Monthly Environmental Monitoring Report

Yancoal Hunter Valley Operations

October 2017

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Revision History

Version No.	Person Responsible	Document Status	Date
1.0	**Environmental Advisor**	**Draft**	**06/12/2017**
1.1	**Environmental Specialist**	**Final**	**08/12/2017**

1.0 INTRODUCTION

This report has been compiled to provide a monthly summary of environmental monitoring results for Hunter Valley Operations (HVO). This report includes all monitoring data collected for the period 1st October to 31st October.

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)
October	54.6	418.4

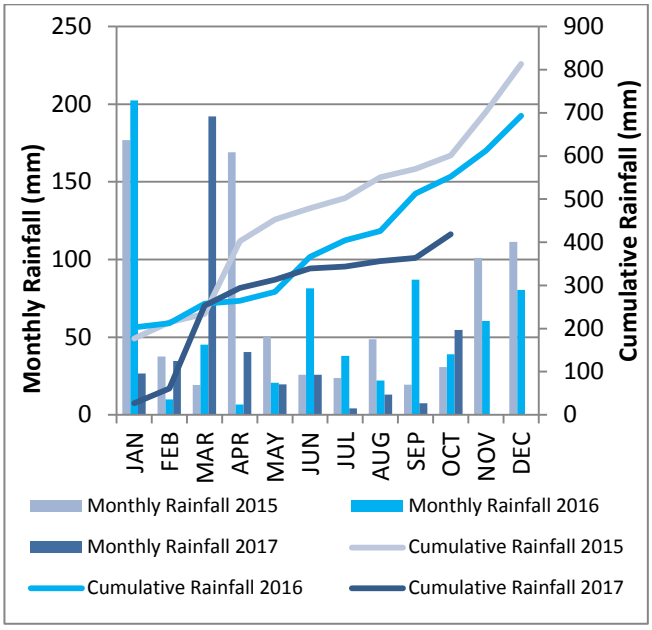

Figure 1: Rainfall Summary 2017

2.1.2 Wind Speed and Direction

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

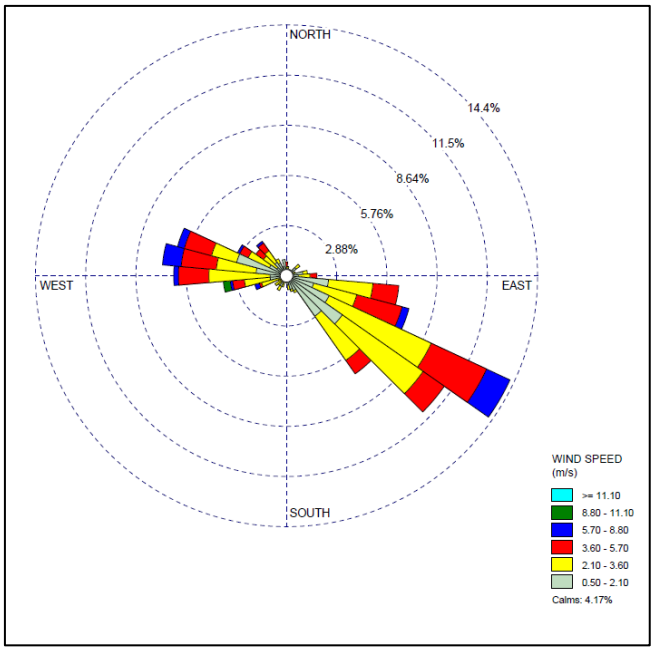

Figure 2: HVO Corporate Wind Rose – October 2017

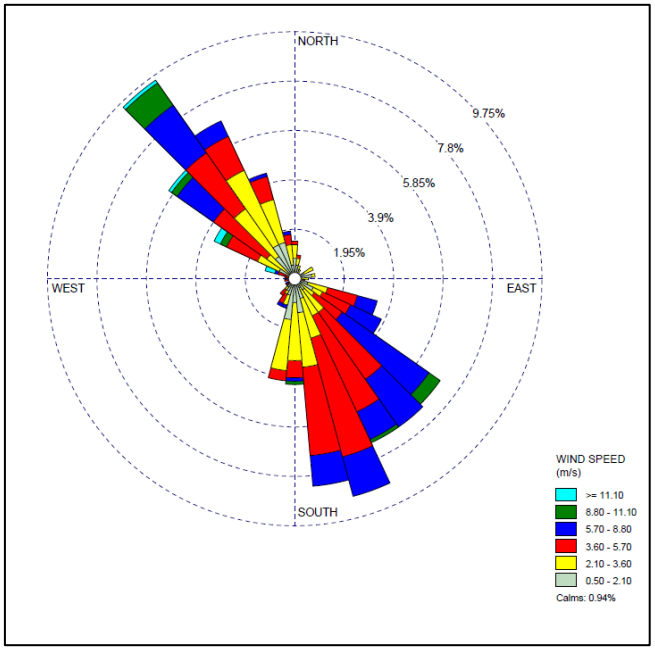

Figure 3: HVO Cheshunt Wind Rose – October 2017

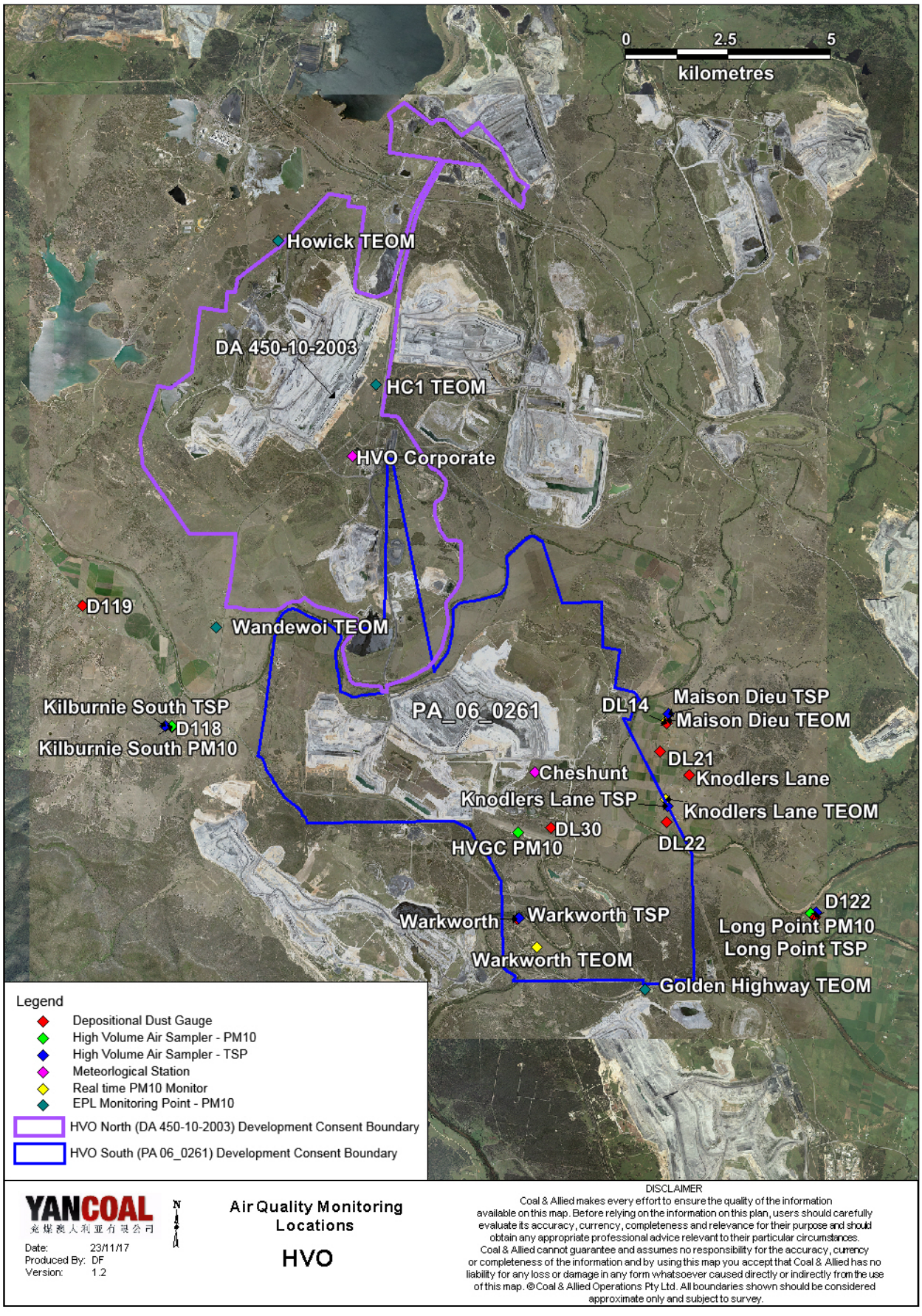

Figure 4: Air Quality Monitoring Location Plan

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

The field notes associated with the DL30 monitor result confirms the presence of insects and bird droppings. As such the result is considered contaminated and will be excluded from calculation of the annual average. There is no evidence to suggest that the Warkworth result was contaminated. Accordingly, this result will be included in the annual average calculation.

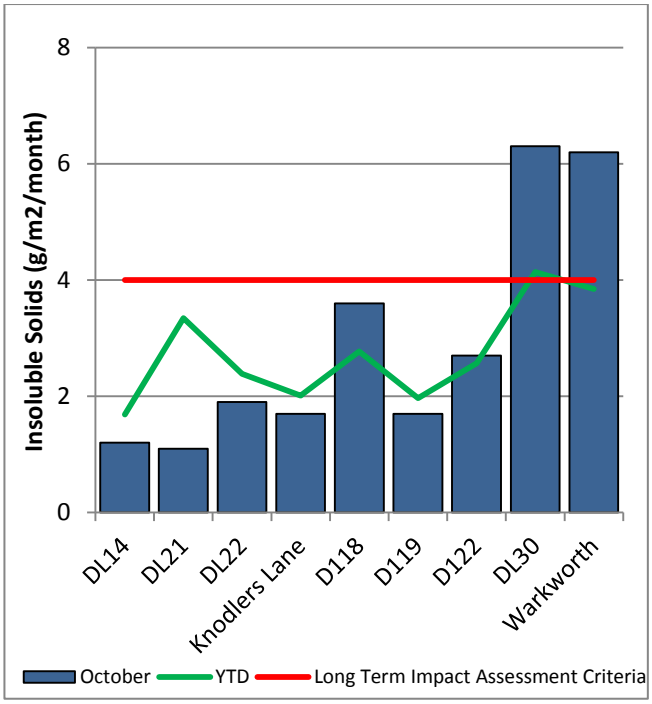

Figure 5: Depositional Dust Results – October 2017

2.3 Suspended Particulates

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

2.3.1 HVAS PM_{10} Results

Figure 6 shows individual PM_{10} results at each monitoring station against the short term impact assessment criteria of 50 µg/m^3.

On 3/10/2017 one HVAS PM_{10} unit recorded a result which was greater than the short term (24hr) PM_{10} impact assessment criteria; Long Point (106 µg/m^3).

Investigation determined that HVO's maximum contribution at Long Point is estimated to be less than 36 µg/m^3; or less than 34% of the measured result. Accordingly, no further action is required (as per approved Air Quality Monitoring Programme).

Data was not available on 21/10/2017 and 27/10/2017 at Long Point due to a power outage and an invalid sample respectively and on 27/10/2017 at Glider Club HVAS due to an invalid sample.

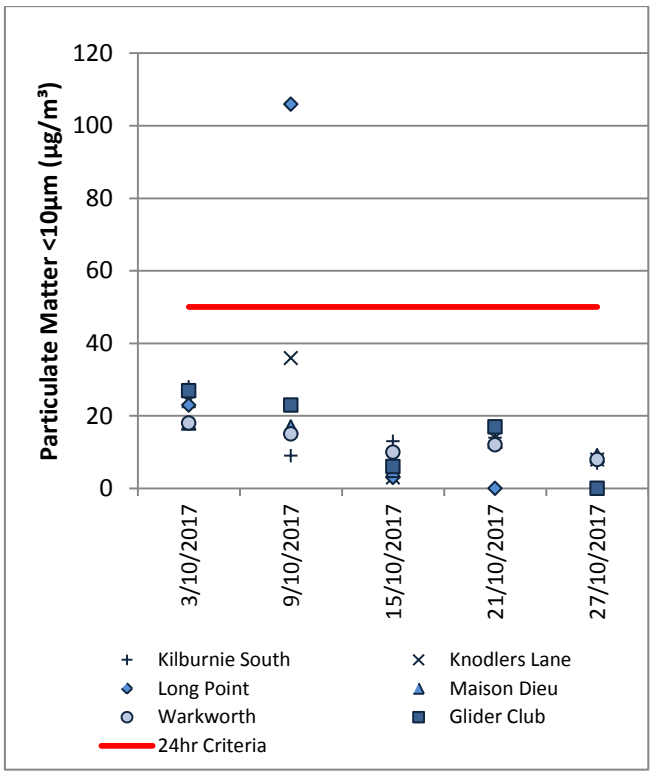

Figure 6: Individual PM_{10} Results – October 2017

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

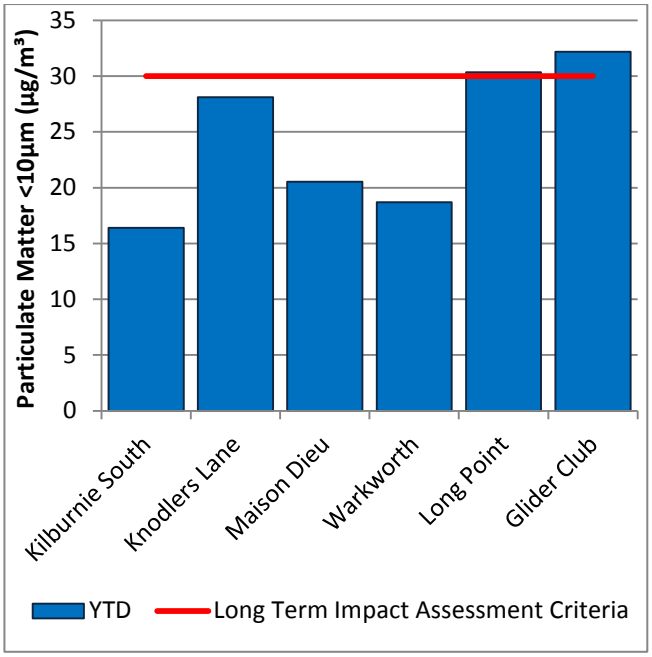

Figure 7: Year to Date Average PM_{10} – October 2017

2.3.2 TSP Results

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

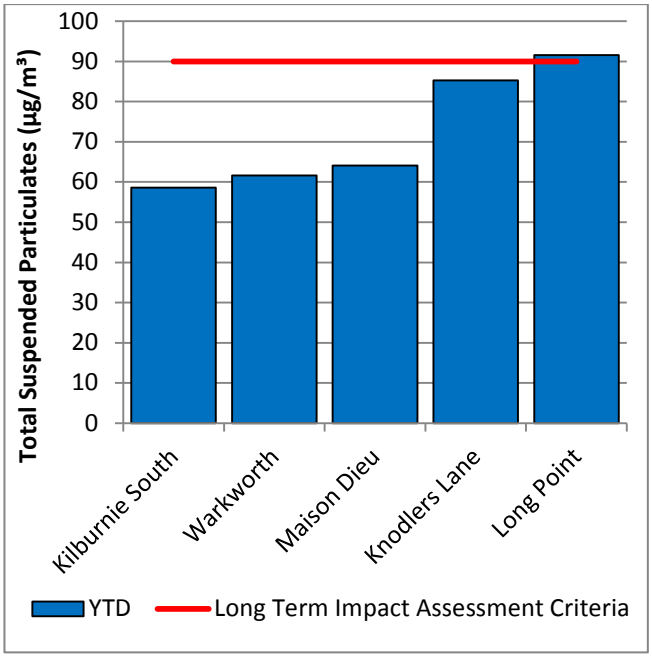

Figure 8: Year to Date Average Total Suspended Particulates – October 2017

2.3.3 Real Time PM_{10} Results

Hunter Valley Operations maintains a network of real time PM_{10} monitors. The real time air quality monitoring stations continuously log information and transmit data to a central database, generating alarms when particulate matter levels exceed internal trigger limits. Results from real time PM_{10} monitoring are used as a reactive measure to guide mining operations to ensure compliance with the relevant conditions of the project approval.

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

2.3.4 Real Time Alarms for Air Quality

During October the real time monitoring system generated 44 automated air quality related alarms. 4 were related to adverse weather conditions and 40 alarms relating to PM_{10}.

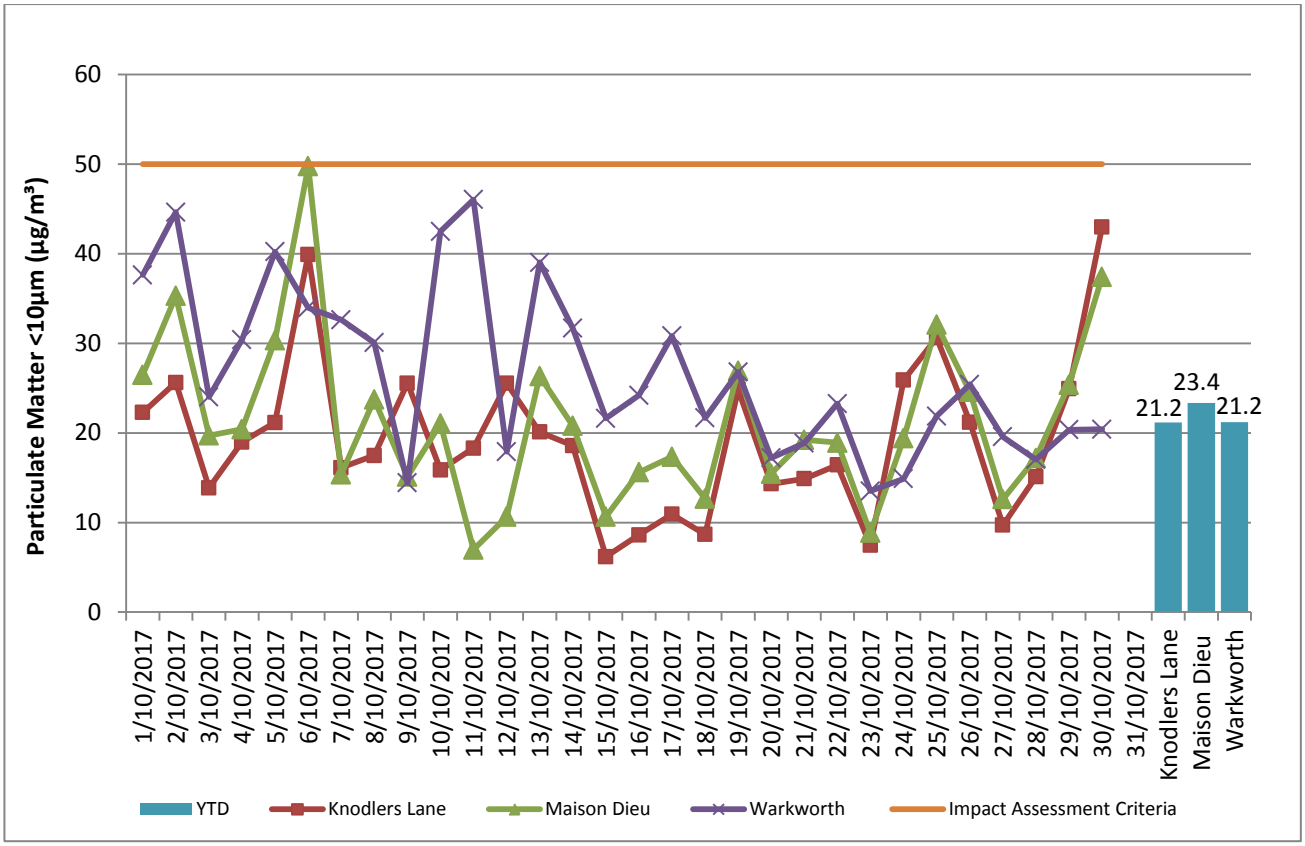

Figure 9: Real Time PM_{10} 24hr average and YTD average – October 2017

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 2017 report.

3.1.2 Site Water Use

Under water allocation licences issued by the NSW DPI 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 2017 monthly report.

4.0 BLASTING

HVO have a network of five blast monitoring units. These are located at nearby privately owned residences and function as regulatory compliance monitors. The location of these monitors can be found in Figure 15.

During October 29 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

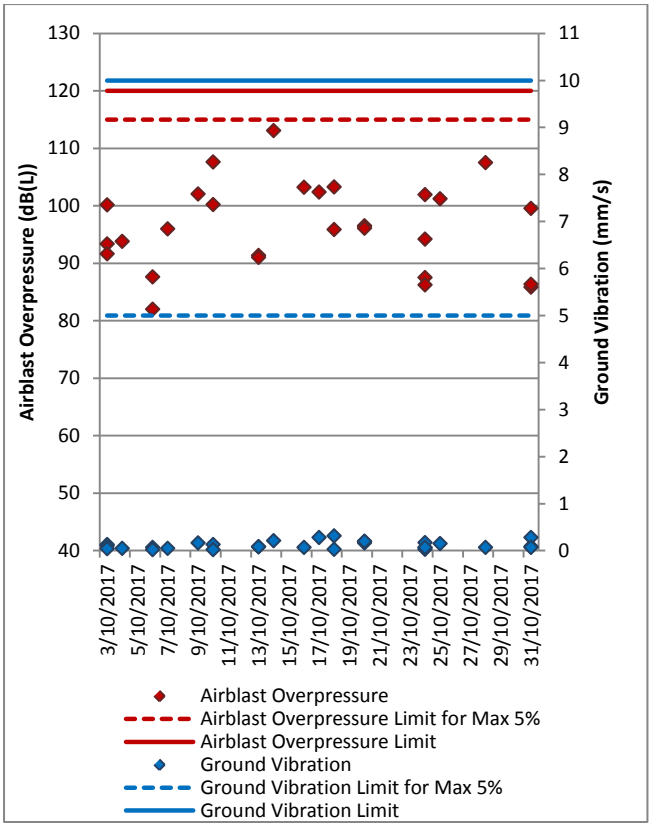

Figure 10: Moses Crossing Blast Monitoring Results – October 2017

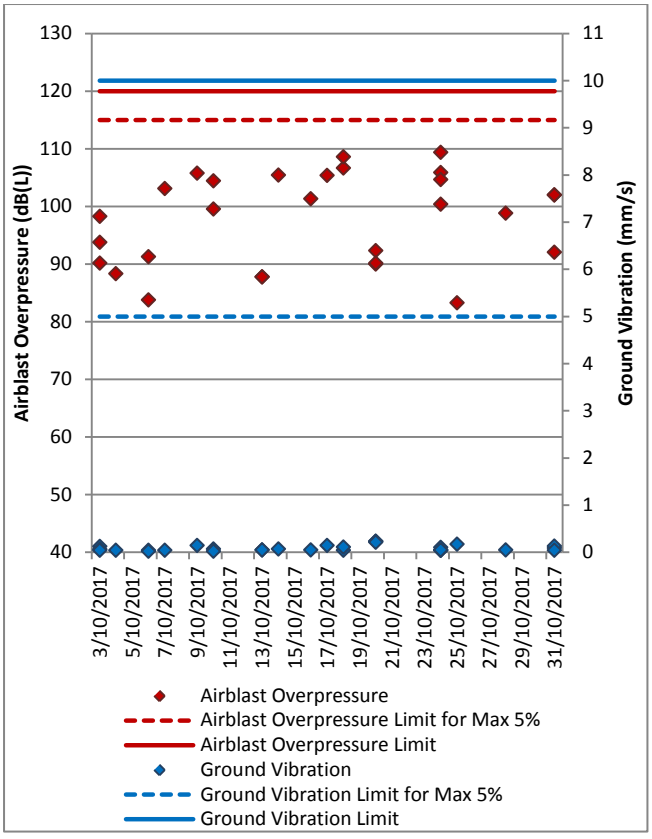

Figure 11: Jerrys Plains Blast Monitoring Results – October 2017

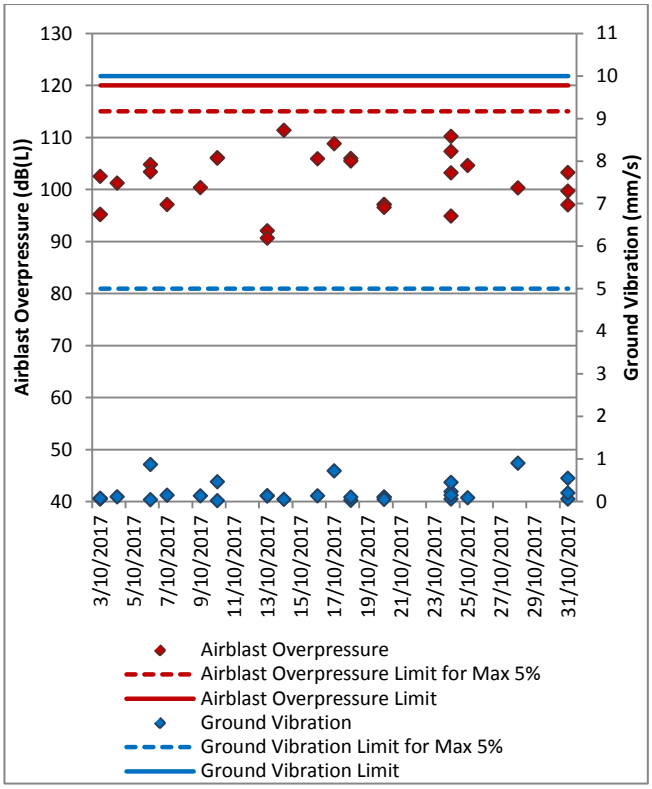

Figure 12: Maison Dieu Blast Monitoring Results – October 2017

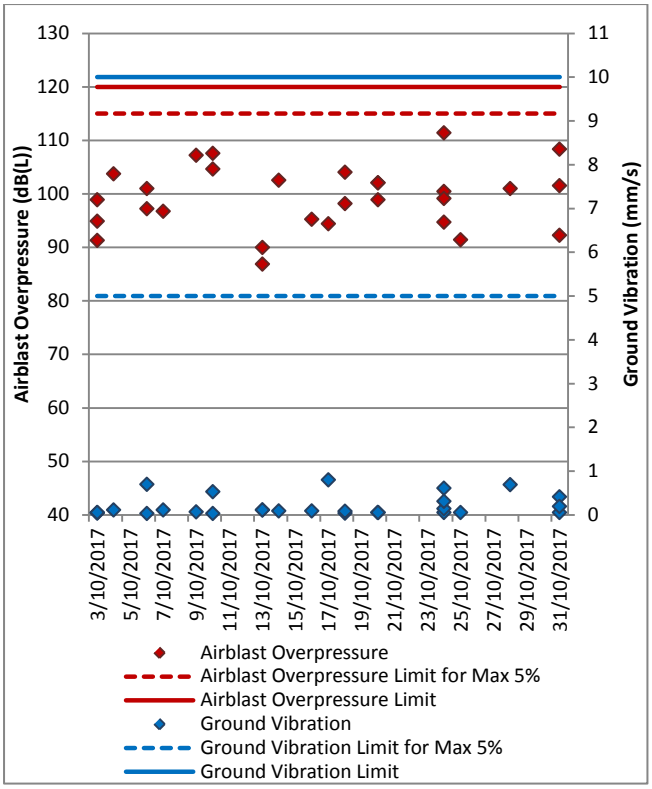

Figure 14: Knodlers Lane Blast Monitoring Results – October 2017

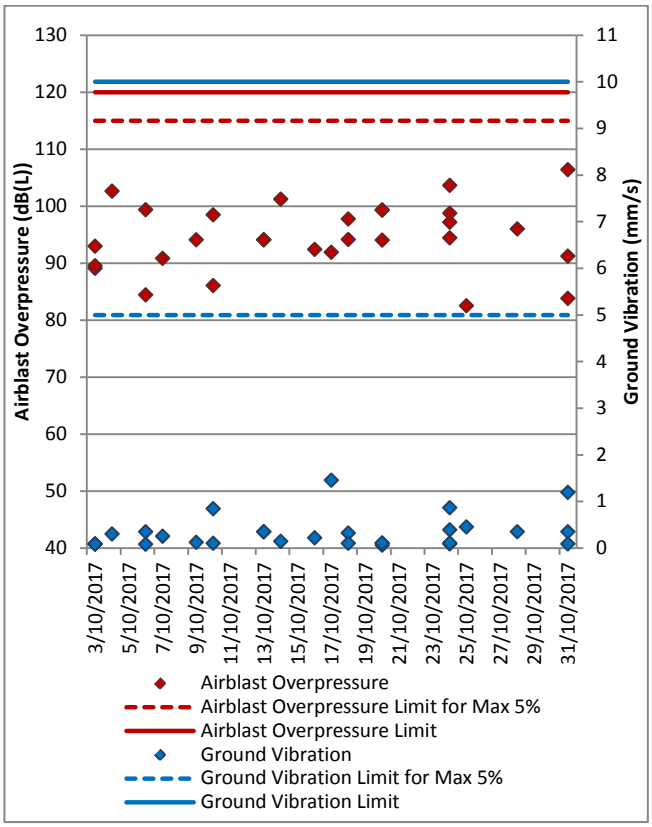

Figure 13: Warkworth Blast Monitoring Results – October 2017

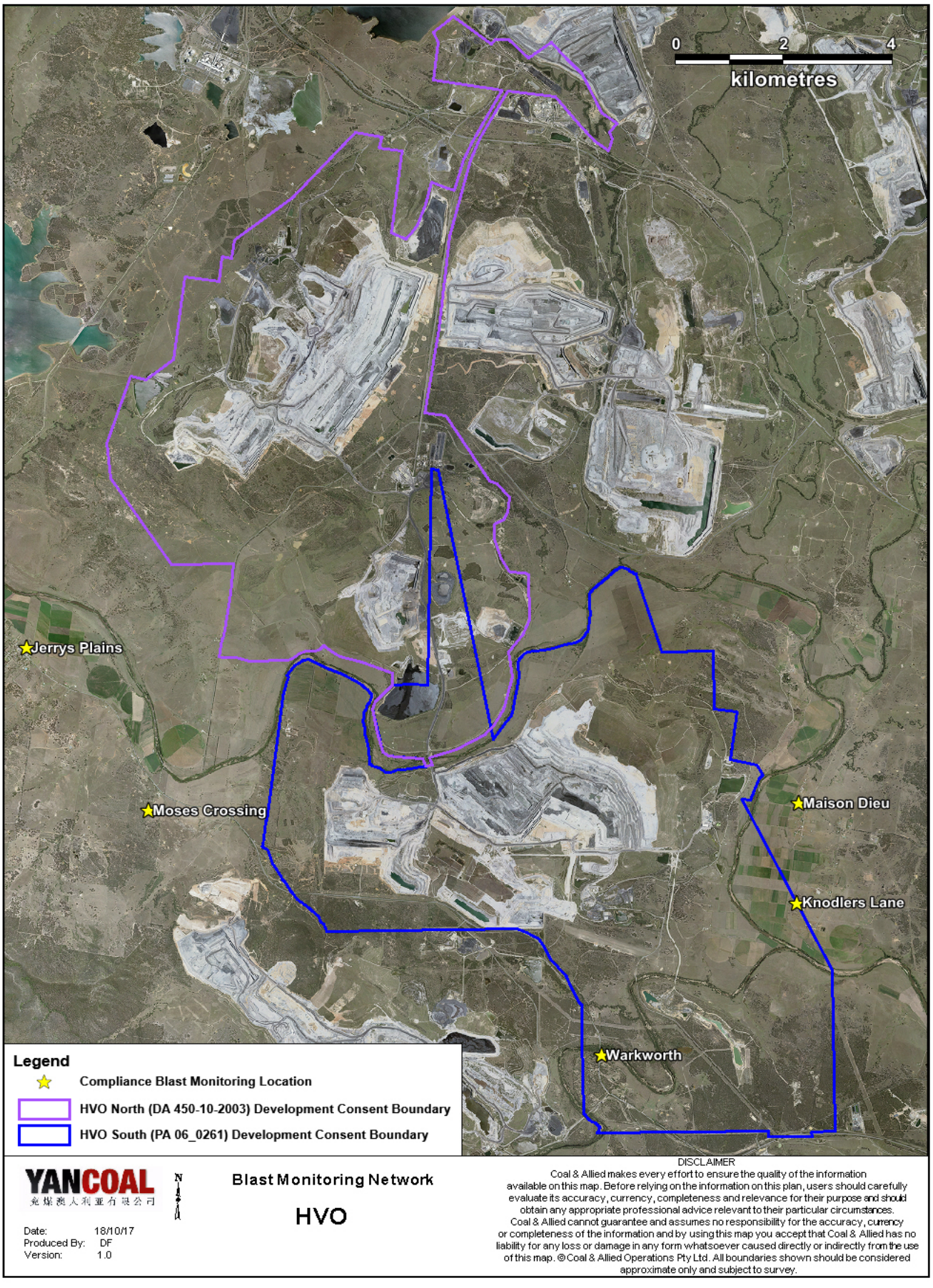

Figure 15: Blast Monitoring Location Plan

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 12-13/10/2017 and 16/10/2017. Monitoring results are detailed in Table 3 to Table 8 .

Table 2: $L_{Aeq,\ 15\ minute}$ HVO South - Impact Assessment Criteria – October 2017

Location	Date and Time	Wind Speed (m/s)[5]	VTG[5]	Criterion dB (A)	Criterion Applies?[1,6]	HVO South L_{Aeq} dB[2,4]	Exceedance[3]
Knodlers Lane	12/10/2017 21:00	3.4	0.5	37	No	41	NA
Maison Dieu	12/10/2017 21:38	3.9	0.5	37	No	36	NA
Shearers Lane	12/10/2017 21:59	3.9	0.5	41	No	33	NA
Kilburnie South	12/10/2017 22:09	3.9	0.5	36	No	38	NA
Kilburnie South[7]	12/10/2017 23:02	3.7	0.5	36	No	38	NA
Kilburnie South[8]	16/10/2017 21:04	4.5	-1	36	No	35	NA
Jerrys Plains Village	12/10/2017 23:42	3.3	0.5	35	No	IA	NA
Jerrys Plains East	13/10/2017 0:11	3	0.5	35	No	30	NA
Long Point Road	16/10/2017 22:01	3.1	-1	35	No	IA	NA
HVGC	12/10/2017 22:50	3.3	0.5	55	No	IA	NA

Table 3: $L_{Aeq,\ 15\ minute}$ HVO South - Land Acquisition Criteria – October 2017

Location	Date and Time	Wind Speed (m/s)[5]	VTG[5]	Criterion dB (A)	Criterion Applies?[1,6]	HVO South L_{Aeq} dB[2,4]	Exceedance[3]
Knodlers Lane	12/10/2017 21:00	3.4	0.5	41	No	41	NA
Maison Dieu	12/10/2017 21:38	3.9	0.5	41	No	36	NA
Shearers Lane	12/10/2017 21:59	3.9	0.5	41	No	33	NA
Kilburnie South	12/10/2017 22:09	3.9	0.5	41	No	38	NA
Kilburnie South[7]	12/10/2017 23:02	3.7	0.5	41	No	38	NA
Kilburnie South[8]	16/10/2017 21:04	4.5	-1	41	No	35	NA
Jerrys Plains Village	12/10/2017 23:42	3.3	0.5	40	No	IA	NA
Jerrys Plains East	13/10/2017 0:11	3	0.5	40	No	30	NA
Long Point Road	16/10/2017 22:01	3.1	-1	40	No	IA	NA
HVGC	12/10/2017 22:50	3.3	0.5	NA	NA	IA	NA

Table 4: $L_{A1,\ 1minute}$ HVO South - Impact Assessment Criteria – October 2017

Location	Date and Time	Wind Speed (m/s)[5]	VTG[5]	Criterion dB (A)	Criterion Applies?[1,6]	HVO South $L_{A1,\ 1min}$ dB[2,4]	Exceedance[3]
Knodlers Lane	12/10/2017 21:00	3.4	0.5	45	No	49	NA
Maison Dieu	12/10/2017 21:38	3.9	0.5	45	No	40	NA
Shearers Lane	12/10/2017 21:59	3.9	0.5	45	No	40	NA
Kilburnie South	12/10/2017 22:09	3.9	0.5	45	No	46	NA
Kilburnie South[7]	12/10/2017 23:02	3.7	0.5	45	No	41	NA
Kilburnie South[8]	16/10/2017 21:04	4.5	-1	45	No	40	NA
Jerrys Plains Village	12/10/2017 23:42	3.3	0.5	45	No	IA	NA
Jerrys Plains East	13/10/2017 0:11	3	0.5	45	No	37	NA
Long Point Road	16/10/2017 22:01	3.1	-1	45	No	IA	NA
HVGC	12/10/2017 22:50	3.3	0.5	NA	NA	IA	NA

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

Table 5: $L_{Aeq,\ 15minute}$ HVO North – Impact Assessment Criteria – October 2017

Location	Date and Time	Wind Speed (m/s)[5]	VTG[5]	Criterion dB (A)	Criterion Applies?[1,6]	HVO North L_{Aeq} dB[2,4]	Exceedance[3]
Knodlers Lane	12/10/2017 21:00	2.5	0.5	35	Yes	IA	Nil
Maison Dieu	12/10/2017 21:38	2.9	-1	35	Yes	IA	Nil
Shearers Lane	12/10/2017 21:59	2.4	-1	35	Yes	IA	Nil
Kilburnie South	12/10/2017 22:09	2.4	-1	39	Yes	IA	Nil
Kilburnie South[7]	12/10/2017 23:02	2.4	-1	39	Yes	IA	Nil
Kilburnie South[8]	16/10/2017 21:04	2.7	-1	39	Yes	<30	Nil
Jerrys Plains Village	12/10/2017 23:42	2	0.5	36	Yes	33	Nil
Jerrys Plains East	13/10/2017 0:11	2.1	0.5	39	Yes	IA	Nil
Long Point Road	16/10/2017 22:01	3.1	-1	35	No	IA	NA
HVGC	12/10/2017 22:50	1.8	0.5	NA	NA	IA	NA

Table 6: $L_{Aeq,15minute}$ HVO North - Land Acquisition Criteria – October 2017

Location	Date and Time	Wind Speed (m/s)[5]	VTG[5]	Criterion dB (A)	Criterion Applies?[1,6]	HVO North L_{Aeq} dB[2,4]	Exceedance[3]
Knodlers Lane	12/10/2017 21:00	2.5	0.5	41	Yes	IA	Nil
Maison Dieu	12/10/2017 21:38	2.9	-1	41	Yes	IA	Nil

Shearers Lane	12/10/2017 21:59	2.4	-1	41	Yes	IA	Nil
Kilburnie South	12/10/2017 22:09	2.4	-1	41	Yes	IA	Nil
Kilburnie South[7]	12/10/2017 23:02	2.4	-1	41	Yes	IA	Nil
Kilburnie South[8]	16/10/2017 21:04	2.7	-1	41	Yes	<30	Nil
Jerrys Plains Village	12/10/2017 23:42	2	0.5	41	Yes	33	Nil
Jerrys Plains East	13/10/2017 0:11	2.1	0.5	41	Yes	IA	Nil
Long Point Road	16/10/2017 22:01	3.1	-1	41	No	IA	NA
HVGC	12/10/2017 22:50	1.8	0.5	NA	NA	IA	NA

Table 7: $L_{A1,\ 1Minute}$ HVO North - Impact Assessment Criteria – October 2017

Location	Date and Time	Wind Speed (m/s)[5]	VTG[5]	Criterion dB (A)	Criterion Applies?[1,6]	HVO North $L_{A1,\ 1min}$ dB[2,4]	Exceedance[3]
Knodlers Lane	12/10/2017 21:00	2.5	0.5	46	Yes	IA	Nil
Maison Dieu	12/10/2017 21:38	2.9	-1	46	Yes	IA	Nil
Shearers Lane	12/10/2017 21:59	2.4	-1	46	Yes	IA	Nil
Kilburnie South	12/10/2017 22:09	2.4	-1	46	Yes	IA	Nil
Kilburnie South[7]	12/10/2017 23:02	2.4	-1	46	Yes	IA	Nil
Kilburnie South[8]	16/10/2017 21:04	2.7	-1	46	Yes	<30	Nil
Jerrys Plains Village	12/10/2017 23:42	2	0.5	46	Yes	42	Nil
Jerrys Plains East	13/10/2017 0:11	2.1	0.5	46	Yes	IA	Nil
Long Point Road	16/10/2017 22:01	3.1	-1	46	No	IA	NA
HVGC	12/10/2017 22:50	1.8	0.5	NA	NA	IA	NA

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

5.2 INP Low Frequency Assessment

In accordance with the requirements of the Industrial Noise Policy (INP), the low frequency modification factor has been applied where appropriate. It should be noted that the Industrial Noise Policy does not give guidance on the application of the penalty where more than one target source is audible. The L_{Ceq} levels reported above are “Total”, or “Total mine noise” at best, and cannot be attributed accurately to a single mine. Accordingly, where the INP criteria for the application of the Low Frequency penalty is triggered, the penalty has been applied to the dominant mine noise source. Resulting L_{Aeq} noise levels exceed the HVO North impact assessment criteria at Jerrys Plains Village by 2dB due to the application of a 5 dB penalty to the site only L_{Aeq}.

HVO reports these measurements so as to ensure full disclosure, however it remains HVO's position that the prescribed methodology is unsuitable when applied to receptors at large distances from mine noise sources due to the nature of noise attenuation. Excess attenuation of noise with distance is greater for high frequency noise than it is for low frequency noise. At significant distance from a noise source (such as private residences from HVO) this often results in large differentials between L_{Aeq} and L_{Ceq}. The NSW Industrial Noise Policy requires the penalty to be applied in these instances, irrespective of actual low frequency affectation. As such, HVO does not consider these instances to constitute non-compliance with the conditions of approval. The results have been reported to the Department of Planning and Environment.

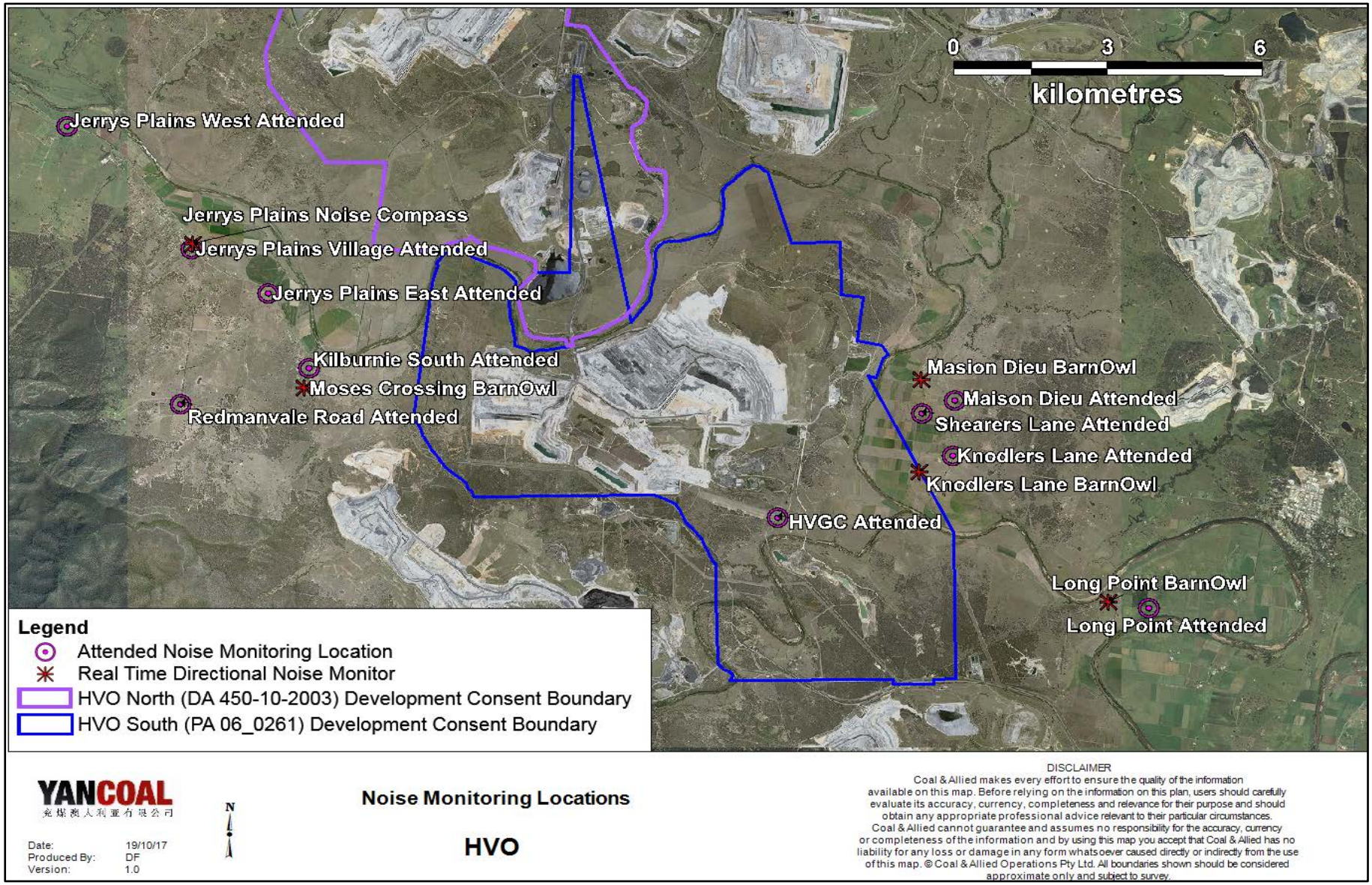

Figure 16: Noise Monitoring Location Plan

5.2.1 Real Time Noise Monitoring

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

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 490.4 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.

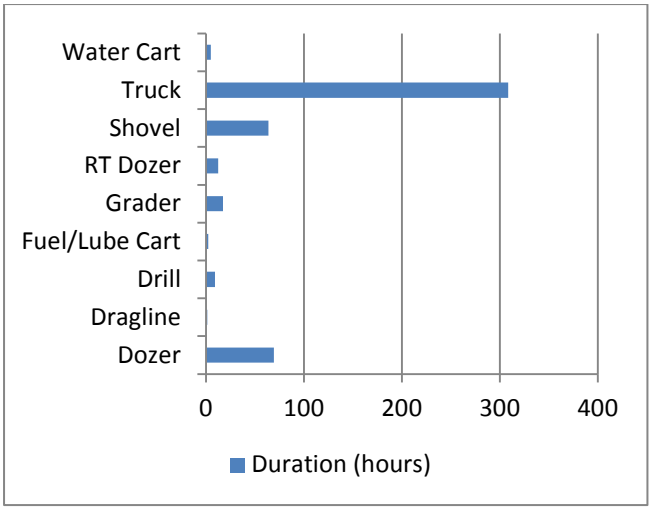

Figure 17: Operational Downtime by Equipment Type – October 2017

7.0 REHABILITATION

During October 3.94 Ha of land was released, 19.55Ha of land was bulk shaped, 4.24 Ha of land was topsoiled, 25.92 Ha of land was composted and 14.85 Ha of land was rehabilitated. Year to date progress can be viewed in Figure 18.

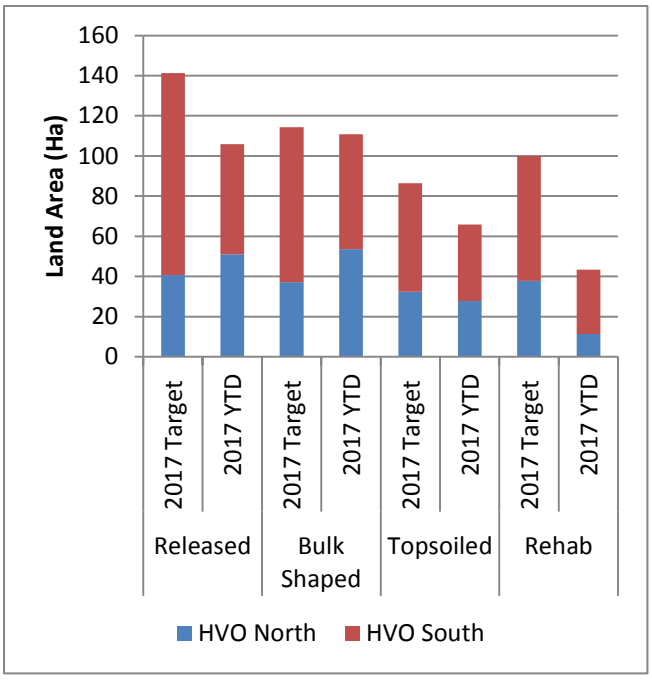

Figure 18: Rehabilitation YTD - October 2017

8.0 COMPLAINTS

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

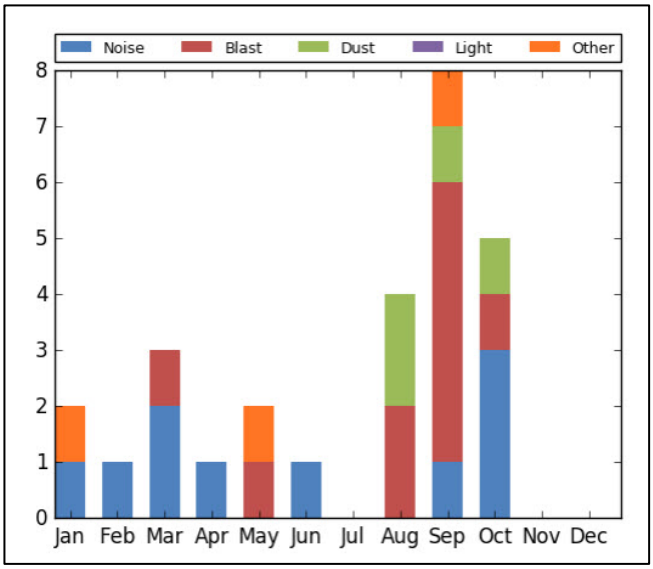

Figure 19: Complaints Graph - October 2017

9.0 ENVIRONMENTAL INCIDENTS

During the reporting period there were no reportable environmental incidents.

Appendix A: Meteorological Data

Table 8: Meteorological Data - HVO Corporate Meteorological Station – October 2017

Date	Air Temperature Maximum (°C)	Air Temperature Minimum (°C)	Relative Humidity Maximum (%)	Relative Humidity Minimum (%)	Solar Radiation Maximum (W/Sq. M)	Wind Direction Average (°)	Wind Speed Average (m/sec)	Rainfall(mm)
1/10/2017	26.3	8.0	88.7	6.4	1080	210.2	1.9	0.0
2/10/2017	21.7	7.0	86.0	30.1	789	157.8	1.2	0.0
3/10/2017	26.8	10.7	100.0	29.7	1323	157.0	1.3	0.0
4/10/2017	28.9	11.2	99.0	24.7	954	165.9	2.1	0.0
5/10/2017	30.8	13.8	94.2	18.4	1168	204.3	1.6	0.0
6/10/2017	25.7	11.8	84.2	7.6	1122	208.3	2.6	0.0
7/10/2017	21.8	9.8	88.6	37.3	1385	116.4	3.0	0.0
8/10/2017	20.3	8.9	100.0	52.9	730	208.4	1.1	1.6
9/10/2017	30.5	15.5	99.0	28.3	1105	280.8	3.7	0.0
10/10/2017	23.4	12.8	89.2	56.0	1301	122.0	3.3	0.0
11/10/2017	32.6	14.4	88.8	21.6	1085	162.9	1.5	0.0
12/10/2017	29.3	13.2	91.6	9.8	1286	267.2	4.7	1.2
13/10/2017	29.9	11.2	100.0	12.2	965	151.2	1.7	0.0
14/10/2017	20.2	11.5	100.0	61.3	1113	129.0	4.0	9.4
15/10/2017	24.9	11.2	100.0	40.3	1586	125.3	3.2	0.6
16/10/2017	24.4	9.6	99.0	32.1	1396	119.0	3.4	0.0
17/10/2017	26.7	10.6	89.1	29.9	1274	118.1	4.0	0.0
18/10/2017	29.7	-	57.1	-	1191	112.0	3.7	0.0
19/10/2017	31.6	-	69.2	-	961	180.1	1.4	0.0
20/10/2017	23.4	10.1	100.0	39.8	262	204.5	2.8	19.6
21/10/2017	20.2	9.1	93.4	40.4	1558	112.3	2.5	0.0
22/10/2017	23.6	6.5	100.0	24.8	1149	183.6	2.1	0.0
23/10/2017	22.0	7.7	100.0	40.9	1316	112.5	2.5	2.2
24/10/2017	29.7	8.5	100.0	17.7	1037	277.7	2.7	0.0
25/10/2017	31.3	16.0	59.2	13.6	1315	-	3.0	0.0
26/10/2017	30.4	9.1	100.0	34.3	1031	115.1	2.5	19.6
27/10/2017	24.6	10.5	100.0	48.8	1453	196.0	2.0	0.2
28/10/2017	28.5	12.3	100.0	27.4	1084	245.3	1.9	0.2
29/10/2017	32.6	18.0	51.6	19.0	1304	-	3.6	0.0
30/10/2017	35.5	15.8	61.8	8.1	1186	249.8	5.0	0.0
31/10/2017	22.2	9.6	67.9	18.5	1466	159.4	2.3	0.0

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