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Acoustic Measurement and Analysis

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Results of Noise Monitoring

Blakebrook Quarry
550 Nimbin Road
Blakebrook NSW 2480

Prepared for

Ecoteam
13 Ewing Street
Lismore NSW 2480

Prepared by
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December 22nd 2021

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1 INTRODUCTION

Ambience Audio Services have been engaged by Ecoteam to conduct noise monitoring at Blakebrook Quarry, 550 Nimbin Road, Blakebrook NSW.

Noise monitoring was conducted on the 18th of November and 16th of December 2021 with the quarry and asphalt plant operating under normal conditions and suitable weather conditions. The noise monitoring was conducted over two days, due to breakdowns with some of the crushing equipment, unsuitable weather, the asphalt plant did not operate at some times, and other scheduled work commitments.

Quarry operations while noise monitoring was conducted included: crushing, screening and stockpiling on the southern side of the quarry floor, asphalt production at the mobile plant at the top of the quarry, and trucks and loader on the quarry floor and internal haul roads. A diagram of equipment operating on the quarry floor during noise monitoring at residential receivers is provided in Appendix C.

To assist with the interpretation of some of the terminology used in this report, Appendix A provides definitions of acoustic terms. Appendix B is a chart of everyday sound pressure levels.

2 NOISE MONITORING REQUIREMENTS

The noise monitoring requirements for the Blakebrook Quarry are outlined in Section 2.2, Sections 7.1, 7.2, 7.4, 7.5 and 7.7 of the Noise and Blast Management Plan Revision 3.1 (Aug 2018) prepared by Environmental Resources Management Australia Pty Ltd (ERM).

Extracts of the relevant parts are copied below.

Section 2.2

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

Table 2: Noise criteria dB(A)

Receiver	*Day* L_{Aeq} *(15 minute)*
Location 2	*36*
All other locations	*35*

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. Appendix 5 sets out the meteorological conditions under which these criteria apply and the requirements for evaluating compliance with these criteria.

However, the noise criteria in Table 2 do not apply if the Proponent has an agreement with the relevant landowner to exceed the noise criteria, and the Proponent has advised the Department in writing of the terms of this agreement.

L6.1 Noise from the premises must not exceed:

(a) 35dB(A) LAeq(15 minute) during the day (7am to 6pm) Monday to Saturday;

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

7.1 MONITORING OBJECTIVES

The noise measurement procedures employed throughout the monitoring program shall be guided by the requirements of AS 1055-1997 "Acoustics - Description and Measurement of Environmental Noise" and the NSW EPA Noise Policy for Industry (EPA, 2017).

7.2 MONITORING LOCATIONS

The Noise Assessment (ERM, 2009) included seven noise monitoring locations that were used throughout the assessment, based on proximity to nearby potentially sensitive receptors. Given the proximity between monitoring locations and the location of anticipated noise-generating plant and equipment, the monitoring locations have been revised and separated into **primary** and **supplementary** acoustic monitoring locations for the purposes of this NBMP.

Primary and supplementary acoustic monitoring locations are identified in ***Figure 1.3.*** Primary acoustic monitoring locations consist of **locations 2, 4** and **8**, with the remainder consisting of supplementary acoustic monitoring locations.

An agreement was reached with the landowner located along Nimbin Road (previously identified as location 8, ERM 2009) in April 2016, wherein the landowner has agreed to exceedances in noise levels from quarry operations. As such the location has been removed as a primary acoustic monitoring location, and a new monitoring location selected.

Primary monitoring locations will be utilised during noise compliance monitoring and are considered representative in determining compliance with the relevant Conditions of Approval.

7.4 METHODOLOGY

Noise

Operator attended noise measurements shall be conducted at all primary acoustic measurement locations (Locations 2, 4 and 9 - refer ***Figure 1.3***) to quantify and characterise the maximum (LAmax), the energy equivalent (LAeq), and background (LA90) noise levels from ambient noise sources and quarrying operations over a 15 minute measurement period.

The operator shall quantify noise emissions and estimate the LAeq (Period) noise contribution during day time activities from each of the quarrying operations, as well as the overall level of ambient noise.

During attended monitoring, digital recordings will be conducted to allow for additional post analysis of the quarry noise levels and source identification.

All acoustic instrumentation employed throughout the monitoring program shall meet with the requirements of AS 1259.2-1990, "Sound Level Meters".

Instrument calibration shall be checked before and after each measurement survey, with the variation in calibrated levels not exceeding ±0.5 dBA.

7.5 METEOROLOGICAL PARAMETERS

Adverse meteorological conditions have the potential to increase noise levels, for example wind speeds up to 3m/s or temperature inversions, however wind speeds above 5m/s (and rainfall) have the potential to generate extraneous and erroneous noise events, which reduce the accuracy and confidence in measured data.

As such, meteorological parameters will be evaluated prior to undertaking works on site, to gain an understanding of the weather conditions and the potential for variations in noise levels.

All noise measurements shall be accompanied by both qualitative description (including cloud cover, approximate wind direction and speed) and quantitative measurements of prevailing local weather conditions throughout the survey period. Rainfall data will be collected from the rain gauge located on-site. All other weather data for the monitoring period will be purchased from the Bureau of Meteorology (BoM) website for the Lismore Observation Station, which is programmed to continuously record the meteorological parameters as shown in *Table 7.1*.

Table 7.1 Meteorological Measurement Parameters

Measured Parameter	Unit	Sample Interval
Mean Wind Speed	m/s	15 minutes
Mean Wind Direction	degrees	15 minutes
Aggregate Rainfall	Mm	15 minutes
Mean Air Temperature	C°	15 minutes

Modifying Factor Corrections

Factor	Assessment and Measurement	When to Apply	Correction	Comment
Tonal Noise	One-third octave or narrow band analysis.	Level of one-third octave band exceeds the level of the adjacent bands on both sides by: • 5 dB or more if the centre frequency of the band containing the tone is above 400 Hz. • 8 dB or more if the centre frequency of the band containing the tone is 160 to 400 Hz inclusive. • 15 dB or more if the centre frequency of the band containing the tone is below 160 Hz.	5 dB	Narrow-band frequency analysis may be required to precisely detect occurrence.
Low Frequency Noise	Measurement of C-weighted and A-weighted level.	Measure/assess C and A weighted levels over same time period. Correction to be applied if the difference between the two levels is 15 dB or more.	5 dB	C-weighting is designed to be more responsive to low-frequency noise.

The latest project approval by the NSW Department of Planning, Industry and Environment (Mod 3 May 2021) requires the asphalt plant to be included in the noise assessment at receiver locations. Appendix 5 of Mod 3 requires additional assessment of low frequency noise in accordance with Fact Sheet C of the NSW Noise Policy for Industry (EPA,2017).

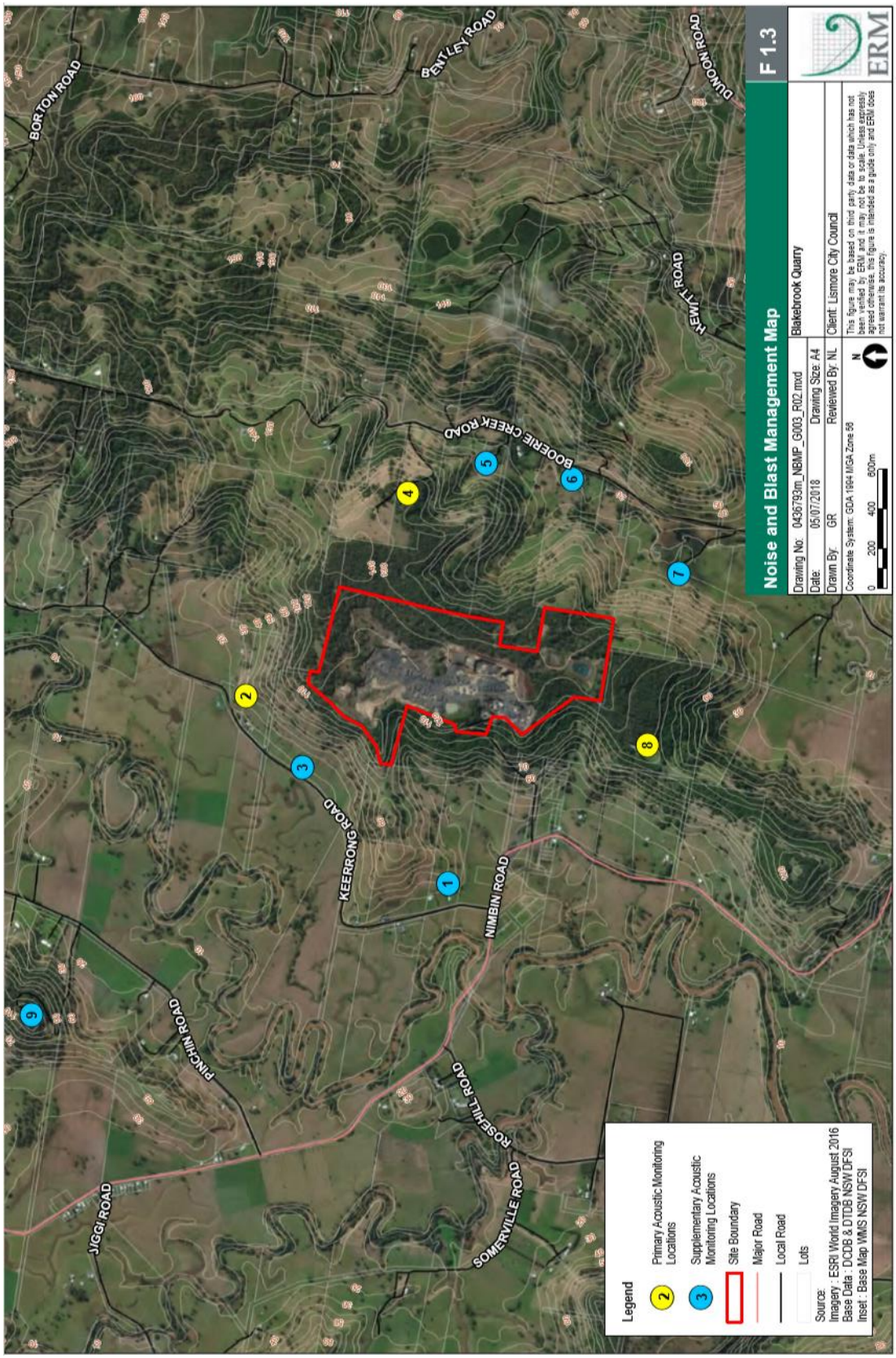
Section 7.4 (Methodology – Noise) in the ERM NBMP v3.1 indicates noise monitoring to be conducted at receiver locations 2, 4 and 9, and refers to figure F1.3. Monitoring was conducted at receiver location 8 instead of Receiver 9 as F1.3 identifies Receiver 8 as the primary receiver and receiver 9 as a supplementary receiver.

Noise monitoring at the receiver locations were conducted within 30m of the residential dwelling in the direction of the quarry.

Table 2.1 Primary Receiver Locations

Receiver	Street Address
2	[redacted]
4	[redacted]
8	[redacted]

Figure 2.1 Noise Monitoring Locations NBMP v3.1



3 MEASUREMENT PROCEDURE AND RESULTS

3.1 Instrumentation

Table 3.1 Instrumentation		
Instrument	**Serial #**	**Calibration Date**
Brüel and Kjær 2250L G4 Sound Level Meter	3006868	July 2021
Bruel & Kjaer 2250 G4 Sound Level Meter	3008548	Dec 2019, Dec 2021
Brüel and Kjær 2250 G4 Sound Level Meter	3028735	Jan 2020
Bruel & Kjaer 4231 Calibrator	2292735	Jan 2021, Dec 2021

Note : Two of the instruments were sent for calibration between the 2 monitoring days -18th of November and the 16th of December 2021.

The sound level meters (SLM) used during the noise survey conform to Australian Standard 1259 "Acoustics - Sound Level Meters", (1990) as type 1 precision sound level meters, and have an accuracy suitable for both field and laboratory use.
The meters' calibrations were checked before and after the measurement periods with a Bruel & Kjaer acoustic calibrator. No significant system drift occurred over the measurement periods.

The SLMs and calibrator have been checked, adjusted and aligned to conform to the factory specifications and issued with conformance certificates by a certified NATA facility.

3.2 Measurement Procedure

Measurements were made in general accordance with procedures laid down in:

1. Australian Standard AS 1055 : 2018 *Acoustics - Description and measurement of environmental noise*

2. The NSW Government *Noise Policy for Industry* (EPA Oct 2017)

The microphone of a B&K 2250 G4 SLM was mounted at a height of 1.5m above the ground and a Bruel and Kjær outdoor windscreen fitted to the microphone. The SLM was located above the cliff face where the working equipment was operating to monitor noise levels while measurements were being conducted at the receiver locations.

The microphone of a B&K 2250L G4 was mounted on a 1.5m high tripod, a Bruel and Kjær outdoor windscreen fitted to the microphone, and located near the asphalt plant to monitor noise levels of the asphalt plant while measurements were being conducted at the receiver locations.

Both SLMs were set to record continuously for the duration of receiver monitoring with 1 second samples. A sound recording was conducted simultaneously.

A third SLM (B&K 2250 G4) was mounted on a 1.2m high tripod and a Bruel and Kjær outdoor windscreen fitted to the microphone. The SLM was used at the receiver locations to monitor noise levels while the quarry and asphalt plant were operating.

A 15 minute period was recorded at each receiver location with A and C weighting, fast response, and 1 second samples with a simultaneous sound recording.

3.3 Weather Conditions

Weather conditions were generally good for acoustic measurements. Observations were taken at each receiver location with a Kestrel 3000 pocket weather meter.

Table 3.2 Receivers Weather Summary Nov Dec 2021							
Date	Time	Receiver	Temp	Relative Humidity	Wind Speed (m/s)	Wind Dir	Cloud Cover
			˚C	%			
18/11/2021	7:45am	2	21	82	Calm		8/8
18/11/2021	9:00am	8	22	75	Calm		8/8
16/12/2021	8:15am	4	21	78	Calm		7/8

Table 3.3 Blakebrook Quarry Local Weather Station					
Time	Temp °C	Relative Humidity %	Wind		
			Dir.	Speed	
				(km/h)	(m/s)
18/11/2021					
7:00 AM	17.5	86	E	0	0.0
7:30 AM	18.3	85	E	0	0.0
8:00 AM	18.9	84	ENE	0	0.0
8:30 AM	19.9	82	ESE	0	0.0
9:00 AM	21.7	75	SSE	0	0.0
9:30 AM	23.7	70	ENE	1.6	0.4
16/12/2021					
7:00 AM	17.0	92	---	0	0.0
7:30 AM	17.3	92	E	0	0.0
8:00 AM	18.1	92	SE	0	0.0
8:30 AM	19.6	92	E	0	0.0
9:00 AM	21.7	88	E	0	0.0
9:30 AM	24.2	82	E	0	0.0

3.3 Measurement Results

Table 3.4 Blakebrook Quarry Measurements Summary Nov Dec 2021									
Measurement Location	**Date**	**Start Time**	**Elapsed Time**	**LAeq [dB]**	**LCeq [dB]**	**LAFmax [dB]**	**LAFmin [dB]**	**LAF10.0 [dB]**	**LAF90.0 [dB]**
Receiver 2	18/11/2021	7:42 AM	0:15:00	50.0	70.0	67.8	31.0	51.7	37.3
Receiver 8	18/11/2021	8:31 AM	0:15:00	41.2	53.4	64.4	35.2	42.3	37.5
Receiver 4	16/12/2021	8:07 AM	0:15:00	39.1	55.8	66.8	31.7	41.6	33.8
Top of Quarry	18/11/2021	6:32 AM	3:40:24	75.6	79.8	89.4	36.9	79.0	57.5
Top of Quarry	16/12/2021	7:00 AM	2:27:22	68.8	74.1	82.7	42.2	72.4	49.3
Asphalt Plant	18/11/2021	6:39 AM	3:38:16	61.8	78.4	90.2	42.8	62.7	60.0
Asphalt Plant	16/12/2021	6:54 AM	2:39:02	63.5	79.0	84.2	53.4	64.5	62.1

Note:
The above results are the ambient noise levels and includes noise from the rural surroundings and quarry noise if audible.

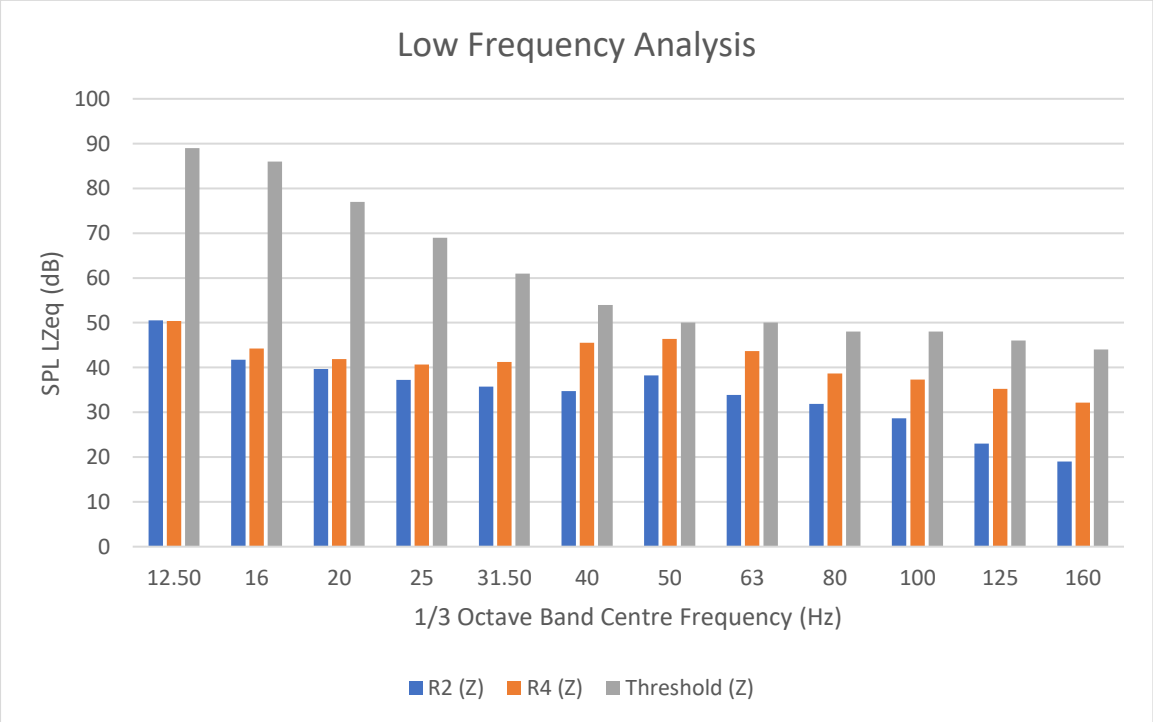
Table 3.5 Noise Observations at Receiver Locations (All measurements 15 mins)				
Receiver	**Date**	**Start Time**	**Observed Noise Sources**	**Quarry Noise**
2	18/11/2021	7:42am	Birds, insects consistent, occasional local traffic on Keerrong Rd, semi trailer on Keerrong Road	Quarry not audible
8	18/11/2021	8:31am	Insects, birds, distant traffic on Nimbin Rd, occasional dog barking, occasional truck on entry haul road	Quarry barely audible. Low frequency of machine just audible at times.
4	16/12/2021	8:07am	Birds, occasional insects, distant aircraft, helicopter	Quarry not audible

3.4 Low Frequency Analysis

The C-A for Receivers 2 and 4 was greater than 15 decibels. Even though the quarry operatios were not audible at these receivers a low frequency analysis is provided as information only.

Table 3.6 Low Frequency Analysis

	Measured A Weighted		Z Correction	Z Weighted		Threshold	Difference	
1/3 Octave band Centre Frequency (Hz)	R2	R4		R2	R4		R2	R4
12.50	-12.9	-13.0	63.4		50.4	89	-38.5	-38.6
16	-15.0	-12.5	56.7	41.7	44.2	86	-44.3	-41.8
20	-10.9	-8.6	50.5	39.6	41.9	77	-37.4	-35.1
25	-7.5	-4.1	44.7	37.2	40.6	69	-31.8	-28.4
31.50	-3.7	1.8	39.4	35.8	41.2	61	-25.3	-19.8
40	0.1	10.9	34.6	34.7	45.5	54	-19.3	-8.5
50	8.0	16.2	30.2	38.2	46.4	50	-11.8	-3.6
63	7.7	17.5	26.2	33.9	43.7	50	-16.1	-6.3
80	9.4	16.2	22.5	31.9	38.7	48	-16.1	-9.3
100	9.6	18.2	19.1	28.7	37.3	48	-19.3	-10.7
125	6.9	19.2	16.1	23.0	35.3	46	-23.0	-10.8
160	5.6	18.8	13.4	19.0	32.2	44	-25.0	-11.9



4 DISCUSSION OF RESULTS

The noise loggers above the quarry and near the asphalt plant indicated that there was consistent quarry and asphalt plant noise during the measurement periods at receiver locations.

Receiver 2 - quarry noise was not audible. The $L_{A90,15min}$ was 37.3 dB(A) and mainly due to consistent insects. The C-A was greater than 15 decibels. The low frequency analysis (Table 3.6 and Chart 3.1) indicates the corrected Z weighted 1/3 octave band noise levels are below the threshold specified in Table C2 in Fact Sheet C of the NSW NPfI.

The $L_{Aeq,15\ min}$ of the quarry operations is estimated to be below 35 dB(A).

Receiver 4 - quarry noise was not audible. Insect noise was consistent. The $L_{A90,15min}$ was 33.8 dB(A). The C-A was greater than 15 decibels. The low frequency analysis indicates the corrected Z weighted 1/3 octave band noise levels are below the threshold specified in Table C2 in Fact Sheet C of the NSW NPfI.

The $L_{Aeq,15\ min}$ of the quarry operations is estimated to be below 33 dB(A).

The resident noted at times the quarry was audible and mainly dependent on the wind.

Receiver 8 - quarry noise was barely audible. Low frequency from quarry machinery was audible at times. The $L_{A90,15min}$ was 37.8 dB(A) and mainly attributed to insects.

The $L_{Aeq,15\ min}$ of the quarry operations is estimated to be below 35 dB(A).

The resident noted that the quarry was audible at times depending on wind conditions and the equipment being used. The resident had noted that recently noise levels were higher for some periods of the day, but were not audible during the noise monitoring.

The asphalt plant is the closest quarry operation to receiver 8. A screener was temporarily located near the asphalt plant which may have attributed to the additional noise level. The screener was not operating during the noise monitoring and has since been located on the quarry pit floor.

The resident also noted that sometimes on start up of the asphalt plant, machinery noise is audible inside the residential dwelling. During a site visit at 9am on the 16th of December the noise was not audible.

Analysis of the logged noise levels of the noise logger at the asphalt plant on the 16th of December showed an increase of approximately 4 decibels in the C weighting, with no change in the A weighting for approximately 15 minutes from 7am. The spectrum data indicated an increase in the 50 Hz 1/3 octave band.

Top of Quarry

Graphs D.4 and D.5 in Appendix D indicates that quarry operations on the pit floor are approximately 6-8 decibels lower on the 16th of December compared to the 18th of November. This is mainly due to machinery (the excavator in particular) operating at a further distance on the 16th of December, from the noise logger located at the top of the quarry.

5 SUMMARY

A noise monitoring survey was conducted to assess compliance of the quarry and asphalt plant operational noise levels at Blakebrook Quarry, Blakebrook, via Lismore NSW. Measurements were undertaken with calibrated noise monitoring equipment on the 18th of November and the 16th of December 2021 and conducted in general accordance with procedures laid down in Australian Standard AS 1055:2018 and the NSW Noise Policy for Industry.

The Blakebrook Quarry operates under EPL No. 3384. Condition L6.1 stipulates that noise from the premises must not exceed 35dB(A) $L_{Aeq,15min}$ during the day (7am to 6pm) Monday to Saturday at residential receiver locations. The current Noise and Blast Management Plan v3.1 (Aug 2018) allows a limit of 36dB(A) $L_{Aeq,15min.}$ at Receiver 2.

The latest project approval by the NSW Department of Planning, Industry and Environment (Mod 3 May 2021) requires the asphalt plant to be included in the noise assessment at receiver locations. Appendix 5 of Mod 3 requires additional assessment of low frequency noise in accordance with Fact Sheet C of the NSW Noise Policy for Industry (EPA,2017).

Measurements were conducted at the 3 primary receiver locations while the quarry and asphalt plant was operating. The quarry and asphalt plant operations were not audible at receiver locations 2 and 4, and occasional low frequency was observed at Receiver 8.

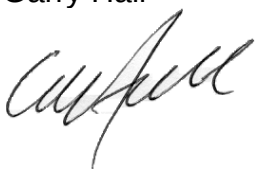
The quarry operational noise levels ($L_{Aeq,15min}$) were not able to be accurately assessed at residential receiver monitoring locations, as the quarry noise was not audible, or barely audible against other noise sources such as distant traffic, insects and birds.

It is estimated from the recorded $L_{A90,15\ min}$ levels, listening to the sound recordings and observations, that the combined quarry and asphalt plant noise levels are below the Project Specific Noise Level of 35 dB(A) $L_{eq,15min}$ at receiver locations 4 and 8, and below the Project Specific Noise Level of 36 dB(A) $L_{eq,15min}$ at receiver location 2.

The current crushing, screening, rock hammering and stock piling operations are on the main pit floor, which provides a substantial noise barrier to receivers. If crushing, screening, rock hammering and stock piling operations change to a higher ground level, then there is potential for increased noise impact at receivers and it is recommended that noise monitoring be conducted at residential receivers.

Receiver 8 is close to the southern cell. It is recommended that noise monitoring be conducted at Receiver 8 when work in the southern cell is undertaken, to assess the noise impact at Receiver 8.

Garry Hall



Acoustic Consultant
Ambience Audio Services

APPENDIX A
Definitions of Terms

Sound pressure level (L_p): A measurable quantity of the size or amplitude of the pressure fluctuations (sound waves) above and below normal atmospheric pressure compared to a reference pressure. Sound pressure levels are measured in decibels whereas sound pressure is measured in pascals (N/m^2).

Decibels (dB): a ratio of energy flows. When used for sound measurement, it is the ratio between a measured quantity of sound pressure and an agreed reference sound pressure. The dB scale is logarithmic and uses the threshold of hearing of 20 μPa (micro pascals) as the reference pressure. This reference level is defined as 0 dB.

Frequency (Hz): The number of pressure variations per second (cycles per second) is called the **frequency** of sound and is measured in **Hertz (Hz)**. The rumble of distant thunder has a low frequency, while a whistle has a high frequency. The normal range of hearing for a healthy young person extends from approximately 20Hz up to 20 000 Hz (20 kHz) while the range from the lowest to highest note on a piano is approximately 27.5 Hz to 4.2 kHz.

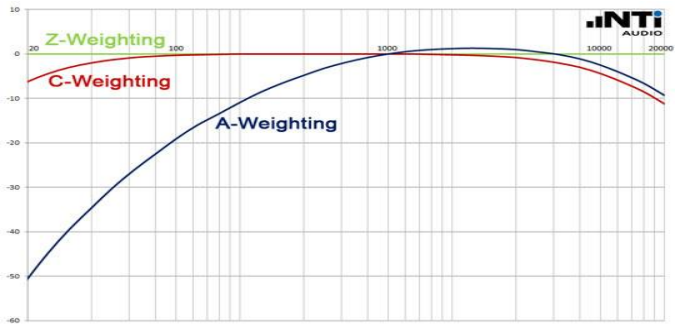
Spectral characteristics: The frequency content of noise.

Octave: a logarithmic unit for ratios between frequencies, with one octave corresponding to a doubling of frequency. For example, the frequency one octave above 40 Hz is 80 Hz.

1/3 Octave: a logarithmic unit of frequency ratio equal to one third of an octave.

"A" frequency weighting: The method of frequency weighting the electrical signal within a noise-measuring instrument to give a very approximate simulate to the human perception of loudness. The symbols for the noise parameters often include the letter "A" (e.g., L_{Aeq}, dBA) to indicate that frequency weighting has been included in the measurement. "A" weighting is most commonly used with regard to noise control issues, regulations and environmental standards.

"C" frequency weighting: The filters used in C weighting captures lower frequencies than A weighting as indicated in the chart below.



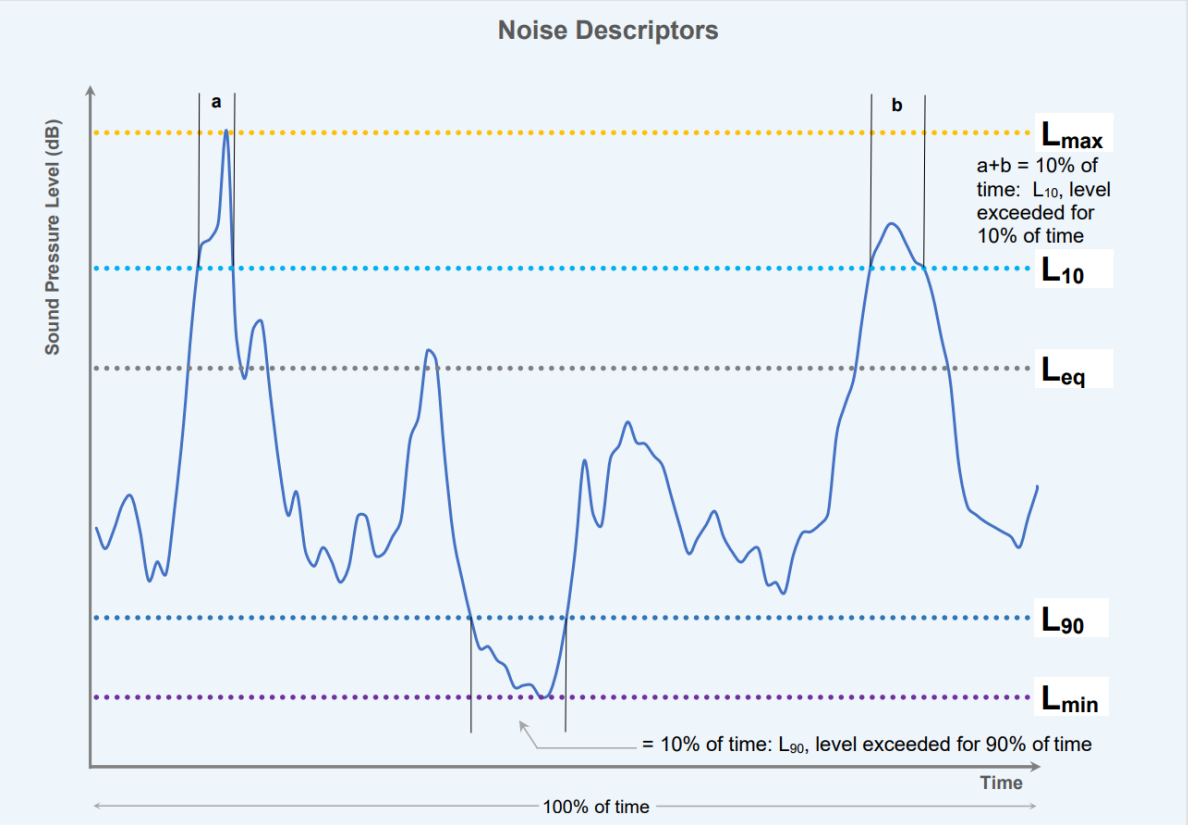
The A-weighting curve is used extensively for general purpose noise measurements but the C-weighting correlates better with the human response to high noise levels.

Fast, Slow and Impulse time weightings: Standardised root-mean-square (rms) averaging times to help define fluctuating noise levels. Impulsive noises have high peak levels with a very short duration (e.g., gun shot), or a sequence of such peaks. The 'Slow' time weighting averages the fluctuations over a one second time base whilst the 'Fast' time weighting averages the fluctuations over a one-eighth of a second time base. Environmental assessment standards usually specify the time weighting (**F**, **S**, or **I**) to be used.

L_{Aeq}: The A-weighted equivalent continuous noise level. A widely used noise descriptor which provides an average of the energy of a constant level of noise which is the same as the varying noise signal being measured. The time in which the measurement was sampled, is indicated with a subscripted number e.g. $L_{Aeq,15\ minute}$ is a 15-minute sample.

Percentile Levels L_N: The sound pressure level that is exceeded for N per cent of the time over which a given sound is measured. e.g. **L_{A90}** is the A-weighted sound pressure level that is exceeded for 90% of the time over which a given sound is measured.

L_{A90} is commonly used to describe the **background noise level** for community noise assessments.



Ambient noise: The all-encompassing noise associated within a given environment. It is the composite of sounds from many sources, both near and far.

Extraneous noise: Noise resulting from activities that are not typical of the area. Atypical activities may include construction, and traffic generated by holiday periods and by events such as concerts or sporting events. Normal daily traffic is not to be considered extraneous.

Background noise: The underlying level of noise present in the ambient noise, excluding the noise source under investigation, when extraneous noise is removed. This is described using the $\mathbf{L_{A90}}$ descriptor, fast time weighting.

Intrusive Noise: Refers to noise that intrudes above the background level by more than 5 decibels.

Noise limits: Enforceable noise levels that appear in consents and licences. The noise limits are based on achievable noise levels, which the proponent has predicted can be met during the environmental assessment. Exceedance of the noise limits can result in the requirement for either the development of noise management plans or legal action.

References:

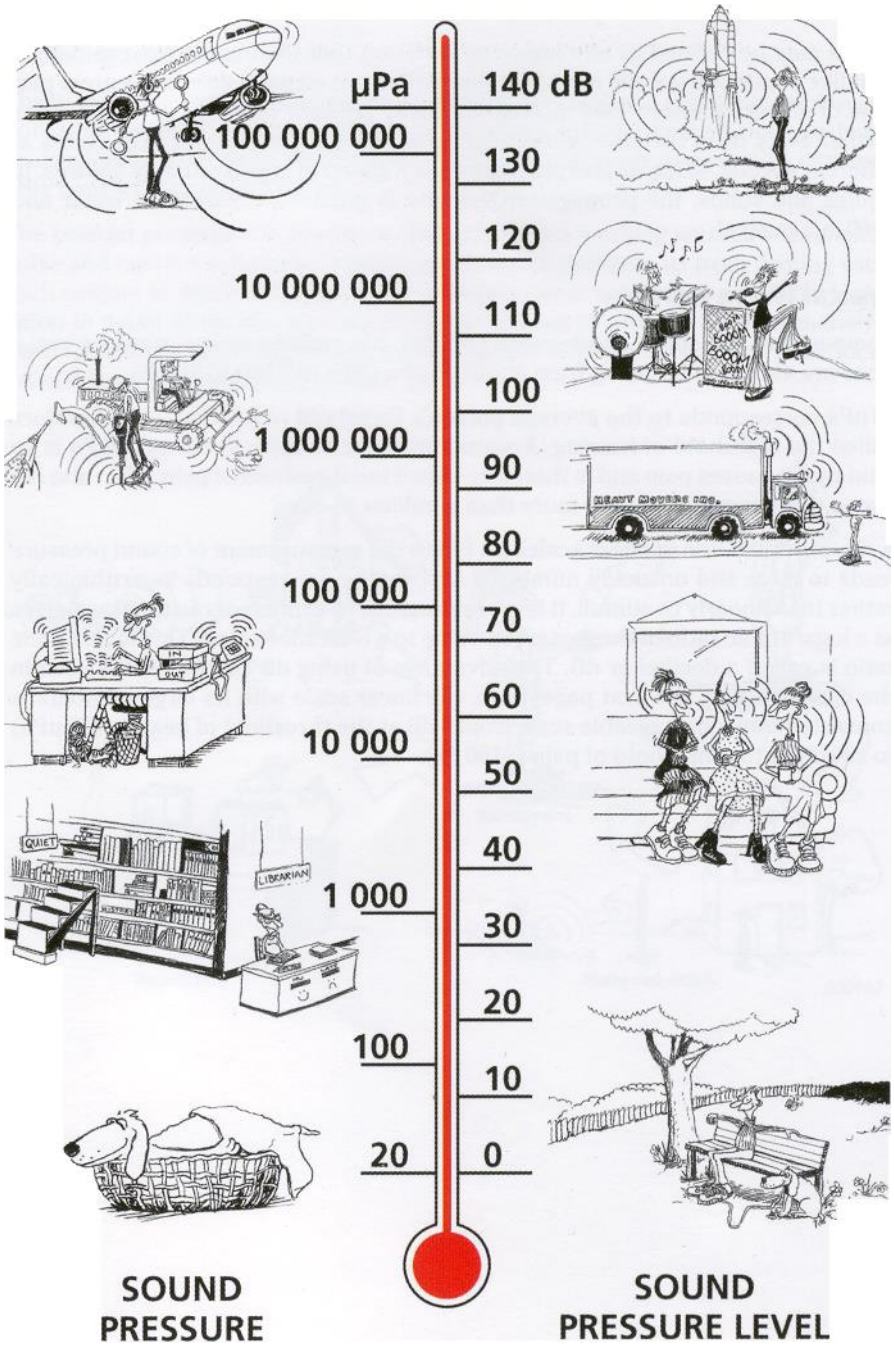
Measuring Sound Brüel and Kjær Sound & Vibration Measurements A/S September 1984

Environmental Noise Brüel and Kjær Sound & Vibration Measurements A/S 2000, 2001

New South Wales Industrial Noise Policy NSW Environment Protection Authority January 2000

https://www.nti-audio.com/en/support/know-how/frequency-weightings-for-sound-level-measurements

APPENDIX B
Comparison of Sound Pressure Levels



Our hearing covers a wide range of sound pressures – a ratio of over a million to one. The dB scale makes the numbers manageable.
Reproduced from
Environmental Noise Brüel and Kjær Sound & Vibration Measurements A/S 2000, 2001

Appendix C
Quarry Operations November, December 2021

Image Source – Lismore City Council Online Mapping
Note : Aerial photo not of November\, December 2021 operations

Quarry Pit Floor Operations 18th November 2021

Quarry equipment in use during noise monitoring

1 x Hyundai 520 excavator
1 x Kleeman MC110Z jaw crusher
1 x Powerscreen Warrior 1400 reclaimer
1 x 12/75 hydraulic stockpile
1 x Kleeman MC09S cone crusher
1 x Komatsu 500 loader
1 water truck
various haul trucks
various service vehicles

The mobile asphalt plant was also operating

Quarry Pit Floor Operations 16th December 2021

Quarry equipment in use during noise monitoring

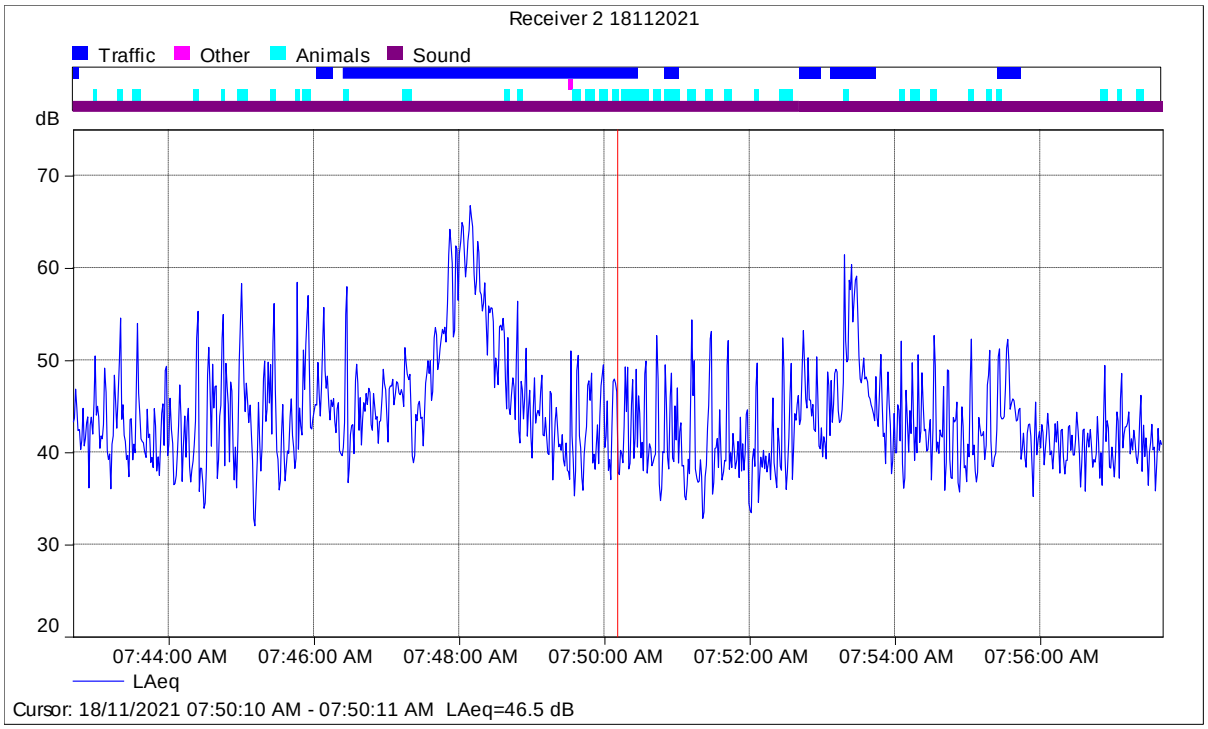
1 x Hyundai 430 excavator
1 x Kleeman MC110Z jaw crusher
1 x Powerscreen Warrior 1400 reclaimer
1 x 16/75 hydraulic stockpile
1 x Precision Screenn 350VSI
1 x Powerscreen Horizon 6203 flat deck screen
1 x Komatsu 500 loader
1 water truck
various haul trucks
various service vehicles

The mobile asphalt plant was also operating

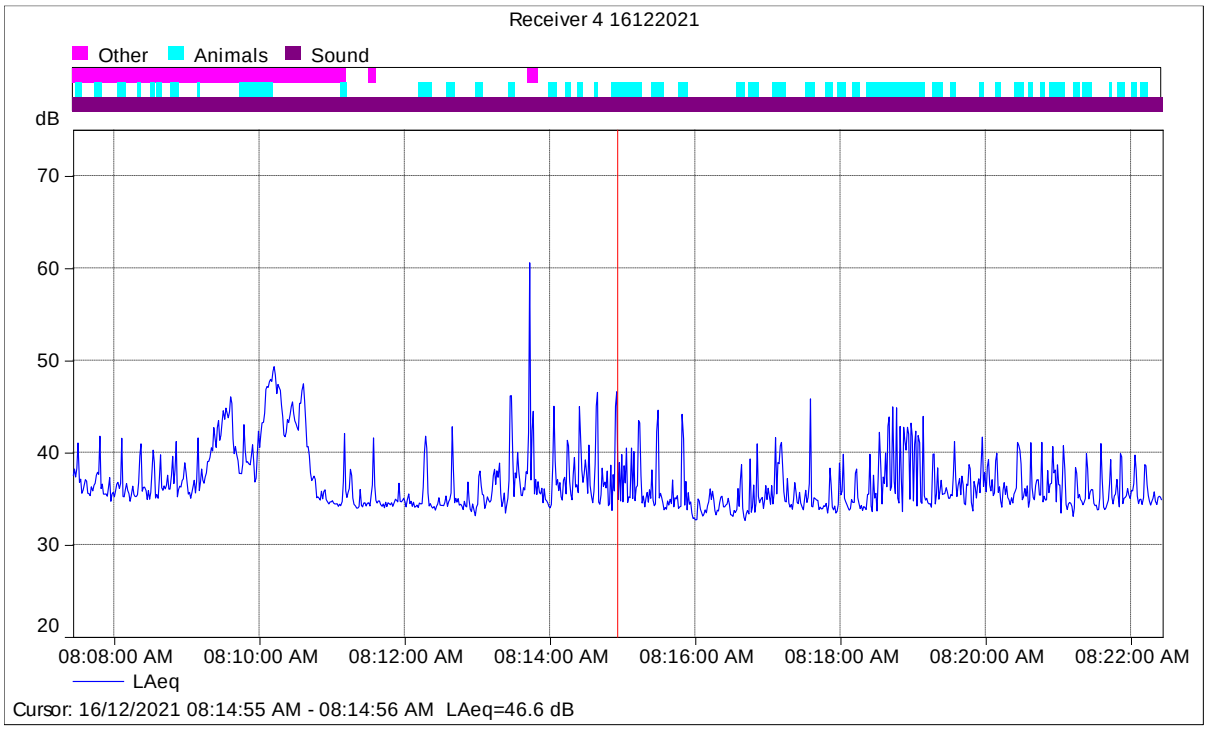
Mobile Asphalt Plant November, December 2021

Appendix D
Logged Noise Profiles

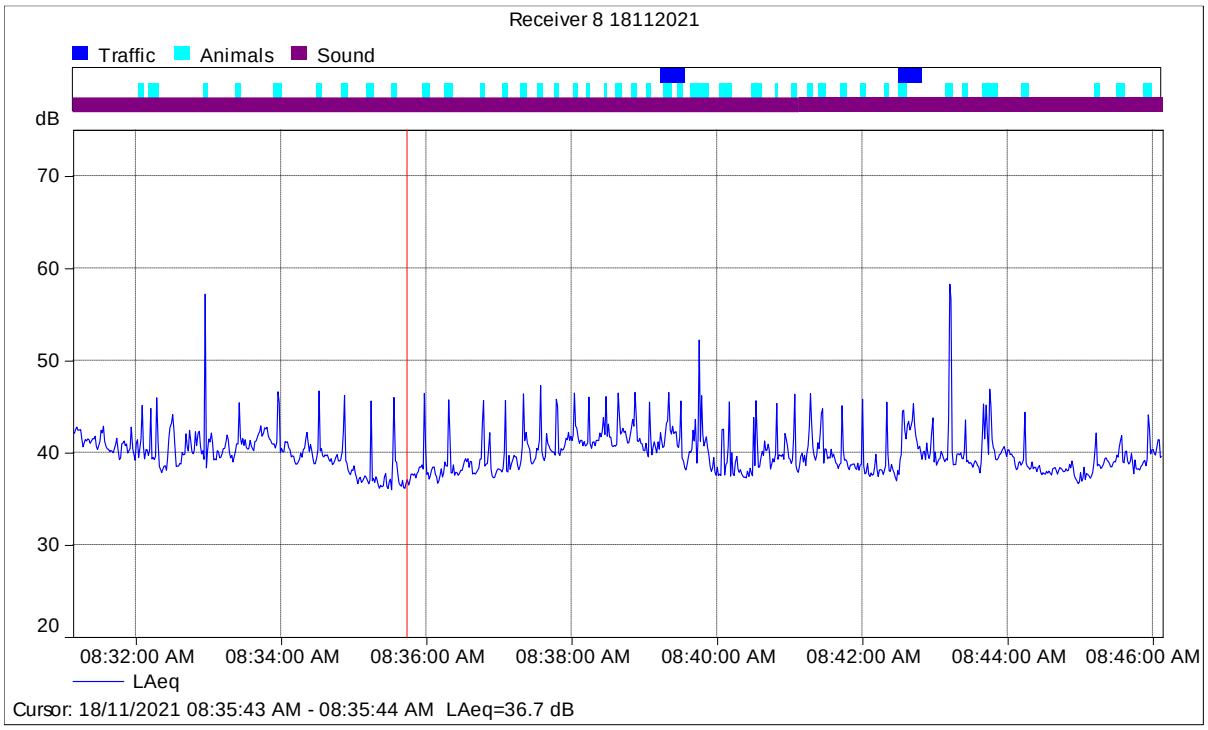
Graph D.1



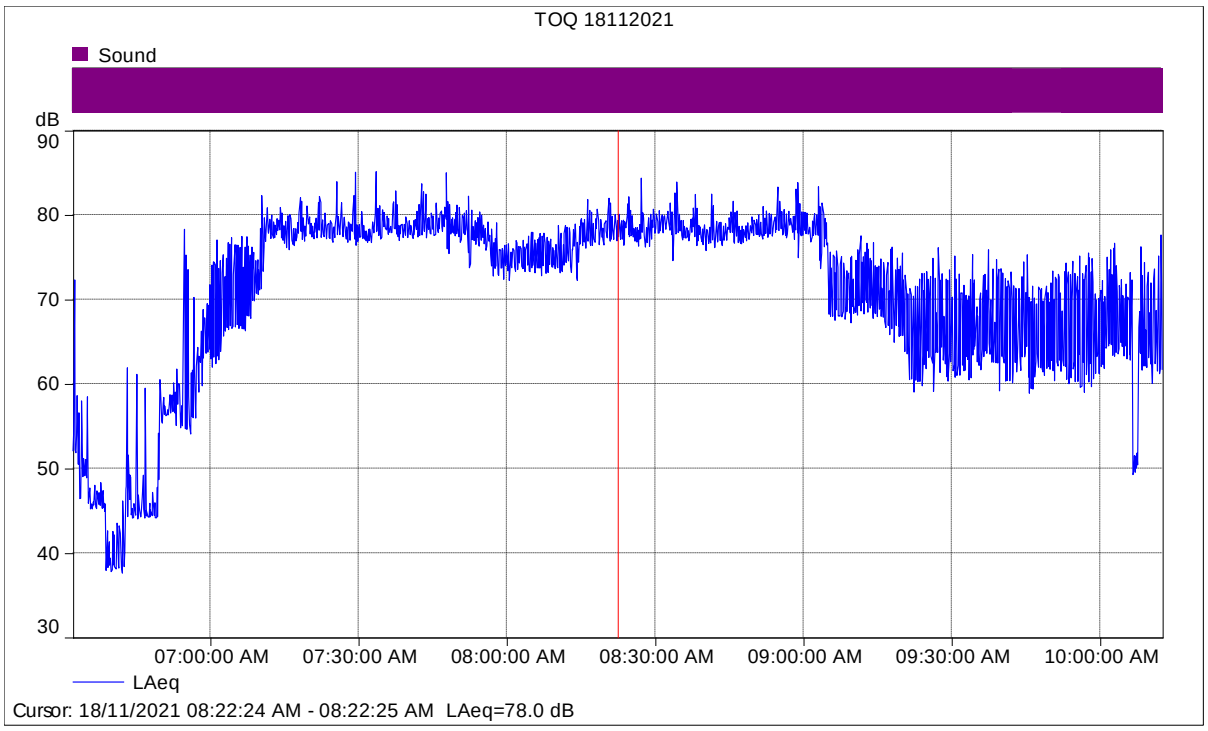
Graph D.2



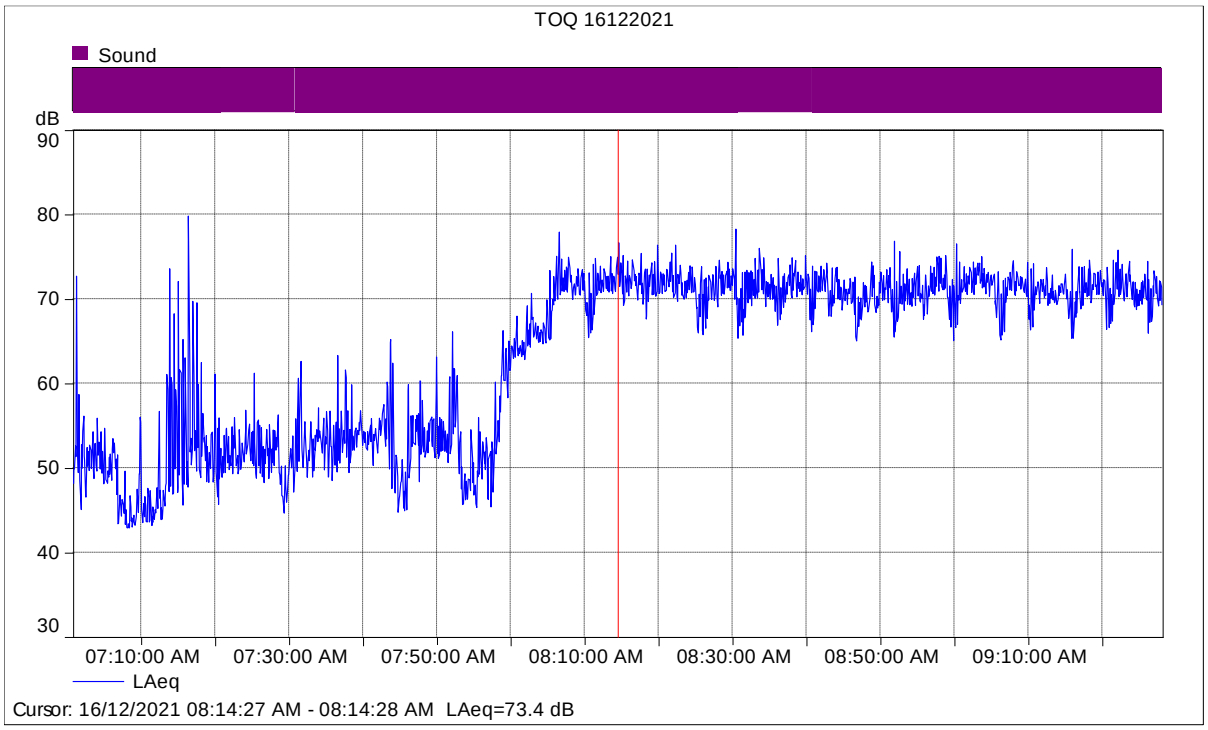
Graph D.3



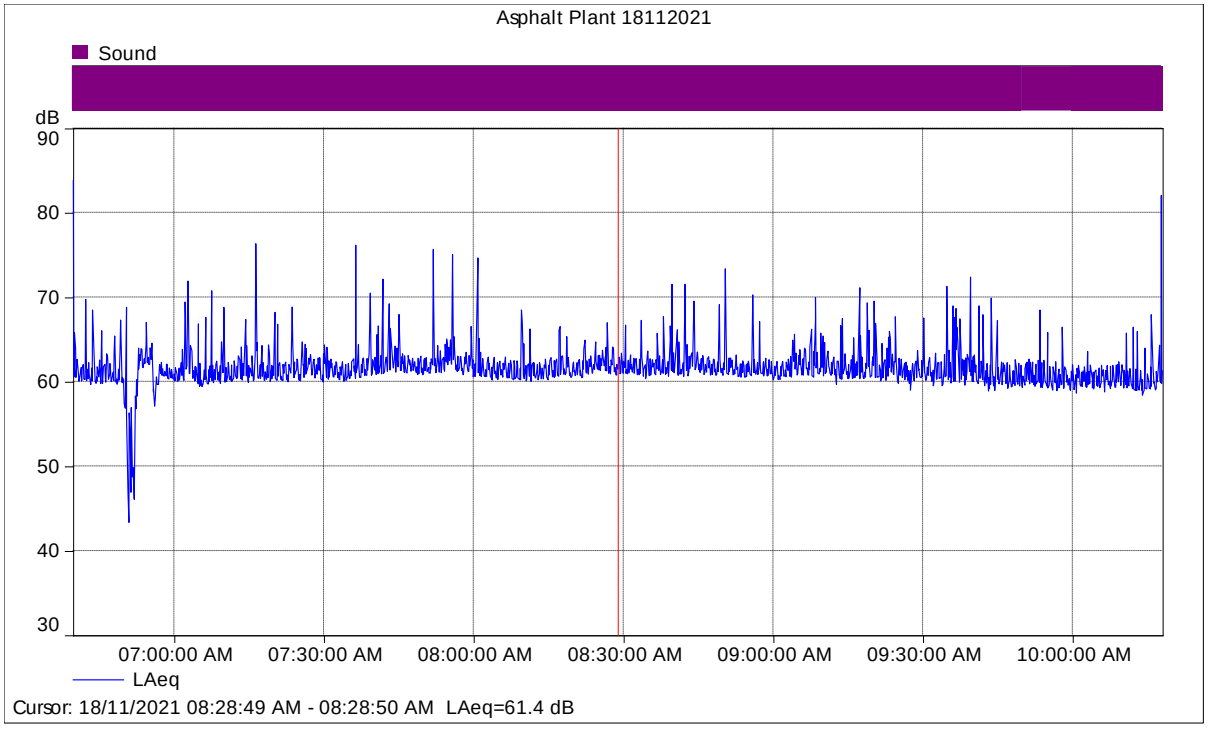
Graph D.4



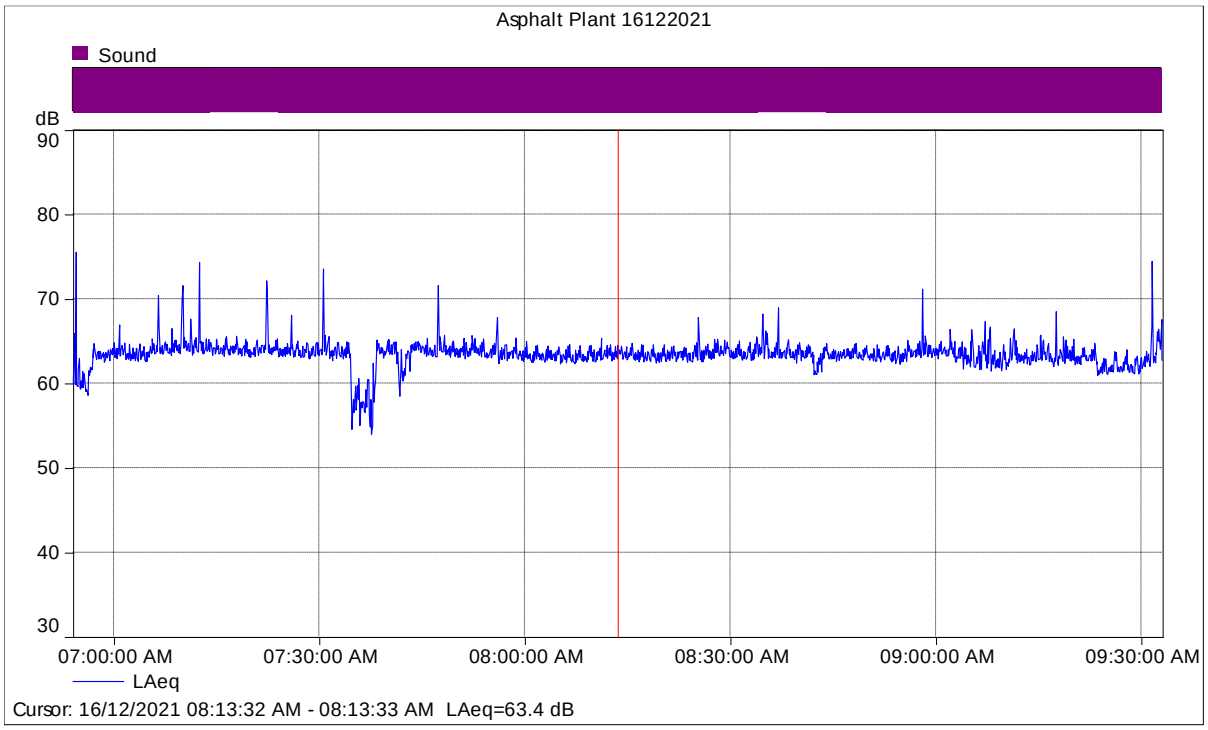
Graph D.5



Graph D.6



Graph D.7


Asphalt Plant 16122021
Sound
dB
90
80
70
60
50
40
30
07:00:00 AM
07:30:00 AM
08:00:00 AM
08:30:00 AM
09:00:00 AM
09:30:00 AM
LAeq
Cursor: 16/12/2021 08:13:32 AM - 08:13:33 AM LAeq=63.4 dB