Monthly Environmental Monitoring Report

Yancoal Mt Thorley Warkworth

September 2017

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Revision History

Version No.	Person Responsible	Document Status	Date
1.0	**Environmental Advisor**	**Draft**	**03/11/2017**
1.1	**Environmental Specialist**	**Final**	**09/11/2017**

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 September to 30 September 2017.

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

2017	Monthly Rainfall (mm)	Cumulative Rainfall (mm)
September	9.4	291.4

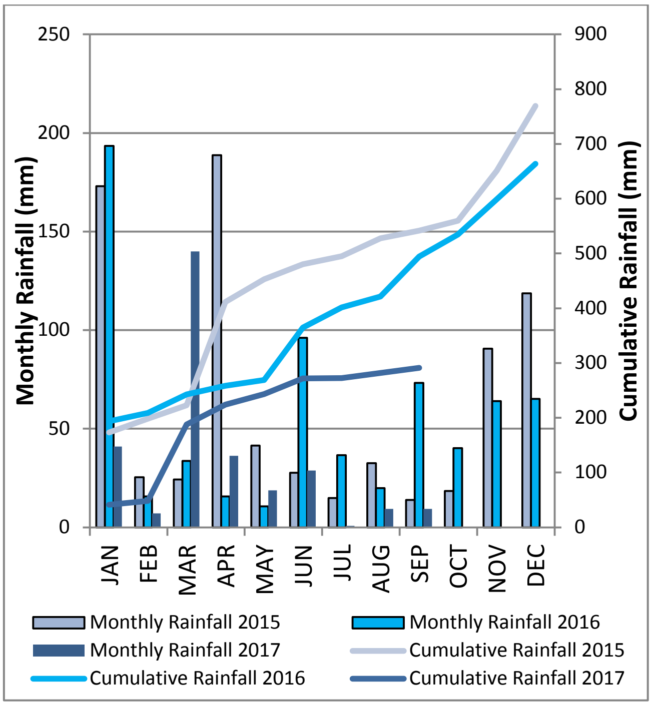


Figure 1: Rainfall Trends YTD

2.1.2 Wind Speed and Direction

Winds from the North West were dominant throughout the reporting period as shown in Figure 2.

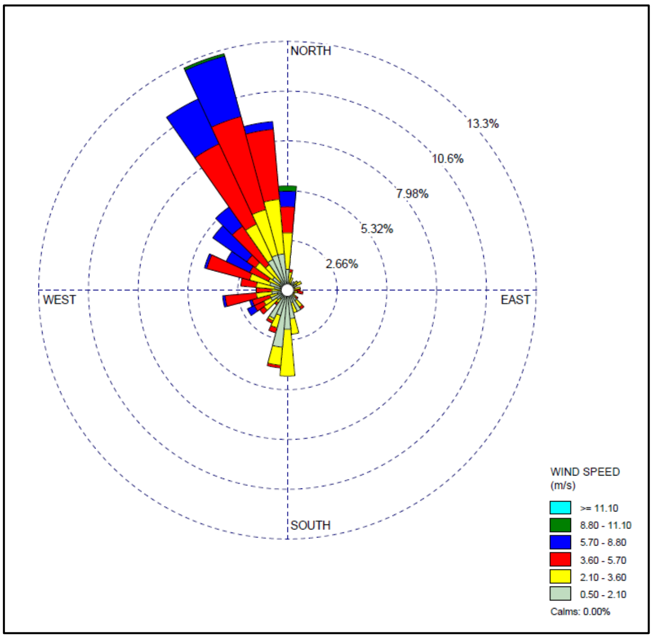


Figure 2: Charlton Ridge Wind Rose – September 2017

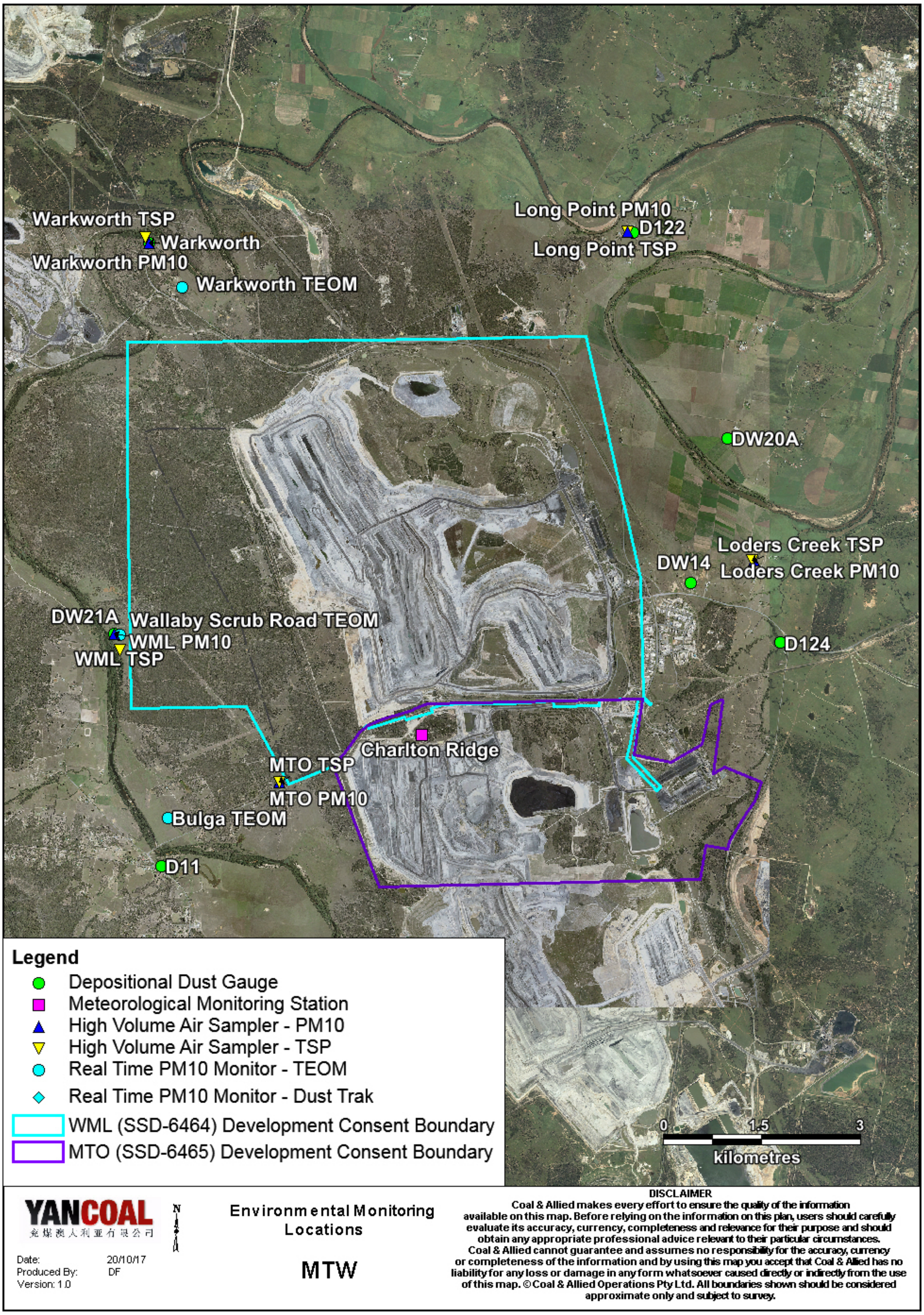


Figure 3: Air Quality Monitoring Locations

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 DW11 and D124 monitors recorded monthly results above the long term impact assessment criteria of 4.0 g/m^2 per month. Field notes associated with these results confirm the presence of bird droppings and/or insects. As such the results are considered contaminated and will be excluded from calculation of the annual average.

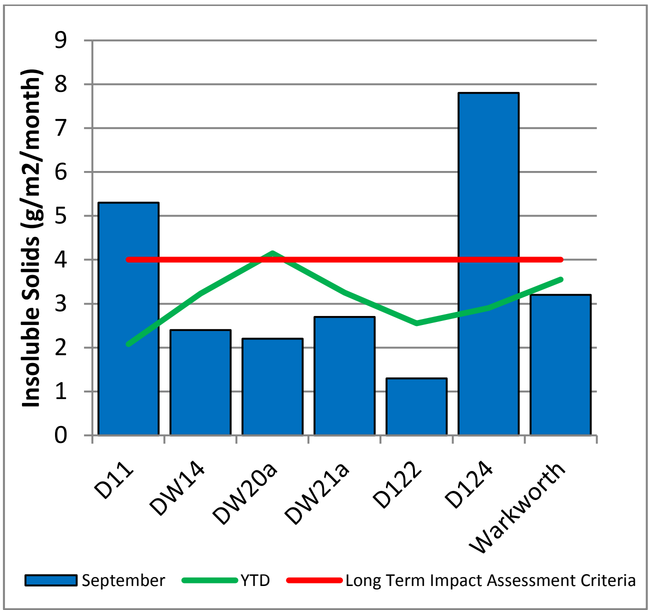


Figure 4: Depositional Dust – September 2017

2.3 Suspended Particulates

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

2.3.1 HVAS PM_{10} Results

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

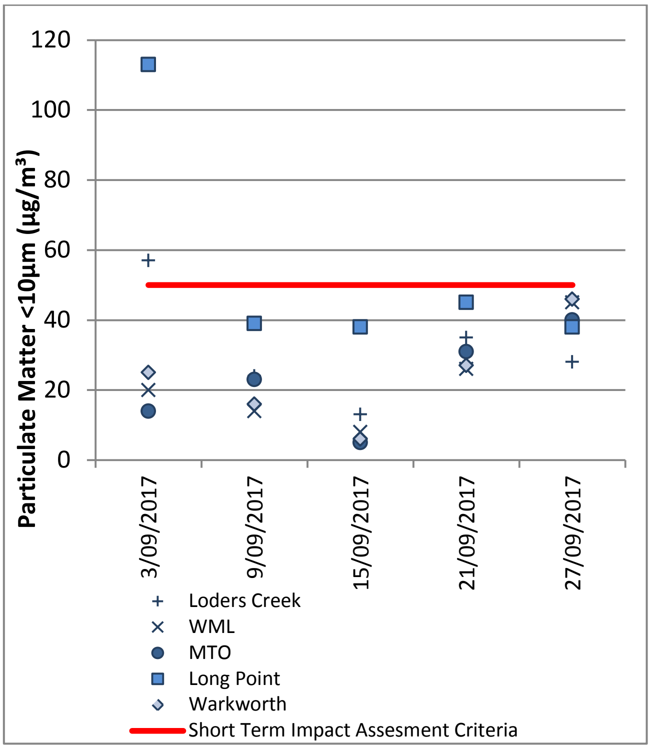


Figure 5: Individual PM_{10} Results – September 2017

On 03/09/2017 the Long Point and Loders Creek HVAS PM_{10} units recorded results of 57 µg/m³ and 113 µg/m³ respectively, which are greater than the short term (24hr) PM_{10} impact assessment criteria.

Investigation determined that the wind direction was primarily not from MTW's angle of influence at Long Point on the 3/09/2017. Accordingly, no further action is required.

Internal investigation, using local meteorological conditions and surrounding air quality monitor data, indicates that the likely MTW contribution to the results at Loders Creek on the 3/09/2017 is less than 61% of the total measured concentration. MTW's potential contribution to the results is estimated to be 35 µg/m³. Accordingly, no further action is required (as per approved Air Quality Management Plan).

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

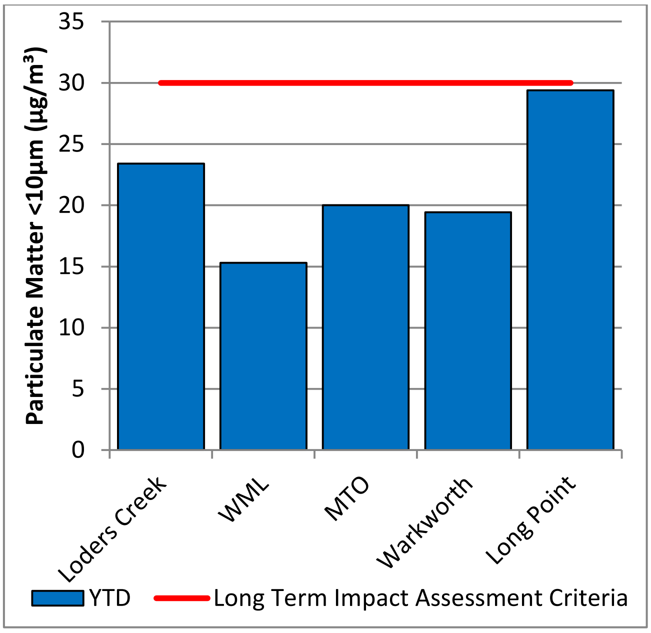


Figure 6: Annual Average PM_{10} –September 2017

2.3.2 TSP Results

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

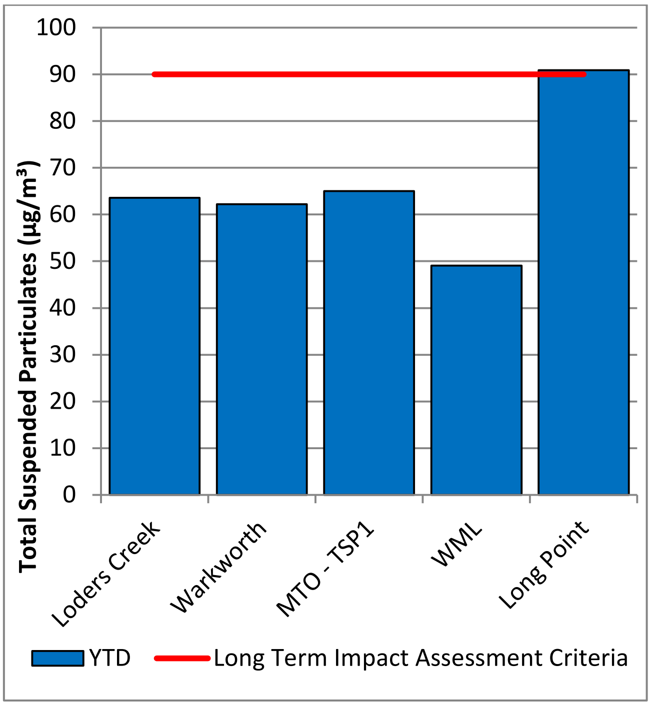


Figure 7: Annual Average Total Suspended Particulates – September 2017

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 year to date annual average PM_{10} result.

2.3.4 Real Time Alarms for Air Quality

During September, the real time monitoring system generated 110 automated air quality related alerts, including 32 alerts for adverse meteorological conditions and 77 alerts for elevated PM_{10} levels.

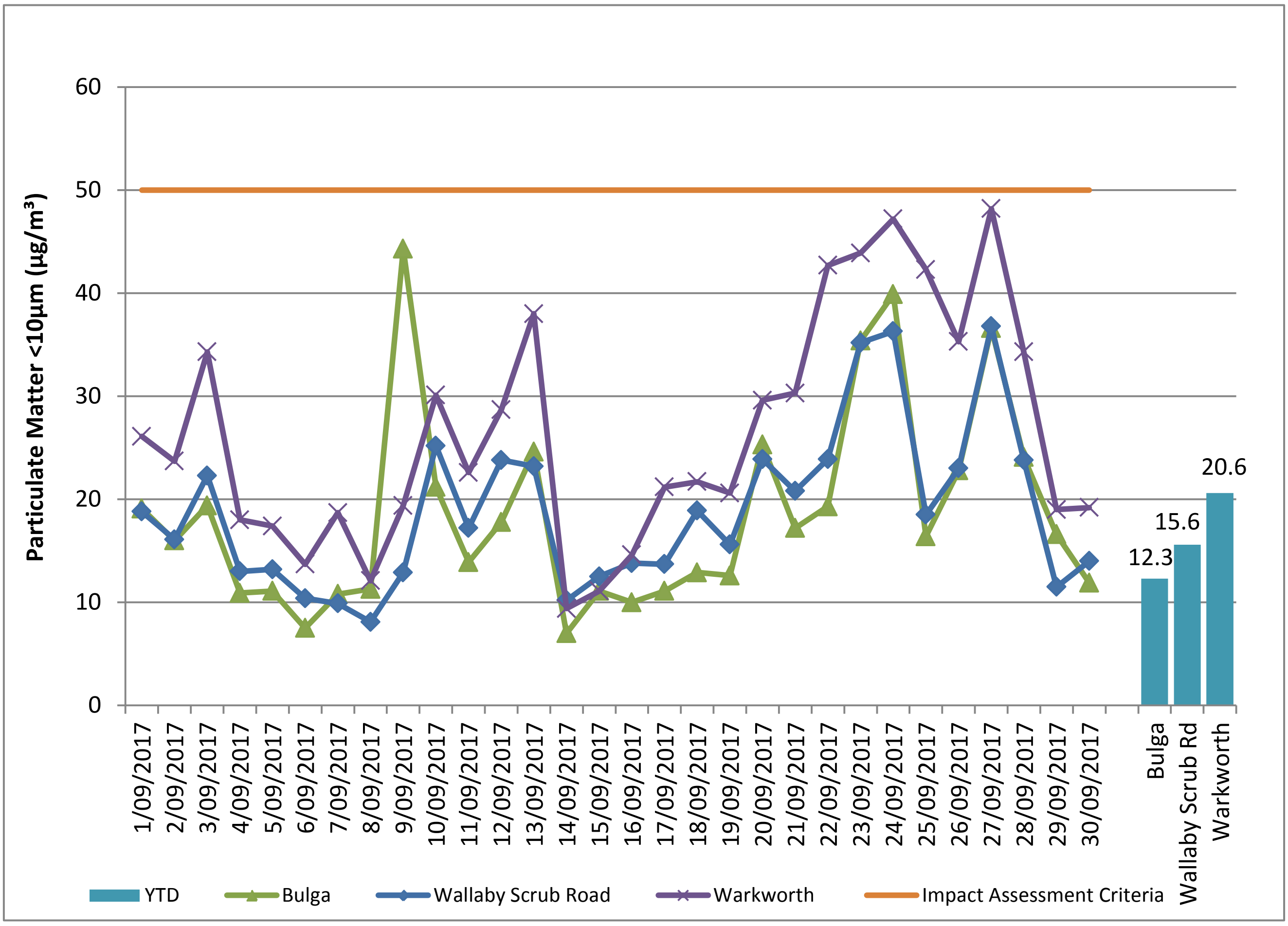


Figure 8: Real Time PM_{10} 24hr average and Year-to-date average – September 2017

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 (2014 – current) within MTW mine dams. Figure 12to Figure 14show the long term surface water trend (2014 - current) in surrounding watercourses.

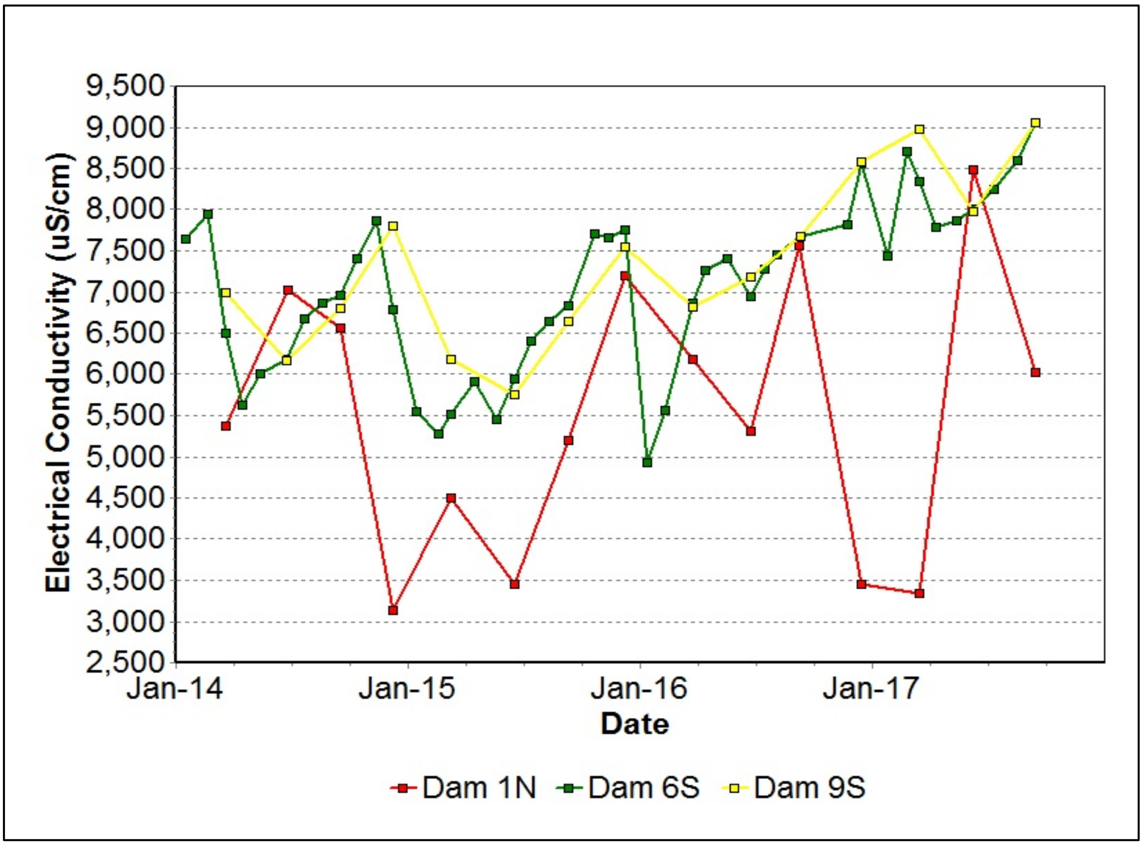


Figure 9: Site Dams Electrical Conductivity Trend 2014 – Current

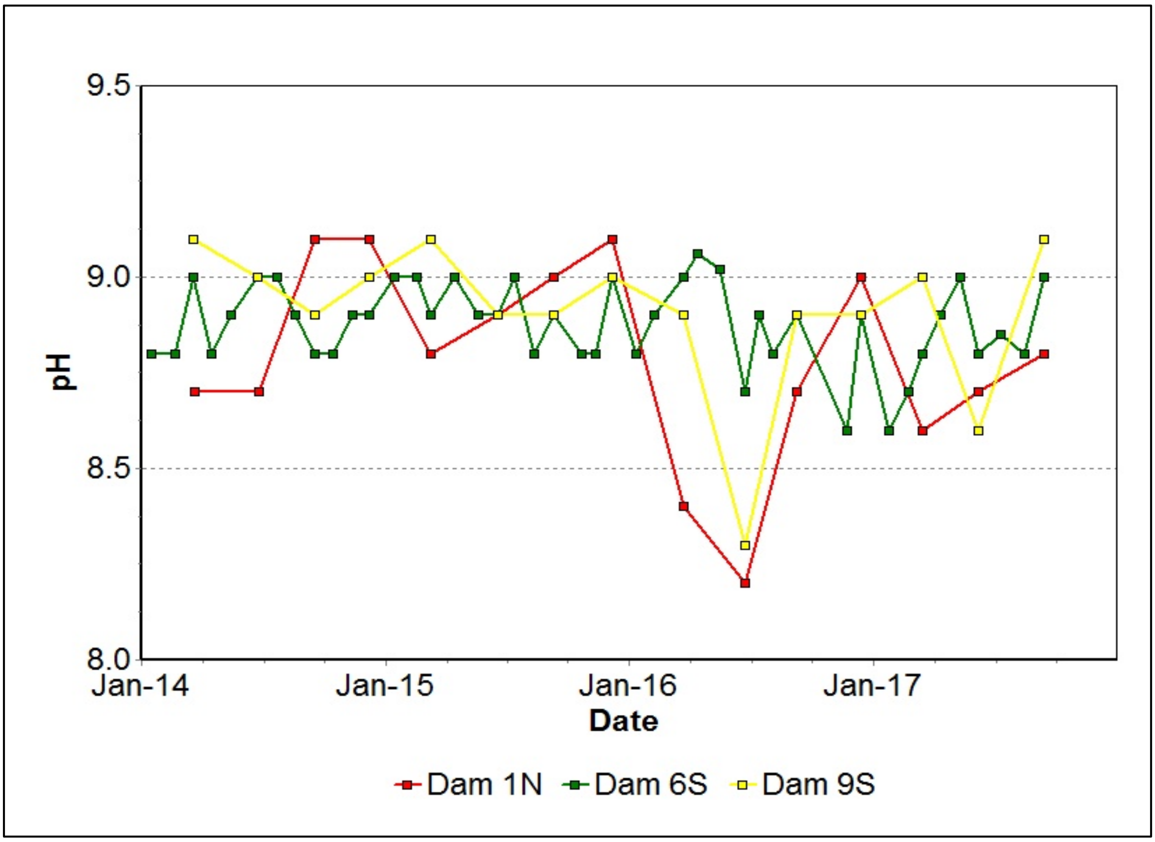


Figure 10: Site Dams pH Trend 2014 - Current

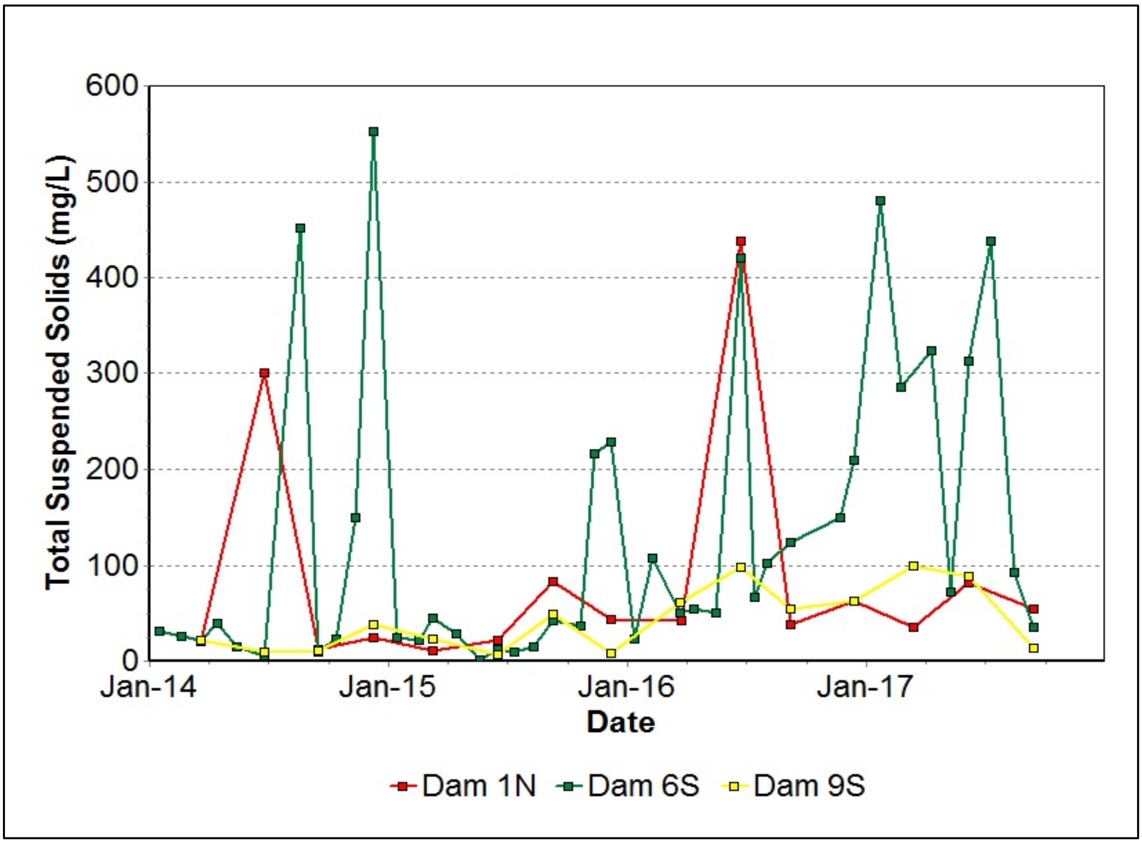


Figure 11: Site Dams Total Suspended Solids Trend 2014 – Current

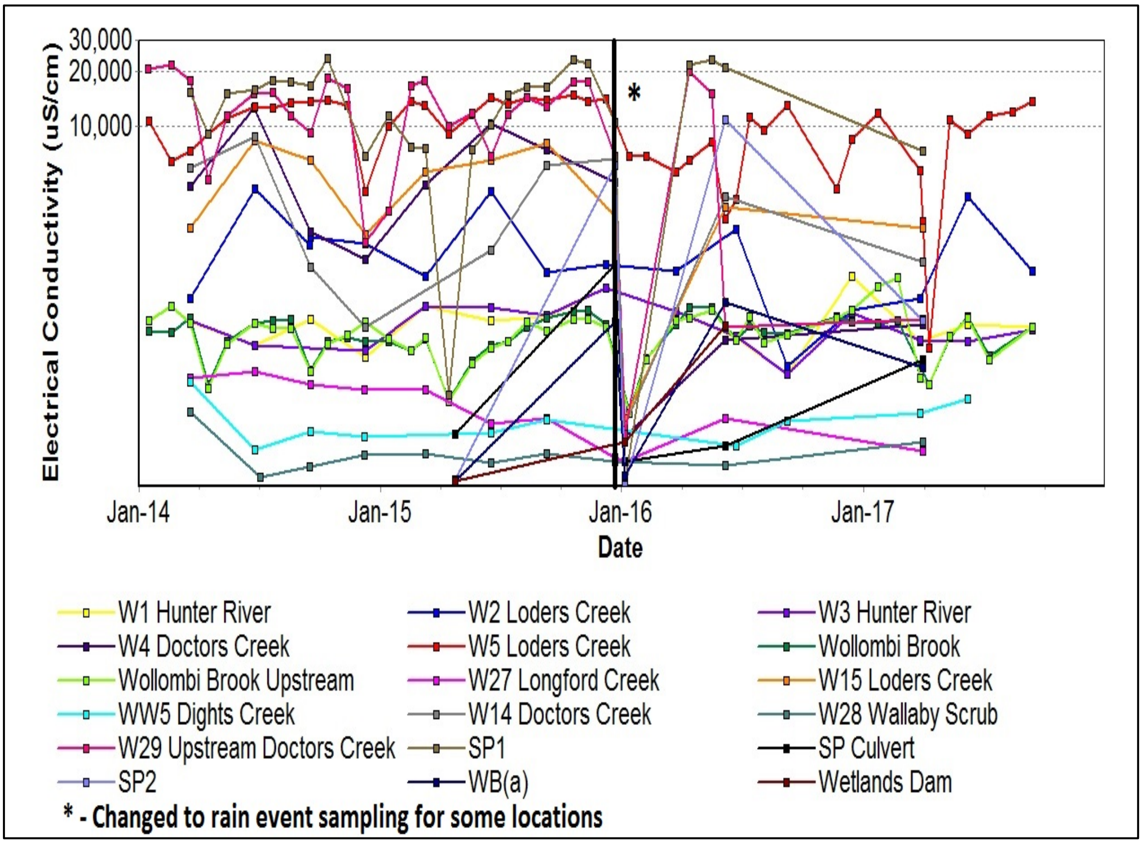


Figure 12: Watercourse Electrical Conductivity Trend 2014 - Current

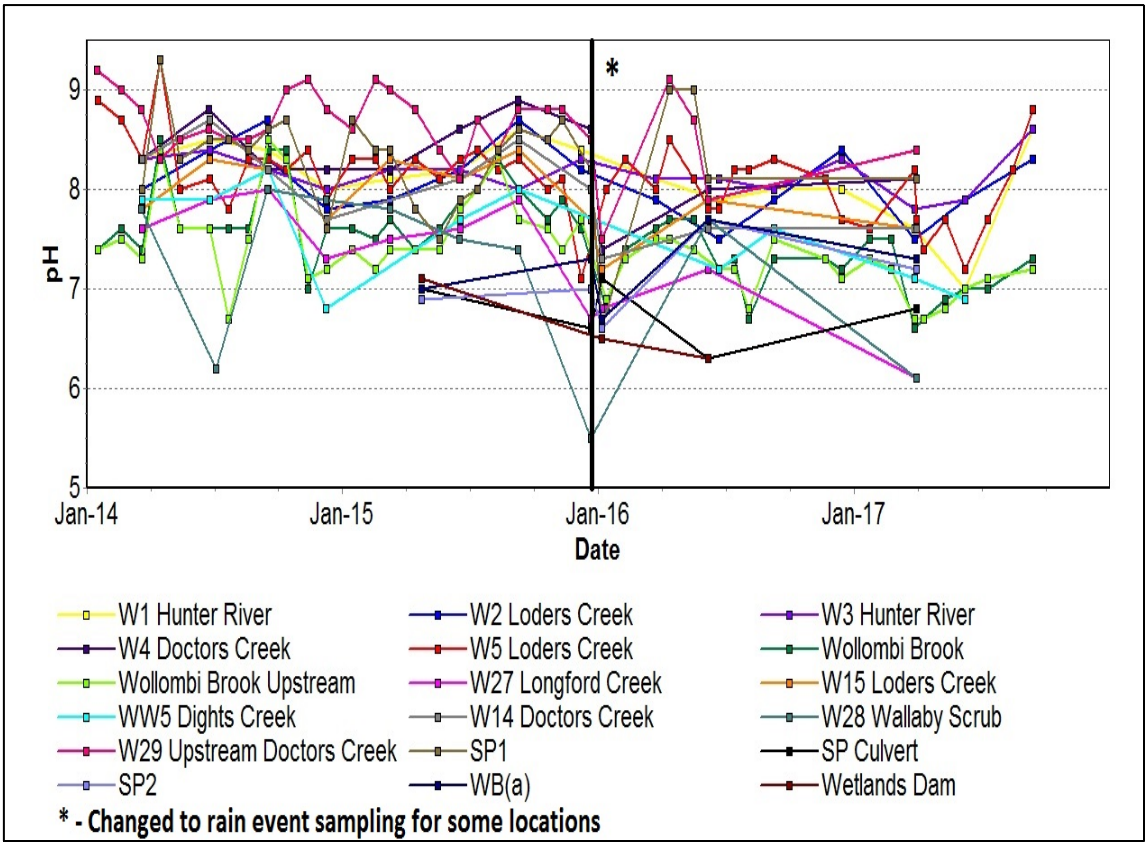


Figure 13: Watercourse pH Trend 2014 – Current

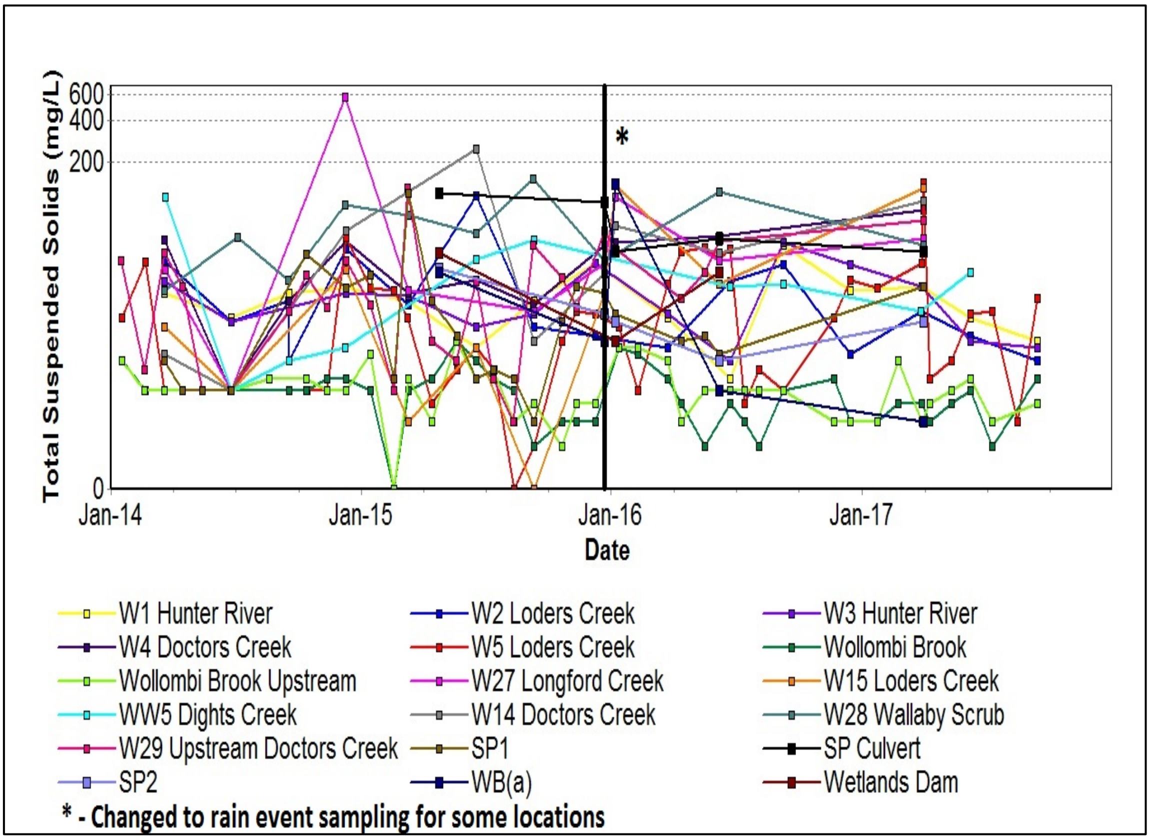


Figure 14: Watercourse Total Suspended Solids Trend 2014 – Current

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.

During Q1, Q2 and Q3 2017, 27 internal trigger limits were breached, summarised in Table 2.

Table 2: Surface Water Trigger Tracking – September YTD 2017

Site	Date	Trigger Limit Breached	Action Taken in Response
W5	15/08/2017	EC –95th Percentile	Watching Brief*
W5	13/09/2017	EC –95th Percentile	Watching Brief*
W1	28/03/2017	pH –5th Percentile	Watching Brief*
W1	08/06/2017	pH –5th Percentile	Watching Brief*
W1	13/09/2017	pH –95th Percentile	Natural Variability, watching brief.
W2	28/03/2017	pH –5th Percentile	Watching Brief*
W3	13/09/2017	pH –95th Percentile	Watching Brief*
W4	31/03/2017	pH –5th Percentile	Watching Brief*
W5	28/03/2017	pH –5th Percentile	Watching Brief*
W5	10/04/2017	pH –5th Percentile	Watching Brief*
W5	11/05/2017	pH –5th Percentile	Watching Brief*
W5	08/06/2017	pH –5th Percentile	Low flow conditions in Loders Creek; pH low but within historical range. Continue to watch and monitor.
W5	10/07/2017	pH –5th Percentile	Site observations concluded no mining related impact, results within natural variability. Continue to watch and monitor.
W15	31/03/2017	pH –5th Percentile	Watching Brief*
W27	31/03/2017	pH –5th Percentile	Watching Brief*
W28	31/03/2017	pH –5th Percentile	Watching Brief*

Wollombi Brook	28/03/2017	pH –5th Percentile	Watching Brief*
Wollombi Brook	10/04/2017	pH –5th Percentile	Watching Brief*
Wollombi Brook Upstream	28/03/2017	pH –5th Percentile	Watching Brief*
Wollombi Brook Upstream	10/04/2017	pH –5th Percentile	Watching Brief*
Wollombi Brook Upstream	11/05/2017	pH –5th Percentile	Low flow conditions in Wollombi Brook; pH low but within historical range. Continue to watch and monitor.
W4	31/03/2017	TSS – 50mg/L (ANZECC criteria)	Field investigation did not identify any mining-related sources of sediment. Elevated TSS associated with high-intensity rainfall event. No further action.
W14	31/03/2017	TSS – 50mg/L (ANZECC criteria)	Field investigation did not identify any mining-related sources of sediment. Elevated TSS associated with high-intensity rainfall event. No further action.
W15	31/03/2017	TSS – 50mg/L (ANZECC criteria)	Investigation did not identify any mining-related sources of sediment. Elevated TSS associated with high-intensity rainfall event. No further action.
W27	31/03/2017	TSS – 50mg/L (ANZECC criteria)	Investigation did not identify any mining-related sources of sediment. Elevated TSS associated with high-intensity rainfall event; data consistent with historical range. No further action.
W28	31/03/2017	TSS – 50mg/L (ANZECC criteria)	Investigation did not identify any mining-related sources of sediment. Elevated TSS associated with high-intensity rainfall event; data consistent with historical range. No further action.
W29	31/03/2017	TSS – 50mg/L (ANZECC criteria)	Field investigation did not identify any mining-related sources of sediment. Elevated TSS associated with high-intensity rainfall event. No further action.

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

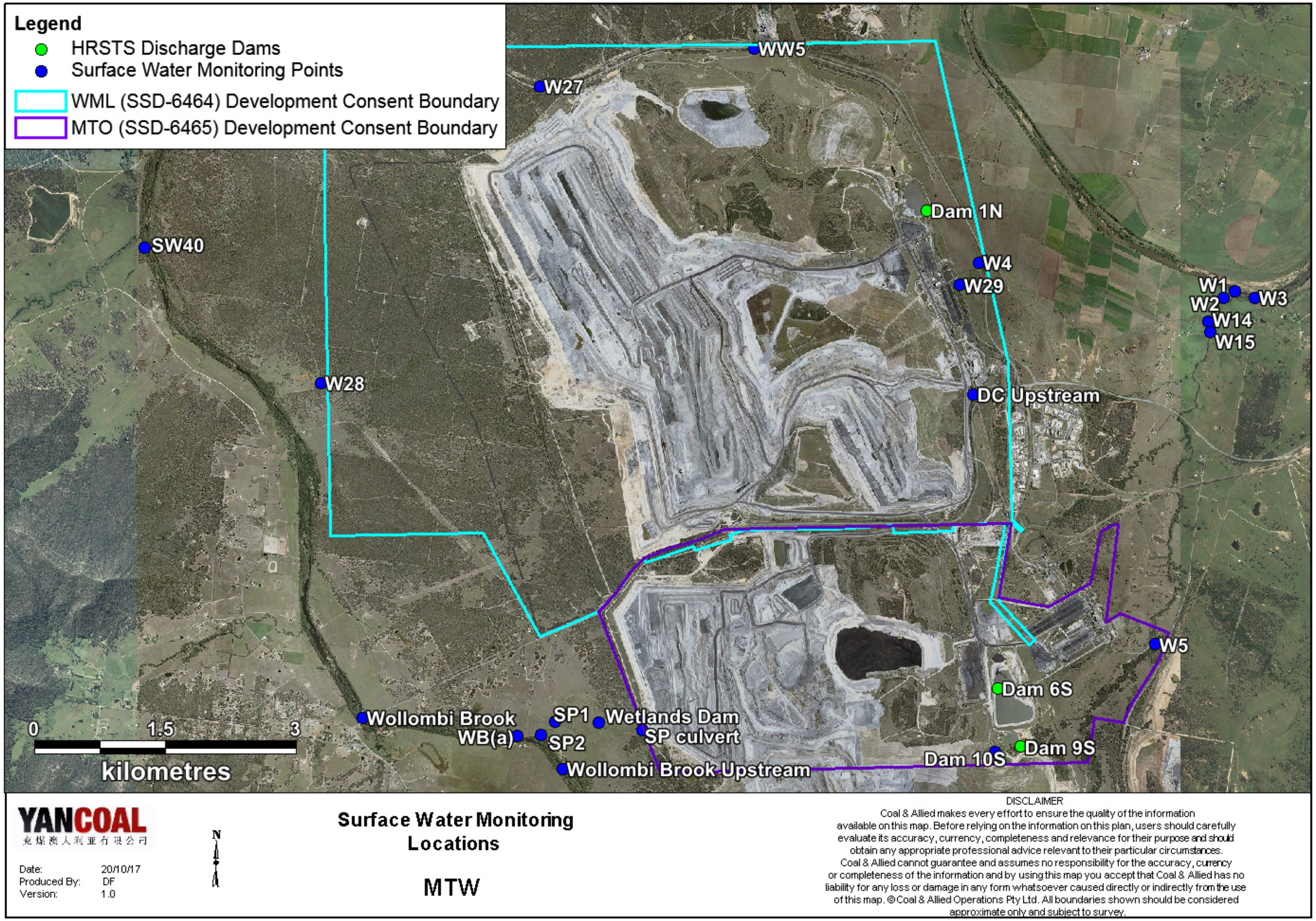


Figure 15: Surface Water Monitoring Location Plan

3.2 Groundwater Monitoring

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

Figure 16 to Figure 58 show the long term water quality trends (2014 – current) for groundwater bores monitored at MTW.

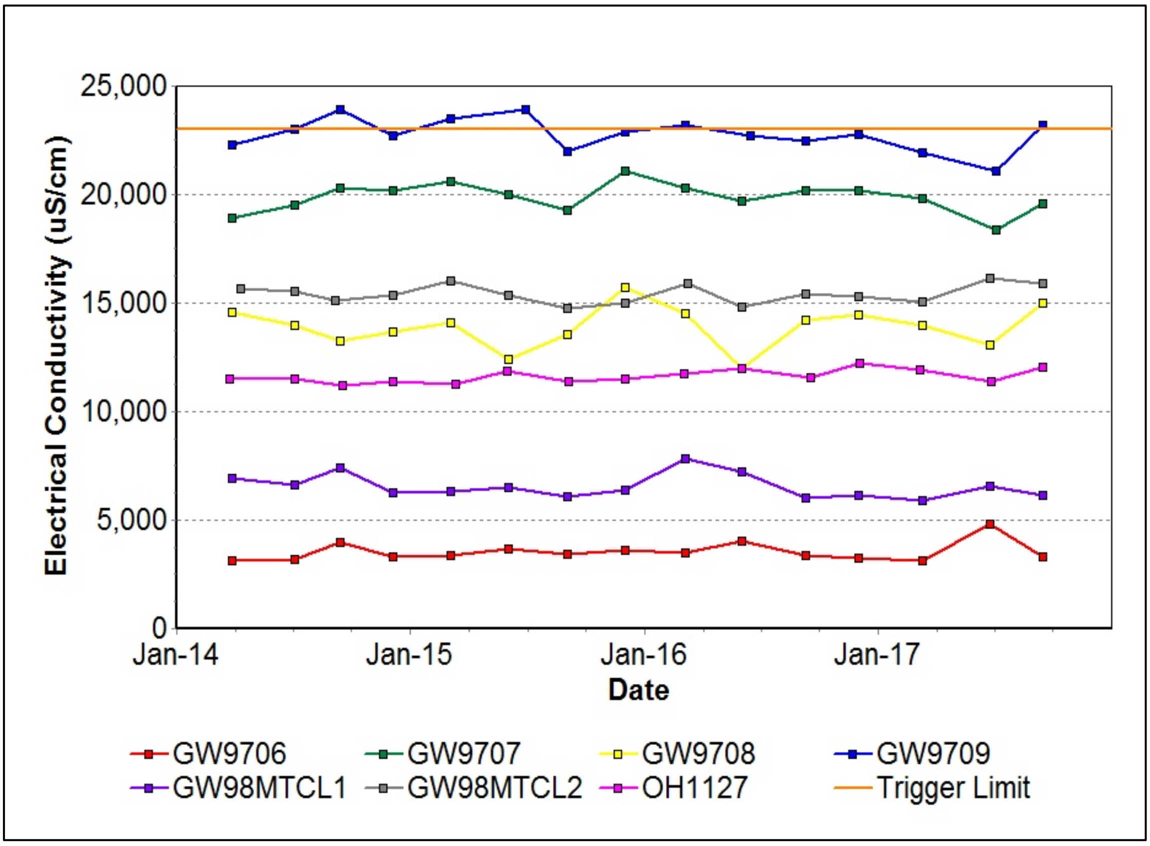


Figure 16: Bayswater Seam Electrical Conductivity Trend 2014 – Current

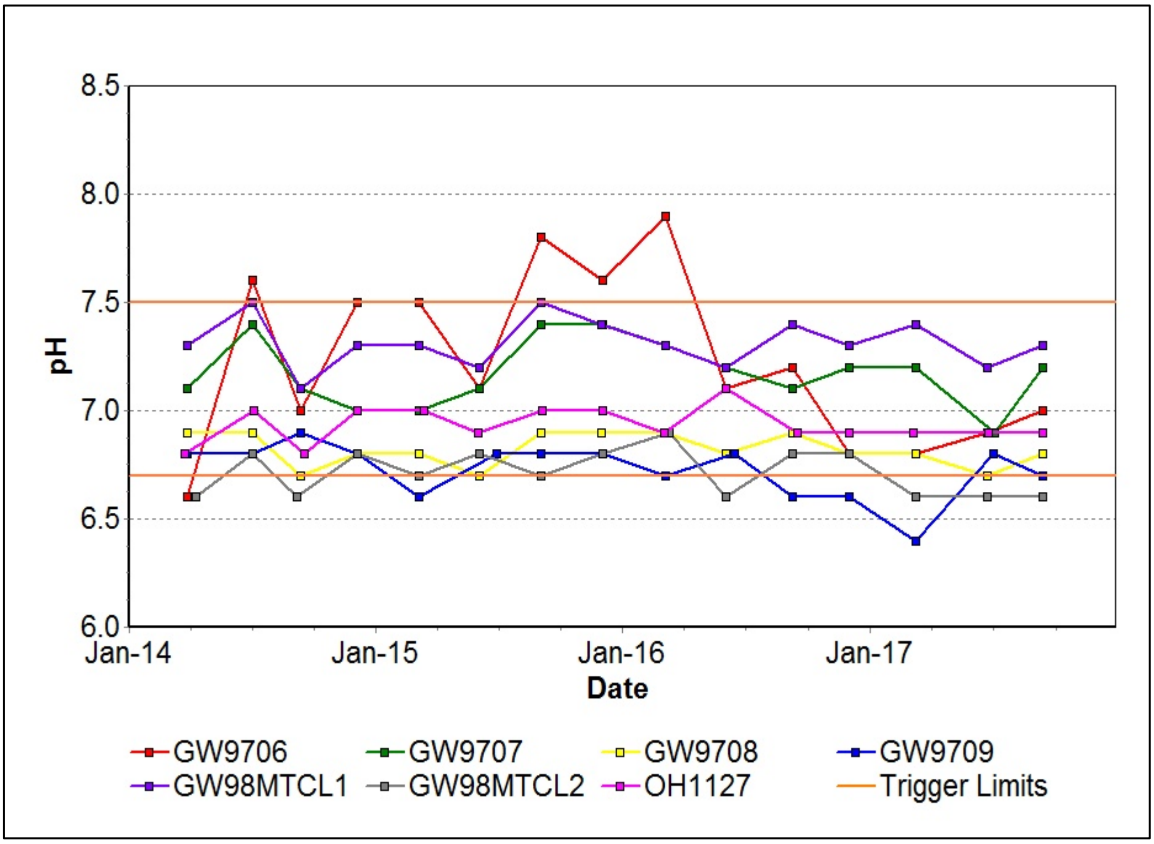


Figure 17: Bayswater Seam pH Trend 2014 – Current

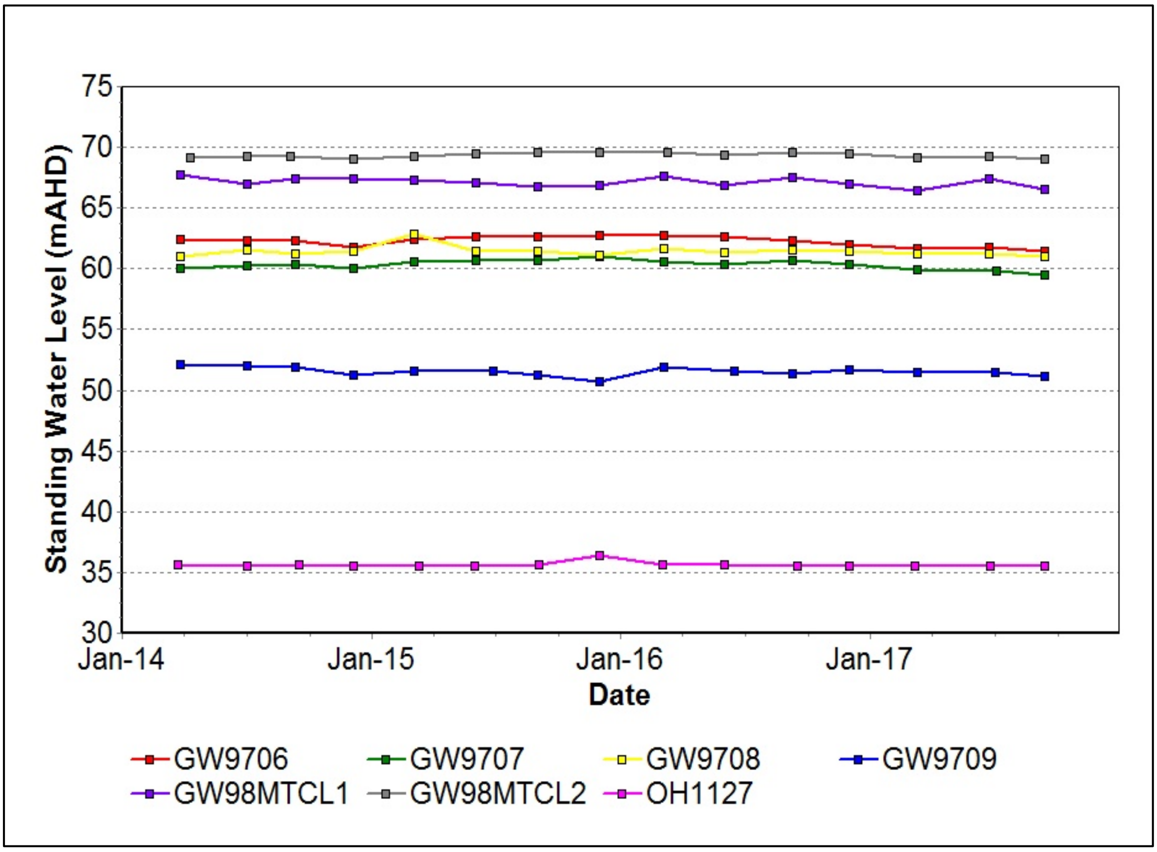


Figure 18: Bayswater Seam Standing Water Level Trend 2014 – Current

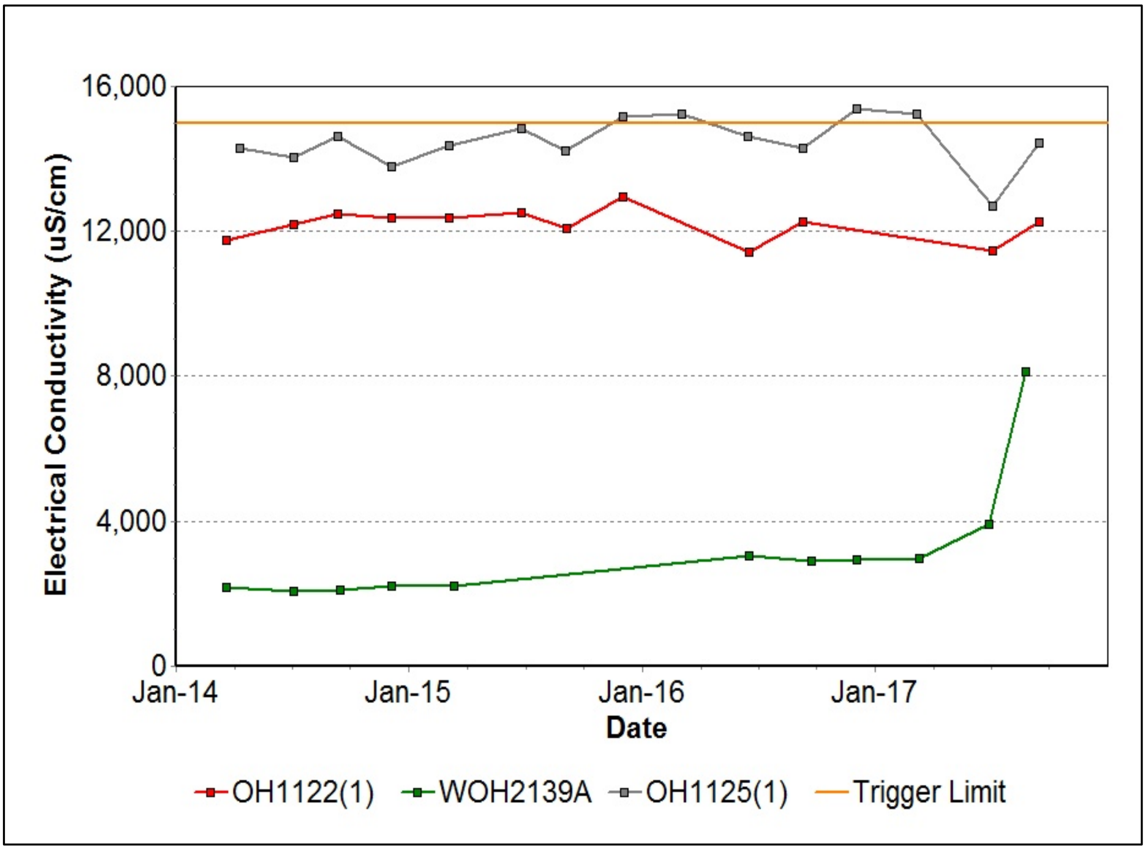


Figure 19: Blakefield Seam Electrical Conductivity Trend 2014 – Current

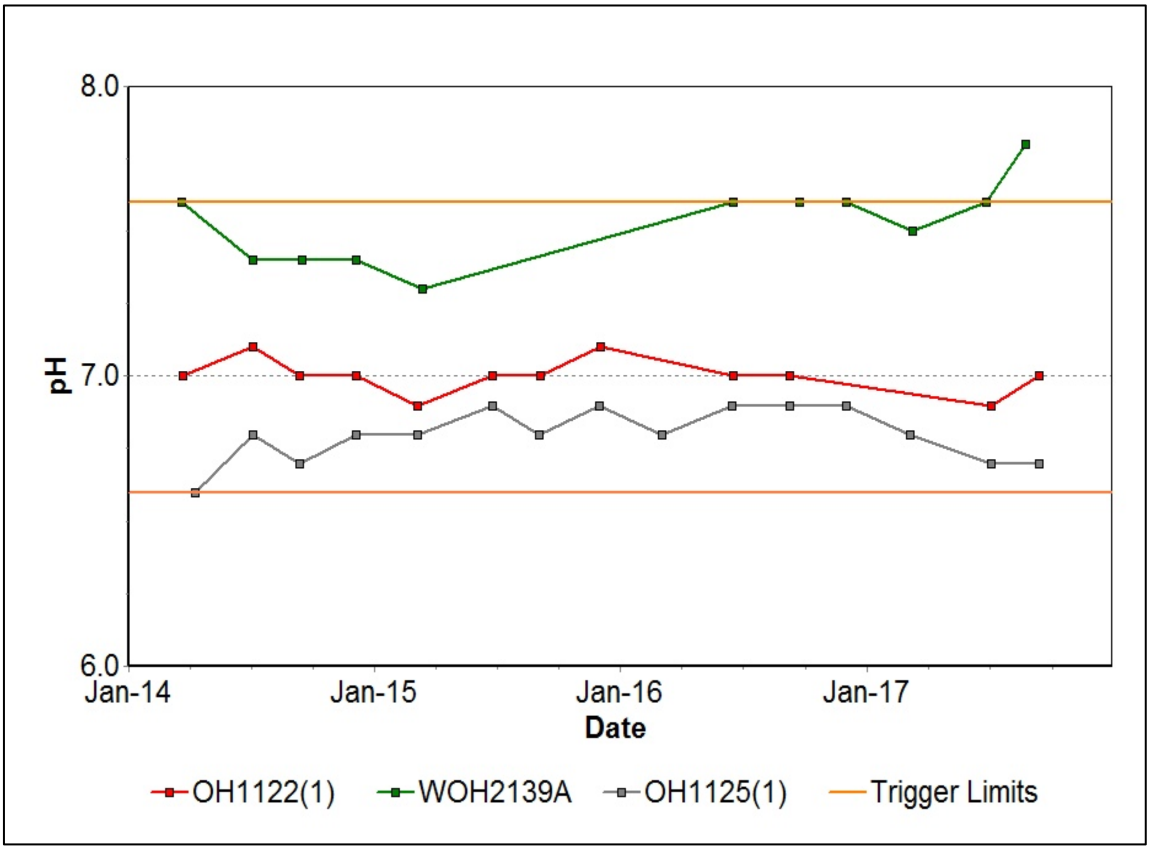


Figure 20: Blakefield Seam pH Trend 2014 – Current

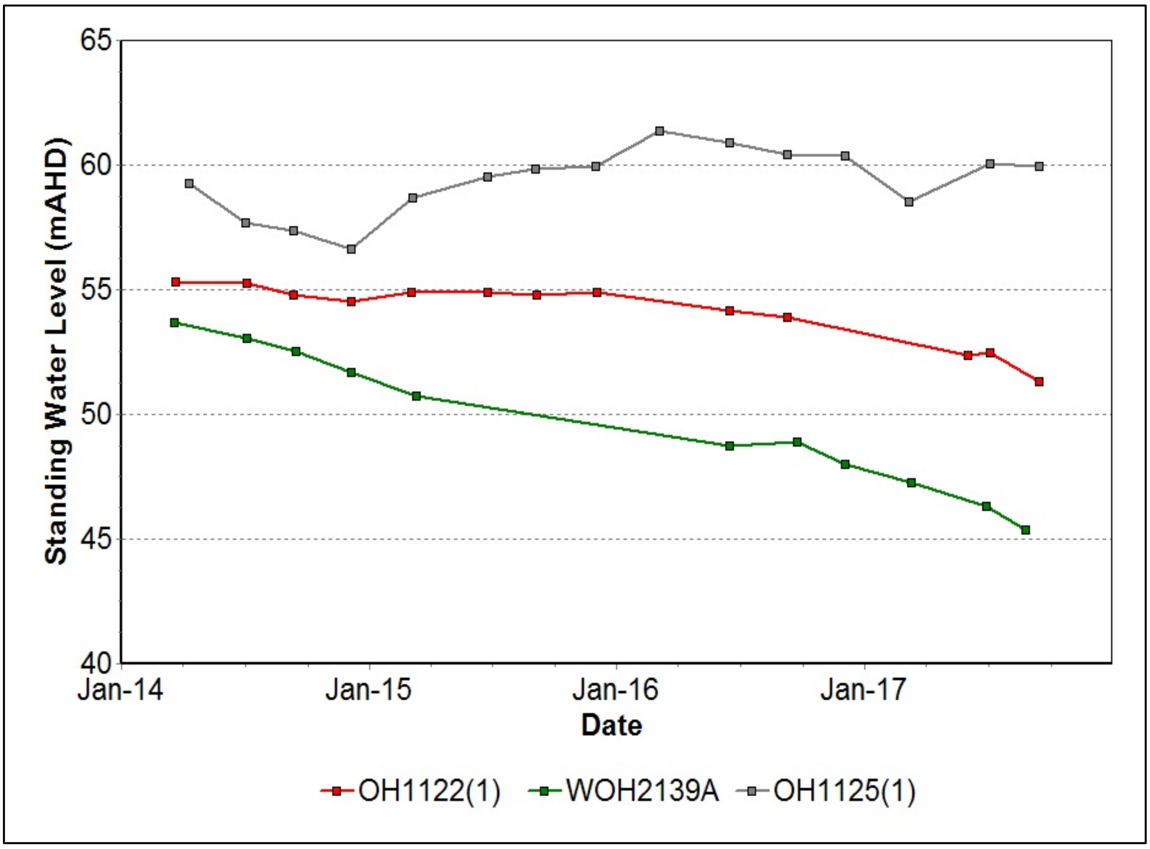


Figure 21: Blakefield Seam Standing Water Level Trend 2014 – Current

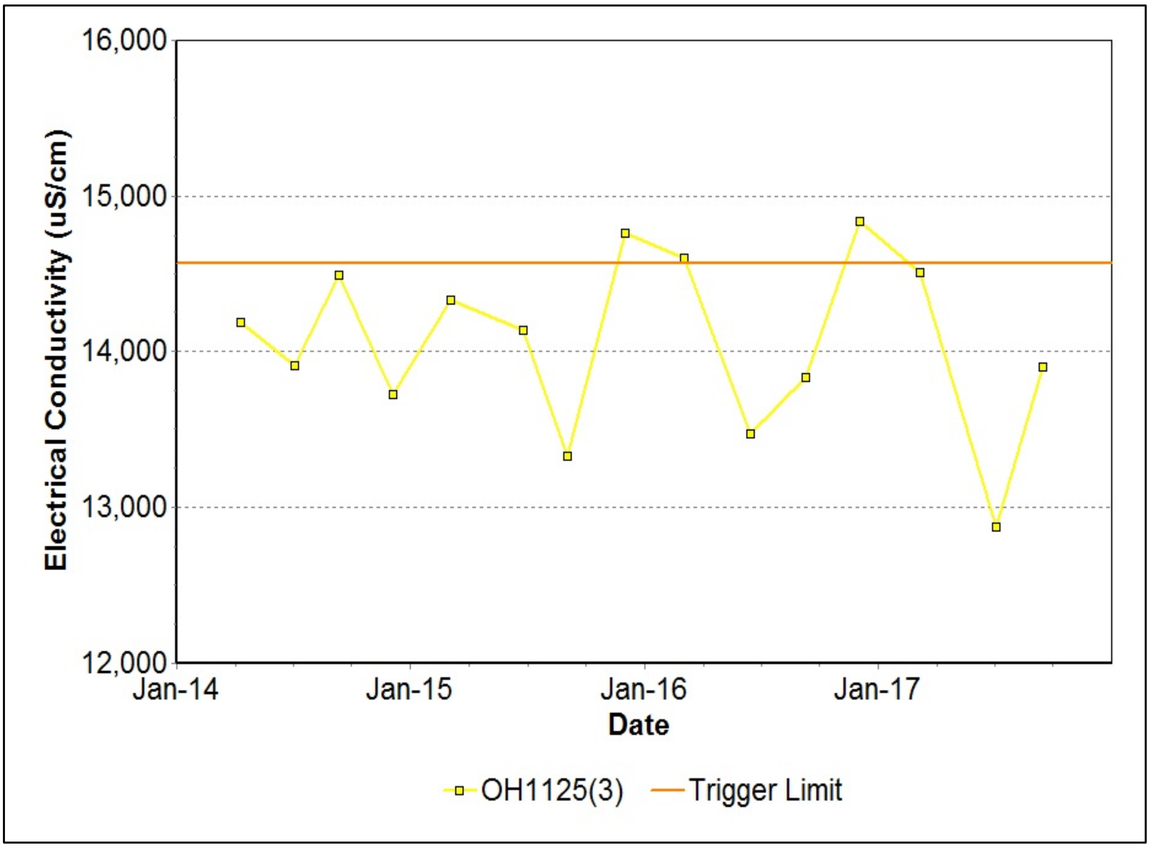


Figure 22: Bowfield Seam Electrical Conductivity Trend 2014 – Current

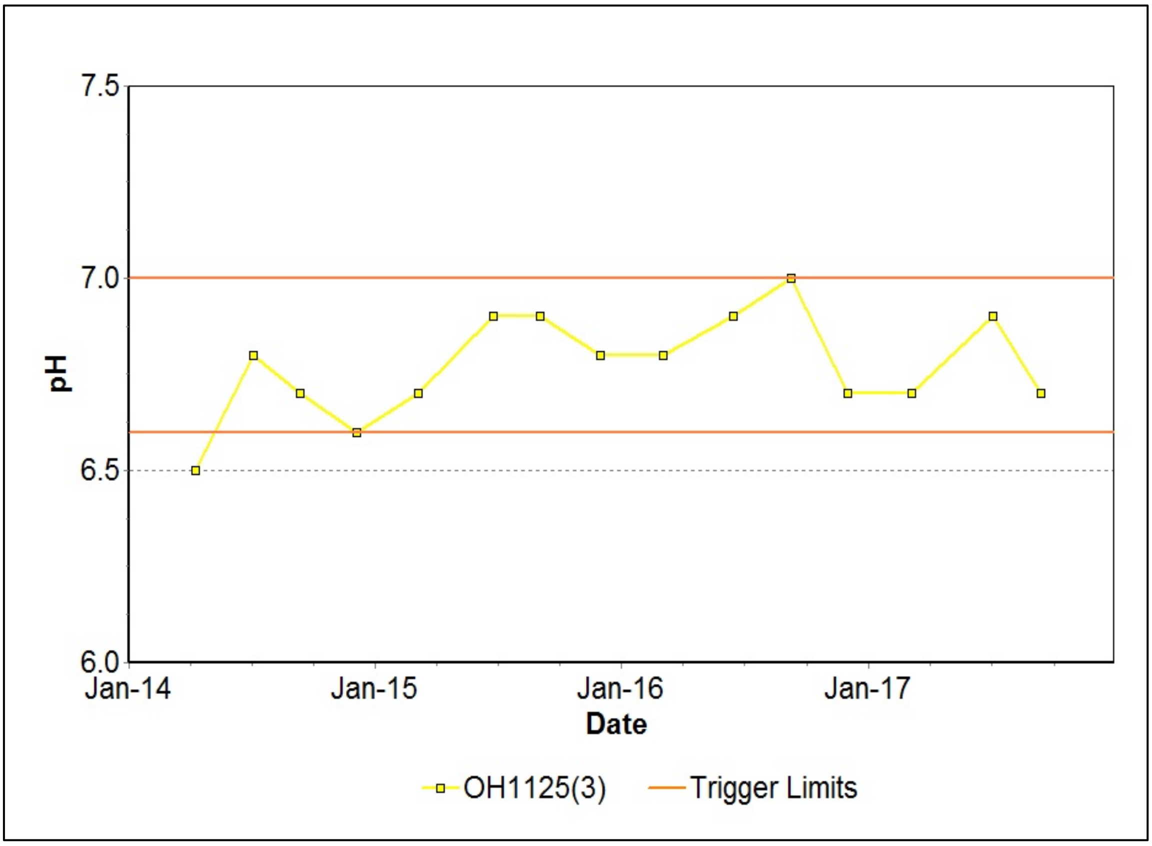


Figure 23: Bowfield Seam pH Trend 2014 – Current

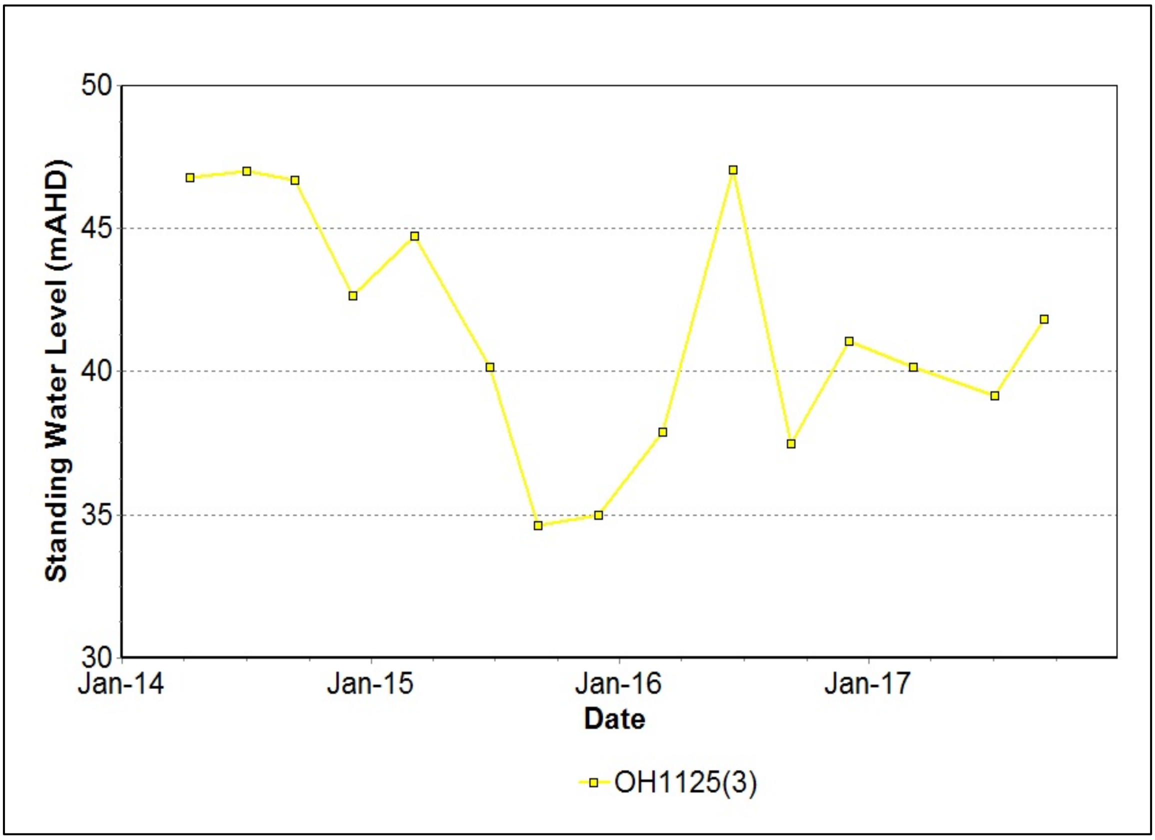


Figure 24: Bowfield Seam Standing Water Level Trend 2014 – Current

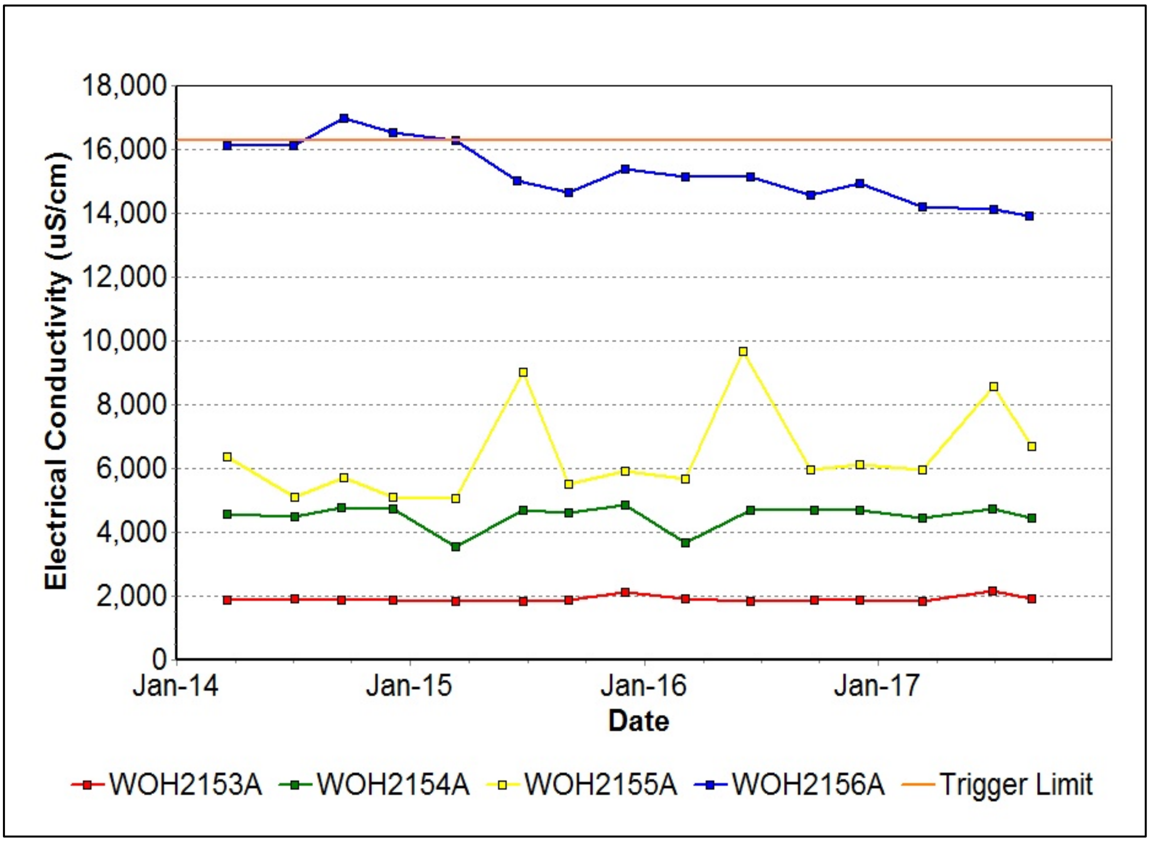


Figure 25: Redbank Seam Electrical Conductivity Trend 2014 – Current

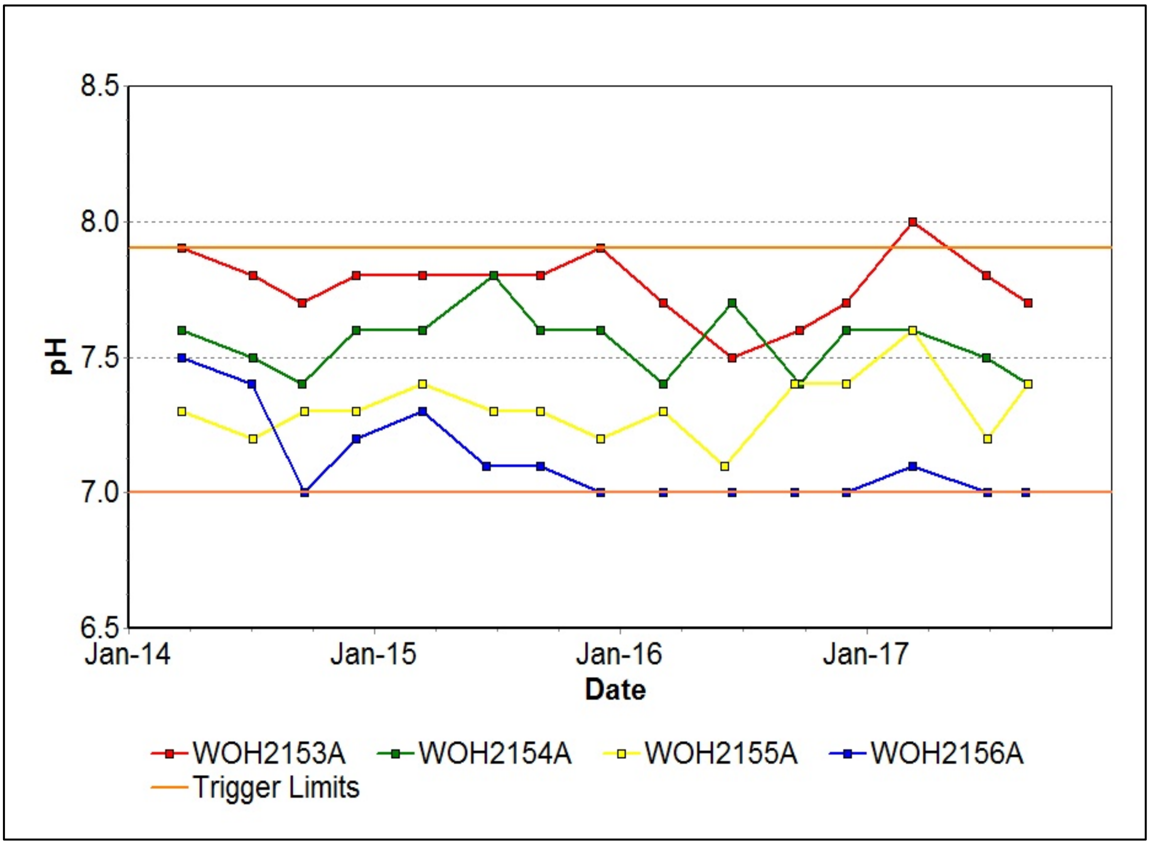


Figure 26: Redbank Seam pH Trend 2014 – Current

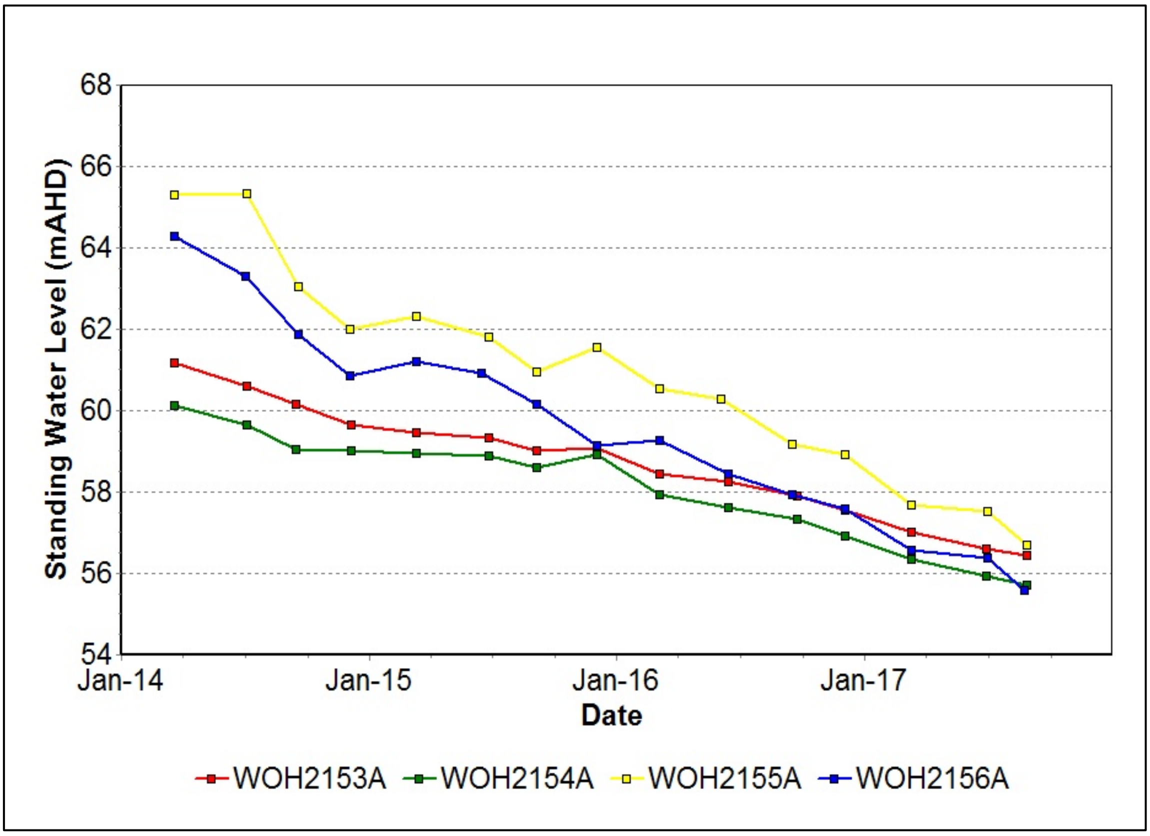


Figure 27: Redbank Seam Standing Water Level Trend 2014 – Current

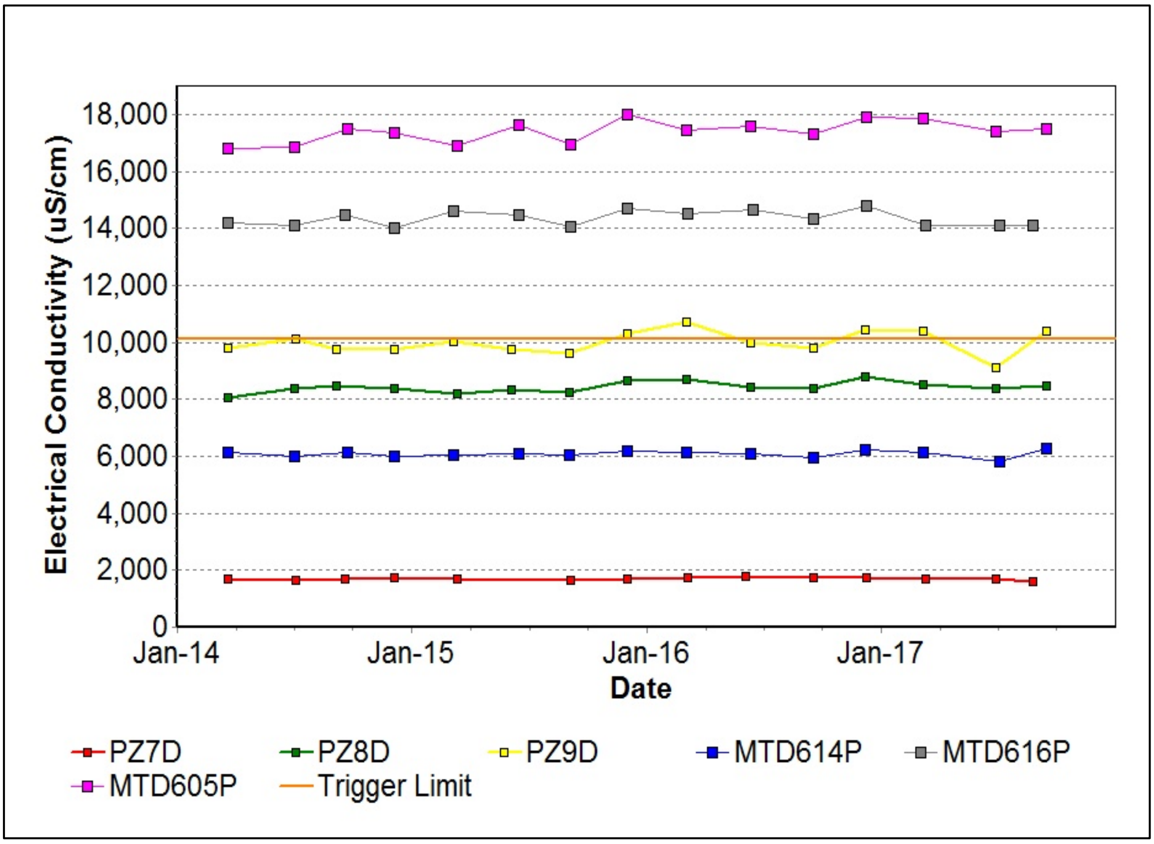


Figure 28: Shallow Overburden Seam Electrical Conductivity Trend 2014 – Current

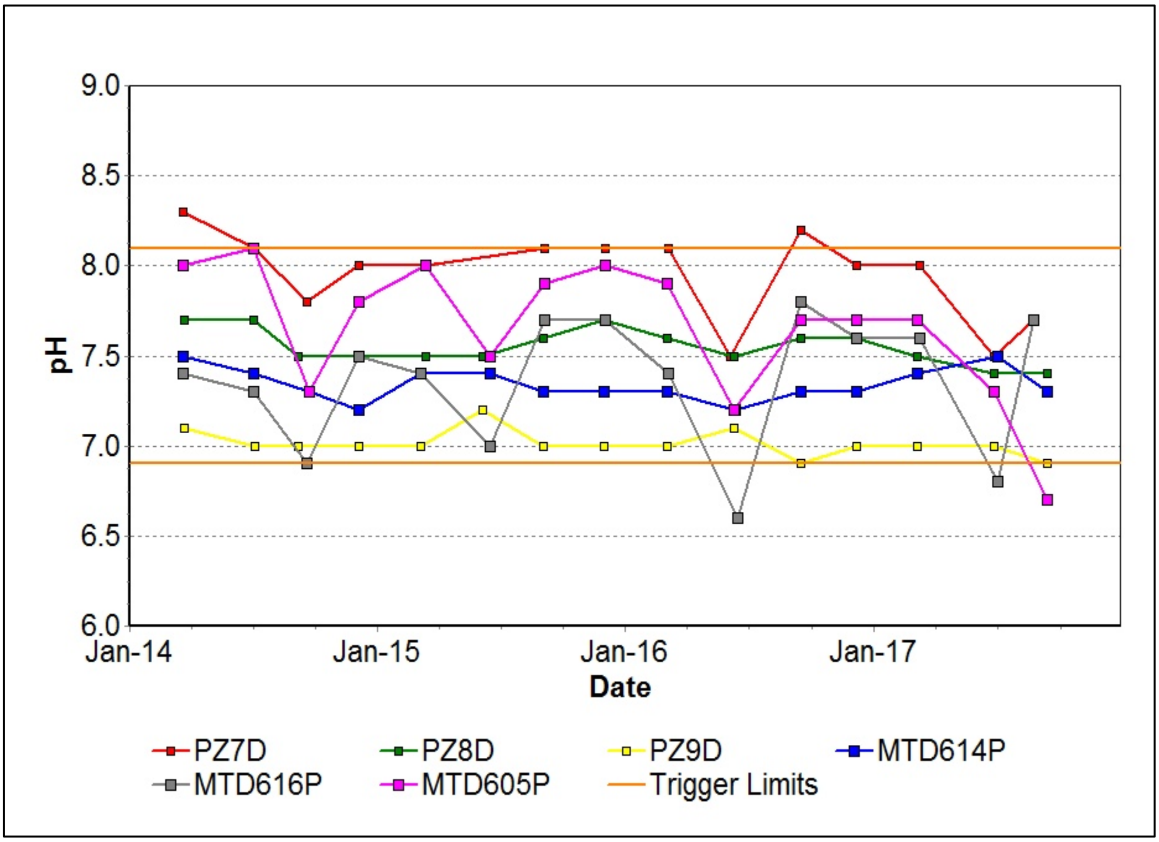


Figure 29: Shallow Overburden Seam pH Trend 2014 – Current

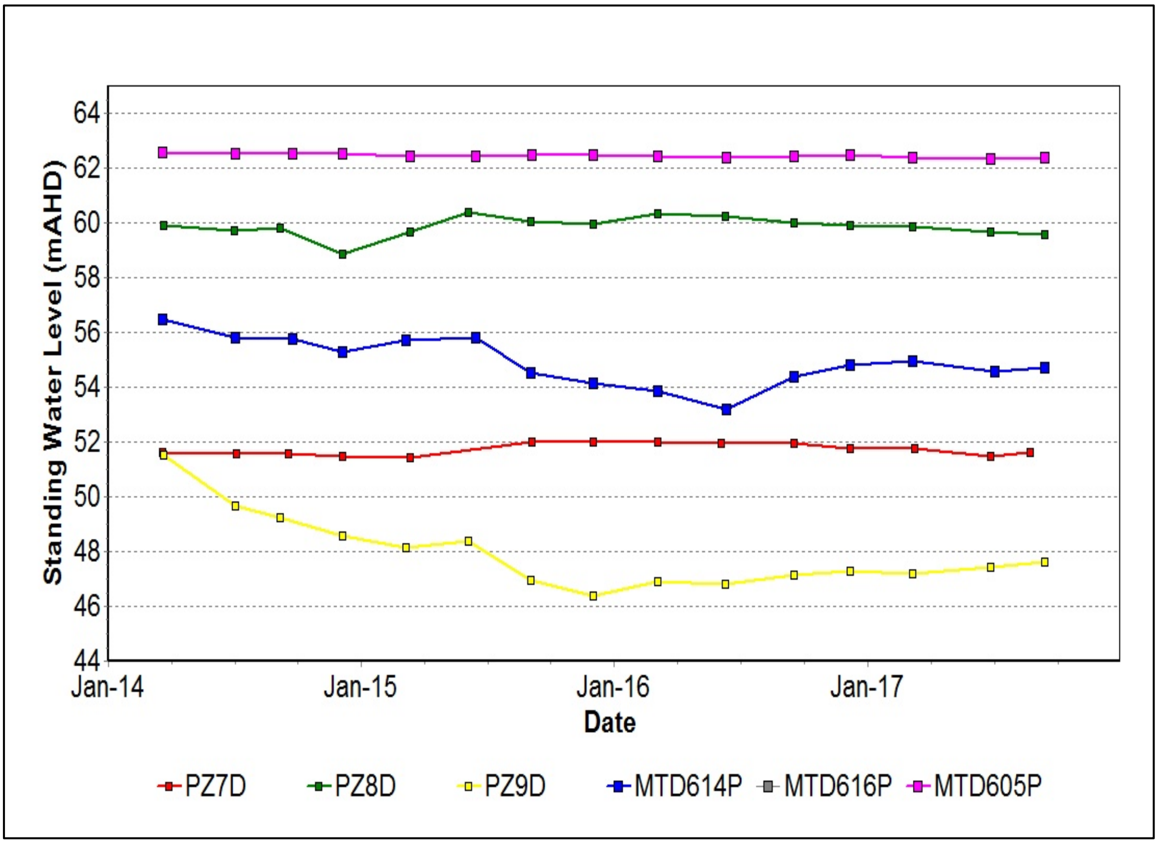


Figure 30: Shallow Overburden Seam Standing Water Level Trend 2014 – Current

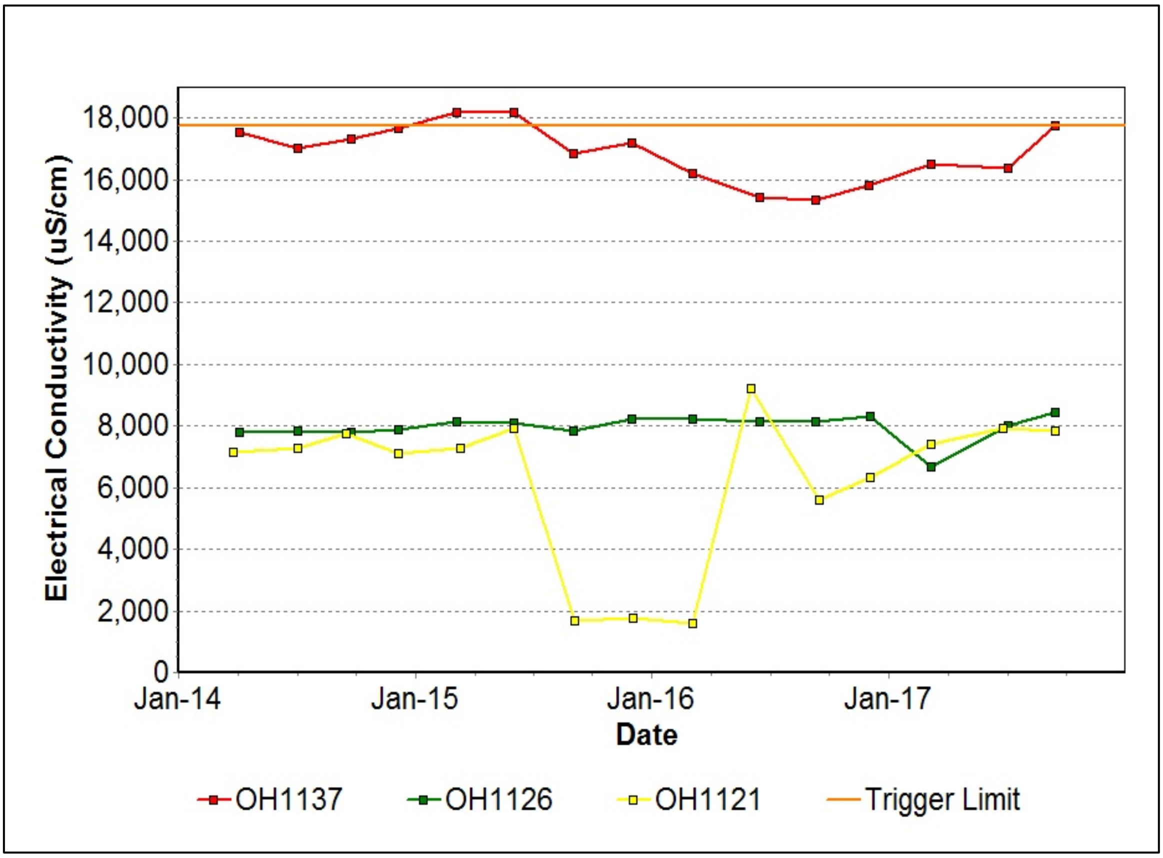


Figure 31: Vaux Seam Electrical Conductivity Trend 2014 – Current

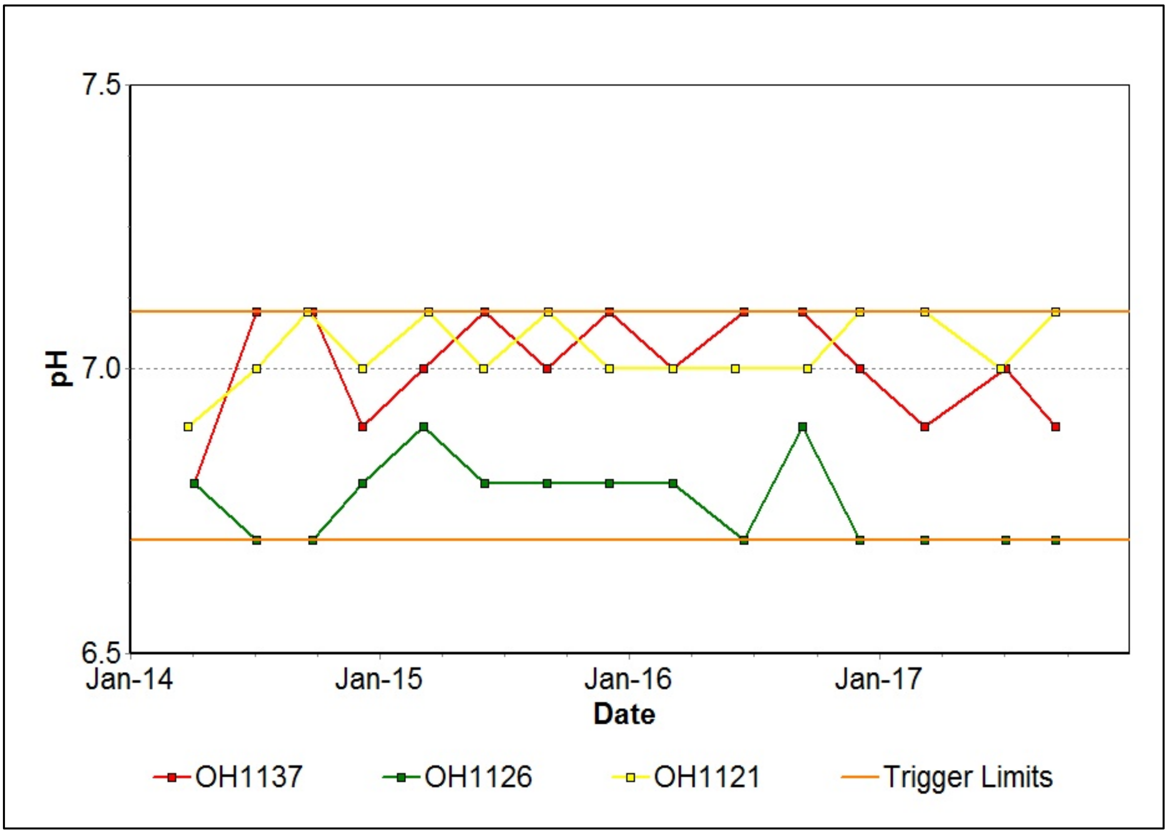


Figure 32: Vaux Seam pH Trend 2014 – Current

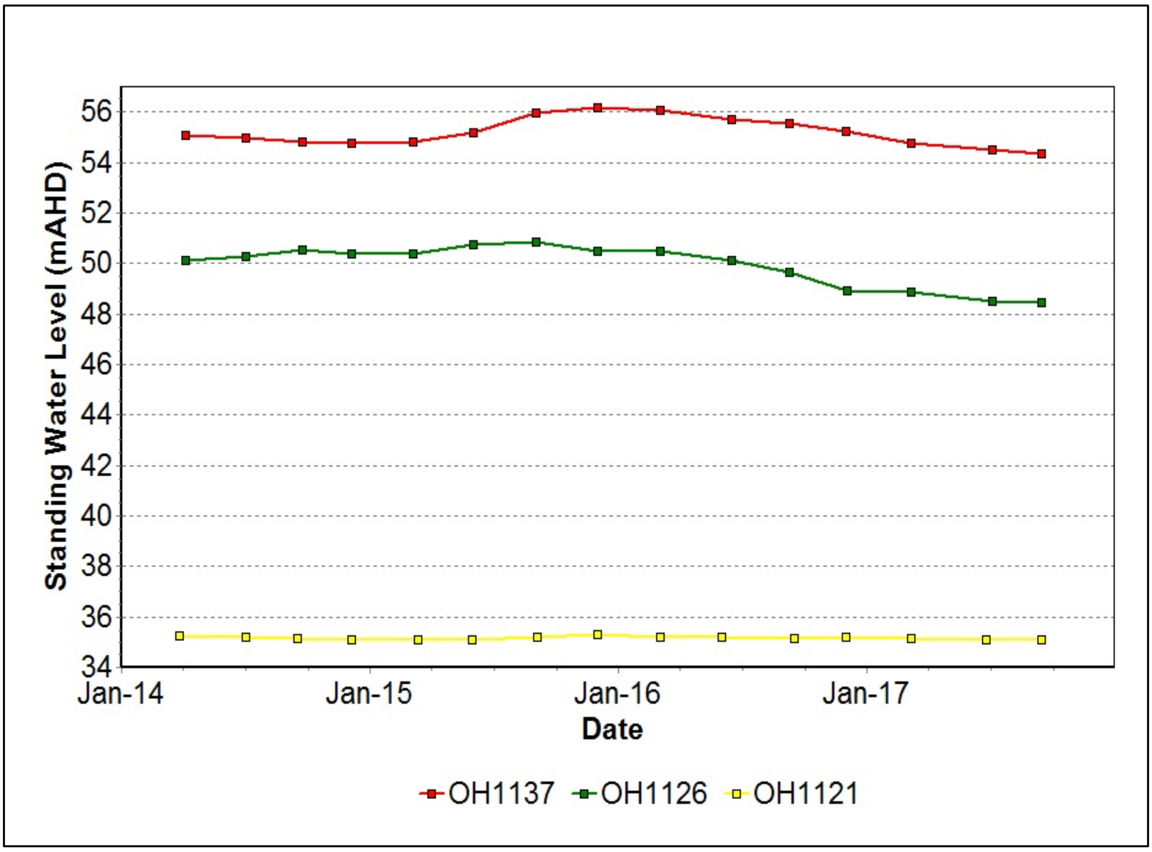


Figure 33: Vaux Seam Standing Water Level Trend 2014 – Current

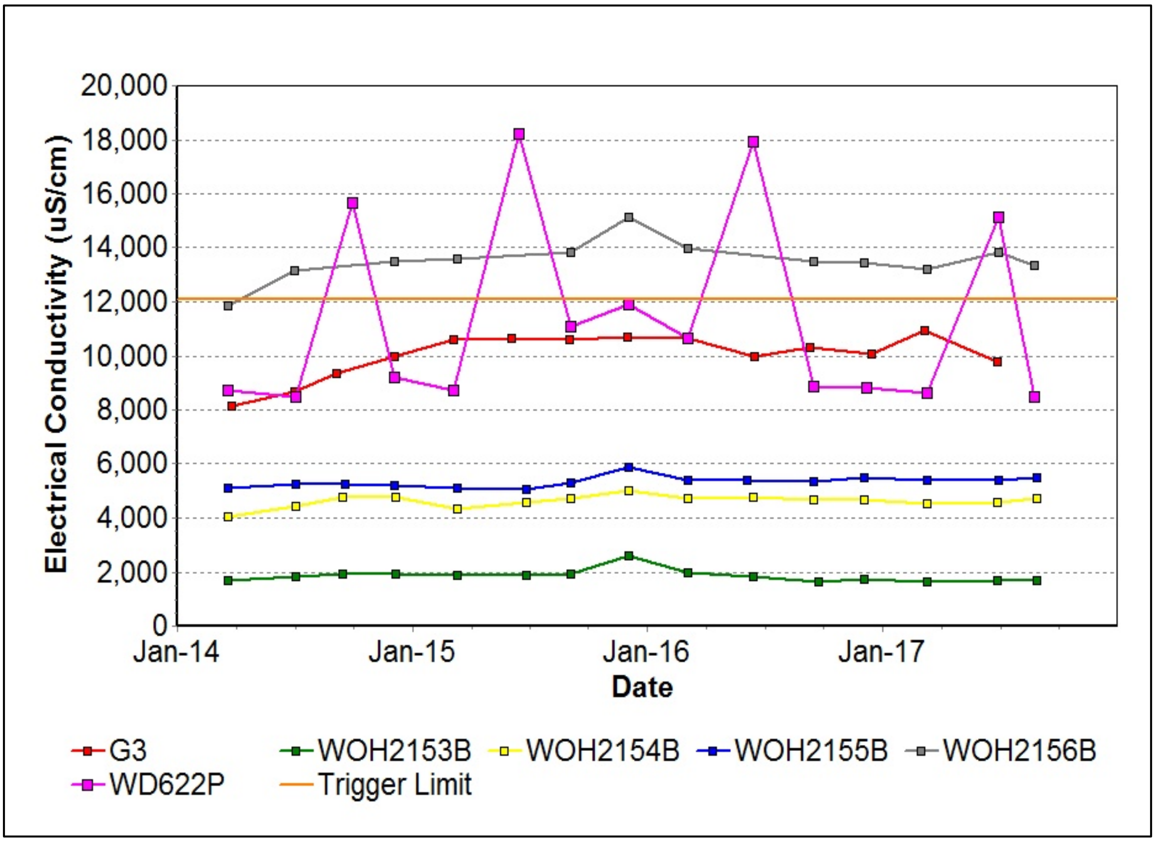


Figure 34: Wambo Seam Electrical Conductivity Trend 2014 – Current

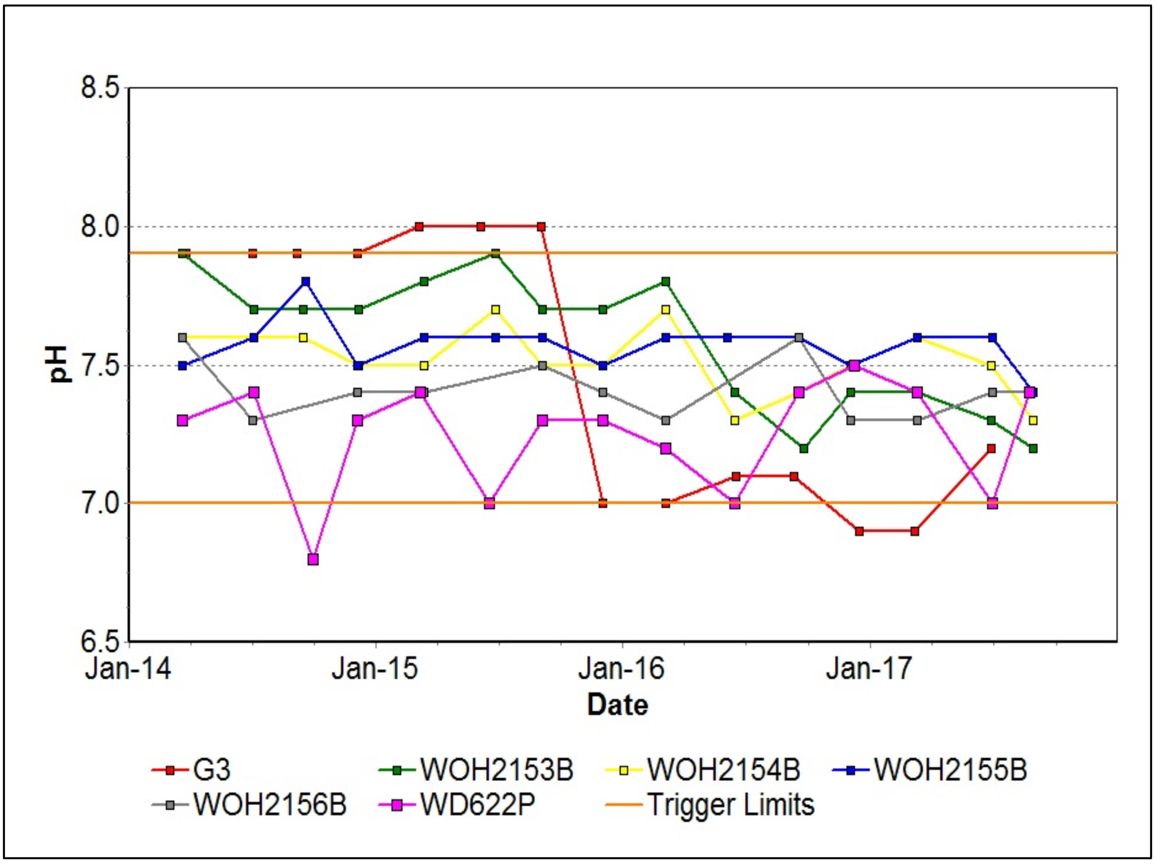


Figure 35: Wambo Seam pH Trend 2014 – Current

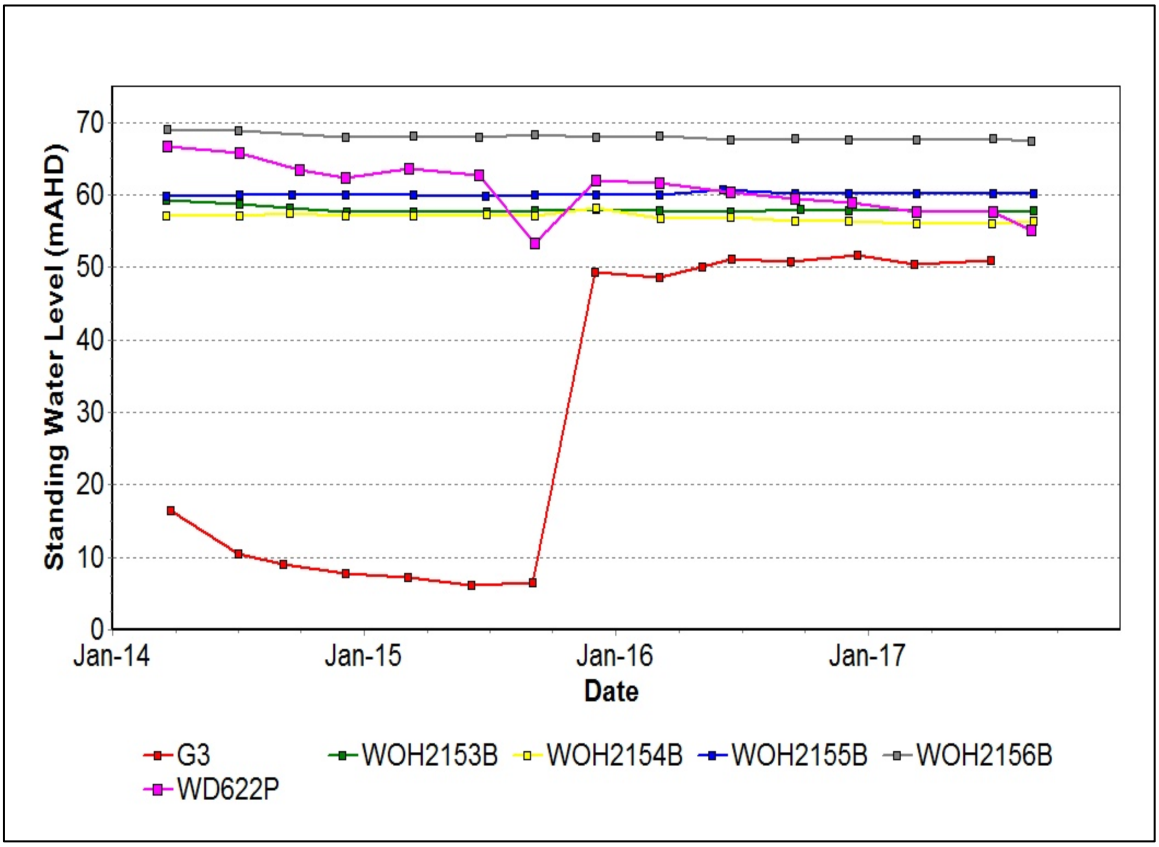


Figure 36: Wambo Seam Standing Water Level Trend 2014 – Current

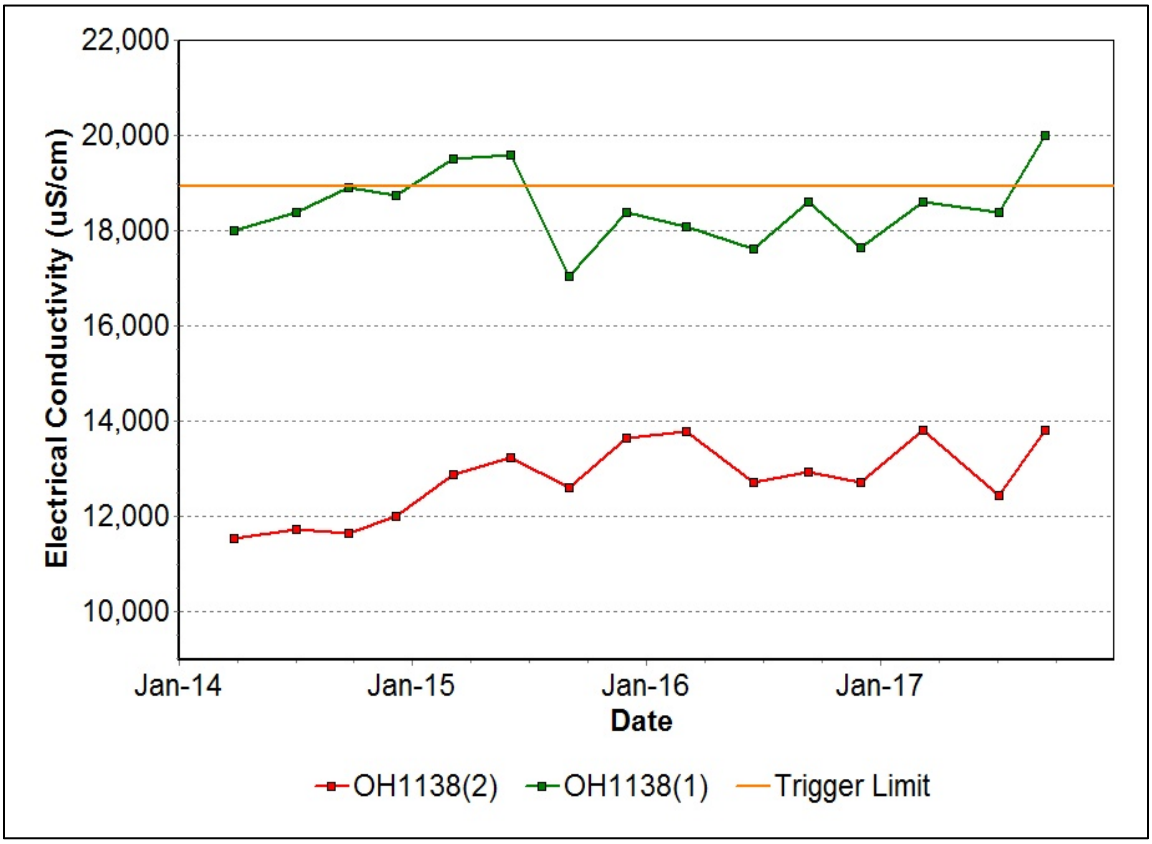


Figure 37: Warkworth Seam Electrical Conductivity Trend 2014 – Current

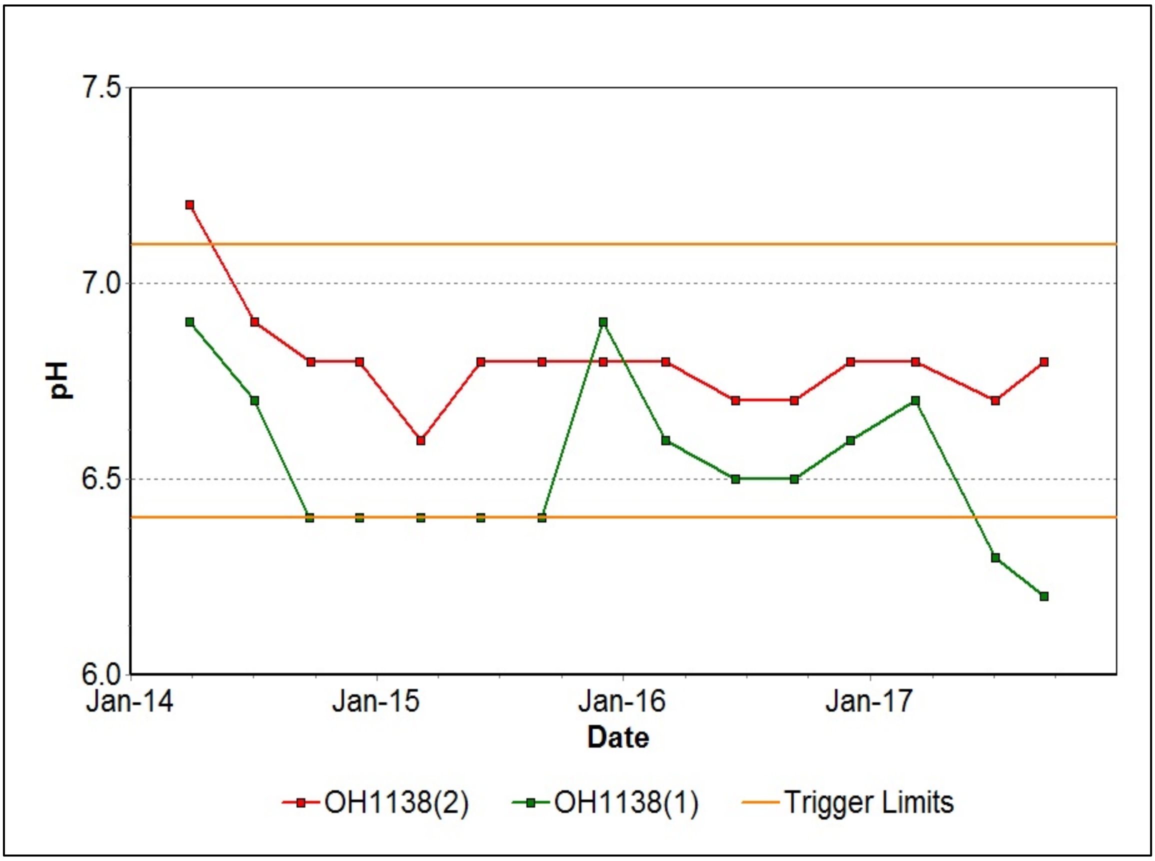


Figure 38: Warkworth Seam pH Trend 2014 – Current

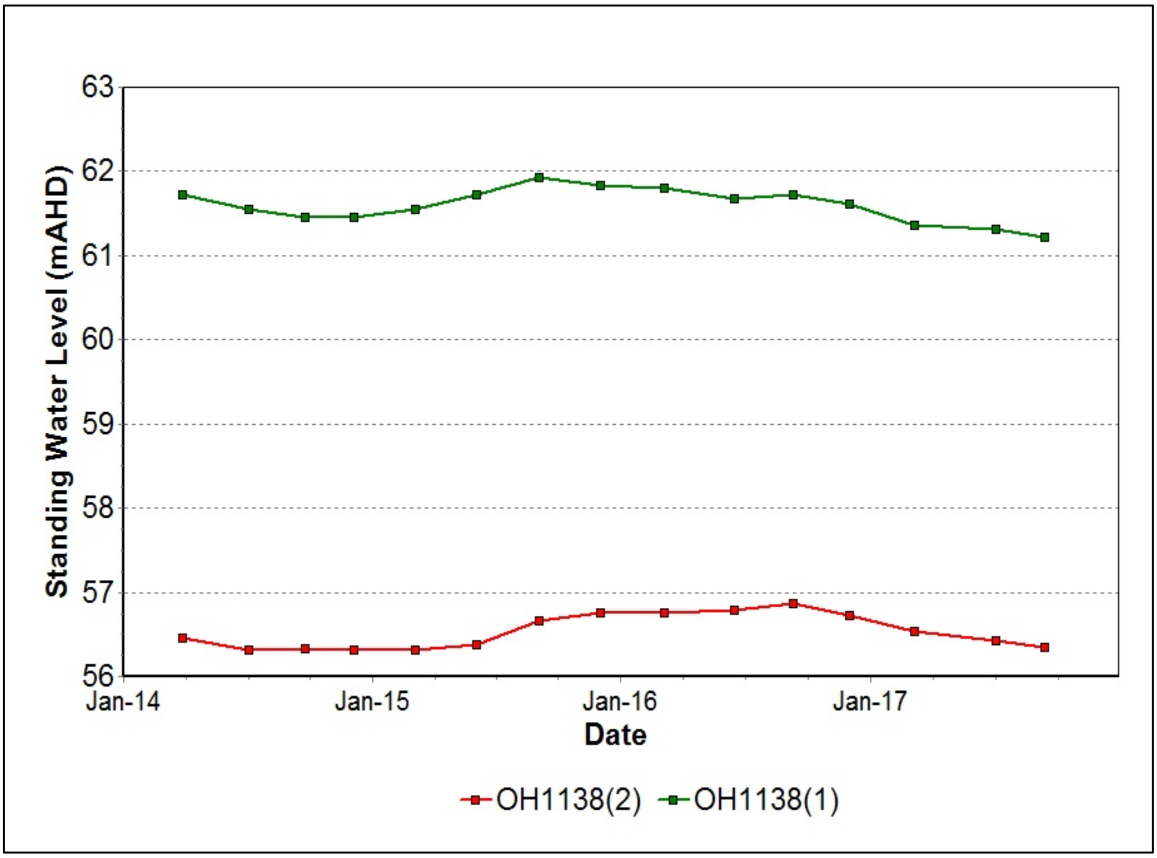


Figure 39: Warkworth Seam Standing Water Level Trend 2014 – Current

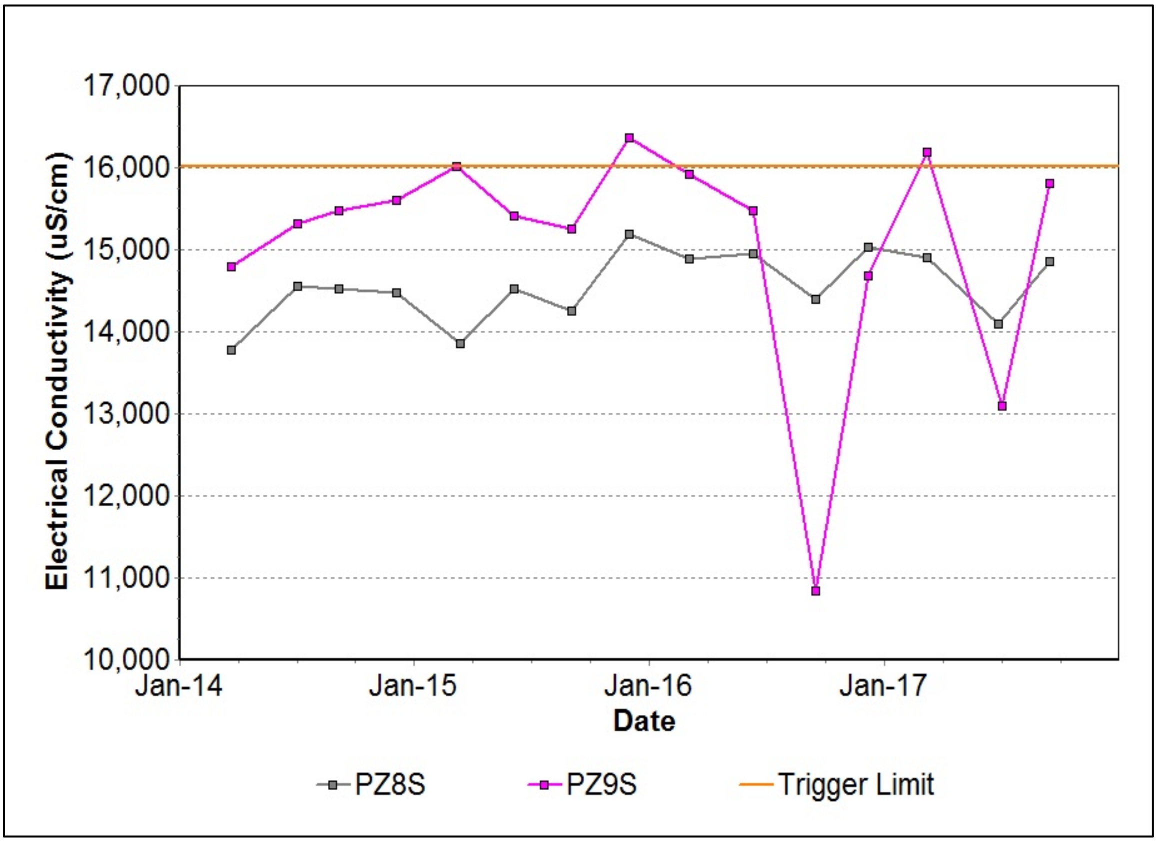


Figure 40: Wollombi Alluvium Electrical Conductivity Trend 2014 – Current

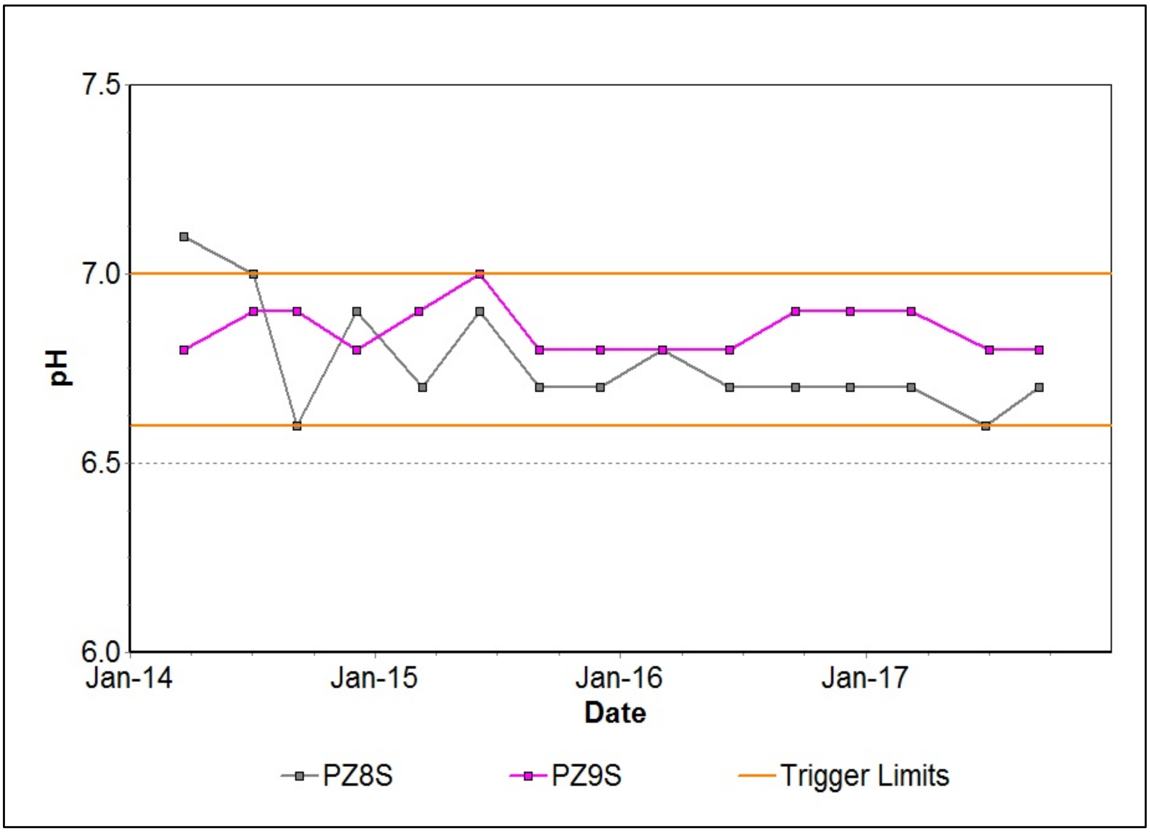


Figure 41: Wollombi Alluvium pH Trend 2014 – Current

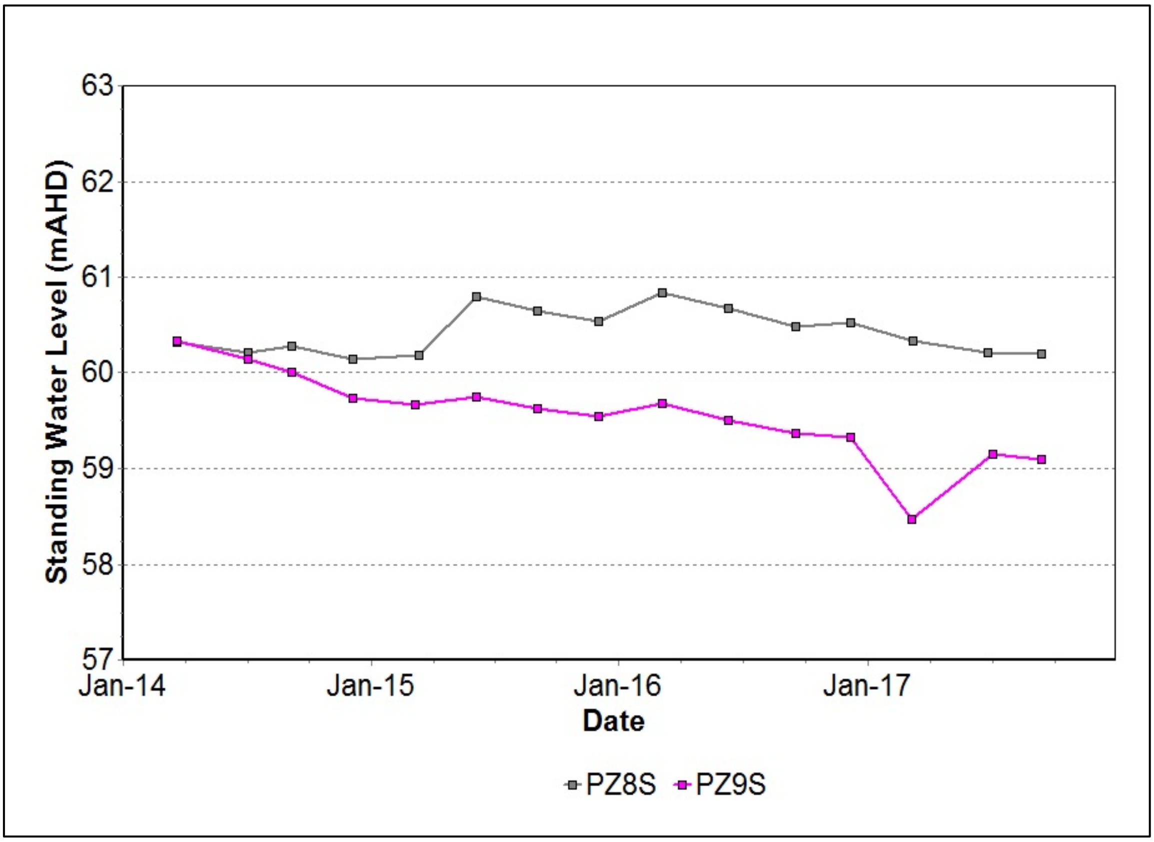


Figure 42: Wollombi Alluvium Standing Water Level Trend 2014 – Current

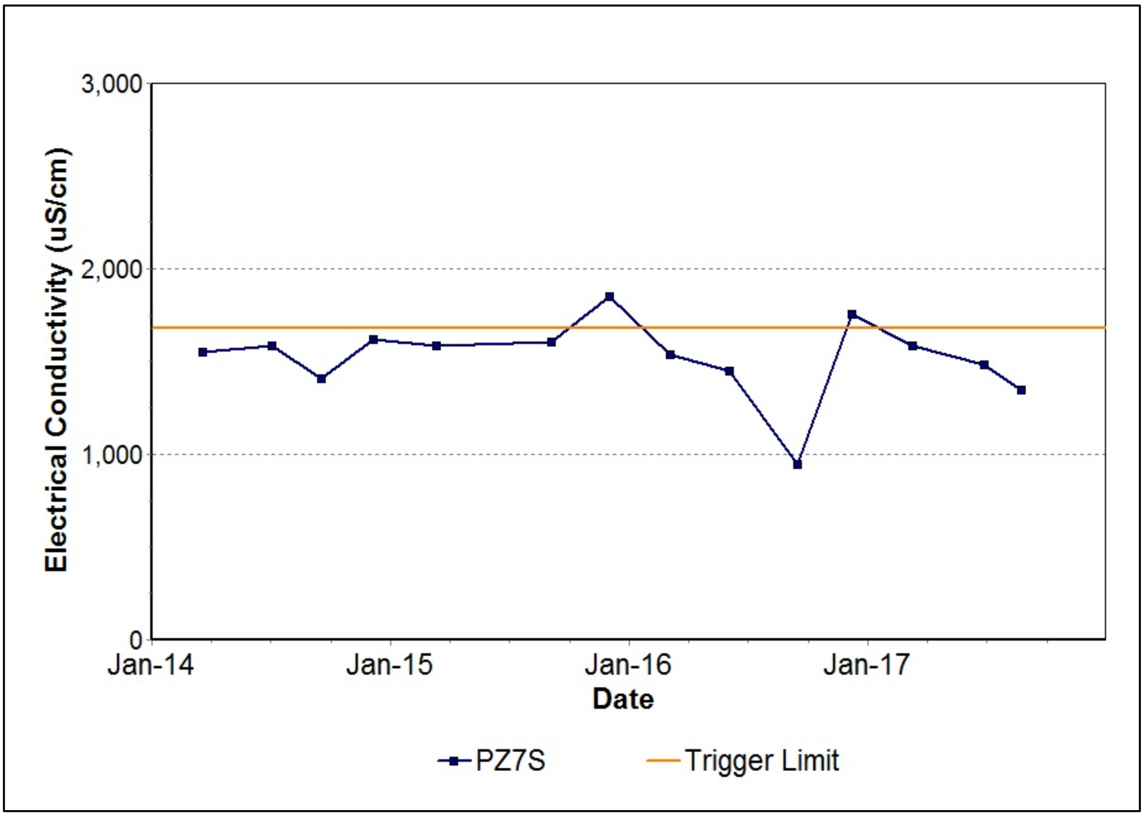


Figure 43: Aeolian Warkworth Sands Electrical Conductivity Trend 2014 – Current

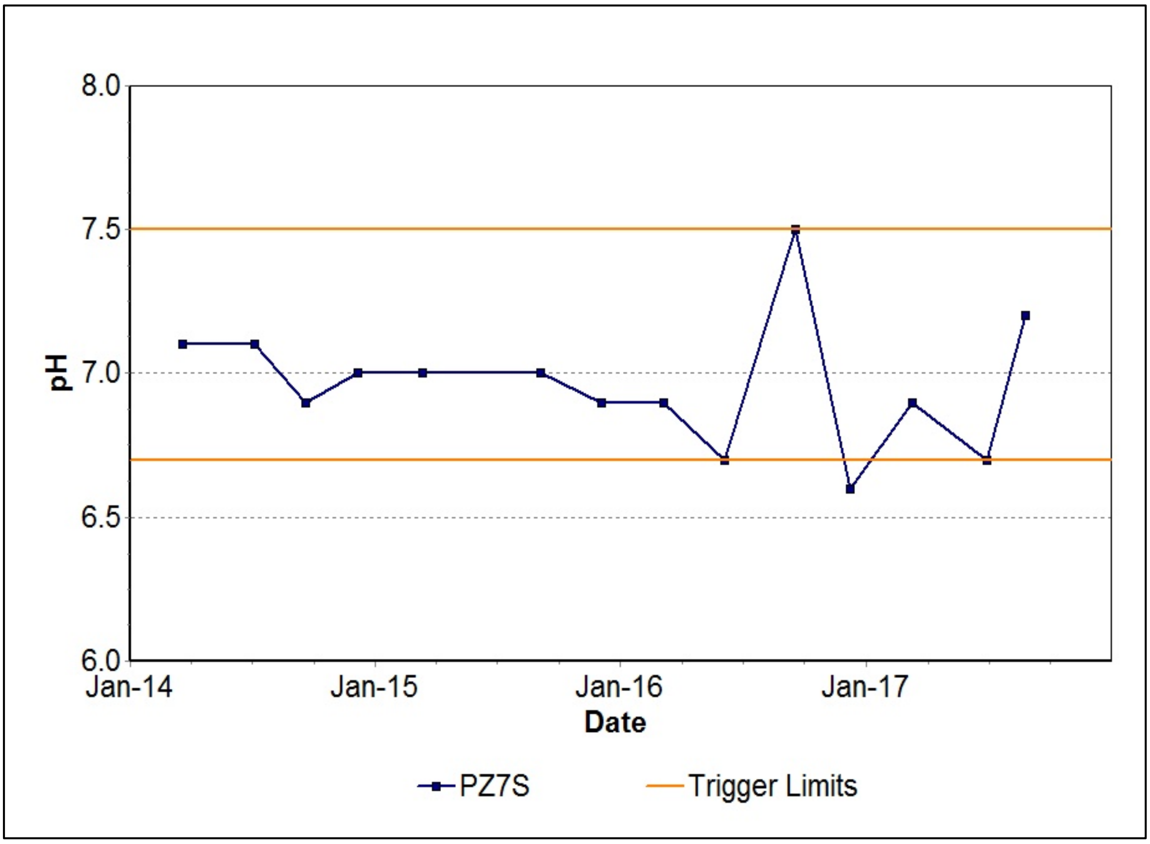


Figure 44: Aeolian Warkworth Sands pH Trend 2014 – Current

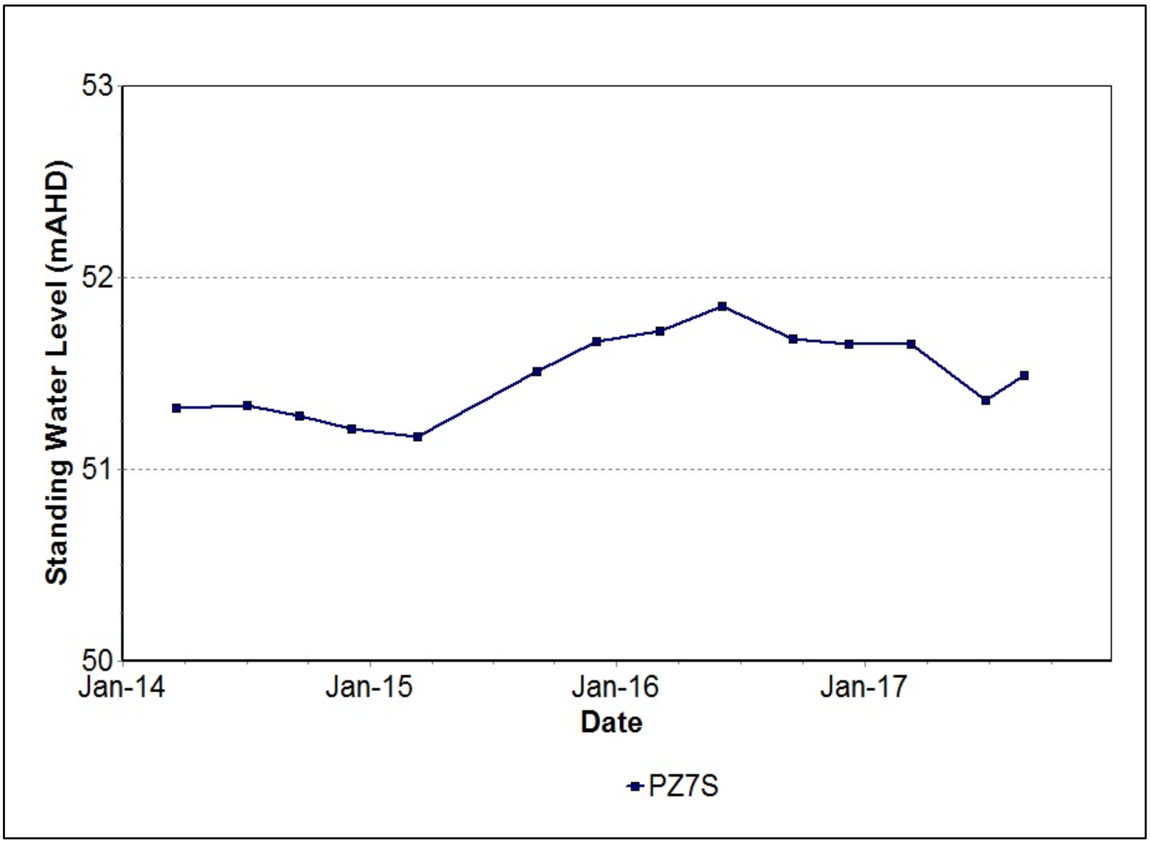


Figure 45: Aeolian Warkworth Sands Standing Water Level Trend 2014 – Current

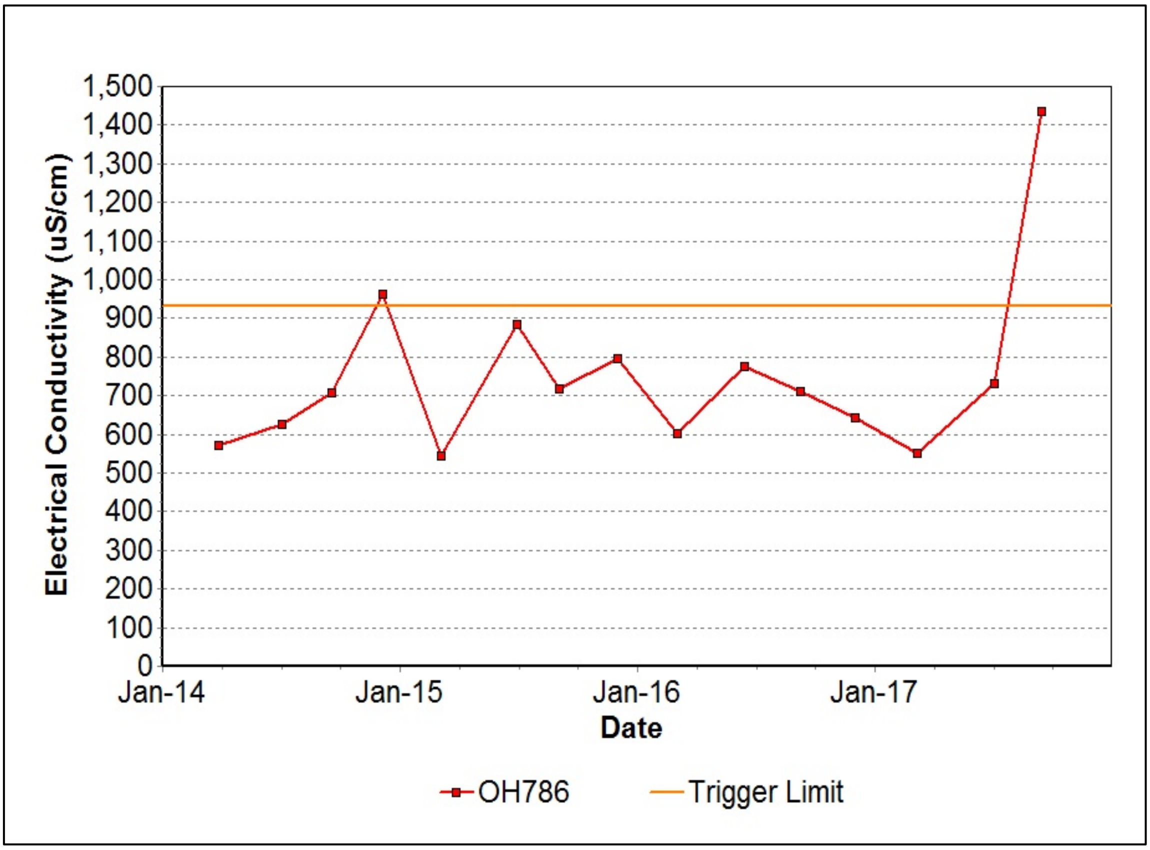


Figure 46: Hunter River Alluvium 1 Seam Electrical Conductivity Trend 2014 – Current

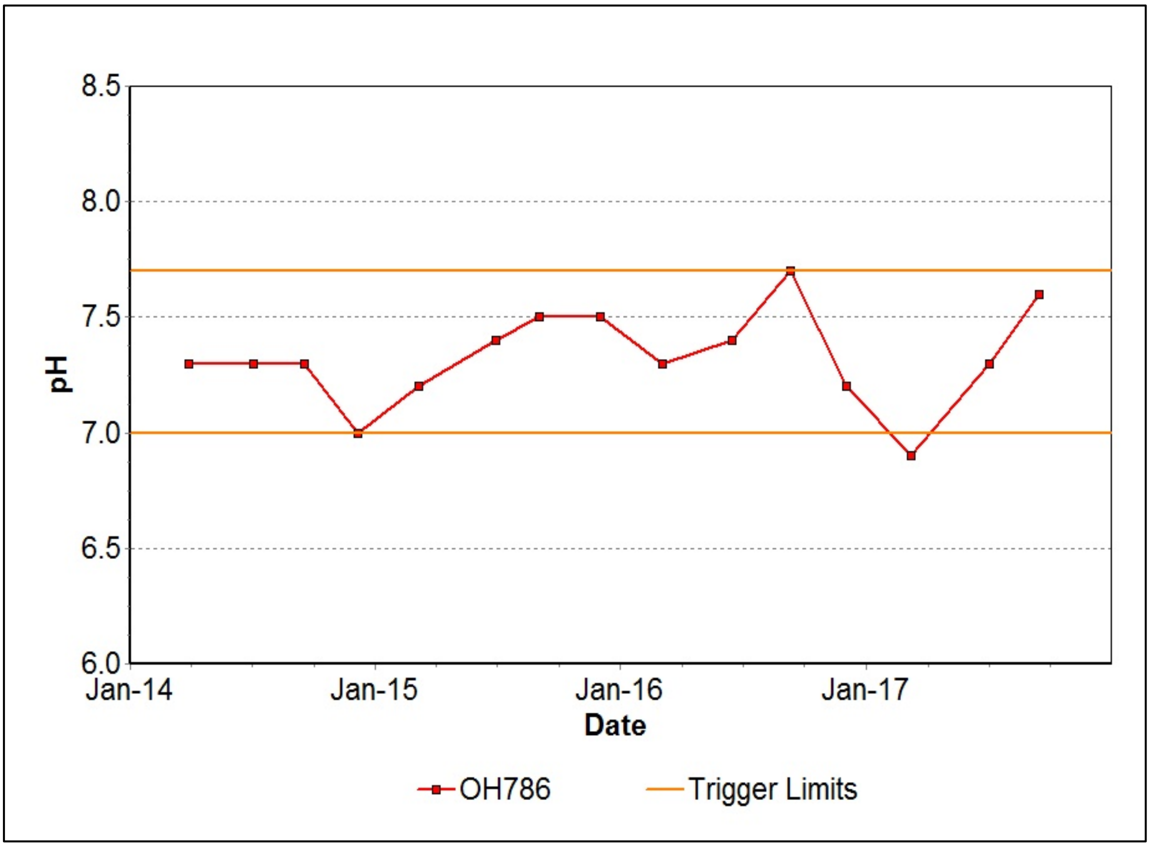


Figure 47: Hunter River Alluvium 1 Seam pH Trend 2014 – Current

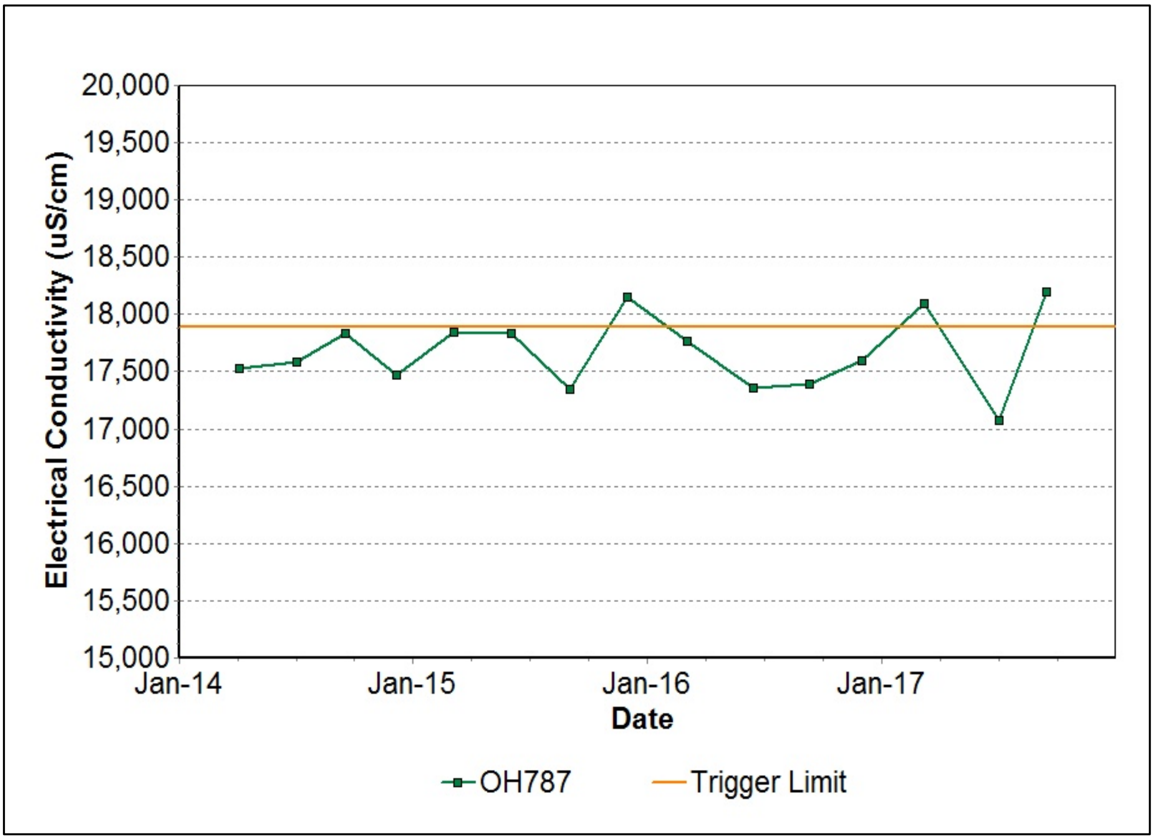


Figure 48: Hunter River Alluvium 2 Seam Electrical Conductivity Trend 2014 – Current

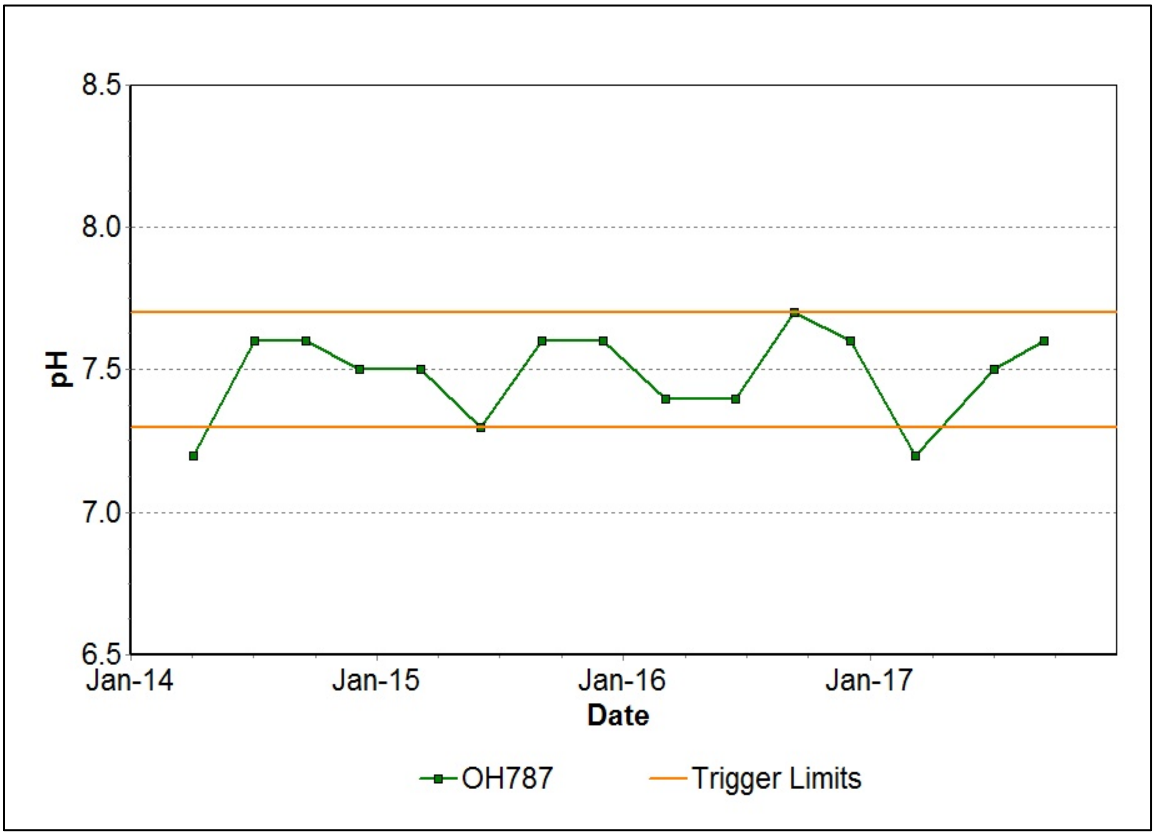


Figure 49: Hunter River Alluvium 2 Seam pH Trend 2014 – Current

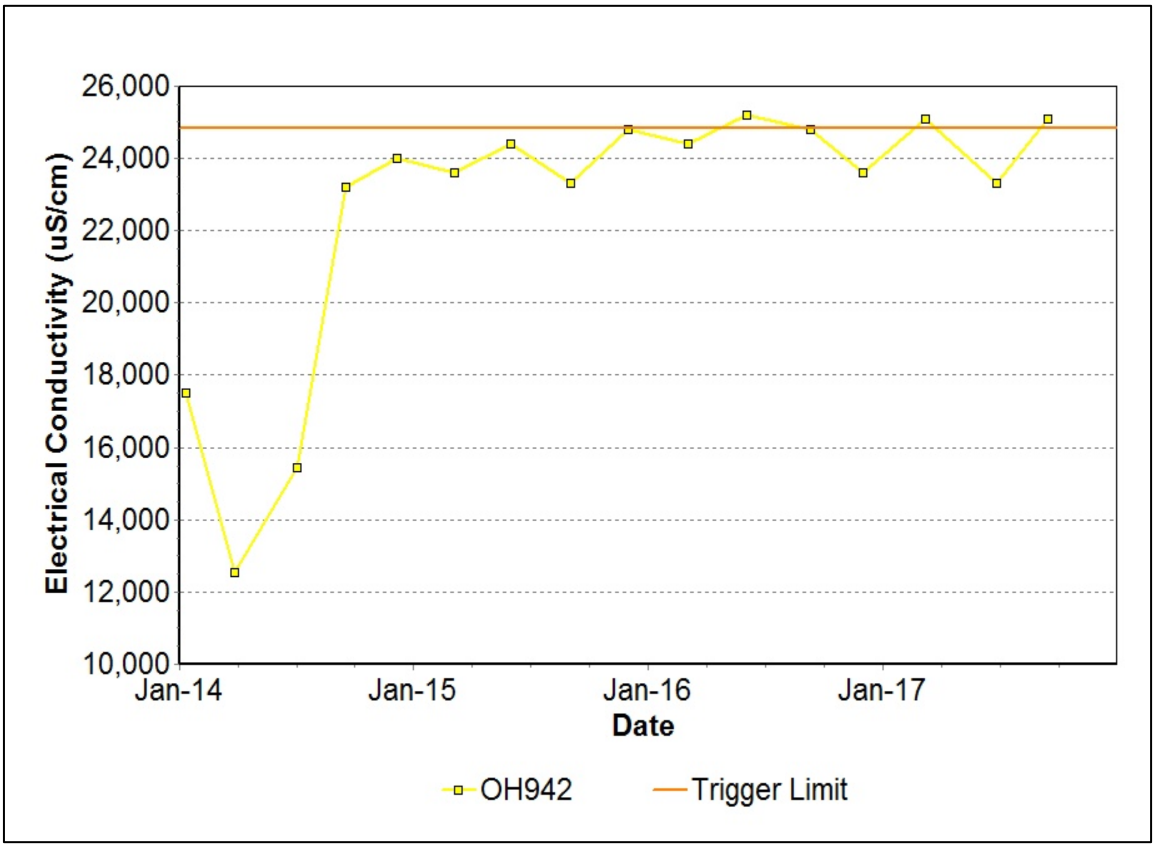


Figure 50: Hunter River Alluvium 3 Seam Electrical Conductivity Trend 2014 – Current

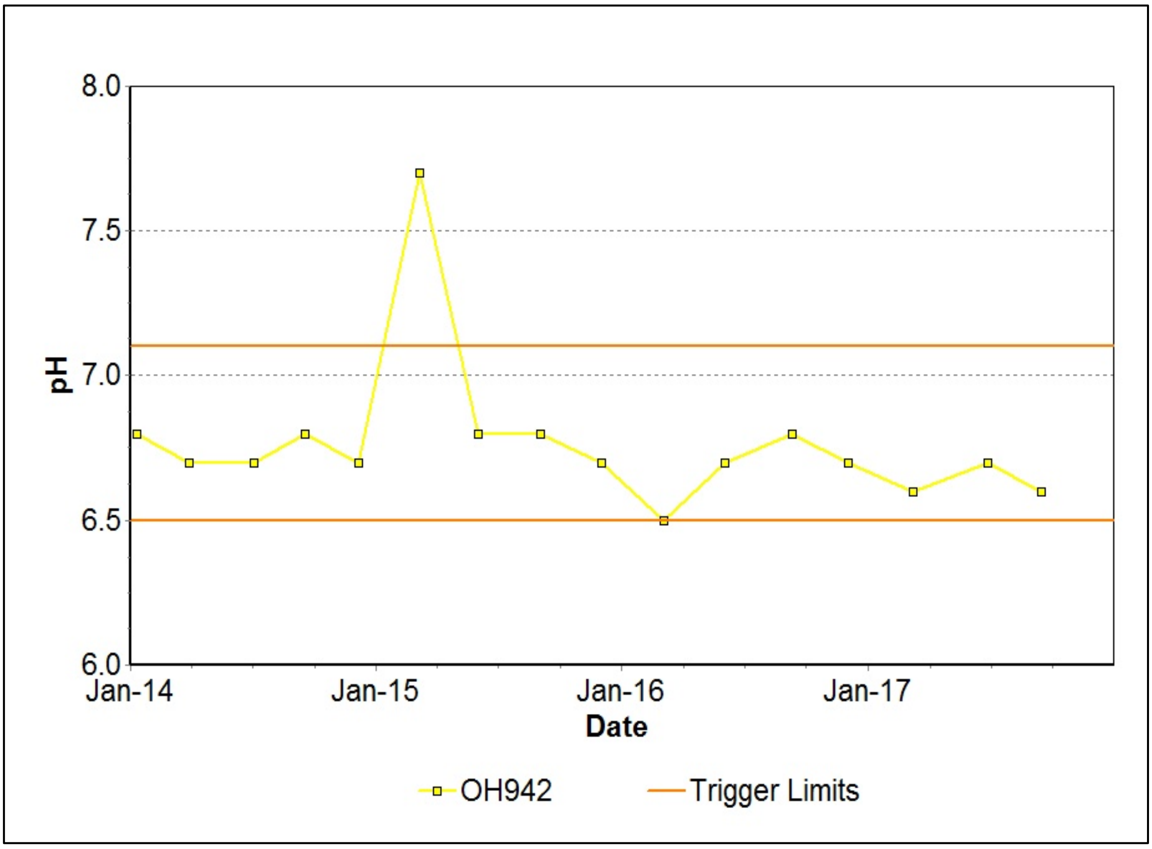


Figure 51: Hunter River Alluvium 3 Seam pH Trend 2014 – Current

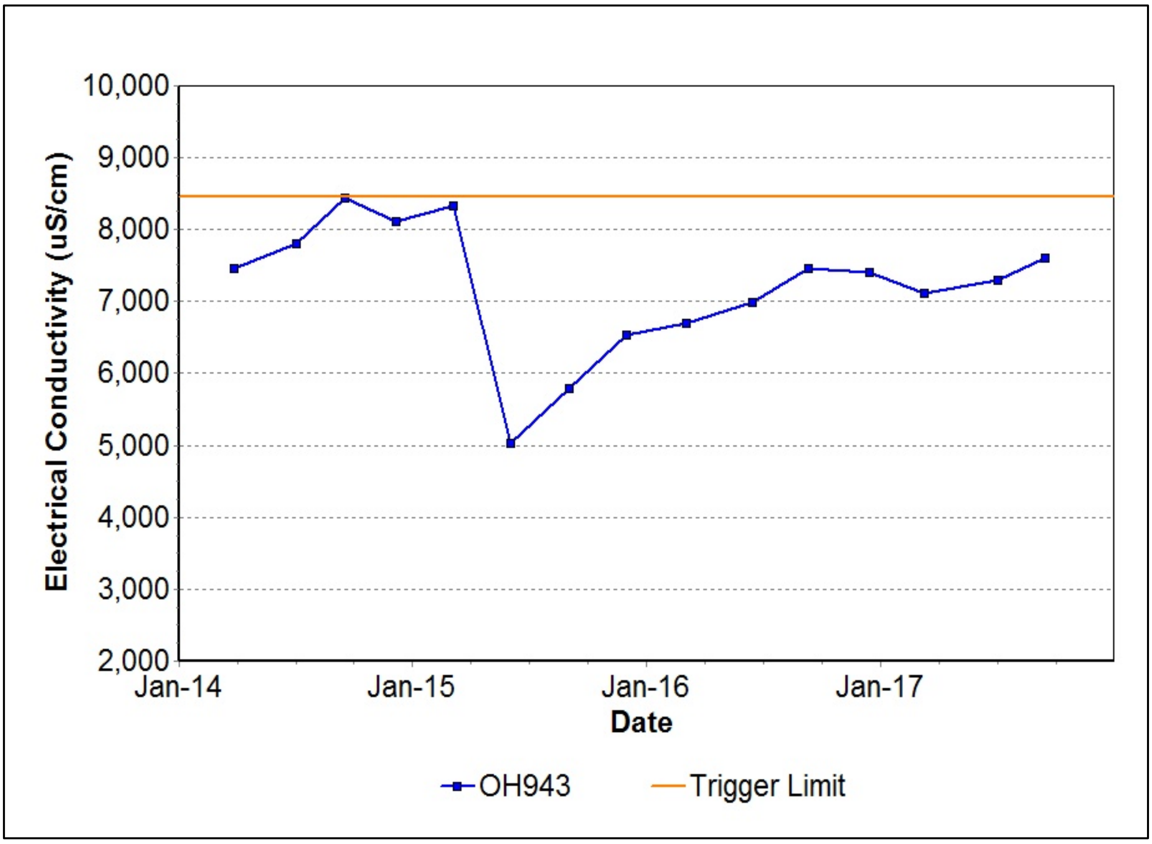


Figure 52: Hunter River Alluvium 4 Seam Electrical Conductivity Trend 2014 - Current

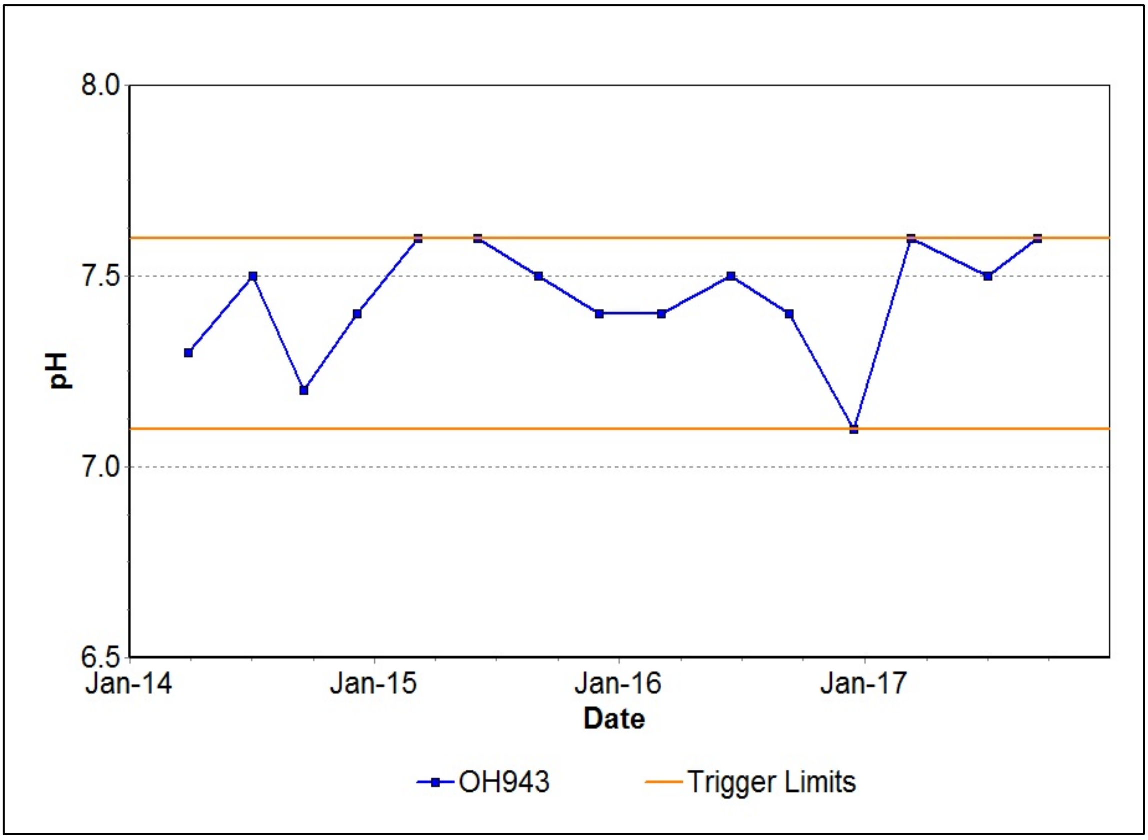
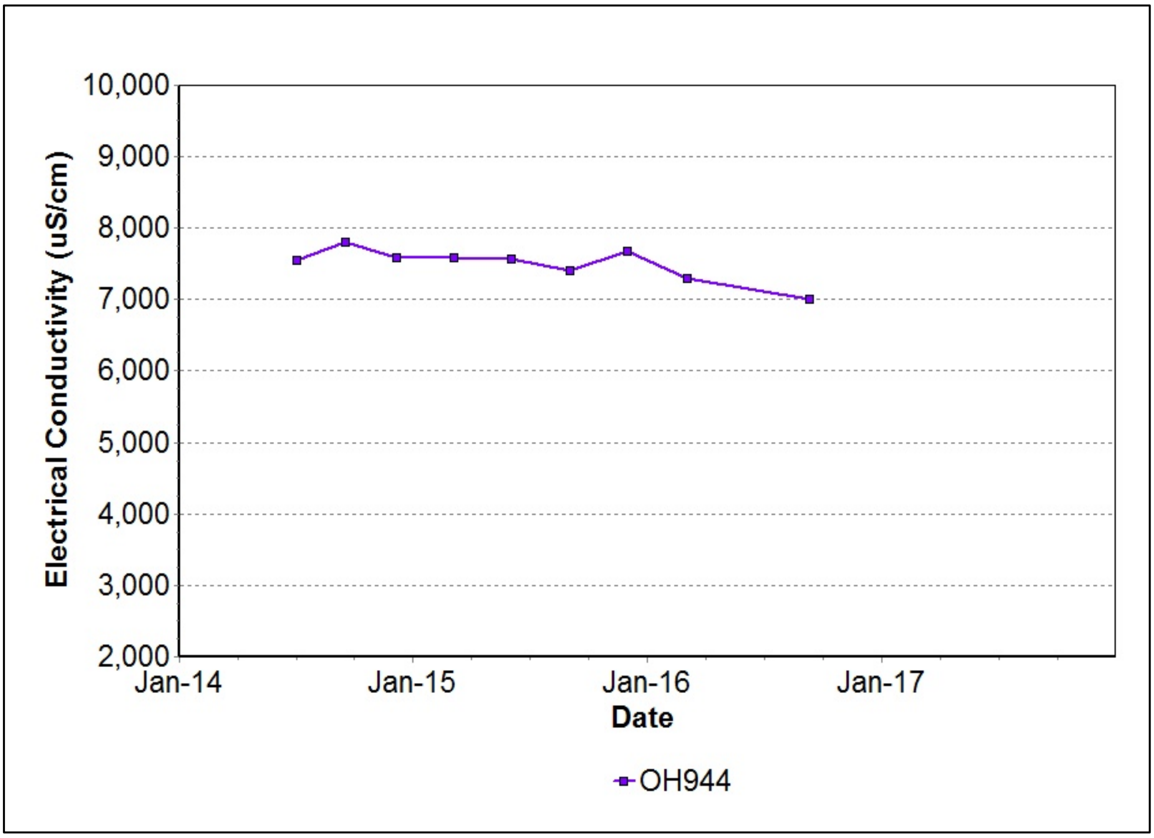


Figure 53: Hunter River Alluvium 4 Seam pH Trend 2014 - Current



Note: There has been insufficient water to sample since September.

Figure 54: Hunter River Alluvium 5 Seam Electrical Conductivity Trend 2014 – Current.

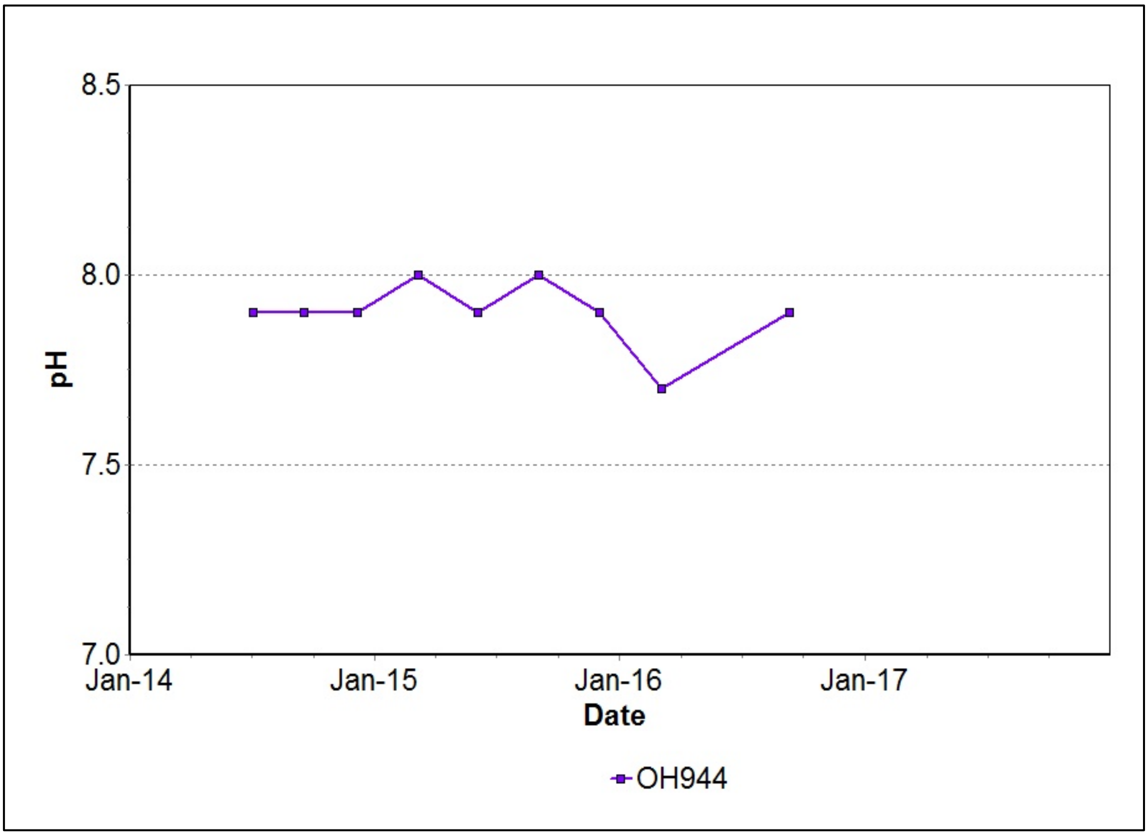


Figure 55: Hunter River Alluvium 5 Seam pH Trend 2014 - Current

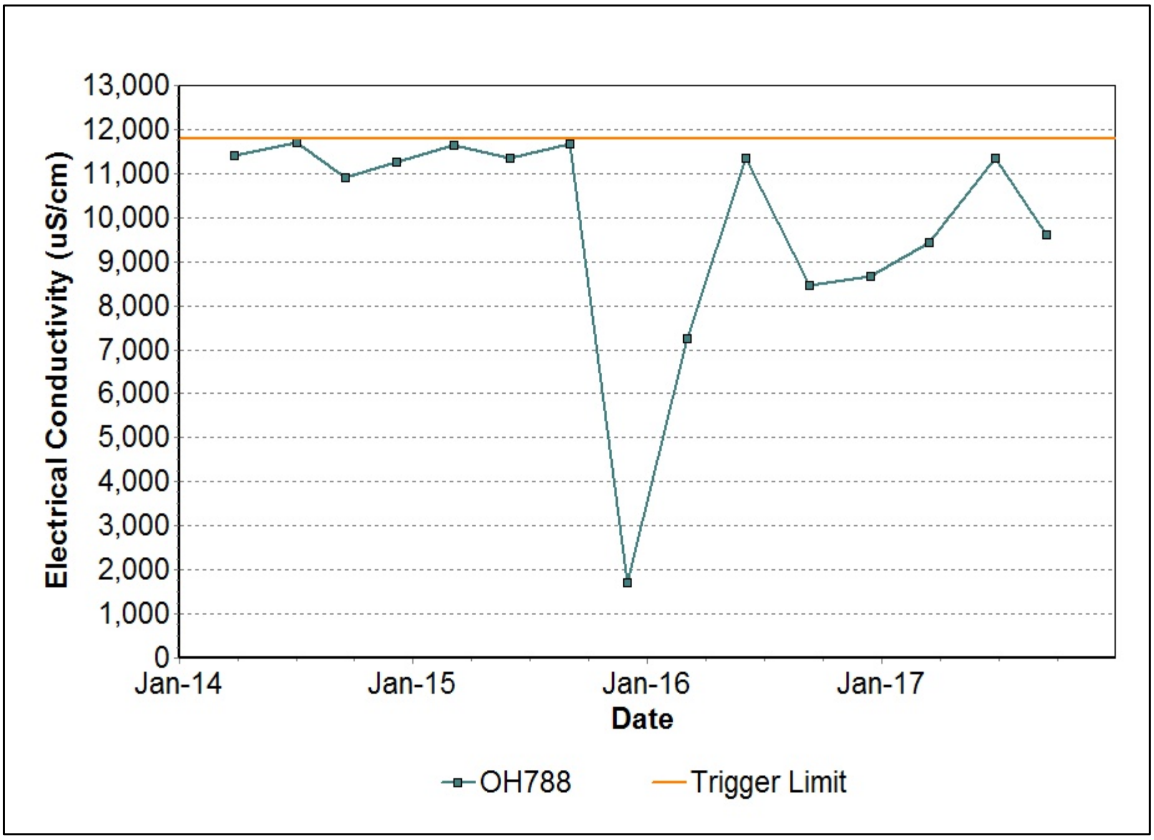


Figure 56: Hunter River Alluvium 6 Seam Electrical Conductivity Trend 2014 - Current

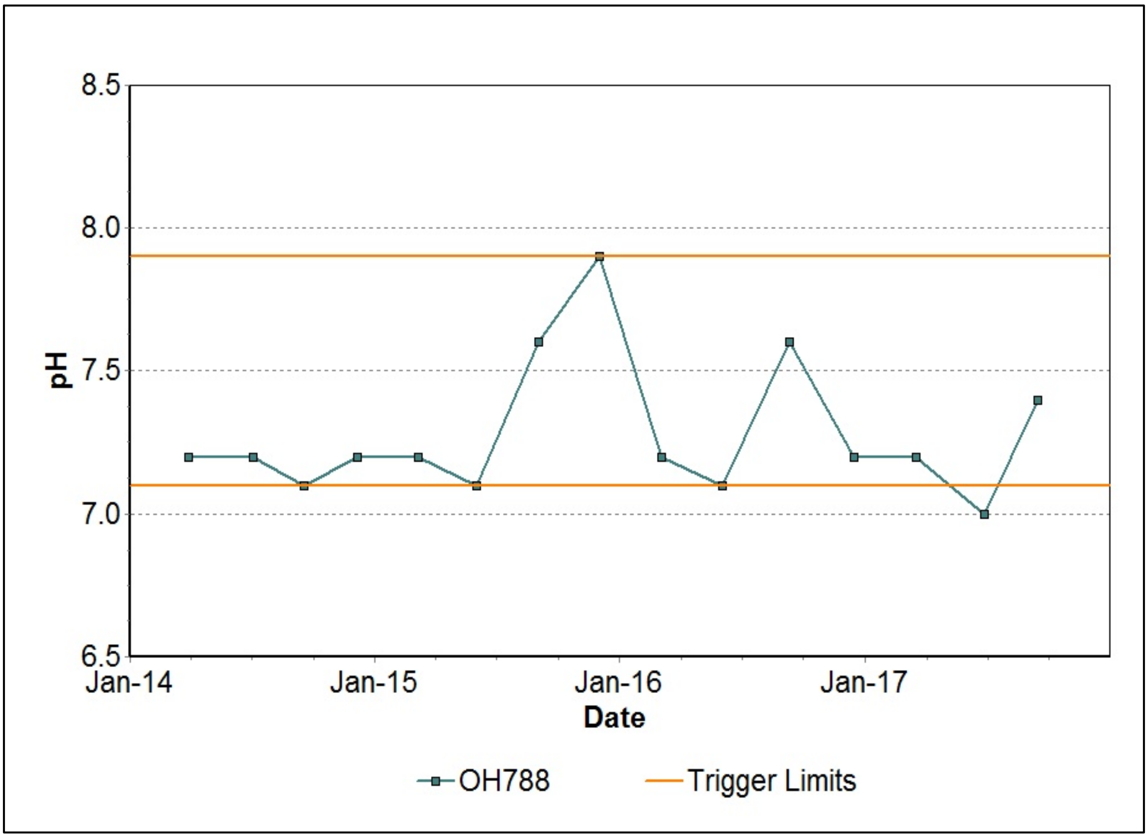


Figure 57: Hunter River Alluvium 6 Seam pH Trend 2014 - Current

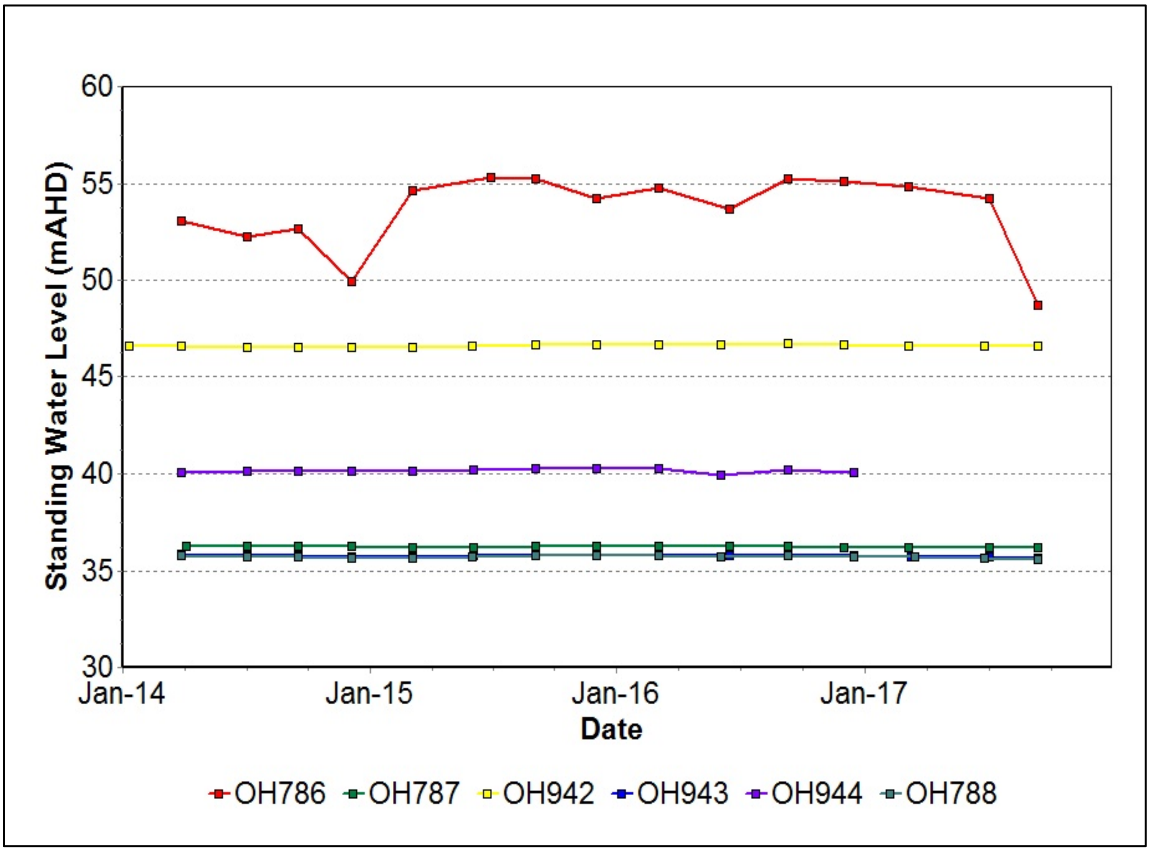


Figure 58: Hunter River Alluvium Standing Water Level Trend 2014 - Current

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 59.

During Q1, Q2 and Q3 2017 a number of trigger limits were breached and investigated summarised in Table 3.

Table 3: Groundwater Triggers - 2017

Site	Date	Trigger Limit Breached	Action Taken in Response
OH 786	14/09/2017	EC – 95th Percentile	Watching Brief*
OH 787	07/03/2017	EC – 95th Percentile	Watching Brief*
OH 787	14/09/2017	EC – 95th Percentile	Watching Brief*
OH942	07/03/2017	EC – 95th Percentile	Watching Brief*
OH942	14/09/2017	EC – 95th Percentile	Watching Brief*
PZ9S	07/03/2017	EC – 95th Percentile	Watching Brief*
GW 9709	14/09/2017	EC – 95th Percentile	Watching Brief*
OH1125(1)	07/03/2017	EC – 95th Percentile	Watching Brief*
MTD616P	10/03/2017	EC – 95th Percentile	Data is stable and consistent with historical trend; significant natural variability in water quality is typical of low-conductivity shallow overburden material. No further action.
MTD616P	03/07/2017	EC – 95th Percentile	Watching Brief*
MTD616P	24/08/2017	EC – 95th Percentile	Data is stable and consistent with historical trend; significant natural variability in water quality is typical of low-conductivity shallow overburden material. No further action
MB15MTW02D	25/08/2017	EC – 95th Percentile	Watching Brief*
MBW02	01/09/2017	EC – 95th Percentile	Watching Brief*
MB15MTW03	28/08/2017	EC – 95th Percentile	Watching Brief*
MTD605P	07/03/2017	EC – 95th Percentile	Data is stable and consistent with historical trend; significant natural variability in water quality is typical of low-conductivity shallow overburden material. No further action.
MTD605P	27/06/2017	EC – 95th Percentile	Watching Brief*
MTD605P	14/09/2017	EC – 95th Percentile	Data is stable and consistent with historical trend; significant natural variability in water quality is typical of low-conductivity shallow overburden material. No further action.
PZ9D	07/03/2017	EC – 95th Percentile	Watching Brief*

PZ9D	Sep	EC – 95th Percentile	Watching Brief*
OH1137	Sep	EC – 95th Percentile	Watching Brief*
WD622P	30/06/2017	EC – 95th Percentile	Watching Brief*
MBW04	Sep	EC – 95th Percentile	Watching Brief*
WOH2156B	10/03/2017	EC – 95th Percentile	Data is stable and consistent with historical trend; no further action.
WOH2156B	30/06/2017	EC – 95th Percentile	Watching Brief*
WOH2156B	24/08/2017	EC – 95th Percentile	Data is stable and consistent with historical trend; no further action.
OH1138(1)	14/09/2017	EC – 95th Percentile	Watching Brief*
OH786	07/03/2017	PH –5th Percentile	Watching Brief*
OH787	07/03/2017	PH –5th Percentile	Watching Brief*
OH788	26/06/2017	PH –5th Percentile	Watching Brief*
GW9709	10/03/2017	PH –5th Percentile	Data broadly in line with historical range; EC or water level do not show a rising or falling trend. Watching brief to be maintained.
GW98MTCL2	10/03/2017	PH –5th Percentile	Watching Brief*
GW98MTCL2	23/07/2017	PH –5th Percentile	Watching Brief*
GW98MTCL2	14/09/2017	PH –5th Percentile	Results in line with historical data, continue to watch and monitor.
MTD616P	03/07/2017	PH –5th Percentile	Watching Brief*
MTD605P	14/09/2017	PH –5th Percentile	Watching Brief*
G3	07/03/2017	PH –5th Percentile	Bore partially collapsed in early 2016 so data may not be representative of aquifer. Removal from monitoring programme has been recommended following review of data from nearby bores.
OH1138(1)	04/07/2017	PH –5th Percentile	Watching Brief*
OH1138(1)	14/09/2017	PH –5th Percentile	Watching Brief*
WOH2139A	25/08/2017	PH –95th Percentile	Watching Brief*
WOH2153A	10/03/2017	PH –95th Percentile	Watching Brief*

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

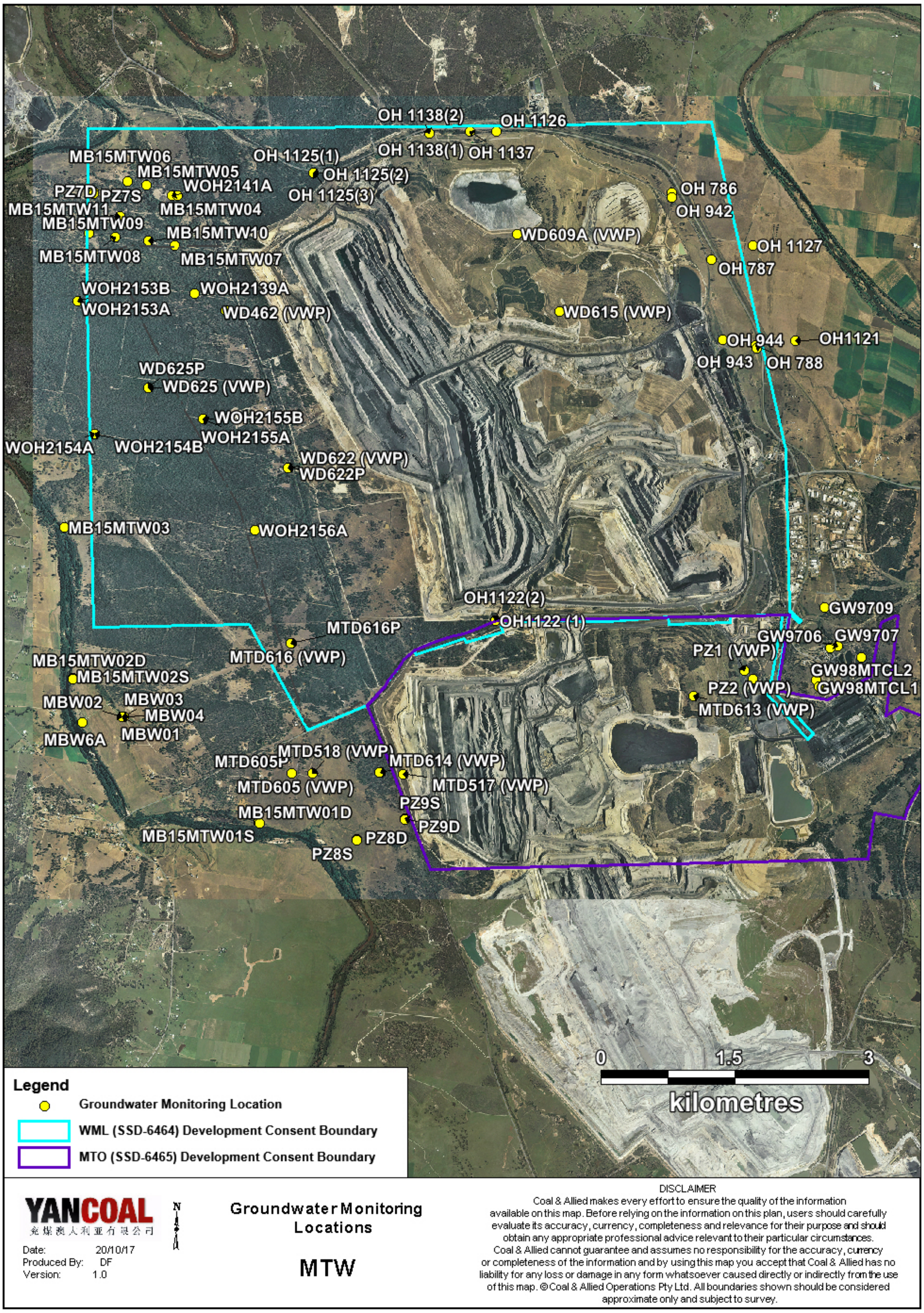


Figure 59: Groundwater Monitoring Location Plan

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 66.

4.1 Blast Monitoring Results

During September 2017, 27 blasts were initiated at MTW. Figure 60 to Figure 65 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

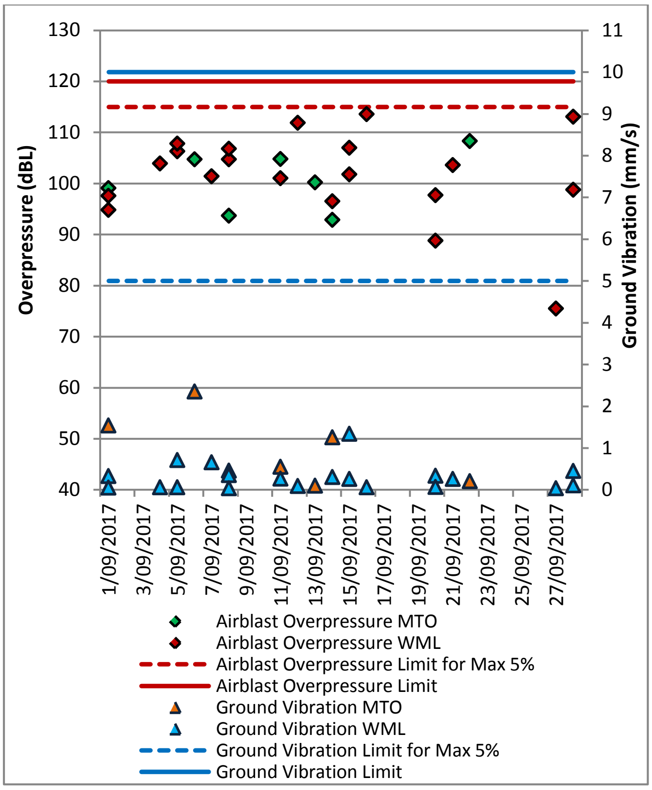


Figure 60: Abbey Green Blast Monitoring Results – September 2017

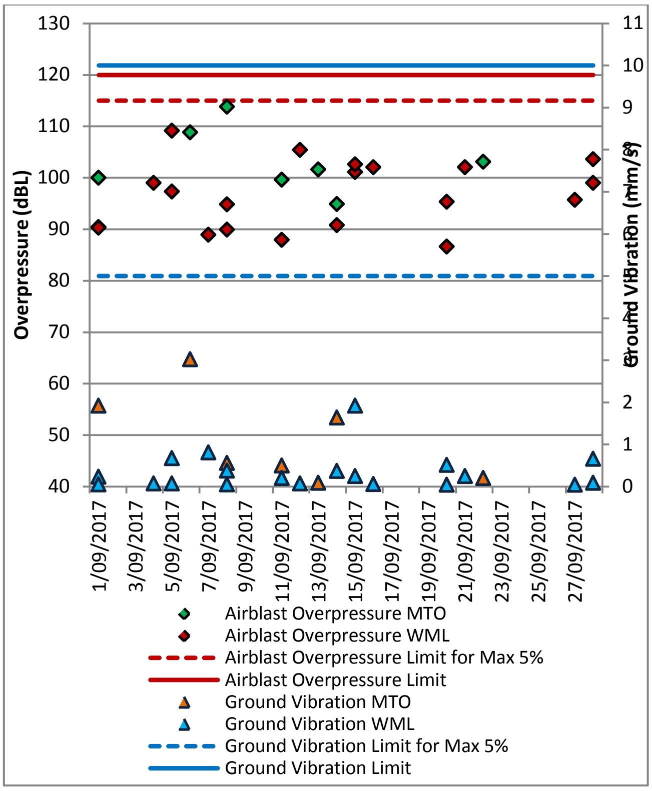


Figure 61: Bulga Village Blast Monitoring Results – September 2017

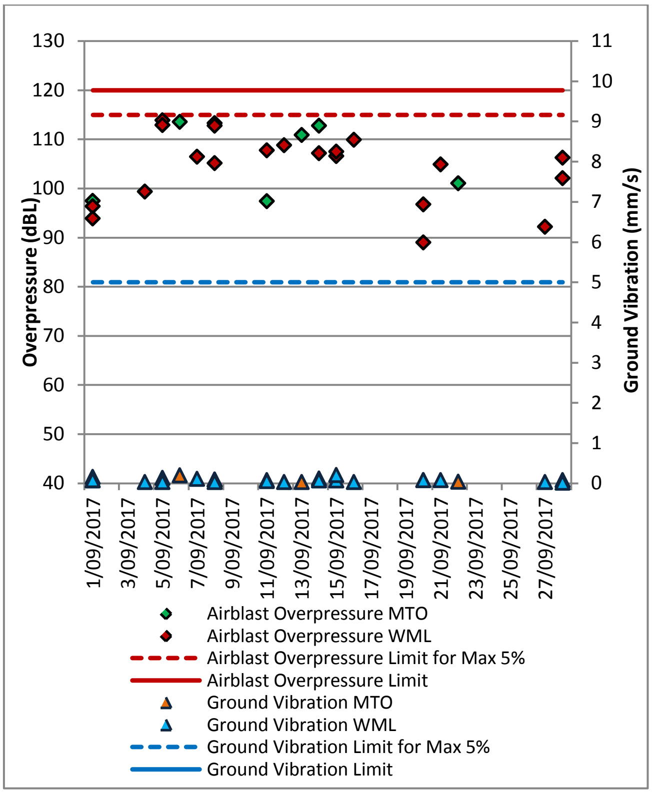


Figure 62: MTIE Blast Monitoring Results – September 2017

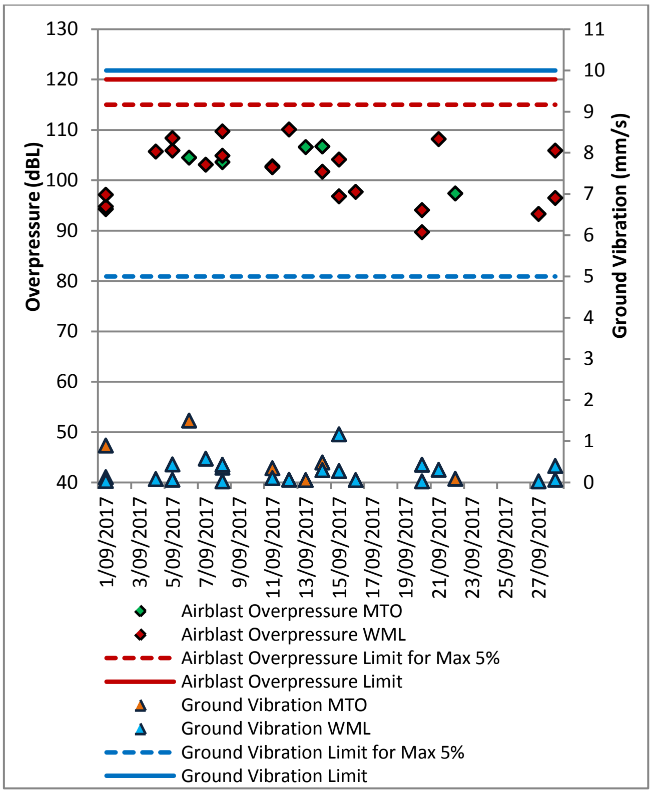


Figure 64: Wambo Road Blast Monitoring Results – September 2017

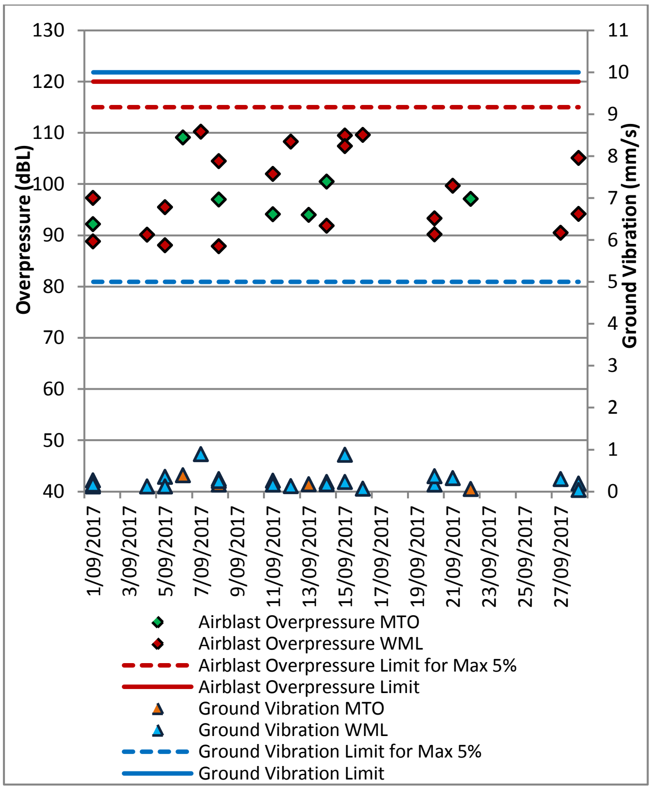


Figure 63: Warkworth Blast Monitoring Results - September 2017

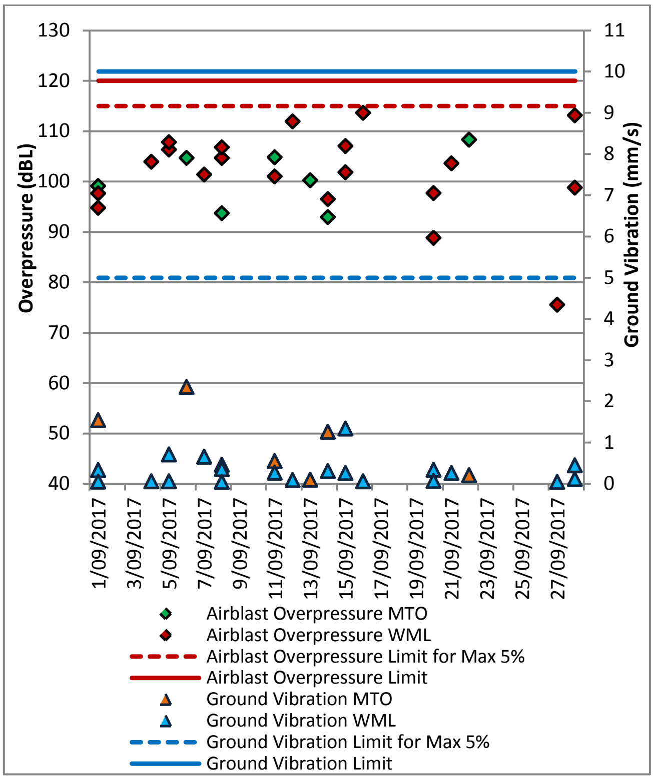


Figure 65: Wollemi Peak Road Blast Monitoring Results - September 2017

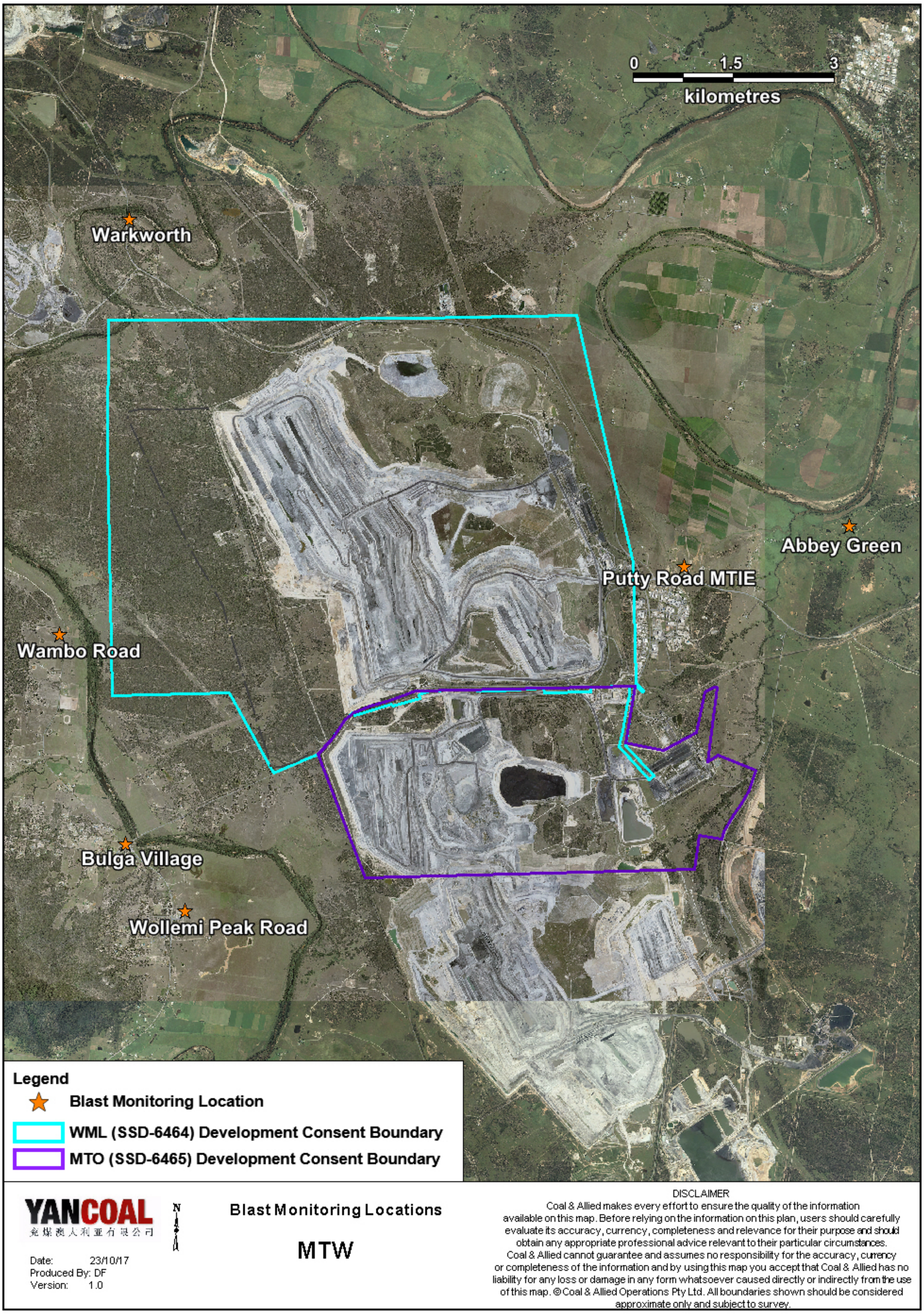


Figure 66: Blast and Vibration Monitoring Location Plan

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. 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 67.

5.1 Attended Noise Monitoring Results

Attended monitoring was conducted at receiver locations surrounding MTW on the night of 14 September 2017. 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: LAeq, 15 minute Warkworth Impact Assessment Criteria – September 2017

Location	Date and Time	Wind Speed (m/s)[5]	Stability Class	Criterion (dB(A))	Criterion Applies?[1,5]	WML L_{Aeq} dB[2,4]	Exceedance[3]	Total L_{Ceq} – L_{Aeq}	Revised WML L_{Aeq} [4,5,6]
Bulga RFS	14/09/2017 21:00	3.5	D	37	No	IA	NA	12	IA
Bulga Village	14/09/2017 21:51	3.1	D	38	No	IA	NA	15	IA
Gouldsville	14/09/2017 21:23	3.2	D	38	No	32	NA	19	37
Inlet Rd	14/09/2017 21:06	3.5	D	37	No	IA	NA	15	IA
Inlet Rd West	14/09/2017 21:28	3.1	D	35	No	IA	NA	16	IA
Long Point	14/09/2017 21:00	3.5	D	35	No	<30	NA	24	<35
South Bulga	14/09/2017 21:22	3.2	D	35	No	IA	NA	17	IA
Wambo Road	14/09/2017 22:38	4	D	38	No	IA	NA	12	IA

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;
2. Estimated or measured LAeq,15minute attributed to WML;
3. NA means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable;
4. Bolded results in red are possible exceedances of relevant criteria; and
5. Criterion may or may not apply due to rounding of meteorological data values.
6. Revised LAeq, 15minute level following application of low frequency noise penalty as per the INP where applicable.

Table 6: LA1, 1 minute Warkworth – Impact Assessment Criteria – September 2017

Location	Date and Time	Wind Speed (m/s)[5]	Stability Class	Criterion (dB(A))	Criterion Applies?[1,5]	WML L_{Aeq} dB[2,4]	Exceedance[3]
Bulga RFS	14/09/2017 21:00	3.5	D	47	No	IA	NA
Bulga Village	14/09/2017 21:51	3.1	D	48	No	IA	NA
Gouldsville	14/09/2017 21:23	3.2	D	48	No	37	NA
Inlet Rd	14/09/2017 21:06	3.5	D	47	No	IA	NA
Inlet Rd West	14/09/2017 21:28	3.1	D	45	No	IA	NA
Long Point	14/09/2017 21:00	3.5	D	45	No	<30	NA
South Bulga	14/09/2017 21:22	3.2	D	45	No	IA	NA
Wambo Road	14/09/2017 22:38	4	D	48	No	IA	NA

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;
2. Estimated or measured LA1,1minute attributed to Warkworth mine (WML);
3. NA in exceedance column means atmospheric conditions outside conditions specified in project approval and so criterion is not applicable.
4. Bolded results in red are possible exceedances of relevant criteria; and
5. Criterion may or may not apply due to rounding of meteorological data values.

5.1.2 MTO Noise Assessment

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

Table 7: LAeq, 15minute Mount Thorley - Impact Assessment Criteria – September 2017

Location	Date and Time	Wind Speed (m/s)[5]	Stability Class	Criterion dB	Criterion Applies?[1,5]	MTO L_{Aeq} dB[2,4]	Exceedance[3]	Total L_{Ceq} – L_{Aeq}	Revised MTO L_{Aeq}[4,5,6]
Bulga RFS	14/09/2017 21:00	3.5	D	37	No	<20	NA	12	<20
Bulga Village	14/09/2017 21:51	3.1	D	38	No	IA	NA	15	IA
Gouldsville	14/09/2017 21:23	3.2	D	35	No	IA	NA	19	IA
Inlet Rd	14/09/2017 21:06	3.5	D	37	No	IA	NA	15	IA
Inlet Rd West	14/09/2017 21:28	3.1	D	35	No	IA	NA	16	IA
Long Point	14/09/2017 21:00	3.5	D	35	No	IA	NA	24	IA
South Bulga	14/09/2017 21:22	3.2	D	36	No	IA	NA	17	IA
Wambo Road	14/09/2017 22:38	4	D	38	No	IA	NA	12	IA

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;
2. Estimated or measured LAeq,15minute attributed to MTO;
3. NA means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable;
4. Bolded results in red are possible exceedances of relevant criteria; and
5. Criterion may or may not apply due to rounding of meteorological data values.
6. Revised LAeq, 15minute level following application of low frequency noise penalty as per the INP where applicable.

Table 8: LA1, 1Minute Mount Thorley - Impact Assessment Criteria – September 2017

Location	Date and Time	Wind Speed (m/s)[5]	Stability Class	Criterion dB	Criterion Applies?[1,5]	MTO $L_{A1,\ 1min}$ dB[2,4]	Exceedance[3]
Bulga RFS	14/09/2017 21:00	3.5	D	47	No	23	NA
Bulga Village	14/09/2017 21:51	3.1	D	48	No	IA	NA
Gouldsville	14/09/2017 21:23	3.2	D	45	No	IA	NA
Inlet Rd	14/09/2017 21:06	3.5	D	47	No	IA	NA
Inlet Rd West	14/09/2017 21:28	3.1	D	45	No	IA	NA
Long Point	14/09/2017 21:00	3.5	D	45	No	IA	NA
South Bulga	14/09/2017 21:22	3.2	D	46	No	IA	NA
Wambo Road	14/09/2017 22:38	4	D	48	No	IA	NA

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;
2. Estimated or measured LA1,1minute attributed to MTO;
3. NA in exceedance column means atmospheric conditions outside conditions specified in project approval and so criterion is not applicable.
4. Bolded results in red are possible exceedances of relevant criteria; and
5. Criterion may or may not apply due to rounding of meteorological data values.

5.1.3 INP Low Frequency Assessment

In accordance with the requirements of the NSW Industrial Noise Policy (INP), the low frequency modification factor has been applied where appropriate. It should be noted that the Industrial Noise Policy does not give guidance on the application of the penalty where more than one target noise source is audible. The L_{Ceq} levels reported above are "Total", or "Total mine noise" at best, and cannot be attributed accurately to a single mine. Accordingly, where the INP criteria for the application of the Low

Frequency modification factor is triggered, the penalty has been applied to the dominant mine noise source (either of WML or MTO), as such resulting in the application of a 5 dB penalty to the site only L_{Aeq} for the measurements taken at Goulsdville and Long Point. The resulting L_{Aeq} noise levels remained in compliance.

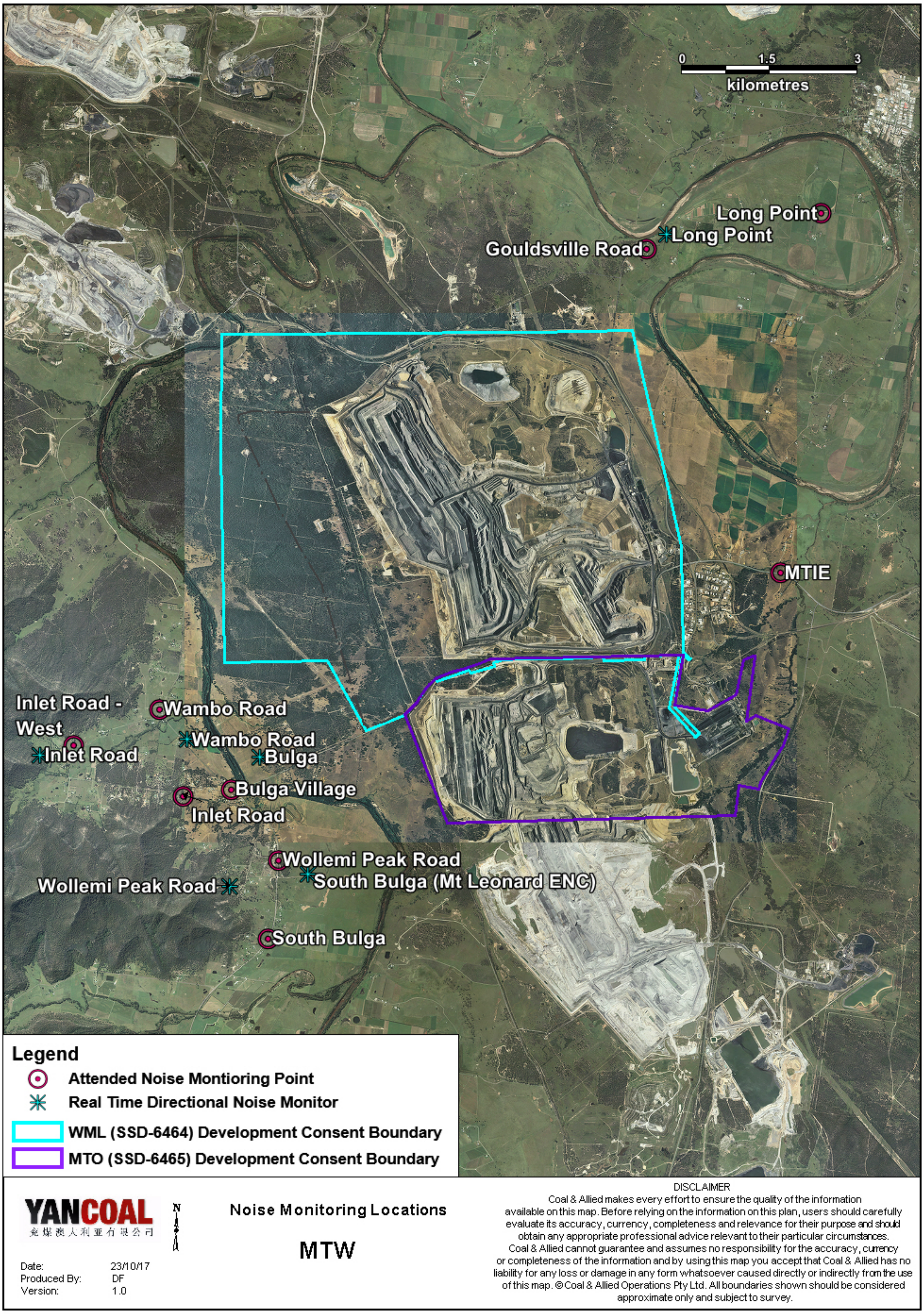


Figure 67: Noise Monitoring Location Plan

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 September are provided in Table 9.

Table 9: Supplementary Attended Noise Monitoring Data –September 2017

No. of assessments	No. of assessments > trigger	No. of nights where assessments > trigger	% greater than trigger
437	2	1	0.5

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

6.0 OPERATIONAL DOWNTIME

During September a total of 3456 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 68.

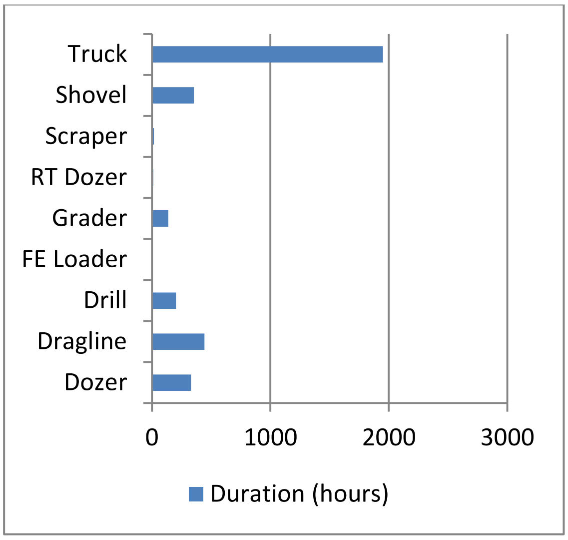


Figure 68: Operational Downtime by Equipment Type – September 2017

7.0 REHABILITATION

During September, 10.5 Ha of land was released, 27.3Ha was bulk shaped, 19.9Ha was top soiled, 23.7Ha was composted and 28.0Ha was rehabilitated. Year-to-date progress can be viewed in Figure 69

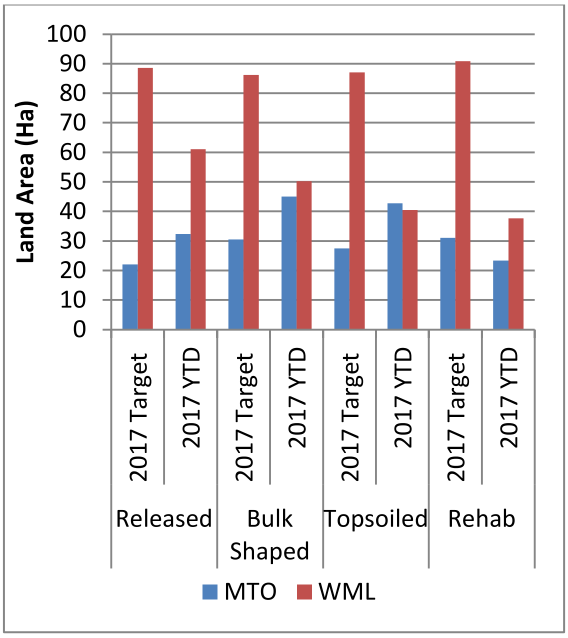


Figure 69: Rehabilitation YTD - September 2017

8.0 ENVIRONMENTAL INCIDENTS

There were no reportable environmental incidents during the reporting period.

9.0 COMPLAINTS

During the reporting period 47 complaints were received, details of these complaints are displayed in Figure 70 below.

	Noise	Dust	Blast	Lighting	Other	Total
January	5	6	3	1	0	15
February	25	3	10	3	0	41
March	14	1	1	2	0	18
April	27	1	7	2	0	37
May	18	4	7	10	3	42
June	10	3	4	3	0	20
July	10	10	8	0	2	30
August	8	18	5	4	1	36
September	21	15	6	2	3	47
October	-	-	-	-	-	-
November	-	-	-	-	-	-
December	-	-	-	-	-	-
Total	138	61	51	27	9	286

Figure 70: Complaints Summary - YTD September 2017

Appendix A: Meteorological Data

Table 10: Meteorological Data – Charlton Ridge Meteorological Station – September 2017

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)
1/09/2017	19.4	4.4	81.8	23.7	801	170.1	1.8	0.0
2/09/2017	24.4	2.9	91.4	12.8	784	189.2	2.4	0.0
3/09/2017	28.6	6.4	57.8	7.5	807	255.1	3.6	0.0
4/09/2017	21.4	9.6	51.6	15.3	884	303.2	4.9	0.0
5/09/2017	18.9	9.0	42.4	19.8	1073	299.8	5.6	0.0
6/09/2017	20.5	8.9	47.2	16.1	891	294.5	5.3	0.0
7/09/2017	21.3	6.1	58.3	12.8	897	276.7	3.5	0.0
8/09/2017	20.5	5.6	54.0	18.6	1094	274.4	3.9	0.0
9/09/2017	19.6	4.7	62.1	16.2	886	184.6	2.5	0.0
10/09/2017	20.1	3.6	76.7	24.8	1130	178.0	1.7	0.0
11/09/2017	24.9	3.7	86.7	8.7	1016	235.1	2.7	0.0
12/09/2017	29.4	6.8	50.0	11.8	983	288.5	3.7	0.0
13/09/2017	32.7	12.8	41.8	5.1	922	278.0	4.5	0.0
14/09/2017	21.4	7.9	91.4	22.9	1169	265.3	4.3	9.4
15/09/2017	23.0	6.0	58.5	20.8	1219	293.8	4.2	0.0
16/09/2017	24.2	8.5	74.9	17.0	955	254.0	4.2	0.0
17/09/2017	20.0	5.0	86.2	24.0	914	149.8	2.2	0.0
18/09/2017	26.3	3.7	86.2	16.6	939	229.4	2.8	0.0
19/09/2017	27.1	10.2	60.1	3.2	923	258.2	3.8	0.0
20/09/2017	21.2	5.1	79.8	17.6	917	159.3	1.7	0.0
21/09/2017	28.3	5.6	90.0	5.4	884	235.1	2.6	0.0
22/09/2017	30.8	8.1	45.3	4.6	906	272.7	2.8	0.0
23/09/2017	34.6	11.6	44.6	5.5	993	244.4	3.3	0.0
24/09/2017	33.0	18.3	29.6	9.1	945	282.9	4.9	0.0
25/09/2017	30.2	14.0	42.0	7.5	934	248.2	3.6	0.0
26/09/2017	25.5	9.2	71.1	12.0	935	166.9	2.5	0.0
27/09/2017	27.3	11.3	76.7	22.7	873	143.3	2.3	0.0
28/09/2017	26.0	13.6	80.3	18.0	1088	253.6	3.2	0.0
29/09/2017	27.3	10.7	48.8	10.7	934	265.0	3.3	0.0
30/09/2017	24.9	13.2	70.7	5.3	999	246.5	3.2	0.0

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