Hunter Valley Operations

Community Consultative Committee

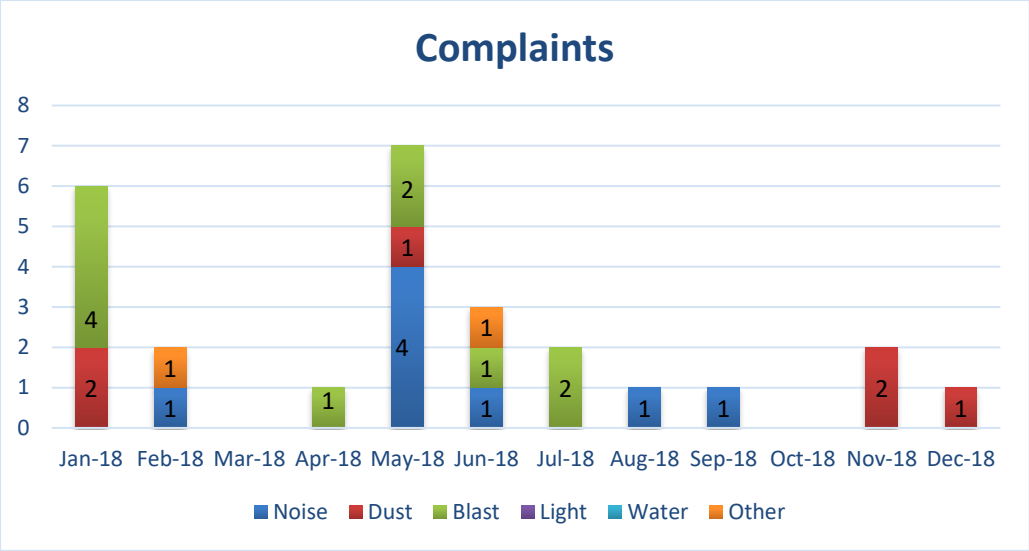
Business Papers – February 2019

Materials ahead of meeting of the committee on **20 February 2019**

Contents page

1.0 Complaints

Complaints overview for 2018



Complaint details 2018 YTD

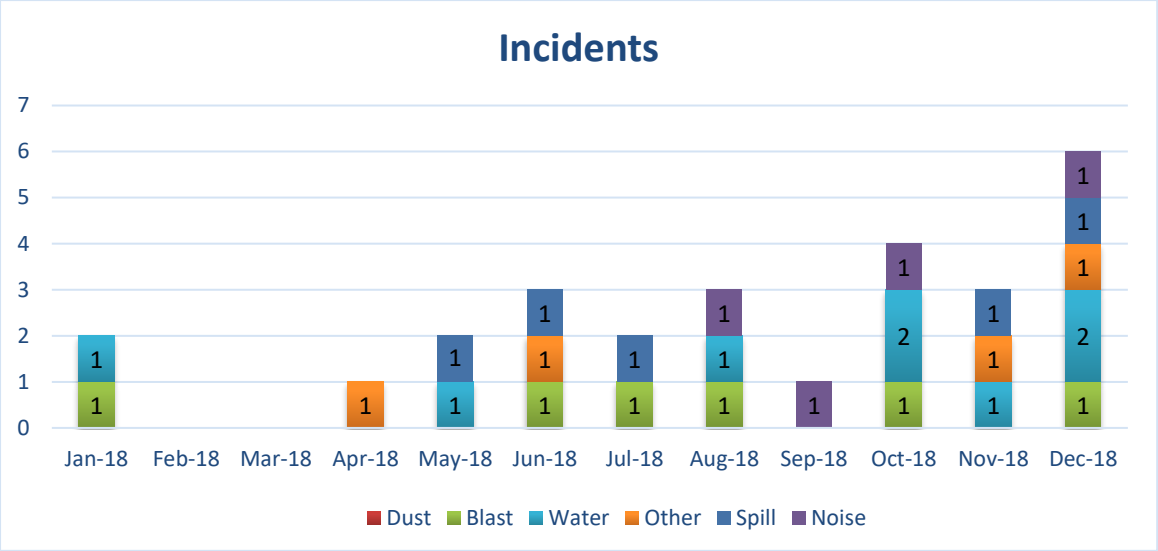
Date	Time	Type	Location	Method Received	Monitoring Indicates Exceedance?
11/01/2018	14:10	Blasting	Gouldsville	hotline	No
17/01/2018	13:43	Air	Unknown	hotline	No
17/01/2018	14:02	Blasting	Jerrys Plains	hotline	Yes**
17/01/2018	14:54	Blasting	Jerrys Plains	Environment Advisor desk phone	Yes**
17/01/2018	15:00	Blasting	Jerrys Plains	hotline	Yes**
19/01/2018	12:05	Air	Jerrys Plains	hotline	No
1/02/2018	15:47	Other	Jerrys Plains	Community relations specialist	No
10/02/2018	06:43	Noise	Gouldsville	Hotline	No
06/04/2018	14:50	Blast	Jerrys Plains	Environmental Manager	No

Date	Time	Type	Location	Method Received	Monitoring Indicates Exceedance?
04/05/2018	13:10	Blast	Maison Dieu	Community relations specialist	No
06/05/2018	23:06	Noise	Jerrys Plains	Regulator	No
12/05/2018	16:30	Blast	Maison Dieu	Community relations specialist	No
19/05/2018	04:30	Noise	Jerrys Plains	Regulator	No
19/05/2018	23:59	Noise	Jerrys Plains	Other	No
21/05/2018	15:00	Blast	Long Point	Hotline	No
29/05/2018	00:43	Noise	Jerrys Plains	Regulator	No
06/06/2018	18:00	Noise	Jerrys Plains	Regulator	No
12/06/2018	12:55	Blast	Jerrys Plains	Hotline	No
18/06/2018	09:09	Flora and Fauna	Jerrys Plains	Hotline	No
17/07/2018	09:40	Blast	Long Point	Hotline	No
17/07/2018	09:58	Blast	Long Point	Hotline	No
28/08/2018	21:20	Noise	Gouldsville	Hotline	No
14/09/2018	22:56	Noise	Jerrys Plains	Hotline	No
6/11/2018	14:40	Dust	Maison Dieu	Environmental Manager	Yes
6/11/2018	17:02	Dust	Maison Dieu	Environmental Manager	Yes
13/12/2018	18:15	Dust	Maison Dieu	Environmental Manager	No

** Real time noise monitoring alerts were generated either prior to or around the time of complaint. The alert was received by the shift supervisors. Inspections and changes were made to operations where possible to reduce noise impact.

2.0 Incidents

Incident overview for 2018 YTD



Incident details for the period YTD

Date	Details	Key Actions	Aspect
12/1/2018	**Breach of ROM pad windrow.** The windrow around the northern side of the Howick ROM pad was noticed to have been breached allowing material from the pad to be washed off the pad into a mine diversion drain. All material contained within the mine.	Re-instatement of the windrow. Removal of excess fines washed from pad. Installation of secondary containment bund on ROM extension. Instructions for ROM loader operators informing them of expectations of water management on the ROM.	Water Management
17/1/2018	**Blast overpressure exceedance.** Blasts RW24BFA01A & RW25WHG01A were fired in Riverview Pit at 13:09 and 13:12 on 17 January. The blast at 13:12 produced an airblast overpressure result that exceeded licence limits at Moses Crossing and Jerrys Plains compliance monitors. The blast also generated visible dust that resulted in four community complaints, local newspaper coverage and subsequent requests for information from the EPA and DP&E. The blast was designed and implemented in accordance with its approved blast management plan and blasting permissions. HVO has been issued a Show Cause notice from the EPA in relation to the blast overpressure exceedance.	Increasing the amount of rock between the edge of the bench and the first line of explosives for blasts in this pit. Review of blasting permissions. Trial of helium balloon release prior to blasting.	Blast

14/04/2018	**Unauthorised Land Clearing by Telstra contractor** On Thursday 12 April 2018 HVO identified that approximately 242 m2 vegetation had been cleared on mine owned land adjoining a Telstra compound. The clearing was identified to have been undertaken by a Telstra contractor for the purpose of upgrading their facility. HVO did not provide authorisation for Telstra or any of its contractors to access this land or clear vegetation. The incident was reported to the NSW Department of Planning and Environment.	HVO directed the contractor to cease all activities on its land. HVO engaged EMM to undertake a vegetation survey to determine the type of vegetation cleared. EMM identified that Bulloak was the main vegetation type and unlikely to meet any of the scientific determinations for threatened ecological communities under the EPBC or NSW Biodiversity Conservation Act.	Land
10/05/2018	**Spill of Diluted Ammonium Nitrate solution** Approximately 250 – 1000L of diluted solution was spilled during filling of tank at Cheshunt Orica Reload Facility. All material contained within Orica facility and within mine site.	Work ceased immediately after identification, solution was contained on site, solution was cleaned up and bunded areas checked and scraped back where necessary. No environmental harm.	Spill
11/05/2018	**Newdell Load Point Fire Tank Overflow** The Newdell fire water tank was found to be overflowing as the water supply (pumped from Dam 14W) continued to supply the tank despite reaching its full cut off level. The overflow water reported via a drainage line to Sump 060. The float operated pump on 060 failed to contain the volume of water in the sump which has then flowed to a culvert under the rail loop and into Bayswater Creek.	Once identified the supply to the fire water tank was stopped, onsite investigation commenced to determine extent and pathway of flow of water. A small pump was installed to stop the flow of water from the culvert, once contained recovery of the water in the creek commenced. Sampling was undertaken to determine water quality at the source and up and down stream of the flow. Incident investigation undertaken. HVO's Pollution Incident Response Management Plan was enacted and relevant authorities notified.	Water Management
19/06/2018	**Dump 10m over OLS at Glider Pit** Part of an overburden dump in its Glider Pit was approximately 10 m above the Obstacle Limitation Surface (OLS) specified in the for the Hunter Valley Gliding Club (HVGC) Amenity Management Plan without prior agreement by the HVGC.	As soon as practicable after becoming aware of the incident HVO notified the HVGC and the Department of Planning and Environment and made arrangements to shape the dump to final landform which brought it below OLS., HVO is implementing an action tracking system within the mine planning process to ensure that actions pertaining to the HVGC and the need to obtain its prior agreement to any exceedances of the OLS are assigned to the correct people, are carried out and can be tracked and monitored.	Land
22/06/2018	**Expanding a coal pad without a Ground Disturbance Permit** Dozer 570 expanded a coal stockpile area outside the boundary of an approved Ground Disturbance Permit (GDP) boundary impacting a small (~0.2 ha) area of rehabilitation.	Once identified and reported, coal was removed from effected area and isolated. GDP was submitted and approved for the area.	Land

26/06/2018	**Oil spill in pit** Excavator 313 topside loading deep in pit (HVO South), swung bucket over the low wall windrow and a rock hit the hydraulic tank release valve, spilling hydraulic oil (<2000L).	Operator notified supervisor. Spill contained and cleaned up. Spill entirely contained within the pit. Damaged equipment repaired.	Spill
21/07/2018	**Oil discharge from electric pump seal** Minor spill of oil (~20L) from mechanical seal on electric pump at Cumnock return water dam. A negligible amount of oil (<5L) leaked down the dam liner and into the dam. HVO Pump on Ravensworth property. Spill contained within mine.	Dry sorb used to contain spill at the scene before being cleaned up. Pump shut down and isolated. Inflowing water was requested to be turned off and isolated until pump repaired.	Spill
31/7/2018	**Blast Overpressure Exceedance (<120dB)** West Pit Blast WN45LEP02A was fired at approximately 13:02, 31/07/2018. Blast recorded a overpressure result of 115.5dB(L) at the Maison Dieu Blast Monitor	Reported to Environment Department to confirmed this was the first >115dB(L) results measured at Maison Dieu for the YTD and EPL Year.	Blast
10/08/2018	**Noise Exceedance – Jerrys Plains** Noise Exceedance measured during compliance monitoring at the Jerrys Plains Village attended monitoring location in relation to haul truck noise from HVO West Pit. Initial noise level measured was 39 dB(A) against a criteria of 36 dB(A).	As per the Noise Management Plan, the monitoring consultant contacted dispatch and advised of the exceedance. Within 75 minutes a remeasure was undertaken measuring 34dB(A) which is below the criteria. No non-compliance.	Noise
21/08/2018	**Blast Overpressure Exceedance (<120dB)** West Pit Blast WN40BAR01A was fired at approximately 13:07, 17/08/2018. Blast recorded a overpressure result of 115.3dB(L) at the Maison Dieu Blast Monitor which triggers internal incident reporting. Overpressure validation was undertaken to confirm result.	Reported to Environment Department to confirm YTD rolling percentage against 5% compliance limit (currently 2.9% Calendar Year and 4.3% EPL Year).	Blast
23/08/2018	**Uncontrolled release of Hunter River water** Hunter River pipeline from Oakland's pumping station to HVCPP dam 17 developed a leak in the pipeline on Ravensworth North's lease adjacent to Lemington road on the old Oakland's road.	Ravensworth North advised HVO Environment Manager that a leak was detected, Pumping ceased immediately, arrangements made to repair the pipeline on Saturday 25th August 2018.	Water Management
05/09/2018	**Noise Exceedance – Jerrys Plains** Noise Exceedance measured during compliance monitoring at the Jerrys Plains Village attended monitoring location in relation to haul truck noise from HVO North. Initial noise level measured was 39 dB(A) against a criteria of 36 dB(A).	As per the Noise Management Plan, the monitoring consultant contacted dispatch and advised of the exceedance. Within 75 minutes a remeasure was undertaken measuring 34dB(A) which is below the criteria. No non-compliance.	Noise
5/10/2018	**Turbid water flowed offsite** Inspection following approximately 75mm of overnight rainfall identified turbid water flowing offsite and in to Farrell's Creek. Observations indicate that rainfall on disturbed areas in the upper pre-strip catchment had overtopped surface water management controls and flowed to lower catchment dams prior to reporting offsite with runoff generated from undisturbed catchment areas	Trigger Pollution Incident Response Management Plan, Special event water sampling, Construction of temporary drainage diversions to reduce the area of disturbed catchment reporting. Reported to EPA, DPE and RR and ICAM investigation conducted.	Water

10/10/2018	**Overflow of water from Newdell CHPP Sump N690** Inspection following overnight rainfall identified turbid water had overflowed from Sump N690 and onto the road verge due to pump failure.	Special event water sampling was conducted, immediate repair of pump and check of similar pumps in area, clean out of sump N690 and reinstated windrows and bunds.	Water
11/10/2018	**Noise Exceedance** Exceedance of LA1 (sleep disturbance) criteria at Moses Crossing from South Pit. Measured 50 dB(A) against criteria of 45 dB(A). Noise deemed to be from dragline bucket impact. As per the Noise Management Plan, the monitoring consultant contacted dispatch and advised of the exceedance, five 1 minute remeasures were undertaken resulting in compliant measurements with a maximum LA1,1min level of 43dB(A).	Reviewed monitoring data and reported exceedance to to DPE.	Noise
16/10/2018	**3A Blast Fume Event** Cat 3A fume from Cheshunt Pit. Acute fume migrated across to HVO North, dissipated onsite. Not reportable.	Reduced the size of the blasts and changed width from back to front.	Blast
11/11/2018	**Mine water leak from secondary floc plant** North Void secondary Floc plant water storage tanks overflowed due to a faulty auto valve that failed to close when tanks where full. Water made contact with a small section of rehab and ran into Carrington Pit. Contained onsite.	Water tank fill water was isolated using a manual valve, roads repaired for safe access, and valve identified as faulty and repaired.	Water
17/11/2018	**Transgrid GDP non-compliance** As part of replacement of 330KV high voltage, transmission tower being performed by the easement holder in the Goat West Rehabilitation area a transmission tower foundation material stockpile was established outside the ground disturbance boundary defined in the Ground Disturbance Permit (GDP). The HVO Environment Team inspected the area and had installed sediment control measures around the material.	HVO Environment team inspected area, sediment control measures were installed around the material and plan put in place to rectify the breach in an appropriate timeframe.	Clearing
21/11/2018	**Truck 407 oil spill** Truck 407 was identified in West Pit to have a blown steering hose after leaving workshop causing minor oil leak.	Oil was contained, cleaned up and reported. Truck 407 taken for repairs before first load.	Hydrocarbon
6/12/2018	**Dam 17N pump house pit pump failure** Minor seep from Dam 17N sump overflow pipe with a damp area noted at the end of the pipe during inspection.	A secondary pump was added to bring the water level down and repair work to the capping of the outlet.	Water
7/12/2018	**Pipe burst at Dam 21N** During inspection is was identified that the pipeline between Dam 21N and Dam 9 had failed, releasing an estimated 75,000 litres of mine and river water to local mine drainage system and tripping the pump in the process. Contained onsite.	The source of the leak from isolated and the pipeline repaired and reconfigured.	Water

14/12/2018	**Blast Fume – Category 3a** West Pit blast WS45LEB01A fired at 13:59 produced a fume with a rating of 3a. The fume was localised and remained onsite.	A Pre-Blast Environmental Checklist and Fume Likelihood assessment have now been implemented.	Blast
17/12/2018	**Noise exceedance** Exceedance of noise criteria at Jerrys Plains Village from West Pit noise. Attended night time monitoring recorded noise levels at 36 dB against a criteria of 36 dB. An additional 2dB was added to the reading due to application of the low frequency penalty, in accordance with the development consent, bringing the result to 38 dB(A). This is an exceedance but not a non-compliance when assessed against the current Noise Management Plan	A follow-up measurement was conducted the following evening on 18 December and no exceedance was recorded. The exceedance was notified to DPE.	Noise
18/12/2018	**Blast miscapture** Knodlers Lane Blast monitor failed to capture complete blast monitoring results for two blasts initiated in the Cheshunt Pit on the 18 December 2018 at 13:18 and 13:19. A second monitor closer to the mine recorded blasting results below criteria indicating that no exceedance would have been recorded. The failure was due to a faulty control unit likely affected by water ingress or lightning surge.	The ground unit from the Knodlers Lane site was exchanged for a calibrated ground unit the following day. Following examination of the subsequent data captured, the control unit was also determined to have been affected. The site was attended again in order to exchange the control unit main board.	Blast
21/12/2018	**Hydrocarbon Spill Newdell** Oil spill onto the Newdell Coal Receival pad from a contractor truck. Oil was contained on receival pad with some minor tracking onto exit of Pikes Gully Road (mine owned road).	Spilled oil on receival pad coal was processed through the CHPP. Street sweeper was used to clean up wheel tracked oil.	Hydrocarbon

3.0 Community Investment

We recognise that our long term success requires us to positively contribute to the development and well-being of the communities where we live and work. We do this by working collaboratively with local organisations to identify and support initiatives that build stronger and healthier communities.

Through our newly enhanced Community Grants Program, we will continue to support community groups and organisations which are committed to developing sustainable communities in the areas in which we operate.

In August we opened our 2018 Community Grants Program and called for local community groups and organisations to apply for funding.

Listed below is a breakdown of local initiatives that have been supported between September – December 2018.

Organisation / Programme	Value
Singleton Neighbourhood Centre Inc - Paving of Outside area	$5,000
WLALC- Penguins Garden Group	$5,000
Singleton Scout Group - Lighting and heating upgrade at Scout Hall	$6,000.00
Singleton Historical Society & Museum - Newspaper Microfilm	$1,800.00
Singleton Heights Public School - Reaching for the Heights	$1,353.48
Singleton Heights Pre-School Inc. - Physical Acknowledgment of Country	$4,181.50
Singleton Fire Brigade Social Club - Singleton Christmas lolly run	$1,000

In addition, there were a number of HVO supported community events held between September and December 2018:

- Blast Adventure Festival was held on 18 November and organised by Singleton Council
- Interview Training for Year 10 students at Singleton High School was held on 27 November where a number of HVO staff donated their time to fill vacancies on interview panels.
- Bush Dinner Dance was held on 1 December and organised by Singleton Council and the Disability Advisory Committee in celebration of International Day for People With a Disability.
- Wildlife Warriors sessions were held on 4 December and involved Wildlife Aid Upper Hunter Valley bringing Australian Wildlife Displays to kindergarten pupils at Singleton Public School.
- Salvos Christmas Party – A donation of $5000 was given to the Salvos to buy Christmas presents for the children attending the Christmas party on 8 December. Members of the Environment and Community Team also donated their time on 5 December to wrap the presents for the party.

4.0 Environmental monitoring

Monthly summaries of environmental monitoring; September – December 2018.

September 2018

Attached as **Appendix A**

October 2018

Attached as **Appendix B**

November 2018

Attached as **Appendix C**

December 2018

Attached as **Appendix D**

5.0 Environmental Documents

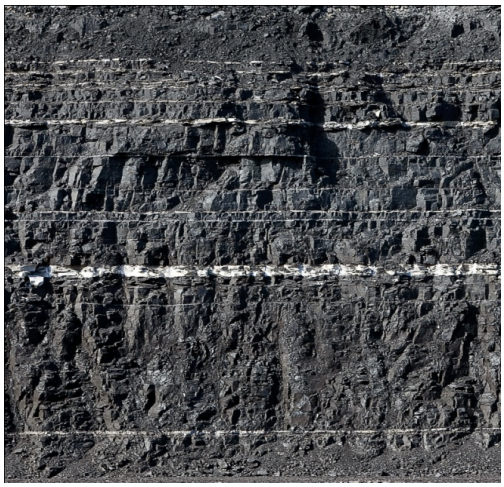
Environmental documents uploaded to the HVO Insite website since the last meeting (https://insite.hvo.com.au/)

17/10/2018	Hunter Valley Operations Water Management Plan
12/11/2018	Hunter Valley Operations Environmental Protection Licence 640
15/01/2019	Hunter Valley Operations Environment Protection Licence 640 Monitoring Data September 2018
15/01/2019	Hunter Valley Operations Environment Protection Licence 640 Monitoring Data October 2018
15/01/2019	Hunter Valley Operations Environment Protection Licence 640 Monitoring Data November 2018
15/01/2019	Hunter Valley Operations Environment Protection Licence 640 Monitoring Data December 2018
18/01/2019	Hunter Valley Operations Monthly Environmental Monitoring Report September 2018
18/01/2019	Hunter Valley Operations Monthly Environmental Monitoring Report October 2018
25/01/2019	Hunter Valley Operations Monthly Environmental Monitoring Report November 2018
31/01/2019	Hunter Valley Operations Monthly Environmental Monitoring Report December 2018

6.0 HVO Environmental Management Strategy

Attached as **Appendix E**

HUNTER VALLEY OPERATIONS



Monthly Environmental Monitoring Report

Hunter Valley Operations

September 2018

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Revision History

Version No.	Person Responsible	Document Status	Date
1.0	**Environment & Community Officer**	**Draft**	**3/01/2019**
1.1	**Environment & Community Coordinator**	**Final**	**8/01/2019**

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 2018.

2.0 AIR QUALITY

2.1 Meteorological Monitoring

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

2.1.1 Rainfall

Rainfall for the period is summarised in Table 1, the 2018 trend and historical trend are shown in Figure 1.

Table 1: Monthly Rainfall HVO

2018	Monthly Rainfall (mm)	Cumulative Rainfall (mm)
September	16.8	239.6

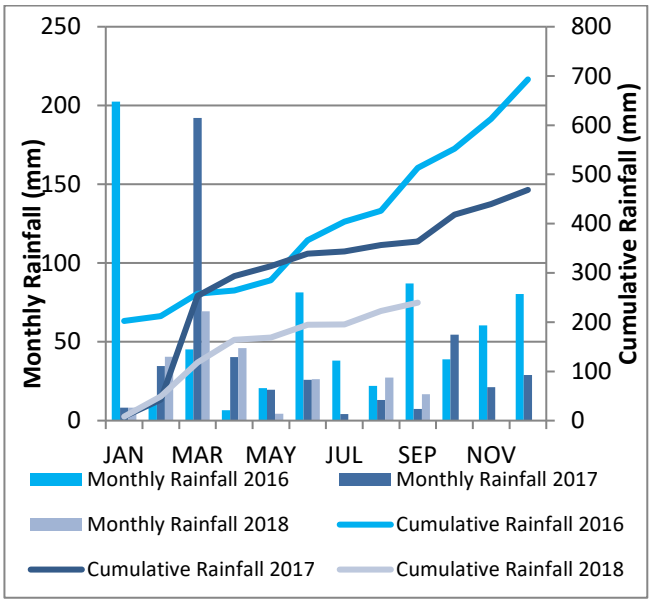


Figure 1: Rainfall Summary 2018

2.1.2 Wind Speed and Direction

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

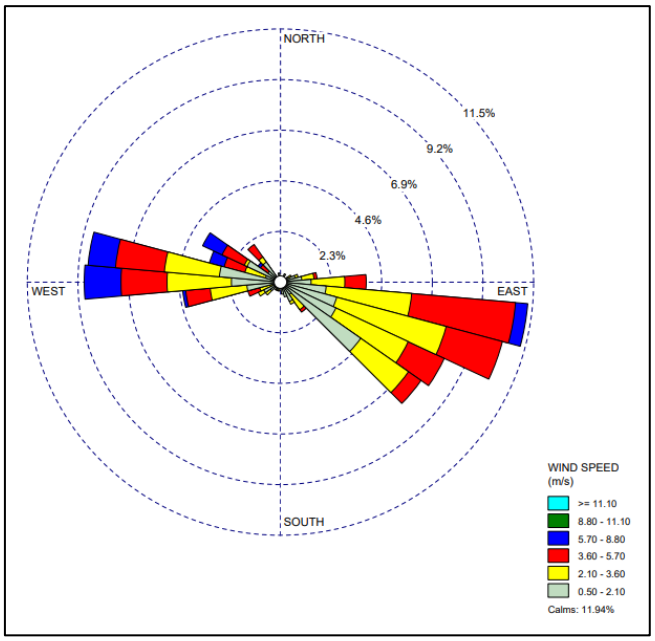


Figure 2: HVO Corporate Wind Rose – September 2018

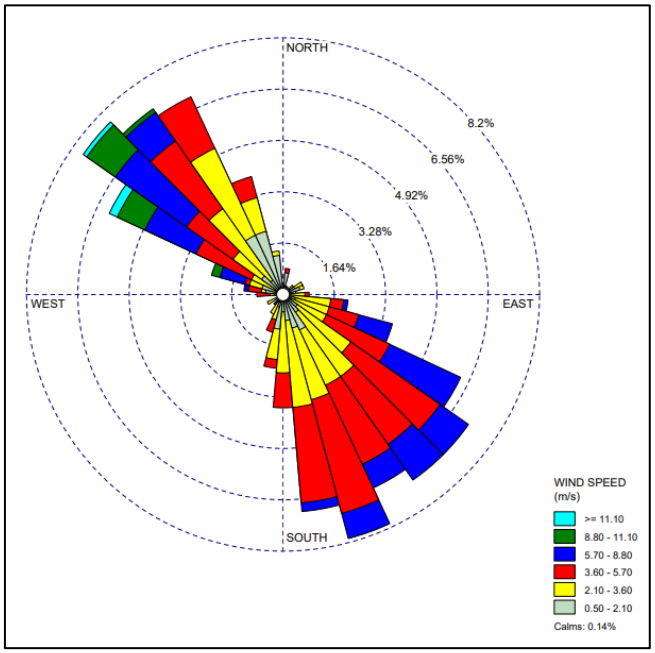


Figure 3: HVO Cheshunt Wind Rose – September 2018

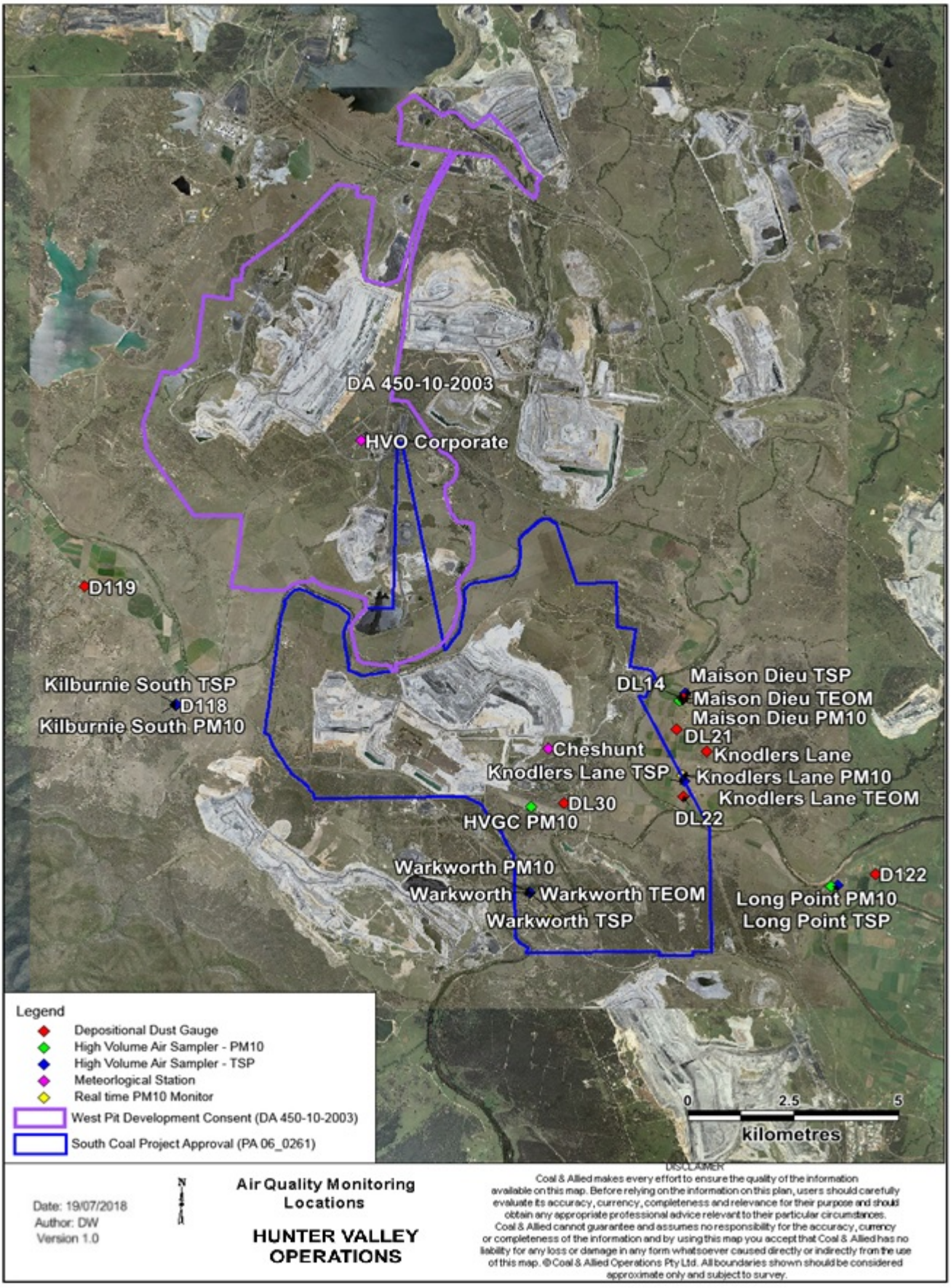


Figure 4: Air Quality Monitoring Location Plan

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 DL22, D118, DL30 and Warkworth 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 DL22 and DL30 monitor's results indicate that the sample was contaminated with bird droppings and insects. Accordingly, this result will not be included in the annual average calculation.

The field notes associated with the D118, and Warkworth monitor's result indicates no evidence to suggest that the result was contaminated. Accordingly, this result will be included in the annual average calculation.

An assessment of HVO's contribution against the long term impact assessment criteria will be provided in the 2018 Annual Review.

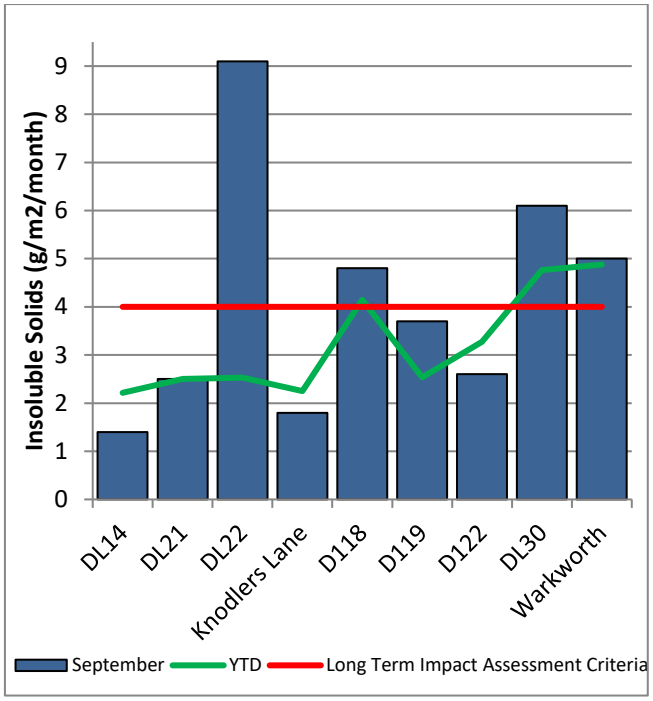


Figure 5: Depositional Dust Results – September 2018

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 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/m^3.

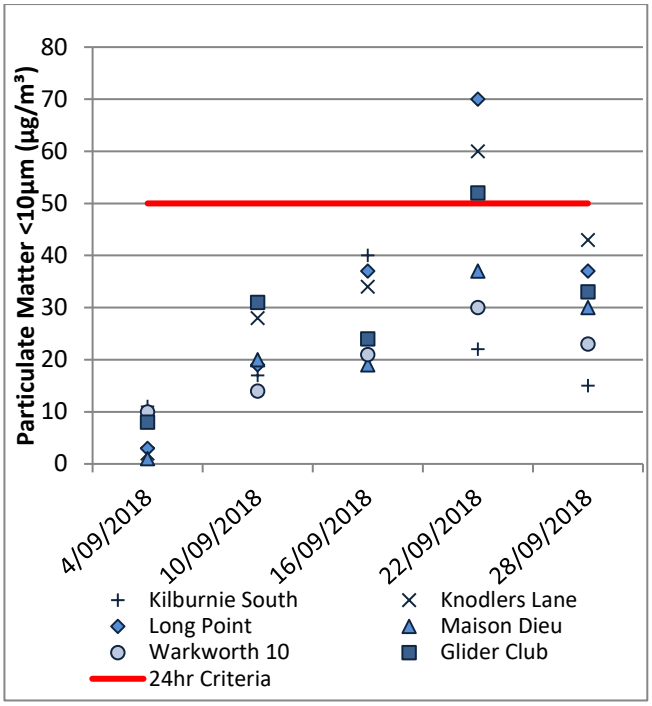


Figure 6: Individual PM_{10} Results – September 2018

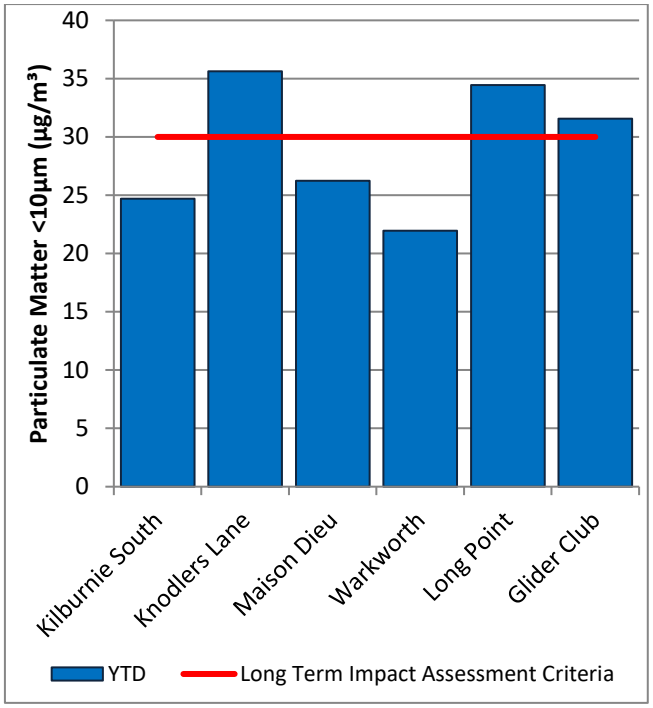


Figure 7: Year to Date Average PM_{10} – September 2018

On 22 September 2018 three HVAS PM_{10} units recorded elevated 24 hour averages: Glider Club (52µg/m^3), Knodlers Lane (60µg/m^3) and Long Point (70µg/m^3). HVO's maximum contribution was calculated to be the following:

- Glider Club: 31.0 µg/m^3 or 51.7% of the measured result;
- Knodlers Lane: 38.0 µg/m^3 or 63.3% of the measured result;
- Long Point: <38.0 µg/m^3 or <54.3% of the measured result.

Figure 7 shows the year to date annual average PM_{10} results. An assessment of HVO's contribution against the long term impact assessment criteria will be provided in the 2018 Annual Review.

2.3.2 TSP Results

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

An assessment of HVO's contribution against the long term impact assessment criteria will be provided in the 2018 Annual Review.

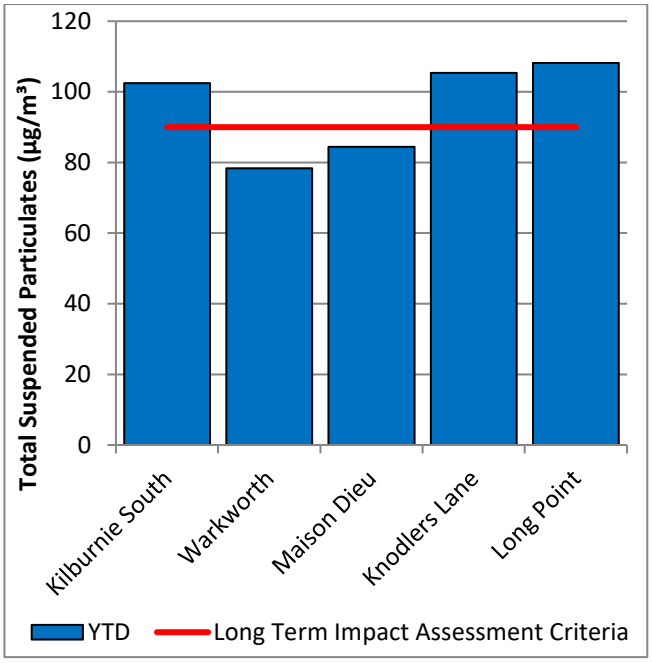


Figure 8: Year to Date Average Total Suspended Particulates – September 2018

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.

2.3.4 Real Time Alarms for Air Quality

During September the real time monitoring system generated 148 automated air quality related alarms. 20 were related to adverse weather conditions and 128 alarms relating to PM_{10}.

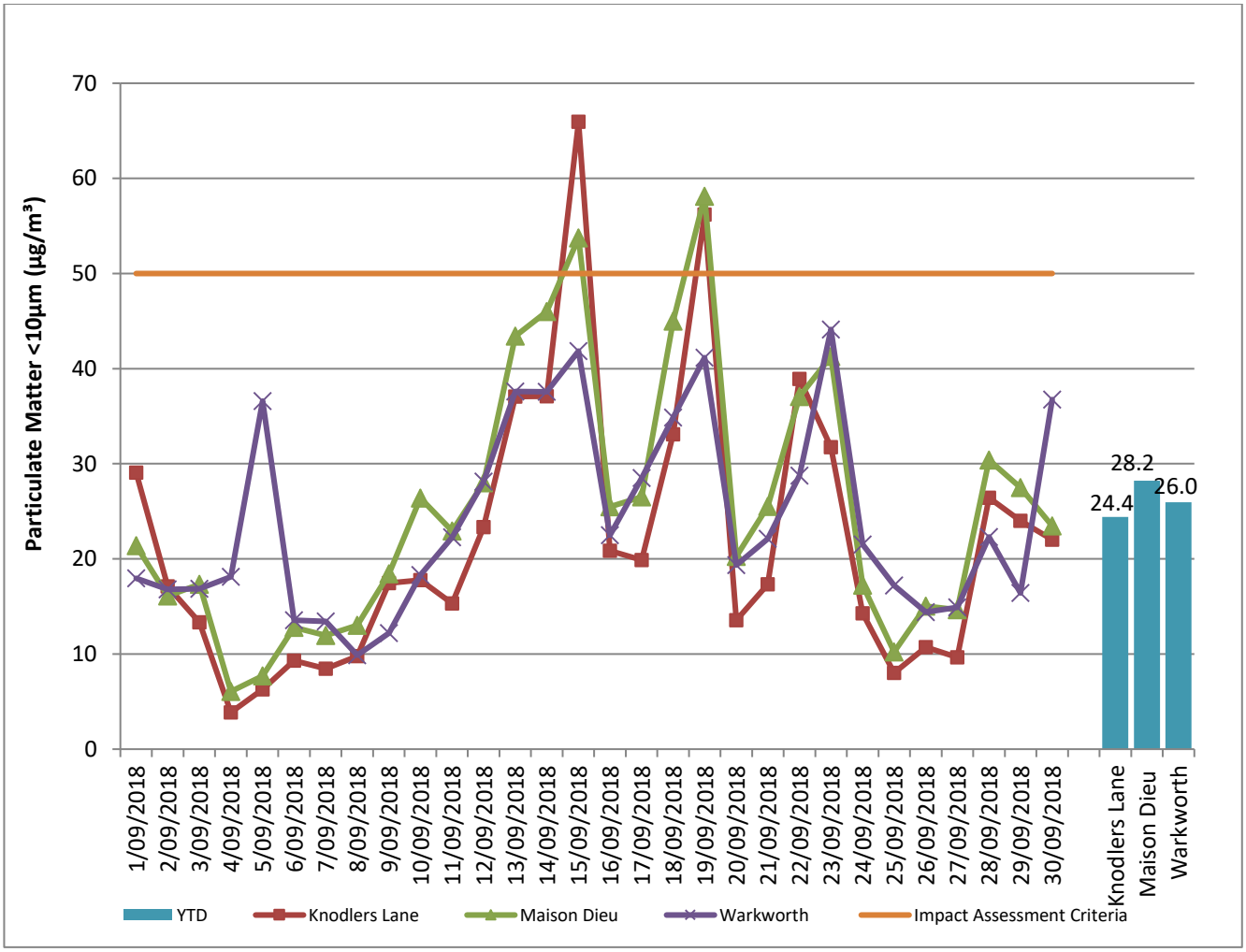


Figure 9: Real Time PM_{10} 24hr average and YTD average – September 2018

Table 2: Real-time PM10 Investigation Results

Date	Site	24hr PM_{10} result ($\mu g/m^3$)	Estimated contribution from HVO ($\mu g/m^3$)	Discussion
15/09/2018	Maison Dieu TEOM	53.8	17.3	An internal investigation determined HVO maximum potential contribution to be in the order of 17.3ug/m3 or 32.2% of the total measured based on prevailing wind conditions and upwind monitoring results.
15/09/2018	Knodlers Lane TEOM	65.9	29.5	An internal investigation determined HVO maximum potential contribution to be in the order of 29.5ug/m3 or 44.8% of the total measured based on prevailing wind

				conditions and upwind monitoring results.
19/09/2018	Maison Dieu TEOM	58.1	19.0	An internal investigation determined HVO maximum potential contribution to be in the order of 19.0ug/m3 or 32.8% of the total measured based on prevailing wind conditions and upwind monitoring results.
19/09/2018	Knodlers Lane TEOM	56.6	21.3	An internal investigation determined HVO maximum potential contribution to be in the order of 21.3ug/m3 or 37.6% of the total measured based on prevailing wind conditions and upwind monitoring results.

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).

In the absence of licence or applicable ANZECC criteria, the 5th / 95th percentile of the available validated data record for a monitoring station are adopted as the basis for a water quality management guideline trigger as outlined in the Water Management Plan for Electrical Conductivity and pH. The 50mg/L ANZECC criteria has been adopted for TSS. Exceedances of these triggers for Quarter 3 2018 are detailed in Table 3.

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

Figure 10 to Figure 12 show the long term surface water trend (2015 – current) within HVO mine dams. Figure 13 to Figure 21 show the long term surface water trend (2015 – current) in surrounding watercourses.

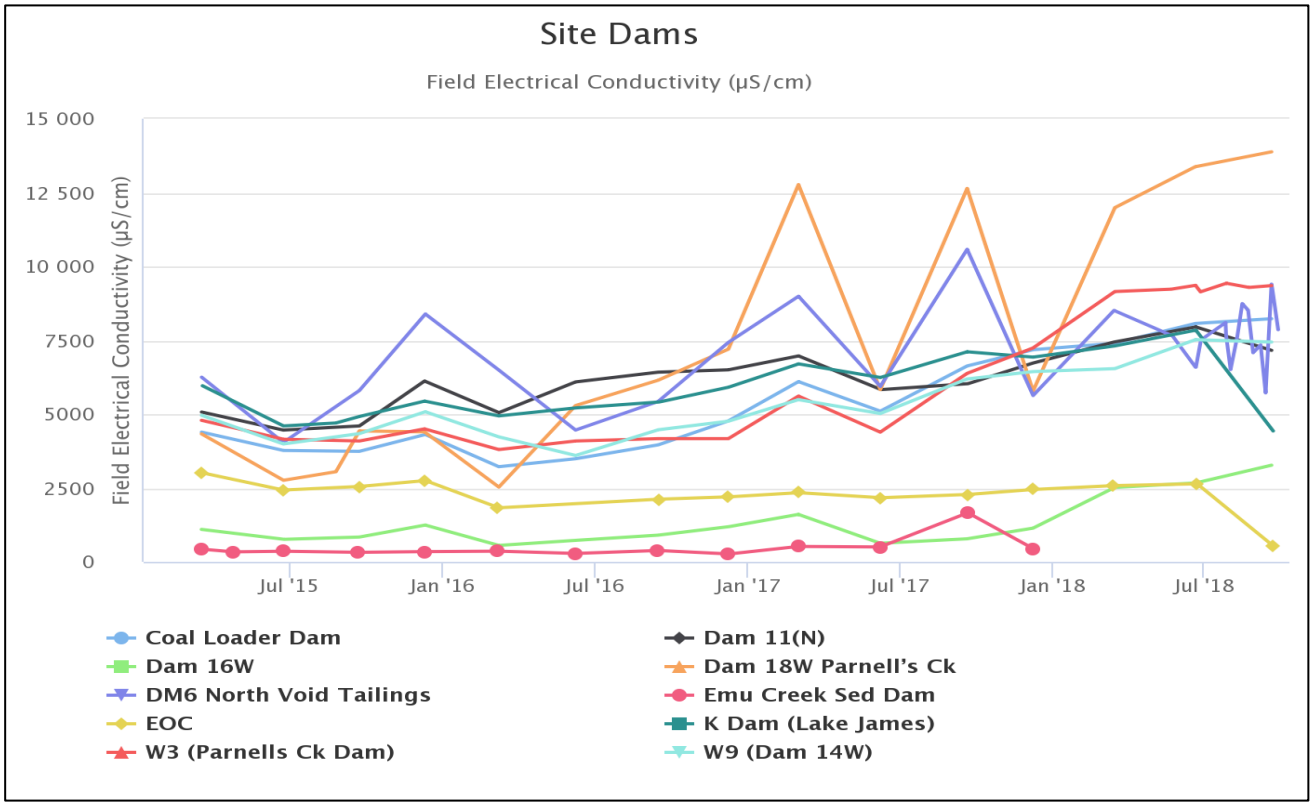


Figure 10: Site Dams Electrical Conductivity Trend – September 2018

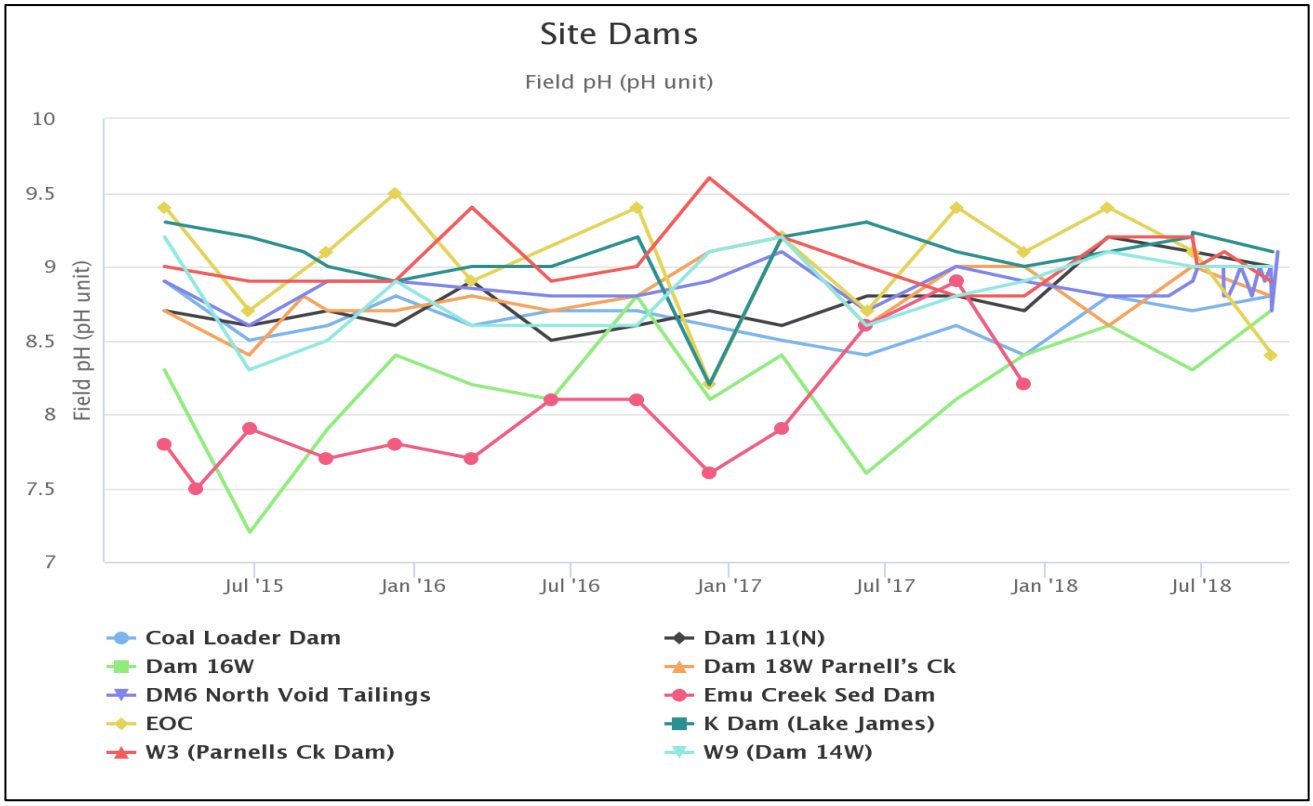


Figure 11: Site Dams pH Trend – September 2018

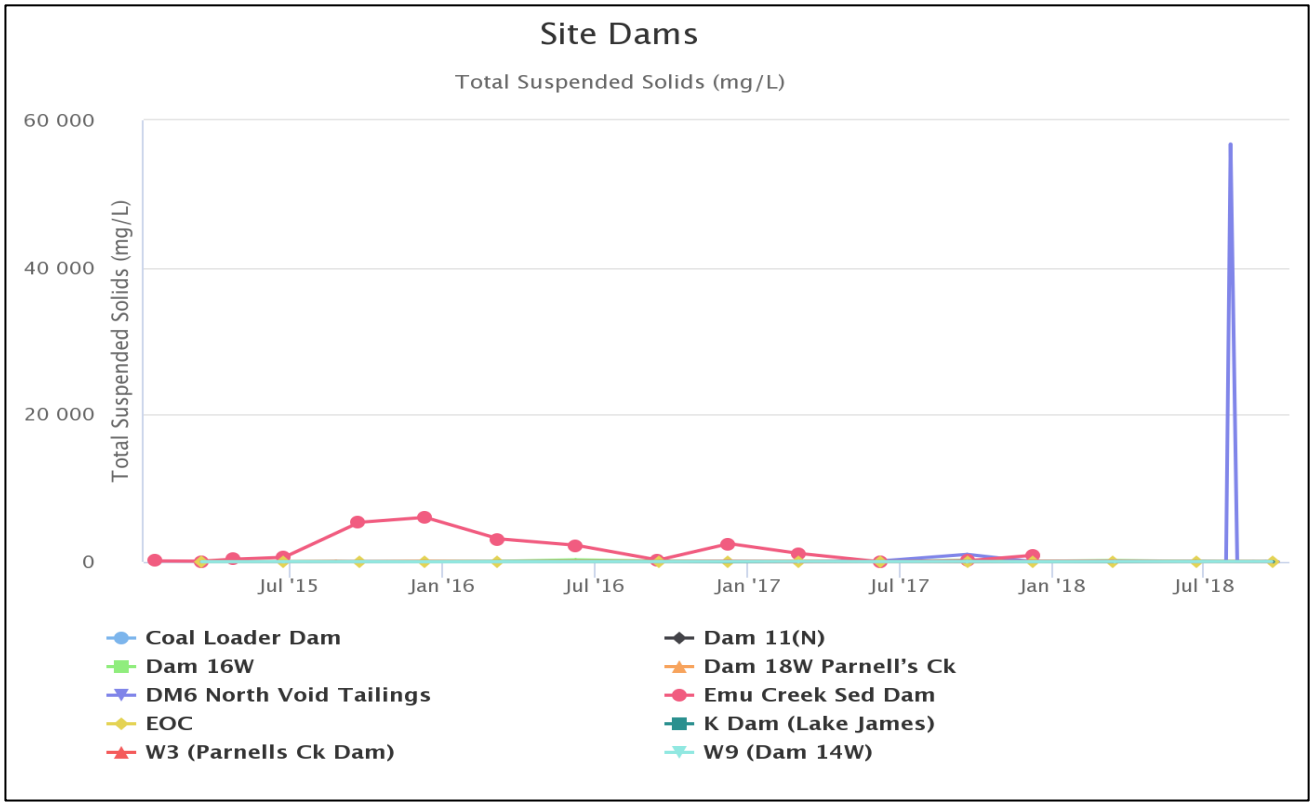


Figure 12: Site Dams Total Suspended Solids Trend – June 2018

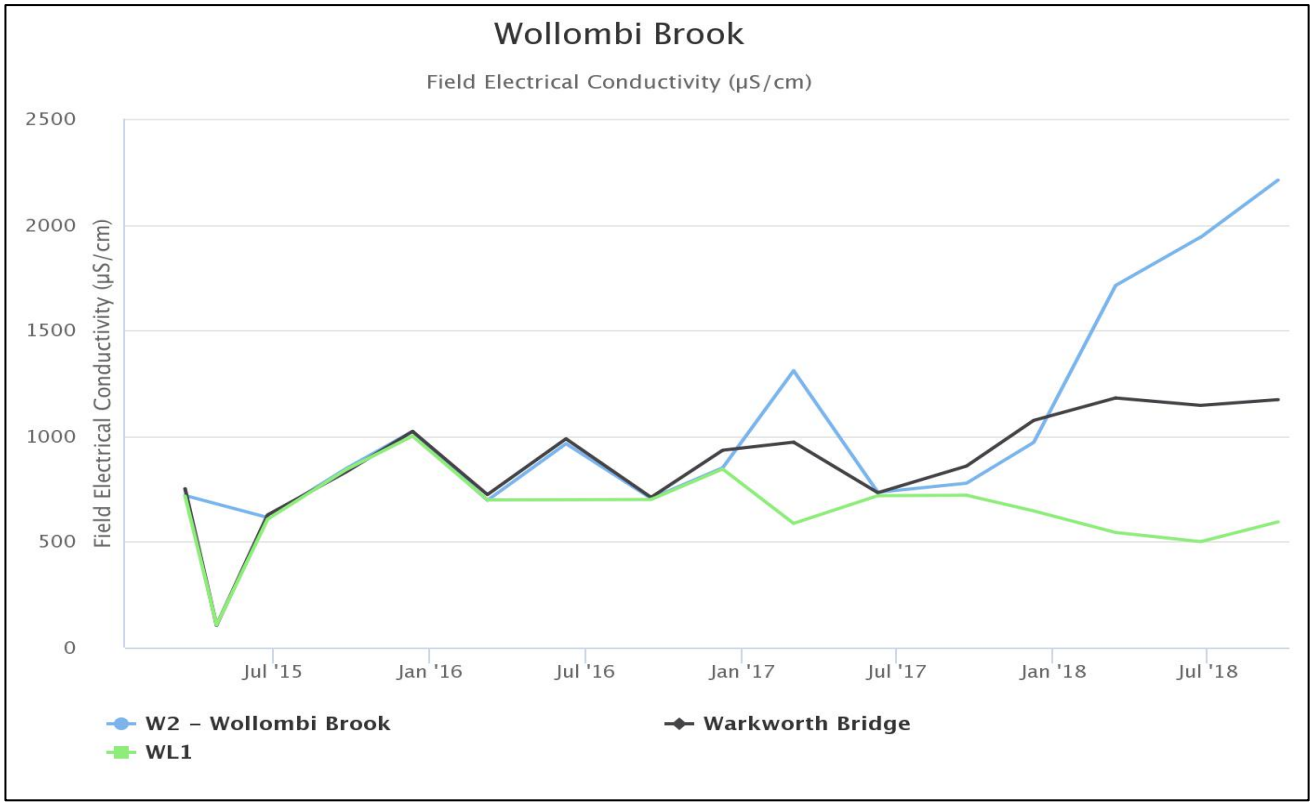


Figure 13: Wollombi Brook Electrical Conductivity Trend – September 2018

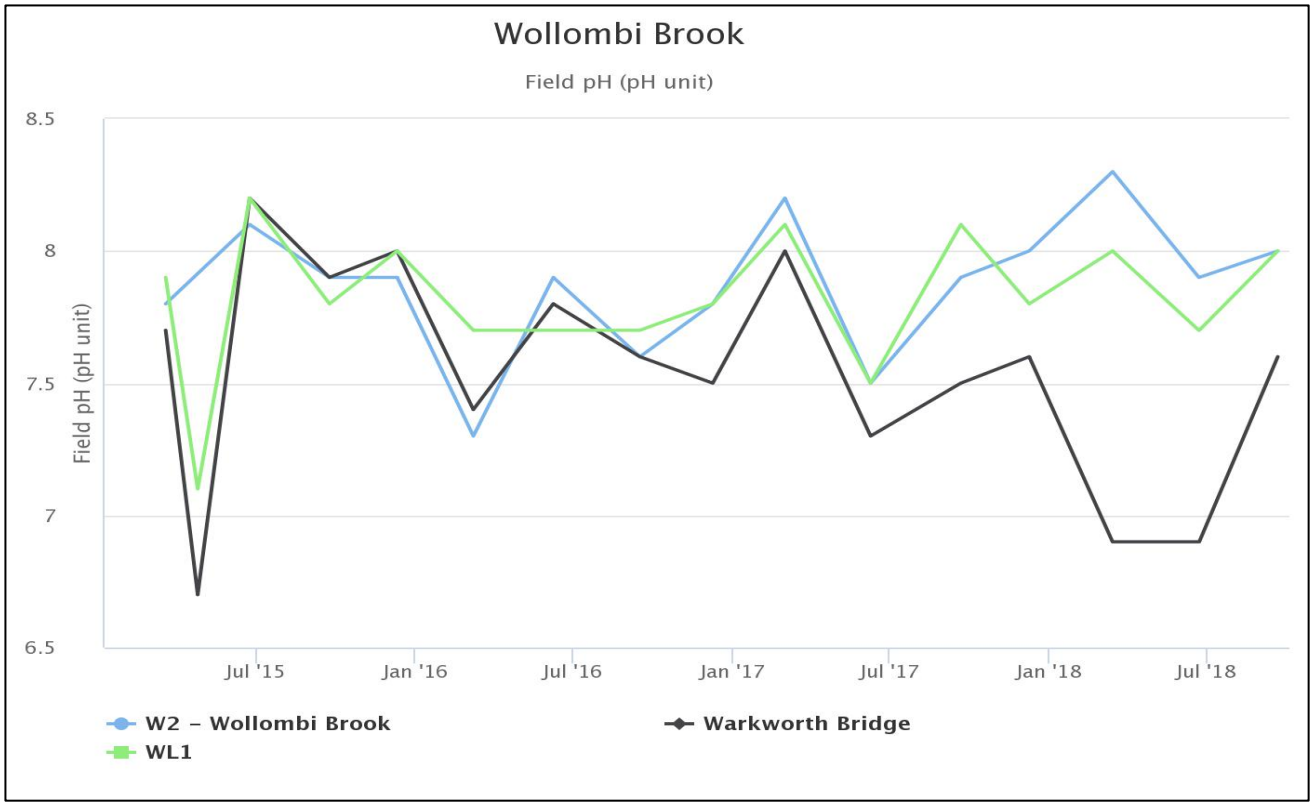


Figure 14: Wollombi Brook pH Trend – September 2018

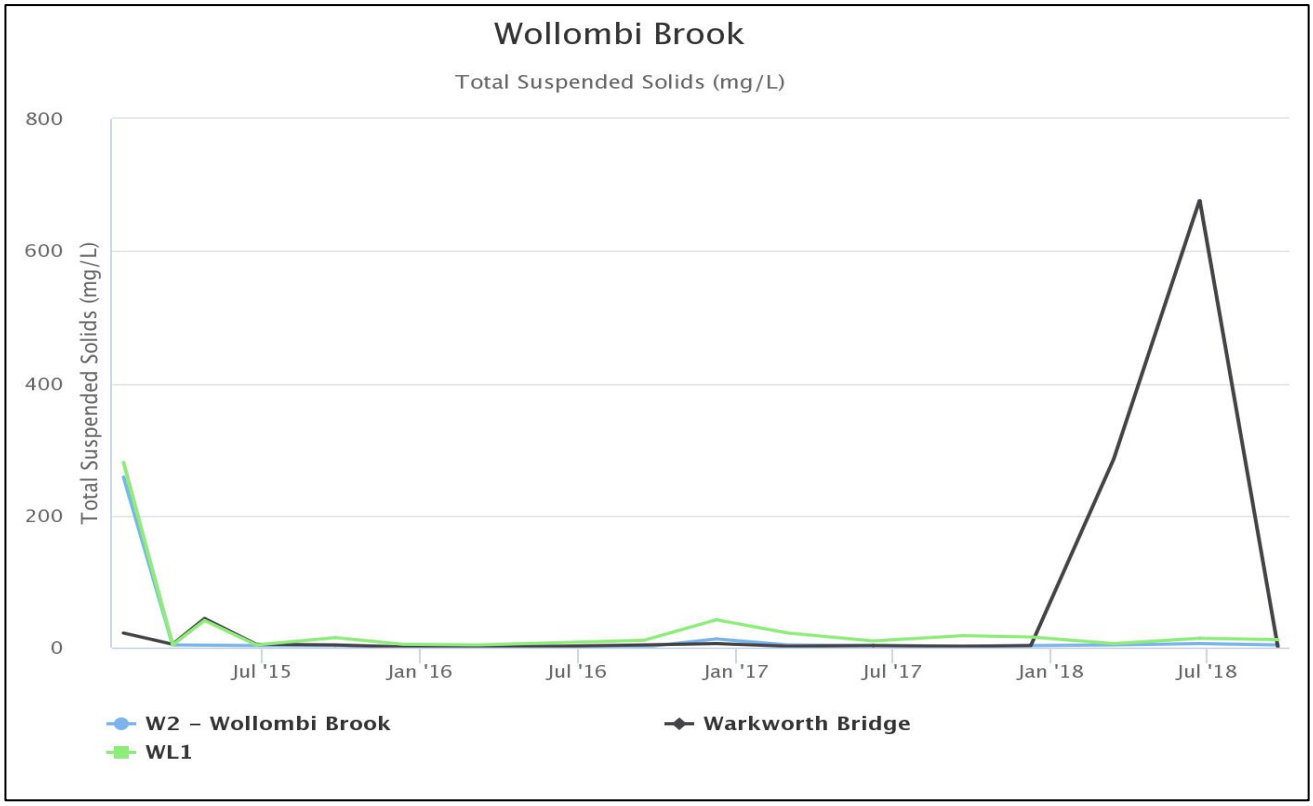


Figure 15: Wollombi Brook Total Suspended Solids Trend – September 2018

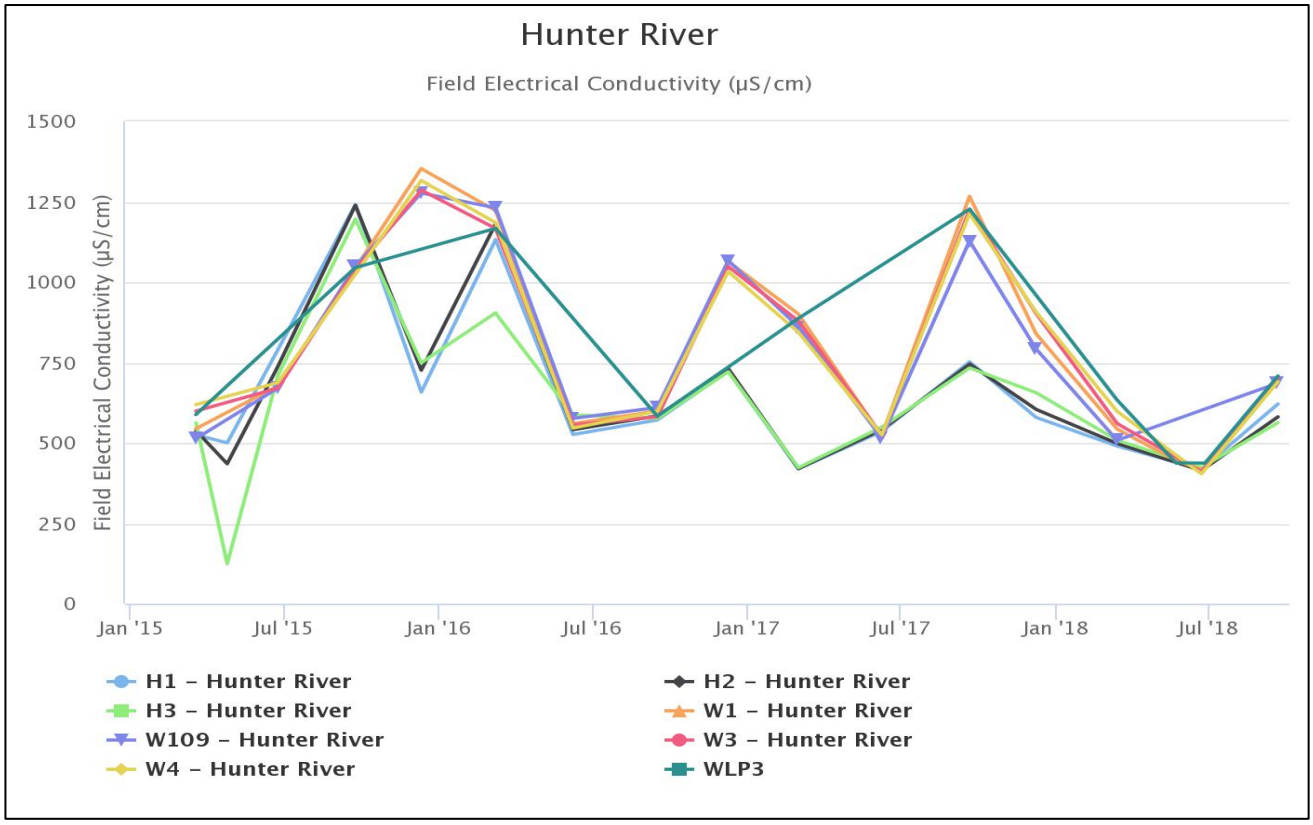


Figure 16: Hunter River Electrical Conductivity Trend – September 2018

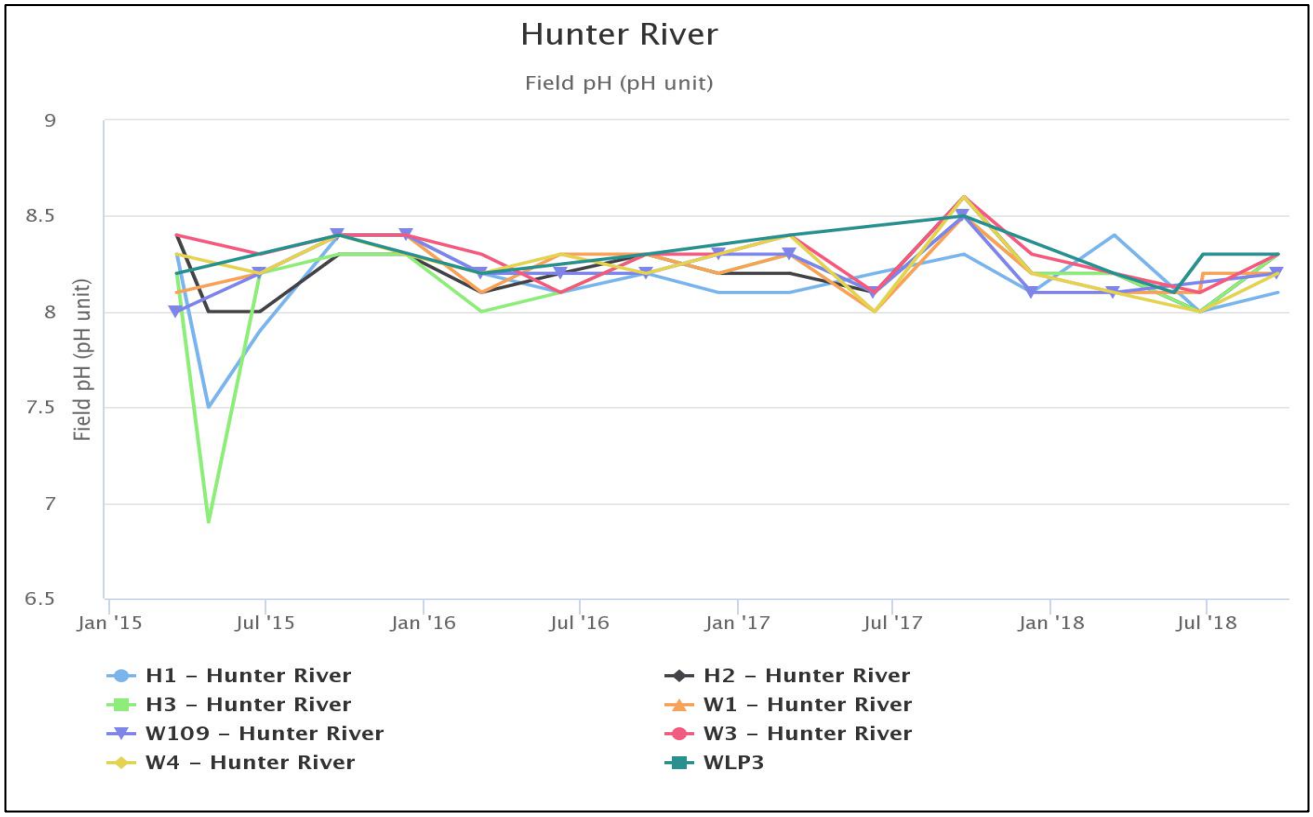


Figure 17: Hunter River pH Trend – September 2018

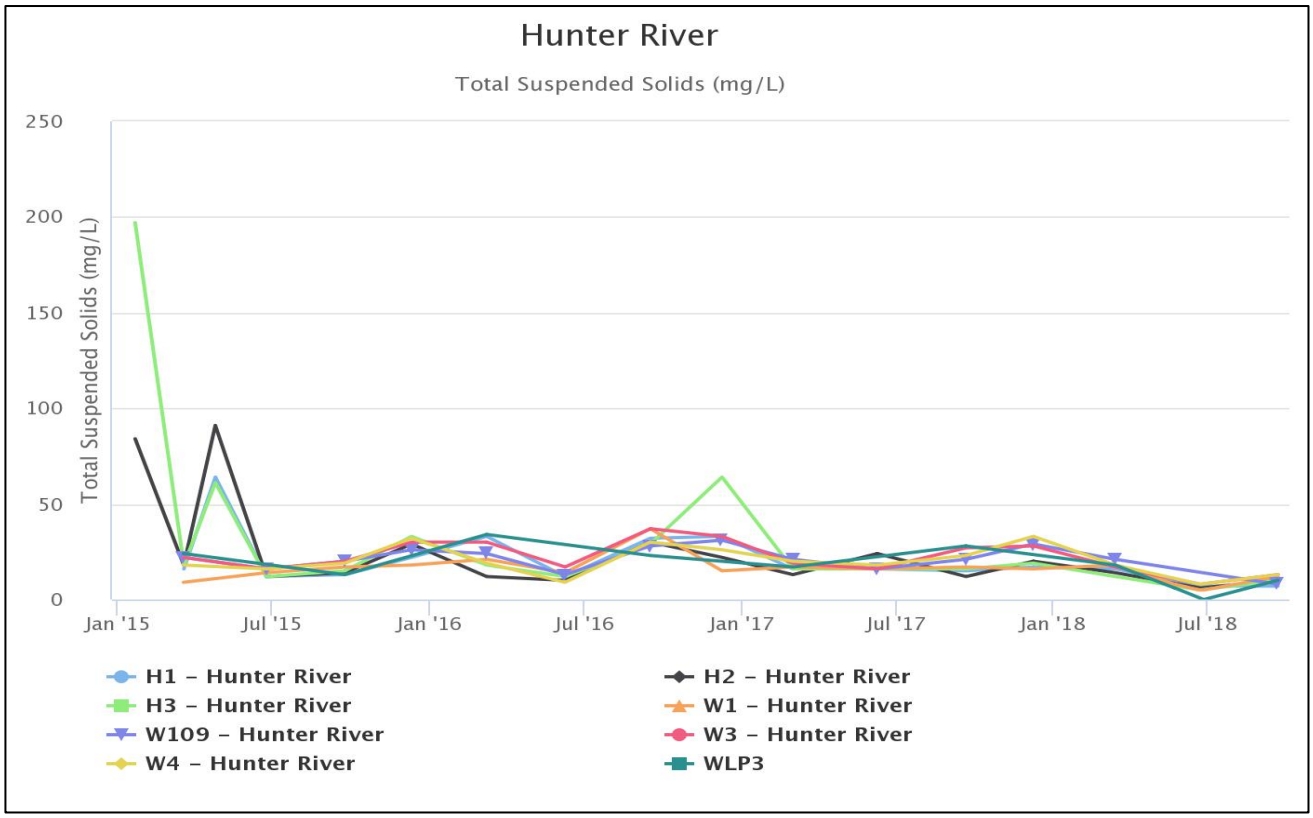


Figure 18: Hunter River Total Suspended Solids – September 2018

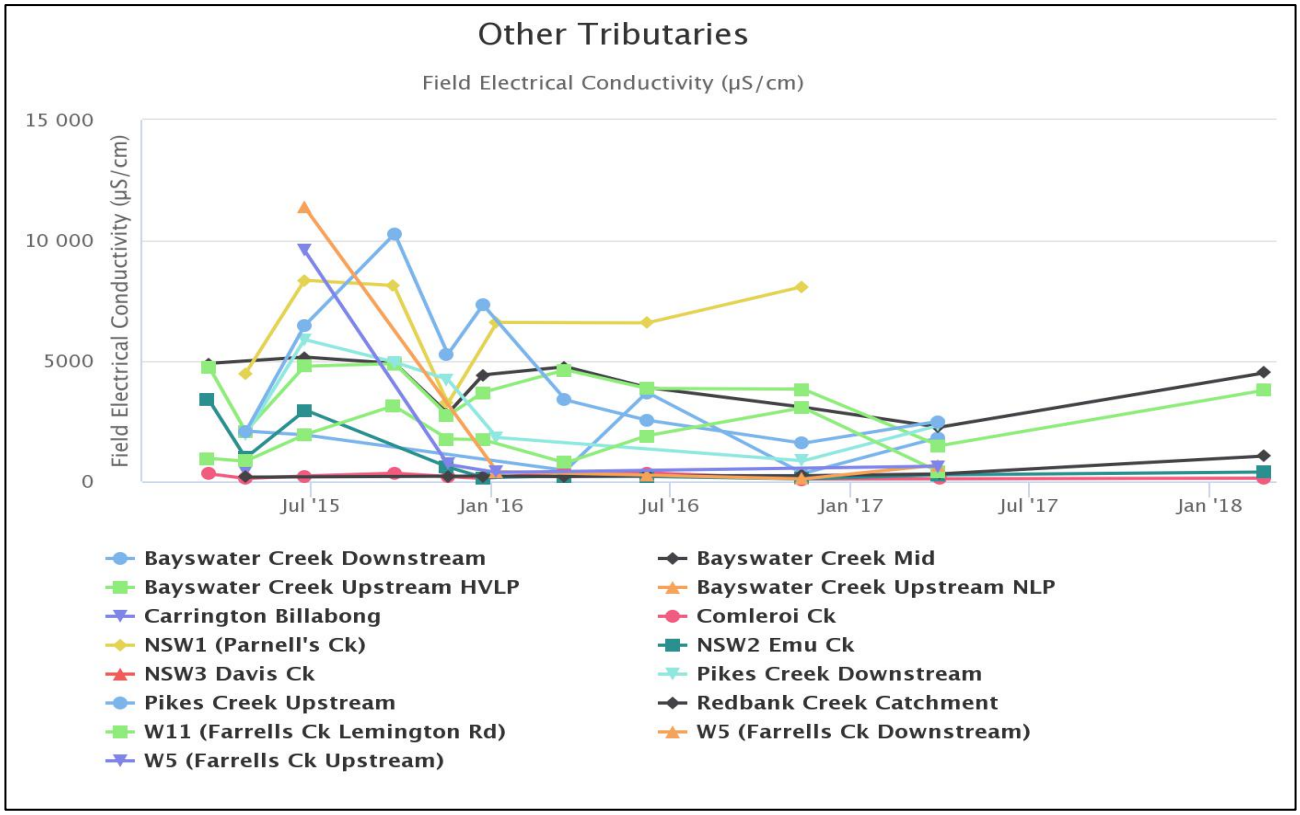


Figure 19: Other Tributaries Electrical Conductivity Trend – September 2018

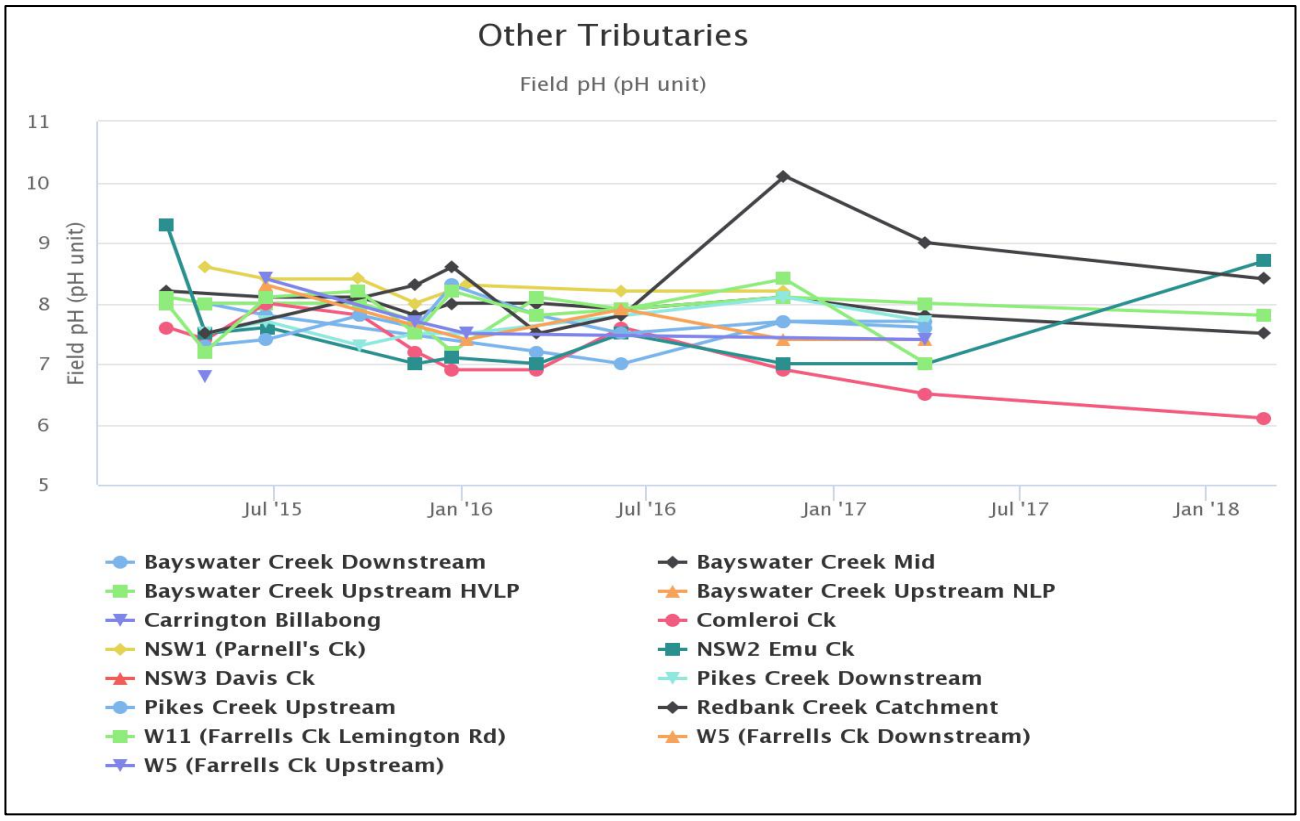


Figure 20: Other Tributaries pH Trend – September 2018

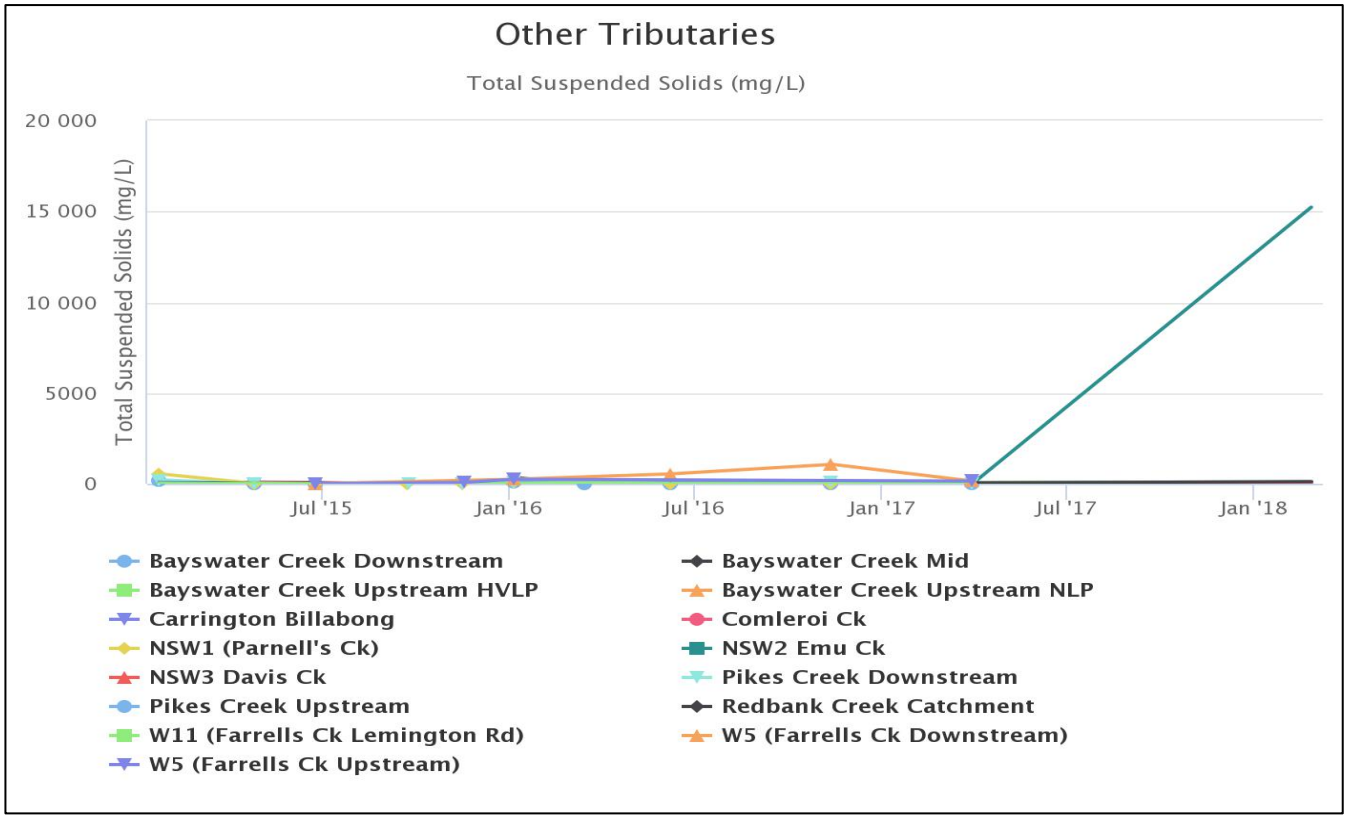


Figure 21: Other Tributaries Total Suspended Solids Trend – September 2018

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.

Trigger limits that have been breached during Quarter 3 2018 are summarised in Table 3.

Table 3: Surface Water Trigger Limit Summary

Site	Date	Trigger Limit Breached	Action taken in response
W2	21/09/2018	EC – 95th Percentile	Third consecutive exceedance of EC trigger (2210µs/cm) Investigation identified that sample was collected from turbid pooling water in the Wollombi Brook as there was no flow. Samples taken downstream in the Wollombi Brook recorded EC level at 594µs/cm. Maintain watching brief.
Warkworth Bridge	21/09/2018	EC -95th Percentile	Fourth consecutive exceedance of EC trigger (1172µs/cm). Investigation identified that sample was collected from turbid pooling water in the Wollombi Brook as there was no flow. Samples

	taken downstream in the Wollombi Brook recorded EC level at 594µs/cm. Maintain watching brief.

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

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 extracted approximately 413.3ML of 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.

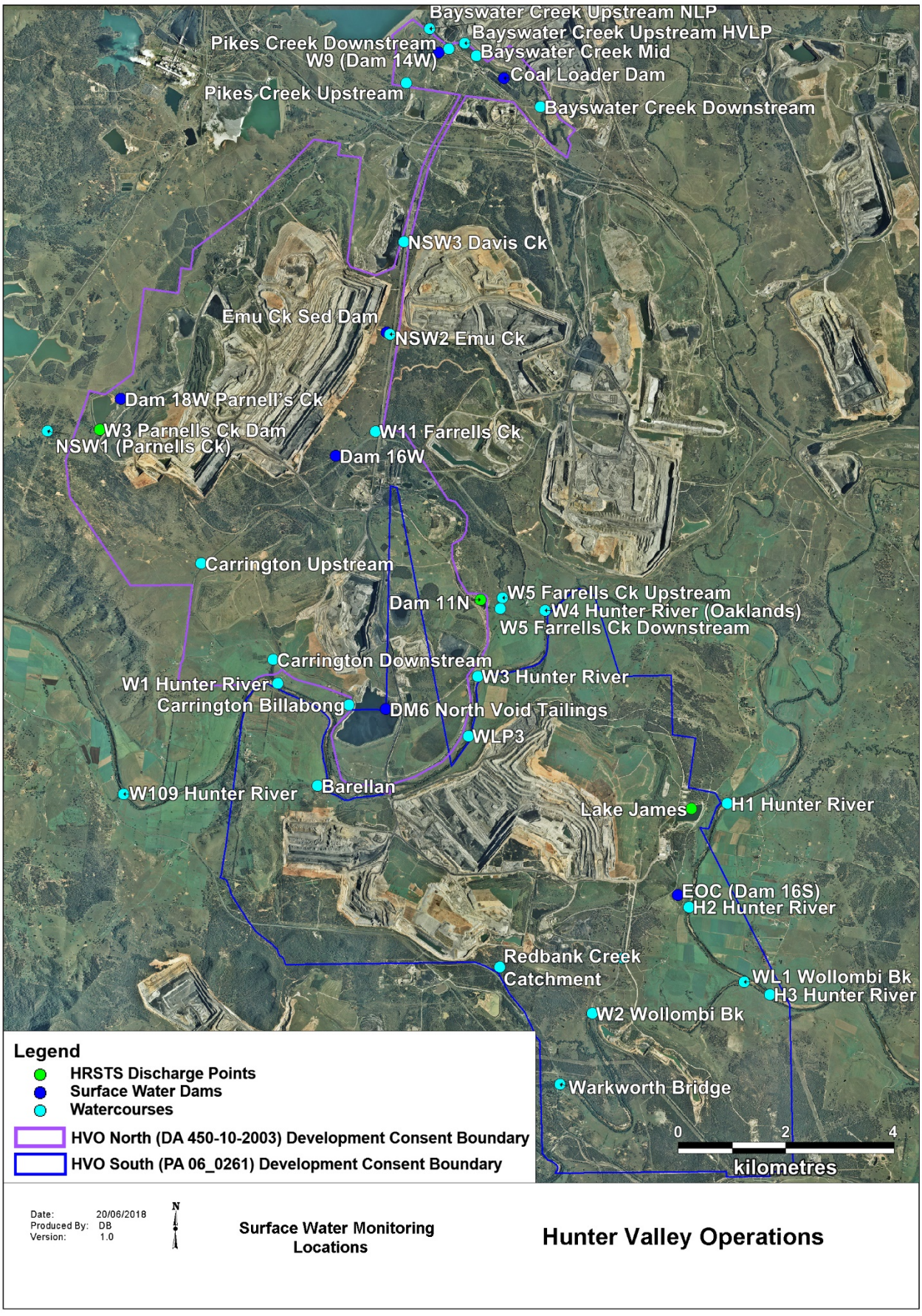


Figure 22: Surface Water Monitoring Location Plan

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 (2015 – current) for ground water bores monitored at HVO.

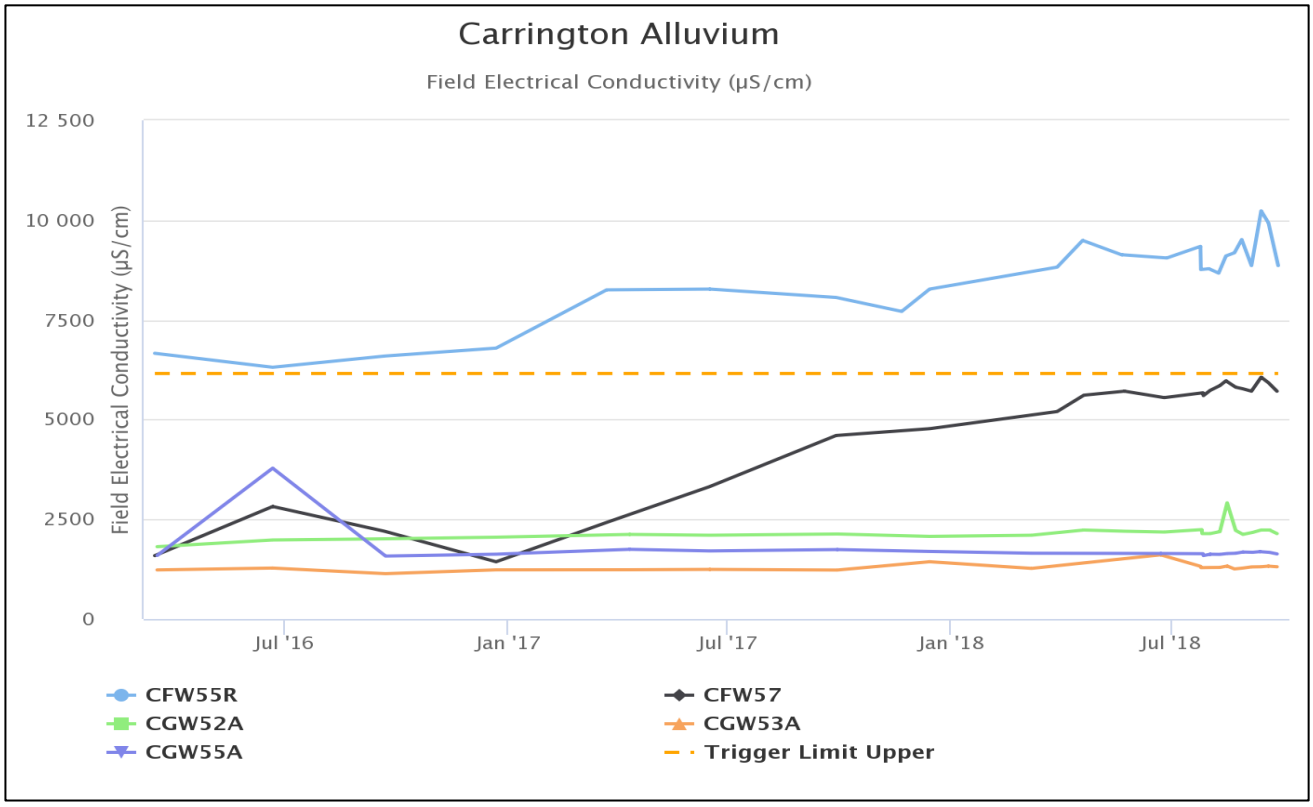


Figure 23: Carrington Alluvium Electrical Conductivity Trend – September 2018

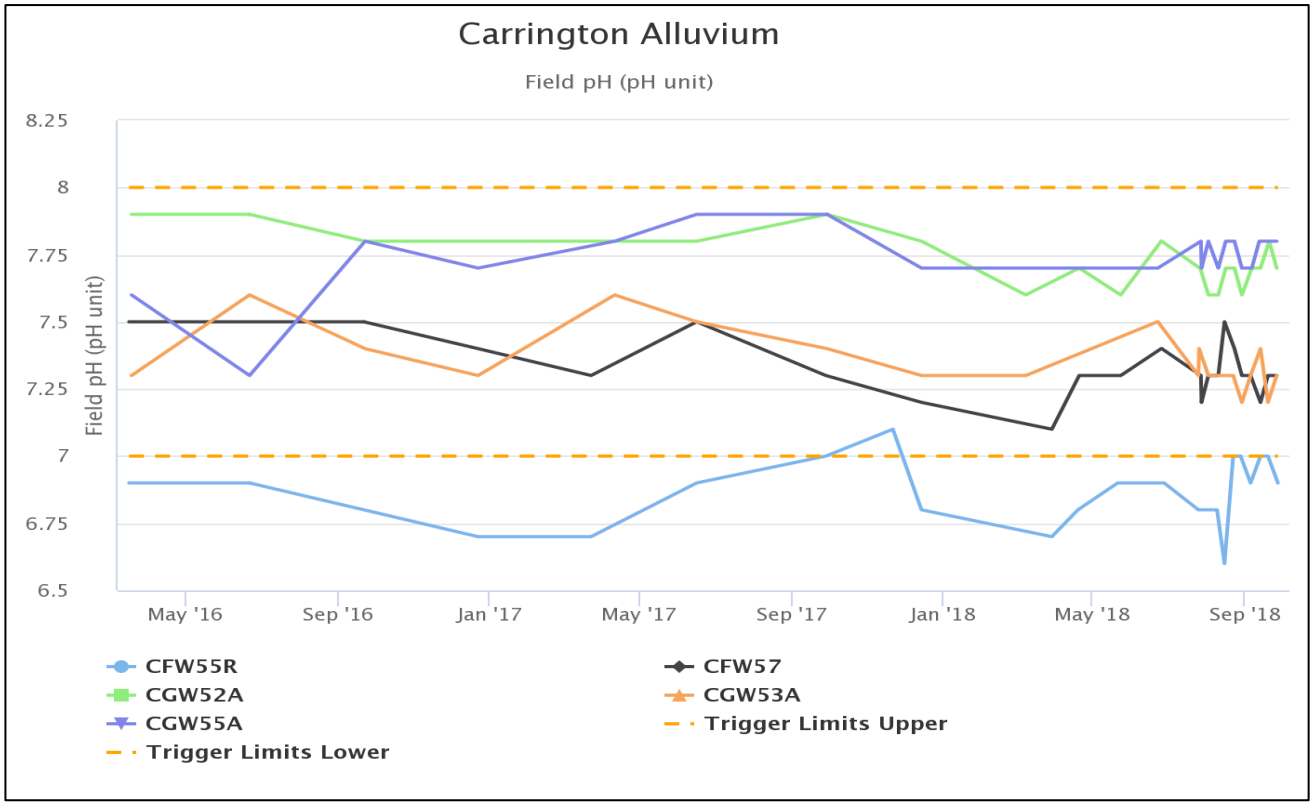


Figure 24: Carrington Alluvium pH Trend – September 2018

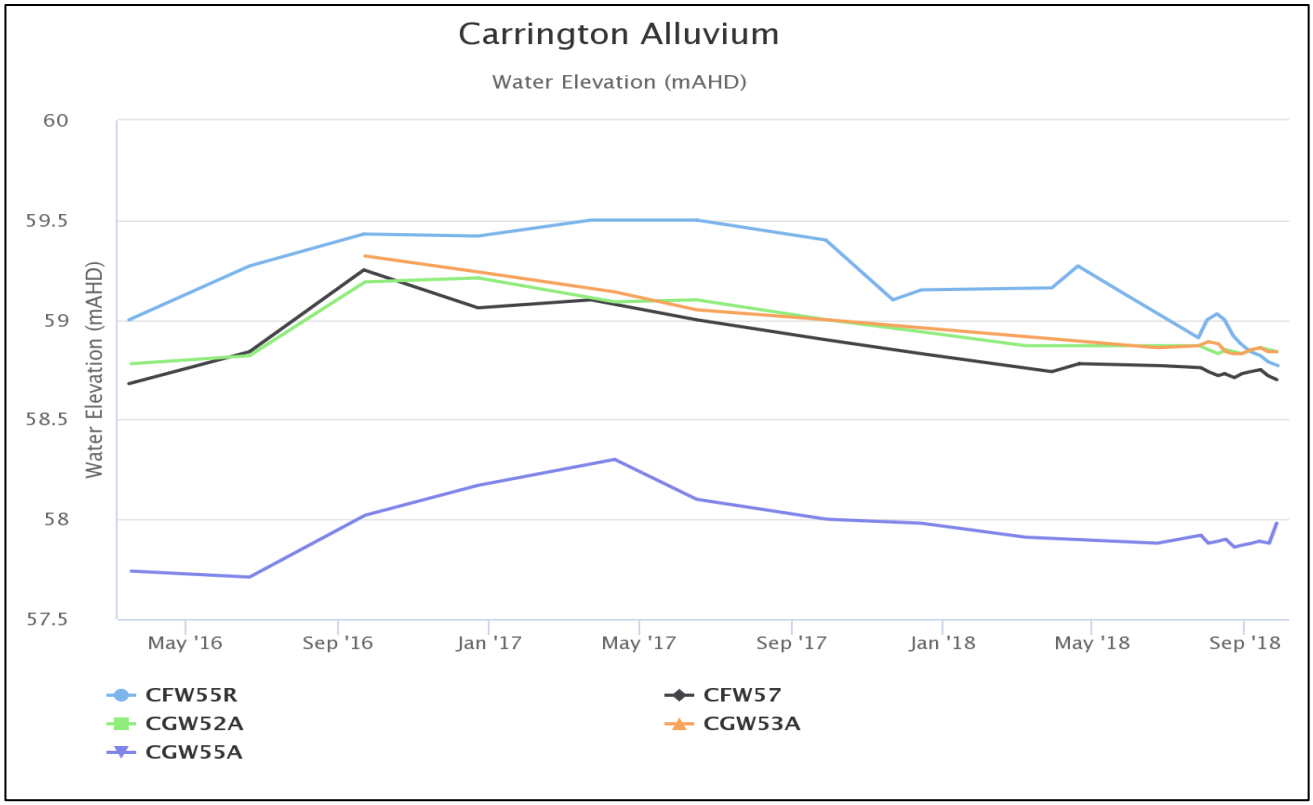


Figure 25: Carrington Alluvium Standing Water Level – September 2018

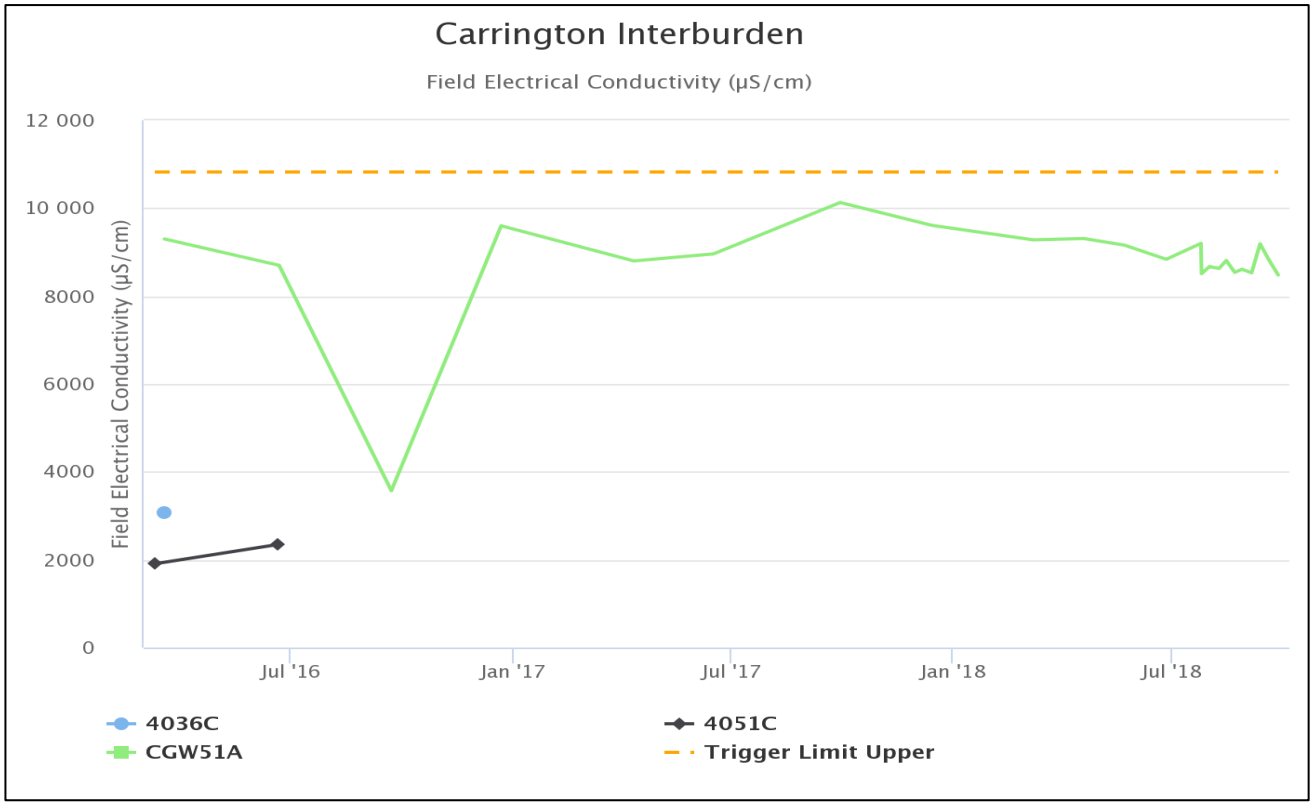


Figure 26: Carrington Interburden Electrical Conductivity Trend – September 2018

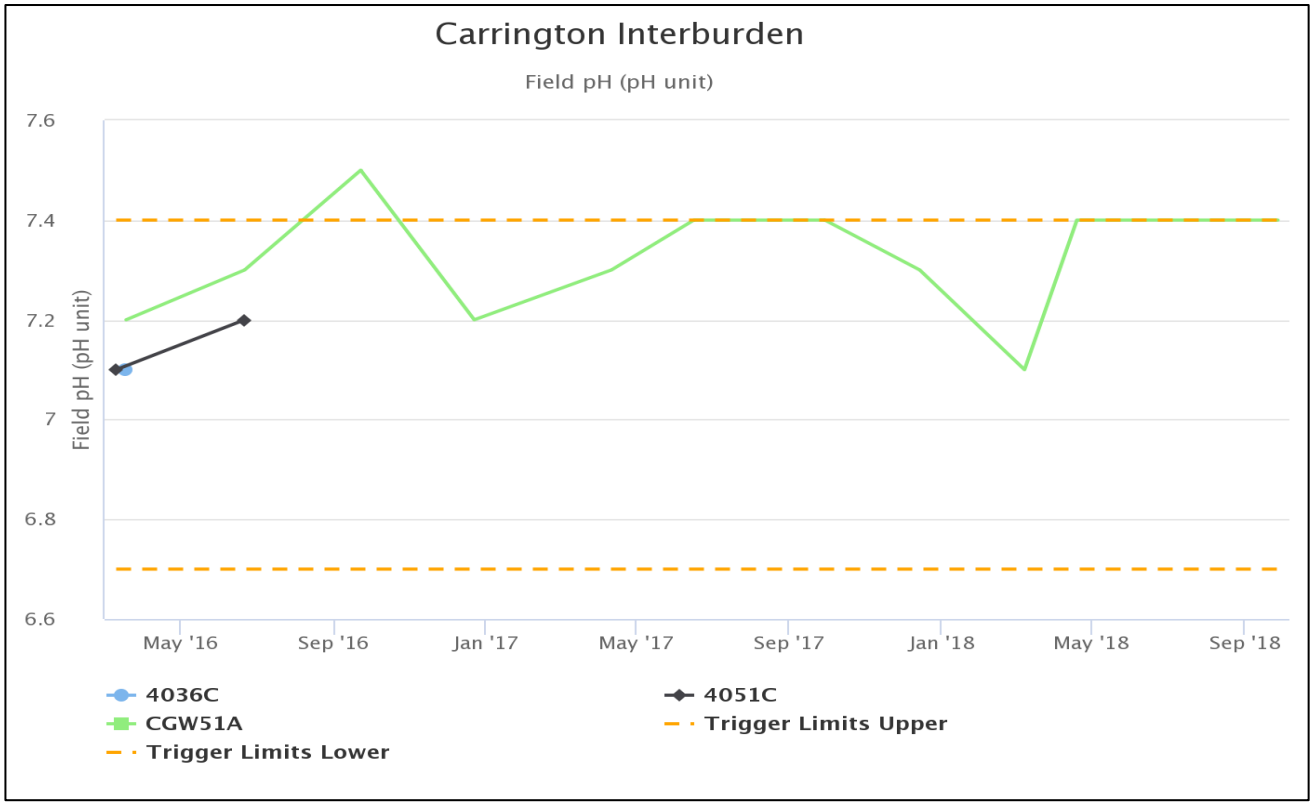


Figure 27: Carrington Interburden pH Trend – September 2018

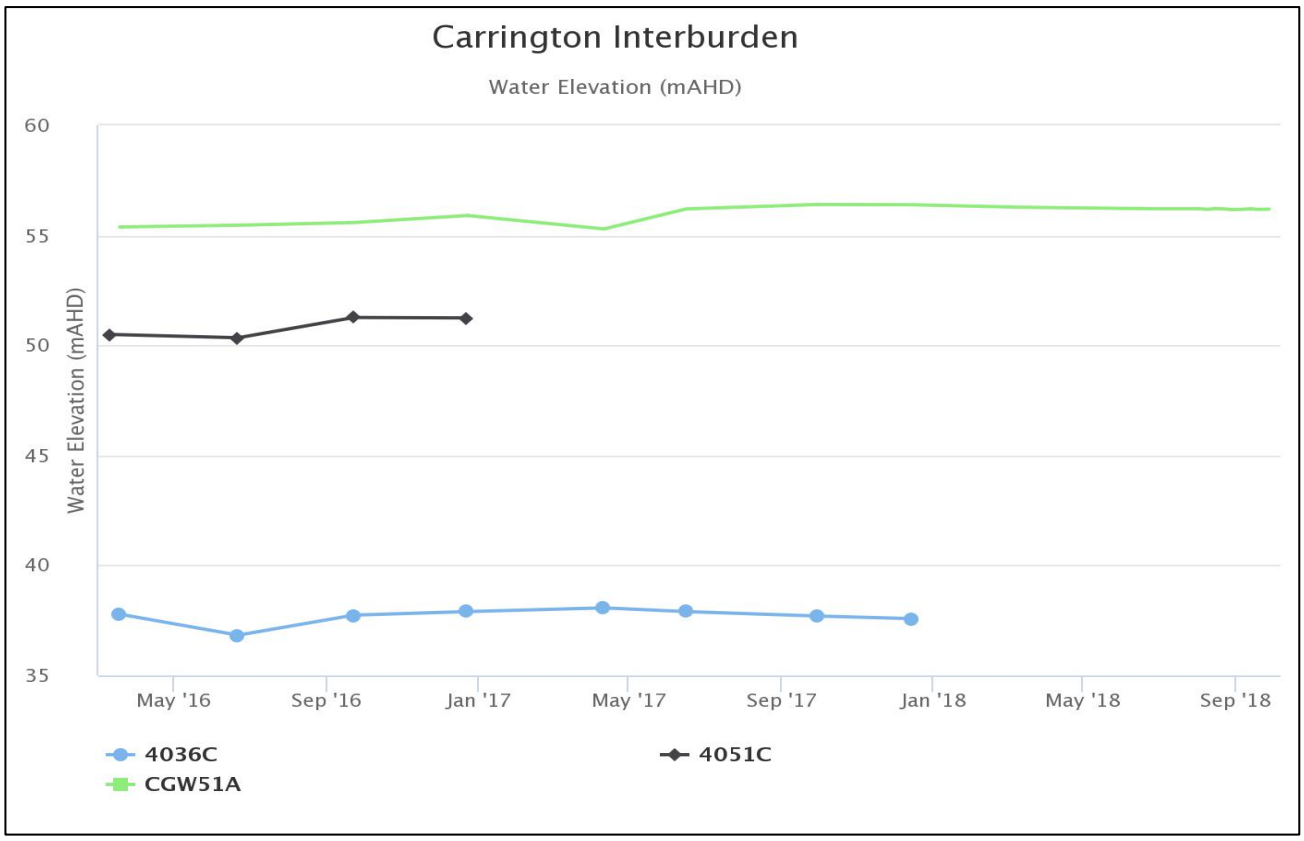


Figure 28: Carrington Interburden Standing Water Level – September 2018

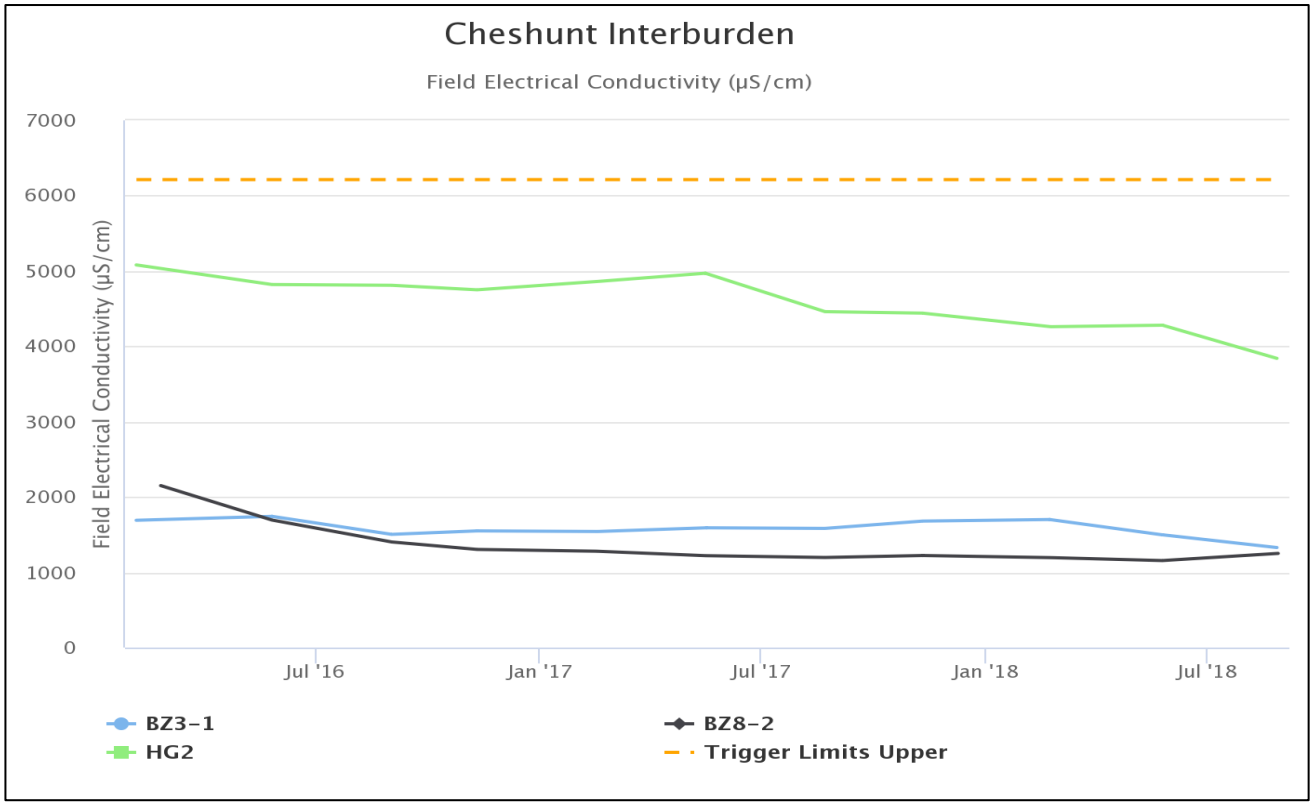


Figure 29: Cheshunt Interburden Electrical Conductivity Trend – September 2018

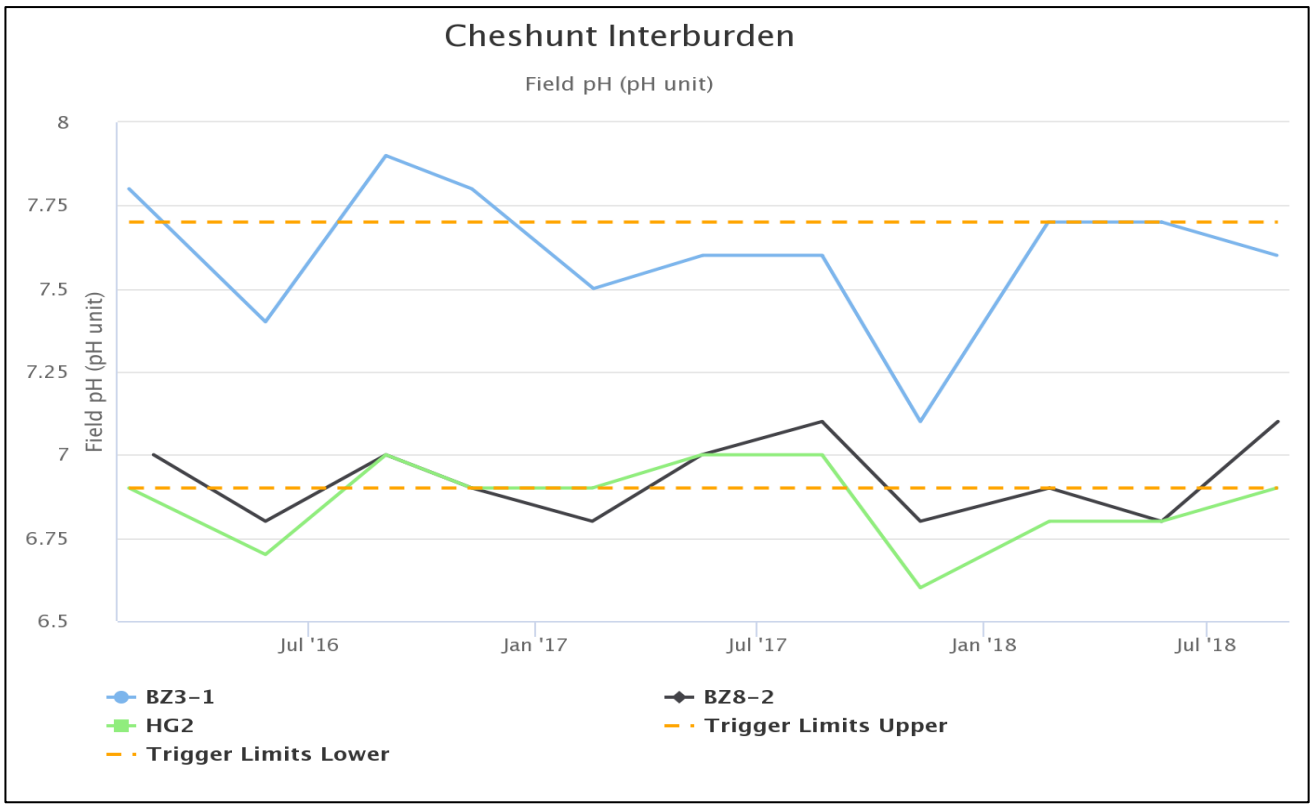


Figure 30: Cheshunt Interburden pH Trend – September 2018

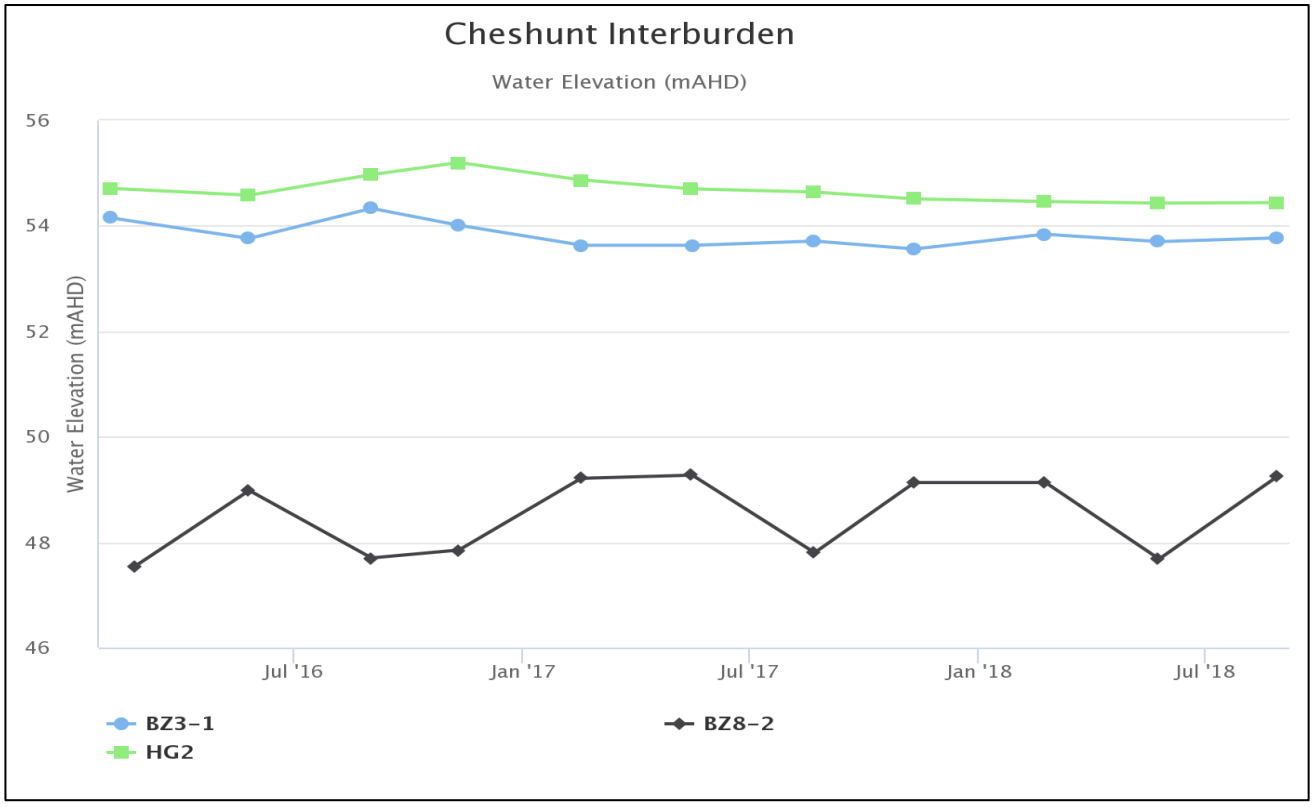


Figure 31: Cheshunt Interburden Standing Water Level – September 2018

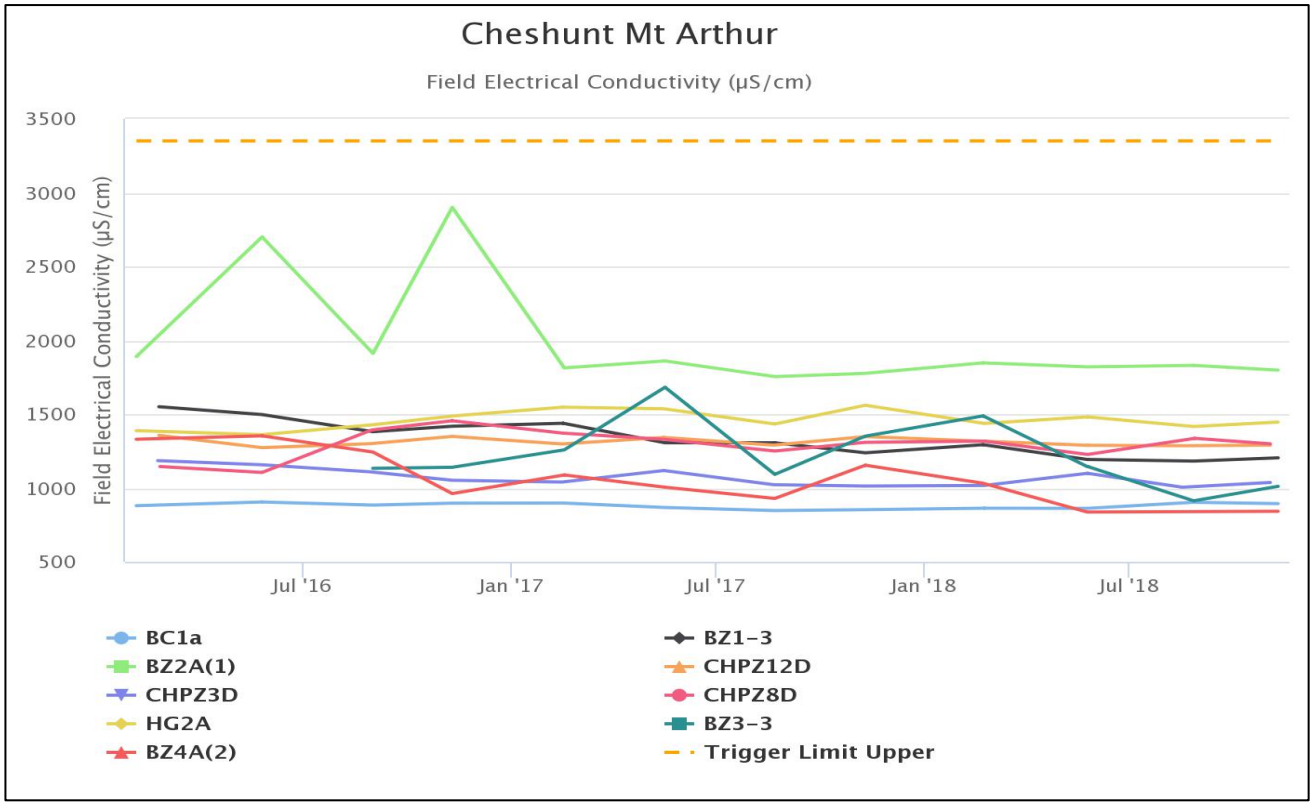


Figure 32: Cheshunt Mt Arthur Electrical Conductivity Trend – September 2018

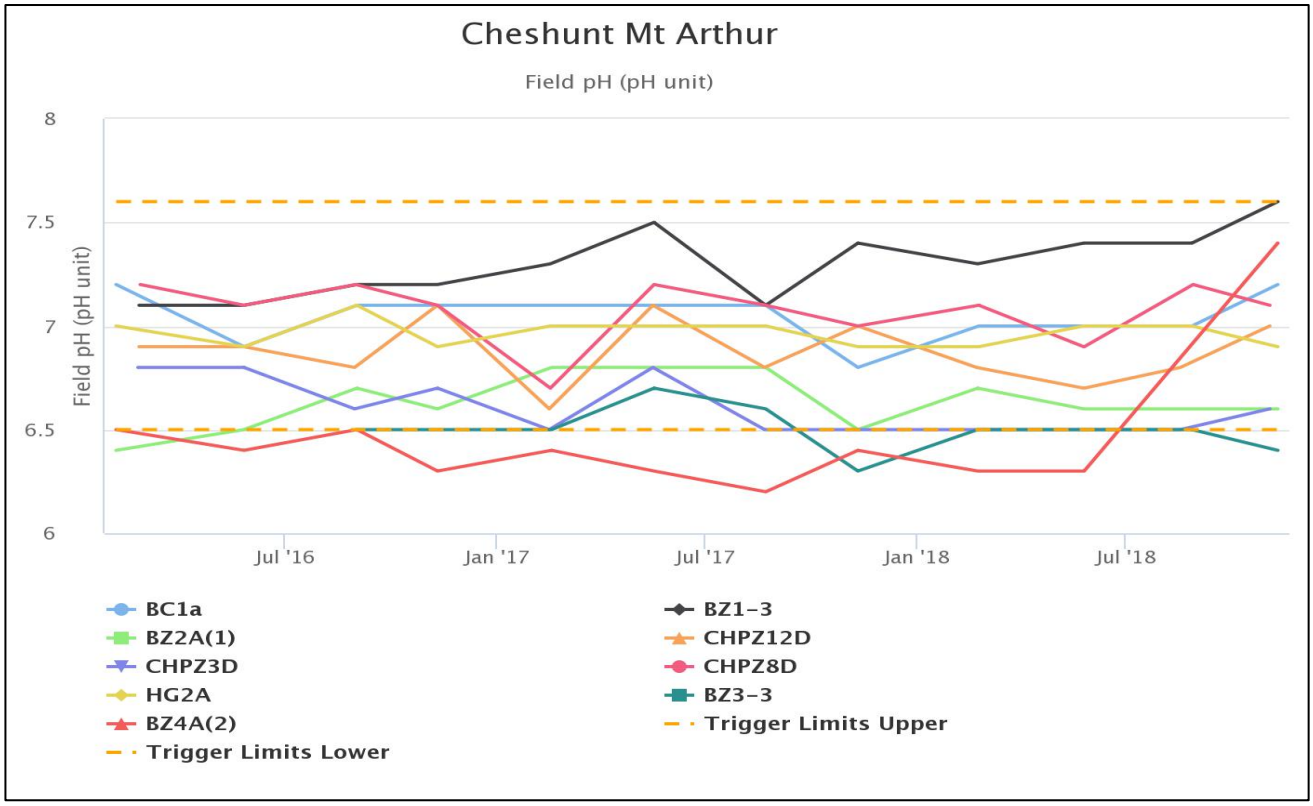


Figure 33: Cheshunt Mt Arthur pH Trend – September 2018

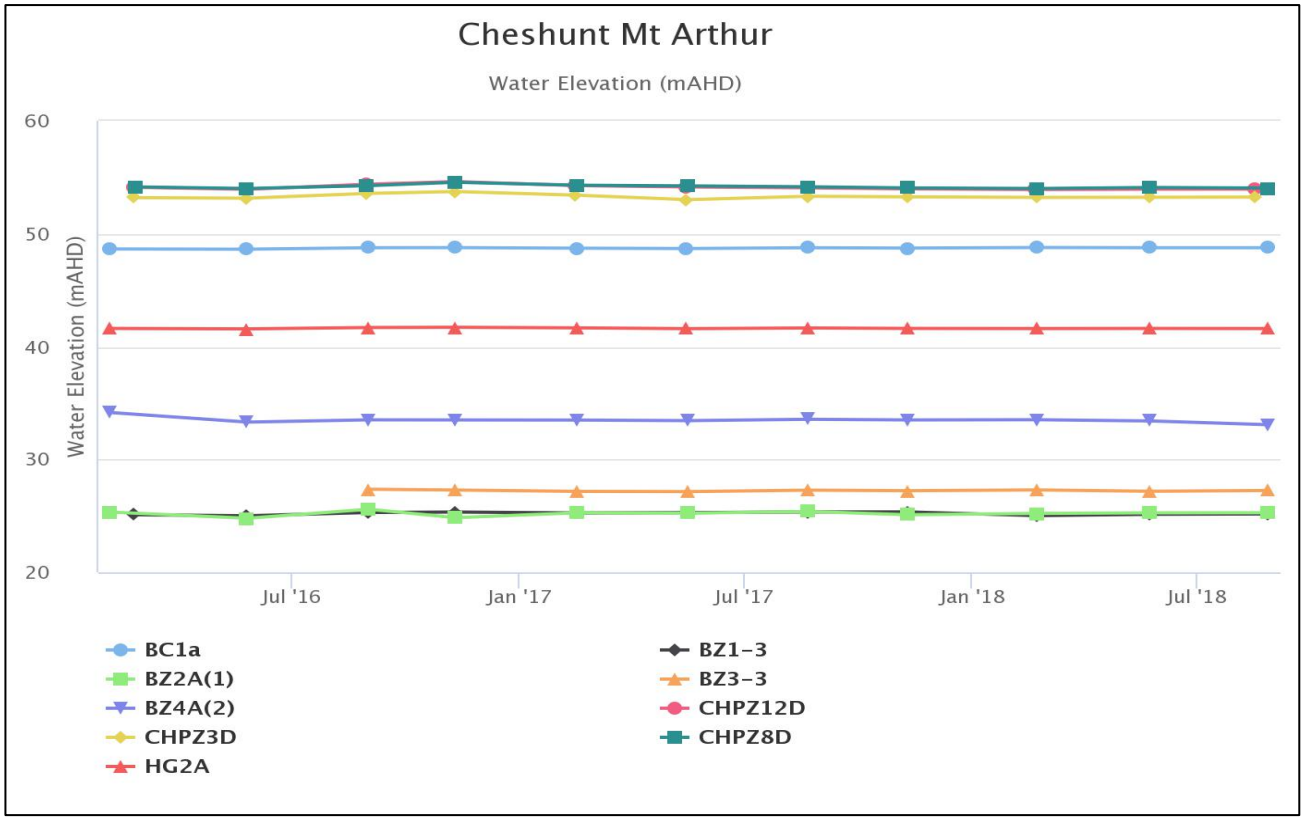


Figure 34: Cheshunt Mt Arthur Standing Water Level – September 2018

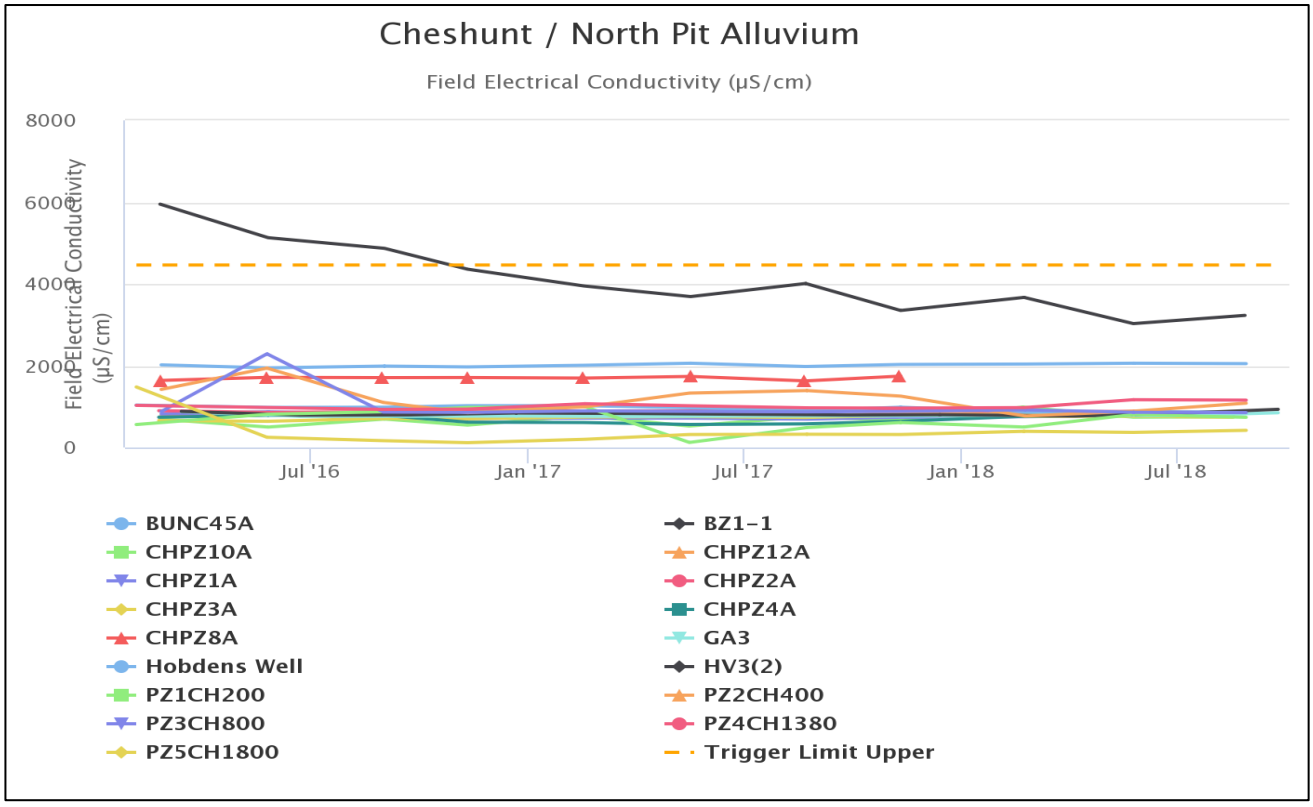


Figure 35: Cheshunt / North Pit Alluvium Electrical Conductivity Trend – September 2018

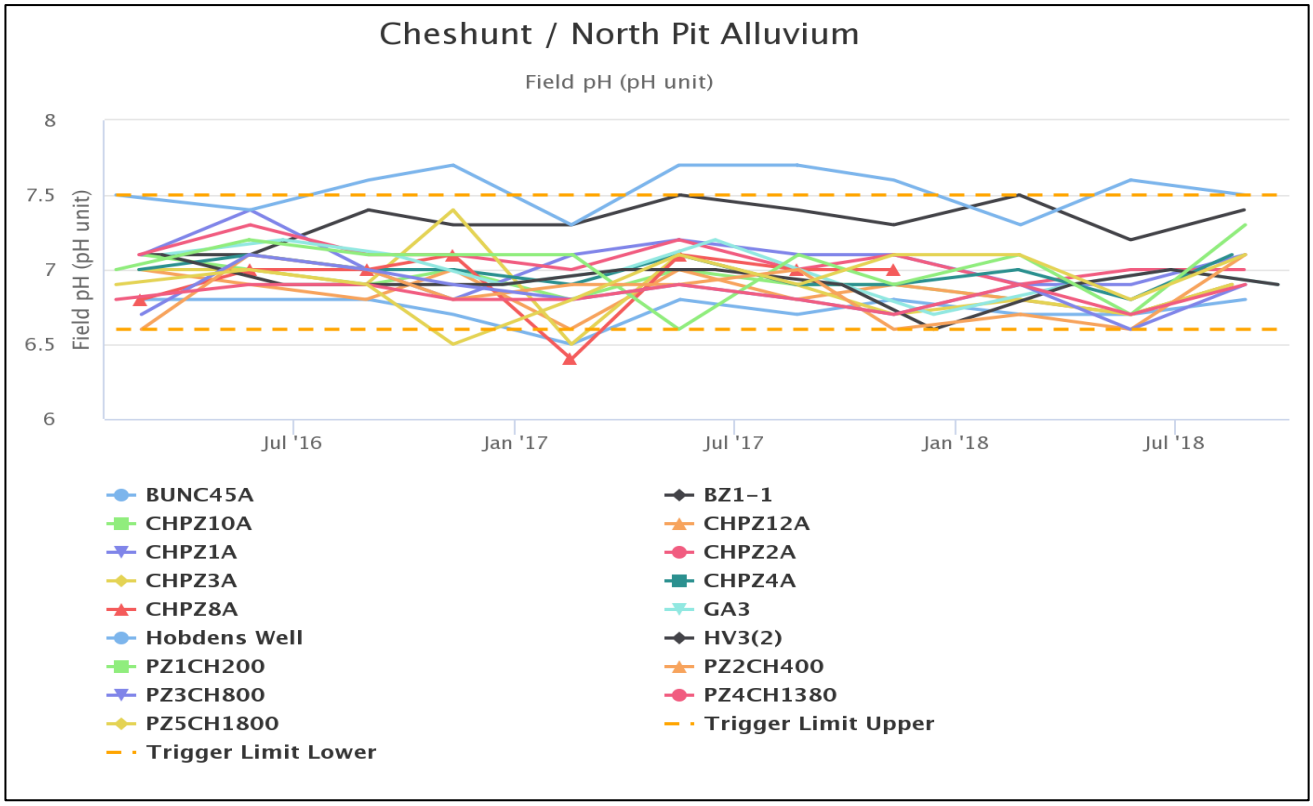


Figure 36: Cheshunt / North Pit Alluvium pH Trend – September 2018

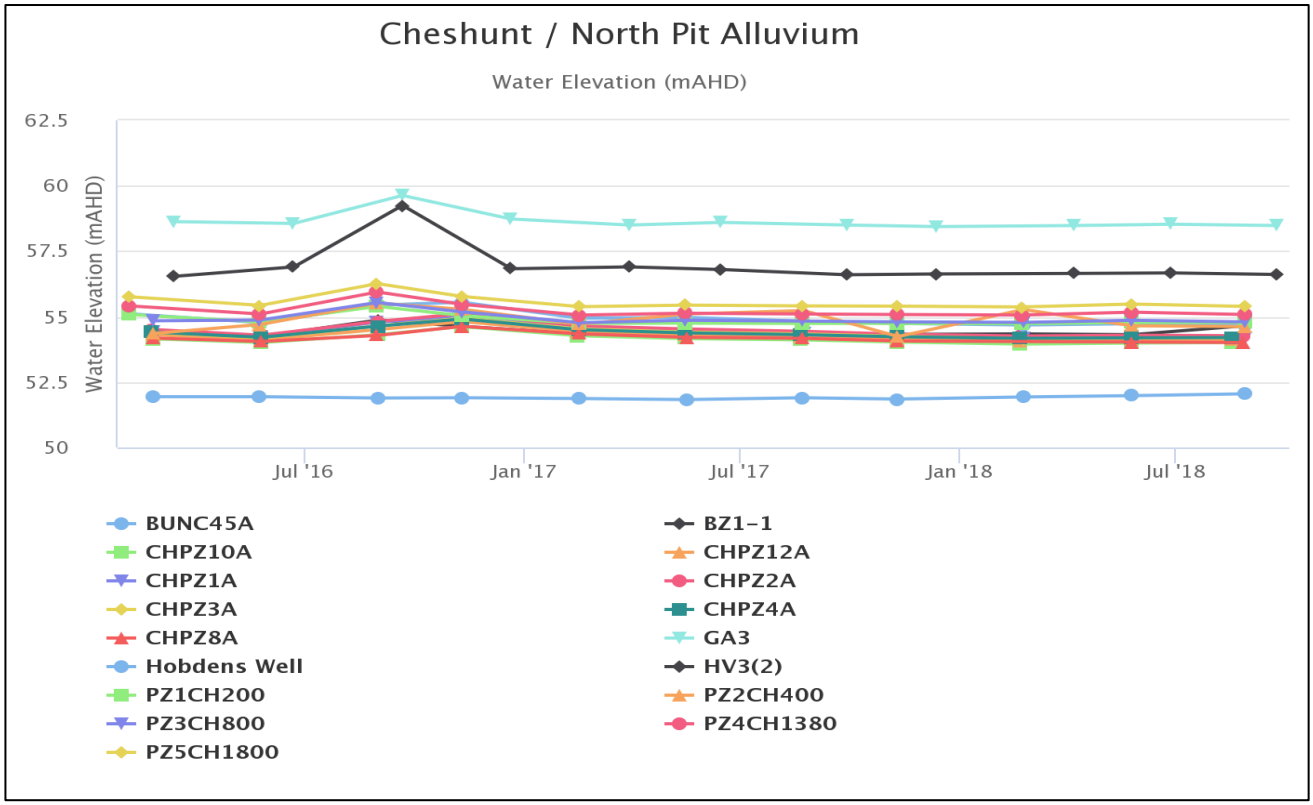


Figure 37: Cheshunt / North Pit Alluvium Standing Water Level – September 2018

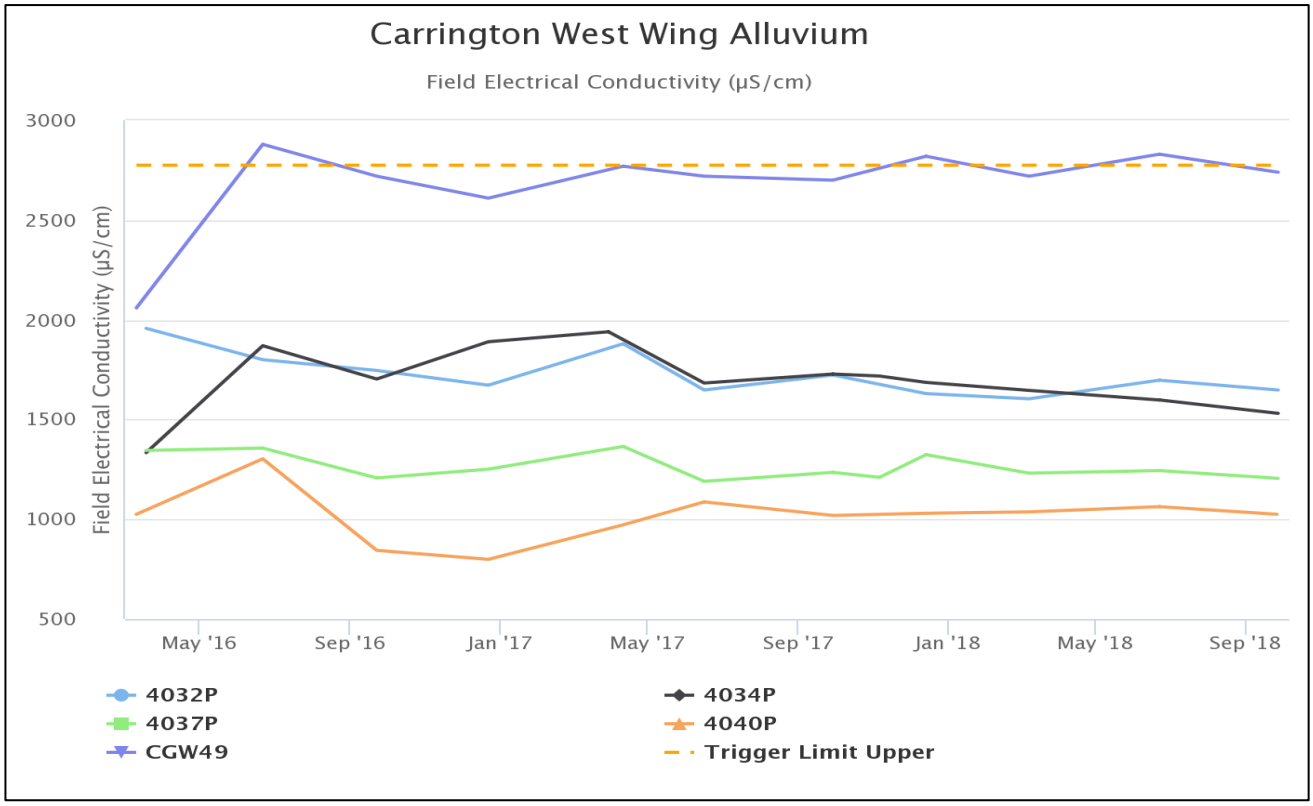


Figure 38: Carrington West Wing Alluvium Electrical Conductivity Trend – September 2018

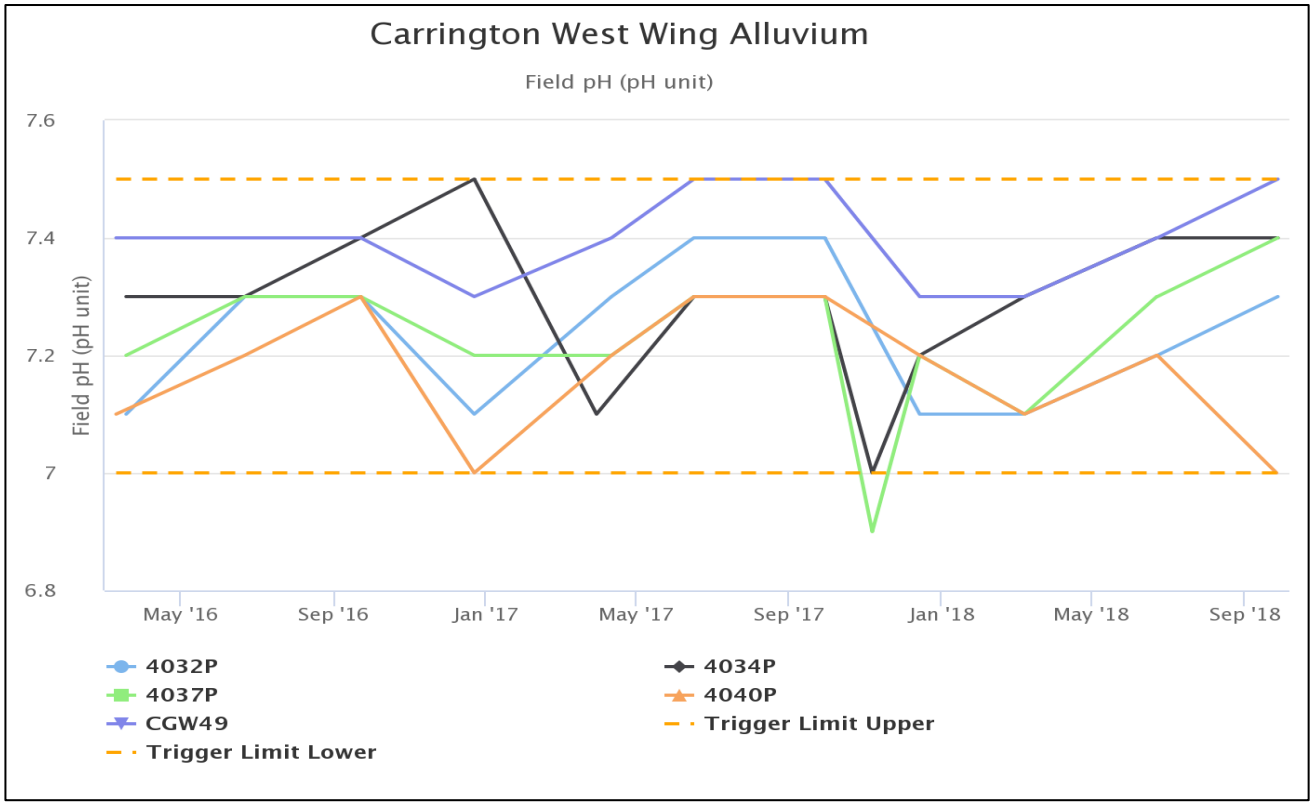


Figure 39: Carrington West Wing Alluvium pH Trend – September 2018

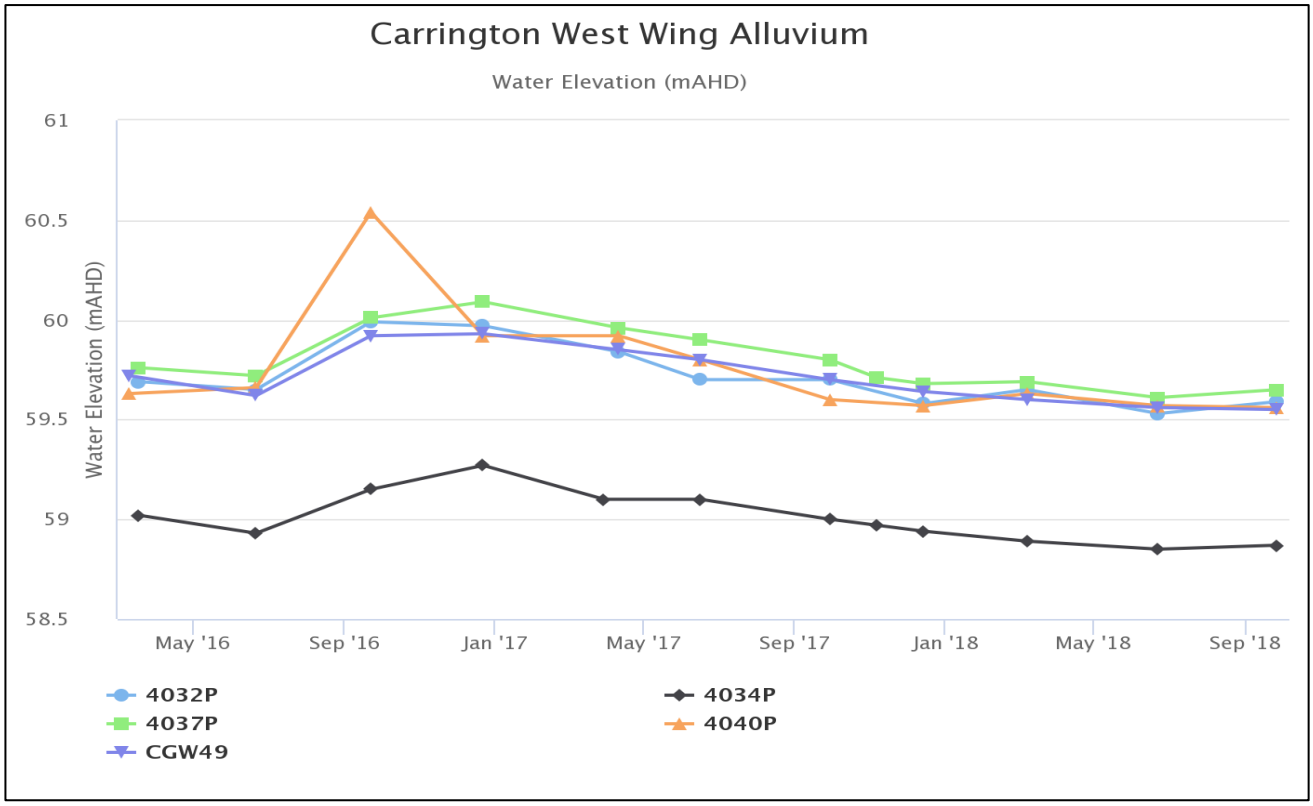


Figure 40: Carrington West Wing Alluvium Standing Water Level – September 2018

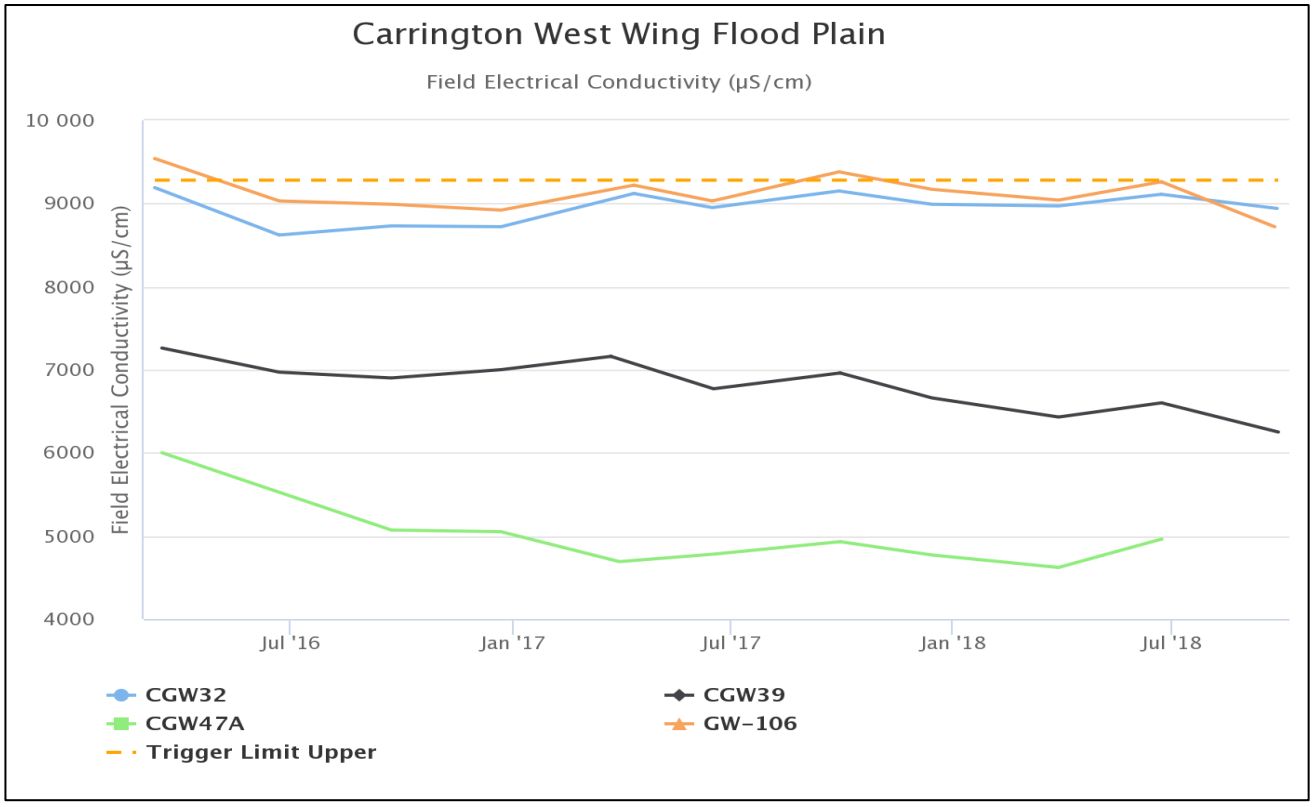


Figure 41: Carrington West Wing Flood Plain Electrical Conductivity Trend – September 2018

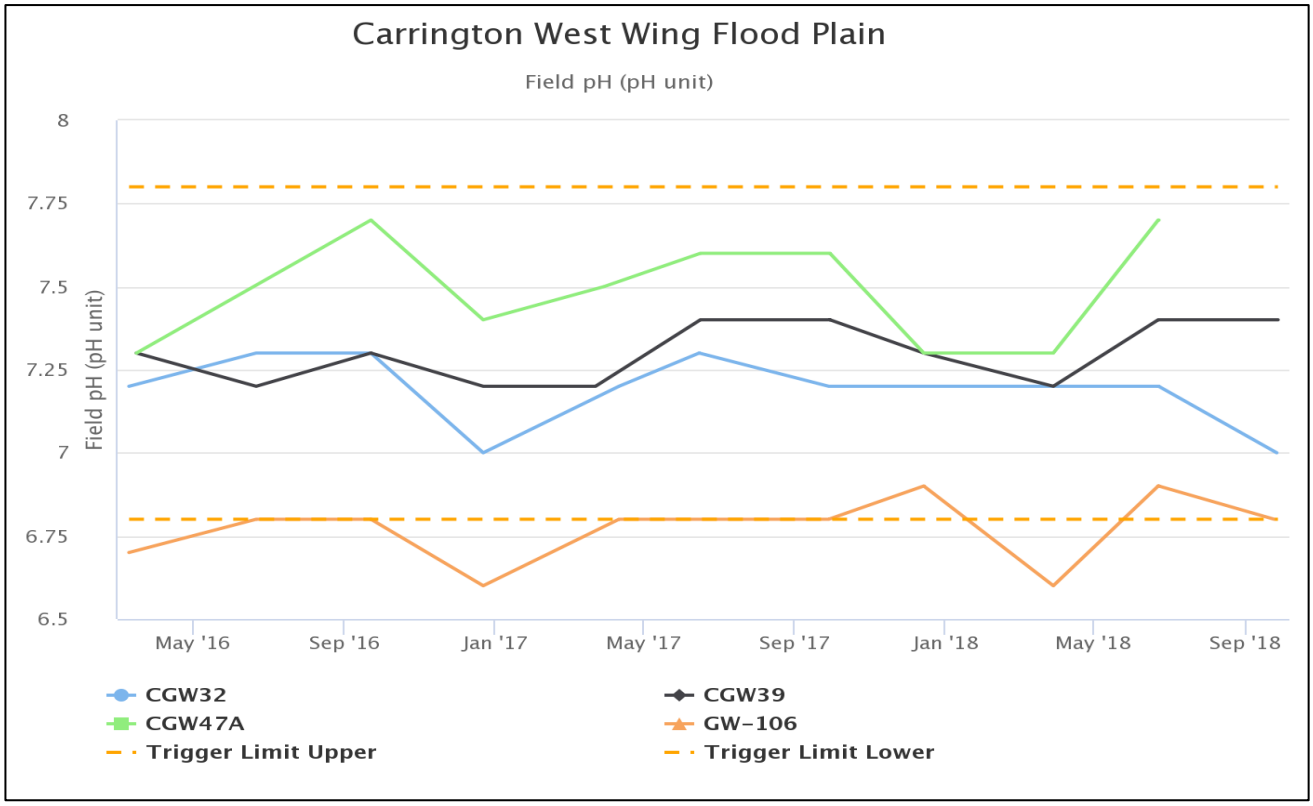


Figure 42: Carrington West Wing Flood Plain pH Trend – September 2018

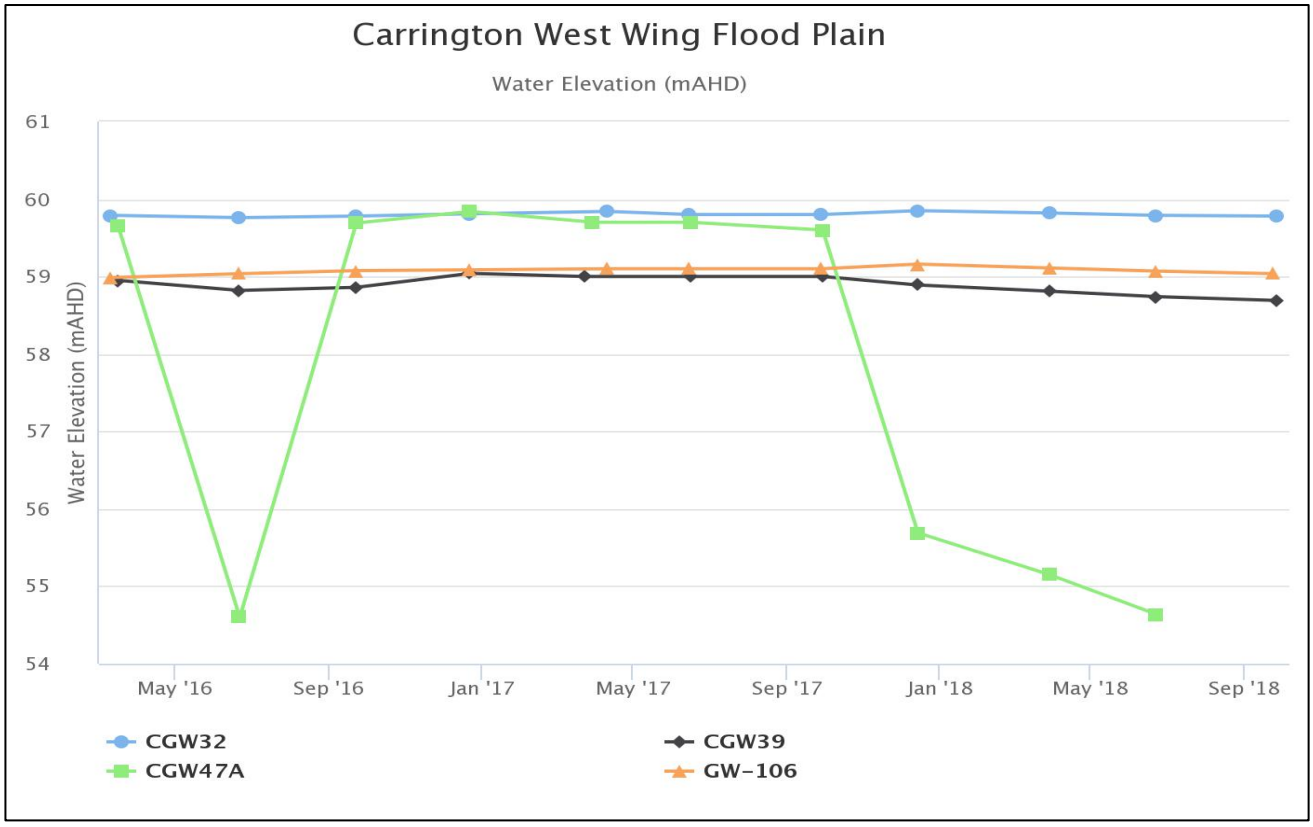


Figure 43: Carrington West Wing Flood Plain Standing Water Level – September 2018

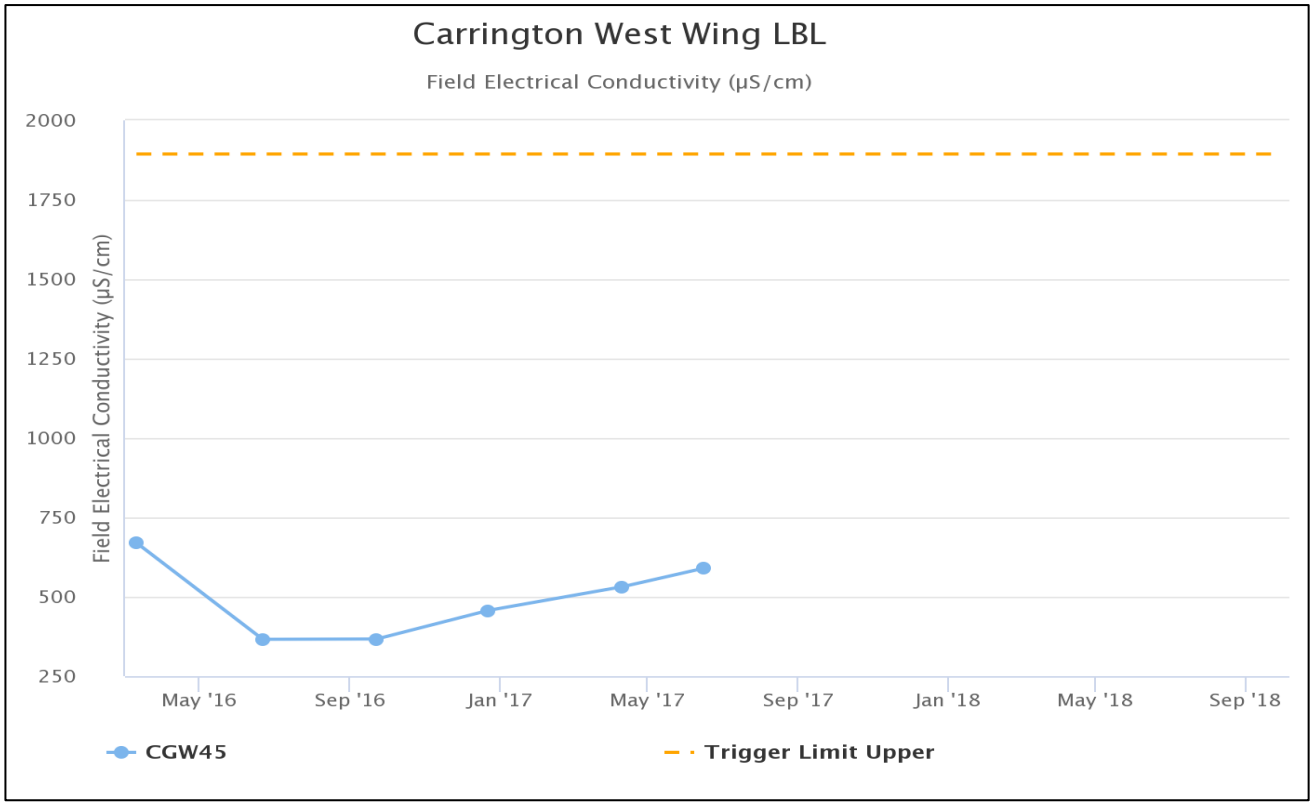


Figure 44: Carrington West Wing LBL Electrical Conductivity Trend – September 2018

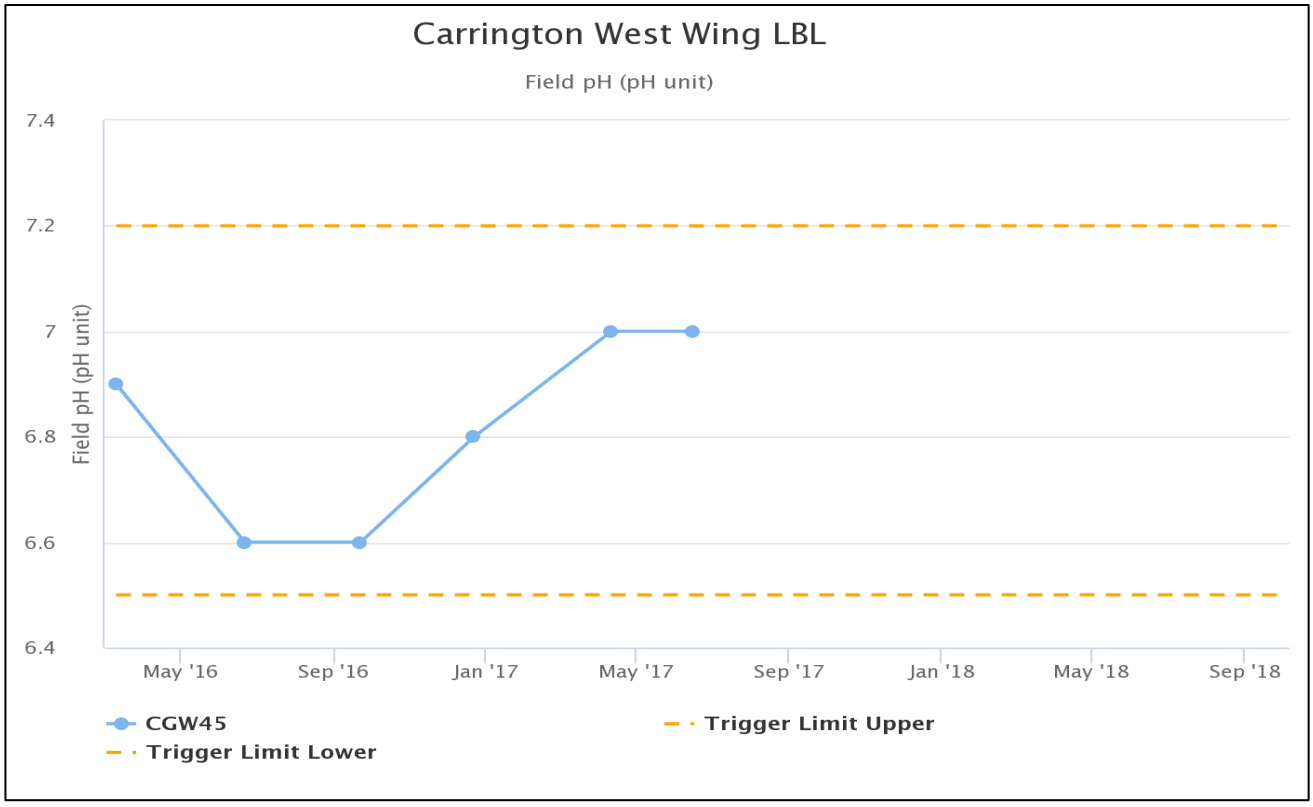


Figure 45: Carrington West Wing LBL pH Trend – September 2018

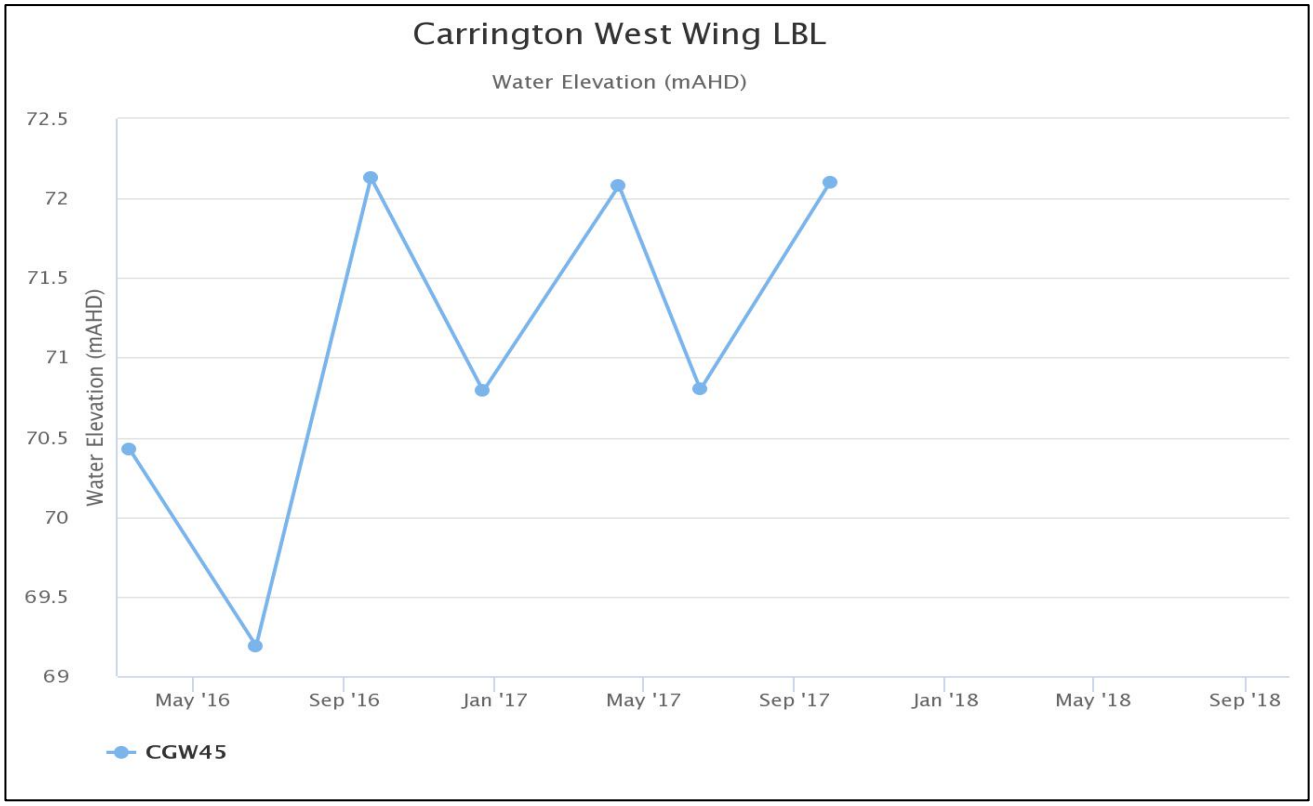


Figure 46: Carrington West Wing LBL Standing Water Level – September 2018

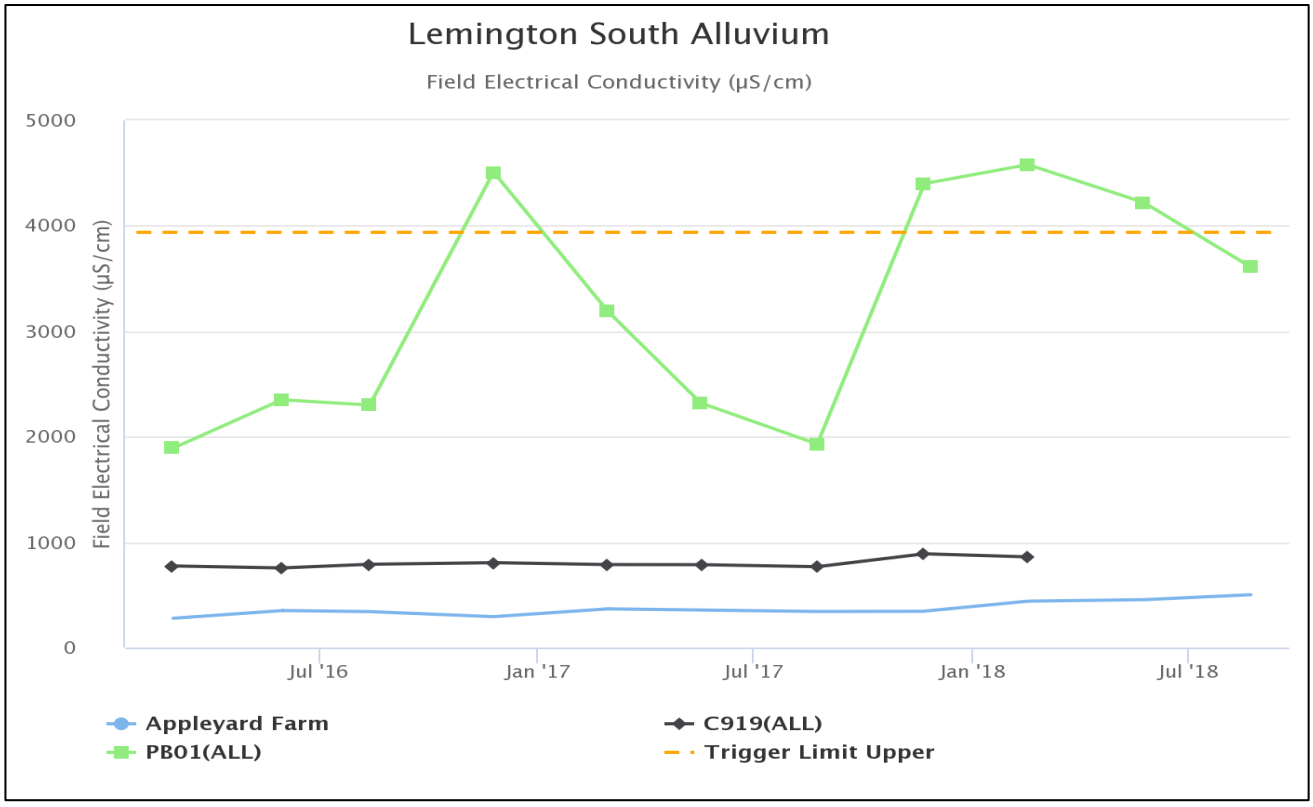


Figure 47: Lemington South Alluvium Electrical Conductivity Trend – September 2018

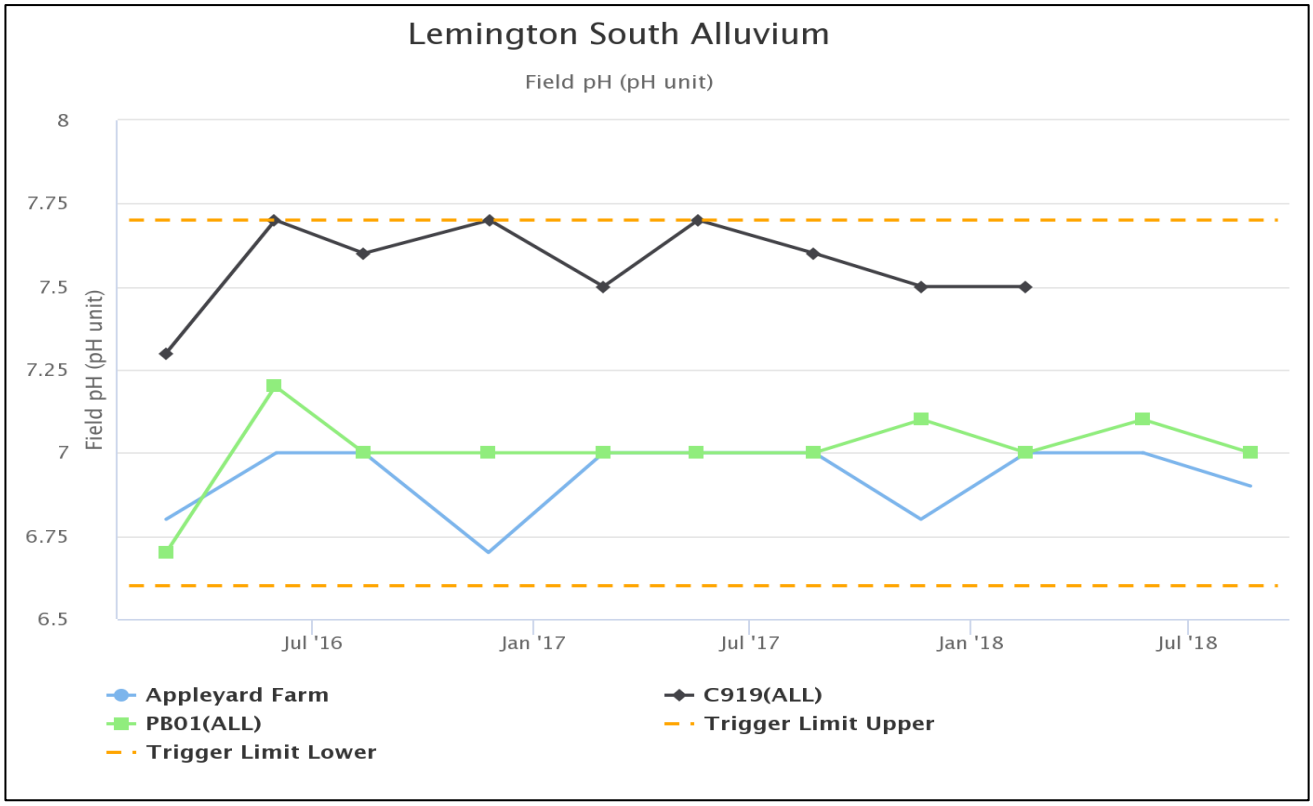


Figure 48: Lemington South Alluvium pH Trend – September 2018

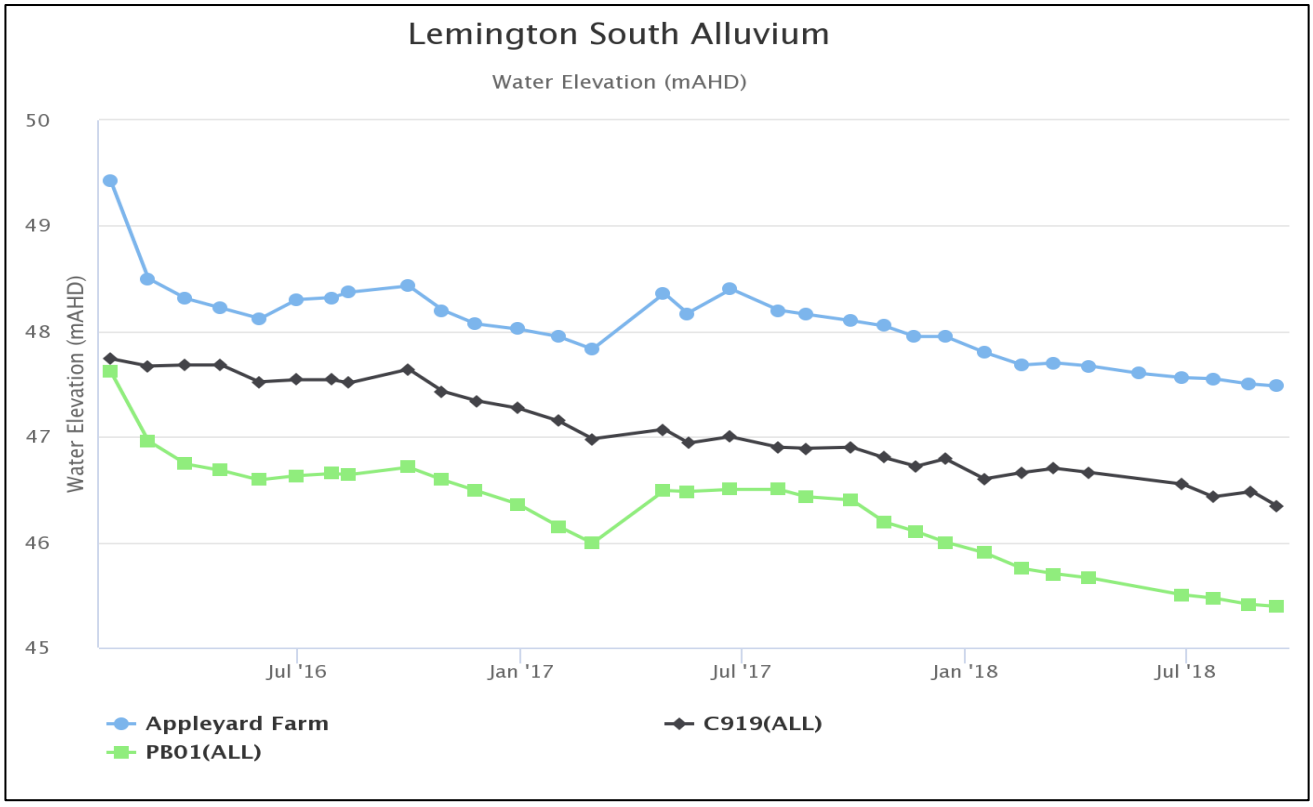


Figure 49: Lemington South Alluvium Standing Water Level Trend – September 2018

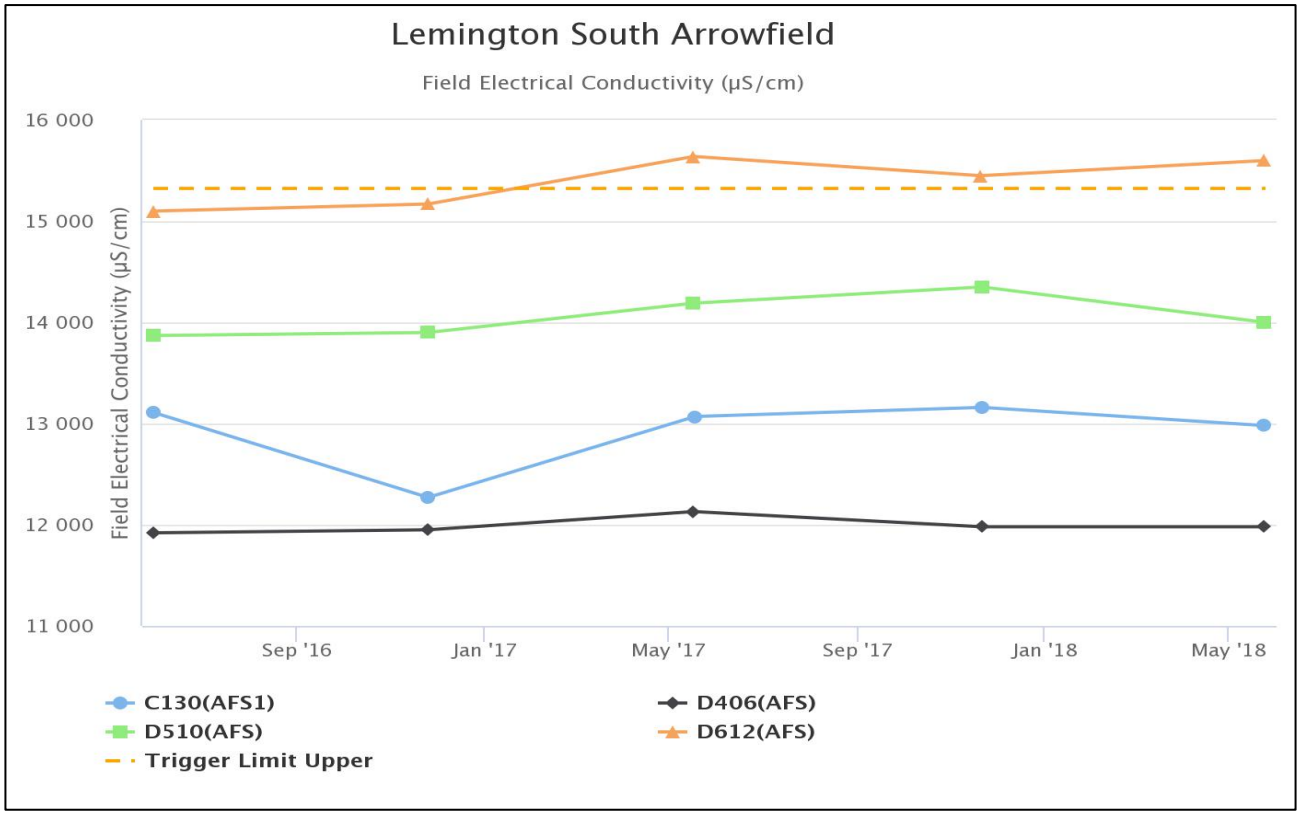


Figure 50: Lemington South Arrowfield Electrical Conductivity Trend – September 2018

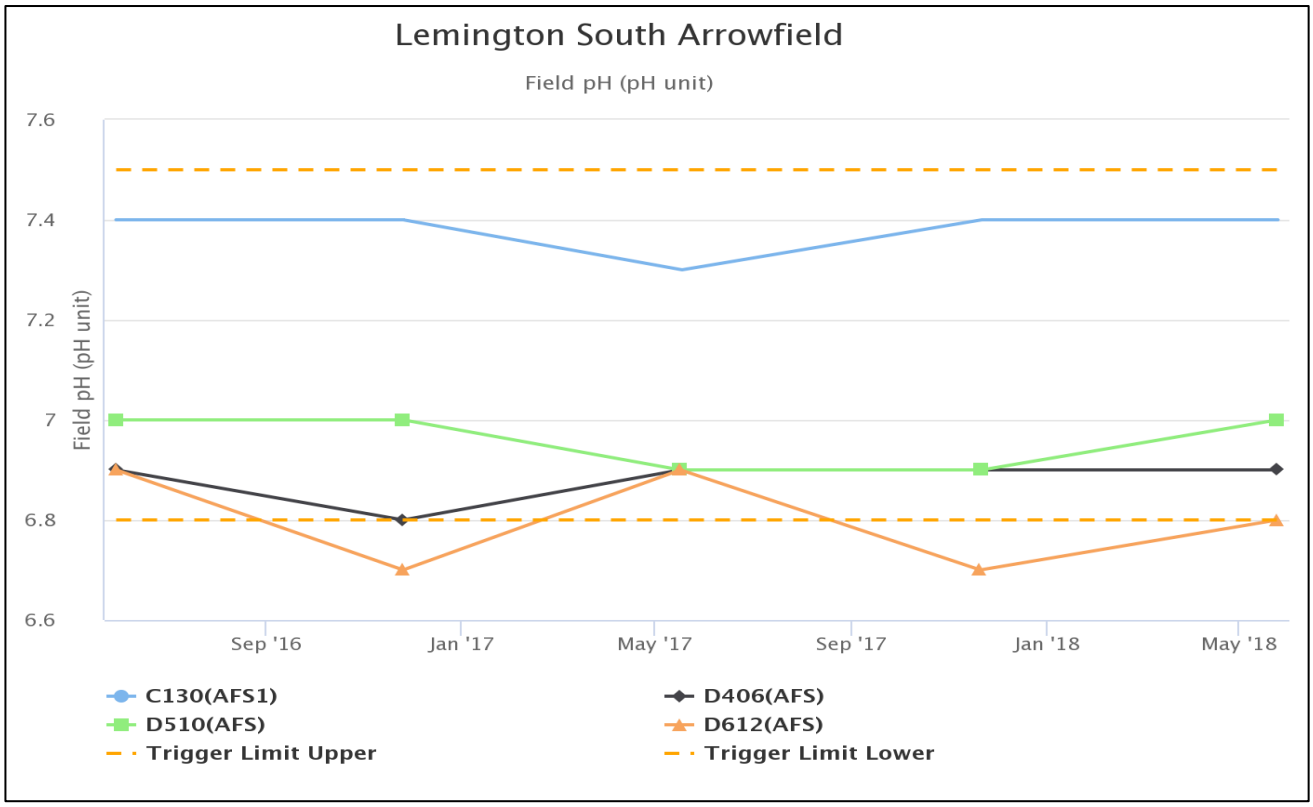


Figure 51: Lemington South Arrowfield pH Trend – September 2018

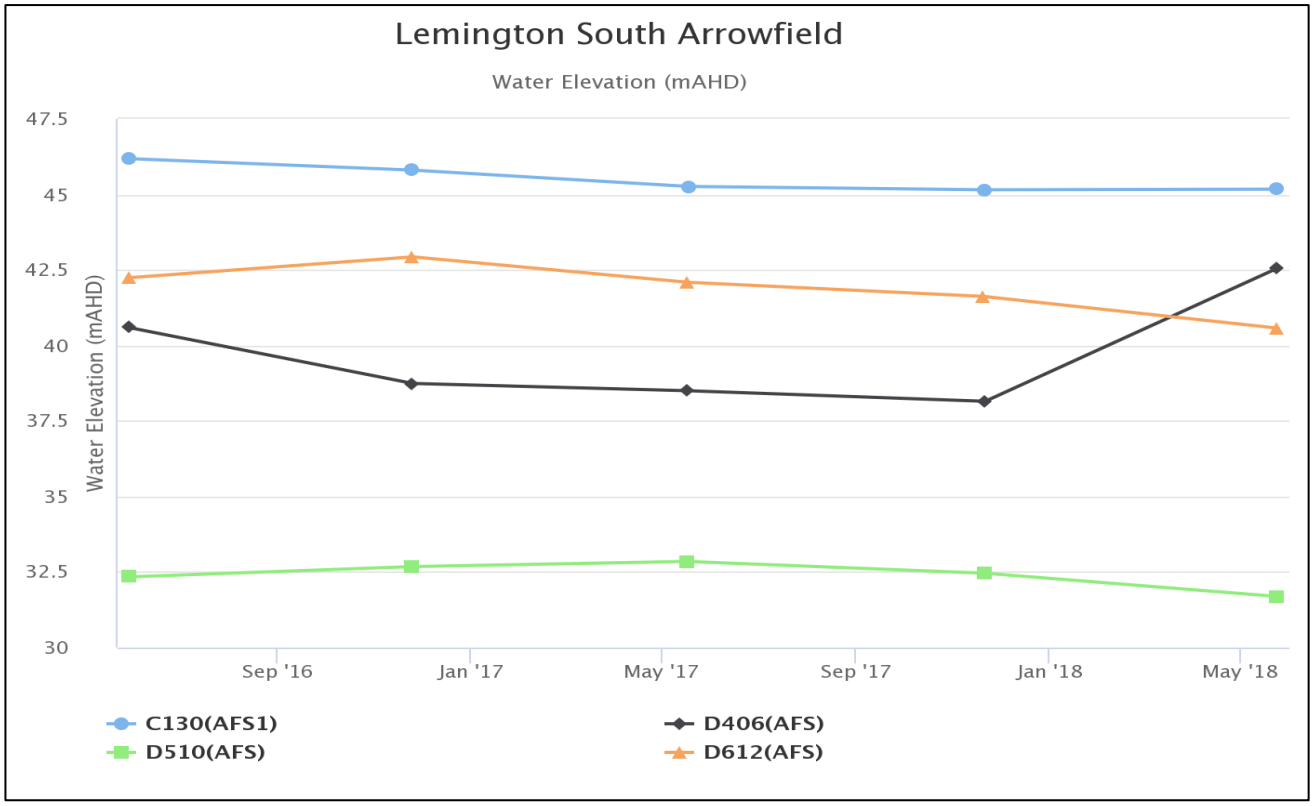


Figure 52: Lemington South Arrowfield Standing Water Level – September 2018

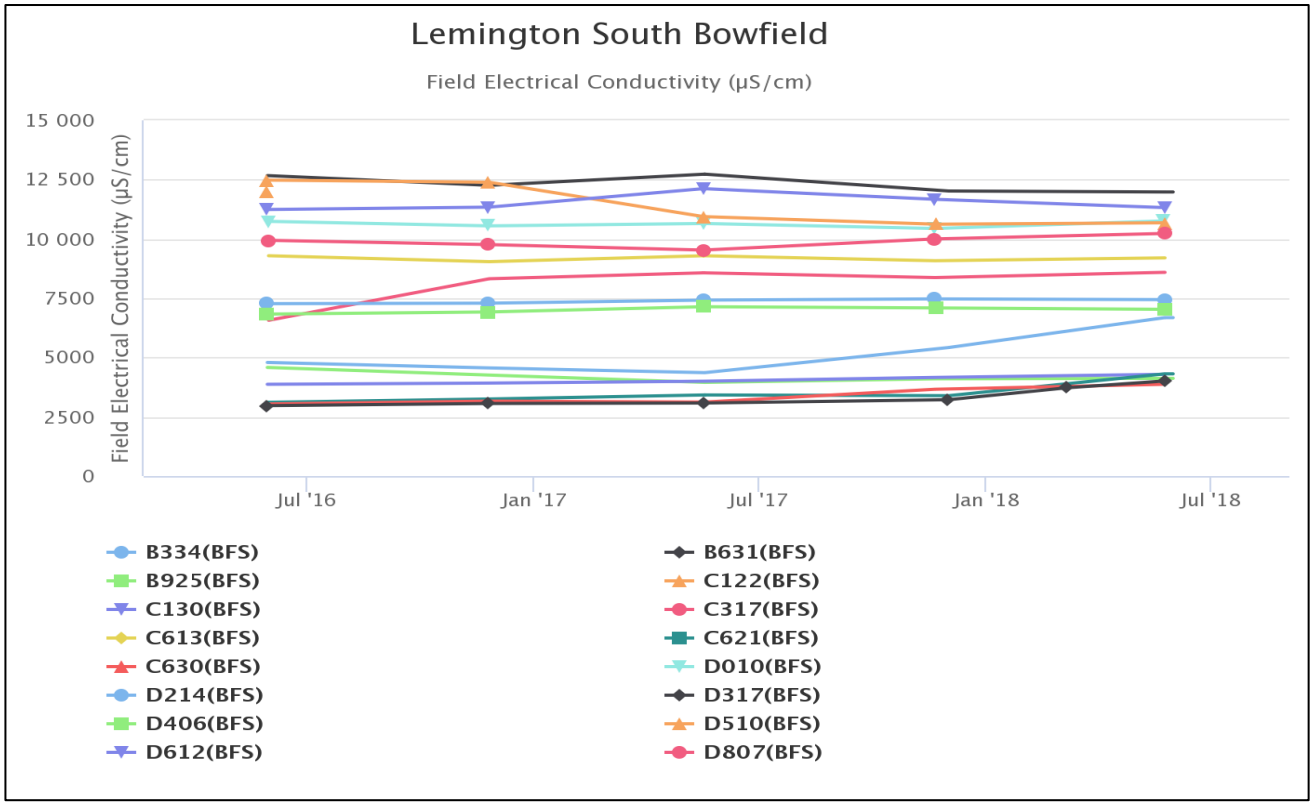


Figure 53: Lemington South Bowfield Electrical Conductivity Trend – September 2018

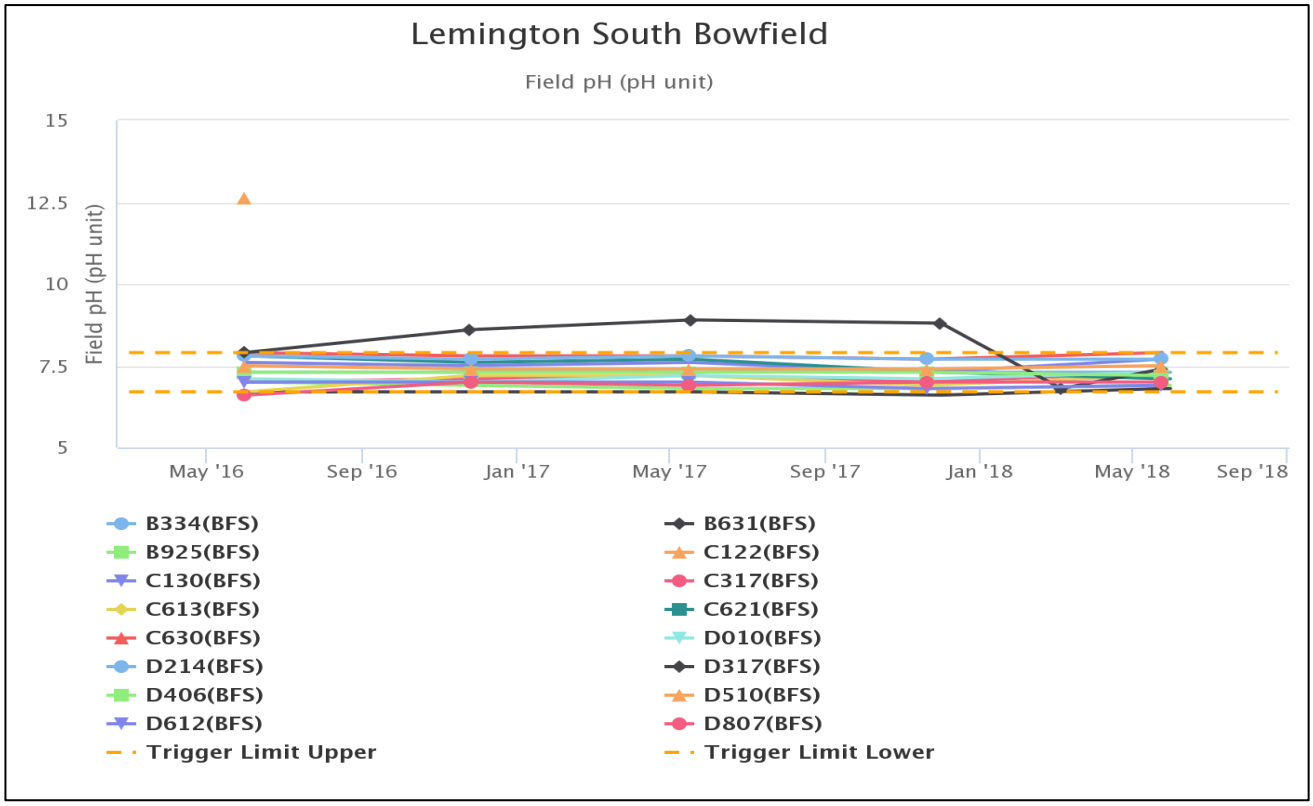


Figure 54: Lemington South Bowfield pH Trend – September 2018

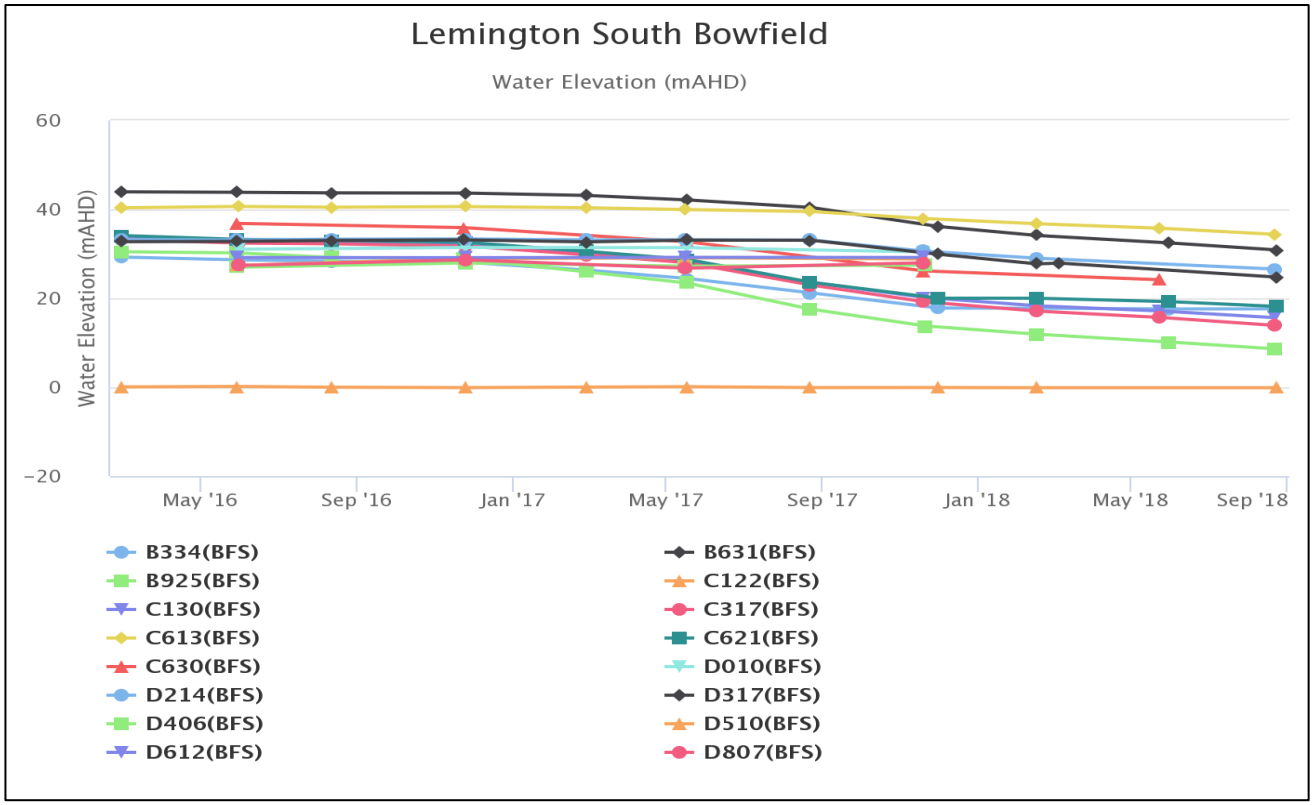


Figure 55: Lemington South Bowfield Standing Water Level – September 2018

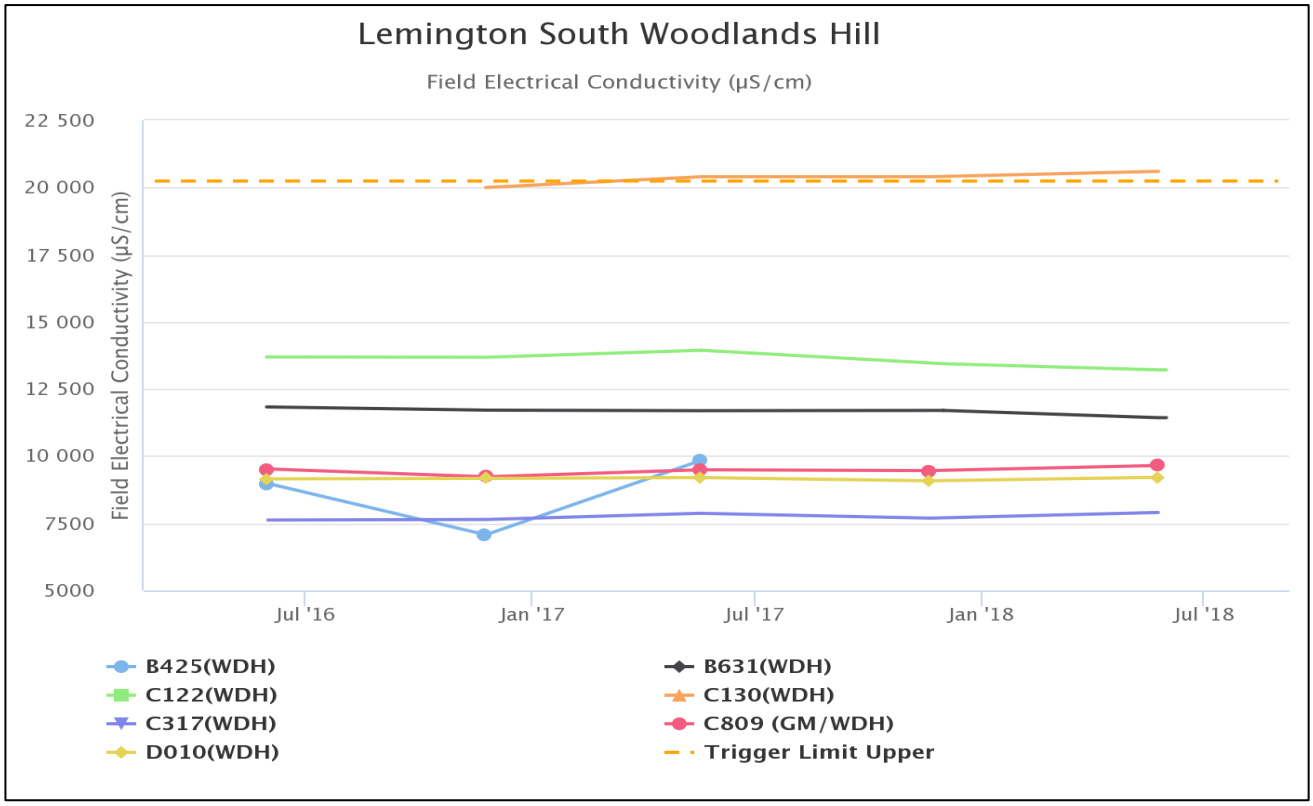


Figure 56: Lemington South Woodlands Hill Electrical Conductivity Trend – September 2018

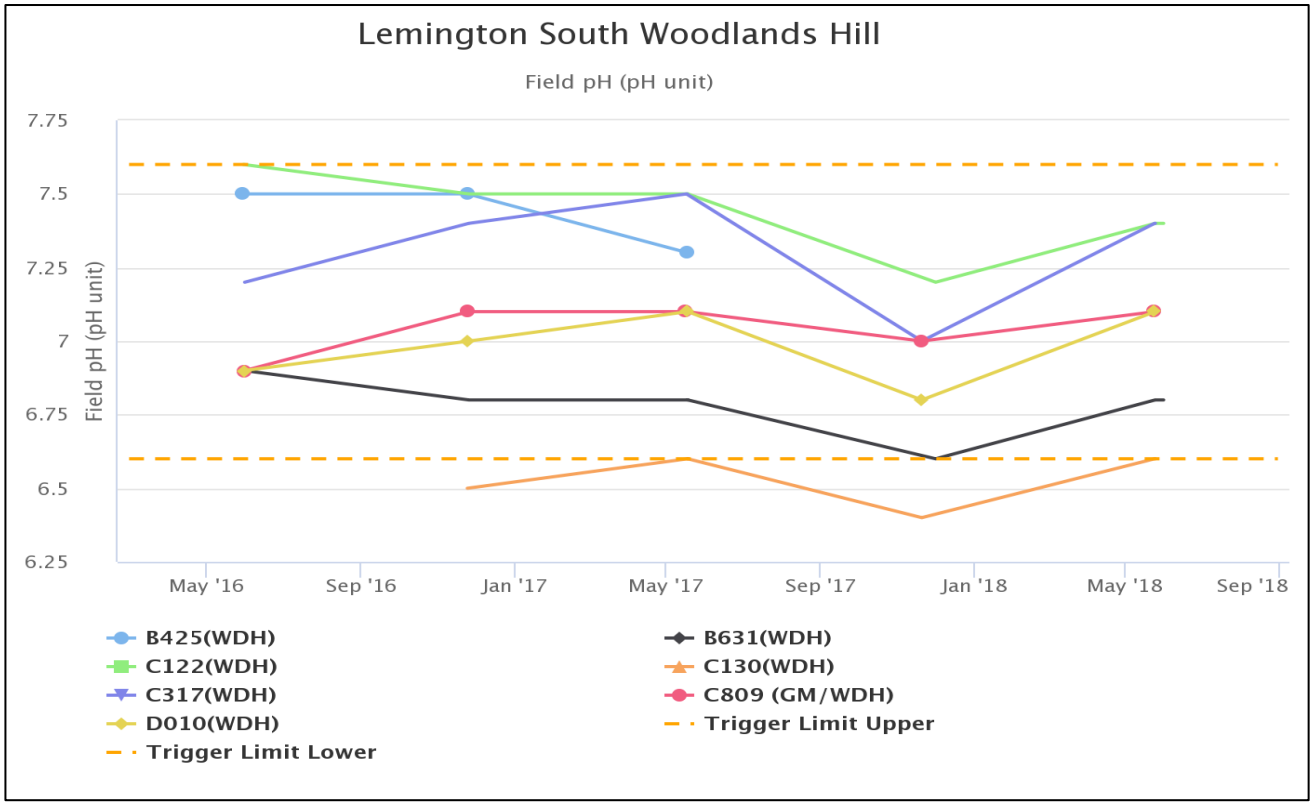


Figure 57: Lemington South Woodlands Hill pH Trend – September 2018

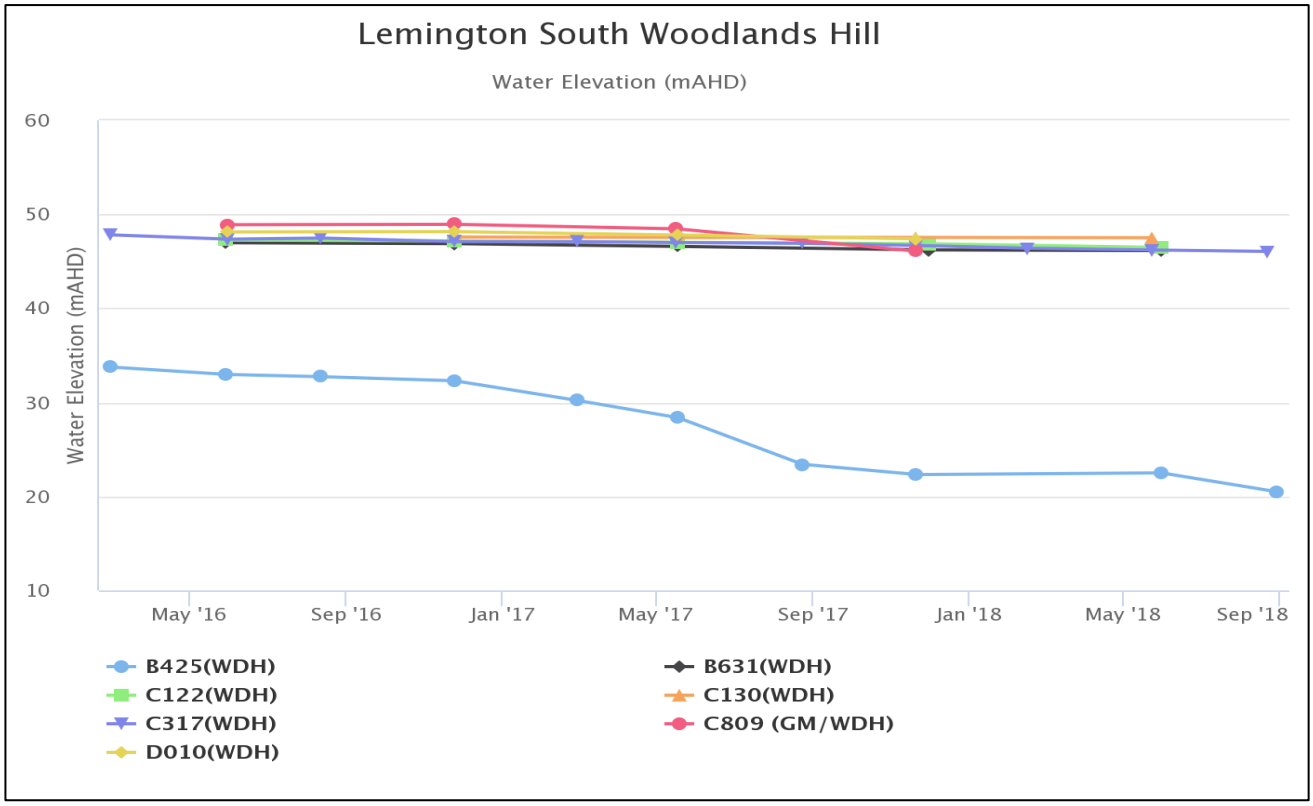


Figure 58: Lemington South Woodlands Hill Standing Water Level – September 2018

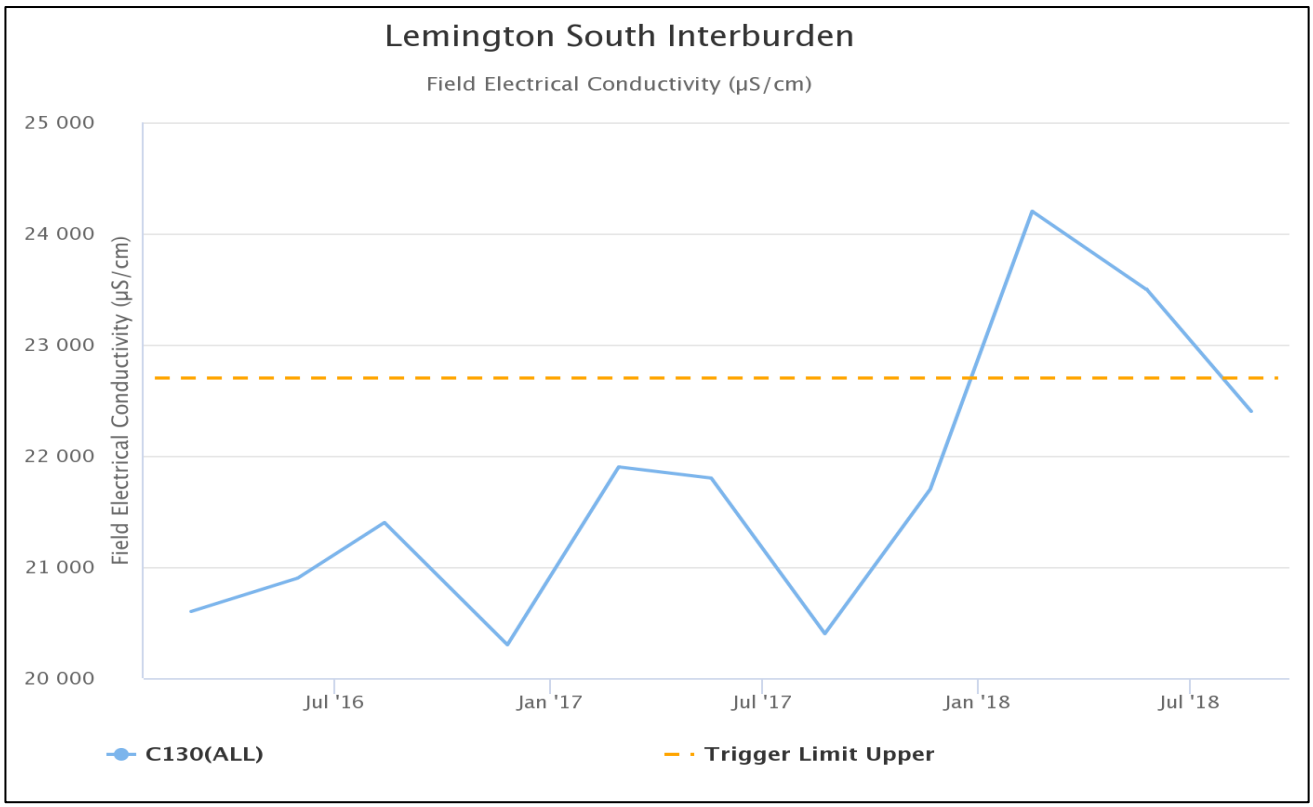


Figure 59: Lemington South Interburden Electrical Conductivity Trend – September 2018

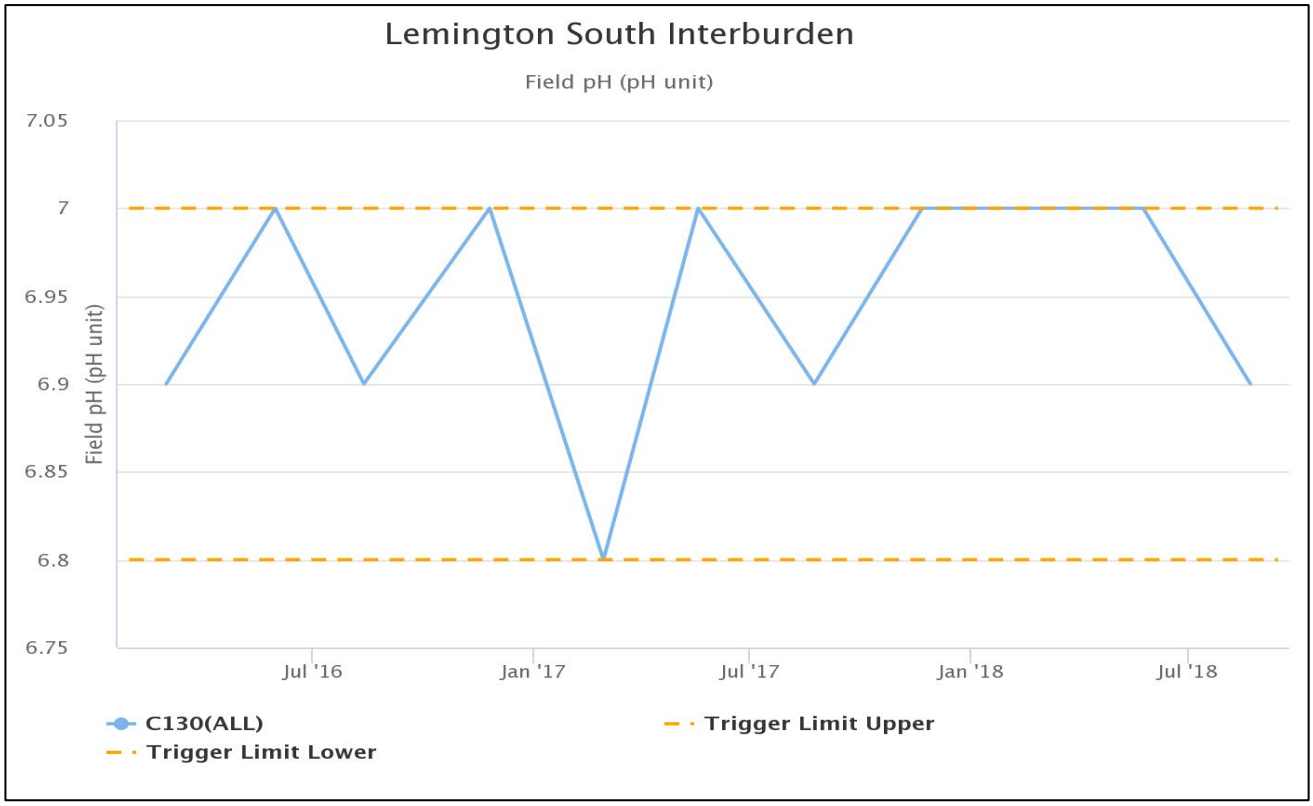


Figure 60: Lemington South Interburden pH Trend – September 2018

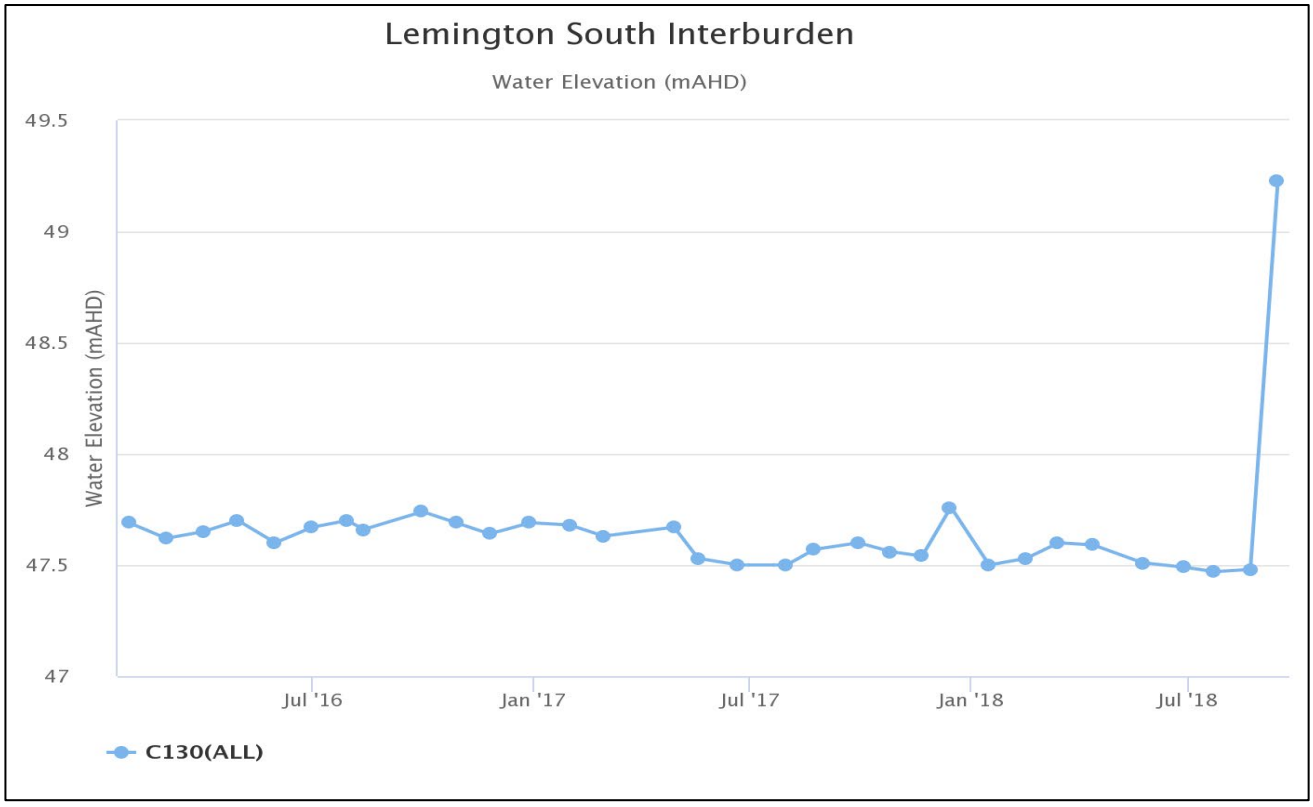


Figure 61: Lemington South Interburden Standing Water Level – September 2018

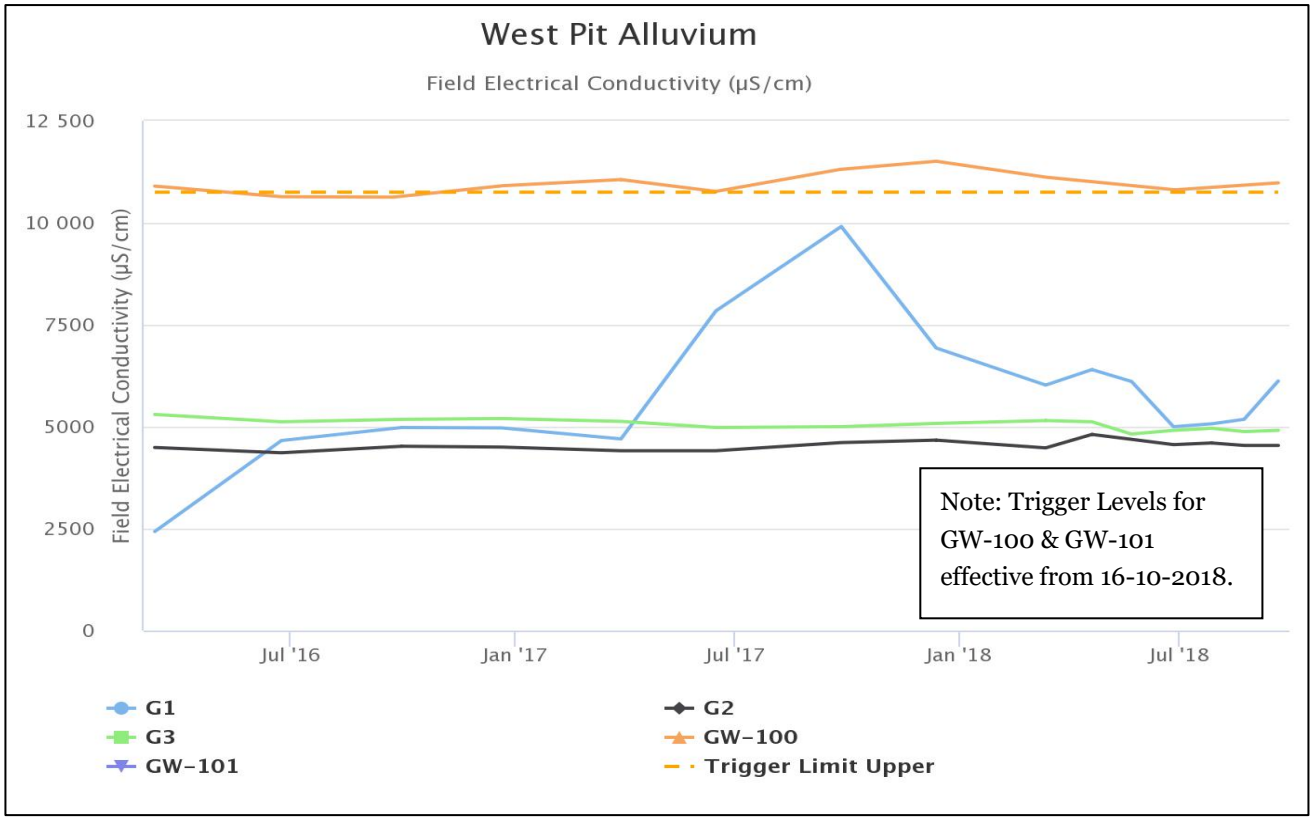


Figure 62: West Pit Alluvium Electrical Conductivity Trend – September 2018

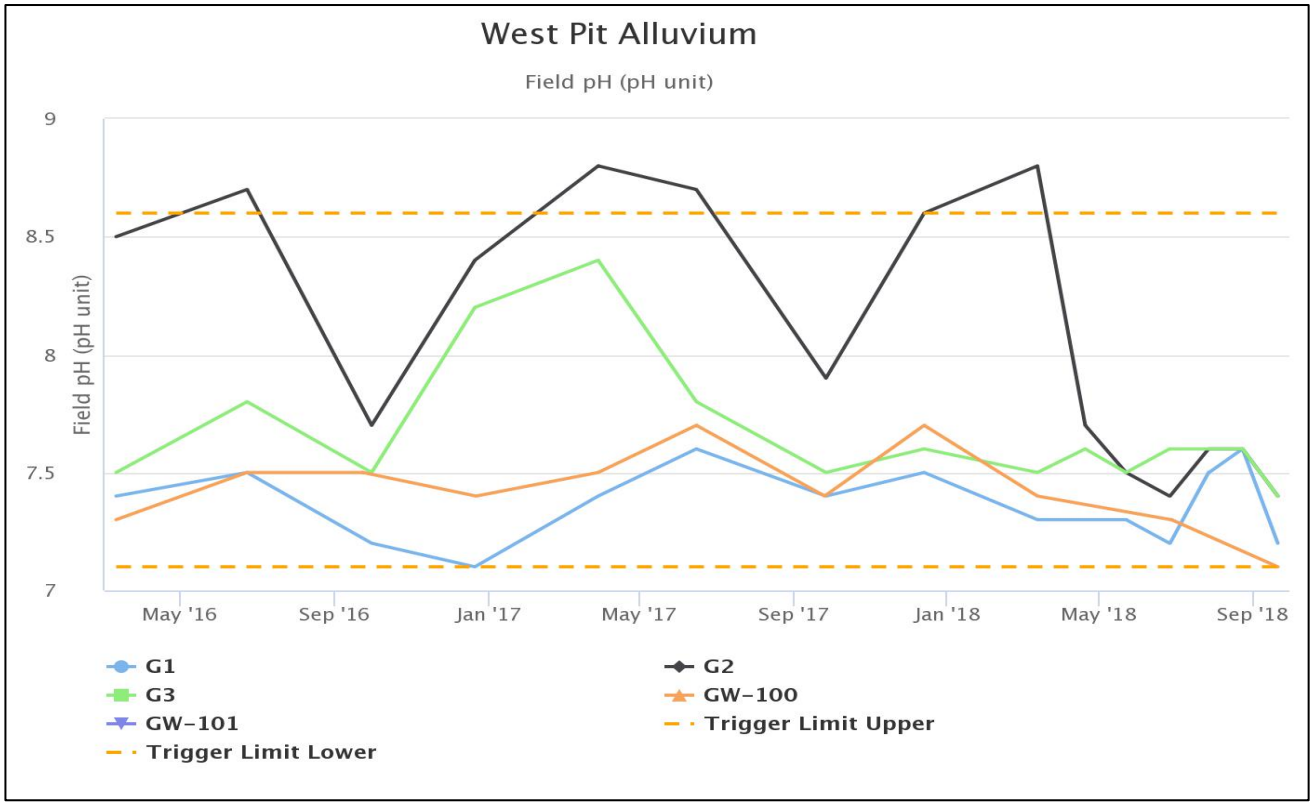


Figure 63: West Pit Alluvium pH Trend – September 2018

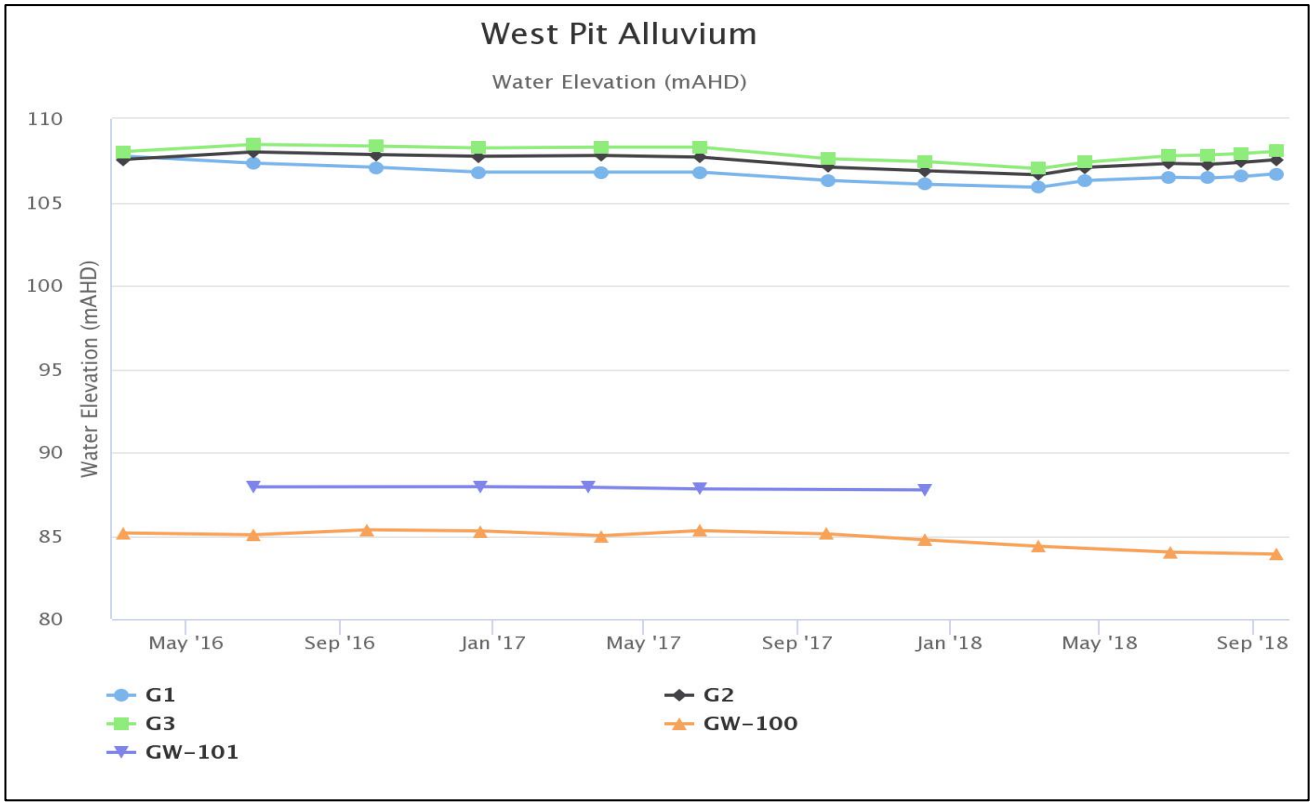


Figure 64: West Pit Alluvium Standing Water Level – September 2018

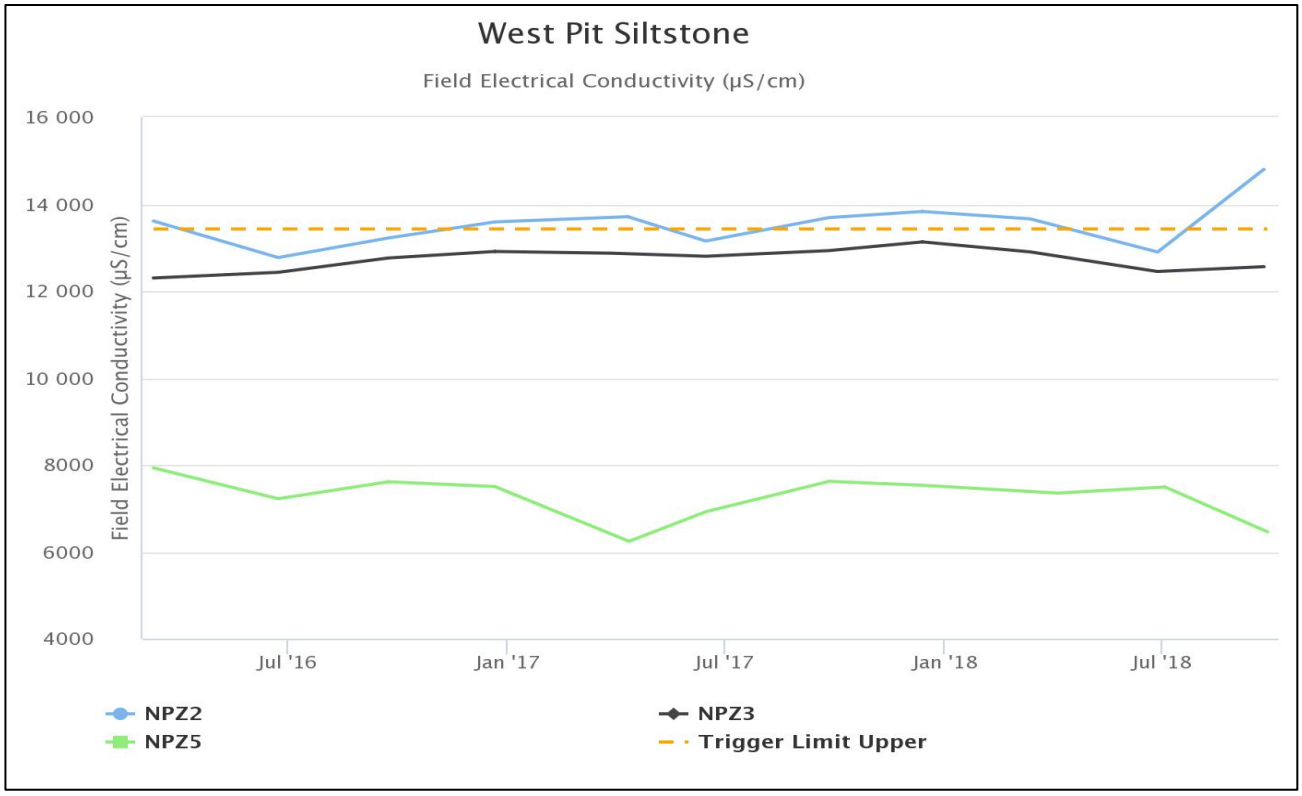


Figure 65: West Pit Siltstone Electrical Conductivity Trend – September 2018

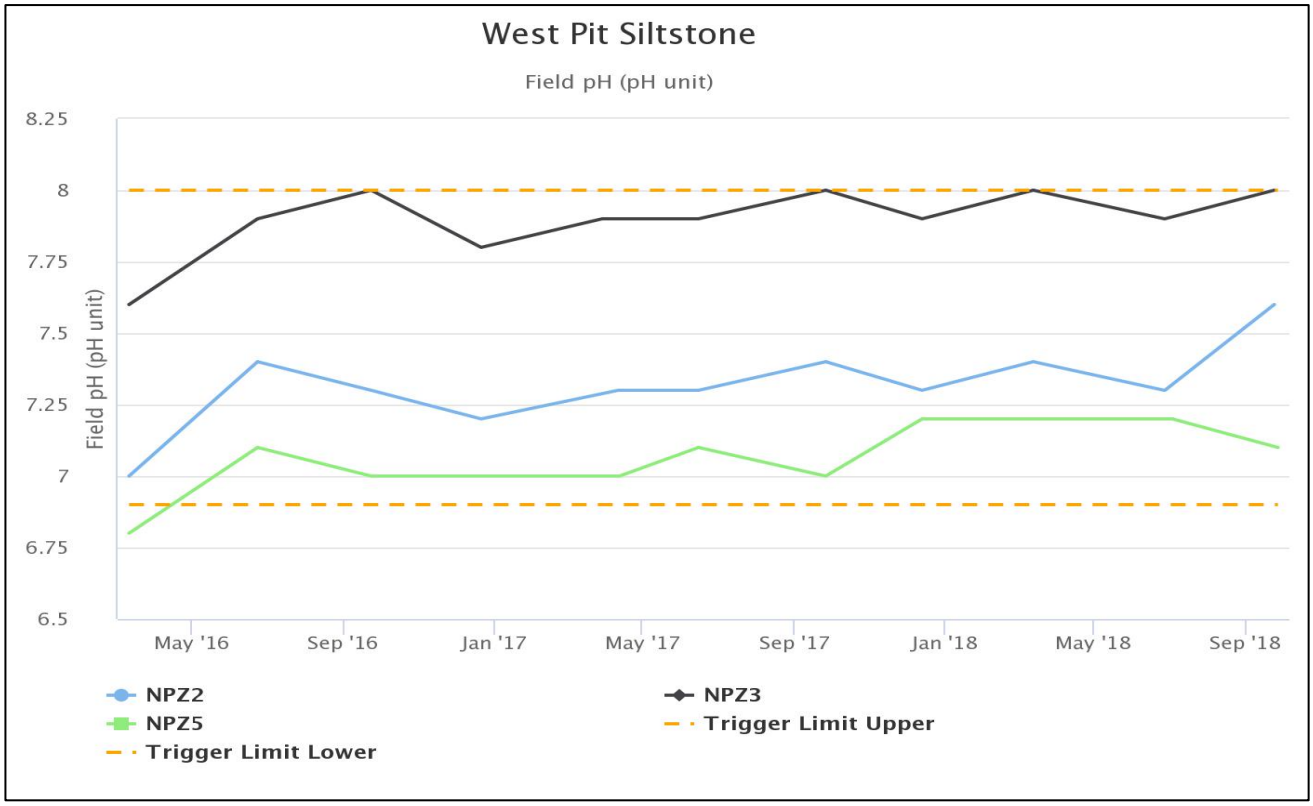


Figure 66: West Pit Siltstone pH Trend – September 2018

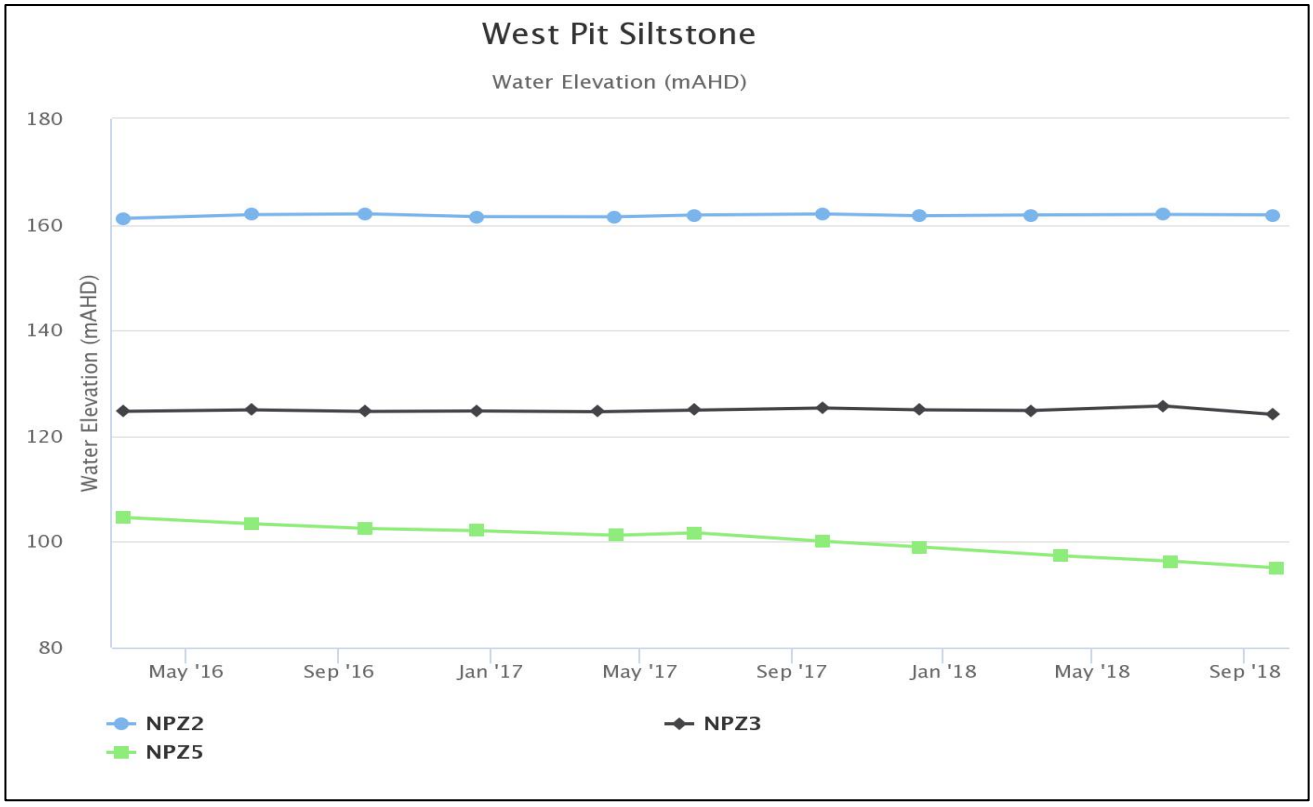


Figure 67: West Pit Siltstone Standing Water Level – September 2018

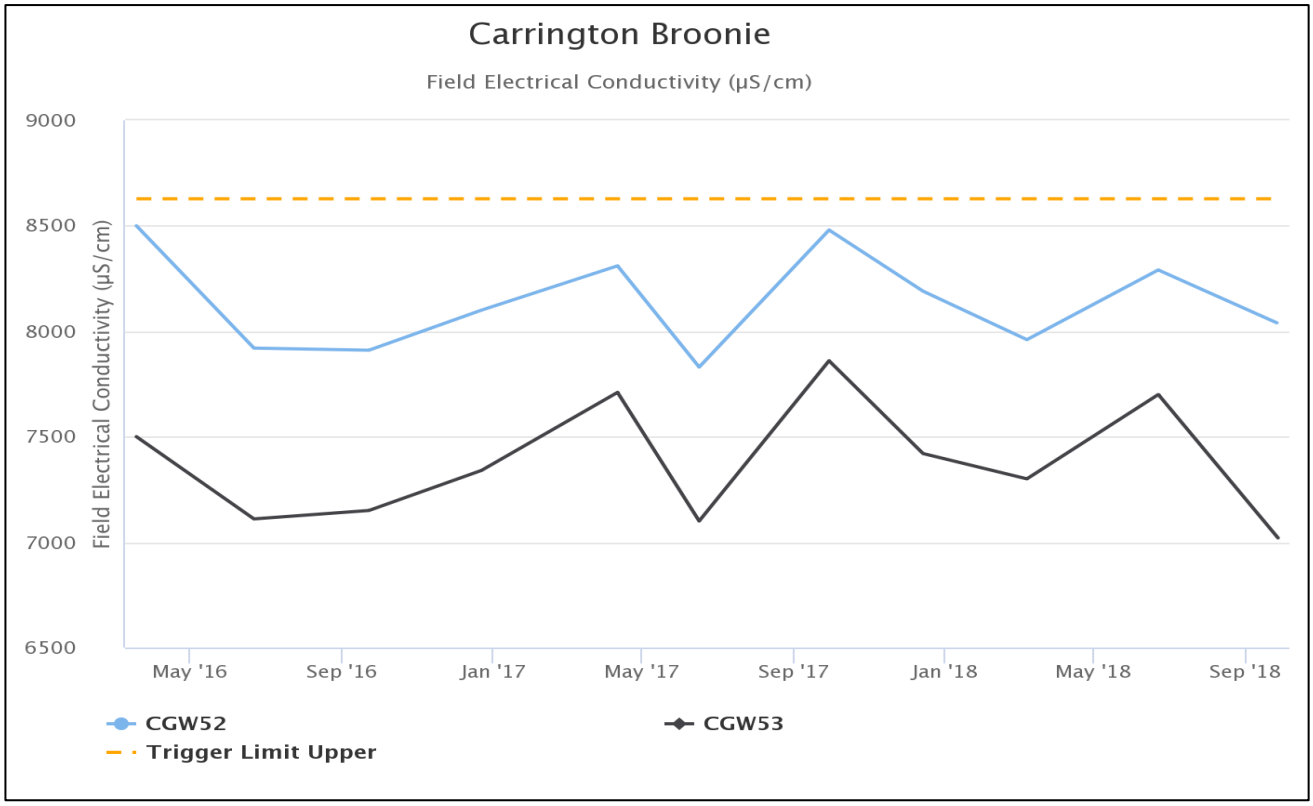


Figure 68: Carrington Broonie Electrical Conductivity Trend – September 2018

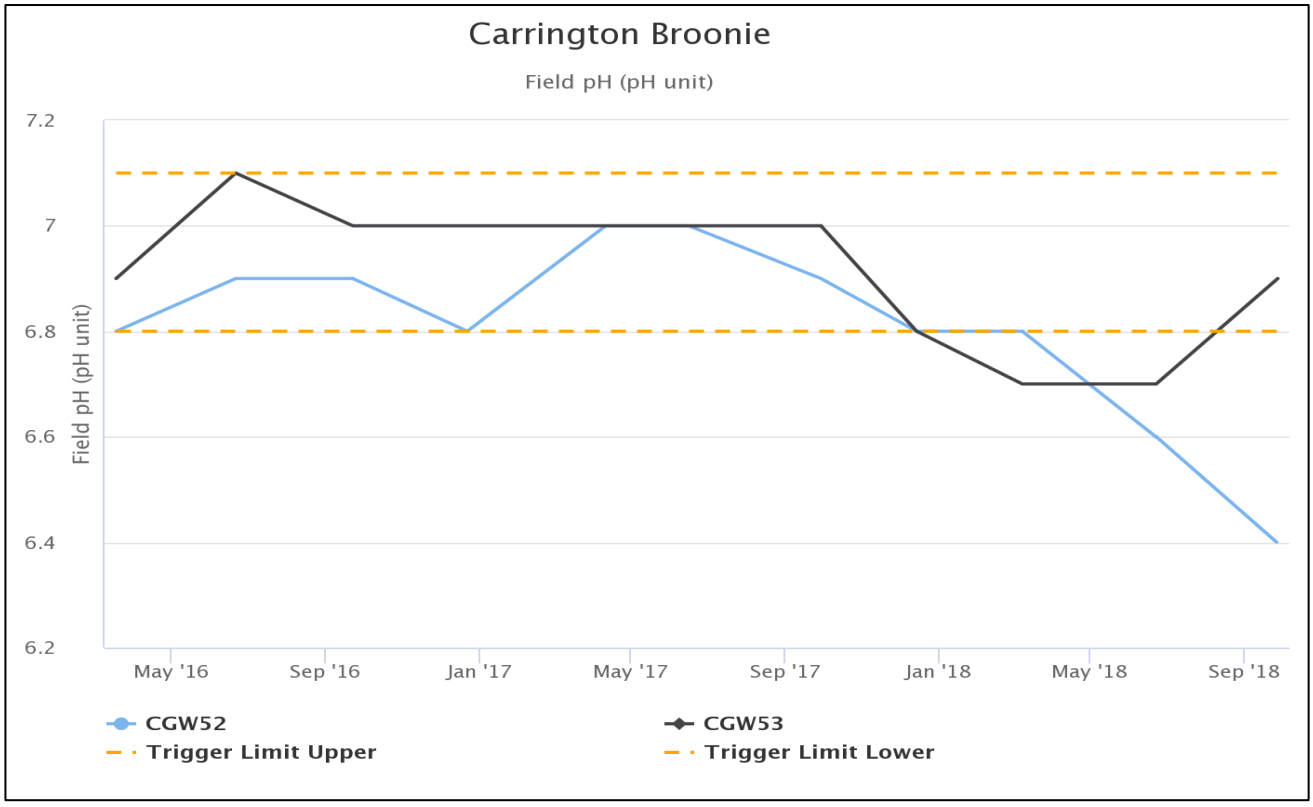


Figure 69: Carrington Broonie pH Trend – September 2018

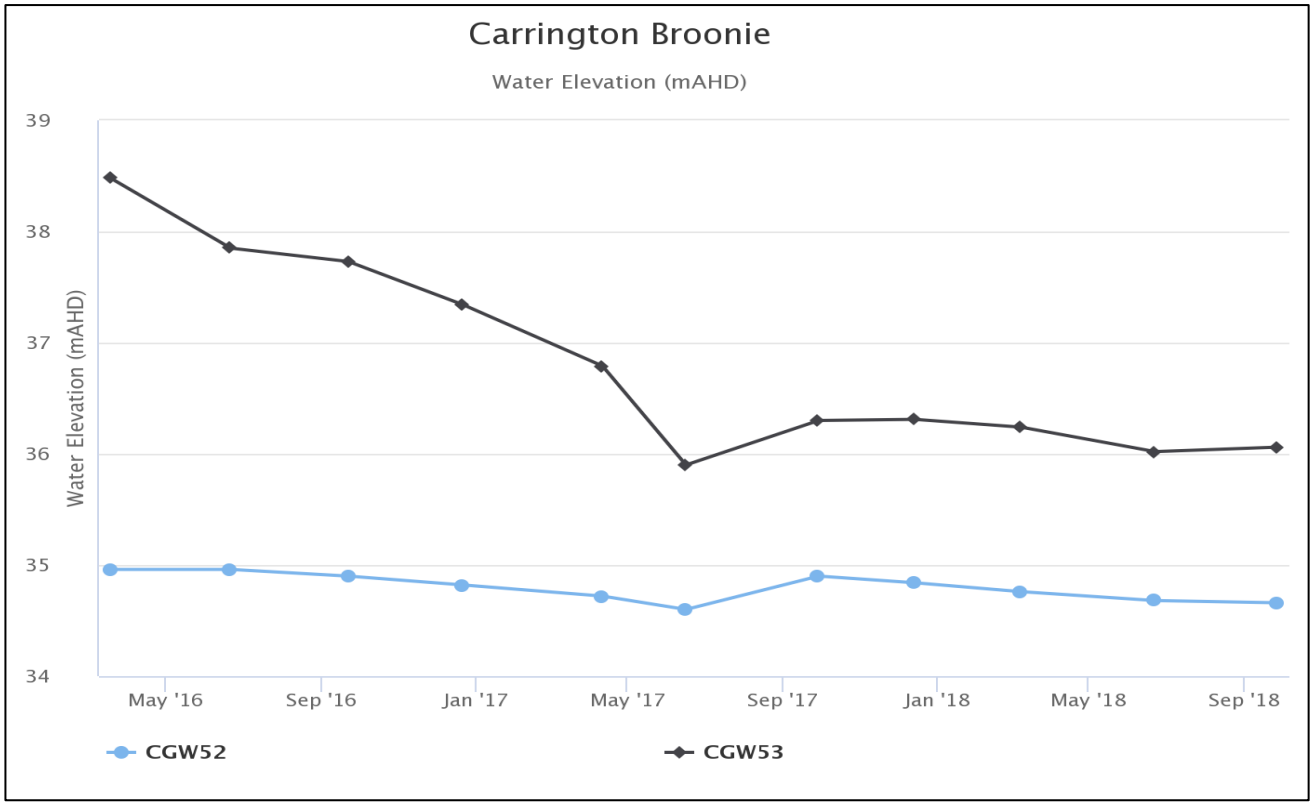


Figure 70: Carrington Broonie Standing Water Level – September 2018

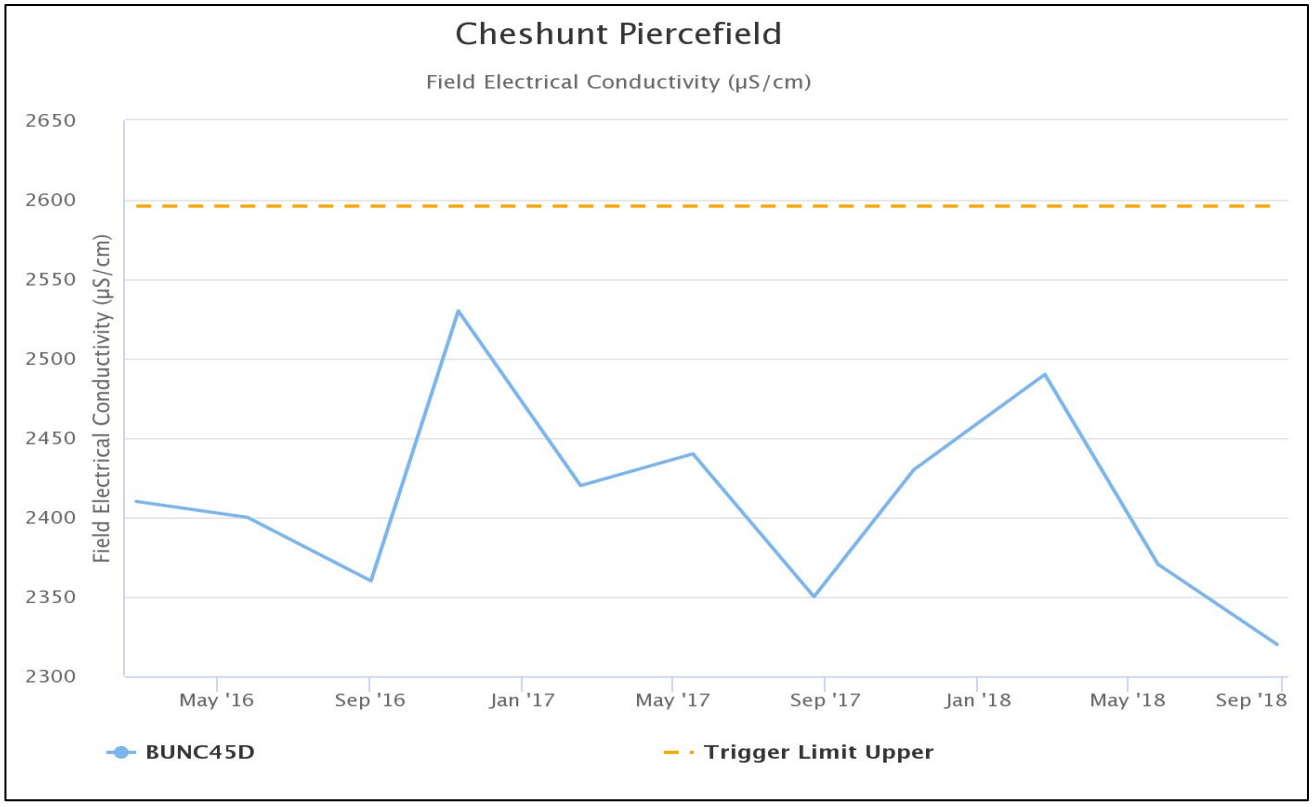


Figure 71: Cheshunt Piercefield Electrical Conductivity Trend – September 2018

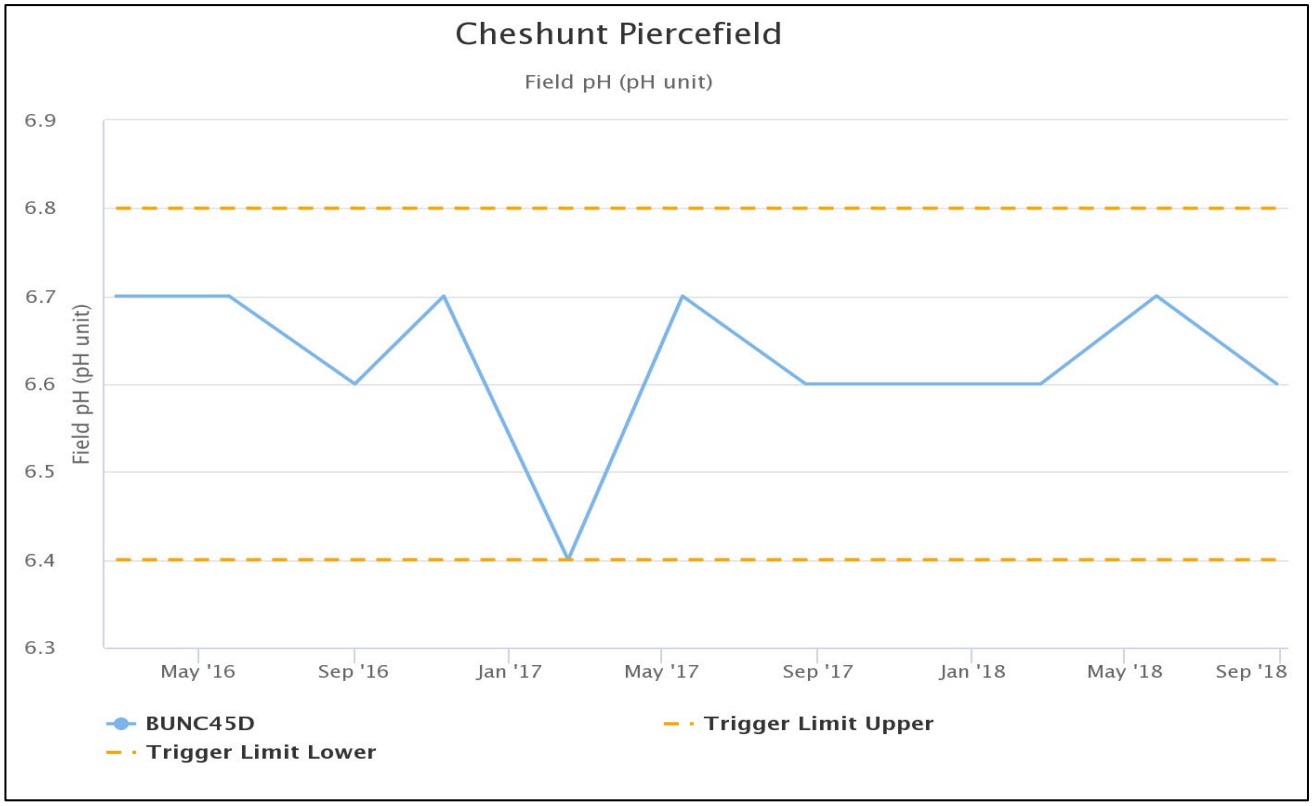


Figure 72: Cheshunt Piercefield pH Trend – September 2018

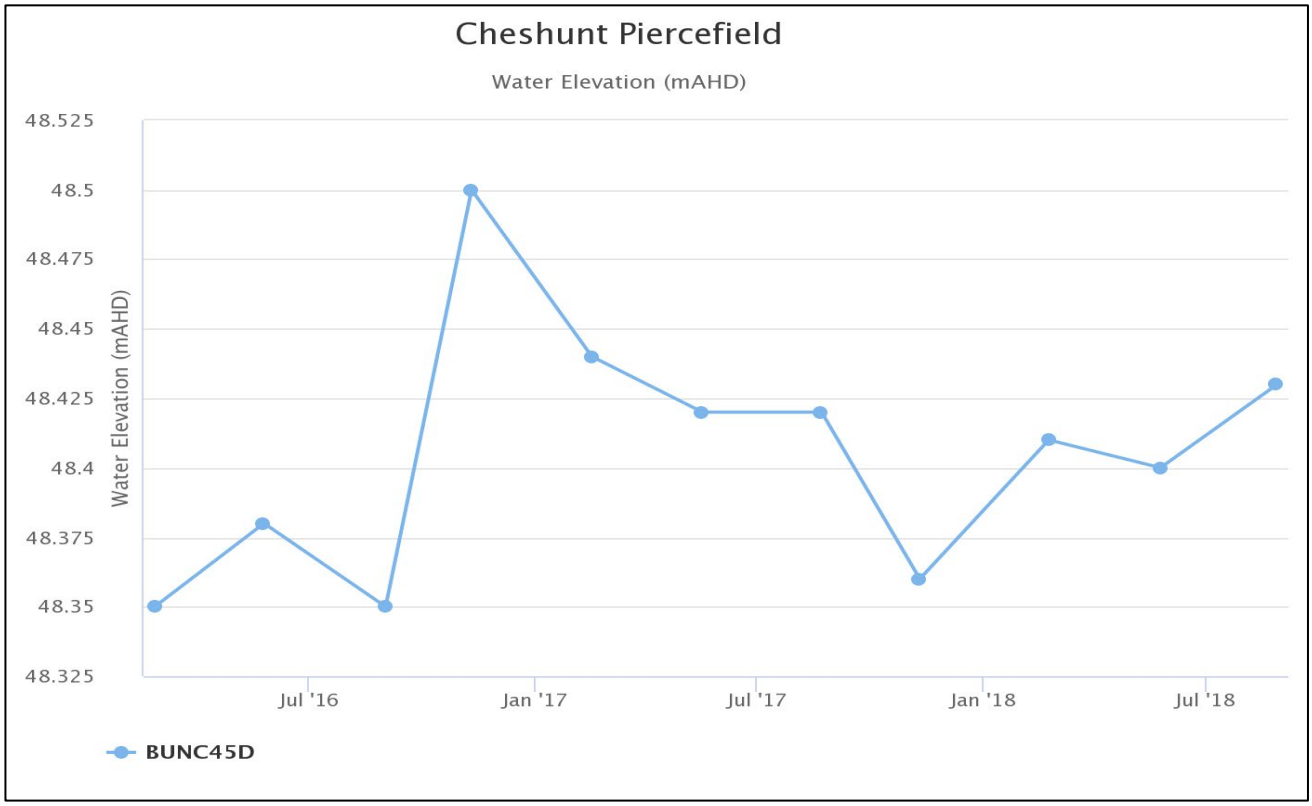


Figure 73: Cheshunt Piercefield Standing Water Level – September 2018

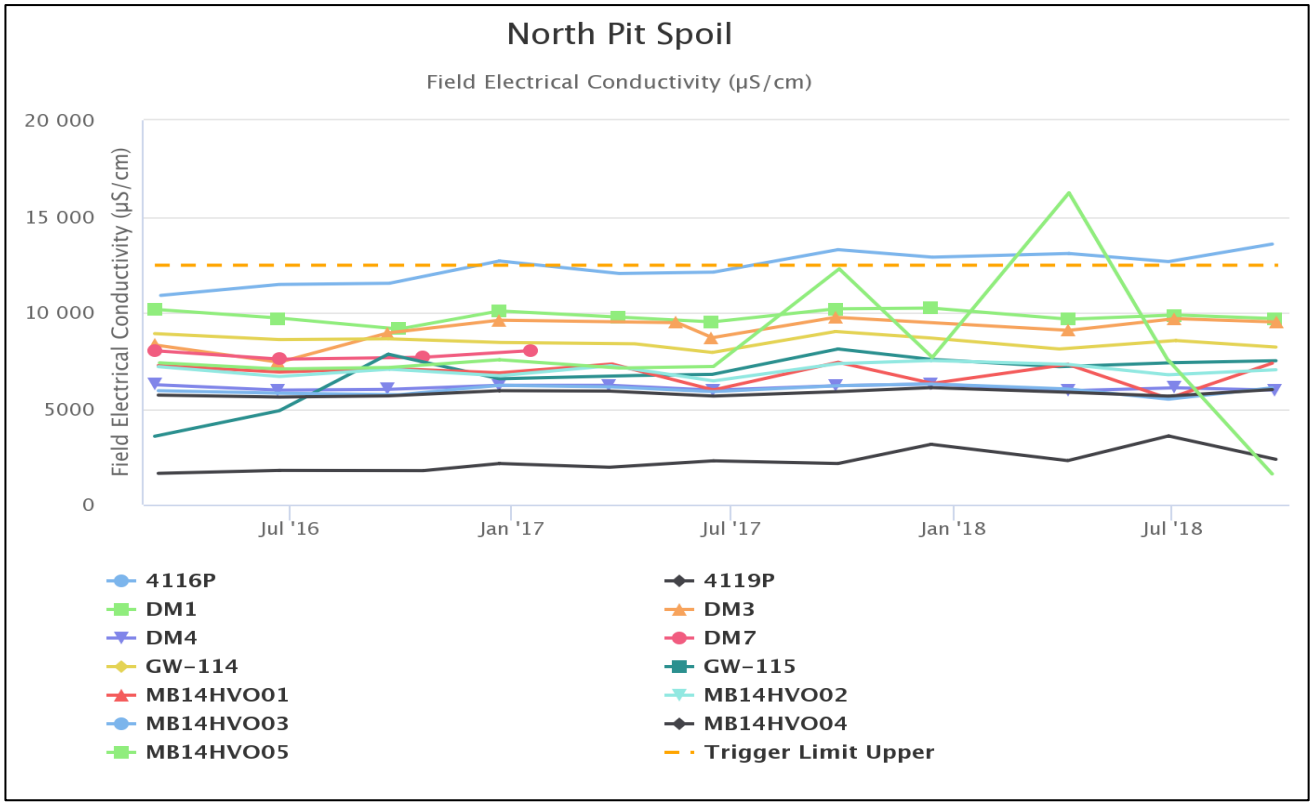


Figure 74: North Pit Spoil Electrical Conductivity Trend – September 2018

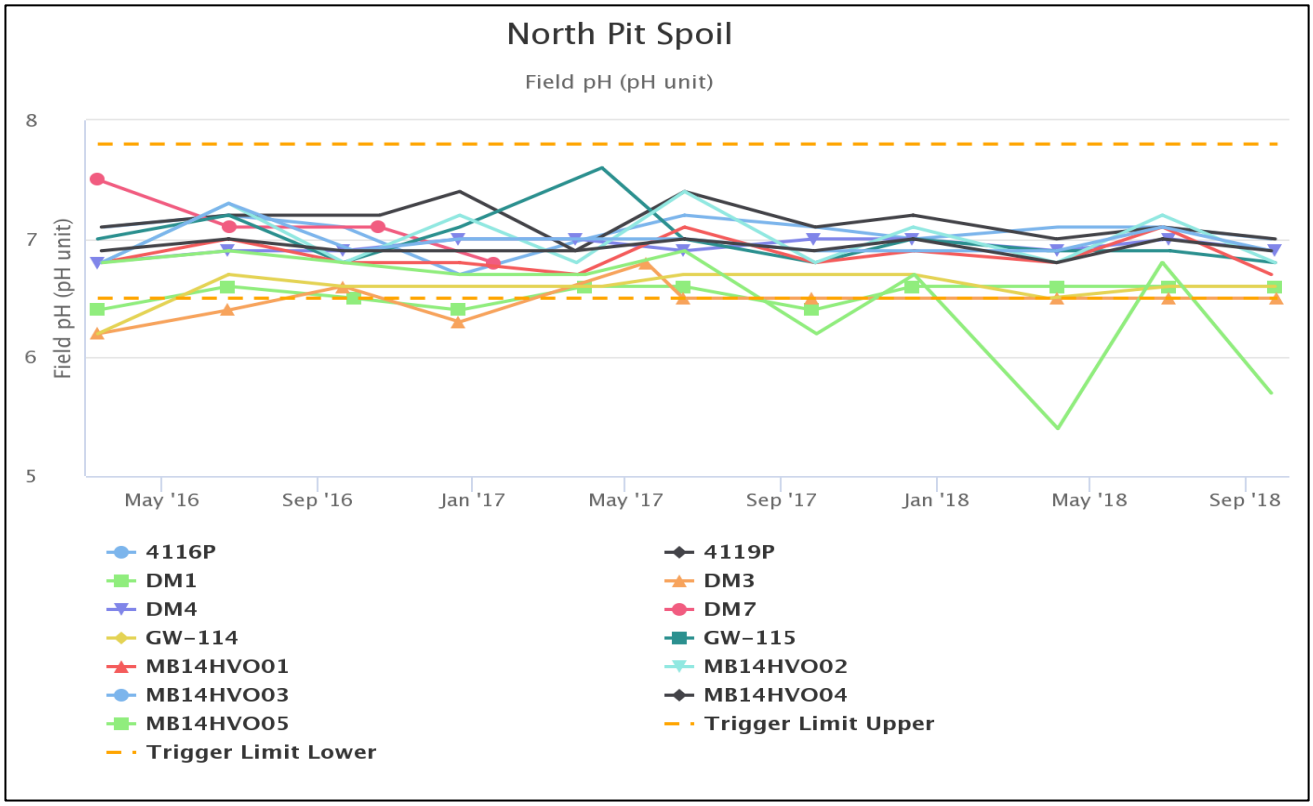


Figure 75: North Pit Spoil pH Trend – September 2018

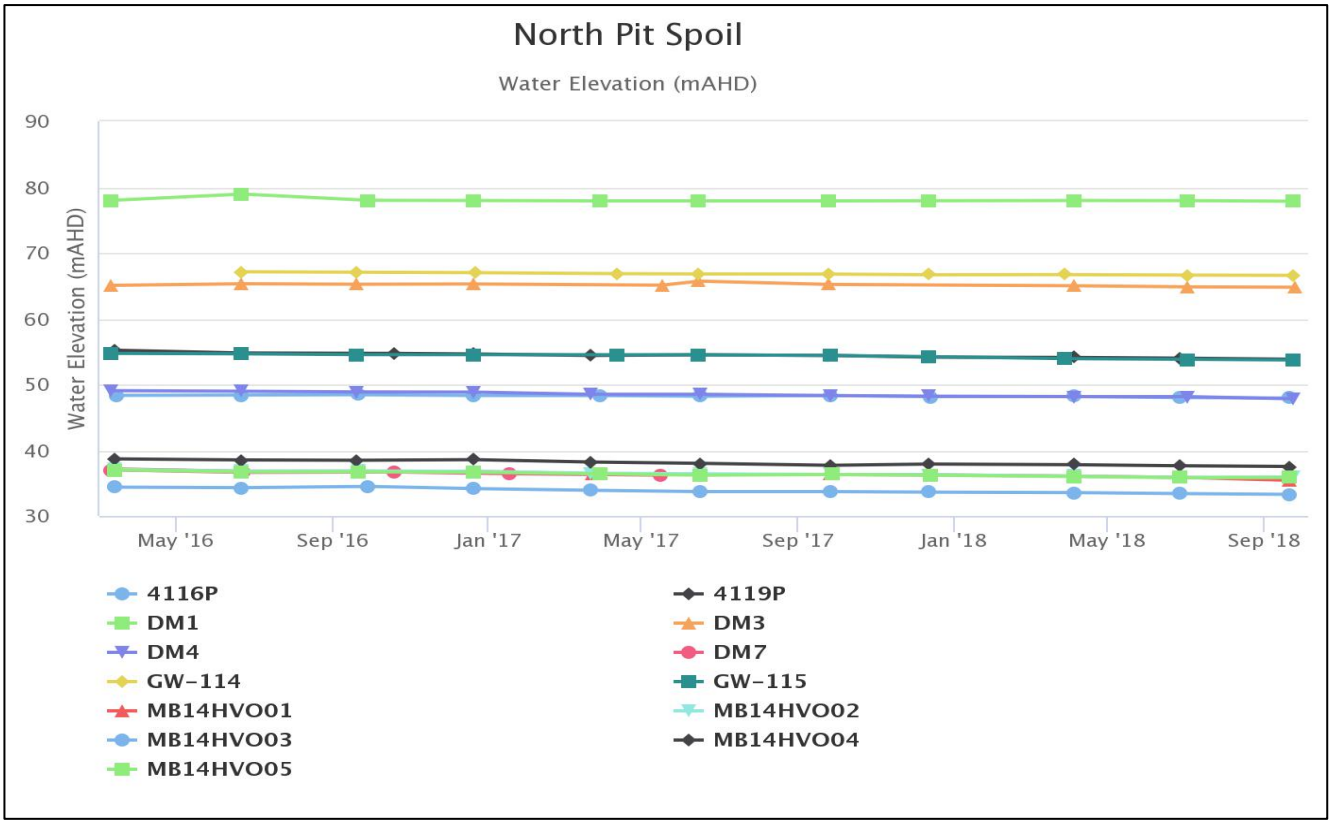


Figure 76: North Pit Spoil Standing Water Level – September 2018

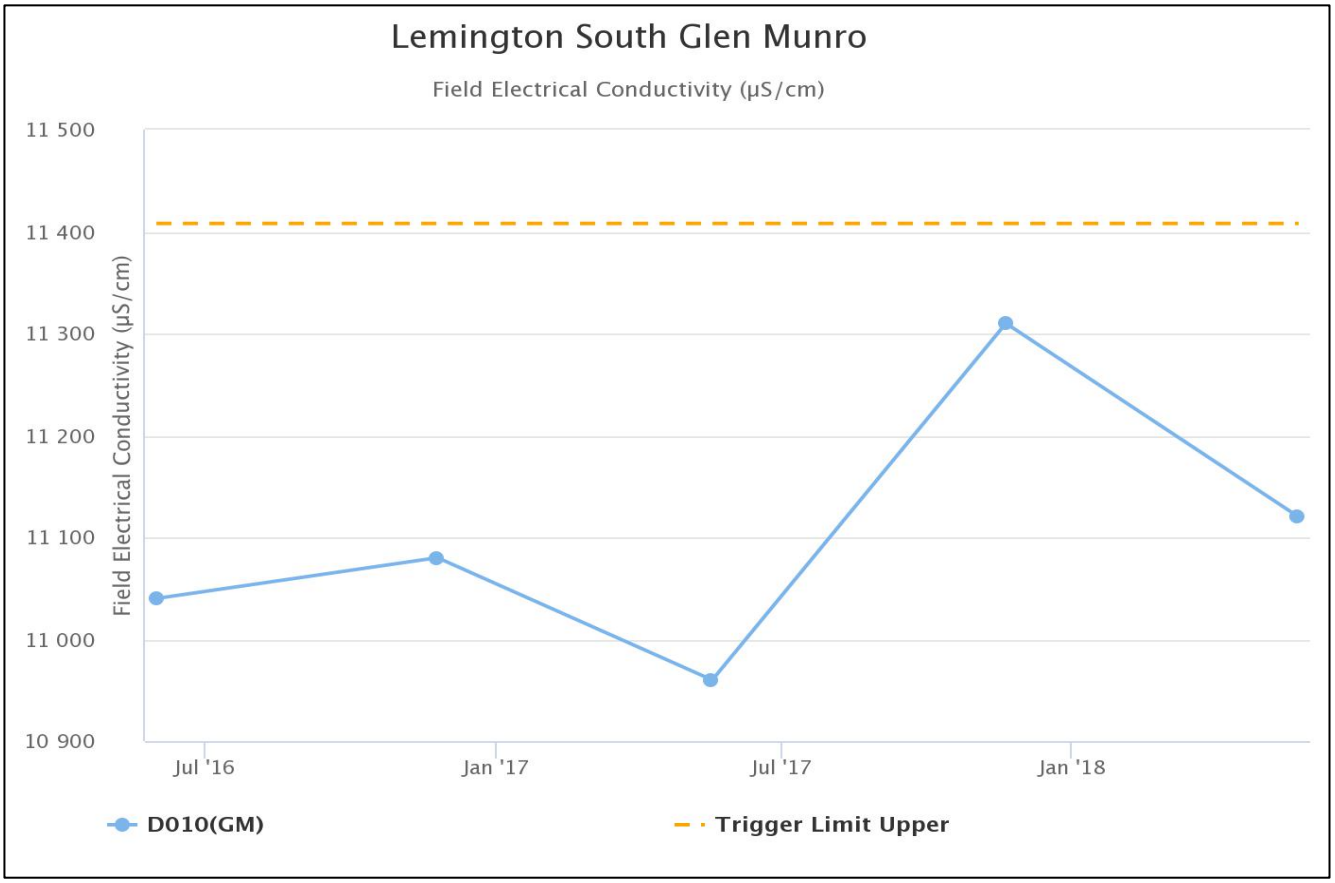


Figure 77: Lemington South Glen Munro EC September 2018

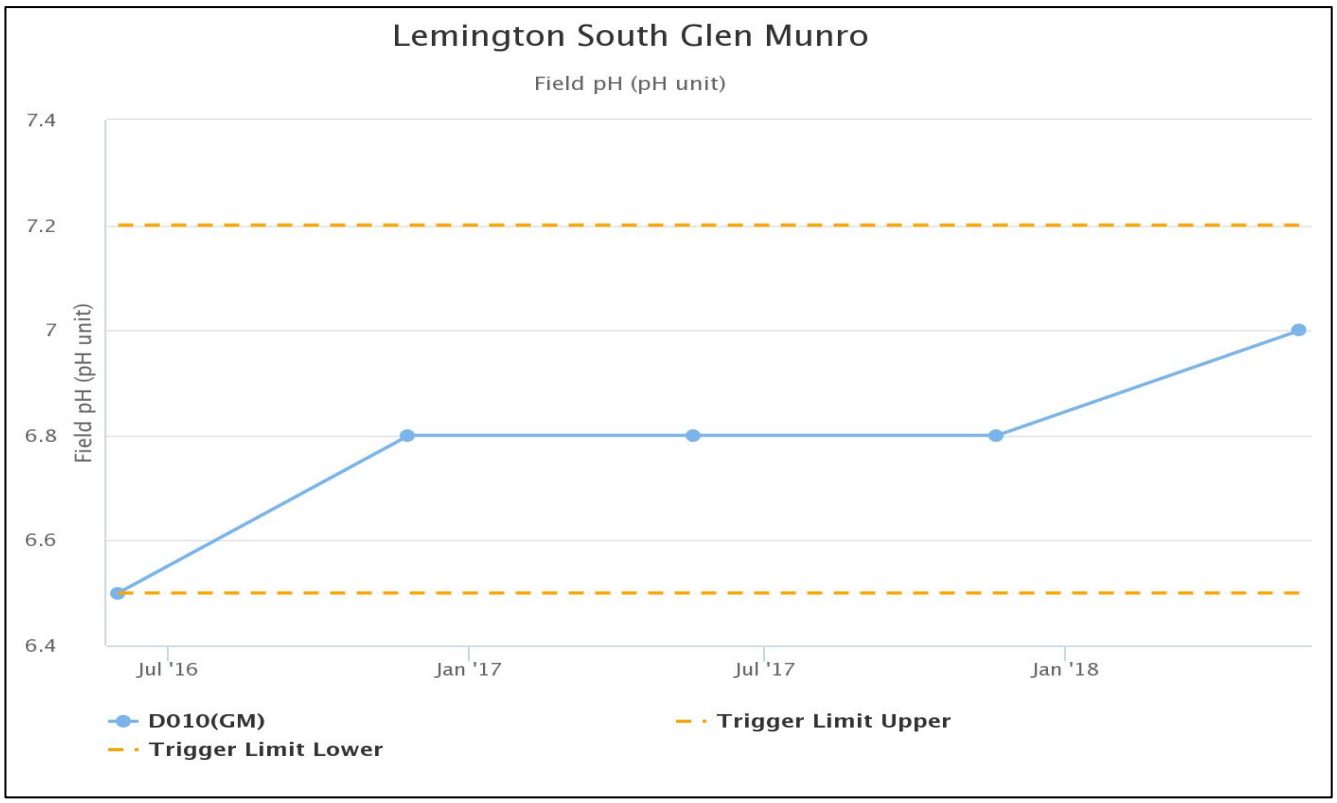


Figure 78: Lemington South Glen Munro pH - September 2018

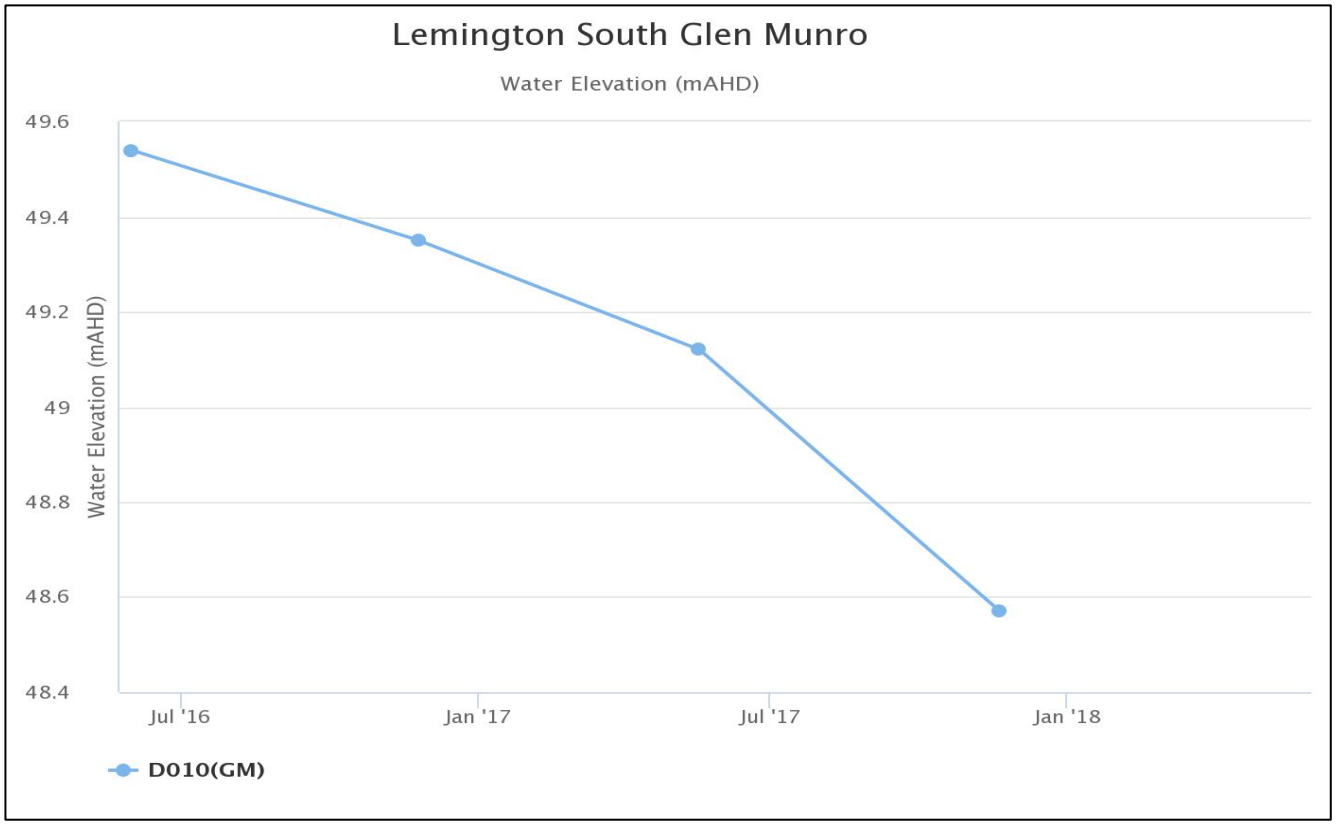


Figure 79: Lemington South Glen Munro Standing Water Level - September 2018

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.

Current internal trigger limits breaches are summarised in Table 4.

Table 4: Groundwater Triggers – Q3 2018

Site	Date	Trigger Limit Breached	Action Taken in Response
CFW55R	25/07/2018	EC – 95th Percentile	Investigation in progress.
CFW55R	01/08/2018	EC – 95th Percentile	
CFW55R	19/09/2018	EC – 95th Percentile	
CFW55R	25/07/2018	PH – 5th Percentile	Investigation in progress.
CFW55R	01/08/2018	PH – 5th Percentile	
CFW55R	19/09/2018	PH – 5th Percentile	
MB14HVO05	21/09/2018	pH – 5th Percentile	2nd consecutive exceedance. Watching Brief*
CGW52	26/09/2018	pH – 5th Percentile	1st exceedance. Watching Brief*
4116P	21/09/2018	EC – 95th Percentile	Investigation in progress
NPz2	24/09/2018	EC – 95th Percentile	Investigation in progress
NPz3	24/09/2018	pH – 95th Percentile	1st exceedance. Watching Brief*

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

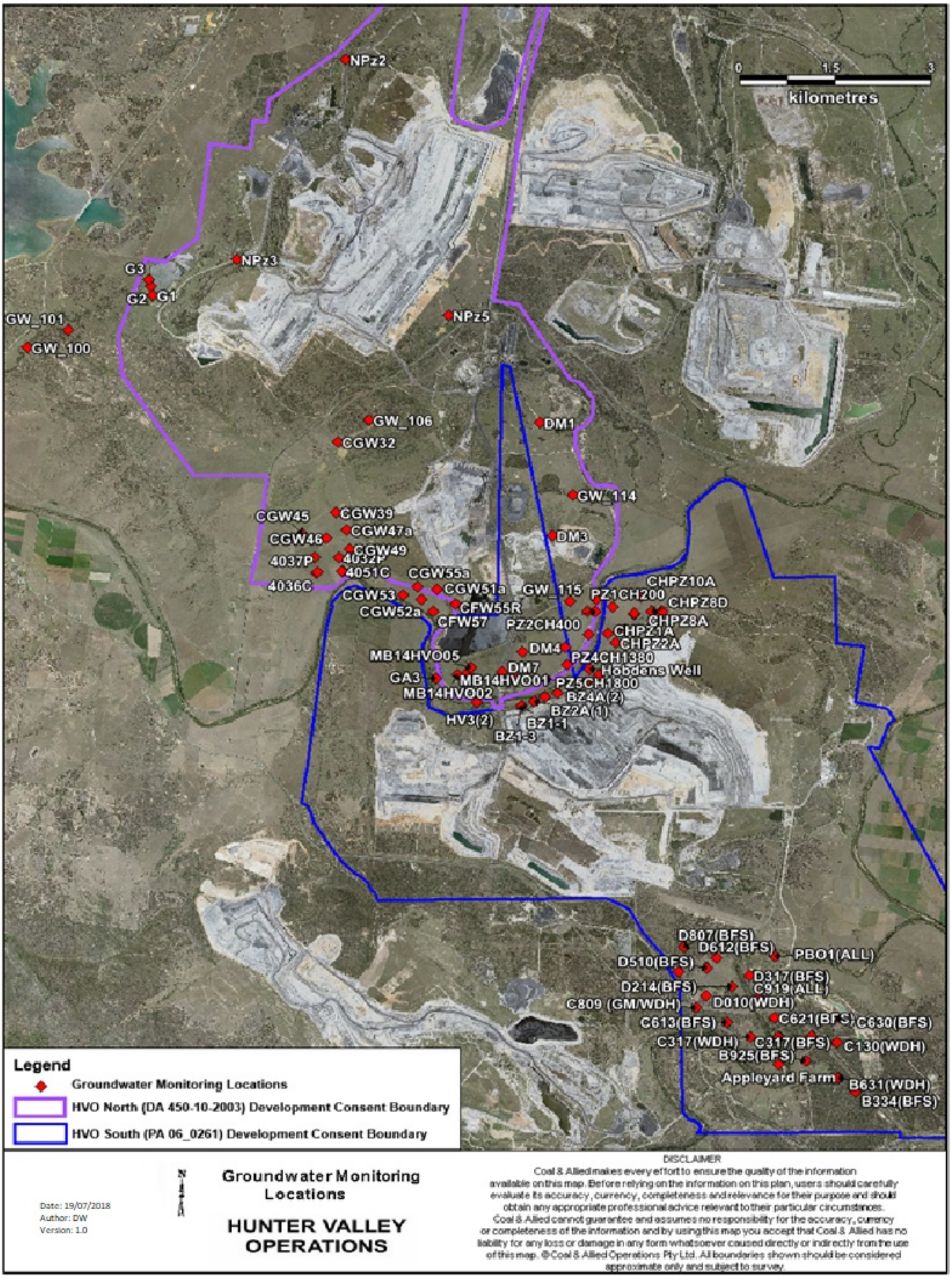


Figure 80: Groundwater Monitoring Location Plan

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 in Figure 83.

During September, 20 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 5.

Table 5: 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.

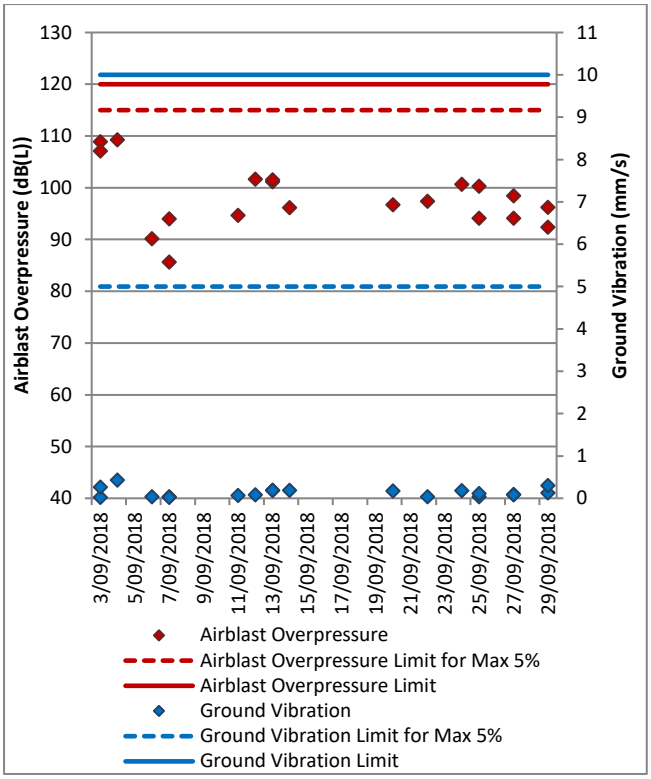


Figure 81: Moses Crossing Blast Monitoring Results – September 2018

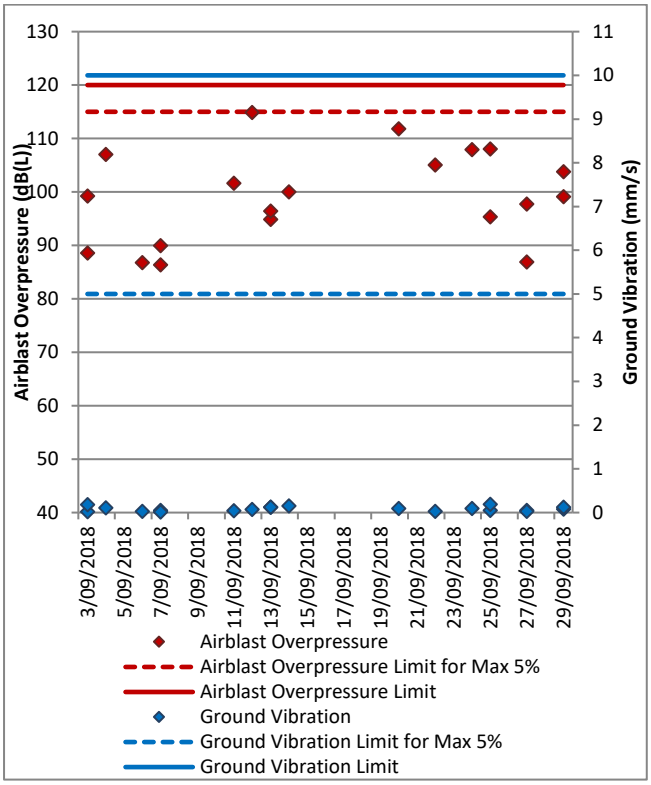


Figure 82: Jerrys Plains Blast Monitoring Results – September 2018

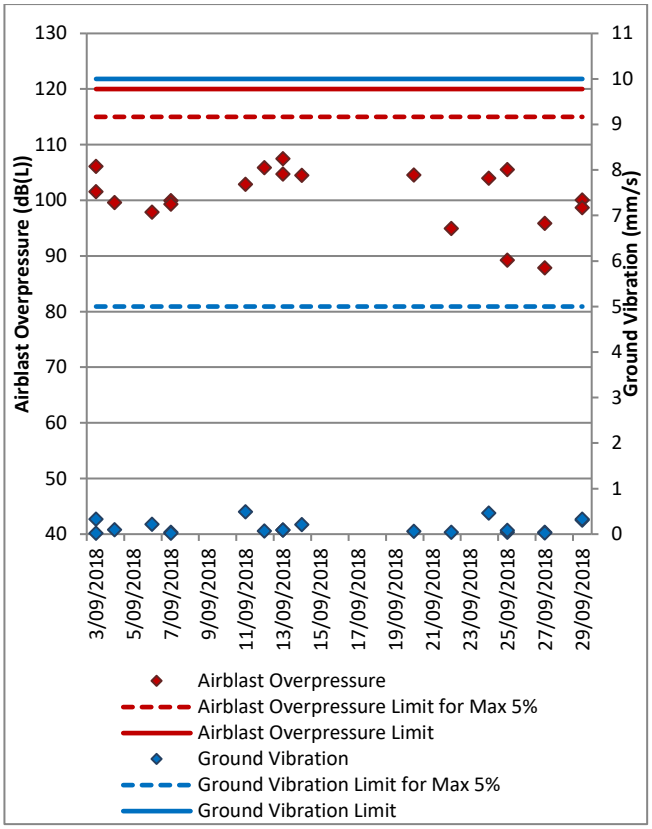


Figure 83: Maison Dieu Blast Monitoring Results – September 2018

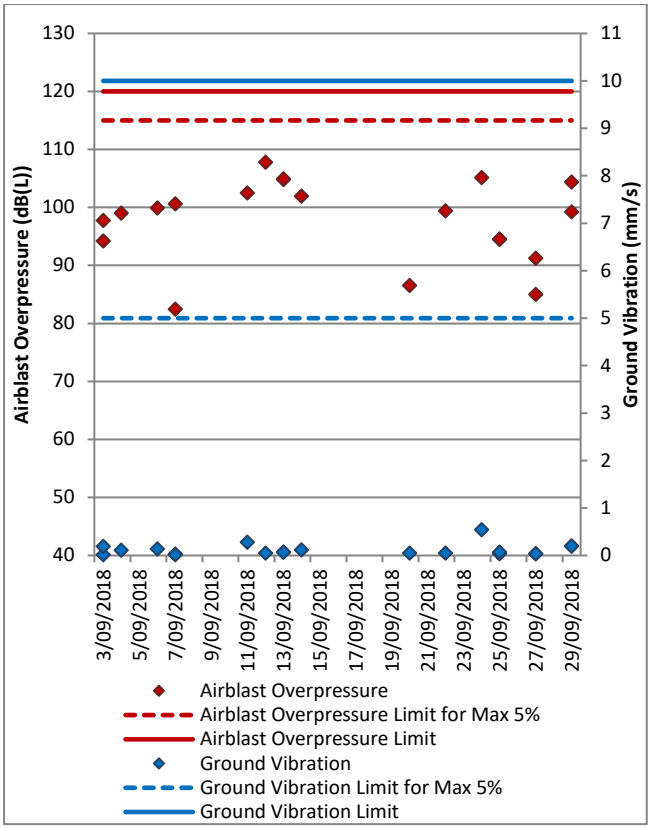


Figure 85: Knodlers Lane Blast Monitoring Results – September 2018

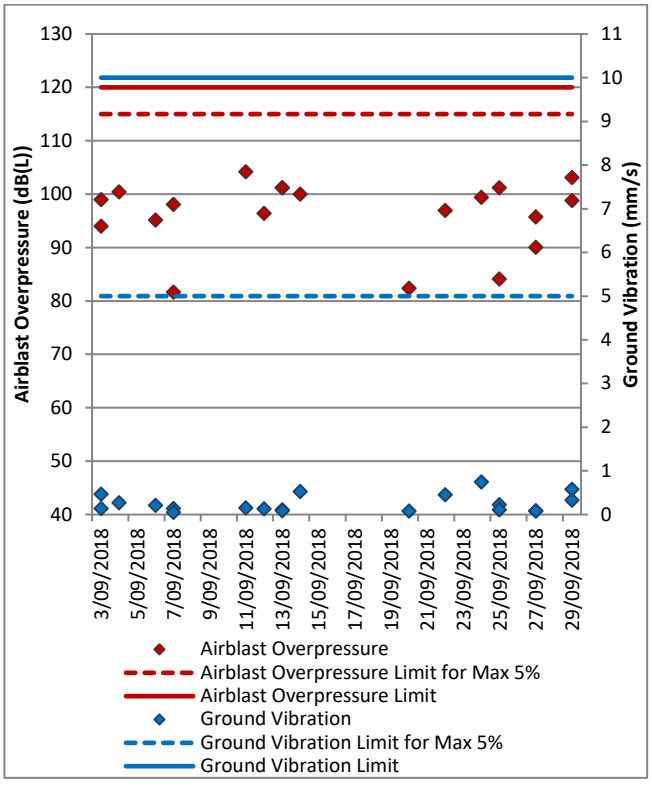


Figure 84: Warkworth Blast Monitoring Results – September 2018

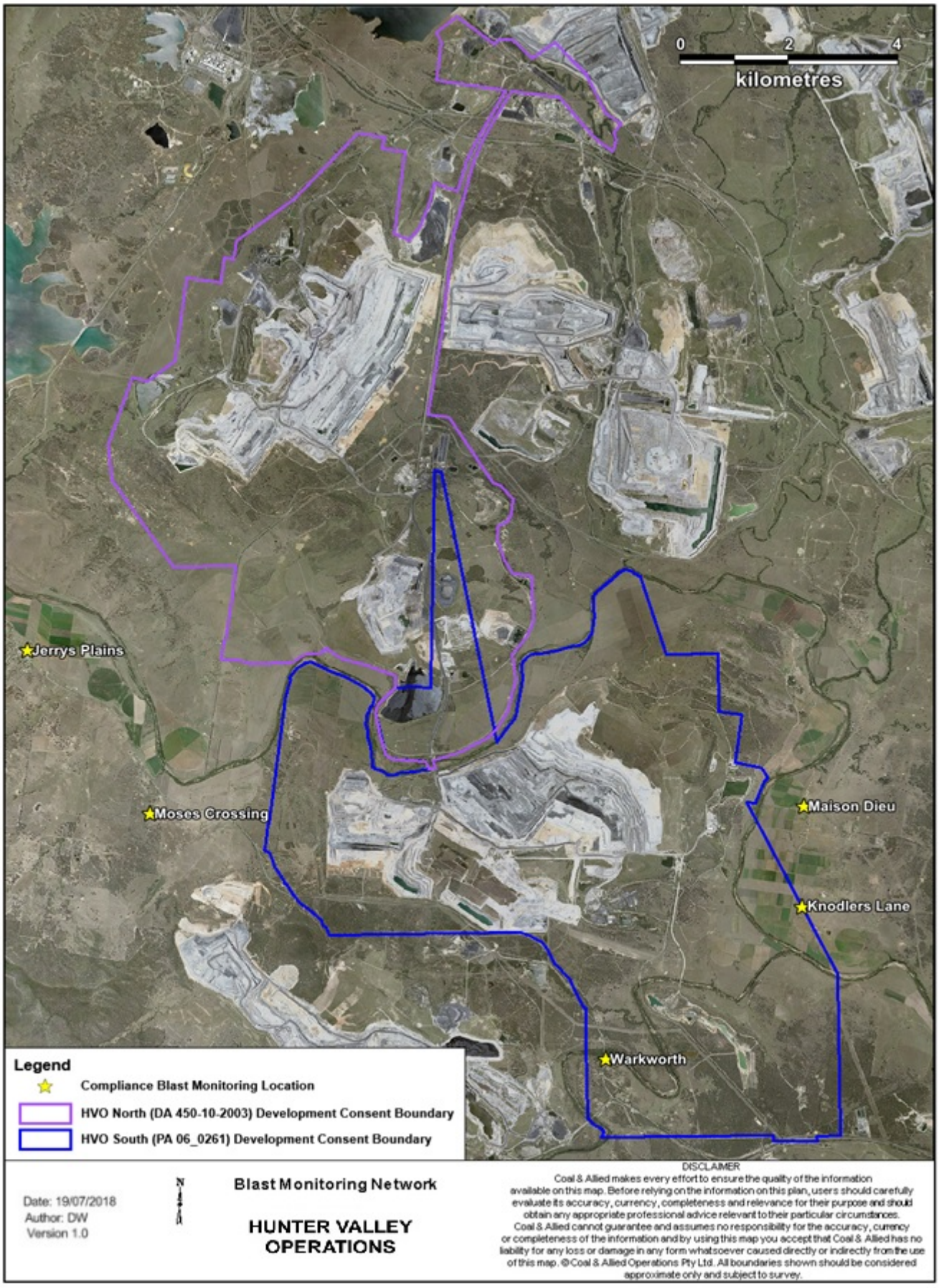


Figure 86: Blast Monitoring Location Plan

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 night shift of 5, 6 and 11 September 2018. Monitoring results are detailed in Table 6 to Table 11 . During the reporting period, there was one noise exceedance recorded. See section **10.0 Environmental Incidents** of this report for more information.

Table 6: $L_{Aeq,\ 15\ minute}$ HVO South - Impact Assessment Criteria – September 2018

Location	Date and Time	Wind Speed (m/s)[1]	VTG[1]	Criterion dB (A)	Criterion Applies?[2]	HVO South L_{Aeq} dB3[3,4]	Exceedance[4,5]
Knodlers Lane	6/09/2018 1:36	2.4	-1	37	Yes	IA	Nil
Maison Dieu	6/09/2018 0:51	2.4	0.5	37	Yes	<25	Nil
Shearers Lane	6/09/2018 1:13	2.4	0.5	41	Yes	IA	Nil
Kilburnie South	5/09/2018 23:59	2.3	0.5	36	Yes	NM	Nil
Jerrys Plains Village	5/09/2018 21:26	3.7	0.5	35	No	IA	NA
Jerrys Plains Village[6]	5/09/2018 22:31	3.8	0.5	35	No	IA	NA
Jerrys Plains Village[7]	11/09/2018 21:53	3	0.5	35	No	IA	NA
Jerrys East	5/09/2018 21:02	4.2	-1	35	No	IA	NA
Long Point	5/09/2018 21:00	3	0.5	35	No	IA	NA
HVGC	6/09/2018 0:53	2.3	0.5	55	Yes	31	Nil
Redmanvale Road	5/09/2018 23:03	2.7	-1	35	Yes	<25	Nil
Jerrys Plains West	5/09/2018 22:06	3.6	0.5	35	No	IA	NA

Notes:
1. Atmospheric data is sourced from the HVO Cheshunt or HVO Corp. weather station using logged meteorological data;
2. Assumed noise emission limits (see Section 2.2 of this report for more information) 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). Criterion may or may not apply due to rounding of meteorological data values;
3. Estimated or measured LAeq,15minute atributed to HVO South Pit Area;
4. Bold results in red indicate exceedance of criteria;
5. NA in exceedance column means atmospheric conditions outside specifed in approval and so criterion is not applicable;
6. Re-measure; and
7. Follow-up Monitoring.

Table 7: $L_{Aeq,\ 15\ minute}$ HVO South - Land Acquisition Criteria – September 2018

Location	Date and Time	Wind Speed (m/s)[1]	VTG[1]	Criterion dB (A)	Criterion Applies?[2]	HVO South L_{Aeq} dB[3,4]	Exceedance[4,5]
Knodlers Lane	6/09/2018 1:36	2.4	-1	41	Yes	IA	Nil
Maison Dieu	6/09/2018 0:51	2.4	0.5	41	Yes	<25	Nil
Shearers Lane	6/09/2018 1:13	2.4	0.5	41	Yes	IA	Nil
Kilburnie South	5/09/2018 23:59	2.3	0.5	41	Yes	NM	Nil
Jerrys Plains Village	5/09/2018 21:26	3.7	0.5	40	No	IA	NA
Jerrys Plains Village[6]	5/09/2018 22:31	3.8	0.5	40	No	IA	NA
Jerrys Plains Village[7]	11/09/2018 21:53	3	0.5	40	No	IA	NA
Jerrys East	5/09/2018 21:02	4.2	-1	40	No	IA	NA
Long Point	5/09/2018 21:00	3	0.5	40	No	IA	NA
HVGC	6/09/2018 0:53	2.3	0.5	NA	NA	31	NA
Redmanvale Road	5/09/2018 23:03	2.7	-1	40	Yes	<25	Nil
Jerrys Plains West	5/09/2018 22:06	3.6	0.5	40	No	IA	NA

Notes:
1. Atmospheric data is sourced from the HVO Cheshunt or HVO Corp. weather station using logged meteorological data;
2. Assumed noise emission limits (see Section 2.2 of this report for more information) 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). Criterion may or may not apply due to rounding of meteorological data values;
3. Estimated or measured LAeq,15minute atributed to HVO South Pit Area;
4. Bold results in red indicate exceedance of criteria;
5. NA in exceedance column means atmospheric conditions outside specifed in approval and so criterion is not applicable;
6. Re-measure; and
7. Follow-up Monitoring.

Table 8: $L_{A1,\ 1minute}$ HVO South - Impact Assessment Criteria – September 2018

Location	Date and Time	Wind Speed (m/s)[1]	VTG[1]	Criterion dB (A)	Criterion Applies?[2]	HVO South $L_{A1,\ 1min}$ dB[3,4]	Exceedance[4,5]
Knodlers Lane	6/09/2018 1:36	2.4	-1	45	Yes	IA	Nil
Maison Dieu	6/09/2018 0:51	2.4	0.5	45	Yes	<25	Nil
Shearers Lane	6/09/2018 1:13	2.4	0.5	45	Yes	IA	Nil
Kilburnie South	5/09/2018 23:59	2.3	0.5	45	Yes	40	Nil
Jerrys Plains Village	5/09/2018 21:26	3.7	0.5	45	No	IA	NA
Jerrys Plains Village[6]	5/09/2018 22:31	3.8	0.5	45	No	IA	NA
Jerrys Plains Village[7]	11/09/2018 21:53	3	0.5	45	No	IA	NA
Jerrys East	5/09/2018 21:02	4.2	-1	45	No	IA	NA
Long Point	5/09/2018 21:00	3	0.5	45	No	IA	NA
HVGC	6/09/2018 0:53	2.3	0.5	NA	NA	34	NA
Redmanvale Road	5/09/2018 23:03	2.7	-1	45	Yes	30	Nil
Jerrys Plains West	5/09/2018 22:06	3.6	0.5	45	No	IA	NA

Notes:
1. Atmospheric data is sourced from the HVO Cheshunt or HVO Corp. weather station using logged meteorological data;
2. Assumed noise emission limits (see Section 2.2 of this report for more information) 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). Criterion may or may not apply due to rounding of meteorological data values;
3. These are results for HVO South Pit Area in the absence of all other noise sources;
4. Bold results in red indicate exceedance of criteria;
5. NA in exceedance column means atmospheric conditions outside specifed in approval and so criterion is not applicable;
6. Re-measure; and
7. Follow-up Monitoring.

.

Table 9: $L_{Aeq,\ 15minute}$ HVO North – Impact Assessment Criteria – September 2018

Location	Date and Time	Wind Speed (m/s)[1]	VTG[1]	Criterion dB (A)	Criterion Applies?[2]	HVO North L_{Aeq} dB[3,4]	Exceedance[4,5]
Knodlers Lane	6/09/2018 1:36	0.3	0.5	35	Yes	IA	Nil
Maison Dieu	6/09/2018 0:51	0.9	-1	35	Yes	IA	Nil
Shearers Lane	6/09/2018 1:13	0.4	-1	35	Yes	IA	Nil
Kilburnie South	5/09/2018 23:59	1.5	0.5	39	Yes	<35	Nil
Jerrys Plains Village	5/09/2018 21:26	2.6	-1	36	Yes	**39[6]**	**3[6]**
Jerrys Plains Village[7]	5/09/2018 22:31	2	0.5	36	Yes	34	Nil
Jerrys Plains Village[8]	11/09/2018 21:53	1.1	-1	36	Yes	34	Nil
Jerrys East	5/09/2018 21:02	4	-1	39	No	35	NA
Long Point	5/09/2018 21:00	3	0.5	35	Yes	IA	Nil
HVGC	6/09/2018 0:53	0.4	-1	NA	NA	IA	NA
Redmanvale Road	5/09/2018 23:03	0.5	35	Yes	<30	Nil	Nil
Jerrys Plains West	5/09/2018 22:06	3	-1	35	Yes	31	Nil

Notes:
1. Atmospheric data is sourced from the HVO Corporate or HVO Corp. weather station using logged meteorological data;
2. 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. Criterion may or may not apply due to rounding of meteorological data values;
3. Estimated or measured LAeq,15minute attributed to HVO North Pit Area;
4. Bold results in red indicate exceedance of criteria;
5. NA in exceedance column means atmospheric conditions outside specified in approval and so criterion is not applicable;
6. Includes low-frequency penalty;
7. Re-measure; and
8. Follow-up monitoring.

Table 10: $L_{Aeq,15minute}$ HVO North - Land Acquisition Criteria – September 2018

Location	Date and Time	Wind Speed (m/s)[1]	VTG[1]	Criterion dB (A)	Criterion Applies?[2]	HVO North L_{Aeq} dB[3,4]	Exceedance[4,5]
Knodlers Lane	6/09/2018 1:36	0.3	0.5	41	Yes	IA	Nil
Maison Dieu	6/09/2018 0:51	0.9	-1	41	Yes	IA	Nil
Shearers Lane	6/09/2018 1:13	0.4	-1	41	Yes	IA	Nil
Kilburnie South	5/09/2018 23:59	1.5	0.5	41	Yes	<35	Nil
Jerrys Plains Village	5/09/2018 21:26	2.6	-1	41	Yes	39	Nil
Jerrys Plains Village[6]	5/09/2018 22:31	2	0.5	41	Yes	34	Nil
Jerrys Plains Village[7]	11/09/2018 21:53	1.1	-1	41	Yes	34	Nil
Jerrys East	5/09/2018 21:02	4	-1	41	No	35	NA
Long Point	5/09/2018 21:00	3	0.5	41	Yes	IA	Nil
HVGC	6/09/2018 0:53	0.4	-1	NA	NA	IA	NA
Redmanvale Road	5/09/2018 23:03	2.2	0.5	41	Yes	<30	Nil
Jerrys Plains West	5/09/2018 22:06	3	-1	41	Yes	31	Nil

Notes:
1. Atmospheric data is sourced from the HVO Corporate or HVO Corp. weather station using logged meteorological data;
2. 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. Criterion may or may not apply due to rounding of

meteorological data values;
3. Estimated or measured LAeq,15minute attributed to HVO North Pit Area;
4. Bold results in red indicate exceedance of criteria;
5. NA in exceedance column means atmospheric conditions outside specified in approval and so criterion is not applicable;
6. Re-measure; and
7.. Follow-up monitoring.

Table 11: $L_{A1,\ 1Minute}$ HVO North - Impact Assessment Criteria – September 2018

Location	Date and Time	Wind Speed (m/s)[1]	VTG[1]	Criterion dB (A)	Criterion Applies?[2]	HVO North $L_{A1,\ 1min}$ dB[3,4]	Exceedance[4,5]
Knodlers Lane	6/09/2018 1:36	0.3	0.5	46	Yes	IA	Nil
Maison Dieu	6/09/2018 0:51	0.9	-1	46	Yes	IA	Nil
Shearers Lane	6/09/2018 1:13	0.4	-1	46	Yes	IA	Nil
Kilburnie South	5/09/2018 23:59	1.5	0.5	46	Yes	38	Nil
Jerrys Plains Village	5/09/2018 21:26	2.6	-1	46	Yes	45	Nil
Jerrys Plains Village[4]	5/09/2018 22:31	2	0.5	46	Yes	39	Nil
Jerrys Plains Village[5]	11/09/2018 21:53	1.1	-1	46	Yes	44	Nil
Jerrys East	5/09/2018 21:02	4	-1	46	No	39	NA
Long Point	5/09/2018 21:00	3	0.5	46	Yes	IA	Nil
HVGC	6/09/2018 0:53	0.4	-1	NA	NA	IA	NA
Redmanvale Road	5/09/2018 23:03	2.2	0.5	46	Yes	<30	Nil
Jerrys Plains West	5/09/2018 22:06	3	-1	46	Yes	39	Nil

Notes:
1. Atmospheric data is sourced from the HVO Corporate or MTW Charlton Ridge weather station using logged meteorological data;
2. 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. Criterion may or may not apply due to rounding of
meteorological data values;
3. These are results for HVO North Pit Area in the absence of all other noise sources;
4. Bold results in red indicate exceedance of criteria; and
5. NA in exceedance column means atmospheric conditions outside specifed in approval and so criterion is not applicable;
6. Re-measure; and
7. Follow-up monitoring.

5.2 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. During September 2018 no measurements required the penalty to be applied. The assessment for low frequency noise is shown in Table 11.

Table 12: Low Frequency Noise Assessment – September 2018

Location	Date and Time	Measured Site Only LA_{eq} dB (Sth/Nth)	Site Only LC_{eq} dB[1] (Sth/Nth)	Site Only LC_{eq}-LA_{eq} dB [1,2] (Sth/Nth)	Result Max exceedance of ref spectrum dB[1,3] (Sth/Nth)	Penalty dB(A)[1]
Knodlers Lane	6/09/2018 1:36	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA
Maison Dieu	6/09/2018 0:51	<25/IA	NA/NA	NA/NA	NA/NA	NA/NA
Shearers Lane	6/09/2018 1:13	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA
Kilburnie South	5/09/2018 23:59	NM/<35	NA/NA	NA/NA	NA/NA	NA/NA
Jerrys Plains Village	5/09/2018 21:26	IA/37	NA/54	NA/17	NA/1	NA/2

Jerrys Plains Village[4]	5/09/2018 22:31	IA/34	NA/52	NA/18	NA/Nil	NA/Nil
Jerrys Plains Village[5]	11/09/2018 21:53	IA/34	NA/52	NA/18	NA/Nil	NA/Nil
Jerrys East	5/09/2018 21:02	IA/35	NA/NA	NA/NA	NA/NA	NA/NA
Long Point	5/09/2018 21:00	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA
HVGC	6/09/2018 0:53	31/IA	49/NA	18/NA	Nil/NA	Nil/NA
Redmanvale Road	5/09/2018 23:03	<25/<30	NA/NA	NA/NA	NA/NA	NA/NA
Jerrys Plains West	5/09/2018 22:06	IA/31	NA/51	NA/20	NA/Nil	NA/Nil

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 as detailed in Sections 2.4 and 3.3 of this report; 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;
4. Re-measure; and
5. Follow-up measurement.

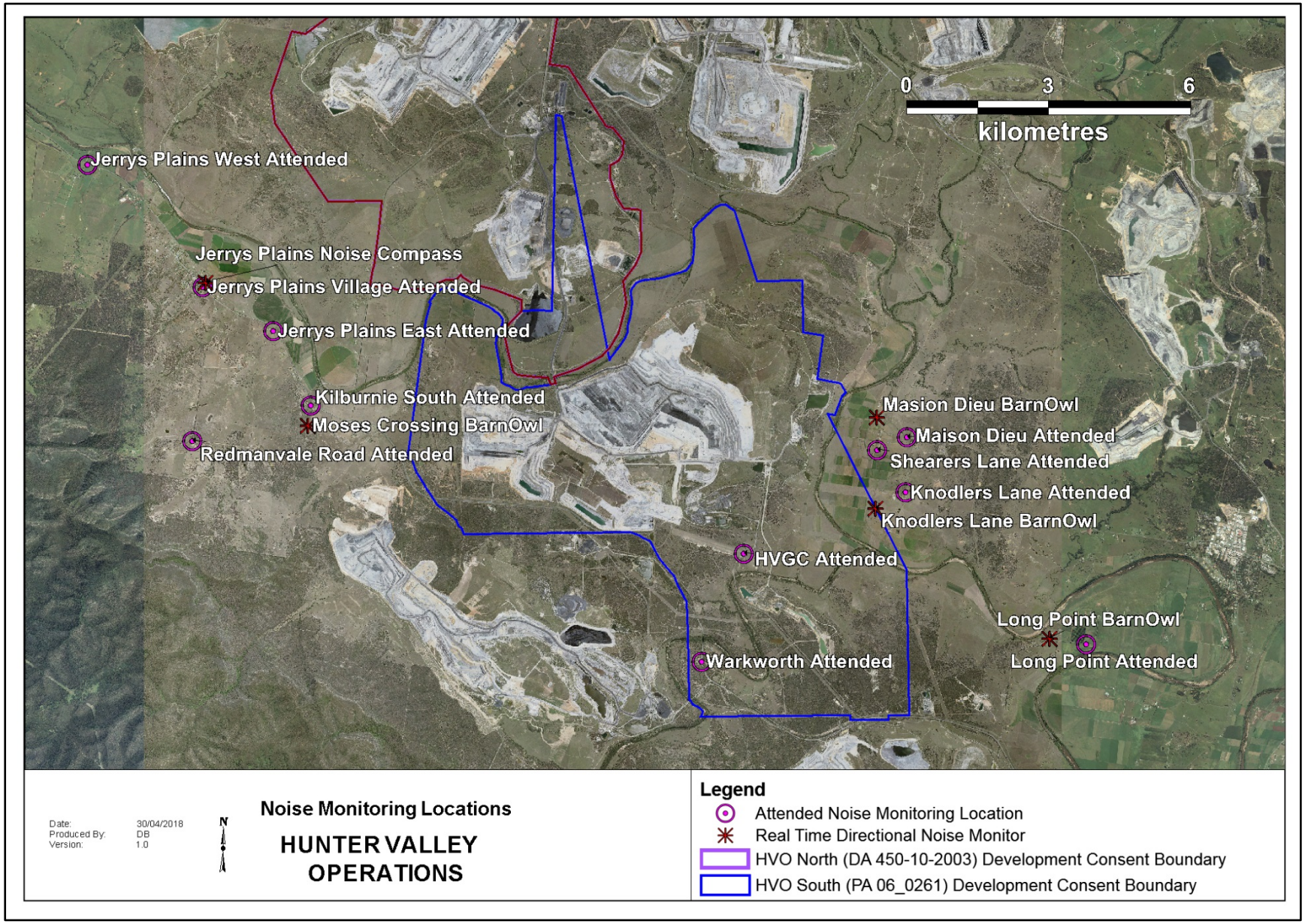


Figure 87: Noise Monitoring Location Plan

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.

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 397 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.

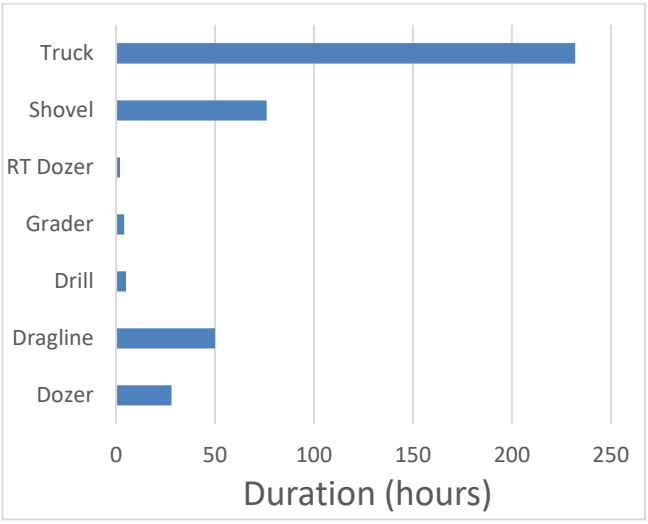


Figure 88: Operational Downtime by Equipment Type – September 2018

8.0 REHABILITATION

During September 3.6 Ha of land was released, 16.1 Ha of land was bulk shaped, 2.1 Ha of land was Topsoiled and 22.0 Ha of land was Rehabilitated. Year to date progress can be viewed in Figure 86.

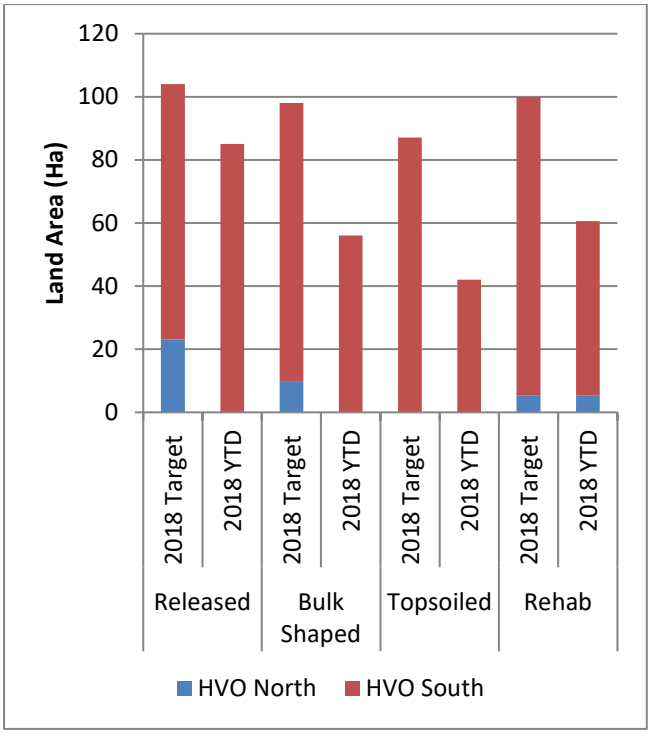


Figure 89: Rehabilitation YTD – September 2018

9.0 COMPLAINTS

During September one complaint was received. Details of complaints received YTD are shown in Table 13.

Table 13: Complaints Summary YTD

	Noise	Dust	Blast	Lighting	Other	Total
January	-	2	4	-	-	6
February	1	-	-	-	1	2
March	-	-	-	-	-	0
April	-	-	1	-	-	1
May	4	1	2	-	-	7
June	1	-	1	-	1	3
July	-	-	2	-	-	2
August	1	-	-	-	-	1
September	1	-	-	-	-	1
October	-	-	-	-	-	-
November	-	-	-	-	-	-
December	-	-	-	-	-	-
Total	8	3	10	-	2	23

Figure 90: Complaints Graph – September 2018

10.0 ENVIRONMENTAL INCIDENTS

During the reporting period there was one recordable environmental incidents.

05 September 2018 – Noise Exceedance

Noise Exceedance measured at the Jerrys Plains Village attended monitoring location in relation to haul truck noise from HVO West Pit. As per the Noise Management Plan, the monitoring consultant contacted dispatch and advised of the exceedance, within 75 minutes a re-measure was undertaken which came under the criteria. HVO Contribution on the re-measure which came under the criteria. A follow up measurement was required and undertaken within 7 days on 11 September 2018 which also resulted in a compliant measurement. The result was reported to the Department of Planning & Environment.

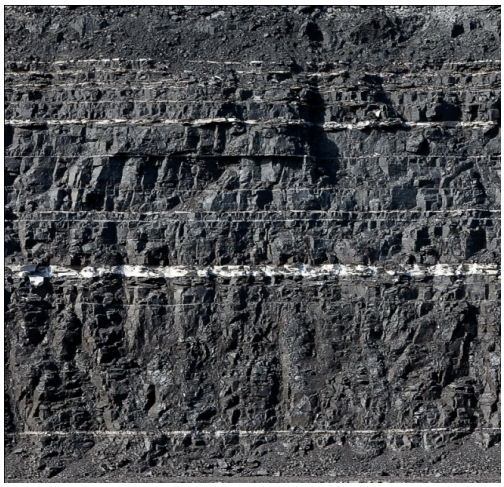
Appendix A: Meteorological Data

Table 14: Meteorological Data - HVO Corporate 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	18	9	92	36	831	284	5.0	0.0
2/09/2018	18	8	78	32	1143	172	2.6	0.0
3/09/2018	16	4	100	46	1147	111	2.9	0.8
4/09/2018	16	8	100	61	994	115	3.3	2.0
5/09/2018	20	8	87	40	1088	109	3.6	0.0
6/09/2018	22	6	99	34	1082	129	1.1	2.4
7/09/2018	18	9	100	78	684	157	1.1	5.6
8/09/2018	17	8	100	67	1022	139	1.9	0.4
9/09/2018	22	5	99	21	812	273	3.3	0.2
10/09/2018	22	8	90	24	797	174	1.9	0.0
11/09/2018	26	5	100	19	747	154	0.8	0.0
12/09/2018	28	8	92	17	787	251	2.7	0.0
13/09/2018	26	11	85	38	563	112	4.1	0.0
14/09/2018	29	11	90	11	817	227	1.3	0.0
15/09/2018	32	9	69	3	836	270	4.7	0.0
16/09/2018	18	5	59	4	883	167	3.1	0.0
17/09/2018	20	1	79	25	899	130	1.6	0.0
18/09/2018	26	7	92	15	834	258	2.6	0.0
19/09/2018	28	9	73	8	1144	244	4.0	0.0
20/09/2018	18	5	84	34	1149	114	2.0	0.0
21/09/2018	23	2	90	12	837	197	1.3	0.0
22/09/2018	25	9	70	9	956	261	2.9	0.0
23/09/2018	25	8	80	14	825	167	2.6	0.0
24/09/2018	16	6	90	54	1085	112	3.9	0.0
25/09/2018	20	5	100	30	1065	110	2.9	0.0
26/09/2018	15	2	100	56	950	145	1.3	5.4
27/09/2018	22	4	100	23	1120	151	0.8	0.0
28/09/2018	31	6	89	6	882	-	2.5	0.0
29/09/2018	24	7	65	11	917	222	4.0	0.0
30/09/2018	21	3	87	22	1233	114	2.7	0.0

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

HUNTER VALLEY
OPERATIONS



Monthly Environmental Monitoring Report

Hunter Valley Operations

October 2018

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Revision History

Version No.	Person Responsible	Document Status	Date
1.0	**Environment & Community Officer**	**Draft**	**11/12/2018**
1.1	**Environment & Community Coordinator**	**Final**	**10/01/2019**

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 1 October to 31 October 2018.

2.0 AIR QUALITY

2.1 Meteorological Monitoring

HVO maintains two meteorological stations; 'Corporate' and 'Cheshunt' as shown on Figure 4.

2.1.1 Rainfall

Rainfall for the period is summarised in Table 1, the 2018 trend and historical trend are shown in Figure 1.

Table 1: Monthly Rainfall HVO

2018	Monthly Rainfall (mm)	Cumulative Rainfall (mm)
October	112.2	351.8

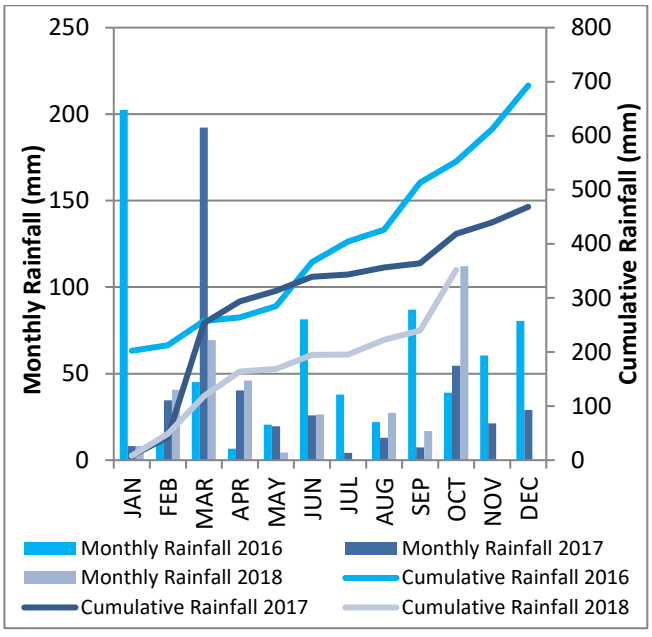


Figure 1: Rainfall Summary 2018

2.1.2 Wind Speed and Direction

South-Easterly winds were dominant during October as shown in Figure 2 (HVO Corporate) and Figure 3 (HVO Cheshunt).

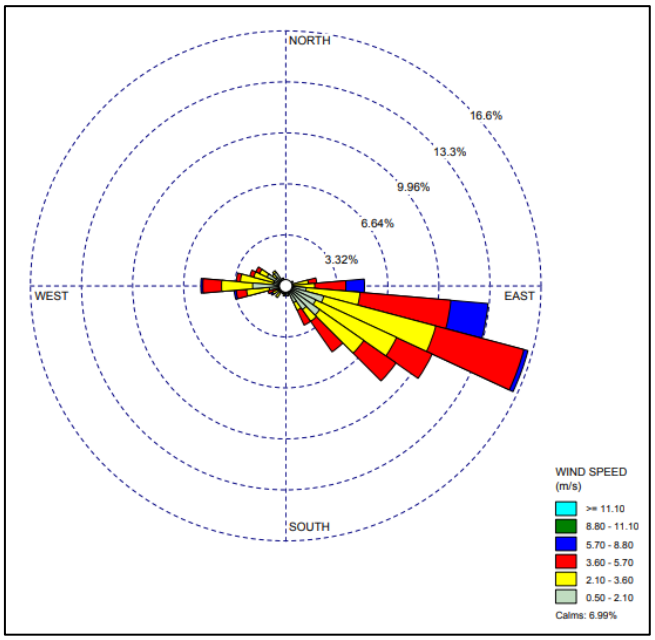


Figure 2: HVO Corporate Wind Rose – October 2018

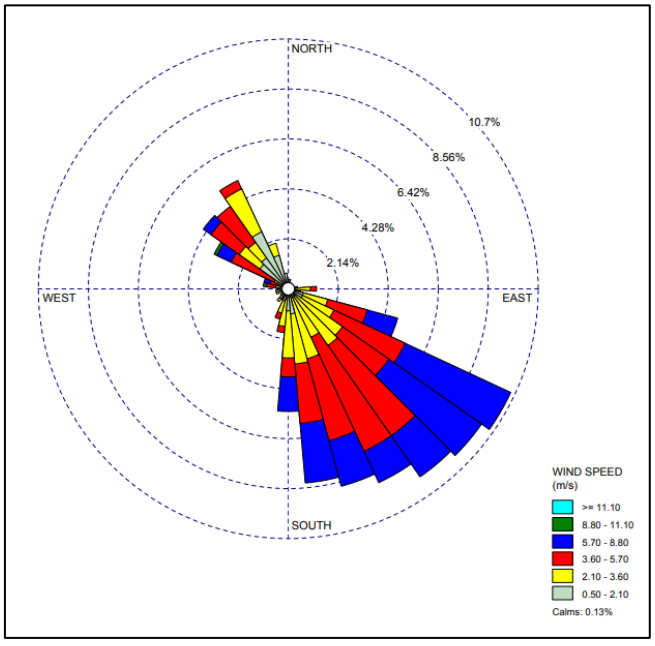


Figure 3: HVO Cheshunt Wind Rose – October 2018

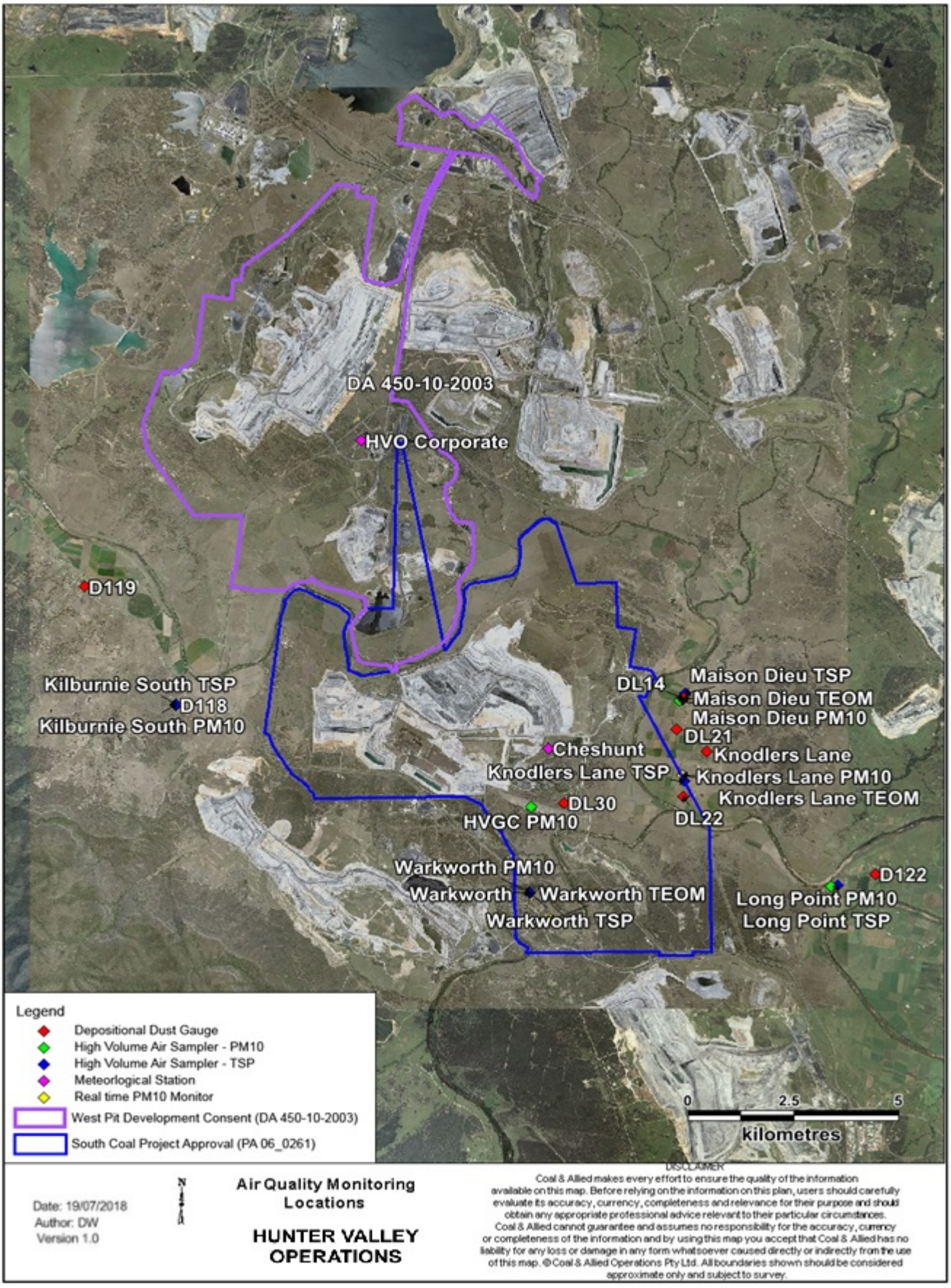


Figure 4: Air Quality Monitoring Location Plan

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 D122, DL30 and Warkworth monitors recorded a monthly result above the long term impact assessment criteria of 4.0 g/m^2 per month.

The field notes associated with the D122 monitor result 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.

There was no evidence to suggest the DL30 and Warkworth monitor's result was contaminated, as such the result will be included in the annual average for those monitors.

An assessment of HVO's contribution against the long term impact assessment criteria will be provided in the 2018 Annual Review.

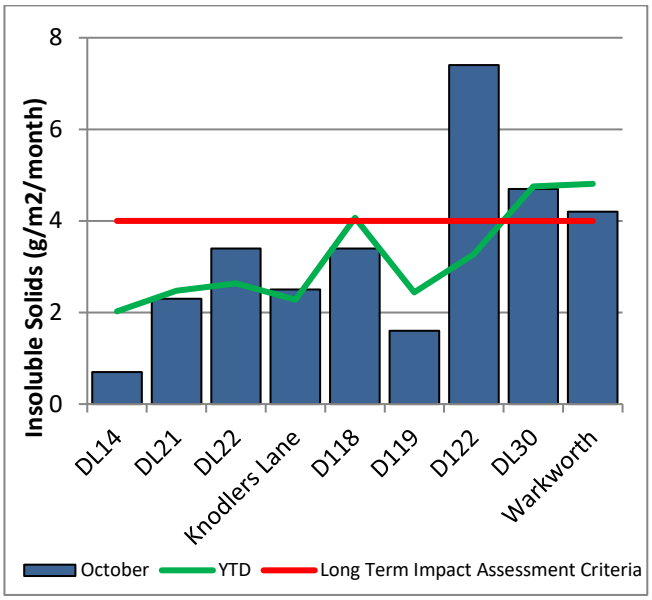


Figure 5: Depositional Dust Results – October 2018

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 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/m^3.

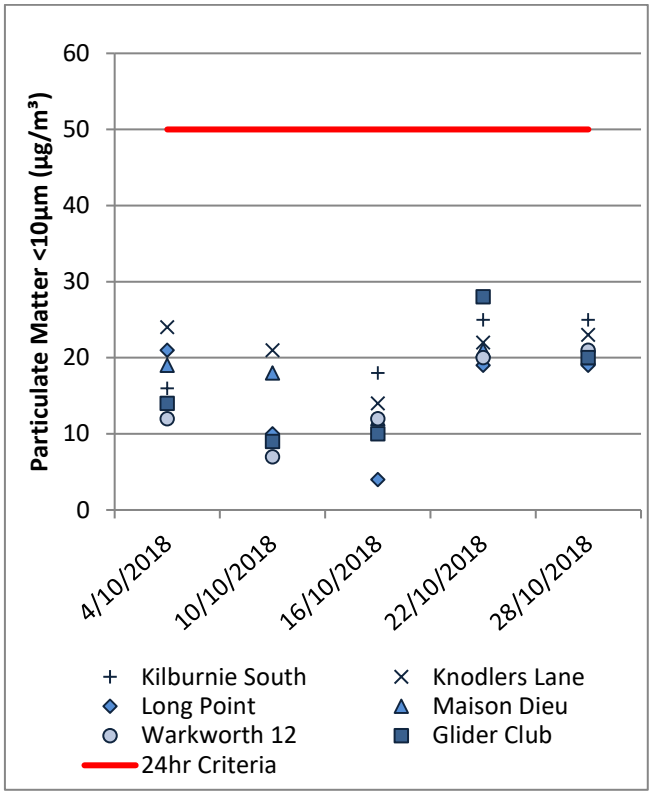


Figure 6: Individual PM_{10} Results – October 2018

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

An assessment of HVO's contribution against the long term impact assessment criteria will be provided in the 2018 Annual Review.

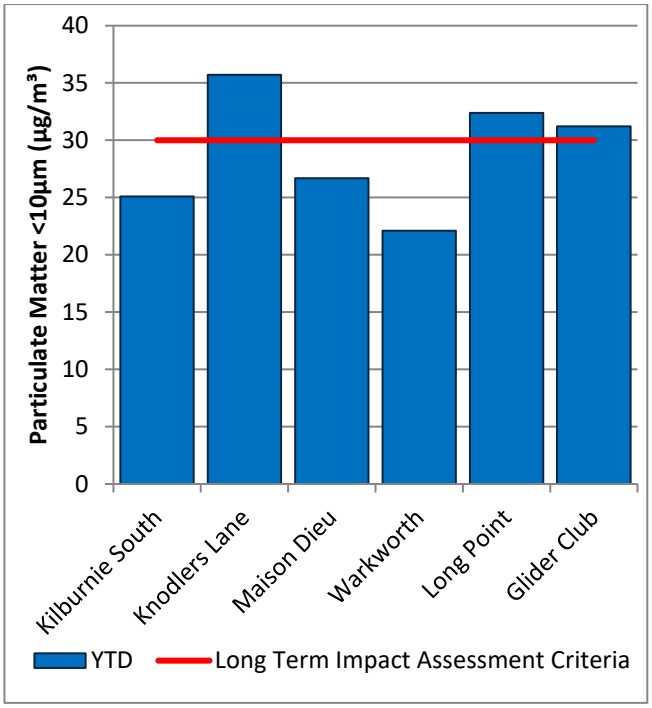


Figure 7: Year to Date Average PM_{10} – October 2018

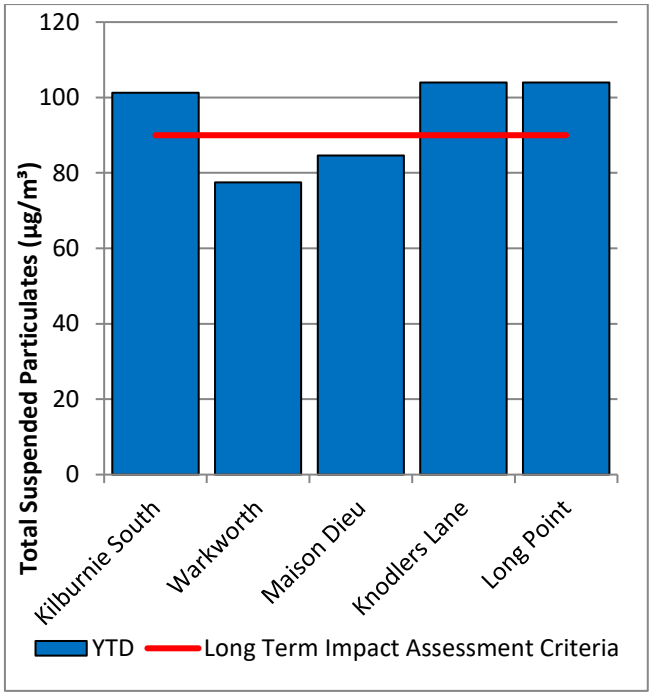


Figure 8: Year to Date Average Total Suspended Particulates – October 2018

2.3.2 TSP Results

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

An assessment of HVO's contribution against the long term impact assessment criteria will be provided in the 2018 Annual Review.

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 help achieve 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.

Results from investigations of elevated results are presented in Table 2.

2.3.4 Real Time Alarms for Air Quality

During October the real time monitoring system generated 82 automated air quality related alarms. 23 were related to adverse weather conditions and 59 alarms relating to PM_{10}.

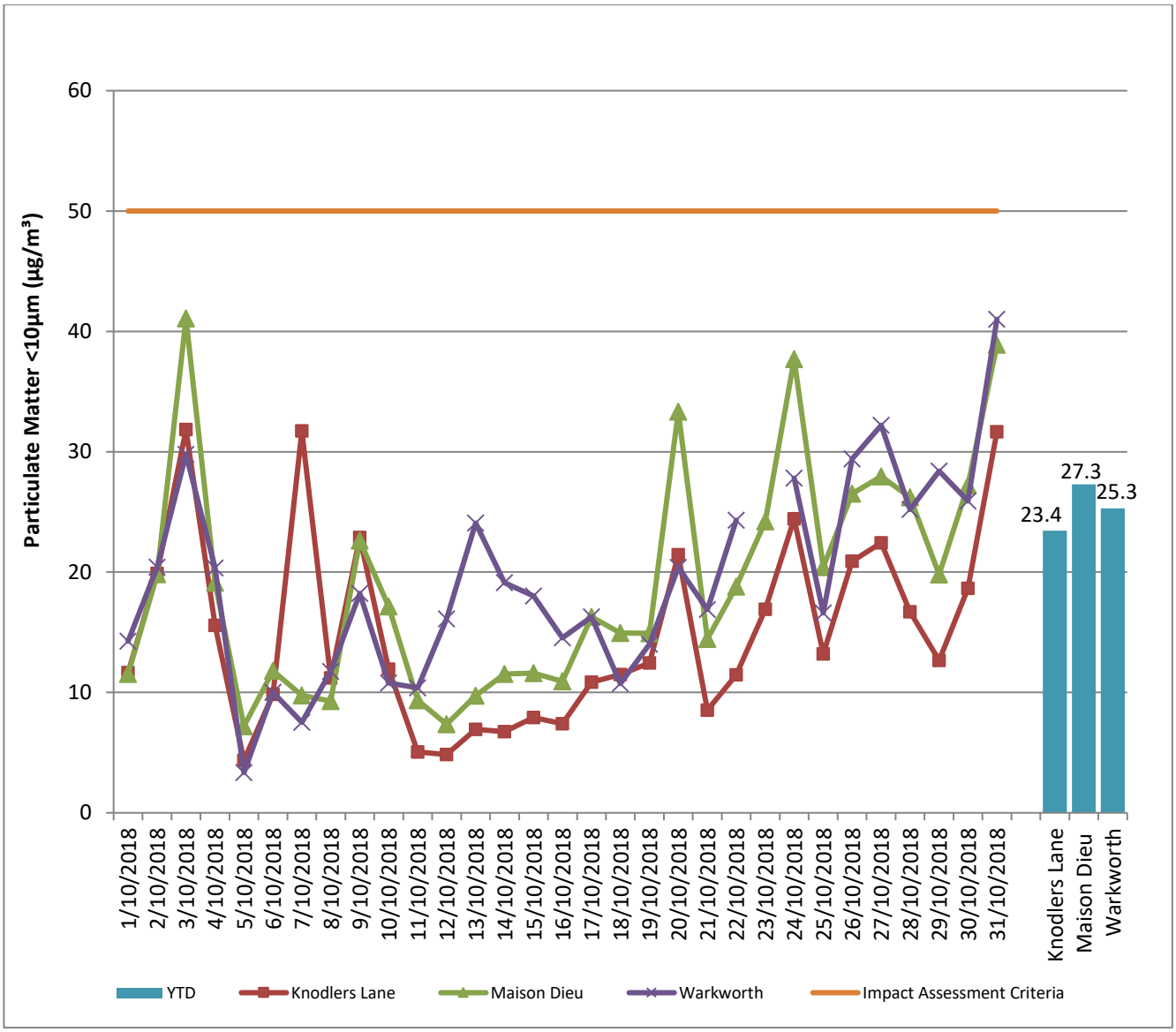


Figure 9: Real Time PM_{10} 24hr average and YTD average – October 2018

3.0 WATER QUALITY

HVO maintains a network of surface water and groundwater monitoring sites.

3.1.1 Surface Water

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

Results of monitoring on Site Dams and the Hunter River as well as other natural tributaries are provided on a quarterly basis, results will appear in the December 2018 report.

3.1.2 Site Water Use

Under water allocation licences issued by Water NSW, HVO is permitted to extract water from the Hunter River. During the reporting period, HVO extracted 191.2ML of water from the Hunter River.

3.1.3 HRSTS Discharge

HVO participates in the Hunter River Salinity Trading Scheme (HRSTS), allowing 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

3.2.1 Groundwater Monitoring Results

Groundwater monitoring is undertaken on a quarterly basis in accordance with the HVO Water Management Plan and Ground Water Monitoring Programme. Results of groundwater monitoring are reported quarterly and as such will be reported in the December 2018 monthly report.

4.0 BLASTING

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 in Figure 15.

Blasting criteria are summarised in Table 3.

Table 2: Blasting Criteria

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%

4.1 Blast Monitoring Results

During October, 16 blasts were initiated at HVO, Figure 10 through to Figure 14 show the blast monitoring results for the reporting period against the impact assessment criteria. The criteria are summarised in Table 3.

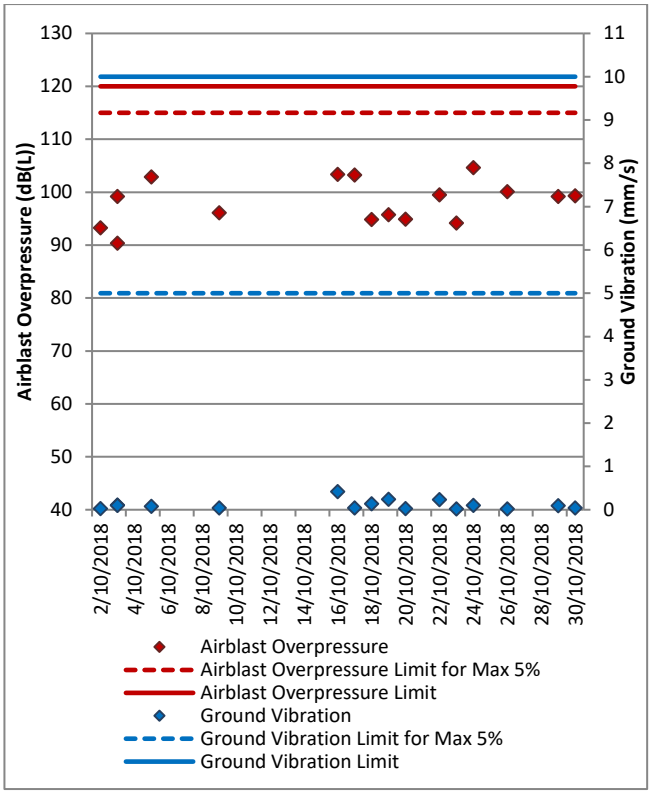


Figure 10: Moses Crossing Blast Monitoring Results – October 2018

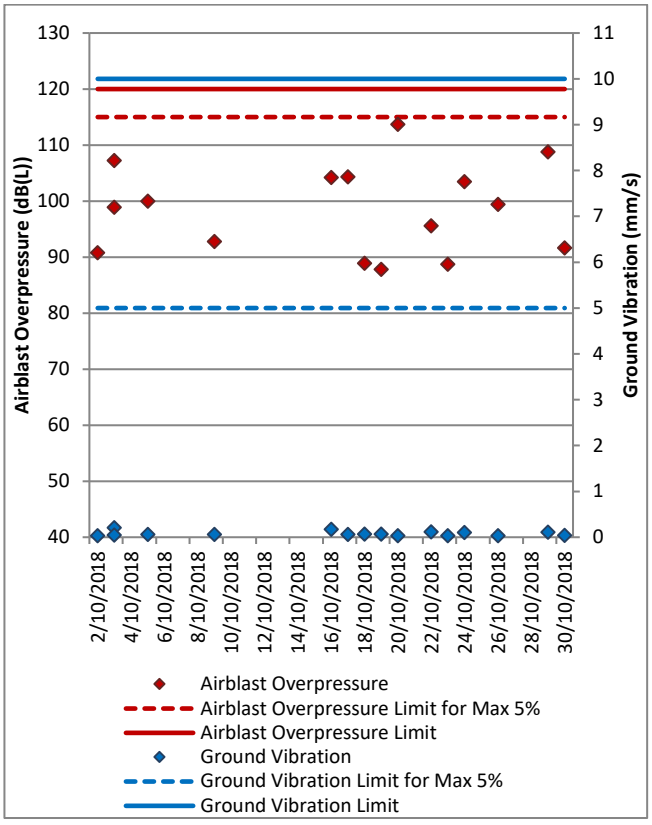


Figure 11: Jerrys Plains Blast Monitoring Results – October 2018

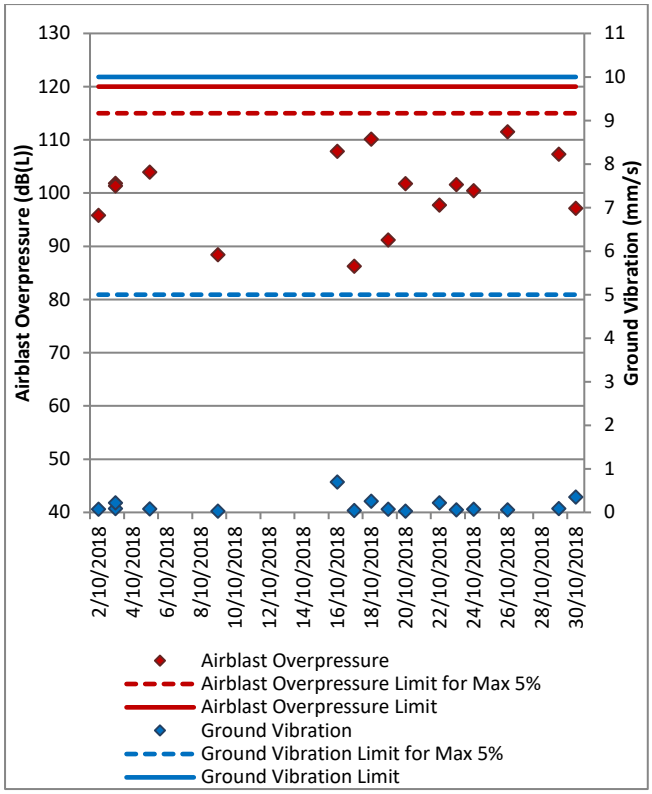


Figure 12: Maison Dieu Blast Monitoring Results – October 2018

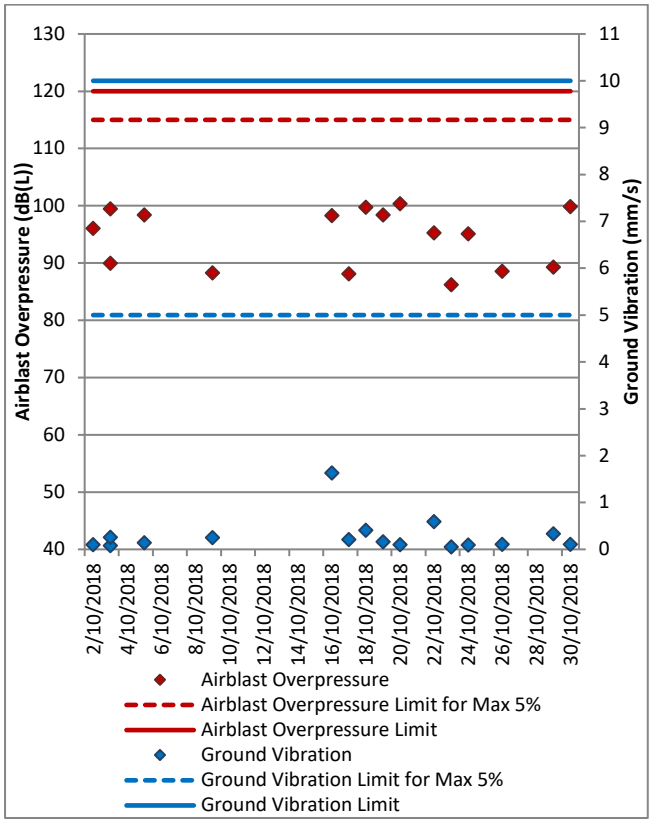


Figure 13: Warkworth Blast Monitoring Results – October 2018

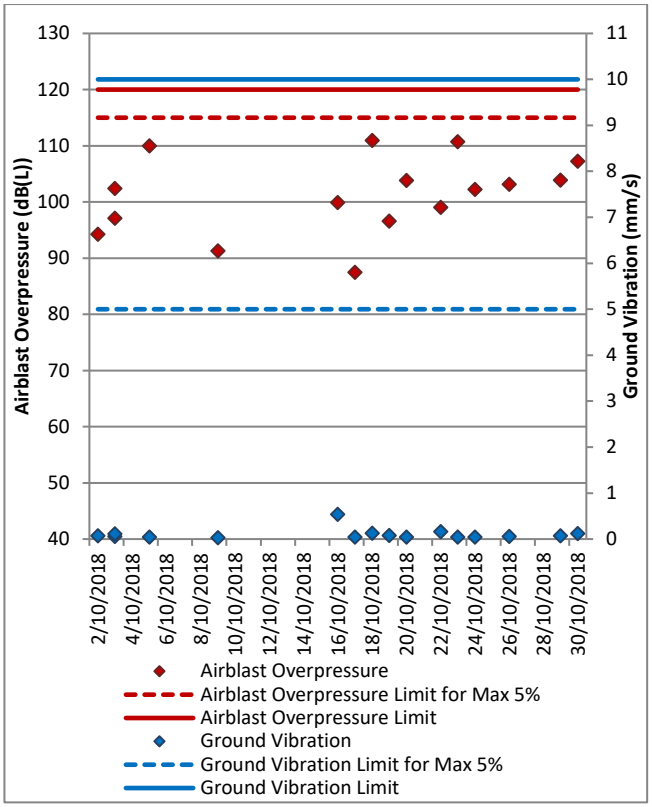


Figure 14: Knodlers Lane Blast Monitoring Results – October 2018

Figure 15: Blast Monitoring Location Plan

5.0 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 16.

5.1 Attended Noise Monitoring Results

Attended monitoring was conducted at receiver locations surrounding HVO on the night of 11 October 2018. Monitoring results are detailed in Table 4 to Table 9 . During October attended noise monitoring, a single exceedance of the HVO North Impact assessment criteria was measured at the Jerrys Plains Village monitoring location. As per the HVO Noise Management Plan, follow up monitoring was conducted which indicated compliance. The results were reported to the Department of Planning & Environment

Table 3: $L_{Aeq,\ 15\ minute}$ HVO South - Impact Assessment Criteria – October 2018

Location	Date and Time	Wind Speed (m/s)[1]	VTG °C/100m[1]	Criterion dB (A)	Criterion Applies?[2]	HVO South L_{Aeq} dB[3,4]	Exceedance[4,5]
Knodlers Lane	11/10/2018 21:22	3	-1	46	Yes	IA	Nil
Maison Dieu	11/10/2018 21:43	3.3	-1	46	No	IA	NA
Shearers Lane	11/10/2018 21:00	3.1	-1	46	No	IA	NA
Kilburnie South	11/10/2018 22:59	2.2	0.5	46	Yes	IA	Nil
Jerrys Plains Village	11/10/2018 21:28	3	-1	46	Yes	42	Nil
Jerrys Plains East	11/10/2018 21:00	3.1	-1	46	No	43	NA
Long Point	11/10/2018 22:59	2.3	3	46	Yes	IA	Nil
HVGC	11/10/2018 23:42	2.4	-1	NA	NA	IA	NA

Notes:
1. Atmospheric data is sourced from the HVO Cheshunt or HVO Corp. weather station using logged meteorological data;
2. Assumed noise emission limits (see Section 2.2 of this report for more information) 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). Criterion may or may not apply due to rounding of meteorological data values;
3. Estimated or measured LAeq,15minute attributed to HVO South Pit Area;
4. Bold results in red indicate exceedance of criteria; and
5. NA in exceedance column means atmospheric conditions outside specified in approval and so criterion is not applicable.

Table 4: $L_{Aeq,\ 15\ minute}$ HVO South - Land Acquisition Criteria – October 2018

Location	Date and Time	Wind Speed (m/s)[1]	VTG °C/100m[1]	Criterion dB (A)	Criterion Applies?[2]	HVO South L_{Aeq} dB[3,4]	Exceedance[4,5]
Knodlers Lane	11/10/2018 21:22	3.4	-1	41	No	IA	NA
Maison Dieu	11/10/2018 21:43	3.1	-1	41	No	IA	NA
Shearers Lane	11/10/2018 21:00	3.9	-1	41	No	IA	NA
Kilburnie South	11/10/2018 22:59	2.6	0.5	41	Yes	33	Nil
Jerrys Plains Village	11/10/2018 21:28	3.4	-1	40	No	IA	NA
Jerrys Plains East	11/10/2018 21:00	3.9	-1	40	No	32	NA
Long Point	11/10/2018 22:59	2.3	3	40	Yes	IA	Nil

HVGC	11/10/2018 23:42	2.5	-1	NA	NA	<35	NA

Notes:
1. Atmospheric data is sourced from the HVO Cheshunt or HVO Corp. weather station using logged meteorological data;
2. Assumed noise emission limits (see Section 2.2 of this report for more information) 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). Criterion may or may not apply due to rounding of meteorological data values;
3. Estimated or measured LAeq,15minute attributed to HVO South Pit Area;
4. Bold results in red indicate exceedance of criteria;
5. NA in exceedance column means atmospheric conditions outside specified in approval and so criterion is not applicable;

Table 5: $L_{A1,\ 1minute}$ HVO South - Impact Assessment Criteria – October 2018

Location	Date and Time	Wind Speed (m/s)[1]	VTG °C/100m[1]	Criterion dB (A)	Criterion Applies?[2]	HVO South $L_{A1,\ 1min}$ dB[3,4]	Exceedance[4,5]
Knodlers Lane	11/10/2018 21:22	3.4	-1	45	No	IA	NA
Maison Dieu	11/10/2018 21:43	3.1	-1	45	No	IA	NA
Shearers Lane	11/10/2018 21:00	3.9	-1	45	No	IA	NA
Kilburnie South	11/10/2018 22:59	2.6	0.5	45	Yes	**50**	**5**
Jerrys Plains Village	11/10/2018 21:28	3.4	-1	45	No	IA	NA
Jerrys Plains East	11/10/2018 21:00	3.9	-1	45	No	41	NA
Long Point	11/10/2018 22:59	2.3	3	45	Yes	IA	Nil
HVGC	11/10/2018 23:42	2.5	-1	NA	NA	41	NA

Notes:
1. Atmospheric data is sourced from the HVO Cheshunt or HVO Corp. weather station using logged meteorological data;
2. Assumed noise emission limits (see Section 2.3 of this report for more information) 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). Criterion may or may not apply due to rounding of meteorological data values;
3. These are results for HVO South Pit Area in the absence of all other noise sources;
4. Bold results in red indicate exceedance of criteria; and
5. NA in exceedance column means atmospheric conditions outside specified in approval and so criterion is not applicable.

Table 6.1: $L_{A1,\ 1minute}$ HVO South - Impact Assessment Criteria Re-measures – October 2018

Location	Time/date	Criterion	HVO South LA1,1min dB[1,2]	Exceedance[2]
Kilburnie South	11/10/2018 23:20	45	NM[3]	Nil
Kilburnie South	11/10/2018 23:22	45	36	Nil
Kilburnie South	11/10/2018 23:23	45	43	Nil
Kilburnie South	11/10/2018 23:24	45	NM[3]	Nil
Kilburnie South	11/10/2018 23:25	45	NM[3]	Nil

Notes:
1. These are results for HVO South Pit Area in the absence of all other noise sources;
2. Bold results in red indicate exceedance of criteria;
3. "NM" indicates that other noise sources (frogs) were present during this measurement and generated LAmax levels. This prevented a precise determination of HVO South site-only LA1,1minute levels, however, these levels were less than the criterion of 45 dB.

Table 7: $L_{Aeq,\ 15minute}$ HVO North – Impact Assessment Criteria – October 2018

Location	Date and Time	Wind Speed (m/s)[1]	VTG °C/100m[1]	Criterion dB (A)	Criterion Applies?[2]	HVO North L_{Aeq} dB[3,4]	Exceedance[4,5]
Knodlers Lane	11/10/2018 21:22	3	-1	35	Yes	IA	Nil
Maison Dieu	11/10/2018 21:43	3.3	-1	35	No	IA	NA
Shearers Lane	11/10/2018 21:00	3.1	-1	35	No	IA	NA
Kilburnie South	11/10/2018 22:59	2.2	0.5	39	Yes	IA	Nil
Jerrys Plains Village	11/10/2018 21:28	3	-1	36	Yes	36	Nil
Jerrys East	11/10/2018 21:00	3.1	-1	39	No	34	NA
Long Point	11/10/2018 22:59	2.3	3	35	Yes	IA	Nil
HVGC	11/10/2018 23:42	2.4	-1	NA	NA	IA	NA

Notes:
1. Atmospheric data is sourced from the HVO Cheshunt or HVO Corp. weather station using logged meteorological data;
2. 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. Criterion may or may not apply due to rounding of meteorological data values;
3. Estimated or measured LAeq,15minute attributed to HVO North Pit Area;
4. Bold results in red indicate exceedance of criteria; and
5. NA in exceedance column means atmospheric conditions outside specified in approval and so criterion is not applicable.

Table 8: $L_{Aeq,15minute}$ HVO North - Land Acquisition Criteria – October 2018

Location	Date and Time	Wind Speed (m/s)[1]	VTG °C/100m[1]	Criterion dB (A)	Criterion Applies?[2]	HVO North L_{Aeq} dB[3,4]	Exceedance[4,5]
Knodlers Lane	11/10/2018 21:22	3	-1	0:00	Yes	IA	Nil
Maison Dieu	11/10/2018 21:43	3.3	-1	0:00	No	IA	NA
Shearers Lane	11/10/2018 21:00	3.1	-1	41	No	IA	NA
Kilburnie South	11/10/2018 22:59	2.2	0.5	0:00	Yes	IA	Nil
Jerrys Plains Village	11/10/2018 21:28	3	-1	41	Yes	36	Nil
Jerrys East	11/10/2018 21:00	3.1	-1	41	No	34	NA
Long Point	11/10/2018 22:59	2.3	3	41	Yes	IA	Nil
HVGC	11/10/2018 23:42	2.4	-1	NA	NA	IA	NA

Notes:
1. Atmospheric data is sourced from the HVO Cheshunt or HVO Corp. weather station using logged meteorological data;
2. 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. Criterion may or may not apply due to rounding of meteorological data values;
3. Estimated or measured LAeq,15minute attributed to HVO North Pit Area;
4. Bold results in red indicate exceedance of criteria; and
5. NA in exceedance column means atmospheric conditions outside specified in approval and so criterion is not applicable.

Table 9: $L_{A1,\ 1Minute}$ HVO North - Impact Assessment Criteria – October 2018

Location	Date and Time	Wind Speed (m/s)[1]	VTG °C/100m[1]	Criterion dB (A)	Criterion Applies?[2]	HVO North $L_{A1,\ 1min}$ dB[3,4]	Exceedance[4,5]
Knodlers Lane	11/10/2018 21:22	3	-1	46	Yes	IA	Nil
Maison Dieu	11/10/2018 21:43	3.3	-1	46	No	IA	NA
Shearers Lane	11/10/2018 21:00	3.1	-1	46	No	IA	NA
Kilburnie South	11/10/2018 22:59	2.2	0.5	46	Yes	IA	Nil
Jerrys Plains Village	11/10/2018 21:28	3	-1	46	Yes	42	Nil
Jerrys East	11/10/2018 21:00	3.1	-1	46	No	43	NA
Long Point	11/10/2018 22:59	2.3	3	46	Yes	IA	Nil
HVGC	11/10/2018 23:42	2.4	-1	NA	NA	IA	NA

Notes:
1. Atmospheric data is sourced from the HVO Cheshunt or HVO Corp. weather station using logged meteorological data;
2. 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. Criterion may or may not apply due to rounding of meteorological data values;
3. These are results for HVO North Pit Area in the absence of all other noise sources;
4. Bold results in red indicate exceedance of criteria; and
5. NA in exceedance column means atmospheric conditions outside specified in approval and so criterion is not applicable.

5.2 NPfI 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. During October 2018 no measurements required the penalty to be applied. The assessment for low frequency noise is shown in Table 10.

Table 10: Low Frequency Noise Assessment - October 2018

Location	Date and Time	Measured Site Only LA_{eq} dB (Sth/Nth)	Site Only LC_{eq} dB[1] (Sth/Nth)	Site Only LC_{eq}-LA_{eq} dB [1,2] (Sth/Nth)	Result Max exceedance of ref spectrum dB[1,3] (Sth/Nth)	Penalty dB(A) [1]	Site $L_{Aeq,15min}$ dB with modifying factor (if applicable)
Knodlers Lane	11/10/2018 21:22	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA
Maison Dieu	11/10/2018 21:43	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA
Shearers Lane	11/10/2018 21:00	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA
Kilburnie South	11/10/2018 22:59	33/IA	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA
Jerrys Plains Village	11/10/2018 21:28	IA/36	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA
Jerrys East	11/10/2018 21:00	32/34	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA
Long Point Road	11/10/2018 22:59	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA
HVGC	11/10/2018 23:42	"35/IA	NA/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.

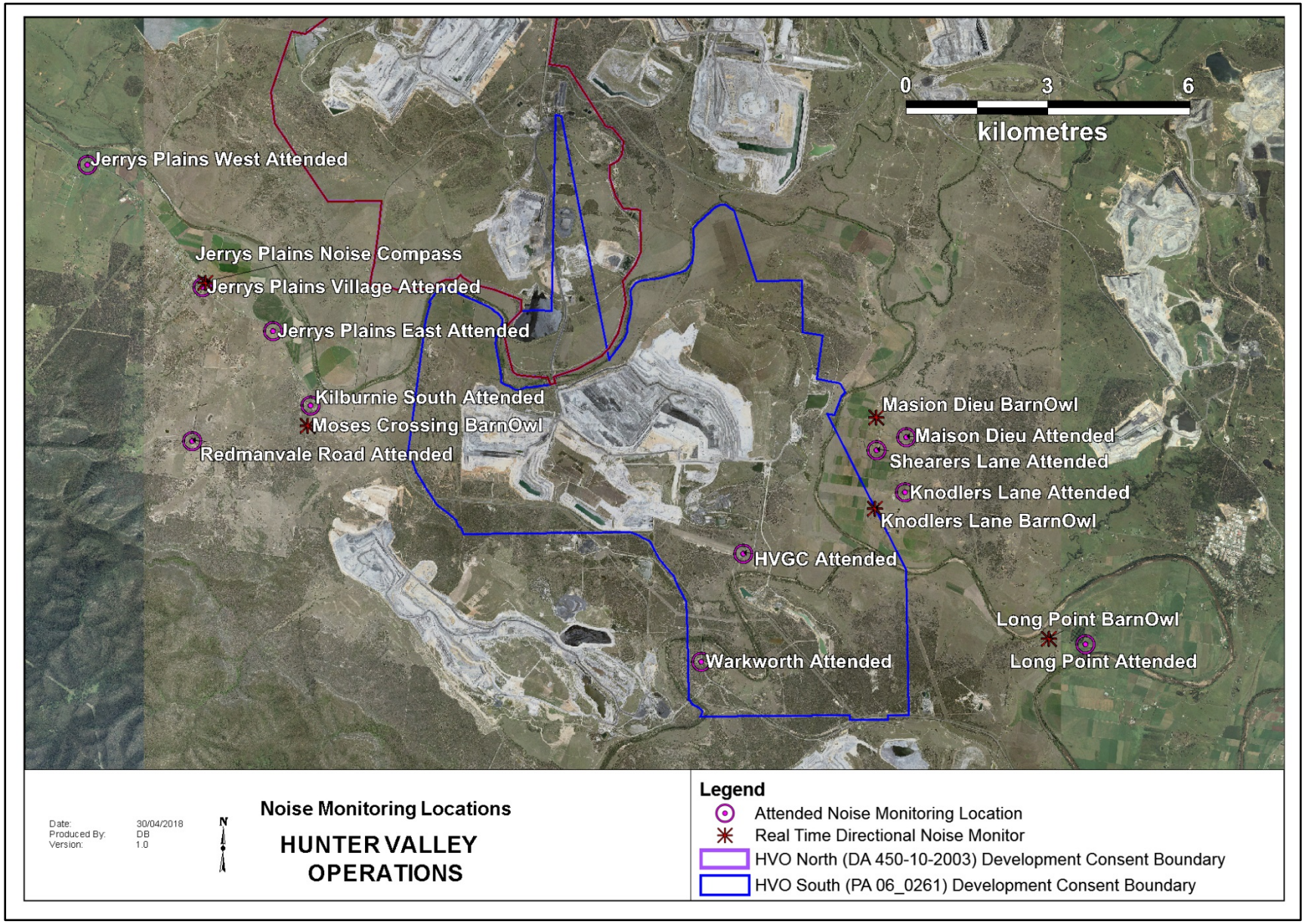


Figure 16: Noise Monitoring Location Plan

5.2.1 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.

It should be noted that this assessment does not compliment or conflict with attended noise monitoring detailed in Section 5.1, and that real time monitoring data includes non-mine noise sources such as dogs, cows, or more commonly, road traffic.

6.0 OPERATIONAL DOWNTIME

During October, a total of 105 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 17.

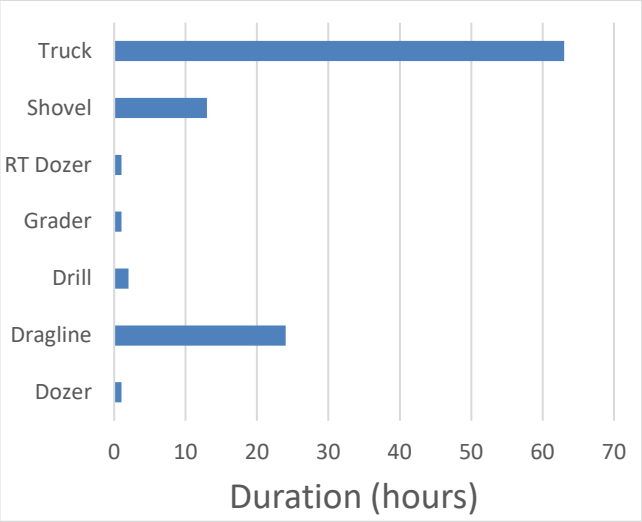


Figure 17: Operational Downtime by Equipment Type – October 2018

7.0 REHABILITATION

During October 7.8 Ha of land was released, 21.4 Ha of land was bulk shaped and 14.6 Ha of land was rehabilitated. Year to date progress can be viewed in Figure 18.

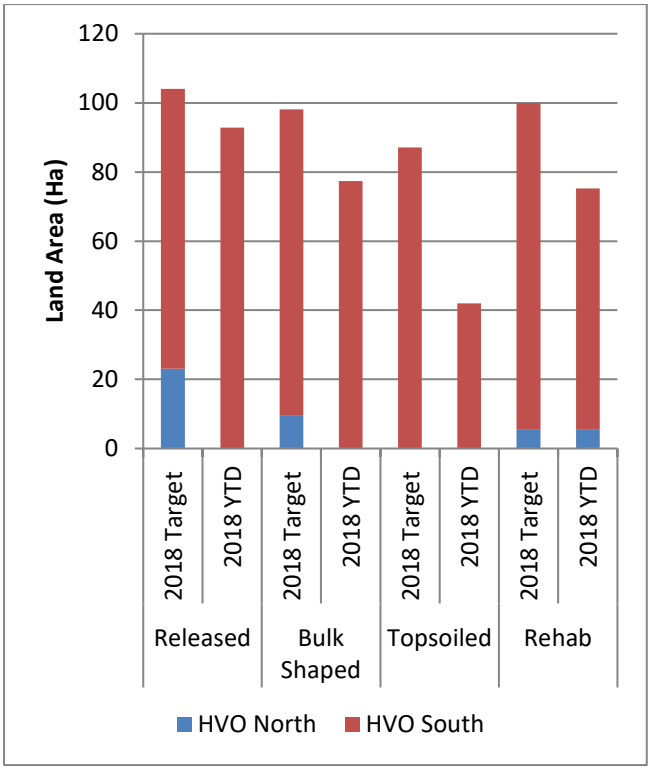


Figure 18: Rehabilitation YTD – October 2018

8.0 COMPLAINTS

No complaints were received during the reporting period. Details of complaints received YTD are shown in Table 11 below.

Table 11: Complaints Summary YTD

	Noise	Dust	Blast	Lighting	Other	Total
January	-	2	4	-	-	6
February	1	-	-	-	1	2
March	-	-	-	-	-	0
April	-	-	1	-	-	1
May	4	1	2	-	-	7
June	1	-	1	-	1	3
July	-	-	2	-	-	2
August	1	-	-	-	-	1
September	1	-	-	-	-	1
October	-	-	-	-	-	0
November	-	-	-	-	-	-
December	-	-	-	-	-	-
Total	8	3	10	-	2	23

9.0 ENVIRONMENTAL INCIDENTS

During the reporting period there were four recordable environmental incidents (Category 1 or greater);

5 October 2018 – Turbid water flowed offsite
Inspection following approximately 75mm of overnight rainfall identified turbid water flowing offsite and in to Farrell's Creek. Observations indicate that rainfall on disturbed areas in the upper pre-strip catchment had overtopped surface water management controls and flowed to lower catchment dams prior to reporting offsite with runoff generated from undisturbed catchment areas.

An investigation was undertaken which included water sampling and construction of temporary drainage diversions to reduce the area of disturbed catchment.

The incident was reported to the EPA, Department of Planning & Environment and the Resources Regulator.

10 October 2018 – Overflow of water from Newdell CHPP Sump N690
Inspection following overnight rainfall identified turbid water had overflowed from Sump N690 and onto the road verge due to pump failure. Investigation determined that the volume would have been low and did not appear to have flowed into natural drainage lines.

An investigation was undertaken which included water sampling, immediate repair of pump and check of similar pumps in area, clean out of sump N690.

12 October 2018 – Noise Exceedance
An exceedance of the $L_{A1,1\ minute}$ (sleep disturbance) criteria at Kilburnie South. The source of the noise deemed to be from dragline bucket impact from HVO South. As per the Noise Management Plan, five 1 minute re-measures were undertaken resulting in compliant measurements.

The results were reported to the Department of Planning & Environment.

16 October 2018 – 3A Blast Fume Event
A category 3A fume was generated from Cheshunt Pit. An acute plume from the blast migrated across to HVO North but dissipated onsite.

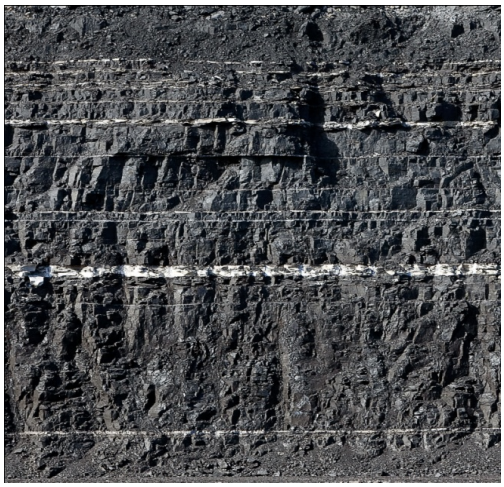
Appendix A: Meteorological Data

Table 12: Meteorological Data - HVO Corporate Meteorological Station – October 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)
1/10/2018	23	4	100	22	1106	107	2.0	0
2/10/2018	27	5	90	8	921	149	1.8	0
3/10/2018	27	7	89	14	1154	211	2.4	0
4/10/2018	18	10	100	85	274	127	2.5	74.8
5/10/2018	16	8	100	71	443	142	3.6	1.2
6/10/2018	19	8	87	58	1434	129	3.4	0
7/10/2018	21	7	99	45	1408	221	1.3	3.6
8/10/2018	26	9	100	24	1016	219	2.3	0
9/10/2018	28	9	100	18	1179	198	1.4	0
10/10/2018	18	7	100	76	673	132	2.8	13.2
11/10/2018	16	6	100	59	1100	103	4.1	4.2
12/10/2018	20	6	100	43	1381	106	3.9	0
13/10/2018	21	10	100	49	1411	110	3.8	5.2
14/10/2018	23	12	100	37	1496	104	4.1	0.2
15/10/2018	25	11	100	47	1619	107	4.5	0
16/10/2018	26	10	100	44	1411	116	3.6	0
17/10/2018	25	11	100	53	1064	171	1.9	4.8
18/10/2018	29	11	100	33	1310	202	1.3	2.2
19/10/2018	30	12	100	27	1100	236	1.7	0
20/10/2018	32	14	100	29	1221	232	2.5	2.6
21/10/2018	21	11	100	72	1462	147	2.6	0
22/10/2018	26	11	99	36	1402	111	2.3	0.2
23/10/2018	32	11	100	11	1018	195	1.6	0
24/10/2018	25	11	83	24	1379	143	4.3	0
25/10/2018	24	10	89	44	1411	107	2.8	0
26/10/2018	28	10	100	18	1037	163	2.7	0
27/10/2018	30	10	89	12	1013	186	2.6	0
28/10/2018	20	10	86	54	966	106	3.5	0
29/10/2018	23	8	83	38	1426	110	3.6	0
30/10/2018	31	8	87	19	1013	196	1.6	0
31/10/2018	30	-	48	-	1020	188	4.2	0

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

HUNTER VALLEY
OPERATIONS



Monthly Environmental Monitoring Report

Hunter Valley Operations

November 2018

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Revision History

Version No.	Person Responsible	Document Status	Date
1.0	**Environment & Community Officer**	**Draft**	**10/12/2018**
1.1	**Environment & Community Coordinator**	**Final**	**25/01/2019**

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 1 November to 30 November 2018.

2.0 AIR QUALITY

2.1 Meteorological Monitoring

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

2.1.1 Rainfall

Rainfall for the period is summarised in Table 1, the 2018 trend and historical trend are shown in Figure 1.

Table 1: Monthly Rainfall HVO

2018	Monthly Rainfall (mm)	Cumulative Rainfall (mm)
November	74.6	426.4

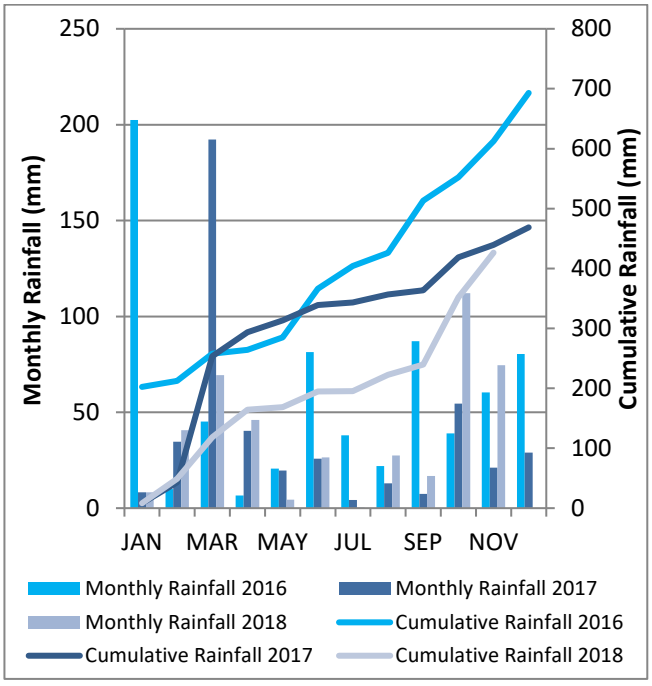

Figure 1: Rainfall Summary 2018

2.1.2 Wind Speed and Direction

South-Easterly winds were dominant during November as shown in Figure 2 (HVO Corporate) and Figure 3 (HVO Cheshunt).

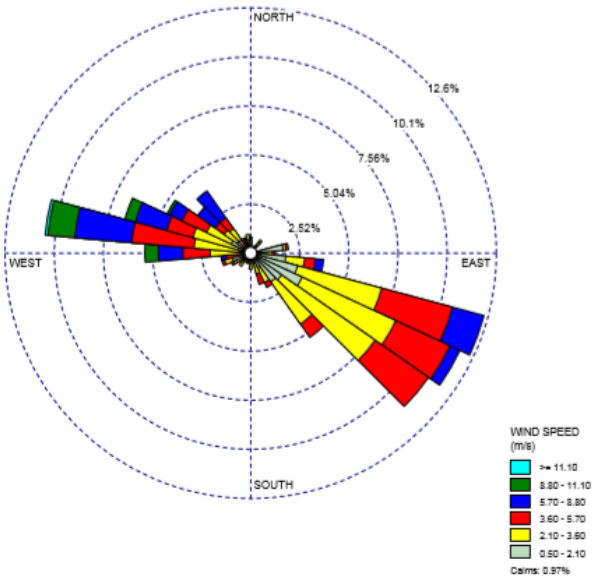

Figure 2: HVO Corporate Wind Rose – November 2018

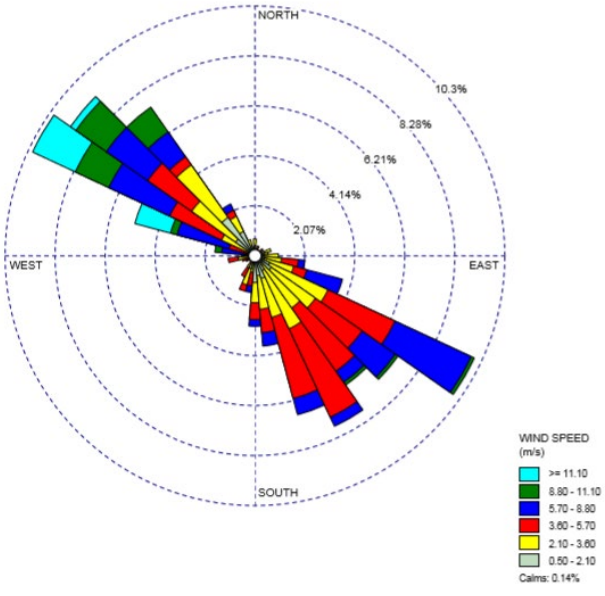

Figure 3: HVO Cheshunt Wind Rose – November 2018

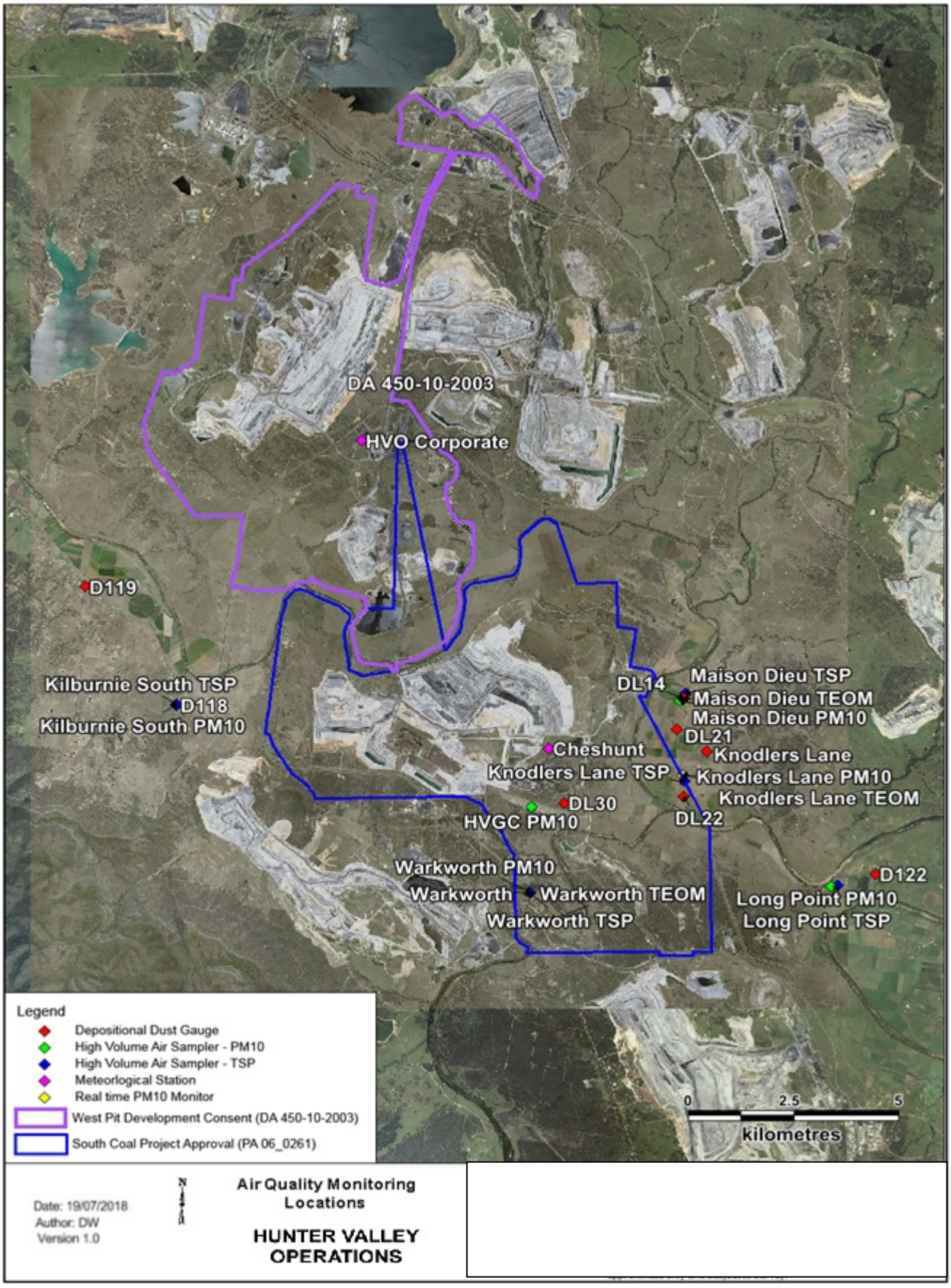

Figure 4: Air Quality Monitoring Location Plan

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 DL22 monitor recorded a monthly result above the long term impact assessment criteria of 4.0 g/m^2 per month.

No sample was collected for DL21 as the dust gauge pole had been knocked over.

An assessment of HVO's contribution against the long term impact assessment criteria will be provided in the 2018 Annual Review.

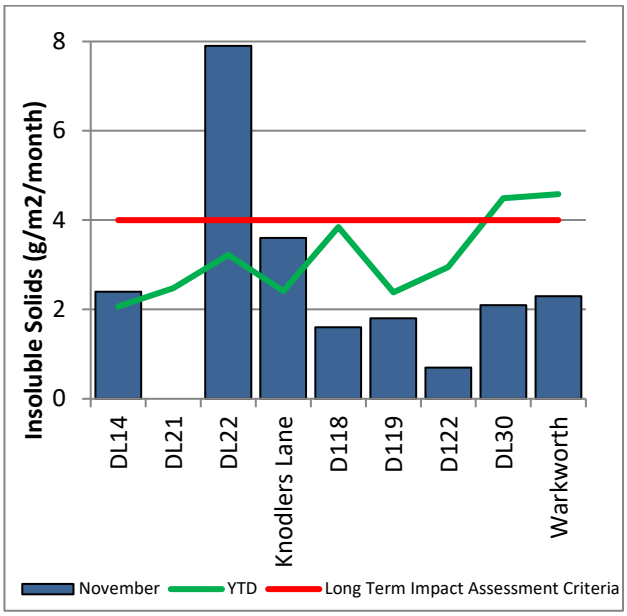

Figure 5: Depositional Dust Results – November 2018

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 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/m^3.

On 3 November 2018, two HVAS units recorded elevated 24 hour averages, Long Point (57µg/m^3) and Knodlers Lane (58 µg/m^3). HVO's maximum contribution was calculated to be the following:

- Long Point: 32.0 µg/m^3 or 56.1% of the total measured result.
- Knodlers Lane: 33.0 µg/m^3 or 56.9% of the total measured result.

On 21 November 2018, all HVAS units with the exception of Kilburnie South recorded elevated 24 hour averages over the 24 hour criteria, Knodlers Lane (54 µg/m^3), Long Point (120 µg/m^3), Maison Dieu (61 µg/m^3), Warkworth (62 µg/m^3) and Glider Club (68 µg/m^3). HVO's maximum contribution was calculated to be the following:

- Knodlers Lane: 4.5 µg/m^3 or 8.3% of the total measured result
- Long Point: <4.5 µg/m^3 or <3.8% of the total measured result
- Maison Dieu: 11.5 µg/m^3 or 18.9% of the total measured result
- Warkworth: 12.5 µg/m^3 or 23.1% of the total measured result
- Glider Club: 18.5 µg/m^3 or 34.3% of the total measured result.

It should be noted that 21 - 23 November 2018 experienced high dust levels being recorded across the Hunter Valley as a dust storm approached from Western NSW and passed over the region. Across this period HVO recorded significant operational downtime as shown in Section 6.

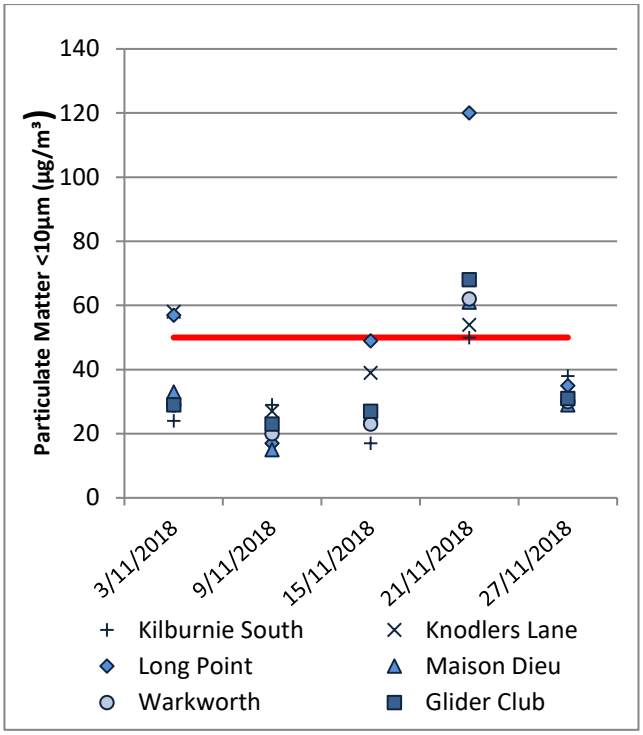

Figure 6: Individual PM_{10} Results – November 2018

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

An assessment of HVO's contribution against the long term impact assessment criteria will be provided in the 2018 Annual Review.

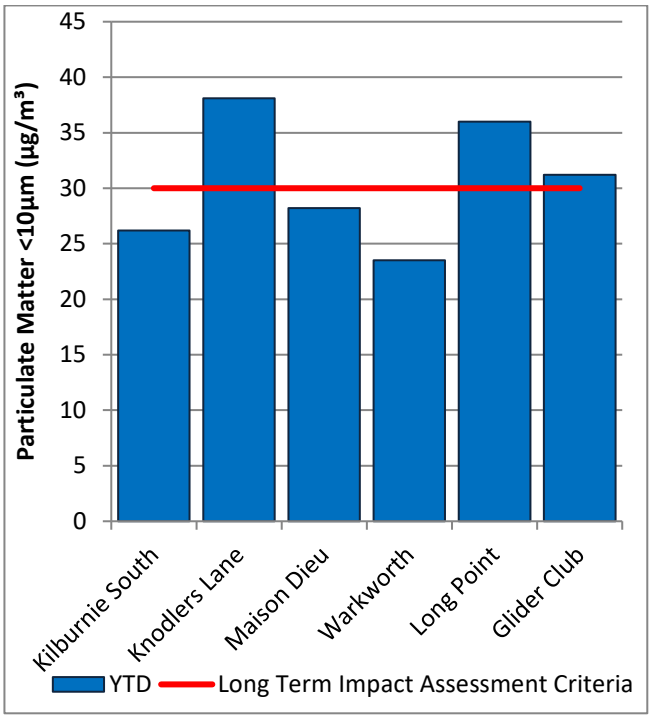

Figure 7: Year to Date Average PM_{10} – November 2018

2.3.2 TSP Results

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

An assessment of HVO's contribution against the long term impact assessment criteria will be provided in the 2018 Annual Review.

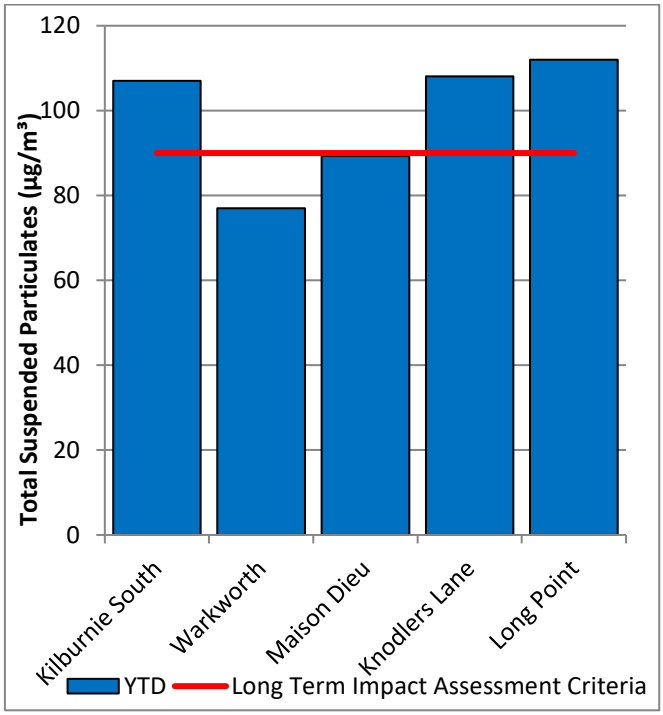

Figure 8: Year to Date Average Total Suspended Particulates – November 2018

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 help achieve 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.

Results from investigations of elevated results are presented in Table 2.

2.3.4 Real Time Alarms for Air Quality

During November the real time monitoring system generated 277 automated air quality related alarms. 15 were related to adverse weather conditions and 262 alarms relating to PM_{10}.

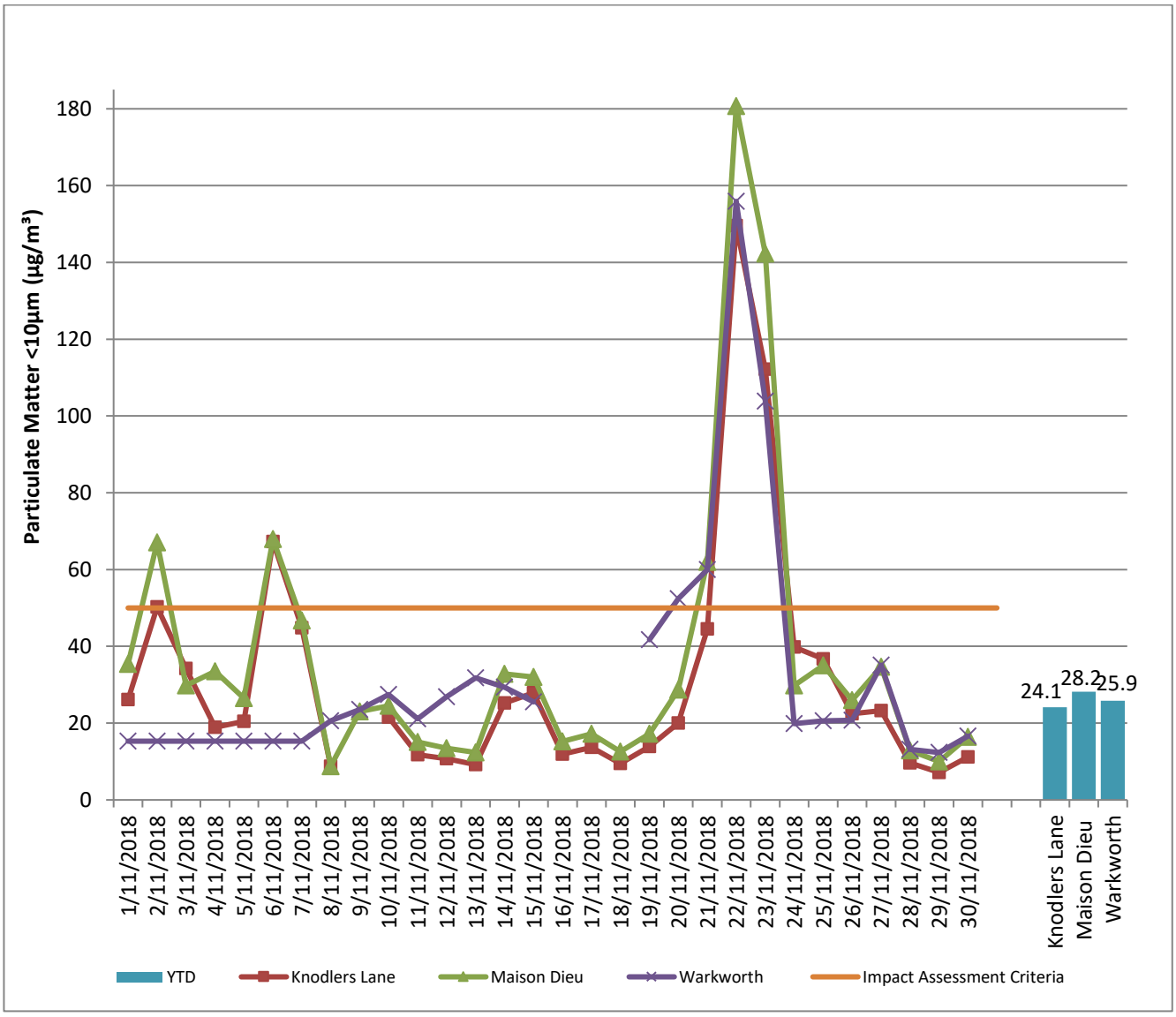

Figure 9: Real Time PM_{10} 24hr average and YTD average – November 2018

Table 2: Real-time PM10 Investigation Results

Date	Site	Total Measured Result (µg/m3)	Estimated contribution from HVO (µg/m3 / %)	Discussion
2/11/2018	Maison Dieu TEOM	67.0	26.2 µg/m3 Or 39.1%	An internal investigation determined HVO maximum potential contribution to be in the order of 26.2ug/m3 or 39.1% of the total measured based on prevailing wind conditions and upwind TEOM monitoring results.
2/11/2018	Knodlers Lane TEOM	50.3	9.4 µg/m3 Or 18.8%	An internal investigation determined HVO maximum potential contribution to be in the order of 9.4ug/m3 or 18.8% of the total measured based on prevailing wind conditions and upwind TEOM monitoring results.
6/11/2018	Maison Dieu TEOM	67.9	23.5 µg/m3 Or 34.6%	An internal investigation determined HVO maximum potential contribution to be in the order of 23.5ug/m3 or 34.6% of the total measured based on prevailing wind conditions and upwind TEOM monitoring results.
6/11/2018	Knodlers Lane TEOM	67.3	22.9 µg/m3 Or 34.0%	An internal investigation determined HVO maximum potential contribution to be in the order of 22.9ug/m3 or 34.0% of the total measured based on prevailing wind conditions and upwind TEOM monitoring results.
20/11/2018	Warkworth TEOM	52.4	5.1 µg/m3 Or 9.8%	Wind direction on this day was generally not from the direction of HVO. Approximately 6.3hrs of the day experienced wind blowing towards the monitor from HVO. HVO contribution during this period was calculated to be 5.1 µg/m3 or 9.8% of the total measured result based on prevailing winds and upwind TEOM monitoring results.

21/11/2018	Warkworth TEOM	60.0	18.6 µg/m3 Or 31.0%	An internal investigation determined HVO maximum potential contribution to be in the order of 18.6ug/m3 or 31.0% of the total measured based on prevailing wind conditions and upwind TEOM monitoring results.
21/11/2018	Maison DIeu	62.0	20.6 µg/m3 Or 33.2%	An internal investigation determined HVO maximum potential contribution to be in the order of 20.6ug/m3 or 33.2% of the total measured based on prevailing wind conditions and upwind TEOM monitoring results.
22/11/2018	Warkworth TEOM	155.9	44.6 µg/m3 Or 28.6%	An internal investigation determined HVO maximum potential contribution to be in the order of 44.6ug/m3 or 28.6% of the total measured based on prevailing wind conditions and upwind TEOM monitoring results.
22/11/2018	Maison Dieu TEOM	180.7	69.4 µg/m3 Or 38.4%	An internal investigation determined HVO maximum potential contribution to be in the order of 69.4ug/m3 or 38.4% of the total measured based on prevailing wind conditions and upwind TEOM monitoring results.
22/11/2018	Knodlers Lane TEOM	149.6	38.3 µg/m3 Or 25.6%	An internal investigation determined HVO maximum potential contribution to be in the order of 38.3ug/m3 or 25.6% of the total measured based on prevailing wind conditions and upwind TEOM monitoring results.
23/11/2018	Masion Dieu TEOM	142.3	71.4 µg/m3 Or 50.2%	An internal investigation determined HVO maximum potential contribution to be in the order of 71.4ug/m3 or 50.2% of the total measured based on prevailing wind conditions and upwind TEOM monitoring results.
23/11/2018	Warkworth TEOM	103.8	33.0µg/m3 Or 31.7%	Although average wind direction on this day was out of the arc of influence, wind was generally from the direction of HVO to the monitor, as such an internal investigation determined HVO maximum potential contribution to be in the order of

				33.0ug/m3 or 31.7% of the total measured based on prevailing wind conditions and upwind TEOM monitoring results.
23/11/2018	Knodlers Lane TEOM	112.2	41.3 µg/m3 Or 36.8%	An internal investigation determined HVO maximum potential contribution to be in the order of 41.3ug/m3 or 36.8% of the total measured based on prevailing wind conditions and upwind TEOM monitoring results.

3.0 WATER QUALITY

HVO maintains a network of surface water and groundwater monitoring sites.

3.1.1 Surface Water

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

Results of monitoring on Site Dams and the Hunter River as well as other natural tributaries are provided on a quarterly basis, results will appear in the December 2018 report.

3.1.2 Site Water Use

Under water allocation licences issued by the Water NSW, HVO is permitted to extract water from the Hunter River. During the reporting period, HVO extracted 251ML of water from the Hunter River.

3.1.3 HRSTS Discharge

HVO participates in the Hunter River Salinity Trading Scheme (HRSTS), allowing 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

3.2.1 Groundwater Monitoring Results

Groundwater monitoring is undertaken on a quarterly basis in accordance with the HVO Water Management Plan and Ground Water Monitoring Programme. Results of groundwater monitoring are reported quarterly and as such will be reported in the December 2018 monthly report.

4.0 BLASTING

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 in Figure 15.

Blasting criteria are summarised in Table 3.

Table 3: Blasting Criteria

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%

4.1 Blast Monitoring Results

During November, 19 blasts were initiated at HVO Figure 10 through to Figure 14 show the blast monitoring results for the reporting period against the impact assessment criteria. The criteria are summarised in Table 3.

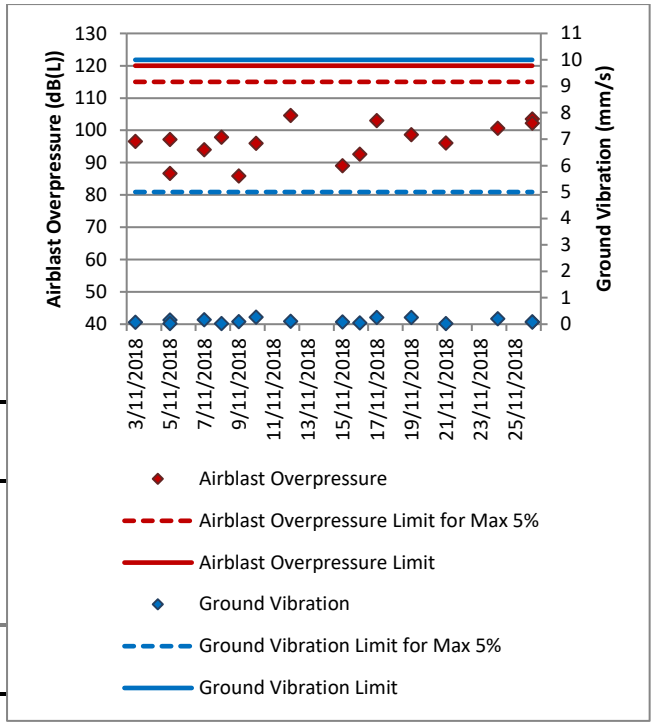

Figure 10: Moses Crossing Blast Monitoring Results – November 2018

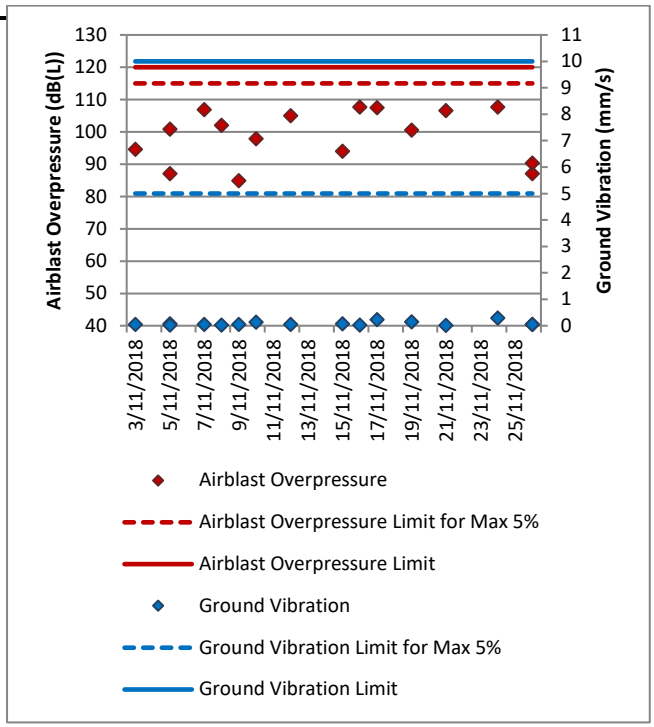

Figure 11: Jerrys Plains Blast Monitoring Results – November 2018

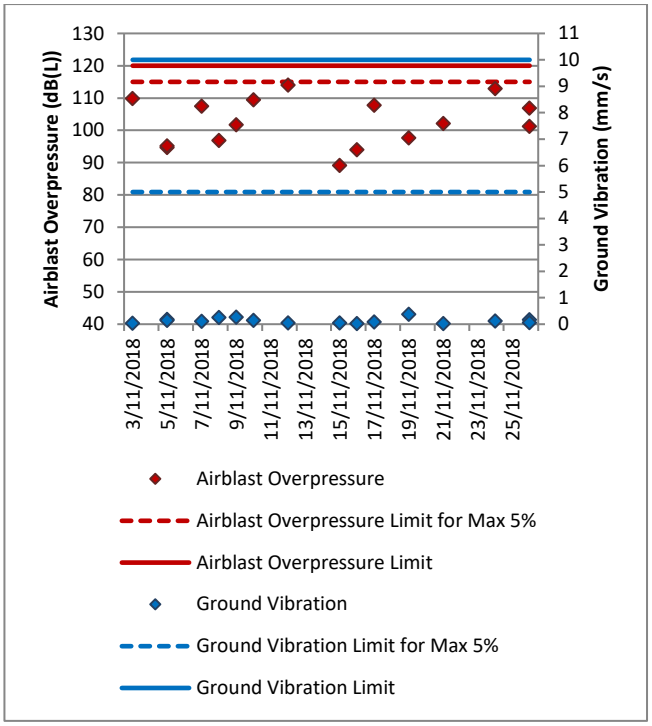

Figure 12: Maison Dieu Blast Monitoring Results – November 2018

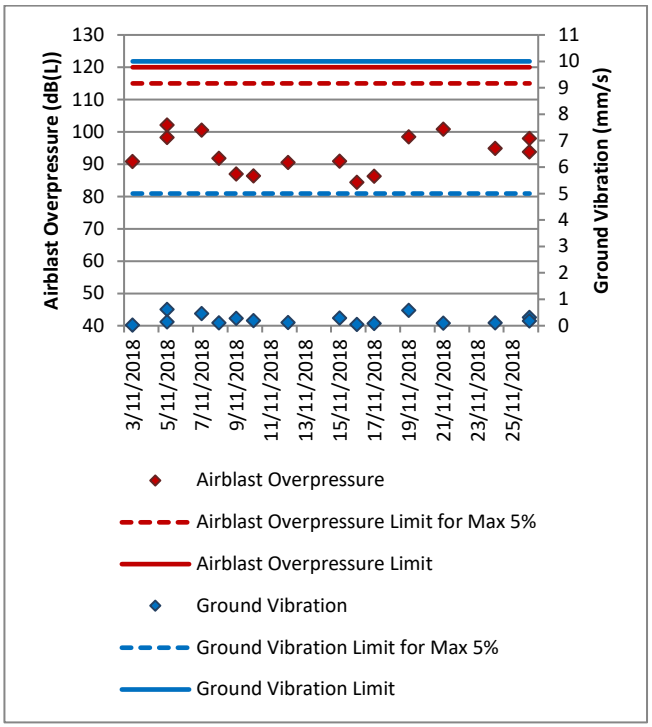

Figure 13: Warkworth Blast Monitoring Results – November 2018

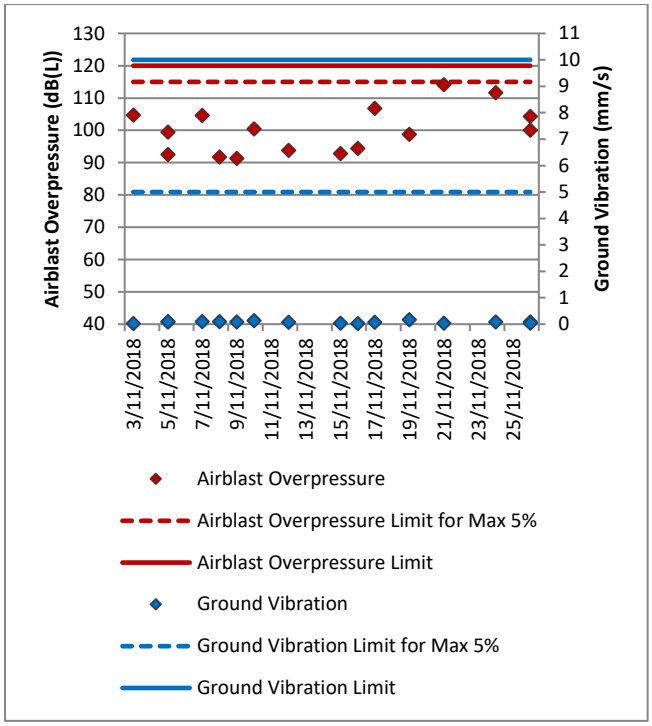

Figure 14: Knodlers Lane Blast Monitoring Results – November 2018

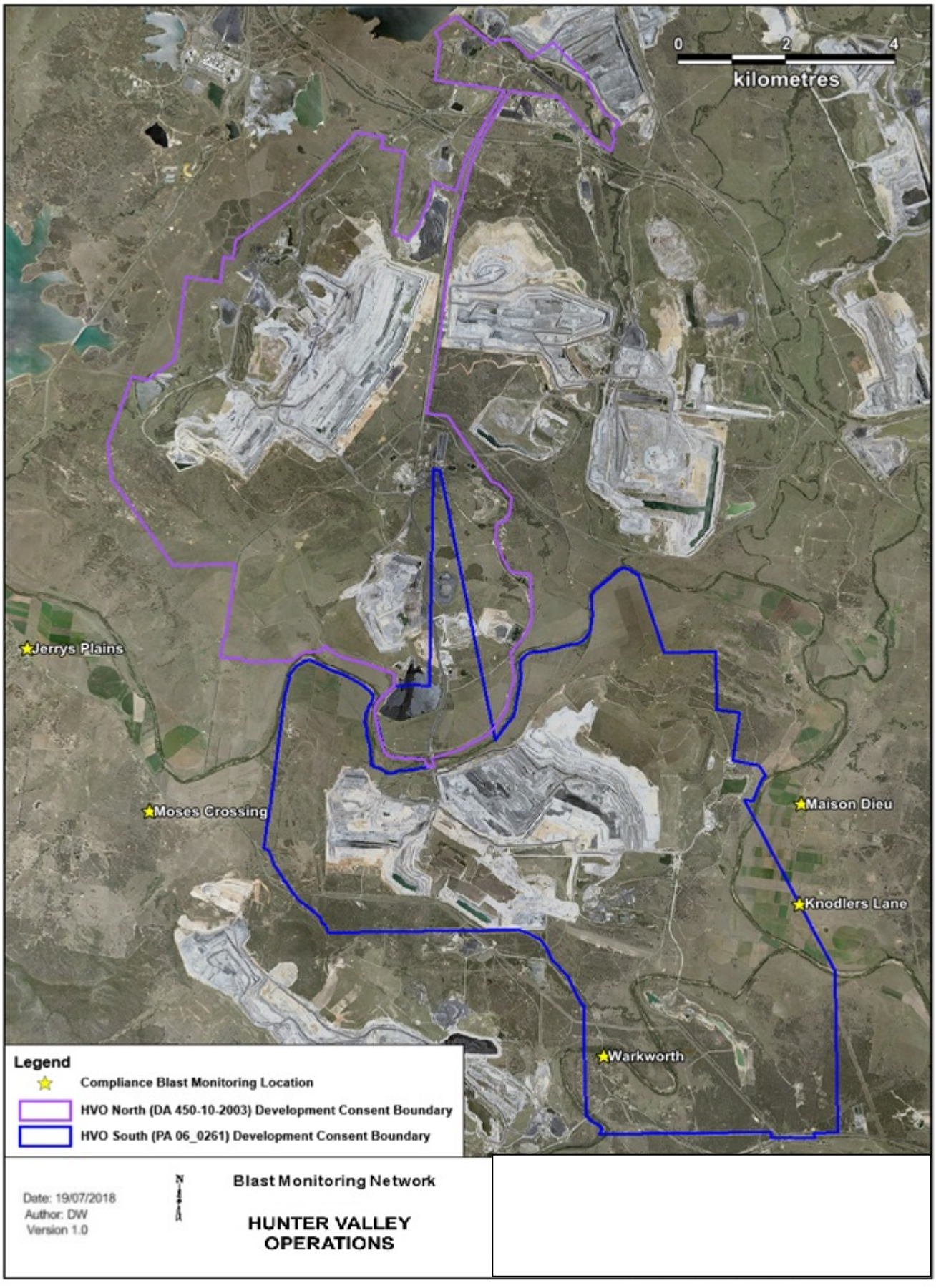

Figure 15: Blast Monitoring Location Plan

5.0 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 16.

5.1 Attended Noise Monitoring Results

Attended monitoring was conducted at receiver locations surrounding HVO on the night of 1-2 November 2018. Monitoring results are detailed in Table 4 to Table 9 . During November attended noise monitoring, noise levels complied with the relevant development consent noise limits at all monitoring locations.

Table 4: $L_{Aeq,\ 15\ minute}$ HVO South - Impact Assessment Criteria – November 2018

Location	Date and Time	Wind Speed (m/s)[1]	VTG °C/100m [1]	Criterion dB (A)	Criterion Applies?[2]	HVO South L_{Aeq} dB[3,4]	Exceedance[4, 5]
Knodlers Lane	1/11/2018 21:42	2.1	3.0	37	No	33	NA
Maison Dieu	1/11/2018 21:21	2.0	0.5	37	Yes	<30	Nil
Shearers Lane	1/11/2018 21:00	2.1	-1.0	41	Yes	IA	Nil
Kilburnie South	1/11/2018 23:02	1.6	0.5	36	Yes	IA	Nil
Jerrys Plains Village	1/11/2018 21:23	2.0	0.5	35	Yes	IA	Nil
Jerrys Plains East	1/11/2018 21:00	2.1	-1.0	35	Yes	IA	Nil
Long Point	1/11/2018 23:07	2.0	0.5	35	Yes	IA	Nil
HVGC	1/11/2018 23:43	2.0	0.5	55	Yes	37[6]	Nil

Notes:
1. Atmospheric data is sourced from the HVO Cheshunt weather station(MTW Charlton Ridge for Long Point) using logged meteorological data;
2. Assumed 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). Criterion may or may not apply due to rounding of meteorological data values;
3. Estimated or measured LAeq,15minute attributed to HVO South Pit Area;
4. Bold results in red indicate exceedance of criteria;
5. NA in exceedance column means atmospheric conditions outside specified in approval and so criterion is not applicable;
6. Result includes the application of a low frequency penalty determined in Table 4.2 of attended monitoring report.

Table 5: $L_{Aeq,\ 15\ minute}$ HVO South - Land Acquisition Criteria – November 2018

Location	Date and Time	Wind Speed (m/s)[1]	VTG °C/100m[1]	Criterion dB (A)	Criterion Applies?[2]	HVO South L_{Aeq} dB[3,4]	Exceedance[4,5]
Knodlers Lane	1/11/2018 21:42	2.1	3.0	41	No	33	NA
Maison Dieu	1/11/2018 21:21	2.0	0.5	41	Yes	<30	Nil
Shearers Lane	1/11/2018 21:00	2.1	-1.0	41	Yes	IA	Nil
Kilburnie South	1/11/2018 23:02	1.6	0.5	41	Yes	IA	Nil
Jerrys Plains Village	1/11/2018 21:23	2.0	0.5	40	Yes	IA	Nil
Jerrys Plains East	1/11/2018 21:00	2.1	-1.0	40	Yes	IA	Nil
Long Point	1/11/2018 23:07	2.0	0.5	40	Yes	IA	Nil
HVGC	1/11/2018 23:43	2.0	0.5	NA	NA	37[6]	NA

Notes:
1. Atmospheric data is sourced from the HVO Cheshunt weather station (or MTW Charlton Ridge for Long Point) using logged meteorological data;
2. Assumed 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). Criterion may or may not apply due to rounding of meteorological data values;
3. Estimated or measured LAeq,15minute attributed to HVO South Pit Area;
4. Bold results in red indicate exceedance of criteria;
5. NA in exceedance column means atmospheric conditions outside specified in approval and so criterion is not applicable;
6. Result includes the application of a low frequency penalty determined in Table 4.2 of attended monitoring report.

Table 6: $L_{A1,\ 1minute}$ HVO South - Impact Assessment Criteria – November 2018

Location	Date and Time	Wind Speed (m/s)[1]	VTG °C/100m[1]	Criterion dB (A)	Criterion Applies?[2]	HVO South $L_{A1,\ 1min}$ dB[3,4]	Exceedance[4,5]
Knodlers Lane	1/11/2018 21:42	2.1	3.0	45	No	37	NA
Maison Dieu	1/11/2018 21:21	2.0	0.5	45	Yes	33	Nil
Shearers Lane	1/11/2018 21:00	2.1	-1.0	45	Yes	IA	Nil
Kilburnie South	1/11/2018 23:02	1.6	0.5	45	Yes	IA	Nil
Jerrys Plains Village	1/11/2018 21:23	2.0	0.5	45	Yes	IA	Nil
Jerrys Plains East	1/11/2018 21:00	2.1	-1.0	45	Yes	IA	Nil
Long Point	1/11/2018 23:07	2.0	0.5	45	Yes	IA	Nil
HVGC	1/11/2018 23:43	2.0	0.5	NA	NA	42	NA

Notes:
1. Atmospheric data is sourced from the HVO Cheshunt weather station (or MTW Charlton Ridge for Long Point) using logged meteorological data;
2. Assumed noise emission limits (see Section 2.3 of this report for more information) 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). Criterion may or may not apply due to rounding of meteorological data values;
3. These are results for HVO South Pit Area in the absence of all other noise sources;
4. Bold results in red indicate exceedance of criteria; and
5. NA in exceedance column means atmospheric conditions outside specified in approval and so criterion is not applicable;

Table 7: $L_{Aeq,\ 15minute}$ HVO North – Impact Assessment Criteria – November 2018

Location	Date and Time	Wind Speed (m/s)[1]	VTG °C/100m[1]	Criterion dB (A)	Criterion Applies?[2]	HVO North L_{Aeq} dB[3,4]	Exceedance[4,5]
Knodlers Lane	1/11/2018 21:42	1.4	0.5	35	Yes	IA	Nil
Maison Dieu	1/11/2018 21:21	1.2	0.5	35	Yes	IA	Nil
Shearers Lane	1/11/2018 21:00	0.8	3.0	35	Yes	IA	Nil
Kilburnie South	1/11/2018 23:02	1.6	0.5	39	Yes	31	Nil
Jerrys Plains Village	1/11/2018 21:23	1.2	0.5	36	Yes	32	Nil
Jerrys Plains East	1/11/2018 21:00	0.8	3.0	39	Yes	<25	Nil
Long Point	1/11/2018 23:07	2.0	0.5	35	Yes	IA	Nil
HVGC	1/11/2018 23:43	0.2	3.0	NA	NA	IA	NA

Notes:
1. Atmospheric data is sourced from the HVO Corp. weather station (or MTW Charlton Ridge for Long Point) using logged meteorological data;
2. 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. Criterion may or may not apply due to rounding of meteorological data values;
3. Estimated or measured LAeq,15minute attributed to HVO North Pit Area;
4. Bold results in red indicate exceedance of criteria; and
5. NA in exceedance column means atmospheric conditions outside specified in approval and so criterion is not applicable.

Table 8: $L_{Aeq,15minute}$ HVO North - Land Acquisition Criteria – November 2018

Location	Date and Time	Wind Speed (m/s)[1]	VTG °C/100m[1]	Criterion dB (A)	Criterion Applies?[2]	HVO North L_{Aeq} dB[3,4]	Exceedance[4,5]
Knodlers Lane	1/11/2018 21:42	1.4	0.5	41	Yes	IA	Nil
Maison Dieu	1/11/2018 21:21	1.2	0.5	41	Yes	IA	Nil
Shearers Lane	1/11/2018 21:00	0.8	3.0	41	Yes	IA	Nil
Kilburnie South	1/11/2018 23:02	1.6	0.5	41	Yes	31	Nil
Jerrys Plains Village	1/11/2018 21:23	1.2	0.5	41	Yes	32	Nil
Jerrys Plains East	1/11/2018 21:00	0.8	3.0	41	Yes	<25	Nil
Long Point	1/11/2018 23:07	2.0	0.5	41	Yes	IA	Nil
HVGC	1/11/2018 23:43	0.2	3.0	NA	NA	IA	NA

Notes:
1. Atmospheric data is sourced from the HVO Corp. weather station (or MTW Charlton Ridge for Long Point) using logged meteorological data;
2. 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. Criterion may or may not apply due to rounding of meteorological data values;
3. Estimated or measured LAeq,15minute attributed to HVO North Pit Area;
4. Bold results in red indicate exceedance of criteria;
5. NA in exceedance column means atmospheric conditions outside specified in approval and so criterion is not applicable;

Table 9: $L_{A1,\ 1Minute}$ HVO North - Impact Assessment Criteria – November 2018

Location	Date and Time	Wind Speed (m/s)[1]	VTG °C/100m[1]	Criterion dB (A)	Criterion Applies?[2]	HVO North $L_{A1,\ 1min}$ dB[3,4]	Exceedance[4,5]
Knodlers Lane	1/11/2018 21:42	1.4	0.5	46	Yes	IA	Nil
Maison Dieu	1/11/2018 21:21	1.2	0.5	46	Yes	IA	Nil
Shearers Lane	1/11/2018 21:00	0.8	3.0	46	Yes	IA	Nil
Kilburnie South	1/11/2018 23:02	1.6	0.5	46	Yes	36	Nil
Jerrys Plains Village	1/11/2018 21:23	1.2	0.5	46	Yes	42	Nil
Jerrys Plains East	1/11/2018 21:00	0.8	3.0	46	Yes	28	Nil
Long Point	1/11/2018 23:07	2.0	0.5	46	Yes	IA	Nil
HVGC	1/11/2018 23:43	0.2	3.0	NA	NA	IA	Nil

Notes:
1. Atmospheric data is sourced from the HVO Corp. (or MTW Charlton Ridge for Long Point) weather station using logged meteorological data;
2. 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. Criterion may or may not apply due to rounding of meteorological data values;
3. These are results for HVO North Pit Area in the absence of all other noise sources;
4. Bold results in red indicate exceedance of criteria;
5. NA in exceedance column means atmospheric conditions outside specified in approval and so criterion is not applicable
.

5.2 NPfI 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. During November 2018 one measurement at the HVGC required the penalty to be applied however remained compliant. The assessment for low frequency noise is shown in Table 10.

Table 10: Low Frequency Noise Assessment – November 2018

Location	Date and Time	Measured Site Only LA_{eq} dB (Sth/Nth)	Site Only LC_{eq} dB[1] (Sth/Nth)	Site Only LC_{eq}-LA_{eq} dB [1,2] (Sth/Nth)	Result Max exceedance of ref spectrum dB[1,3] (Sth/Nth)	Penalty dB(A) [1]
Knodlers Lane	1/11/2018 21:42	33/IA	NA/NA	NA/NA	NA/NA	NA/NA
Maison Dieu	1/11/2018 21:21	<30/IA	NA/NA	NA/NA	NA/NA	NA/NA
Shearers Lane	1/11/2018 21:00	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA
Kilburnie South	1/11/2018 23:02	IA/31	NA/NA	NA/NA	NA/NA	NA/NA
Jerrys Plains Village	1/11/2018 21:23	IA/32	NA/NA	NA/NA	NA/NA	NA/NA
Jerrys Plains East	1/11/2018 21:00	IA/<25	NA/NA	NA/NA	NA/NA	NA/NA
Long Point	1/11/2018 23:07	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA
HVGC	1/11/2018 23:43	35/IA	54/NA	19/NA	1/NA	2/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 as detailed in Sections 2.4 and 3.3 of the attended noise report;
3. As per NPfI, compare measured spectrum against reference spectrum to determine if the low frequency modifying factor is triggered and application of penalty is required.

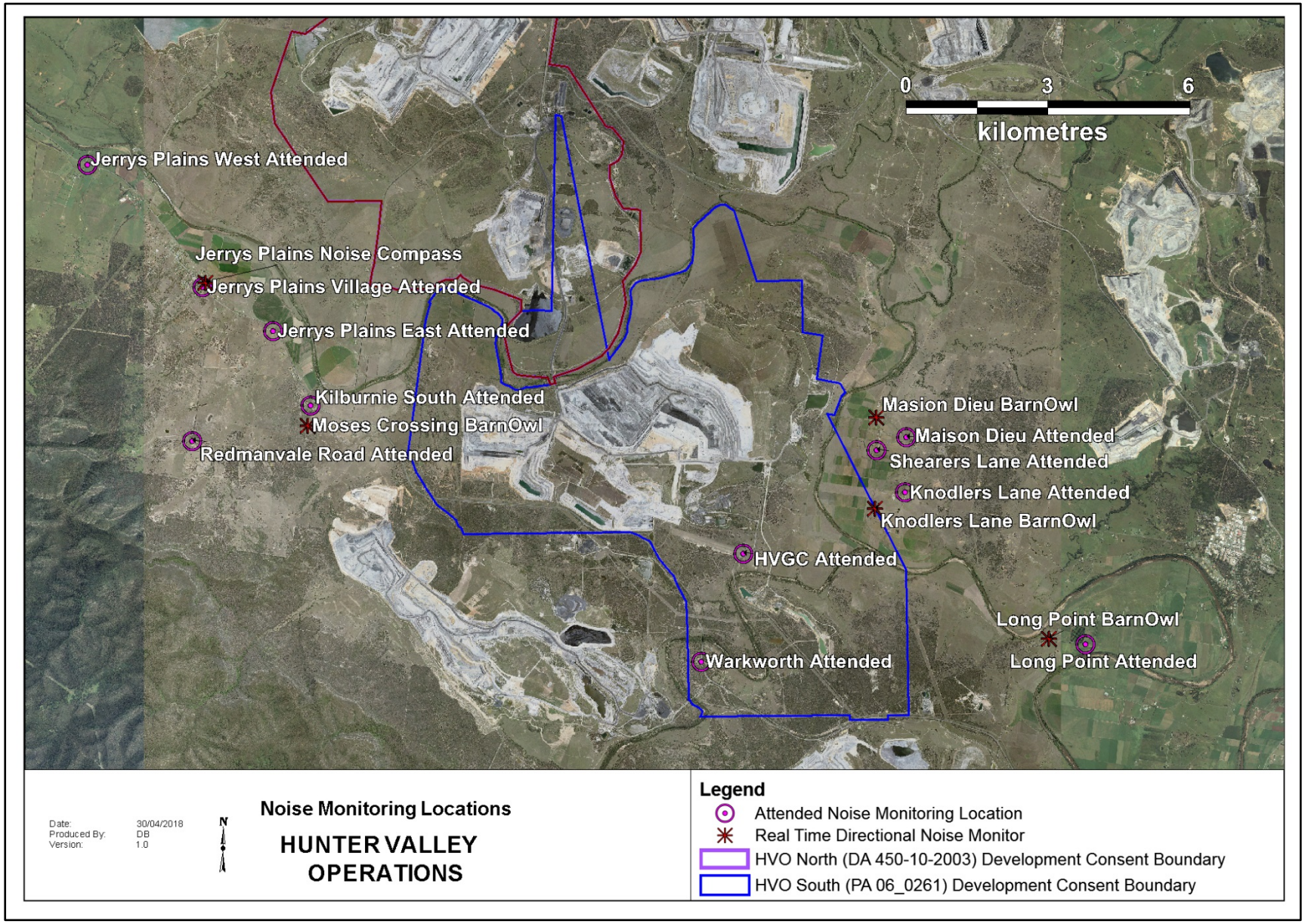

Figure 16: Noise Monitoring Location Plan

5.2.1 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.

It should be noted that this assessment does not compliment or conflict with attended noise monitoring detailed in Section 5.1, and that real time monitoring data includes non-mine noise sources such as dogs, cows, or more commonly, road traffic.

6.0 OPERATIONAL DOWNTIME

During November, a total of 2211 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 17.

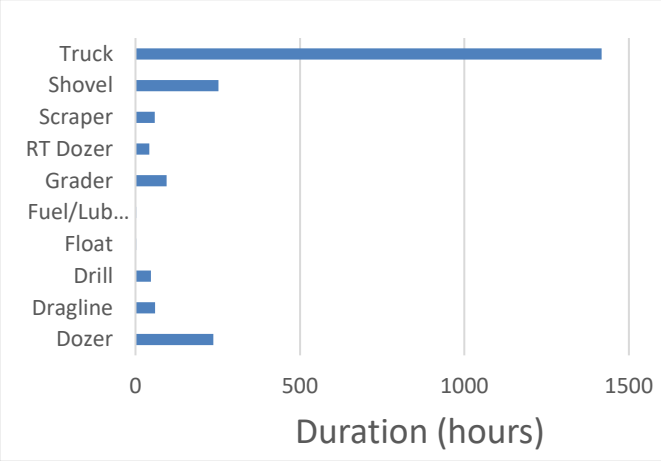

Figure 17: Operational Downtime by Equipment Type – November 2018

7.0 REHABILITATION

During November 4.7 Ha of land was released, 10.4 Ha of land was bulk shaped and 12.5 Ha of land was rehabilitated. Year to date progress can be viewed in Figure 18.

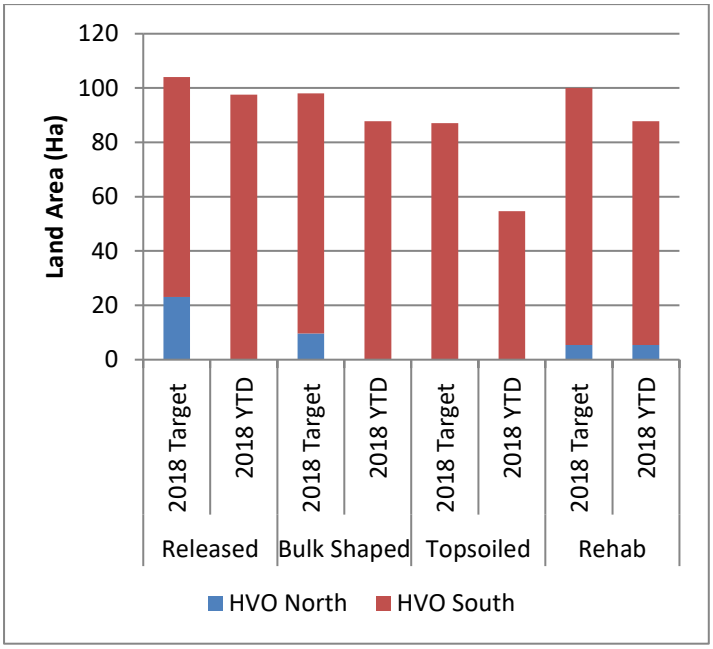

Figure 18: Rehabilitation YTD – November 2018

8.0 COMPLAINTS

Two complaints were received during the reporting period. Details of complaints received YTD are shown in Table 11 below.

Table 11: Complaints Summary YTD

	Noise	Dust	Blast	Lighting	Other	Total
January	-	2	4	-	-	6
February	1	-	-	-	1	2
March	-	-	-	-	-	0
April	-	-	1	-	-	1
May	4	1	2	-	-	7
June	1	-	1	-	1	3
July	-	-	2	-	-	2
August	1	-	-	-	-	1
September	1	-	-	-	-	1
October	-	-	-	-	-	0
November	-	2	-	-	-	2
December	-	-	-	-	-	-
Total	8	5	10	-	2	25

9.0 ENVIRONMENTAL INCIDENTS

During the reporting period there were three recordable environmental incidents;

11 November 2018 – Mine water leak from secondary floc plant

The North Void secondary floc plant water storage tanks overflowed due to a faulty auto valve that failed to close when tanks where full. The water was all contained onsite. Immediate actions included isolation of the leaking tank and repair of the faulty valve.

17 November 2018 – GDP non compliance

As part of replacement of 330KV high voltage, transmission tower being performed by the easement holder in the Goat West Rehabilitation area a transmission tower foundation material stockpile was established outside the ground disturbance boundary defined in the Ground Disturbance Permit (GDP). The HVO Environment Team inspected the area and had installed sediment control measures around the material.

21 November 2018 – Oil Spill from Truck

Truck 407 was identified in West Pit to have a blown a steering hose causing a minor oil leak. The oil was contained and cleaned up and the truck was taken for repairs.

Appendix A: Meteorological Data

Table 12: Meteorological Data - HVO Corporate Meteorological Station – November 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)
1/11/2018	34	22	67	18	1048	204	2.4	0.0
2/11/2018	35	22	65	10	1483	297	5.7	0.0
3/11/2018	35	16	82	14	1091	249	5.3	0.2
4/11/2018	30	15	95	23	1162	126	2.6	0.0
5/11/2018	33	13	100	11	1365	226	2.1	0.0
6/11/2018	36	17	63	9	1303	236	3.1	0.0
7/11/2018	29	15	100	25	492	276	3.6	9.4
8/11/2018	22	8	100	23	1368	190	2.9	7.4
9/11/2018	24	7	87	21	1225	147	1.8	0.0
10/11/2018	26	9	83	14	1356	132	2.5	0.0
11/11/2018	28	9	100	16	1047	123	2.6	0.0
12/11/2018	27	10	90	29	1029	122	3.3	0.0
13/11/2018	29	10	89	11	1292	117	2.3	0.0
14/11/2018	26	13	89	36	1064	200	1.7	0.0
15/11/2018	31	12	100	18	1271	195	3.6	4.0
16/11/2018	20	10	100	65	1182	126	3.3	0.0
17/11/2018	24	12	90	42	1518	119	3.6	0.0
18/11/2018	23	10	99	33	1563	114	4.4	0.2
19/11/2018	27	10	89	27	1267	121	3.1	0.0
20/11/2018	33	11	80	20	1160	NAN	1.9	0.0
21/11/2018	28	16	87	40	1129	NAN	5.3	0.2
22/11/2018	25	15	76	4	1215	288	7.3	0.0
23/11/2018	23	11	45	16	1357	279	7.9	0.0
24/11/2018	26	10	44	13	1164	283	5.4	0.0
25/11/2018	28	12	74	12	1548	245	4.2	0.0
26/11/2018	28	10	80	18	1445	162	2.7	0.0
27/11/2018	31	10	98	15	1369	137	2.1	0.8
28/11/2018	26	11	100	35	1496	188	3.3	52.4
29/11/2018	24	11	80	39	1677	139	3.1	0.0
30/11/2018	28	11	86	26	1537	185	1.4	0.0

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

HUNTER VALLEY OPERATIONS

Monthly Environmental Monitoring Report

Hunter Valley Operations

December 2018

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Revision History

Version No.	Person Responsible	Document Status	Date
1.0	**Environment & Community Officer**	**Draft**	**25/01/2019**
1.1	**Environment & Community Coordinator**	**Final**	**30/01/2019**

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 December to 31st December 2018.

2.0 AIR QUALITY

2.1 Meteorological Monitoring

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

2.1.1 Rainfall

Rainfall for the period is summarised in Table **1**, the 2018 trend and historical trend are shown in Figure 1.

Table 1: Monthly Rainfall HVO

2018	Monthly Rainfall (mm)	Cumulative Rainfall (mm)
December	50.6	522.2

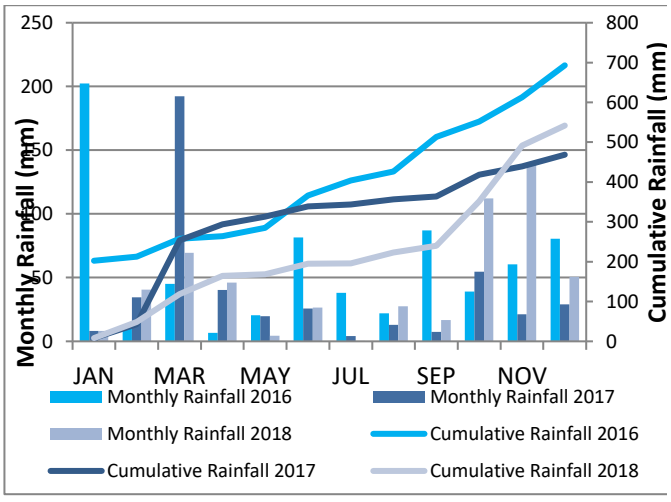

Figure 1: Rainfall Summary 2018

2.1.2 Wind Speed and Direction

South - Easterly winds were dominant during December as shown in Figure 2 (HVO Corporate) and Figure 3 (HVO Cheshunt).

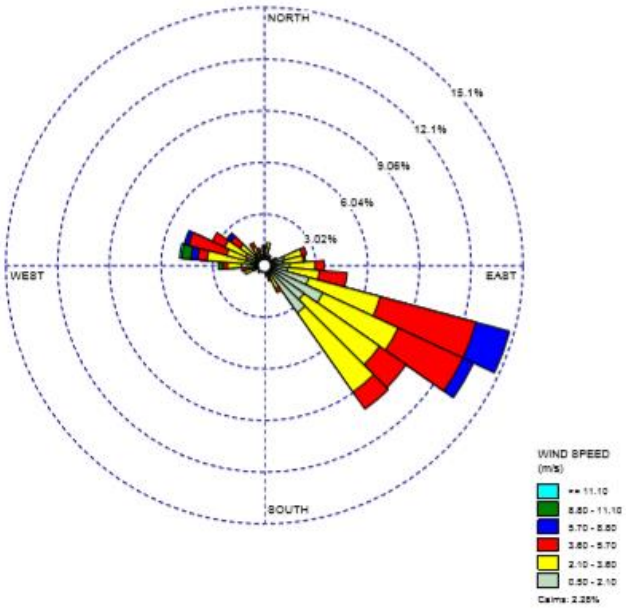

Figure 2: HVO Corporate Wind Rose – December 2018

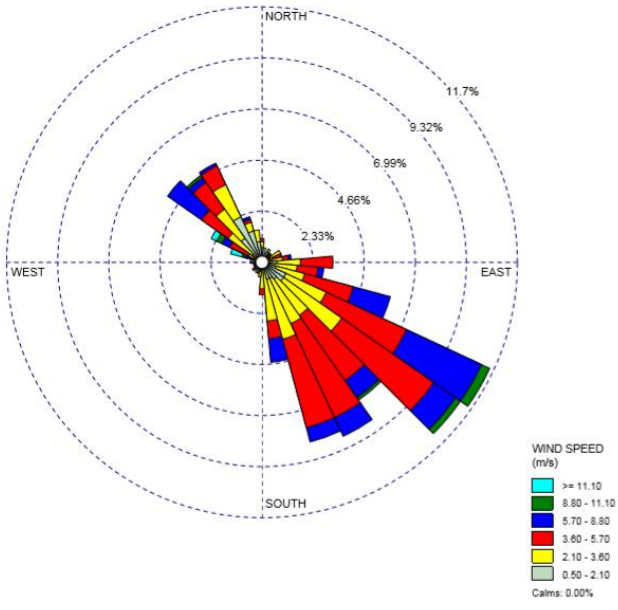

Figure 3: HVO Cheshunt Wind Rose – December 2018

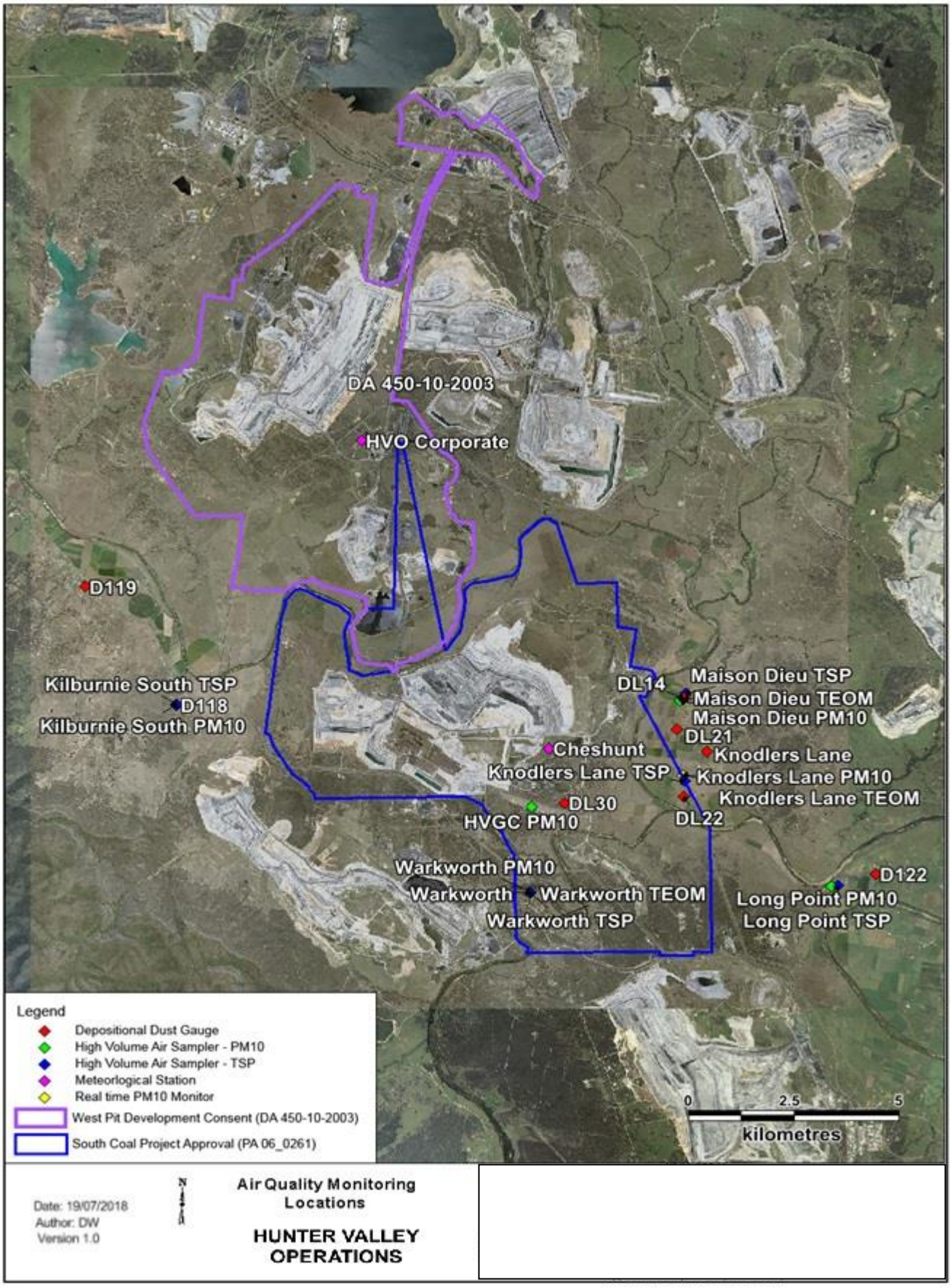

Figure 4: Air Quality Monitoring Location Plan

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, DL22, and Warkworth 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, DL22, and Warkworth monitor's result indicates no evidence to suggest that the result was contaminated and will be included in the annual average calculation.

An assessment of HVO's contribution against the long term impact assessment criteria will be provided in the 2018 Annual Review.

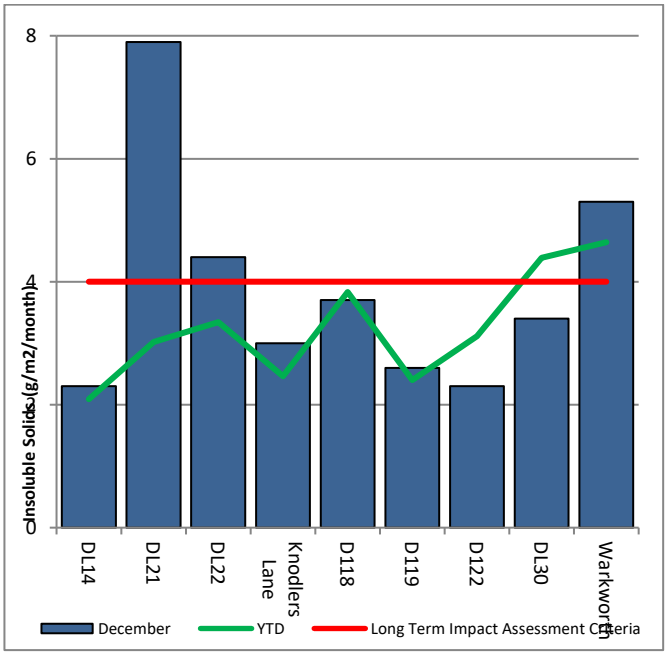

Figure 5: Depositional Dust Results – December 2018

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 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.

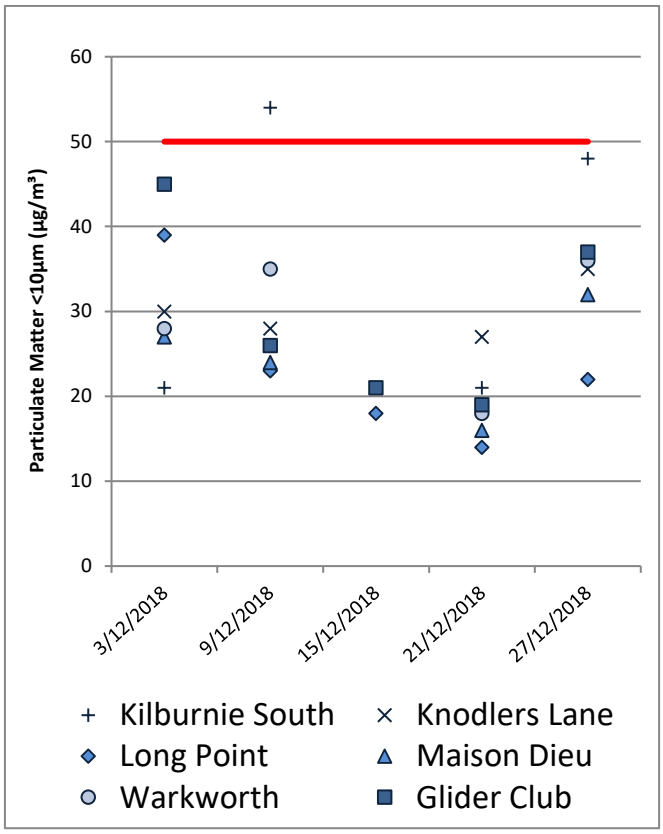

Figure 6: Individual PM_{10} Results – December 2018

The PM_{10} 24hr criterion was exceeded at Kilburnie South on 9 December. HVO's maximum contribution was calculated to be 29µg/m^3 or 53% of the measured result.

In addition, no samples were collected on 15 December at Kilburnie South, Maison Dieu and Warkworth as all ran under timer criterion due to power interruptions caused by storms activity.

Figure 7 shows the year to date annual average PM_{10} results. An assessment of HVO's contribution against the long term impact assessment criteria will be provided in the 2018 Annual Review.

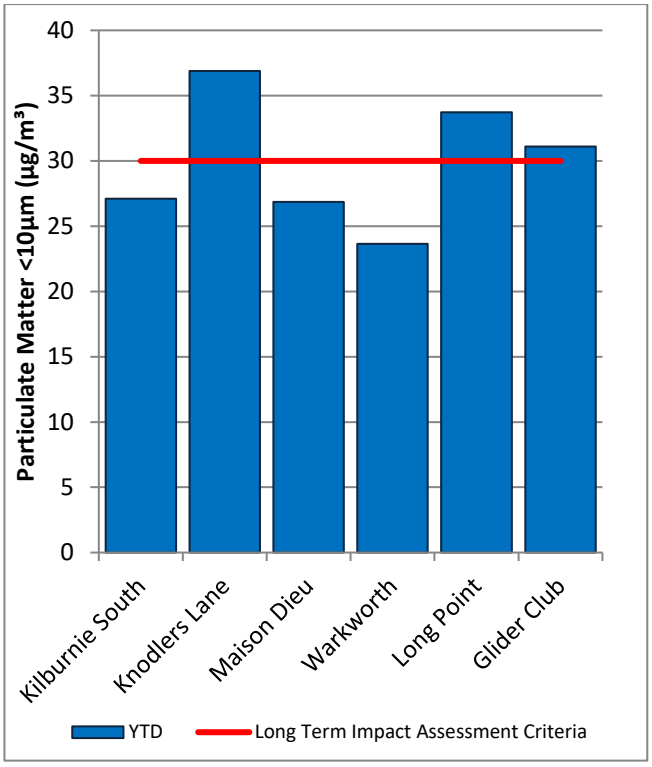

Figure 7: Year to Date Average PM_{10} – December 2018

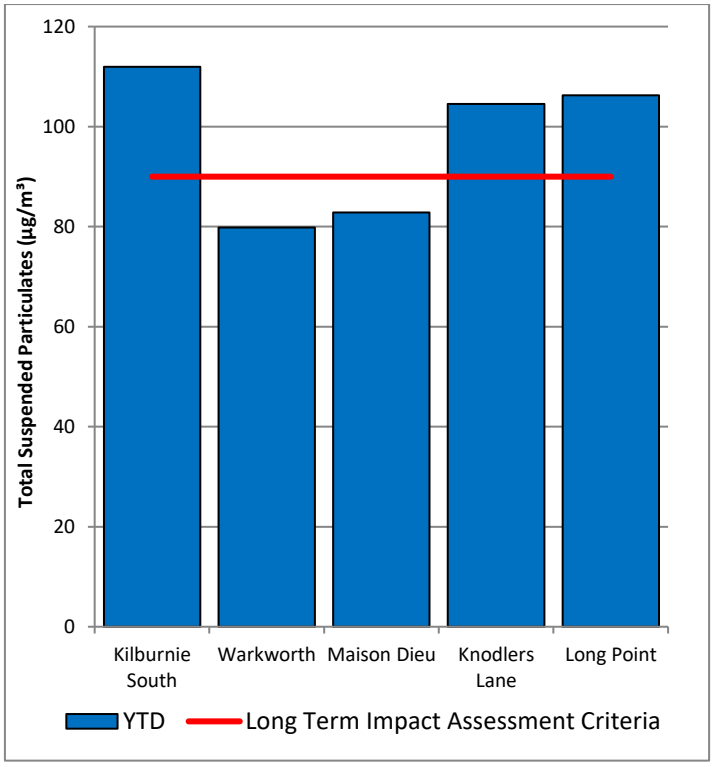

Figure 8: Year to Date Average Total Suspended Particulates – December 2018

2.3.2 TSP Results

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

An assessment of HVO's contribution against the long term impact assessment criteria will be provided in the 2018 Annual Review.

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.

Table 2 shows the exceedances for real time PM_{10} monitoring for December.

2.3.4 Real Time Alarms for Air Quality

During December the real time monitoring system generated 267 automated air quality related alarms. 117 were related to adverse weather conditions and 150 alarms relating to PM_{10}.

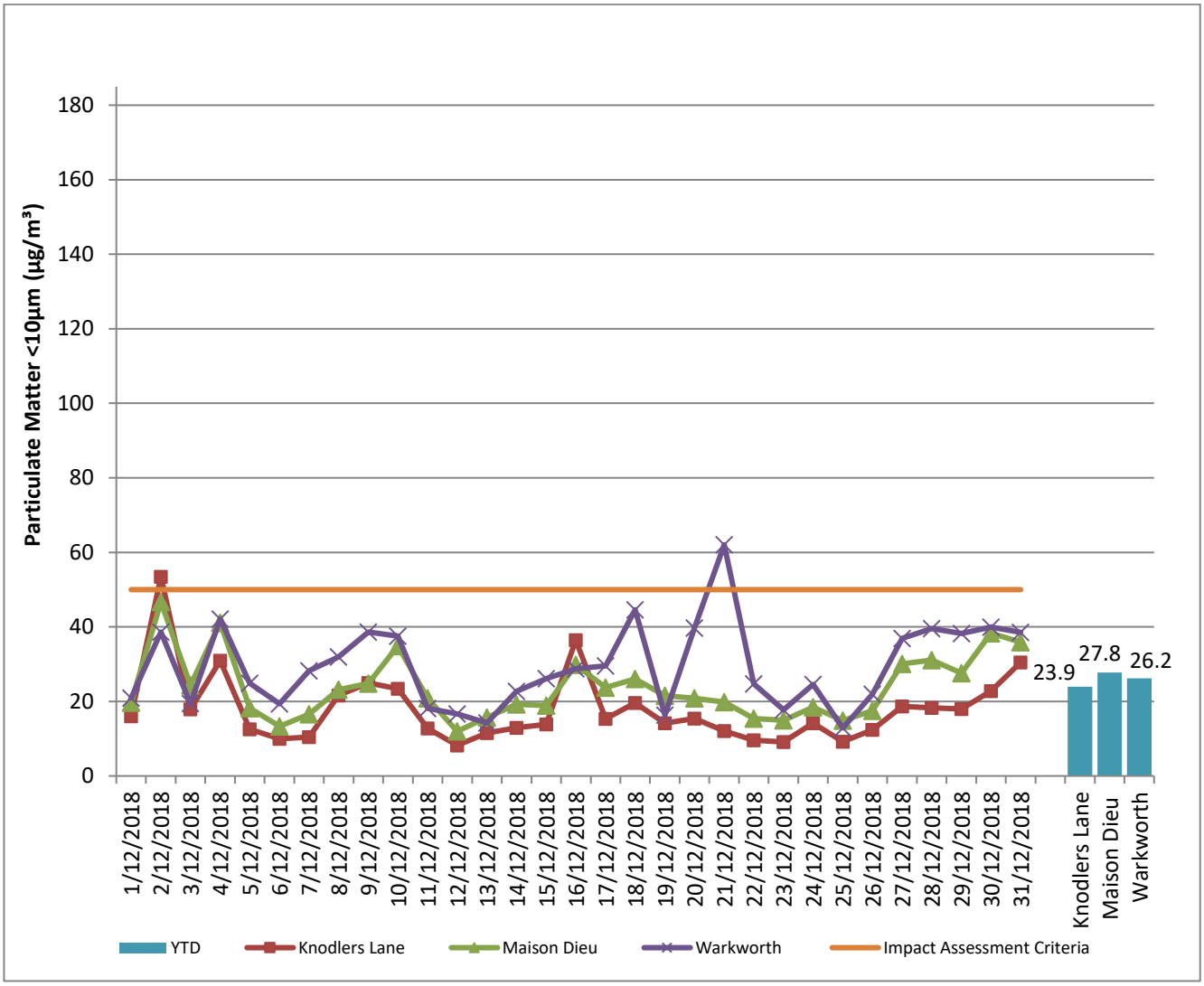

Figure 9: Real Time PM_{10} 24hr average and YTD average – December 2018

Table 2: Real-time PM10 Investigation Results

Date	Site	Total Measured Result (µg/m3)	Estimated contribution from HVO (µg/m3 / %)	Discussion
2/12/2018	Knodlers Lane TEOM	53.5	15.8µg/m3 Or 37.7%	An internal investigation determined HVO maximum potential contribution to be in the order of 15.8ug/m3 or 37.7% of the total measured based on prevailing wind conditions and upwind monitoring results.

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).

In the absence of licence or applicable ANZECC criteria, the 5th / 95th percentile of the available validated data record for a monitoring station are adopted as the basis for a water quality management guideline trigger as outlined in the Water Management Plan for Electrical Conductivity and pH. The 50mg/L ANZECC criteria has been adopted for TSS. Exceedances of these triggers for Quarter 4 2018 are detailed in Table 3

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

Figure 10 to Figure 12 show the long term surface water trend (2015- current) within HVO mine dams.

Figures 13 to 21 show the long term surface water trend (2015 – current) in surrounding watercourses

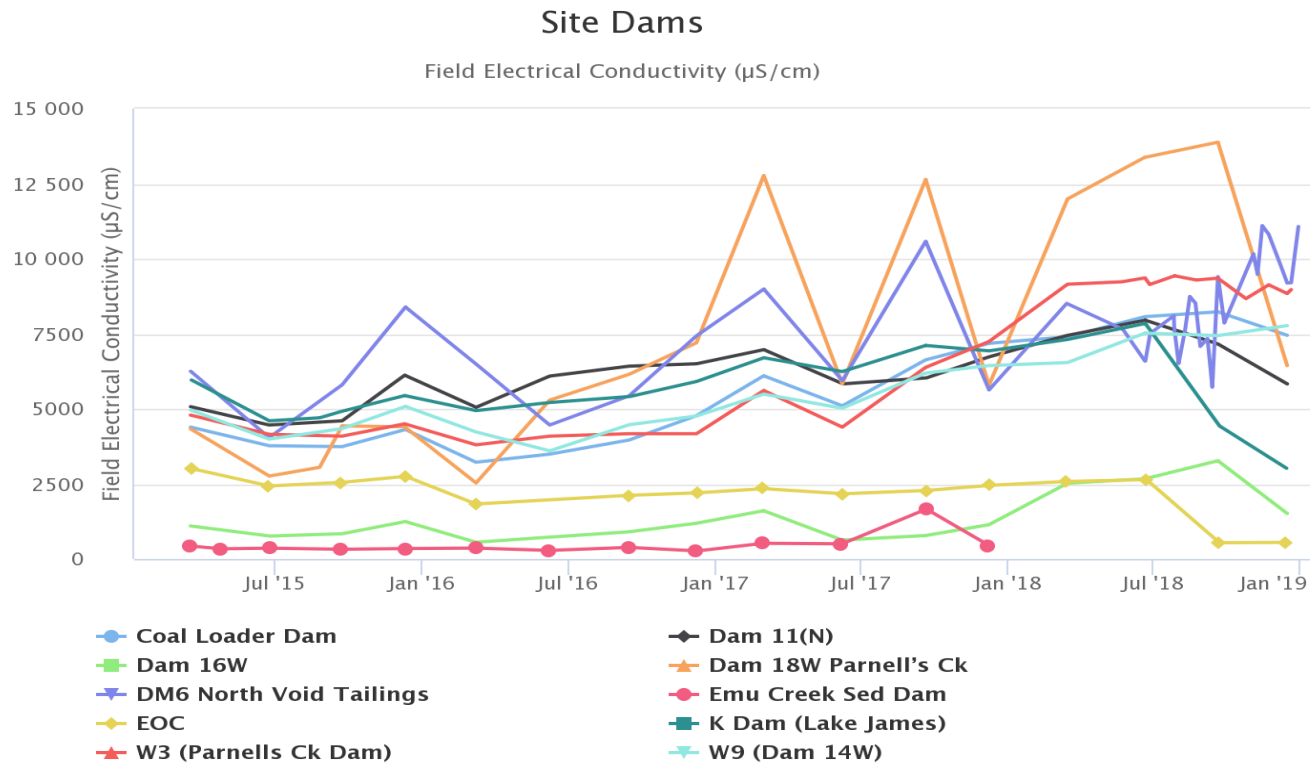

Figure 10: Site Dams Electrical Conductivity Trend – December 2018

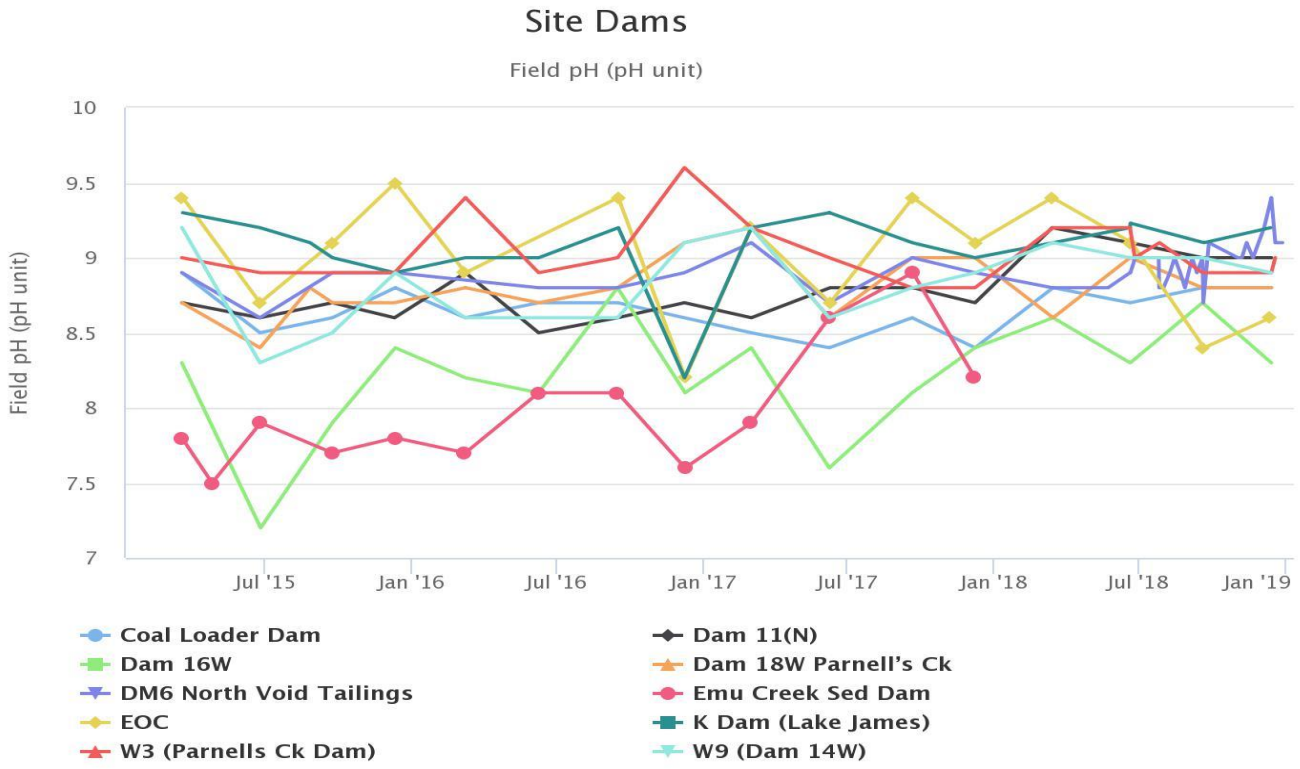

Figure 11: Site Dams pH Trend – December 2018

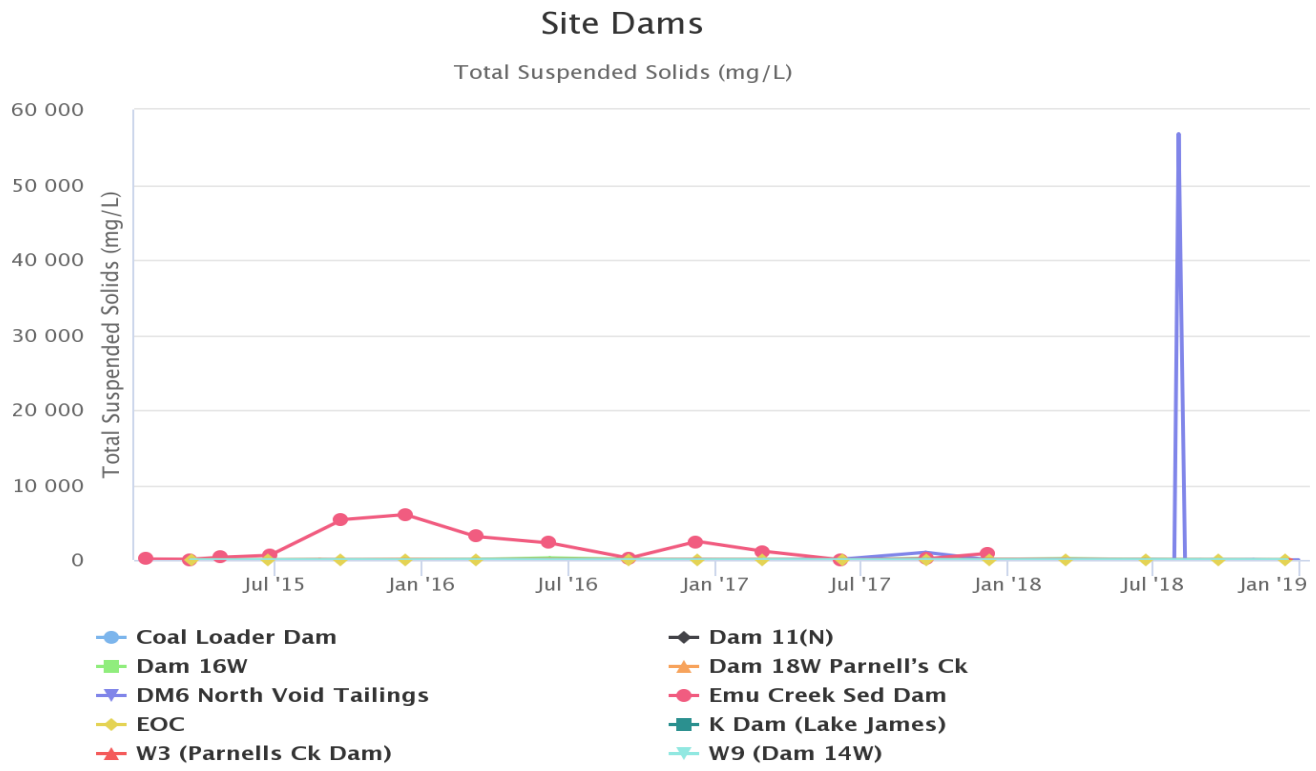

Figure 12: Site Dams Total Suspended Solids Trend – December 2018

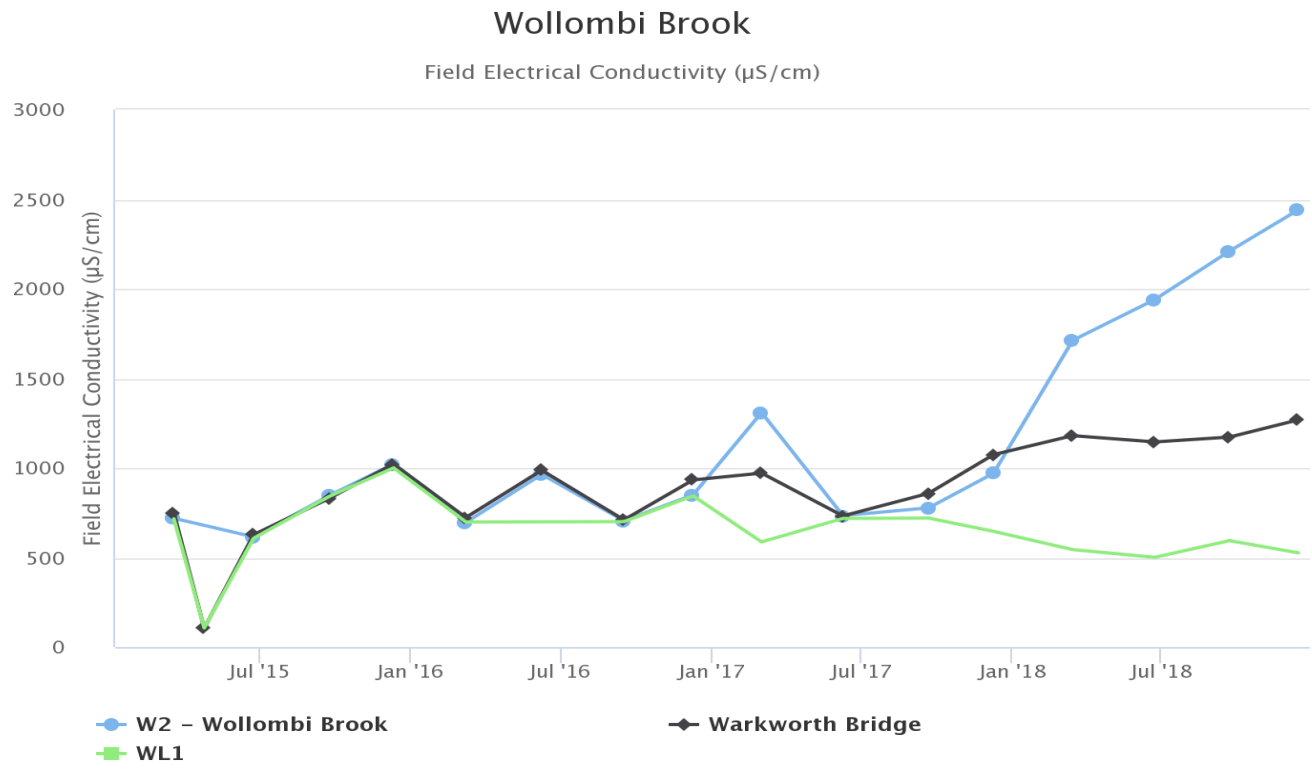

Figure 13: Wollombi Brook Electrical Conductivity Trend – December 2018

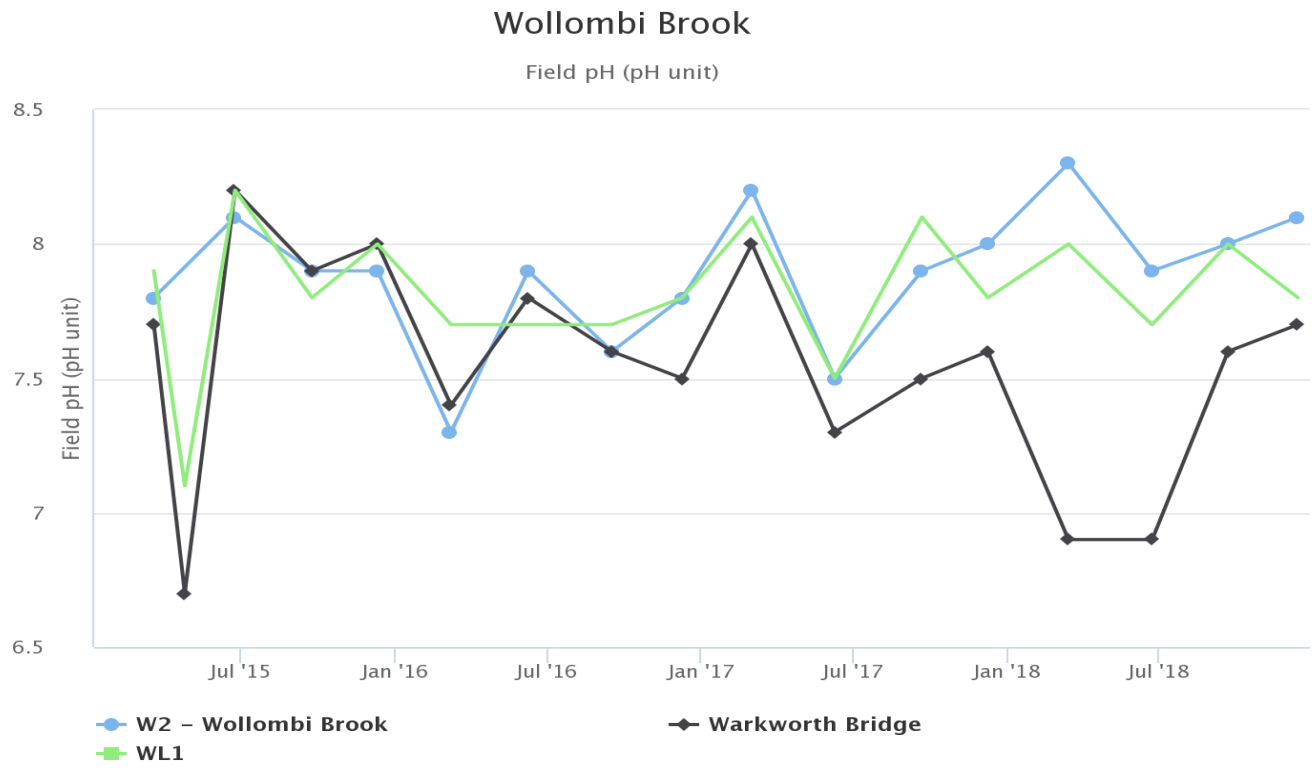

Figure 14: Wollombi Brook pH Trend – December 2018

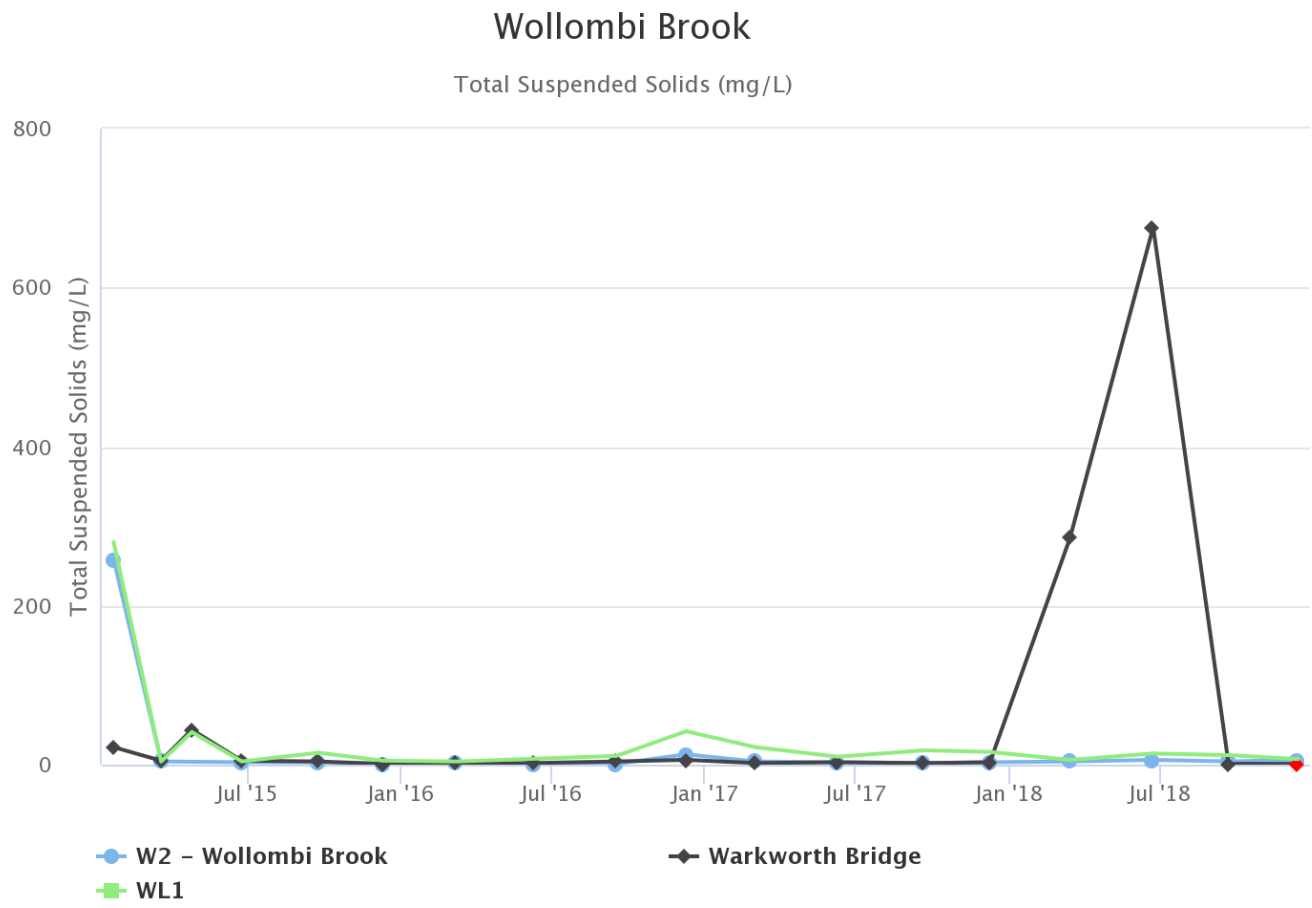

Figure 15: Wollombi Brook Total Suspended Solids Trend – December 2018

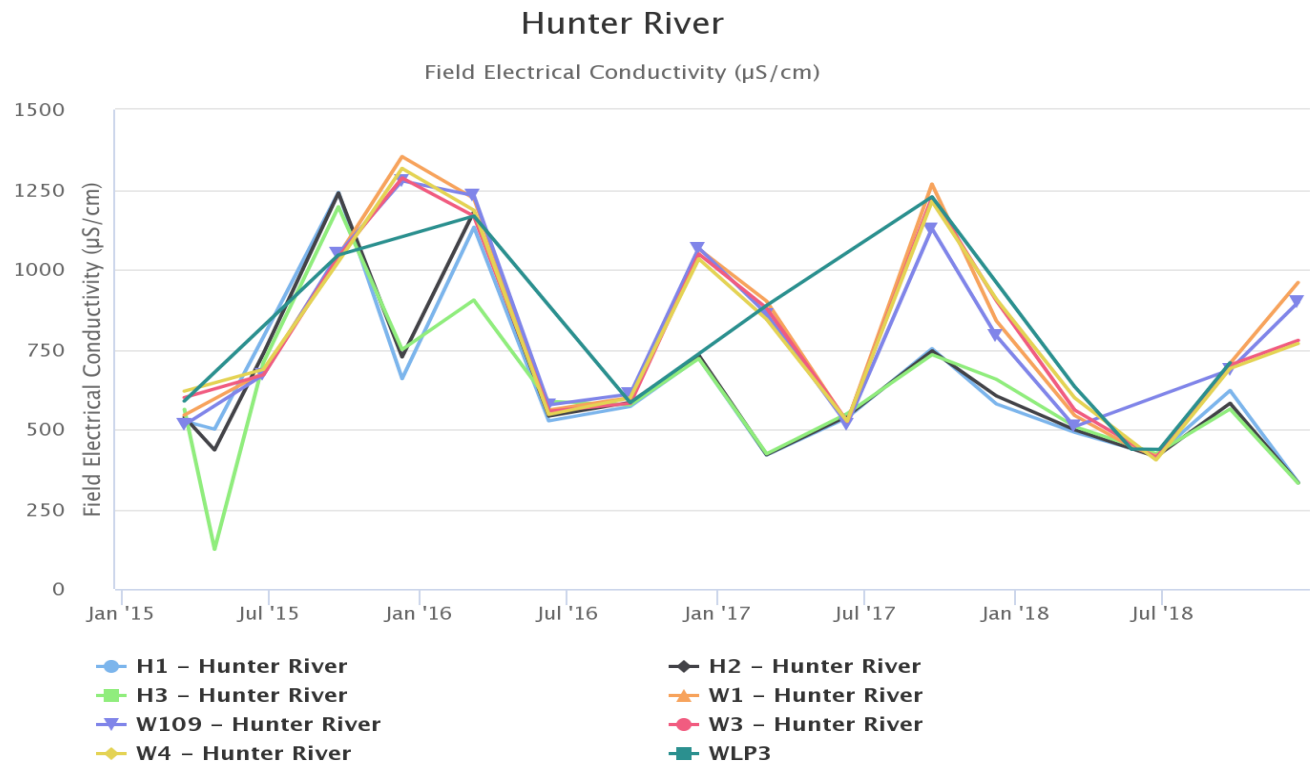

Figure 16: Hunter River Electrical Conductivity Trend – December 2018

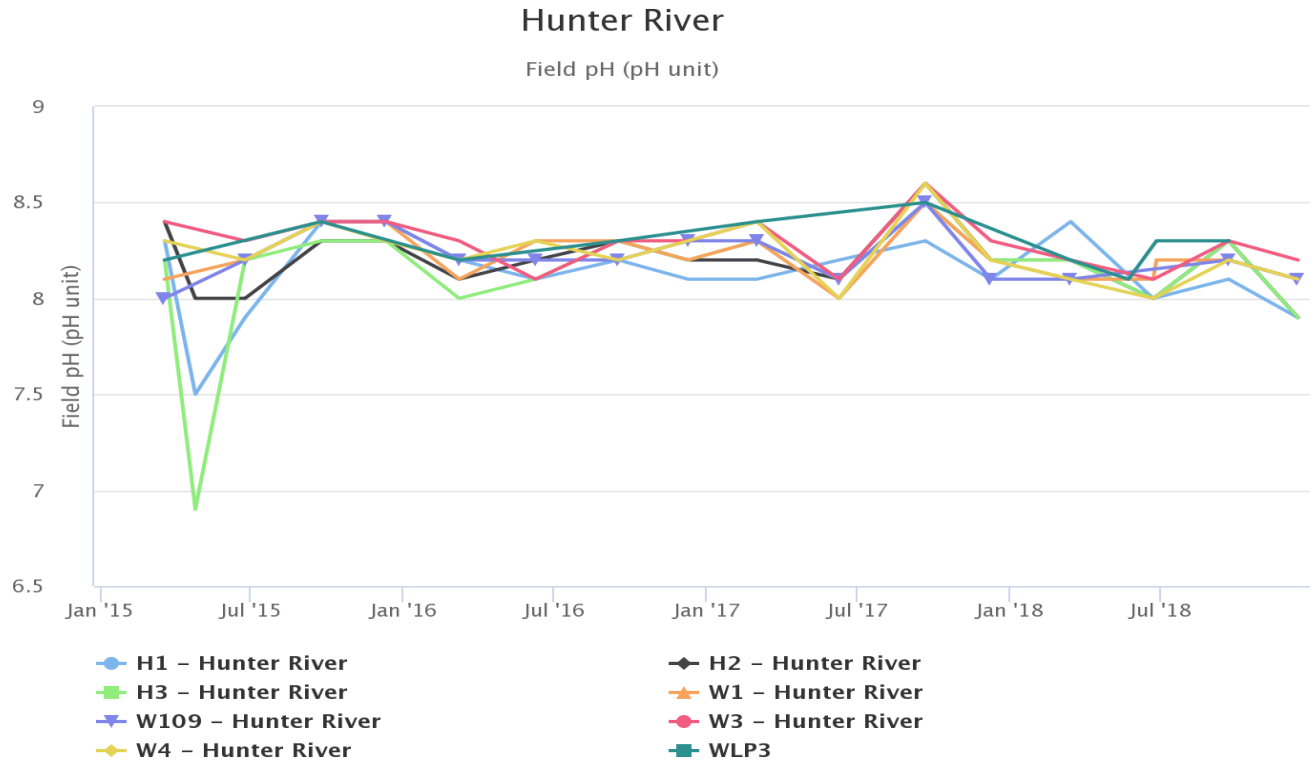

Figure 17: Hunter River pH Trend – December 2018

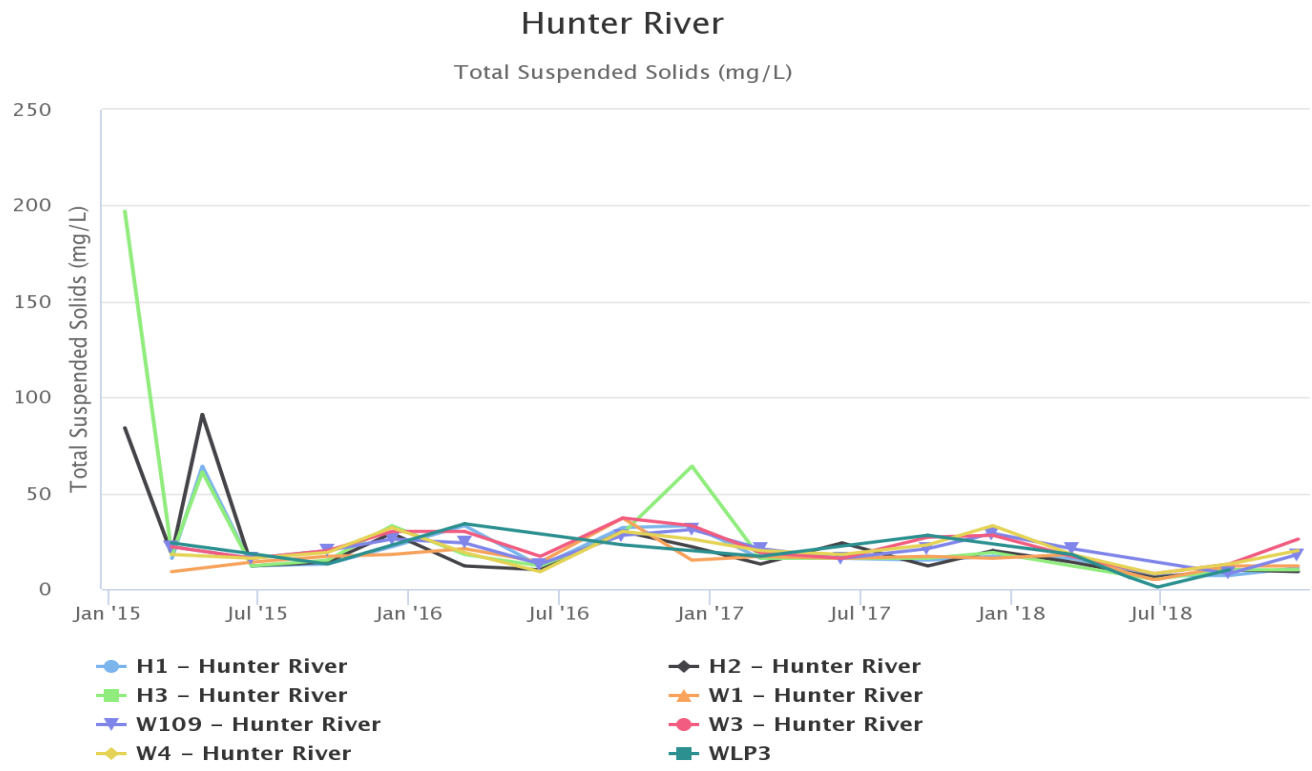

Figure 18: Hunter River Total Suspended Solids – December 2018

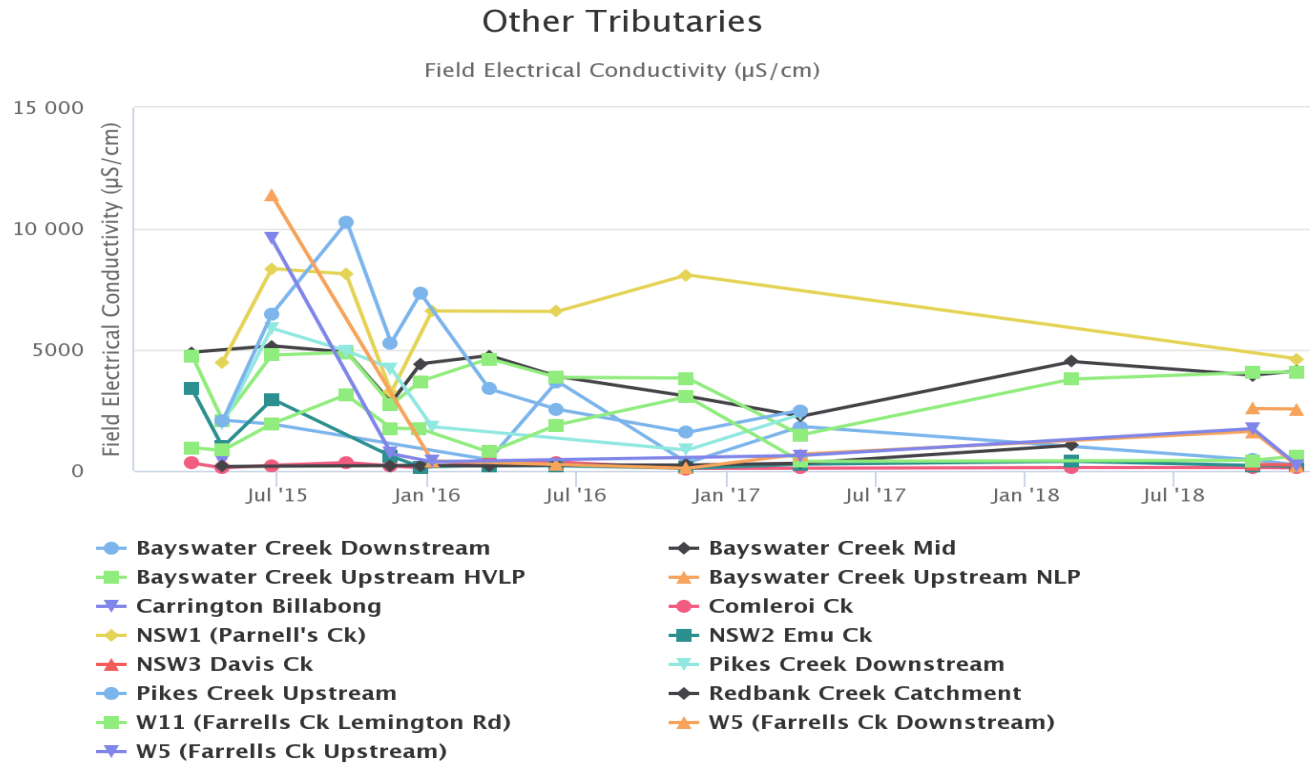

Figure 19: Other Tributaries Electrical Conductivity Trend – December 2018

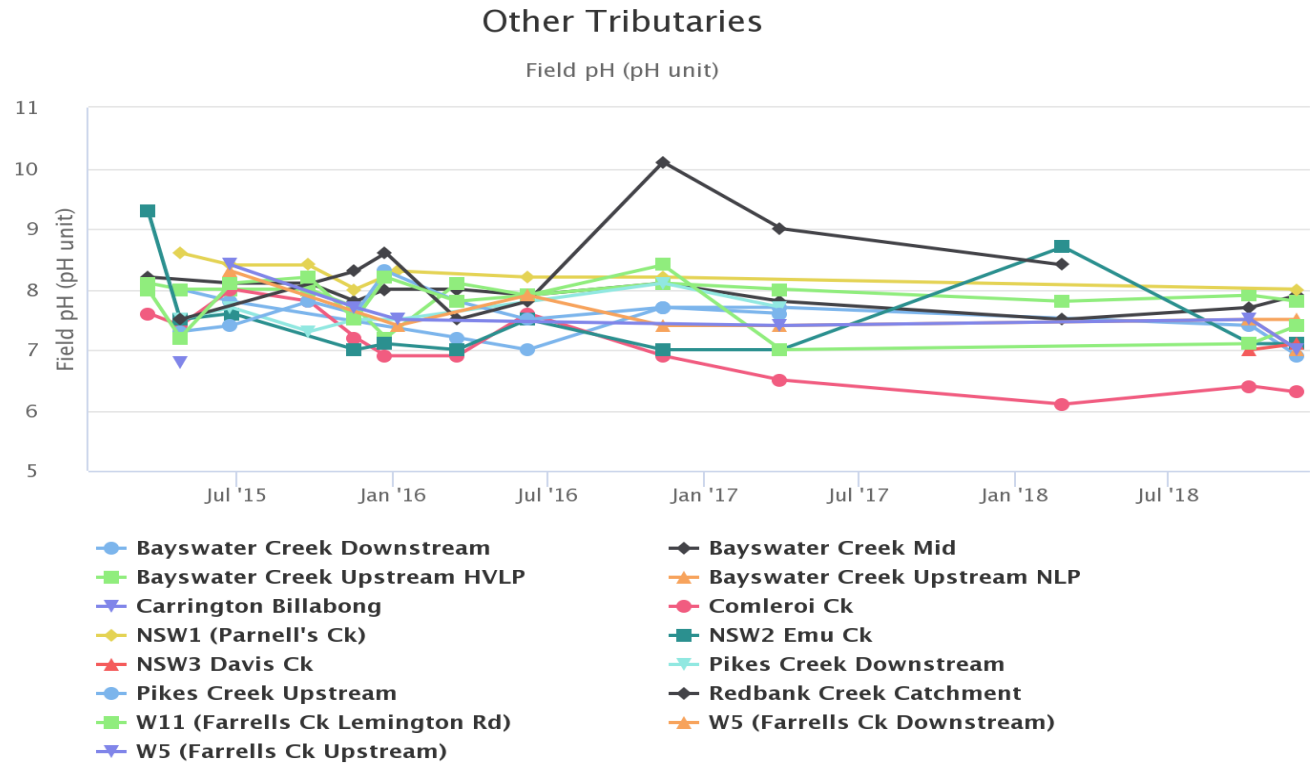

Figure 20: Other Tributaries pH Trend – December 2018

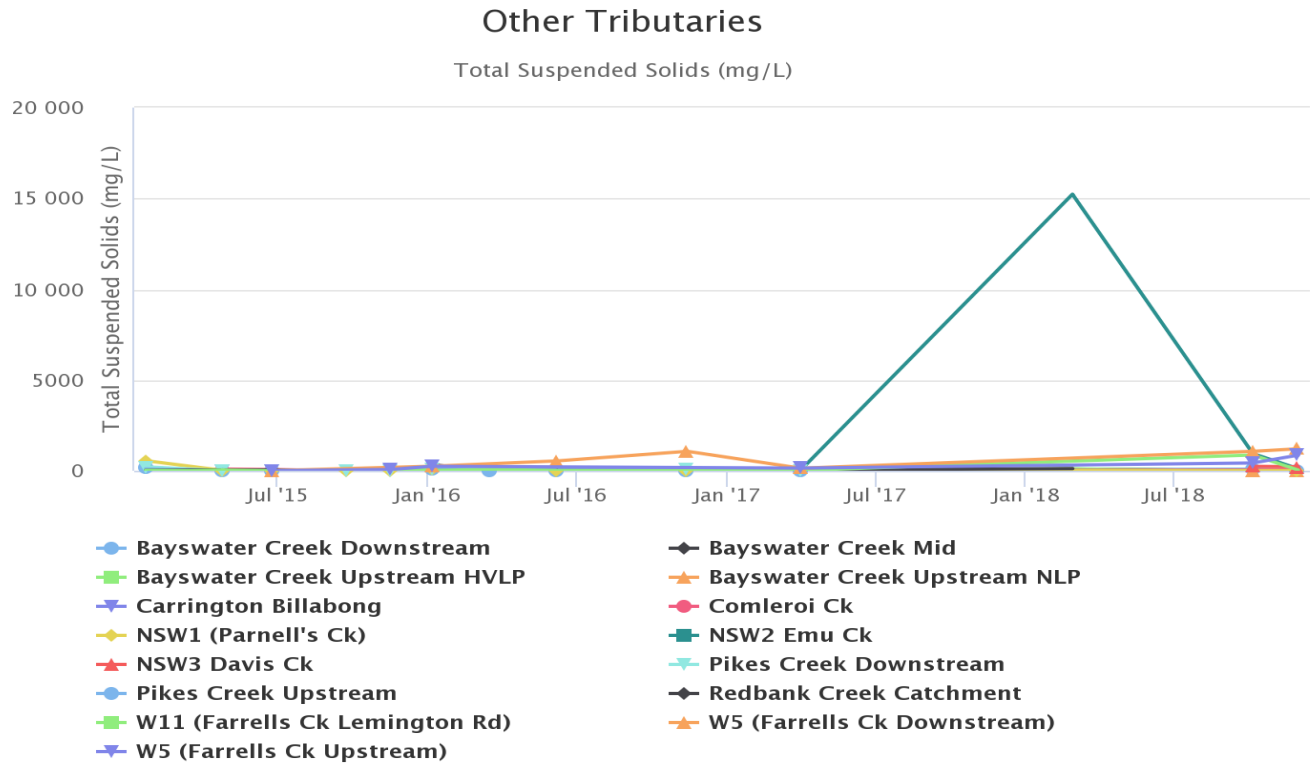

Figure 21: Other Tributaries Total Suspended Solids Trend – December 2018

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 extracted approximately 211.8ML of 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.

Current internal trigger limits that have been breached are summarised in Table 3.

Table 3: Surface Water Trigger Limit Summary

Site	Date	Trigger Limit Breached	Action taken in response
Bayswater Creek Downstream	5/10/2018	TSS - 50mg/L (ANZECC Guideline)	Elevated TSS associated with rainfall event (76mm 4-5/10/2018). This site typically dry in 12 months prior. Observations indicate that the sample was taken from a turbid pool of water in the creek as there was no flow. Monitoring results upstream indicated there was also no flow in the creek and showed more elevated EC results compared to those downstream. Based on this it can be assumed that the sample taken was not representative of water flows in the creek and that there is no impact to suggest mining influence. Maintain watching brief*.
NSW 2 Emu Creek	5/10/2018	TSS - 50mg/L (ANZECC Guideline)	Elevated TSS associated with rainfall event (76mm 4-5/10/2018). Observations indicate that sample was taken from a slow flow of water through the creek line. No further downstream catchment exists due to mining operations. No further action required.
NSW 3 Davis Creek	5/10/2018	TSS - 50mg/L (ANZECC Guideline)	Elevated TSS associated with rainfall event (76mm 4-5/10/2018). Site is typically dry.Observations indicate that sample was taken from a pool of water through the creek line as there was no flow. Other monitoring parameters also suggest no mining influence. Maintain watching brief*.
Comleroi Ck	29/11/2018	TSS - 50mg/L (ANZECC Guideline)	Elevated TSS associated with rainfall event (52.4mm 28/11/2018). Observations indicate that sample was taken from a pool of water through the creek line as there was no flow. Other monitoring parameters also suggest no mining influence. Maintain watching brief. Maintain watching brief. Maintain watching brief*
NSW 2 Emu Creek	29/11/2018	TSS - 50mg/L (ANZECC Guideline)	Elevated TSS associated with rainfall event (52.4mm 28/11/2018). Observations indicate that sample was taken from a pool of water through the creek line. No further downstream catchment exists due to mining operations. No further action required.
NSW 3 Davis Creek	29/11/2018	TSS - 50mg/L (ANZECC Guideline)	Elevated TSS associated with rainfall event (52.4mm 28/11/2018). Site is typically dry. Observations indicate that sample was taken from a pool of water through the creek line as there was no flow. Other monitoring parameters also suggest no mining influence. Maintain watching brief*.

W11	5/10/2018	pH – 5th Percentile	Watching brief. Sampling event following this indicated pH within trigger range.
Bayswater Creek Downstream	29/11/2018	pH – 5th Percentile	First exceedance, Watching brief*
H2	13/12/2018	pH – 5th Percentile	First exceedance, Watching brief*.
W2	13/12/2018	EC – 95th Percentile	Fourth consecutive exceedance of EC trigger (2440µs/cm) Investigation identified that sample was collected from turbid pooling water in the Wollombi Brook as there was no flow. Samples taken downstream in the Wollombi Brook recorded EC level at 526µs/cm. Maintain watching brief.
Warkworth Bridge	13/12/2018	EC -95th Percentile	Fifth consecutive exceedance of EC trigger (1268µs/cm). Investigation identified that sample was collected from pooling water in the Wollombi Brook as there was no flow. Samples taken downstream in the Wollombi Brook recorded EC level at 526µs/cm. Maintain watching brief.

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

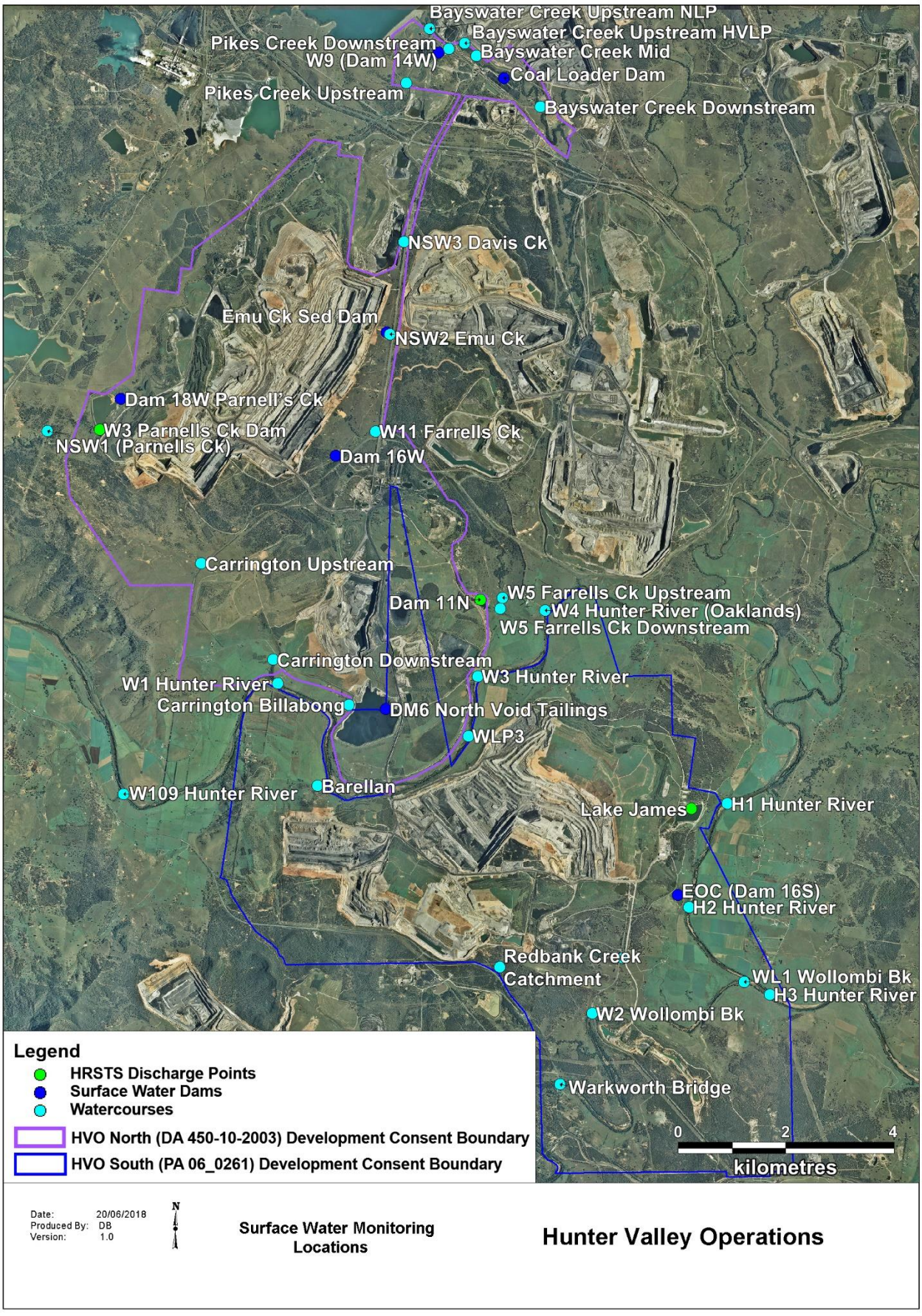

Figure 22: Surface Water Monitoring Location Plan

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 80.

Figure 23 to Figure 76 show the long term trends (2016 – current) for ground water bores monitored at HVO.

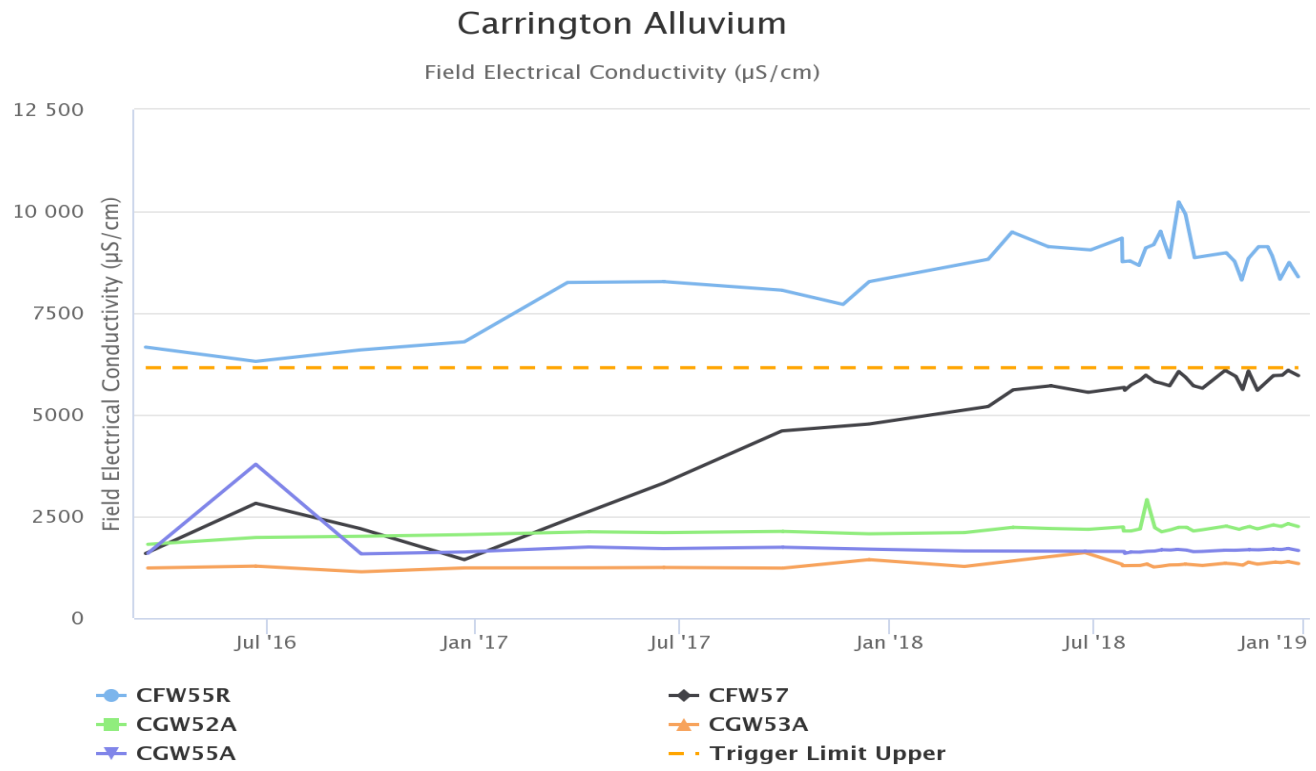

Figure 23: Carrington Alluvium Electrical Conductivity Trend – December 2018

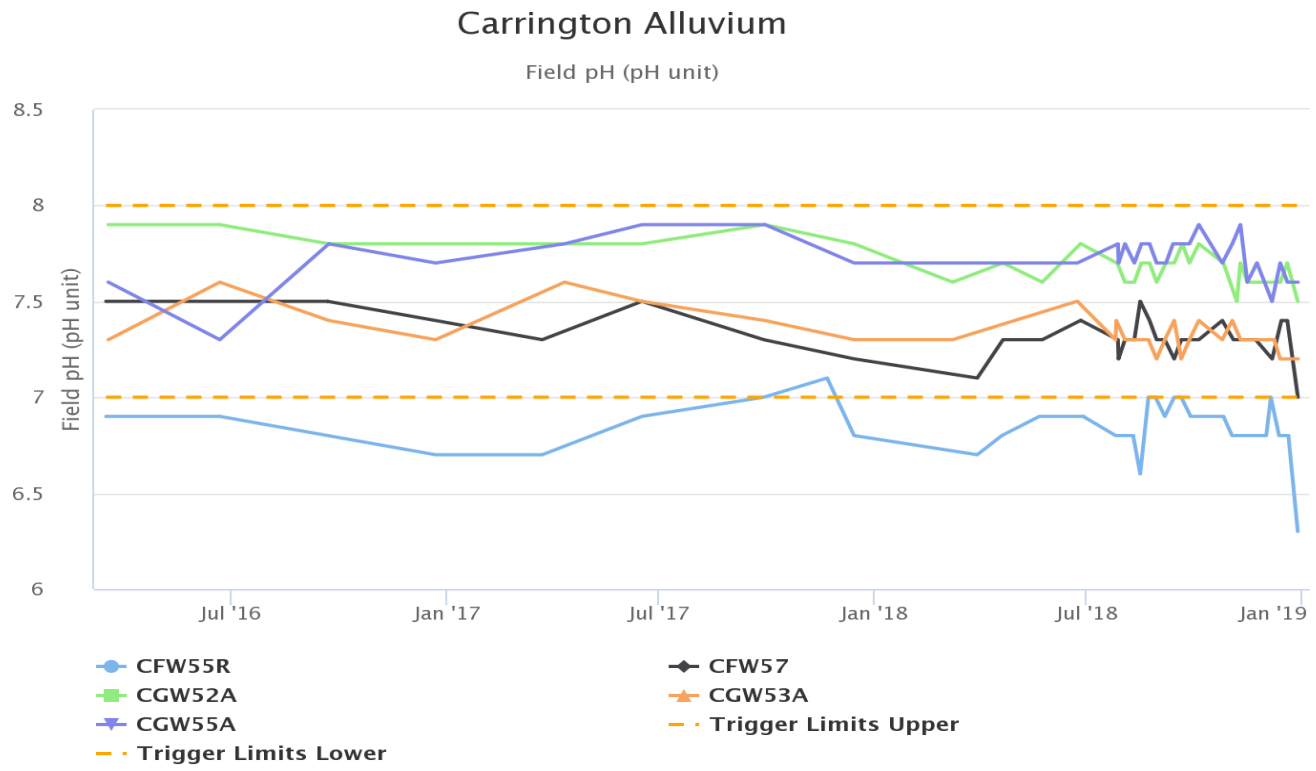

Figure 24: Carrington Alluvium pH Trend – December 2018

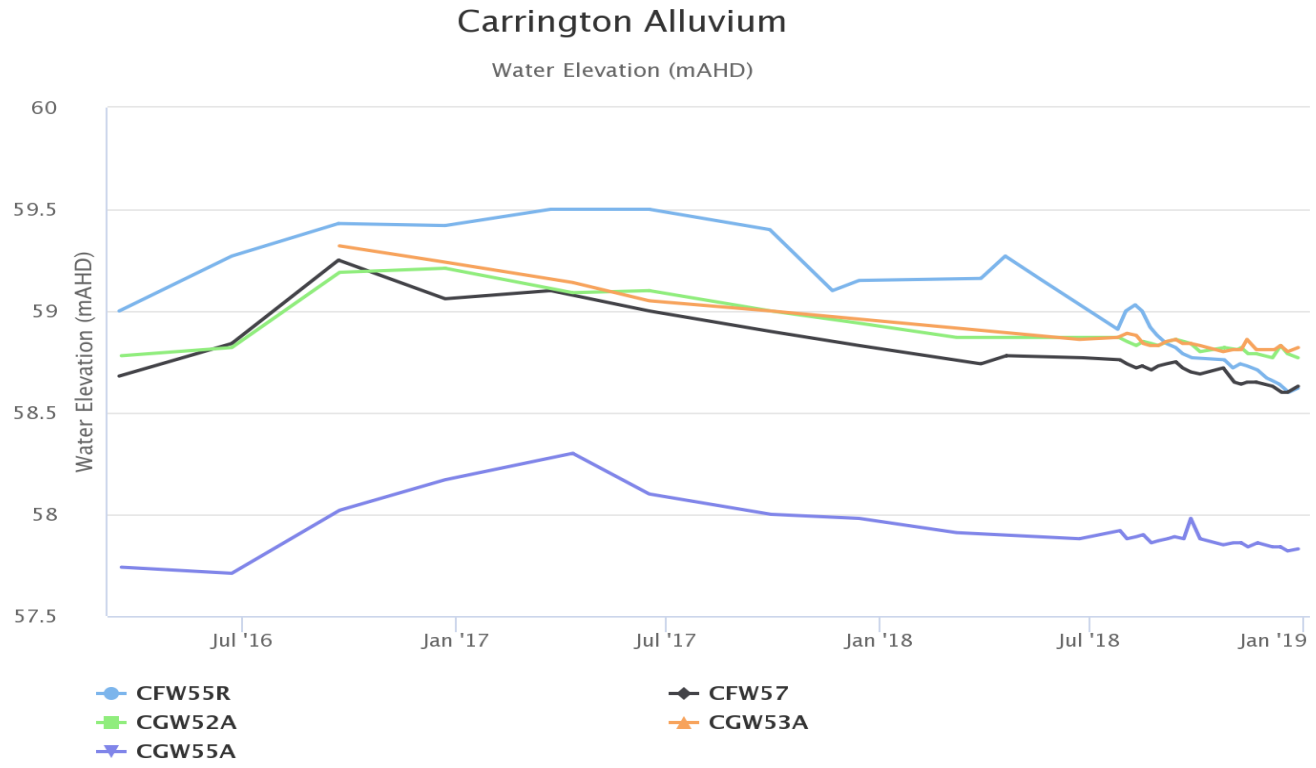

Figure 25: Carrington Alluvium Standing Water Level – December 2018

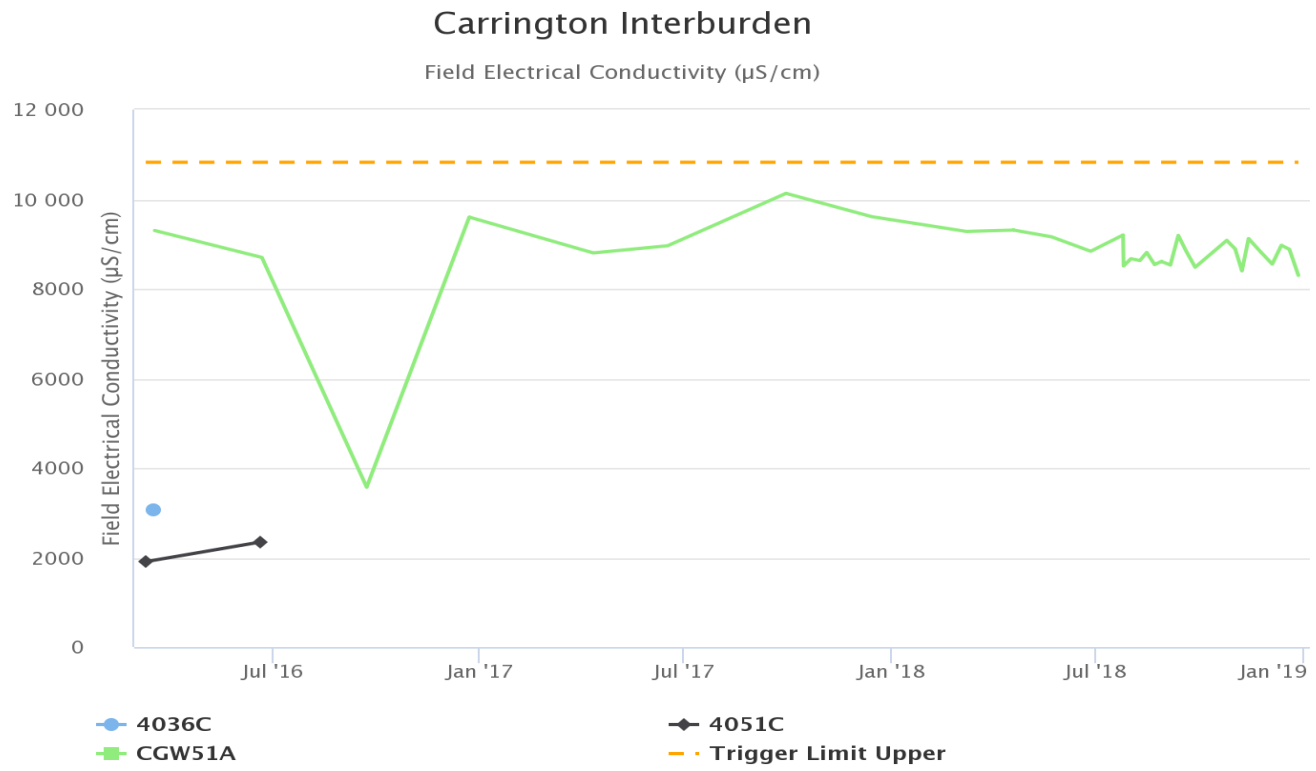

Figure 26: Carrington Interburden Electrical Conductivity Trend – December 2018

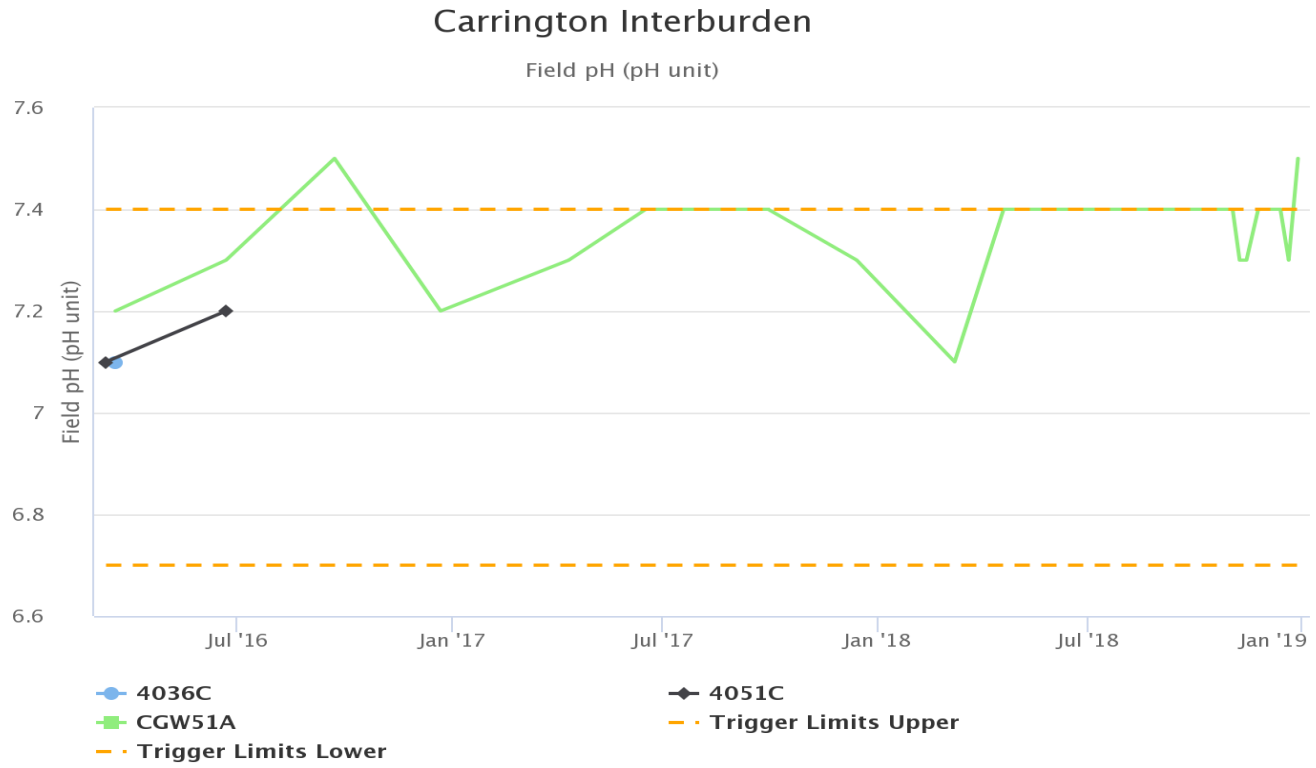

Figure 27: Carrington Interburden pH Trend – December 2018

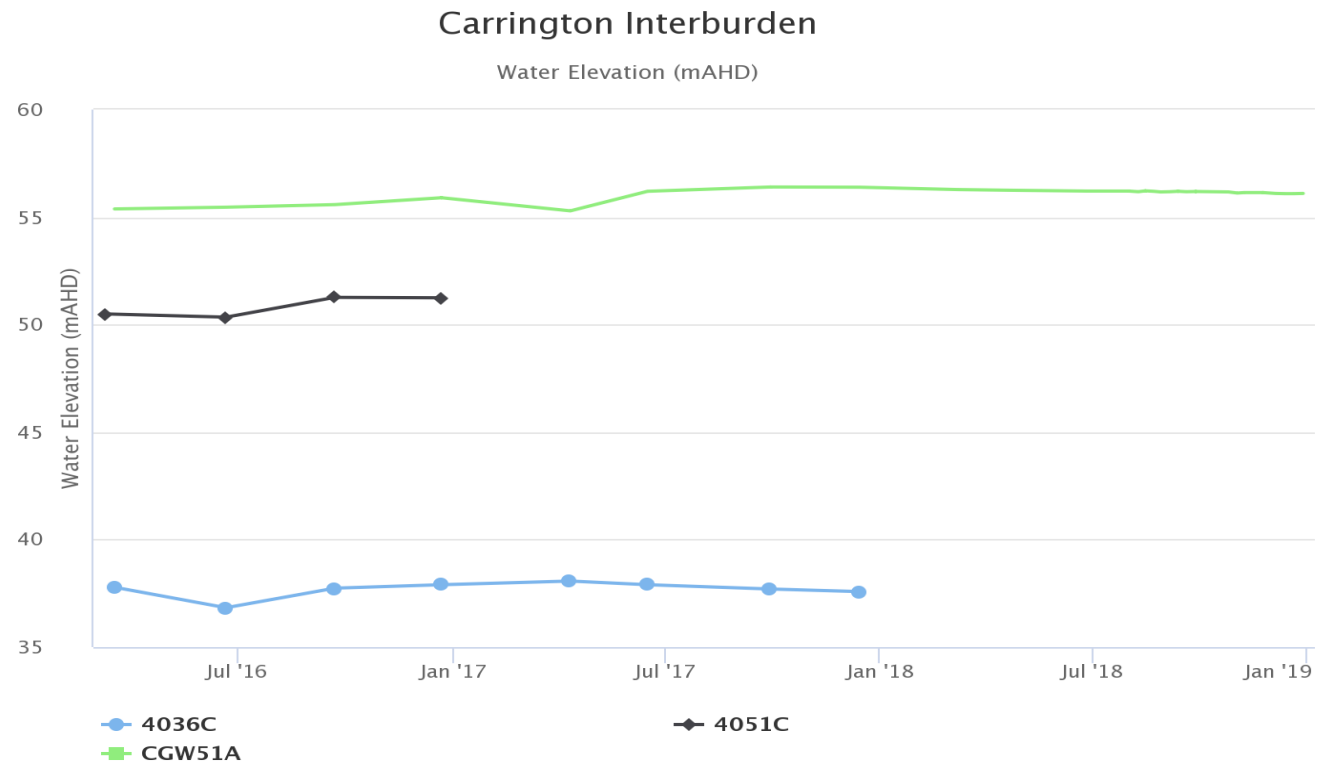

Figure 28: Carrington Interburden Standing Water Level – December 2018

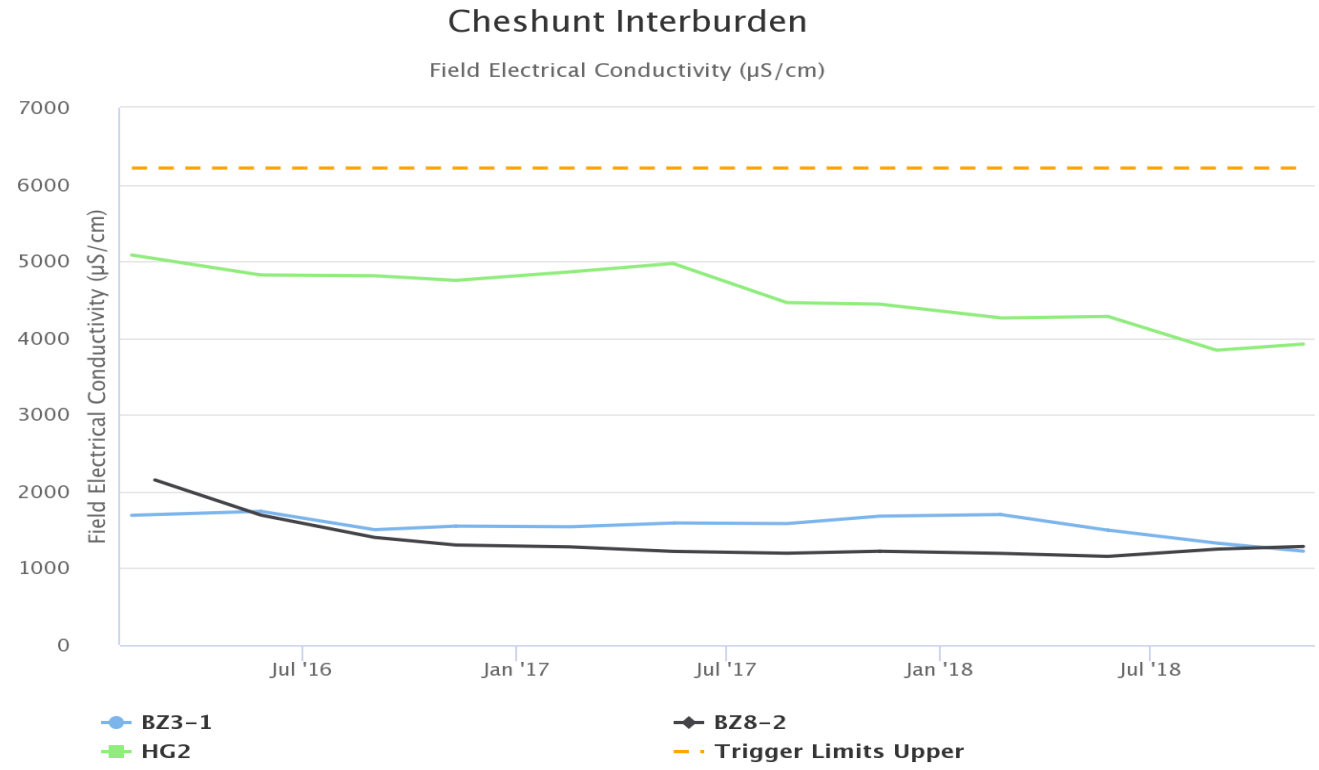

Figure 29: Cheshunt Interburden Electrical Conductivity Trend – December 2018

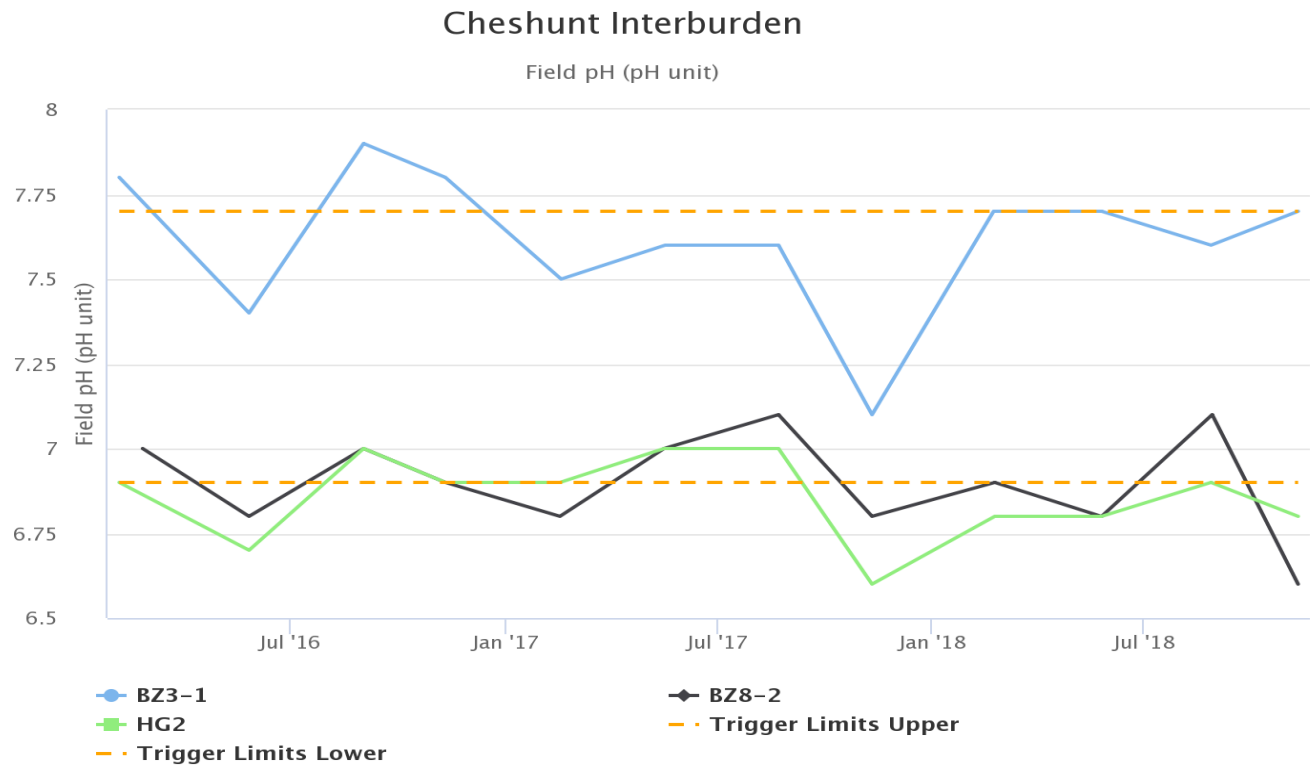

Figure 30: Cheshunt Interburden pH Trend – December 2018

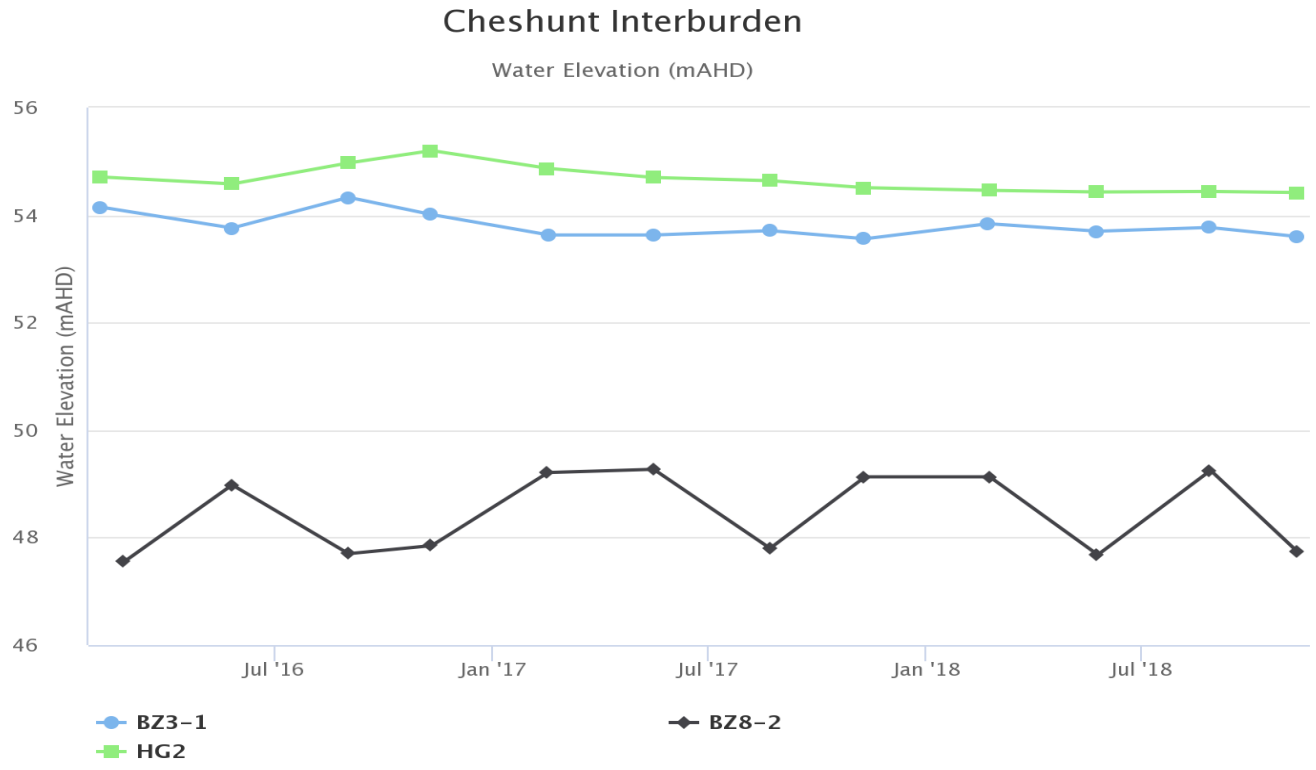

Figure 31: Cheshunt Interburden Standing Water Level – December 2018

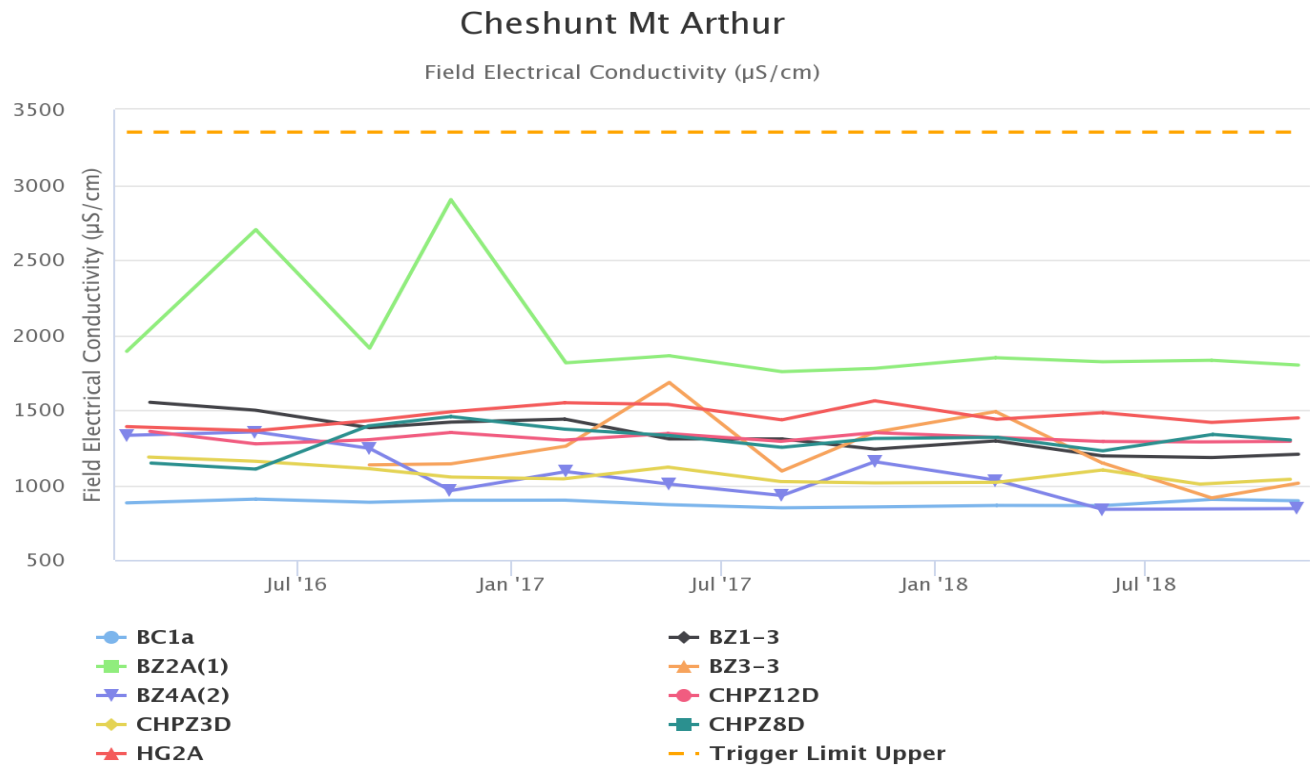

Figure 32: Cheshunt Mt Arthur Electrical Conductivity Trend – December 2018

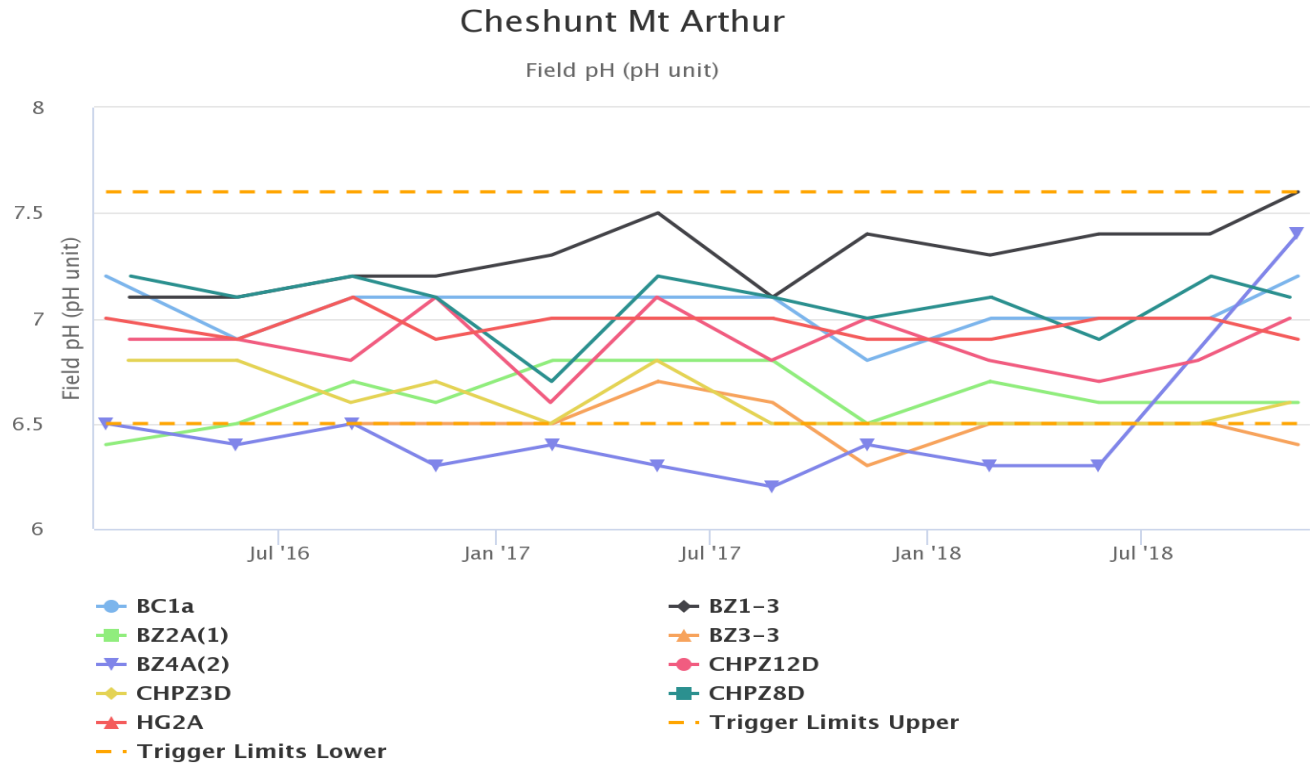

Figure 33: Cheshunt Mt Arthur pH Trend – December 2018

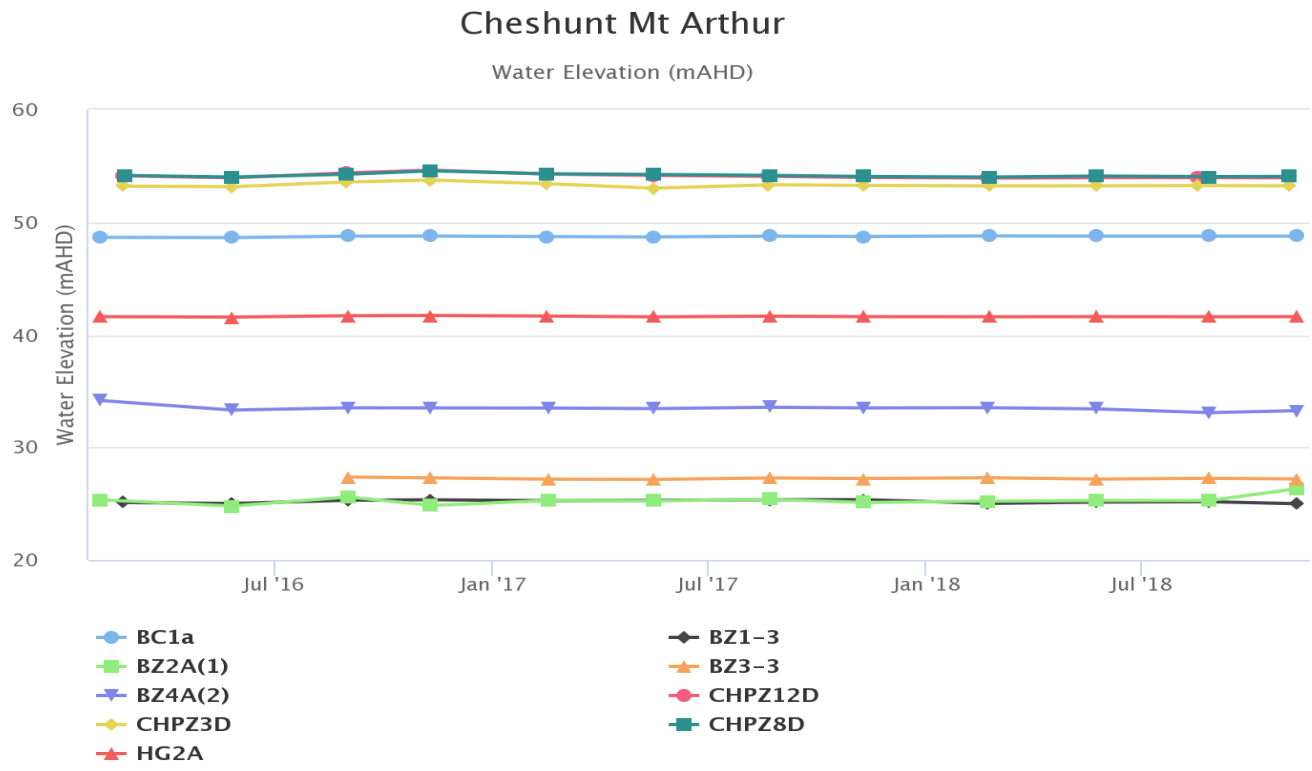

Figure 34: Cheshunt Mt Arthur Standing Water Level – December 2018

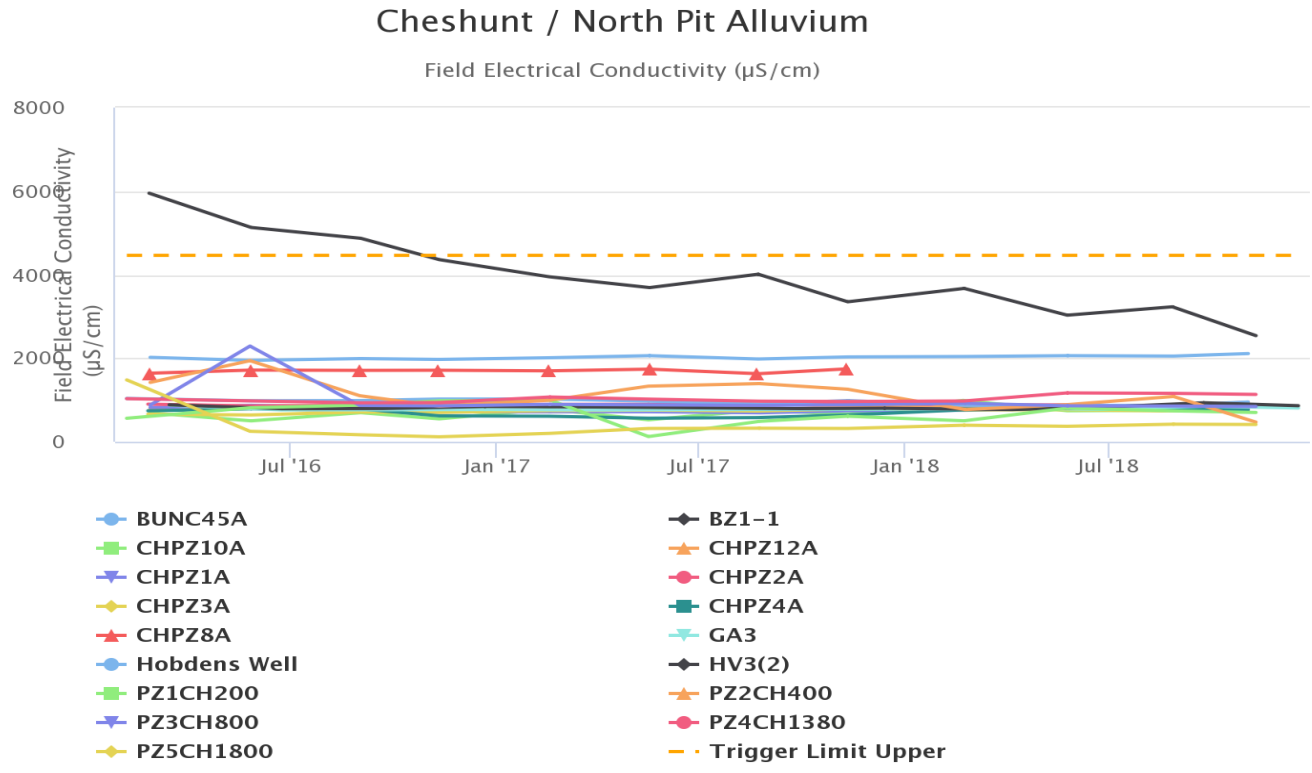

Figure 35: Cheshunt / North Pit Alluvium Electrical Conductivity Trend – December 2018

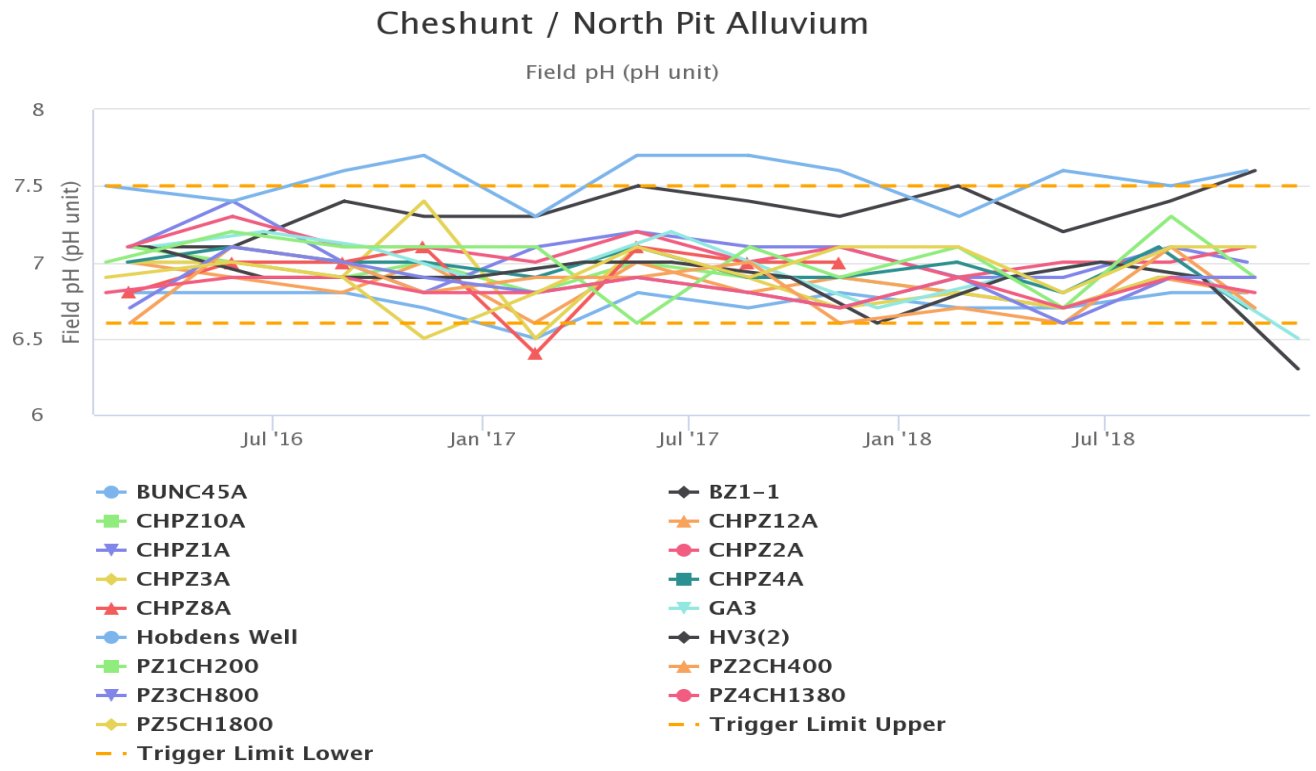

Figure 36: Cheshunt / North Pit Alluvium pH Trend – December 2018

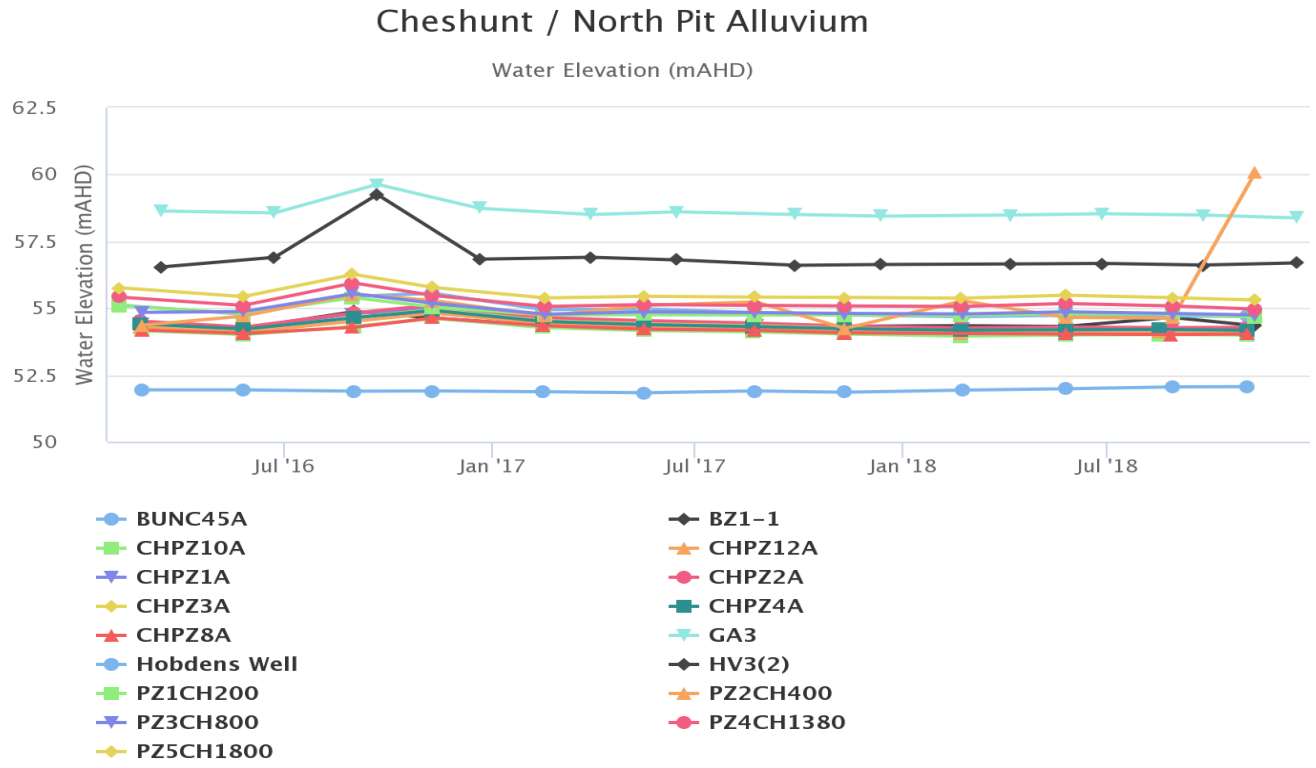

Figure 37: Cheshunt / North Pit Alluvium Standing Water Level – December 2018

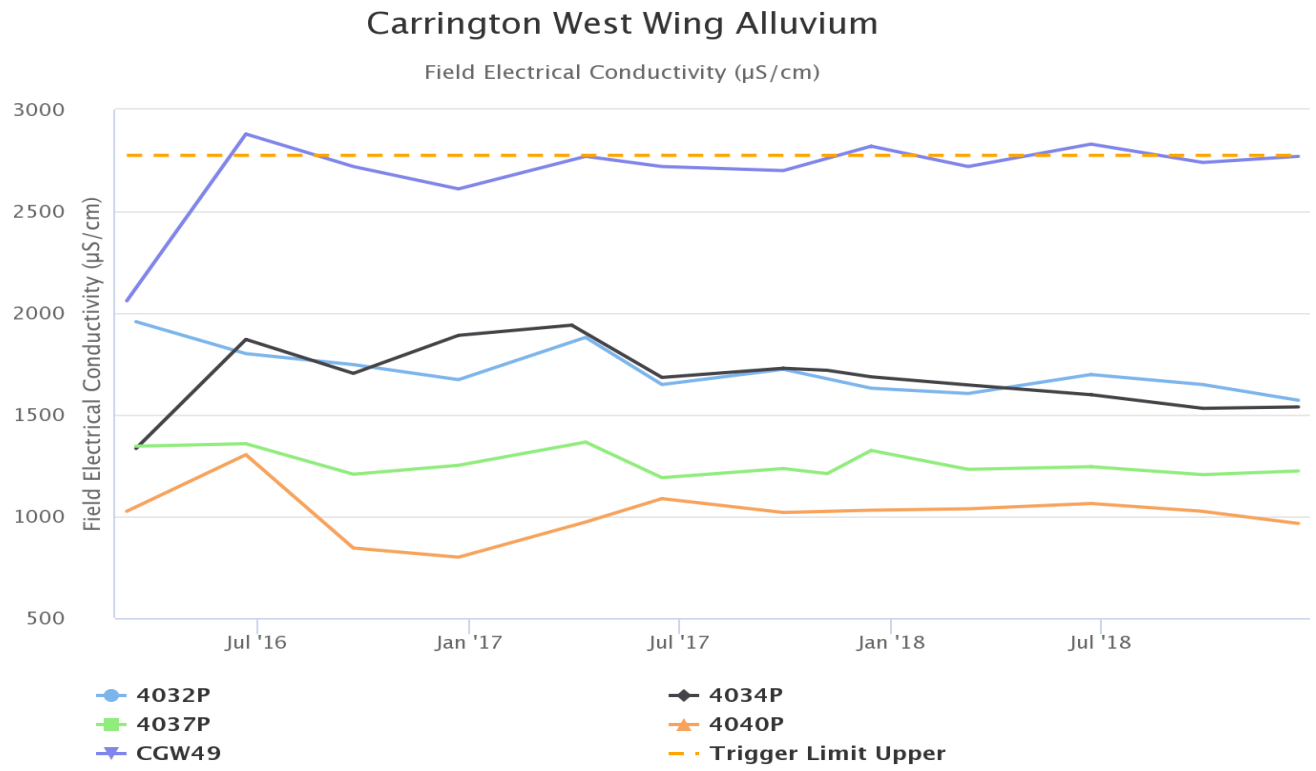

Figure 38: Carrington West Wing Alluvium Electrical Conductivity Trend – December 2018

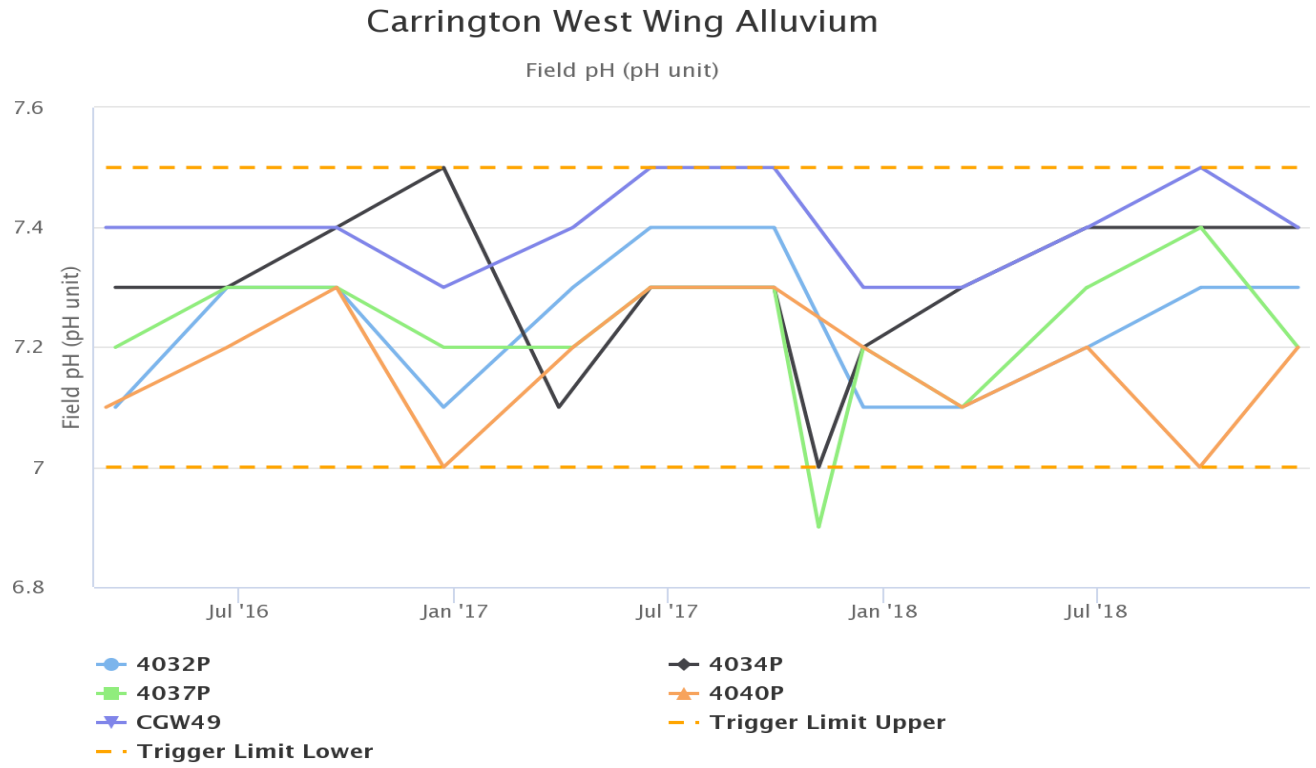

Figure 39: Carrington West Wing Alluvium pH Trend – December 2018

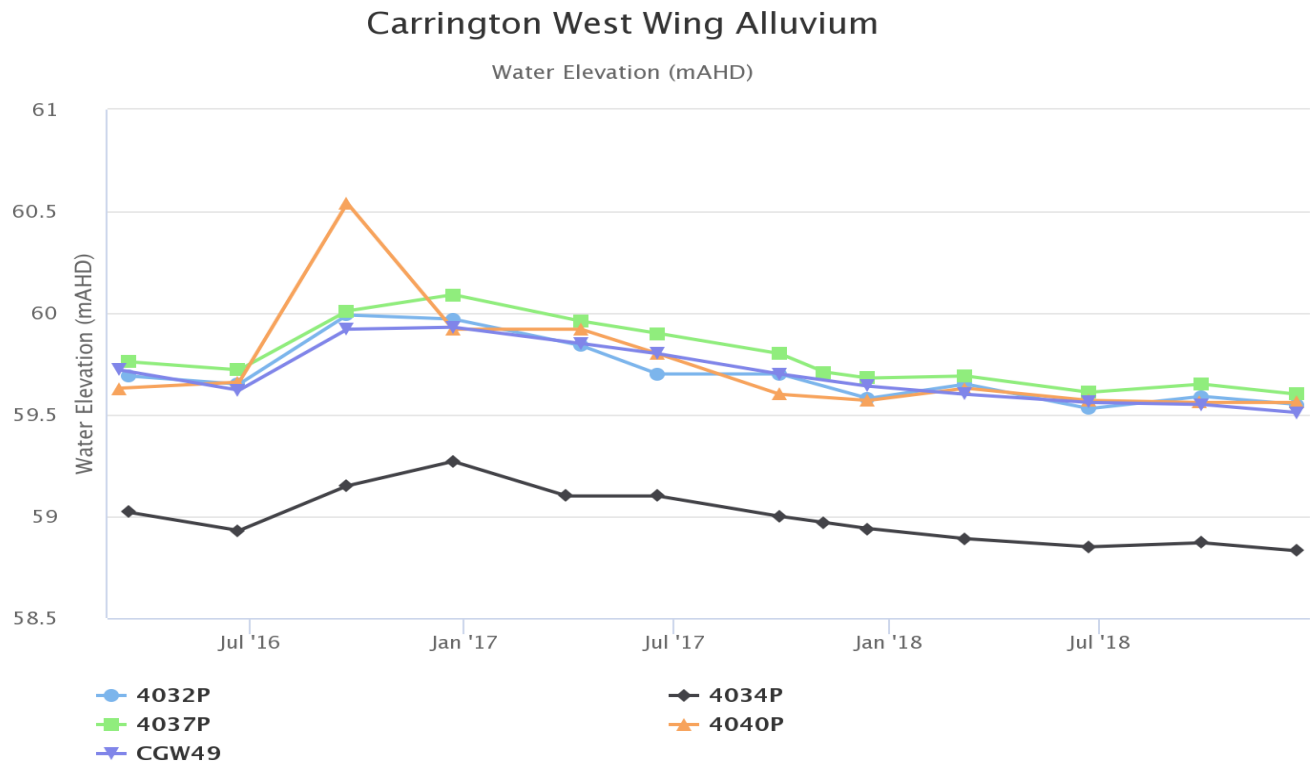

Figure 40: Carrington West Wing Alluvium Standing Water Level – December 2018

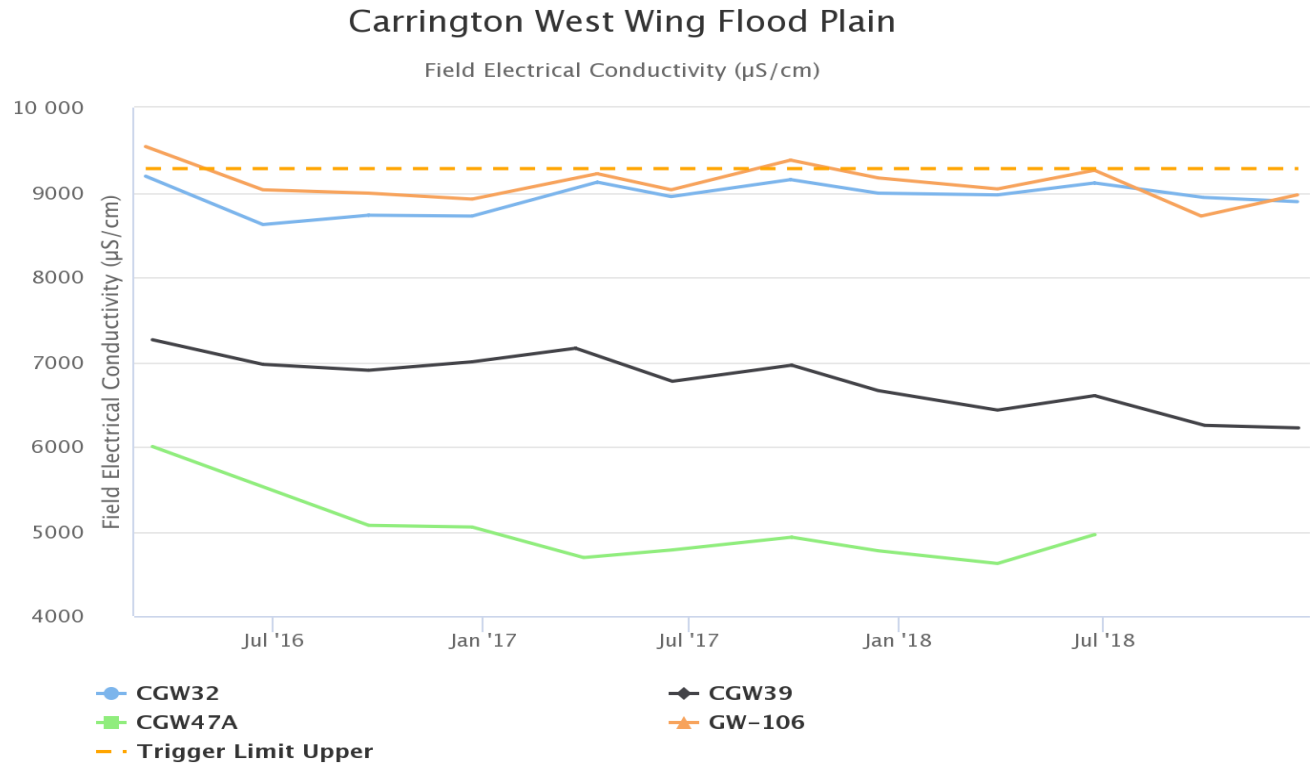

Figure 41: Carrington West Wing Flood Plain Electrical Conductivity Trend – December 2018

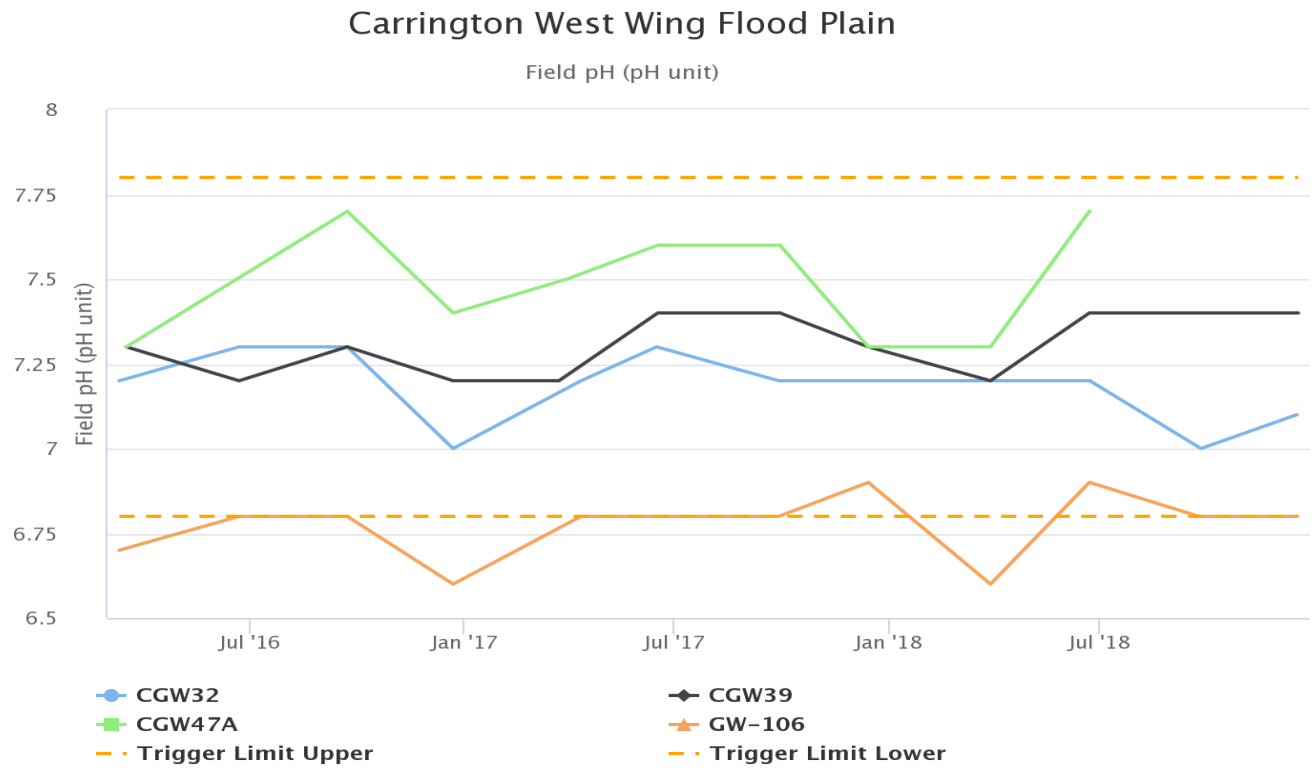

Figure 42: Carrington West Wing Flood Plain pH Trend – December 2018

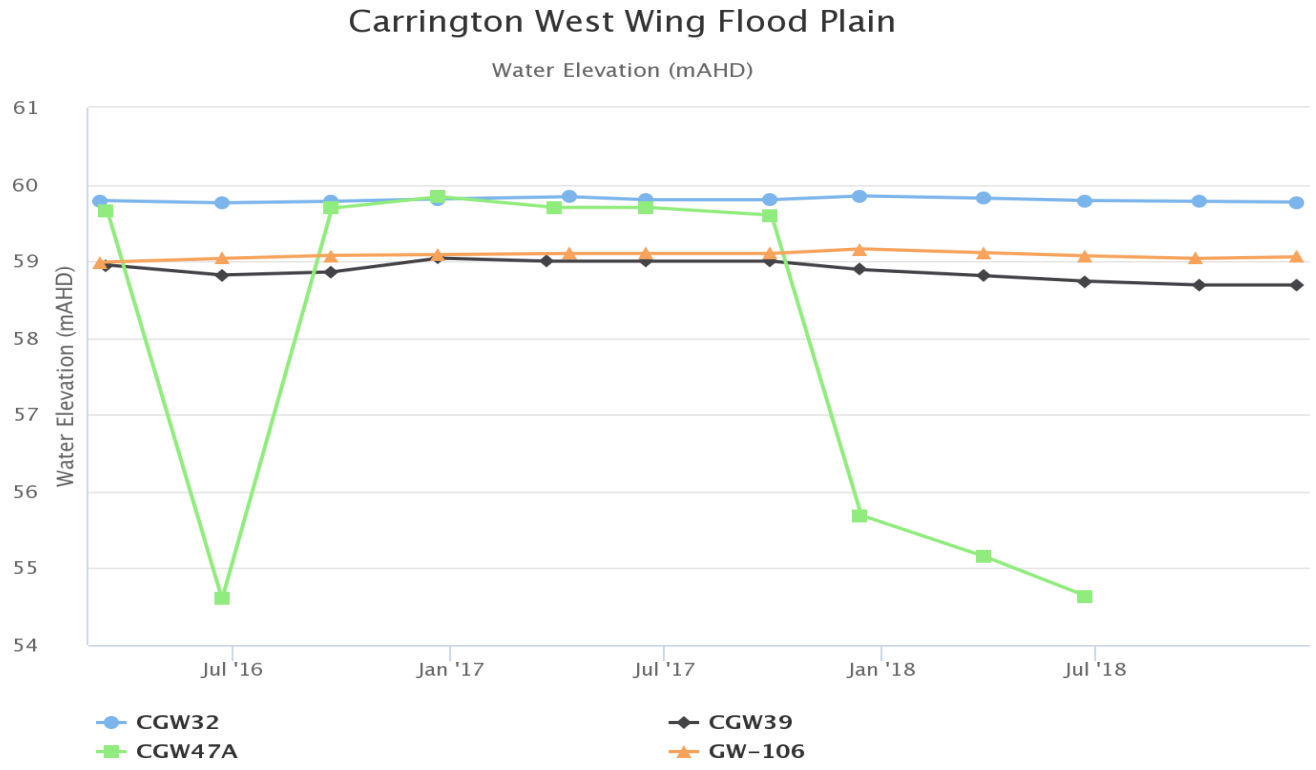

Figure 43: Carrington West Wing Flood Plain Standing Water Level – December 2018

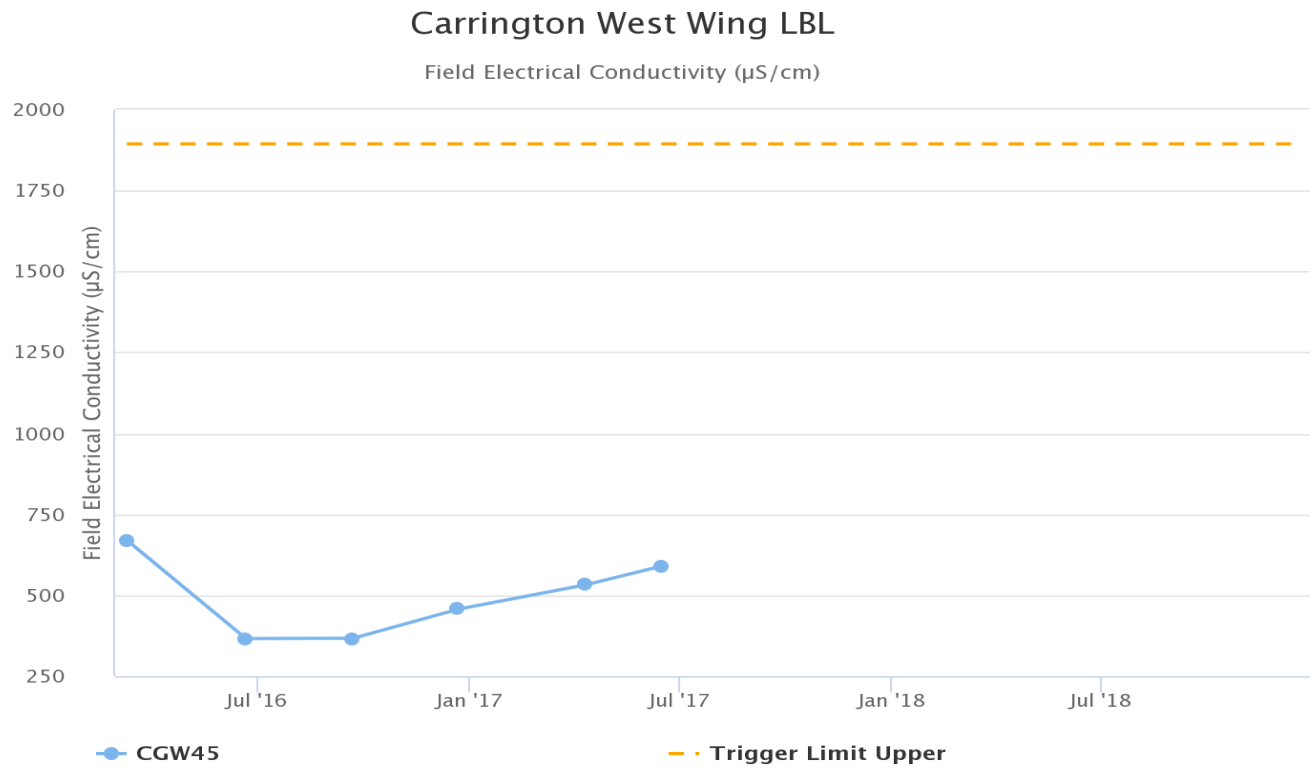

Figure 44: Carrington West Wing LBL Electrical Conductivity Trend – December 2018

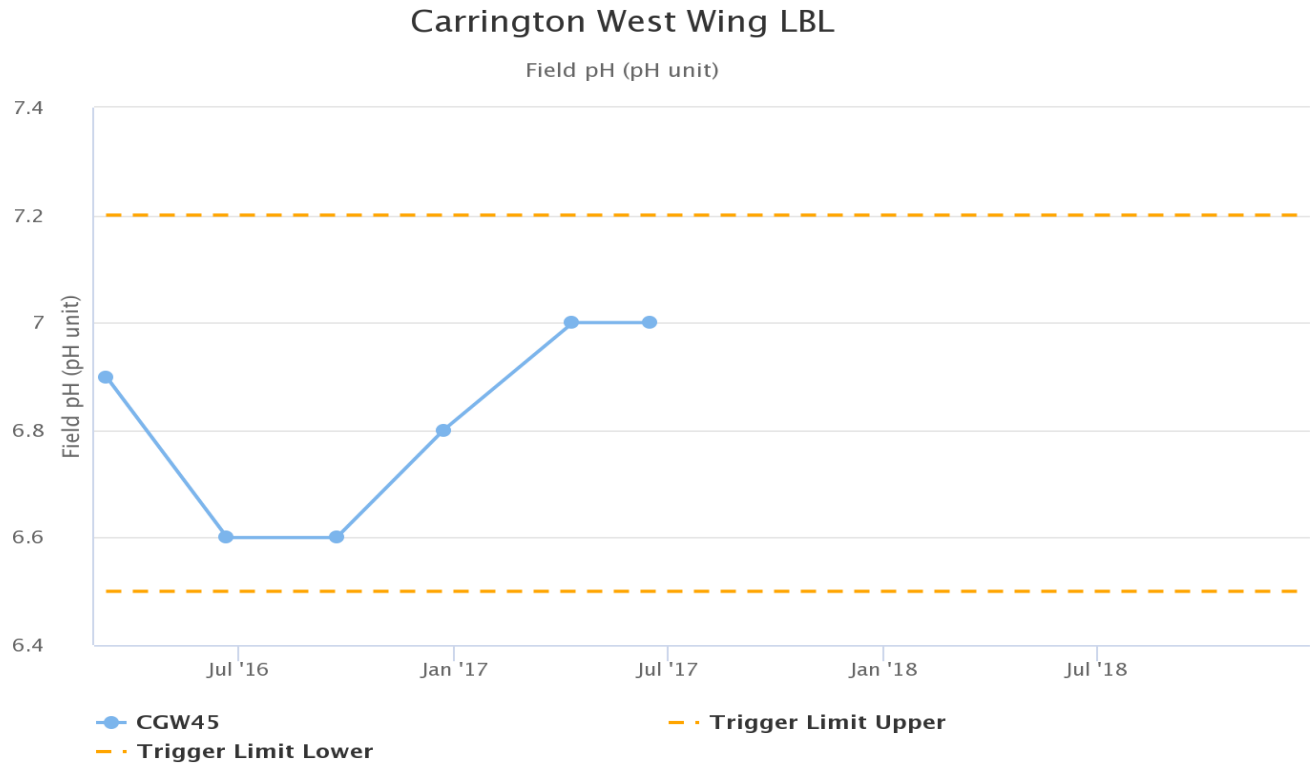

Figure 45: Carrington West Wing LBL pH Trend – December 2018

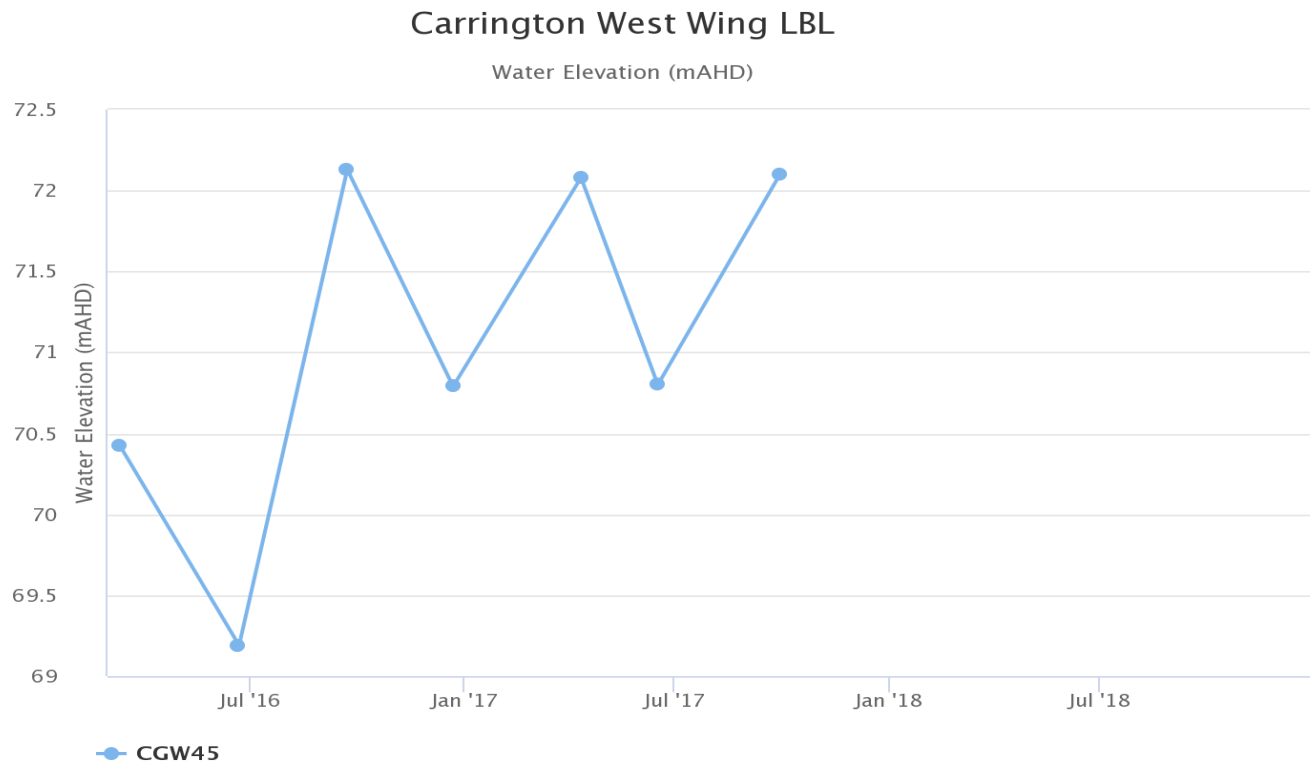

Figure 46: Carrington West Wing LBL Standing Water Level – December 2018

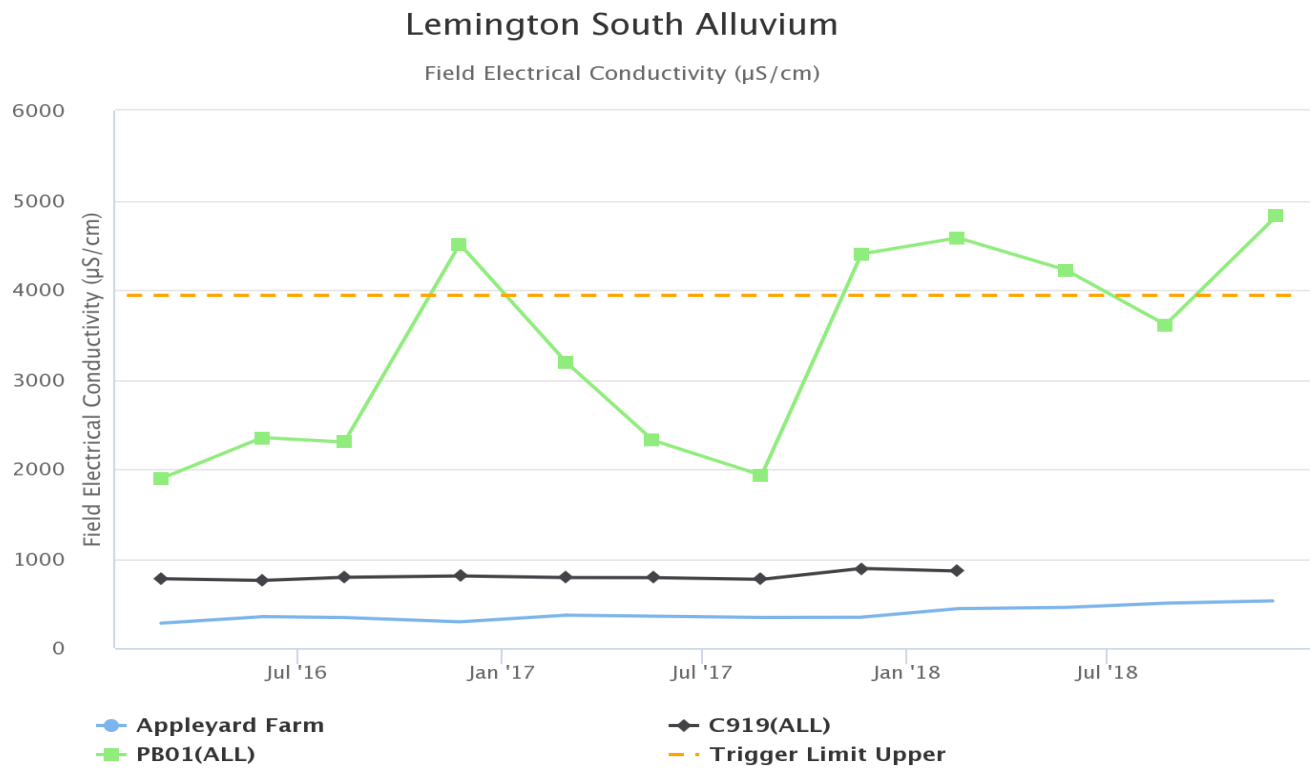

Figure 47: Lemington South Alluvium Electrical Conductivity Trend – December 2018

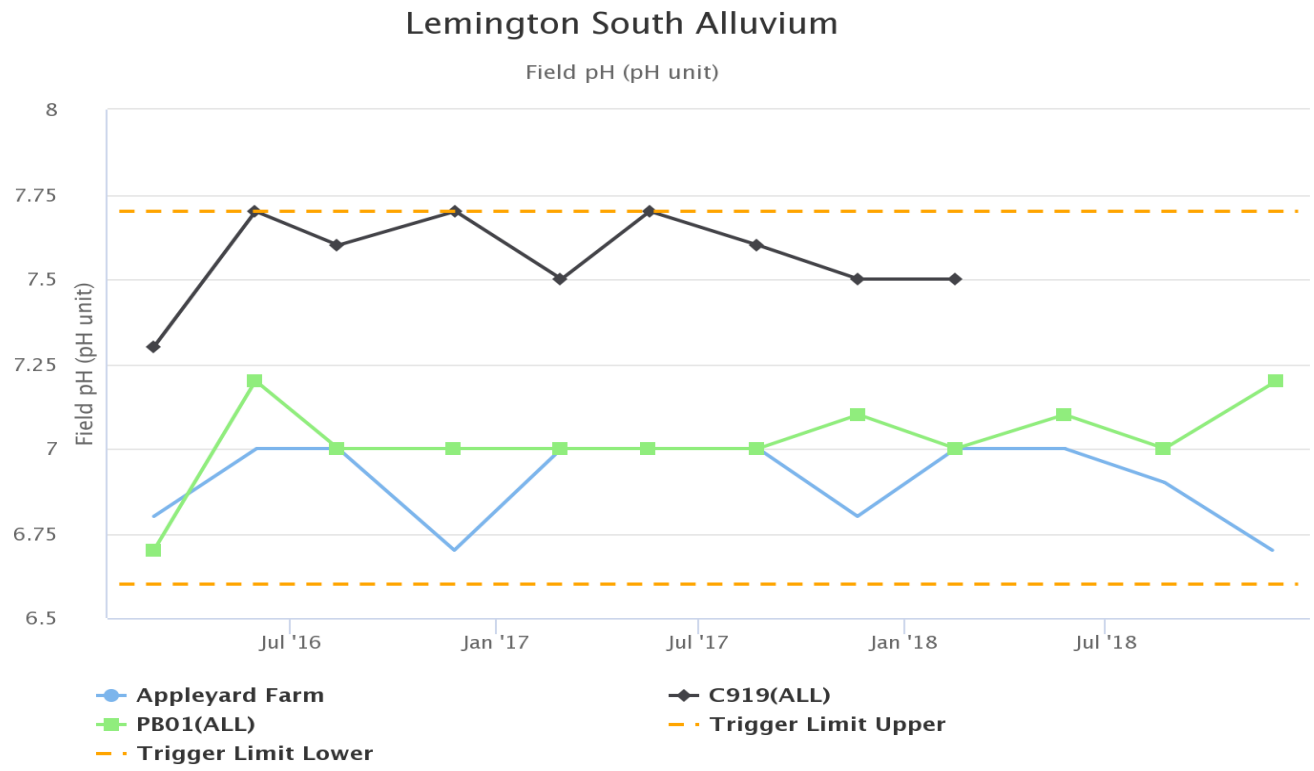

Figure 48: Lemington South Alluvium pH Trend – December 2018

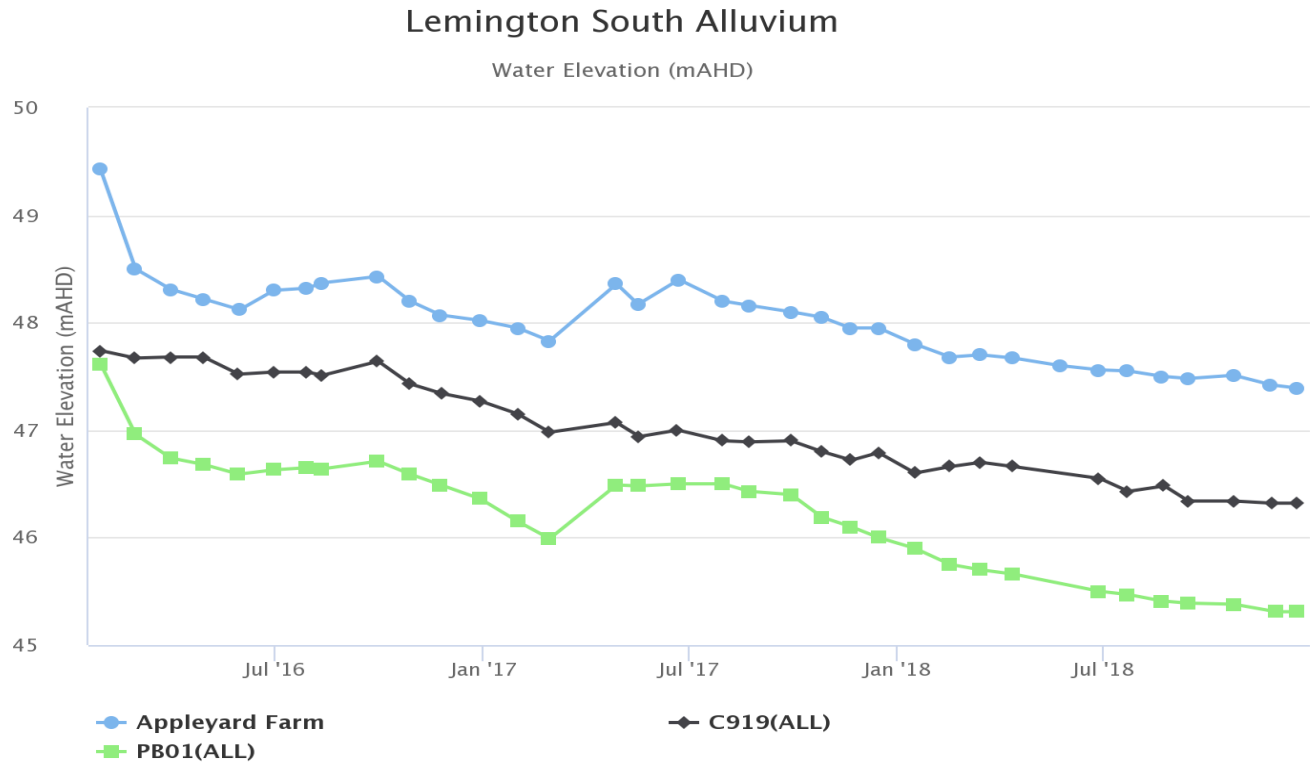

Figure 49: Lemington South Alluvium Standing Water Level Trend – December 2018

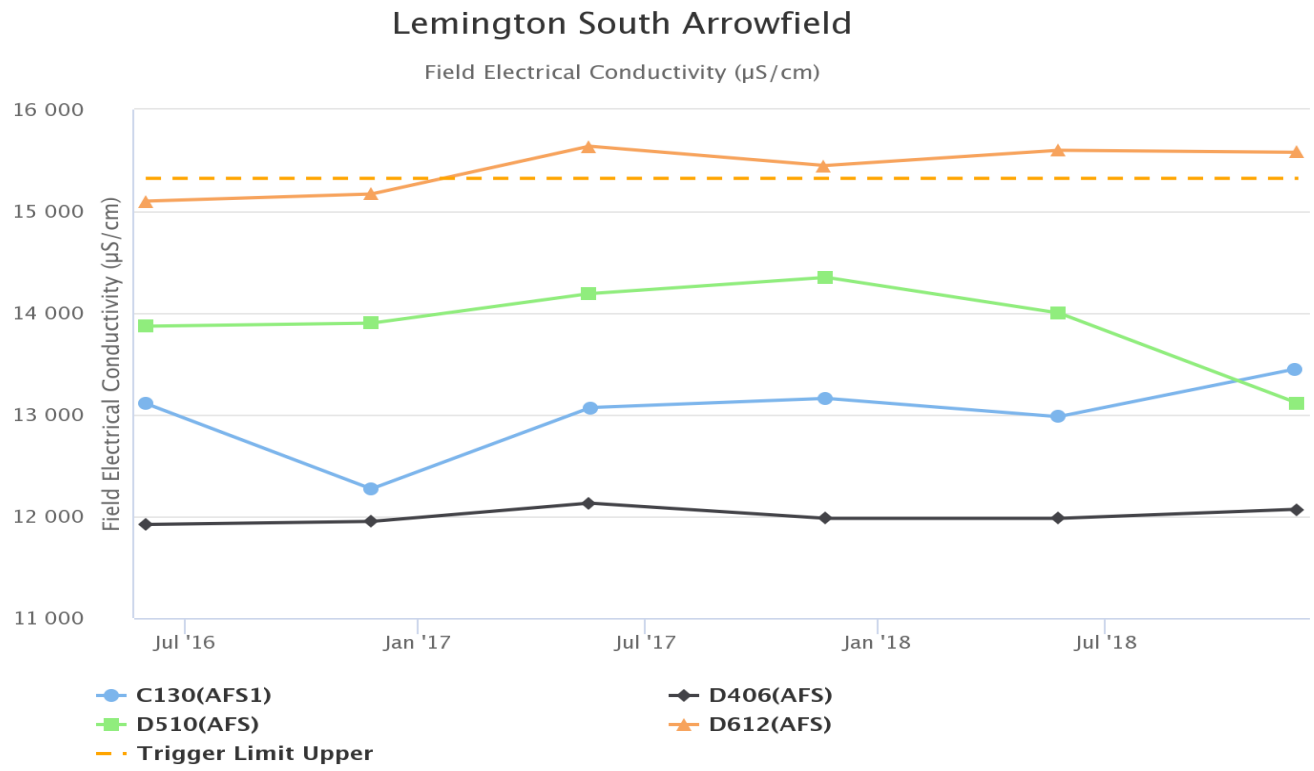

Figure 50: Lemington South Arrowfield Electrical Conductivity Trend – December 2018

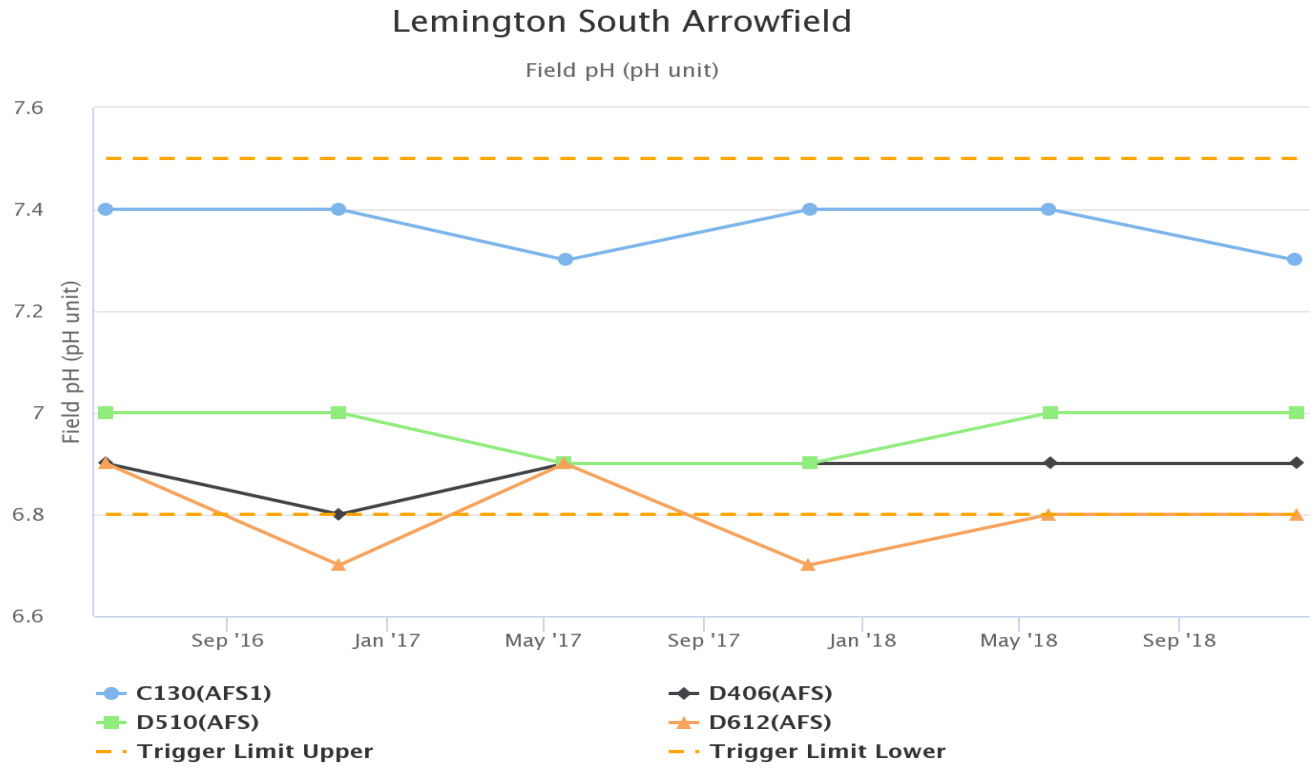

Figure 51: Lemington South Arrowfield pH Trend – December 2018

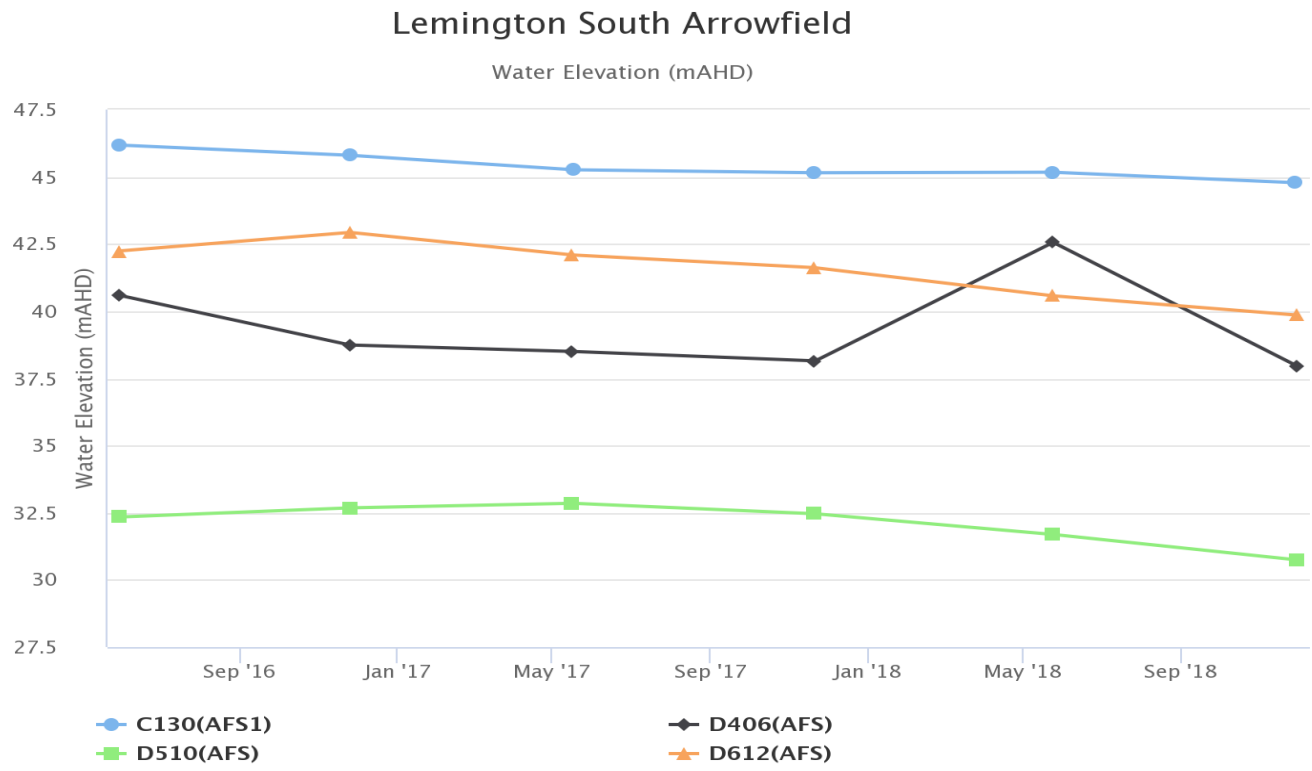

Figure 52: Lemington South Arrowfield Standing Water Level – December 2018

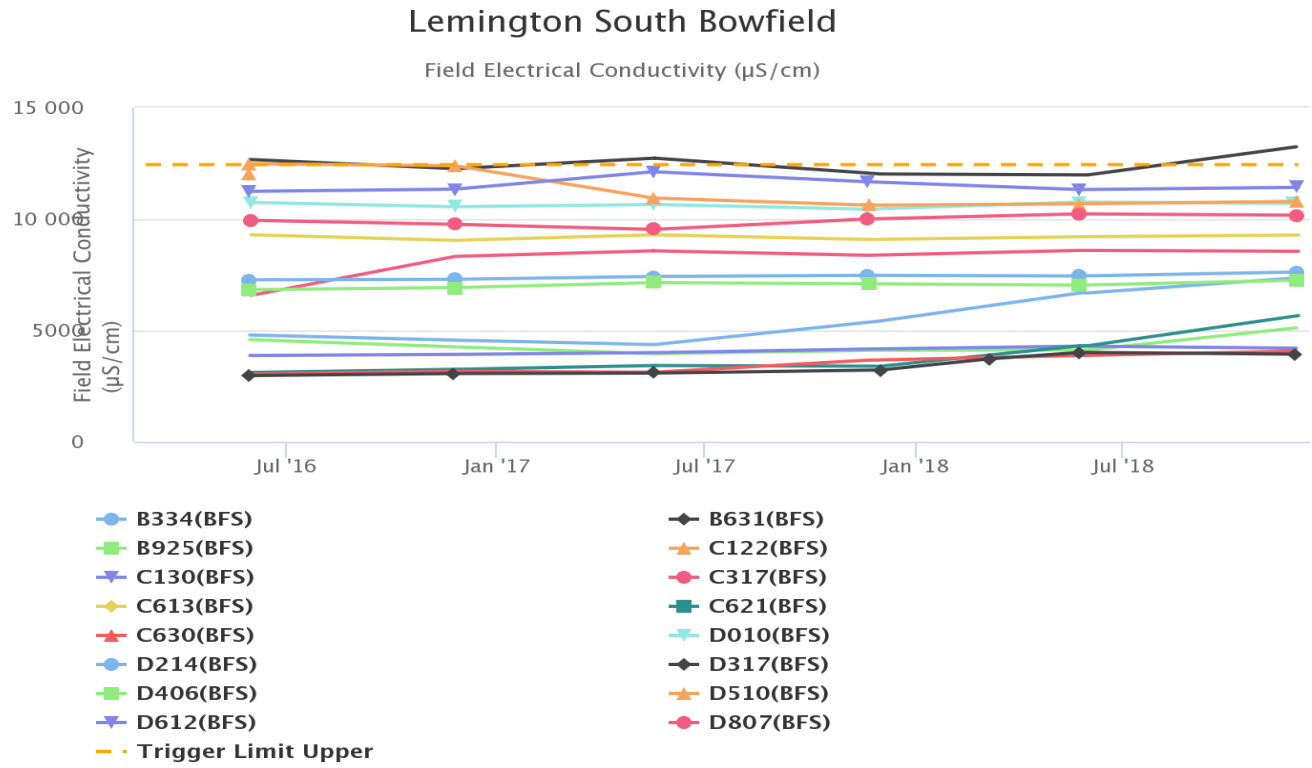

Figure 53: Lemington South Bowfield Electrical Conductivity Trend – December 2018

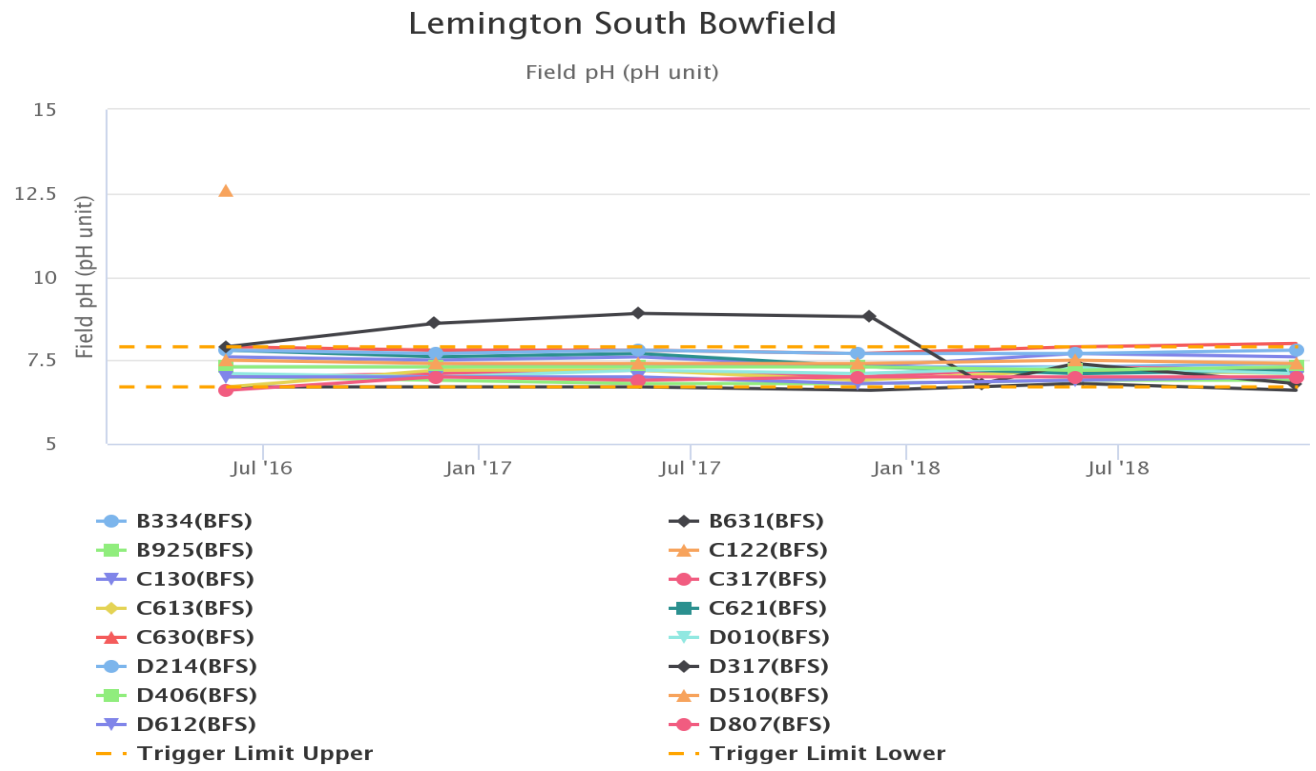

Figure 54: Lemington South Bowfield pH Trend – December 2018

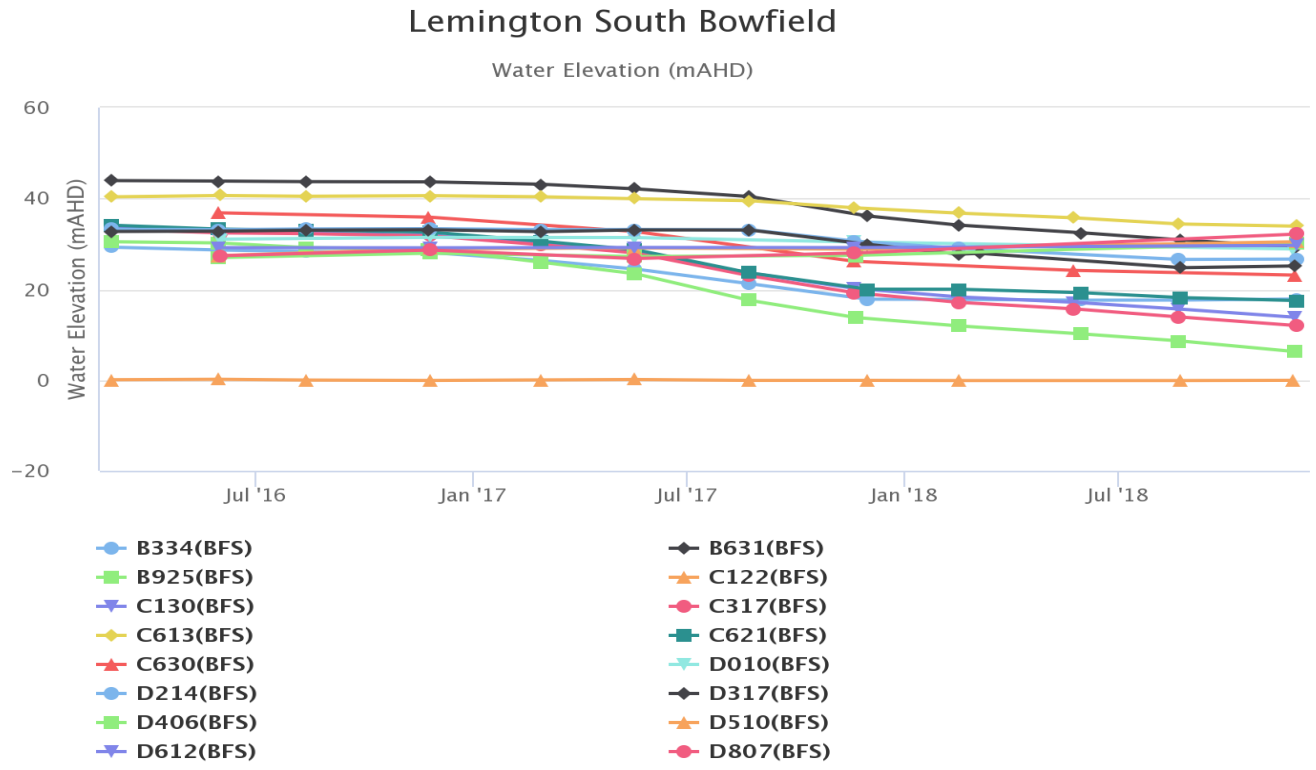

Figure 55: Lemington South Bowfield Standing Water Level – December 2018

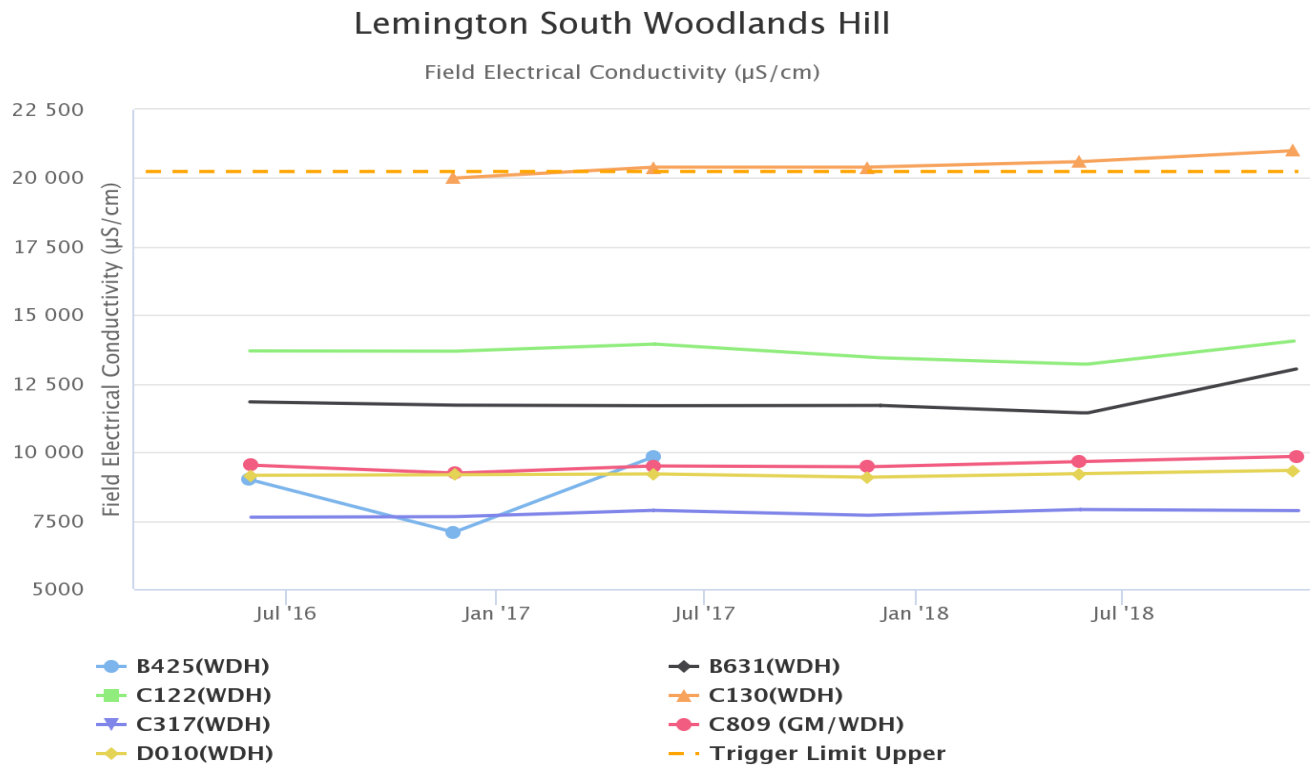

Figure 56: Lemington South Woodlands Hill Electrical Conductivity Trend – December 2018

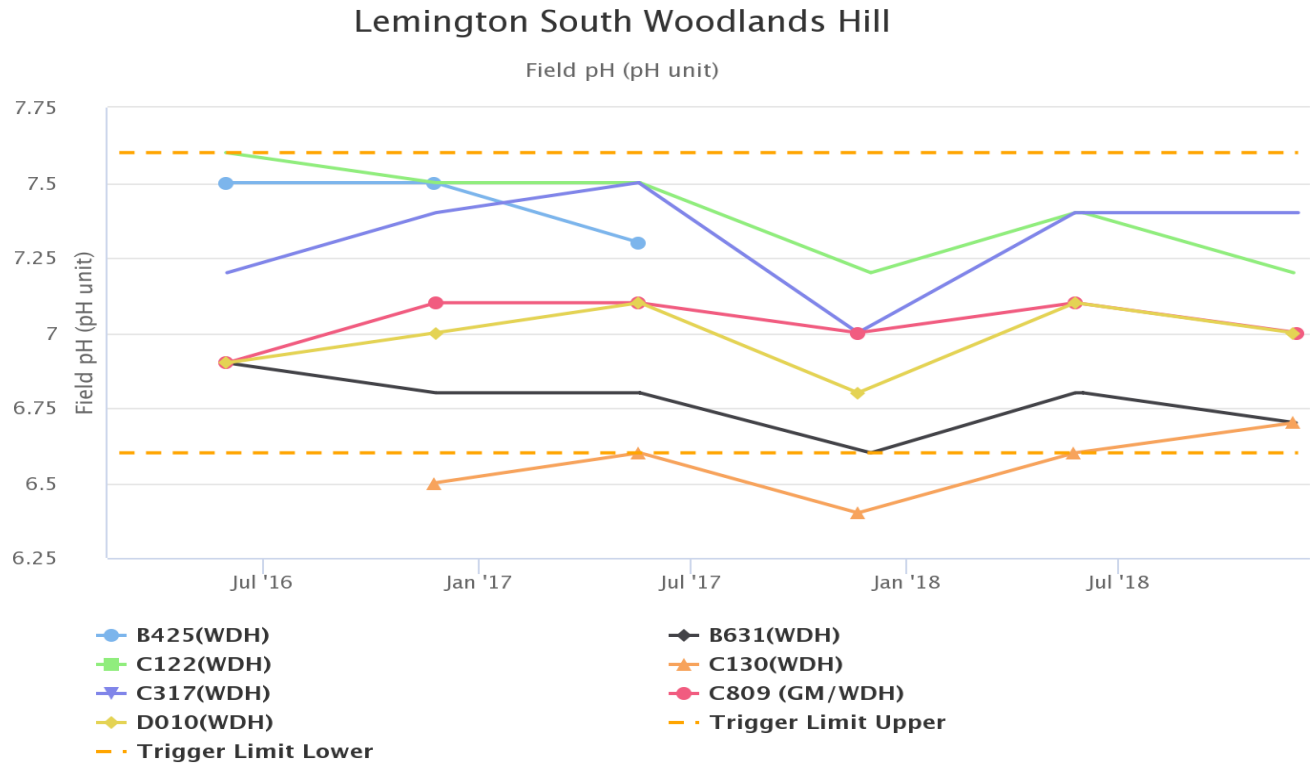

Figure 57: Lemington South Woodlands Hill pH Trend – December 2018

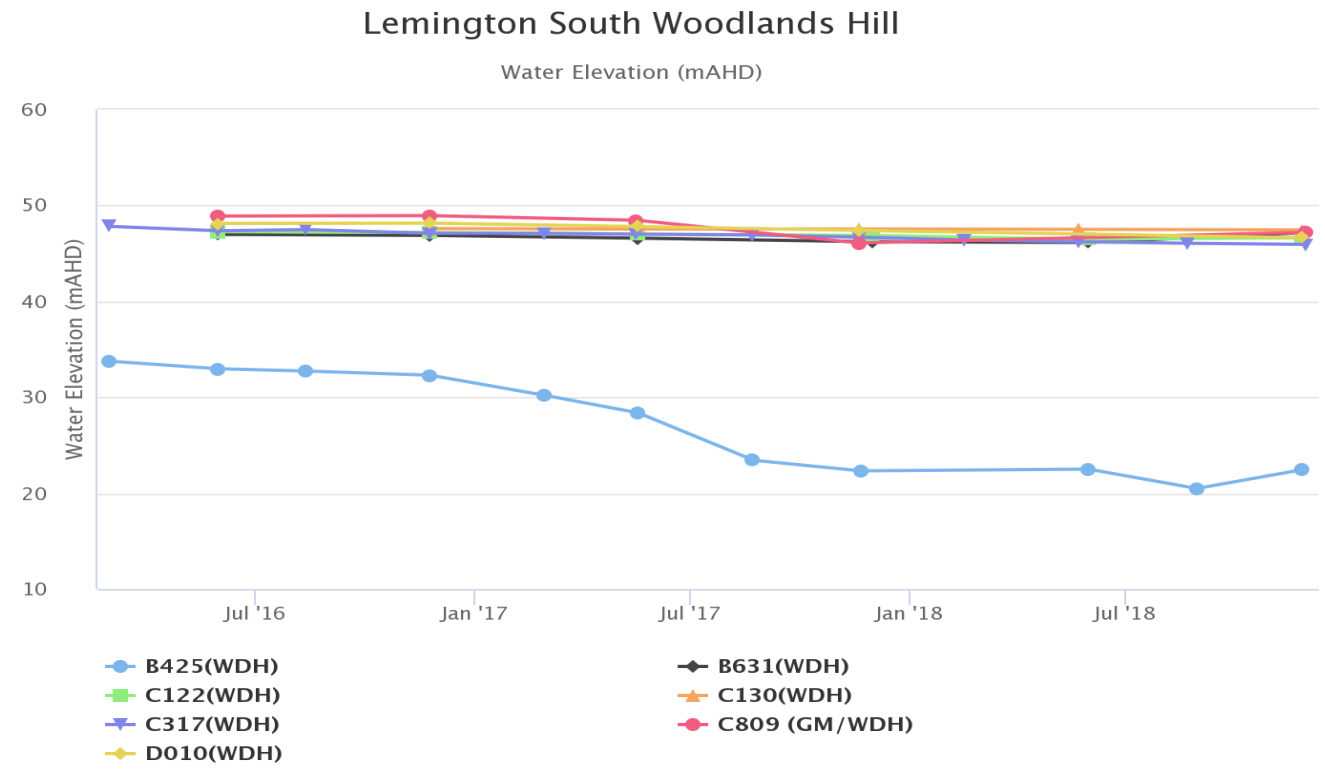

Figure 58: Lemington South Woodlands Hill Standing Water Level – December 2018

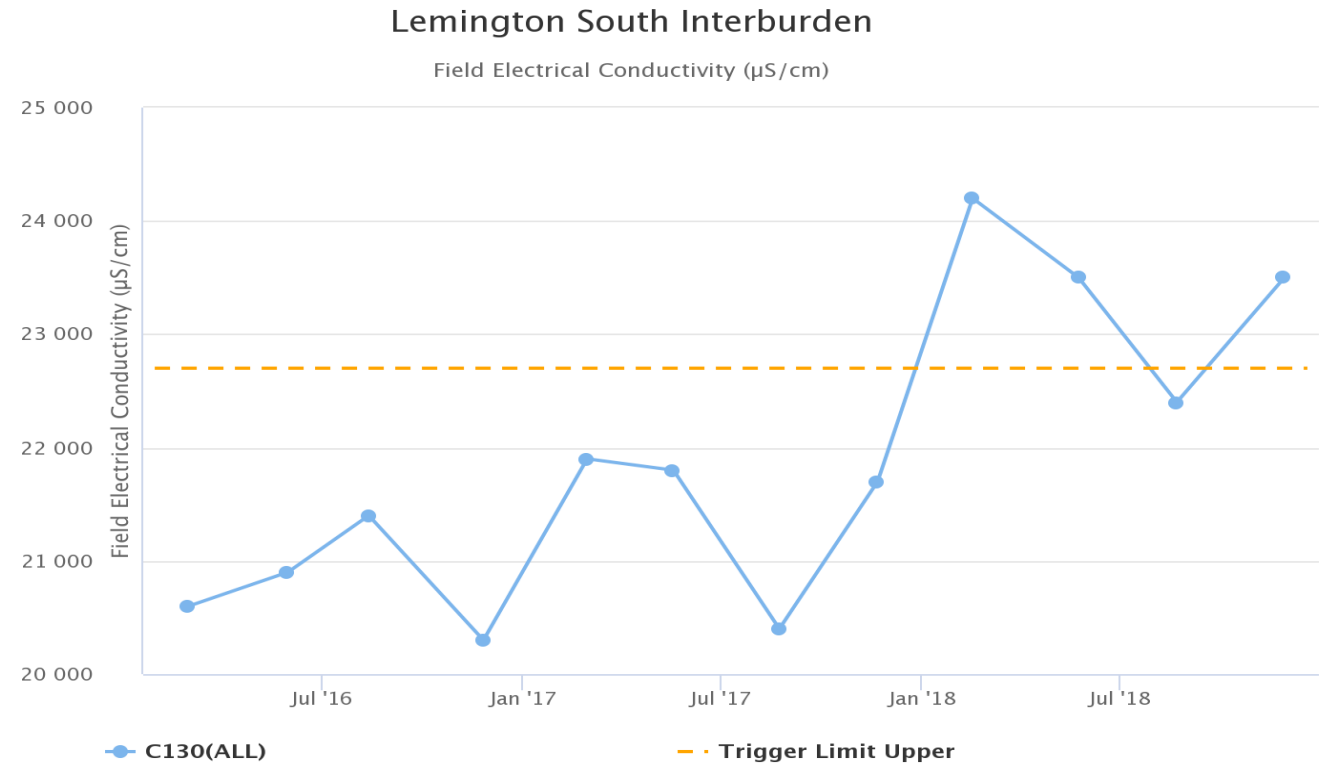

Figure 59: Lemington South Interburden Electrical Conductivity Trend – December 2018

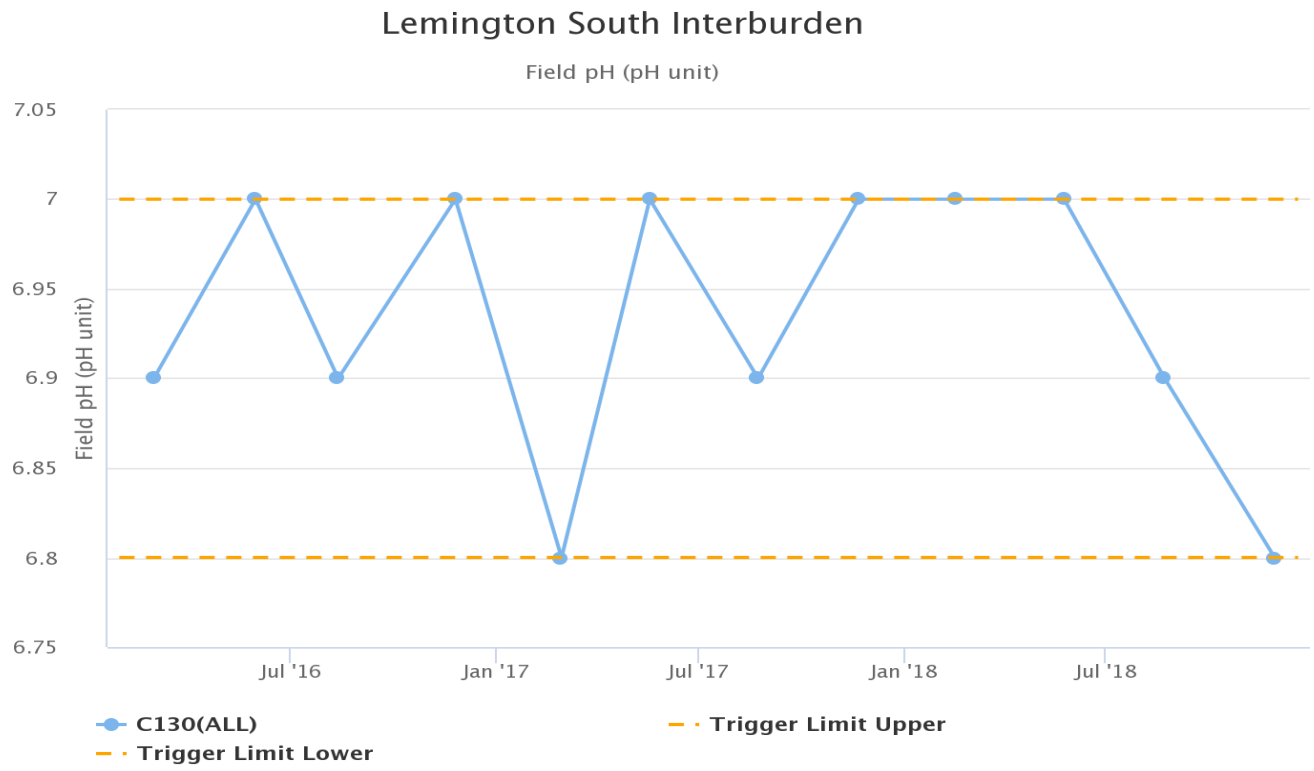

Figure 60: Lemington South Interburden pH Trend – December 2018

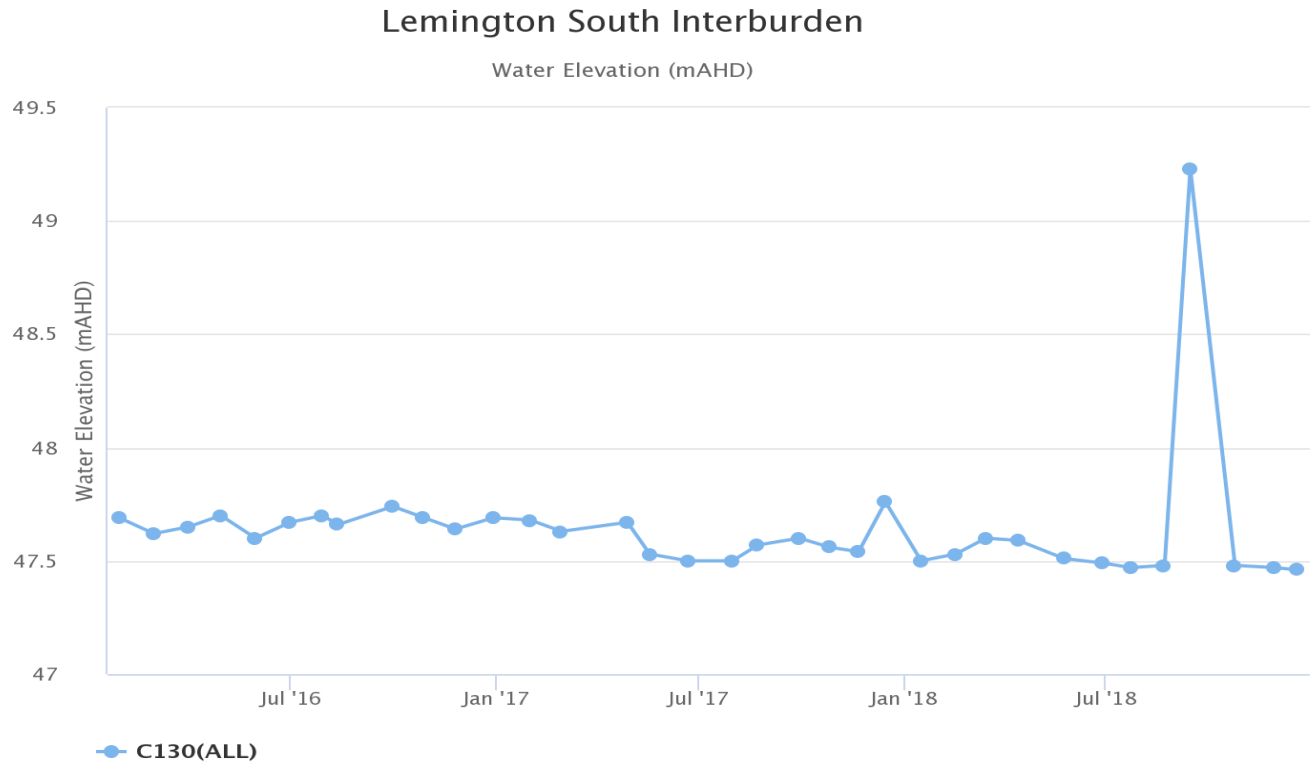

Figure 61: Lemington South Interburden Standing Water Level – December 2018

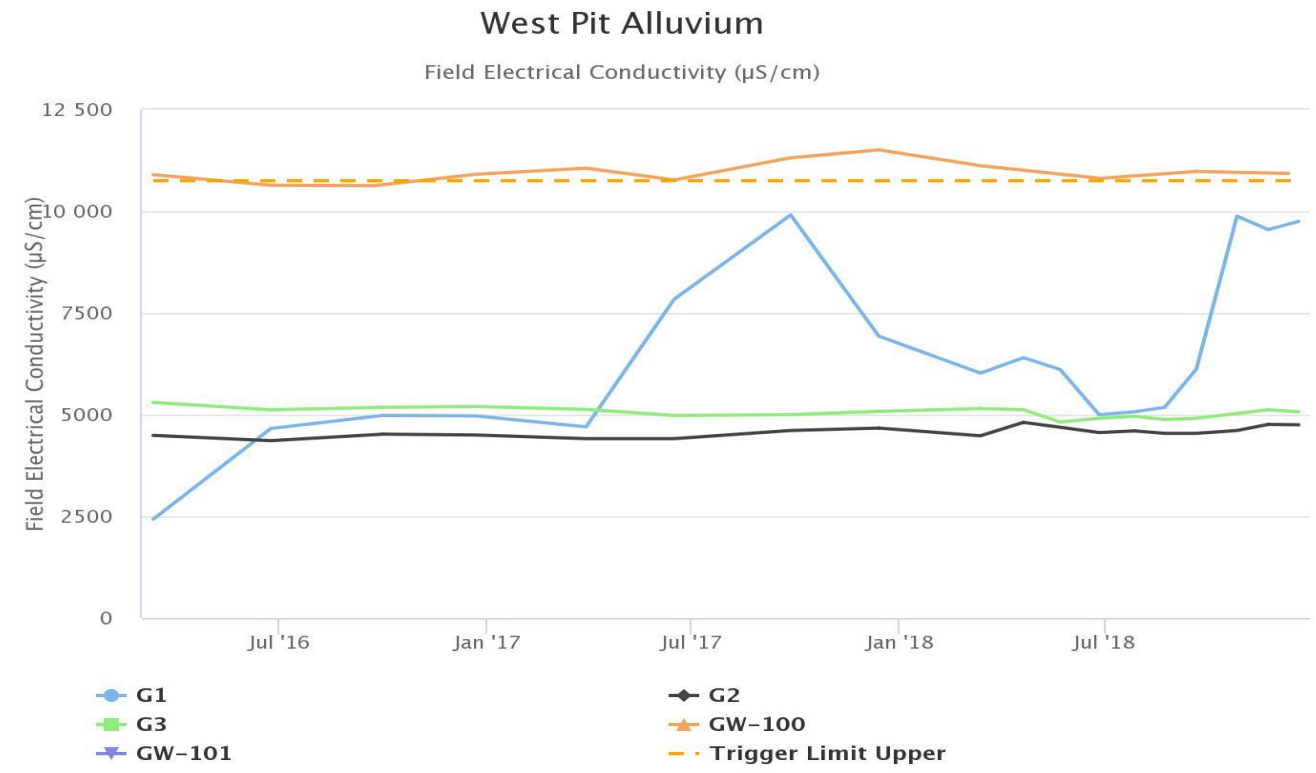

Figure 62: West Pit Alluvium Electrical Conductivity Trend – December 2018

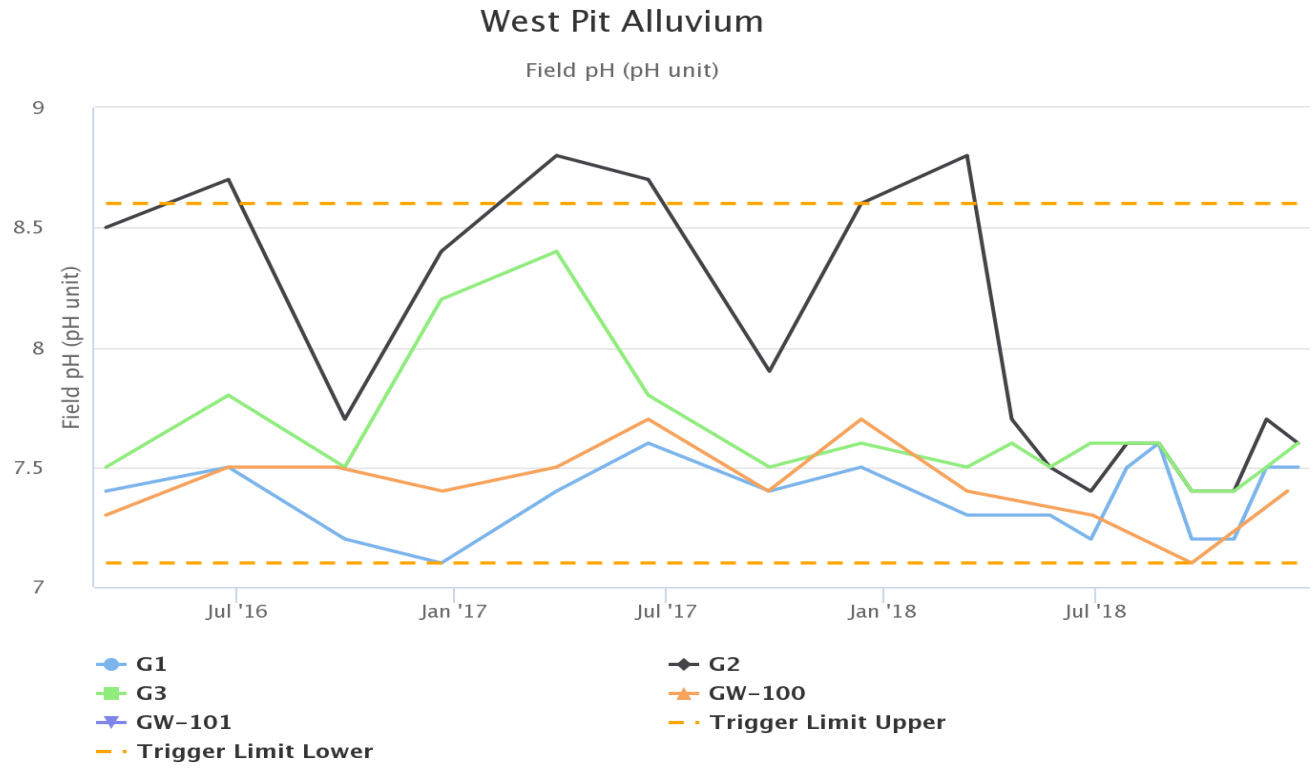

Figure 63: West Pit Alluvium pH Trend – December 2018

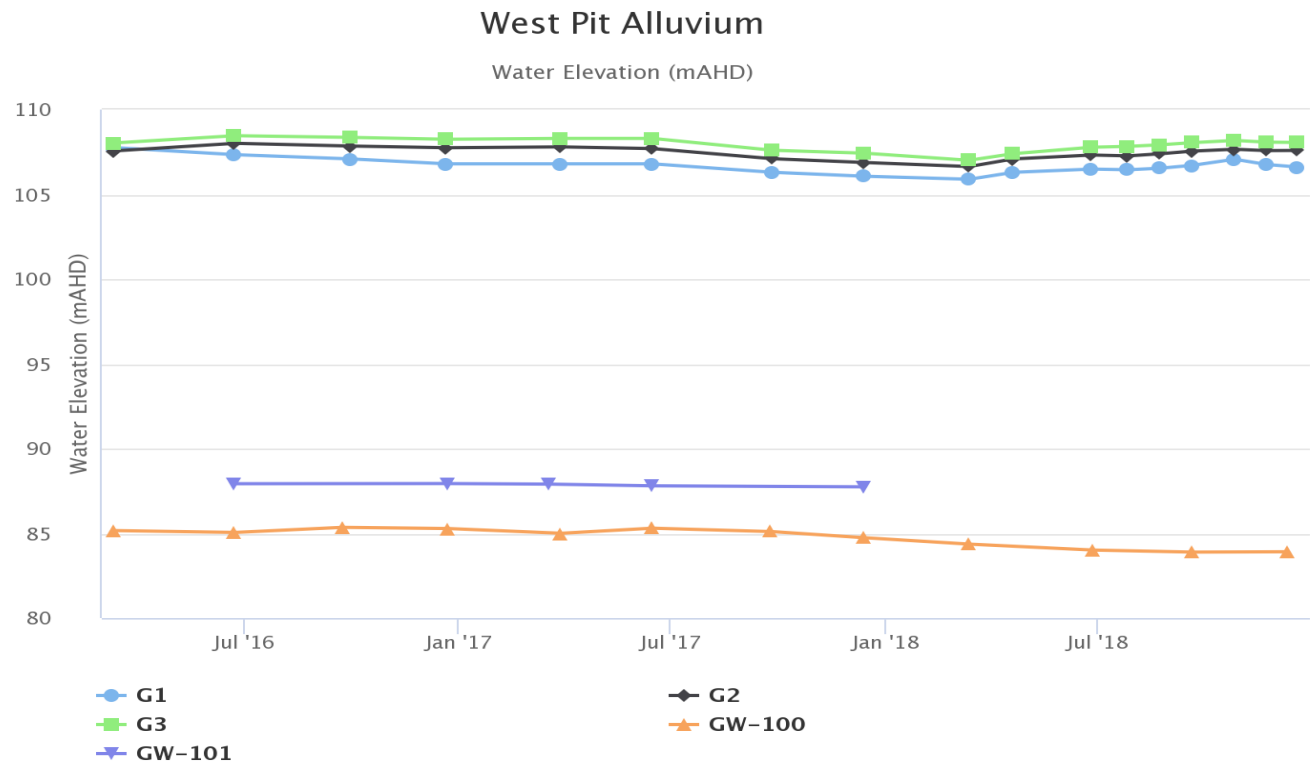

Figure 64: West Pit Alluvium Standing Water Level – December 2018

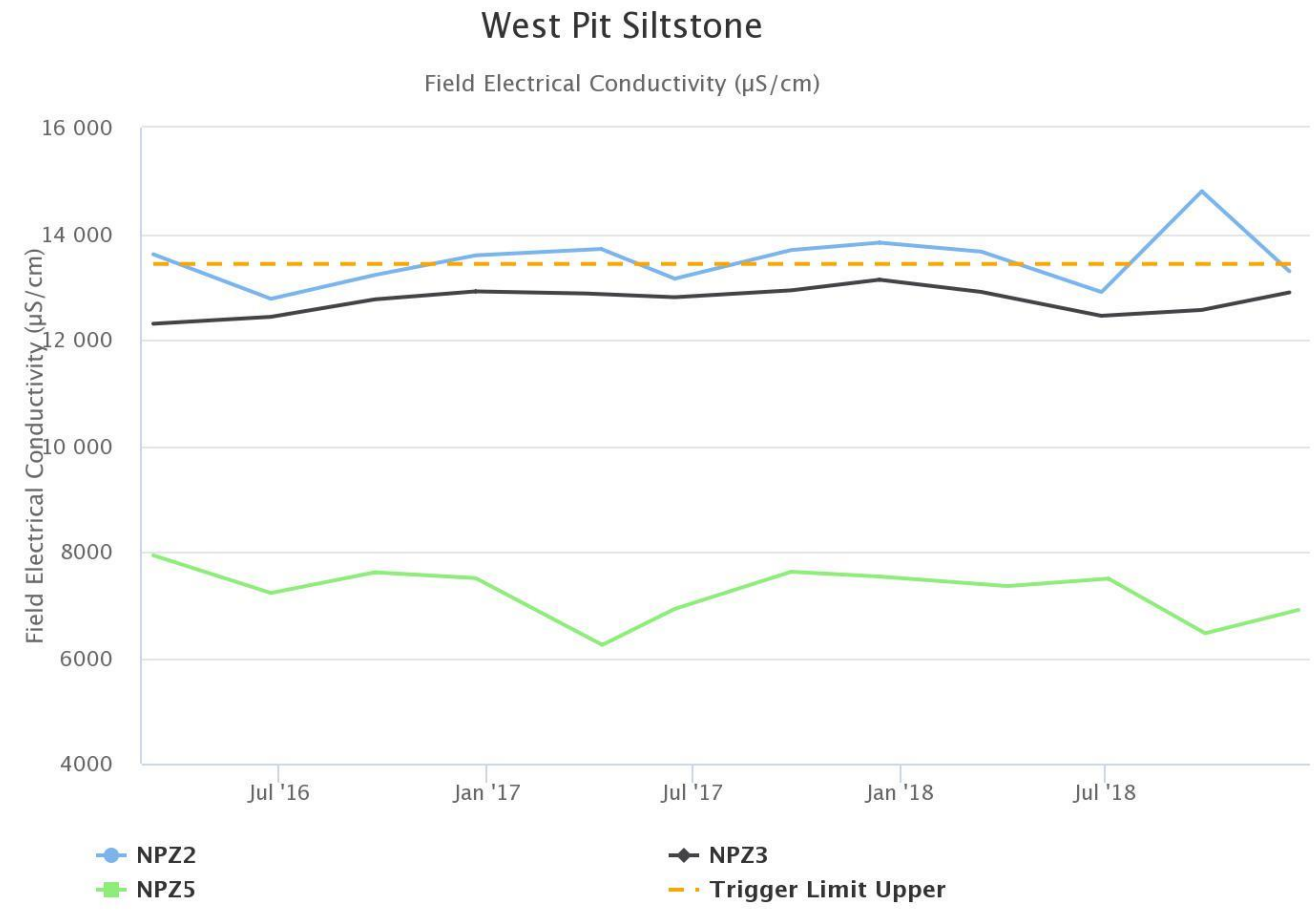

Figure 65: West Pit Siltstone Electrical Conductivity Trend – December 2018

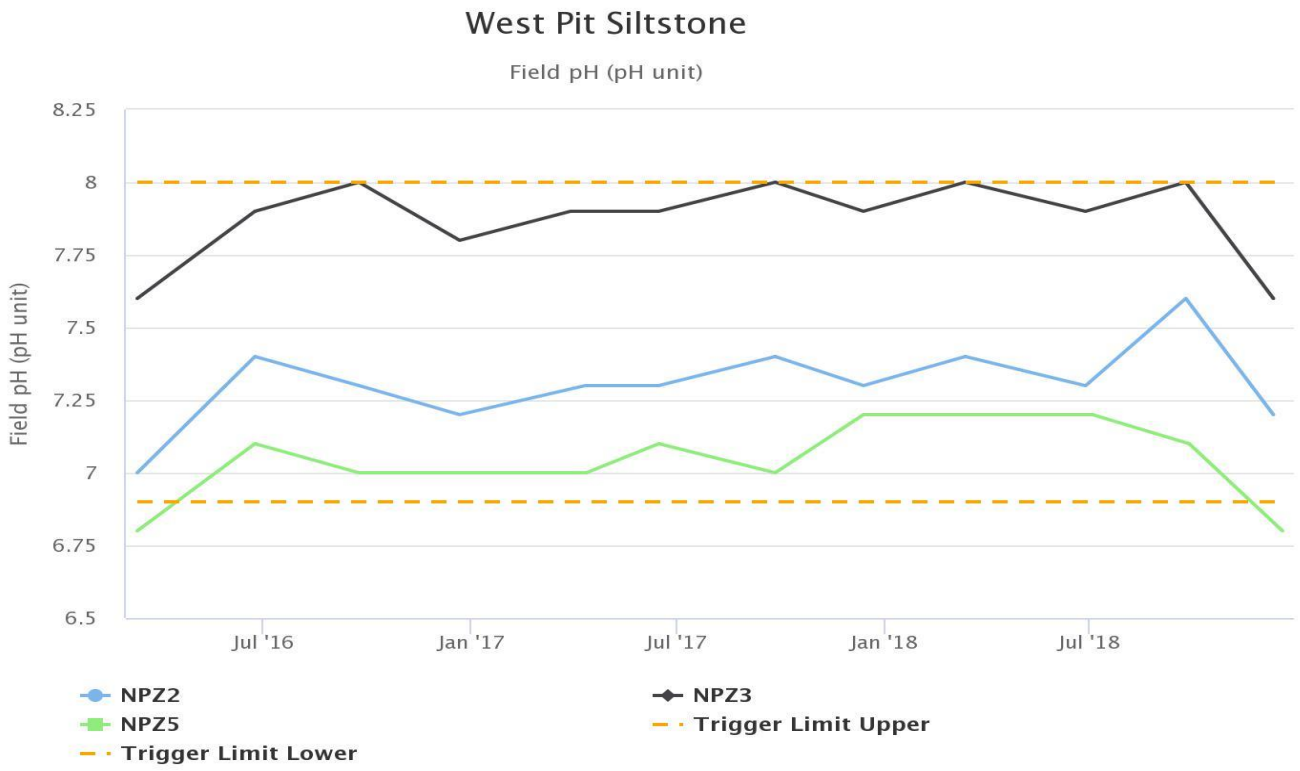

Figure 66: West Pit Siltstone pH Trend – December 2018

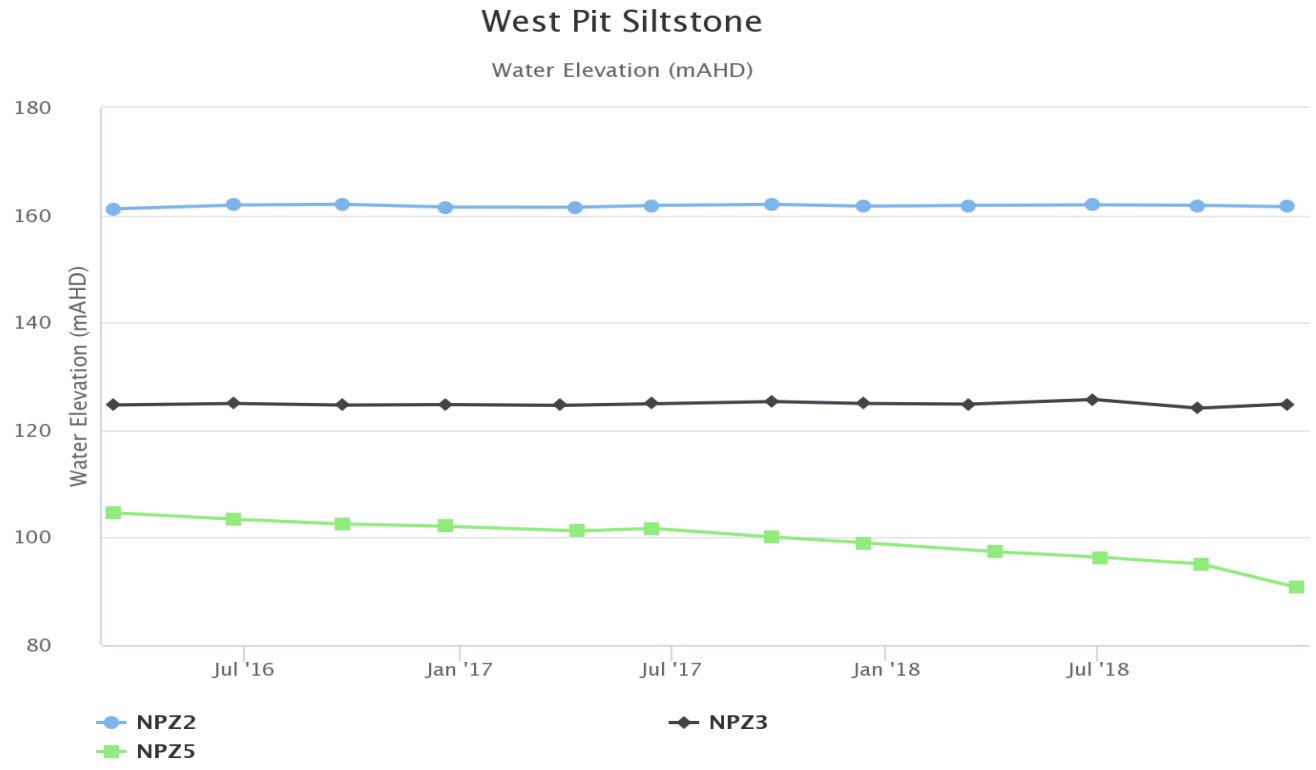

Figure 67: West Pit Siltstone Standing Water Level – December 2018

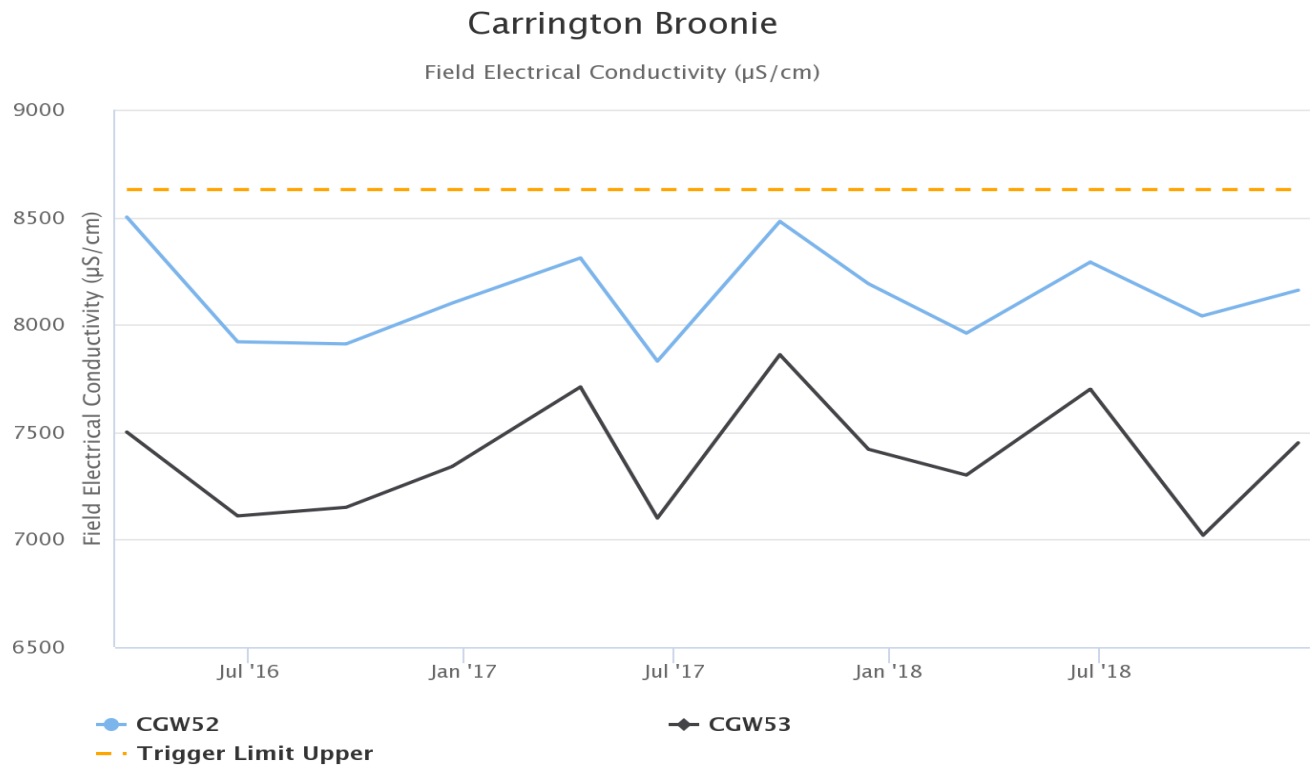

Figure 68: Carrington Broonie Electrical Conductivity Trend – December 2018

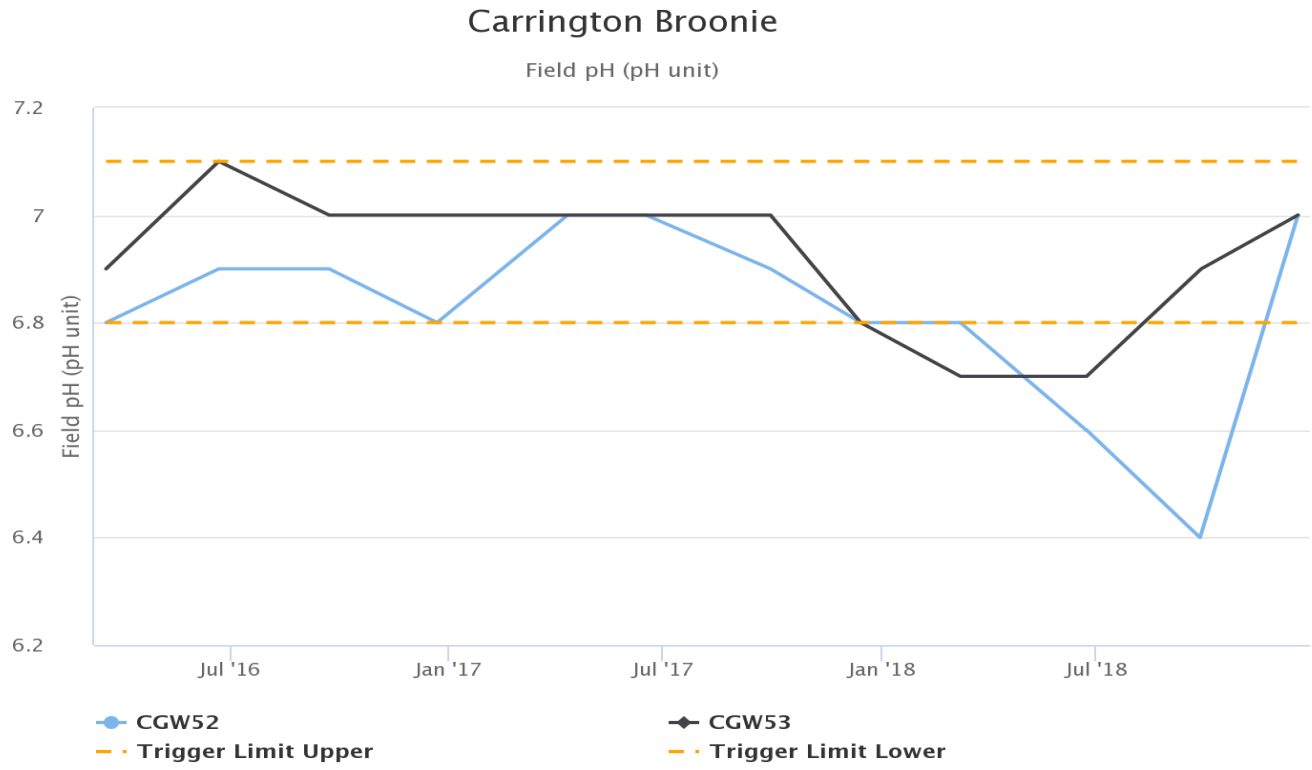

Figure 69: Carrington Broonie pH Trend – December 2018

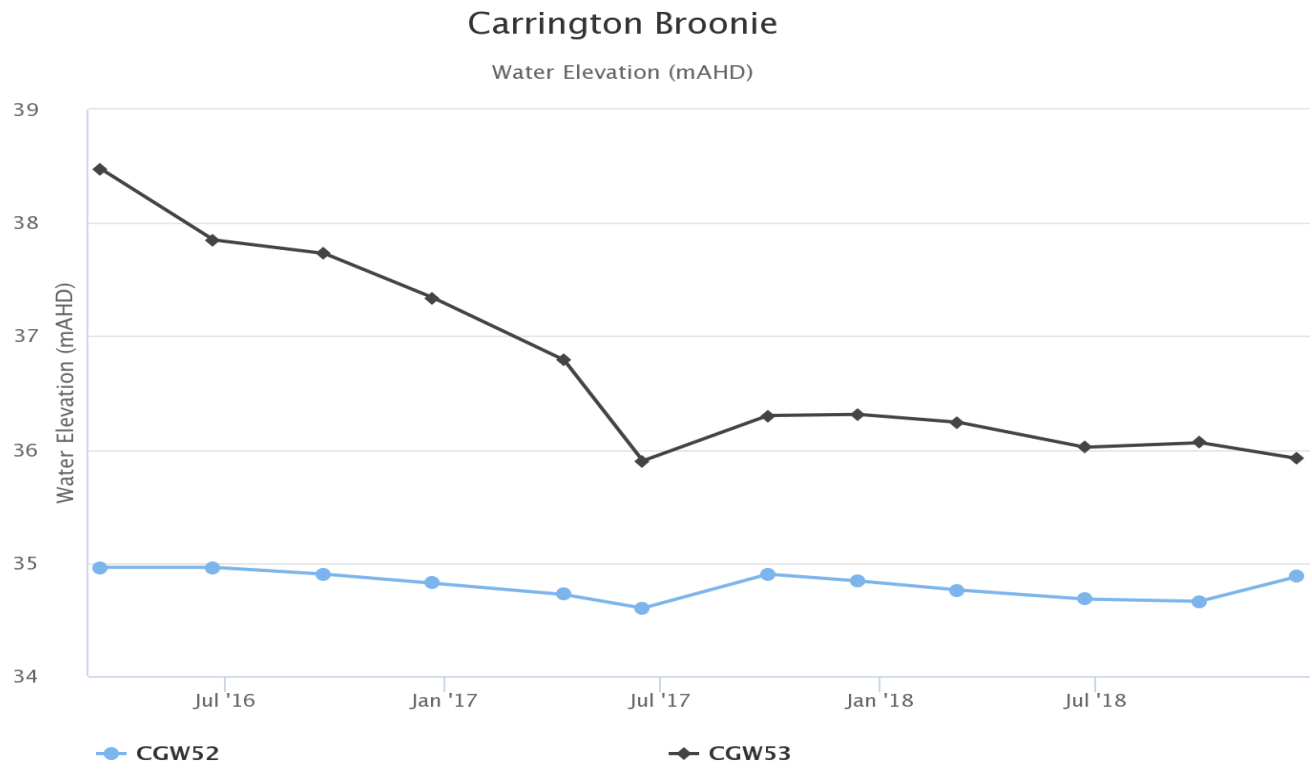

Figure 70: Carrington Broonie Standing Water Level – December 2018

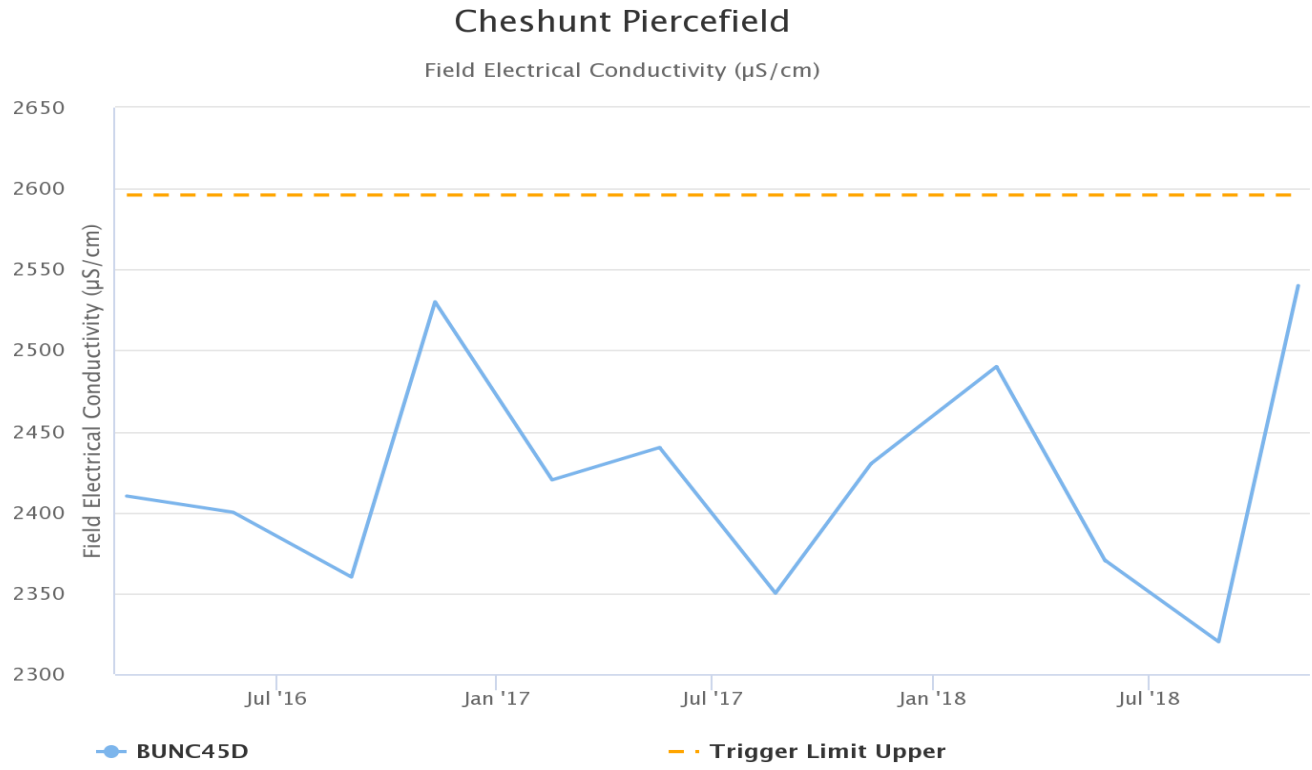

Figure 71: Cheshunt Piercefield Electrical Conductivity Trend – December 2018

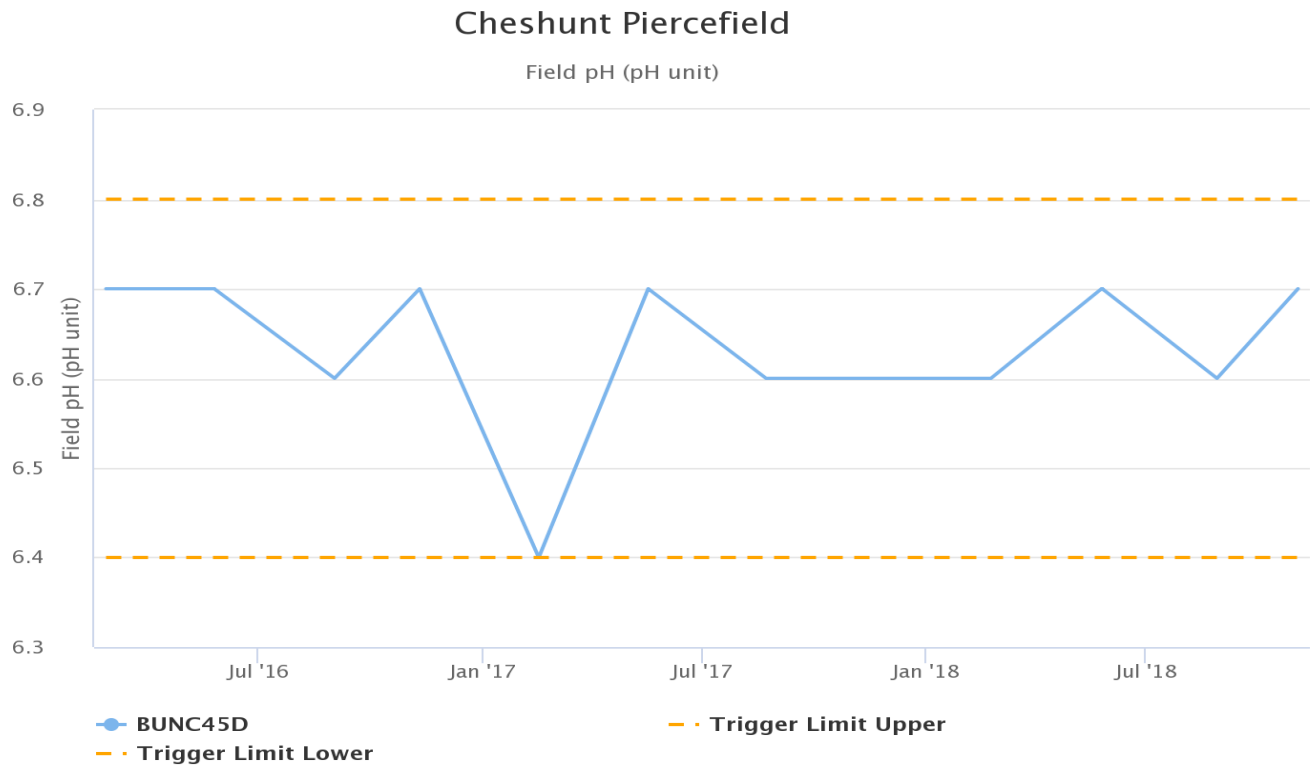

Figure 72: Cheshunt Piercefield pH Trend – December 2018

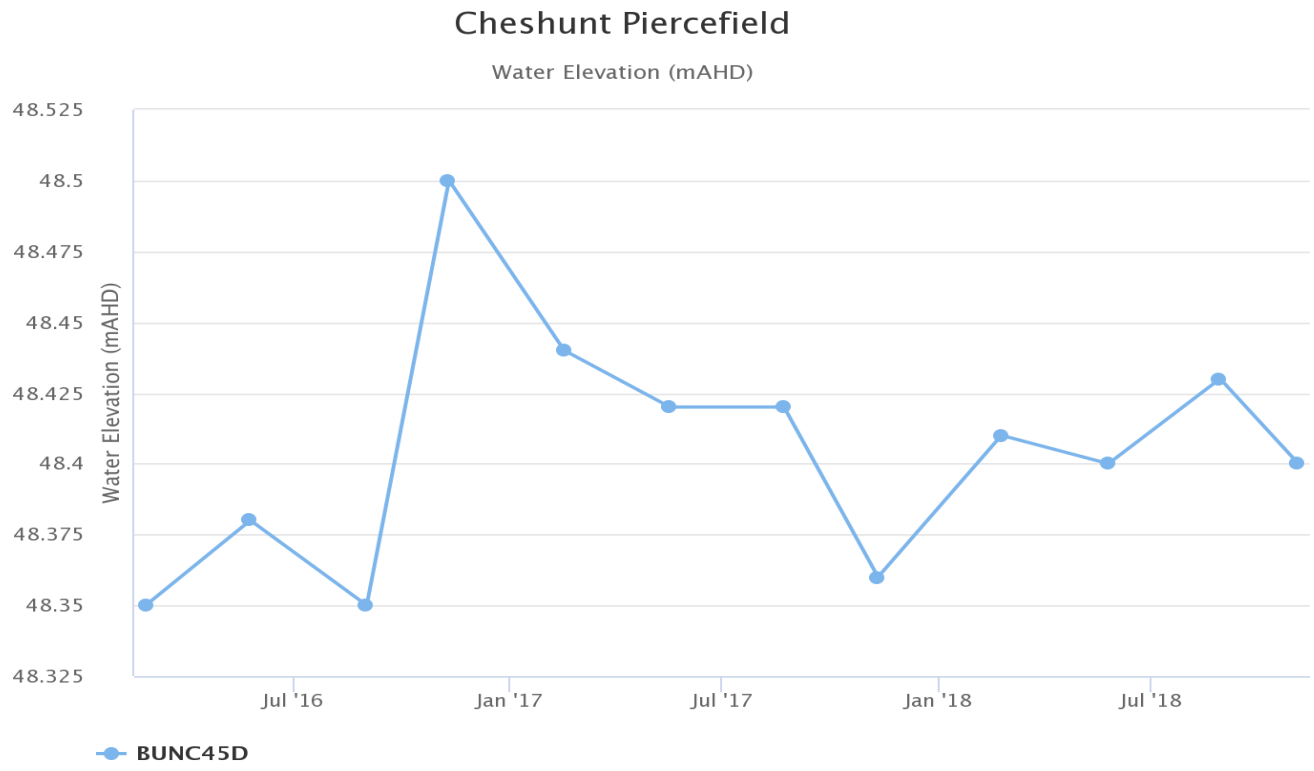

Figure 73: Cheshunt Piercefield Standing Water Level – December 2018

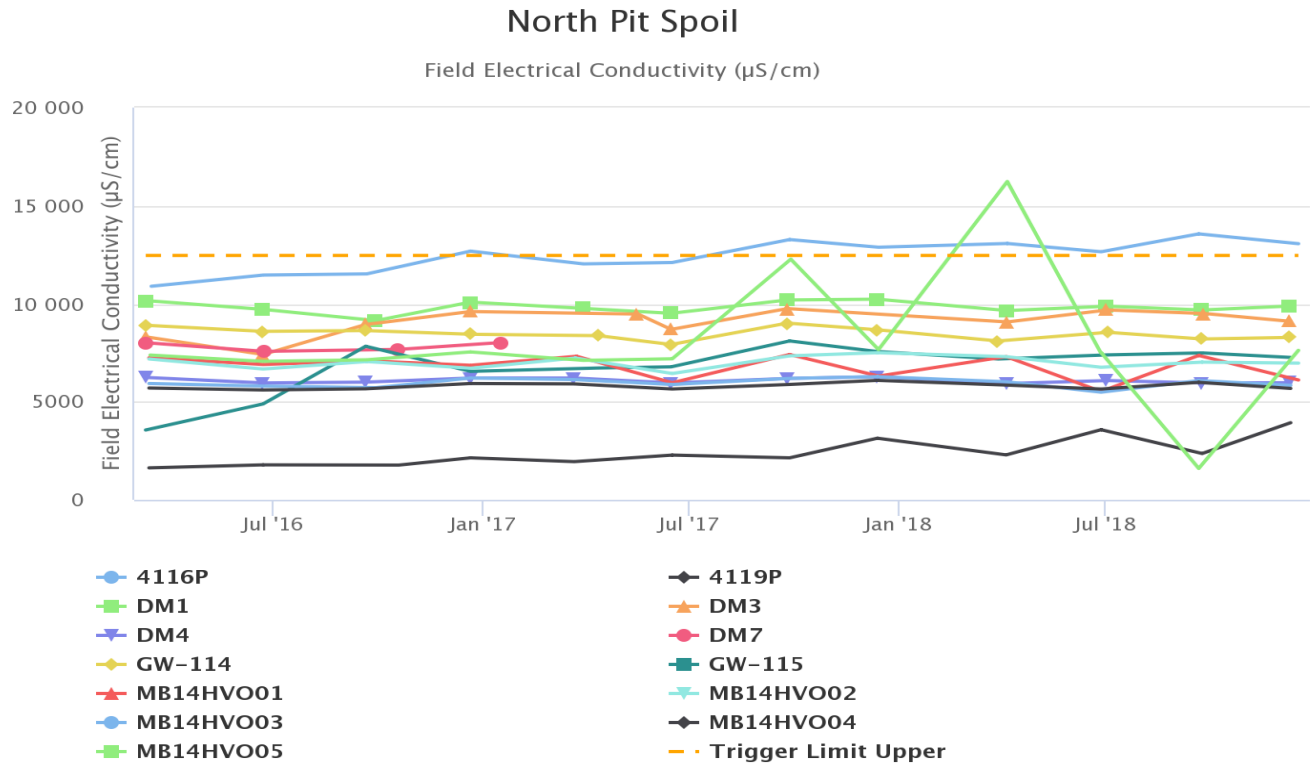

Figure 74: North Pit Spoil Electrical Conductivity Trend – December 2018

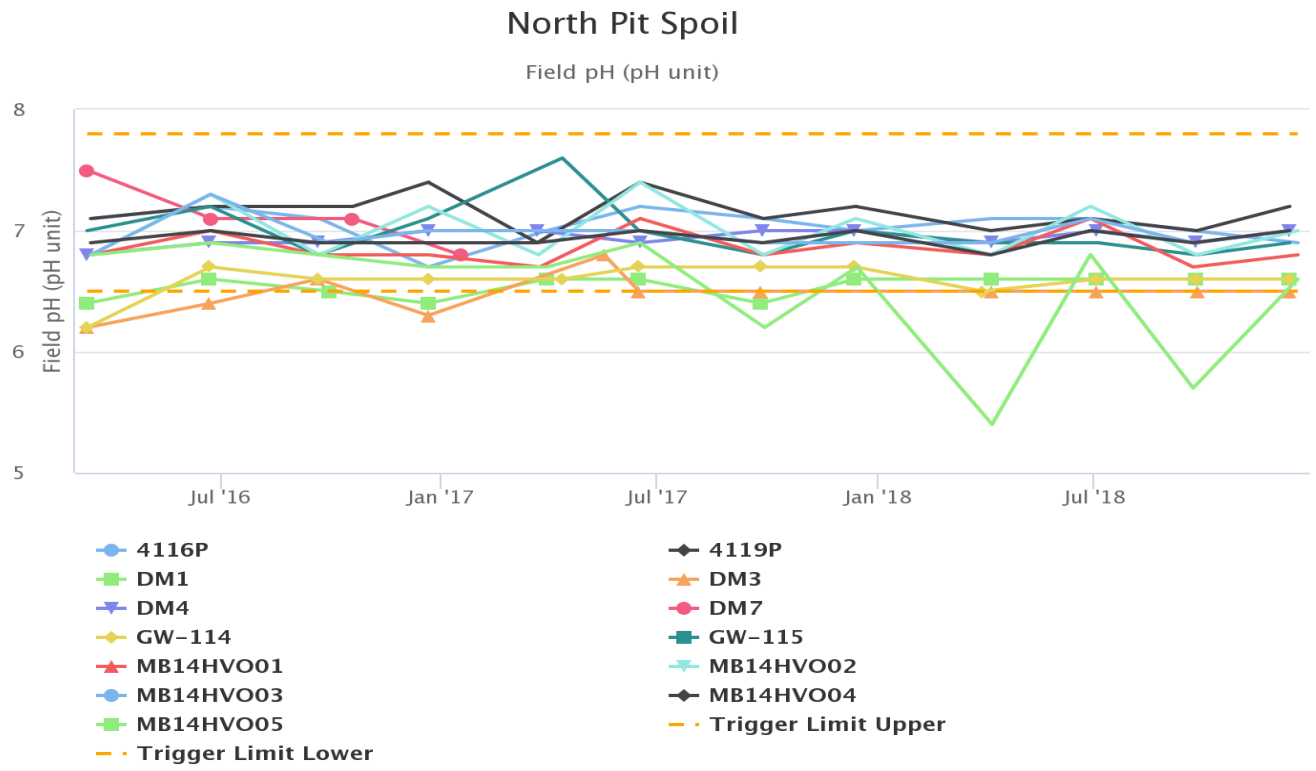

Figure 75: North Pit Spoil pH Trend – December 2018

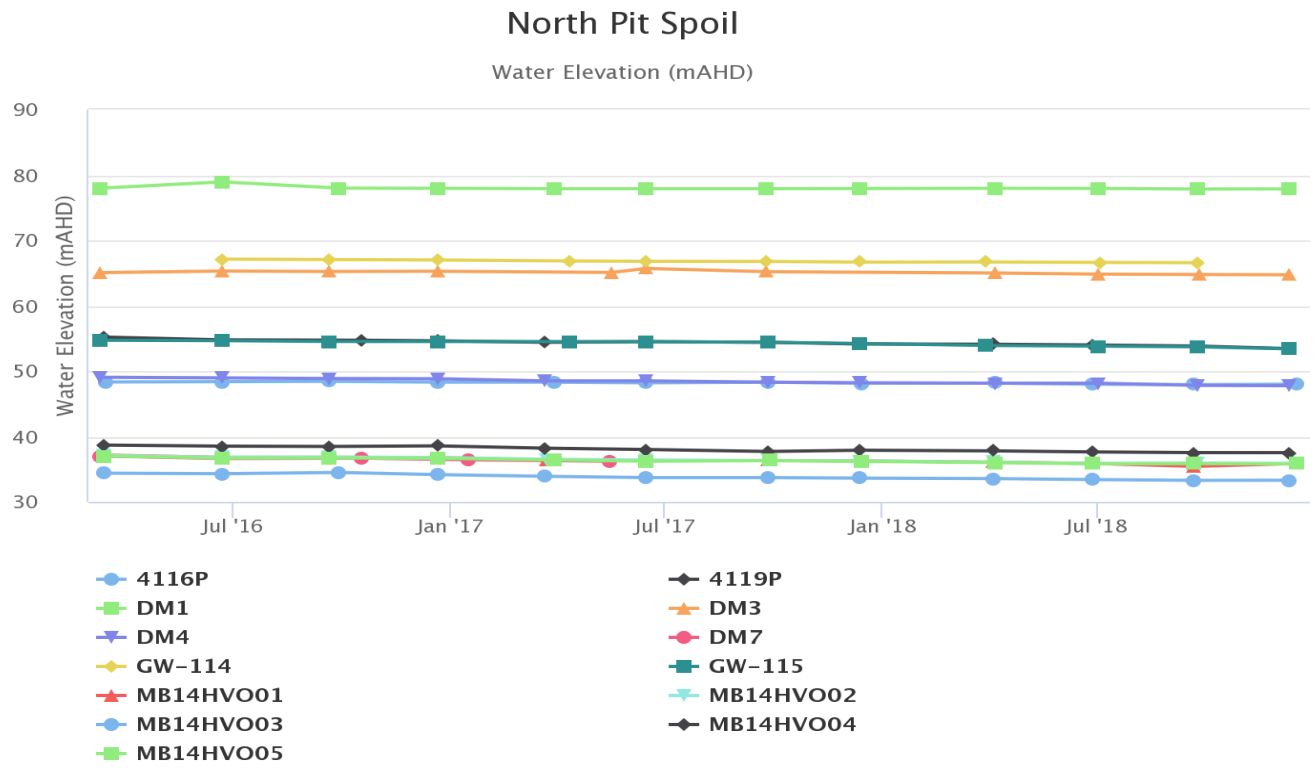

Figure 76: North Pit Spoil Standing Water Level – December 2018

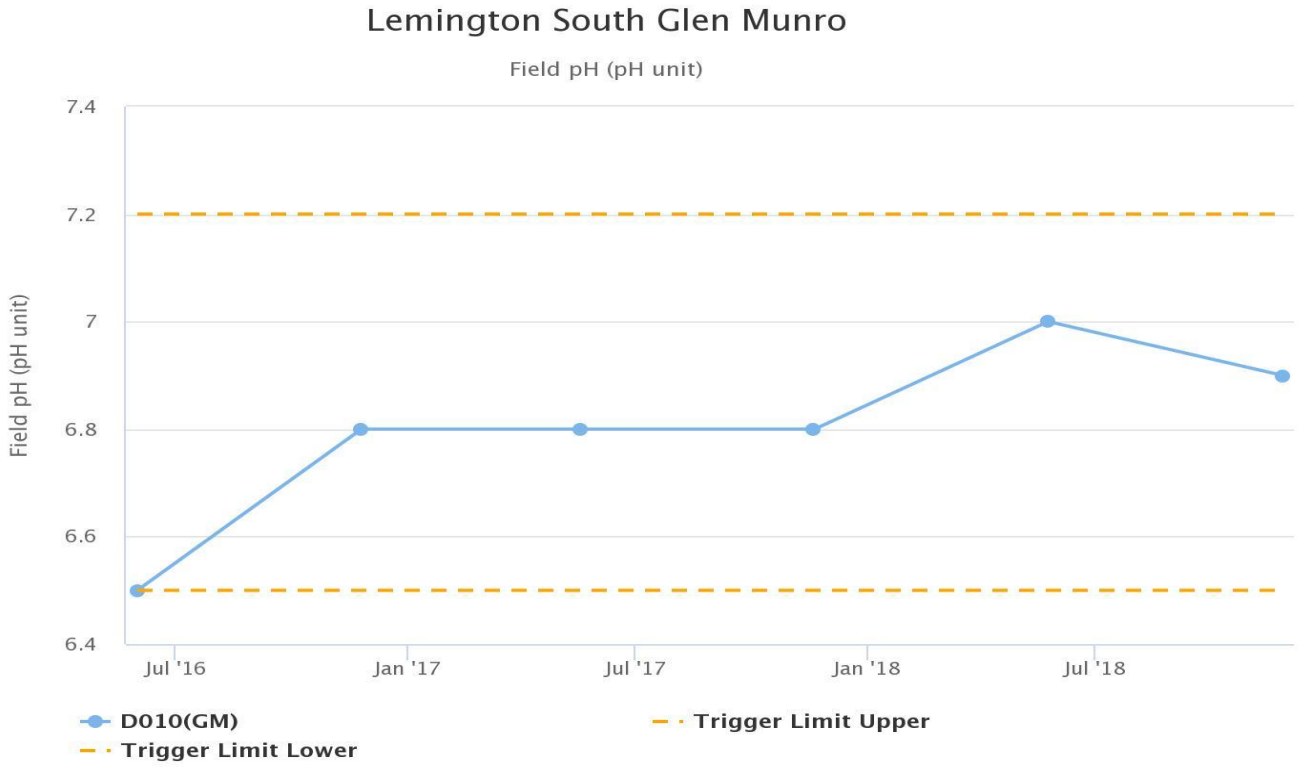

Figure 77: Lemington South Glen Munro pH Trend – December 2018

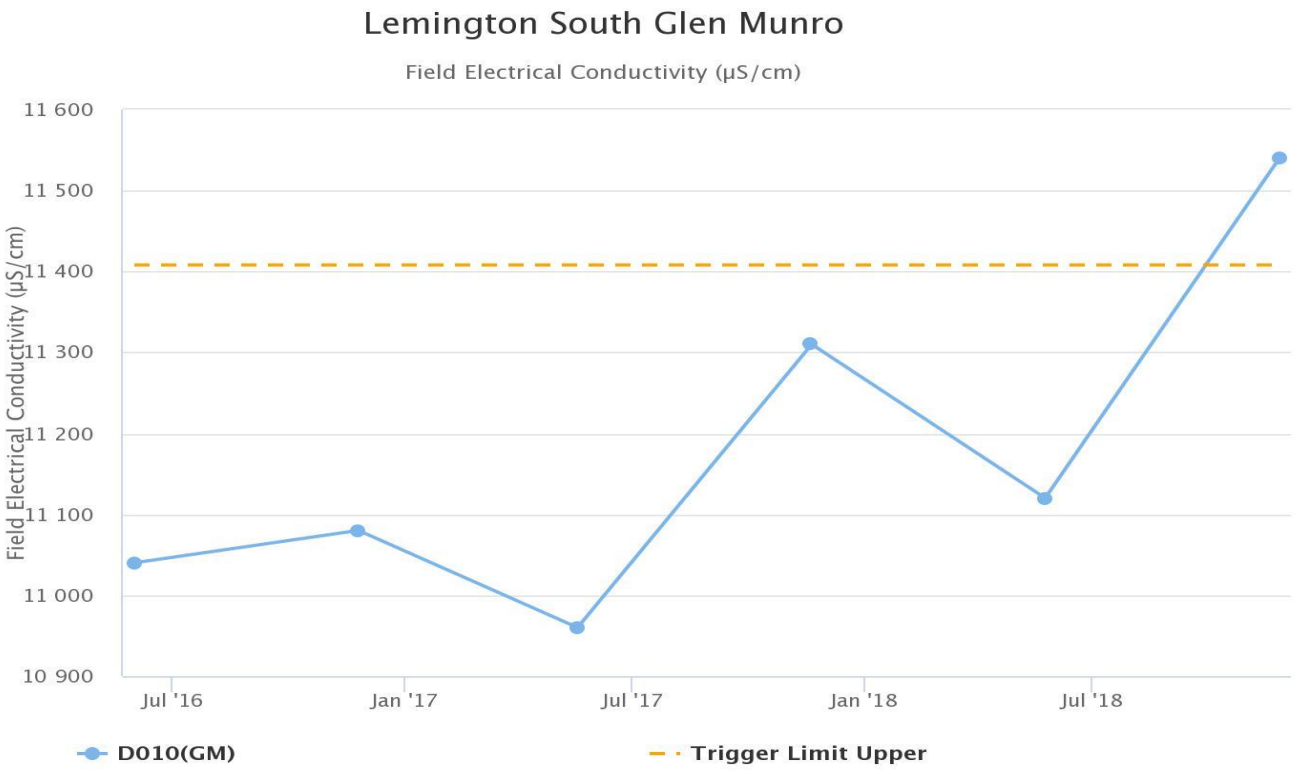

Figure 78: Lemington South Glen Munro Electrical Conductivity Trend – December 2018

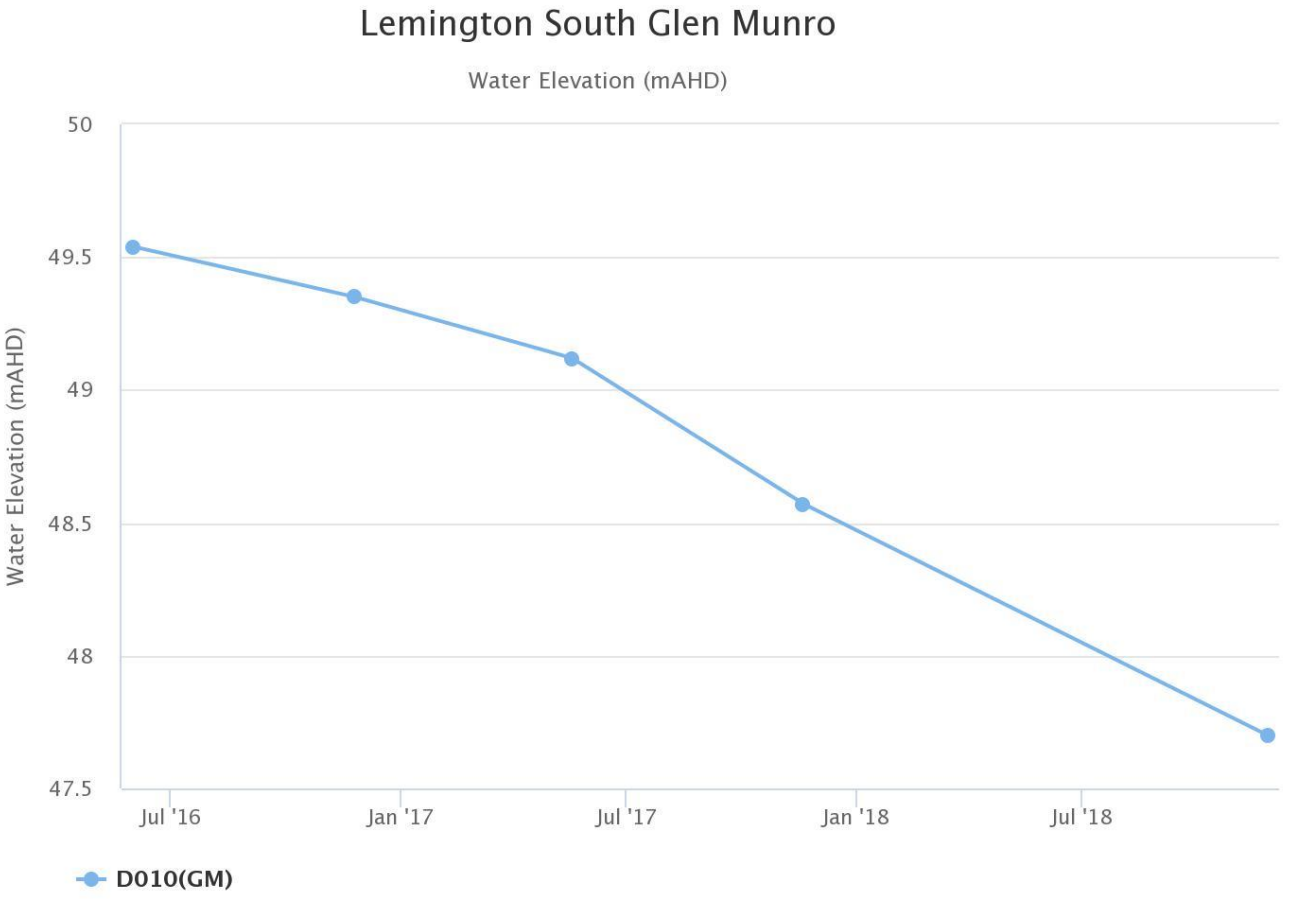

Figure 79: Lemington South Glen Munro Standing Water Level Trend – December 2018

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.

Current internal trigger limits breaches are summarised in Table 4.

Table 4: Groundwater Triggers – Q4 2018

Site	Date	Trigger Limit Breached	Action Taken in Response
CFW55R	25/10/2018 – 27/12/2018	EC – 95th Percentile	Investigation in progress
CFW55R	25/10/2018 – 27/12/2018	pH – 5th Percentile	Investigation in progress
CGW51a	27/12/2018	pH – 95th Percentile	1st exceedance. Watching Brief*
B631(BFS)	28/11/2018	EC – 95th Percentile	1st exceedance. Watching Brief*
BZ3-3	9/11/2018	pH – 5th Percentile	1st exceedance. Watching Brief*
C130(WDH)	28/11/2018	EC – 95th Percentile	Investigation in progress
D612(AFS)	30/11/2018	EC – 95th Percentile	Investigation in progress
D010 (GM)	26/11/2018	EC – 95th Percentile	1st exceedance. Watching Brief*
C130(ALL)	28/11/2018	EC – 95th Percentile	1st exceedance. Watching Brief*
PBO1(ALL)	30/11/2018	EC – 95th Percentile	Investigation in progress
4116P	17/12/2018	EC – 95th Percentile	Investigation in progress
C630(BFS)	28/11/2018	pH – 95th Percentile	2nd exceedance. Watching Brief*
BZ8-2	9/11/2018	pH – 5th Percentile	1st exceedance. Watching Brief*
HG2	9/11/2018	pH – 5th Percentile	1st exceedance. Watching Brief*
BZ1-1	9/11/2018	pH – 95th Percentile	1st exceedance. Watching Brief*
Hobdens Well	2/11/2018	pH – 95th Percentile	1st exceedance. Watching Brief*
NPz5	18/12/2018	pH – 5th Percentile	1st exceedance. Watching Brief*
GA3	17/12/2018	pH – 5th Percentile	1st exceedance. Watching Brief*

HV3 (2)	17/12/2018	pH – 5th Percentile	1st exceedance. Watching Brief*
GW-100	10/12/2018	EC – 95th Percentile	1st exceedance. Watching Brief*

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

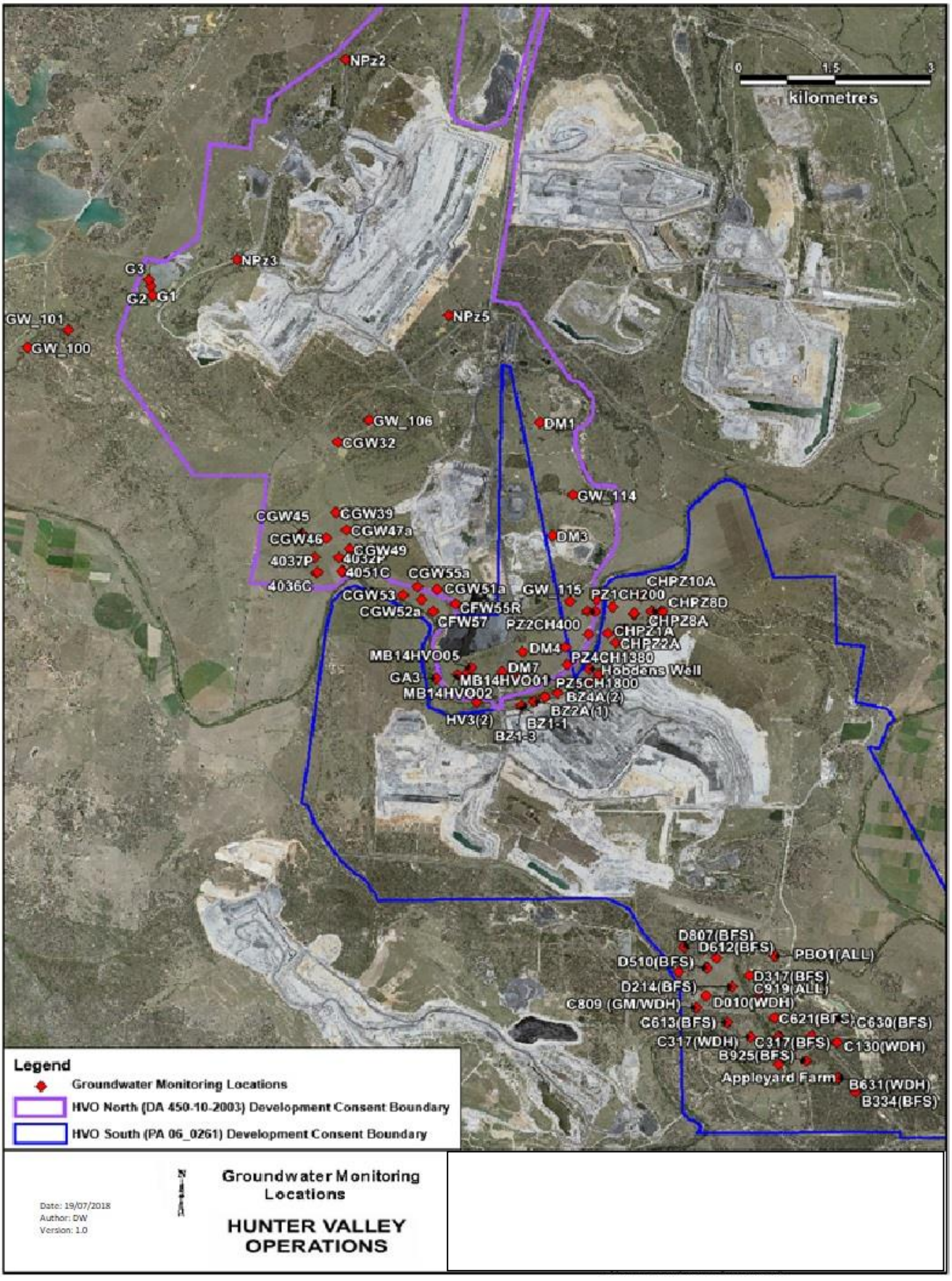

Figure 80: Groundwater Monitoring Location Plan

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 in Figure 86.

During December, 14 blasts were initiated at HVO. Figure 81 through to Figure 85 show the blast monitoring results for the reporting period against the impact assessment criteria. The criteria are summarised in Table 5.

On 18 December, the Knodlers Lane blast monitor failed to capture both overpressure and vibration results for the shot at 13:19 and vibration data for the shot at 13:18. Further discussion about this incident are discussed in Section 10.

Table 5: 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.

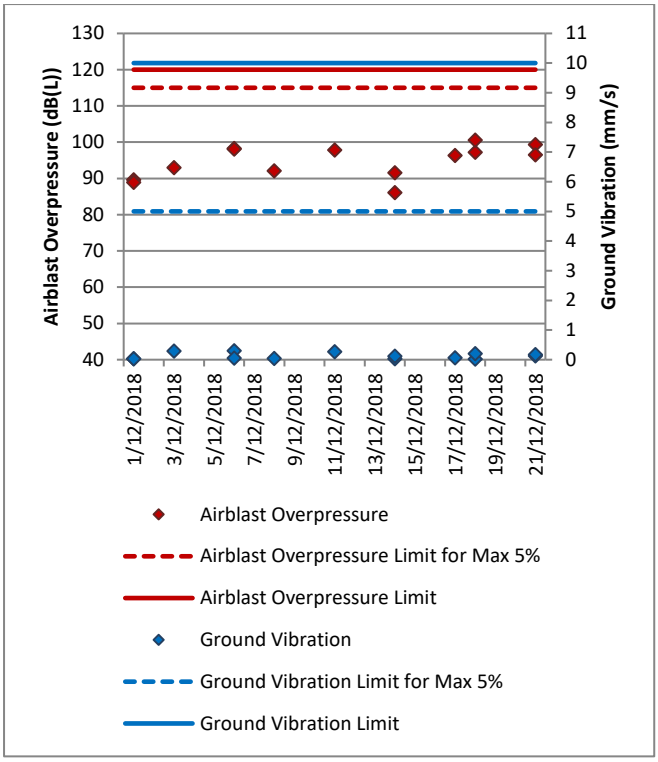

Figure 81: Moses Crossing Blast Monitoring Results – December 2018

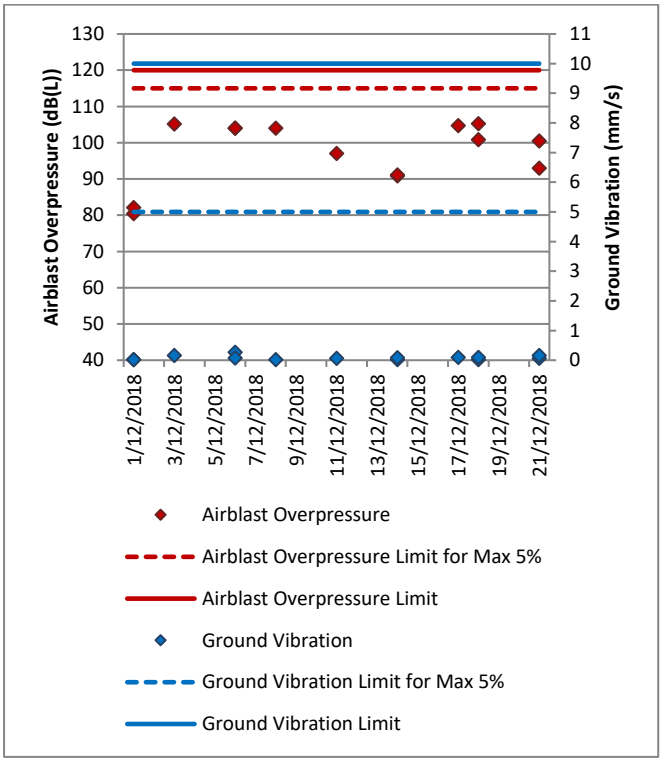

Figure 82: Jerrys Plains Blast Monitoring Results – December 2018

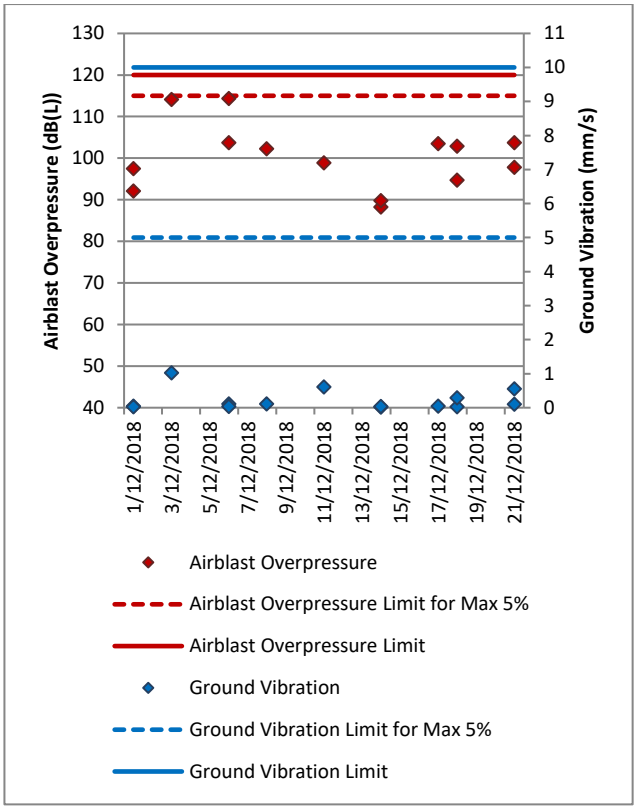

Figure 83: Maison Dieu Blast Monitoring Results – December 2018

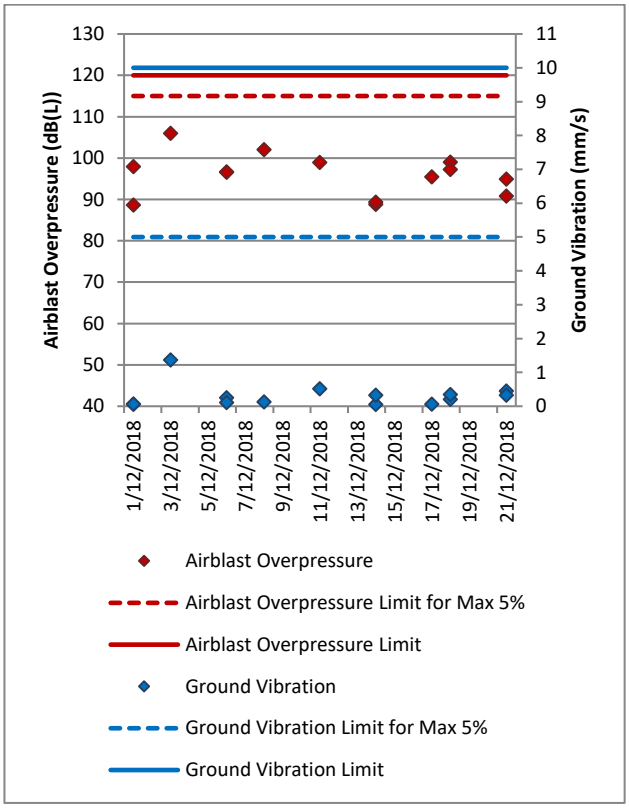

Figure 84: Warkworth Blast Monitoring Results – December 2018

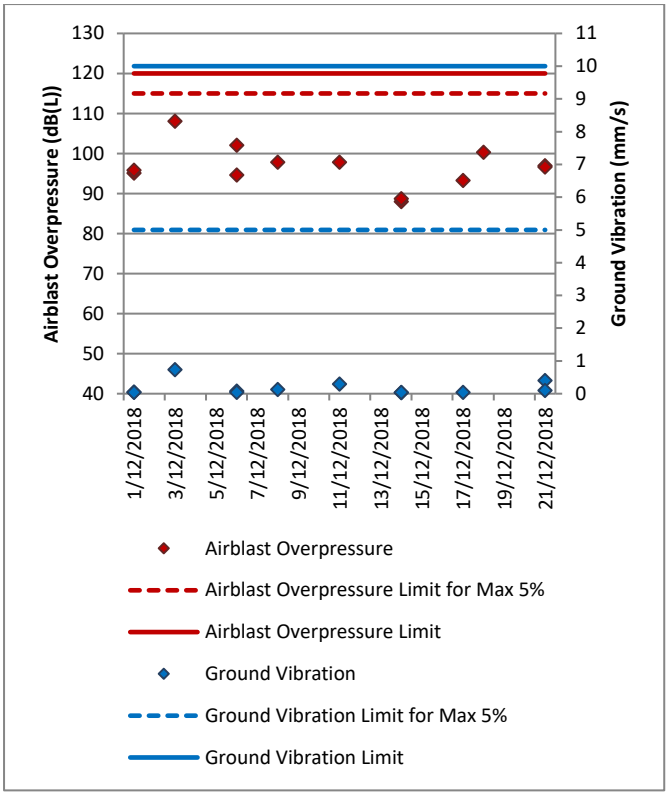

Figure 85: Knodlers Lane Blast Monitoring Results – December 2018

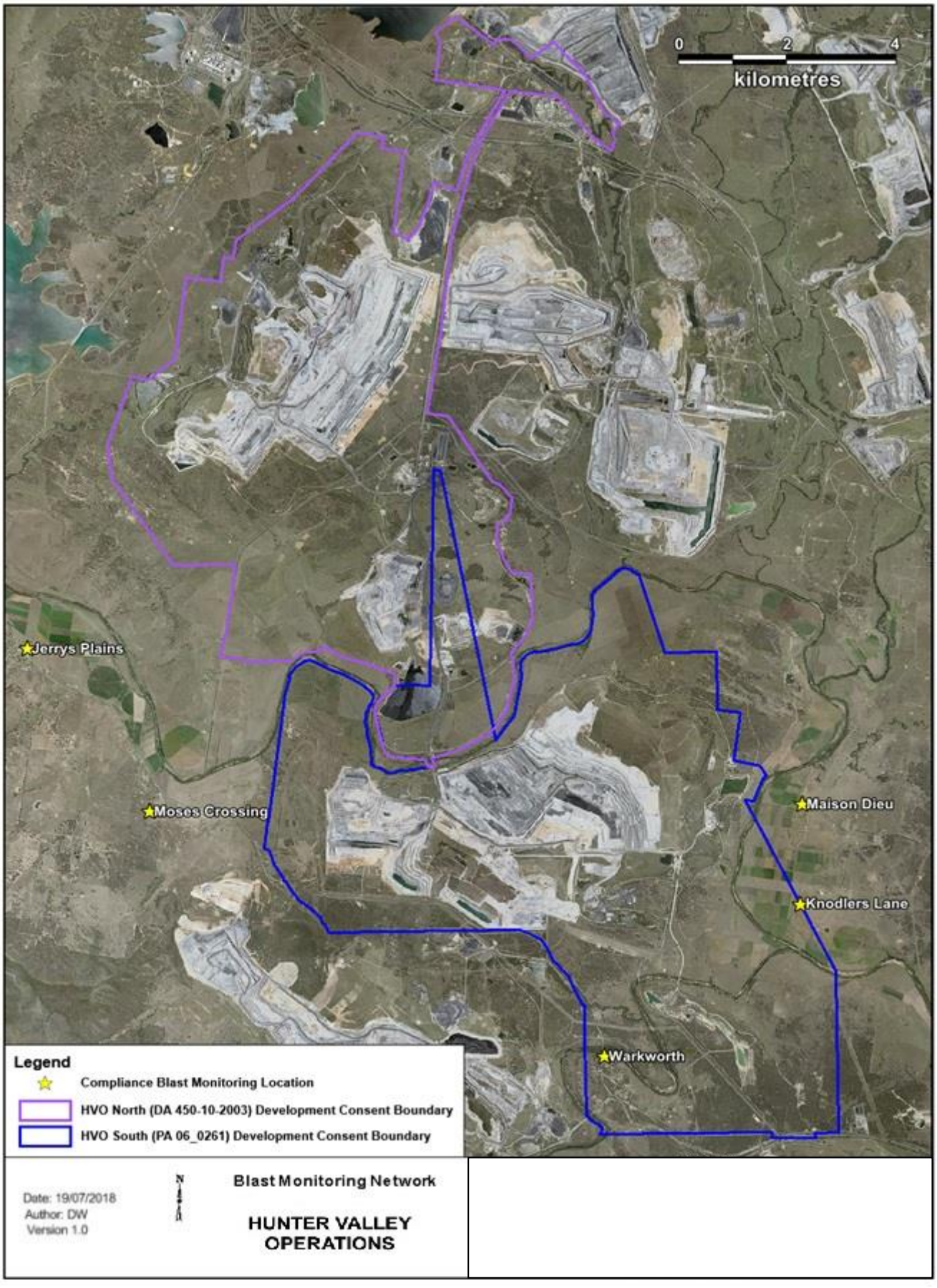

Figure 86: Blast Monitoring Location Plan

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 87.

6.1 Attended Noise Monitoring Results

Attended monitoring was conducted at receiver locations surrounding HVO on the night shift of 17 and 18 December 2018. Monitoring results are detailed in Table 6 to Table 11 . During the reporting period, there was one noise exceedance recorded. See section **10.0 Environmental Incidents** of this report for more information.

Table 6: $L_{Aeq,\ 15\ minute}$ HVO South - Impact Assessment Criteria – December 2018

Location	Date and Time	Wind Speed (m/s)[1]	VTG[1]	Criterion dB (A)	Criterion Applies?[2]	HVO South L_{Aeq} dB[3,4]	Exceedance[4,5]
Knodlers Lane	17/12/2018 21:44	4.2	0.5	37	No	IA	NA
Maison Dieu	17/12/2018 21:24	3.7	0.5	37	No	IA	NA
Shearers Lane	17/12/2018 21:01	3.8	0.5	41	No	IA	NA
Kilburnie South	17/12/2018 23:46	3.9	0.5	36	No	NM	NA
Jerrys Plains Village	17/12/2018 21:53	4.2	0.5	35	No	IA	NA
Jerrys Plains Village[6]	18/12/2018 21:16	5.9	-1	35	No	IA	NA
Jerrys Plains East	17/12/2018 21:30	3.7	0.5	35	No	IA	NA
Long Point	17/12/2018 22:57	3.4	-1	35	No	IA	NA
HVGC	18/12/2018 00:21	4.5	0.5	55	No	NM	NA

Notes:
1. Atmospheric data is sourced from the HVO Cheshunt (or MTW Charlton Ridge for Long Point) weather station using logged meteorological data;
2. Assumed noise emission limits (see Section 2.2 of this report for more information) 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). Criterion may or may not apply due to rounding of meteorological data values;
3. Estimated or measured LAeq,15minute attributed to HVO South Pit Area;
4. Bold results in red indicate exceedance of criteria;
5. NA in exceedance column means atmospheric conditions outside specified in approval and so criterion is not applicable; and
6. Follow up measurement

Table 7: $L_{Aeq,\ 15\ minute}$ HVO South - Land Acquisition Criteria – December 2018

Location	Date and Time	Wind Speed (m/s)[1]	VTG[1]	Criterion dB (A)	Criterion Applies?[2]	HVO South L_{Aeq} dB[3,4]	Exceedance[4,5]
Knodlers Lane	17/12/2018 21:44	4.2	0.5	41	No	IA	NA
Maison Dieu	17/12/2018 21:24	3.7	0.5	41	No	IA	NA
Shearers Lane	17/12/2018 21:01	3.8	0.5	41	No	IA	NA
Kilburnie South	17/12/2018 23:46	3.9	0.5	41	No	NM	NA
Jerrys Plains Village	17/12/2018 21:53	4.2	0.5	41	No	IA	NA
Jerrys Plains Village[6]	18/12/2018 21:16	5.9	-1	40	No	IA	NA
Jerrys Plains East	17/12/2018 21:30	3.7	0.5	40	No	IA	NA
Long Point	17/12/2018 22:57	3.4	-1	40	No	IA	NA
HVGC	18/12/2018 00:21	4.5	0.5	40	No	NM	NA

Notes:
1. Atmospheric data is sourced from the HVO Cheshunt (or MTW Charlton Ridge for Long Point) weather station using logged meteorological data;
2. Assumed noise emission limits (see Section 2.2 of this report for more information) 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). Criterion may or may not apply due to rounding of meteorological data values;
3. Estimated or measured LAeq,15minute attributed to HVO South Pit Area;
4. Bold results in red indicate exceedance of criteria;
5. NA in exceedance column means atmospheric conditions outside specified in approval and so criterion is not applicable; and
6. Follow up measurement

Table 8: $L_{A1,\ 1minute}$ HVO South - Impact Assessment Criteria – December 2018

Location	Date and Time	Wind Speed (m/s)[1]	VTG[1]	Criterion dB (A)	Criterion Applies?[2]	HVO South $L_{A1,\ 1min}$ dB[3,4]	Exceedance[4,5]
Knodlers Lane	17/12/2018 21:44	4.2	0.5	45	No	IA	NA
Maison Dieu	17/12/2018 21:24	3.7	0.5	45	No	IA	NA
Shearers Lane	17/12/2018 21:01	3.8	0.5	45	No	IA	NA
Kilburnie South	17/12/2018 23:46	3.9	0.5	45	No	NM	NA
Jerrys Plains Village	17/12/2018 21:53	4.2	0.5	45	No	IA	NA
Jerrys Plains Village[6]	18/12/2018 21:16	5.9	-1	45	No	IA	NA
Jerrys Plains East	17/12/2018 21:30	3.7	0.5	45	No	IA	NA
Long Point	17/12/2018 22:57	3.4	-1	45	No	IA	NA
HVGC	18/12/2018 00:21	4.5	0.5	Nil	No	NM	NA

Notes:
1. Atmospheric data is sourced from the HVO Cheshunt (or MTW Charlton Ridge for Long Point) weather station using logged meteorological data;
2. Assumed noise emission limits (see Section 2.3 of this report for more information) 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). Criterion may or may not apply due to rounding of meteorological data values;
3. These are results for HVO South Pit Area in the absence of all other noise sources;
4. Bold results in red indicate exceedance of criteria;
5. NA in exceedance column means atmospheric conditions outside specified in approval and so criterion is not applicable; and
6. Follow up measurement

Table 9: $L_{Aeq, 15minute}$ HVO North – Impact Assessment Criteria – December 2018

Location	Date and Time	Wind Speed (m/s)[1]	VTG[1]	Criterion dB (A)	Criterion Applies?[2]	HVO North L_{Aeq} dB[3,4]	Exceedance[4,5]
Knodlers Lane	17/12/2018 21:44	3	-1	35	Yes	IA	Nil
Maison Dieu	17/12/2018 21:24	3.8	-1	35	No	IA	NA
Shearers Lane	17/12/2018 21:01	3.9	-1	35	No	IA	NA
Kilburnie South	17/12/2018 23:46	2.3	-1	39	Yes	NM	Nil
Jerrys Plains Village	17/12/2018 21:53	3	-1	36	Yes	38	2
Jerrys Plains Village[6]	18/12/2018 21:16	5.6	-1	36	No	IA	NA
Jerrys Plains East	17/12/2018 21:30	3.8	-1	39	No	35	NA
Long Point	17/12/2018 22:57	3.4	-1	35	No	IA	NA
HVGC	18/12/2018 00:21	1.7	0.5	IA	Yes	NM	Nil

Notes:
1. Atmospheric data is sourced from the HVO Corporate (or MTW Charlton Ridge for Long Point) weather station using logged meteorological data;
2. 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. Criterion may or may not apply due to rounding of meteorological data values;
3. Estimated or measured LAeq,15minute attributed to HVO North Pit Area;
4. Bold results in red indicate exceedance of criteria;
5. NA in exceedance column means atmospheric conditions outside specified in approval and so criterion is not applicable; and
6. Follow up measurement

Table 10: $L_{Aeq,15minute}$ HVO North - Land Acquisition Criteria – December 2018

Location	Date and Time	Wind Speed (m/s)[1]	VTG[1]	Criterion dB (A)	Criterion Applies?[2]	HVO North L_{Aeq} dB[3,4]	Exceedance[4,5]
Knodlers Lane	17/12/2018 21:44	3	-1	41	Yes	IA	Nil
Maison Dieu	17/12/2018 21:24	3.8	-1	41	No	IA	NA
Shearers Lane	17/12/2018 21:01	3.9	-1	41	No	IA	NA
Kilburnie South	17/12/2018 23:46	2.3	-1	41	Yes	NM	Nil
Jerrys Plains Village	17/12/2018 21:53	3	-1	41	Yes	38	Nil
Jerrys Plains Village[6]	18/12/2018 21:16	5.6	-1	41	No	IA	NA
Jerrys Plains East	17/12/2018 21:30	3.8	-1	41	No	35	NA
Long Point	17/12/2018 22:57	3.4	-1	41	No	IA	NA
HVGC	18/12/2018 00:21	1.7	0.5	NA	NA	NM	NA

Notes:
1. Atmospheric data is sourced from the HVO Corporate (or MTW Charlton Ridge for Long Point) weather station using logged meteorological data;
2. 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. Criterion may or may not apply due to rounding of meteorological data values;
3. Estimated or measured LAeq,15minute attributed to HVO North Pit Area;
4. Bold results in red indicate exceedance of criteria;
5. NA in exceedance column means atmospheric conditions outside specified in approval and so criterion is not applicable; and
6. Follow up measurement

Table 11: $L_{A1, 1Minute}$ HVO North - Impact Assessment Criteria – December 2018

Location	Date and Time	Wind Speed (m/s)[1]	VTG[1]	Criterion dB (A)	Criterion Applies?[2]	HVO North $L_{A1, 1min}$ dB[3,4]	Exceedance[4,5]
Knodlers Lane	17/12/2018 21:44	3	-1	46	Yes	IA	Nil
Maison Dieu	17/12/2018 21:24	3.8	-1	46	No	IA	NA
Shearers Lane	17/12/2018 21:01	3.9	-1	46	No	IA	NA
Kilburnie South	17/12/2018 23:46	2.3	-1	46	Yes	NM	Nil
Jerrys Plains Village	17/12/2018 21:53	3	-1	46	Yes	44	Nil
Jerrys Plains Village[6]	18/12/2018 21:16	5.6	-1	46	No	IA	NA
Jerrys Plains East	17/12/2018 21:30	3.8	-1	46	No	44	NA
Long Point	17/12/2018 22:57	3.4	-1	46	No	IA	NA
HVGC	18/12/2018 00:21	1.7	0.5	NA	NA	NM	NA

Notes:
1. Atmospheric data is sourced from the HVO Corporate or (MTW Charlton Ridge for Long Point) weather station using logged meteorological data;
2. 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. Criterion may or may not apply due to rounding of meteorological data values;
3. These are results for HVO North Pit Area in the absence of all other noise sources;
4. Bold results in red indicate exceedance of criteria;
5. NA in exceedance column means atmospheric conditions outside specified in approval and so criterion is not applicable; and
6. Follow up measurement

5.2 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. During December 2018 one measurement required the penalty to be applied. The assessment for low frequency noise is shown in Table 12.

Table 12: Low Frequency Noise Assessment – December 2018

Location	Date and Time	Measured Site Only LA_{eq} dB (Sth/Nth)	Site Only LC_{eq} dB[1] (Sth/Nth)	Site Only LC_{eq}-LA_{eq} dB [1,2] (Sth/Nth)	Result Max exceedance of ref spectrum dB[1,3] (Sth/Nth)	Penalty dB(A)[1]
Knodlers Lane	17/12/2018 21:44	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA
Maison Dieu	17/12/2018 21:24	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA
Shearers Lane	17/12/2018 21:01	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA
Kilburnie South	17/12/2018 23:46	NM/NM	NA/NA	NA/NA	NA/NA	NA/NA
Jerrys Plains Village	17/12/2018 21:53	IA/36	NA/55	NA/19	NA/3 @ 100Hz	NA/2
Jerrys Plains Village[4]	18/12/2018 21:16	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA
Jerrys Plains East	17/12/2018 21:30	IA/35	NA/NA	NA/NA	NA/NA	NA/NA
Long Point	17/12/2018 22:57	IA/IA	NA/NA	NA/NA	NA/NA	NA/NA
HVGC	18/12/2018 00:21	NM/NM	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;
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;
4. Follow up measurement.

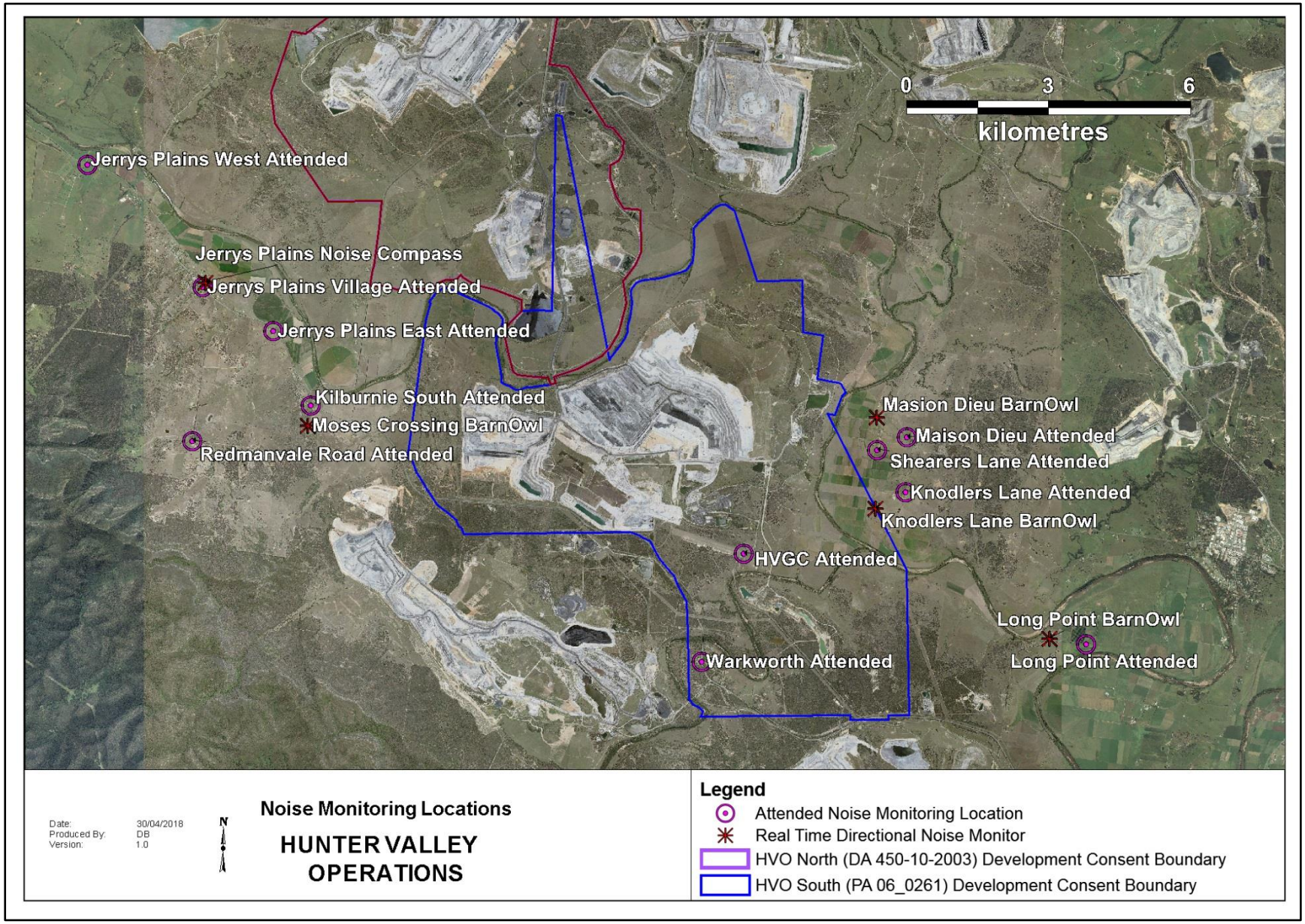

Figure 87: Noise Monitoring Location Plan

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.

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 December, a total of 628 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 88.

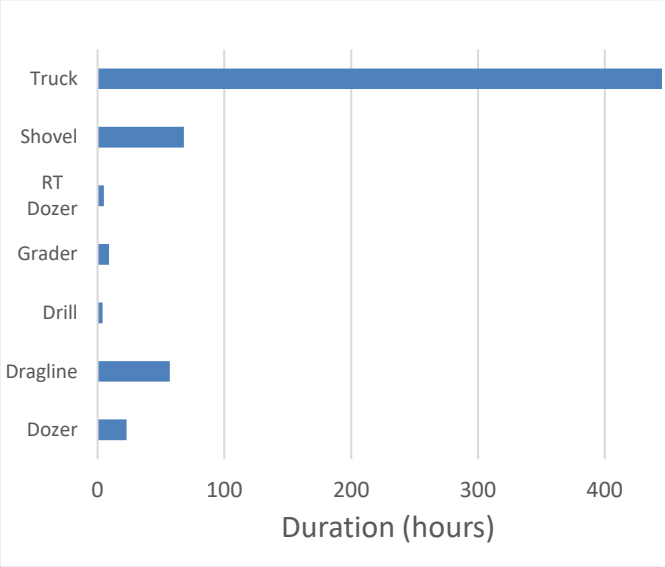

Figure 88: Operational Downtime by Equipment Type – December 2018

8.0 REHABILITATION

During December 18.32 Ha of land was released, 0.71 Ha of land was bulk shaped, 16.93 Ha of land was Topsoiled and 13.07 Ha of land was Rehabilitated. Year to date progress can be viewed in Figure 89.

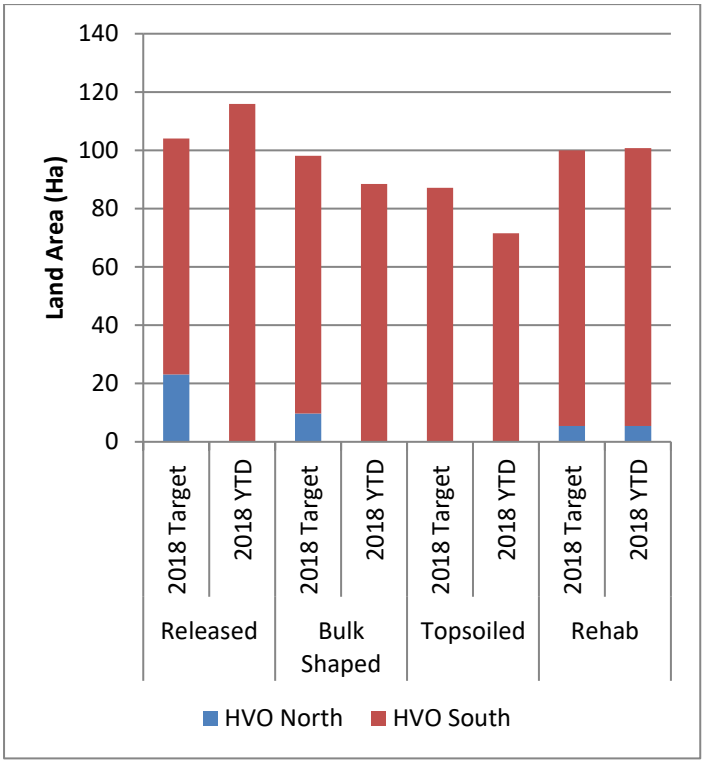

Figure 89: Rehabilitation YTD – December 2018

9.0 COMPLAINTS

During December one complaint was received. Details of complaints received YTD are shown in Table 13.

Table 13: Complaints Summary YTD

	Noise	Dust	Blast	Lighting	Other	Total
January	-	2	4	-	-	6
February	1	-	-	-	1	2
March	-	-	-	-	-	0
April	-	-	1	-	-	1
May	4	1	2	-	-	7
June	1	-	1	-	1	3
July	-	-	2	-	-	2
August	1	-	-	-	-	1
September	1	-	-	-	-	1
October	-	-	-	-	-	-
November	-	2	-	-	-	2
December	-	1	-	-	-	1
Total	8	6	10	-	2	26

10.0 ENVIRONMENTAL INCIDENTS

During the reporting period there were six recordable environmental incidents.

6/12/2018 – Dam 17N pump house pit pump failure

Minor seep from Dam 17N sump overflow pipe with a damp area noted at the end of pipe during inspection. The source of water in sump has been identified as leaking from the Dam 17N through tears in the liner and reporting to the sump via the installed underdrainage system.

Immediate actions included a secondary pump being added to bring water level down, repair work to the capping of the outlet and the water level in Dam 17N lowered below tears in liner to allow repair.

7/12/2018 – Pipe burst at Dam 21N

During an inspection it was identified that the pipeline between Dam 21N and Dam 9 had failed, releasing an estimated 75,000 litres of mine and river water to the local mine drainage system. All water was contained on site with no potential to leave site. All water reported to Dam 20 through the mine drainage system. Immediate actions included isolating the source, area and repairing and reconfiguring the pipeline.

14/12/2018 – Blast Fume – Category 3a

A blast fired at West Pit at 13:59 produced a small fume with a rating of 3a which remained in pit. Wet weather on the days leading up to shot being fired and the blast pattern being at maximum allowable sleep time (5 days) were contributing factors.

17/12/2018 – Noise exceedance

Attended night time monitoring recorded noise levels at 36dB(A) at Jerrys Plains Village against a criteria of 36dB(A). An additional 2dB was added to the reading due application of the low frequency penalty, in accordance with the development consent, bringing the result to 38dB(A). A follow-up measurement was conducted the following evening on 18 December and no exceedance was recorded. The exceedance was notified to DPE.

18/12/2018 – Blast miscapture

Knodlers Lane Blast monitor failed to capture complete blast monitoring results for two blasts initiated in the Cheshunt Pit on the 18 December 2018. Both overpressure and vibration results were not captured for the shot at 13:19 and vibration data was not captured for the shot at 13:18. A second monitor closer to the mine recorded blasting results below criteria.

Immediate actions included the ground unit being exchanged for a calibrated ground unit on the 19 December. In addition, the control unit was also found to have been affected and was exchanged on 20 December.

The event was reported to the DPE.

03/11/2018 – Hydrocarbon Spill Newdell

Oil spill onto the Newdell coal receival pad from a contractor truck. Oil was contained on the receival pad with some minor tracking on Pikes Gully Road which is a public road. A street sweeper was deployed to clean up the wheel tracked oil. The spilled oil on the receival pad will be processed through the CHPP.

Appendix A: Meteorological Data

Table 14: Meteorological Data - HVO Corporate Meteorological Station – December 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)
1/12/2018	34	19	82	8	1072	222	2.8	0
2/12/2018	36	16	96	9	1595	237	5.0	0
3/12/2018	31	15	90	6	1128	228	3.1	0
4/12/2018	30	15	80	18	1122	179	3.6	0
5/12/2018	23	13	88	49	1724	117	4.9	0
6/12/2018	28	12	89	27	1456	115	3.9	0
7/12/2018	30	11	82	22	1106	131	2.9	0
8/12/2018	33	12	86	13	1092	128	2.3	0
9/12/2018	35	12	99	10	1202	122	2.2	0
10/12/2018	33	15	90	20	1409	109	2.8	0
11/12/2018	23	14	100	62	300	129	2.3	19.4
12/12/2018	24	13	100	67	1243	122	3.0	0.8
13/12/2018	32	15	100	36	1323	237	2.4	5.8
14/12/2018	26	16	100	66	1703	183	2.3	3.8
15/12/2018	29	15	100	33	790	126	2.1	5.6
16/12/2018	33	15	100	32	1265	-	2.1	3.2
17/12/2018	33	16	86	30	1309	226	2.9	0
18/12/2018	30	16	88	44	1439	114	3.3	0
19/12/2018	31	16	100	44	1433	114	2.8	7.6
20/12/2018	36	15	100	28	1558	-	2.7	3.8
21/12/2018	25	15	89	53	1612	127	3.7	0
22/12/2018	26	11	97	29	1524	155	3.7	0
23/12/2018	25	10	81	28	1550	121	3.3	0
24/12/2018	28	7	93	25	1271	125	2.4	0
25/12/2018	34	10	99	10	1117	154	2.0	0
26/12/2018	36	14	78	10	1096	110	1.7	0
27/12/2018	38	20	63	7	1073	146	2.3	0
28/12/2018	40	17	66	5	1115	175	2.3	0
29/12/2018	39	14	87	5	1078	188	2.4	0
30/12/2018	38	20	46	1	1059	227	3.0	0
31/12/2018	39	16	89	8	1122	176	2.5	0.6

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