Boggabri Coal Mine

December 2016
Environmental Noise Monitoring

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Prepared for
Boggabri Coal Operations Pty Ltd
PO Box 12
Boggabri NSW 2382

Prepared by
Global Acoustics Pty Ltd
PO Box 3115
Thornton NSW 2322

Prepared: Joel Curran
Chemical Engineer (Acoustics)

QA Review: Katie Weekes
Environmental Scientists
Jeremy Welbourne
Civil Engineer (Acoustics)
EXECUTIVE SUMMARY

Global Acoustics was engaged by Boggabri Coal Operations Pty Ltd to conduct a noise survey around Boggabri Coal Mine (BCM), an open cut coal mine located north-east of the township of Boggabri, NSW.

Attended environmental noise monitoring described in this report was undertaken during the night period of 21/22 December 2016. There were eight attended monitoring locations during this survey as listed in Table 1.1 and shown in Figure 1.

The survey purpose was to quantify and describe the existing acoustic environment around the mine and compare results with relevant limits in the project approval and Environment Protection Licence (EPL).

Attended monitoring was conducted during the night period in accordance with the EPA ‘Industrial Noise Policy’ (INP) guidelines and Australian Standard AS 1055 ‘Acoustics, Description and Measurement of Environmental Noise’. The duration of each measurement was 15 minutes. Monitoring was conducted during the night period, as project approval and EPL noise limits are the same for the day, evening and night periods, and it is considered that night is the most conservative period in which to monitor.

Noise levels from BCM complied with the $L_{Aeq,15\text{minute}}$ and $L_{A1,1\text{minute}}$ project approval and EPL criteria at all monitoring locations during the December 2016 survey.

No measurements occurred during which BCM was directly measurable, was within 5 dB of criteria and where meteorological conditions resulted in criteria applying (in accordance with the project approval and EPL). Therefore no measurements required examination using the low frequency assessment methods outlined in Section 2.3.2.

Global Acoustics Pty Ltd
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1 INTRODUCTION

1.1 Background

Global Acoustics was engaged by Boggabri Coal Operations Pty Ltd to conduct a noise survey around Boggabri Coal Mine (BCM), an open cut coal mine located north-east of the township of Boggabri, NSW.

Attended environmental noise monitoring described in this report was undertaken during the night period of 21/22 December 2016. There were eight attended monitoring locations during this survey as listed in Table 1.1 and shown in Figure 1.

The survey purpose was to quantify and describe the existing acoustic environment around the mine and compare results with relevant limits.

1.2 Monitoring Locations

There were eight 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: BCM MONITORING LOCATIONS

<table>
<thead>
<tr>
<th>Report Descriptor</th>
<th>Property Name and Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>N1</td>
<td>'Goonbri', Goonbri Road</td>
</tr>
<tr>
<td>N2</td>
<td>'Sylvania', Dripping Rock Road</td>
</tr>
<tr>
<td>N3</td>
<td>'Picton', Dripping Rock Road</td>
</tr>
<tr>
<td>N4</td>
<td>'Barbers Lagoon', Boggabri-Manilla Road</td>
</tr>
<tr>
<td>N5</td>
<td>'Glenhope', 84 Warners Road</td>
</tr>
<tr>
<td>N6</td>
<td>'Roma', Vine Lane</td>
</tr>
<tr>
<td>N7</td>
<td>'Arlington', Curracabah Road</td>
</tr>
<tr>
<td>N8</td>
<td>'Roma 2', 94 Warners Road</td>
</tr>
</tbody>
</table>
Figure 1: Boggabri Coal Attended Noise Monitoring Locations (Source: BCM Noise Management Plan)
1.3 Terminology & Abbreviations

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

<table>
<thead>
<tr>
<th>Descriptor</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>L_A</strong></td>
<td>The A-weighted root mean squared (RMS) noise level at any instant</td>
</tr>
<tr>
<td><strong>L_Amax</strong></td>
<td>The maximum A-weighted noise level over a time period or for an event</td>
</tr>
<tr>
<td><strong>L_A1</strong></td>
<td>The noise level which is exceeded for 1 percent of the time</td>
</tr>
<tr>
<td><strong>L_A10</strong></td>
<td>The noise level which is exceeded for 10 percent of the time, which is approximately the average of the maximum noise levels</td>
</tr>
<tr>
<td><strong>L_A50</strong></td>
<td>The noise level which is exceeded for 50 percent of the time</td>
</tr>
<tr>
<td><strong>L_A90</strong></td>
<td>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</td>
</tr>
<tr>
<td><strong>L_Amin</strong></td>
<td>The minimum A-weighted noise level over a time period or for an event</td>
</tr>
<tr>
<td><strong>L_Aeq</strong></td>
<td>The average noise energy during a measurement period</td>
</tr>
<tr>
<td><strong>L_pk</strong></td>
<td>The unweighted peak noise level at any instant</td>
</tr>
<tr>
<td><strong>dB(A)</strong></td>
<td>Noise level measurement units are decibels (dB). The “A” weighting scale is used to describe human response to noise</td>
</tr>
<tr>
<td><strong>SPL</strong></td>
<td>Sound pressure level (SPL), fluctuations in pressure measured as 10 times a logarithmic scale, the reference pressure being 20 micropascals</td>
</tr>
<tr>
<td><strong>ABL</strong></td>
<td>Assessment background level (ABL), the 10th percentile background noise level for a single period (day, evening or night) of a 24 hour monitoring period</td>
</tr>
<tr>
<td><strong>RBL</strong></td>
<td>Rating background level (RBL), the background noise level for a period (day, evening or night) determined from ABL data</td>
</tr>
<tr>
<td><strong>Hertz (Hz)</strong></td>
<td>Cycles per second, the frequency of fluctuations in pressure, sound is usually a combination of many frequencies together</td>
</tr>
<tr>
<td><strong>VTG</strong></td>
<td>Vertical temperature gradient in degrees Celsius per 100 metres altitude. Estimated from wind speed and sigma theta data</td>
</tr>
<tr>
<td><strong>IA</strong></td>
<td>Denotes Inaudible. When site only noise is noted as IA, there was no noise from the source of interest audible at the monitoring location</td>
</tr>
<tr>
<td><strong>NM</strong></td>
<td>Denotes 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</td>
</tr>
<tr>
<td><strong>Day</strong></td>
<td>This is the period 7:00am to 6:00pm</td>
</tr>
<tr>
<td><strong>Evening</strong></td>
<td>This is the period 6:00pm to 10:00pm</td>
</tr>
<tr>
<td><strong>Night</strong></td>
<td>This is the period 10:00pm to 7:00am</td>
</tr>
</tbody>
</table>
2 CONSENT AND CRITERIA

All monitoring has been carried out in accordance with the most recent BCM project approval, Environment Protection Licence (EPL 12407) and Noise Management Plan (NMP).

2.1 Project Approval

2.1.1 Project Approval Impact Assessment Criteria

Noise conditions from BCM’s MOD 4 consolidated approval (09-0182) are reproduced in Appendix A. Table 3 in Section 5 of the approval outlines the day, evening and night time impact assessment criteria for the project, which are reproduced in Table 2.1.

<table>
<thead>
<tr>
<th>Descriptor</th>
<th>Monitoring Location</th>
<th>Day/Evening/Night Impact Assessment Criterion</th>
<th>Night Impact Assessment Criterion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Property Name</td>
<td>LAeq,15minute dB</td>
<td>LA1,1minute dB</td>
</tr>
<tr>
<td>N1</td>
<td>Goonbri</td>
<td>NA¹</td>
<td>NA¹</td>
</tr>
<tr>
<td>N2</td>
<td>Sylvania</td>
<td>35</td>
<td>45</td>
</tr>
<tr>
<td>N3</td>
<td>Picton</td>
<td>35</td>
<td>45</td>
</tr>
<tr>
<td>N4</td>
<td>Barbers Lagoon</td>
<td>35</td>
<td>45</td>
</tr>
<tr>
<td>N5</td>
<td>Glenhope</td>
<td>NA¹</td>
<td>NA¹</td>
</tr>
<tr>
<td>N6</td>
<td>Roma</td>
<td>35</td>
<td>45</td>
</tr>
<tr>
<td>N7</td>
<td>Arlington</td>
<td>35</td>
<td>45</td>
</tr>
<tr>
<td>N8</td>
<td>Roma 2</td>
<td>NA¹</td>
<td>NA¹</td>
</tr>
</tbody>
</table>

Note:

1. NA indicates that this location is acquisition upon request, and therefore, has no applicable criteria.

Notes under the criteria table in the project approval state that:

“1. 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. Operational noise generated by the project includes noise generated from the use of the private haul road and proposed rail spur.”

Further to this, Section 14 – Noise Measurement, outlines further detail on meteorological exclusions:

“Where conditions in this approval refer to measurement of noise within the context of the NSW Industrial Noise Policy the inversion class to be applied to the project is Class G.”
Based on the information in the project approval noise limits have been assumed to apply under all meteorological conditions except for:

- wind speeds greater than 3 m/s at 10 metres above ground level.

As noise limits apply under the strongest inversion conditions, stability class G, no exemptions for inversion conditions are applicable for BCM.

### 2.1.2 Cumulative Noise Criteria

Cumulative noise impact assessment criteria as specified in Table 4 of Section 7 of BCM’s approval are detailed in Table 2.2.

<table>
<thead>
<tr>
<th>Descriptor</th>
<th>Monitoring Location Property Name</th>
<th>Cumulative Impact Assessment Criterion $L_{Aeq,night}$ dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>N1</td>
<td>Goonbri</td>
<td>NA¹</td>
</tr>
<tr>
<td>N2</td>
<td>Sylvania</td>
<td>40</td>
</tr>
<tr>
<td>N3</td>
<td>Picton</td>
<td>40</td>
</tr>
<tr>
<td>N4</td>
<td>Barbers Lagoon</td>
<td>40</td>
</tr>
<tr>
<td>N5</td>
<td>Glenhope</td>
<td>NA¹</td>
</tr>
<tr>
<td>N6</td>
<td>Roma</td>
<td>40</td>
</tr>
<tr>
<td>N7</td>
<td>Arlington</td>
<td>40</td>
</tr>
<tr>
<td>N8</td>
<td>Roma 2</td>
<td>NA¹</td>
</tr>
</tbody>
</table>

Note:
1. NA indicates that this location is acquisition upon request, and therefore, has no applicable criteria.

Notes from project approval:
1. Cumulative noise is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions), of the NSW Industrial Noise Policy, and
2. Operational noise includes noise from the mining operations and use of private haul roads and rail spurs.

### 2.2 Environment Protection Licence

BCM holds Environment Protection Licence (EPL) No.12407. Section L3 of the licence specifies noise limits and the meteorological conditions in which they apply. These limits and meteorological exclusions are consistent between the EPL and the project approval, however, the EPL does not specify cumulative noise criteria.

Section M8 of the EPL specifies monthly monitoring during the night period for fifteen minutes at each location. Eight monitoring locations were included in this survey while changes to the NMP were being finalised. These proposed changes will remove the requirement for monitoring at N1, N5 and N8.
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.

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 or 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 BCM 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/penalty 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 total measured site only C-weighted noise level at a receptor exceeds the relevant criterion, a 5 dB penalty (modifying factor) is added to measured levels. This method is included to provide a comparison with the INP method.
Low Frequency Assessment Methods

Low frequency assessment methods are detailed in Table 2.3.

Table 2.3: LOW FREQUENCY ASSESSMENT METHODS AND MODIFYING FACTOR TRIGGERS

<table>
<thead>
<tr>
<th>Assessment Method</th>
<th>Calculation Method</th>
<th>Night Period Modifying Factor Trigger</th>
<th>Day Period Modifying Factor Trigger</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broner, 2010</td>
<td>Site only $L_{Ceq}$</td>
<td>&gt;60</td>
<td>&gt;65</td>
</tr>
<tr>
<td>INP, total</td>
<td>Site only $L_{Ceq}$ minus site only $L_{Aeq}$</td>
<td>&gt;=15</td>
<td>&gt;=15</td>
</tr>
</tbody>
</table>

The EPA is currently undertaking a review of the assessment of low frequency noise. While a Draft Industrial Noise Guideline (ING) was released in September 2015, low frequency noise results from BCM have been compared to the assessment methods and modifying factor triggers presented above. The applicability of these triggers have been considering when applying low frequency modifying factor corrections.
3 METHODOLOGY

3.1 Overview

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

Monitoring was conducted during the night period, as project approval and EPL noise limits are the same for the day, evening and night periods, and it is considered that night is a more conservative period in which to monitor. One fifteen minute measurement was taken at each location.

In most cases, monitoring near the residence façade is impractical due to barking dogs or issues with obtaining access. In all cases, measurements for this survey were undertaken at a suitable and representative location.

The terms 'Inaudible' (IA) or 'Not Measurable' (NM) may be used in this report. When site noise is noted as IA, no site noise was audible at the monitoring location. NM indicates that some site noise was audible, but indeterminate due to one of the following reasons:

- site noise levels were insignificant and unlikely, in many cases, to be even noticed; or
- site noise levels were masked by another relatively loud noise source, but were estimated to be less than $L_{Aeq}$ 30 dB, which is insignificant in terms of any applicable criterion.

If site noise were 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 NM in this report are due to insignificant absolute values.

Meteorological data was obtained from the BCM weather station. This allowed correlation of atmospheric parameters and measured noise levels.

3.2 Cumulative Noise

In order to assess cumulative noise impacts as required, we have assumed total mining noise levels from the attended survey will apply for the entire period being assessed.
3.3 **Modification Factors**

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 BCM at the monitoring locations are unlikely to be intermittent. In addition, there is no equipment on site at BCM that would generate impulsive noise as defined in the INP. However, low frequency noise from BCM has been addressed.

3.4 **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**

<table>
<thead>
<tr>
<th>Model</th>
<th>Serial Number</th>
<th>Calibration Due Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rion NA-28 sound level analyser</td>
<td>370304</td>
<td>16/11/2018</td>
</tr>
<tr>
<td>Larson Davis CAL 150 acoustic calibrator</td>
<td>3333</td>
<td>30/09/2018</td>
</tr>
</tbody>
</table>
4 RESULTS

4.1 Attended Noise Monitoring

Noise levels measured at each location during attended surveys are provided in Table 4.1.

Table 4.1: MEASURED NOISE LEVELS - DECEMBER 2016

<table>
<thead>
<tr>
<th>Location and Property Name</th>
<th>Start Date and Time</th>
<th>$L_{\text{Amax}}$ dB</th>
<th>$L_{\text{A1}}$ dB</th>
<th>$L_{\text{A10}}$ dB</th>
<th>$L_{\text{A50}}$ dB</th>
<th>$L_{\text{Aeq}}$ dB</th>
<th>$L_{\text{A90}}$ dB</th>
<th>$L_{\text{Amin}}$ dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>N1 - Goonbri</td>
<td>21/12/2016 22:00</td>
<td>46</td>
<td>44</td>
<td>40</td>
<td>38</td>
<td>38</td>
<td>37</td>
<td>34</td>
</tr>
<tr>
<td>N2 - Sylvania</td>
<td>21/12/2016 22:33</td>
<td>43</td>
<td>39</td>
<td>38</td>
<td>37</td>
<td>37</td>
<td>36</td>
<td>35</td>
</tr>
<tr>
<td>N3 - Picton</td>
<td>21/12/2016 22:58</td>
<td>42</td>
<td>39</td>
<td>38</td>
<td>31</td>
<td>34</td>
<td>28</td>
<td>24</td>
</tr>
<tr>
<td>N4 - Barbers Lagoon</td>
<td>21/12/2016 23:27</td>
<td>45</td>
<td>43</td>
<td>42</td>
<td>39</td>
<td>40</td>
<td>38</td>
<td>37</td>
</tr>
<tr>
<td>N5 - Glenhope</td>
<td>21/12/2016 23:53</td>
<td>43</td>
<td>40</td>
<td>40</td>
<td>34</td>
<td>36</td>
<td>32</td>
<td>29</td>
</tr>
<tr>
<td>N6 - Roma</td>
<td>22/12/2016 00:46</td>
<td>48</td>
<td>46</td>
<td>40</td>
<td>32</td>
<td>36</td>
<td>36</td>
<td>26</td>
</tr>
<tr>
<td>N7 - Arlington</td>
<td>22/12/2016 01:18</td>
<td>45</td>
<td>41</td>
<td>38</td>
<td>36</td>
<td>36</td>
<td>34</td>
<td>33</td>
</tr>
<tr>
<td>N8 - Roma 2</td>
<td>22/12/2016 00:15</td>
<td>39</td>
<td>38</td>
<td>37</td>
<td>33</td>
<td>34</td>
<td>30</td>
<td>28</td>
</tr>
</tbody>
</table>

Notes:
1. Levels in this table are not necessarily the result of activity at BCM.
## 4.2 Project Specific Criteria and Weather Conditions

Table 4.2 compares measured $L_{Aeq,15\text{minute}}$ levels from BCM with project approval and EPL criteria.

### Table 4.2: $L_{Aeq,15\text{minute}}$ GENERATED BY BCM AGAINST PROJECT APPROVAL/EPL CRITERIA – DECEMBER 2016

<table>
<thead>
<tr>
<th>Location and Property Name</th>
<th>Start Date and Time</th>
<th>Wind Speed m/s¹</th>
<th>Criterion dB²</th>
<th>Criterion Applies³,⁴</th>
<th>BCM $L_{Aeq,15\text{min}}$ dB⁴,⁵</th>
<th>Exceedance⁴,⁵</th>
</tr>
</thead>
<tbody>
<tr>
<td>N1 - Goonbri</td>
<td>21/12/2016 22:00</td>
<td>0.6</td>
<td>NA</td>
<td>NA</td>
<td>23</td>
<td>NA</td>
</tr>
<tr>
<td>N2 - Sylvania</td>
<td>21/12/2016 22:33</td>
<td>0.7</td>
<td>35</td>
<td>Yes</td>
<td>&lt;20</td>
<td>Nil</td>
</tr>
<tr>
<td>N3 - Picton</td>
<td>21/12/2016 22:58</td>
<td>0.6</td>
<td>35</td>
<td>Yes</td>
<td>IA</td>
<td>Nil</td>
</tr>
<tr>
<td>N4 - Barbers Lagoon</td>
<td>21/12/2016 23:27</td>
<td>0.0</td>
<td>35</td>
<td>Yes</td>
<td>IA</td>
<td>Nil</td>
</tr>
<tr>
<td>N5 - Glenhope</td>
<td>21/12/2016 23:53</td>
<td>1.9</td>
<td>NA</td>
<td>NA</td>
<td>IA</td>
<td>NA</td>
</tr>
<tr>
<td>N6 - Roma</td>
<td>22/12/2016 00:46</td>
<td>1.8</td>
<td>35</td>
<td>Yes</td>
<td>IA</td>
<td>Nil</td>
</tr>
<tr>
<td>N7 - Arlington</td>
<td>22/12/2016 01:18</td>
<td>2.3</td>
<td>35</td>
<td>Yes</td>
<td>IA</td>
<td>Nil</td>
</tr>
<tr>
<td>N8 - Roma 2</td>
<td>22/12/2016 00:15</td>
<td>2.7</td>
<td>NA</td>
<td>NA</td>
<td>IA</td>
<td>NA</td>
</tr>
</tbody>
</table>

**Notes:**

1. Criterion may or may not apply due to rounding of meteorological data values;
2. NA in 'Criterion', 'Criterion Applies' and 'Exceedance' columns indicates this location is acquisition upon request and has no applicable noise limits;
3. Estimated or measured $L_{Aeq,15\text{minute}}$ attributed to BCM;
4. Bold results in red are possible exceedances of relevant criteria;
5. NA in exceedance column indicates atmospheric conditions outside those specified in project approval and EPL, therefore criterion does not apply; and
6. Noise emission limits do not apply during wind speeds greater than 3 metres per second (at a height of 10 metres).
Table 4.3 compares measured $L_{A1,1\text{minute}}$ levels from BCM with project approval and EPL criteria.

<table>
<thead>
<tr>
<th>Location and Property Name</th>
<th>Start Date and Time</th>
<th>Wind Speed m/s</th>
<th>Criterion dB</th>
<th>Criterion Applies</th>
<th>BCM $L_{A1,1\text{min}}$ dB</th>
<th>Exceedance</th>
</tr>
</thead>
<tbody>
<tr>
<td>N1 - Goonbri</td>
<td>21/12/2016 22:00</td>
<td>0.6</td>
<td>NA</td>
<td>NA</td>
<td>29</td>
<td>NA</td>
</tr>
<tr>
<td>N2 - Sylvania</td>
<td>21/12/2016 22:33</td>
<td>0.7</td>
<td>45</td>
<td>Yes</td>
<td>$&lt;$20</td>
<td>Nil</td>
</tr>
<tr>
<td>N3 - Picton</td>
<td>21/12/2016 22:58</td>
<td>0.6</td>
<td>45</td>
<td>Yes</td>
<td>IA</td>
<td>Nil</td>
</tr>
<tr>
<td>N4 - Barbers Lagoon</td>
<td>21/12/2016 23:27</td>
<td>0.0</td>
<td>45</td>
<td>Yes</td>
<td>IA</td>
<td>Nil</td>
</tr>
<tr>
<td>N5 - Glenhope</td>
<td>21/12/2016 23:53</td>
<td>1.9</td>
<td>NA</td>
<td>NA</td>
<td>IA</td>
<td>NA</td>
</tr>
<tr>
<td>N6 - Roma</td>
<td>22/12/2016 00:46</td>
<td>1.8</td>
<td>45</td>
<td>Yes</td>
<td>IA</td>
<td>Nil</td>
</tr>
<tr>
<td>N7 - Arlington</td>
<td>22/12/2016 01:18</td>
<td>2.3</td>
<td>45</td>
<td>Yes</td>
<td>IA</td>
<td>Nil</td>
</tr>
<tr>
<td>N8 - Roma 2</td>
<td>22/12/2016 00:15</td>
<td>2.7</td>
<td>NA</td>
<td>NA</td>
<td>IA</td>
<td>NA</td>
</tr>
</tbody>
</table>

Notes:
1. Criterion may or may not apply due to rounding of meteorological data values;
2. NA in ‘Criterion’, ‘Criterion Applies’ and ‘Exceedance’ columns indicates this location is acquisition upon request and has no applicable noise limits;
3. Estimated or measured $L_{Aeq,15\text{minute}}$ attributed to BCM;
4. Bold results in red are possible exceedances of relevant criteria;
5. NA in exceedance column indicates atmospheric conditions outside those specified in project approval and EPL, therefore criterion does not apply; and
6. Noise emission limits do not apply during wind speeds greater than 3 metres per second (at a height of 10 metres).
### 4.3 Cumulative Noise Assessment

Table 4.4 compares measured $L_{Aeq}$ levels for BCM and all other audible mining operations with cumulative noise impact assessment criteria, as detailed in the project approval.

**Table 4.4: Mining $L_{Aeq, period}$ Noise Levels Against BCM Cumulative Impact Assessment Criteria – December 2016**

<table>
<thead>
<tr>
<th>Location and Property Name</th>
<th>Start Date and Time</th>
<th>Cumulative Criterion $L_{Aeq, period}$ dB¹</th>
<th>BCM Cumulative $L_{Aeq, period}$ dB²,³,⁴</th>
<th>Exceedance¹,⁴</th>
</tr>
</thead>
<tbody>
<tr>
<td>N1 - Goonbri</td>
<td>21/12/2016 22:00</td>
<td>NA</td>
<td>29</td>
<td>NA</td>
</tr>
<tr>
<td>N2 - Sylvania</td>
<td>21/12/2016 22:33</td>
<td>40</td>
<td>&lt;20</td>
<td>Nil</td>
</tr>
<tr>
<td>N3 - Picton</td>
<td>21/12/2016 22:58</td>
<td>40</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>N4 - Barbers Lagoon</td>
<td>21/12/2016 23:27</td>
<td>40</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>N5 - Glenhope</td>
<td>21/12/2016 23:53</td>
<td>NA</td>
<td>Nil</td>
<td>NA</td>
</tr>
<tr>
<td>N6 - Roma</td>
<td>22/12/2016 00:46</td>
<td>40</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>N7 - Arlington</td>
<td>22/12/2016 01:18</td>
<td>40</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>N8 - Roma 2</td>
<td>22/12/2016 00:15</td>
<td>NA</td>
<td>Nil</td>
<td>NA</td>
</tr>
</tbody>
</table>

**Notes:**

1. NA in criterion and exceedance columns indicates this location is acquisition on request and has no applicable noise limits or meteorological conditions are outside those specified in project approval and EPL, therefore criterion does not apply;
2. These are results for BCM and all other mining noise. 15 minute measurements have been assumed to apply across the entire night period as worst case results;
3. By definition, cumulative noise refers to two or more noise sources. If only one source of mining noise is audible, or if BCM is inaudible, then the measured cumulative noise is defined here as Nil; and
4. Bold results in red are possible exceedances of relevant criteria.
4.4 Low Frequency Assessment

Table 4.5 provides statistics for attended noise monitoring undertaken around BCM in December 2016.

Table 4.5: ATTENDED MEASUREMENT STATISTICS FOR BCM – DECEMBER 2016

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Total for December 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of measurements</td>
<td>8</td>
</tr>
<tr>
<td>Number of measurements where criterion applies (where there is an applicable criterion)</td>
<td>5</td>
</tr>
<tr>
<td>Number of measurements where BCM was directly measurable (not less than a maximum cut-off value), was within 5 dB of the criteria and where met results in criterion applying</td>
<td>0</td>
</tr>
</tbody>
</table>

None of the 8 measurements occurred during which BCM was directly measurable (not “inaudible”, “not measurable” or less than a maximum cut-off value “<30 dB”), was within 5 dB of the relevant criterion and where meteorological conditions resulted in criteria applying (in accordance with the project approval and EPL). Therefore no measurements required examination using the low frequency assessment methods outlined in Section 2.3.2.

4.5 Atmospheric Conditions

Atmospheric condition measurement data, collected with each noise measurement, using a kestrel hand held meteorological monitor are shown in Table 4.6. 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 4.6: MEASURED ATMOSPHERIC CONDITIONS – DECEMBER 2016

<table>
<thead>
<tr>
<th>Location and Property Name</th>
<th>Start Date and Time</th>
<th>Temperature Degrees</th>
<th>Wind Speed m/s 1,2</th>
<th>Wind Direction Degrees 1,2</th>
<th>Cloud Cover Eighths</th>
</tr>
</thead>
<tbody>
<tr>
<td>N1 - Goonbri</td>
<td>21/12/2016 22:00</td>
<td>24</td>
<td>-</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>N2 - Sylvania</td>
<td>21/12/2016 22:33</td>
<td>20</td>
<td>-</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>N3 - Picton</td>
<td>21/12/2016 22:58</td>
<td>20</td>
<td>-</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>N4 - Barbers Lagoon</td>
<td>21/12/2016 23:27</td>
<td>22</td>
<td>-</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>N5 - Glenhope</td>
<td>21/12/2016 23:53</td>
<td>20</td>
<td>-</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>N6 - Roma</td>
<td>22/12/2016 00:46</td>
<td>18</td>
<td>-</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>N7 - Arlington</td>
<td>22/12/2016 01:18</td>
<td>21</td>
<td>1.9</td>
<td>110</td>
<td>0</td>
</tr>
<tr>
<td>N8 - Roma 2</td>
<td>22/12/2016 00:15</td>
<td>18</td>
<td>0.6</td>
<td>120</td>
<td>0</td>
</tr>
</tbody>
</table>

Notes:
1. Wind speed and direction measured at 1.8 metres; and
2. "-" denotes calm conditions at 1.8 metres.
5 SUMMARY OF COMPLIANCE

The following summaries apply to attended noise monitoring conducted during the night of 21/22 December 2016.

5.1 Operational Noise Assessment

Activities from BCM complied with the relevant project approval and EPL noise limits during monitoring on 21/22 December 2016 at all monitoring locations.

5.2 Low Frequency Assessment

No measurements occurred during which BCM was directly measurable, was within 5 dB of criteria and where meteorological conditions resulted in criteria applying (in accordance with the project approval and EPL). Therefore no measurements required examination using the low frequency assessment methods outlined in Section 2.3.2.

Global Acoustics Pty Ltd
APPENDIX

A STATUTORY REQUIREMENTS
The noise sections of the BCM’s project approval are reproduced below:

A.1 BCM DEVELOPMENT CONSENT

NOISE AND VIBRATION

Construction Noise and Vibration Criteria

2. During the hours of:
   (a) 7:00 am to 6:00 pm Monday to Fridays, inclusive;
   (b) 8:00 am to 1:00 pm on Saturdays; and
   (c) at no time on Sundays or public holidays.

Noise from activities associated with the construction and/or upgrade of the Boggabri Rail Spur Line, Kamilaroi Highway Access Roads, and Daisymede Laydown Compound shall meet the criteria in Table 1.

Table 1: Construction Noise Impact Assessment Criteria – Maximum Any Stage of Project Life

<table>
<thead>
<tr>
<th>Location</th>
<th>Construction Noise Impact Assessment Criteria day</th>
<th>Location</th>
<th>Construction Noise Impact Assessment Criteria day</th>
</tr>
</thead>
<tbody>
<tr>
<td>27</td>
<td>50 dB(A) L_Aeq(25s)</td>
<td>23</td>
<td>45 dB(A) L_Aeq(25s)</td>
</tr>
<tr>
<td>All other privately-owned residences</td>
<td>40 dB(A) L_Aeq(25s)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: To interpret the locations referred to in Table 1, see the applicable figure in Appendix 4.

Vibration from activities associated with the construction and/or upgrade of Boggabri Rail Spur Line, Kamilaroi Highway Access Roads, and Daisymede Laydown Compound shall meet the limits set by:
(a) for structural damage, the vibration limits set out in the German Standard DIN 4150-3: Structural Vibration - effects of vibration on structures; and
(b) for human exposure, the acceptable vibration values set out in the Environmental Noise Management Assessing Vibration: A Technical Guideline (Department of Environment and Conservation, 2006).

Should the Proponent propose to undertake any construction works associated with the Boggabri Rail Spur Line, Kamilaroi Highway Access Roads, and Daisymede Laydown Compound outside of hours specified above then the Proponent must develop an Out of Hours Work (OOHW) protocol consistent with the requirements of the Interim Construction Noise Guideline (Department of Environment and Climate Change, 2009). The OOHW protocol must be developed to the satisfaction of the Secretary in consultation with the EPA and residents likely to be affected and demonstrate how the proposed scheduling would minimise impacts and how local residents’ preferences would be accommodated.

Note: For areas where construction noise from the Boggabri Rail Spur Line, Kamilaroi Highway Access Roads, and Daisymede Laydown Compound is predicted to be at or below 35dB(A) and/or below operational noise criteria at sensitive receptors, this is likely to provide sufficient justification for the need to operate outside of recommended standard hours as specified in the ICNG.
Operational Noise – Noise Affected Land

3. For privately-owned residences identified within the project’s 35dB(A) noise impact contour (see Appendix 4A) the owner(s) can make a written request to the Proponent for one of the following:
   (a) mitigation (such as double glazing, insulation and air conditioning) at the residence in consultation with the owner(s). These measures must be reasonable and feasible and directed towards reducing the noise impacts of the project on the residence. If within 3 months of receiving this request from the owner(s), the Proponent and owner(s) 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; or
   (b) acquisition of the residence and land in accordance with the procedures in conditions 8-9 of Schedule 4.

Upon receiving a written request from the owner(s), the Proponent must undertake whichever option has been requested by the owner(s).

However, this condition does not apply if the Proponent has an agreement with the owner(s) of the relevant residence to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.

Notes:
1. For the purposes of this condition a privately-owned residence is defined as a residence not owned by a mining company that is regularly occupied; or an existing residence that is not regularly occupied but for which a valid development consent exists; or a proposed residence for which a development application has been lodged with the relevant authority prior to the date of this approval.
2. For the purposes of acquisition under this condition, parcels of land that are in close proximity and operated as a single agricultural enterprise should be considered as part of the land to be acquired. Where the Proponent and the owner(s) cannot agree on whether non-contiguous parcels of land should be included, either party may refer the matter to the Secretary for resolution. The Secretary’s decision as to the lands to be included for acquisition under the procedures in conditions 8 and 9 of Schedule 4 shall be final.

4. Where the owner(s) of a residence included in condition 3 of this schedule have opted for either an agreement to generate higher noise levels or mitigation under condition 3(a), and the owner(s) have reason to believe that the noise impacts at the residence are more than 3 dB(A) above the predicted noise levels for that residence (see Table 2), the owner(s) can request an independent noise impact assessment for the residence. The request shall be made in writing to the Secretary. If the Secretary considers that a noise impact assessment is warranted, then the Proponent shall commission the assessment.

If the noise impact assessment determines that the noise generated by the project causes sustained exceedances, or is likely to cause sustained exceedances, of the predicted noise levels by more than 3 dB(A) the owner(s) may require the Proponent to acquire the residence and land in accordance with the procedures in conditions 8-9 of Schedule 4.
### Table 2: Maximum Predicted Noise Levels

<table>
<thead>
<tr>
<th>Location Property/ID</th>
<th>Day ($L_{Aeq (1/3 min)}$)</th>
<th>Evening ($L_{Aeq (1/3 min)}$)</th>
<th>Night ($L_{Aeq (1/10 min)}$)</th>
<th>Night ($L_{A1 (1 min)}$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>54</td>
<td>35</td>
<td>42</td>
<td>42</td>
<td>45</td>
</tr>
<tr>
<td>52</td>
<td>35</td>
<td>41</td>
<td>41</td>
<td>45</td>
</tr>
<tr>
<td>67, 68</td>
<td>35</td>
<td>40</td>
<td>40</td>
<td>45</td>
</tr>
<tr>
<td>23</td>
<td>35</td>
<td>38</td>
<td>38</td>
<td>51</td>
</tr>
<tr>
<td>27, 48</td>
<td>36</td>
<td>38</td>
<td>38</td>
<td>48</td>
</tr>
<tr>
<td>86</td>
<td>35</td>
<td>38</td>
<td>38</td>
<td>45</td>
</tr>
<tr>
<td>43, 44</td>
<td>35</td>
<td>37</td>
<td>37</td>
<td>45</td>
</tr>
<tr>
<td>32, 33, 76, 90</td>
<td>35</td>
<td>36</td>
<td>36</td>
<td>45</td>
</tr>
</tbody>
</table>

**Notes:**
1. To interpret the locations referred to in Table 2, see the applicable figure in Appendix 4.
2. The noise assessment must be undertaken by a suitably qualified, experienced and independent person, whose appointment has been approved by the Secretary and include either:
   - sufficient monitoring at the affected residence to allow for assessment of the impacts under a range of meteorological conditions (including adverse conditions) likely to be experienced at the residence;
   - sufficient monitoring to allow reliable prediction of the likely impacts under the range of meteorological conditions (including adverse conditions) likely to be experienced at the residence.
3. Monitoring should be conducted in accordance with the requirements of the NSW Industrial Noise Policy.
4. Where predictions of likely impacts are to be used, either in substitution for, or in conjunction with, direct measurement of noise impacts at the residence, it must be based on sufficient monitoring data to provide a reliable estimate of the impacts (including under adverse meteorological conditions) and be derived using standard noise modeling techniques accepted by the EPA.
5. The Proponent shall ensure that the requested noise impact assessment is submitted to the Secretary within 3 months of the Secretary’s decision that the assessment was warranted. The Proponent shall also provide a copy of the assessment to the owner(s) of the residence at the same time it is submitted to the Secretary.
6. Note 2 to condition 3 of this Schedule applies to acquisition under this condition.

5. At any stage of the project, except for the noise-affected land identified in condition 3 as being within the project’s 35 dB(A) contour, the Proponent shall ensure that operational noise generated by the project does not exceed the criteria in Table 3 at any residence on privately-owned land.

### Table 3: Noise Impact Assessment Criteria dB(A) – maximum any stage of project life

<table>
<thead>
<tr>
<th>Location Property/ID</th>
<th>Day ($L_{Aeq (1/3 min)}$)</th>
<th>Evening ($L_{Aeq (1/3 min)}$)</th>
<th>Night ($L_{Aeq (1/10 min)}$)</th>
<th>Night ($L_{A1 (1 min)}$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All other privately-owned residences</td>
<td>35</td>
<td>35</td>
<td>35</td>
<td>45</td>
</tr>
</tbody>
</table>

**Notes:**
1. 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. Operational noise generated by the project includes noise generated from use of the private haul road and proposed rail spur.

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

6. If the owner(s) of a privately-owned residence, which is not within the project’s 35 dB(A) noise impact contour (see condition 3 and Appendix 4A), have reason to believe that operational noise from the project...
is causing the criteria in Table 3 to be exceeded at the residence, the owner(s) can request an independent noise impact assessment for the residence. The request shall be made in writing to the Secretary. If the Secretary considers that a noise impact assessment is warranted, then the Proponent shall commission the assessment.

If the noise impact assessment determines that the noise generated by the project causes sustained exceedances, or is likely to cause sustained exceedances, of the criteria in Table 3, the owner(s) can make a written request to the Proponent for one of the following:

(a) mitigation (such as double glazing, insulation and air conditioning) at the residence in consultation with the owner(s). These measures must be reasonable and feasible and directed towards reducing the noise impacts of the project on the residence. If within 3 months of receiving this request from the owner(s), the Proponent and owner(s) 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; or

(b) acquisition of the residence and land in accordance with the procedures in conditions 8-9 of Schedule 4.

Upon receiving a written request from the owner(s), the Proponent must undertake whichever option has been requested by the owner(s).

However, this condition does not apply if the Proponent has an agreement with the owner(s) of the relevant residence to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.

Notes:
1. For the purposes of this condition a privately-owned residence is defined as a residence not owned by a mining company that is regularly occupied; or is an existing residence that is not regularly occupied but for which a valid development consent exists; or is a proposed residence for which a development application has been lodged with the relevant authority prior to the date of this approval.
2. For the purposes of acquisition under this condition, parcels of land that are close to proximity and operated as a single agricultural enterprise should be considered as part of the land to be acquired. Where the Proponent and the owner(s) cannot agree on whether non-contiguous parcels of land should be included, either party may refer the matter to the Secretary for resolution. The Secretary’s decision as to the land to be included for acquisition under the procedures in conditions 8 and 9 of Schedule 4 shall be final.
3. Notes 2, 3, 4 and 5 of condition 4 apply to this condition.

Cumulative Noise Criteria

7. Except for the noise affected land identified in condition 3 as being within the project’s 35 dBA contour, the Proponent shall ensure that the operational noise generated by the project combined with the noise generated by other mines does not exceed the criteria in Table 4 at any residence on privately-owned land.

Table 4: Cumulative noise criteria dBA (L_{eq, period})

<table>
<thead>
<tr>
<th>Location</th>
<th>Day (L_{eq, period})</th>
<th>Evening (L_{eq, period})</th>
<th>Night (L_{eq, period})</th>
</tr>
</thead>
<tbody>
<tr>
<td>All privately-owned land</td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
</tbody>
</table>

Notes:
- Cumulative noise is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions), of the NSW Industrial Noise Policy.
- Operational noise includes noise from the mining operations and use of private haul roads and rail spurs

Cumulative Noise Acquisition Criteria

8. If the owner(s) of a privately-owned residence, which is not within the project’s 35 dBA noise impact contour (see condition 3 and Appendix 4A), reasonably believes that the noise limits in Table 4 are being exceeded at the residence and that the exceedance is caused by operational noise from the project and one or more other mines (including use of private haul roads or rail spurs), the owner(s) can request an independent noise impact assessment for the residence. The request shall be made in writing to the Secretary. If the Secretary considers that a noise impact assessment is warranted, then the Proponent shall commission the assessment.

Where the noise impact assessment determines that the cumulative noise generated by the project combined with the noise from the other mine(s) causes, or is likely to cause, sustained exceedances of the criteria in Table 4, then the owner(s) can make a written request to the Proponent for one of the following:

(a) mitigation (such as double glazing, insulation and air conditioning) at the residence in consultation with the owner(s). These measures must be reasonable and feasible and directed towards reducing the noise impacts of the project on the residence. If within 3 months of receiving this request from the owner(s), the Proponent and owner(s) 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: or

(b)

acquisition of the residence and land in accordance with the procedures in conditions 8-9 of Schedule 4.

Upon receiving a written request from the owner(s), the Proponent must undertake whichever option has been requested by the owner(s).

However, this condition does not apply if the Proponent has an agreement with the owner(s) of the relevant residence to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.

The Proponent may seek to recover an equitable share of the costs incurred from the other mines contributing to the cumulative impact. Unless otherwise agreed between the mines, the proportional contributions should be based on expert analysis of the monitoring results to assess relative contribution to the impact. In the event of a dispute between the mines the Proponent or one of the contributing mines, may submit the matter to the Secretary for resolution. The Secretary’s decision shall be final.

Notes:
1. For the purposes of this condition a privately-owned residence is defined as a residence not owned by a mining company that is regularly occupied; or is an existing residence that is not regularly occupied but for which a valid development consent exists; or is a proposed residence for which a development application has been lodged with the relevant authority prior to the date of this approval.
2. For the purposes of acquisition under this condition, parcels of land that are in close proximity and operated as a single agricultural enterprise should be considered as part of the land to be acquired. Where the Proponent and the owner(s) cannot agree on whether non-contiguous parcels of land should be included, either party may refer the matter to the Secretary for resolution. The Secretary’s decision as to the lands to be included for acquisition under the procedures in conditions 8 and 9 of Schedule 4 shall be final.
3. Notes 2, 3, 4 and 5 of condition 4 apply to this condition.
4. The noise impact assessment shall include assessment of the relative contribution of the mines to the impact at the residence.

Attenuation of Plant

9. The Proponent shall:
   (a)
   
   ensure that:
   
   • all new trucks, dozers, drills and excavators purchased for use on the site after the date of this approval are commissioned as noise suppressed (or attenuated) units;
   
   • ensure that all equipment and noise control measures deliver sound power levels that are equal to or better than the sound power levels identified in the EA and that correspond to best practice or the application of best available technology economically achievable;
   
   • where reasonable and feasible, improvements are made to existing noise suppression equipment and technologies become available; and
   
   (b)
   
   monitor and report on the implementation of these requirements annually on its website.

10. The Proponent shall:
   (a)
   
   conduct an annual testing program of the attenuated plant on site to ensure that the attenuation remains effective;
   
   (b)
   
   restore the effectiveness of any attenuation if it is found to be defective; and
   
   (c)
   
   report on the results of any testing and/or attenuation work within the Annual Review.

Boggabri Rail Spur Line and Bridge Design – Noise impacts

11. The Proponent shall:
   (a)
   
   ensure all relevant Boggabri Rail Spur Line and rail bridge designs are assessed by suitably qualified and experienced persons in acoustic engineering for the purpose of providing reasonable and feasible recommendations to minimise noise, including low frequency noise. This acoustic review should consider the EA’s relevant recommendations and additional noise attenuation such as acoustic barriers to minimise noise at sensitive receptors;
   
   (b)
   
   implement reasonable and feasible recommendations made in the acoustic review;
   
   (c)
   
   undertake commissioning trials of the operation of the Spur Line to optimise train speed to minimise noise impacts; and
   
   (d)
   
   following completion and commissioning of the Spur Line, undertake targeted noise monitoring to determine the accuracy of predicted acoustic impacts and effectiveness of any noise reduction measures, including monitoring during adverse inversion conditions,

   to the satisfaction of the Secretary.
Operating Conditions

12. The Proponent shall:
   a. implement best management practice to minimise the operational, low frequency and road and rail traffic noise of the project;
   b. operate a comprehensive noise management system on site that uses a combination of predictive meteorological forecasting and real-time noise monitoring data to guide the day to day planning of mining operations and the implementation of both proactive and reactive noise mitigation measures to ensure compliance with the relevant conditions of this approval;
   c. maintain the effectiveness of noise suppression equipment on plant at all times and ensure defective plant is not used operationally until fully repaired;
   d. ensure that noise attenuated plant is deployed preferentially in locations relevant to sensitive receivers;
   e. minimise the noise impacts of the project during meteorological conditions when the noise limits in this approval do not apply;
   f. ensure that the Boggabri Rail Spur Line is only accessed by locomotives that are approved to operate on the NSW rail network in accordance with the noise limits in ARTC’s EPL (No. 3142);
   g. use its best endeavours to ensure that rolling stock supplied by service providers on the Boggabri Rail Spur Line is designed and constructed to minimise noise;
   h. ensure any new rail rolling stock manufactured specifically for the project is designed and constructed to minimise noise;
   i. use its best endeavours to achieve the long term intrusive noise goals for the project in Table 5, where this is reasonable and feasible, and report on the progress towards achieving these goals in the annual review; and
   j. coordinate the noise management on site with the noise management at other mines within the Leard Forest Mining Precinct to minimise the cumulative noise impacts of these mines.

to the satisfaction of the Secretary.

Notes:
- The comprehensive review can be undertaken as part of independent environmental audits required under condition 10 of Schedule 5.

<table>
<thead>
<tr>
<th>Location</th>
<th>Day</th>
<th>Evening</th>
<th>Night</th>
</tr>
</thead>
<tbody>
<tr>
<td>All residences on privately owned land</td>
<td>35</td>
<td>35</td>
<td>35</td>
</tr>
</tbody>
</table>

Notes:
- To interpret the locations referred to Table 5, see the applicable figures in Appendix 4; and
- Noise generated by the project is to be measured in accordance with condition 14 of this schedule.

Noise Management Plan

13. The Proponent shall prepare and implement a Noise Management Plan for the project to the satisfaction of the Secretary. This plan must:
   a. be prepared in consultation with the EPA and the CCC, and submitted to the Secretary for approval within 6 months of the date of this approval;
   b. describe the measures that would be implemented to ensure:
      - best management practice is being employed;
      - the noise impacts of the project are minimised during meteorological conditions when the noise limits in this approval do not apply; and
      - compliance with the relevant conditions of this approval;
   c. describe the proposed noise management system in detail;
   d. include a risk/response matrix to codify mine operational responses to varying levels of risk resulting from weather conditions and specific mining activities;
   e. include commitments to provide summary reports and specific briefings at CCC meetings on issues arising from noise monitoring;
   f. include a monitoring program that:
      - uses a combination of real time and supplementary attended monitoring to evaluate the performance of the project;
      - adequately supports the proactive and reactive noise management system on site;
      - uses predictive meteorological forecasting to incorporate proactive mitigation measures to manage noise impacts;
      - includes monitoring of inversion strength at an appropriate sampling rate to determine compliance with noise limits;
      - evaluates and reports on the effectiveness of the noise management system on site;
• provides for the annual validation of the noise model for the project; and
• includes a Leard Forest Mining Precinct Noise Management Strategy that has been prepared in consultation with other coal mines in the Precinct to minimise the cumulative noise impacts of all mines within the Precinct, that includes:
• systems and processes to ensure that all mines are managed to achieve their noise criteria;
• a shared environmental monitoring network and data sharing protocol; and
• procedures for identifying and apportioning the sources and contribution(s) to cumulative noise impacts for operating mines and other sources, using the noise and meteorological monitoring network and appropriate investigative tools.

Note: The Leard Forest Mining Precinct Noise Management Strategy can be developed in stages and will need to be subject to ongoing review dependent upon the determination and commencement of other mining projects in the area.

Noise Measurement

14. Where conditions in this approval refer to measurement of noise within the context of the NSW Industrial Noise Policy the inversion class to be applied to the project is Class C.

However, the Proponent may undertake an investigation to determine whether a proposal for change in this classification could be considered for approval by the Secretary. Any such investigation must be conducted in consultation with the EPA and be conducted by a suitably qualified person whose appointment has been endorsed by the EPA and approved by the Secretary. The report and recommendation must be submitted to the EPA for endorsement prior to submission to the Secretary. If the Secretary is satisfied that the recommendation is reasonable, then the Secretary may amend the inversion class applying to the project under this approval.
The noise sections of the BCM's EPL are reproduced below:

## A.2 BCM EPL CONDITIONS

### L3 Noise limits

L3.1 Noise generated at the premises must not exceed the noise limits in the table below.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>All privately owned residences</td>
<td>35 dB(A)</td>
<td>35 dB(A)</td>
<td>35 dB(A)</td>
<td>45 dB(A)</td>
</tr>
</tbody>
</table>

L3.2 The noise limits identified in the above table do not apply at privately owned residences that are:

a) identified as residences subject to acquisition or noise mitigation on request within the Project Approval Conditions (PA 10_0138); or

b) subject to a private agreement, relating to the noise levels, between the licensee and the land owner.

L3.3 For the purpose of condition L3.2(a) above, those properties identified as residences subject to acquisition or noise mitigation on request within the Project Approval Conditions (PA 10_0138) are:

<table>
<thead>
<tr>
<th>Property No.</th>
<th>Lot/DP</th>
</tr>
</thead>
<tbody>
<tr>
<td>54</td>
<td>Lot 12/ DP 754926</td>
</tr>
<tr>
<td>52</td>
<td>Lot 2/ DP 716002</td>
</tr>
<tr>
<td>67</td>
<td>Lot 2/ DP 754927</td>
</tr>
<tr>
<td>68</td>
<td>Lot 3/ DP 754927</td>
</tr>
<tr>
<td>23</td>
<td>Lot 1/ DP 754926</td>
</tr>
<tr>
<td>27</td>
<td>Lot 4/ DP 754926</td>
</tr>
<tr>
<td>48</td>
<td>Lot 22/ DP 618032</td>
</tr>
<tr>
<td>86</td>
<td>Lot 2/ DP 1131282</td>
</tr>
<tr>
<td>43</td>
<td>Lot 1/ DP 500312</td>
</tr>
<tr>
<td>44</td>
<td>Lot 11/ DP 775513</td>
</tr>
<tr>
<td>32</td>
<td>Lot 1/ DP 1099042</td>
</tr>
<tr>
<td>33</td>
<td>Lot 1/ DP 1092090</td>
</tr>
<tr>
<td>79</td>
<td>Lot 132/ DP 754926</td>
</tr>
<tr>
<td>90</td>
<td>Lot 143/ DP 754926</td>
</tr>
</tbody>
</table>

L3.4 For the purpose of the table above:

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;

c) Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sundays and Public Holidays.

### L3.5 Determining Compliance

To determine compliance:

a) with the LAeq (15 minute) noise limits in the Noise Limits table, the noise measurement equipment must be located:
i) approximately on the property boundary, where any dwelling is situated 30 metres or less from the property boundary closest to the premises; or
ii) within 30 metres of a dwelling façade, but not closer than 3m, where any dwelling on the property is situated more than 30 metres from the property boundary closest to the premises; or, where applicable
iii) within approximately 50 metres of the boundary of a National Park or a Nature Reserve.
b) with the LA1(1 minute) noise limits in the Noise Limits table, the noise measurement equipment must be located within 1 metre of a dwelling façade.
c) with the noise limits in the Noise Limits table, the noise measurement equipment must be located:
i) at the most affected point at a location where there is no dwelling at the location; or
ii) at the most affected point within an area at a location prescribed by part (a) or part (b) of this condition.

L3.6 The noise limits set out in the Noise Limits table apply under all meteorological conditions except for the following:
a) Wind speeds greater than 3 metres/second at 10 metres above ground level.

For the purposes of this condition:
a) Data recorded by the meteorological station identified as EPA Identification Point(s) W1 must be used to determine meteorological conditions; and
b) Temperature inversion conditions (stability category) are to be determined by the sigma-theta method referred to in Part E4 of Appendix E to the NSW Industrial Noise Policy.

L3.7 For the purposes of determining the noise generated at the premises the modification factors in Section 4 of the NSW Industrial Noise Policy must be applied, as appropriate, to the noise levels measured by the noise monitoring equipment.

M8 Noise monitoring

M8.1 To assess compliance with the noise limits presented in the Noise Limits table, attended noise monitoring must be undertaken in accordance with the condition titled Determining Compliance, outlined above, and:
a) at noise monitoring locations N2, N3, N4, N6 and N7 as shown on the map titled “Noise Management Strategy Boggabri Coal Pty Ltd” in the Boggabri Coal Operations Pty Ltd Noise Management Plan, Rev 9, dated January 2016, and approved by the DPE (DOC15/528364-31); b) occur monthly in a reporting period; and
c) occur during each night period as defined in the NSW Industrial Noise Policy for a minimum of 15 minutes.
APPENDIX

B  CALIBRATION CERTIFICATES
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0860 A.B.N. 05160 395 119
www.acousticresearch.com.au

Acoustic Research Labs Pty Ltd

Sound Level Meter
IEC 61672-3:2006

Calibration Certificate

Calibration Number: C16643

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

Equipment Tested/Model Number: Bioa NA-28
Instrument Serial Number: 00370304
Microphone Serial Number: 10421
Pre-amplifier Serial Number: 69313

Pre-Test Atmospheric Conditions
Ambient Temperature: 22.2°C
Relative Humidity: 46.6%
Barometric Pressure: 99.95kPa

Post-Test Atmospheric Conditions
Ambient Temperature: 22.4°C
Relative Humidity: 44.5%
Barometric Pressure: 99.95kPa

Calibration Technician: Vicky Jaiswal
Calibration Date: 16/11/2016

Secondary Check: Sandra Minto
Report Issue Date: 17/11/2016

Approved Signatory: Juan Aguero

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 | |
| --- | --- | Temperature | ±0.05°C |
| 31.5 Hz to 0.1Hz | ±0.12dB | Relative Humidity | ±5.49% |
| 125Hz | ±0.18dB | Barometric Pressure | ±0.07kPa |
| 1kHz | ±0.31dB | | |

Electrical Tests
31.5 Hz to 20kHz ±0.12dB

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.

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, calibration, certification and inspection results.
Sound Calibrator

IES 60942-2004

Calibration Certificate

Calibration Number C16526

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

Equipment Tested/Model Number: Larson Davis Cal 150
Instrument Serial Number: 3333

Atmospheric Conditions
Ambient Temperature: 21.4°C
Relative Humidity: 38.1%
Barometric Pressure: 97.7kPa

Calibration Technician: Vicky Jairwal
Calibration Date: 30/09/2016

Secondary Check: Riley Cooper
Report Issue Date: 04/10/2016

Approved Signatory: Ken Williams

<table>
<thead>
<tr>
<th>Clause and Characteristic Tested</th>
<th>Result</th>
<th>Clause and Characteristic Tested</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.2.2: Generated Sound Pressure Level</td>
<td>Pass</td>
<td>5.5.2: Frequency Generated</td>
<td>Pass</td>
</tr>
<tr>
<td>5.2.3: Short Term Fluctuation</td>
<td>Pass</td>
<td>5.5: Total Distortion</td>
<td>Pass</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nominal Level</th>
<th>Nominal Frequency</th>
<th>Measured Level</th>
<th>Measured Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>94.1</td>
<td>94.1</td>
<td>1000.0</td>
<td>1000.0</td>
</tr>
<tr>
<td>114.0</td>
<td>113.9</td>
<td>1000.0</td>
<td>1000.03</td>
</tr>
</tbody>
</table>

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 levels and frequencies stated, for the environmental conditions under which the tests were performed.

Least Uncertainties of Measurement:

<table>
<thead>
<tr>
<th>Specific Test</th>
<th>Uncertainty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generated SPL</td>
<td>±0.04dB</td>
</tr>
<tr>
<td>Short Term Fluct.</td>
<td>±0.02dB</td>
</tr>
<tr>
<td>Frequency</td>
<td>±0.01%</td>
</tr>
<tr>
<td>Distortion</td>
<td>±0.5%</td>
</tr>
<tr>
<td>Environmental Conditions</td>
<td></td>
</tr>
<tr>
<td>Temperature</td>
<td>±0.05°C</td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>±0.46%</td>
</tr>
<tr>
<td>Barometric Pressure</td>
<td>±0.017kPa</td>
</tr>
</tbody>
</table>

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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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.