

# Hunter Valley Operations

## Community Consultative Committee

### **Business Papers – March 2017**

Materials ahead of meeting of the committee on 23 March 2017

# Contents page

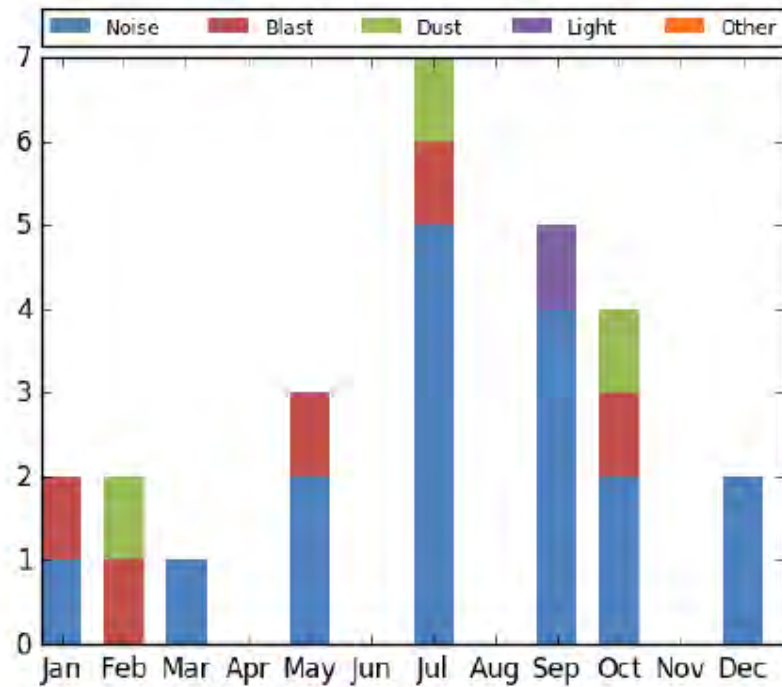
<b>1.0 Complaints</b>	<b>3</b>
<b>2.0 Incidents</b>	<b>6</b>
<b>3.0 Environmental monitoring</b>	<b>8</b>
October 2016	8
November 2016	8
December 2016	8
January 2017	8
<b>4.0 Environmental Documents</b>	<b>9</b>
<b>Appendices</b>	

# 1.0 Complaints

Complaints overview for 2016

## Hunter Valley Operations Monthly Complaints Summary

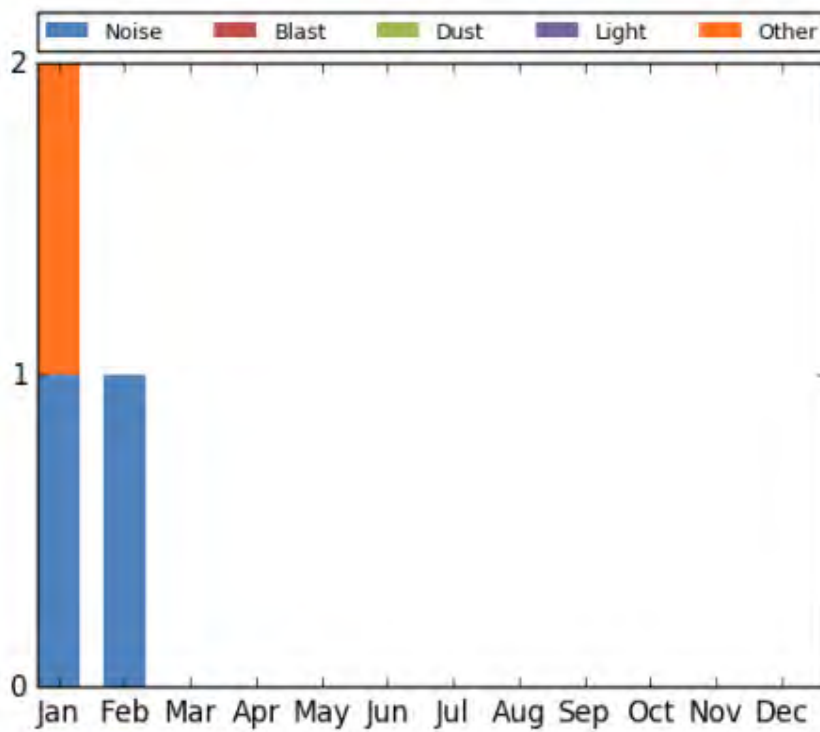
	Noise	Dust	Blast	Lighting	Other	Total
January	1	0	1	0	0	2
February	0	1	1	0	0	2
March	1	0	0	0	0	1
April	0	0	0	0	0	0
May	2	0	1	0	0	3
June	0	0	0	0	0	0
July	5	1	1	0	0	7
August	0	0	0	0	0	0
September	4	0	0	1	0	5
October	2	1	1	0	0	4
November	0	0	0	0	0	0
December	2	0	0	0	0	2
<b>Total</b>	<b>17</b>	<b>3</b>	<b>5</b>	<b>1</b>	<b>0</b>	<b>26</b>



Complaints overview for 2017 (YTD as at 22 February 2017)

## Hunter Valley Operations Monthly Complaints Summary

	Noise	Dust	Blast	Lighting	Other	Total
January	1	0	0	0	1	2
February	1	0	0	0	0	1
March	-	-	-	-	-	-
April	-	-	-	-	-	-
May	-	-	-	-	-	-
June	-	-	-	-	-	-
July	-	-	-	-	-	-
August	-	-	-	-	-	-
September	-	-	-	-	-	-
October	-	-	-	-	-	-
November	-	-	-	-	-	-
December	-	-	-	-	-	-
<b>Total</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>3</b>



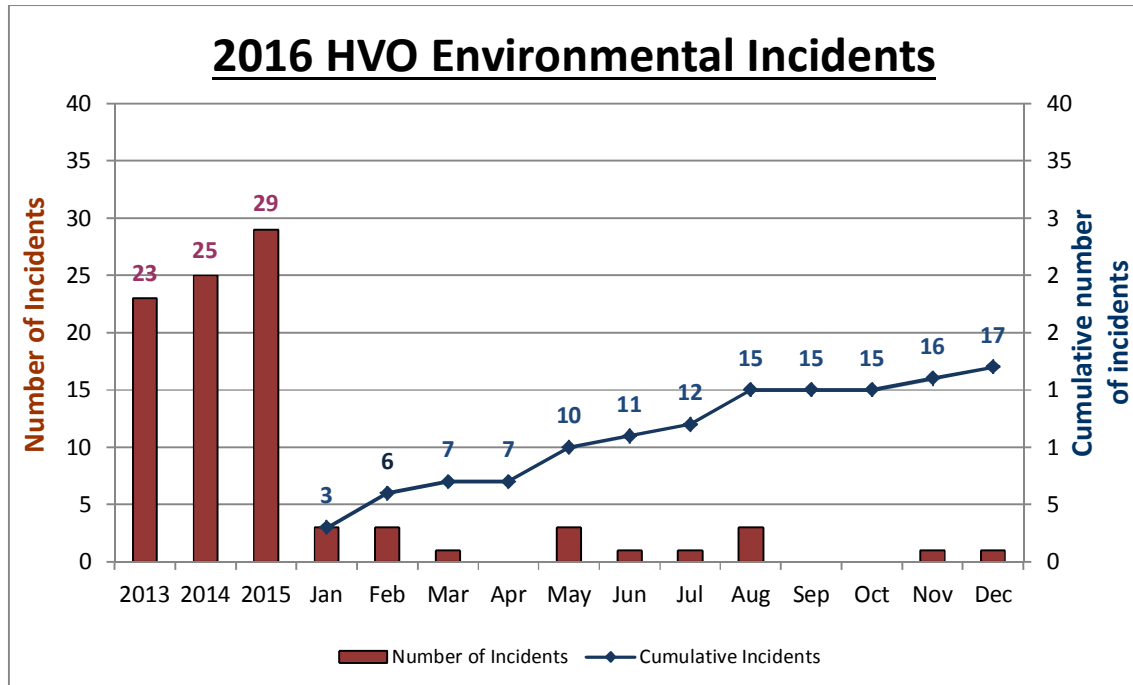
## Complaint details for the period 31 October 2016 to 22 February 2017

<b>Date</b>	<b>Time</b>	<b>Type</b>	<b>Location</b>	<b>Method Received</b>	<b>Monitoring Indicates Exceedance?</b>
24/12/2016	8:40	Noise	Maison Dieu	Complaints Line	No
24/12/2016	8:53	Noise	Maison Dieu	Complaints Line	No
05/01/2017	23:59	Noise	Jerrys Plains	Complaints Line	Yes**
12/01/2017	8:56	Blast	Jerrys Plains	Complaints Line	No
09/02/2017	22:56	Noise	Jerrys Plains	Complaints Line	No

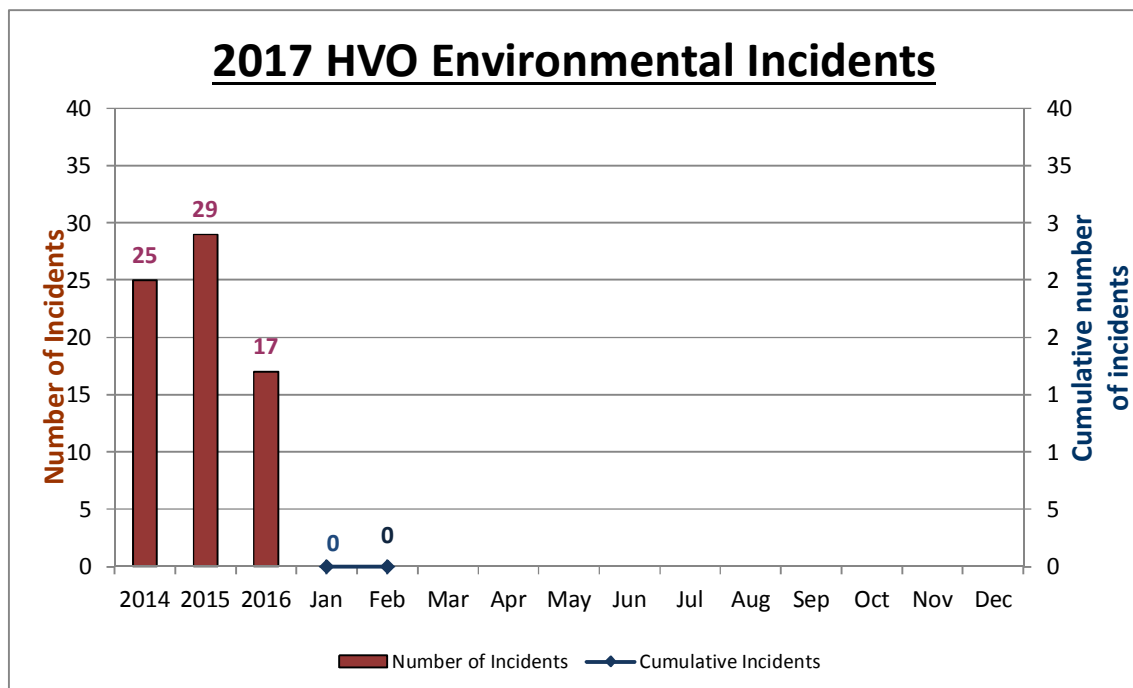
\*\* Real time noise monitoring alerts were generated either prior to or around the time of complaint. The alert was received by the shift supervisors. Inspections and changes were made to operations where possible to reduce noise impact.

## 2.0 Incidents

### Incident overview for 2016



### Incident overview for 2017 (YTD as at 22 February)



## Incident details for the period 31 October 2016 to 22 February 2017

Date	Details	Key Actions	Aspect
04/11/2016	<p><b>Water leaking from pump infrastructure at Parnell's Dam</b></p> <p>On 4 November 2016 at approximately 09:30 a pump flange adjacent to the Parnells Dam discharge point (EPA Identification No. 4, EPL640) was observed to have a small pinhole leak, resulting in an accumulation of water in the discharge point dissipater dam, subsequently overflowing via the discharge point weir into Parnells Creek.</p> <p>The duration of discharge is unknown; however, on a worst case scenario it would have been no greater than 51 hours. This is known based on the timing of the last inspection at the site, which was undertaken at ~11:40 on 2 November 2016.</p> <p>Sampling of Dam 9W (Parnells Dam, water source feeding pipeline), the dissipater dam water and receiving waters in Parnells Creek was undertaken on 4 November 2016. The sampled water was analysed for Electrical Conductivity, pH and Total Suspended Solids.</p> <p>Water quality results show poorer water quality upstream and downstream on Parnells Creek discharge point, indicating that no impact occurred as a result of the overflowing water and there was no material harm.</p> <p>The incident was formally reported to the NSW EPA and Department of Planning. EPA have subsequently issued HVO with a \$15000 fine.</p>	<ul style="list-style-type: none"> <li>• A small sump was dug and a pump fitted to recover the accumulated water and pump back to Parnells Dam.</li> <li>• An electric pump has been installed in the sump as a longer term control method</li> <li>• Additional mitigation works are being developed including increasing the size of the dissipator dam and altering the pump back arrangements.</li> </ul>	Water
3/12/2016	<p><b>Tailings line weld failure</b></p> <p>The tailings pipeline between Howick CHPP and Cumnock Void split at a welded joint on the wall of Dam 4W. Tailings were directed into Dam 4W and along the haul road. All tailings were retained within the mine, with no potential for offsite release.</p>	<ul style="list-style-type: none"> <li>• The pipeline was repaired</li> <li>• The tailings were recovered from the haul road.</li> </ul>	Tailings

## 3.0 Environmental monitoring

Monthly summaries of environmental monitoring - October 2016 – January 2017.

### **October 2016**

Attached as **Appendix A**

### **November 2016**

Attached as **Appendix B**

### **December 2016**

Attached as **Appendix C**

### **January 2017**

Attached as **Appendix D**



## 4.0 Environmental Documents

Environmental documents uploaded to the RTCA website since November 2016 CCC are listed below:

23/09/2016	Hunter Valley Operations Environmental Protection Licence 640 Monthly Meaningful Summary August 2016
23/09/2016	Hunter Valley Operations Environmental Protection Licence 640 Monthly Obtained Data Summary August 2016
26/09/2016	Hunter Valley Operations Environmental Monitoring Report August 2016
18/11/2016	Hunter Valley Operations Complaints Register 2016
18/11/2016	Hunter Valley Operations Environmental Protection Licence 640 Monthly Meaningful Summary September 2016
18/11/2016	Hunter Valley Operations Environmental Protection Licence 640 Monthly Obtained Data Summary September 2016
18/11/2016	Hunter Valley Operations Environmental Monitoring Report September 2016
18/11/2016	Hunter Valley Operations Complaints Register 2016
18/11/2016	Hunter Valley Operations Community Consultative Committee Meeting Minutes October 2016
18/11/2016	Hunter Valley Operations Community Consultative Committee Meeting Presentation October 2016
22/11/2016	Hunter Valley Operations Community Consultative Committee Meeting Minutes July 2016
4/01/2017	Hunter Valley Operations Environmental Protection Licence 640 Monthly Meaningful Summary October 2016
4/01/2017	Hunter Valley Operations Environmental Protection Licence 640 Monthly Obtained Data Summary October 2016
4/01/2017	Hunter Valley Operations Environmental Monitoring Report October 2016

2/02/2017	Hunter Valley Operations Environmental Protection Licence 640 Monthly Meaningful Summary November 2016
2/02/2017	Hunter Valley Operations Environmental Protection Licence 640 Monthly Obtained Data Summary November 2016
2/02/2017	Hunter Valley Operations Complaints Register 2016
2/02/2017	Hunter Valley Operations Complaints Register 2016
2/02/2017	Hunter Valley Operations Environmental Protection Licence 640 Monthly Meaningful Summary December 2016
2/02/2017	Hunter Valley Operations Environmental Protection Licence 640 Monthly Obtained Data Summary December 2016
3/02/2017	Hunter Valley Operations Environmental Monitoring Report November 2016
3/02/2017	Hunter Valley Operations Environmental Monitoring Report December 2016
3/02/2017	Hunter Valley Operations North Modification 5 Environmental Assessment
7/02/2017	Hunter Valley Operations South Modification 5 Environmental Assessment 2017
7/02/2017	Hunter Valley Operations South Modification 5 Environmental Assessment 2017 Appendix A - Project approval
7/02/2017	Hunter Valley Operations South Modification 5 Environmental Assessment 2017 Appendix B - Study team
7/02/2017	Hunter Valley Operations South Modification 5 Environmental Assessment 2017 Appendix C - Land ownership
7/02/2017	Hunter Valley Operations South Modification 5 Environmental Assessment 2017 Appendix D - HVO CCC presentation
7/02/2017	Hunter Valley Operations South Modification 5 Environmental Assessment 2017 Appendix E - Noise and vibration study
7/02/2017	Hunter Valley Operations South Modification 5 Environmental Assessment 2017 Appendix F - Air quality and greenhouse gas study
7/02/2017	Hunter Valley Operations South Modification 5 Environmental Assessment 2017 Appendix G Part 1 - Groundwater study

7/02/2017	Hunter Valley Operations South Modification 5 Environmental Assessment 2017 Appendix G Part 2 - Groundwater study
7/02/2017	Hunter Valley Operations South Modification 5 Environmental Assessment 2017 Appendix H - Surface water study
8/02/2017	Hunter Valley Operations South Modification 5 Environmental Assessment Public Information Booklet
17/02/2017	Hunter Valley Operations Pollution Incident Response Management Plan
23/02/2017	Hunter Valley Operations Community Consultative Committee Meeting Minutes November 2016
23/02/2017	Hunter Valley Operations Community Consultative Committee Presentation November 2016
24/02/2017	HVO North Development Consent DA 450-10-2003 Current



Business Papers – Appendix A

Environmental Monitoring Report – October 2016



*Managed by Rio Tinto Coal Australia*

## Hunter Valley Operations

## Monthly Environmental Report

October 2016

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# CONTENTS

1.0	INTRODUCTION.....	4
2.0	AIR QUALITY .....	4
2.1	Meteorological Monitoring .....	4
2.1.1	Rainfall.....	4
2.1.2	Wind Speed and Direction .....	4
2.2	Depositional Dust .....	6
2.3	Suspended Particulates .....	6
2.3.1	HVAS PM <sub>10</sub> Results.....	6
2.3.2	TSP Results .....	7
2.3.3	Real Time PM <sub>10</sub> Results.....	7
2.3.4	Real Time Alarms for Air Quality .....	7
3.0	WATER QUALITY .....	8
3.1.1	Surface Water.....	8
3.1.2	Site Water Use .....	8
3.1.3	HRSTS Discharge .....	8
3.2.1	Groundwater Monitoring Results .....	8
4.0	BLAST MONITORING .....	9
4.1	Blast Monitoring Results .....	9
5.0	NOISE.....	12
5.1	Attended Noise Monitoring Results .....	12
5.2	Real Time Noise Monitoring .....	16
6.0	OPERATIONAL DOWNTIME.....	16
7.0	REHABILITATION.....	16
8.0	COMPLAINTS.....	16
9.0	ENVIRONMENTAL INCIDENTS .....	17
	Appendix A: Meteorological Data.....	18

## Figures

Figure 1: Year to Date Rainfall Summary 2016	4
Figure 2: HVO Corporate Wind Rose – October 2016	4
Figure 3: HVO Cheshunt Wind Rose – October 2016	4
Figure 4: Air Quality Monitoring Location Plan	5
Figure 5: Depositional Dust Results – October 2016	6
Figure 6: Individual PM <sub>10</sub> Results – October 2016	6
Figure 7: Year To Date Average PM <sub>10</sub> – October 2016	7
Figure 8: Year To Date Average Total Suspended Particulates - October 2016	7
Figure 9: Real Time PM <sub>10</sub> 24hr average and YTD Average – October 2016	8
Figure 10: Moses Crossing Blast Monitoring Results – October 2016	9
Figure 11: Jerrys Plains Blast Monitoring Results – October 2016	9
Figure 12: Maison Dieu Blast Monitoring Results - October 2016	10
Figure 13: Warkworth Blast Monitoring Results - October 2016	10
Figure 14: Knodlers Lane Blast Monitoring Results – October 2016	10
Figure 15: Blast Monitoring Location Plan	11
Figure 16: Noise Monitoring Location Plan	15
Figure 17: Operational Downtime by Equipment Type – October 2016	16
Figure 18: Rehabilitation YTD - October 2016	16
Figure 19: Complaints Graph - October 2016	17

## Tables

Table 1: Monthly Rainfall HVO	4
Table 2: Blasting Limits	9
Table 3: L <sub>Aeq, 15 minute</sub> HVO South - Impact Assessment Criteria – October 2016	12
Table 4: L <sub>Aeq, 15 minute</sub> HVO South - Land Acquisition Criteria – October 2016	12
Table 5: L <sub>A1, 1minute</sub> HVO South - Impact Assessment Criteria – October 2016	13
Table 6: L <sub>Aeq, 15minute</sub> HVO North – Impact Assessment Criteria – October 2016	13
Table 7: L <sub>Aeq, 15minute</sub> HVO North - Land Acquisition Criteria – October 2016	13
Table 8: L <sub>A1, 1Minute</sub> HVO North - Impact Assessment Criteria – October 2016	14
Table 9: Meteorological Data - HVO Corporate Meteorological Station – October 2016	19

## Revision History

Version No.	Person Responsible	Document Status	Date
<b>1.0</b>	<b>Environmental Advisor</b>	<b>Draft</b>	<b>22/11/2016</b>
<b>1.1</b>	<b>Environmental Specialist</b>	<b>Final</b>	<b>01/12/2016</b>

# 1.0 INTRODUCTION

This report has been compiled to provide a monthly summary of environmental monitoring results for Hunter Valley Operations (HVO) as described in the Hunter Valley Operations Online Communication Plan. This report includes all monitoring data collected for the period 1<sup>st</sup> October to 31<sup>st</sup> October 2016.

## 2.0 AIR QUALITY

### 2.1 Meteorological Monitoring

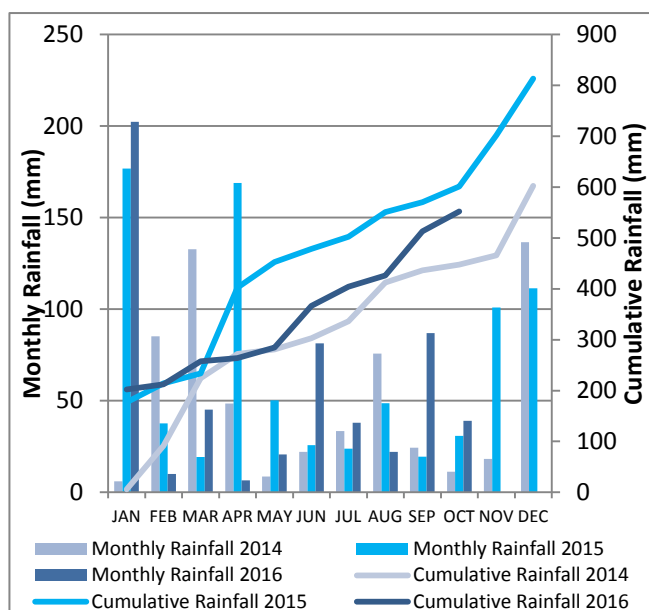
HVO maintains two meteorological stations; 'Corporate' and 'Cheshunt' (Refer to Figure 4: Air Quality Monitoring Location Plan).

#### 2.1.1 Rainfall

Rainfall for the period is summarised in Table 1, the 2016 trend and historical trend are shown in Figure 1.

**Table 1: Monthly Rainfall HVO**

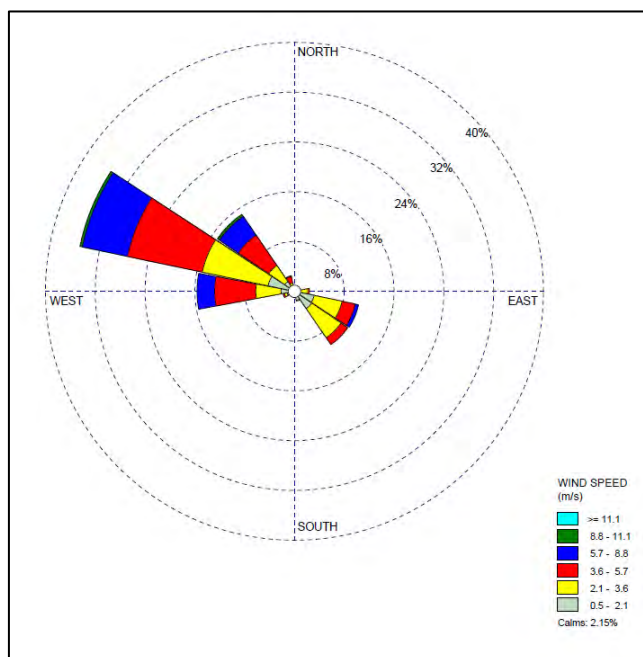
2016	Monthly Rainfall (mm)	Cumulative Rainfall (mm)
<b>October</b>	39	552.2



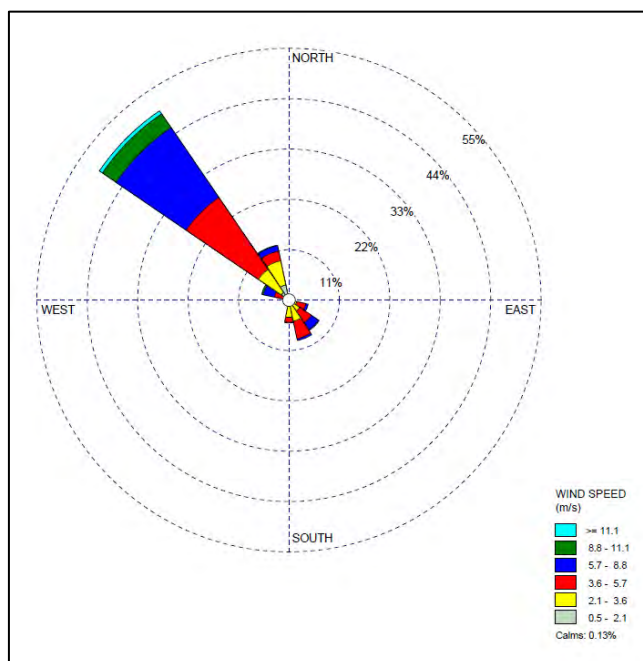
**Figure 1: Year to Date Rainfall Summary 2016**

#### 2.1.2 Wind Speed and Direction

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



**Figure 2: HVO Corporate Wind Rose – October 2016**

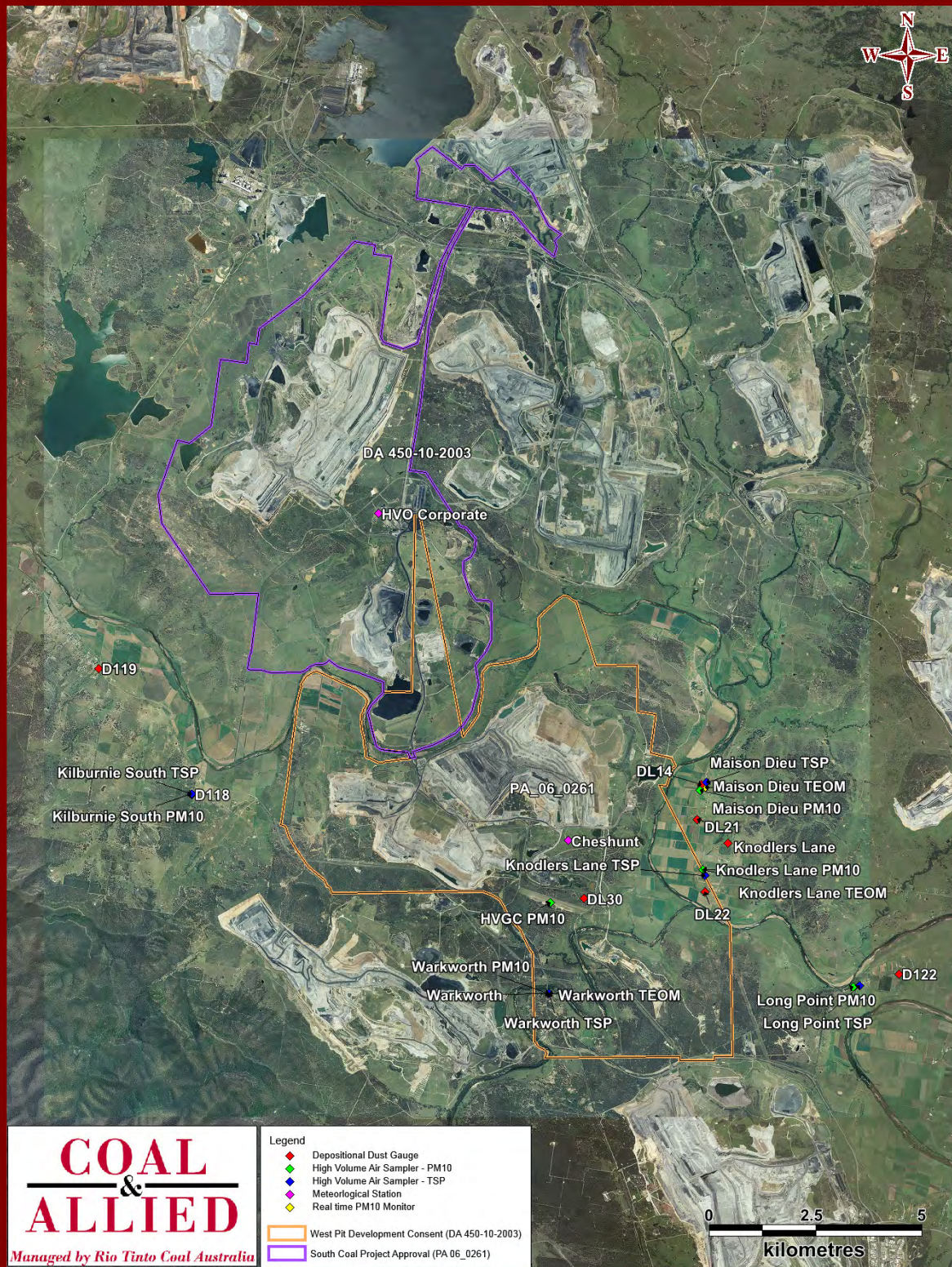


**Figure 3: HVO Cheshunt Wind Rose – October 2016**



Hunter Valley Operations  
Air Quality Monitoring Locations

Date: 160223  
Plan By: DF  
Version: 1.1



RTCA - NSW Environmental Services

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.

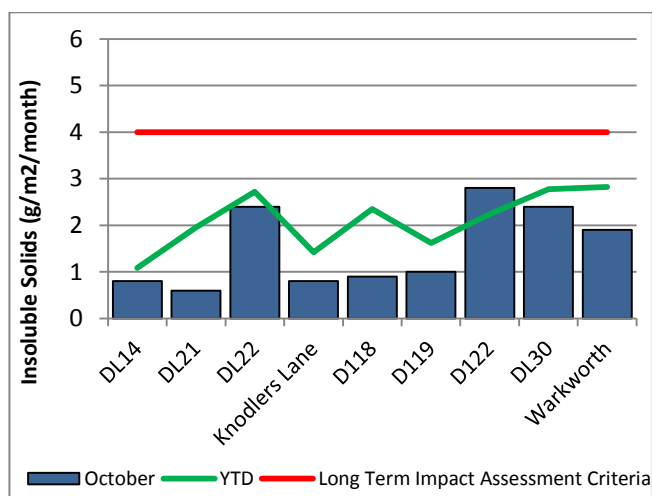


Figure 5: Depositional Dust Results – October 2016

## 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<sub>10</sub>). The location of these monitors can be found in Figure 4. Each HVAS was run for 24 hours on a six-day cycle in accordance with EPA requirements.

### 2.3.1 HVAS PM<sub>10</sub> Results

Figure 6 shows individual PM<sub>10</sub> results at each monitoring station against the short term impact assessment criteria of 50µg/m<sup>3</sup>.

On 26/10/2016 one HVAS PM<sub>10</sub> unit recorded a result greater than the short term (24hr) PM<sub>10</sub> impact assessment criteria; Long Point (55 µg/m<sup>3</sup>). At the time of preparation of this report, the result is under investigation. Preliminary advice has been provided to the Department of Planning & Environment.

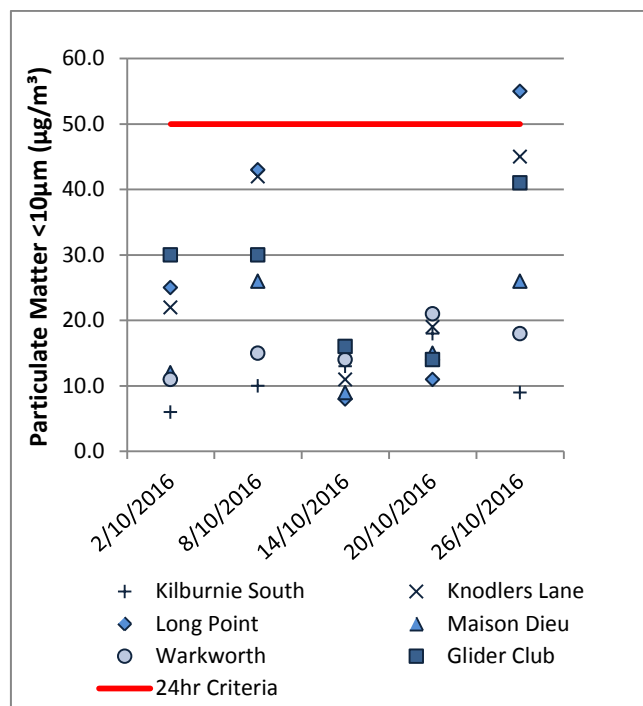
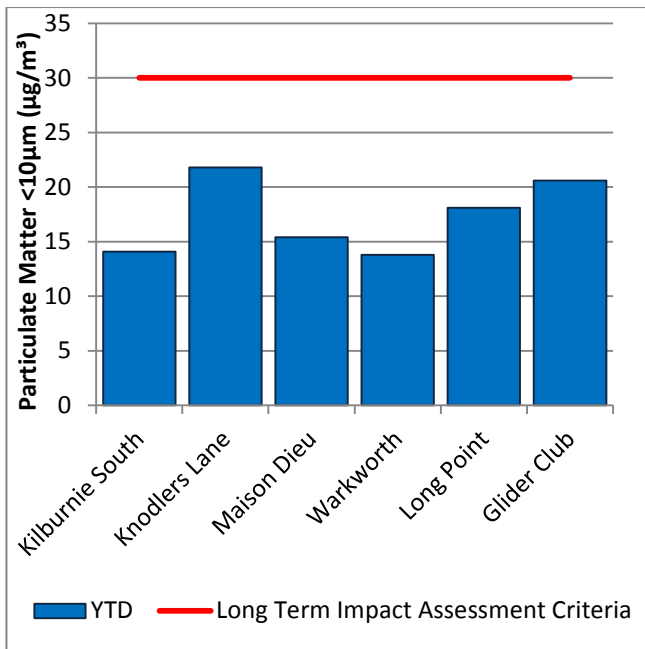


Figure 6: Individual PM<sub>10</sub> Results – October 2016

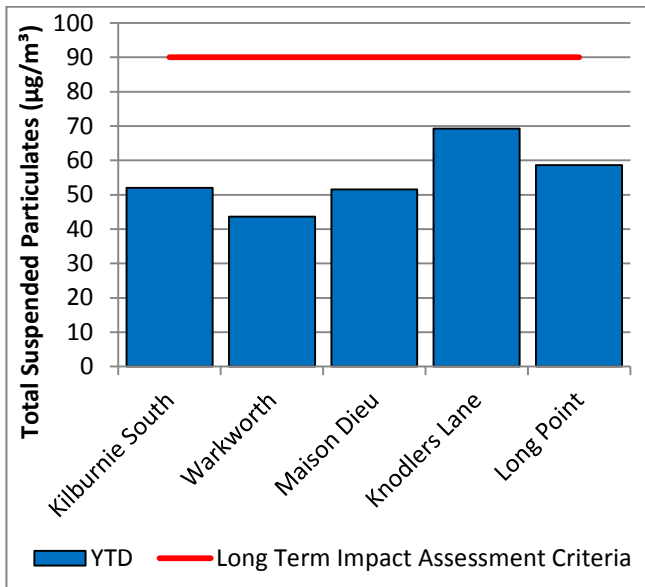
Figure 7 shows the annual average PM<sub>10</sub> results. During the reporting period, all PM<sub>10</sub> results were below the long term impact assessment criteria.



**Figure 7: Year To Date Average PM<sub>10</sub> – October 2016**

### 2.3.2 TSP Results

Figure 8 shows the annual average TSP results compared against the long term impact assessment criteria of 90µg/m<sup>3</sup>.



**Figure 8: Year To Date Average Total Suspended Particulates - October 2016**

### 2.3.3 Real Time PM<sub>10</sub> Results

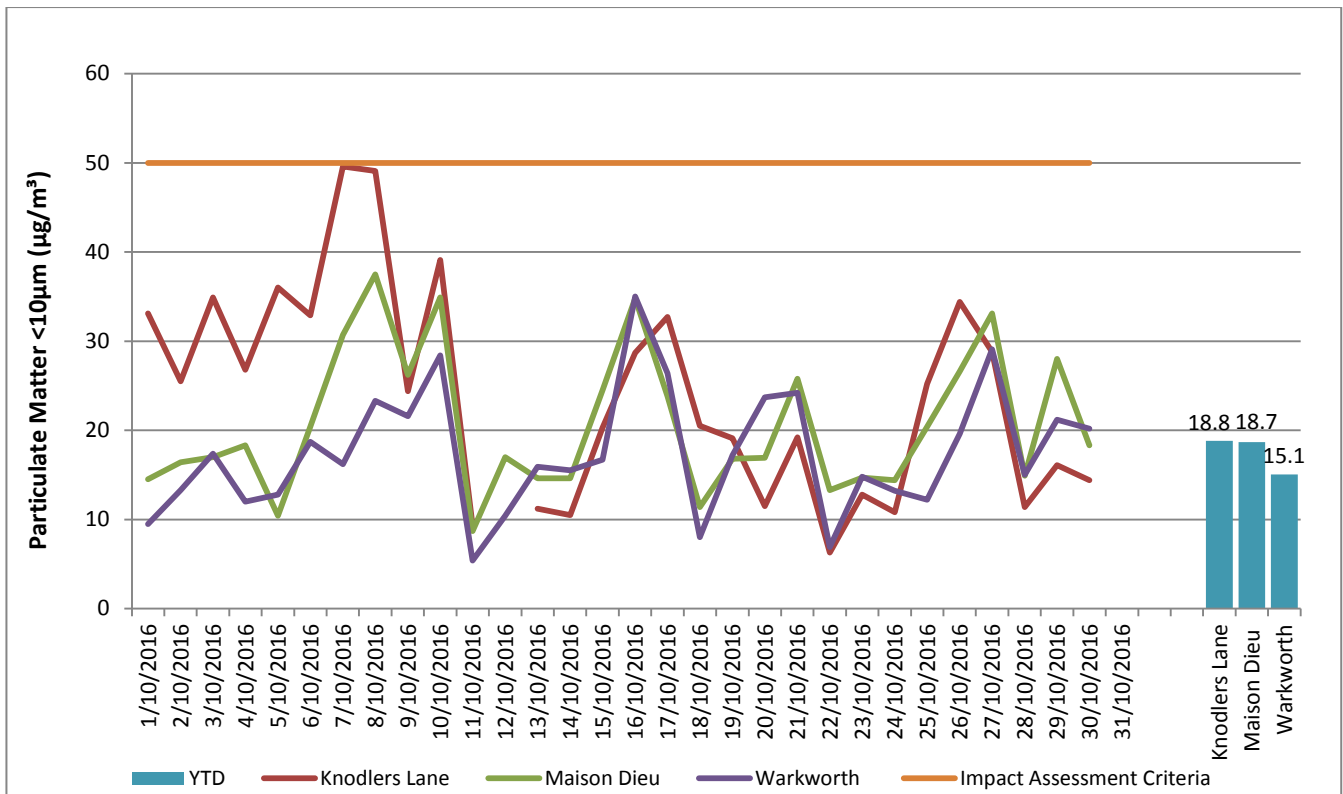
Hunter Valley Operations maintains a network of real time PM<sub>10</sub> monitors. The real time air quality monitoring stations continuously log information and transmit data to a central database, generating alarms when particulate matter levels exceed internal trigger limits. Results from real time PM<sub>10</sub> 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 are shown in Figure 9, including the daily 24 hour average PM<sub>10</sub> result and the YTD PM<sub>10</sub> average.

Data was not available on the 12<sup>th</sup> October (Knodlers Lane) due to equipment issues.

### 2.3.4 Real Time Alarms for Air Quality

During October, the real time monitoring system generated 87 automated air quality related alarms. 53 alarms were related to adverse weather conditions and 34 alarms related to PM<sub>10</sub>.



**Figure 9: Real Time PM<sub>10</sub> 24hr average and YTD Average – October 2016**

### 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 2016 report.

#### 3.1.2 Site Water Use

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

#### 3.1.3 HRSTS Discharge

HVO participates in the 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 2016 monthly report.

## 4.0 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 15.

During October, 26 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 2.

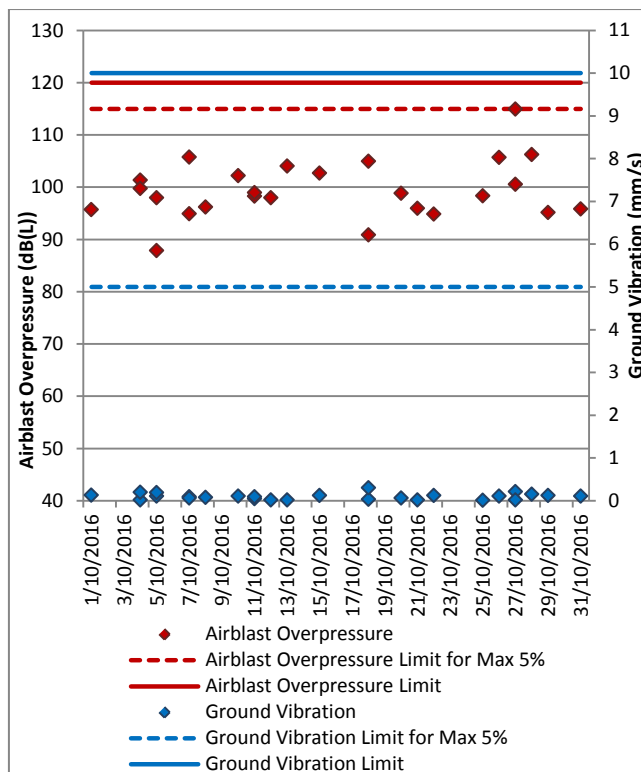
**Table 2: Blasting Limits**

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%

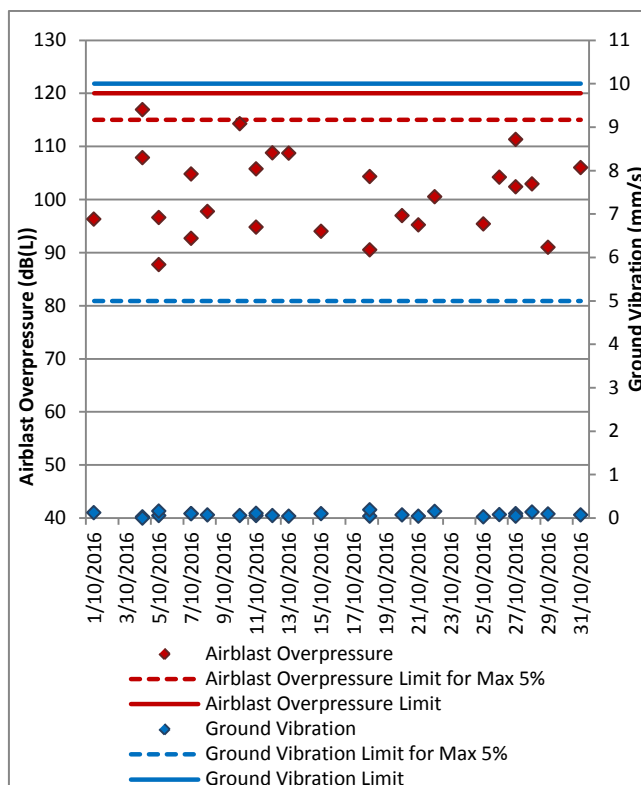
During the reporting period, five blasts exceeded the 115 dB(L) threshold for airblast overpressure. A blast recorded on the 4th of October at 9:02am recorded an elevated airblast overpressure reading of 116.9dB(L) at the Jerrys Plains blast monitoring location and 116.9dB(L) at the Maison Dieu blast monitoring location. Blasts recorded on the 4<sup>th</sup> of October at 10:58am, 18<sup>th</sup> of October at 4:06pm, 27<sup>th</sup> of October at 2:35pm and 27<sup>th</sup> October at 4:53pm recorded elevated airblast overpressure readings of 118.8dB(L), 118.0dB(L), 118.6dB(L) and 118.1dB(L) at the Maison Dieu blast monitoring location respectively. It should be noted that these results are greater than expected. HVO has commenced an investigation into these results and the performance of the Maison Dieu monitor.

No blasts exceeded the 5mm/s criterion for ground vibration.

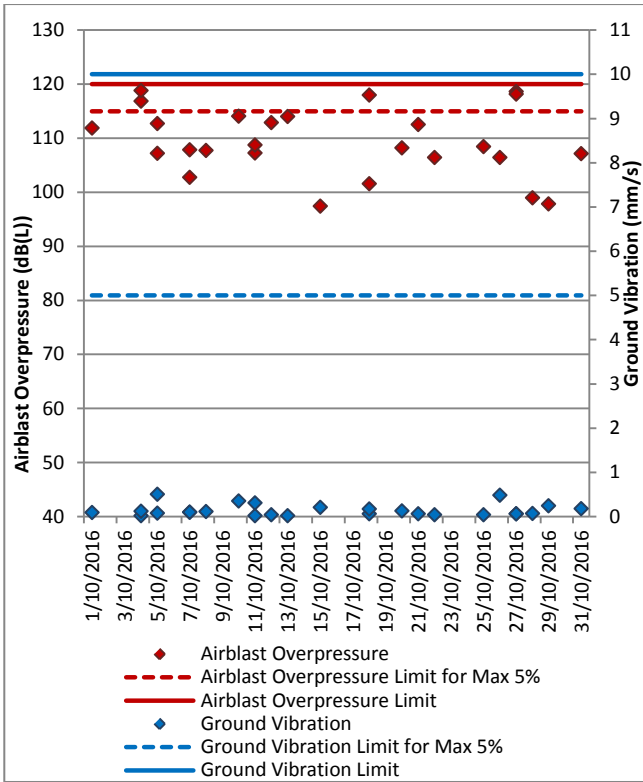
### 4.1 Blast Monitoring Results



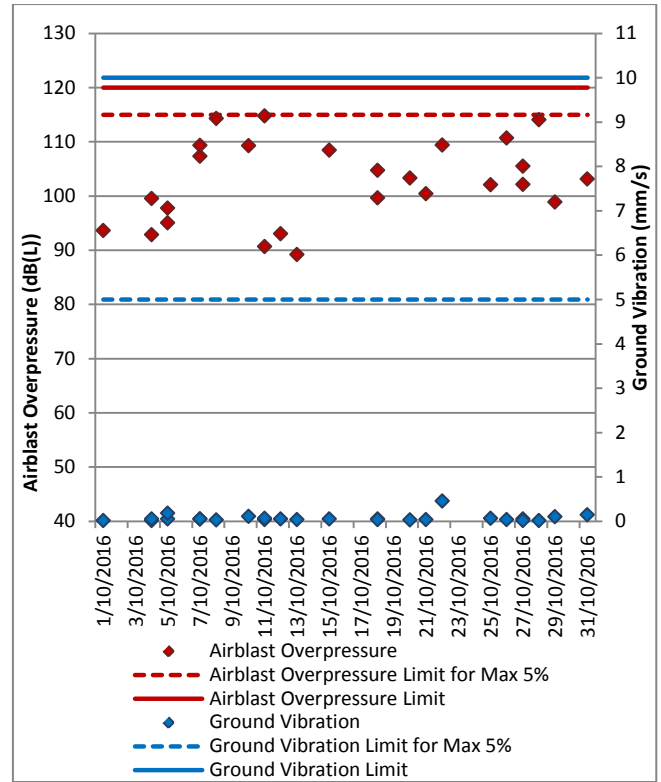
**Figure 10: Moses Crossing Blast Monitoring Results – October 2016**



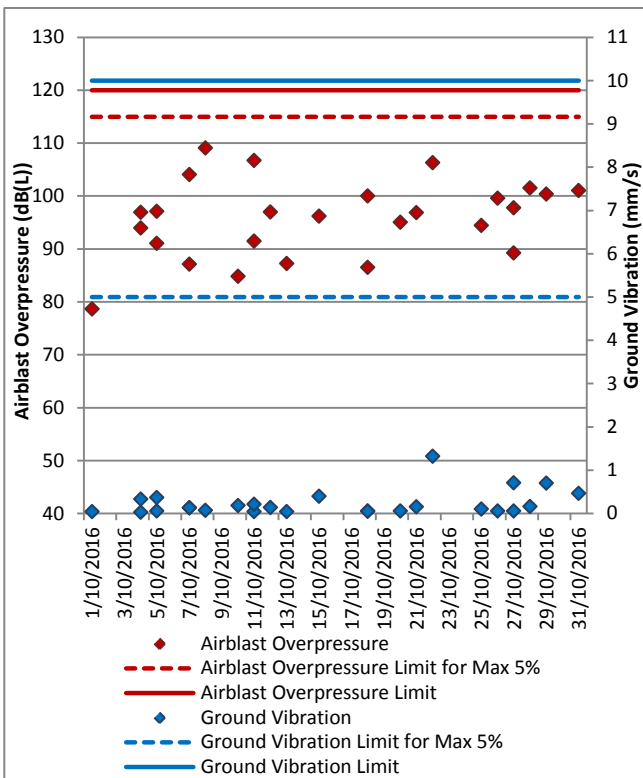
**Figure 11: Jerrys Plains Blast Monitoring Results – October 2016**



**Figure 12: Maison Dieu Blast Monitoring Results - October 2016**



**Figure 14: Knodlers Lane Blast Monitoring Results - October 2016**



**Figure 13: Warkworth Blast Monitoring Results - October 2016**



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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 nights of 6/7; and 24 October 2016. Monitoring results are detailed in Table 3 to Table 8.

**Table 3: L<sub>Aeq</sub>, 15 minute HVO South - Impact Assessment Criteria – October 2016**

Location	Date and Time	Wind Speed (m/s) <sup>5</sup>	VTG <sup>5</sup>	Criterion dB	Criterion Applies? <sup>1,6</sup>	HVO South L <sub>Aeq</sub> dB <sup>2</sup>	Exceedance <sup>34</sup>
Knodlers Lane	06/10/2016 23:20	3.1	-1.0	37	No	33	NA
Maison Dieu	06/10/2016 23:42	3.9	-1.0	37	No	34	NA
Shearers Lane	07/10/2016 0:05	3.7	-1.0	41	No	36	NA
Kilburnie South	06/10/2016 23:03	2.9	-1.0	36	Yes	IA	Nil
Jerrys Plains Village	06/10/2016 22:05	3.9	-1.0	35	No	IA	NA
Jerrys Plains East	06/10/2016 21:41	3.4	-1.0	35	No	IA	NA
Long Point Road	24/10/2016 21:08	1.9	3.0	35	No	33	NA
HVGC	06/10/2016 21:04	3.9	-1.0	55	No	44	NA

**Table 4: L<sub>Aeq</sub>, 15 minute HVO South - Land Acquisition Criteria – October 2016**

Location	Date and Time	Wind Speed (m/s) <sup>5</sup>	VTG <sup>5</sup>	Criterion dB	Criterion Applies? <sup>1,6</sup>	HVO South L <sub>Aeq</sub> dB <sup>2</sup>	Exceedance <sup>34</sup>
Knodlers Lane	06/10/2016 23:20	3.1	-1.0	41	No	33	NA
Maison Dieu	06/10/2016 23:42	3.9	-1.0	41	No	34	NA
Shearers Lane	07/10/2016 0:05	3.7	-1.0	41	No	36	NA
Kilburnie South	06/10/2016 23:03	2.9	-1.0	41	Yes	IA	Nil
Jerrys Plains Village	06/10/2016 22:05	3.9	-1.0	40	No	IA	NA
Jerrys Plains East	06/10/2016 21:41	3.4	-1.0	40	No	IA	NA
Long Point Road	24/10/2016 21:08	1.9	3.0	40	No	33	NA
HVGC	06/10/2016 21:04	3.9	-1.0	NA	No	44	NA



**Table 5: LA<sub>1, 1minute</sub> HVO South - Impact Assessment Criteria – October 2016**

Location	Date and Time	Wind Speed (m/s) <sup>5</sup>	VTG <sup>5</sup>	Criterion dB	Criterion Applies? <sup>1,6</sup>	HVO South LA <sub>1, 1min</sub> dB <sup>2</sup>	Exceedance <sup>3,4</sup>
Knodlers Lane	06/10/2016 23:20	3.1	-1.0	45	No	40	NA
Maison Dieu	06/10/2016 23:42	3.9	-1.0	45	No	37	NA
Shearers Lane	07/10/2016 0:05	3.7	-1.0	45	No	42	NA
Kilburnie South	06/10/2016 23:03	2.9	-1.0	45	Yes	IA	Nil
Jerrys Plains Village	06/10/2016 22:05	3.9	-1.0	45	No	IA	NA
Jerrys Plains East	06/10/2016 21:41	3.4	-1.0	NA	No	IA	NA
Long Point Road	24/10/2016 21:08	1.9	3.0	45	No	38	NA
HVGC	06/10/2016 21:04	3.9	-1.0	NA	No	50	NA

**Notes**

1. Noise emission limits apply for winds up to 3 metres per second (at a height of 10m), or vertical temperature gradients of up to 3 degrees/100m and wind speeds of up to 2 m/s (at a height of 10m);

2. Estimated or measured LA<sub>eq, 15minute</sub> dB attributed to HVO South Pit Area;

3. NA in exceedance column means atmospheric conditions outside specified in approval and so criterion is not applicable;

4. Bolded results in red indicate exceedance of criteria;

5. Atmospheric data is sourced from the HVO Corporate weather station using logged met data;

6. Criterion may or may not apply due to rounding of meteorological data values

**Table 6: LA<sub>eq, 15minute</sub> HVO North – Impact Assessment Criteria – October 2016**

Location	Date and Time	Wind Speed (m/s) <sup>5</sup>	VTG <sup>5</sup>	Criterion dB	Criterion Applies? <sup>1,6</sup>	HVO North LA <sub>eq</sub> dB <sup>2</sup>	Exceedance <sup>3,4</sup>
Knodlers Lane	06/10/2016 23:20	3.1	-1.0	35	No	IA	NA
Maison Dieu	06/10/2016 23:42	3.9	-1.0	35	No	IA	NA
Shearers Lane	07/10/2016 0:05	3.7	-1.0	35	No	IA	NA
Kilburnie South	06/10/2016 23:03	2.9	-1.0	39	Yes	IA	Nil
Jerrys Plains Village	06/10/2016 22:05	3.9	-1.0	36	No	IA	NA
Jerrys Plains East	06/10/2016 21:41	3.4	-1.0	39	No	NM	NA
Long Point Road	24/10/2016 21:08	1.9	3.0	35	Yes	IA	Nil
HVGC	06/10/2016 21:04	3.9	-1.0	NA	No	IA	NA

**Table 7: LA<sub>eq, 15minute</sub> HVO North - Land Acquisition Criteria – October 2016**

Location	Date and Time	Wind Speed (m/s) <sup>5</sup>	VTG <sup>5</sup>	Criterion dB	Criterion Applies? <sup>1,6</sup>	HVO North LA <sub>eq</sub> dB <sup>2</sup>	Exceedance <sup>3,4</sup>
Knodlers Lane	06/10/2016 23:20	3.1	-1.0	41	No	IA	NA
Maison Dieu	06/10/2016 23:42	3.9	-1.0	41	No	IA	NA
Shearers Lane	07/10/2016 0:05	3.7	-1.0	41	No	IA	NA
Kilburnie South	06/10/2016 23:03	2.9	-1.0	41	Yes	IA	Nil
Jerrys Plains Village	06/10/2016 22:05	3.9	-1.0	41	No	IA	NA
Jerrys Plains East	06/10/2016 21:41	3.4	-1.0	41	No	NM	NA
Long Point Road	24/10/2016 21:08	1.9	3.0	41	Yes	IA	Nil
HVGC	06/10/2016 21:04	3.9	-1.0	NA	No	IA	NA

**Table 8: LA1, 1Minute HVO North - Impact Assessment Criteria – October 2016**

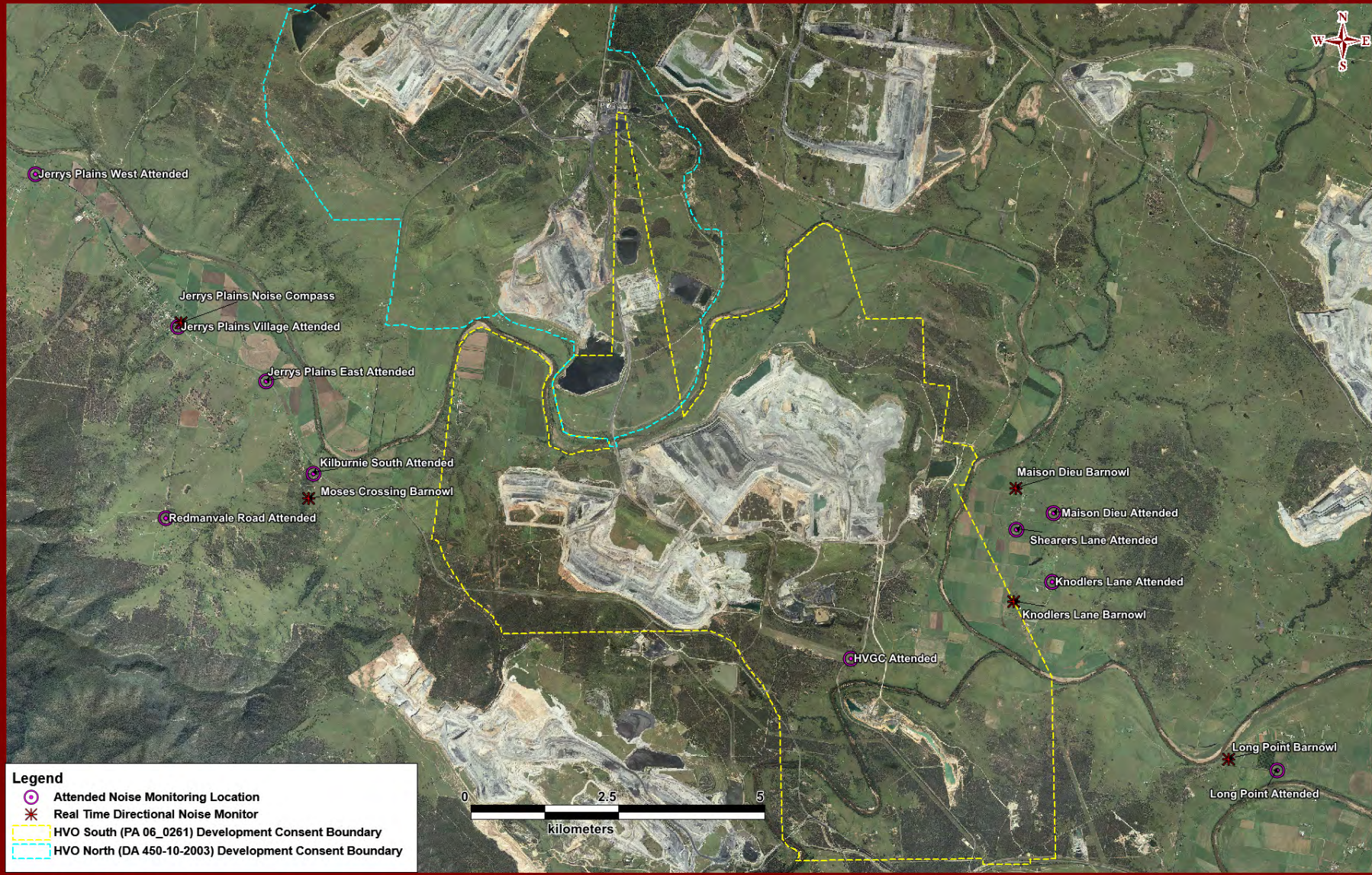
Location	Date and Time	Wind Speed (m/s) <sup>5</sup>	VTG <sup>5</sup>	Criterion dB	Criterion Applies? <sup>1,6</sup>	HVO North LA1, 1min dB <sup>2</sup>	Exceedance <sup>3,4</sup>
Knodlers Lane	06/10/2016 23:20	3.1	-1.0	46	No	IA	NA
Maison Dieu	06/10/2016 23:42	3.9	-1.0	46	No	IA	NA
Shearers Lane	07/10/2016 0:05	3.7	-1.0	46	No	IA	NA
Kilburnie South	06/10/2016 23:03	2.9	-1.0	46	Yes	IA	Nil
Jerrys Plains Village	06/10/2016 22:05	3.9	-1.0	46	No	IA	NA
Jerrys Plains East	06/10/2016 21:41	3.4	-1.0	NA	No	NM	NA
Long Point Road	24/10/2016 21:08	1.9	3.0	46	Yes	IA	Nil
HVGC	06/10/2016 21:04	3.9	-1.0	NA	No	IA	NA
Knodlers Lane	06/10/2016 23:20	3.1	-1.0	46	No	IA	NA

*Notes*

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

Hunter Valley Operations  
Noise Monitoring Locations

Date: 161027  
Plan By: DF  
Version: 2.0



**Legend**

- ⊙ Attended Noise Monitoring Location
- \* Real Time Directional Noise Monitor
- HVO South (PA 06\_0261) Development Consent Boundary
- HVO North (DA 450-10-2003) Development Consent Boundary

RTCA - NSW Environmental Services

Figure 16: Noise Monitoring Location Plan

## 5.2 Real Time Noise Monitoring

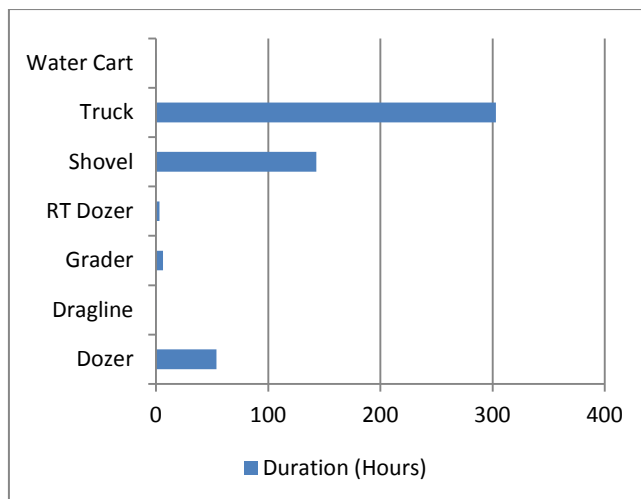
HVO utilises a network of real-time directional noise monitors to manage noise impacts on a continuous basis. Noise alarms are in place at five monitoring locations (Knodlers Lane, Maison Dieu, Jerrys Plains, Moses Crossing, and Long Point), which alert HVO staff to elevated noise levels likely to be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

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

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

## 6.0 OPERATIONAL DOWNTIME

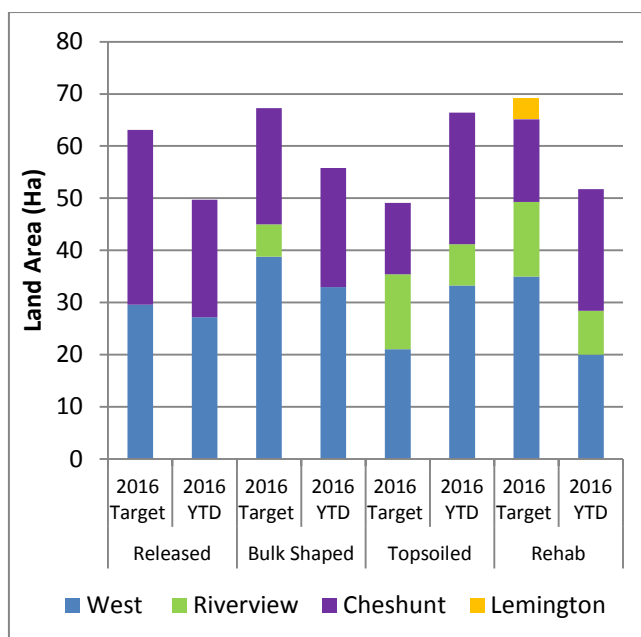
During October, a total of 509.7 hours of equipment downtime was logged in response to real time monitoring and visual inspections for environmental reasons such as dust, noise and meteorological conditions. Operational downtime by equipment type is shown in Figure 17.



**Figure 17: Operational Downtime by Equipment Type – October 2016**

## 7.0 REHABILITATION

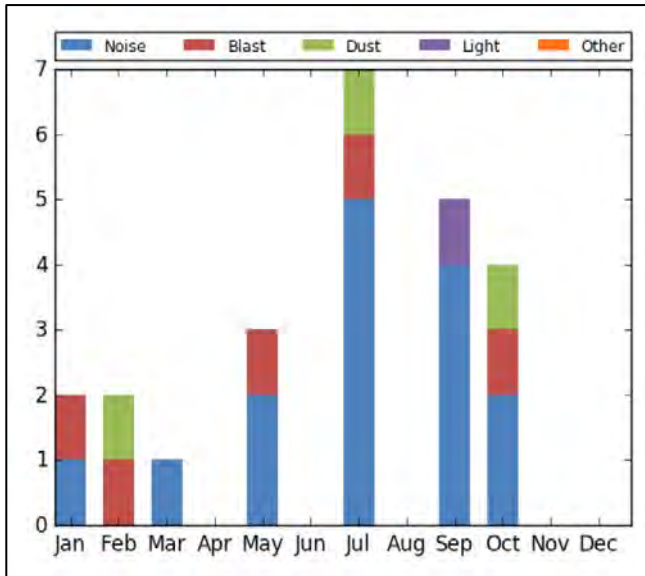
During October, 2.8 Ha of land was released, 8.7 Ha of land was bulk shaped, 3.4 Ha of land was topsoiled, 3.4 Ha of land was composted and 9.9 Ha of land was rehabilitated. Year to date progress can be viewed in Figure 18.



**Figure 18: Rehabilitation YTD - October 2016**

## 8.0 COMPLAINTS

Four complaints were received during the reporting period. Details of complaints received YTD are shown in Figure 19 below.



**Figure 19: Complaints Graph - October 2016**

## **9.0 ENVIRONMENTAL INCIDENTS**

There were no reportable environmental incidents recorded during the reporting period.

## **Appendix A: Meteorological Data**

**Table 9: Meteorological Data - HVO Corporate Meteorological Station – October 2016**

<b>Date</b>	<b>Air Temperature Maximum (°C)</b>	<b>Air Temperature Minimum (°C)</b>	<b>Relative Humidity Maximum (%)</b>	<b>Relative Humidity Minimum (%)</b>	<b>Solar Radiation Maximum (W/Sq. M)</b>	<b>Wind Direction Average (°)</b>	<b>Wind Speed Average (m/sec)</b>	<b>Rainfall(mm)</b>
1/10/2016 0:00	19.9	10.8	65.8	33.4	1429	292.6	5.3	0.0
2/10/2016 0:00	-	-	-	-	-	-	-	-
3/10/2016 0:00	25.1	10.6	91.2	25.9	954	291.4	4.6	0.8
4/10/2016 0:00	21.1	9.6	65.1	29.0	1101	296.0	7.0	0.0
5/10/2016 0:00	21.0	9.6	62.0	17.3	1032	287.3	5.3	0.0
6/10/2016 0:00	25.7	11.5	58.0	19.8	983	302.8	4.5	0.0
7/10/2016 0:00	27.9	13.0	69.0	19.1	1072	287.1	3.9	0.0
8/10/2016 0:00	28.2	12.3	88.0	27.0	1288	234.6	4.1	0.0
9/10/2016 0:00	24.6	11.9	88.0	30.4	1117	116.0	2.0	0.0
10/10/2016 0:00	30.9	13.5	88.2	30.9	1099	262.8	4.2	0.0
11/10/2016 0:00	20.1	8.9	89.5	17.1	1107	267.9	3.7	2.0
12/10/2016 0:00	21.5	6.4	72.0	28.6	1011	281.2	2.8	0.0
13/10/2016 0:00	18.3	9.2	84.8	39.1	1339	134.0	2.7	0.0
14/10/2016 0:00	21.9	7.0	100.0	19.3	1202	132.2	1.4	0.0
15/10/2016 0:00	25.6	6.2	94.4	19.8	1016	278.7	1.9	0.0
16/10/2016 0:00	28.0	10.9	68.2	23.4	997	-	3.9	0.0
17/10/2016 0:00	22.1	9.7	100.0	29.9	789	292.5	4.5	10.8
18/10/2016 0:00	-	-	-	-	1065	288.4	5.1	0.0
19/10/2016 0:00	14.9	13.1	69.9	55.8	-	136.7	2.7	0.0
20/10/2016 0:00	24.2	11.3	80.6	36.2	1302	125.7	2.8	0.0
21/10/2016 0:00	28.8	9.5	100.0	36.1	1207	243.6	2.5	1.2
22/10/2016 0:00	20.8	10.8	100.0	35.4	666	287.4	3.9	19.8
23/10/2016 0:00	20.3	5.9	78.1	28.3	1490	198.0	2.3	0.0
24/10/2016 0:00	23.0	11.9	74.9	25.0	1071	257.6	3.4	0.0
25/10/2016 0:00	25.4	8.3	92.6	20.0	1058	270.1	3.1	0.0
26/10/2016 0:00	28.1	12.0	70.0	17.9	1217	295.0	3.5	0.0
27/10/2016 0:00	31.3	14.0	89.2	17.1	1269	211.5	3.1	0.0
28/10/2016 0:00	20.2	12.0	100.0	67.5	1285	127.3	3.0	0.0
29/10/2016 0:00	27.2	13.4	93.5	41.1	1202	128.7	2.0	0.0
30/10/2016 0:00	30.0	12.6	100.0	35.2	979	234.4	3.1	4.4
31/10/2016 0:00	24.5	12.5	83.7	15.7	1093	258.1	4.3	0.0

- Data unavailable due to technical issues



Business Papers – Appendix B

Environmental Monitoring Report – November 2016





*Managed by Rio Tinto Coal Australia*

## Hunter Valley Operations

## Monthly Environmental Report

November 2016

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# CONTENTS

1.0	INTRODUCTION.....	4
2.0	AIR QUALITY .....	4
2.1	Meteorological Monitoring .....	4
2.1.1	Rainfall.....	4
2.1.2	Wind Speed and Direction .....	4
2.2	Depositional Dust .....	6
2.3	Suspended Particulates .....	6
2.3.1	HVAS PM <sub>10</sub> Results.....	6
2.3.2	TSP Results .....	7
2.3.3	Real Time PM <sub>10</sub> Results.....	7
2.3.4	Real Time Alarms for Air Quality .....	7
3.0	WATER QUALITY .....	8
3.1.1	Surface Water.....	8
3.1.2	Site Water Use .....	8
3.1.3	HRSTS Discharge .....	8
3.2.1	Groundwater Monitoring Results .....	8
4.0	BLAST MONITORING .....	10
4.1	Blast Monitoring Results .....	10
5.0	NOISE.....	13
5.1	Attended Noise Monitoring Results .....	13
5.2	Real Time Noise Monitoring .....	17
6.0	OPERATIONAL DOWNTIME.....	17
7.0	REHABILITATION.....	17
8.0	COMPLAINTS.....	17
9.0	ENVIRONMENTAL INCIDENTS .....	18
	Appendix A: Meteorological Data.....	19

## Figures

Figure 1: Year to Date Rainfall Summary 2016	4
Figure 2: HVO Corporate Wind Rose – November 2016	4
Figure 3: HVO Cheshunt Wind Rose – November 2016	4
Figure 4: Air Quality Monitoring Location Plan	5
Figure 5: Depositional Dust Results – November 2016	6
Figure 6: Individual PM <sub>10</sub> Results – November 2016	6
Figure 7: Year To Date Average PM <sub>10</sub> – November 2016	7
Figure 8: Year To Date Average Total Suspended Particulates - November 2016	7
Figure 9: Real Time PM <sub>10</sub> 24hr average and YTD Average – November 2016	8
Figure 10: Moses Crossing Blast Monitoring Results – November 2016	10
Figure 11: Jerrys Plains Blast Monitoring Results – November 2016	10
Figure 12: Maison Dieu Blast Monitoring Results - November 2016	11
Figure 13: Warkworth Blast Monitoring Results - November 2016	11
Figure 14: Knodlers Lane Blast Monitoring Results – November 2016	11
Figure 15: Blast Monitoring Location Plan	12
Figure 16: Noise Monitoring Location Plan	16
Figure 17: Operational Downtime by Equipment Type – November 2016	17
Figure 18: Rehabilitation YTD - November 2016	17
Figure 19: Complaints Graph - November 2016	18

## Tables

Table 1: Monthly Rainfall HVO	4
Table 2: Blasting Limits	10
Table 3: L <sub>Aeq, 15 minute</sub> HVO South - Impact Assessment Criteria – November 2016	13
Table 4: L <sub>Aeq, 15 minute</sub> HVO South - Land Acquisition Criteria – November 2016	13
Table 5: L <sub>A1, 1minute</sub> HVO South - Impact Assessment Criteria – November 2016	14
Table 6: L <sub>Aeq, 15minute</sub> HVO North – Impact Assessment Criteria – November 2016	14
Table 7: L <sub>Aeq, 15minute</sub> HVO North - Land Acquisition Criteria – November 2016	14
Table 8: L <sub>A1, 1Minute</sub> HVO North - Impact Assessment Criteria – November 2016	15
Table 9: Meteorological Data - HVO Corporate Meteorological Station – November 2016	20

## Revision History

Version No.	Person Responsible	Document Status	Date
<b>1.0</b>	<b>Environmental Advisor</b>	<b>Draft</b>	<b>28/12/2016</b>

## 1.0 INTRODUCTION

This report has been compiled to provide a monthly summary of environmental monitoring results for Hunter Valley Operations (HVO) as described in the Hunter Valley Operations Online Communication Plan. This report includes all monitoring data collected for the period 1<sup>st</sup> November to 30<sup>th</sup> November 2016.

## 2.0 AIR QUALITY

### 2.1 Meteorological Monitoring

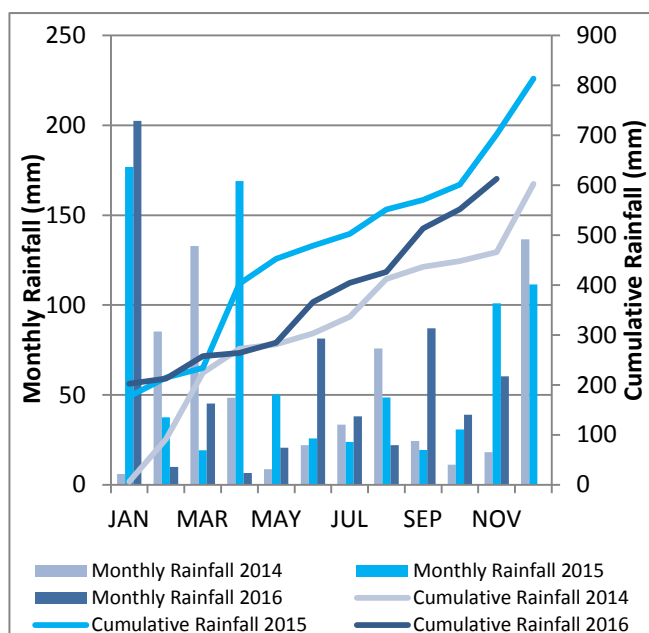
HVO maintains two meteorological stations; 'Corporate' and 'Cheshunt' (Refer to Figure 4: Air Quality Monitoring Location Plan).

#### 2.1.1 Rainfall

Rainfall for the period is summarised in Table 1, the 2016 trend and historical trend are shown in Figure 1.

**Table 1: Monthly Rainfall HVO**

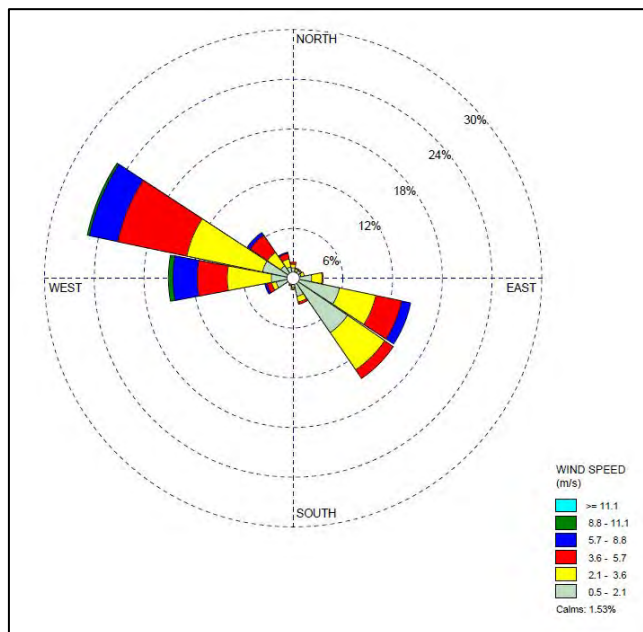
2016	Monthly Rainfall (mm)	Cumulative Rainfall (mm)
<b>November</b>	60.4	612.6



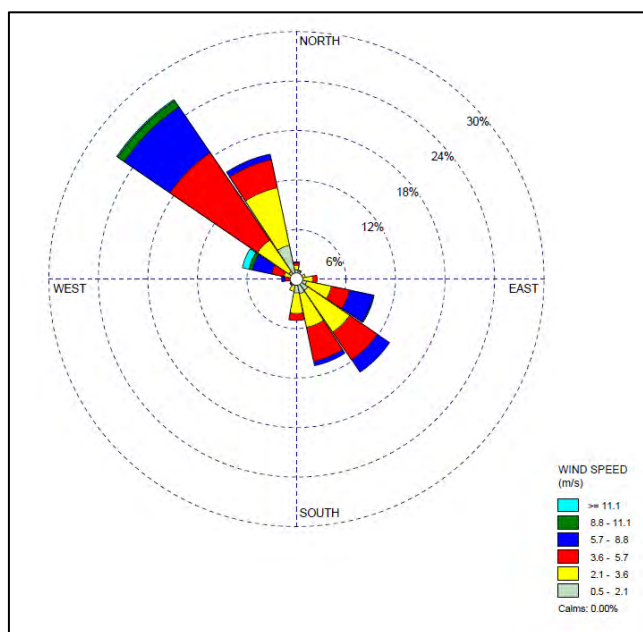
**Figure 1: Year to Date Rainfall Summary 2016**

### 2.1.2 Wind Speed and Direction

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



**Figure 2: HVO Corporate Wind Rose – November 2016**



**Figure 3: HVO Cheshunt Wind Rose – November 2016**

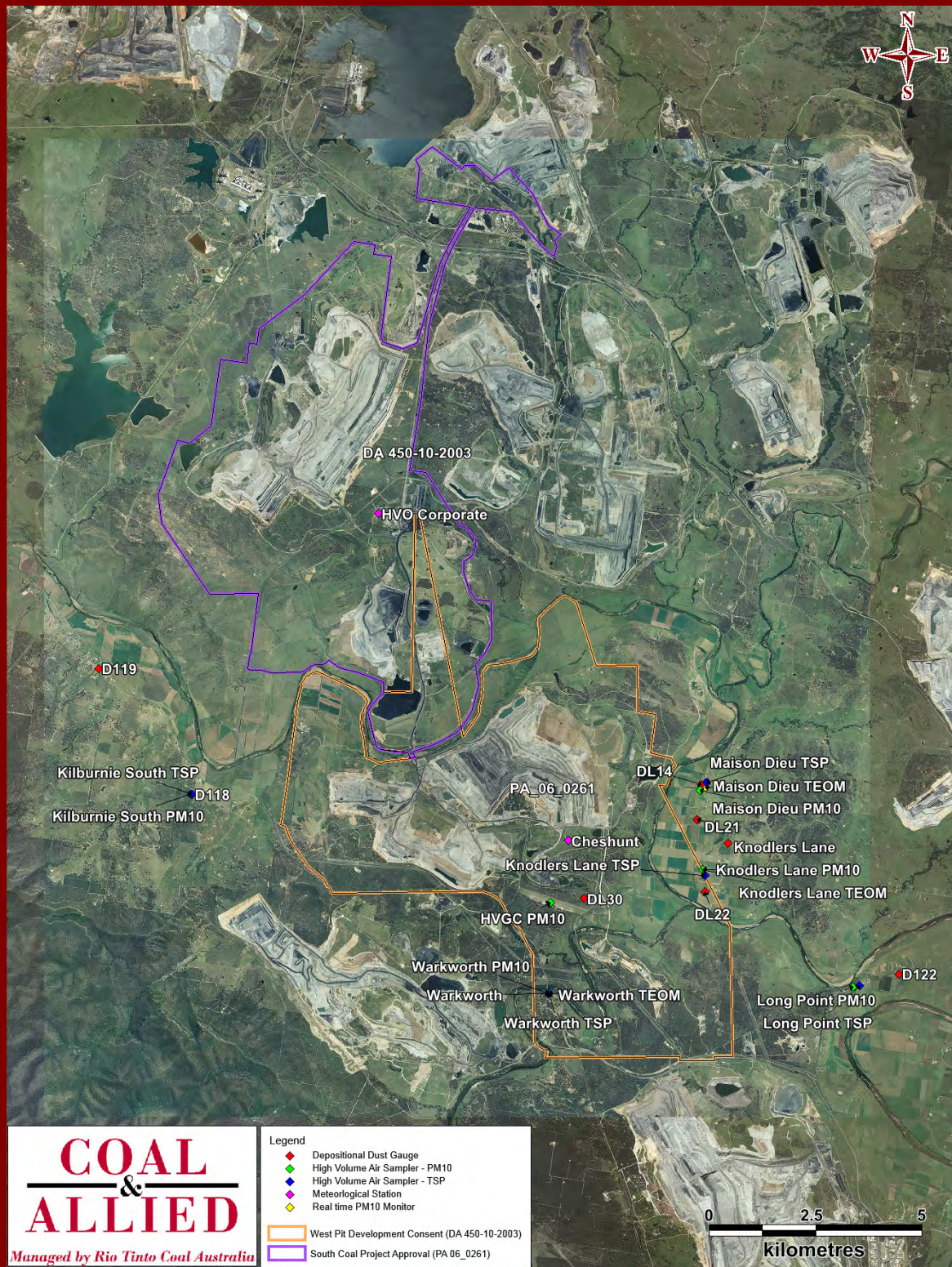
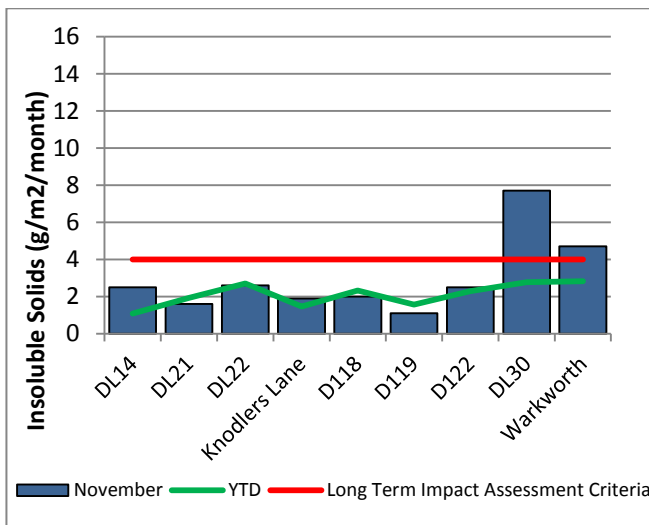


Figure 4: Air Quality Monitoring Location Plan

## 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.



**Figure 5: Depositional Dust Results – November 2016**

## 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<sub>10</sub>). The location of these monitors can be found in Figure 4. Each HVAS was run for 24 hours on a six-day cycle in accordance with EPA requirements.

### 2.3.1 HVAS PM<sub>10</sub> Results

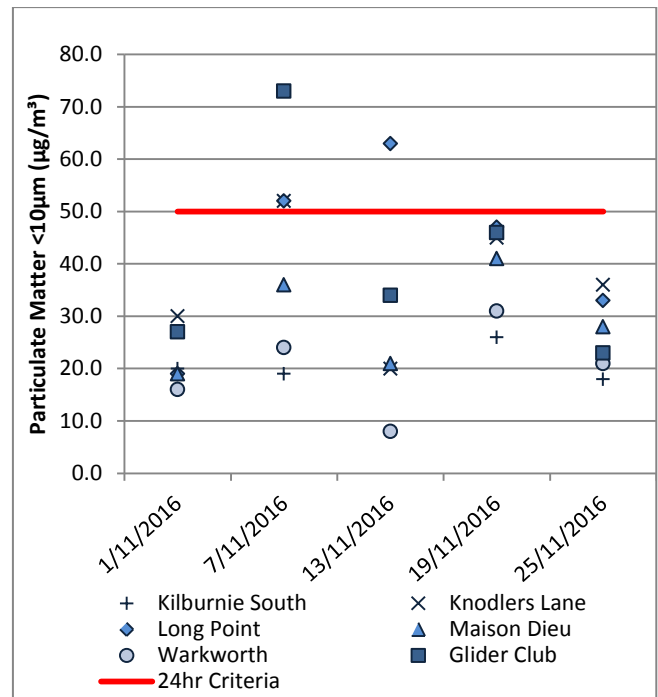
Figure 6 shows individual PM<sub>10</sub> results at each monitoring station against the short term impact assessment criteria of 50µg/m<sup>3</sup>.

On 7/11/2016 three HVAS PM<sub>10</sub> units recorded results greater than the short term (24hr) PM<sub>10</sub> impact assessment criteria; Long Point (52 µg/m<sup>3</sup>), Knodlers Lane (52 µg/m<sup>3</sup>) and Glider Club (73 µg/m<sup>3</sup>).

Preliminary investigation indicates that the likely HVO contribution to the result at Long Point and Knodlers Lane on the 7<sup>th</sup> November is less than 70%. The Hunter Valley Gliding Club were notified of the result. Feedback received confirms that there was no activity at the Club on the day. Accordingly, no further action is required.

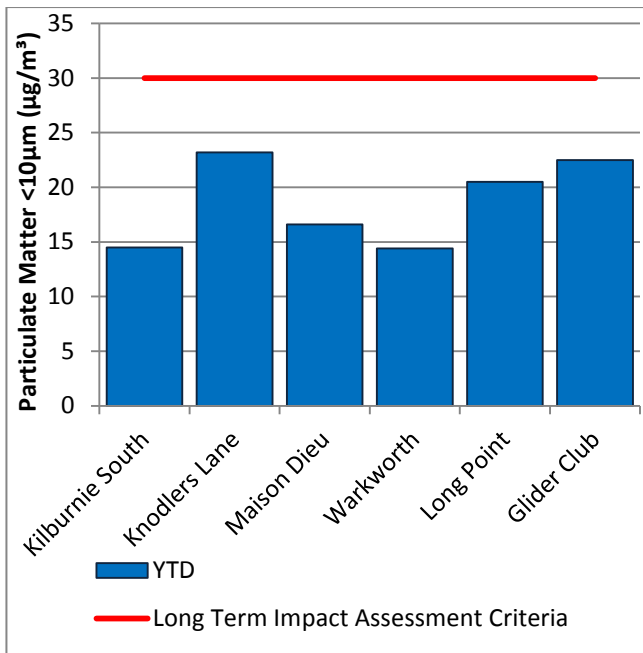
On 13/11/2016 one HVAS PM<sub>10</sub> unit recorded a result greater than the short term (24hr) PM<sub>10</sub> impact assessment criteria; Long Point (63 µg/m<sup>3</sup>).

Preliminary investigation indicates that the measurement is likely influenced by a local source. All downwind monitors located closer to HVO including the monitor located at the Gliding Club returned measurements below criterion on the day.



**Figure 6: Individual PM<sub>10</sub> Results – November 2016**

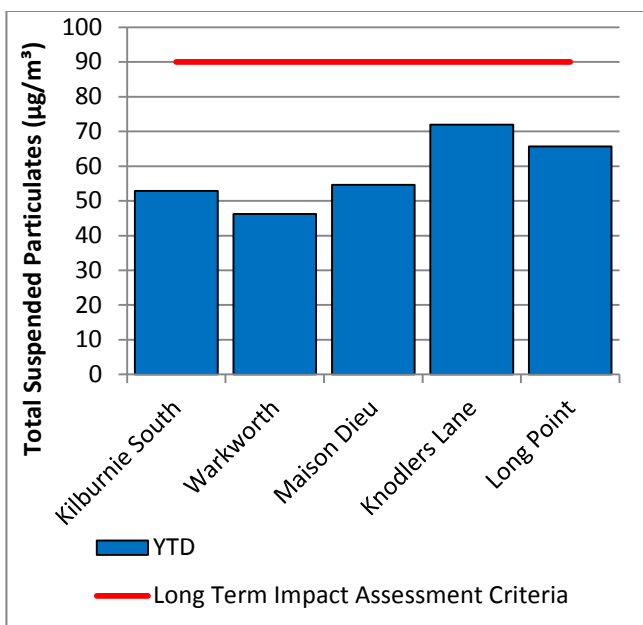
Figure 7 shows the annual average PM<sub>10</sub> results. During the reporting period, all PM<sub>10</sub> results were below the long term impact assessment criteria.



**Figure 7: Year To Date Average PM<sub>10</sub> – November 2016**

### 2.3.2 TSP Results

Figure 8 shows the annual average TSP results compared against the long term impact assessment criteria of 90µg/m<sup>3</sup>.



**Figure 8: Year To Date Average Total Suspended Particulates - November 2016**

### 2.3.3 Real Time PM<sub>10</sub> Results

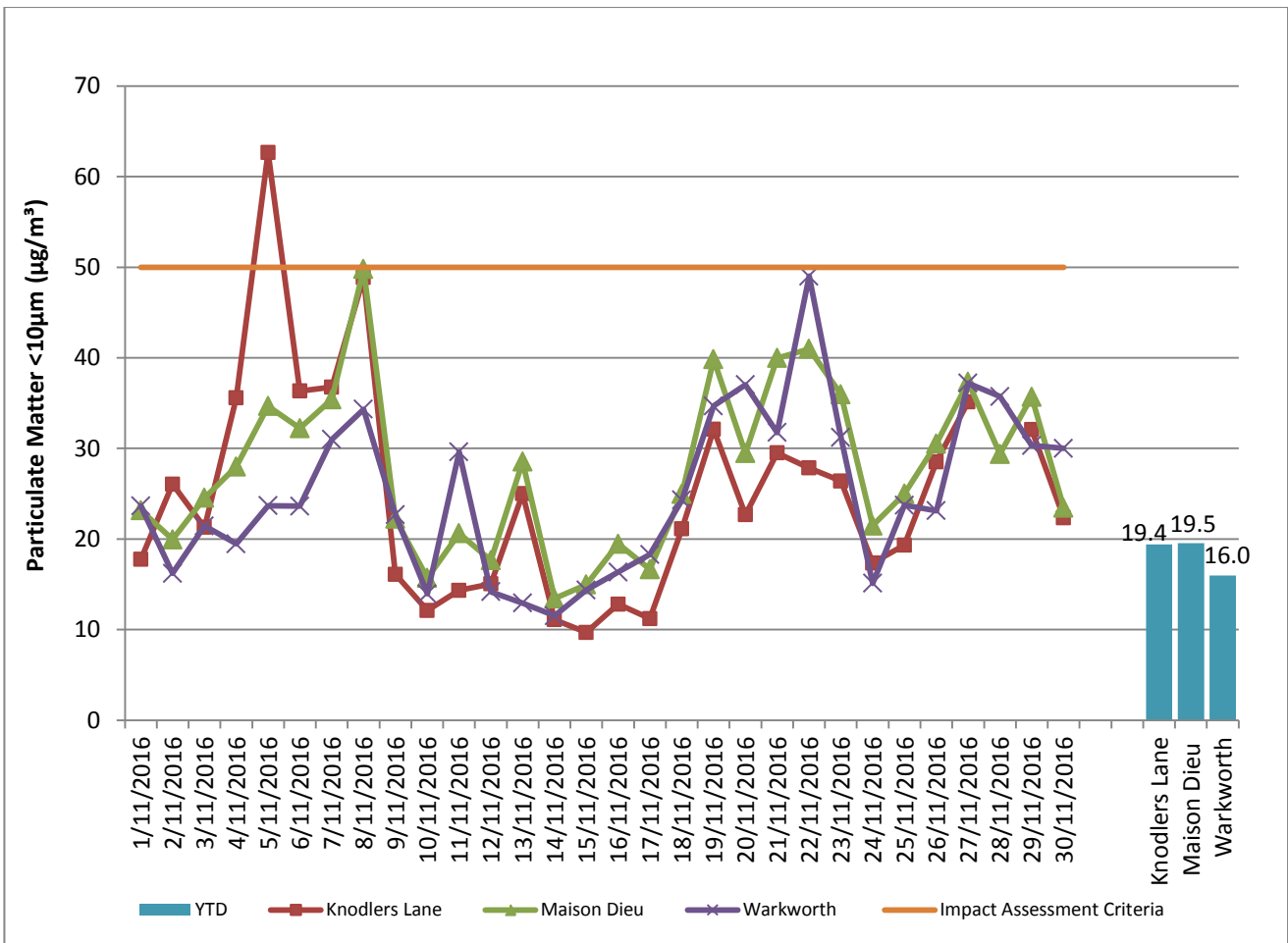
Hunter Valley Operations maintains a network of real time PM<sub>10</sub> monitors. The real time air quality monitoring stations continuously log information and transmit data to a central database, generating alarms when particulate matter levels exceed internal trigger limits. Results from real time PM<sub>10</sub> 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 are shown in Figure 9, including the daily 24 hour average PM<sub>10</sub> result and the YTD PM<sub>10</sub> average.

Data was not available on the 28<sup>th</sup> November (Knodlers Lane) due to equipment issues.

### 2.3.4 Real Time Alarms for Air Quality

During November, the real time monitoring system generated 64 automated air quality related alarms. 20 alarms were related to adverse weather conditions and 44 alarms related to PM<sub>10</sub>.



**Figure 9: Real Time PM<sub>10</sub> 24hr average and YTD Average – November 2016**

### 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 2016 report.

#### 3.1.2 Site Water Use

Under water allocation licences issued by the NSW Office

Of Water, HVO is permitted to extract water from the Hunter River. During the reporting period, HVO did not extract any water from the Hunter River.

#### 3.1.3 HRSTS Discharge

HVO participates in the 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 2016 monthly report.

## 4.0 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 15.

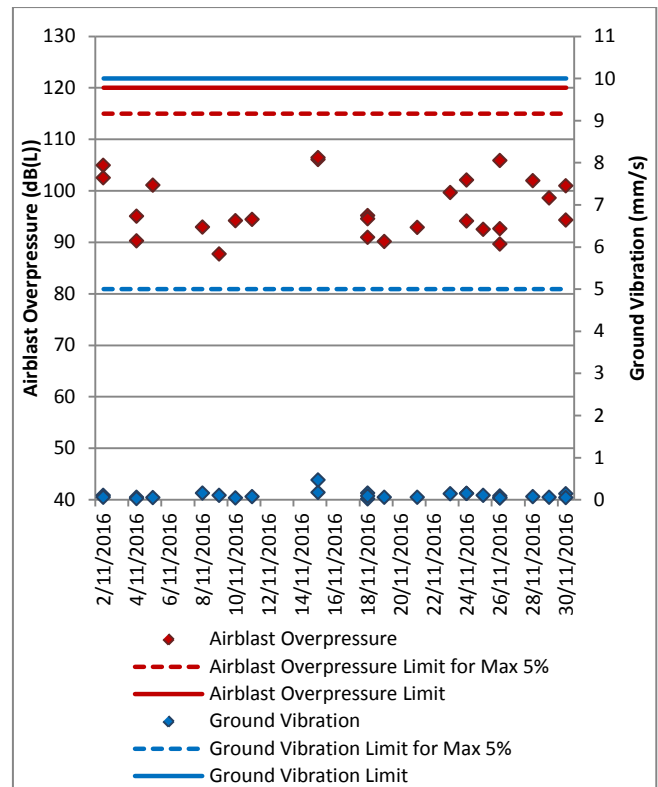
During November, 27 blasts were initiated at HVO. Figure 10 through to Figure 14 show the blast monitoring results for the reporting period against the impact assessment criteria. The criteria are summarised in Table 2.

**Table 2: Blasting Limits**

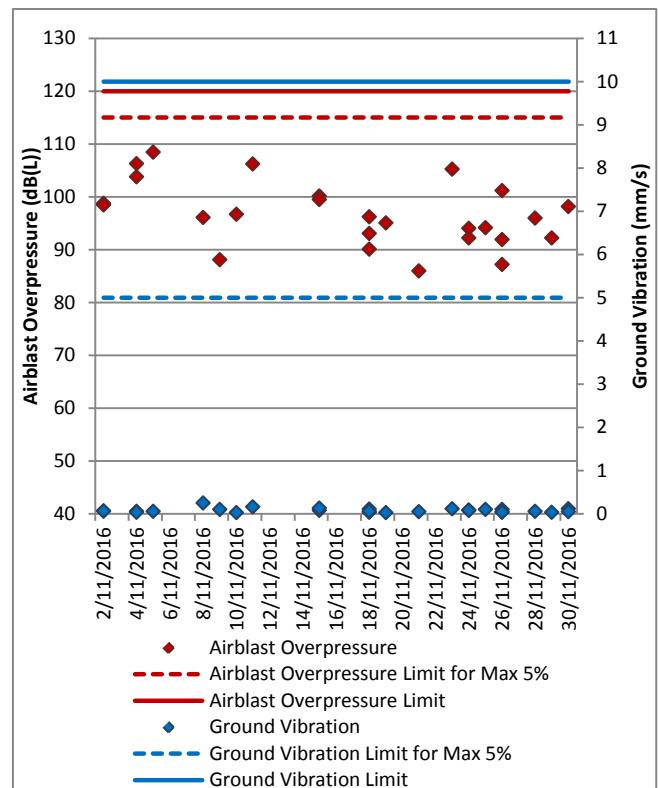
Airblast Overpressure (dB(L))	Comments
115	5% of the total number of blasts in a 12 month period
120	0%
Ground Vibration (mm/s)	Comments
5	5% of the total number of blasts in a 12 month period
10	0%

During the reporting period there were no exceedances of the airblast overpressure or ground vibration criteria.

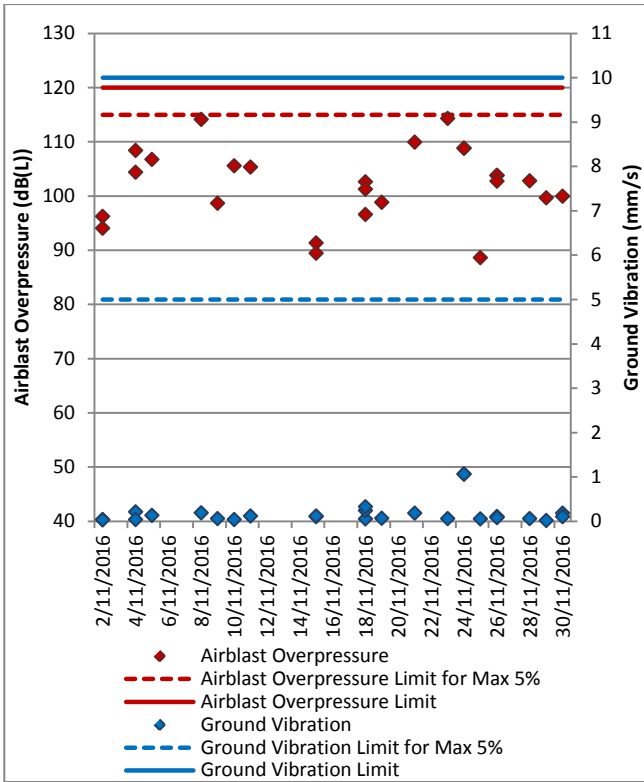
### 4.1 Blast Monitoring Results



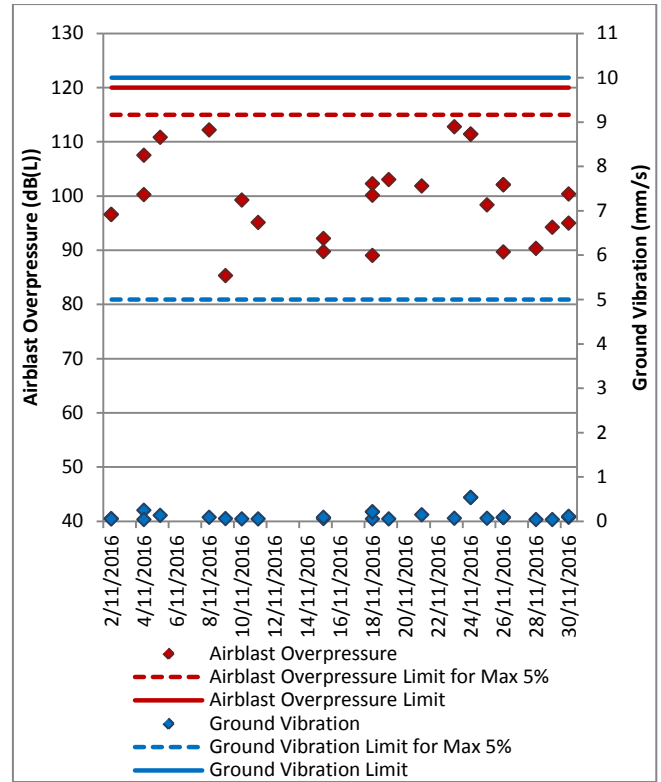
**Figure 10: Moses Crossing Blast Monitoring Results – November 2016**



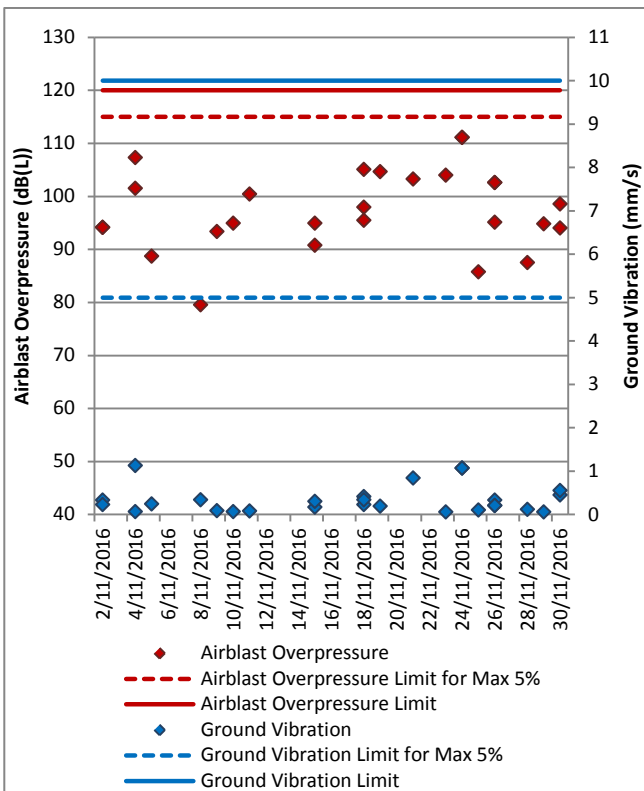
**Figure 11: Jerrys Plains Blast Monitoring Results – November 2016**



**Figure 12: Maison Dieu Blast Monitoring Results - November 2016**



**Figure 14: Knodlers Lane Blast Monitoring Results - November 2016**



**Figure 13: Warkworth Blast Monitoring Results - November 2016**



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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 nights of 9, 16 and 17 November 2016. Monitoring results are detailed in Table 3 to Table 8.

**Table 3: L<sub>Aeq</sub>, 15 minute HVO South - Impact Assessment Criteria – November 2016**

Location	Date and Time	Wind Speed (m/s) <sup>5</sup>	VTG <sup>5</sup>	Criterion dB	Criterion Applies? <sup>1,6</sup>	HVO South L <sub>Aeq</sub> dB <sup>2</sup>	Exceedance <sup>34</sup>
Knodlers Lane	9/11/2016 21:02	2	0.5	37	Yes	IA	Nil
Maison Dieu	9/11/2016 21:21	1.5	3	37	No	IA	NA
Shearers Lane	16/11/2016 21:00	3.4	-1	41	No	IA	NA
Kilburnie South	9/11/2016 23:20	1	0.5	36	Yes	28	Nil
Jerrys Plains Village	9/11/2016 22:06	1.8	0.5	35	Yes	28	Nil
Jerrys Plains East	9/11/2016 21:36	2.1	0.5	35	Yes	29	Nil
Long Point Road	17/11/2016 21:49	1.7	3	35	No	<30	NA
HVGC	9/11/2016 21:05	2	0.5	55	No	26	NA

**Table 4: L<sub>Aeq</sub>, 15 minute HVO South - Land Acquisition Criteria – November 2016**

Location	Date and Time	Wind Speed (m/s) <sup>5</sup>	VTG <sup>5</sup>	Criterion dB	Criterion Applies? <sup>1,6</sup>	HVO South L <sub>Aeq</sub> dB <sup>2</sup>	Exceedance <sup>34</sup>
Knodlers Lane	9/11/2016 21:02	2	0.5	41	Yes	IA	Nil
Maison Dieu	9/11/2016 21:21	1.5	3	41	No	IA	NA
Shearers Lane	16/11/2016 21:00	3.4	-1	41	No	IA	NA
Kilburnie South	9/11/2016 23:20	1	0.5	41	Yes	28	Nil
Jerrys Plains Village	9/11/2016 22:06	1.8	0.5	40	Yes	28	Nil
Jerrys Plains East	9/11/2016 21:36	2.1	0.5	40	Yes	29	Nil
Long Point Road	17/11/2016 21:49	1.7	3	40	No	<30	NA
HVGC	9/11/2016 21:05	2	0.5	NA	No	26	NA

**Table 5: LA<sub>1, 1minute</sub> HVO South - Impact Assessment Criteria – November 2016**

Location	Date and Time	Wind Speed (m/s) <sup>5</sup>	VTG <sup>5</sup>	Criterion dB	Criterion Applies? <sup>1,6</sup>	HVO South LA <sub>1, 1min</sub> dB <sup>2</sup>	Exceedance <sup>3,4</sup>
Knodlers Lane	9/11/2016 21:02	2	0.5	45	Yes	IA	Nil
Maison Dieu	9/11/2016 21:21	1.5	3	45	No	IA	NA
Shearers Lane	16/11/2016 21:00	3.4	-1	45	No	IA	NA
Kilburnie South	9/11/2016 23:20	1	0.5	45	Yes	39	Nil
Jerrys Plains Village	9/11/2016 22:06	1.8	0.5	45	Yes	32	Nil
Jerrys Plains East	9/11/2016 21:36	2.1	0.5	NA	No	32	NA
Long Point Road	17/11/2016 21:49	1.7	3	45	No	31	NA
HVGC	9/11/2016 21:05	2	0.5	NA	No	30	NA

**Notes**

1. Noise emission limits apply for winds up to 3 metres per second (at a height of 10m), or vertical temperature gradients of up to 3 degrees/100m and wind speeds of up to 2 m/s (at a height of 10m);

2. Estimated or measured LA<sub>eq, 15minute</sub> dB attributed to HVO South Pit Area;

3. NA in exceedance column means atmospheric conditions outside specified in approval and so criterion is not applicable;

4. Bolded results in red indicate exceedance of criteria;

5. Atmospheric data is sourced from the HVO Corporate weather station using logged met data;

6. Criterion may or may not apply due to rounding of meteorological data values

**Table 6: LA<sub>eq, 15minute</sub> HVO North – Impact Assessment Criteria – November 2016**

Location	Date and Time	Wind Speed (m/s) <sup>5</sup>	VTG <sup>5</sup>	Criterion dB	Criterion Applies? <sup>1,6</sup>	HVO North LA <sub>eq</sub> dB <sup>2</sup>	Exceedance <sup>3,4</sup>
Knodlers Lane	9/11/2016 21:02	2	0.5	35	Yes	IA	Nil
Maison Dieu	9/11/2016 21:21	1.5	3	35	Yes	IA	Nil
Shearers Lane	16/11/2016 21:00	3.4	-1	35	No	IA	NA
Kilburnie South	9/11/2016 23:20	1	0.5	39	Yes	IA	Nil
Jerrys Plains Village	9/11/2016 22:06	1.8	0.5	36	Yes	28	Nil
Jerrys Plains East	9/11/2016 21:36	2.1	0.5	39	Yes	IA	Nil
Long Point Road	17/11/2016 21:49	1.7	3	35	Yes	IA	Nil
HVGC	9/11/2016 21:05	2	0.5	NA	No	IA	NA

**Table 7: LA<sub>eq, 15minute</sub> HVO North - Land Acquisition Criteria – November 2016**

Location	Date and Time	Wind Speed (m/s) <sup>5</sup>	VTG <sup>5</sup>	Criterion dB	Criterion Applies? <sup>1,6</sup>	HVO North LA <sub>eq</sub> dB <sup>2</sup>	Exceedance <sup>3,4</sup>
Knodlers Lane	9/11/2016 21:02	2	0.5	41	Yes	IA	Nil
Maison Dieu	9/11/2016 21:21	1.5	3	41	Yes	IA	Nil
Shearers Lane	16/11/2016 21:00	3.4	-1	41	No	IA	NA
Kilburnie South	9/11/2016 23:20	1	0.5	41	Yes	IA	Nil
Jerrys Plains Village	9/11/2016 22:06	1.8	0.5	41	Yes	28	Nil
Jerrys Plains East	9/11/2016 21:36	2.1	0.5	41	Yes	IA	Nil
Long Point Road	17/11/2016 21:49	1.7	3	41	Yes	IA	Nil
HVGC	9/11/2016 21:05	2	0.5	NA	No	IA	NA

**Table 8: LA1, 1Minute HVO North - Impact Assessment Criteria – November 2016**

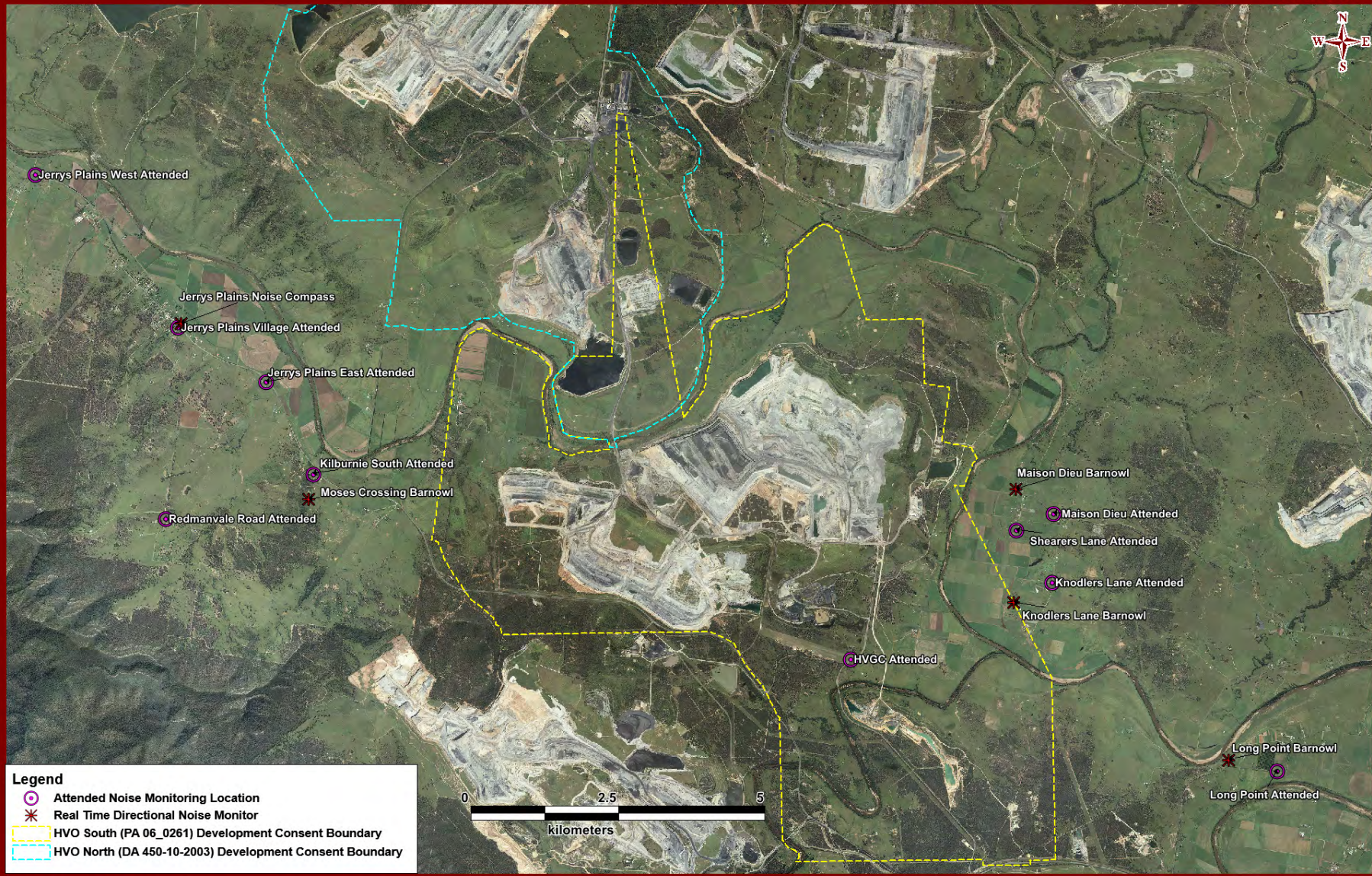
Location	Date and Time	Wind Speed (m/s) <sup>5</sup>	VTG <sup>5</sup>	Criterion dB	Criterion Applies? <sup>1,6</sup>	HVO North LA1, 1min dB <sup>2</sup>	Exceedance <sup>3,4</sup>
Knodlers Lane	9/11/2016 21:02	2	0.5	46	Yes	IA	Nil
Maison Dieu	9/11/2016 21:21	1.5	3	46	Yes	IA	Nil
Shearers Lane	16/11/2016 21:00	3.4	-1	46	No	IA	NA
Kilburnie South	9/11/2016 23:20	1	0.5	46	Yes	IA	Nil
Jerrys Plains Village	9/11/2016 22:06	1.8	0.5	46	Yes	33	Nil
Jerrys Plains East	9/11/2016 21:36	2.1	0.5	NA	No	IA	NA
Long Point Road	17/11/2016 21:49	1.7	3	46	Yes	IA	Nil
HVGC	9/11/2016 21:05	2	0.5	NA	No	IA	NA
Knodlers Lane	9/11/2016 21:02	2	0.5	46	Yes	IA	Nil

**Notes**

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

# Hunter Valley Operations Noise Monitoring Locations

Date: 161027  
Plan By: DF  
Version: 2.0



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Figure 16: Noise Monitoring Location Plan



## 5.2 Real Time Noise Monitoring

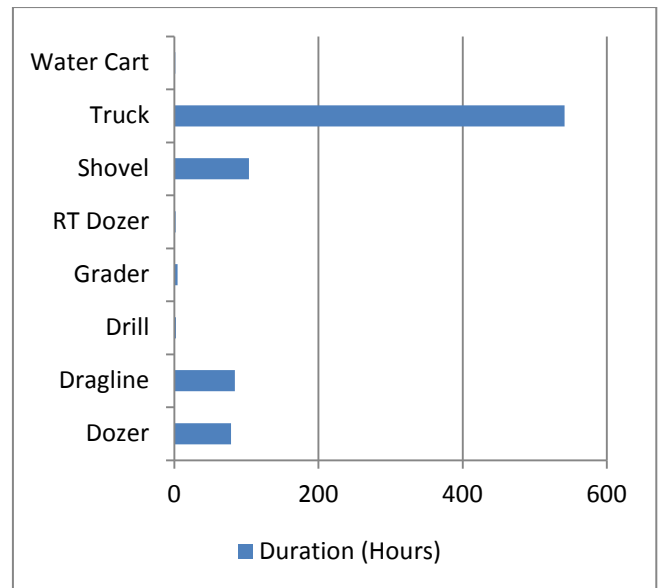
HVO utilises a network of real-time directional noise monitors to manage noise impacts on a continuous basis. Noise alarms are in place at five monitoring locations (Knodlers Lane, Maison Dieu, Jerrys Plains, Moses Crossing, and Long Point), which alert HVO staff to elevated noise levels likely to be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

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

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

## 6.0 OPERATIONAL DOWNTIME

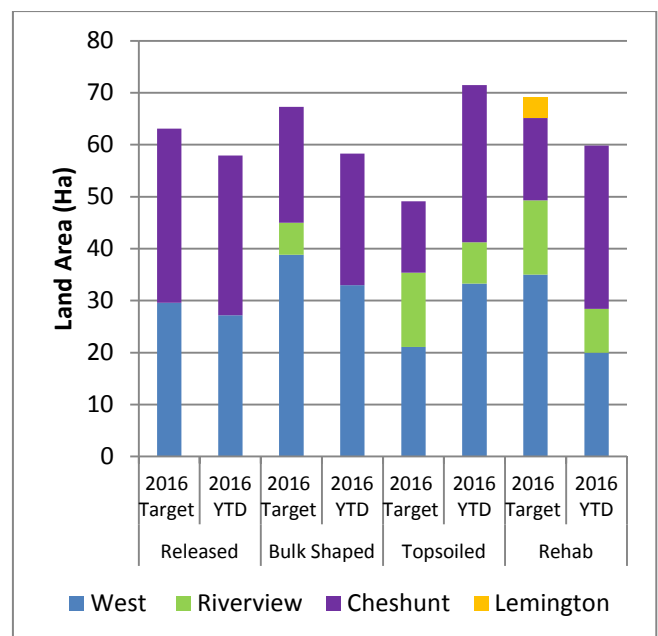
During November, a total of 817 hours of equipment downtime was logged in response to real time monitoring and visual inspections for environmental reasons such as dust, noise and meteorological conditions. Operational downtime by equipment type is shown in Figure 17.



**Figure 17: Operational Downtime by Equipment Type – November 2016**

## 7.0 REHABILITATION

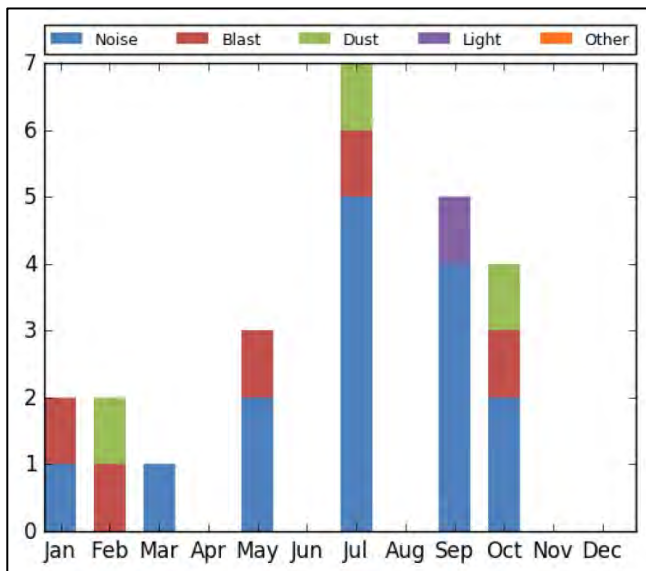
During November, 8.2 Ha of land was released, 2.6 Ha of land was bulk shaped, 5.0 Ha of land was topsoiled, 0.9 Ha of land was composted and 8.1 Ha of land was rehabilitated. Year to date progress can be viewed in Figure 18.



**Figure 18: Rehabilitation YTD - November 2016**

## 8.0 COMPLAINTS

No complaints were received during the reporting period. Details of complaints received YTD are shown in Figure 19 below.



**Figure 19: Complaints Graph - November 2016**

## 9.0 ENVIRONMENTAL INCIDENTS

One reportable environmental incident occurred during the reporting period.

During a joint agency dam compliance audit on the 4<sup>th</sup> November a pump flange adjacent to the Parnells Dam discharge point (EPA identification No.4, EPL 640) was observed to have a small pinhole leak. Immediate actions were undertaken to manage and contain the seepage.

The incident was recorded in the Coal and Allied incident and action management system for investigation. The Department of Planning and Environment, the Environmental Protection Agency and the Resources Regulator undertook the joint agency compliance audit.

## **Appendix A: Meteorological Data**

**Table 9: Meteorological Data - HVO Corporate Meteorological Station – November 2016**

<b>Date</b>	<b>Air Temperature Maximum (°C)</b>	<b>Air Temperature Minimum (°C)</b>	<b>Relative Humidity Maximum (%)</b>	<b>Relative Humidity Minimum (%)</b>	<b>Solar Radiation Maximum (W/Sq. M)</b>	<b>Wind Direction Average (°)</b>	<b>Wind Speed Average (m/sec)</b>	<b>Rainfall(mm)</b>
1/11/2016 0:00	24.0	9.0	79.1	19.3	1168	199.0	1.5	0.0
2/11/2016 0:00	25.8	11.0	84.1	18.4	1080	256.9	2.8	0.0
3/11/2016 0:00	28.3	11.4	72.8	16.1	1067	270.1	2.3	0.0
4/11/2016 0:00	29.7	13.6	71.3	11.3	1085	265.3	3.4	0.0
5/11/2016 0:00	27.3	15.5	47.8	7.4	1128	278.4	5.7	0.0
6/11/2016 0:00	26.4	12.5	61.5	15.2	1081	256.0	4.8	0.0
7/11/2016 0:00	32.7	11.9	69.7	15.4	1061	281.3	3.4	0.0
8/11/2016 0:00	36.0	17.0	88.1	9.7	1110	242.2	3.1	6.8
9/11/2016 0:00	25.6	14.6	100.0	53.1	1070	164.6	2.0	2.2
10/11/2016 0:00	30.2	12.8	100.0	18.4	1183	237.2	3.1	0.0
11/11/2016 0:00	30.9	13.6	99.1	27.1	1211	125.1	2.6	0.0
12/11/2016 0:00	31.7	16.2	100.0	39.8	1068	248.2	3.8	32.0
13/11/2016 0:00	29.4	17.1	84.0	12.2	1134	278.6	6.0	0.0
14/11/2016 0:00	23.4	12.4	100.0	33.3	1520	252.6	5.0	3.8
15/11/2016 0:00	24.7	11.9	100.0	32.0	1491	194.2	1.6	0.4
16/11/2016 0:00	27.1	10.1	98.4	29.3	1091	178.0	2.6	0.0
17/11/2016 0:00	27.5	12.3	91.1	27.2	1358	119.6	2.0	0.0
18/11/2016 0:00	33.6	13.2	91.6	13.3	1086	259.8	2.3	0.0
19/11/2016 0:00	34.1	15.1	83.1	13.2	1090	207.2	3.7	0.0
20/11/2016 0:00	30.1	13.8	91.4	36.6	1230	123.2	2.3	0.0
21/11/2016 0:00	35.1	15.4	100.0	15.9	1200	190.2	2.2	0.0
22/11/2016 0:00	35.6	17.2	85.1	13.2	1027	200.0	2.0	0.0
23/11/2016 0:00	34.9	15.5	93.4	13.6	1278	201.9	2.8	0.0
24/11/2016 0:00	26.9	12.3	95.2	14.7	1064	199.5	2.8	0.0
25/11/2016 0:00	29.7	9.8	90.7	11.3	1143	222.1	2.6	0.0
26/11/2016 0:00	30.5	10.4	92.6	12.4	1067	180.1	1.8	0.0
27/11/2016 0:00	29.8	15.5	94.2	32.0	1243	117.7	2.7	0.0
28/11/2016 0:00	34.1	17.8	99.2	12.2	1144	197.2	2.5	0.0
29/11/2016 0:00	33.5	16.7	82.0	11.2	1177	212.5	3.7	0.0
30/11/2016 0:00	30.9	14.8	99.1	17.7	1072	134.3	2.4	15.2



Business Papers – Appendix C

Environmental Monitoring Report – December 2016



*Managed by Rio Tinto Coal Australia*

# Hunter Valley Operations

## Monthly Environmental Report

### December 2016

Coal & Allied Operations Pty Ltd

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# CONTENTS

1.0	INTRODUCTION.....	6
2.0	AIR QUALITY .....	6
2.1	Meteorological Monitoring.....	6
2.1.1	Rainfall.....	6
2.1.2	Wind Speed and Direction .....	6
2.2	Depositional Dust.....	8
2.3	Suspended Particulates .....	8
2.3.1	HVAS PM <sub>10</sub> Results.....	8
2.3.2	TSP Results .....	9
2.3.3	Real Time PM <sub>10</sub> Results .....	9
2.3.4	Real Time Alarms for Air Quality .....	10
3.0	SURFACE WATER.....	11
3.1.1	Surface Water Monitoring.....	11
3.1.2	Site Water Use .....	13
3.1.3	HRSTS Discharge .....	13
3.1.4	Surface Water Trigger Limits .....	13
4.0	GROUNDWATER .....	17
4.1.1	Groundwater Monitoring .....	17
4.2.1	Groundwater Trigger Tracking .....	26
5.0	BLASTING.....	31
5.1.1	Blast Monitoring .....	31
6.0	NOISE.....	34
6.1	Attended Noise Monitoring Results.....	34
6.2	Real Time Noise Monitoring .....	38
7.0	OPERATIONAL DOWNTIME.....	38
8.0	REHABILITATION.....	38
9.0	COMPLAINTS.....	38
10.0	ENVIRONMENTAL INCIDENTS .....	39
	Appendix A: Meteorological Data.....	40

## Figures

Figure 1: Year to Date Rainfall Summary 2016	6
Figure 2: HVO Corporate Wind Rose – December 2016	6
Figure 3: HVO Cheshunt Wind Rose – December 2016	6
Figure 4: Air Quality Monitoring Location Plan	7
Figure 5: Depositional Dust Results – December 2016	8
Figure 6: Individual PM <sub>10</sub> Results – December 2016	9
Figure 7: Year to Date Average PM <sub>10</sub> – December 2016	9
Figure 8: Annual Average Total Suspended Particulates – December 2016	9
Figure 9: Real Time PM <sub>10</sub> 24hr average and YTD average – December 2016	10
Figure 10: Site Dams Electrical Conductivity Trend - December 2016	11
Figure 11: Site Dams pH Trend - December 2016	11
Figure 12: Site Dams Total Suspended Solids Trend – December 2016	11
Figure 13: Wollombi Brook Electrical Conductivity Trend - December 2016	12
Figure 14: Wollombi Brook pH Trend - December 2016	12
Figure 15: Wollombi Brook Total Suspended Solids Trend - December 2016	12
Figure 16: Hunter River Electrical Conductivity Trend - December 2016	12
Figure 17: Hunter River pH Trend - December 2016	12
Figure 18: Hunter River Suspended Solids - December 2016	12
Figure 19: Other Tributaries Electrical Conductivity Trend - December 2016	13
Figure 20: Other Tributaries pH Trend – December 2016	13
Figure 21: Other Tributaries Total Suspended Solids Trend - December 2016	13
Figure 22: Surface Water Monitoring Location Plan	16
Figure 23: Carrington Alluvium Electrical Conductivity Trend - December 2016	17
Figure 24: Carrington Alluvium pH Trend – December 2016	17
Figure 25: Carrington Alluvium Standing Water Level - December 2016	17
Figure 26: Carrington Interburden Electrical Conductivity Trend - December 2016	18
Figure 27: Carrington Interburden pH Trend – December 2016	18
Figure 28: Carrington Interburden Standing Water Level - December 2016	18
Figure 29: Cheshunt Interburden Electrical Conductivity Trend - December 2016	18
Figure 30: Cheshunt Interburden pH Trend - December 2016	18
Figure 31: Cheshunt Interburden Standing Water Level – December 2016	18
Figure 32: Cheshunt Mt Arthur Electrical Conductivity Trend - December 2016	19
Figure 33: Cheshunt Mt Arthur pH Trend - December 2016	19
Figure 34: Cheshunt Mt Arthur Standing Water Level – December 2016	19
Figure 35: Cheshunt / North Pit Alluvium Electrical Conductivity Trend - December 2016	19
Figure 36: Cheshunt / North Pit Alluvium pH Trend - December 2016	19
Figure 37: Cheshunt / North Pit Alluvium Standing Water Level – December 2016	19
Figure 38: Carrington West Wing Alluvium Electrical Conductivity Trend - December 2016	20
Figure 39: Carrington West Wing Alluvium pH Trend - December 2016	20
Figure 40: Carrington West Wing Alluvium Standing Water Level – December 2016	20
Figure 41: Carrington West Wing Flood Plain Electrical Conductivity Trend - December 2016	20
Figure 42: Carrington West Wing Flood Plain pH Trend - December 2016	20
Figure 43: Carrington West Wing Flood Plain Standing Water Level - December 2016	20
Figure 44: Carrington West Wing LBL Electrical Conductivity Trend - December 2016	21
Figure 45: Carrington West Wing LBL pH Trend - December 2016	21
Figure 46: Carrington West Wing LBL Standing Water Level - December 2016	21
Figure 47: Lemington South Alluvium Electrical Conductivity Trend - December 2016	21
Figure 48: Lemington South Alluvium pH Trend – December 2016	21



Figure 49: Lemington South Alluvium Standing Water Level Trend – December 2016	21
Figure 50: Lemington South Arrowfield Electrical Conductivity Trend – December 2016	22
Figure 51: Lemington South Arrowfield pH Trend – December 2016	22
Figure 52: Lemington South Arrowfield Standing Water Level - December 2016	22
Figure 53: Lemington South Bowfield Electrical Conductivity Trend - December 2016	22
Figure 54: Lemington South Bowfield pH Trend - December 2016	22
Figure 55: Lemington South Bowfield Standing Water Level - December 2016	22
Figure 56: Lemington South Woodlands Hill Electrical Conductivity Trend - December 2016	23
Figure 57: Lemington South Woodlands Hill pH Trend - December 2016	23
Figure 58: Lemington South Woodlands Hill Standing Water Level – December 2016	23
Figure 59: Lemington South Interburden Electrical Conductivity Trend - December 2016	23
Figure 60: Lemington South Interburden pH Trend - December 2016	23
Figure 61: Lemington South Interburden Standing Water Level - December 2016	23
Figure 62: West Pit Alluvium Electrical Conductivity Trend - December 2016	24
Figure 63: West Pit Alluvium pH Trend – December 2016	24
Figure 64: West Pit Alluvium Standing Water Level - December 2016	24
Figure 65: West Pit Siltstone Electrical Conductivity Trend – December 2016	24
Figure 66: West Pit Siltstone pH Trend – December 2016	24
Figure 67: West Pit Siltstone Standing Water Level – December 2016	24
Figure 68: Carrington Broonie Electrical Conductivity Trend - December 2016	25
Figure 69: Carrington Broonie pH Trend - December 2016	25
Figure 70: Carrington Broonie Standing Water Level - December 2016	25
Figure 71: Cheshunt Piercefield Electrical Conductivity Trend - December 2016	25
Figure 72: Cheshunt Piercefield pH Trend - December 2016	25
Figure 73: Cheshunt Piercefield Standing Water Level - December 2016	25
Figure 74: North Pit Spoil Electrical Conductivity Trend - December 2016	26
Figure 75: North Pit Spoil pH Trend - December 2016	26
Figure 76: North Pit Spoil Standing Water Level - December 2016	26
Figure 77: Groundwater Monitoring Location Plan	30
Figure 78: Moses Crossing Blast Monitoring Results – December 2016	31
Figure 79: Jerrys Plains Blast Monitoring Results –December 2016	31
Figure 80: Maison Dieu Blast Monitoring Results – December 2016	32
Figure 81: Warkworth Blast Monitoring Results – December 2016	32
Figure 82: Knodlers Lane Blast Monitoring Results – December 2016	32
Figure 83: Blast Monitoring Location Plan	33
Figure 84: Noise Monitoring Location Plan	37
Figure 85: Operational Downtime by Equipment Type –December 2016	38
Figure 86: Rehabilitation YTD – December 2016	38
Figure 87: Complaints Graph – December 2016	39

## Tables

Table 1: Monthly Rainfall HVO	6
Table 3: Groundwater Triggers - 2016	27
Table 4: Blasting Limits	31
Table 5: $L_{Aeq, 15 \text{ minute}}$ HVO South - Impact Assessment Criteria – December 2016	34
Table 6: $L_{Aeq, 15 \text{ minute}}$ HVO South - Land Acquisition Criteria – December 2016	34
Table 7: $L_{A1, 1 \text{ minute}}$ HVO South – Sleep Disturbance Criteria – December 2016	35
Table 8: $L_{Aeq, 15 \text{ minute}}$ HVO North – Impact Assessment Criteria – December 2016	35

<b>Table 9: <math>L_{Aeq,15\text{minute}}</math> HVO North - Land Acquisition Criteria – December 2016</b>	<b>35</b>
<b>Table 10: <math>L_{A1, 1\text{Minute}}</math> HVO North – Sleep Disturbance Criteria – December 2016</b>	<b>36</b>
<b>Table 11: Meteorological Data - HVO Corporate Meteorological Station – December 2016</b>	<b>41</b>

Revision History

<b>Version No.</b>	<b>Person Responsible</b>	<b>Document Status</b>	<b>Date</b>
1.1	Acting Environmental Specialist	Final	02/02/2017

# 1.0 INTRODUCTION

This report has been compiled to provide a monthly summary of environmental monitoring results for Hunter Valley Operations (HVO) as described in the Hunter Valley Operations Online Communication Plan. This report includes all monitoring data collected for the period 1 December 2016 to 31 December 2016.

# 2.0 AIR QUALITY

## 2.1 Meteorological Monitoring

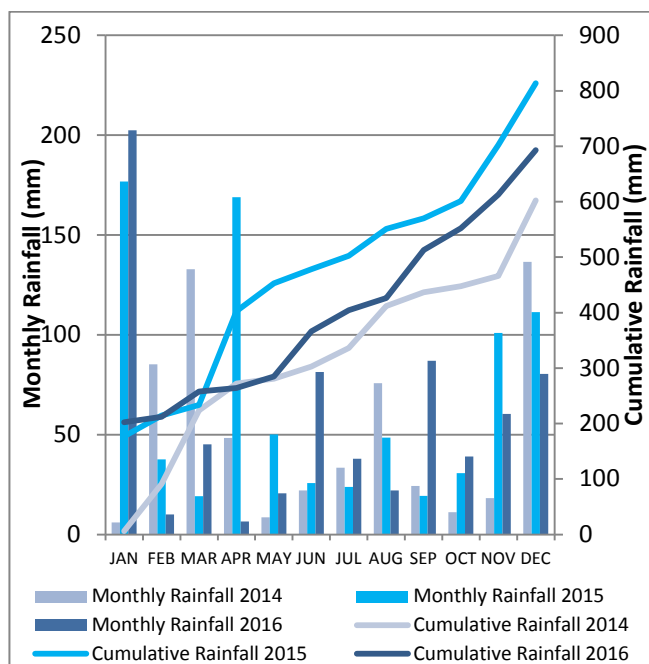
HVO maintains two meteorological stations; 'Corporate' and 'Cheshunt' (Refer to Figure 4: Air Quality Monitoring Location Plan).

### 2.1.1 Rainfall

Rainfall for the period is summarised in Table 1, the 2016 trend and historical trend are shown in Figure 1.

**Table 1: Monthly Rainfall HVO**

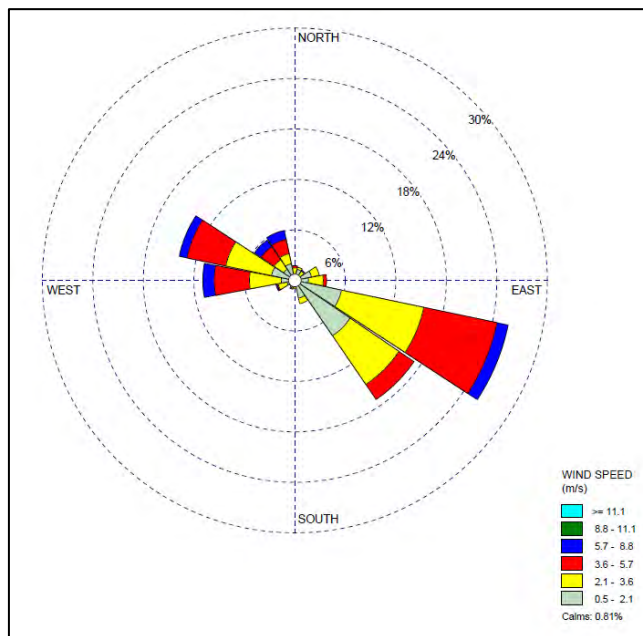
2016	Monthly Rainfall (mm)	Cumulative Rainfall (mm)
<b>December</b>	80.4	693



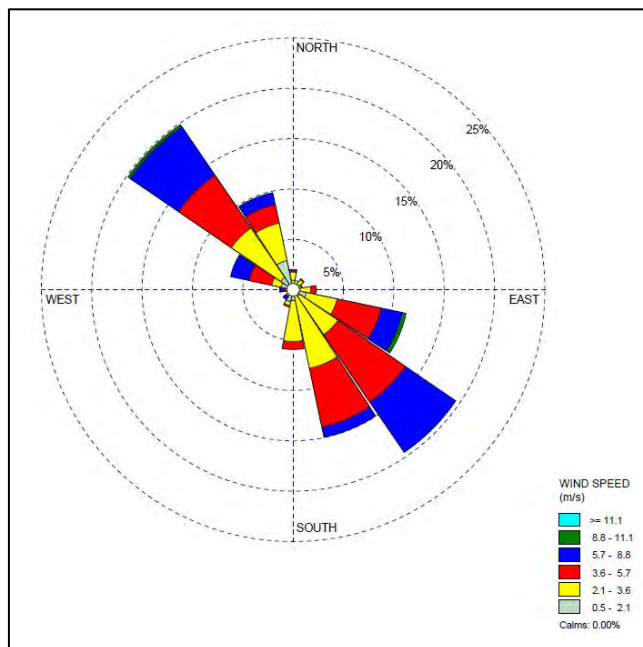
**Figure 1: Year to Date Rainfall Summary 2016**

## 2.1.2 Wind Speed and Direction

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



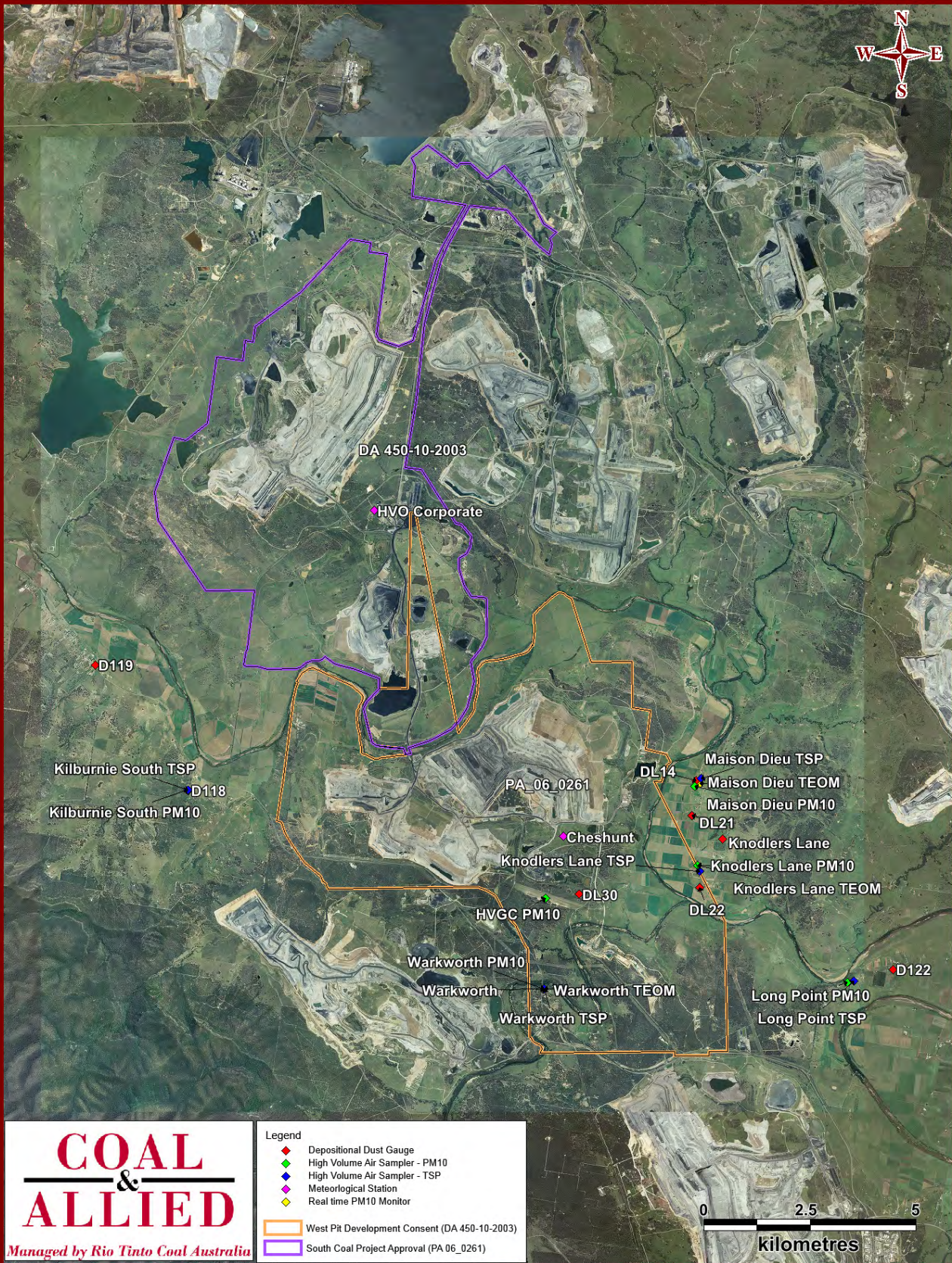
**Figure 2: HVO Corporate Wind Rose - December 2016**



**Figure 3: HVO Cheshunt Wind Rose - December 2016**

Hunter Valley Operations  
Air Quality Monitoring Locations

Date: 160223  
Plan By: DF  
Version: 1.1



**COAL & ALLIED**  
Managed by Rio Tinto Coal Australia

**Legend**

- ◆ Depositional Dust Gauge
- ◆ High Volume Air Sampler - PM10
- ◆ High Volume Air Sampler - TSP
- ◆ Meteorological Station
- ◆ Real time PM10 Monitor
- West Pit Development Consent (DA 450-10-2003)
- South Coal Project Approval (PA 06\_0261)

RTCA - NSW Environmental Services

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 DL14, DL21, Knolders Lane and Warkworth monitors recorded monthly results above the long term impact assessment criteria of 4.0 g/m<sup>2</sup> per month. The field notes associated with the DL14, DL21 and Knolders Lane results confirm the presence of insects and bird droppings. As such the results are considered contaminated and will be excluded from calculation of the annual average. There is no evidence to suggest that the Warkworth result is contaminated. Accordingly, this result will be included in the annual average calculation.

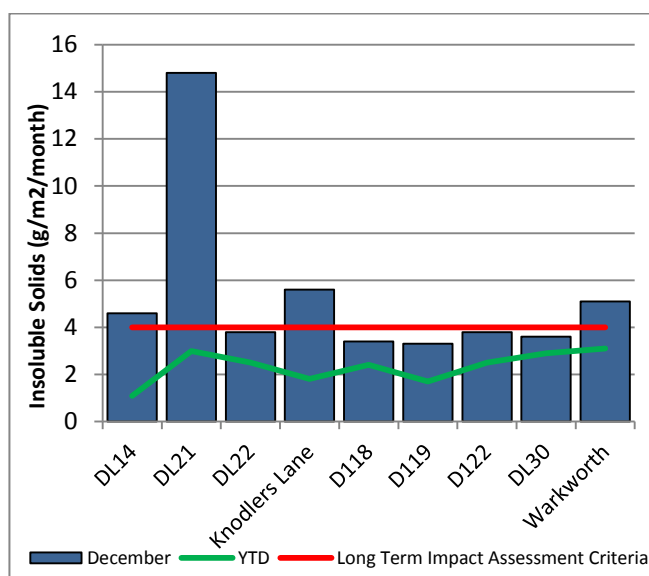


Figure 5: Depositional Dust Results – December 2016

## 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<sub>10</sub>). The location of these monitors can be found in Figure 4. Each HVAS was run for 24 hours on a six-day cycle in accordance with EPA requirements.

### 2.3.1 HVAS PM<sub>10</sub> Results

Figure 6 shows individual PM<sub>10</sub> results at each monitoring station against the short term impact assessment criteria of 50µg/m<sup>3</sup>.

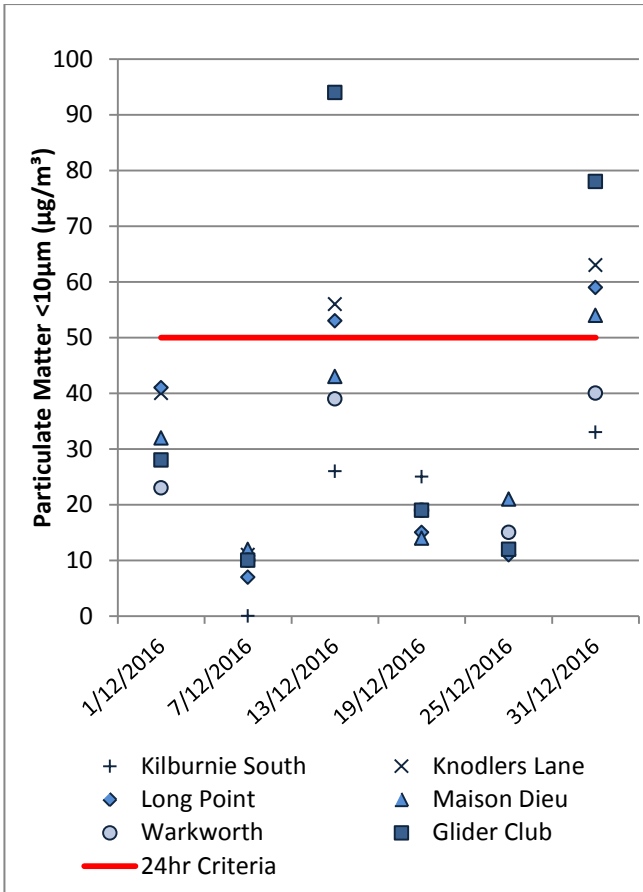
The Kilburnie South HVAS monitor failed to collect a valid sample on the 7th of December due to a power outage.

On 13/12/2016 three HVAS PM<sub>10</sub> units recorded results greater than the short term (24hr) PM<sub>10</sub> impact assessment criteria; Knolders Lane (56 µg/m<sup>3</sup>), Long Point (53 µg/m<sup>3</sup>) and Gliding Club (94 µg/m<sup>3</sup>).

Preliminary investigation indicates that the likely HVO contribution to the result at Long Point and Knolders Lane on the 13th December is less than 60%. The Hunter Valley Gliding Club were notified of the result. Feedback received confirms that there was no activity at the Club on the day. Accordingly, no further action is required.

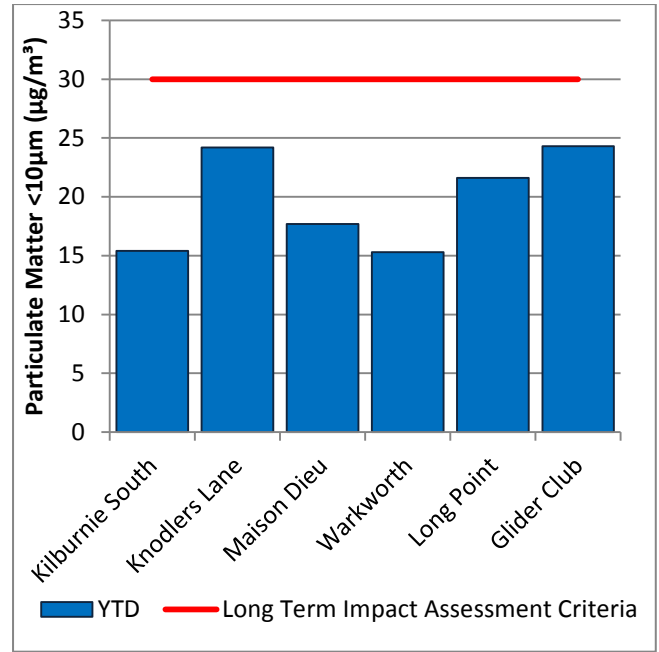
On 31/12/2016 four HVAS PM<sub>10</sub> units recorded results greater than the short term (24hr) PM<sub>10</sub> impact assessment criteria; Knolders Lane (63 µg/m<sup>3</sup>), Long Point (59 µg/m<sup>3</sup>), Maison Dieu (63 µg/m<sup>3</sup>) and Gliding Club (78 µg/m<sup>3</sup>).

Preliminary investigation indicates that HVO was outside of the main arc of influence for all locations on the 31st December. Accordingly, no further action is required.



**Figure 6: Individual PM<sub>10</sub> Results – December 2016**

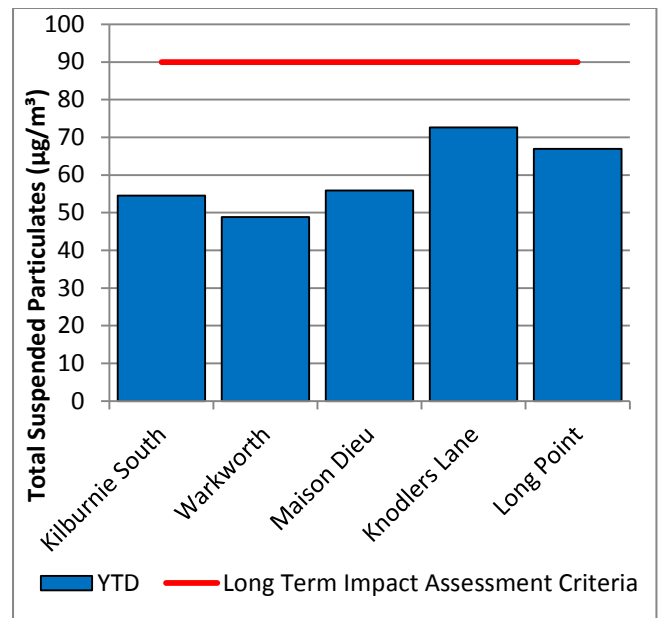
Figure 7 shows the annual average PM<sub>10</sub> results. During the reporting period, all PM<sub>10</sub> results were below the long term impact assessment criteria.



**Figure 7: Year to Date Average PM<sub>10</sub> – December 2016**

### 2.3.2 TSP Results

Figure 8 shows the annual average TSP results compared against the long term impact assessment criteria of 90µg/m<sup>3</sup>.



**Figure 8: Annual Average Total Suspended Particulates – December 2016**

### 2.3.3 Real Time PM<sub>10</sub> Results

Hunter Valley Operations maintains a network of real time PM<sub>10</sub> 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<sub>10</sub> 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 are shown in Figure 9, including the daily 24 hour average PM<sub>10</sub> result and the 24 hour YTD PM<sub>10</sub> average. There was one result recorded which exceeded the short term (24hr) criteria in the approvals. A measurement of 50.6µg/m<sup>3</sup> was recorded at the Knodlers Lane TEOM location on the 14th December.

An investigation was undertaken to assess air quality and meteorological conditions on the day, and to assess the maximum potential HVO contribution to the measured

result. The investigation determined that HVO's maximum potential contribution to measured levels at Knodlers Lane is estimated at less than 20% of the measured result on the day.

Data was not available on the 15<sup>th</sup> December (Maison Dieu) due to technical issues.

### 2.3.4 Real Time Alarms for Air Quality

During December, the real time monitoring system generated 65 automated air quality related alarms. 29 alarms were related to adverse weather conditions and 36 alarms related to PM<sub>10</sub>.

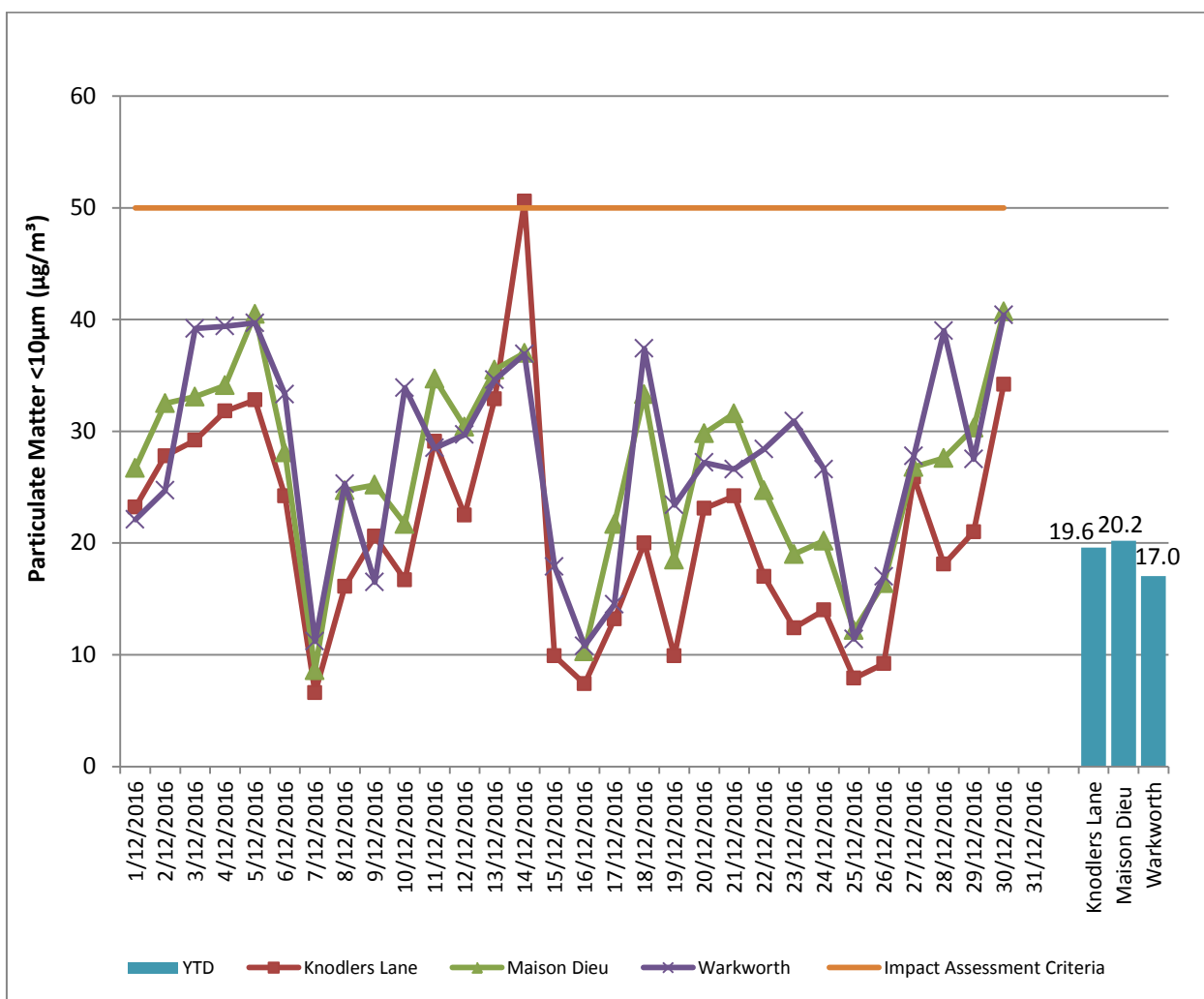


Figure 9: Real Time PM<sub>10</sub> 24hr average and YTD average – December 2016

### 3.0 SURFACE WATER

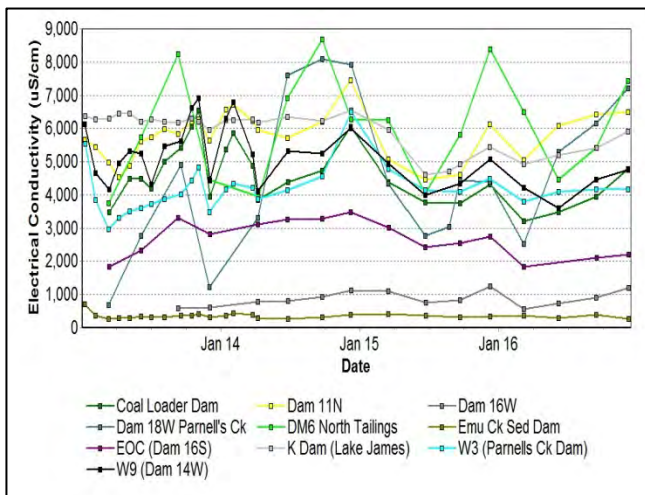
#### 3.1.1 Surface Water Monitoring

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

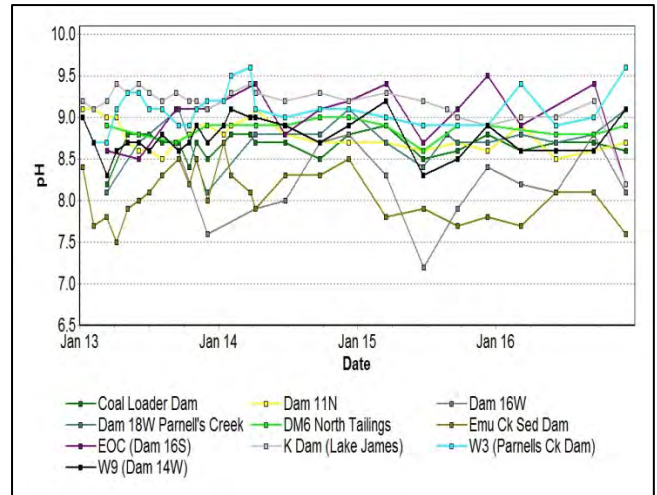
Watercourses are assessed against ANZECC Guidelines for Fresh and Marine Water Quality (2000) for:

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

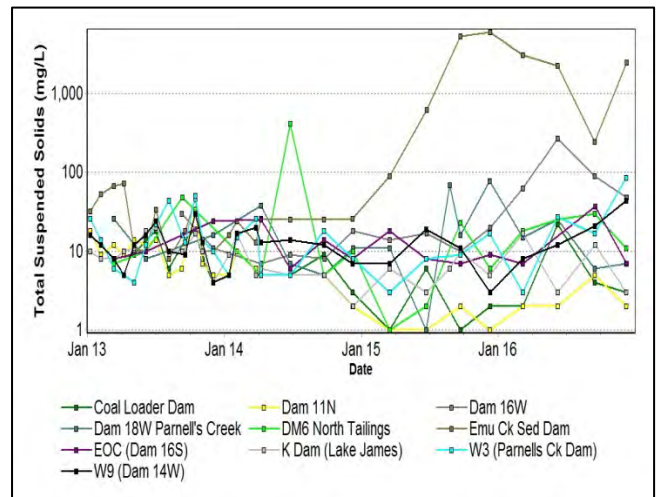
The location of Surface Water monitoring locations is shown in Figure 22.



**Figure 10: Site Dams Electrical Conductivity Trend - December 2016**

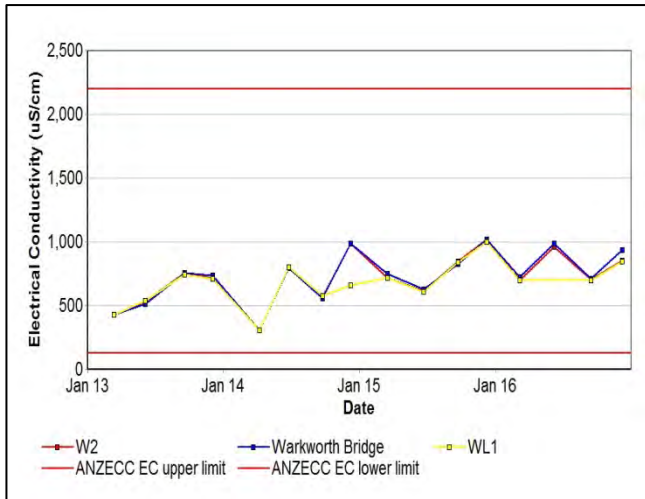


**Figure 11: Site Dams pH Trend - December 2016**

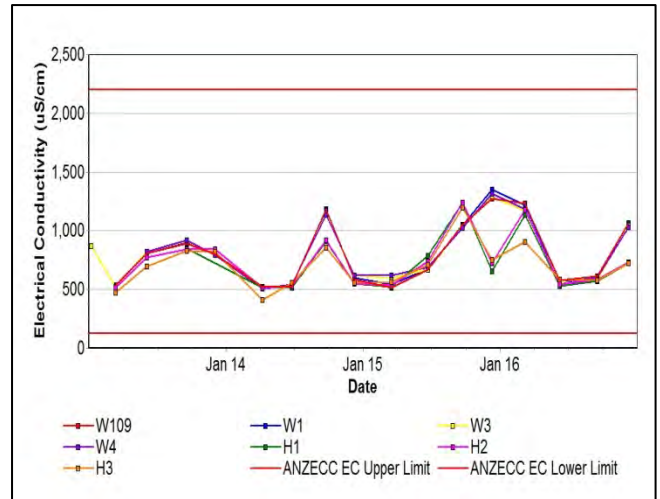


**Figure 12: Site Dams Total Suspended Solids Trend - December 2016**

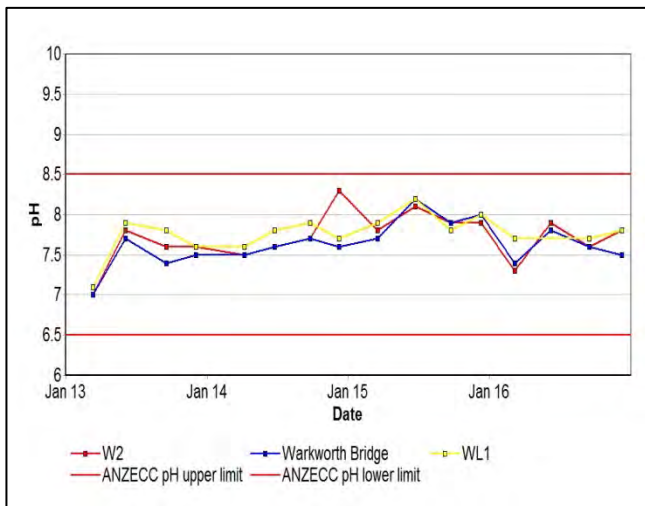




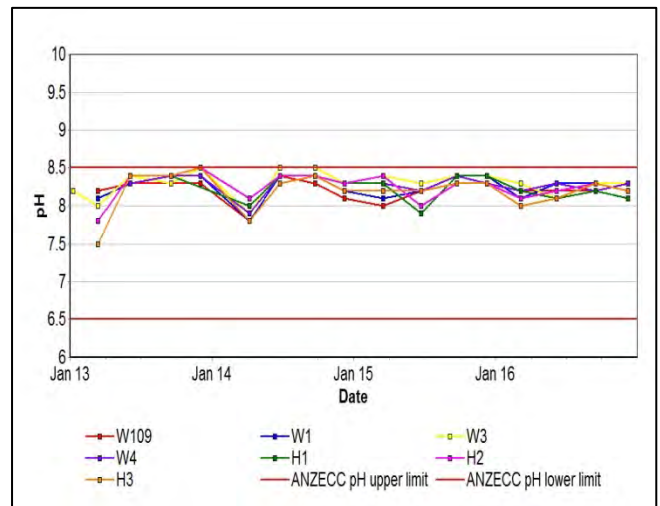
**Figure 13: Wollombi Brook Electrical Conductivity Trend - December 2016**



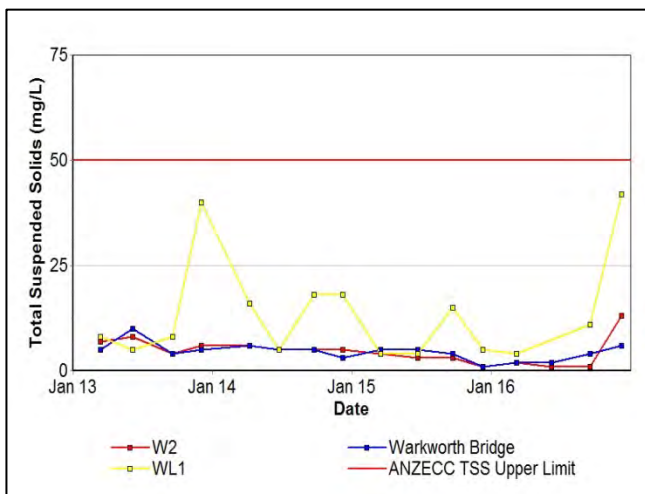
**Figure 16: Hunter River Electrical Conductivity Trend - December 2016**



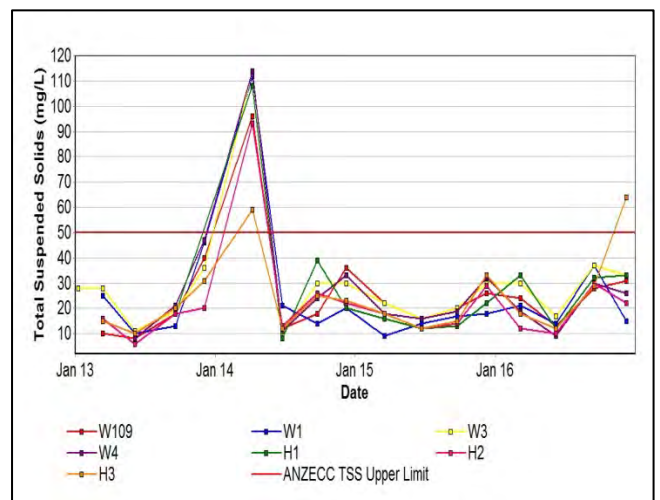
**Figure 14: Wollombi Brook pH Trend - December 2016**



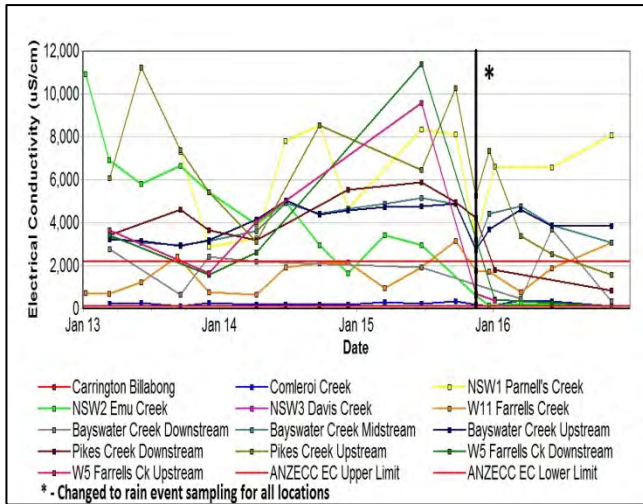
**Figure 17: Hunter River pH Trend - December 2016**



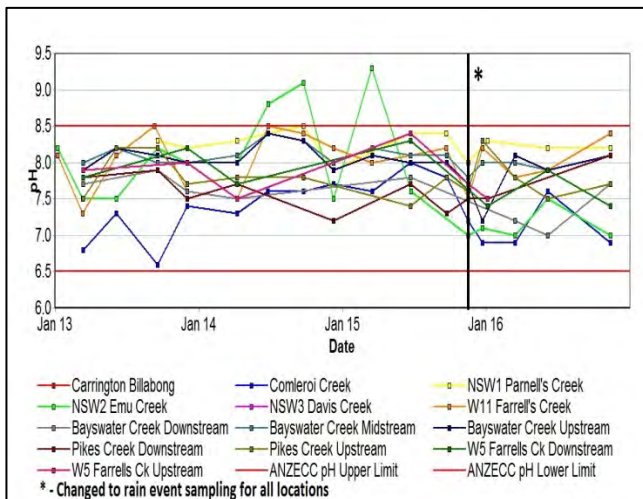
**Figure 15: Wollombi Brook Total Suspended Solids Trend - December 2016**



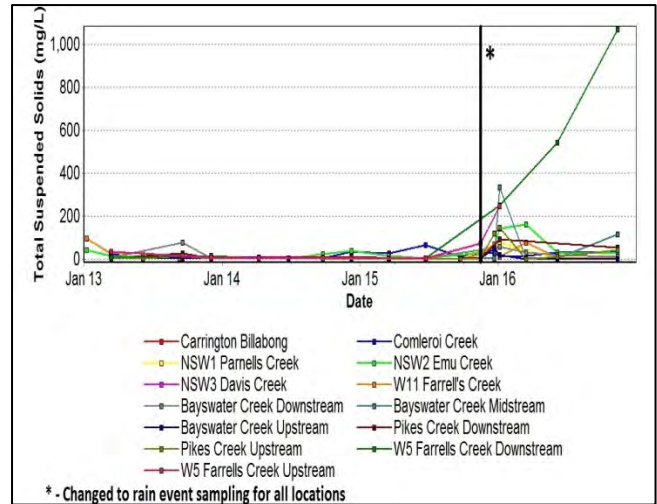
**Figure 18: Hunter River Suspended Solids - December 2016**



**Figure 19: Other Tributaries Electrical Conductivity Trend - December 2016**



**Figure 20: Other Tributaries pH Trend – December 2016**



**Figure 21: Other Tributaries Total Suspended Solids Trend - December 2016**

### 3.1.2 Site Water Use

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

### 3.1.3 HRSTS Discharge

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

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

### 3.1.4 Surface Water Trigger Limits

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

During 2016 25 internal trigger limits were breached, summarised in Table 2.

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

<b>Site</b>	<b>Date</b>	<b>Trigger Limit Breached</b>	<b>Action taken in response</b>
Bayswater Creek Downstream	06/06/2016	EC –95th Percentile	Watching Brief*
Comleroi Creek	06/06/2016	EC –95th Percentile	Watching Brief*
H1	07/03/2016	EC –95th Percentile	Watching Brief*
H2	07/03/2016	EC –95th Percentile	Watching Brief*
H3	07/03/2016	EC –95th Percentile	Watching Brief*
W1	07/03/2016	EC –95th Percentile	Third consecutive trigger exceedance. Elevated EC associated with low flow conditions in the Hunter River, due to low rainfall recharge. Data consistent with upstream DPI Water monitoring station (#210083). No further action.
W109	07/03/2016	EC –95th Percentile	Third consecutive trigger exceedance. Elevated EC associated with low flow conditions in the Hunter River, due to low rainfall recharge. Data consistent with upstream DPI Water monitoring station (#210083). No further action.
W11	12/11/2016	EC –95th Percentile	Watching Brief*
W4	07/03/2016	EC –95th Percentile	Third consecutive trigger exceedance. Elevated EC associated with low flow conditions in the Hunter River, due to low rainfall recharge. Data consistent with upstream DPI Water monitoring station (#210083). No further action.
WL1	07/06/2016	EC –95th Percentile	Watching Brief*
Comleroi Creek	05/01/2016	pH – 5 <sup>th</sup> Percentile	Watching Brief*
NSW 2 Emu Creek	05/01/2016	pH – 5 <sup>th</sup> Percentile	Watching Brief*
NSW 2 Emu Creek	12/11/2016	pH – 5 <sup>th</sup> Percentile	Watching Brief*
Pikes Creek Downstream	12/11/2016	EC –95th Percentile	Watching Brief*
Bayswater Creek Downstream	05/01/2016	pH – 5 <sup>th</sup> Percentile	Watching Brief*
W11	05/01/2016	pH – 5 <sup>th</sup> Percentile	Watching Brief*
Bayswater Creek Downstream	05/01/2016	TSS – 50mg/L (ANZECC criteria)	Elevated TSS associated with high runoff due to rainfall event (63mm of rain recorded 03/01/2016 to 05/01/2016) – source of sediment is likely from input from Pikes Creek. No follow up

			required
Bayswater Creek Midstream	05/01/2016	TSS – 50mg/L (ANZECC criteria)	Elevated TSS associated with high runoff due to rainfall event (63mm of rain recorded 03/01/2016 to 05/01/2016) – source of sediment is likely from input from Pikes Creek. No follow up required.
Bayswater Creek Midstream	12/11/2016	TSS – 50mg/L (ANZECC criteria)	Elevated TSS associated with high runoff due to rainfall event – source of sediment is likely from input from Pikes Creek. No follow up required
H3	8/12/2016	TSS – 50mg/L (ANZECC criteria)	Elevated TSS associated with high runoff due to rainfall event- primary source appears to be localised around confluence with Wollombi. Upstream data does not suggest high sediment load from further upstream. Watching brief.
NSW 1 Parnells Creek	05/01/2016	TSS – 50mg/L (ANZECC criteria)	Elevated TSS associated with high runoff due to rainfall event (63mm of rain recorded 03/01/2016 to 05/01/2016) – review of site indicates upstream erosion and sediment controls in place and compliant. No follow up required.
NSW2 Emu Creek	05/01/2016	TSS – 50mg/L (ANZECC criteria)	Elevated TSS associated with high runoff due to rainfall event (63mm of rain recorded 03/01/2016 to 05/01/2016) – rainfall event exceeded design capacity for sediment controls (compliant with site Water Management Plan and Blue Book). No follow up required.
Pikes Creek Downstream	05/01/2016	TSS – 50mg/L (ANZECC criteria)	Elevated TSS associated with high runoff due to rainfall event (63mm of rain recorded 03/01/2016 to 05/01/2016) – upstream sample indicates high sediment load in catchment. No follow up required.
Pikes Creek Downstream	12/11/2016	TSS – 50mg/L (ANZECC criteria)	Elevated TSS associated with high runoff due to rainfall event- upstream sample (45 mg/L) indicates high sediment load in catchment. No follow up required
Pikes Creek Upstream	05/01/2016	TSS – 50mg/L (ANZECC criteria)	Elevated TSS associated with high runoff due to rainfall event (63mm of rain recorded 03/01/2016 to 05/01/2016). No mine-related sources of sediment in catchment.

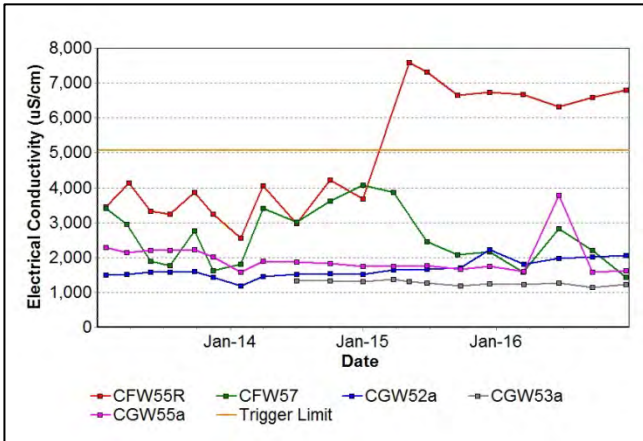
\* = Watching Brief established pending outcomes of subsequent monitoring events. No further action required.



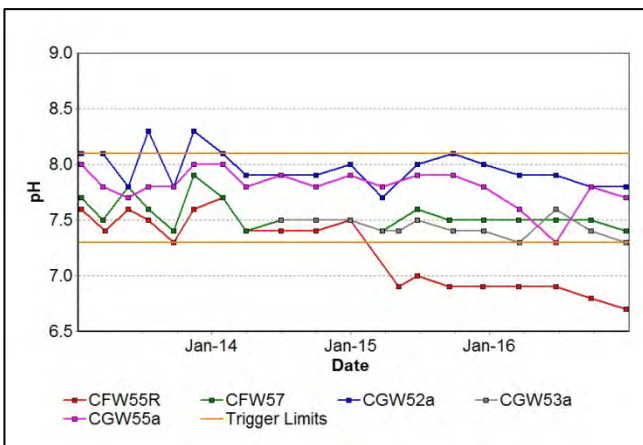
## 4.0 GROUNDWATER

### 4.1.1 Groundwater Monitoring

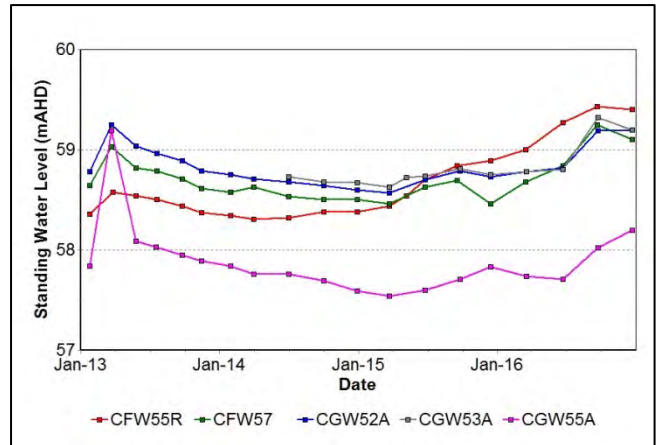
Groundwater monitoring is undertaken on a quarterly basis in accordance with the HVO Water Management Plan and Ground Water Monitoring Programme. Monitoring sites are shown in Figure 77.



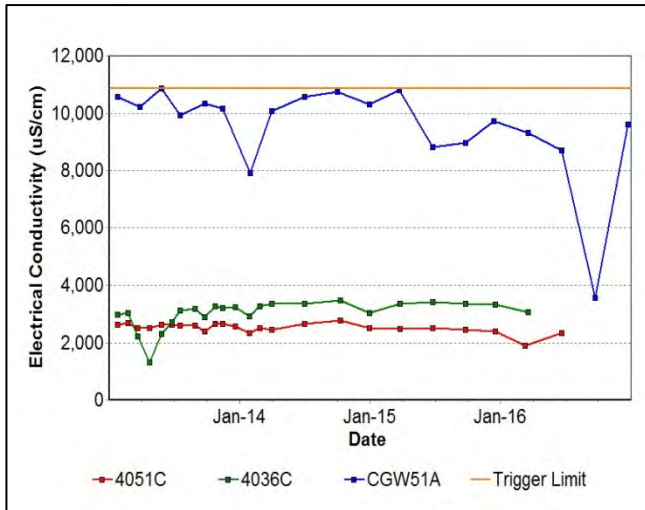
**Figure 23: Carrington Alluvium Electrical Conductivity Trend - December 2016**



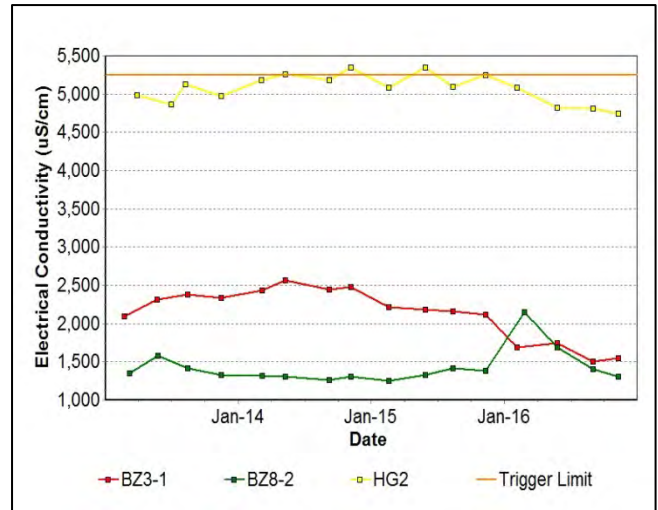
**Figure 24: Carrington Alluvium pH Trend – December 2016**



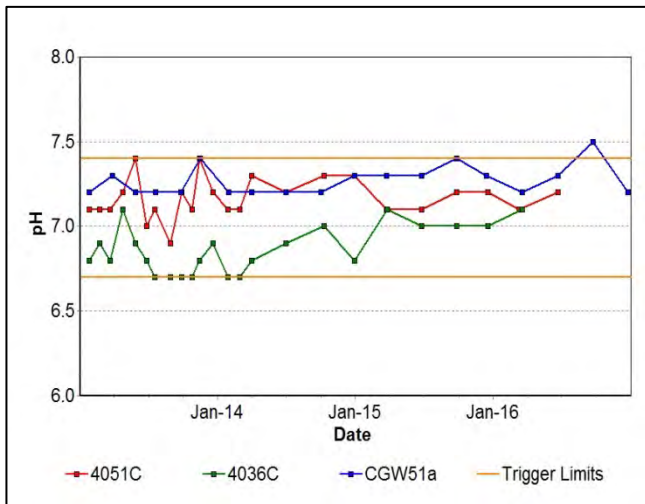
**Figure 25: Carrington Alluvium Standing Water Level - December 2016**



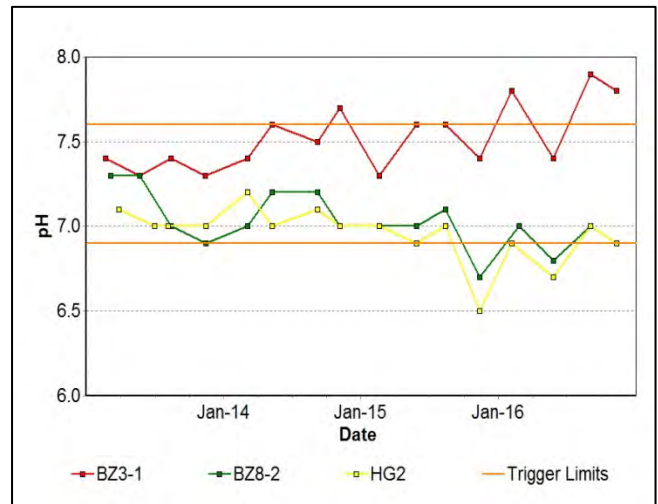
**Figure 26: Carrington Interburden Electrical Conductivity Trend - December 2016**



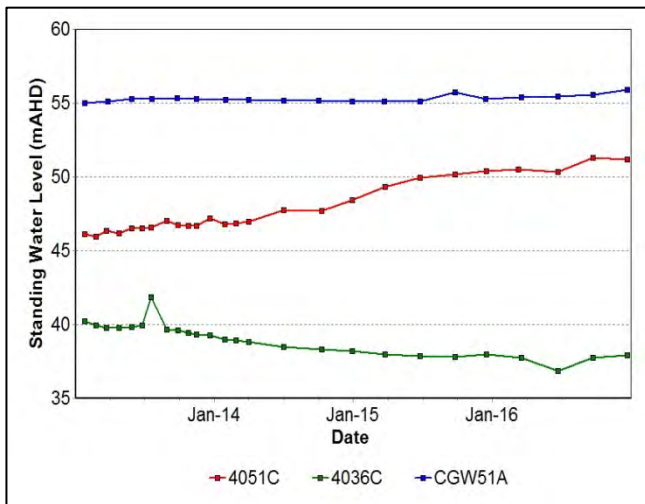
**Figure 29: Cheshunt Interburden Electrical Conductivity Trend - December 2016**



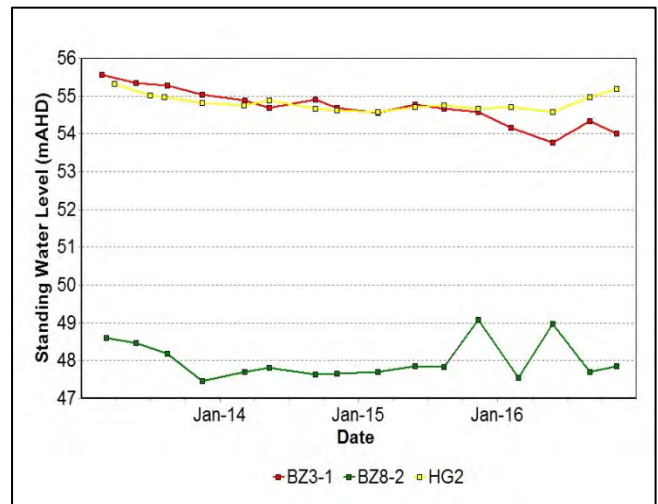
**Figure 27: Carrington Interburden pH Trend – December 2016**



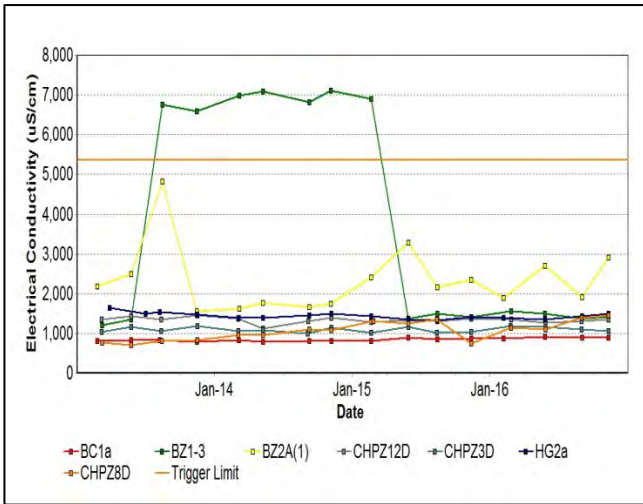
**Figure 30: Cheshunt Interburden pH Trend - December 2016**



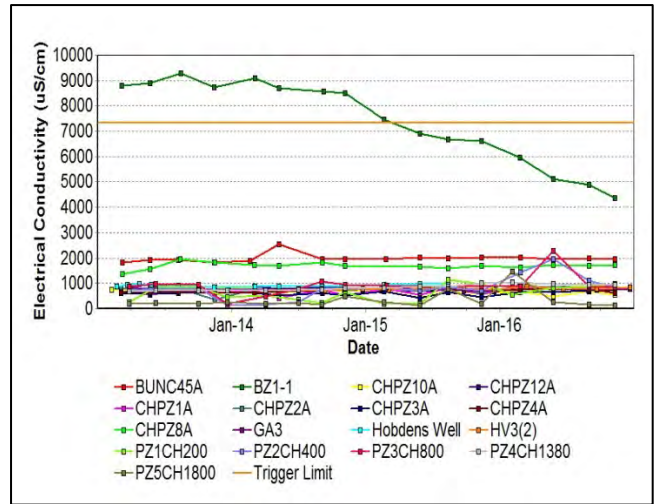
**Figure 28: Carrington Interburden Standing Water Level - December 2016**



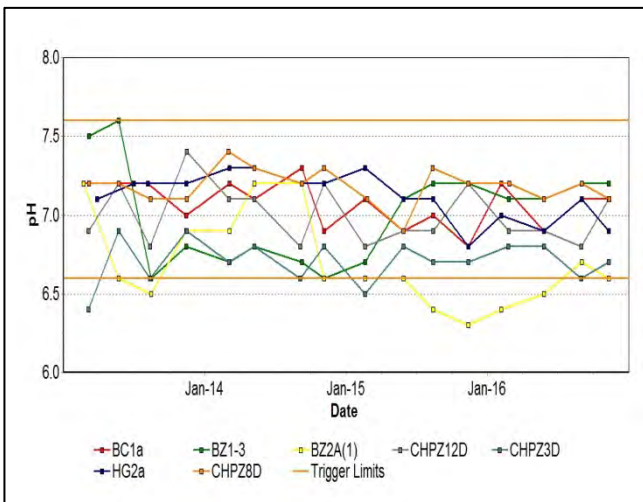
**Figure 31: Cheshunt Interburden Standing Water Level – December 2016**



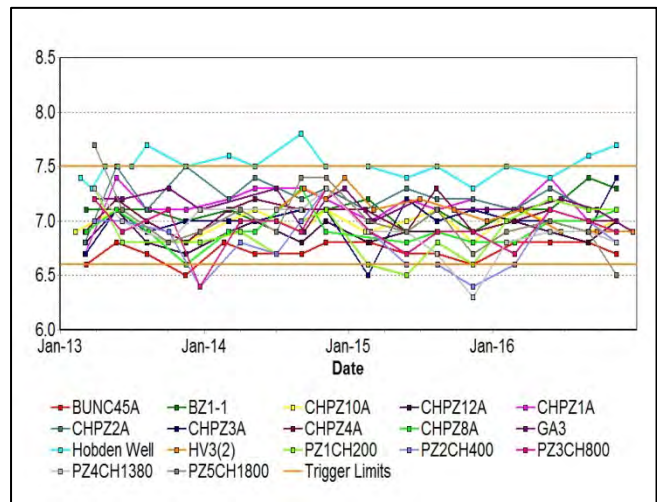
**Figure 32: Cheshunt Mt Arthur Electrical Conductivity Trend - December 2016**



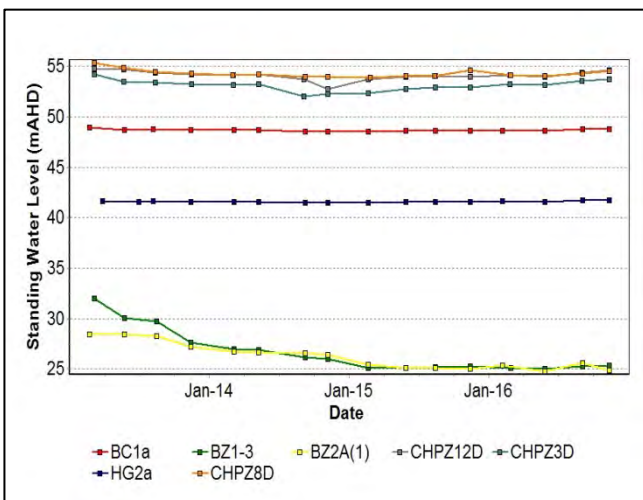
**Figure 35: Cheshunt / North Pit Alluvium Electrical Conductivity Trend - December 2016**



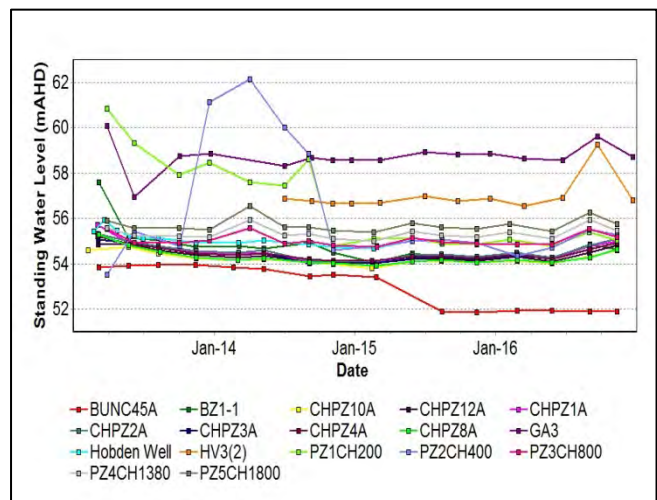
**Figure 33: Cheshunt Mt Arthur pH Trend - December 2016**



**Figure 36: Cheshunt / North Pit Alluvium pH Trend - December 2016**

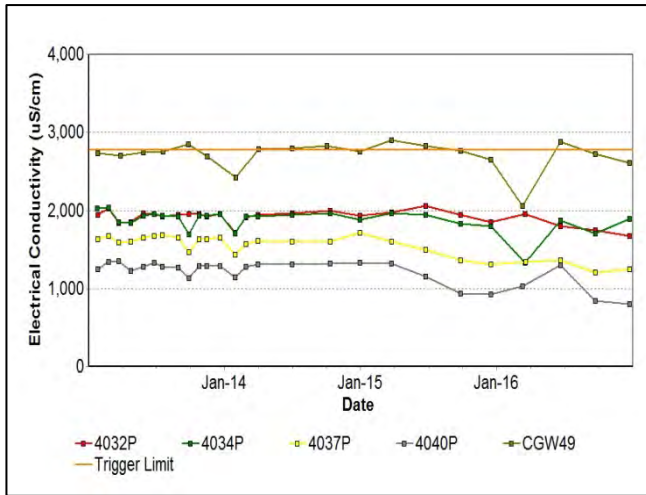


**Figure 34: Cheshunt Mt Arthur Standing Water Level – December 2016**

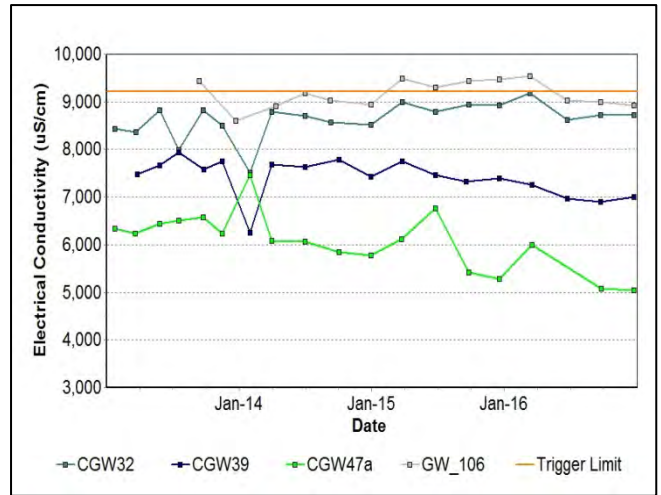


**Figure 37: Cheshunt / North Pit Alluvium Standing Water Level – December 2016**

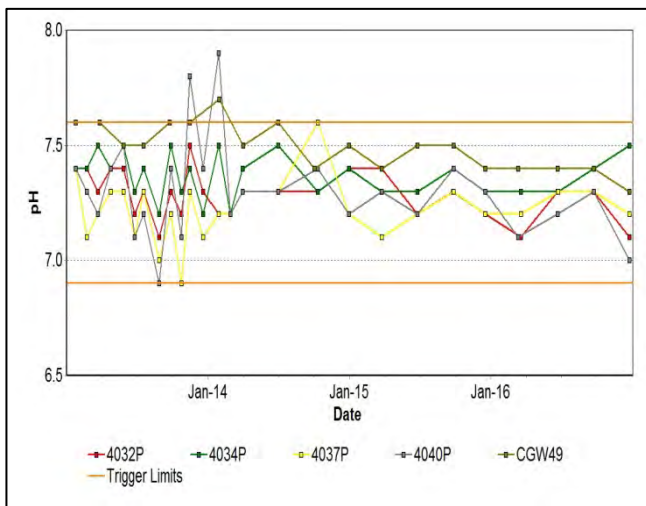




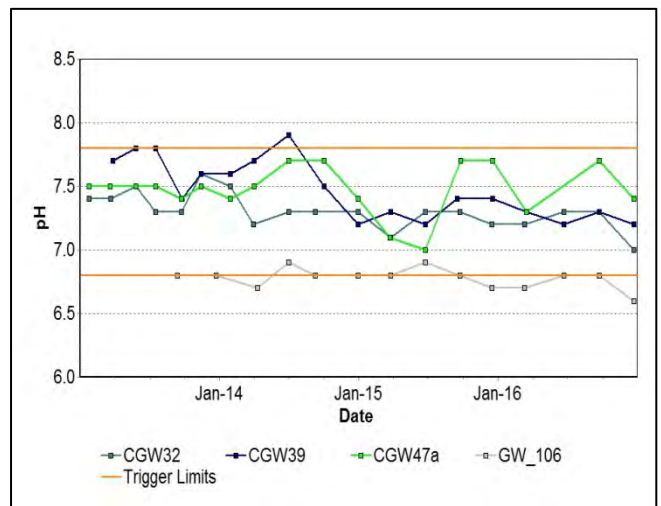
**Figure 38: Carrington West Wing Alluvium Electrical Conductivity Trend - December 2016**



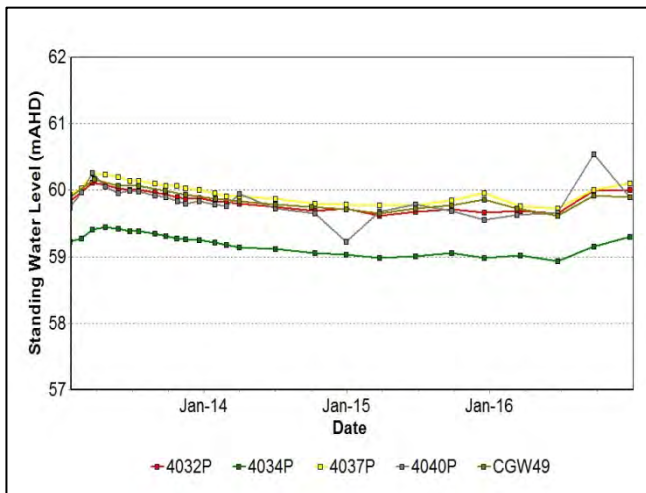
**Figure 41: Carrington West Wing Flood Plain Electrical Conductivity Trend - December 2016**



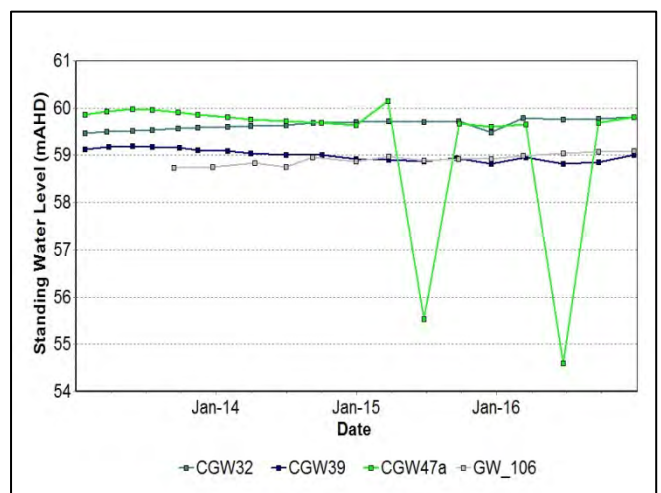
**Figure 39: Carrington West Wing Alluvium pH Trend - December 2016**



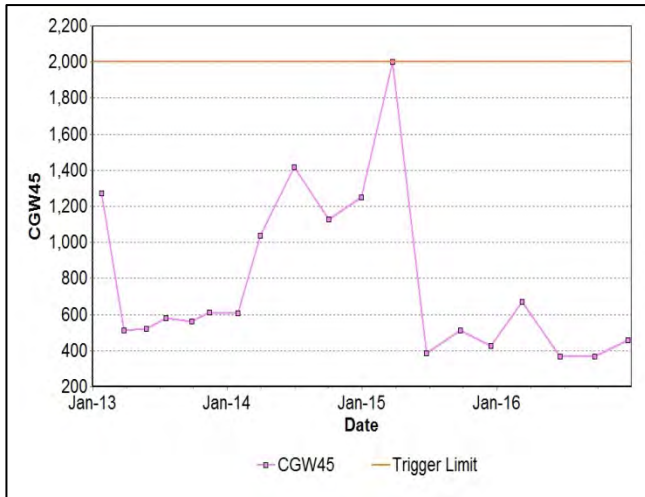
**Figure 42: Carrington West Wing Flood Plain pH Trend - December 2016**



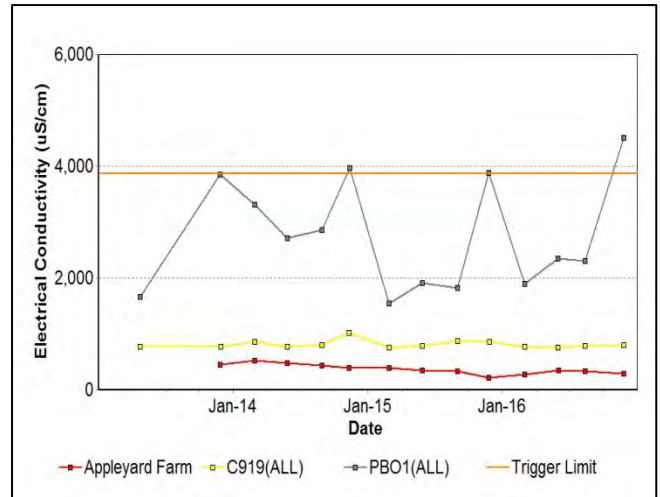
**Figure 40: Carrington West Wing Alluvium Standing Water Level – December 2016**



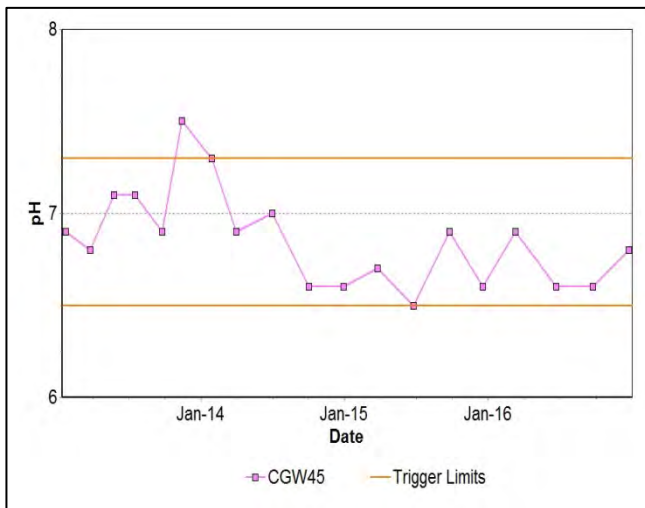
**Figure 43: Carrington West Wing Flood Plain Standing Water Level - December 2016**



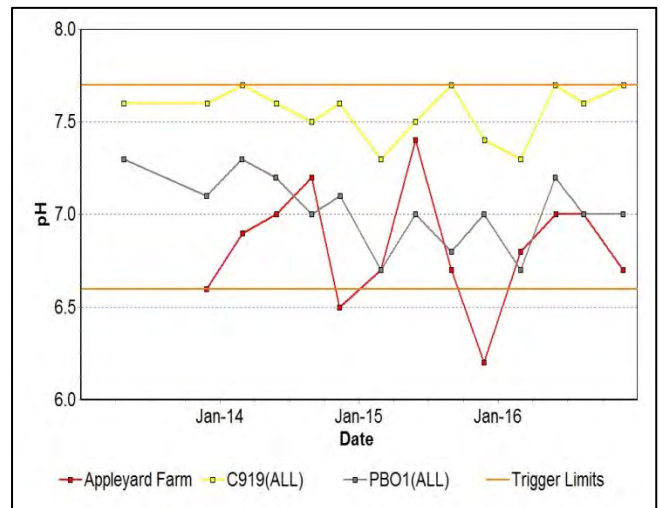
**Figure 44: Carrington West Wing LBL Electrical Conductivity Trend - December 2016**



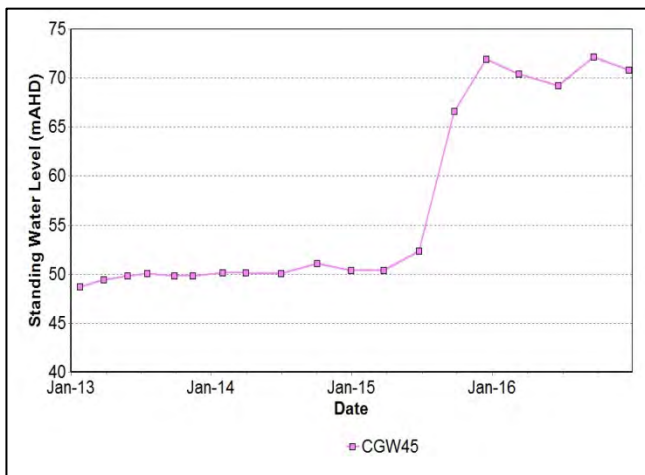
**Figure 47: Lemington South Alluvium Electrical Conductivity Trend - December 2016**



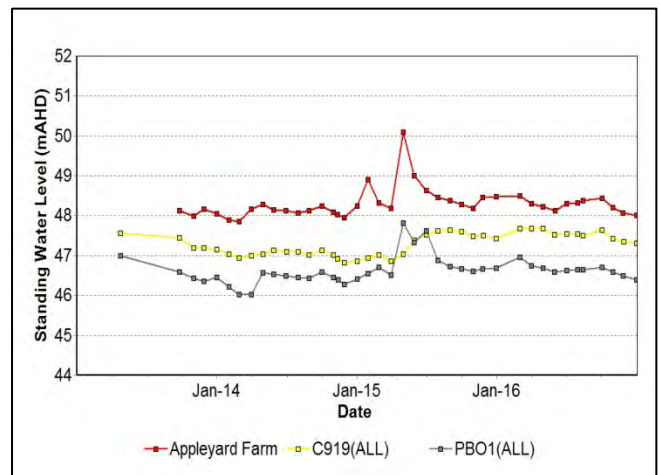
**Figure 45: Carrington West Wing LBL pH Trend - December 2016**



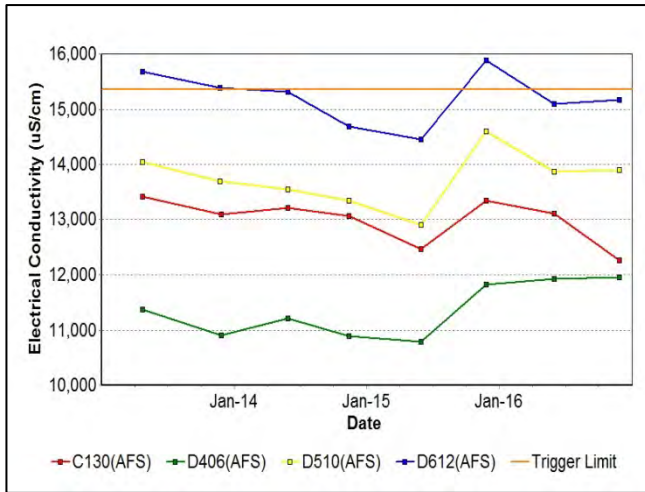
**Figure 48: Lemington South Alluvium pH Trend - December 2016**



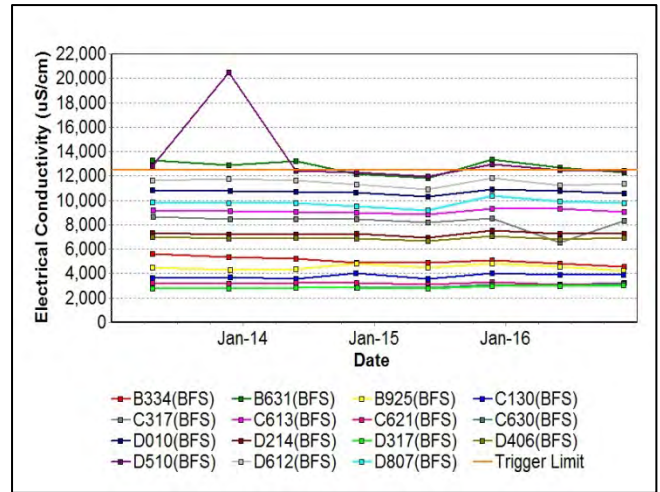
**Figure 46: Carrington West Wing LBL Standing Water Level - December 2016**



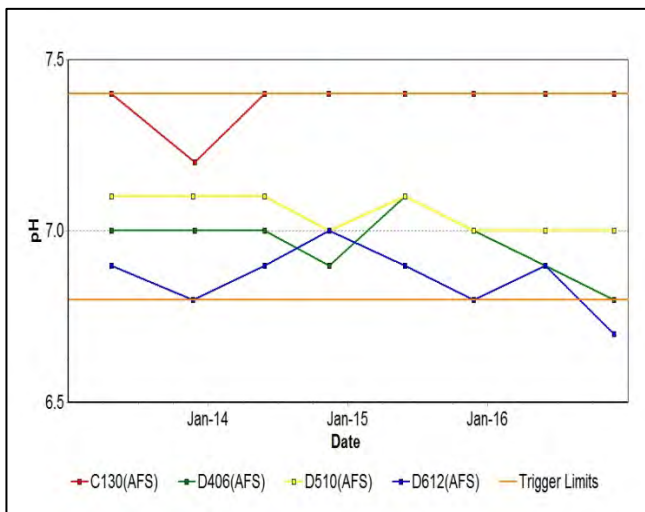
**Figure 49: Lemington South Alluvium Standing Water Level Trend - December 2016**



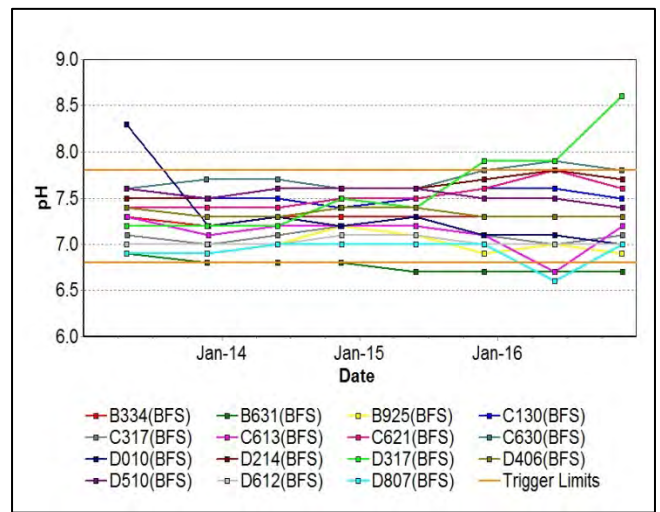
**Figure 50: Lemington South Arrowfield Electrical Conductivity Trend – December 2016**



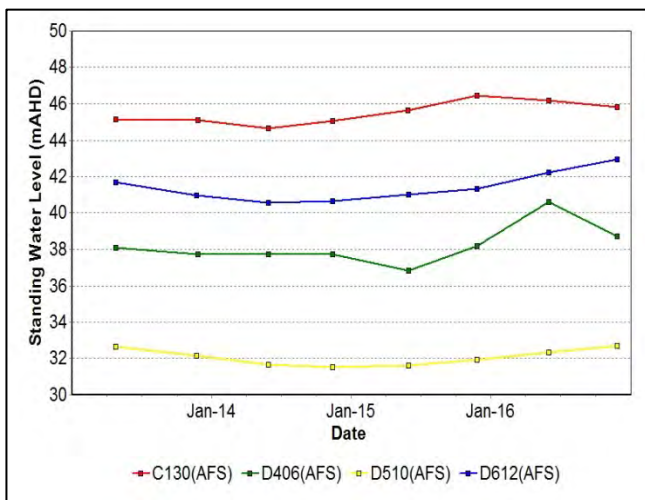
**Figure 53: Lemington South Bowfield Electrical Conductivity Trend - December 2016**



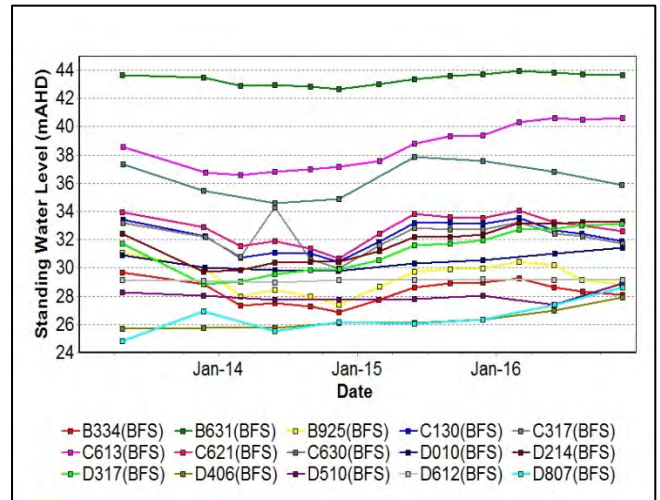
**Figure 51: Lemington South Arrowfield pH Trend – December 2016**



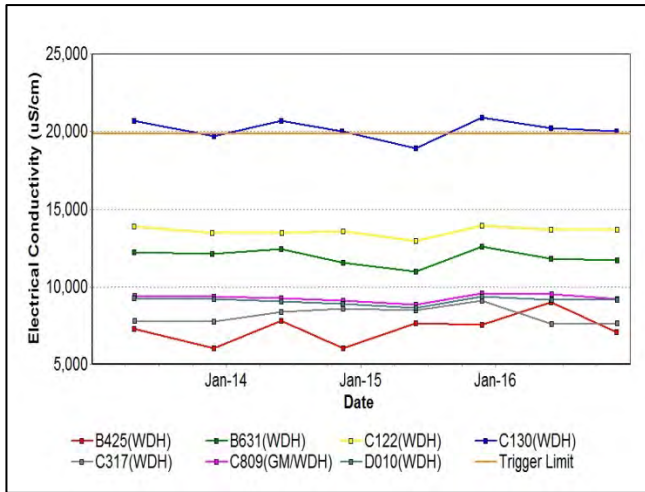
**Figure 54: Lemington South Bowfield pH Trend - December 2016**



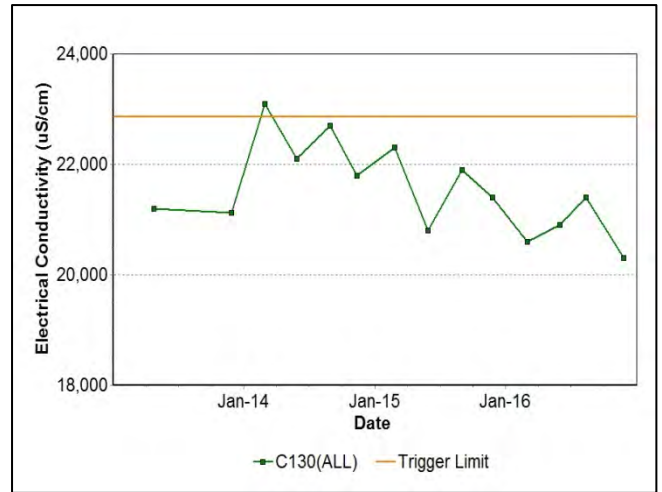
**Figure 52: Lemington South Arrowfield Standing Water Level - December 2016**



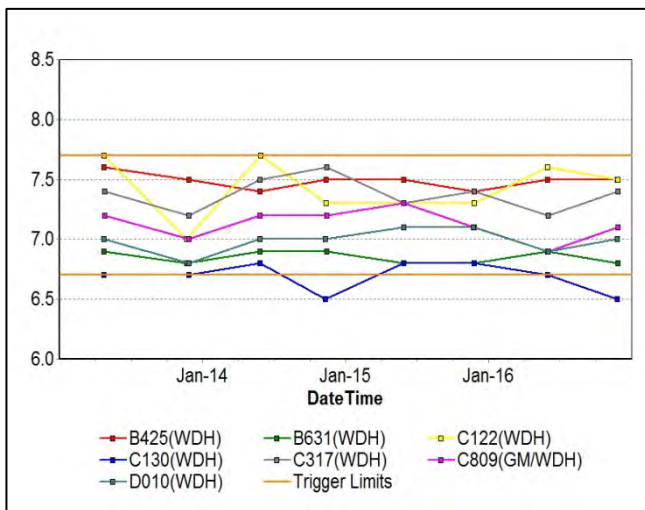
**Figure 55: Lemington South Bowfield Standing Water Level - December 2016**



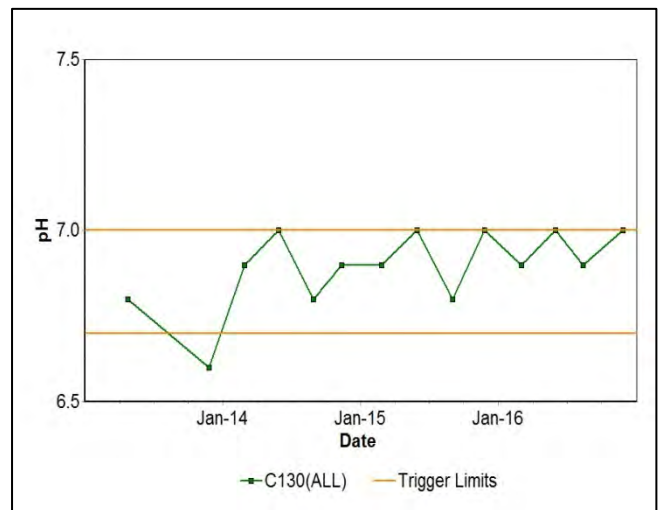
**Figure 56: Lemington South Woodlands Hill Electrical Conductivity Trend - December 2016**



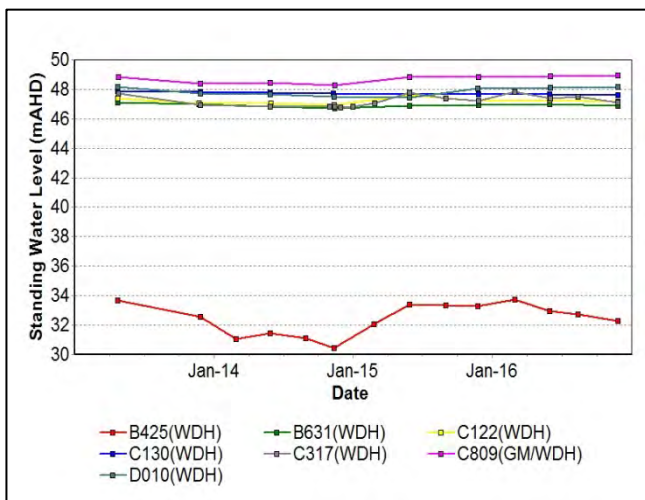
**Figure 59: Lemington South Interburden Electrical Conductivity Trend - December 2016**



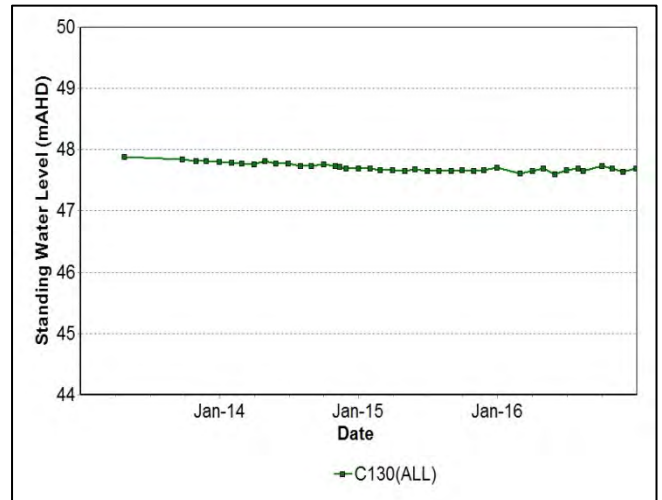
**Figure 57: Lemington South Woodlands Hill pH Trend - December 2016**



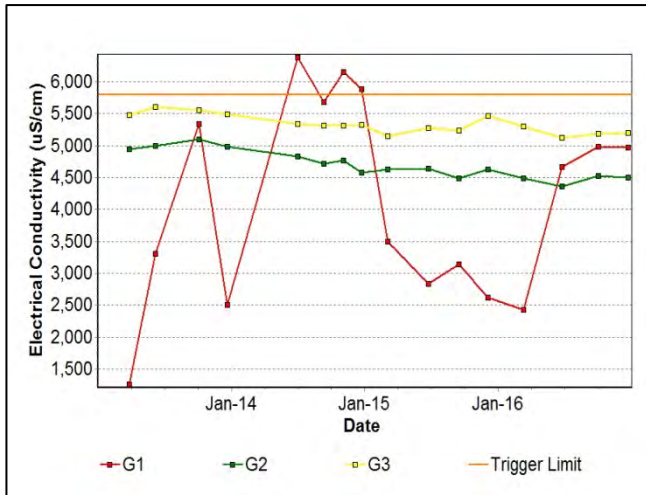
**Figure 60: Lemington South Interburden pH Trend - December 2016**



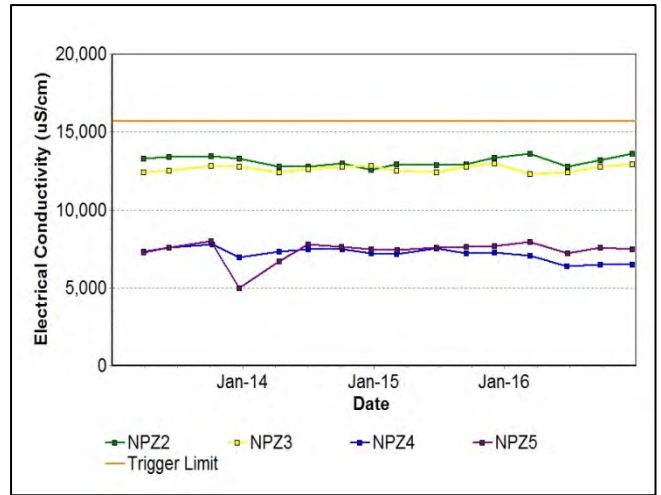
**Figure 58: Lemington South Woodlands Hill Standing Water Level - December 2016**



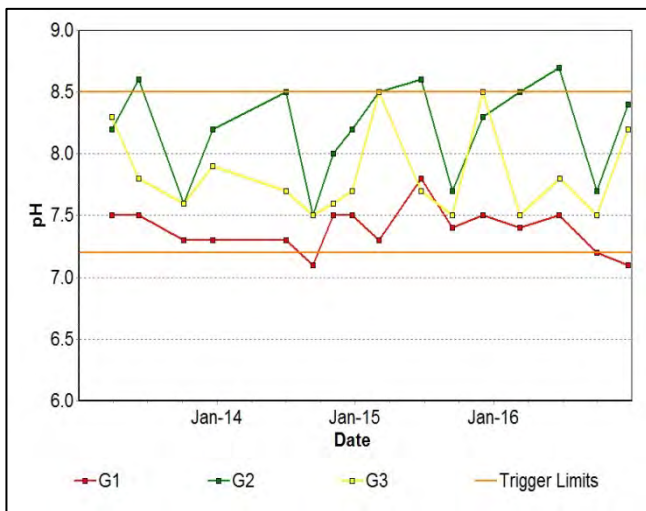
**Figure 61: Lemington South Interburden Standing Water Level - December 2016**



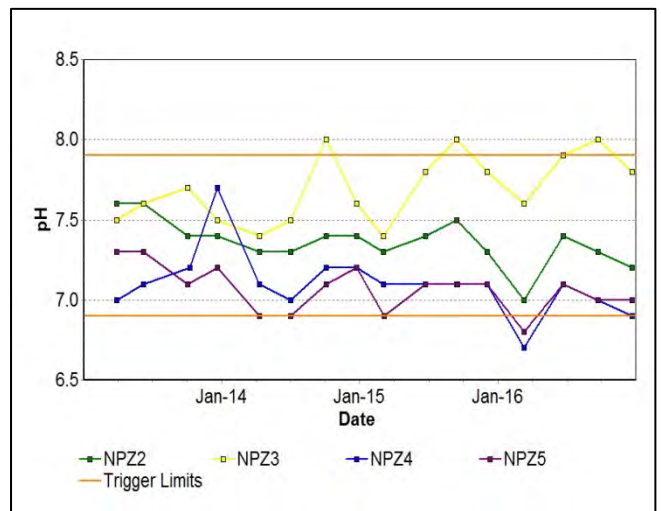
**Figure 62: West Pit Alluvium Electrical Conductivity Trend - December 2016**



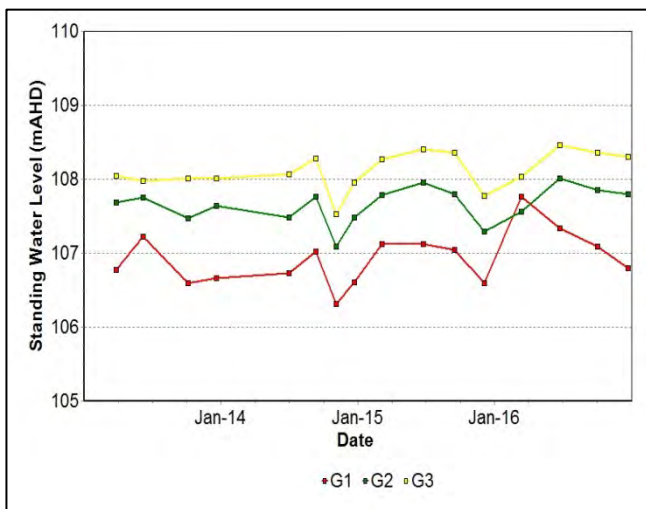
**Figure 65: West Pit Siltstone Electrical Conductivity Trend – December 2016**



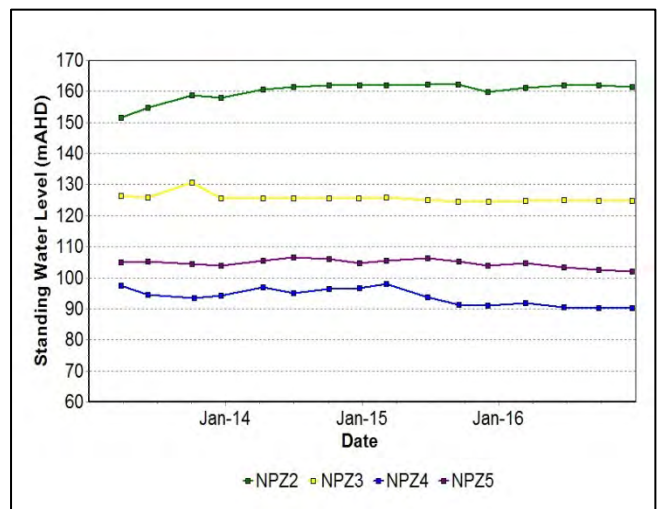
**Figure 63: West Pit Alluvium pH Trend – December 2016**



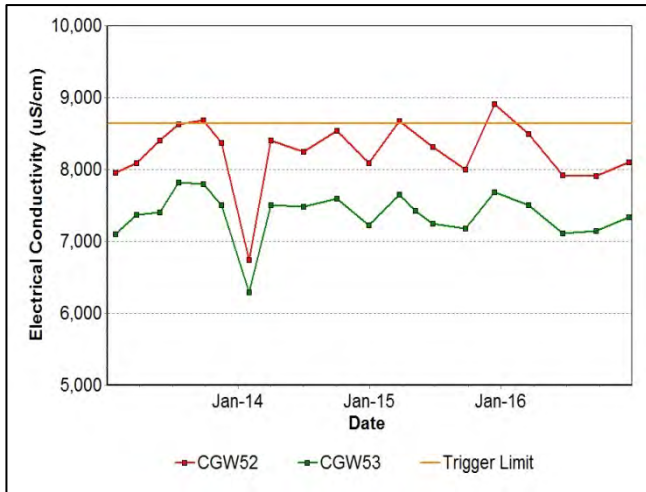
**Figure 66: West Pit Siltstone pH Trend – December 2016**



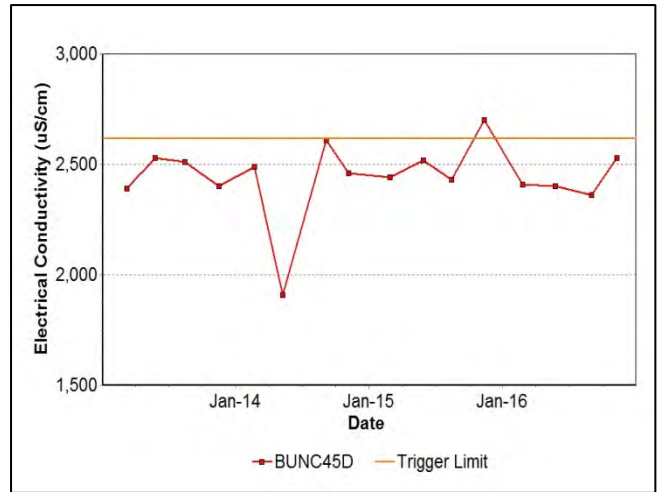
**Figure 64: West Pit Alluvium Standing Water Level - December 2016**



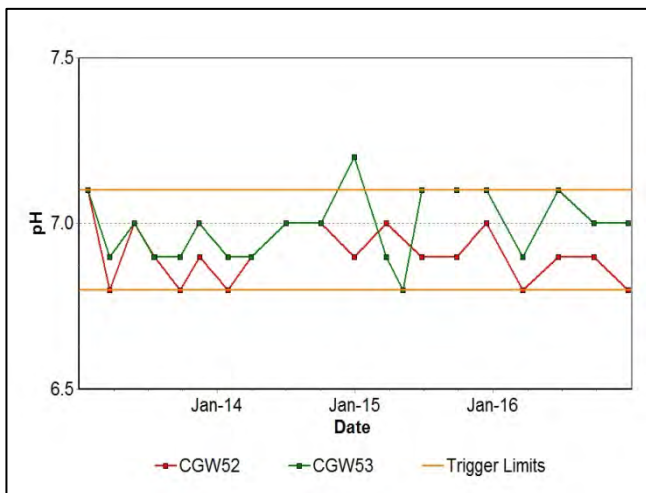
**Figure 67: West Pit Siltstone Standing Water Level – December 2016**



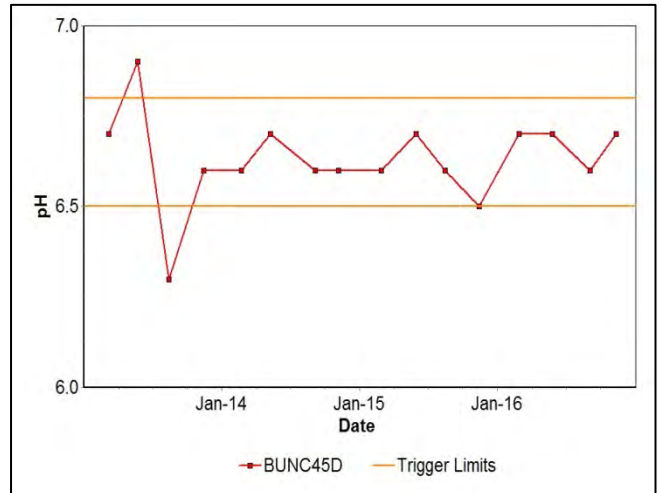
**Figure 68: Carrington Broonie Electrical Conductivity Trend - December 2016**



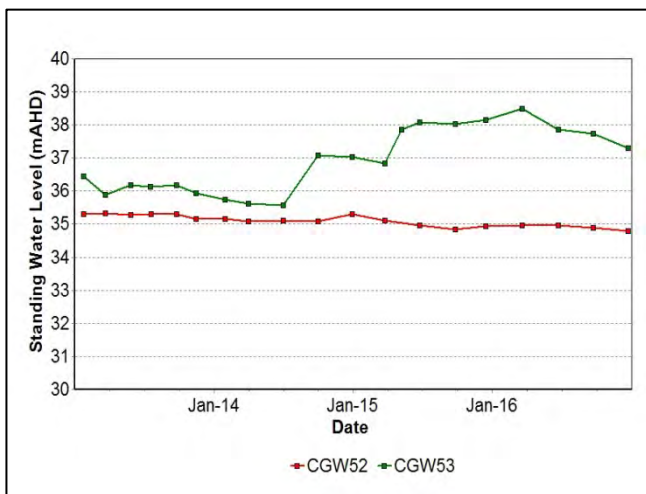
**Figure 71: Cheshunt Piercefield Electrical Conductivity Trend - December 2016**



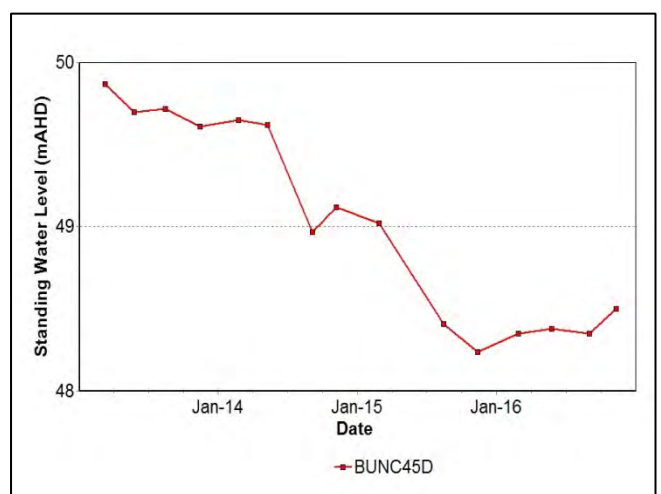
**Figure 69: Carrington Broonie pH Trend - December 2016**



**Figure 72: Cheshunt Piercefield pH Trend - December 2016**



**Figure 70: Carrington Broonie Standing Water Level - December 2016**

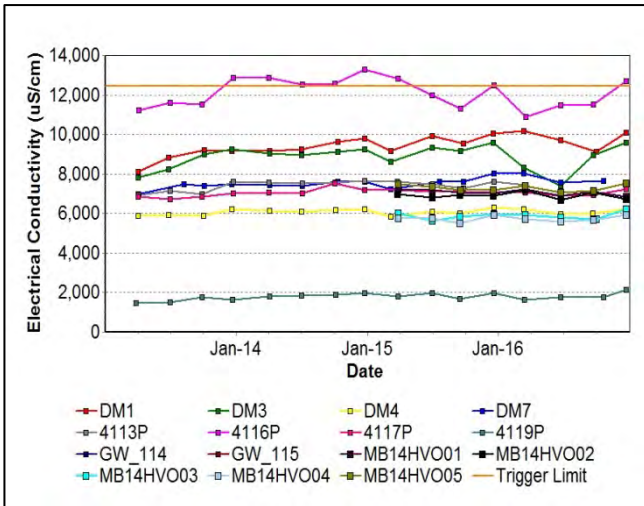


**Figure 73: Cheshunt Piercefield Standing Water Level - December 2016**

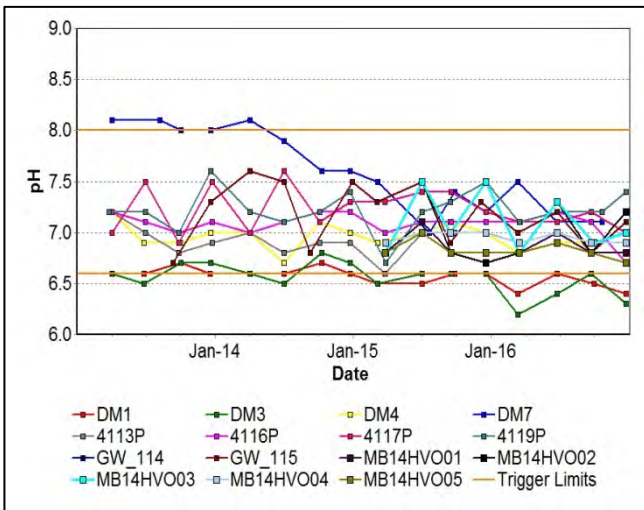
### 4.2.1 Groundwater Trigger Tracking

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. Locations of groundwater bores are shown in Figure 77.

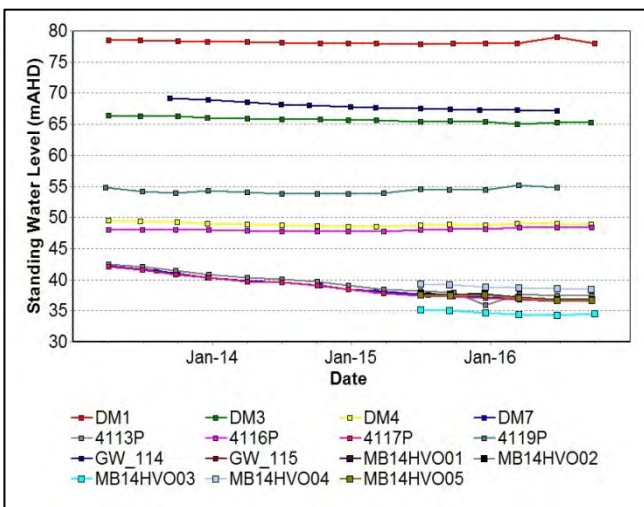
During 2016 a range of internal trigger limits were breached, these are summarised in Table 3.



**Figure 74: North Pit Spoil Electrical Conductivity Trend - December 2016**



**Figure 75: North Pit Spoil pH Trend - December 2016**



**Figure 76: North Pit Spoil Standing Water Level - December 2016**

**Table 3: Groundwater Triggers - 2016**

Site	Date	Trigger Limit Breached	Action Taken in Response
CFW55R	16/03/2016	EC – 95 <sup>th</sup> Percentile	Watching brief maintained. Investigation determined that hydro geochemical speciation has not changed and that water quality is consistent with nearby bore CFW57. This, coupled with historical data showing similar elevated EC and depressed pH, suggests the variations are natural and unlikely to be due to anthropogenic impact. Watching brief, no further action required.
CFW55R	21/06/2016	EC – 95 <sup>th</sup> Percentile	Watching brief maintained.
CFW55R	21/09/2016	EC – 95 <sup>th</sup> Percentile	Watching brief maintained.
CFW55R	22/12/2016	EC – 95 <sup>th</sup> Percentile	Watching brief maintained.
GW_106	10/03/2016	EC – 95 <sup>th</sup> Percentile	GW106 is stable and consistent with historical range. Watching brief maintained, no further action required.
B631(BFS)	30/05/2016	EC – 95 <sup>th</sup> Percentile	Watching Brief.
D510(BFS)	30/05/2016	EC – 95 <sup>th</sup> Percentile	Watching Brief.
C130(WDH)	30/05/2016	EC – 95 <sup>th</sup> Percentile	Watching Brief.
C130(WDH)	24/11/2016	EC – 95 <sup>th</sup> Percentile	Results are stable and consistent with historical trend. No further action required.
CGW49	21/06/2016	EC – 95 <sup>th</sup> Percentile	Watching Brief.
4051C	Sept/Dec	EC – 95 <sup>th</sup> Percentile	Unable to sample due to blockage. Bore will be inspected to determine repairs required.
4113P	Sept/Dec	EC – 95 <sup>th</sup> Percentile	Unable to sample due to blockage. Removal from monitoring programme has been recommended following review of nearby bores, which indicates sufficient monitoring coverage.
4116P	21/12/2016	EC – 95 <sup>th</sup> Percentile	Watching Brief.
PB01(ALL)	24/11/2016	EC – 95 <sup>th</sup> Percentile	Watching Brief.



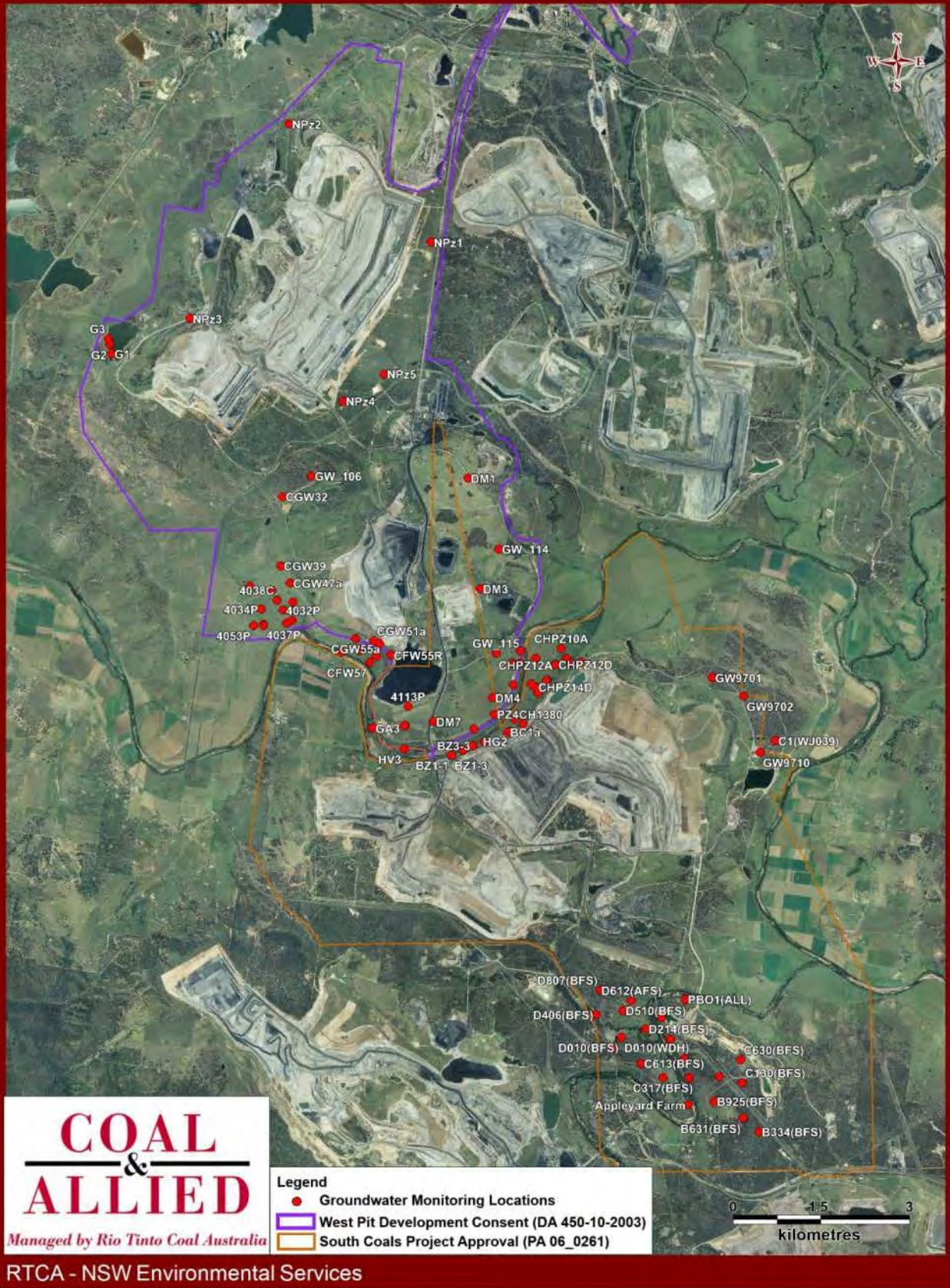
B631(BFS)	30/05/2016	PH – 5 <sup>th</sup> Percentile	Trend is stable and generally consistent with adjacent bores. Watching brief maintained.
B631(BFS)	25/11/2016	PH – 5 <sup>th</sup> Percentile	Results are stable and consistent with historical trend. No further action required.
C613(BFS)	31/05/2016	PH – 5 <sup>th</sup> Percentile	Watching Brief.
C630(BFS)	30/05/2016	PH – 95 <sup>th</sup> Percentile	Watching Brief.
D317(BFS)	30/05/2016	PH – 95 <sup>th</sup> Percentile	Watching Brief.
D317(BFS)	24/11/2016	PH – 95 <sup>th</sup> Percentile	Watching Brief.
D807(BFS)	31/05/2016	PH – 5 <sup>th</sup> Percentile	Watching Brief.
C130(WDH)	24/11/2016	PH – 5 <sup>th</sup> Percentile	Watching Brief.
D612(AFS)	25/11/2016	PH – 5 <sup>th</sup> Percentile	Watching Brief.
BZ2A(1)	05/02/2016	PH – 5 <sup>th</sup> Percentile	Watching Brief.
BZ2A(1)	26/05/2016	PH – 5 <sup>th</sup> Percentile	No adverse trend identified – historical dataset for the MTA bores show pH variable but generally steady. Water level noted to be steady. No further action – watching brief maintained.
BZ4A(2)	05/02/2016	PH – 5 <sup>th</sup> Percentile	Watching Brief.
BZ3-1	05/02/2016	PH – 95 <sup>th</sup> Percentile	Watching Brief.
BZ3-1	01/09/2016	PH – 95 <sup>th</sup> Percentile	Watching Brief.
BZ3-1	10/11/2016	PH – 95 <sup>th</sup> Percentile	Watching Brief.
BZ8-2	26/05/2016	PH – 5 <sup>th</sup> Percentile	Watching Brief.
HG2	26/05/2016	PH – 5 <sup>th</sup> Percentile	Watching Brief.
Hobden's Well	01/09/2016	PH – 95 <sup>th</sup> Percentile	Watching Brief.
Hobden's Well	10/11/2016	PH – 95 <sup>th</sup> Percentile	Watching Brief.
NPZ3	23/09/2016	PH – 95 <sup>th</sup> Percentile	Watching Brief.
NPZ4	11/03/2016	PH – 5 <sup>th</sup> Percentile	Watching Brief.

NPZ5	11/03/2016	PH – 5 <sup>th</sup> Percentile	Watching Brief.
PZ5CH1800	10/11/2016	PH – 5 <sup>th</sup> Percentile	Watching Brief.
G1	21/12/2016	PH – 5 <sup>th</sup> Percentile	Watching Brief.
G2	23/06/2016	PH – 95 <sup>th</sup> Percentile	Watching Brief.
CFW55R	16/03/2016	PH – 5 <sup>th</sup> Percentile	Watching brief maintained. Investigation determined that hydro geochemical speciation has not changed and that water quality is consistent with nearby bore CFW57. This, coupled with historical data showing similar elevated EC and depressed pH, suggests the variations are natural and unlikely to be due to anthropogenic impact. Watching brief, no further action required.
CFW55R	21/06/2016	PH – 5 <sup>th</sup> Percentile	Watching brief maintained.
CFW55R	21/09/2016	PH – 5 <sup>th</sup> Percentile	Watching brief maintained.
CFW55R	22/12/2016	PH – 5 <sup>th</sup> Percentile	Watching brief maintained.
CGW51a	22/09/2016	PH – 95 <sup>th</sup> Percentile	Watching Brief.
DM1	11/03/2016	PH – 5 <sup>th</sup> Percentile	Watching Brief.
DM1	29/09/2016	PH – 5 <sup>th</sup> Percentile	Watching Brief.
DM1	21/12/2016	PH – 5 <sup>th</sup> Percentile	Watching Brief.
DM3	11/03/2016	PH – 5 <sup>th</sup> Percentile	Watching Brief.
DM3	22/06/2016	PH – 5 <sup>th</sup> Percentile	Watching Brief.
DM3	21/12/2016	PH – 5 <sup>th</sup> Percentile	Watching Brief.
GW_114	11/03/2016	PH – 5 <sup>th</sup> Percentile	Watching Brief.
GW 106	10/03/2016	PH – 5 <sup>th</sup> Percentile	Watching Brief.

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

**Hunter Valley Operations  
Groundwater Monitoring Locations**

Date: 141027  
Plan By: DS  
Version: 1.1



**Figure 77: Groundwater Monitoring Location Plan**

## 5.0 BLASTING

### 5.1.1 Blast Monitoring

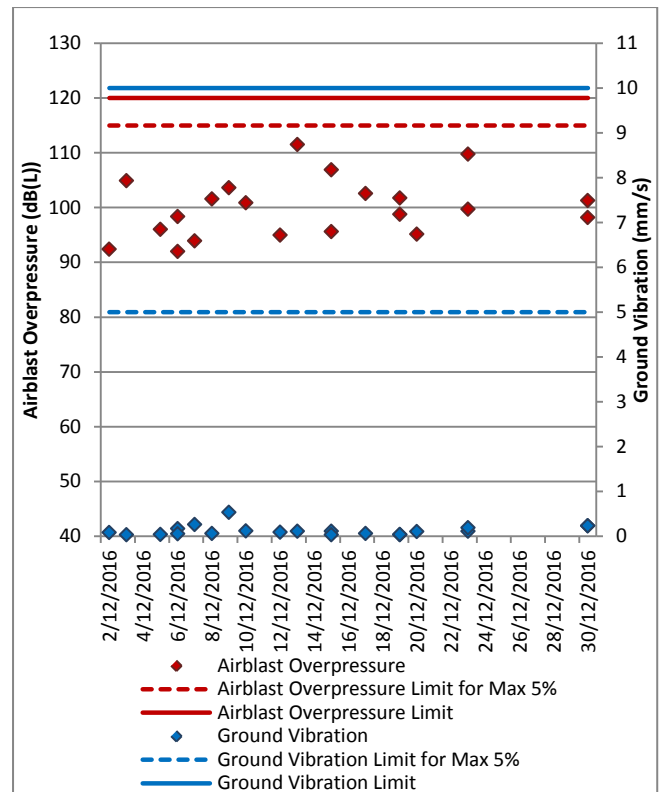
HVO have a network of five blast monitoring units. These are located at nearby privately owned residences and function as regulatory compliance monitors. The location of these monitors can be found in Figure 83.

During December, 21 blasts were initiated at HVO. Figure 78 through to Figure 82 show the blast monitoring results for the reporting period against the impact assessment criteria. The criteria are summarised in Table 4.

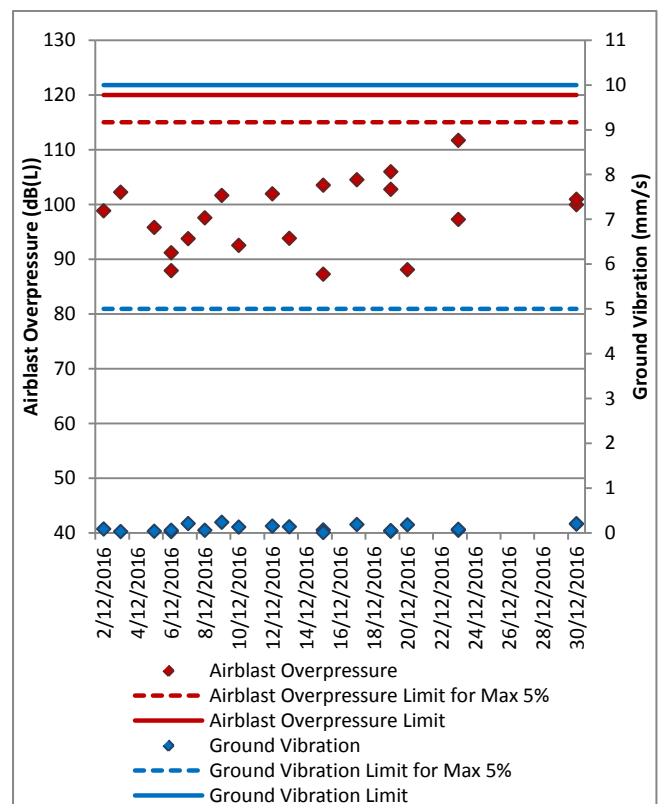
**Table 4: Blasting Limits**

Airblast Overpressure (dB(L))	Comments
115	5% of the total number of blasts in a 12 month period
120	0%
Ground Vibration (mm/s)	Comments
5	5% of the total number of blasts in a 12 month period
10	0%

During the reporting period there were no exceedances of the airblast overpressure or ground vibration criteria.



**Figure 78: Moses Crossing Blast Monitoring Results – December 2016**



**Figure 79: Jerrys Plains Blast Monitoring Results – December 2016**

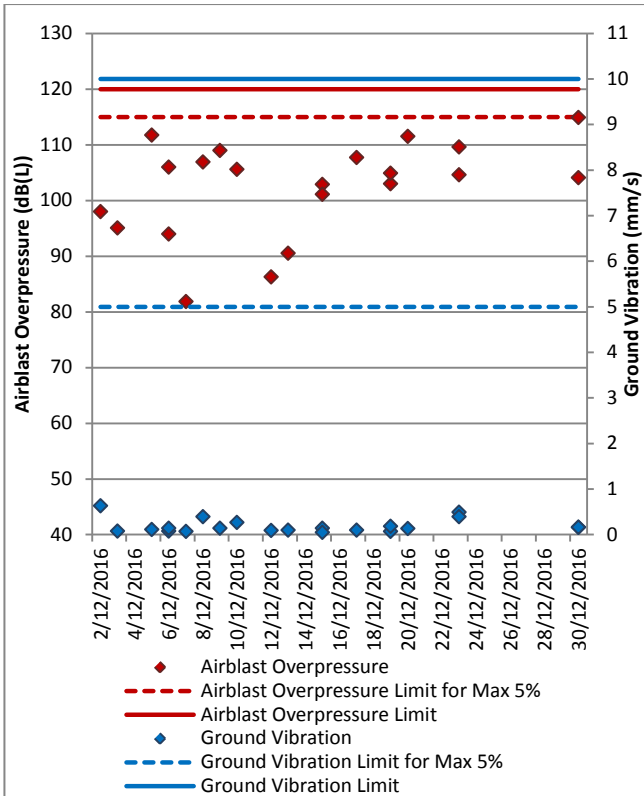


Figure 80: Maison Dieu Blast Monitoring Results – December 2016

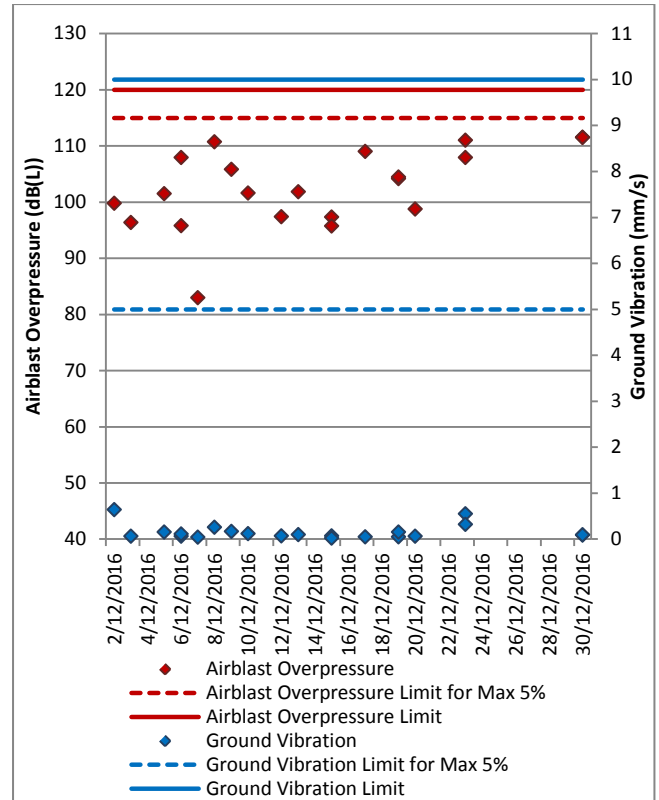


Figure 82: Knodlers Lane Blast Monitoring Results – December 2016

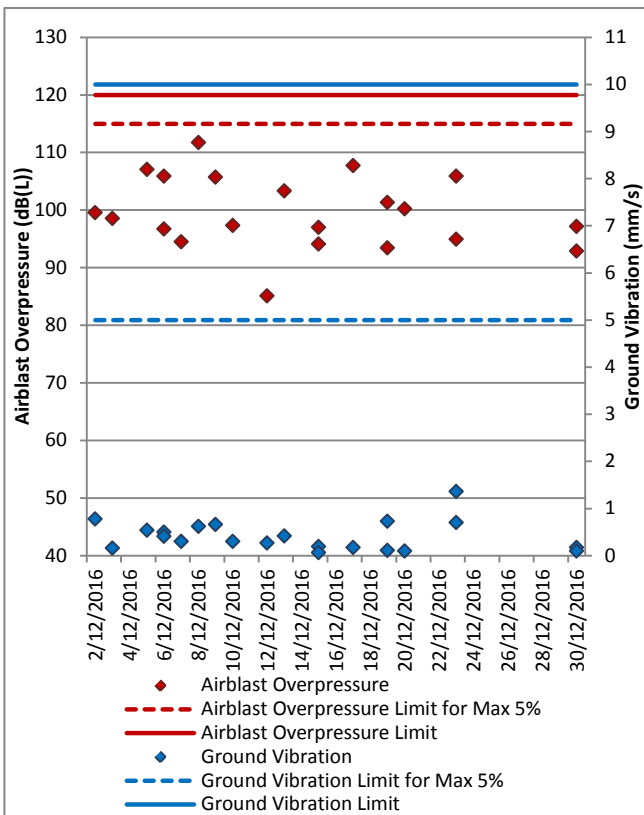


Figure 81: Warkworth Blast Monitoring Results – December 2016

**Hunter Valley Operations  
Blast Monitoring Locations**

Date: 130917  
Plan By: DS  
Version: 1.0



RTCA - NSW Environmental Services

**Figure 83: Blast Monitoring Location Plan**

## 6.0 NOISE

Routine attended noise monitoring is carried out at defined locations around HVO as described in the HVO Noise Monitoring Programme. The purpose of the noise surveys is to quantify and describe the acoustic environment around the site and compare results with specified limits. Unattended monitoring (real time noise monitoring) also occurs at five sites surrounding HVO. The attended noise monitoring locations are displayed in Figure 84.

### 6.1 Attended Noise Monitoring Results

Attended monitoring was conducted at receiver locations surrounding HVO on the nights of 1<sup>st</sup> and 20<sup>th</sup> of December 2016. Monitoring results are detailed in Table 5 to Table 10.

**Table 5: L<sub>Aeq</sub>, 15 minute HVO South - Impact Assessment Criteria – December 2016**

Location	Date and Time	Wind Speed (m/s) <sup>5</sup>	VTG <sup>5</sup>	Criterion dB	Criterion Applies? <sup>1,6</sup>	HVO South L <sub>Aeq</sub> dB <sup>2,4</sup>	Exceedance <sup>3</sup>
Knodlers Lane	1/12/2016 21:02	2.1	3	37	No	<30	NA
Maison Dieu	1/12/2016 21:26	2.2	3	37	No	IA	NA
Shearers Lane	1/12/2016 21:53	1.9	3	41	No	NM	NA
Kilburnie South	1/12/2016 22:47	0.4	3	36	No	32	NA
Jerrys Plains Village	1/12/2016 21:45	2.2	0.5	35	Yes	IA	Nil
Jerrys Plains East	1/12/2016 21:13	2.1	0.5	35	Yes	IA	Nil
Long Point Road	20/12/2016 21:04	3.9	-1	35	No	IA	NA
HVGC	1/12/2016 22:56	1.4	0.5	55	Yes	NM	Nil

**Table 6: L<sub>Aeq</sub>, 15 minute HVO South - Land Acquisition Criteria – December 2016**

Location	Date and Time	Wind Speed (m/s) <sup>5</sup>	VTG <sup>5</sup>	Criterion dB	Criterion Applies? <sup>1,6</sup>	HVO South L <sub>Aeq</sub> dB <sup>2,4</sup>	Exceedance <sup>3</sup>
Knodlers Lane	1/12/2016 21:02	2.1	3	41	No	<30	NA
Maison Dieu	1/12/2016 21:26	2.2	3	41	No	IA	NA
Shearers Lane	1/12/2016 21:53	1.9	3	41	No	NM	NA
Kilburnie South	1/12/2016 22:47	0.4	3	41	No	32	NA
Jerrys Plains Village	1/12/2016 21:45	2.2	0.5	40	Yes	IA	Nil
Jerrys Plains East	1/12/2016 21:13	2.1	0.5	40	Yes	IA	Nil
Long Point Road	20/12/2016 21:04	3.9	-1	40	No	IA	NA
HVGC	1/12/2016 22:56	1.4	0.5	NA	Yes	NM	NA

**Table 7: L<sub>A1, 1minute</sub> HVO South – Sleep Disturbance Criteria – December 2016**

Location	Date and Time	Wind Speed (m/s) <sup>5</sup>	VTG <sup>5</sup>	Criterion dB	Criterion Applies? <sup>1,6</sup>	HVO South L <sub>A1, 1min</sub> dB <sup>2,4</sup>	Exceedance <sup>3</sup>
Knodlers Lane	1/12/2016 21:02	2.1	3	45	No	<30	NA
Maison Dieu	1/12/2016 21:26	2.2	3	45	No	IA	NA
Shearers Lane	1/12/2016 21:53	1.9	3	45	No	NM	NA
Kilburnie South	1/12/2016 22:47	0.4	3	45	No	38	NA
Jerrys Plains Village	1/12/2016 21:45	2.2	0.5	45	Yes	IA	Nil
Jerrys Plains East	1/12/2016 21:13	2.1	0.5	45	Yes	IA	Nil
Long Point Road	20/12/2016 21:04	3.9	-1	45	No	IA	NA
HVGC	1/12/2016 22:56	1.4	0.5	NA	Yes	NM	NA

**Notes**

1. Noise emission limits apply for winds up to 3 metres per second (at a height of 10m), or vertical temperature gradients of up to 3 degrees/100m and wind speeds of up to 2 m/s (at a height of 10m);

2. Estimated or measured L<sub>Aeq, 15minute</sub> dB attributed to HVO South Pit Area;

3. NA in exceedance column means atmospheric conditions outside specified in approval and so criterion is not applicable;

4. Bolded results in red indicate exceedance of criteria;

5. Atmospheric data is sourced from the HVO Corporate weather station using logged met data; and

6. Criterion may or may not apply due to rounding of meteorological data values

**Table 8: L<sub>Aeq, 15minute</sub> HVO North – Impact Assessment Criteria – December 2016**

Location	Date and Time	Wind Speed (m/s) <sup>5</sup>	VTG <sup>5</sup>	Criterion dB	Criterion Applies? <sup>1,6</sup>	HVO North L <sub>Aeq</sub> dB <sup>2,4</sup>	Exceedance <sup>3</sup>
Knodlers Lane	1/12/2016 21:02	2.1	3	35	Yes	IA	Nil
Maison Dieu	1/12/2016 21:26	2.2	3	35	Yes	NM	Nil
Shearers Lane	1/12/2016 21:53	1.9	3	35	Yes	NM	Nil
Kilburnie South	1/12/2016 22:47	0.4	3	39	Yes	37	Nil
Jerrys Plains Village	1/12/2016 21:45	2.2	0.5	36	Yes	36	Nil
Jerrys Plains East	1/12/2016 21:13	2.1	0.5	39	Yes	35	Nil
Long Point Road	20/12/2016 21:04	3.9	-1	35	No	IA	NA
HVGC	1/12/2016 22:56	1.4	0.5	NA	Yes	IA	NA

**Table 9: L<sub>Aeq, 15minute</sub> HVO North - Land Acquisition Criteria – December 2016**

Location	Date and Time	Wind Speed (m/s) <sup>5</sup>	VTG <sup>5</sup>	Criterion dB	Criterion Applies? <sup>1,6</sup>	HVO North L <sub>Aeq</sub> dB <sup>2,4</sup>	Exceedance <sup>3</sup>
Knodlers Lane	1/12/2016 21:02	2.1	3	41	Yes	IA	Nil
Maison Dieu	1/12/2016 21:26	2.2	3	41	Yes	NM	Nil
Shearers Lane	1/12/2016 21:53	1.9	3	41	Yes	NM	Nil
Kilburnie South	1/12/2016 22:47	0.4	3	41	Yes	37	Nil
Jerrys Plains Village	1/12/2016 21:45	2.2	0.5	41	Yes	36	Nil
Jerrys Plains East	1/12/2016 21:13	2.1	0.5	41	Yes	35	Nil



Long Point Road	20/12/2016 21:04	3.9	-1	41	No	IA	NA
HVGC	1/12/2016 22:56	1.4	0.5	NA	Yes	IA	NA

**Table 10: LA<sub>I</sub>, 1Minute HVO North – Sleep Disturbance Criteria – December 2016**

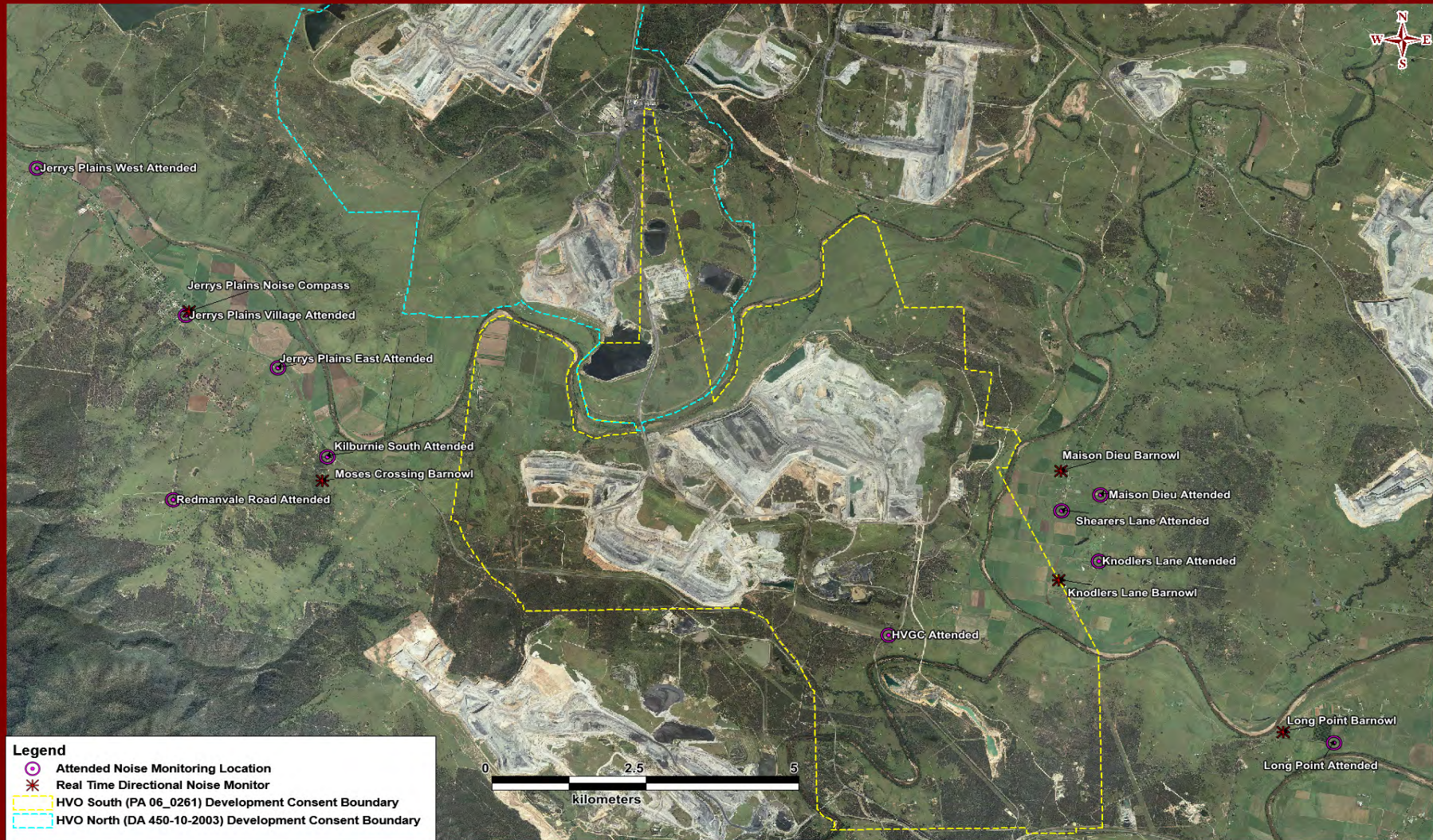
Location	Date and Time	Wind Speed (m/s) <sup>5</sup>	VTG <sup>5</sup>	Criterion dB	Criterion Applies? <sup>1,6</sup>	HVO North LA <sub>I</sub> , 1min dB <sup>2,4</sup>	Exceedance <sup>3</sup>
Knodlers Lane	1/12/2016 21:02	2.1	3	46	Yes	IA	Nil
Maison Dieu	1/12/2016 21:26	2.2	3	46	Yes	NM	Nil
Shearers Lane	1/12/2016 21:53	1.9	3	46	Yes	NM	Nil
Kilburnie South	1/12/2016 22:47	0.4	3	46	Yes	41	Nil
Jerrys Plains Village	1/12/2016 21:45	2.2	0.5	46	Yes	41	Nil
Jerrys Plains East	1/12/2016 21:13	2.1	0.5	46	Yes	39	Nil
Long Point Road	20/12/2016 21:04	3.9	-1	46	No	IA	NA
HVGC	1/12/2016 22:56	1.4	0.5	NA	Yes	IA	NA

Notes

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

# Hunter Valley Operations Noise Monitoring Locations

Date: 161027  
Plan By: DF  
Version: 2.0



RTCA - NSW Environmental Services

Figure 84: Noise Monitoring Location Plan

## 6.2 Real Time Noise Monitoring

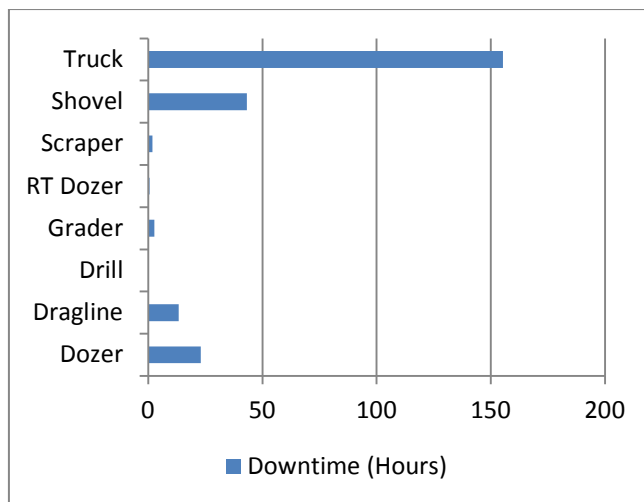
HVO utilises a network of real-time directional noise monitors to manage noise impacts on a continuous basis. Noise alarms are in place at five monitoring locations (Knodlers Lane, Maison Dieu, Jerrys Plains, Moses Crossing, and Long Point), which alert HVO staff to elevated noise levels likely to be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

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

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

## 7.0 OPERATIONAL DOWNTIME

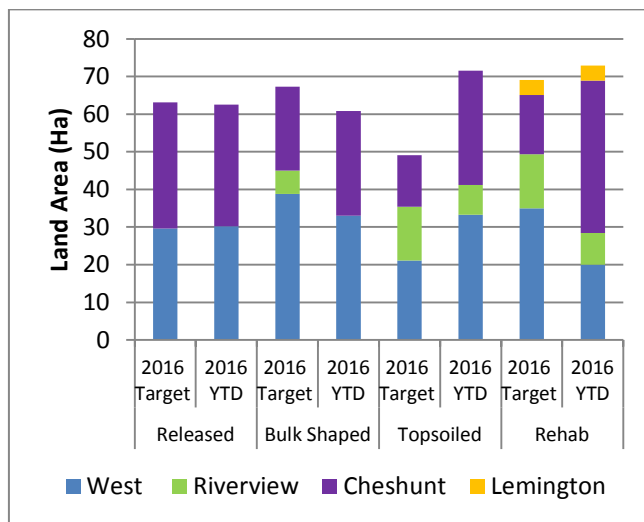
During December, a total of 240.3 hours of equipment downtime was logged in response to real time monitoring and visual inspections for environmental reasons such as dust, noise and meteorological conditions. Operational downtime by equipment type is shown in Figure 85.



**Figure 85: Operational Downtime by Equipment Type –December 2016**

## 8.0 REHABILITATION

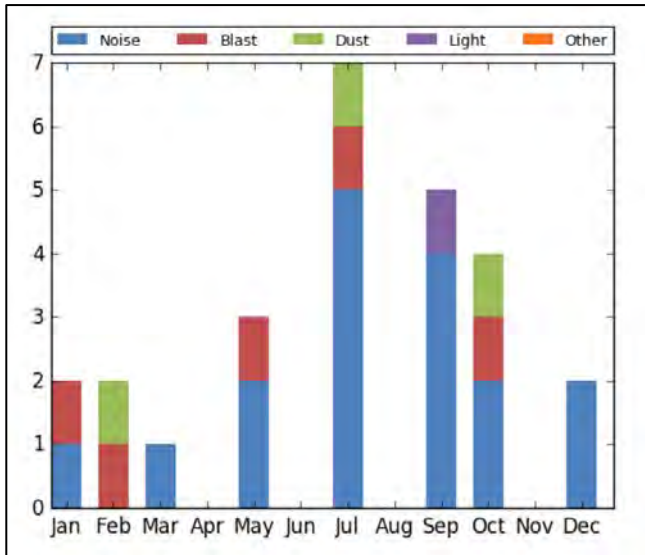
During December, 4.6Ha of land was released, 2.5Ha of land was bulk shaped, 9.9Ha of land was composted and 13.0Ha of land was rehabilitated. Year to date progress can be viewed in Figure 86.



**Figure 86: Rehabilitation YTD – December 2016**

## 9.0 COMPLAINTS

Five complaints were received during the reporting period. Details of this complaint are shown in Figure 87 below.



**Figure 87: Complaints Graph – December 2016**

## **10.0 ENVIRONMENTAL INCIDENTS**

During the reporting period there were no reportable environmental incidents.

## **Appendix A: Meteorological Data**

**Table 11: Meteorological Data - HVO Corporate Meteorological Station – December 2016**

<b>Date</b>	<b>Air Temperature Maximum (°C)</b>	<b>Air Temperature Minimum (°C)</b>	<b>Relative Humidity Maximum (%)</b>	<b>Relative Humidity Minimum (%)</b>	<b>Solar Radiation Maximum (W/Sq. M)</b>	<b>Wind Direction Average (°)</b>	<b>Wind Speed Average (m/sec)</b>	<b>Rainfall(mm)</b>
1/12/2016	33.2	14.6	89.0	14.4	1174	217.8	2.4	0.0
2/12/2016	37.7	17.5	78.1	11.4	1295	257.6	3.0	0.0
3/12/2016	31.0	16.6	88.9	22.7	1385	124.8	3.6	0.0
4/12/2016	34.7	16.8	88.6	26.1	1179	118.9	2.2	0.0
5/12/2016	39.5	18.9	94.6	17.6	1241	173.2	2.4	3.4
6/12/2016	32.0	18.6	100.0	37.5	1420	127.3	2.1	19.8
7/12/2016	26.9	16.8	100.0	46.1	1427	104.3	2.1	7.2
8/12/2016	34.6	15.7	100.0	34.1	1327	215.5	3.2	0.0
9/12/2016	26.4	14.8	85.3	14.9	1158	255.7	4.9	0.0
10/12/2016	28.4	12.2	88.9	21.1	1225	124.8	2.5	0.0
11/12/2016	31.9	14.3	87.9	25.1	1123	157.9	2.3	0.2
12/12/2016	33.0	16.2	91.1	25.5	1108	152.9	1.6	0.0
13/12/2016	36.7	19.8	55.6	15.4	1171	293.1	3.9	0.0
14/12/2016	37.2	21.3	59.6	11.5	1285	257.2	4.3	0.0
15/12/2016	24.2	14.6	100.0	56.4	299	116.5	3.2	13.6
16/12/2016	21.5	15.4	100.0	84.0	1383	146.7	1.4	27.4
17/12/2016	32.0	19.0	100.0	27.7	1434	271.0	3.8	0.0
18/12/2016	26.0	14.0	83.3	27.6	1531	117.2	4.1	0.0
19/12/2016	26.7	12.4	88.1	35.4	1278	121.4	3.1	0.0
20/12/2016	33.3	11.8	84.8	27.9	1330	272.8	3.4	0.0
21/12/2016	35.2	16.9	78.2	12.9	1117	219.2	4.6	0.0
22/12/2016	26.4	16.0	85.8	46.5	1454	119.7	3.9	0.0
23/12/2016	30.5	14.1	85.9	34.8	1199	126.8	2.7	0.0
24/12/2016	33.1	15.1	100.0	27.7	1410	203.0	2.2	8.6
25/12/2016	31.5	16.3	100.0	28.5	1423	134.1	1.7	0.2
26/12/2016	35.0	15.1	95.5	18.0	1133	192.7	1.9	0.0
27/12/2016	36.3	18.4	81.7	21.6	1171	175.6	2.5	0.0
28/12/2016	36.0	18.1	89.0	17.5	1144	174.7	1.8	0.0
29/12/2016	38.8	22.5	69.5	12.7	1125	259.2	3.1	0.0
30/12/2016	40.6	20.8	54.0	12.7	1167	236.5	2.8	0.0
31/12/2016	39.8	20.9	85.4	15.6	1473	192.3	2.9	0.0



Business Papers – Appendix D

Environmental Monitoring Report –January 2017



*Managed by Rio Tinto Coal Australia*

## Hunter Valley Operations

### Monthly Environmental Report

January 2017

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# CONTENTS

1.0	INTRODUCTION.....	4
2.0	AIR QUALITY .....	4
2.1	Meteorological Monitoring .....	4
2.1.1	Rainfall.....	4
2.1.2	Wind Speed and Direction .....	4
2.2	Depositional Dust .....	6
2.3	Suspended Particulates .....	6
2.3.1	HVAS PM <sub>10</sub> Results.....	6
2.3.2	TSP Results .....	7
2.3.3	Real Time PM <sub>10</sub> Results.....	7
2.3.4	Real Time Alarms for Air Quality .....	7
3.0	WATER QUALITY .....	8
3.1.1	Surface Water.....	8
3.1.2	Site Water Use .....	9
3.1.3	HRSTS Discharge .....	9
3.2.1	Groundwater Monitoring Results .....	9
4.0	BLAST MONITORING .....	10
4.1	Blast Monitoring Results .....	10
5.0	NOISE.....	13
5.1	Attended Noise Monitoring Results .....	13
5.2	Real Time Noise Monitoring .....	17
6.0	OPERATIONAL DOWNTIME.....	17
7.0	REHABILITATION.....	17
8.0	COMPLAINTS.....	17
9.0	ENVIRONMENTAL INCIDENTS .....	18
	Appendix A: Meteorological Data.....	19

## Figures

Figure 1: Year to Date Rainfall Summary 2017	4
Figure 2: HVO Corporate Wind Rose – January 2017	4
Figure 3: HVO Cheshunt Wind Rose – January 2017	4
Figure 4: Air Quality Monitoring Location Plan	5
Figure 5: Depositional Dust Results – January 2017	6
Figure 6: Individual PM <sub>10</sub> Results – January 2017	7
Figure 7: Year To Date Average PM <sub>10</sub> – January 2017	7
Figure 8: Year To Date Average Total Suspended Particulates - January 2017	7
Figure 9: Real Time PM <sub>10</sub> 24hr average and YTD Average – January 2017	8
Figure 10: Moses Crossing Blast Monitoring Results – January 2017	10
Figure 11: Jerrys Plains Blast Monitoring Results – January 2017	10
Figure 12: Maison Dieu Blast Monitoring Results - January 2017	11
Figure 13: Warkworth Blast Monitoring Results - January 2017	11
Figure 14: Knodlers Lane Blast Monitoring Results – January 2017	11
Figure 15: Blast Monitoring Location Plan	12
Figure 16: Noise Monitoring Location Plan	16
Figure 17: Operational Downtime by Equipment Type – January 2017	17
Figure 18: Complaints Graph – January 2017	18

## Tables

Table 1: Monthly Rainfall HVO	4
Table 2: Blasting Limits	10
Table 3: L <sub>Aeq, 15 minute</sub> HVO South - Impact Assessment Criteria – January 2017	13
Table 4: L <sub>Aeq, 15 minute</sub> HVO South - Land Acquisition Criteria – January 2017	13
Table 5: L <sub>A1, 1minute</sub> HVO South - Impact Assessment Criteria – January 2017	14
Table 6: L <sub>Aeq, 15minute</sub> HVO North – Impact Assessment Criteria – January 2017	14
Table 7: L <sub>Aeq, 15minute</sub> HVO North - Land Acquisition Criteria – January 2017	14
Table 8: L <sub>A1, 1Minute</sub> HVO North - Impact Assessment Criteria – January 2017	15
Table 9: Meteorological Data - HVO Corporate Meteorological Station – January 2017	20

## Revision History

Version No.	Person Responsible	Document Status	Date
<b>1.0</b>	<b>Environmental Advisor</b>	<b>Final</b>	<b>27/02/2017</b>

# 1.0 INTRODUCTION

This report has been compiled to provide a monthly summary of environmental monitoring results for Hunter Valley Operations (HVO) as described in the Hunter Valley Operations Online Communication Plan. This report includes all monitoring data collected for the period 1<sup>st</sup> January to 31<sup>st</sup> January 2017.

# 2.0 AIR QUALITY

## 2.1 Meteorological Monitoring

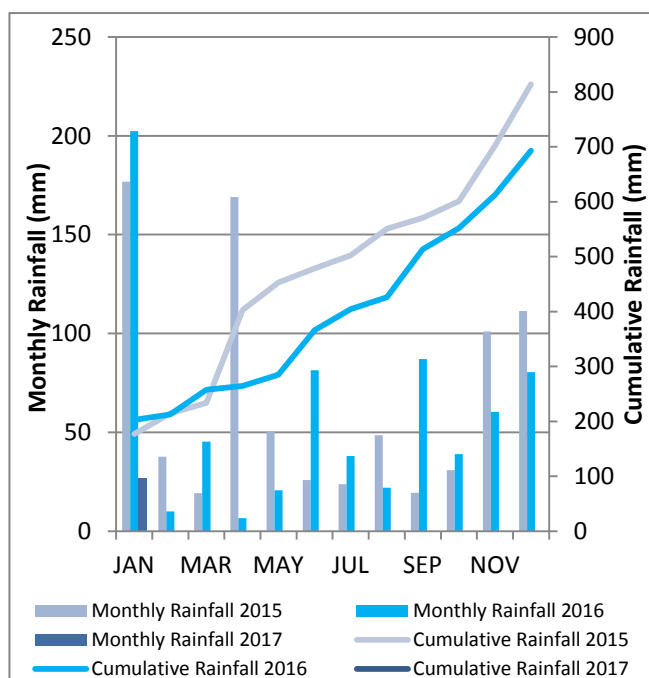
HVO maintains two meteorological stations; 'Corporate' and 'Cheshunt' (Refer to Figure 4: Air Quality Monitoring Location Plan).

### 2.1.1 Rainfall

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

**Table 1: Monthly Rainfall HVO**

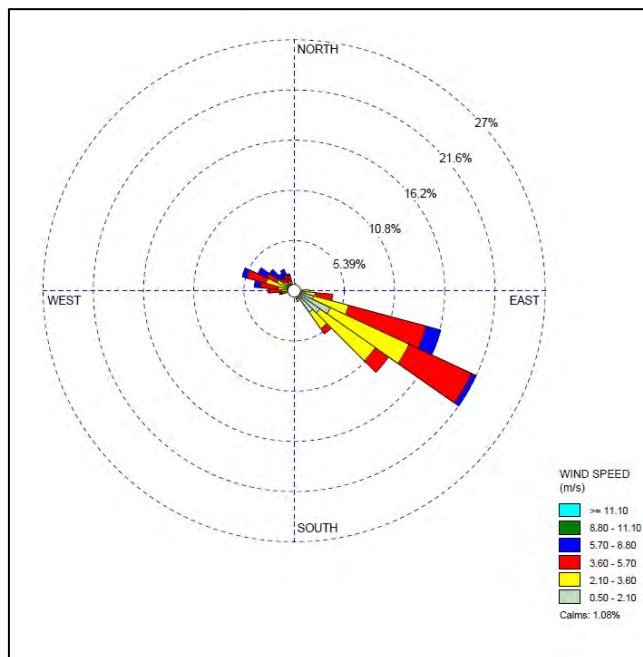
2017	Monthly Rainfall (mm)	Cumulative Rainfall (mm)
January	26.6	26.6



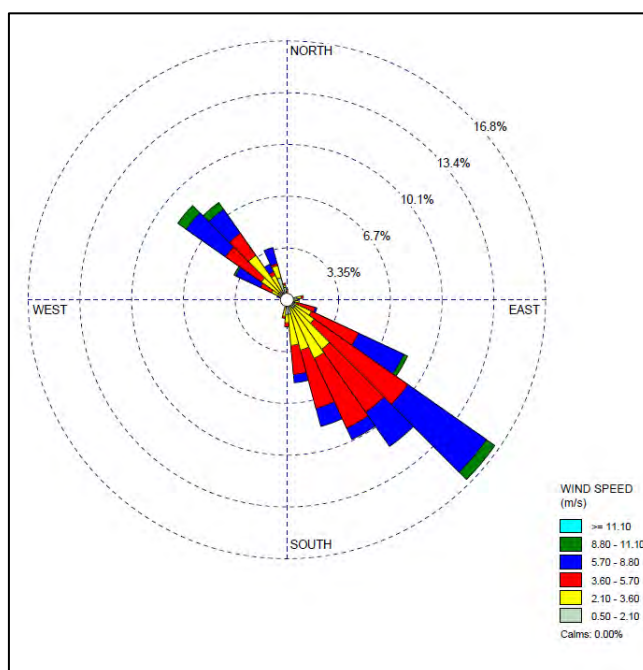
**Figure 1: Year to Date Rainfall Summary 2017**

## 2.1.2 Wind Speed and Direction

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



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



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

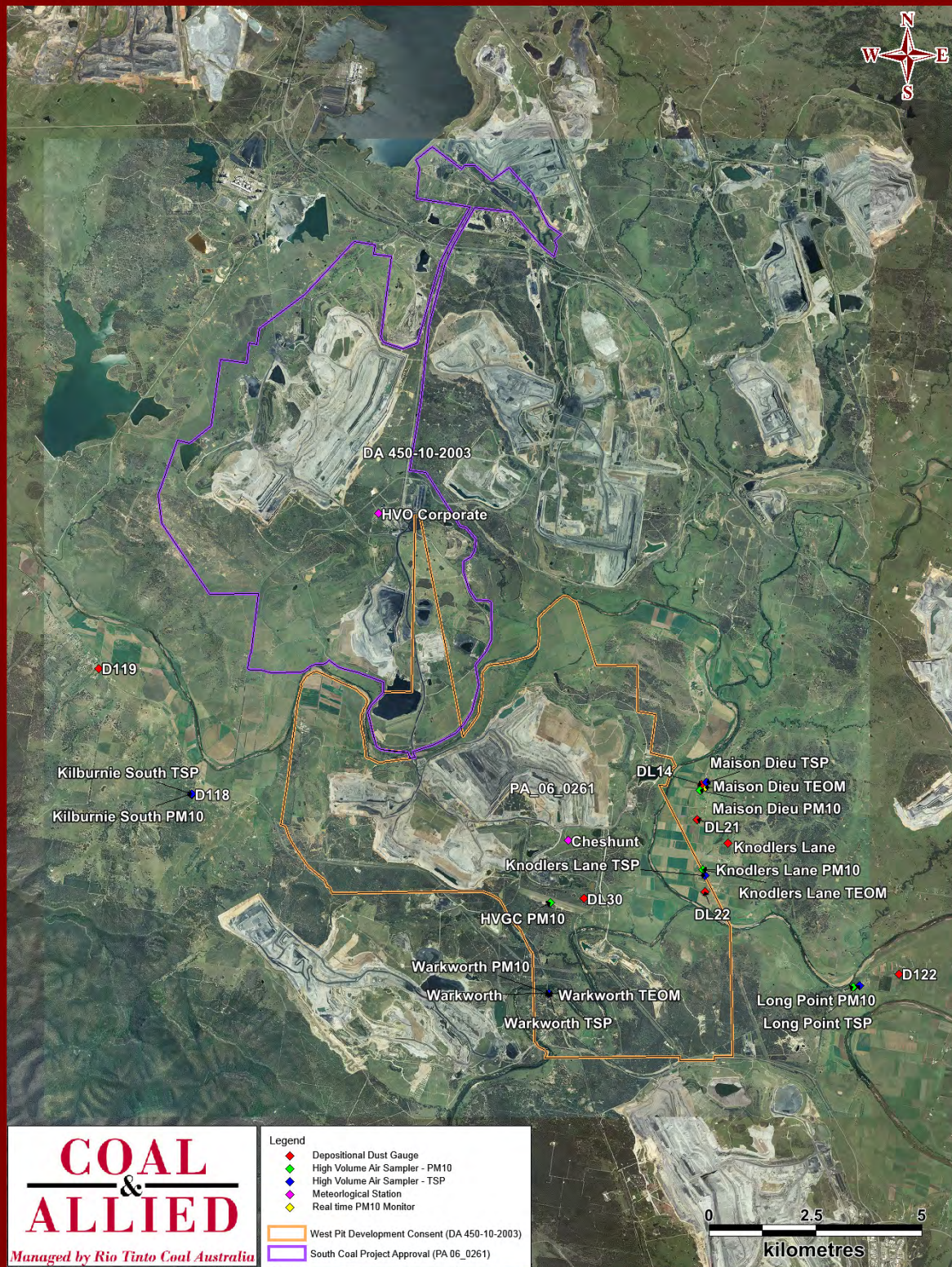


Figure 4: Air Quality Monitoring Location Plan

## 2.2 Depositional Dust

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

Figure 5 displays insoluble solids results from depositional dust gauges during the reporting period compared against the year-to-date average and the annual impact assessment criteria.

During the reporting period the Warkworth monitor recorded a monthly result above the long term impact assessment criteria of 4.0 g/m<sup>2</sup> per month. The field notes associated with the Warkworth monitor confirm the presence of insects and vegetation. As such the result is considered contaminated and will be excluded from calculation of the annual average.

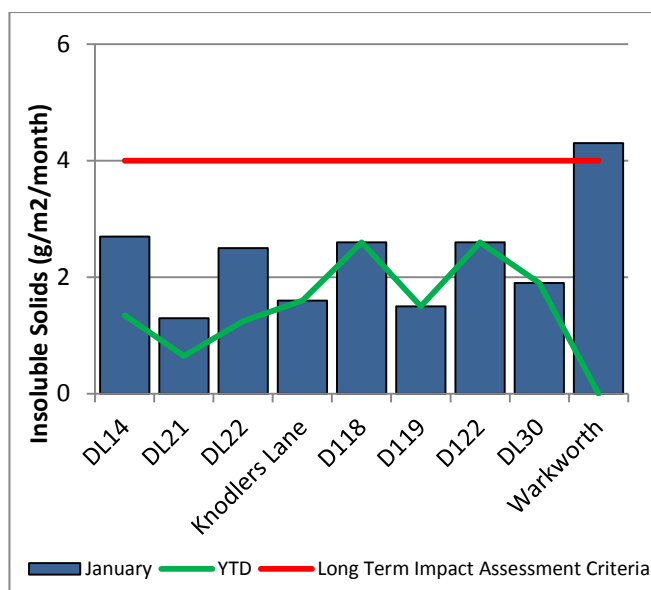


Figure 5: Depositional Dust Results – January 2017

## 2.3 Suspended Particulates

Suspended particulates are measured by a network of High Volume Air Samplers (HVAS) measuring Total Suspended Particulates (TSP) and Particulate Matter <10µm (PM<sub>10</sub>). The location of these monitors can be found in Figure 4. Each HVAS was run for 24 hours on a six-day cycle in accordance with EPA requirements.

### 2.3.1 HVAS PM<sub>10</sub> Results

Figure 6 shows individual PM<sub>10</sub> results at each monitoring station against the short term impact assessment criteria of 50µg/m<sup>3</sup>.

On 18/01/2017 four HVAS PM<sub>10</sub> units recorded results greater than the short term (24hr) PM<sub>10</sub> impact assessment criteria; Long Point (135 µg/m<sup>3</sup>), Knodlers Lane (51 µg/m<sup>3</sup>), Cheshunt East (64 µg/m<sup>3</sup>) and Glider Club (64 µg/m<sup>3</sup>).

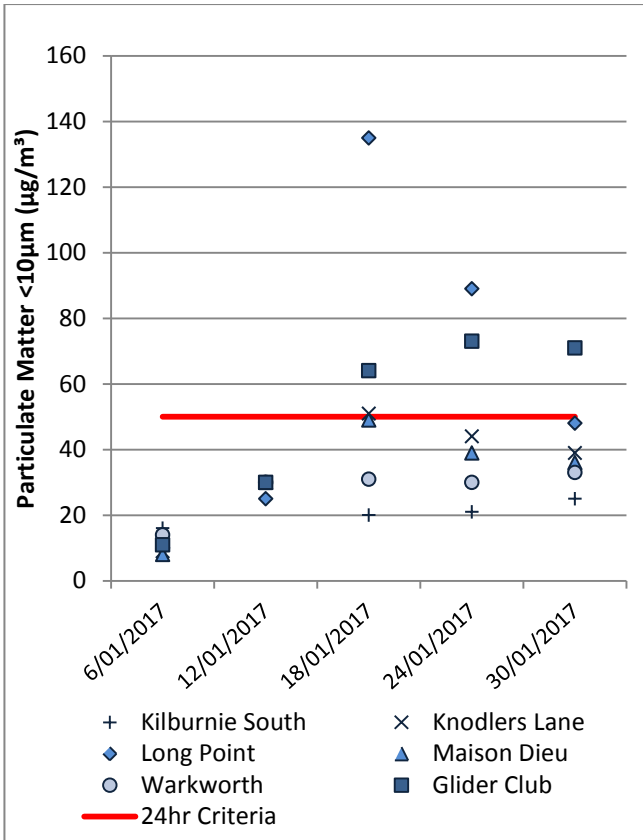
Investigation indicates that the Long Point HVAS failed to collect valid samples on the 18<sup>th</sup> January due to local livestock impacting the monitor. The proximity of the monitor to livestock is being increased, through the relocation of a nearby chook yard and also a demountable horse yard away from the monitor. Investigation indicates that that the likely HVO contribution to the results at Knodlers Lane, Cheshunt East and Gliding Club on the 18<sup>th</sup> January is less than 75%. Accordingly, no further action is required.

On 24/01/2017 three HVAS PM<sub>10</sub> units recorded results greater than the short term (24hr) PM<sub>10</sub> impact assessment criteria; Long Point (89 µg/m<sup>3</sup>), Cheshunt East (51 µg/m<sup>3</sup>) and Gliding Club (73 µg/m<sup>3</sup>).

Investigation indicates that the Long Point HVAS failed to collect valid samples on the 24<sup>th</sup> January due to local livestock impacting the monitor. Preliminary investigation indicates that HVO was outside the main arc of influence for the Cheshunt East and Gliding Club monitoring locations, on the 24<sup>th</sup> January. Accordingly, no further action is required.

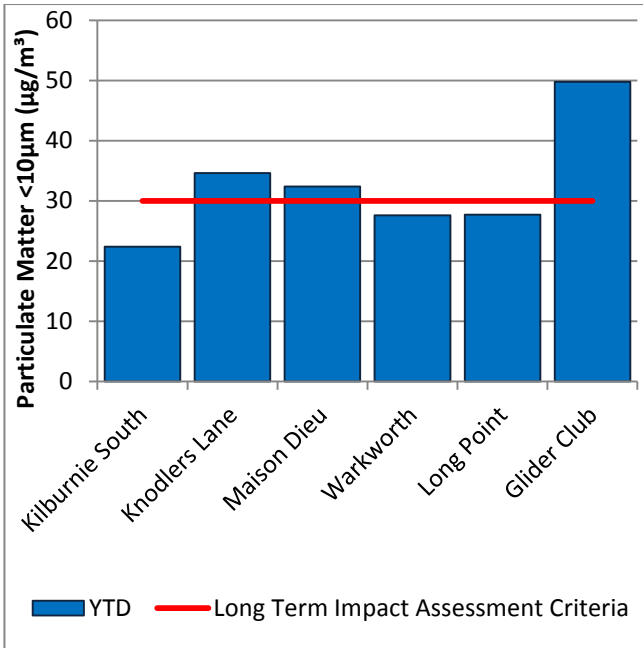
On 30/01/2017 two HVAS PM<sub>10</sub> units recorded results greater than the short term (24hr) PM<sub>10</sub> impact assessment criteria; Cheshunt East (54 µg/m<sup>3</sup>) and Gliding Club (71 µg/m<sup>3</sup>).

Investigation indicates that that the likely HVO contribution to the results at Cheshunt East and Gliding Club on the 30<sup>th</sup> January is less than 75%. Accordingly, no further action is required.



**Figure 6: Individual PM<sub>10</sub> Results – January 2017**

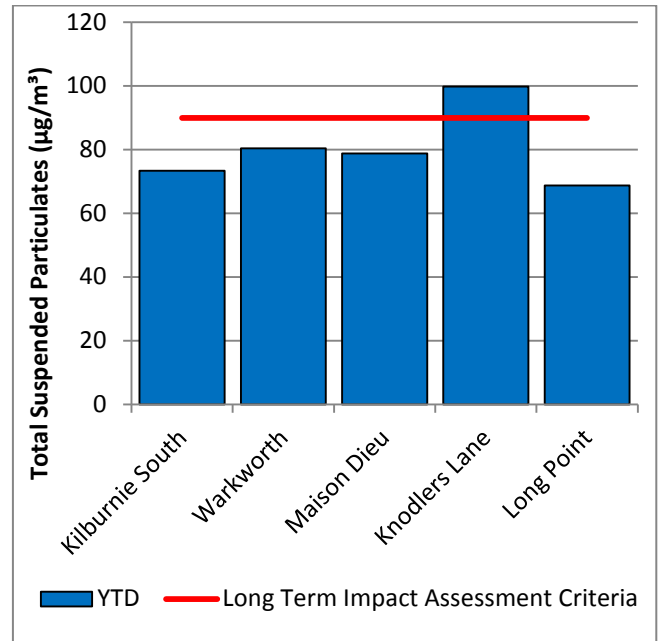
Figure 7 shows the annual average PM<sub>10</sub> results. During the reporting period, all PM<sub>10</sub> results were below the long term impact assessment criteria.



**Figure 7: Year To Date Average PM<sub>10</sub> – January 2017**

### 2.3.2 TSP Results

Figure 8 shows the annual average TSP results compared against the long term impact assessment criteria of 90µg/m<sup>3</sup>.



**Figure 8: Year To Date Average Total Suspended Particulates - January 2017**

### 2.3.3 Real Time PM<sub>10</sub> Results

Hunter Valley Operations maintains a network of real time PM<sub>10</sub> 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<sub>10</sub> 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 are shown in Figure 9, including the daily 24 hour average PM<sub>10</sub> result and the 24 hour YTD PM<sub>10</sub> average. There were two results recorded which exceeded the short term (24hr) criteria in the approvals. A measurement of 51.4µg/m<sup>3</sup> was recorded at the Knodlers Lane TEOM location and a measurement of 62.1µg/m<sup>3</sup> was recorded at the Maison Dieu TEOM location on the 11th January.

An investigation was undertaken to assess air quality and meteorological conditions on the day, and to assess the maximum potential HVO contribution to the measured result. The investigation determined that HVO's maximum potential contribution to measured levels at Knodlers Lane is estimated at less than 40% and at

Maison Dieu is estimated at less than 50% of the measured results on the day.

Data was not available on the 20<sup>th</sup> January (Warkworth) due to technical issues.

### 2.3.4 Real Time Alarms for Air Quality

During January, the real time monitoring system generated 75 automated air quality related alarms. 26 alarms were related to adverse weather conditions and 49 alarms related to PM<sub>10</sub>.

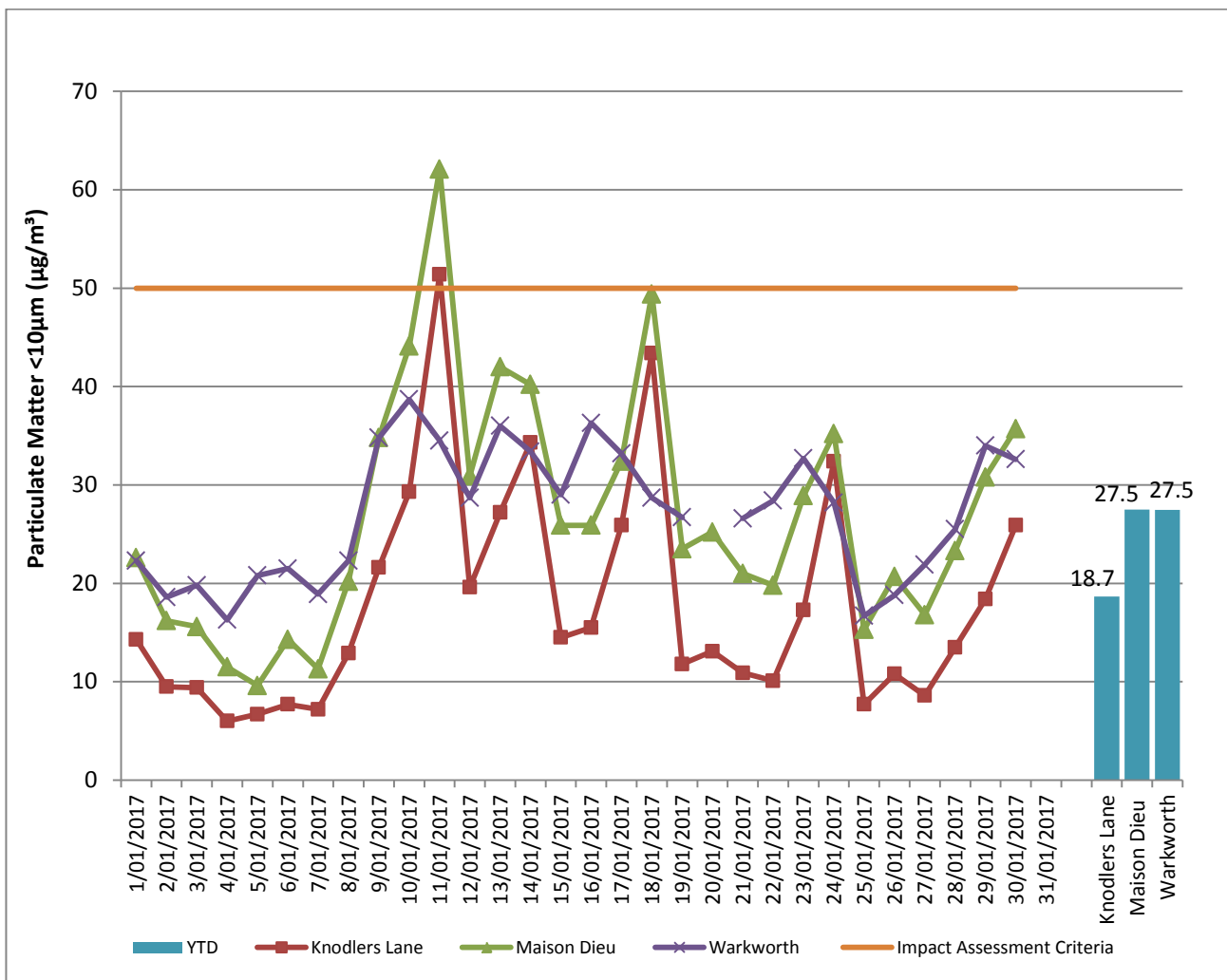


Figure 9: Real Time PM<sub>10</sub> 24hr average and YTD Average – January 2017

## 3.0 WATER QUALITY

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

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).

### 3.1.1 Surface Water

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 March 2017 report.

### **3.1.2 Site Water Use**

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

### **3.1.3 HRSTS Discharge**

HVO participates in the 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 March 2017 monthly report.



## 4.0 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 15.

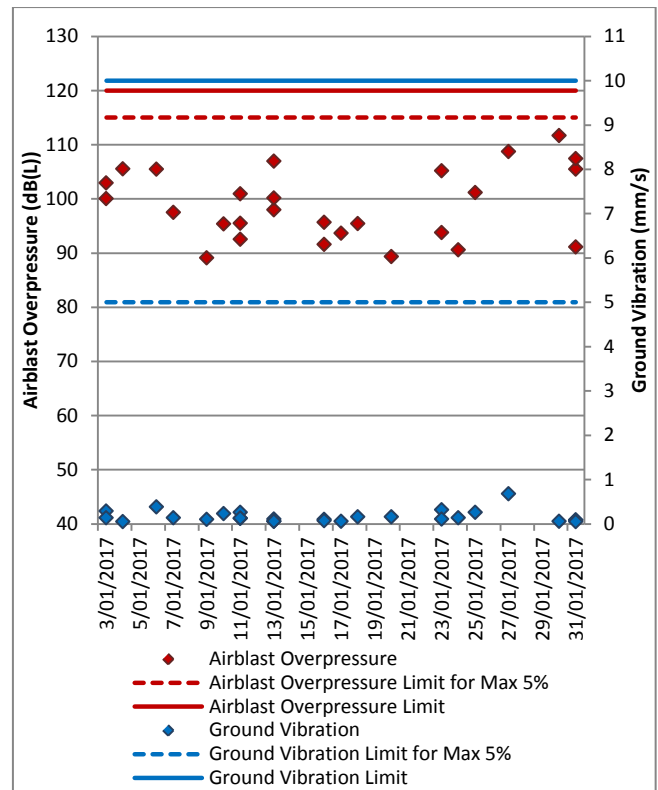
During January, 27 blasts were initiated at HVO. Figure 10 through to Figure 14 show the blast monitoring results for the reporting period against the impact assessment criteria. The criteria are summarised in Table 2.

**Table 2: Blasting Limits**

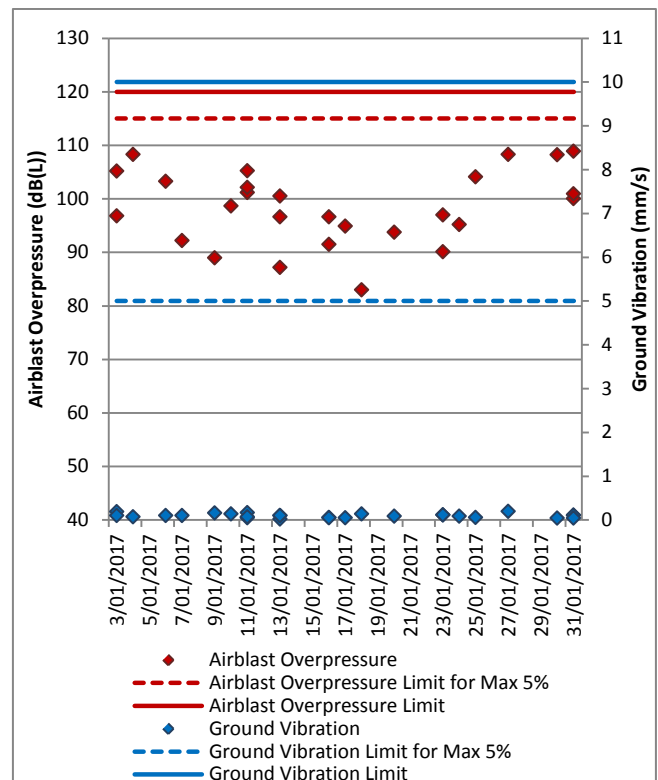
Airblast Overpressure (dB(L))	Comments
115	5% of the total number of blasts in a 12 month period
120	0%
Ground Vibration (mm/s)	Comments
5	5% of the total number of blasts in a 12 month period
10	0%

During the reporting period one blast exceeded the 115 dB(L) threshold for airblast overpressure. A blast recorded on the 31<sup>st</sup> January at 2:12pm, recorded an elevated airblast overpressure reading of 115.8dB(L) at the Maison Dieu blast monitoring location. No blasts exceeded the 5mm/s criterion for ground vibration.

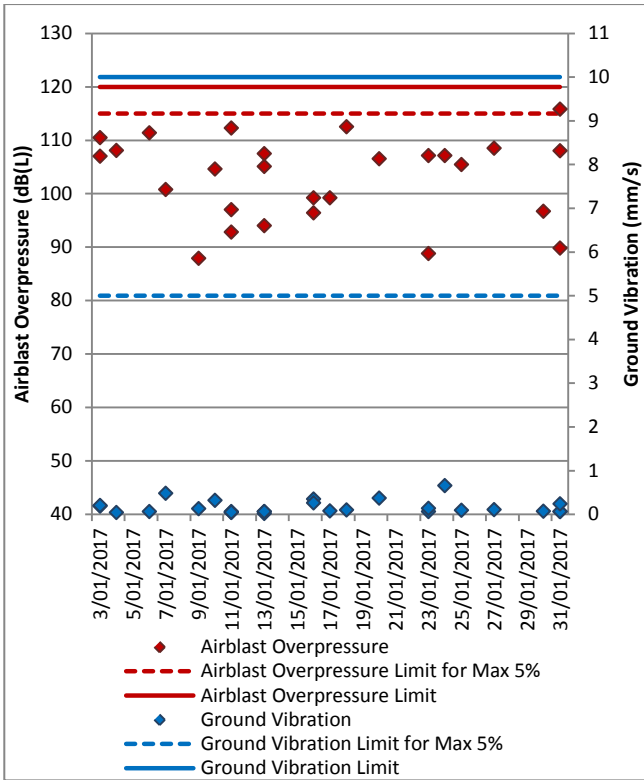
### 4.1 Blast Monitoring Results



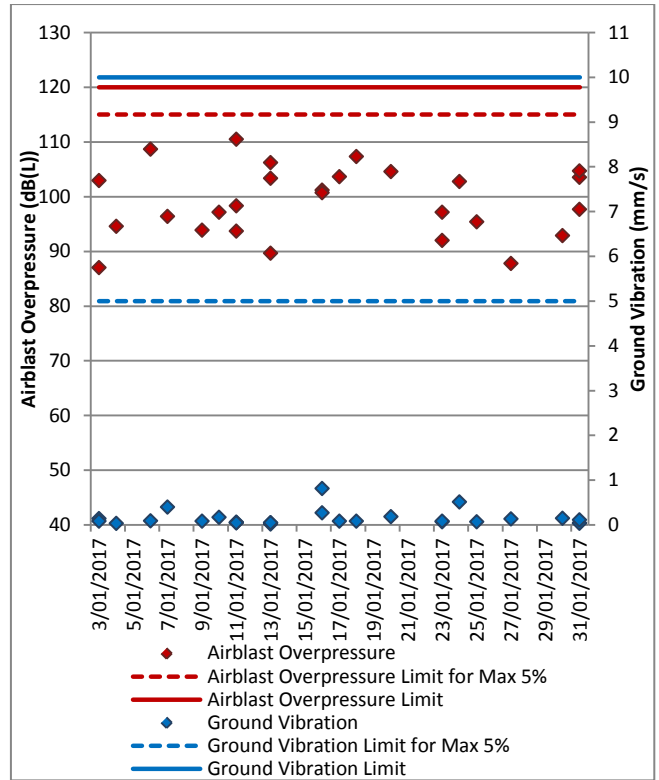
**Figure 10: Moses Crossing Blast Monitoring Results – January 2017**



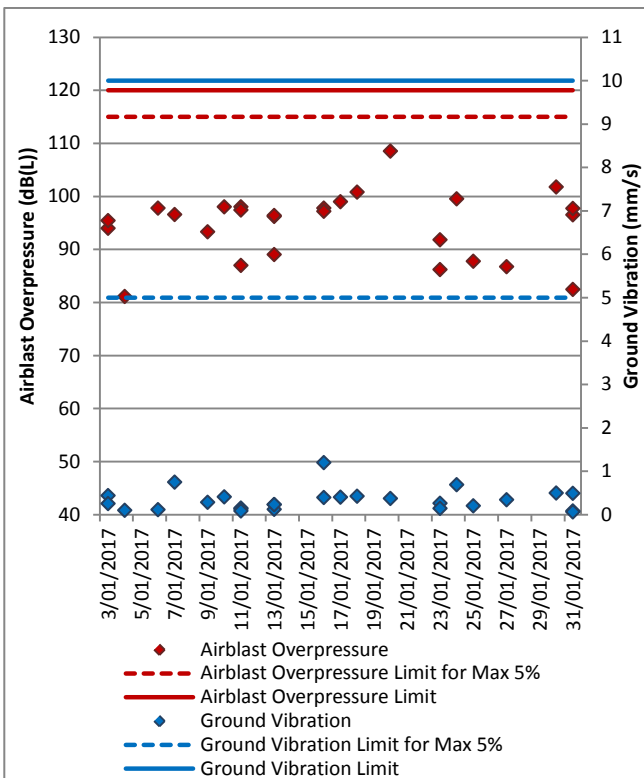
**Figure 11: Jerrys Plains Blast Monitoring Results – January 2017**



**Figure 12: Maison Dieu Blast Monitoring Results - January 2017**



**Figure 14: Knodlers Lane Blast Monitoring Results - January 2017**



**Figure 13: Warkworth Blast Monitoring Results - January 2017**



RTCA - NSW Environmental Services

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 9th of January 2017. Monitoring results are detailed in Table 3 to Table 8.

**Table 3: L<sub>Aeq</sub>, 15 minute HVO South - Impact Assessment Criteria – January 2017**

Location	Date and Time	Wind Speed (m/s) <sup>5</sup>	VTG <sup>5</sup>	Criterion dB	Criterion Applies? <sup>1,6</sup>	HVO South L <sub>Aeq</sub> dB <sup>2,4</sup>	Exceedance <sup>3</sup>
Knodlers Lane	9/01/2017 21:00	3	-1	37	No	IA	NA
Maison Dieu	9/01/2017 21:26	3.3	-1	37	No	IA	NA
Shearers Lane	9/01/2017 21:55	3.4	-1	41	No	IA	NA
Kilburnie South	9/01/2017 21:34	3.3	-1	36	No	35	NA
Jerrys Plains Village	9/01/2017 22:27	3.4	-1	35	No	NM	NA
Jerrys Plains East	9/01/2017 22:04	3.4	-1	35	No	NM	NA
Long Point Road	9/01/2017 21:00	3.5	-1	45	No	IA	NA
HVGC	9/01/2017 21:02	3	-1	55	No	NM	NA

**Table 4: L<sub>Aeq</sub>, 15 minute HVO South - Land Acquisition Criteria – January 2017**

Location	Date and Time	Wind Speed (m/s) <sup>5</sup>	VTG <sup>5</sup>	Criterion dB	Criterion Applies? <sup>1,6</sup>	HVO South L <sub>Aeq</sub> dB <sup>2,4</sup>	Exceedance <sup>3</sup>
Knodlers Lane	9/01/2017 21:00	3	-1	41	No	IA	NA
Maison Dieu	9/01/2017 21:26	3.3	-1	41	No	IA	NA
Shearers Lane	9/01/2017 21:55	3.4	-1	41	No	IA	NA
Kilburnie South	9/01/2017 21:34	3.3	-1	41	No	35	NA
Jerrys Plains Village	9/01/2017 22:27	3.4	-1	40	No	NM	NA
Jerrys Plains East	9/01/2017 22:04	3.4	-1	40	No	NM	NA
Long Point Road	9/01/2017 21:00	3.5	-1	40	No	IA	NA
HVGC	9/01/2017 21:02	3	-1	NA	No	NM	NA

**Table 5: LA<sub>1, 1minute</sub> HVO South - Impact Assessment Criteria – January 2017**

Location	Date and Time	Wind Speed (m/s) <sup>5</sup>	VTG <sup>5</sup>	Criterion dB	Criterion Applies? <sup>1,6</sup>	HVO South LA <sub>1, 1min</sub> dB <sup>2,4</sup>	Exceedance <sup>3</sup>
Knodlers Lane	9/01/2017 21:00	3	-1	45	No	IA	NA
Maison Dieu	9/01/2017 21:26	3.3	-1	45	No	IA	NA
Shearers Lane	9/01/2017 21:55	3.4	-1	45	No	IA	NA
Kilburnie South	9/01/2017 21:34	3.3	-1	45	No	41	NA
Jerrys Plains Village	9/01/2017 22:27	3.4	-1	45	No	NM	NA
Jerrys Plains East	9/01/2017 22:04	3.4	-1	45	No	NM	NA
Long Point Road	9/01/2017 21:00	3.5	-1	45	No	IA	NA
HVGC	9/01/2017 21:02	3	-1	NA	No	NM	NA

**Notes**

1. Noise emission limits apply for winds up to 3 metres per second (at a height of 10m), or vertical temperature gradients of up to 3 degrees/100m and wind speeds of up to 2 m/s (at a height of 10m);

2. Estimated or measured LA<sub>eq, 15minute</sub> dB attributed to HVO South Pit Area;

3. NA in exceedance column means atmospheric conditions outside specified in approval and so criterion is not applicable;

4. Bolded results in red indicate exceedance of criteria;

5. Atmospheric data is sourced from the HVO Corporate weather station using logged met data;

6. Criterion may or may not apply due to rounding of meteorological data values

**Table 6: LA<sub>eq, 15minute</sub> HVO North – Impact Assessment Criteria – January 2017**

Location	Date and Time	Wind Speed (m/s) <sup>5</sup>	VTG <sup>5</sup>	Criterion dB	Criterion Applies? <sup>1,6</sup>	HVO North LA <sub>eq</sub> dB <sup>2,4</sup>	Exceedance <sup>3</sup>
Knodlers Lane	9/01/2017 21:00	3	-1	35	Yes	IA	Nil
Maison Dieu	9/01/2017 21:26	3.3	-1	35	No	IA	NA
Shearers Lane	9/01/2017 21:55	3.4	-1	35	No	IA	NA
Kilburnie South	9/01/2017 21:34	3.3	-1	39	No	NM	NA
Jerrys Plains Village	9/01/2017 22:27	3.4	-1	36	No	30	NA
Jerrys Plains East	9/01/2017 22:04	3.4	-1	39	No	32	NA
Long Point Road	9/01/2017 21:00	3.5	-1	35	No	IA	NA
HVGC	9/01/2017 21:02	3	-1	NA	No	IA	NA

**Table 7: LA<sub>eq, 15minute</sub> HVO North - Land Acquisition Criteria – January 2017**

Location	Date and Time	Wind Speed (m/s) <sup>5</sup>	VTG <sup>5</sup>	Criterion dB	Criterion Applies? <sup>1,6</sup>	HVO North LA <sub>eq</sub> dB <sup>2,4</sup>	Exceedance <sup>3</sup>
Knodlers Lane	9/01/2017 21:00	3	-1	41	Yes	IA	Nil
Maison Dieu	9/01/2017 21:26	3.3	-1	41	No	IA	NA
Shearers Lane	9/01/2017 21:55	3.4	-1	41	No	IA	NA
Kilburnie South	9/01/2017 21:34	3.3	-1	41	No	NM	NA
Jerrys Plains Village	9/01/2017 22:27	3.4	-1	41	No	30	NA
Jerrys Plains East	9/01/2017 22:04	3.4	-1	41	No	32	NA
Long Point Road	9/01/2017 21:00	3.5	-1	41	No	IA	NA
HVGC	9/01/2017 21:02	3	-1	NA	No	IA	NA

**Table 8: LA<sub>1, 1Minute</sub> HVO North - Impact Assessment Criteria – January 2017**

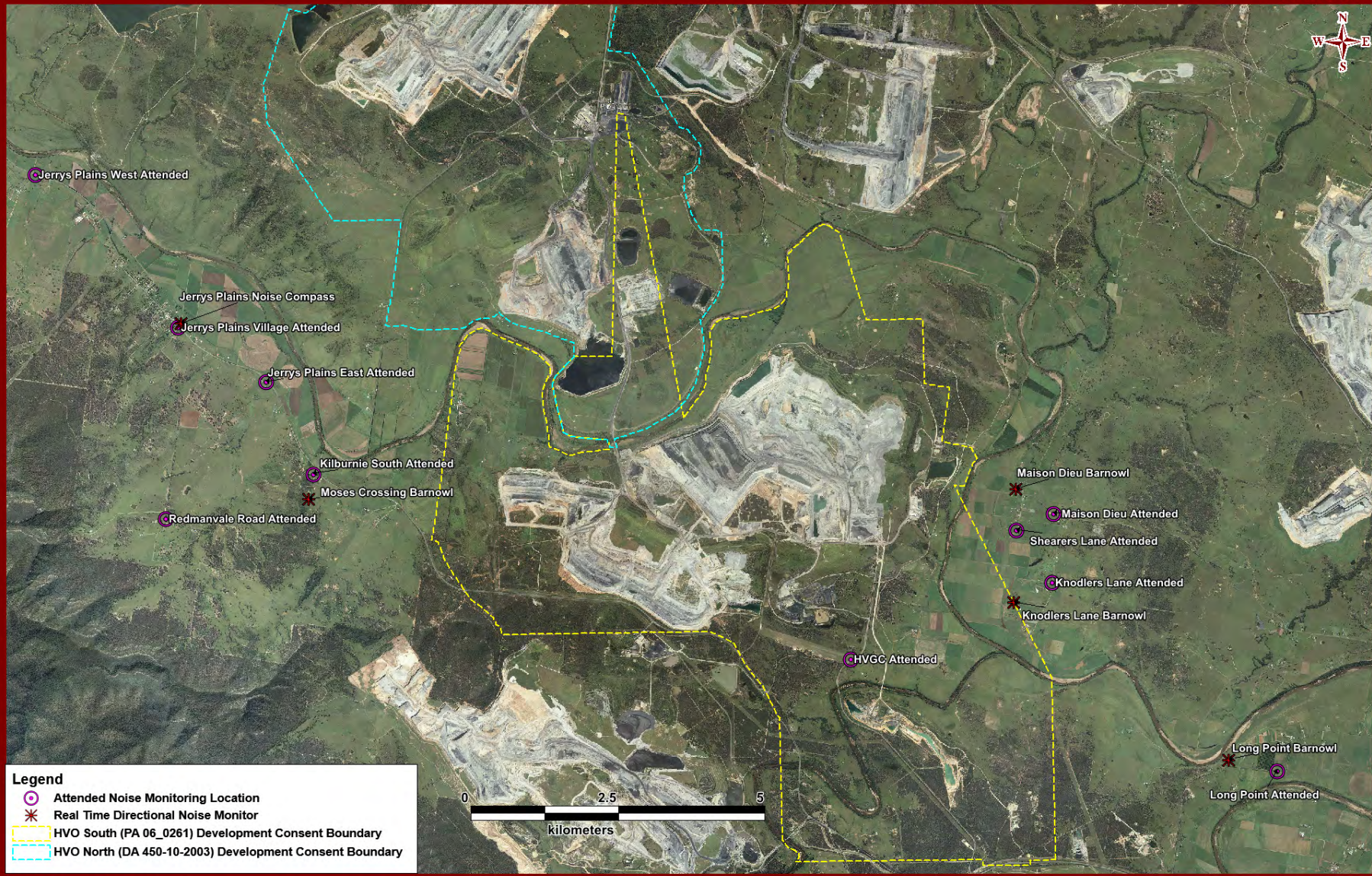
Location	Date and Time	Wind Speed (m/s) <sup>5</sup>	VTG <sup>5</sup>	Criterion dB	Criterion Applies? <sup>1,6</sup>	HVO North LA <sub>1, 1min</sub> dB <sup>2,4</sup>	Exceedance <sup>3</sup>
Knodlers Lane	9/01/2017 21:00	3	-1	46	Yes	IA	Nil
Maison Dieu	9/01/2017 21:26	3.3	-1	46	No	IA	NA
Shearers Lane	9/01/2017 21:55	3.4	-1	46	No	IA	NA
Kilburnie South	9/01/2017 21:34	3.3	-1	46	No	NM	NA
Jerrys Plains Village	9/01/2017 22:27	3.4	-1	46	No	37	NA
Jerrys Plains East	9/01/2017 22:04	3.4	-1	46	No	42	NA
Long Point Road	9/01/2017 21:00	3.5	-1	46	No	IA	NA
HVGC	9/01/2017 21:02	3	-1	NA	No	IA	NA

**Notes**

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

# Hunter Valley Operations Noise Monitoring Locations

Date: 161027  
Plan By: DF  
Version: 2.0



**Legend**

- ⊙ Attended Noise Monitoring Location
- \* Real Time Directional Noise Monitor
- HVO South (PA 06\_0261) Development Consent Boundary
- HVO North (DA 450-10-2003) Development Consent Boundary

RTCA - NSW Environmental Services

Figure 16: Noise Monitoring Location Plan

## 5.2 Real Time Noise Monitoring

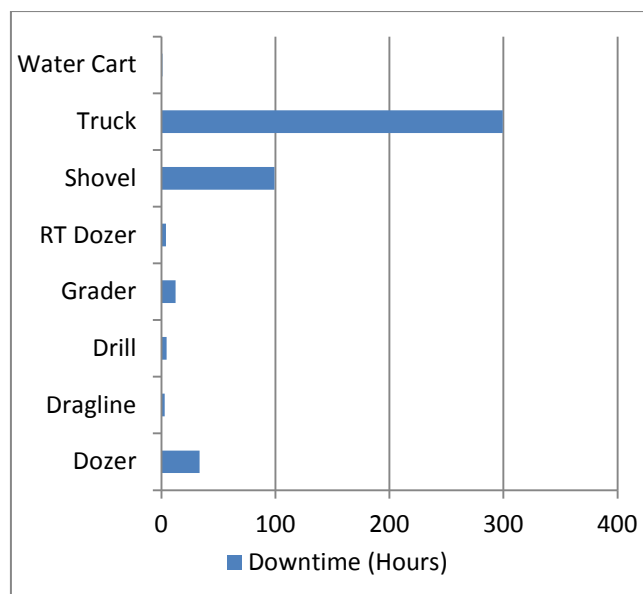
HVO utilises a network of real-time directional noise monitors to manage noise impacts on a continuous basis. Noise alarms are in place at five monitoring locations (Knodlers Lane, Maison Dieu, Jerrys Plains, Moses Crossing, and Long Point), which alert HVO staff to elevated noise levels likely to be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

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

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

## 6.0 OPERATIONAL DOWNTIME

During January, a total of 456.7 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 – January 2017**

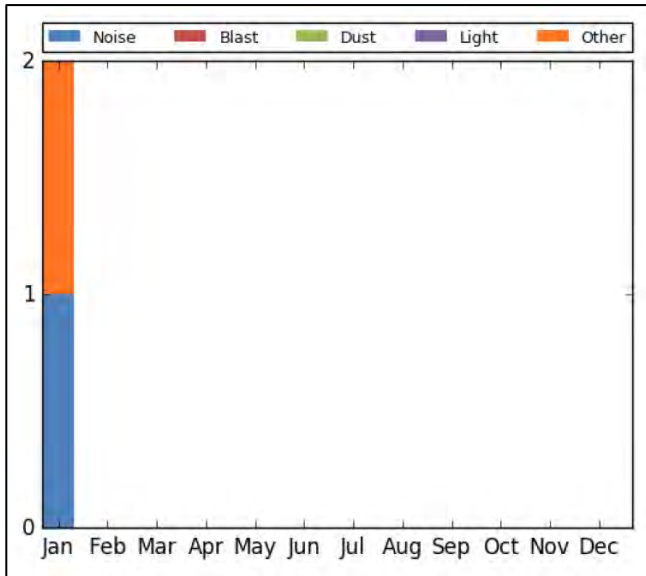
## 7.0 REHABILITATION

Good areas of early stage rehabilitation have been carried over from 2016 to allow ongoing work over coming months including 35.8ha of dumps released for rehabilitation, 15.8ha of released area which has been bulk shaped to the MOP landform, and 5.1ha which has been topsoiled and composted in preparation for seeding. Limited rehabilitation works were undertaken during January with 1ha of new bulk shaping completed and 2.3ha topsoiled.

## 8.0 COMPLAINTS

Two complaints were received during the reporting period. Details of complaints received YTD are shown in Figure 19 below.





**Figure 18: Complaints Graph – January 2017**

## **9.0 ENVIRONMENTAL INCIDENTS**

During the reporting period there were no reportable environmental incidents.

## **Appendix A: Meteorological Data**

**Table 9: Meteorological Data - HVO Corporate Meteorological Station – January 2017**

<b>Date</b>	<b>Air Temperature Maximum (°C)</b>	<b>Air Temperature Minimum (°C)</b>	<b>Relative Humidity Maximum (%)</b>	<b>Relative Humidity Minimum (%)</b>	<b>Solar Radiation Maximum (W/Sq. M)</b>	<b>Wind Direction Average (°)</b>	<b>Wind Speed Average (m/sec)</b>	<b>Rainfall(mm)</b>
1/01/2017 0:00	28.8	20.1	100.0	59.3	1301	114.8	2.3	2.6
2/01/2017 0:00	27.7	17.9	100.0	51.2	1419	142.3	3.1	14.4
3/01/2017 0:00	27.2	15.3	90.8	37.7	1494	118.2	3.3	0.0
4/01/2017 0:00	26.1	15.1	93.7	39.4	1597	115.1	3.4	0.0
5/01/2017 0:00	29.3	15.4	100.0	42.1	1487	123.5	3.5	0.0
6/01/2017 0:00	29.6	16.7	100.0	38.9	1448	117.3	3.8	0.0
7/01/2017 0:00	31.3	16.1	93.5	26.6	1345	119.1	3.1	0.0
8/01/2017 0:00	35.5	13.5	97.6	12.5	1176	138.3	1.6	0.0
9/01/2017 0:00	38.8	17.5	81.9	8.8	1066	173.4	2.2	0.0
10/01/2017 0:00	38.2	17.9	81.4	8.4	1338	194.3	2.0	0.0
11/01/2017 0:00	38.6	25.4	57.4	14.2	1314	272.8	3.2	0.0
12/01/2017 0:00	32.4	19.7	84.7	38.6	1091	115.9	4.2	0.0
13/01/2017 0:00	42.4	20.9	82.8	14.1	1028	237.3	4.1	0.0
14/01/2017 0:00	38.1	21.2	78.4	24.4	1147	246.2	4.2	0.0
15/01/2017 0:00	26.1	16.8	99.8	48.5	812	110.8	4.0	0.0
16/01/2017 0:00	34.8	17.7	92.3	18.6	1174	132.5	2.4	0.0
17/01/2017 0:00	39.9	16.1	99.6	19.9	1289	248.5	3.1	0.0
18/01/2017 0:00	42.3	18.9	80.6	13.0	1110	244.3	5.5	0.0
19/01/2017 0:00	25.5	16.3	100.0	54.6	1314	121.7	3.7	0.2
20/01/2017 0:00	30.8	14.4	100.0	49.5	1467	242.3	3.3	8.2
21/01/2017 0:00	27.7	15.2	87.3	35.9	1379	121.0	3.3	0.0
22/01/2017 0:00	32.5	12.9	97.4	22.6	1090	118.0	2.8	0.0
23/01/2017 0:00	38.0	27.4	53.7	17.9	1062	243.5	2.1	0.0
24/01/2017 0:00	40.2	18.6	99.3	21.8	1573	231.1	6.1	0.2
25/01/2017 0:00	23.5	16.5	100.0	63.8	649	126.2	3.3	0.4
26/01/2017 0:00	25.7	16.9	100.0	70.3	449	119.2	2.1	0.2
27/01/2017 0:00	30.6	16.5	100.0	43.4	1382	126.2	3.2	0.4
28/01/2017 0:00	37.7	15.3	100.0	15.9	1036	160.7	1.7	0.0
29/01/2017 0:00	39.0	19.5	85.4	21.6	1214	153.1	1.7	0.0
30/01/2017 0:00	40.1	19.2	96.7	16.5	1306	252.9	3.3	0.0
31/01/2017 0:00	42.4	21.6	82.7	10.2	1386	250.5	4.5	0.0