HUNTER VALLEY
OPERATIONS

MONTHLY ENVIRONMENTAL MONITORING REPORT - DECEMBER 2024

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REVIEW
[Planned Review Date]

OWNER
Superintendent - Environment and Community

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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 1 – 31 December 2024 (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 recorded at the HVO Corporate weather station during the period is summarised in **Table 1.** The 2022, 2023 and 2024 trends are shown in **Figure 1.**

Table 1 - Rainfall data for the Reporting Period

2024	Monthly Rainfall (mm)	Cumulative Rainfall (mm)
December	17.6	645.2

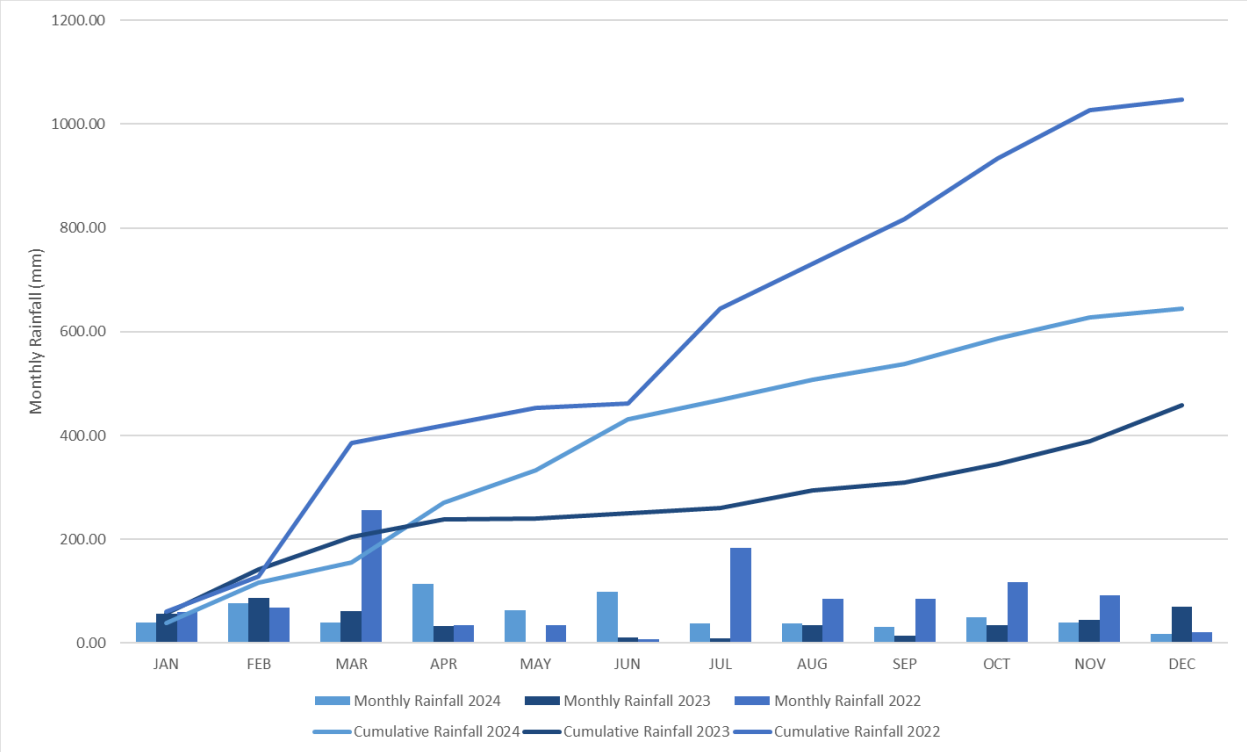

Figure 1: Rainfall Summary 2024

2.1.2 | WIND SPEED AND DIRECTION

South westerly winds were prevailing at both the HVO Corporate and Cheshunt weather stations during the reporting period as shown in **Figure 2 and Figure 3.**

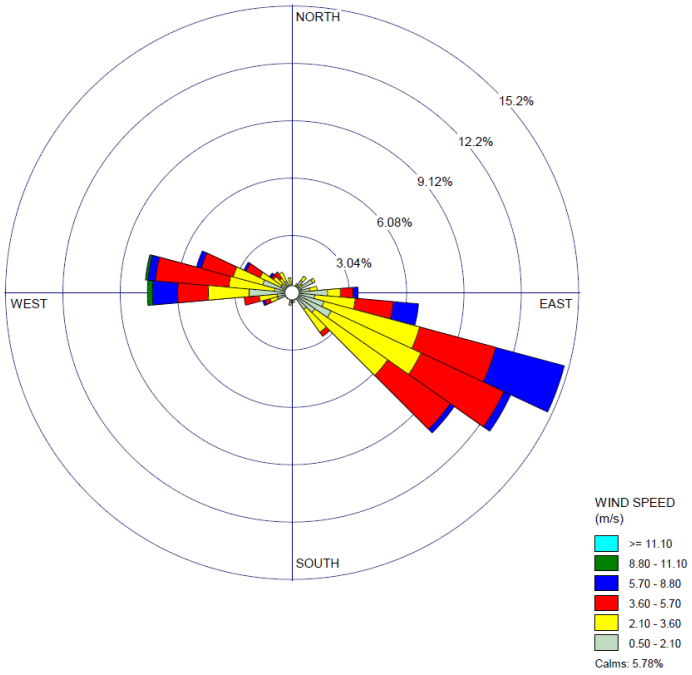

Figure 2: HVO Corporate Wind Rose for the Reporting Period

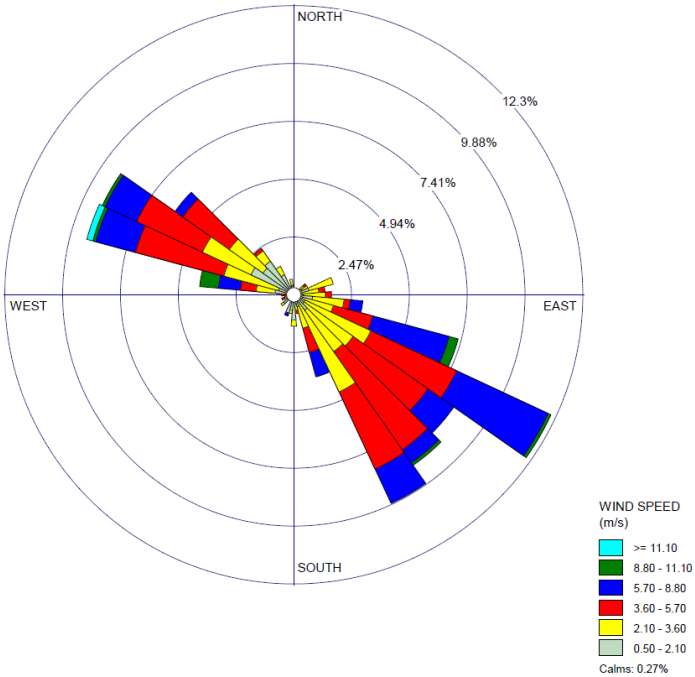

Figure 3: HVO Cheshunt Wind Rose for the Reporting Period

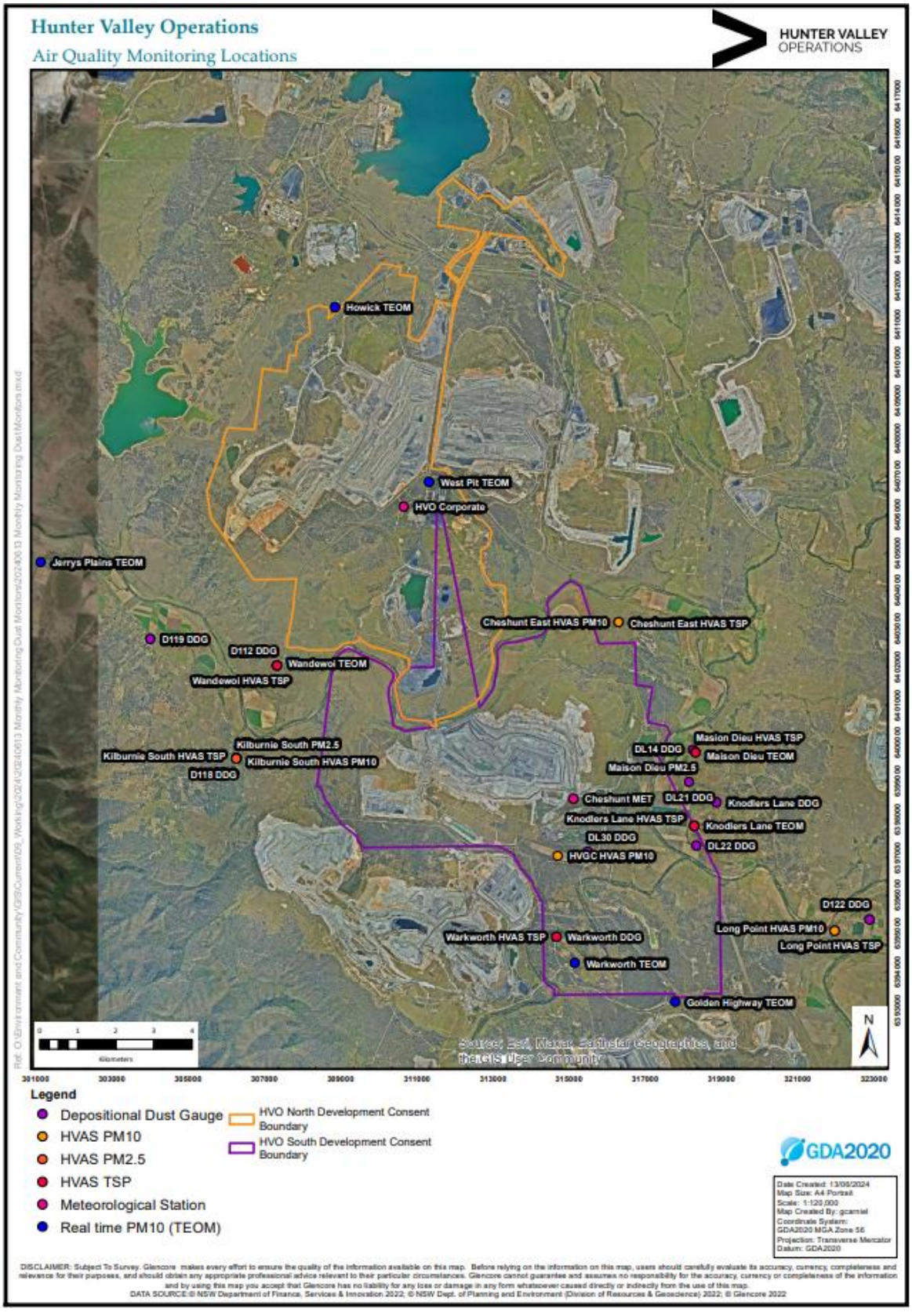

Figure 4: Air Quality Monitoring Location Plan

2.2 | DEPOSITIONAL DUST

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

Error! Reference source not found. 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 2024 Annual Review.

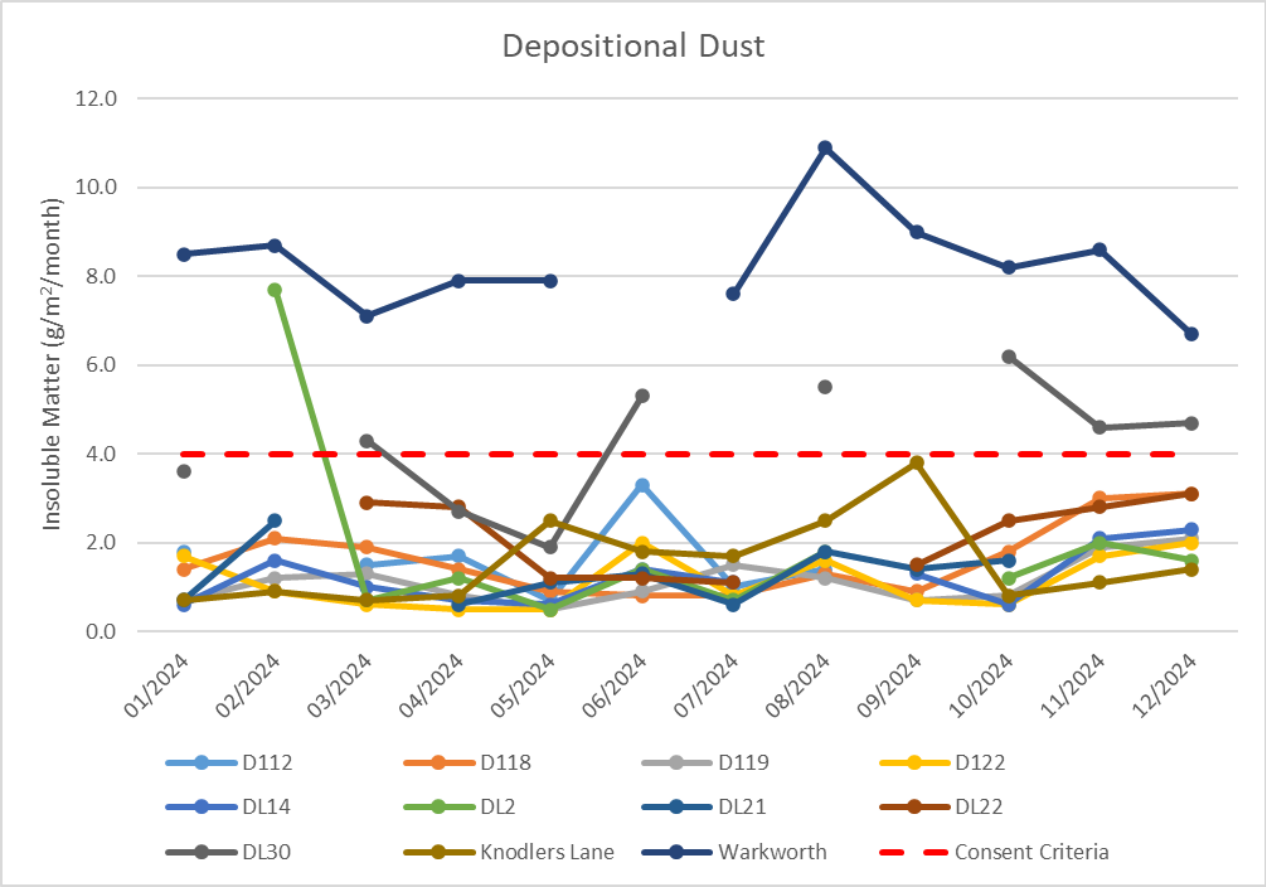

Figure 5: Depositional Dust Results for the Reporting Period

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 (PM_{10}). The Kilburnie South (Moses Crossing) and Maison Dieu HVAS also monitor Particulate Matter <2.5µm ($PM_{2.5}$). 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 PM_{10} results at each monitoring station against the short-term impact assessment criteria of 50µg/m^3. All monitors were below the short-term impact assessment criteria during the reporting period with the exception of Gliding Club on 13 December. The potential exceedance was investigated internally by HVO and found that the maximum calculated HVO contribution was below the compliance limit.

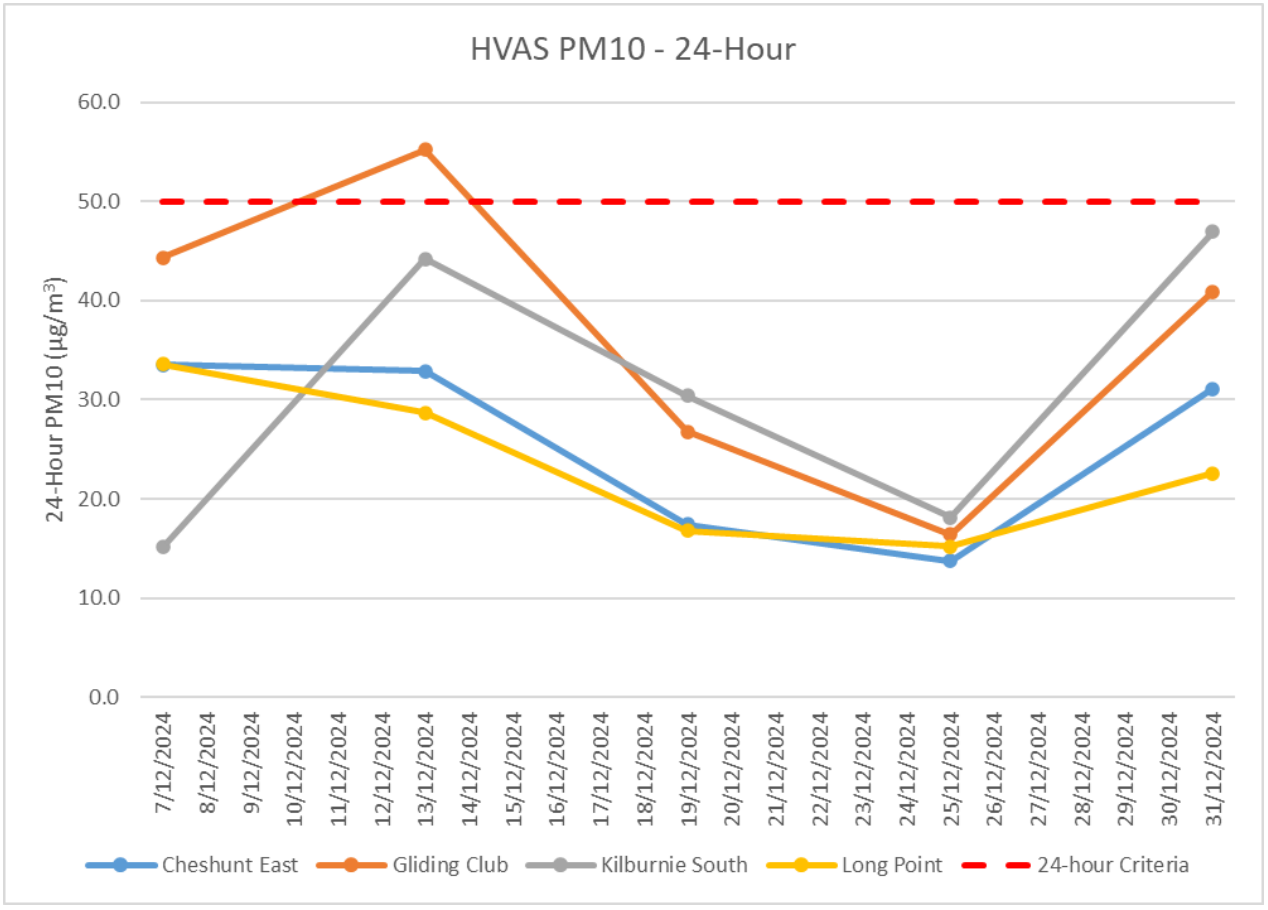

Figure 6: Individual PM_{10} Results for the Reporting Period

2.3.1.2 | PERFORMANCE AGAINST LONG TERM IMPACT ASSESSMENT CRITERIA

Figure 7 shows the year-to-date annual average PM_{10} results. All 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 2024 Annual Review.

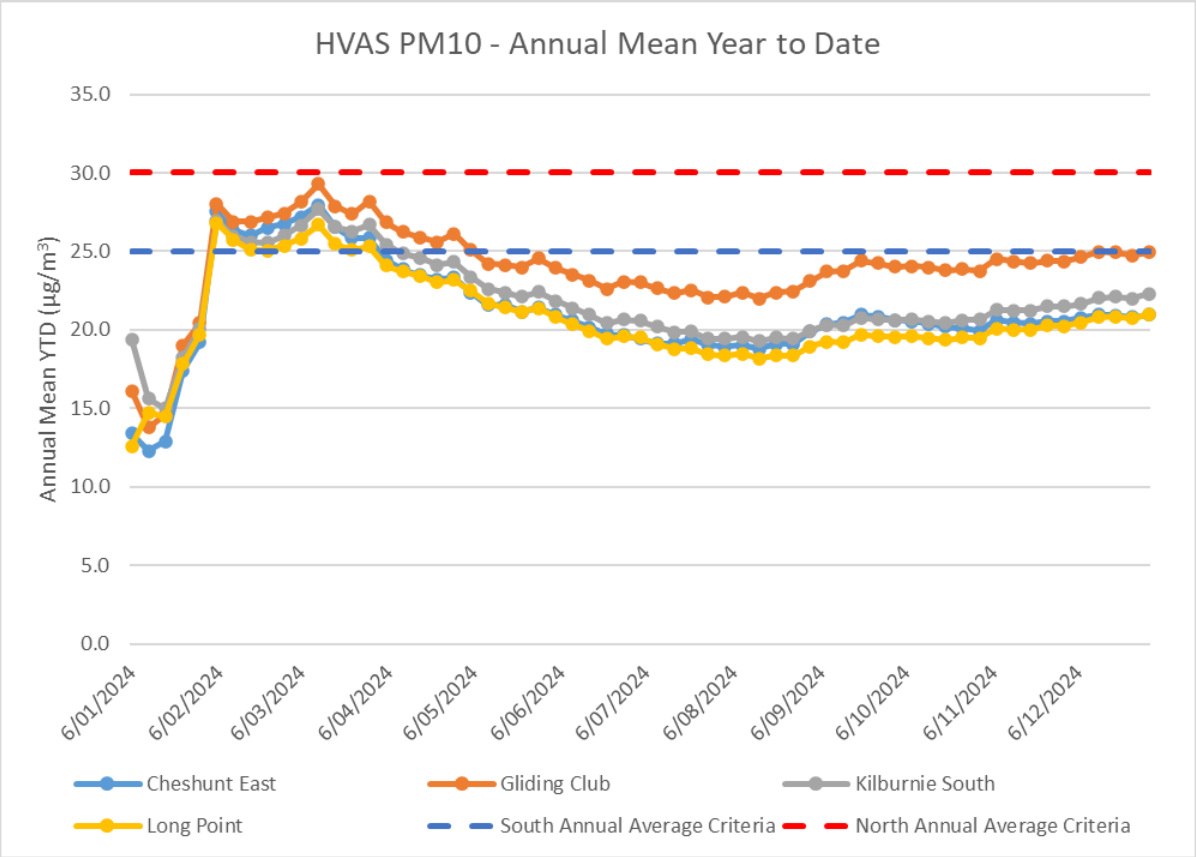

Figure 7: Year to Date Average PM_{10} as at end of the Reporting Period

2.3.2 | HVAS $PM_{2.5}$ RESULTS

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

2.3.2.1 | HVAS $PM_{2.5}$ RESULTS

Figure 8 shows individual $PM_{2.5}$ results at each monitoring station against the HVO South short-term impact assessment criteria of 25µg/m³. Monitoring locations were below the relevant short-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 2024 Annual Review.

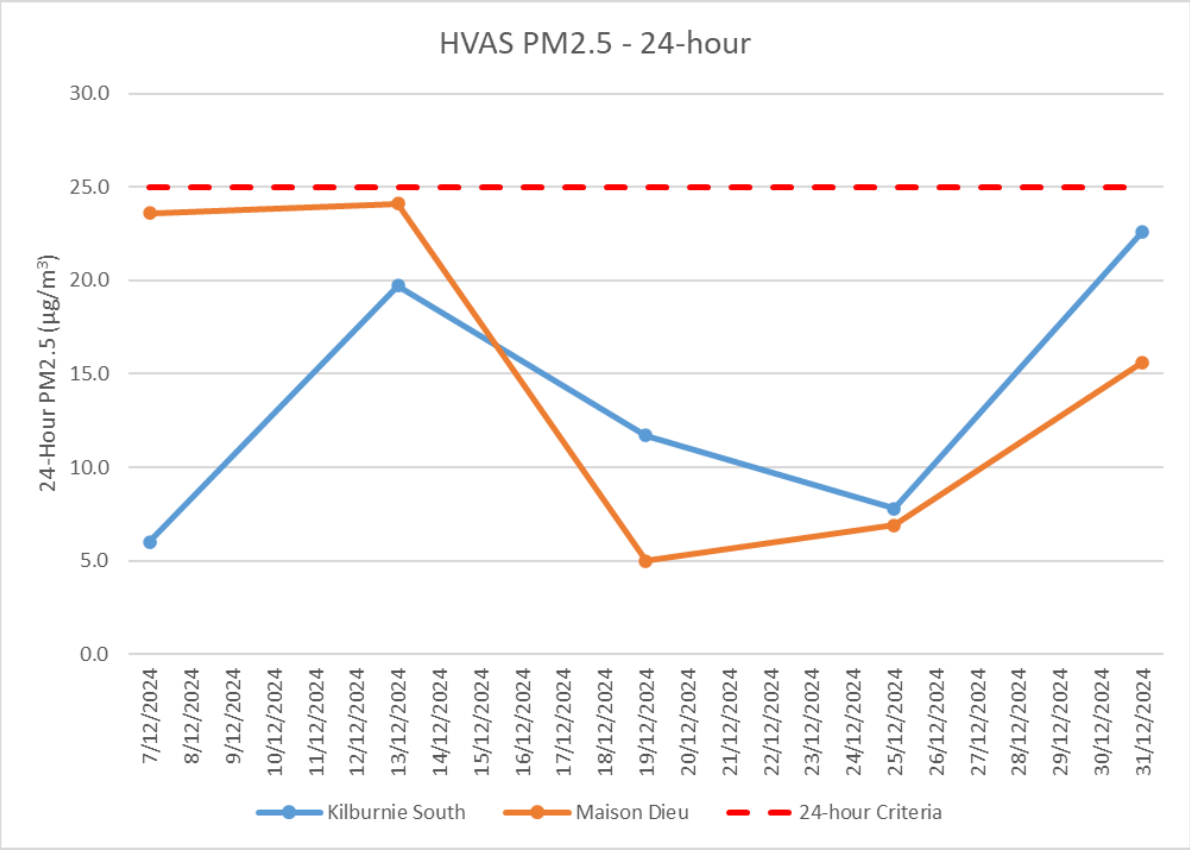

Figure 8: Results for the Reporting Period

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 monitors annual average year to date results were above the $PM_{2.5}$ annual rolling mean criteria of 8µg/m^3.

An assessment of HVO's contribution against the long-term impact assessment criteria will be provided in the 2024 Annual Review.

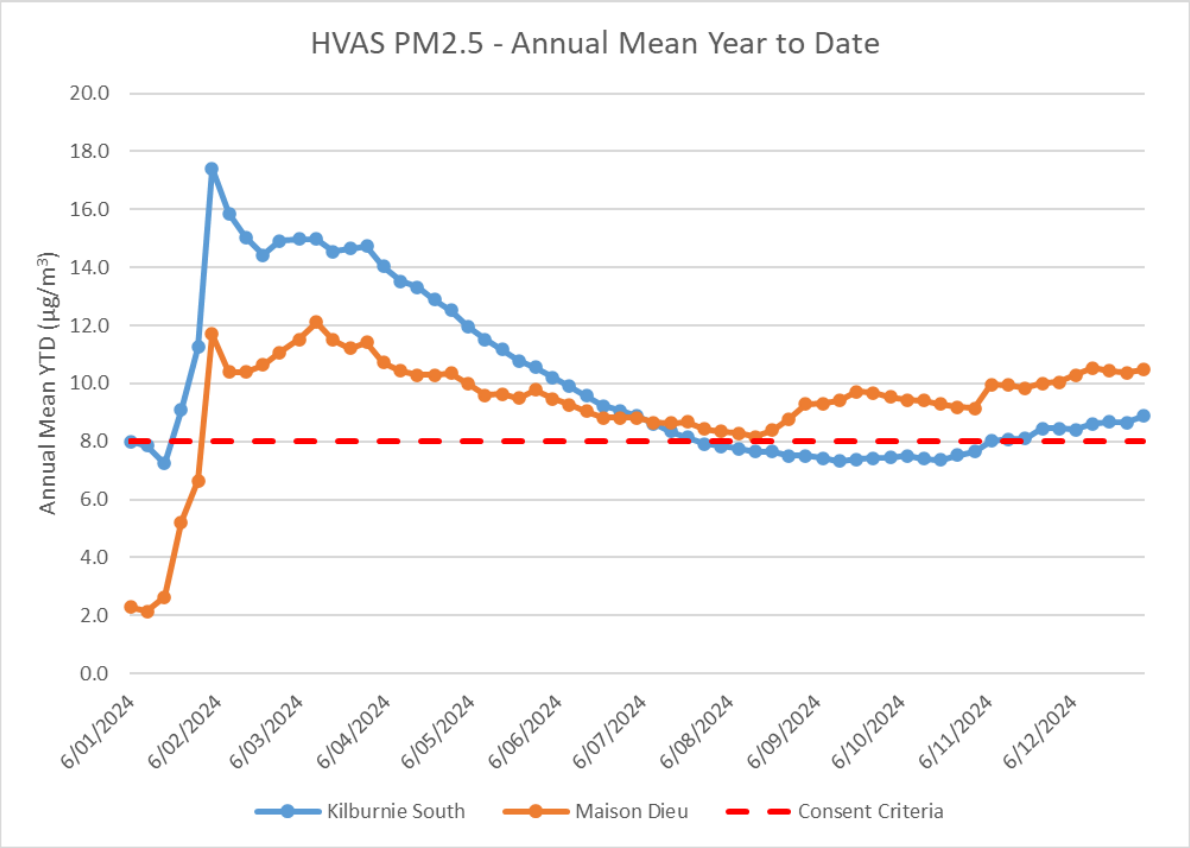

Figure 9: Year to Date Average $PM_{2.5}$ as at end of the Reporting Period

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/m^3.

Six of the seven monitors were below the relevant long-term impact assessment criteria during the reporting period. The Warkworth monitor recorded results greater than the 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 2024 Annual Review.

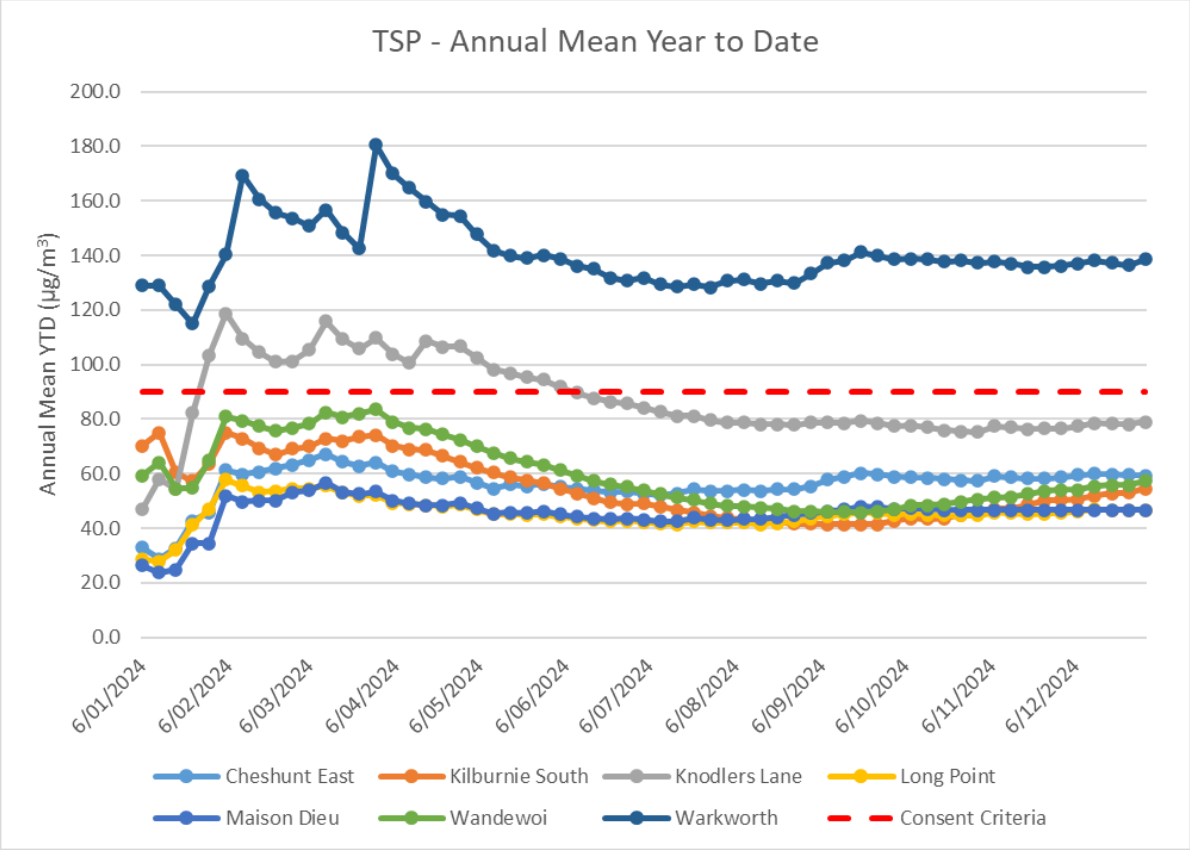

Figure 10: Year to Date Average Total Suspended Particulates as at end of the Reporting Period

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. During the reporting period, daily results were below the 24-hr average criteria of 50µg/m^3 with the exception of:

- Warkworth monitor on 13 and 27 December; and
- Jerrys Plains monitor on 14 December.

The Warkworth exceedances were investigated internally by HVO and it was found that the maximum calculated HVO contributions were below the compliance limit. The Jerrys Plains exceedance was investigated by a third-party air quality consultant, who determined HVO's maximum possible contribution to be 6.3ug/m^3 (HVO North) and 9.5ug/m3 (HVO South) respectively. Refer to Section 9 of this report.

Jerrys Plains monitor reported data capture rates of less than 75% on 19 and 20 December and therefore these are not displayed on **Figure 11**.

Figure 12 shows the annual rolling average PM_{10} results from the real time monitoring sites. The annual average results for Warkworth are above the relevant long-term impact assessment criteria for the reporting period. All other location results are currently below the relevant long-term impact assessment criteria for the reporting period.

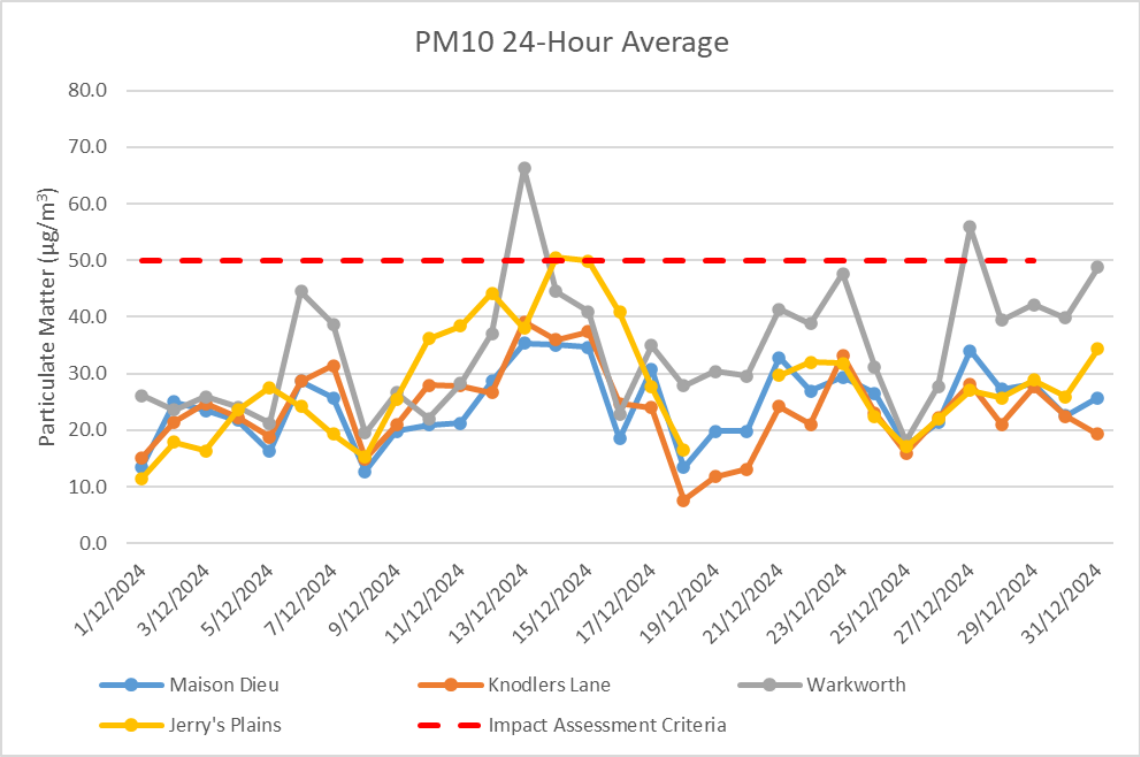

Figure 11: Real Time PM_{10} 24hr for the Reporting Period

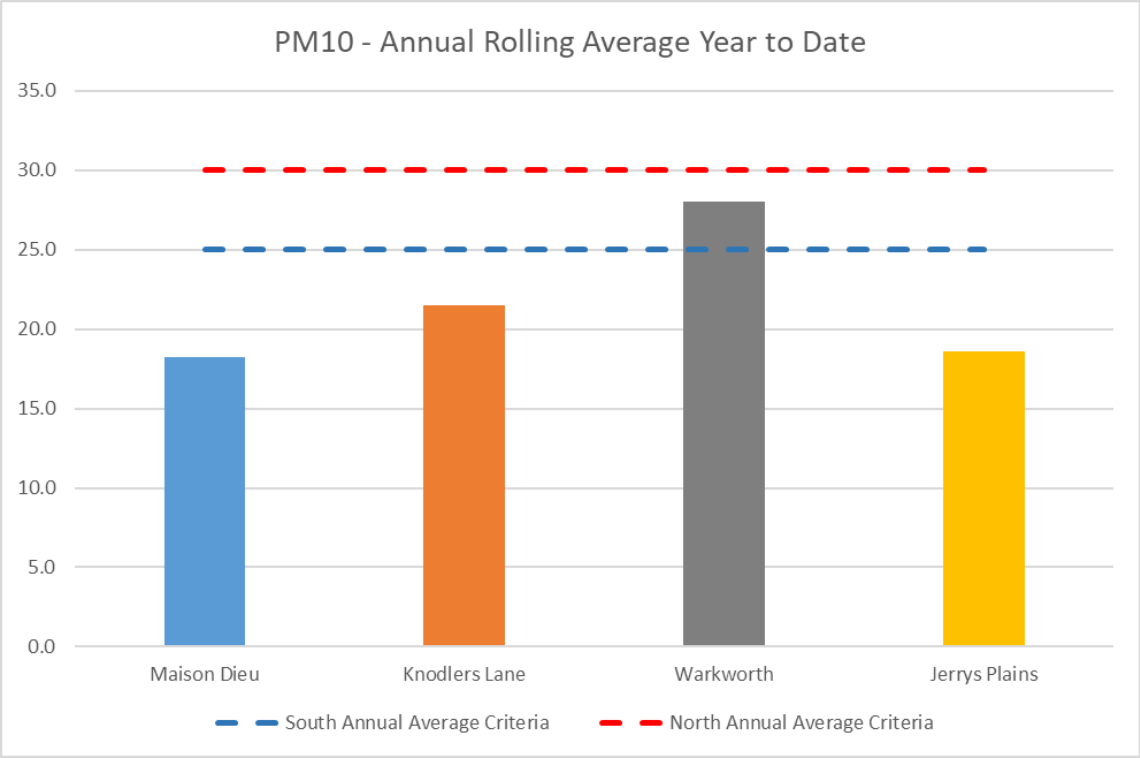

Figure 12: Real Time PM_{10} Annual Average for the Reporting Period

2.3.5 | REAL TIME ALARMS FOR AIR QUALITY

The real time monitoring system generated one hundred and ninety-eight (198) automated air quality related alarms during the reporting period. Thirty-nine (39) alarms related to adverse weather conditions (wind or rain) and one hundred and fifty-nine (159) 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, Wollombi Brook, the Hunter River and other natural tributaries are provided in **Figure 14 to Figure 25.**

Note: Other natural tributaries are only sampled following a significant rain event (>30mm). Results displayed are those following the last significant rain event which may have been outside the reporting period.

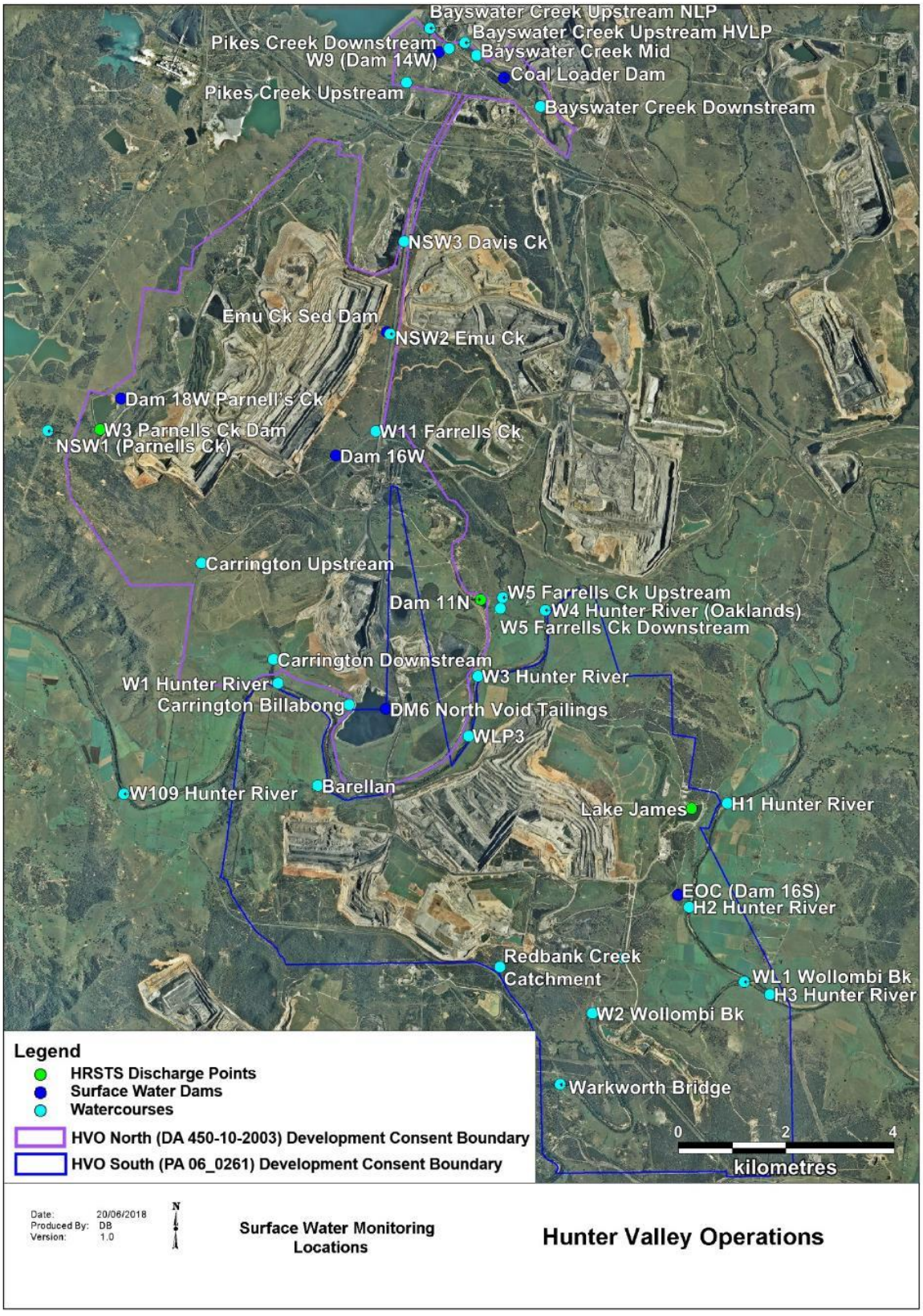

Figure 13: HVO Surface Water Monitoring Locations

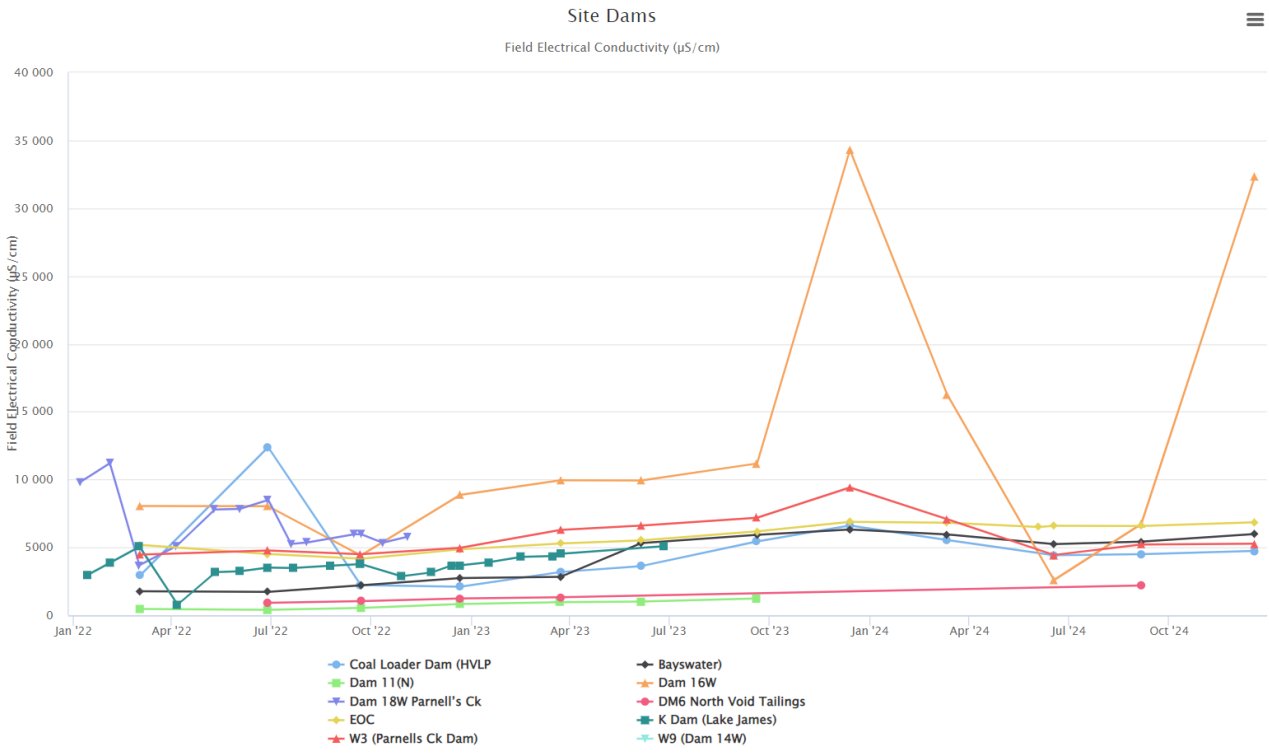

Figure 14 Site Dams Electrical Conductivity – Q4 2024

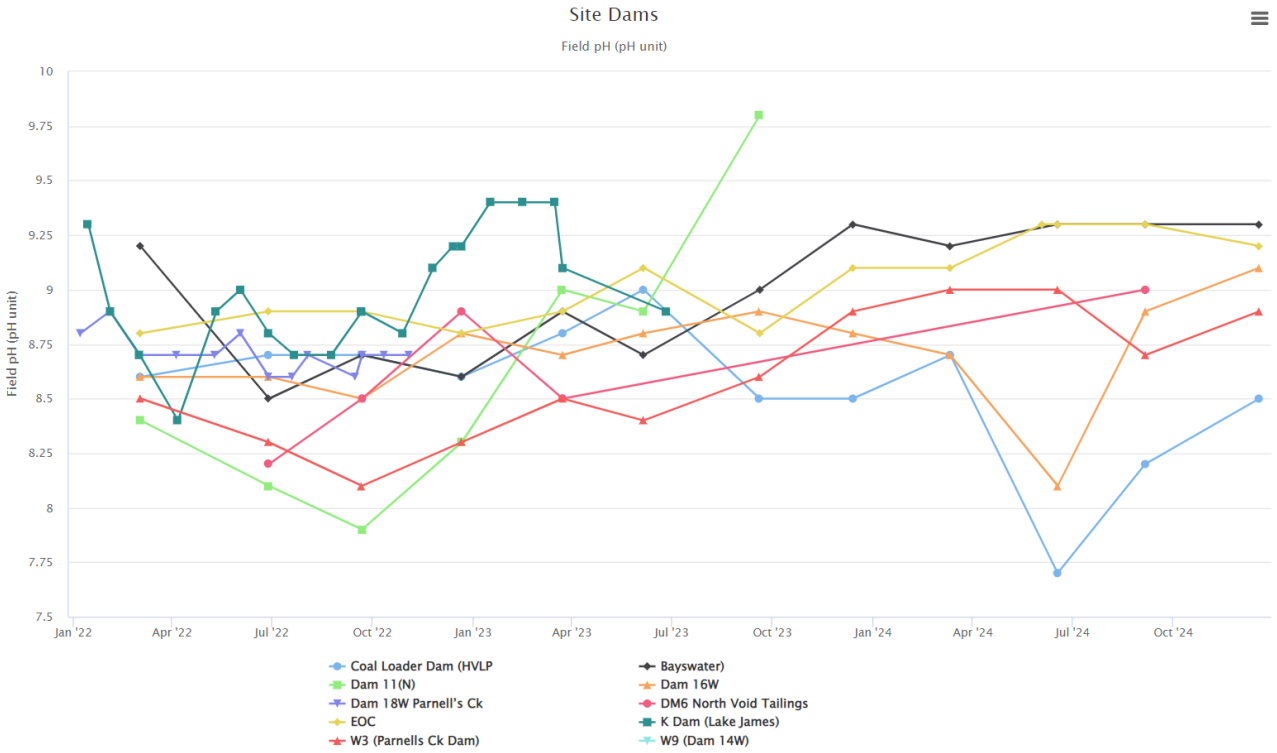

Figure 15 Site Dams Field pH – Q4 2024

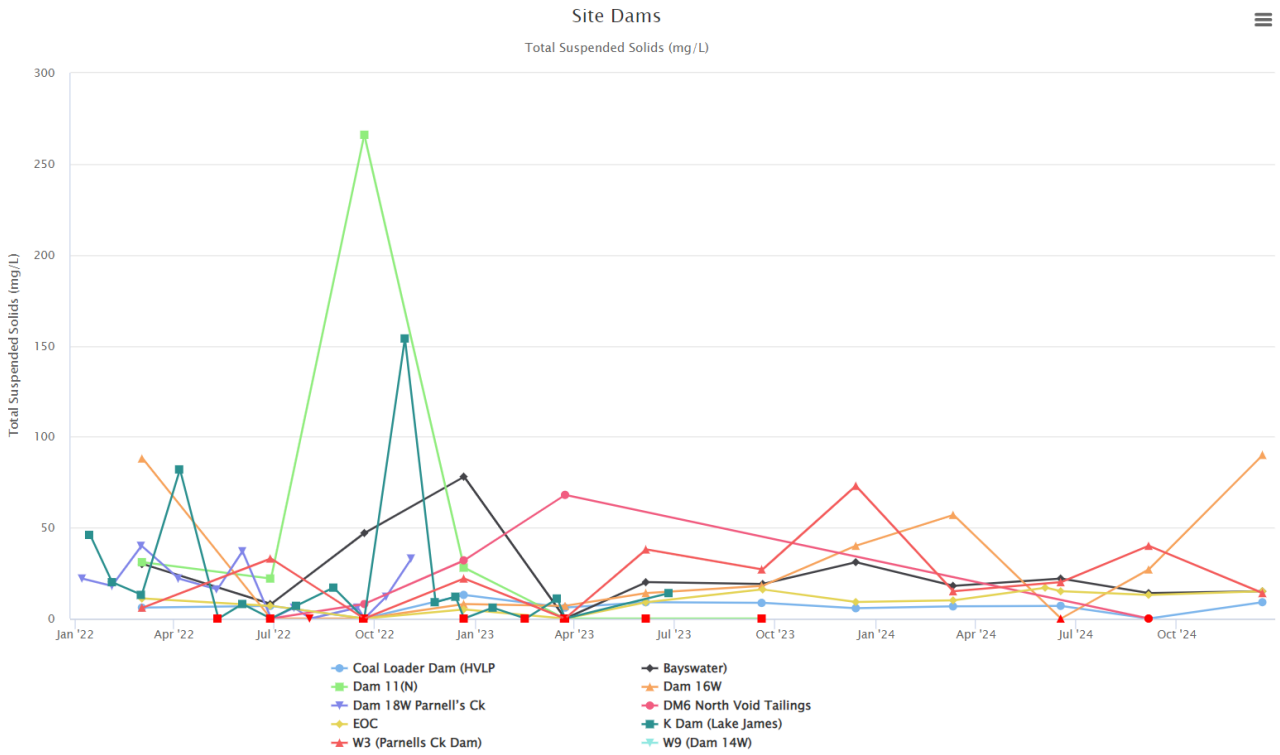

Figure 16 Site Dams Total Suspended Solids – Q4 2024

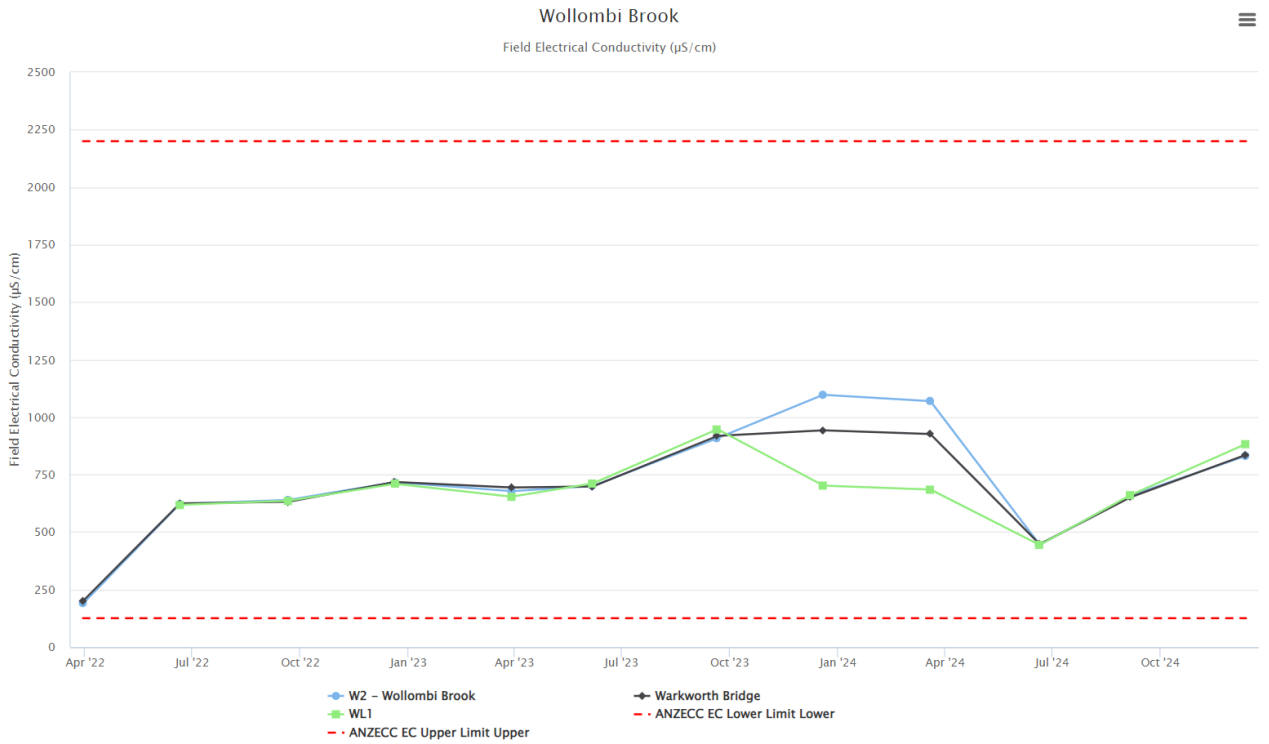

Figure 17 Wollombi Brook Electrical Conductivity – Q4 2024

Figure 18 Wollombi Brook Field pH – Q4 2024

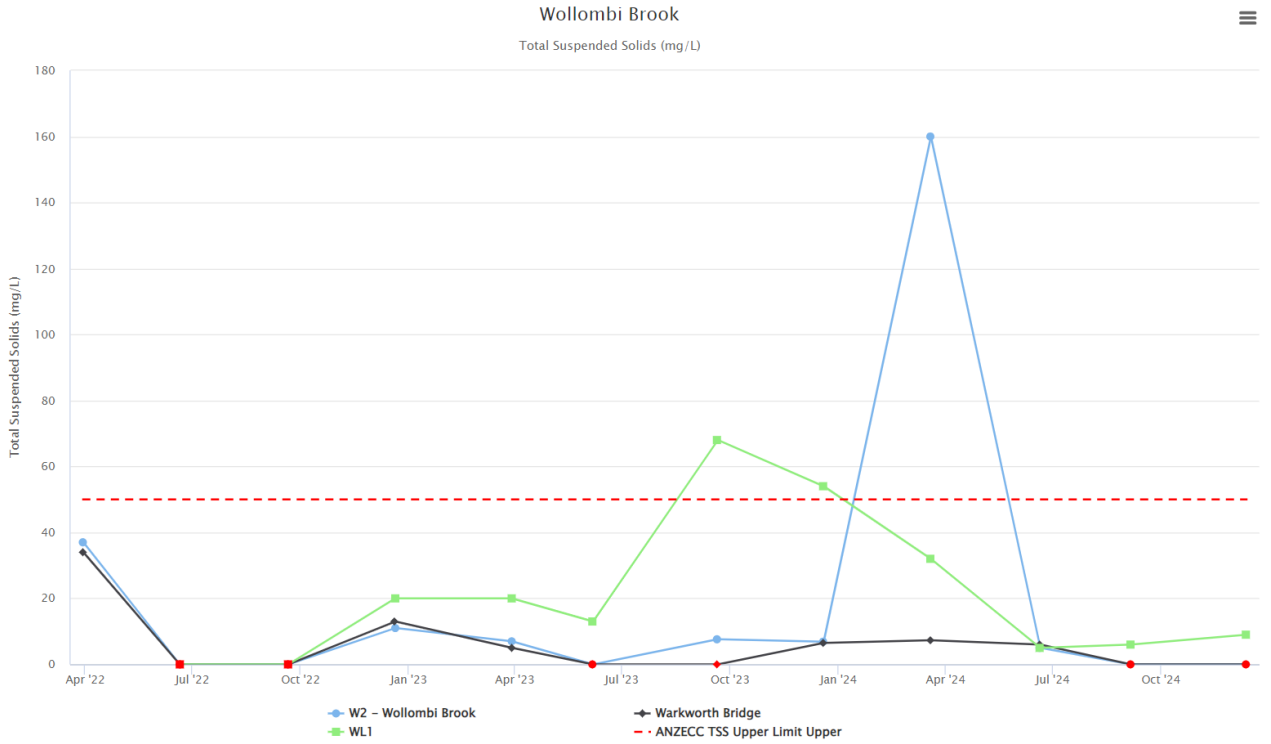

Figure 19 Wollombi Brook Total Suspended Solids – Q4 2024

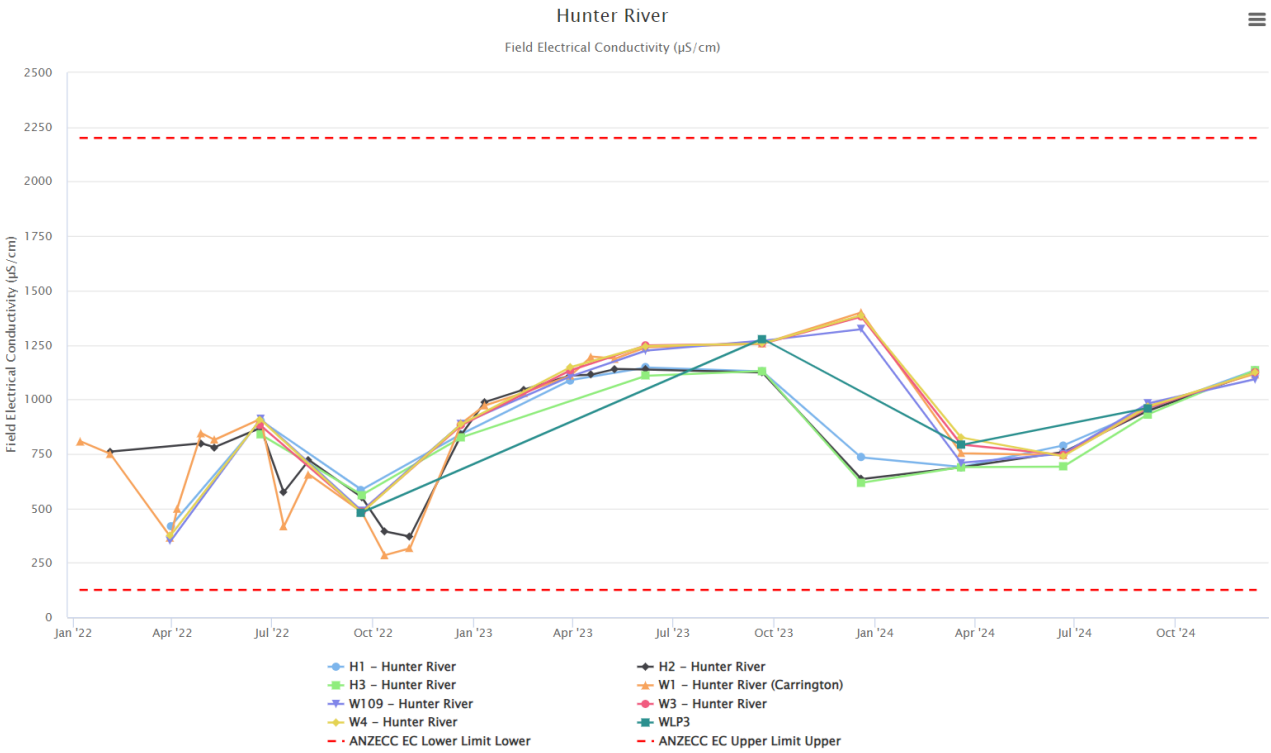

Figure 20 Hunter River Electrical Conductivity – Q4 2024

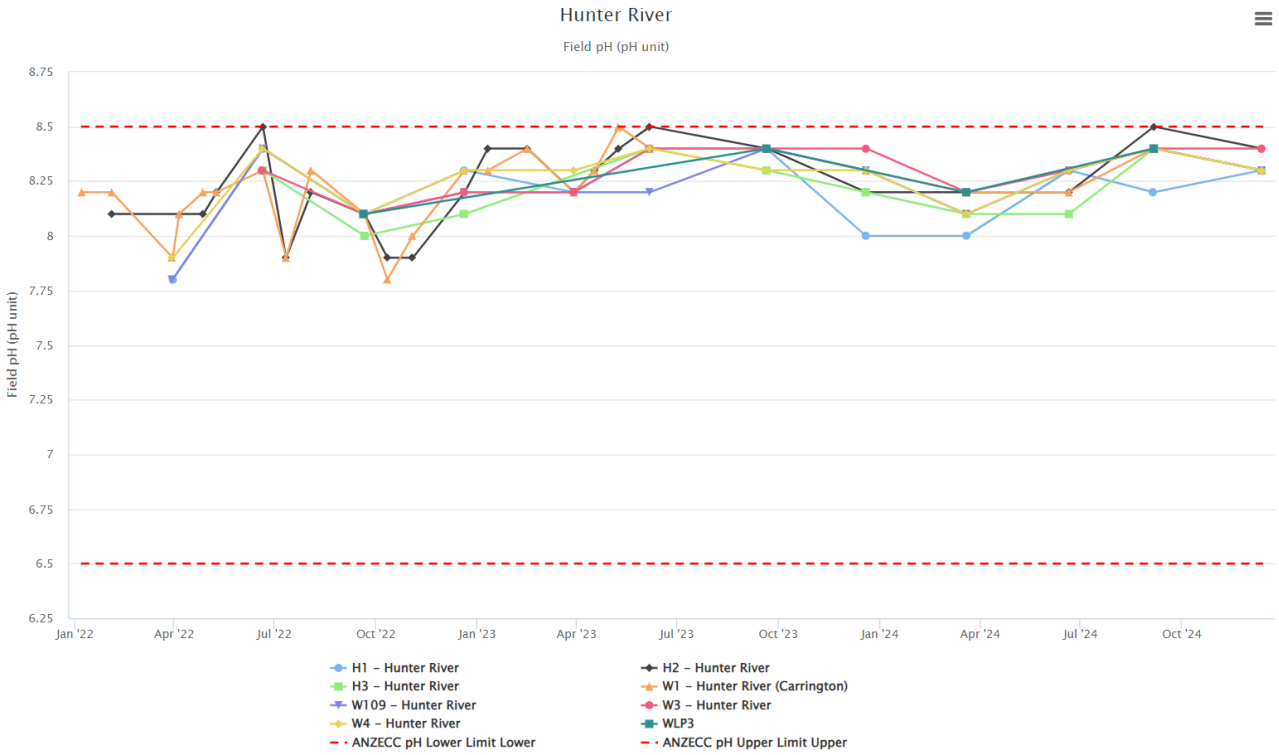

Figure 21 Hunter River Field pH – Q4 2024

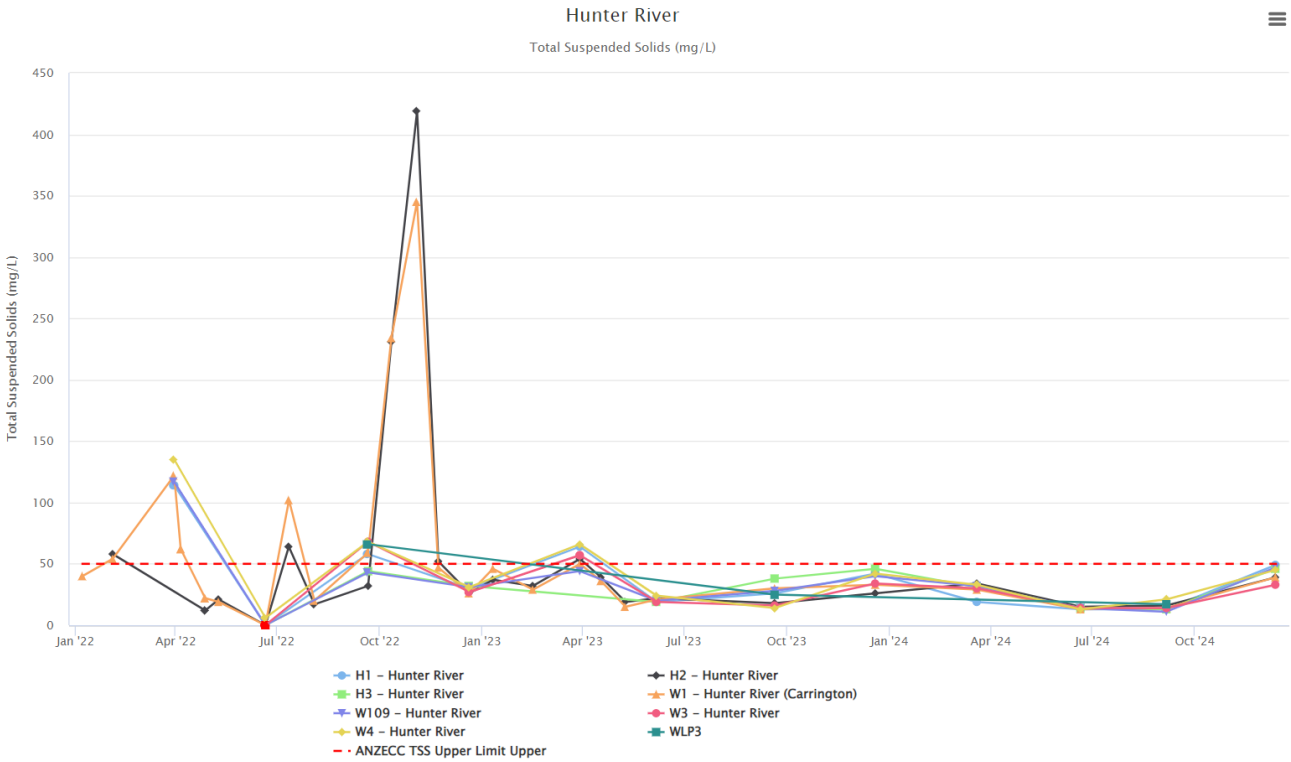

Figure 22 Hunter River Field TSS – Q4 2024

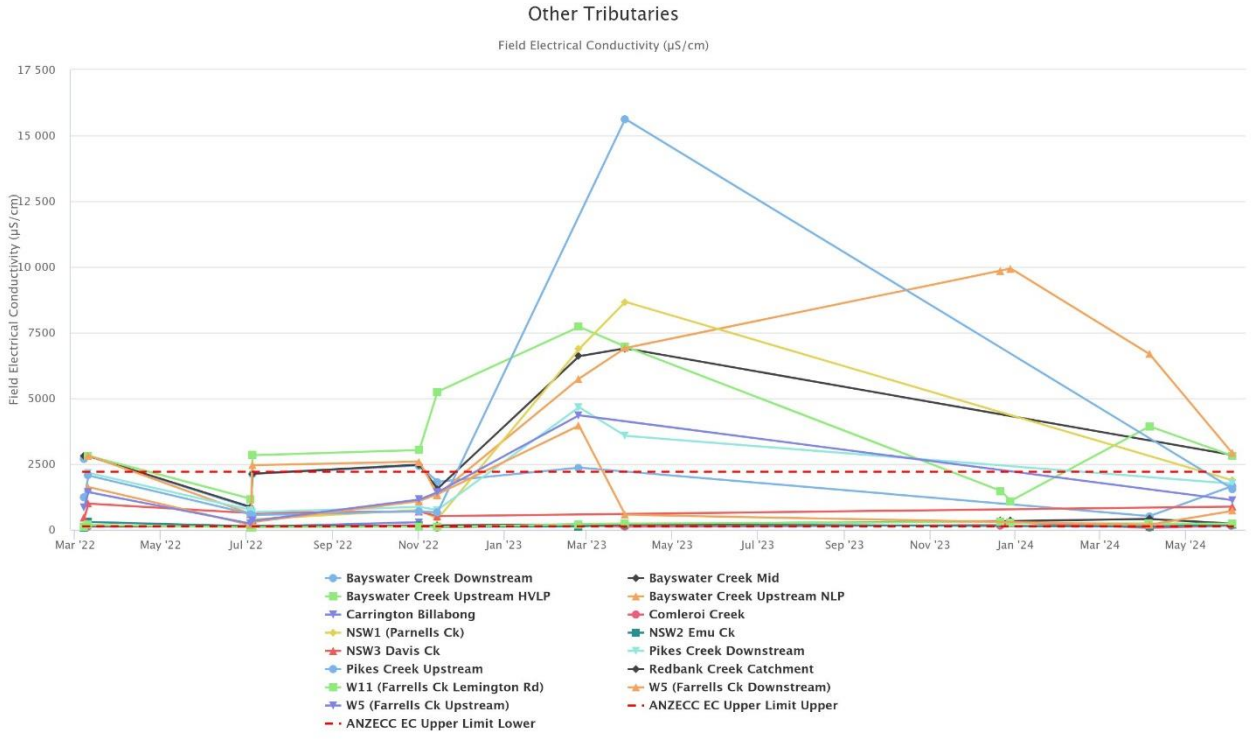

Figure 23 Other Tributaries Electrical Conductivity – Q4 2024

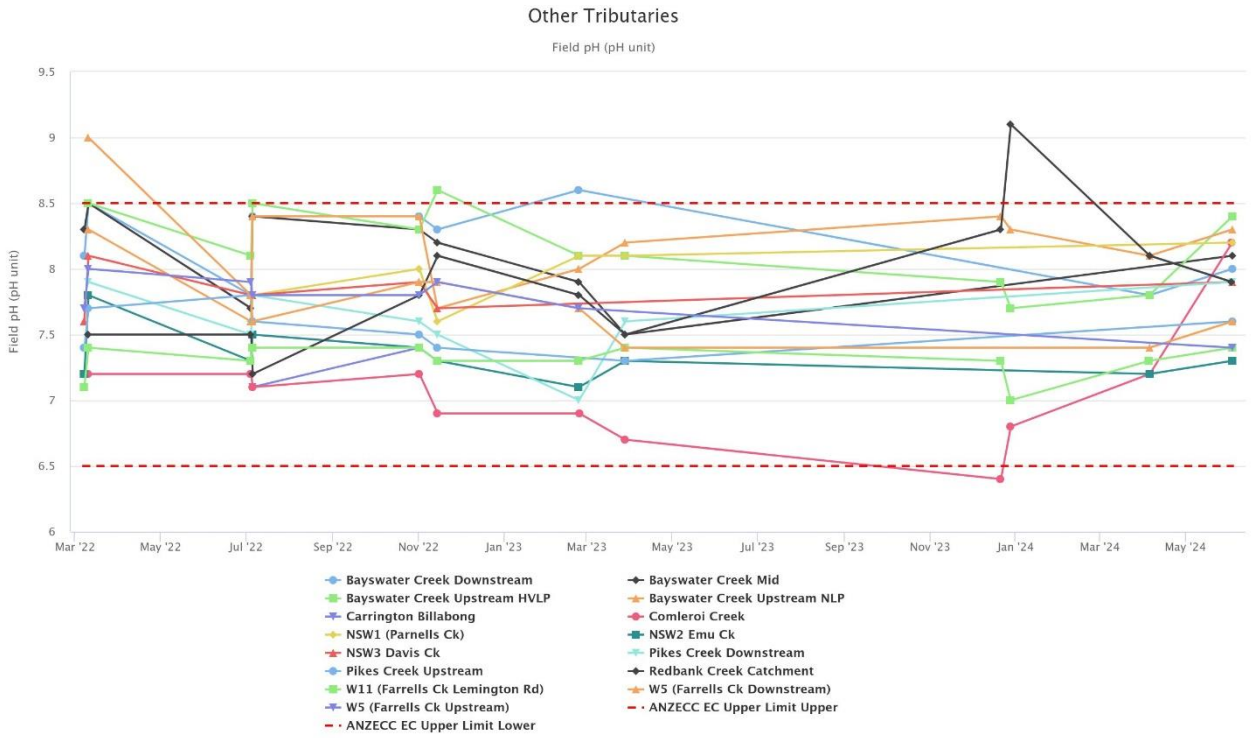

Figure 24 Other Tributaries Field pH – Q4 2024

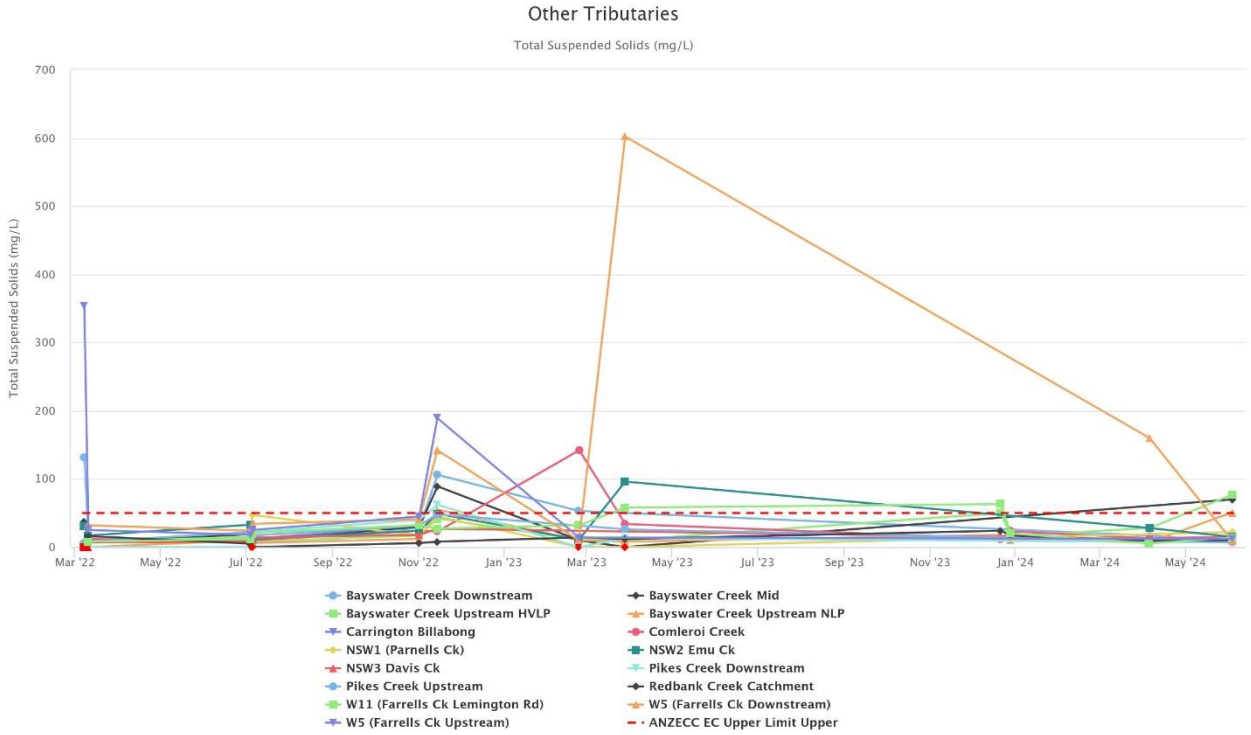

Figure 25 Other Tributaries Total Suspended Solids – Q4 2024

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 – Q4 2024

Site	Date	Trigger Limit	Response Action
H3 – Hunter River	12/12/2024	Electrical Conductivity (uS/cm)	Second exceedance of EC. No investigation required.
H3 – Hunter River	12/12/2024	Electrical Conductivity (uS/cm)	First exceedance of EC. No investigation required.

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 Programme. The location of groundwater monitoring points across HVO are shown in **Figure 26.**

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

Notes: Some or all sites within Lemington South Arrowfield, Lemington South Bowfield, Lemington South Glen Munro and Lemington South Woodlands Hill groupings are sampled bi-annually. Results displayed are the most recent, which may be outside the reporting period.

Bore NPZ3 within the West Pit Siltstone grouping is blocked and has been unable to be sampled since December 2022.

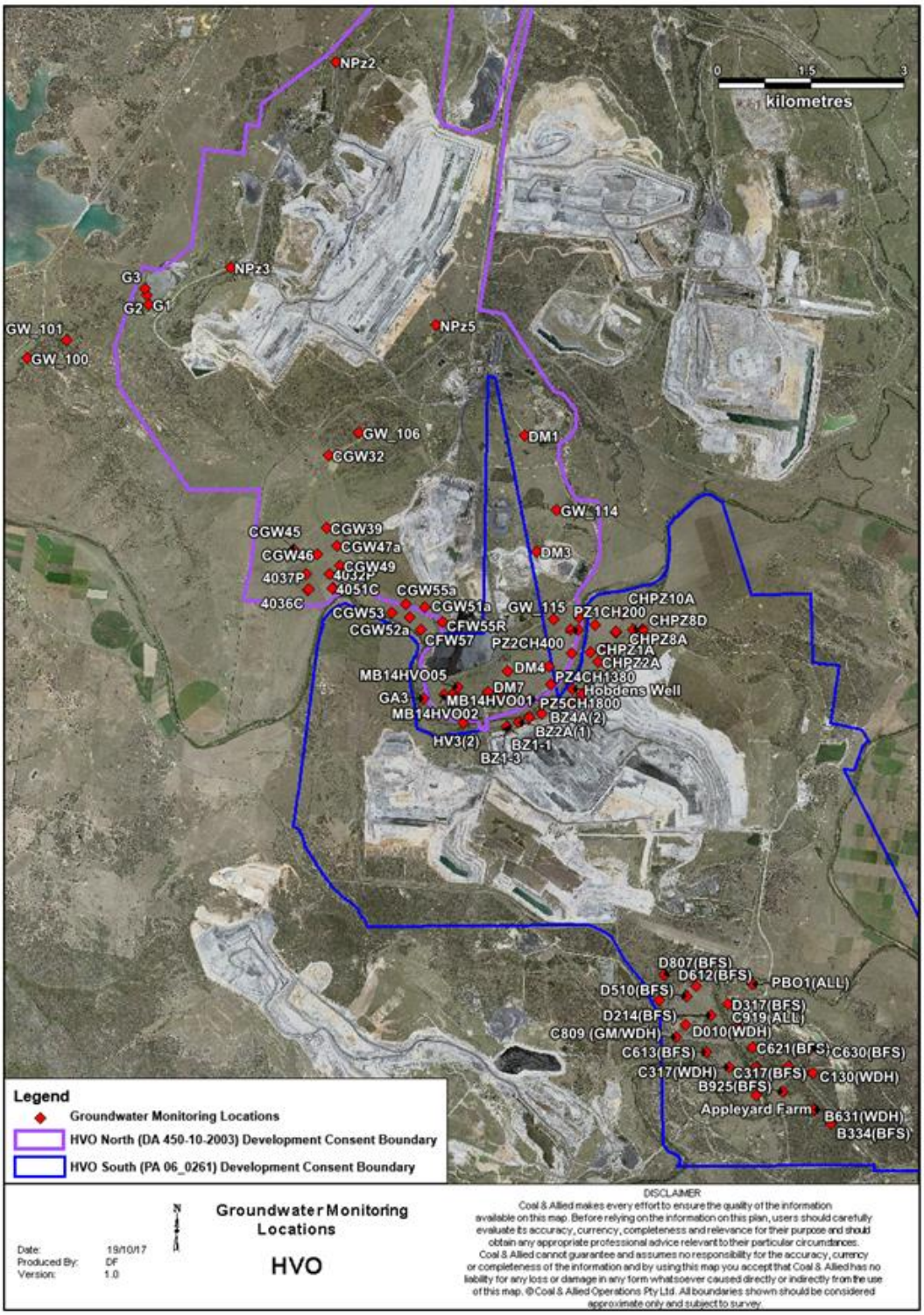

Figure 26: Groundwater Monitoring Locations at HVO

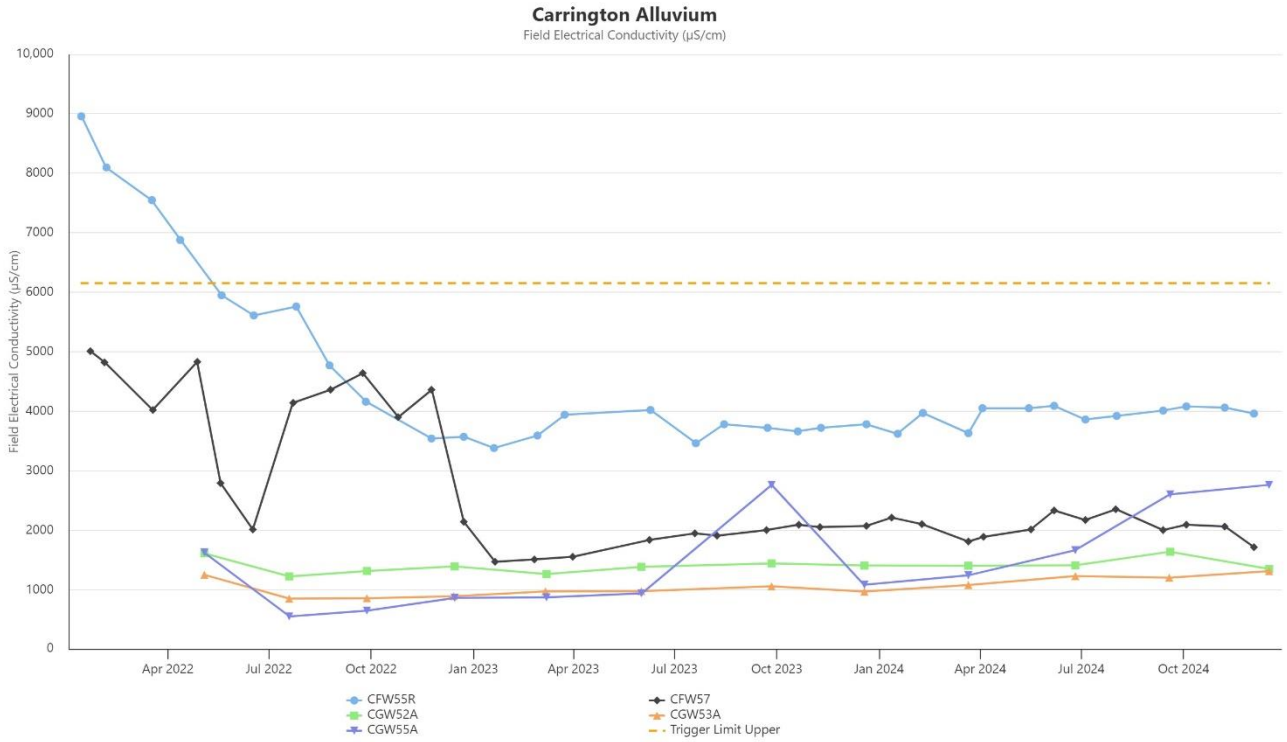

Figure 27 - Carrington Alluvium Electrical Conductivity Trend - Q4 2024

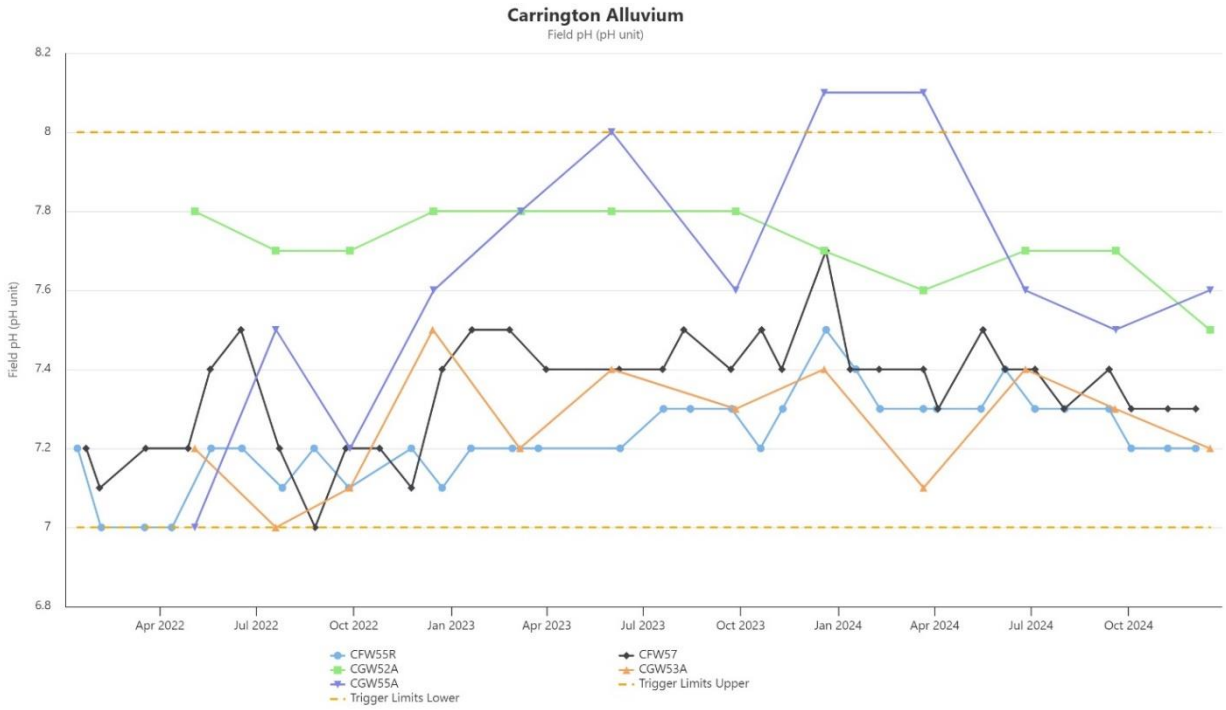

Figure 28 Carrington Alluvium Field pH Trend - Q4 2024

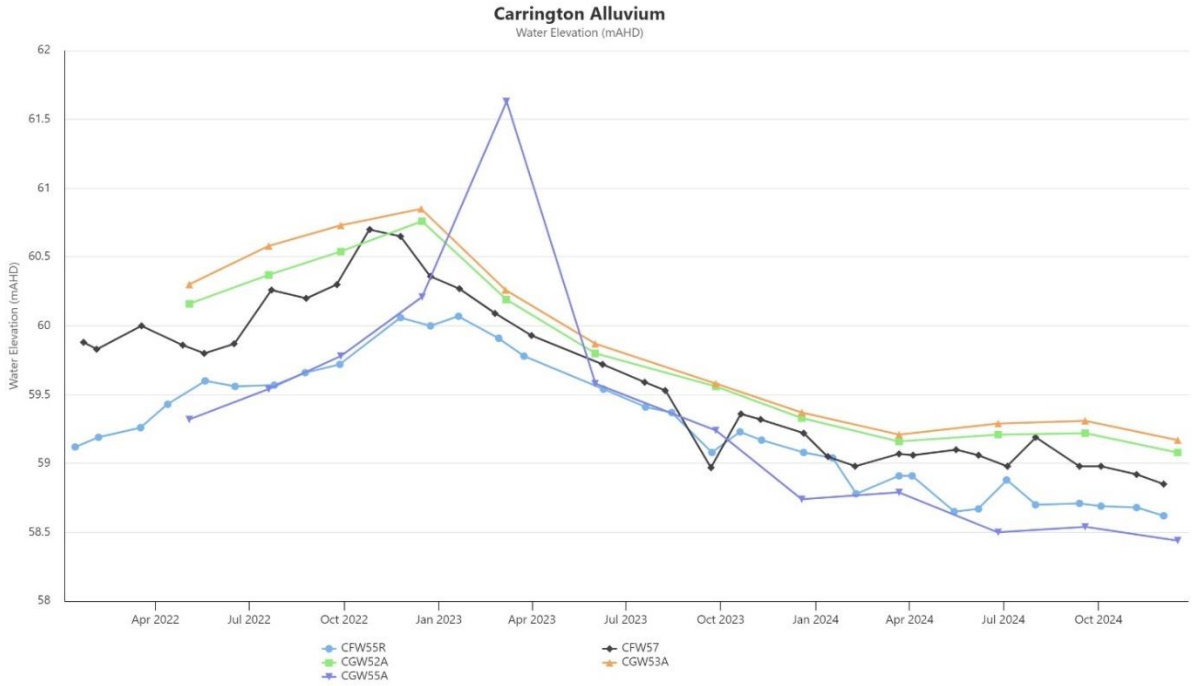

Figure 29 - Carrington Alluvium Water Elevation Trend - Q4 2024

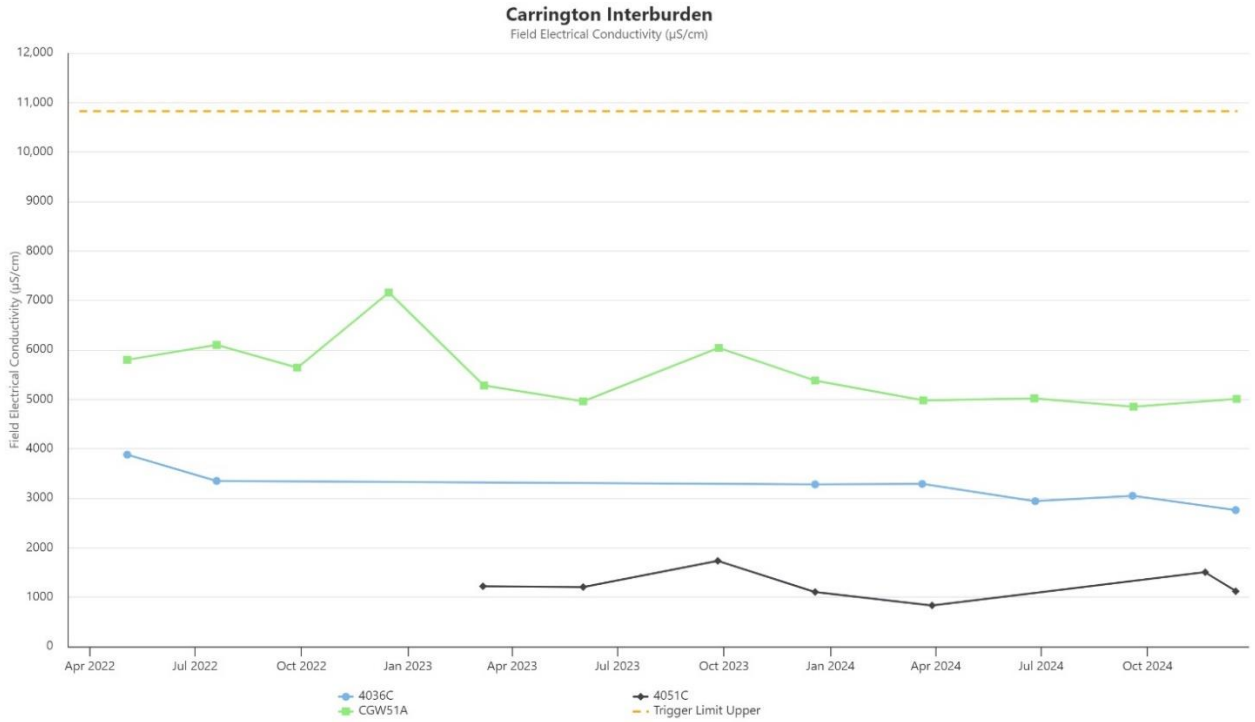

Figure 30 - Carrington Interburden Electrical Conductivity Trend - Q4 2024

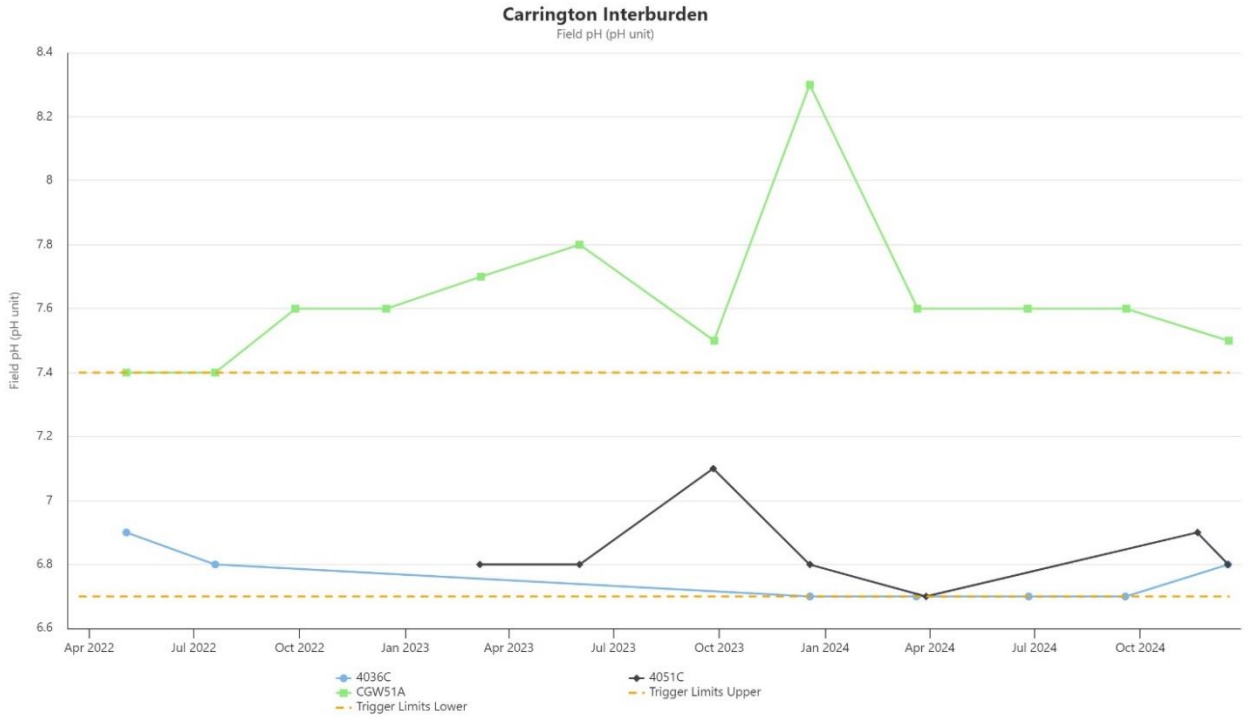

Figure 31 - Carrington Interburden Field pH Trend - Q4 2024

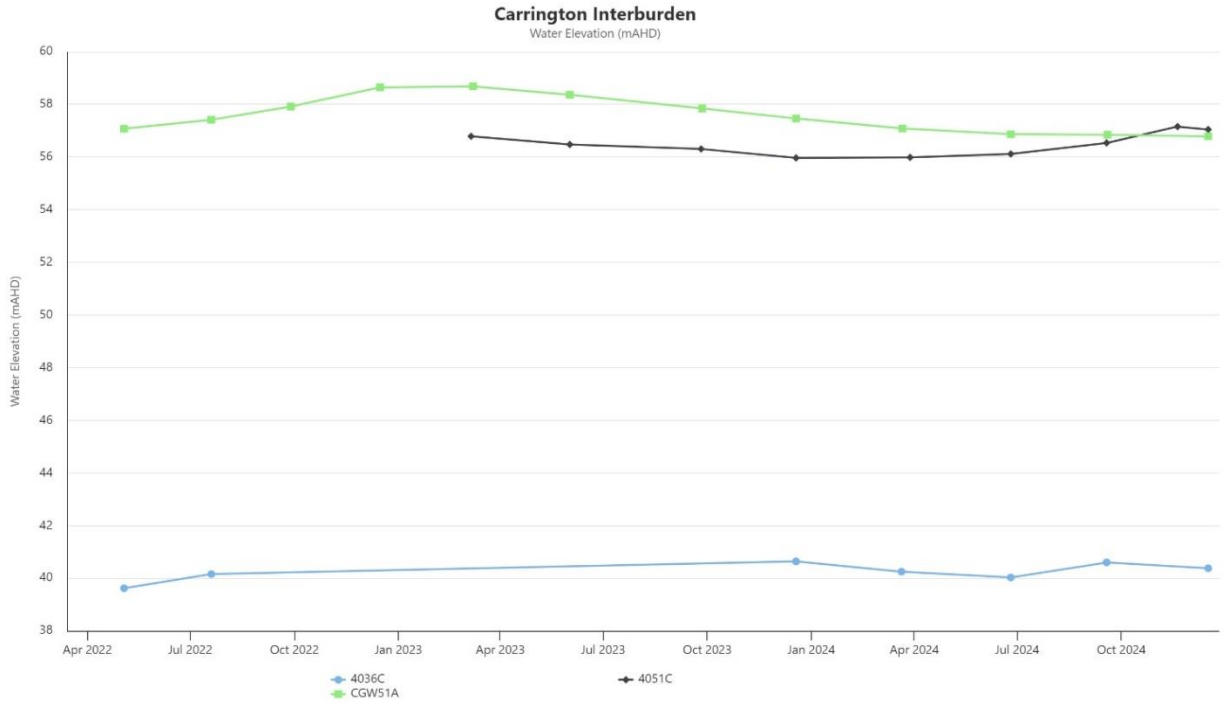

Figure 32 - Carrington Interburden Water Elevation Trend - Q4 2024

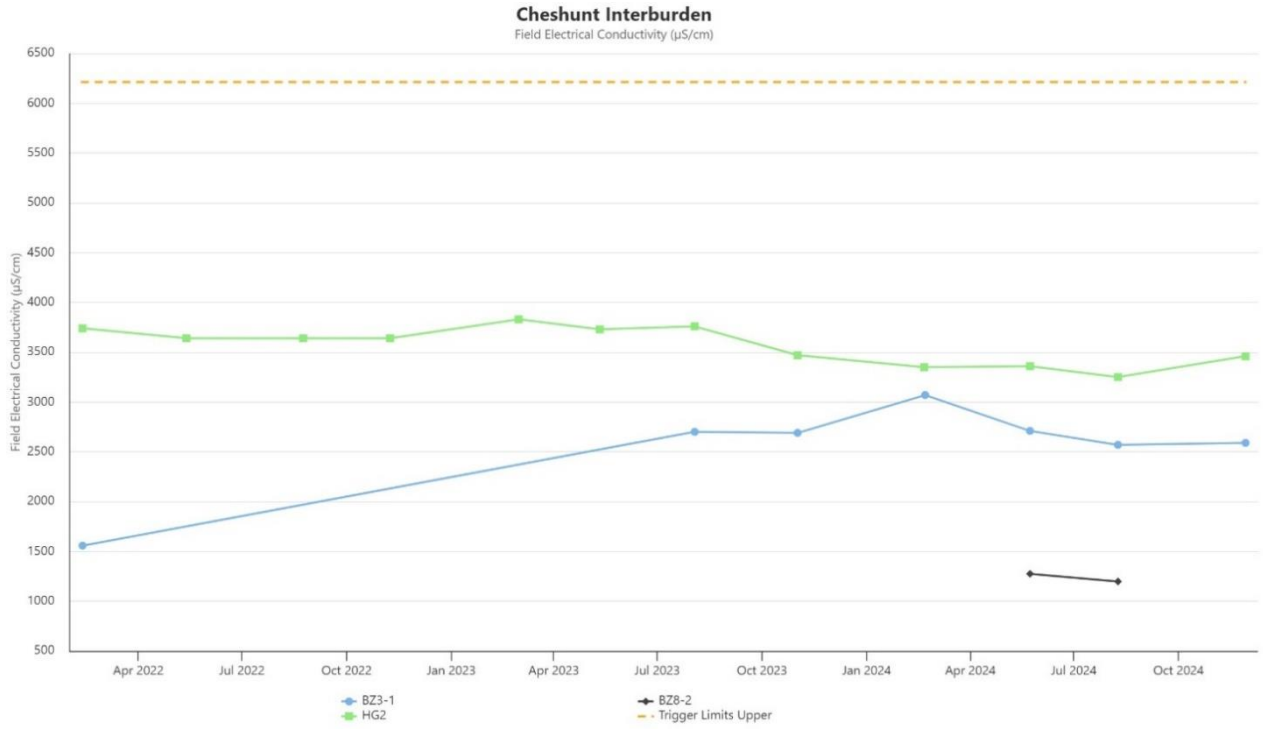

Figure 33 - Cheshunt Interburden Electrical Conductivity Trend - Q4 2024

Figure 34 - Cheshunt Interburden Field pH Trend - Q4 2024

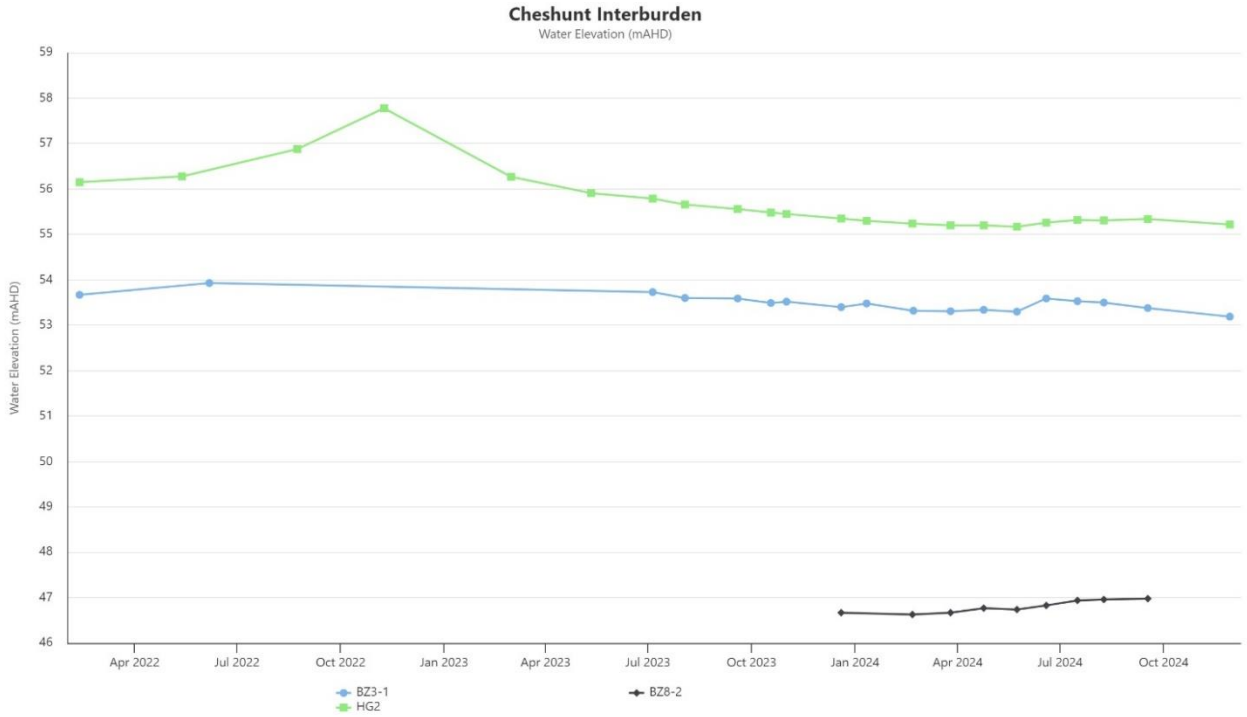

Figure 35 - Cheshunt Interburden Water Elevation Trend - Q4 2024

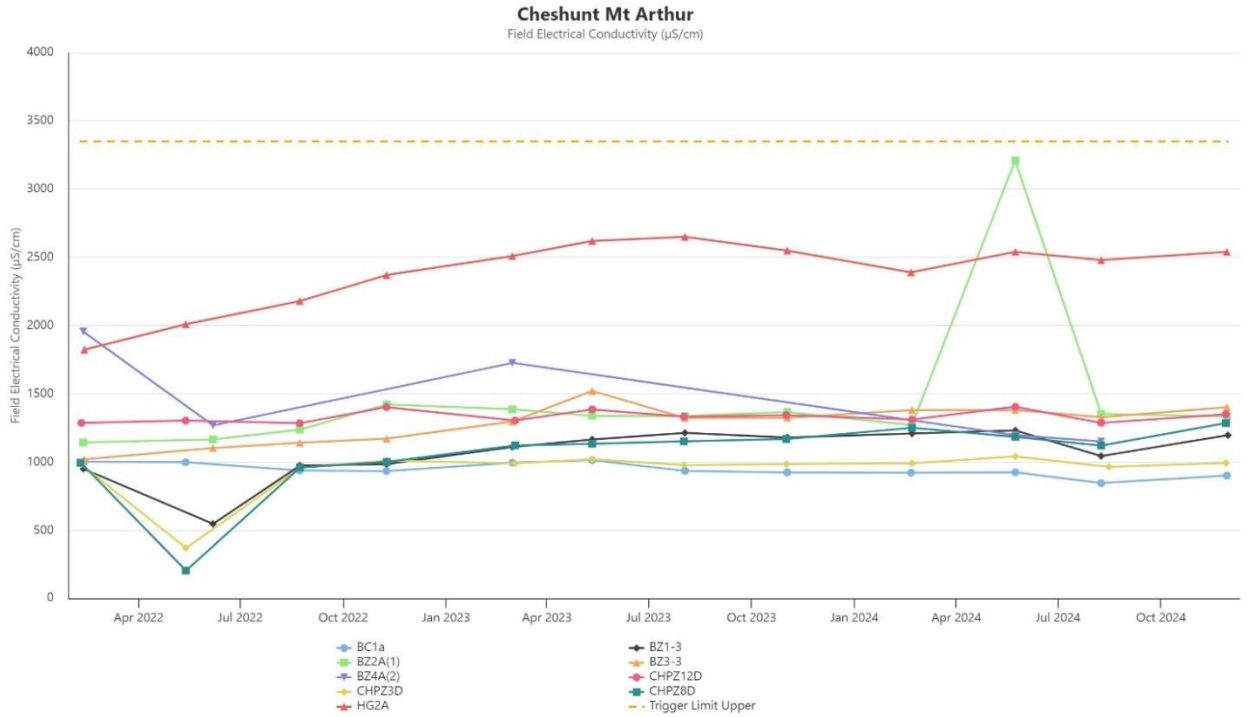

Figure 36 – Cheshunt Mt Arthur Electrical Conductivity Trend – Q4 2024

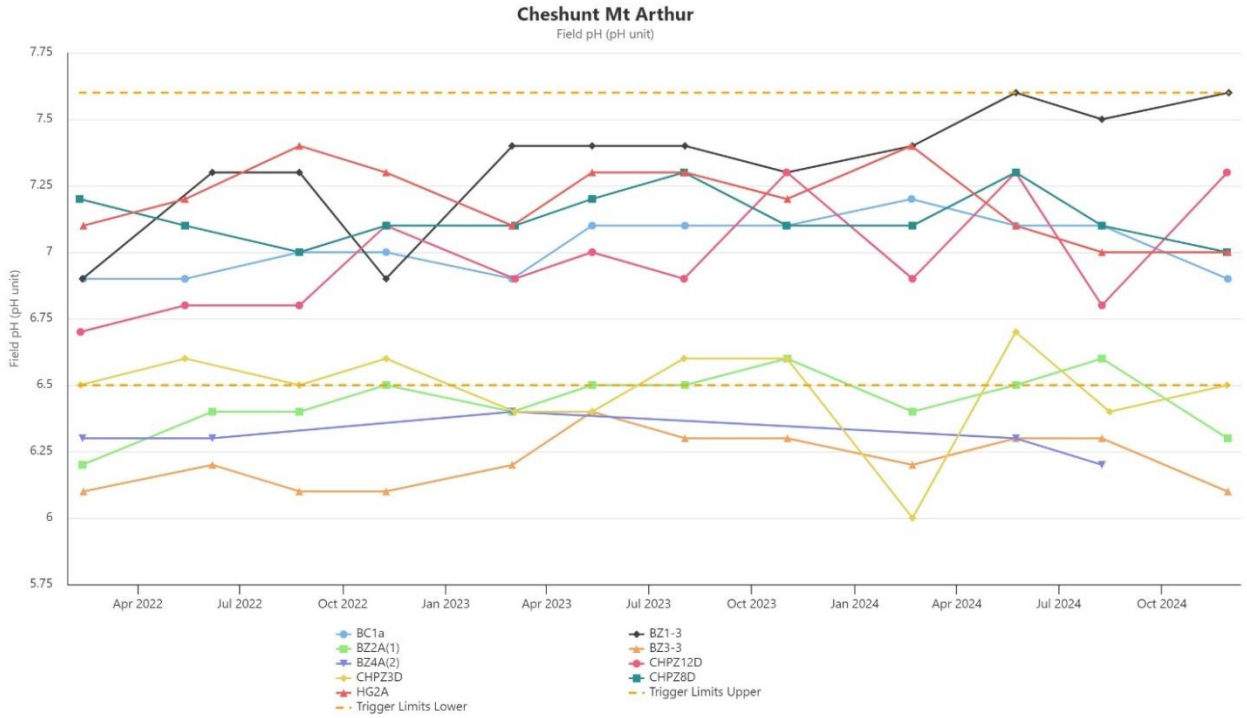

Figure - 37 Cheshunt Mt Arthur Field pH Trend - Q4 2024

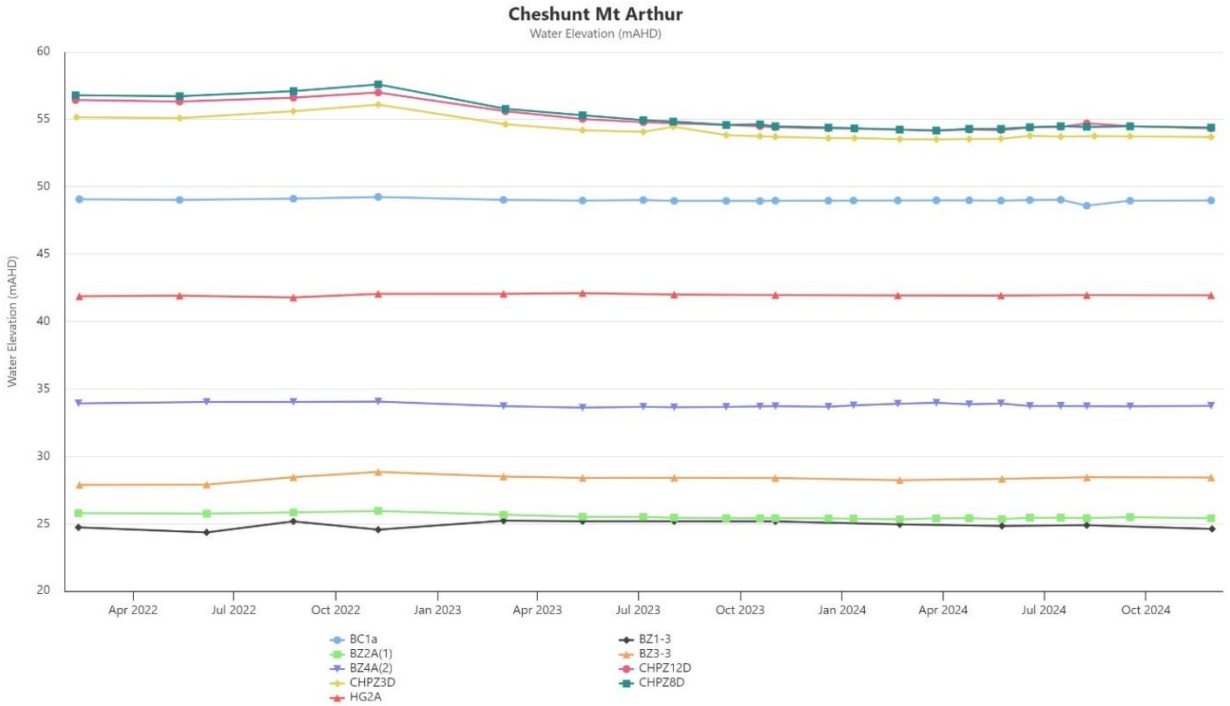

Figure 38 - Cheshunt Mt Arthur Water Elevation Trend - Q4 2024

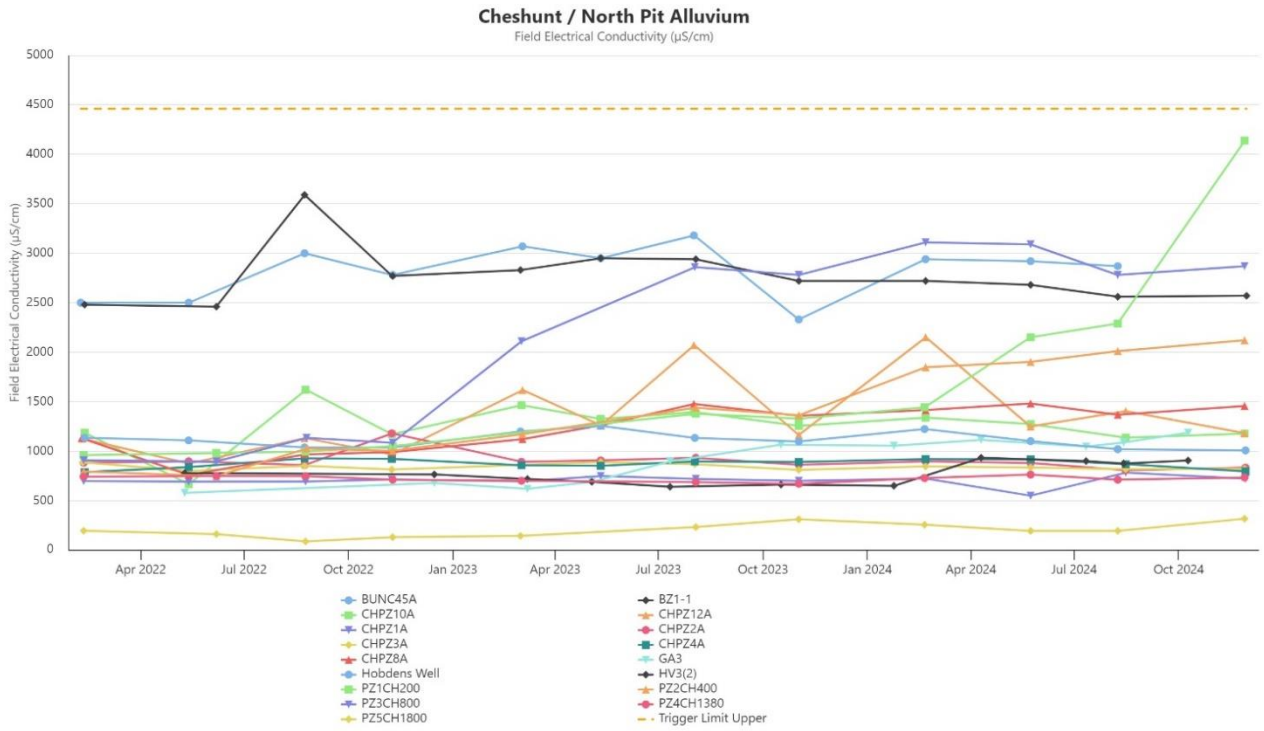

Figure 39 - Cheshunt North Pit Alluvium Electrical Conductivity Trend – Q4 2024

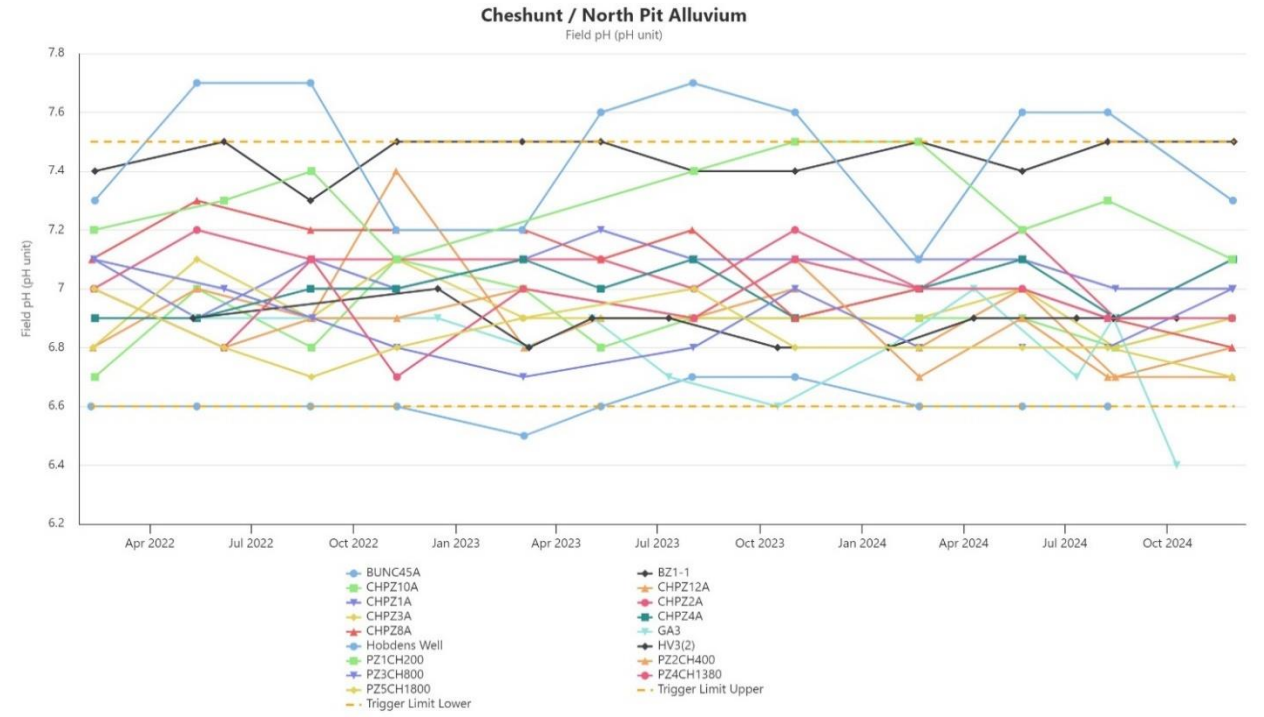

Figure 40 - Cheshunt North Alluvium Field pH Trend – Q4 2024

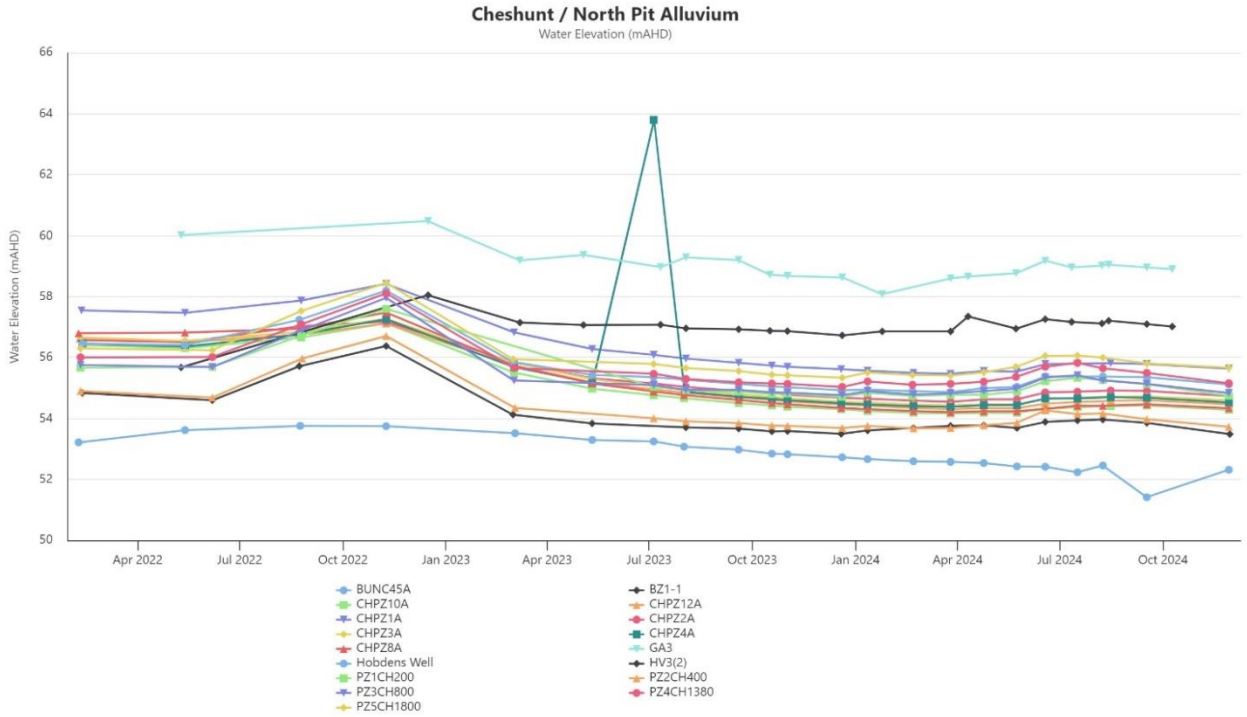

Figure 41 - Cheshunt North Pit Alluvium Water Elevation Trend - Q4 2024

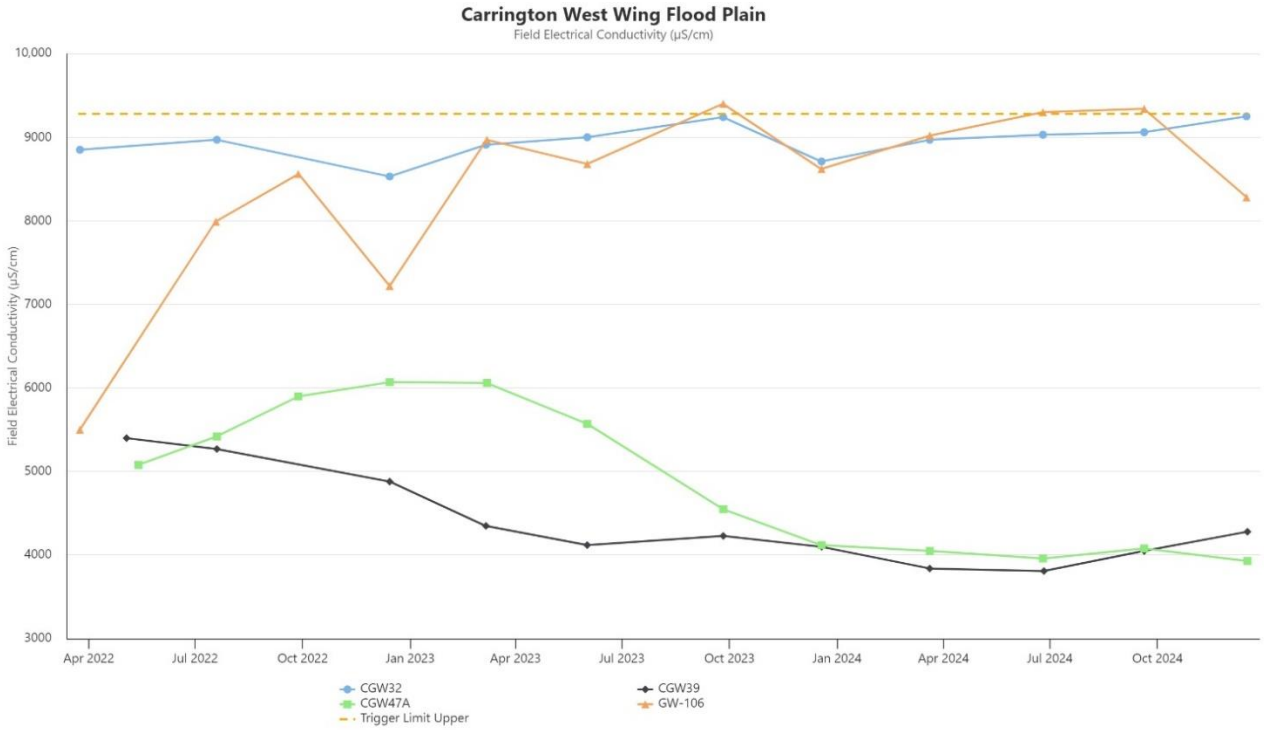

Figure 42 - Carrington West Wing Flood Plain Electrical Conductivity Trend - Q4 2024

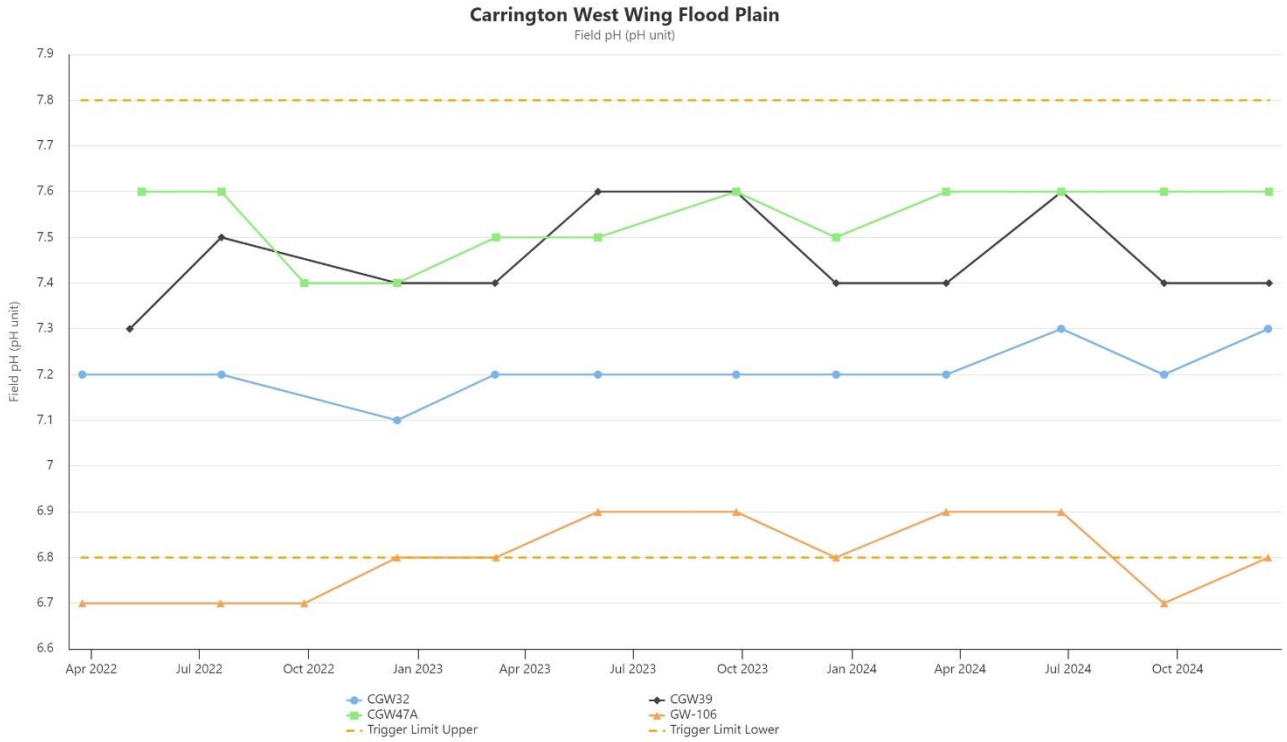

Figure 43 - Carrington West Wing Flood Plain pH Trend - Q4 2024

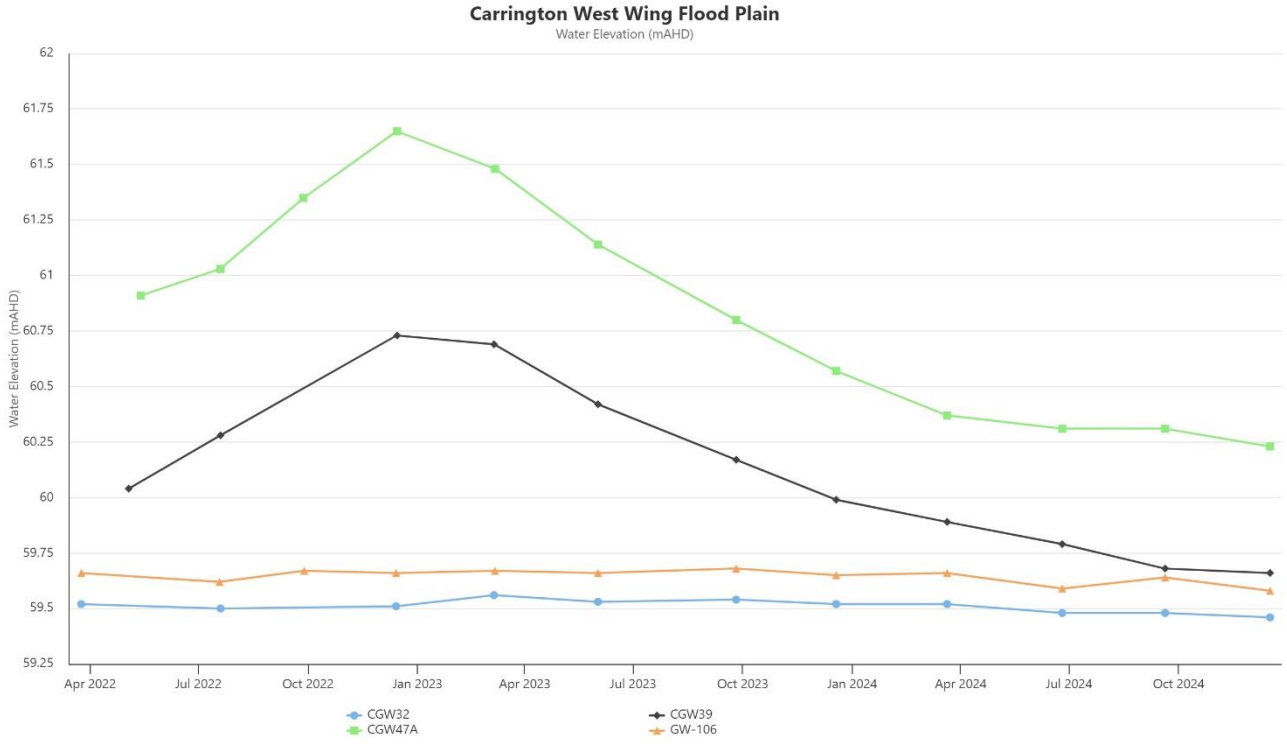

Figure 44 - Carrington West Wing Flood Plain Water Elevation Trend - Q4 2024

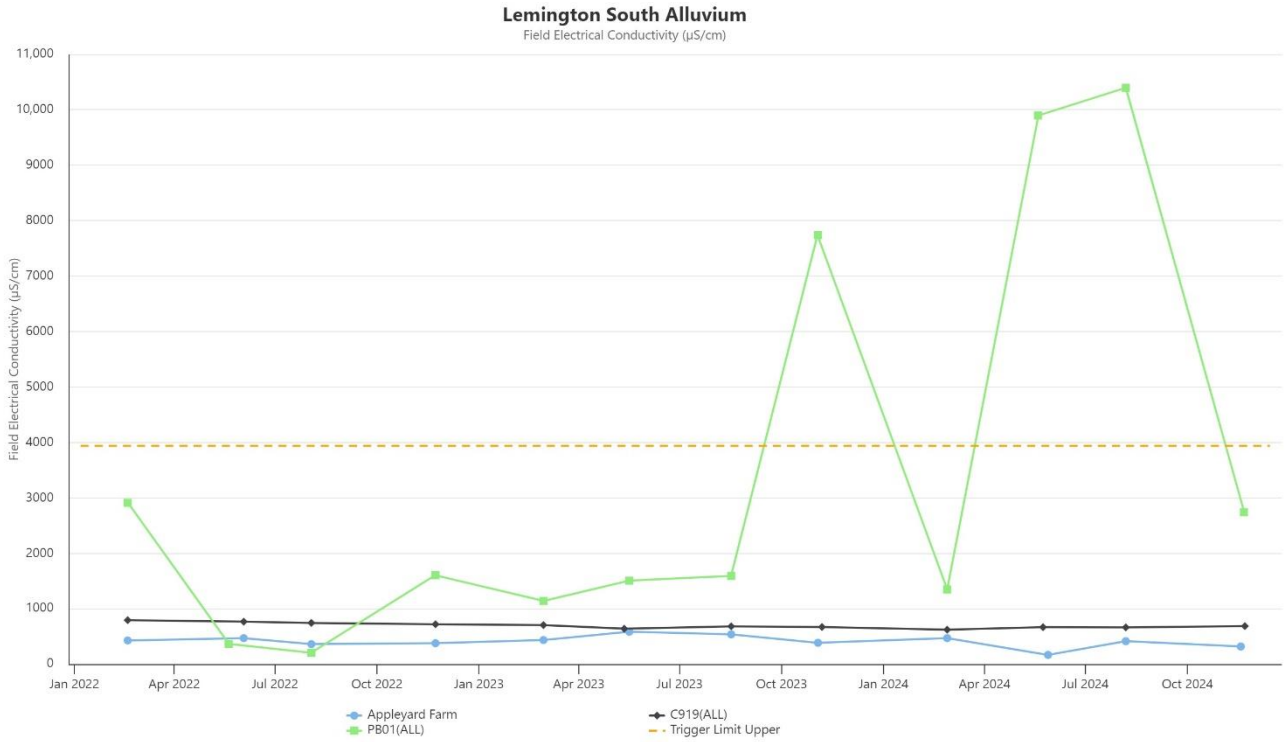

Figure 45 - Lemington South Alluvium Electrical Conductivity Trend - Q4 2024

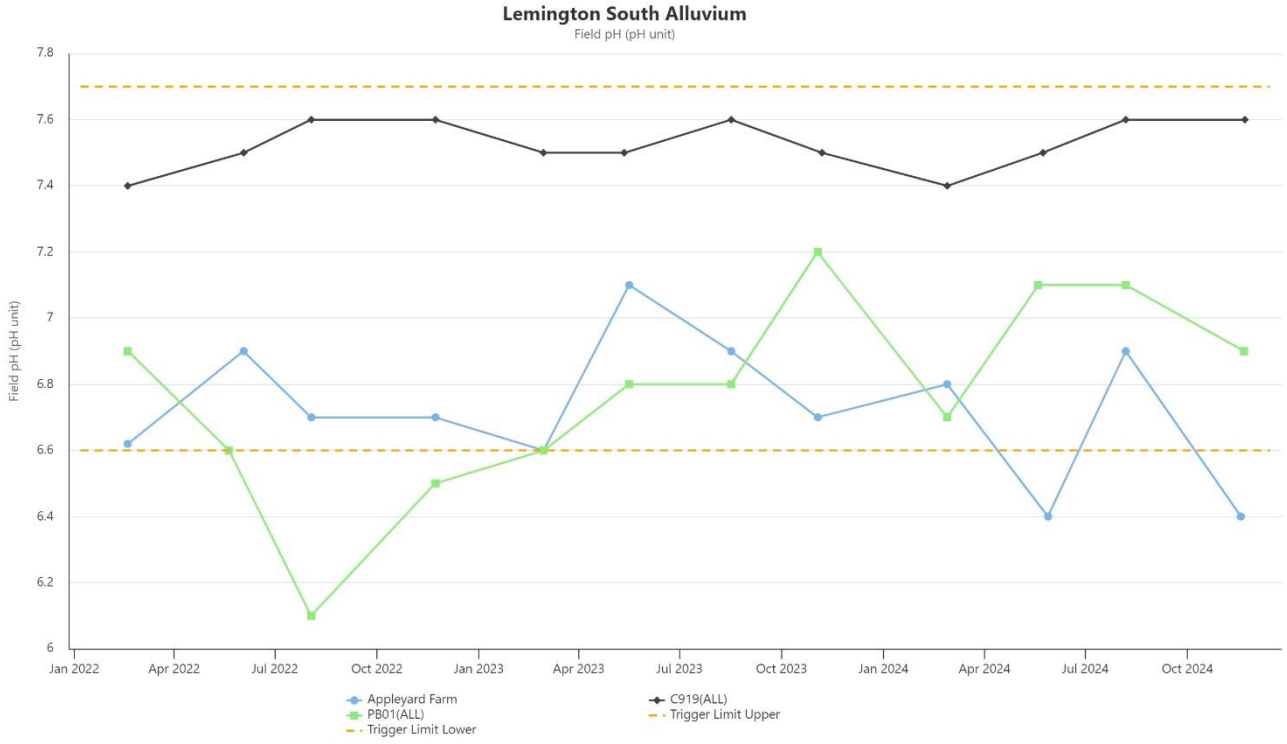

Figure 46 - Lemington South Alluvium Field pH Trend - Q4 2024

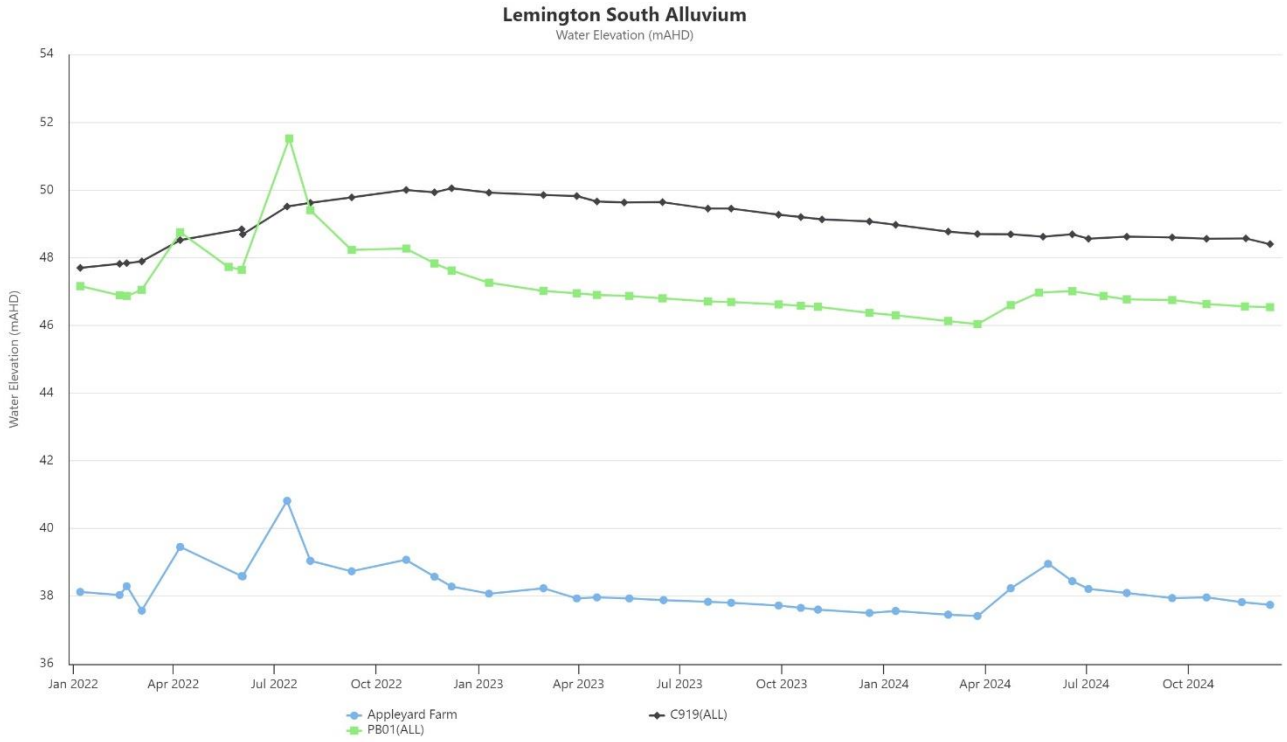

Figure 47 - Lemington South Alluvium Water Elevation Trend - Q4 2024

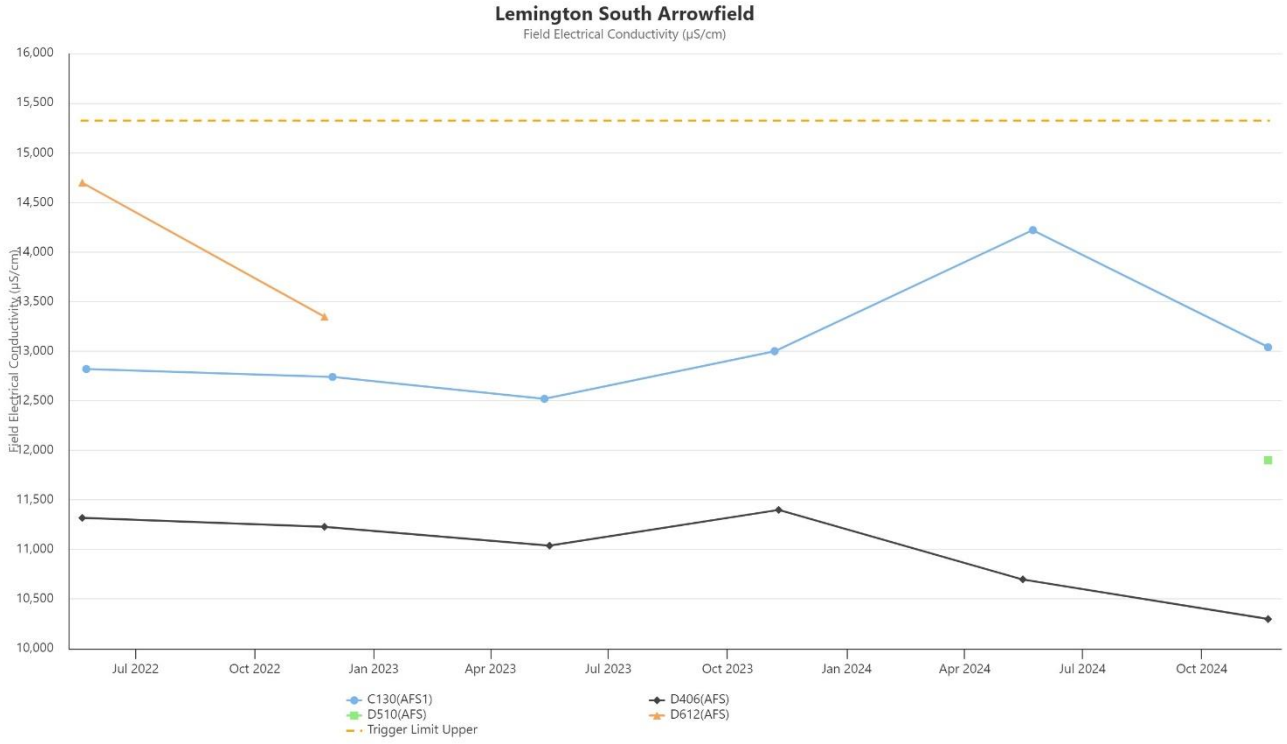

Figure 48 - Lemington South Arrowfield Electrical Conductivity Trend - Q4 2024

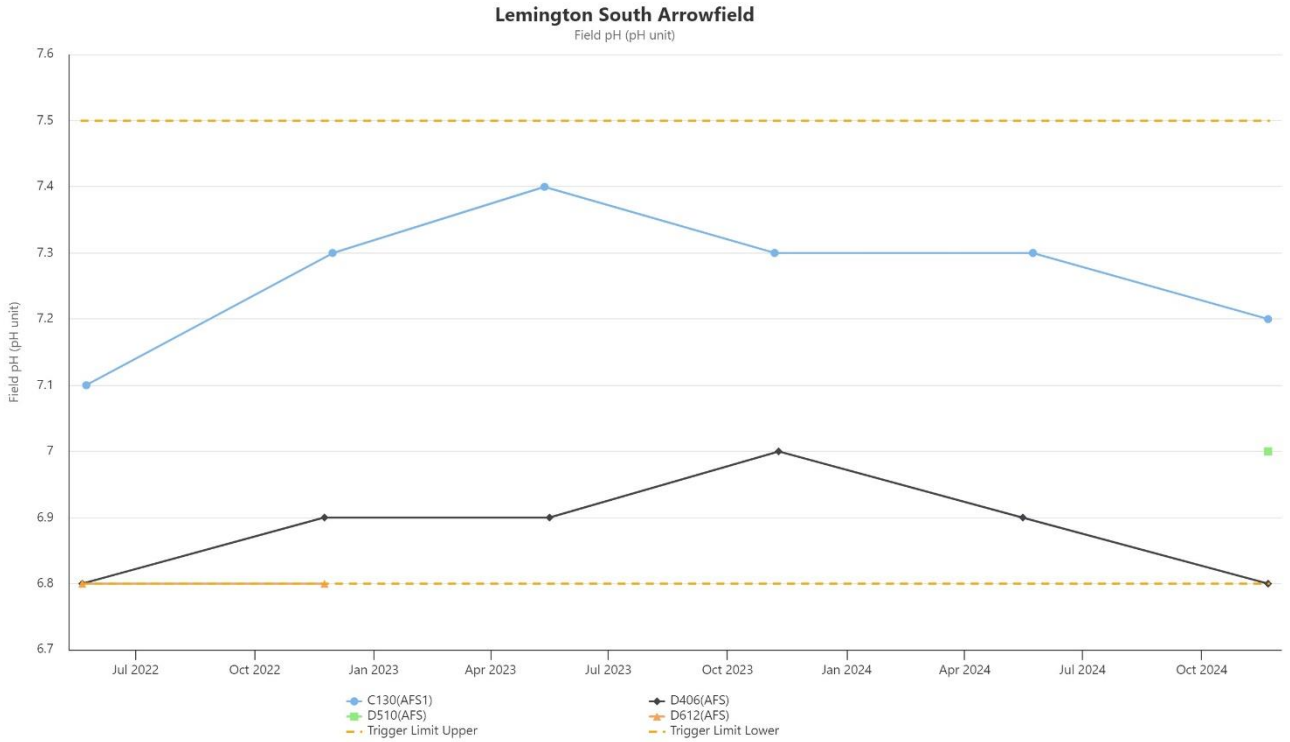

Figure 49 - Lemington South Arrowfield Field pH Trend - Q4 2024

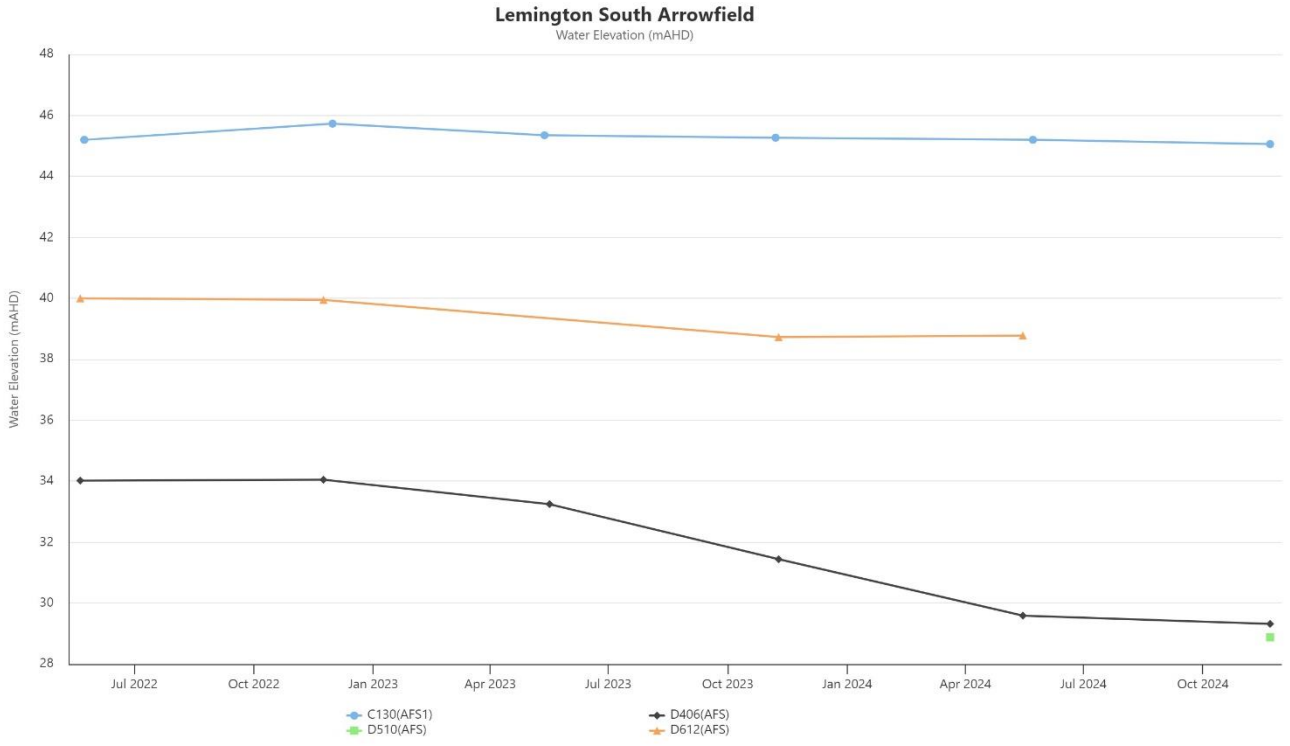

Figure 50 - Lemington South Arrowfield Water Elevation Trend – Q4 2024

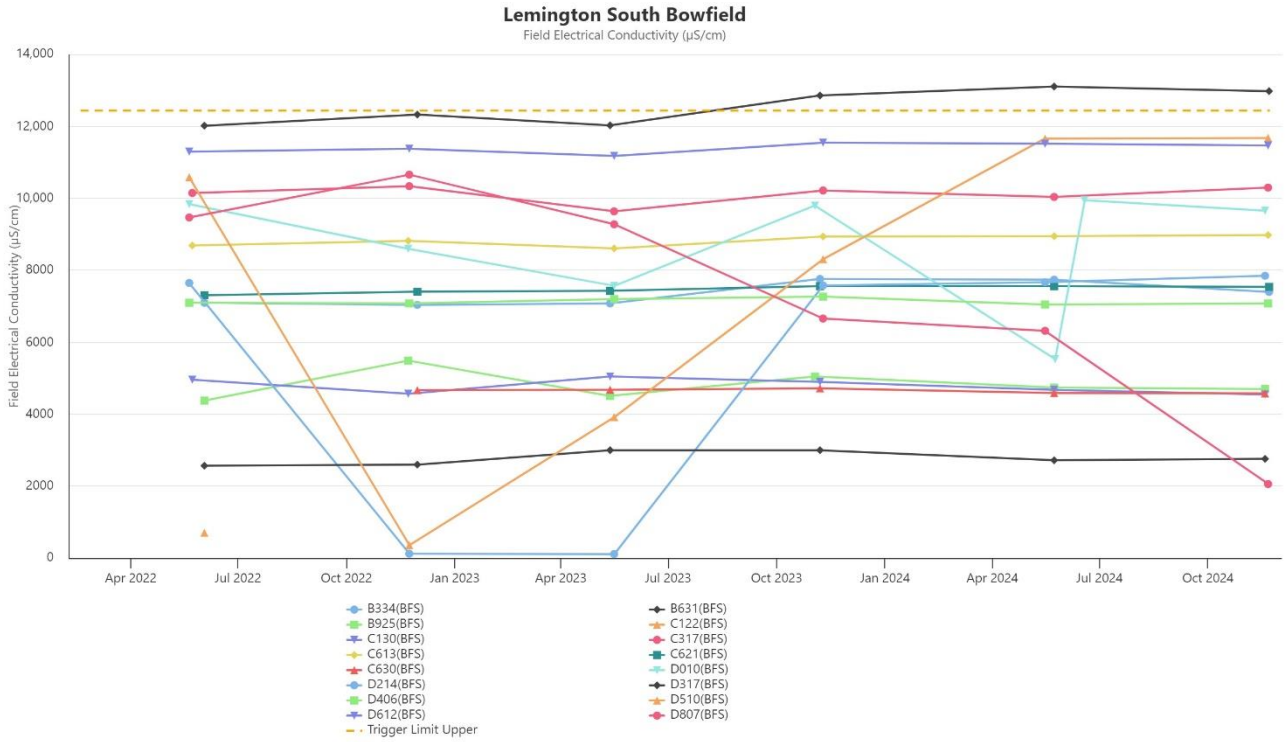

Figure 51 - Lemington South Bowfield Electrical Conductivity Trend - Q4 2024

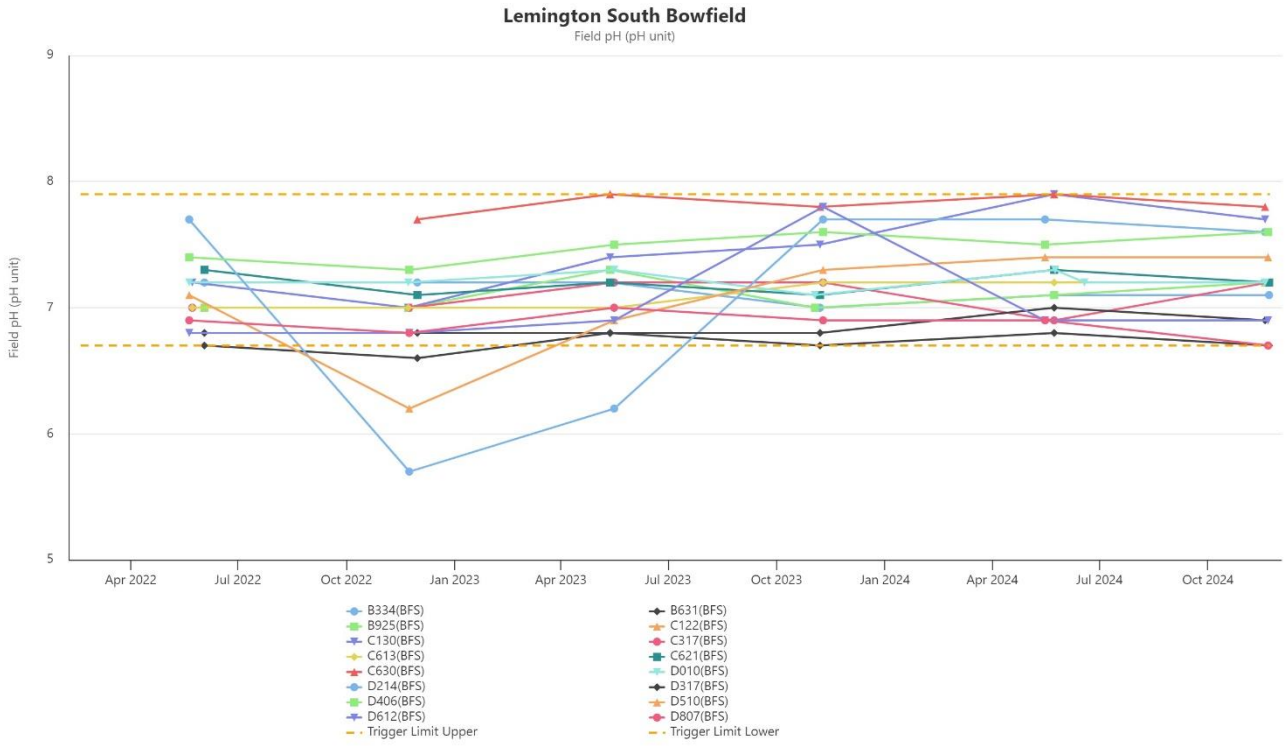

Figure 52 - Lemington South Bowfield pH Trend - Q4 2024

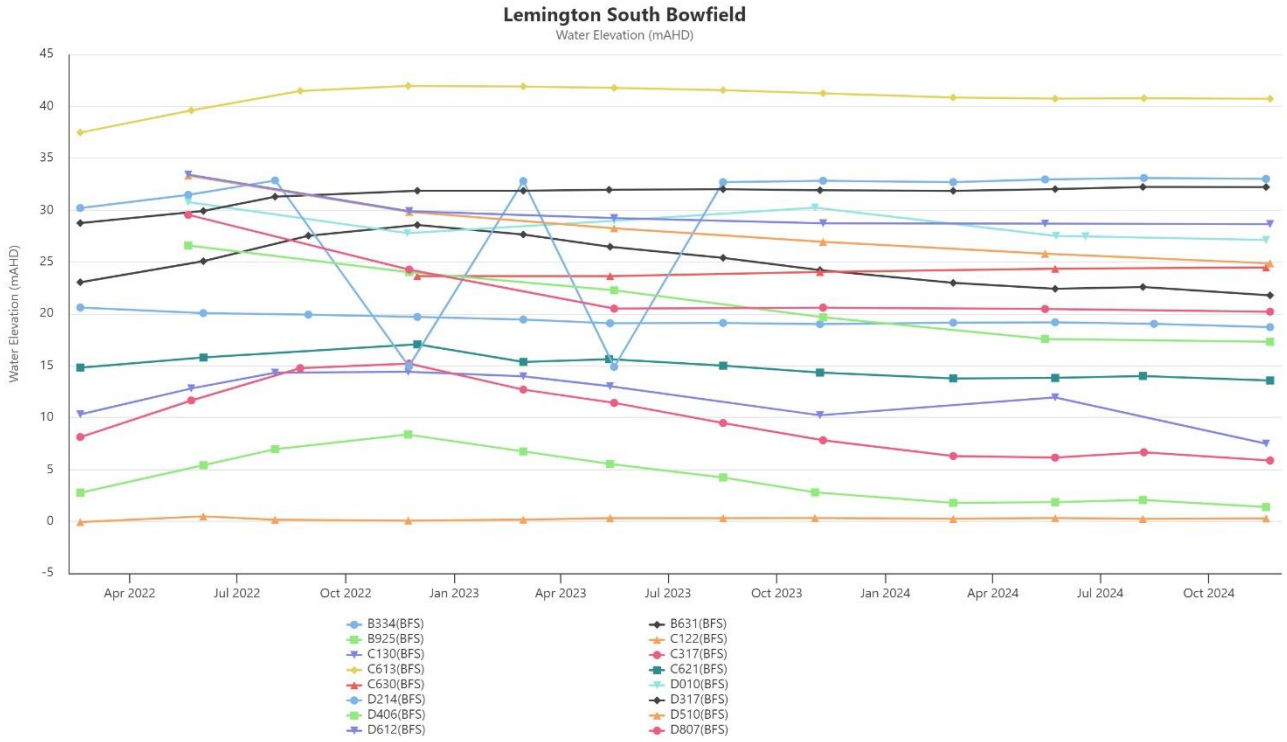

Figure 53 - Lemington South Bowfield Water Elevation Trend - Q4 2024

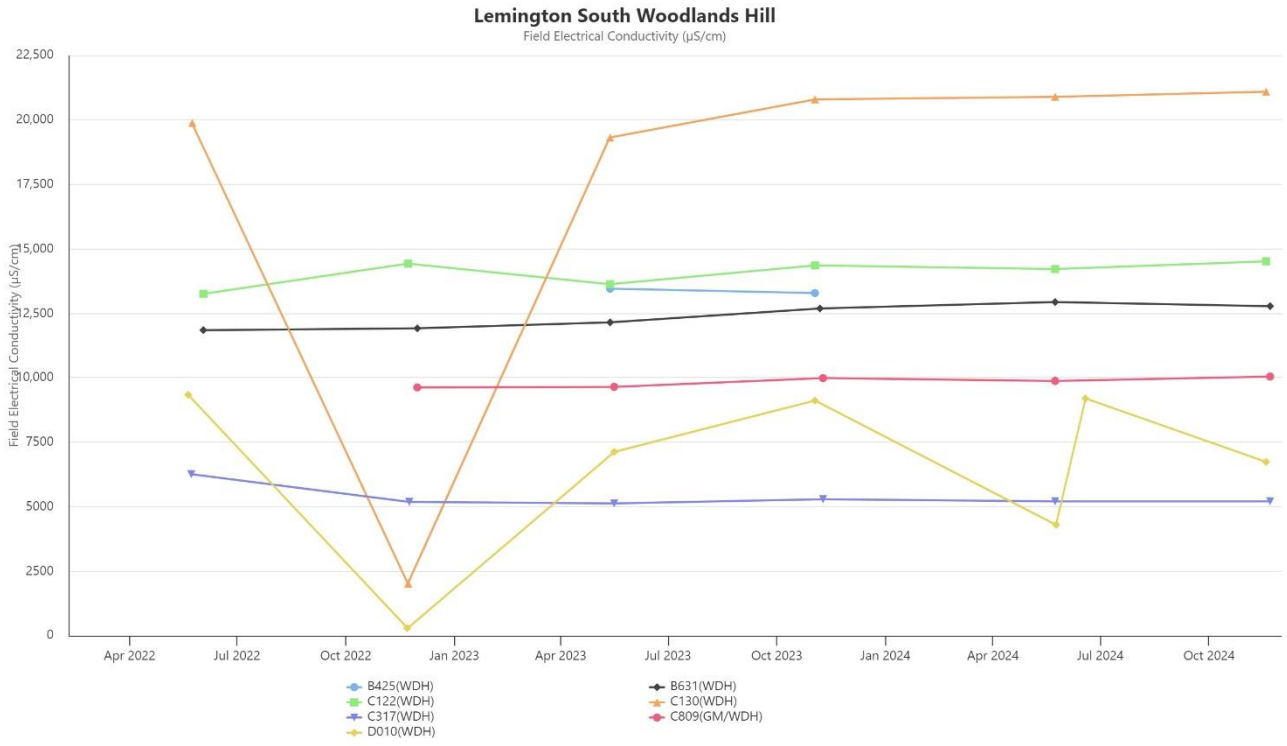

Figure 54 - Lemington South Woodlands Hill Electrical Conductivity Trend - Q4 2024

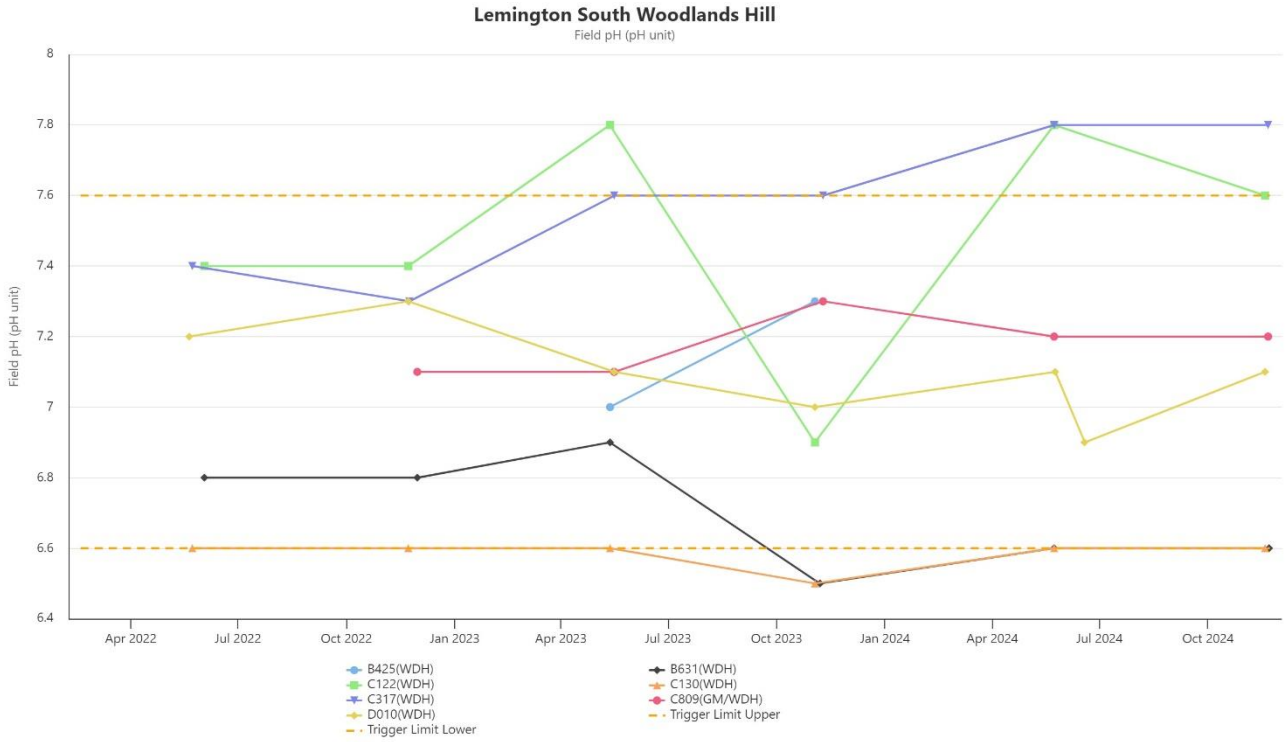

Figure 55 - Lemington South Woodlands Hill Field pH Trend - Q4 2024

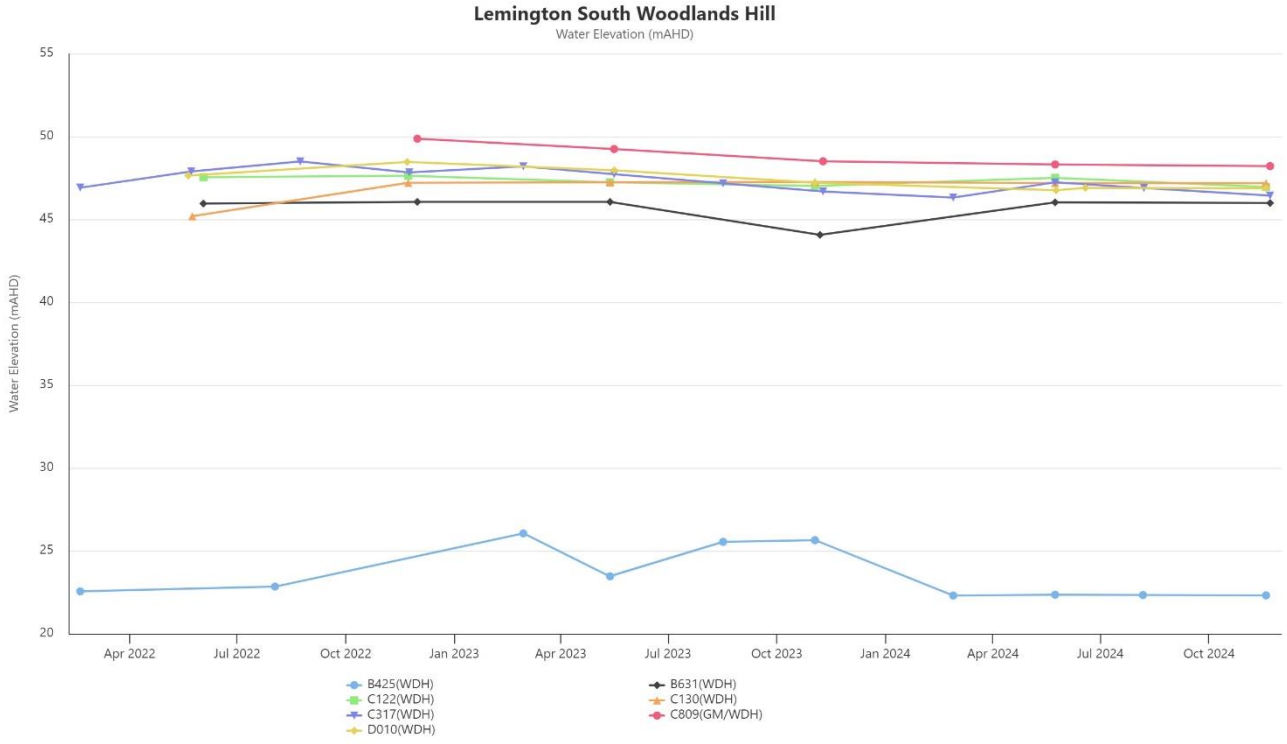

Figure 56 - Lemington South Woodlands Hill Water Elevation Trend - Q4 2024

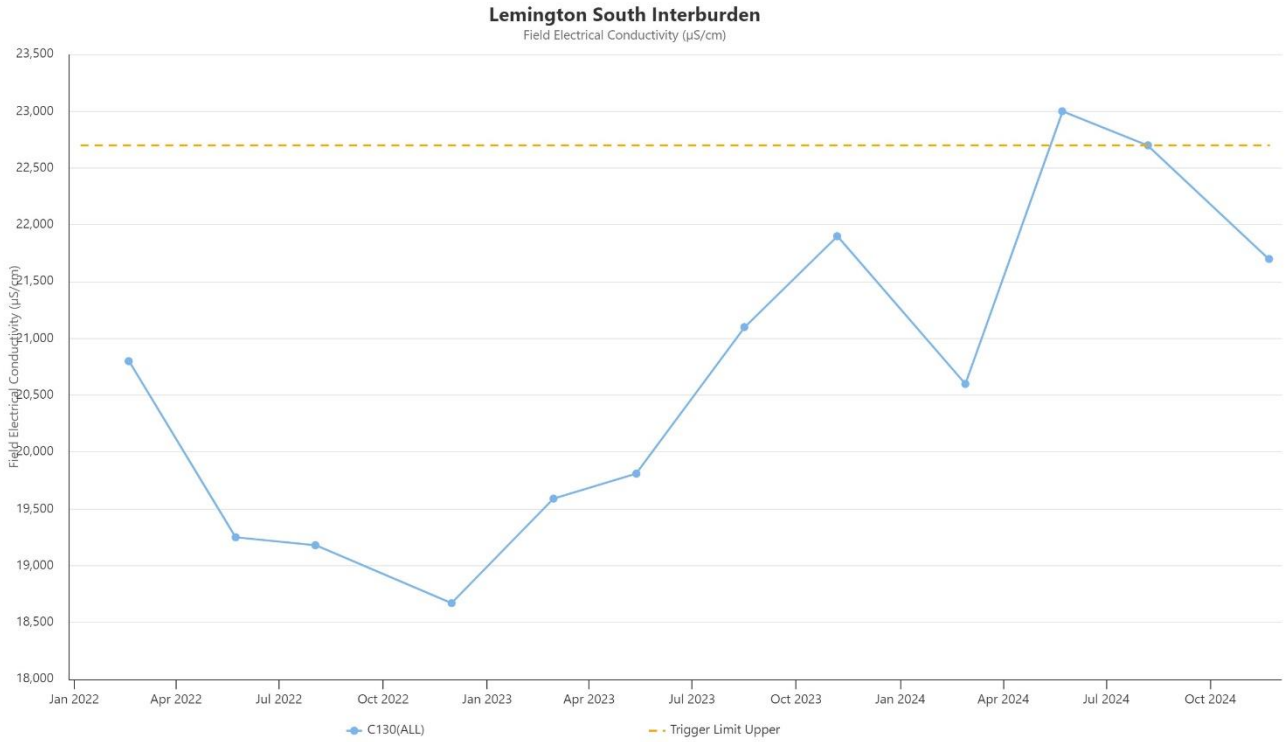

Figure 57 - Lemington South Interburden Electrical Conductivity Trend - Q4 2024

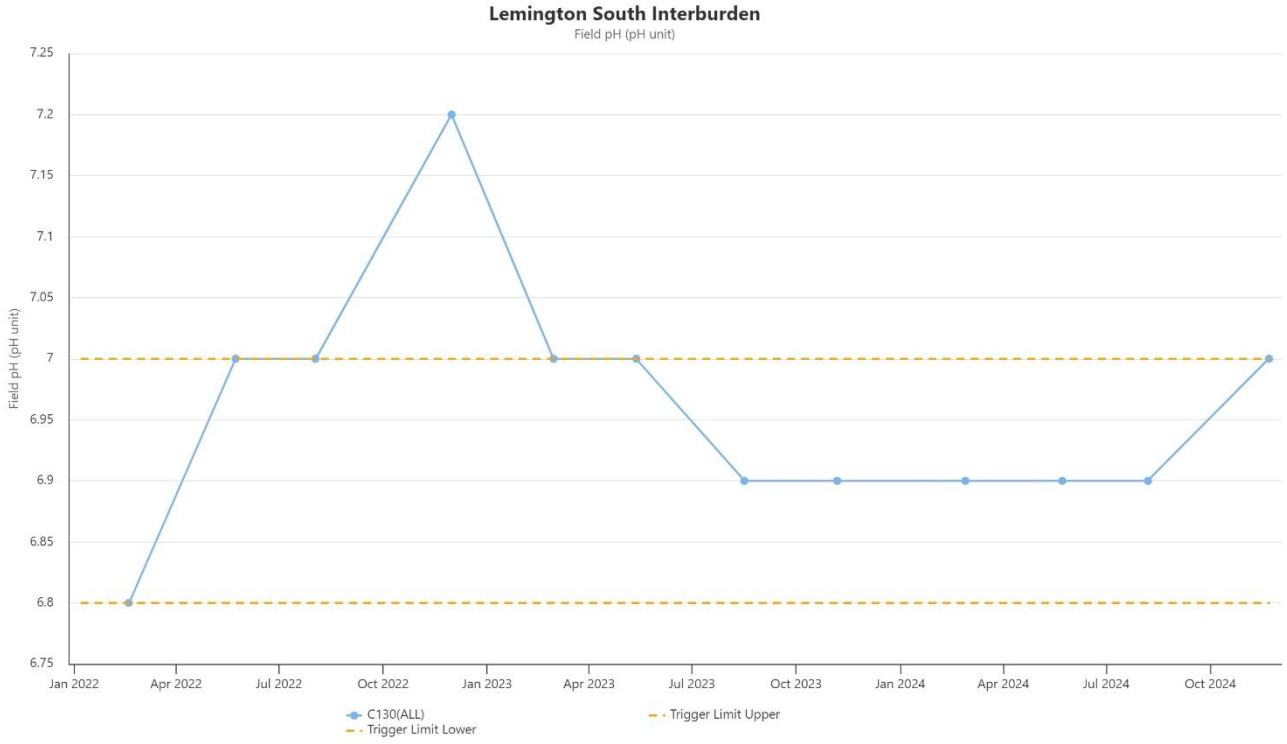

Figure 58 - Lemington South Interburden Field pH Trend - Q4 2024

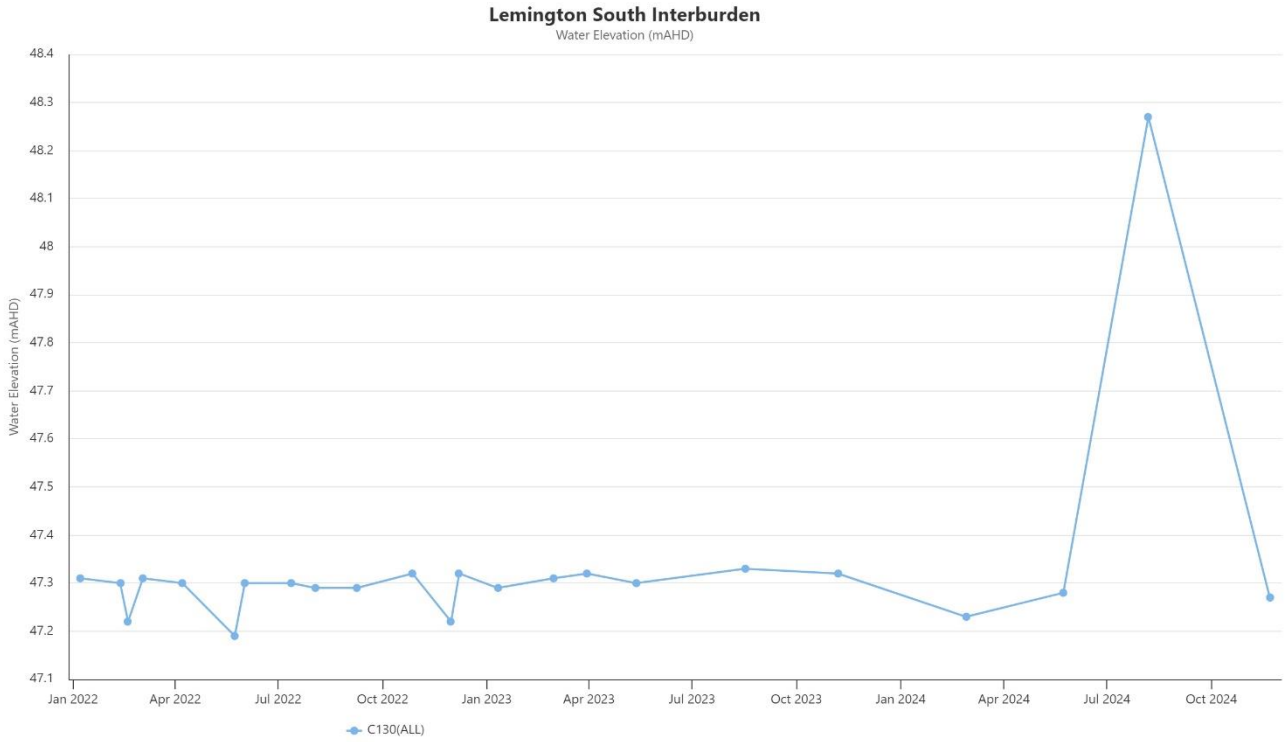

Figure 59 - Lemington South Interburden Water Elevation Trend - Q4 2024

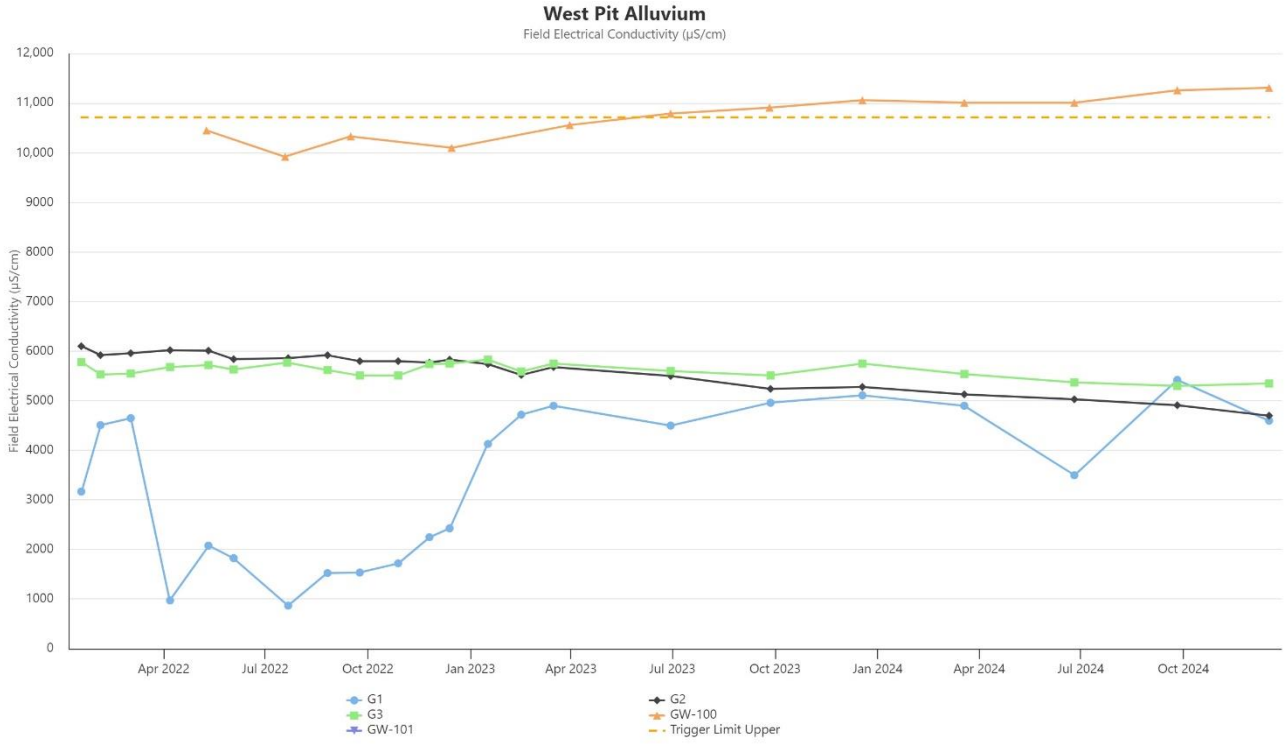

Figure 60 - West Pit Alluvium Electrical Conductivity Trend - Q4 2024

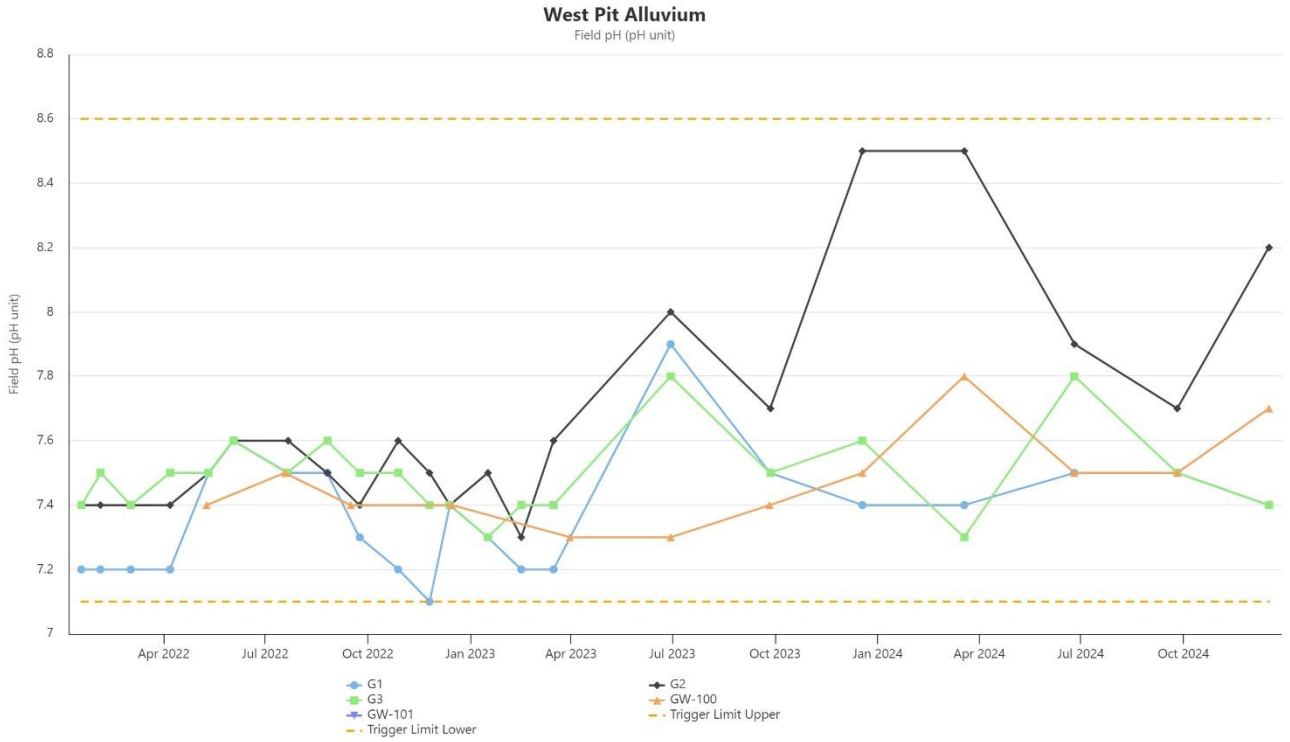

Figure 61 - West Pit Alluvium pH Trend - Q4 2024

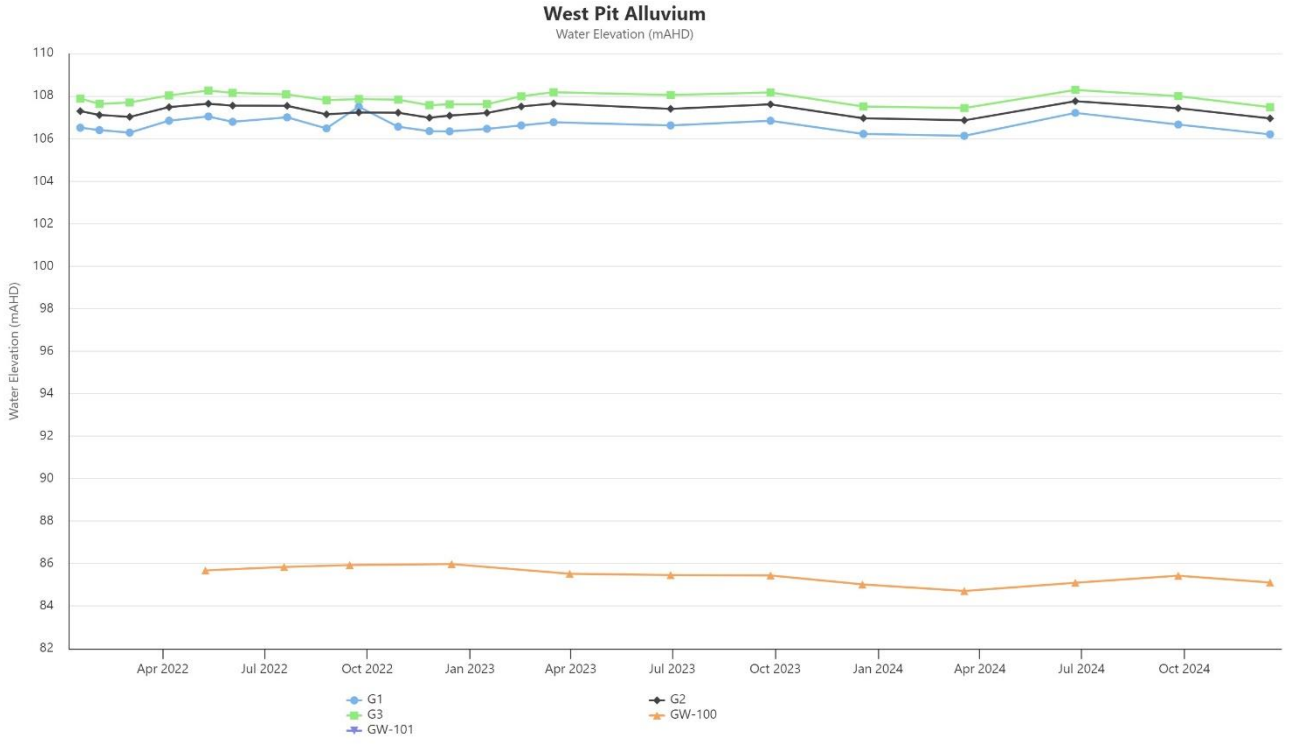

Figure 62 - West Pit Alluvium Water Elevation Trend - Q4 2024

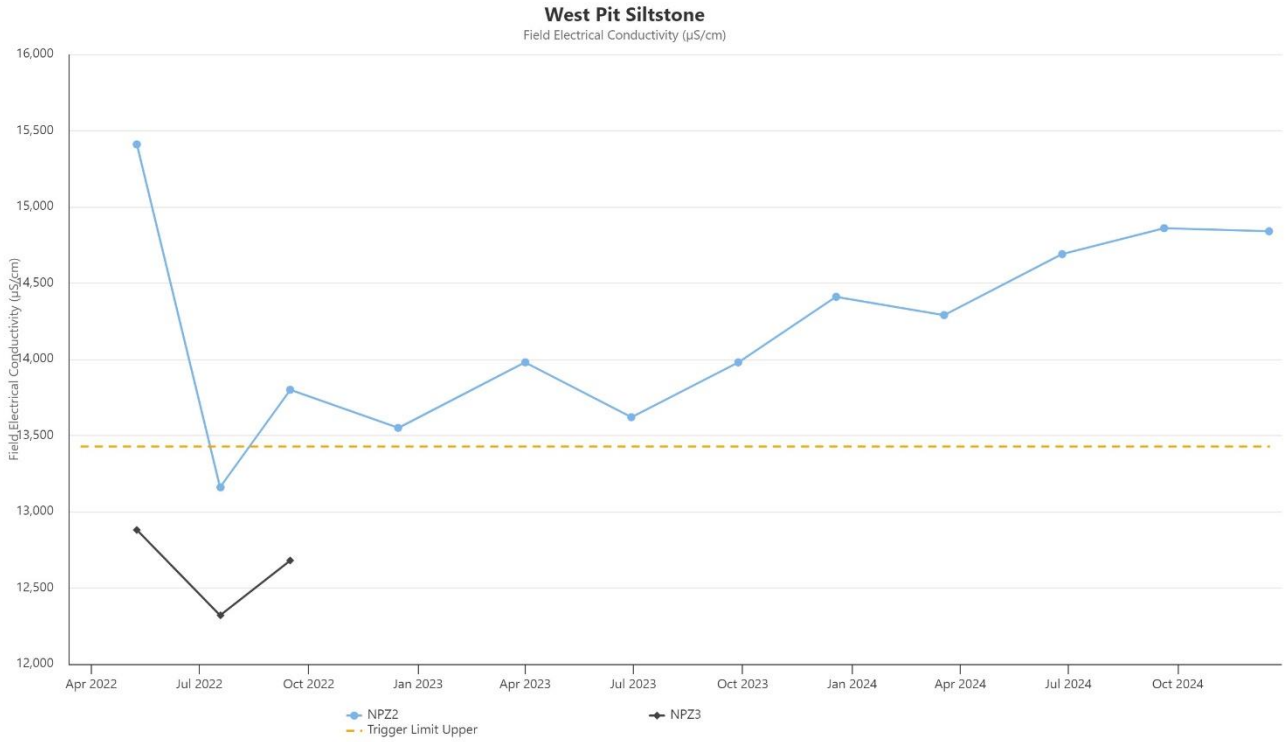

Figure 63 - West Pit Siltstone Electrical Conductivity Trend - Q4 2024

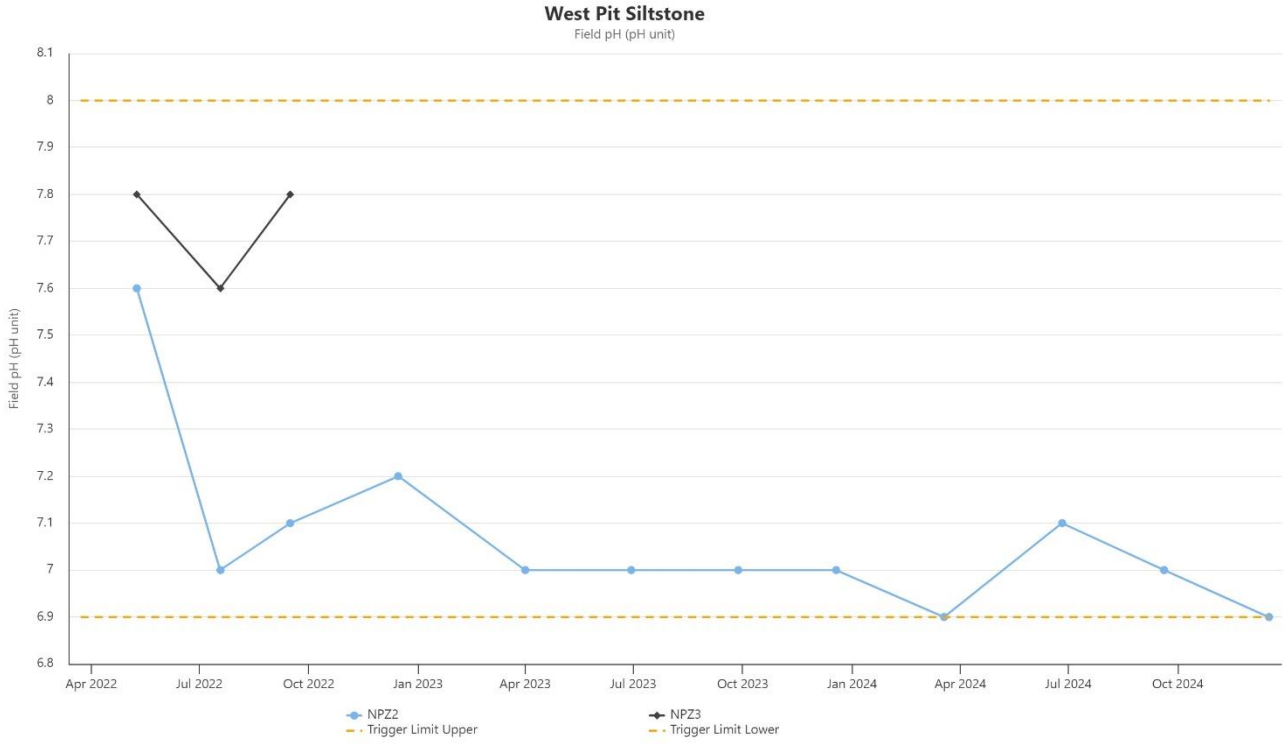

Figure 64 - West Pit Siltstone Field pH Trend - Q4 2024

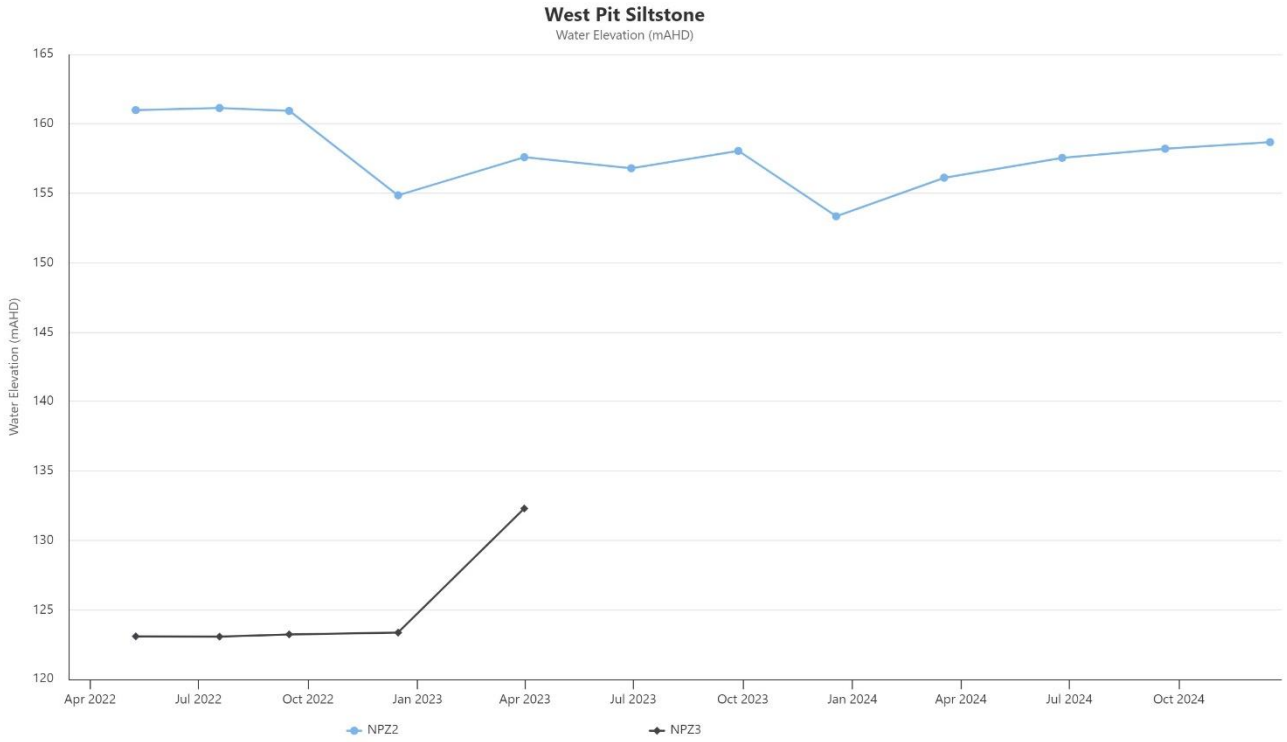

Figure 65 - West Pit Siltstone Water Elevation Trend- Q4 2024

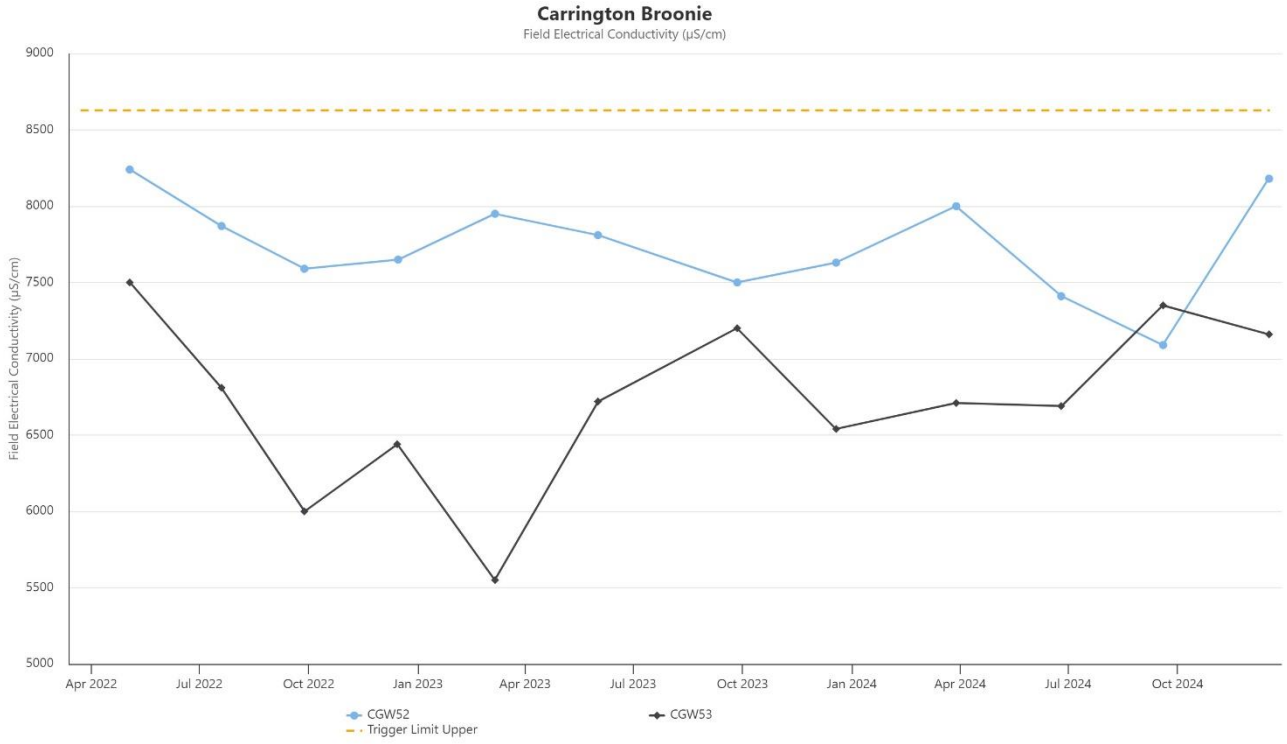

Figure 66 - Carrington Broonie Electrical Conductivity Trend - Q4 2024

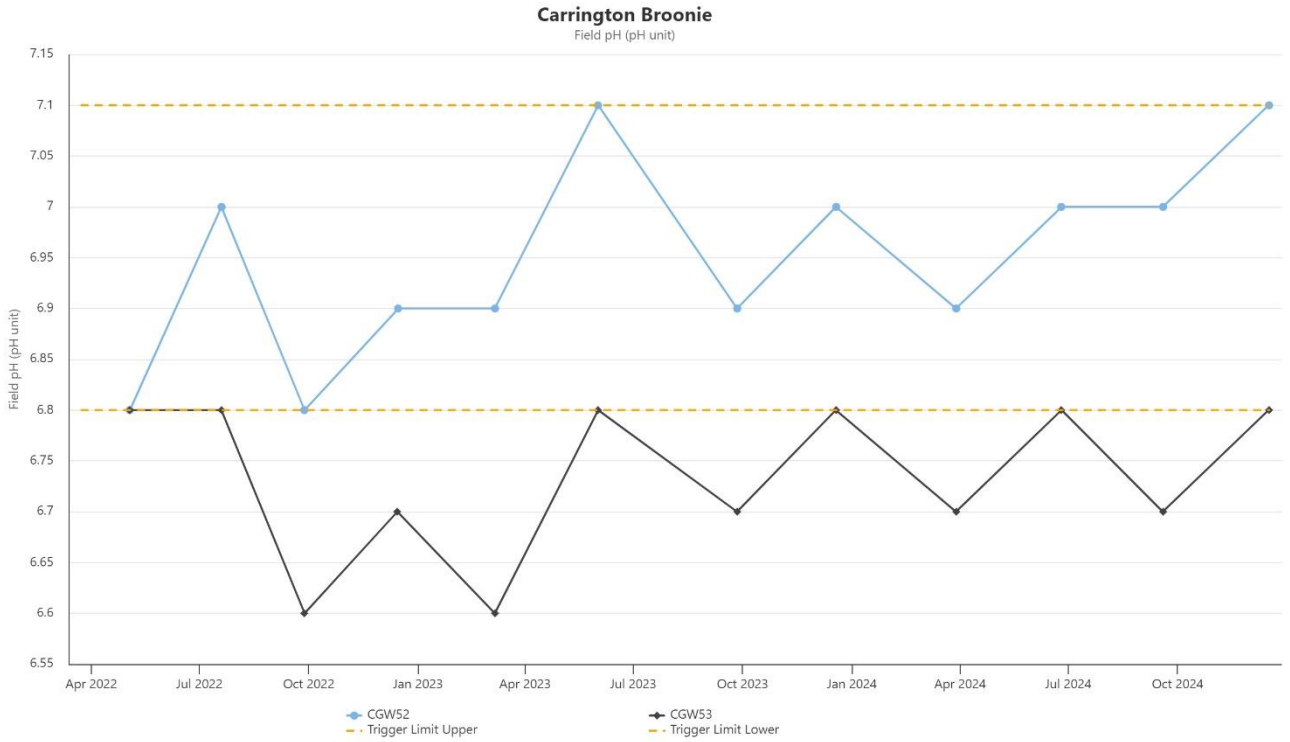

Figure 67 - Carrington Broonie Field pH Trend - Q4 2024

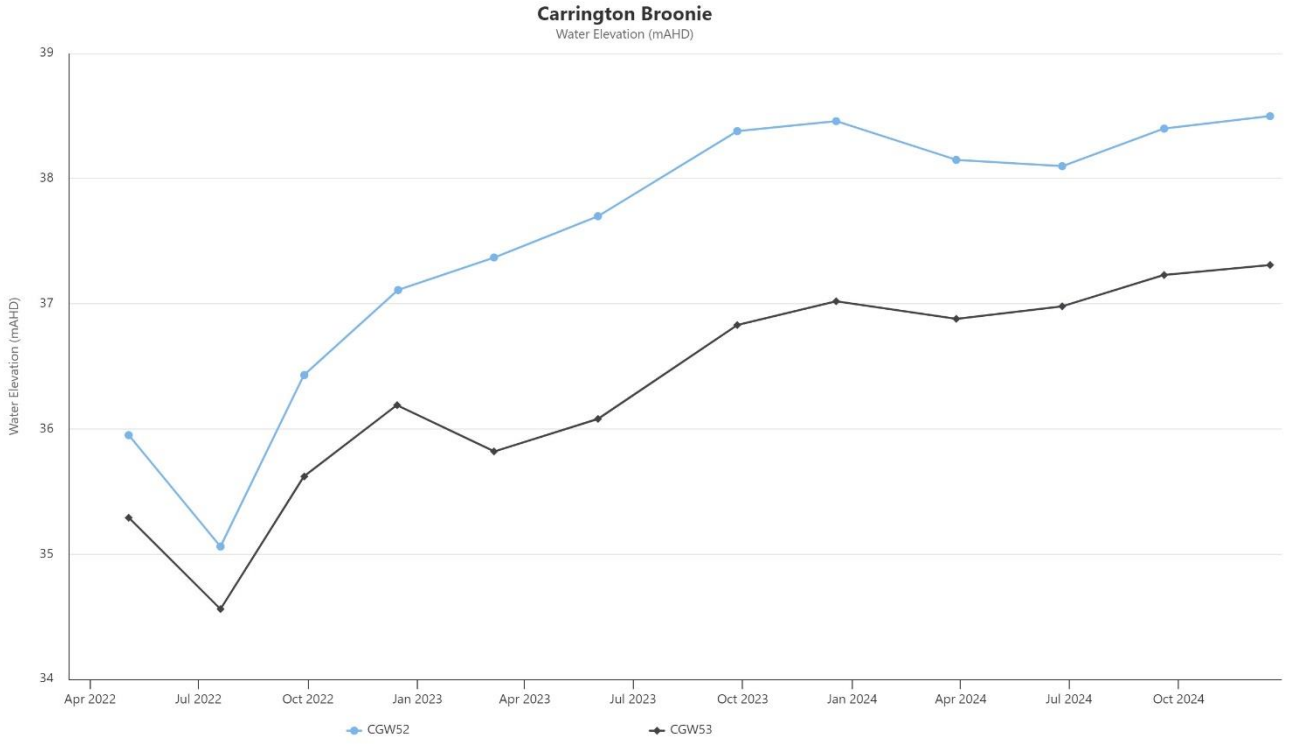

Figure 68 - Carrington Broonie Water Elevation Trend - Q4 2024

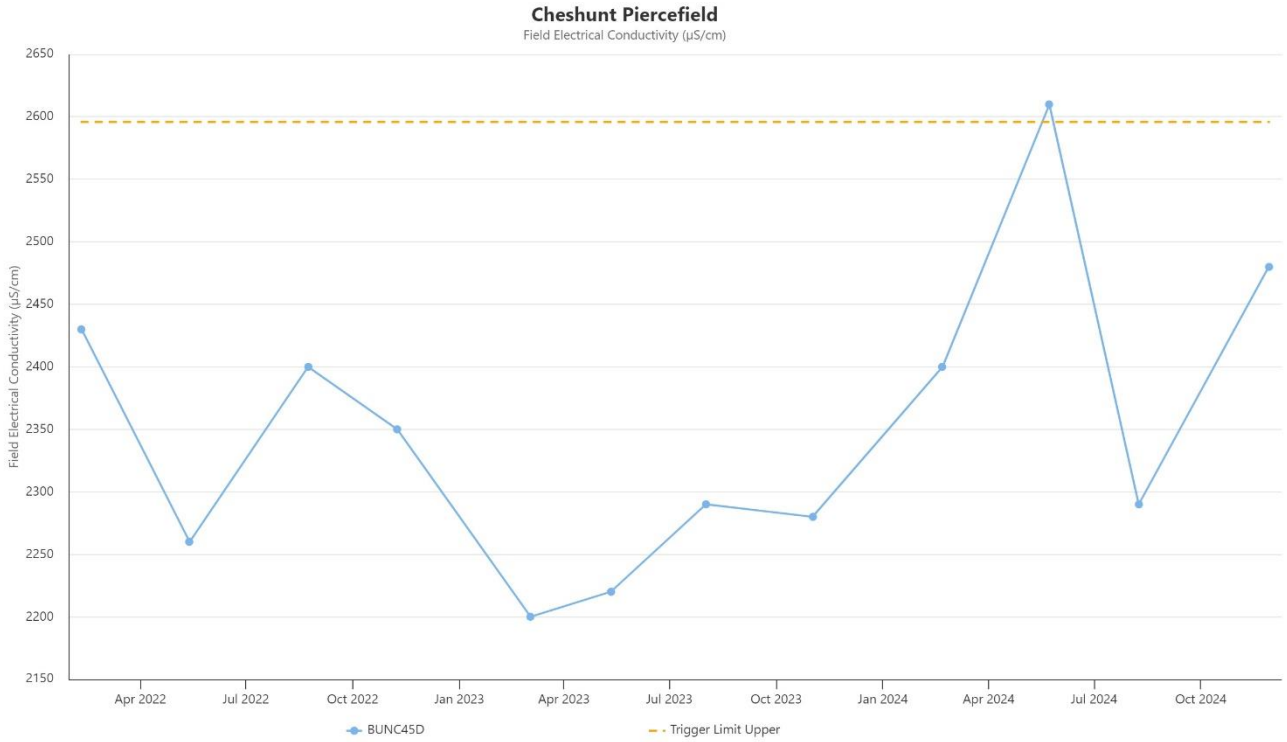

Figure 69 - Cheshunt Piercefield Electrical Conductivity Trend - Q4 2024

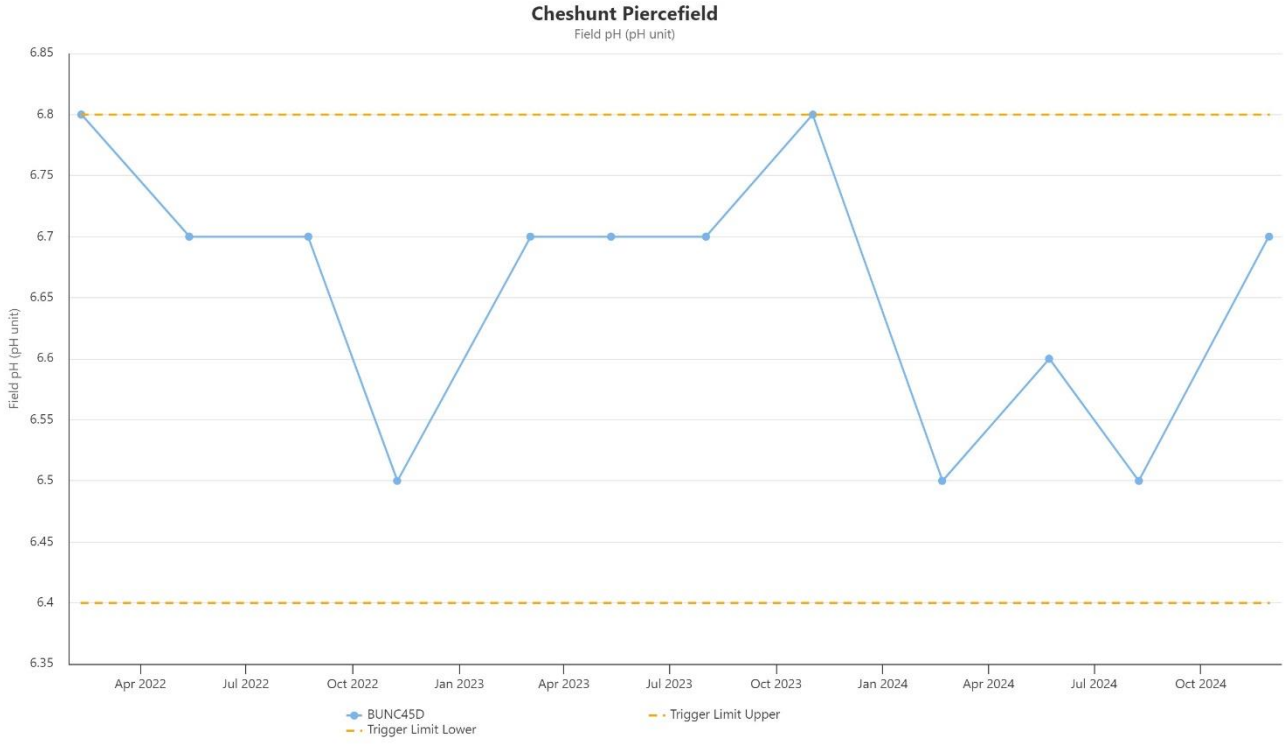

Figure 70 - Cheshunt Piercefield Field pH Trend – Q4 2024

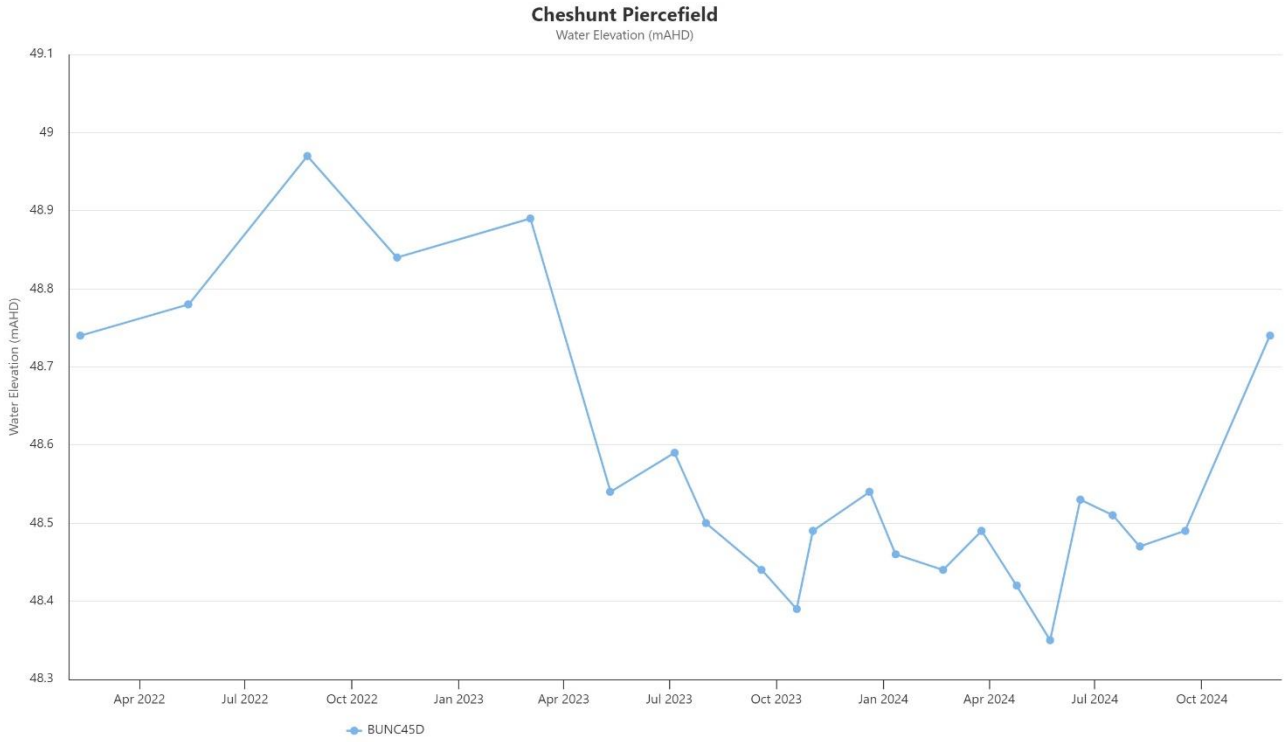

Figure 71 - Cheshunt Piercefield Water Elevation Trend - Q4 2024

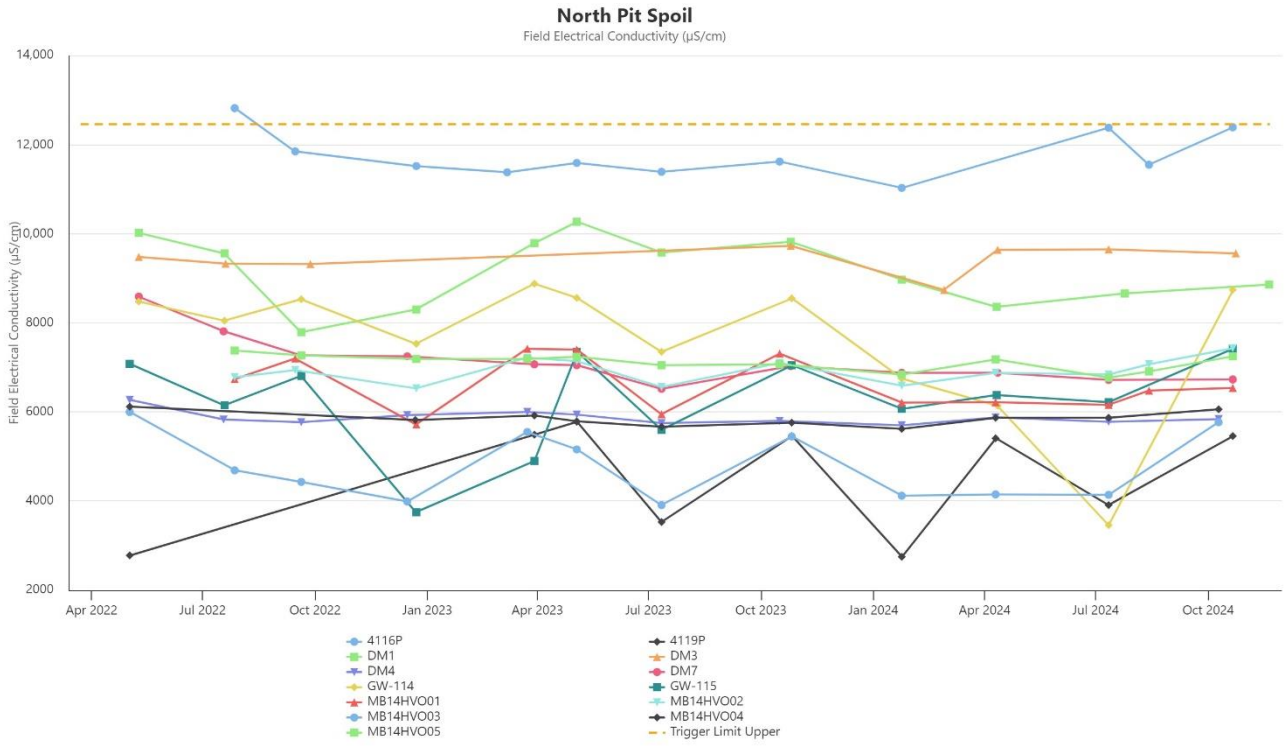

Figure 72 - North Pit Spoil Electrical Conductivity Trend - Q4 2024

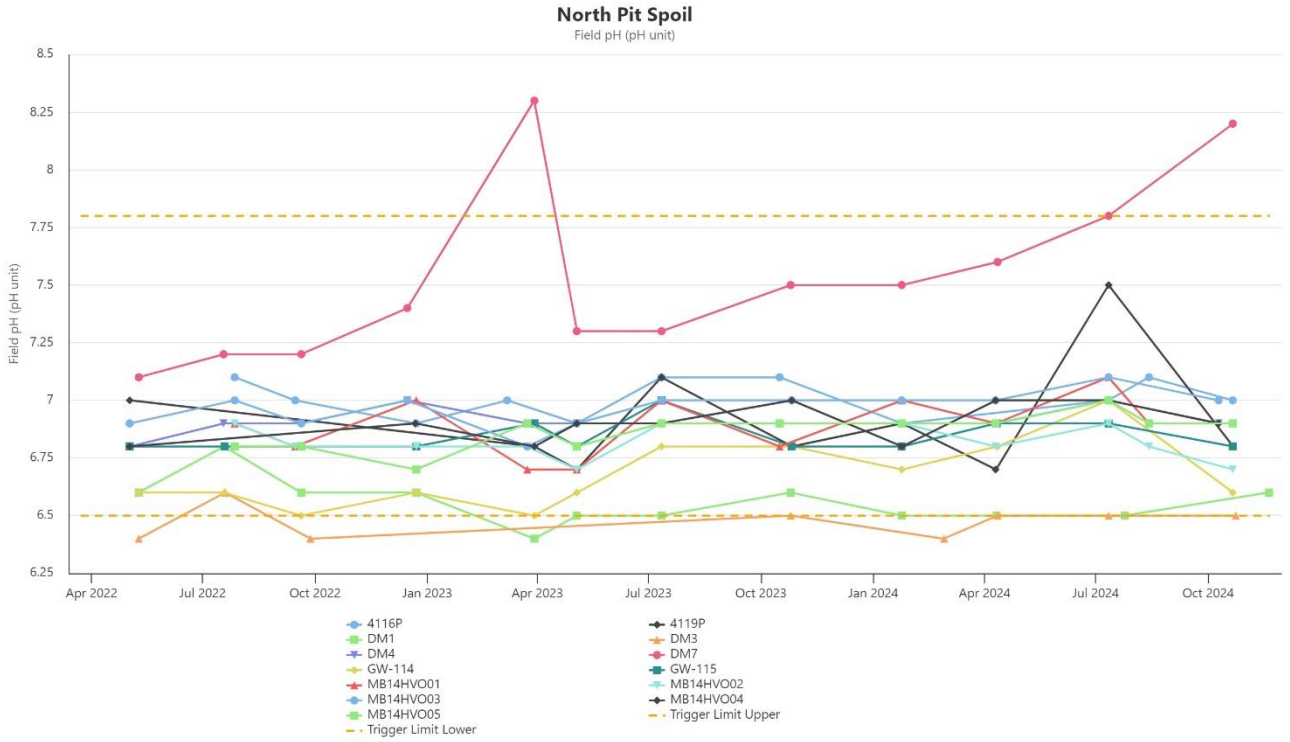

Figure 73 - North Pit Spoil Field pH Trend - Q4 2024

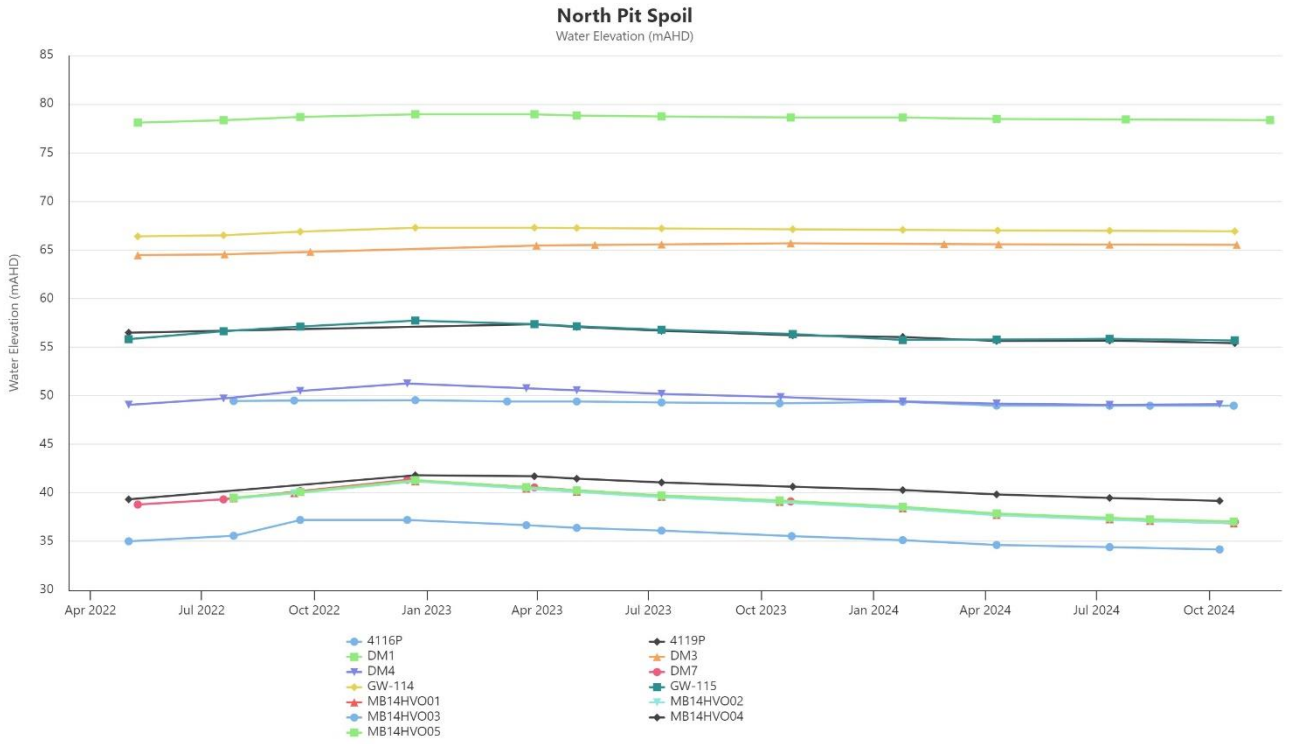

Figure 74 - North Pit Spoil Water Elevation Trend - Q4 2024

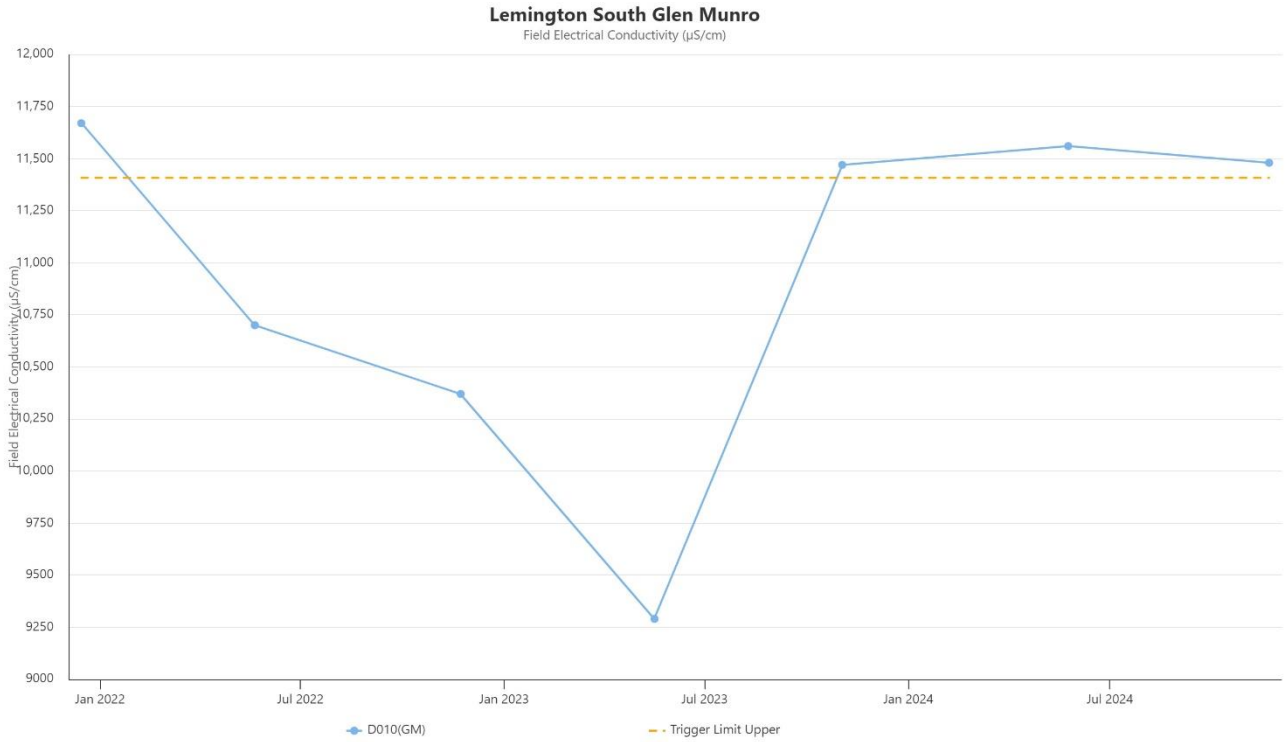

Figure 75 - Lemington South Glen Munro Electrical Conductivity Trend - Q4 2024

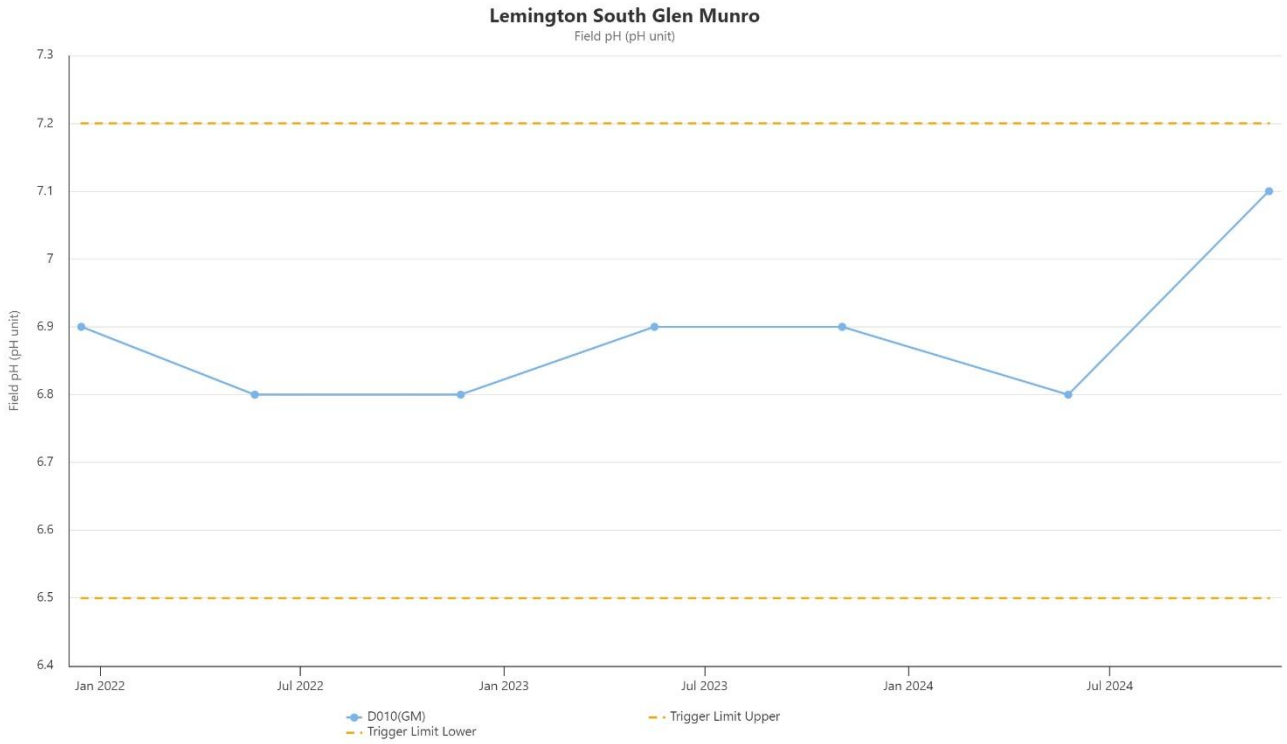

Figure 76 - Lemington South Glen Munro Field pH Trend - Q4 2024

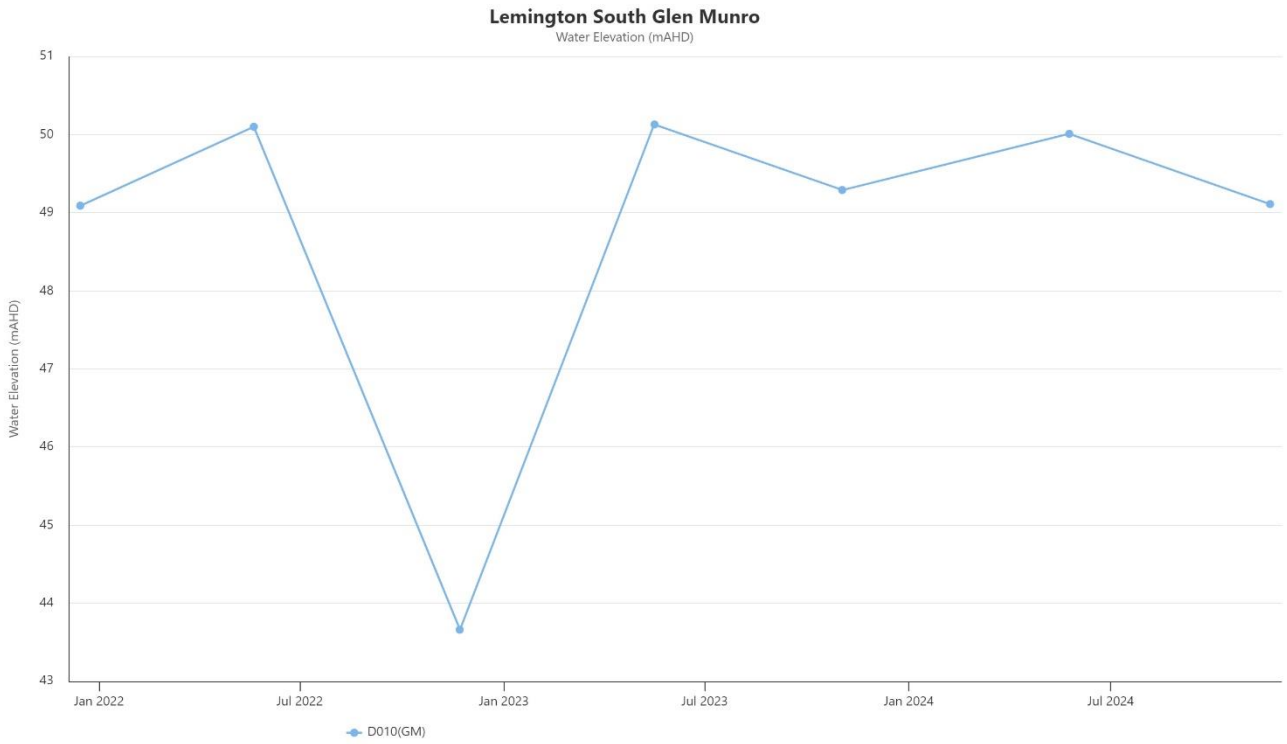

Figure 77 - Lemington South Glen Munro Water Elevation Trend - Q4 2024

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 Q4 2024

Site	Date	Trigger Limit Breached	Response Action
CGW53a	18/12/2024	Water Elevation (mAHD)	Fourteenth 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. A minor increase was recorded in June and September 2024 in response to above average rainfall over the reporting period. It is noted that the trigger level has already been aligned with the EPL conditions in version 3.4 of the revised WMP which is currently with DPHI for approval. No further action required.
CGW55a	18/12/2024	Water Elevation (mAHD)	Twelfth consecutive water level readings above the 95th percentile trigger level of 58.43mAHD 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 then declined until June 2024 in response to below average rainfall, then stabilising over the reporting period. It is noted that the trigger level has already been aligned with the EPL conditions in version 3.4 of the revised WMP which is currently with DPHI for approval. No further action required.
BZ3-3	8/08/2024	pH	Seventeenth consecutive reading below the lower pH trigger level of 6.5 since November 2019. Increasing pH trend between June 2006 (6.0) and August 2012 (7.1) followed by a decreasing trend between December 2012 (7.1) and November 2022 (6.1) then remained stable to September 2024. The Q3 reading of 6.3 is within the historical range. It is noted that the bore has already been removed from the compliance monitoring network in the updated draft WMP which is currently with DPHI for approval.
CGW51a	18/12/2024	pH	Nineth consecutive reading above the upper pH trigger level of 7.4 since September 2022. pH ranging between 6.8 (November 2006) and 8.3 (December 2023), with an increasing trend from September 2019 to December 2023 followed by a stable trend over 2024. The Q3 reading of 7.6 is within the historical range.

			It is noted that the bore has already been removed from the compliance monitoring network in the updated draft WMP which is currently with DPHI for approval.
GW-100	25/12/2024	Electrical Conductivity (EC)	Sixth consecutive reading above the upper EC trigger level of 10,751µS/cm since January 2023. EC ranging between 9,570µS/cm in September 2019 to 11,510µS/cm in December 2017. EC remained relatively stable until December 2022, following which there has been an increasing trend until September 2024. The Q3 reading of 11,260 µS/cm is within the historical range. The EC trend correlates with fluctuations in rainfall over time.
NPz2	19/12/2024	Electrical Conductivity (EC)	Nineth consecutive reading above the EC trigger level of 13,428µS/cm since September 2022. EC has ranged between 12,590µS/cm (December 2014) and 19,400µS/cm (December 2009). EC levels have remained relatively stable since March 2013. The Q3 reading of 14,860µS/cm is within the historical range. It is noted that the bore has already been removed from the compliance monitoring network in the updated draft WMP which is currently with DPHI for approval.

4 | BLASTING

HVO maintains a network of blast monitoring units located at nearby privately owned residences and function as regulatory compliance monitors. The location of these monitors can be found in **Figure 78.** 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

Seventeen (17) 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)
3/12/2024 15:56	97.91	87.00	102.47	105.56	103.95
7/12/2024 13:29	104.10	109.09	109.00	94.40	106.04
9/12/2024 13:02	95.19	94.23	94.13	97.67	92.34
11/12/2024 13:30	96.63	90.51	100.02	99.41	96.68
12/12/2024 13:11	101.24	101.49	97.24	107.06	87.55
12/12/2024 13:35	96.06	96.72	96.51	98.10	94.25
14/12/2024 12:44	97.24	98.88	107.54	94.70	88.84
16/12/2024 16:32	102.04	108.02	109.89	97.36	90.27
17/12/2024 13:34	91.41	110.03	104.47	96.25	102.51
20/12/2024 13:17	89.76	87.61	96.76	90.43	97.17
21/12/2024 10:14	93.07	97.80	97.86	86.55	99.03
24/12/2024 9:14	88.54	90.74	95.64	97.12	93.07
24/12/2024 9:18	85.15	86.61	90.66	95.36	83.83
24/12/2024 9:19	93.94	86.11	98.83	100.69	95.75
24/12/2024 13:00	95.76	103.45	94.39	96.06	92.64
27/12/2024 13:15	94.80	98.95	103.28	105.11	102.63
30/12/2024 13:17	106.67	92.50	103.06	89.62	98.63

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)
3/12/2024 15:56	0.12	0.13	0.31	0.60	0.25
7/12/2024 13:29	0.14	0.08	0.09	0.09	0.04
9/12/2024 13:02	0.22	0.14	0.16	0.18	0.07
11/12/2024 13:30	0.11	0.09	0.19	0.45	0.13
12/12/2024 13:11	0.10	0.05	0.10	0.36	0.04
12/12/2024 13:35	0.06	0.05	0.09	0.11	0.03
14/12/2024 12:44	0.09	0.07	0.20	0.51	0.11
16/12/2024 16:32	0.10	0.07	0.14	0.28	0.09
17/12/2024 13:34	0.05	0.06	0.08	0.46	0.04
20/12/2024 13:17	0.10	0.16	0.09	0.09	0.06
21/12/2024 10:14	0.15	0.33	0.10	0.06	0.06
24/12/2024 9:14	0.07	0.05	0.16	0.32	0.14
24/12/2024 9:18	0.11	0.06	0.13	0.23	0.07
24/12/2024 9:19	0.14	0.07	0.19	0.45	0.15
24/12/2024 13:00	0.05	0.05	0.08	0.11	0.06
27/12/2024 13:15	0.04	0.05	0.06	0.10	0.02
30/12/2024 13:17	0.10	0.08	0.10	0.28	0.09

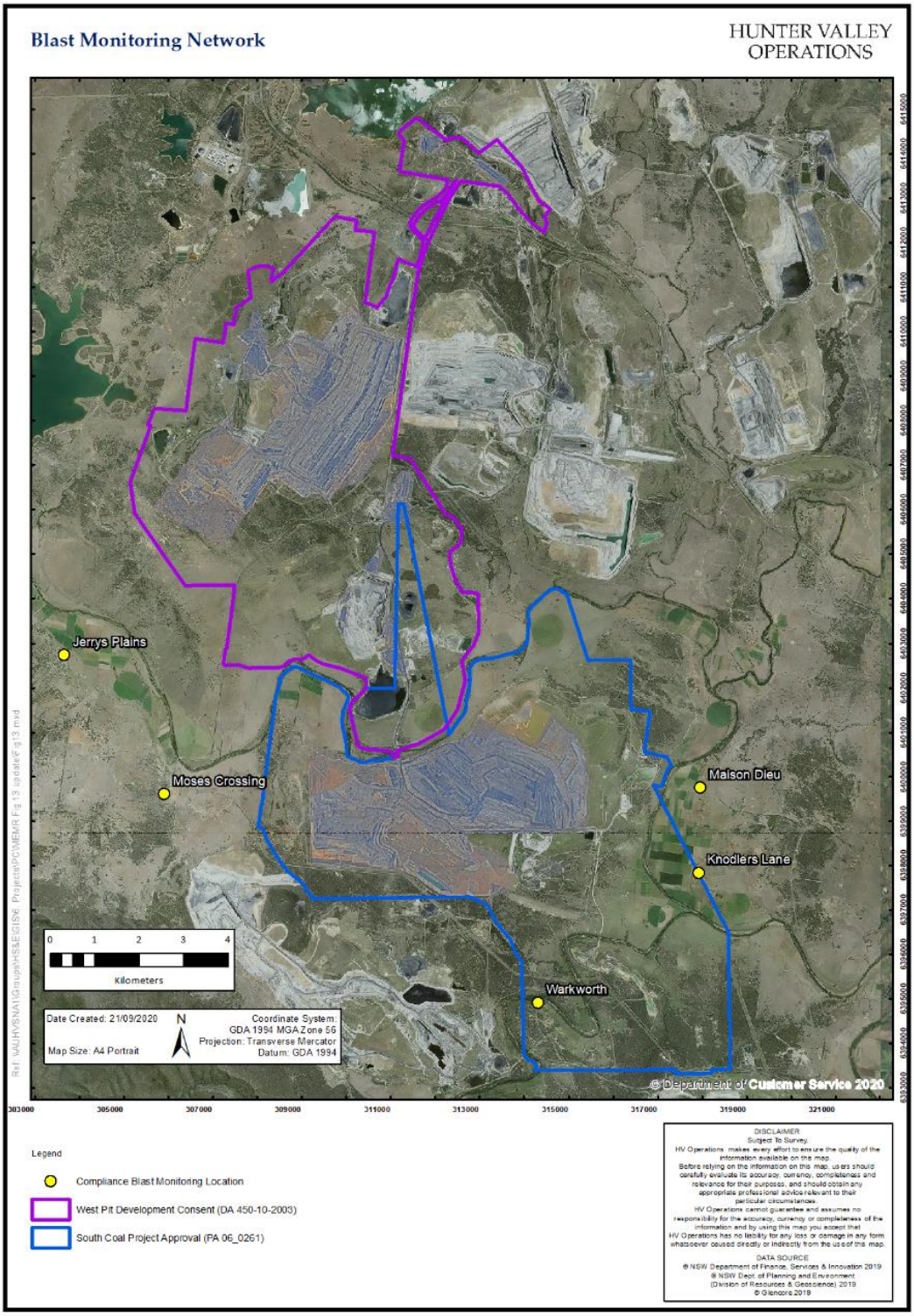

Figure 78 - Blast Monitoring Location Plan

5 | NOISE

Routine attended noise monitoring occurs at defined locations around HVO, as described in the HVO Noise Monitoring Programme. 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** - Noise Monitoring Location Plan**.**

5.1 | ATTENDED NOISE MONITORING RESULTS

Attended monitoring was conducted at receiver locations around HVO during the night period of the 2 December 2024.

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	2/12/2024 21:00	1.6	105	E	Yes	35	46	IA	IA	Nil	Nil
Knodlers Lane	2/12/2024 21:47	1.2	64	F	Yes	35	46	IA	IA	Nil	Nil
Maison Dieu	2/12/2024 21:24	1.2	77	F	Yes	35	46	IA	IA	Nil	Nil
Long Point (Dights Crossing)	2/12/2024 22:46	1.8	162	D	Yes	35	46	IA	IA	Nil	Nil
Kilburnie South	2/12/2024 23:56	0.4	156	E	Yes	39	46	33	37	Nil	Nil
Jerrys Plains East	2/12/2024 23:35	1.0	146	D	Yes	39	46	<30	<30	Nil	Nil
Jerrys Plains Village	2/12/2024 22:12	0.0	-	G	No	40	46	<30	40	N/A	N/A
Jerrys Plains West	2/12/2024 21:53	1.3	75	F	Yes	40	46	<30	38	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	2/12/2024 21:00	2.7	82	D	Yes	41	45	IA	IA	Nil	Nil
Knodlers Lane	2/12/2024 21:47	2.3	76	D	Yes	40	45	IA	IA	Nil	Nil
Maison Dieu	2/12/2024 21:24	2.7	65	D	Yes	39	45	IA	IA	Nil	Nil
Long Point (Dights Crossing)	2/12/2024 22:46	2.0	193	D	Yes	37	45	IA	IA	Nil	Nil
Kilburnie South (Moses Crossing)	2/12/2024 23:56	1.9	186	D	Yes	39	45	<25	<25	Nil	Nil
Jerrys Plains East	2/12/2024 23:35	1.9	183	D	Yes	38	45	IA	IA	Nil	Nil
Jerrys Plains Village	2/12/2024 22:12	2.4	207	D	Yes	35	45	IA	IA	Nil	Nil
Jerrys Plains West	2/12/2024 21:53	1.8	161	F	Yes	35	45	IA	IA	Nil	Nil
HVGC	3/12/2024 0:28	1.8	188	D	Yes	55	--	<30	<30	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 South 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	2/12/2024 21:00	IA	Yes	No	No	N/A	No	N/A	Nil
Knodlers Lane	2/12/2024 21:47	IA	Yes	No	No	N/A	No	N/A	Nil
Maison Dieu	2/12/2024 21:24	IA	Yes	No	No	N/A	No	N/A	Nil
Long Point (Dights Crossing)	2/12/2024 22:46	IA	Yes	No	No	N/A	No	N/A	Nil
Kilburnie South	2/12/2024 23:56	33	Yes	No	No	N/A	No	N/A	Nil
Jerrys Plains East	2/12/2024 23:35	<30	Yes	No	No	N/A	No	N/A	Nil
Jerrys Plains Village	2/12/2024 22:12	<30	No	N/A	N/A	N/A	N/A	N/A	N/A
Jerrys Plains West	2/12/2024 21:53	<30	Yes	No	No	N/A	No	N/A	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? [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	2/12/2024 21:00	IA	Yes	No	No	N/A	No	N/A	Nil
Knodlers Lane	2/12/2024 21:47	IA	Yes	No	No	N/A	No	N/A	Nil
Maison Dieu	2/12/2024 21:24	IA	Yes	No	No	N/A	No	N/A	Nil
Long Point (Dights Crossing)	2/12/2024 22:46	IA	Yes	No	No	N/A	No	N/A	Nil
Kilburnie South (Moses Crossing)	2/12/2024 23:56	<25	Yes	No	No	N/A	No	N/A	Nil
Jerrys Plains East	2/12/2024 23:35	IA	Yes	No	No	N/A	No	N/A	Nil
Jerrys Plains Village	2/12/2024 22:12	IA	Yes	No	No	N/A	No	N/A	Nil
Jerrys Plains West	2/12/2024 21:53	IA	Yes	No	No	N/A	No	N/A	Nil
HVGC	3/12/2024 0:28	<30	Yes	No	No	N/A	No	N/A	Nil

1. NA denotes 'not applicable'

2. NM denotes 'not measurable'

3. 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, Kilburnie South [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.

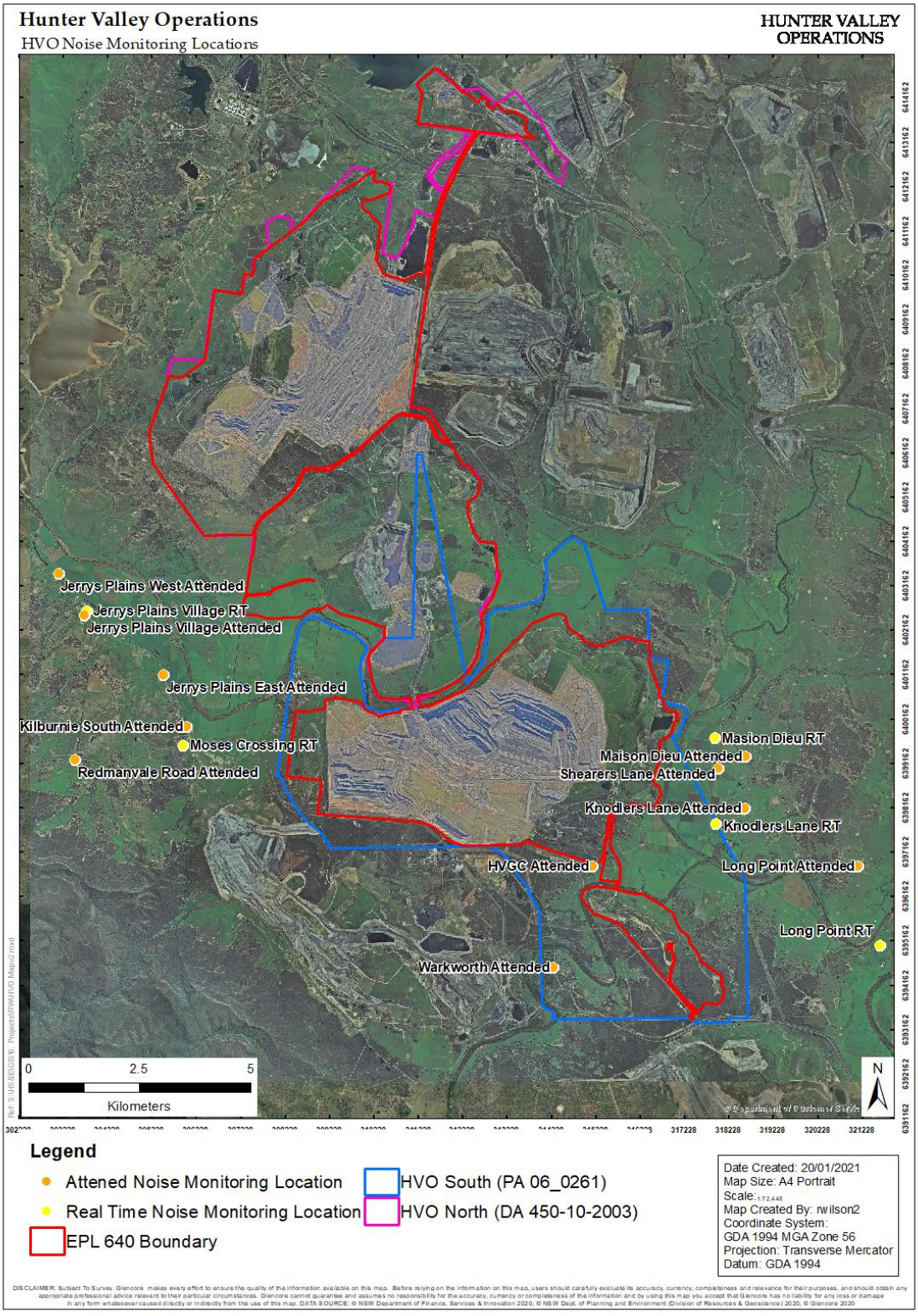

Figure 79 - Noise Monitoring Location Plan

6 | OPERATIONAL DOWNTIME

A total of approximately six hundred and fifty-six (656) 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 80**. 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).

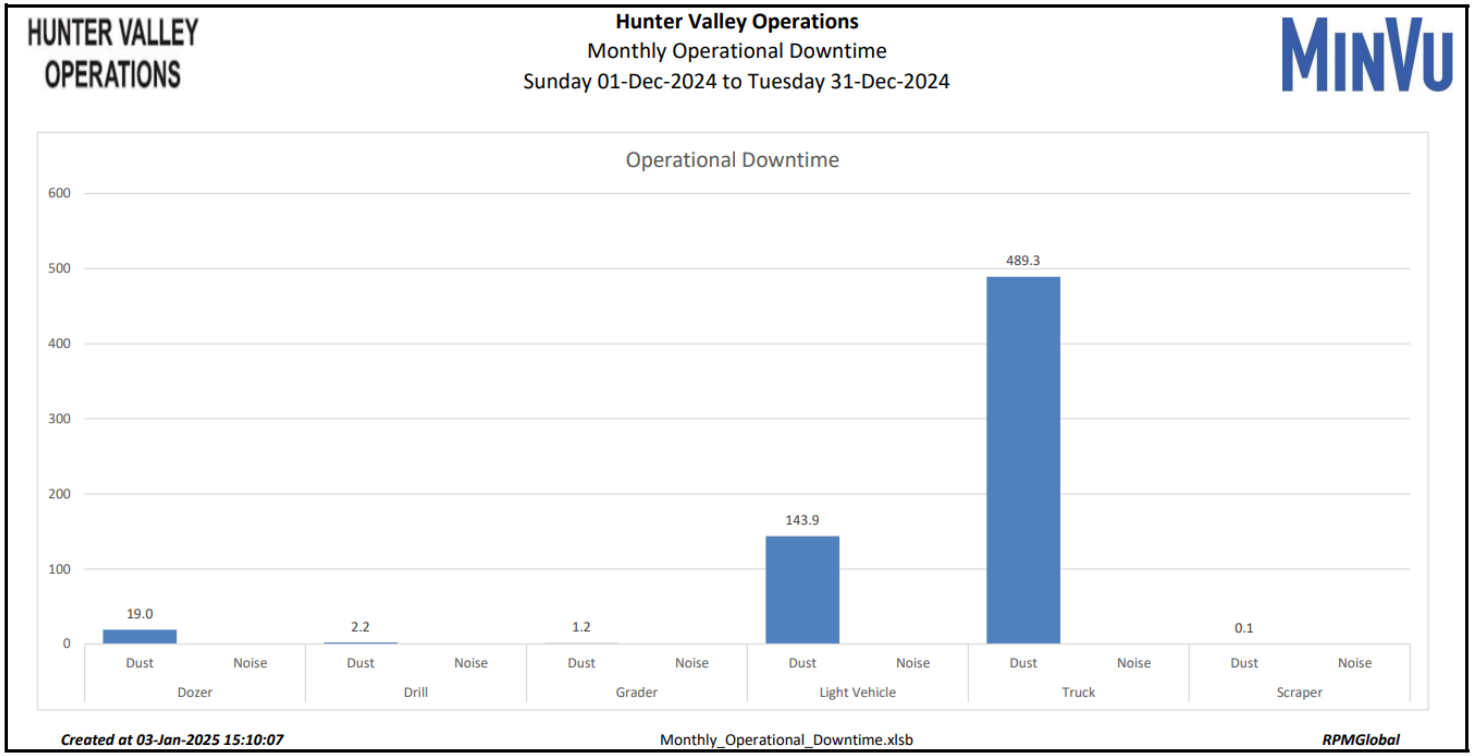

Figure 80 - Operational Downtime by Equipment Type for the Reporting Period

7 | REHABILITATION

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

- 0.00ha of land was released (became available for the application of topsoil);
- 0.00ha of land was reshaped;
- 15.44ha of land was topsoiled; and
- 32.51ha of land was rehabilitated.

Year to date progress is shown in **Figure 81.**

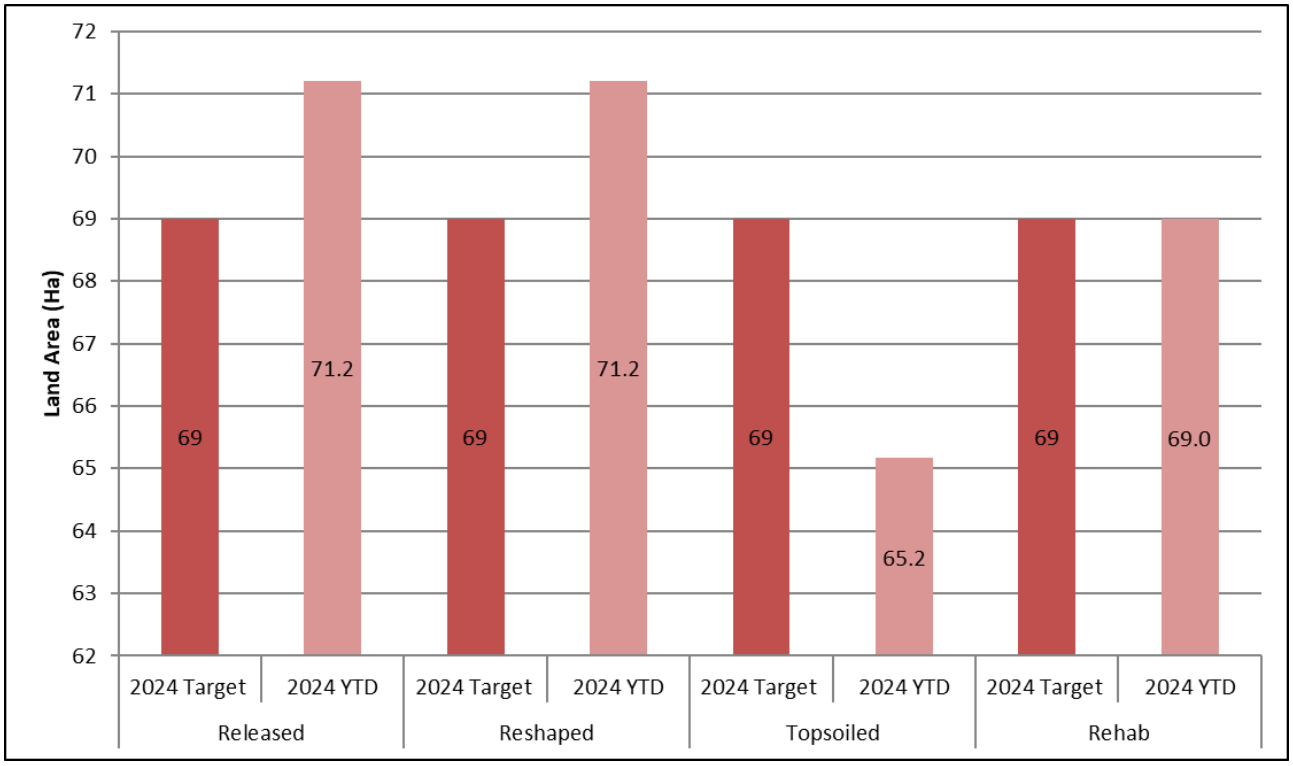

Figure 81 – Rehabilitation YTD September 2024

8 | COMPLAINTS

There were two community complaints received during the reporting period. Details of complaints received during 2024 are shown in **Table 11.**

Table 11 – Complaints Summary 2024

Complaint Number	Date	Time	Complainant ID	Nature of Complaint	Mode of Complaint	Brief Description and Response
No community complaints were received during January						
No community complaints were received during February						
1	12 March	8:59pm	1	Noise	Community Hotline	• A resident of Jerrys Plains called the Community Complaints Hotline at 8:59pm regarding noise, commenting that “noise is pretty loud tonight” as well as equiment horns could be heard. • The OCE on duty in South Pit contacted the resident at 9:02pm and subsequently notified the OCE on duty in West Pit. Following communication between West Pit OCE and relevant equipment operators, horn blasting and dumping practices – thought to be the causes of the disturbance – were altered and/or stopped. • An internal investigation conducted following the complaint found that no noise alarms had triggered within one hour of the complaint. Horn noise was audible from noise recordings at the Jerrys Plains noise monitor.
2	2 April	1:31pm	2	Blast	Community Hotline	• A resident of Jerrys Plains called the United Wambo Joint Venture (UWJV) Community Complaints Hotline at 1:31pm regarding noise and vibration from a blast. This was relayed to HVO given they did not have a blast at that time.

Complaint Number	Date	Time	Complainant ID	Nature of Complaint	Mode of Complaint	Brief Description and Response
						• A member of the HVO Environment and Community team contacted the resident to advise a blast had been fired in the Mitchell Pit at 1:29pm. • The closest monitor to the resident recorded overpressure of 105.5 dBL against a criteria of 120 dBL and ground vibration of 0.11mm/s against a criteria of 10mm/s.
3	4 April	12:30pm	3	Traffic	Community Hotline	• A resident of Jerrys Plains called the Community Complaints Hotline at 12:30pm regarding traffic incidents at HVO North entry off Lemington Road. • The resident reported that a vehicle exiting HVO North on the afternoon of 3 April failed to stop at the stop sign and almost collided with his wifes vehicle. They have witnessed other vehicles failing to stop at the same location within the past two months. • An internal investigation following the complaint resulted in a site-wide presentation about the importance of road safety whilst travelling to and from HVO delivered at daily HCOMs. Vegetation maintenance will be performed to increase visibility at the intersection.
4	3 May	7:40am	3	Traffic	Direct call to Environment and Community Officer	• A resident of Jerrys Plains called the Environment and Community Officer directly regarding a traffic incident at HVO North's intersection with Lemington Road. • The resident reported that a vehicle (small truck) exiting HVO North at approximately 7:40am on 3 May failed to stop at the stop sign and almost collided with his wifes vehicle. • Following an internal investigation into the complaint, a site-wide communication about road safety and the 100km/h speed limit

Complaint Number	Date	Time	Complainant ID	Nature of Complaint	Mode of Complaint	Brief Description and Response
						along Lemington Road was delivered at daily HCOMs. In addition, road marking, signs and the surveillance camera near the intersection will be upgraded.
No community complaints were received during June						
No community complaints were received during July						
5	30 August	10:05am	4	Blast	Direct call to Environment and Community Officer	• A resident of Jerrys Plains contacted the HVO Environment and Community officer directly via telephone at 10:05am describing two loud blasts in succession as well as floor movement and house shudder. The Environment and Community Officer communicated to the resident advising that a blast had been fired in the HVO Mitchell Pit at 10:04am. • The closest monitor to the resident recorded overpressure of 100.18 dBL against a criteria of 120 dBL and ground vibration of 0.06mm/s against a criteria of 10mm/s.
6	30 August	10:13am	5	Blast	Community Hotline	• A resident of Jerrys Plains contacted the HVO Community Complaints Hotline at 10:13am describing their house rattling as well as two loud bangs. The Environment and Community Officer communicated to the resident via telephone shortly after the call to advise a blast had been fired in the HVO Mitchell Pit at 10:04am. • The closest monitors to the resident – Jerrys Plains and Moses Crossing – recorded overpressure results of 100.18 dBL and 112.37 dBL respectively against a criteria of 120dBL and ground vibration results of 0.06mm/s and 0.21mm/s respectively against a criteria of 10mm/s. • HVO conducted an internal investigation into the blast and as requested provided the outcomes to the resident via email.

Complaint Number	Date	Time	Complainant ID	Nature of Complaint	Mode of Complaint	Brief Description and Response
7	30 August	10:19am	1	Blast	Community Hotline	• A resident of Jerrys Plains contacted the HVO Community Complaints Hotline at 10:19am describing ground movement worse than a recent earthquake. The Environment and Community Officer communicated to the resident via telephone shortly after the call to advise a blast had been fired in the HVO Mitchell Pit at 10:04am. • The closest monitors to the resident – Jerrys Plains and Moses Crossing – recorded overpressure results of 100.18 dBL and 112.37 dBL respectivelyt against a criteria of 120dBL and ground vibration results of 0.06mm/s and 0.21mm/s respectively against a criteria of 10mm/s. • HVO conducted an internal investigation into the blast and as requested provided the outcomes to the resident via email.
8	24 September	1:50pm	6	Blast	Community Hotline	• A resident of Maison Dieu contacted the HVO Community Complaints Hotline at 1:50pm describing a blast that occurred at 1.30pm that shook their house and left dust over their cars. • The HVO Environment and Community Officer communicated to the resident via telephone shortly after the call to advise a blast had been fired in the HVO Cheshunt Pit at 1:29pm. • The closest monitors to the resident, Maison Dieu and Knodlers Lane, recorded blasting levels below relevant criteria. These monitors recorded overpressures of 112.74 and 114.6dBL respectively against a criteria of 120dBL and ground vibration of 0.33 and 0.26mm/s respectively against a criteria of 10mm/s. • HVO conducted an internal investigation into the blast and as requested, and provided the outcomes to the resident.

Complaint Number	Date	Time	Complainant ID	Nature of Complaint	Mode of Complaint	Brief Description and Response
9	21 October	6:33am	7	Traffic	Community Hotline	• A member of the community called the HVO Community Complaints Hotline at 6:33am on 22 October regarding a traffic hazard at the intersection of the HVO South access road and Golden Highway. • The community member reported that a vehicle exiting HVO South on the afternoon of 21 October failed to give way causing them to brake sharply to avoid a collision with the offending vehicle. • A communication about the importance of providing an adequate gap at this intersection was provided to Mine and Maintenance teams at HVO South.
10	30 October	1:50pm	8	Air quality	Community Hotline	• A resident of Putty Road, Mt Thorley contacted the HVO community complaints hotline regarding poor air quality. • The resident was not able to attribute the dusty conditions to a blast event or any other event or location related to HVO. The residence is approximately 13km from HVO's nearest active mining area. • The daily 24-hr results from the two closest real-time PM_{10} monitors (Knodlers Lane and Maison Dieu) were below the compliance limits.
11	4 November	9:27am	8	Air quality	Direct call to Environment and Community Officer	• A resident of Putty Road, Mt Thorley contacted HVO regarding poor air quality. • The resident attributed dusty conditions to HVO South. • Representatives from HVO's Environment and Community team attended the residence to discuss the residents concerns.

Complaint Number	Date	Time	Complainant ID	Nature of Complaint	Mode of Complaint	Brief Description and Response
						• The daily 24-hr results from the two closest real-time PM_{10} monitors (Knodlers Lane and Maison Dieu) were below the compliance limits.
12	17 December	11:00am	8	Air quality	Community Hotline	• A resident of Putty Road, Mt Thorley contacted the HVO community complaints hotline regarding poor air quality. • The resident attributed the dusty conditions to HVO South. • The resident was contacted by a HVO Environment and Community Officer to further discuss the nature of the complaint. • The daily 24-hr results from the two closest real-time PM_{10} monitors (Knodlers Lane and Maison Dieu) were below the compliance limits.
13	21 December	11:14am	8	Air quality	Direct call to Environment and Community Officer	• A resident of Putty Road, Mt Thorley directly contacted a HVO Environment and Community Officer via telephone regarding poor air quality. • The resident attributed the dusty conditions to HVO South. • The daily 24-hr results from the two closest real-time PM_{10} monitors (Knodlers Lane and Maison Dieu) were below the compliance limits.

9 | ENVIRONMENTAL INCIDENTS

One (1) reportable environmental incident occurred during the reporting period as follows:

14/12/2024 – TEOM PM_{10} dust exceedance – Jerrys Plains

Monitoring results indicate that on 14 December 2024, the Jerrys Plains Tapered Element Oscillating Microbalance (TEOM) recorded a total result of 50.6µg/m^3 for the 24-hour averaging period for PM_{10}, exceeding the relevant criteria of 50ug/m^3. A third-party consultant was engaged to investigate the result and determined HVO's maximum possible contribution to be 13.0ug/m^3 (HVO North) and 9.5ug/m^3 (HVO South). HVO implemented operational controls on 14 December to comply with the HVO Air Quality and Greenhouse Gas Management Plan. The DPHI were advised of this exceedance on 18 December and an incident report was submitted on 20 December.

APPENDIX A: METEOROLOGICAL DATA (HVO CORPORATE)

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)
1/12/2024	22.46	18.83	95.8	81.60	250	138.5	1.16	1.6
2/12/2024	29.99	19.10	95.2	43.40	1419	226.8	2.18	0.0
3/12/2024	34.70	17.69	83.1	19.87	1357	243.6	2.24	1.4
4/12/2024	29.77	20.79	88.5	44.47	628	262.9	2.90	0.0
5/12/2024	29.29	19.43	86.0	51.16	1452	177.3	3.45	0.0
6/12/2024	30.46	18.26	91.4	46.70	1455	111.5	2.95	0.0
7/12/2024	33.24	19.42	92.5	44.82	1210	205.6	1.46	1.6
8/12/2024	34.58	21.56	84.8	34.64	1629	257.5	3.42	1.2
9/12/2024	35.64	18.86	88.8	24.74	1228	228.7	5.08	0.0
10/12/2024	24.89	17.44	92.0	67.20	989	122.9	3.04	0.0
11/12/2024	32.13	18.74	90.5	24.65	1383	158.3	3.29	0.0
12/12/2024	30.25	15.52	87.6	26.00	1190	117.3	2.33	0.0
13/12/2024	34.60	16.17	86.0	10.49	1115	221.3	2.37	0.0
14/12/2024	36.38	18.43	80.1	11.99	1102	200.7	2.26	0.0
15/12/2024	35.17	19.83	82.8	20.47	1072	115.1	2.65	0.0
16/12/2024	37.37	20.22	89.4	21.51	1255	141.4	2.87	0.0
17/12/2024	36.11	21.11	83.1	20.91	1072	113.9	3.62	1.4
18/12/2024	39.50	19.12	88.8	17.72	1067	223.7	2.97	1.8
19/12/2024	21.13	14.66	94.2	54.99	1283	117.3	4.39	0.0
20/12/2024	25.87	12.94	90.0	27.84	1542	107.0	3.46	0.0
21/12/2024	29.32	12.90	78.9	25.88	1121	134.4	2.04	0.0
22/12/2024	36.08	13.79	87.7	17.40	1245	189.3	2.95	0.0
23/12/2024	34.82	19.34	78.1	30.29	1113	111.3	3.15	0.0
24/12/2024	30.49	16.11	87.9	3.01	1129	236.2	4.65	0.0
25/12/2024	29.40	14.56	78.4	13.99	1123	161.0	3.11	0.0
26/12/2024	32.22	13.77	74.1	19.50	1105	135.2	2.22	0.0
27/12/2024	36.70	15.69	82.5	14.32	1099	172.4	2.09	8.8
28/12/2024	35.69	17.73	93.8	29.17	1321	250.8	3.64	0.0
29/12/2024	32.12	18.87	83.8	12.36	1331	144.7	2.97	0.0
30/12/2024	31.98	15.71	79.7	12.39	1107	159.4	2.72	0.0
31/12/2024	31.74	18.81	79.9	26.41	1390	114.4	4.60	0.0