



1 May 2024

Ref: 212218/10318

Muswellbrook Coal Company

PO Box 123

Muswellbrook NSW 2333

## RE: APRIL 2024 NOISE MONITORING RESULTS – MUSWELLBROOK COAL MINE

This letter report presents the results of noise compliance monitoring, commencing at about 10:15 pm on Tuesday 16<sup>th</sup> of April, 2024, for the Muswellbrook Coal Company (MCC) mine at Muscle Creek Road, Muswellbrook. The monitoring was undertaken as per the requirements of D.A. 205/2002 and detailed in the Noise Management Plan (NMP) for the mine.

### Attended Noise Monitoring Program

Noise monitoring was undertaken in accordance with the NMP as summarised below.

All attended monitoring and equipment maintenance and calibration is conducted in accordance with the Noise Policy for Industry (NPI) and AS1055 – Acoustics, Description and Measurement of Environmental Noise.

Attended noise monitoring is undertaken monthly by an independent noise consultant. Each attended noise survey will be conducted during night periods only. If it is identified during the noise monitoring that the mining noise from the operation is exceeding the criteria, MCC will be notified and the operations will be modified as required. Monitoring at the location(s) where the noise levels are elevated will be undertaken again with a minimum break of 75 minutes between monitoring.

The noise criteria for MCC apply under all meteorological conditions except for the following:

- i. Wind speeds greater than 3m/s at 10m above ground level; or
- ii. Stability category F temperature inversion conditions and wind speeds greater than 2 m/s at 10m above ground level; or
- iii. Stability category G temperature inversion conditions.

To determine compliance with the Leq (15 min) operational noise criteria the modification factors detailed in Section 4 of the NPI must be applied, as appropriate, to the measured noise levels.

Due to the distance of the mine from each residence, the monitoring of LA1 (1minute) at the facade is not considered necessary and will be conducted at/or near the property boundary.

The attended noise monitoring locations are detailed in **Table 1** and shown in **Figure 1**.

Table 1 Noise Monitoring Locations	
Location	Description
R13	Sandy Creek Road
R15	Queen St
R17	Queen St
R25	Sandy Creek Road
R32	Muscle Creek Road

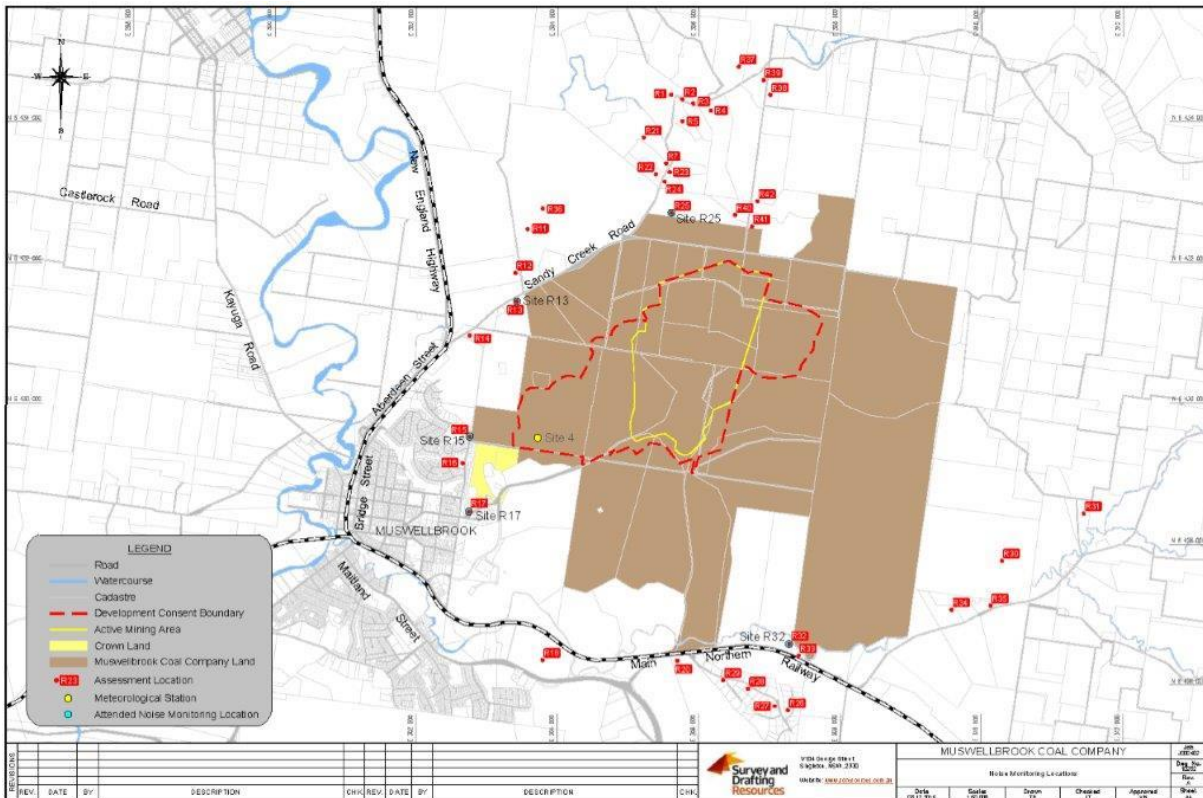


Figure 1 – Noise Monitoring Locations

Noise criteria for all assessment locations shown in Figure 1 are detailed in **Appendix I** to this report.

### Monitoring Equipment

Attended noise monitoring was conducted with a Brüel & Kjær Type 2250 Precision Sound Analyser. This instrument has Type 1 characteristics as defined in AS1259-1990 “Sound Level Meters” and has current NATA calibration. Field calibration is carried out at the start and end of each monitoring period. Calibration certificates are attached as **Appendix II** to this report.

A-weighted noise levels were measured over the 15 minute monitoring period with data acquired of 1 second statistical intervals and the meter set to “fast” response. Each 1 second measurement is accompanied by a third-octave band spectrum from 20 - 20k Hz which is required for analysing NPI ‘modifying factors’.



Time based field notes allow for determination of the relative contributions to the overall noise level of all significant noise sources.

### Measurement Analysis

The MCC compliance noise criteria are based on a 15 minute Leq noise level. The 15 minute Leq noise level for each monitoring period is shown in the tables below. Where the noise from MCC was audible Bruel & Kjaer “Evaluator” analysis software was used to quantify the contribution of the mine and other significant noise sources to the overall level. Mine noise from MCC is shown in the table in bold type.

All noise levels shown are in dB(A) Leq (15 min) unless otherwise detailed.

### MCC Operations

Operational details for MCC for the monitoring period on the 16<sup>th</sup> of April, 2024 are detailed in **Appendix III**. At the time of the noise monitoring MCC had ceased mining operations and work was being undertaken to rehabilitate the site.

### Noise Compliance Assessment

The results of the noise measurements are shown in **Table 2**.

Table 2 MCC Operational Noise Monitoring Results – 16 <sup>th</sup> April 2024									
Location	Time	dB(A), Leq	MCC Contribution dB(A), Leq	Criterion dB(A) Leq	dB(A), L1 (1min) <sup>1</sup>	Criterion dB(A), L1 (1min) <sup>1</sup>	Stability Class/ Wind speed (m/s)/dir <sup>o</sup>	Compliant Met Conditions?	Identified Noise Sources <sup>2</sup>
R13 Sandy Creek Rd.	11:03pm	37	29	41	33	45	F/2.1/145	No	Birds (34), traffic (32), <b>MCC (29)</b> , insects (21)
R15 Queen St.	10:35pm	49	29	37	36	45	D/3.5/142	No	Traffic (49), <b>MCC (29)</b> , insects (22)
R17 Queen St.	10:12pm	54	27	35	35	45	D/4.3/133	No	Traffic (54), frogs (38), insects (32), <b>MCC (27)</b>
R25 Sandy Creek Rd.	11:23pm	39	38	42	41	45	F/1.3/142	Yes	<b>MCC (38)</b> , insects (31)
R32 Muscle Creek Rd.	11:52pm	33	24	35	28	45	F/1.4/155	Yes	Insects (30), traffic (28), <b>MCC (24)</b>

1. L1 (1 min) from MCC mine noise only
2. See text regarding MCC noise sources

The results in Table 2 show that, under the operational and meteorological conditions at the time, noise from MCC was audible at all monitoring locations.

Table 2 also shows that the noise was consistent enough to be measurable at all monitoring locations. At locations R13 and R25, the noise from MCC was from a combination of mine hum with occasional engine revs, and dozer tracks. At the remaining locations, the noise from MCC was a combination of mine hum and engine revs.

The data analysis presented in Table 2 shows that the noise from MCC did not exceed the relevant noise criteria at any time or location during the monitoring period.

The data from the mine operated weather station showed that meteorological conditions were compliant with the conditions in the NMP for the noise monitoring surveys conducted at locations R25 and R32. Meteorological conditions were not compliant at locations R13, R15, and R17.

As indicated above, noise from MCC was measurable at all monitoring locations.

Data from those times where MCC operations were audible during the monitoring survey were analysed using the “Evaluator” software. This analysis showed the noise did not contain any tonal or impulsive components as per definitions in the NPI.

The methodology for analysing the low frequency noise modifying factor correction in the NPI is shown in extract below.

Low-frequency noise	Measurement of source contribution C-weighted and A-weighted level and one-third octave measurements in the range 10– 160 Hz	Measure/assess source contribution C- and A-weighted Leq,T levels over same time period. Correction to be applied where the C minus A level is 15 dB or more and: <ul style="list-style-type: none"> <li>where any of the one-third octave noise levels in Table C2 are exceeded by up to and including 5 dB and cannot be mitigated, a 2-dB(A) positive adjustment to measured/predicted A-weighted levels applies for the evening/night period</li> <li>where any of the one-third octave noise levels in Table C2 are exceeded by more than 5 dB and cannot be mitigated, a 5-dB(A) positive adjustment to measured/predicted A-weighted levels applies for the evening/night period and a 2-dB(A) positive adjustment applies for the daytime period.</li> </ul>	2 or 5 dB <sup>2</sup>	A difference of 15 dB or more between C- and A-weighted measurements identifies the potential for an unbalance spectrum and potential increased annoyance. The values in Table C2 are derived from Moorhouse (2011) for DEFRA fluctuating low-frequency noise criteria with corrections to reflect external assessment locations.
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**Table C2 : One-third octave low-frequency noise thresholds.**

Hz/dB(Z)	One-third octave dB(Z) Leq (15 min) 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	



The correction applies to the mine noise component only. There are many sources of low frequency noise in the acoustic environment of each receiver area (including noise from road and rail traffic). In many cases the C minus A level is greater than 15 due to these other noise sources. In most instances the screening criteria will be the one third octave analysis. The NPI quantitative assessment of noise from MCC can only be conducted where the noise was clearly definable, which is at a level typically greater than 30 dB(A) or when there are no other significant sources. Receiver R25 was the only location where quantitative assessment of low frequency noise was possible.

**Table 3** presents the low-frequency assessment of the mine noise measured at 38 dB(A) at Location R25 on the 16<sup>th</sup> April 2024.

Table 3. Low-frequency analysis – R25 Sandy Creek Rd 11:23 pm													
Hz/dB(Z)	One-third octave LZeq,15min threshold level												
Frequency (Hz)	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
R25, dB(Z)	--	45	45	43	45	43	42	39	45	48	47	39	39
Threshold, dB(Z)	92	89	86	77	69	61	54	50	50	48	48	46	44
Exceedance, dB	--	0	0	0	0	0	0	0	0	0	0	0	0

The results in Table 3 show no exceedance of the low-frequency criteria.

In addition to the operational noise, the noise from MCC must not exceed **45 or 47 dB(A) L1 (1 min)** between the hours of 10 pm and 7 am (see Appendix I for details of noise criteria at various receiver locations). This is to minimise the potential for sleep disturbance as a result of individual loud noises from the mine.

The compliance measurement locations are different for each of the operational and sleep disturbance noise. That is, the sleep disturbance criterion is typically applicable at 1m from the facade of a bedroom window.

To avoid undue disturbance to residents the L1 (1 min) noise level from the operational measurements are used to show general compliance with the sleep disturbance criterion. That is, as the distance between the noise source and the operational noise monitoring location is significantly greater than the distance between the operational noise monitoring location and the sleep disturbance monitoring location (i.e. 1m from the facade of the house) there will be little variation in L1 (1 min) levels between the two monitoring locations.

It must be noted, however, that the sleep disturbance criterion is applicable at the outside of a bedroom window. As the internal layout of each residence is not known, to consider a worst case, the bedroom windows were assumed to be facing towards the mine.

As shown in Table 2, during the night time measurement circuit the L1 (1 min) noise from MCC did not exceed 45 dB(A) at any monitoring location.

We trust this report fulfils your requirements at this time, however, should you require additional information or assistance please contact the undersigned on (02) 4954 2276.

Yours faithfully,

**SPECTRUM ACOUSTICS PTY LIMITED**

Author:



**Neil Pennington**

Acoustical Consultant

## Appendix I

Noise criteria from Development Consent DA205/2002 (Locations as per Figure 1).


Location	Day	Evening	Night	
	L <sub>Aeq</sub> (15 minute)	L <sub>Aeq</sub> (15 minute)	L <sub>Aeq</sub> (15 minute)	L <sub>A1</sub> (1 minute)
R1, R2, R3, R4, R17, R26, R27, R28, R29, R30, R31, R32, R33, R34, R35, R37, R38, R39	35	35	35	45
R5	36	36	36	45
R7	38	38	38	45
R11	39	39	39	45
R12	39	39	39	45
R13	41	41	41	45
R14	38	38	38	45
R15	37	37	37	45
R16	36	36	36	45
R17	35	35	35	45
R18	45	38	37	47
R20	45	38	37	47
R21	37	37	37	45
R22	39	39	39	45
R23	39	39	39	45
R24	40	40	40	45
R25	42	42	42	45
R36	38	38	38	45
R40	42	42	42	45
R41	42	42	42	45
R42	40	40	40	45

Note: All levels are in dB(A)

Note: Following further consultation with the community it has been identified that R11 is a stable complex, not a residence, so the criteria listed in the table above do not apply.


## Appendix II

### Calibration Certificates



**NVMS**

Australian Calibration Laboratory  
Suite 4.03, Level 4, 3 Thomas Holt Drive, Macquarie Park NSW 2113, Australia  
Accredited for compliance with ISO/IEC 17025 - Calibration. Laboratory No. 1301



**NATA**

WORLD RECOGNISED  
ACCREDITATION

**CERTIFICATE OF CALIBRATION**

Certificate No: CAU2300638

Page 1 of 11

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**CALIBRATION OF:**

Sound Level Meter:	Brüel & Kjær	2250	No: 2653961
Microphone:	Brüel & Kjær	4966	No: 3343809
Preamplifier:	Brüel & Kjær	ZC-0032	No: 25104
Supplied Calibrator:	None		
Software version:	BZ7224 Version 4.7.6	Pattern Approval:	-
Instruction manual:	BE1897-11	Identification:	N/A

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**CUSTOMER:**

Spectrum Acoustics Pty Ltd  
8 Panylan St  
Cardiff NSW 2285

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**CALIBRATION CONDITIONS:**

Preconditioning: 4 hours at 23 °C  
Environment conditions: *see actual values in Environmental conditions sections*

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**SPECIFICATIONS:**

The Sound Level Meter has been calibrated in accordance with the requirements as specified in IEC61672-1:2013 class 1. Procedures from IEC 61672-3:2013 were used to perform the periodic tests. The measurements included in this document are traceable to Australian/National standards.

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**PROCEDURE:**

The measurements have been performed with the assistance of Brüel & Kjær Sound Level Meter Calibration System B&K 3630 with application software type 7763 (version 8.6 - DB: 8.60) and test procedure 2250-4966.

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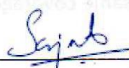
**RESULTS:**

Initial calibration	Calibration prior to repair/adjustment
Calibration without repair/adjustment	X Calibration after repair/adjustment

The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor  $k = 2$  providing a level of confidence of approximately 95 %. The uncertainty evaluation has been carried out in accordance with EA-4/02 from elements originating from the standards, calibration method, effect of environmental conditions and any short time contribution from the device under calibration.


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Date of Calibration: 12/09/2023



Sajeeb Tharayil  
Calibration Technician

Certificate issued: 12/09/2023



Craig Patrick  
Approved signatory

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 www.acousticresearch.com.au

**Sound Calibrator**  
 IEC 60942-2017  
**Calibration Certificate**

Calibration Number C21052

**Client Details** Spectrum Acoustics  
 30 Veronica Street  
 Cardiff NSW 2285

**Equipment Tested/ Model Number :** Pulsar Model 105  
**Instrument Serial Number :** 75503

**Atmospheric Conditions**  
**Ambient Temperature :** 23.8°C  
**Relative Humidity :** 48.3%  
**Barometric Pressure :** 100.16kPa

**Calibration Technician :** Jeff Yu  
**Calibration Date :** 04 Feb 2021  
**Secondary Check:** Max Moore  
**Report Issue Date :** 5 Feb 2021

**Approved Signatory :** Ken Williams

Characteristic Tested	Result
Generated Sound Pressure Level	Pass
Frequency Generated	Pass
Total Distortion	Pass

Nominal Level	Nominal Frequency	Measured Level	Measured Frequency
94	1000	94.00	1000.30

The sound calibrator has been shown to conform to the class 1 requirements for periodic testing, described in Annex B of IEC 60942:2017 for the sound pressure level(s) and frequency(ies) stated, for the environmental conditions under which the tests were performed.

Least Uncertainties of Measurement - Environmental Conditions			
Specific Tests		Environmental Conditions	
Generated SPL	±0.14dB	Temperature	±0.2°C
Frequency	±0.09%	Relative Humidity	±2.4%
Distortion	±0.09%	Barometric Pressure	±0.015kPa

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

\* The tests <1000 kHz are not covered by Acoustic Research Labs Pty Ltd NATA 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 - calibration.  
 The results of the tests, calibrations and/or measurements included in this document are traceable to SI units.  
 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.



## Appendix III

### Operational Details – 16 April 2024 (10:15pm to 12:00am)

#### Excavator and Truck

- EX212 was operating in Zone 5 with 5 x 777 trucks running to the RL220 dump area (Zone 7)

#### Dozer Push

- 3x DZ's were being used in Zone 1 on waste
- 2x DZ's were being used in Zone 2 on waste
- 3x DZ's were being used in Zone 3 on waste
- 1x DZ was being used in Zone 5 (EX212 Work Area)
- 1x DZ was being used at RL220 area on dump maintenance (Zone 7)

#### Ancillary Equipment

- 1x Grader being used for haul road maintenance
- 1 x Loader being used for Pit Maintenance

### Crib Breaks (Engine Off) for 16/04/2024 - Night Shift

The Crib Break for Night Shift of 16th of April occurred within the 11pm – 12am time-period. The following machinery was operational continuously through this period:

- EX212 and 3 x Trucks (Zone 5)
- 1 x Loader being used for Pit Maintenance
- 1 x Dozer (Zone 1)
- 1 x Dozer (Zone 7)

