Monthly Environmental Monitoring Report

Yancoal Mt Thorley Warkworth

March 2019

CONTENTS

Figures

Tables

Revision History

Version No.	Person Responsible	Document Status	Date
1.0	**Environmental Advisor**	**Final**	**06/05/2019**

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 2019.

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

2019	Monthly Rainfall (mm)	Cumulative Rainfall (mm)
March	124.4	202.0

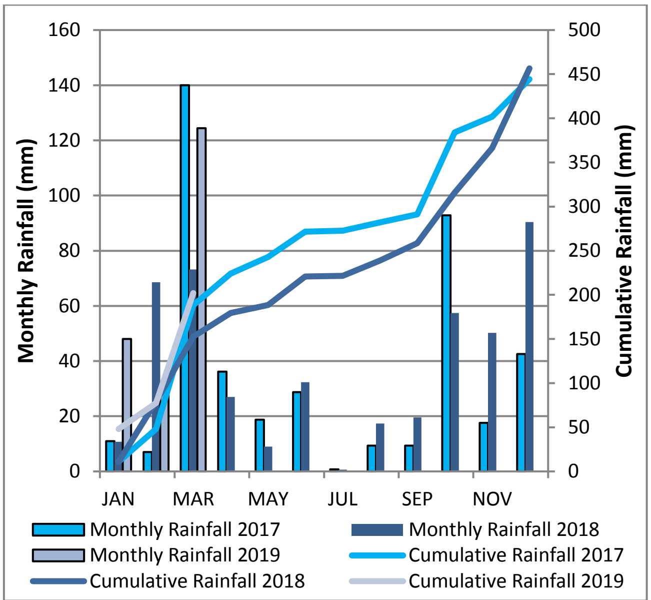


Figure 1: Rainfall Trends YTD

2.1.2 Wind Speed and Direction

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

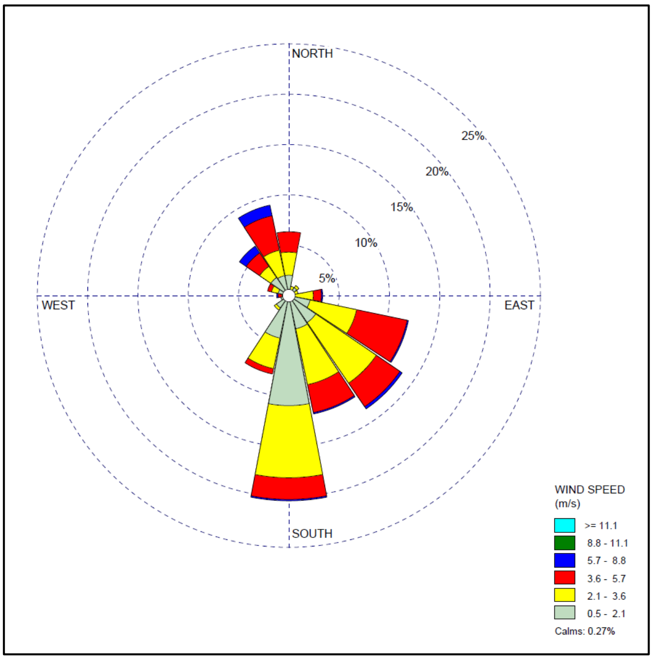


Figure 2: Charlton Ridge Wind Rose – March 2019

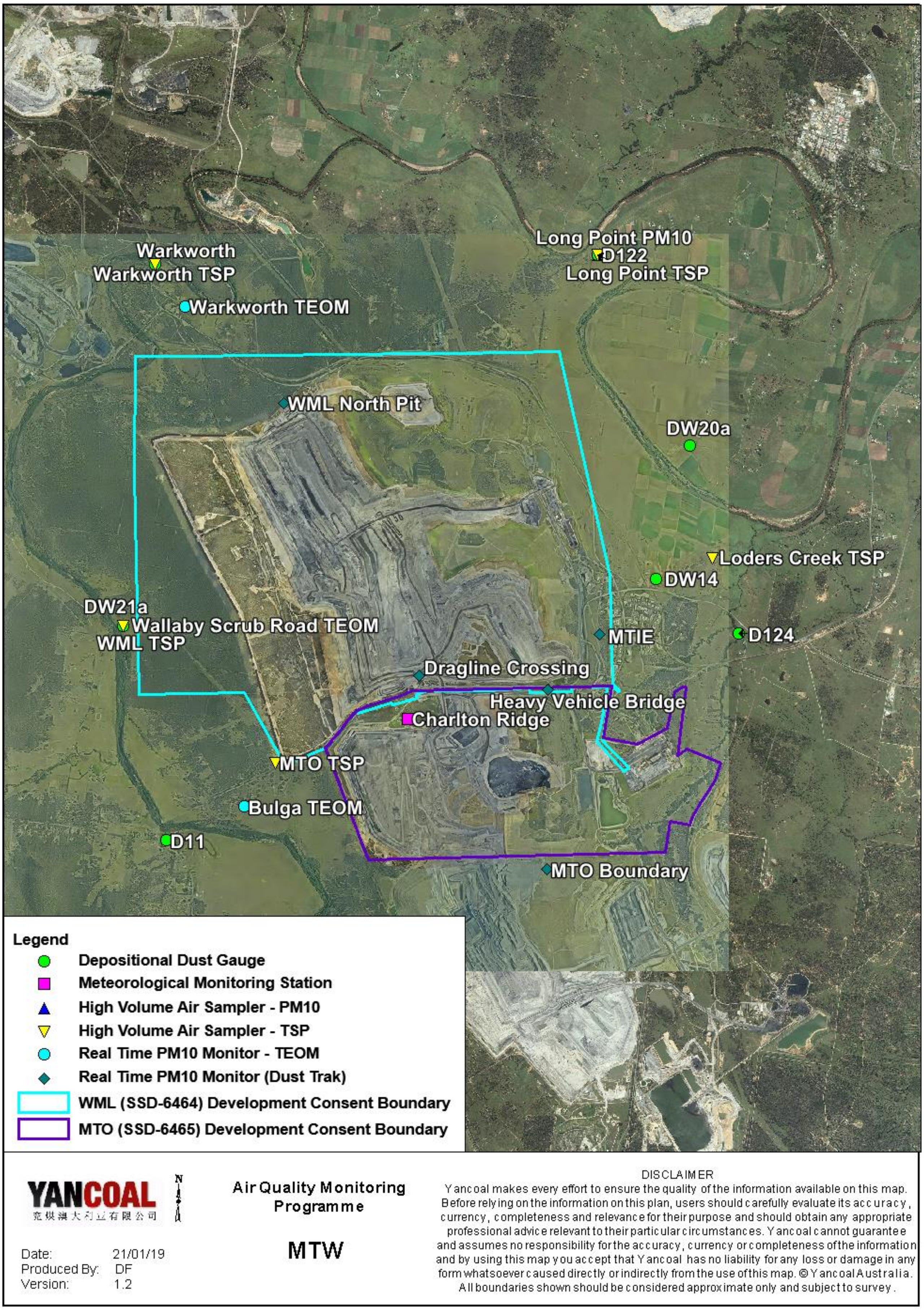


Figure 3: Air Quality Monitoring Locations

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 DW20a, D124 and Warkworth monitors recorded monthly results above the long-term impact assessment criteria of 4.0 g/m^2 per month. Field notes associated with DW20a and D124 confirm the presence of bird droppings, vegetation and/or insects. As such the results are considered contaminated and will be excluded from calculation of the annual average. There is no evidence to suggest that the Warkworth results are contaminated. Accordingly, the results will be included in the annual average calculation.

An assessment of MTW's contribution to the long-term Impact assessment criteria will be provided in the 2019 Annual Review Report.

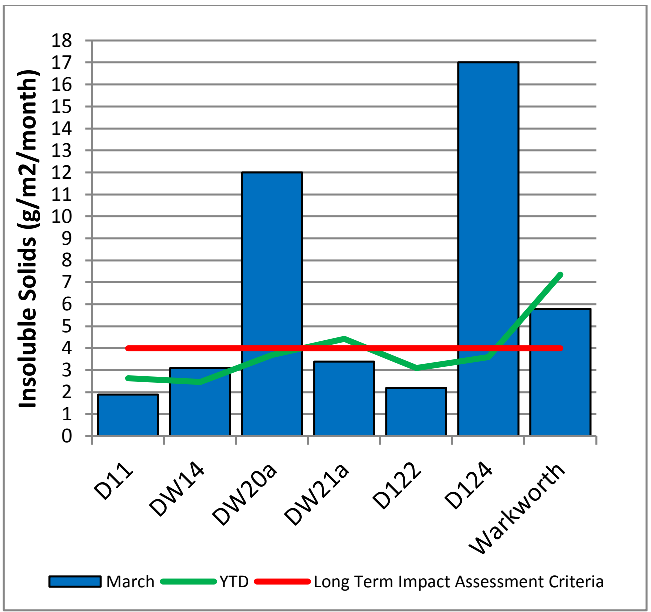


Figure 4: Depositional Dust – March 2019

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/m³.

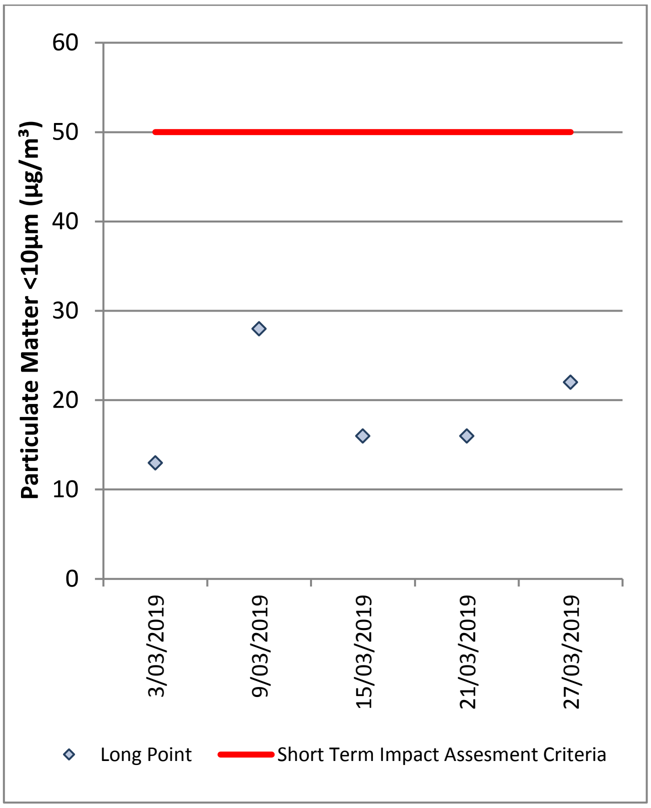


Figure 5: Individual PM_{10} Results – March 2019

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

An assessment of MTW's contribution to the long-term Impact assessment criteria will be provided in the 2019 Annual Review Report.

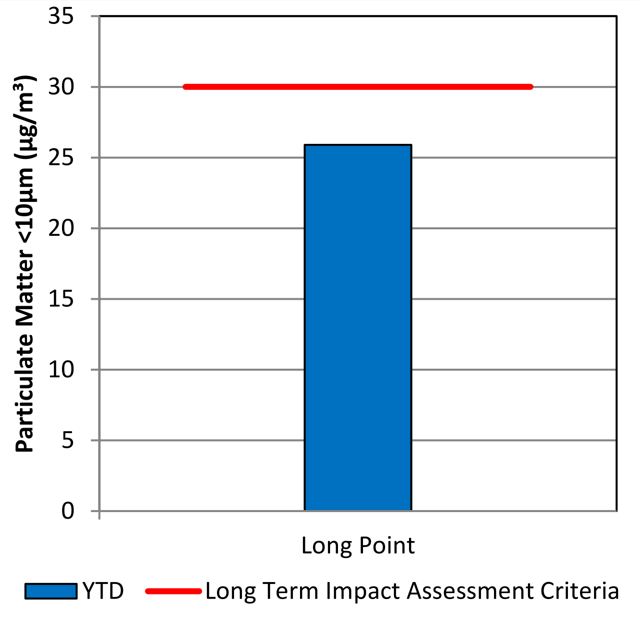


Figure 6: Annual Average PM_{10} – March 2019

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 contribution to the long-term assessment criteria will be reported in the 2019 Annual Review Report.

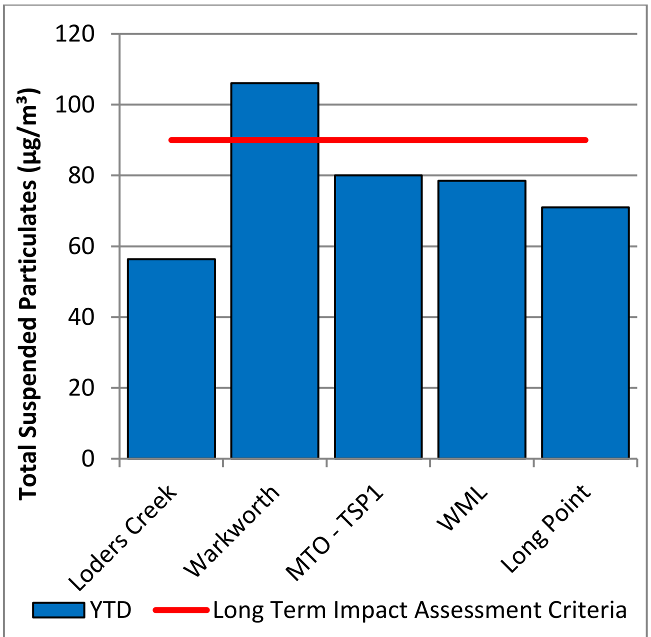


Figure 7: Annual Average Total Suspended Particulates - March 2019

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.

On 6 March 2019, the Bulga (62.3 µg/m³), Wallaby Scrub Road (61.7 µg/m³) and Warkworth (78.0 µg/m³) TEOM's exceeded the short term (24hr) criteria. These measurements were assessed for MTW's potential contribution based on meteorological conditions on this day resulting in maximum estimated contributions of 13.2 µg/m³, 9.5 µg/m³ and 16.1 µg/m³ respectively (less than 25% contribution to the results) from the direction of MTW. Accordingly, no further action is required (as per approved Air Quality Monitoring Programme).

On 11 March 2019, the Bulga (53.1 µg/m³) and Warkworth (51.2 µg/m³) TEOM's exceeded the short term (24hr) criteria. These measurements were assessed for MTW's potential contribution based on meteorological conditions on this day resulting in maximum estimated contributions of 13.3 µg/m³ and 35.3 µg/m³ respectively (less than 22% and 69% contribution to the results respectively) from the direction of MTW. Accordingly, no further action is required (as per approved Air Quality Monitoring Programme).

On 31 March, the Warkworth (64.2 µg/m³) TEOM exceeded the short term (24hr) criteria. This measurement was assessed for MTW's potential contribution based on meteorological conditions on this day resulting in a maximum estimated contribution of 9.6 µg/m³ (less than 15% contribution to the result) from the direction of MTW. Accordingly, no further action is required (as per approved Air Quality Monitoring Programme).

2.3.4 Real Time Alarms for Air Quality

During March, the real time monitoring system generated 146 automated air quality related alerts, including 8 alerts for adverse meteorological conditions and 138 alerts for elevated PM10 levels.

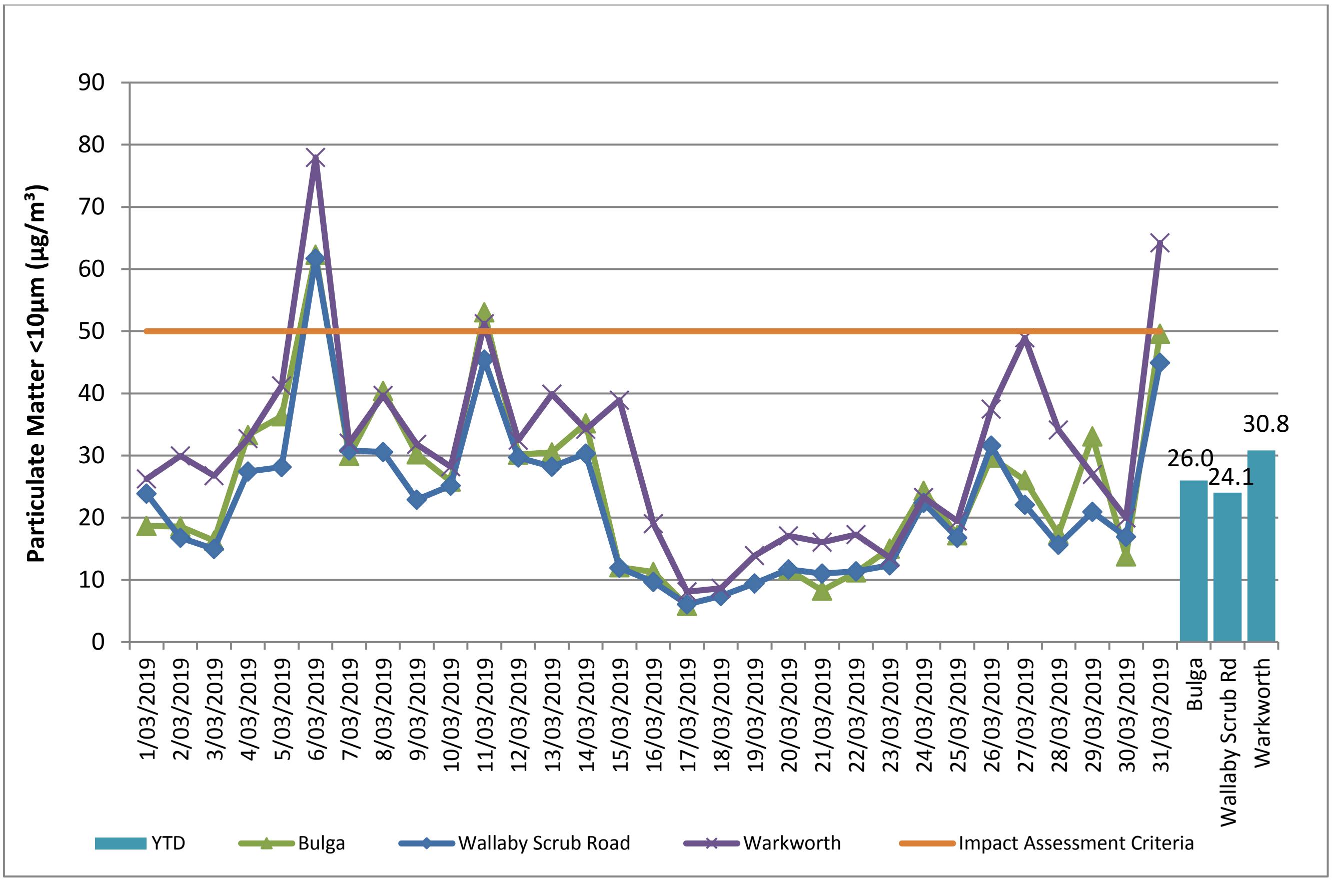


Figure 8: Real Time PM10 24hr average and Year-to-date average – March 2019

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 (2016 – current) within MTW mine dams. **Figure 12** to **Figure 14** show the long-term surface water trend (2016 - current) in surrounding watercourses.

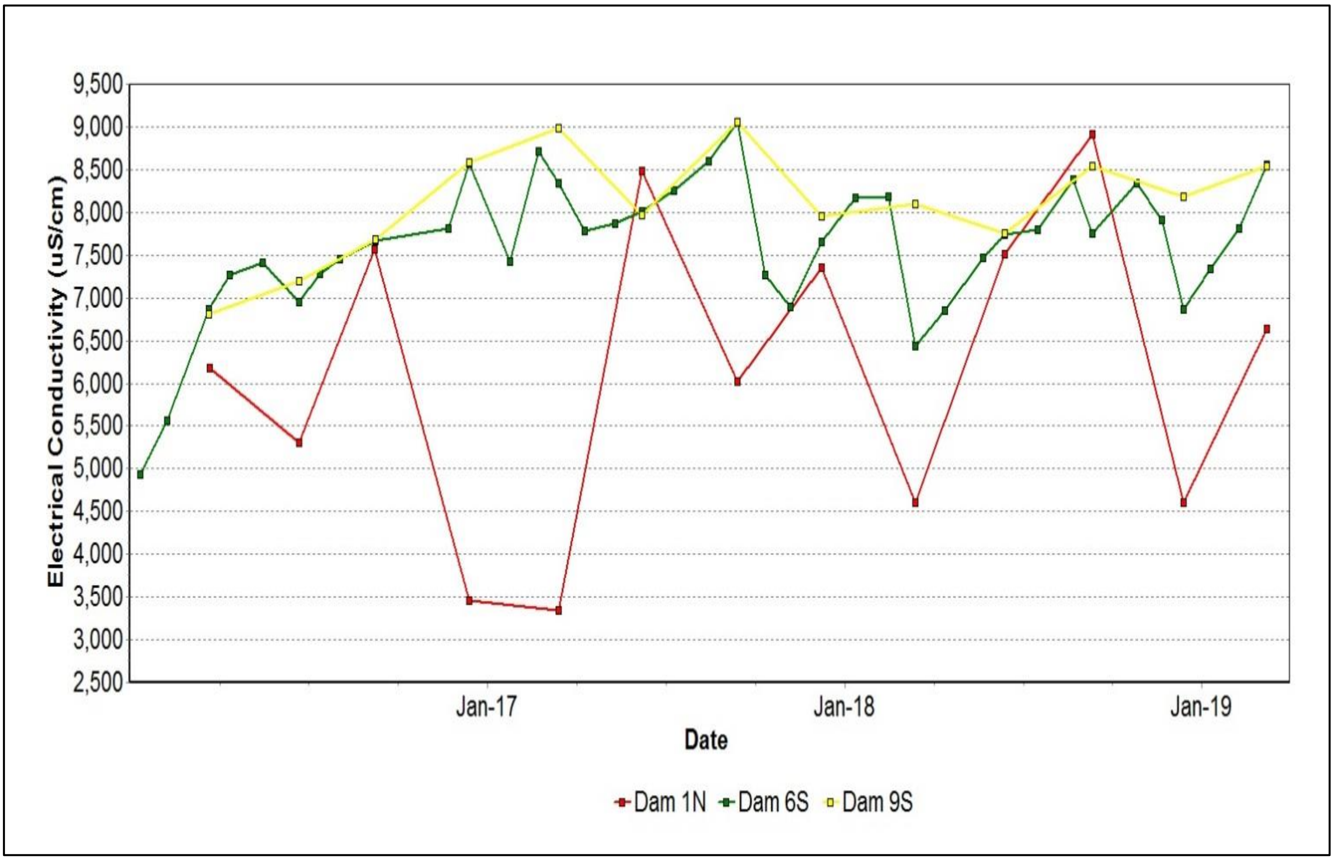


Figure 9: Site Dams Electrical Conductivity Trend – March 2019

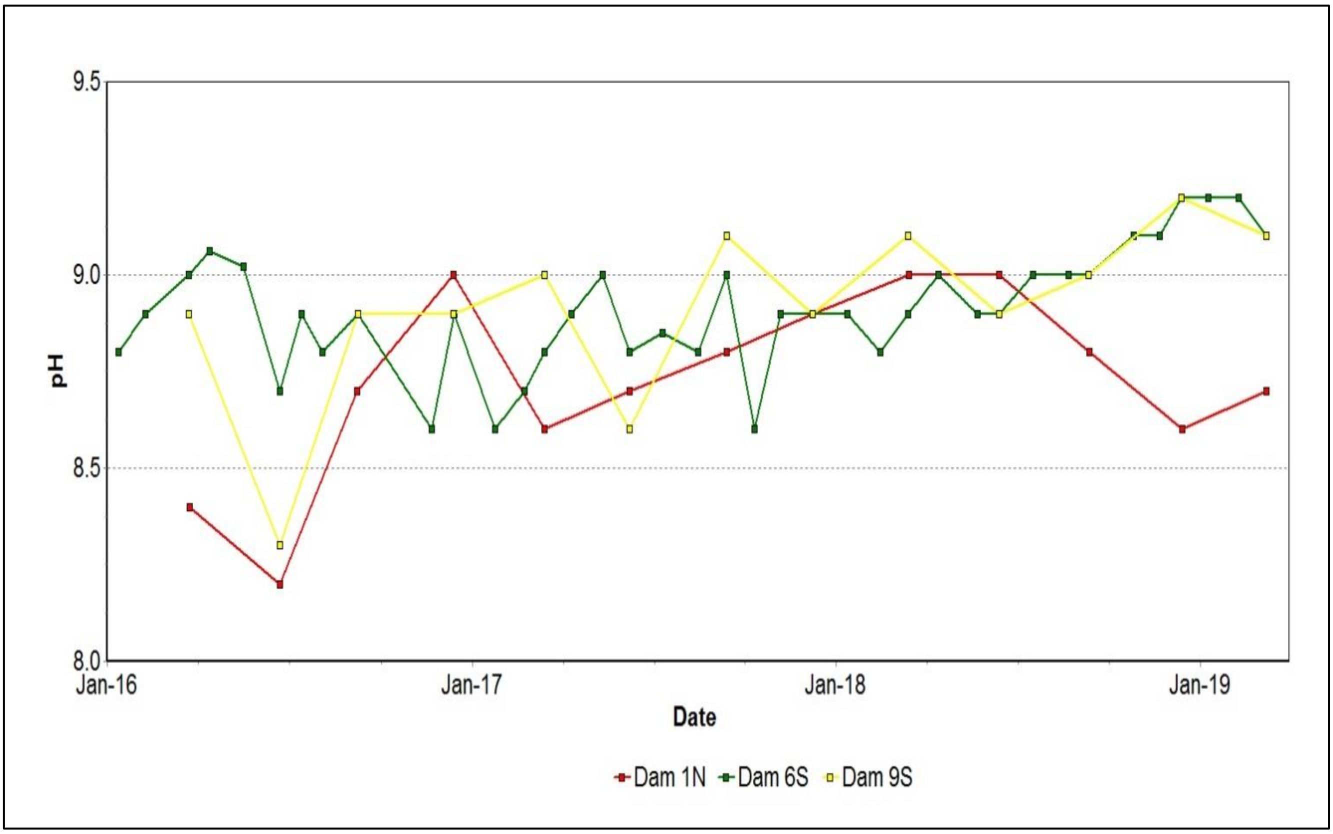


Figure 10: Site Dams pH Trend – March 2019

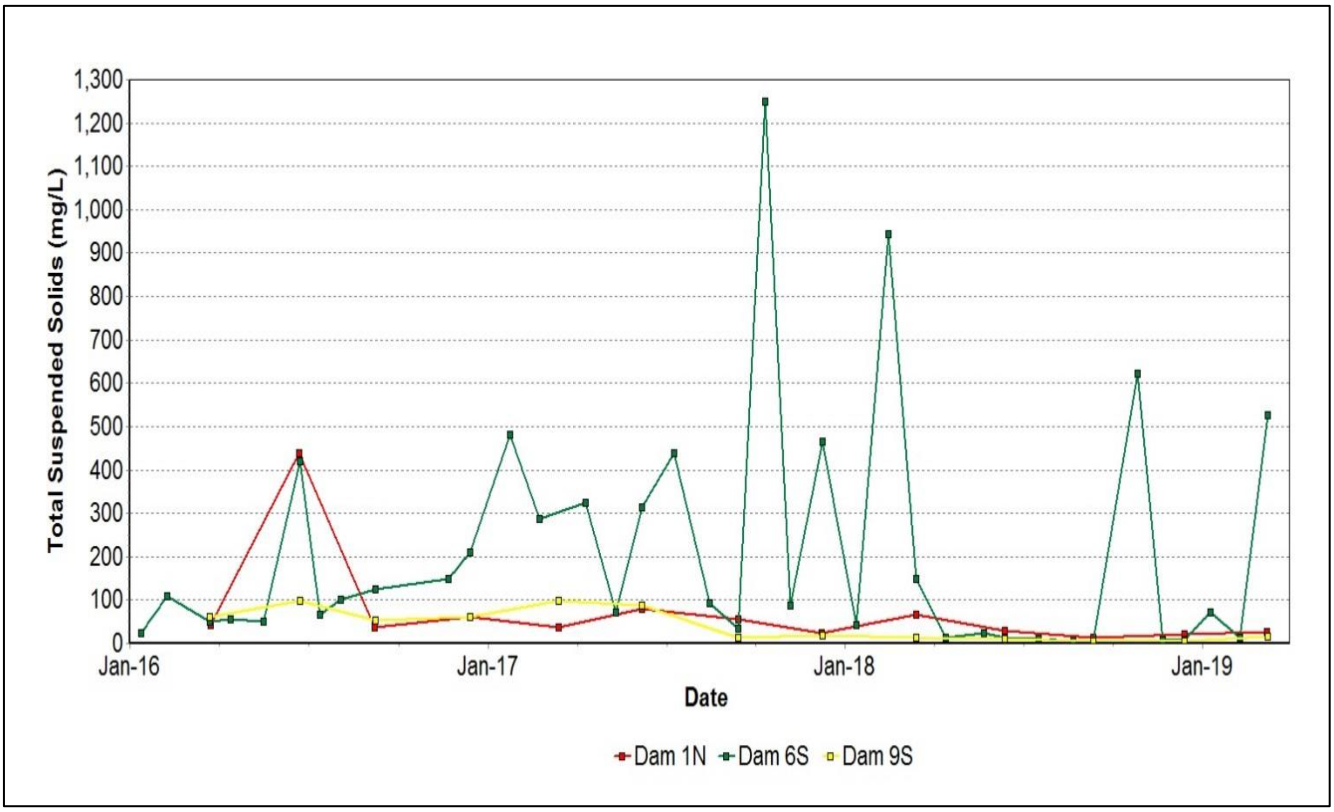
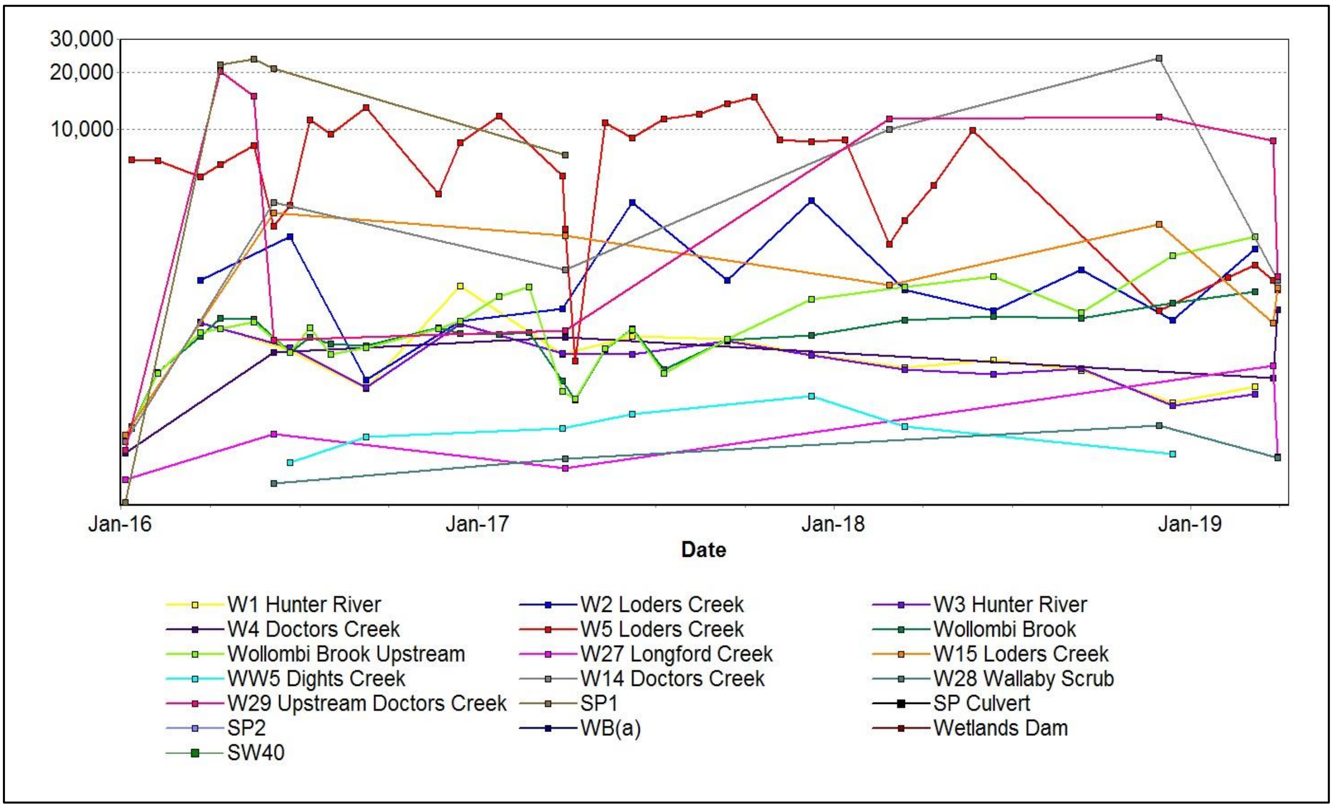
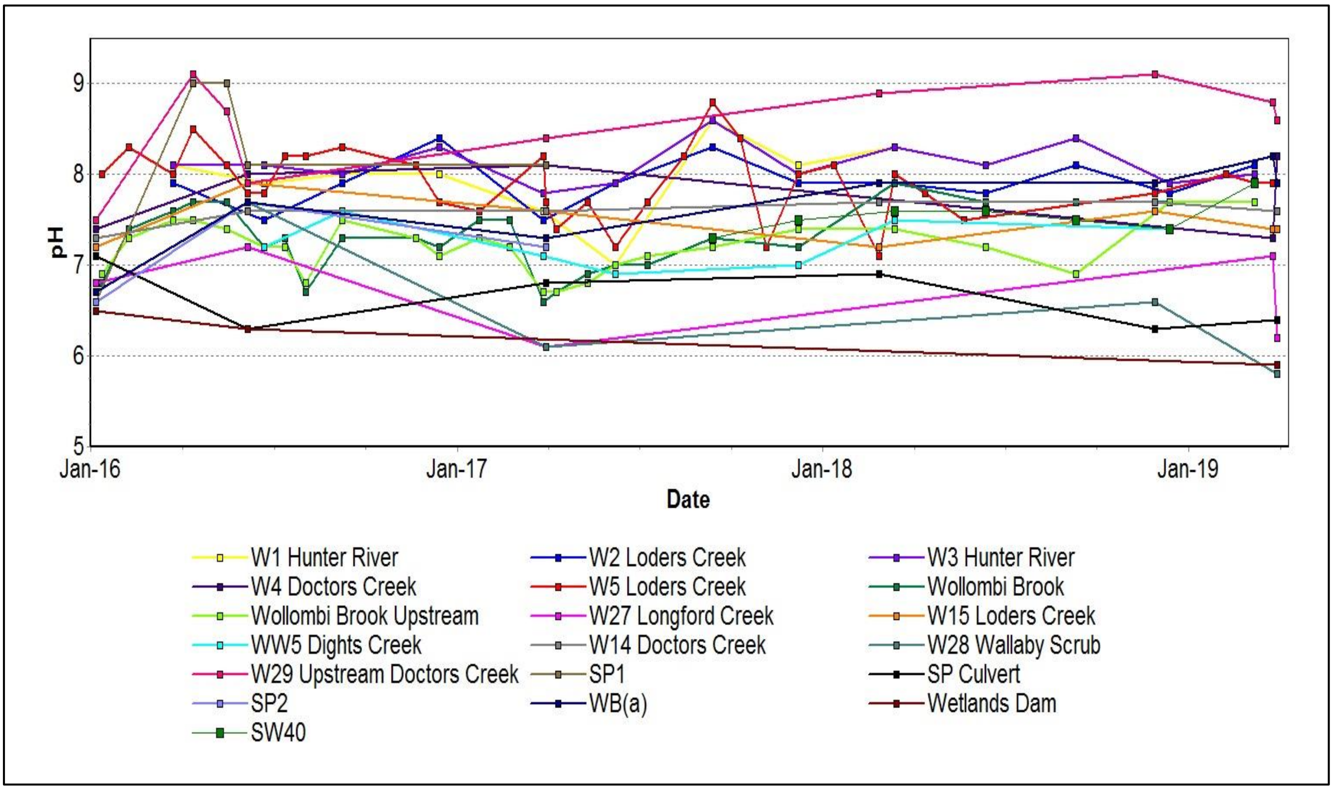


Figure 11: Site Dams Total Suspended Solids Trend – March 2019



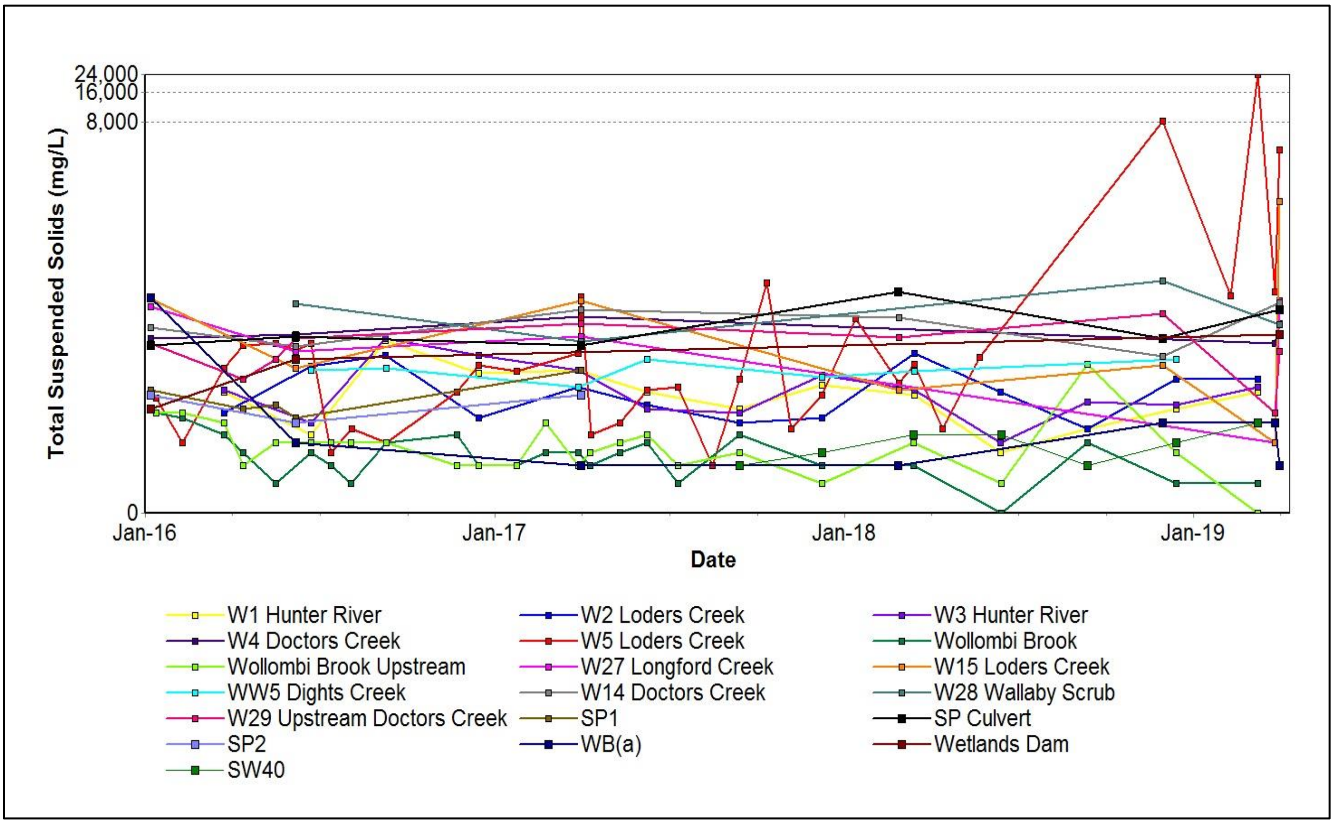
Note: Missing data indicates that there was insufficient water to take a sample, or that there was no safe access.

Figure 12: Watercourse Electrical Conductivity Trend – March 2019



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 2019



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 2019

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 2019

Site	Date	Trigger Limit Breached	Action Taken in Response
W27	26/03/2019	EC –95th Percentile	Watching Brief*
Wollombi Brook	08/03/2019	EC –95th Percentile	Elevated EC is considered attributable to prolonged dry climatic conditions, and not related to mining related impacts. Wollombi Brook Upstream showing similar EC results and trends. Continue to watch and monitor.
Wollombi Brook Upstream	08/03/2019	EC –95th Percentile	Watching Brief*
SW40	08/03/2019	EC –95th Percentile	Watching Brief*
W4	26/03/2019	pH –5th Percentile	Watching Brief*
W27	31/03/2019	pH –5th Percentile	Watching Brief*
W28	31/03/2019	pH –5th Percentile	Watching Brief*
W4	31/03/2019	TSS – 50mg/L (ANZECC criteria)	Field investigation did not identify any mining related sources of sediment. Elevated TSS results most likely attributable to high intensity rainfall event after prolonged dry period (52mm in 24 hours).
W5	09/01/2019	TSS – 50mg/L (ANZECC criteria)	Field investigation did not identify any mining related sources of sediment. Elevated TSS results considered attributable to sampling from a pool of water with no flow.
W5	08/02/2019	TSS – 50mg/L (ANZECC criteria)	Elevated TSS results considered attributable to sampling from a pool of water with no flow.
W5	08/03/2019	TSS – 50mg/L (ANZECC criteria)	Field investigation did not identify any mining related sources of sediment. Elevated TSS results most likely attributable to sampling from a pool of water with no flow.
W14	31/03/2019	TSS – 50mg/L (ANZECC criteria)	Field investigation did not identify any mining related sources of sediment. Elevated TSS results most likely attributable to high intensity rainfall event after prolonged dry period (52mm in 24 hours).
W15	31/03/2019	TSS – 50mg/L (ANZECC criteria)	Field investigation did not identify any mining related sources of sediment. Elevated TSS results most likely attributable to high intensity rainfall event after prolonged dry period (52mm in 24 hours).

W27	31/03/2019	TSS – 50mg/L (ANZECC criteria)	Elevated TSS results most likely attributable to high intensity rainfall event after prolonged dry period (52mm in 24 hours). In addition, TSS results were potentially affected by turbid water associated with the overtopping of an MTW sediment dam as a result of significant rainfall on 30 March 2019. This is discussed further in Section 8.0.
W28	31/03/2019	TSS – 50mg/L (ANZECC criteria)	Elevated TSS results most likely attributable to high intensity rainfall event after prolonged dry period (52mm in 24 hours). In addition, TSS results were potentially affected by turbid water associated with the overtopping of an MTW sediment dam as a result of significant rainfall on 30 March 2019. This is discussed further in Section 8.0.

* = Watching brief established pending outcomes of subsequent monitoring events. No specific actions required.

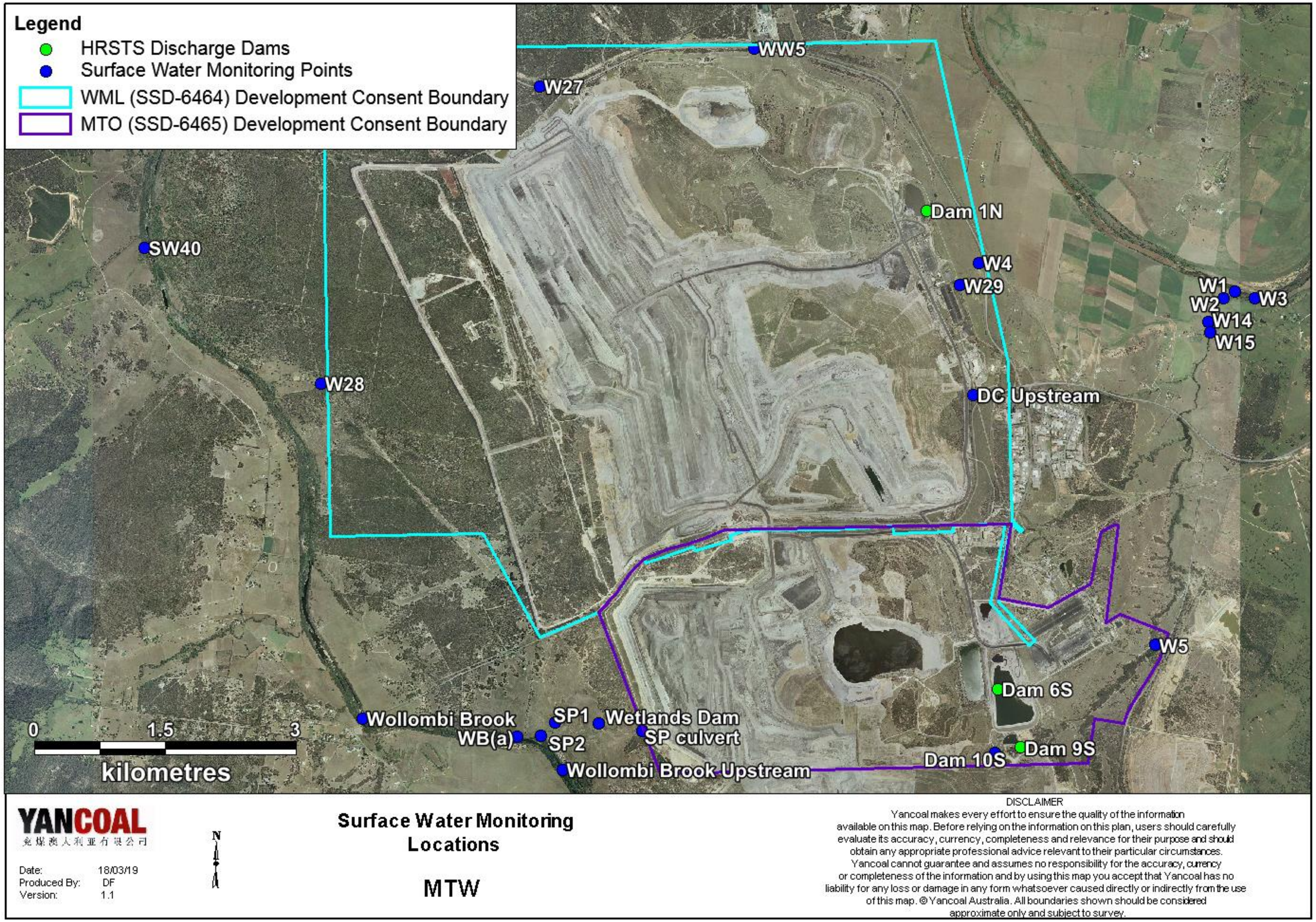


Figure 15: Surface Water Monitoring Location Plan

3.2 Groundwater Monitoring

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

Figure 16 to **Figure 60** show the long-term water quality trends (2016 – current) for groundwater bores monitored at MTW.

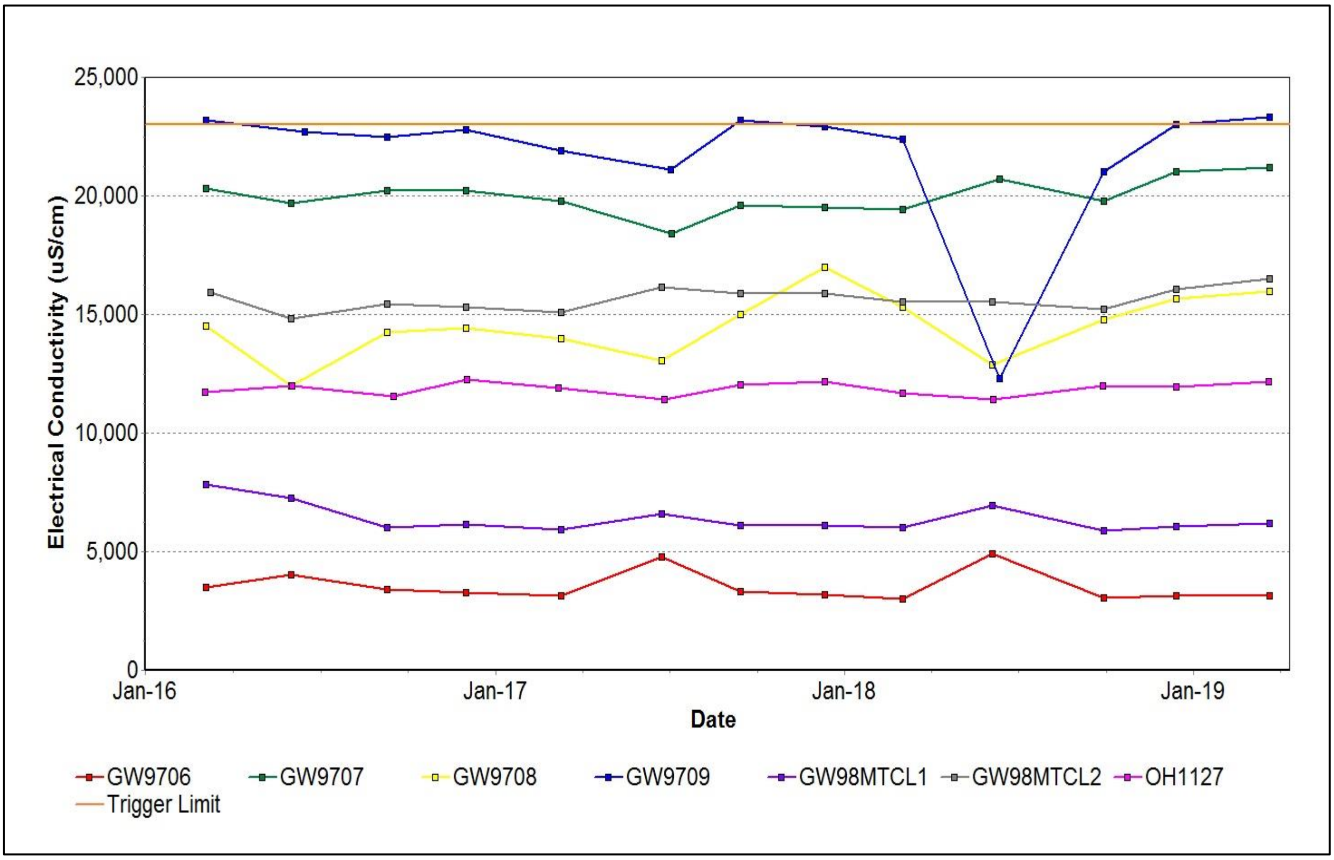


Figure 16: Bayswater Seam Electrical Conductivity Trend – March 2019

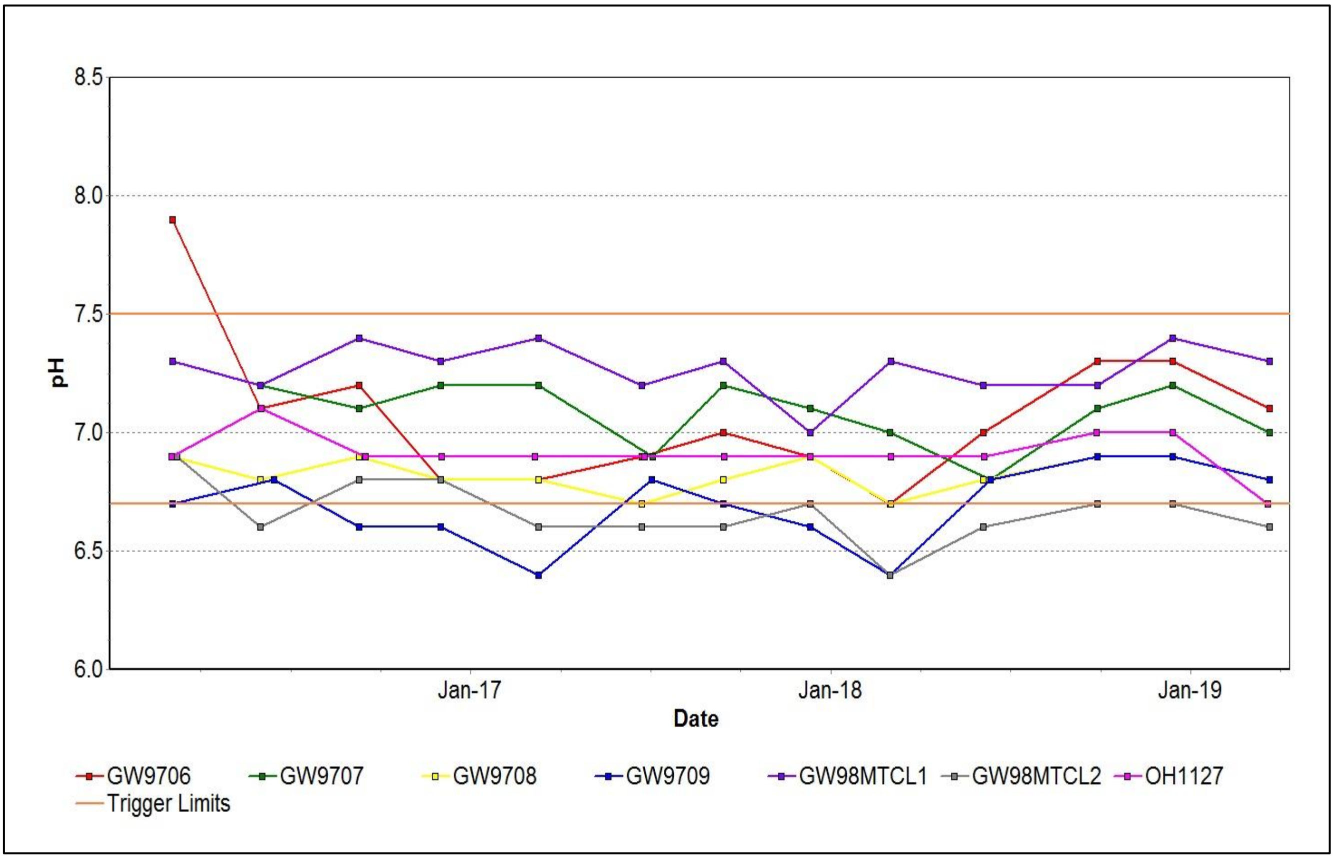


Figure 17: Bayswater Seam pH Trend – March 2019

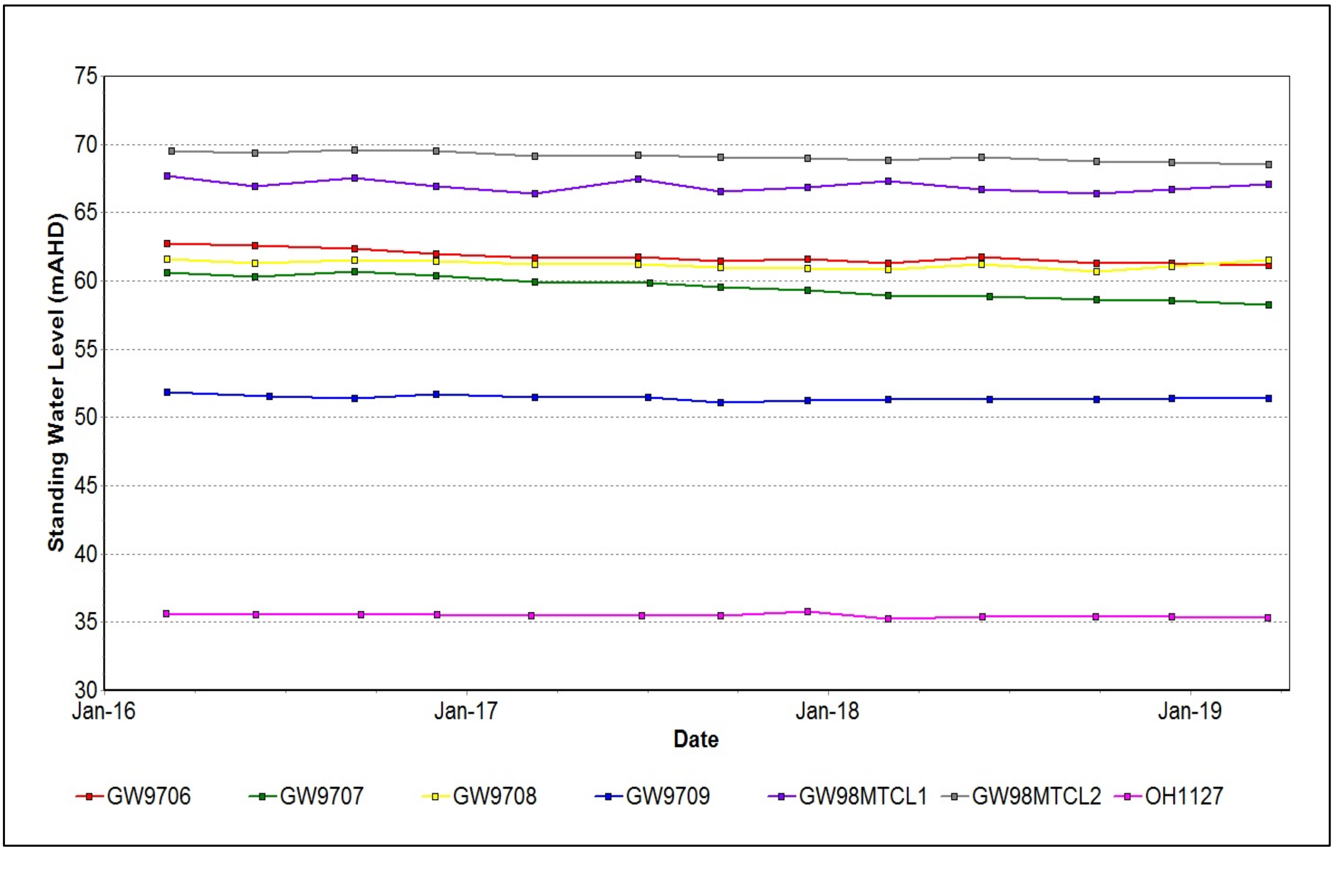


Figure 18: Bayswater Seam Standing Water Level Trend – March 2019

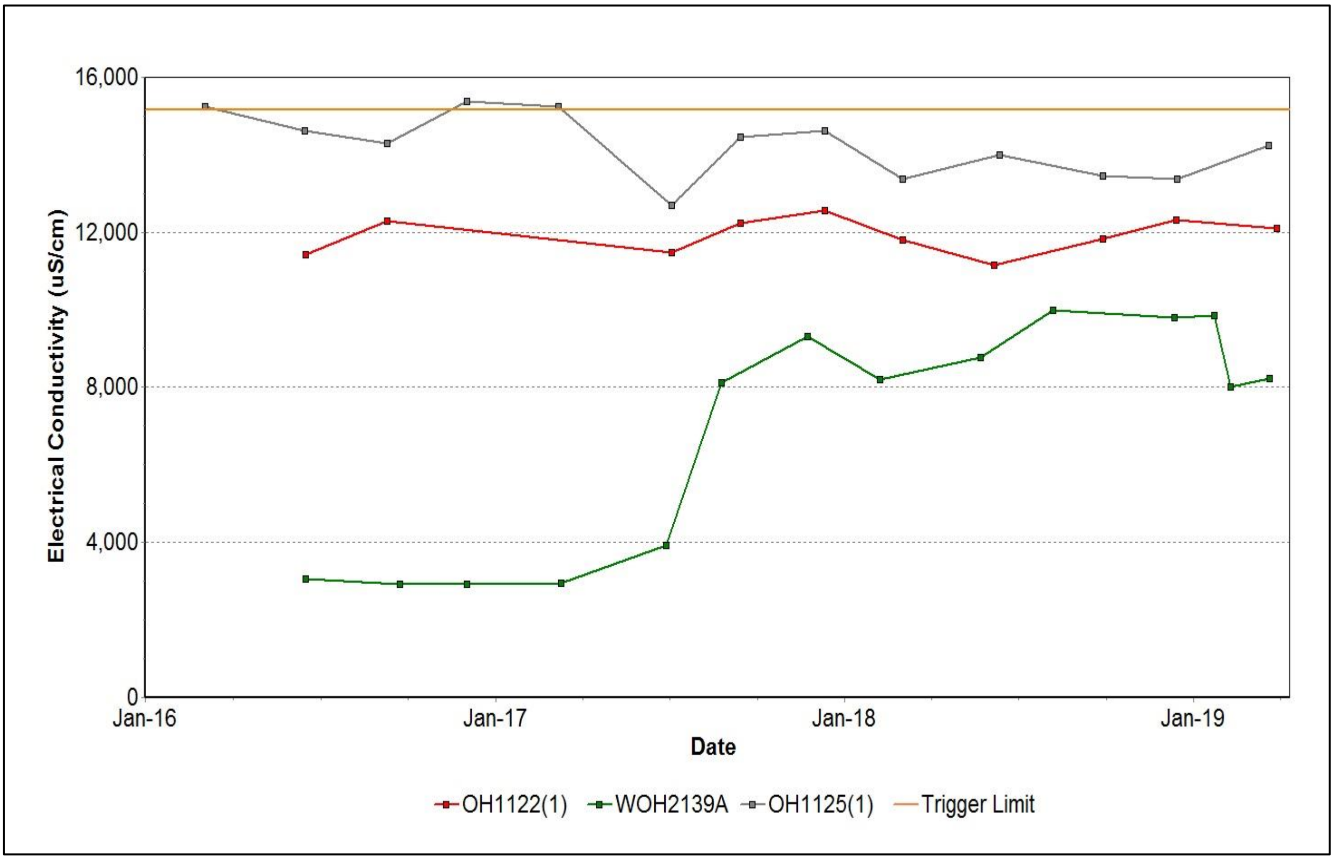


Figure 19: Blakefield Seam Electrical Conductivity Trend – March 2019

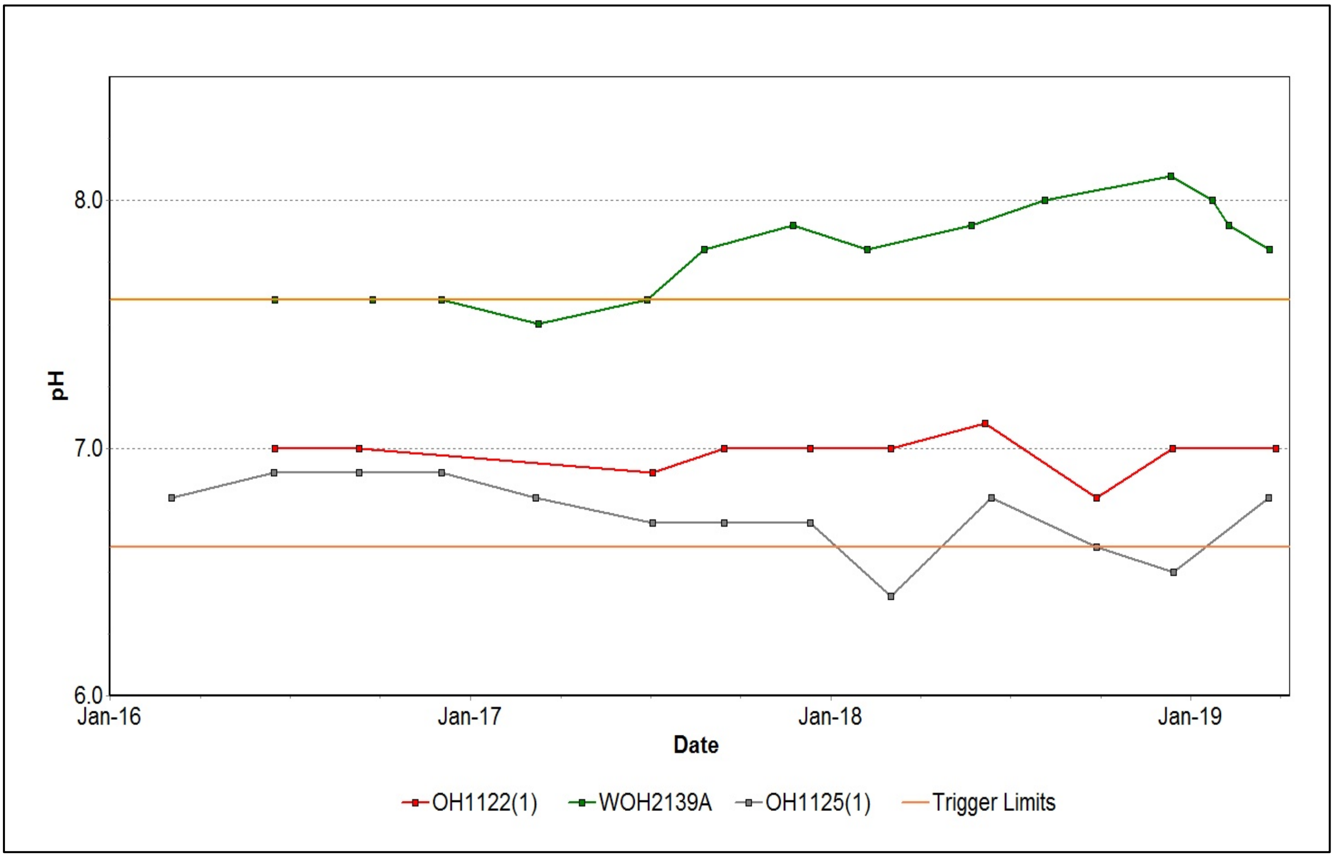


Figure 20: Blakefield Seam pH Trend – March 2019

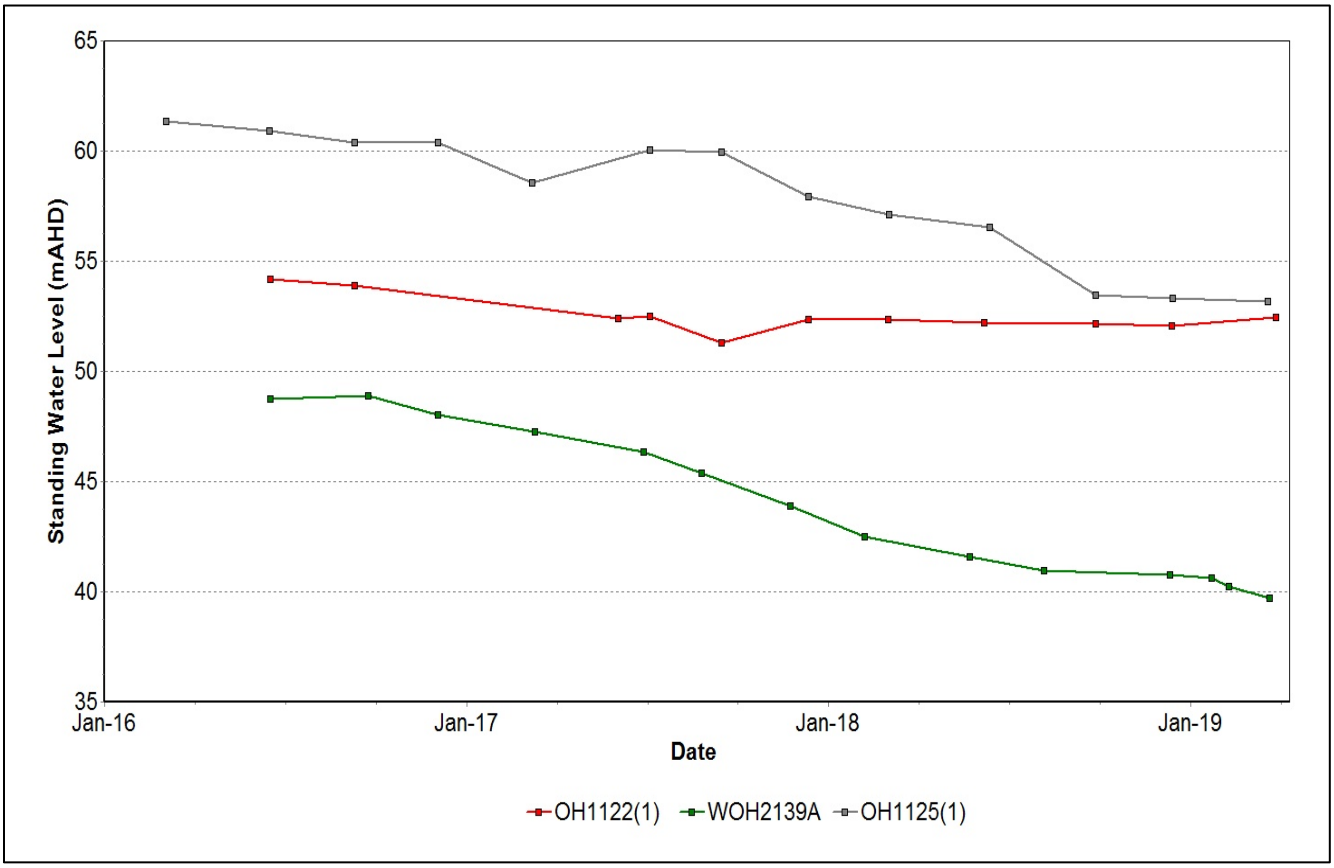


Figure 21: Blakefield Seam Standing Water Level Trend – March 2019

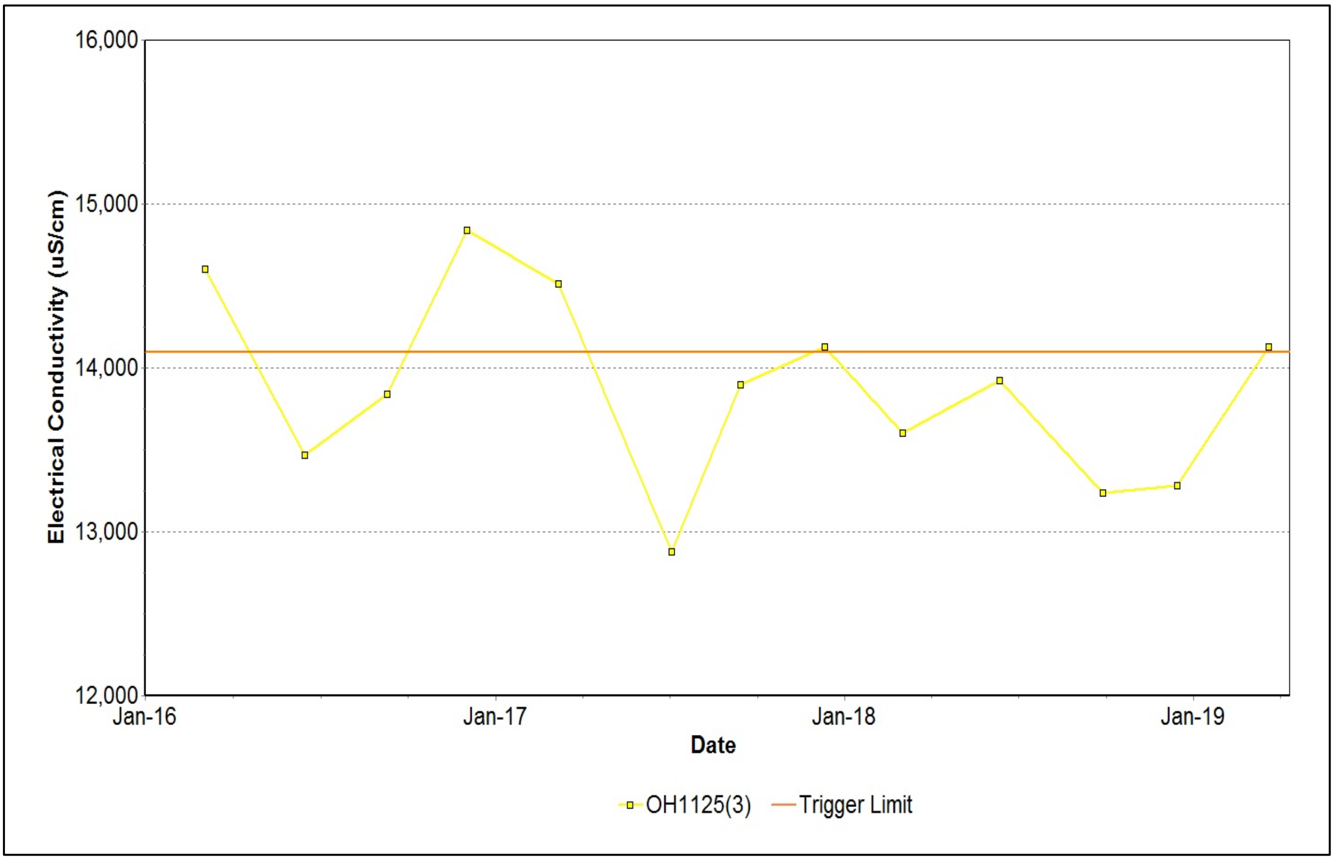


Figure 22: Bowfield Seam Electrical Conductivity Trend – March 2019

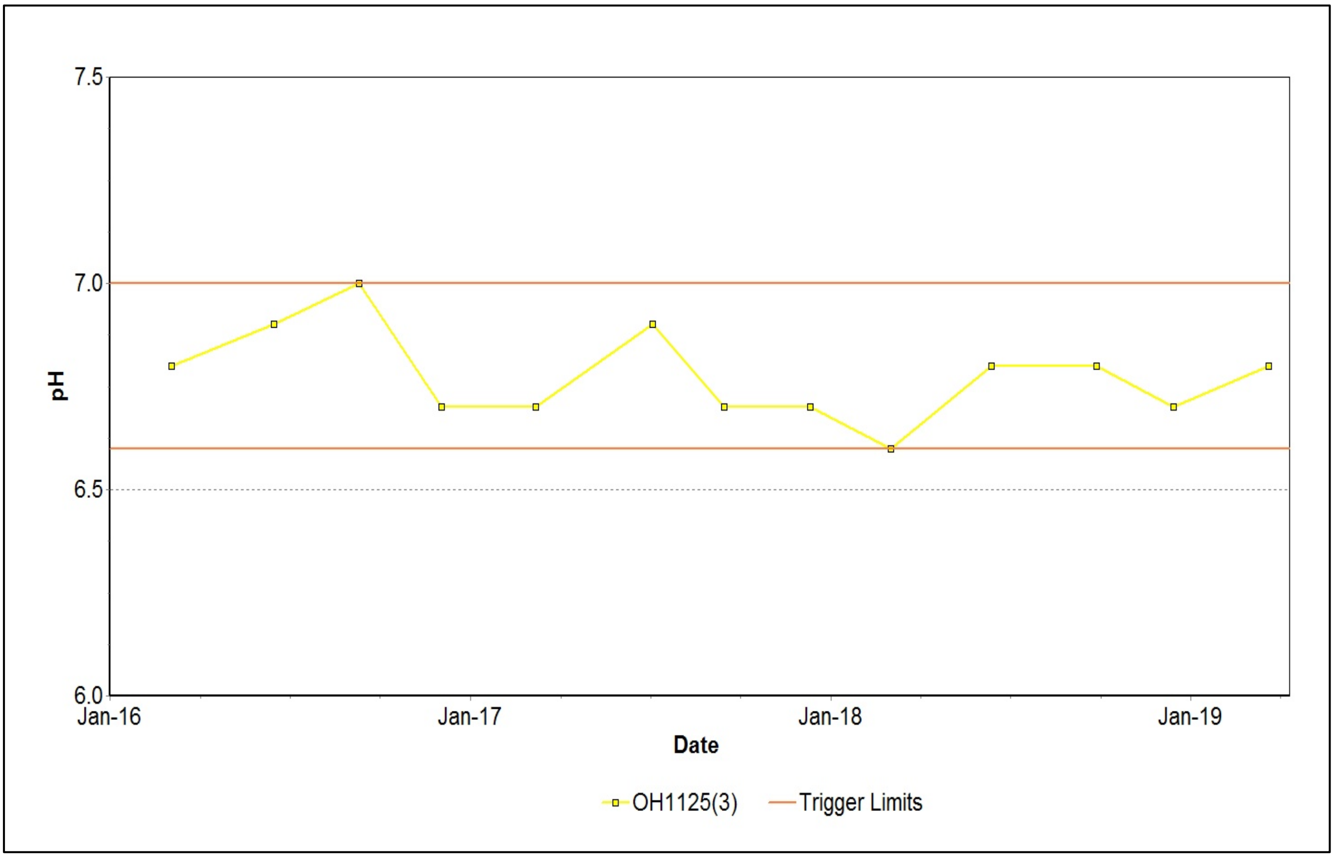


Figure 23: Bowfield Seam pH Trend – March 2019

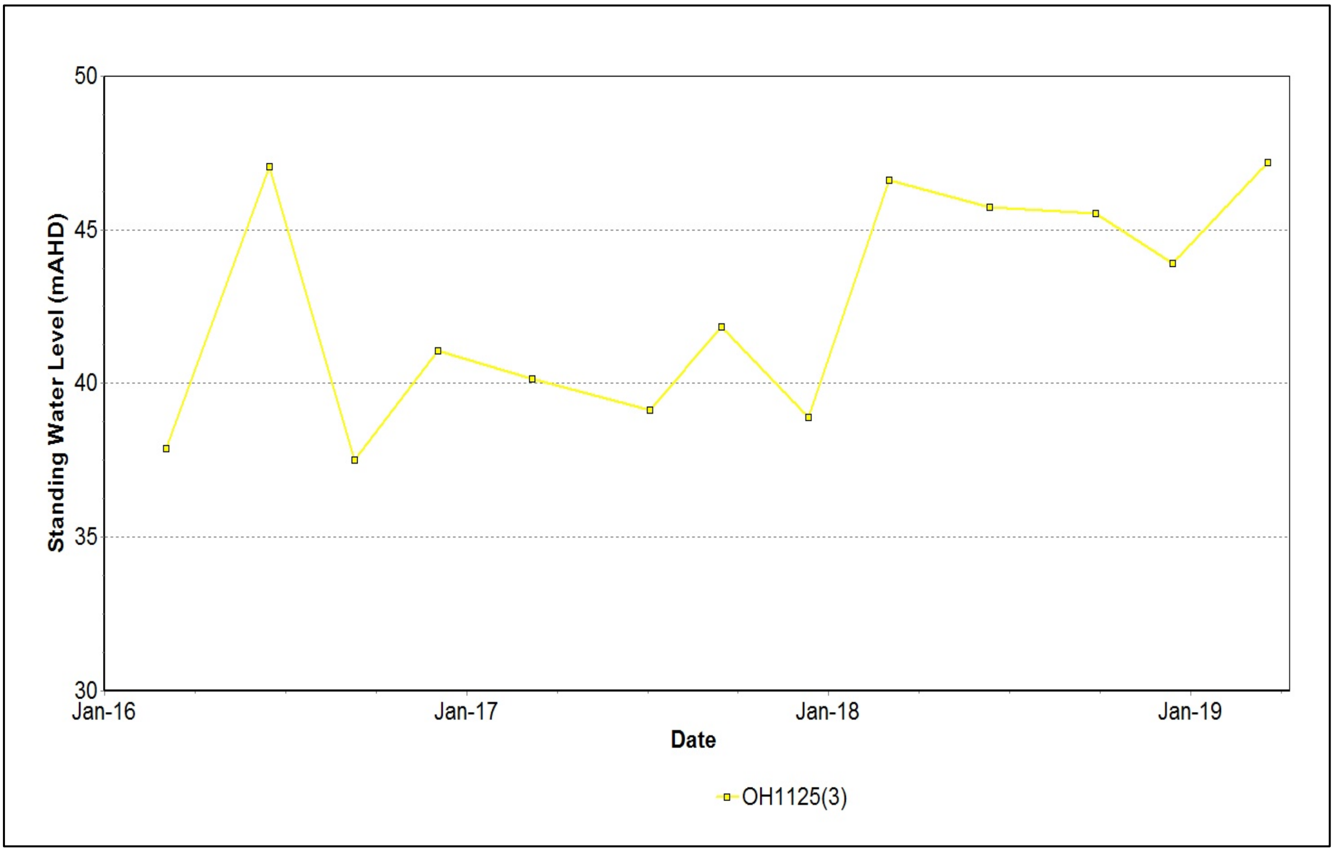


Figure 24: Bowfield Seam Standing Water Level Trend – March 2019

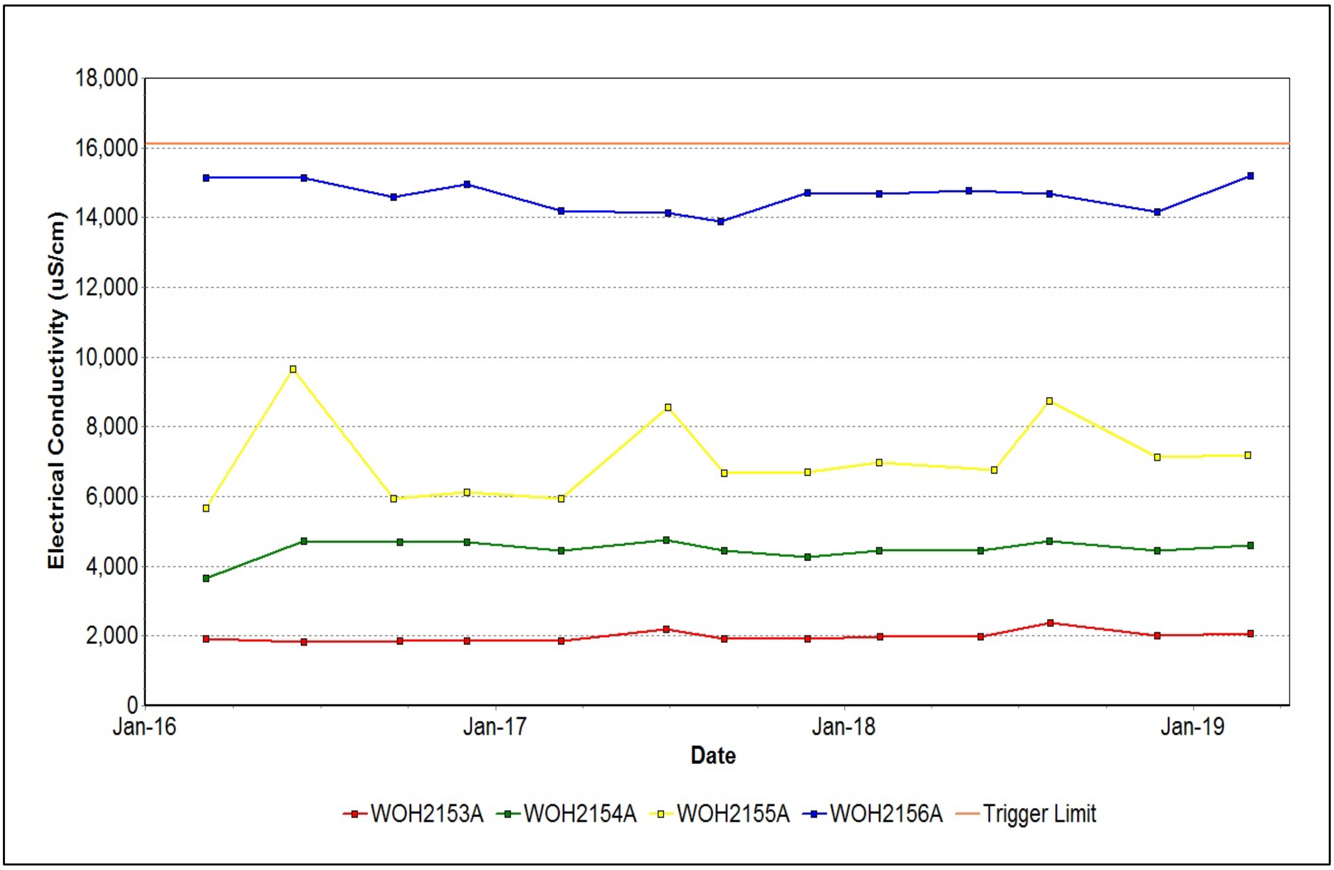


Figure 25: Redbank Seam Electrical Conductivity Trend – March 2019

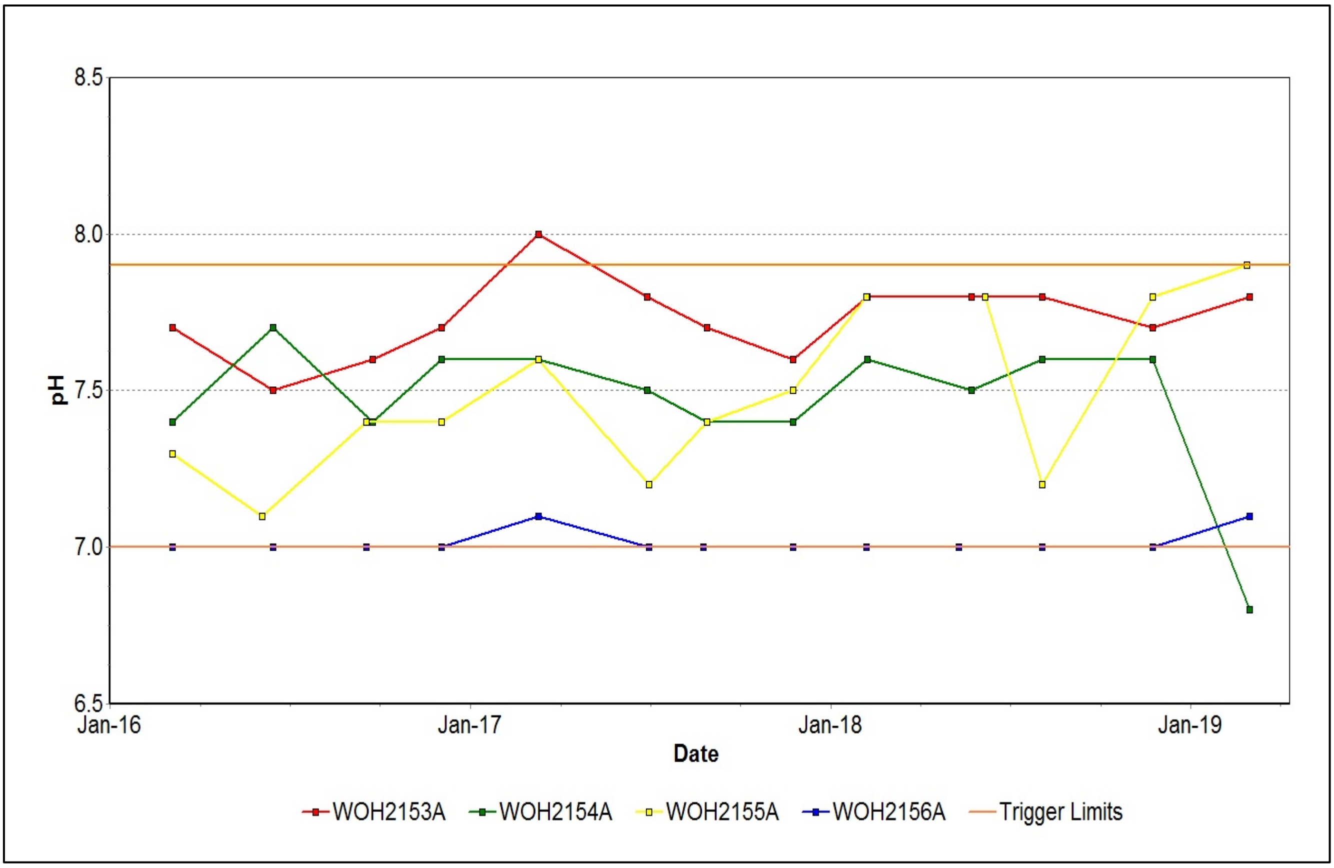


Figure 26: Redbank Seam pH Trend – March 2019

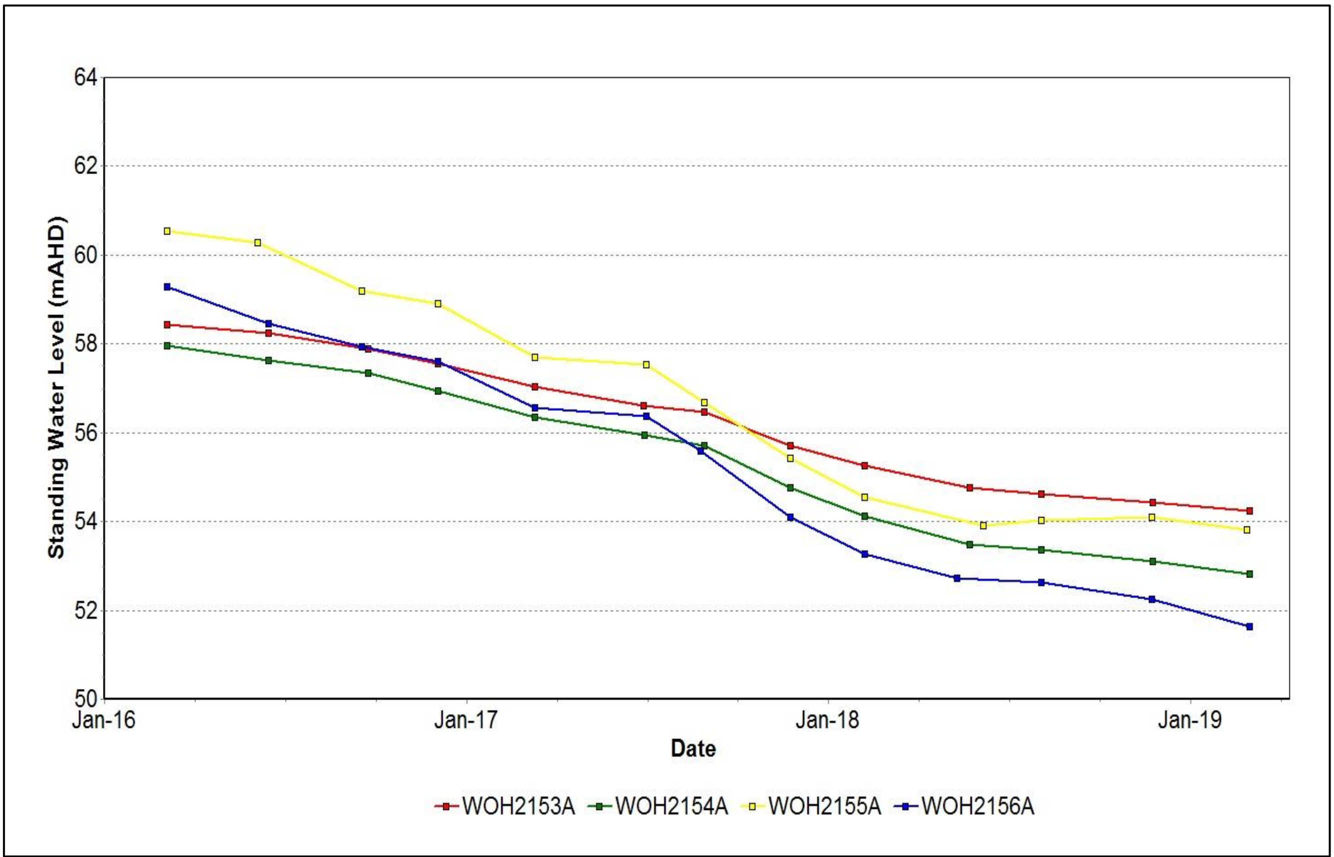


Figure 27: Redbank Seam Standing Water Level Trend – March 2019

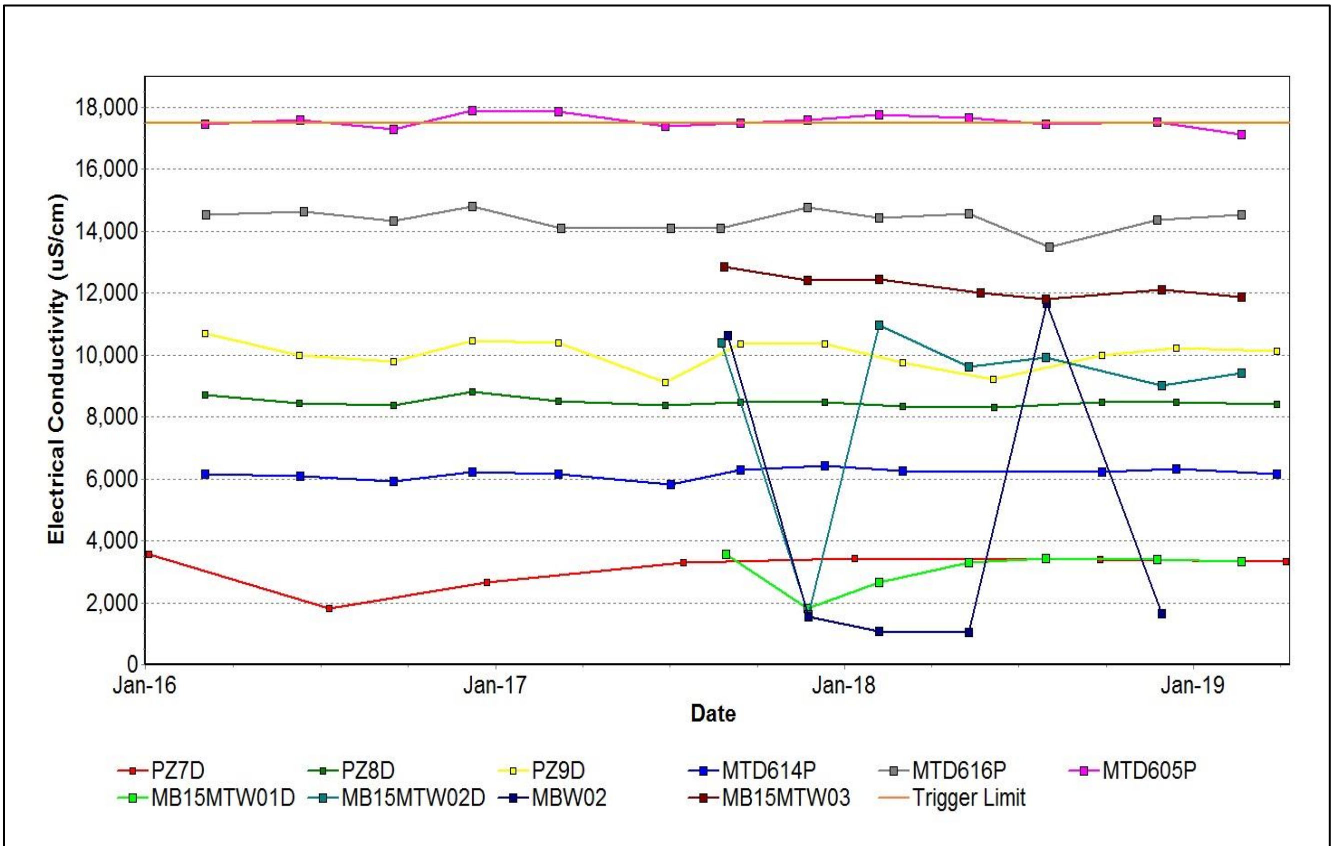


Figure 28: Shallow Overburden Seam Electrical Conductivity Trend – March 2019

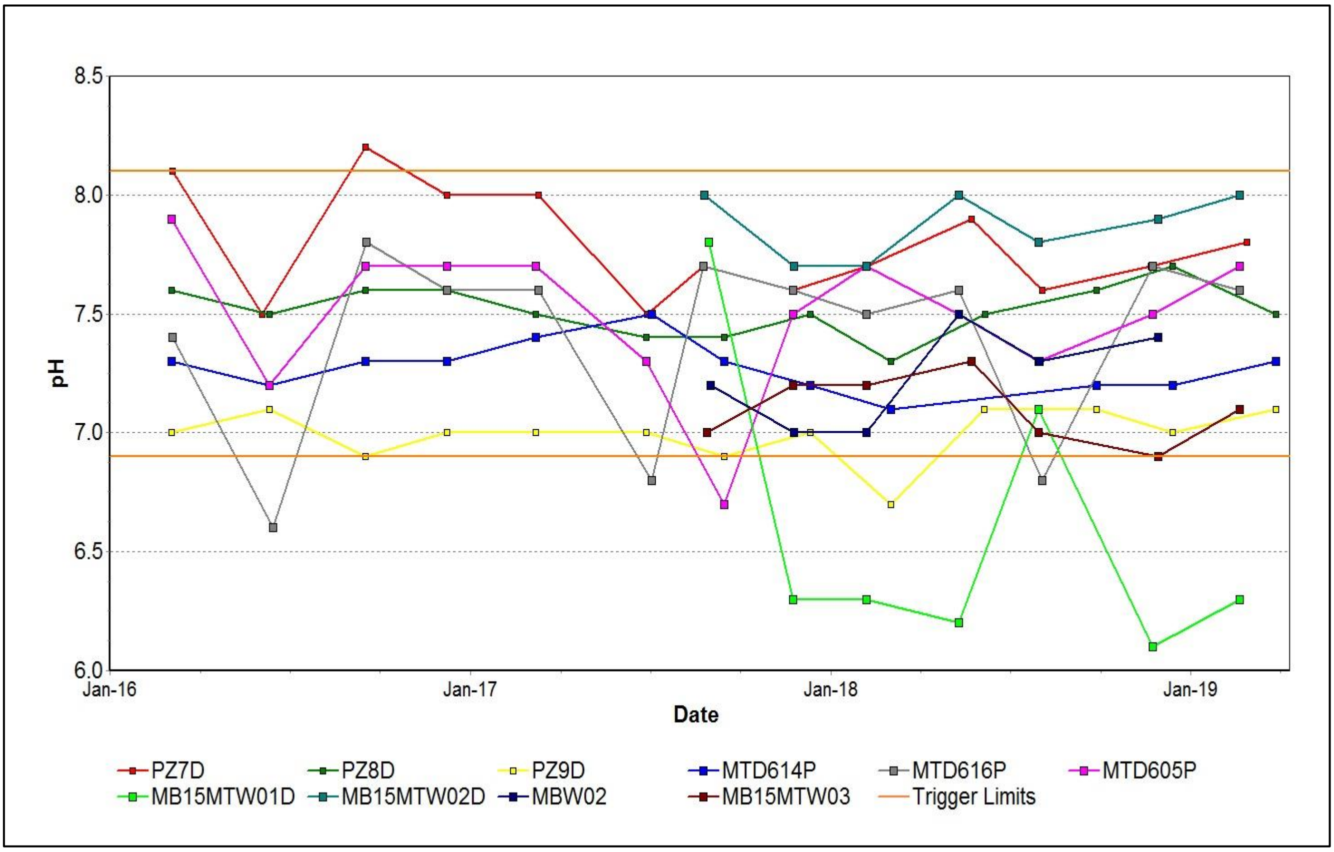


Figure 29: Shallow Overburden Seam pH Trend – March 2019

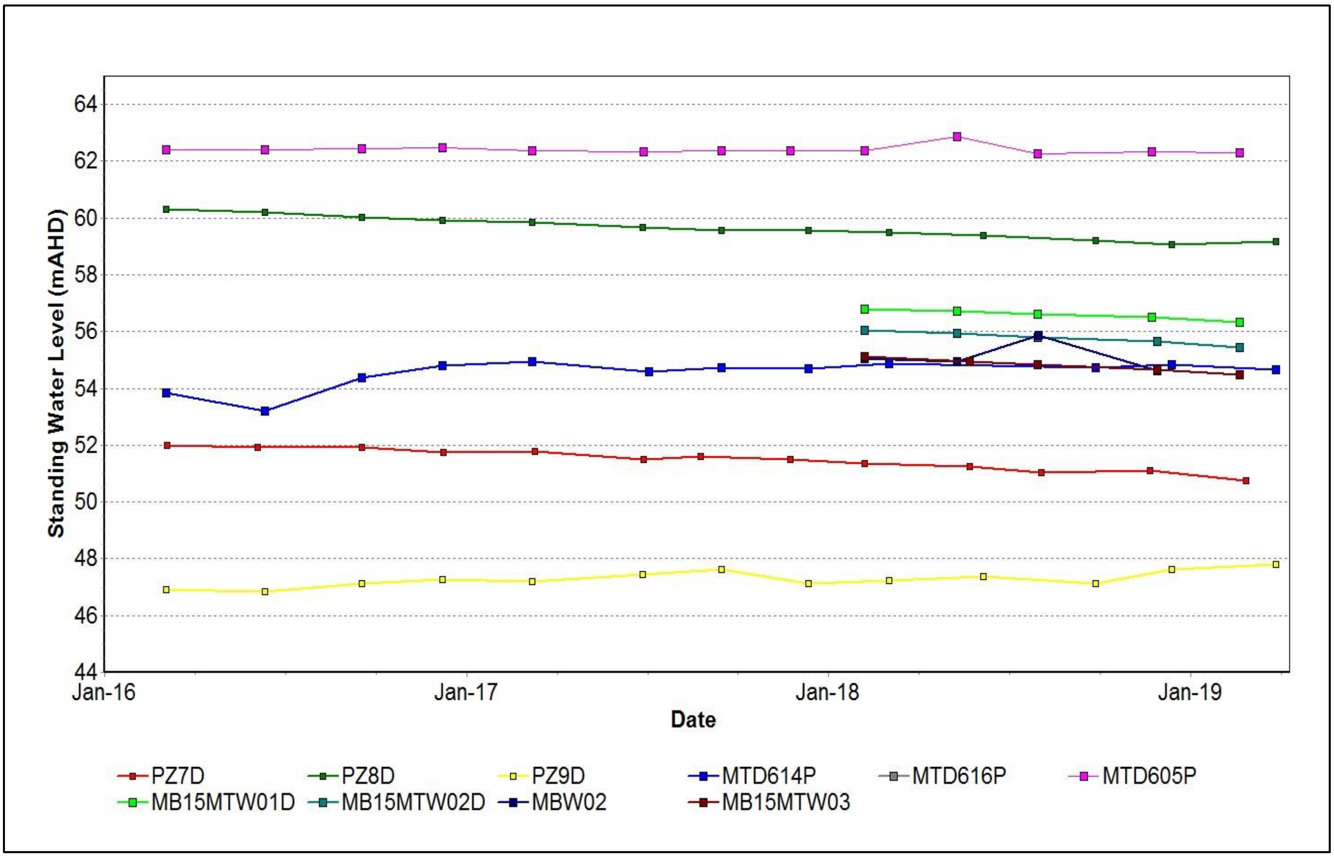


Figure 30: Shallow Overburden Seam Standing Water Level Trend – March 2019

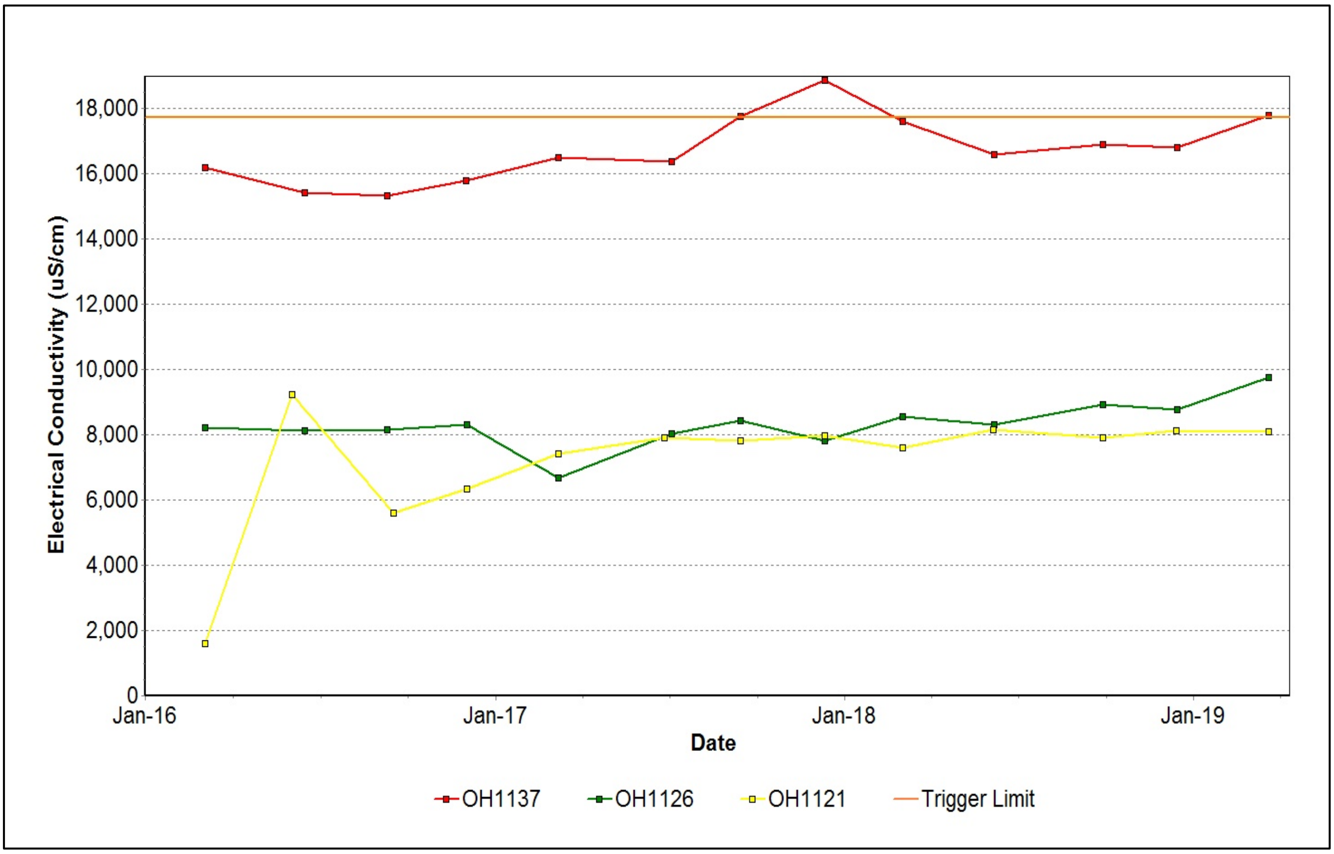


Figure 31: Vaux Seam Electrical Conductivity Trend – March 2019

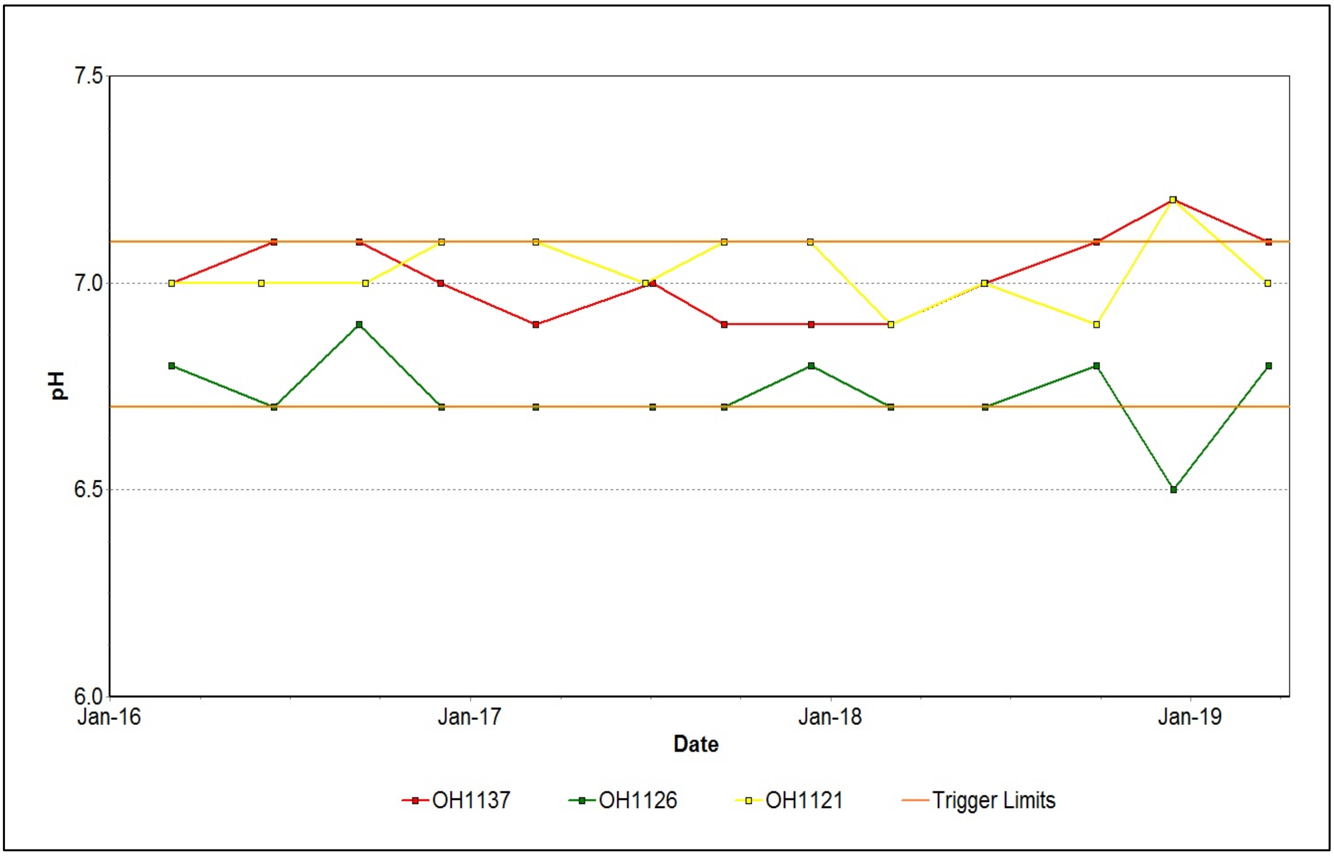


Figure 32: Vaux Seam pH Trend – March 2019

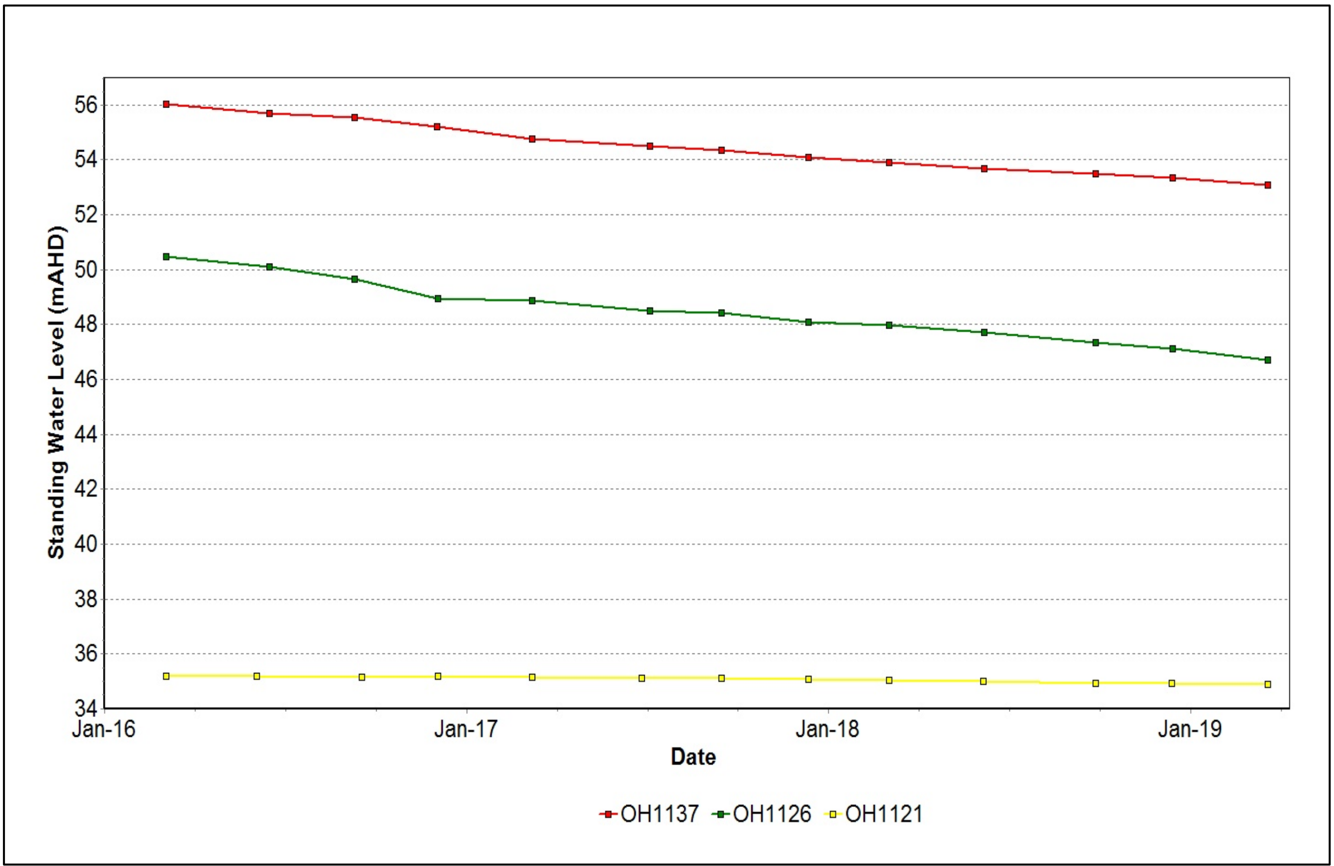
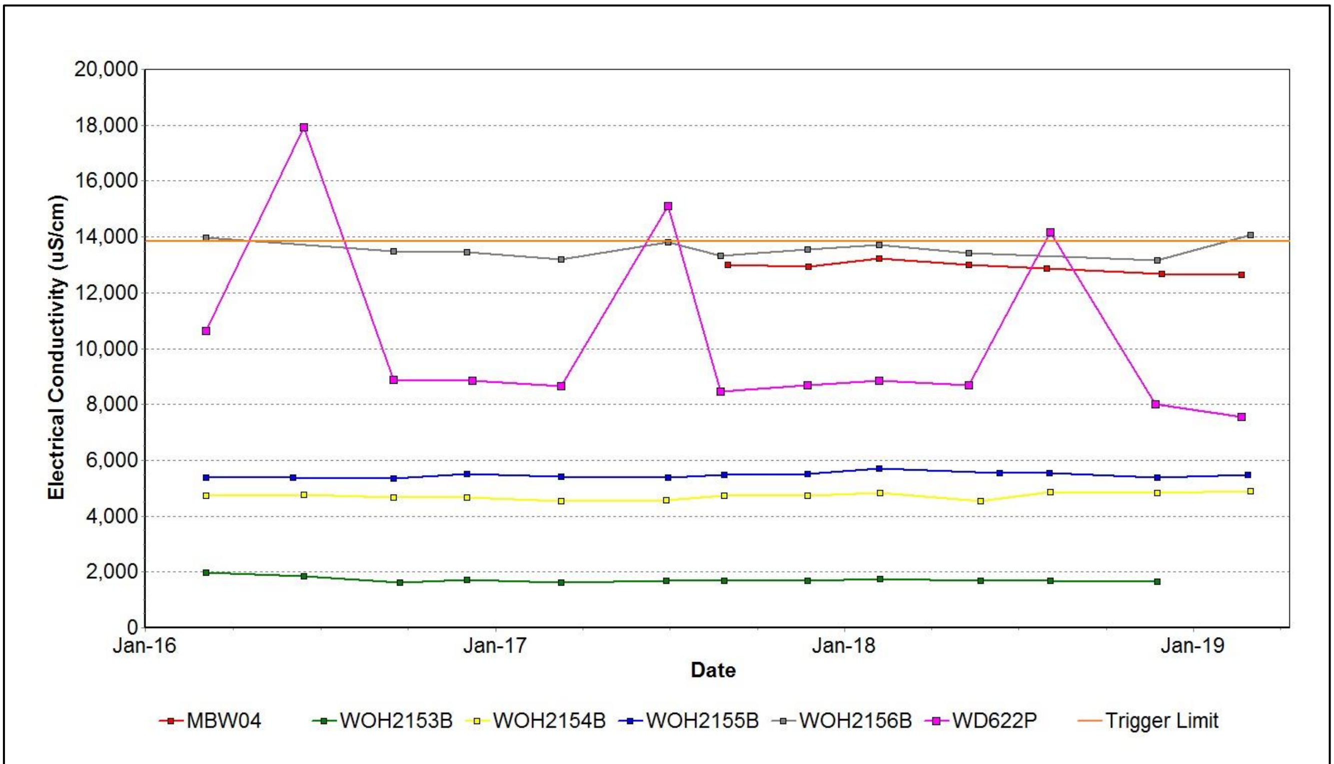
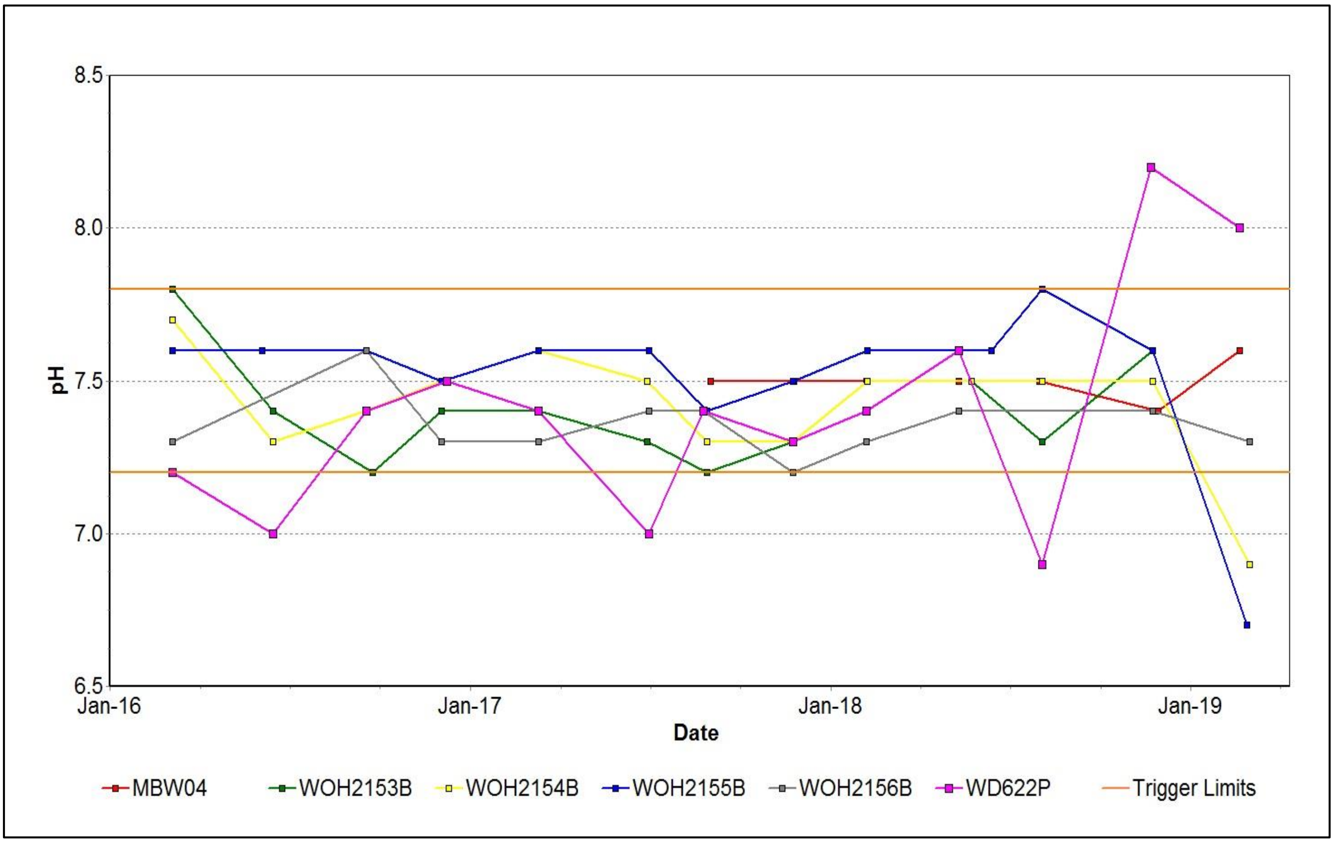


Figure 33: Vaux Seam Standing Water Level Trend – March 2019



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

Figure 34: Wambo Seam Electrical Conductivity Trend – March 2019



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

Figure 35: Wambo Seam pH Trend – March 2019

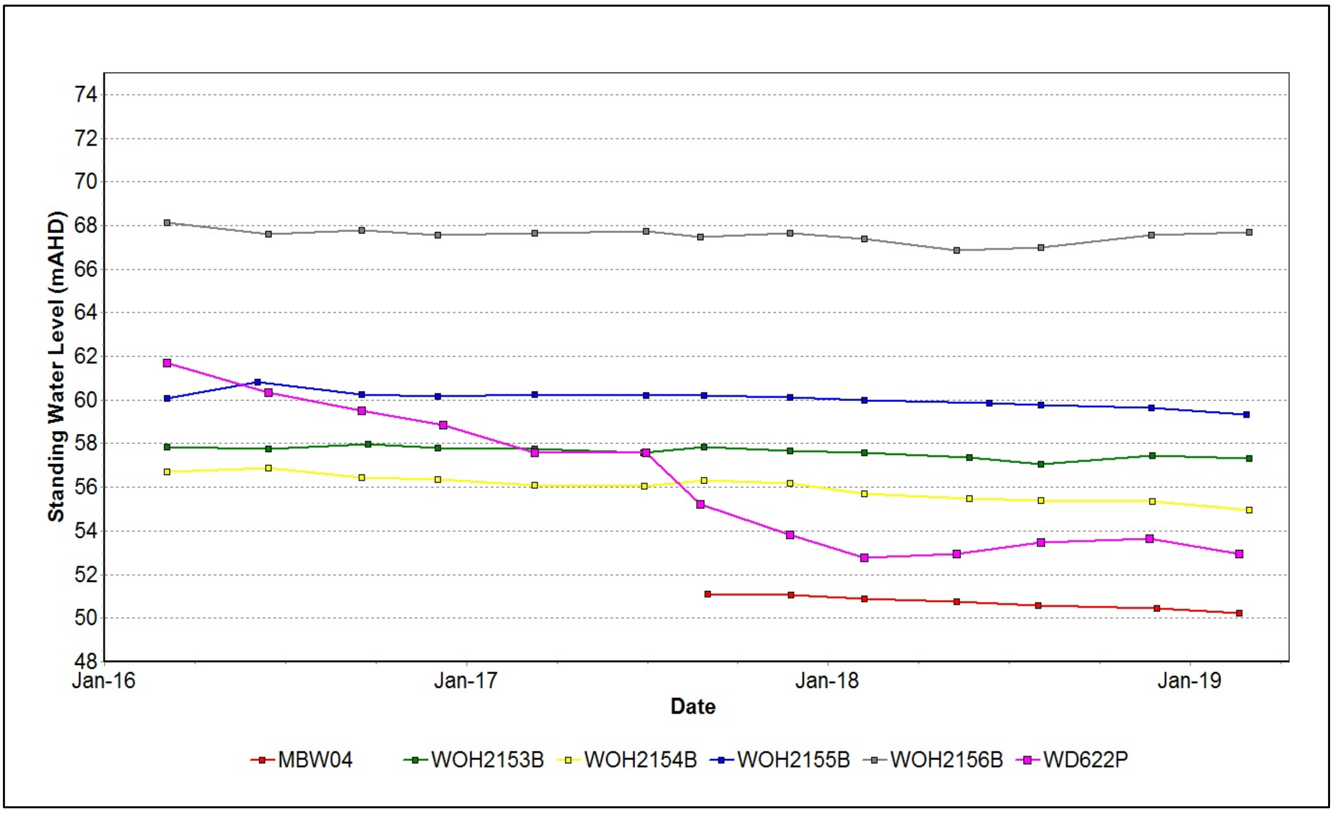


Figure 36: Wambo Seam Standing Water Level Trend – March 2019

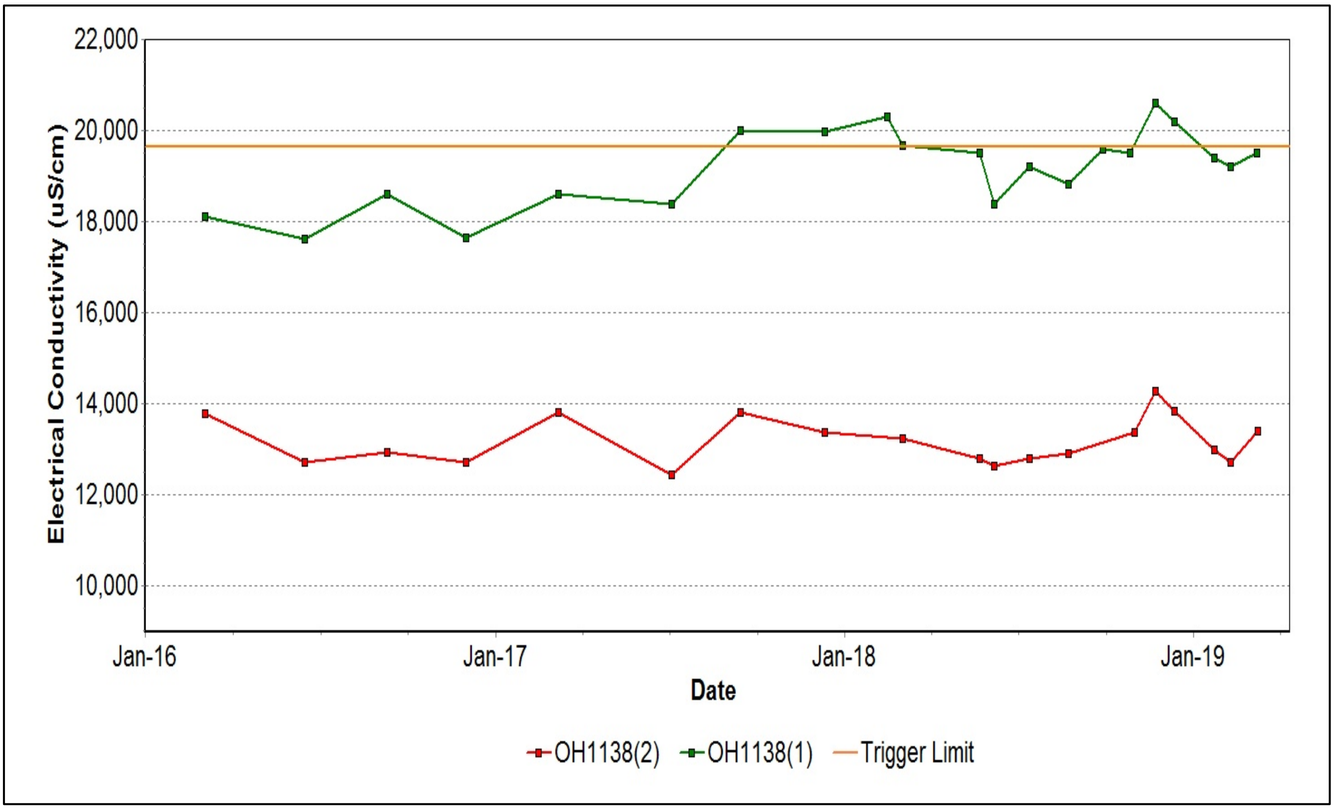


Figure 37: Warkworth Seam Electrical Conductivity Trend – March 2019

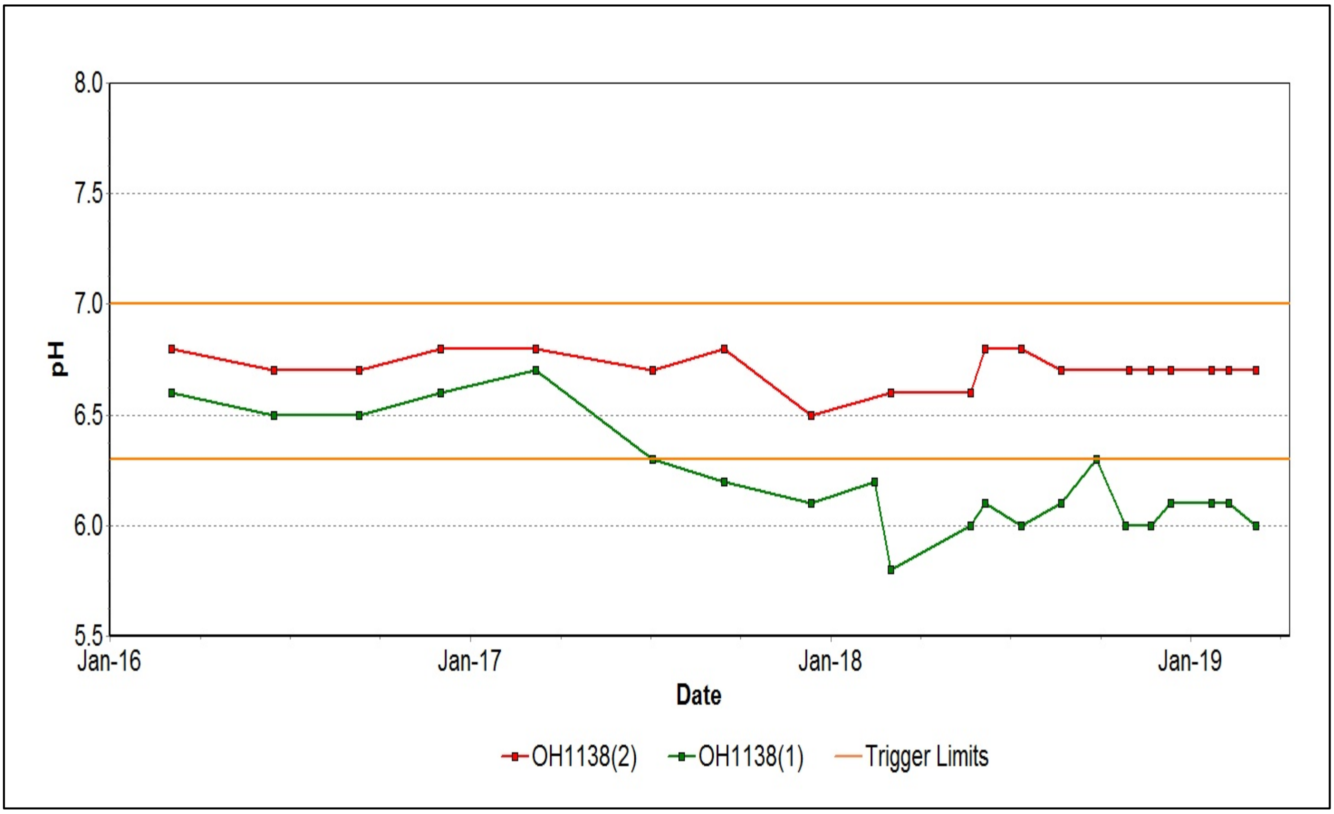


Figure 38: Warkworth Seam pH Trend – March 2019

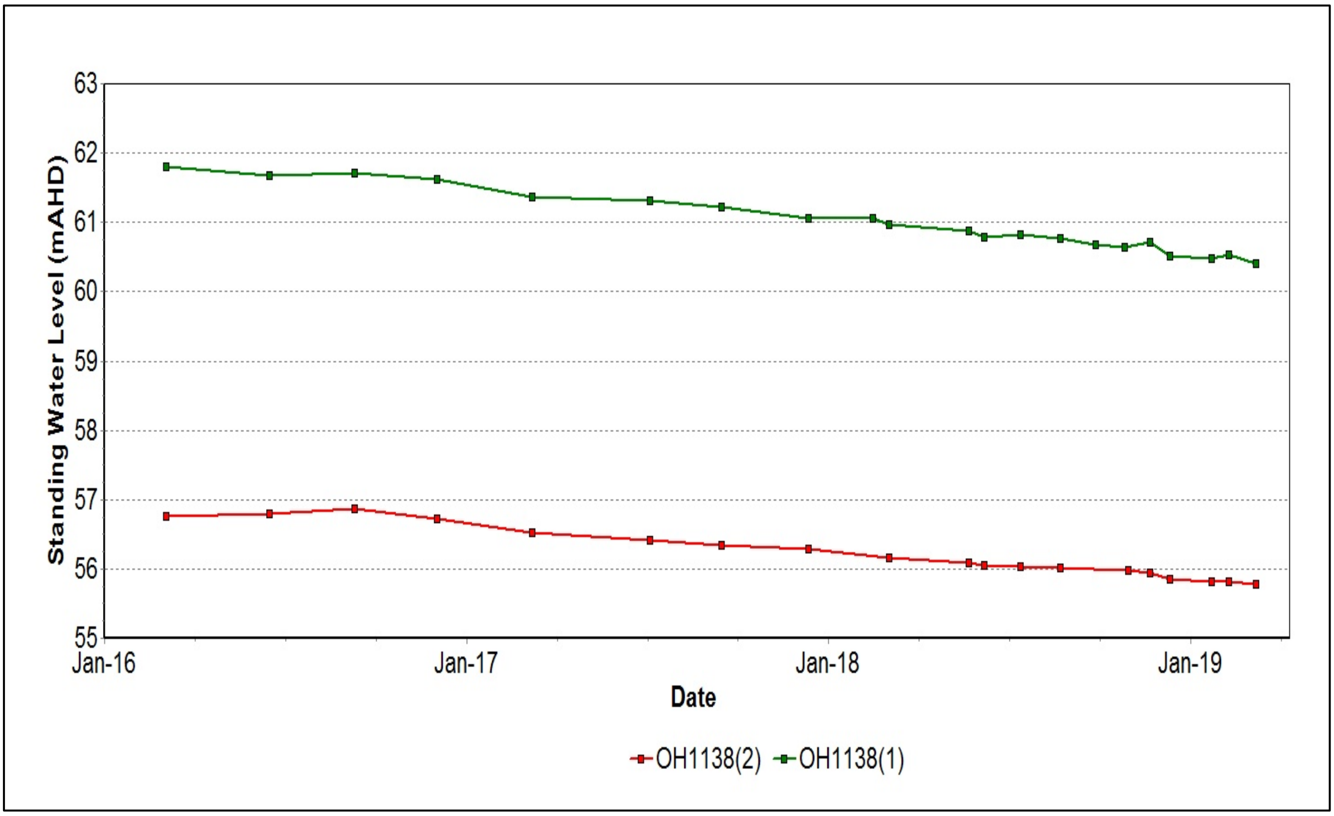


Figure 39: Warkworth Seam Standing Water Level Trend – March 2019

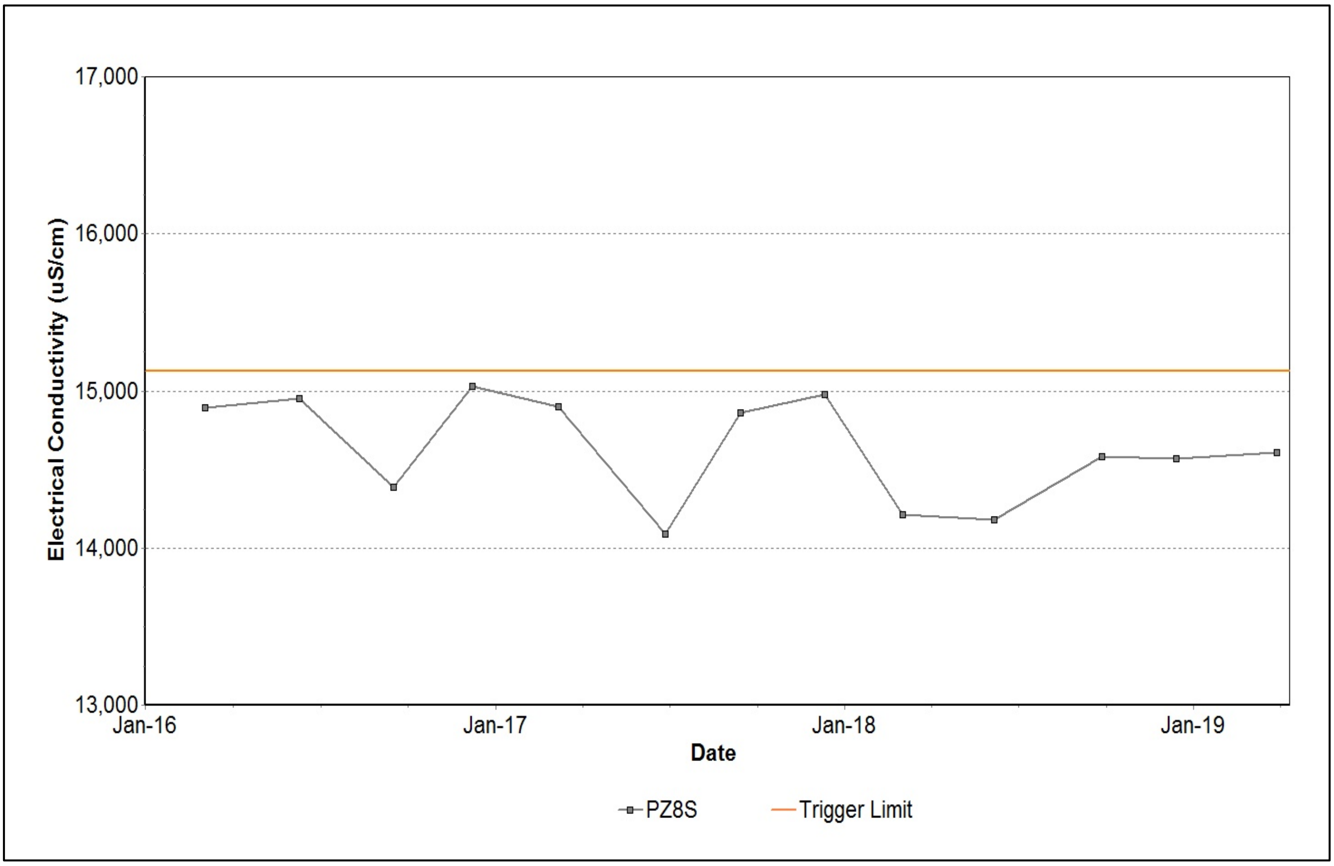


Figure 40: Wollombi Alluvium 1 Electrical Conductivity Trend – March 2019

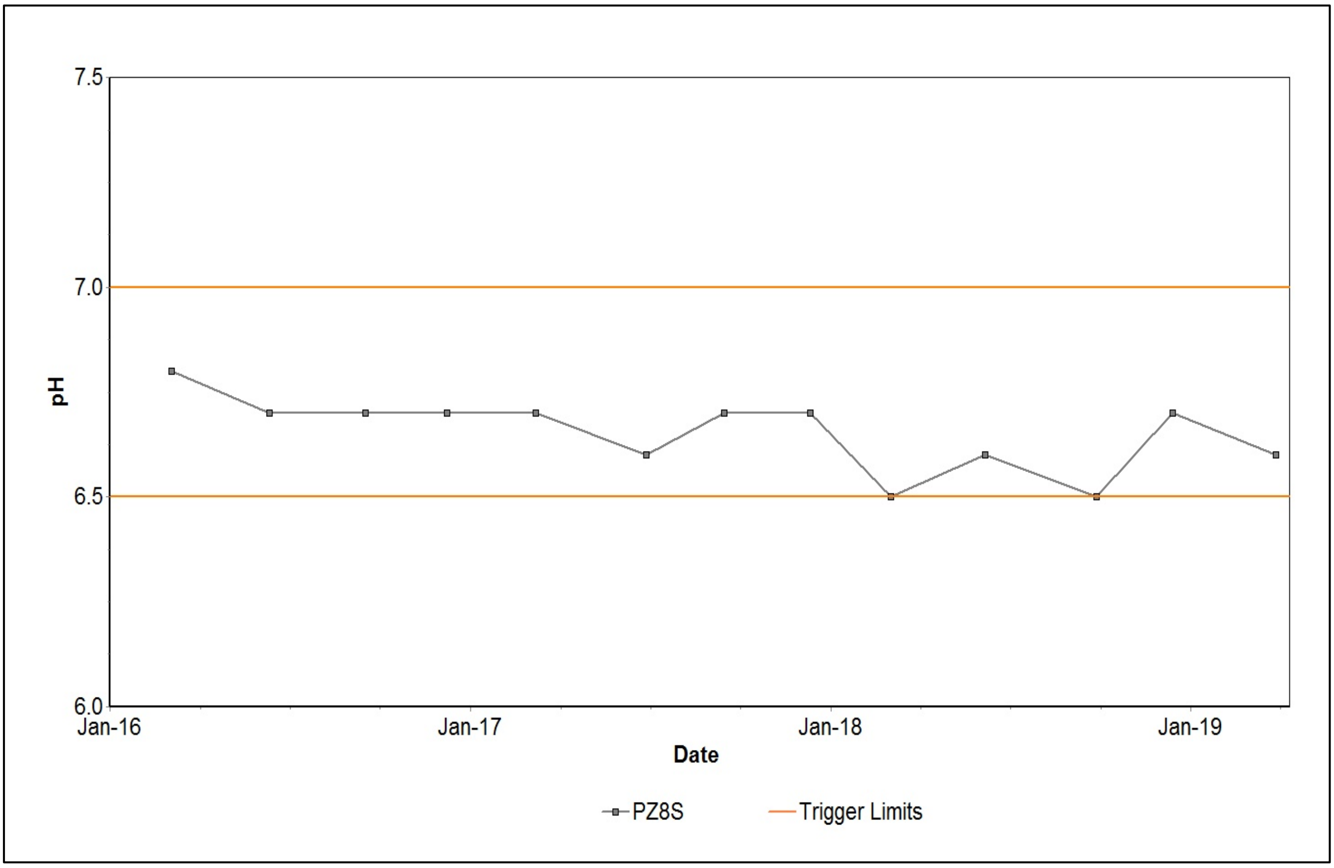


Figure 41: Wollombi Alluvium 1 pH Trend – March 2019

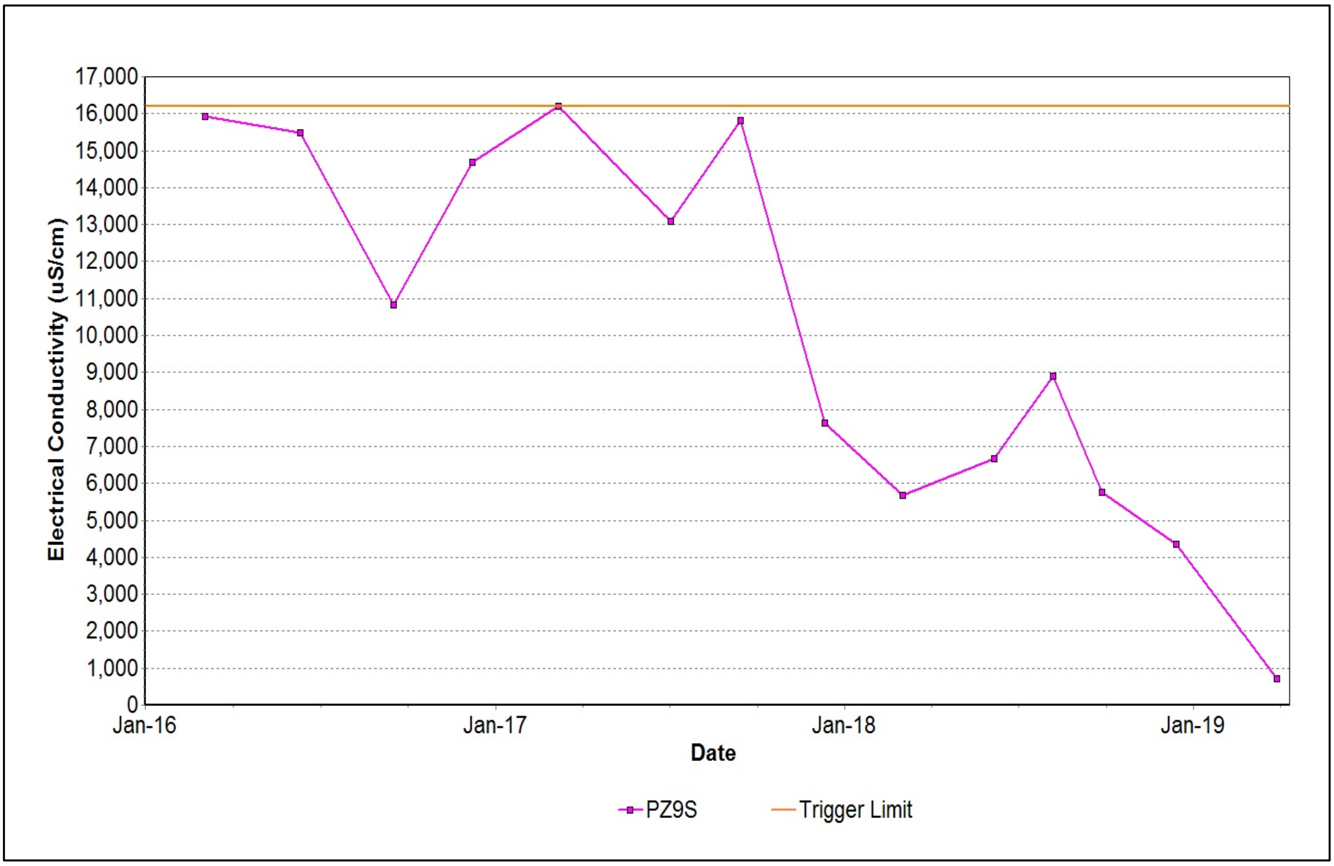


Figure 42: Wollombi Alluvium 2 Electrical Conductivity Trend – March 2019

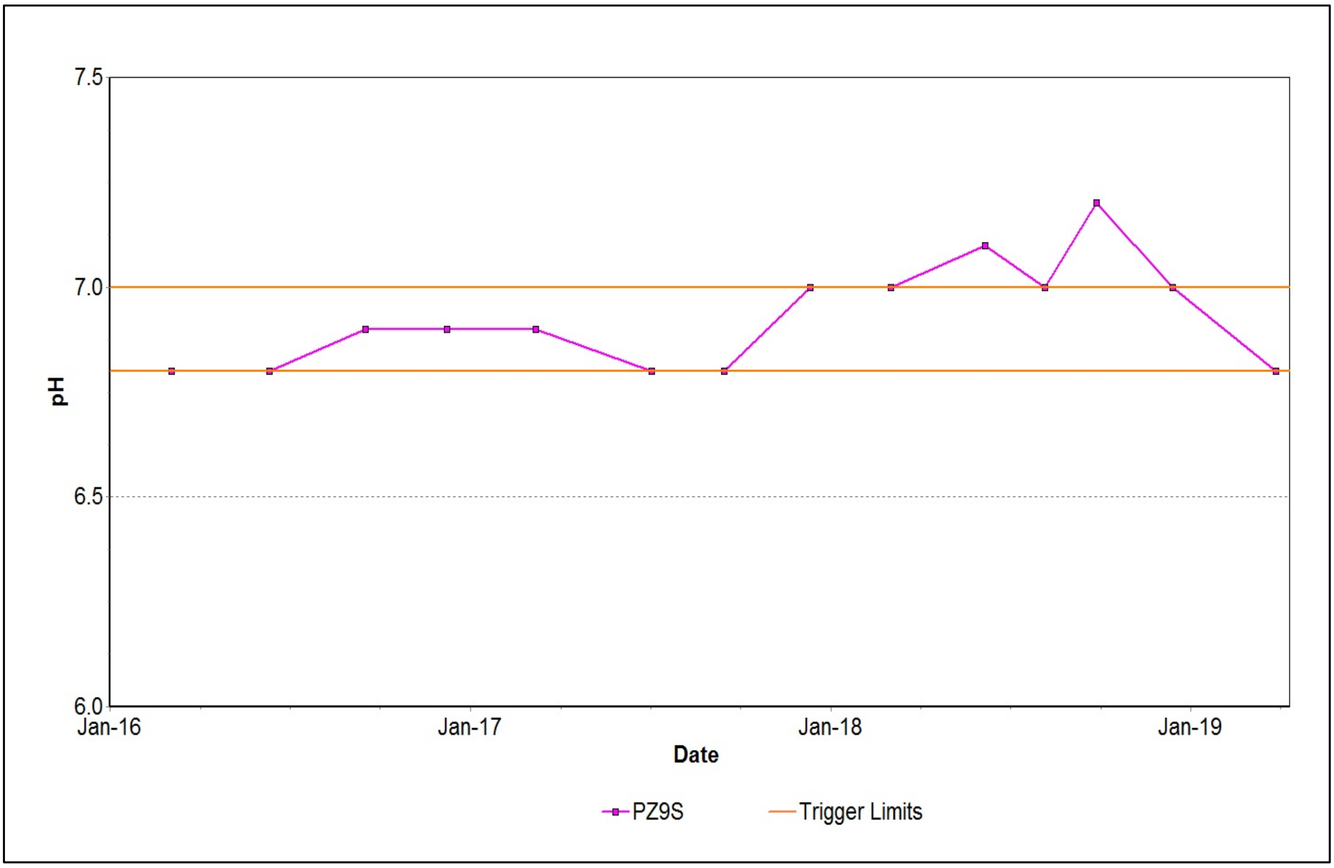


Figure 43: Wollombi Alluvium 2 pH Trend – March 2019

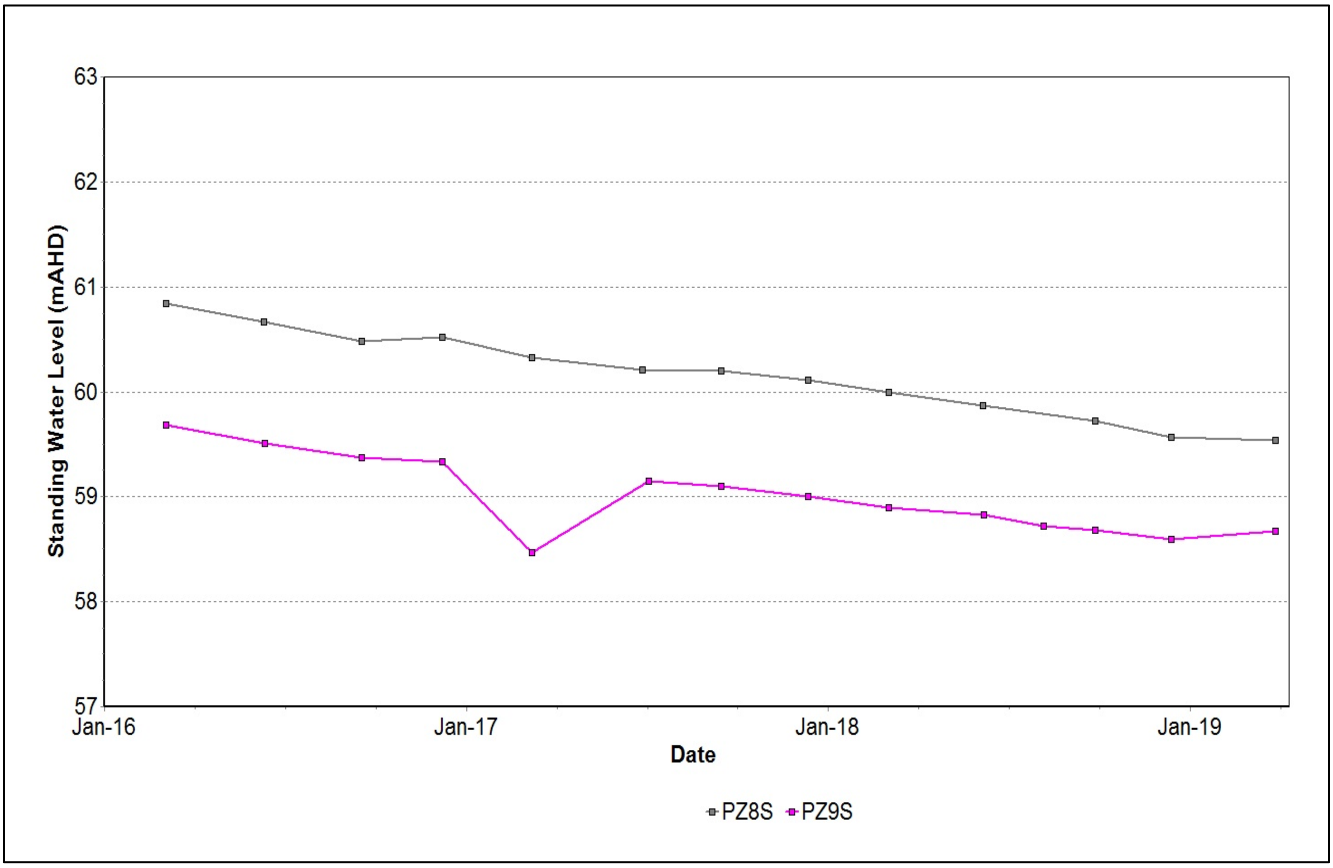


Figure 44: Wollombi Alluvium Standing Water Level Trend – March 2019

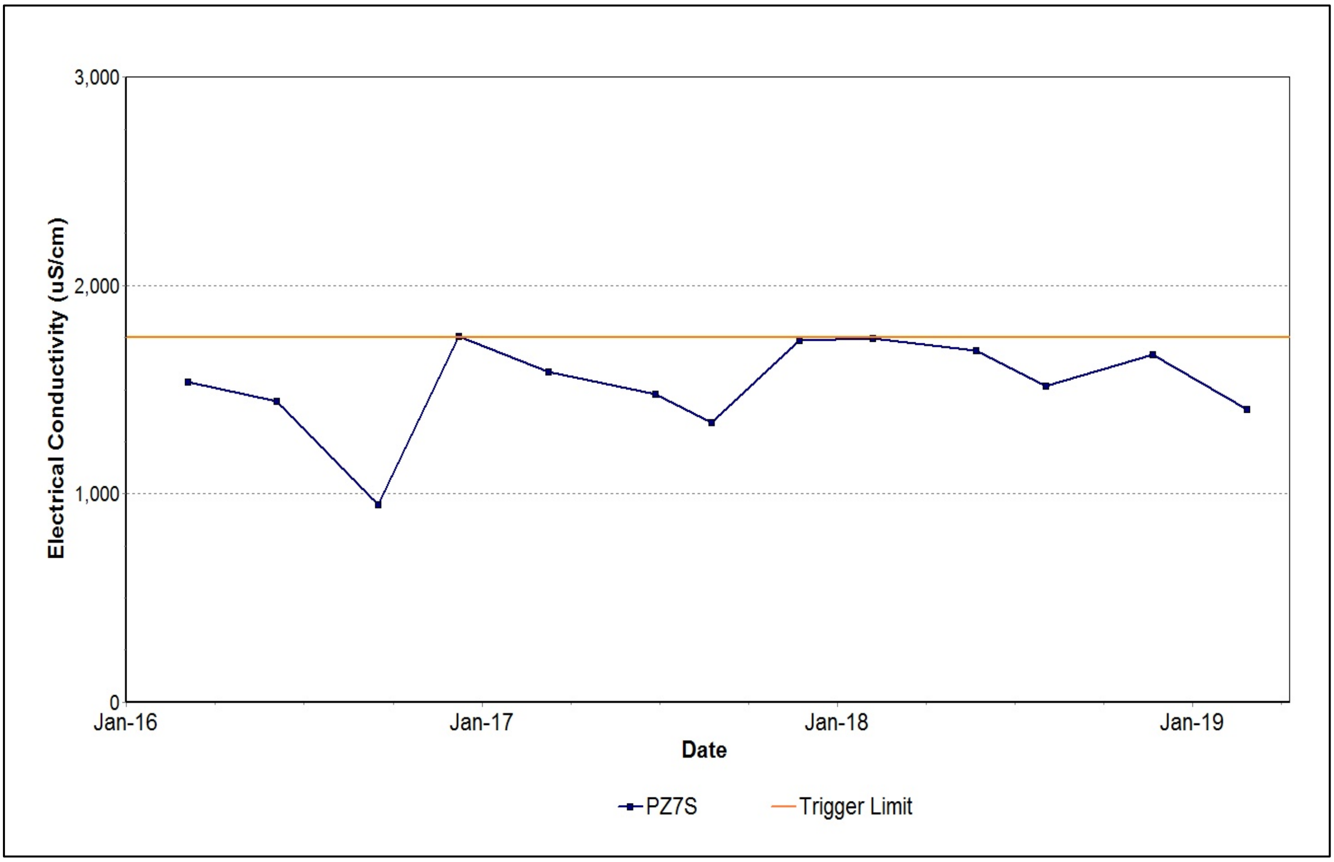


Figure 45: Aeolian Warkworth Sands Electrical Conductivity Trend – March 2019

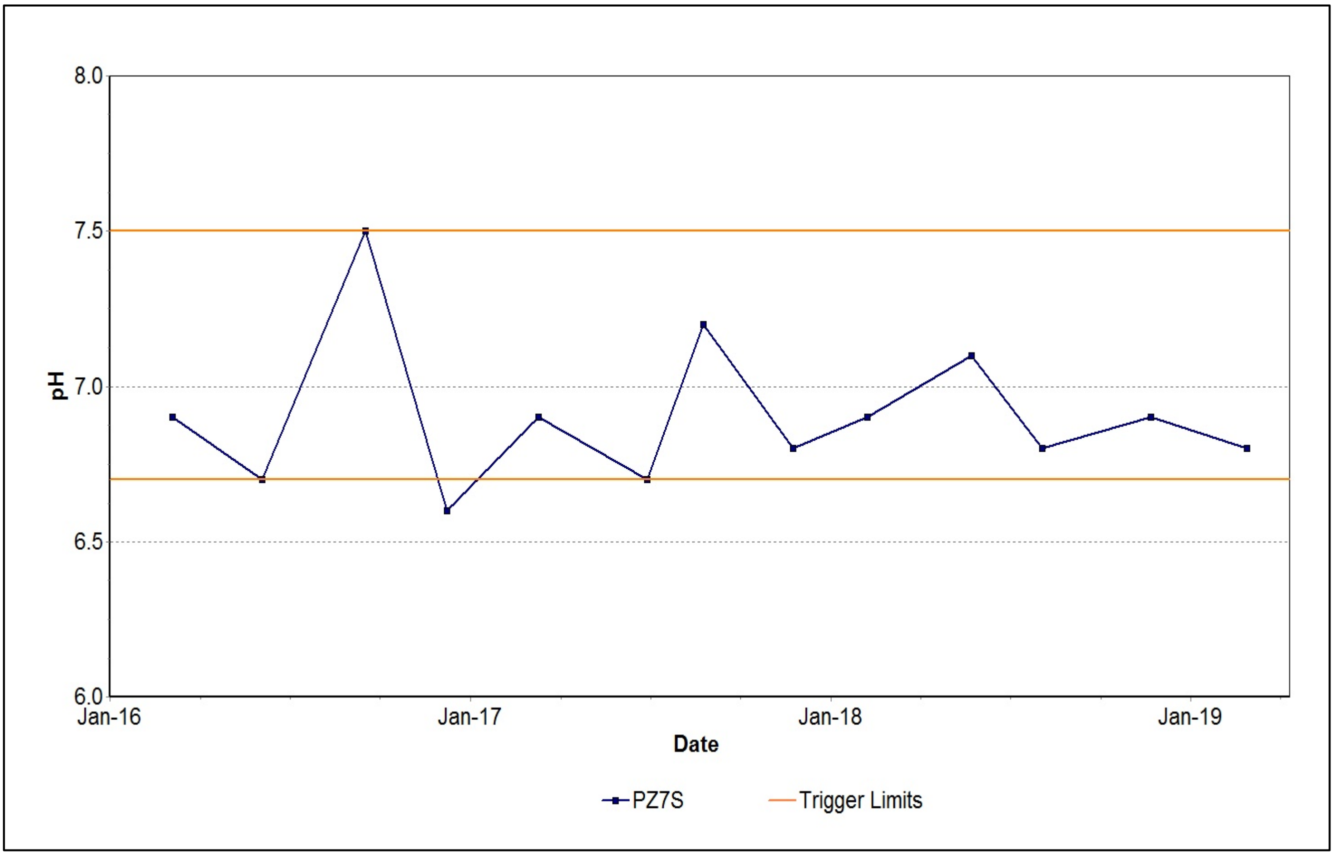


Figure 46: Aeolian Warkworth Sands pH Trend – March 2019

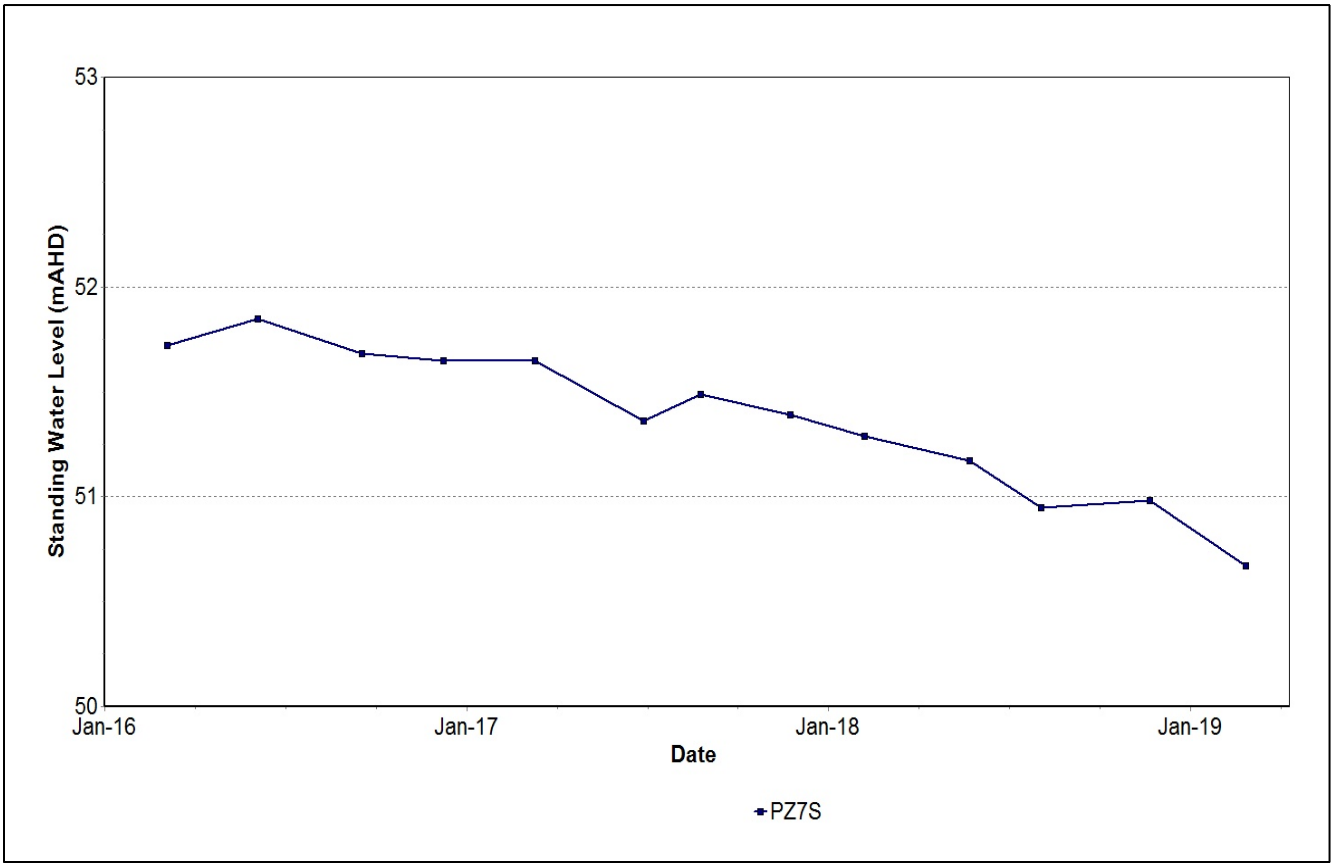


Figure 47: Aeolian Warkworth Sands Standing Water Level Trend – March 2019

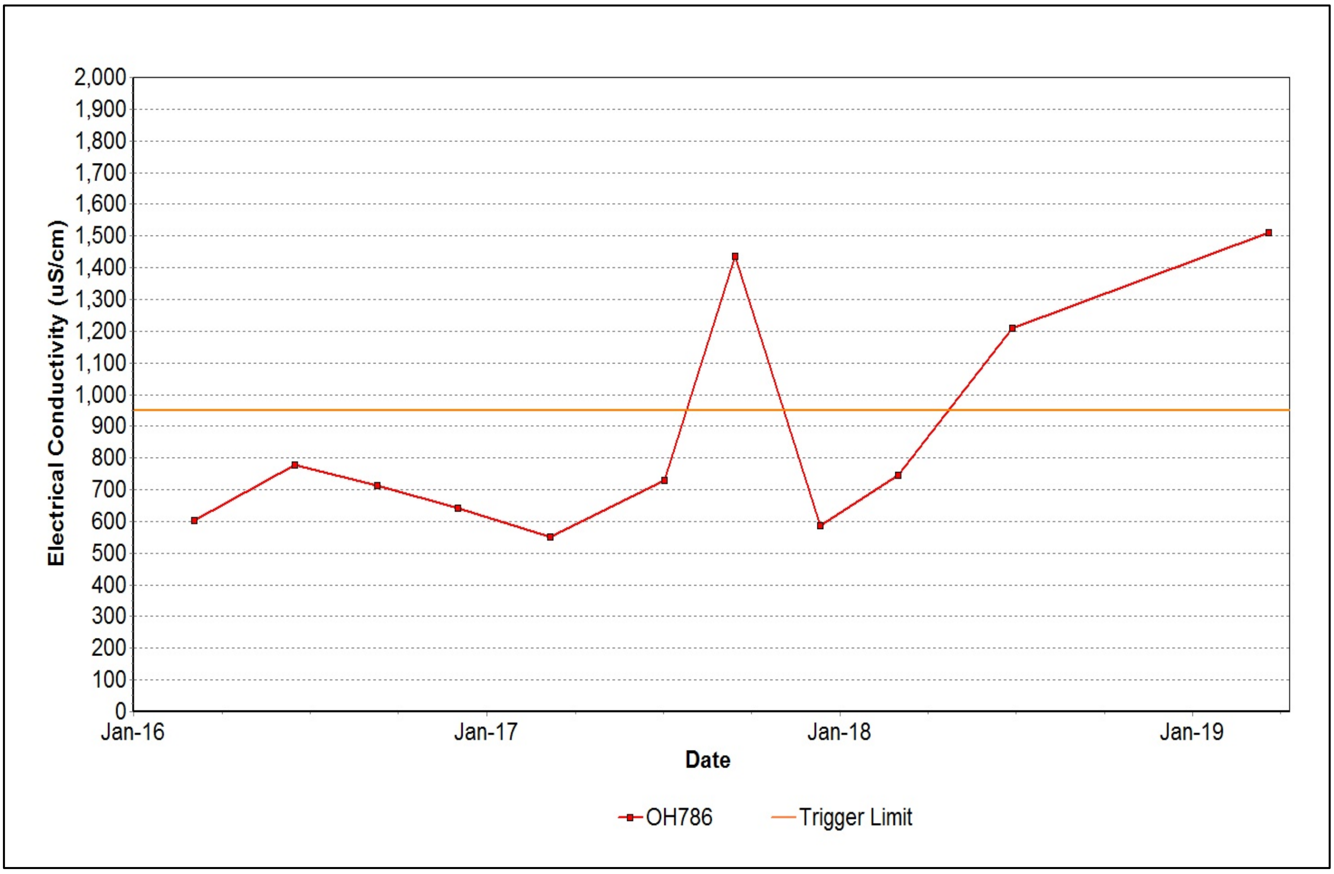


Figure 48: Hunter River Alluvium 1 Seam Electrical Conductivity Trend – March 2019

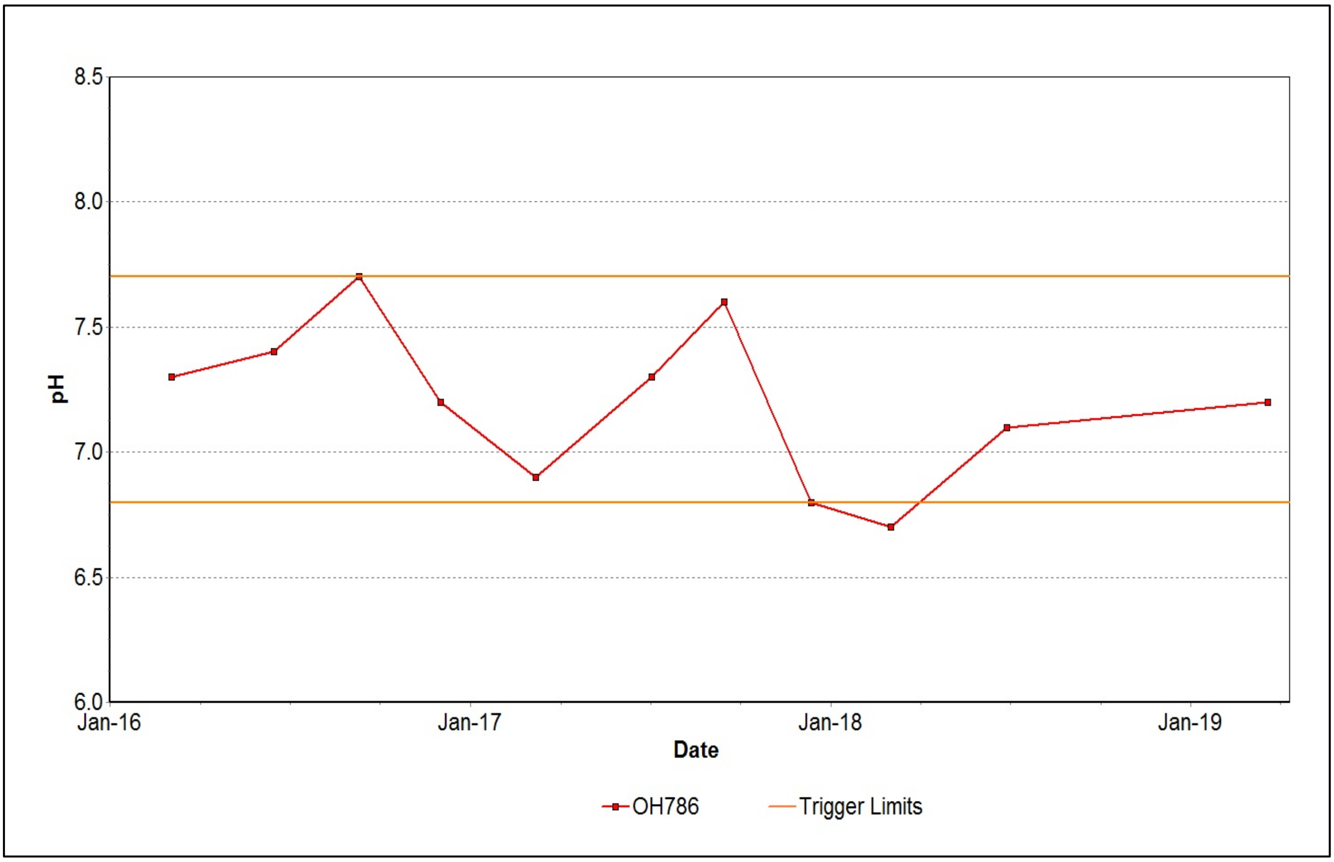


Figure 49: Hunter River Alluvium 1 Seam pH Trend – March 2019

Note: There has been insufficient water to sample since June 2018.

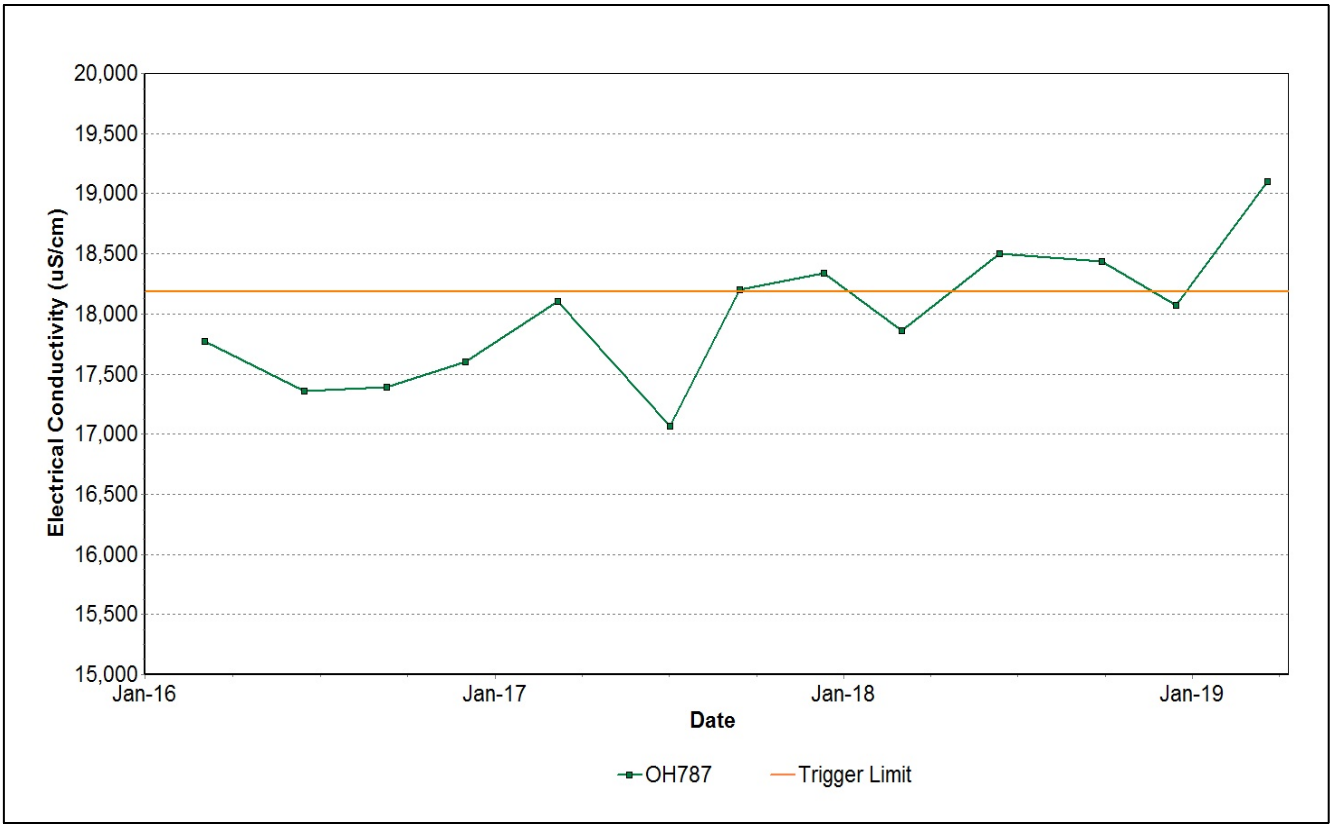


Figure 50: Hunter River Alluvium 2 Seam Electrical Conductivity Trend – March 2019

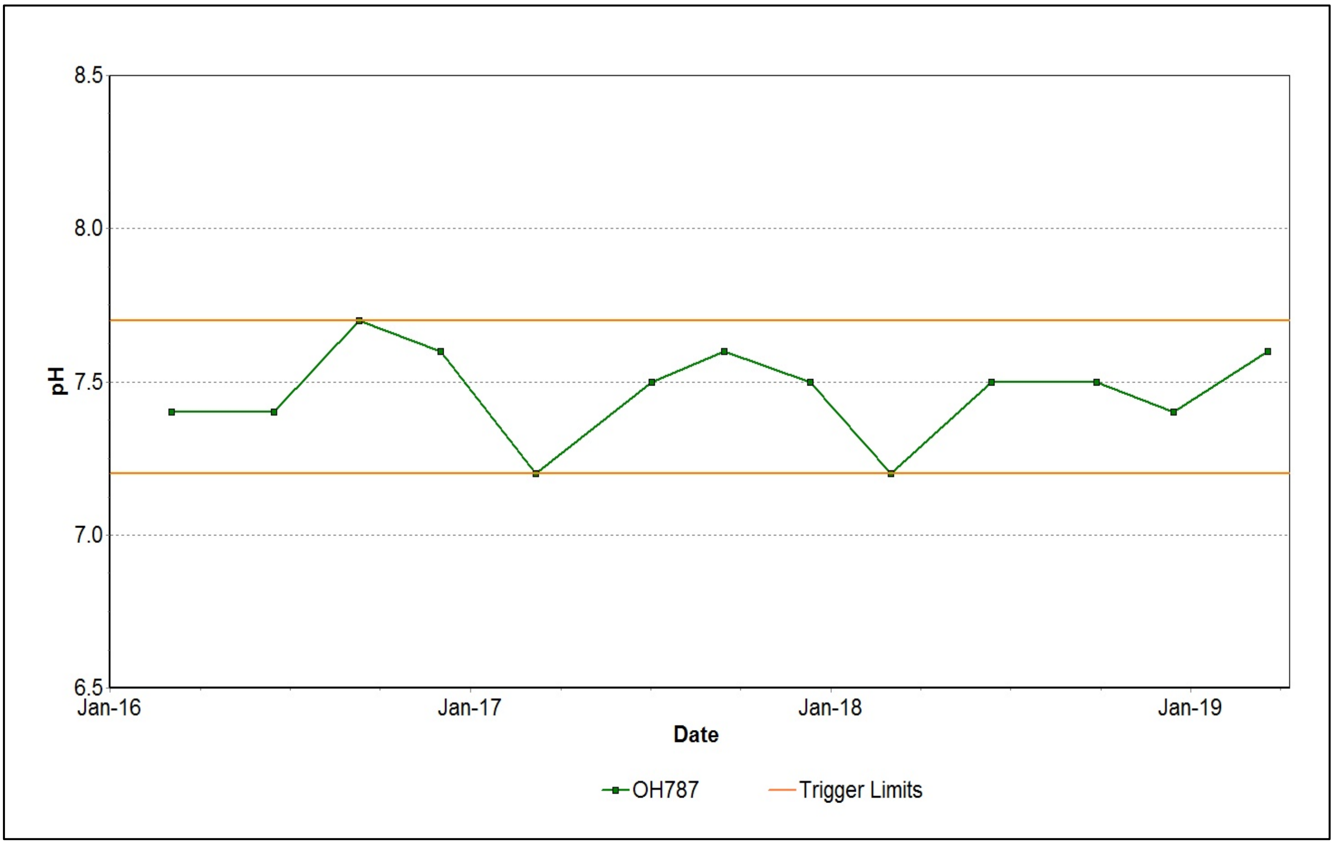


Figure 51: Hunter River Alluvium 2 Seam pH Trend – March 2019

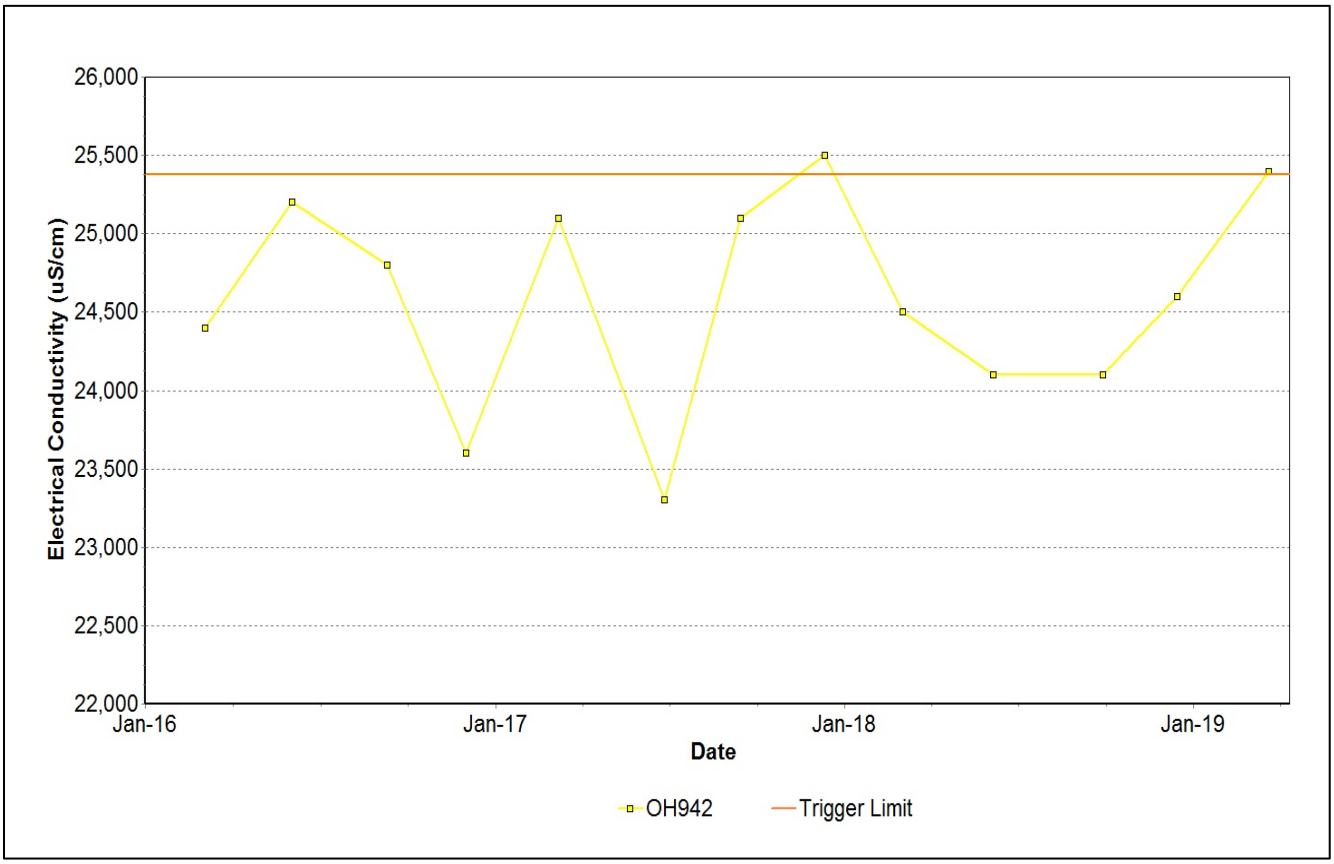


Figure 52: Hunter River Alluvium 3 Seam Electrical Conductivity Trend – March 2019

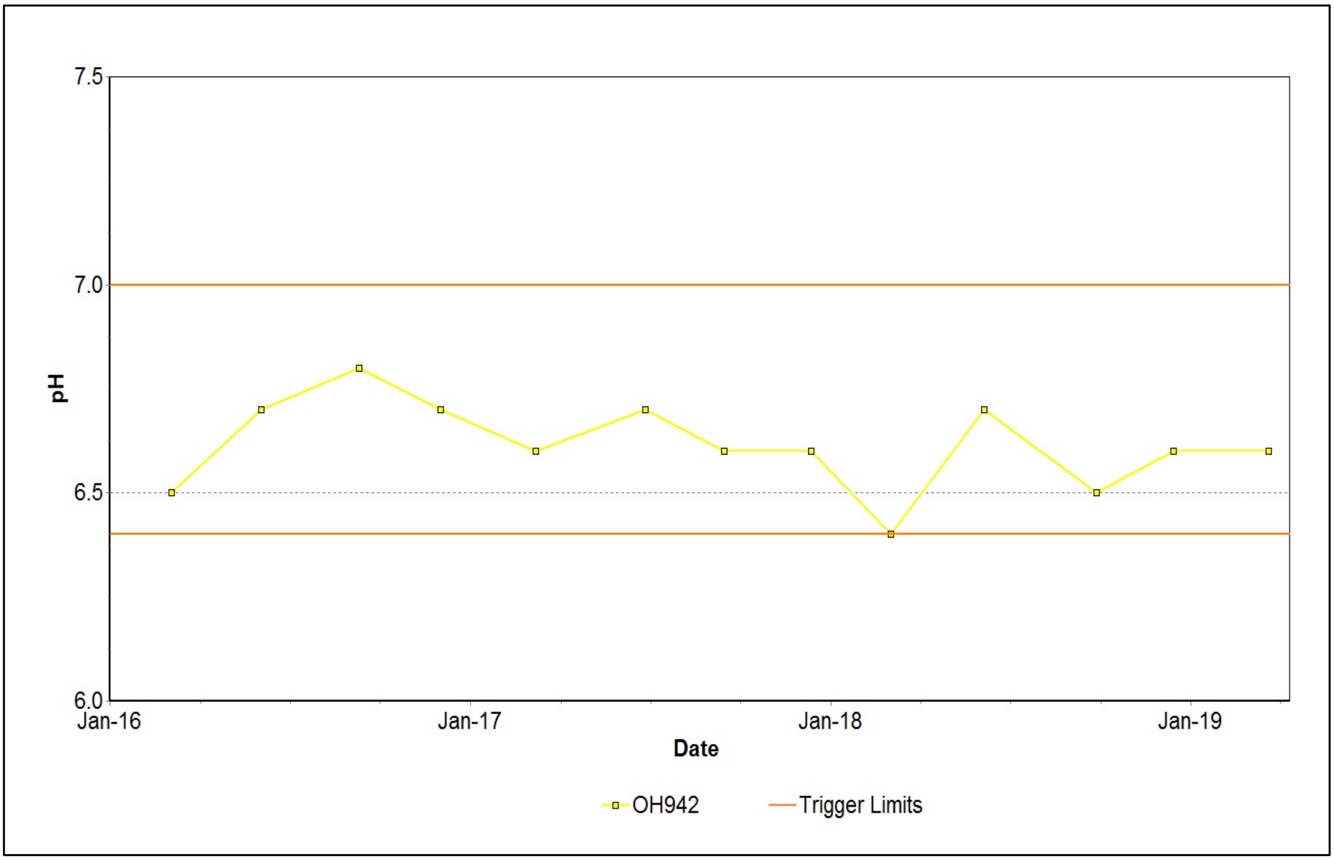


Figure 53: Hunter River Alluvium 3 Seam pH Trend – March 2019

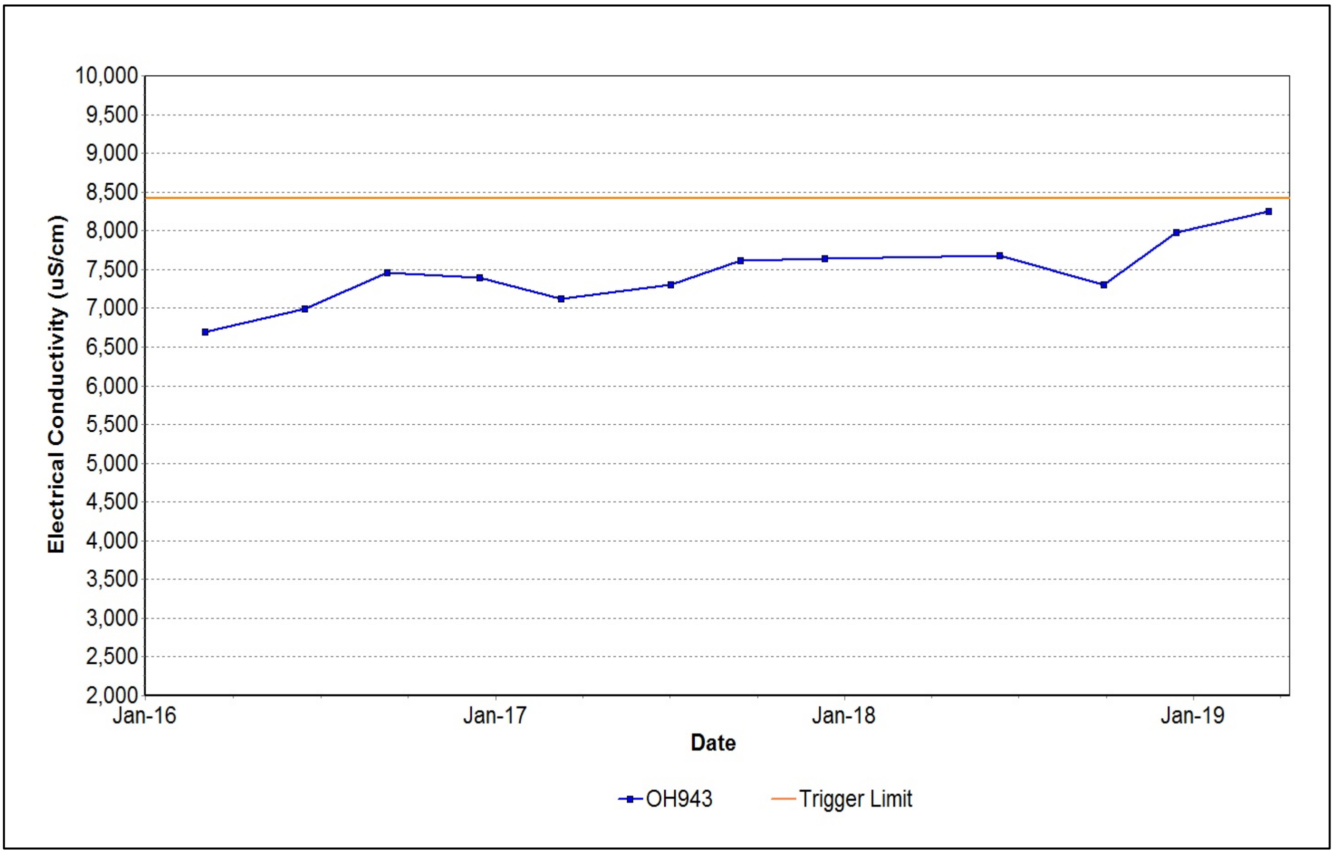


Figure 54: Hunter River Alluvium 4 Seam Electrical Conductivity Trend – March 2019

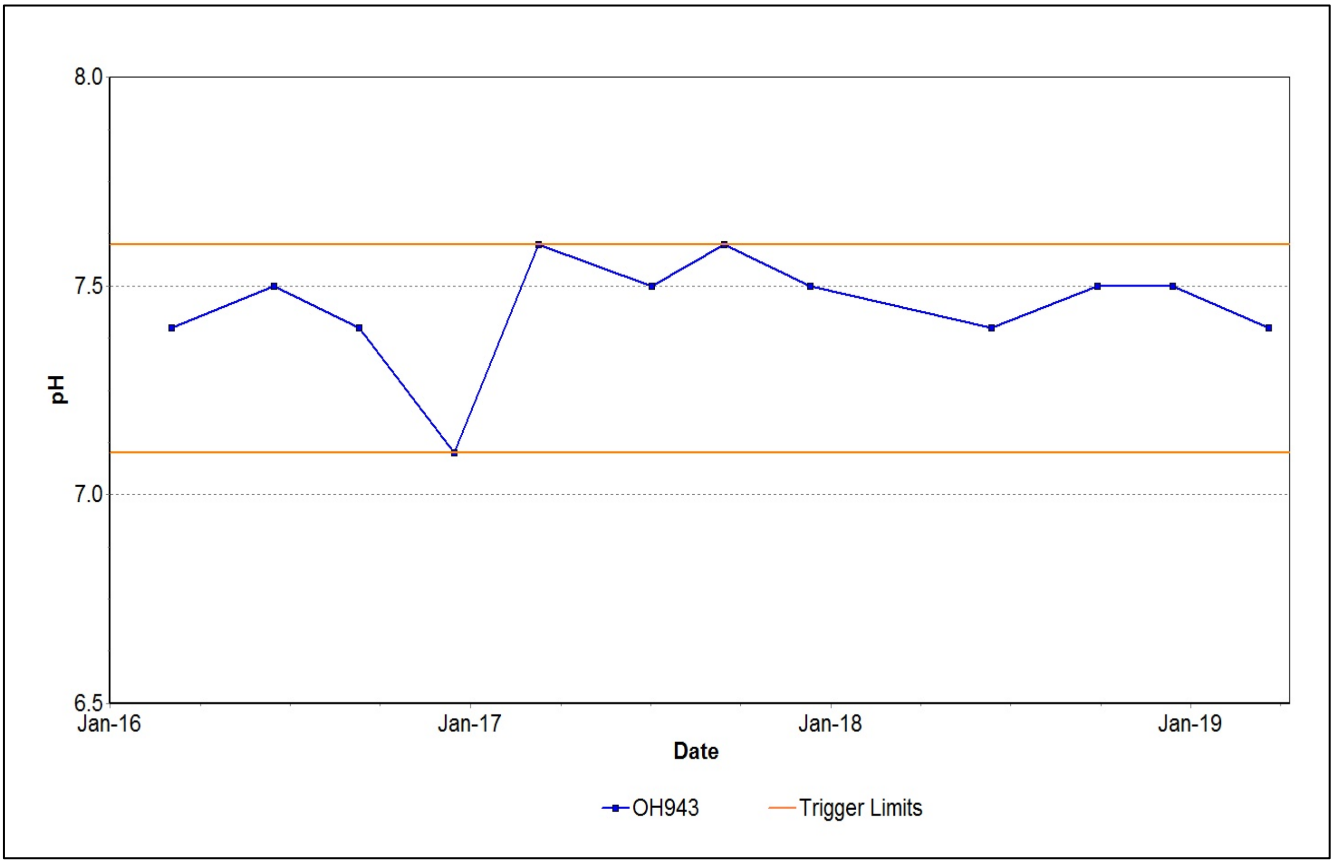
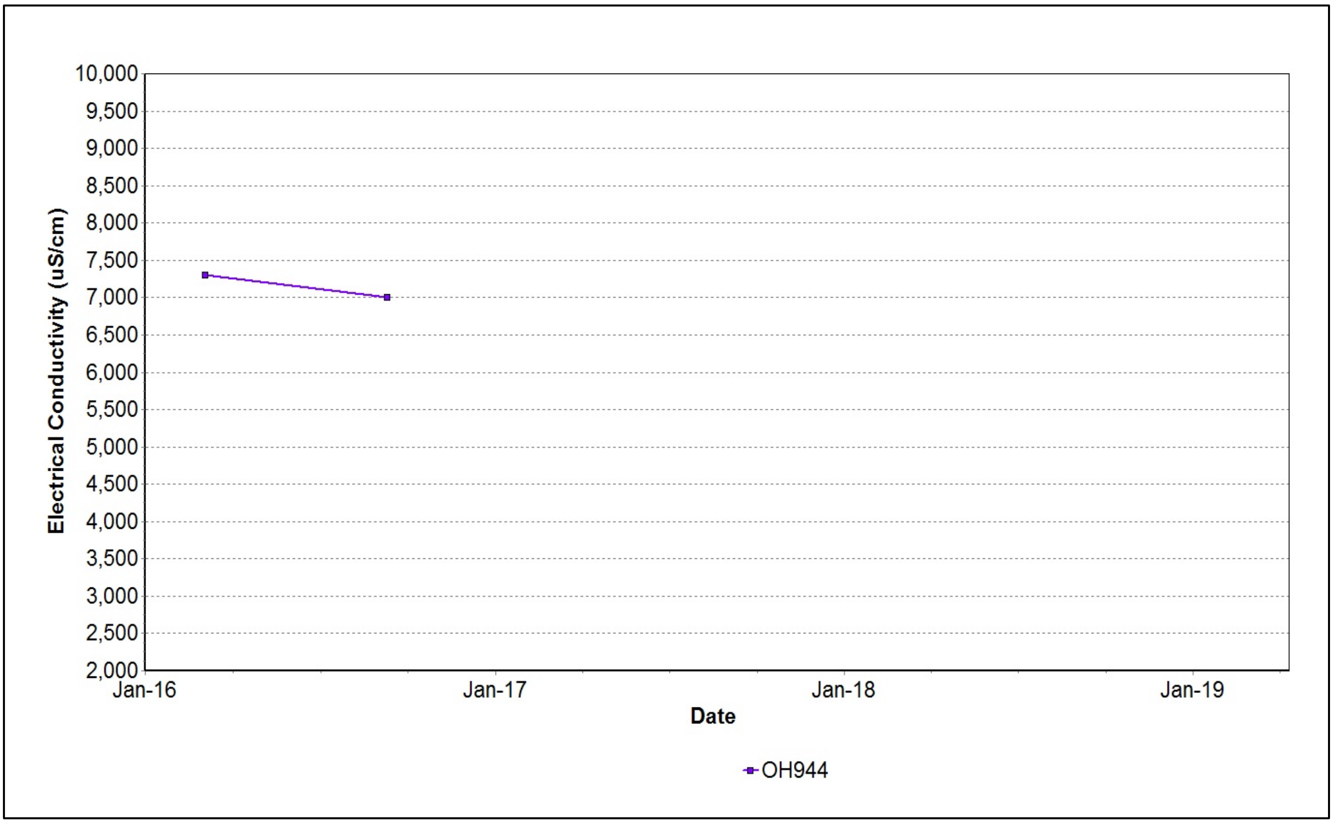
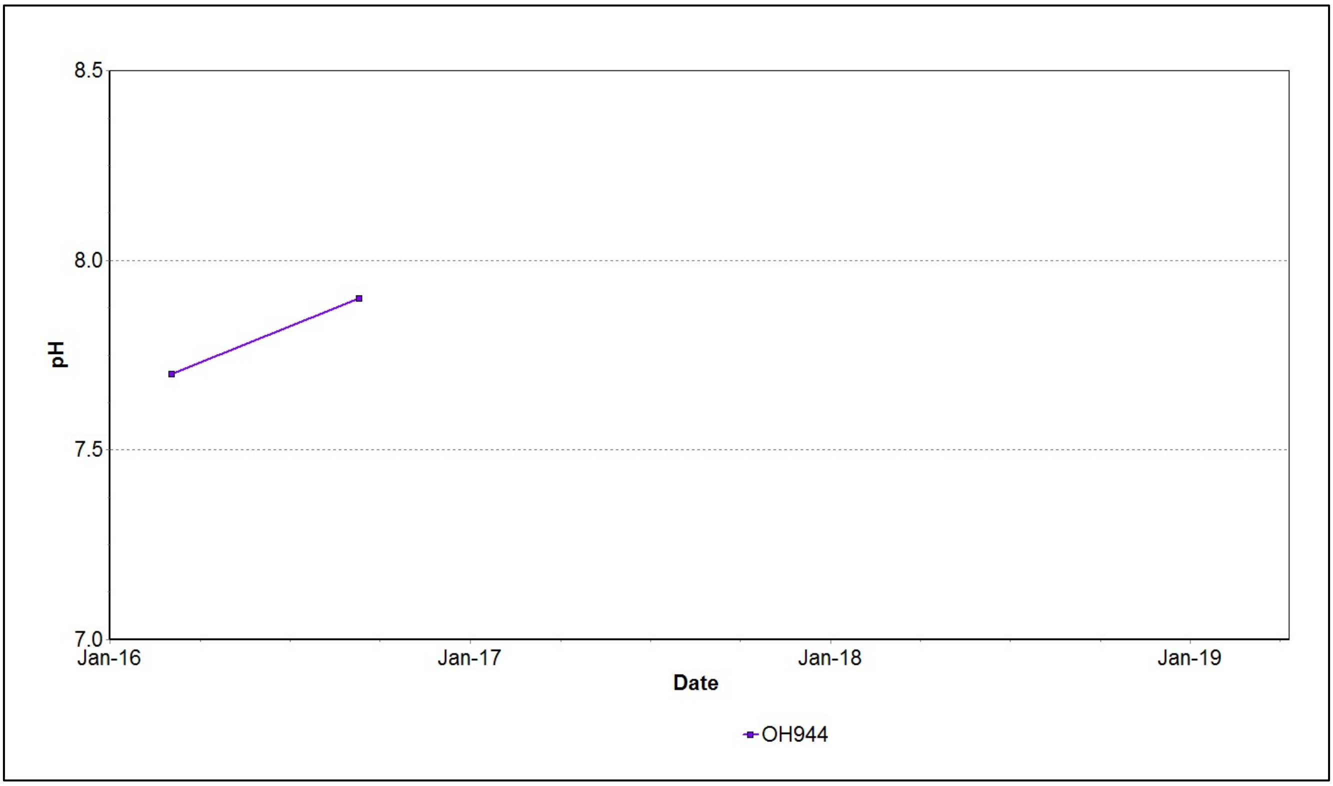


Figure 55: Hunter River Alluvium 4 Seam pH Trend – March 2019



Note: There has been insufficient water to sample since December 2016.

Figure 56: Hunter River Alluvium 5 Seam Electrical Conductivity Trend – March 2019



Note: There has been insufficient water to sample since December 2016.

Figure 57: Hunter River Alluvium 5 Seam pH Trend – March 2019

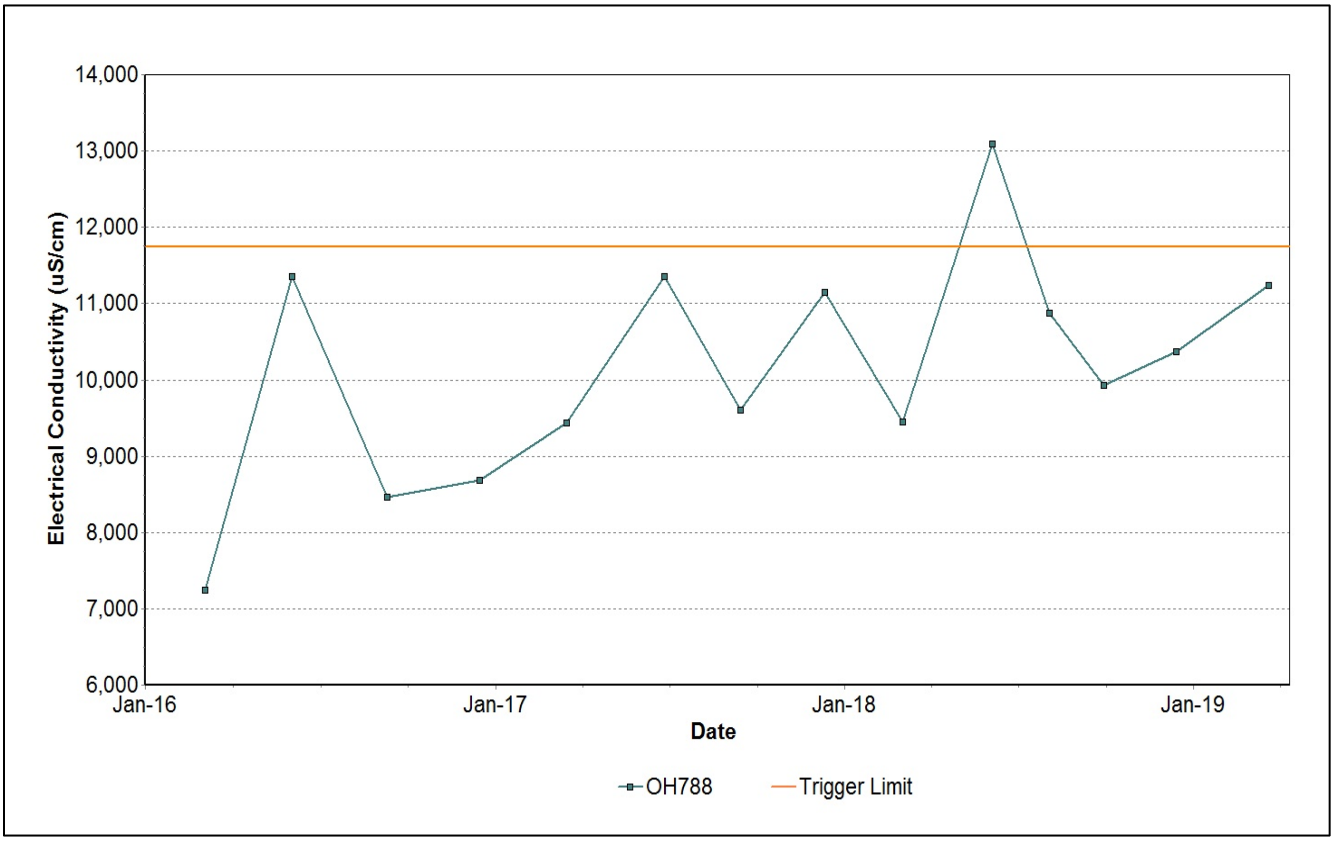


Figure 58: Hunter River Alluvium 6 Seam Electrical Conductivity – March 2019

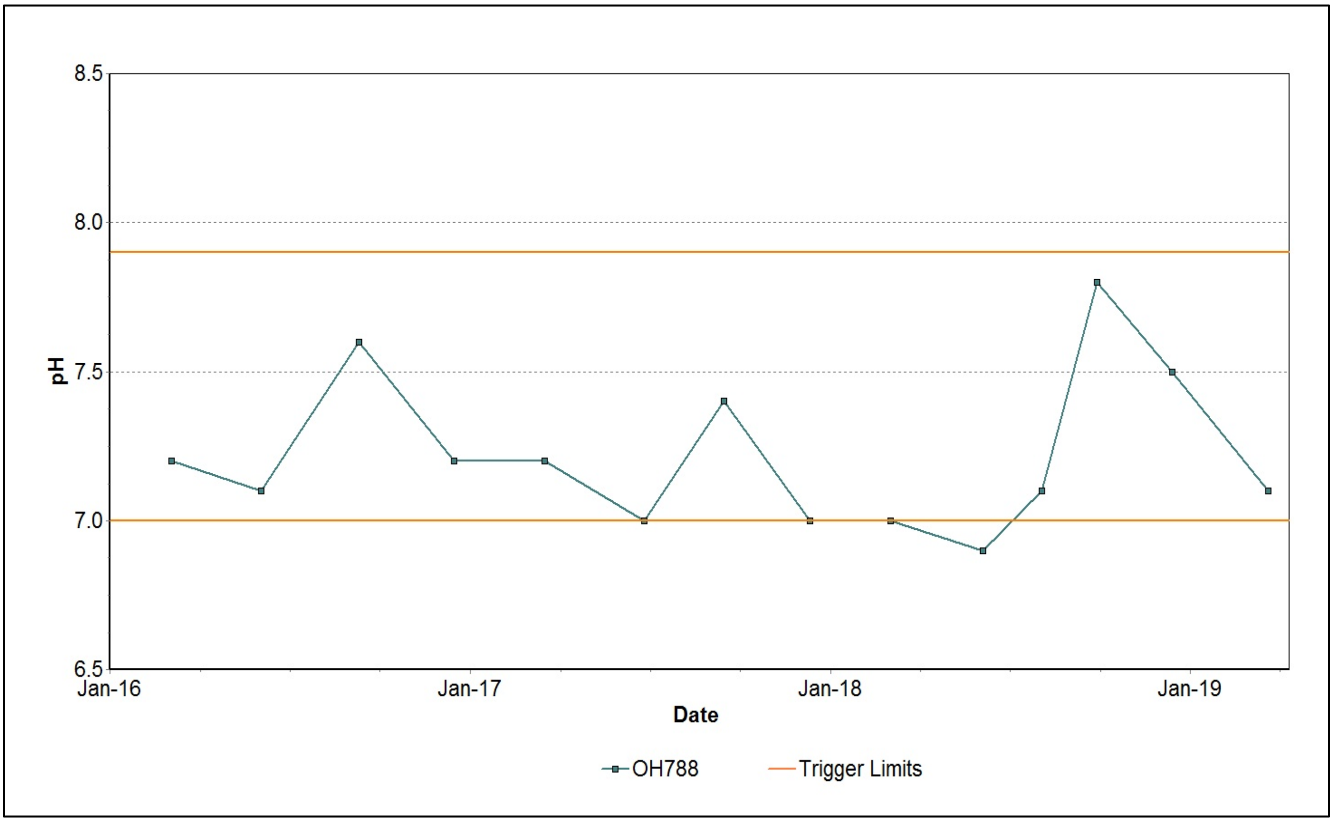
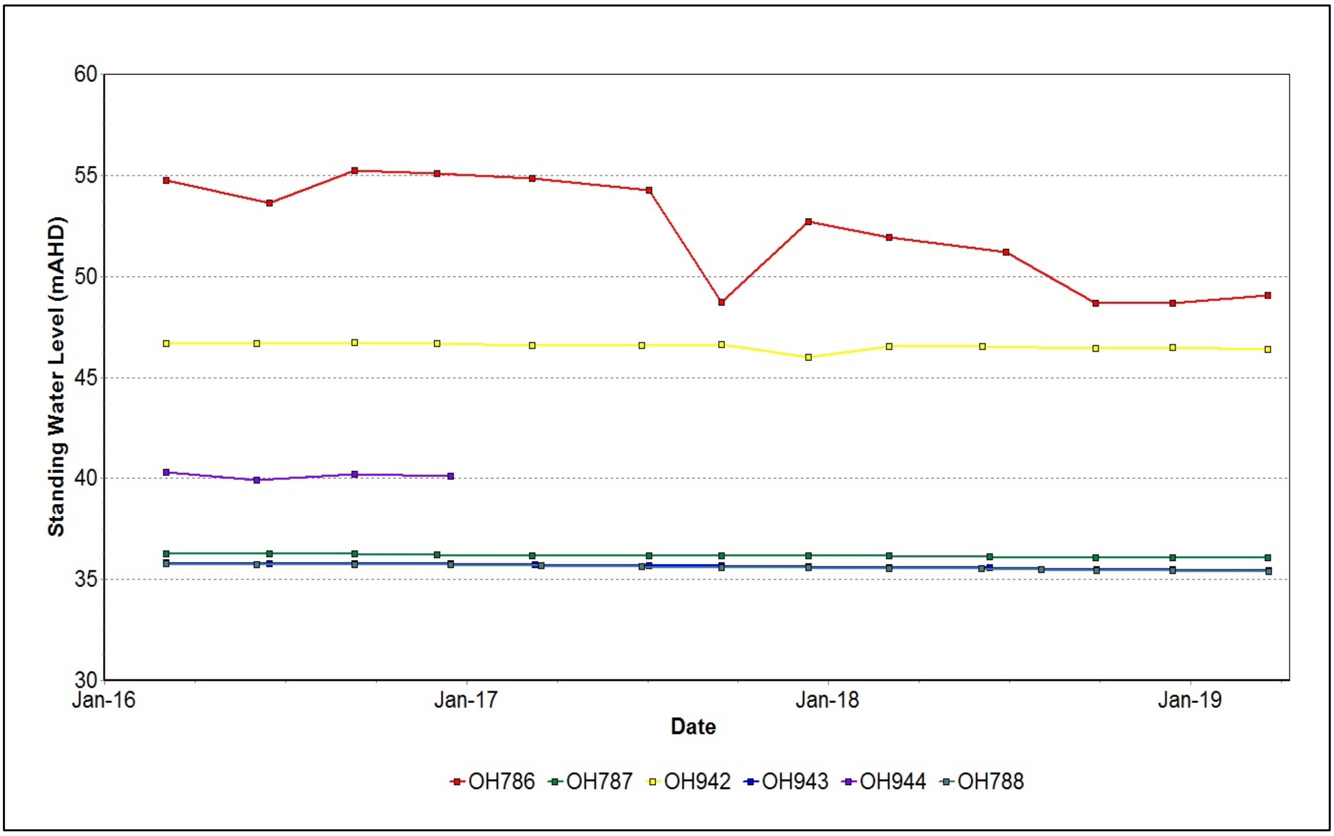


Figure 59: Hunter River Alluvium 6 Seam pH Trend – March 2019



Note: There has been insufficient water to sample at OH944 since December 2016.

Figure 60: Hunter River Alluvium Standing Water Level Trend – March 2019

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 61**.

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

Table 3: Groundwater Triggers - 2019

Site	Date	Trigger Limit Breached	Action Taken in Response
WOH2156B	01/03/2019	EC – 95th Percentile	Watching Brief*
WD625P	01/03/2019	EC – 95th Percentile	Watching Brief*
OH 786	20/03/2019	EC – 95th Percentile	Watching Brief*
OH 787	20/03/2019	EC – 95th Percentile	Watching Brief*
OH942	20/03/2019	EC – 95th Percentile	Watching Brief*
GW9709	21/03/2019	EC – 95th Percentile	Watching Brief*
OH1137	20/03/2019	EC – 95th Percentile	Watching Brief*
WOH2139A	22/01/2019	pH – 95th Percentile	Watching Brief*
WOH2139A	08/02/2019	pH – 95th Percentile	Watching Brief*
WOH2139A	21/03/2019	pH – 95th Percentile	pH results are dropping and trending back within trigger limits. Continue to watch and monitor trend.
WOH2154A	01/03/2019	pH – 5th Percentile	Watching Brief*
MB15MTW01D	19/02/2019	pH – 5th Percentile	Watching Brief*
WD622P	19/02/2019	pH – 95th Percentile	Fluctuating pH is considered to be partly a result of coal seam depressurisation, as evidenced by historical trending of falling water level. This trend is consistent with the effects of nearby mining. Fluctuations also coincide with changes to the sampling methodology, from quarterly grab sampling to low flow pumping/purging prior to annual comprehensive sampling and analysis. Watching Brief.
WOH2154B	01/03/2019	pH – 5th Percentile	Watching Brief*
WOH2155B	26/02/2019	pH – 5th Percentile	Watching Brief*
WD625P	01/03/2019	pH – 5th Percentile	Watching Brief*
OH 1138(1)	22/01/2019	pH – 5th Percentile	Continue to monitor on increased frequency
OH 1138(1)	08/02/2019	pH – 5th Percentile	Continue to monitor on increased frequency
OH 1138(1)	08/03/2019	pH – 5th Percentile	Continue to monitor on increased frequency

* = Watching brief established pending outcomes of subsequent monitoring events. No specific actions required.

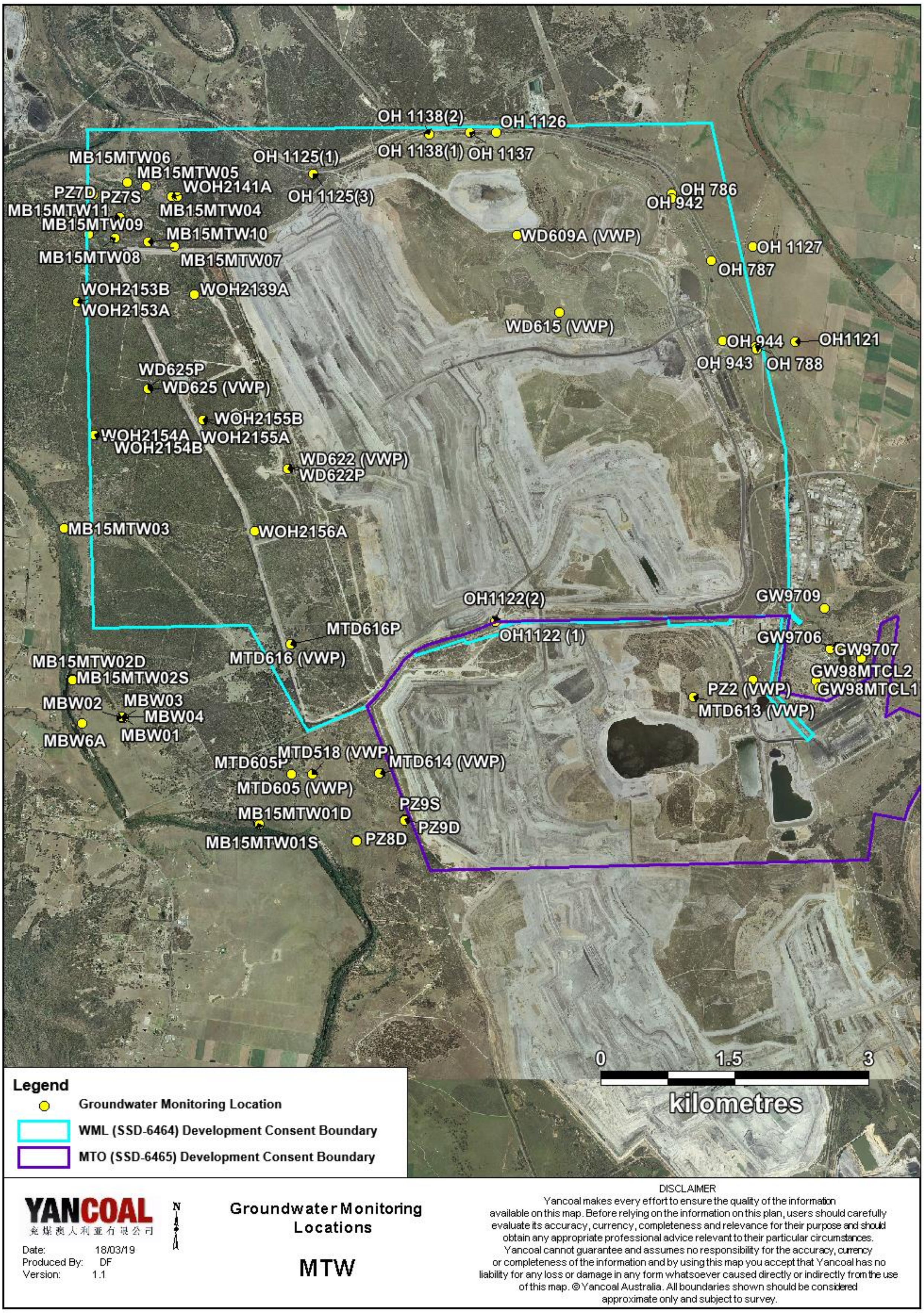


Figure 61: Groundwater Monitoring Location Plan

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 68**.

4.1 Blast Monitoring Results

During March 2019, 23 blasts were initiated at MTW. **Figure 62** to **Figure 67** 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 one blast exceeded the 115 dB(L) threshold for airblast overpressure at the Wollemi Peak Road blast monitor on 6 March at 13:28. No blast exceeded the 5mm/s criteria for ground vibration.

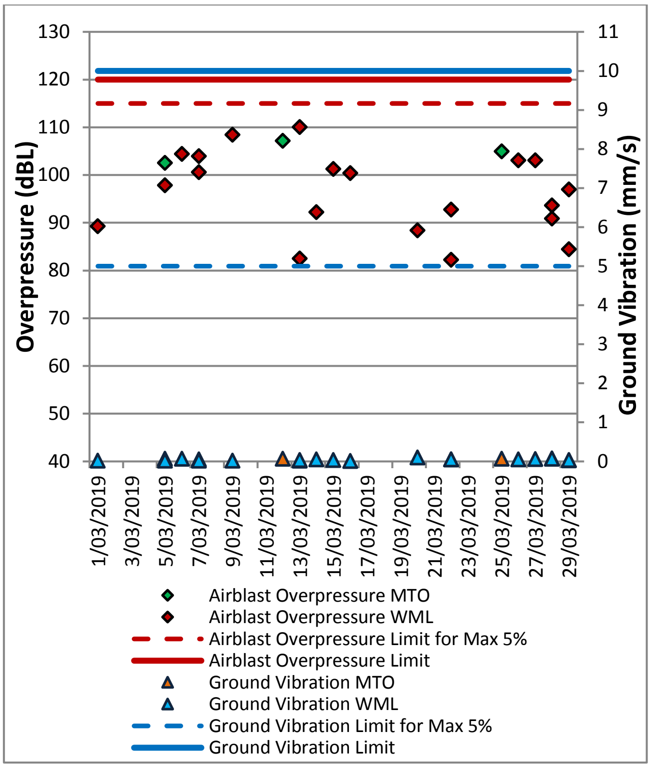


Figure 62: Abbey Green Blast Monitoring Results – March 2019

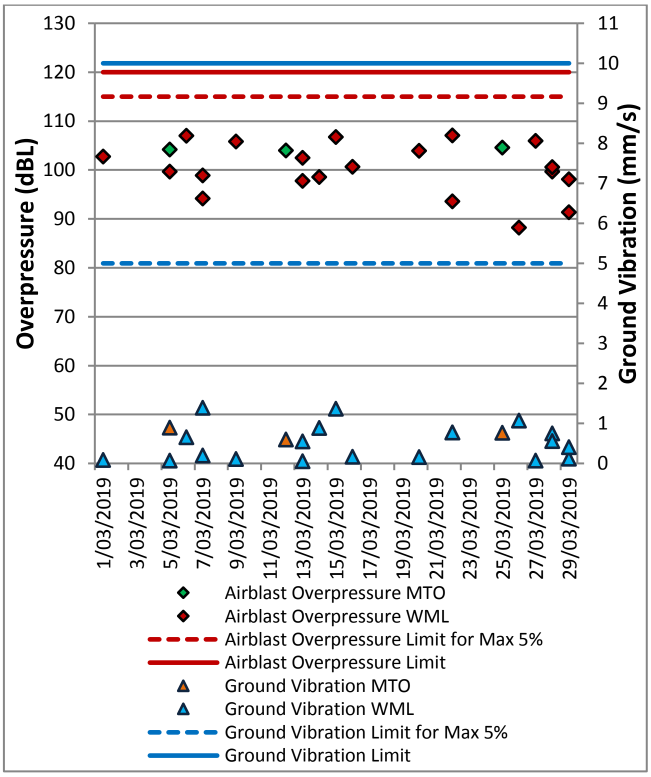


Figure 63: Bulga Village Blast Monitoring Results – March 2019

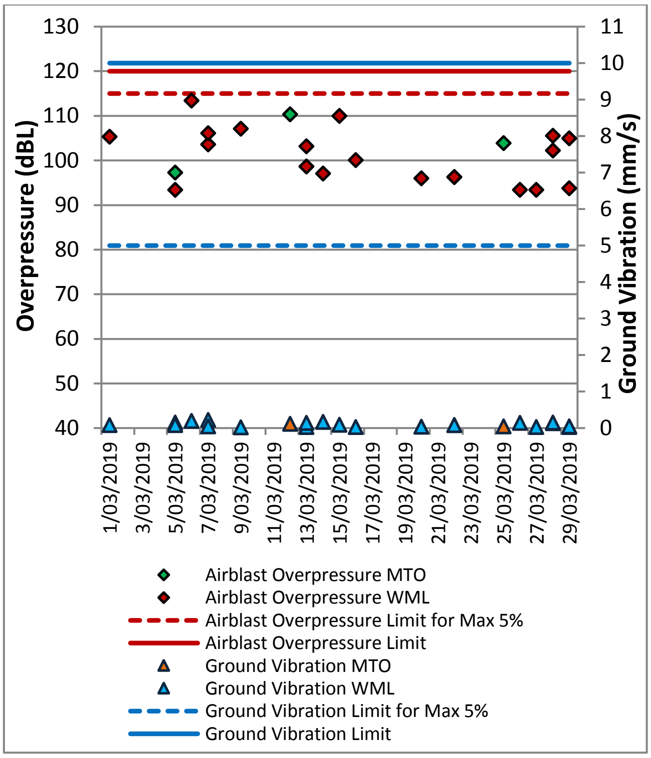


Figure 64: MTIE Blast Monitoring Results – March 2019

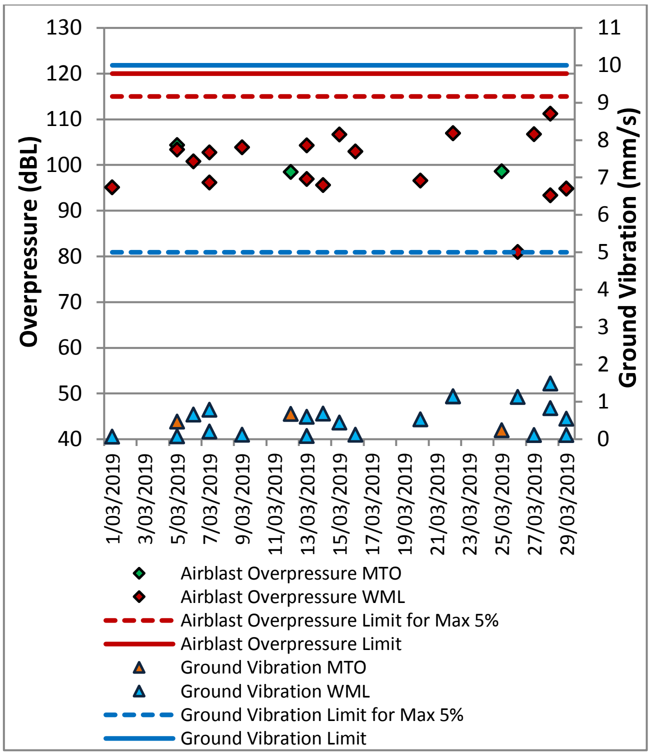


Figure 66: Wambo Road Blast Monitoring Results – March 2019

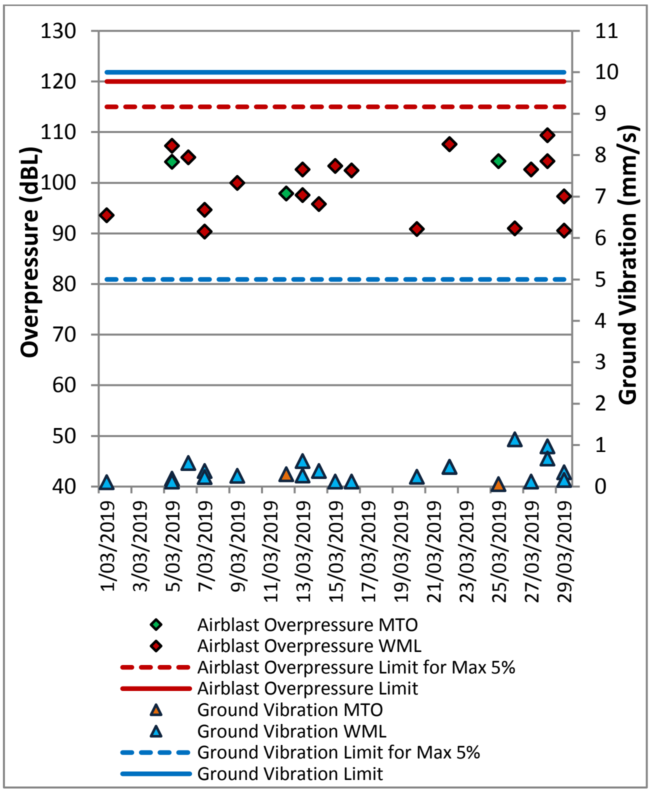


Figure 65: Warkworth Blast Monitoring Results - March 2019

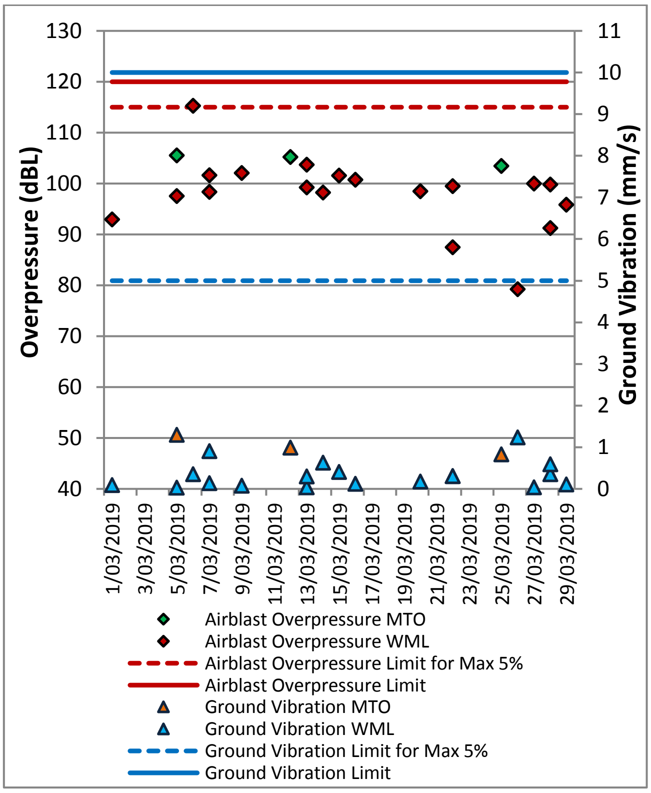


Figure 67: Wollemi Peak Road Blast Monitoring Results - March 2019

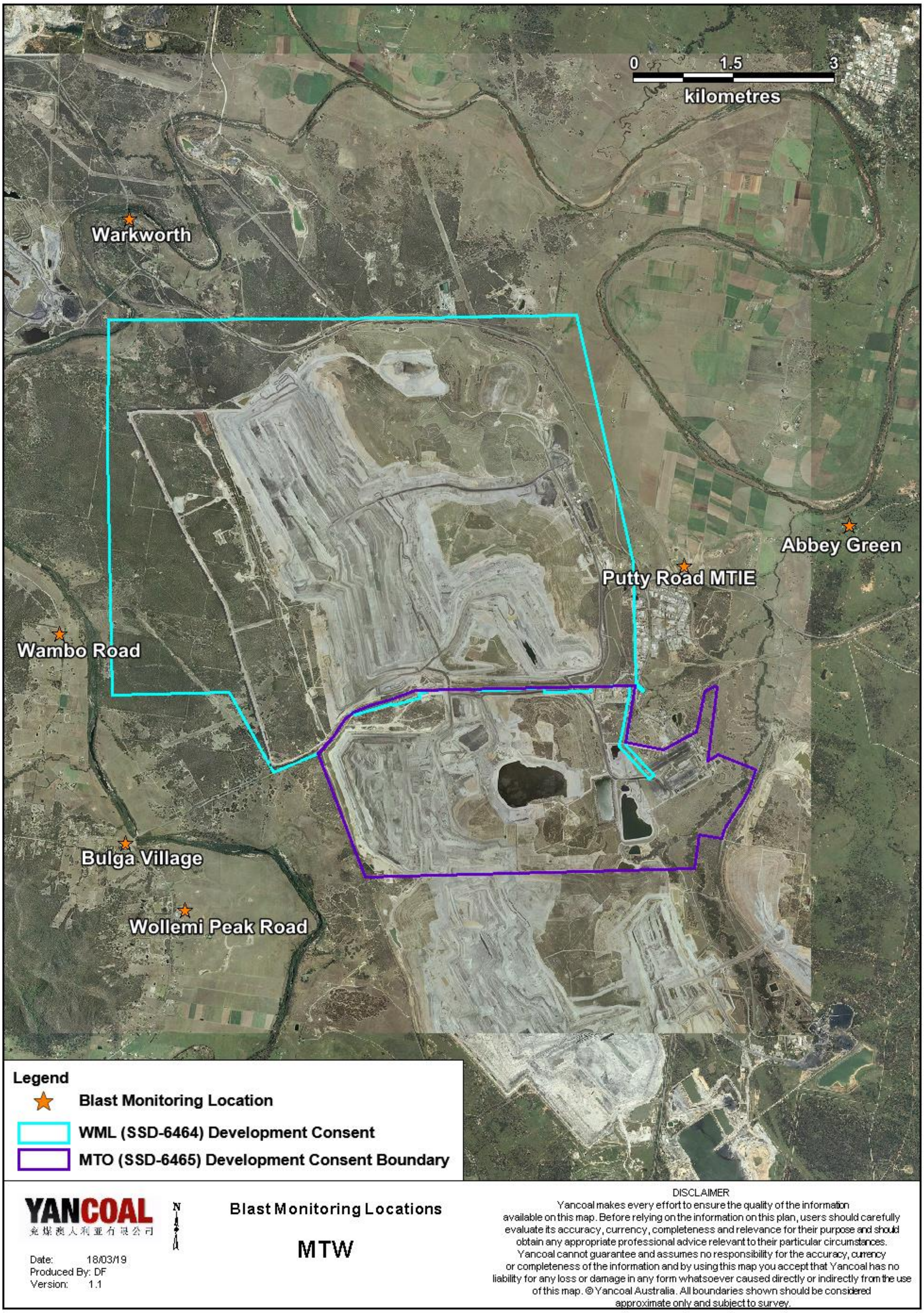


Figure 68: Blast and Vibration Monitoring Location Plan

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 69**.

5.1 Attended Noise Monitoring Results

Attended monitoring was conducted at receiver locations surrounding MTW on the night of 19 March 2019. 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 2019

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	19/03/2019 21:00	1.6	D	37	Yes	IA	Nil
Bulga Village	19/03/2019 23:09	1.4	D	38	Yes	<20	Nil
Gouldsville	19/03/2019 21:26	1.2	D	38	Yes	<30	Nil
Inlet Rd	19/03/2019 21:23	1.2	D	37	Yes	IA	Nil
Inlet Rd West	19/03/2019 21:00	1.6	D	35	Yes	IA	Nil
Long Point	19/03/2019 21:00	1.6	D	35	Yes	23	Nil
South Bulga	19/03/2019 21:20	1.1	D	35	Yes	IA	Nil
Wambo Road	19/03/2019 22:48	1.2	F	38	Yes	NM	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 2019

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	19/03/2019 21:00	1.6	D	47	Yes	IA	Nil
Bulga Village	19/03/2019 23:09	1.4	D	48	Yes	<20	Nil
Gouldsville	19/03/2019 21:26	1.2	D	48	Yes	38	Nil
Inlet Rd	19/03/2019 21:23	1.2	D	47	Yes	IA	Nil
Inlet Rd West	19/03/2019 21:00	1.6	D	45	Yes	IA	Nil
Long Point	19/03/2019 21:00	1.6	D	45	Yes	27	Nil
South Bulga	19/03/2019 21:20	1.1	D	45	Yes	IA	Nil
Wambo Road	19/03/2019 22:48	1.2	F	48	Yes	NM	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 2019

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	19/03/2019 21:00	1.6	D	37	Yes	IA	Nil
Bulga Village	19/03/2019 23:09	1.4	D	38	Yes	IA	Nil
Gouldsville	19/03/2019 21:26	1.2	D	35	Yes	IA	Nil
Inlet Rd	19/03/2019 21:23	1.2	D	37	Yes	IA	Nil
Inlet Rd West	19/03/2019 21:00	1.6	D	35	Yes	IA	Nil
Long Point	19/03/2019 21:00	1.6	D	35	Yes	IA	Nil
South Bulga	19/03/2019 21:20	1.1	D	36	Yes	IA	Nil
Wambo Road	19/03/2019 22:48	1.2	F	38	Yes	<30	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 2019

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	19/03/2019 21:00	1.6	D	47	Yes	IA	Nil
Bulga Village	19/03/2019 23:09	1.4	D	48	Yes	IA	Nil
Gouldsville	19/03/2019 21:26	1.2	D	45	Yes	IA	Nil
Inlet Rd	19/03/2019 21:23	1.2	D	47	Yes	IA	Nil
Inlet Rd West	19/03/2019 21:00	1.6	D	45	Yes	IA	Nil
Long Point	19/03/2019 21:00	1.6	D	45	Yes	IA	Nil
South Bulga	19/03/2019 21:20	1.1	D	46	Yes	IA	Nil
Wambo Road	19/03/2019 22:48	1.2	F	48	Yes	34	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. There were no noise measurements taken during the reporting period which required the penalty to be applied. The assessment for low frequency noise is shown in **Table 9**.

Table 9: Low Frequency Noise Assessment – March 2019

Location	Date and Time	Measured Site Only LA_{eq} dB (WML/MTO)	Site Only LC_{eq} dB[1] (WML/MTO)	Site Only LC_{eq}-LA_{eq} dB [1,3] (WML/MTO)	Result Max exceedance of ref spectrum dB[1,3] (WML/MTO)	Penalty dB[1] (WML/MTO)	Exceedance
Bulga RFS	19/03/2019 21:00	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA	NA
Bulga Village	19/03/2019 23:09	<20/IA	NA/NA	NA/NA	NA/NA	NA/NA	NA
Gouldsville	19/03/2019 21:26	<30/IA	NA/NA	NA/NA	NA/NA	NA/NA	NA
Inlet Rd	19/03/2019 21:23	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA	NA
Inlet Rd West	19/03/2019 21:00	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA	NA
Long Point	19/03/2019 21:00	23/IA	NA/NA	NA/NA	NA/NA	NA/NA	NA
South Bulga	19/03/2019 21:20	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA	NA
Wambo Road	19/03/2019 22:48	NM/<30	NA/NA	NA/NA	NA/NA	NA/NA	NA

Notes:

1. Where it is not possible to determine the site-only result due to the presence of other low-frequency noise sources occurring during the measurement, or where criteria were not applicable due to meteorological conditions, or where site-only contributions were more than 5 dB less than the relevant LAeq criterion this is noted as NA (not available) and no further assessment has been undertaken;

2. As per NPfI, if LCeq −LAeq ≥ 15 dB further assessment of low-frequency noise required as detailed in Sections 2.4 and 3.3 of this report;

3. As per NPfI, compare measured spectrum against reference spectrum to determine if the low-frequency modifying factor is triggered and application of penalty is required.

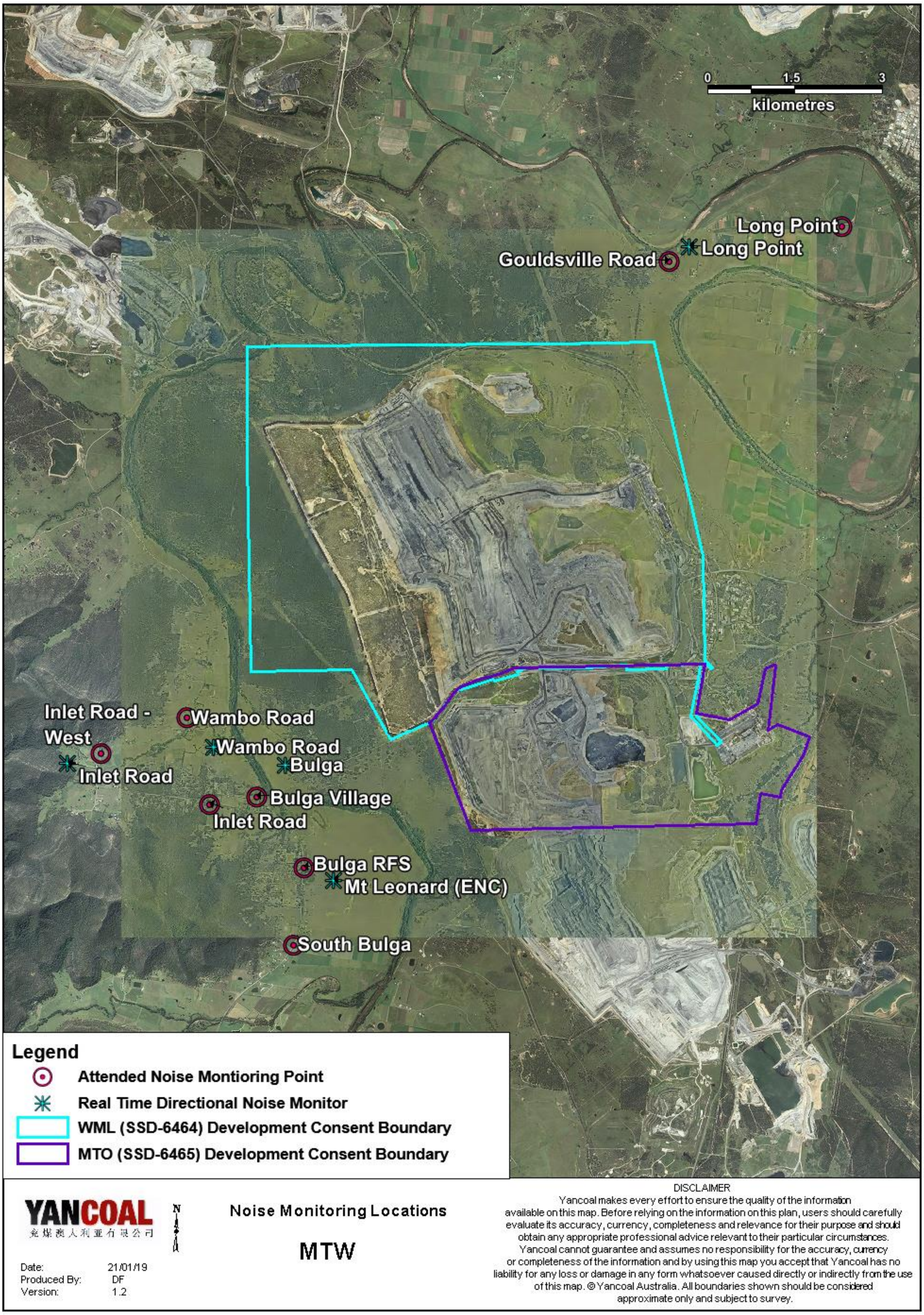


Figure 69: Noise Monitoring Location Plan

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 10**.

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Table 10: Supplementary Attended Noise Monitoring Data – March 2019

No. of assessments	No. of assessments > trigger	No. of nights where assessments > trigger	% greater than trigger
706	6	5	0.9

Note: 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 178 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 70**.

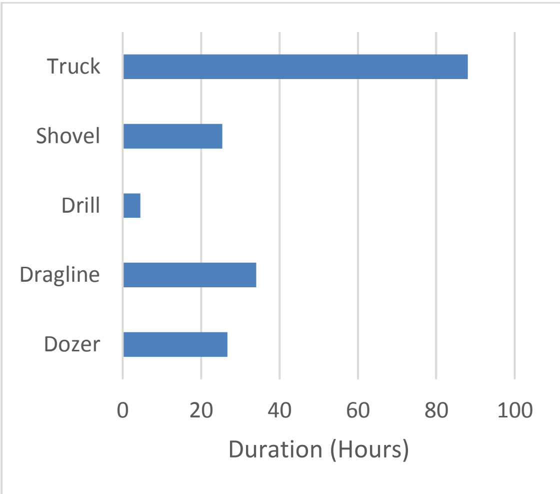

Figure 70: Operational Downtime by Equipment Type – March 2019

7.0 REHABILITATION

During March 0.9Ha of land was released, 2.7Ha was bulk shaped and 3.4Ha was topsoiled. Year-to-date progress can be viewed in **Figure 71**

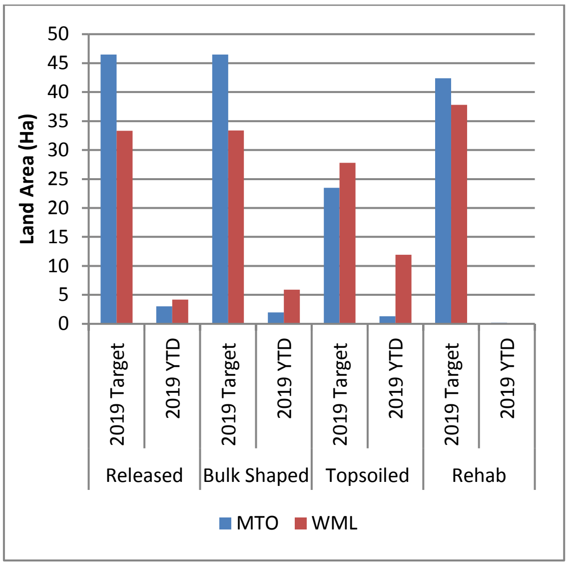

Figure 71: Rehabilitation YTD - March 2019

8.0 ENVIRONMENTAL INCIDENTS

There was one environmental incident recorded during the reporting period.

On 30 March 2019, two Sediment Dams overtopped their spillways due to greater than design rainfall. A total of 52mm of rainfall was recorded on the day of the incident. 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 34 complaints were received, details of these complaints are displayed in **Table 11** below.

Table 11: Complaints Summary - YTD March 2019

	Noise	Dust	Blast	Lighting	Other	Total
January	7	6	9	3	0	25
February	14	16	11	2	0	43
March	20	8	4	2	0	34
April						
May						
June						
July						
August						
September						
October						
November						
December						
Total	41	30	24	7	0	102

Appendix A: Meteorological Data

Table 12: Meteorological Data – Charlton Ridge Meteorological Station – March 2019

Date	Air Temperature Maximum (°C)	Air Temperature Minimum (°C)	Relative Humidity Maximum (%)	Relative Humidity Minimum (%)	Solar Radiation Maximum (W/Sq. M)	Wind Direction Average (°)	Wind Speed Average (m/sec)	Rainfall(mm)
1/03/2019	31	17	78	26	1274	120	3.2	0.0
2/03/2019	30	17	74	24	1179	126	3.2	0.0
3/03/2019	33	16	85	26	1006	147	2.6	0.0
4/03/2019	35	16	86	21	972	155	2.3	0.0
5/03/2019	36	16	87	17	960	155	2.3	0.0
6/03/2019	37	19	76	14	1288	225	3.6	3.6
7/03/2019	21	16	76	55	273	145	3.6	0.0
8/03/2019	33	15	81	28	1073	141	1.9	0.0
9/03/2019	36	19	94	27	1380	198	2.2	14.0
10/03/2019	33	19	95	24	1240	196	2.0	0.0
11/03/2019	35	20	78	24	965	155	2.6	0.0
12/03/2019	36	19	81	9	1070	213	2.5	0.0
13/03/2019	28	18	78	43	1255	132	3.8	0.0
14/03/2019	33	18	84	27	1278	138	2.5	0.0
15/03/2019	28	17	80	39	1370	165	3.9	0.0
16/03/2019	22	16	91	63	872	166	3.1	4.2
17/03/2019	21	16	97	74	369	243	1.9	18.0
18/03/2019	22	15	98	67	793	259	2.9	16.0
19/03/2019	25	16	93	57	1254	204	1.6	1.6
20/03/2019	28	17	95	43	1278	159	2.0	0.2
21/03/2019	29	16	94	40	1183	160	2.4	0.0
22/03/2019	29	15	94	44	1181	163	2.2	5.6
23/03/2019	31	13	97	41	999	179	2.4	7.6
24/03/2019	34	16	94	26	950	184	1.9	0.0
25/03/2019	25	19	92	59	713	253	3.8	1.6
26/03/2019	27	15	81	21	967	225	2.7	0.0
27/03/2019	26	13	75	32	1161	150	3.2	0.0
28/03/2019	27	13	84	33	1068	147	2.6	0.0
29/03/2019	28	16	80	39	205	149	1.5	0.0
30/03/2019	25	10	98	25	173	252	3.9	52.0
31/03/2019	23	8	59	26	-	260	3.7	0.0

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