Monthly Environmental Monitoring Report

Yancoal Mount Thorley Warkworth

September 2022

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Revision History

Version No.	Version Details	Document Status	Date
1.0	**Environment and Community Advisor**	**Final**	**09/02/2023**

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 2022.

2.0 AIR QUALITY

2.1 Meteorological Monitoring

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

2.1.1 Rainfall

Rainfall for the reporting period is summarised in **Table 1**. The year-to-date monthly rainfall totals, 2022 monthly rainfall totals and historical average monthly rainfall trend are shown in **Figure 1**.

Table 1: Monthly Rainfall MTW

2022	Monthly Rainfall (mm)	Cumulative Rainfall (mm)
September	69	873.2

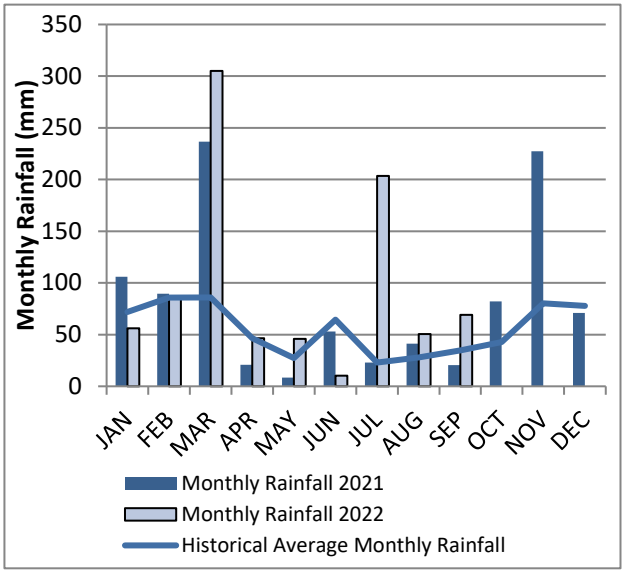

Figure 1: Rainfall Trend YTD

Note: The historical average monthly rainfall is calculated from 2007 to 2021 monthly totals

2.1.2 Wind Speed and Direction

Winds from the north west and from the south were dominant during the reporting period as shown in **Figure 2.**

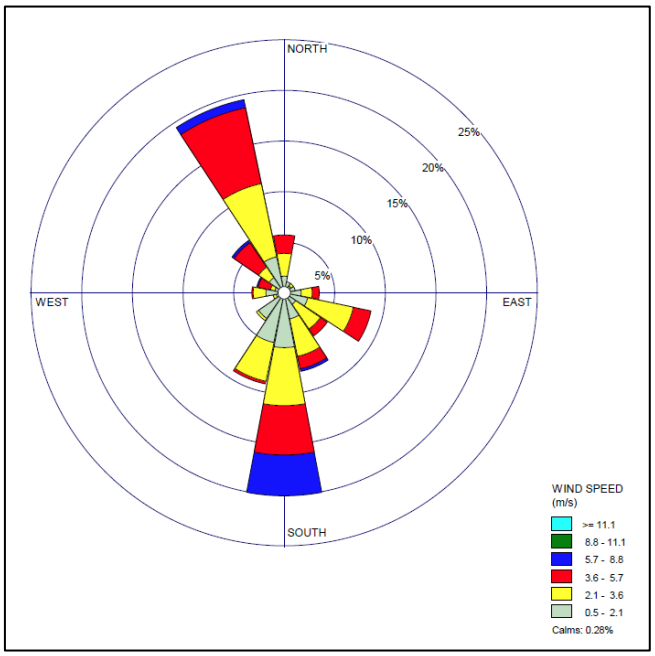

Figure 2: Charlton Ridge Wind Rose – September 2022

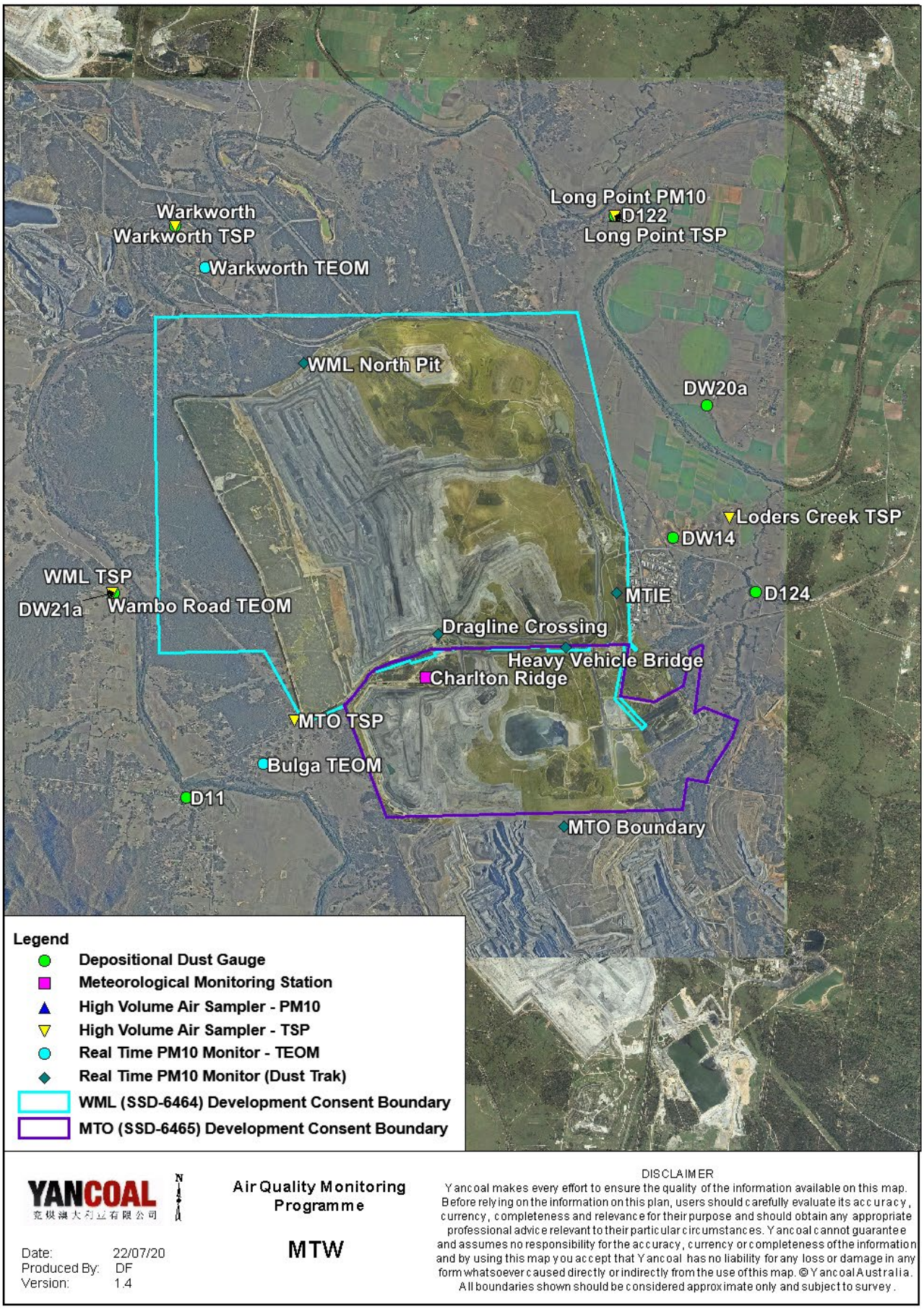

Figure 3: Air Quality Monitoring Locations

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/m^2 per month. There is no evidence to suggest that the Warkworth 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 2022 Annual Review Report.

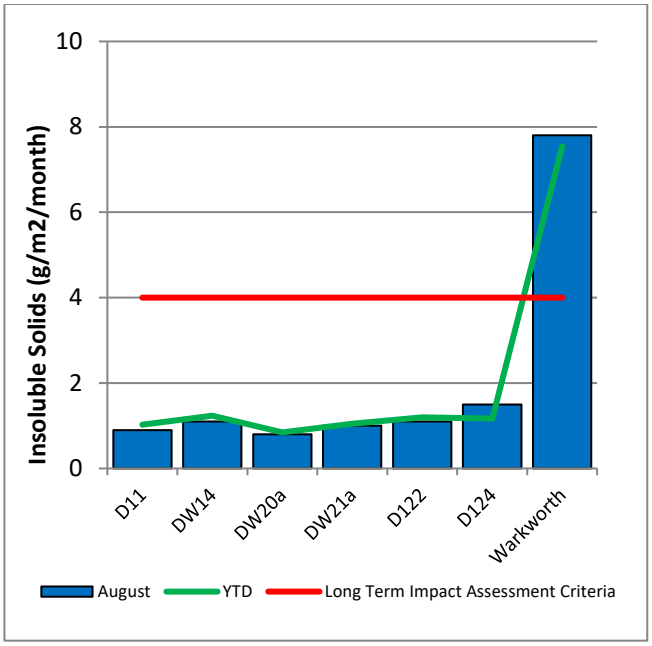

Figure 4: Depositional Dust – September 2022

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/m^3.

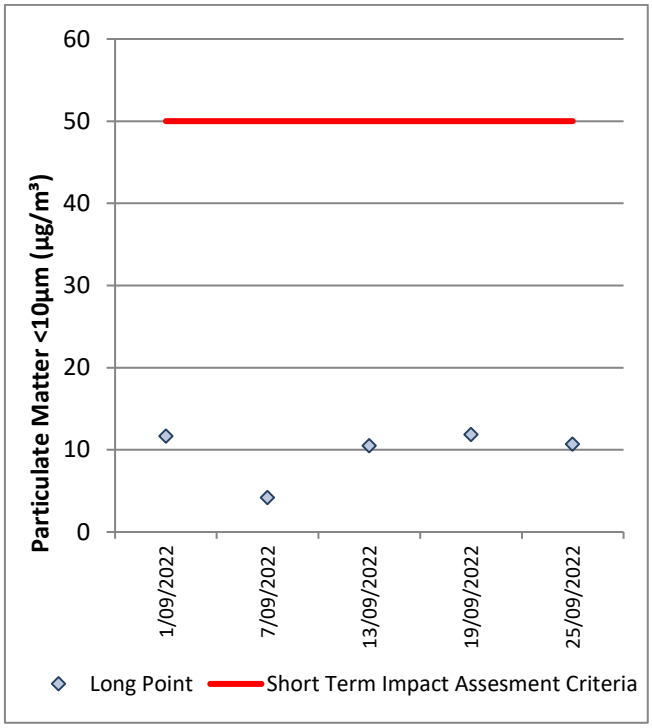

Figure 5: Individual PM10 Results – September 2022

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 2022 Annual Review Report.

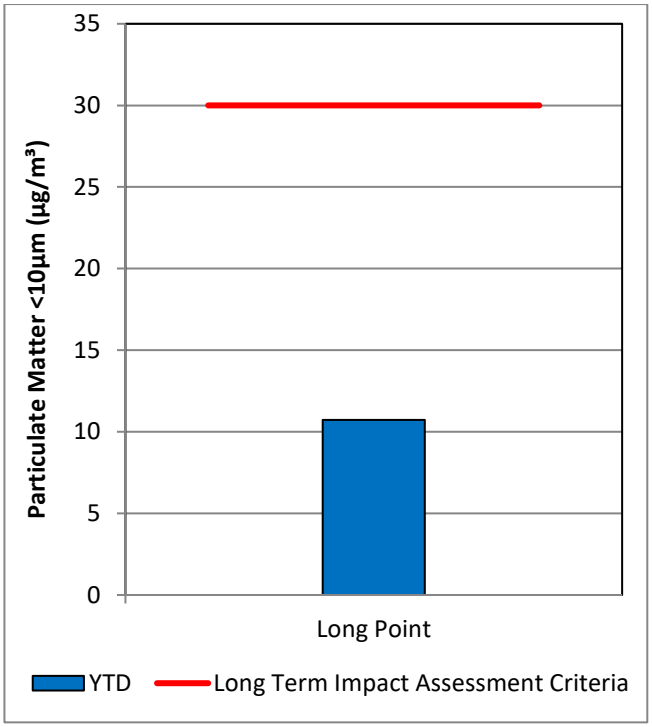

Figure 6: Annual Average PM_{10} – September 2022

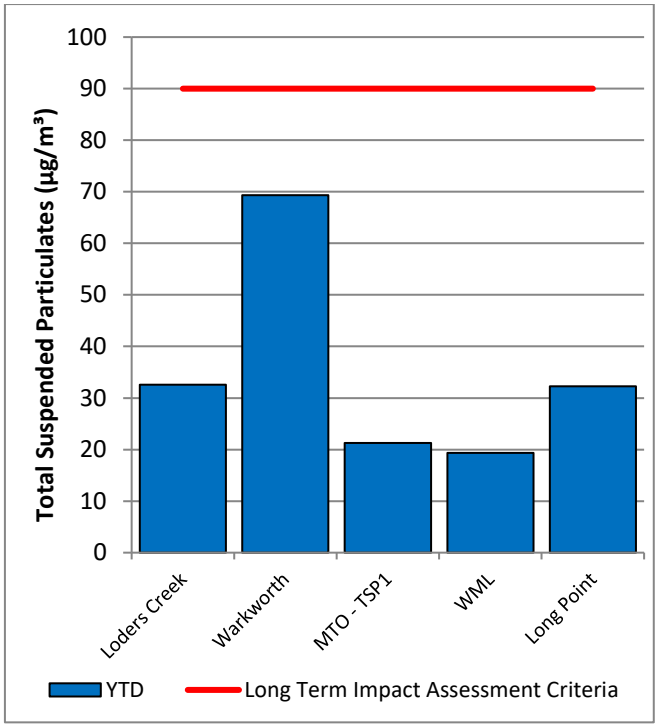

Figure 7: Annual Average Total Suspended Particulates - September 2022

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 2022 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.

2.3.4 Real Time Alarms for Air Quality

During September, the real time monitoring system generated 30 automated air quality related alerts, including 13 alerts for adverse meteorological conditions and 17 alerts for elevated PM_{10} levels

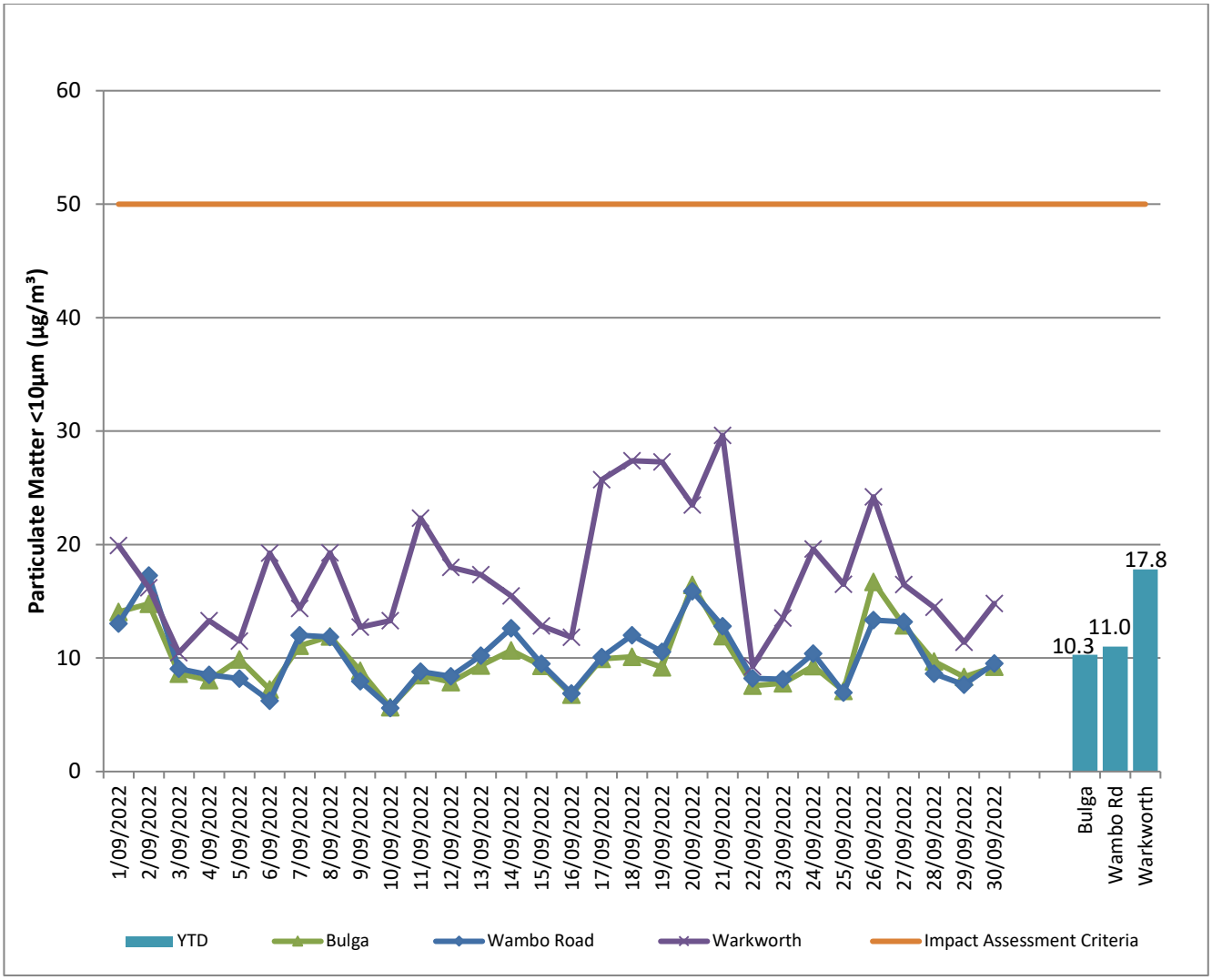

Figure 8: Real Time PM_{10} daily 24hr average (line graphs) and YTD annual average (column graphs) – September 2022

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 (2019 – current) within MTW mine dams. **Figure 12** to **Figure 14** show the long-term surface water trend (2019 – current) in surrounding watercourses.

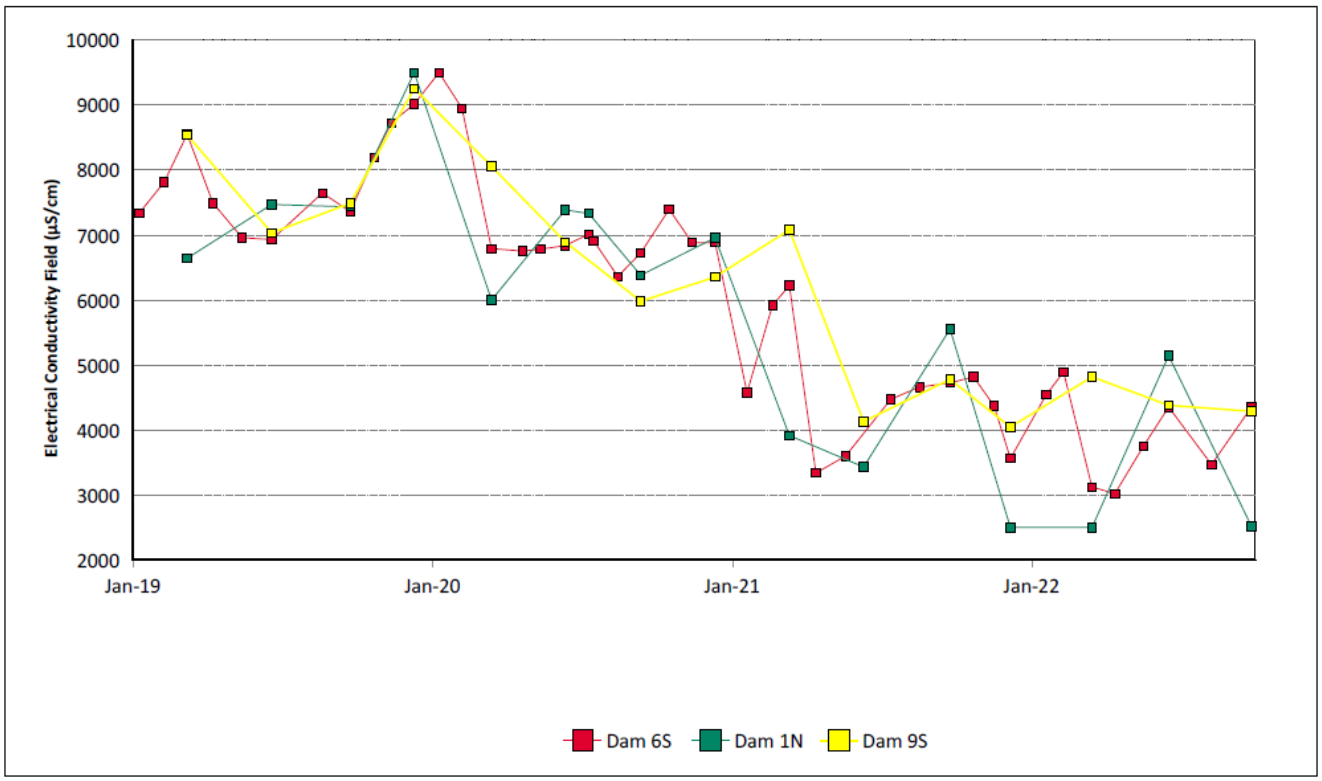

Figure 9: Site Dams Electrical Conductivity Field Trend - September 2022

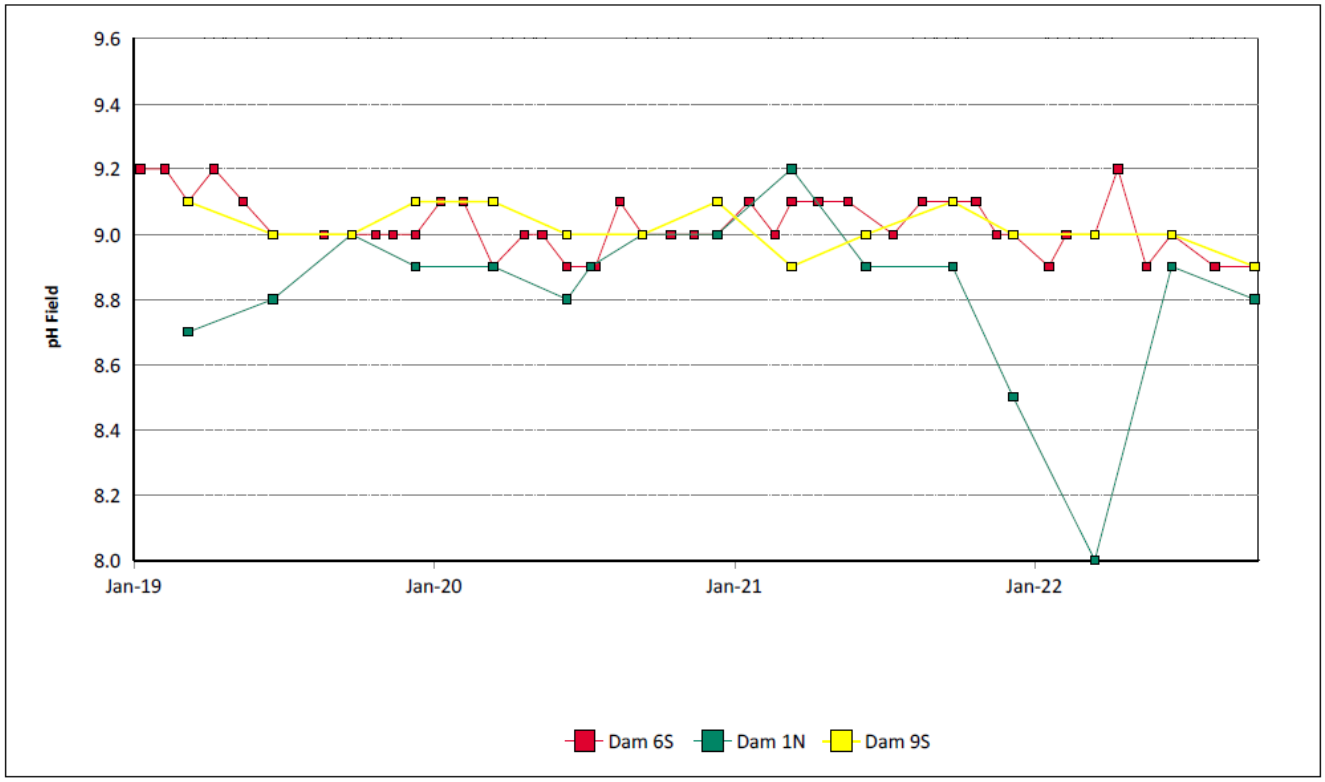

Figure 10: Site Dams pH Field Trend - September 2022

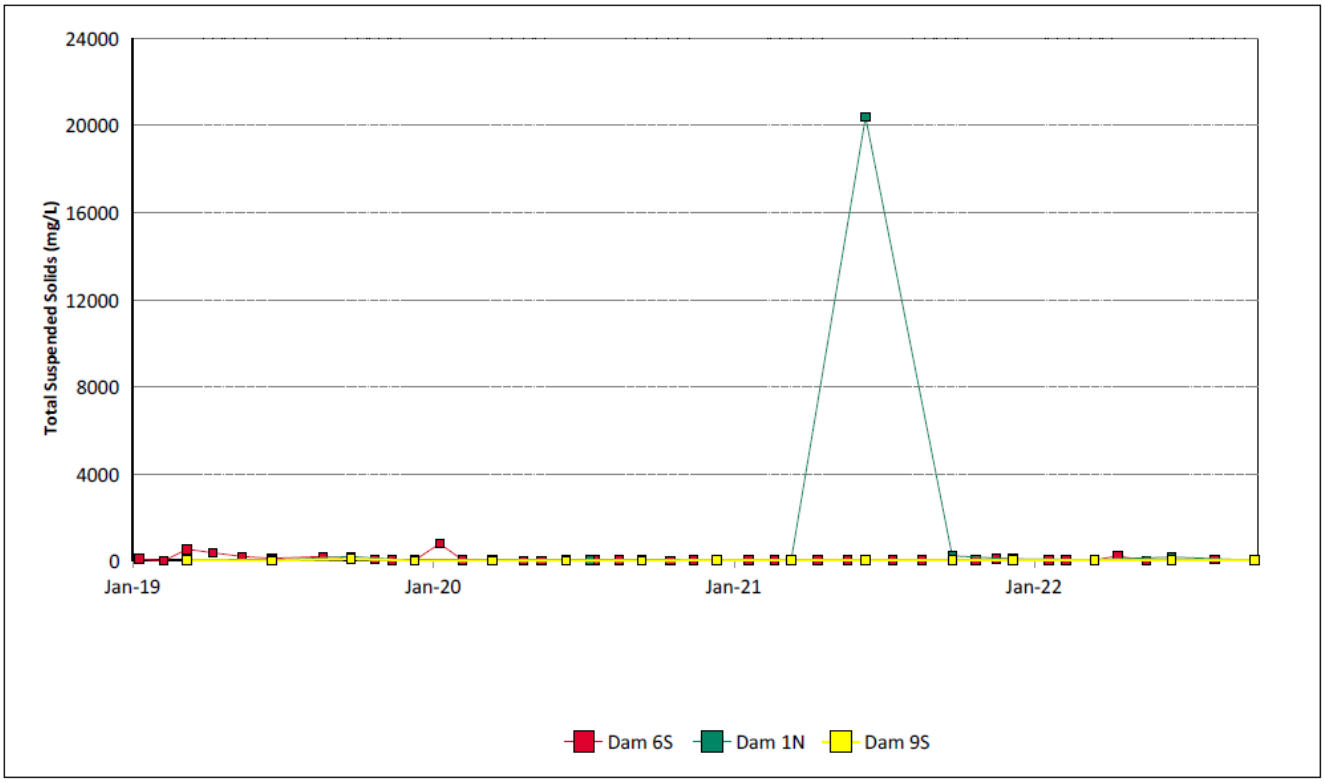

Figure 11: Site Dams Total Suspended Solids Trend - September 2022

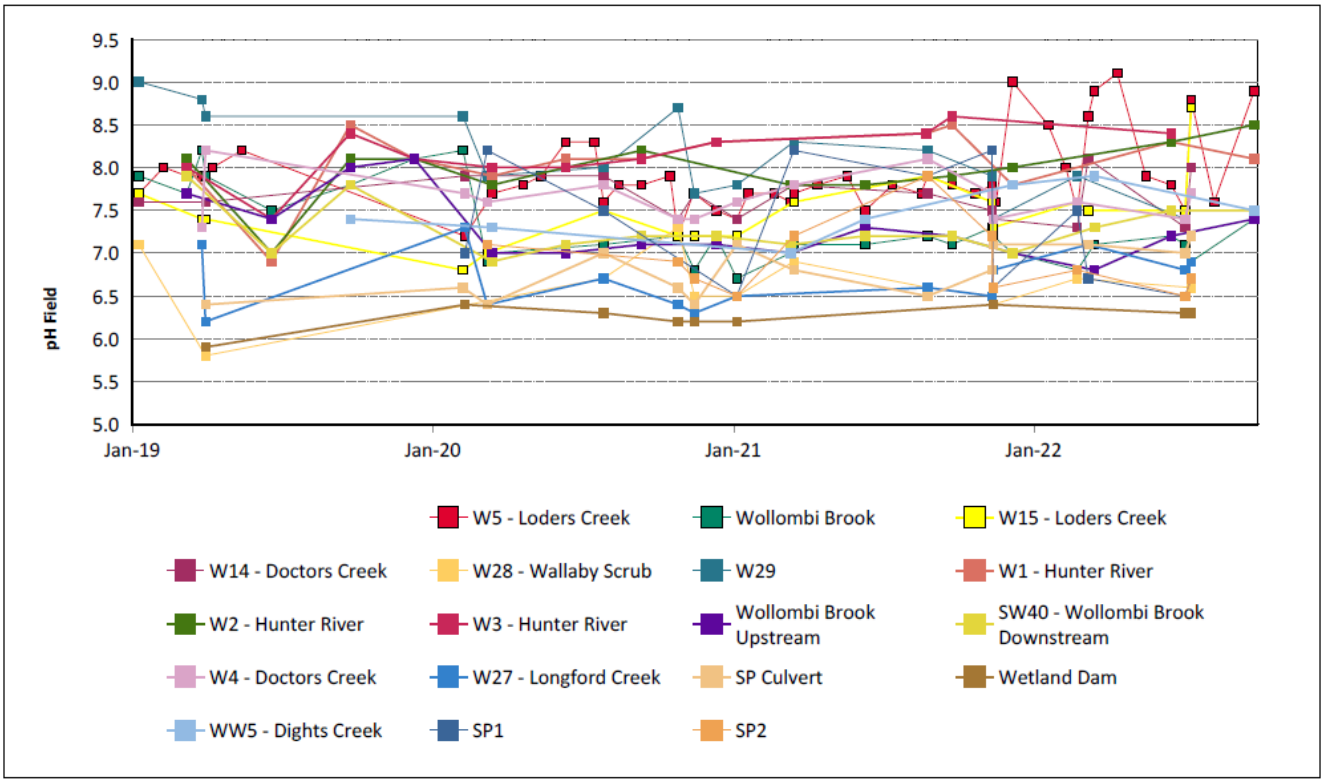

Figure 12: Watercourse pH Field Trend - September 2022

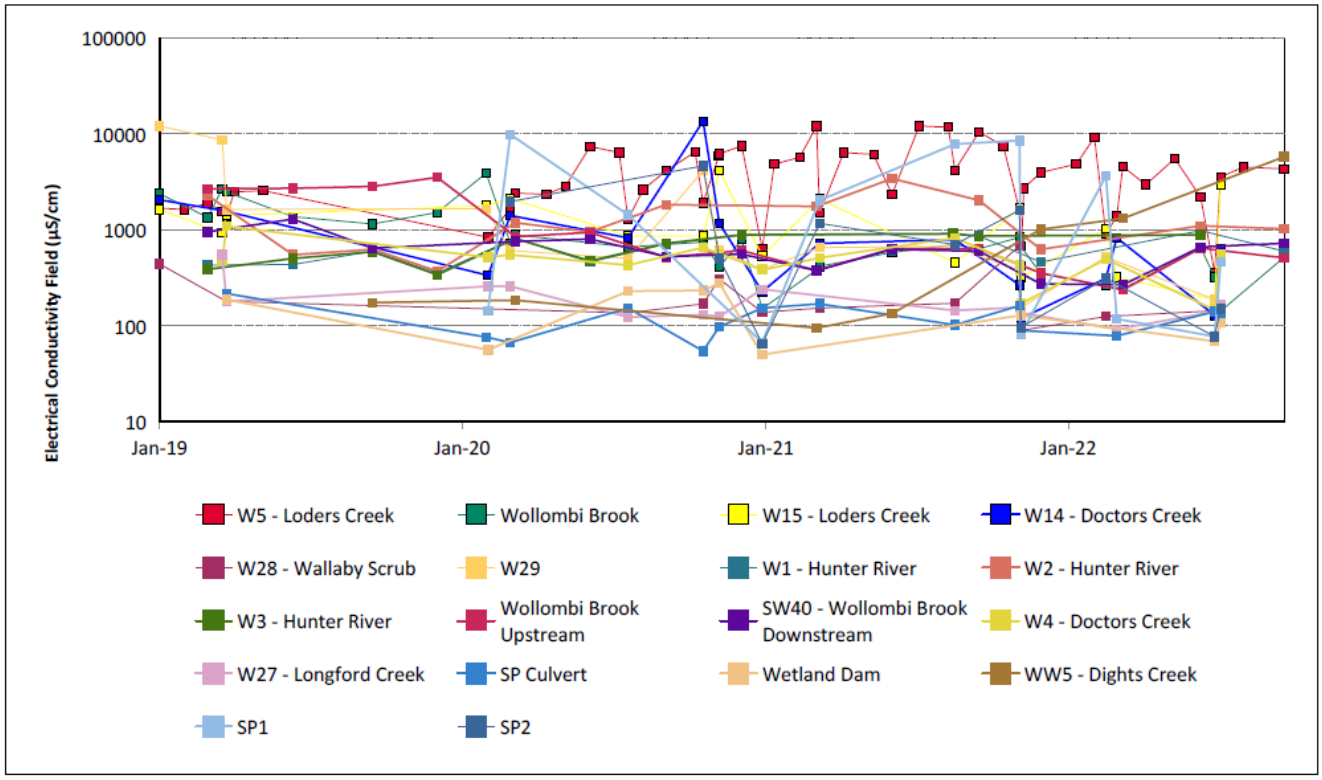

Figure 13: Watercourse Electrical Conductivity Field Trend - September 2022

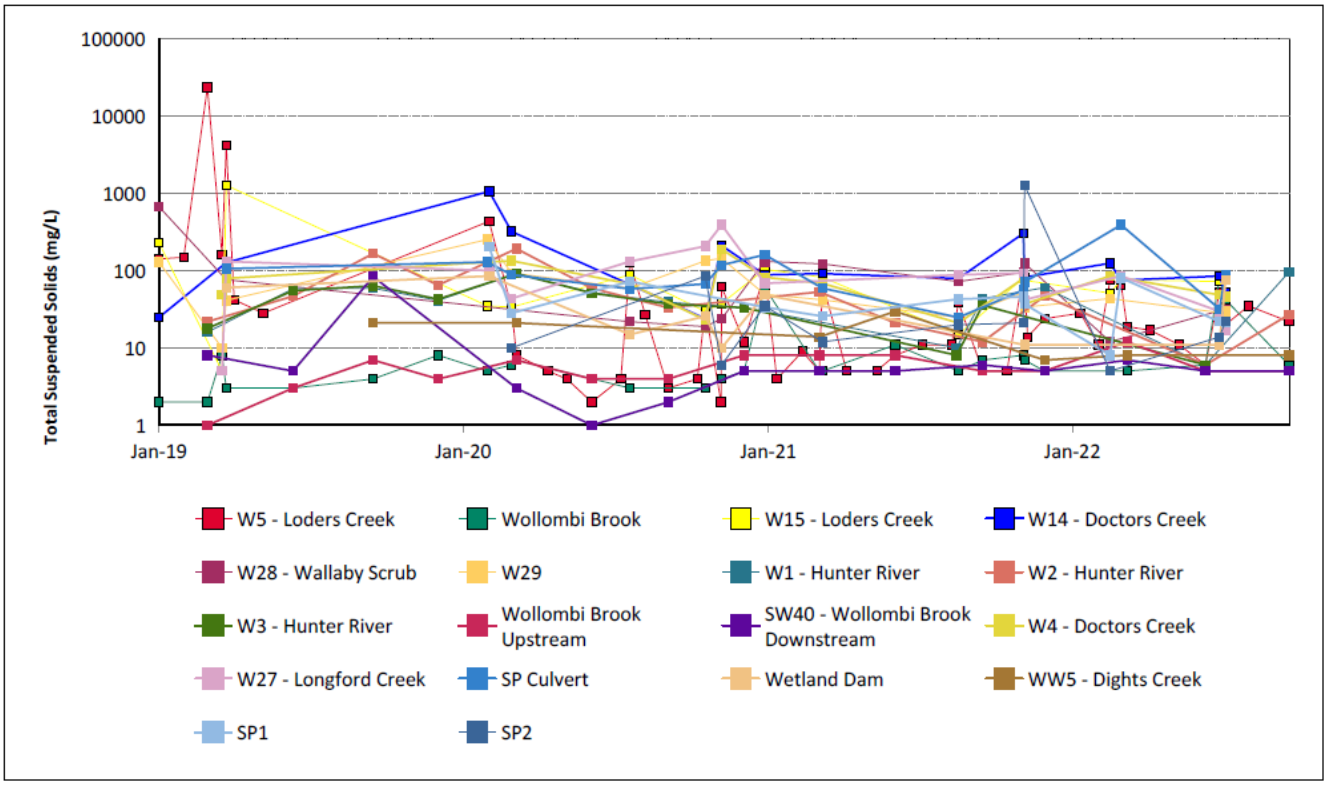

Figure 14: Watercourse Total Suspended Solids Trend - September 2022

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 2022

Site	Date	Trigger Limit Breached	Action Taken in Response
WW5	15/03/2022	EC – 95th Percentile	Watching Brief*
WW5	26/09/2022	EC – 95th Percentile	Elevated EC considered related to sampling from a pool of water, with no flow. Watching Brief*
SP1	04/07/2022	pH – 5th Percentile	Watching Brief*
W5	15/03/2022	pH – 95th Percentile	Watching Brief*
W5	12/04/2022	pH – 95th Percentile	Watching Brief*
W5	26/09/2022	pH – 95th Percentile	Watching Brief*
W15	11/07/2022	pH – 95th Percentile	Watching Brief*
W29	04/07/2022	pH – 5th Percentile	Watching Brief*
W29	11/07/2022	pH – 5th Percentile	Watching Brief*
SP1	08/03/2022	TSS – 50mg/L (ANZECC criteria)	Elevated TSS associated with high runoff due to rainfall event (53.2mm on 7/03/2022 and 78.4mm on 8/03/2022), resulting in mobilisation of sediment. No MTW site sources of sediment identified. No follow up required.
W1	26/09/2022	TSS – 50mg/L (ANZECC criteria)	Elevated TSS considered associated with high flow in the Hunter River. No MTW site sources of sediment identified. No follow up required.
W4	23/02/2022	TSS – 50mg/L (ANZECC criteria)	Elevated TSS associated with high runoff due to rainfall event (21.0mm on 22/02/2022), resulting in mobilisation of sediment. No MTW site sources of sediment identified. No follow up required.
W5	23/02/2022	TSS – 50mg/L (ANZECC criteria)	Elevated TSS associated with high runoff due to rainfall event (21.0mm on 22/02/2022), resulting in mobilisation of sediment. No MTW site sources of sediment identified. No follow up required.

Site	Date	Trigger Limit Breached	Action Taken in Response
W5	8/03/2022	TSS – 50mg/L (ANZECC criteria)	Elevated TSS associated with high runoff due to rainfall event (53.2mm on 7/03/2022 and 78.4mm on 8/03/2022), resulting in mobilisation of sediment. No follow up required.
W5	04/07/2022	TSS – 50mg/L (ANZECC criteria)	Elevated TSS associated with high runoff due to rainfall event (76 mm on 3/07/2022 and 23.2mm on 4/07/2022), resulting in mobilisation of sediment
W14	23/02/2022	TSS – 50mg/L (ANZECC criteria)	Elevated TSS associated with high runoff due to rainfall event (21.0mm on 22/02/2022), resulting in mobilisation of sediment. No MTW site sources of sediment identified. No follow up required.
W14	8/03/2022	TSS – 50mg/L (ANZECC criteria)	Elevated TSS associated with high runoff due to rainfall event (53.2mm on 7/03/2022 and 78.4mm on 8/03/2022), resulting in mobilisation of sediment. No MTW site sources of sediment identified. No follow up required.
W14	04/07/2022	TSS – 50mg/L (ANZECC criteria)	Elevated TSS associated with high runoff due to rainfall event (76 mm on 3/07/2022 and 23.2 mm on 4/07/2022), resulting in mobilisation of sediment in Doctors Creek. In addition, TSS results were potentially affected by turbid water associated with the overtopping of one mine water sump (CC5 Coal Conveyor Sump) at WML, which was reported to EPA and DPE.
W14	11/07/2022	TSS – 50mg/L (ANZECC criteria)	Elevated TSS associated with runoff due to continued rainfall (12.2mm on 10/07/2022, following high rainfall earlier in the month (175.6mm received from 1 - 7 July)), resulting in mobilisation of sediment. No MTW site sources of sediment identified. No follow up required.
W15	23/02/2022	TSS – 50mg/L (ANZECC criteria)	Elevated TSS associated with high runoff due to rainfall event (21.0mm on 22/02/2022), resulting in mobilisation of sediment. No MTW site sources of sediment identified. No follow up required.
W15	8/03/2022	TSS – 50mg/L (ANZECC criteria)	Elevated TSS associated with high runoff due to rainfall event (53.2mm on 7/03/2022 and 78.4mm on 8/03/2022), resulting in mobilisation of sediment. MTW were also discharging into Loders Creek from Dam 9S on this day, although TSS results from the discharge point were below the trigger limit. No follow up required.
W15	04/07/2022	TSS – 50mg/L (ANZECC criteria)	Elevated TSS associated with high runoff due to rainfall event (76 mm on 3/07/2022 and 23.2 mm on 4/07/2022),

Site	Date	Trigger Limit Breached	Action Taken in Response
			resulting in mobilisation of sediment in Loders Creek. In addition, TSS results were potentially affected by turbid water associated with the overtopping of a mine water catchment basin at MTCL, which was reported to EPA and DPE.
W15	11/07/2022	TSS – 50mg/L (ANZECC criteria)	Elevated TSS associated with runoff due to continued rainfall (12.2mm on 10/07/2022, following high rainfall earlier in the month (175.6mm received from 1 - 7 July)), resulting in mobilisation of sediment in Loders Creek. In addition, TSS results were potentially affected by a licenced mine water discharge event from MTO's Dam 9S discharge point. Note: Water sample TSS laboratory results for the mine water discharge on 11 July 2022 were well below the MTO licence limits (EPL 1976).
W27	8/03/2022	TSS – 50mg/L (ANZECC criteria)	Elevated TSS associated with high runoff due to rainfall event (53.2mm on 7/03/2022 and 78.4mm on 8/03/2022), resulting in mobilisation of 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.

During the reporting period licenced HRSTS discharge from Dam 9S (EPL 1976 Point 4) occurred from 1 to 27 of September discharging a total of 649.6 ML.

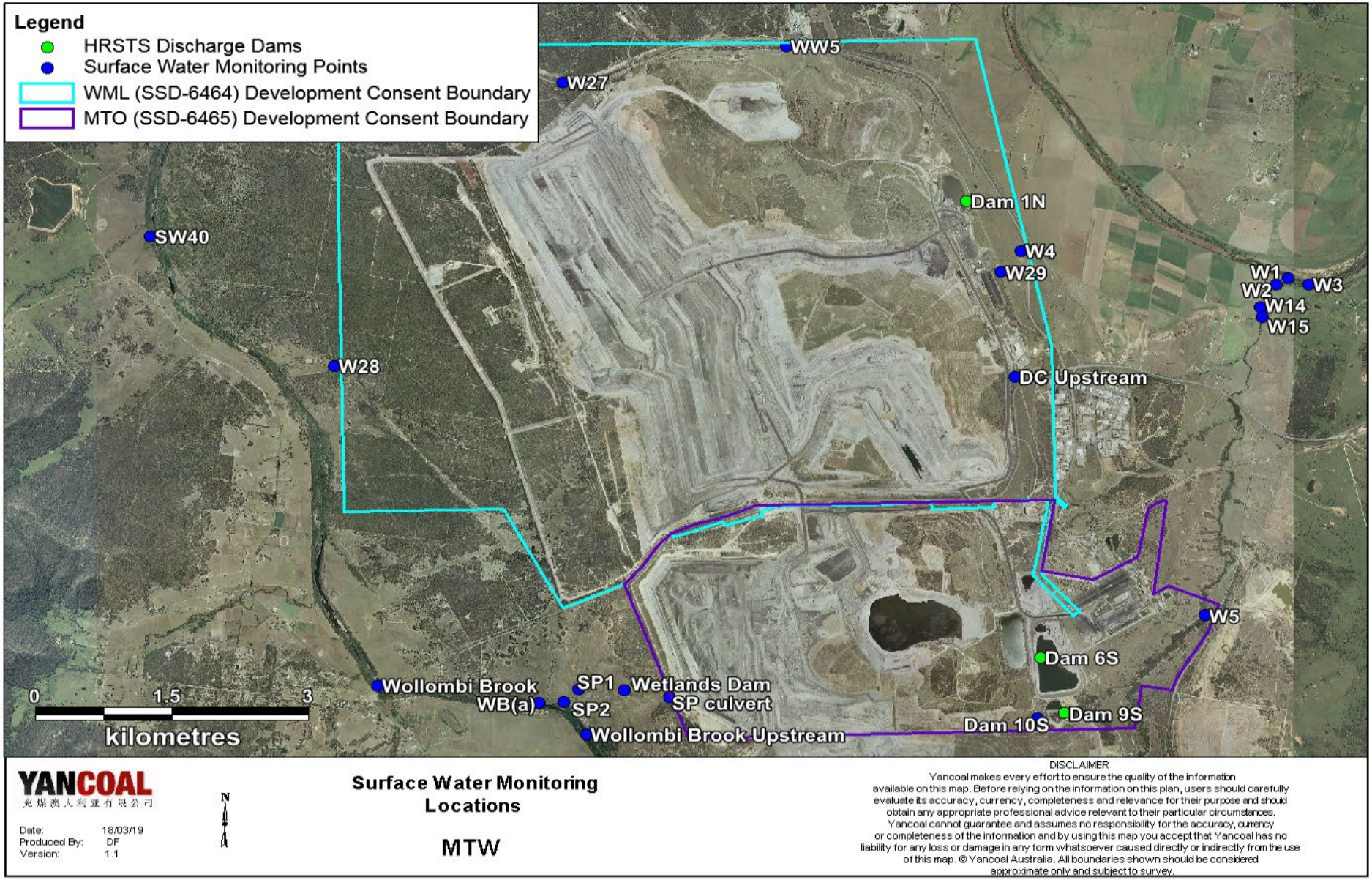

Figure 15: Surface Water Monitoring Location Plan

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 (2019 - current) for groundwater bores monitored at MTW.

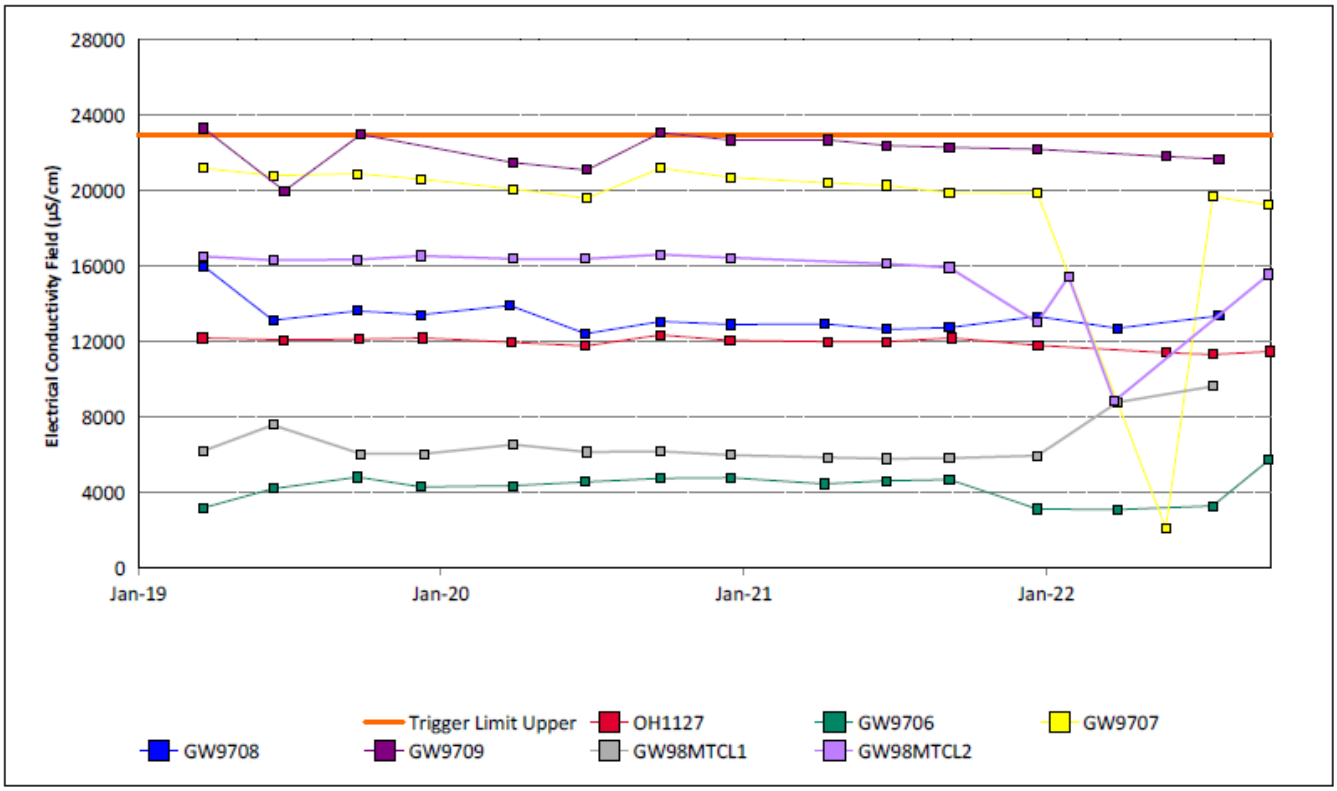

Figure 16: Bayswater Seam Electrical Conductivity Field Trend - September 2022

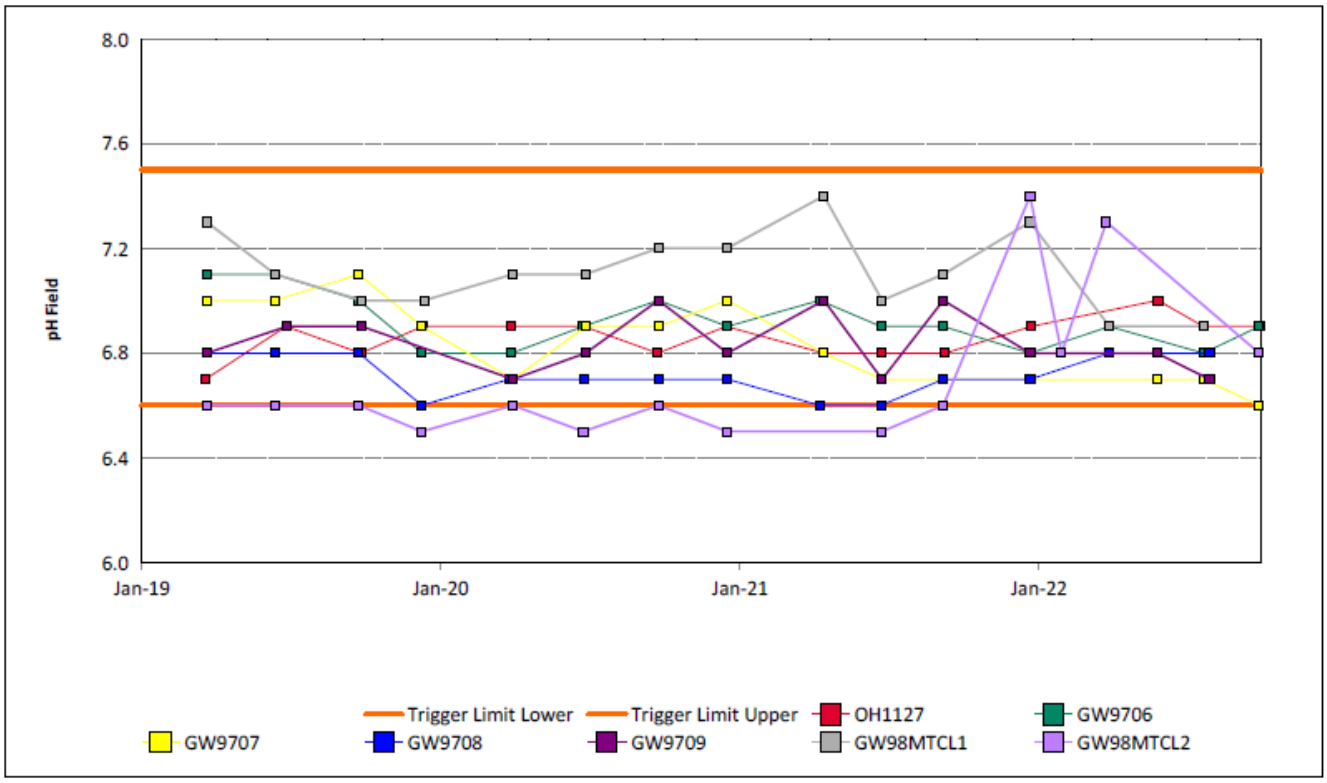

Figure 17: Bayswater Seam pH Field Trend - September 2022

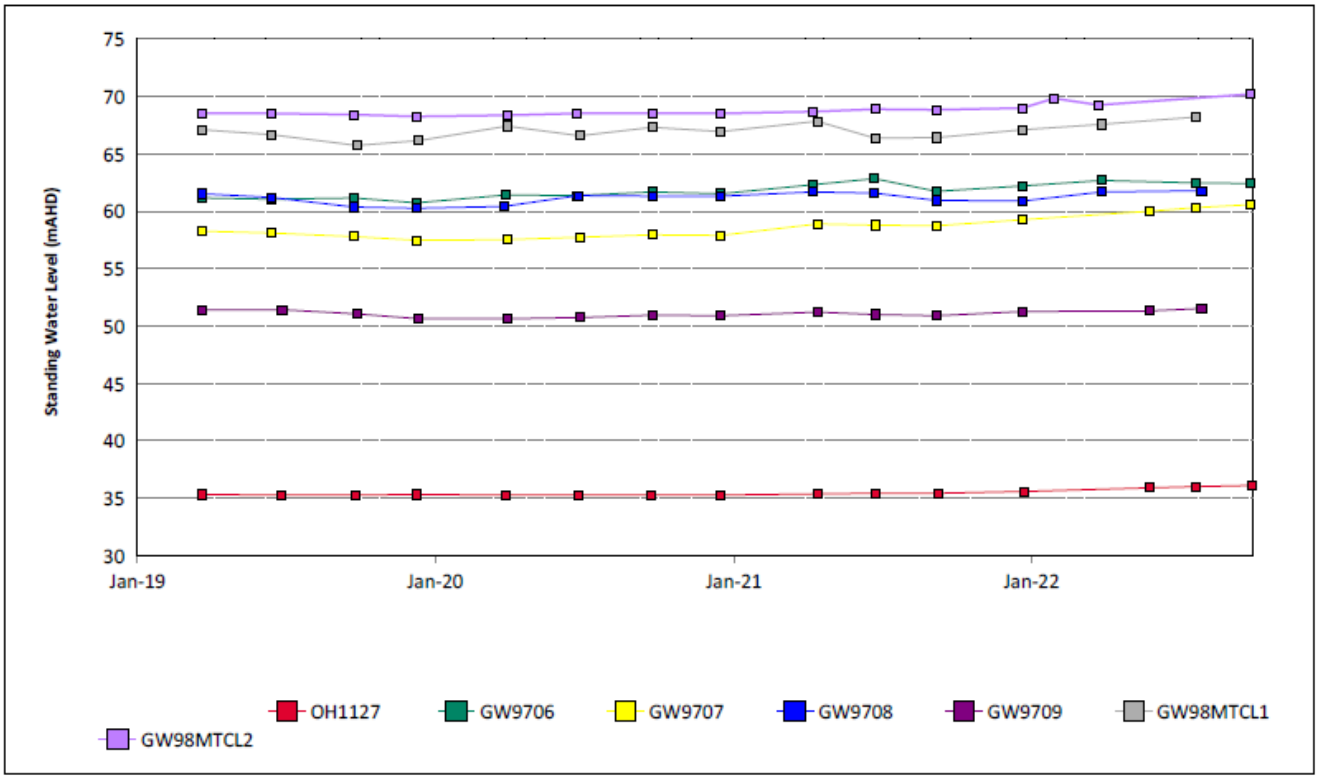

Figure 18: Bayswater Seam Standing Water Level Trend - September 2022

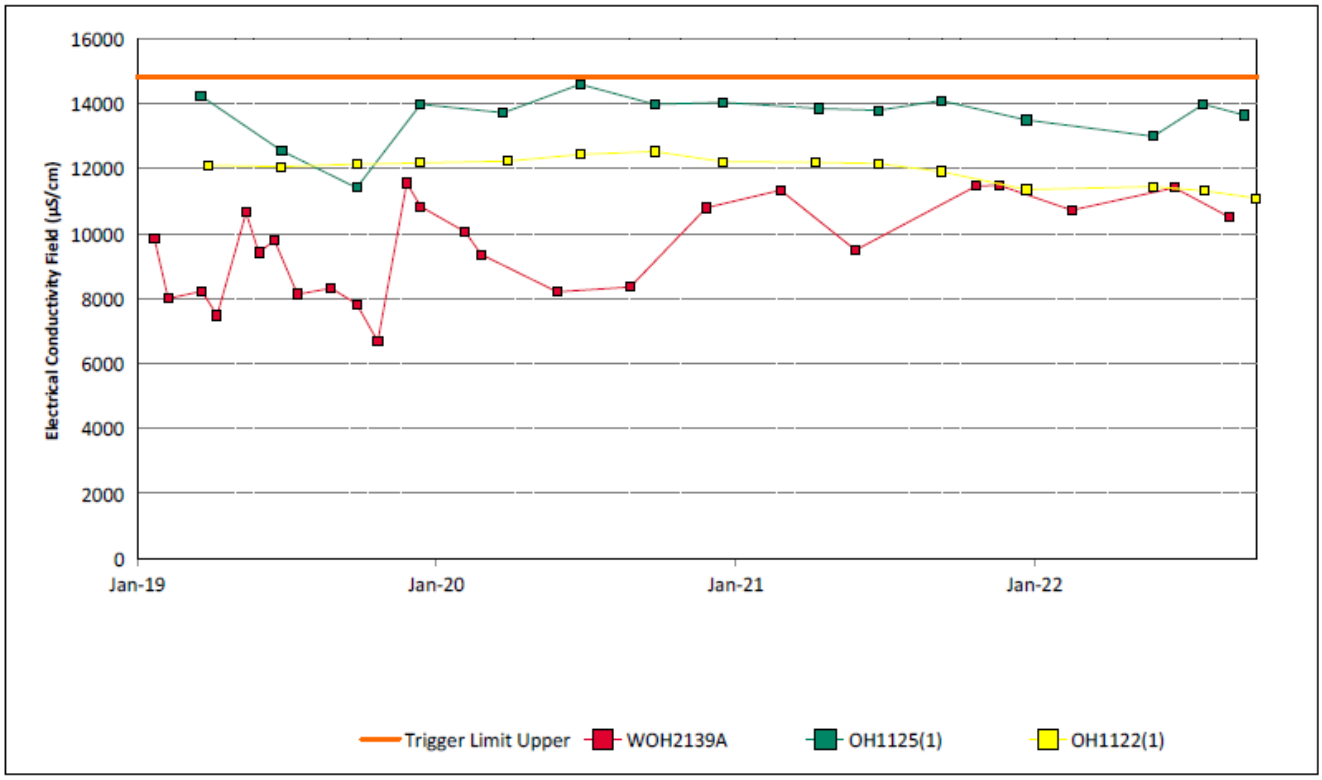

Figure 19: Blakefield Seam Electrical Conductivity Field Trend - September 2022

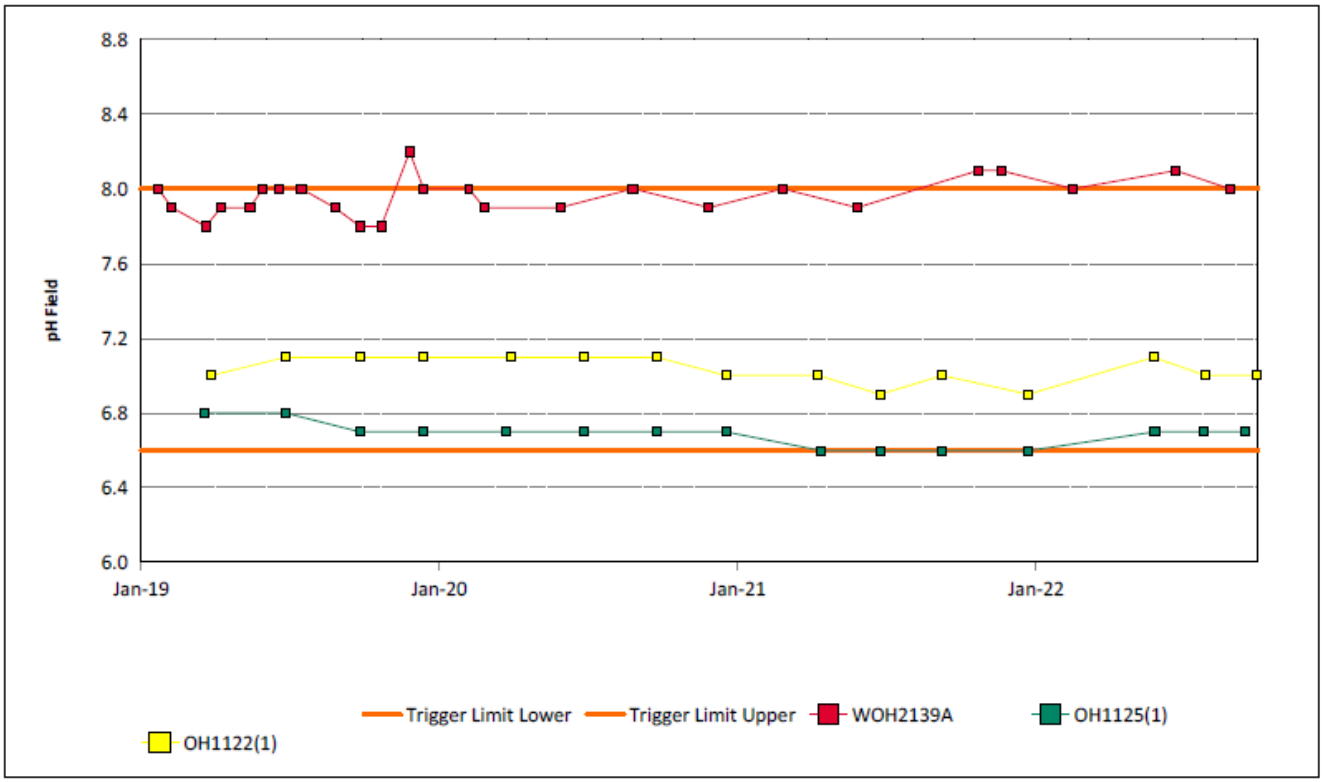

Figure 20: Blakefield Seam pH Field Trend - September 2022

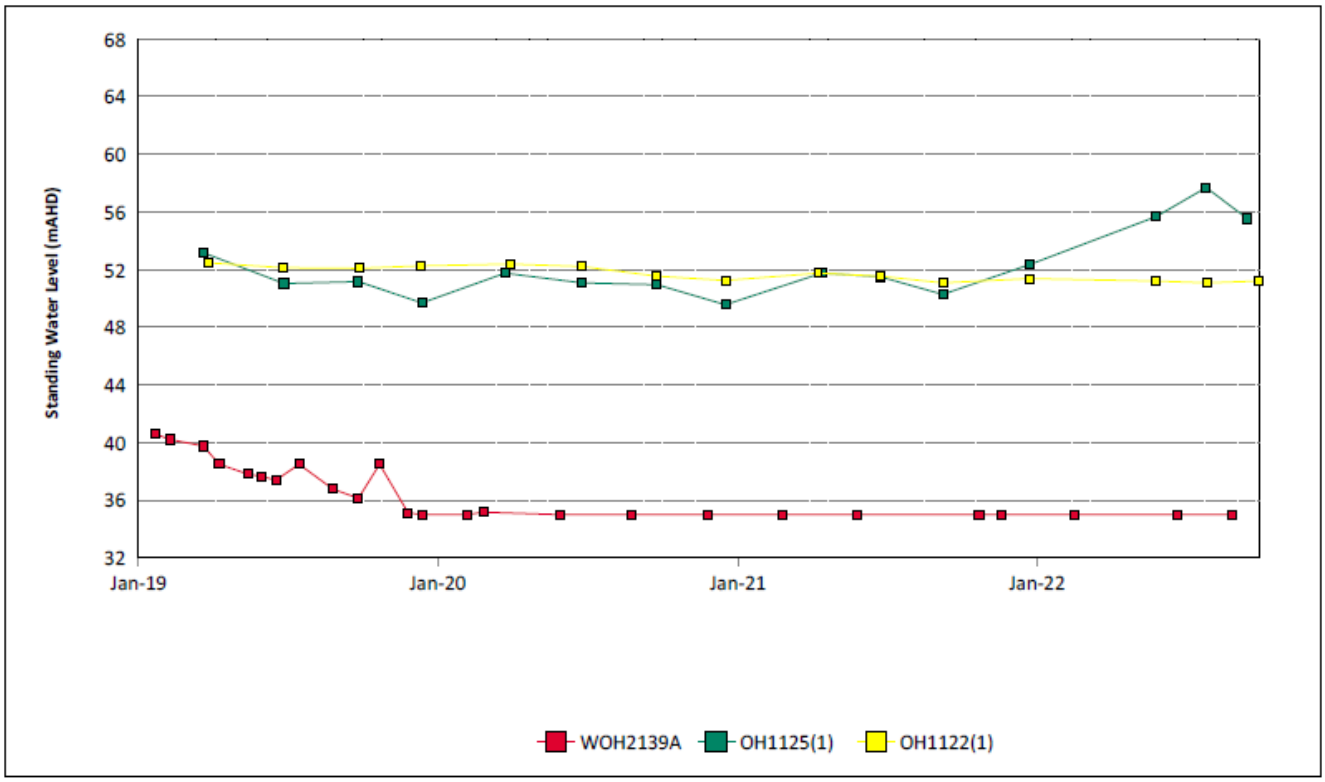

Figure 21: Blakefield Seam Standing Water Level Trend - September 2022

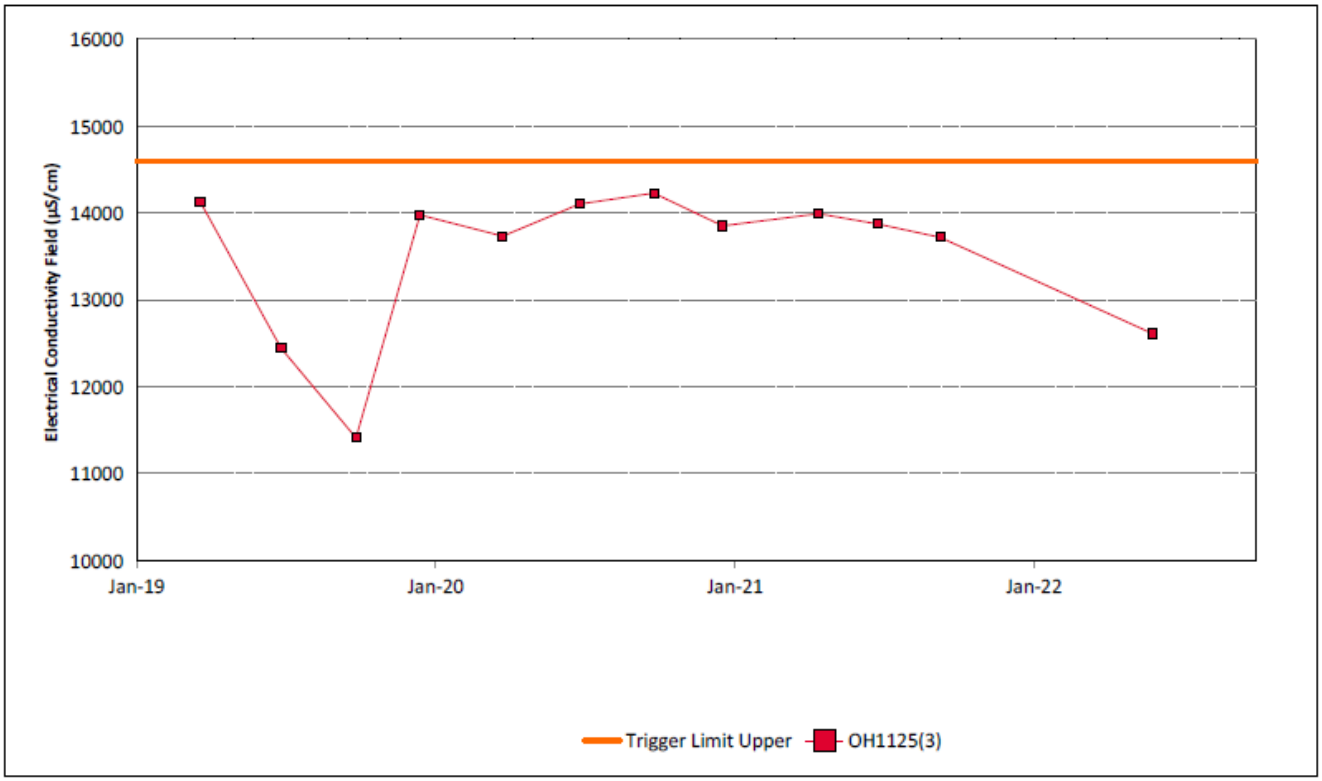

Figure 22: Bowfield Seam Electrical Conductivity Field Trend - September 2022

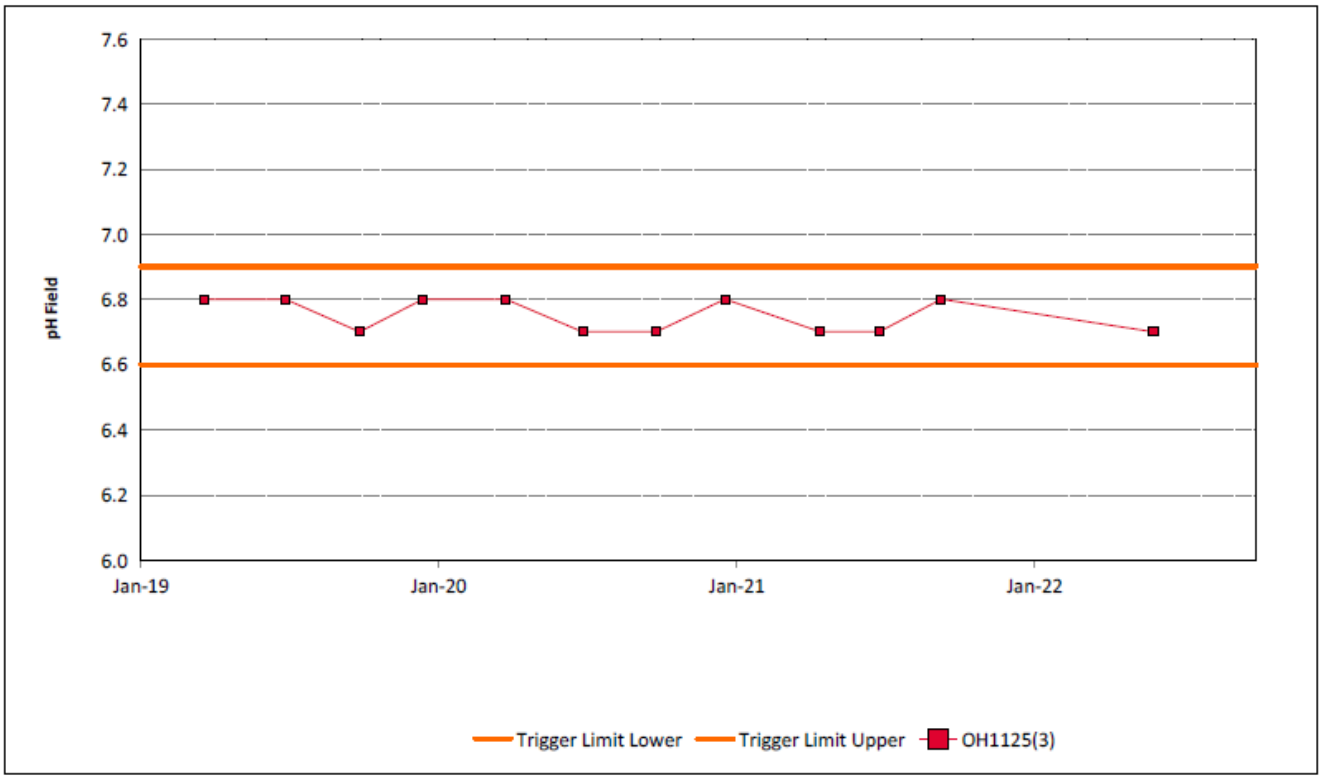

Figure 23: Bowfield Seam pH Field Trend - September 2022

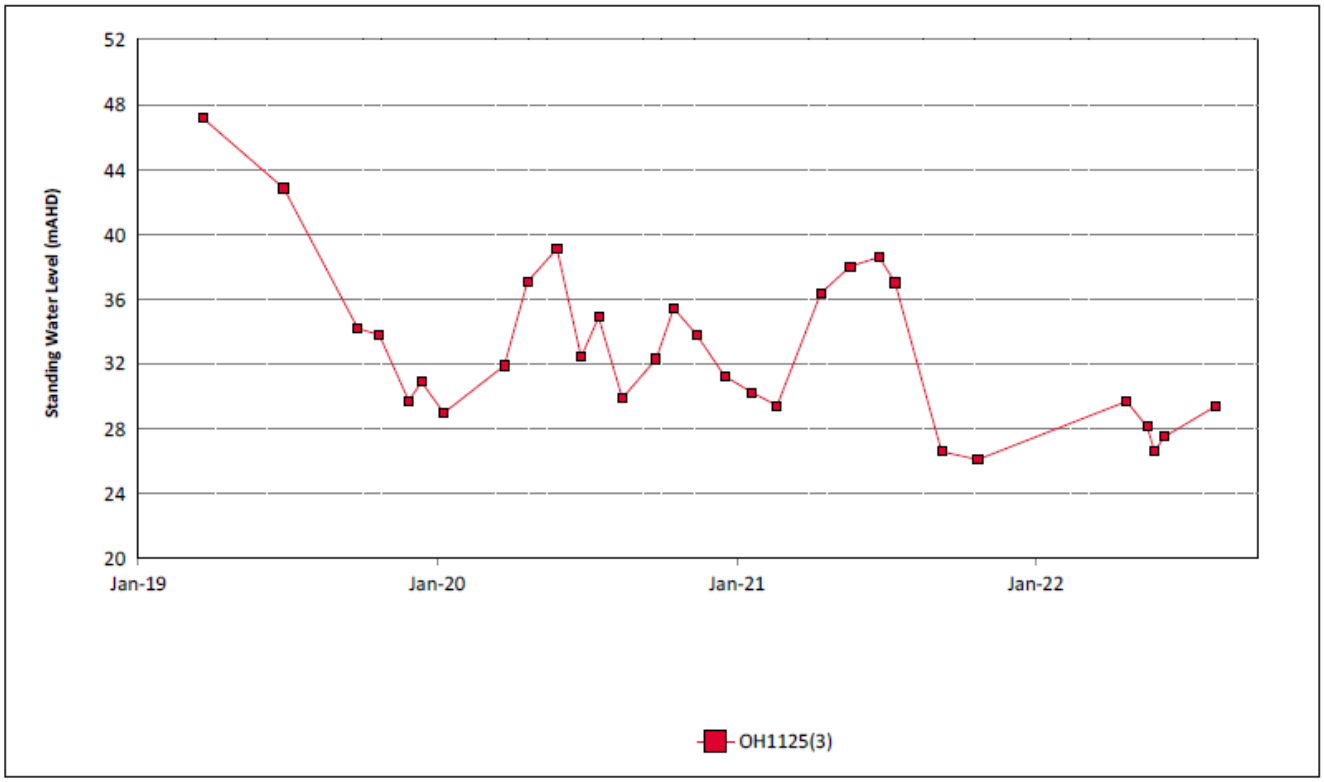

Figure 24: Bowfield Seam Standing Water Level Trend - September 2022

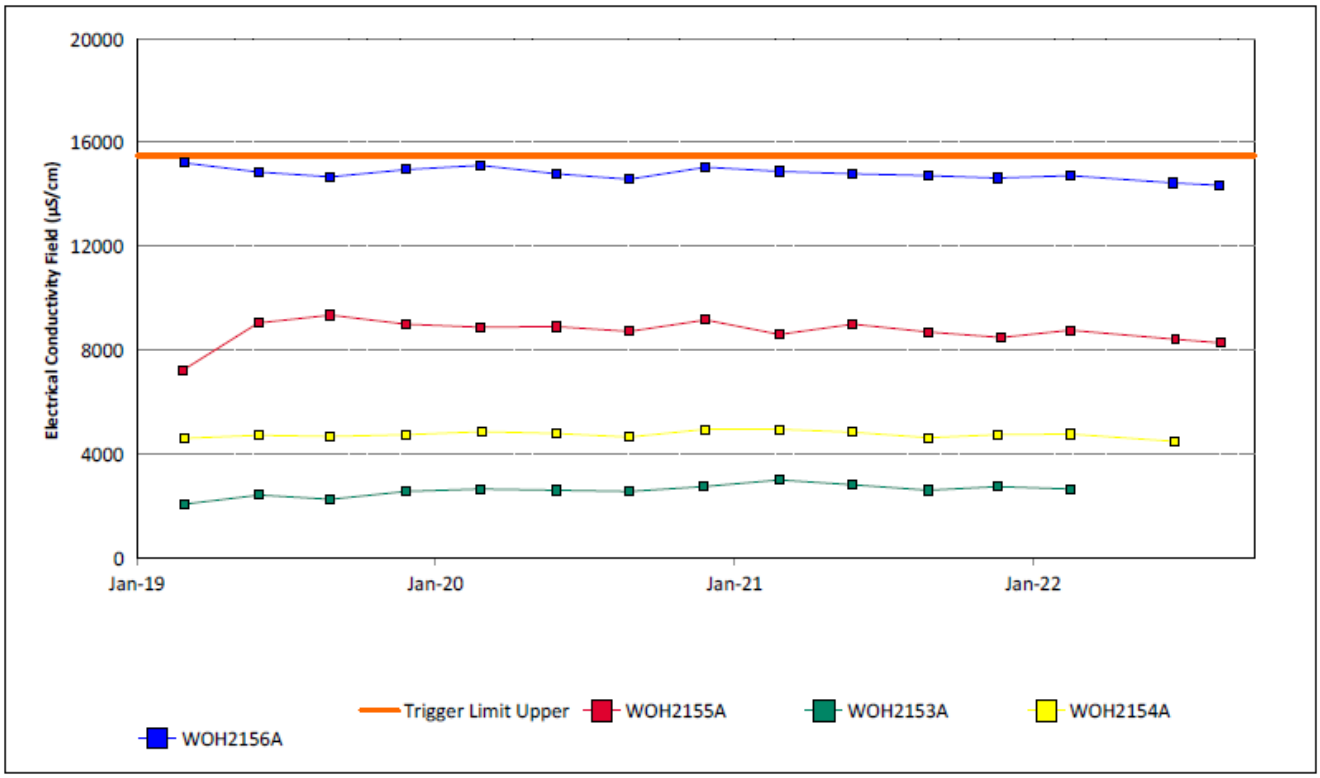

Figure 25: Redbank Seam Electrical Conductivity Field Trend - September 2022

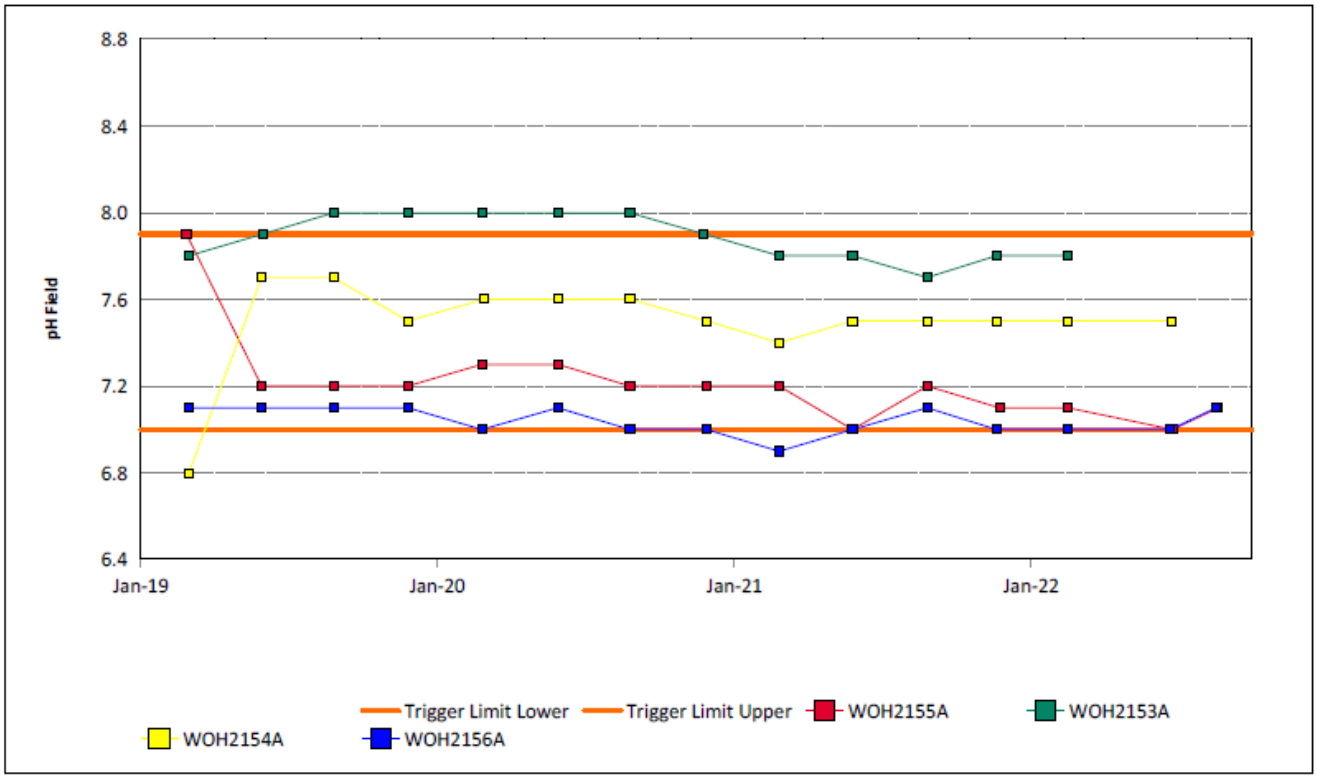

Figure 26: Redbank Seam pH Field Trend - September 2022

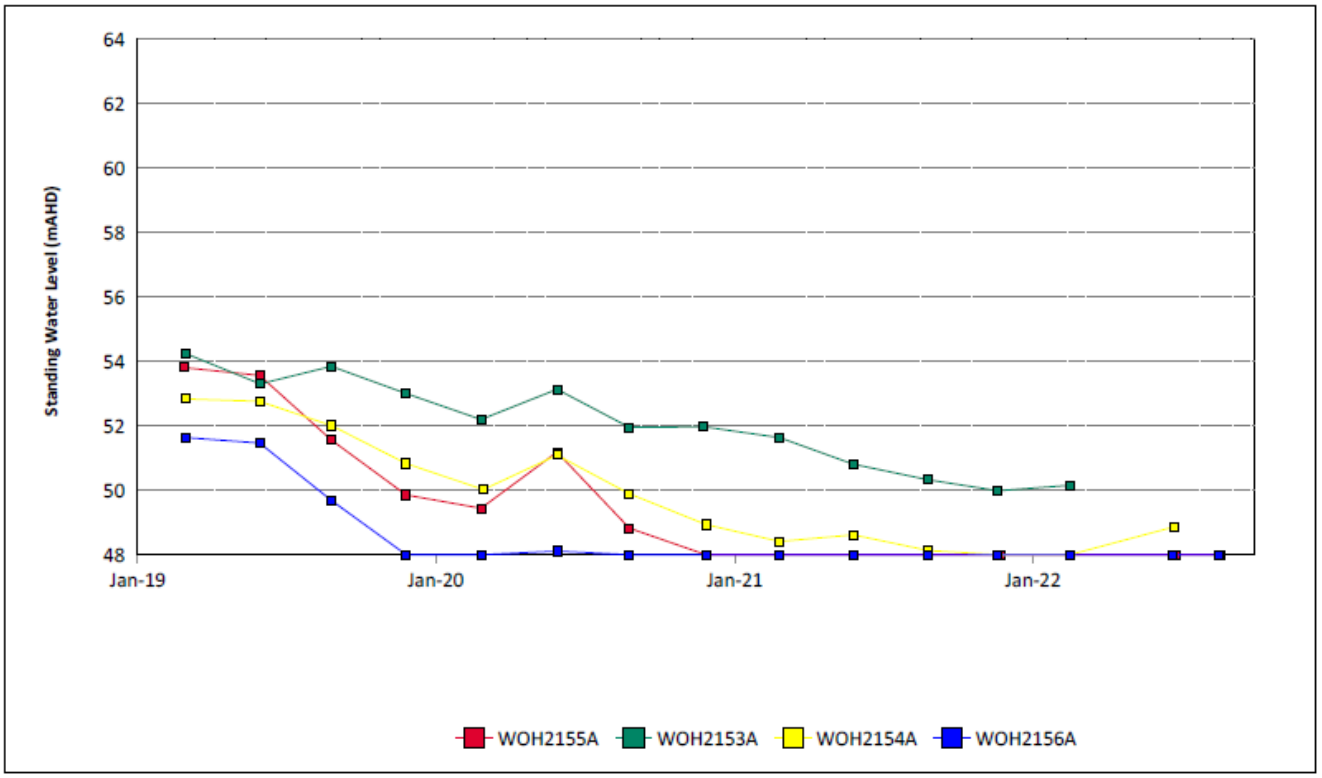

Figure 27: Redbank Seam Standing Water Level Trend - September 2022

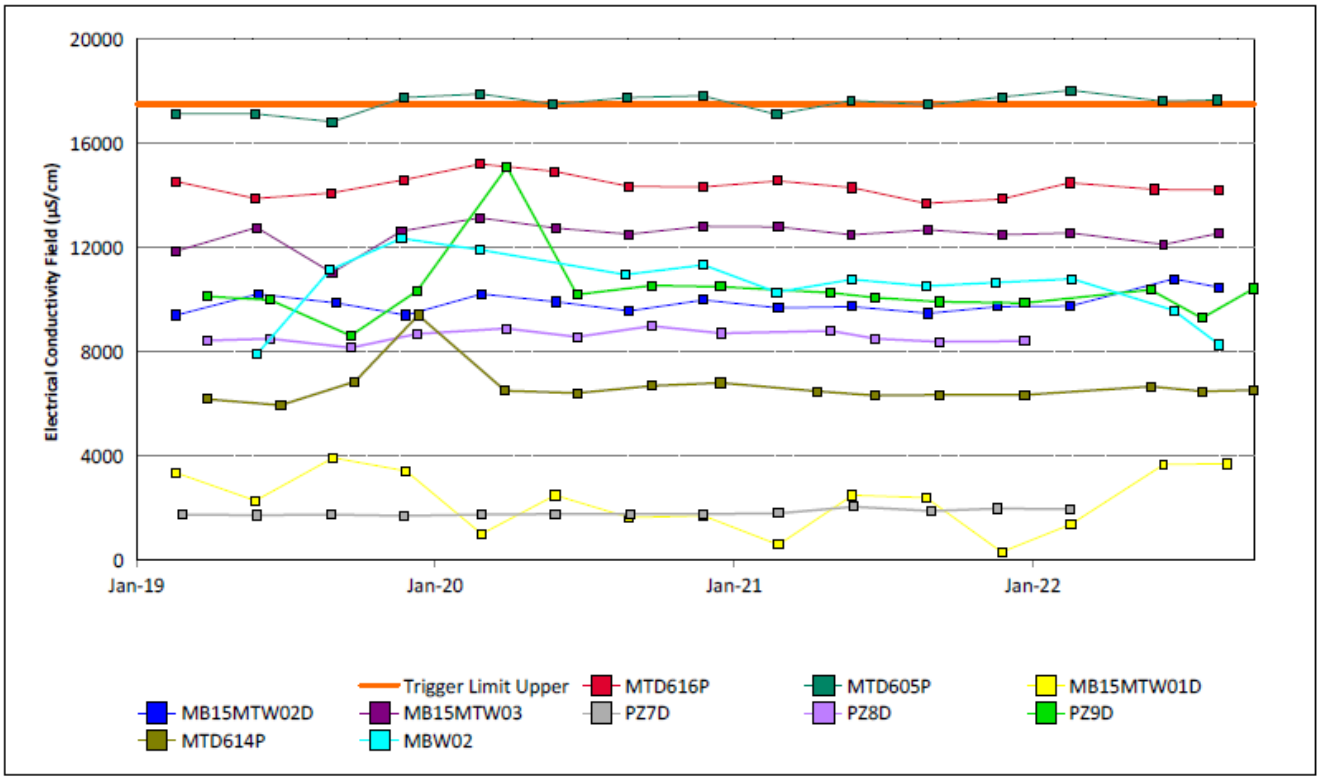

Figure 28: Shallow Overburden Electrical Conductivity Field Trend - September 2022

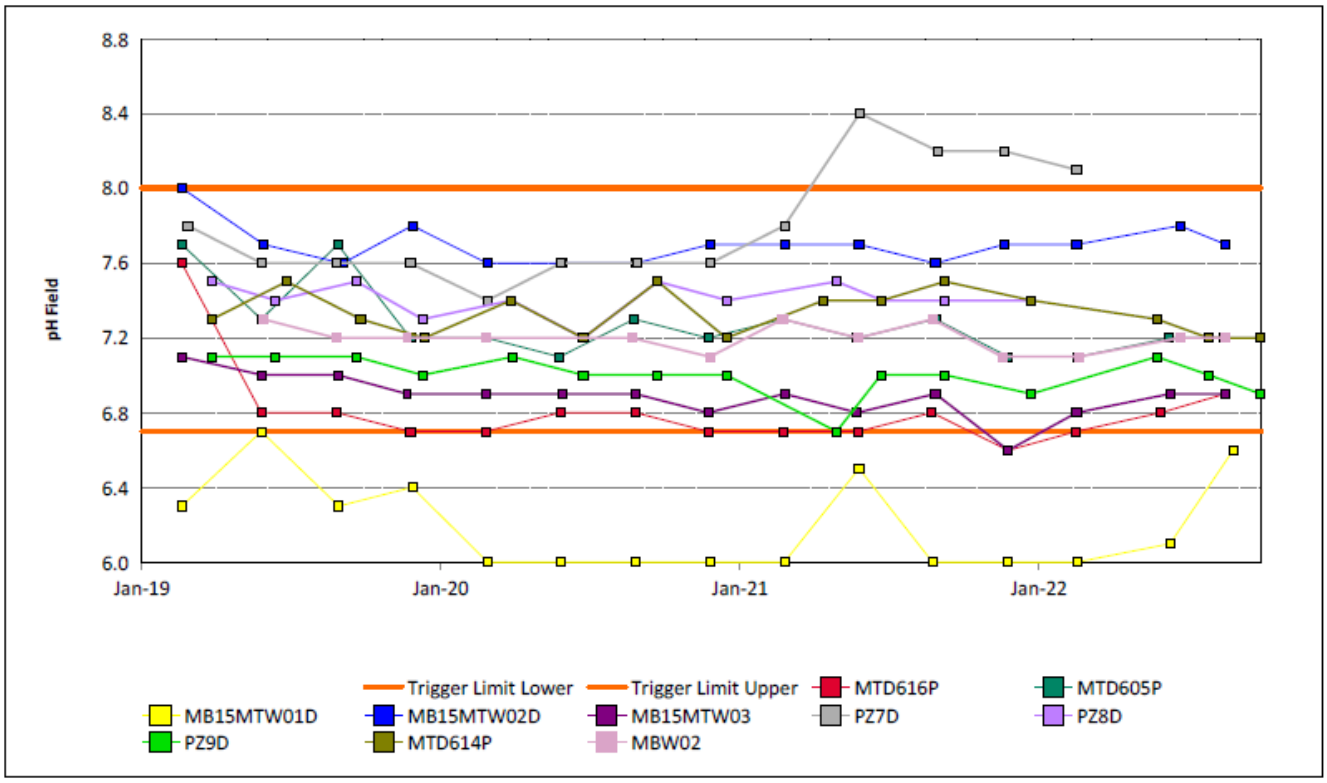

Figure 29: Shallow Overburden pH Field Trend - September 2022

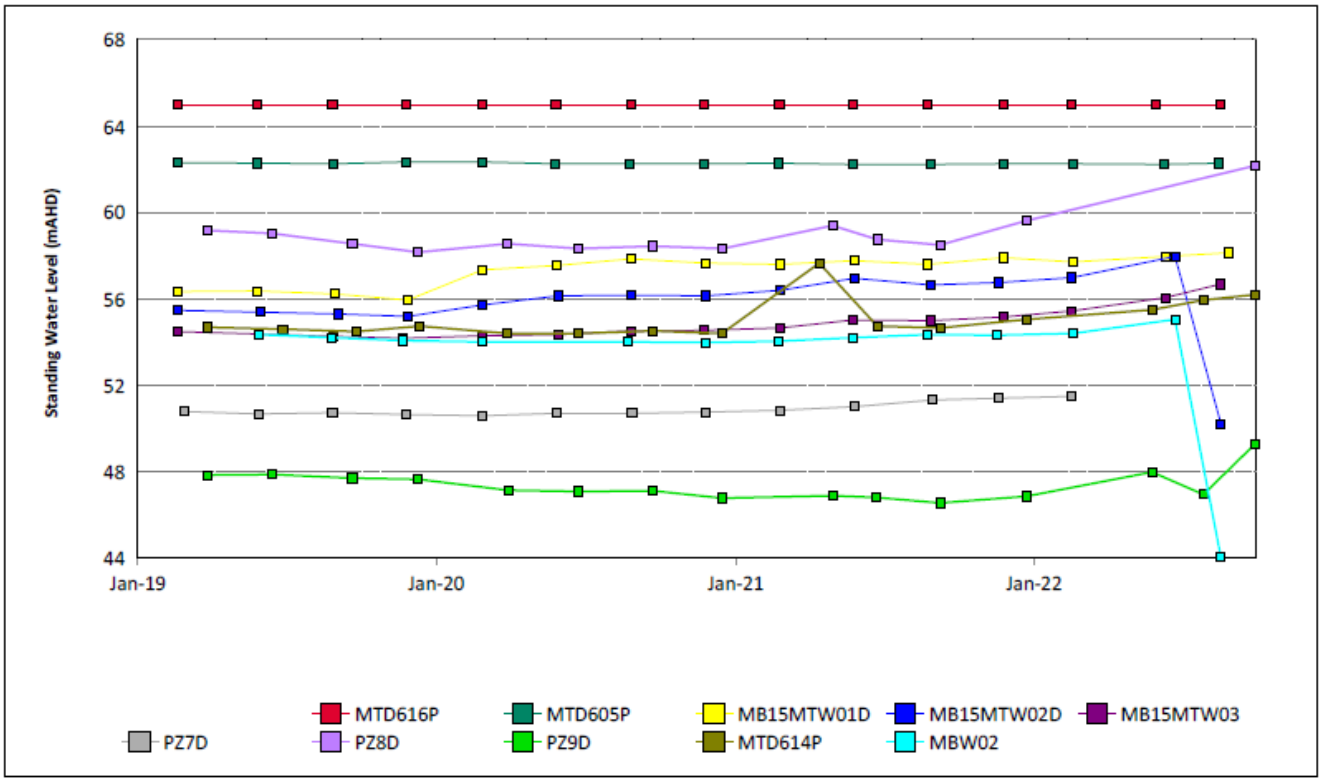

Figure 30: Shallow Overburden Standing Water Level Trend - September 2022

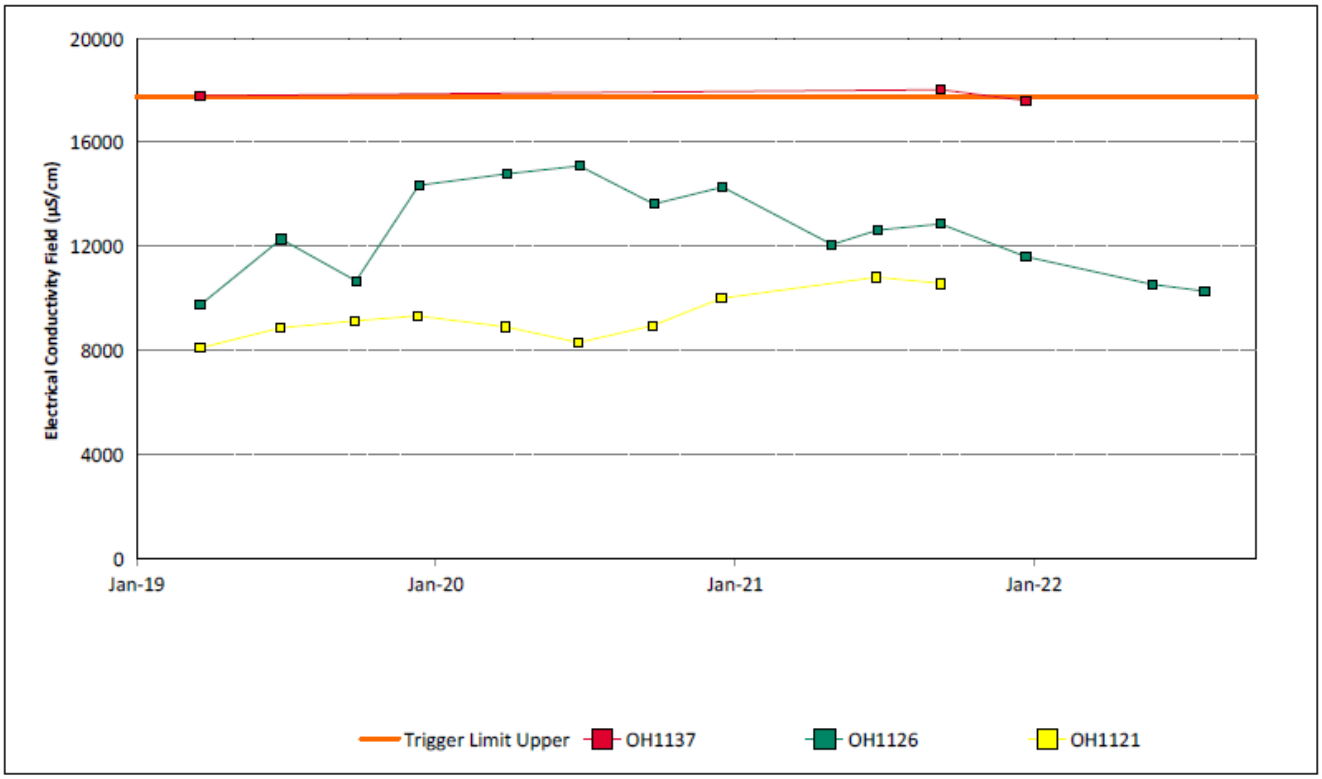

Figure 31: Vaux Seam Electrical Conductivity Field Trend - September 2022

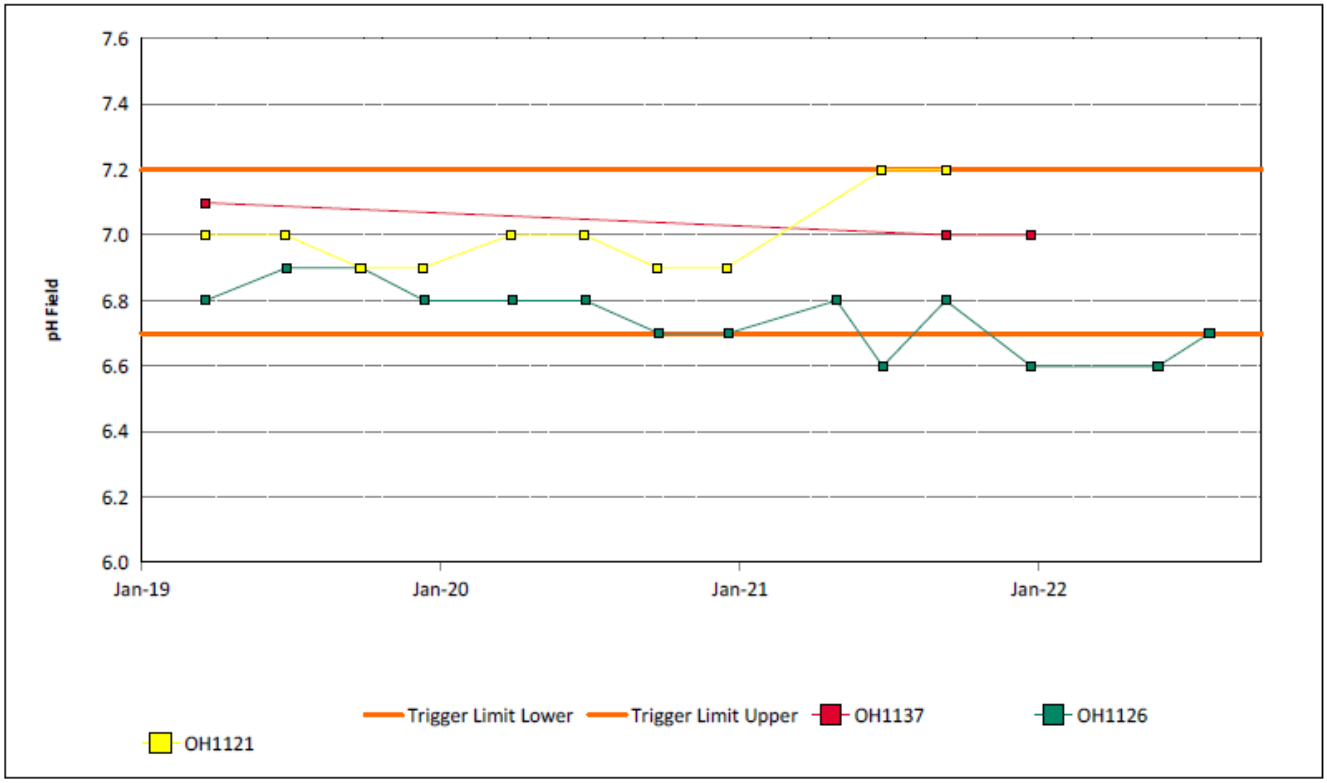

Figure 32: Vaux Seam pH Field Trend - September 2022

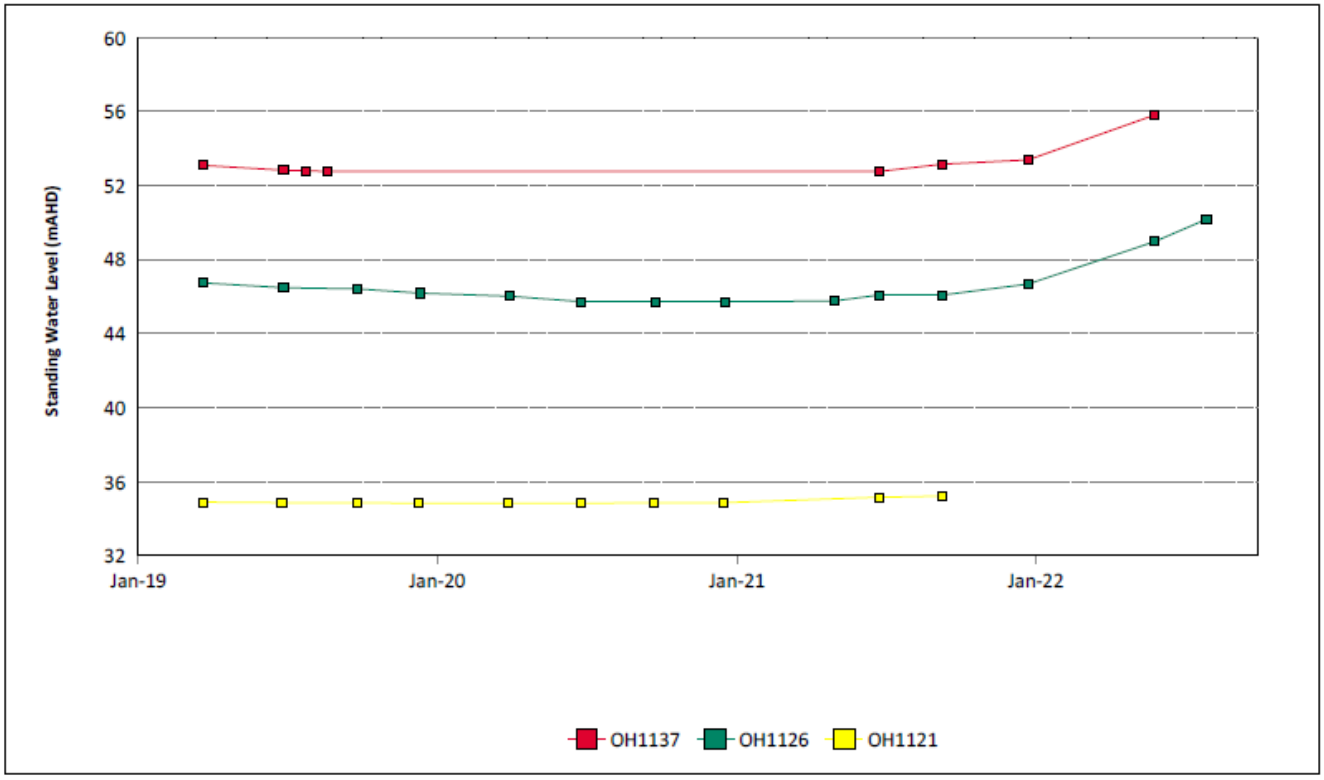

Figure 33: Vaux Seam Standing Water Level Trend - September 2022

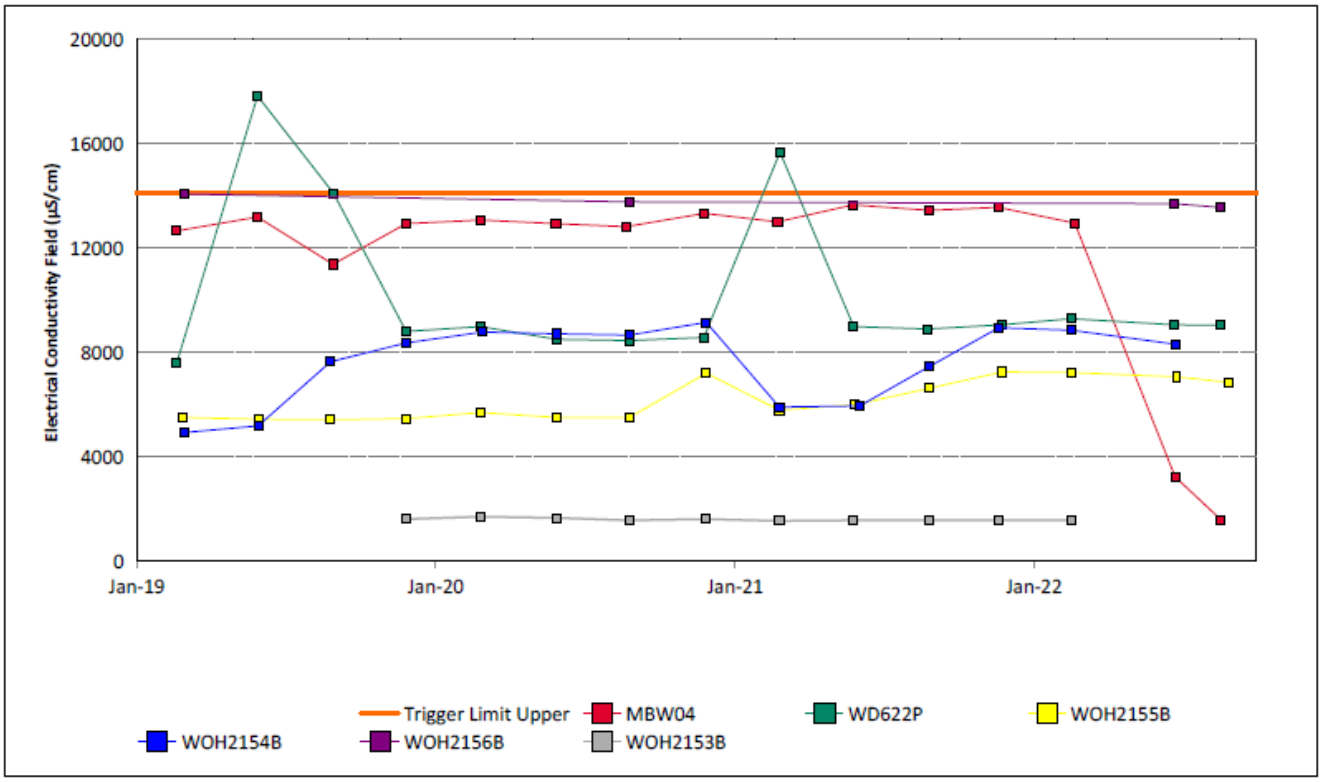

Figure 34: Wambo Seam Electrical Conductivity Field Trend - September 2022

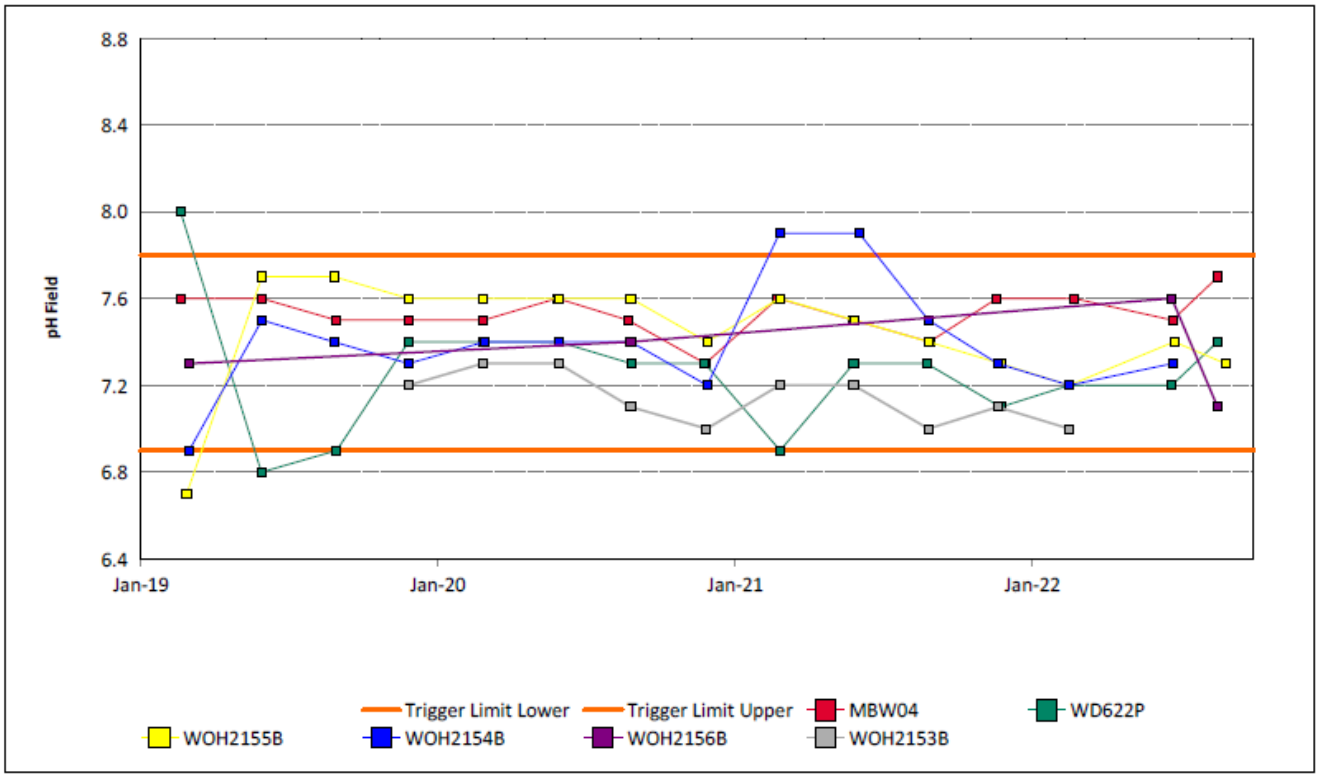

Figure 35: Wambo Seam pH Field Trend - September 2022

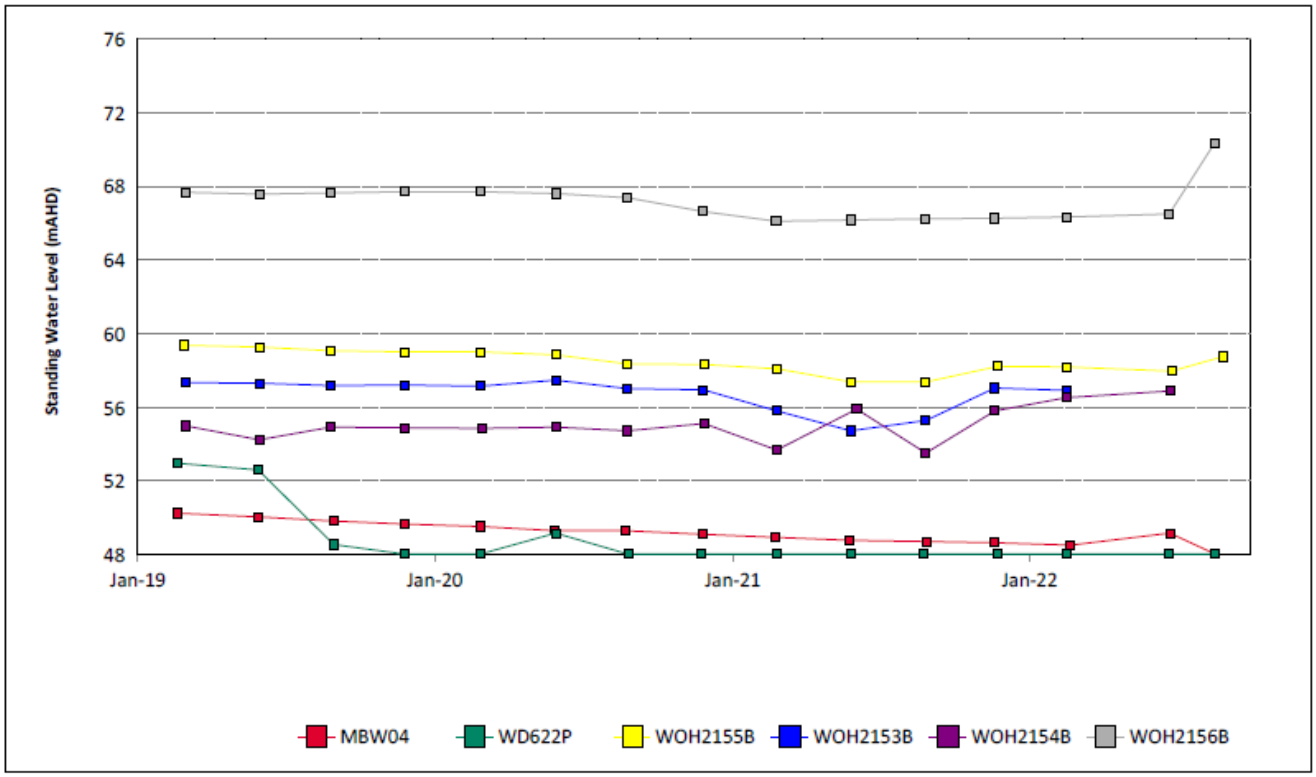

Figure 36: Wambo Seam Standing Water Level Trend - September 2022

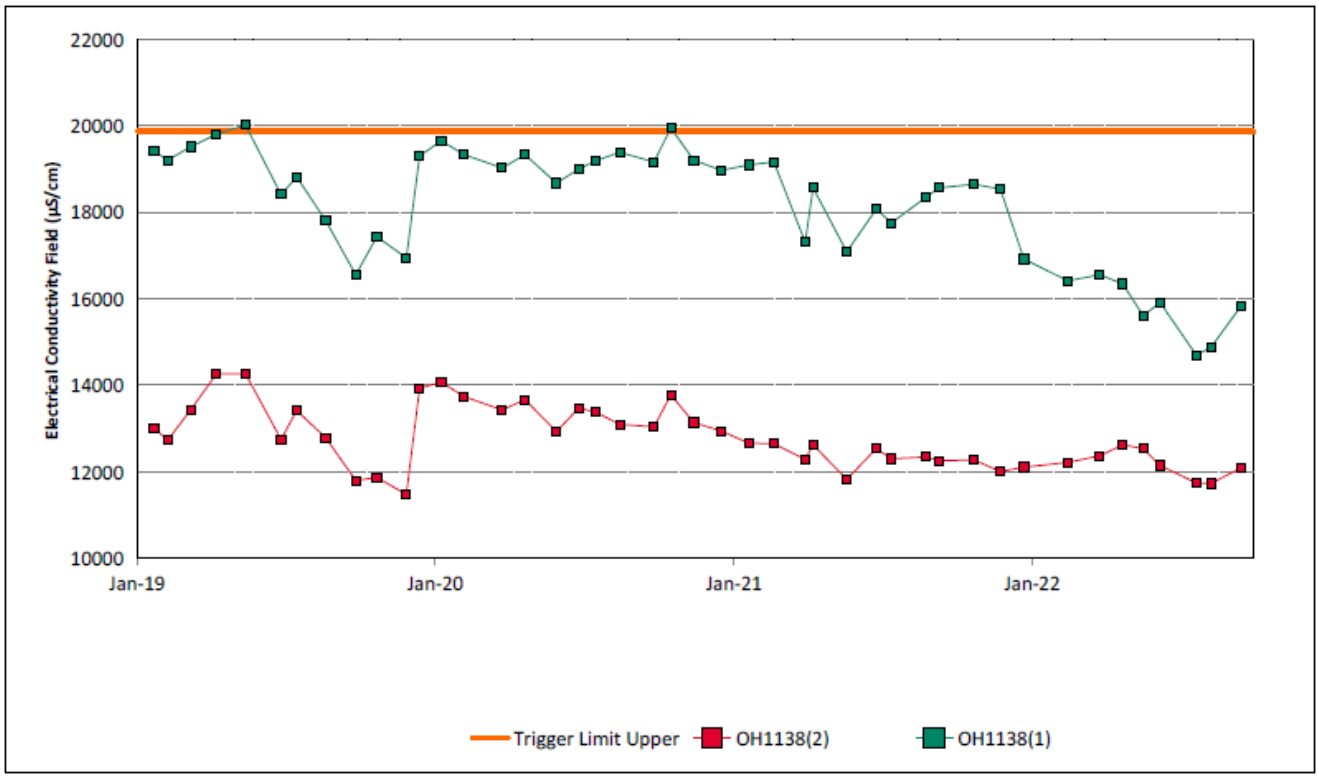

Figure 37: Warkworth Seam Electrical Conductivity Field Trend - September 2022

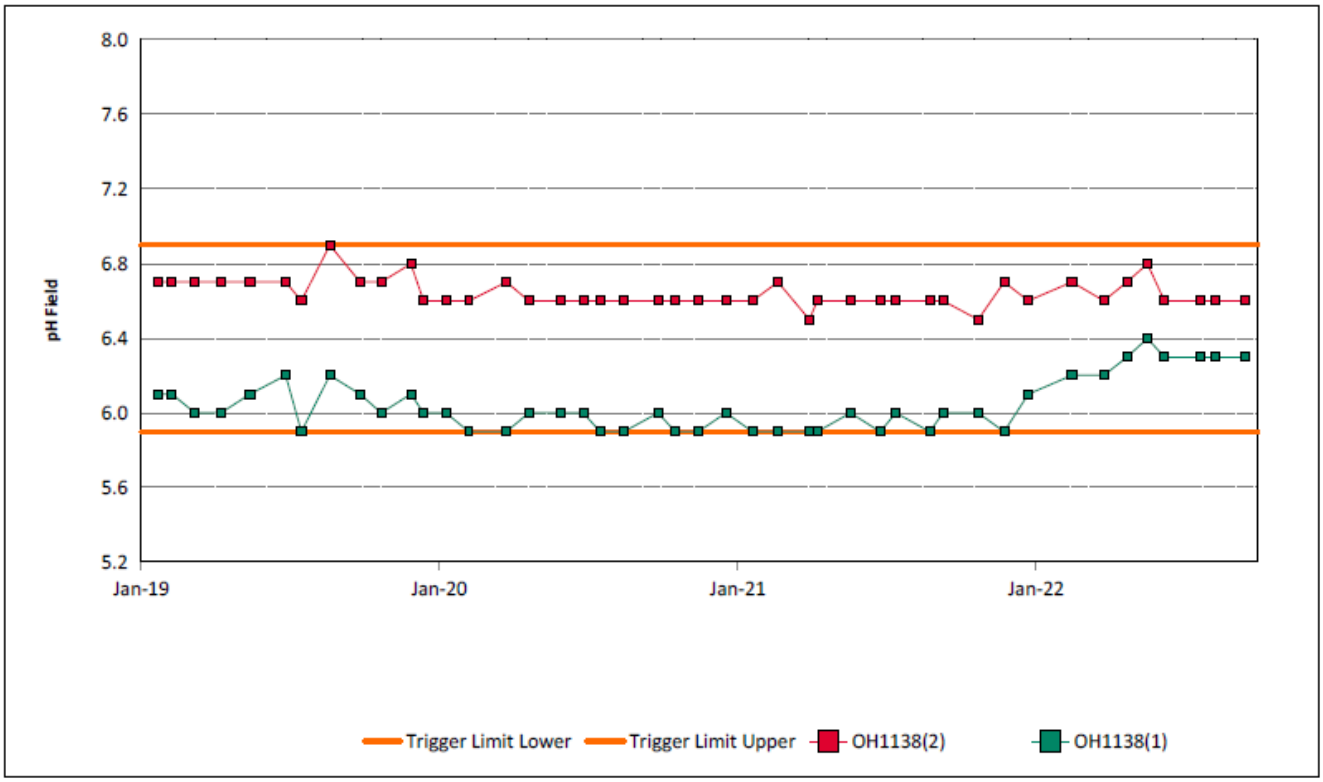

Figure 38: Warkworth Seam pH Field Trend - September 2022

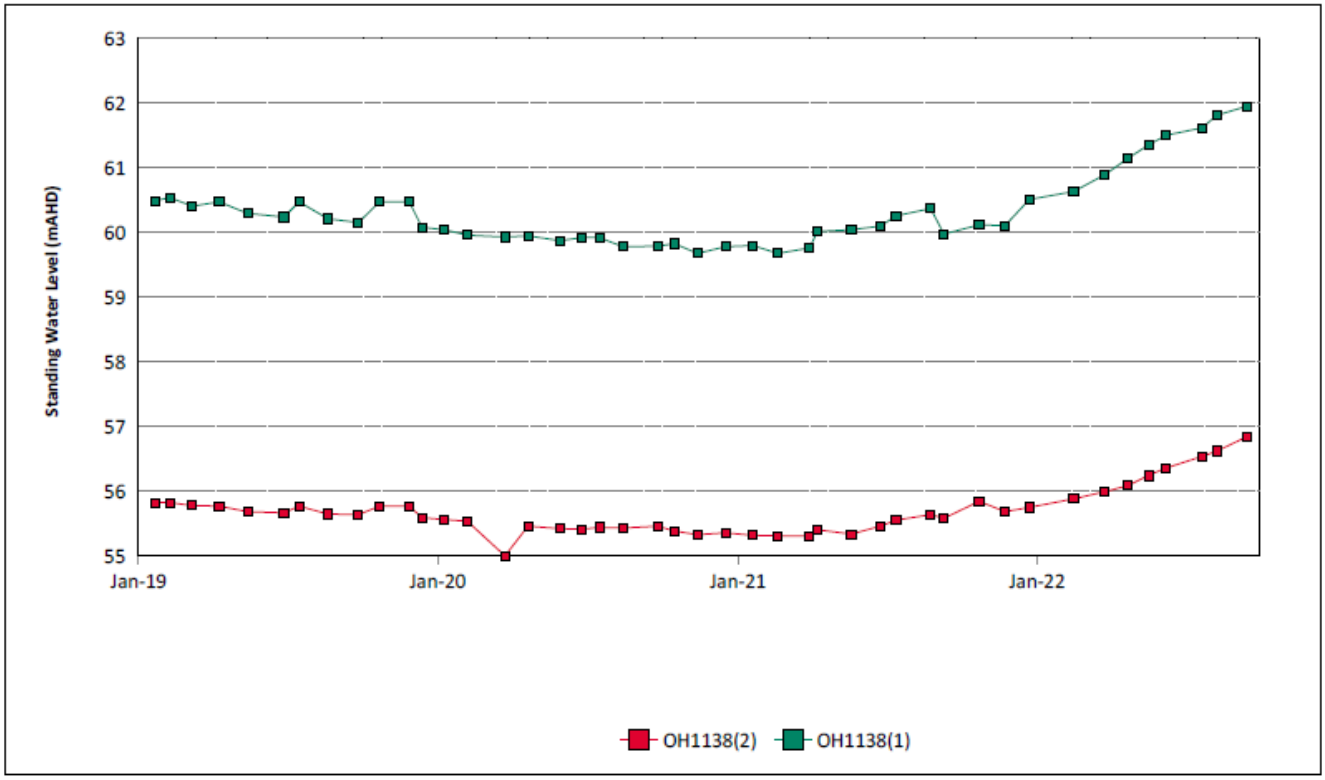

Figure 39: Warkworth Seam Standing Water Level Trend - September 2022

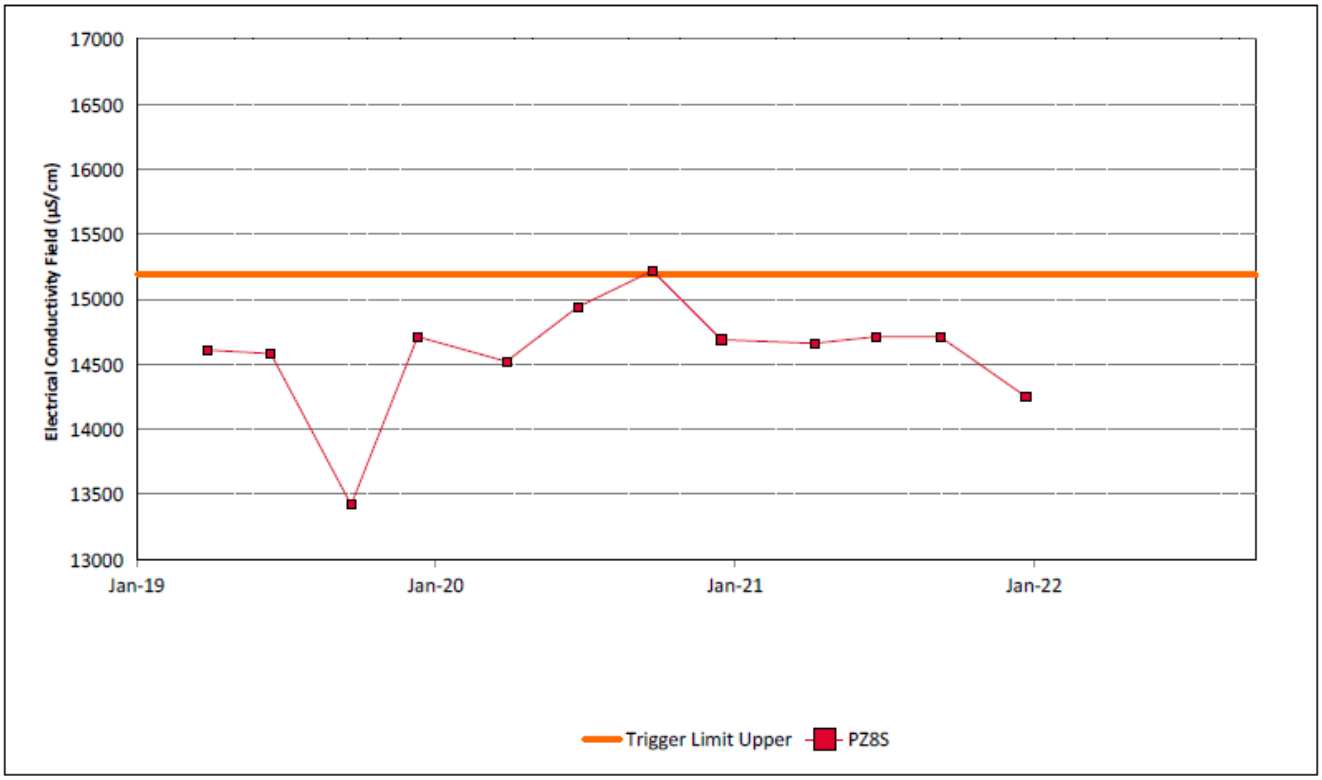

Figure 40: Wollombi Alluvium 1 Electrical Conductivity Field Trend - September 2022

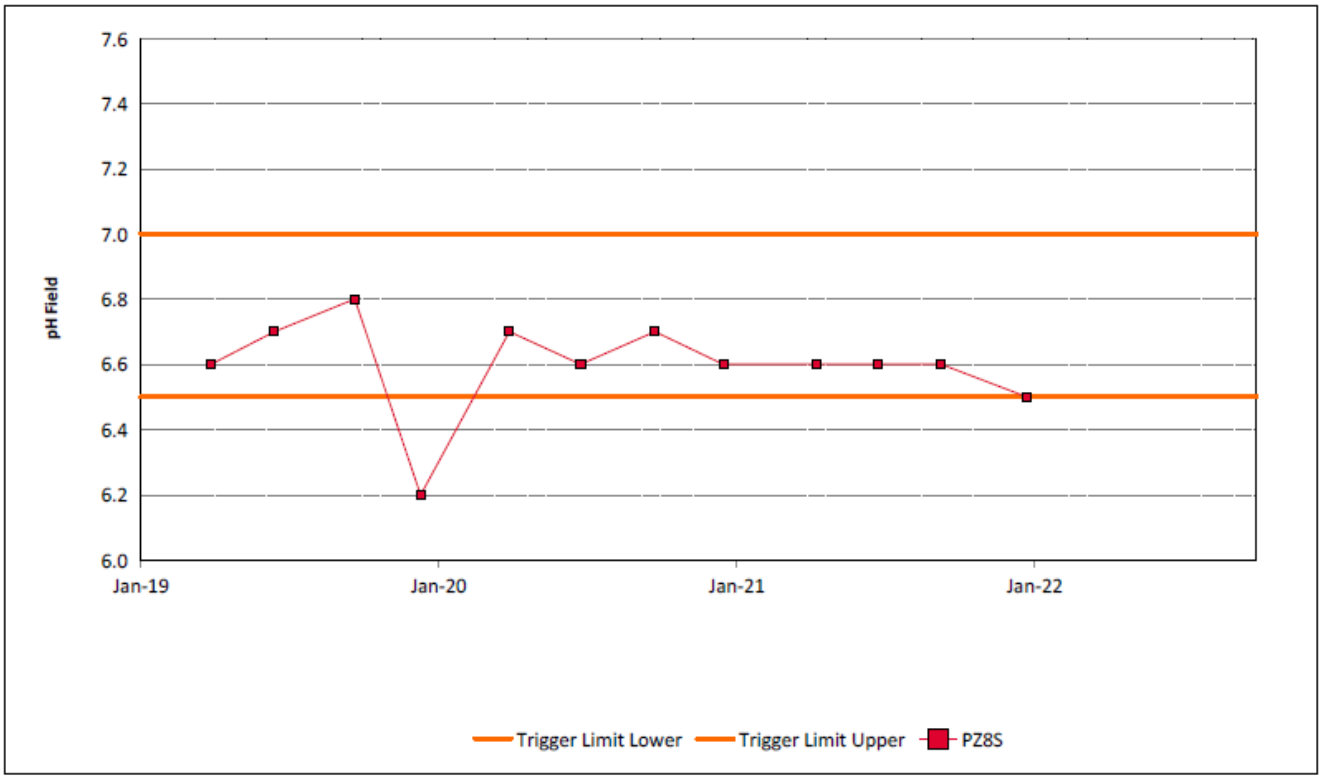

Figure 41: Wollombi Alluvium 1 pH Field Trend - September 2022

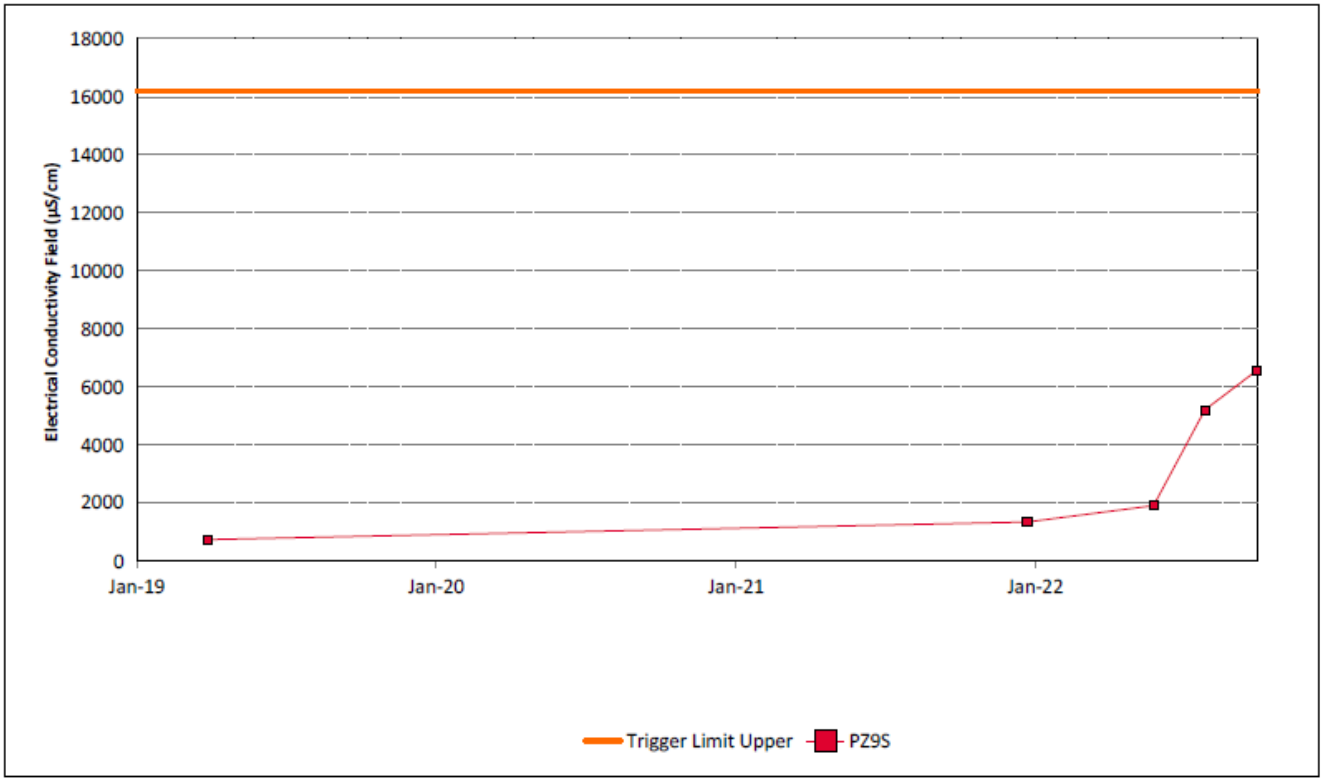

Figure 42: Wollombi Alluvium 2 Electrical Conductivity Field Trend - September 2022

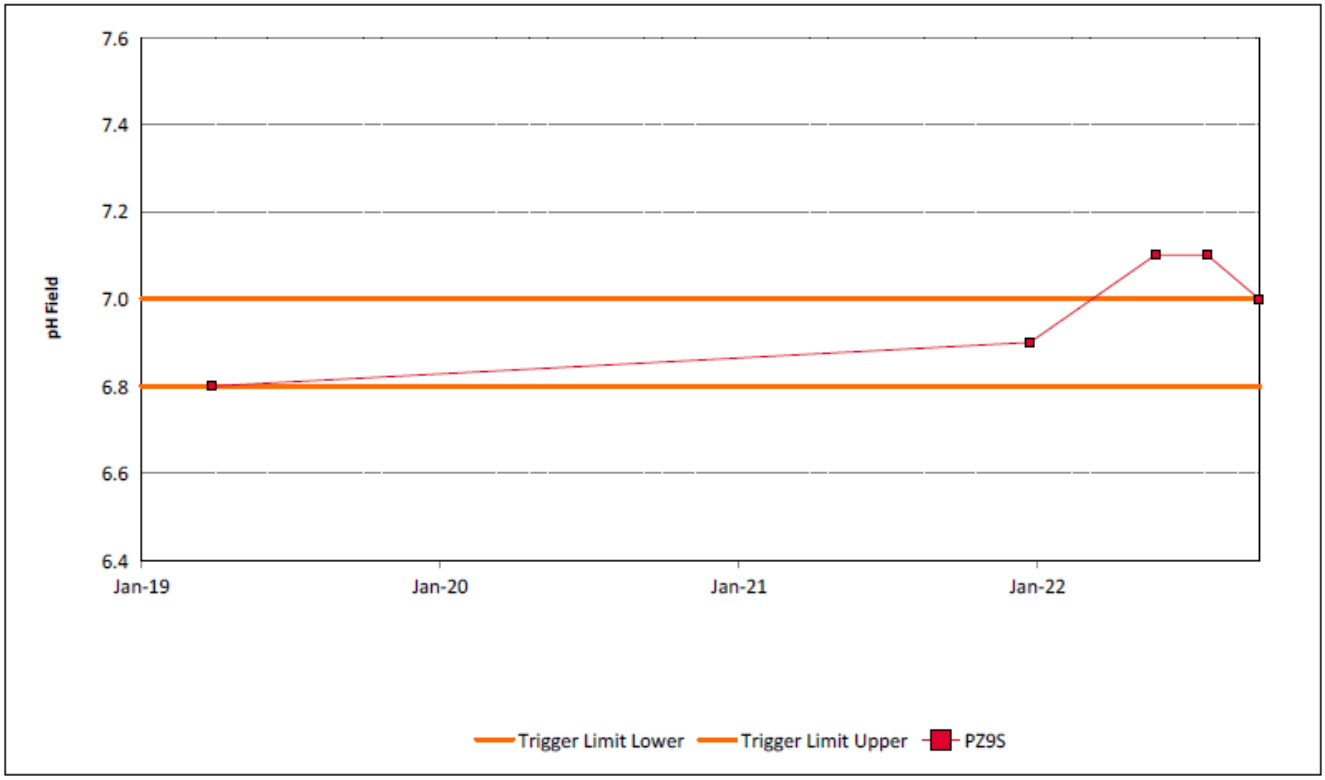

Figure 43: Wollombi Alluvium 2 pH Field Trend - September 2022

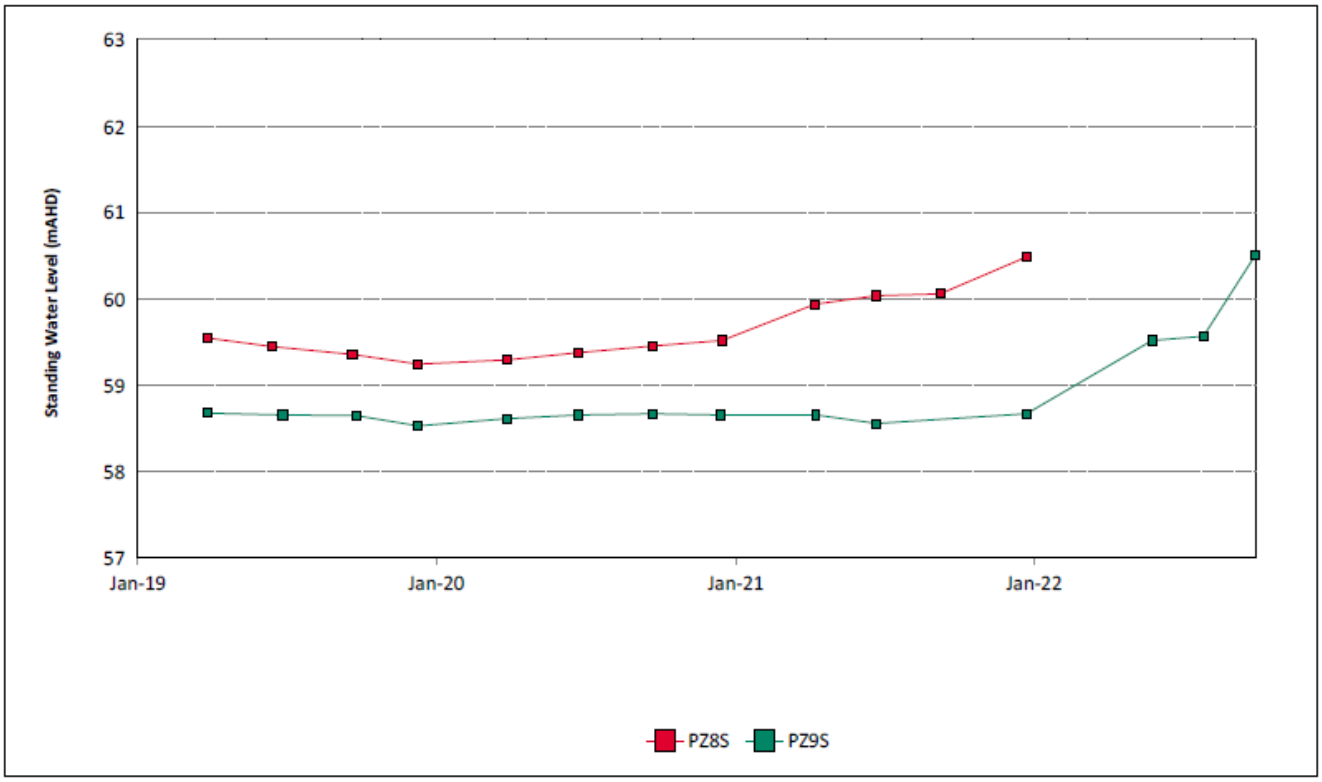

Figure 44: Wollombi Alluvium Standing Water Level Trend - September 2022

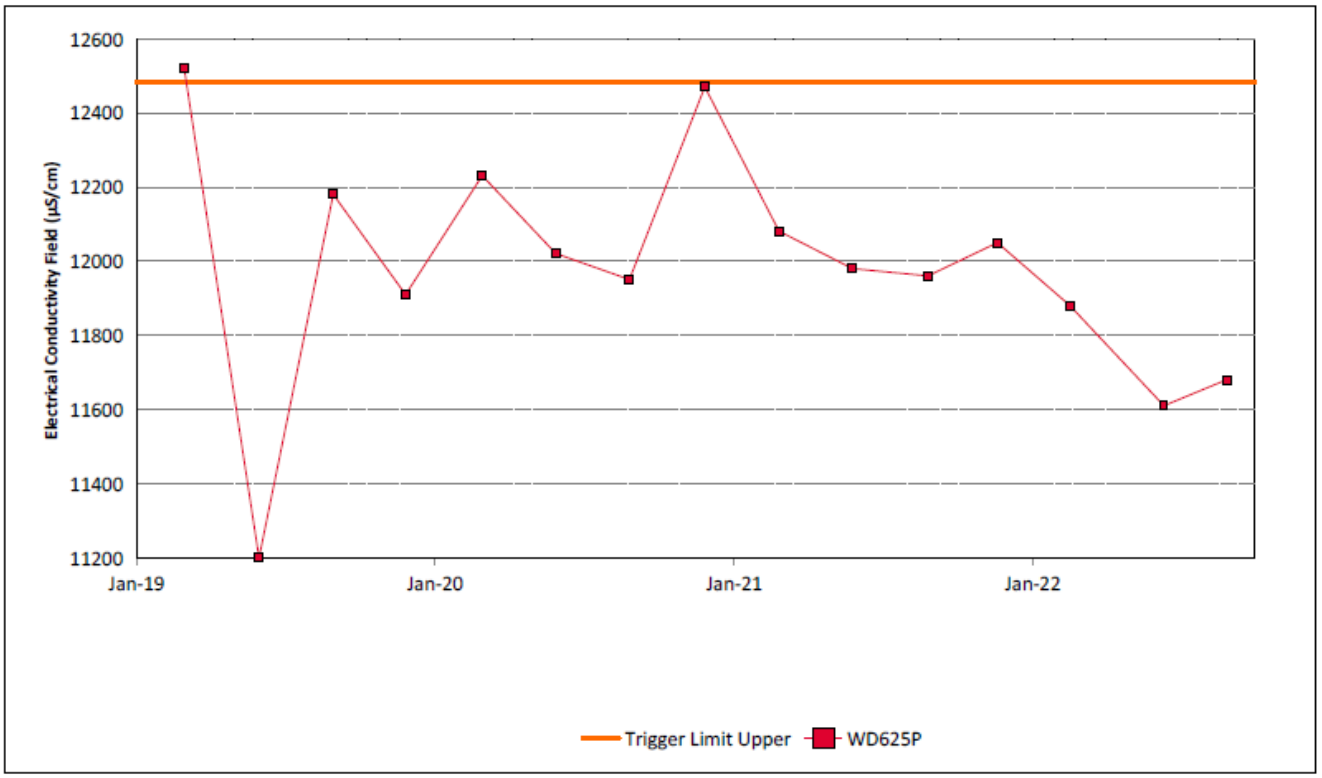

Figure 45: Woodlands Hill Seam Electrical Conductivity Field Trend - September 2022

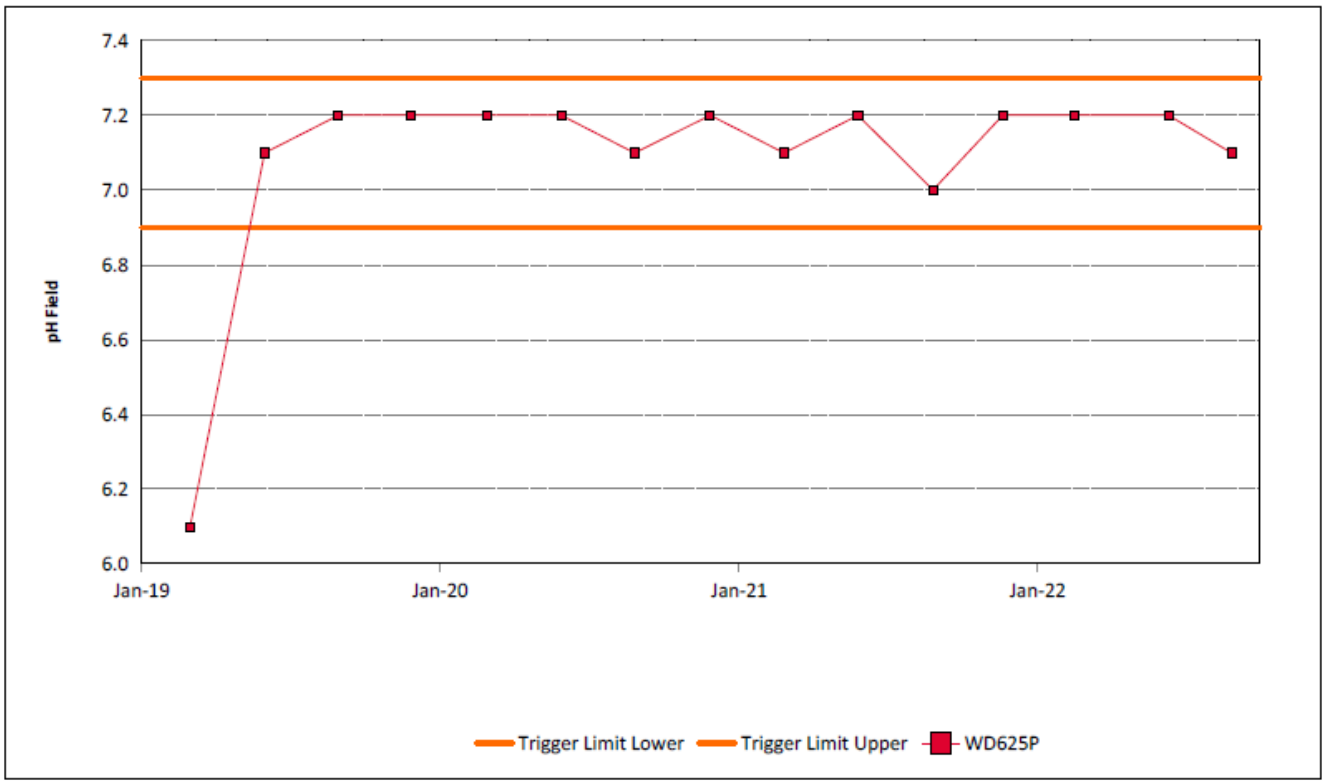

Figure 46: Woodlands Hill Seam pH Field Trend - September 2022

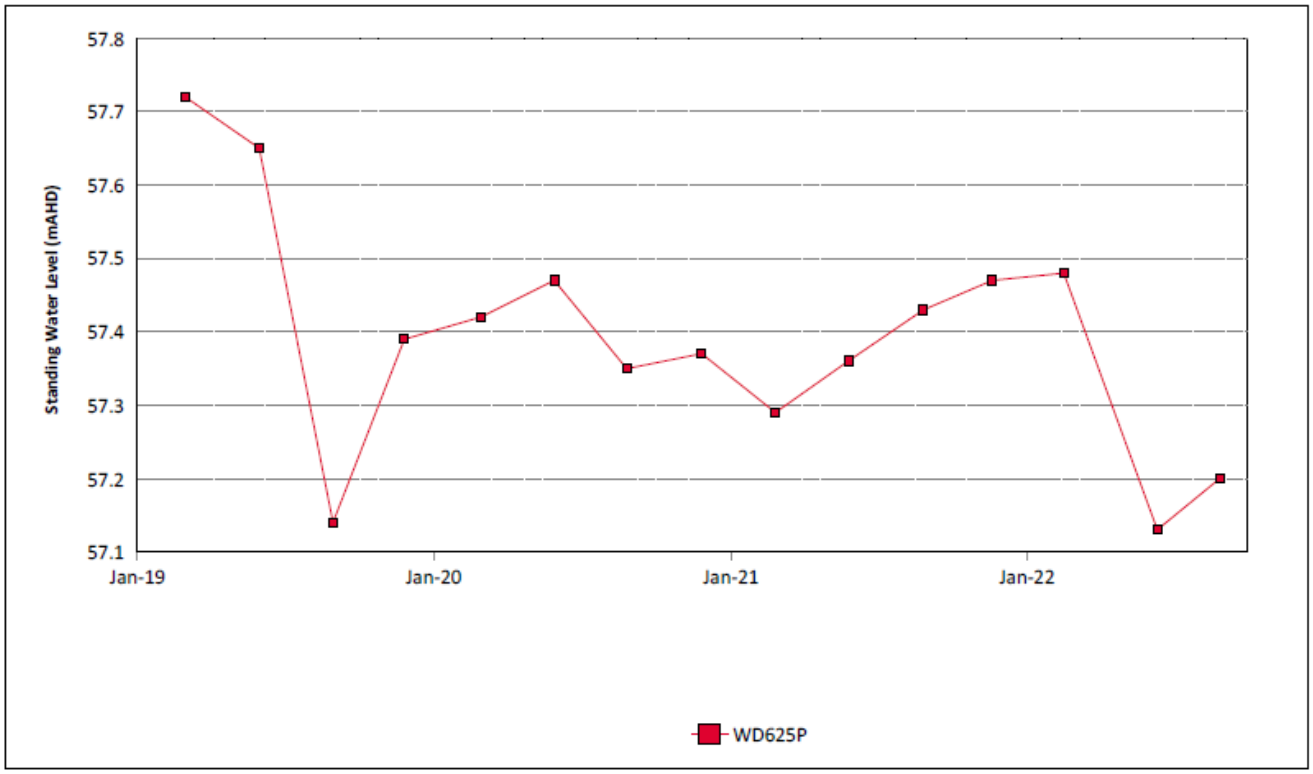

Figure 47: Woodlands Hill Seam Standing Water Level Trend - September 2022

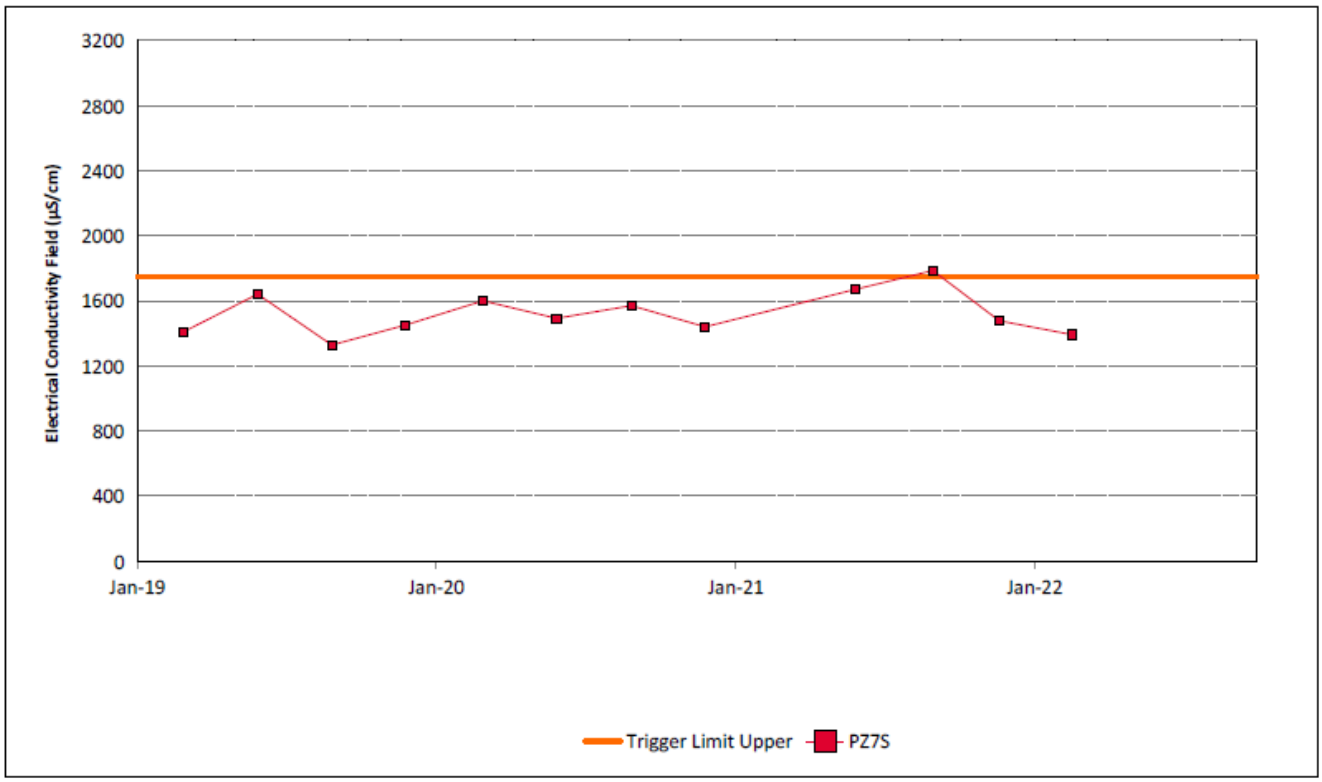

Figure 48: Aeolian Warkworth Sands Electrical Conductivity Field Trend - September 2022

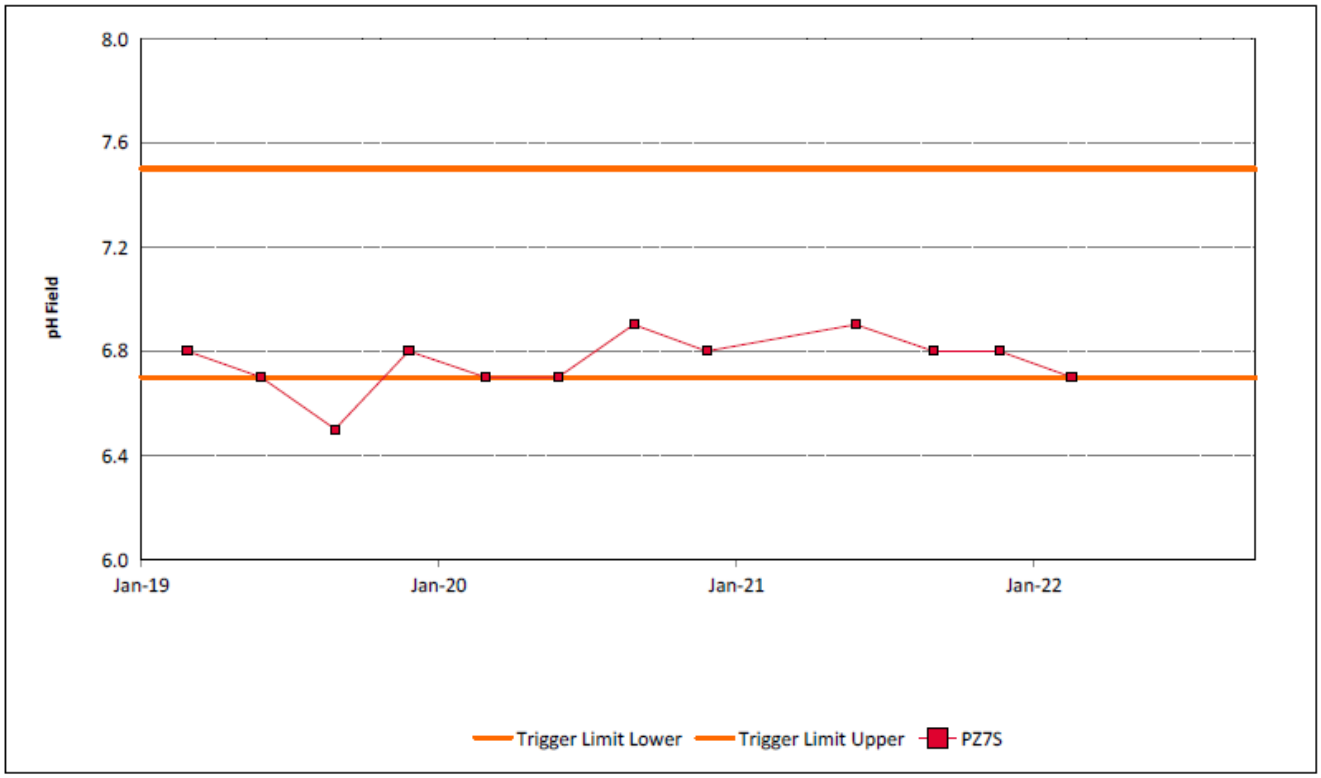

Figure 49: Aeolian Warkworth Sands pH Field Trend - September 2022

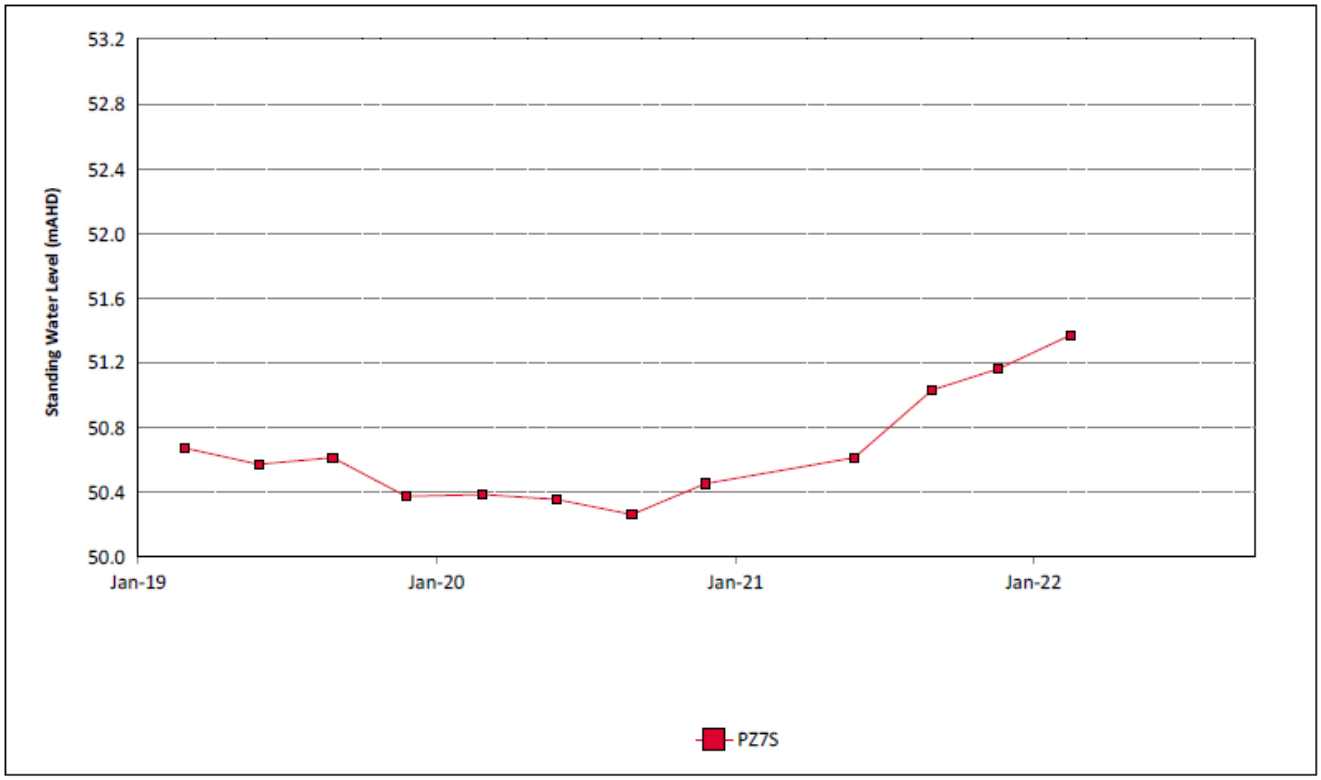

Figure 50: Aeolian Warkworth Sands Standing Water Level Trend - September 2022

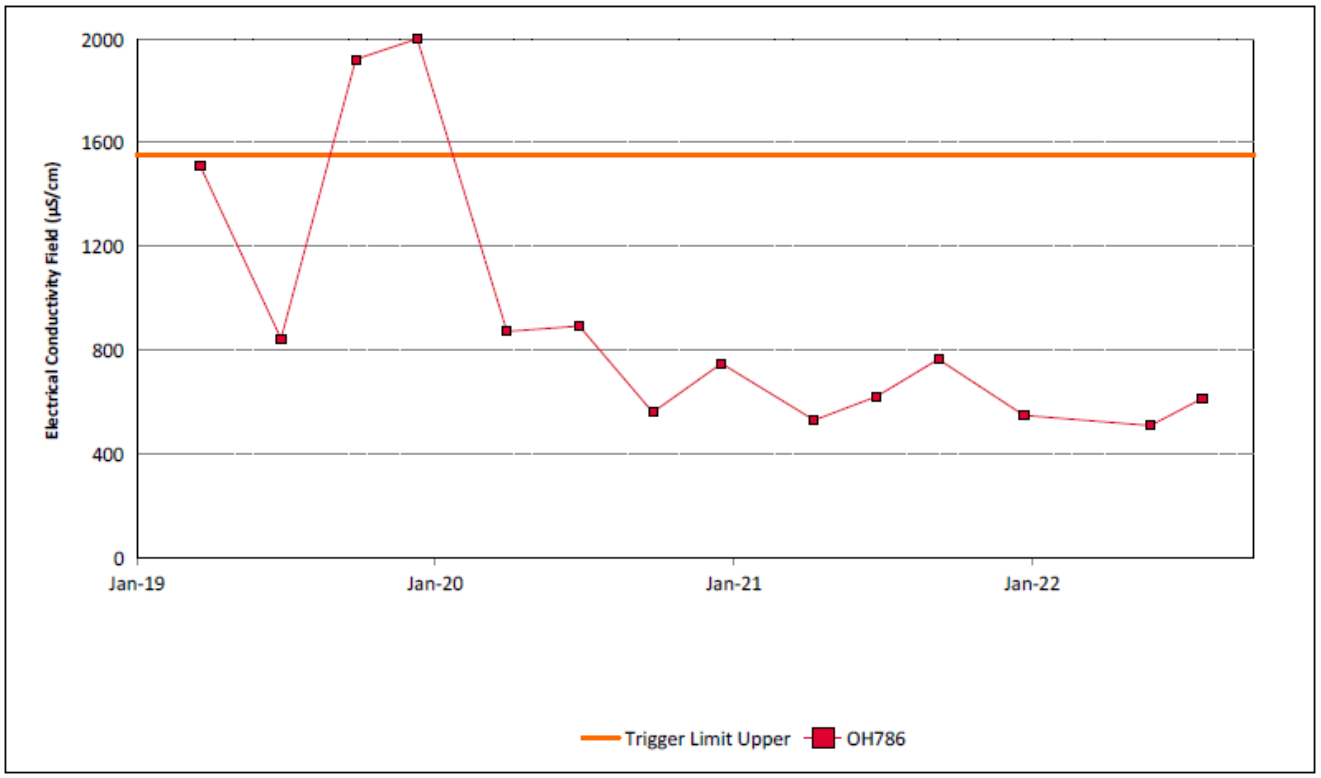

Figure 51: Hunter River Alluvium 1 Electrical Conductivity Field Trend - September 2022

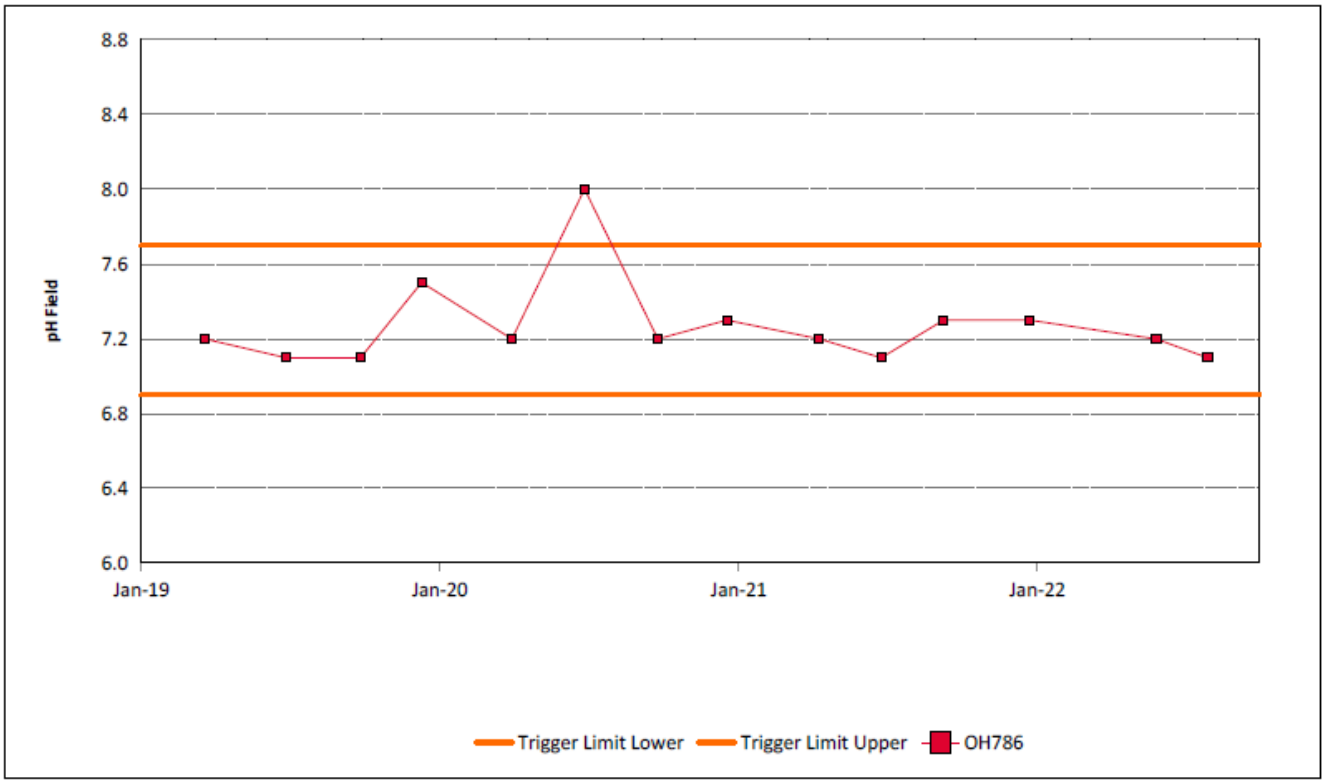

Figure 52: Hunter River Alluvium 1 pH Field Trend - September 2022

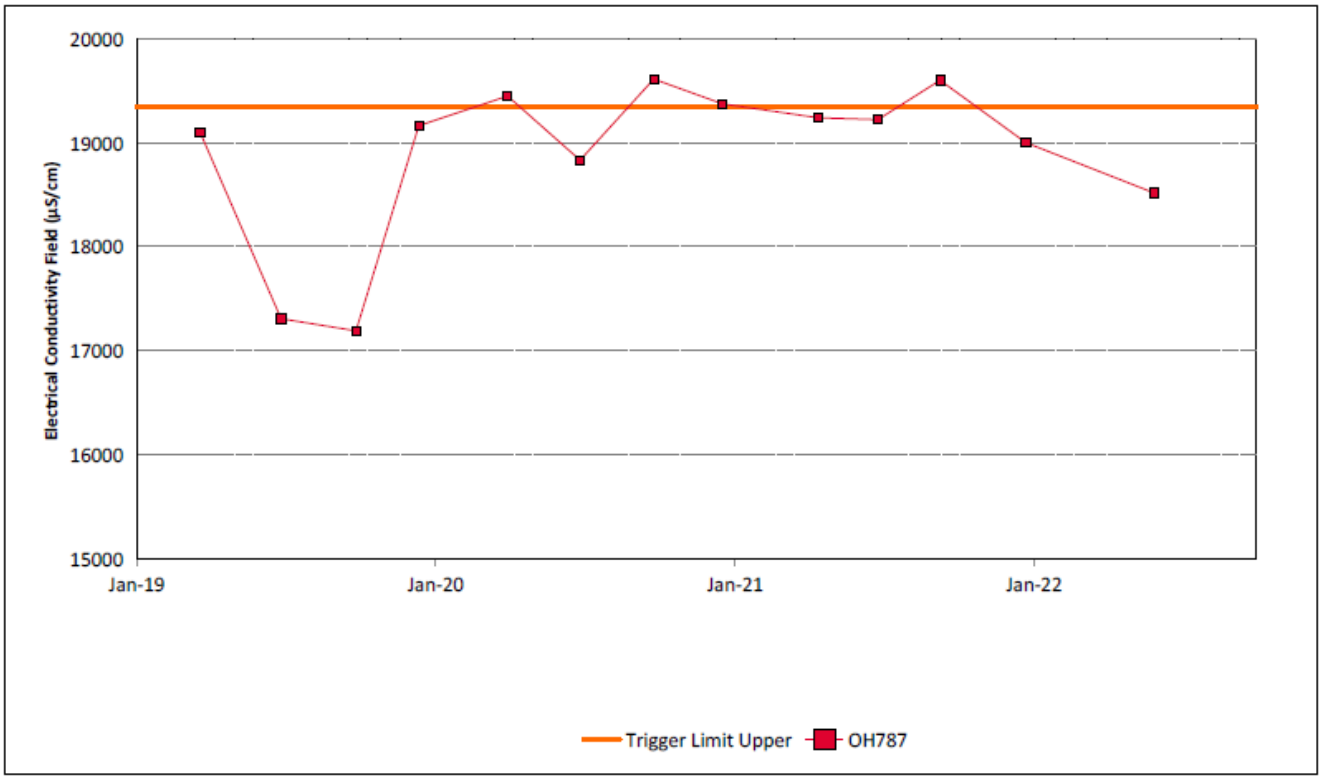

Figure 53: Hunter River Alluvium 2 Electrical Conductivity Field Trend - September 2022

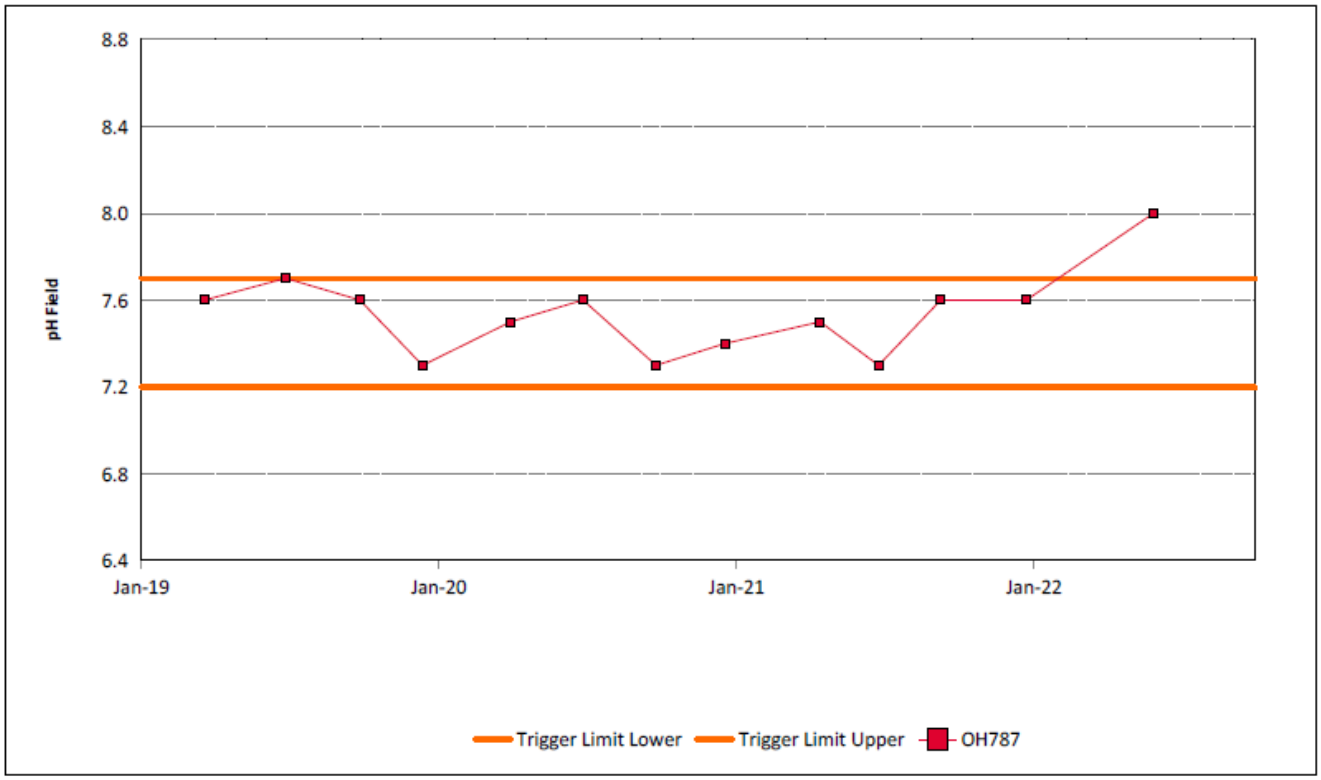

Figure 54: Hunter River Alluvium 2 pH Field Trend - September 2022

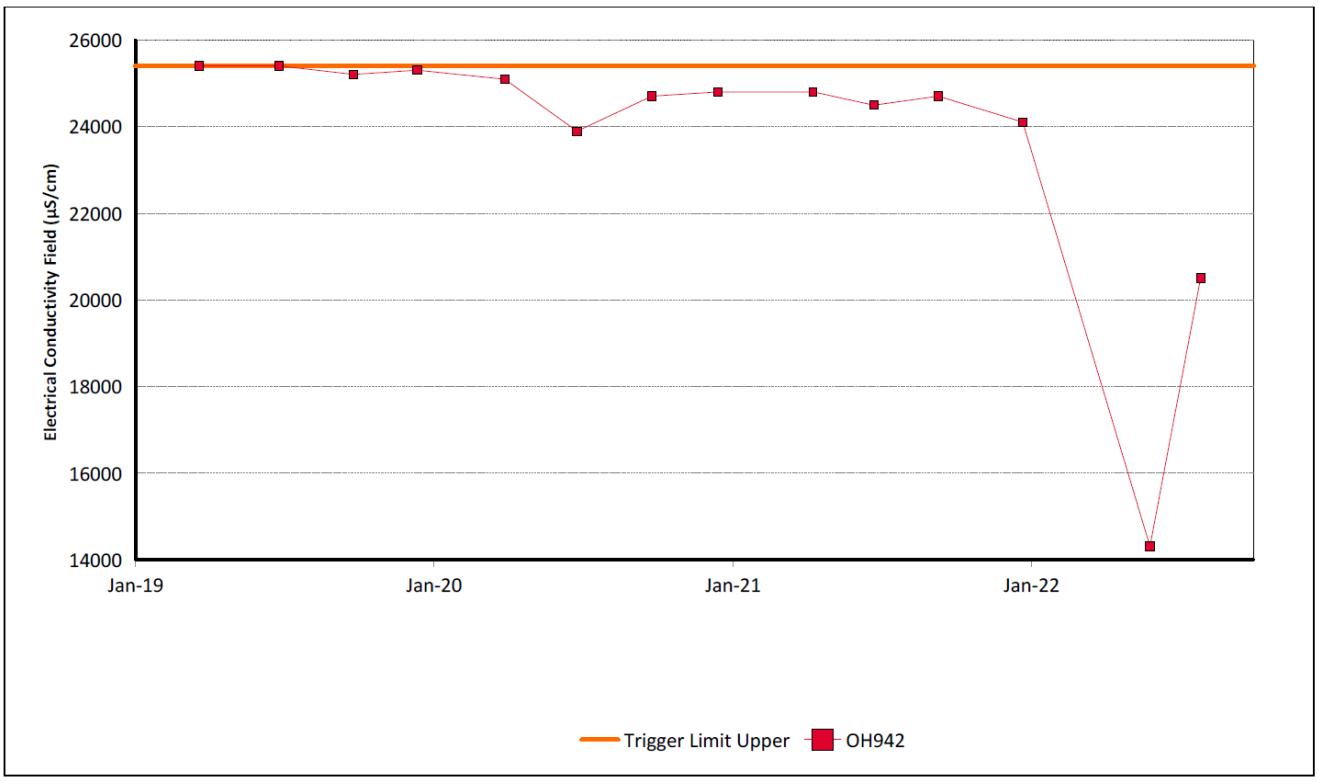

Figure 55: Hunter River Alluvium 3 Electrical Conductivity Field Trend - September 2022

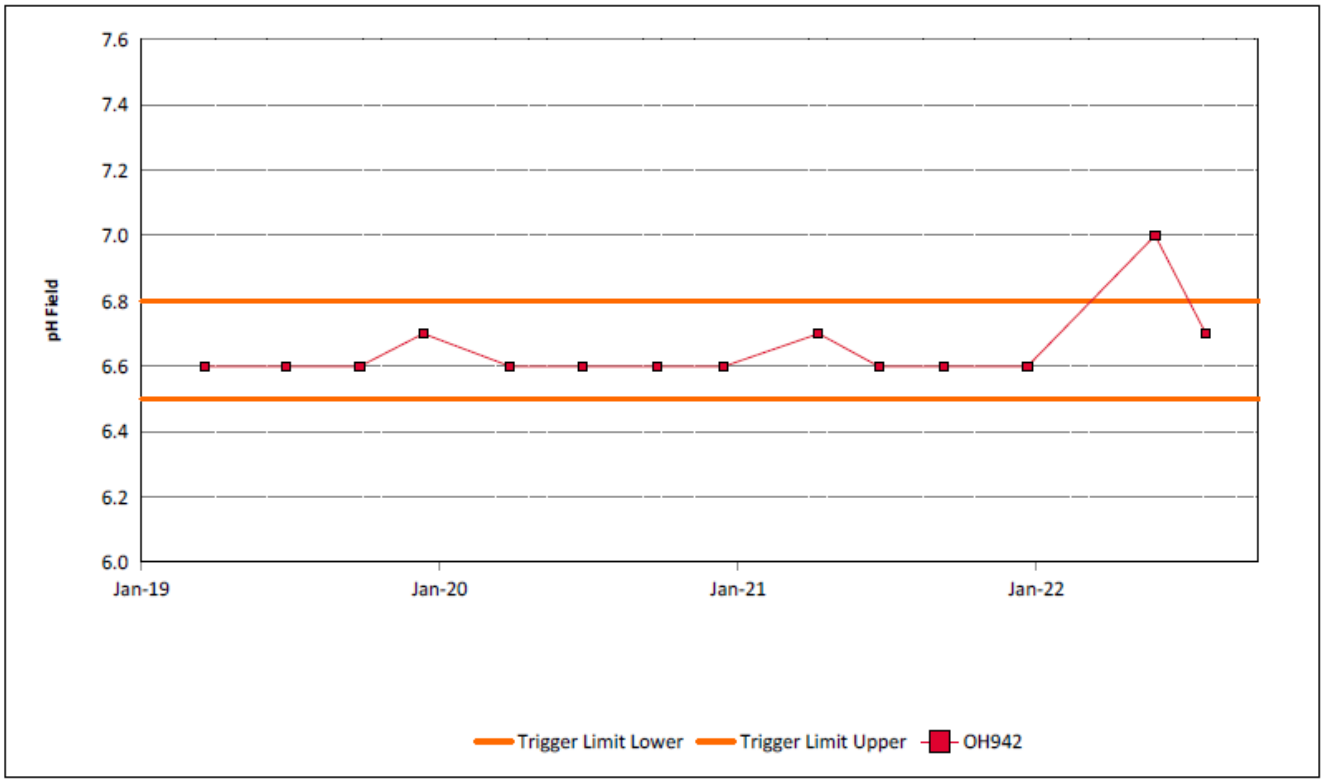

Figure 56: Hunter River Alluvium 3 pH Field Trend - September 2022

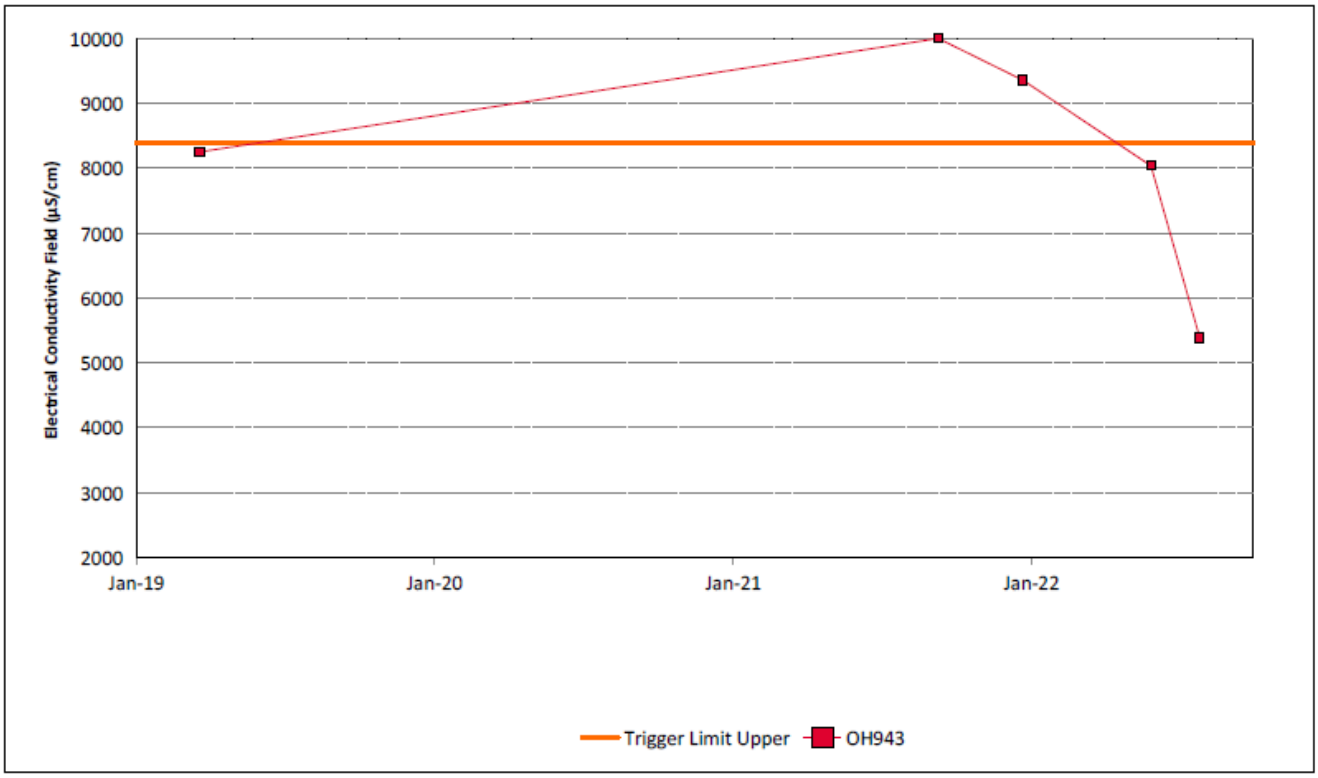

Figure 57: Hunter River Alluvium 4 Electrical Conductivity Field Trend - September 2022

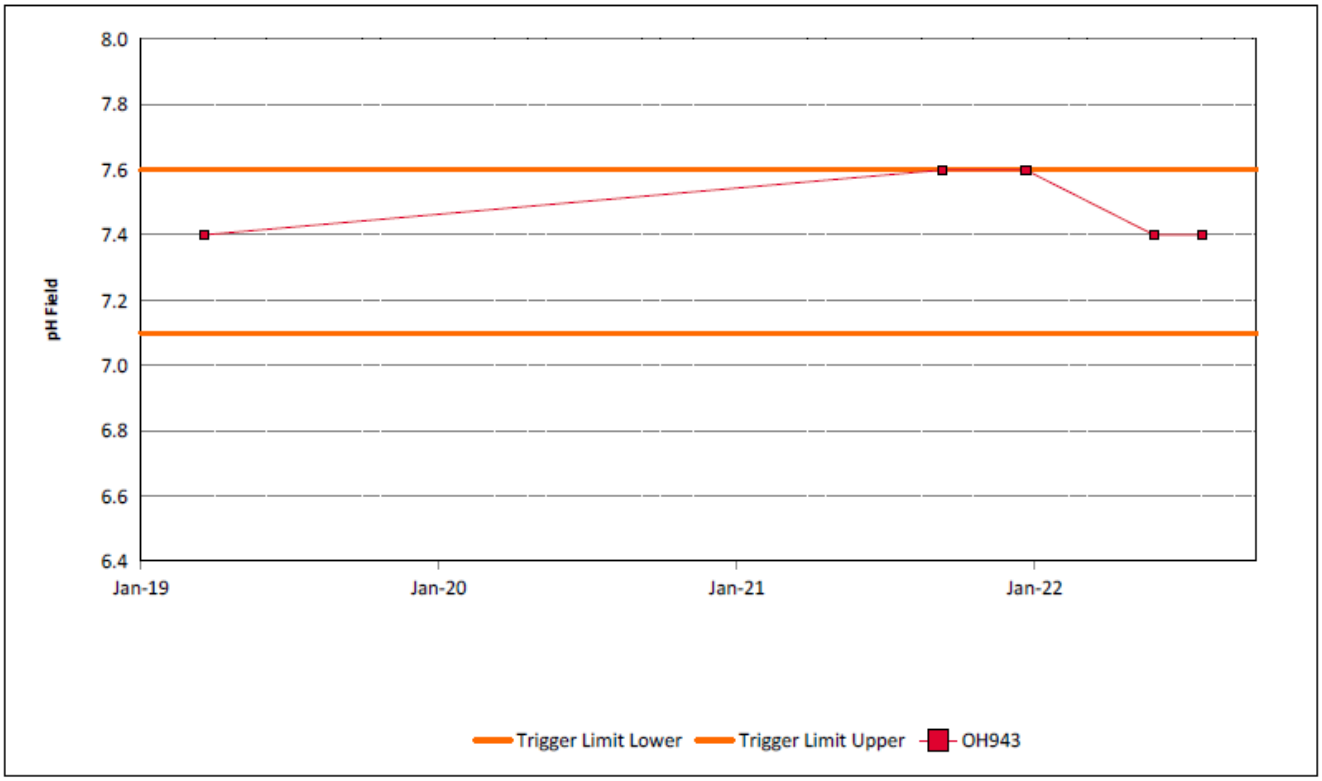

Figure 58: Hunter River Alluvium 4 pH Field Trend - September 2022

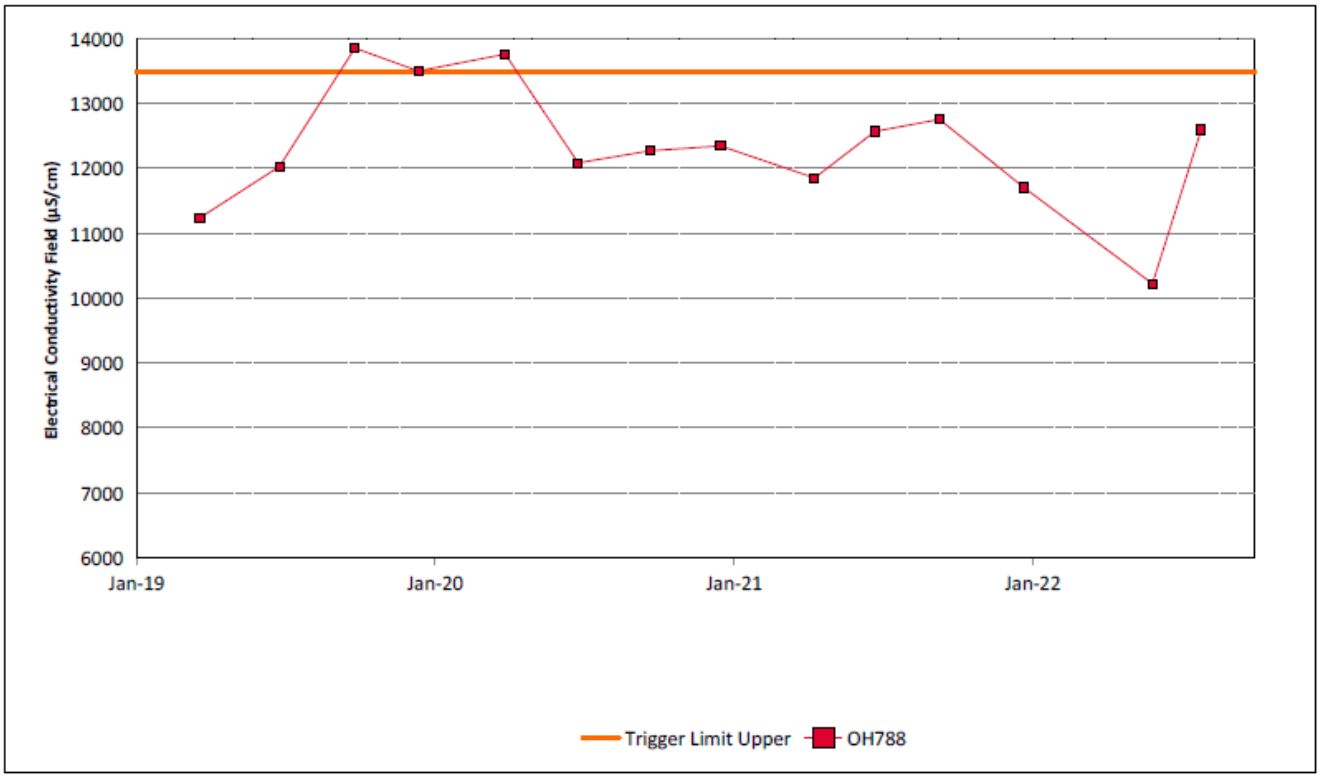

Figure 59: Hunter River Alluvium 5 Electrical Conductivity Field Trend - September 2022

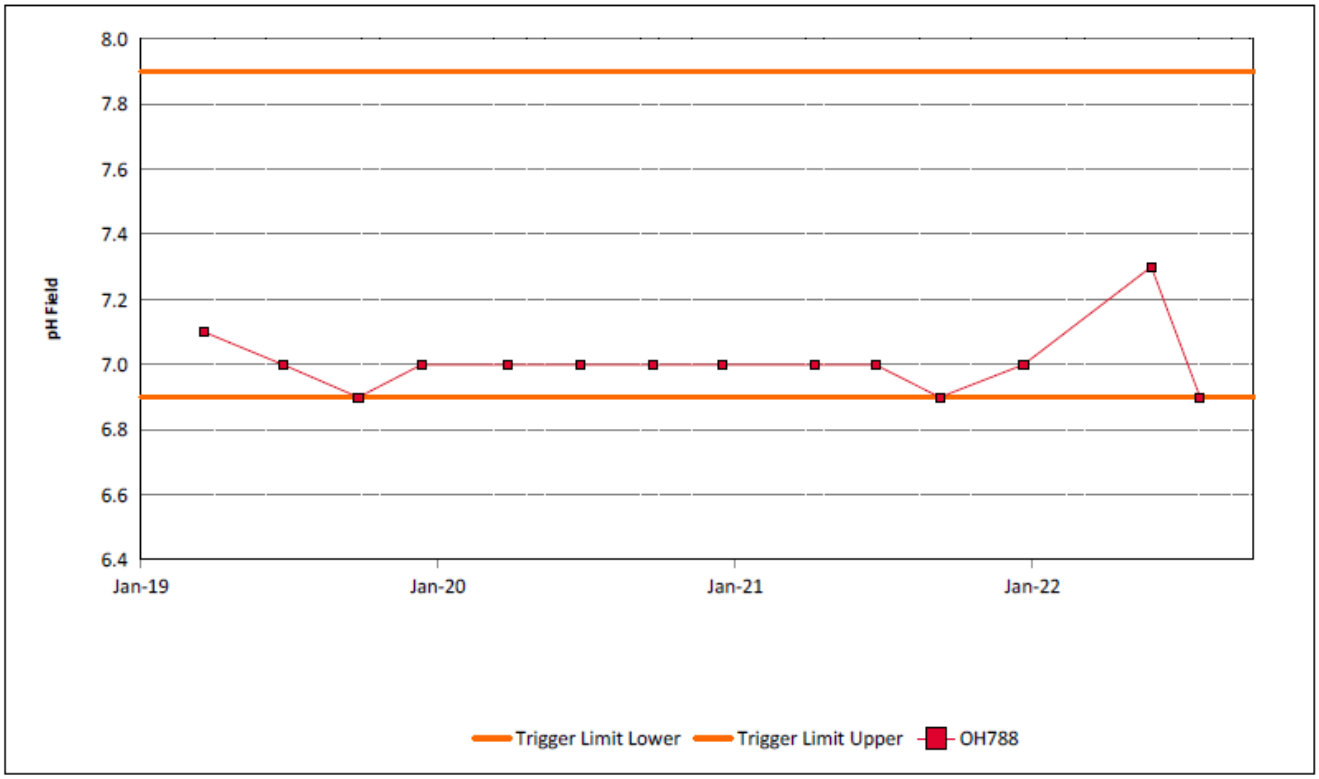

Figure 60: Hunter River Alluvium 5 pH Field Trend - September 2022

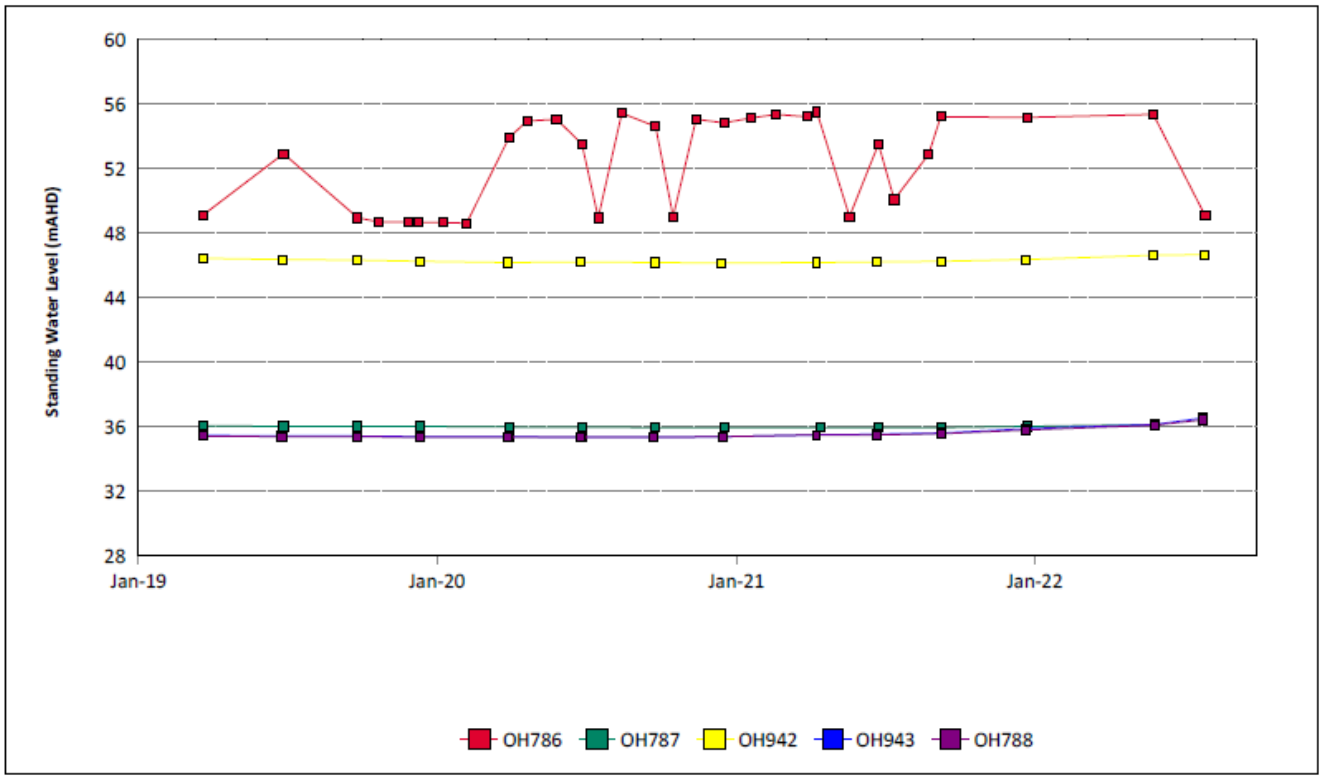

Figure 61: Hunter River Alluvium Standing Water Level Trend - September 2022

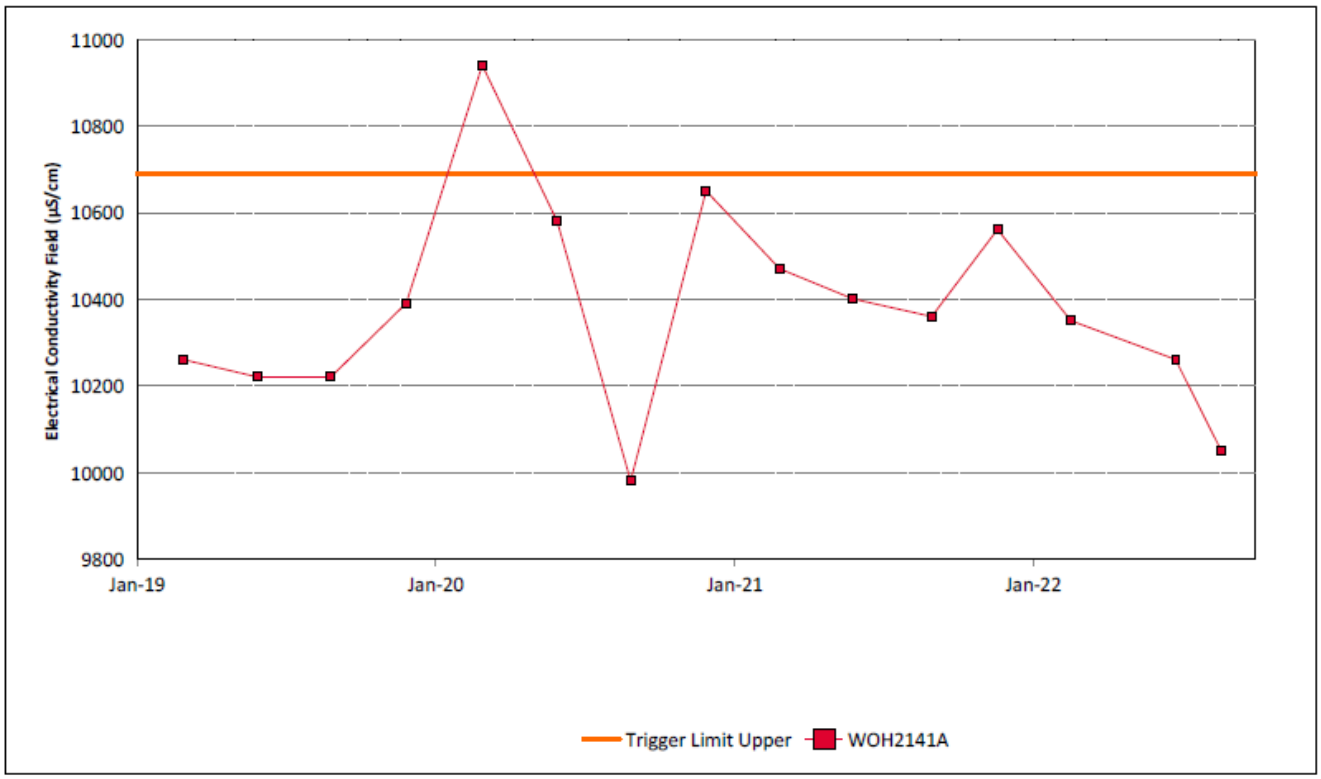

Figure 62: Whynot Seam Electrical Conductivity Field Trend - September 2022

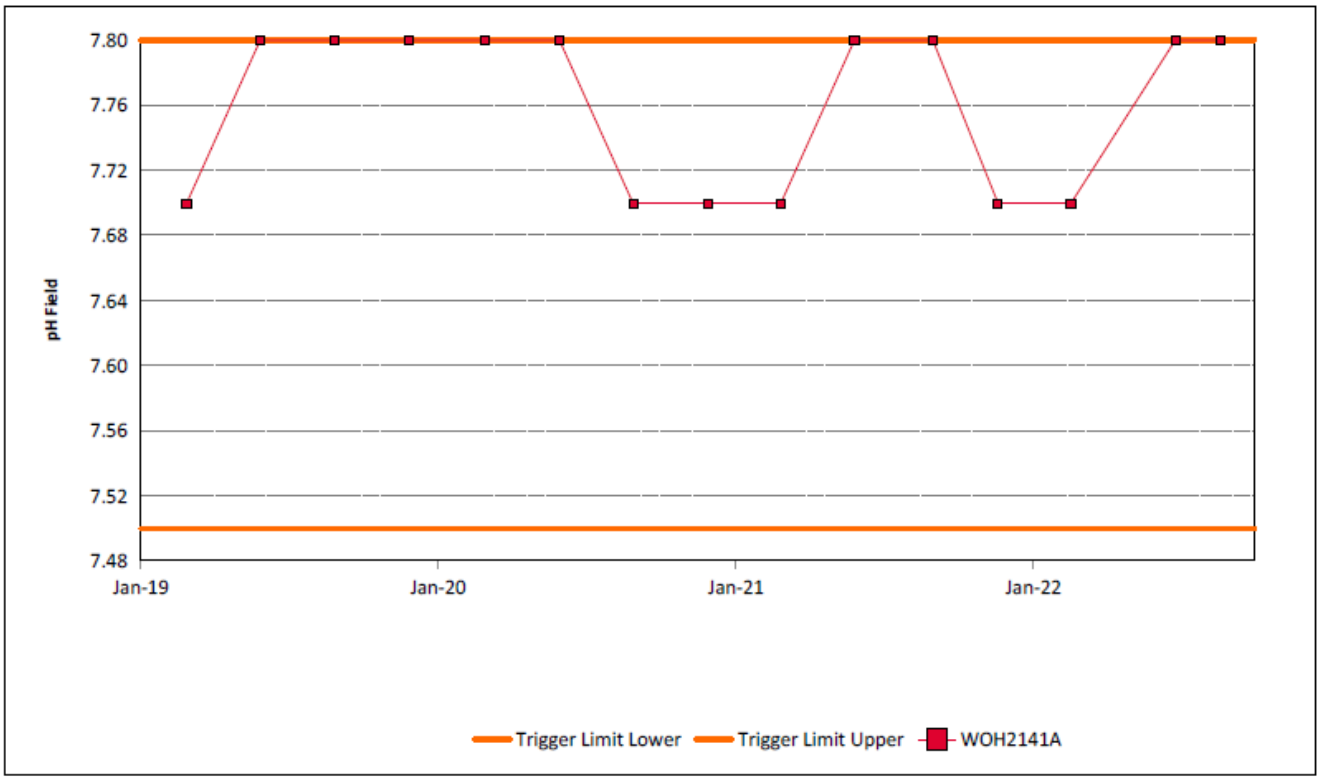

Figure 63: Whynot Seam pH Field Trend - September 2022

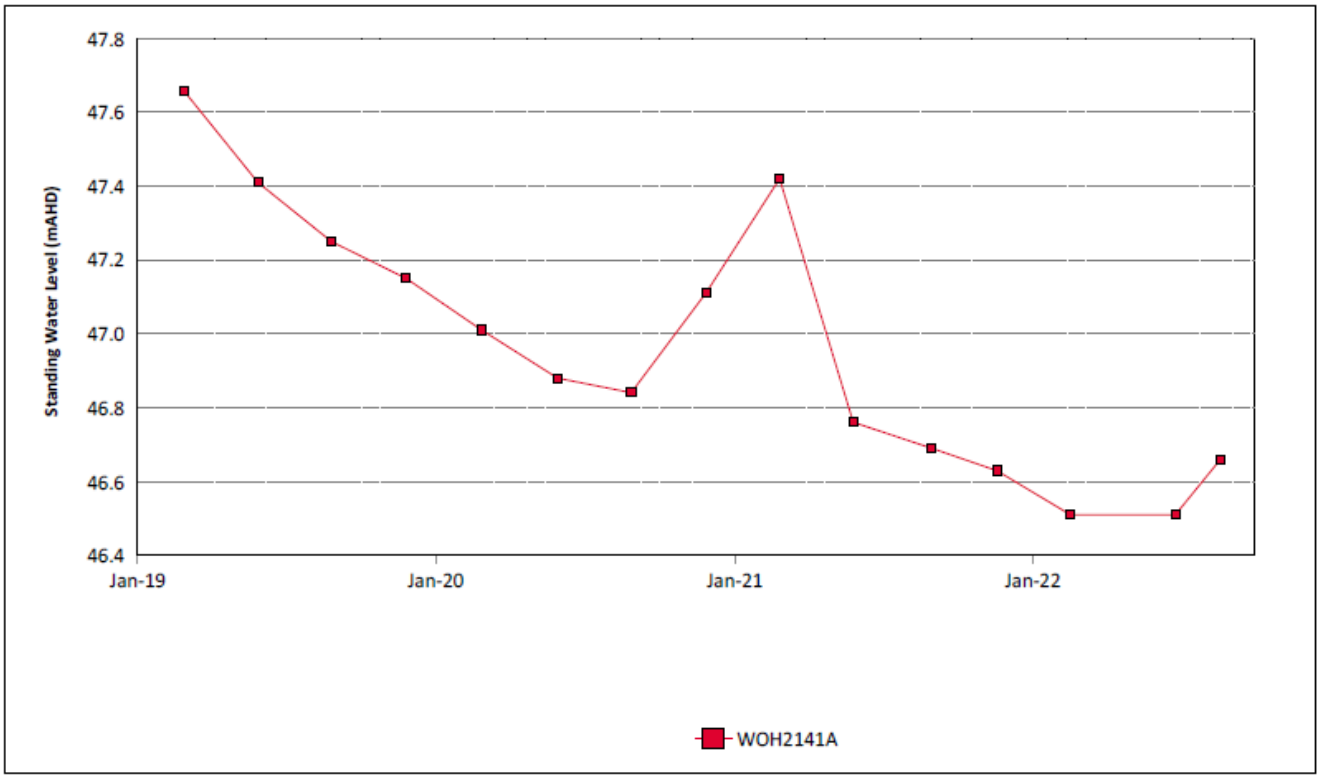

Figure 64: Whynot Seam Standing Water Level Trend - September 2022

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

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

Table 3: Groundwater Trigger Tracking – September 2022

Site	Date	Trigger Limit Breached	Action Taken in Response
MB15MTW01D	17/02/2022	pH –5th Percentile	Consultant engaged to complete investigation.
MB15MTW01D	10/06/2022	pH –5th Percentile	Investigation 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	26/08/2022	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.
PZ7D	16/02/2022	pH –95th Percentile	Investigation completed. The consultant identified in their report that the high pH could indicate that stagnant water is present within the bore. PZ7D displays a subdued response to rainfall recharge, with recorded groundwater levels remaining relatively stable since December 2011. The limited response to rainfall recharge indicates limited surface connectivity and/or overlying sediments with low hydraulic conductivity. PZ7D is part of a larger dataset from the shallow overburden seam. The 95th percentile of the seam is currently 8 while the 95th percentile of PZ7D is 8.2. The result is consistent with previous results and within sample location trigger levels. No further investigation required.
OH1126	26/05/2022	pH –5th Percentile	OH1126 returned to above pH 5th percentile trigger level for the sample on 11 October 2022.
OH787	27/05/2022	pH –95th Percentile	Watching Brief*. Note: no samples have been possible since 27/05/2022 with no safe access due to wet ground.
OH942	26/05/2022	pH –95th Percentile	OH942 returned to below the pH 95th percentile trigger level for the sample on 12 October 2022.

Site	Date	Trigger Limit Breached	Action Taken in Response
WOH2139A	21/06/2022	pH –95th Percentile	WOH2139A returned to below the pH 95th percentile trigger level for the sample on 26 August 2022.
PZ9S	25/05/2022	pH –95th Percentile	Watching Brief*
PZ9S	27/07/2022	pH –95th Percentile	PZ9S returned to below the pH 95th percentile trigger level for the sample on 28 September 2022.
MTD605P	17/02/2022	EC – 95th Percentile	Watching Brief*
MTD605P	9/06/2022	EC – 95th Percentile	Investigation completed. MTD605P is part of a larger dataset from the shallow overburden seam. The 95th percentile of the seam is currently 17,516uS/cm while the 95th percentile of MTD605P is 17,933uS/cm. The result is consistent with previous results and within sample location trigger levels. No further investigation required. Watching Brief*
MTD605P	26/08/2022	EC – 95th Percentile	Refer comment above. Watching Brief*
* = Watching brief established pending outcomes of subsequent monitoring events. No specific actions required.			

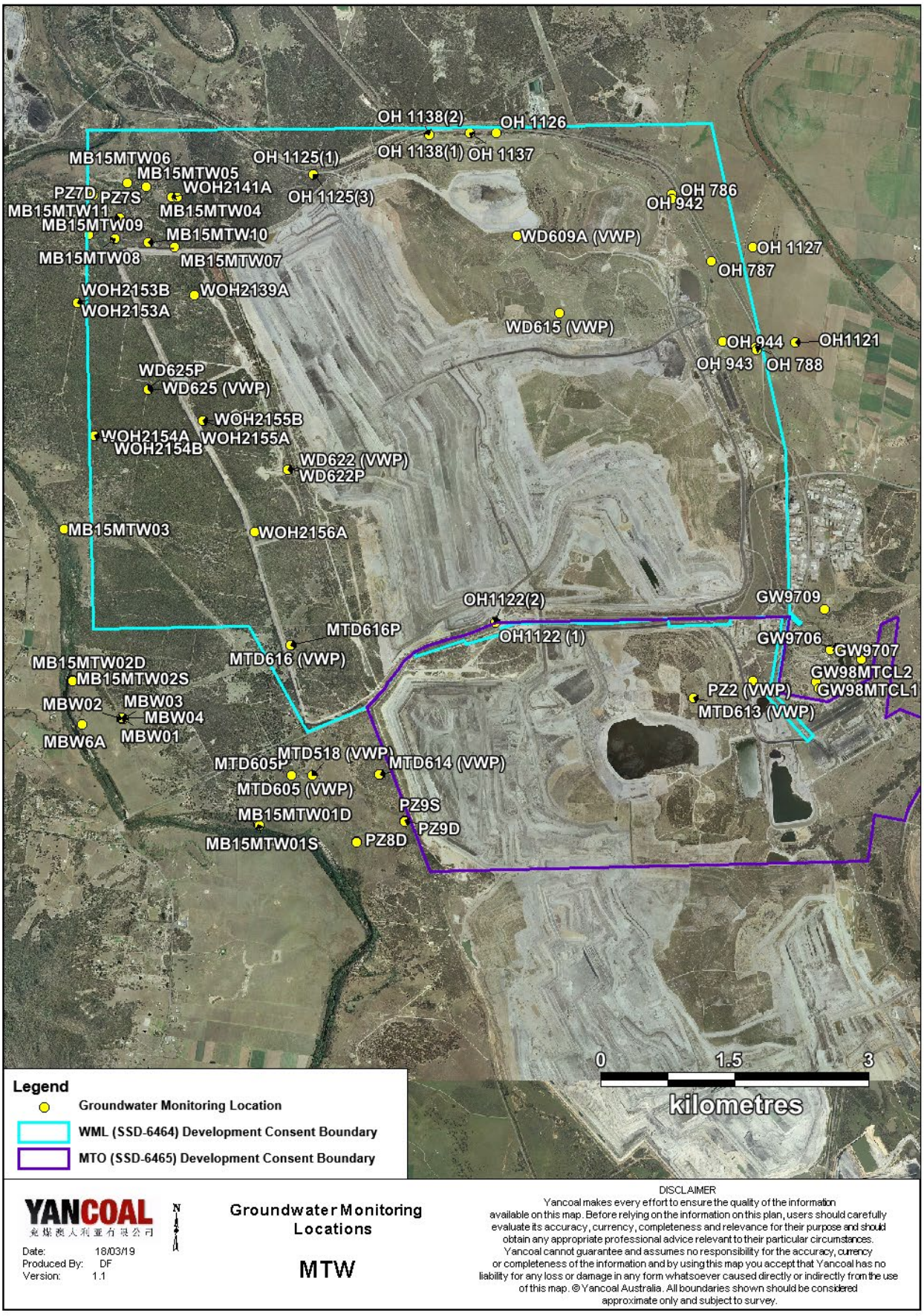

Figure 65: Groundwater Monitoring Location Plan

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 2022, 23 blasts were initiated at MTW. **Figure 66**to **Figure 71** 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 115 dB(L) 5% threshold for airblast overpressure or 5mm/s 5% threshold for ground vibration.

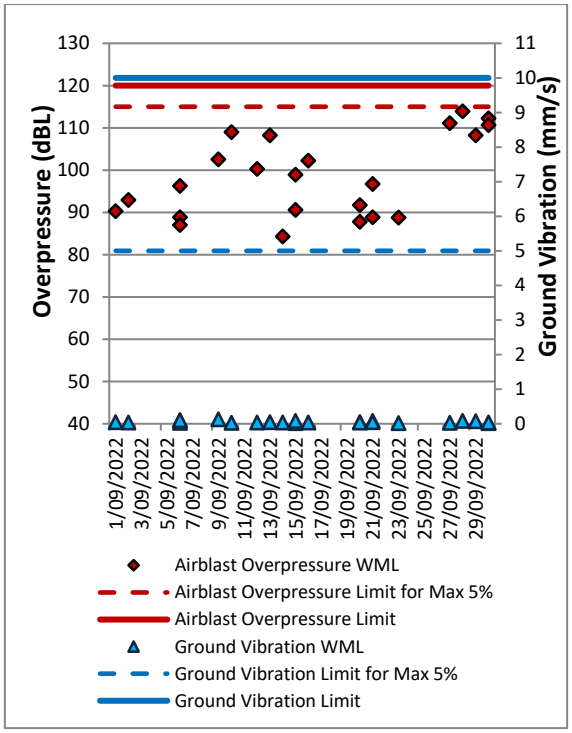

Figure 66: Abbey Green Blast Monitoring Results – September 2022

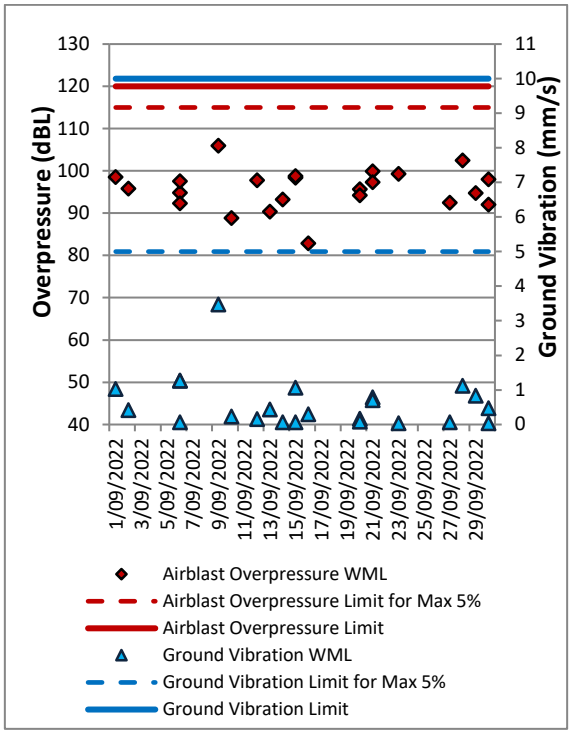

Figure 67: Bulga Village Blast Monitoring Results – September 2022

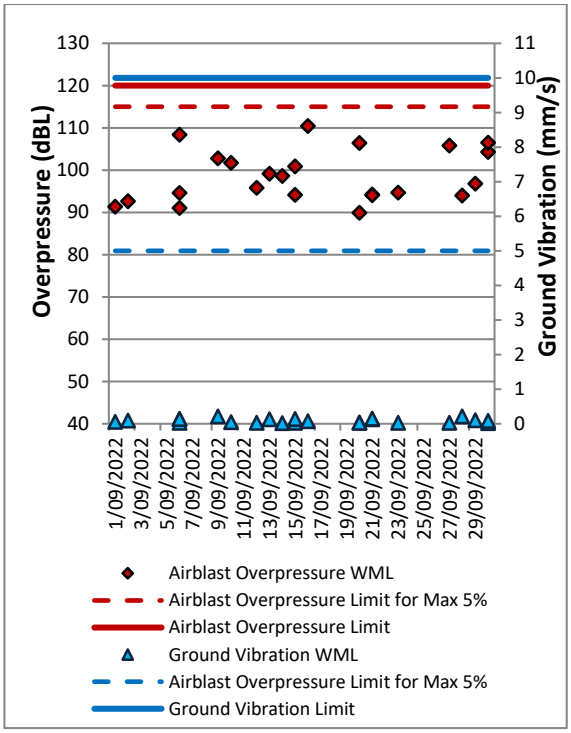

Figure 68: MTIE Blast Monitoring Results – September 2022

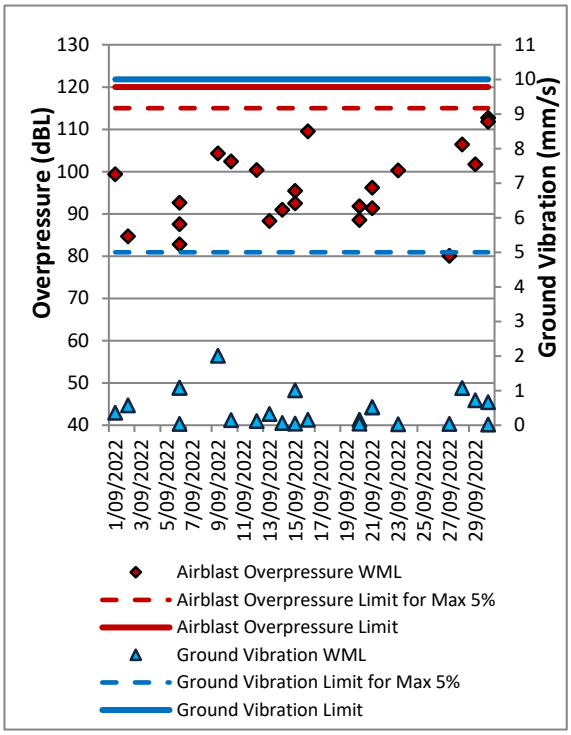

Figure 69: Wollemi Peak Road Blast Monitoring Results - September 2022

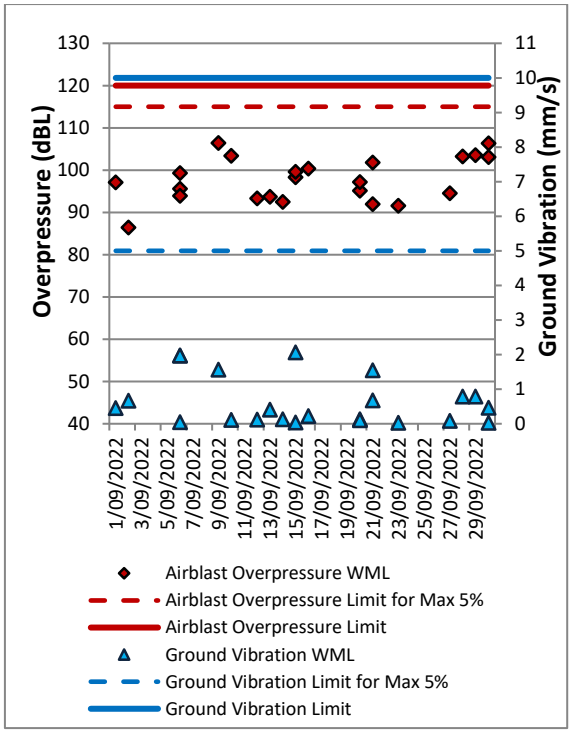

Figure 70: Wambo Road Blast Monitoring Results – September 2022

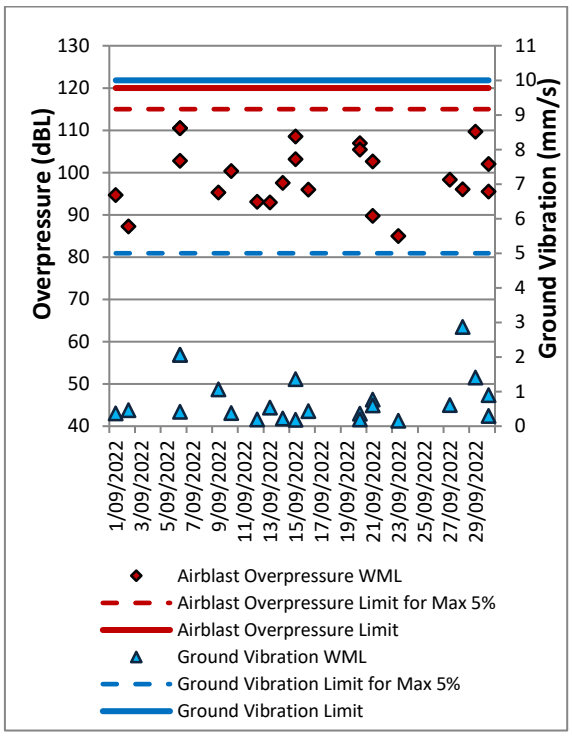

Figure 71: Warkworth Blast Monitoring Results – September 2022

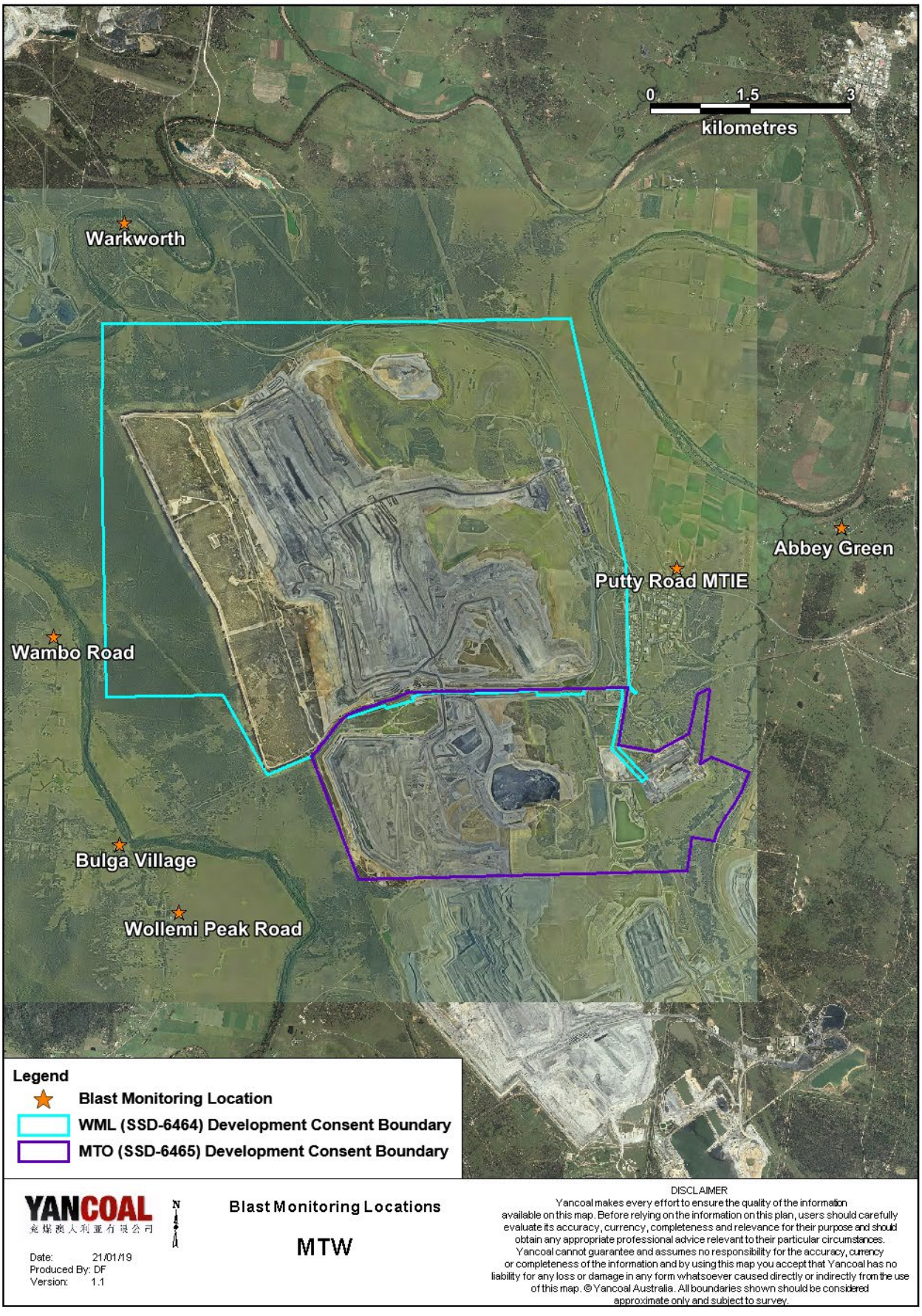

Figure 72: MTW Blast Monitoring Location Plan

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 14th September 2022. Measurements complied with the relevant criteria, with the exception of WML levels at Wambo Road, where noise levels were increased by the applicability of a low frequency modifying factor (refer to **Table 9**). Follow up monitoring conducted on 20 September 2022 (as required by the MTW Noise Management Plan) complied with the relevant criteria at the remeasured location. 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 **Table 5** and **Table 6**.

Table 5: $L_{Aeq,\ 15\ minute}$ Warkworth Impact Assessment Criteria – September 2022

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	14/09/2022 23:34	1.4	F	37	Yes	31	Nil
Bulga Village	14/09/2022 22:19	2.4	F	38	Yes	34	NA
Gouldsville	14/09/2022 21:36	2.6	F	38	Yes	<25	NA
Inlet Rd	14/09/2022 21:49	2.2	F	37	Yes	33	NA
Inlet Rd West	14/09/2022 21:21	2.4	F	35	Yes	34	NA
Long Point	14/09/2022 21:09	2.4	F	35	Yes	IA	NA
South Bulga	15/09/2022 0:01	1.8	F	35	Yes	IA	Nil
Wambo Road	14/09/2022 22:45	2.0	F	38	Yes	**39**	**1**
Wambo Road[5]	20/09/2022 00:28	2.8	E	38	Yes	IA	Nil

Notes:
1. Noise criteria apply during all meteorological conditions except the following: during periods of rain or hail; average wind speed at microphone height exceeds 5 m/s; 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.
5. Follow-up measurement.

Table 6: $L_{A1,\ 1\ minute}$ Warkworth - Impact Assessment Criteria – September 2022

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	14/09/2022 23:34	1.4	F	47	Yes	34	Nil
Bulga Village	14/09/2022 22:19	2.4	F	48	No	40	NA
Gouldsville	14/09/2022 21:36	2.6	F	48	No	31	NA
Inlet Rd	14/09/2022 21:49	2.2	F	47	No	42	NA
Inlet Rd West	14/09/2022 21:21	2.4	F	45	No	38	NA
Long Point	14/09/2022 21:09	2.4	F	45	No	IA	NA
South Bulga	15/09/2022 0:01	1.8	F	45	Yes	IA	Nil

Wambo Road	14/09/2022 22:45	2.0	F	48	Yes	41	Nil
Wambo Road[5]	20/09/2022 00:28	2.8	E	48	Yes	IA	Nil

Notes:
1. Noise criteria apply during all meteorological conditions except the following: during periods of rain or hail; average wind speed at microphone height exceeds 5 m/s; 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. Follow-up measurement.

5.1.2 MTO Noise Assessment

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

Table 7: $L_{Aeq,\ 15minute}$ Mount Thorley - Impact Assessment Criteria – September 2022

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	14/09/2022 23:34	1.4	F	37	Yes	35	Nil
Bulga Village	14/09/2022 22:19	2.4	F	38	No	35	NA
Gouldsville	14/09/2022 21:36	2.6	F	38	No	IA	NA
Inlet Rd	14/09/2022 21:49	2.2	F	37	No	36	NA
Inlet Rd West	14/09/2022 21:21	2.4	F	35	No	<30	NA
Long Point	14/09/2022 21:09	2.4	F	35	No	IA	NA
South Bulga	15/09/2022 0:01	1.8	F	36	Yes	33	Nil
Wambo Road	14/09/2022 22:45	2	F	38	Yes	<30	Nil
Wambo Road[5]	20/09/2022 00:28	2.8	E	38	Yes	<25	Nil

Notes:
1. Noise criteria apply during all meteorological conditions except the following: during periods of rain or hail; average wind speed at microphone height exceeds 5 m/s; 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.
5. Follow-up measurement.

Table 8: $L_{A1,\ 1Minute}$ Mount Thorley - Impact Assessment Criteria – September 2022

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	14/09/2022 23:34	1.4	F	47	Yes	41	Nil
Bulga Village	14/09/2022 22:19	2.4	F	48	No	41	NA
Gouldsville	14/09/2022 21:36	2.6	F	45	No	IA	NA
Inlet Rd	14/09/2022 21:49	2.2	F	47	No	38	NA
Inlet Rd West	14/09/2022 21:21	2.4	F	45	No	<30	NA
Long Point	14/09/2022 21:09	2.4	F	45	No	IA	NA
South Bulga	15/09/2022 0:01	1.8	F	46	Yes	36	Nil
Wambo Road	14/09/2022 22:45	2.0	F	48	Yes	<30	Nil
Wambo Road[5]	20/09/2022 00:28	2.8	E	48	Yes	29	Nil

Notes:
1. Noise criteria apply during all meteorological conditions except the following: during periods of rain or hail; average wind speed at microphone height exceeds 5 m/s; 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. Follow-up measurement.

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. This resulted in the application of a 2dB penalty to the site only LAeq for the measurements taken at Wambo Road on 14 September 2022. Resulting LAeq noise levels exceed the WML impact assessment criteria at Wambo Road by 1dB.

As described in **Section 8**, the Wambo Road result and MTW's response was reported to the Department of Planning and Environment.

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 2022

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	14/09/2022 23:34	31	Yes	No	No	NA	No	NA	Nil
Bulga Village	14/09/2022 22:19	34	No	NA	NA	NA	NA	NA	Nil
Gouldsville	14/09/2022 21:36	<25	No	NA	NA	NA	NA	NA	Nil
Inlet Rd	14/09/2022 21:49	33	No	NA	NA	NA	NA	NA	Nil
Inlet Rd West	14/09/2022 21:21	34	No	NA	NA	NA	NA	NA	Nil
Long Point	14/09/2022 21:09	IA	No	NA	NA	NA	NA	NA	Nil
South Bulga	15/09/2022 0:01	IA	Yes	No	No	NA	No	NA	Nil
Wambo Road	14/09/2022 22:45	37	Yes	No	No	NA	Yes	**2 dB @ 80 Hz**	**2**
Wambo Road[3]	20/09/2022 00:28	IA	Yes	No	No	NA	No	NA	Nil

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

Table 10: Mount Thorley Operations Low Frequency Noise Assessment – September 2022

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	14/09/2022 23:34	35	Yes	No	No	NA	No	NA	Nil
Bulga Village	14/09/2022 22:19	35	No	NA	NA	NA	NA	NA	Nil
Gouldsville	14/09/2022 21:36	IA	No	NA	NA	NA	NA	NA	Nil
Inlet Rd	14/09/2022 21:49	36	No	NA	NA	NA	NA	NA	Nil
Inlet Rd West	14/09/2022 21:21	<30	No	NA	NA	NA	NA	NA	Nil
Long Point	14/09/2022 21:09	IA	No	NA	NA	NA	NA	NA	Nil
South Bulga	15/09/2022 0:01	33	Yes	No	No	NA	No	NA	Nil
Wambo Road	14/09/2022 22:45	<30	Yes	No	No	NA	No	NA	Nil
Wambo Road[3]	20/09/2022 0:28	<25	Yes	No	No	NA	No	NA	Nil

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

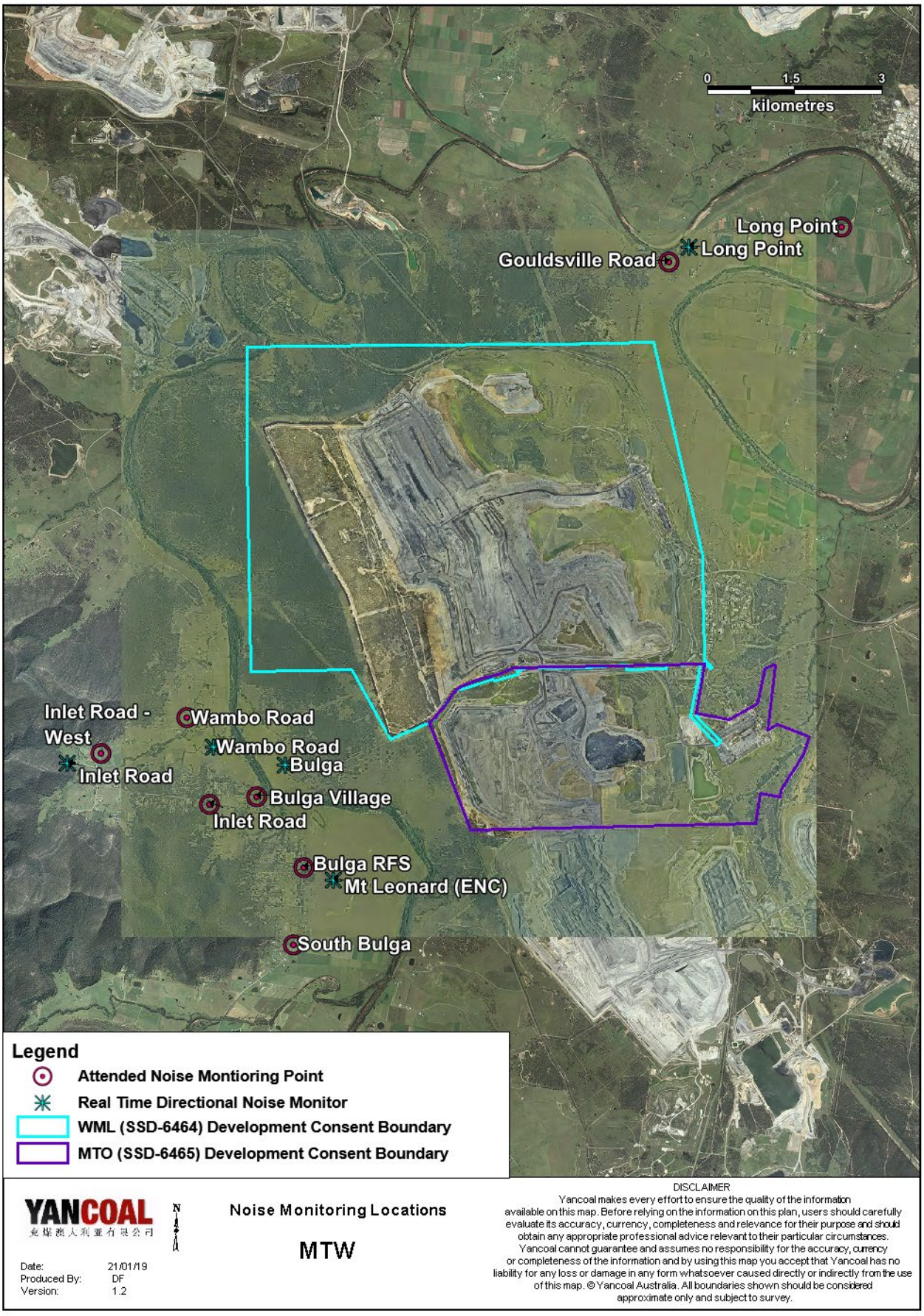

Figure 73: Noise Monitoring Location Plan

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 2022

No. of assessments	No. of assessments > trigger	No. of nights where assessments > trigger	% greater than trigger
665	15	6	2.26

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 683 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**.

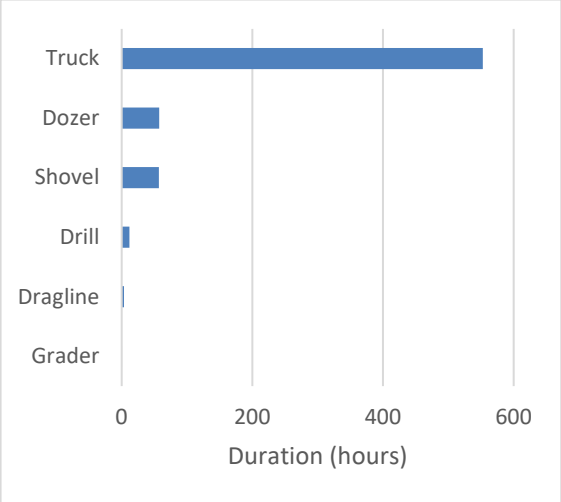

Figure 74: Operational Downtime by Equipment Type – September 2022

7.0 REHABILITATION

During September 2022, 4.6 Ha of land was released, 4.4 Ha was bulk shaped and 4.5 Ha was composted.

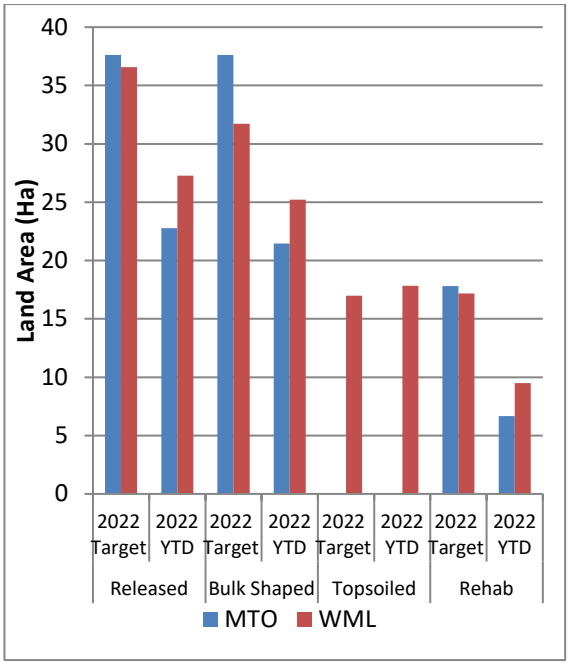

Figure 75: Rehabilitation YTD – September 2022

8.0 ENVIRONMENTAL INCIDENTS

There was one environmental incident recorded during the reporting period.

An exceedance of the WML Impact Assessment criteria was recorded at the Wambo Road monitoring location on 14 September 2022 starting at 22:45. A mining continuum from WML was audible throughout the measurement, generating a site only LAeq of 37dB. A low-frequency modifying factor of +2dB was applicable to the Wambo Road measurement, in accordance with the NPfI, resulting in an adjusted site-only LAeq of 39 dB, which exceeded the relevant criterion by 1 dB. In accordance with the approved Noise Management Plan process, on 15 September 2022 at 00:25 (after the conclusion of the entire noise monitoring survey), the noise consultant advised MTW of the potential noise exceedance at the Wambo Road location. MTW had already attended the Wambo Road area and conducted a supplementary noise monitoring reading on 15 September 2022 00:15, which was 2 dB below the relevant criterion. A further supplementary noise monitoring reading was conducted on 15 September 2022 03:10 which was also 2 dB below the relevant criterion. As noise levels were recorded at 2dB below the relevant criterion, no operational changes were therefore enacted in response to the supplementary noise monitoring events. During follow up measurement at the Wambo Road monitoring location on 20 September 2022 starting at 00:28, site only LAeq was recorded as inaudible, thereby complying with the relevant criteria.

The Department of Planning and Environment was notified in writing of the exceedance measurement on 15 September 2022. A written report was also provided to DPE on 21 September 2022. The private residences within the Wambo Road representative monitoring area were also notified of the noise exceedance.

9.0 COMPLAINTS

6 complaints were received during the reporting period. Details of these complaints are shown in **Table 12** below.

Table 12: Complaints Summary YTD

	Noise	Dust	Blast	Lighting	Other	Total
January	2	1	4	0	0	7
February	8	0	5	0	1	14
March	8	0	3	0	0	11
April	1	0	7	6	0	14
May	4	0	6	1	0	11
June	0	1	4	1	0	6
July	7	0	5	0	1	13
August	3	0	5	0	0	8
September	2	0	2	2	0	6
October						
November						
December						
Total	35	2	41	10	2	90

Appendix A: Meteorological Data

Table 13: Meteorological Data – Charlton Ridge Meteorological Station – September 2022

Date	Air Temperature		Relative Humidity		Wind Direction	Wind Speed	Rainfall
	Maximum (°C)	Minimum (°C)	Maximum (%)	Minimum (%)	Average (°)	Average (m/sec)	total (mm)
1/09/2022	22	4	100	34	200	1.6	0.2
2/09/2022	17	5	100	60	196	2.3	3.6
3/09/2022	13	2	100	73	174	5.8	6.2
4/09/2022	18	3	99	56	172	4.6	2.0
5/09/2022	19	1	100	36	182	2.2	0.2
6/09/2022	18	2	98	48	169	2.4	0.0
7/09/2022	21	1	100	47	158	2.7	0.0
8/09/2022	22	3	100	43	137	1.9	0.2
9/09/2022	22	5	100	43	184	1.8	5.2
10/09/2022	21	5	97	44	287	3.8	0.0
11/09/2022	20	3	93	42	286	3.8	0.0
12/09/2022	21	0	96	35	256	2.7	0.0
13/09/2022	20	3	92	33	199	2.1	0.0
14/09/2022	20	3	96	37	150	2.4	0.0
15/09/2022	14	3	100	80	151	1.4	17.0
16/09/2022	23	5	100	36	246	3.7	4.6
17/09/2022	24	3	92	30	273	3.4	0.0
18/09/2022	22	5	68	33	288	4.7	0.0
19/09/2022	22	4	82	32	269	3.5	0.0
20/09/2022	23	1	90	40	155	2.4	0.0
21/09/2022	19	6	100	64	189	2.2	4.4
22/09/2022	18	8	100	77	115	3.5	14.0
23/09/2022	23	6	100	63	138	2.2	0.0
24/09/2022	22	6	100	55	197	2.1	1.6
25/09/2022	23	2	100	31	242	2.4	0.2
26/09/2022	23	3	99	36	180	1.3	0.0
27/09/2022	22	5	100	45	179	1.7	2.8
28/09/2022	23	6	100	28	254	2.8	2.0
29/09/2022	22	8	100	49	233	3.8	1.6
30/09/2022	19	6	100	63	177	5.0	3.2