Monthly Environmental Monitoring Report

Yancoal Mount Thorley Warkworth

September 2023

CONTENTS

Figures

Tables

Revision History

Version No.	Version Details	Date
1.0	Final	16/02/2024

1.0 INTRODUCTION

This report has been compiled to provide a monthly summary of environmental monitoring results for Mount Thorley Warkworth (MTW). This report includes all monitoring data collected for the period 1 September to 30 September 2023.

2.0 AIR QUALITY

2.1 Meteorological Monitoring

Meteorological data is collected at MTW's 'Charlton Ridge' meteorological station (refer to **Figure 3**).

2.1.1 Rainfall

Rainfall for the reporting period is summarised in **Table 1**. The year-to-date monthly rainfall totals, 2023 monthly rainfall totals and historical average monthly rainfall trend are shown in **Figure 1**.

Table 1: Monthly Rainfall MTW

2023	Monthly Rainfall (mm)	Cumulative Rainfall (mm)
September	23.4	328.4

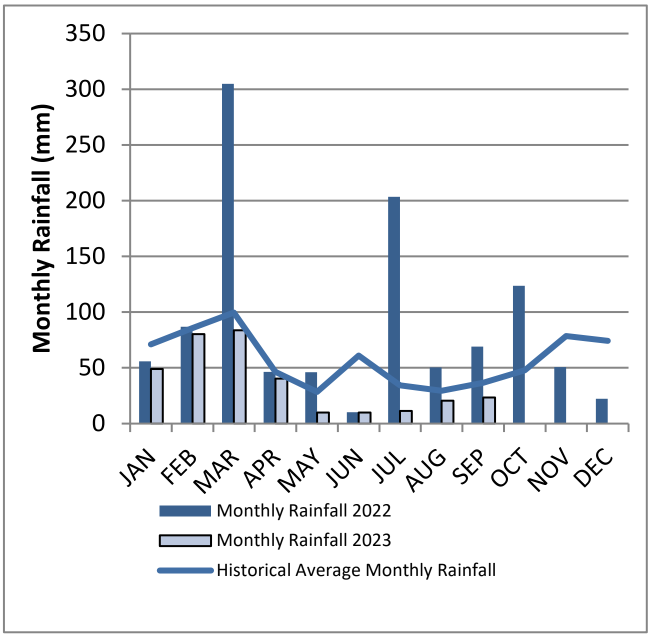

Figure 1: Rainfall Trend YTD

Note: The historical average monthly rainfall is calculated from 2007 to 2022 monthly totals

2.1.2 Wind Speed and Direction

Winds from the Northwest and Southwest were dominant during the reporting period as shown in **Figure 2.**

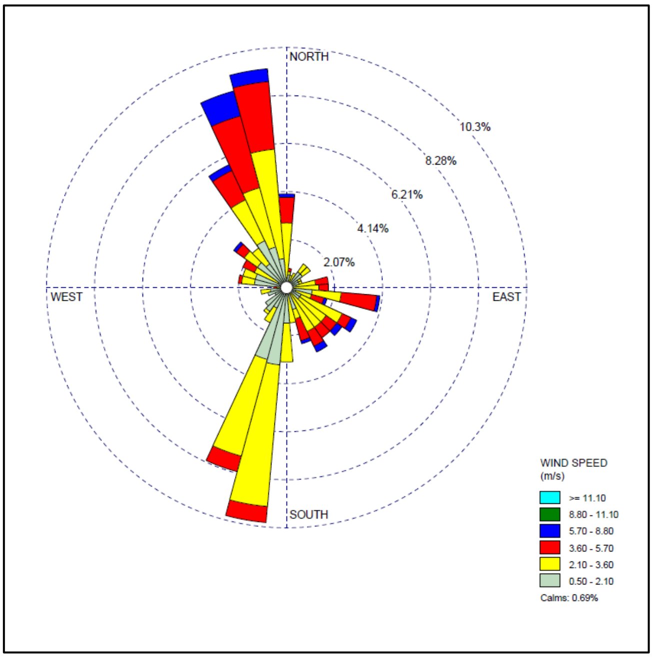

Figure 2: Charlton Ridge Wind Rose – September 2023

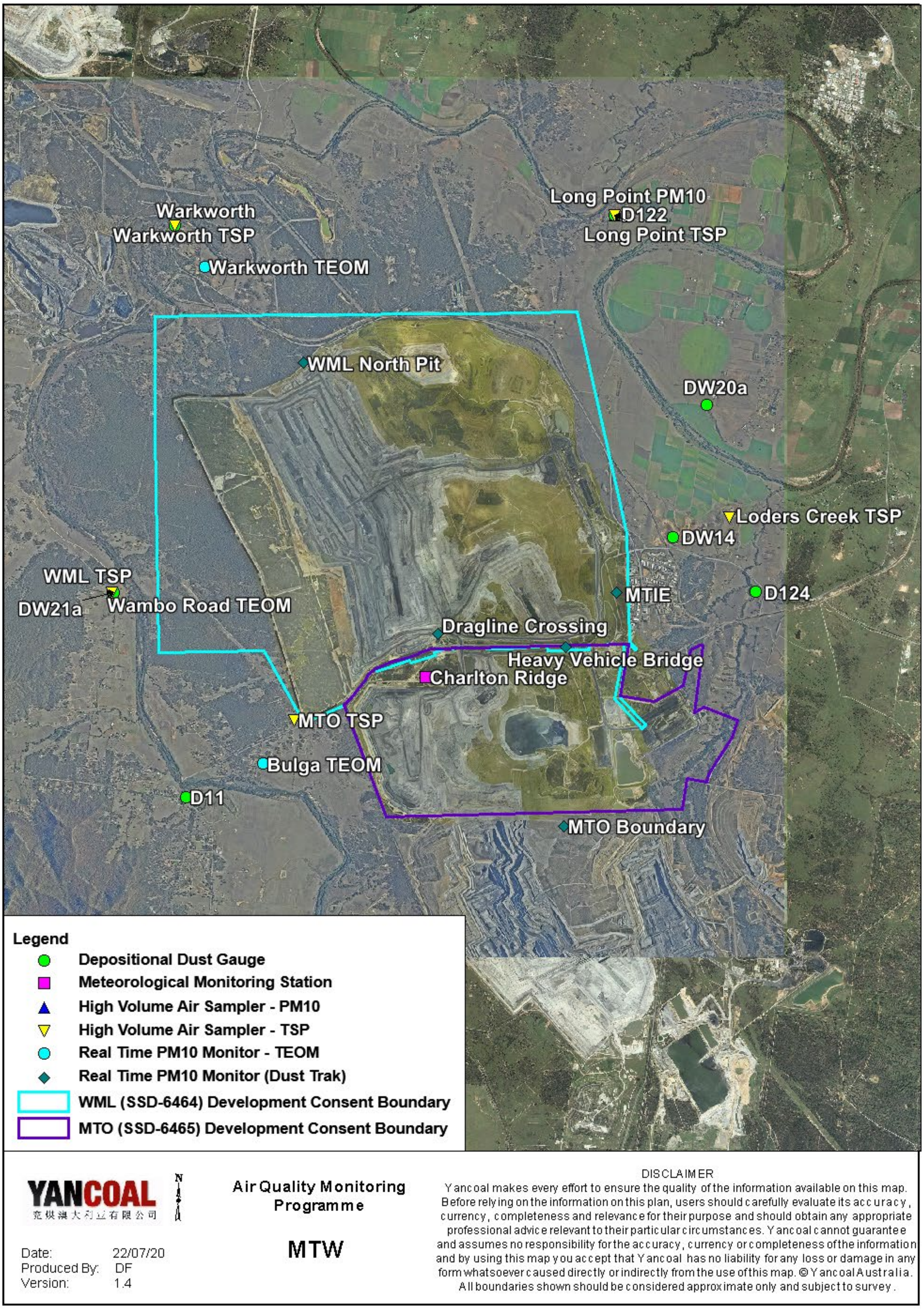

Figure 3: Air Quality Monitoring Locations

2.2 Depositional Dust

To monitor air quality, MTW operates and maintains a network of seven depositional dust gauges, situated on private and mine owned land surrounding MTW.

During the reporting period the Warkworth monitor recorded a monthly result above the long-term impact assessment criteria of 4.0 g/m2 per month. There is no evidence to suggest that the result is contaminated. Accordingly, the result will be included in the annual average calculation.

Figure 4 displays insoluble solids results from depositional dust gauges during the reporting period compared against the year-to-date average and the annual impact assessment criteria.

An annual assessment of MTW's compliance with the Long-Term Impact Assessment Criteria will be provided in the 2023 Annual Review Report.

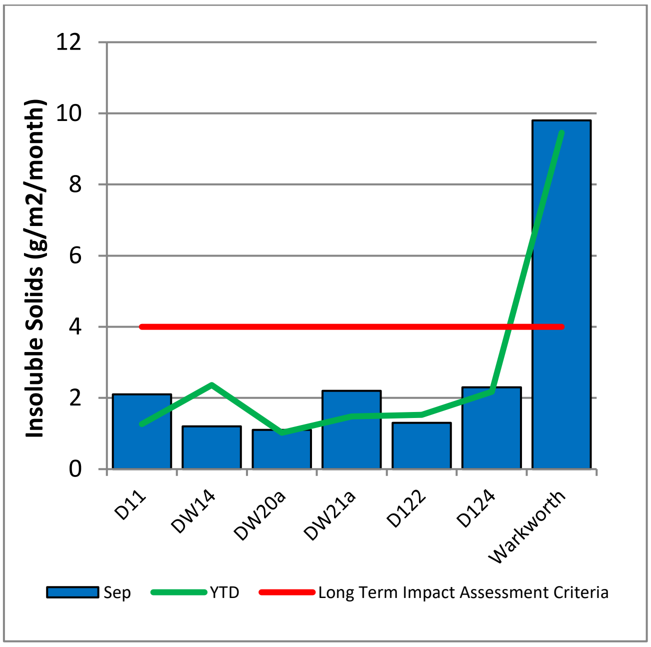

Figure 4: Depositional Dust – September 2023

2.3 Suspended Particulates

Suspended particulates are measured by a network of High Volume Air Samplers (HVAS) measuring Total Suspended Particulates (TSP) and Particulate Matter <10µm (PM_{10}). The location of these monitors can be found in **Figure 3**. Each HVAS was run for 24 hours on a six-day cycle in accordance with EPA requirements.

2.3.1 HVAS PM_{10} Results

Figure 5 shows the individual PM_{10} results at each monitoring station against the short-term impact assessment criteria of 50µg/m³.

On 20 September 2023 the Long Point HVAS PM10 unit recorded a result of 73.7 µg/m³, which is greater than the short term (24hr) PM10 impact assessment criteria.

Investigation determined that the wind direction was generally not from MTW's angle of influence and that the likely MTW contribution to the results is less than 75%. Accordingly, no further action is required (as per approved Air Quality Monitoring Programme).

Figure 6 shows the annual average PM10 result against the long term impact assessment criteria.

An assessment of MTW's compliance with the Long-Term Impact Assessment Criteria will be provided in the 2023 Annual Review Report.

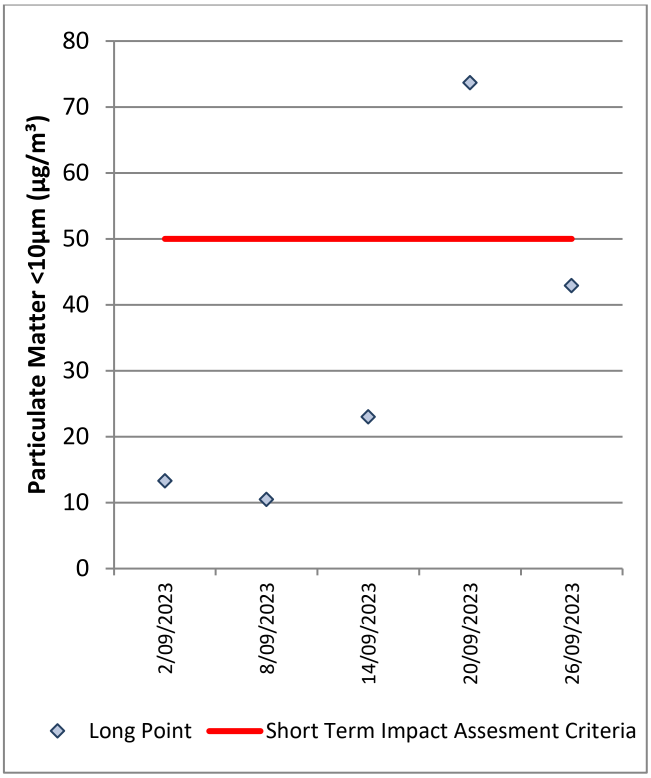

Figure 5: Individual PM10 Results – September 2023

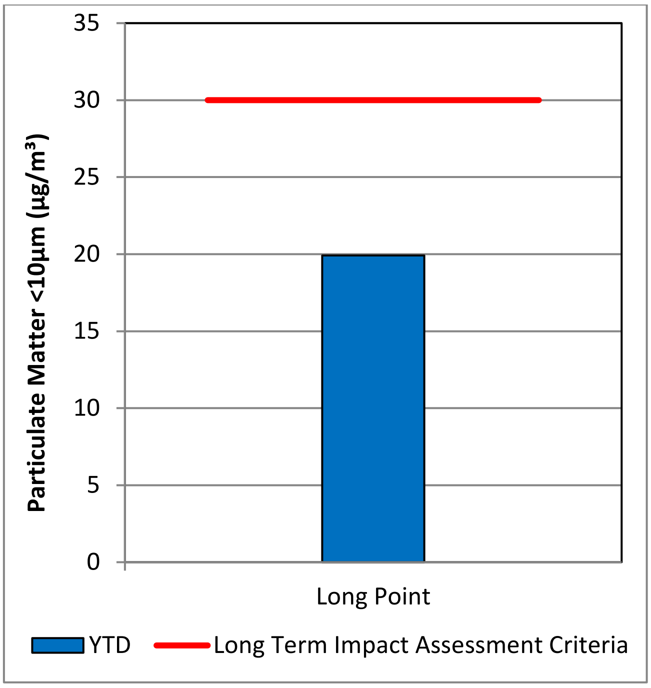

Figure 6: Annual Average PM_{10} – September 2023

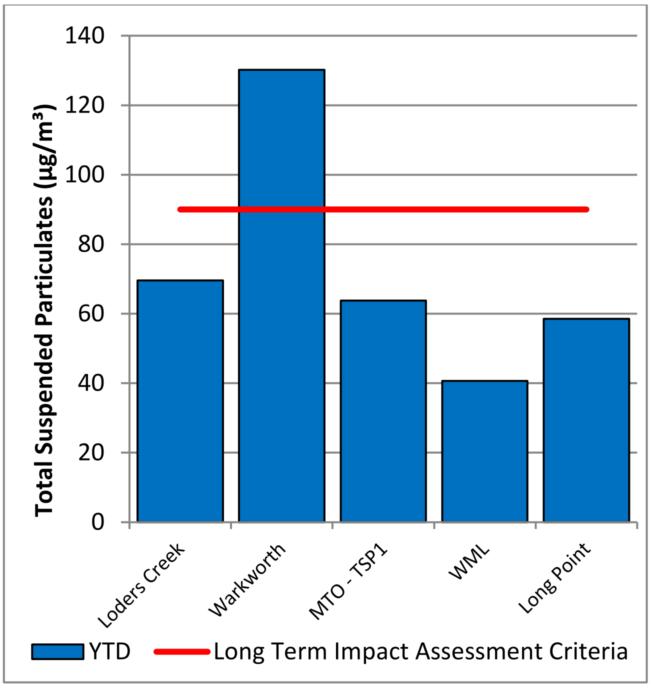

Figure 7: Annual Average Total Suspended Particulates – September 2023

2.3.2 TSP Results

Figure 7 shows the annual average TSP results compared against the long-term impact assessment criteria of 90µg/m³.

An assessment of MTW's compliance with the Long-Term Impact Assessment Criteria will be provided in the 2023 Annual Review Report.

2.3.3 Real Time PM_{10} Results

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

Results for real time dust sampling are shown in **Figure 8**, including the daily 24-hour average PM_{10} result and the annual PM_{10} average.

On 7 September 2023, the Warkworth OEH TEOM (53.5µg/m³) exceeded the short term (24hr) criteria. The measurement was assessed for MTW's potential contribution based on meteorological conditions and background PM_{10} levels on this day resulting in a maximum estimated contribution of 6.2 µg/m³, less than a 12% contribution to the result. Accordingly, no further action is required (as per approved Air Quality Monitoring Programme).

On 7 September 2023, the Bulga OEH TEOM (51.1 µg/m³) exceeded the short term (24hr) criteria. The measurement was assessed for MTW's potential contribution based on meteorological conditions on this day resulting in a maximum estimated contribution of 26.8 ug/m³, less than a 53% contribution to the result. Accordingly, no further action is required (as per approved Air Quality Monitoring Programme).

On 16 September 2023, the Warkworth OEH TEOM (59.2 µg/m³) exceeded the short term (24hr) criteria. The measurement was assessed for MTW's potential contribution based on meteorological conditions on this day resulting in a maximum estimated contribution of 1.1 ug/m³, less than a 2% contribution to the result. Accordingly, no further action is required (as per approved Air Quality Monitoring Programme).

On 17 September 2023, the Warkworth OEH TEOM (51.9 µg/m³) exceeded the short term (24hr) criteria. The measurement was assessed for MTW's potential contribution based on meteorological conditions on this day resulting in a maximum estimated contribution of 15.1 ug/m³, less than a 30% contribution to the result. Accordingly, no further action is required (as per approved Air Quality Monitoring Programme).

On 18 September 2023, the Warkworth OEH TEOM (50.9 µg/m³) exceeded the short term (24hr) criteria. The measurement was assessed for MTW's potential contribution based on meteorological conditions on this day resulting in a maximum estimated contribution of 13.1 ug/m³, less than a 26% contribution to the result. Accordingly, no further action is required (as per approved Air Quality Monitoring Programme).

On 19 September 2023, the Warkworth OEH TEOM (93.6 µg/m³) exceeded the short term (24hr) criteria. The measurement was assessed for MTW's potential contribution based on meteorological conditions on this day resulting in a maximum estimated contribution of 1.3 ug/m³, less than a 2% contribution to the result. Accordingly, no further action is required (as per approved Air Quality Monitoring Programme).

On 20 September 2023, the Warkworth OEH TEOM (93.6 µg/m³) exceeded the short term (24hr) criteria. The measurement was assessed for MTW's potential contribution based on meteorological conditions on this day resulting in a maximum estimated contribution of 11.8 ug/m³, less than a 13% contribution to the result. Accordingly, no further action is required (as per approved Air Quality Monitoring Programme).

2.3.4 Real Time Alarms for Air Quality

During September, the real time monitoring system generated 272 automated air quality related alerts, including 12 alerts for adverse meteorological conditions and 260 alerts for elevated PM_{10} levels.

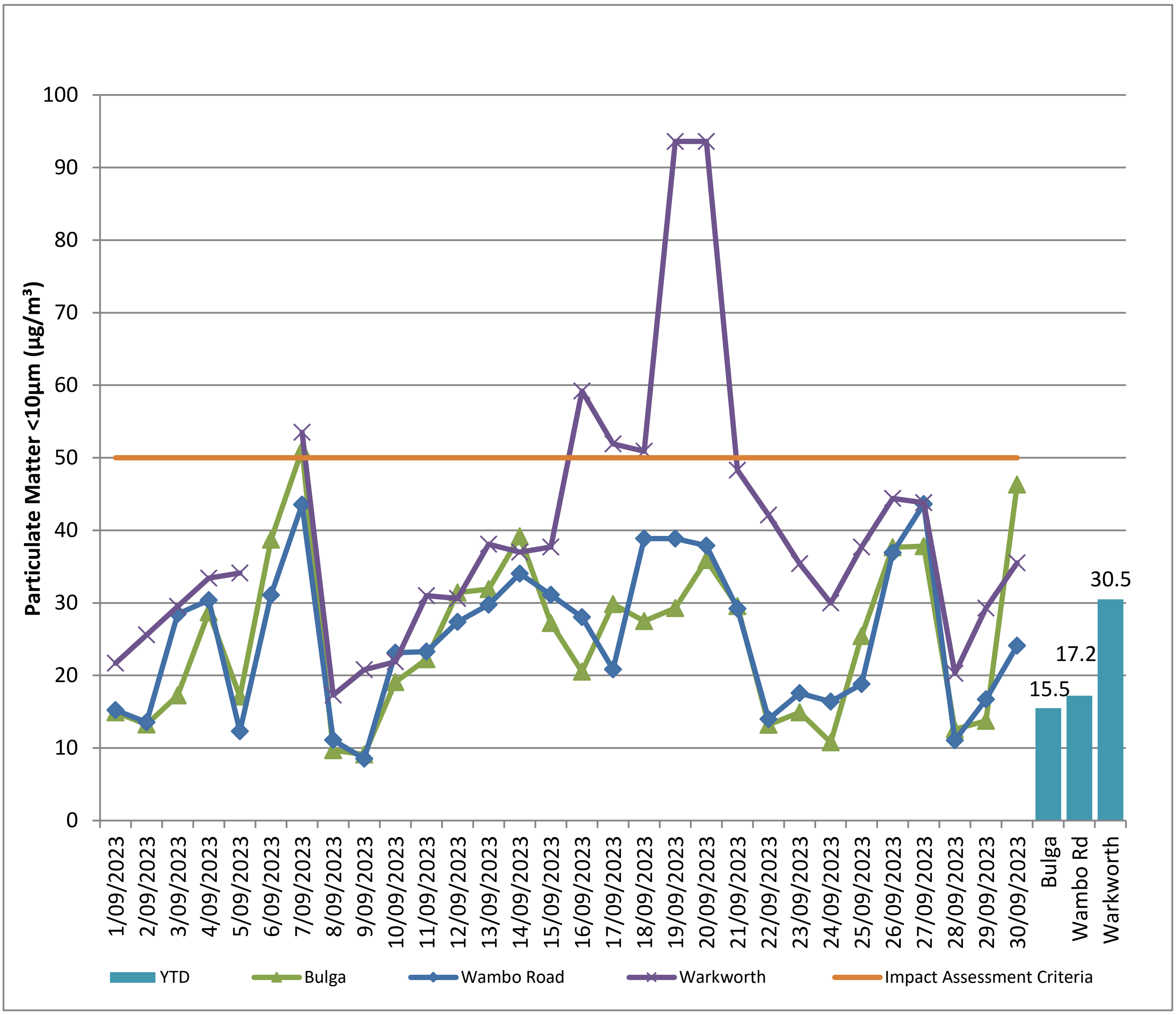

Figure 8: Real Time PM_{10} daily 24hr average (line graphs) and YTD annual average (column graphs) – September 2023

3.0 WATER QUALITY

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

3.1 Surface Water

Monitoring is conducted at mine site dams and surrounding natural watercourses. The surface water monitoring locations are outlined in **Figure 15**.

Surface water courses are sampled on a monthly or quarterly sampling regime. Water quality is evaluated through the parameters of pH, Electrical Conductivity (EC) and Total Suspended Solids (TSS). The Hunter River and the Wollombi Brook are sampled both upstream and downstream of mining operations, to record background water quality and to monitor the potential impact of mining on the river system. Other Hunter River tributaries are also monitored.

3.1.1 Surface Water Monitoring results

Figure 9 to **Figure 11** show the long-term surface waste trend (2020 – current) within MTW mine dams. **Figure 12** to **Figure 14** show the long-term surface water trend (2020 – current) in surrounding watercourses.

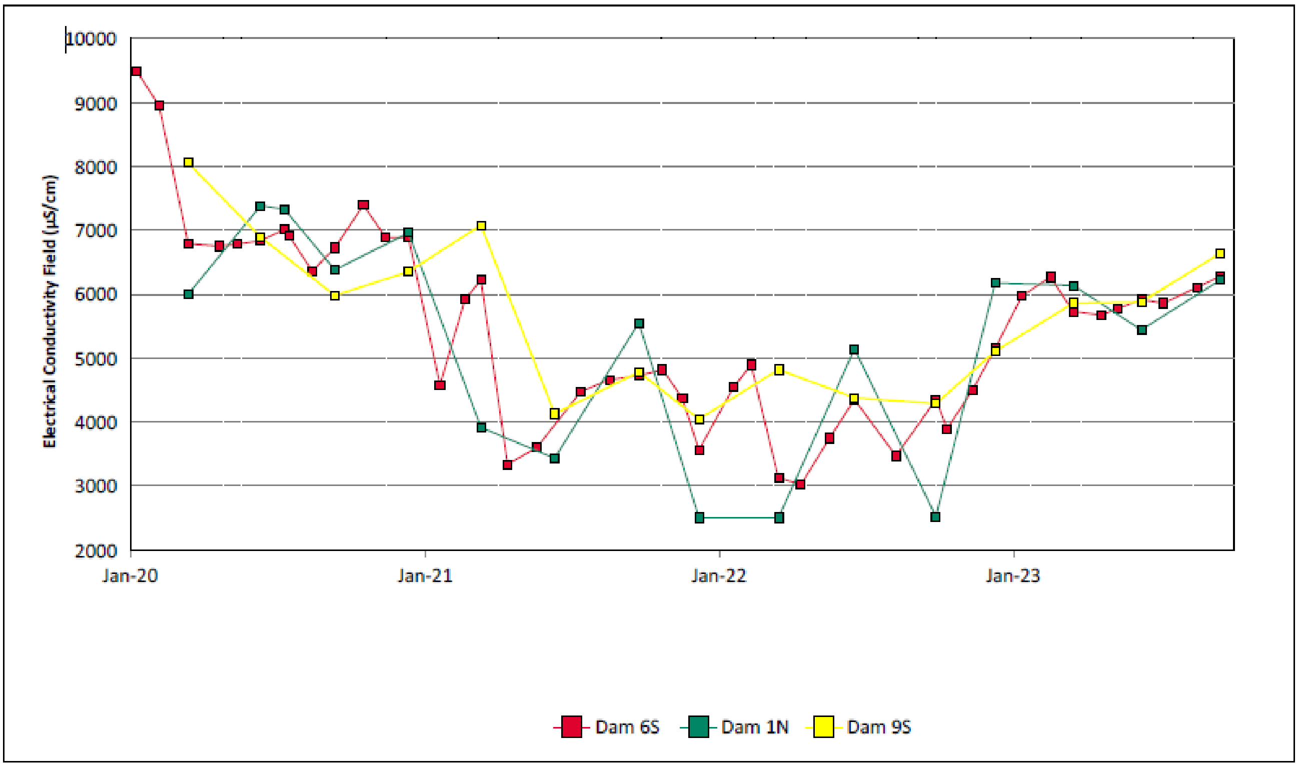

Figure 9: Site Dams Electrical Conductivity Field Trend – September 2023

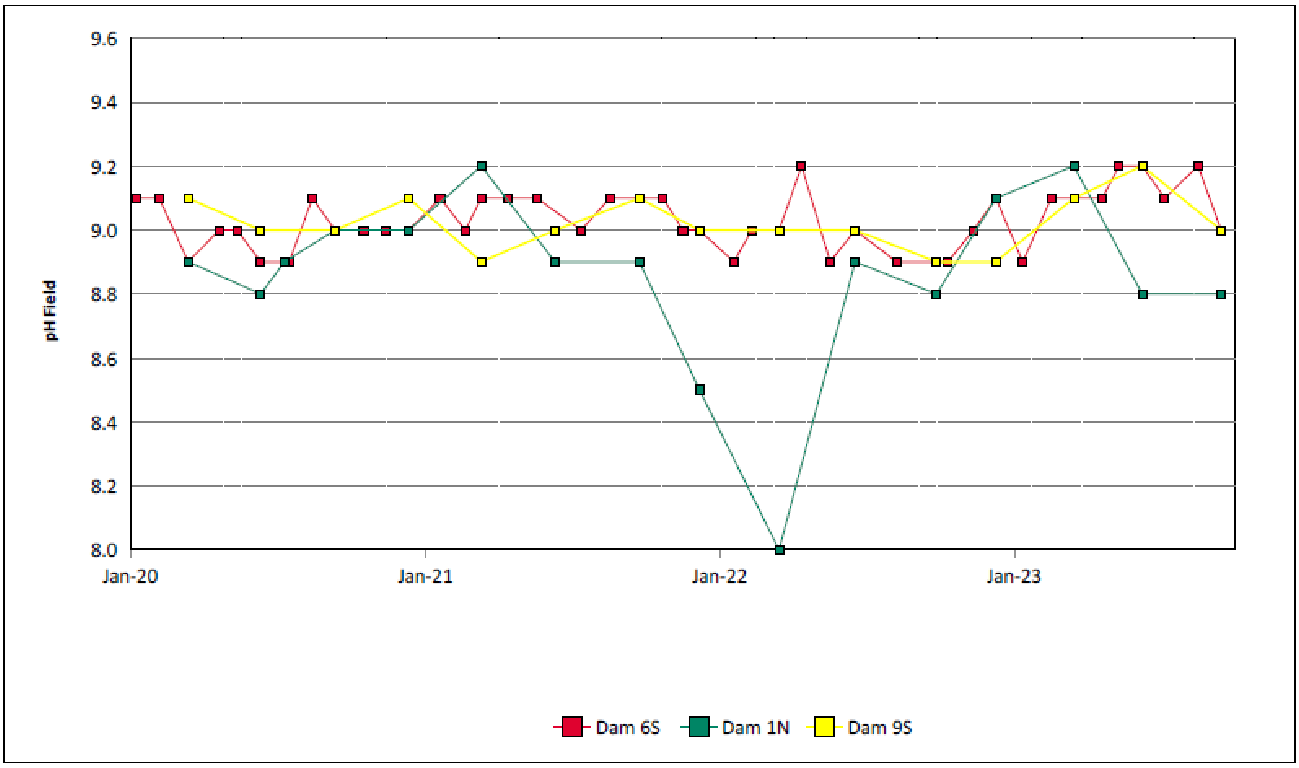

Figure 10: Site Dams pH Field Trend – September 2023

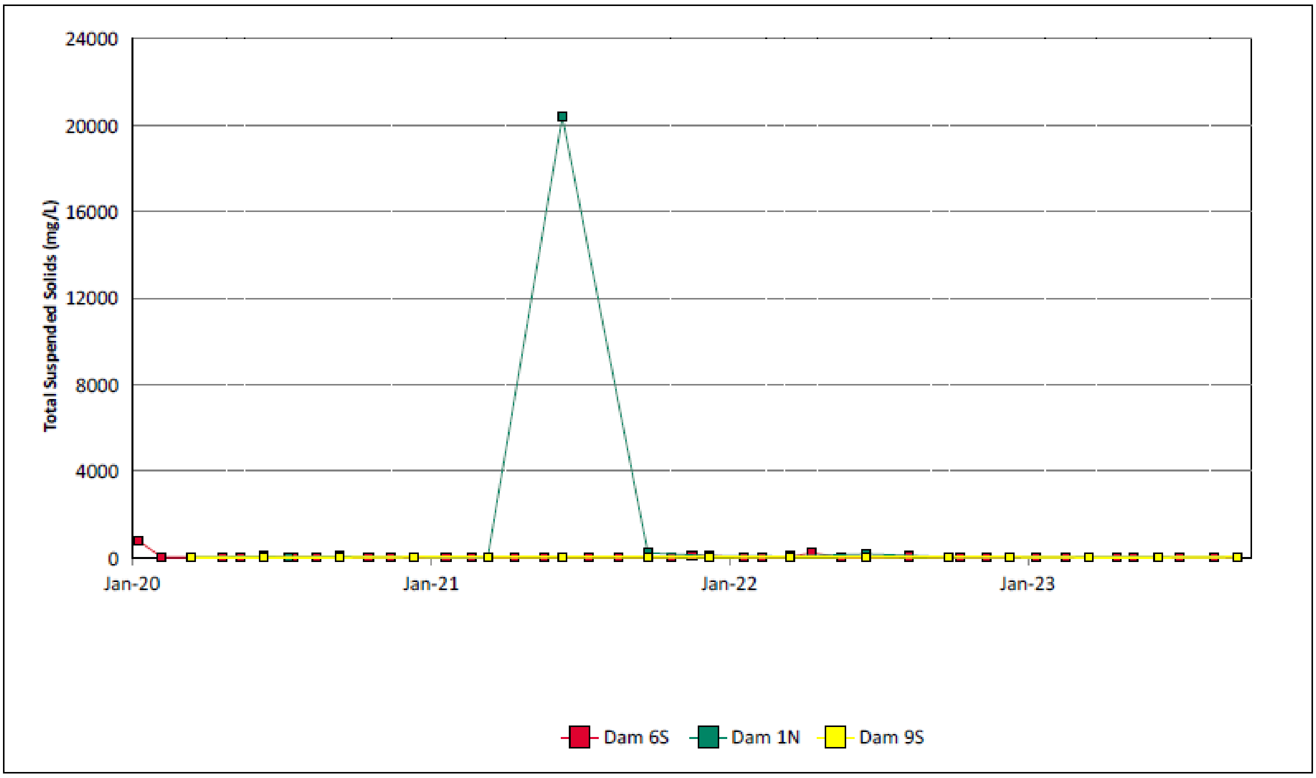

Figure 11: Site Dams Total Suspended Solids Trend – September 2023

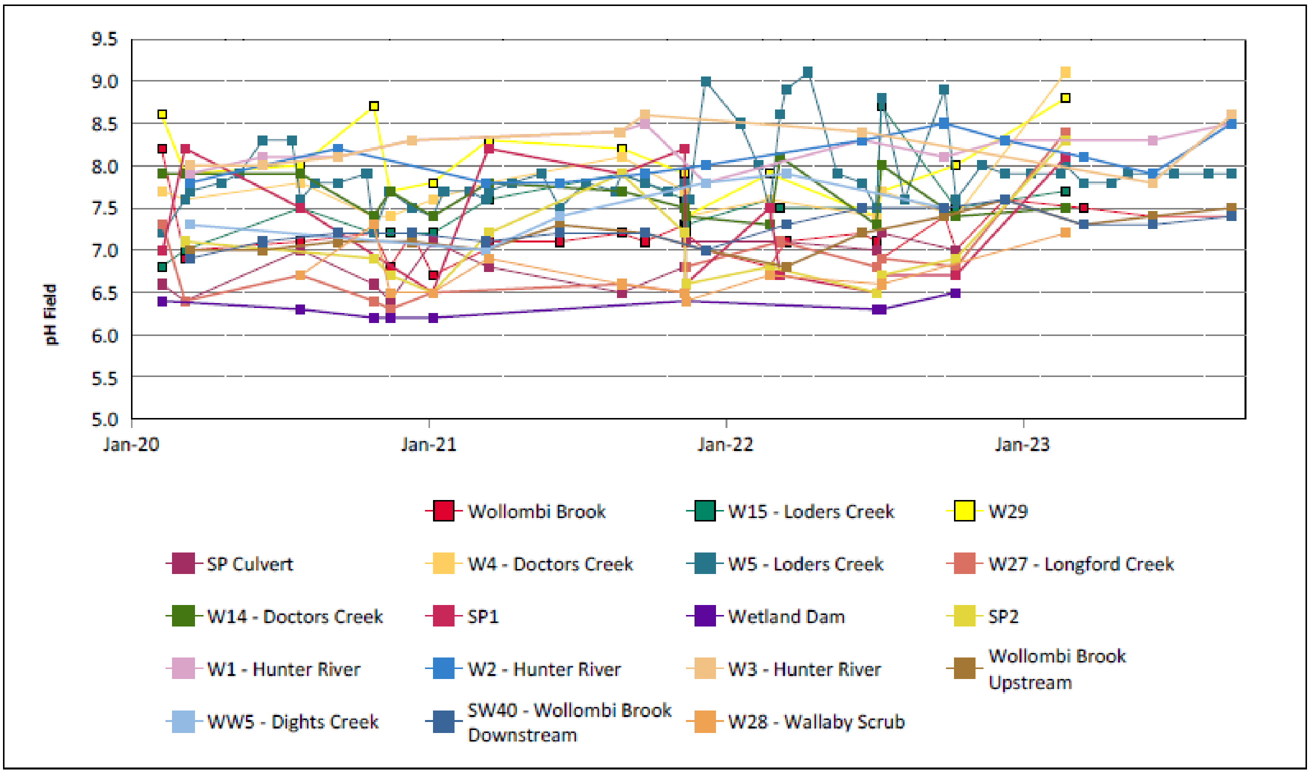

Figure 12: Watercourse pH Field Trend – September 2023

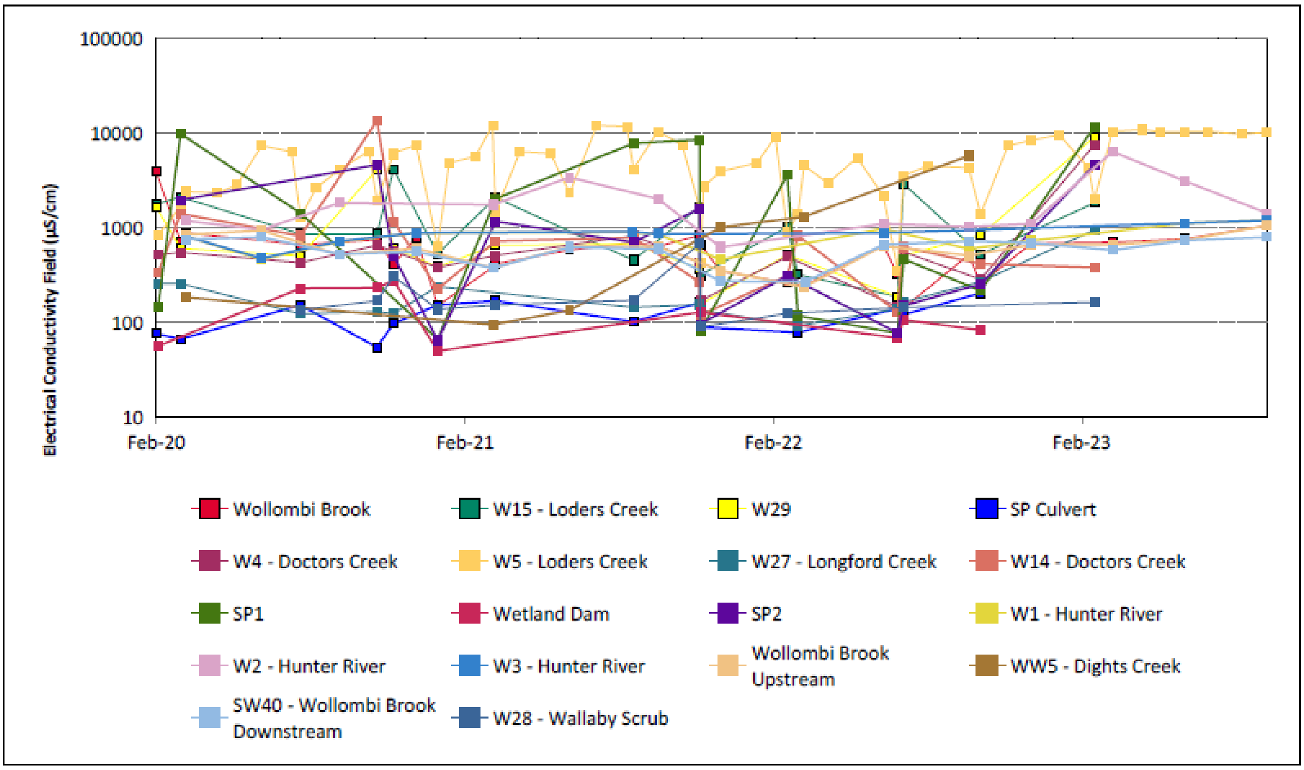

Figure 13: Watercourse Electrical Conductivity Field Trend – September 2023

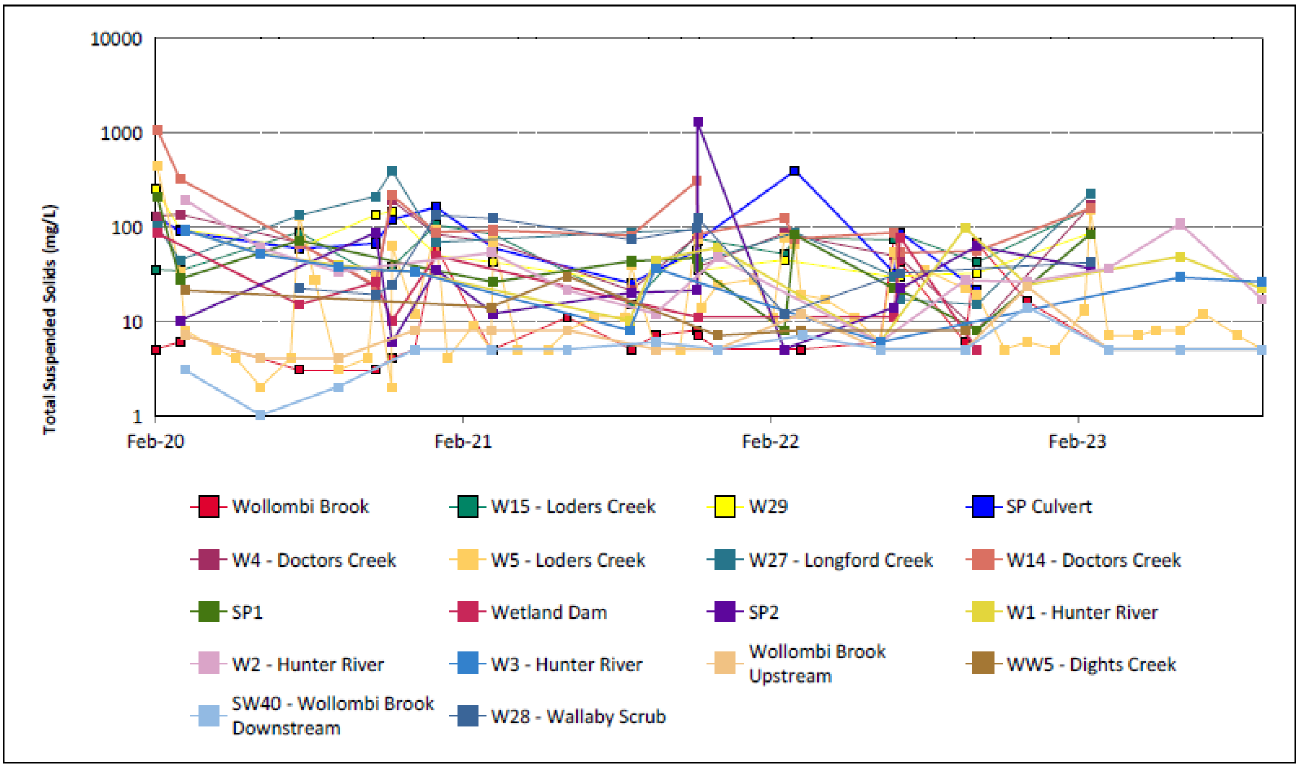

Figure 14: Watercourse Total Suspended Solids Trend – September 2023

3.1.2 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 MTW Water Management Plan.

Current internal surface water trigger limit breaches are summarised in **Table 2**.

Table 2: Surface Water Trigger Tracking – September 2023

Site	Date	Trigger Limit Breached	Action Taken in Response
W1	08/06/2023	EC – 95th Percentile	Watching Brief*
W1	14/09/2023	EC – 95th Percentile	Watching Brief*
W2	15/03/2023	EC – 95th Percentile	Watching Brief*
W3	08/06/2023	EC – 95th Percentile	Watching Brief*
W3	14/09/2023	EC – 95th Percentile	Watching Brief*
W27	22/02/2023	EC – 95th Percentile	Watching Brief*
W4	22/02/2023	pH – 95th Percentile	Watching Brief*
W27	22/02/2023	pH – 95th Percentile	Watching Brief*
W3	14/09/2023	pH – 95th Percentile	Watching Brief*
W2	08/06/2023	TSS – 50mg/L (ANZECC criteria)	Watching Brief*. Unlikely to be associated with MTW mining related impacts. Elevated TSS results most likely attributable to sampling from water with no flow (pool of water). Note: Result is not considered to be a valid representation given that there was no flow at the time of sampling.
W4	22/02/2023	TSS – 50mg/L (ANZECC criteria)	Elevated TSS associated with high runoff due to rainfall event (53.2mm on 22/02/2023), resulting in mobilisation of sediment. No MTW site sources of sediment identified. No follow up required.
W14	22/02/2023	TSS – 50mg/L (ANZECC criteria)	Elevated TSS associated with high runoff due to rainfall event (53.2mm on 22/02/2023), resulting in mobilisation of sediment. No MTW site sources of sediment identified. No follow up required.
W15	22/02/2023	TSS – 50mg/L (ANZECC criteria)	Elevated TSS associated with high runoff due to rainfall event (53.2mm on 22/02/2023), resulting in mobilisation of sediment. No MTW site sources of sediment identified. No follow up required.
W27	22/02/2023	TSS – 50mg/L (ANZECC criteria)	Elevated TSS associated with high runoff due to rainfall event (53.2mm on 22/02/2023), resulting in mobilisation of sediment. No MTW site sources of sediment identified. No follow up required.
W29	22/02/2023	TSS – 50mg/L (ANZECC criteria)	Elevated TSS associated with high runoff due to rainfall event (53.2mm on 22/02/2023), resulting in mobilisation of sediment. No MTW site sources of sediment identified. No follow up required.
SP1	22/02/2023	TSS – 50mg/L (ANZECC criteria)	Elevated TSS associated with high runoff due to rainfall event (53.2mm on 22/02/2023), resulting in mobilisation of

Site	Date	Trigger Limit Breached	Action Taken in Response
			sediment. No MTW site sources of sediment identified. No follow up required.

3.2 HRSTS Discharge

MTW participates in the Hunter River Salinity Trading Scheme (HRSTS), allowing discharge from licensed discharge points located at Dam 1N and Dam 9S. Discharges can only take place subject to HRSTS regulations.

No HRSTS discharge occurred during the reporting period.

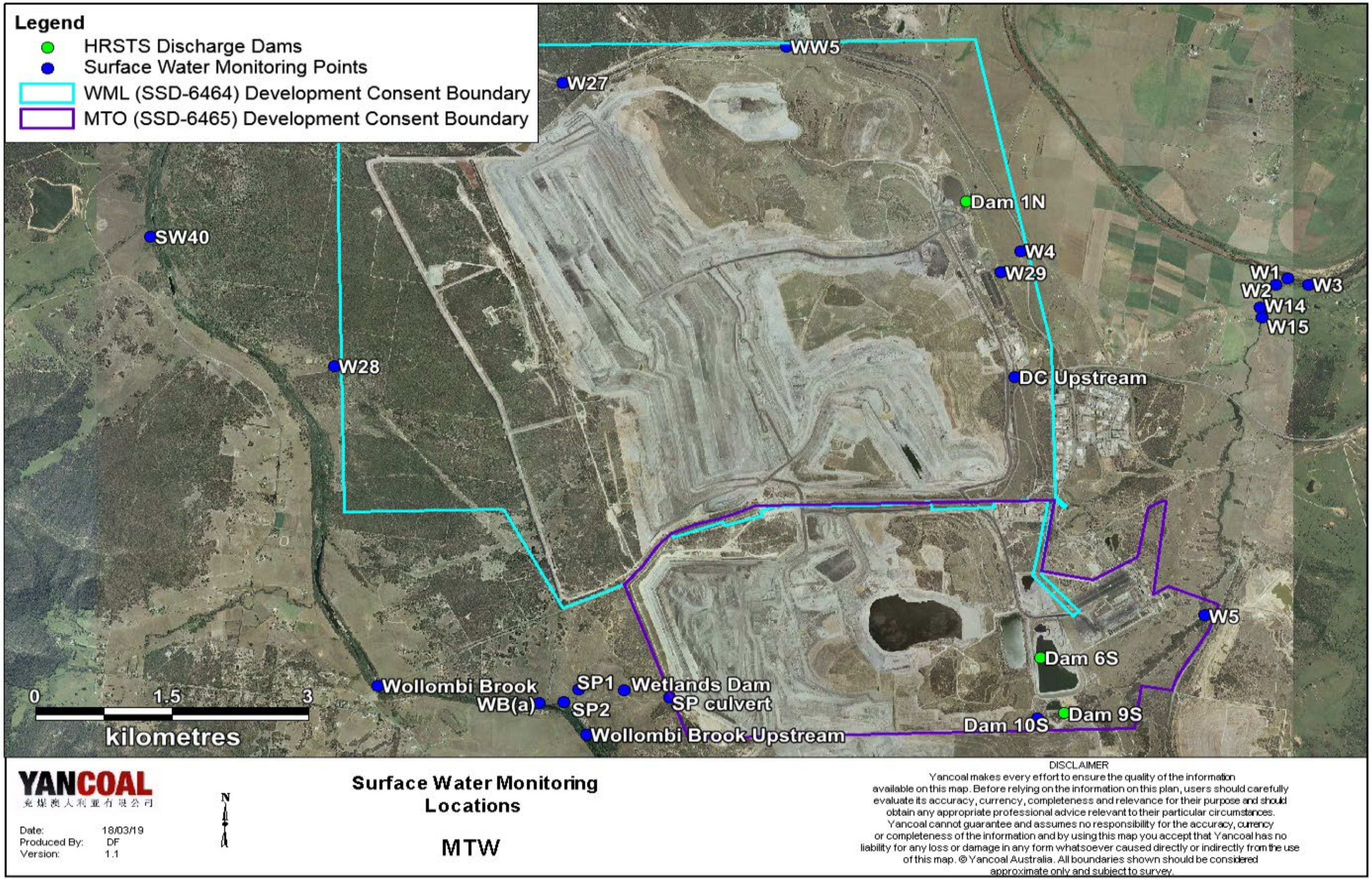

Figure 15: Surface Water Monitoring Location Plan

3.3 Groundwater Monitoring

Groundwater monitoring is undertaken on a quarterly basis in accordance with the MTW Groundwater Monitoring Programme.

Figure 16 to **Figure 64** show the long-term water quality trends (2020 - current) for groundwater bores monitored at MTW.

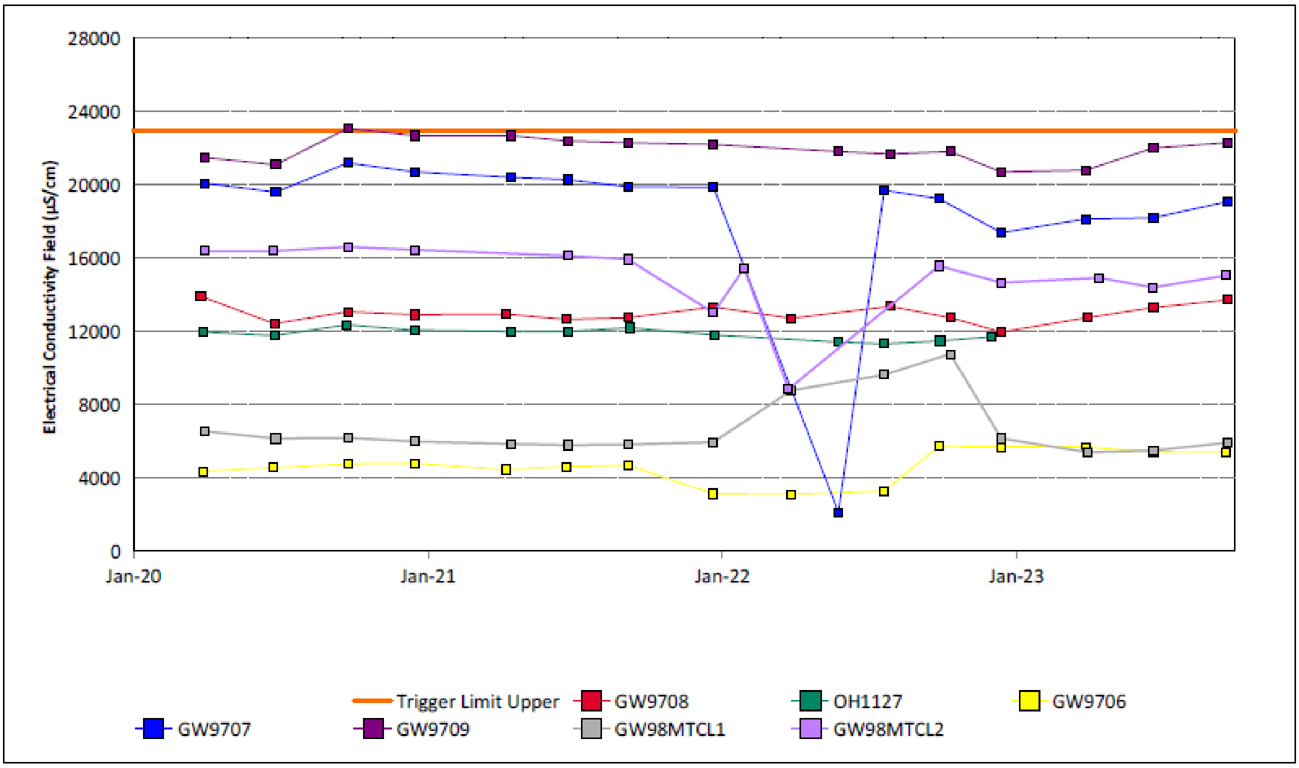

Figure 16: Bayswater Seam Electrical Conductivity Field Trend – September 2023

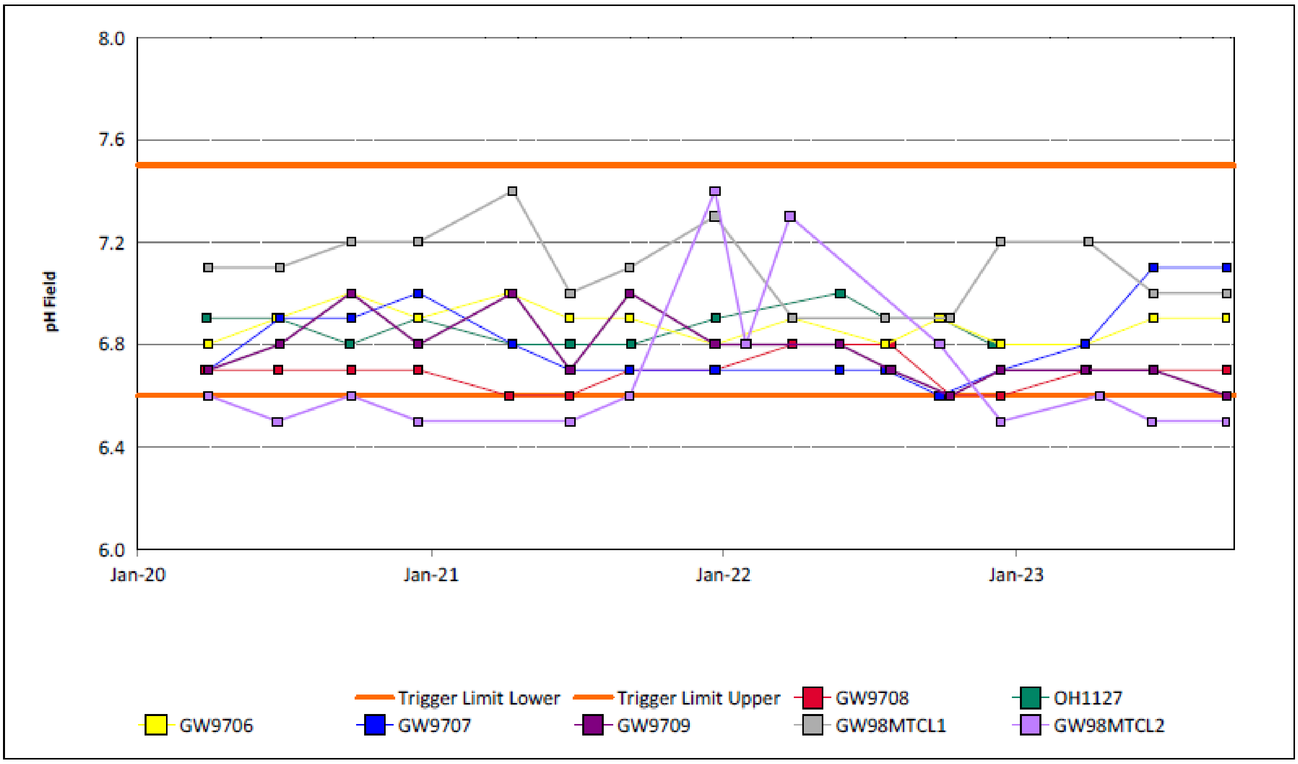

Figure 17: Bayswater Seam pH Field Trend – September 2023

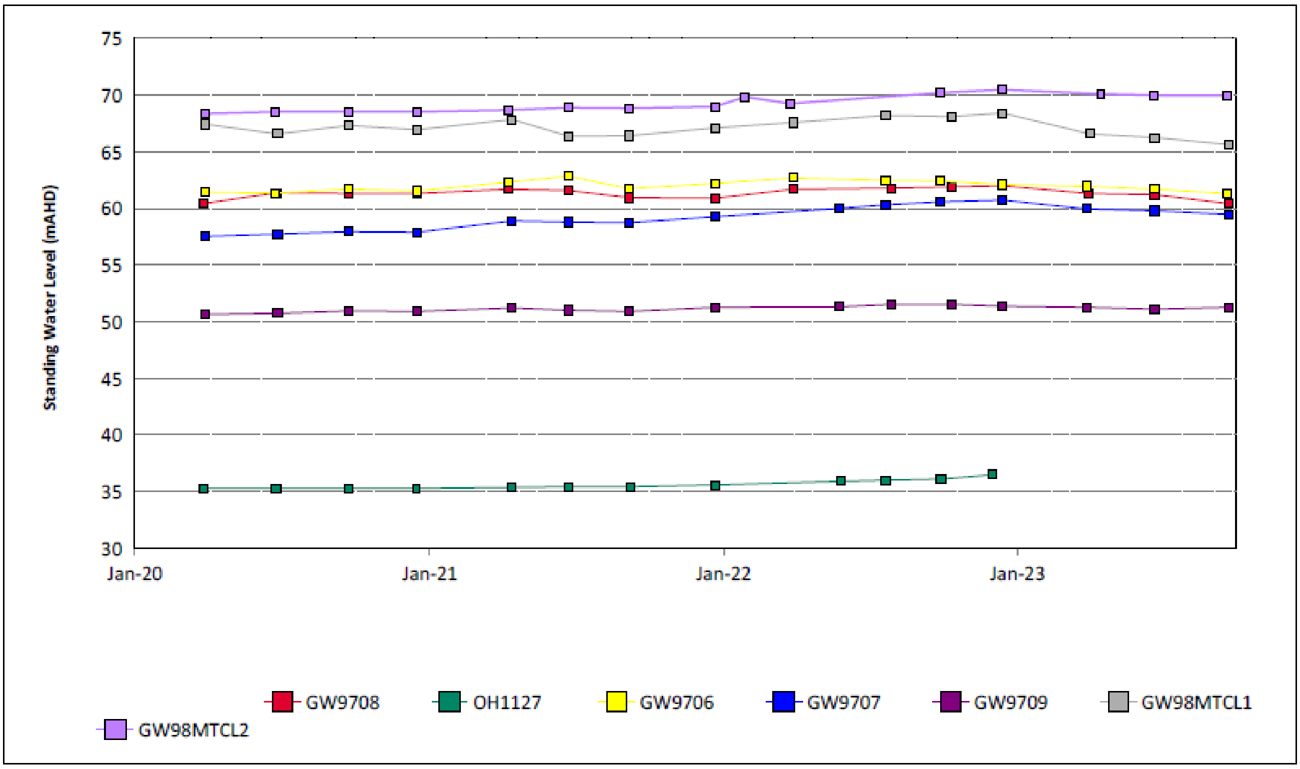

Figure 18: Bayswater Seam Standing Water Level Trend – September 2023

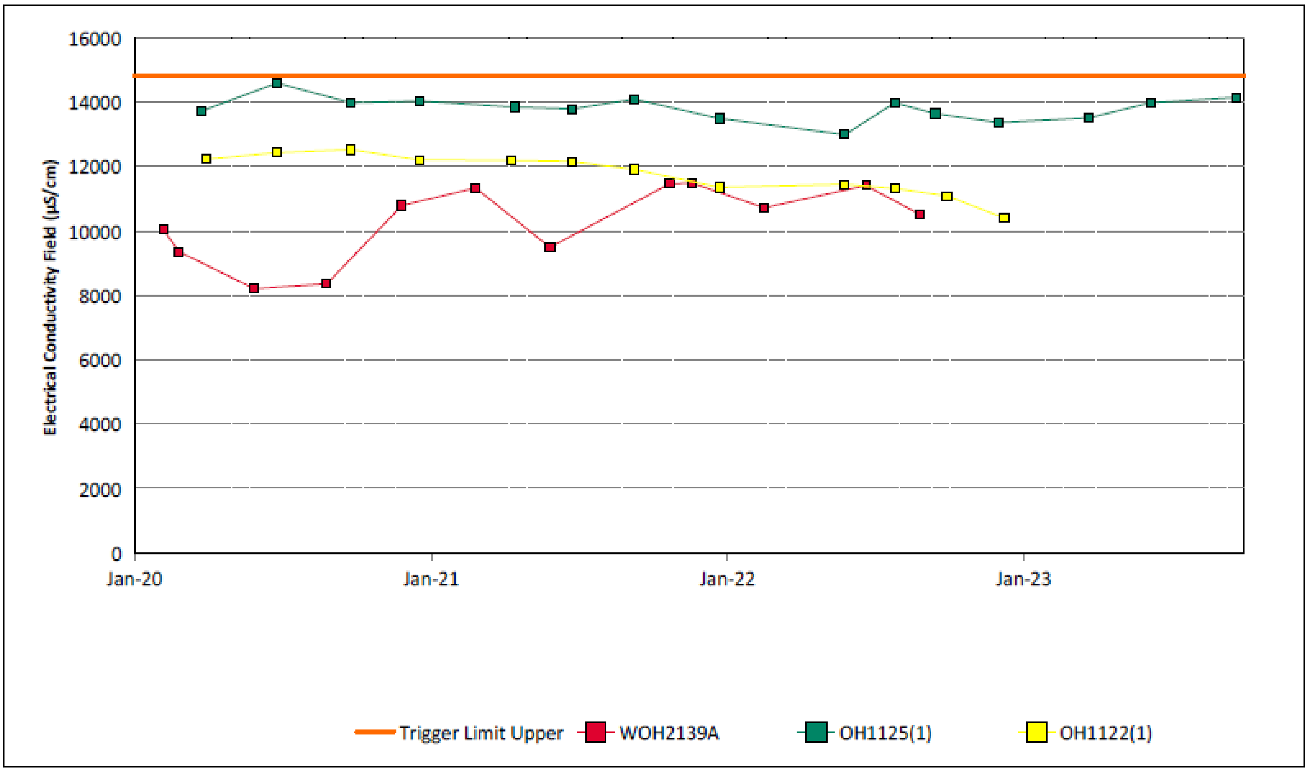

Figure 19: Blakefield Seam Electrical Conductivity Field Trend – September 2023

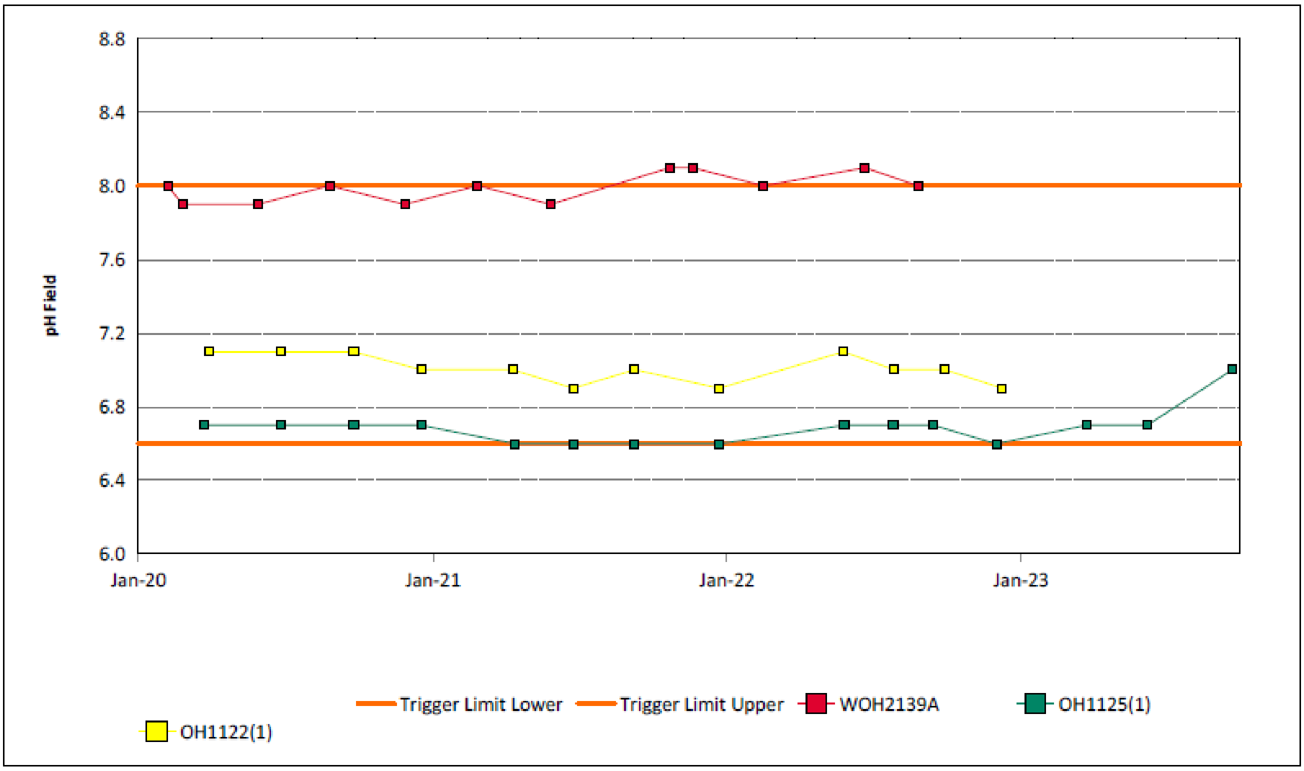

Figure 20: Blakefield Seam pH Field Trend – September 2023

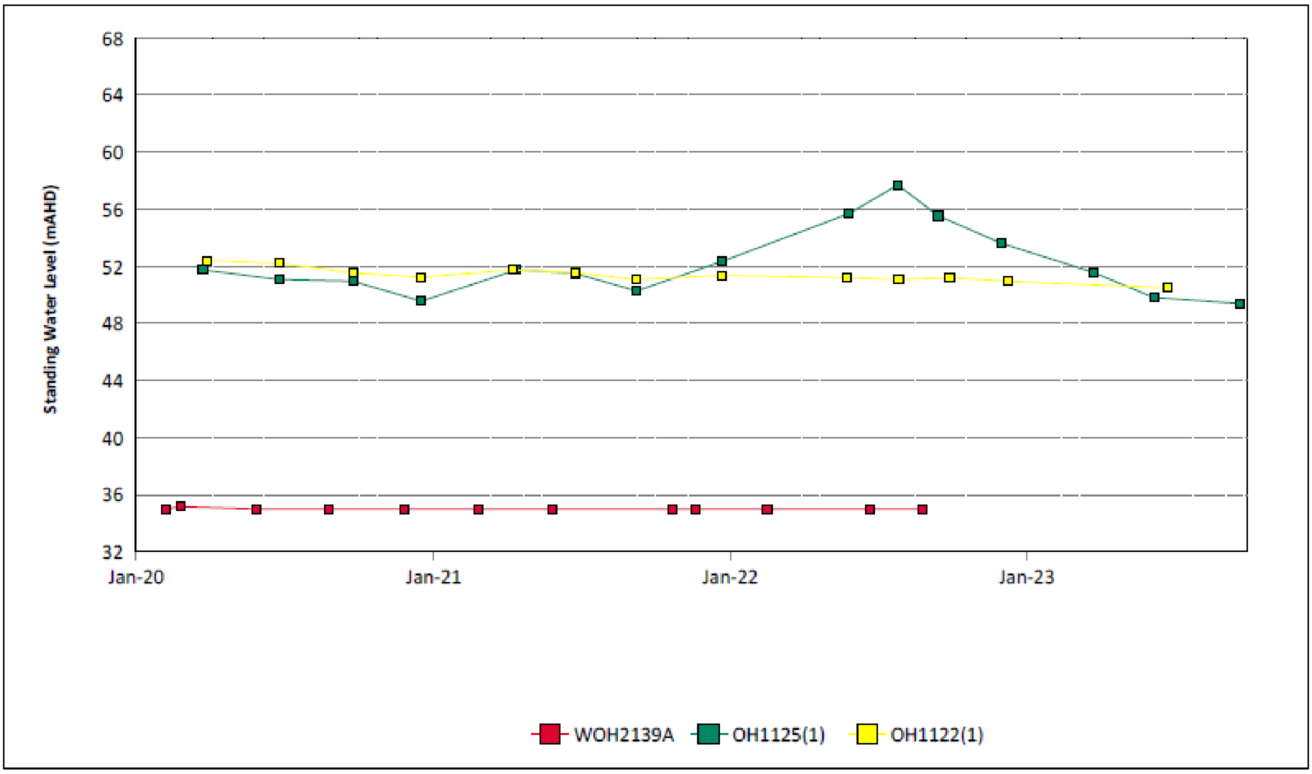

Figure 21: Blakefield Seam Standing Water Level Trend – September 2023

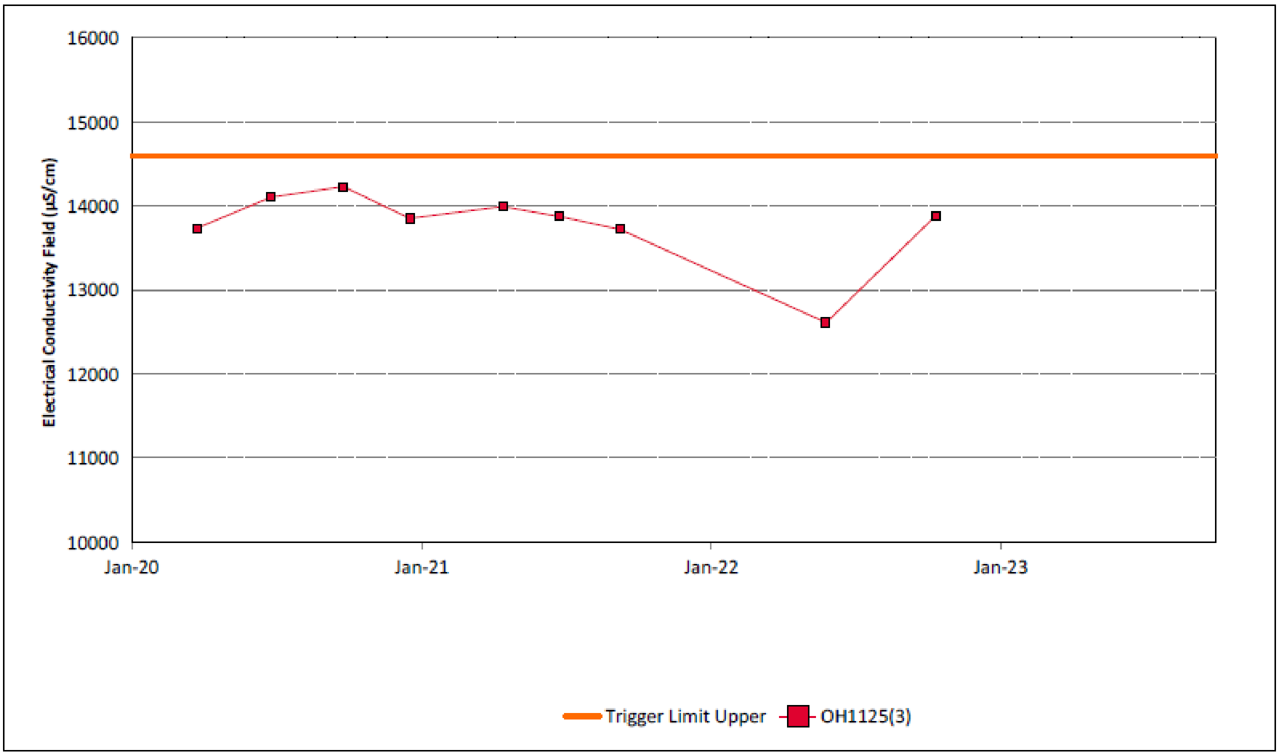

Figure 22: Bowfield Seam Electrical Conductivity Field Trend – September 2023

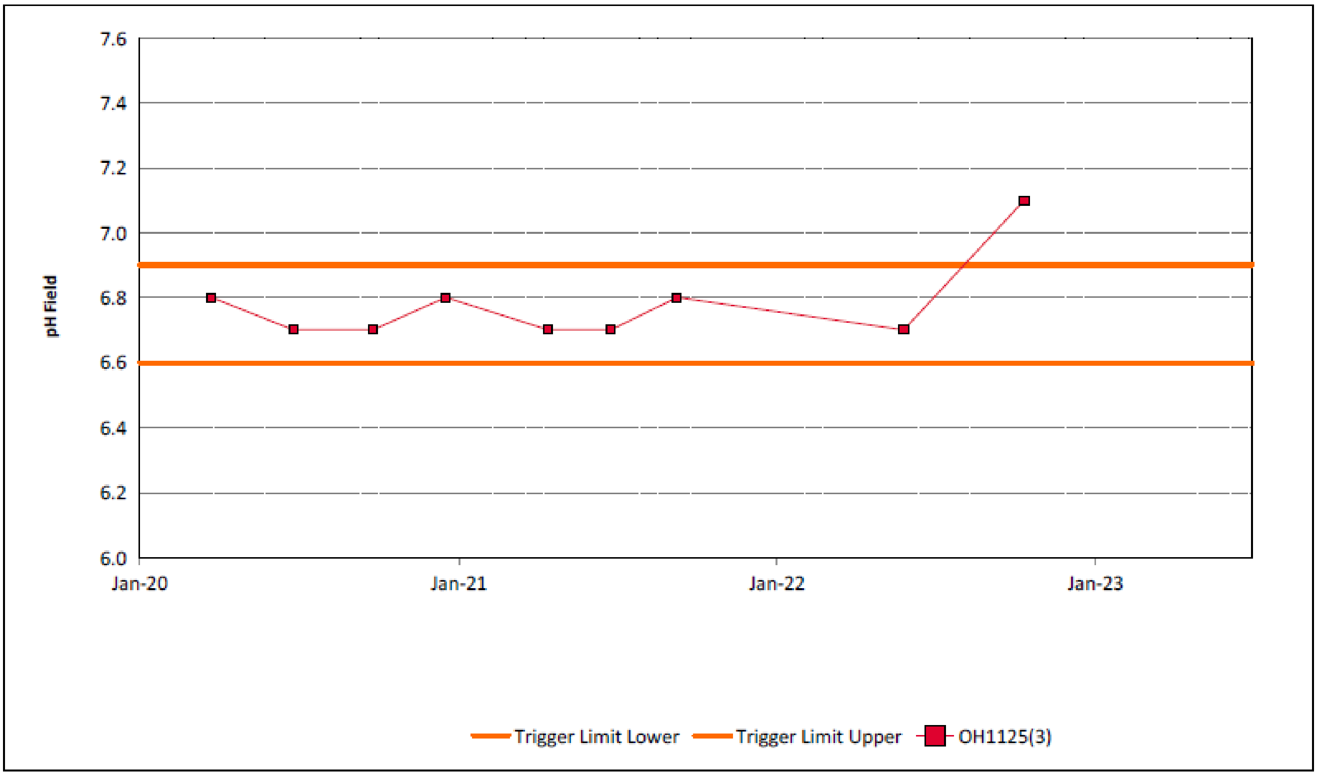

Figure 23: Bowfield Seam pH Field Trend - September 2023

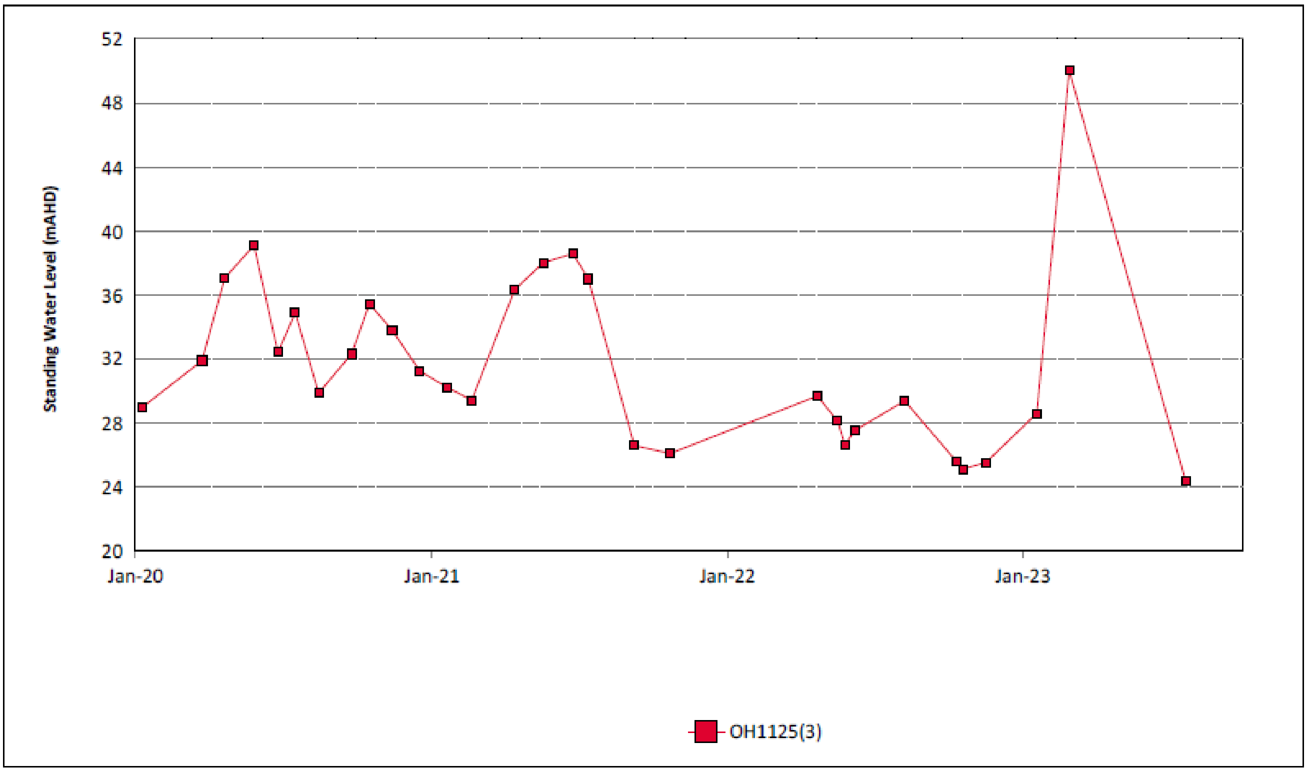

Figure 24: Bowfield Seam Standing Water Level Trend – September 2023

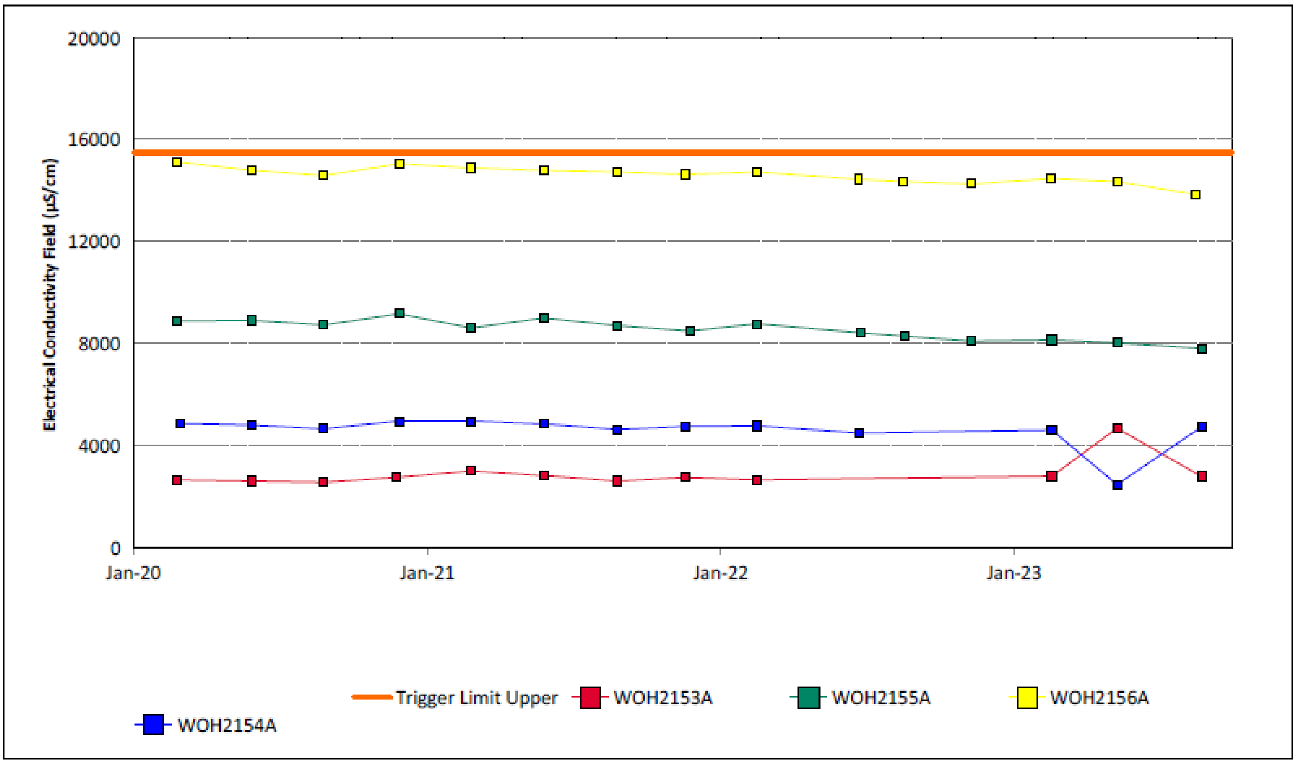

Figure 25: Redbank Seam Electrical Conductivity Field Trend – September 2023

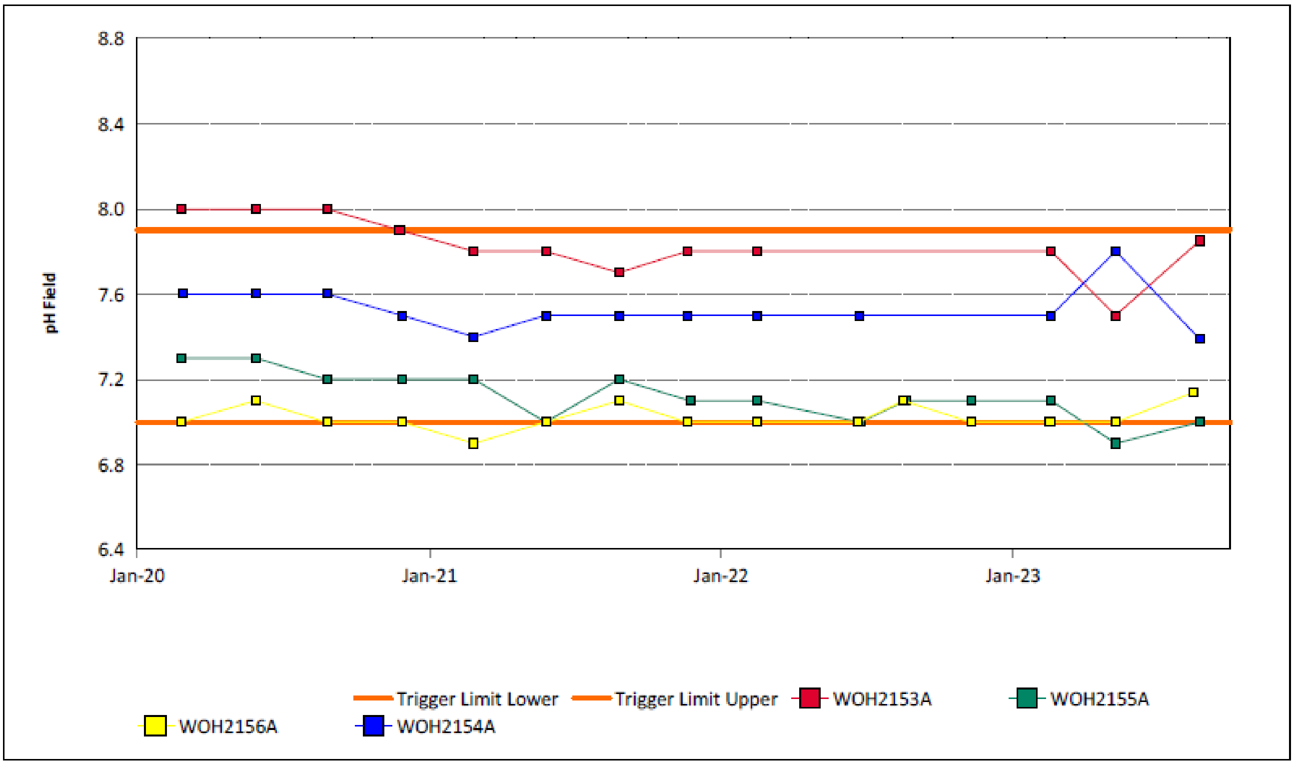

Figure 26: Redbank Seam pH Field Trend – September 2023

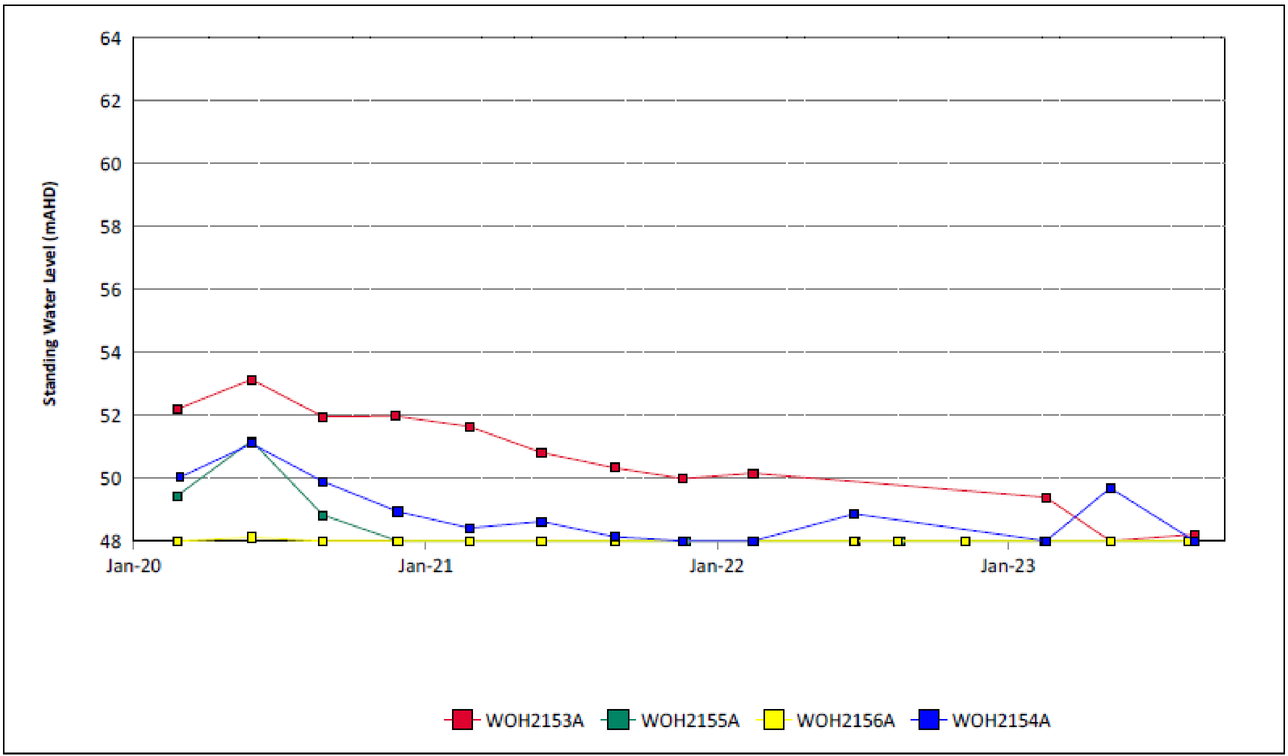

Figure 27: Redbank Seam Standing Water Level Trend – September 2023

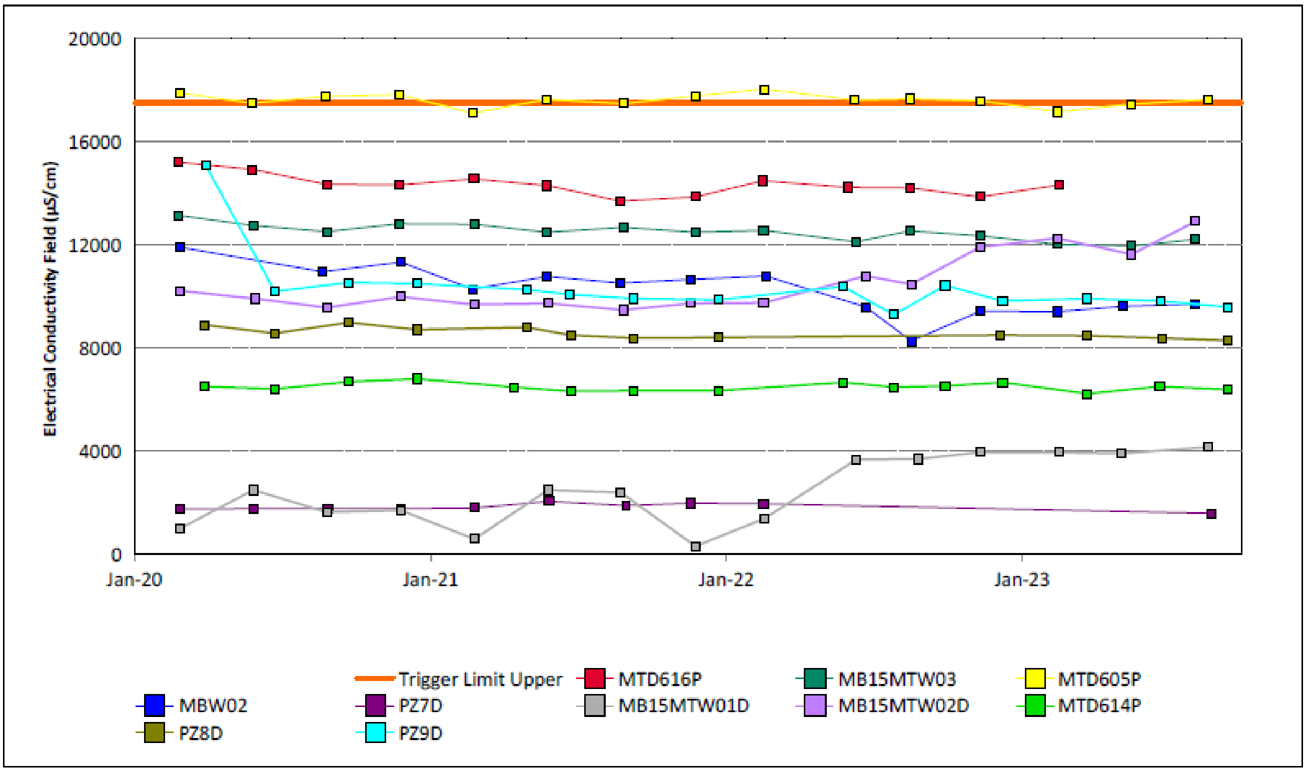

Figure 28: Shallow Overburden Electrical Conductivity Field Trend – September 2023

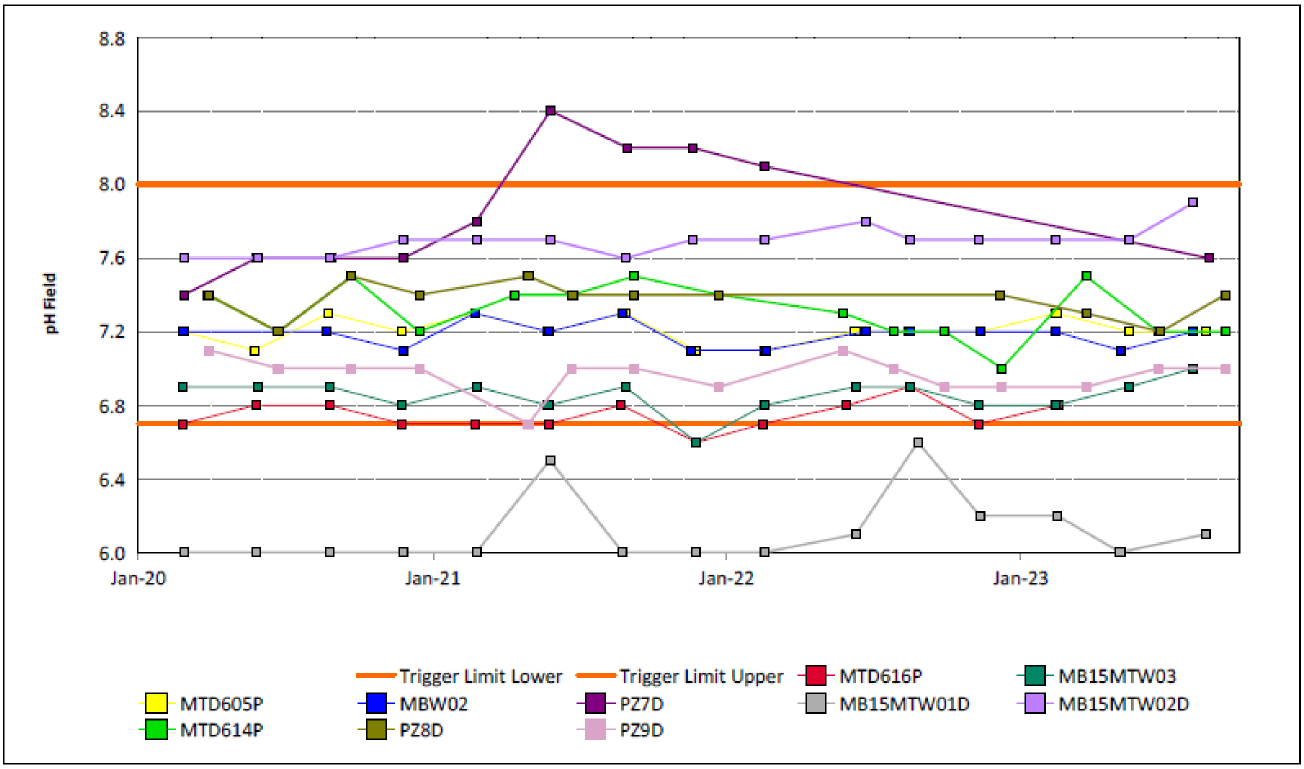

Figure 29: Shallow Overburden pH Field Trend – September 2023

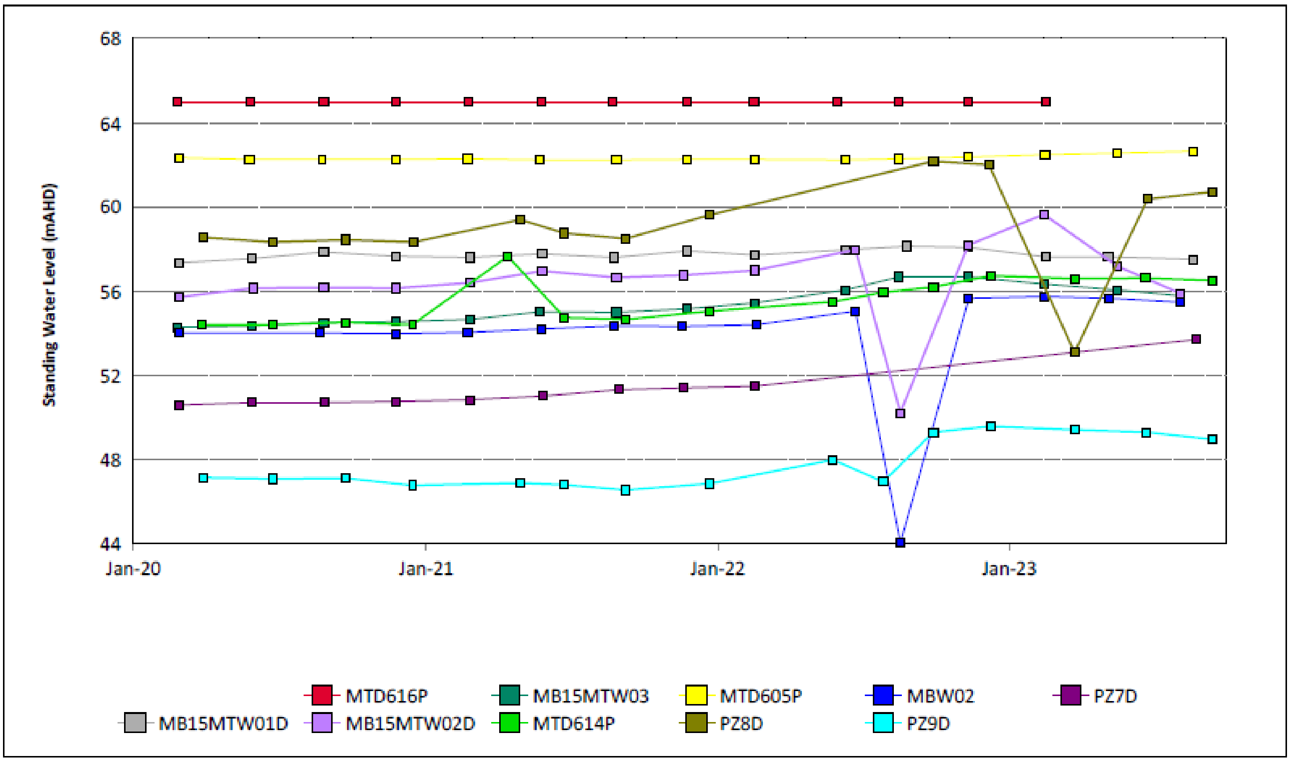

Figure 30: Shallow Overburden Standing Water Level Trend – September 2023

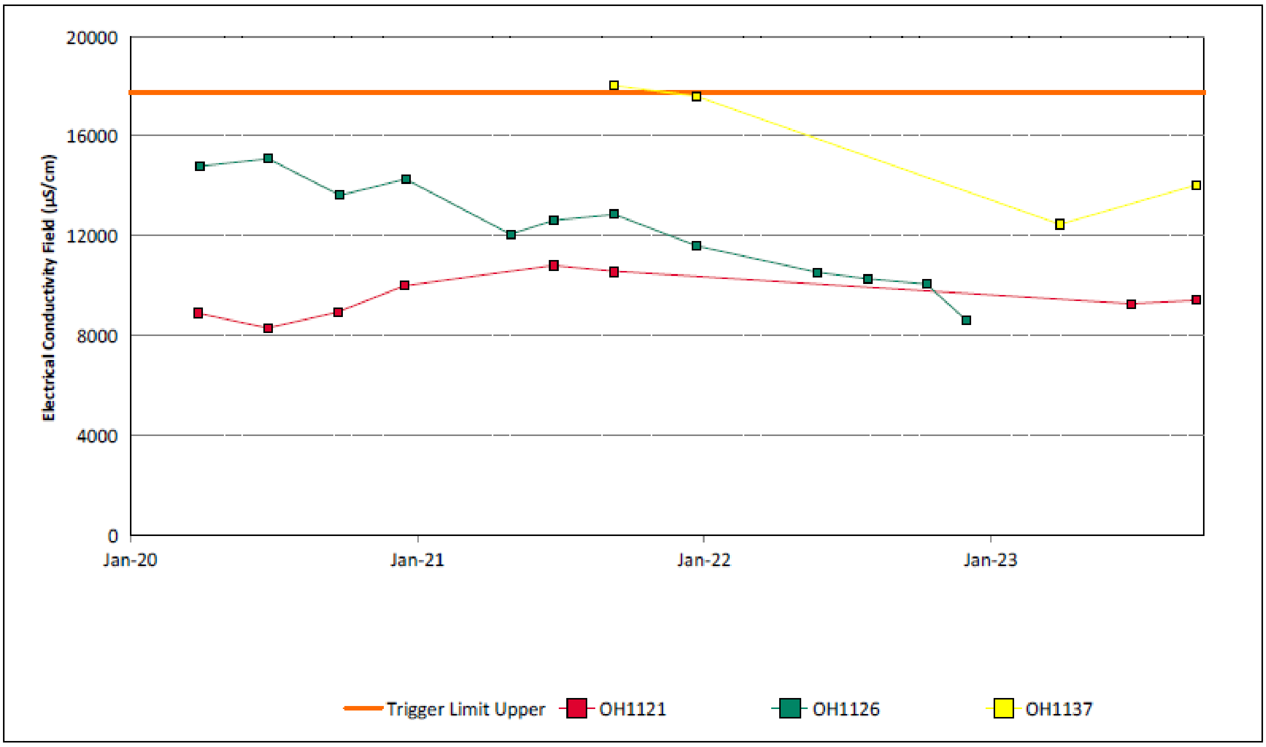

Figure 31: Vaux Seam Electrical Conductivity Field Trend – September 2023

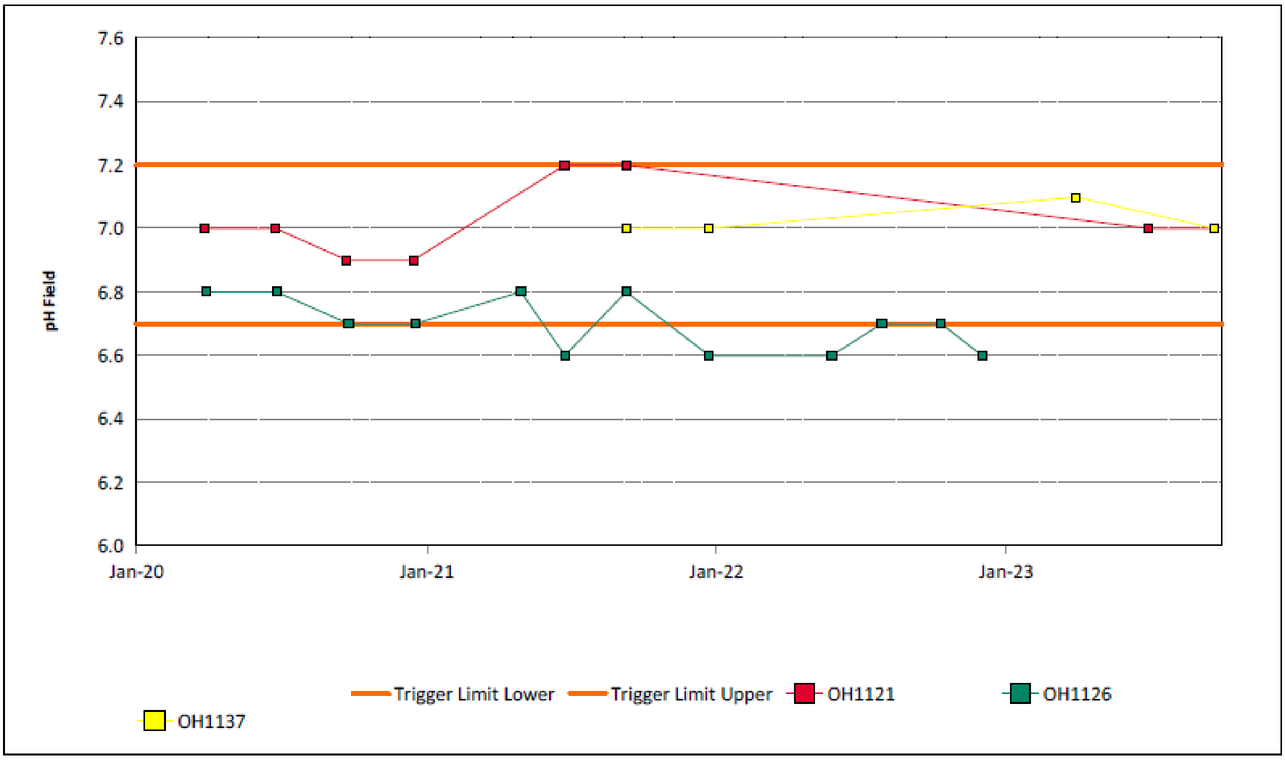

Figure 32: Vaux Seam pH Field Trend – September 2023

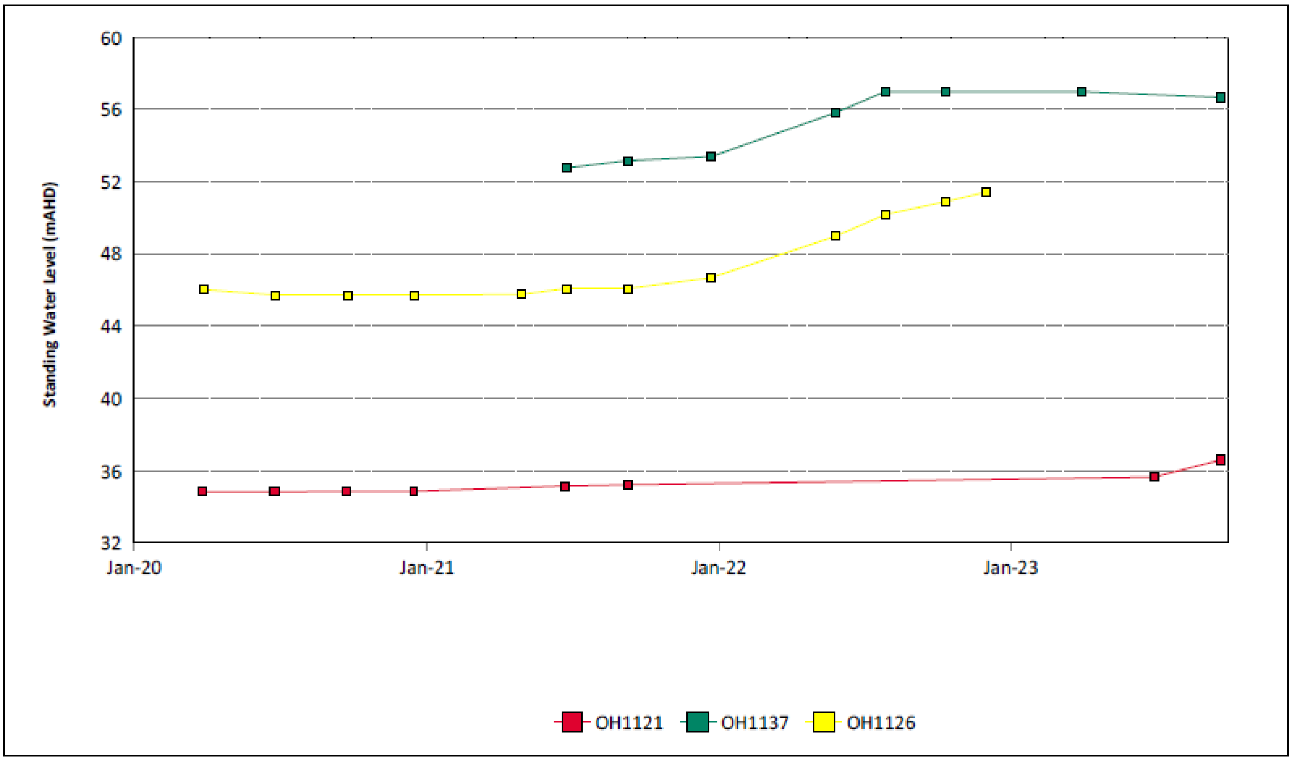

Figure 33: Vaux Seam Standing Water Level Trend – September 2023

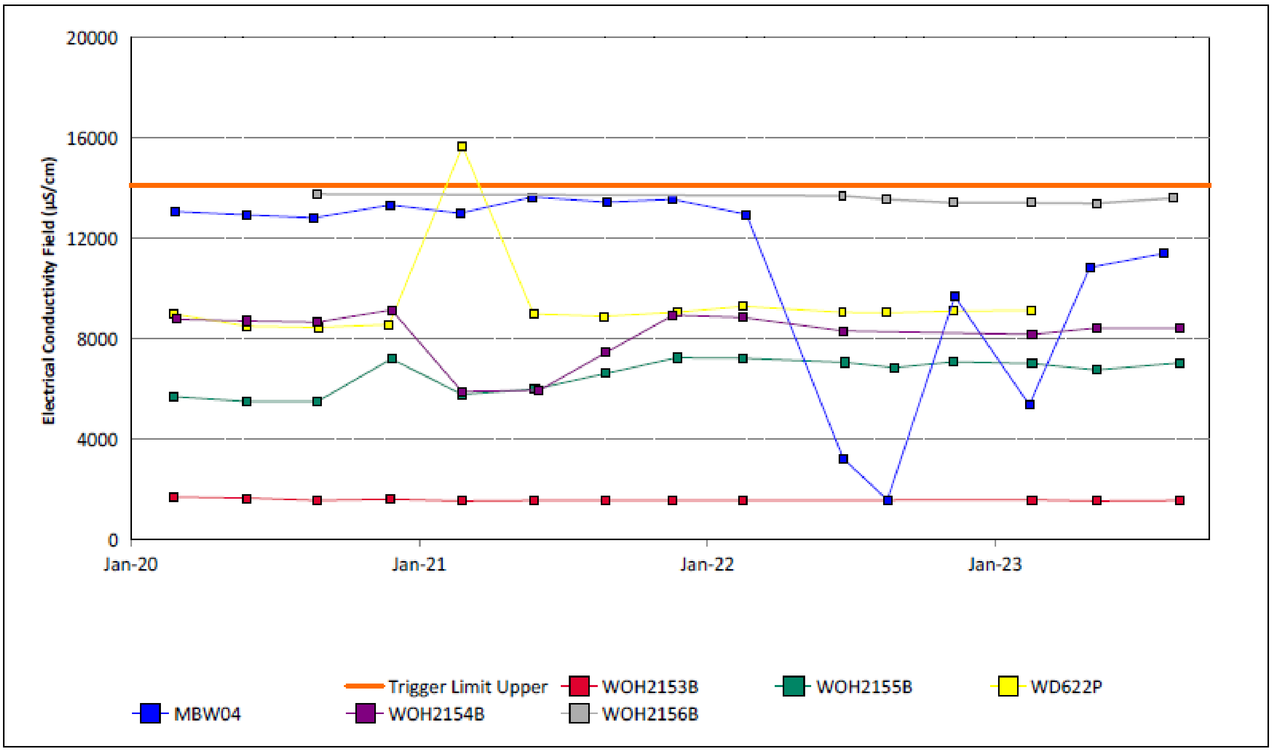

Figure 34: Wambo Seam Electrical Conductivity Field Trend – September 2023

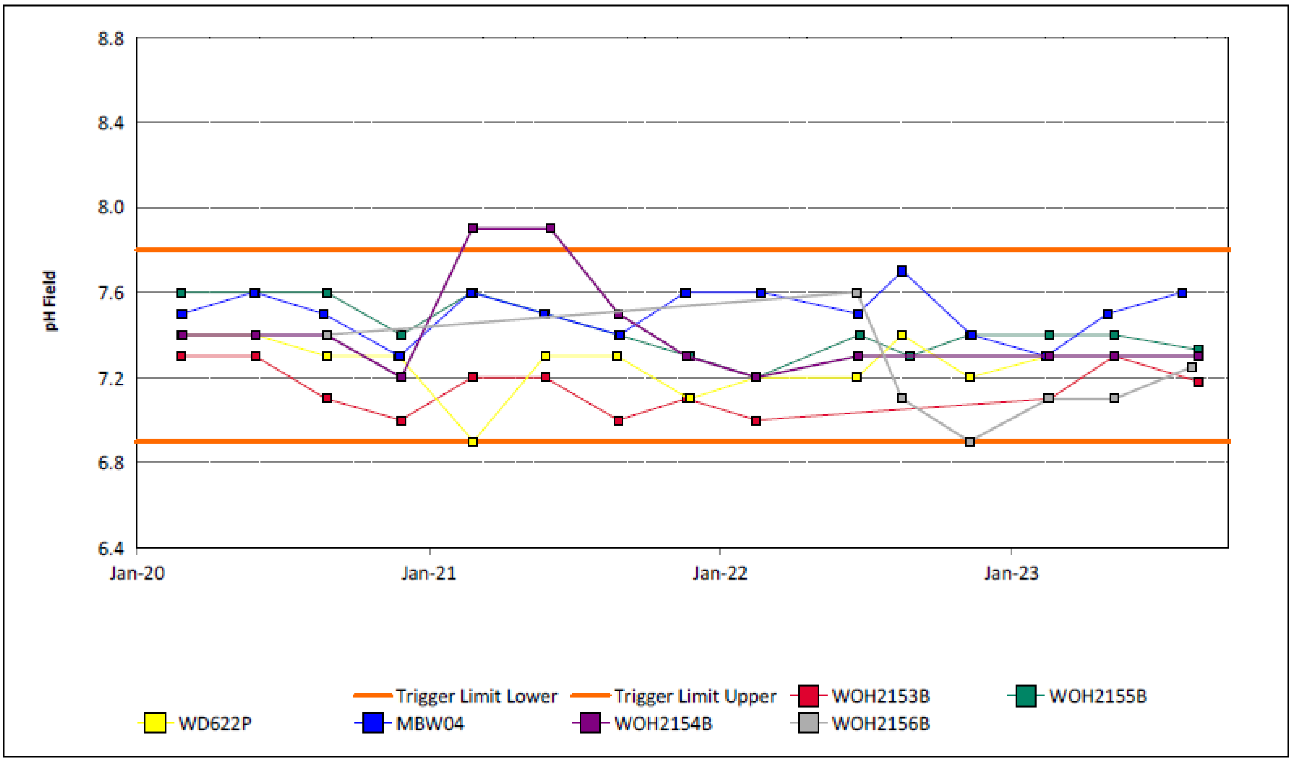

Figure 35: Wambo Seam pH Field Trend – September 2023

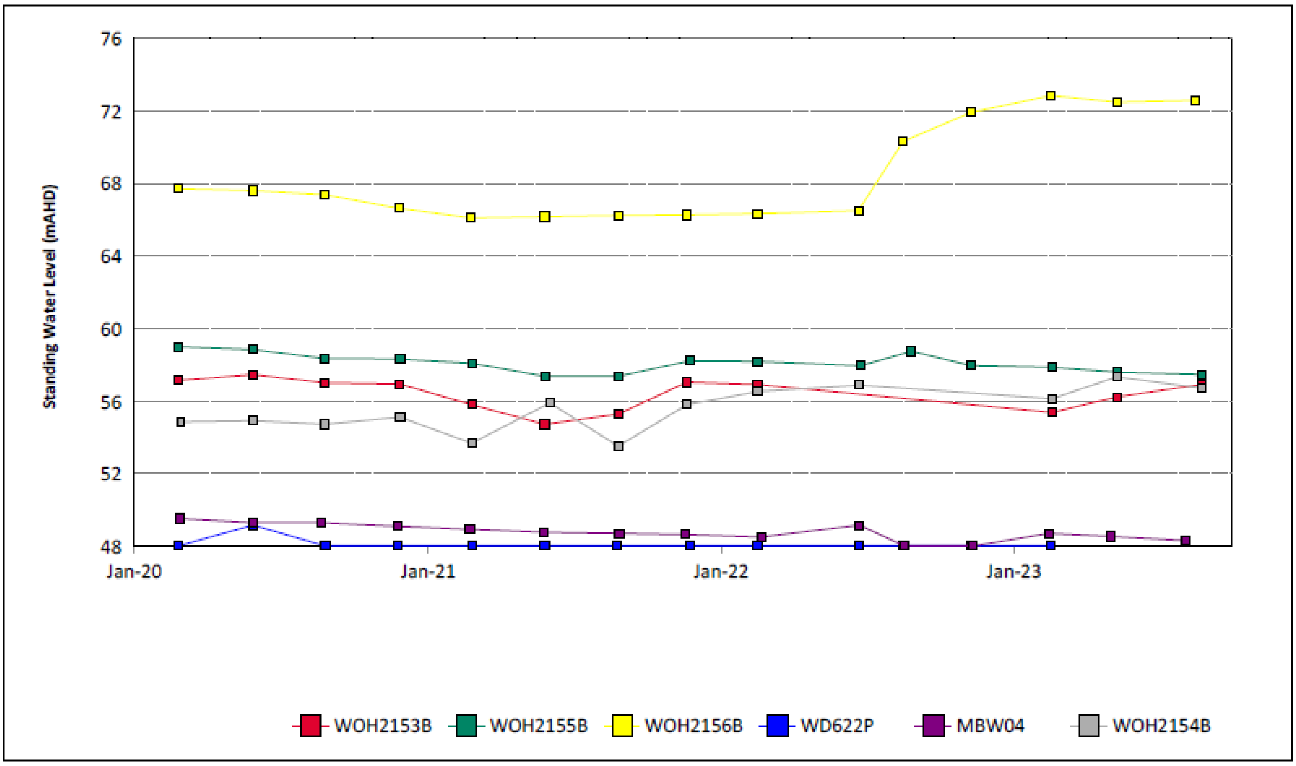

Figure 36: Wambo Seam Standing Water Level Trend – September 2023

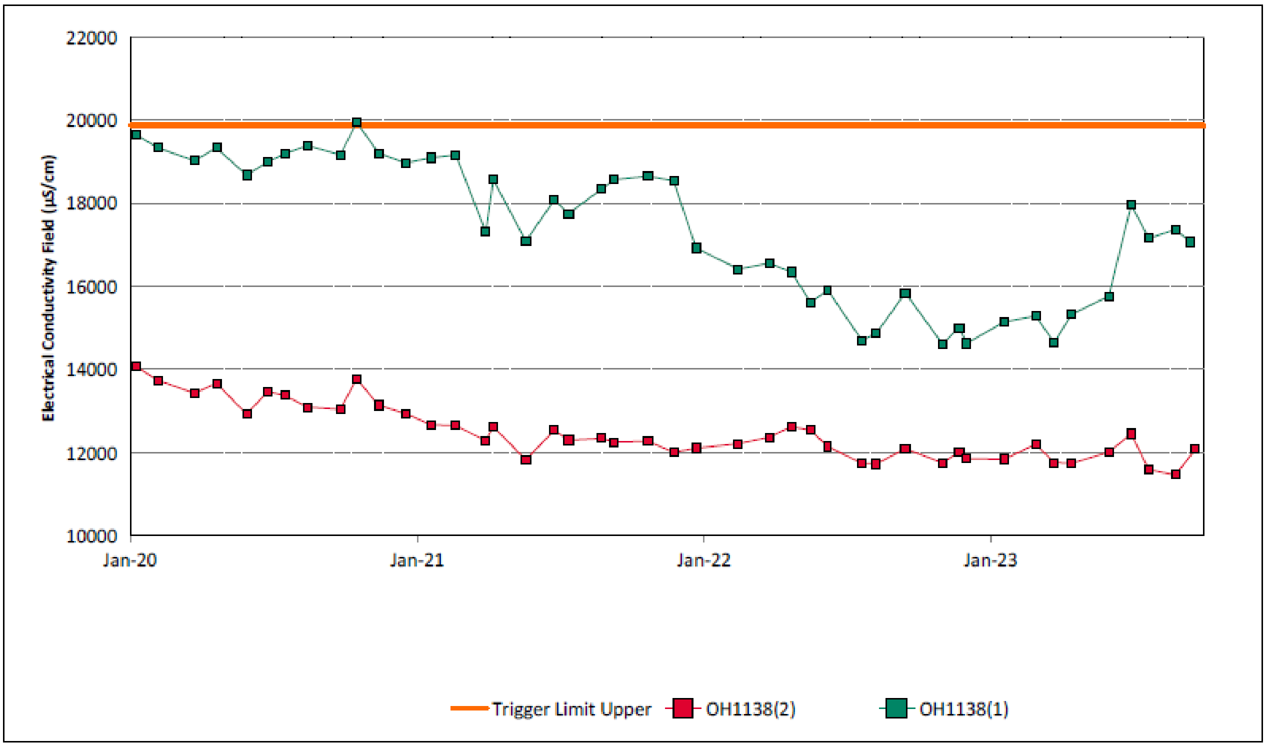

Figure 37: Warkworth Seam Electrical Conductivity Field Trend – September 2023

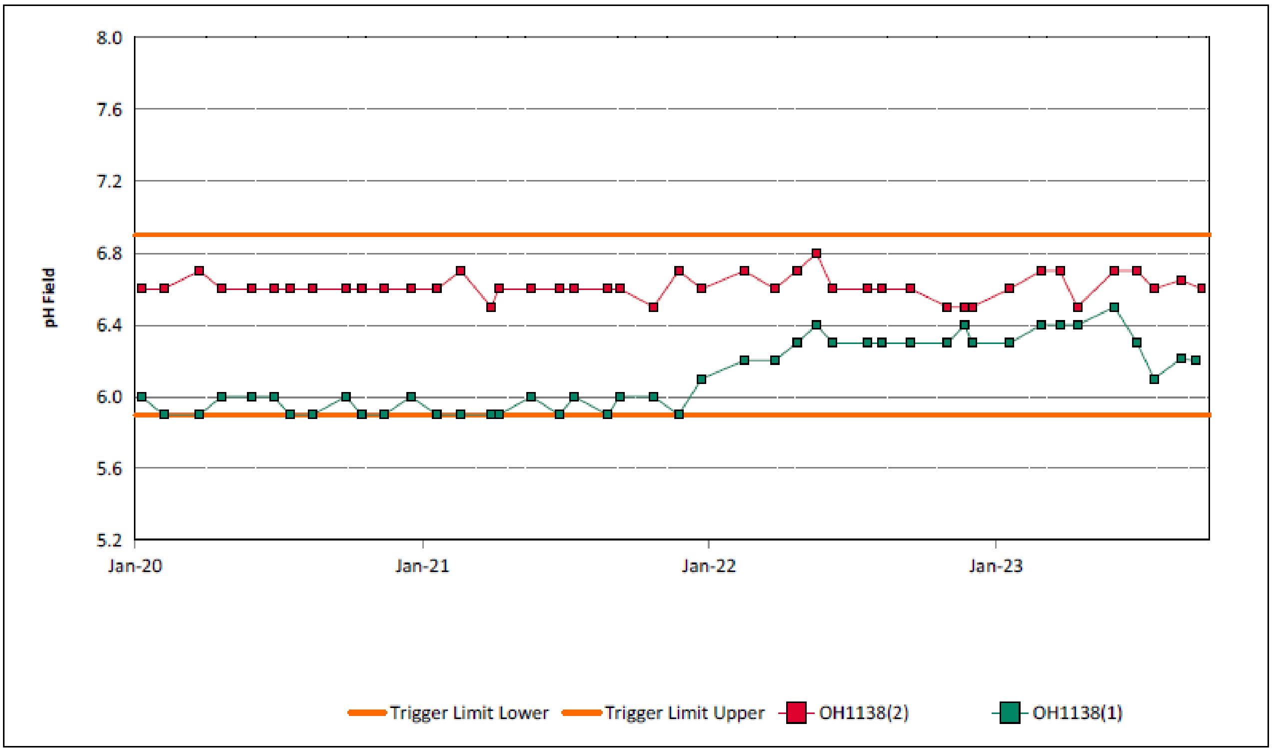

Figure 38: Warkworth Seam pH Field Trend – September 2023

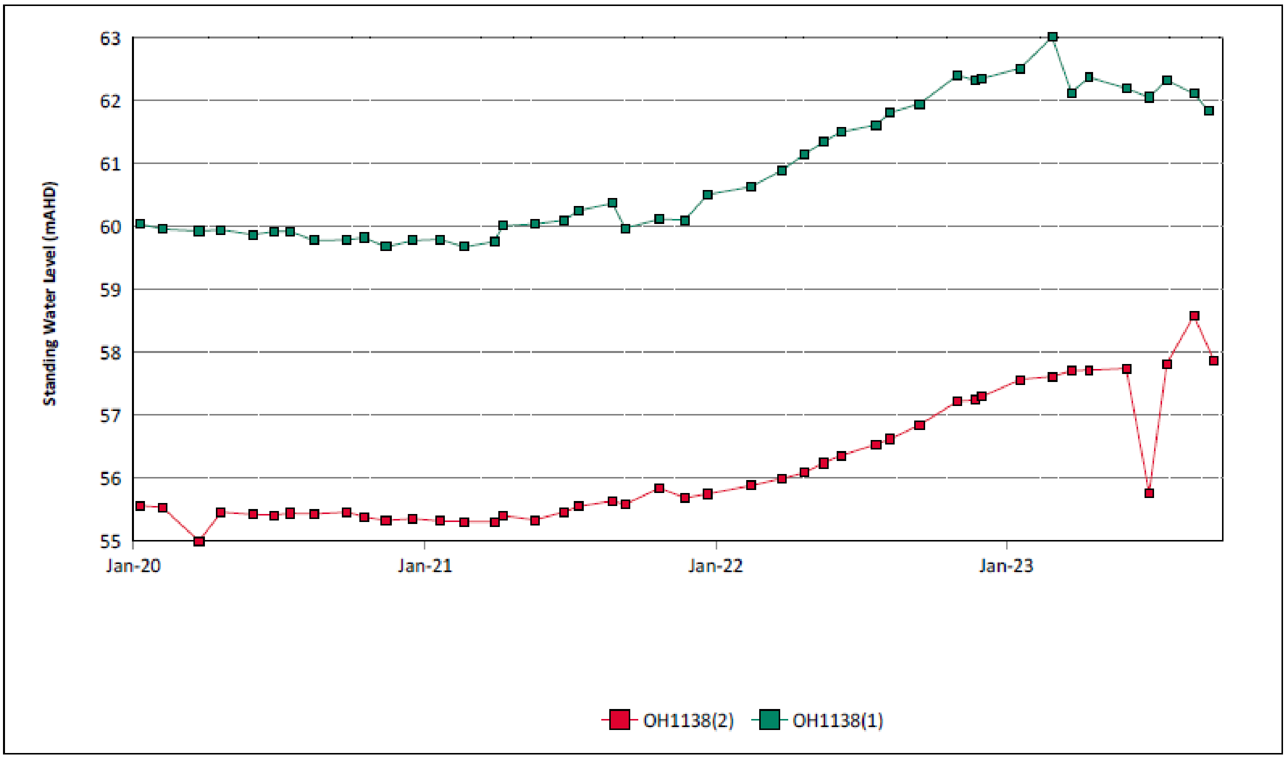

Figure 39: Warkworth Seam Standing Water Level Trend – September 2023

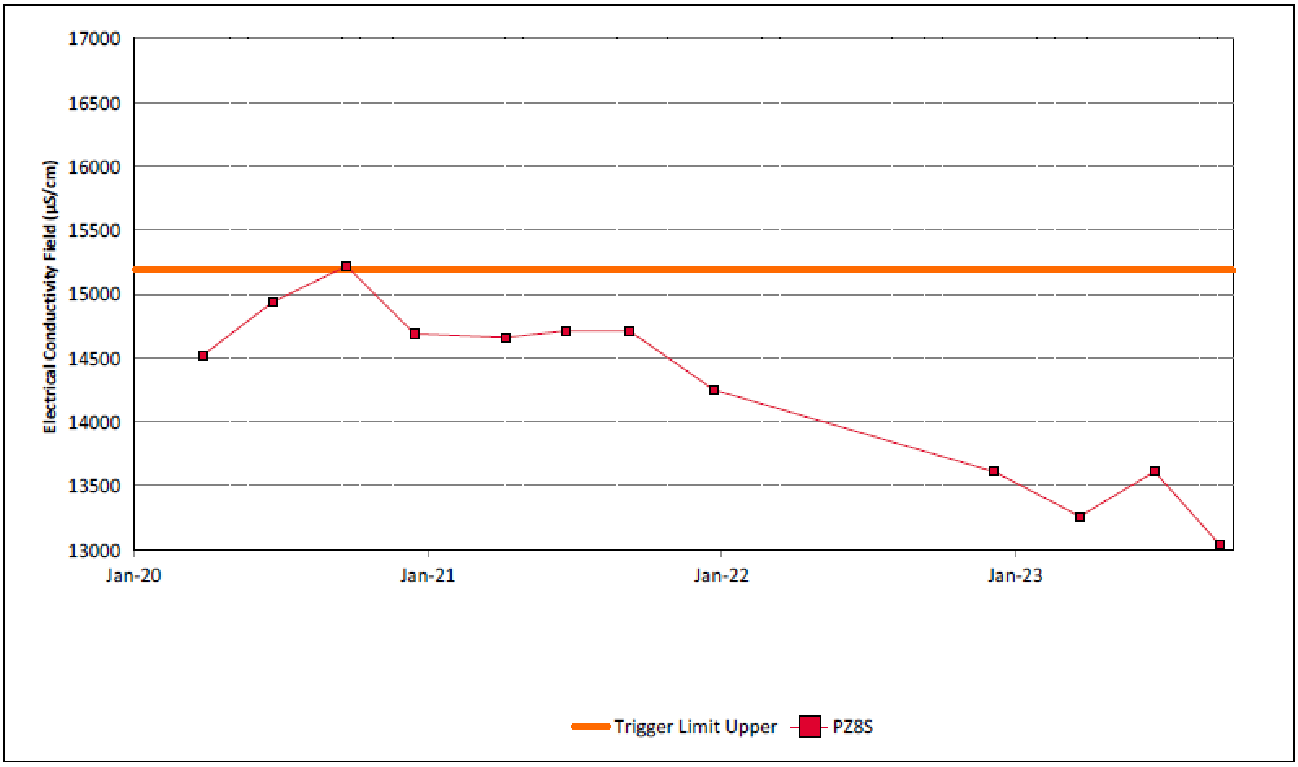

Figure 40: Wollombi Alluvium 1 Electrical Conductivity Field Trend – September 2023

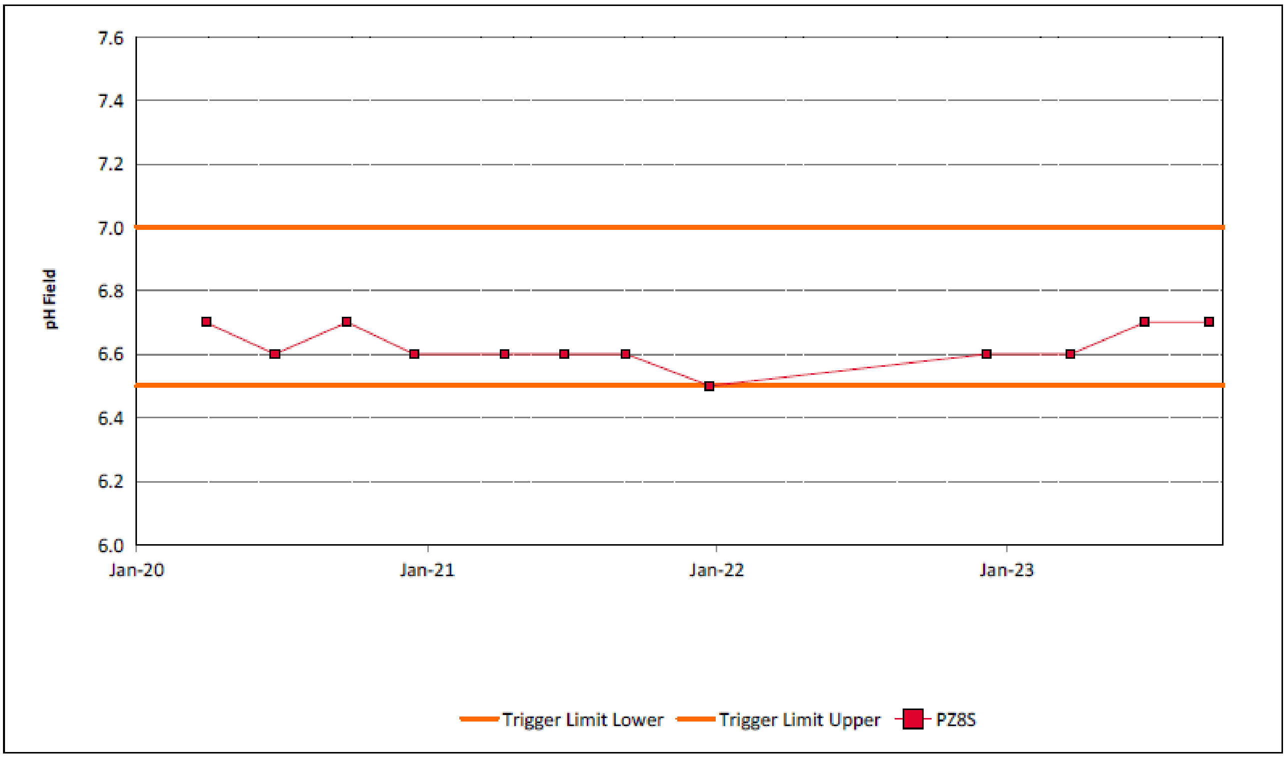

Figure 41: Wollombi Alluvium 1 pH Field Trend – September 2023

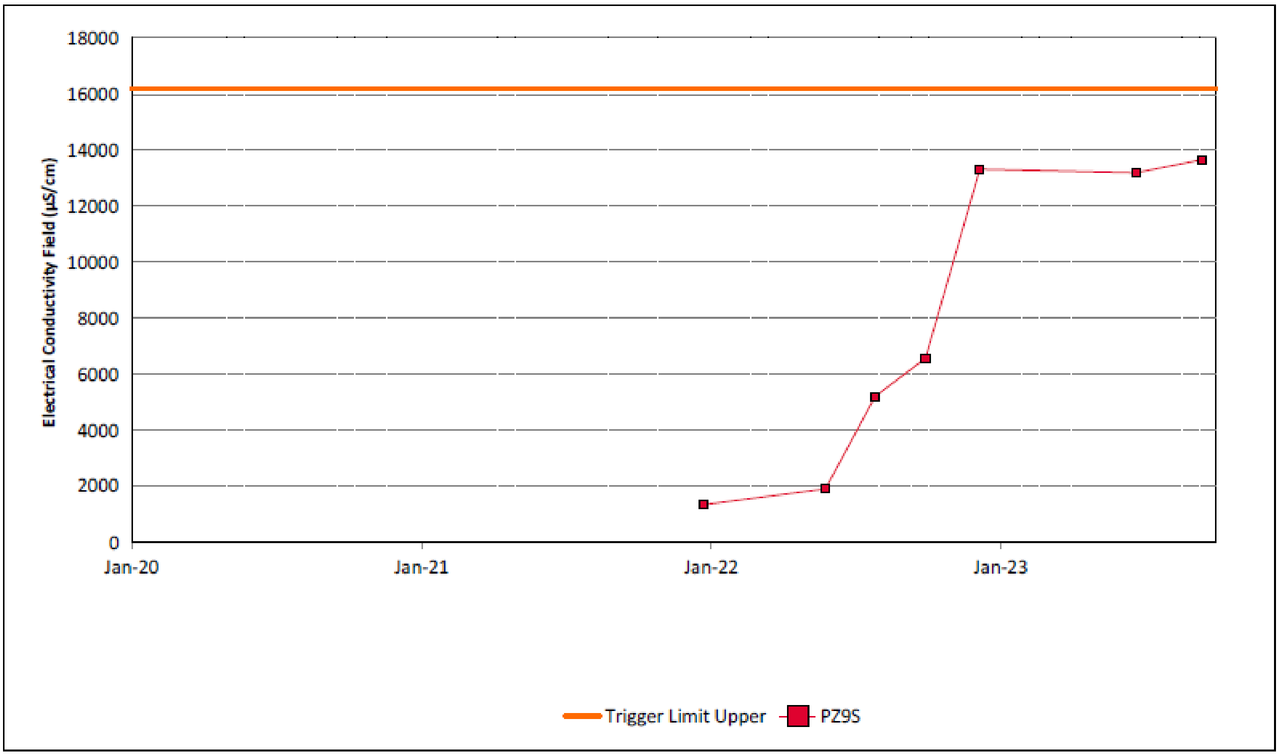

Figure 42: Wollombi Alluvium 2 Electrical Conductivity Field Trend – September 2023

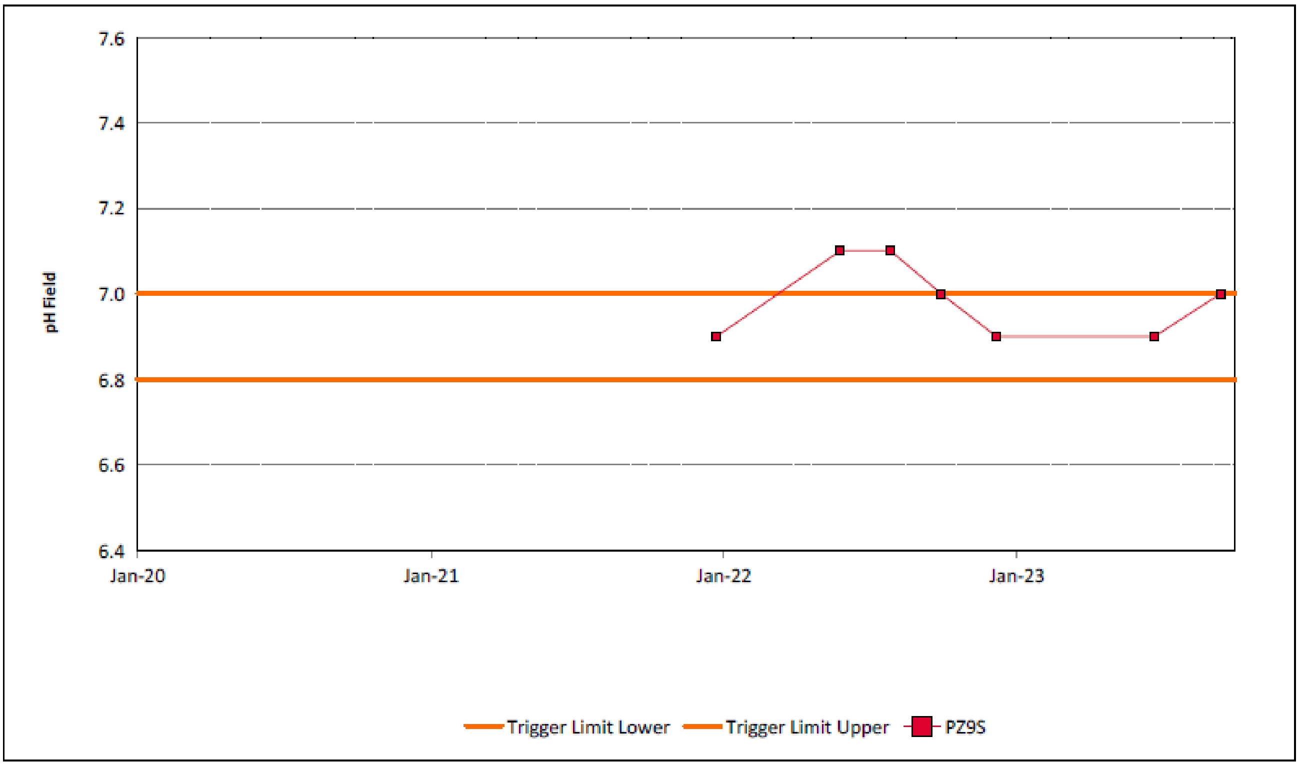

Figure 43: Wollombi Alluvium 2 pH Field Trend – September 2023

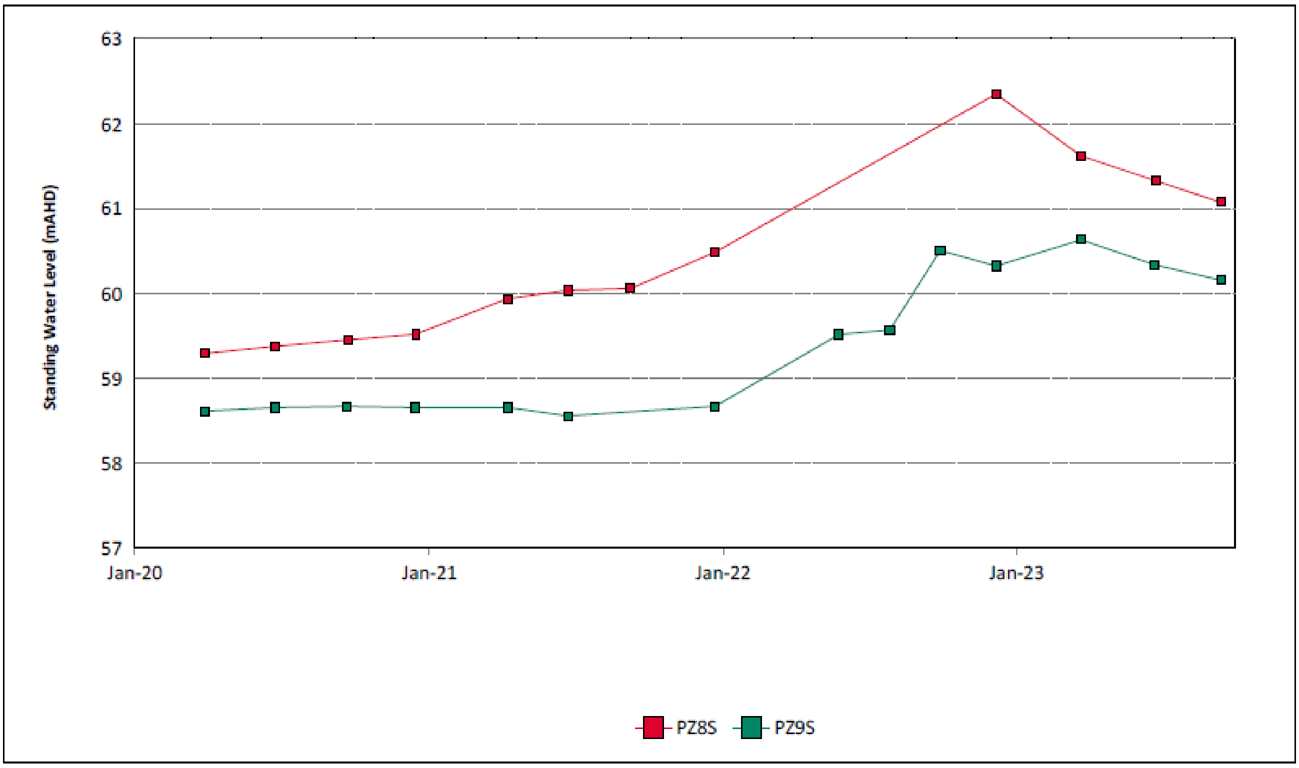

Figure 44: Wollombi Alluvium Standing Water Level Trend – September 2023

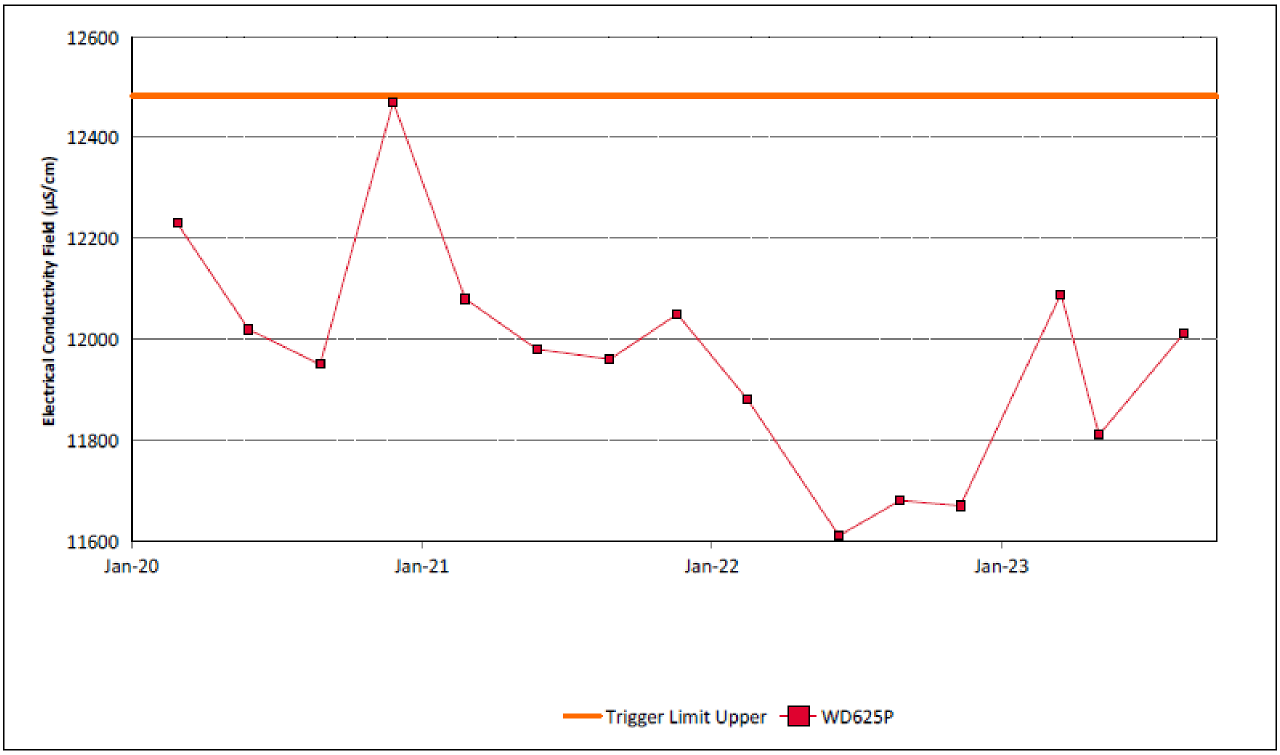

Figure 45: Woodlands Hill Seam Electrical Conductivity Field Trend – September 2023

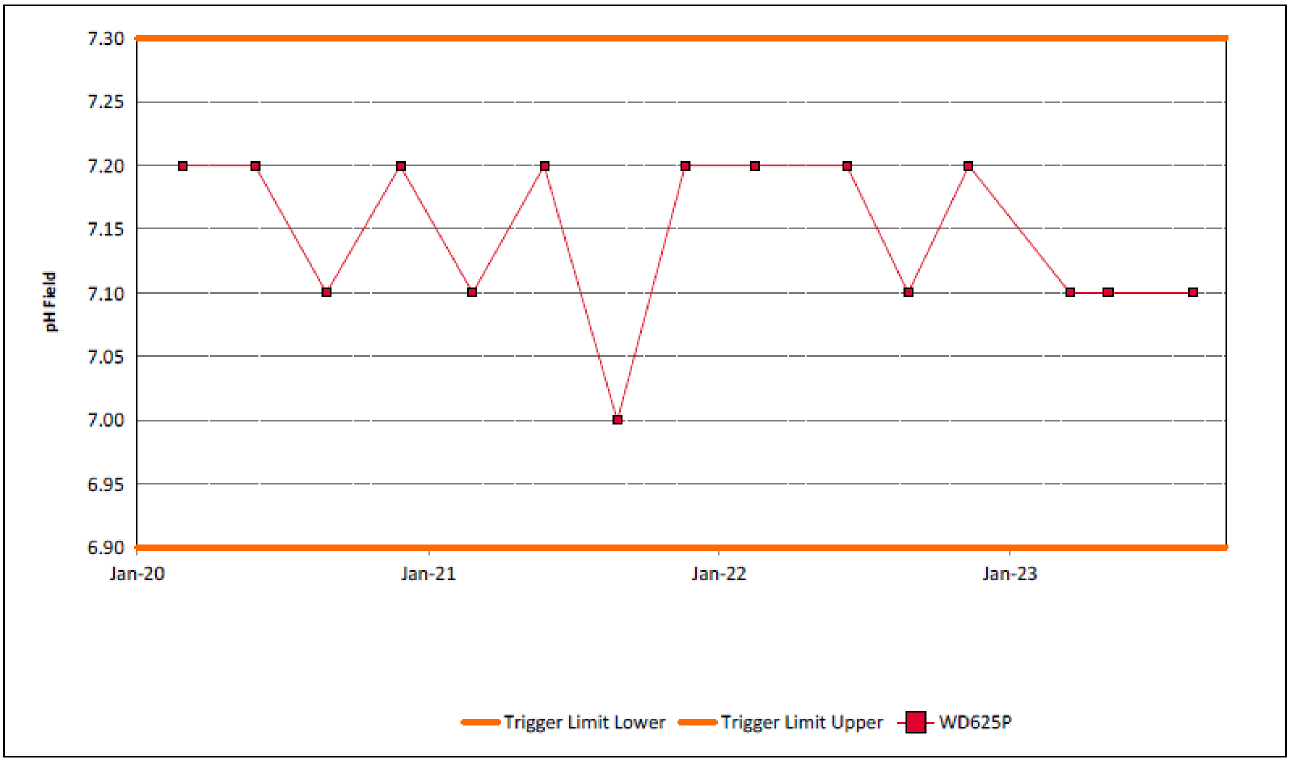

Figure 46: Woodlands Hill Seam pH Field Trend – September 2023

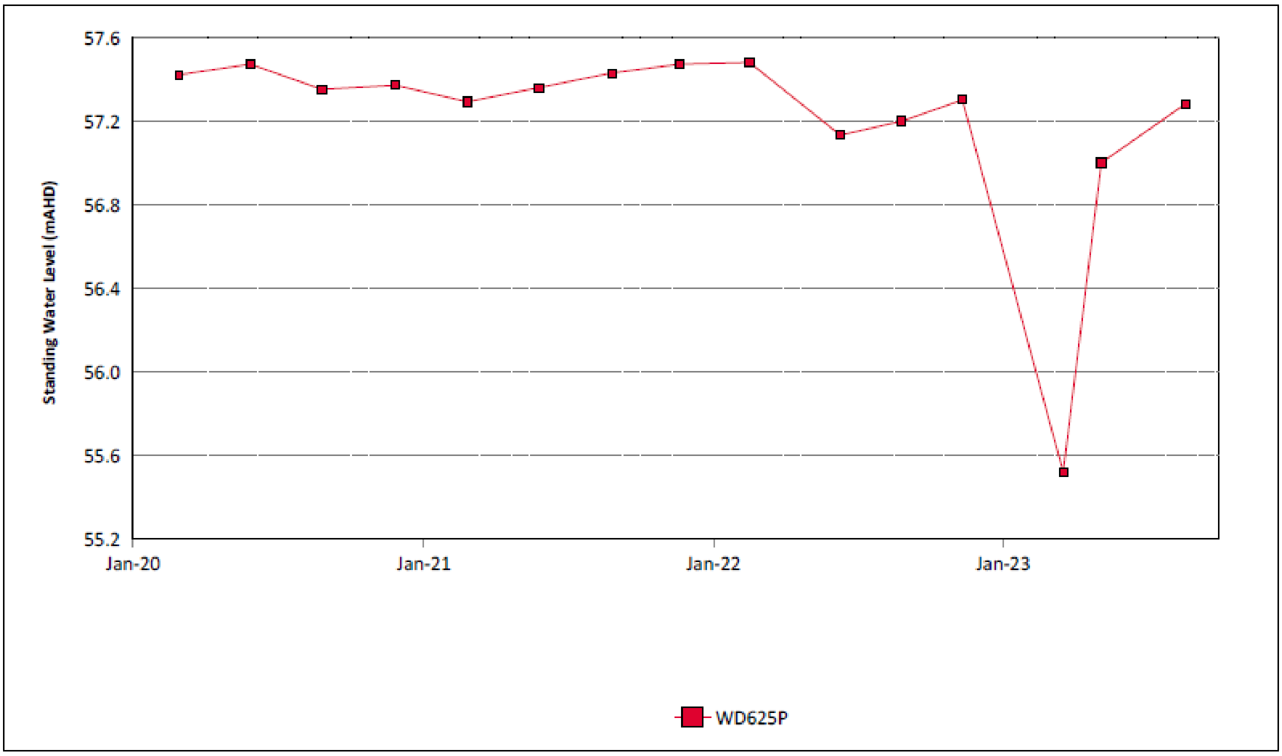

Figure 47: Woodlands Hill Seam Standing Water Level Trend - September 2023

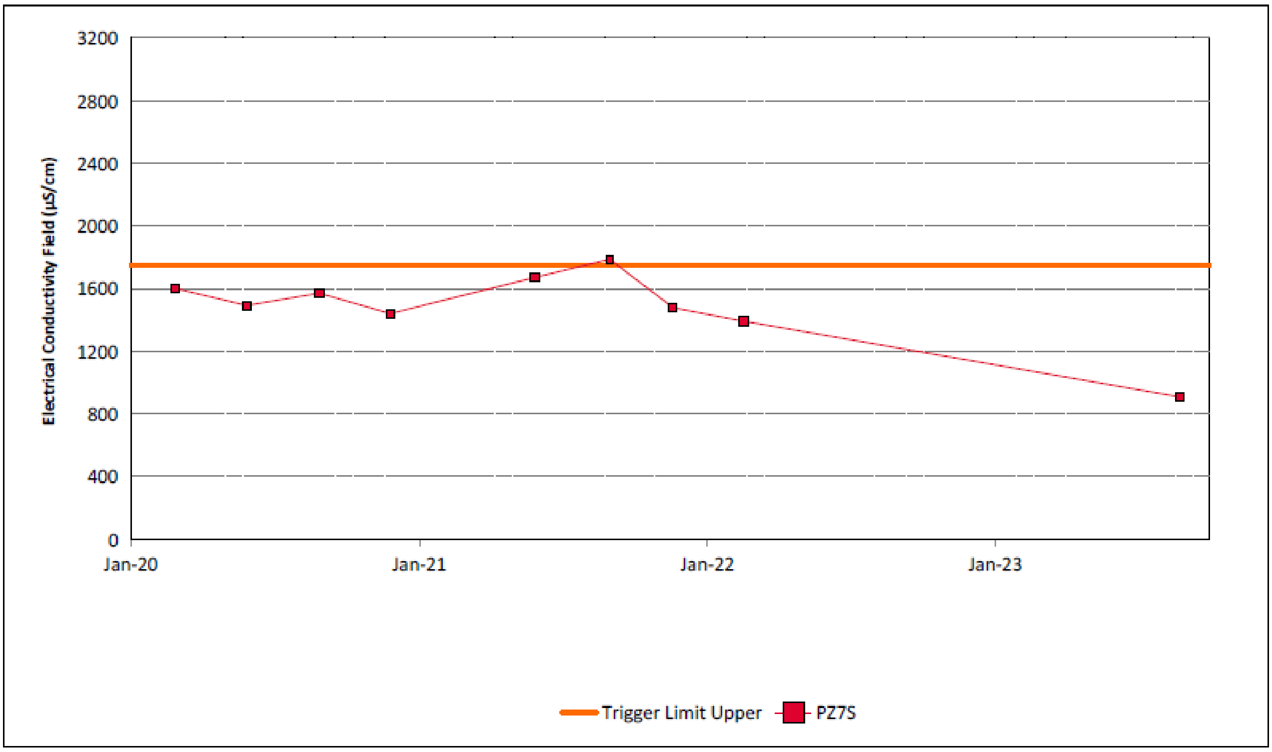

Figure 48: Aeolian Warkworth Sands Electrical Conductivity Field Trend – September 2023

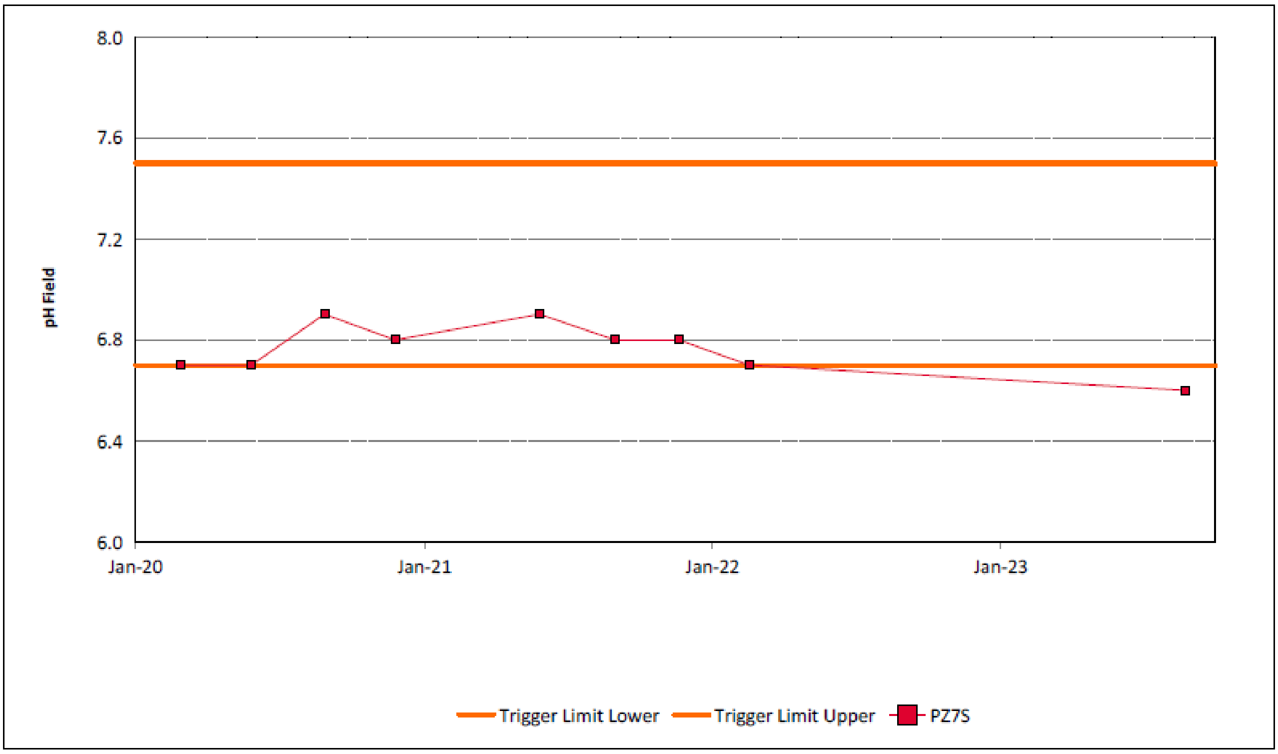

Figure 49: Aeolian Warkworth Sands pH Field Trend - September 2023

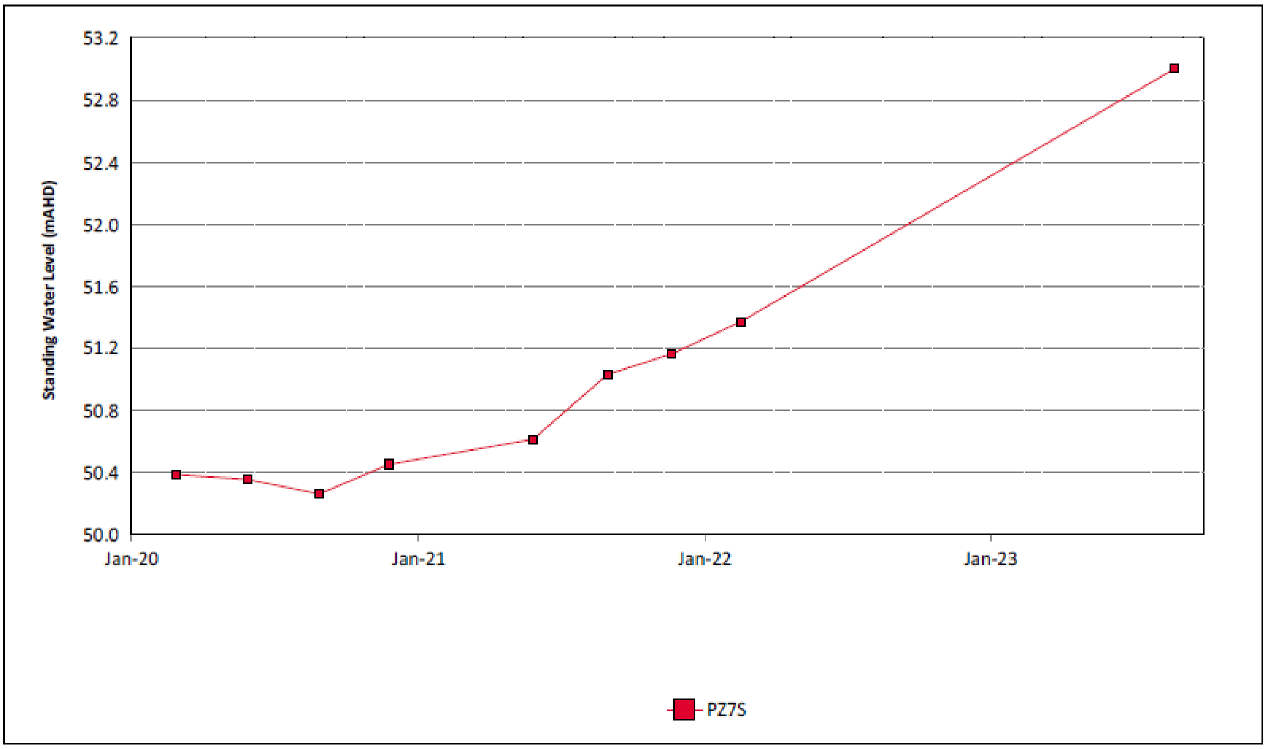

Figure 50: Aeolian Warkworth Sands Standing Water Level Trend – September 2023

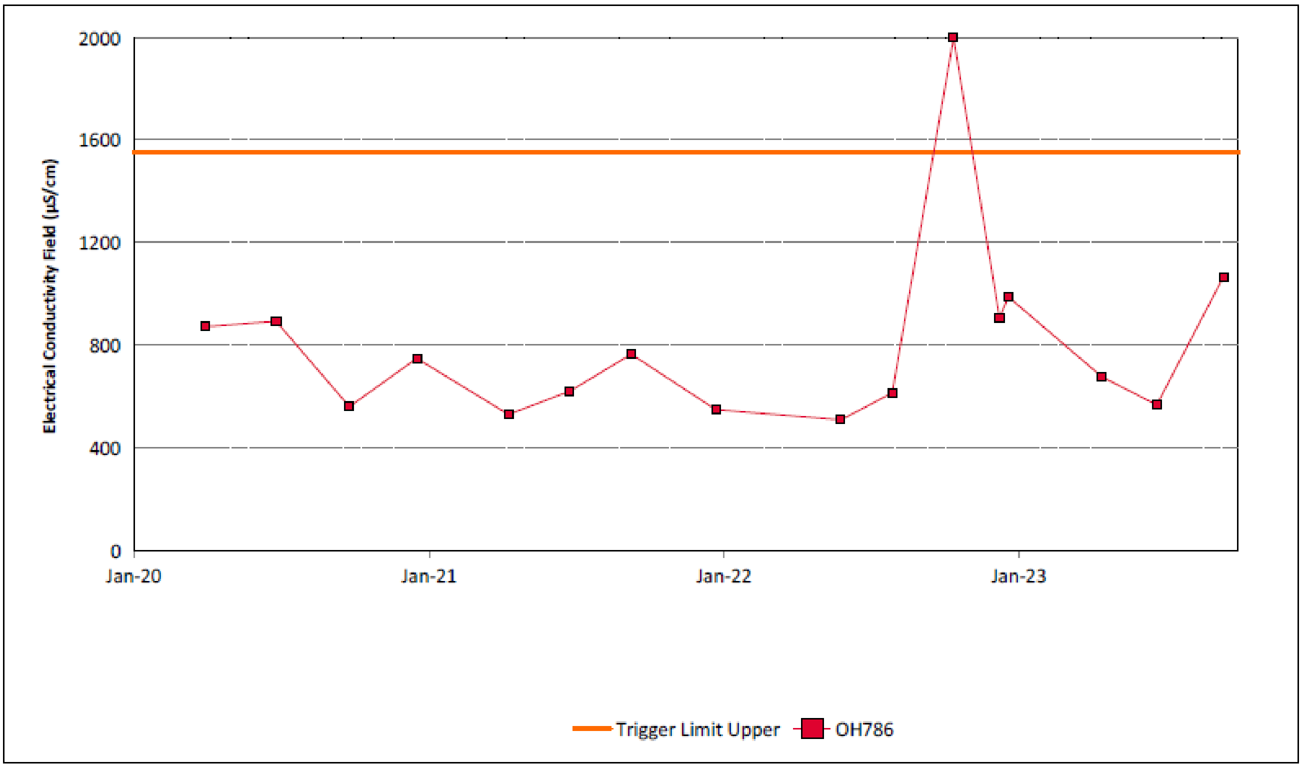

Figure 51: Hunter River Alluvium 1 Electrical Conductivity Field Trend – September 2023

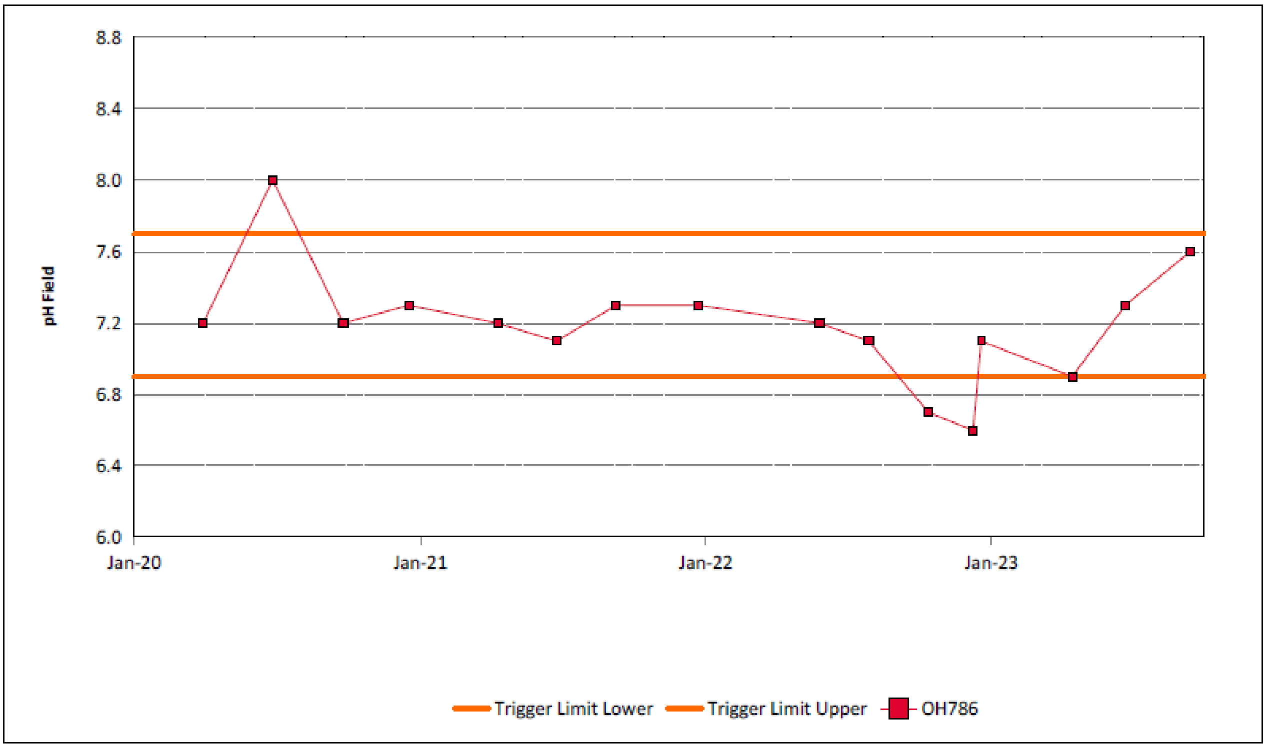

Figure 52: Hunter River Alluvium 1 pH Field Trend – September 2023

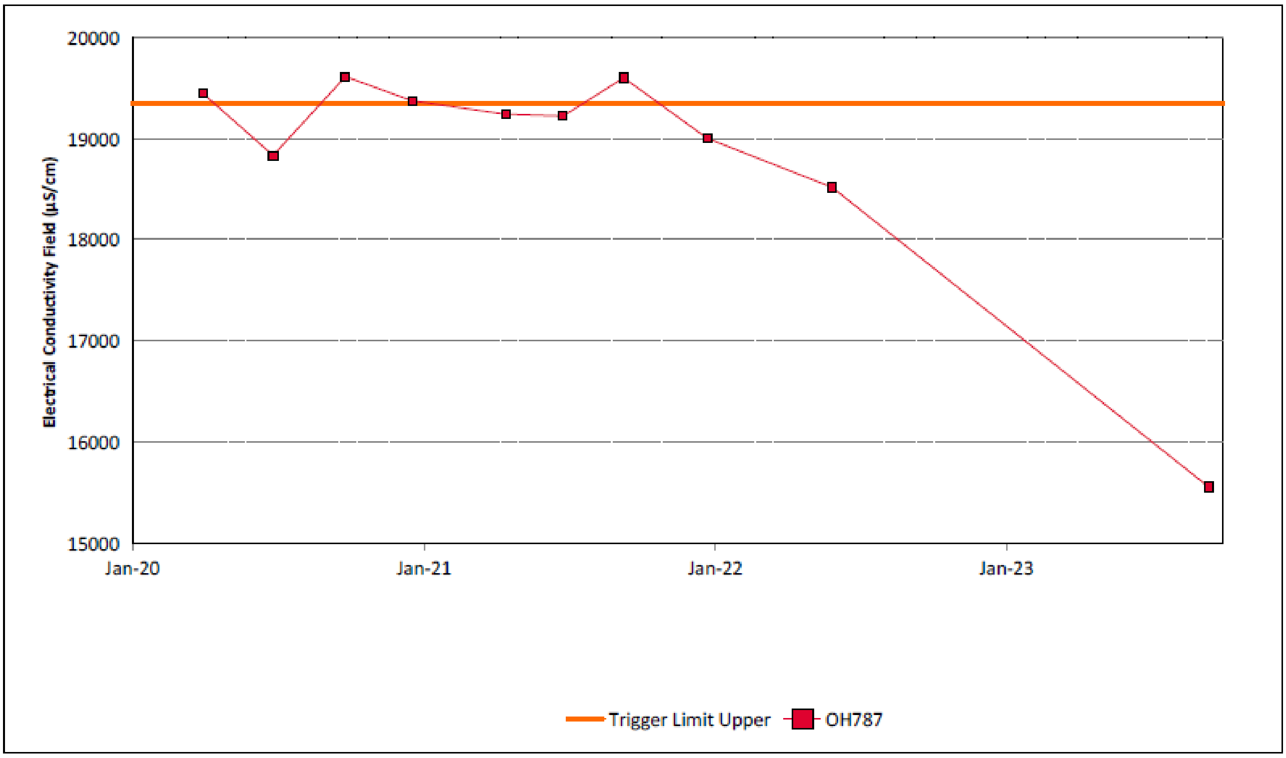

Figure 53: Hunter River Alluvium 2 Electrical Conductivity Field Trend - September 2023

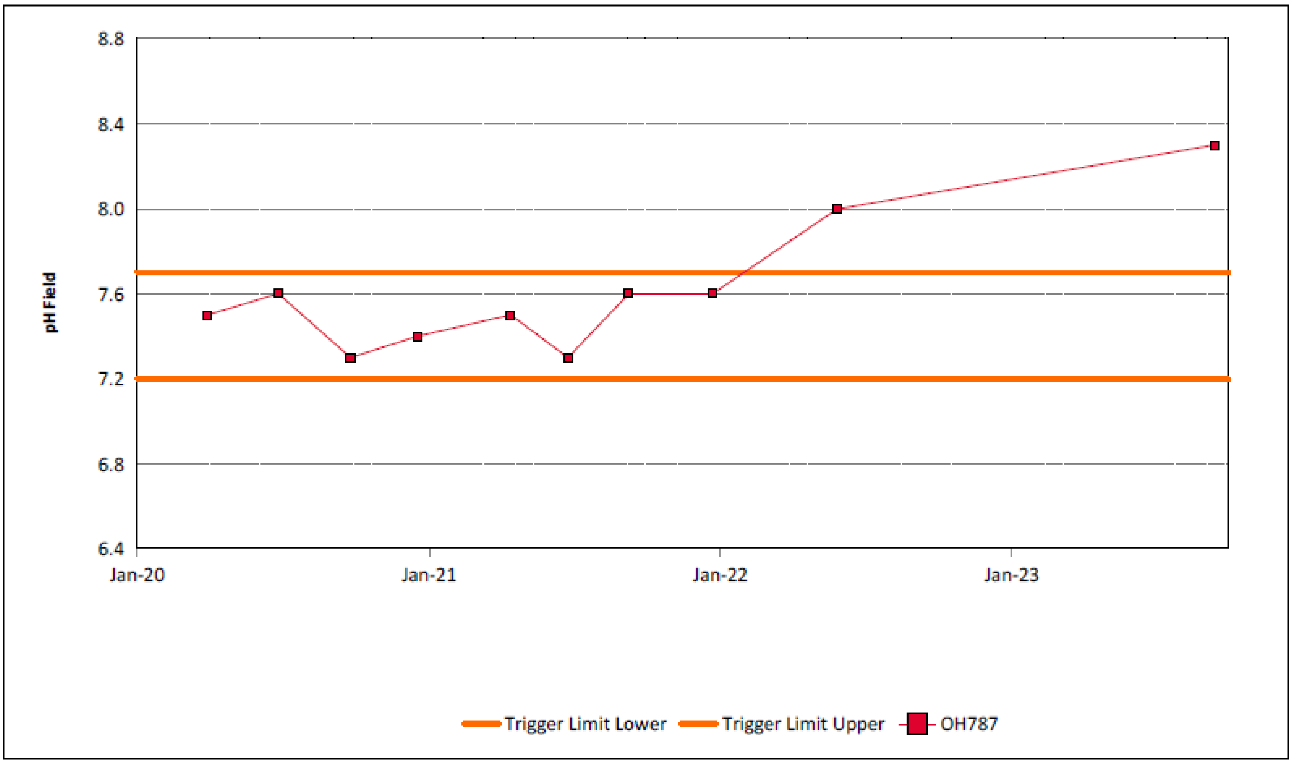

Figure 54: Hunter River Alluvium 2 pH Field Trend – September 2023

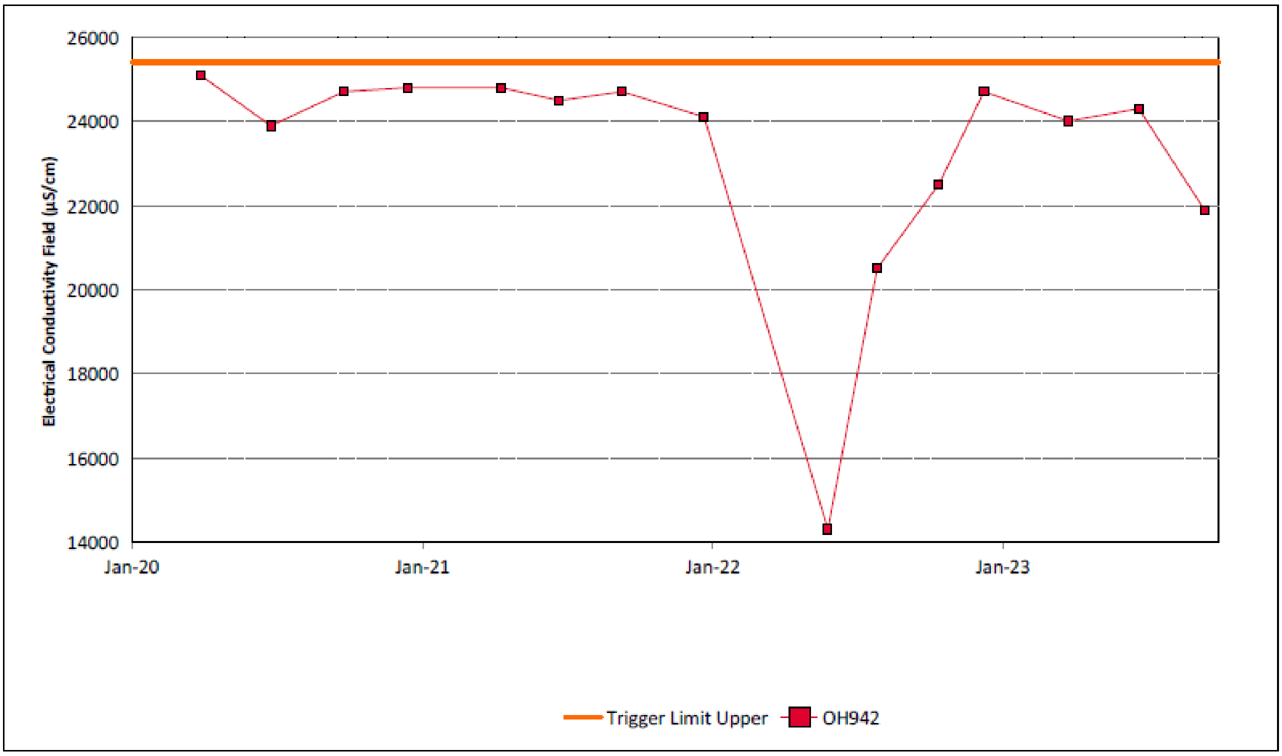

Figure 55: Hunter River Alluvium 3 Electrical Conductivity Field Trend – September 2023

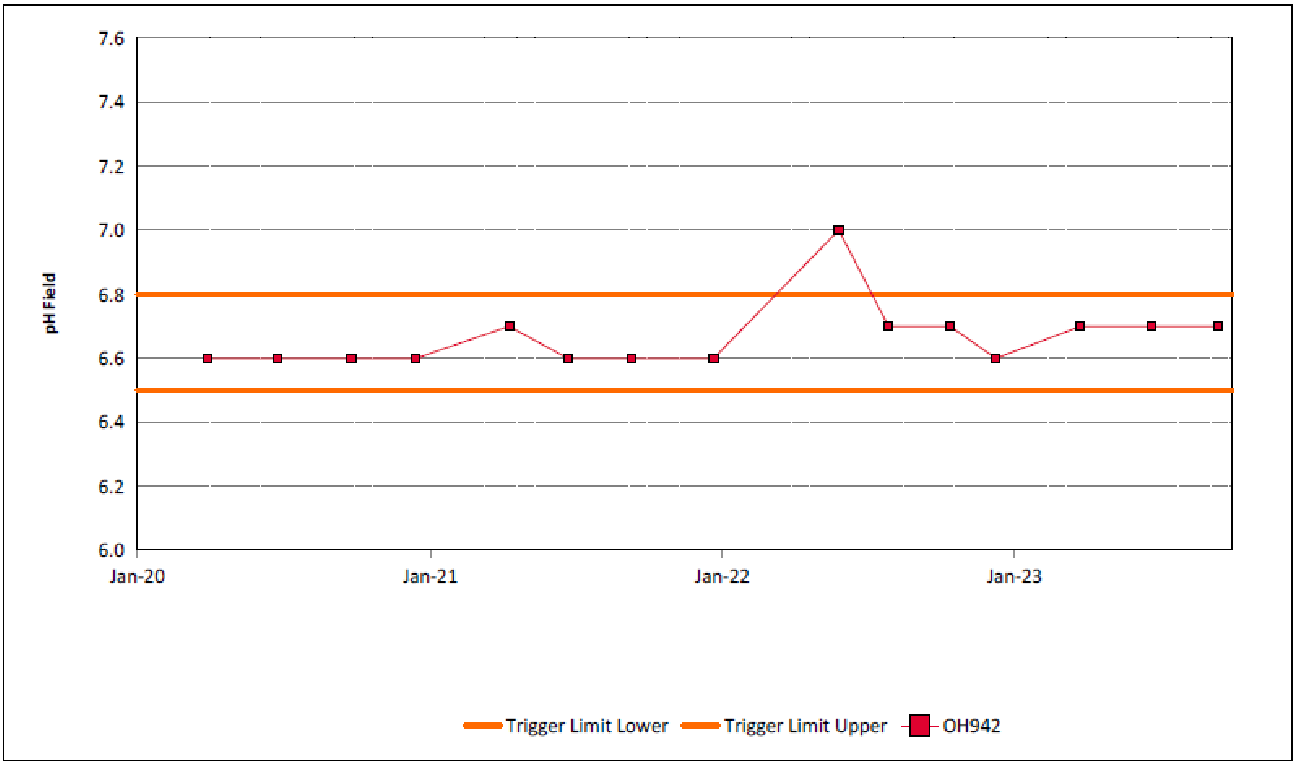

Figure 56: Hunter River Alluvium 3 pH Field Trend – September 2023

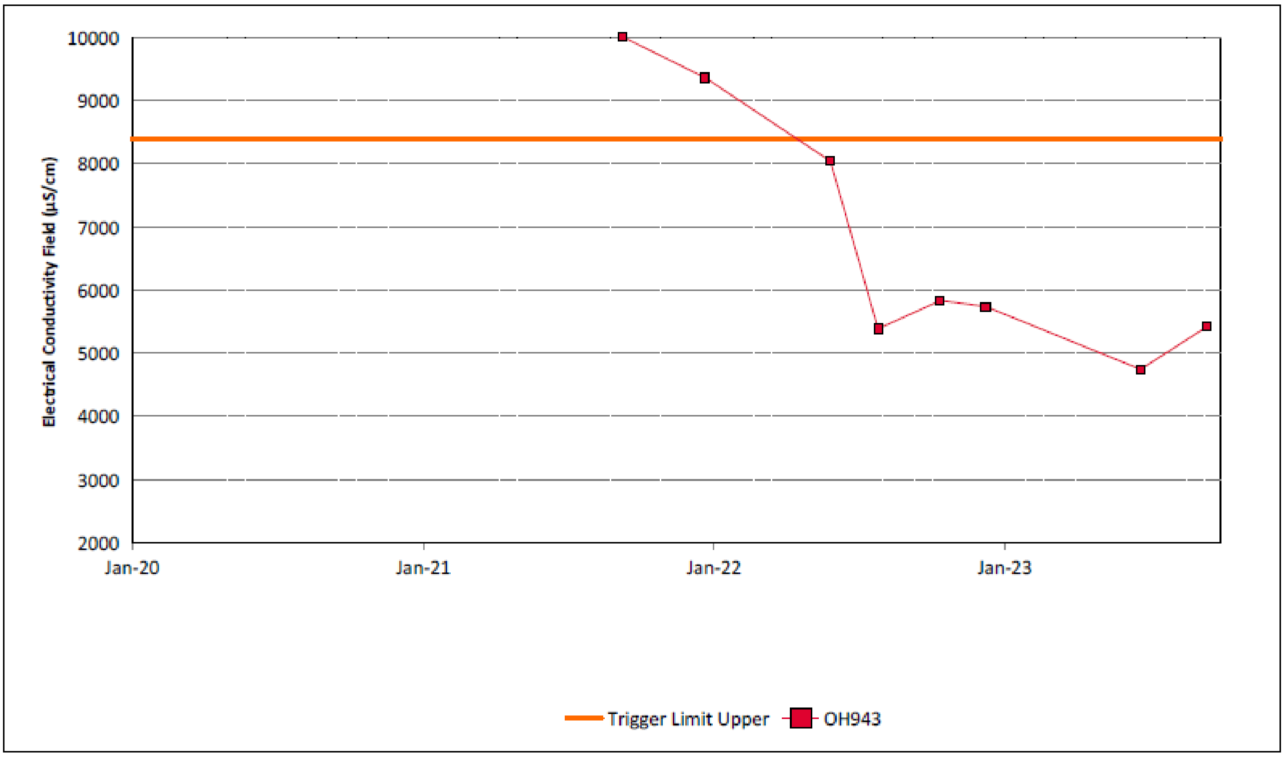

Figure 57: Hunter River Alluvium 4 Electrical Conductivity Field Trend – September 2023

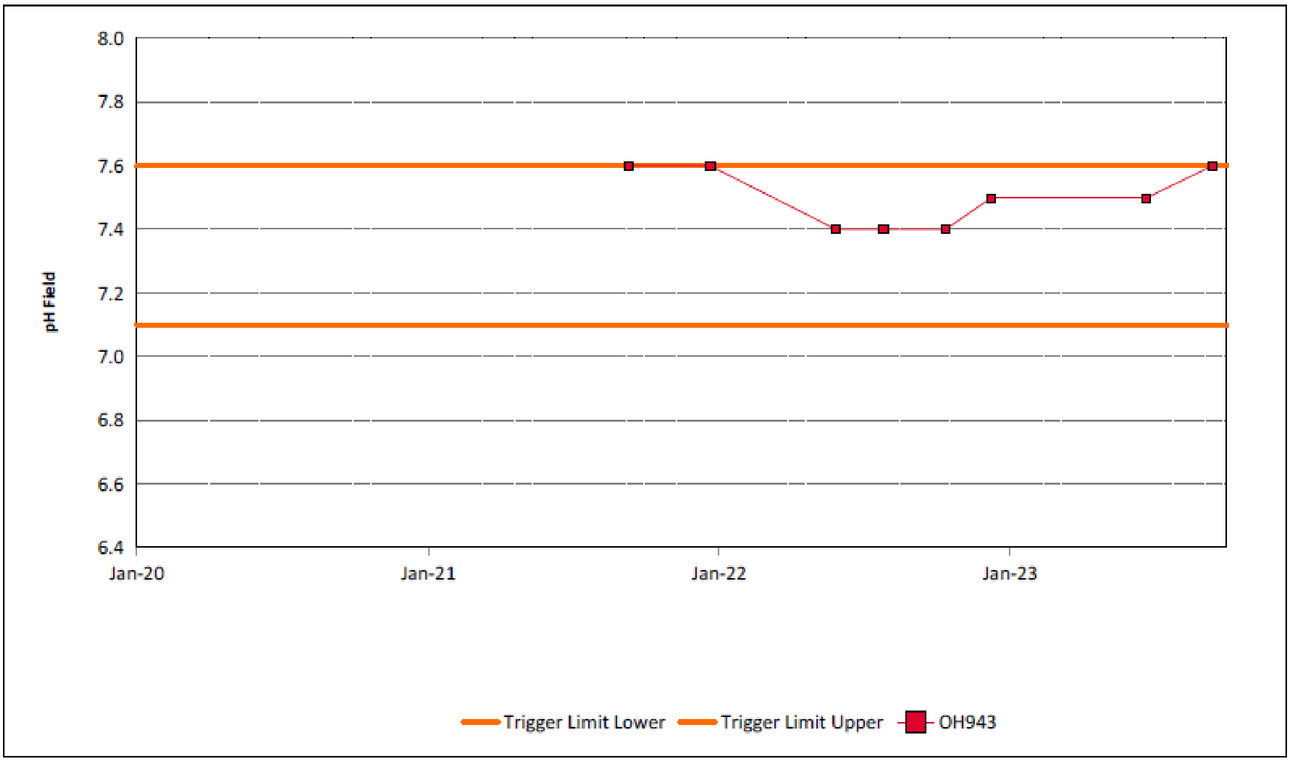

Figure 58: Hunter River Alluvium 4 pH Field Trend – September 2023

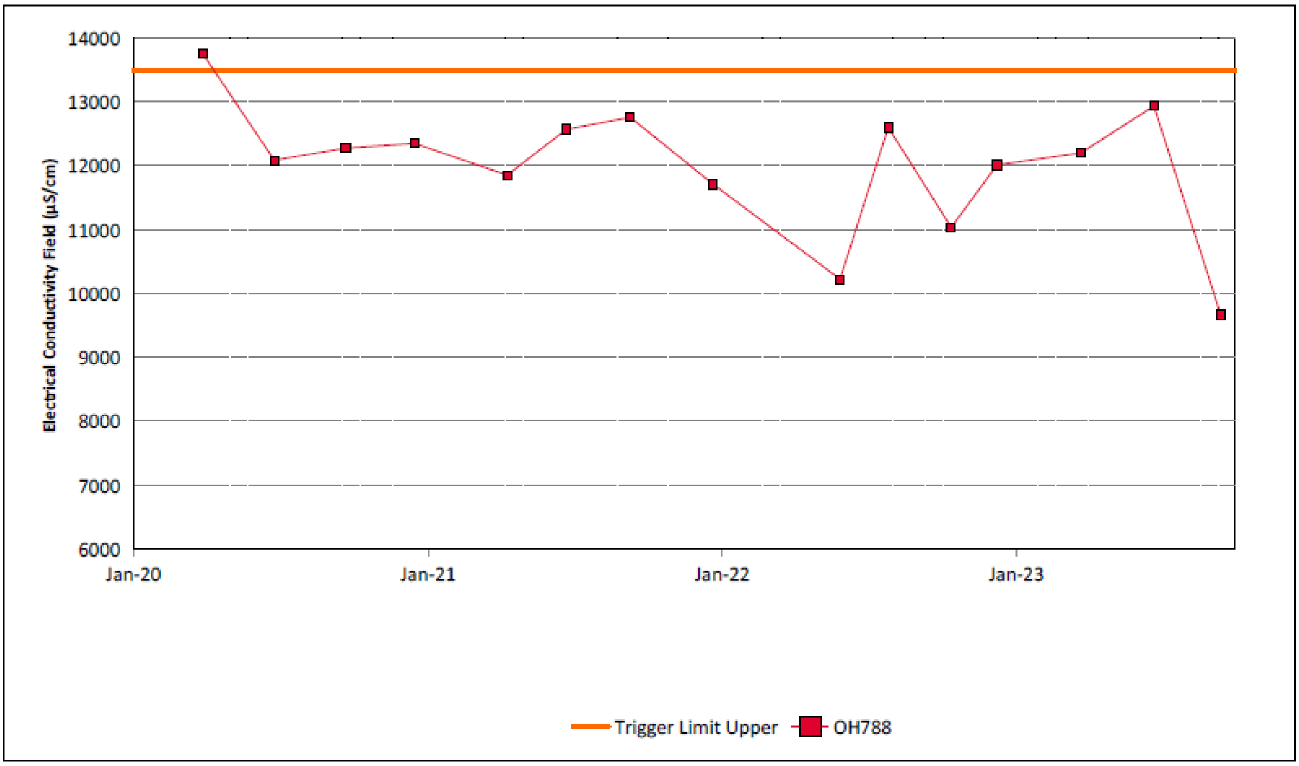

Figure 59: Hunter River Alluvium 5 Electrical Conductivity Field Trend – September 2023

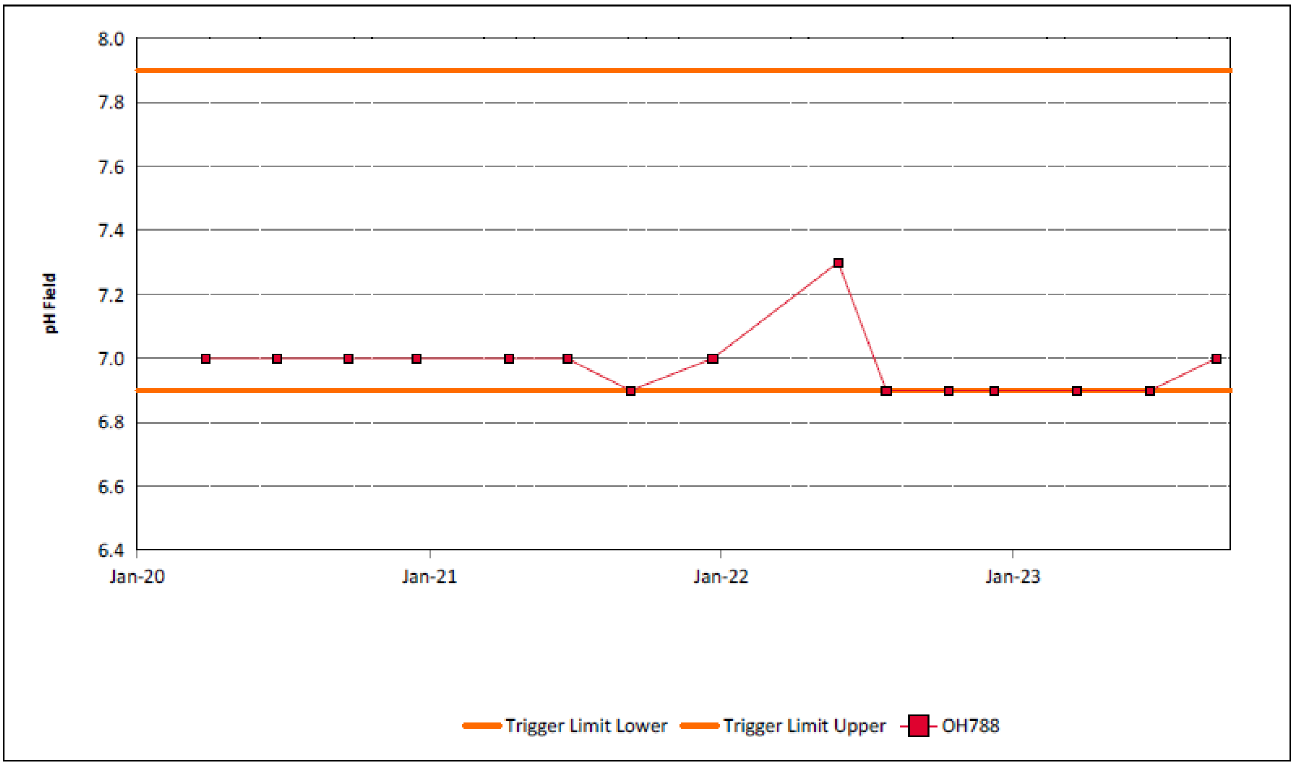

Figure 60: Hunter River Alluvium 5 pH Field Trend – September 2023

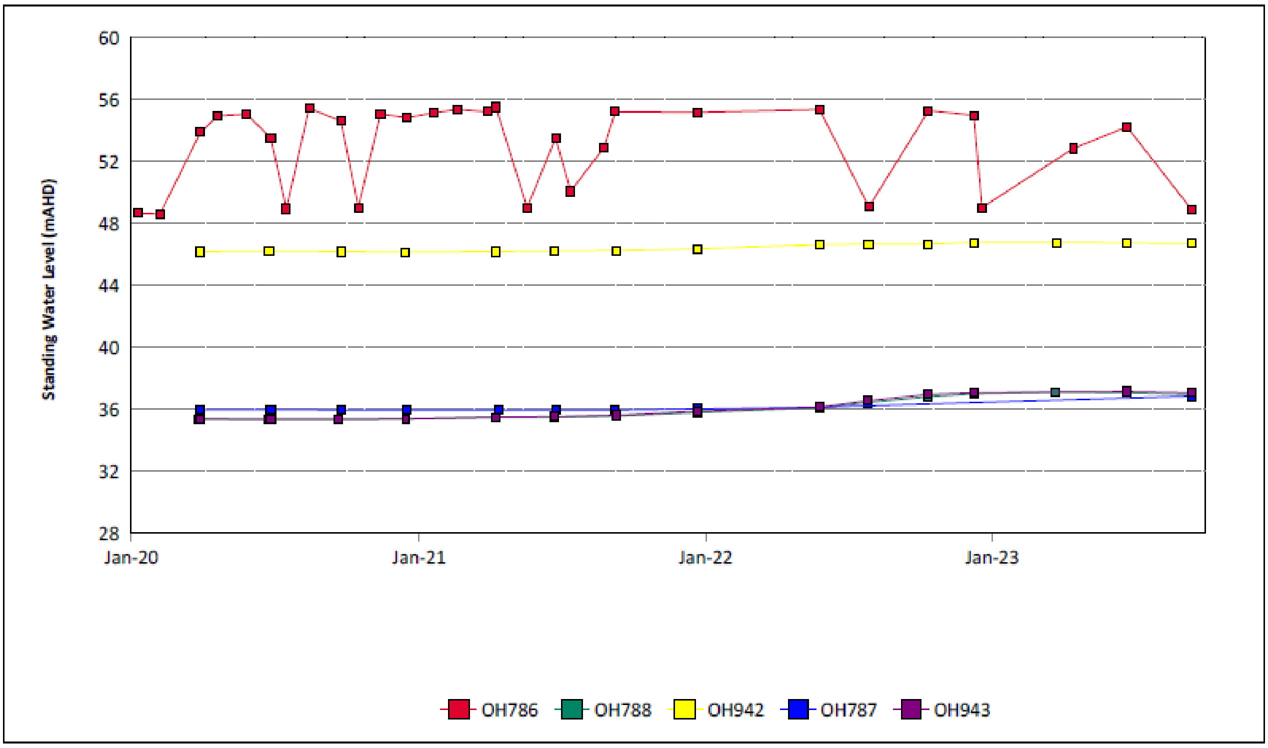

Figure 61: Hunter River Alluvium Standing Water Level Trend – September 2023

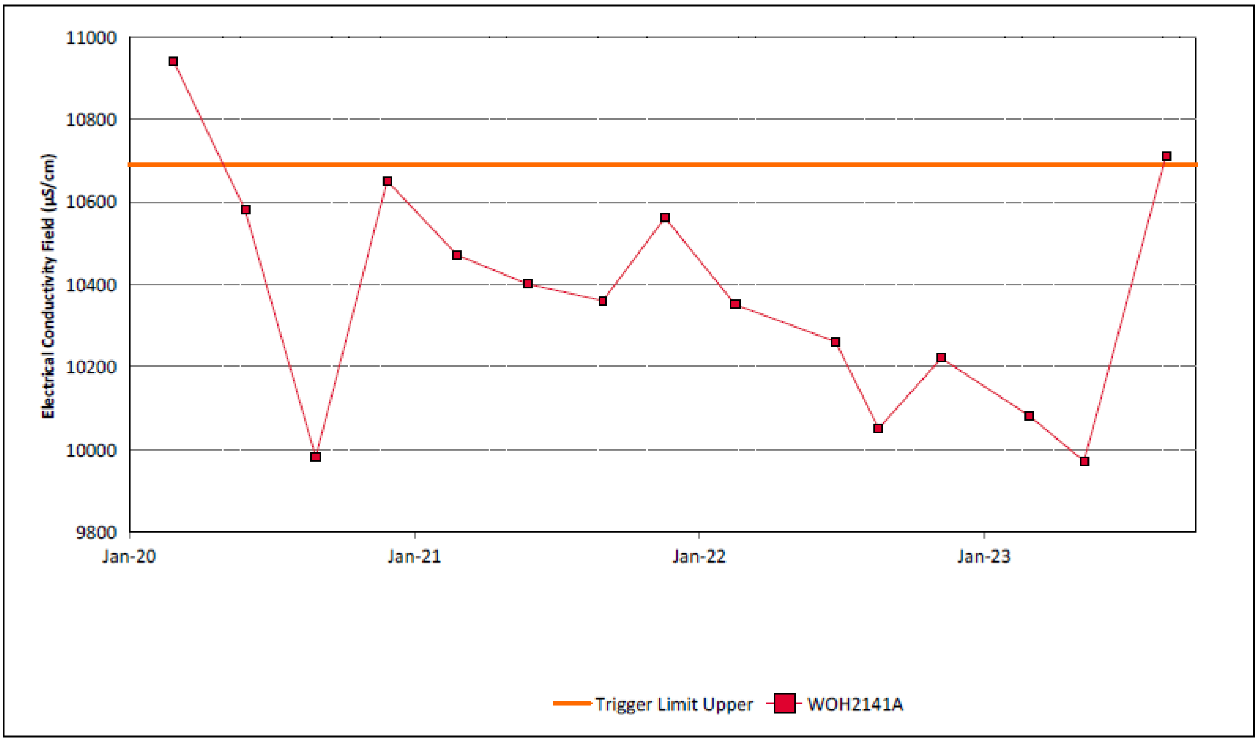

Figure 62: Whynot Seam Electrical Conductivity Field Trend – September 2023

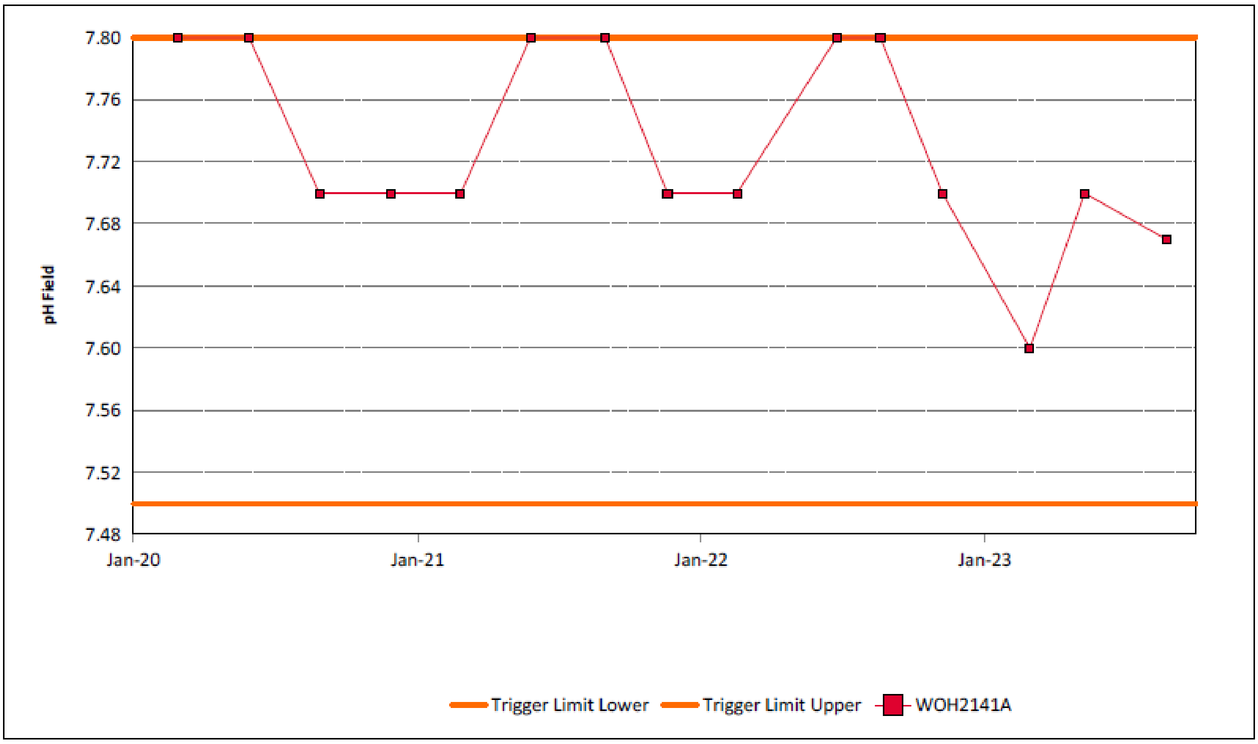

Figure 63: Whynot Seam pH Field Trend – September 2023

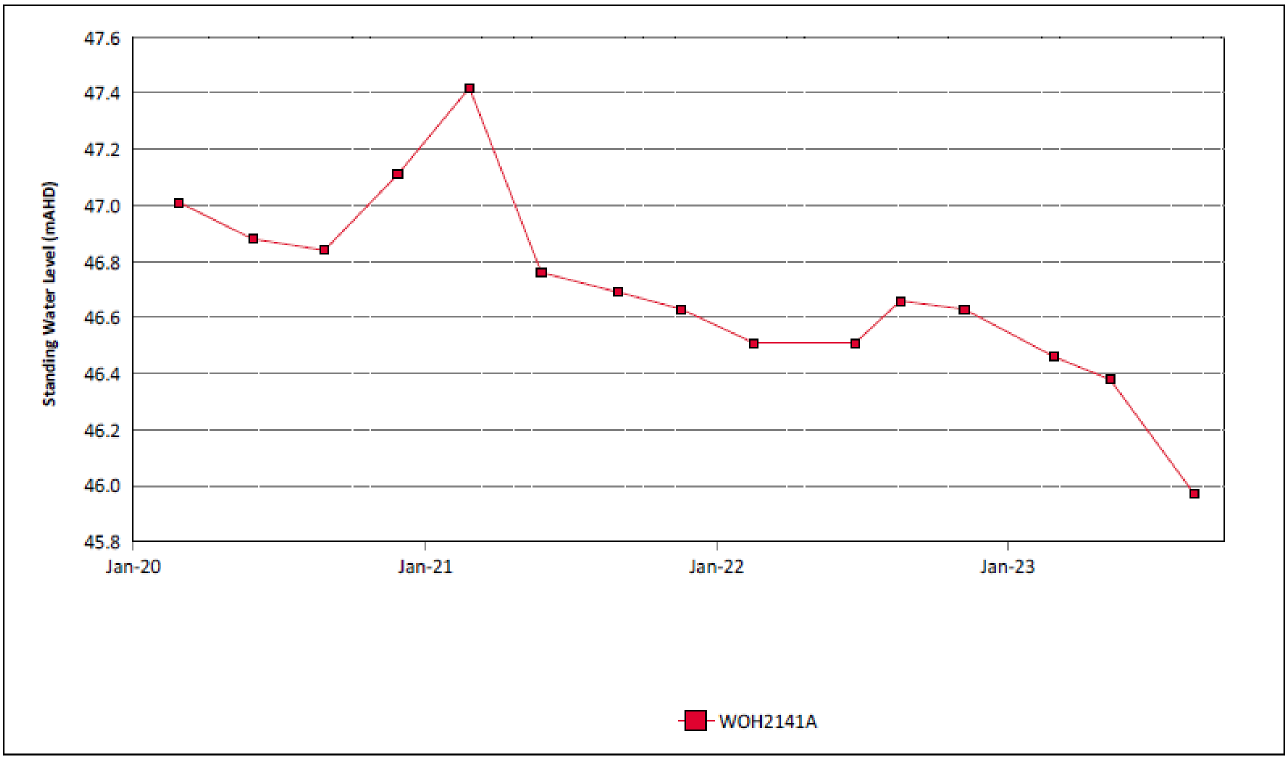

Figure 64: Whynot Seam Standing Water Level Trend – September 2023

3.3.1 Groundwater Trigger Tracking

Internal trigger limits have been developed to assess monitoring data on an on-going basis, and to highlight potentially adverse groundwater impacts. The process for evaluating monitoring results against the internal triggers and subsequent responses are outlined in the MTW Water Management Plan. Locations of groundwater bores are shown in **Figure 56**.

Current internal groundwater trigger limit breaches are summarised in **Table 3**

Table 3: Groundwater Trigger Tracking –September 2023

Site	Date	Trigger Limit Breached	Action Taken in Response
MB15MTW01D	15/02/2023	pH –5th Percentile	Investigation previously completed. The consultant identified in their report that “it is likely the trigger values derived for shallow overburden bores do not accurately represent in-situ groundwater water quality for MB15MTW01D”. MB15MTW01D is part of a larger dataset from the shallow overburden seam. The 5th percentile of the seam is currently 6.7 while the 5th percentile of MB15MTW01D is 5.4. The result is consistent with previous results and within sample location trigger levels. No further investigation required.
MB15MTW01D	04/05/2023	pH –5th Percentile	Investigation previously completed. The consultant identified in their report that “it is likely the trigger values derived for shallow overburden bores do not accurately represent in-situ groundwater water quality for MB15MTW01D”. MB15MTW01D is part of a larger dataset from the shallow overburden seam. The 5th percentile of the seam is currently 6.3 while the 5th percentile of MB15MTW01D is 5.4. The result is consistent with previous results and within sample location trigger levels. No further investigation required.
MB15MTW01D	18/08/2023	pH –5th Percentile	Investigation previously completed. The consultant identified in their report that “it is likely the trigger values derived for shallow overburden bores do not accurately represent in-situ groundwater water quality for MB15MTW01D”. MB15MTW01D is part of a larger dataset from the shallow overburden seam. The 5th percentile of the seam is currently 6.3 while the 5th percentile of MB15MTW01D is 5.5. The result is consistent with previous results and within sample location trigger levels. No further investigation required.
WOH2155A	09/05/2023	pH –5th Percentile	WOH2155A returned to above the pH 5th percentile trigger level for the sample on 22 August 2023.
GW98MTCL2	19/06/2023	pH –5th Percentile	Watching Brief*
GW98MTCL2	19/09/2023	pH –5th Percentile	Watching Brief*
OH787	11/09/2023	pH – 95th Percentile	Watching Brief*
PZ7S	23/08/2023	pH –5th Percentile	Watching Brief*

Site	Date	Trigger Limit Breached	Action Taken in Response
OH788	21/06/2023	EC – 95^{th} Percentile	Watching Brief*
MTD605P	18/08/2023	EC – 95^{th} Percentile	Watching Brief*
WOH2141A	22/08/2023	EC – 95^{th} Percentile	Watching Brief*
* = Watching brief established pending outcomes of subsequent monitoring events. No specific actions required.			

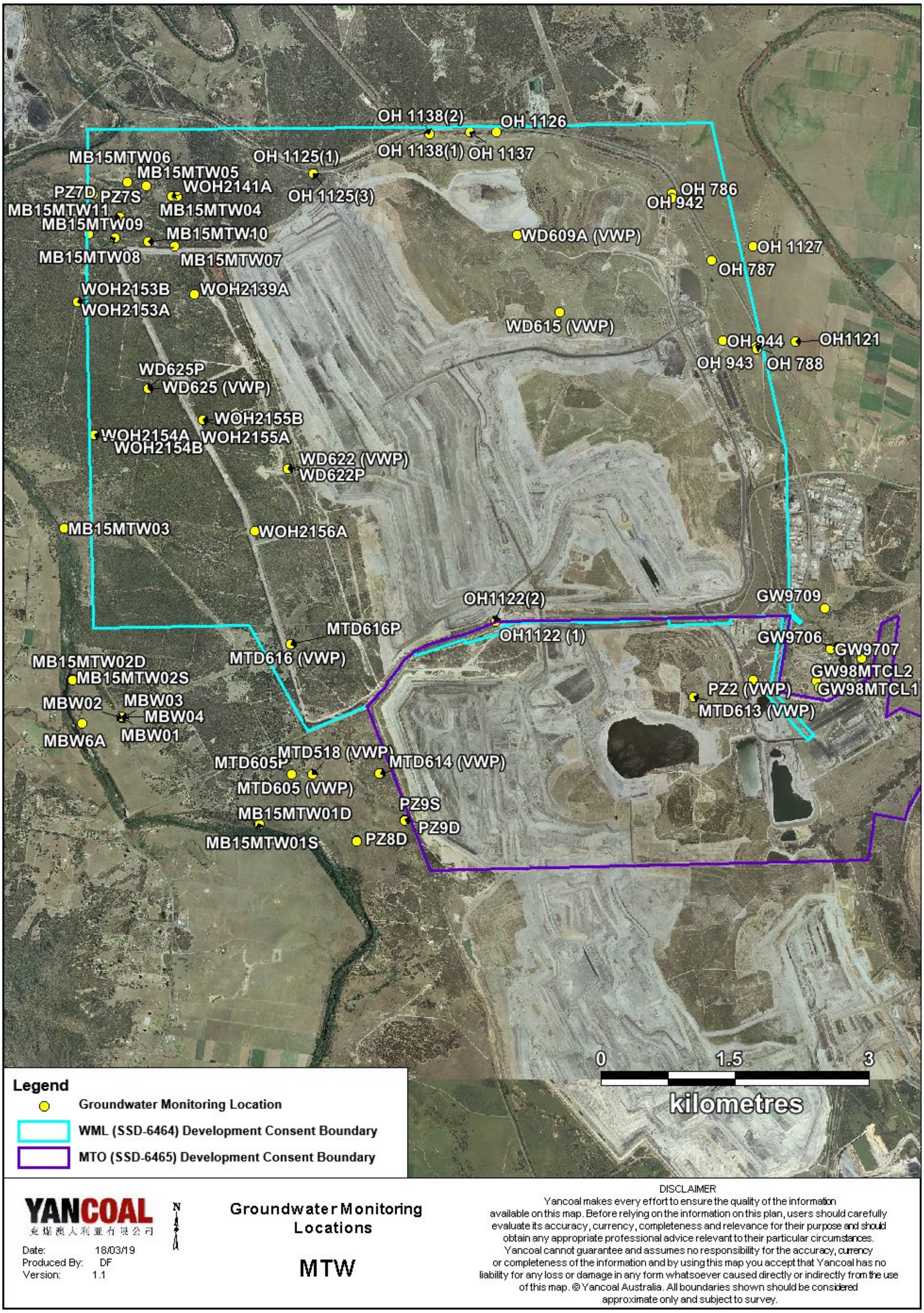

Figure 65: Groundwater Monitoring Location Plan

4.0 BLAST MONITORING

MTW have a network of six blast monitoring units. These are located at nearby privately owned residences and function as regulatory compliance monitors.

The location of these monitors can be found in **Figure 72**.

4.1 Blast Monitoring Results

During September 2023, 23 blasts were initiated at MTW. **Figure 9** to **Figure 14** show the blast monitoring results for the reporting period against the impact assessment criteria. The criteria are summarised in **Table 4**.

Table 4: Blasting Limits

Airblast Overpressure (dB(L))	Comments
115	5% of the total number of blasts in a 12 month period at WML or MTO
120	0%
Ground Vibration (mm/s)	**Comments**
5	5% of the total number of blasts in a 12 month period at WML or MTO
10	0%

During the reporting period no blasts exceeded the 5mm/s criteria for ground vibration, or the 115dB(L) threshold for airblast overpressure.

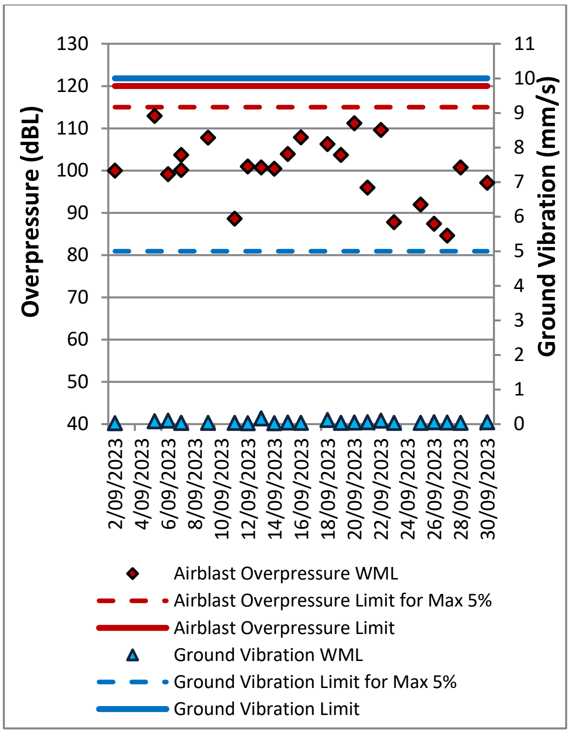

Figure 66: Abbey Green Blast Monitoring Results – September 2023

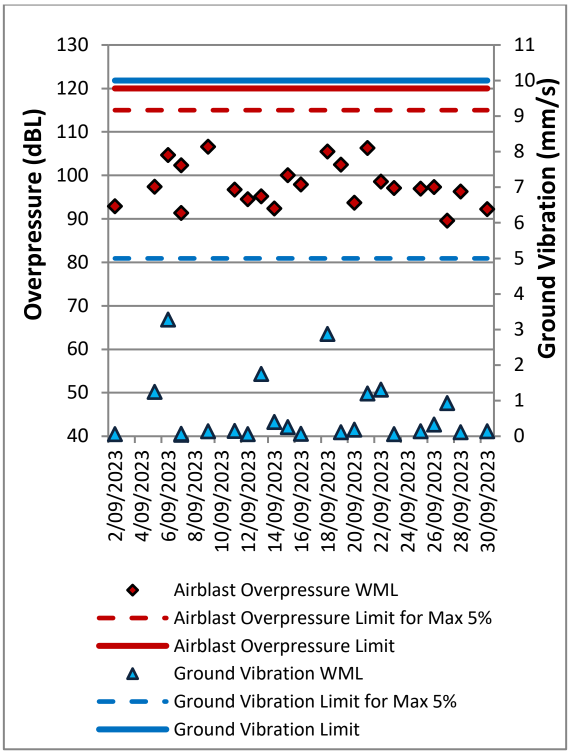

Figure 67: Bulga Village Blast Monitoring Results – September 2023

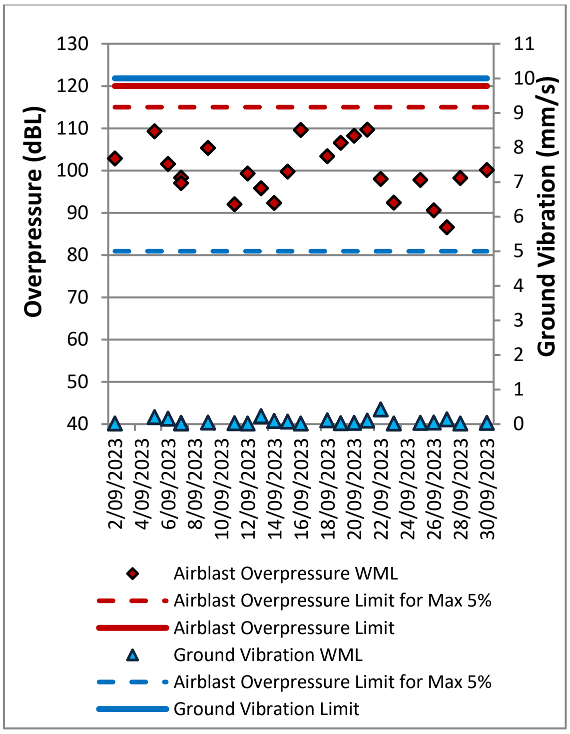

Figure 68: MTIE Blast Monitoring Results – September 2023

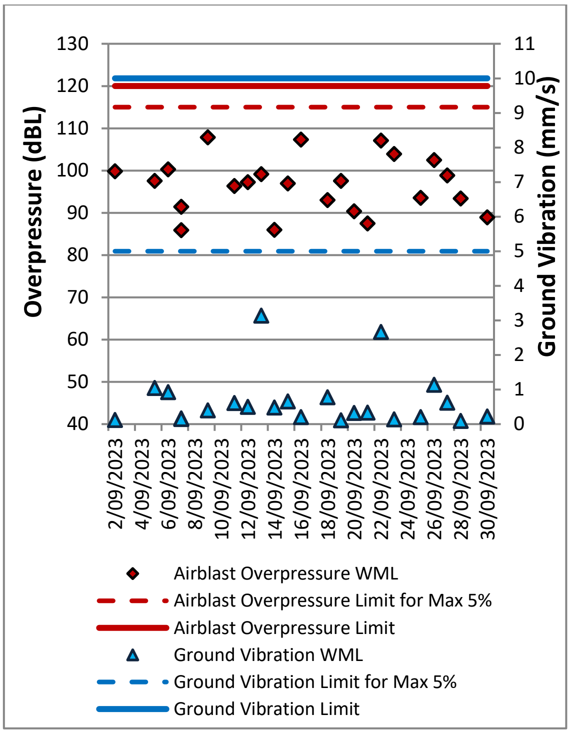

Figure 70: Warkworth Blast Monitoring Results – September 2023

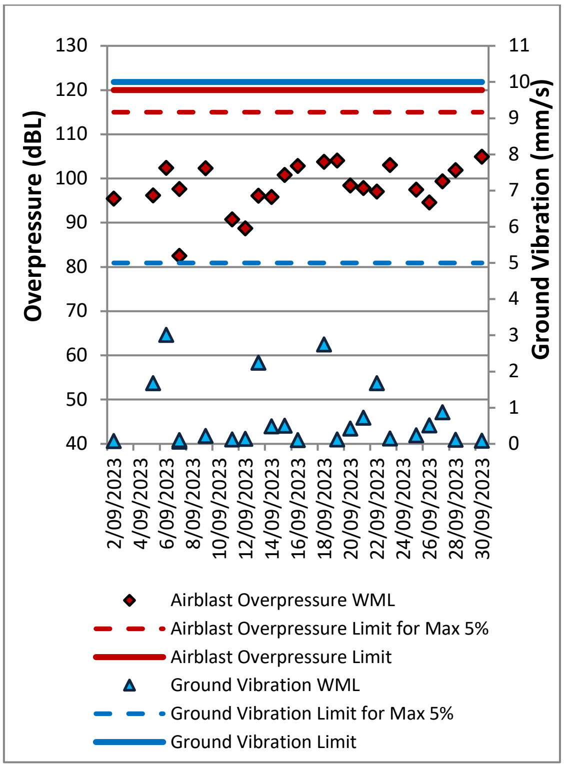

Figure 69: Wambo Road Blast Monitoring Results - September 2023

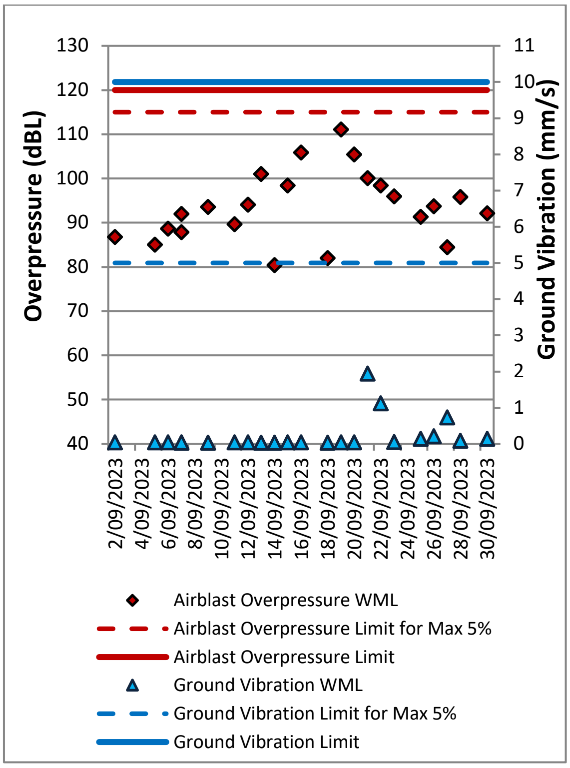

Figure 71: Wollemi Peak Road Blast Monitoring Results – September 2023

Figure 72: MTW Blast Monitoring Location Plan

5.0 NOISE

Routine attended noise monitoring is carried out in accordance with the MTW Noise Management Plan. A review against EIS predictions will be reported in the Annual Review. The purpose of the noise surveys is to quantify and describe the acoustic environment around the site and compare results with specified limits. Real time noise monitoring also occurs at five sites surrounding MTW. Noise monitoring locations are displayed in **Figure 73**.

5.1 Attended Noise Monitoring Results

Attended monitoring was conducted at receiver locations surrounding MTW on the night of 6 September 2023. All measurements complied with the relevant criteria. Results are detailed in **Table 5 to Table 8.**

5.1.1 WML Noise Assessment

Compliance assessments undertaken against the WML noise criteria are presented in **Tables 5** and **6**.

Table 5: $L_{Aeq, 15 minute}$ Warkworth Impact Assessment Criteria – September 2023

Location	Date and Time	Wind Speed (m/s)	Stability Class	Criterion dB(A)	Criterion Applies?[1]	WML L_{Aeq} dB[2,3,4]	Exceedance[3,4]
Bulga RFS	06/09/2023 23:35	2.5	D	37	Yes	33	Nil
Bulga Village	06/09/2023 22:45	2.1	F	38	Yes	36	Nil
Gouldsville	06/09/2023 21:21	2.2	F	38	Yes	<25	Nil
Inlet Rd	06/09/2023 21:39	2.1	F	37	Yes	35	Nil
Inlet Rd West	06/09/2023 21:03	2.4	D	35	Yes	33	Nil
Long Point	06/09/2023 21:00	2.4	D	35	Yes	IA	Nil
South Bulga	07/09/2023 00:27	2.2	D	35	Yes	IA	Nil
Wambo Road	06/09/2023 22:19	2.3	F	38	Yes	30	Nil

Notes:
1. Noise criteria apply during all meteorological conditions except the following: wind speeds greater than 3 m/s measured at 10 metres above ground level; stability category F temperature inversion conditions and wind speeds greater than 2m/s at 10m above ground level; or stability category G temperature inversion conditions. Criterion may or may not apply due to rounding of meteorological data values;
2. Site-only LAeq,15minute attributed to WML, including modifying factors if applicable;
3. Bold results in red indicate exceedance of relevant criterion; and
4. NA in exceedance column means atmospheric conditions outside conditions specified in consent, therefore criterion was not applicable.

Table 6: $L_{A1, 1 minute}$ Warkworth - Impact Assessment Criteria – September 2023

Location	Date and Time	Wind Speed (m/s)	Stability Class	Criterion dB(A)	Criterion Applies?[1]	WML $L_{A1, 1min}$ dB[2,3,4]	Exceedance[3,4]
Bulga RFS	06/09/2023 23:35	2.5	D	47	Yes	35	Nil
Bulga Village	06/09/2023 22:45	2.1	F	48	Yes	39	Nil
Gouldsville	06/09/2023 21:21	2.2	F	48	Yes	<25	Nil
Inlet Rd	06/09/2023 21:39	2.1	F	47	Yes	47	Nil
Inlet Rd West	06/09/2023 21:03	2.4	D	45	Yes	44	Nil
Long Point	06/09/2023 21:00	2.4	D	45	Yes	IA	Nil
South Bulga	07/09/2023 00:27	2.2	D	45	Yes	IA	Nil
Wambo Road	06/09/2023 22:19	2.3	F	48	Yes	40	Nil

Notes:
1. Noise criteria apply during all meteorological conditions except the following: wind speeds greater than 3 m/s measured at 10 metres above ground level; stability category F temperature inversion conditions and wind speeds greater than 2m/s at 10m above ground level; or stability category G temperature
inversion conditions. Criterion may or may not apply due to rounding of meteorological data values;
2. Site-only LA1,1minute attributed to WML;
3. Bold results in red indicate exceedance of relevant criterion; and
4. NA in exceedance column means atmospheric conditions outside conditions specified in consent, therefore criterion was not applicable.

5.1.2 MTO Noise Assessment

Compliance assessments undertaken against the MTO noise criteria are presented in **Table 7** and **8**.

Table 7: $L_{Aeq,\ 15minute}$ Mount Thorley - Impact Assessment Criteria – September 2023

Location	Date and Time	Wind Speed (m/s)	Stability Class	Criterion dB	Criterion Applies?[1]	MTO L_{Aeq} dB[2,3,4]	Exceedance[3,4]
Bulga RFS	06/09/2023 23:35	2.5	D	37	Yes	33	Nil
Bulga Village	06/09/2023 22:45	2.1	F	38	Yes	IA	Nil
Gouldsville	06/09/2023 21:21	2.2	F	35	Yes	IA	Nil
Inlet Rd	06/09/2023 21:39	2.1	F	37	Yes	IA	Nil
Inlet Rd West	06/09/2023 21:03	2.4	D	35	Yes	<30	Nil
Long Point	06/09/2023 21:00	2.4	D	35	Yes	IA	Nil
South Bulga	07/09/2023 00:27	2.2	D	36	Yes	IA	Nil
Wambo Road	06/09/2023 22:19	2.3	F	38	Yes	IA	Nil

Notes:
1. Noise criteria apply during all meteorological conditions except the following: wind speeds greater than 3 m/s measured at 10 metres above ground level; stability category F temperature inversion conditions and wind speeds greater than 2m/s at 10m above ground level; or stability category G temperature inversion conditions. Criterion may or may not apply due to rounding of meteorological data values;
2. Site-only LAeq,15minute attributed to MTO, including modifying factors if applicable;
3. Bold results in red indicate exceedance of relevant criterion; and
4. NA in exceedance column means atmospheric conditions outside conditions specified in consent, therefore criterion was not applicable.

Table 8: $L_{A1,\ 1Minute}$ Mount Thorley - Impact Assessment Criteria – September 2023

Location	Date and Time	Wind Speed (m/s)	Stability Class	Criterion dB	Criterion Applies?[1]	MTO $L_{A1,\ 1min}$ dB[2,3,4]	Exceedance[3,4]
Bulga RFS	06/09/2023 23:35	2.5	D	47	Yes	40	Nil
Bulga Village	06/09/2023 22:45	2.1	F	48	Yes	IA	Nil
Gouldsville	06/09/2023 21:21	2.2	F	45	Yes	IA	Nil
Inlet Rd	06/09/2023 21:39	2.1	F	47	Yes	IA	Nil
Inlet Rd West	06/09/2023 21:03	2.4	D	45	Yes	<30	Nil
Long Point	06/09/2023 21:00	2.4	D	45	Yes	IA	Nil
South Bulga	07/09/2023 00:27	2.2	D	46	Yes	IA	Nil
Wambo Road	06/09/2023 22:19	2.3	F	48	Yes	IA	Nil

Notes:
1. Noise criteria apply during all meteorological conditions except the following: wind speeds greater than 3 m/s measured at 10 metres above ground level; stability category F temperature inversion conditions and wind speeds greater than 2m/s at 10m above ground level; or stability category G temperature inversion conditions. Criterion may or may not apply due to rounding of meteorological data values;
2. Site-only LA1,1minute attributed to MTO;
3. Bold results in red indicate exceedance of relevant criterion; and
4. NA in exceedance column means atmospheric conditions outside conditions specified in consent, therefore criterion was not applicable.

5.1.3 NPfI Low Frequency Assessment

In accordance with the requirements of the EPA's Noise Policy for Industry (NPfI), the applicability of the low frequency modification factor corrections has been assessed. There were no noise measurements taken during the reporting period which required the penalty to be applied. The WML assessment for low frequency noise is shown in **Table 9** and the MTO assessment for low frequency noise is shown in **Table 10**.

Table 9: Warkworth Low Frequency Noise Assessment – September 2023

Location	Date and Time	Measured WML LAeq dB	Criterion Applies?	Intermittency Modifying Factor?	Tonality Modifying Factor?	Frequency of Tonality[1]	Low-frequency Modifying Factor?	Maximum Exceedance of Reference Spectrum [1,2]	Penalty dB[2]
Bulga RFS	06/09/2023 23:35	33	Yes	No	No	NA	No	NA	Nil
Bulga Village	06/09/2023 22:45	36	No	NA	NA	NA	NA	NA	Nil
Gouldsville	06/09/2023 21:21	<25	No	NA	NA	NA	NA	NA	Nil
Inlet Rd	06/09/2023 21:39	35	No	NA	NA	NA	NA	NA	Nil
Inlet Rd West	06/09/2023 21:03	33	Yes	No	No	NA	No	NA	Nil
Long Point	06/09/2023 21:00	IA	Yes	No	No	NA	No	NA	Nil
South Bulga	07/09/2023 00:27	IA	Yes	No	No	NA	No	NA	Nil
Wambo Road	06/09/2023 22:19	30	No	NA	NA	NA	NA	NA	Nil

Notes:
1. NA denotes 'not applicable'; and
2. Bold results indicate that application of NPfI modifying factor/s is required.

Table 10: Mount Thorley Operations Low Frequency Noise Assessment – September 2023

Location	Date and Time	Measured WML LAeq dB	Criterion Applies?	Intermittency Modifying Factor?	Tonality Modifying Factor?	Frequency of Tonality[1]	Low-frequency Modifying Factor?	Maximum Exceedance of Reference Spectrum [1,2]	Penalty dB[2]
Bulga RFS	06/09/2023 23:35	33	Yes	No	No	NA	No	NA	Nil
Bulga Village	06/09/2023 22:45	IA	No	NA	NA	NA	NA	NA	Nil
Gouldsville	06/09/2023 21:21	IA	No	NA	NA	NA	NA	NA	Nil
Inlet Rd	06/09/2023 21:39	IA	No	NA	NA	NA	NA	NA	Nil
Inlet Rd West	06/09/2023 21:03	<30	Yes	No	No	NA	No	NA	Nil
Long Point	06/09/2023 21:00	IA	Yes	No	No	NA	No	NA	Nil
South Bulga	07/09/2023 00:27	IA	Yes	No	No	NA	No	NA	Nil
Wambo Road	06/09/2023 22:19	IA	No	NA	NA	NA	NA	NA	Nil

Notes:
1. NA denotes 'not applicable'; and
2. Bold results indicate that application of NPfI modifying factor/s is required.

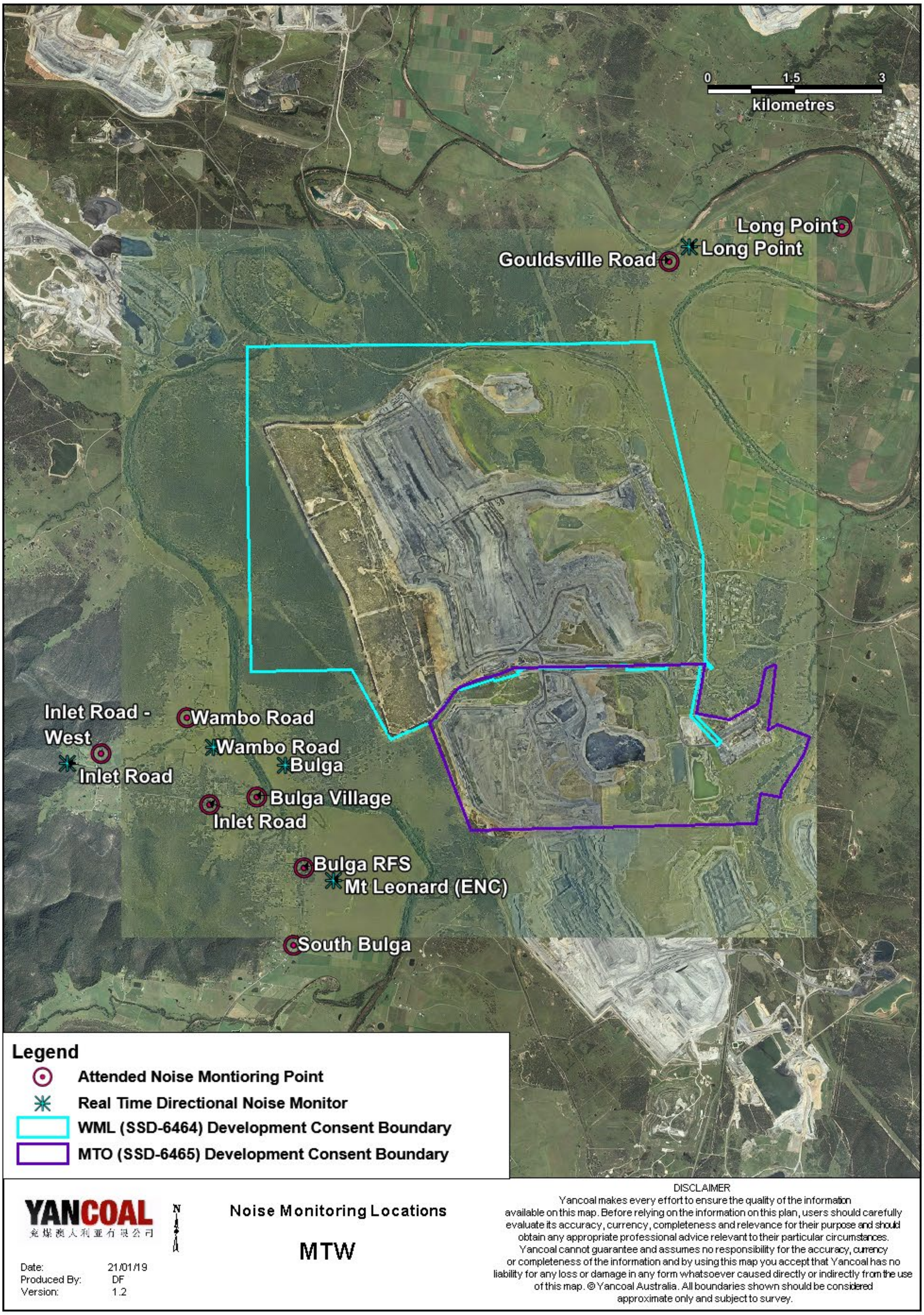

Figure 73: Noise Monitoring Location Plan

5.2 Noise Management Measures

A program of targeted supplementary attended noise monitoring is in place at MTW, supported by the real-time directional monitoring network and ensuring the highest level of noise management is maintained. The supplementary program is undertaken by MTW personnel and involves:

- Routine inspections from both inside and outside the mine boundary;
- Routine and as-required handheld noise assessments (undertaken in response to noise alarm and/or community complaint), comparing measured levels against consent noise limits; and
- Validation monitoring following operational modifications to assess the adequacy of the modifications.

Where a noise assessment identifies noise emissions which are exceeding the relevant noise limit(s) for any particular residence, modifications will be made to ensure that the noise event is resolved within 75 minutes of identification. The actions taken are commensurate with the nature and severity of the noise event, but can include:

- Changing the haul route to a less noise sensitive haul;
- Changing dump locations (in-pit or less exposed dump option);
- Reducing equipment numbers;
- Shut down of task; or
- Site shut down.

A summary of these assessments undertaken are provided in **Table 11**.

Table 11: Supplementary Attended Noise Monitoring Data – September 2023

No. of assessments	No. of assessments > trigger	No. of nights where assessments > trigger	% greater than trigger
739	26	11	3.52

Note: Measurements are taken under all meteorological conditions, including conditions under which the consent noise criteria do not apply.

6.0 OPERATIONAL DOWNTIME

During September, a total of 1002 hours of equipment downtime was logged in response to environmental events such as dust, noise and adverse meteorological conditions. Operational downtime by equipment type is shown in **Figure 74**.

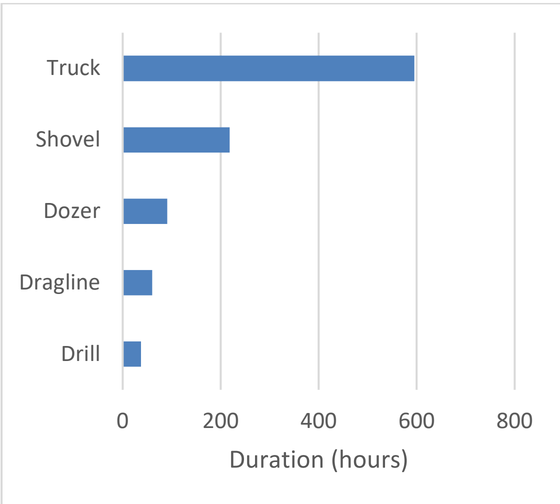

Figure 74: Operational Downtime by Equipment Type – September 2023

7.0 REHABILITATION

During September 2023, 23.12 Ha of land was released, 1.32 Ha was bulk shaped, 12.59 Ha was topsoiled, 5.61 Ha land was composted and 5.37 Ha of land was rehabilitated.

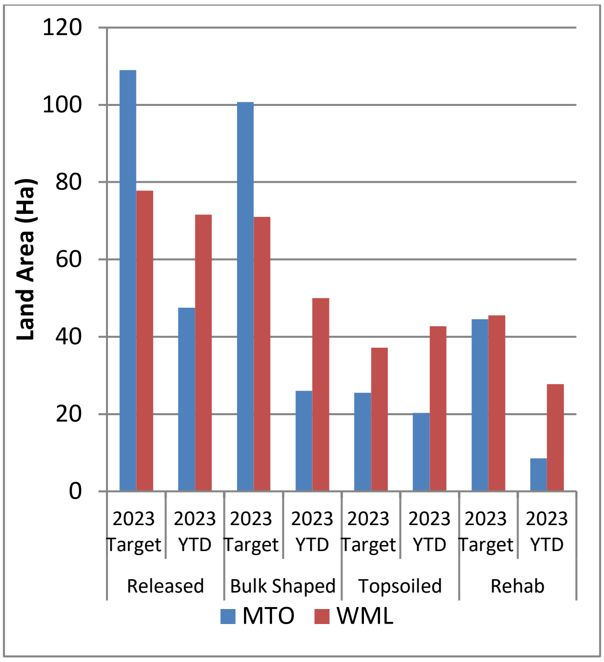

Figure 75: Rehabilitation YTD – September 2023

8.0 ENVIRONMENTAL INCIDENTS

There were no environmental incidents during the reporting period.

9.0 COMPLAINTS

Thirty-nine complaints were received during the reporting period. Details of these complaints are shown in **Table 12**.

Table 12: Complaints Summary YTD

	Noise	Dust	Blast	Lighting	Other	Total
January	1	2	2	3	0	8
February	4	5	4	0	0	13
March	4	6	0	4	0	14
April	2	2	0	0	0	4
May	2	2	1	1	0	6
June	1	1	2	1	1	6
July	1	2	2	1	0	6
August	8	10	4	0	0	22
September	3	26	8	1	1	39
October						
November						
December						
Total	26	56	23	11	2	118

Appendix A: Meteorological Data

Table 13: Meteorological Data – Charlton Ridge Meteorological Station – September 2023

Date	Air Temperature		Relative Humidity		Wind Direction	Wind Speed	Rainfall
	Maximum (°C)	Minimum (°C)	Maximum (%)	Minimum (%)	Average (°)	Average (m/sec)	total (mm)
1/09/2023	21	8	97	41	185	2.4	0.0
2/09/2023	21	6	92	32	174	1.7	0.0
3/09/2023	22	7	96	37	164	2.0	0.0
4/09/2023	25	7	97	40	149	1.9	3.4
5/09/2023	27	10	99	13	251	3.0	0.2
6/09/2023	25	5	80	16	181	1.9	0.0
7/09/2023	31	6	92	19	204	2.7	0.0
8/09/2023	21	9	97	26	266	3.5	8.8
9/09/2023	20	6	79	23	256	3.5	0.0
10/09/2023	20	4	78	26	179	2.0	0.0
11/09/2023	21	5	87	31	157	2.3	0.0
12/09/2023	24	6	93	31	184	2.1	0.0
13/09/2023	26	7	94	19	197	2.1	0.0
14/09/2023	27	8	95	25	187	1.9	0.0
15/09/2023	30	8	84	10	213	2.3	0.0
16/09/2023	33	10	71	15	278	3.1	0.0
17/09/2023	35	13	58	12	258	2.9	0.0
18/09/2023	36	11	59	9	232	2.5	0.0
19/09/2023	35	15	50	13	269	3.7	0.0
20/09/2023	-	-	-	-	-	-	-
21/09/2023	27	12	79	11	164	4.7	0.0
22/09/2023	21	8	89	33	159	3.6	0.0
23/09/2023	21	5	94	38	151	2.7	0.0
24/09/2023	23	6	91	31	153	2.9	0.0
25/09/2023	28	6	96	21	202	2.4	0.0
26/09/2023	28	10	100	22	186	2.2	1.2
27/09/2023	28	13	100	30	167	2.4	9.6
28/09/2023	24	12	100	49	154	2.8	0.2
29/09/2023	32	9	100	17	225	2.7	0.0
30/09/2023	33	12	85	15	191	2.4	0.0

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