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ATTENDED CONSTRUCTION NOISE MONITORING – April 2021
New Berrima Clay/Shale Quarry
New Berrima, NSW

Prepared for:
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May 2021

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EXECUTIVE SUMMARY

Attended noise monitoring has been carried out for the New Berrima Clay/Shale Quarry (NBCSQ) on 8th April 2021. Monitoring was carried out in accordance with requirements of EPL20377, Project Approval 08_0212, the New Berrima Clay/Shale Quarry Noise Management (NBCSQ) Plan and other relevant Australian Standards and guidelines.

The NBCSQ was in full operation during the entire monitoring period. The below equipment was operating throughout the monitoring period:

- Volvo A40D Dump Truck
- Volvo A40F Dump Truck
- Volvo A30C Dump Truck
- Cat D8T Bulldozer
- Volvo EC4800 Excavator
- Sumitomo SH350 Excavator
- Barfort
- Komatsu 13.5T

The site-specific operational criteria were not exceeded at any location or at any time throughout the monitoring period.

Data from those times where noise from NBCSQ operations was audible and measurable were analysed using Bruel & Kjaer *"Evaluator"* software. This analysis showed the noise did not contain any tonal, impulsive and low frequency components as per definitions of "modifying factor corrections" in the NSW Noise Policy for Industry.

NBCSQ was compliant with Environmental Protection Licence (EPL) 20377 and New Berrima Clay/Shale Quarry Project Approval 08_0212 conditions for April 2021.

1.0 INTRODUCTION

This report presents the results of attended noise compliance monitoring and measurements conducted for the New Berrima Clay/Shale Quarry (NBCSQ) on 8th April 2021. Monitoring was undertaken in accordance with requirements of the NBCSQ Noise Management Plan (NMP) dated September 2018. The noise monitoring programme and procedures in the NMP have been developed in accordance with the NBCSQ Environmental Protection Licence (EPL) no 20377, and the Project Approval (PA 08_0212). To aid in the understanding of this report a description of acoustical terms is attached as **Appendix A**.

1.1 Noise Monitoring Locations

The NMP (Section 3.2) contains a table (Table 4) detailing the on-site locations for attended noise monitoring as reproduced below in **Table 1**. On-site monitoring locations are adopted as proxies for off-site receivers. Compliance with the limits at the on-site locations implies compliance with the (lower) criteria at off-site receivers. The monitoring locations are shown on **Figure 1**.

Table 1
NBCSQ Noise Monitoring Locations

Monitoring Point	Description
N1	North of the extraction area
N2	East of the extraction area
N3	South east of the extraction area

The NBCSQ has a meteorological station installed on site with all meteorological data available through an online portal. This data is used to supplement the attended noise monitoring data.

1.2 Monitoring Frequency and Duration

The NMP indicates that attended monitoring is to be conducted quarterly at each location during construction activities, and annually once extraction activities begin. Each survey is to consist of one 15 minute measurement at each location. For the purposes of attended noise monitoring, operating hours are defined in the NMP as being 7:00am - 5:00pm Monday to Friday and 8:00am – 1:00pm Saturdays, with no operations commencing on Sundays or Public Holidays. Monitoring is conducted as required in Condition L2.1 of the EPL.

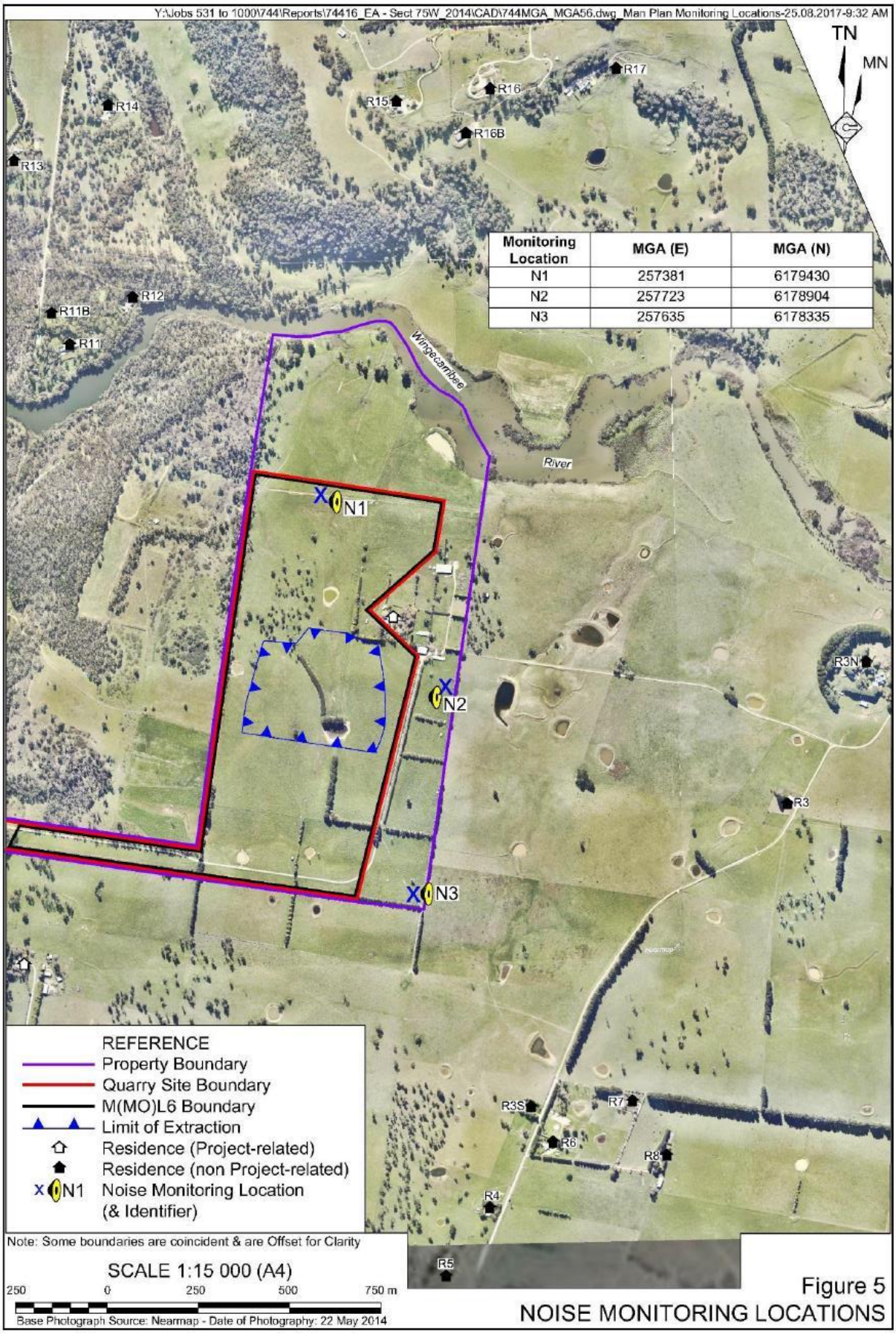

Figure 1: Noise Monitoring Locations

2.0 CRITERIA AND CONDITIONS

2.1 Noise Assessment Criteria

The noise assessment criteria are detailed in Condition L2.1 of the EPL and Table 4 of the NMP. The criteria vary for each receiver monitoring location and are shown in **Table 2**. Noise criteria for all residences listed in the EPL and NMP are shown in **Appendix B**.

Table 2
Noise Criteria, dB(A),Leq(15min)

Location	Noise Limit at any time - dB(A),Leq(15min)
N1	42
N2	49
N3	44

2.2 Applicable Meteorological Conditions

The noise limits apply under all meteorological conditions except for any one of the following;

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

2.3 Other Conditions

To determine compliance with the Leq (15 min) operational noise criteria the modification factors detailed in Fact Sheet C of the NSW Noise Policy for Industry must be applied, as appropriate, to the measured noise levels.

3.0 NOISE MONITORING PROCEDURE

3.1 Monitoring Equipment

Attended noise monitoring was conducted with a Brüel & Kjær Type 2250 Precision Sound Analyser. This instrument has Class 1 characteristics as defined in AS IEC61672.1-2004 and has current NATA calibration. Calibration certificates are included in Appendix C. Field calibration is carried out at the start and end of each monitoring period.

A-weighted noise levels were measured over the 15-minute monitoring periods with data acquired at 1 or 2 second statistical intervals and the meter set to “fast” response. Each 1 or 2 second measurement is accompanied by a third-octave band spectrum from 20 - 20k Hz which is required for analysing INP ‘modifying factors’. Time based field notes allow for determination of the relative contributions to the overall noise level of all significant noise sources.

3.2 Measurement Analysis

The 15 minute Leq noise level for each monitoring period is shown in the tables below. Where the noise from NBCSQ was audible, Bruel & Kjaer "Evaluator" analysis software was used to quantify the contributions of NBCSQ and other significant noise sources to the overall noise level. Both the total measured noise level and the noise contribution from the NBCSQ operations are shown in the tables.

3.3 Meteorological Data

Meteorological data used in this report were taken from the weather station at the NBCSQ.

4.0 RESULTS AND DISCUSSION

4.1 Measured Noise Levels

4.1.1 NBCSQ Operations

Measured noise levels for each monitoring location are summarised in **Table 3**.

Table 3
NBCSQ Operational Noise Monitoring Results – 8th April 2021

Location	Time	dB(A), Leq	NBCSQ Contribution dB(A), Leq	Criterion dB(A) Leq	Wind speed (m/s),dir	Identified Noise Sources
N1	12:15 pm	40	29	42	2.6 @ 93° (E)	Wind, birds, insects, truck revs
N2	12:38 pm	40	34	49	3.7 @ 19° (NNE)	Wind, birds, insects, Exc. & dozer revs, water cart reverse 'squawker'
N3	12:54 pm	42	29	44	2.6 @ 65° (ENE)	Wind, birds, insects, dozer revs, train

4.2 Discussion of Results

The results in Table 3 show that, under the operating and meteorological conditions at the times, for the 15 minute compliance measurement periods, the noise from the NBCSQ operations was audible at all monitoring locations but well below compliance limits.

Data from where NBCSQ noise was measurable were analysed using Bruel & Kjaer *"Evaluator"* software. This analysis showed the noise did not contain any tonal or impulsive components as per definitions of "modifying factor corrections" in Section 4 of the NSW Noise Policy for Industry.

APPENDIX A

DESCRIPTION OF ACOUSTICAL TERMS

Table A1

Definition of acoustical terms

Term	Description
dB(A)	The quantitative measure of sound heard by the human ear, measured by the A-Scale Weighting Network of a sound level meter expressed in decibels (dB).
SPL	Sound Pressure Level. The incremental variation of sound pressure above and below atmospheric pressure and expressed in decibels. The human ear responds to pressure fluctuations, resulting in sound being heard.
STL	Sound Transmission Loss. The ability of a partition to attenuate sound, in dB.
Lw	Sound Power Level radiated by a noise source per unit time re 1pW.
Leq	Equivalent Continuous Noise Level - taking into account the fluctuations of noise over time. The time-varying level is computed to give an equivalent dB(A) level that is equal to the energy content and time period.
L1	Average Peak Noise Level - the level exceeded for 1% of the monitoring period.
L90	"Background" Noise Level - the level exceeded for 90% of the monitoring period.

APPENDIX B

NOISE LIMITS

EPL 20377

L2 Noise limits

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

Identification Point	Noise Limit at any time - dB(A) LAeq(15 minute)	Location
N1	42	North of the quarry void and labelled N1 on map titled "Environmental Monitoring Locations" dated 20 November 2015 (DOC16/206245).
N2	49	East of the quarry void and labelled N2 on map titled "Environmental Monitoring Locations" dated 20 November 2015 (DOC16/206245).
N3	44	South east of the quarry void and labelled N3 on map titled "Environmental Monitoring Locations" dated 20 November 2015 (DOC16/206245).

PA 08_0212

Noise Criteria – Bund Construction

4. During the construction of the Visibility Barriers, the Proponent must ensure that the noise generated on site does not exceed the criteria in Table 1.

Table 1- Noise Criteria - Bund Construction

Receiver	***$L_{Aeq\ (15\ min)}$ dB(A)***
R2	43
All other receivers	38

Notes:

- *Receiver locations are shown in Figure 4 of APPENDIX A.*
- *Noise generated by the project is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the NSW Industrial Noise Policy.*

Noise Criteria

5. Except for the period when the Visibility Barriers are being constructed, the Proponent must ensure that the noise generated by the project does not exceed 38dB(a) $L_{Aeq\ (15min)}$ at any residence on privately-owned land.

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

APPENDIX C

CALIBRATION CERTIFICATE

Brüel & Kjær

Australian Calibration Laboratory
Suite 2, 6-10 Talavera Road, North Ryde NSW 2113, Australia
Accredited for compliance with ISO/IEC 17025 - Calibration. Laboratory No. 1301

NATA
WORLD RECOGNISED ACCREDITATION

CERTIFICATE OF CALIBRATION

Certificate No: CAU1901071 Page 1 of 12

CALIBRATION OF:

Sound Level Meter:	Bruel & Kjaer	2250	No: 2747794
Microphone:	Bruel & Kjaer	4189	No: 2733511
Preamplifier:	Bruel & Kjaer	ZC-0032	No: 15339
Supplied Calibrator:	Bruel & Kjaer	None	No: N/A
Software version:	BZ7224 Version 4.6.0	Pattern Approval:	PTB
Instruction manual:	BE1712-22	Identification:	N/A

CUSTOMER:

Spectrum Acoustics Pty Ltd
30 Veronica Street
Cardiff NSW 2285

CALIBRATION CONDITIONS:

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

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.

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 8.0 - DB: 8.00) and test procedure 2250-4189.

RESULTS:

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

Date of Calibration: 05/11/2019

Sajeeb Tharayil
Calibration Technician

Certificate issued: 05/11/2019

Craig Patrick
Approved signatory