Ashton Coal

Environmental Noise Monitoring

August 2017

Prepared for

Ashton Coal Operations Pty Ltd

Global Acoustics

Noise and Vibration Analysis and Solutions

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Environmental Noise Monitoring
August 2017

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Global Acoustics Pty Ltd ~ Environmental noise modelling and impact assessment ~ Sound power testing ~ Noise control advice ~ Noise and vibration monitoring ~ OHS noise monitoring and advice ~ Expert evidence in Land and Environment and Compensation Courts ~ Architectural acoustics ~ Blasting assessments and monitoring ~ Noise management plans (NMP) ~ Sound level meter and noise logger sales and hire

EXECUTIVE SUMMARY

Global Acoustics was engaged by Ashton Coal Operations to conduct monthly noise monitoring for the Ashton Coal Project (ACP) in accordance with the relevant Project Approval, Environment Protection Licence, and Noise Management Plan.

Environmental noise monitoring described in this report was undertaken during the night of 2/3 August 2017. The survey purpose is to quantify and describe the existing acoustic environment at monitoring locations around the site and compare results with relevant limits.

Operational Noise Assessment

Activities from ACP complied with the relevant project specific noise limits at all monitoring locations. during attended noise monitoring for August 2017.

Meteorological conditions resulted in criteria being not applicable during all measurements.

Low Frequency Assessment

None of the 3 measurements occurred during which ACP was the primary low frequency source, was directly measurable (not "inaudible", "not measurable" or less than a maximum cut-off value "<30 dB"), where ACP was within 5 dB of the criterion (or exceeded the criterion), and where meteorological conditions resulted in criteria applying (in accordance with the consent). No further low frequency assessment was undertaken.

Global Acoustics Pty Ltd

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1 INTRODUCTION

1.1 Background

Global Acoustics was engaged by Ashton Coal Operations to conduct environmental noise monitoring for the Ashton Coal Project (ACP). ACP is an underground mine located to the north-west of Camberwell, off the New England Highway.

Monthly attended noise monitoring is a requirement of the ACP Noise Management Plan (NMP). Monitoring described in this report was undertaken at three locations during the night period of 2/3 August 2017.

The survey purpose is to quantify and describe the existing acoustic environment at monitoring locations around the site and compare results with relevant limits.

1.2 Attended Noise Monitoring Locations

There were three monitoring locations during this survey as detailed in Table 1.1 and shown on Figure 1. It should be noted that this figure shows the actual monitoring position, not the location of residences.

Table 1.1: ACP ATTENDED NOISE MONITORING LOCATIONS

Report Descriptor	Monitoring Location
N2	Camberwell village (west)
N3	Camberwell village (north-east)
N4	South of New England Highway

Figure 1: ACP Attended Noise Monitoring locations

Source: Ashton Coal Project NMP

1.3 Terminology & Abbreviations

Some definitions of terms and abbreviations, which may be used in this report, are provided in Table 1.2.

Table 1.2: TERMINOLOGY & ABBREVIATIONS

Descriptor	Definition
L_A	The A-weighted root mean squared (RMS) noise level at any instant
L_{Amax}	The maximum A-weighted noise level over a time period or for an event
L_{A1}	The noise level which is exceeded for 1 per cent of the time
L_{A10}	The noise level which is exceeded for 10 percent of the time, which is approximately the average of the maximum noise levels
L_{A50}	The noise level which is exceeded for 50 per cent of the time
L_{A90}	The level exceeded for 90 percent of the time, which is approximately the average of the minimum noise levels. The L_{A90} level is often referred to as the "background" noise level and is commonly used to determine noise criteria for assessment purposes
L_{Amin}	The minimum A-weighted noise level over a time period or for an event
L_{Aeq}	The average noise energy during a measurement period
dB(A)	Noise level measurement units are decibels (dB). The "A" weighting scale is used to describe human response to noise
SPL	Sound pressure level (SPL), fluctuations in pressure measured as 10 times a logarithmic scale, the reference pressure being 20 micropascals
Hertz (Hz)	Cycles per second, the frequency of fluctuations in pressure, sound is usually a combination of many frequencies together
VTG	Vertical temperature gradient in degrees Celsius per 100 metres altitude
IA	Inaudible. When site only noise is noted as IA, there was no noise from the source of interest audible at the monitoring location
NM	Not Measurable. If site only noise is noted as NM, this means some noise from the source of interest was audible at low-levels, but could not be quantified
Day	This is the period 7:00am to 6:00pm
Evening	This is the period 6:00pm to 10:00pm
Night	This is the period 10:00pm to 7:00am

2 CONSENT AND CRITERIA

2.1 Project Approval and Project Specific Criteria

The sections of the project approval relating to noise are reproduced in Appendix A. Different noise limits exist for ACP when open cut mining operations are not being undertaken. As this is currently the case, noise impact assessment criteria are outlined in Appendix 6 the PA (MOD 5) and are detailed in Table 2.1.

Table 2.1: ACP NOISE IMPACT ASSESSMENT CRITERIA

Descriptor	Day/Evening/Night Impact Assessment Criteria $L_{Aeq,15minute}$	Night Impact Assessment Criteria $L_{A1,1minute}$
N2	38/38/36	46
N3	38/38/36	46
N4	38/38/36	46

Appendix 8 of the project approval states:

> *Data collected for the purposes of determining compliance with the relevant conditions of this approval is to be excluded under the following meteorological conditions:*
>
> *a) during periods of rain or hail;*
>
> *b) average wind speed at microphone height exceeds 5 m/s;*
>
> *c) wind speeds greater than 3 m/s measures at 10 m above ground level; and*
>
> *d) temperature inversion conditions greater than 3°C/100m.*

This has been interpreted to mean that criteria used for determining compliance are not applicable under the above meteorological conditions.

2.2 Environment Protection Licence

ACP holds Environment Protection Licence (EPL) No. 11879. The most recent license revision was issued on 24 October 2016. The relevant sections of the EPL relating to noise are reproduced in Appendix A.

2.3 Modifying Factors

Noise monitoring and reporting is carried out generally in accordance with the Environment Protection Authority (EPA) 'Industrial Noise Policy' (INP). Chapter 4 of the INP deals specifically with modifying factors that may apply to industrial noise. The most common modifying factors are addressed in detail below.

As detailed in the notes below Condition 2, Schedule 3 of the project approval:

> *Noise generated by the project is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions), of the NSW Industrial Noise Policy.*

2.3.1 Tonality, Intermittent and Impulsive Noise

As defined in the Industrial Noise Policy:

> *Tonal noise contains a prominent frequency and is characterised by a definite pitch.*
>
> *Impulsive noise has high peaks of short duration and a sequence of such peaks.*
>
> *Intermittent noise is characterised by the level suddenly dropping to the background noise levels several times during a measurement, with a noticeable change in noise level of at least 5 dB. Intermittent noise applies to night-time only.*

Years of monitoring have indicated that noise levels from mining operations, particularly those levels measured at significant distances from the source are relatively continuous. Given this, noise levels from Maules Creek Coal at the monitoring locations are unlikely to be intermittent. In addition, there is no equipment on site that is likely to generate tonal or impulsive noise as defined in the INP.

2.3.2 Low Frequency Noise

INP Method

As defined in the Industrial Noise Policy:

> *Low frequency noise contains major components within the low frequency range (20 Hz to 250 Hz) of the frequency spectrum.*

As detailed in Chapter 4 of the INP, low frequency noise should be assessed by measuring the site only C-weighted and site only A-weighted level over the same time period. The correction of 5 dB is applied *if the difference between the two levels is 15 dB or more*.

Broner Method

Low frequency noise can also be assessed against criteria specified in the paper 'A Simple Method for Low Frequency Noise Emission Assessment' (Broner JLFNV Vol29-1 pp1-14 2010). If the predicted site only C- weighted noise level at a receptor exceeds the relevant modifying factor trigger, a 5 dB penalty (modifying factor) is added to measured levels. This method is included to provide a comparison with the INP method.

dING Method

Whilst the INP is the current document for assessment of industrial noise impact in NSW, the EPA has recently published the Draft Industrial Noise Guideline (dING), which is currently under review after a period of public consultation. The dING contains an alternate method of assessing low frequency noise to the INP, which is:.

> *Measure/assess C-weighted and A-weighted $L_{eq,}T$ levels over the same time period. The low frequency noise modifying factor correction is to be applied where the C-A level exceeds 15 dB and:*
>
> • *where any of the 1/3 octave noise levels in Table C2 are exceeded by* ***up to*** *5 dB and cannot be mitigated, a 2 dBA positive adjustment to measured A weighted levels applies for the evening/night period; and*
>
> • *where any of the 1/3 octave noise levels in Table C2 are exceeded by* ***more than*** *5 dB and cannot be mitigated, a 5 dBA positive adjustment to measured A weighted levels applies for the evening/night period and a 2 dBA positive adjustment applies for the daytime period.*

Table C2 of the dING is reproduced below:

Table C2: One-third octave low frequency noise thresholds

Hz/dB(Z)	One-third octave $L_{Zeq,15minute}$ threshold level												
f,Hz	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
dB(Z)	92	89	86	77	69	61	54	50	50	48	48	46	44

Note: dB(z) = decibel (Z-weighted); f,Hz = frequency in Hertz; Hz/dB(Z) = hertz per decibel (Z-weighted). For the assessment of low frequency noise, care should be taken to select a wind screen that has wind-induced noise characteristics at least 10 dB below the threshold values in Table C2 for wind speeds up to 5 metres per second. It is likely that high performance larger diameter wind screens (nominally 175 mm) will be required to achieve this performance (Hessler et.al. 2008). In any case, the performance of the wind screen and wind speeds at which data will be excluded needs to be stated.

Low frequency noise shall be assessed under the meteorological conditions under which noise limits would apply.

Measurements should be made between 1.2 and 1.5 metres above ground level unless otherwise approved through a planning instrument (consent/approval) or Environment Protection Licence and at locations nominated in the development consent or license.

2.3.3 Low Frequency Noise Assessment Methods

Low frequency assessment methods are summarised in Table 2.2.

Table 2.2: LOW FREQUENCY ASSESSMENT METHODS AND MODIFYING FACTOR TRIGGERS

Assessment Method	Calculation Method
Broner, 2010	Site only L_{Ceq}
INP	Site only L_{Ceq} minus site only L_{Aeq}
dING	1. Site only L_{Ceq} minus site only L_{Aeq} 2. One third octave low frequency noise threshold

Triggers and penalties associated with each method are outlined in Section 2.3.2.

3 METHODOLOGY

3.1 Overview

Noise monitoring was conducted at the monitoring locations in accordance with the Environmental Protection Authority (EPA) 'Industrial Noise Policy' (INP) guidelines and Australian Standard AS1055 'Acoustics, Description and Measurement of Environmental Noise'.

Meteorological data was obtained from ACP's weather stations; 'Repeater Weather Station' (M2) and 'Site 1 Weather Station' (M1). This allowed correlation of atmospheric parameters and measured noise levels. See Section 3.3 for further details on calculation method. Atmospheric condition measurement at ground level was also undertaken.

3.2 Attended Noise Monitoring

During this survey, attended monitoring was undertaken at three locations predominantly during night period, once at each location. The measurement at N4 commenced in the late evening period but the majority of the measurement occurred during the night period. Results for this measurement have been compared to the night time criterion. The duration of each measurement was 15 minutes.

Attended monitoring is preferred to the use of noise loggers when determining compliance with prescribed limits as it allows the most accurate determination of the contribution, if any, to measured noise levels by the source of interest, in this case Ashton Coal Project.

If the exact contribution of the source of interest cannot be established, due to masking by other noise sources in a similar frequency range, but site noise levels are observed to be well below (more than 5 dB lower than) any relevant criterion, a maximum estimate of the potential contribution of the site might be made based on other measured site-only noise levels, for example L_{A10}, L_{A50} or L_{A90}. This is generally expressed as a 'less than' quantity, such as <20 dB or <30 dB.

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may also be used in this report. When site noise is noted as IA, no site noise was audible at the monitoring location. When site noise is noted as NM, this means some noise was audible but could not be quantified. If site noise was NM due to masking but estimated to be significant in relation to a relevant criterion, we would employ methods as per the Industrial Noise Policy (e.g. measure closer and back calculate) to determine a value for reporting.

All sites noted as NM in this report are due to one or more of the following reasons:

- site noise levels were extremely low and unlikely, in many cases, to be even noticed;
- site noise levels were masked by another relatively loud noise source that is characteristic of the environment (e.g. breeze in foliage or continuous road traffic noise) that cannot be eliminated by moving closer; and/or

- it was not feasible or reasonable to employ INP methods such as move closer and back calculate. Cases may include, but are not limited to, rough terrain preventing closer measurement, addition/removal of significant source to receiver shielding caused by moving closer, and meteorological conditions where back calculation may not be accurate.

A measurement of $L_{A1,1minute}$ corresponds to the highest noise level generated for 0.6 second during one minute. In practical terms this was quantified by measuring or estimating the highest noise level emitted from a site noise source during the entire measurement period (i.e. the highest level of the worst minute during the 15 minute measurement).

To avoid disturbance to residents, particularly during the night period, monitoring locations have been used to represent multiple residences. Suitable monitoring locations where noise levels are likely to be higher than those measured at the residence are chosen to take a conservative approach, as the direct measurement of noise 1 metre from the dwelling facades or within 30 metres of the residence is often impractical due to access requirements and the presence of dogs, air conditioners and other noise sources at the residences.

Received levels from various noise sources were noted during attended monitoring and particular attention was paid to the extent of ACP's contribution, if any, to measured levels. At each receptor location, the $L_{Aeq,15min}$ for ACP (in the absence of any other noise) was measured directly, where possible, or determined by frequency analysis. Time variations of noise sources in each measurement, their temporal characteristics, are taken into account via statistical descriptors.

3.3 Vertical Temperature Gradient Estimation

Temperature inversion conditions have been determined using direct measurement method as referred to in Part E2 of Appendix E to the NSW INP.

Inversion strength based on the temperature differential between the two weather stations was calculated using the following formula:

Inversion strength = (upper height temp – lower height temp) x (100/[upper height – lower height]),

Where:

- Upper height temperature is the temperature measured at 10 metres above ground level at M2;
- Lower height temperature is the temperature measured at 10 metres above ground level at M1; and
- Upper height – lower height is the vertical difference between M2 and M1 (which is 55.6 metres).

Other meteorological data, such as wind speed, was sourced from M2.

3.4 Noise Monitoring Equipment

The equipment used to measure environmental noise levels is detailed in Table 3.1. Calibration certificates are provided in Appendix B.

Table 3.1: ATTENDED NOISE MONITORING EQUIPMENT

Model	Serial Number	Calibration Due Date
Rion NA-28 sound level analyser	00701424	05/06/2019
Rion NA-28 sound level analyser	01070590	28/06/2018
Pulsar 106 acoustic calibrator	79631	30/03/2019
Pulsar 106 acoustic calibrator	74813	05/06/2019

4 RESULTS

4.1 Attended Noise Monitoring

Noise levels measured at each location during attended surveys are provided in Table 4.1. These noise levels are the result of many sounds reaching the sound level meter microphone during monitoring.

Table 4.1: MEASURED NOISE LEVELS - AUGUST 2017

Location	Start Date and Time	L_{Amax} dB	L_{A1} dB	L_{A10} dB	L_{A50} dB	L_{Aeq} dB	L_{A90} dB	L_{Amin} dB	L_{Ceq} dB
N2	03/08/2017 00:53	60	55	50	42	46	36	32	54
N3	03/08/2017 00:33	63	59	53	44	49	39	34	57
N4	02/08/2017 21:55	54	50	46	42	43	39	36	56

Notes:

1. *Levels in this table are not necessarily the result of activity at ACP.*

Table 4.2 compares measured $L_{Aeq,15minute}$ levels from ACP with impact assessment criteria.

Table 4.2: $L_{Aeq,15minute}$ GENERATED BY ACP AGAINST IMPACT ASSESSMENT CRITERIA – AUGUST 2017

Location	Start Date and Time	Wind Speed m/s[1,5]	VTG °C/100m[1,5]	Criterion dB	Criterion Applies?[1,5]	ACP L_{Aeq} dB[2,4]	Exceedance[3,4]
N2	03/08/2017 00:53	0.7	7.4	36	No	<30	NA
N3	03/08/2017 00:33	1.8	5.4	36	No	IA	NA
N4	02/08/2017 21:55[6]	1.4	8.6	36	No	IA	NA

Notes:

1. *Noise emission limits do not apply during the following meteorological conditions: periods of rain or hail, wind speeds greater than 3 metres per second (at a height of 10 metres); or temperature inversion conditions greater than 3°C/100m;*
2. *Estimated or measured $L_{Aeq,15minute}$ attributed to ACP;*
3. *NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable;*
4. *Bold results in red indicate exceedance of criteria;*
5. *Criterion may or may not apply due to rounding of meteorological data values; and*
6. *This measurement commenced in the late evening period, however, was predominantly undertaken during the night period. ACP noise levels were therefore compared against night time criterion.*

Table 4.3 compares measured $L_{A1,1minute}$ levels from ACP with impact assessment criteria.

Table 4.3: $L_{A1,1minute}$ GENERATED BY ACP AGAINST IMPACT ASSESSMENT CRITERIA – AUGUST 2017

Location	Start Date and Time	Wind Speed m/s[1,5]	VTG °C/100m[1,5]	Criterion dB	Criterion Applies?[1,5]	ACP $L_{A1,1min}$ dB[2,4]	Exceedance[3,4]
N2	03/08/2017 00:53	0.7	7.4	46	No	33	NA
N3	03/08/2017 00:33	1.8	5.4	46	No	IA	NA
N4	02/08/2017 21:55[6]	1.4	8.6	46	No	IA	NA

Notes:

1. *Noise emission limits do not apply during the following meteorological conditions: periods of rain or hail, wind speeds greater than 3 metres per second (at a height of 10 metres); or temperature inversion conditions greater than 3°C/100m;*
2. *Estimated or measured $L_{A1,1minute}$ attributed to ACP;*
3. *NA in exceedance column means atmospheric conditions outside conditions specified in development consent and so criterion is not applicable;*
4. *Bold results in red indicate exceedance of criteria;*
5. *Criterion may or may not apply due to rounding of meteorological data values; and*
6. *This measurement commenced in the late evening period, however, was predominantly undertaken during the night period. ACP noise levels were therefore compared against night time criterion.*

4.2 Low Frequency Assessment

Table 4.4 provides statistics for attended noise monitoring undertaken around ACP during the survey.

Table 4.4: ATTENDED MEASUREMENT STATISTICS FOR ACP – AUGUST 2017

Conditions	Total for August 2017
Number of measurements	3
Number of measurements where criterion applied	0
Number of measurements where ACP was measurable, was within 5 dB of the criterion (or exceeded the relevant criterion) and criterion applied	0

None of the three measurements occurred during which operational activities from ACP were directly measurable (not "inaudible", "not measurable" or less than a maximum cut-off value of 30 dB), were within 5 dB of the relevant criterion (or exceeded the relevant criterion) and where meteorological conditions resulted in criteria applying (in accordance with the project approval). No further low-frequency assessment was required.

4.3 Atmospheric Conditions

Atmospheric condition data measured by the operator at each location is shown in Table 4.5. Atmospheric condition data is routinely recorded on a site-by-site basis to show conditions during the monitoring period. The wind speed, direction and temperature were measured at 1.8 metres. Attended noise monitoring is not undertaken during rain or hail.

Table 4.5: MEASURED ATMOSPHERIC CONDITIONS – AUGUST 2017

Location	Start Date and Time	Temperature Degrees	Wind Speed m/s	Wind Direction Degrees	Cloud Cover Eighths
N2	03/08/2017 00:53	8	0.4	90	0
N3	03/08/2017 00:33	5	0.4	90	0
N4	02/08/2017 21:55	7	0.0	-	0

Notes:

1. *Wind speed and direction measured at 1.8 metres; and*
2. *"-" indicates calm conditions at 1.8 metres.*

Meteorological data from ACP weather stations is used to determine compliance with specified noise criteria.

5 SUMMARY OF COMPLIANCE

Global Acoustics was engaged by Ashton Coal Operations to conduct noise monitoring for the Ashton Coal Project in accordance with Project Approval, EPL, and NMP.

The following summaries apply to attended noise monitoring conducted during the night period 2/3 August 2017.

Operational Noise Assessment

Activities from ACP complied with the relevant development consent noise limits during attended noise monitoring for August 2017 at all monitoring locations.

Meteorological conditions resulted in criteria being not applicable during all measurements.

Low Frequency Assessment

None of the three measurements occurred during which ACP was the primary low frequency source, was directly measurable (not "inaudible", "not measurable" or less than a maximum cut-off value "<30 dB"), where ACP was within 5 dB of the criterion (or exceeded the criterion), and where meteorological conditions resulted in criteria applying (in accordance with the consent). No further low frequency assessment was undertaken.

Global Acoustics Pty Ltd

APPENDIX

A PROJECT APPROVAL AND ENVIRONMENT PROTECTION LICENCE

A.1 ASHTON COAL OPERATIONS PROJECT APPROVAL

Relevant sections of project approval (modification 5) are reproduced below.

APPENDIX 6
ALTERNATE NOISE CONDITIONS

NOISE

Application

1. Conditions 2 to 3 below have effect during times when open cut mining operations are not being undertaken at the Ashton Mine Complex, in the opinion of the Secretary.

Noise Criteria

2. Except for the noise-affected land in Table 1 of Schedule 3, the Applicant must ensure that the noise generated by the development does not exceed the criteria in Table 1 at any residence on privately-owned land or on more than 25 per cent of any privately-owned land.

Table 1: Noise Criteria dB(A)

Receiver No.	Receiver	Day ($L_{Aeq\ (15min)}$)	Evening ($L_{Aeq\ (15min)}$)	Night ($L_{Aeq\ (15min)}$)	Night ($L_{A1\ (1min)}$)
-	All privately-owned land	38	38	36	46

Noise generated by the development is to be measured in accordance with the relevant requirements of the *NSW Industrial Noise Policy*. Appendix 8 sets out the requirements for evaluating compliance with these criteria.

However, these noise criteria do not apply if the Applicant has an agreement with the relevant owner/s of the residence/land to generate higher noise levels, and the Applicant has advised the Department in writing of the terms of this agreement.

Additional Noise Mitigation Measures

3. Upon receiving a written request from the owner of any residence on any privately-owned land where subsequent operational noise monitoring shows the noise generated by the development exceeds the noise limits in Table 2, the Applicant must implement additional reasonable and feasible noise mitigation measures (such as double glazing, insulation, and/or air conditioning) at the residence in consultation with the owner.

If within 3 months of receiving this request from the landowner, the Applicant and the landowner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Secretary for resolution.

Table 2: Additional Noise Mitigation Criteria dB(A) $L_{Aeq\ (15min)}$

Receiver No.	Receiver	Day ($L_{Aeq\ (15min)}$)	Evening ($L_{Aeq\ (15min)}$)	Night ($L_{Aeq\ (15min)}$)
-	All privately-owned land	38	38	38

Notes:

- *Noise generated by the development is to be measured in accordance with the relevant requirements of the NSW Industrial Noise Policy. Appendix 8 sets out the requirements for evaluating compliance with these criteria.*
- *For this condition to apply, the exceedance of the criteria must be systemic.*

APPENDIX 8
NOISE COMPLIANCE ASSESSMENT

Compliance Monitoring

1. Attended monitoring is to be used to evaluate compliance with the relevant conditions of this approval.

2. Data collected for the purposes of determining compliance with the relevant conditions of this approval is to be excluded under the following meteorological conditions:
   a) during periods of rain or hail;
   b) average wind speed at microphone height exceeds 5 m/s;
   c) wind speeds greater than 3 m/s measures at 10 m above ground level; and
   d) temperature inversion conditions greater than 3°C/100m.

3. Unless otherwise agreed with the Secretary, this monitoring is to be carried out in accordance with the relevant requirements relating for reviewing performance set out in the NSW Industrial Noise Policy (as amended from time to time), in particular the requirements relating to:
   a) monitoring locations for the collection of representative noise data;
   b) equipment used to collect noise data, and conformity with Australian Standards relevant to such equipment; and
   c) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration.

4. To the extent that there is any inconsistency between the Industrial Noise Policy and the requirements set out in this Appendix, the Appendix prevails to the extent of the inconsistency.

Determination of Meteorological Conditions

5. Except for wind speed at microphone height, the data to be used for determining meteorological conditions shall be that recorded by the meteorological station located in the vicinity of the site (as required by condition 18 of Schedule 3).

A.2 ASHTON COAL OPERATIONS ENVIRONMENT PROTECTION LICENCE

Relevant sections of EPL 11879 are reproduced below.

L2 Noise limits

L2.1 Noise from the premises must not exceed the limits specified in the table below:

Location	Day LAeq(15 minute)	Evening LAeq(15 minute)	Night LAeq(15 minute)	Night LAeq(1 minute)
Any residence not owned by the licensee or not subject to an agreement between the licensee and the residence owner as to an alternative noise limit.	38	38	36	46

L2.2 For the purpose of Condition L2.1:
a) Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays,
b) Evening is defined as the period from 6pm to 10pm, and
c) Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sundays and Public Holidays

L2.3 Noise from the premises must be measured at the most affected point on or within the residential boundary or at the most affected point within 30m of the dwelling where the dwelling is more than 30m from boundary to determine compliance with the LAeq(15 minute) noise limits in condition L2.1. Where it can be demonstrated that direct measurement of noise from the premises is impractical, the EPA may accept alternative means of determining compliance. See Chapter 11 of the NSW Industrial Noise Policy. The modification factors presented in Section 4 of the NSW Industrial Noise Policy shall also be applied to the measured noise level where applicable.

L2.4 Noise from the premises is to be measured or computed at 1m from the dwelling facade to determine compliance with condition L2.1 (LA1 (1 minute) noise limit).

L2.5 The noise emission limits identified in condition L2.1 apply under the following meteorological conditions:

a) wind speeds up to 3m/s at 10m above ground level; and
b) temperature inversion conditions up to 3oC/100m.

L2.6 Open cut mining activities must only be carried out between the hours of 0700 and 2200 Monday to Saturday, and 0800 and 2200 on Sundays and Public Holidays.

APPENDIX

B CALIBRATION CERTIFICATES

Acoustic Research Labs Pty Ltd
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Octave Band Filter
AS 4476:1997
Calibration Certificate

Calibration Number C17248A

Client Details	Global Acoustics Pty Ltd 12/16 Huntingdale Drive Thornton NSW 2322
Filter Model Number :	Rion NA-28
Filter Serial Number :	N/A
Instrument Serial Number :	00701424
Microphone Serial Number :	01916
Pre-amplifier Serial Number :	01463

Atmospheric Conditions

Ambient Temperature :	24.4°C
Relative Humidity :	39%
Barometric Pressure :	99.78kPa

Calibration Technician : Vicky Jaiswal **Secondary Check:** Nick Williams
Calibration Date : 05/06/2017 **Report Issue Date :** 06/06/2017

Approved Signatory : Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
4.4 & 5.3: 1/1 Octave relative attenuation	*Pass*	4.6 & 5.5: Linear operating range	*Pass*
4.4 & 5.3: 1/3 Octave relative attenuation	*Pass*	4.8 & 5.7: Anti-alias filters	*Pass*
		4.10 & 5.9: Flat frequency response	*Pass*

The fractional octave band meter under test has been shown to conform to the class 1 requirements for periodic testing as described in AS 4476:1997 for the tests stated above.

Least Uncertainties of Measurement -

Electrical Tests		Environmental Conditions	
< 16Hz	*±0.19dB*	*Temperature*	*±0.05°C*
16Hz-100Hz	*±0.11dB*	*Relative Humidity*	*±0.46%*
100Hz-1000Hz	*±0.09dB*	*Barometric Pressure*	*±0.017kPa*
1000Hz-10kHz	*±0.09dB*		
>10kHz	*±0.16dB*		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

This calibration certificate is to be read in conjunction with the calibration test report.

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Sound Level Meter
IEC 61672-3.2006

Calibration Certificate

Calibration Number C16323

Client Details Global Acoustics Pty Ltd
12/16 Huntingdale Drive
Thorton NSW 2322

Equipment Tested/ Model Number : Rion NA-28
Instrument Serial Number : 01070590
Microphone Serial Number : 08184
Pre-amplifier Serial Number : 52329

Pre-Test Atmospheric Conditions		Post-Test Atmospheric Conditions	
Ambient Temperature :	21.4°C	**Ambient Temperature :**	21.4°C
Relative Humidity :	37.5%	**Relative Humidity :**	37.5%
Barometric Pressure :	100.19kPa	**Barometric Pressure :**	100.23kPa

Calibration Technician : Calvin Simpfendorfer
Secondary Check: Riley Cooper
Calibration Date : 28/06/2016
Report Issue Date : 30/06/2016
Approved Signatory : Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10: Self-generated noise	*Pass*	14: Level linearity on the reference level range	*Pass*
11: Acoustical tests of a frequency weighting	*Pass*	15: Level linearity incl. the level range control	*Pass*
12: Electrical tests of frequency weightings	*Pass*	16: Toneburst response	*Pass*
13: Frequency and time weightings at 1 kHz	*Pass*	17: Peak C sound level	*Pass*
		18: Overload Indication	*Pass*

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed.

As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation test performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

Least Uncertainties of Measurement -

Acoustic Tests		Environmental Conditions	
31.5 Hz to 8kHz	*±0.12dB*	*Temperature*	*±0.05°C*
12.5kHz	*±0.18dB*	*Relative Humidity*	*±0.46%*
16kHz	*±0.31dB*	*Barometric Pressure*	*±0.017kPa*
Electrical Tests			
31.5 Hz to 20 kHz	*±0.12dB*		

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Sound Calibrator
IEC 60942-2004

Calibration Certificate

Calibration Number C17149

Client Details Global Acoustics Pty Ltd
12/16 Huntingdale Drive
Thornton NSW 2322

Equipment Tested/ Model Number : Pulsar 106
Instrument Serial Number : 79631

Atmospheric Conditions
Ambient Temperature : 21.9°C
Relative Humidity : 54.6%
Barometric Pressure : 98.84kPa

Calibration Technician : Vicky Jaiswal
Calibration Date : 30/03/2017
Secondary Check: Riley Cooper
Report Issue Date : 31/03/2017
Approved Signatory : Juan Aguero

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
5.2.2: Generated Sound Pressure Level	*Pass*	5.3.2: Frequency Generated	*Pass*
5.2.3: Short Term Fluctuation	*Pass*	5.5: Total Distortion	*Pass*

	Nominal Level	Nominal Frequency	Measured Level	Measured Frequency
Measured Output	94.0	1000.0	94.1	1000.38

The sound calibrator has been shown to conform to the class 2 requirements for periodic testing, described in Annex B of IEC 60942:2004 for the sound pressure level(s) and frequency(ies) stated, for the environmental conditions under which the tests were performed.

Least Uncertainties of Measurement -

Specific Tests

Generated SPL	*±0.11dB*
Short Term Fluct.	*±0.02dB*
Frequency	*±0.01%*
Distortion	*±0.5%*

Environmental Conditions

Temperature	*±0.05°C*
Relative Humidity	*±0.46%*
Barometric Pressure	*±0.017kPa*

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

This calibration certificate is to be read in conjunction with the calibration test report.

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Sound Calibrator
IEC 60942-2004

Calibration Certificate

Calibration Number C17249

Client Details Global Acoustics Pty Ltd
12/16 Huntingdale Drive
Thornton NSW 2322

Equipment Tested/ Model Number : Pulsar 106
Instrument Serial Number : 74813

Atmospheric Conditions
Ambient Temperature : 24.3°C
Relative Humidity : 38.9%
Barometric Pressure : 99.96kPa

Calibration Technician : Vicky Jaiswal
Secondary Check: Nick Williams
Calibration Date : 05/06/2017
Report Issue Date : 06/06/2017

Approved Signatory : Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
5.2.2: Generated Sound Pressure Level	*Pass*	5.3.2: Frequency Generated	*Pass*
5.2.3: Short Term Fluctuation	*Pass*	5.5: Total Distortion	*Pass*

	Nominal Level	Nominal Frequency	Measured Level	Measured Frequency
Measured Output	94.0	1000.0	93.8	1000.33

The sound calibrator has been shown to conform to the class 2 requirements for periodic testing, described in Annex B of IEC 60942:2004 for the sound pressure level(s) and frequency(ies) stated, for the environmental conditions under which the tests were performed..

Least Uncertainties of Measurement -

Specific Tests		Environmental Conditions	
Generated SPL	*±0.11dB*	*Temperature*	*±0.05°C*
Short Term Fluct.	*±0.02dB*	*Relative Humidity*	*±0.46%*
Frequency	*±0.01%*	*Barometric Pressure*	*±0.017kPa*
Distortion	*±0.5%*		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

This calibration certificate is to be read in conjunction with the calibration test report.

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