Monthly Environmental Monitoring Report

Yancoal Mt Thorley Warkworth

March 2021

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Revision History

Version No.	Person Responsible	Document Status	Date
1.0	**Environmental Advisor**	**Final**	**11/08/2021**

1.0 INTRODUCTION

This report has been compiled to provide a monthly summary of environmental monitoring results for Mt Thorley Warkworth (MTW). This report includes all monitoring data collected for the period 1 March to 31 March.

2.0 AIR QUALITY

2.1 Meteorological Monitoring

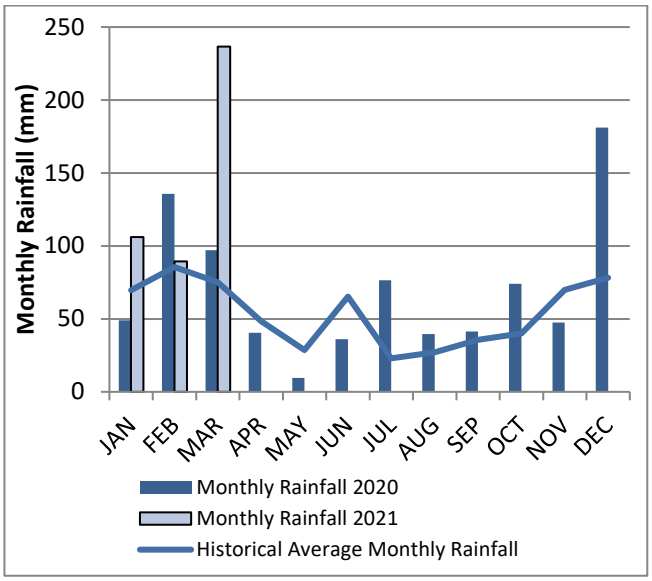
Meteorological data is collected at MTW's 'Charlton Ridge' meteorological station (refer to **Figure 3**: Air Quality Monitoring Locations).

2.1.1 Rainfall

Rainfall for the period is summarised in **Table 1**, the year-to-date trend and historical trend are shown in **Figure 1**.

Table 1: Monthly Rainfall MTW

2021	Monthly Rainfall (mm)	Cumulative Rainfall (mm)
March	236.6	432.0



Note: The historical average monthly rainfall is calculated from 2007 to 2020 monthly totals

2.1.2 Wind Speed and Direction

Winds from the south east were dominant throughout the reporting period as shown in **Figure 2**.

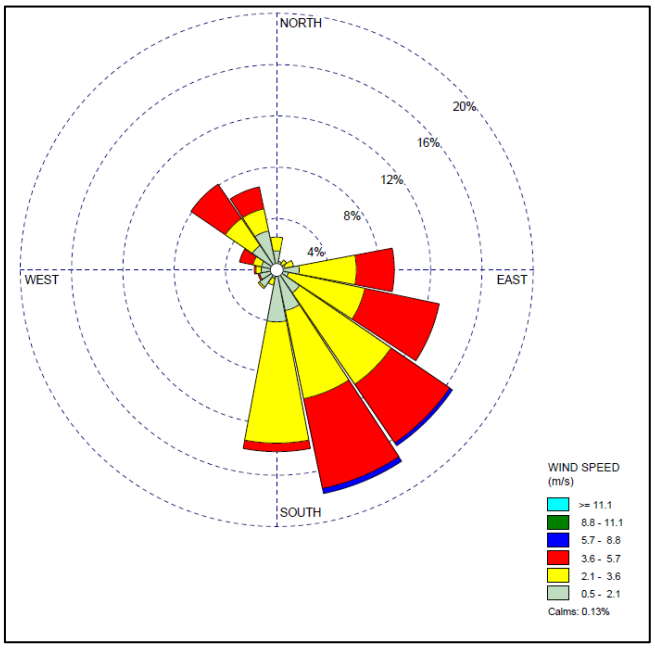


Figure 2: Charlton Ridge Wind Rose – March 2021

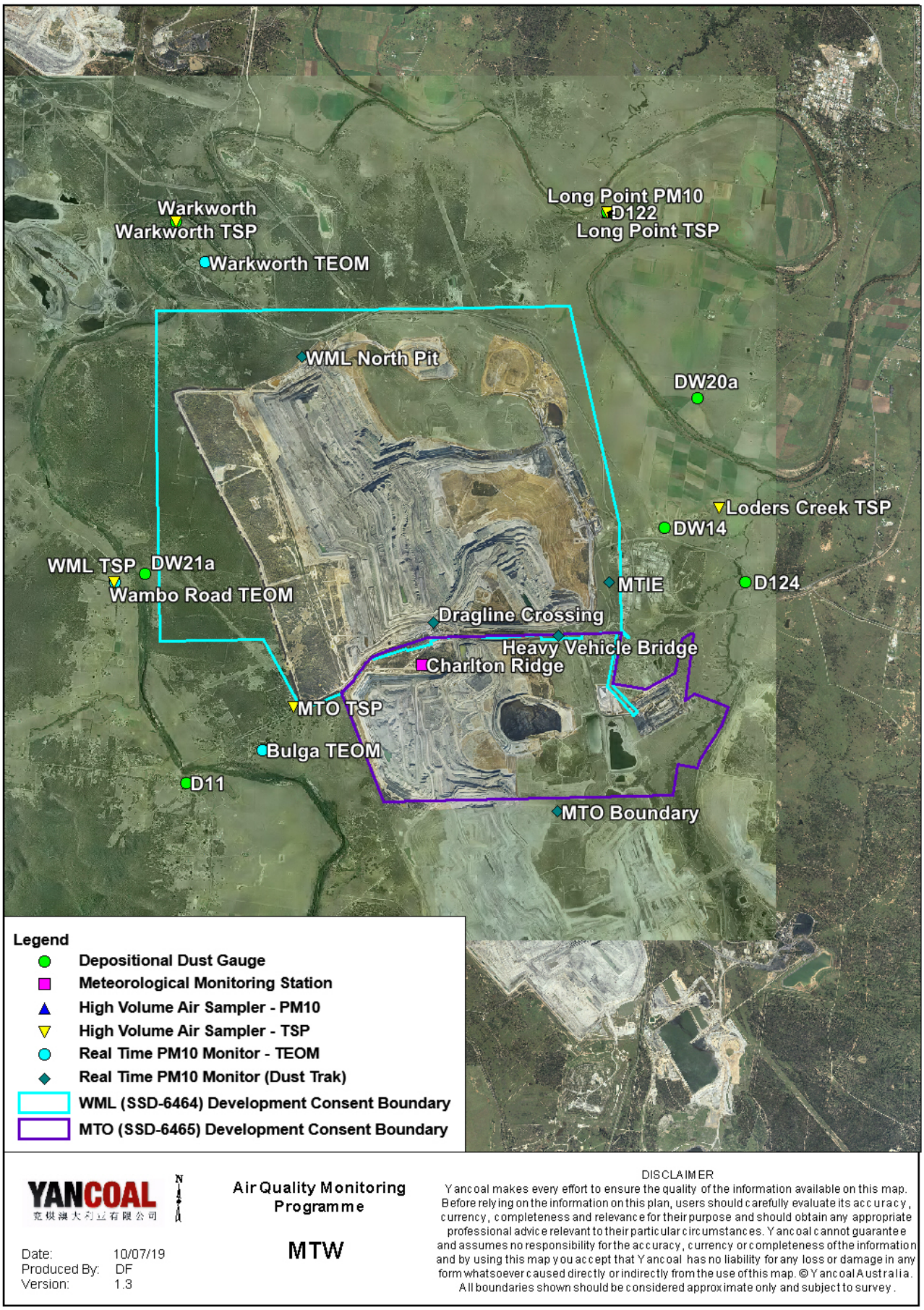


Figure 3: Air Quality Monitoring Locations

2.2 Depositional Dust

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

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.

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.

An annual assessment of MTW's compliance with the Long-Term Impact Assessment Criteria will be provided in the 2021 Annual Review Report.

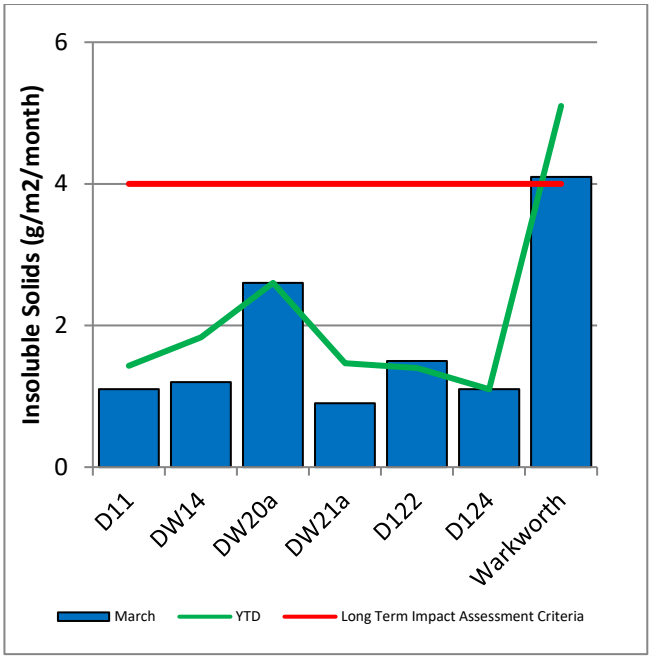


Figure 4: Depositional Dust – March 2021

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 the monitoring station against the short-term impact assessment criteria of 50µg/m^3.

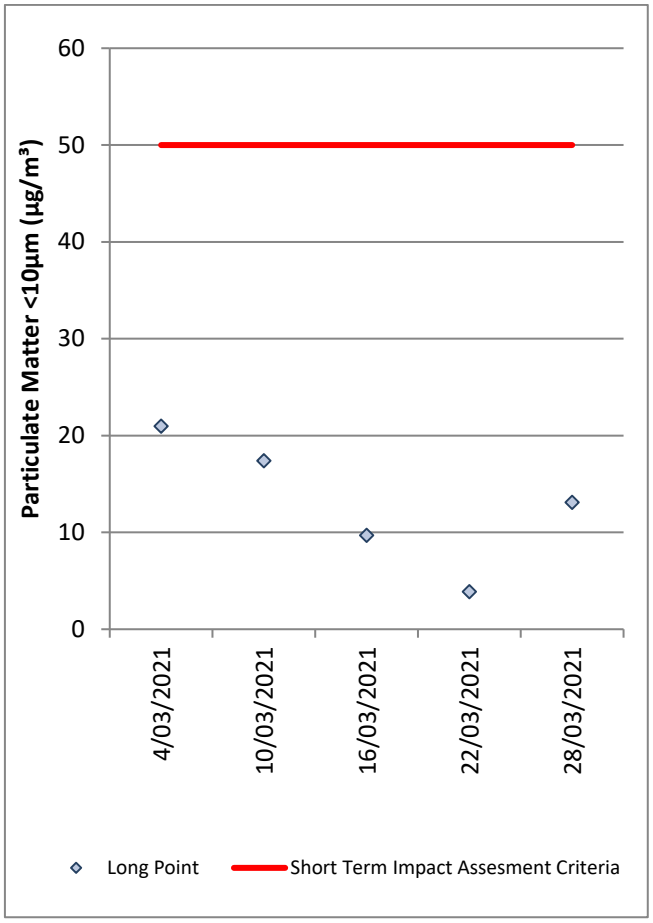


Figure 5: Individual PM_{10} Results – March 2021

Figure 6 shows the annual average PM_{10} results against the long-term impact assessment criteria.

An annual assessment of MTW's compliance with the Long-Term Impact Assessment Criteria will be provided in the 2021 Annual Review Report.

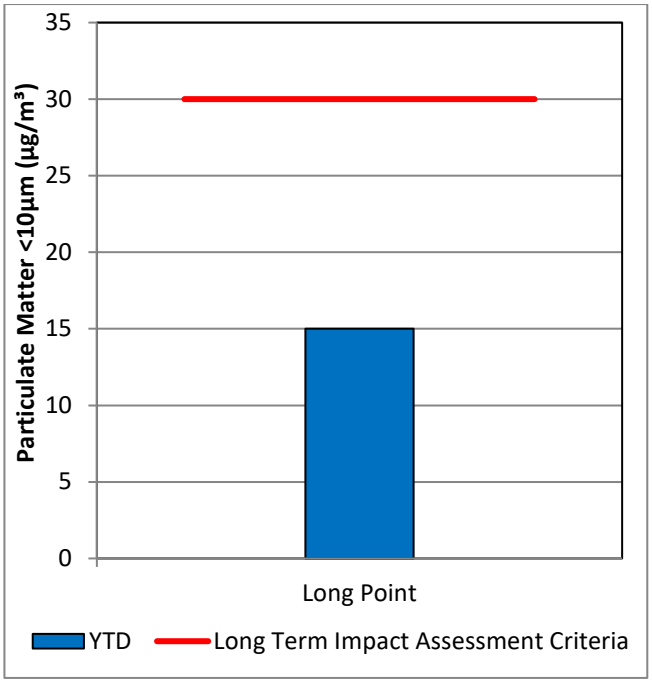


Figure 6: Annual Average PM_{10} – March 2021

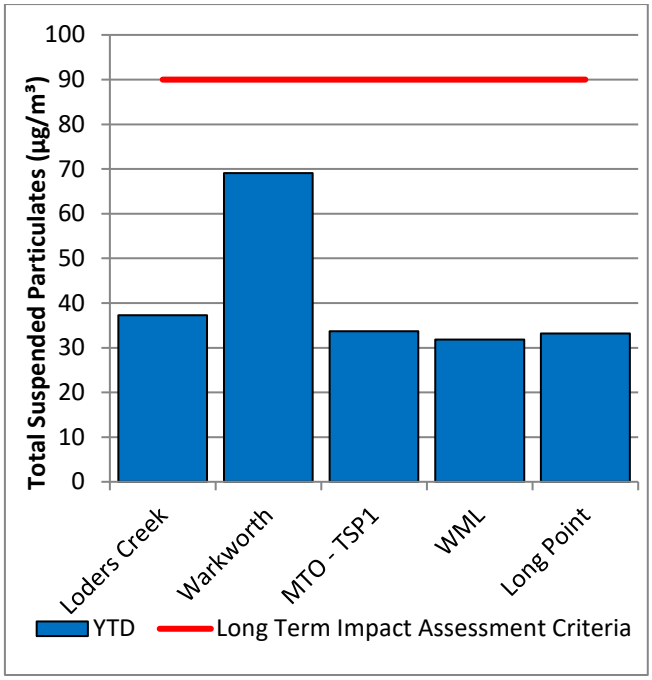


Figure 7: Annual Average Total Suspended Particulates – March 2021

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 annual assessment of MTW's compliance with the Long-Term Impact Assessment Criteria will be provided in the 2021 Annual Review Report.

2.3.3 Real Time PM_{10} Results

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

Results 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.

Data was not available on 2, 3 and 5 March 2021 from the Warkworth TEOM and 14 and 15 March 2021 from the Wambo Road TEOM due to equipment issues.

2.3.4 Real Time Alarms for Air Quality

During **March**, the real-time monitoring system generated 38 automated air quality related alerts, including 9 alerts for adverse meteorological conditions and 29 alerts for elevated PM10 levels.

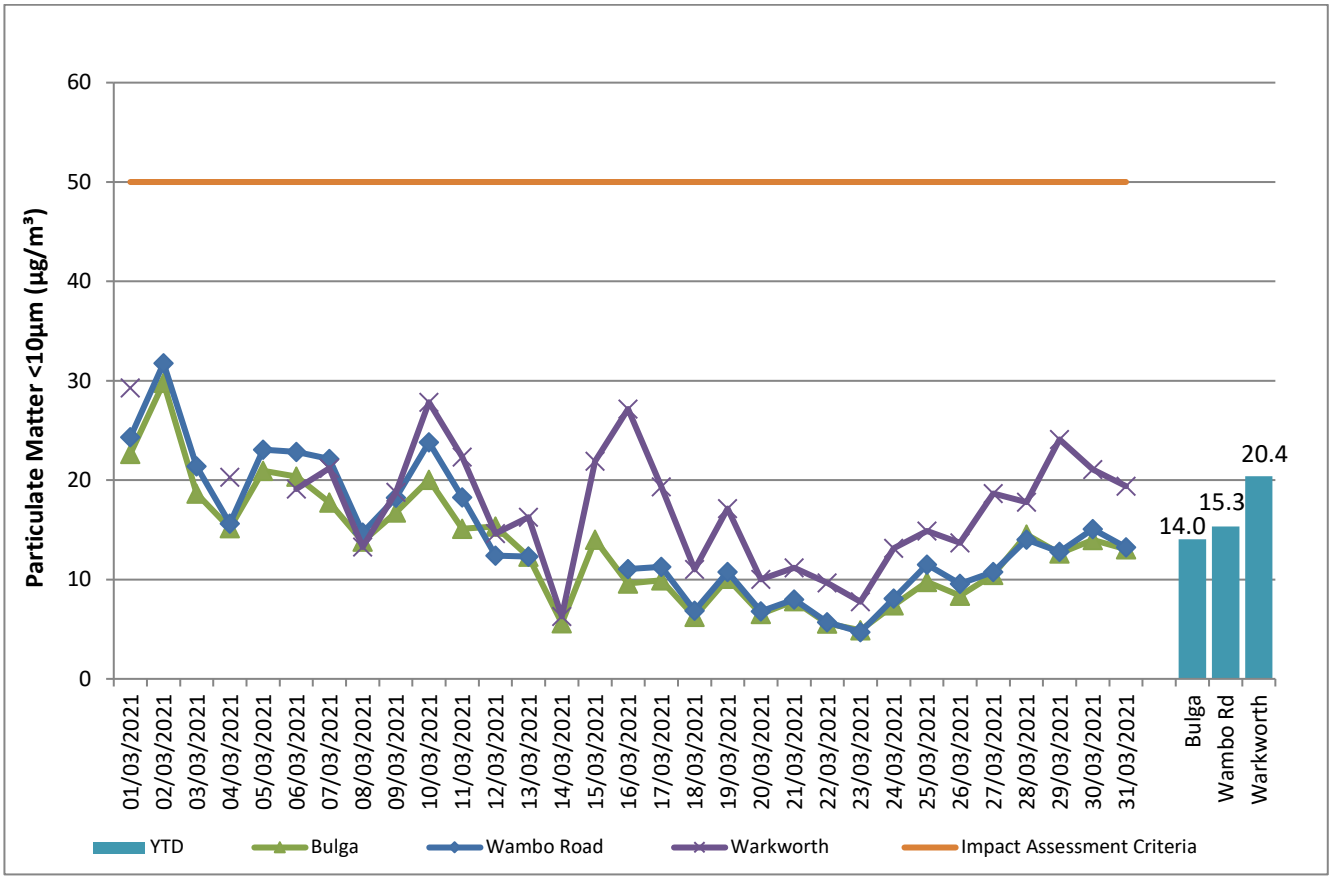


Figure 8: Real Time PM10 24hr average and Year-to-date average – March 2021

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 monitor the potential impact of mining. Other Hunter River tributaries are also monitored.

3.1.1 Surface Water Monitoring Results

Figure 9 to **Figure 11** show the long-term surface water trend (2018 – current) within MTW mine dams. **Figure 12** to **Figure 14** show the long-term surface water trend (2018 - current) in surrounding watercourses.

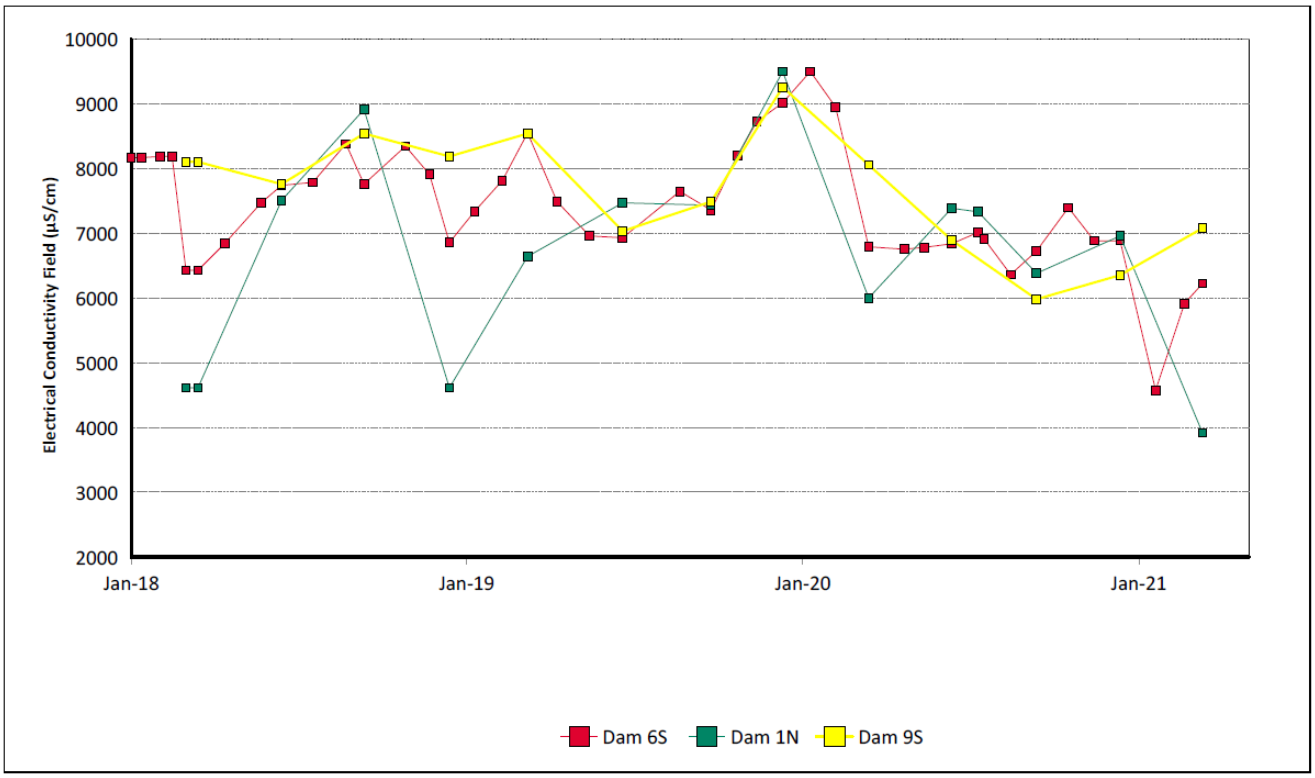


Figure 9: Site Dams Electrical Conductivity Trend – March 2021

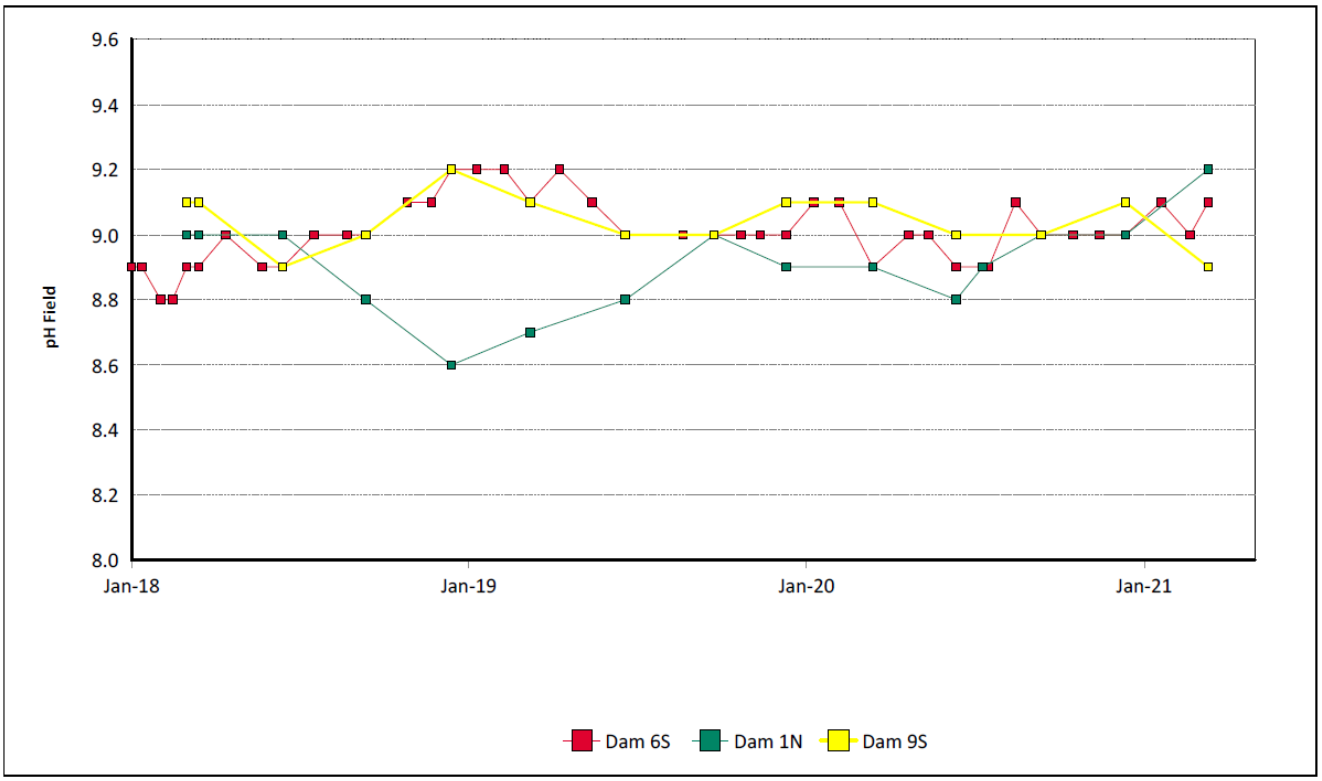


Figure 10: Site Dams pH Trend – March 2021

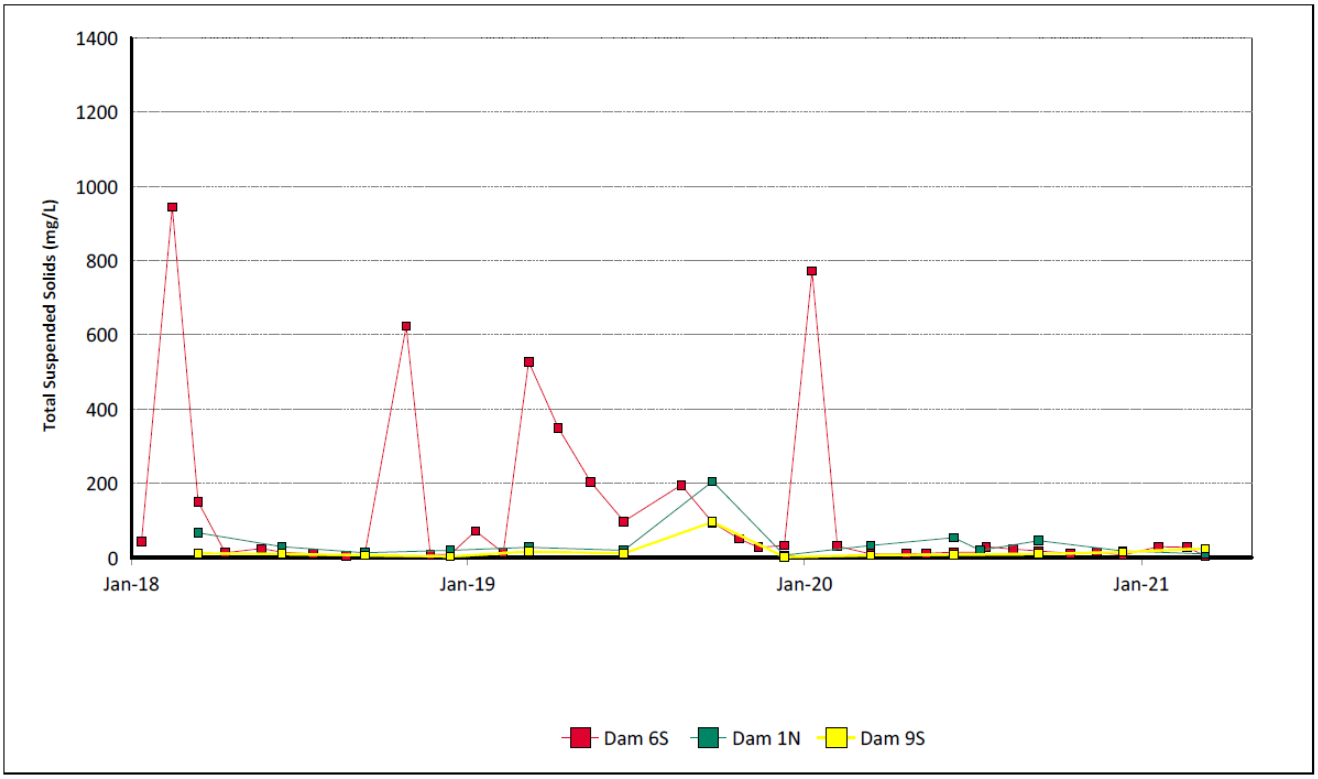
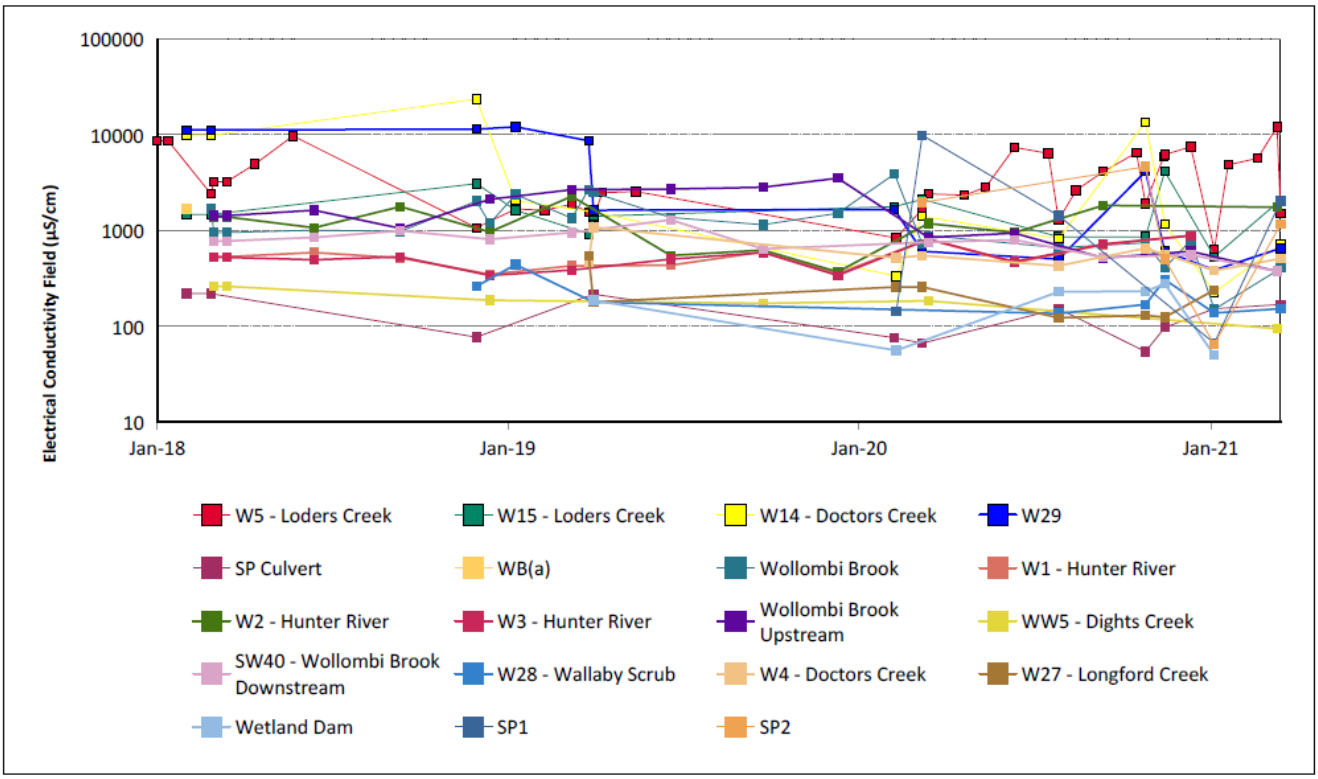
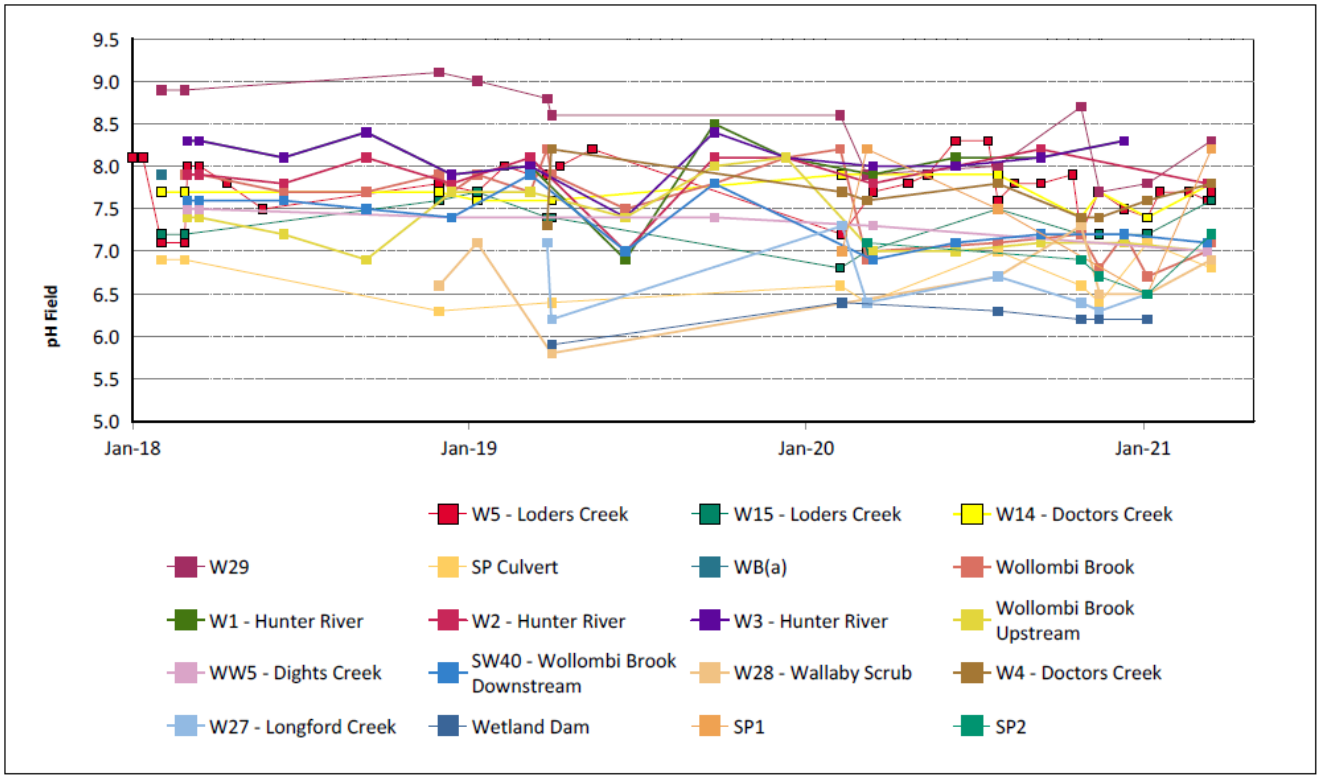


Figure 11: Site Dams Total Suspended Solids Trend – March 2021



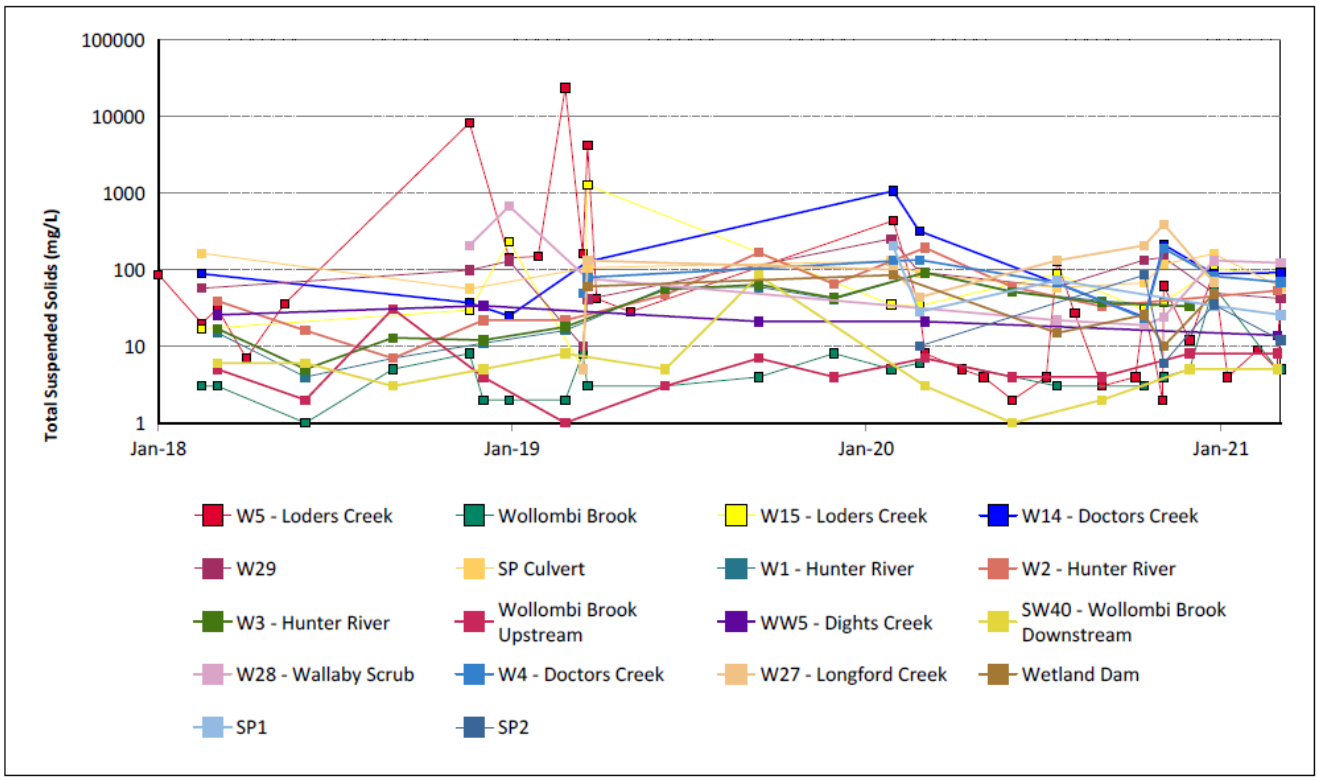
Note: Missing data indicates that there was insufficient water to take a sample, or that there was no safe access.

Figure 12: Watercourse Electrical Conductivity Trend – March 2021



Note: Missing data indicates that there was insufficient water to take a sample, or that there was no safe access.

Figure 13: Watercourse pH Trend – March 2021



Note: Missing data indicates that there was insufficient water to take a sample, or that there was no safe access.

Figure 14: Watercourse Total Suspended Solids Trend – March 2021

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 –March YTD 2021

Site	Date	Trigger Limit Breached	Action Taken in Response
SP1	05/01/2021	pH –5th Percentile	Watching Brief*
W5	05/01/2021	pH –5th Percentile	Watching Brief*
W15	05/01/2021	pH –5th Percentile	Cyclical lower-pH measurements are consistently seen in the historical trend for this Loders Creek monitoring location. Monitoring results back within trigger limits for March 2021 sample round. No follow up required.
W29	05/01/2021	pH –5th Percentile	Watching Brief*
W2	11/03/2021	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. Note: Result is not considered to be a valid representation given that there was no flow at the time of sampling.
W4	05/01/2021	TSS – 50mg/L (ANZECC criteria)	Watching Brief*. Elevated TSS associated with high runoff due to rainfall event (79.4mm on 4 January). Consistent with and higher than upstream sample W29 (which is closer to MTW); no mine site sources of sediment identified (no dam overtopping and/or site discharges recorded during the event). No follow up required.
W4	15/03/2021	TSS – 50mg/L (ANZECC criteria)	Watching Brief*. Elevated TSS associated with rainfall event (36.2mm on 14 March) and is considered related to sampling from slow flowing water. Consistent with and higher than upstream sample W29 (which is closer to MTW); no mine site sources of sediment identified (no dam overtopping and/or site discharges recorded during the event). No follow up required.

Site	Date	Trigger Limit Breached	Action Taken in Response
W5	05/01/2021	TSS – 50mg/L (ANZECC criteria)	Elevated TSS associated with high runoff due to rainfall event (79.4mm on 4 January), resulting in mobilisation of sediment in Loders Creek. No MTW site sources of sediment identified. No follow up required.
W5	15/03/2021	TSS – 50mg/L (ANZECC criteria)	Elevated TSS associated with rainfall event (36.2mm on 14 March), resulting in mobilisation of sediment in Loders Creek. No MTW site sources of sediment identified. No follow up required.
W14	05/01/2021	TSS – 50mg/L (ANZECC criteria)	Elevated TSS associated with high runoff due to rainfall event (79.4mm on 4 January). No mine site sources of sediment identified. Upstream sample W29 (which is closer to MTW) indicates source of sediment may be partially attributable to runoff from downstream farming properties. No follow up required.
W14	15/03/2021	TSS – 50mg/L (ANZECC criteria)	Elevated TSS associated with rainfall event (36.2mm on 14 March), resulting in mobilisation of sediment in Doctors Creek. No mine site sources of sediment identified. Upstream sample W29 (which is closer to MTW) indicates source of sediment may be partially attributable to runoff from downstream farming properties. No follow up required.
W15	05/01/2021	TSS – 50mg/L (ANZECC criteria)	Investigation undertaken. Note: Elevated TSS results most likely attributable to high runoff due to rainfall event (79.4mm on 4 January), resulting in mobilisation of sediment in Loders Creek. In addition, TSS results were potentially affected by turbid water associated with the overtopping of one mine water dam at MTO and several MTCL dams/catchment basins which were reported to EPA and DPIE.
W15	15/03/2021	TSS – 50mg/L (ANZECC criteria)	Elevated TSS associated with rainfall event (36.2mm on 14 March), resulting in mobilisation of sediment in Loders Creek. No mine site sources of sediment identified (no dam overtopping and/or site discharges recorded during the event). No follow up required.

Site	Date	Trigger Limit Breached	Action Taken in Response
W27	05/01/2021	TSS – 50mg/L (ANZECC criteria)	Investigation undertaken. Note: Elevated TSS results most likely attributable to high runoff due to rainfall event (79.4mm on 4 January). In addition, TSS results were potentially affected by turbid water associated with the overtopping of an MTW mine water dam as a result of the rainfall event which was reported to EPA and DPIE.
W28	05/01/2021	TSS – 50mg/L (ANZECC criteria)	Investigation undertaken. Note: Elevated TSS results most likely attributable to high runoff due to rainfall event (79.4mm on 4 January). In addition, TSS results were potentially affected by turbid water associated with the overtopping of MTW sediment dams as a result of greater than design rainfall, which were reported to EPA and DPIE.
W28	15/03/2021	TSS – 50mg/L (ANZECC criteria)	Elevated TSS associated with rainfall event (36.2mm on 14 March). No mine site sources of sediment identified (no dam overtopping and/or site discharges recorded during the event). No follow up required.

* = Watching brief established pending outcomes of subsequent monitoring events.

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 period 631.1 ML of mine water was discharged from Dam 9S (MTO) in accordance with HRSTS requirements.

Note: Reported discharge volume data is based on HRSTS 24-hour discharge block totals, at the discharge point. The last discharge block for this March report ended at 5pm on 1 April 2021.

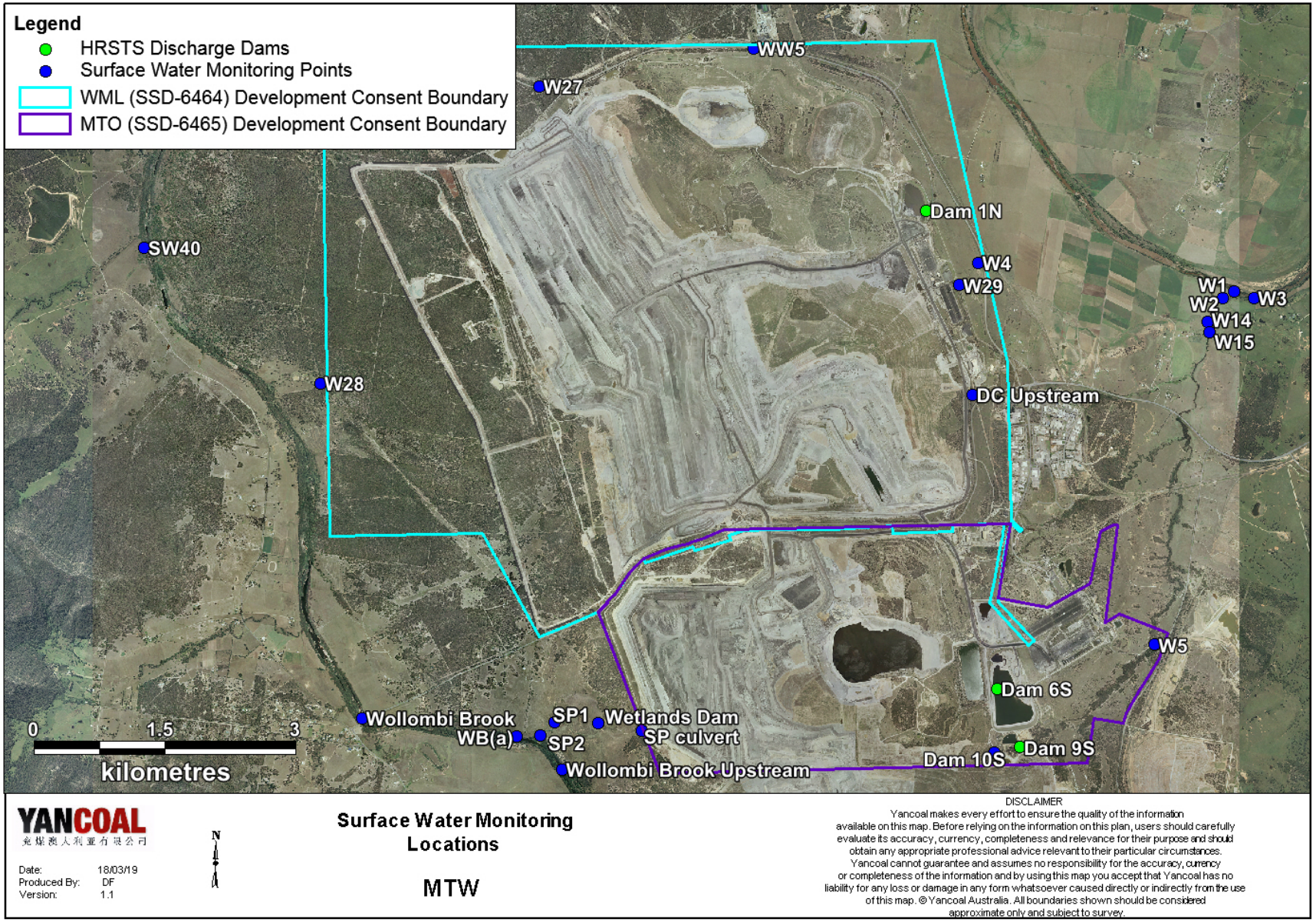
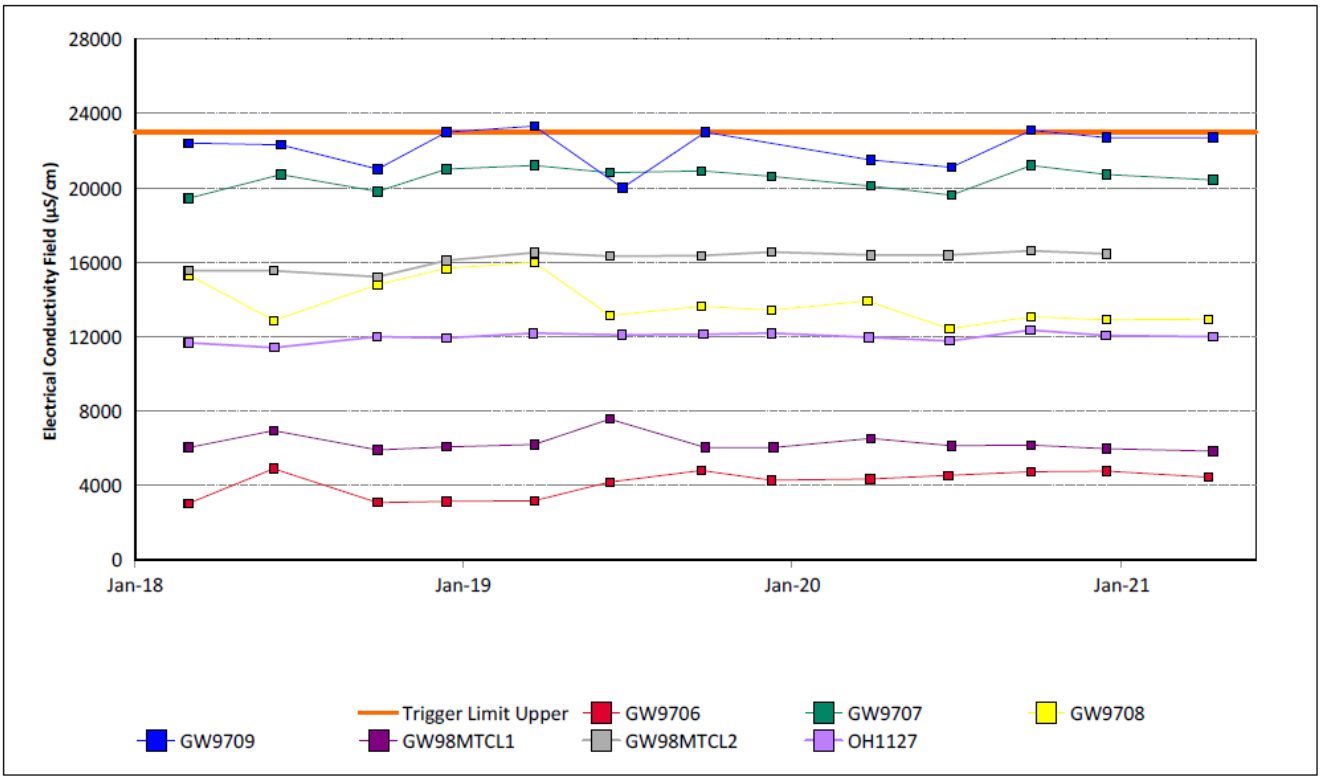


Figure 15: Surface Water Monitoring Location Plan

3.3 Groundwater Monitoring

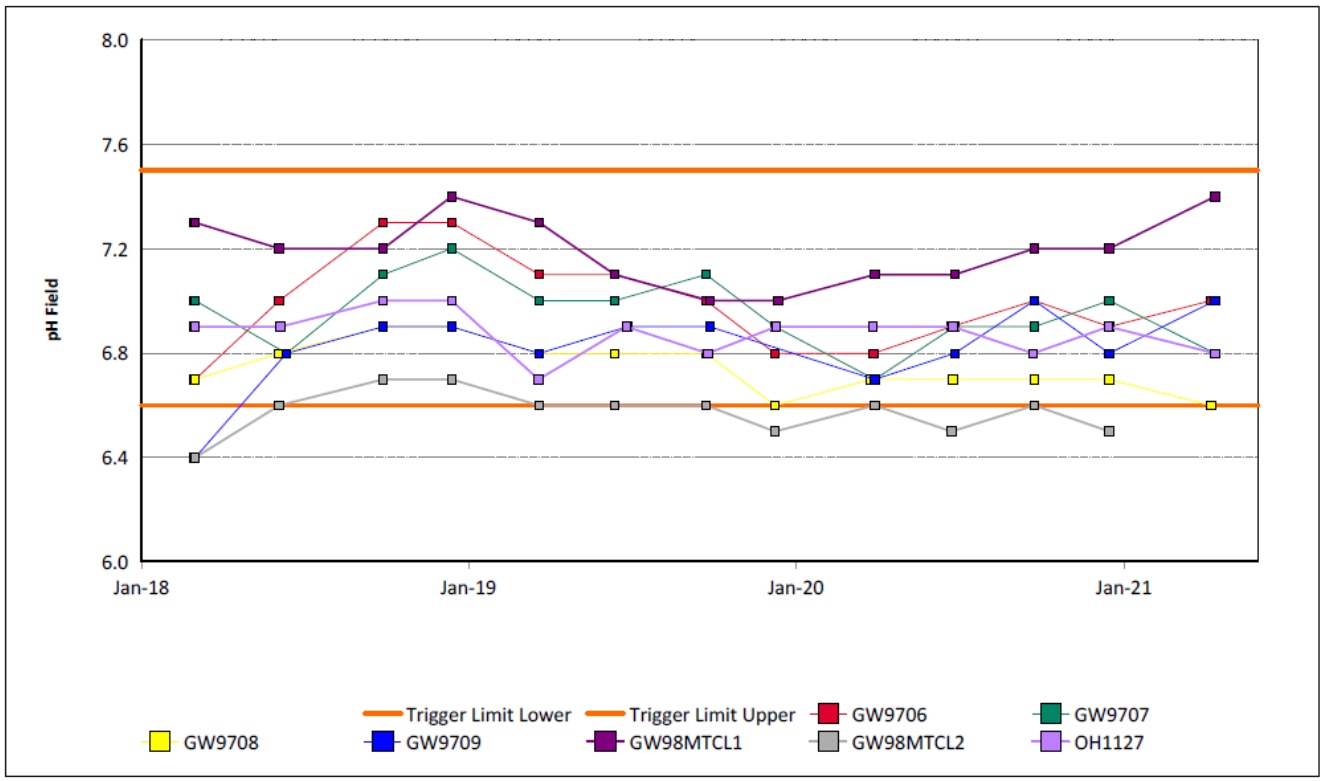
Groundwater monitoring is undertaken on a quarterly basis in accordance with the MTW Groundwater Monitoring Programme.

Figure 16 to **Figure 61** show the long-term water quality trends (2018 – current) for groundwater bores monitored at MTW.



Note: Missing data indicates that there was insufficient water to take a sample.

Figure 16: Bayswater Seam Electrical Conductivity Trend – March 2021



Note: Missing data indicates that there was insufficient water to take a sample.

Figure 17: Bayswater Seam pH Trend – March 2021

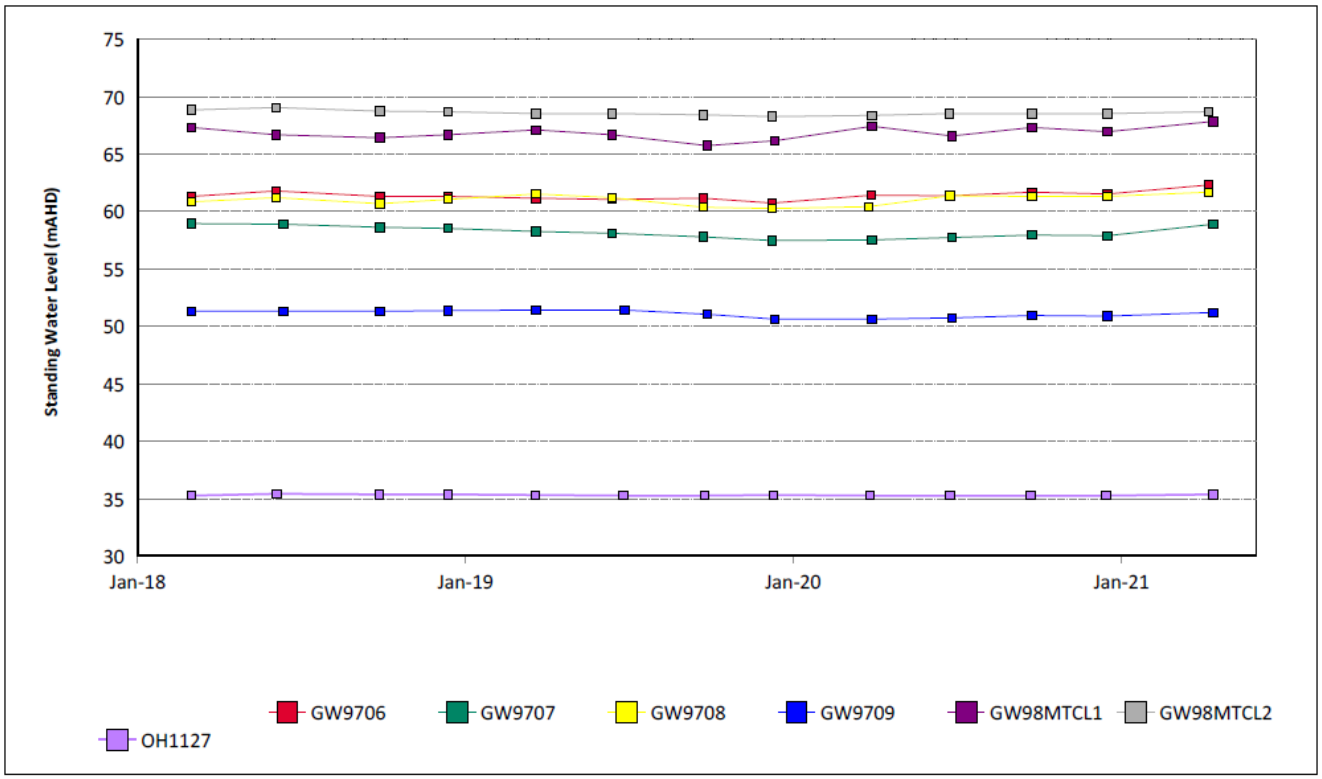


Figure 18: Bayswater Seam Standing Water Level Trend – March 2021

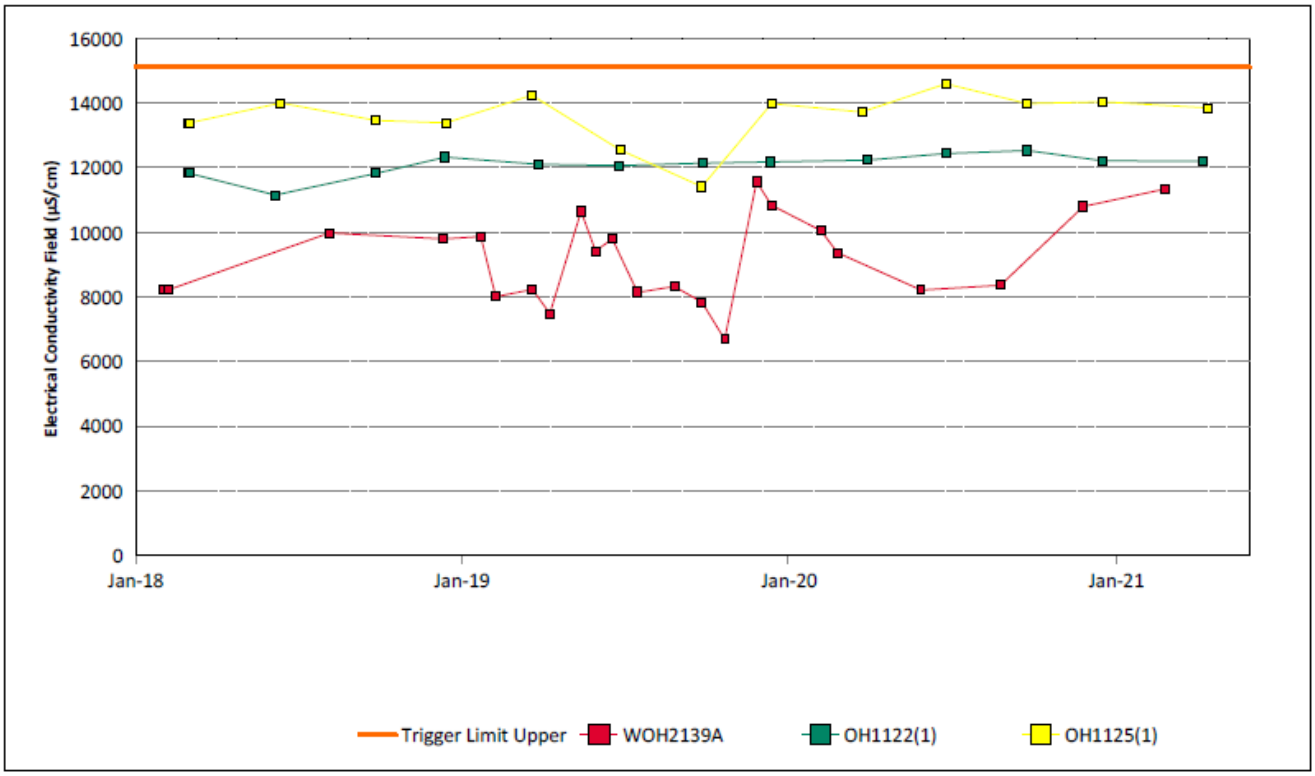


Figure 19: Blakefield Seam Electrical Conductivity Trend – March 2021

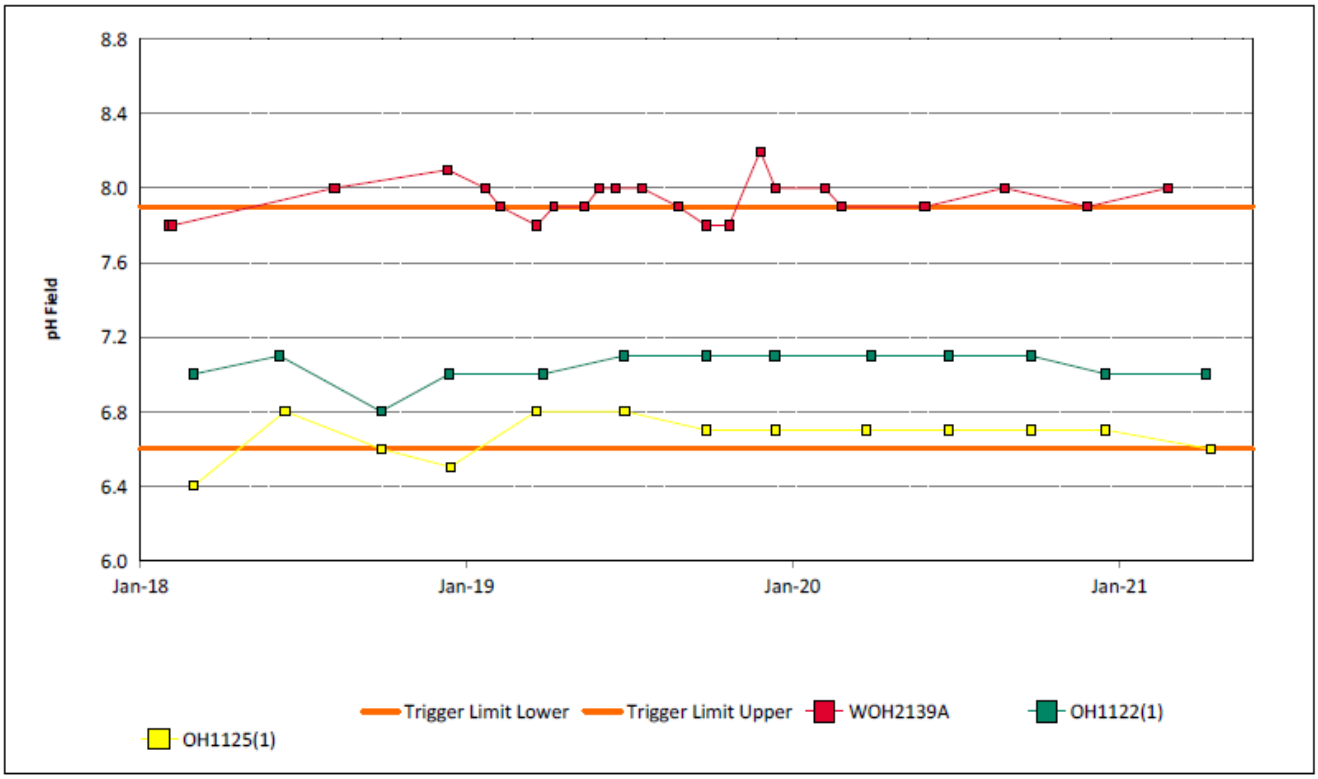


Figure 20: Blakefield Seam pH Trend – March 2021

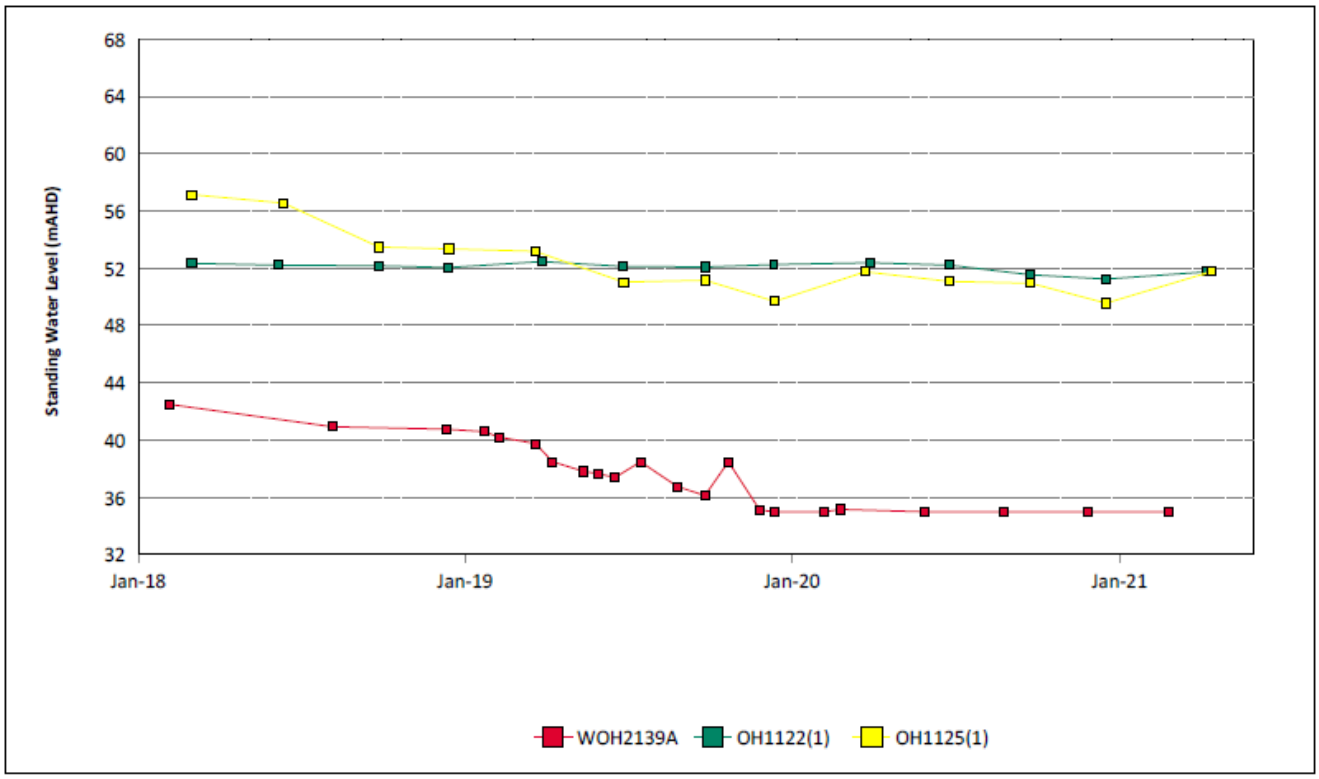


Figure 21: Blakefield Seam Standing Water Level Trend – March 2021

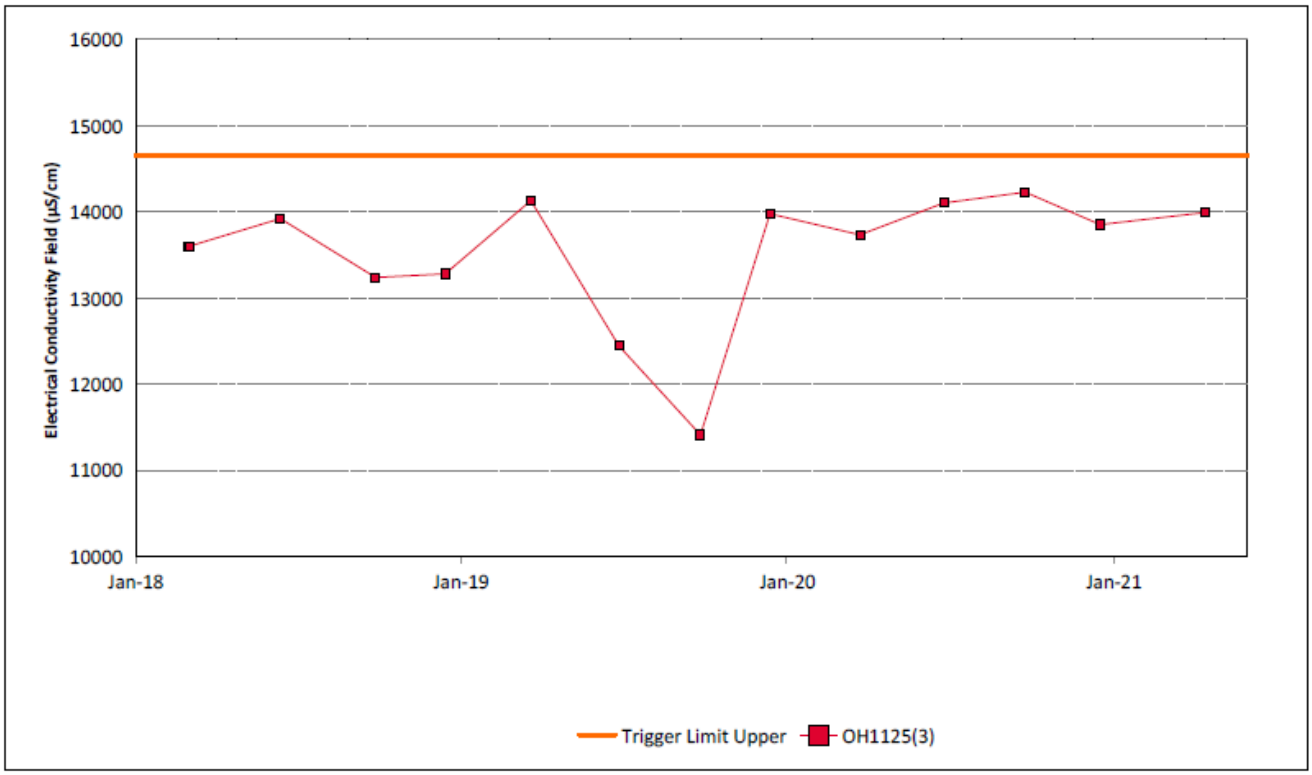


Figure 22: Bowfield Seam Electrical Conductivity Trend – March 2021

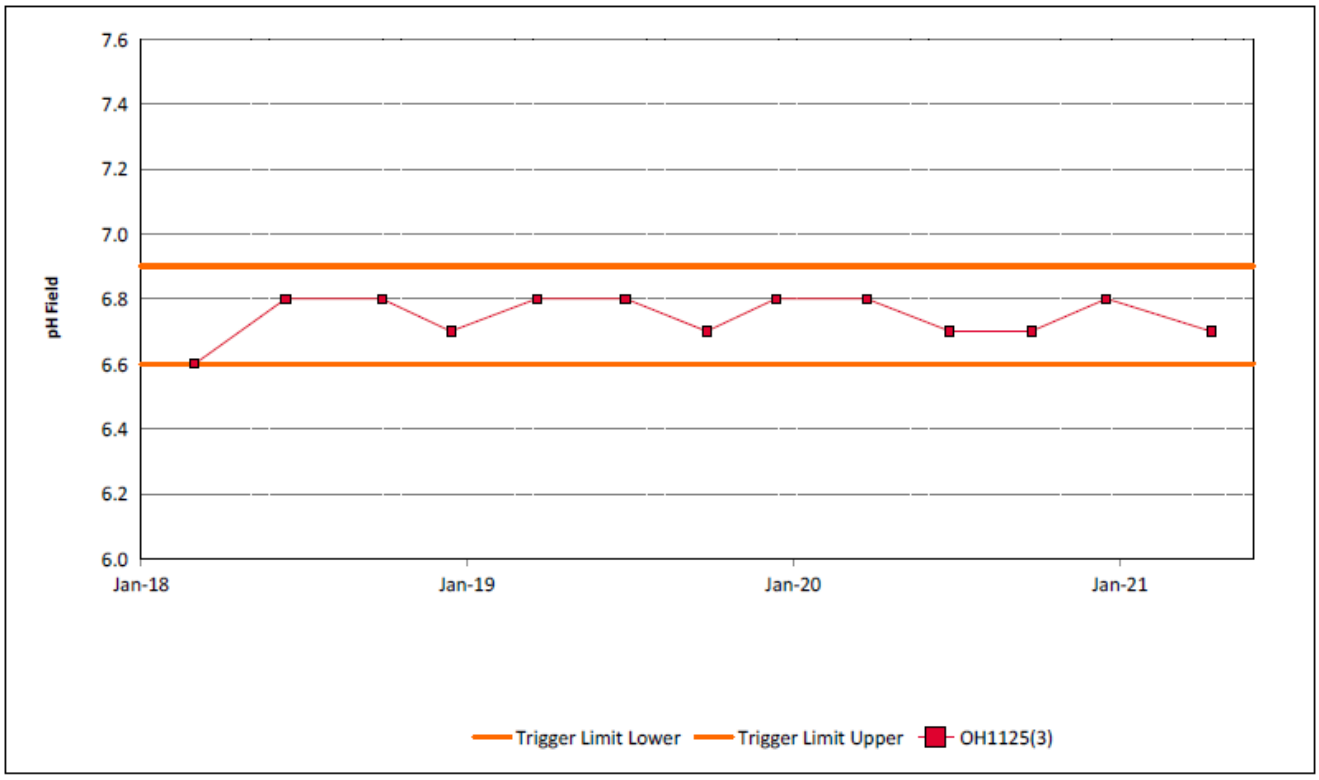


Figure 23: Bowfield Seam pH Trend – March 2021

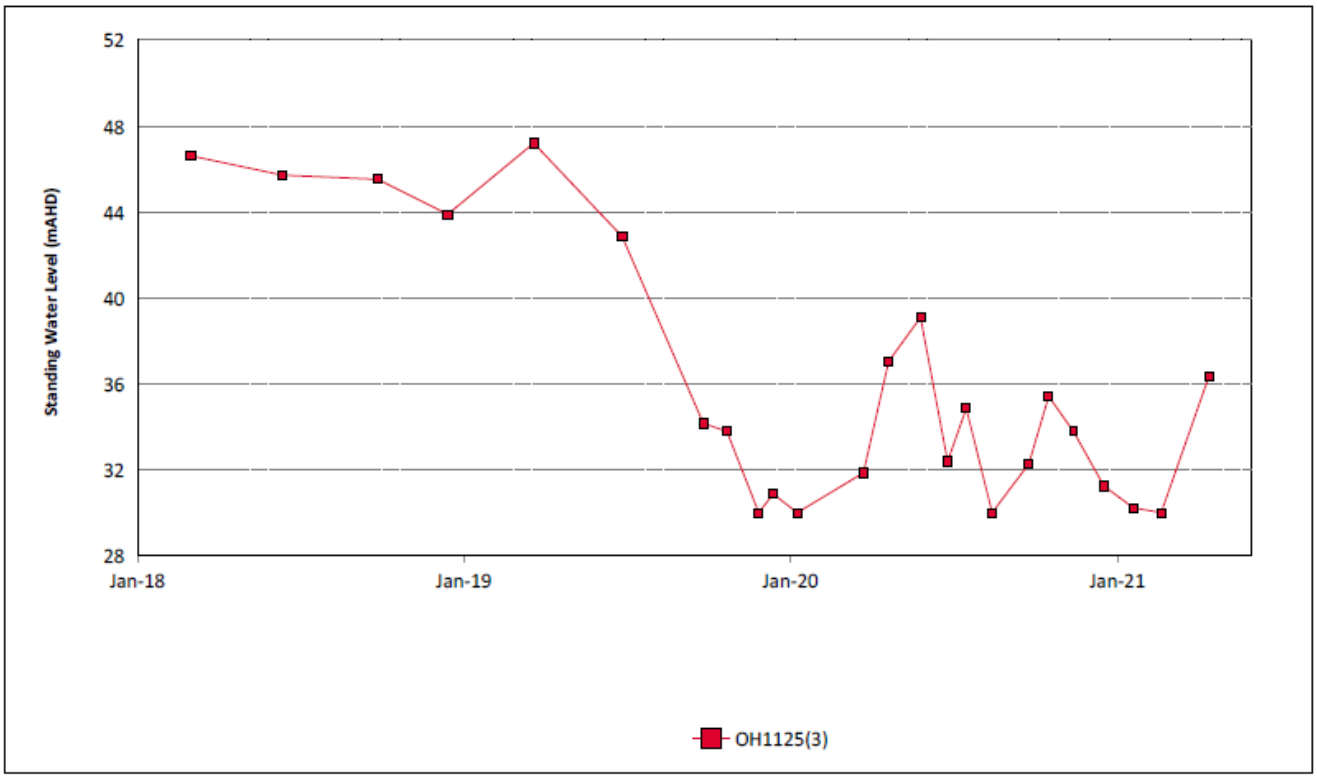


Figure 24: Bowfield Seam Standing Water Level Trend – March 2021

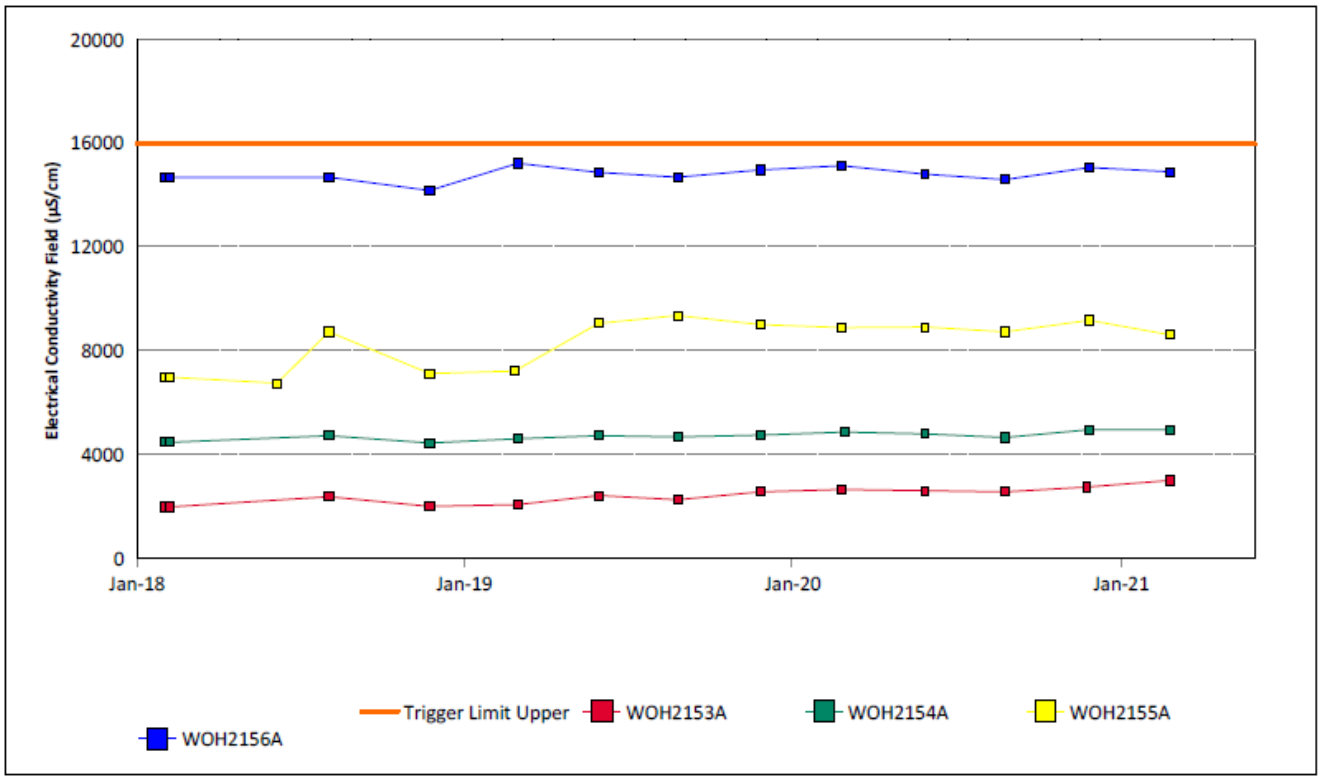


Figure 25: Redbank Seam Electrical Conductivity Trend – March 2021

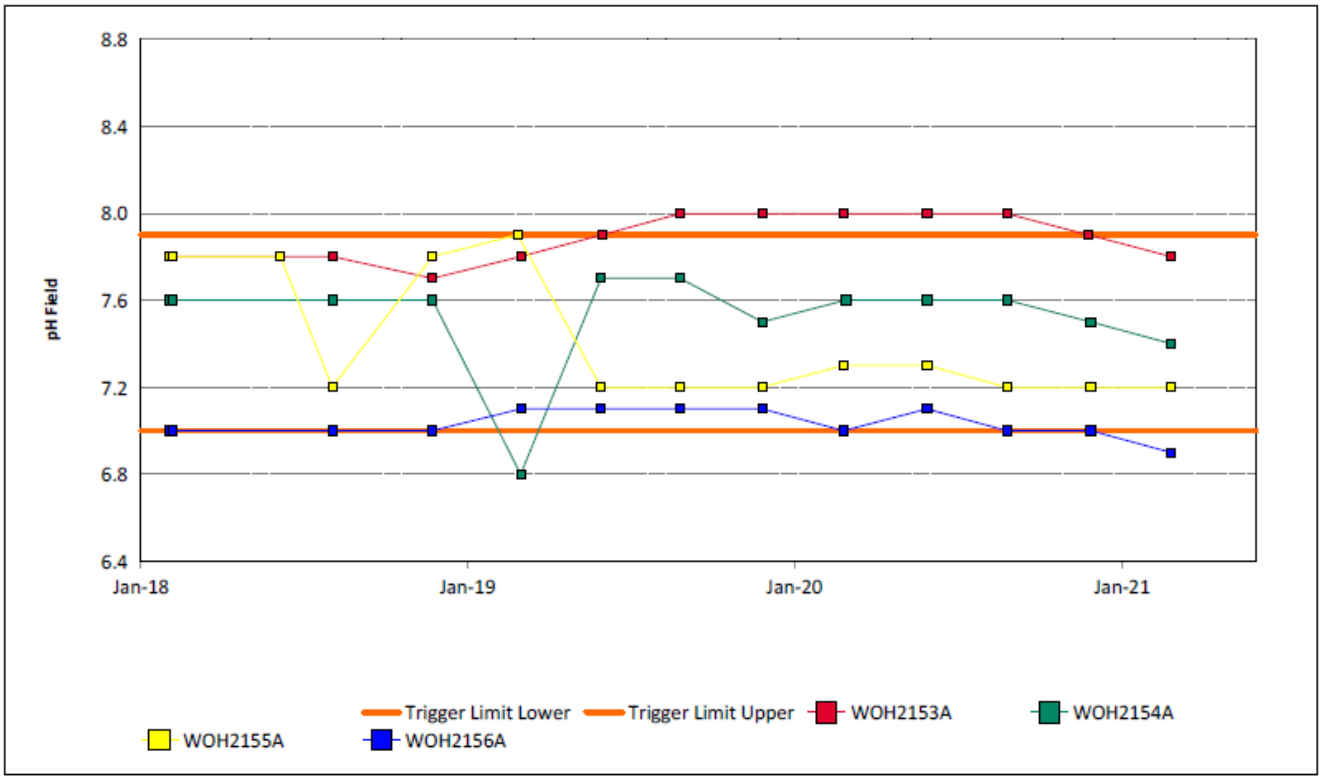


Figure 26: Redbank Seam pH Trend – March 2021

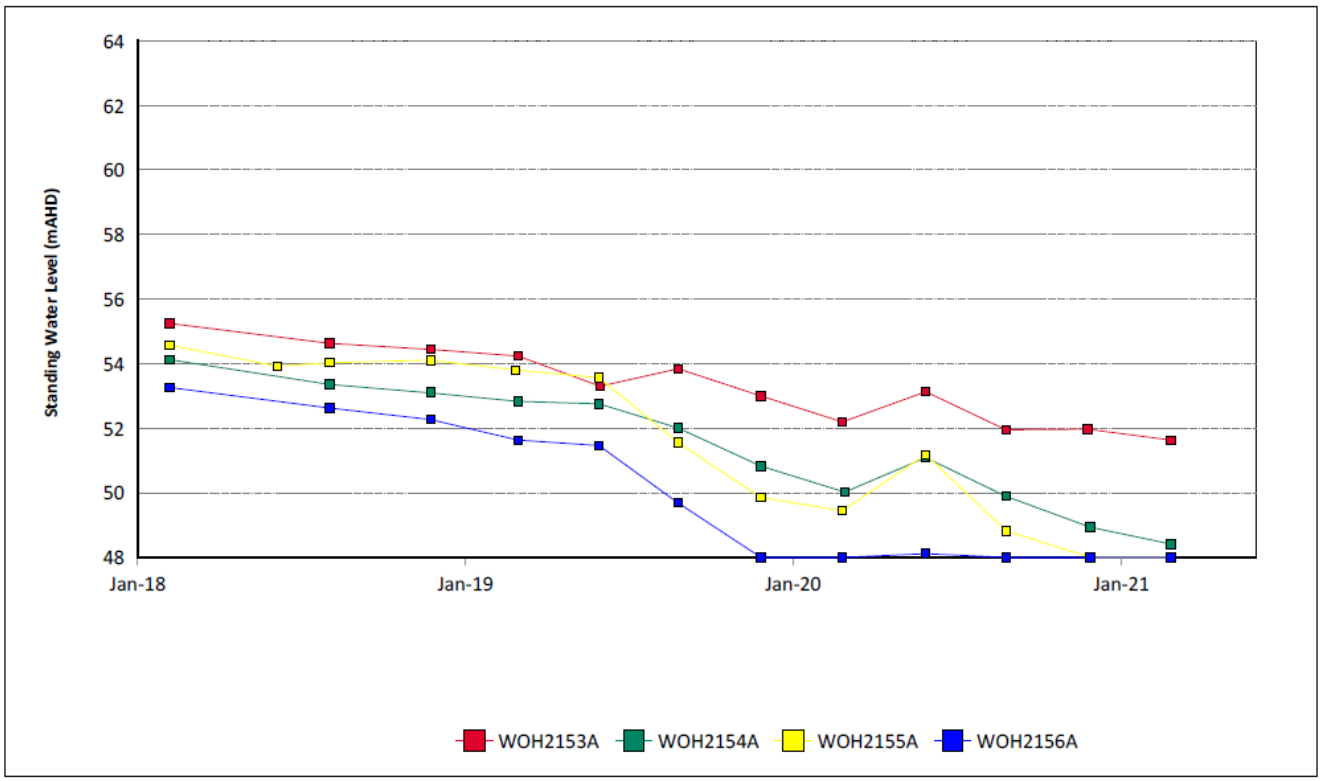


Figure 27: Redbank Seam Standing Water Level Trend – March 2021

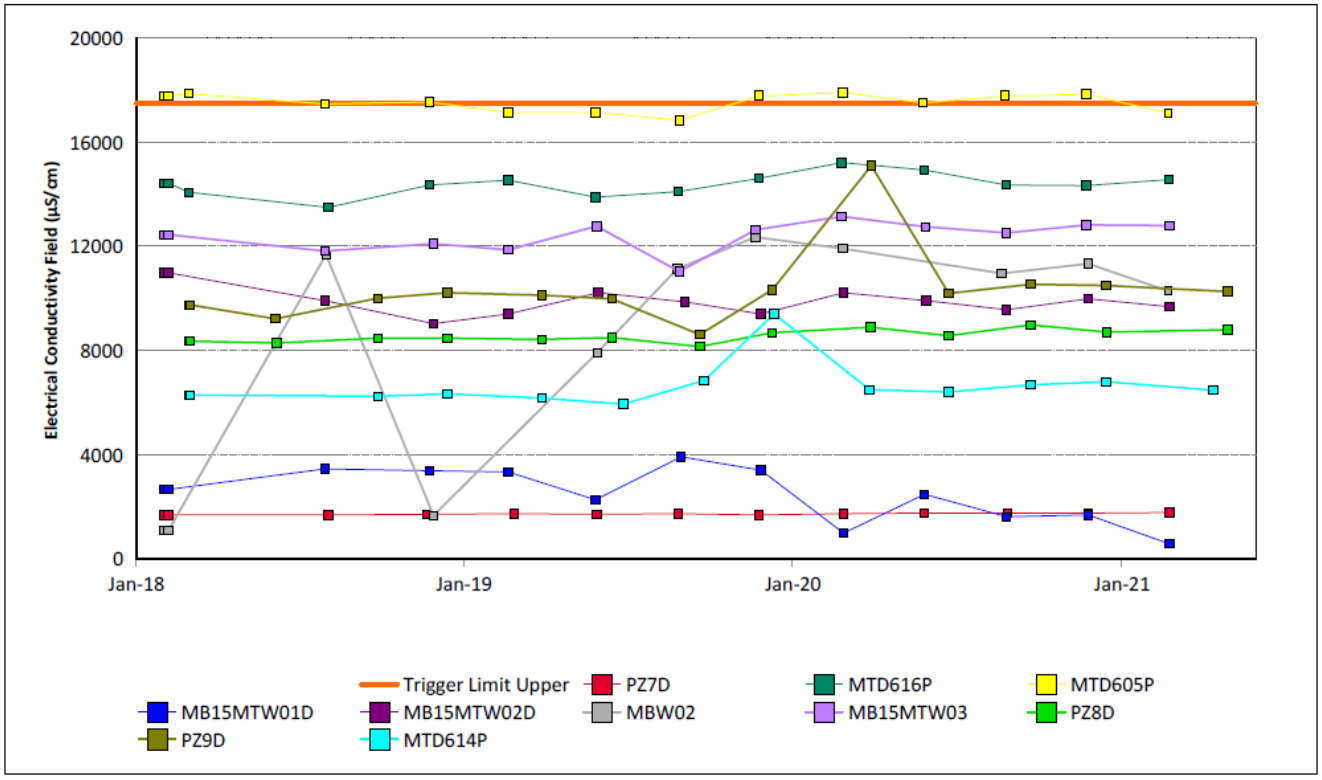


Figure 28: Shallow Overburden Electrical Conductivity Trend – March 2021

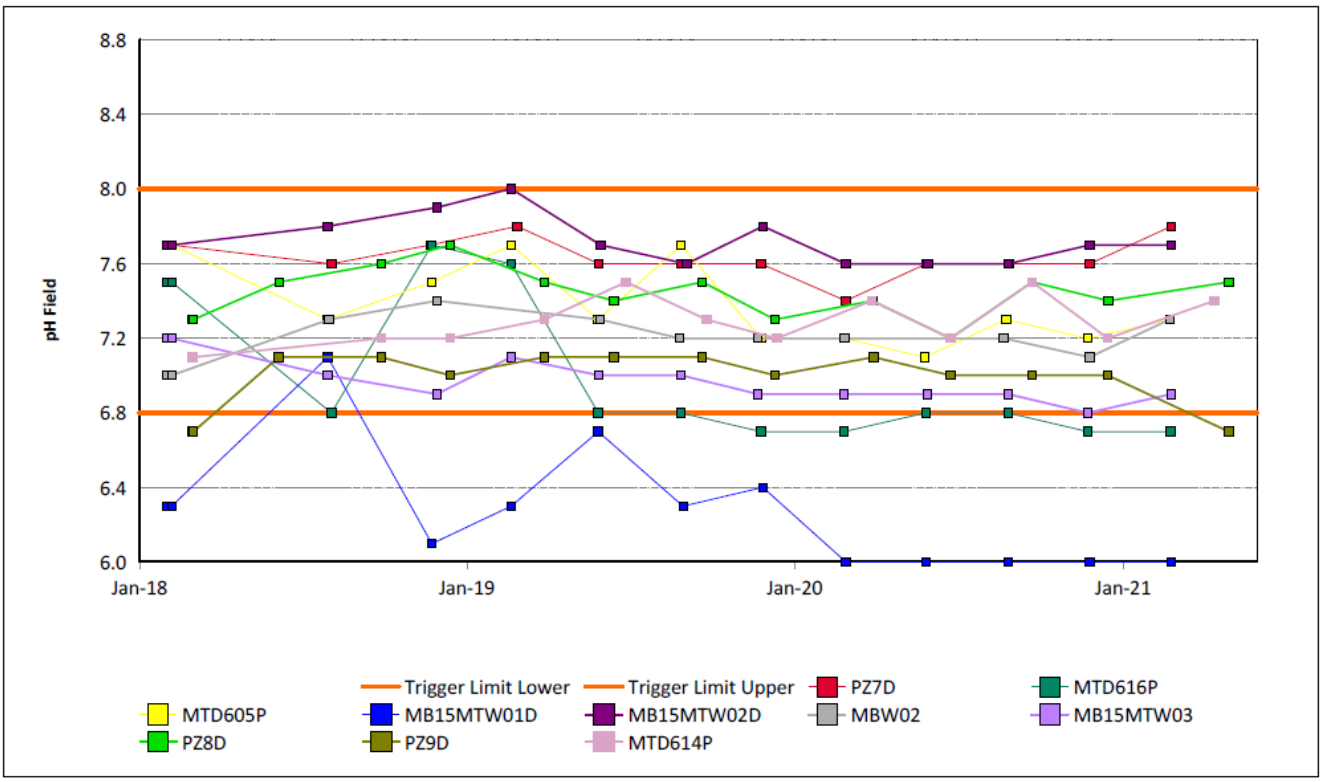


Figure 29: Shallow Overburden pH Trend – March 2021

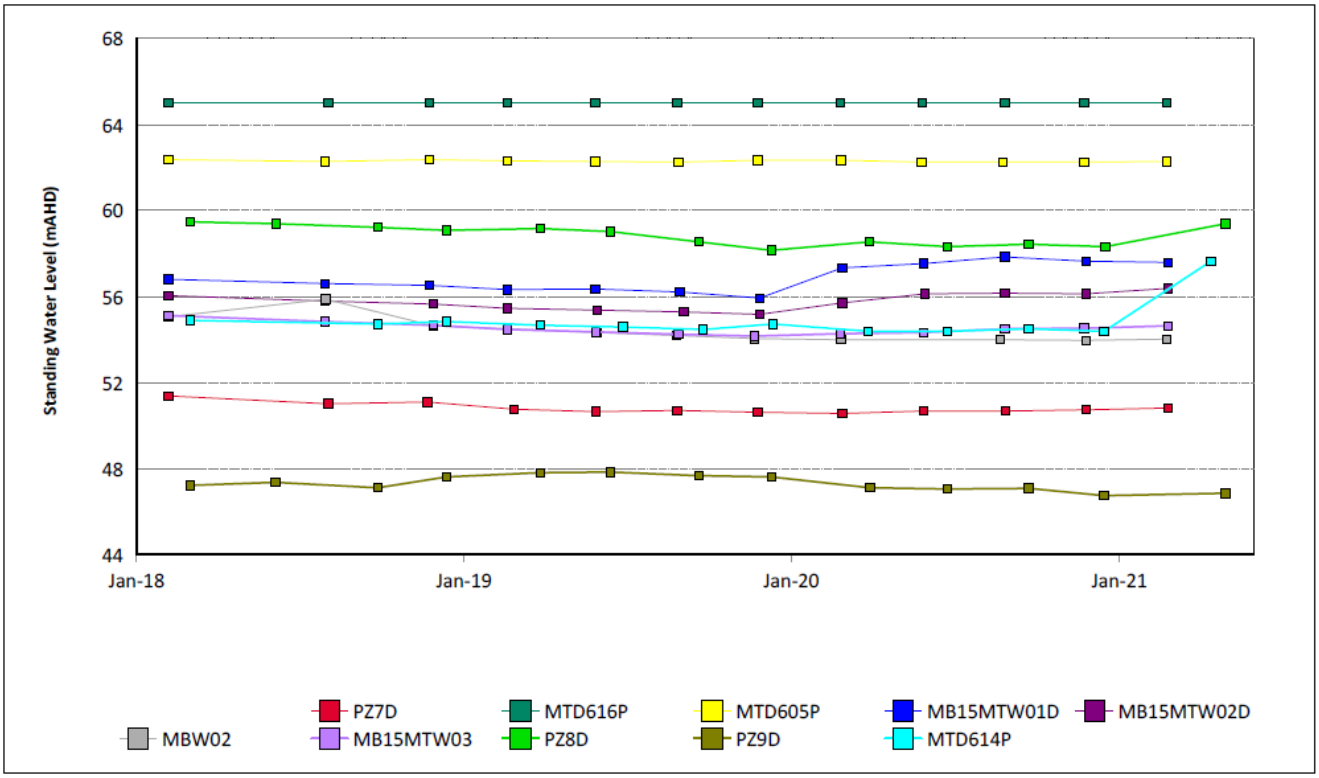
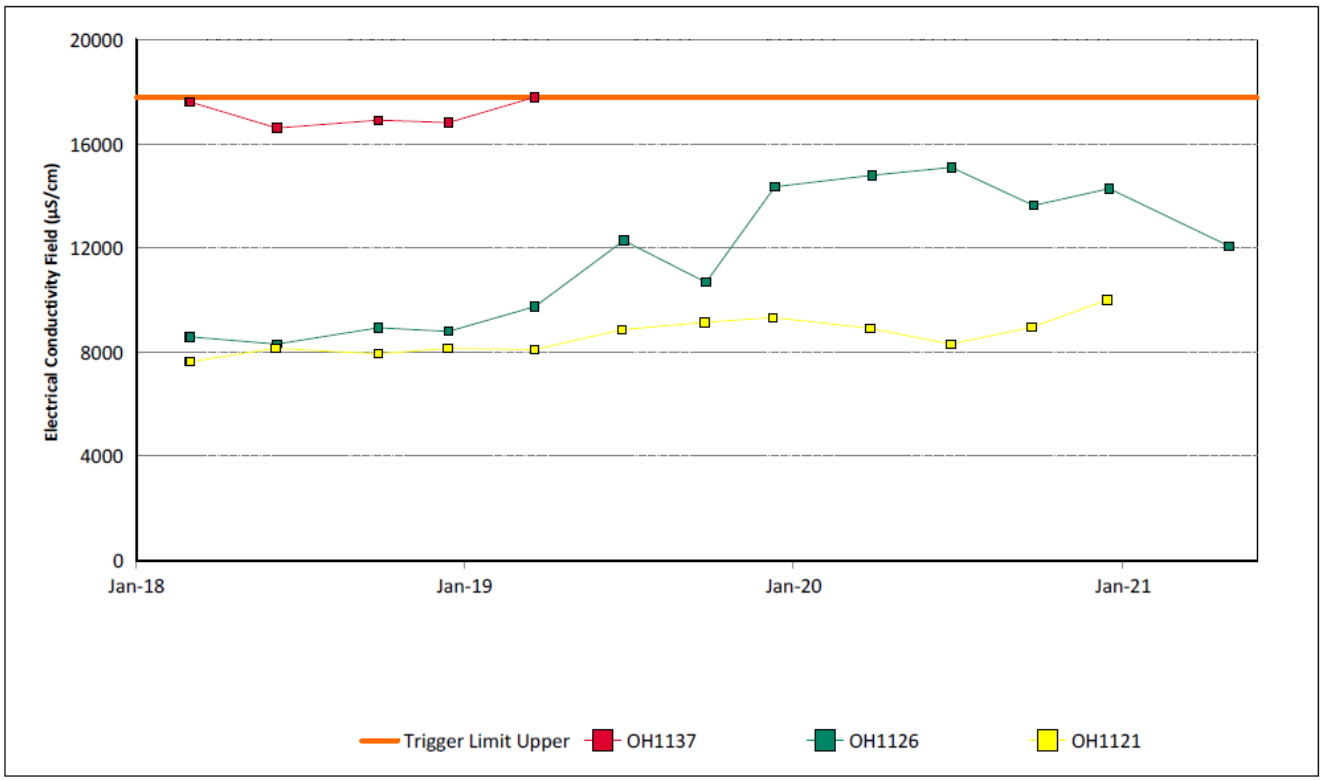
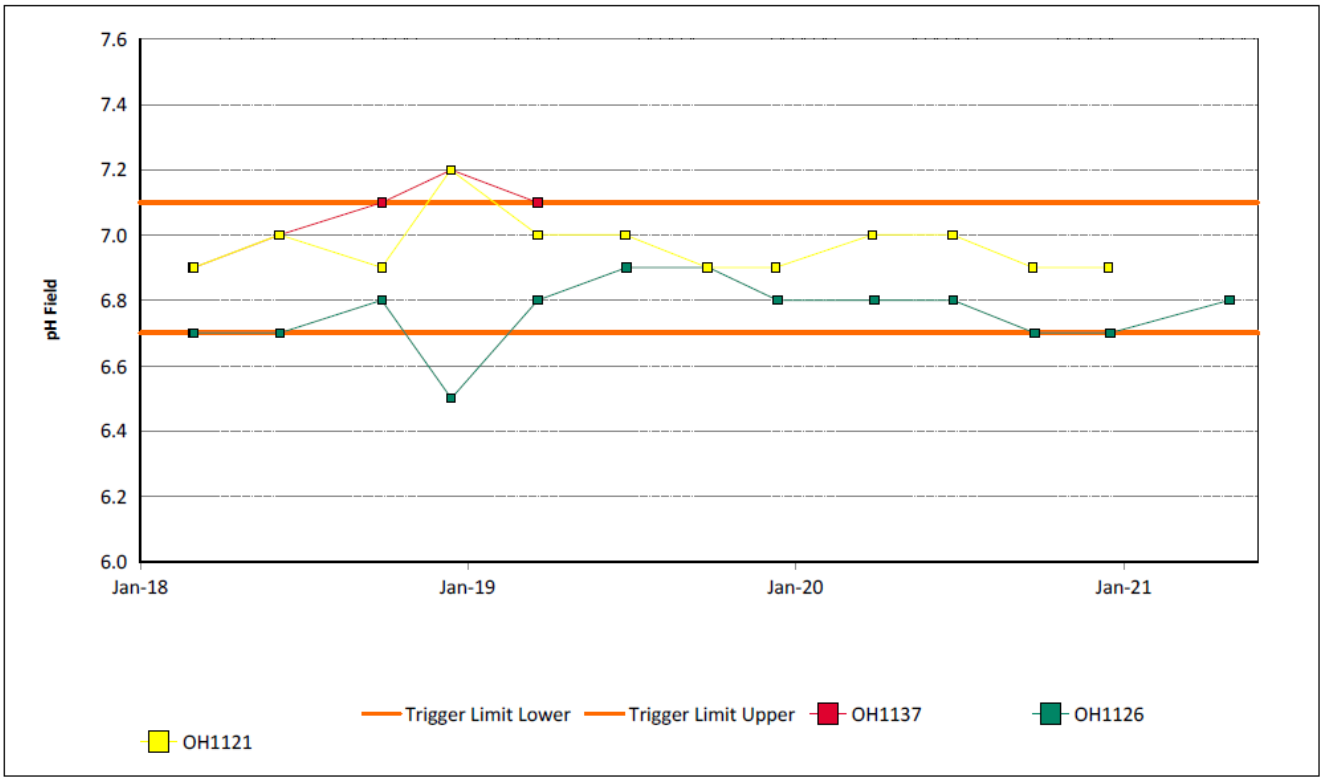


Figure 30: Shallow Overburden Standing Water Level Trend – March 2021



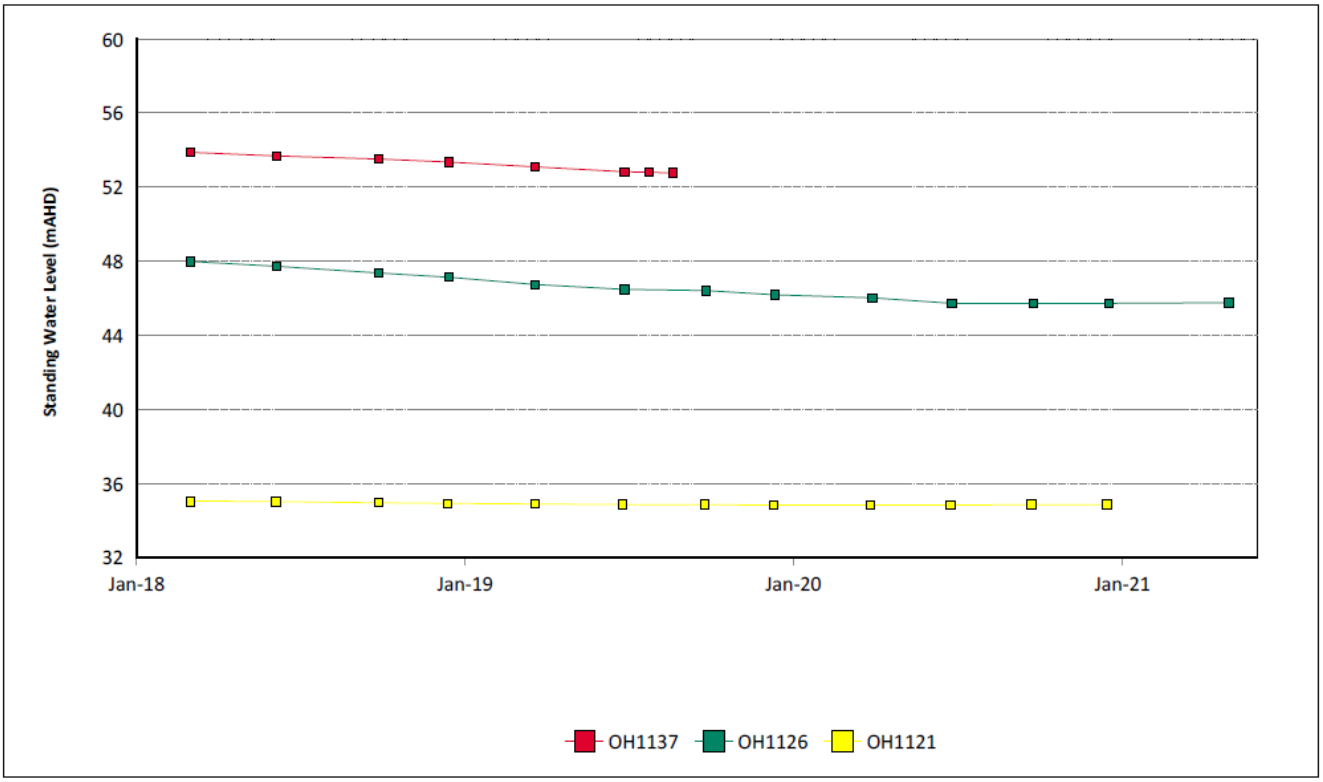
Note: Missing data indicates that there was insufficient water to take a sample.

Figure 31: Vaux Seam Electrical Conductivity Trend – March 2021



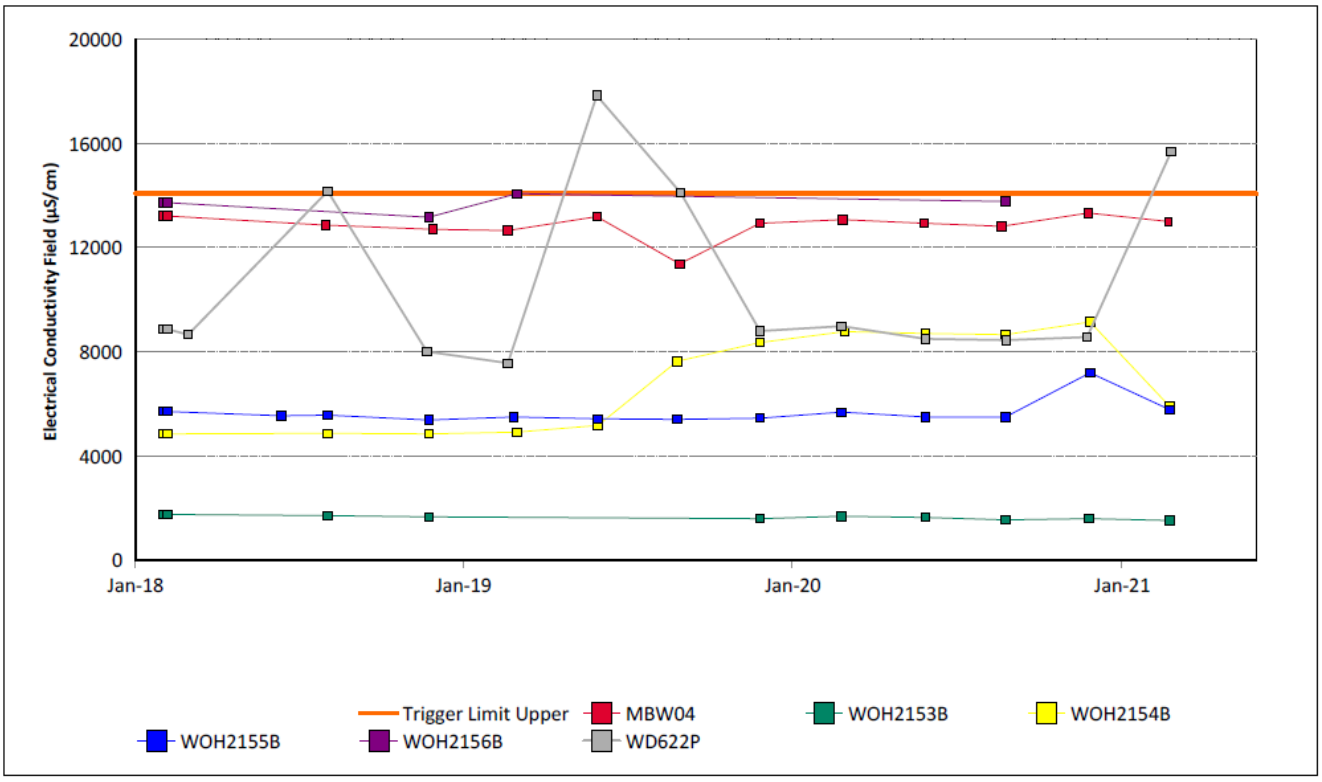
Note: Missing data indicates that there was insufficient water to take a sample.

Figure 32: Vaux Seam pH Trend – March 2021



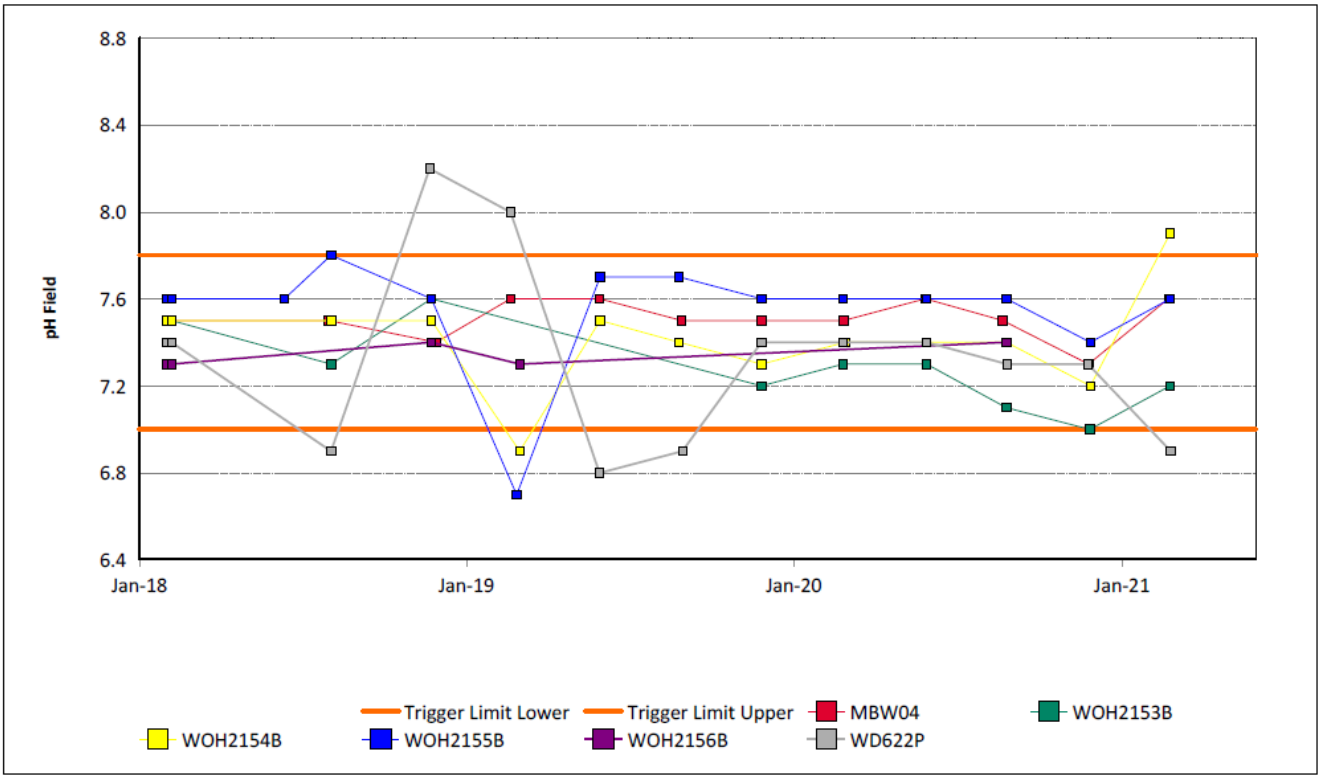
Note: Missing data indicates that there was insufficient water to take a sample.

Figure 33: Vaux Seam Standing Water Level Trend – March 2021



Note: Missing data indicates that there was insufficient water to take a sample.

Figure 34: Wambo Seam Electrical Conductivity Trend – March 2021



Note: Missing data indicates that there was insufficient water to take a sample.

Figure 35: Wambo Seam pH Trend – March 2021

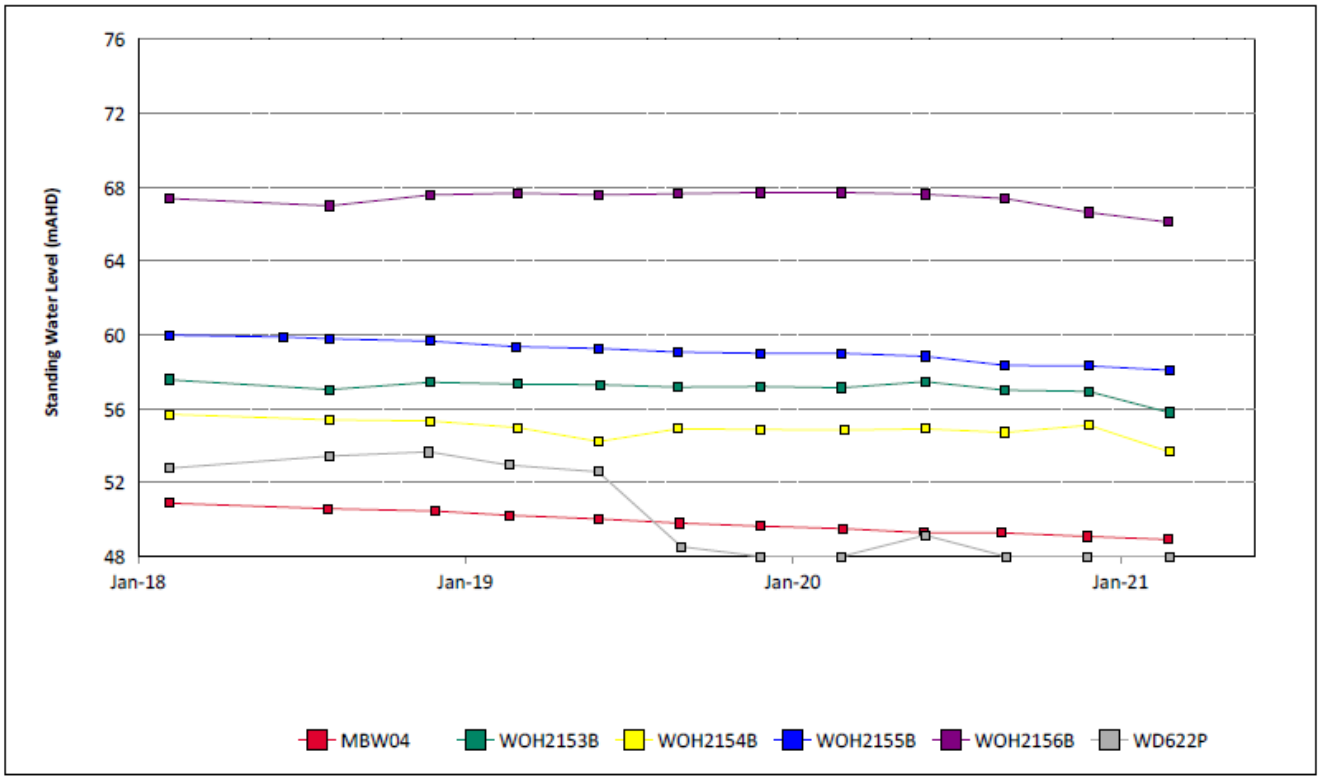


Figure 36: Wambo Seam Standing Water Level Trend – March 2021

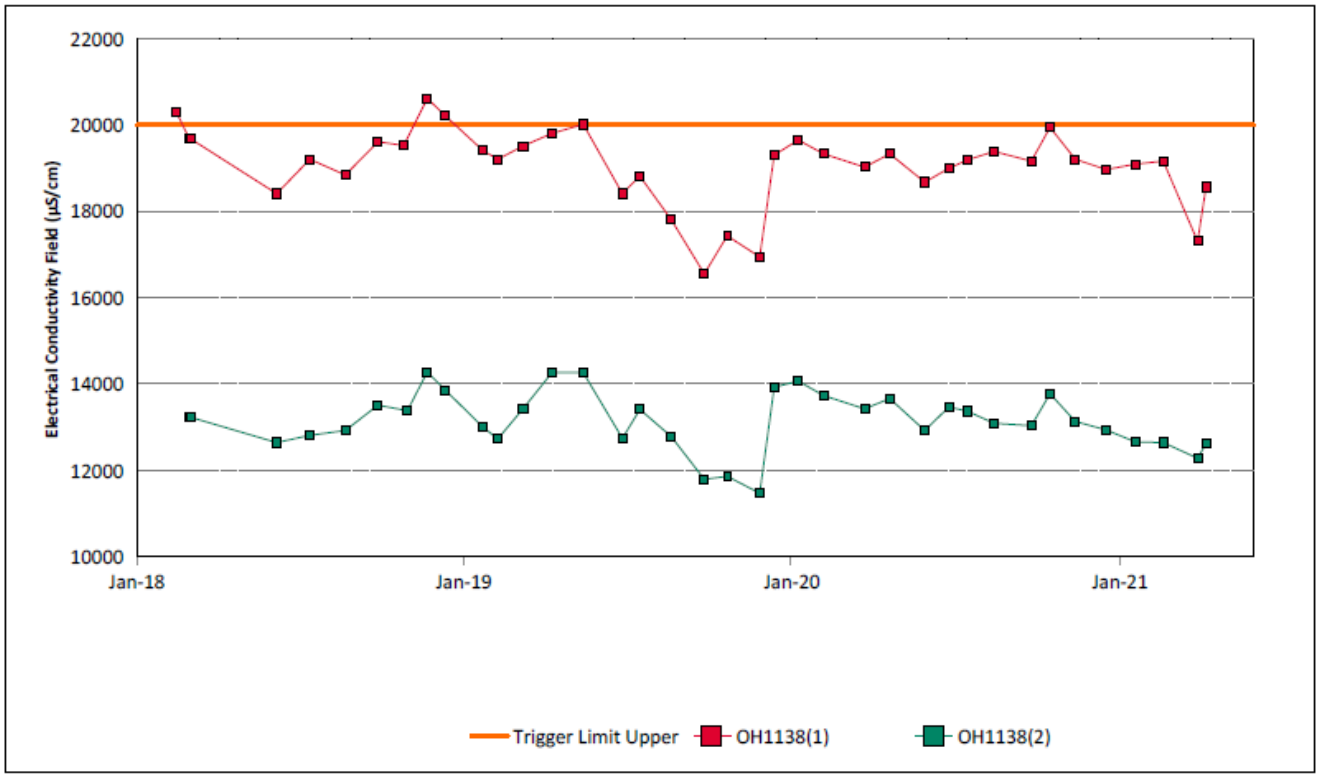


Figure 37: Warkworth Seam Electrical Conductivity Trend – March 2021

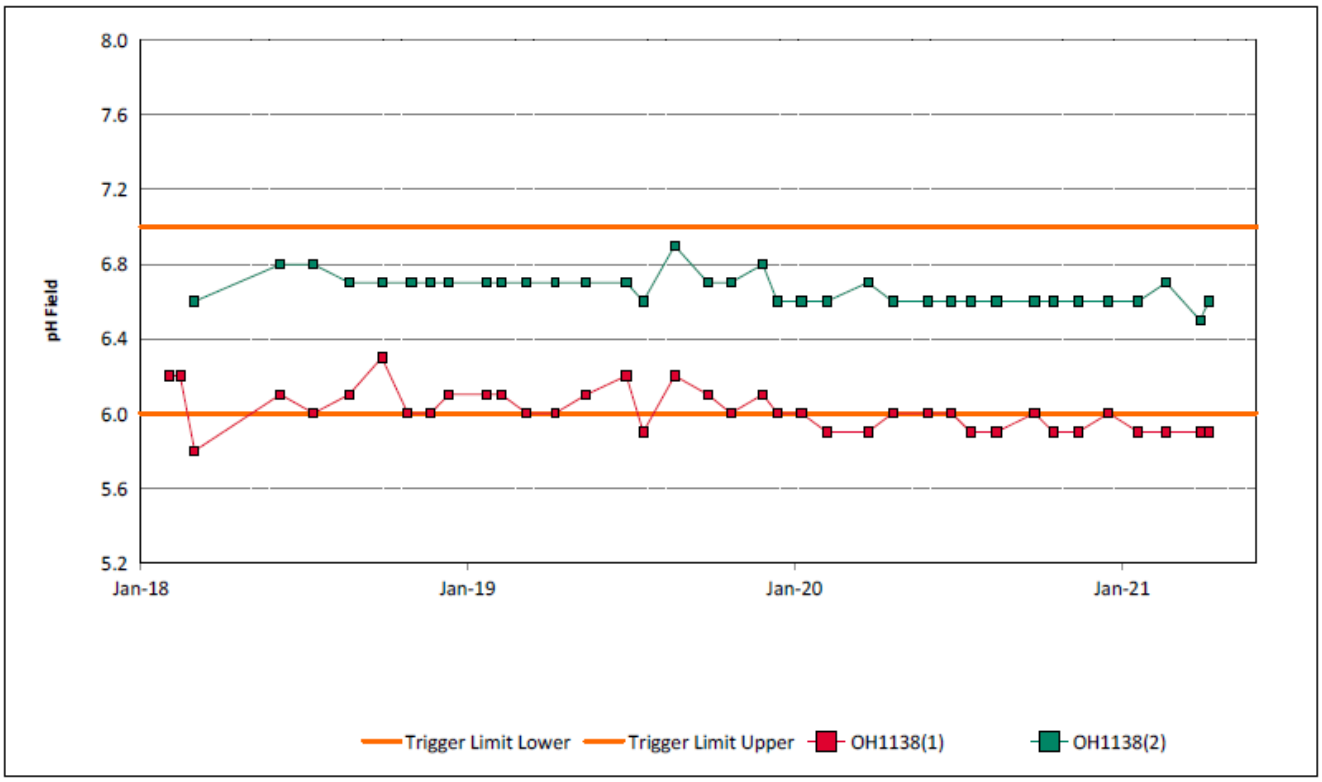


Figure 38: Warkworth Seam pH Trend – March 2021

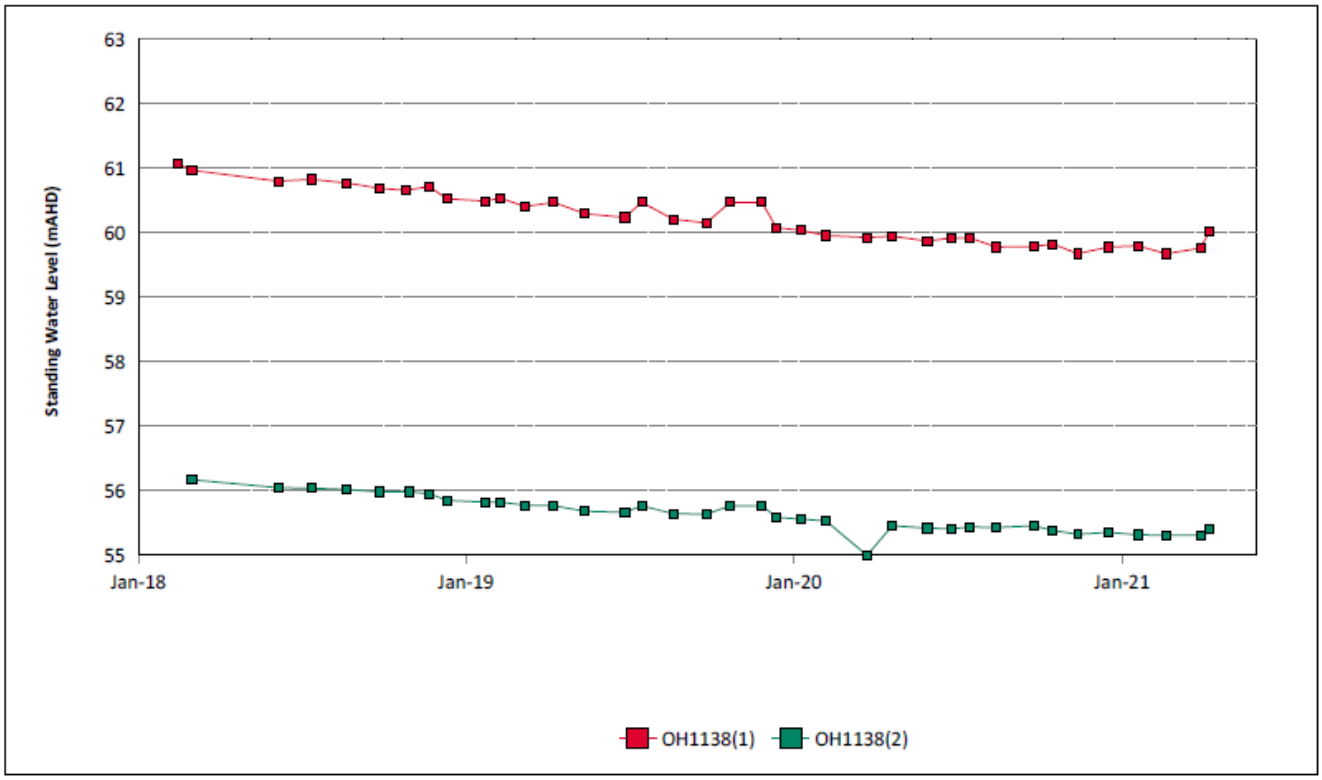


Figure 39: Warkworth Seam Standing Water Level Trend – March 2021

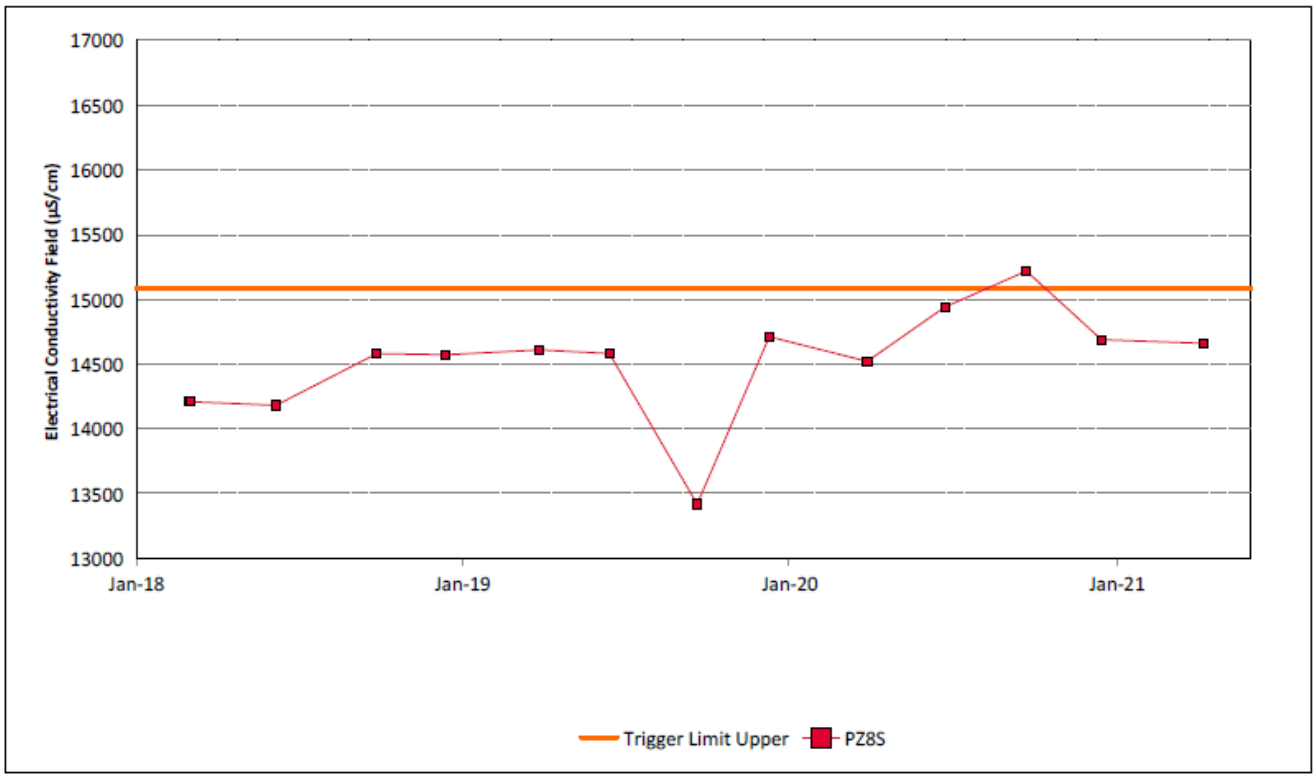


Figure 40: Wollombi Alluvium Electrical Conductivity Trend – March 2021

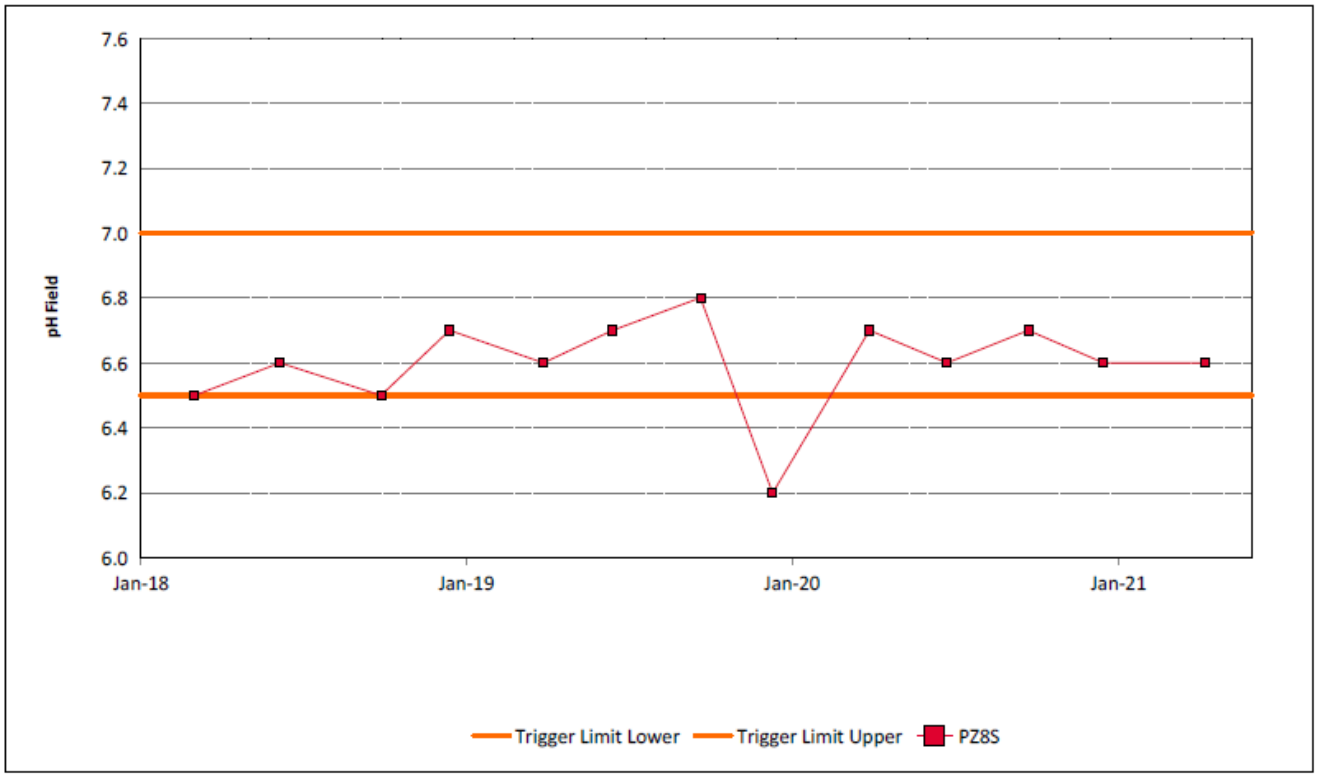
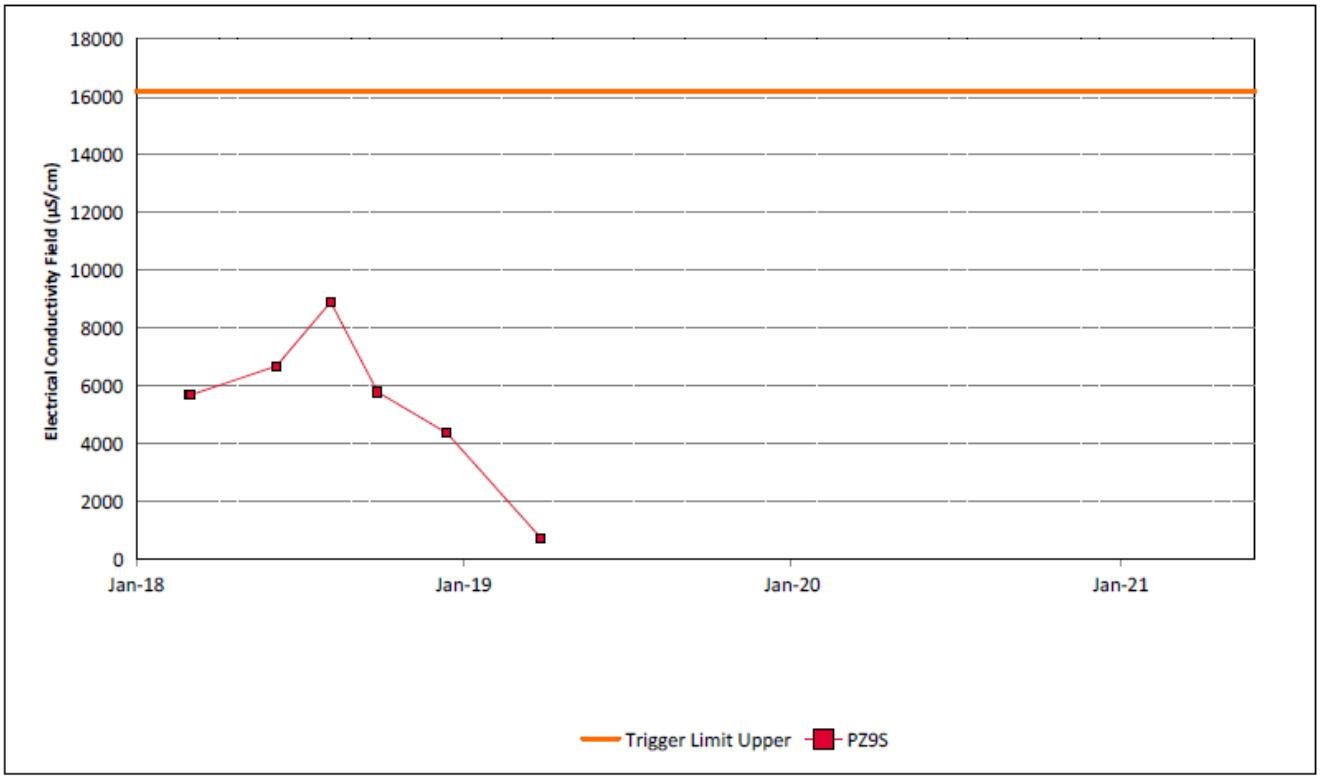
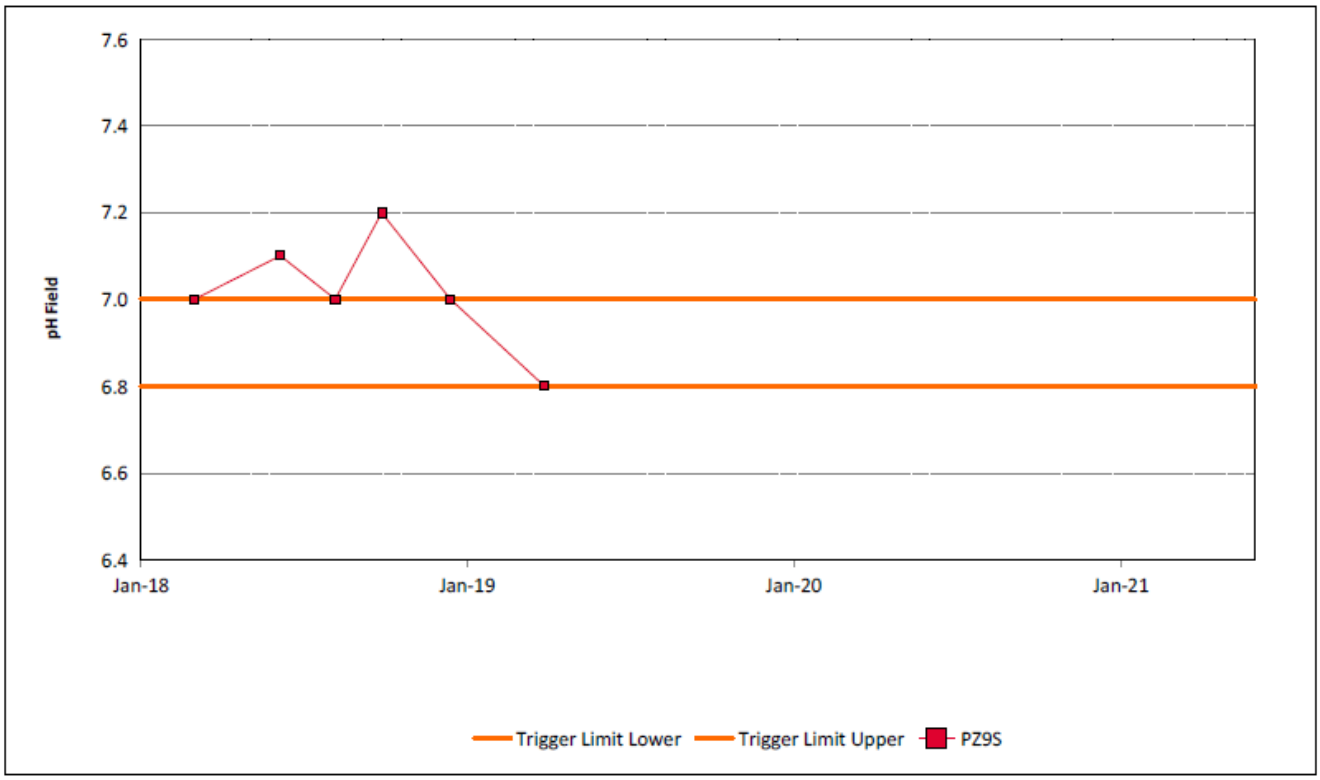


Figure 41: Wollombi Alluvium pH Trend – March 2021



Note: Missing data indicates that there was insufficient water to take a sample.

Figure 42: Wollombi Alluvium 2 Electrical Conductivity Trend – March 2021



Note: Missing data indicates that there was insufficient water to take a sample.

Figure 43: Wollombi Alluvium 2 pH Trend – March 2021

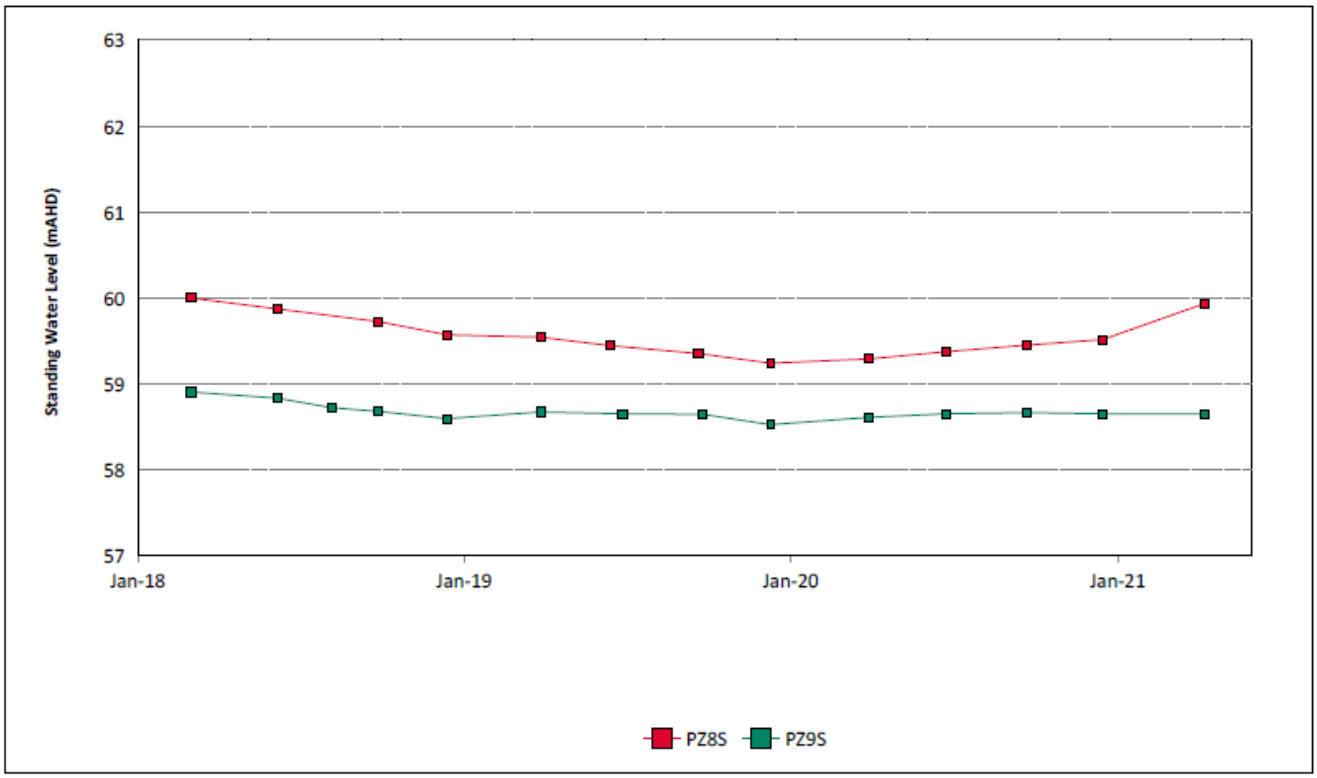


Figure 44: Wollombi Alluvium Standing Water Level Trend – March 2021

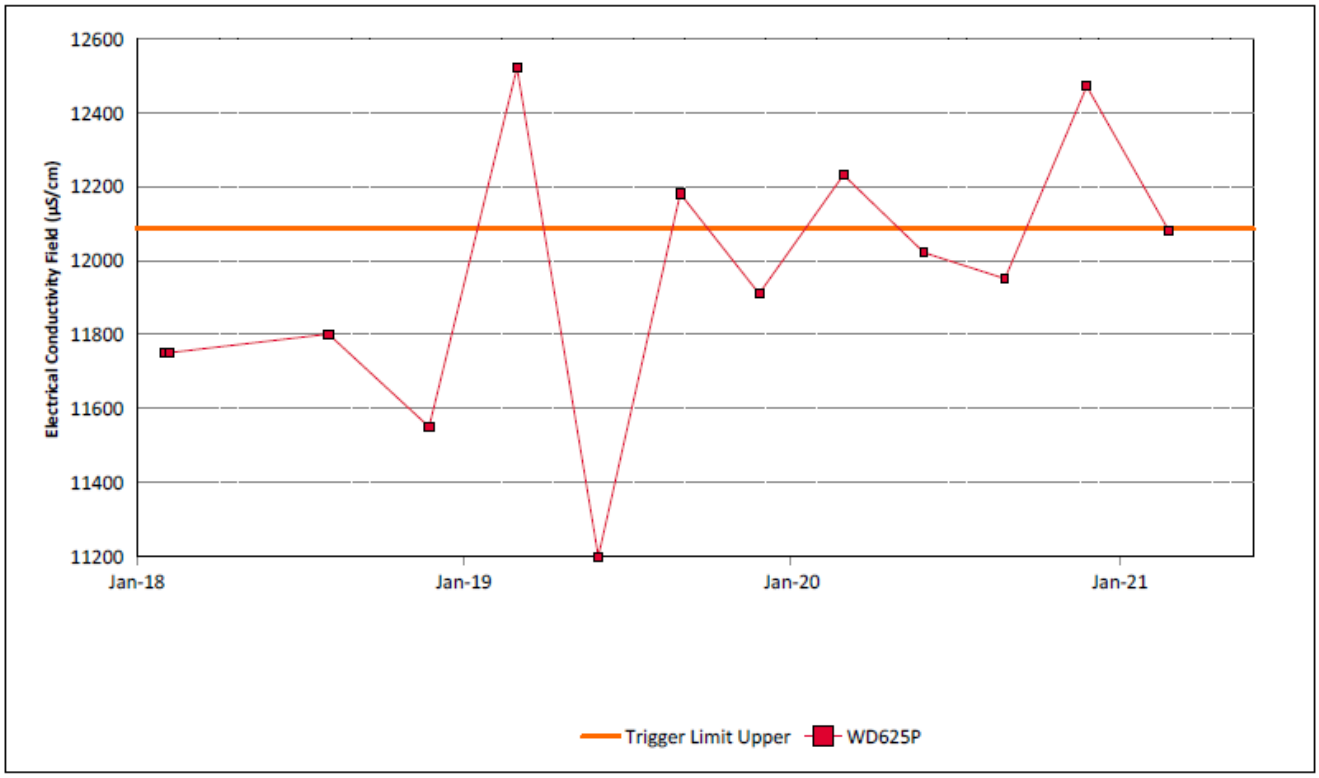


Figure 45: Woodlands Hill Seam Electrical Conductivity Trend - March 2021

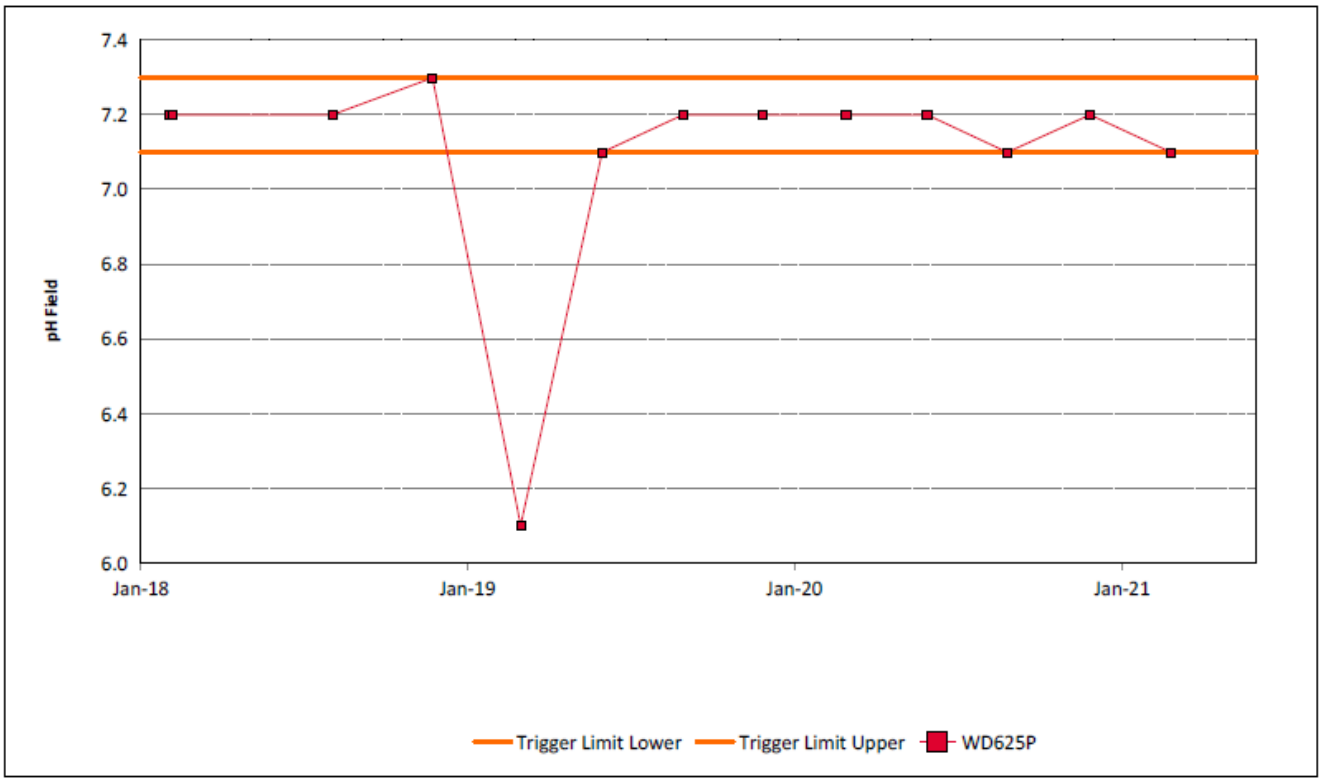


Figure 46: Woodlands Hill Seam pH Trend - March 2021

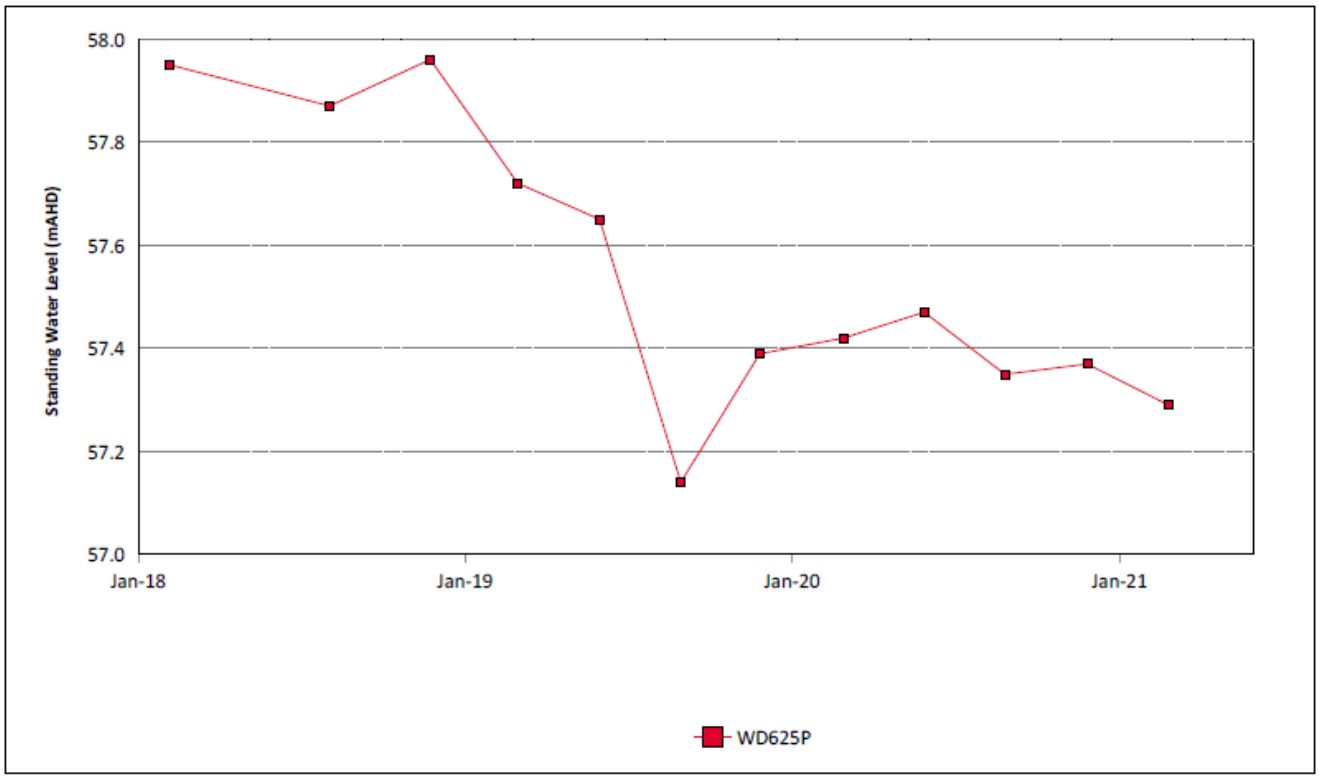


Figure 47: Woodlands Hill Seam Standing Water Level Trend - March 2021

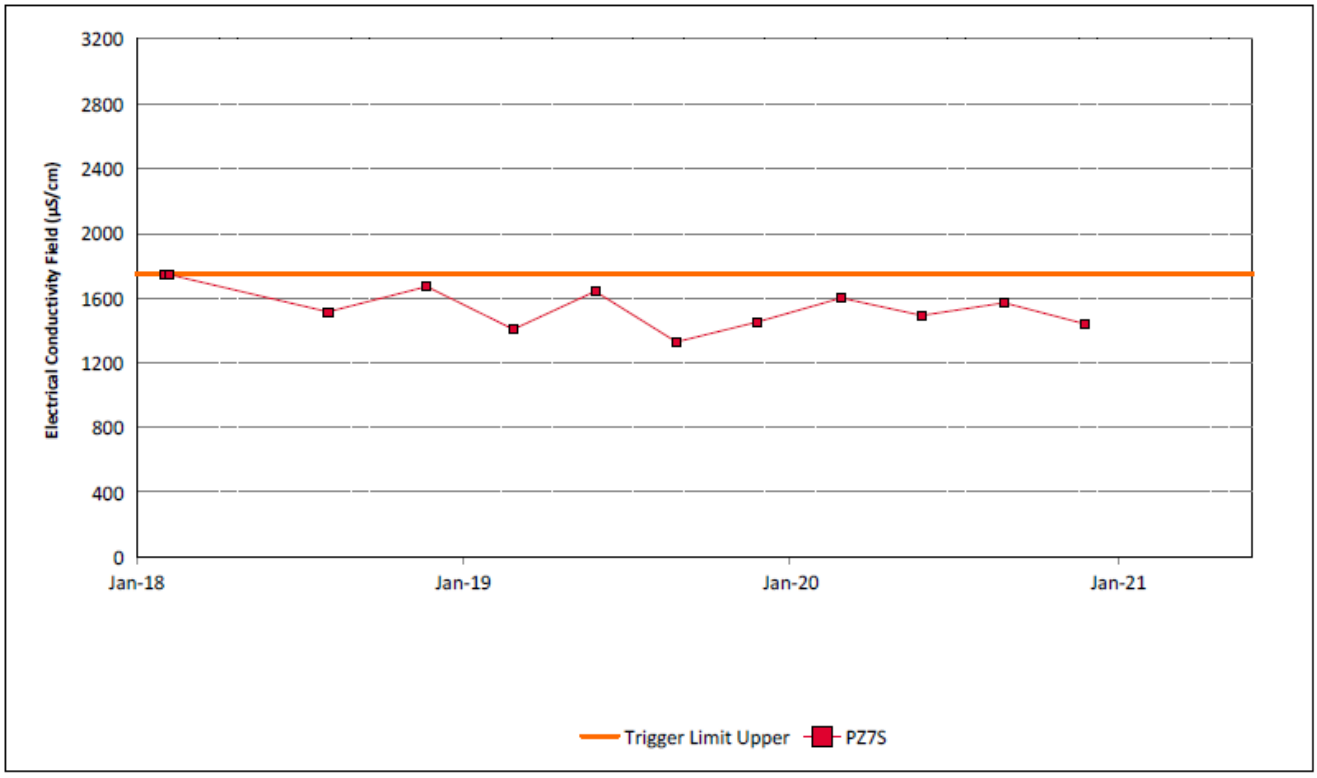


Figure 48: Aeolian Warkworth Sands Electrical Conductivity Trend – March 2021

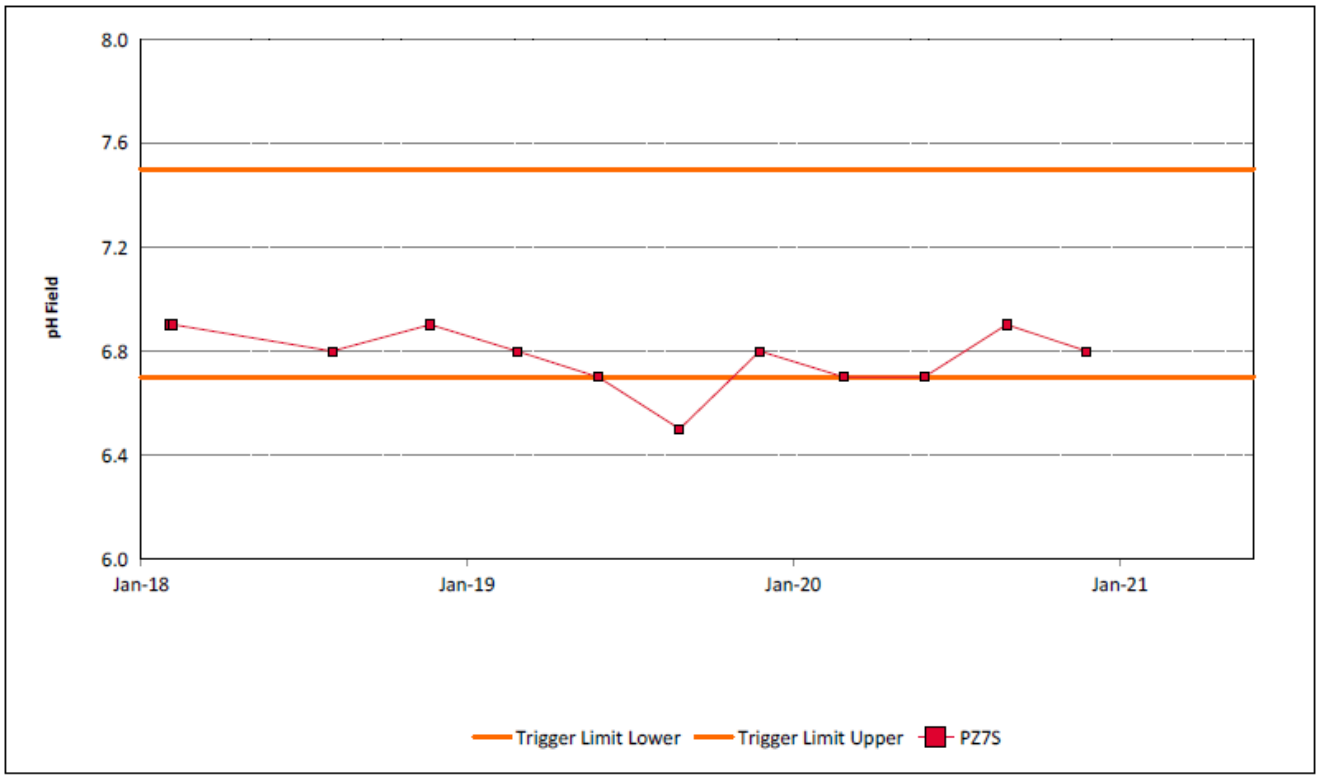


Figure 49: Aeolian Warkworth Sands pH Trend – March 2021

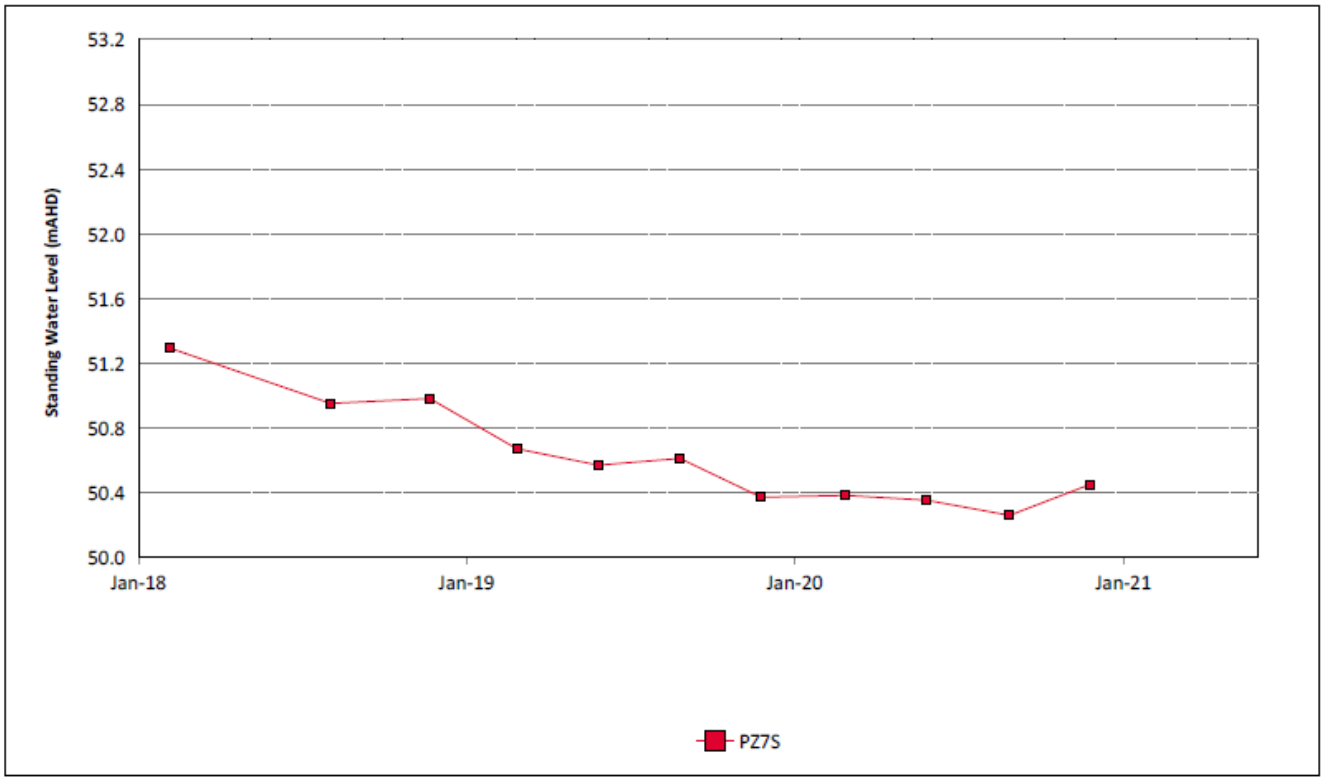


Figure 50: Aeolian Warkworth Sands Standing Water Level Trend – March 2021

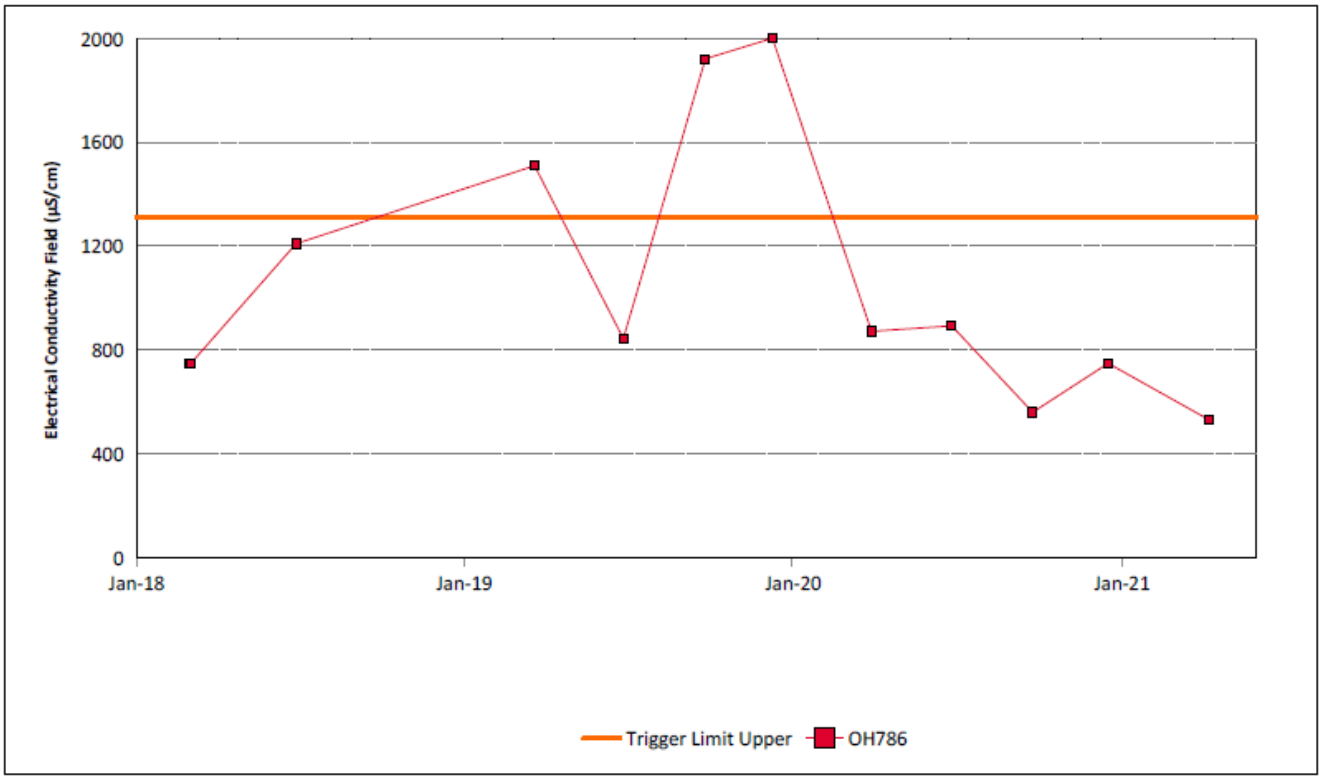


Figure 51: Hunter River Alluvium 1 Electrical Conductivity Trend – March 2021

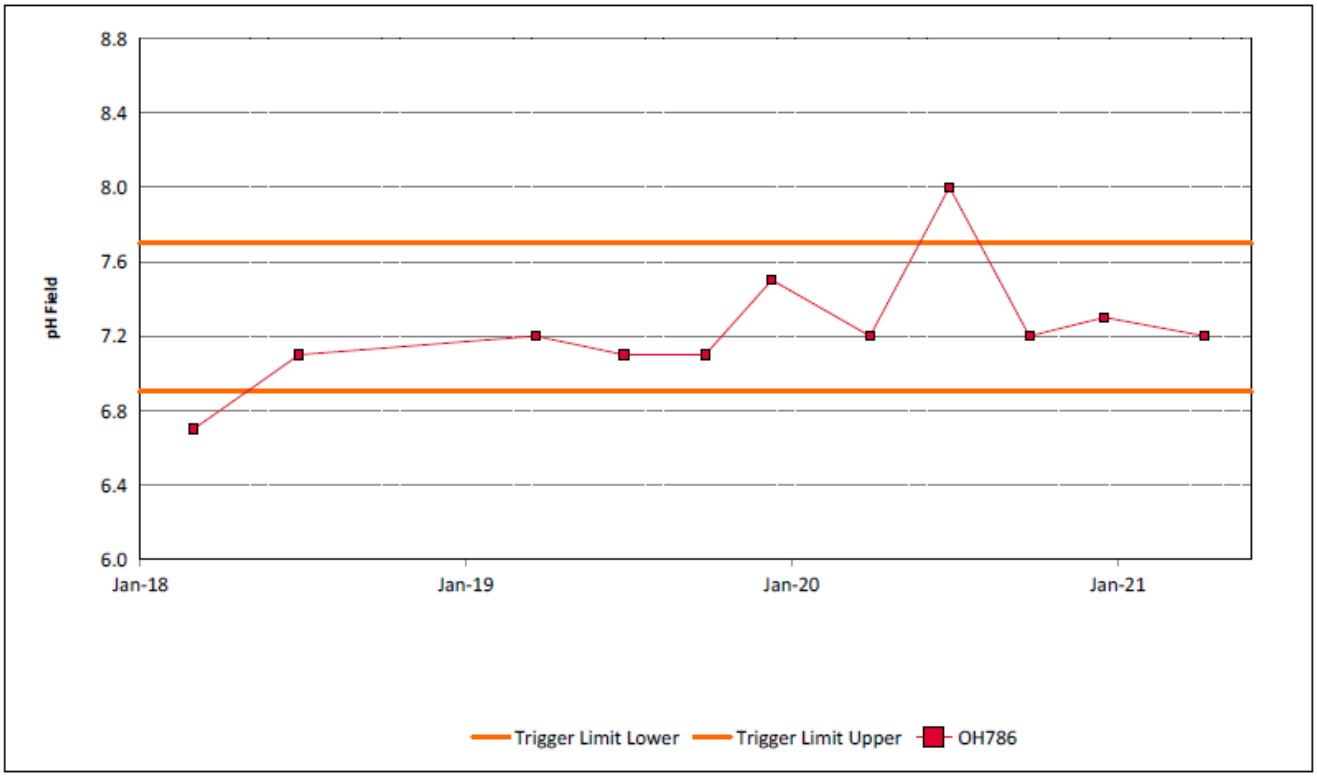


Figure 52: Hunter River Alluvium 1 pH Trend – March 2021

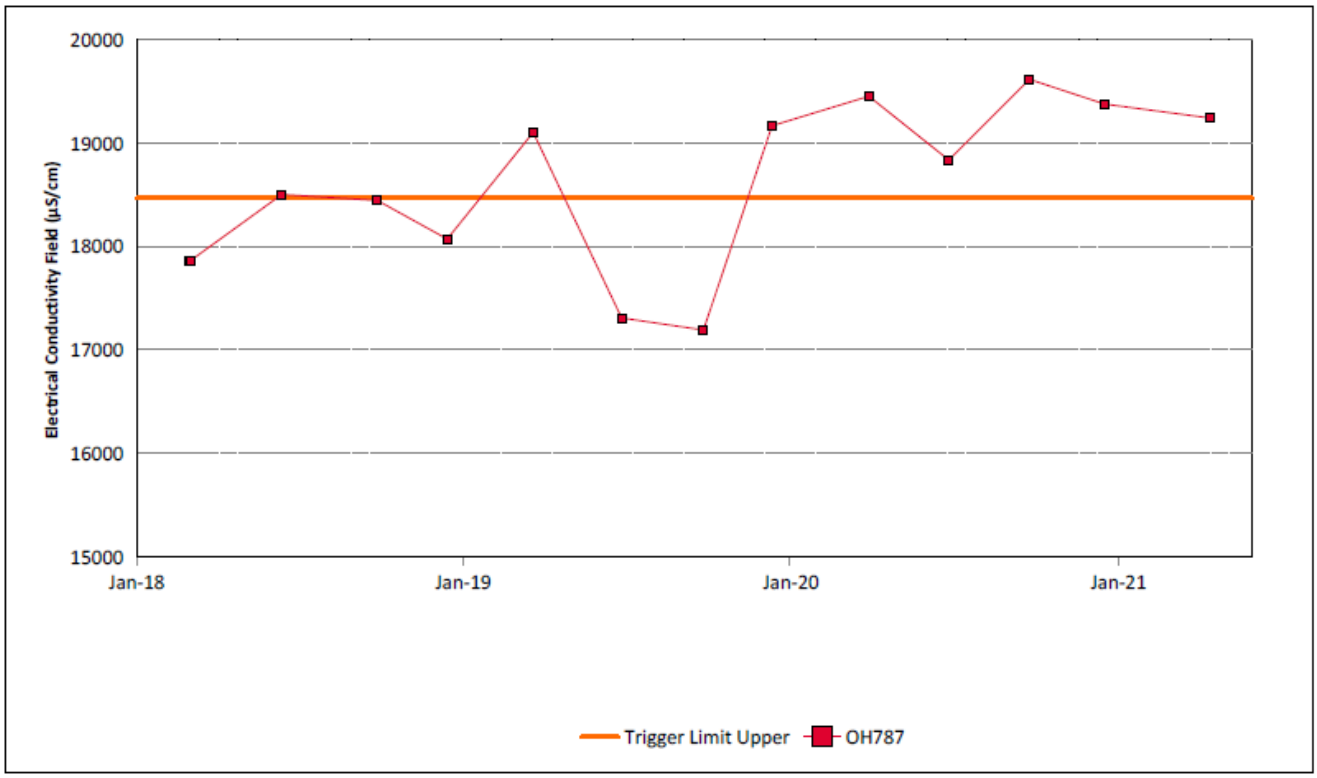


Figure 53: Hunter River Alluvium 2 Electrical Conductivity Trend – March 2021

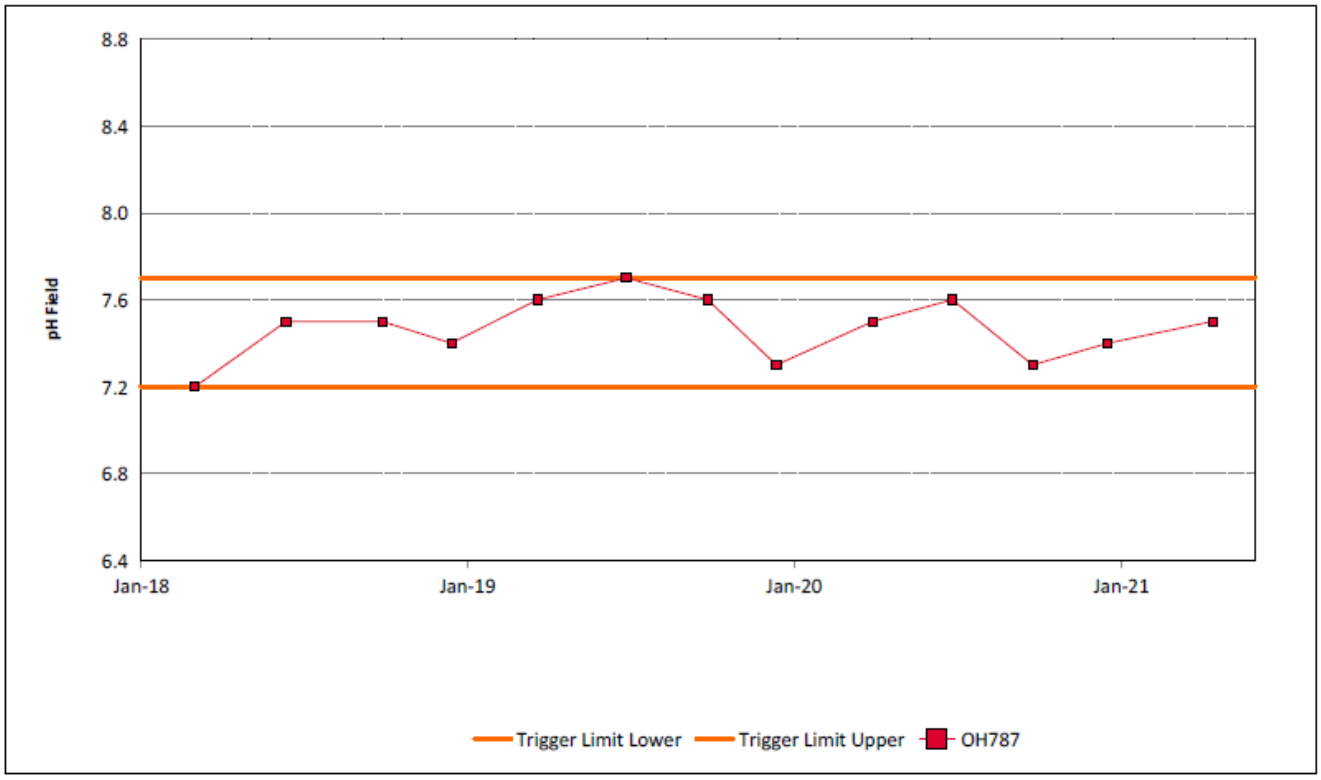


Figure 54: Hunter River Alluvium 2 pH Trend – March 2021

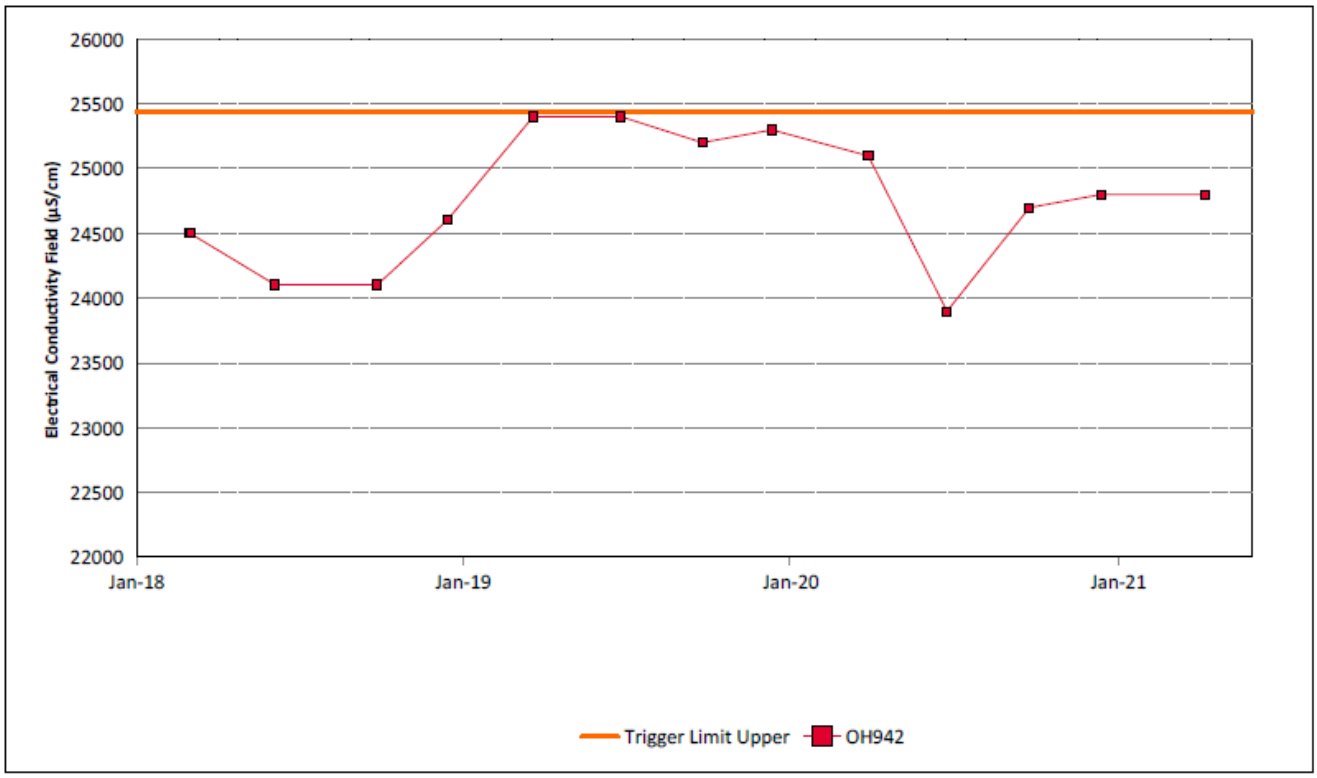


Figure 55: Hunter River Alluvium 3 Electrical Conductivity Trend – March 2021

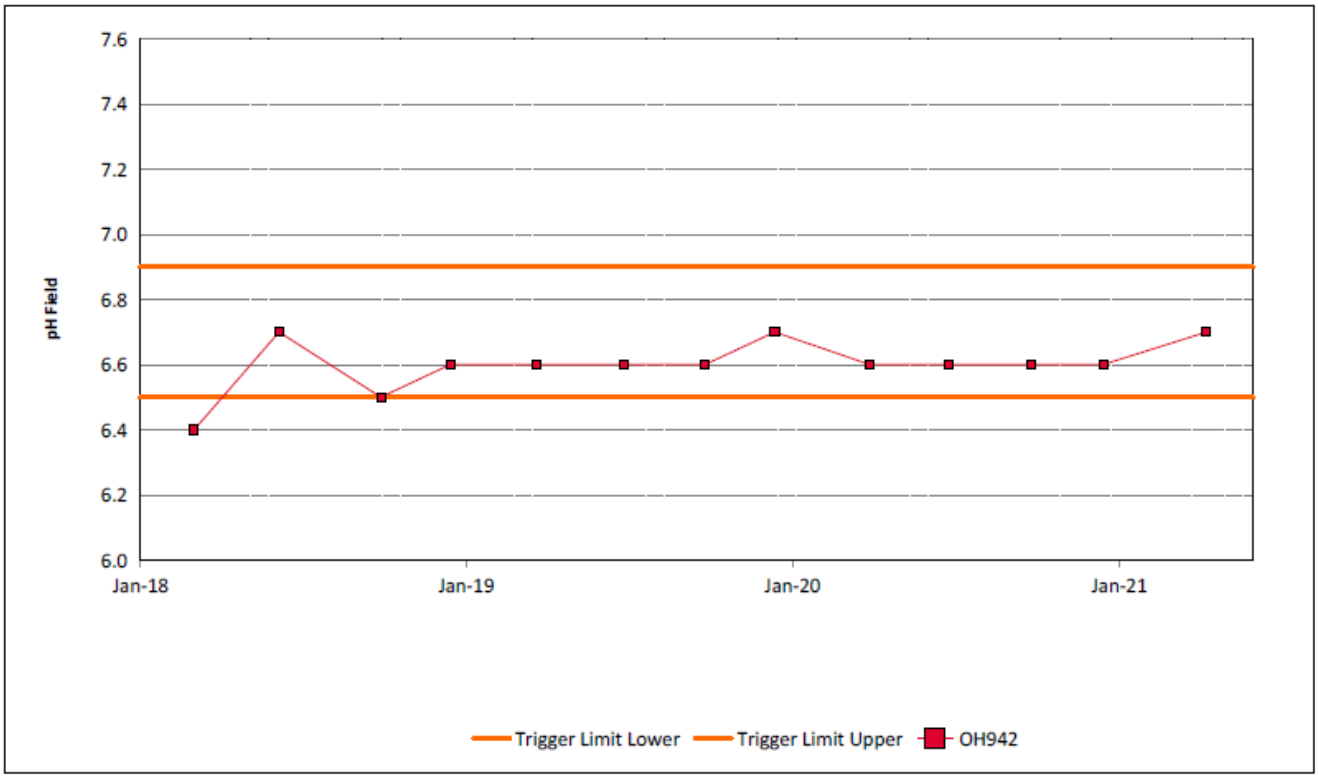
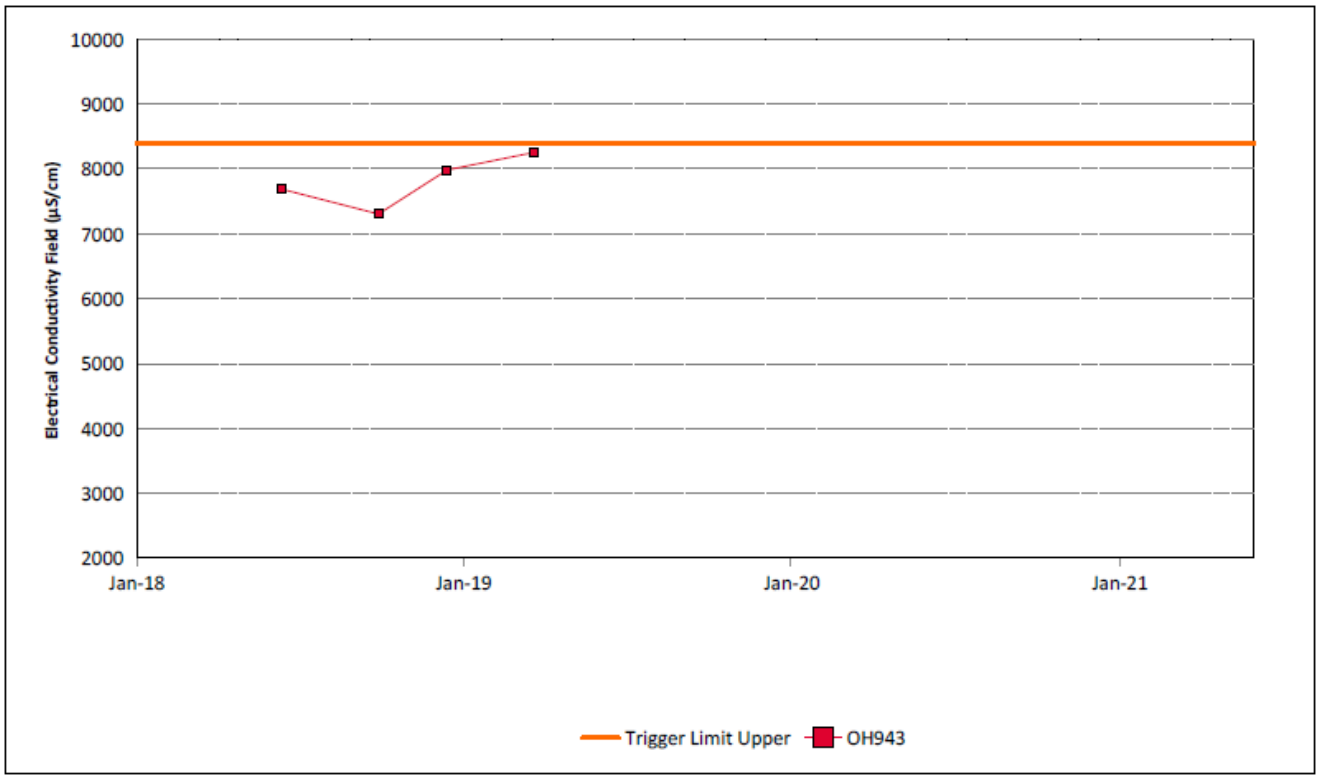
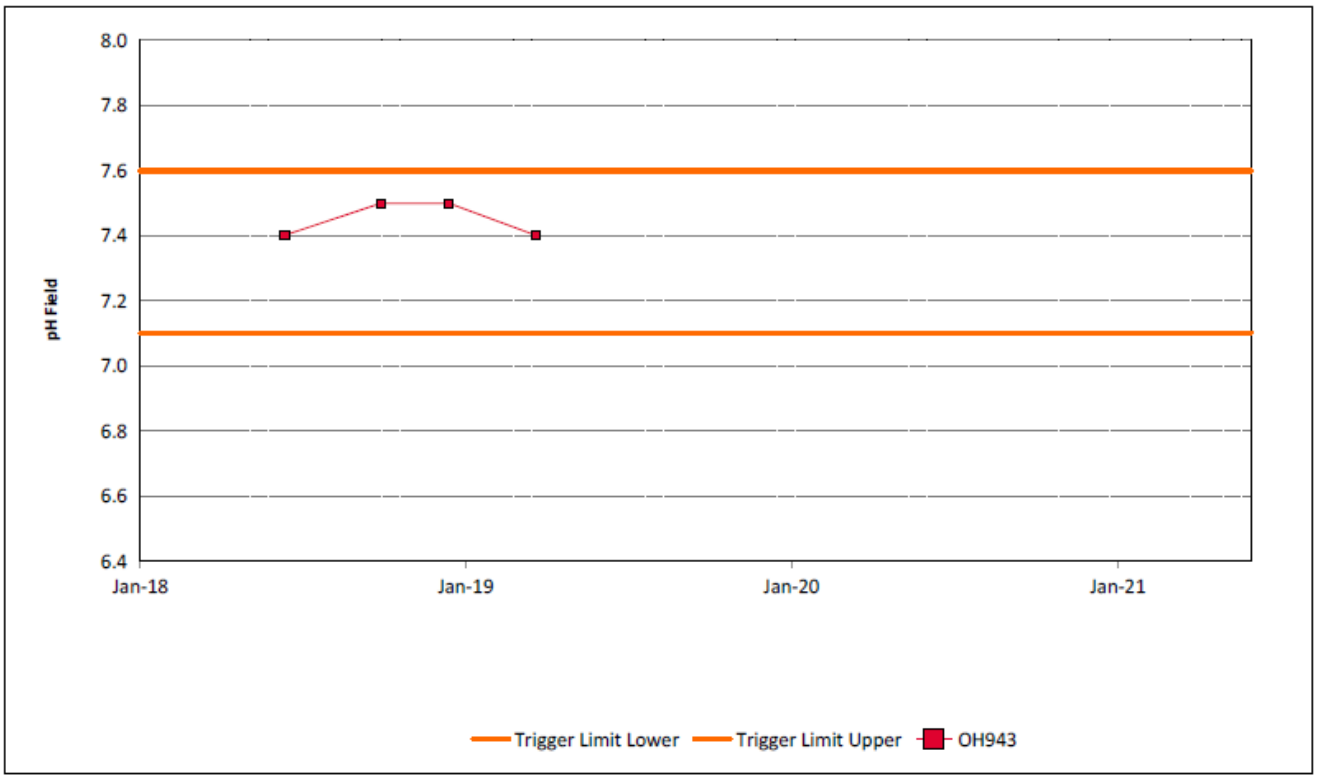


Figure 56: Hunter River Alluvium 3 pH Trend – March 2021



Note: Missing data indicates that there was insufficient water to take a sample.

Figure 57: Hunter River Alluvium 4 Electrical Conductivity Trend – March 2021



Note: Missing data indicates that there was insufficient water to take a sample.

Figure 58: Hunter River Alluvium 4 pH Trend – March 2021

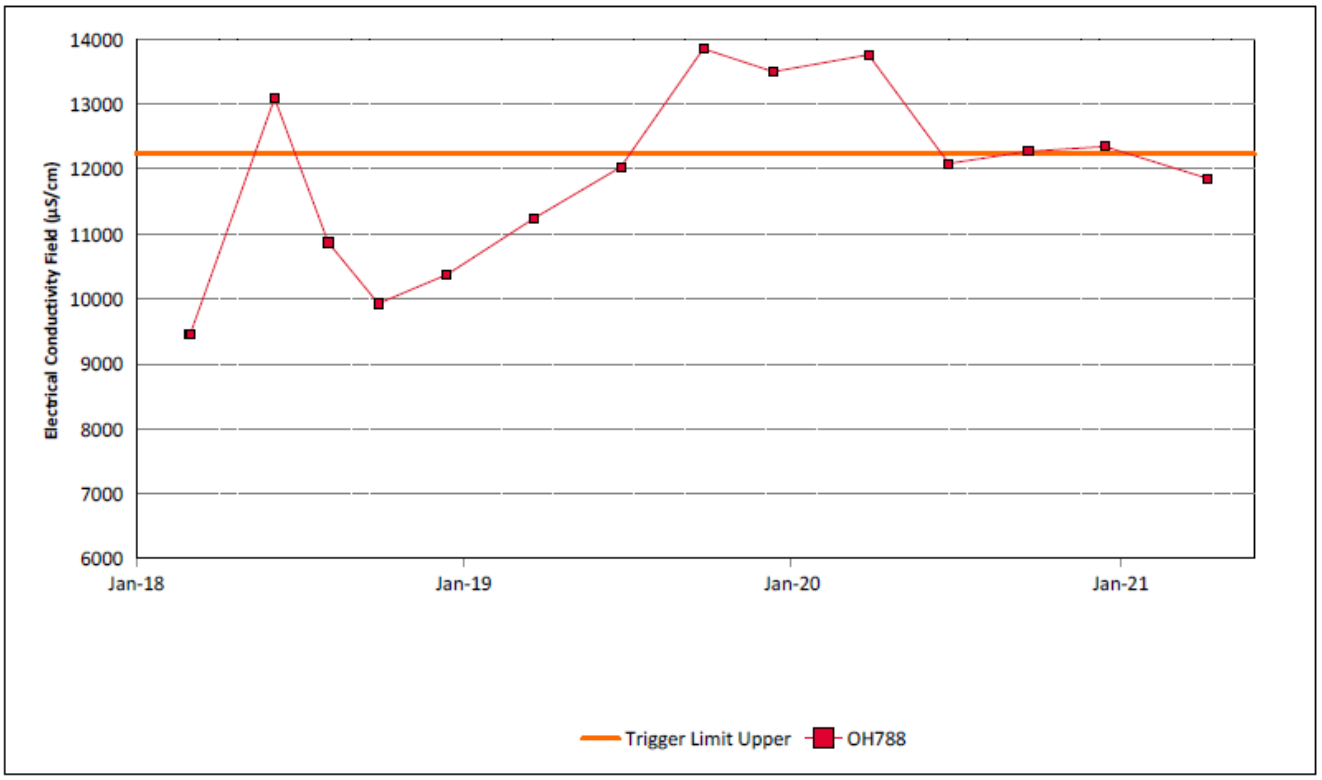


Figure 59: Hunter River Alluvium 5 Electrical Conductivity – March 2021

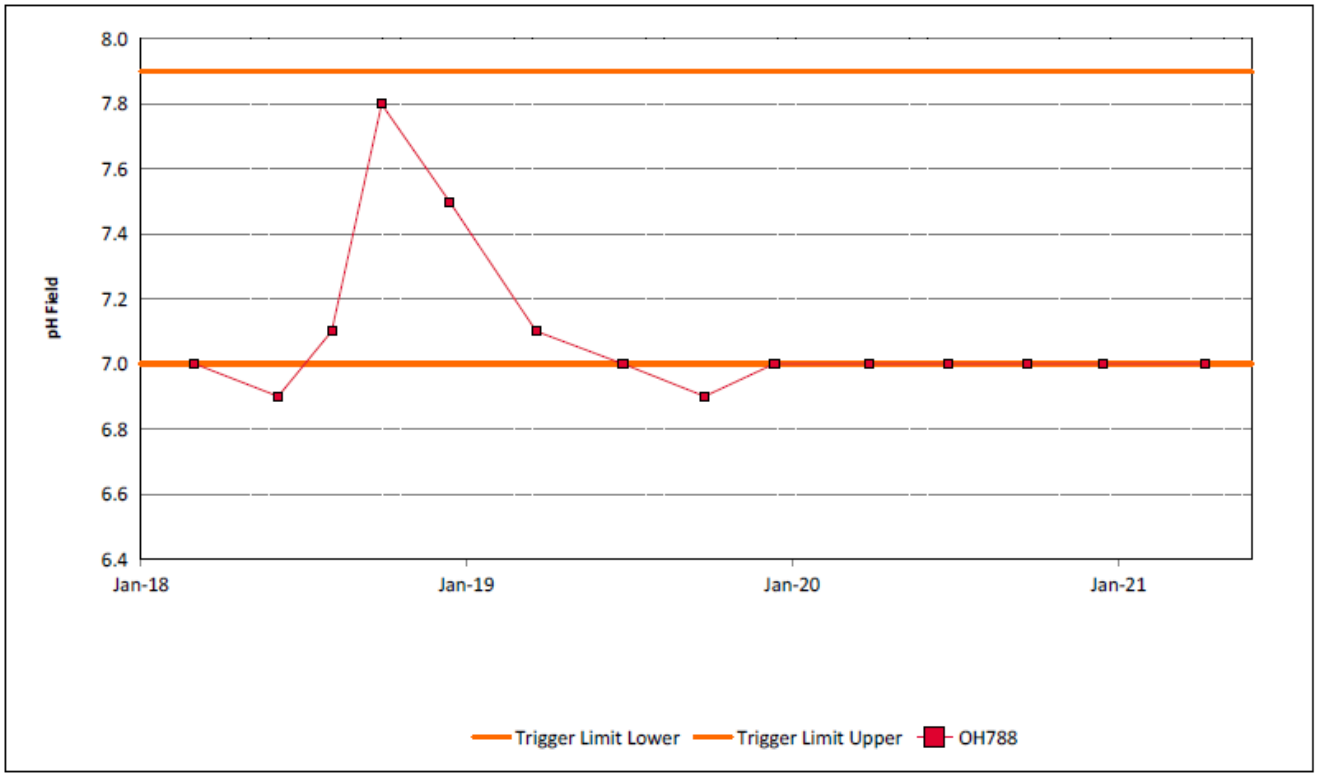


Figure 60: Hunter River Alluvium 5 pH Trend – March 2021

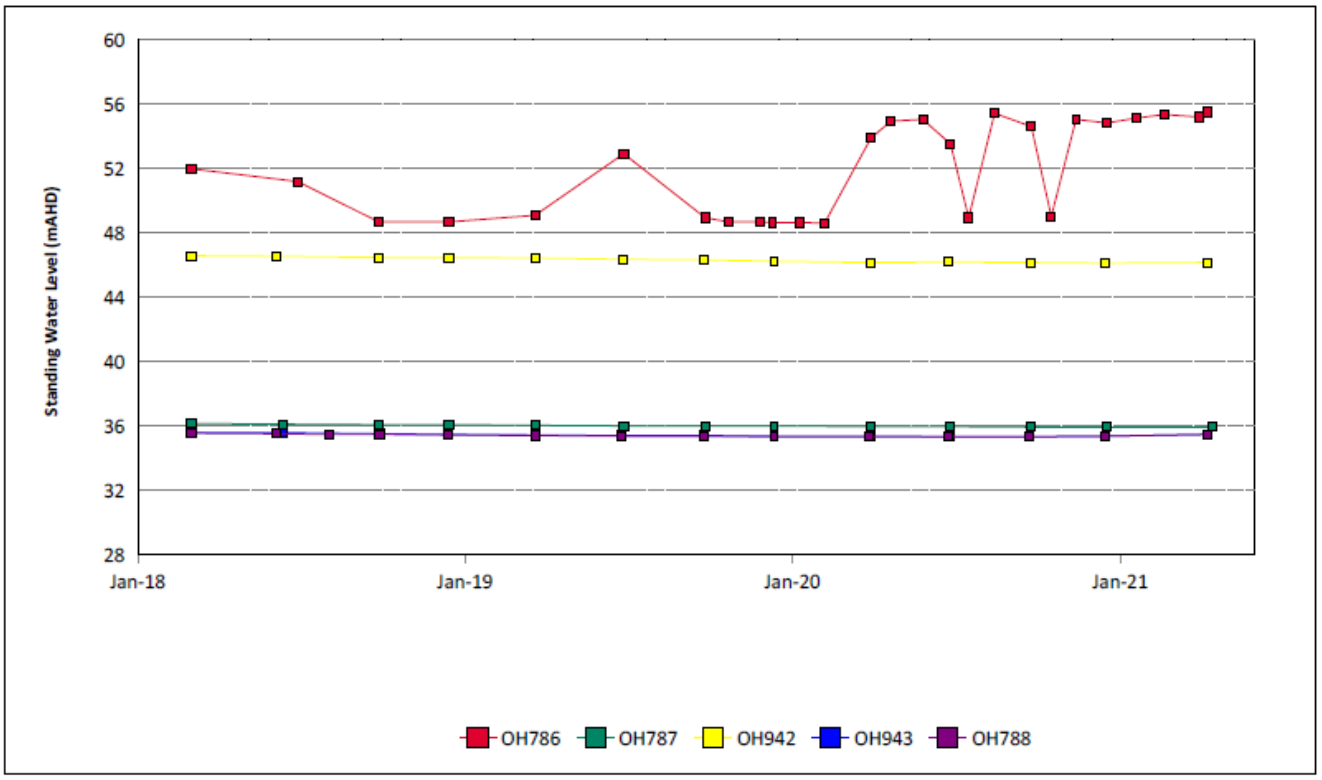


Figure 61: Hunter River Alluvium Standing Water Level Trend – March 2021

3.2.1 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 62**.

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

Table 3: Groundwater Triggers – 2021

Site	Date	Trigger Limit Breached	Action Taken in Response
OH787	13/04/2021	EC – 95th Percentile	Watching Brief* A change to the sampling methodology implemented in 2019 i.e. low flow pumping/purging prior to all sampling and analysis, is considered the cause of the measured increase in EC since then.
WD622P	25/02/2021	EC – 95th Percentile	Watching Brief*
WOH2139A	25/02/2021	pH – 95th Percentile	Watching Brief*
WOH2156A	25/02/2021	pH – 5th Percentile	Watching Brief*
MB15MTW01D	25/02/2021	pH – 5th Percentile	Watching Brief* A change to the sampling methodology implemented in 2019 i.e. low flow pumping/purging prior to all sampling and analysis, is possibly considered the cause of the measured drop in pH results since then.
MTD616P	25/02/2021	pH – 5th Percentile	Watching Brief*
WD622P	25/02/2021	pH – 5th Percentile	Watching Brief*
WOH2154B	24/02/2021	pH – 95th Percentile	Watching Brief*
PZ9D	24/02/2021	pH – 5th Percentile	Watching Brief*
OH1138(1)	19/01/2021	pH – 5th Percentile	Watching Brief*
OH1138(1)	19/02/2021	pH – 5th Percentile	Watching Brief*
OH1138(1)	29/03/2021	pH – 5th Percentile	Results were investigated in the MTW 2020 Annual Groundwater Review. pH results for monitoring bore OH1138 likely to be attributable to the regional drawdown associated within the active mining in North Pit and the potential influences from the abstraction of water from the Lemington underground workings. Continue Watching Brief*
* = Watching brief established pending outcomes of subsequent monitoring events. No specific actions required.			

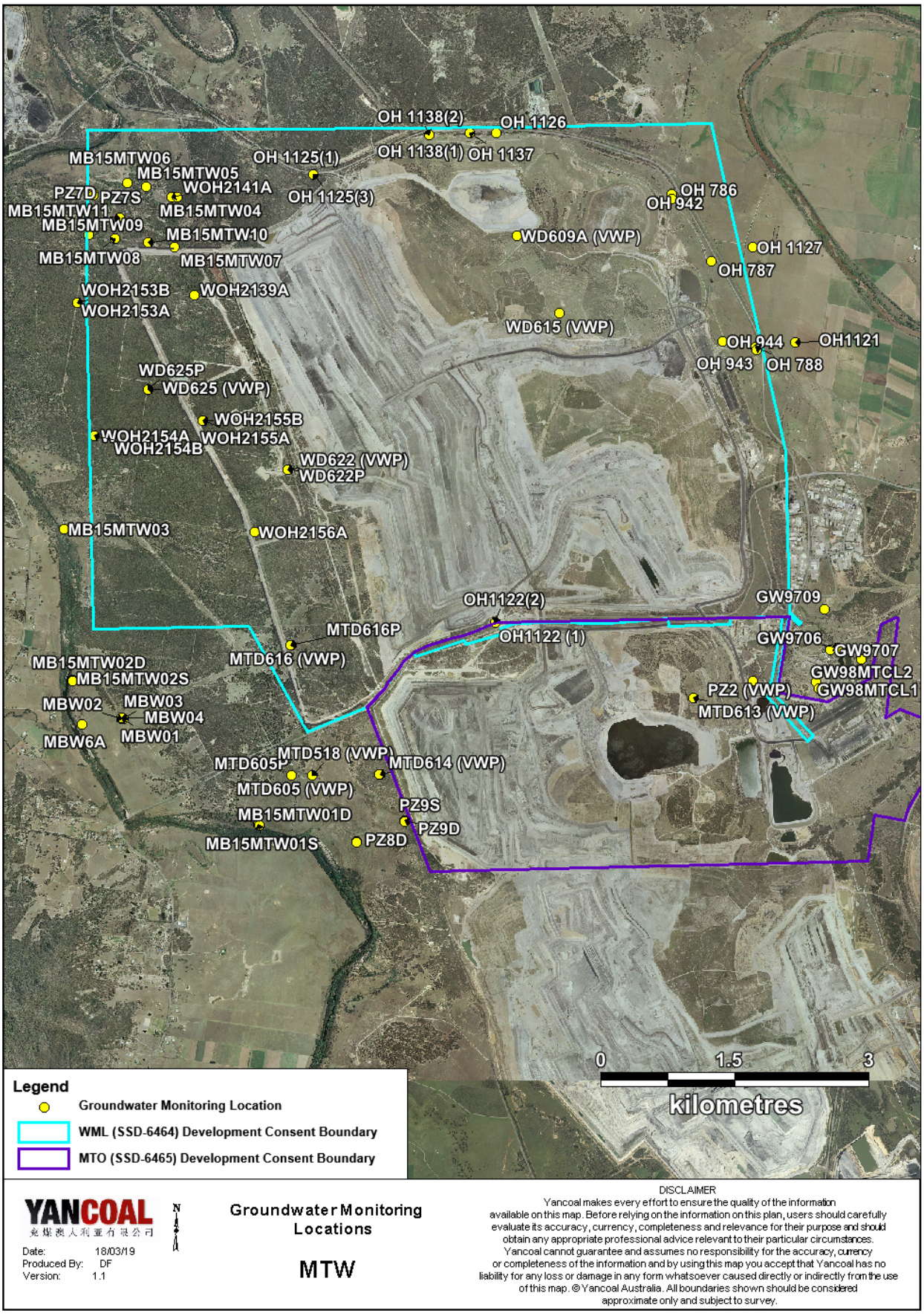


Figure 62: Groundwater Monitoring Location Plan

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 69**.

4.1 Blast Monitoring Results

During March 2021, 13 blasts were initiated at MTW. **Figure 63** to **Figure 68** 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
120	0%
Ground Vibration (mm/s)	**Comments**
5	5% of the total number of blasts in a 12-month period
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.

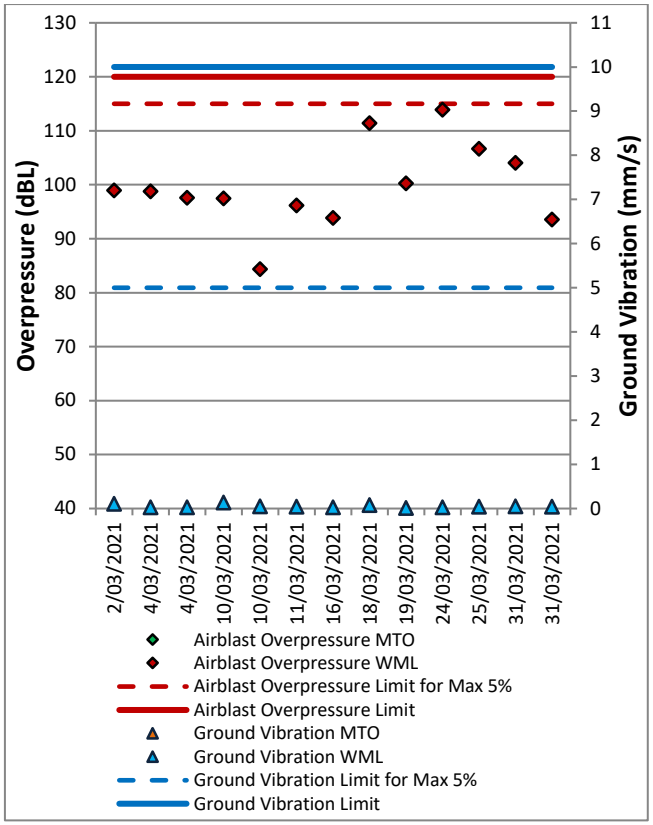


Figure 63: Abbey Green Blast Monitoring Results – March 2021

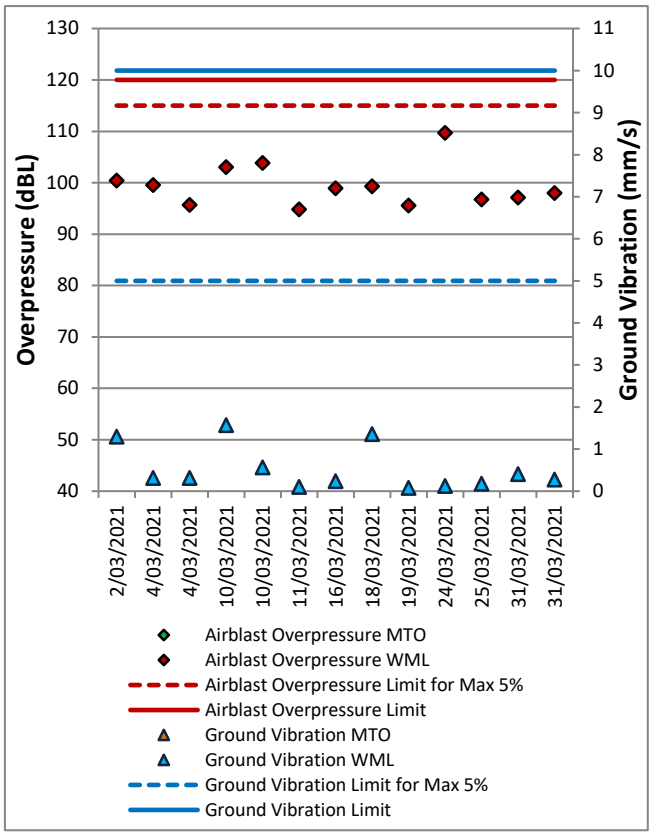


Figure 64: Bulga Village Blast Monitoring Results – March 2021

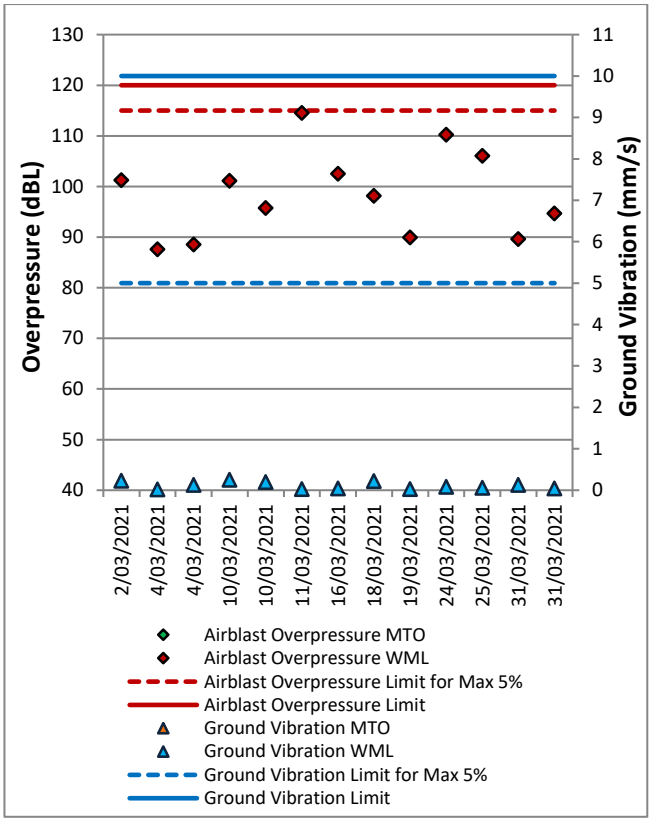


Figure 65: MTIE Blast Monitoring Results – March 2021

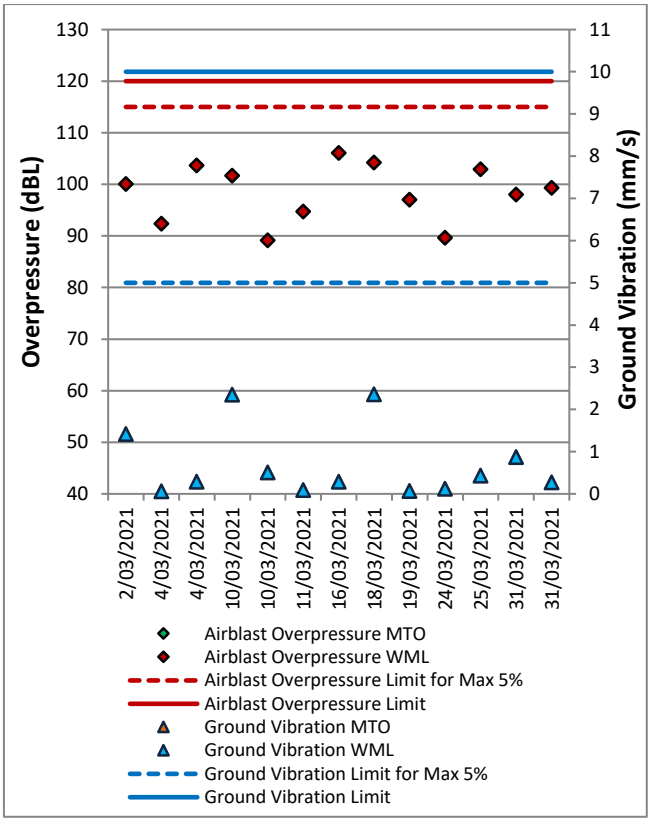


Figure 67: Wambo Road Blast Monitoring Results – March 2021

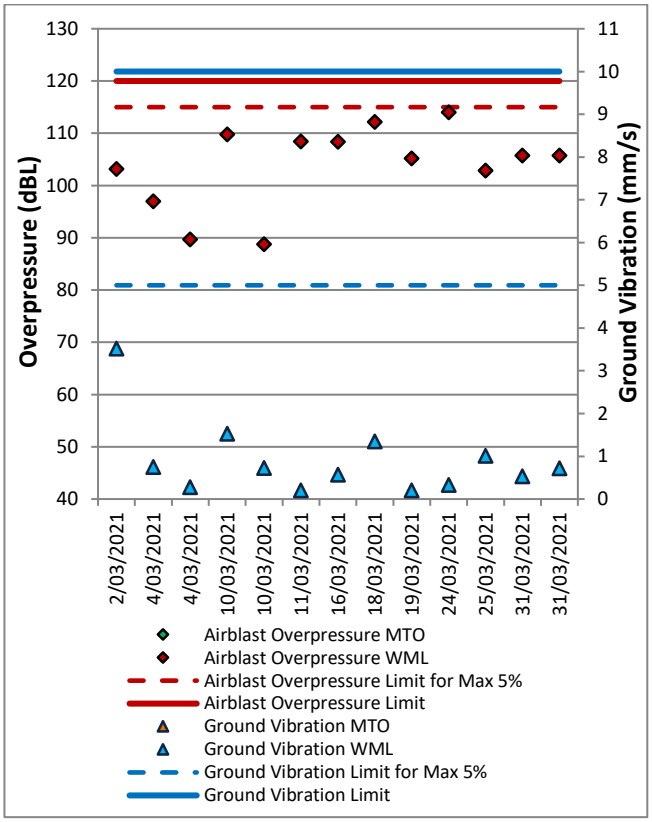


Figure 66: Warkworth Blast Monitoring Results - March 2021

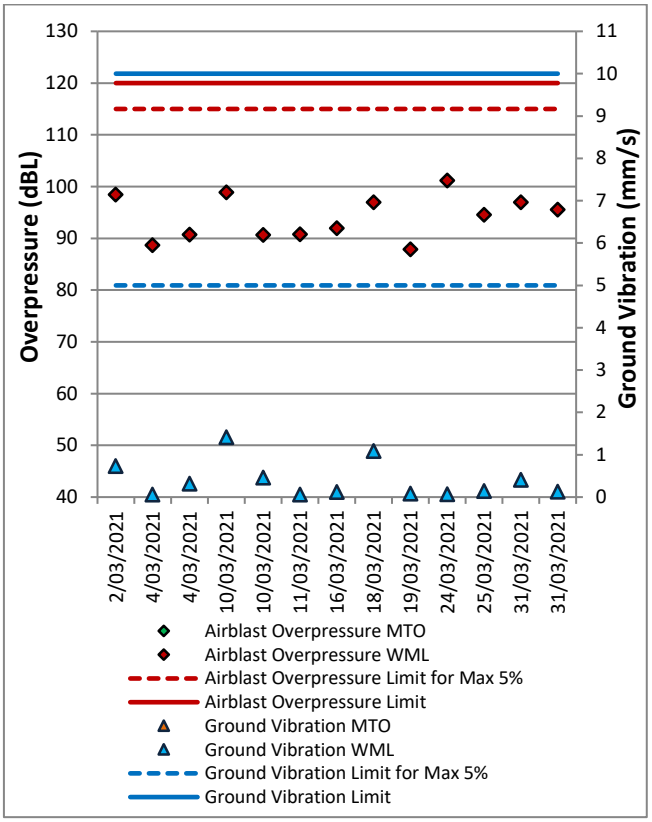


Figure 68: Wollemi Peak Road Blast Monitoring Results - March 2021

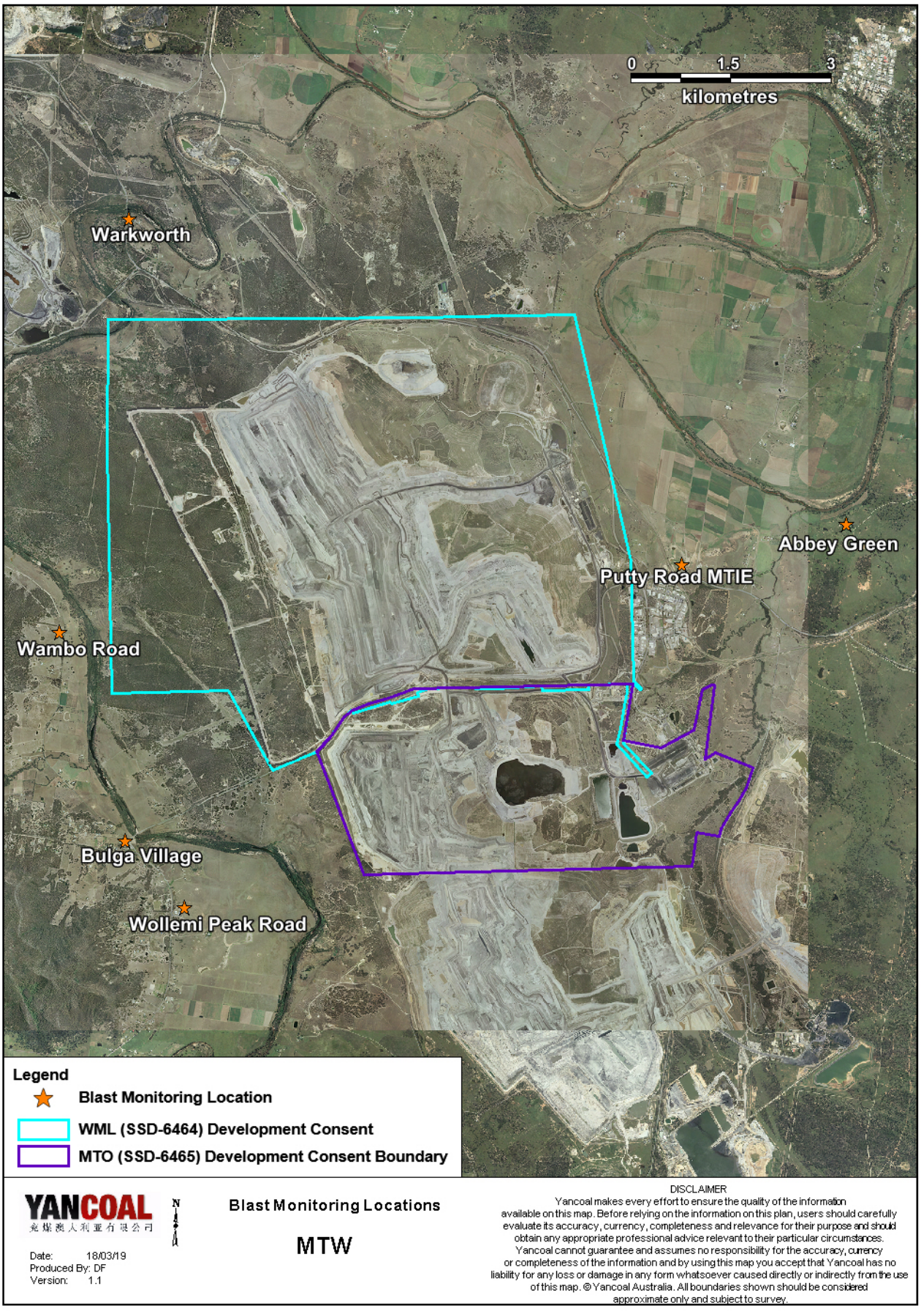


Figure 69: Blast and Vibration Monitoring Location Plan

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 Report. The purpose of the noise surveys is to quantify and describe the acoustic environment around the site and compare results with specified limits. Unattended monitoring (real time noise monitoring) also occurs at five sites surrounding MTW. The attended noise monitoring locations are displayed in **Figure 70.**

5.1 Attended Noise Monitoring Results

Attended monitoring was conducted at receiver locations surrounding MTW on the night of 15/16 March 2021. 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 **Table 5** and **Table 6**.

Table 5: $L_{Aeq,\ 15\ minute}$ Warkworth Impact Assessment Criteria – March 2021

Location	Date and Time	Wind Speed (m/s)	Stability Class	Criterion (dB(A))	Criterion Applies?[1]	WML L_{Aeq} dB[2,3]	Exceedance[3,4]
Bulga RFS	16/03/2021 0:19	2	E	37	Yes	IA	Nil
Bulga Village	15/03/2021 23:34	2.2	D	38	Yes	33	Nil
Gouldsville	15/03/2021 21:29	1.8	E	38	Yes	<30	Nil
Inlet Rd	15/03/2021 21:42	2	E	37	Yes	33	Nil
Inlet Rd West	15/03/2021 21:12	1.7	F	35	Yes	30	Nil
Long Point	15/03/2021 21:05	2.1	F	35	No	IA	NA
South Bulga	16/03/2021 1:05	2.4	D	35	Yes	IA	Nil
Wambo Road	15/03/2021 22:11	1.9	F	38	Yes	38	Nil

Notes:
1. Noise emission limits 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. Estimated or measured LAeq,15minute attributed to WML;
3. Bold results in red are possible exceedances of relevant criteria;
4. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not Applicable.

Table 6: $L_{A1,\ 1\ minute}$ Warkworth Impact Assessment Criteria – March 2021

Location	Date and Time	Wind Speed (m/s)	Stability Class	Criterion (dB(A))	Criterion Applies?[1]	WML L_{Aeq} dB[2,3]	Exceedance[3,4]
Bulga RFS	16/03/2021 0:19	2	E	47	Yes	IA	Nil
Bulga Village	15/03/2021 23:34	2.2	D	48	Yes	45	Nil
Gouldsville	15/03/2021 21:29	1.8	E	48	Yes	<30	Nil
Inlet Rd	15/03/2021 21:42	2	E	47	Yes	39	Nil
Inlet Rd West	15/03/2021 21:12	1.7	F	45	Yes	34	Nil
Long Point	15/03/2021 21:05	2.1	F	45	No	IA	NA
South Bulga	16/03/2021 1:05	2.4	D	45	Yes	IA	Nil
Wambo Road	15/03/2021 22:11	1.9	F	48	Yes	42	Nil

Notes:
1. Noise emission limits 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. Estimated or measured LA1,1minute attributed to WML;
3. Bold results in red are possible exceedances of relevant criteria;
4. NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not Applicable.

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 Operations - Impact Assessment Criteria – March 2021

Location	Date and Time	Wind Speed (m/s)	Stability Class	Criterion dB	Criterion Applies?[1]	MTO L_{Aeq} dB[2,3]	Exceedance[3,4]
Bulga RFS	16/03/2021 0:19	2	E	37	Yes	IA	Nil
Bulga Village	15/03/2021 23:34	2.2	D	38	Yes	IA	Nil
Gouldsville	15/03/2021 21:29	1.8	E	35	Yes	IA	Nil
Inlet Rd	15/03/2021 21:42	2	E	37	Yes	IA	Nil
Inlet Rd West	15/03/2021 21:12	1.7	F	35	Yes	IA	Nil
Long Point	15/03/2021 21:05	2.1	F	35	No	IA	NA
South Bulga	16/03/2021 1:05	2.4	D	36	Yes	IA	Nil
Wambo Road	15/03/2021 22:11	1.9	F	38	Yes	IA	Nil

Notes:
1. Noise emission limits 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. Estimated or measured LAeq,15minute attributed to MTO;
3. Bold results in red are possible exceedances of relevant criteria;
4. NA in exceedance column means atmospheric conditions outside conditions specified in project approval and so criterion is not applicable.

Table 8: $L_{A1, 1Minute}$ Mount Thorley Operations - Impact Assessment Criteria – March 2021

Location	Date and Time	Wind Speed (m/s)	Stability Class	Criterion dB	Criterion Applies?[1]	MTO $L_{A1, 1min}$ dB[2,3]	Exceedance[3,4]
Bulga RFS	16/03/2021 0:19	2	E	47	Yes	IA	Nil
Bulga Village	15/03/2021 23:34	2.2	D	48	Yes	IA	Nil
Gouldsville	15/03/2021 21:29	1.8	E	45	Yes	IA	Nil
Inlet Rd	15/03/2021 21:42	2	E	47	Yes	IA	Nil
Inlet Rd West	15/03/2021 21:12	1.7	F	45	Yes	IA	Nil
Long Point	15/03/2021 21:05	2.1	F	45	No	IA	NA
South Bulga	16/03/2021 1:05	2.4	D	46	Yes	IA	Nil
Wambo Road	15/03/2021 22:11	1.9	F	48	Yes	IA	Nil

Notes:
1. Noise emission limits 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. Estimated or measured LAeq,15minute attributed to MTO;
3. Bold results in red are possible exceedances of relevant criteria;
4. NA in exceedance column means atmospheric conditions outside conditions specified in project approval and so criterion is not applicable.

5.1.3 Low Frequency Assessment

In accordance with the requirements of the EPA's Noise Policy for Industry (NPfI), the applicability of the low frequency modification penalty has been assessed. This resulted in the application of a 2dB penalty to the site only LAeq for the measurements taken at Bulga Village and Wambo Road for Warkworth on 15/16 March 2021. 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 – March 2021

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]	Exceedance
Bulga RFS	16/03/2021 0:19	IA	Yes	No	No	NA	No	NA	Nil	NA
Bulga Village	15/03/2021 23:34	31	Yes	No	No	NA	Yes	2 dB @ 80 Hz	+2	NA
Gouldsville	15/03/2021 21:29	<30	Yes	No	No	NA	No	NA	Nil	NA
Inlet Rd	15/03/2021 21:42	33	Yes	No	No	NA	No	NA	Nil	NA
Inlet Rd West	15/03/2021 21:12	30	Yes	No	No	NA	No	NA	Nil	NA
Long Point	15/03/2021 21:05	IA	No	No	No	NA	No	NA	Nil	NA
South Bulga	16/03/2021 1:05	IA	Yes	No	No	NA	No	NA	Nil	NA
Wambo Road	15/03/2021 22:11	36	Yes	No	No	NA	Yes	2 dB @ 80 Hz	+2	NA

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 – March 2021

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]	Exceedance
Bulga RFS	16/03/2021 0:19	IA	Yes	No	No	NA	No	NA	Nil	NA
Bulga Village	15/03/2021 23:34	IA	Yes	No	No	NA	No	NA	Nil	NA
Gouldsville	15/03/2021 21:29	IA	Yes	No	No	NA	No	NA	Nil	NA
Inlet Rd	15/03/2021 21:42	IA	Yes	No	No	NA	No	NA	Nil	NA
Inlet Rd West	15/03/2021 21:12	IA	Yes	No	No	NA	No	NA	Nil	NA
Long Point	15/03/2021 21:05	IA	No	No	No	NA	No	NA	Nil	NA
South Bulga	16/03/2021 1:05	IA	Yes	No	No	NA	No	NA	Nil	NA
Wambo Road	15/03/2021 22:11	IA	Yes	No	No	NA	No	NA	Nil	NA

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

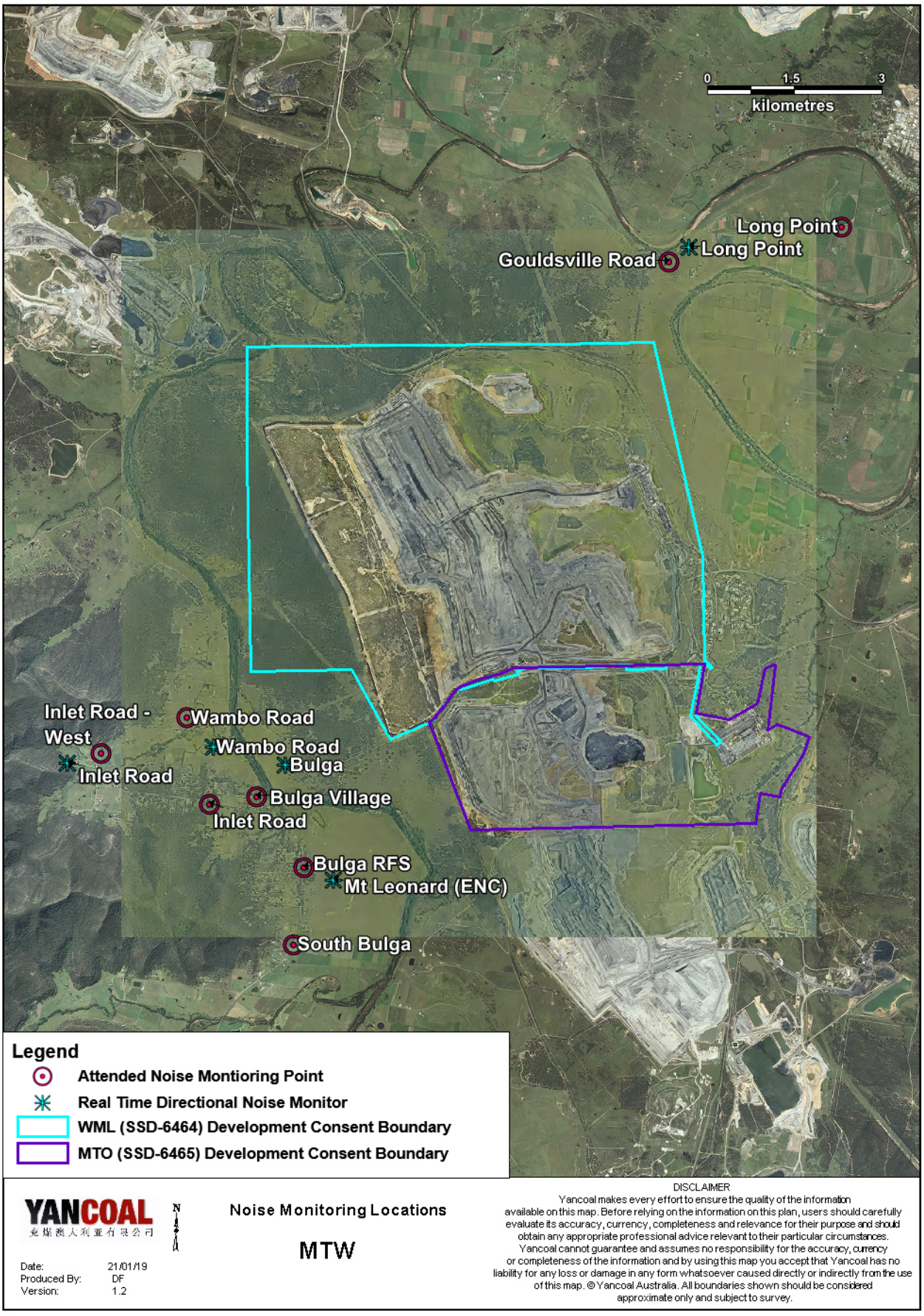


Figure 70: Noise Monitoring Location Plan

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 so as 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 during March are provided in **Table 11**.

Table 11: Supplementary Attended Noise Monitoring Data – March 2021

No. of assessments	No. of assessments > trigger	No. of nights where assessments > trigger	% greater than trigger
589	0	0	0

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

6.0 OPERATIONAL DOWNTIME

During March a total of 88 hours of equipment downtime was logged in response to environmental events such as dust, noise and elevated wind impacts. Operational downtime by equipment type is shown in **Figure 71**.

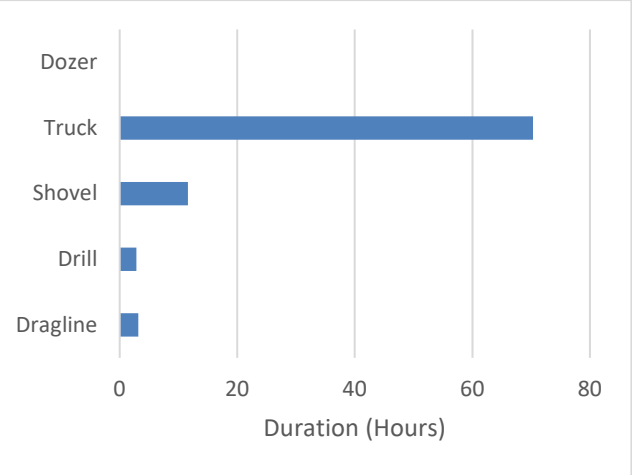


Figure 71: Operational Downtime by Equipment Type – March 2021

7.0 REHABILITATION

During March, 0 Ha of land was released for rehabilitation. Year-to-date progress can be viewed in **Figure 72.**

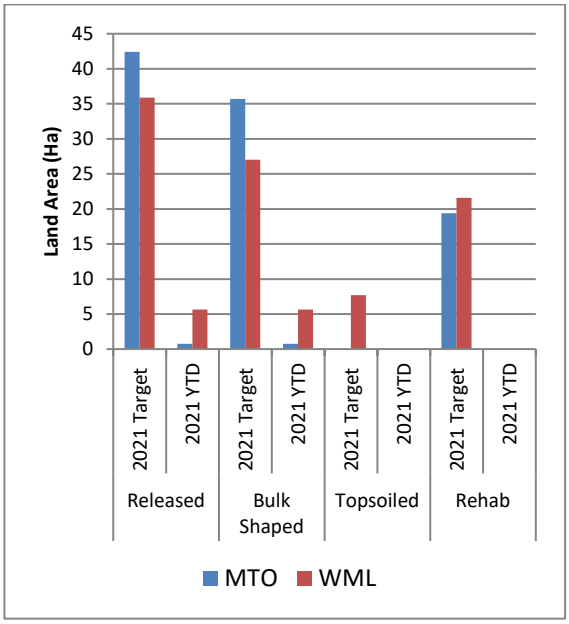


Figure 72: Rehabilitation YTD – March 2021

8.0 ENVIRONMENTAL INCIDENTS

There was one environmental incident recorded during the reporting period.

On 19 March 2021, multiple dams overtopped their spillways due to a significant rainfall event. Rainfall started at approximately 2:00am Thursday 18th March 2021 and continued to approximately 5:30pm on Tuesday 23 March 2021. A total of 175.2mm of rainfall was recorded during the above period. Notifications to the relevant regulatory authorities was undertaken by the MTW Environment and Community Manager in accordance with the sites Pollution Incident Response Management Plan.

9.0 COMPLAINTS

During the reporting period 12 complaints were received, details of these complaints are displayed in **Table 12** below.

Table 12: Complaints Summary - YTD March 2021

	Noise	Dust	Blast	Lighting	Other	Total
January	1	0	6	4	1	12
February	4	0	3	0	0	7
March	5	0	3	3	1	12
April						
May						
June						
July						
August						
September						
October						
November						
December						
Total	10	0	12	7	2	31

Appendix A: Meteorological Data

Table 13: Meteorological Data – Charlton Ridge Meteorological Station – March 2021

Date	Air Temperature Maximum (°C)	Air Temperature Minimum (°C)	Relative Humidity Maximum (%)	Relative Humidity Minimum (%)	Wind Direction Average (°)	Wind Speed Average (m/sec)	Rainfall(mm)
1/03/2021	34	17	92	28	191	2.3	0.0
2/03/2021	29	15	84	23	152	2.9	0.0
3/03/2021	24	13	83	54	146	3.3	0.0
4/03/2021	29	11	90	30	170	2.1	0.0
5/03/2021	29	11	82	32	191	2.6	0.0
6/03/2021	26	13	80	40	131	2.9	0.0
7/03/2021	29	11	88	39	143	2.3	0.0
8/03/2021	31	12	97	44	238	2.3	7.6
9/03/2021	31	14	97	38	240	3.1	0.4
10/03/2021	28	16	84	54	107	3.1	0.0
11/03/2021	29	15	88	47	104	2.6	0.2
12/03/2021	28	15	98	57	156	1.5	11.0
13/03/2021	33	15	99	38	216	1.7	0.2
14/03/2021	24	10	99	73	169	3.7	36.2
15/03/2021	24	10	91	50	150	2.9	0.0
16/03/2021	22	10	98	54	155	3.1	0.4
17/03/2021	20	12	99	72	137	3.5	4.4
18/03/2021	21	13	99	71	145	3.7	29.2
19/03/2021	20	13	99	81	146	3.8	43.2
20/03/2021	24	14	99	75	131	4.6	36.8
21/03/2021	20	13	99	87	120	4.1	18.8
22/03/2021	19	12	99	89	125	3.5	33.0
23/03/2021	22	13	99	85	129	2.2	14.2
24/03/2021	27	14	99	42	306	4.0	0.0
25/03/2021	27	12	82	43	286	3.5	0.0
26/03/2021	26	11	94	28	226	2.0	0.0
27/03/2021	27	12	90	30	228	1.8	0.0
28/03/2021	27	10	90	34	220	1.8	0.0
29/03/2021	27	12	91	37	147	2.2	0.0
30/03/2021	24	11	97	47	158	2.8	1.0
31/03/2021	23	10	89	51	155	2.7	0.0