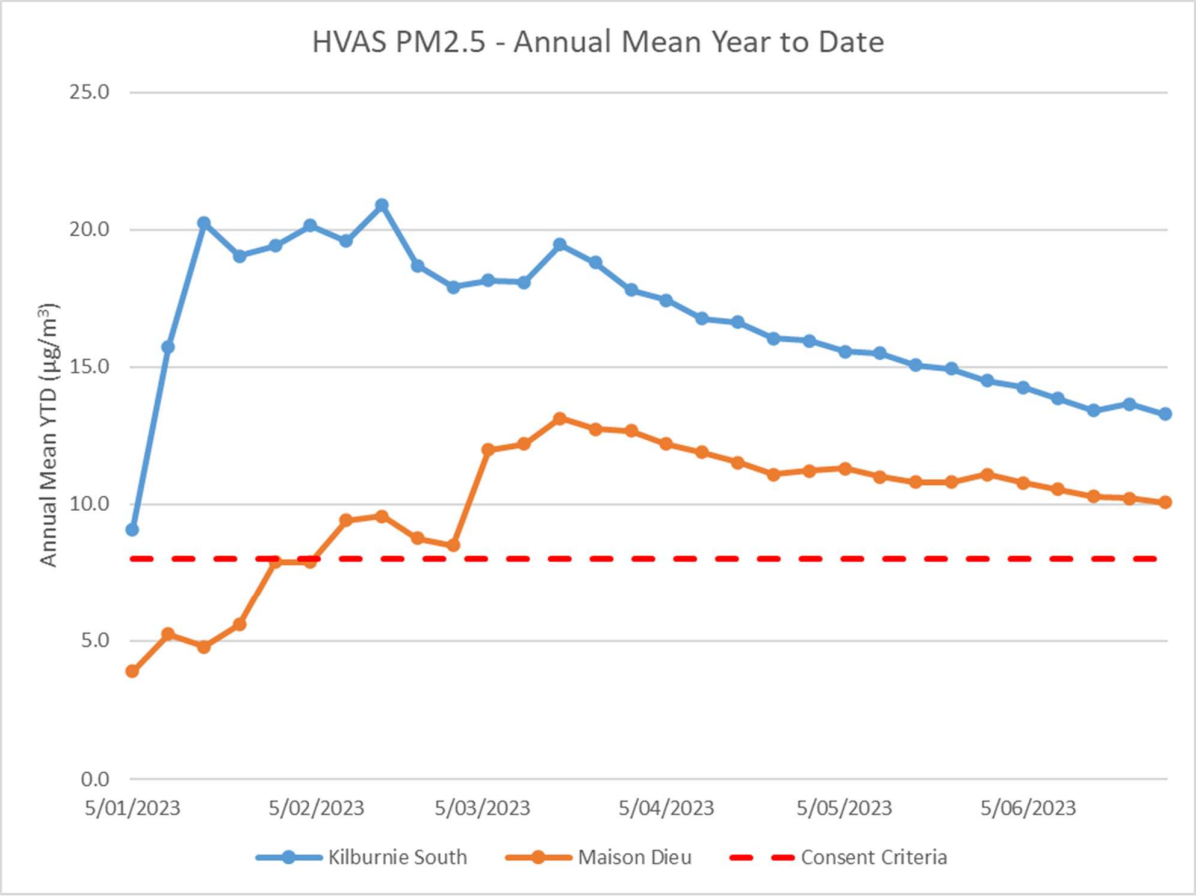

Figure 9 - Year to Date Average $PM_{2.5}$ as at end of the Reporting Period

2.3.3 | TSP RESULTS

2.3.3.1 | 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.

Warkworth monitor results were above the relevant long-term impact assessment criteria during the reporting period. All other monitors were below the relevant long-term impact assessment criteria during the reporting period.

An assessment of HVO's contribution against the long-term impact assessment criteria will be provided in the 2023 Annual Review.

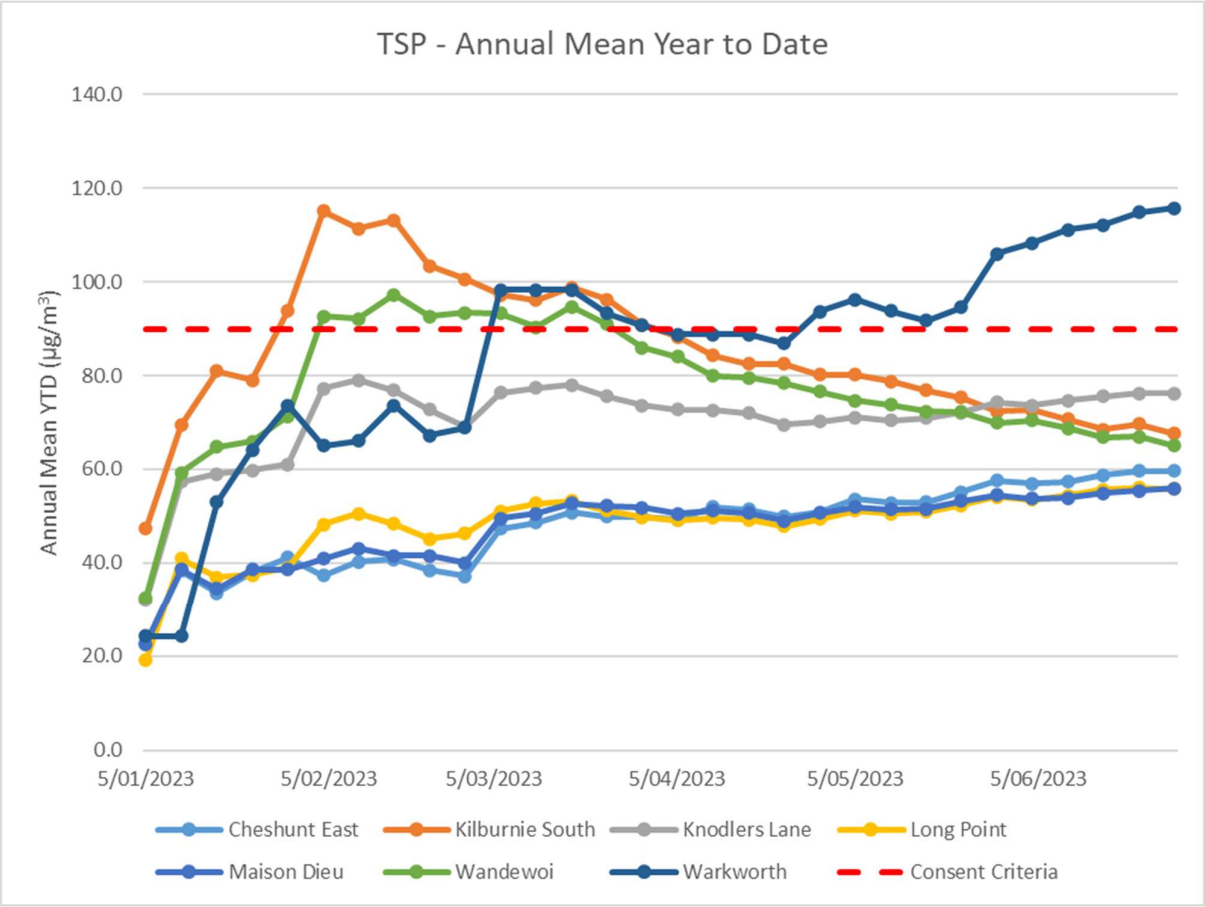

Figure 10 - Year to Date Average Total Suspended Particulates as at end of the Reporting Period

2.3.4 | REAL TIME PM_{10} RESULTS

HVO maintains a network of real time PM_{10} monitors. The real time air quality monitoring stations continuously record information and transmit data to a central database, generating alarms when particulate matter levels exceed internal trigger levels. 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.

Figure 11 shows the daily 24-hour average PM_{10} result from the real time monitoring sites. The year to date annual averages for each monitoring site are shown in Figure 12.

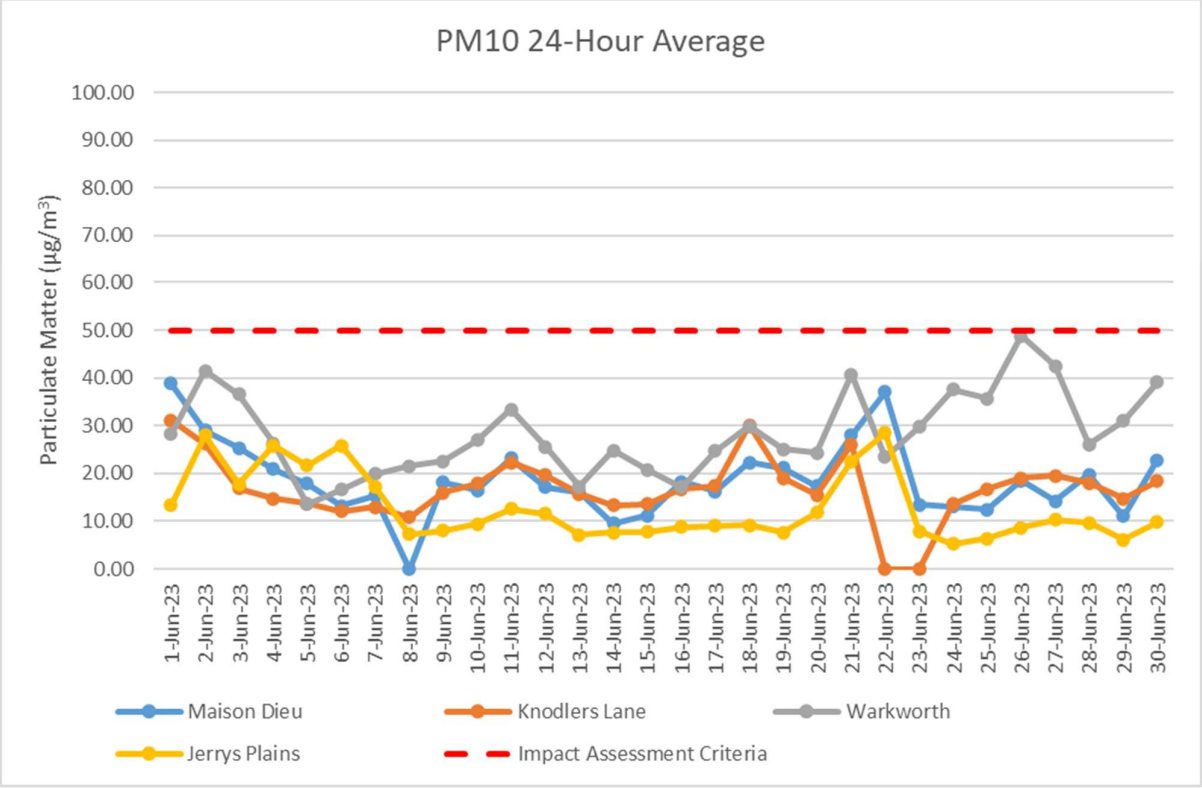

Figure 11 – Real Time PM_{10} 24hr for the Reporting Period

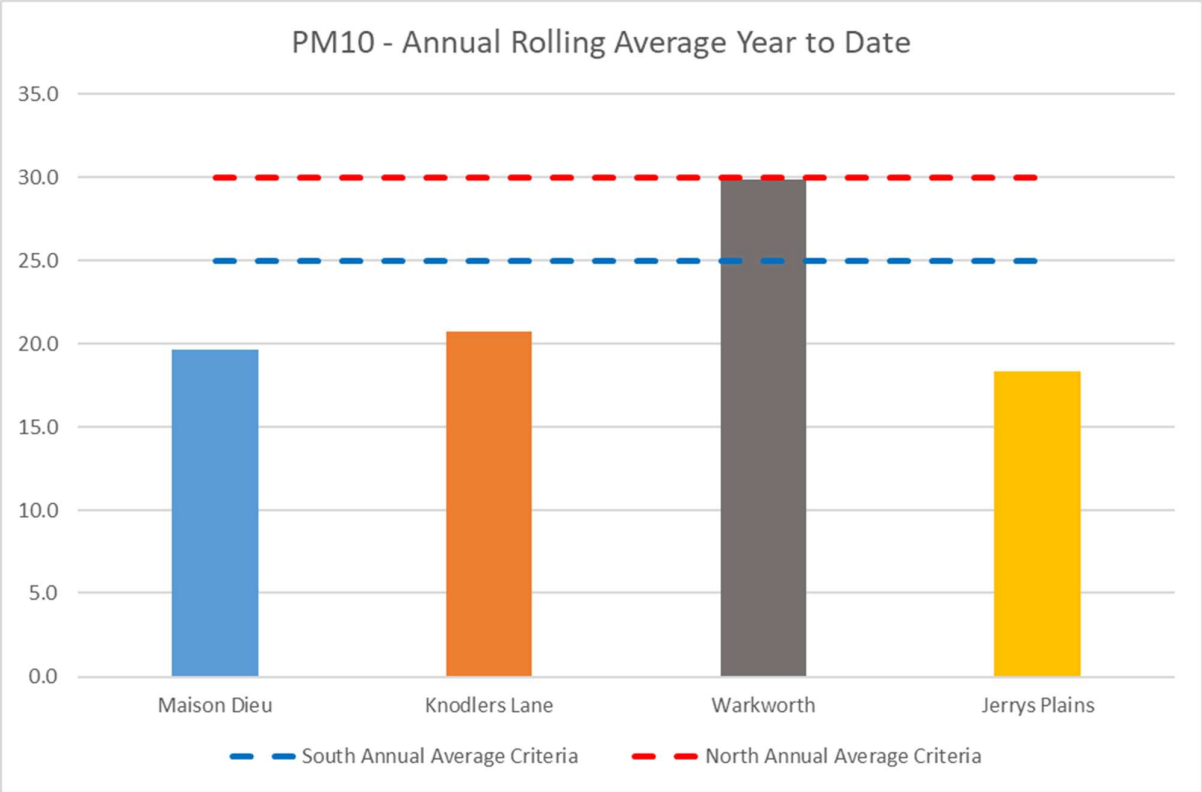

Figure 12 – Real Time PM_{10} Annual Average for the Reporting Period.

2.3.5 | REAL TIME ALARMS FOR AIR QUALITY

The real time monitoring system generated 97 automated air quality related alarms during the reporting period. Of the total, 33 alarms related to adverse weather conditions and 64 alarms related to dust conditions.

3 | WATER QUALITY

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

3.1 | SURFACE WATER

Surface watercourses are sampled on a quarterly sampling regime. Water quality is assessed through the parameters of pH, electrical conductivity (EC) and Total Suspended Solids (TSS). The location of surface water monitoring points across HVO is shown in Figure 13.

Results from monitoring on site dams, the Hunter River and other natural tributaries are provided in Figure 14 to Figure 25.

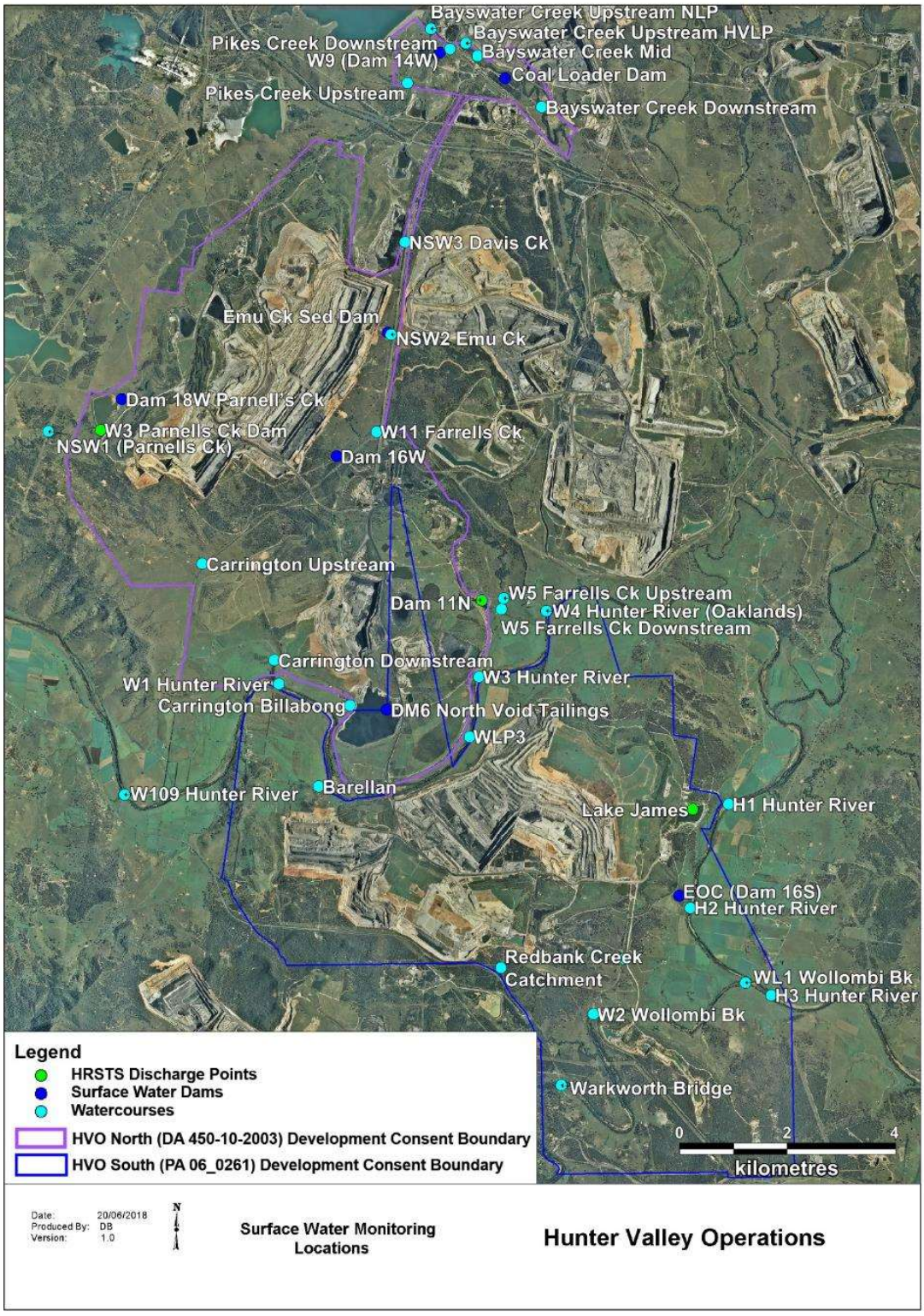

Figure 13 – HVO Surface Water Monitoring Locations

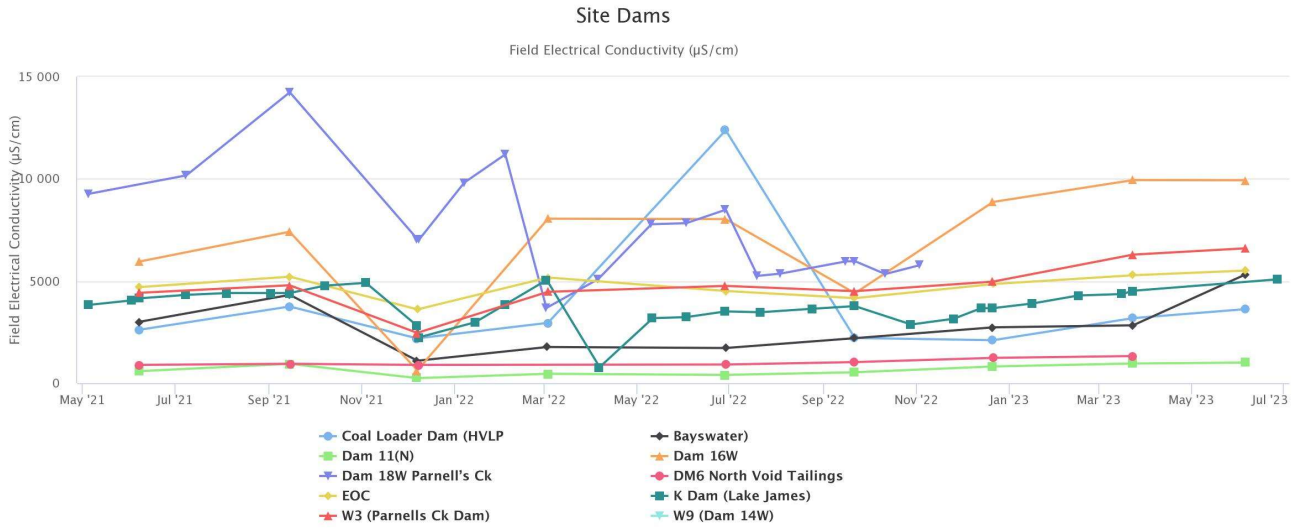

Figure 14 Site Dams Electrical Conductivity - June 2023

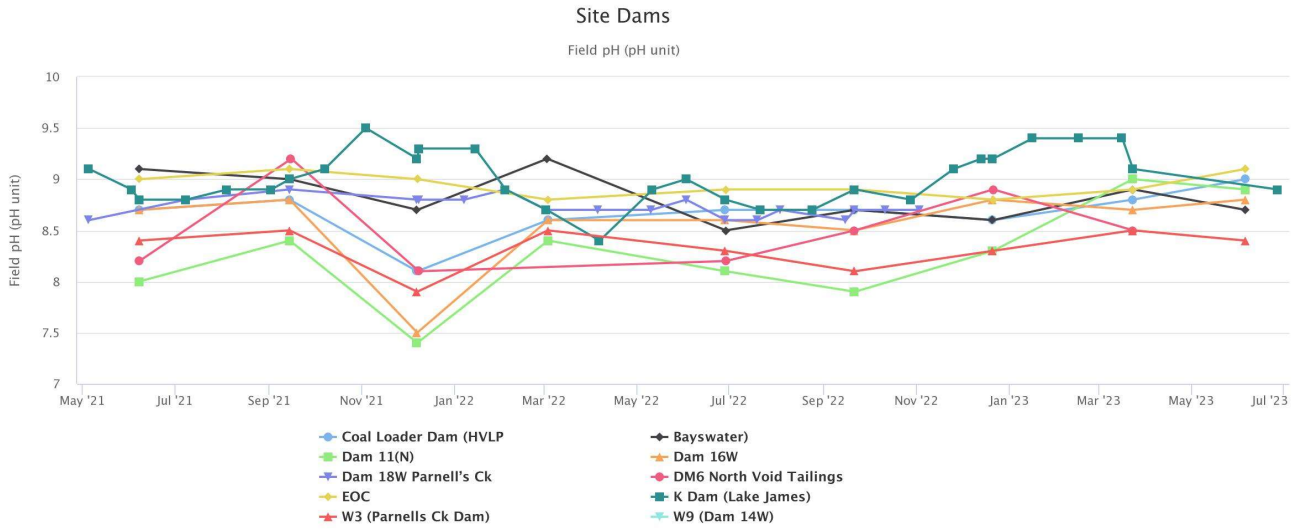

Figure 15 Site Dams Field pH - June 2023

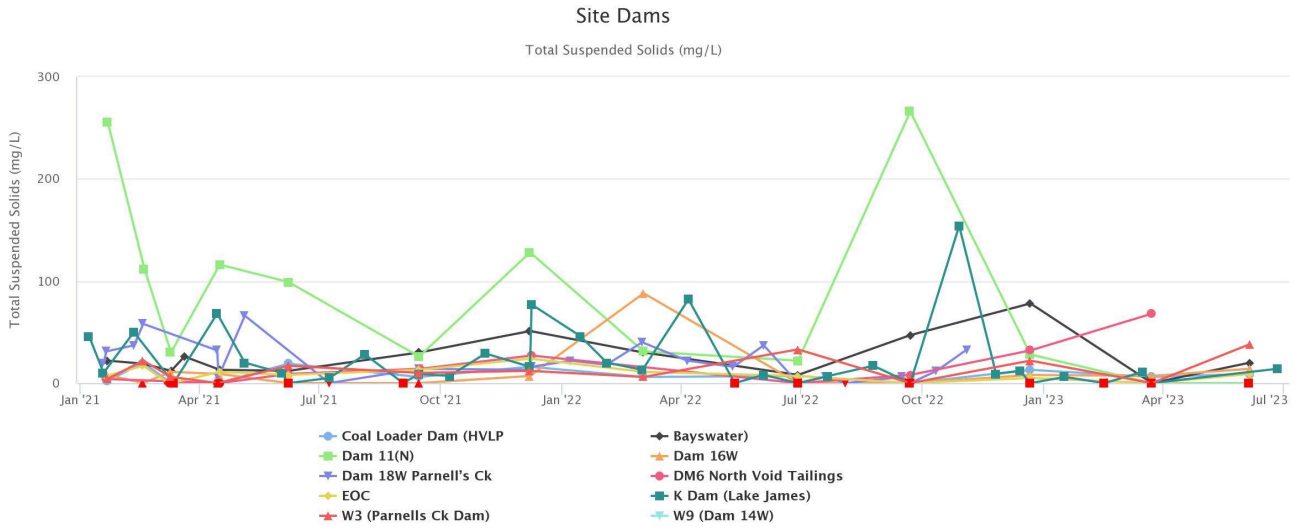

Figure 16 Site Dams Total Suspended Solids - June 2023

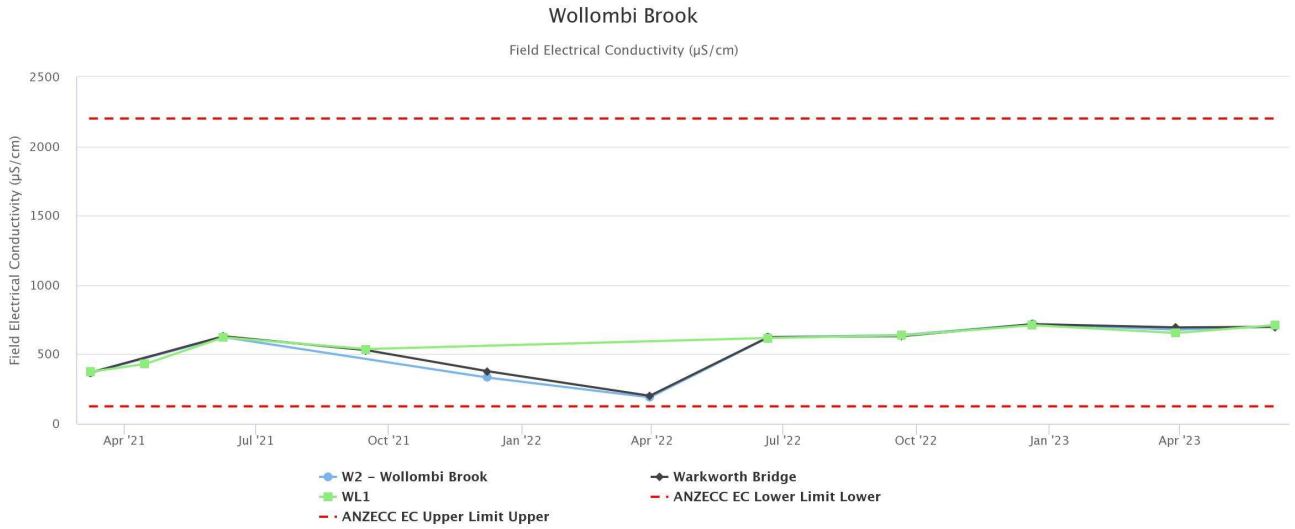

Figure 17 Wollombi Brook Electrical Conductivity - June 2023

Figure 18 Wollombi Brook Field pH - June 2023

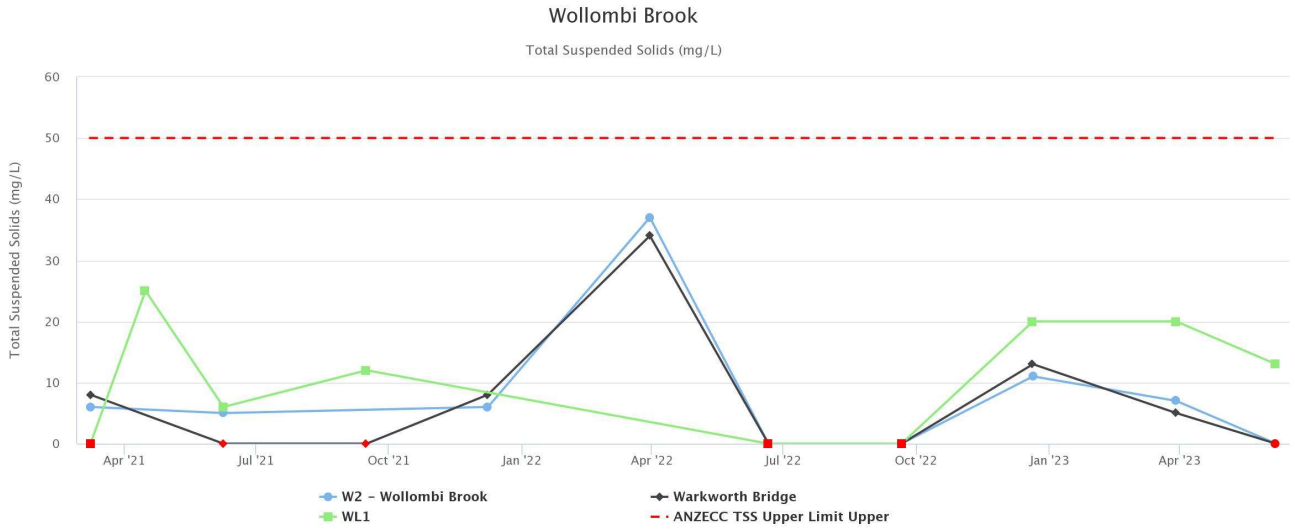

Figure 19 Wollombi Brook Total Suspended Solids - June 2023

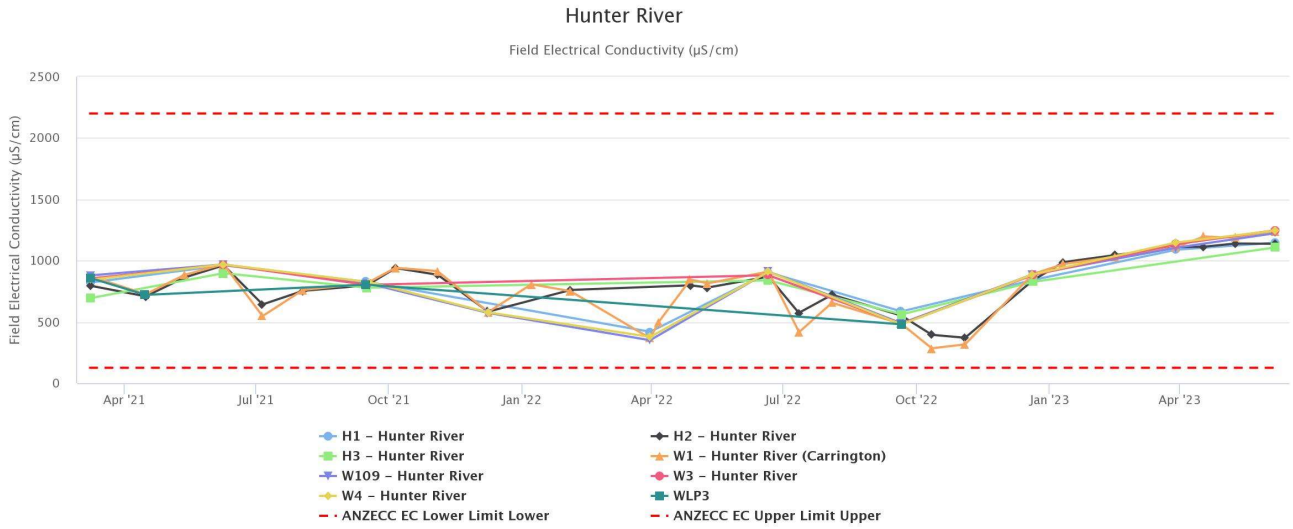

Figure 20 Hunter River Electrical Conductivity - June 2023

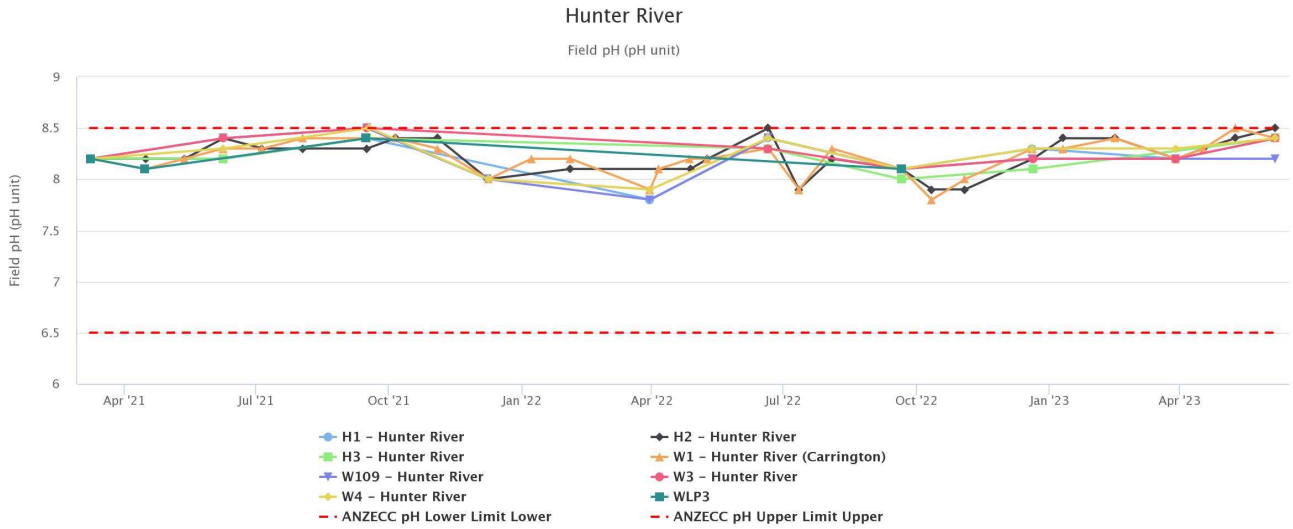

Figure 21 Hunter River Field pH - June 2023

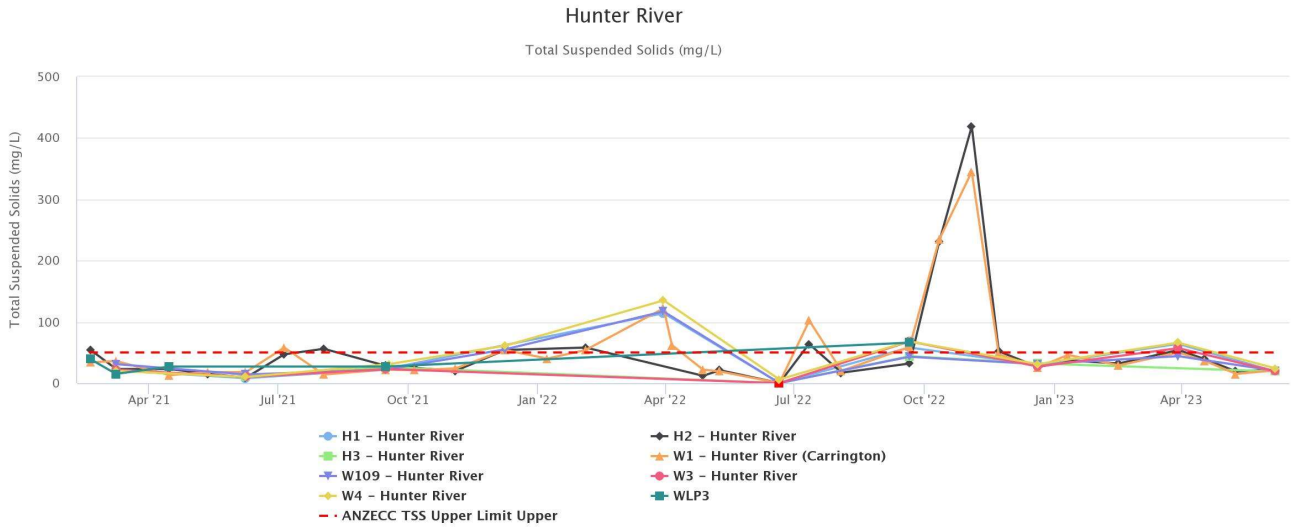

Figure 22 Hunter River Total Suspended Solids - June 2023

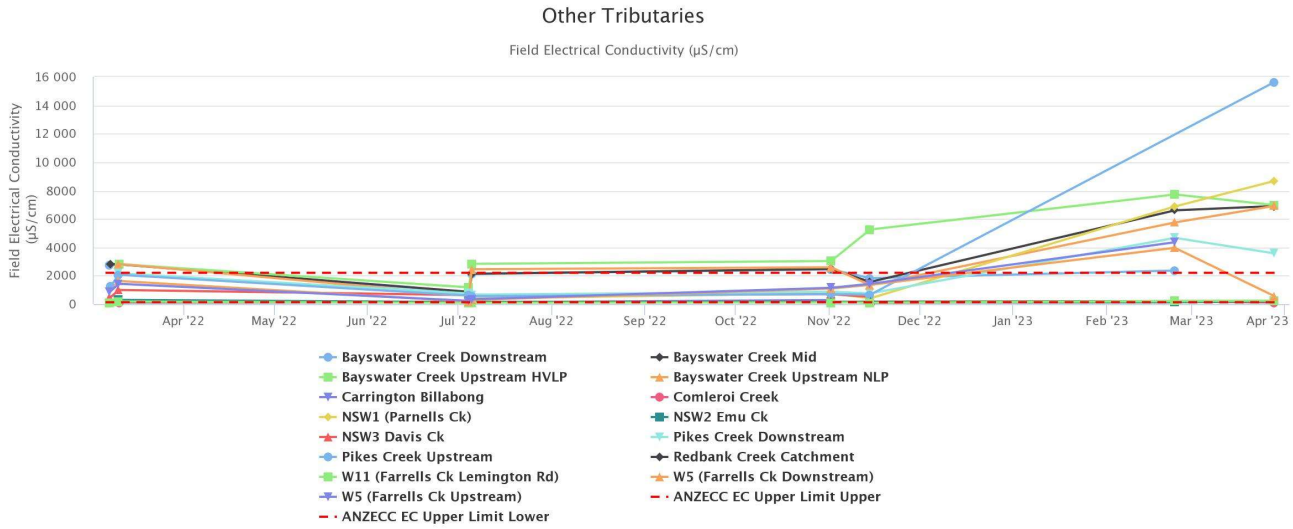

Figure 23 Other Tributaries Electrical Conductivity - June 2023

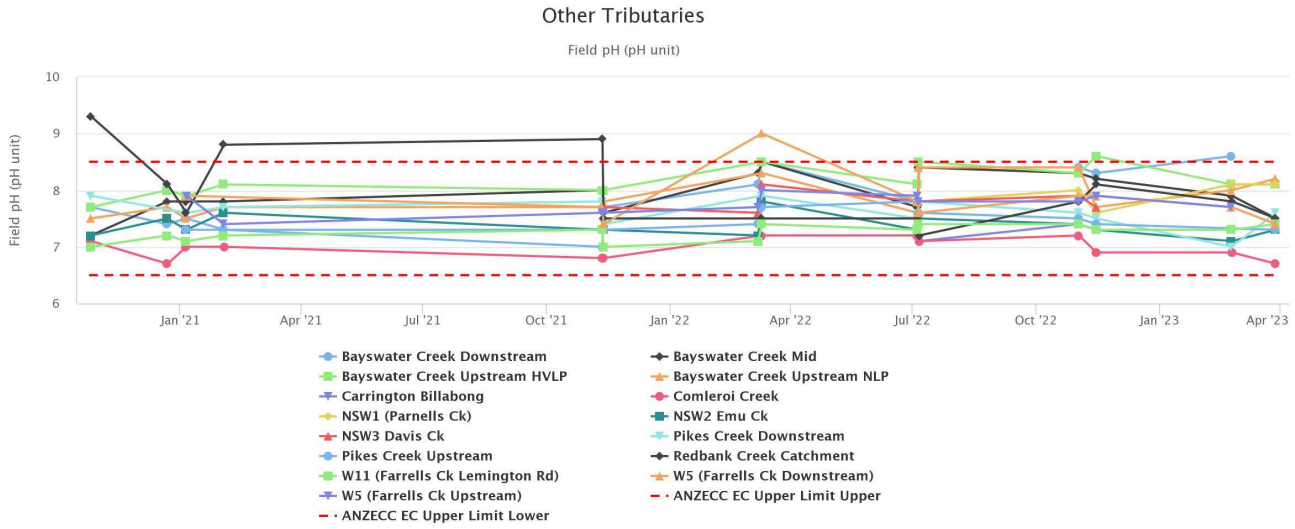

Figure 24 Other Tributaries Field pH - June 2023

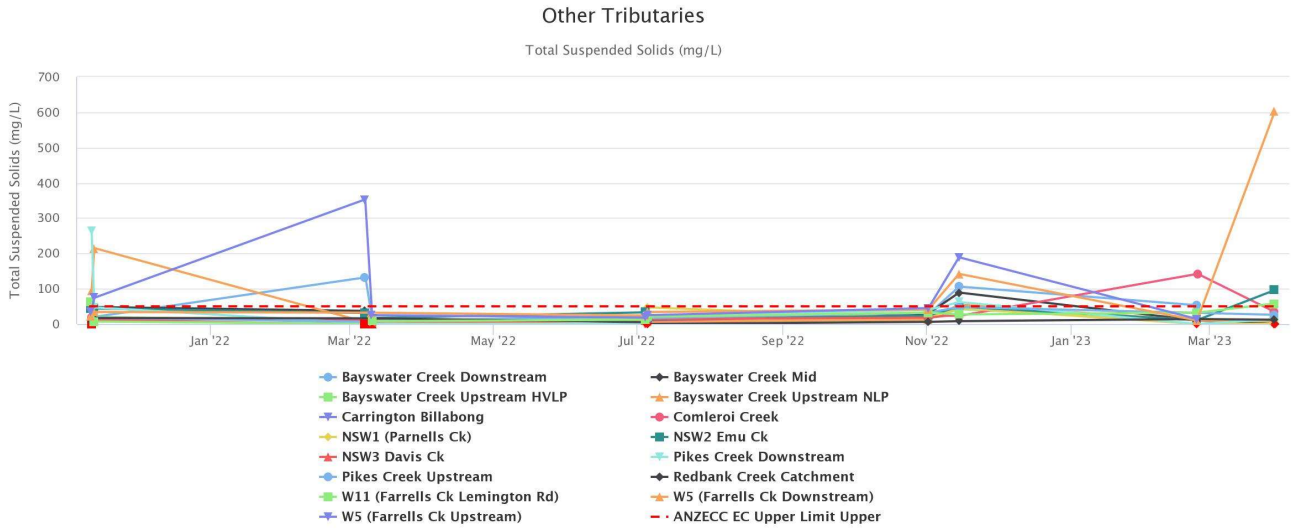

Figure 25 Other Tributaries Total Suspended Solids - June 2023

3.1.1 | SURFACE WATER TRIGGER TRACKING

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.

Surface water trigger tracking results are summarised in

Table 2.

Table 2 - Surface Water Trigger Tracking – Q2 2023

Site	Date	Trigger Limit Breached	Response Action
H2 - Hunter River	17/04/2023	Electrical Conductivity (uS/cm)	No investigation required - first trigger exceedance
H2 - Hunter River	9/05/2023	Electrical Conductivity (uS/cm)	No investigation required - second trigger exceedance
W109 - Moses Crossing	6/06/2023	Electrical Conductivity (uS/cm)	No investigation required - first trigger exceedance
W4 - Hunter River	6/06/2023	Electrical Conductivity (uS/cm)	No investigation required - first trigger exceedance
W3 - Hunter River	6/06/2023	Electrical Conductivity (uS/cm)	No investigation required - first trigger exceedance
H1 - Hunter River	6/06/2023	Electrical Conductivity (uS/cm)	No investigation required - first trigger exceedance
H2 - Hunter River	6/06/2023	Electrical Conductivity (uS/cm)	Third Exceedance of EC. - Field Observations indicate that the sample was clear in colour and turbidity, with nil odour. - Approximately 1mm of rainfall in the seven days prior to sampling. - No HRSTS discharges upstream of H2 on or prior to the 6/06/23. - No sediment basins overtopped during rain event - On 6/06/23 site W109 Hunter River (upstream of H2) indicated a trigger value exceedance of 1,224 EC (µS/cm) within the broader catchment. - On 6/06/23 sites W3 (1248 µS/cm), W4 (1245 µS/cm) and H1 (1146 µS/cm) all recorded trigger value exceedances (all upstream of H2). The EC result at H2 (1137 µS/cm) was less than that recorded at W109, W3, W4 and H1 (immediately upstream of H2). Investigation: There were no onsite events identified to indicate that the EC exceedance was associated with a HVO mining impact. The EC exceedance appears to be a result of high EC within the broader catchment. Continue monitoring this location for further trigger exceedances.

H3 - Hunter River	6/06/2023	Electrical Conductivity (uS/cm)	No investigation required - first trigger exceedance

3.2 | SITE WATER USE

HVO is permitted to extract water from the Hunter River under water allocation licenses issued by Water NSW.

HVO did not extract water from the Hunter River during the reporting period.

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.

HVO did not undertake any HRSTS discharges during the reporting period.

3.4 | GROUNDWATER MONITORING RESULTS

Groundwater monitoring is undertaken on a quarterly basis in accordance with the HVO Water Management Plan and Groundwater Monitoring Program. The location of groundwater monitoring points across HVO are show in Figure 26.

Groundwater monitoring results are provided in Figure 27 to Figure 77.

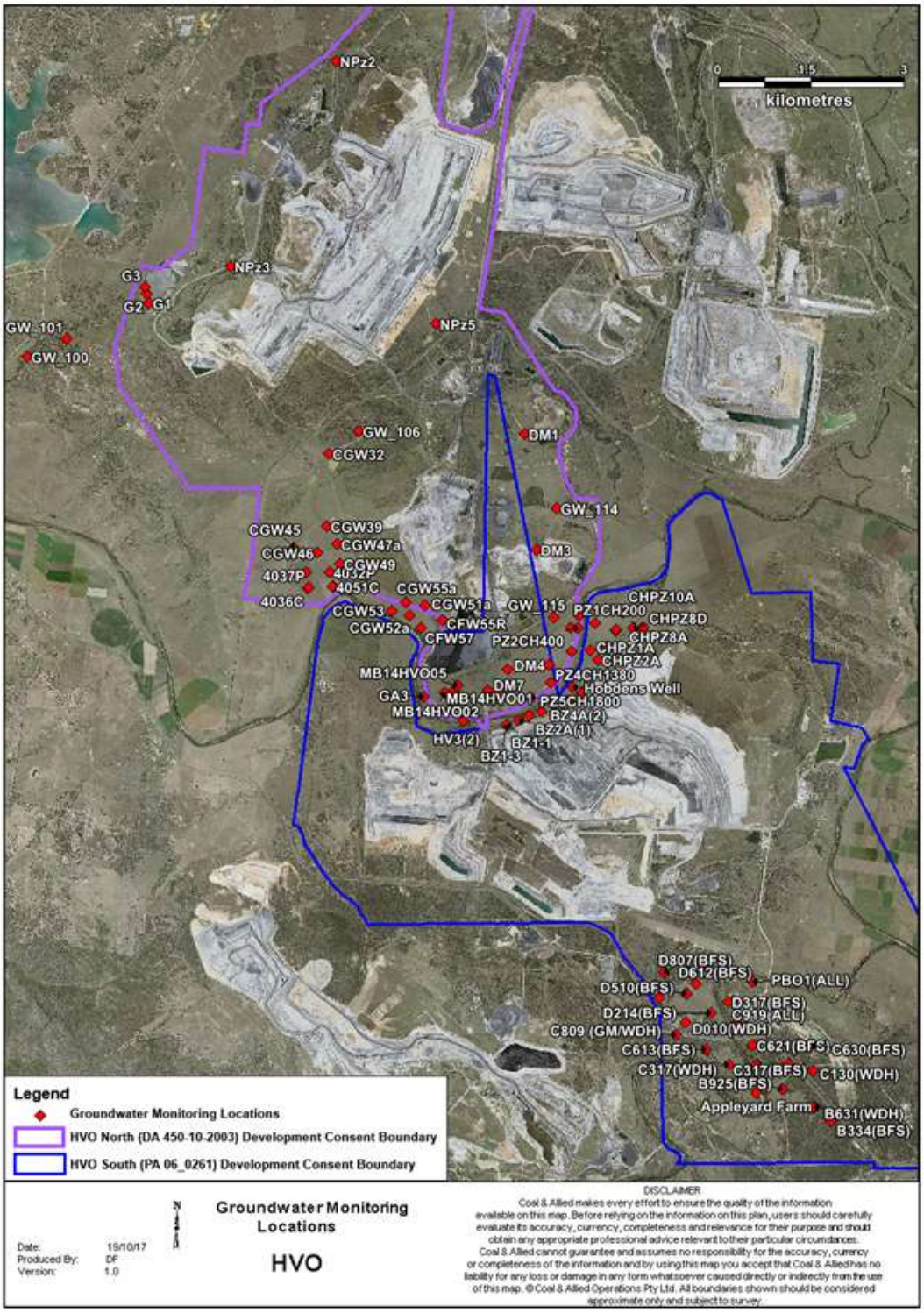

Figure 26 - Groundwater Monitoring Locations at HVO

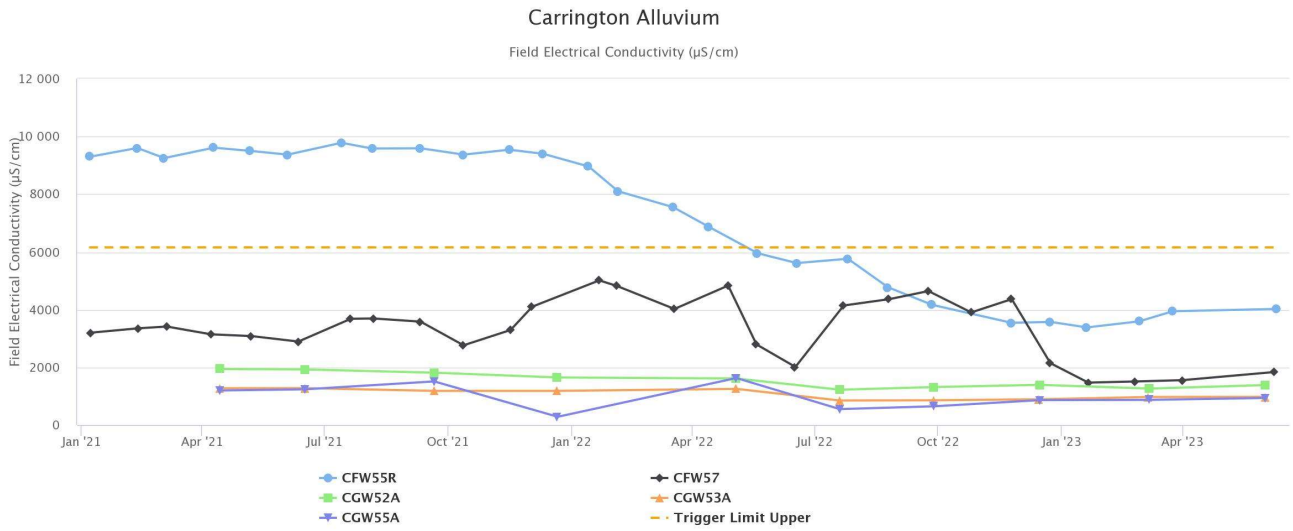

Figure 27 - Carrington Alluvium Electrical Conductivity Trend – Q2 2023

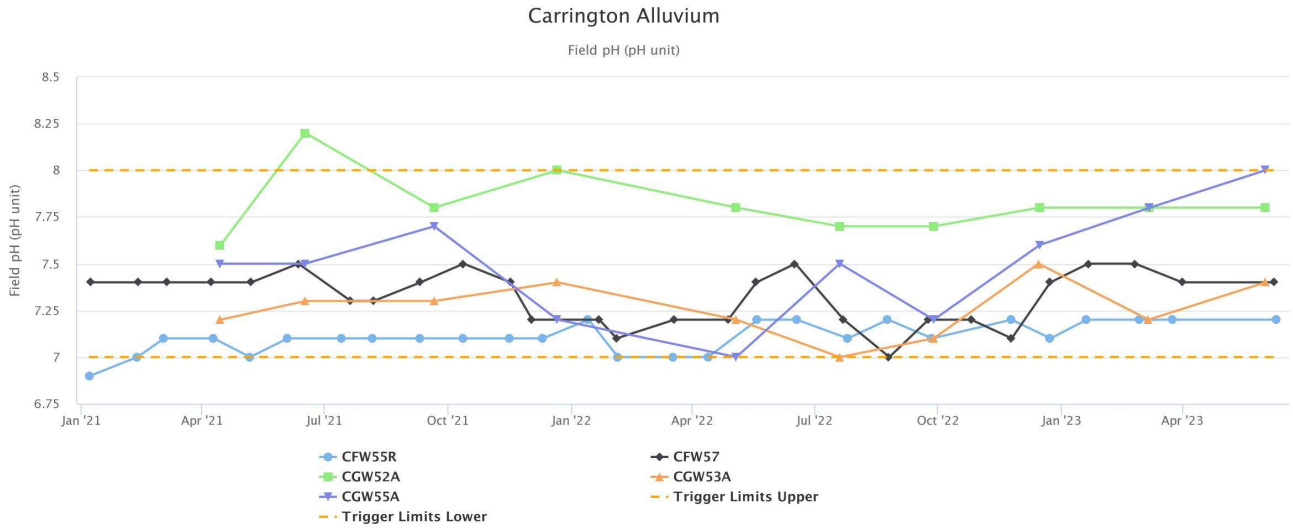

Figure 28 Carrington Alluvium Field pH Trend – Q2 2023

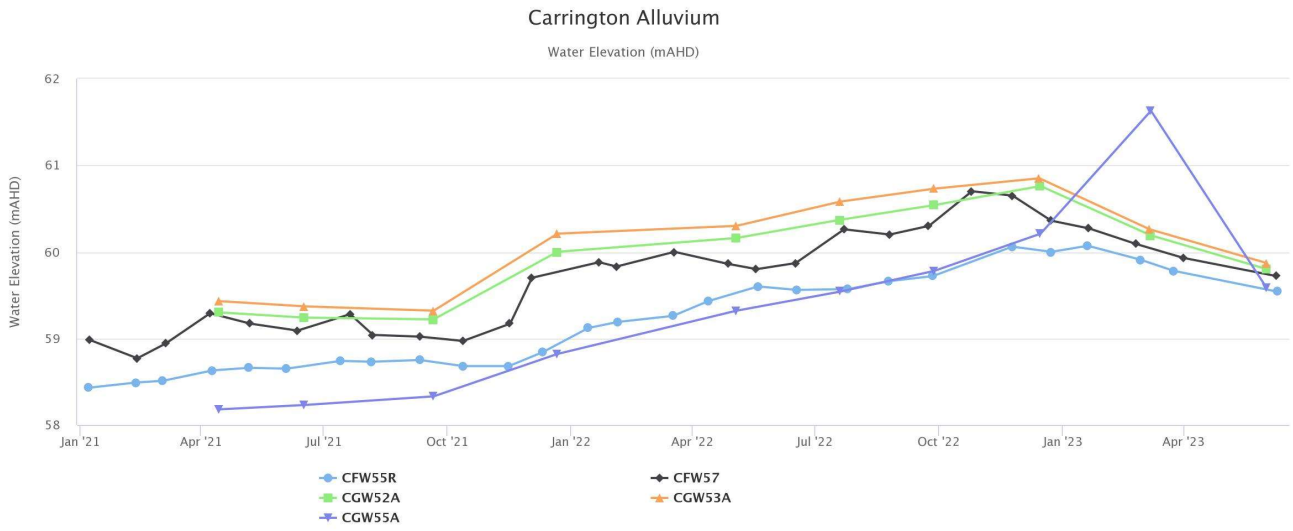

Figure 29 - Carrington Alluvium Water Elevation Trend – Q2 2023

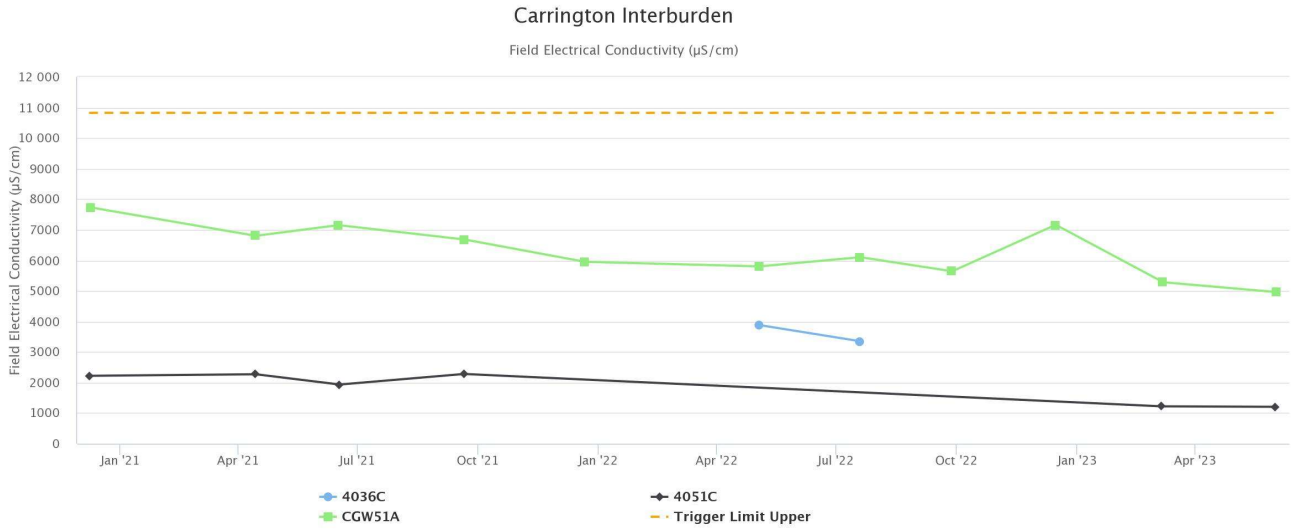

Figure 30 - Carrington Interburden Electrical Conductivity Trend – Q2 2023

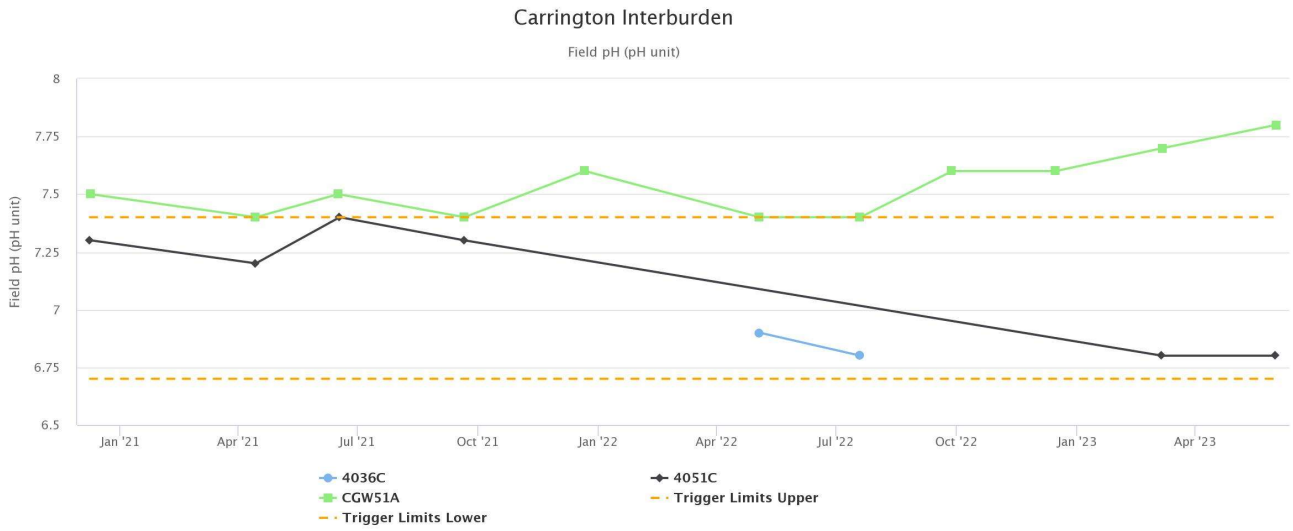

Figure 31 - Carrington Interburden Field pH Trend – Q2 2023

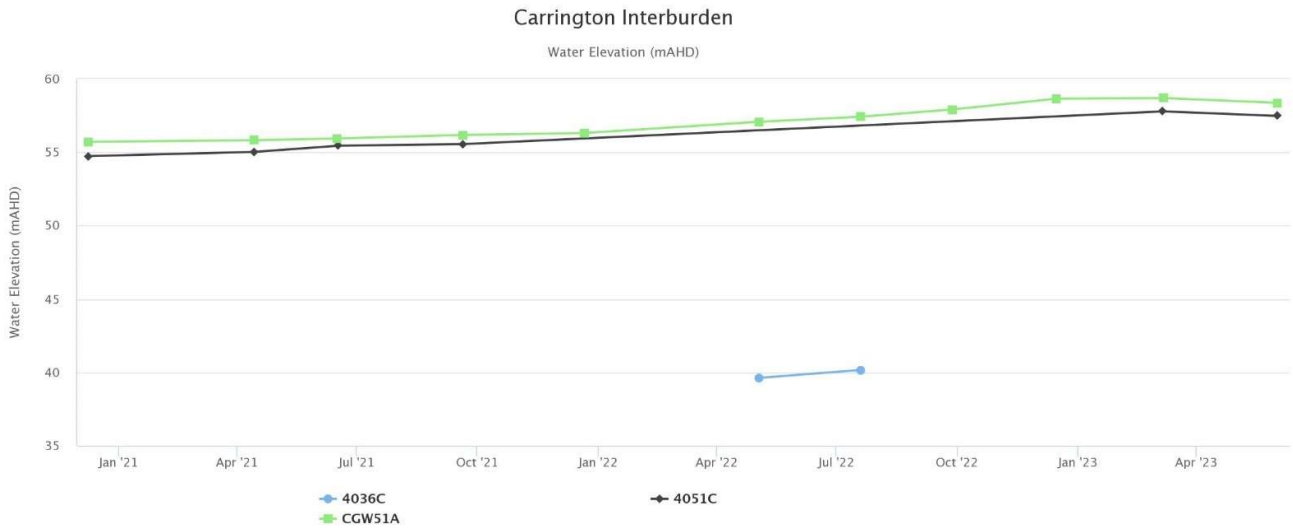

Figure 32 - Carrington Interburden Water Elevation Trend – Q2 2023

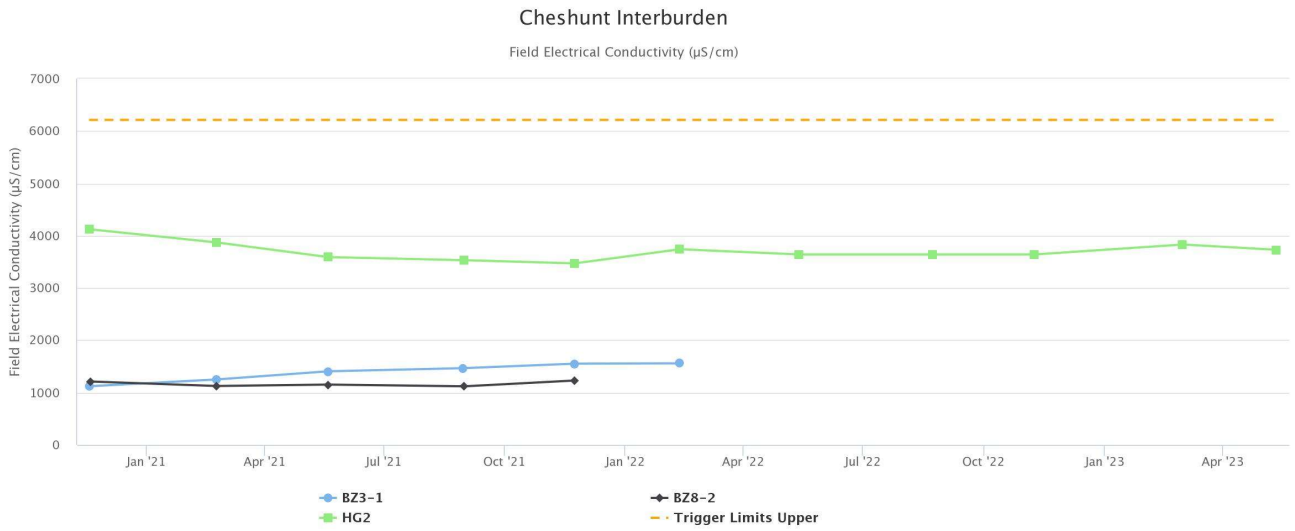

Figure 33 - Cheshunt Interburden Electrical Conductivity Trend – Q2 2023

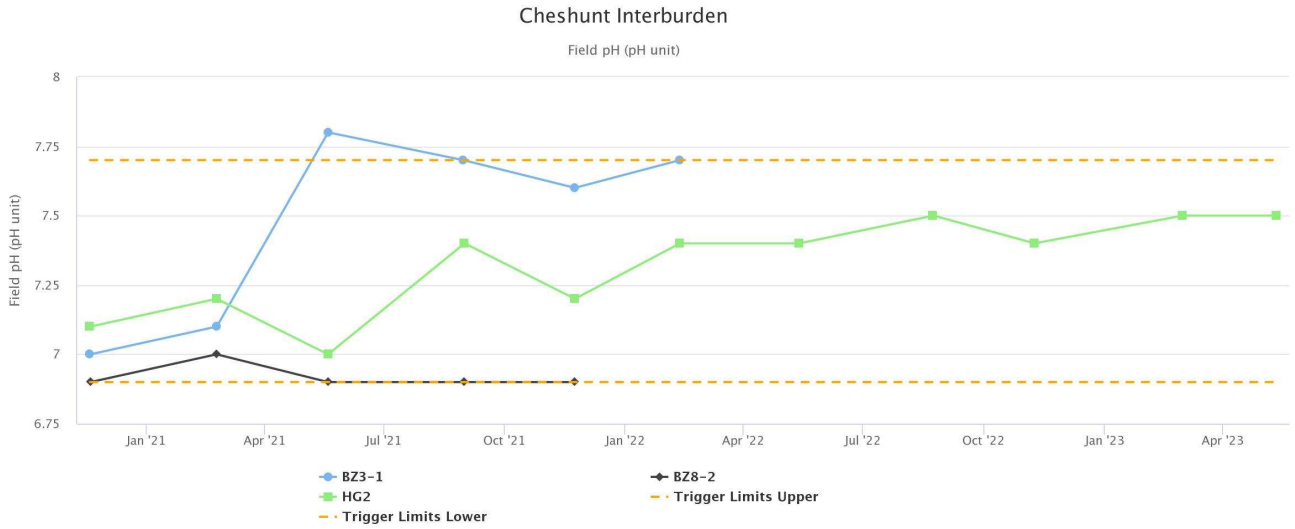

Figure 34 - Cheshunt Interburden Field pH Trend – Q2 2023

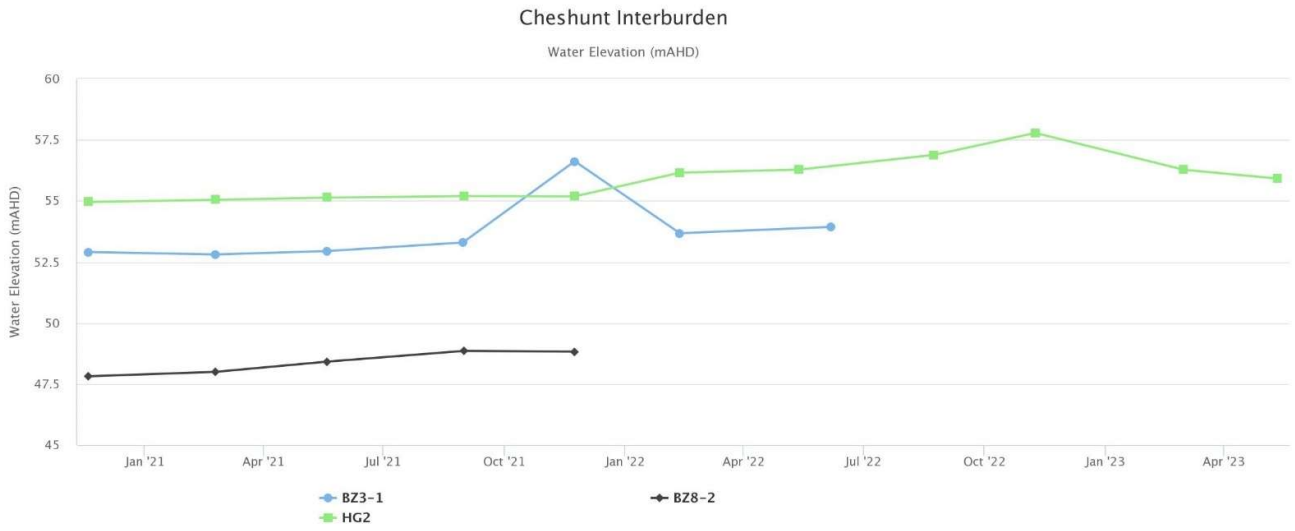

Figure 35 - Cheshunt Interburden Water Elevation Trend – Q2 2023

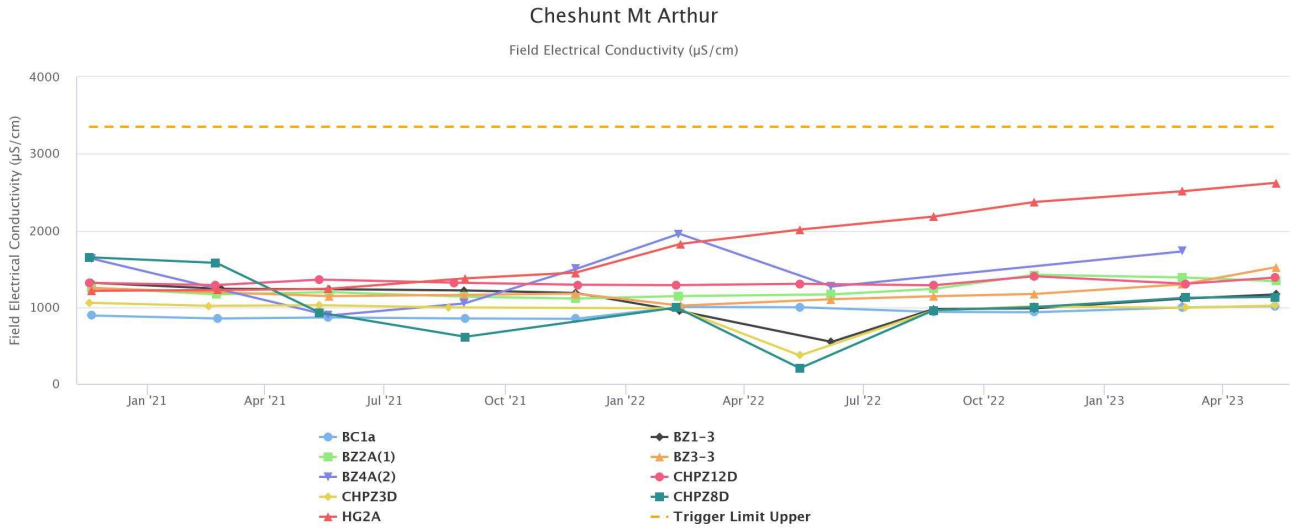

Figure 36 – Cheshunt Mt Arthur Electrical Conductivity Trend – Q2 2023

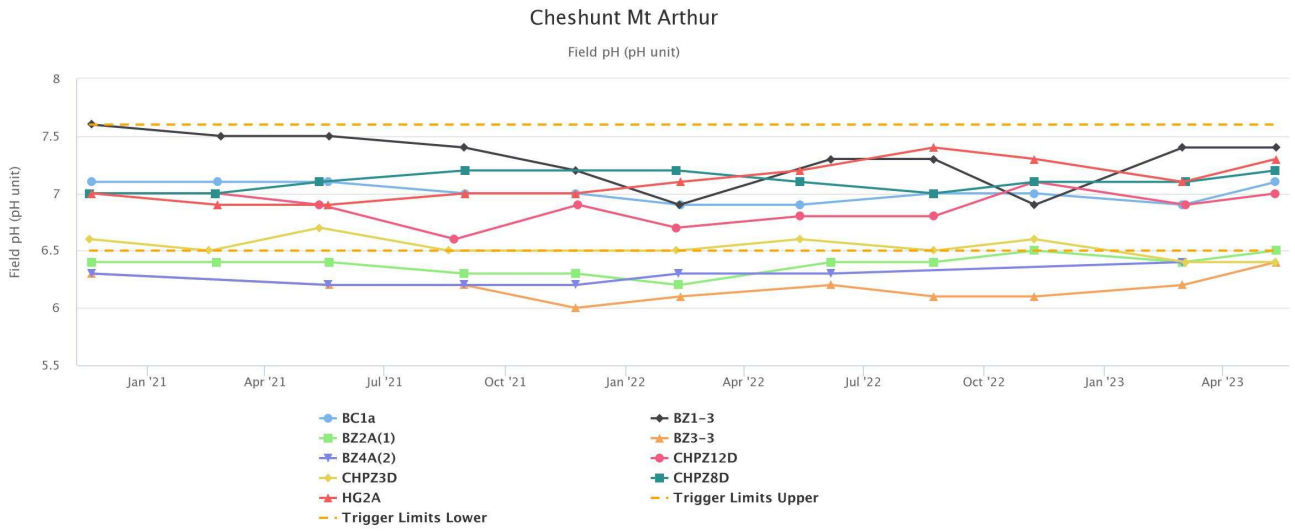

Figure - 37 Cheshunt Mt Arthur Field pH Trend – Q2 2023

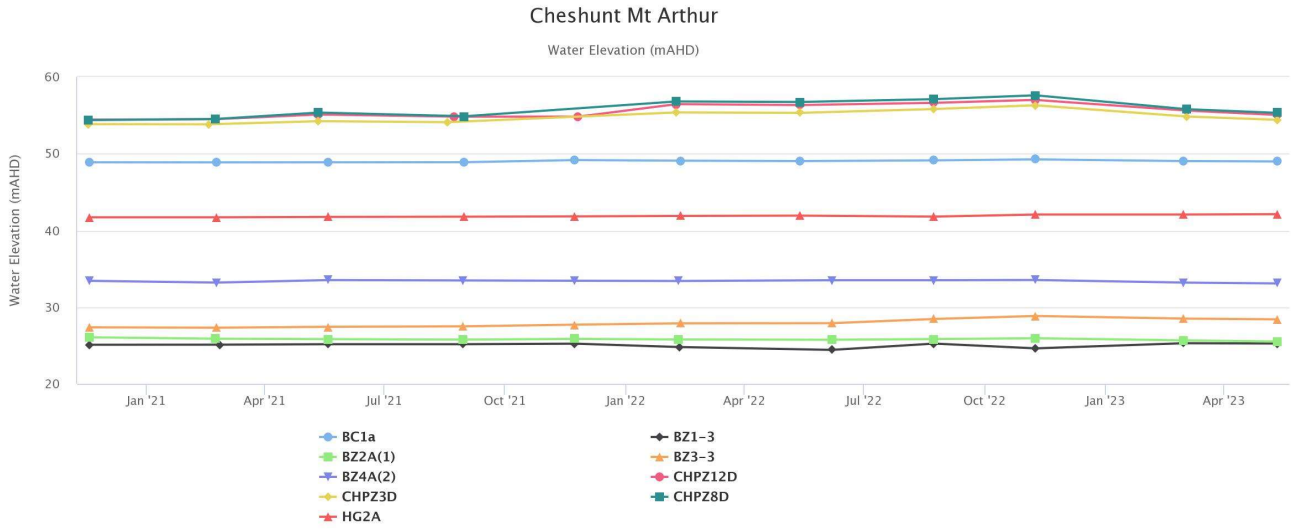

Figure 38 - Cheshunt Mt Arthur Water Elevation Trend – Q2 2023

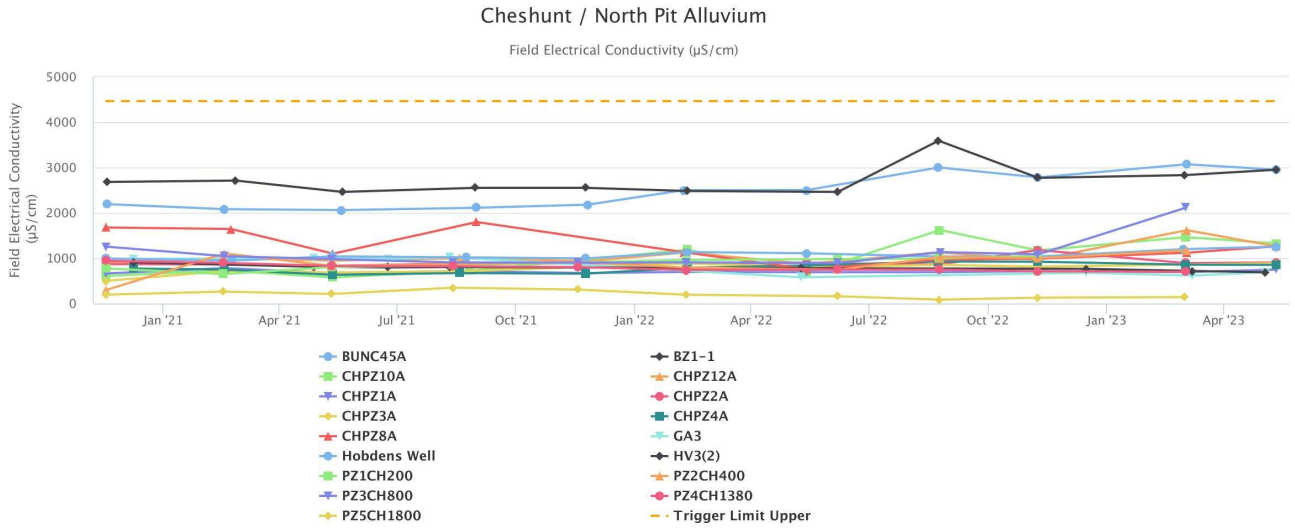

Figure 39 - Cheshunt North Pit Alluvium Electrical Conductivity Trend – Q2 2023

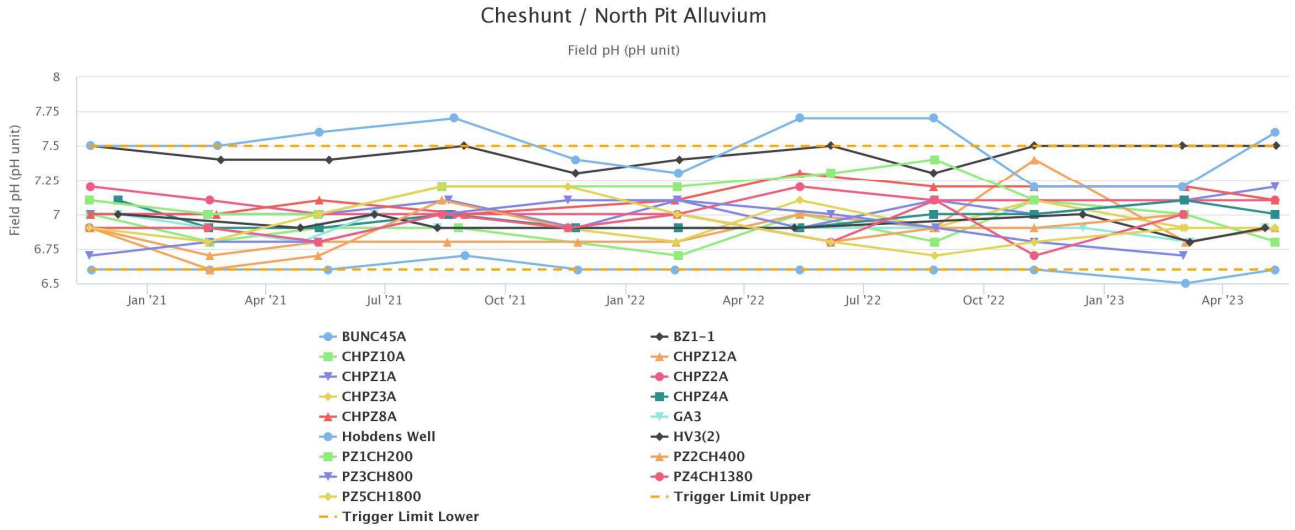

Figure 40 - Cheshunt North Alluvium Field pH Trend - Q2 2023

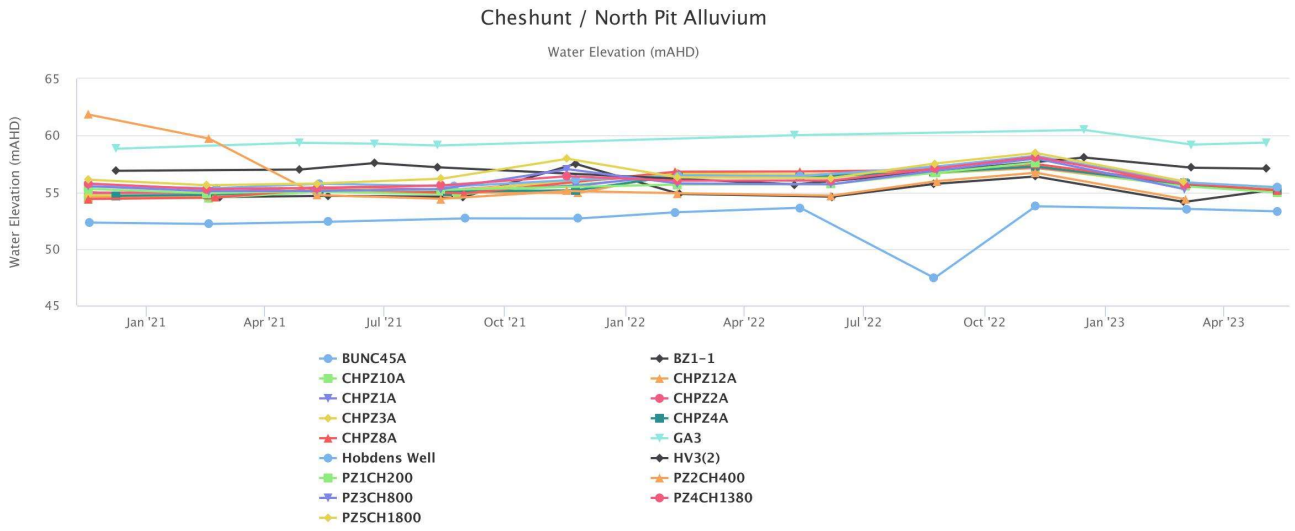

Figure 41 - Cheshunt North Pit Alluvium Water Elevation Trend – Q2 2023

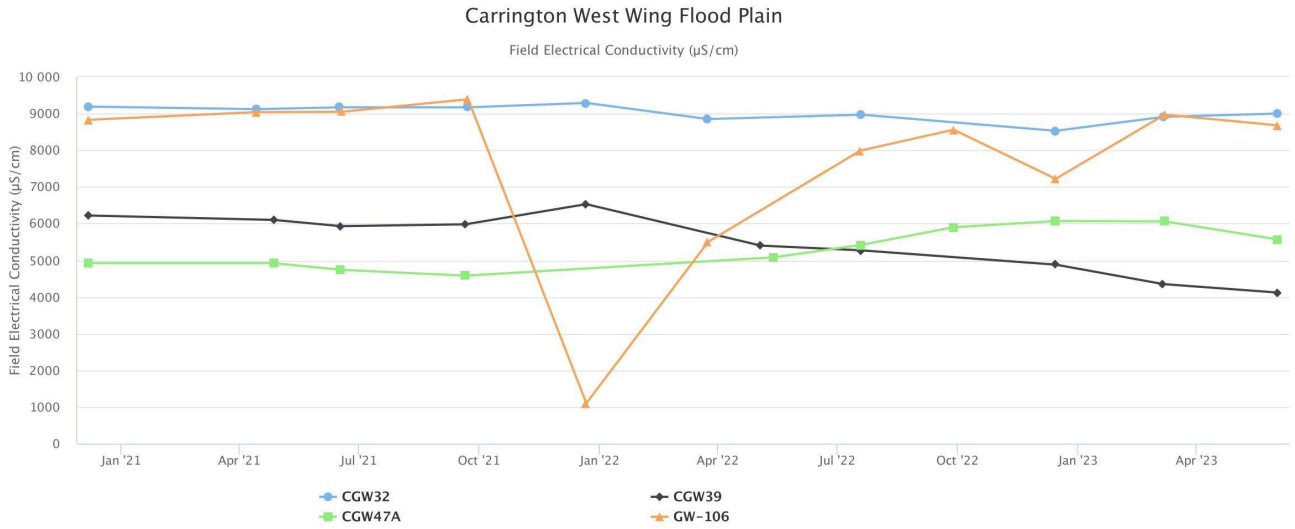

Figure 42 - Carrington West Wing Flood Plain Electrical Conductivity Trend – Q2 2023

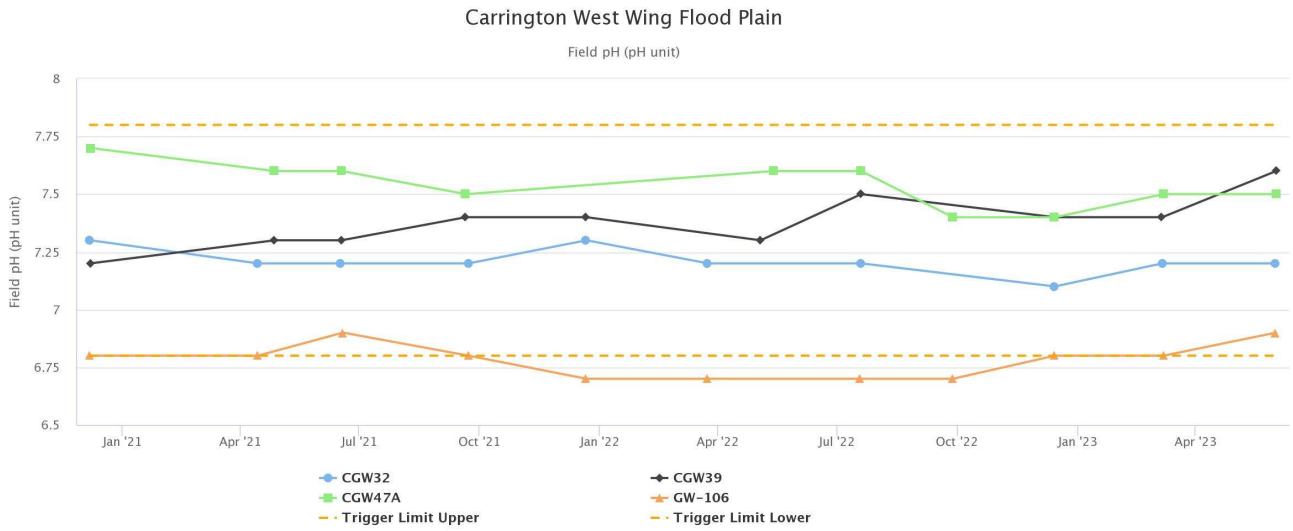

Figure 43 - Carrington West Wing Flood Plain pH Trend – Q2 2023

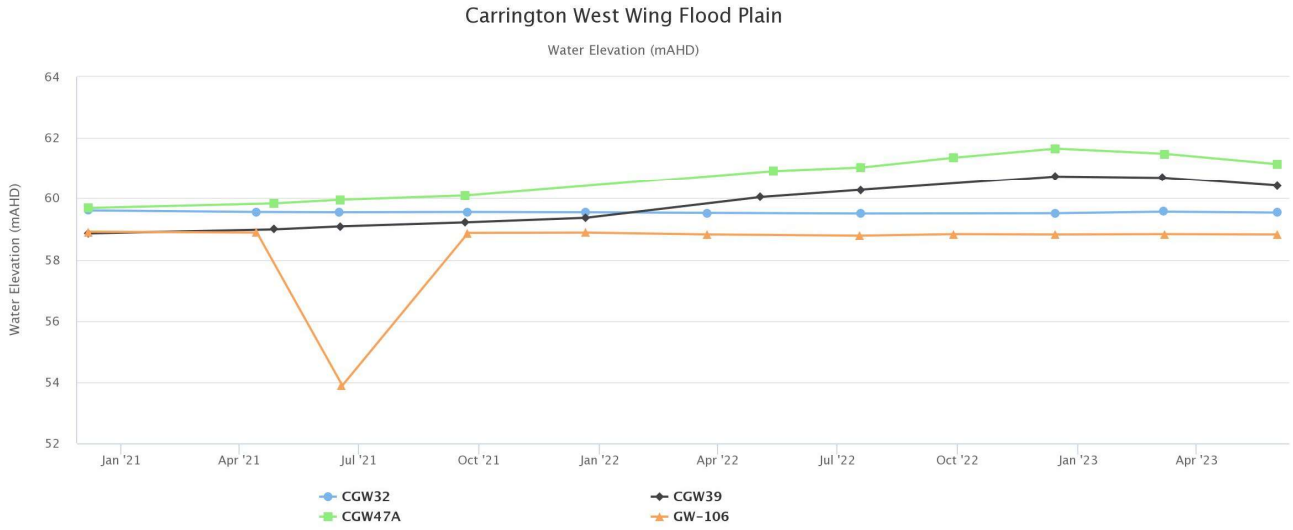

Figure 44 - Carrington West Wing Flood Plain Water Elevation Trend – Q2 2023

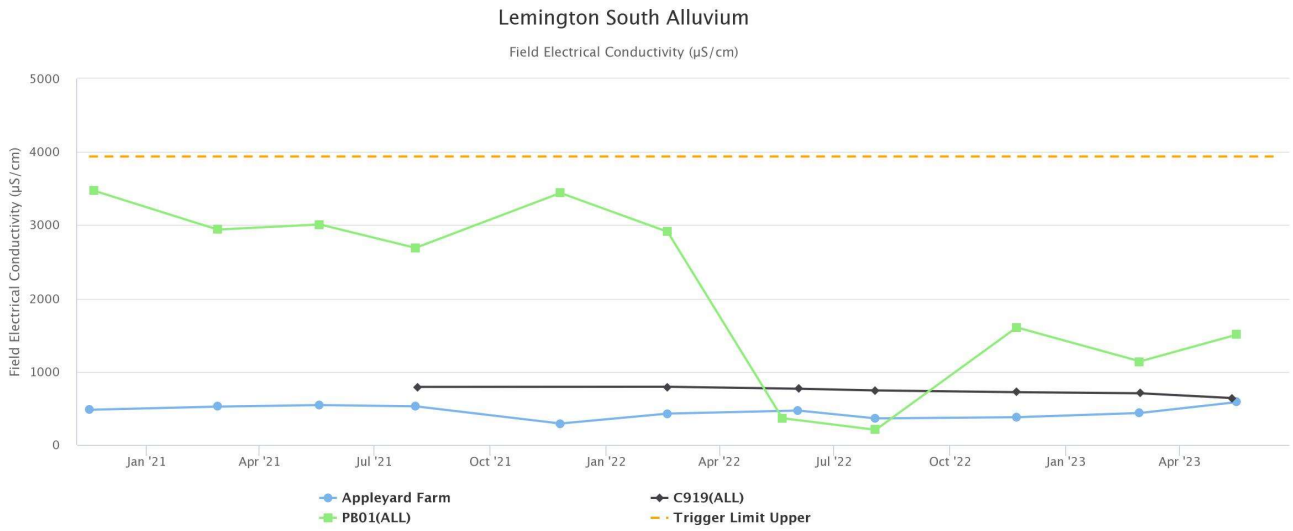

Figure 45 - Lemington South Alluvium Electrical Conductivity Trend – Q2 2023

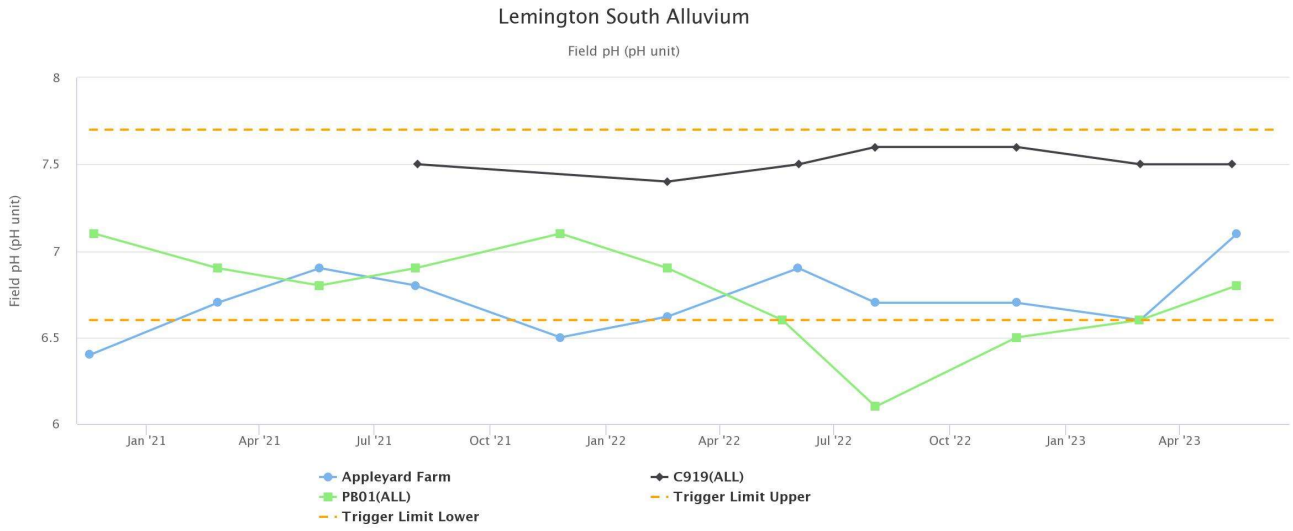

Figure 46 - Lemington South Alluvium Field pH Trend – Q2 2023

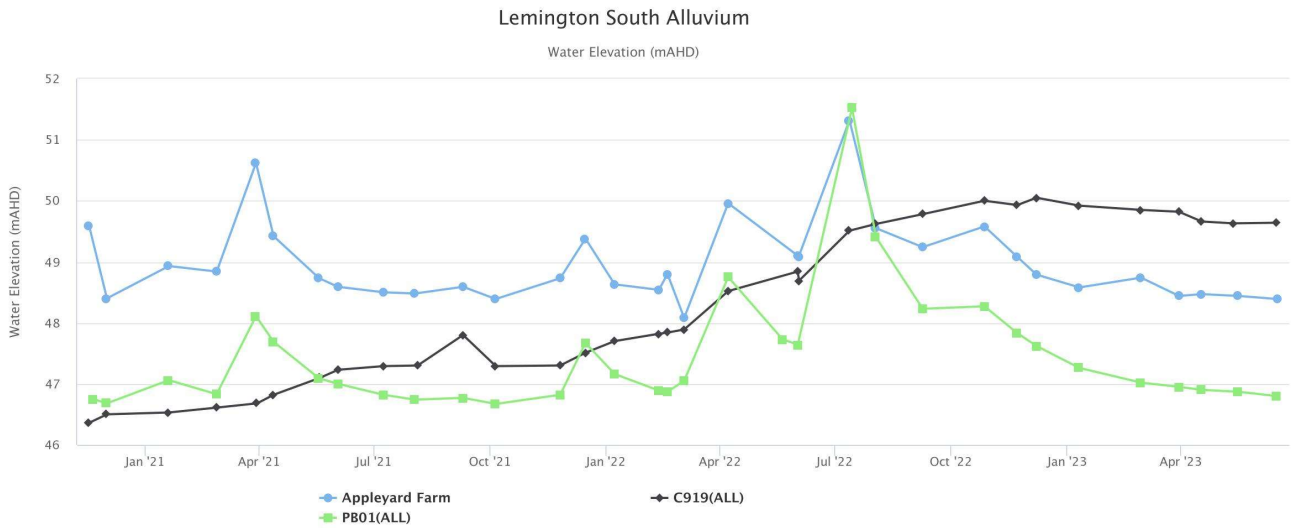

Figure 47 - Lemington South Alluvium Water Elevation Trend – Q2 2023

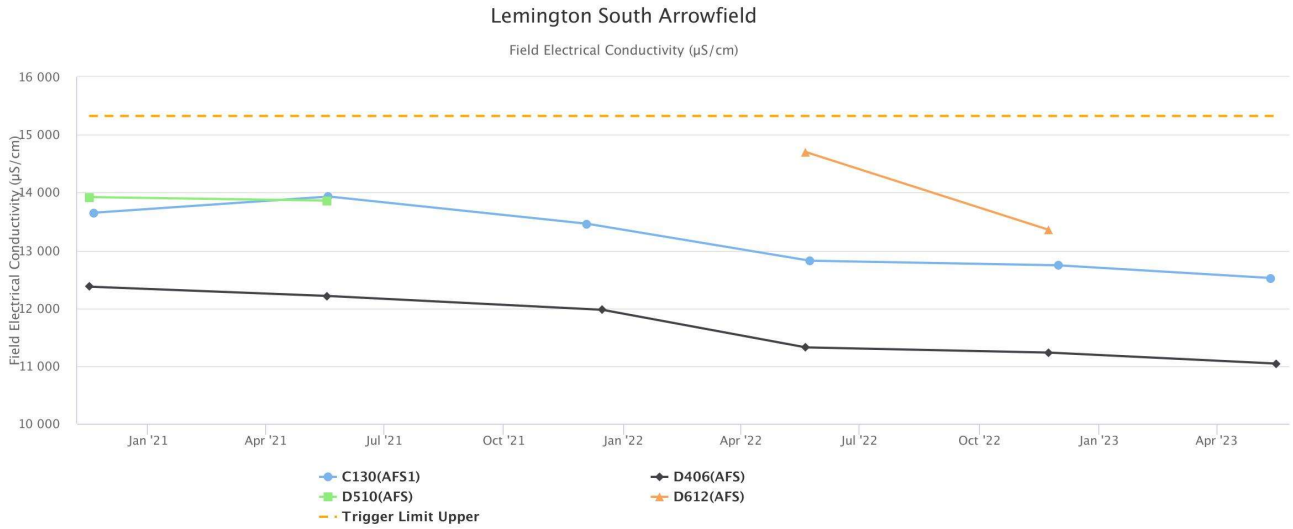

Figure 48 - Lemington South Arrowfield Electrical Conductivity Trend – Q2 2023

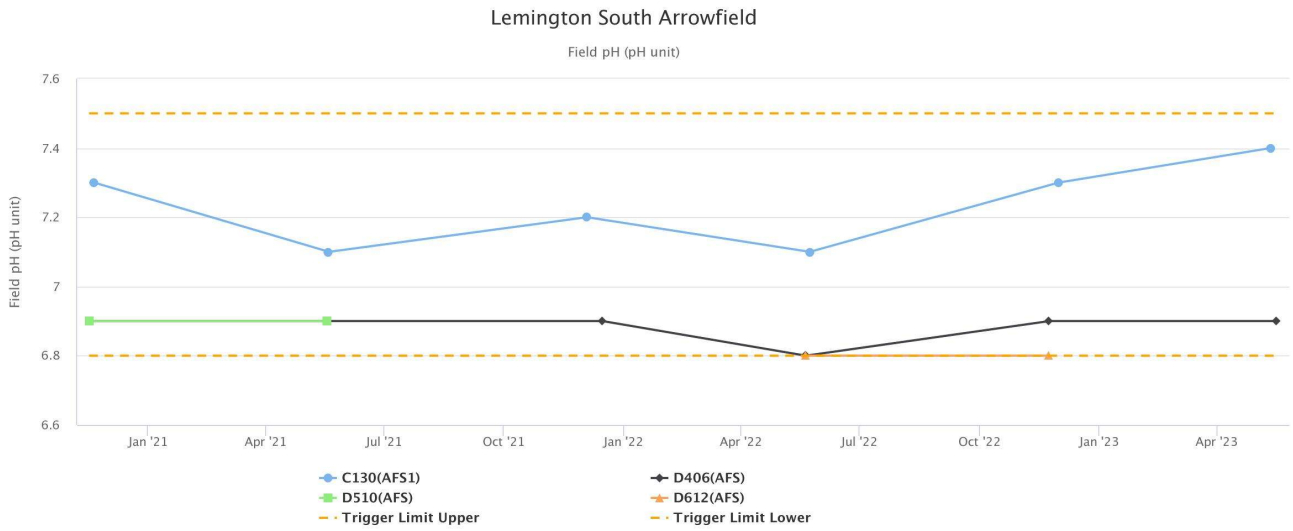

Figure 49 - Lemington South Arrowfield Field pH Trend – Q2 2023

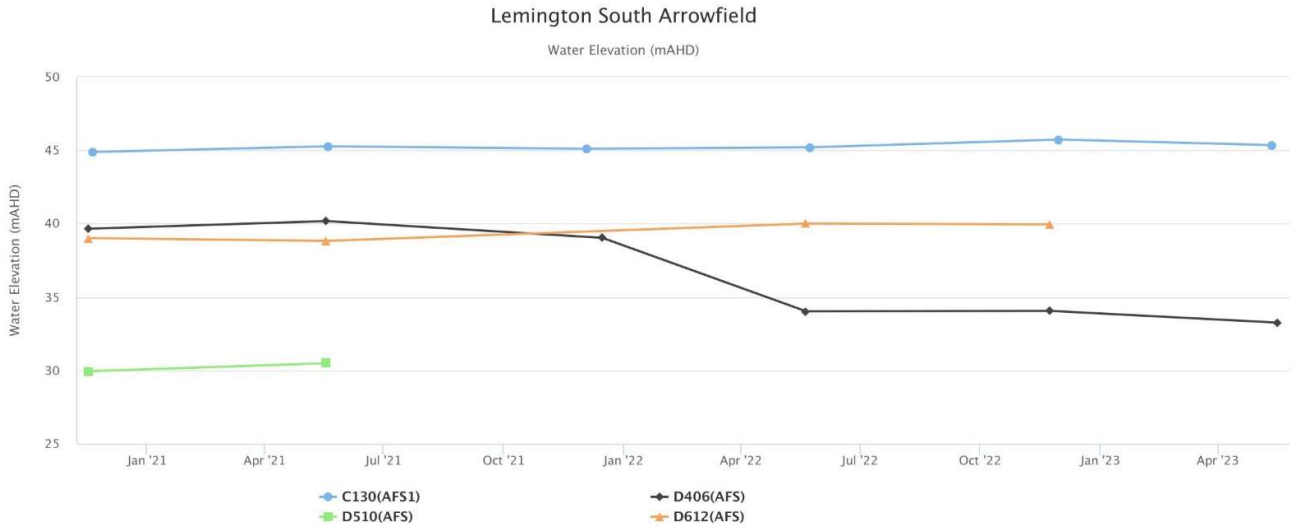

Figure 50 – Lemington South Arrowfield Water Elevation Trend – Q2 2023

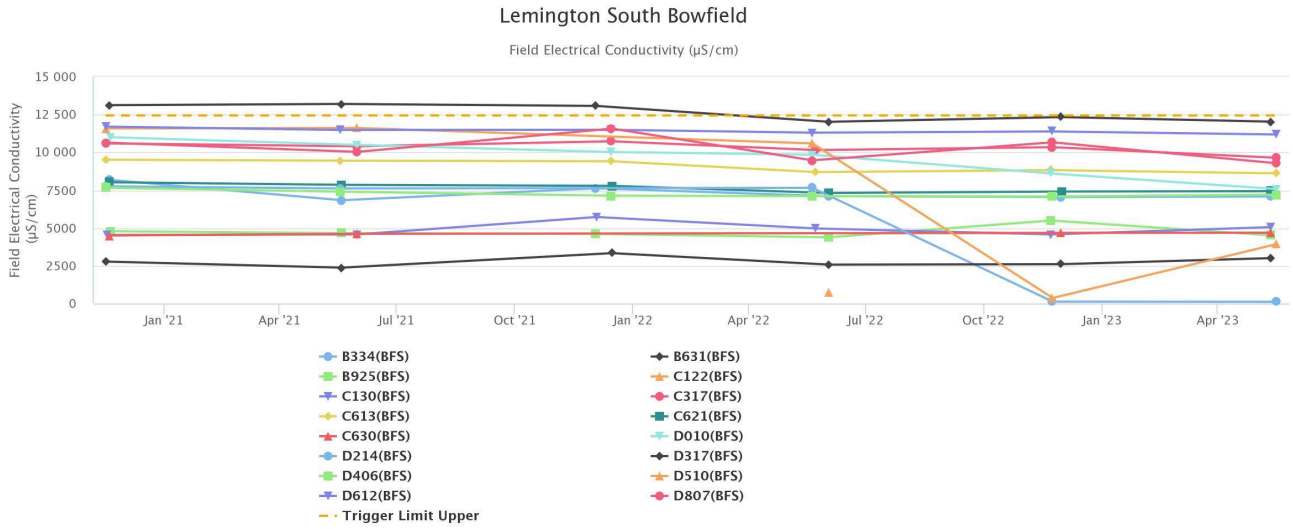

Figure 51 - Lemington South Bowfield Electrical Conductivity Trend – Q2 2023

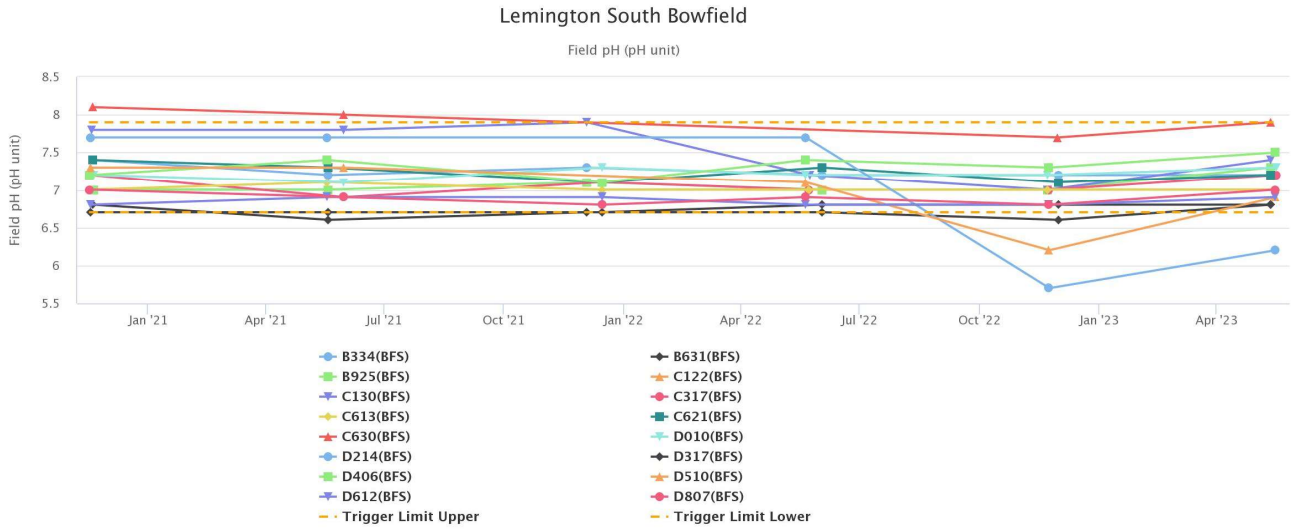

Figure 52 - Lemington South Bowfield pH Trend – Q2 2023

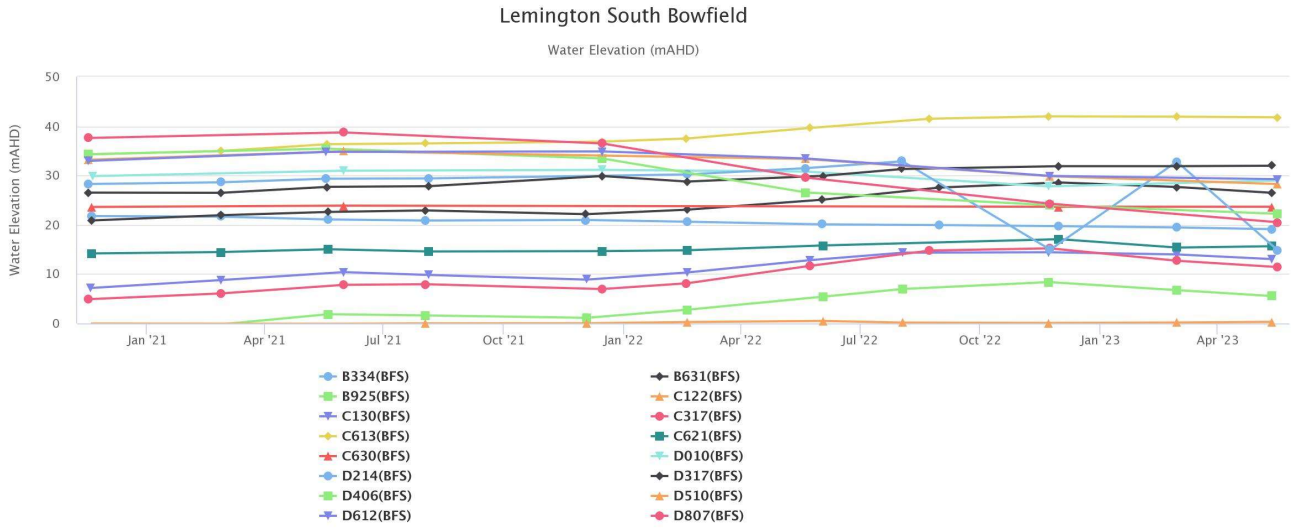

Figure 53 - Lemington South Bowfield Water Elevation Trend – Q2 2023

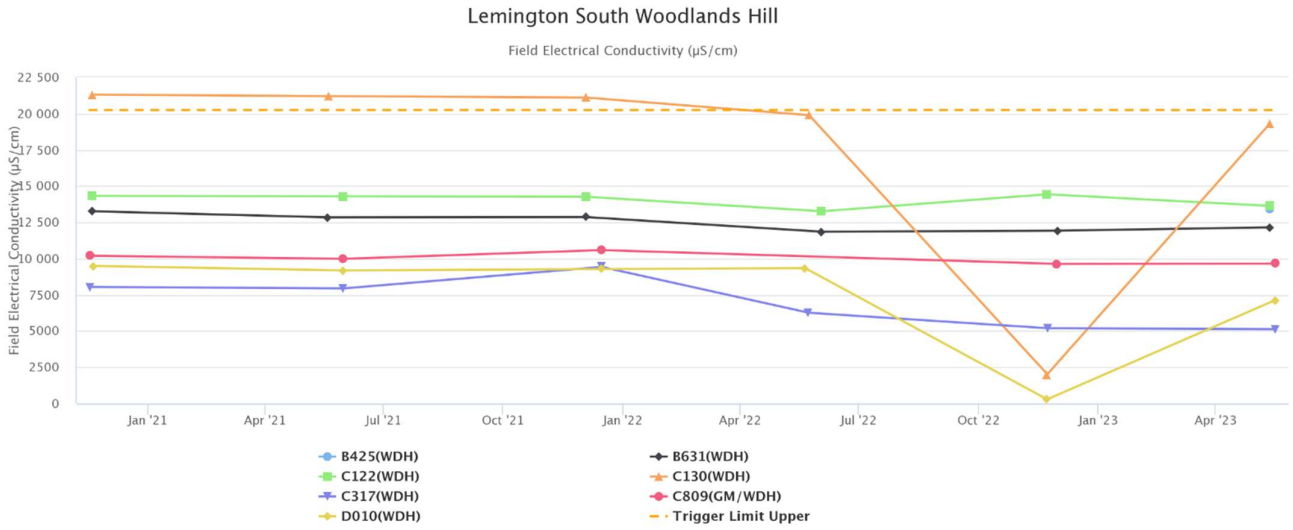

Figure 54 - Lemington South Woodlands Hill Electrical Conductivity Trend – Q2 2023

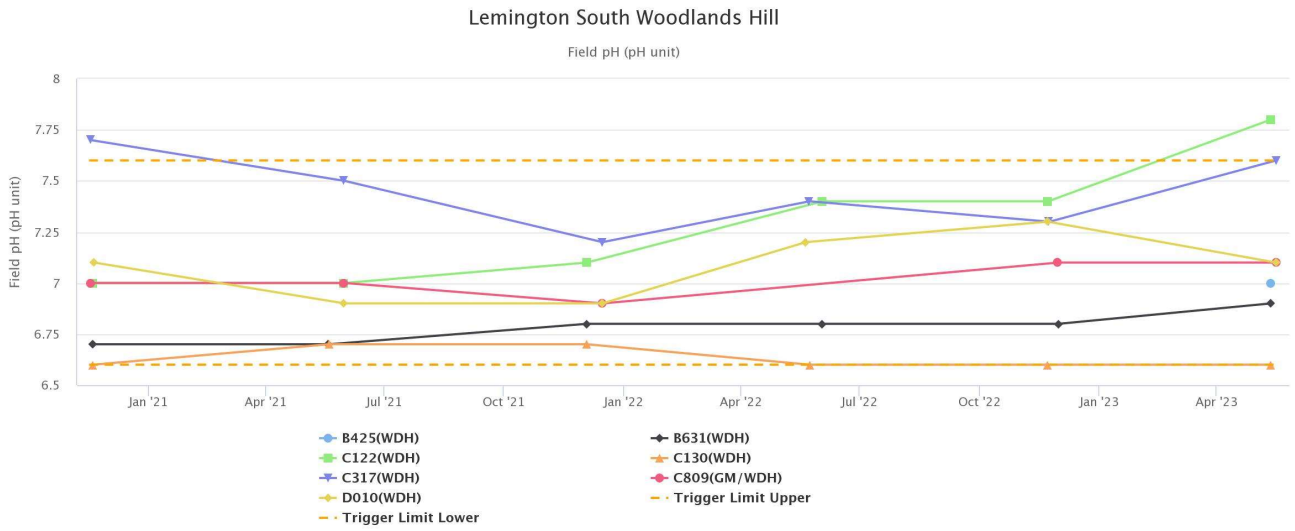

Figure 55 - Lemington South Woodlands Hill Field pH Trend – Q2 2023

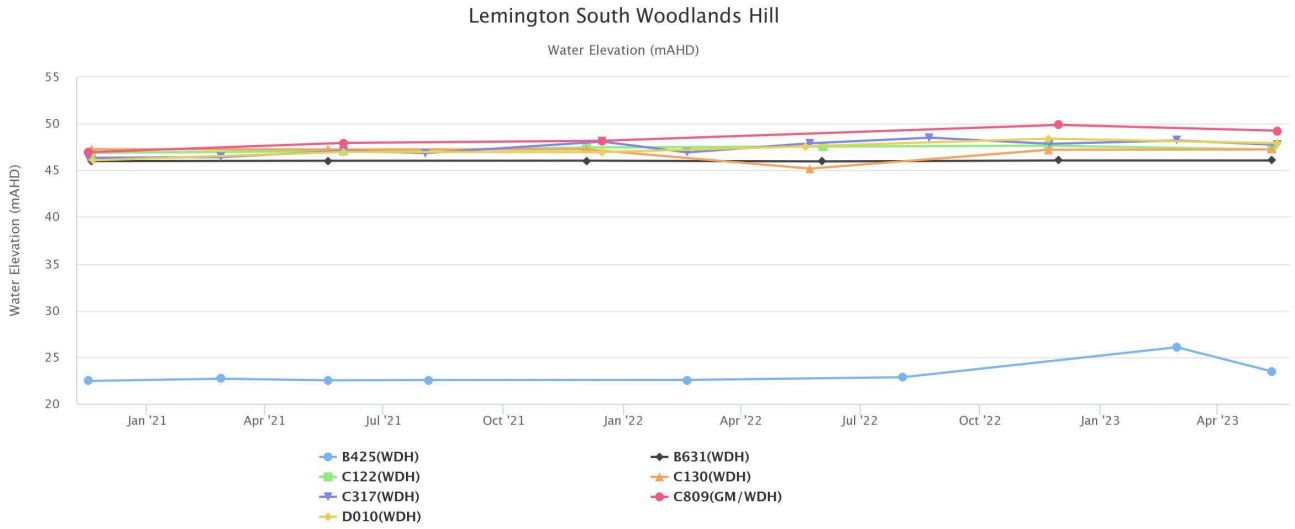

Figure 56 - Lemington South Woodlands Hill Water Elevation Trend – Q2 2023

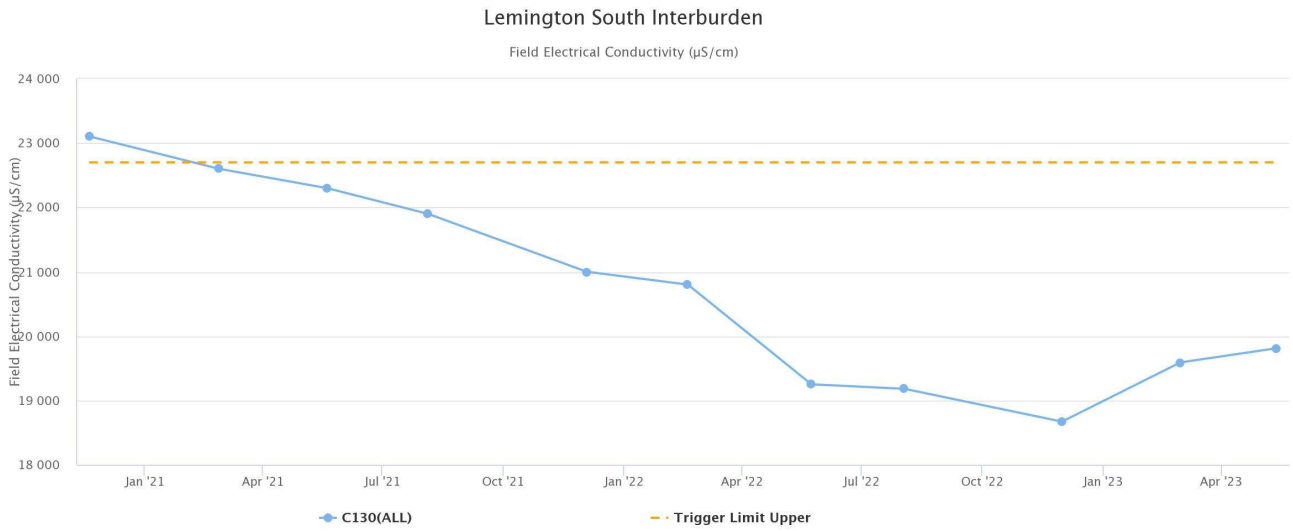

Figure 57 - Lemington South Interburden Electrical Conductivity Trend – Q2 2023

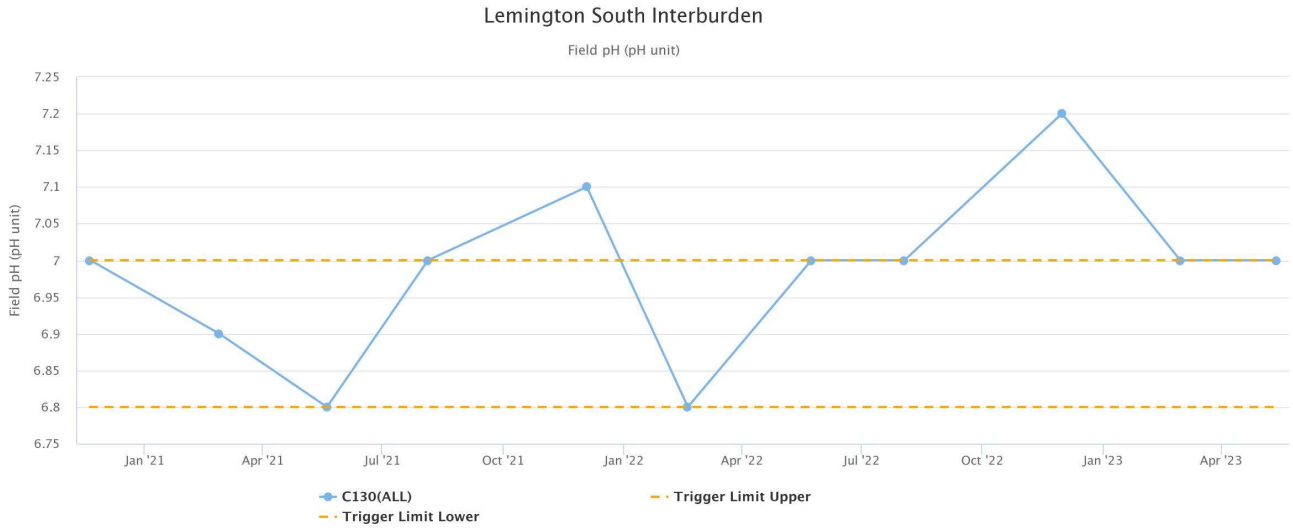

Figure 58 - Lemington South Interburden Field pH Trend – Q2 2023

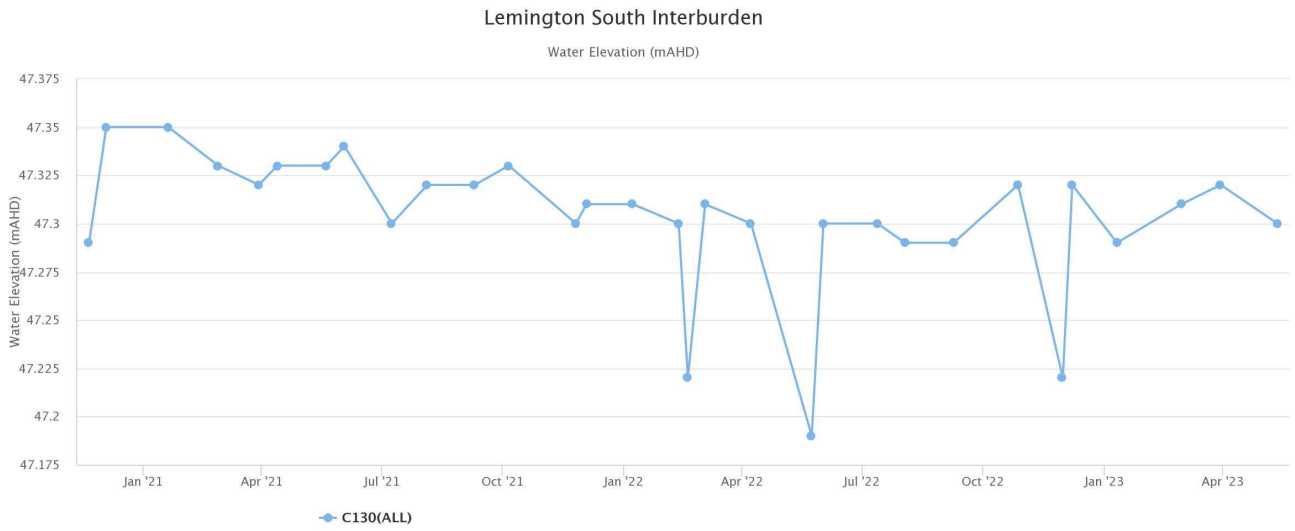

Figure 59 - Lemington South Interburden Water Elevation Trend – Q2 2023

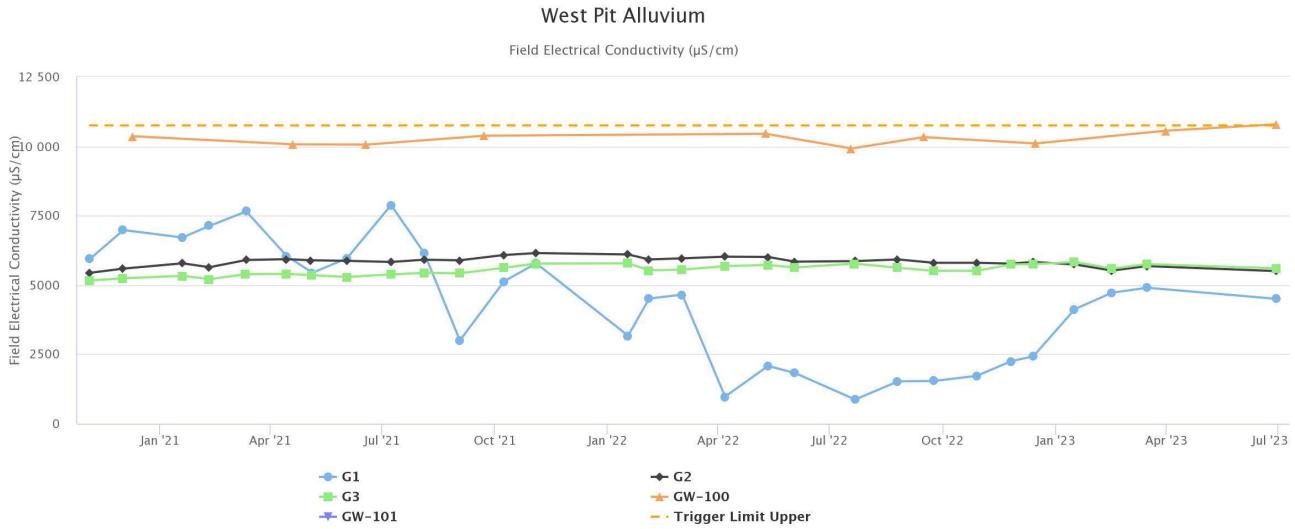

Figure 60 - West Pit Alluvium Electrical Conductivity Trend – Q2 2023

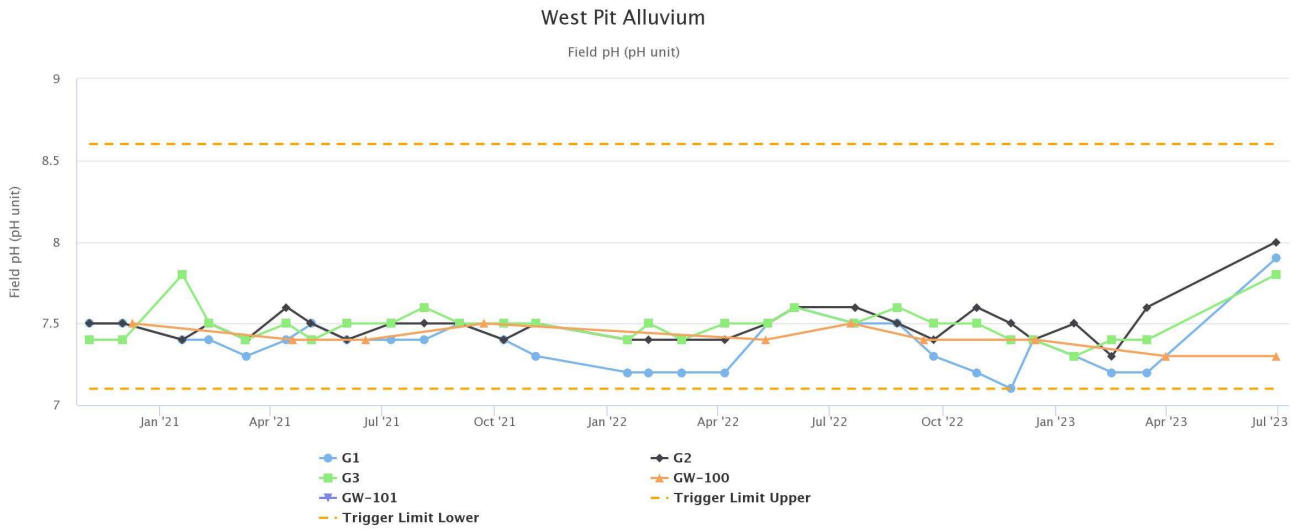

Figure 61 - West Pit Alluvium pH Trend – Q2 2023

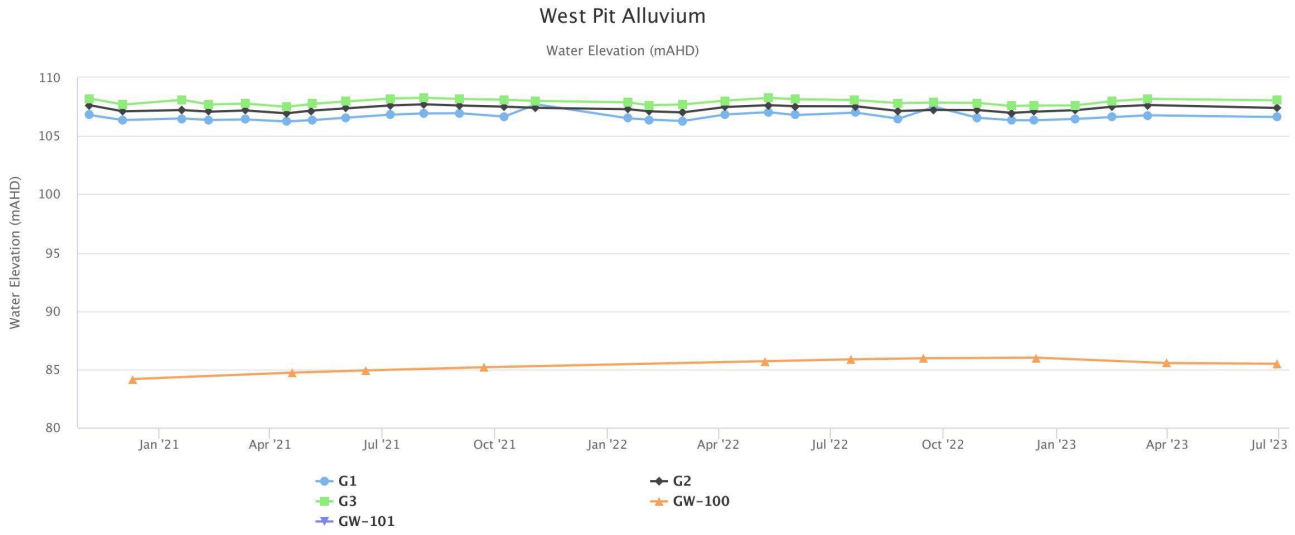

Figure 62 - West Pit Alluvium Water Elevation Trend – Q2 2023

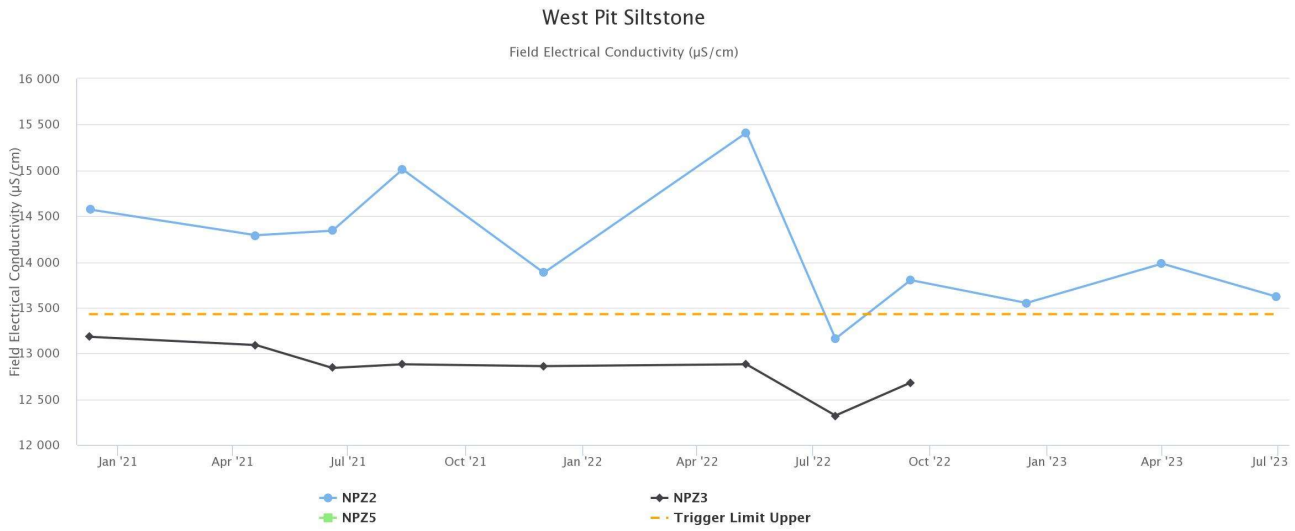

Figure 63 - West Pit Siltstone Electrical Conductivity Trend – Q2 2023

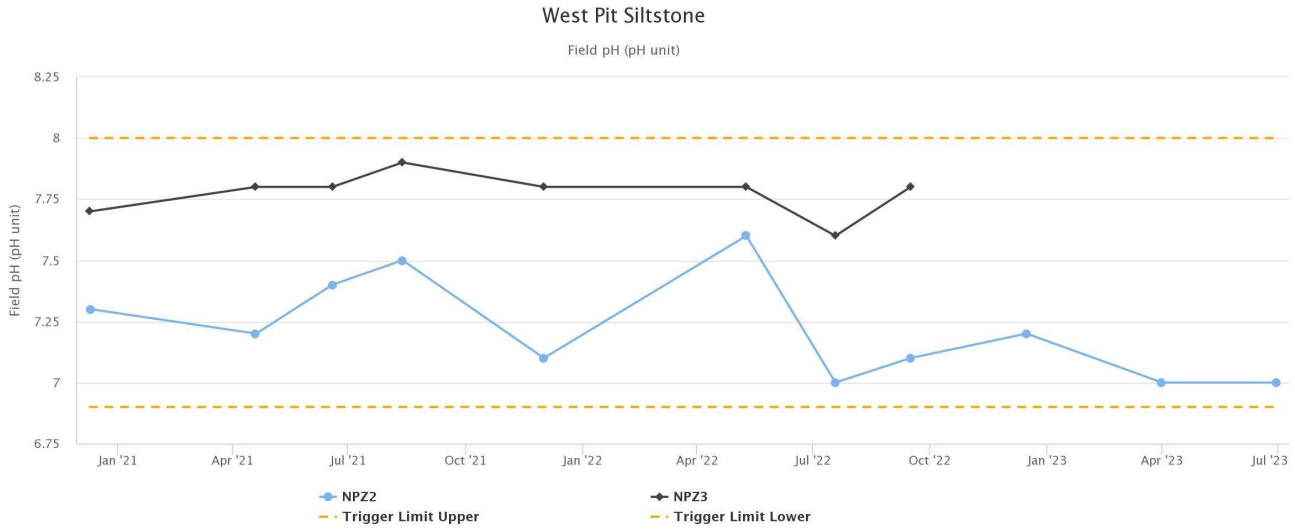

Figure 64 - West Pit Siltstone Field pH Trend – Q2 2023

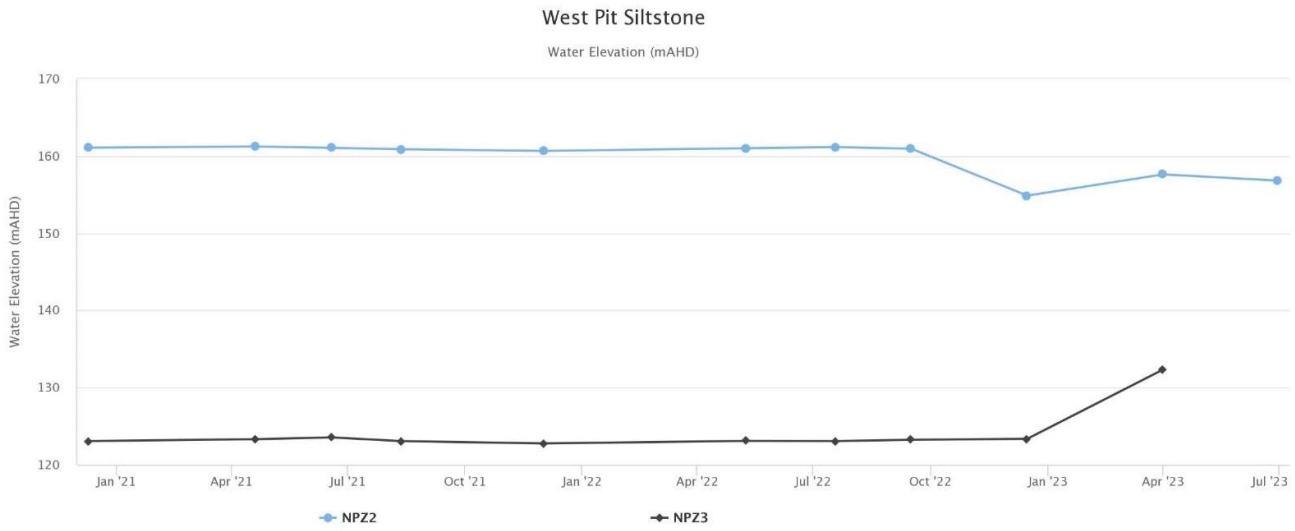

Figure 65 - West Pit Siltstone Water Elevation Trend- Q2 2023

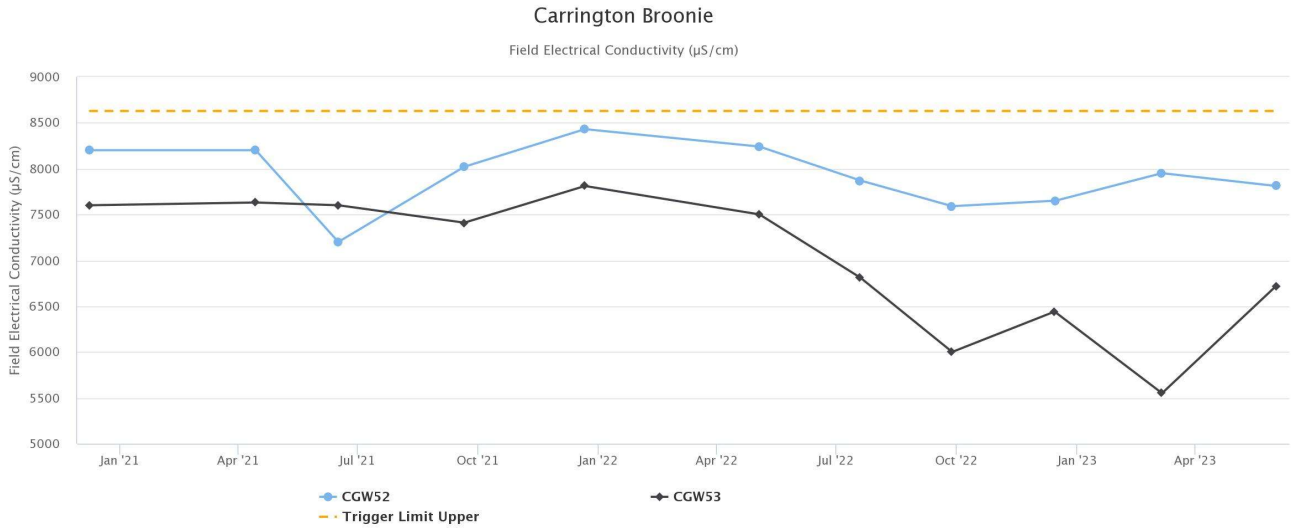

Figure 66 - Carrington Broonie Electrical Conductivity Trend – Q2 2023

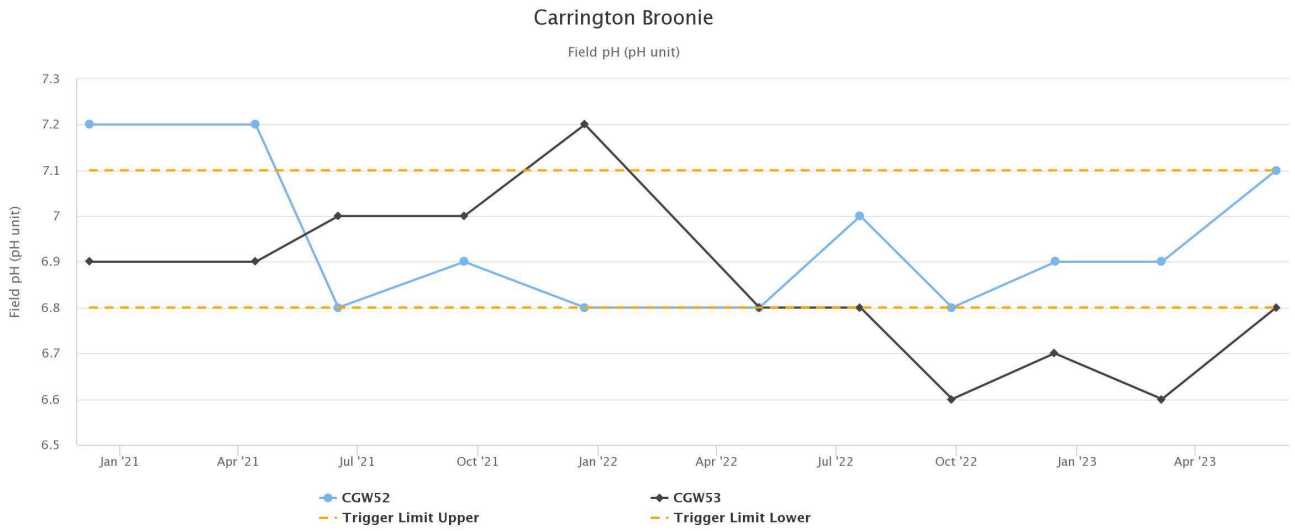

Figure 67 - Carrington Broonie Field pH Trend – Q2 2023

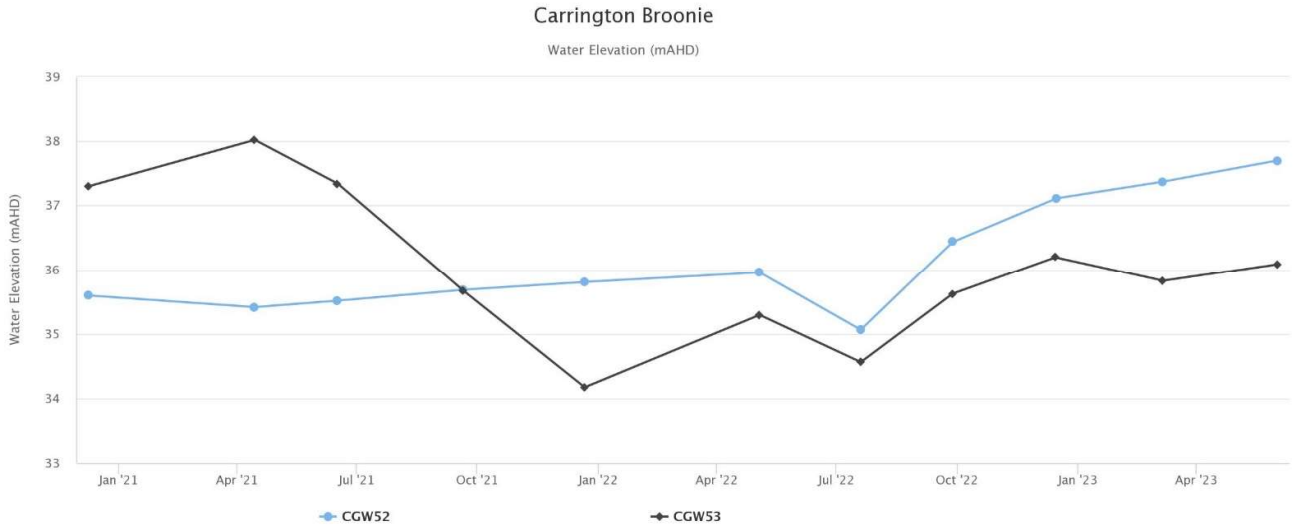

Figure 68 - Carrington Broonie Water Elevation Trend – Q2 2023

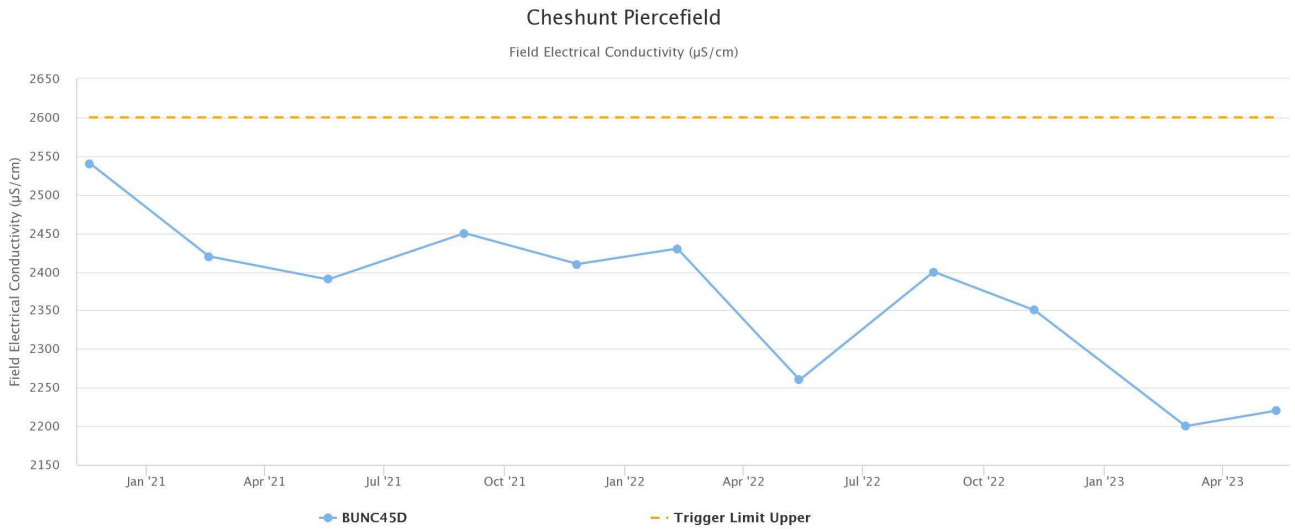

Figure 69 - Cheshunt Piercefield Electrical Conductivity Trend – Q2 2023

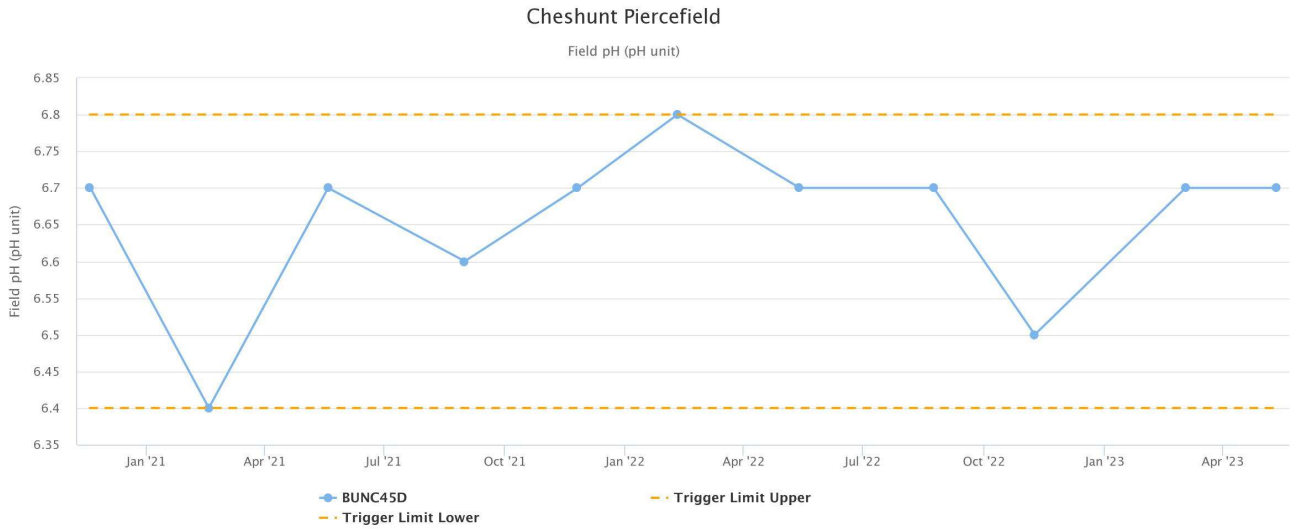

Figure 70 – Cheshunt Piercefield Field pH Trend – Q2 2023

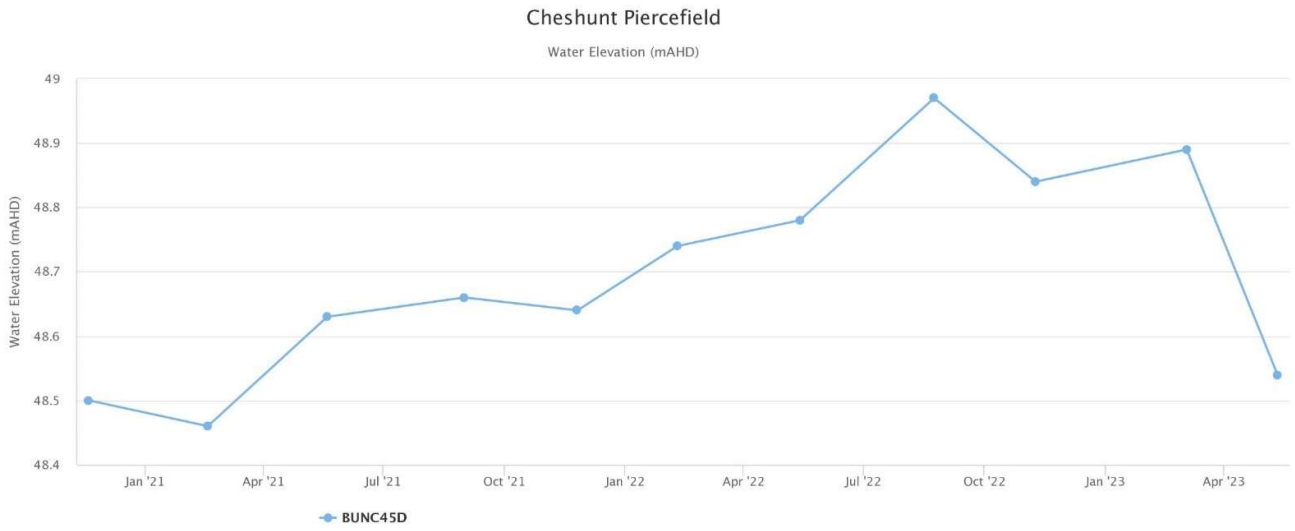

Figure 71 - Cheshunt Piercefield Water Elevation Trend – Q2 2023

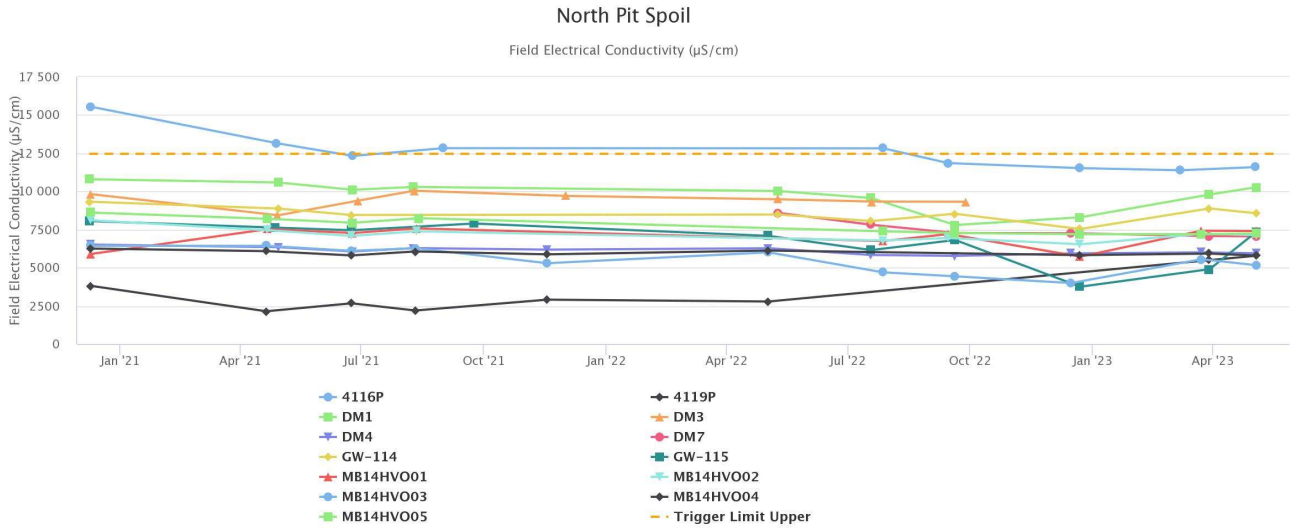

Figure 72 - North Pit Spoil Electrical Conductivity Trend – Q2 2023

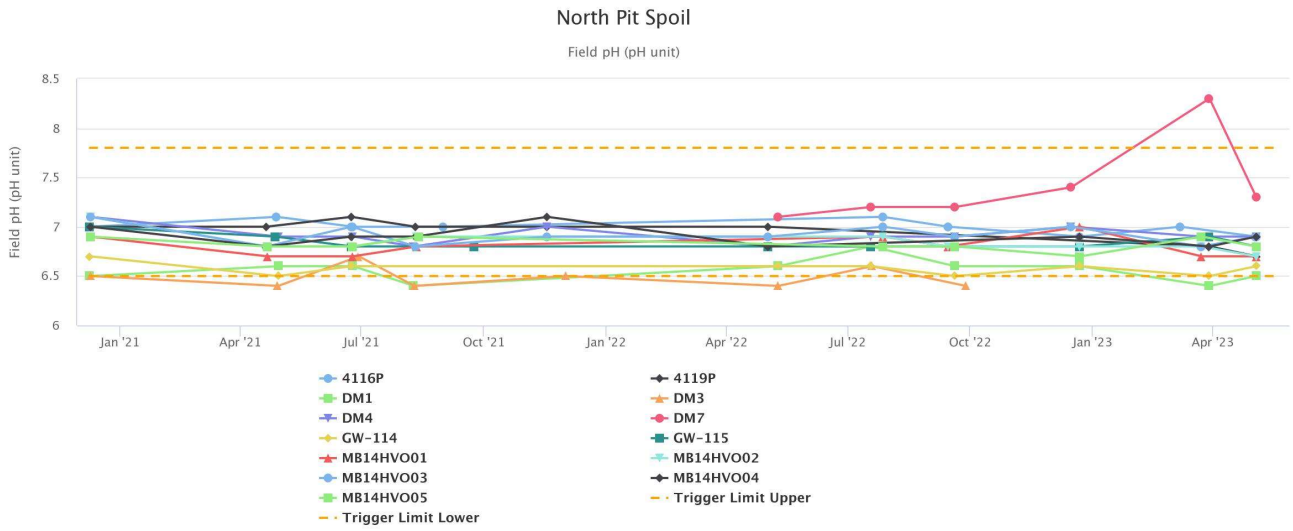

Figure 73 - North Pit Spoil Field pH Trend – Q2 2023

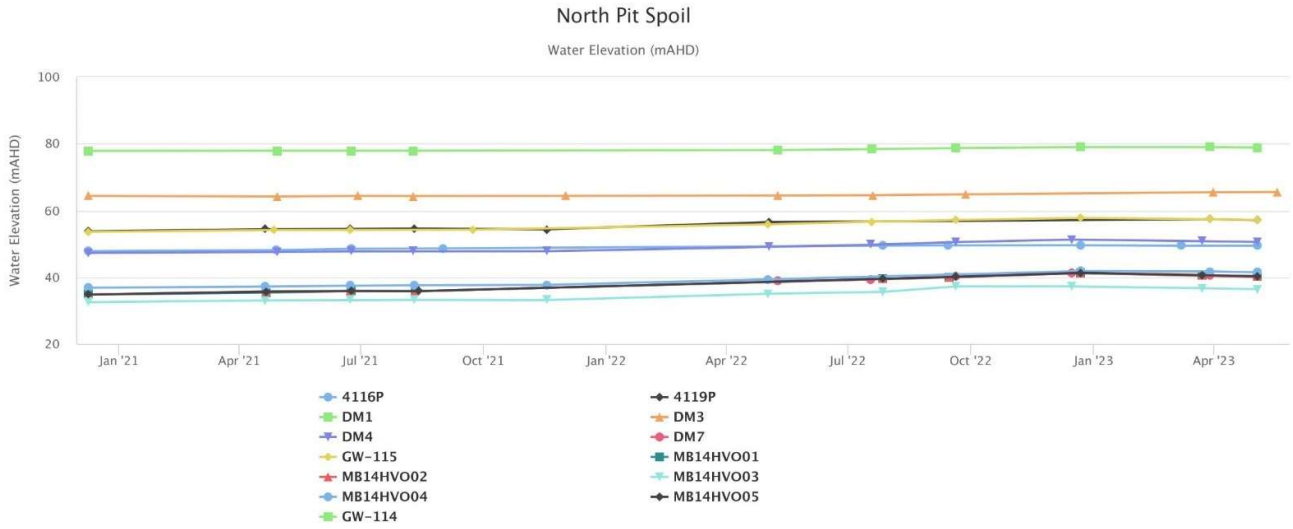

Figure 74 - North Pit Spoil Water Elevation Trend – Q2 2023

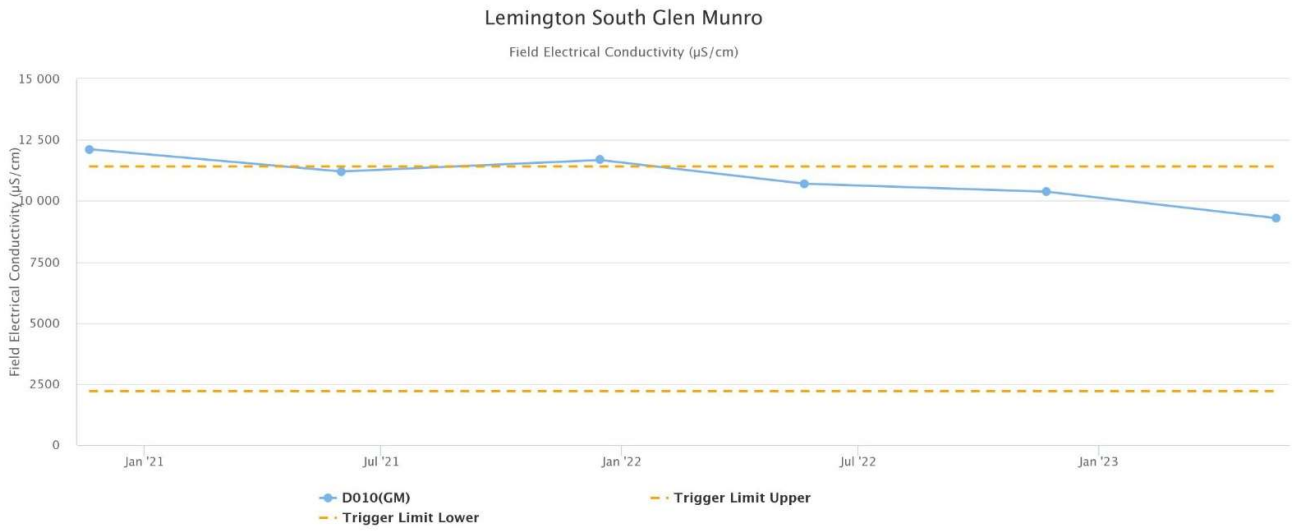

Figure 75 - Lemington South Glen Munro Electrical Conductivity Trend – Q2 2023

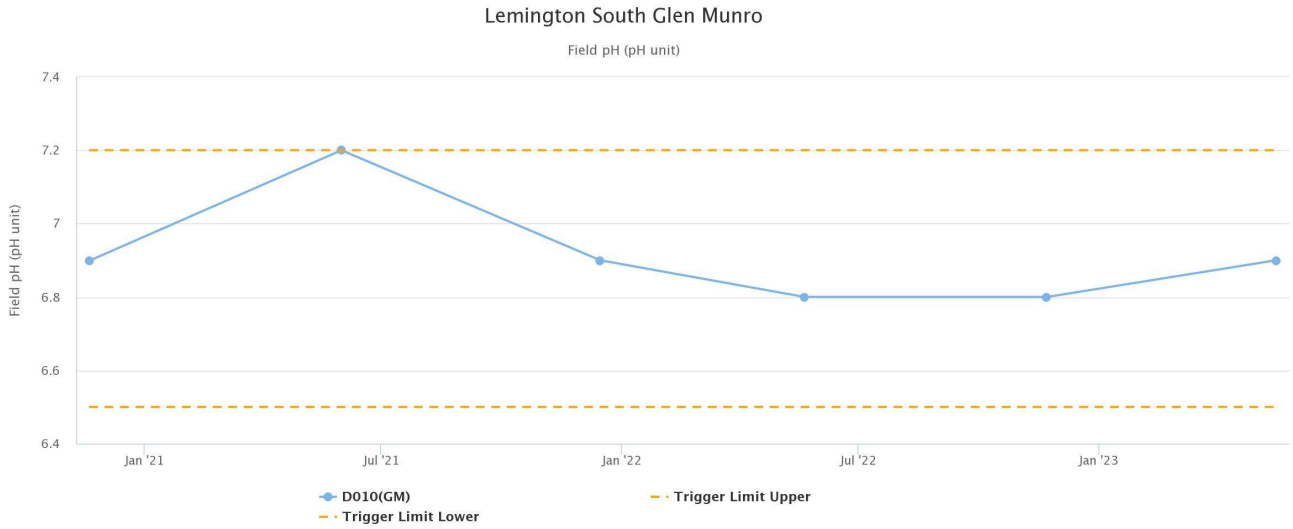

Figure 76 - Lemington South Glen Munro Field pH Trend – Q2 2023

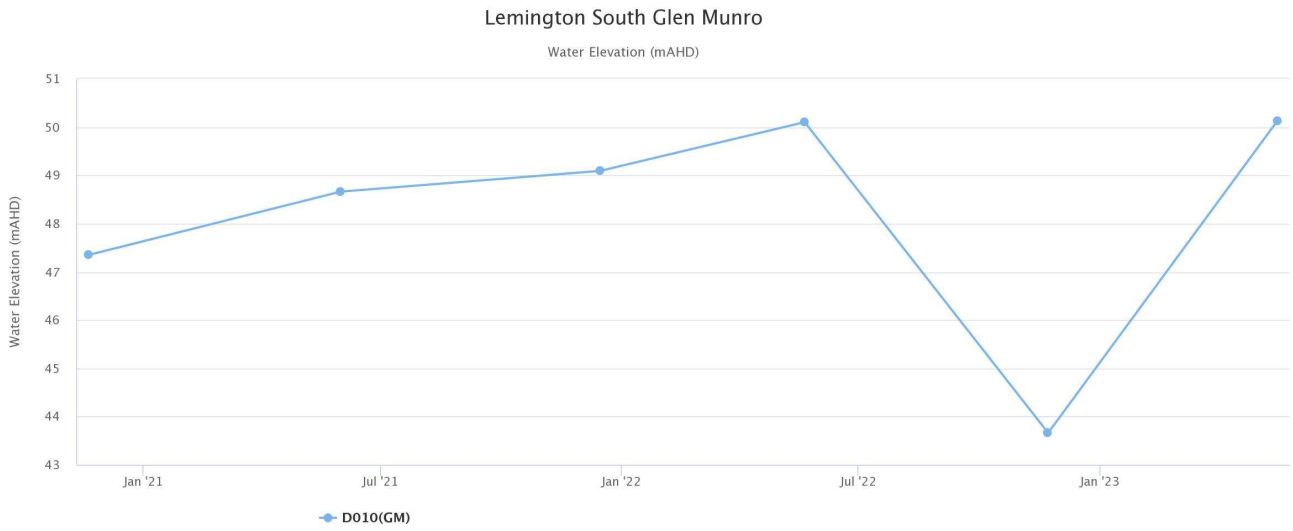

Figure 77 - Lemington South Glen Munro Water Elevation Trend – Q2 2023

3.4.1 | GROUNDWATER TRIGGER TRACKING

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

Groundwater trigger tracking results are summarised below in Table 3.

Table 3 - Groundwater Trigger Tracking Q2 2023

Site	Date	Trigger Limit Breached	Response Action
CFW55R	9/06/2023	Water Elevation (mAHD)	Twelve consecutive water level readings above the 95th percentile trigger level of 59.41 mAHD since April 2022. Groundwater levels in bore CFW55R have gradually increased since February 2020 with a sharp increase between September 2021 and January 2023 in response to above average rainfall, followed by a slight decline in levels in response to below average rainfall over the reporting period. No further action required.
CFW57	8/06/2023	Water Elevation (mAHD)	Seventeen consecutive water level readings above the 95th percentile trigger level of 59.24 mAHD since December 2021.

			Groundwater levels in bore CFW57 have gradually increased since February 2020 with a sharp increase between September 2021 and November 2022 in response to above average rainfall, followed by a slight decline in levels in response to below average rainfall over the reporting period. No further action required.
CGW53a	1/06/2023	Water Elevation (mAHD)	Nine consecutive water level readings above the 95th percentile trigger level of 59.19 mAHD since June 2021. Groundwater levels in bore CGW53a have gradually increased since December 2019 with a sharp increase between September 2021 and December 2022 in response to above average rainfall. Levels continued to decline slightly by June 2023 in response to below average rainfall. No further action required.
CGW55a	1/06/2023	Water Elevation (mAHD)	Eight consecutive water level readings above the 95th percentile trigger level of 58.43 mAHD since December 2021. Groundwater levels in bore CGW55a have gradually increased since March 2020 with a sharp increase between September 2021 and March 2023 in response to above average rainfall. Levels declined slightly between March and June 2023 in response to below average rainfall. No further action required.

4 | BLASTING

HVO maintains a network of blast monitoring units located at nearby privately owned residences that function as regulatory compliance monitors. The location of these monitors can be found in Figure 15. Blasting criteria for HVO are summarised in Table 4.

Table 4 – Blasting Criteria

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

4.1 | BLAST MONITORING RESULTS

Twenty-four (24) blasts were initiated at HVO during the reporting period. Blast monitoring results for the period are shown in Table 5 and Table 6.

Table 5 – Overpressure Blast Monitoring Results for the reporting period

Date and Time	Moses Crossing (dBL)	Jerrys Plains Village (dBL)	Maison Dieu (dBL)	Warkworth (dBL)	Knodlers Lane (dBL)
1/06/2023 13:18	104.02	109.43	106.58	90.29	113.64
1/06/2023 15:07	92.80	102.34	106.93	102.21	110.29
2/06/2023 13:11	91.40	97.54	94.68	93.75	93.60
5/06/2023 13:04	103.74	109.04	99.33	87.23	86.23
7/06/2023 13:11	85.48	87.86	84.75	84.71	83.41
8/06/2023 13:05	92.67	98.04	104.61	101.54	107.03
10/06/2023 12:57	101.06	98.48	99.36	94.99	101.82
10/06/2023 13:09	86.22	106.82	91.58	94.66	105.85
10/06/2023 15:18	87.51	98.67	87.17	96.03	93.37
13/06/2023 14:50	98.94	101.97	96.44	95.93	105.77
15/06/2023 9:57	95.46	104.26	103.02	103.46	109
15/06/2023 13:31	87.68	103.98	93.32	94.86	102.51
15/06/2023 13:33	84.86	103.86	103.89	89.47	103.67
17/06/2023 16:29	87.29	88.67	89.00	87.39	88.72
19/06/2023 13:19	92.09	110.30	107.89	112.35	107.19
20/06/2023 12:54	91.89	95.07	95.77	98.91	94.07
21/06/2023 13:06	94.28	91.26	98.96	102.21	99.27
21/06/2023 16:21	88.81	98.65	82.46	87.99	85.20
23/06/2023 13:26	87.20	91.63	103.08	83.75	107.96
23/06/2023 13:31	99.08	102.67	107.86	96.06	108.76
27/06/2023 11:02	90.93	95.08	99.37	96.31	102.18
27/06/2023 13:09	86.75	91.80	100.18	100.31	100.78
28/06/2023 13:07	87.41	91.65	96.24	86.22	90.76
29/06/2023 14:16	95.65	103.23	105.39	110.41	106.29

Table 6 – Ground Vibration Blast Monitoring Results for the reporting period

Date and Time	Moses Crossing (mm/s)	Jerrys Plains Village (mm/s)	Maison Dieu (mm/s)	Warkworth (mm/s)	Knodlers Lane (mm/s)
1/06/2023 13:18	0.20	0.28	0.11	0.16	0.16
1/06/2023 15:07	0.11	0.11	0.05	0.56	0.12
2/06/2023 13:11	0.17	0.12	0.11	0.82	0.12
5/06/2023 13:04	0.09	0.02	0.04	0.06	0.11
7/06/2023 13:11	0.16	0.10	0.12	0.09	0.15
8/06/2023 13:05	0.14	0.07	0.06	0.25	0.12
10/06/2023 12:57	0.19	0.07	0.19	0.76	0.28
10/06/2023 13:09	0.12	0.09	0.09	0.08	0.12
10/06/2023 15:18	0.15	0.12	0.07	0.11	0.12
13/06/2023 14:50	0.13	0.15	0.05	0.49	0.14
15/06/2023 9:57	0.09	0.04	0.04	0.11	0.11
15/06/2023 13:31	0.10	0.04	0.35	0.37	0.24
15/06/2023 13:33	0.09	0.03	0.05	0.12	0.11
17/06/2023 16:29	0.08	0.03	0.04	0.08	0.10
19/06/2023 13:19	0.09	0.05	0.06	0.04	0.12
20/06/2023 12:54	0.13	0.05	0.08	0.14	0.12
21/06/2023 13:06	0.14	0.07	0.53	0.85	0.50
21/06/2023 16:21	0.17	0.13	0.06	0.50	0.11
23/06/2023 13:26	0.29	0.26	0.13	0.44	0.14
23/06/2023 13:31	0.09	0.03	0.05	0.13	0.11
27/06/2023 11:02	0.09	0.03	0.04	0.12	0.11
27/06/2023 13:09	0.09	0.05	0.06	0.10	0.11
28/06/2023 13:07	0.09	0.03	0.08	0.13	0.13
29/06/2023 14:16	0.17	0.27	0.14	0.13	0.16

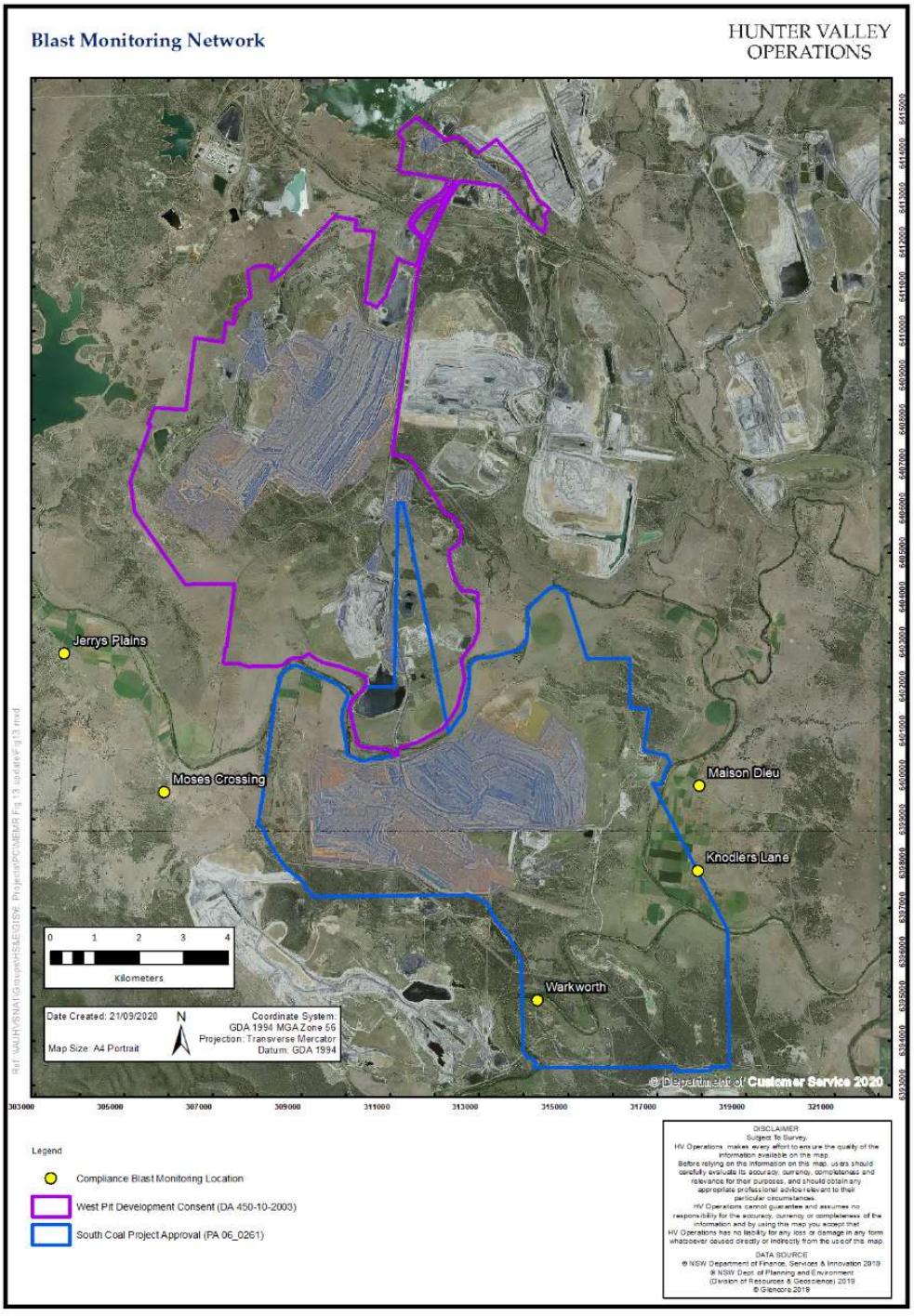

Figure 78 - Blast Monitoring Location Plan

5 | NOISE

Routine attended noise monitoring occurs at defined locations around HVO, as described in the HVO Noise Monitoring Program. The noise monitoring aims to quantify and describe the acoustic environment around the site and compare results with specified limits. The attended noise monitoring locations are displayed in Figure 79.

5.1 | ATTENDED NOISE MONITORING RESULTS

Attended monitoring was conducted at receiver locations around HVO during the night period of the 6th of June 2023.

Compliance with the HVO noise impact limits ensures compliance with the land acquisition criteria. Therefore, since no noise impact exceedances occurred for the reporting period the land acquisition assessment has not been presented. These will only be reported in instances of noise impact exceedances.

Monitoring results are detailed in Table 7 and Table 8.

Table 7 - LAeq,15minute and 1minute HVO North Against Impact Assessment Criteria for the Reporting Period

Location	Start date and time	Wind		Stability class	Very enhancing? [1]	HVO North limits, dB [1]		HVO North levels, dB		Exceedances, dB	
		Speed m/s	Direction [3]			$L_{Aeq,15minute}$	$L_{A1,1min}$	$L_{Aeq,15minute}$ [2]	$L_{A1,1min}$	$L_{Aeq,15minute}$	$L_{A1,1min}$
Shearers Lane	6/06/2023 21:00	0.5	141	D	Yes	35	46	IA	IA	Nil	Nil
Knodlers Lane	6/06/2023 21:40	0.6	112	E	Yes	35	46	IA	IA	Nil	Nil
Maison Dieu	6/06/2023 21:20	0	-	E	Yes	35	46	IA	IA	Nil	Nil
Long Point (Dights Crossing)	6/06/2023 22:27	0.4	111	E	Yes	35	46	IA	IA	Nil	Nil
Kilburnie South	6/06/2023 23:24	0	-	E	Yes	39	46	IA	IA	Nil	Nil
Jerrys Plains East	6/06/2023 22:58	0	-	G	No	39	46	IA	IA	N/A	N/A
Jerrys Plains Village	6/06/2023 21:22	0	-	E	Yes	40	46	29	34	Nil	Nil
Jerrys Plains West	6/06/2023 21:00	0.5	141	D	Yes	40	46	31	37	Nil	Nil

1. Noise limits are adjusted by +5 dB during 'very noise-enhancing meteorological conditions' in accordance with the NPfI.
2. Site-only LAeq,15minute, includes modifying factor penalties if applicable.
3. Degrees magnetic north, "-" indicates calm conditions

Table 8 - LAeq,15minute and 1minute HVO South Against Impact Assessment Criteria for the Reporting Period

Location	Start date and time	Wind		Stability class	Very enhancing? [1]	HVO South limits, dB [1]		HVO South levels, dB		Exceedances, dB	
		Speed m/s	Direction [3]			$L_{Aeq,15minute}$	$L_{A1,1min}$	$L_{Aeq,15minute}$ [2]	$L_{A1,1min}$	$L_{Aeq,15minute}$	$L_{A1,1min}$
Shearers Lane	6/06/2023 21:00	2.8	164	E	Yes	41	45	IA	IA	Nil	Nil
Knodlers Lane	6/06/2023 21:40	2.3	166	E	Yes	40	45	IA	IA	Nil	Nil
Maison Dieu	6/06/2023 21:20	2.4	184	D	Yes	39	45	IA	IA	Nil	Nil
Long Point (Dights Crossing)	6/06/2023 22:27	1.8	183	E	Yes	37	45	IA	IA	Nil	Nil
Kilburnie South	6/06/2023 23:24	1.6	156	D	Yes	39	45	IA	IA	Nil	Nil
Jerrys Plains East	6/06/2023 22:58	1.8	154	E	Yes	38	45	26	28	Nil	Nil
Jerrys Plains Village	6/06/2023 21:22	2.4	184	D	Yes	35	45	IA	IA	Nil	Nil
Jerrys Plains West	6/06/2023 21:00	2.8	164	E	Yes	35	45	IA	IA	Nil	Nil
HVGC	6/06/2023 23:53	1.7	145	E	Yes	55	NA	<35	40	Nil	Nil

1. Noise limits are adjusted by +5 dB during 'very noise-enhancing meteorological conditions' in accordance with the NPfI.
2. Site-only LAeq,15minute, includes modifying factor penalties if applicable.
3. Degrees magnetic north, "-" indicates calm conditions.

5.2 | LOW FREQUENCY ASSESSMENT

In accordance with the requirements of the EPA's Noise Policy for Industry (NPfI), the applicability of the low frequency modification penalty has been assessed. No penalties were applied for monitoring undertaken through the reporting period. The assessments for the low frequency noise are shown in Table 9 and Table 10.

Table 9 - Modifying Factor Assessment HVO North for the Reporting Period

Location	Start date and time	Measured HVO North L_{Aeq} dB	Very enhancing? [1]	Intermittency modifying factor?	Tonality modifying factor?	Frequency of tonality	Low-frequency modifying factor? [1,2]	Exceedance of reference spectrum [2,3]	Total penalty dB [2,3]
Shearers Lane	6/06/2023 21:00	IA	Yes	No	No	NA	No	NA	Nil
Knodlers Lane	6/06/2023 21:40	IA	Yes	No	No	NA	No	NA	Nil
Maison Dieu	6/06/2023 21:20	IA	Yes	No	No	NA	No	NA	Nil
Long Point (Dights Crossing)	6/06/2023 22:27	IA	Yes	No	No	NA	No	NA	Nil
Kilburnie South	6/06/2023 23:24	IA	Yes	No	No	NA	No	NA	Nil
Jerrys Plains East	6/06/2023 22:58	IA	No	No	No	NA	NA	NA	Nil
Jerrys Plains Village	6/06/2023 21:22	29	Yes	No	No	NA	No	NA	Nil
Jerrys Plains West	6/06/2023 21:00	31	Yes	No	No	NA	No	NA	Nil

1. Low-frequency modifying factors are not applicable during 'very noise-enhancing meteorological conditions' in accordance with the NPfI.

2. NA denotes 'not applicable'.

3. Bold results indicate that application of NPfI modifying factor(s) is required.

Table 10 - Modifying Factor Assessment HVO South for the Reporting Period

Location	Start date and time	Measured HVO South LAeq dB	Very enhancing? !	Intermittency modifying factor?	Tonality modifying factor?	Frequency of tonality	Low-frequency modifying factor? 1,2	Exceedance of reference spectrum 2,3	Total penalty dB 2,3
Shearers Lane	6/06/2023 21:00	IA	Yes	No	No	NA	No	NA	Nil
Knodlers Lane	6/06/2023 21:40	IA	Yes	No	No	NA	No	NA	Nil
Maison Dieu	6/06/2023 21:20	IA	Yes	No	No	NA	No	NA	Nil
Long Point (Dights Crossing)	6/06/2023 22:27	IA	Yes	No	No	NA	No	NA	Nil
Kilburnie South	6/06/2023 23:24	IA	Yes	No	No	NA	No	NA	Nil
Jerrys Plains East	6/06/2023 22:58	26	Yes	No	No	NA	No	NA	Nil
Jerrys Plains Village	6/06/2023 21:22	IA	Yes	No	No	NA	No	NA	Nil
Jerrys Plains West	6/06/2023 21:00	IA	Yes	No	No	NA	No	NA	Nil
HVGC	25/01/2023 23:53	<35	Yes	No	No	NA	No	NA	Nil

1. NA denotes 'not applicable'; and

2. Bold results indicate that application of NPfI modifying factor/s 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, shown in Figure 79. 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 that require investigation.

HVO investigates and responds to noise alarms with appropriate modification to operations. Changes in response to a noise alarm can include replacing equipment with alternative units, changing or relocating tasks, or shutting down equipment. It should be noted that this assessment does not compliment or conflict with attended noise monitoring detailed in **Section 5.1 |**. Real time monitoring data includes non-mine noise sources such as animals, road traffic and weather.

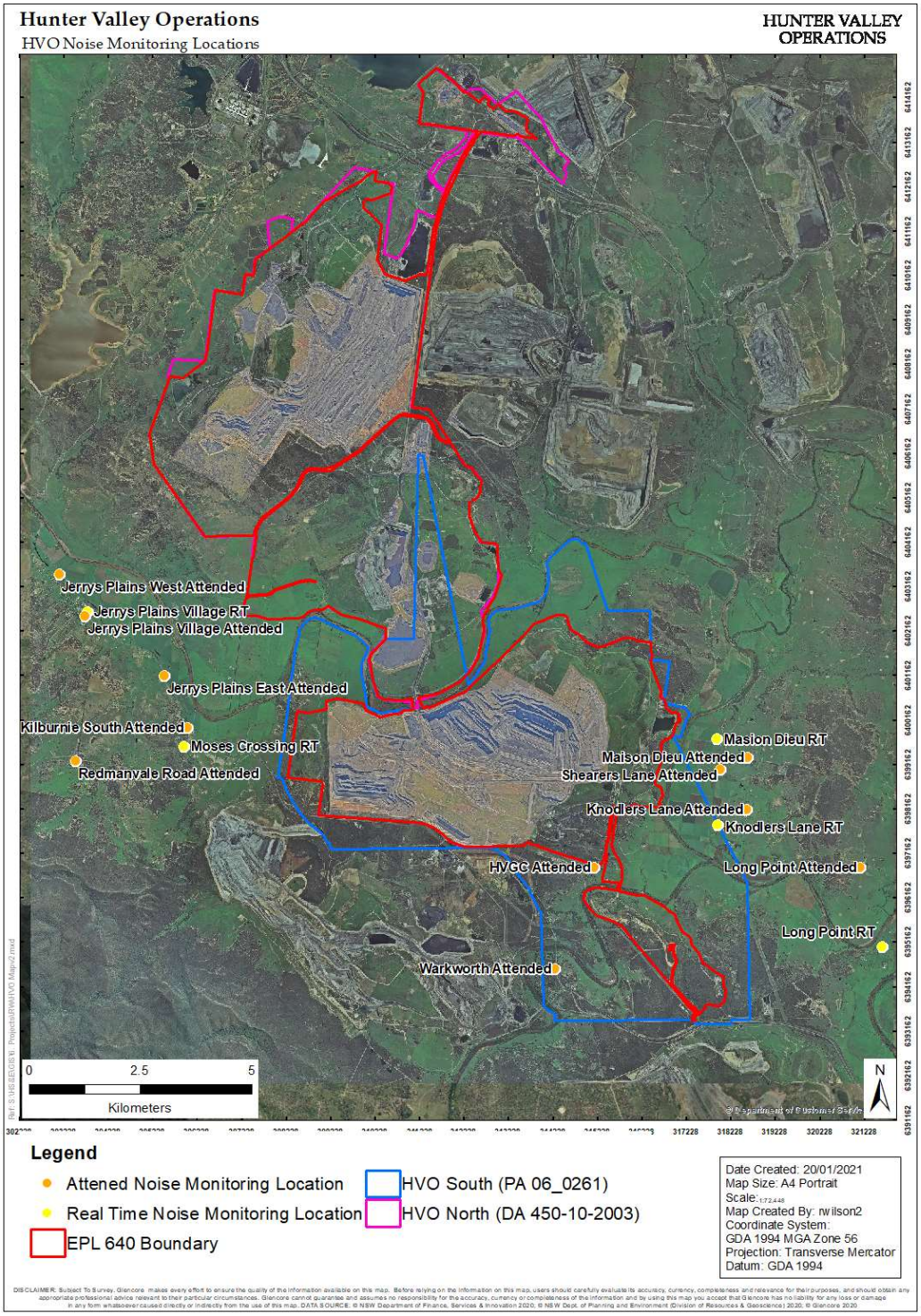

Figure 79 - Noise Monitoring Location Plan

6 | OPERATIONAL DOWNTIME

A total of 152.3 hours of equipment downtime was logged in response to real time monitoring and inspections for environmental factors such as noise and dust during the reporting period. Operational downtime by equipment type is show in Figure 1780. 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).

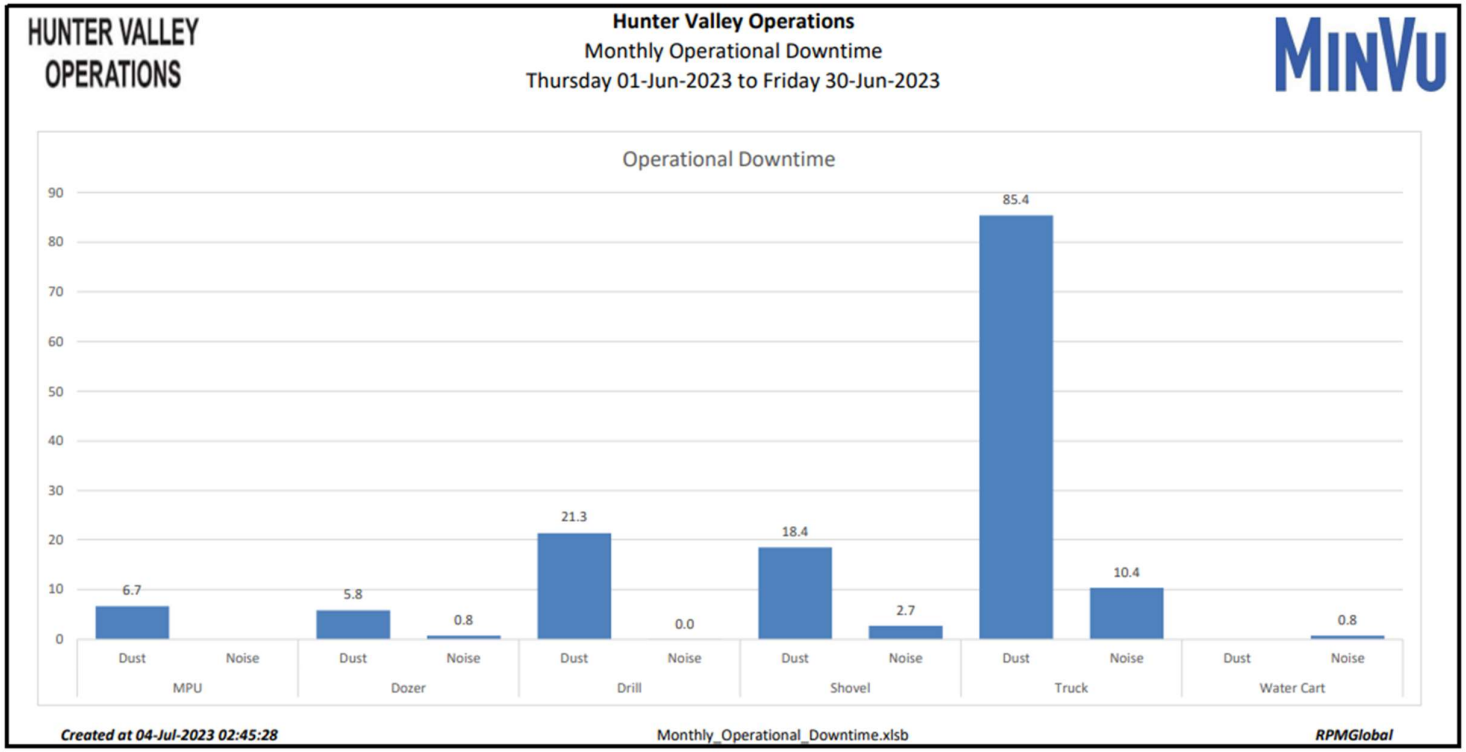

Figure 80 - Operational Downtime by Equipment Type for the Reporting Period

7 | REHABILITATION

The following activities related to rehabilitation were completed during the reporting period:

- 11.03 Ha of land was reshaped;
- 11.03 Ha of land was released (became available for the application of topsoil);
- 0.56 Ha of land was topsoiled; and
- 0.56 Ha of land was rehabilitated.

Year to date progress is shown in Figure 181.

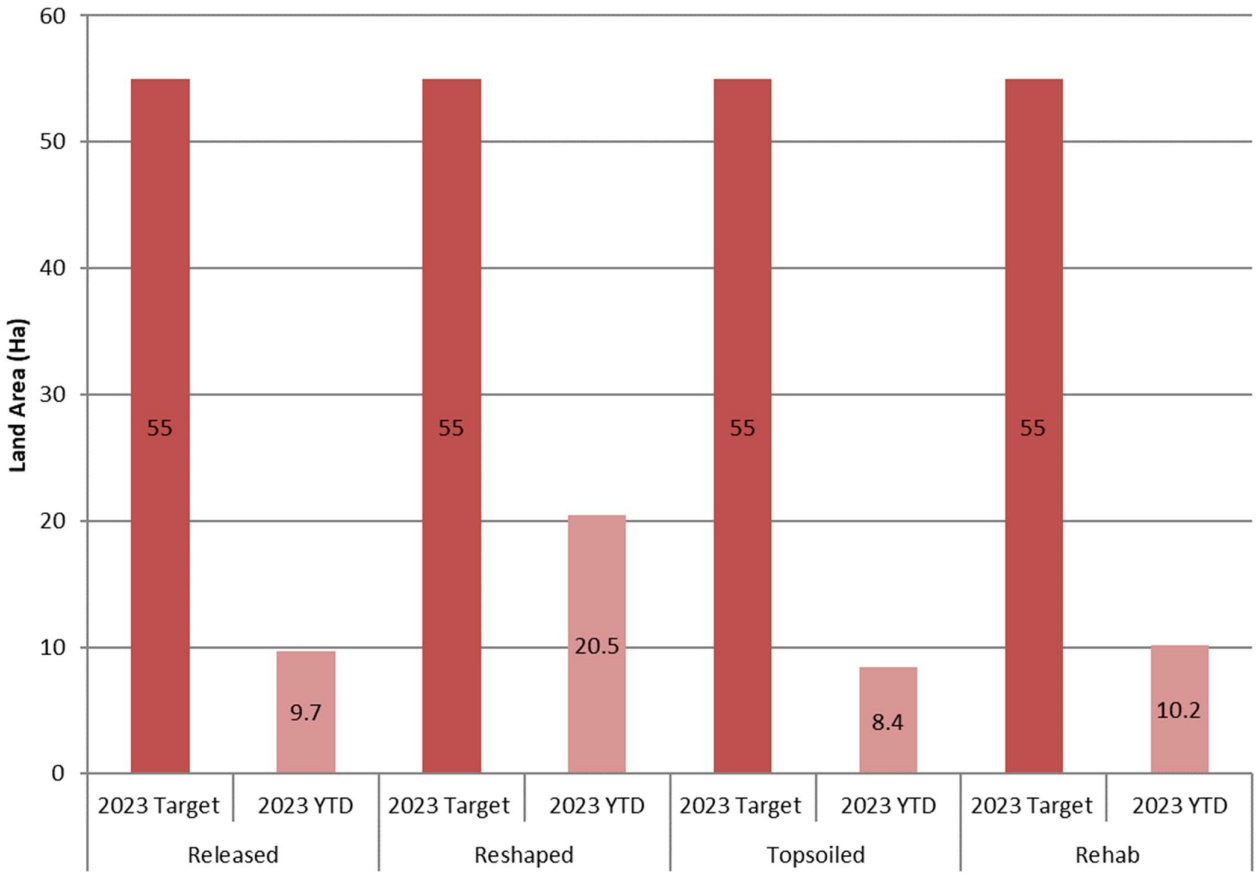

Figure 81 - Rehabilitation YTD June 2023

8 | COMPLAINTS

There were two complaints during the reporting period.

Details of complaints received from 2023 are shown in Table 11.

Table 11 – Complaints Summary 2023

Complaint Number	Date	Time	Complainant ID	Nature of Complaint	Mode of Complaint	Brief Description and Response
No community complaints were received in January.						
1	1 February	12:06am	1	Lighting	Community Hotline	• A complainant of Long Point called the Community Complaints Hotline at 12.06am regarding a lighting complaint, commenting that “light from HVO was shining directly into their house keeping their family awake”. • The OCE contacted the complainant at 12:27am and shutdown the lighting plant identified to be causing the disturbance. This was verified by the complainant. • An internal investigation conducted following the complaint found that the light from the lighting plant was likely to be visible from the complainant's location. Process changes have been made as a result of the complaint to close the identified gap in operational practices.
No community complaints were received in March.						
2	11 April	7:11am	2	Traffic	Community Hotline	• A member of the public was driving east along Golden Highway near the entrance to HVO South, when a train of four cars pulled out in front of them.

Complaint Number	Date	Time	Complainant ID	Nature of Complaint	Mode of Complaint	Brief Description and Response
						• The complainant reported that the last car to pull out failed to give way to them which forced them to flash their headlights, sound the horn and take evasive action and brake heavily causing their car's ABS system to engage to slow down and prevent a collision. • An internal investigation conducted following the complaint identified the driver of the vehicle. The employees supervisor notified them of the complaint and the importance of safe driving practices when travelling to and from site.
3	29 April	1:40pm	1	Blast dust	Community Hotline	• A complainant of Long Point called the Community Complaints Hotline at 1:40pm on 29/4/2023. The OCE contacted the complainant who asked what was going on to create the dust he saw, the OCE advised that a blast had just taken place. • The blast was fired in accordance with HVO blasting permissions for wind speed and direction. The wind direction and wind speed at the time of the blast was 2.7m/s and 268 degrees. The resident's property is located 8 kilometres from the blast location at a bearing of 295 degrees. • A review of camera footage of the blast fired at approximately 1:30pm confirmed that a dust plume was produced but was not abnormal in its colour or volume. Low winds will have slowed the dissipation of the dust plume.

Complaint Number	Date	Time	Complainant ID	Nature of Complaint	Mode of Complaint	Brief Description and Response
						• The nearest real-time PM10 monitor (Maison Dieu) located downwind of the blast, but north of the resident, issued a level 1 dust trigger (PM10 10-minute average > 150u/gm3) at 2:10pm, the daily average was 27ug/m3 and below the criteria. A High-Volume Air Sampler is located within 150m of their residence and was monitoring particulates during the blast. The unit recorded a daily average result of 24.6 ug/m3 which was below the criteria.
No community complaints were received in May.						
4	1 June	11:28pm	3	Blast fume	Community Hotline	• A blast fume complaint was received by a complainant who wished to remain anonymous at 11:28pm on 1/6/2023 following a blast fired at 1.18pm earlier that day in West Pit. The complainant described the blast as “disgraceful” and also voiced their concern about roads being closed off and the impacts associated with blast fume. • A review of the camera footage confirmed a fumy blast which was reviewed and investigated by the Drill & Blast team. The wind direction and wind speed at the time of the blast was 5.6m/s and 264 degrees. Blast fume travelled from WN47LLD02/03A post ignition across HC1 conveyor road and towards Ravensworth Open Cut where it dissipated.

Complaint Number	Date	Time	Complainant ID	Nature of Complaint	Mode of Complaint	Brief Description and Response
						• Pre-blast environmental assessment ranked the fume and dust risk as possible, and the blast was fired in accordance with blasting permissions for wind speed and direction.
5	10 June	1:09pm	4	Blast dust	Community Hotline	• A complainant called the HVO Hotline at 1:09pm on 10/6/2023 following a blast in Cheshunt Pit at 12:56pm. The complainant was annoyed that dust from the blast had blown towards them. • A review of camera footage of the blast fired confirmed that a dust plume did travel in the direction of the complainant, no fume was observed. • The dust plume was not excessive; however it was observed to travel lower to the ground before dispersing. The nearest real-time air quality monitor (Warkworth) recorded a maximum of 21 ug/m3 in the hour following the blast against a criteria of 50 ug/m3. • The wind direction and wind speed at 12:55pm was 4.3m/s and 314 degrees. Pre-blast environmental assessment ranked the fume and dust risk as unlikely and blast was fired in accordance with blasting permissions for wind speed and direction.

9 | ENVIRONMENTAL INCIDENTS

There were no reportable environmental incidents during the reporting period.

APPENDIX A: METEOROLOGICAL DATA

Date	Air Temp Max (°C)	Air Temp Min (°C)	Relative Humidity (Max %)	Relative Humidity (Min %)	Solar Radiation Maximum (W/Sq. M)	Average Wind Direction (°)	Average Wind Speed (m/sec)	Rainfall (mm)
1/06/2023	19.90	8.67	75.78	42.77	663.5	285.6	3.47	0.0
2/06/2023	23.82	12.22	67.83	34.48	889.0	283.4	3.03	0.0
3/06/2023	20.86	8.70	95.40	48.91	633.4	151.8	1.27	0.0
4/06/2023	24.05	11.08	96.60	36.67	774.4	220.6	1.72	0.0
5/06/2023	18.05	11.92	88.90	61.80	711.4	115.8	3.17	0.0
6/06/2023	17.82	10.93	88.00	52.90	686.5	119.9	3.31	0.0
7/06/2023	17.47	9.63	96.40	54.04	795.8	134.3	0.95	0.0
8/06/2023	17.61	6.82	95.60	62.55	606.6	161.1	0.43	0.0
9/06/2023	16.50	8.75	94.60	59.91	508.9	268.4	2.80	1.6
10/06/2023	17.68	9.14	88.00	38.83	556.3	284.7	4.26	0.0
11/06/2023	17.72	7.70	73.54	33.48	562.7	258.7	2.50	0.0
12/06/2023	18.23	3.63	88.20	37.01	559.2	220.6	0.95	0.0
13/06/2023	19.87	4.95	93.50	41.21	642.5	235.2	1.05	0.0
14/06/2023	17.10	8.25	89.70	58.04	747.9	273.5	2.48	1.6
15/06/2023	16.35	6.18	89.50	35.88	555.7	280.5	4.05	0.2
16/06/2023	15.89	5.57	77.82	37.14	566.0	278.7	3.35	0.0
17/06/2023	17.67	3.96	79.23	33.31	548.5	275.5	2.04	0.0
18/06/2023	18.14	4.80	79.97	33.97	556.8	270.4	2.41	0.0
19/06/2023	18.88	7.40	64.66	21.53	561.8	272.9	3.69	0.0
20/06/2023	14.90	3.45	77.00	26.19	555.6	285.0	4.38	0.0
21/06/2023	15.23	4.33	73.01	26.14	559.3	267.9	2.38	0.0
22/06/2023	14.20	0.98	75.27	34.73	544.9	194.9	1.48	0.0
23/06/2023	12.55	3.50	93.50	52.38	662.1	172.6	0.49	0.6
24/06/2023	16.77	7.53	94.80	35.62	669.2	266.9	4.54	6.2
25/06/2023	17.40	6.85	67.21	33.05	574.5	291.2	4.36	0.0
26/06/2023	19.75	8.55	57.60	24.88	556.8	268.8	5.49	0.0
27/06/2023	18.03	7.90	53.18	25.28	559.3	285.0	5.18	0.0
28/06/2023	17.16	6.95	71.32	34.59	622.6	278.4	3.46	0.0
29/06/2023	12.45	8.29	91.80	49.36	193.0	274.9	2.98	0.6
30/06/2023	15.43	5.69	82.60	36.68	630.6	285.4	4.28	0.0