# Monthly Environmental Monitoring Report

## Yancoal Mt Thorley Warkworth

## September 2018

**CONTENTS**

**Figures**

**Tables**



Revision History

| Version No. | Person Responsible | Document Status | Date |
|---|---|---|---|
| **1.0** | **Environmental Advisor** | **Draft** | **26/10/2018** |
| **1.1** | **Environment & Community Manager** | **Final** | **26/10/2018** |

# 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 1st September to 30th September 2018.

# 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**

| 2018 | Monthly Rainfall (mm) | Cumulative Rainfall (mm) |
|---|---|---|
| **September** | 19.6 | 194.5 |

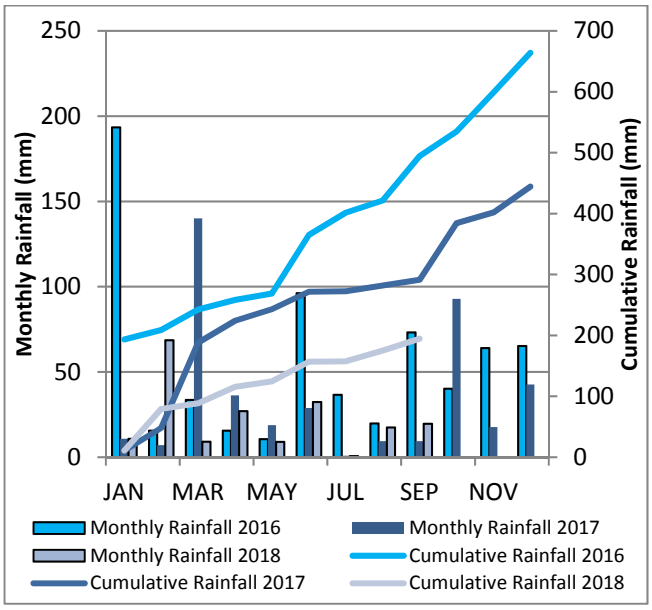



**Figure 1: Rainfall Trends YTD**

### 2.1.2 Wind Speed and Direction

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

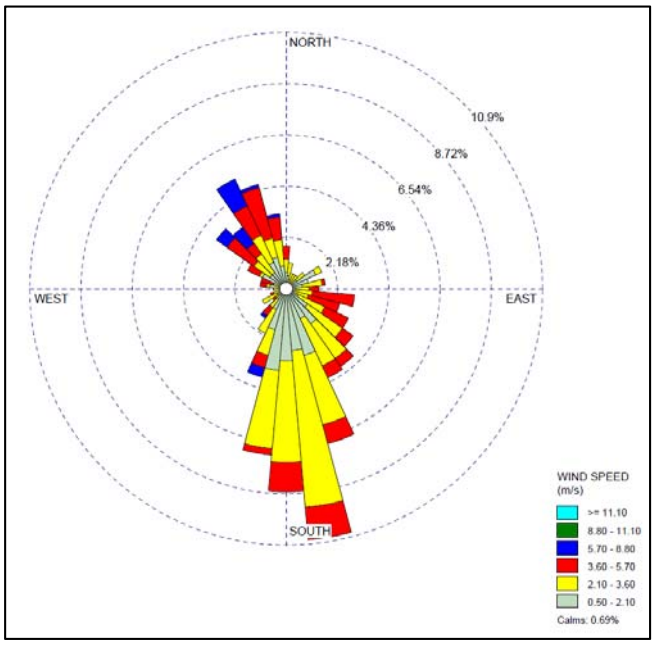



**Figure 2: Charlton Ridge Wind Rose – September 2018**

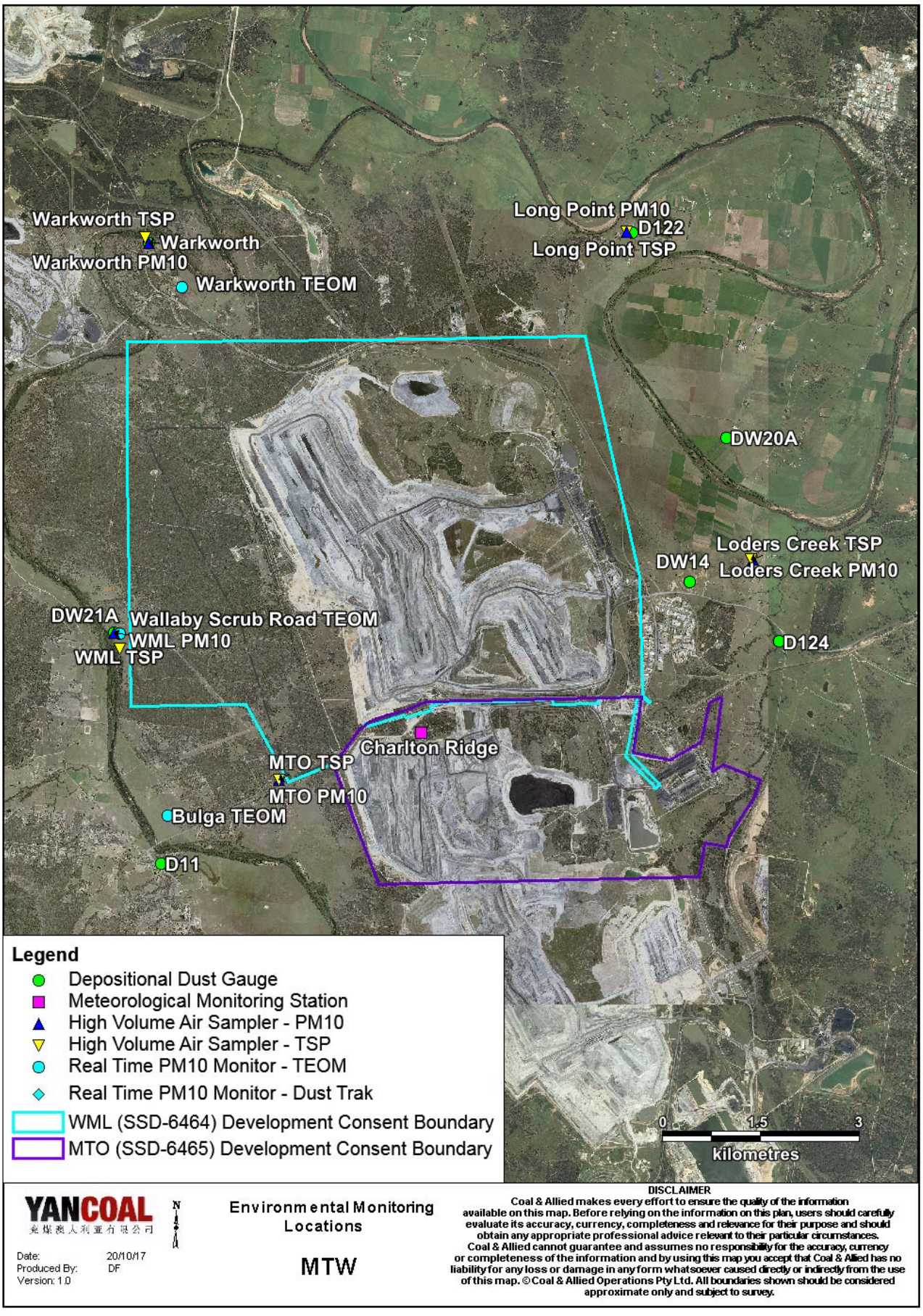



**Figure 3: Air Quality Monitoring Locations**

## 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 DW21a, 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 monitor DW21a and D124 results confirm the presence of insects, vegetation and bird droppings. 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 result is contaminated. Accordingly, the result 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 2018 Annual Review Report.

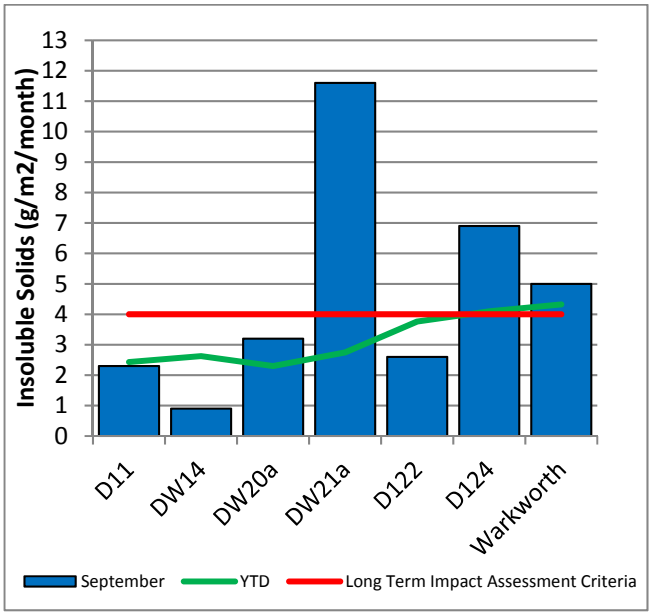



**Figure 4: Depositional Dust – September 2018**

## 2.3 Suspended Particulates

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

### 2.3.1 HVAS $PM_{10}$ Results

**Figure 5** shows the individual $PM_{10}$ results at each monitoring station against the short term impact assessment criteria of 50µg/m$^3$.

On 16th and 22nd September 2018 the Loders Creek HVAS unit recorded results of 58 µg/m$^3$ and 60 µg/m$^3$ respectively which are greater than the short term (24hr) $PM_{10}$ impact assessment criteria.

Investigations indicate that the likely MTW contribution to the results at Loders Creek on the 16th and 22nd September is less than 69% and 62% respectively. Accordingly, no further action is required (as per approved Air Quality Monitoring Programme).

On 22nd September 2018 the Long Point HVAS $PM_{10}$ unit recorded a result of 70 µg/m$^3$ which is greater than the short term (24hr) $PM_{10}$ impact assessment criteria.

Investigation indicates that the likely MTW contribution to the result at Long Point on the 22nd September is less than 59%. Accordingly, no further action is required (as per approved Air Quality Monitoring Programme).

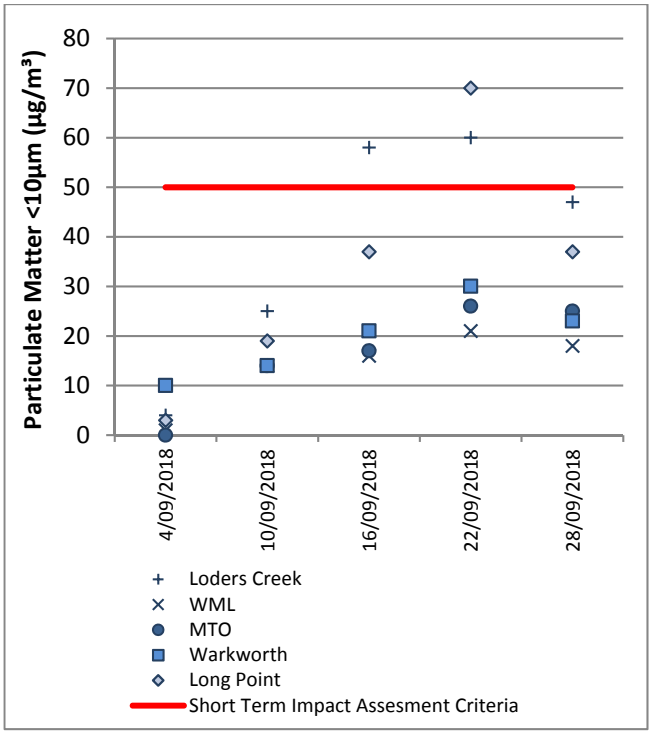



**Figure 5: Individual $PM_{10}$ Results – September 2018**

**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 2018 Annual Review Report.

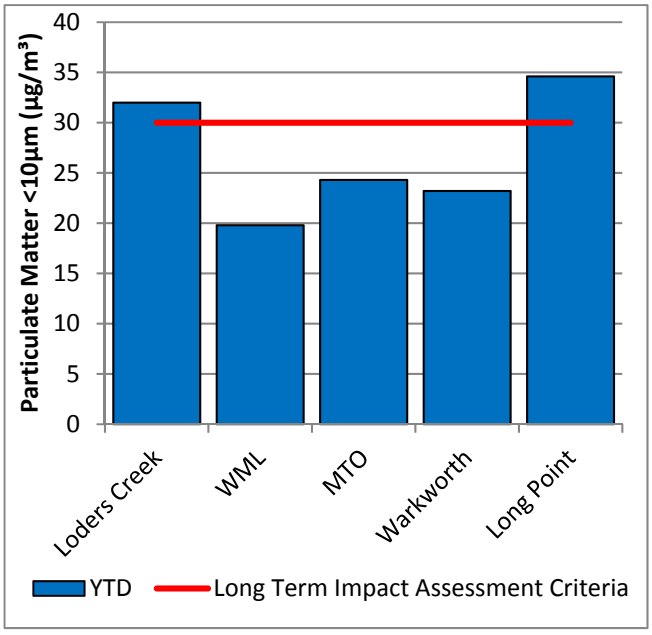



**Figure 6: Annual Average $PM_{10}$ – September 2018**

### 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 2018 Annual Review Report.

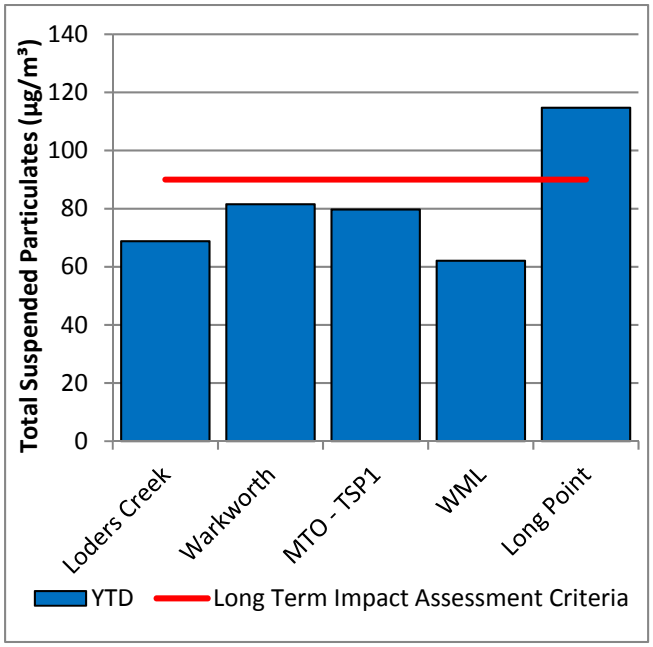



**Figure 7: Annual Average Total Suspended Particulates – September 2018**

### 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 the 3rd September from the Warkworth monitor due to equipment issues.

### 2.3.4 Real Time Alarms for Air Quality

During September, the real time monitoring system generated 122 automated air quality related alerts, including 9 alerts for adverse meteorological conditions and 113 alerts for elevated PM10 levels.

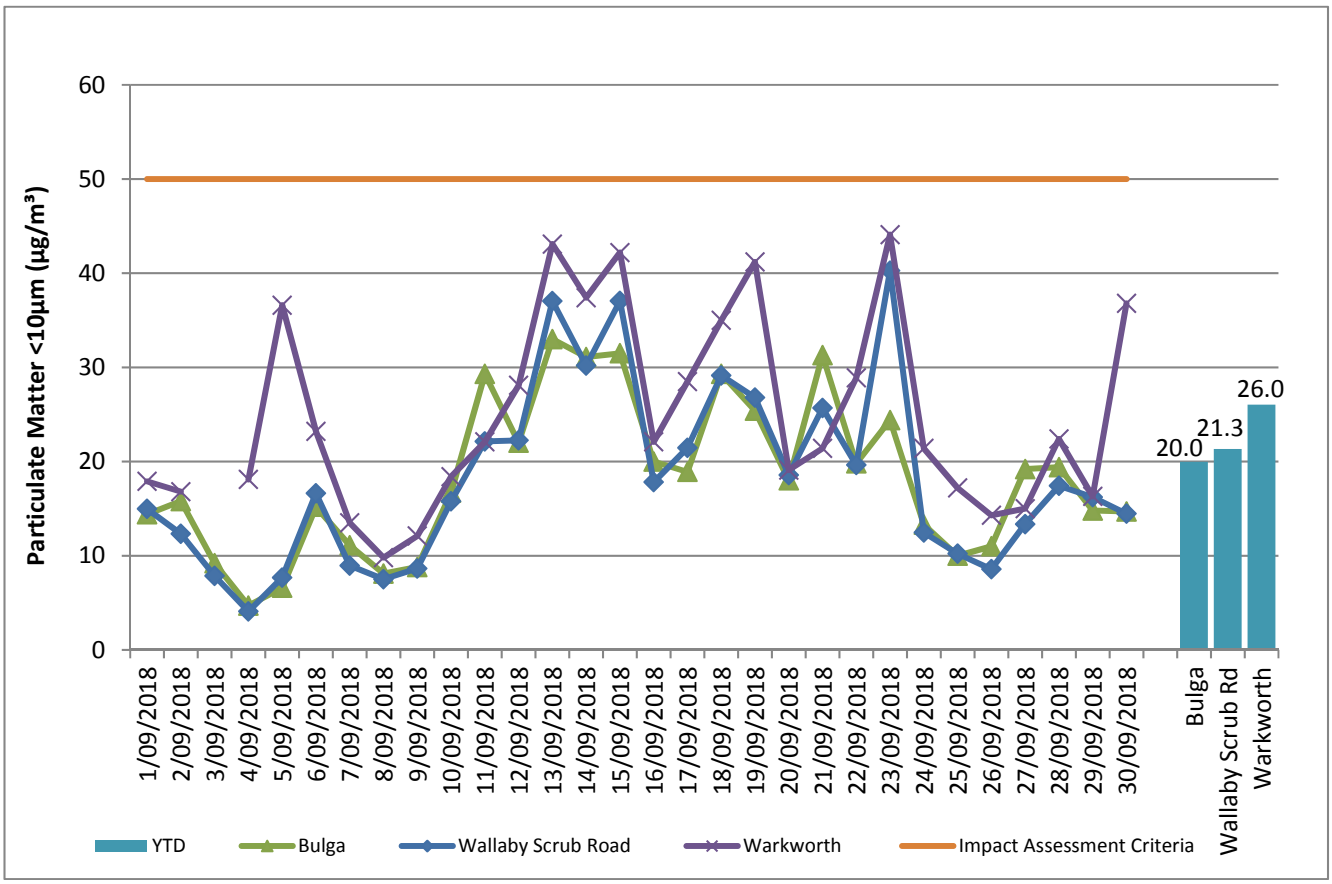



**Figure 8: Real Time $PM_{10}$ 24hr average and Year-to-date average – September 2018**

# 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 (2015 – current) within MTW mine dams. **Figure 12** to **Figure 14** show the long term surface water trend (2015 - current) in surrounding watercourses.

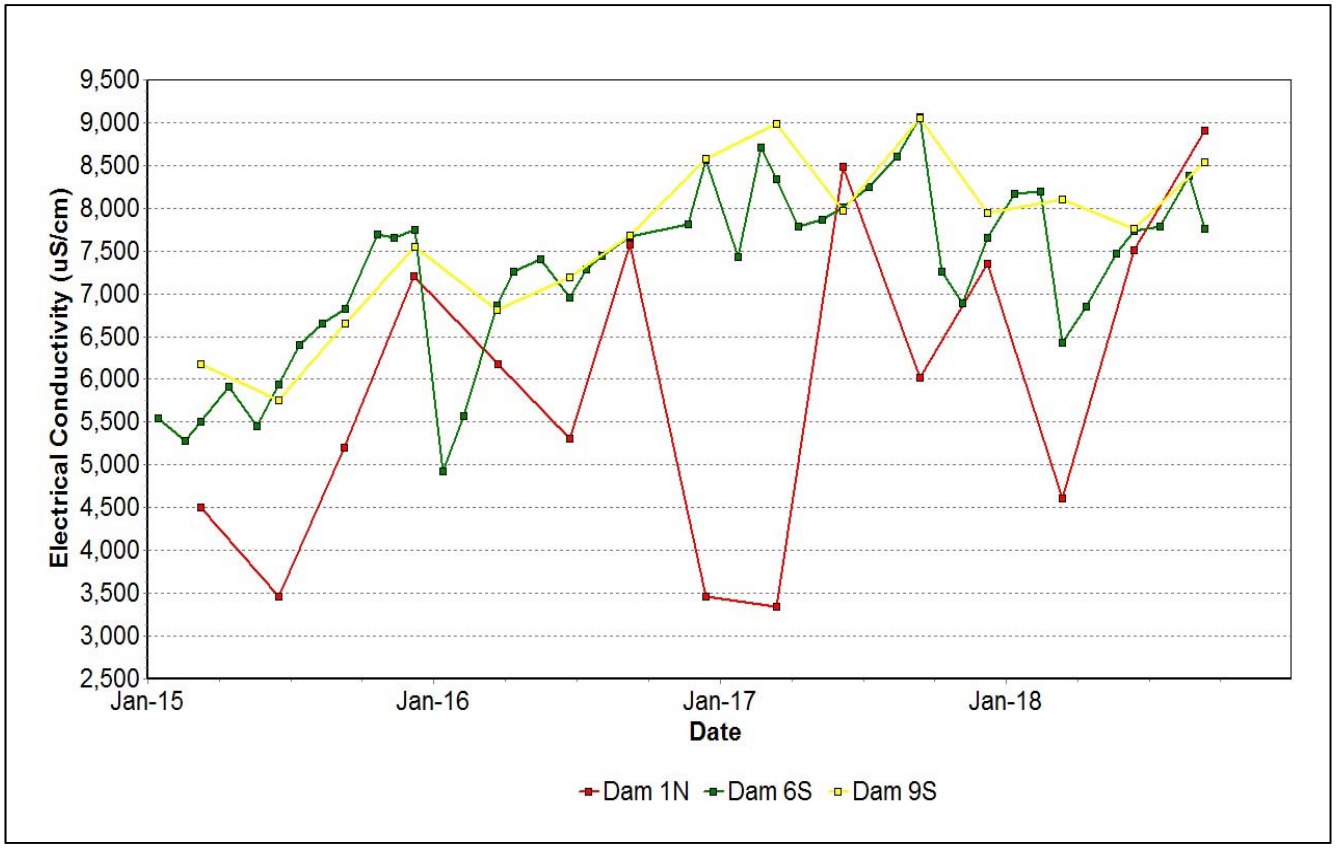



**Figure 9: Site Dams Electrical Conductivity Trend – September 2018**

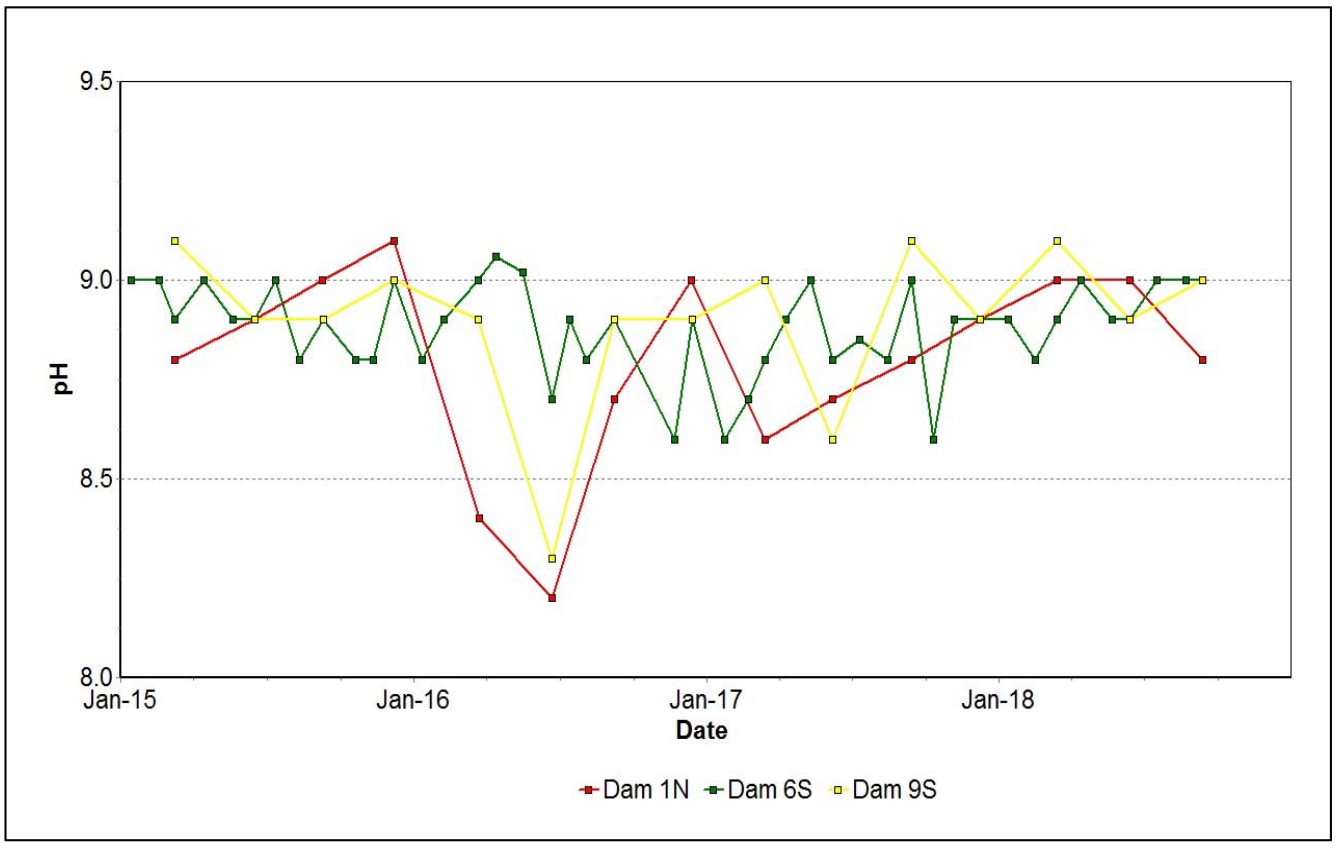



**Figure 10: Site Dams pH Trend – September 2018**

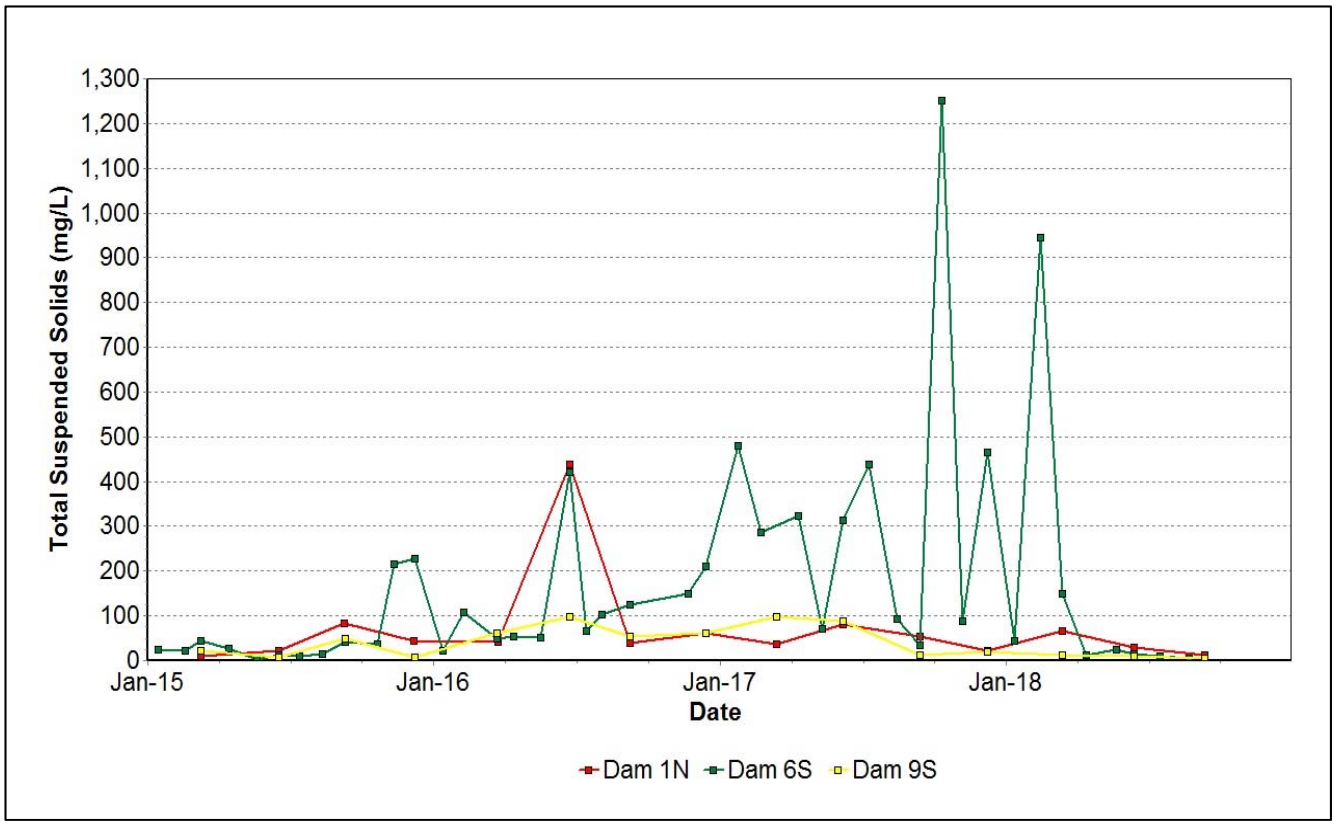
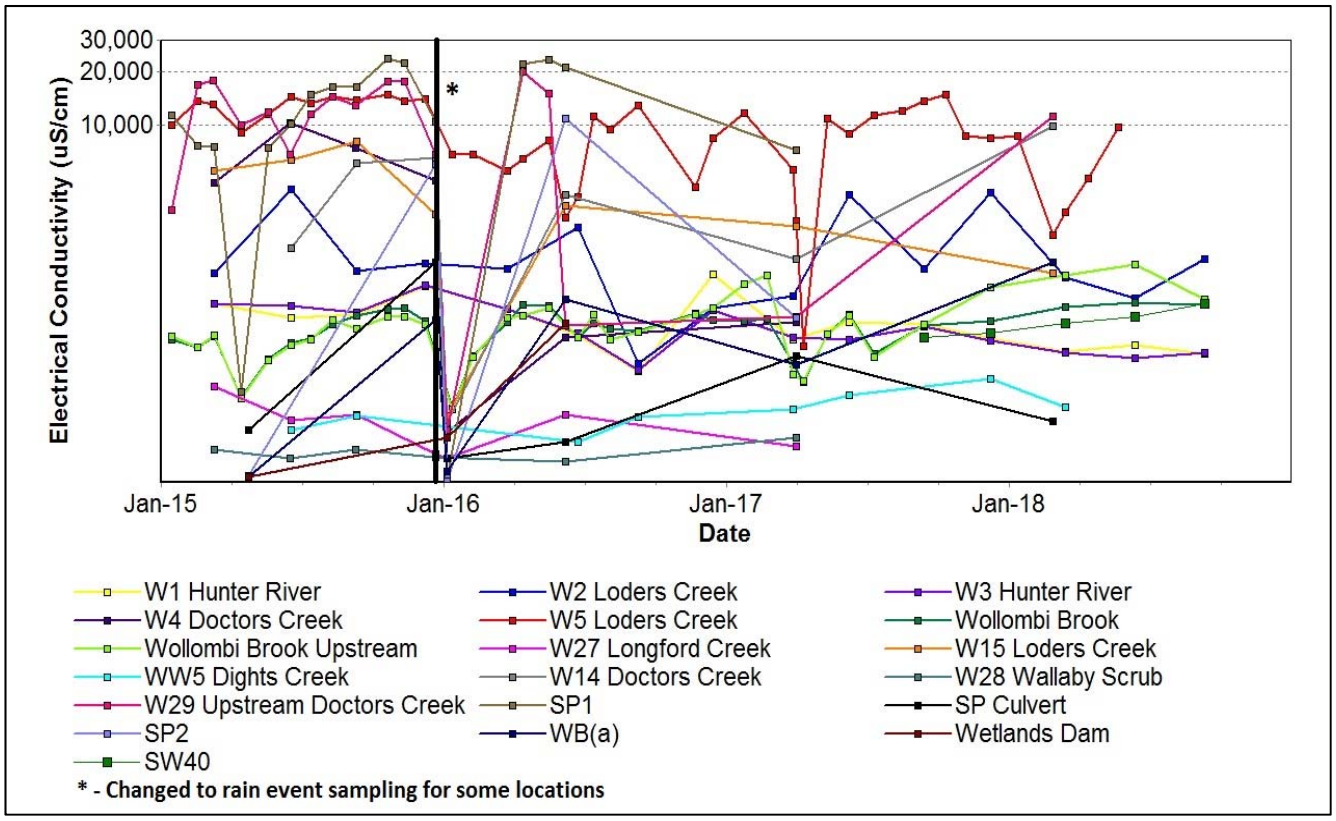
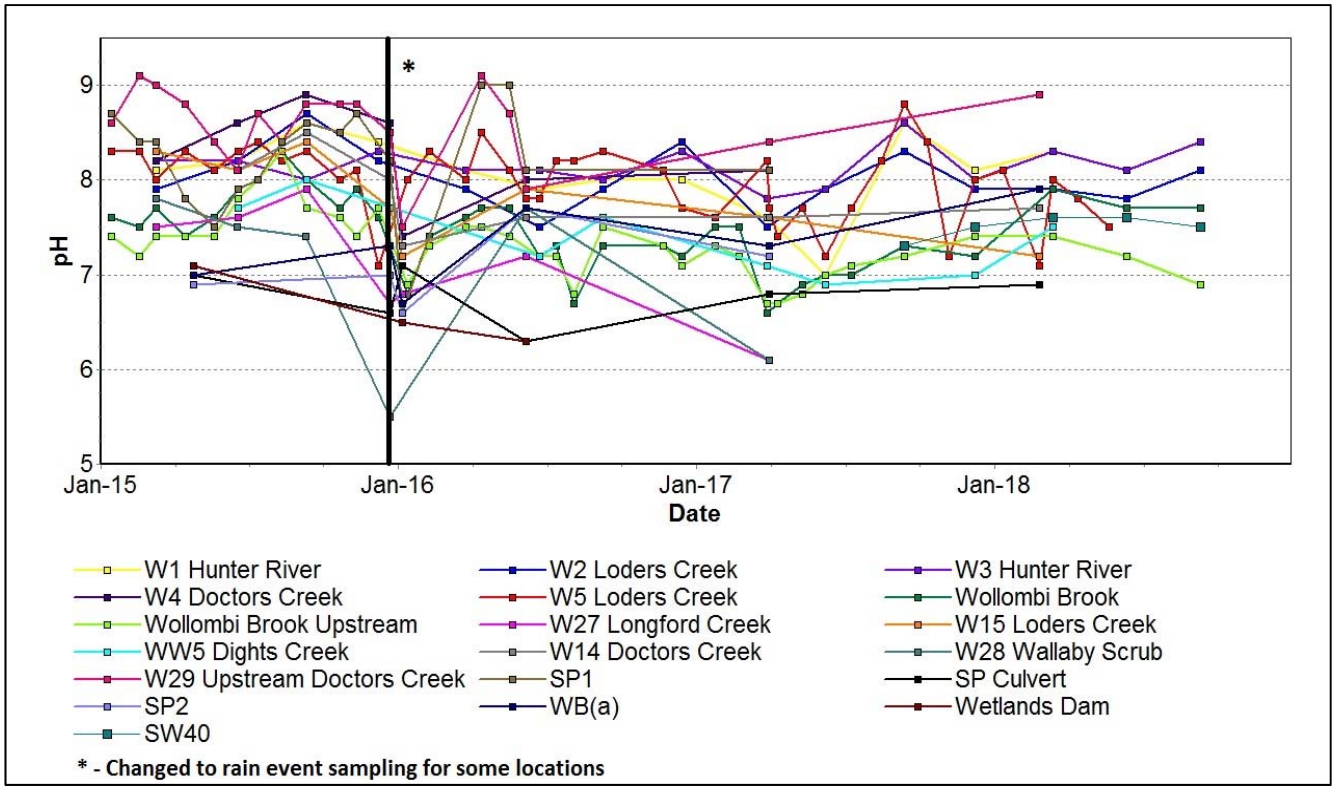



**Figure 11: Site Dams Total Suspended Solids Trend – September 2018**



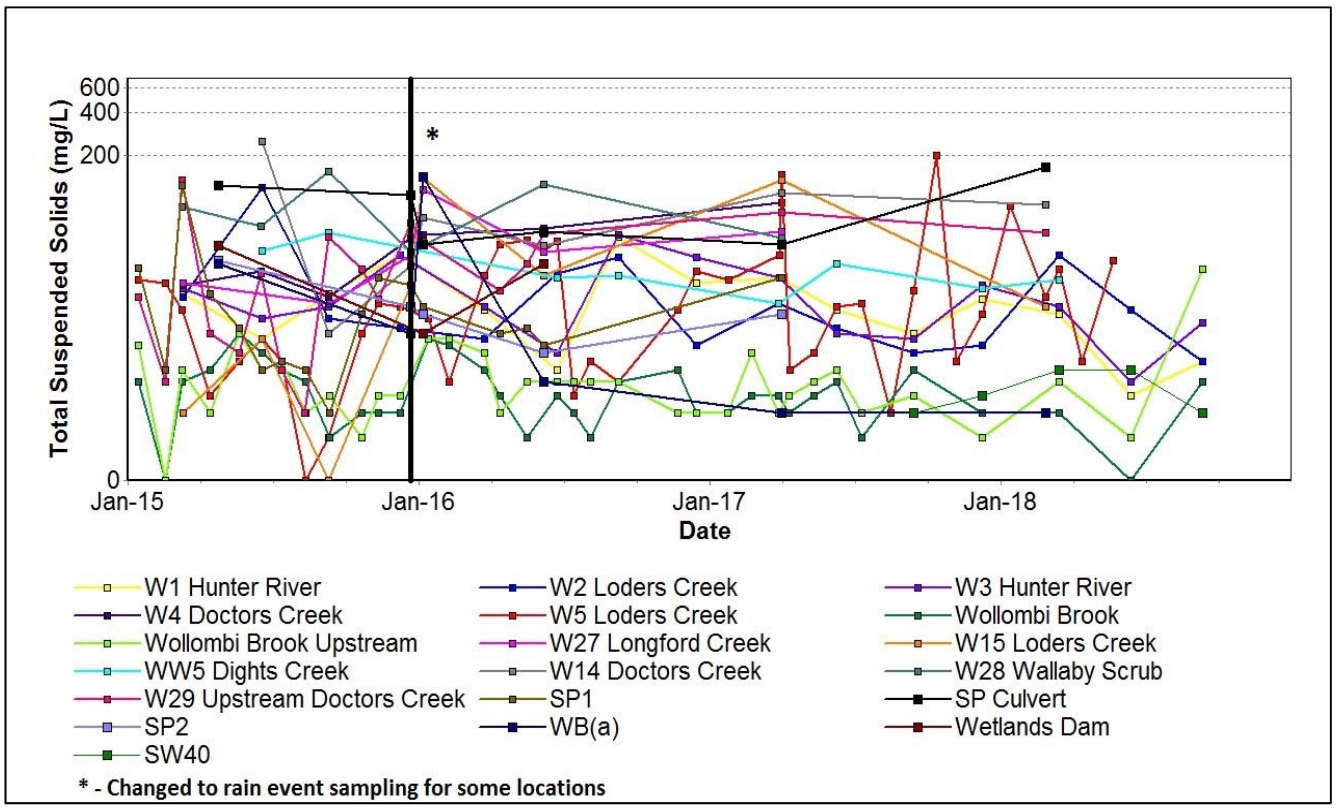

*Note: Missing data indicates that there was insufficient water to take a sample, or that there was no safe access.*

**Figure 12: Watercourse Electrical Conductivity Trend – September 2018**




*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 – September 2018**




*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 – September 2018**

### 3.1.2 Surface Water Trigger Tracking

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

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

**Table 2: Surface Water Trigger Tracking – September YTD 2018**

| Site | Date | Trigger Limit Breached | Action Taken in Response |
|---|---|---|---|
| W14 | 26/02/2018 | EC –95$^{th}$ Percentile | Watching Brief* |
| Wollombi Brook | 14/03/2018 | EC –95$^{th}$ Percentile | Watching Brief* |
| Wollombi Brook | 13/06/2018 | EC –95$^{th}$ Percentile | Watching Brief* |
| Wollombi Brook | 11/09/2018 | EC –95$^{th}$ Percentile | Elevated EC is considered attributable to prolonged dry climatic conditions, and not related to mining related impacts. Continue to watch and monitor. |
| Wollombi Brook Upstream | 14/03/2018 | EC –95$^{th}$ Percentile | Watching Brief* |
| Wollombi Brook Upstream | 13/06/2018 | EC –95$^{th}$ Percentile | Elevated EC is considered attributable to prolonged dry climatic conditions, and not related to mining related impacts. Continue to watch and monitor. |
| SW40 | 11/09/2018 | EC –95$^{th}$ Percentile | Watching Brief* |
| W5 | 14/02/2018 | pH –5$^{th}$ Percentile | Watching Brief* |
| W5 | 22/05/2018 | pH –5$^{th}$ Percentile | Watching Brief* |
| W15 | 26/02/2018 | pH –5$^{th}$ Percentile | Watching Brief* |
| W5 | 12/01/2018 | TSS – 50mg/L (ANZECC criteria) | Field investigation did not identify any mining related sources of sediment. Elevated TSS associated with high intensity rainfall event after prolonged dry period. No further action taken |
| W14 | 26/02/2018 | TSS – 50mg/L (ANZECC criteria) | Field investigation did not identify any mining related sources of sediment. Elevated TSS associated with high intensity rainfall event after prolonged dry period. No further action taken |
| W29 | 26/02/2018 | TSS – 50mg/L (ANZECC criteria) | Field investigation did not identify any mining related sources of sediment. Elevated TSS associated with high intensity rainfall event after prolonged dry period. No further action taken |

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

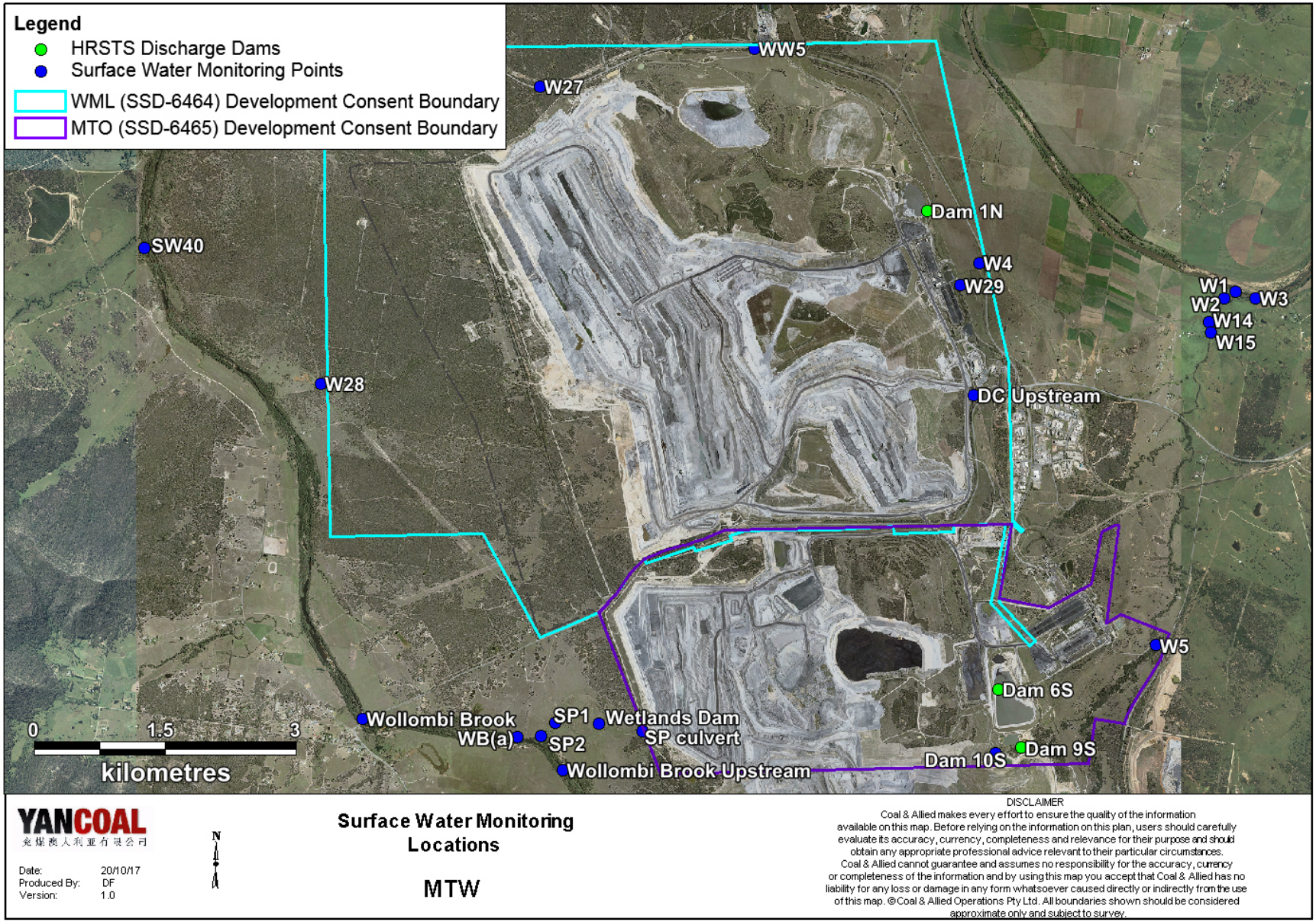



**Figure 15: Surface Water Monitoring Location Plan**

## 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 (2015 – current) for groundwater bores monitored at MTW.

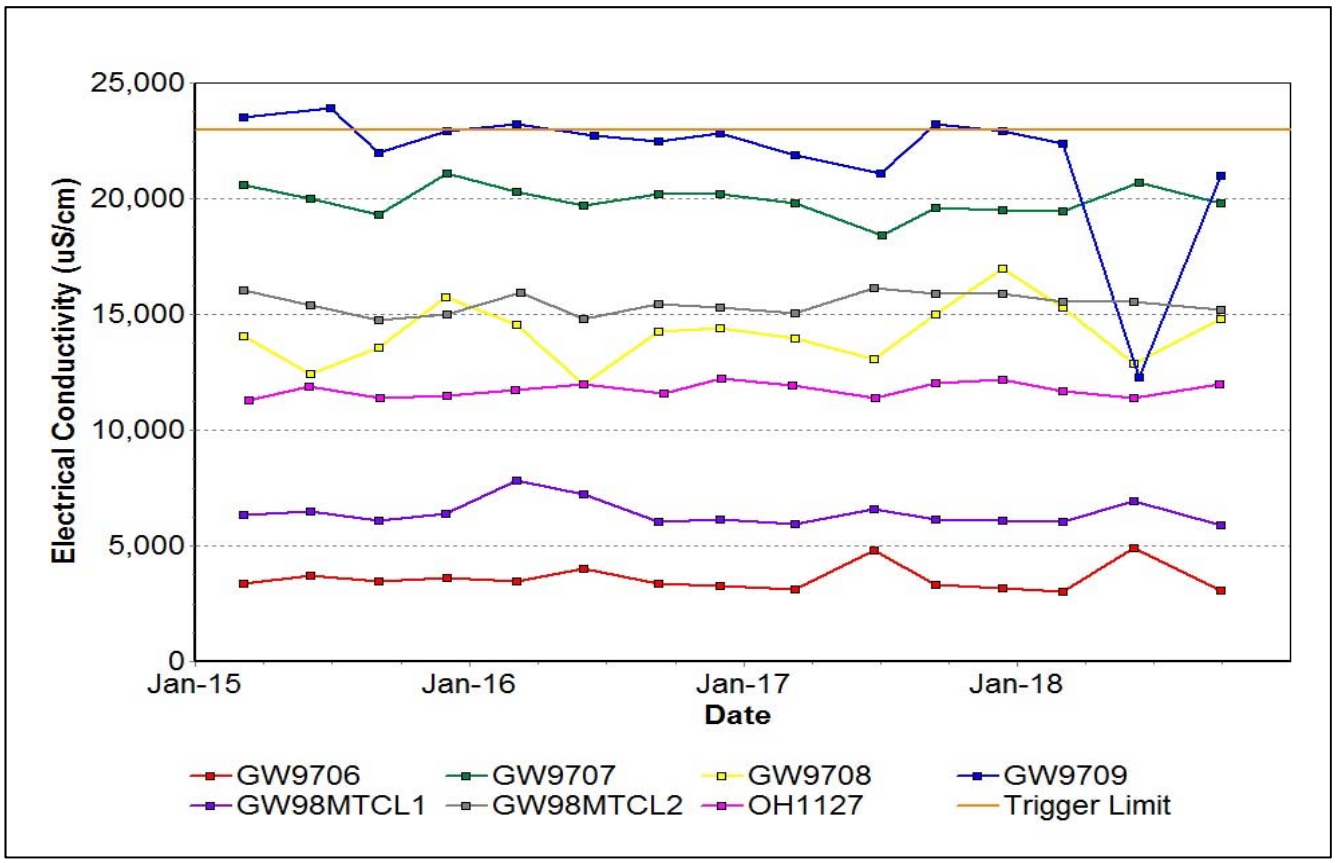



**Figure 16: Bayswater Seam Electrical Conductivity Trend – September 2018**

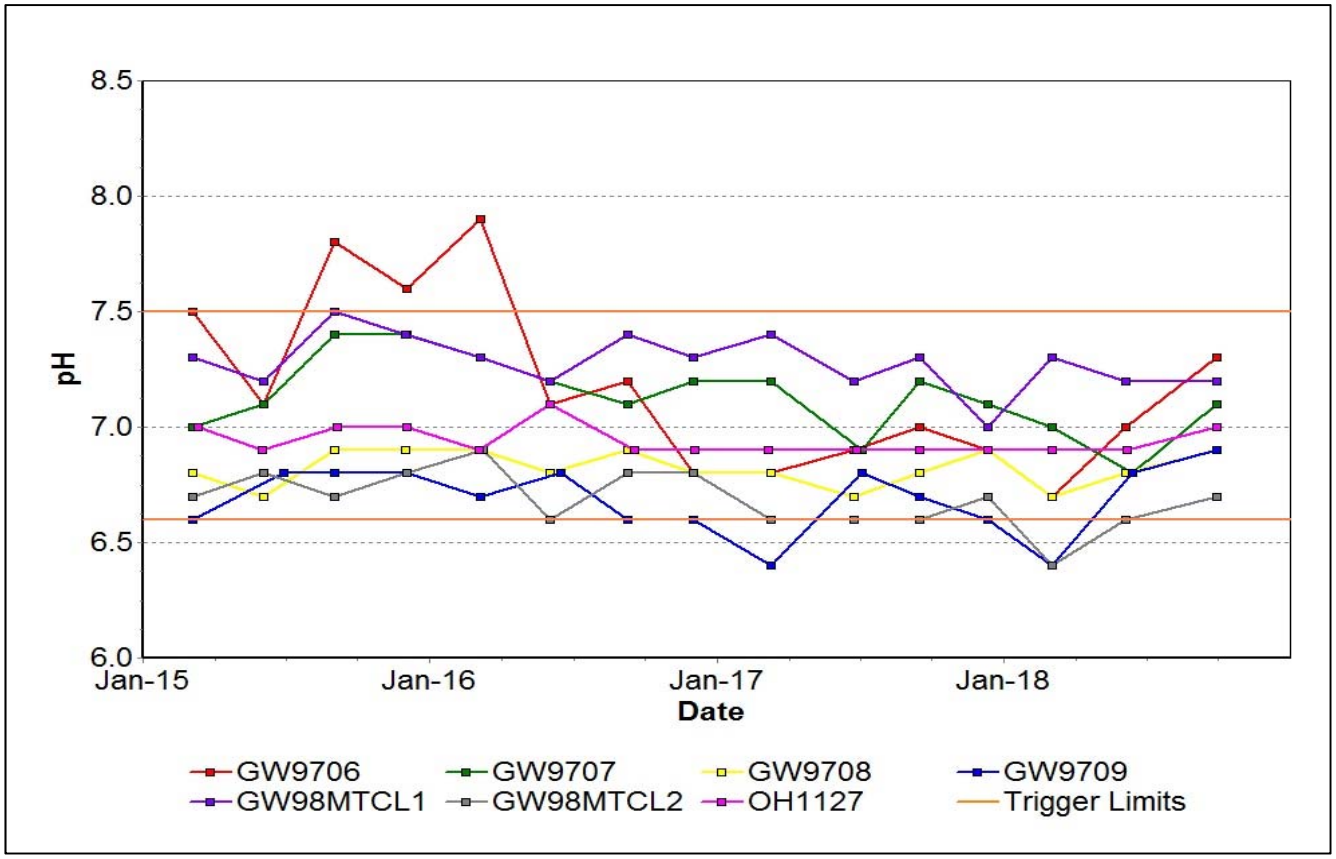



**Figure 17: Bayswater Seam pH Trend – September 2018**

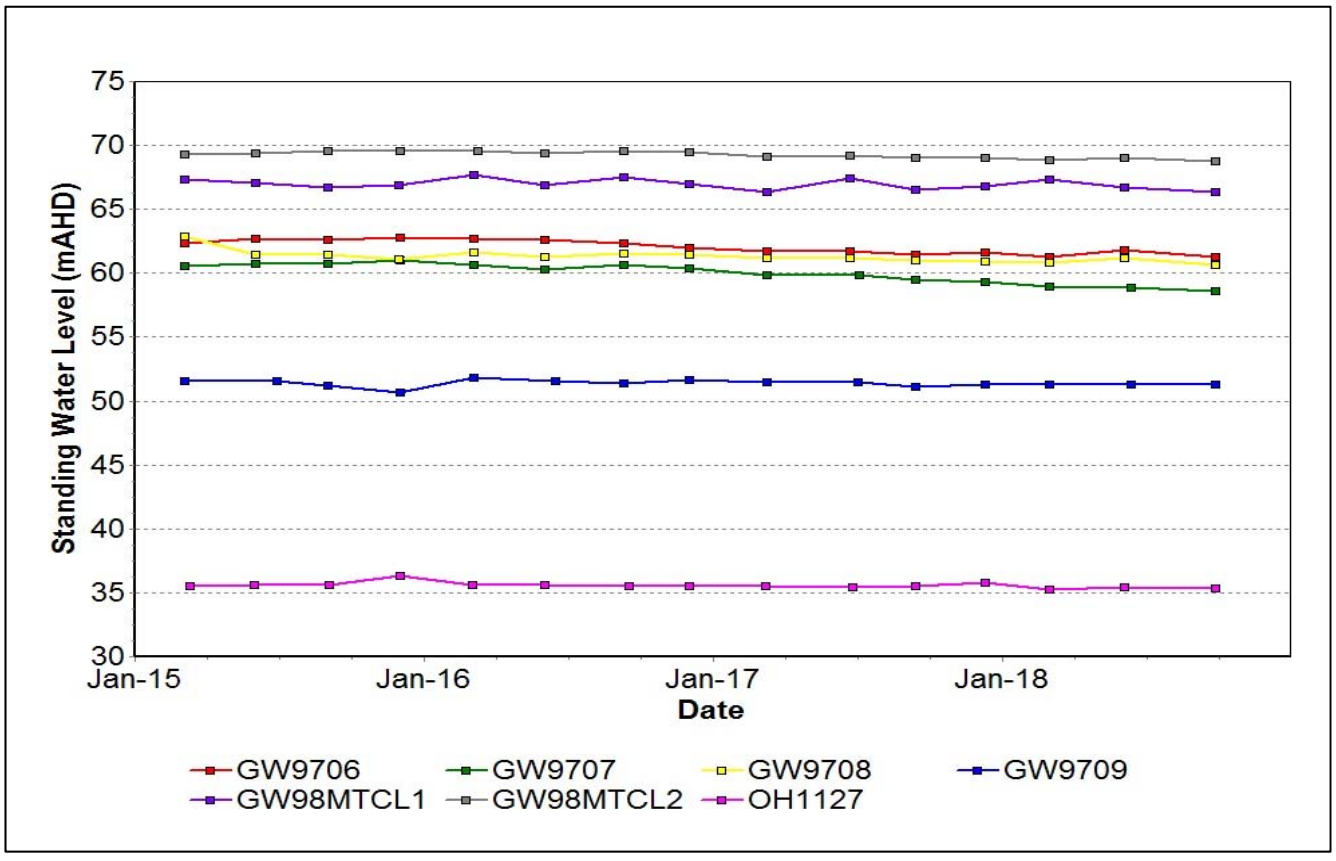



**Figure 18: Bayswater Seam Standing Water Level Trend – September 2018**

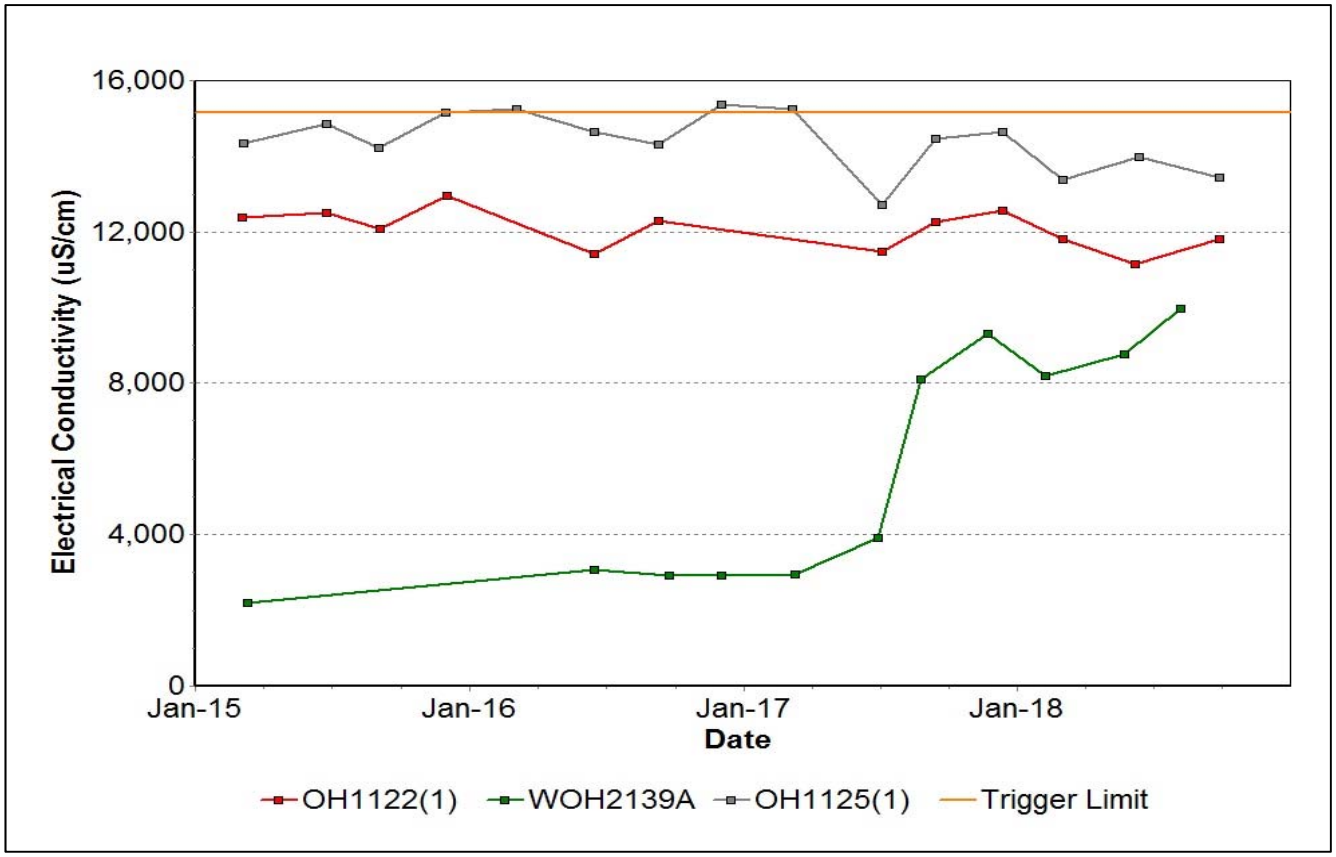



**Figure 19: Blakefield Seam Electrical Conductivity Trend – September 2018**

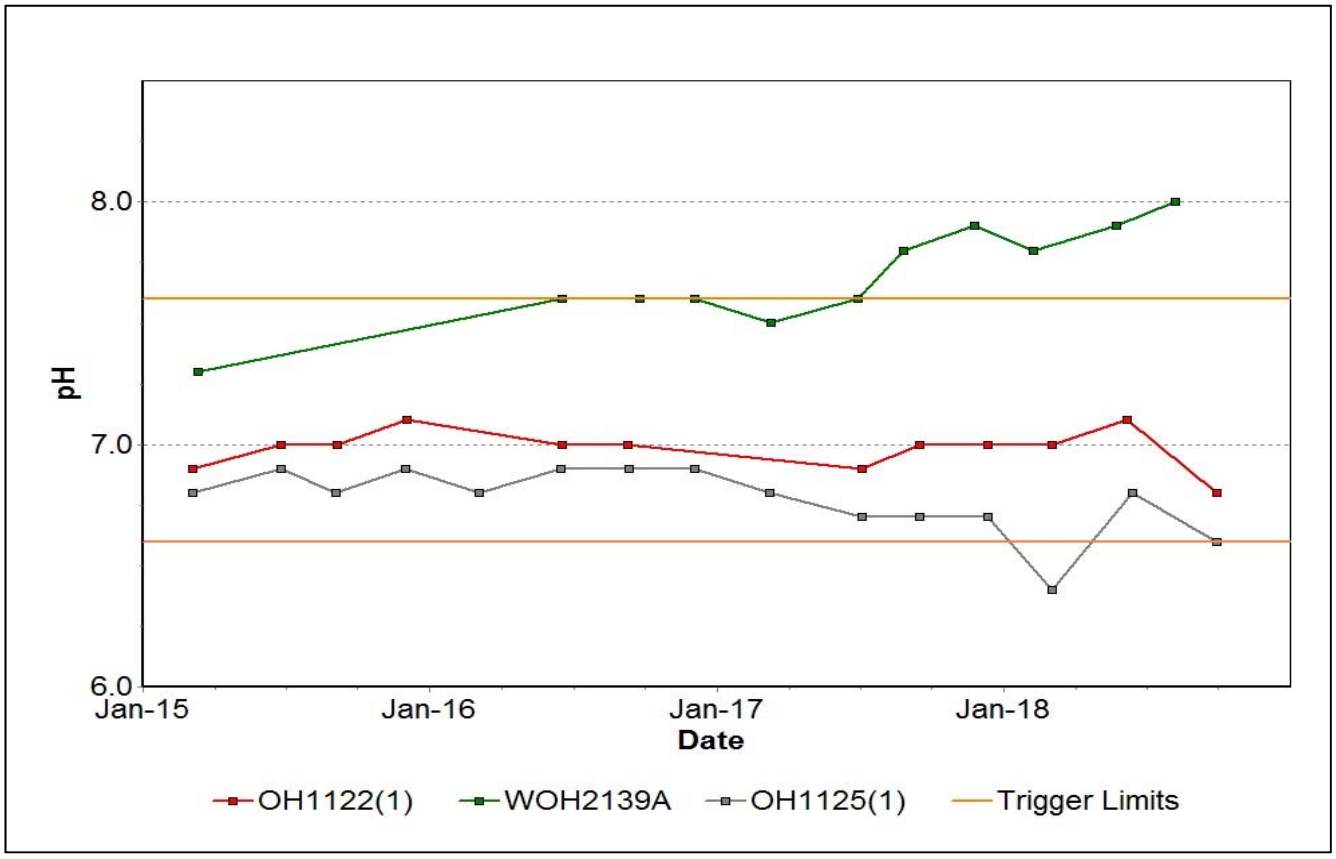



**Figure 20: Blakefield Seam pH Trend – September 2018**

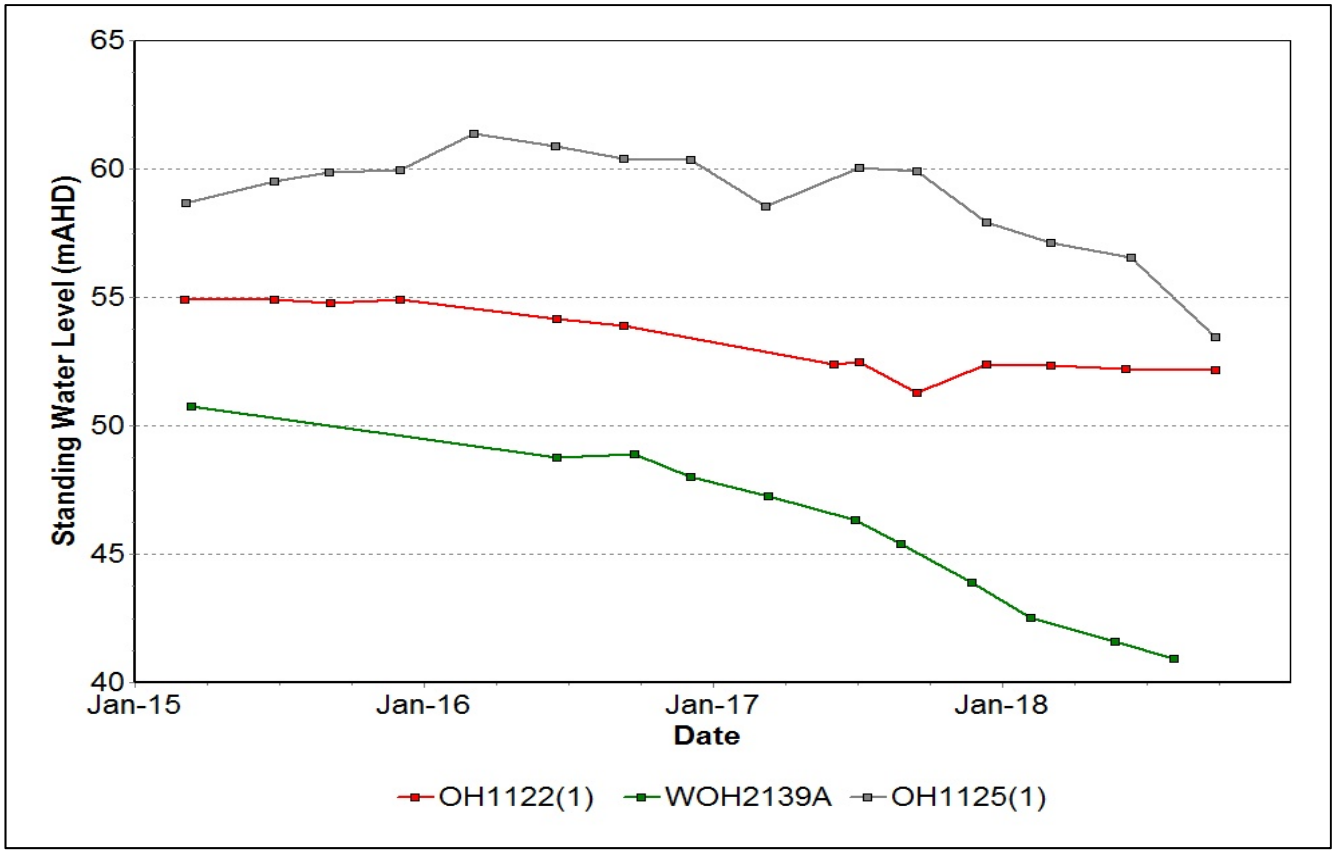



**Figure 21: Blakefield Seam Standing Water Level Trend – September 2018**

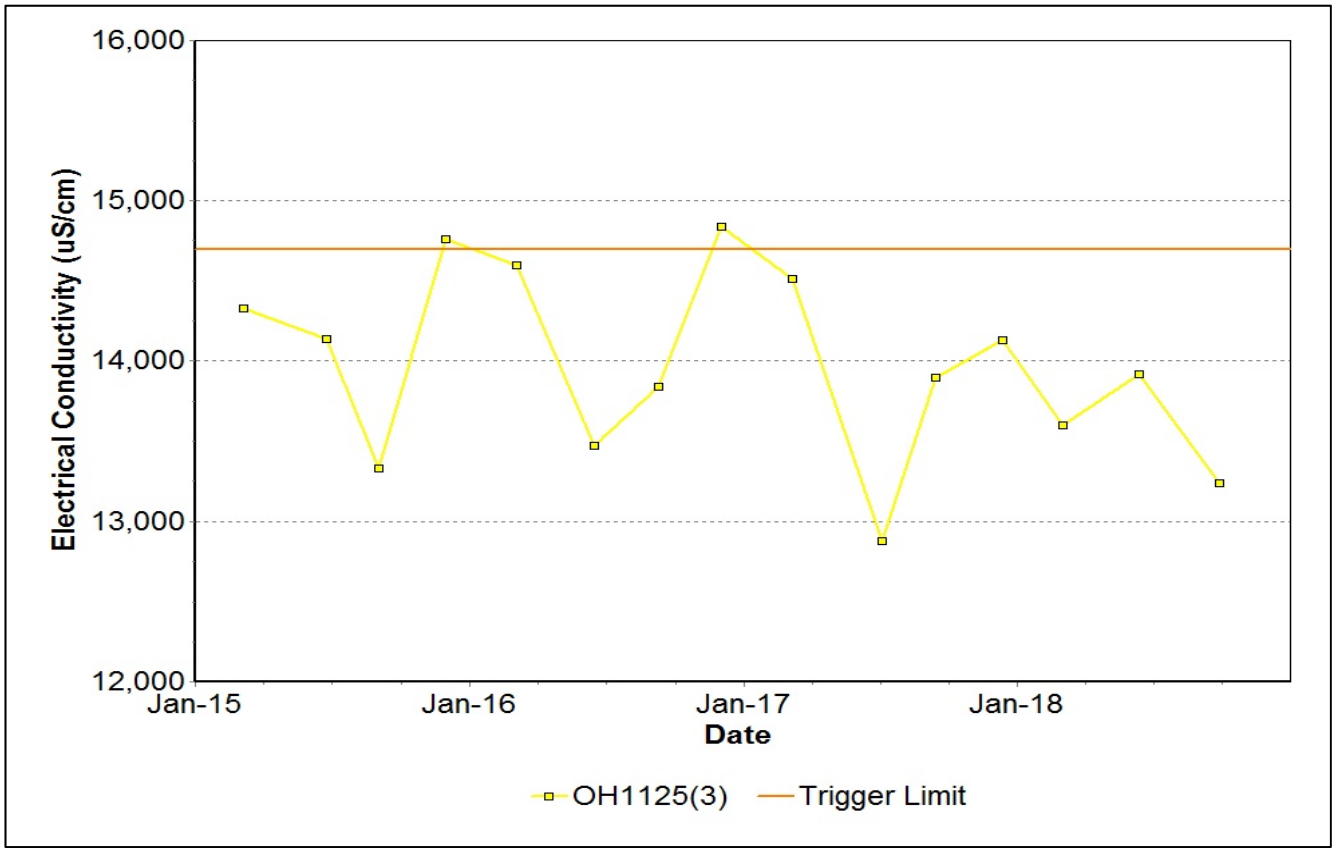



**Figure 22: Bowfield Seam Electrical Conductivity Trend – September 2018**

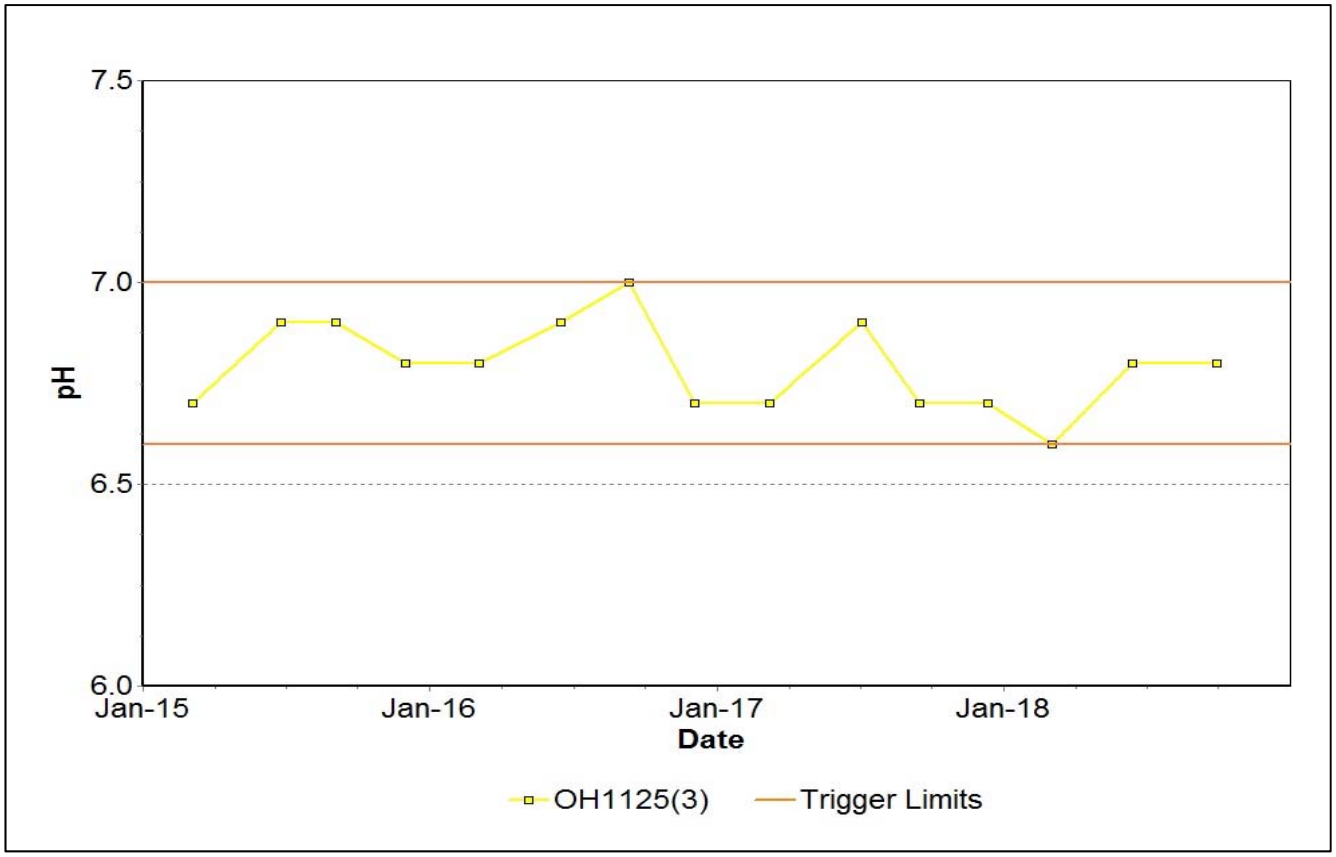



**Figure 23: Bowfield Seam pH Trend – September 2018**

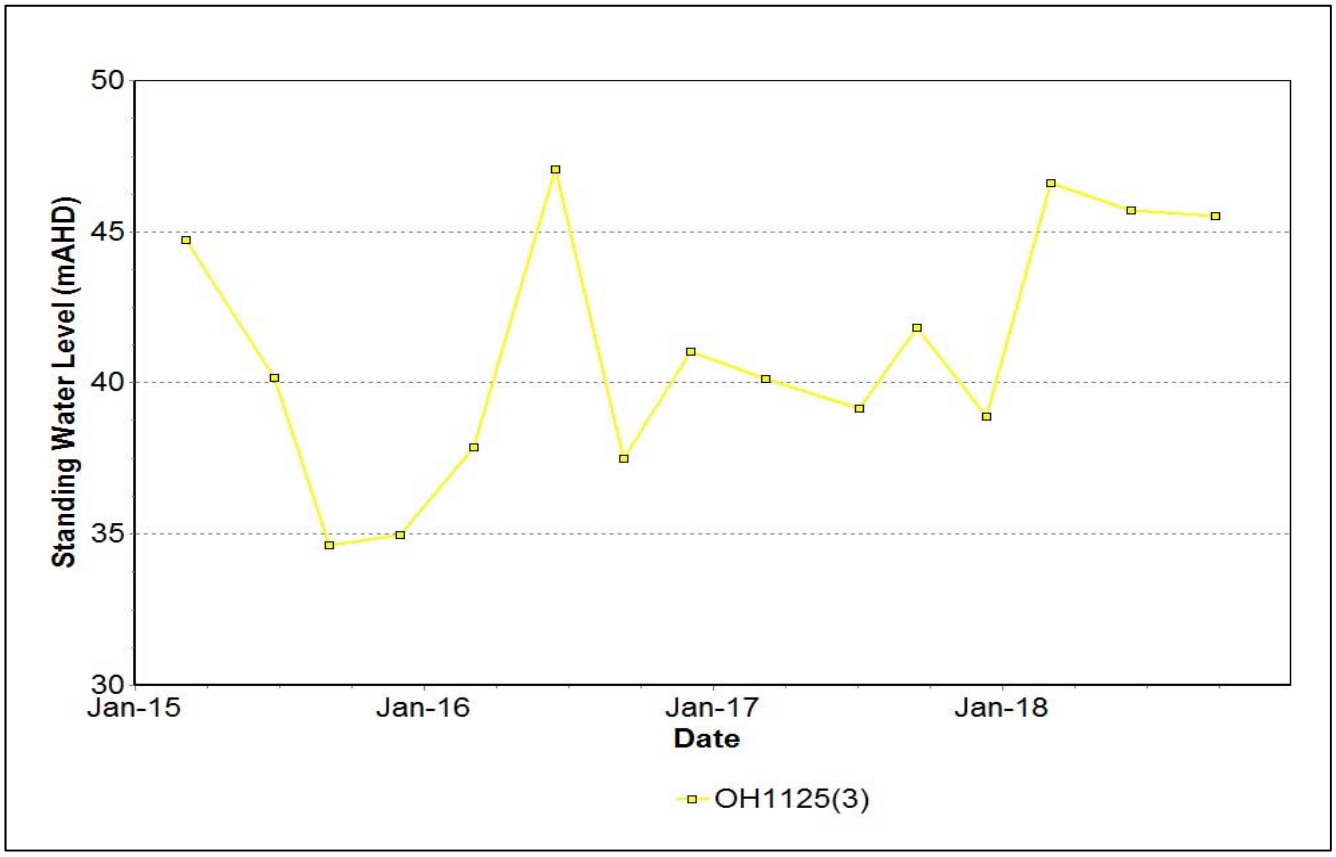



**Figure 24: Bowfield Seam Standing Water Level Trend – September 2018**

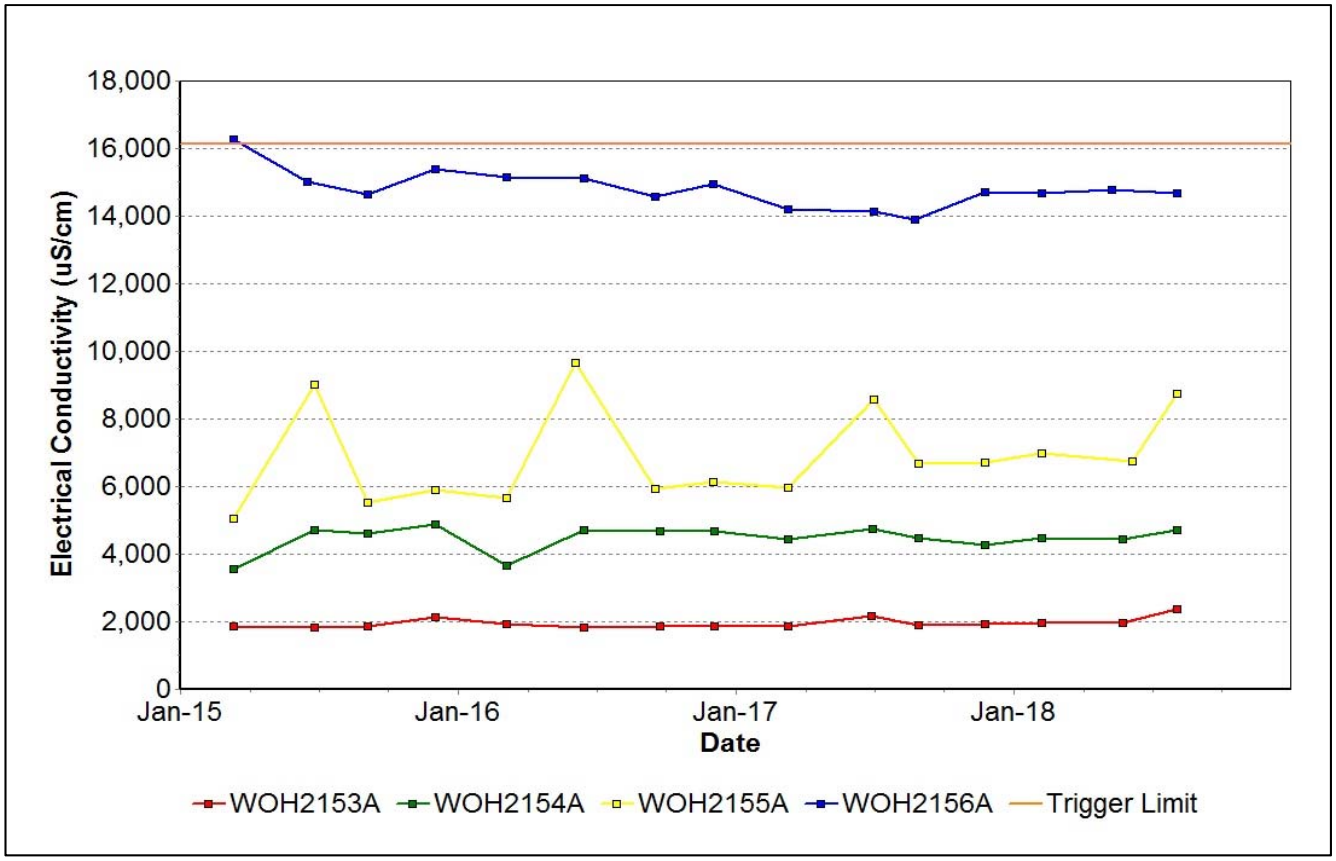



**Figure 25: Redbank Seam Electrical Conductivity Trend – September 2018**

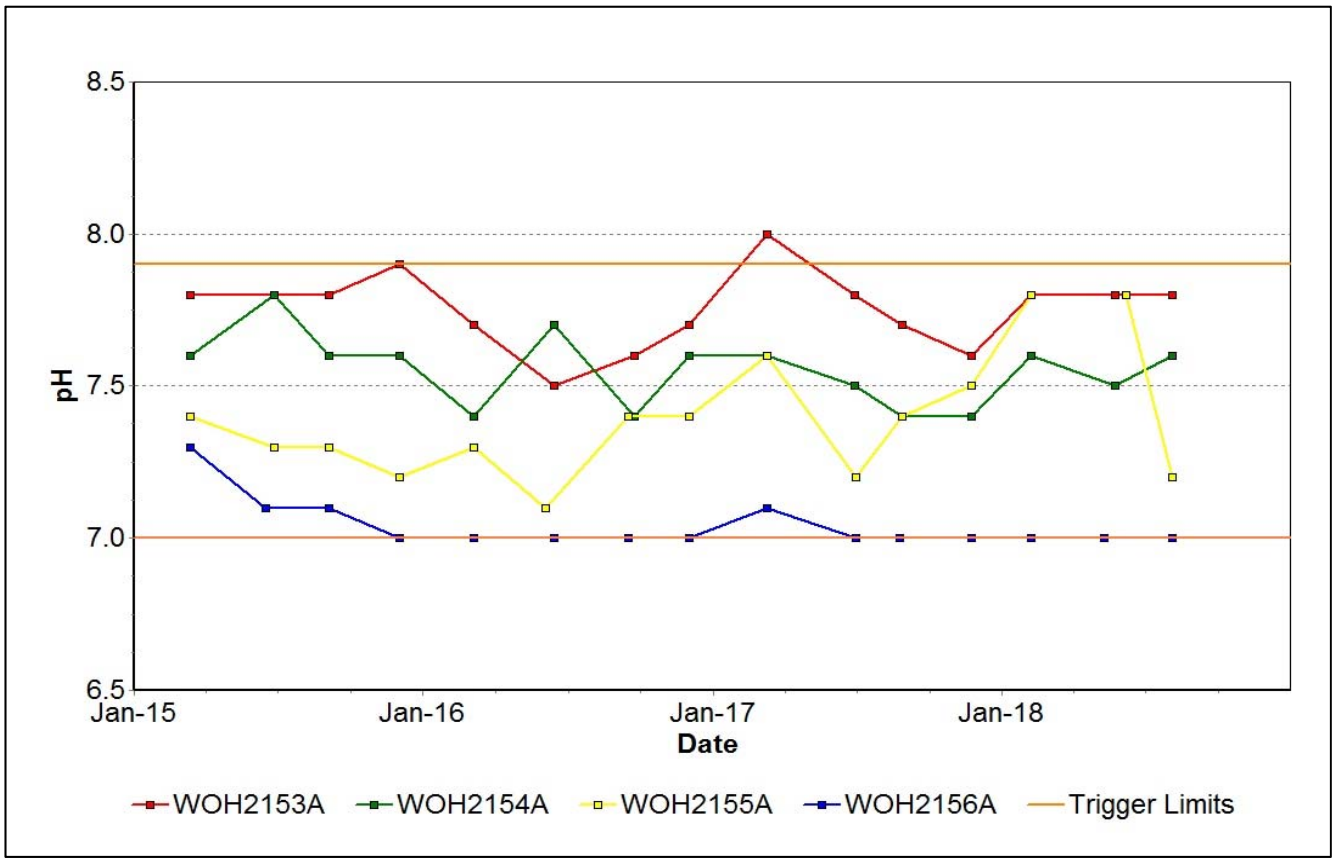



**Figure 26: Redbank Seam pH Trend – September 2018**

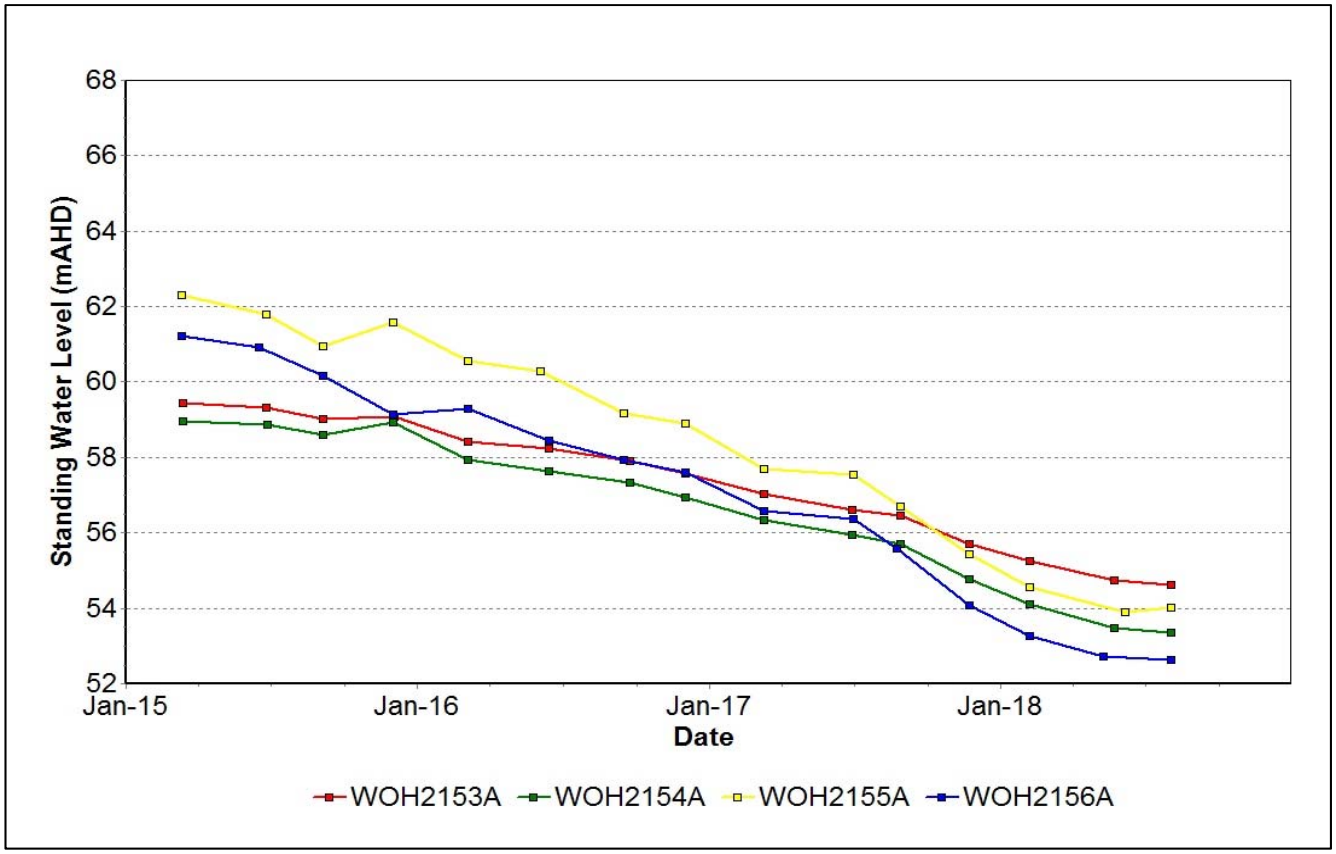



**Figure 27: Redbank Seam Standing Water Level Trend – September 2018**

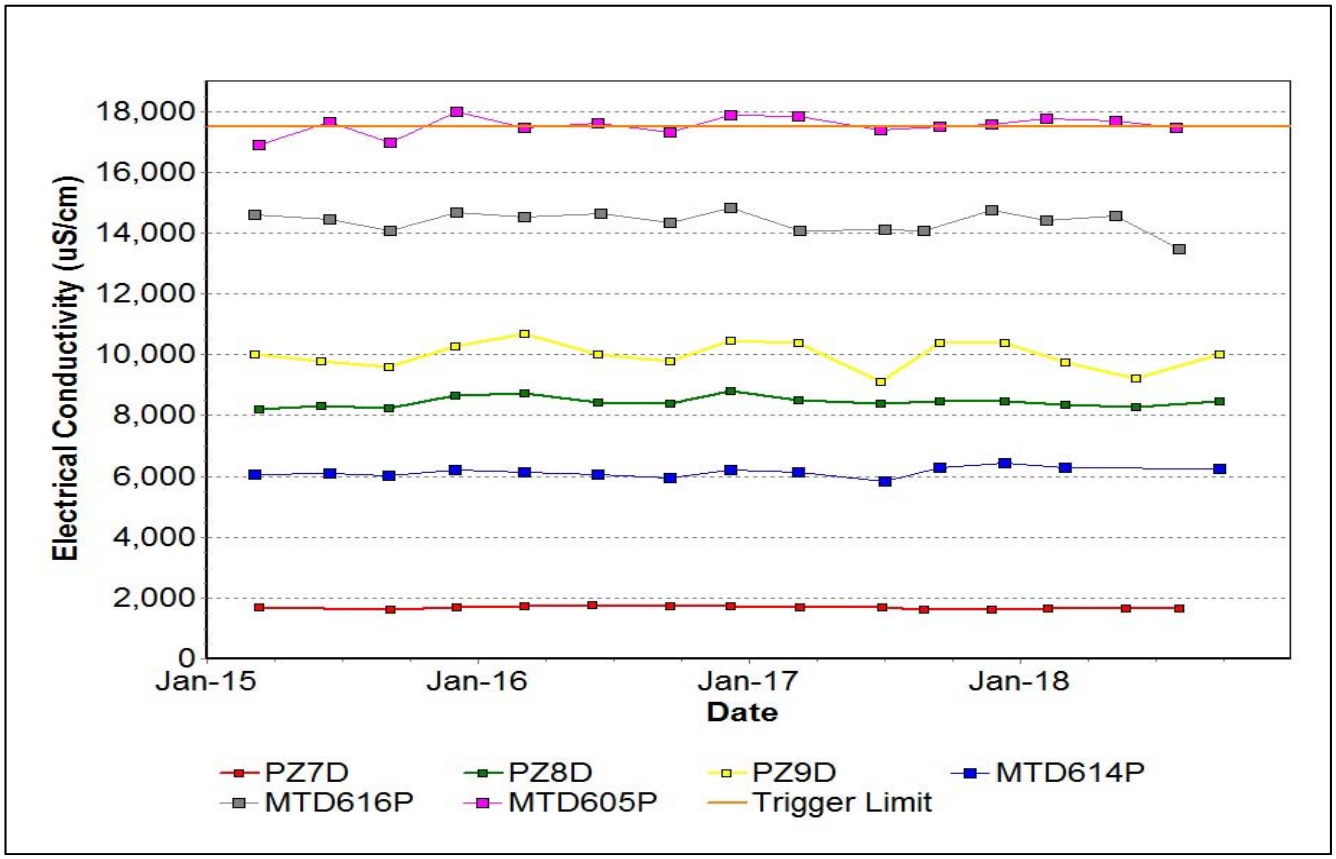



**Figure 28: Shallow Overburden Seam Electrical Conductivity Trend – September 2018**

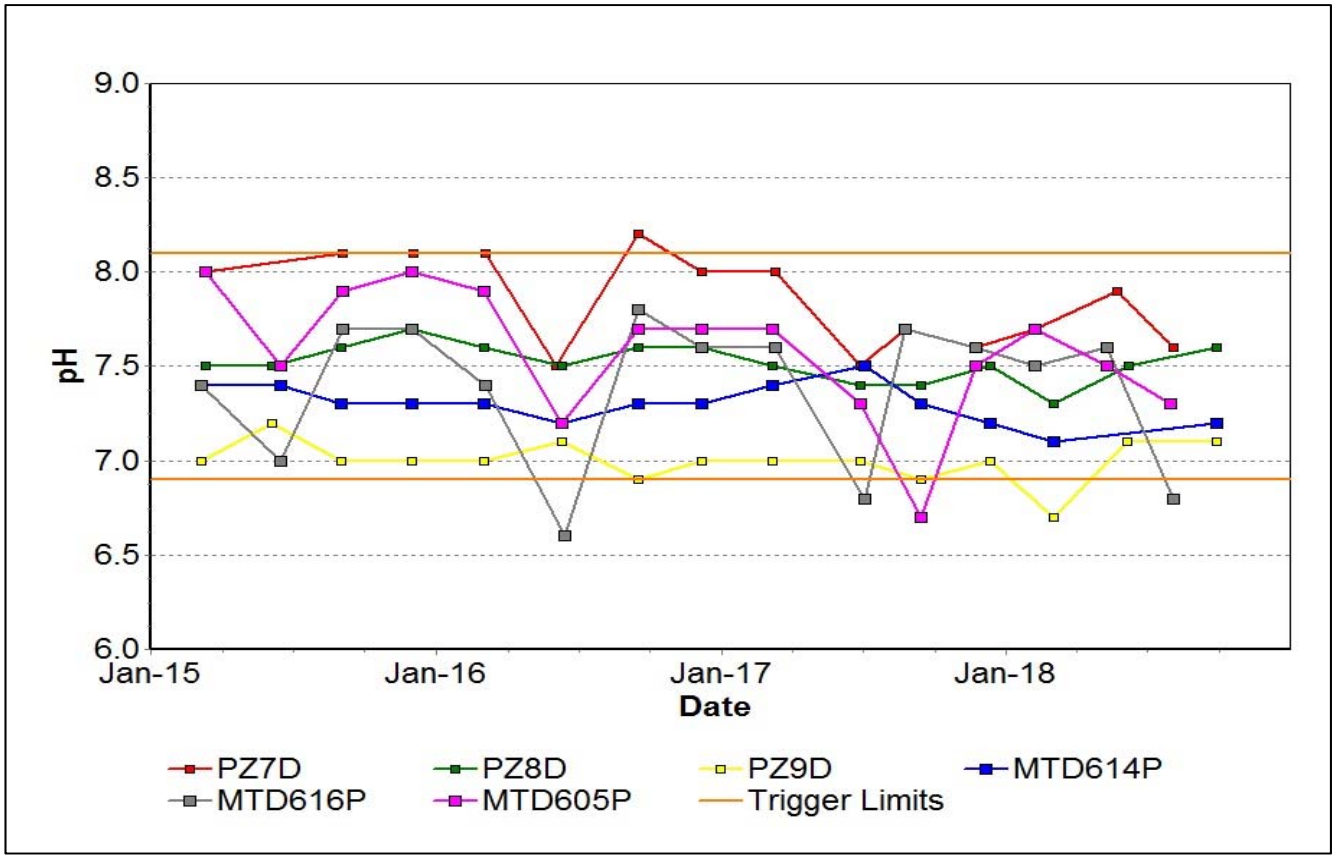



**Figure 29: Shallow Overburden Seam pH Trend – September 2018**

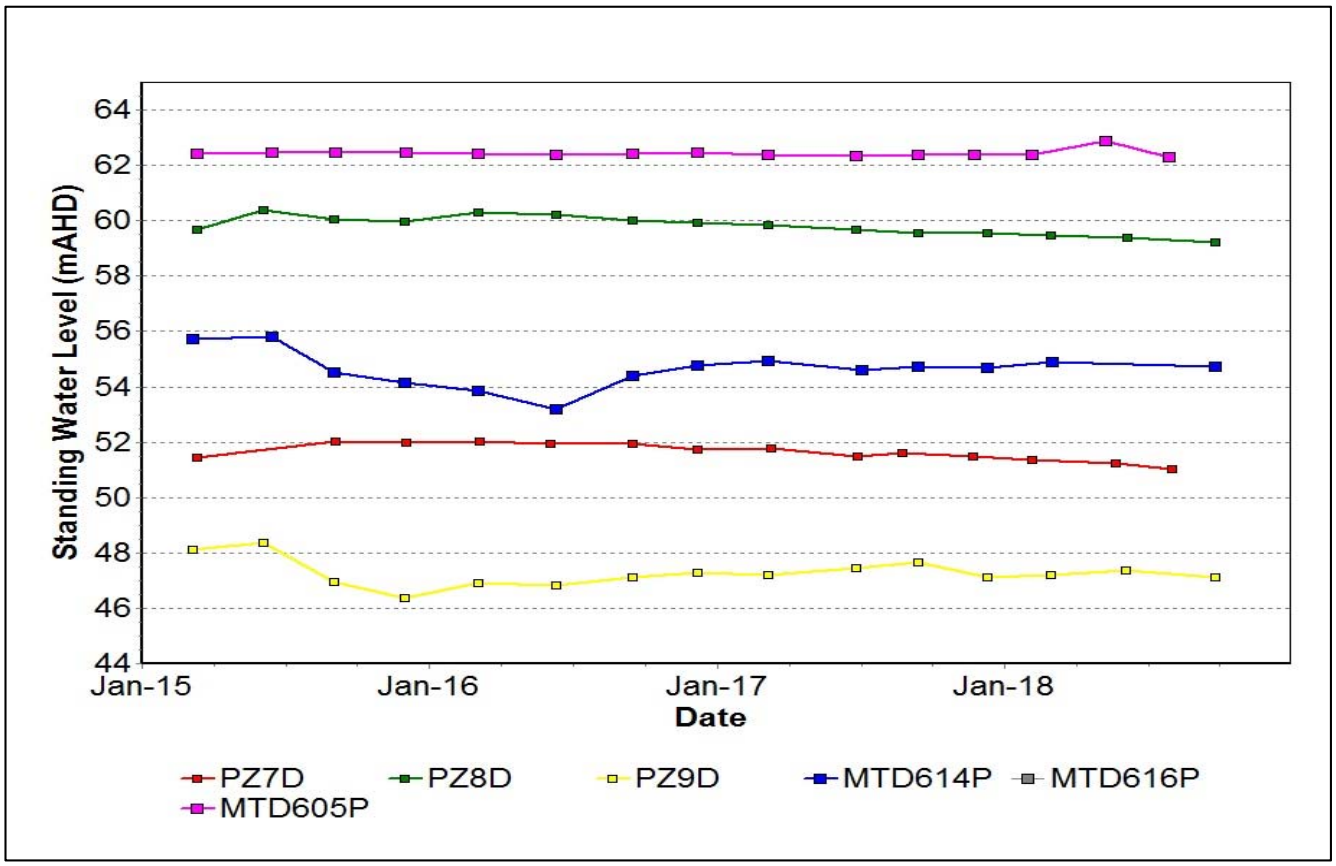



**Figure 30: Shallow Overburden Seam Standing Water Level Trend – September 2018**

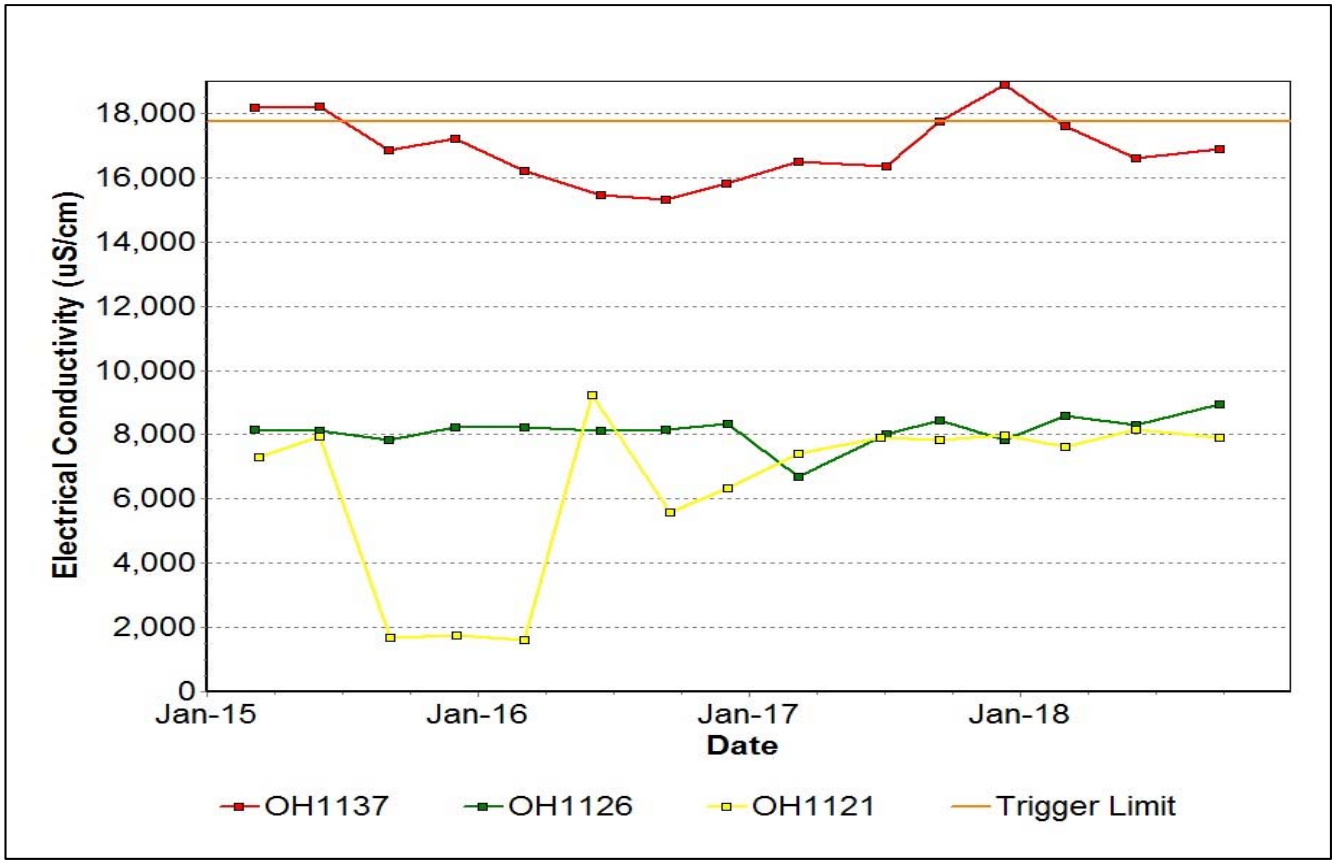



**Figure 31: Vaux Seam Electrical Conductivity Trend – September 2018**

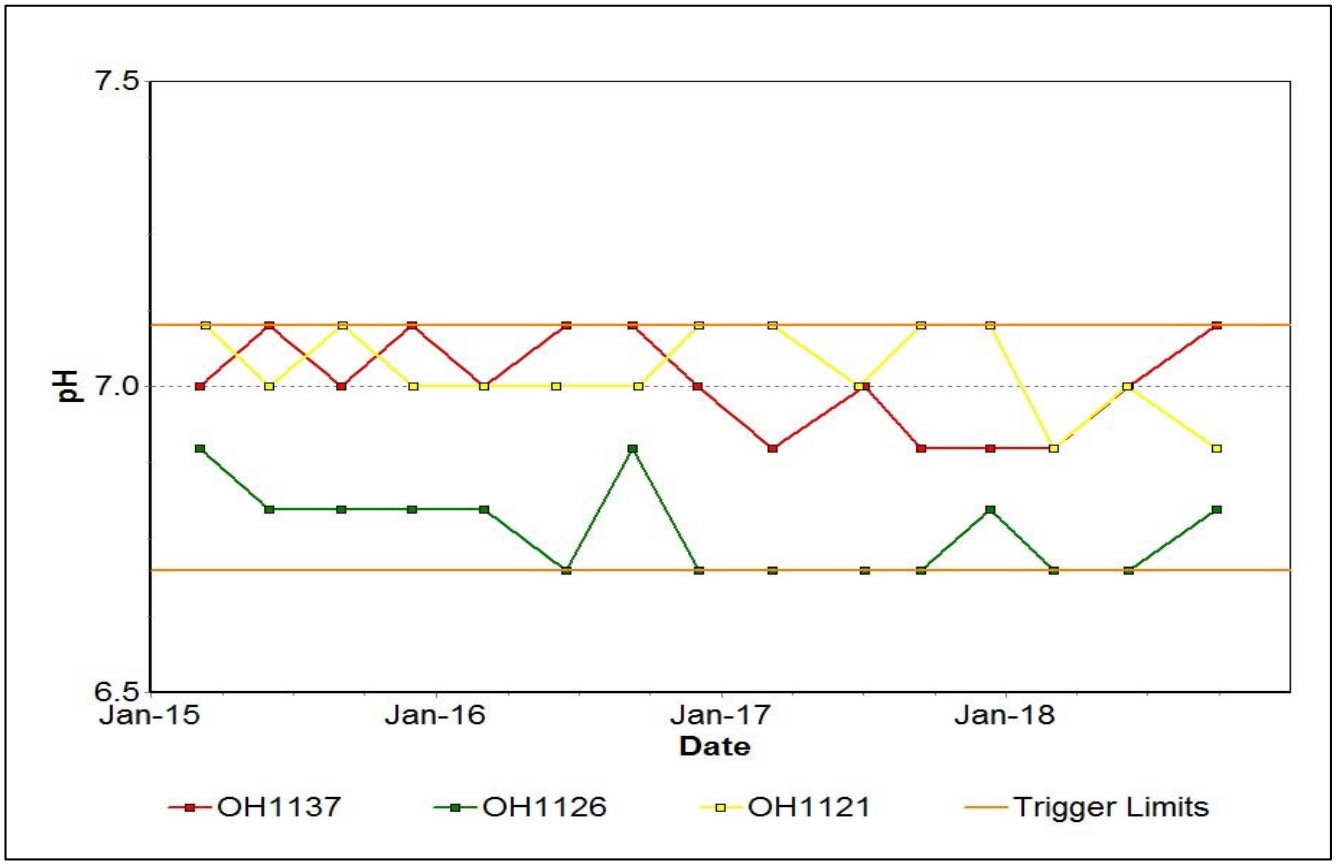



**Figure 32: Vaux Seam pH Trend – September 2018**

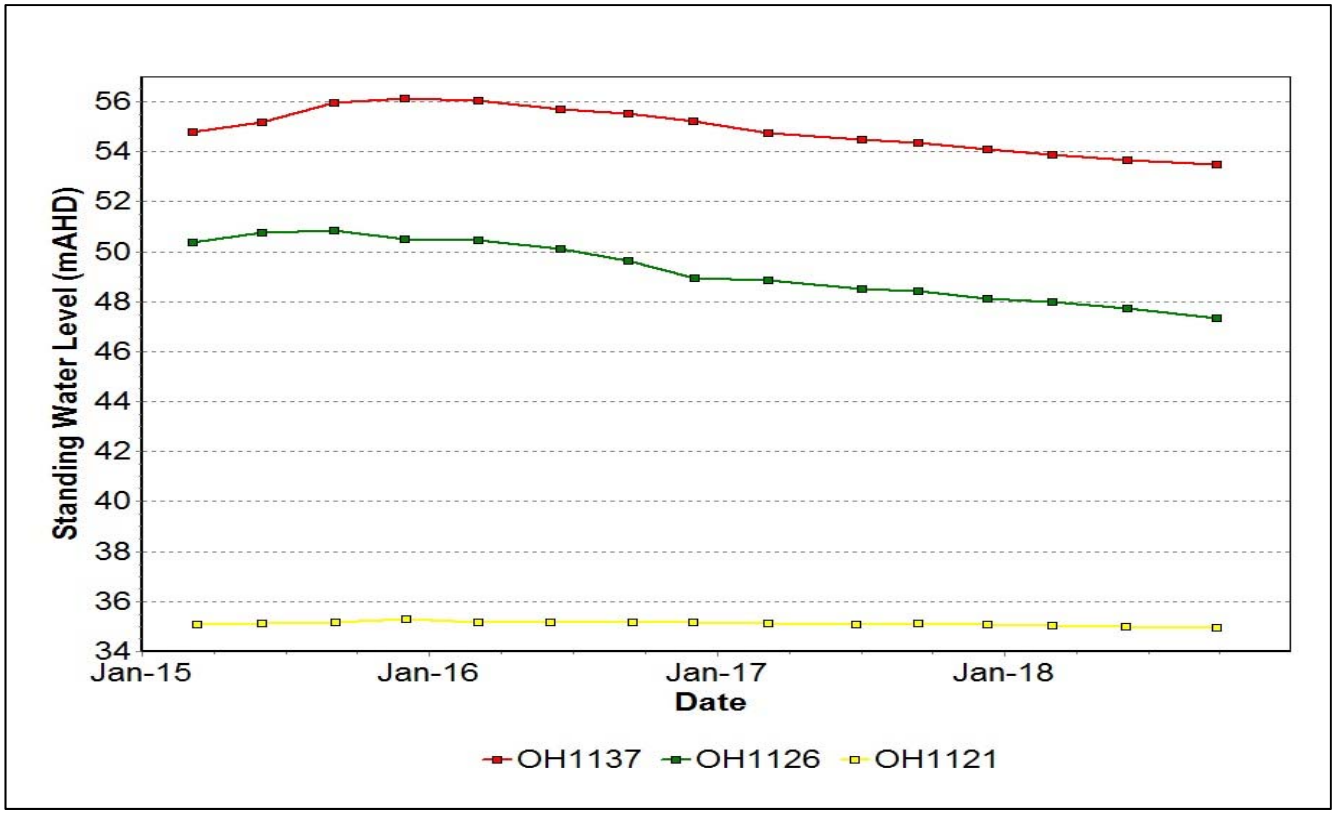
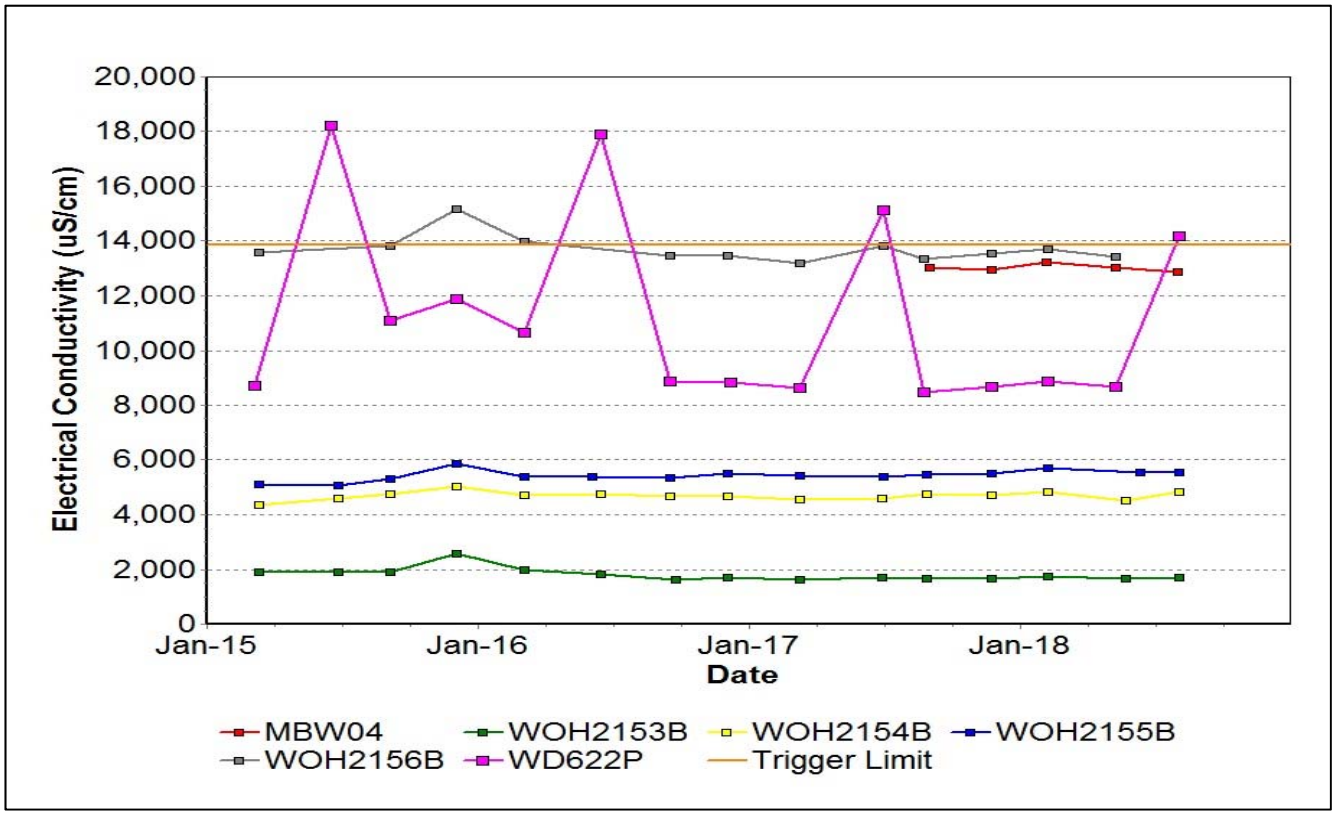
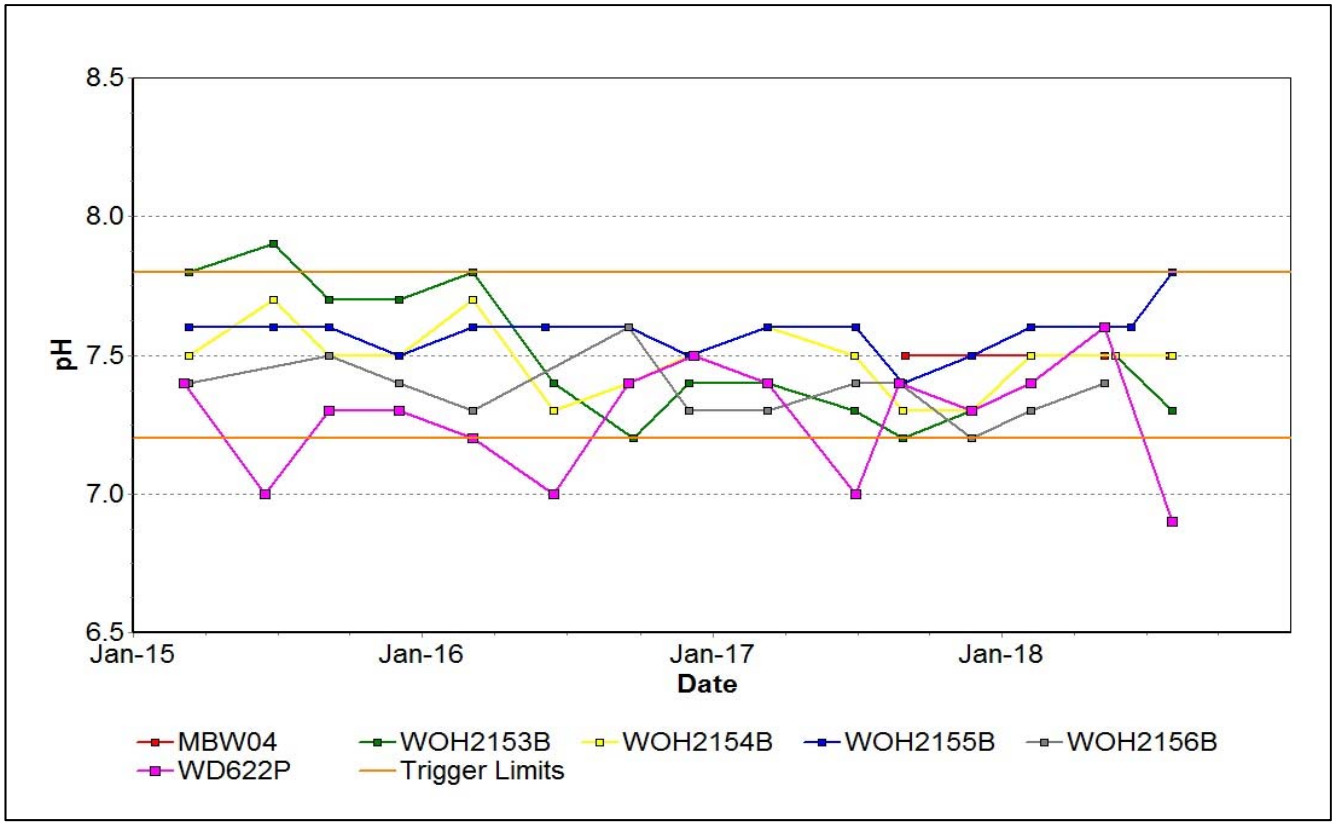



**Figure 33: Vaux Seam Standing Water Level Trend – September 2018**




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

**Figure 34: Wambo Seam Electrical Conductivity Trend – September 2018**




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

**Figure 35: Wambo Seam pH Trend – September 2018**

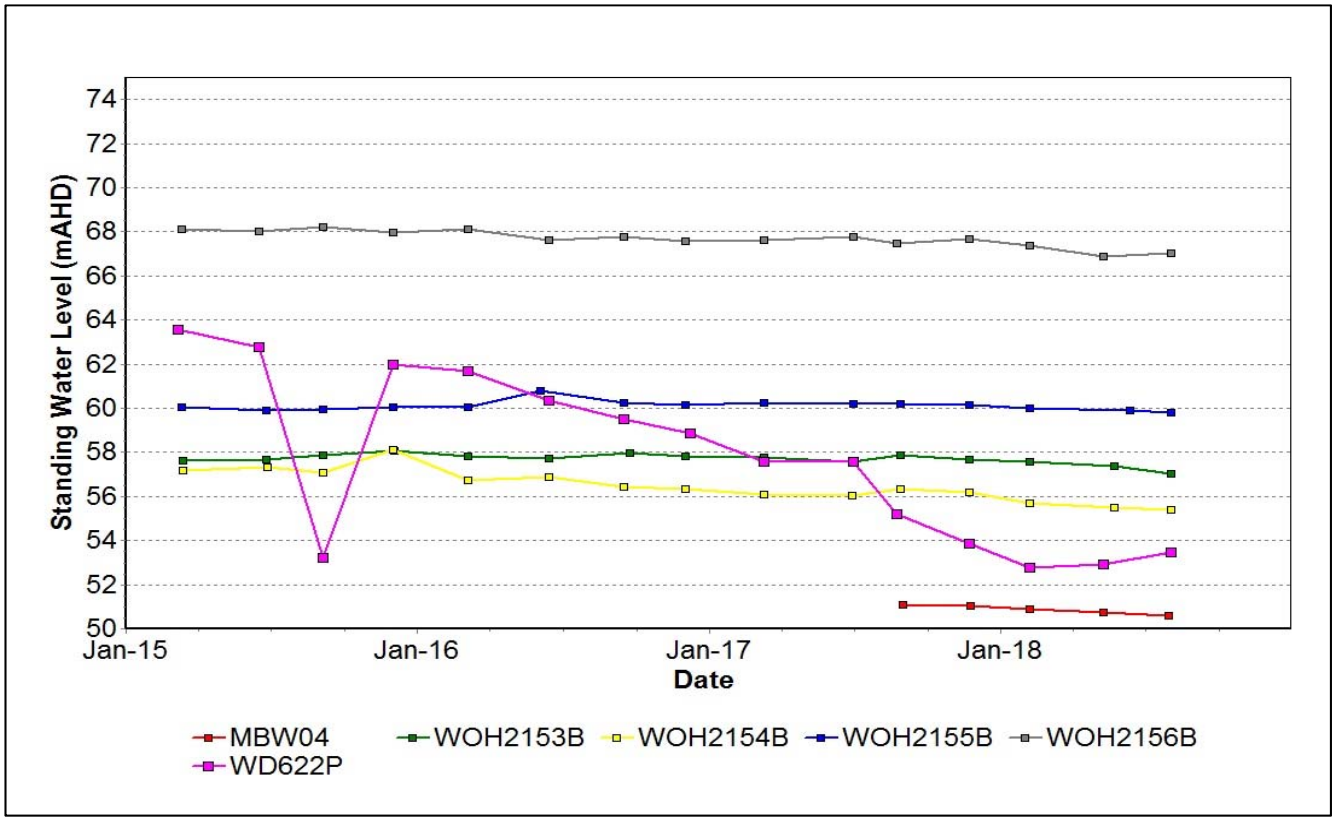



**Figure 36: Wambo Seam Standing Water Level Trend – September 2018**

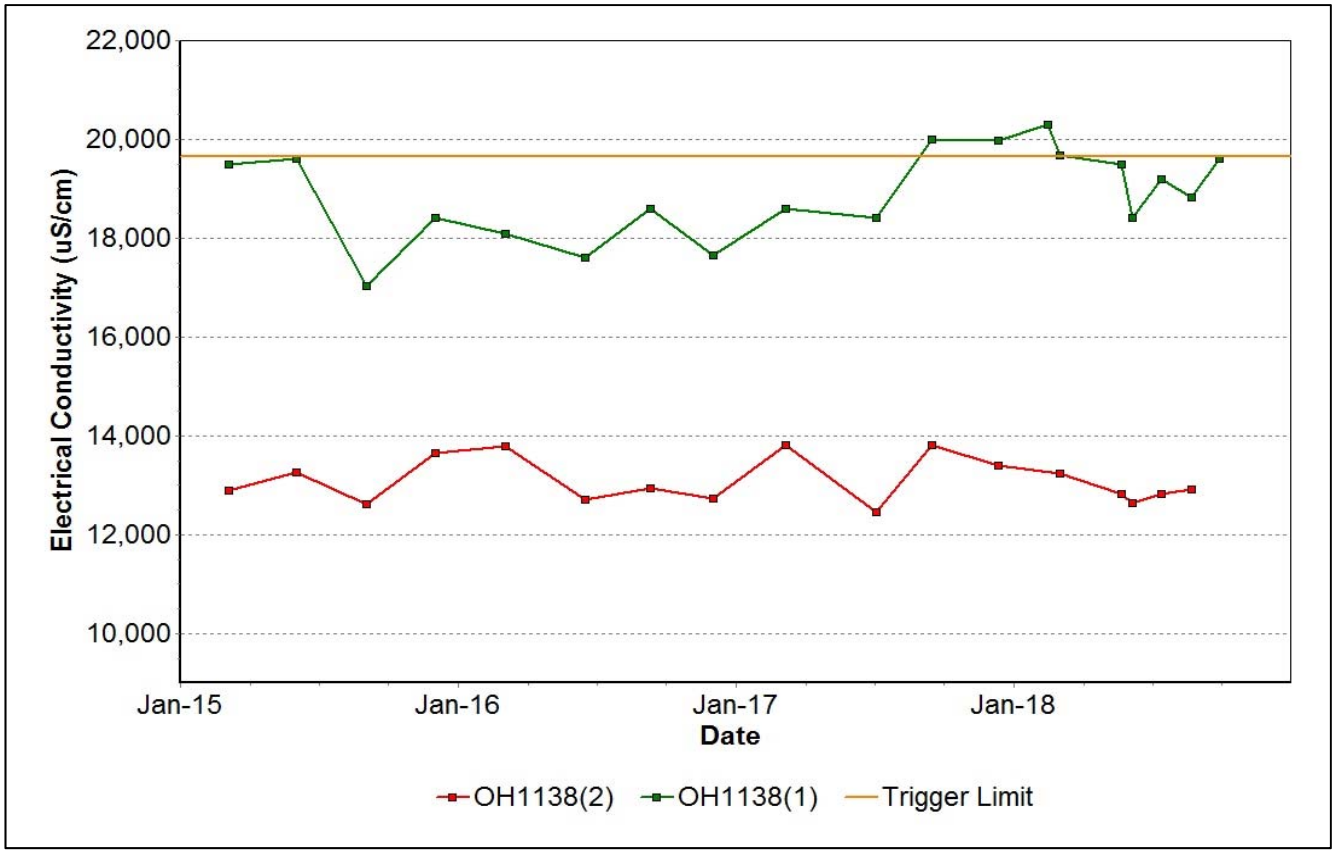



**Figure 37: Warkworth Seam Electrical Conductivity Trend – September 2018**

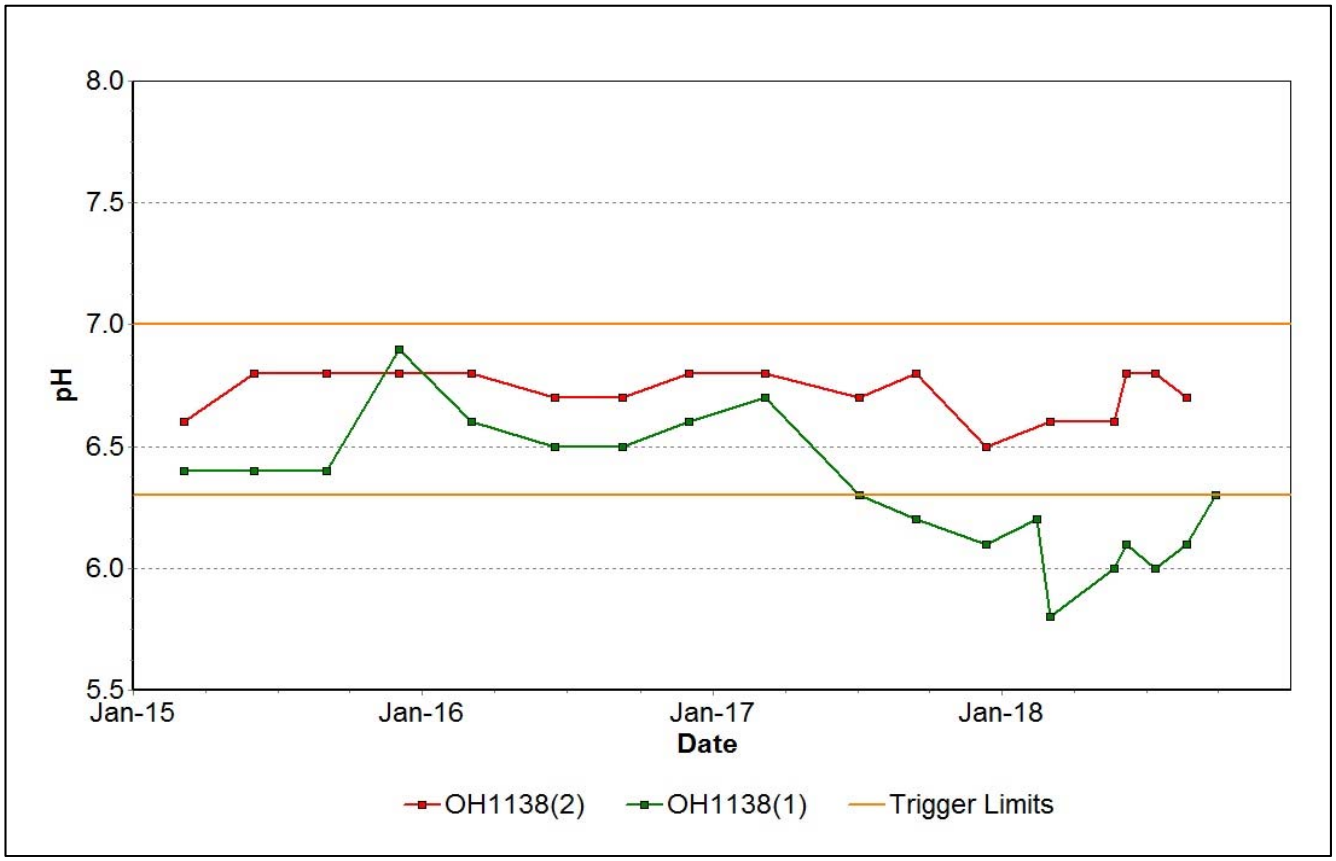



**Figure 38: Warkworth Seam pH Trend – September 2018**

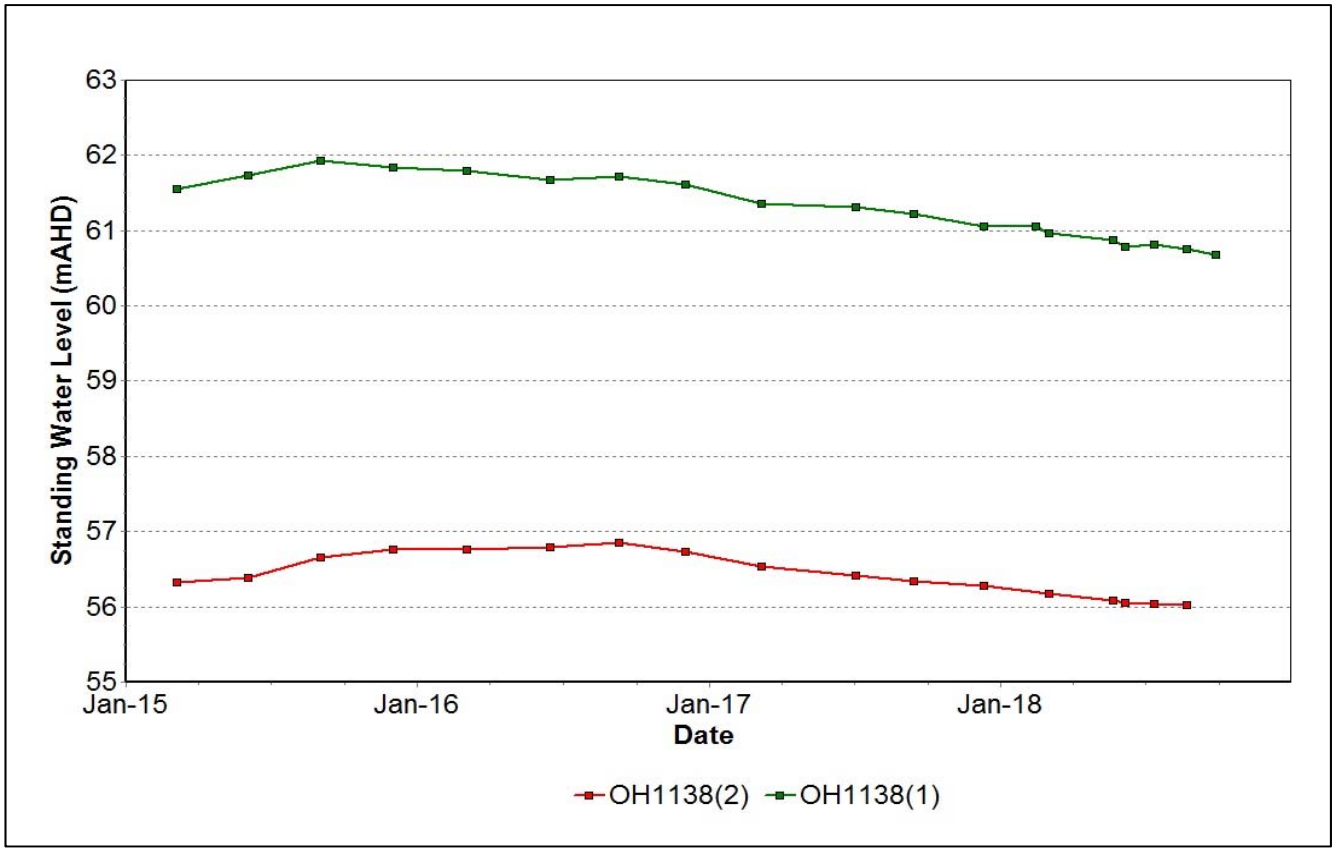



**Figure 39: Warkworth Seam Standing Water Level Trend – September 2018**

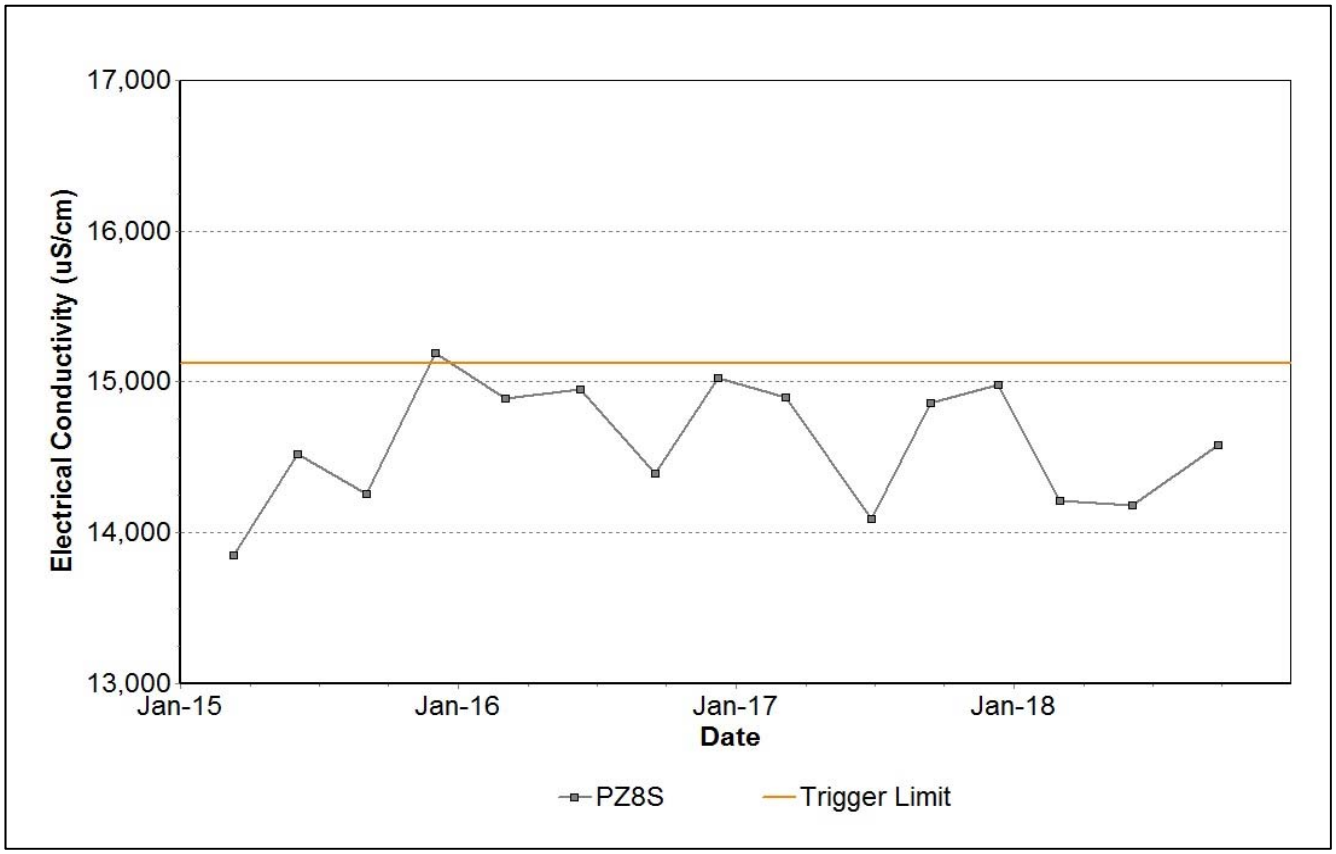



**Figure 40: Wollombi Alluvium 1 Electrical Conductivity Trend – September 2018**

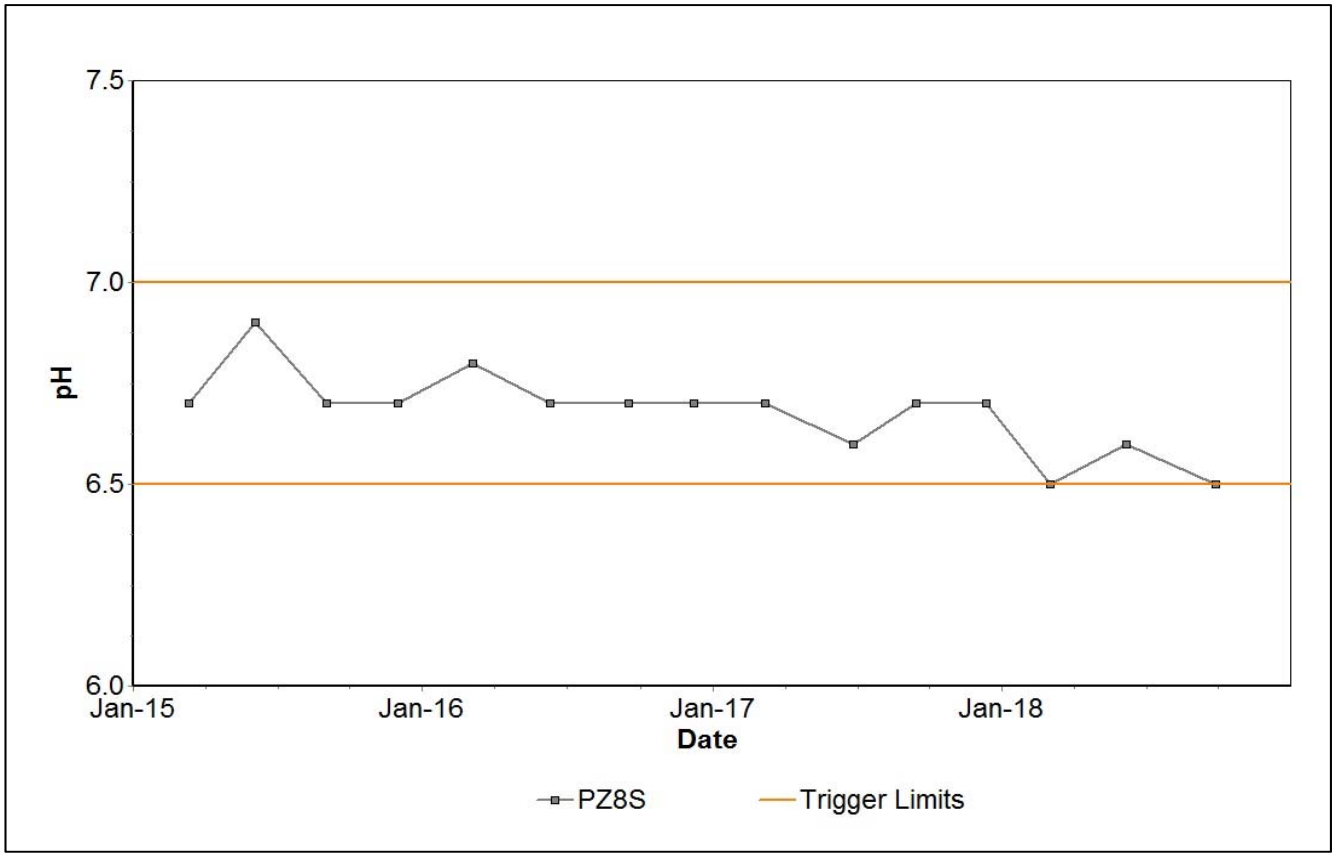



**Figure 41: Wollombi Alluvium 1 pH Trend – September 2018**

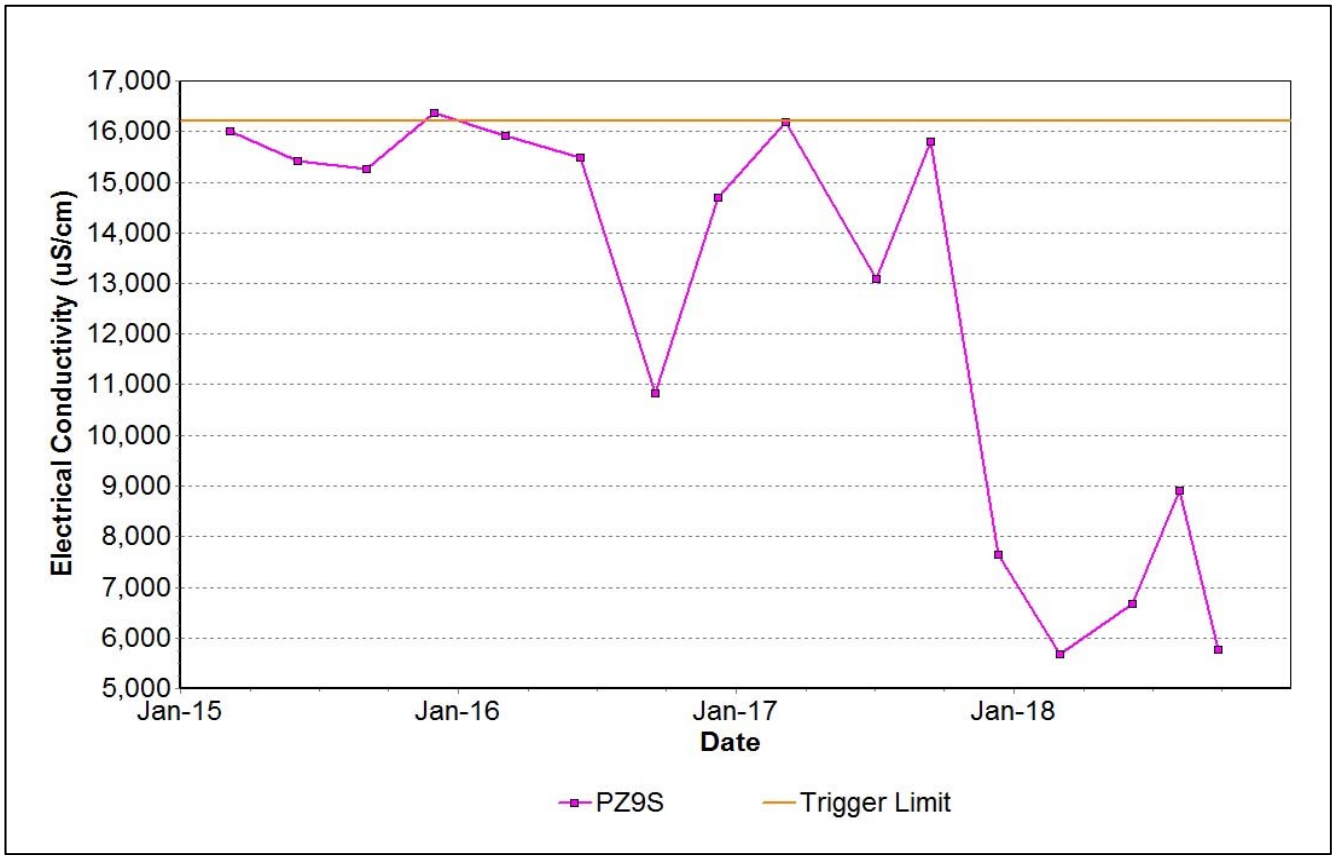



**Figure 42: Wollombi Alluvium 2 Electrical Conductivity Trend – September 2018**

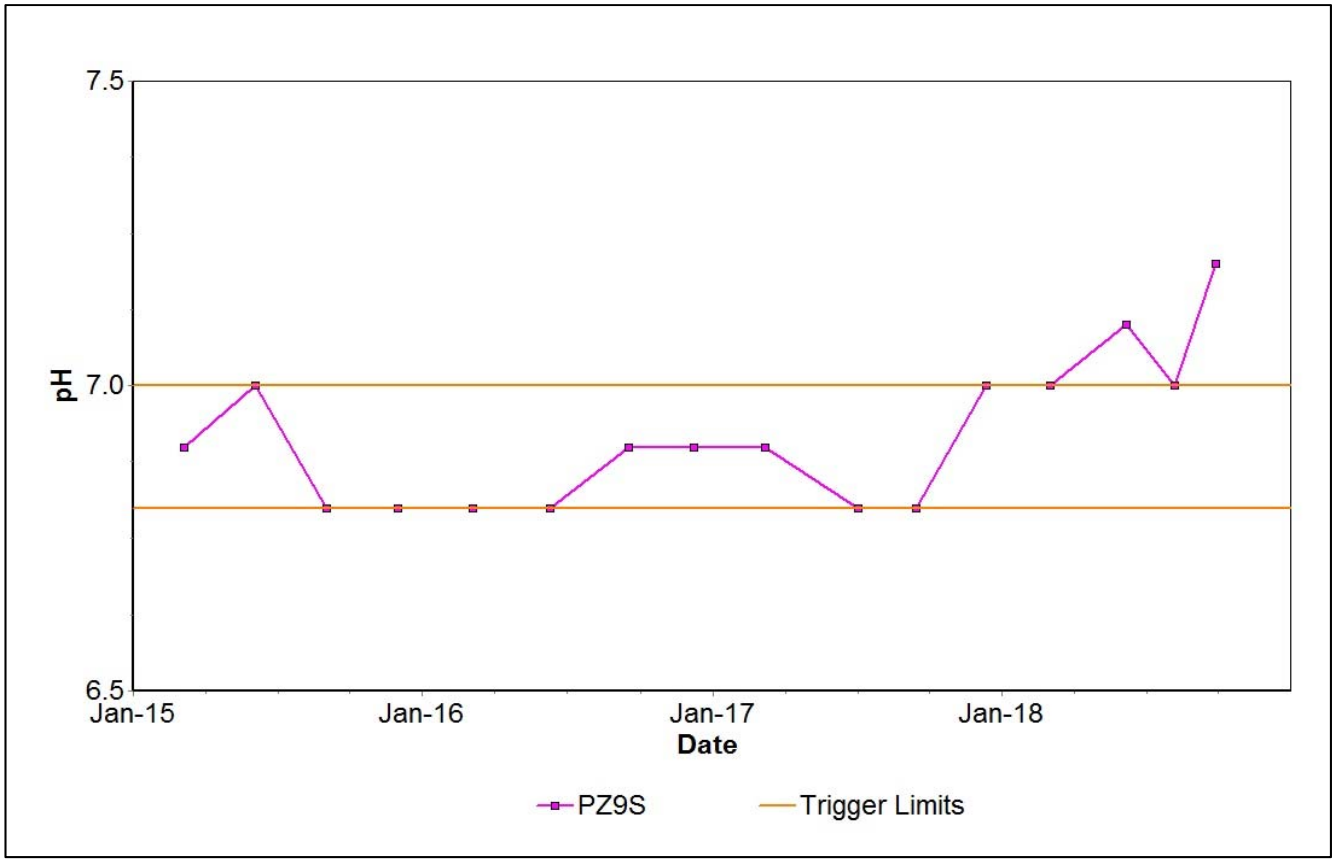



**Figure 43: Wollombi Alluvium 2 pH Trend – September 2018**

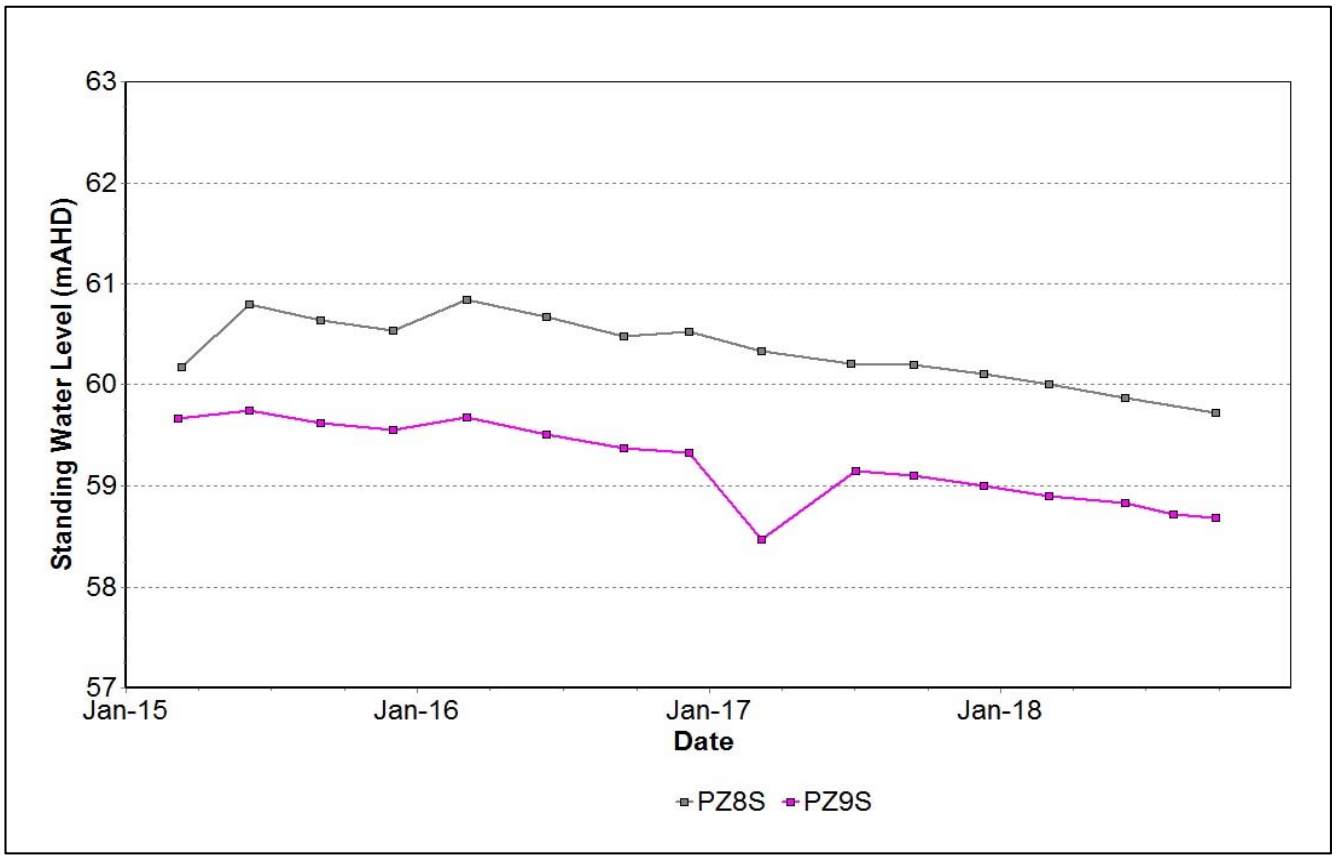



**Figure 44: Wollombi Alluvium Standing Water Level Trend – September 2018**

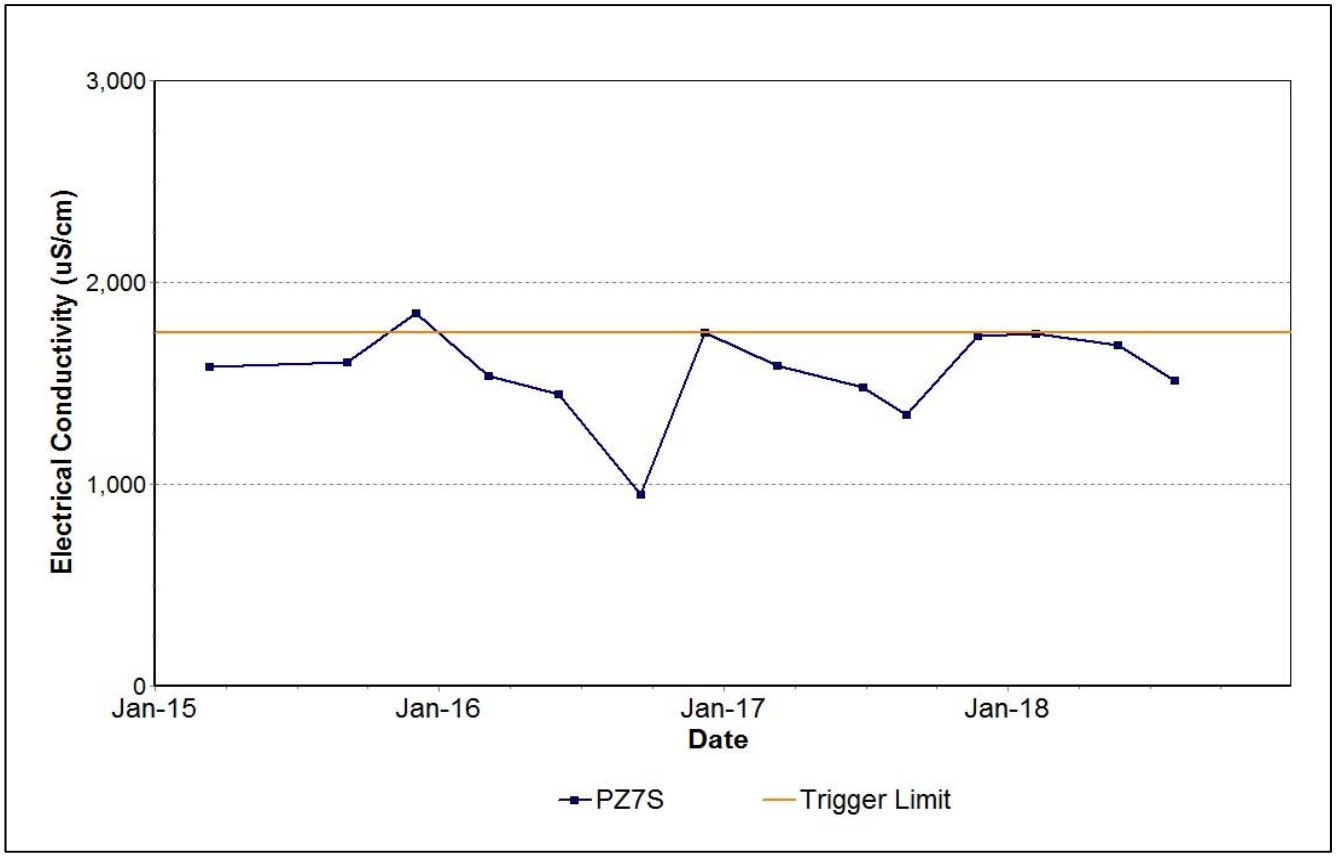



**Figure 45: Aeolian Warkworth Sands Electrical Conductivity Trend – September 2018**

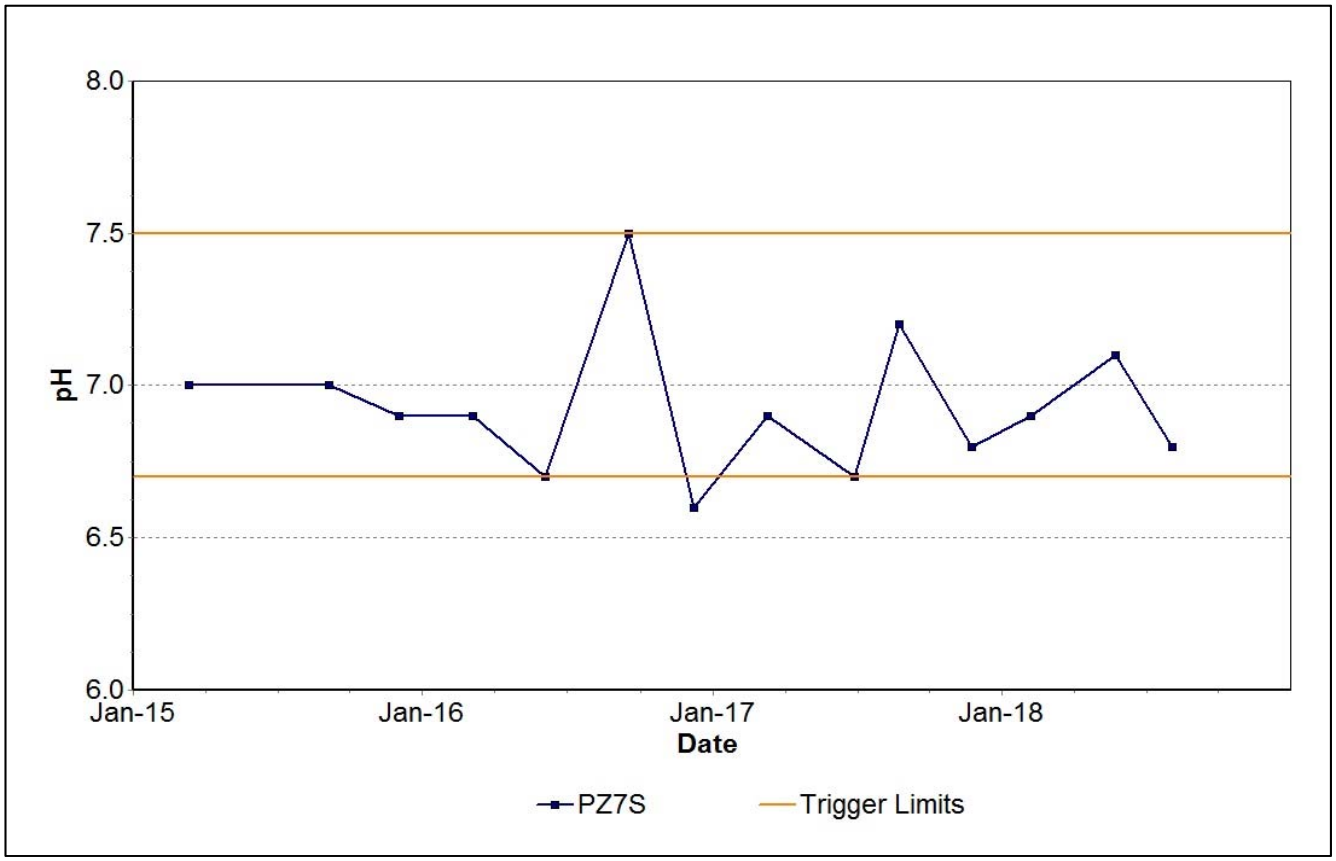



**Figure 46: Aeolian Warkworth Sands pH Trend – September 2018**

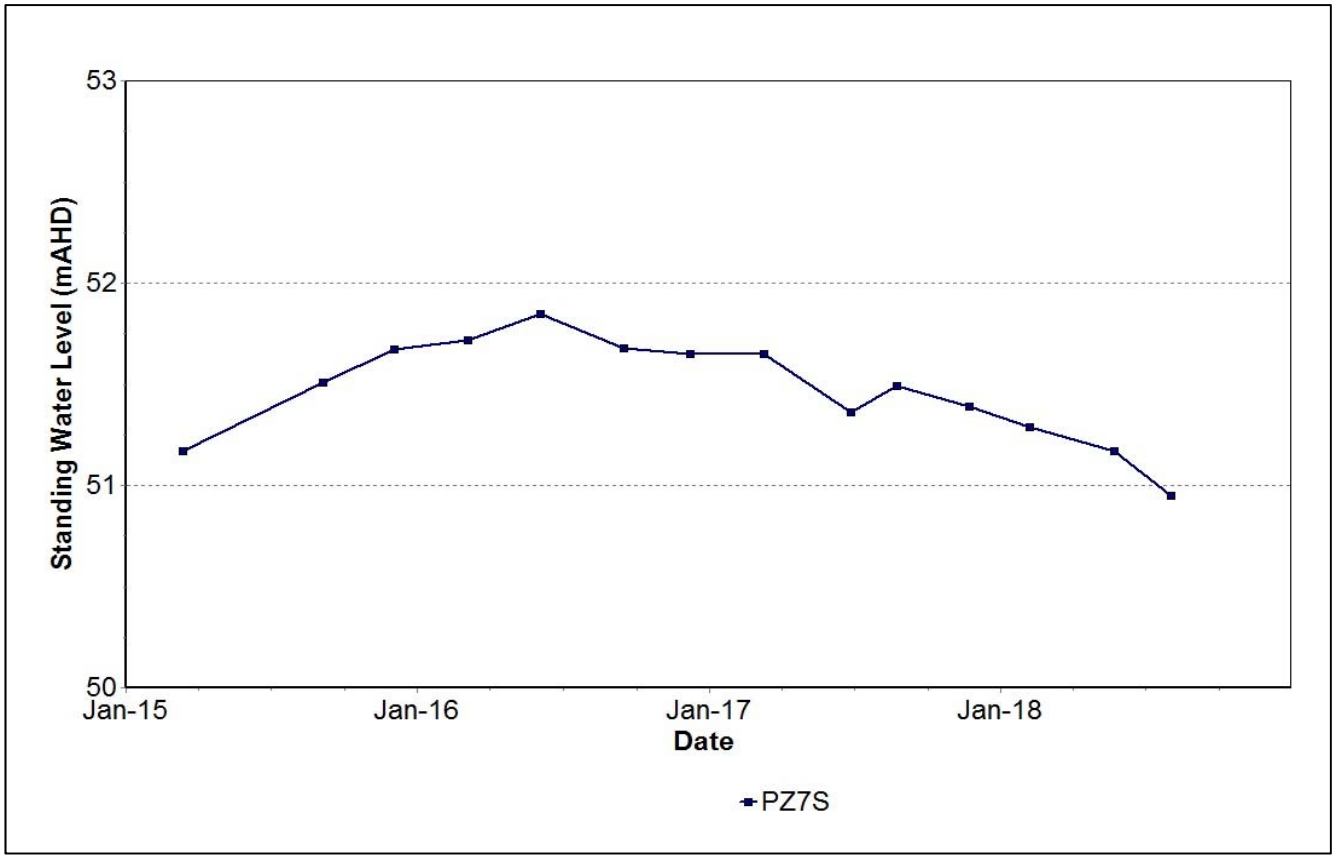



**Figure 47: Aeolian Warkworth Sands Standing Water Level Trend – September 2018**

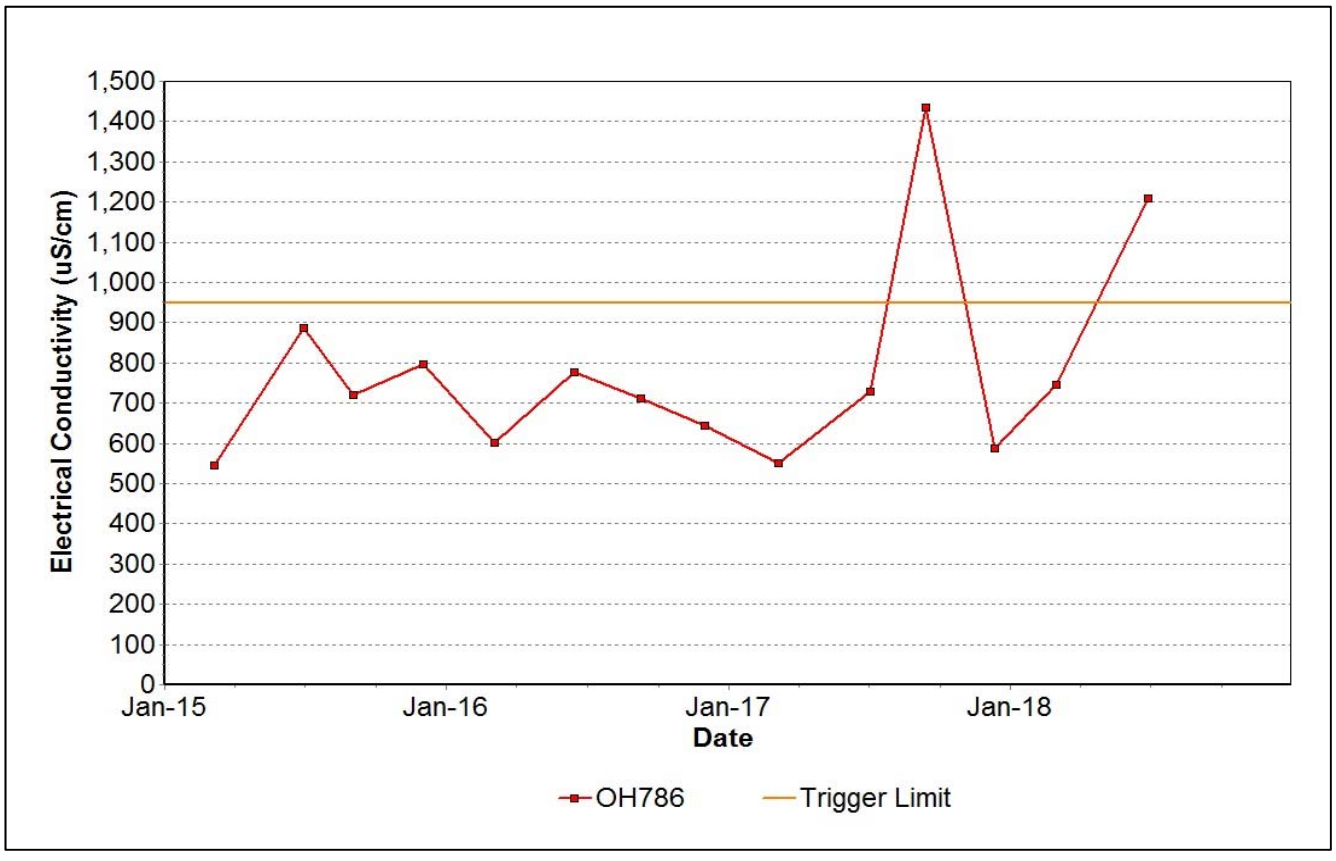



**Figure 48: Hunter River Alluvium 1 Seam Electrical Conductivity Trend – September 2018**

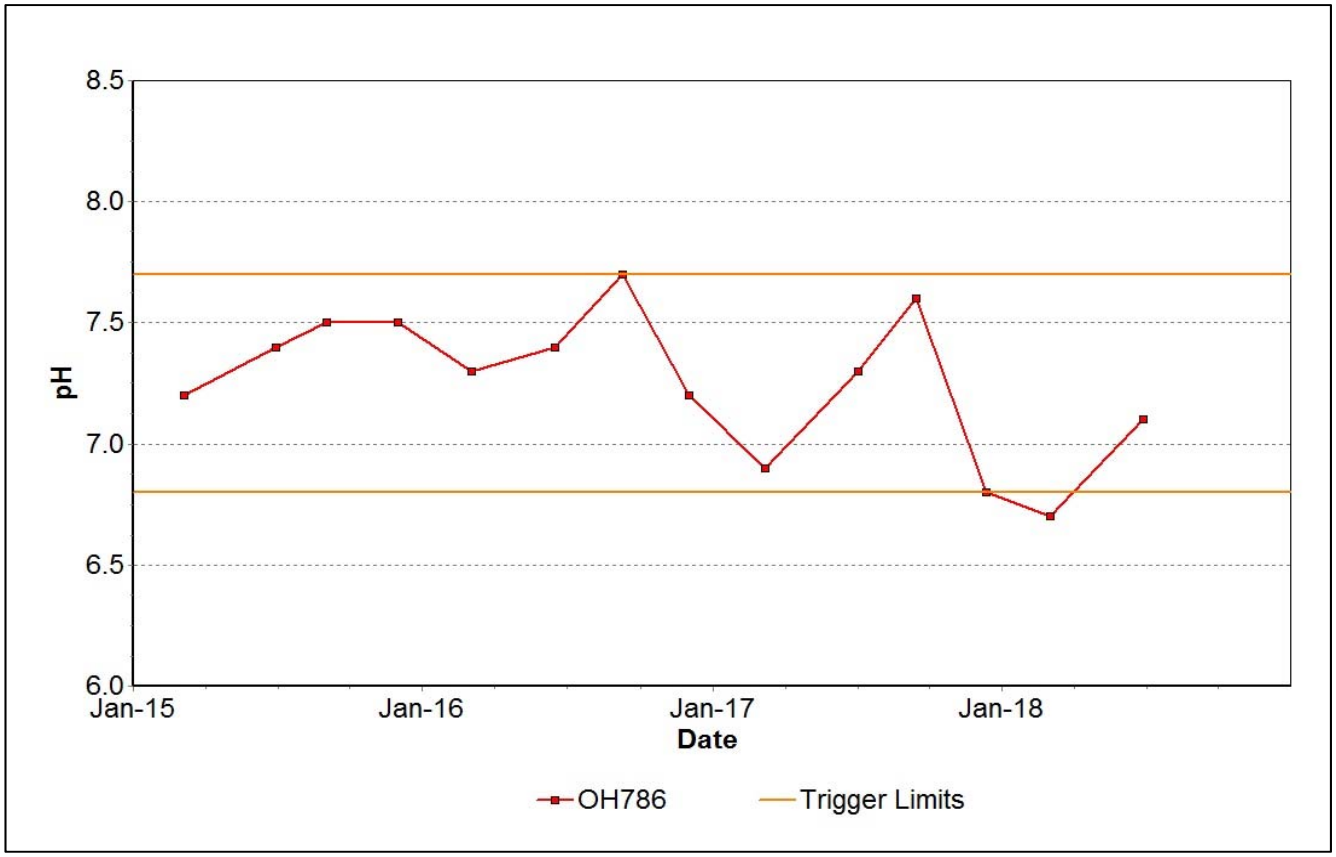



**Figure 49: Hunter River Alluvium 1 Seam pH Trend – September 2018**

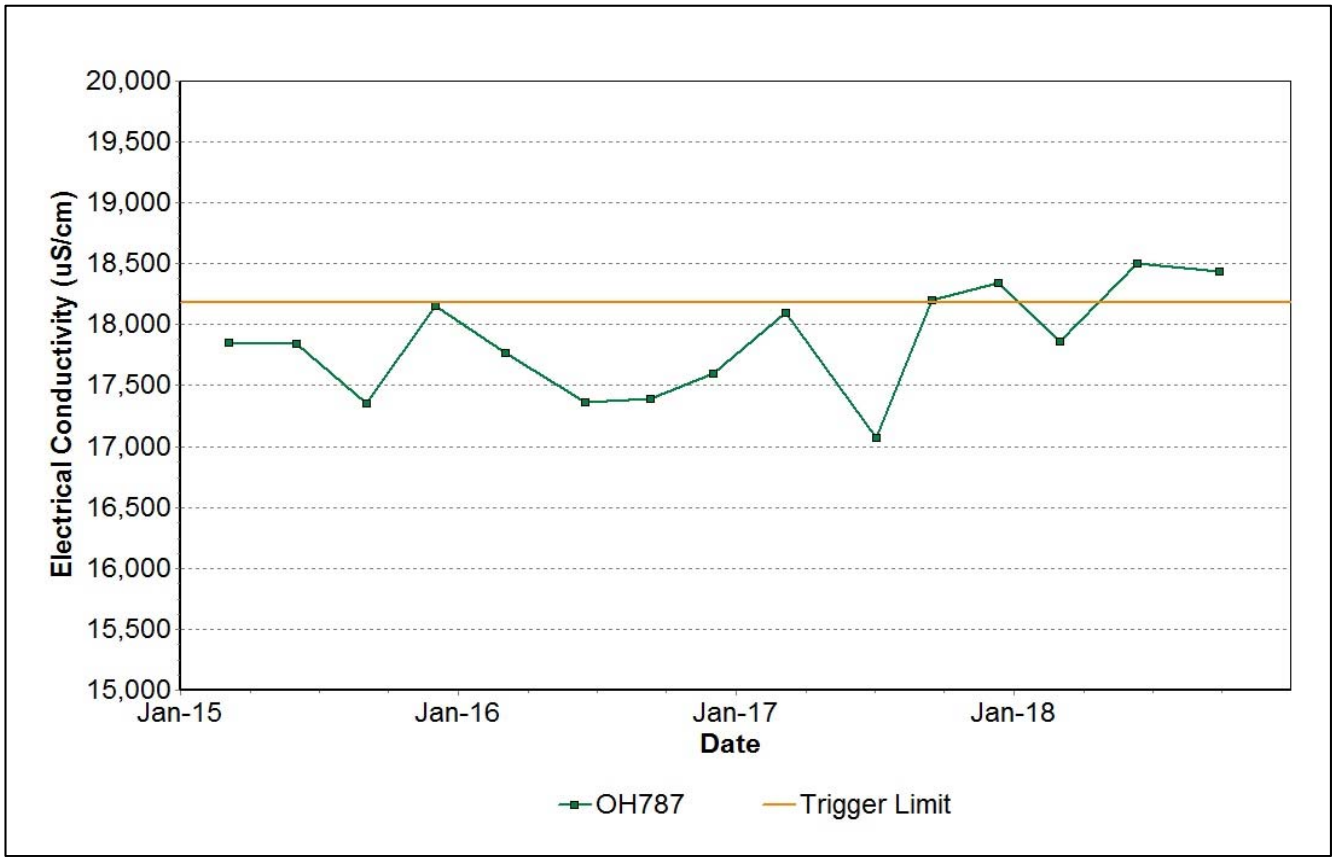



**Figure 50: Hunter River Alluvium 2 Seam Electrical Conductivity Trend – September 2018**

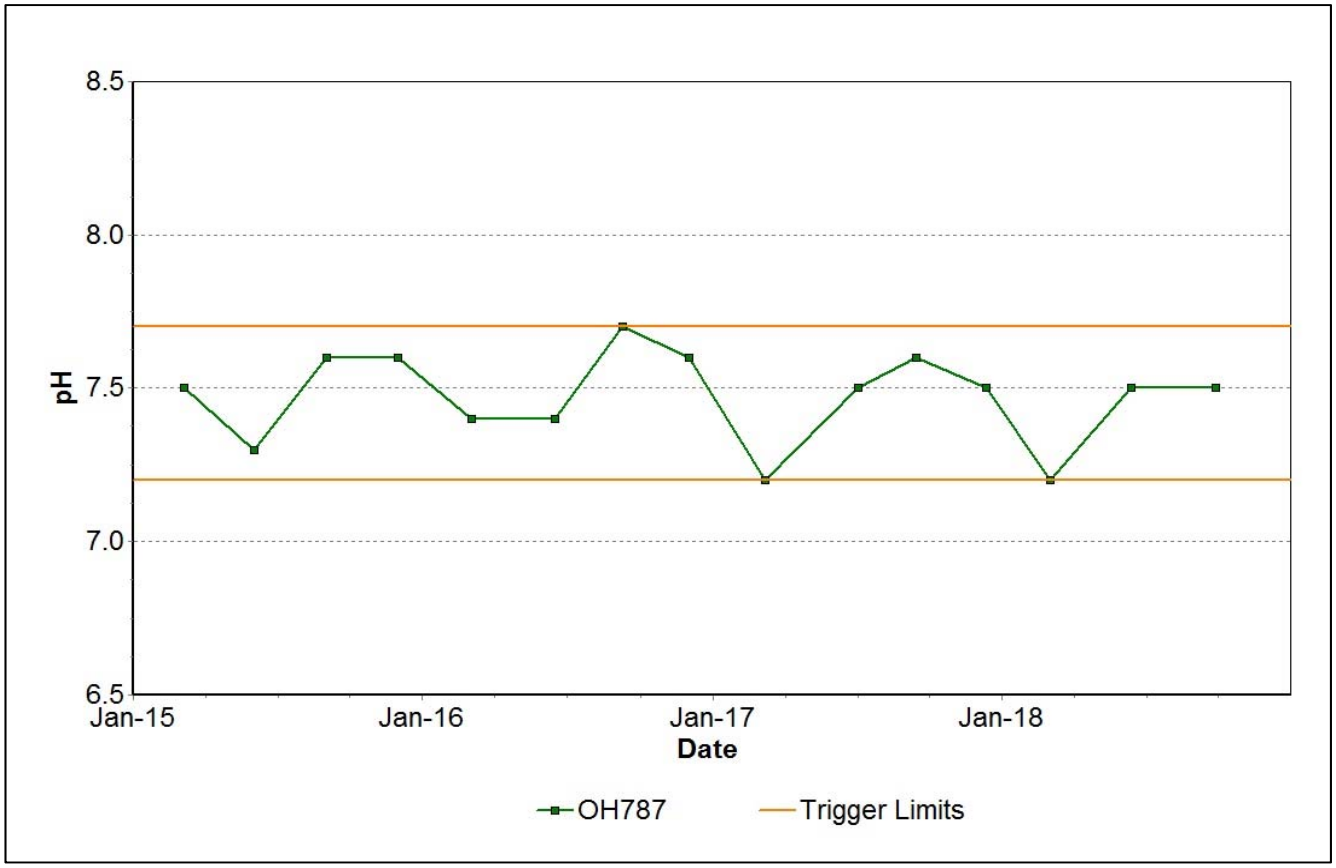



**Figure 51: Hunter River Alluvium 2 Seam pH Trend – September 2018**

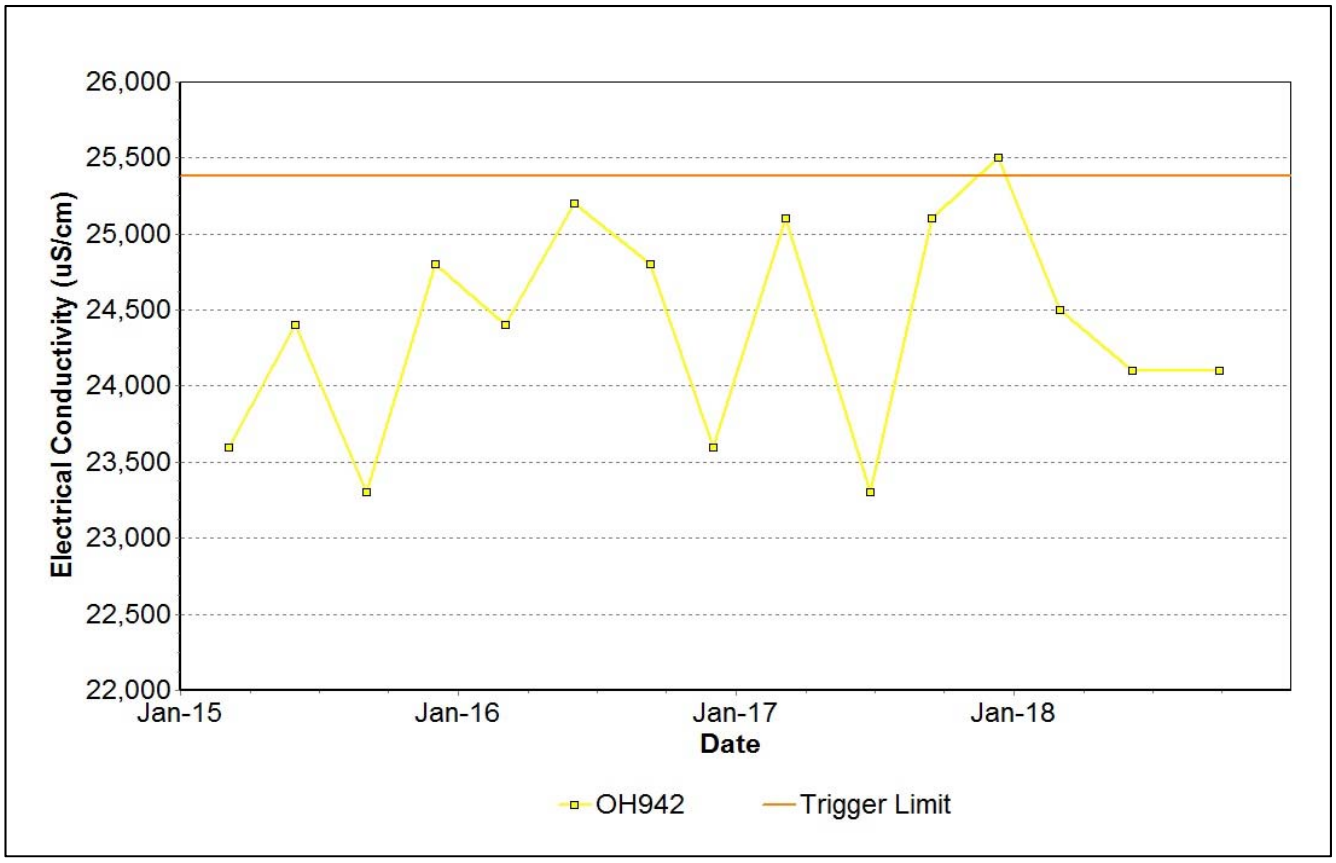



**Figure 52: Hunter River Alluvium 3 Seam Electrical Conductivity Trend – September 2018**

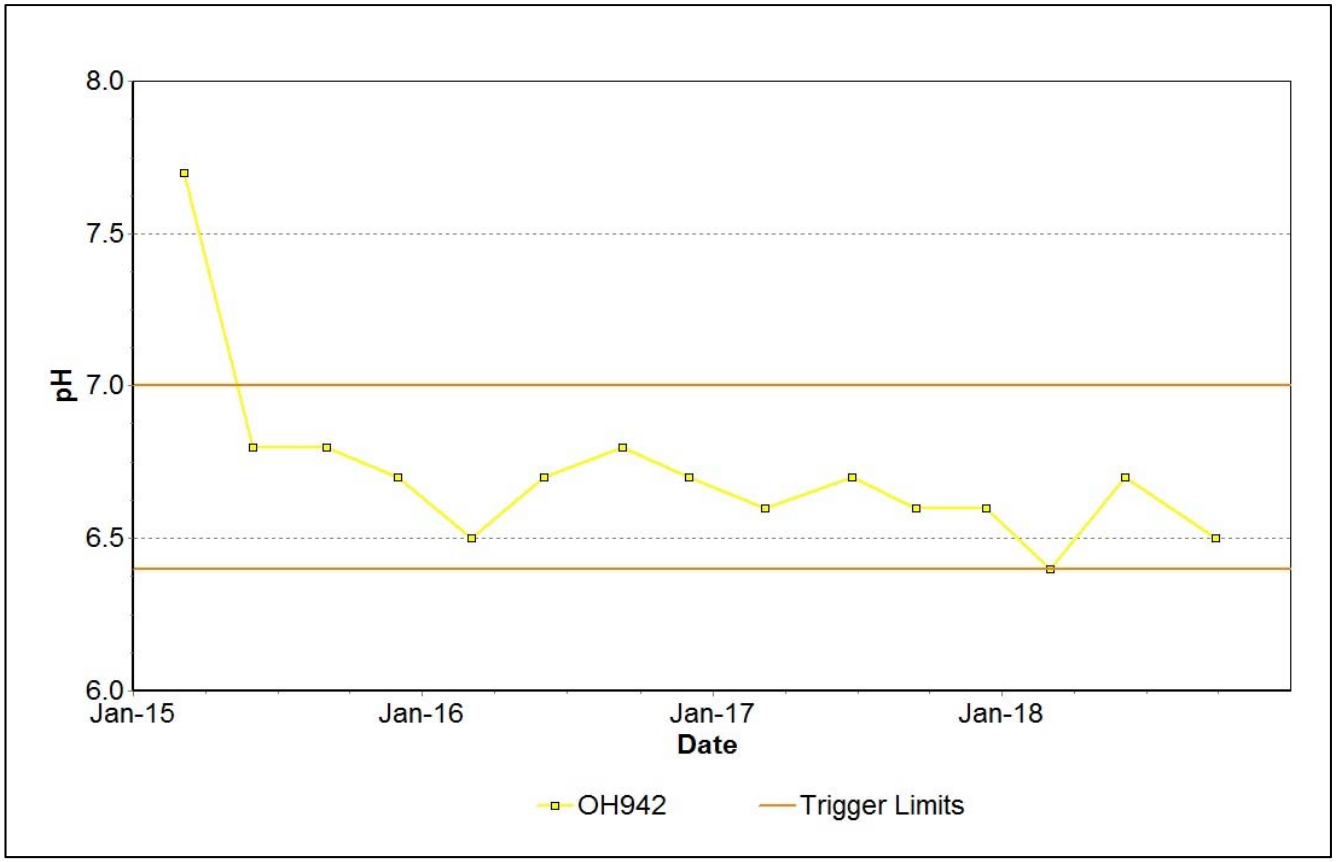



**Figure 53: Hunter River Alluvium 3 Seam pH Trend – September 2018**

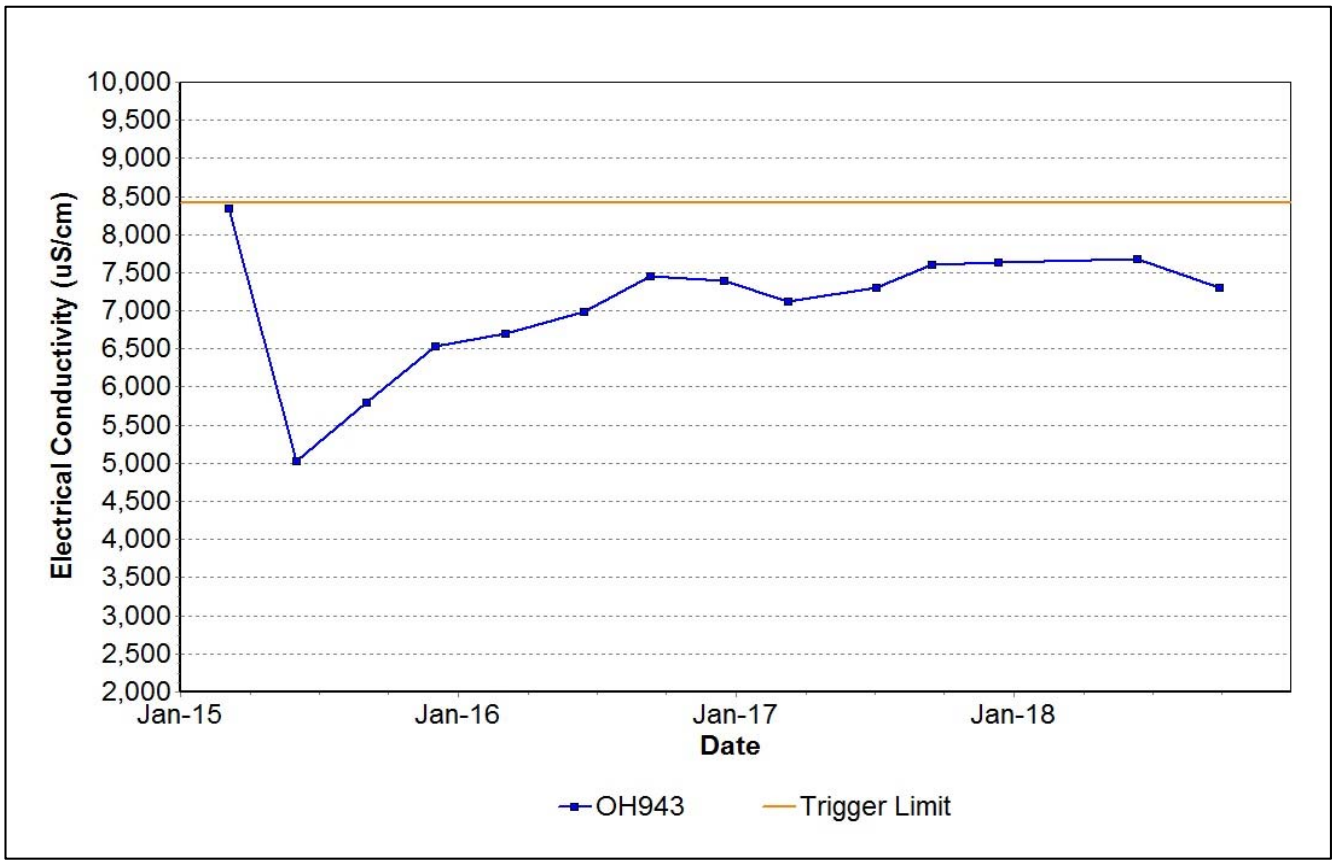



**Figure 54: Hunter River Alluvium 4 Seam Electrical Conductivity Trend – September 2018**

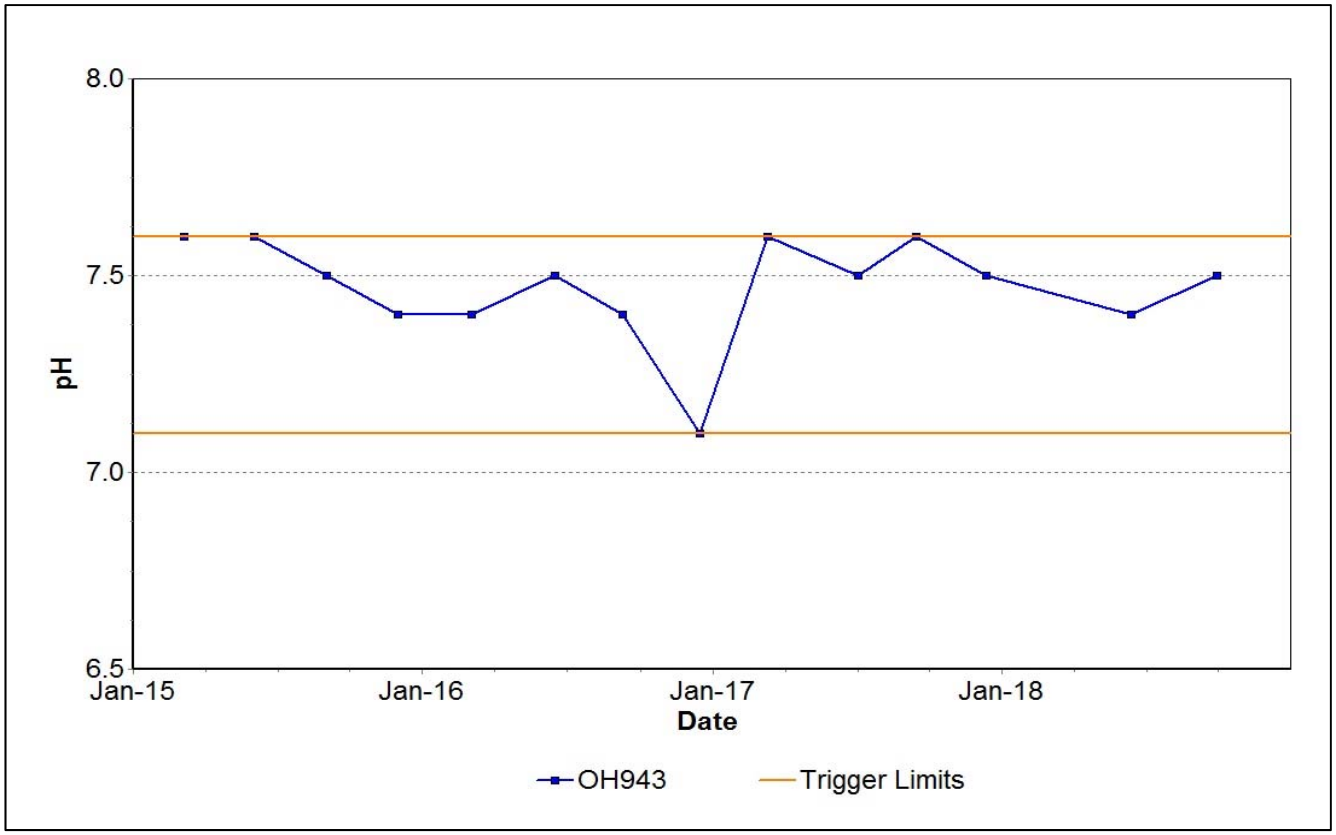
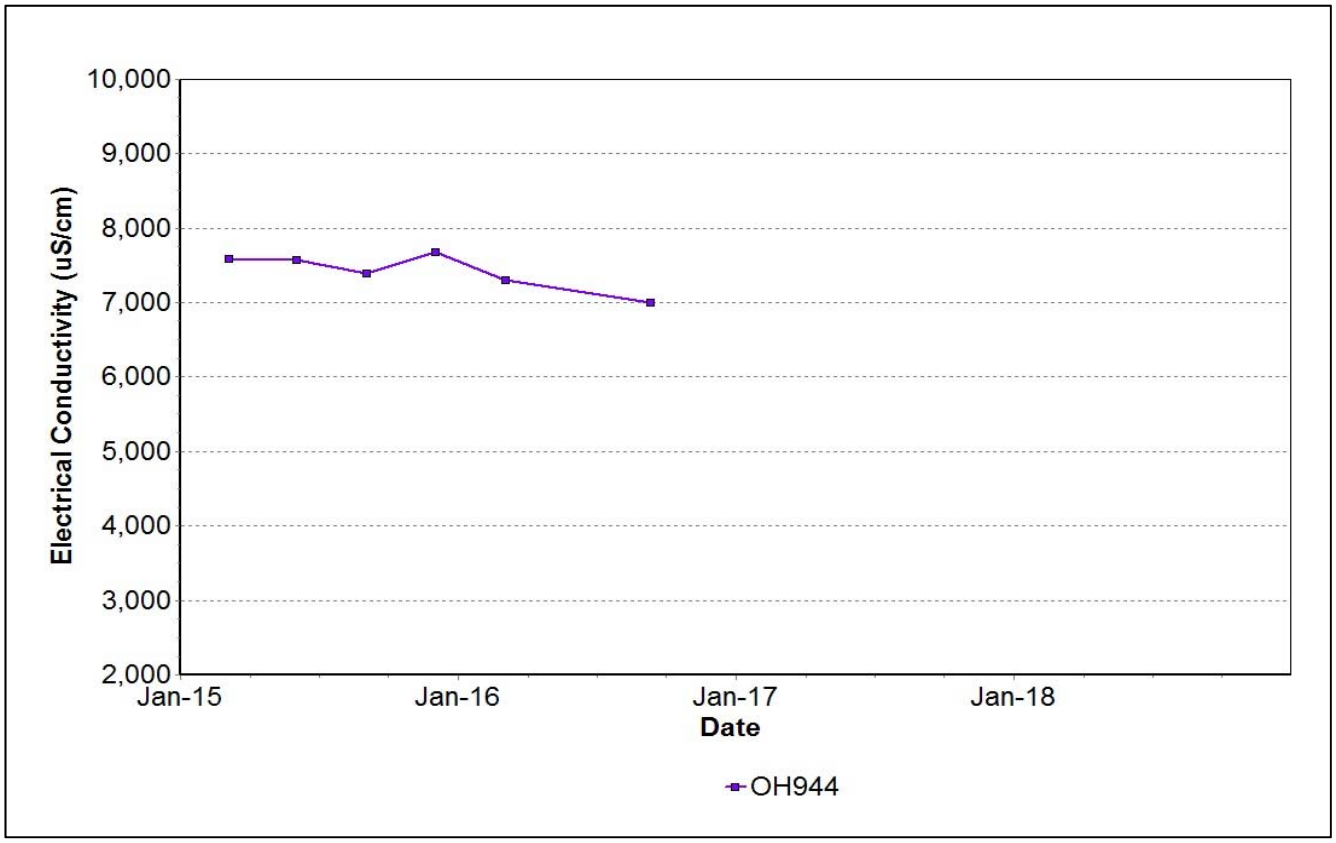
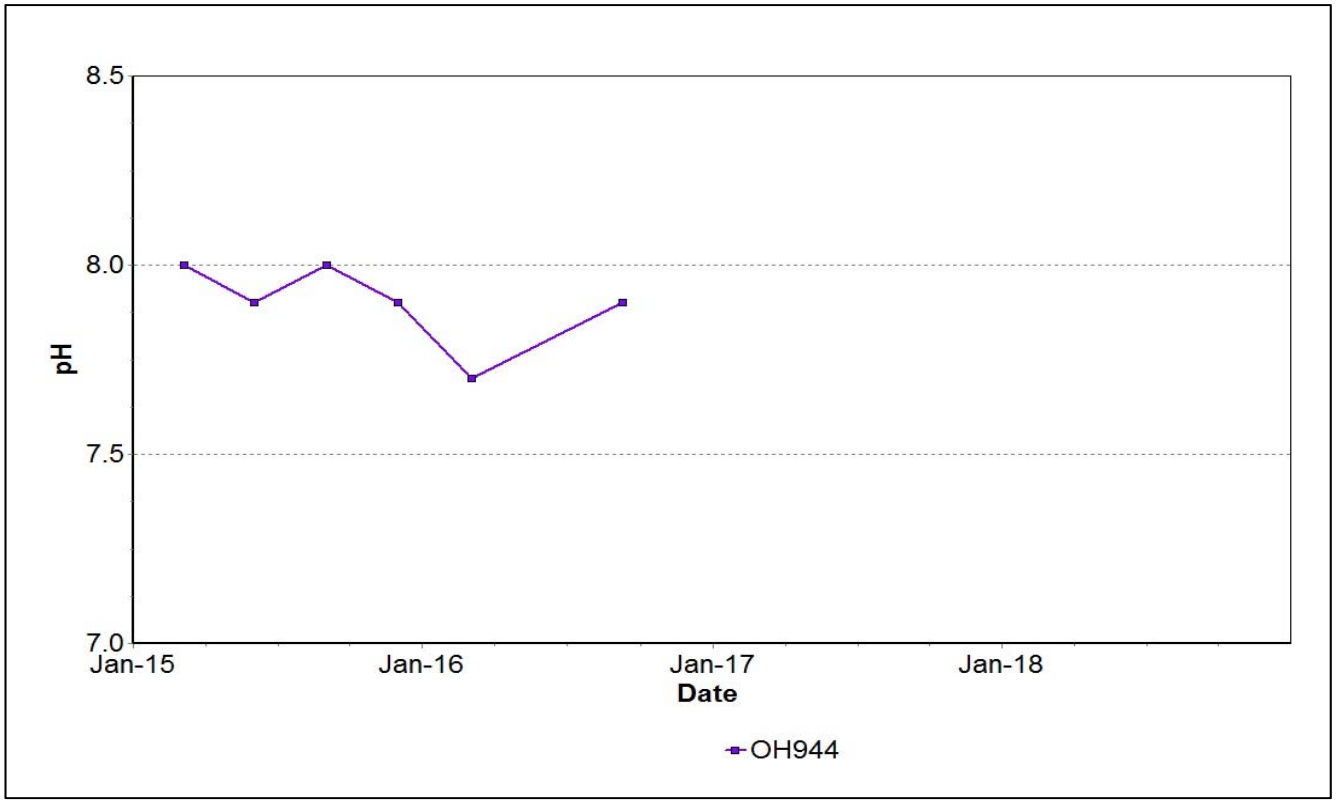



**Figure 55: Hunter River Alluvium 4 Seam pH Trend – September 2018**




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

**Figure 56: Hunter River Alluvium 5 Seam Electrical Conductivity Trend – September 2018**




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

**Figure 57: Hunter River Alluvium 5 Seam pH Trend – September 2018**

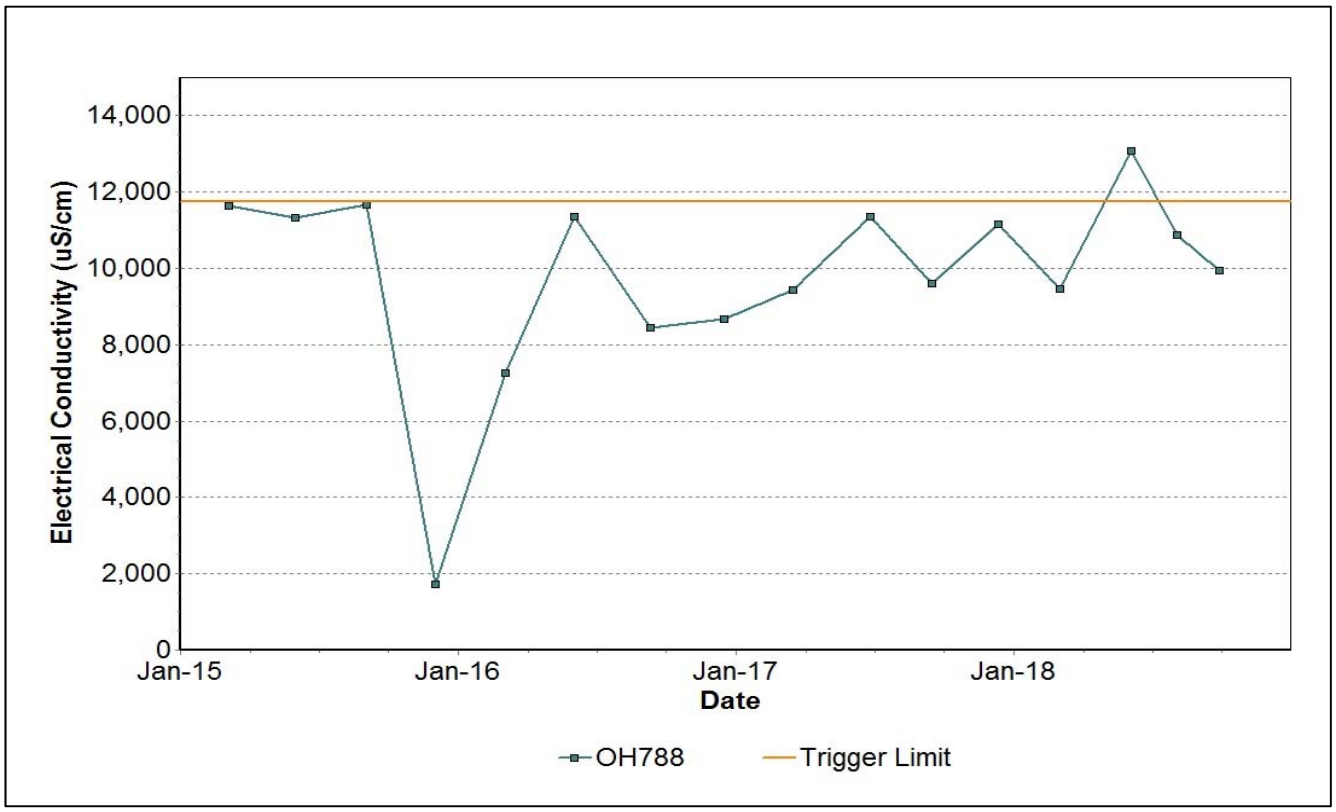



**Figure 58: Hunter River Alluvium 6 Seam Electrical Conductivity – September 2018**

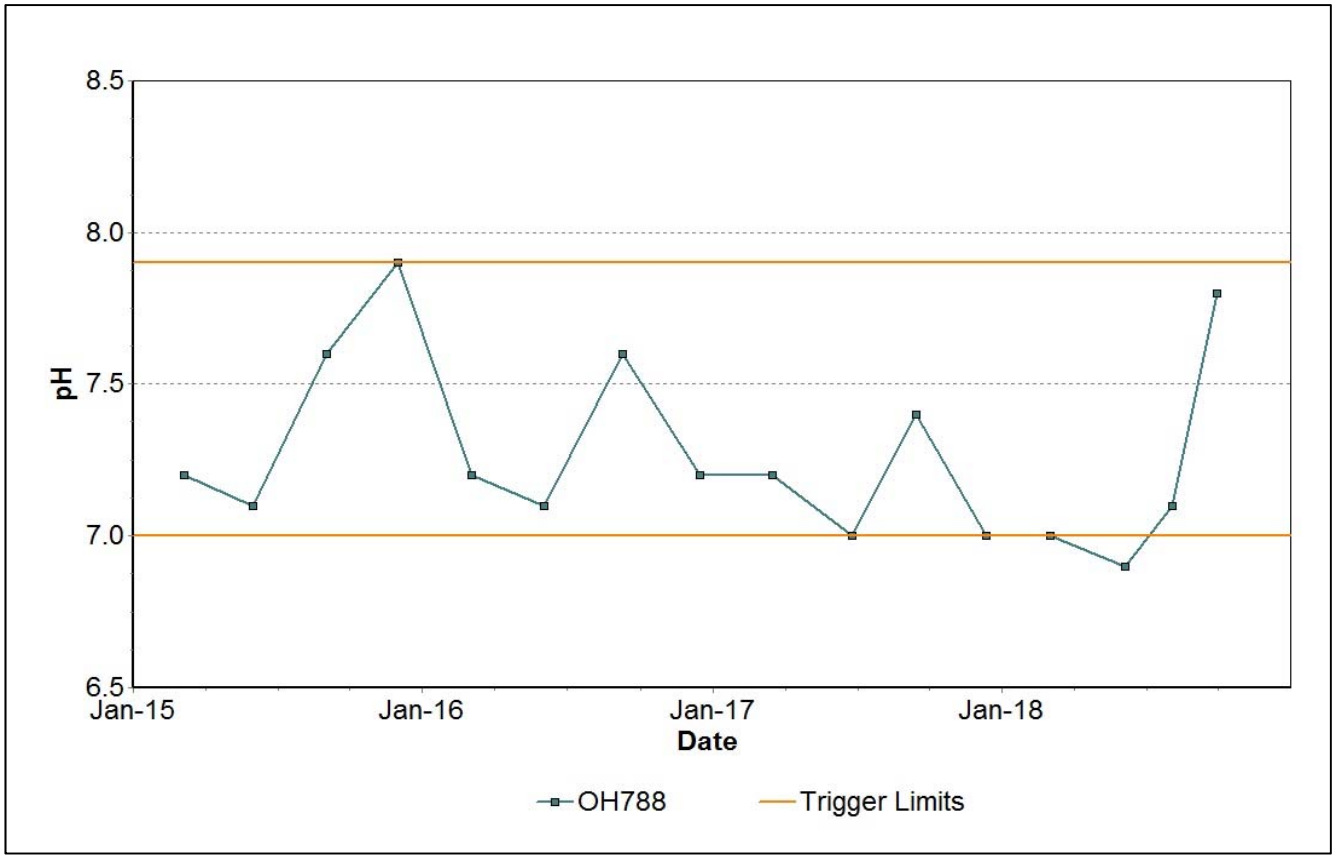



**Figure 59: Hunter River Alluvium 6 Seam pH Trend – September 2018**

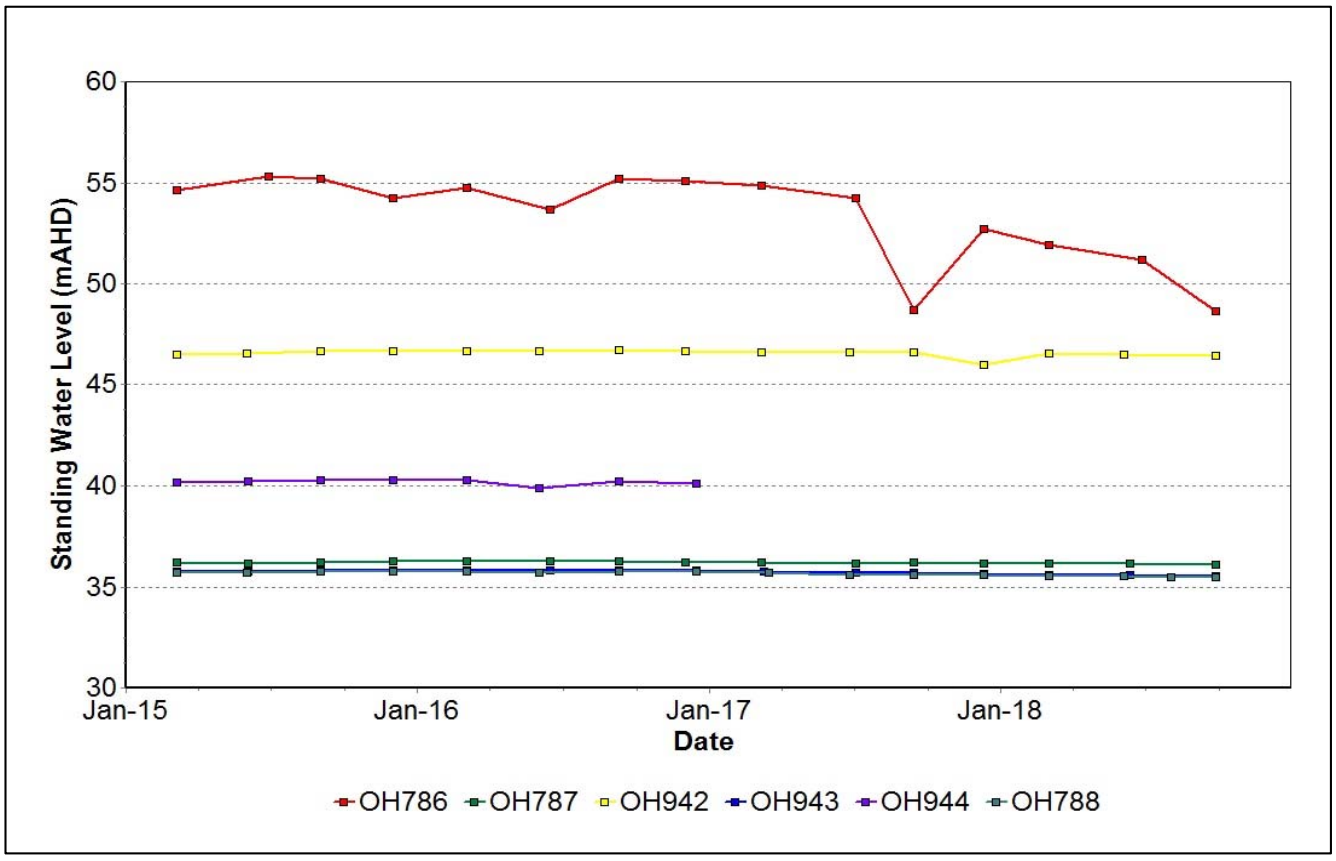



**Figure 60: Hunter River Alluvium Standing Water Level Trend – September 2018**

### 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 - 2018**

| Site | Date | Trigger Limit Breached | Action Taken in Response |
|---|---|---|---|
| OH 786 | 28/06/2018 | EC – 95th Percentile | Watching Brief* |
| OH 787 | 02/03/2018 | EC – 95th Percentile | Data is stable and consistent with historical trend; no further action |
| OH 787 | 12/06/2018 | EC – 95th Percentile | Elevated EC is considered attributable to prolonged dry climatic conditions, and not related to mining related impacts. Continue to watch and monitor |
| OH 787 | 27/09/2018 | EC – 95th Percentile | Continue to watch and monitor |
| OH788 | 04/06/2018 | EC – 95th Percentile | Watching Brief* |
| MTD605P | 06/02/2018 | EC – 95th Percentile | Data is stable and consistent with historical trend; no further action |
| MTD605P | 10/05/2018 | EC – 95th Percentile | Data is stable and consistent with historical trend, other bores within the Shallow Overburden are stable; no further action required |
| WD622P | 03/08/2018 | EC – 95th Percentile | Watching Brief* |
| WOH2156B | 06/02/2018 | EC – 95th Percentile | Data is stable and consistent with historical trend; no further action |
| OH 1138(1) | 02/03/2018 | EC – 95th Percentile | Data is stable and consistent with historical trend; no further action |
| OH 786 | 02/03/2018 | pH –5th Percentile | Watching Brief* |
| OH 787 | 02/03/2018 | pH –5th Percentile | Watching Brief* |
| OH 942 | 02/03/2018 | pH –5th Percentile | Watching Brief* |
| OH 788 | 02/03/2018 | pH –5th Percentile | Watching Brief* |
| OH 788 | 04/06/2018 | pH –5th Percentile | Follow up monitoring undertaken in August and September indicates that data returned to within trigger levels. No further action required. |
| PZ8S | 02/03/2018 | pH –5th Percentile | Watching Brief* |
| PZ9S | 02/03/2018 | pH – 95th Percentile | Watching Brief* |
| PZ9S | 06/06/2018 | pH – 95th Percentile | Investigation commenced. |
| PZ9S | 27/09/2018 | pH – 95th Percentile | Investigation indicates change to pH is likely the result of depressurisation, as evidenced by falling water level. There is <300mm left |

| | | | |
|---|---|---|---|
| | | | in the piezometer water column. This trend is consistent with effects of nearby mining. Continue routine monitoring. No further action required. |
| GW9709 | 02/03/2018 | pH –5th Percentile | Watching Brief* |
| GW98MTCL2 | 02/03/2018 | pH –5th Percentile | Watching Brief* |
| GW98MTCL2 | 04/06/2018 | pH –5th Percentile | Watching Brief* |
| WOH2139A | 06/02/2018 | pH – 95th Percentile | Data is stable and consistent with historical trend; no further action |
| WOH2139A | 23/05/2018 | pH – 95th Percentile | Data is stable and consistent with historical trend. Other bores within the Blakefield seam are stable; no further action required |
| WOH2139A | 06/08/2018 | pH – 95th Percentile | Increasing trend identified. Undertake additional monitoring on increased frequency. |
| MTD616P | 03/08/2018 | pH –5th Percentile | Watching Brief* |
| OH 1125(1) | 02/03/2018 | pH –5th Percentile | Watching Brief* |
| MB15MTW01D | 06/02/2018 | pH –5th Percentile | Watching Brief* |
| MB15MTW01D | 10/05/2018 | pH –5th Percentile | Data is stable and consistent with historical trend, other bores within the Shallow Overburden are stable; no further action required |
| PZ9D | 02/03/2018 | pH –5th Percentile | Watching Brief* |
| WD622P | 03/08/2018 | pH –5th Percentile | Watching Brief* |
| OH 1138(1) | 06/02/2018 | pH –5th Percentile | Investigation commenced. |
| OH 1138(1) | 06/06/2018 | pH –5th Percentile | pH beginning to recover to historic levels. Continue to monitor on increased frequency |
| OH 1138(1) | 27/09/2018 | N/A | pH beginning to recover to historic levels in June, and returned to being within trigger levels in September. Continue to monitor on increased frequency to confirm. |

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

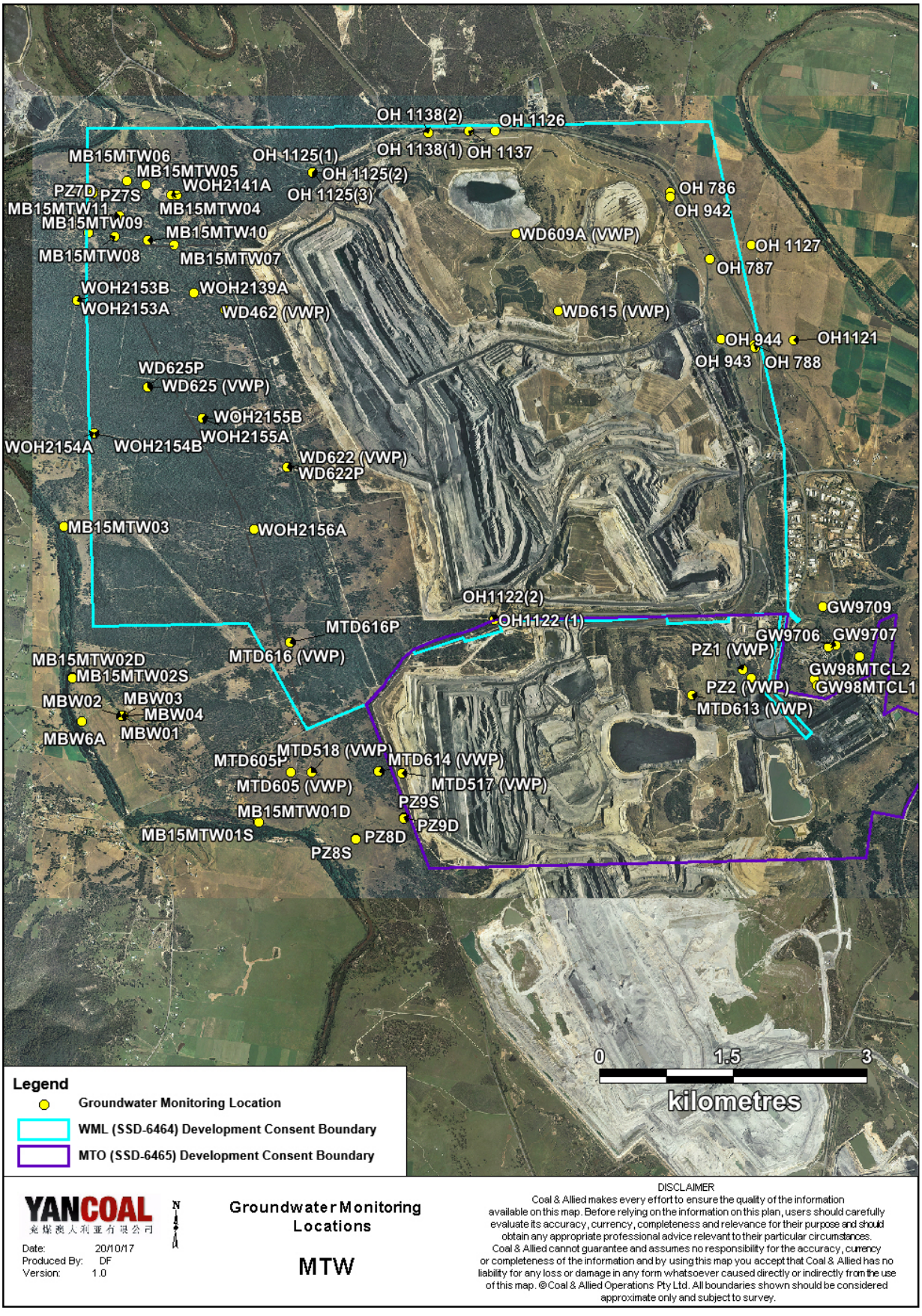



**Figure 61: Groundwater Monitoring Location Plan**

# 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 September 2018, 22 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 no blasts exceeded the 115 dB(L) 5% threshold for airblast overpressure or 5mm/s-5% threshold for ground vibration

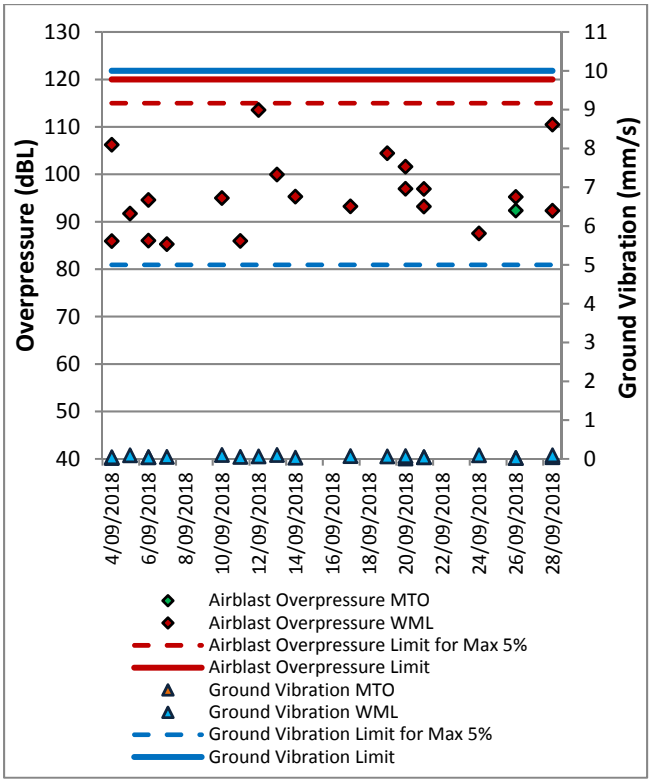



**Figure 62: Abbey Green Blast Monitoring Results – September 2018**

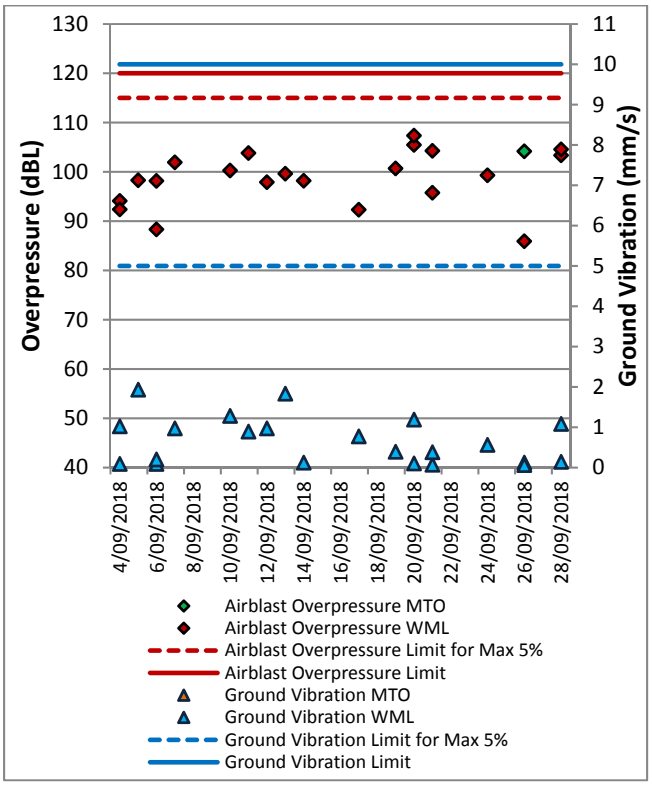



**Figure 63: Bulga Village Blast Monitoring Results – September 2018**

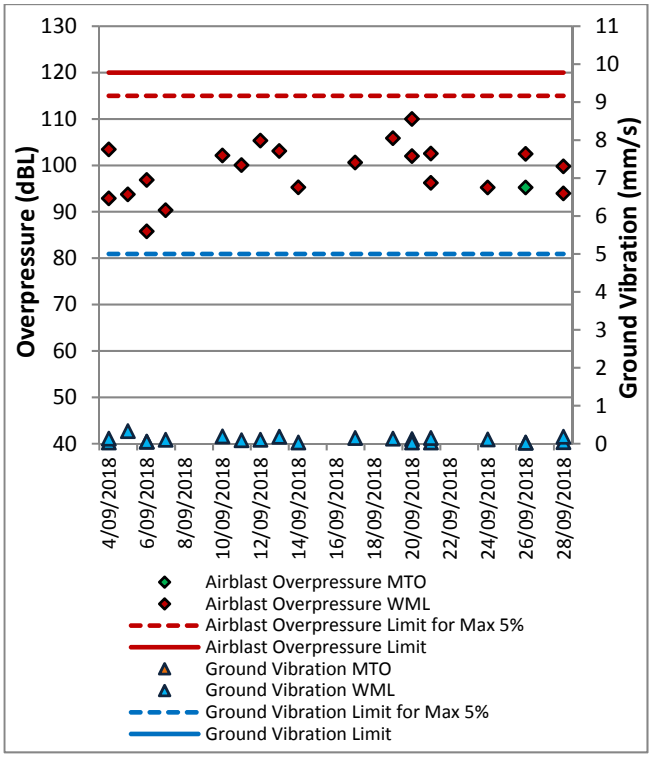



**Figure 64: MTIE Blast Monitoring Results – September 2018**

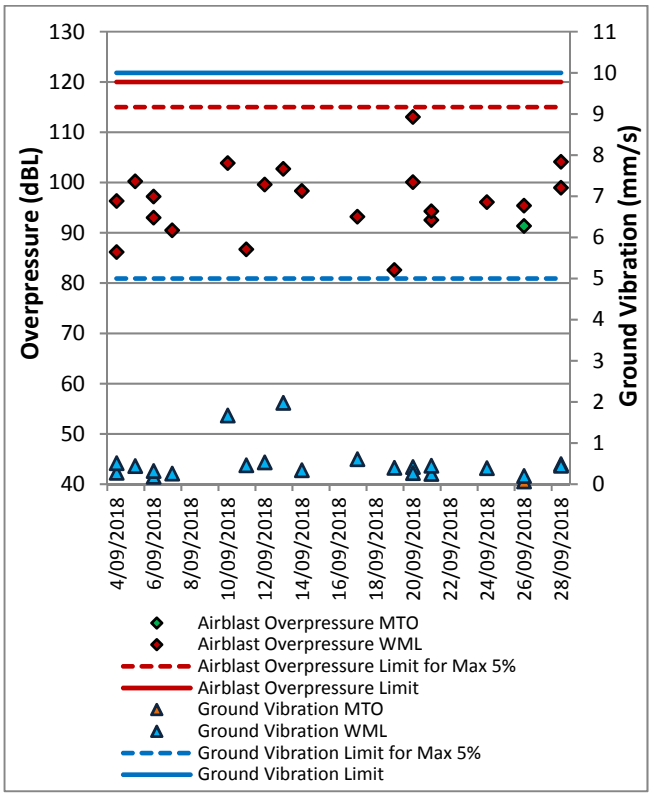



**Figure 65: Warkworth Blast Monitoring Results - September 2018**

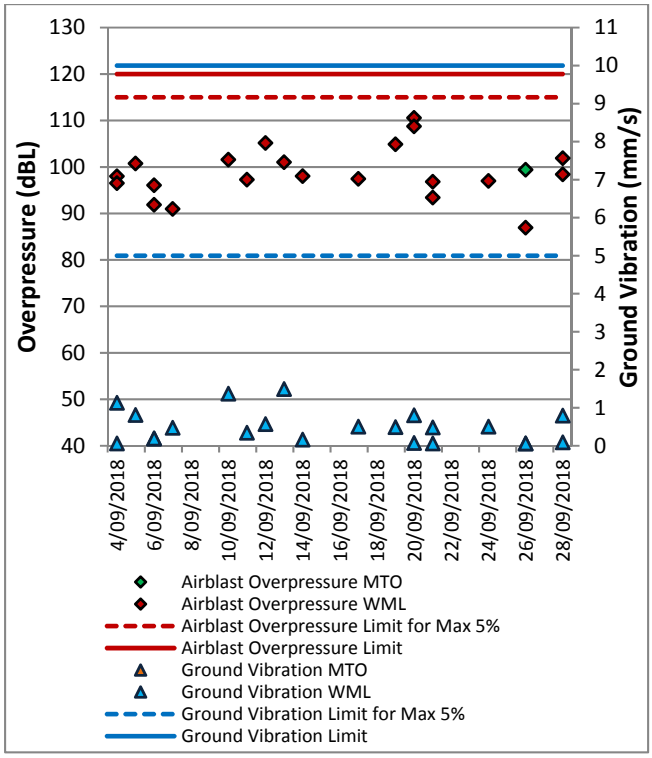



**Figure 66: Wambo Road Blast Monitoring Results – September 2018**

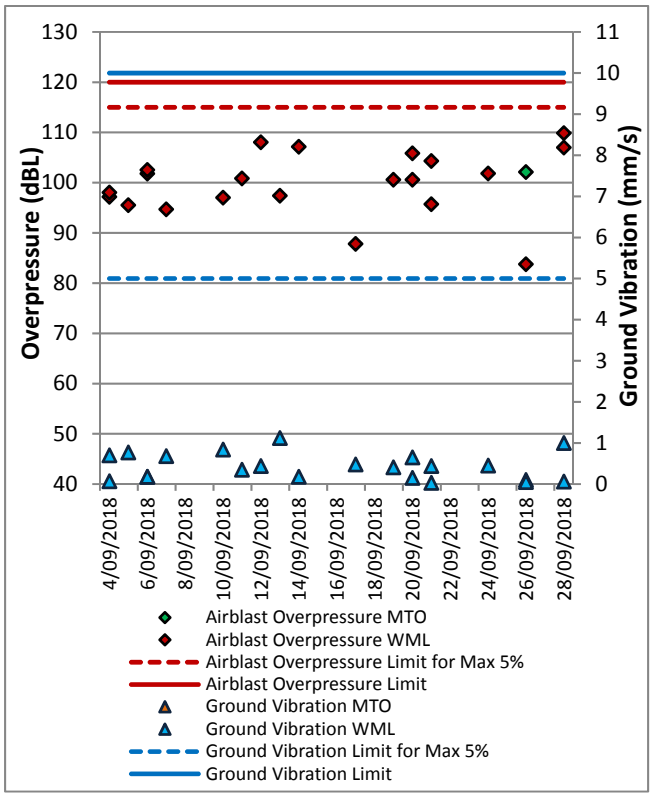



**Figure 67: Wollemi Peak Road Blast Monitoring Results - September 2018**

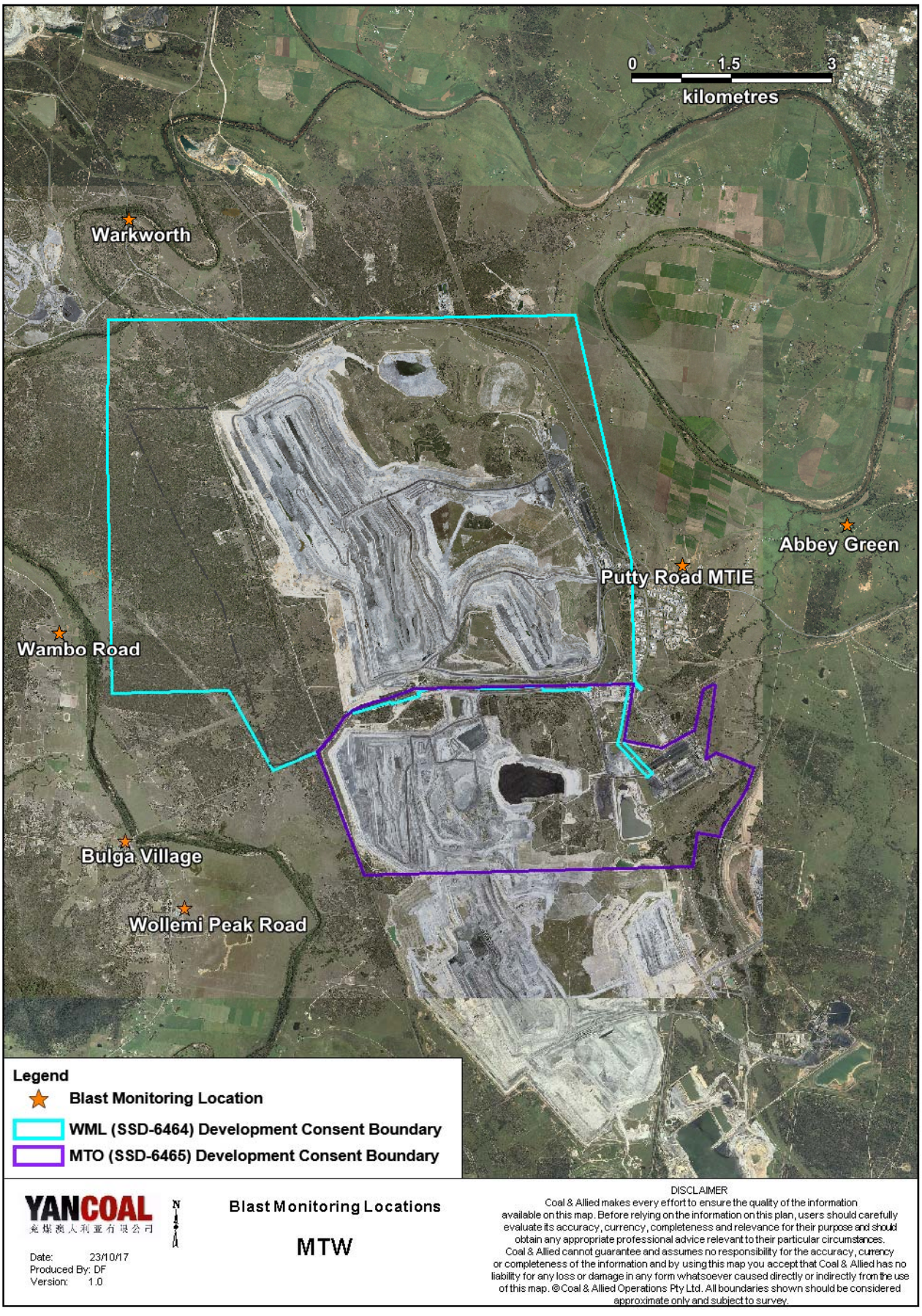



**Figure 68: Blast and Vibration Monitoring Location Plan**

# 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 5 September 2018. 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 – September 2018**

| 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 | 5/09/2018 21:04 | 3.0 | E | 37 | Yes | 37 | Nil |
| Bulga Village | 5/09/2018 23:18 | 2.2 | F | 38 | No | 38 | NA |
| Gouldsville | 5/09/2018 21:23 | 2.1 | F | 38 | No | IA | NA |
| Inlet Rd | 5/09/2018 21:22 | 2.1 | F | 37 | No | 35 | NA |
| Inlet Rd West | 5/09/2018 21:00 | 3.0 | E | 35 | Yes | 31 | Nil |
| Long Point | 5/09/2018 21:00 | 3.0 | E | 35 | Yes | IA | Nil |
| South Bulga | 5/09/2018 21:40 | 2.5 | D | 35 | Yes | 33 | Nil |
| Wambo Road | 5/09/2018 22:56 | 2.0 | F | 38 | Yes | 36 | 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; and*
*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 – September 2018**

| 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 | 5/09/2018 21:04 | 3.0 | E | 47 | Yes | 45 | Nil |
| Bulga Village | 5/09/2018 23:18 | 2.2 | F | 48 | No | 46 | NA |
| Gouldsville | 5/09/2018 21:23 | 2.1 | F | 48 | No | IA | NA |
| Inlet Rd | 5/09/2018 21:22 | 2.1 | F | 47 | No | 48 | NA |
| Inlet Rd West | 5/09/2018 21:00 | 3.0 | E | 45 | Yes | 40 | Nil |
| Long Point | 5/09/2018 21:00 | 3.0 | E | 45 | Yes | IA | Nil |
| South Bulga | 5/09/2018 21:40 | 2.5 | D | 45 | Yes | 39 | Nil |
| Wambo Road | 5/09/2018 22:56 | 2.0 | F | 48 | Yes | 44 | 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; and*
*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 – September 2018**

| 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 | 5/09/2018 21:04 | 3 | E | 37 | Yes | IA | Nil |
| Bulga Village | 5/09/2018 23:18 | 2.2 | F | 38 | No | IA | NA |
| Gouldsville | 5/09/2018 21:23 | 2.1 | F | 35 | No | IA | NA |
| Inlet Rd | 5/09/2018 21:22 | 2.1 | F | 37 | No | 32 | NA |
| Inlet Rd West | 5/09/2018 21:00 | 3 | E | 35 | Yes | IA | Nil |
| Long Point | 5/09/2018 21:00 | 3 | E | 35 | Yes | IA | Nil |
| South Bulga | 5/09/2018 21:40 | 2.5 | D | 36 | Yes | 33 | Nil |
| Wambo Road | 5/09/2018 22:56 | 2 | 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; and*
*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 – September 2018**

| 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 | 5/09/2018 21:04 | 3 | E | 47 | Yes | IA | Nil |
| Bulga Village | 5/09/2018 23:18 | 2.2 | F | 48 | No | IA | NA |
| Gouldsville | 5/09/2018 21:23 | 2.1 | F | 45 | No | IA | NA |
| Inlet Rd | 5/09/2018 21:22 | 2.1 | F | 47 | No | 41 | NA |
| Inlet Rd West | 5/09/2018 21:00 | 3 | E | 45 | Yes | IA | Nil |
| Long Point | 5/09/2018 21:00 | 3 | E | 45 | Yes | IA | Nil |
| South Bulga | 5/09/2018 21:40 | 2.5 | D | 46 | Yes | 43 | Nil |
| Wambo Road | 5/09/2018 22:56 | 2 | 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 LA1,1minute attributed to MTO;*
*3. Bold results in red are possible exceedances of relevant criteria; and*
*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 - September 2018**

| 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 | 5/09/2018 21:04 | 37/IA | NA/NA | NA/NA | NA/NA | NA/NA | NA |
| Bulga Village | 5/09/2018 23:18 | 38/IA | NA/NA | NA/NA | NA/NA | NA/NA | NA |
| Gouldsville | 5/09/2018 21:23 | IA/IA | NA/NA | NA/NA | NA/NA | NA/NA | NA |
| Inlet Rd | 5/09/2018 21:22 | 35/32 | NA/NA | NA/NA | NA/NA | NA/NA | NA |
| Inlet Rd West | 5/09/2018 21:00 | 31/IA | 50/NA | 19/NA | 0/NA | Nil/NA | NA |
| Long Point | 5/09/2018 21:00 | IA/IA | NA/NA | NA/NA | NA/NA | NA/NA | NA |
| South Bulga | 5/09/2018 21:40 | 33/33 | NA/NA | NA/NA | NA/NA | NA/NA | NA |
| Wambo Road | 5/09/2018 22:56 | 36/IA | 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, 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; and*
*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.*

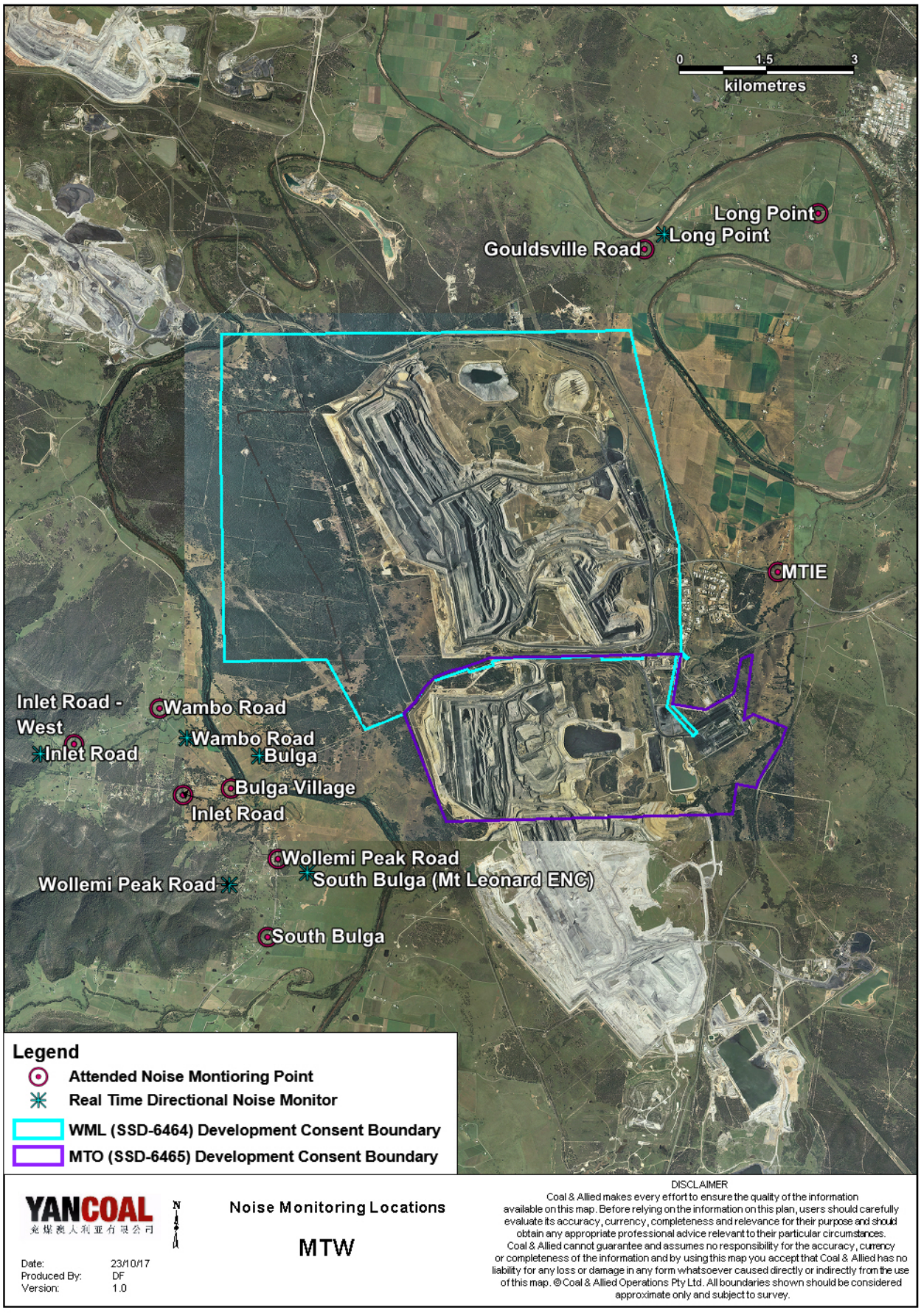



**Figure 69: Noise Monitoring Location Plan**

## 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 September are provided in **Table 10**.

.

**Table 10: Supplementary Attended Noise Monitoring Data – September 2018**

| No. of assessments | No. of assessments > trigger | No. of nights where assessments > trigger | % greater than trigger |
|---|---|---|---|
| 561 | 4 | 2 | 0.7 |

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 529 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**.

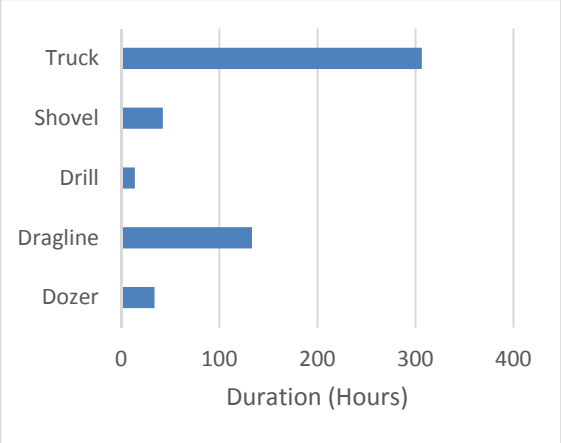



**Figure 70: Operational Downtime by Equipment Type – September 2018**

## 7.0 REHABILITATION

During September, 3.5Ha of land was released, 1.9Ha was topsoiled, 1.9 Ha was composted and 6.6 Ha was rehabilitated. Year-to-date progress can be viewed in **Figure 71**

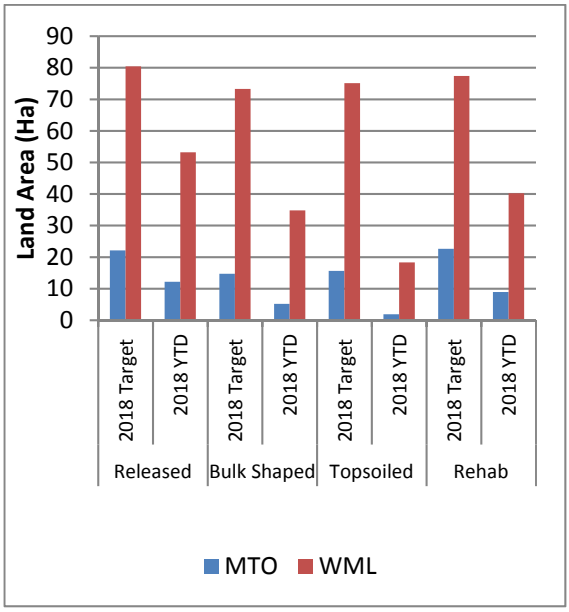



**Figure 71: Rehabilitation YTD - September 2018**

## 8.0 ENVIRONMENTAL INCIDENTS

There were no reportable environmental incidents during the reporting period.

## 9.0 COMPLAINTS

During the reporting period 40 complaints were received, details of these complaints are displayed in **Figure 72** below.

| | Noise | Dust | Blast | Lighting | Other | Total |
|---|---|---|---|---|---|---|
| **January** | 9 | 6 | 15 | 1 | 0 | 31 |
| **February** | 7 | 4 | 3 | 3 | 0 | 17 |
| **March** | 24 | 0 | 0 | 3 | 0 | 27 |
| **April** | 8 | 3 | 9 | 3 | 2 | 25 |
| **May** | 13 | 11 | 3 | 3 | 0 | 30 |
| **June** | 14 | 2 | 8 | 0 | 0 | 24 |
| **July** | 9 | 12 | 8 | 0 | 0 | 29 |
| **August** | 22 | 13 | 5 | 3 | 0 | 43 |
| **September** | 22 | 9 | 3 | 5 | 1 | 40 |
| **October** | | | | | | |
| **November** | | | | | | |
| **December** | | | | | | |
| **Total** | 128 | 60 | 54 | 21 | 3 | 266 |

**Figure 72: Complaints Summary - YTD September 2018**

# Appendix A: Meteorological Data

**Table 11: Meteorological Data – Charlton Ridge Meteorological Station – September 2018**

| 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) |
|---|---|---|---|---|---|---|---|---|
| 1/09/2018 | 19 | 9 | 90 | 37 | 962 | 308 | 5.1 | 0.0 |
| 2/09/2018 | 19 | 8 | 72 | 30 | 1096 | 187 | 2.5 | 0.0 |
| 3/09/2018 | 18 | 8 | 92 | 45 | 1116 | 164 | 3.1 | 3.2 |
| 4/09/2018 | 17 | 8 | 96 | 55 | 1196 | 154 | 2.9 | 3.4 |
| 5/09/2018 | 20 | 8 | 94 | 43 | 1199 | 154 | 2.6 | 0.2 |
| 6/09/2018 | 22 | 9 | 91 | 37 | 1089 | 154 | 1.8 | 0.4 |
| 7/09/2018 | 18 | 11 | 98 | 68 | 791 | 176 | 1.8 | 8.4 |
| 8/09/2018 | 16 | 11 | 90 | 67 | 1209 | 180 | 3.2 | 0.0 |
| 9/09/2018 | 23 | 8 | 91 | 21 | 904 | 260 | 2.8 | 0.0 |
| 10/09/2018 | 22 | 8 | 86 | 29 | 856 | 200 | 2.1 | 0.0 |
| 11/09/2018 | 24 | 7 | 93 | 28 | 806 | 149 | 1.7 | 0.0 |
| 12/09/2018 | - | - | - | - | 852 | 256 | 3.5 | 0.0 |
| 13/09/2018 | - | - | - | - | 846 | 139 | 2.8 | 0.0 |
| 14/09/2018 | 29 | 14 | 85 | 16 | 888 | 200 | 2.3 | 0.0 |
| 15/09/2018 | 33 | 9 | 74 | 5 | 953 | 250 | 3.9 | 0.0 |
| 16/09/2018 | 19 | 6 | 58 | 5 | 961 | 179 | 3.5 | 0.0 |
| 17/09/2018 | 20 | 4 | 72 | 25 | 1100 | 150 | 2.2 | 0.0 |
| 18/09/2018 | 26 | 5 | 90 | 19 | 926 | 212 | 2.6 | 0.0 |
| 19/09/2018 | 28 | 9 | 68 | 10 | 1202 | 241 | 3.5 | 0.0 |
| 20/09/2018 | 16 | 6 | 80 | 45 | 1216 | 143 | 2.4 | 0.0 |
| 21/09/2018 | 21 | 4 | 87 | 19 | 941 | 173 | 1.8 | 0.0 |
| 22/09/2018 | 26 | 7 | 80 | 11 | 1101 | 235 | 2.4 | 0.0 |
| 23/09/2018 | 26 | 8 | 71 | 15 | 948 | 175 | 2.8 | 0.0 |
| 24/09/2018 | 16 | 10 | 90 | 50 | 1064 | 158 | 3.7 | 0.0 |
| 25/09/2018 | 20 | 8 | 91 | 34 | 1249 | 135 | 2.6 | 0.0 |
| 26/09/2018 | 15 | 7 | 93 | 55 | 907 | 154 | 2.0 | 3.8 |
| 27/09/2018 | 23 | 8 | 93 | 19 | 1016 | 153 | 1.7 | 0.2 |
| 28/09/2018 | 31 | 6 | 93 | 8 | 991 | 233 | 2.5 | 0.0 |
| 29/09/2018 | 25 | 9 | 63 | 11 | 1010 | 199 | 3.0 | 0.0 |
| 30/09/2018 | 21 | 7 | 78 | 24 | 1355 | 146 | 2.9 | 0.0 |

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