# Monthly Environmental Monitoring Report

## Yancoal Hunter Valley Operations

## September 2017

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Revision History

| Version No. | Person Responsible | Document Status | Date |
|---|---|---|---|
| **1.0** | **Environmental Graduate** | **Draft** | **27/10/2017** |
| **1.1** | **Environmental Specialist** | **Final** | **9/11/2017** |

# 1.0 INTRODUCTION

This report has been compiled to provide a monthly summary of environmental monitoring results for Hunter Valley Operations (HVO). This report includes all monitoring data collected for the period 1st September to 30th September.

# 2.0 AIR QUALITY

## 2.1 Meteorological Monitoring

HVO maintains two meteorological stations; 'Corporate' and 'Cheshunt' (Refer toFigure 4: Air Quality Monitoring Location Plan).

### 2.1.1 Rainfall

Rainfall for the period is summarised in Table 1, the 2017 trend and historical trend are shown in Figure 1

**Table 1: Monthly Rainfall HVO**

| 2017 | Monthly Rainfall (mm) | Cumulative Rainfall (mm) |
|---|---|---|
| **September** | 7.4 | 363.8 |

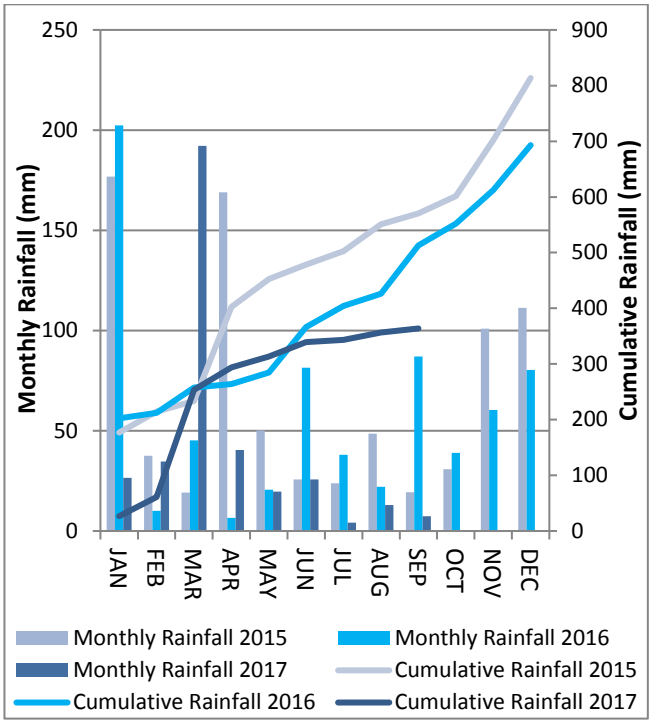


**Figure 1: Rainfall Summary 2017**

### 2.1.2 Wind Speed and Direction

North-Westerly winds were dominant during September as shown in Figure 2 (HVO Corporate) and Figure 3 (HVO Cheshunt).

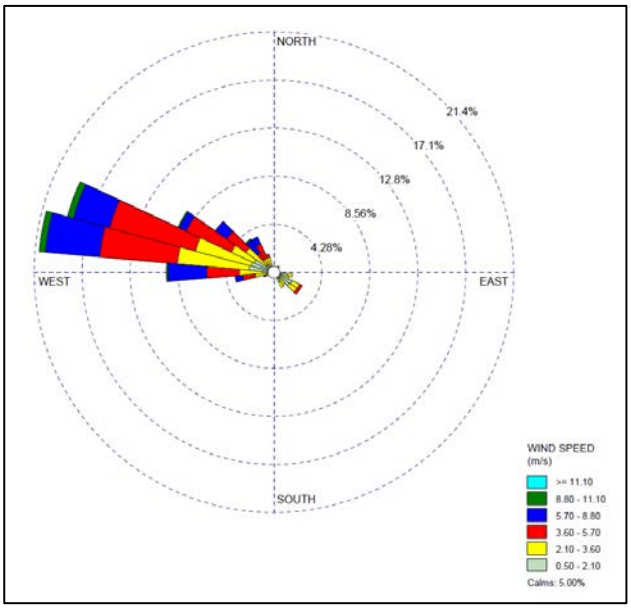


**Figure 2: HVO Corporate Wind Rose – September 2017**

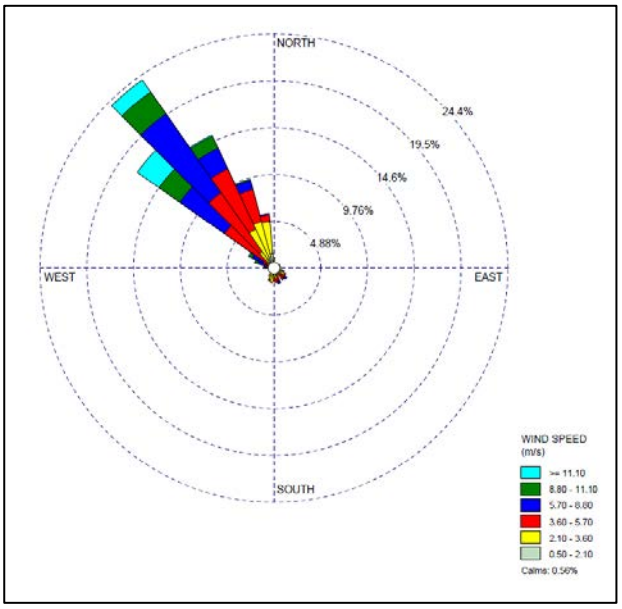


**Figure 3: HVO Cheshunt Wind Rose – September 2017**

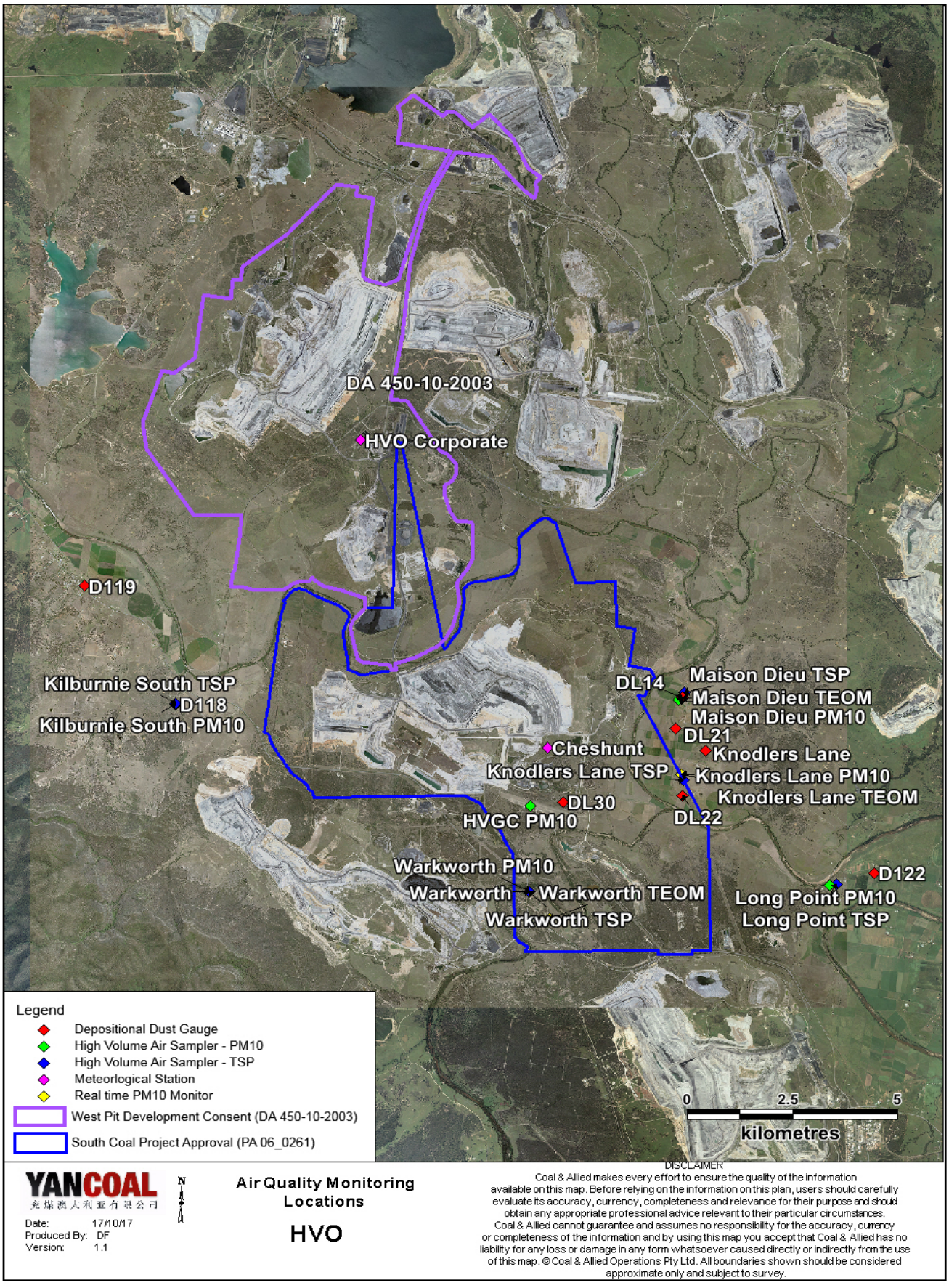


**Figure 4: Air Quality Monitoring Location Plan**

## 2.2 Depositional Dust

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

Figure 5 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 DL21, Knodlers Lane and DL30 monitors recorded monthly results above the long term impact assessment criteria of 4.0 g/m$^2$ per month.

The field notes associated with the DL21, Knodlers Lane and DL30 monitors results confirm the presence of insects and bird droppings. As such the results are considered contaminated and will be excluded from calculation of the annual average.

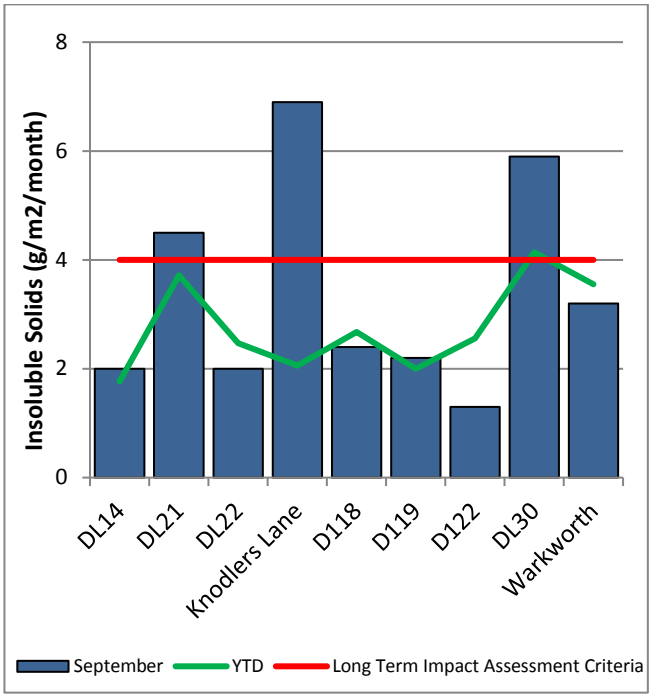


**Figure 5: Depositional Dust Results – September 2017**

## 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 4. Each HVAS was run for 24 hours on a six-day cycle.

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

Figure 6 shows individual $PM_{10}$ results at each monitoring station against the short term impact assessment criteria of 50 µg/m3.

On 3/09/2017 three HVAS $PM_{10}$ units recorded results which were greater than the short term (24hr) $PM_{10}$ impact assessment criteria; Long Point (113 µg/m3), Knodlers Lane (59 µg/m3) and Glider Club (82 µg/m3).

At the time of preparation of this report, the results at Long Point, Knodlers Lane and Glider Club are under external investigation, results of these investigations will be provided in the Annual Environment Report.

On 15/09/2017 one HVAS $PM_{10}$ unit recorded results which were greater than the short term (24hr) $PM_{10}$ impact assessment criteria; Glider Club (54 µg/m3).

Investigation determined that HVO's maximum contribution at Glider Club is estimated to be less than 44.5 µg/m3; or less than 82% of the measured result. Accordingly, no further action is required (as per approved Air Quality Monitoring Programme).

On 21/09/2017 one HVAS $PM_{10}$ unit recorded results which were greater than the short term (24hr) $PM_{10}$ impact assessment criteria; Glider Club (62 µg/m3).

Investigation determined that HVO's maximum contribution at Glider Club is estimated to be less than 44.5 µg/m3; or less than 72% of the measured result. Accordingly, no further action is required (as per approved Air Quality Monitoring Programme).

On 27/09/2017 one HVAS PM10 unit recorded results which were greater than the short term (24hr) $PM_{10}$ impact assessment criteria; Kilburnie South (62 µg/m3).

Investigation determined that HVO's maximum contribution at Kilburnie South is estimated to be less than 13 µg/m3; or less than 26% of the measured result. Accordingly, no further action is required (as per approved Air Quality Monitoring Programme).

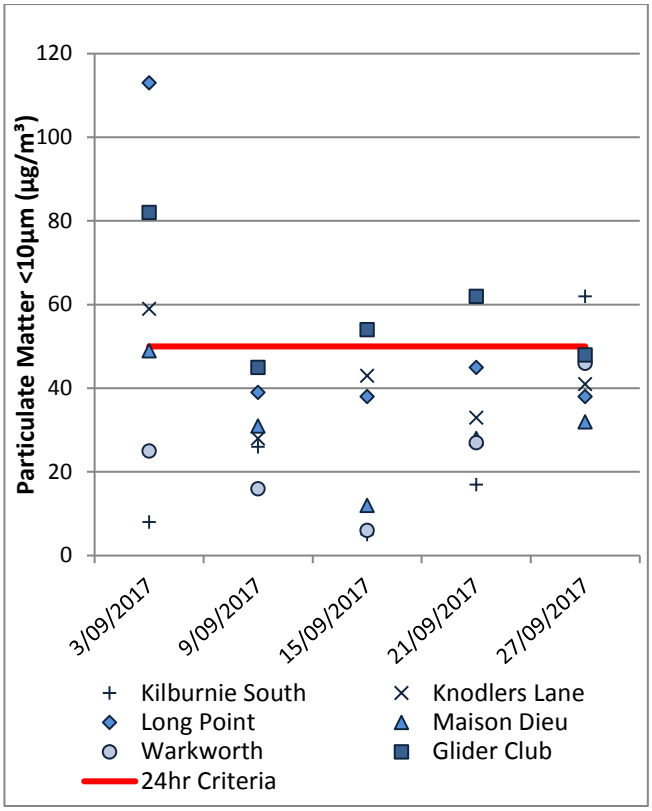


**Figure 6: Individual $PM_{10}$ Results – September 2017**

Figure 7 shows the year to date annual average $PM_{10}$ results.

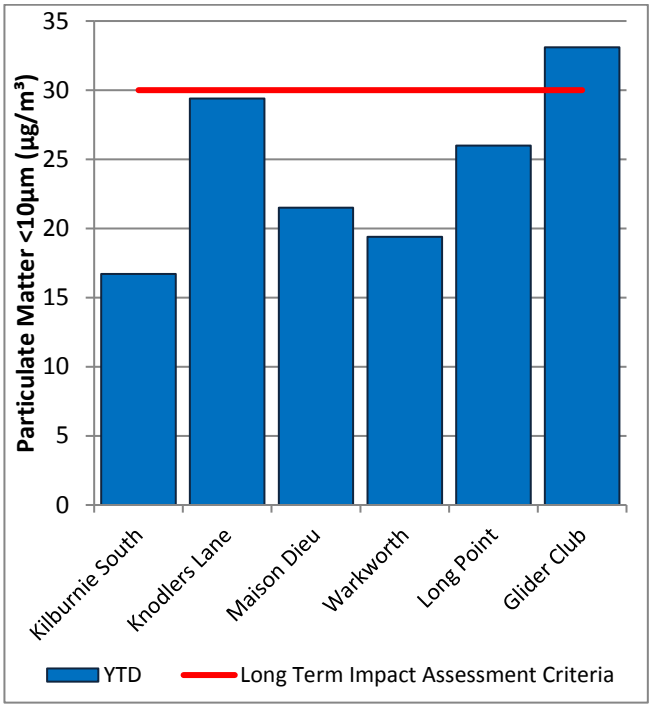


**Figure 7: Year to Date Average $PM_{10}$ – September 2017**

### 2.3.2 TSP Results

Figure 8 shows the annual average TSP results compared against the long term impact assessment criteria of 90µg/m³.

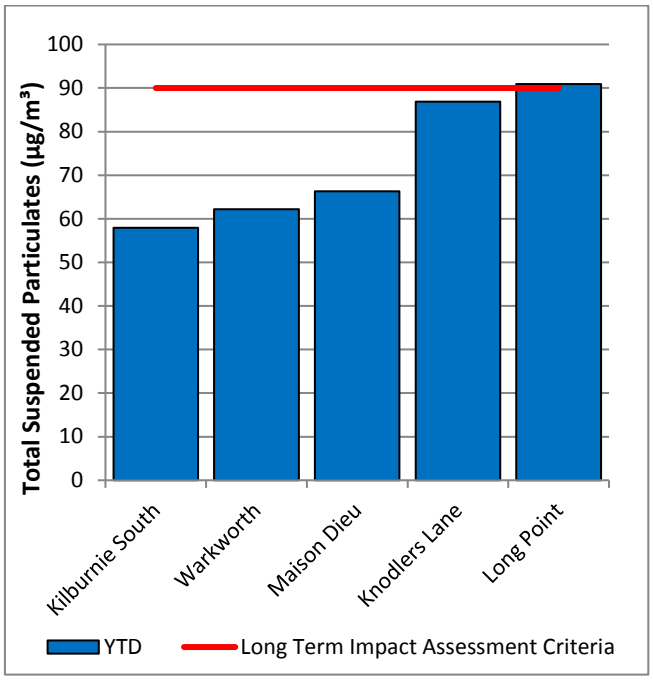


**Figure 8: Year to Date Average Total Suspended Particulates – September 2017**

### 2.3.3 Real Time $PM_{10}$ Results

Hunter Valley Operations 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 from real time $PM_{10}$ monitoring are used as a reactive measure to guide mining operations to ensure compliance with the relevant conditions of the project approval.

Results for real time dust sampling is shown in Figure 9, including the daily 24 hour average $PM_{10}$ result and the year to date 24 hour $PM_{10}$ annual average.

Seven results recorded elevated levels at the Knodlers Lane TEOM which exceeded the short term (24hr) criteria. These measurements were assessed for HVO's maximum potential contribution based on mining activities and meteorological conditions on these days.

Resulting in the following maximum estimated contributions from the direction of HVO:

- 5 September 2017 – 41 µg/m³;
- 12 September 2017 – 50 µg/m³;
- 13 September 2017 – 40µg/m³;
- 23 September 2017 – 31 µg/m³
- 24 September 2017 – 31 µg/m³
- 25 September 2017 – 40 µg/m³; and
- 30 September 2017 – 46 µg/m³

Six results recorded elevated levels at the Maison Dieu TEOM which exceeded the short term (24hr) criteria. These measurements were assessed for HVO's maximum potential contribution based on mining activities and meteorological conditions on these days. Resulting in the following maximum estimated contributions from the direction of HVO:

- 3 September 2017 – 34 µg/m³;
- 13 September 2017 – 41 µg/m³;
- 22 September 2017 – 34 µg/m³;
- 23 September 2017 – 15µg/m³
- 24 September 2017 – 46 µg/m³; and
- 25 September 2017 – 41µg/m³

### 2.3.4 Real Time Alarms for Air Quality

During September the real time monitoring system generated 176 automated air quality related alarms. 42 were related to adverse weather conditions and 134 alarms relating to $PM_{10}$.

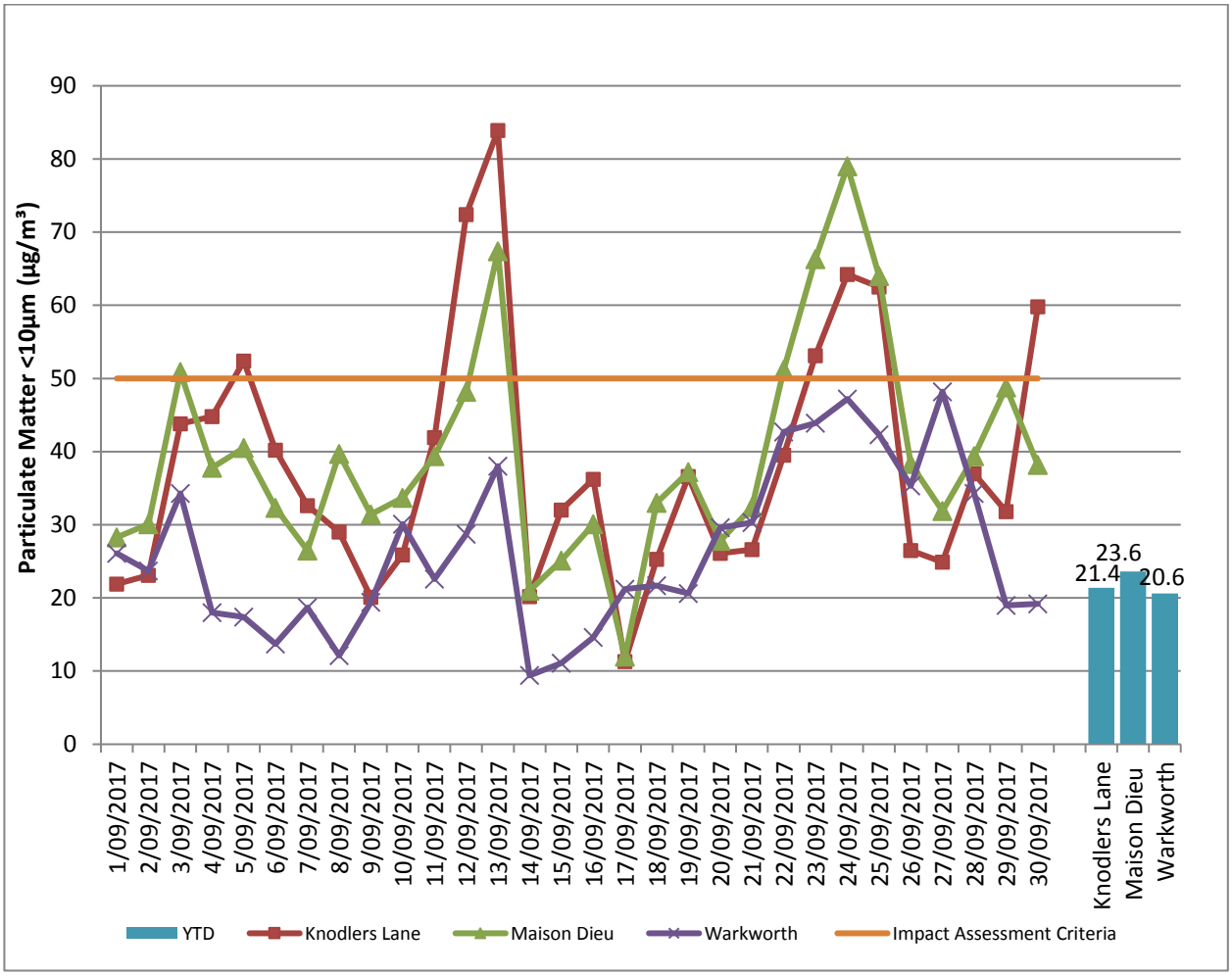


**Figure 9: Real Time $PM_{10}$ 24hr average and YTD average – September 2017**

# 3.0 SURFACE WATER

## 3.1.1 Surface Water Monitoring

Surface water courses are sampled on a quarterly or rain event sampling regime. Water quality is evaluated through the parameters of pH, Electrical Conductivity (EC) and Total Suspended Solids (TSS).

Watercourses are assessed against ANZECC Guidelines for Fresh and Marine Water Quality (2000) for:

- pH (6.5 to 8.5);
- Electrical Conductivity (125 to 2200µS/cm); and
- Total Suspended Solids (maximum 50mg/L)

The location of Surface Water monitoring locations is shown in Figure 22

Figure 10 to Figure 12 show the long term surface water trend (2014 – current) within HVO mine dams. Figure 13 to Figure 21 show the long term surface water trend (2014 – current) in surrounding watercourses.

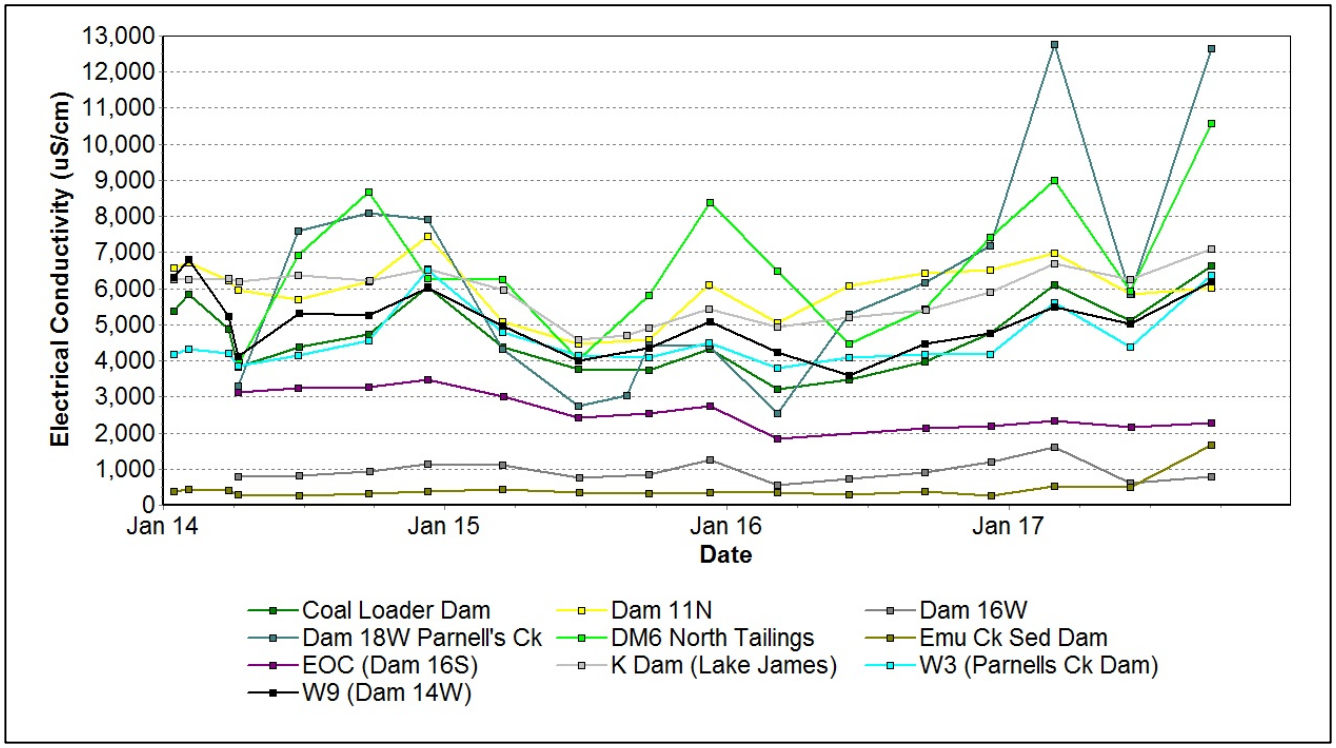


**Figure 10: Site Dams Electrical Conductivity Trend – September 2017**

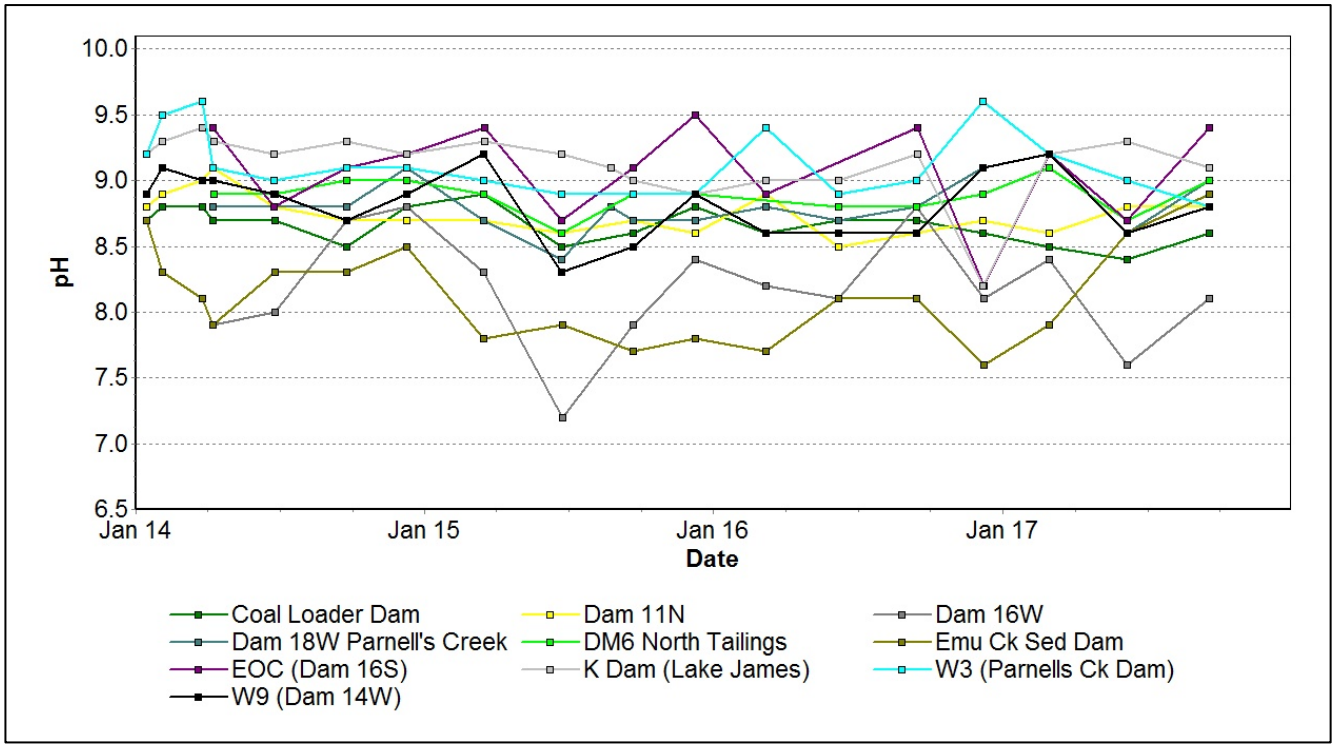


**Figure 11: Site Dams pH Trend – September 2017**

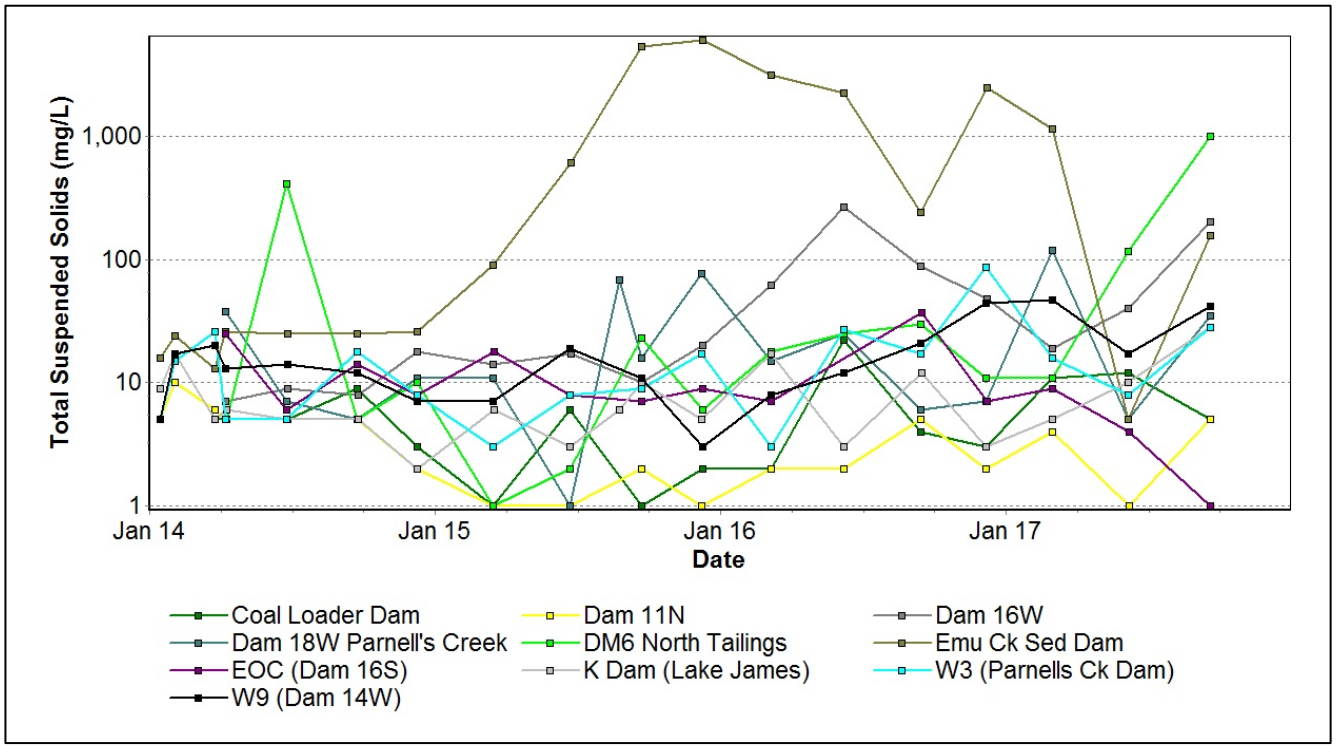


**Figure 12: Site Dams Total Suspended Solids Trend – September 2017**

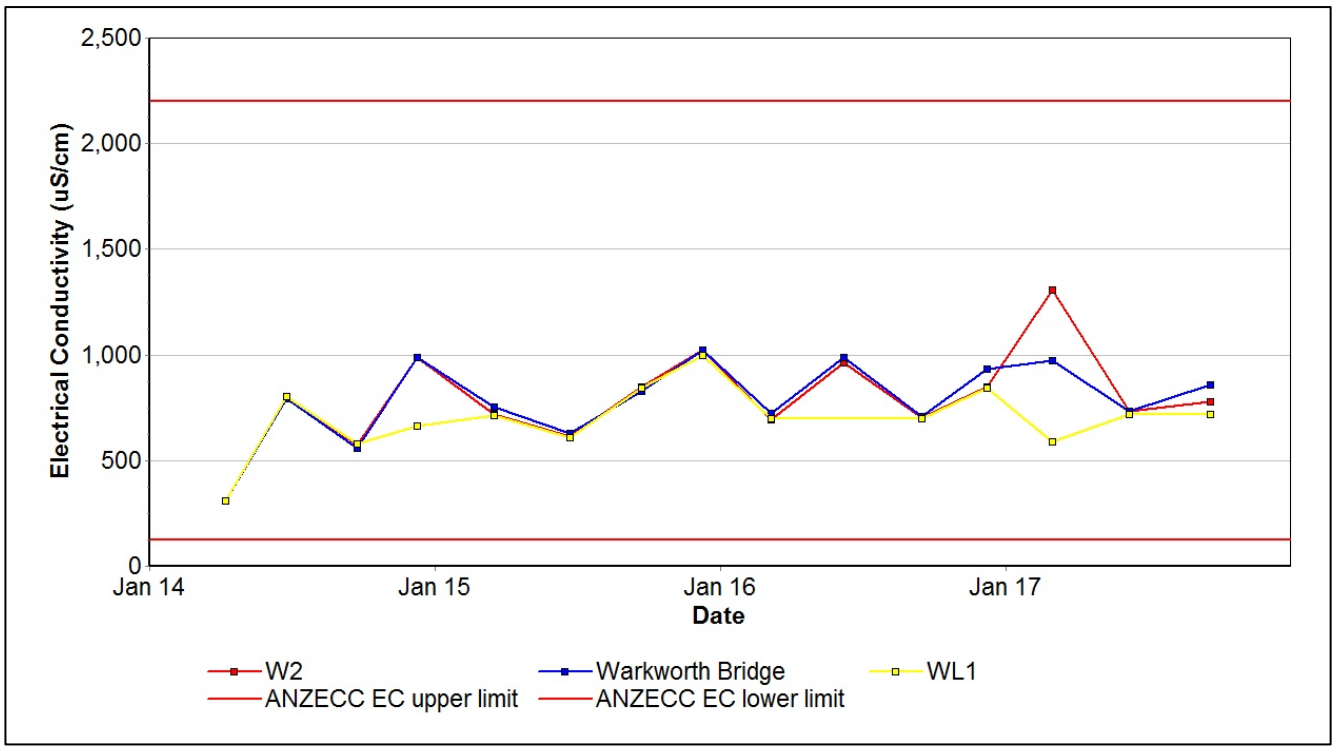


**Figure 13: Wollombi Brook Electrical Conductivity Trend - September 2017**

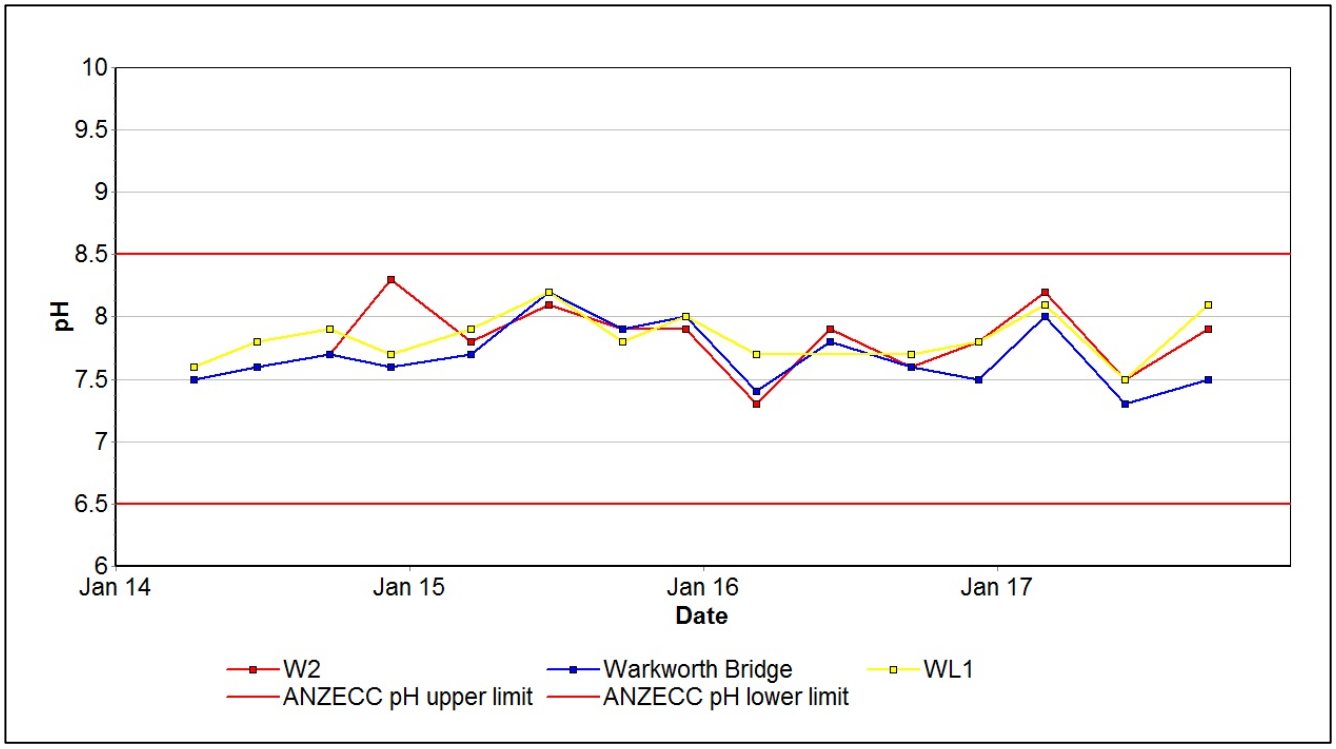


**Figure 14: Wollombi Brook pH Trend - September 2017**

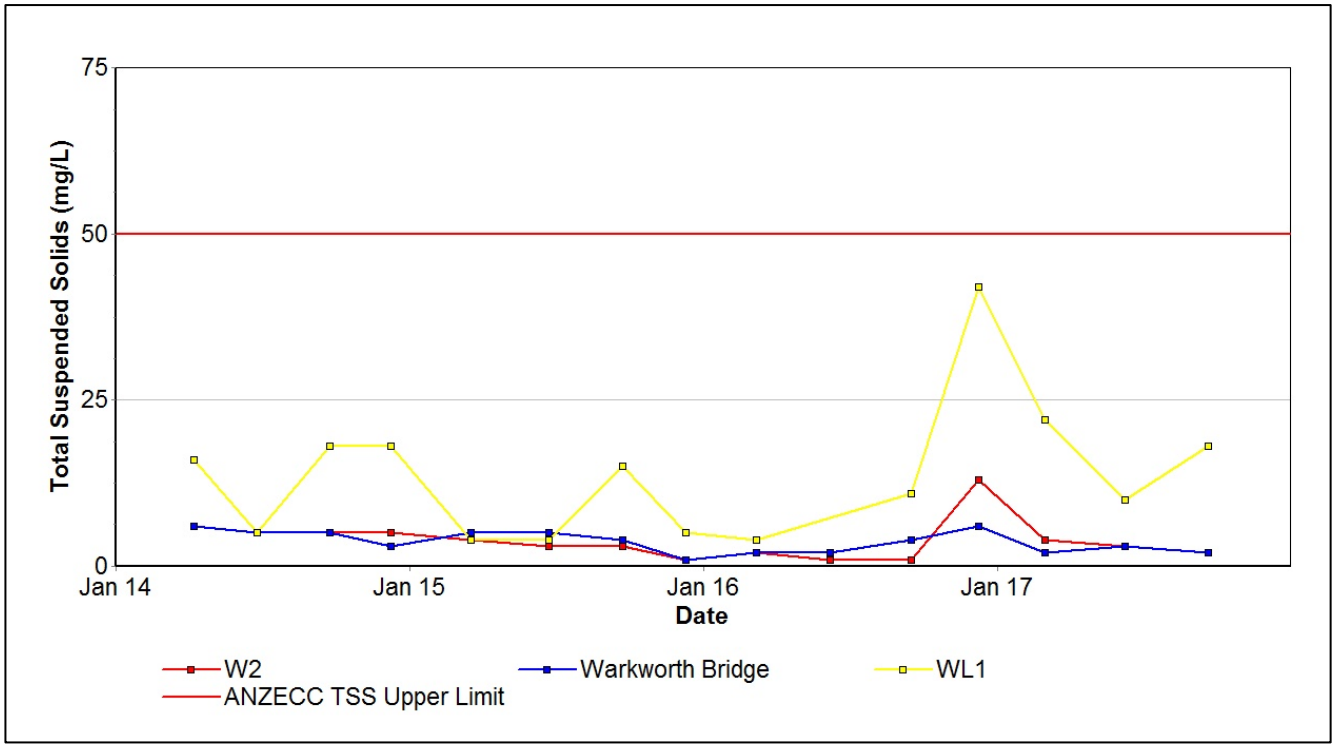


**Figure 15: Wollombi Brook Total Suspended Solids Trend - September 2017**

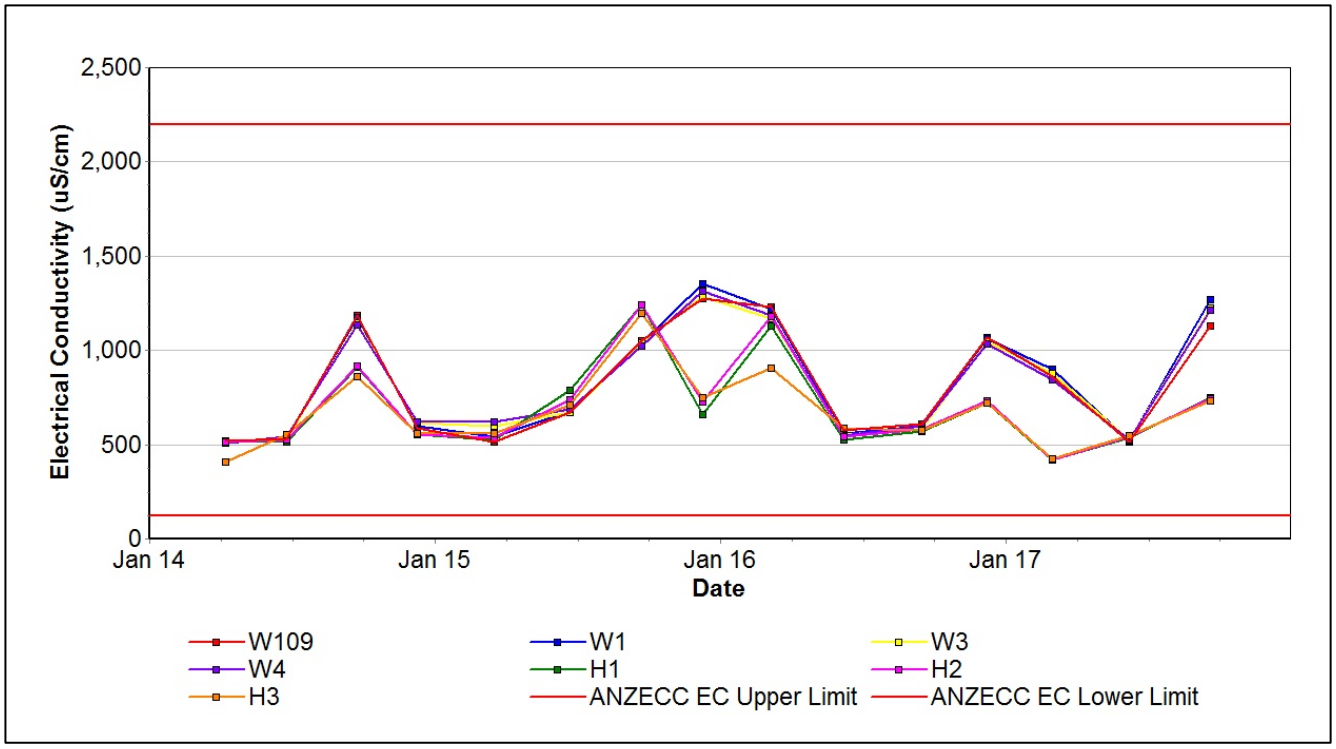


**Figure 16: Hunter River Electrical Conductivity Trend - September 2017**

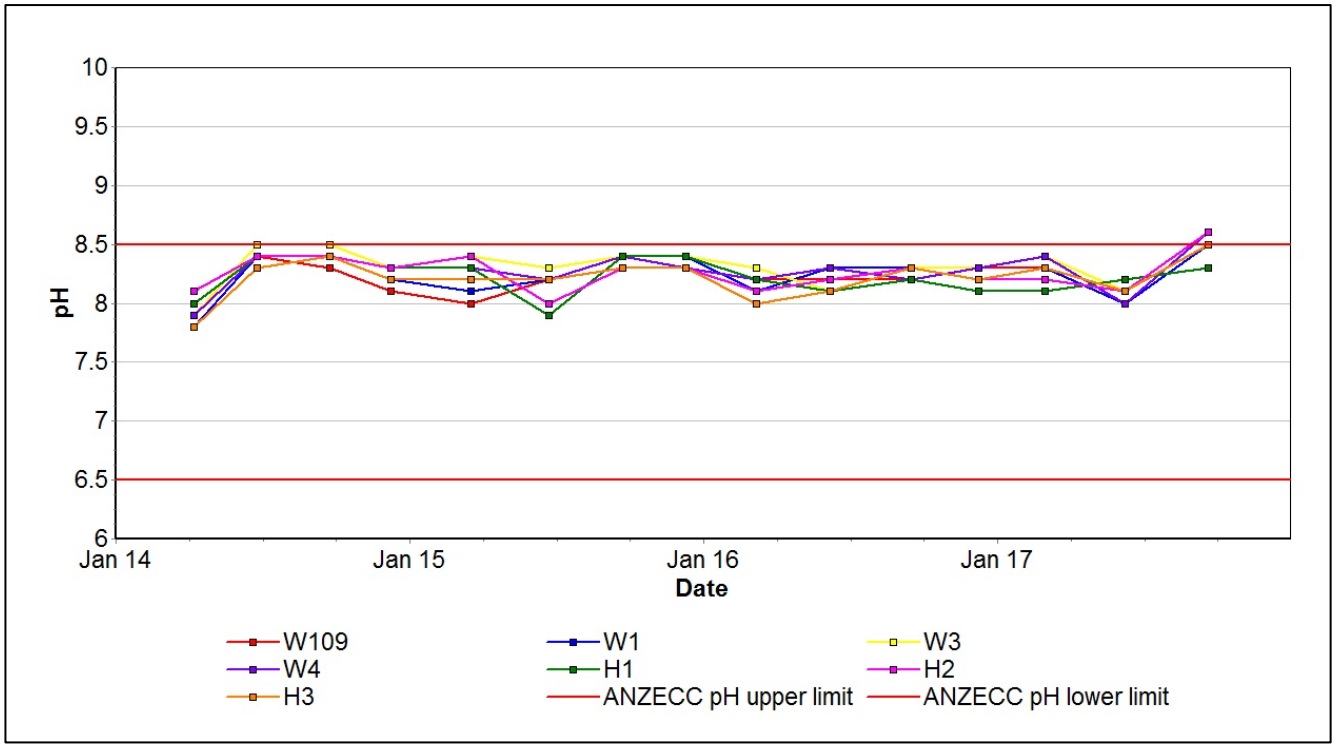


**Figure 17: Hunter River pH Trend - September 2017**

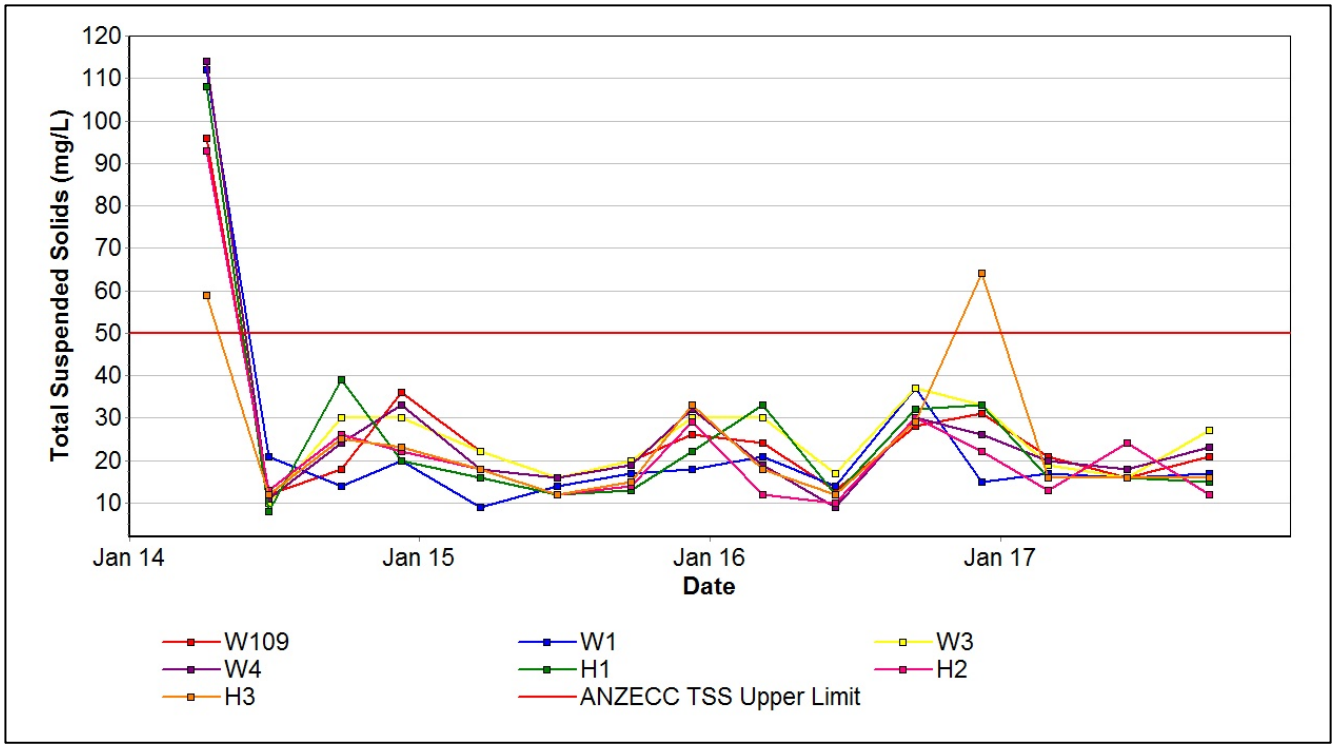


**Figure 18: Hunter River Total Suspended Solids - September 2017**

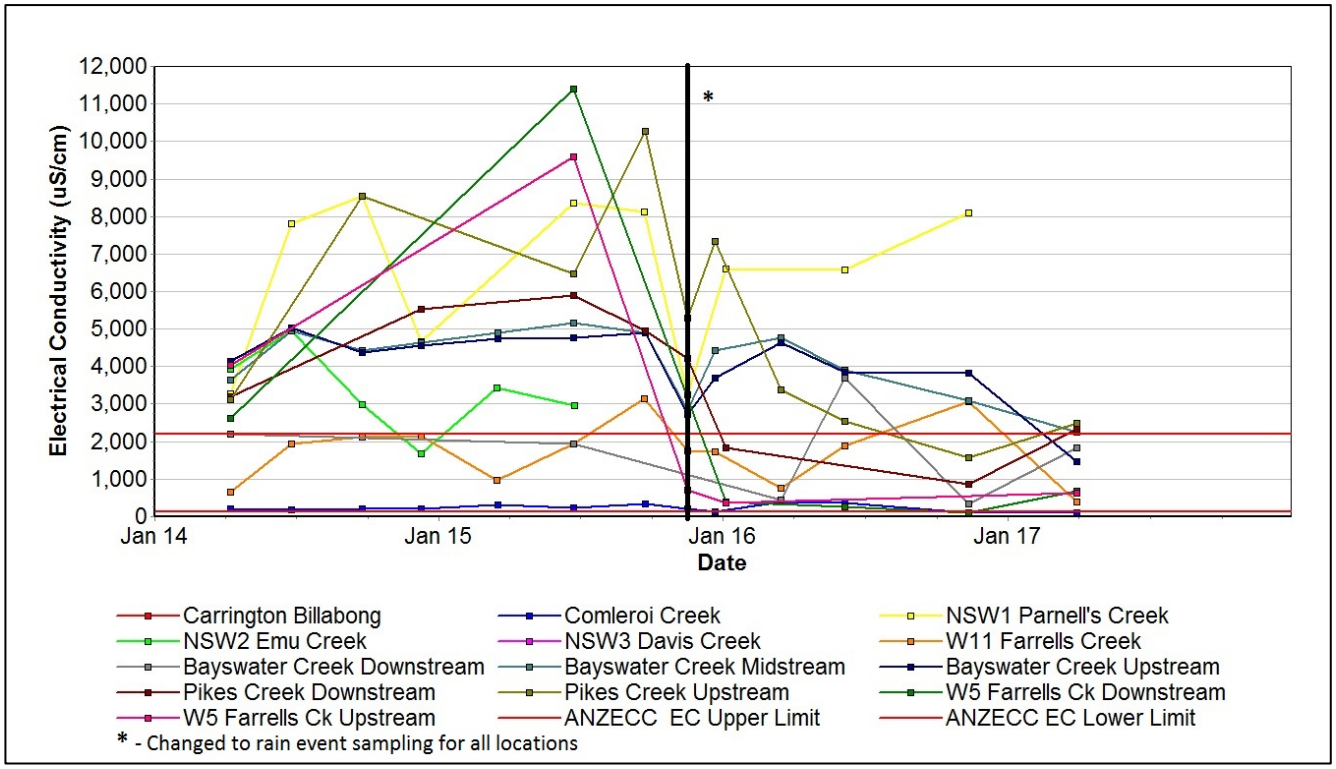


**Figure 19: Other Tributaries Electrical Conductivity Trend - September 2017**

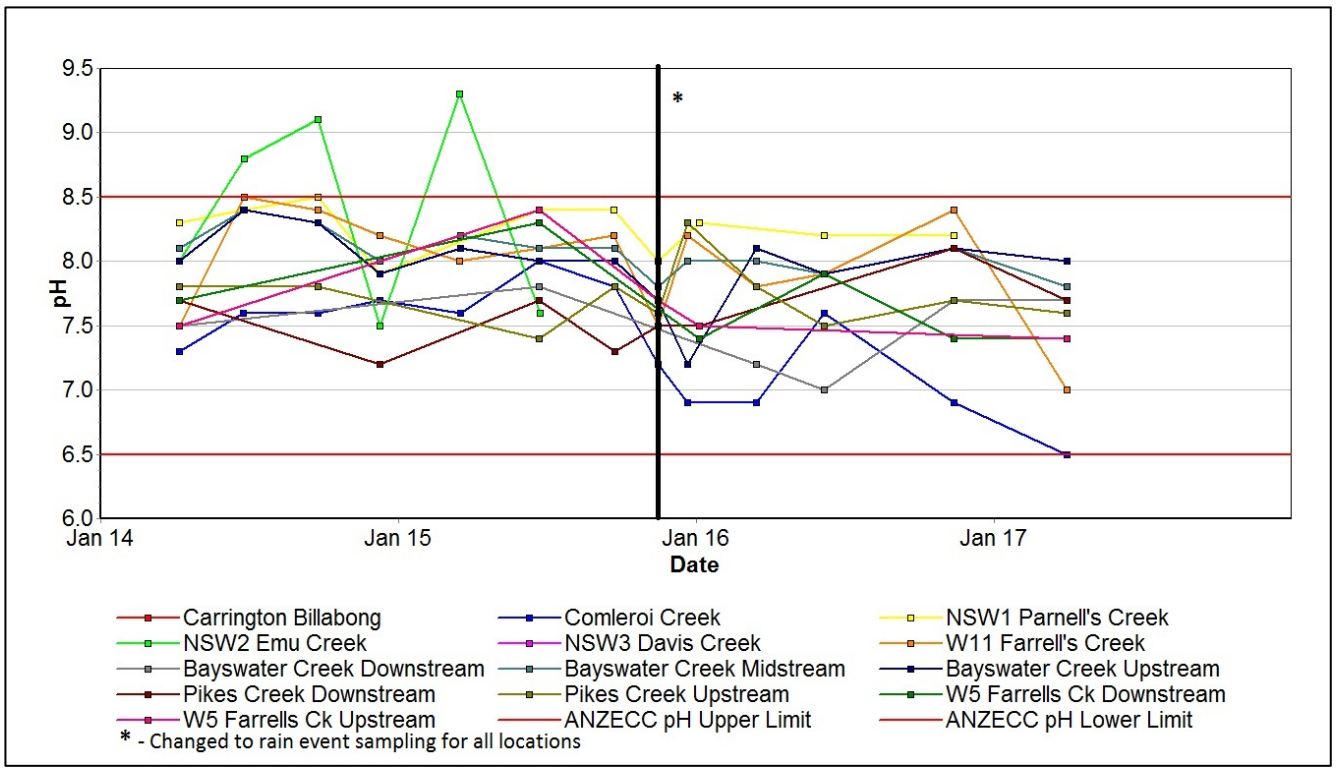


**Figure 20: Other Tributaries pH Trend – September 2017**

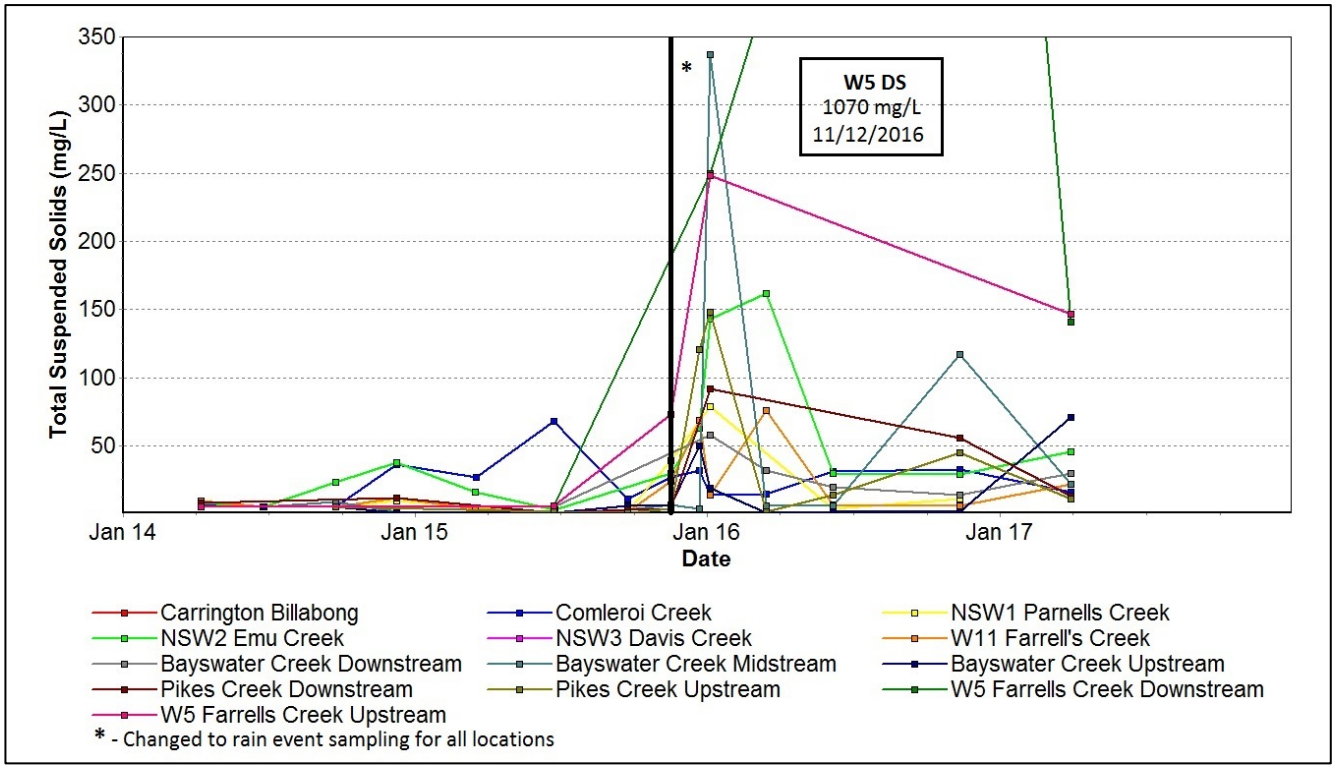


**Figure 21: Other Tributaries Total Suspended Solids Trend - September 2017**

## 3.1.2 Site Water Use

Under water allocation licences issued by the NSW Office of Water, HVO is permitted to extract water from the Hunter River. During the reporting period, HVO did not extract any water from the Hunter River.

## 3.1.3 HRSTS Discharge

HVO participates in the HRSTS, allowing it to discharge from licensed discharge points Dam 11N (to Farrell's Creek), Lake James (to the Hunter River) and Parnell's Dam (to Parnell's Creek). Discharges can only take place subject to HRSTS regulations.

During the reporting period no water was discharged under the HRSTS.

## 3.1.4 Surface Water Trigger Limits

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 HVO Water Management Plan.

During Q3 2017 a range of internal trigger limits were breached, summarised in Table 2.

**Table 2: Surface Water Trigger Limit Summary**

| Site | Date | Trigger Limit Breached | Action taken in response |
|---|---|---|---|
| W1 (Hunter River) | 08/06/2017 | pH – 5th Percentile | Watching Brief* |

| | | | |
|---|---|---|---|
| W4 Hunter River | 08/06/2017 | pH – 5th Percentile | Watching Brief* |
| H2 | 20/09/2017 | pH – 95th Percentile | Watching Brief* |
| H3 | 20/09/2017 | pH – 95th Percentile | Watching Brief* |
| W1 (Hunter River) | 20/09/2017 | pH – 95th Percentile | Watching Brief* |
| W3 Hunter River | 20/09/2017 | pH – 95th Percentile | Watching Brief* |
| W4 Hunter River | 20/09/2017 | pH – 95th Percentile | Watching Brief* |

* = Watching Brief established pending outcomes of subsequent monitoring events. No further action required.

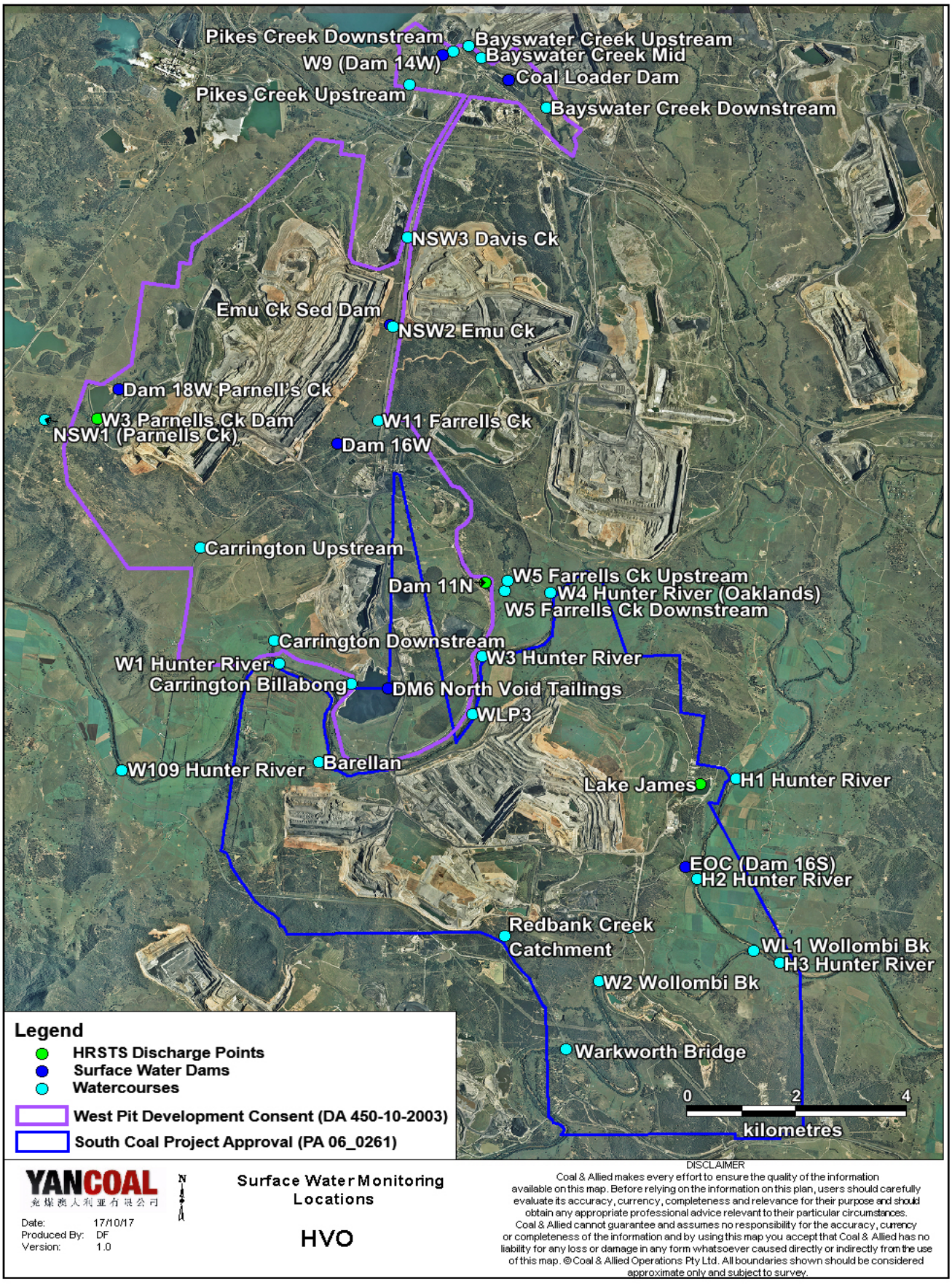


**Figure 22: Surface Water Monitoring Location Plan**

# 4.0 GROUNDWATER

## 4.1.1 Groundwater Monitoring

Groundwater monitoring is undertaken on a quarterly basis in accordance with the HVO Water Management Plan and Ground Water Monitoring Programme. Monitoring sites are shown in Figure 77

Figure 23 to Figure 76 show the long term trends (2014 – current) for ground water bores monitored at HVO.

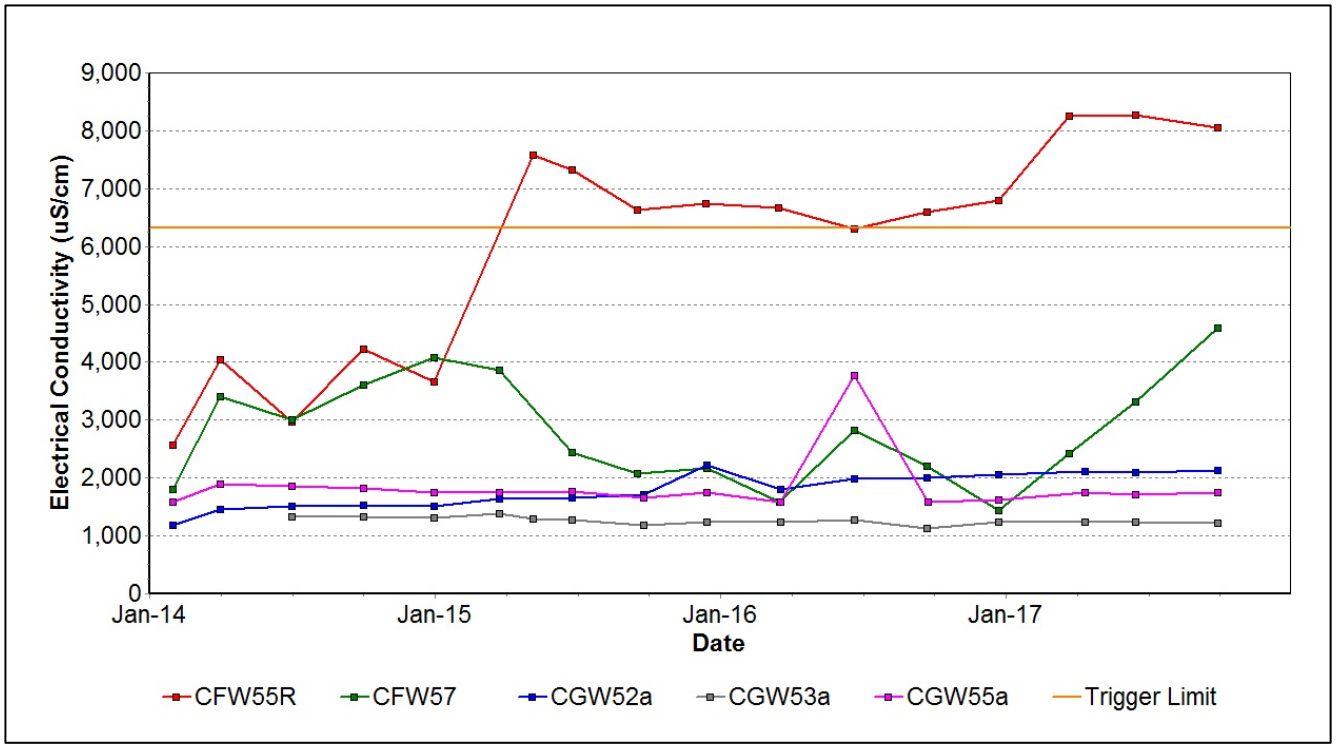


**Figure 23: Carrington Alluvium Electrical Conductivity Trend - September 2017**

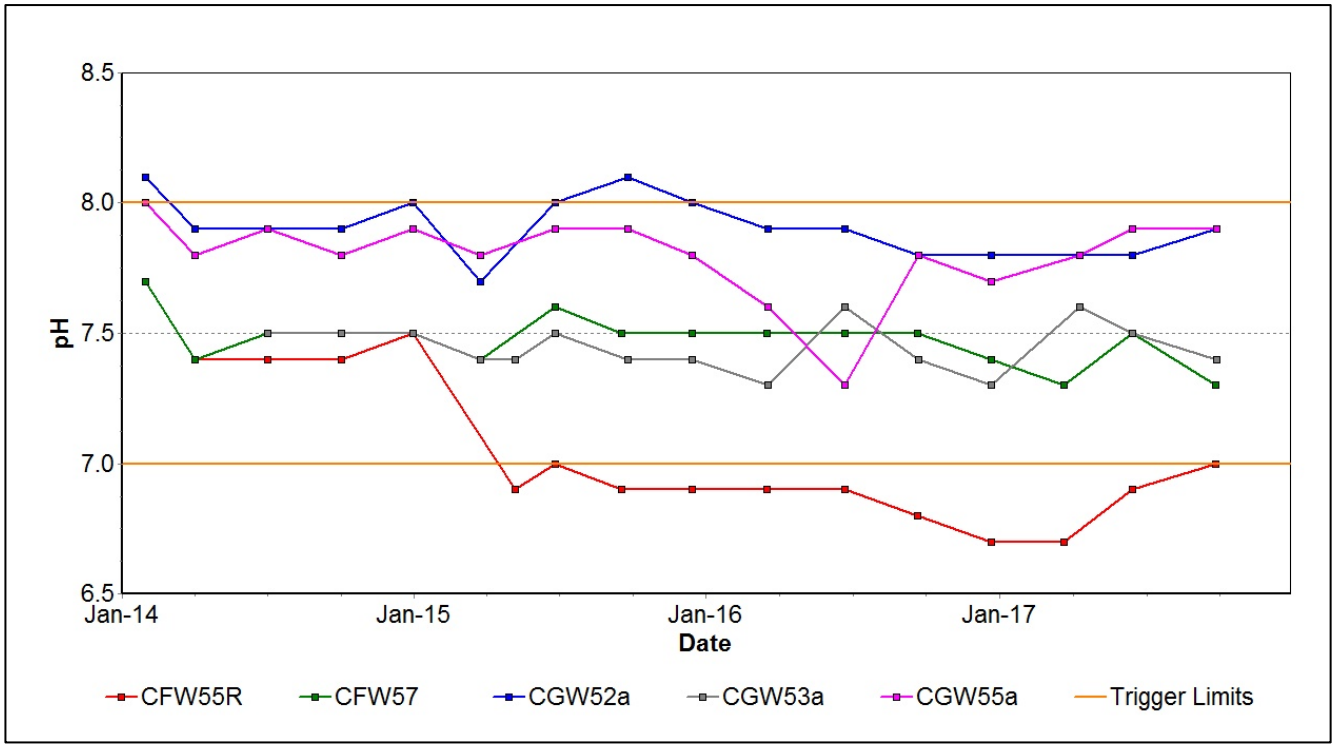


**Figure 24: Carrington Alluvium pH Trend – September 2017**

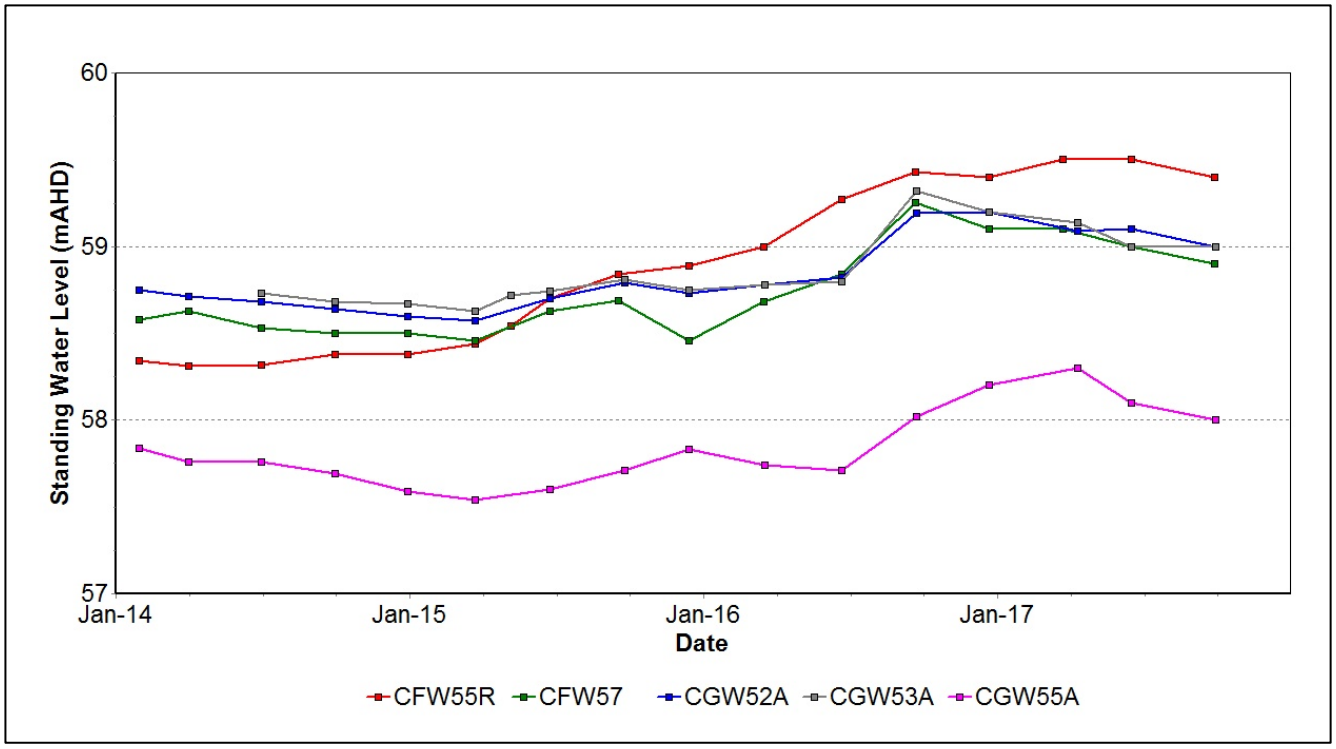


**Figure 25: Carrington Alluvium Standing Water Level - September 2017**

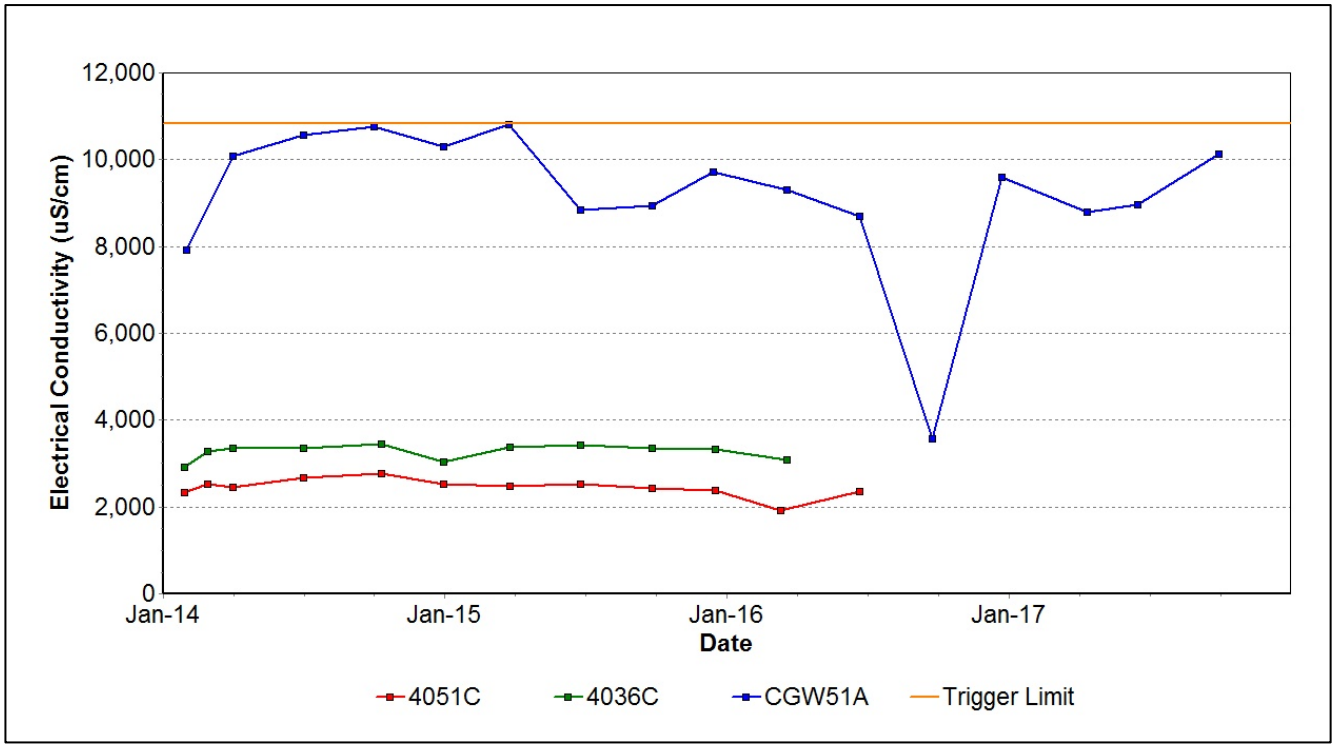


**Figure 26: Carrington Interburden Electrical Conductivity Trend - September 2017**

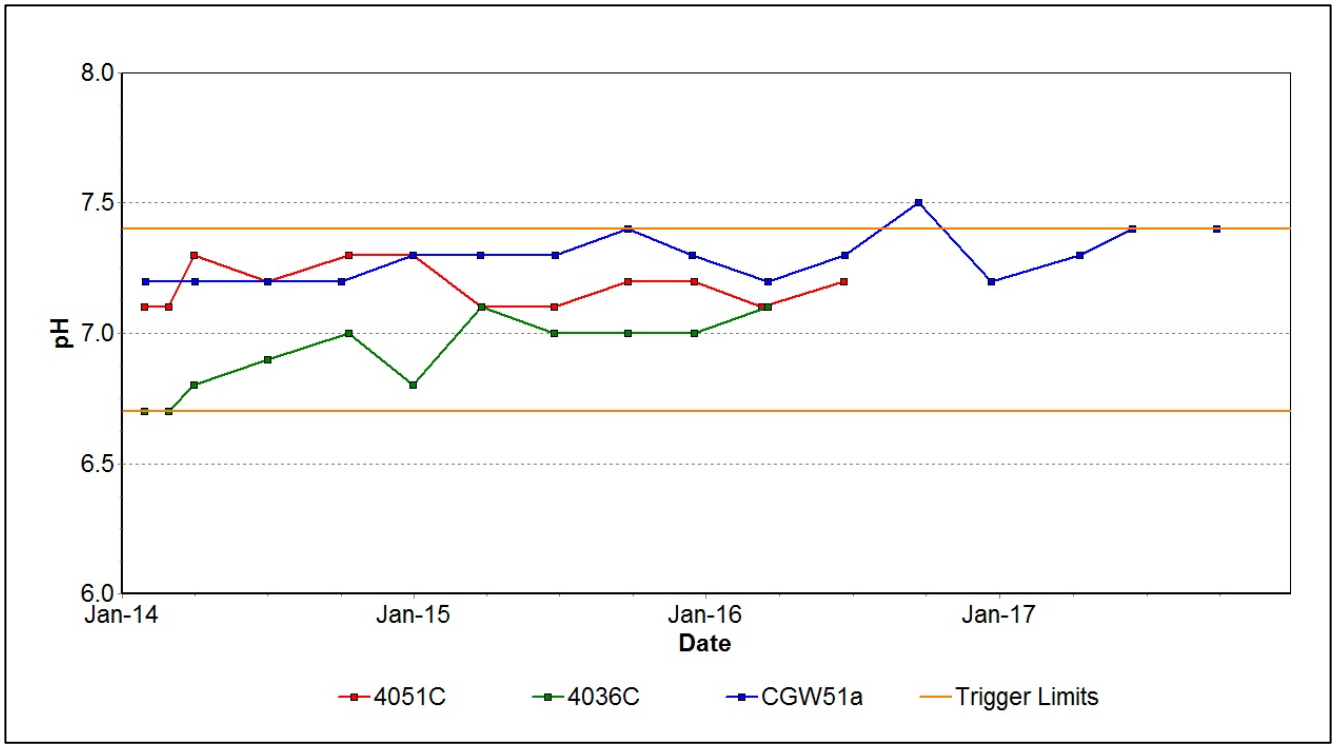


**Figure 27: Carrington Interburden pH Trend – September 2017**

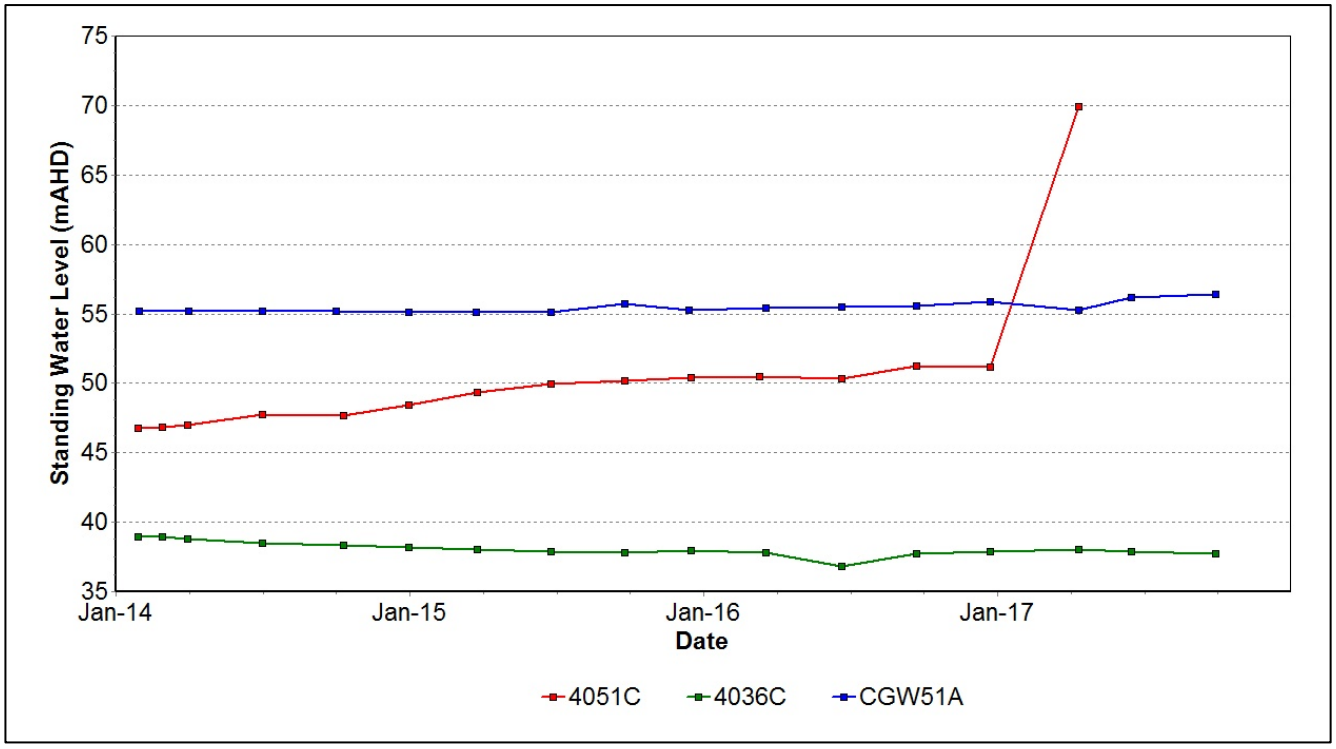


**Figure 28: Carrington Interburden Standing Water Level - September 2017**

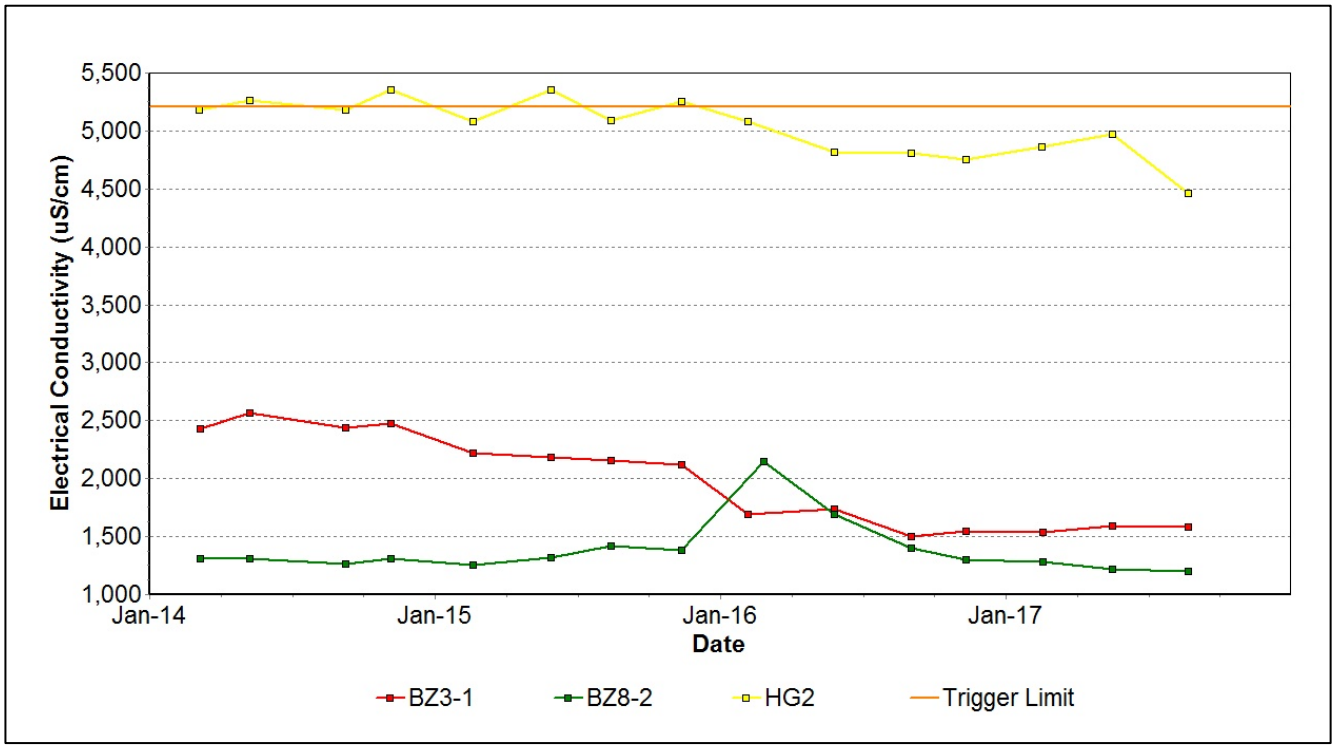


**Figure 29: Cheshunt Interburden Electrical Conductivity Trend - September 2017**

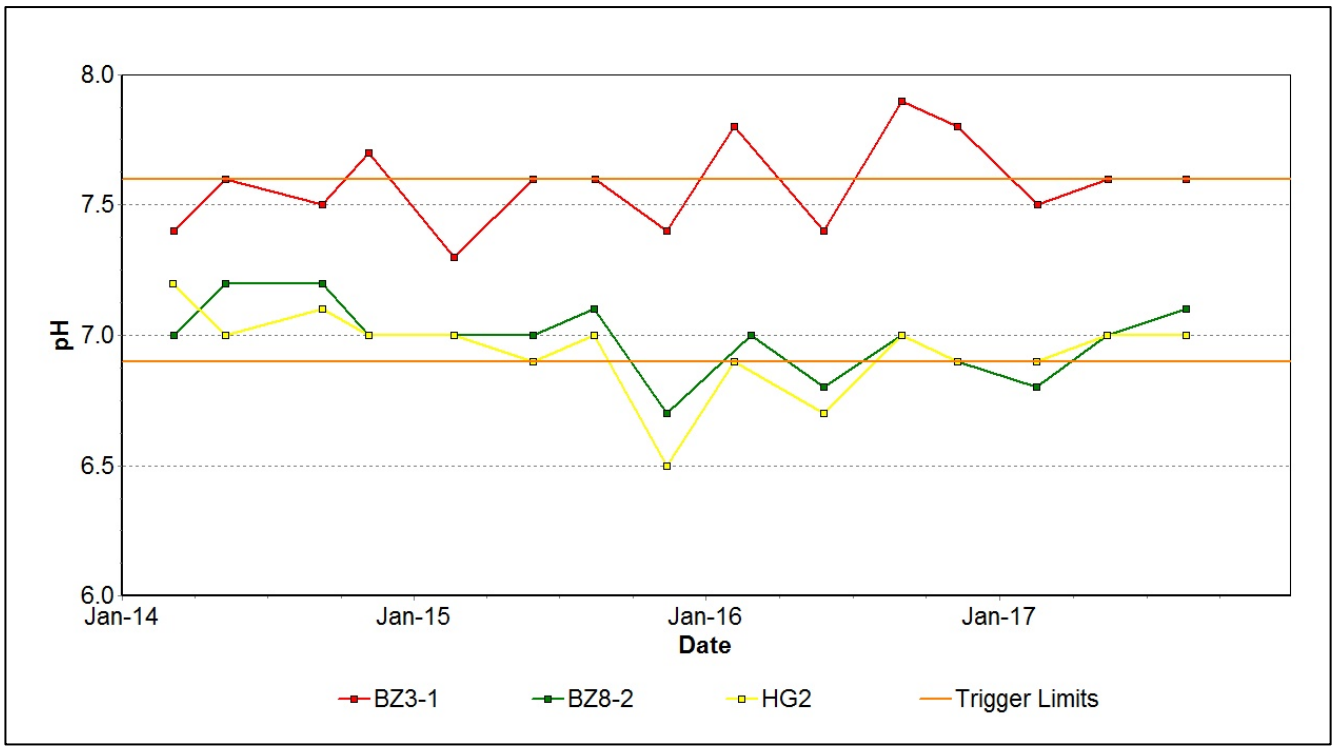


**Figure 30: Cheshunt Interburden pH Trend - September 2017**

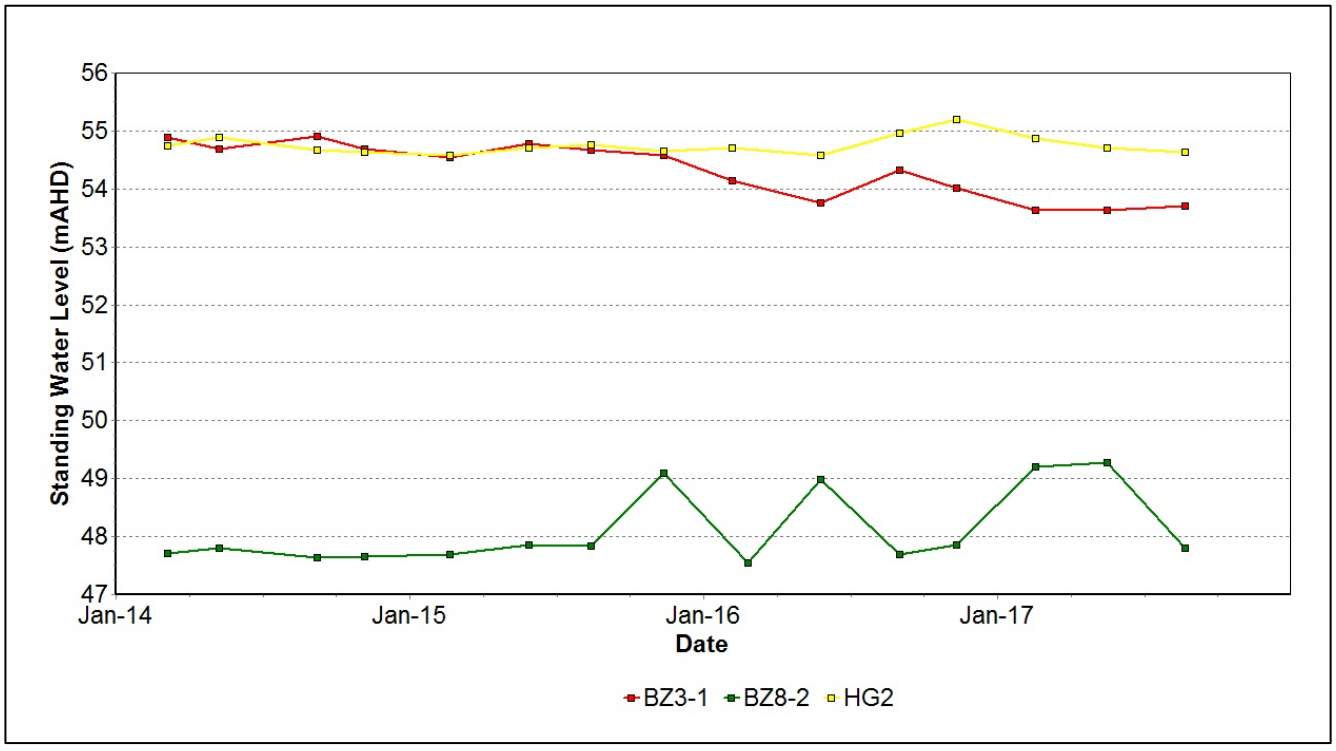


**Figure 31: Cheshunt Interburden Standing Water Level – September 2017**

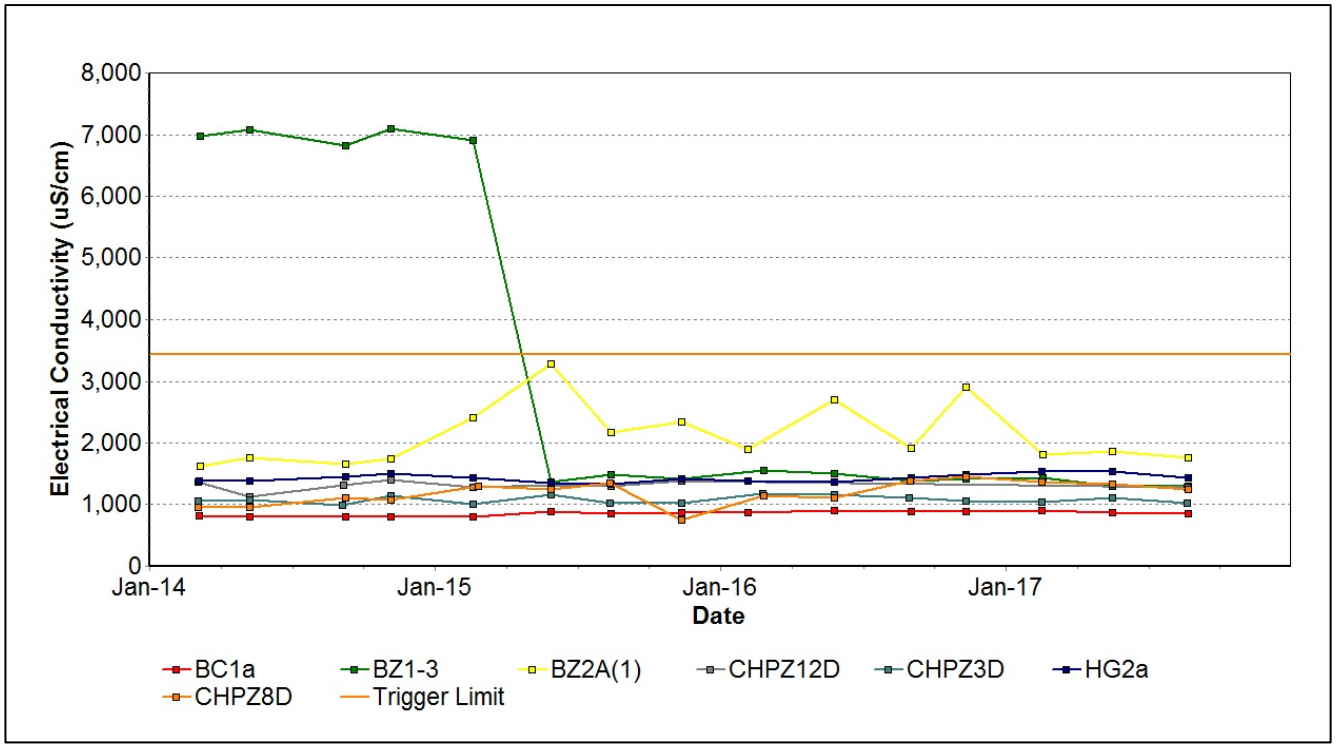


**Figure 32: Cheshunt Mt Arthur Electrical Conductivity Trend - September 2017**

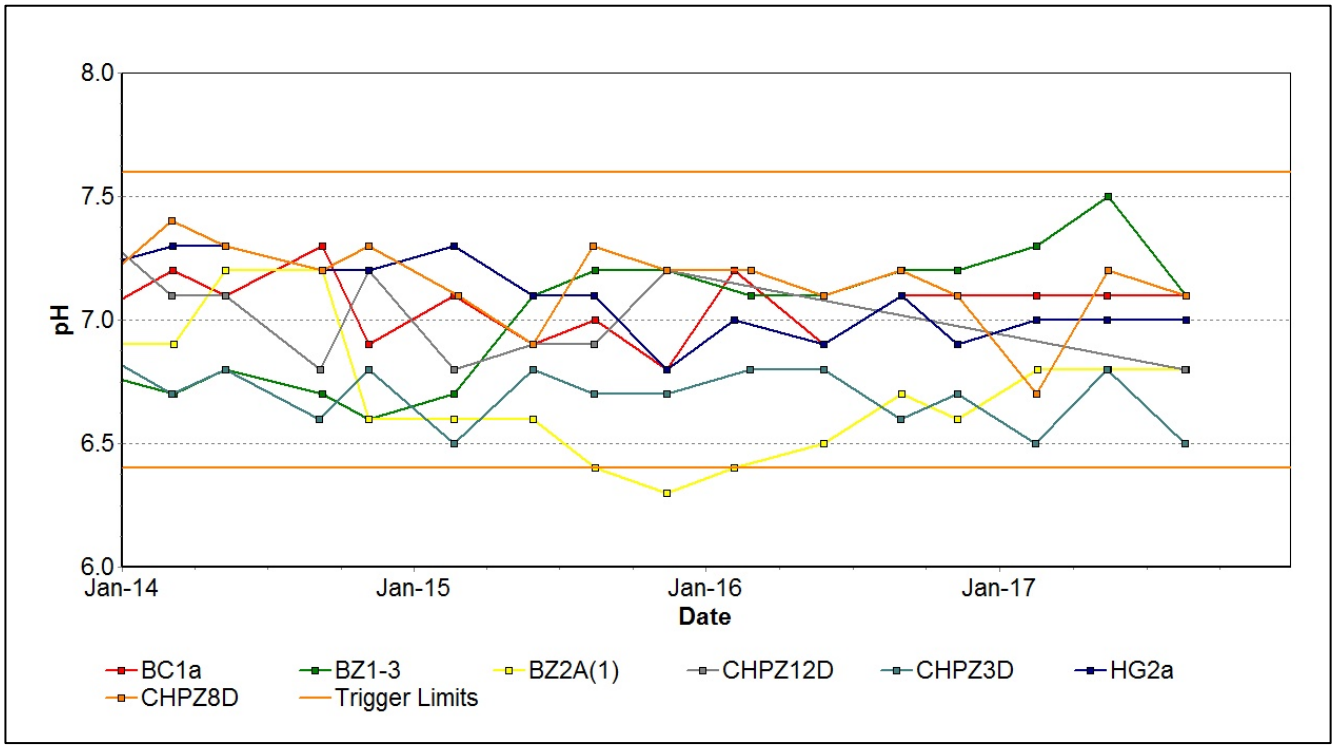


**Figure 33: Cheshunt Mt Arthur pH Trend - September 2017**

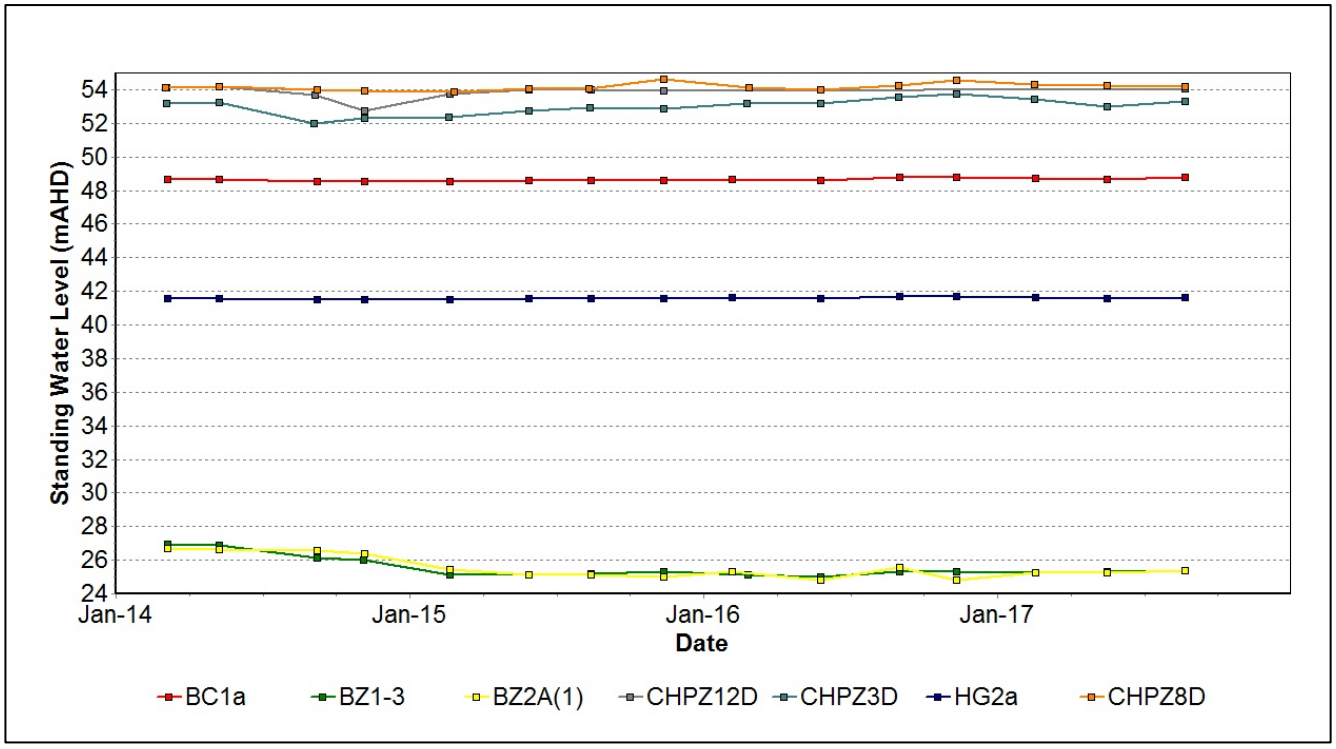


**Figure 34: Cheshunt Mt Arthur Standing Water Level – September 2017**

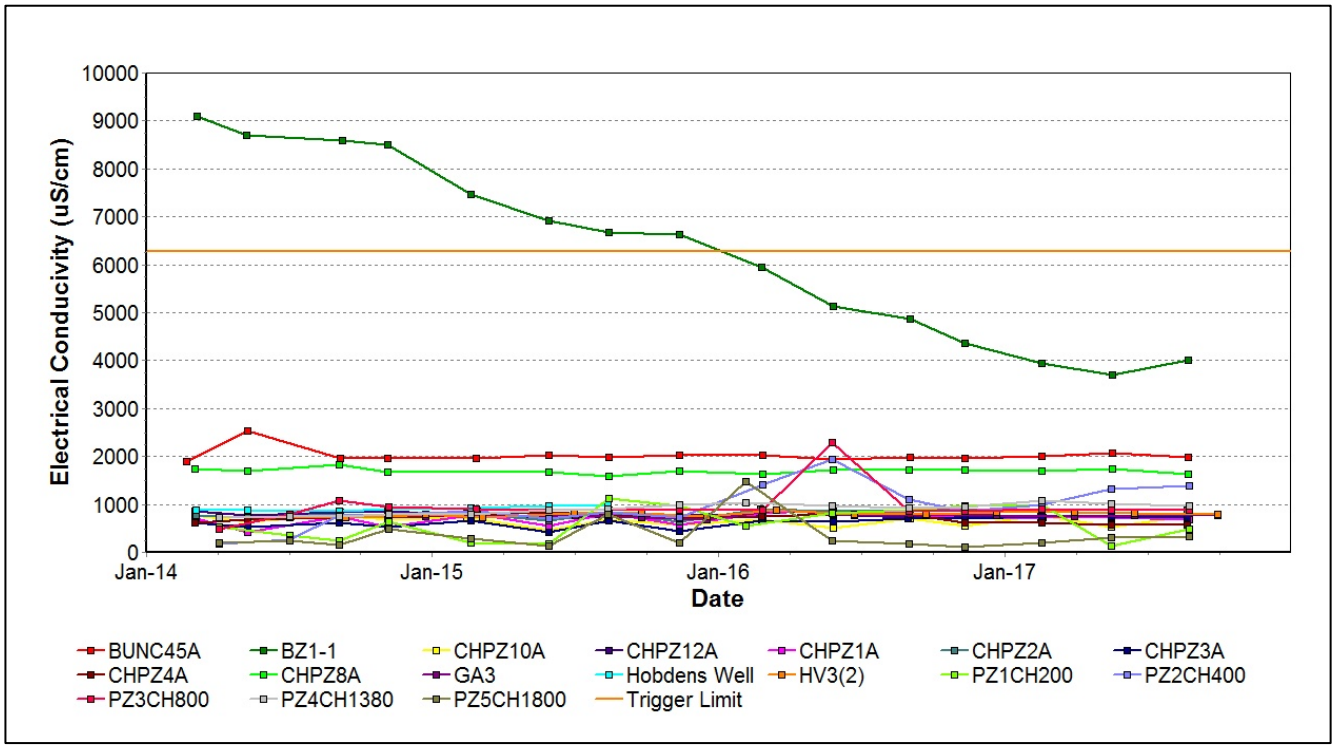


**Figure 35: Cheshunt / North Pit Alluvium Electrical Conductivity Trend - September 2017**

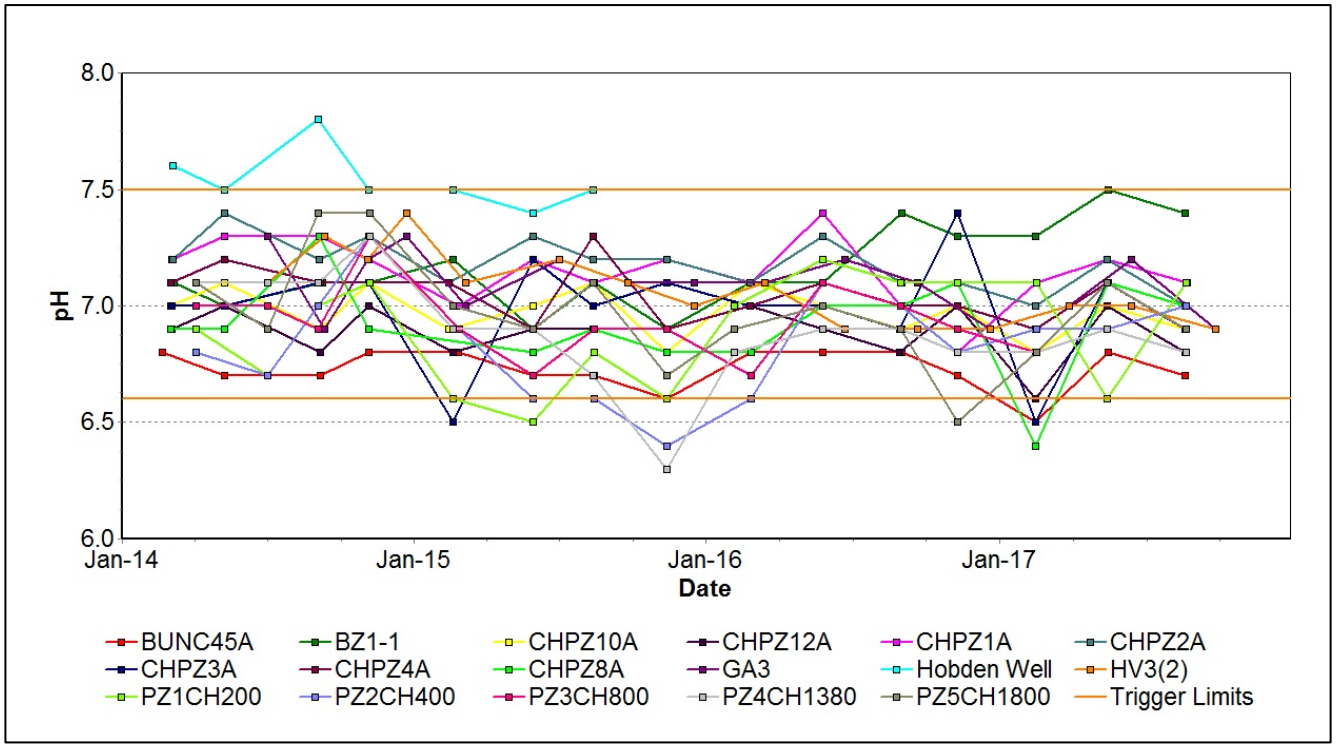


**Figure 36: Cheshunt / North Pit Alluvium pH Trend - September 2017**

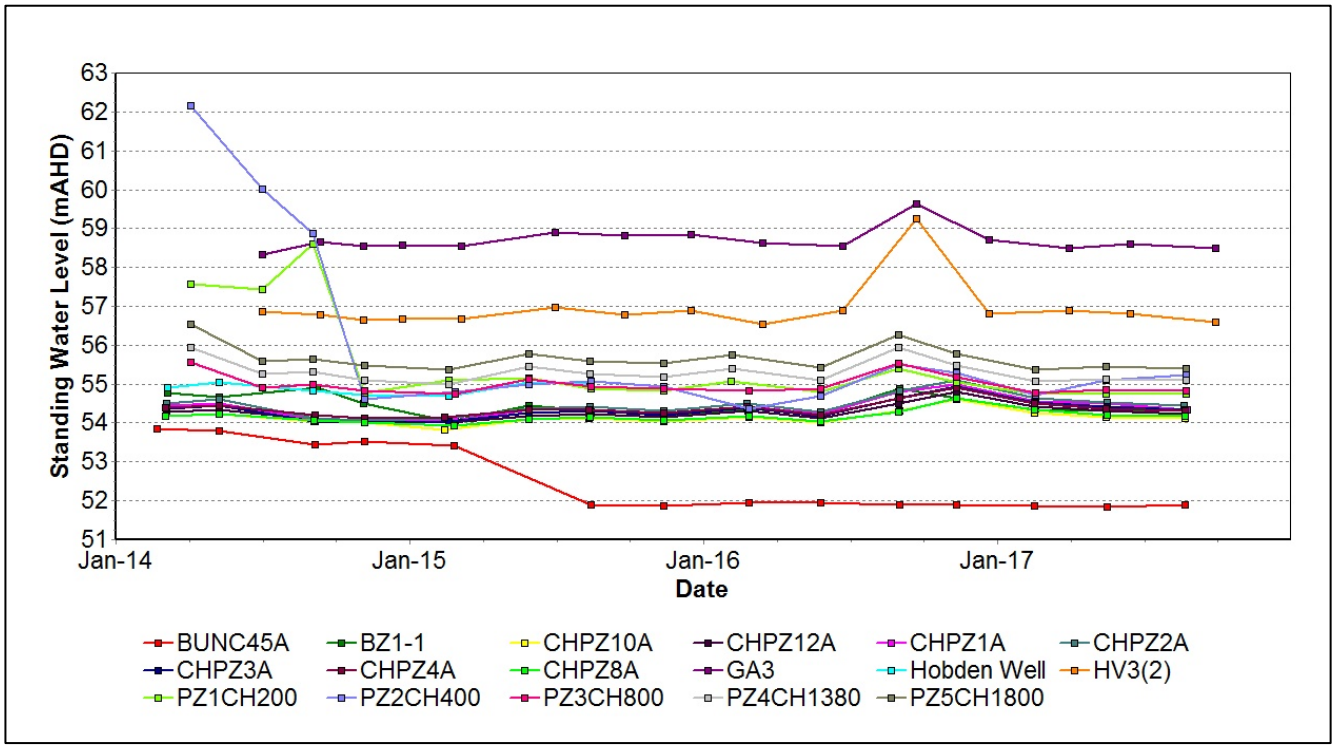


**Figure 37: Cheshunt / North Pit Alluvium Standing Water Level – September 2017**

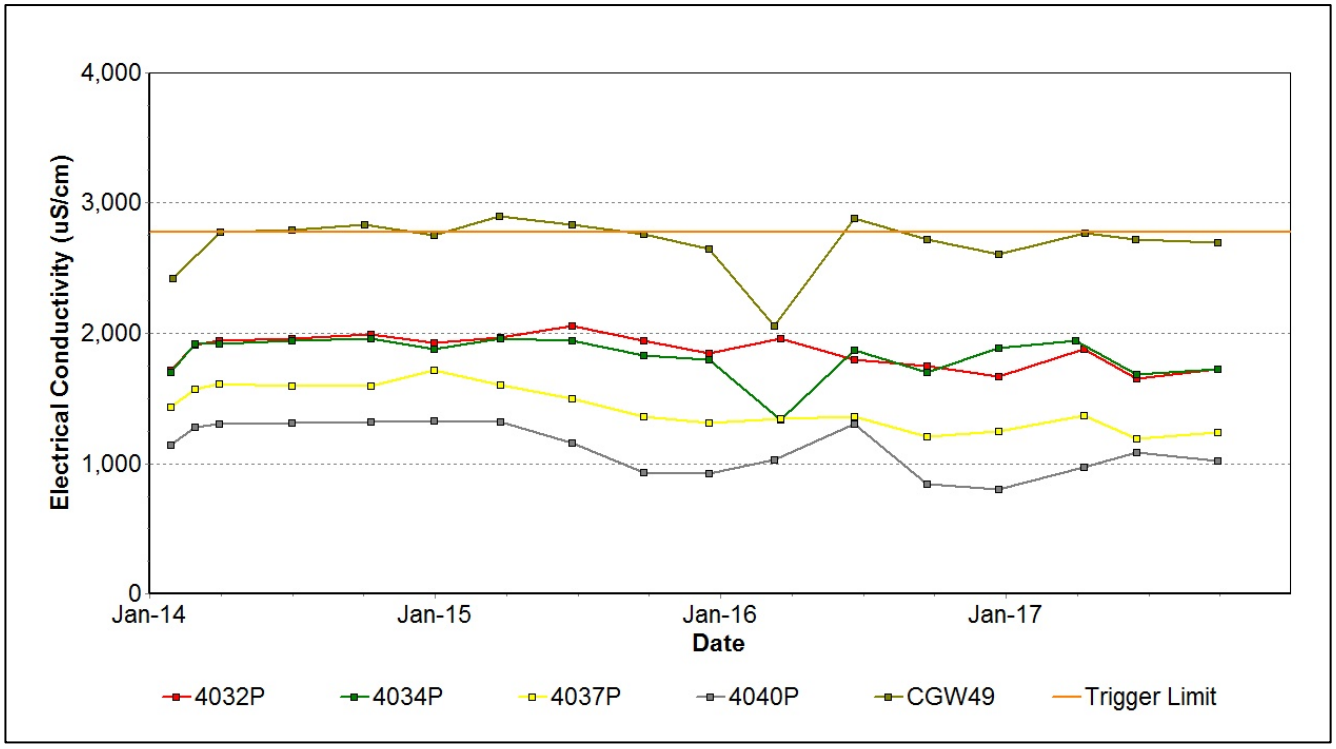


**Figure 38: Carrington West Wing Alluvium Electrical Conductivity Trend - September 2017**

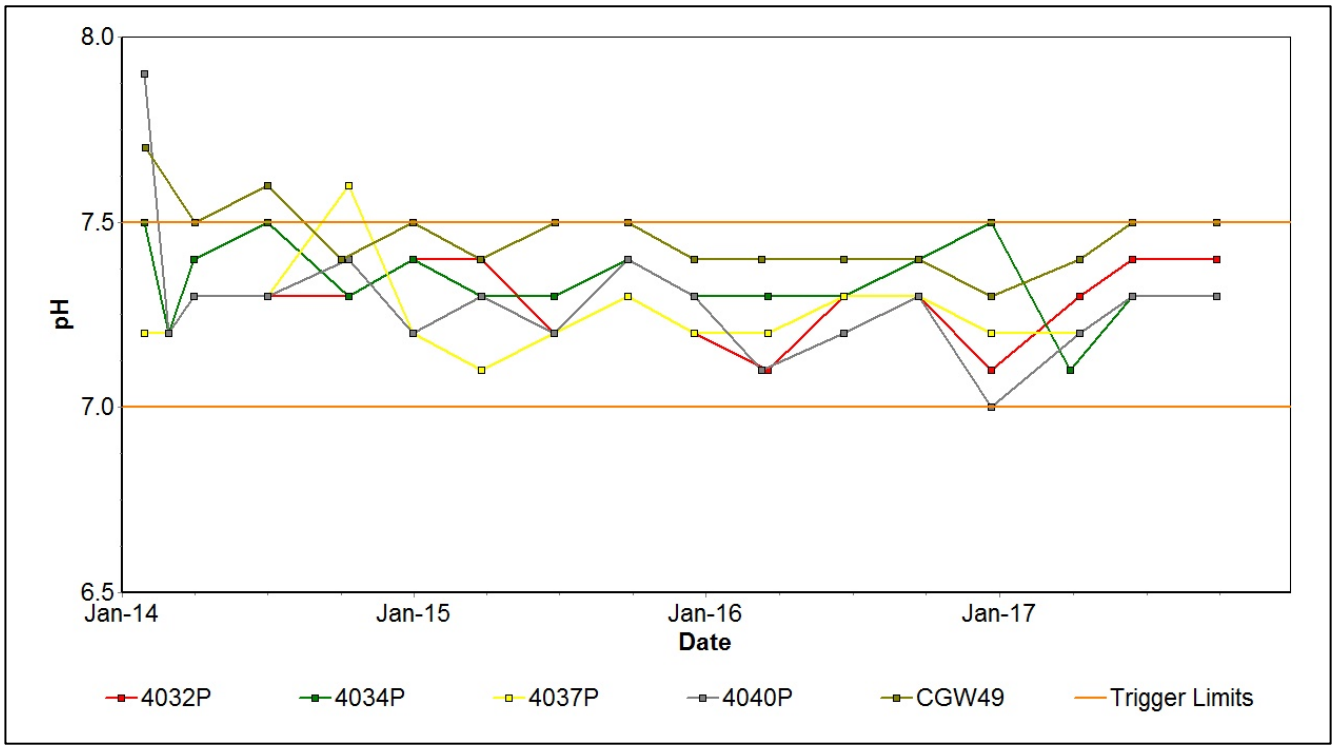


**Figure 39: Carrington West Wing Alluvium pH Trend - September 2017**

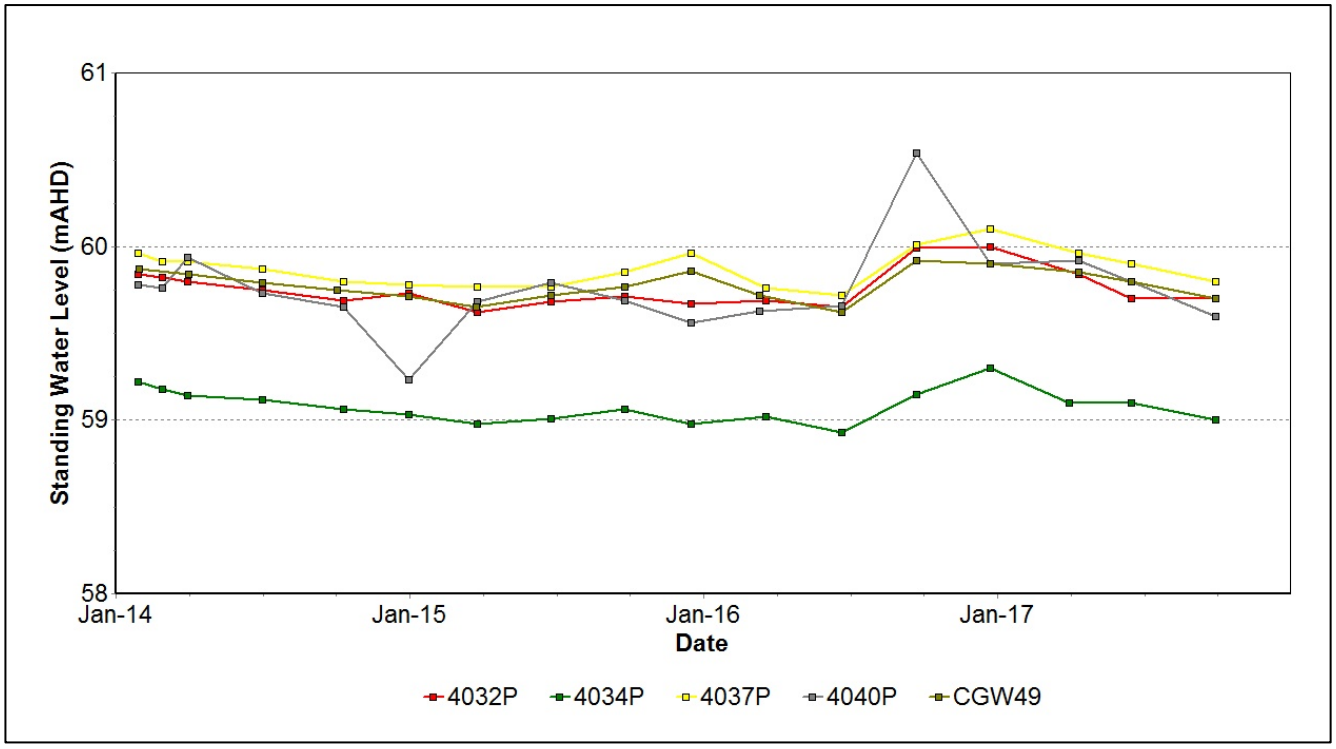


**Figure 40: Carrington West Wing Alluvium Standing Water Level – September 2017**

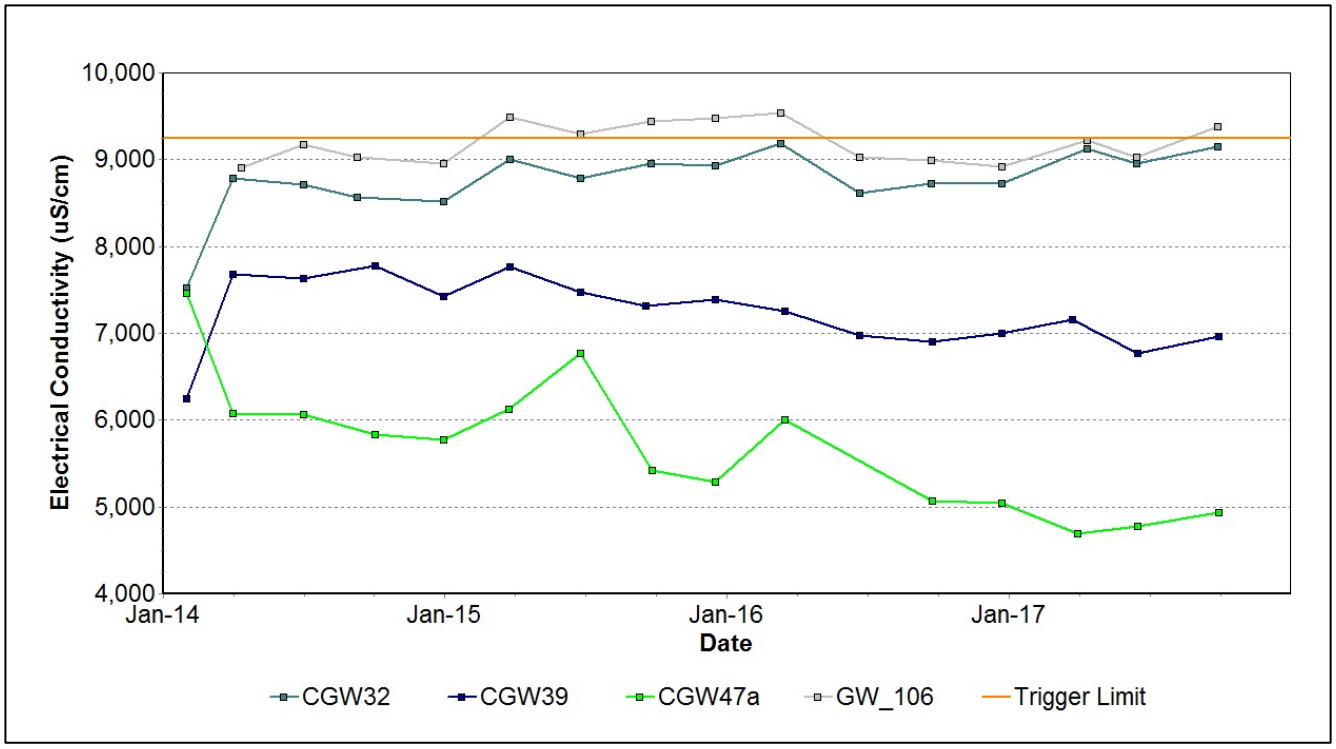


**Figure 41: Carrington West Wing Flood Plain Electrical Conductivity Trend - September 2017**

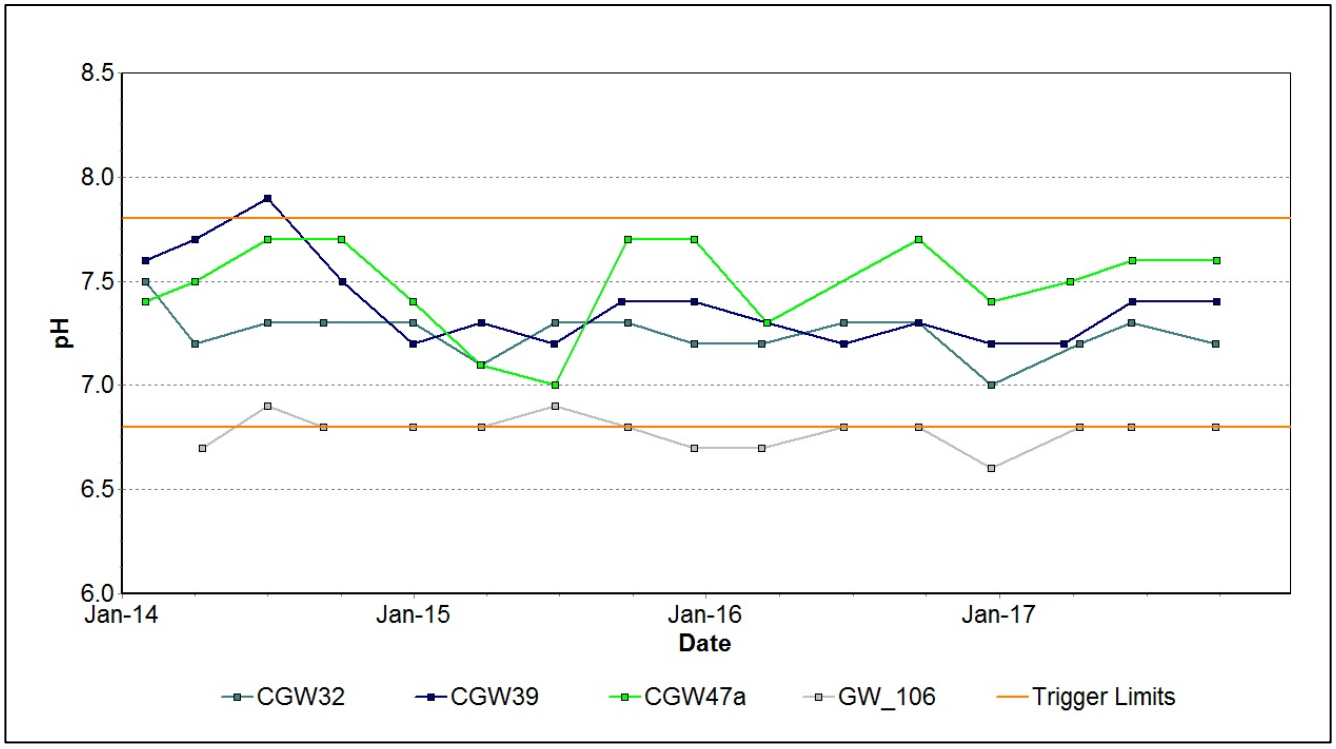


**Figure 42: Carrington West Wing Flood Plain pH Trend - September 2017**

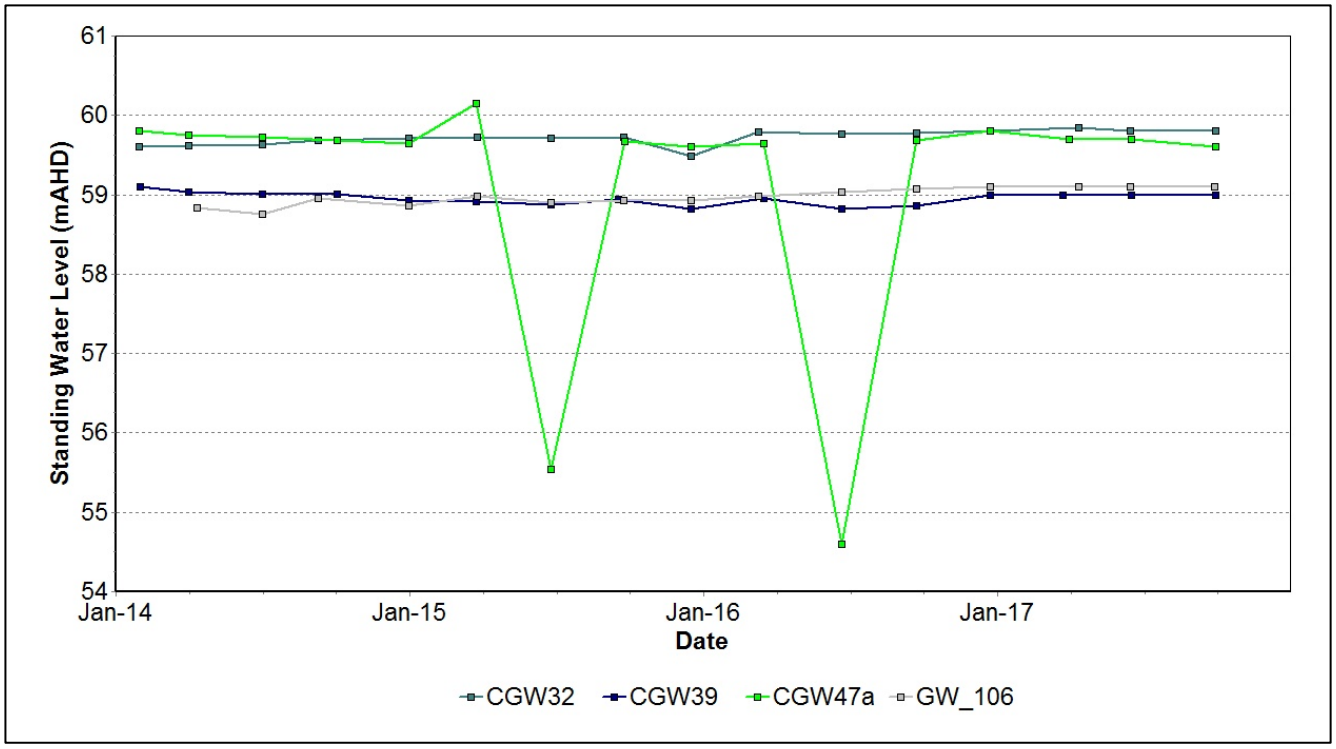


**Figure 43: Carrington West Wing Flood Plain Standing Water Level – September 2017**

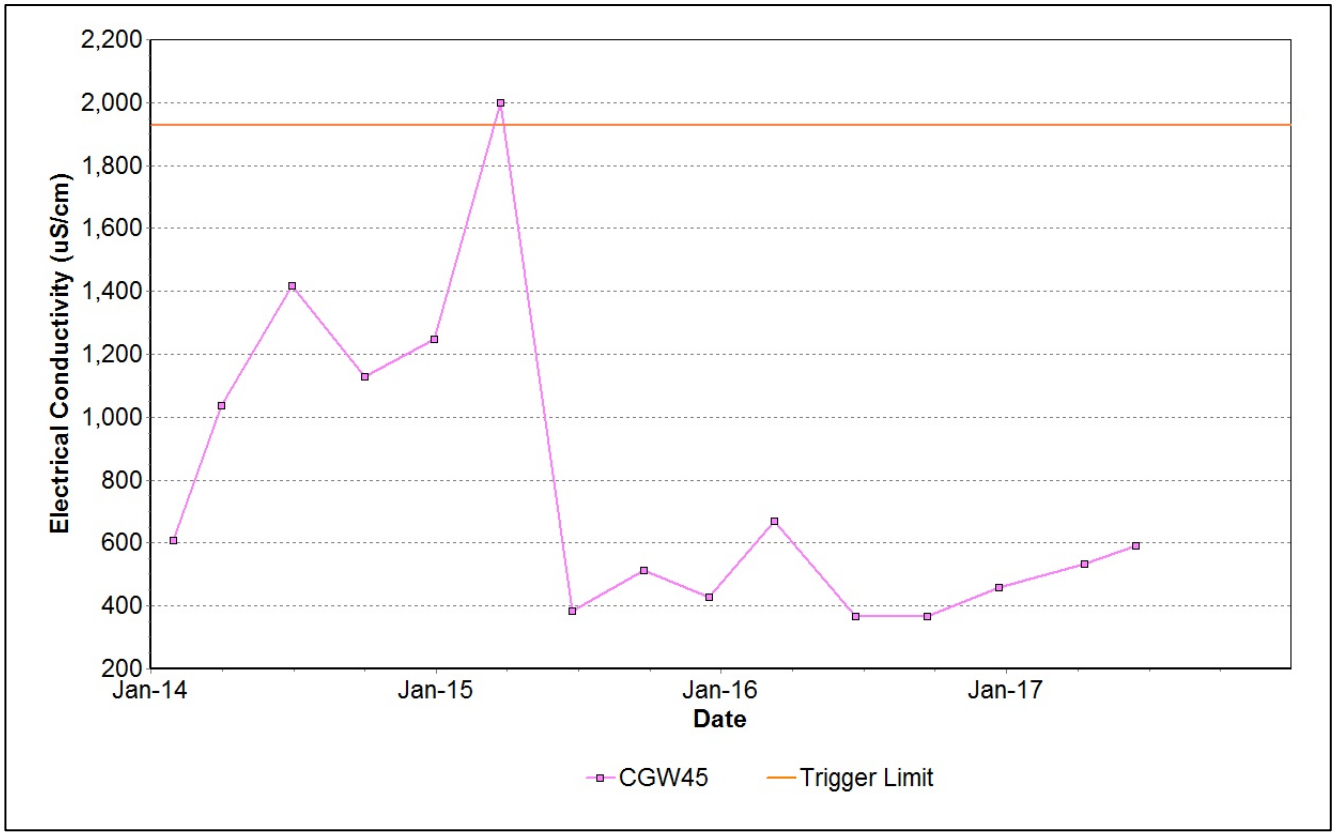


**Figure 44: Carrington West Wing LBL Electrical Conductivity Trend - September 2017**

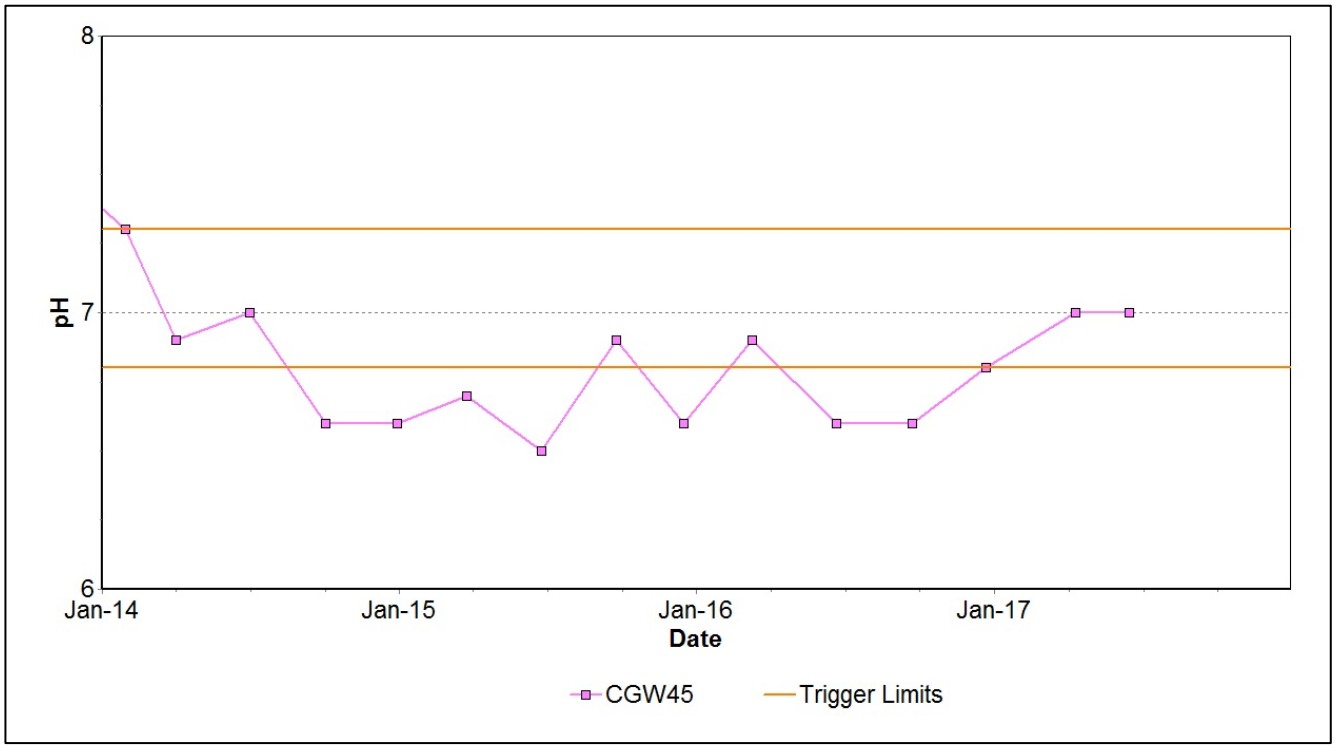


**Figure 45: Carrington West Wing LBL pH Trend - September 2017**

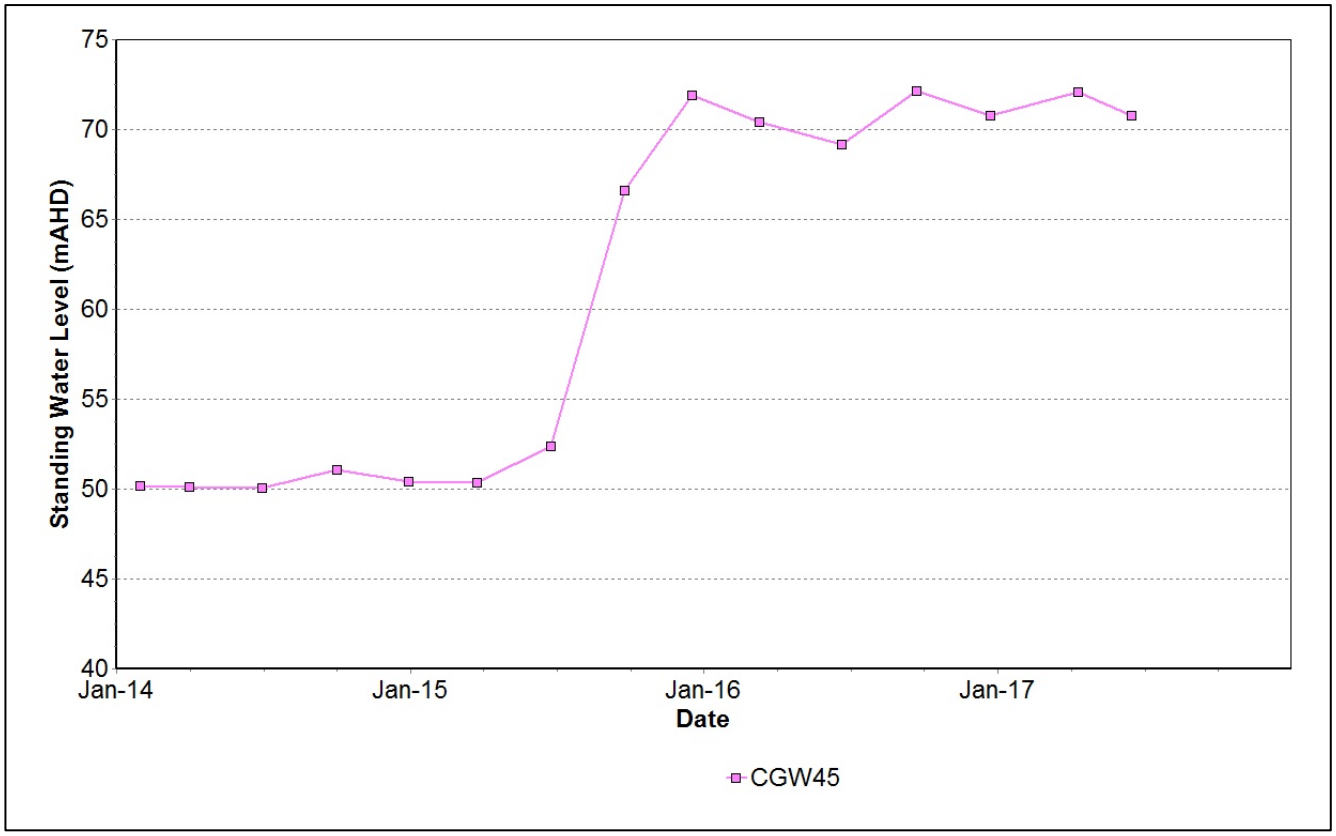


**Figure 46: Carrington West Wing LBL Standing Water Level - September 2017**

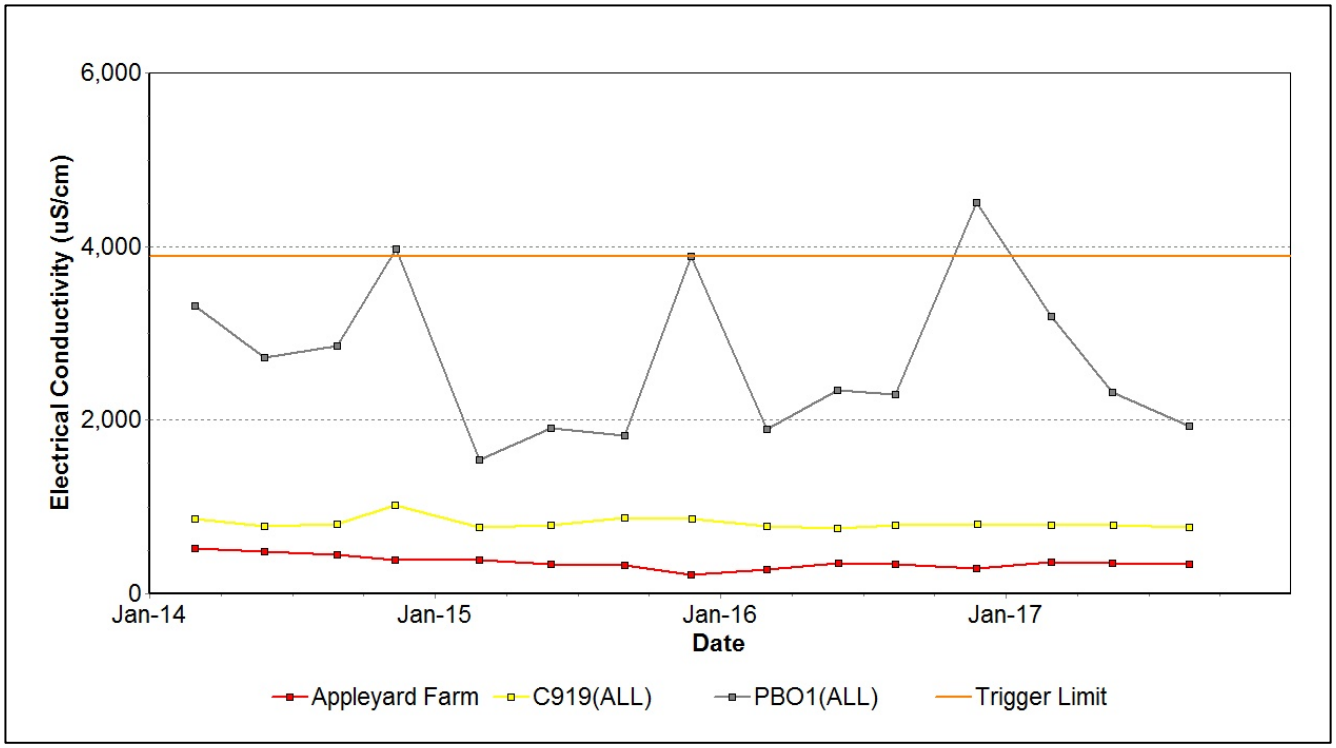


**Figure 47: Lemington South Alluvium Electrical Conductivity Trend - September 2017**

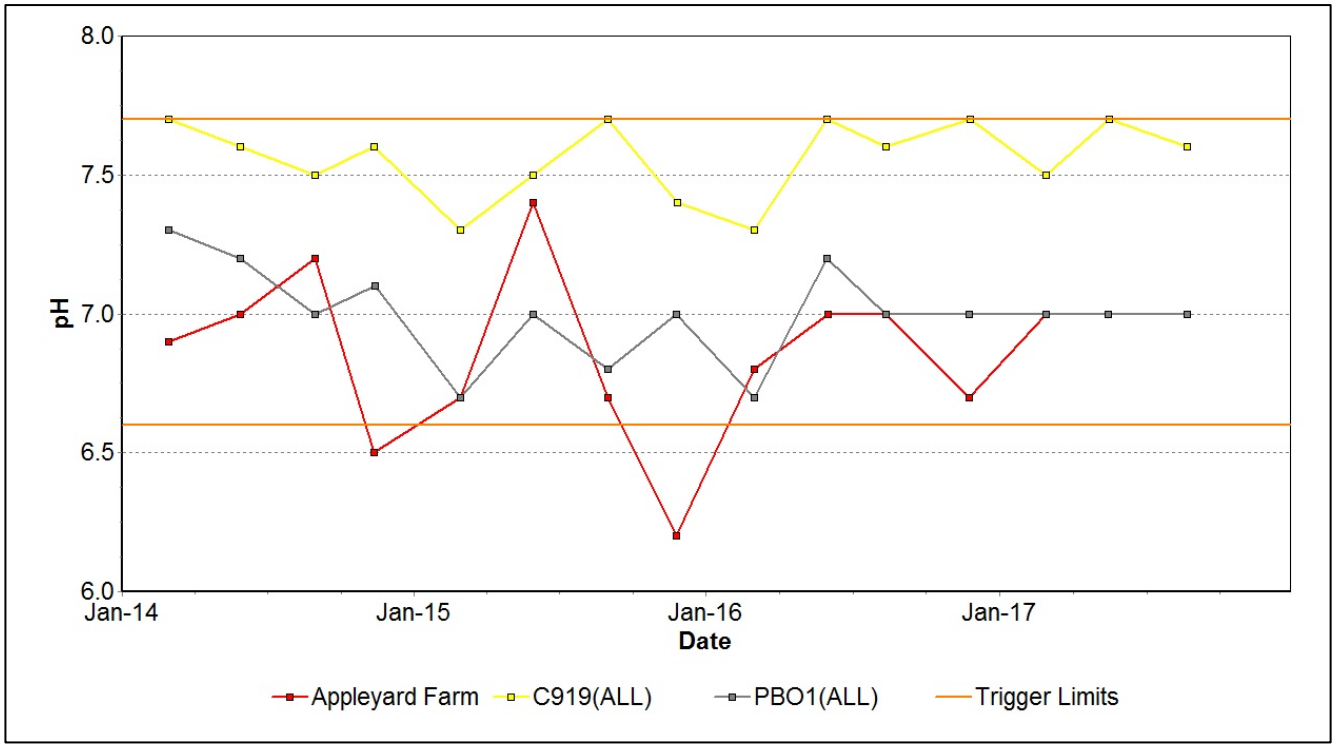


**Figure 48: Lemington South Alluvium pH Trend – September 2017**

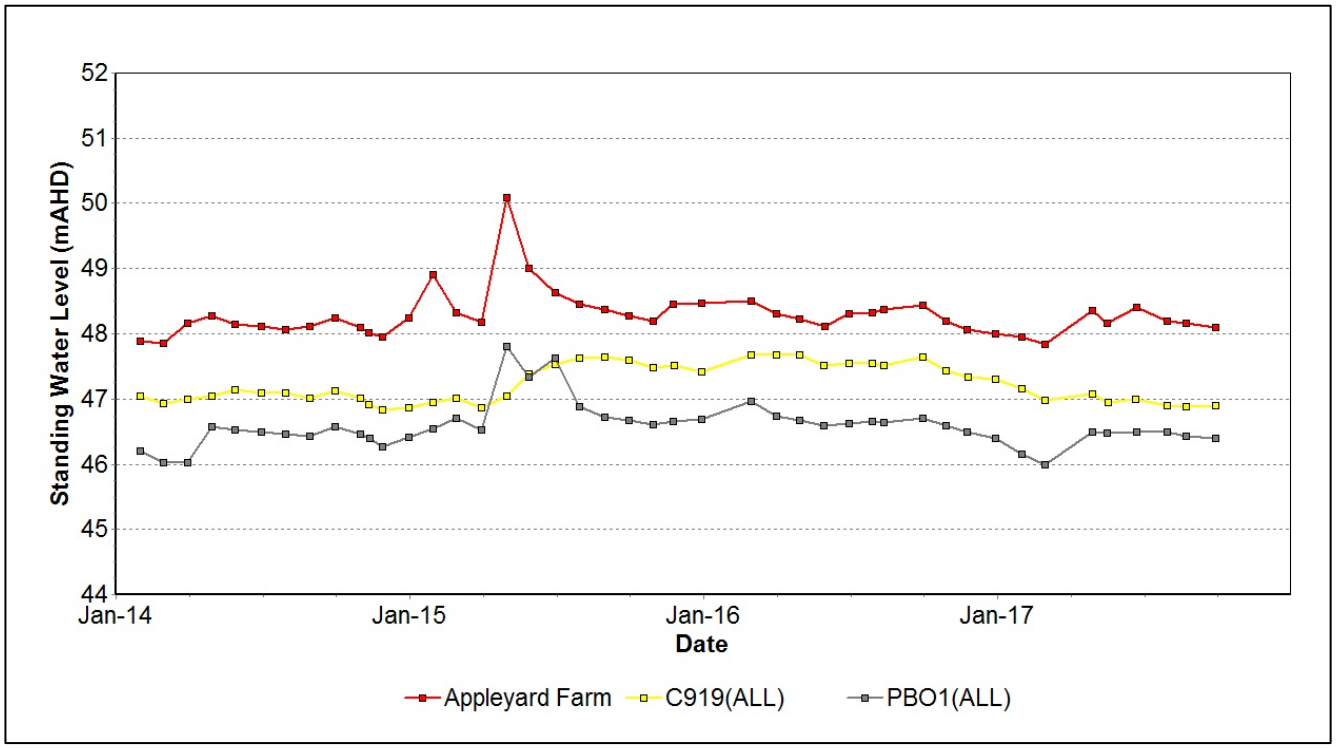


**Figure 49: Lemington South Alluvium Standing Water Level Trend – September 2017**

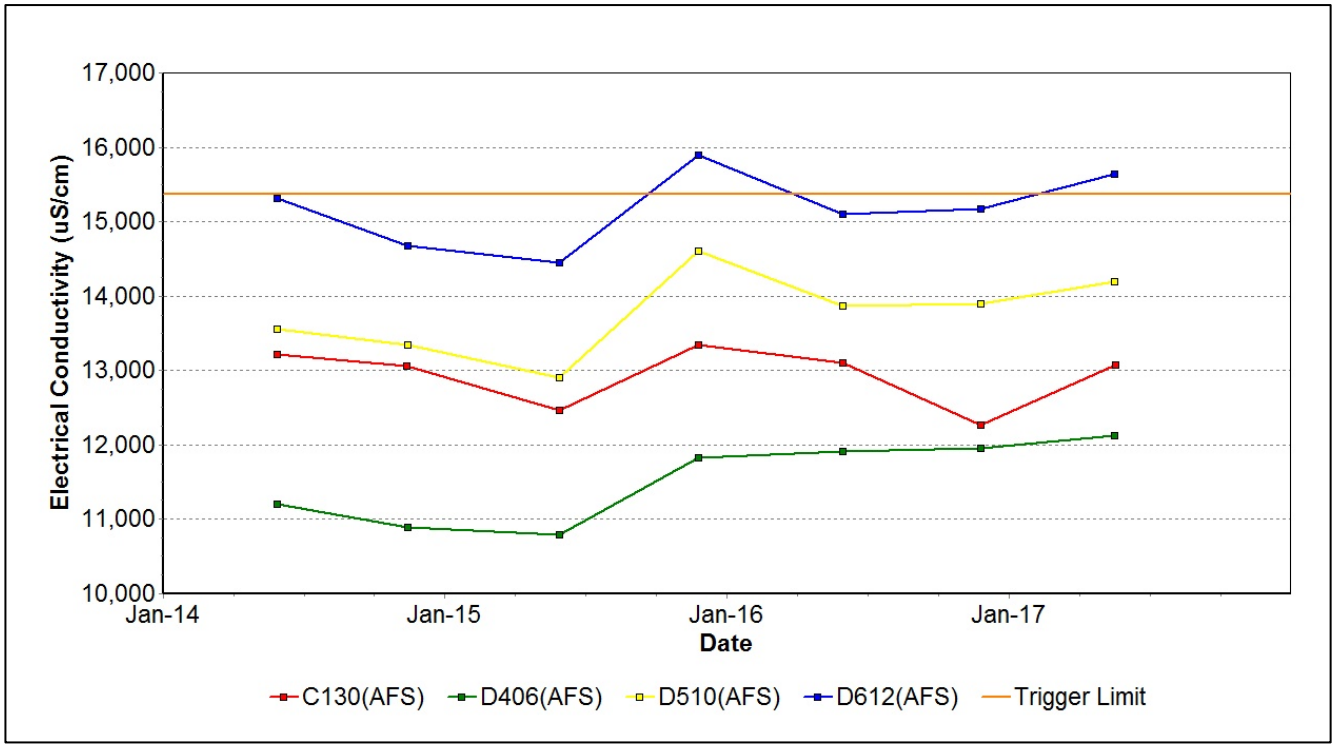


**Figure 50: Lemington South Arrowfield Electrical Conductivity Trend – September 2017**

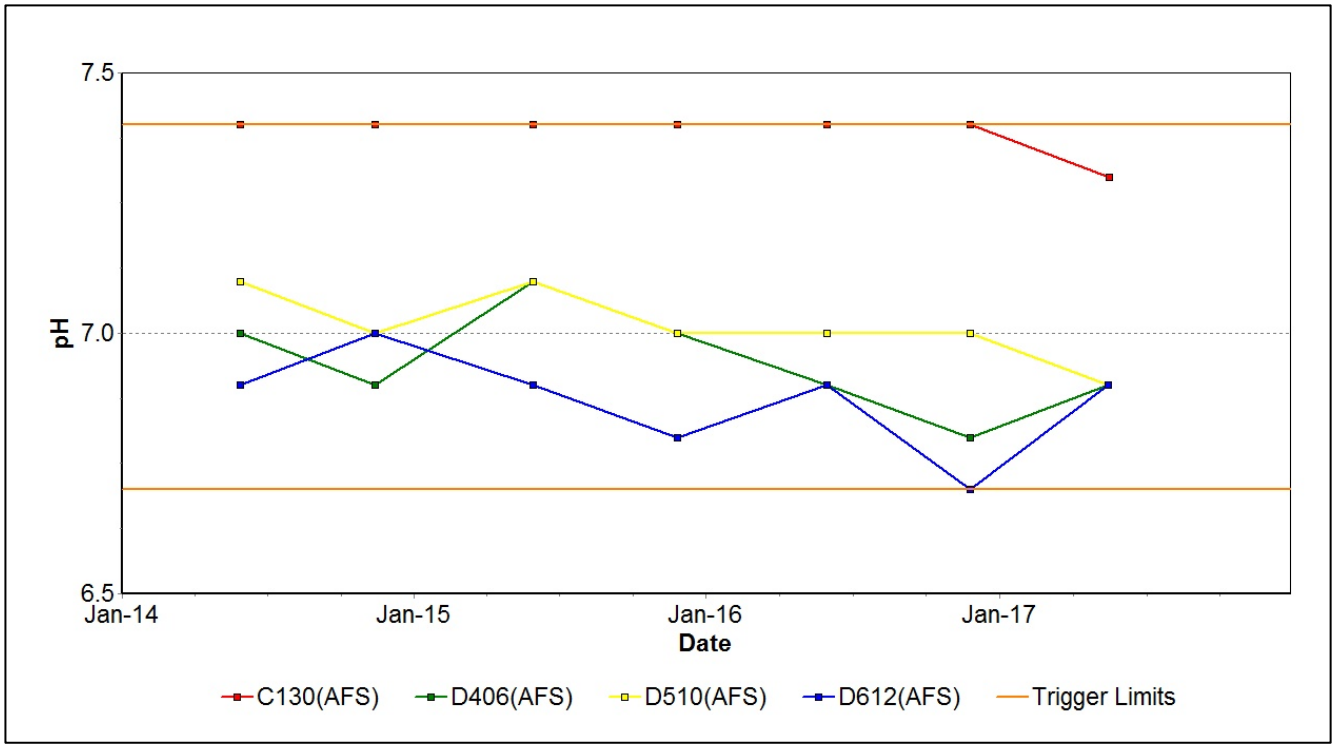


**Figure 51: Lemington South Arrowfield pH Trend – September 2017**

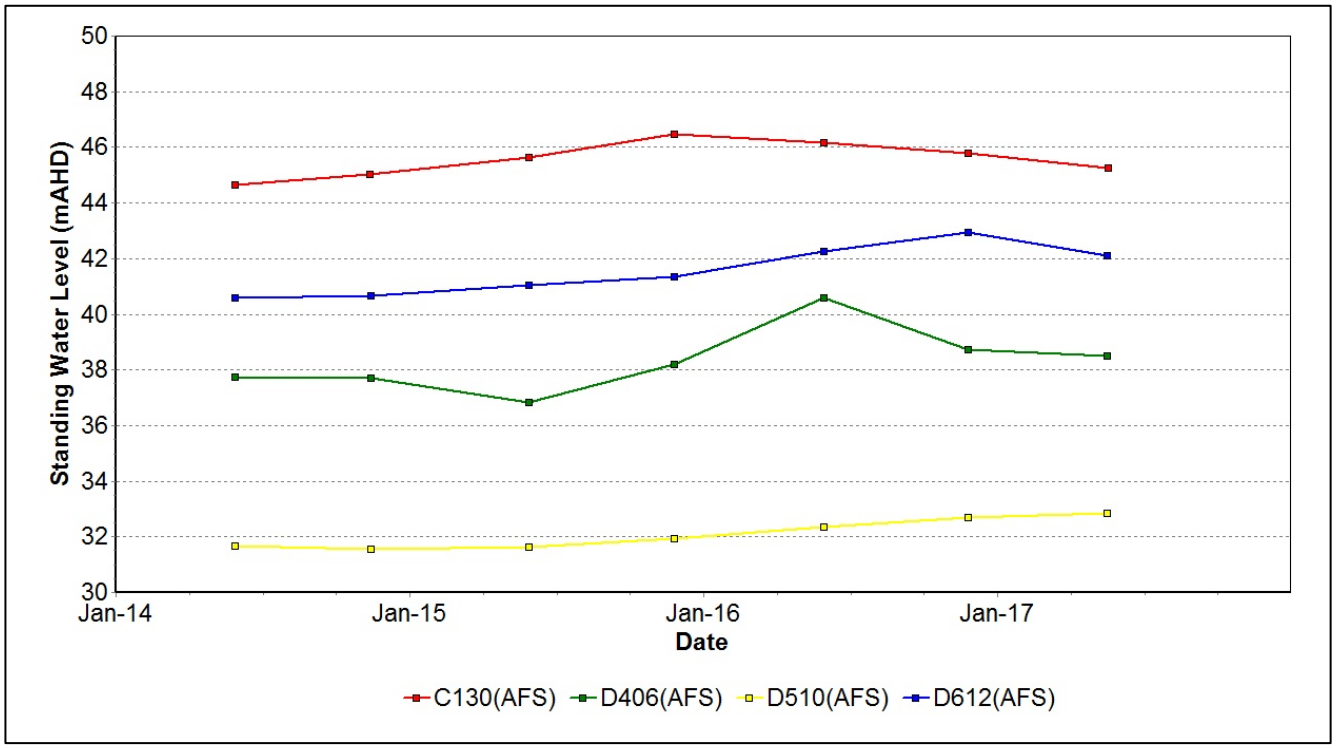


**Figure 52: Lemington South Arrowfield Standing Water Level - September 2017**

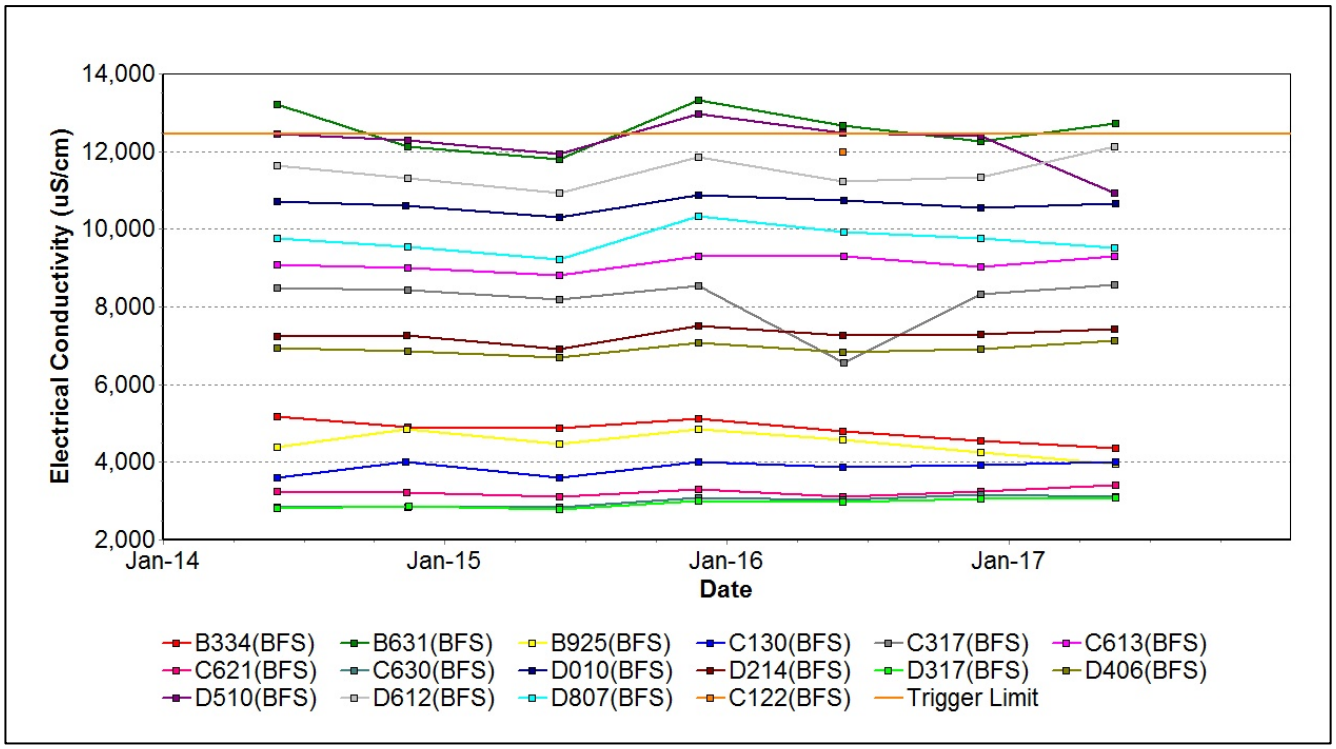


**Figure 53: Lemington South Bowfield Electrical Conductivity Trend - September 2017**

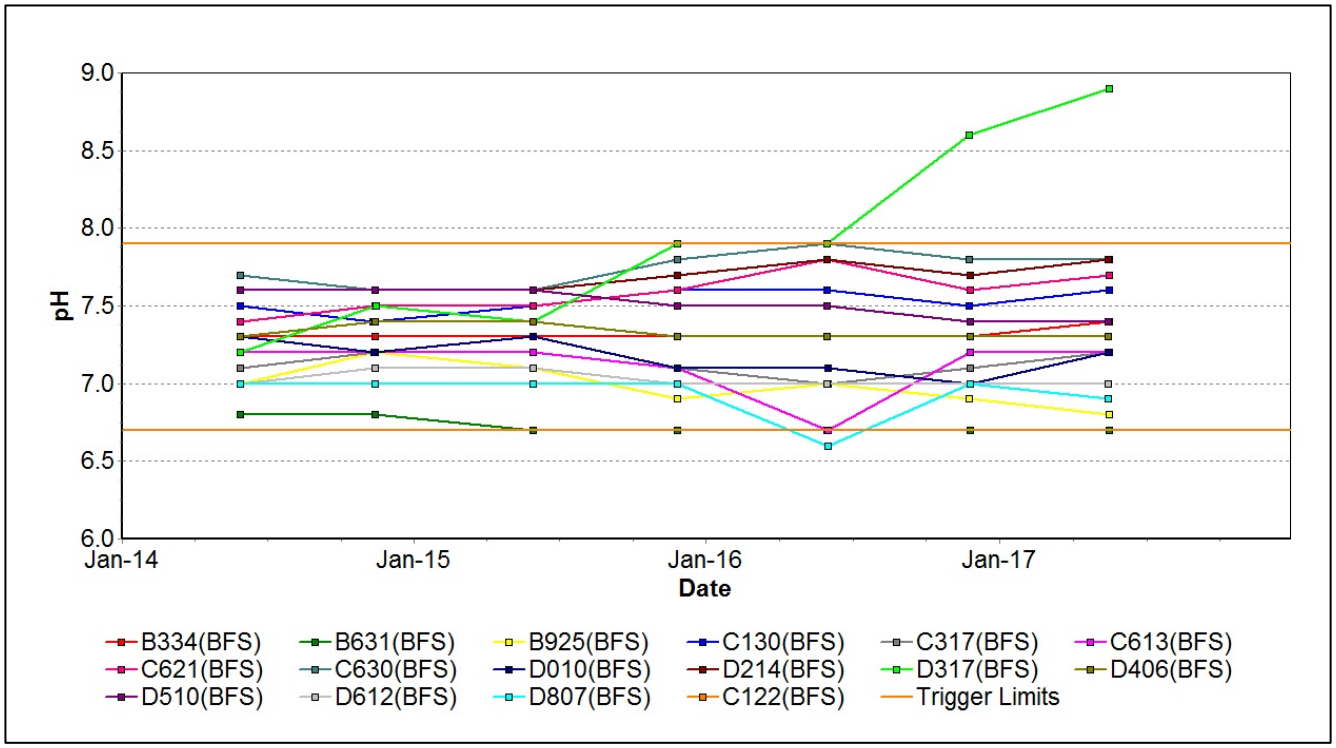


**Figure 54: Lemington South Bowfield pH Trend - September 2017**

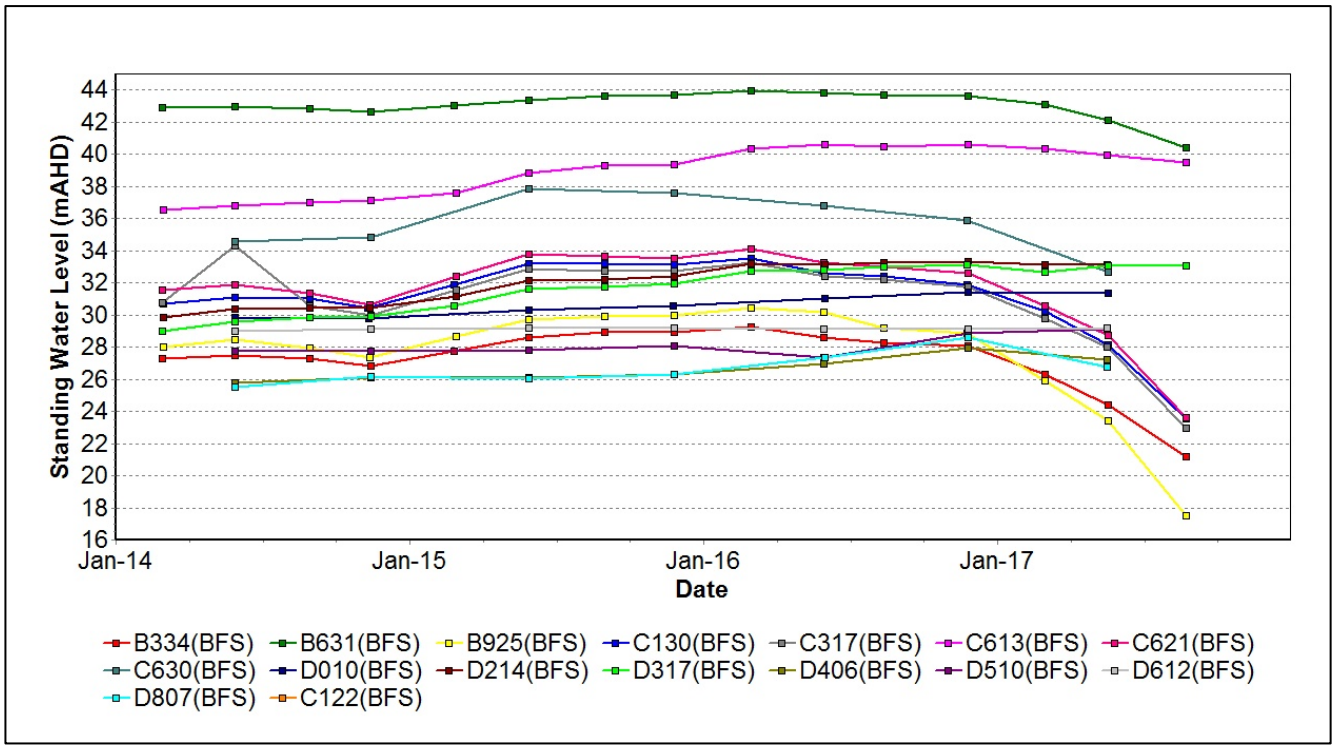


**Figure 55: Lemington South Bowfield Standing Water Level - September 2017**

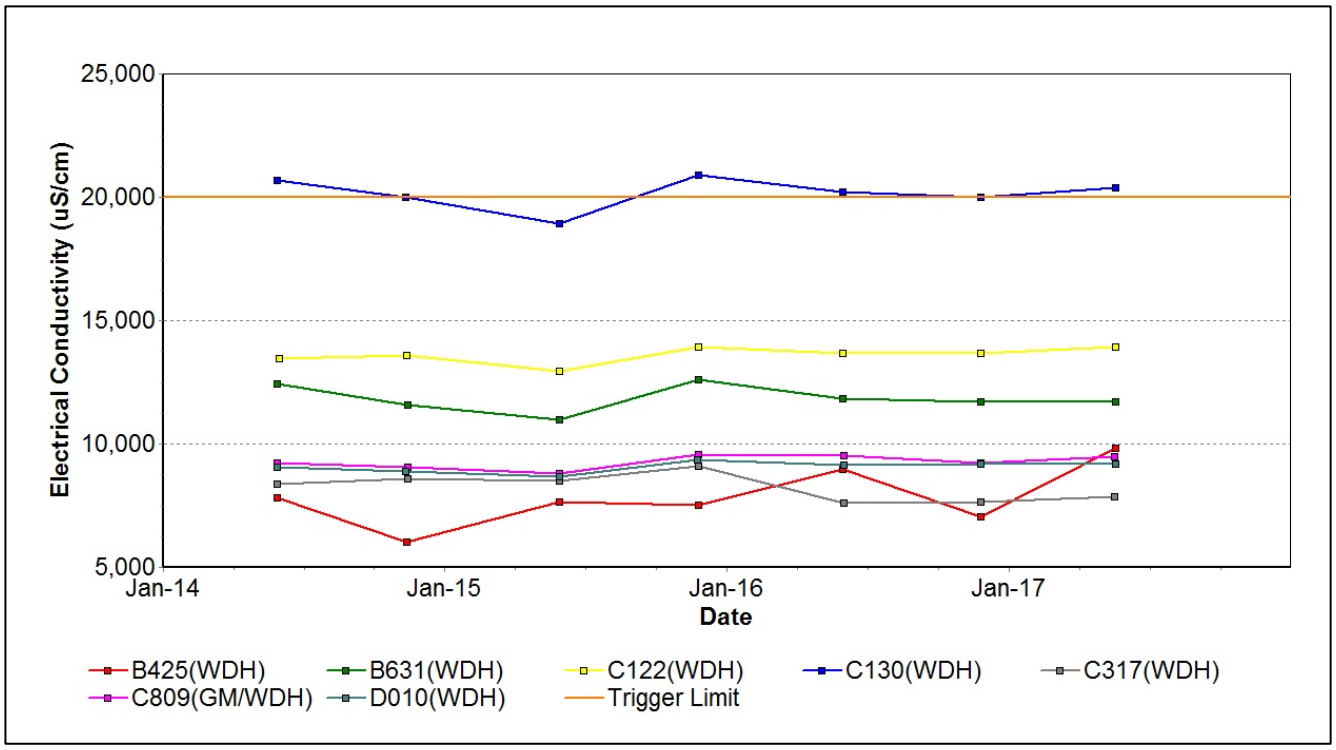


**Figure 56: Lemington South Woodlands Hill Electrical Conductivity Trend - September 2017**

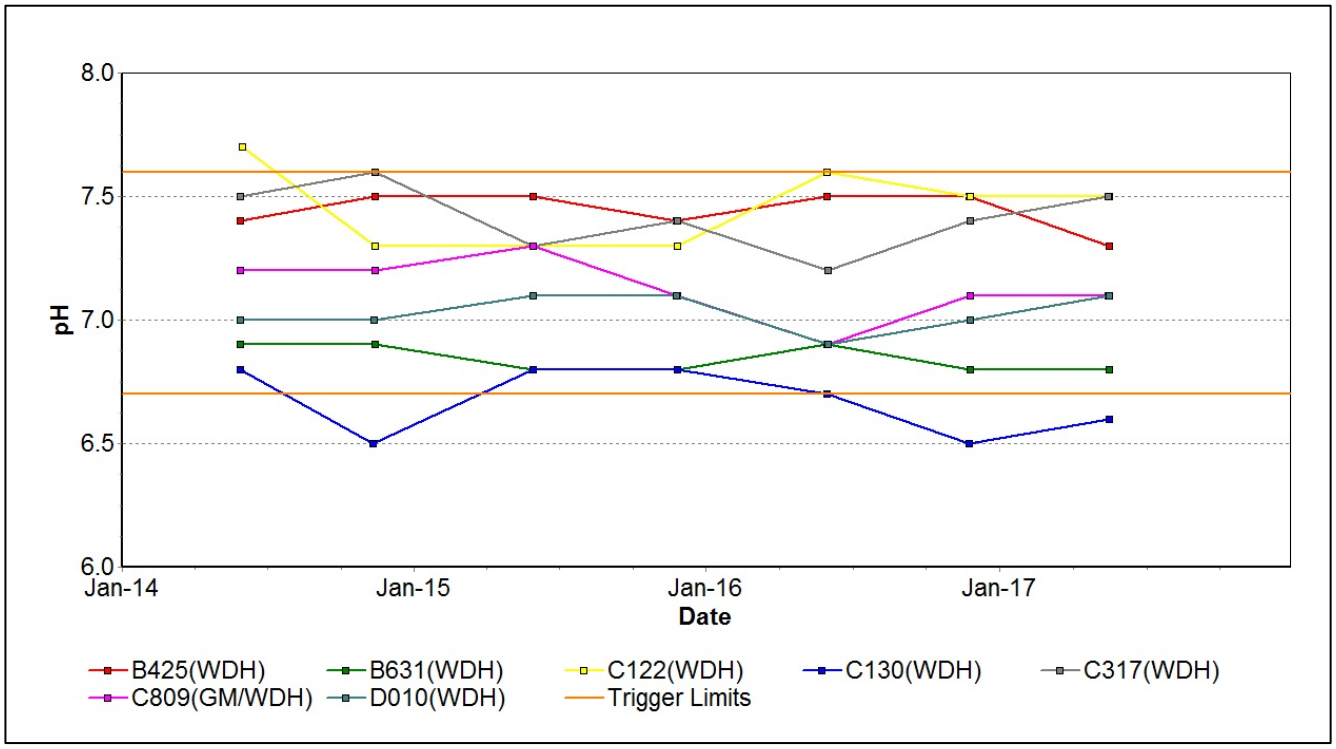


**Figure 57: Lemington South Woodlands Hill pH Trend - September 2017**

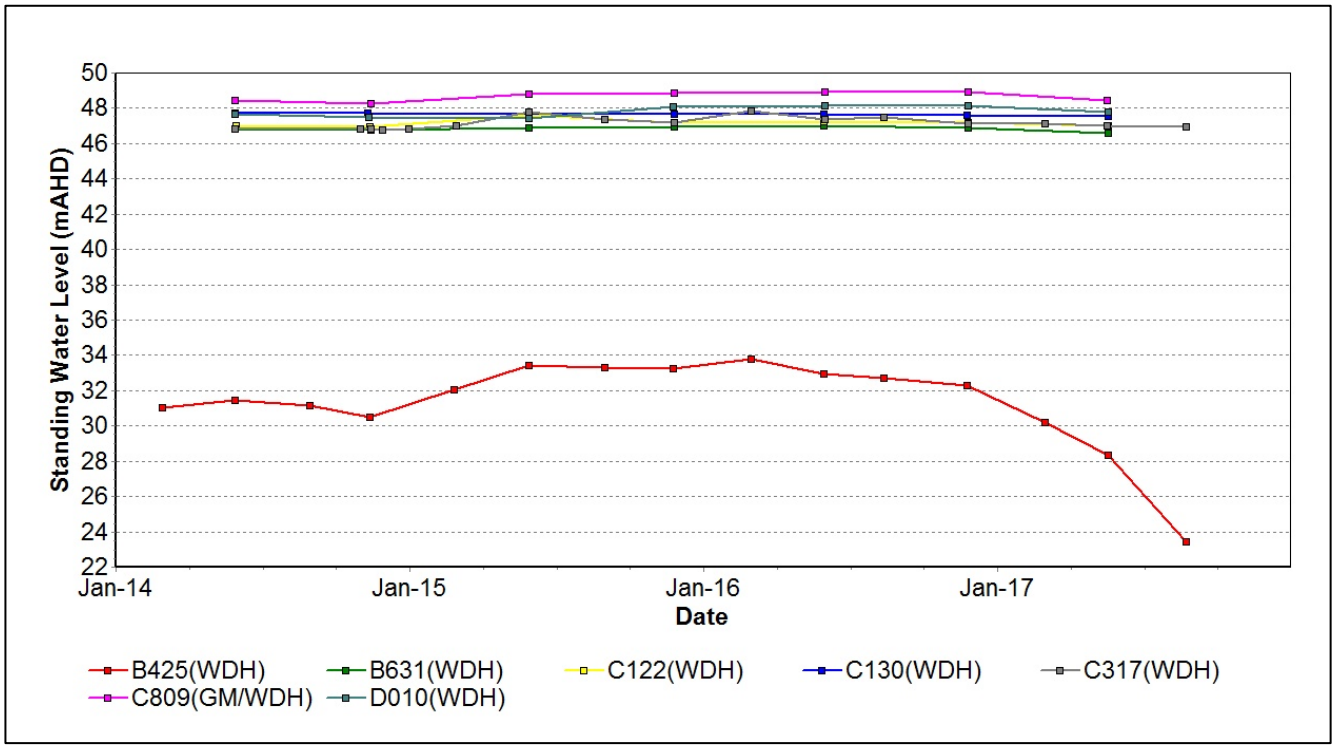


**Figure 58: Lemington South Woodlands Hill Standing Water Level – September 2017**

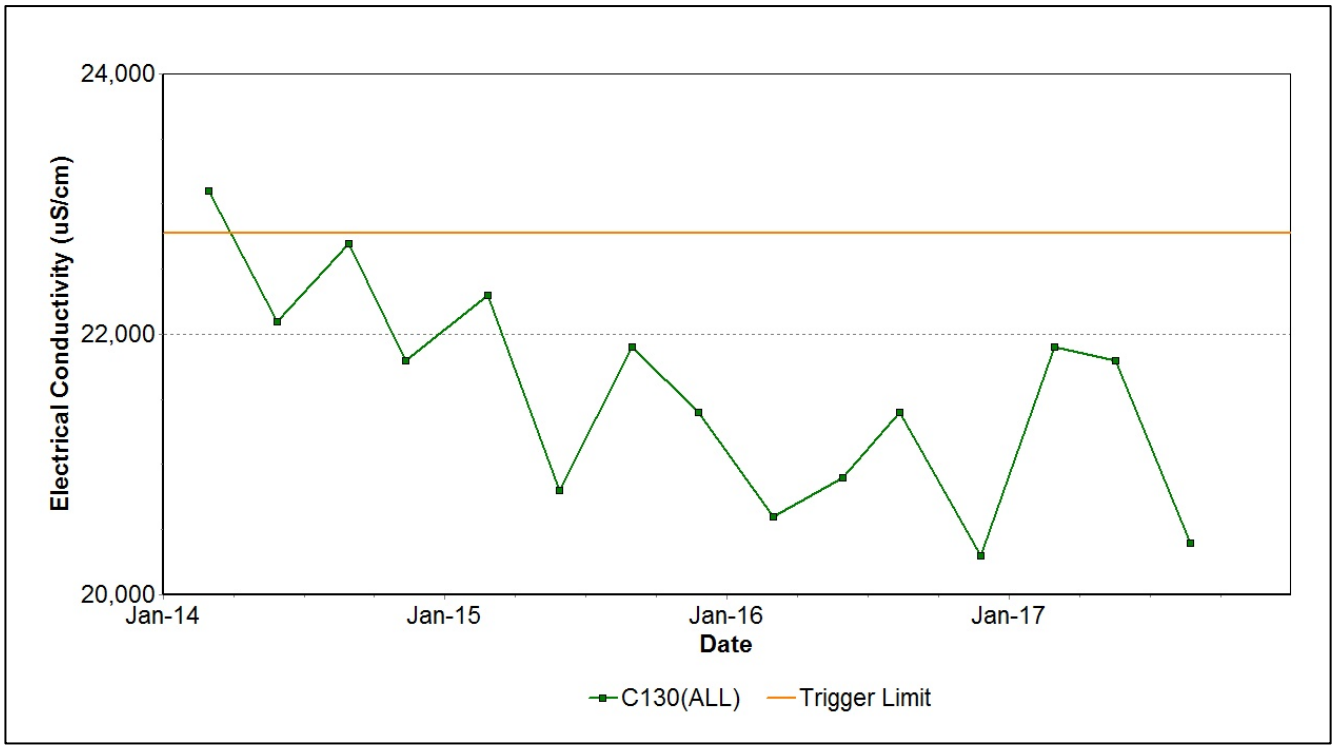


**Figure 59: Lemington South Interburden Electrical Conductivity Trend - September 2017**

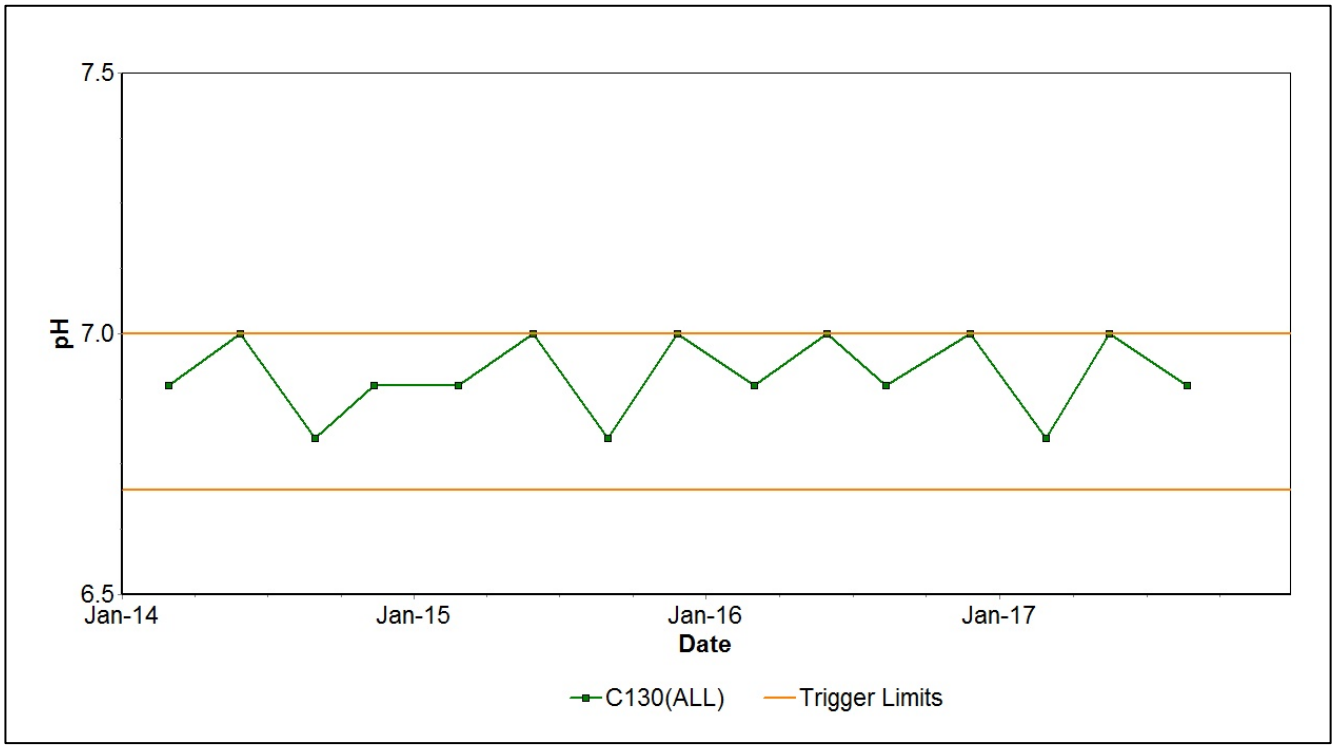


**Figure 60: Lemington South Interburden pH Trend - September 2017**

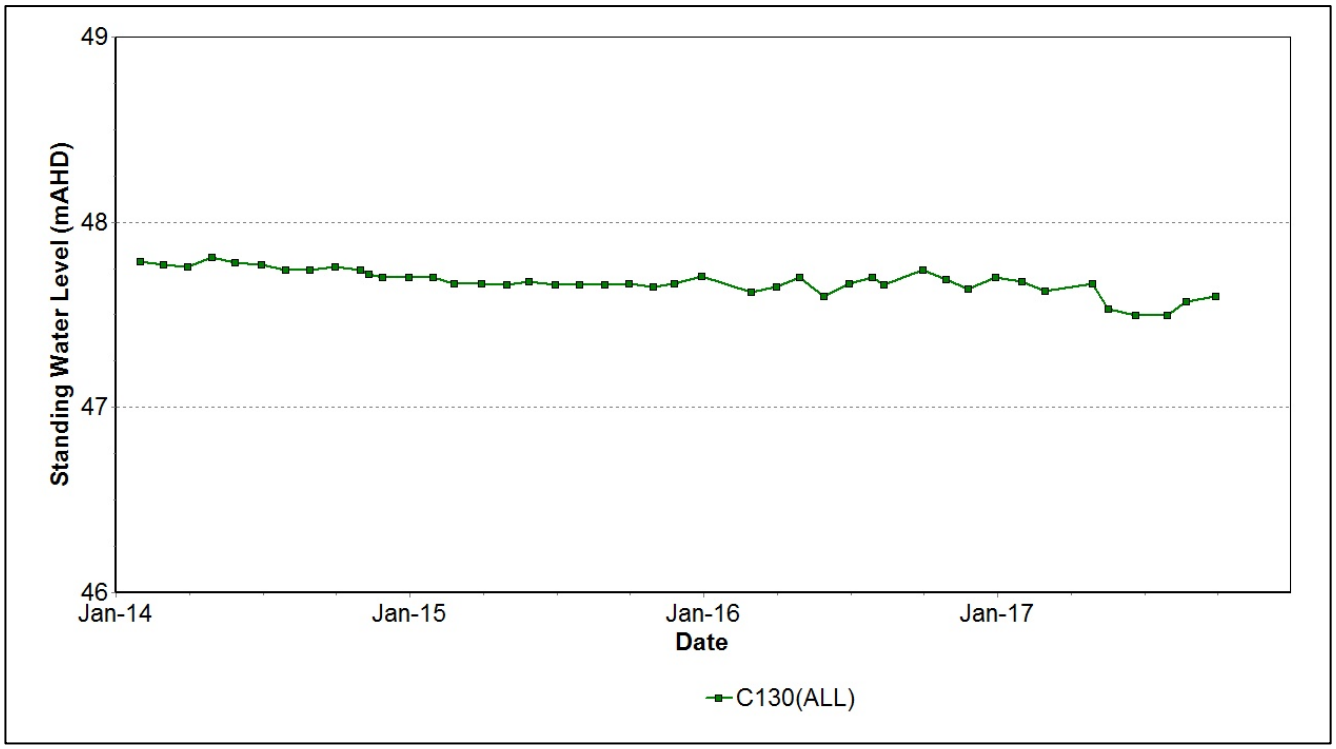


**Figure 61: Lemington South Interburden Standing Water Level - September 2017**

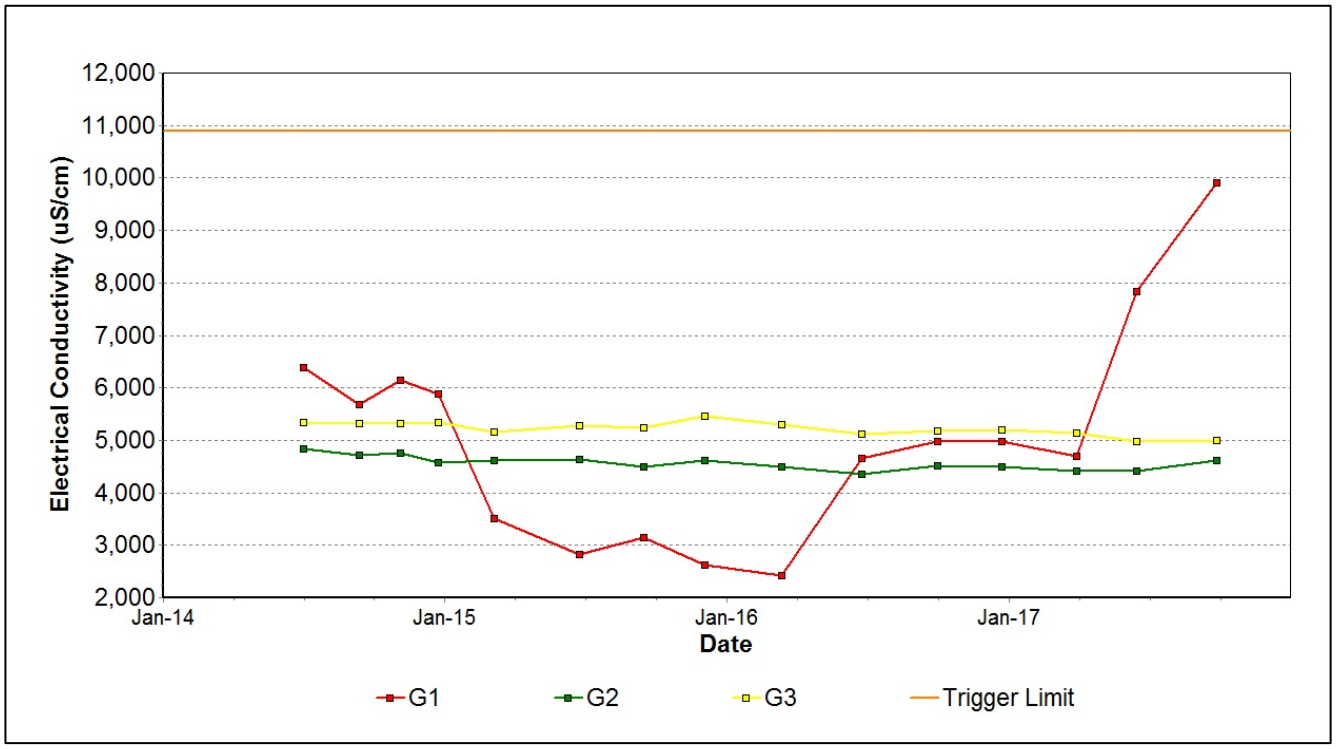


**Figure 62: West Pit Alluvium Electrical Conductivity Trend - September 2017**

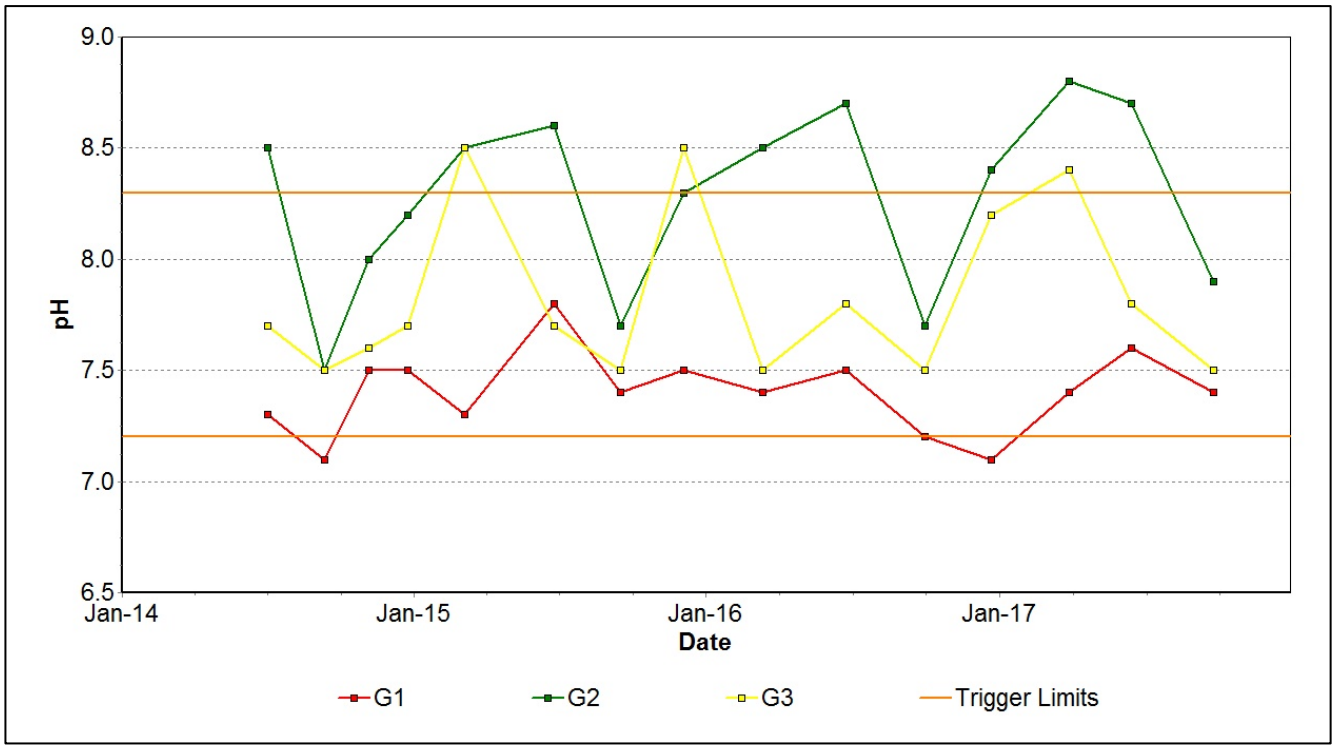


**Figure 63: West Pit Alluvium pH Trend – September 2017**

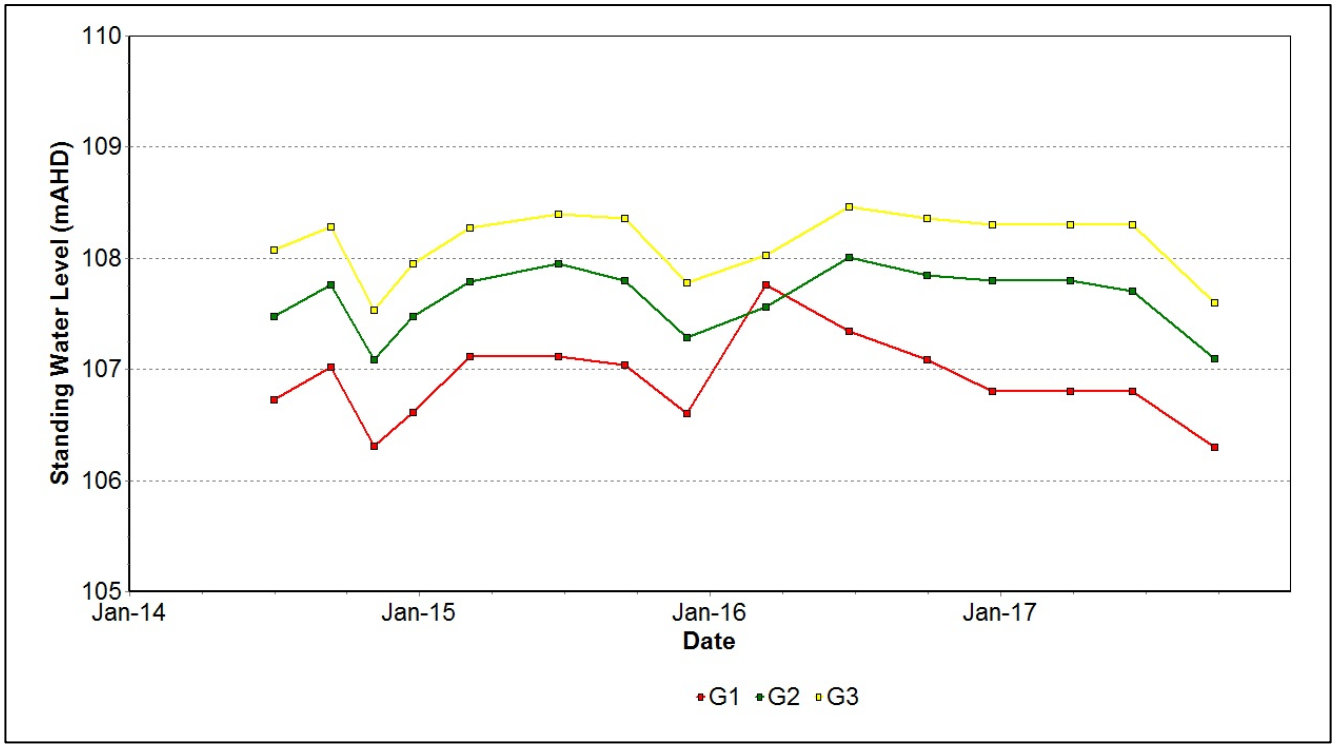


**Figure 64: West Pit Alluvium Standing Water Level - September 2017**

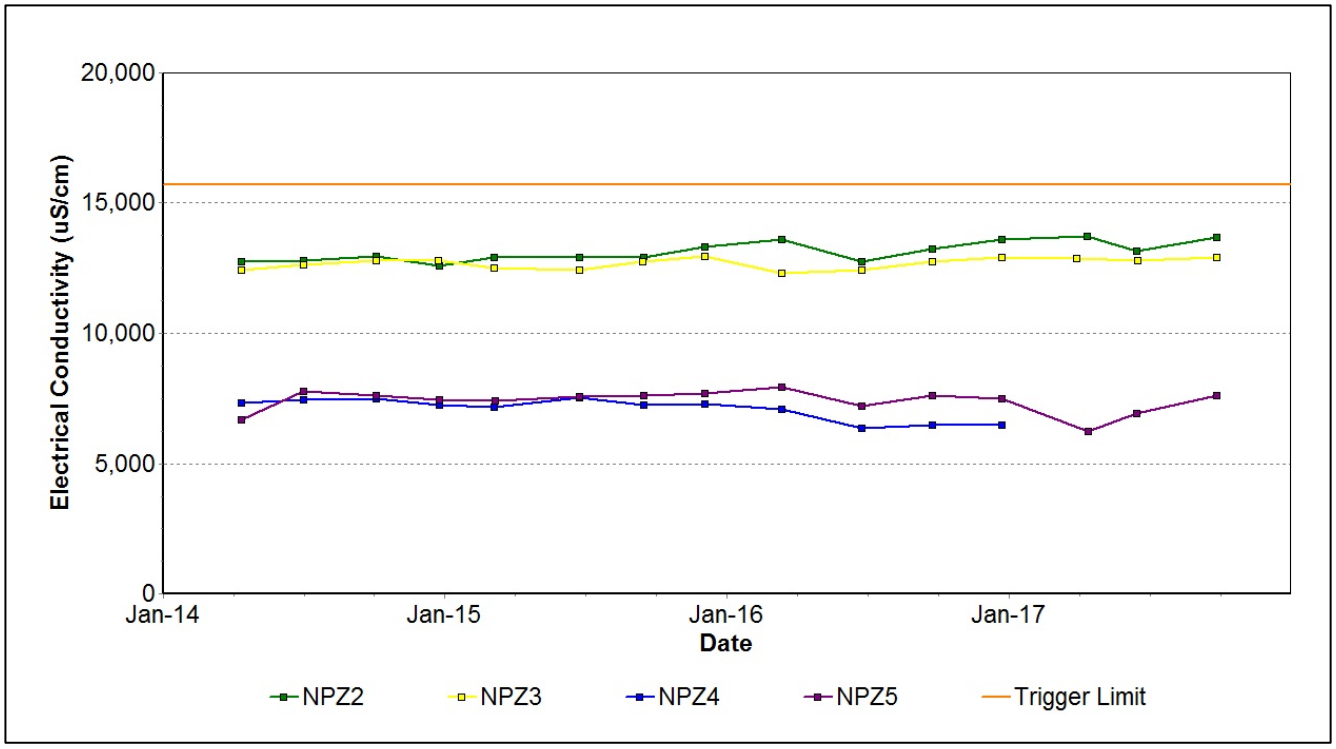


**Figure 65: West Pit Siltstone Electrical Conductivity Trend – September 2017**

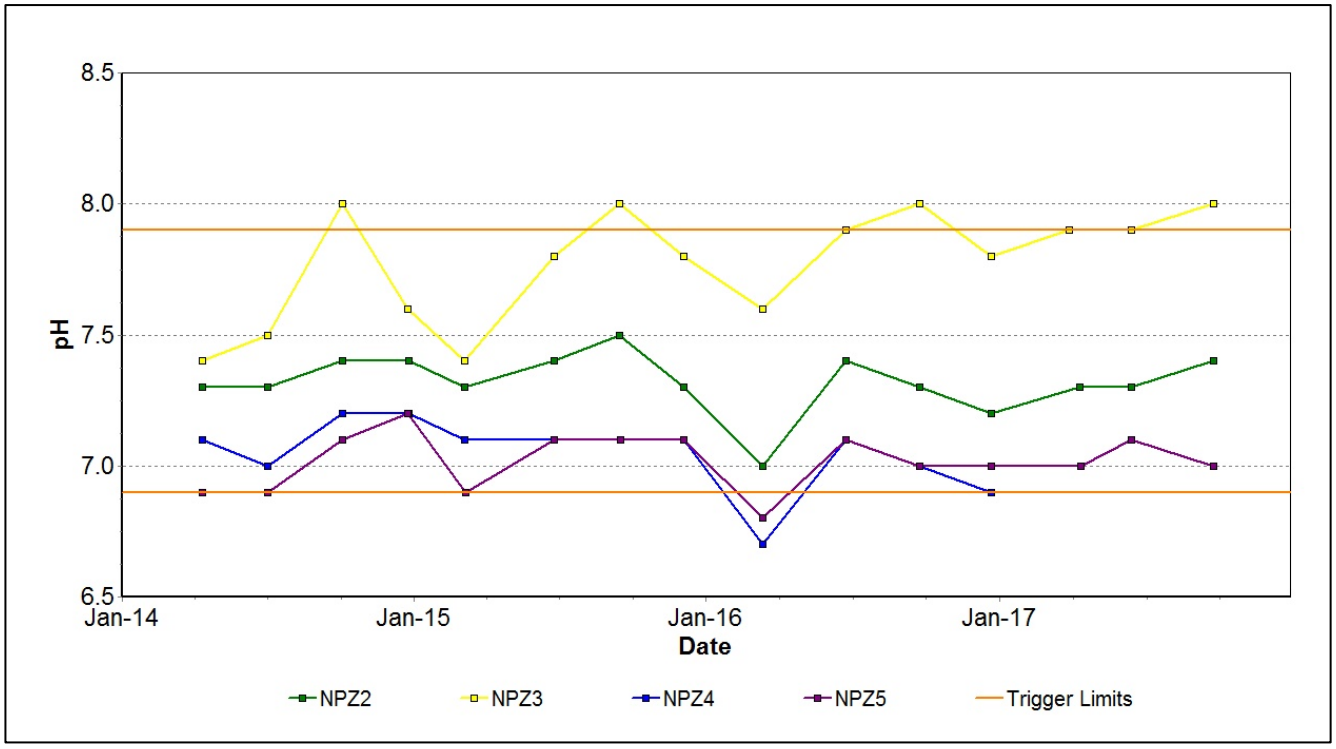


**Figure 66: West Pit Siltstone pH Trend – September 2017**

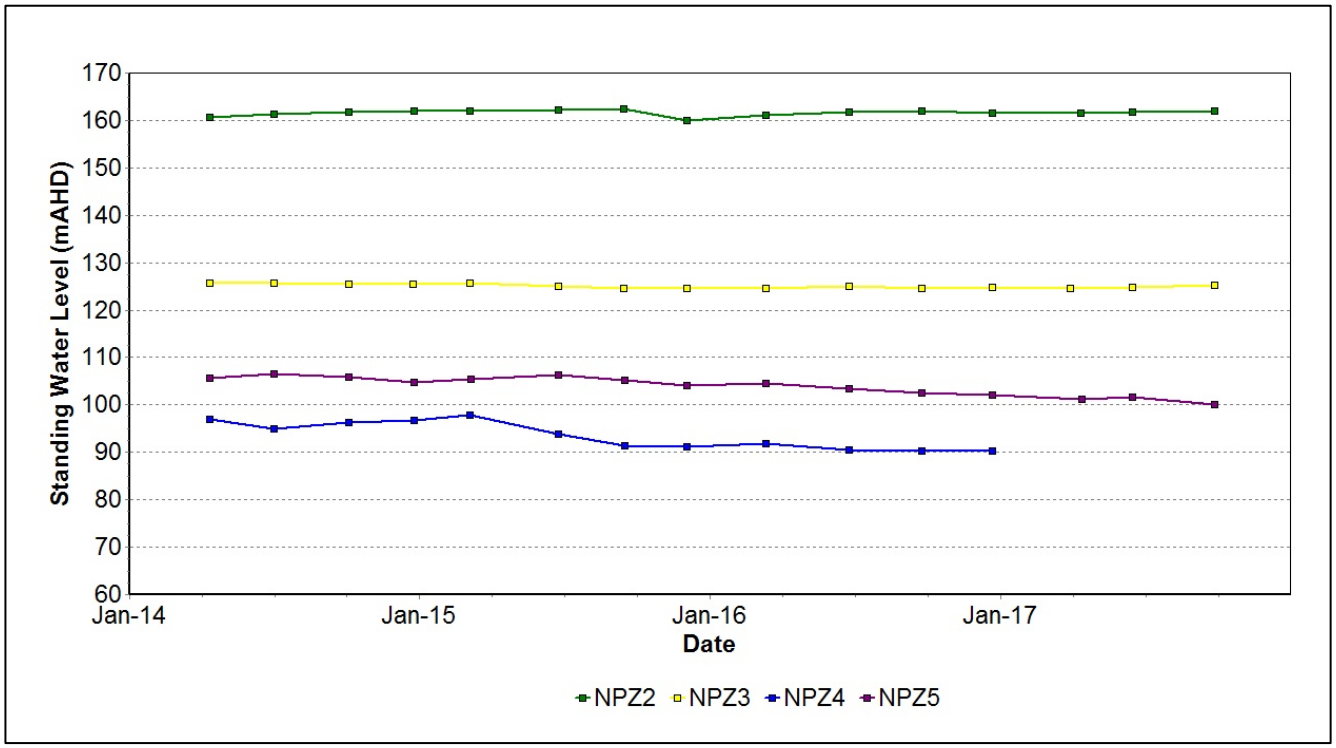


**Figure 67: West Pit Siltstone Standing Water Level – September 2017**

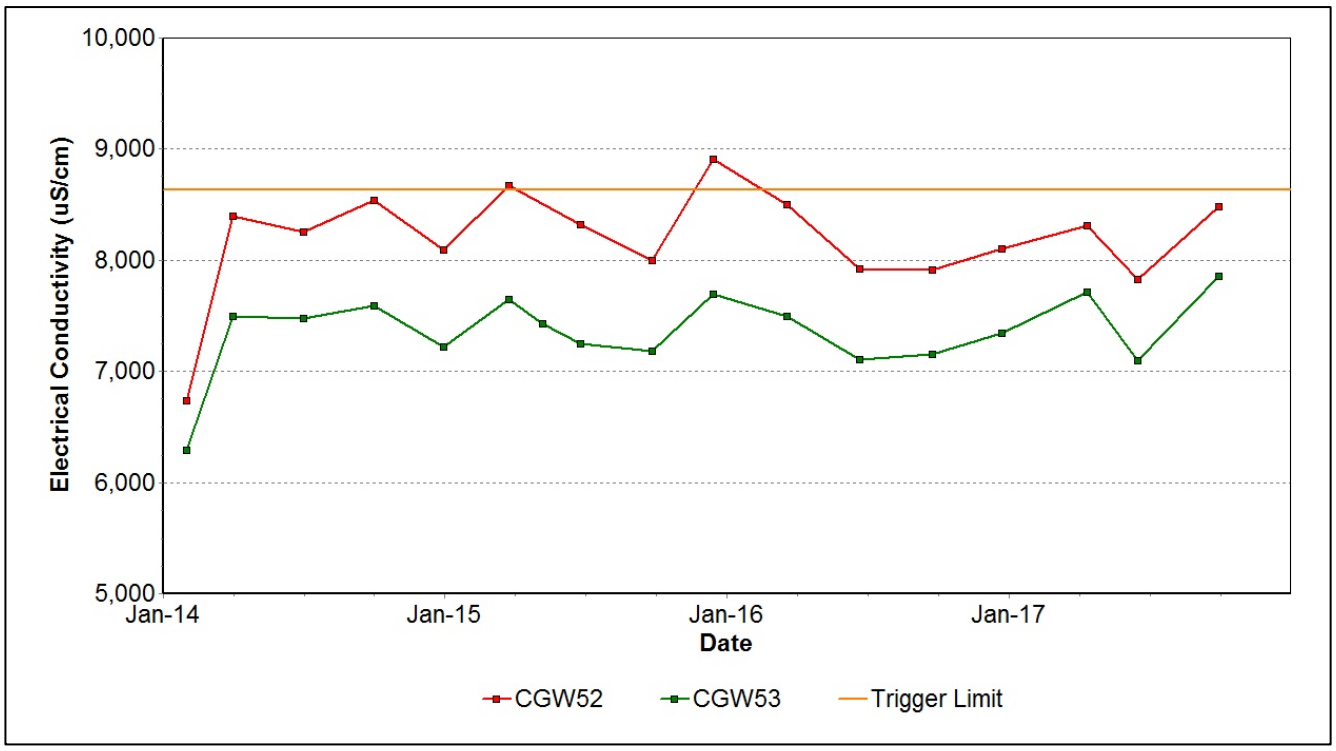


**Figure 68: Carrington Broonie Electrical Conductivity Trend - September 2017**

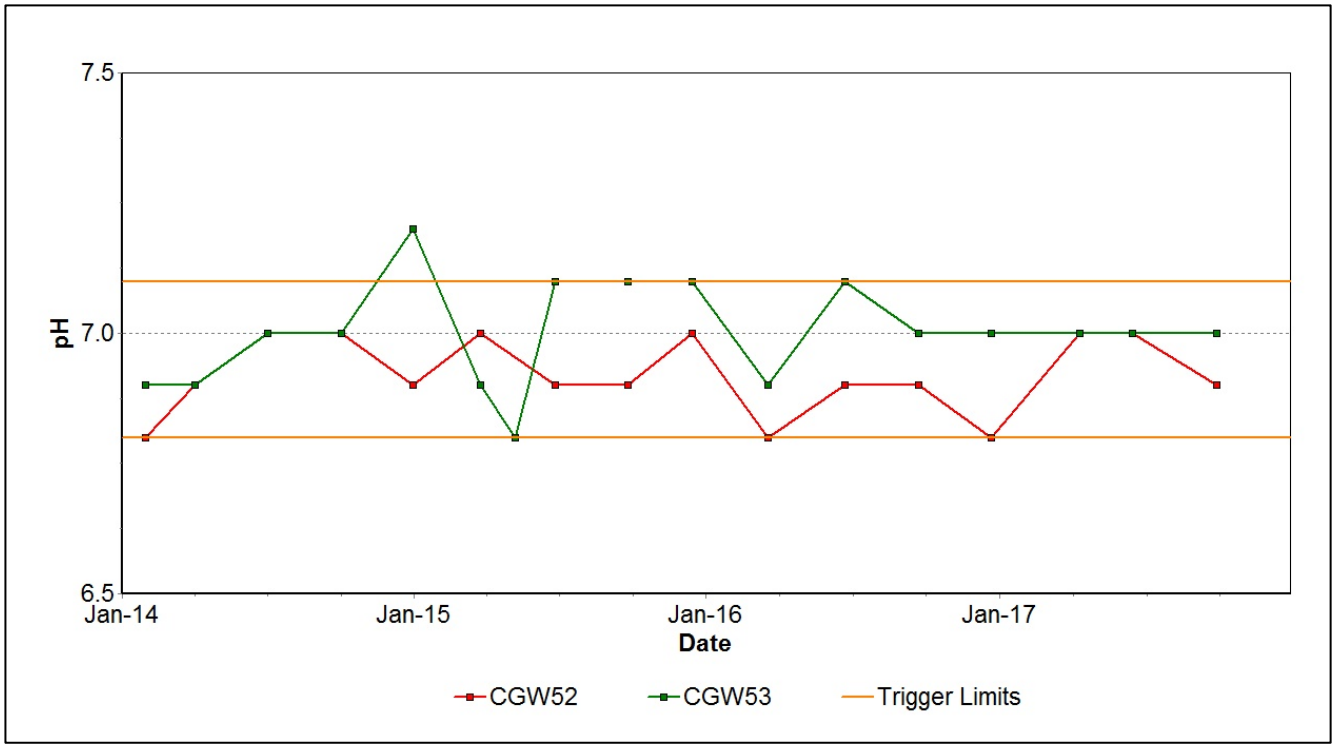


**Figure 69: Carrington Broonie pH Trend - September 2017**

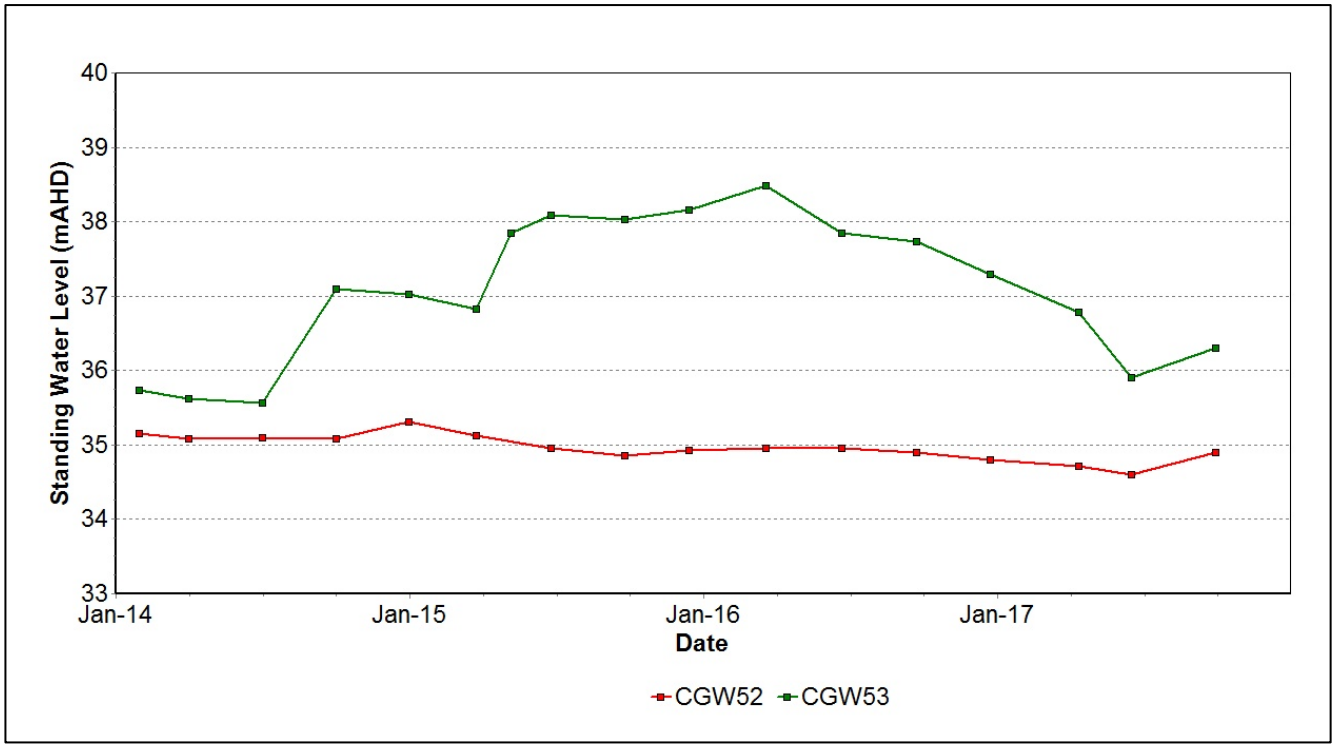


**Figure 70: Carrington Broonie Standing Water Level - September 2017**

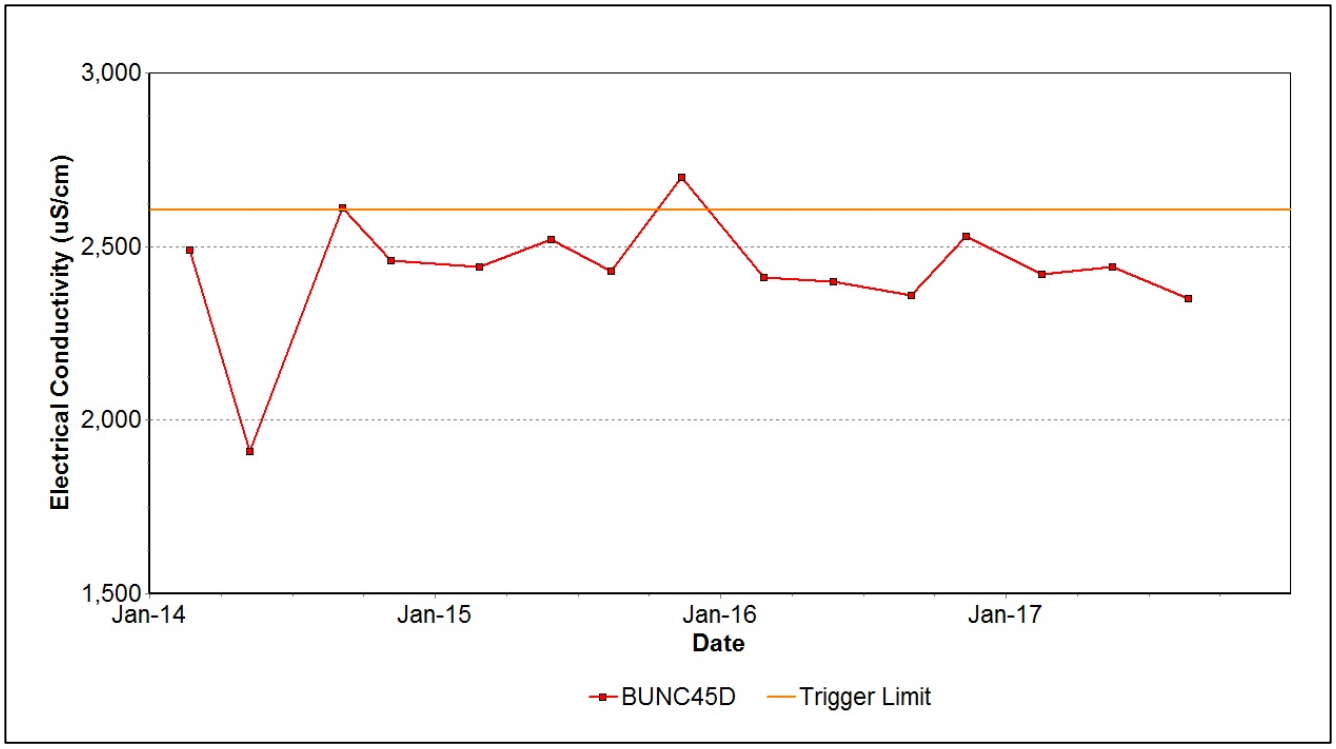


**Figure 71: Cheshunt Piercefield Electrical Conductivity Trend – September 2017**

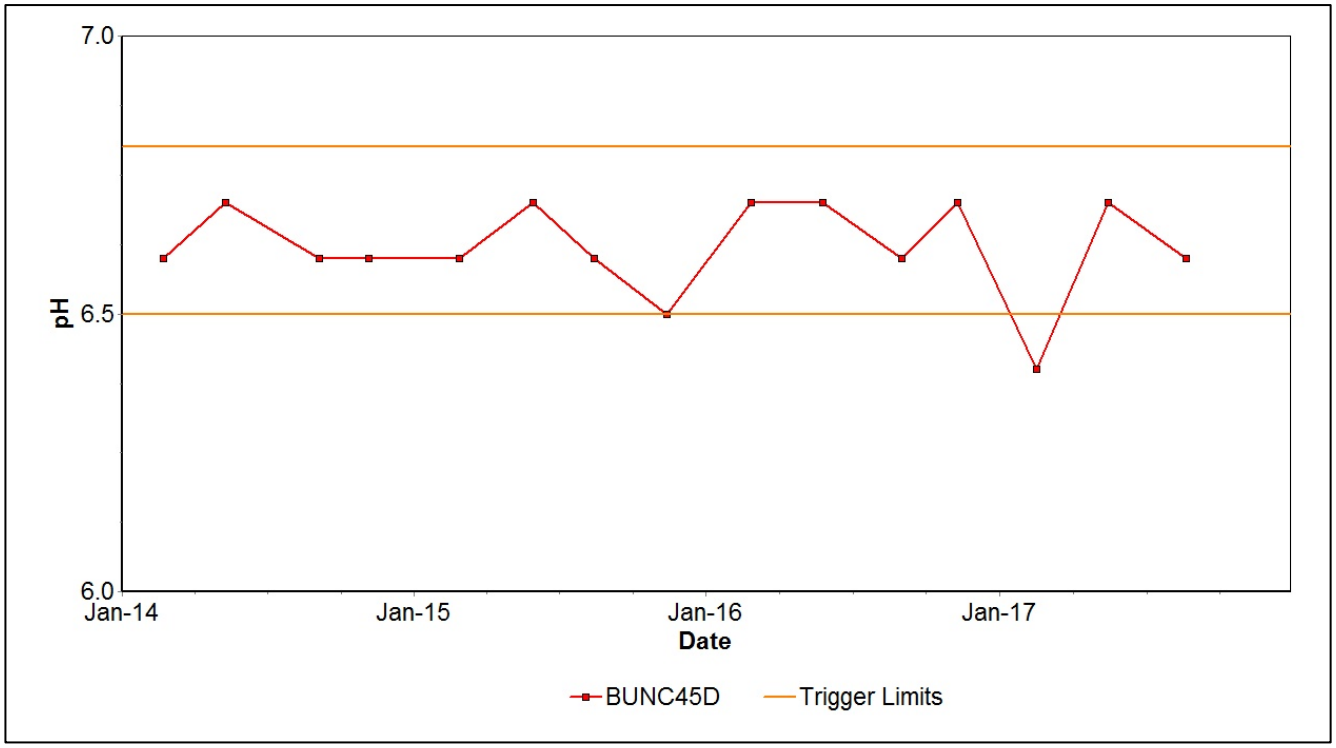


**Figure 72: Cheshunt Piercefield pH Trend - September 2017**

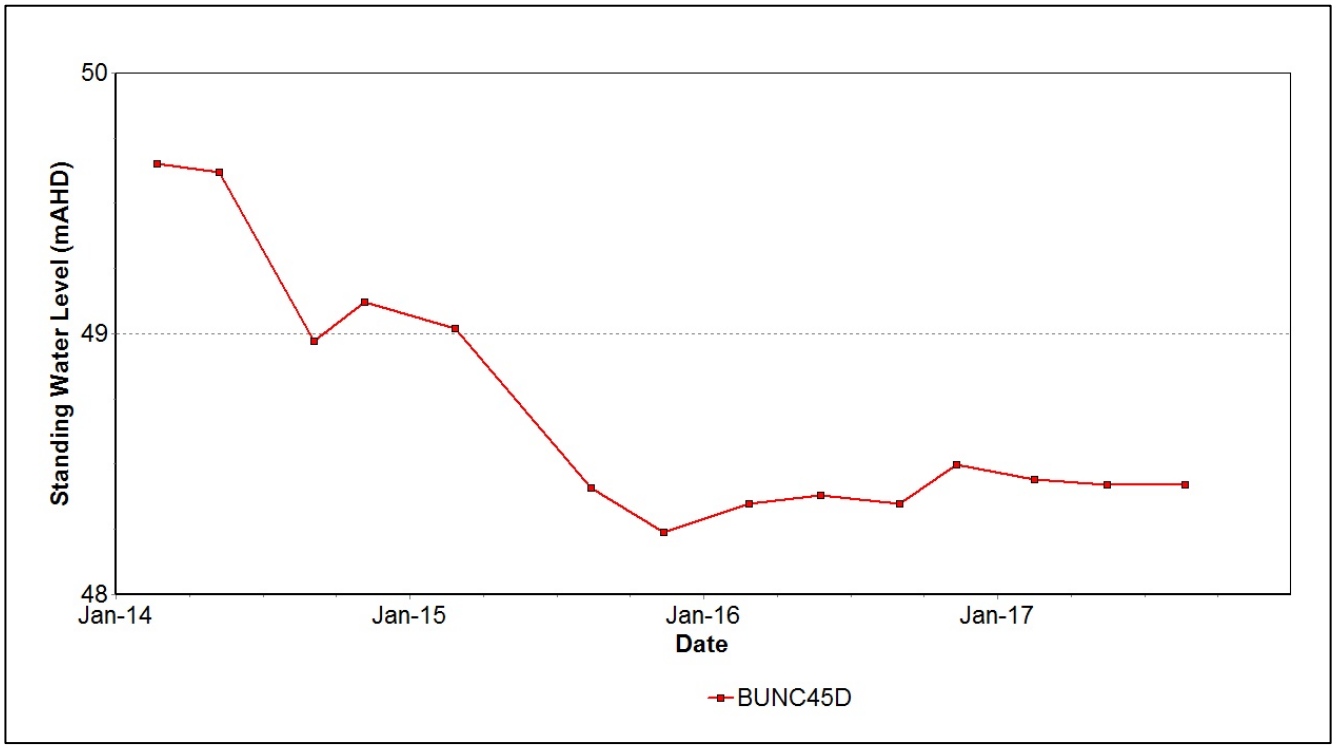


**Figure 73: Cheshunt Piercefield Standing Water Level - September 2017**

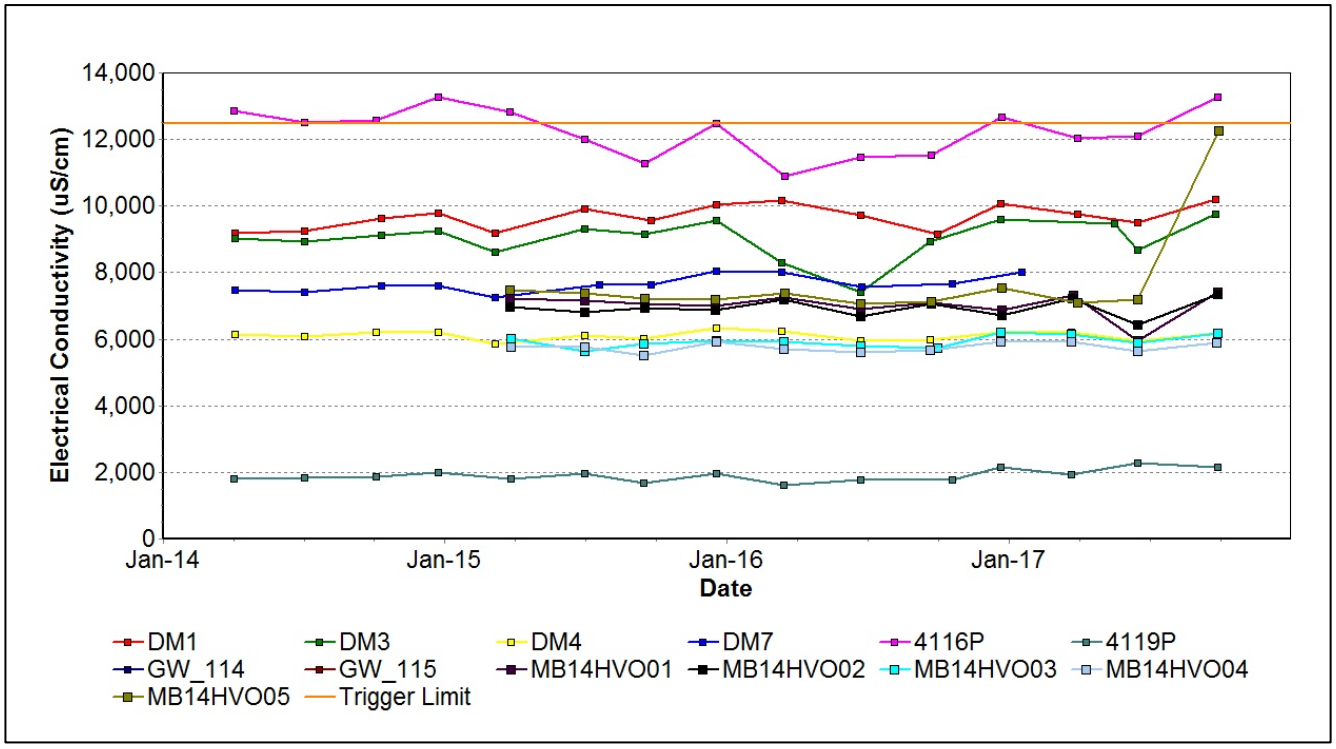


**Figure 74: North Pit Spoil Electrical Conductivity Trend - September 2017**

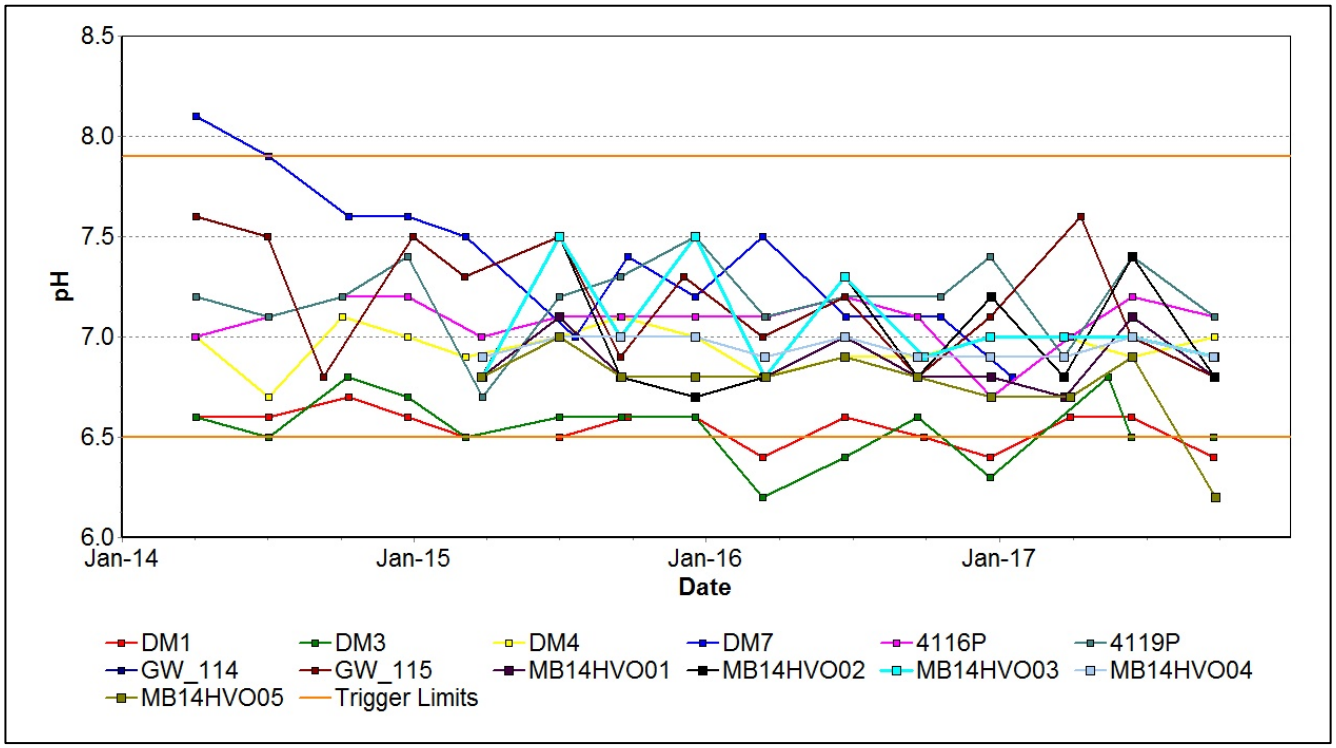


**Figure 75: North Pit Spoil pH Trend - September 2017**

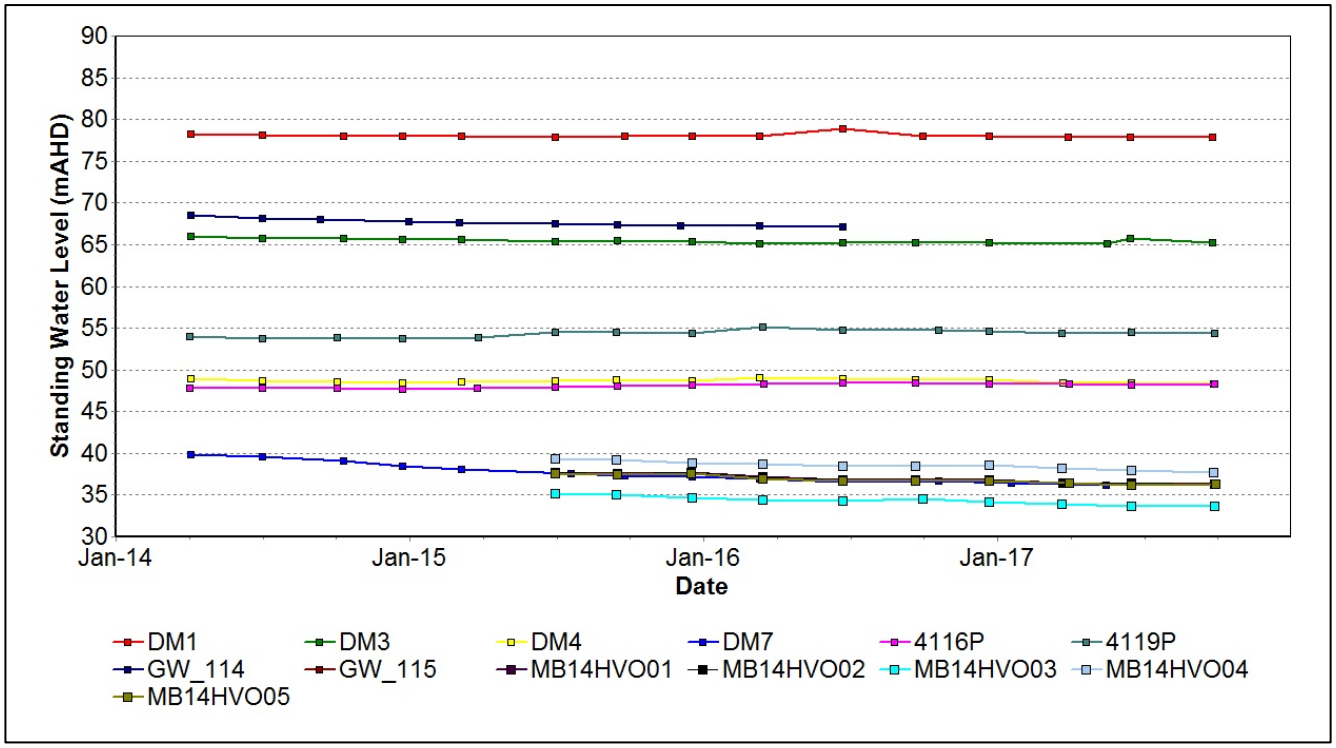


**Figure 76: North Pit Spoil Standing Water Level - September 2017**

### 4.2.1 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 HVO Water Management Plan.

During Q3 2017 a range of internal trigger limits were breached, these are summarised in **Table 3**.

**Table 3: Groundwater Triggers - 2017**

| Site | Date | Trigger Limit Breached | Action Taken in Response |
|---|---|---|---|
| B631(BFS) | 18/05/2017 | EC – 95$^{th}$ Percentile | Watching Brief* |
| C130WDH | 18/05/2017 | EC – 95$^{th}$ Percentile | Watching Brief* |
| D612(AFS) | 17/05/2017 | EC – 95$^{th}$ Percentile | Watching Brief* |
| CFW55R | 16/06/2017 | EC – 95$^{th}$ Percentile | 4$^{th}$ consecutive exceedance: Previous investigation determined that hydro geochemical speciation has not changed and that water quality is consistent with nearby bore CFW57. This, coupled with historical data showing similar elevated EC and depressed pH, suggests |

| | | | |
|---|---|---|---|
| | | | the variations are natural and unlikely to be due to anthropogenic impact. Watching brief, no further action required. |
| B631(BFS) | 18/05/2017 | PH – 5th Percentile | Watching Brief* |
| BZ2A(2) | 16/05/2017 | PH – 5th Percentile | Watching Brief* |
| C130(WDH) | 18/05/2017 | PH – 5th Percentile | Watching Brief* |
| CGW46 | 16/06/2017 | PH – 95th Percentile | Watching Brief* |
| D317(BFS) | 18/05/2017 | PH – 95th Percentile | Increasing trend in pH not reflected spatially in neighbouring bores. Water level in bore stable, suggesting water quality changes are not related to any mining-related activity. Continue to watch and monitor. |
| G2 | 15/06/2017 | PH – 95th Percentile | Measurements highly variable and consistent with historical range. Watch and monitor. |
| Hobdens Well | 16/05/2017 | PH – 95th Percentile | Watching Brief* |
| CFW55R | 16/06/2017 | PH – 5th Percentile | 5th consecutive exceedance: Previous investigation determined that hydro geochemical speciation has not changed and that water quality is consistent with nearby bore CFW57. This, coupled with historical data showing similar elevated EC and depressed pH, suggests the variations are natural and unlikely to be due to anthropogenic impact. Watching brief, no further action required. |

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

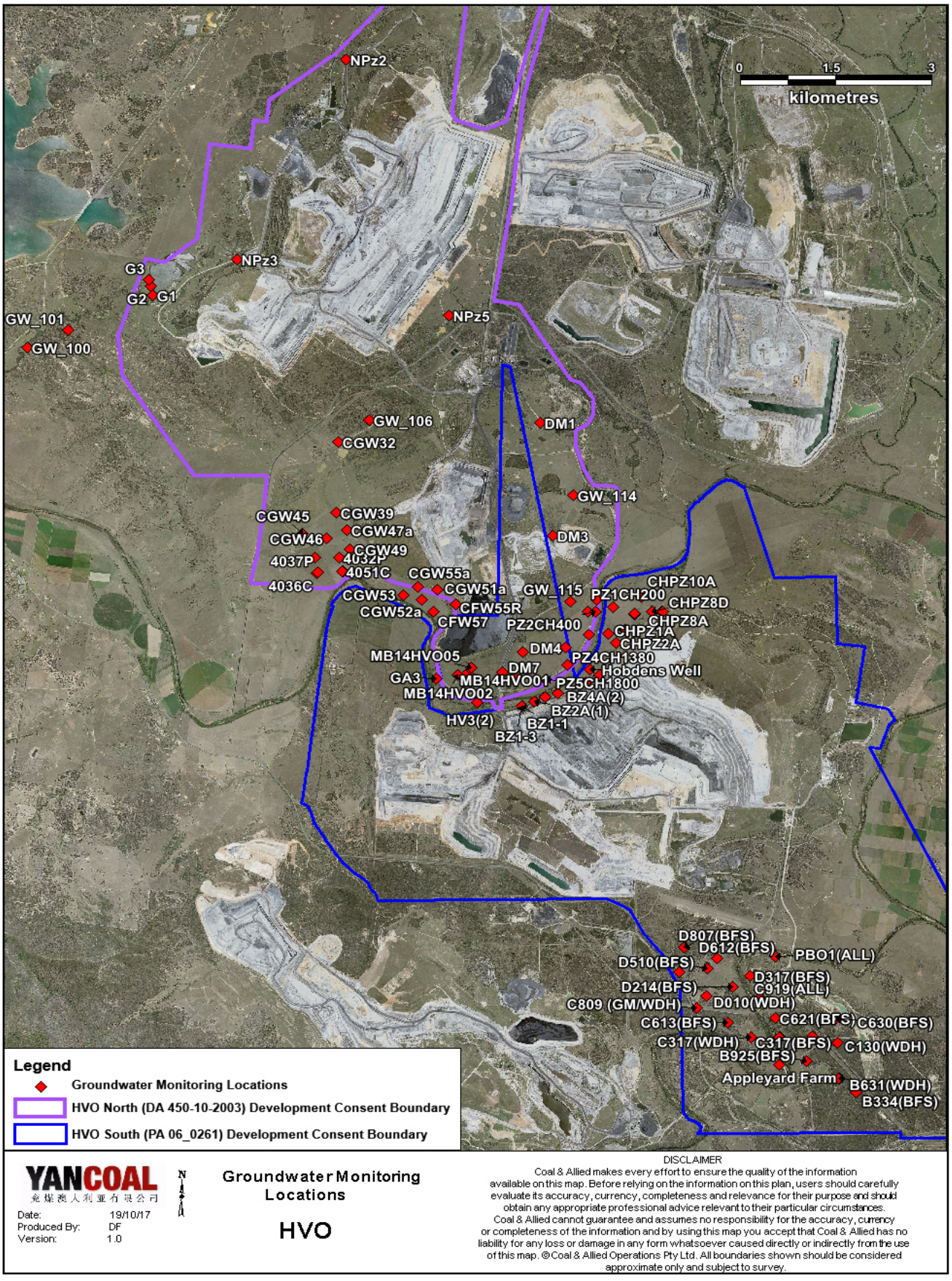


**Figure 77: Groundwater Monitoring Location Plan**

# 5.0 BLASTING

## 5.1.1 Blast Monitoring

HVO have a network of five 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 inFigure 83.

During September 23 blasts were initiated at HVO. Figure 78 through to Figure 82 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 there were no exceedances of the airblast overpressure or ground vibration criteria.

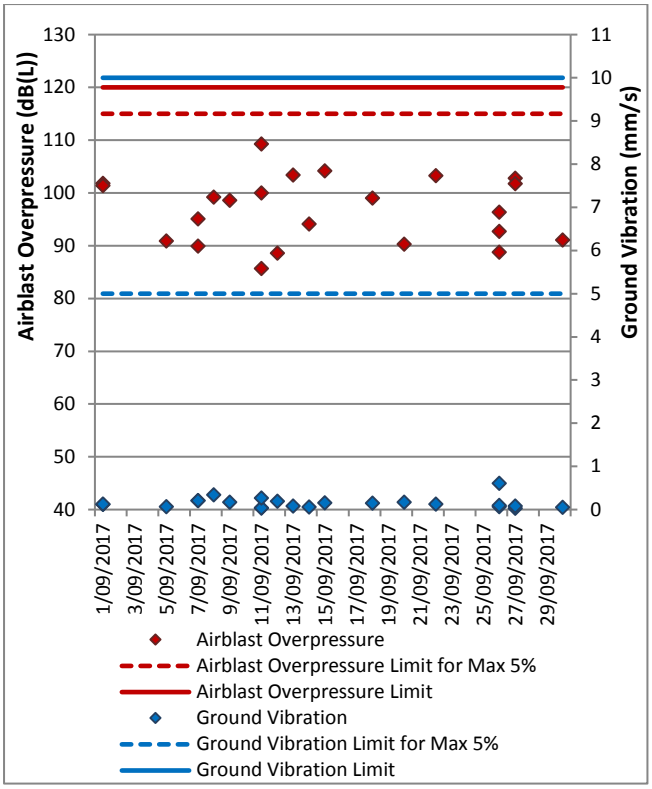


**Figure 78: Moses Crossing Blast Monitoring Results – September 2017**

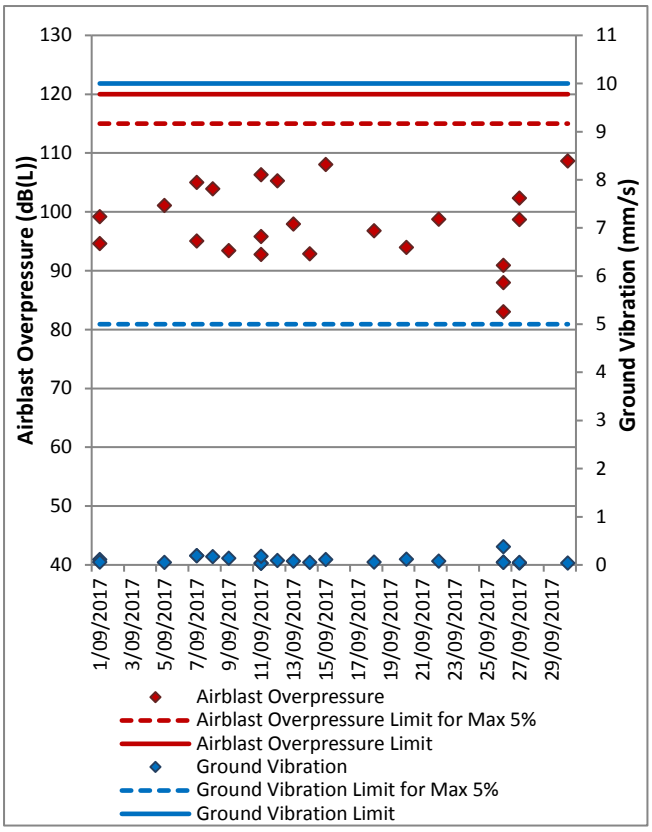


**Figure 79: Jerrys Plains Blast Monitoring Results – September 2017**

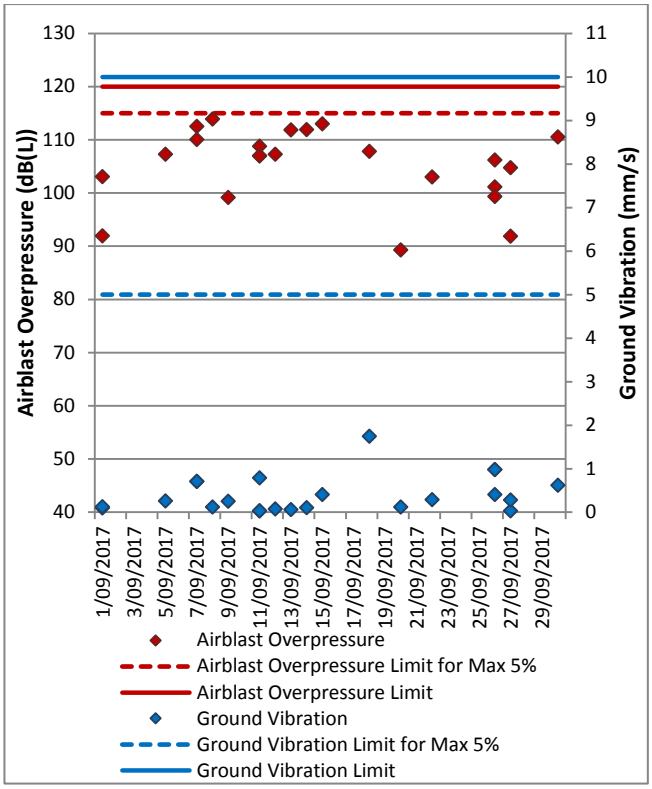


**Figure 80: Maison Dieu Blast Monitoring Results – September 2017**

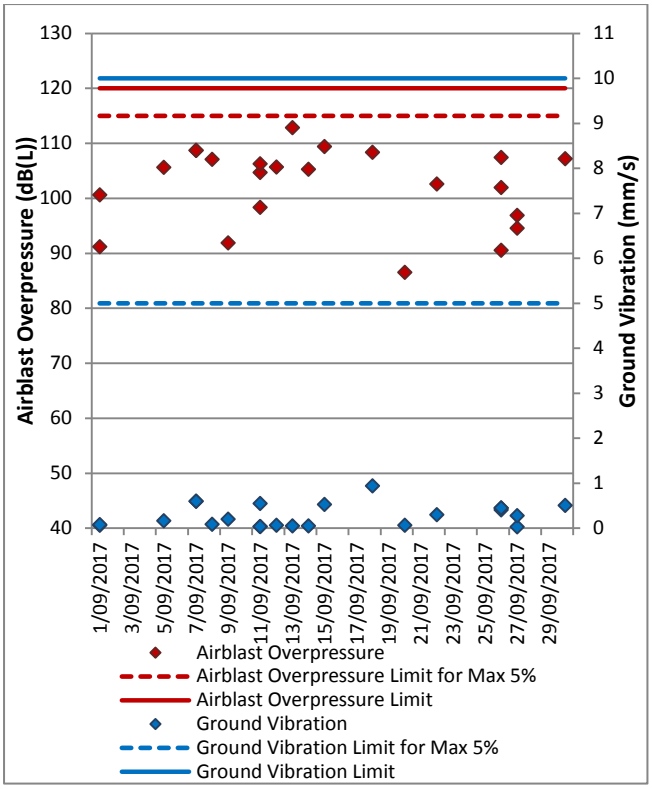


**Figure 82: Knodlers Lane Blast Monitoring Results – September 2017**

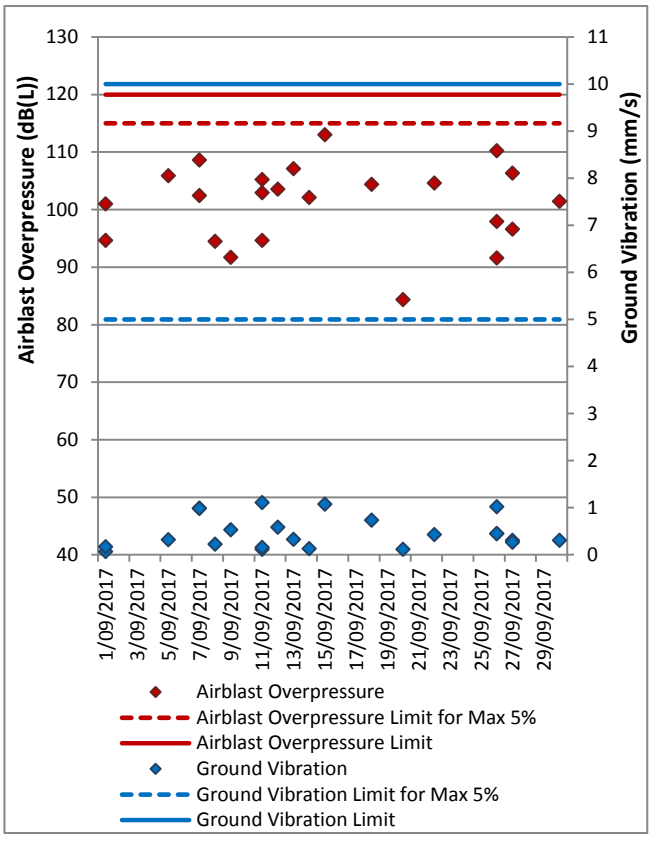


**Figure 81: Warkworth Blast Monitoring Results – September 2017**

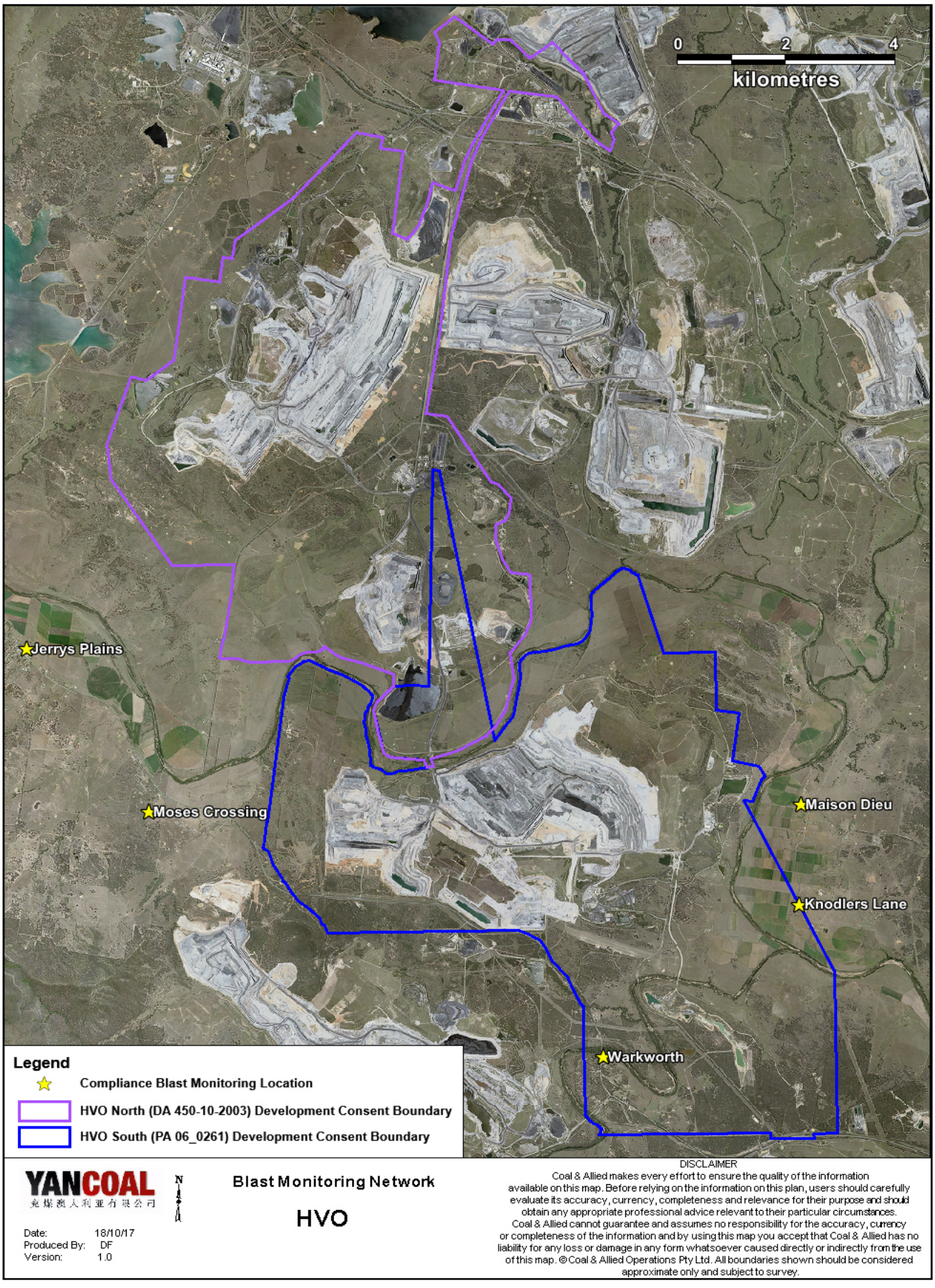


**Figure 83: Blast Monitoring Location Plan**

# 6.0 NOISE

Routine attended noise monitoring is carried out at defined locations around HVO as described in the HVO Noise Monitoring Programme. 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 HVO. The attended noise monitoring locations are displayed in Figure 84

## 6.1 Attended Noise Monitoring Results

Attended monitoring was conducted at receiver locations surrounding HVO on the nights of 14/09/2017 and 15/09/2017. Monitoring results are detailed in Table 3to Table 8 .

**Table 5: $L_{Aeq,\ 15\ minute}$ HVO South - Impact Assessment Criteria – September 2017**

| Location | Date and Time | Wind Speed (m/s)[5] | VTG[5] | Criterion dB (A) | Criterion Applies?[1,6] | HVO South $L_{Aeq}$ dB[2,4] | Exceedance[3] |
|---|---|---|---|---|---|---|---|
| Knodlers Lane | 14/09/2017 22:41 | 4.7 | -1 | 37 | No | 41 | NA |
| Maison Dieu | 14/09/2017 23:29 | 3.5 | -1 | 37 | No | 41 | NA |
| Shearers Lane | 15/09/2017 0:06 | 3.8 | -1 | 41 | No | 42 | NA |
| Kilburnie South | 14/09/2017 22:56 | 4.5 | -1 | 36 | No | IA | NA |
| Jerrys Plains Village | 14/09/2017 21:35 | 4.4 | -1 | 35 | No | IA | NA |
| Jerrys Plains East | 14/09/2017 22:29 | 4.4 | -1 | 35 | No | IA | NA |
| Long Point Road | 14/09/2017 21:00 | 3.5 | -1 | 35 | No | IA | NA |
| HVGC | 14/09/2017 21:02 | 4 | -1 | 55 | No | 48 | NA |

**Table 6: $L_{Aeq,\ 15\ minute}$ HVO South - Land Acquisition Criteria – September 2017**

| Location | Date and Time | Wind Speed (m/s)[5] | VTG[5] | Criterion dB (A) | Criterion Applies?[1,6] | HVO South $L_{Aeq}$ dB[2,4] | Exceedance[3] |
|---|---|---|---|---|---|---|---|
| Knodlers Lane | 14/09/2017 22:41 | 4.7 | -1 | 41 | No | 41 | NA |
| Maison Dieu | 14/09/2017 23:29 | 3.5 | -1 | 41 | No | 41 | NA |
| Shearers Lane | 15/09/2017 0:06 | 3.8 | -1 | 41 | No | 42 | NA |
| Kilburnie South | 14/09/2017 22:56 | 4.5 | -1 | 41 | No | IA | NA |
| Jerrys Plains Village | 14/09/2017 21:35 | 4.4 | -1 | 40 | No | IA | NA |
| Jerrys Plains East | 14/09/2017 22:29 | 4.4 | -1 | 40 | No | IA | NA |
| Long Point Road | 14/09/2017 21:00 | 3.5 | -1 | 40 | No | IA | NA |
| HVGC | 14/09/2017 21:02 | 4 | -1 | NA | NA | 48 | NA |

**Table 7: $L_{A1, 1minute}$ HVO South - Impact Assessment Criteria – September 2017**

| Location | Date and Time | Wind Speed (m/s)[5] | VTG[5] | Criterion dB (A) | Criterion Applies?[1,6] | HVO South $L_{A1, 1min}$ dB[2,4] | Exceedance[3] |
|---|---|---|---|---|---|---|---|
| Knodlers Lane | 14/09/2017 22:41 | 4.7 | -1 | 45 | No | 48 | NA |
| Maison Dieu | 14/09/2017 23:29 | 3.5 | -1 | 45 | No | 51 | NA |
| Shearers Lane | 15/09/2017 0:06 | 3.8 | -1 | 45 | No | 52 | NA |
| Kilburnie South | 14/09/2017 22:56 | 4.5 | -1 | 45 | No | IA | NA |
| Jerrys Plains Village | 14/09/2017 21:35 | 4.4 | -1 | 45 | No | IA | NA |
| Jerrys Plains East | 14/09/2017 22:29 | 4.4 | -1 | 45 | No | IA | NA |
| Long Point Road | 14/09/2017 21:00 | 3.5 | -1 | 45 | No | IA | NA |
| HVGC | 14/09/2017 21:02 | 4 | -1 | NA | NA | 56 | NA |

*Notes*
*1. Noise emission limits apply for wind speeds up to 3 metres per second (at a height of 10m), or temperature inversion conditions of up to 3 degrees/100m (at a height of 10m);*
*2. Estimated or measured $L_{Aeq,15minute}$ dB attributed to HVO South Pit Area;*
*3. NA in exceedance column means atmospheric conditions outside specified in approval and so criterion is not applicable;*
*4. Bolded results in red indicate exceedance of criteria;*
*5. Atmospheric data is sourced from the HVO Corporate weather station using logged met data;*
*6. Criterion may or may not apply due to rounding of meteorological data values*

**Table 8: $L_{Aeq, 15minute}$ HVO North – Impact Assessment Criteria – September 2017**

| Location | Date and Time | Wind Speed (m/s)[5] | VTG[5] | Criterion dB (A) | Criterion Applies?[1,6] | HVO North $L_{Aeq}$ dB[2,4] | Exceedance[3] |
|---|---|---|---|---|---|---|---|
| Knodlers Lane | 14/09/2017 22:41 | 4.7 | -1 | 35 | No | IA | NA |
| Maison Dieu | 14/09/2017 23:29 | 3.5 | -1 | 35 | No | IA | NA |
| Shearers Lane | 15/09/2017 0:06 | 3.8 | -1 | 35 | No | IA | NA |
| Kilburnie South | 14/09/2017 22:56 | 4.5 | -1 | 39 | No | <20 | NA |
| Jerrys Plains Village | 14/09/2017 21:35 | 4.4 | -1 | 36 | No | <20 | NA |
| Jerrys Plains East | 14/09/2017 22:29 | 4.4 | -1 | 39 | No | <25 | NA |
| Long Point Road | 14/09/2017 21:00 | 3.5 | -1 | 35 | No | IA | NA |
| HVGC | 14/09/2017 21:02 | 4 | -1 | NA | NA | IA | NA |

**Table 9: $L_{Aeq,15minute}$ HVO North - Land Acquisition Criteria – September 2017**

| Location | Date and Time | Wind Speed (m/s)[5] | VTG[5] | Criterion dB (A) | Criterion Applies?[1,6] | HVO North $L_{Aeq}$ dB[2,4] | Exceedance[3] |
|---|---|---|---|---|---|---|---|
| Knodlers Lane | 14/09/2017 22:41 | 4.7 | -1 | 41 | No | IA | NA |
| Maison Dieu | 14/09/2017 23:29 | 3.5 | -1 | 41 | No | IA | NA |
| Shearers Lane | 15/09/2017 0:06 | 3.8 | -1 | 41 | No | IA | NA |
| Kilburnie South | 14/09/2017 22:56 | 4.5 | -1 | 41 | No | <20 | NA |
| Jerrys Plains Village | 14/09/2017 21:35 | 4.4 | -1 | 41 | No | <20 | NA |
| Jerrys Plains East | 14/09/2017 22:29 | 4.4 | -1 | 41 | No | <25 | NA |
| Long Point Road | 14/09/2017 21:00 | 3.5 | -1 | 41 | No | IA | NA |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| HVGC | 14/09/2017 21:02 | 4 | -1 | NA | NA | IA | NA |

**Table 10: $L_{A1, 1Minute}$ HVO North - Impact Assessment Criteria – September 2017**

| Location | Date and Time | Wind Speed (m/s)[5] | VTG[5] | Criterion dB (A) | Criterion Applies?[1,6] | HVO North $L_{A1, 1min}$ dB[2,4] | Exceedance[3] |
|---|---|---|---|---|---|---|---|
| Knodlers Lane | 14/09/2017 22:41 | 4.7 | -1 | 46 | No | IA | NA |
| Maison Dieu | 14/09/2017 23:29 | 3.5 | -1 | 46 | No | IA | NA |
| Shearers Lane | 15/09/2017 0:06 | 3.8 | -1 | 46 | No | IA | NA |
| Kilburnie South | 14/09/2017 22:56 | 4.5 | -1 | 46 | No | <20 | NA |
| Jerrys Plains Village | 14/09/2017 21:35 | 4.4 | -1 | 46 | No | <20 | NA |
| Jerrys Plains East | 14/09/2017 22:29 | 4.4 | -1 | 46 | No | <25 | NA |
| Long Point Road | 14/09/2017 21:00 | 3.5 | -1 | 46 | No | IA | NA |
| HVGC | 14/09/2017 21:02 | 4 | -1 | NA | NA | IA | NA |

*Notes*
*1. Noise emission limits apply under all meteorological conditions, except during periods of rain or hail, when average winds speed at microphone heights exceeds 5 metres per second, when wind speeds greater than 3 metres per second are measured at 10m above ground level, or during temperature inversion conditions greater than 3 degrees C/100m;2. Estimated or measured LAeq,15minute dB attributed to HVO North Area;*
*3. NA in exceedance column means atmospheric conditions outside specified in approval and so criterion is not applicable;*
*4. Bolded results in red indicate exceedance of criteria;*
*5. Atmospheric data is sourced from the HVO Corporate weather station using logged met data;*
*6. Criterion may or may not apply due to rounding of meteorological data values*

## 5.2 INP Low Frequency Assessment

In accordance with the requirements of the 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 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 penalty is triggered, the penalty has been applied to the dominant mine noise source. There were no exceedances of noise criteria following application of the INP Low Frequency modification factor during September 2017.

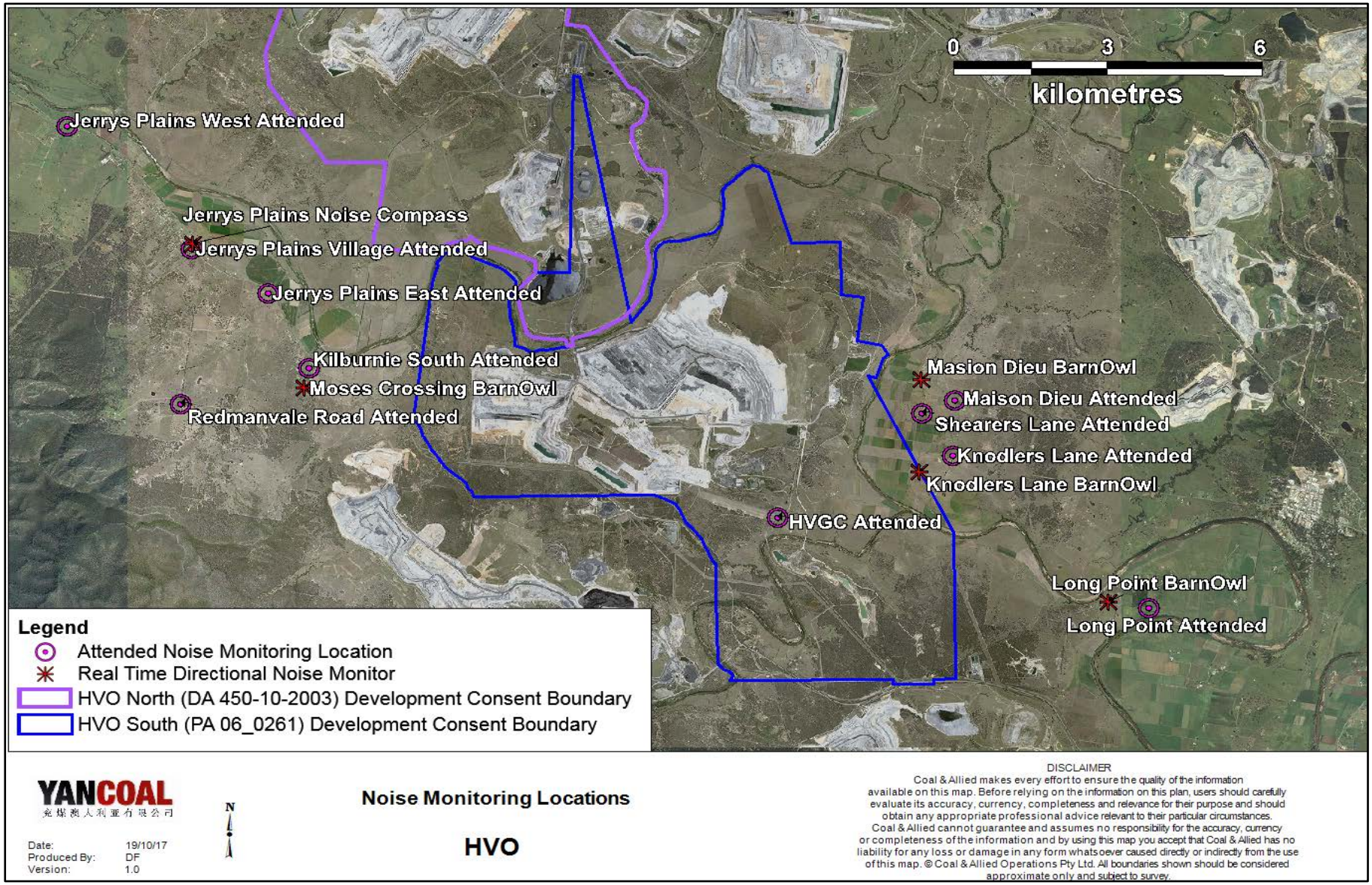


**Figure 84: Noise Monitoring Location Plan**

## 6.2 Real Time Noise Monitoring

HVO utilises a network of real-time directional noise monitors to manage noise impacts on a continuous basis. Noise alarms are in place at five monitoring locations (Knodlers Lane, Maison Dieu, Jerrys Plains, Moses Crossing, and Long Point), which alert HVO staff to elevated noise levels likely to be attributable to HVO. Noise alarms are investigated and responded to with the appropriate level of operational modification. Changes in response to a noise alarm can include replacing equipment with quieter (noise attenuated) units, changing or relocating tasks, and shutting down equipment.

HVO's Planning approvals stipulate noise criteria which must be met during the life of the development(s). The approvals however do not stipulate requirements or give guidance on noise affectation, or the frequency of any elevated noise event which would constitute noise affectation. Page 6 of the NSW Industrial Noise Policy (INP) comments that criteria "seek to restrict the risk of people being highly annoyed to less than 10 percent, and to meet this for at least 90 percent of the time".

For the purposes of assessing the effectiveness of the noise management system, HVO applies a similar approach with regard to the frequency of any elevated noise event. It should be noted that this assessment does not compliment or conflict with attended noise monitoring detailed in Section 6.1, and that real time monitoring data includes non-mine noise sources such as dogs, cows, or more commonly, road traffic.

# 7.0 OPERATIONAL DOWNTIME

During September, a total of 2531.5 hours of equipment downtime was logged in response to real time monitoring and visual inspections for environmental reasons such as dust, noise and meteorological conditions. Operational downtime by equipment type is shown in Figure 85.

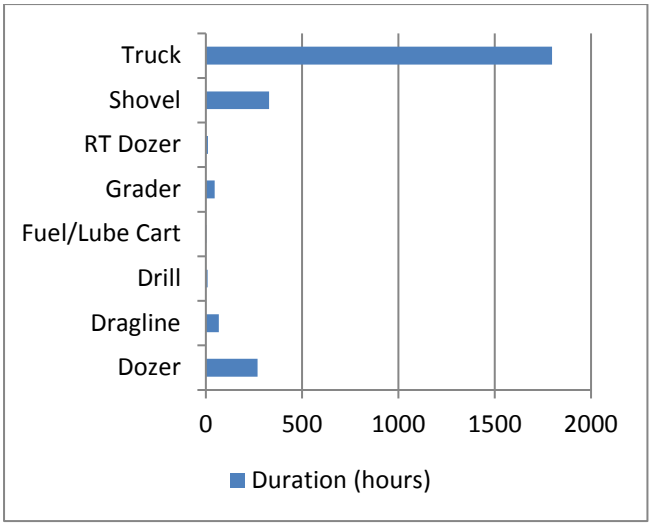


**Figure 85: Operational Downtime by Equipment Type – September 2017**

# 8.0 REHABILITATION

During September 23.1 Ha of land was released, 17.1Ha of land was bulk shaped, 15.2 Ha of land was topsoiled and 22.4 Ha of land was composted. Year to date progress can be viewed in Figure 86.

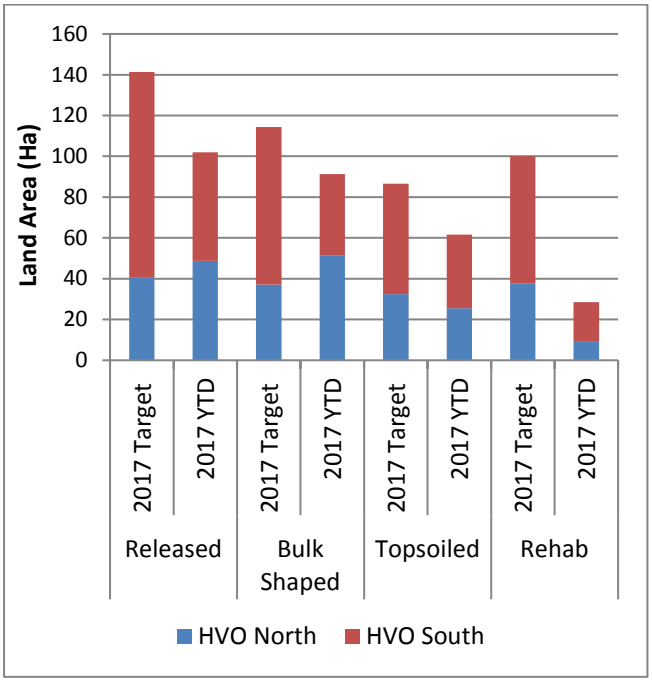


**Figure 86: Rehabilitation YTD - September 2017**

## 9.0 COMPLAINTS

7 complaints were received during the reporting period. Details of complaints received YTD are shown in Figure 87 below.

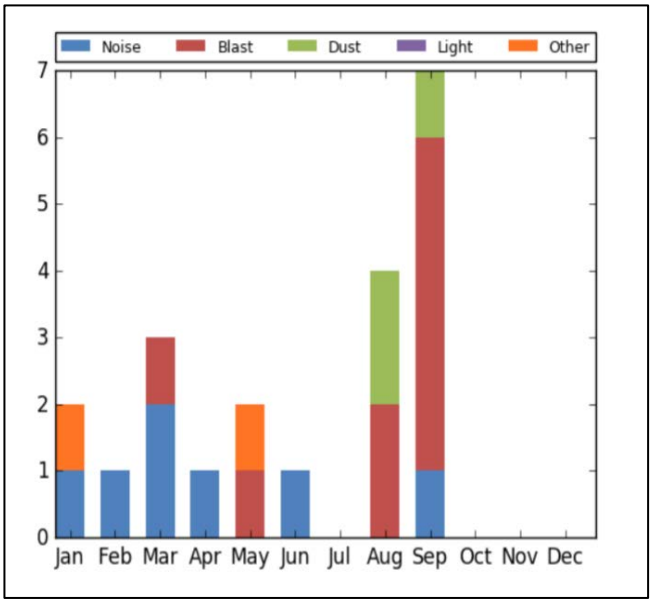


**Figure 87: Complaints Graph - September 2017**

## 10.0 ENVIRONMENTAL INCIDENTS

During the reporting period there were no reportable environmental incidents.

# Appendix A: Meteorological Data

**Table 11: Meteorological Data - HVO Corporate 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 | 18.4 | 1.7 | 91.1 | 25.6 | 764 | 159.6 | 1.0 | 0.0 |
| 2/09/2017 | 24.8 | 1.5 | 100.0 | 9.0 | 698 | 266.6 | 2.2 | 0.0 |
| 3/09/2017 | 29.0 | 8.4 | 53.1 | 7.6 | 702 | 291.7 | 4.8 | 0.0 |
| 4/09/2017 | 20.8 | 8.7 | 54.1 | 15.3 | 794 | 289.1 | 5.6 | 0.0 |
| 5/09/2017 | 18.3 | 8.8 | 44.3 | 19.4 | 918 | 290.7 | 6.5 | 0.0 |
| 6/09/2017 | 19.0 | 7.7 | 49.4 | 14.6 | 807 | 286.7 | 6.3 | 0.0 |
| 7/09/2017 | 20.8 | 4.2 | 62.0 | 18.0 | 817 | 288.6 | 4.0 | 0.0 |
| 8/09/2017 | 19.8 | 4.3 | 61.2 | 22.6 | 1012 | 271.3 | 4.7 | 0.0 |
| 9/09/2017 | 19.7 | 3.0 | 63.9 | 15.1 | 805 | 207.5 | 2.3 | 0.0 |
| 10/09/2017 | 19.8 | 2.9 | 81.2 | 21.1 | 1160 | 216.5 | 1.3 | 0.0 |
| 11/09/2017 | 25.3 | 3.1 | 91.1 | 8.9 | 923 | 283.9 | 3.0 | 0.0 |
| 12/09/2017 | 29.6 | 8.2 | 39.4 | 12.1 | 1174 | 291.3 | 3.6 | 0.0 |
| 13/09/2017 | 32.2 | 14.4 | 37.4 | 5.2 | 975 | 282.4 | 4.9 | 0.0 |
| 14/09/2017 | 20.9 | 6.3 | 98.9 | 22.8 | 1062 | 276.0 | 5.8 | 7.4 |
| 15/09/2017 | 21.8 | 4.9 | 62.9 | 24.1 | 880 | 297.3 | 4.2 | 0.0 |
| 16/09/2017 | 23.1 | 6.6 | 84.7 | 19.0 | 898 | 250.5 | 4.4 | 0.0 |
| 17/09/2017 | 20.3 | 3.4 | 100.0 | 23.4 | 872 | 120.5 | 1.6 | 0.0 |
| 18/09/2017 | 26.9 | 5.1 | 90.6 | 13.5 | 871 | 286.7 | 2.6 | 0.0 |
| 19/09/2017 | 25.3 | 10.8 | 44.3 | 6.7 | 871 | 265.9 | 4.7 | 0.0 |
| 20/09/2017 | 22.1 | 5.5 | 87.6 | 16.6 | 854 | 168.3 | 0.9 | 0.0 |
| 21/09/2017 | 29.0 | 5.4 | 91.6 | 6.8 | 834 | 278.5 | 2.4 | 0.0 |
| 22/09/2017 | 31.3 | 10.9 | 35.0 | 6.5 | 871 | 279.2 | 3.0 | 0.0 |
| 23/09/2017 | 35.9 | 14.6 | 32.0 | 7.1 | 1057 | 280.3 | 3.9 | 0.0 |
| 24/09/2017 | 32.2 | 20.3 | 23.3 | 8.1 | 970 | - | 5.6 | 0.0 |
| 25/09/2017 | 28.0 | 13.8 | 32.3 | 6.8 | 873 | 276.4 | 5.3 | 0.0 |
| 26/09/2017 | 26.7 | 9.4 | 79.9 | 8.0 | 916 | 216.8 | 2.5 | 0.0 |
| 27/09/2017 | 27.4 | 7.7 | 93.6 | 21.8 | 852 | 124.8 | 1.6 | 0.0 |
| 28/09/2017 | 25.0 | 14.3 | 86.3 | 22.6 | 1183 | 257.2 | 3.5 | 0.0 |
| 29/09/2017 | 26.4 | 10.7 | 55.4 | 10.2 | 916 | 280.5 | 4.0 | 0.0 |
| 30/09/2017 | 24.4 | 13.3 | 72.9 | 6.0 | 1138 | 263.5 | 3.6 | 0.0 |

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