Invincible Colliery

Environmental Noise Monitoring

Quarter 3 2018

Prepared for

Castlereagh Coal

Global Acoustics

Noise and Vibration Analysis and Solutions

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Invincible Colliery

Environmental Noise Monitoring
Quarter 3 2018

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Report date: 18 October 2018

Prepared for

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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 to conduct a noise survey around Invincible Colliery, an open cut coal mine north west of Lithgow.

Castlereagh Coal obtained a modification to the project approval in February 2018 (07-0127) for the continuation of open cut mining activities. Schedule 3, Conditions 1 to 5 of the approval detail the noise requirements. Invincible Colliery also operates in accordance with EPL 1095. Noise requirements are detailed in L4 of the licence.

Given that the site is currently under care and maintenance, monitoring was not undertaken during the evening or night periods as there are no activities occurring at this time. Although noise monitoring was carried out during the day period, given the site is on significantly reduced operations, there is unlikely to be any off-site noise. Therefore the monitoring program has been modified slightly to take this into account. The duration of each day measurement was 10 minutes if no site noise was heard, whereas when mining was audible; the measurement duration was increased to 15 minutes.

Attended monitoring was conducted in accordance with Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise' and relevant NSW EPA requirements. During this survey attended monitoring was undertaken once at each measurement location during the day period.

Environmental noise monitoring described in this report was undertaken during the day period of 23 August 2018. There were 3 monitoring locations during the survey.

Invincible Colliery complied with the approval and EPL $L_{Aeq,15minute}$ noise limits at all locations during Quarter 3 2018 monitoring. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

Global Acoustics Pty Ltd

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Appendices

1 INTRODUCTION

1.1 Background

Global Acoustics was engaged to conduct a noise survey around Invincible Colliery, an open cut coal mine north west of Lithgow.

Environmental noise monitoring described in this report was undertaken during the day period of 23 August 2018. There were 3 monitoring locations during the survey.

Given that the site is currently under care and maintenance, monitoring was not undertaken during the evening period as there are no activities occurring at this time. Although noise monitoring was carried out during the day period, given the site is on significantly reduced operations, there is unlikely to be any off-site noise. Therefore the monitoring program has been modified slightly to take this into account. The duration of each day measurement was 10 minutes if no site noise was heard, whereas when mining was audible; the measurement duration was increased to 15 minutes.

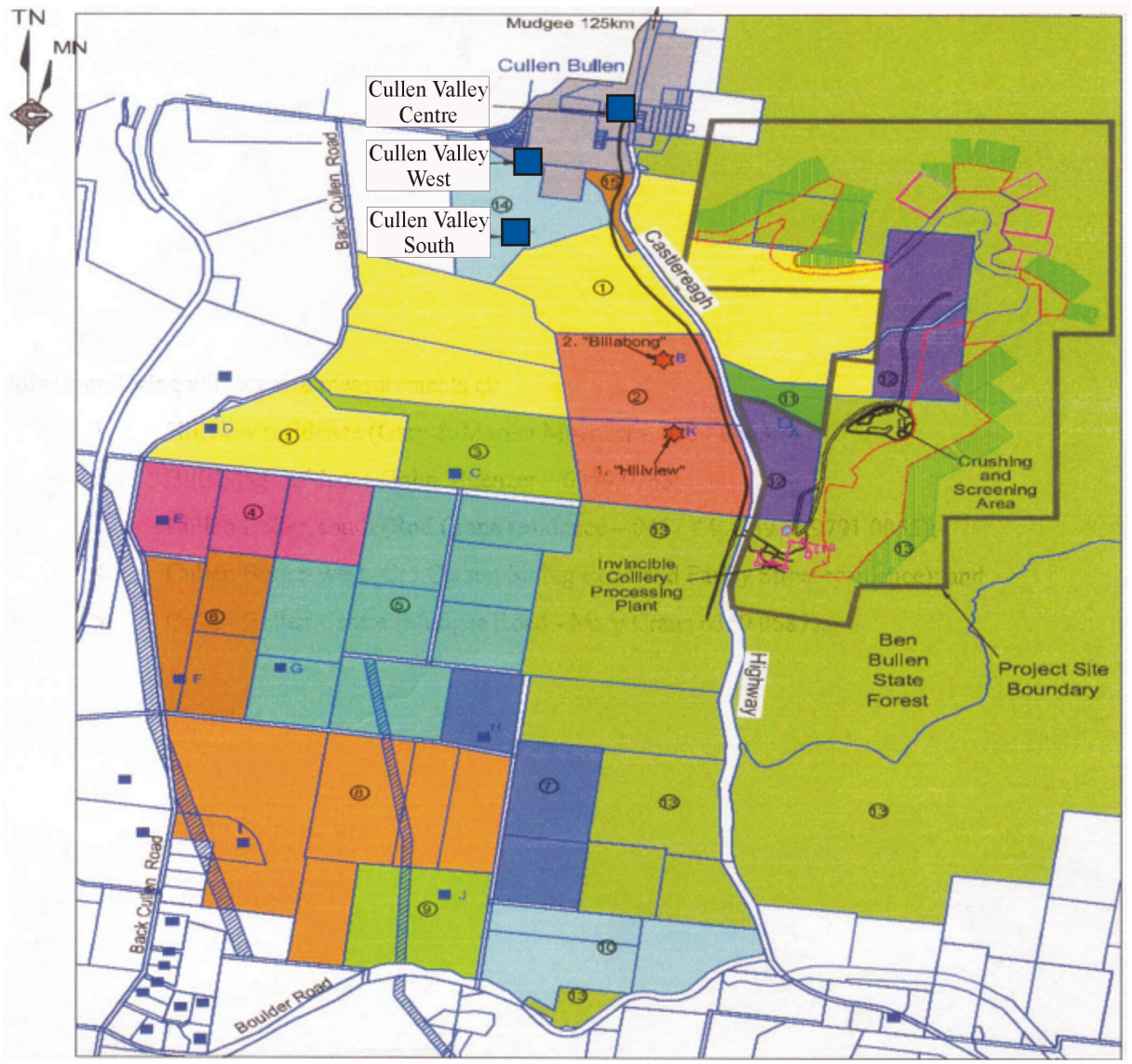
The purpose of the survey is to quantify and describe the acoustic environment around the site and compare results with specified limits.

1.2 Attended Noise Monitoring Locations

There were three monitoring locations during this survey as detailed in Table 1 and shown on Figure 1.1.

Table 1: ATTENDED NOISE MONITORING LOCATIONS

Descriptor	Owner	Monitoring Location
Cullen Bullen Centre	M. Crane	Mudgee Road
Cullen Bullen West	NA	Off Carson Siding Road and Farley Street
Cullen Bullen South	R. Crane	Off Cullen Valley Haul Road



Invincible Colliery attended noise monitoring locations

Figure 1.1: Invincible Colliery Attended Noise Monitoring Locations

Source: Invincible Colliery Open Cut Mine Extension – Noise Impact Assessment (ERM – April 2008).

1.3 Terminology & Abbreviations

Some definitions of terms and abbreviations, which may be used in this report, are provided in Table 2.

Table 2: TERMINOLOGY & ABBREVIATIONS

Descriptor	Definition
L_A	The A-weighted root mean squared (RMS) noise level at any instant
$L_{A1,1minute}$	The noise level which is exceeded for 1 per cent of the specified time period of 1 minute
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_{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_{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.
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 CONSENTS AND CRITERIA

This section discusses the relevant regulatory approvals relating to noise monitoring and assessment for the Invincible Colliery operation. The relevant conditions relating to noise from the project approval and Environmental Protection Licence (EPL) are reproduced in Appendix A.

2.1 Project Specific Criteria

2.1.1 Project Approval

Castlereagh Coal obtained a modification to the project approval in February 2018 (07-0127) for the continuation of open cut mining activities. Schedule 3, Conditions 1 to 5 of the approval details the noise requirements. Noise impact assessment criteria as described in the project approval are detailed in Table 3.

Table 3: INVINCIBLE COLLIERY PROJECT APPROVAL NOISE IMPACT ASSESSMENT CRITERIA, dB

Residence / Location	Day $L_{Aeq,15minute}$	Evening $L_{Aeq,15minute}$	Night $L_{Aeq,15minute}$
All Privately owned land	35	35	35

Notes:

1. *An agreement with respect to noise emissions has been negotiated between Invincible Colliery and the owner of "Billabong" and "Hillview". The owner of the two residences has confirmed that predicted noise levels are acceptable, despite the predicted noise levels being greater than the calculated noise criterion. These two residences are also subject to acquisition upon request. As such there is no noise criterion for these two residences and monitoring is no longer undertaken.*

The noise criteria in Table 3 apply under meteorological conditions of:

- wind speeds greater than 3 m/s at 10 metres above ground level; or
- temperature inversion conditions between 1.5ºC and 3ºC/100m and wind speeds greater than 2 m/s at 10 metres above ground level; or
- temperature inversion conditions greater than 3ºC/100m.

2.1.2 EPL Licence

Invincible Colliery operates in accordance with EPL 1095. Noise requirements are detailed in L4 of the licence. Noise impact assessment criteria as described in the EPL are detailed in Table 4.

Table 4: INVINCIBLE COLLIERY EPL NOISE IMPACT ASSESSMENT CRITERIA, dB

Residence / Location	Day $L_{Aeq,15minute}$	Evening $L_{Aeq,15minute}$	Night $L_{Aeq,15minute}$
All Privately owned land	40	35	35

The noise criteria in Table 4 apply under all meteorological conditions except:

- during rain and wind speeds (at 10m height) greater than 3m/s; and
- under "non-significant" weather conditions.

The EPA has confirmed with Global Acoustics that non-significant weather conditions are those that occur less than 30% of the time. The most recent noise impact assessment for Invincible Colliery was undertaken by Umwelt as part of the Southern Extension Project in 2016. The wind rose data in Appendix C of this assessment indicates that only NE and ENE winds occur more than 30% of the time at this particular site during the day or evening. Given this, the EPL noise criteria in Table 4 only apply under NE and ENE wind directions (33.75° - 78.75°).

2.2 Modifying Factors

The EPA 'Noise Policy for Industry' (NPfI, 2017) was approved for use in NSW in October 2017, and supersedes the EPA's Industrial Noise Policy (INP, 2000). Assessment and reporting of modifying factors is to be carried out in accordance with Fact Sheet C of the NPfI.

NPfI modifying factors, as they are applicable to mining noise, are described in more detail below.

2.2.1 Tonality and Intermittent Noise

As defined in the NPfI:

> *Tonal noise contains a prominent frequency and is characterised by a definite pitch.*
>
> *Intermittent noise is noise where the level suddenly drops/increases several times during the assessment period, with a noticeable change in source noise level of at least 5 dB(A); for example, equipment cycling on and off. The intermittency correction is not intended to be applied to changes in noise level due to meteorology.*

There were no intermittent noise sources from site during the survey as defined in the NPfI.

2.2.2 Low Frequency Noise

As defined in the NPfI:

> *Low frequency noise is noise with an unbalanced spectrum and containing major components within the low-frequency range (10 – 160 Hz) of the frequency spectrum.*

The NPfI contains the current method of assessing low frequency noise, which is a 2-step process as detailed below:

> *Measure/assess source contribution 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 is 15 dB or more and:*

*• where any of the 1/3 octave noise levels in Table C2 are exceeded by **up to and including** 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 and associated notes from the NPfI is reproduced below:

Table C2: One-third octave low-frequency noise thresholds.

Hz/dB(Z)	One-third octave $L_{Zeq,15min}$ threshold level												
Frequency (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

Notes:

- dB(Z) = decibel (Z frequency weighted).
- For the assessment of low-frequency noise, care should be taken to select a wind screen that can protect the microphone from 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, 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 corrections only apply under the standard and/or noise-enhancing meteorological conditions.
- Where a receiver location has had architectural acoustic treatment applied (including alternative means of mechanical ventilation satisfying the Building Code of Australia) by a proponent, as part of consent requirements or as a private negotiated agreement, alternative external low-frequency noise assessment criteria may be proposed to account for the higher transmission loss of the building façade.
- 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 licence.

3 METHODOLOGY

3.1 Overview

Attended monitoring was conducted at three sites in accordance with Australian Standard AS 1055 'Acoustics, Description and Measurement of Environmental Noise' and relevant NSW EPA guidelines. Atmospheric condition measurement was also undertaken.

Meteorological data has been sourced from the Invincible Colliery weather station.

3.2 Attended Noise Monitoring

Given the site is on care and maintenance, the duration of each day measurement was generally 10 minutes. The exceptions were when mining was audible; the duration of these measurements was increased to 15 minutes. During this survey attended monitoring was undertaken once at each measurement location during the day period.

Attended monitoring is preferred to the use of noise loggers when determining compliance with prescribed limits; it allows an accurate determination of the contribution, if any, to measured noise levels by the source of interest (in this case Invincible Colliery).

As indicated in section L4.2 of the EPL, modifying factors from Section 4 of the INP, now the NPfI, should be implemented where applicable. Tonality and low frequency from Invincible Colliery were assessed by analysis of the measured L_{Aeq} spectrum.

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 NPfI (e.g. measure closer and back calculate) to determine a value for reporting.

Therefore, 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 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.

3.3 Modifying Factors

Years of monitoring have indicated that noise levels from mining operations, particularly those measured at significant distances from the source are relatively continuous and broad spectrum. Given this, noise levels from Invincible Colliery at the monitoring locations are unlikely to be intermittent or tonal.

Assessment of low-frequency modifying factors is necessary when application of the maximum correction could potentially result in an exceedance of the relevant site-only L_{Aeq} criterion. Low-frequency analysis is therefore undertaken for measurements in this report where:

- meteorological conditions resulted in criteria being applicable;
- contributions from Invincible Colliery were audible and directly measurable, such that the site-only L_{Aeq} was not "NM" or less than a maximum cut off value (e.g. "<20 dB" or "<30dB");
- contributions from Invincible Colliery were within 5 dB of the relevant L_{Aeq} criterion, as 5 dB is the maximum penalty that can be applied by low-frequency modifying factors; and
- Invincible Colliery was the dominant low-frequency noise source.

All measurements meeting these conditions were evaluated for possible low frequency penalty applicability in accordance with the NPfI.

3.4 Attended Monitoring Equipment

The equipment detailed in Table 5 were used to measure environmental noise levels. Calibration certificates are provided in Appendix B.

Table 5: ATTENDED NOISE MONITORING EQUIPMENT

Model	Serial Number	Calibration Due Date
Rion NA-28 sound level analyser	701424	05/06/2019
Pulsar 106 acoustic calibrator	74813	05/06/2019

4 RESULTS

4.1 Modifying Factors

Measured Invincible Colliery only levels were assessed for the applicability of modifying factors in accordance with the EPA's NPfI.

There were no intermittent or tonal noise sources, as defined in the NPfI, audible from site during the survey. None of the measurements satisfied the conditions outlined in Section 3.3 when assessing low frequency noise.

Therefore no further assessment of modifying factors was undertaken.

4.2 Attended Noise Monitoring

Overall noise levels measured at each location during attended measurement are provided in Table 6.

Table 6: MEASURED NOISE LEVELS[1] - QUARTER 3 2018

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
Cullen Bullen Centre	23/08/2018 13:14	78	72	63	48	60	42	36	69
Cullen Bullen West	23/08/2018 13:28	67	59	47	42	46	39	35	62
Cullen Bullen South	23/08/2018 13:41	59	51	46	38	42	34	30	61

Notes:

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

4.3 Project Approval Results

Table 7 details L_{Aeq} noise levels for Invincible Colliery in the absence of other noise sources. Criteria are then applied if weather conditions are in accordance with the mine's project approval.

Table 7: $L_{Aeq,15minute}$ GENERATED BY INVINCIBLE COLLIERY, PROJECT APPROVAL CRITERIA – QUARTER 3 2018

Location	Start Date and Time	Wind Speed m/s [1,2]	VTG °C/100m²	L_{Aeq} Criterion dB	Criterion Applies? [1]	Invincible Colliery L_{Aeq} dB [3,4]	Exceedance[4,5]	Notes
Cullen Bullen Centre	23/08/2018 13:14	2.4	-2.0	35	Yes	IA	Nil	Invincible Colliery was inaudible. Road traffic noise generated the measured levels. Birds, insects, frogs and breeze were also noted.
Cullen Bullen West	23/08/2018 13:28	2.4	-2.0	35	Yes	IA	Nil	Invincible Colliery was inaudible. Road traffic noise, breeze and birds generated the measured levels. Insects, dogs and school children were also noted.
Cullen Bullen South	23/08/2018 13:41	2.4	-2.0	35	Yes	IA	Nil	Invincible Colliery was inaudible. Road traffic noise, breeze and birds primarily generated all measured levels. An aircraft was also noted and generated the L_{Amax}, L_{A1} and contributed to the L_{Aeq}.

Notes:

1. *Meteorological data has been sourced from the Invincible Colliery weather station;*
2. *Noise emission limits do not apply under the following meteorological conditions:*
   - *Wind speeds greater than 3 m/s at 10 meters above ground level; or temperature inversion conditions between 1.5°C and 3°C/100m and wind speeds greater than 2 m/s at 10 metres above ground level; or*
   - *temperature inversion conditions greater than 3°C/100m.*
3. *These are results for Invincible Colliery in the absence of all other noise sources. NM denotes audible but not measurable, IA denotes inaudible;*
4. *Bold results in red are those greater than the relevant criterion (if applicable); and*
5. *NA in exceedance column means atmospheric conditions outside specified in the project approval and so criterion is not applicable.*

4.4 EPL Results

Table 8 details L_{Aeq} noise levels for Invincible Colliery in the absence of other noise sources. Criteria are then applied if weather conditions are in accordance with the mine's EPL.

Table 8: $L_{Aeq,15minute}$ GENERATED BY INVINCIBLE COLLIERY, EPL CRITERIA – QUARTER 3 2018

Location	Start Date and Time	Wind Speed m/s [1,2]	Wind Direction	VTG $^oC/100m^2$	L_{Aeq} Criterion dB	Criterion Applies? [1]	Invincible Colliery L_{Aeq} dB [3,4]	Exceedance[4,5]	Notes
Cullen Bullen Centre	23/08/2018 13:14	2.4	16	-2.0	40	No	IA	NA	Invincible Colliery was inaudible. Road traffic noise generated the measured levels. Birds, insects, frogs and breeze were also noted.
Cullen Bullen West	23/08/2018 13:28	2.4	49	-2.0	40	Yes	IA	Nil	Invincible Colliery was inaudible. Road traffic noise, breeze and birds generated the measured levels. Insects, dogs and school children were also noted.
Cullen Bullen South	23/08/2018 13:41	2.4	48	-2.0	40	Yes	IA	Nil	Invincible Colliery was inaudible. Road traffic noise, breeze and birds primarily generated all measured levels. An aircraft was also noted and generated the L_{Amax}, L_{A1} and contributed to the L_{Aeq}.

Notes:

1. *Meteorological data has been sourced from the Invincible Colliery weather station;*
2. *Noise emission limits do not apply under following meteorological conditions:*
   - *during rain and wind speeds (at 10m height) greater than 3m/s; and*
   - *under "non-significant" weather conditions;*
3. *These are results for Invincible Colliery in the absence of all other noise sources. NM denotes audible but not measurable, IA denotes inaudible;*
4. *Bold results in red are those greater than the relevant criterion (if applicable); and*
5. *NA in exceedance column means atmospheric conditions outside specified in the project approval and so criterion is not applicable.*

4.5 Atmospheric Conditions

Atmospheric condition data measured by the operator during each measurement using a Kestrel hand-held weather meter is shown in Table 9. The wind speed, direction and temperature were measured at approximately 1.8 metres. Attended noise monitoring is not undertaken during rain or hail.

Table 9: MEASURED ATMOSPHERIC CONDITIONS – QUARTER 3 2018

Location	Start Date and Time	Temperature °C	Wind Speed m/s	Wind Direction	Cloud Cover 1/8s
Cullen Bullen Centre	23/08/2018 13:14	14	0.3	120	8
Cullen Bullen West	23/08/2018 13:28	15	1.7	60	8
Cullen Bullen South	23/08/2018 13:41	11	1.0	90	7

Meteorological data sourced from the Invincible Colliery weather station is used to determine compliance with criteria.

5 SUMMARY OF COMPLIANCE

Environmental noise monitoring described in this report was undertaken during the day period on 23 August 2018. There were 3 monitoring locations during the survey.

Given that the site is currently under care and maintenance, monitoring was not undertaken during the evening period as there are no activities occurring at this time. Although noise monitoring was carried out during the day period, given the site is on significantly reduced operations, there is unlikely to be any off-site noise. Therefore the monitoring program has been modified slightly to take this into account. The duration of each day measurement was 10 minutes if no site noise was heard, whereas when mining was audible; the measurement duration was increased to 15 minutes.

Invincible Colliery complied with the approval and EPL $L_{Aeq,15minute}$ noise limits at all locations during Quarter 3 2018 monitoring. Criteria may not always be applicable due to meteorological conditions at the time of monitoring.

Global Acoustics Pty Ltd

APPENDIX

A STATUTORY REQUIREMENTS

NSW Department of Planning Project Approval 07-0127 applies to the Invincible Colliery operation. The noise section is reproduced below.

A.1 INVINCIBLE COLLIERY PROJECT APPROVAL

NOISE

Acquisition Upon Request

1. If a written request for acquisition was made by the owner of the land listed in Table 1, before the approval of Modification 5, the Proponent must acquire the land in accordance with the procedures in conditions 5 and 6 of schedule 4.

Table 1: Land subject to acquisition upon request

Residence
Billabong, Hillview

Note: To interpret the locations referred to in Table 1, see the applicable figures in Appendix 3.

Noise Criteria

2. The Proponent must ensure that the noise generated by the project does not exceed the criteria in Table 2 at any residence on privately-owned land.

Table 2: Noise criteria dB(A)

Location	Day	Evening	Night	
	$L_{Aeq(15\ minute)}$	$L_{Aeq(15\ minute)}$	$L_{Aeq(15\ minute)}$	$L_{A1(1\ minute)}$
393 (Billabong)	40	40	35	45
394 (Hillview)	43	43	35	45
All other privately owned land	35	35	35	45

Note: To interpret the locations referred to in Table 2, see the applicable figures in Appendix 3.

Noise generated by the project is to be measured in accordance with the relevant requirements of the *NSW Industrial Noise Policy* (as may be revised from time to time). Appendix 4 sets out the meteorological conditions under which these criteria apply, and the requirements for evaluating compliance with these criteria.

However, these criteria do not apply if the Proponent has a written agreement with the relevant landowner to exceed the noise criteria, and the Proponent has advised the Department in writing of the terms of this agreement.

Operating Conditions

3. The Proponent must:
   (a) implement all reasonable and feasible measures to minimise the operational, low frequency and road noise of the project;
   (b) minimise the noise impacts of the project during meteorological conditions when the noise criteria in this consent do not apply (see Appendix 4);
   (c) co-ordinate noise management at the site with the Cullen Valley and Baal Bone mines, to minimise any cumulative noise impacts; and
   (d) carry out regular monitoring to determine whether the development is complying with the relevant conditions of this approval.

Noise Management Plan

4. Prior to recommencing mining operations, unless the Secretary agrees otherwise, the Proponent must prepare a Noise Management Plan for the project to the satisfaction of the Secretary. This plan must:
   (a) be prepared in consultation with the EPA;
   (b) describe the measures that would be implemented to ensure compliance with the relevant noise criteria and operating conditions in this approval;
   (c) describe the proposed noise management system in detail; and

(d) include a noise monitoring program that:
- evaluates and reports on:
  - the effectiveness of the noise management system;
  - compliance against the noise criteria in this approval; and
- compliance against the noise operating conditions; and
- defines what constitutes a noise incident, and includes a protocol for identifying and notifying the Department and relevant stakeholders of any noise incidents.

5. The Noise Management Plan approved by the Secretary must be implemented.

APPENDIX 4
NOISE COMPLIANCE ASSESSMENT

Applicable Meteorological Conditions

1. The noise criteria in Table 1 of schedule 3 are to apply under all meteorological conditions except the following:
   b) wind speeds greater than 3 m/s at 10 m above ground level; or
   c) temperature inversion conditions between 1.5 ºC and 3ºC/100 m and wind speeds greater than 2 m/s at 10 m above ground level; or
   d) temperature inversion conditions greater than 3ºC/100 m.

Determination of Meteorological Conditions

2. Except for wind speed at microphone height, the data to be used for determining meteorological conditions must be that recorded by the meteorological station located on the site.

Compliance Monitoring

3. Attended monitoring is to be used to evaluate compliance with the relevant conditions of this consent.

4. This monitoring must be carried out at least 4 times a year, unless the Secretary directs otherwise.

5. Unless otherwise agreed with the Secretary, this monitoring is to be carried out generally in accordance with the relevant requirements 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) meteorological conditions during which collection of noise data is not appropriate;
   c) equipment used to collect noise data, and conformance with Australian Standards relevant to such equipment; and
   d) modifications to noise data collected, including for the exclusion of extraneous noise and/or penalties for modifying factors apart from adjustments for duration and low frequency noise.

6. The assessment of excessive levels of low frequency noise generated by the mine shall be as follows:
   Measure/assess C- and A-weighted Leq,T levels over same time period. Where the C minus A level is 15dB or more and:
   - where any of the 1/3 octave noise levels in Table 4-1 are exceeded by up to 5dB and cannot be mitigated, a 2 dB(A) positive adjustment to measured/predicted A weighted levels applies for the evening/night period.
   - where any of the 1/3 octave noise levels in Table 4-1 are exceeded by more than 5dB and cannot be mitigated, a 5 dB(A) positive adjustment to measured/predicted A weighted levels applies for the evening/night period and a 2dB positive adjustment applies for the daytime period.

Table 4-1: One-third octave low frequency noise thresholds

Hz/dB(Z)	***One-third octave $L_{Zeq,15minute}$ threshold level***												
Frequency (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

A.2 INVINCIBLE EPL1095

L4 Noise limits

L4.1 Noise from the premises must not exceed:

a) 40 dB(A) LAeq(15 minute) during the day (7 am to 6 pm); and
b) 35 dB(A) LAeq(15 minute) at all other times except as expressly provided by this licence;

at any residence on privately owned land.

Where LAeq means the equivalent continuous noise level – the level of noise equivalent to the energy-average of noise levels occurring over a measurement period.

Note: The licensee may exceed the limits set in L5.1 only if the licensee has a written negotiated noise agreement with the landowner of the premises in question and has provided a copy of this agreement to the EPA.

L4.2 To determine compliance with condition(s) L5.1 noise must be measured at, or computed for, the most affected point or within the residential boundary, or at the most affected point within 30 m of a dwelling (rural situations) where the dwelling is more than 30 m from the boundary. A modifying factor correction must be applied for tonal, impulsive or intermittent noise in accordance with the "Environmental Noise Management - NSW Industrial Noise Policy (January 2000)".

L4.3 The noise emission limits identified in this licence apply under all meteorological conditions except:
a) during rain and wind speeds (at 10m height) greater than 3m/s; and
b) under "non-significant weather conditions".

Note: Field meteorological indicators for non-significant weather conditions are described in the NSW Industrial Noise Policy, Chapter 5 and Appendix E in relation to wind and temperature inversions.

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

Sound Level Meter
IEC 61672-3.2013

Calibration Certificate

Calibration Number C17248

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

Pre-Test Atmospheric Conditions		**Post-Test Atmospheric Conditions**	
Ambient Temperature :	24.3°C	**Ambient Temperature :**	24.4°C
Relative Humidity :	40%	**Relative Humidity :**	39.5%
Barometric Pressure :	100.05kPa	**Barometric Pressure :**	100kPa

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
12: Acoustical Sig. tests of a frequency weighting	*Pass*	17: Level linearity incl. the level range control	*Pass*
13: Electrical Sig. tests of frequency weightings	*Pass*	18: Toneburst response	*Pass*
14: Frequency and time weightings at 1 kHz	*Pass*	19: C Weighted Peak Sound Level	*Pass*
15: Long Term Stability	*Pass*	20: Overload Indication	*Pass*
16: Level linearity on the reference level range	*Pass*	21: High Level Stability	*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	*±0.16dB*	*Temperature*	*±0.05°C*
12.5kHz	*±0.2dB*	*Relative Humidity*	*±0.46%*
16kHz	*±0.29dB*	*Barometric Pressure*	*±0.017kPa*
Electrical Tests			
31.5 Hz to 20 kHz	*±0.12dB*		

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

NATA
WORLD RECOGNISED ACCREDITATION

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

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration and inspection reports.

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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
Calibration Date : 05/06/2017
Secondary Check: Nick Williams
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.

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