

Noise Compliance Monitoring Report - June 2023

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Noise Compliance Monitoring Report - June 2023

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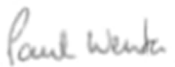
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Table of Contents

1.0	Introduction	1
1.1	Background	1
1.2	Site	1
2.0	Regulatory Conditions	1
2.1	Project Approval Requirements	1
2.2	EPL Requirements	1
3.0	Methodology	2
3.1	Source Monitoring	3
3.2	Instrumentation	3
3.3	NSW Noise Policy for Industry	3
4.0	Monitoring	3
4.1	Attended Monitoring	3
4.1.1	Weather Conditions	3
4.1.2	Site Operations	3
4.2	Monitoring Locations	3
5.0	Results	4
5.1	Receiver Location Monitoring	4
5.2	Site Source Monitoring	6
5.3	Predicted Noise Levels	7
5.4	Assessment Against Short-Term Night Time Criteria	7
6.0	Conclusion	8
Appendix A		
	Glossary of Acoustic Terms	A

List of Tables

Table 1	EPL Noise limits	1
Table 2	June 2023 Attended Noise Monitoring Results Summary	5
Table 3	June 2023 – On-site Results	6
Table 4	June 2023 – Calculated Noise Levels at the Receiver Locations	7

List of Figures

Figure 1	Site and Receiver Monitoring Locations	4
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1.0 Introduction

1.1 Background

National Ceramics Industries Australia Pty Ltd (NCIA or the Site) has engaged AECOM Australia Pty Ltd (AECOM) to conduct compliance noise monitoring to satisfy the requirements of the Project Approval (09_0006, 19 January 2012) and the sites Environmental Protection Licence (EPL 11956).

Acoustic terminology used in this report is defined in **Appendix A**.

1.2 Site

The site is located at 175 Racecourse Rd, Rutherford NSW and is bounded by industrial facilities to the west, vacant land immediately to the south, a golf driving range to the east and an RSPCA facility and Racecourse Rd to the north.

Site noise is generally characterised as continual general process noise (automated process machinery, conveyors, air emissions stacks and associated fans etc.), with some heavy vehicle traffic as well as a loader and fork lifts that operate intermittently. Traffic is predominantly limited to the day time and evening period with trucks only permitted between 7am and 10pm. Occasional sporadic impact noises were also observed.

The site is operational 24 hours a day, seven days a week however as stated there are limitations on truck deliveries to between 7am and 10pm.

2.0 Regulatory Conditions

The site is required to satisfy the conditions and noise limits outlined both in the Project Approval (09_0006) and EPL (no. 11956). The requirements of these documents are outlined below.

2.1 Project Approval Requirements

Project Approval reference 09_0006 issued 19 January 2012 states the following in regard to Noise Limits:

26. The Proponent shall ensure that noise generated from the project does not exceed the noise limits presented in Table 5. 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.

Table 5: Project Noise Limits dB(A)

Location	Day	Evening	Night	
	L_{Aeq} (15 minutes)	L_{Aeq} (15 minutes)	L_{Aeq} (15 minutes)	L_{AMax}
Kenvil Close	35	35	35	45
Wollombi Road	35	35	35	45

2.2 EPL Requirements

The noise limits defined in EPL 11956 are shown in **Table 1**, with the noise from the premises not to exceed these limits.

Table 1 EPL Noise limits

	Day (7am – 6pm)	Evening (6pm – 10pm)	Other Times (Night)
Noise Limit (dB(A))	41	39	35

Other EPL conditions relating to noise are:

- L5.2 *Noise from the premises is to be measured at the most affected point on or within the receptor site boundary to determine compliance with this condition.*
- L5.3 *Noise from the premises shall not exceed the LA1 (1 minute) noise level of 45 dB(A) at the nearest residential receiver most affected by noise from activities at the premises. The noise limit applies 1 metre from the dwelling façade and shall apply during the night period only.*
- L5.4 *The noise emission limits specified above apply under all meteorological conditions except:*
- a) During rain and wind speeds greater than 3 m/s; and*
 - b) From 6pm to 7am during intense inversions, which are indicated by cloud cover less than 40per cent and wind speeds less than 1.0 m/s.*

With the exception of the LA1 monitoring location defined as the 'nearest residential receiver' in Condition L5.3, the EPL does not define monitoring locations (receptors). With the exception of the LA1 location, EPL receptors are assumed to be those outlined by the Project Approval. As the Project Approval stipulates either lower or equivalent L_{Aeq} values to the EPL, the Project Approval noise limits have been applied as a conservative approach to assessing the noise impact of the facility on the receiver locations.

3.0 Methodology

The influence of extraneous noise, i.e. road and rail traffic as well as other community noise, makes it difficult to determine the noise contribution from the site in isolation, and therefore difficult to determine compliance with Approval and EPL limits.

Where direct measurement of noise contribution from an industrial facility is not possible due to persistent extraneous noise sources, the Environment Protection Authority's Noise Policy for Industry (NPfI) makes an allowance for assessment by other methods.

Section 7.1.1 Options for noise monitoring of the NPfI states:

- **Direct measurement at alternative or intermediate location/s**

Where direct measurement of noise at a compliance location is not practical because of poor signal-to-noise ratios (that is, extraneous noise is louder than the noise under investigation), or where access to the location has been denied or is unavailable, measurements at intermediate locations between the source and the receiver location, where signal-to-noise ratios are higher, may be a viable option. For this approach to be effective there needs to be well-established theoretical and/or empirical relationships between the intermediate location and the receiver location in terms of noise exposure. Noise modelling may be one option to establish this relationship. The techniques under the above section 'Direct measurement at a receiver location' would also be relevant in terms of quantifying the level of noise from the source at the intermediate location(s). Where this technique is relied upon, it is the responsibility of the proponent to demonstrate a robust acoustic relationship between the compliance location and the intermediate location.

Section 7.1.1 goes on to discuss assessment through the use of computer noise modelling. It states:

"The use of intermediate means of model validation or calibration can be a useful technique"

Determining compliance by prediction from onsite noise levels is therefore deemed to be appropriate in this instance.

3.1 Source Monitoring

Definitive compliance with Project Approval and EPL noise limits at the nominated receiver locations is difficult to determine through direct measurement due to the influence of extraneous noise sources during the day, evening and night periods. Therefore, in order to determine the noise contribution of the facility at the receiver locations, an alternative method of determining compliance, in accordance with the NPfl was considered appropriate. In this case site source measurements were used to predict noise impacts at each receiver location. Source noise monitoring was carried out at a single monitoring location on the eastern side of the NCIA site in order to predict the noise levels at the Project Approval and EPL monitoring locations in the absence of external noise sources.

3.2 Instrumentation

Attended measurements were conducted using a Larson Davis SoundTrack LxT. This instrument has Class 1 characteristics as defined in AS IEC 61672.1-2004 “Electroacoustics - Sound Level Meters”. Measurements were conducted over 15-minute intervals.

Calibration of the instrument was confirmed with a Larson Davis CAL150 Sound Level Calibrator prior to, and at the completion of monitoring with all calibration checks returning results within 0.1dB of the expected value. All equipment used for the monitoring has current calibration certificates (i.e. calibrated in the last year).

The sound level meter was set to ‘fast’ time weighting and programmed to store $L_{10(15 \text{ min})}$, $L_{Aeq(15 \text{ min})}$ and $L_{A90(15 \text{ min})}$ noise levels during each measurement period.

3.3 NSW Noise Policy for Industry

In reference to determining compliance with noise conditions, the Noise Policy for Industry (NPfl) notes that where noise levels are less than 2 dB above a noise limit the exceedance can be considered negligible.

4.0 Monitoring

4.1 Attended Monitoring

Attended measurements were conducted by an AECOM technician on 6 June 2023 at the monitoring locations listed in **Section 2.0** during daytime (0700 – 1800), evening (1800 – 2200) and night time (2200 - 0700) periods with measurements conducted at a height of approximately 1.5m above ground level.

4.1.1 Weather Conditions

Weather conditions during the day time sampling were slightly overcast, 16 degrees with light winds (approximately 2 m/s). Conditions for the evening and night time monitoring were clear skies, 13 degrees and light winds (2 m/s or less).

4.1.2 Site Operations

On 6 June 2023 the NCIA facility was operating under normal conditions. Noise emission characteristics of the site are outlined in **Section 1.2**.

4.2 Monitoring Locations

The two Project Approval monitoring locations are:

- Kenvil Close, Rutherford (assumed to be adjacent to 3 Kenvil Close)
- Wollombi Road, Farley (292 Wollombi Road).

Note that the Wollombi Road location was shifted due to construction activities occurring in the vicinity of the location used historically (252 Wollombi Road). 292 Wollombi Road is considered an equivalent and suitable location for this assessment.

While the EPL does not specifically define monitoring locations, it does require compliance at the nearest residential receiver for assessment of night time noise only. This location is deemed to be:

- 26 Fairway Street, Rutherford.

These monitoring locations are shown in **Figure 1** along with the site source monitoring location.



Figure 1 Site and Receiver Monitoring Locations

Due to external noise sources often dominating at the EPL monitoring locations, attended noise measurements were also conducted at the site, just in from the boundary during day, evening and night periods to quantify site noise emissions for the prediction of the noise level at each of the required receiver locations in the absence of extraneous noise.

5.0 Results

5.1 Receiver Location Monitoring

Attended noise monitoring was conducted at the two Project Approval defined receiver locations during the day, evening and night time periods. The results in the form of the $L_{Aeq} (15min)$ (the equivalent continuous sound level) and the $L_{A90} (15min)$ (the sound pressure level exceeded for 90% of the measurement period i.e. for 90% of the measurement period it was louder than the $L_{A90} (15 min)$). Results from the attended noise monitoring carried out during June 2023 are presented in **Table 2**.

Table 2 June 2023 Attended Noise Monitoring Results Summary

Location	Date / Time	Project Approval L _{Aeq} (15mins) dB(A)	Measured Noise Level, dB(A)		Description of Noise Environment
			L _{Aeq} (15 min)	L _{A90} (15 min)	
Day (7:00 am – 18:00 pm)					
Kenvil Cl	6/6/23 11:17	35	46.0	41.8	<ul style="list-style-type: none">• Site inaudible• Highway and local traffic• Trains and planes• Birds, dogs
Wollombi Rd	6/6/23 10:52	35	63.2	41.2	<ul style="list-style-type: none">• Site audible at times• Traffic on Wollombi Rd dominant• Birds, cows• Passing trains
Evening (18:00 pm – 22:00 pm)					
Kenvil Cl	6/6/23 21:22	35	39.9	37.0	<ul style="list-style-type: none">• Site inaudible• Highway traffic dominant• Minimal local traffic• Crickets / birds occasionally• Minimal residential noise• Dogs barking some distance away• Paused for passing trains
Wollombi Rd	6/6/23 21:45	35	57.4	40.6	<ul style="list-style-type: none">• Site clearly audible (all continuous process noise)• Occasional traffic along Wollombi Rd, dominant when passing• Crickets/frogs• Trains• Some residential noise
Night (22:00 pm – 7:00 am)					
Kenvil Cl	6/6/23 22:01	35	40.5	35.3	<ul style="list-style-type: none">• Site barely audible• Highway Traffic. No local traffic.• Dogs barking some distance away• Birds and Crickets• Paused for passing trains
Wollombi Rd	6/6/23 22:25	35	57.2	41.0	<ul style="list-style-type: none">• Site clearly audible (all continuous process noise)• Occasional traffic along Wollombi Rd, dominant when passing• Crickets/frogs• Trains• Some residential noise

Bold values indicate measured noise level above Project Approval criteria

The results in **Table 2** show that the measured $L_{Aeq(15\text{ min})}$ noise levels at Kenvil Close and Wollombi Road monitoring locations are above the 35 dB(A) Project Approval limit for each of the three time periods.

In most cases traffic was noted to be a significant noise source. At Kenvil Close the site noted to be inaudible during the day and evening and barely audible during the night period. The Wollombi Road locations was audible at times during the day period, and audible in the evening and night during reduced traffic periods.

In order to determine the noise contribution from the facility alone at the receiver locations, an alternative method of determining compliance, in accordance with the NPfl was considered appropriate. In this case site source measurements were used to predict noise impacts for each receiver location.

5.2 Site Source Monitoring

Source noise measurements were conducted during the day, evening and night time periods at a single location considered to be representative on the eastern side of the site. Results from the site monitoring carried out on 6 June 2023 are presented in **Table 3**, with the calculated predicted receiver results provided in **Section 5.3**.

Table 3 June 2023 – On-site Results

Location	Time		Measured Noise Level, $L_{Aeq(15\text{ min})}$ and $L_{A90(15\text{ min})}$ dB(A)		Site Operation
			$L_{Aeq(15\text{ min})}$	$L_{A90(15\text{ min})}$	
On-Site	Day	6/6/23 10:52	51.8	51.0	<ul style="list-style-type: none"> Site dominant with majority of noise generated by continuous processes. Highway traffic occasionally audible Birds Some noise from other nearby industrial sites Minimal extraneous noise Paused for passing trains
	Evening	6/6/23 20:52	52.1	51.4	<ul style="list-style-type: none"> Plant noise dominant and very constant Dogs occasionally barking at nearby RSPCA facility Crickets Paused for passing trains
	Night	6/6/23 23:07	52.5	51.7	<ul style="list-style-type: none"> Site noise dominant Crickets Minimal other noise Paused for passing trains

The results of the site measurements demonstrate there is very little extraneous noise present at this location with the L_{A90} results relatively close to the L_{Aeq} results for all three time periods. The L_{A90} represents the lowest 10% of the noise measured.

5.3 Predicted Noise Levels

In order to predict resultant noise levels at each receiver from the NCIA facility alone, a 'flat ground' model was used based on hemispherical spreading, conservatively assuming no topographical shielding, ground or air absorption, directivity or meteorological effects. Calculated noise levels at each receiver location are presented in **Table 4**.

Table 4 June 2023 – Calculated Noise Levels at the Receiver Locations

Receiver Location	Time	Calculated noise impact, dB(A)	Project Approval Limit, dB(A)	Comply
Kenvil Close	Day	34	35	Yes
	Evening	34	35	Yes
	Night	35	35	Yes
Wollombi Road	Day	32	35	Yes
	Evening	32	35	Yes
	Night	33	35	Yes

Calculated results show that all predicted results are either below or equivalent to the 35dB Project Approval limit at both receiver locations.

5.4 Assessment Against Short-Term Night Time Criteria

Both the Project Approval and EPL state that a 45dB short term limit applies during the night time period (10pm – 7am). The Project Approval stipulates the $L_{A_{Max}}$ must not exceed 45 dB at the two receiver locations (Kenvil Close and Wollombi Road) while the EPL stipulates that the L_{A1} must not exceed 45 dB at the nearest residential receiver most affected by noise from activities at the premises (deemed to be 26 Fairway Street).

$L_{A_{Max}}$ measurements performed at the Project Approval locations were elevated due to localised noise sources and are not representative of the site contribution. While an L_{A1} measurement was not directly obtained at 26 Fairway Street, the $L_{A_{Max}}$ measured at this location was 45 dB, equivalent to the criteria. The $L_{A_{Max}}$ reading is a shorter time period than the L_{A1} and provides a conservative assessment of short term noise potentially impacting sleep.

Due to the proximity of the Fairway Street location to the site (357m) and the significant distance between the two Project Approval locations and the site (1050m and 1280m), a compliant result at Fairway Street implies the $L_{A_{Max}}$ is also compliant at both the Kenvil Close and Wollombi Road locations, which is consistent with observations made during the measurement periods.

6.0 Conclusion

Attended noise compliance monitoring at designated NCIA Project Approval and EPL noise receivers was conducted on 6 June 2023.

Site noise from NCIA was noted to be either inaudible or barely audible at Kenvil Close, and audible at the Wollombi Road location. $L_{Aeq(15\text{ min})}$ levels measured at the receiver locations were largely influenced by extraneous noise sources such as road and rail traffic and other ambient sources (e.g. birds, crickets) at both locations. Extraneous noise sources present at the defined Project Approval locations means in-situ assessment of the site contribution at the receiver locations is not possible.

Due to the difficulty in determining the contribution of the facility at the nominated receiver locations, an alternative method of determining compliance, in accordance with the NPfI, was considered appropriate. In this case site source measurements were used to calculate noise impacts at each receiver location.

As shown in **Table 4**, calculated noise levels demonstrate compliance with the Project Approval noise limits at the Kenvil Close and Wollombi Road location for all three time periods.

An assessment of the short term night time noise impacts as a result of the site found the EPL receptor at 26 Fairway Street was compliant, with the Project Approval monitoring locations significantly further from the site also deemed to be compliant.

Appendix A

Glossary of Acoustic Terms

Appendix A Glossary of Acoustic Terms

The following is a brief description of acoustic terminology used in this report:

<i>Sound power level</i>	The total sound emitted by a source																						
<i>Sound pressure level</i>	The amount of sound at a specified point																						
<i>Decibel [dB]</i>	The measurement unit of sound																						
<i>A Weighted decibels [dB(A)]</i>	<p>The A weighting is a frequency filter applied to measured noise levels to represent how humans hear sounds. The A-weighting filter emphasises frequencies in the speech range (between 1kHz and 4 kHz) which the human ear is most sensitive to, and places less emphasis on low frequencies at which the human ear is not so sensitive. When an overall sound level is A-weighted it is expressed in units of dB (A).</p> <p>The decibel scale is logarithmic in order to produce a better representation of the response of the human ear. A 3 dB increase in the sound pressure level corresponds to a doubling in the sound energy. A 10 dB increase in the sound pressure level corresponds to a perceived doubling in volume. Examples of decibel levels of common sounds are as follows:</p> <table> <tr> <td>0dB(A)</td><td>Threshold of human hearing</td></tr> <tr> <td>30dB(A)</td><td>A quiet country park</td></tr> <tr> <td>40dB(A)</td><td>Whisper in a library</td></tr> <tr> <td>50dB(A)</td><td>Open office space</td></tr> <tr> <td>70dB(A)</td><td>Inside a car on a freeway</td></tr> <tr> <td>80dB(A)</td><td>Outboard motor</td></tr> <tr> <td>90dB(A)</td><td>Heavy truck pass-by</td></tr> <tr> <td>100dB(A)</td><td>Jackhammer/Subway train</td></tr> <tr> <td>110 dB(A)</td><td>Rock Concert</td></tr> <tr> <td>115dB(A)</td><td>Limit of sound permitted in industry</td></tr> <tr> <td>120dB(A)</td><td>747 take off at 250 metres</td></tr> </table>	0dB(A)	Threshold of human hearing	30dB(A)	A quiet country park	40dB(A)	Whisper in a library	50dB(A)	Open office space	70dB(A)	Inside a car on a freeway	80dB(A)	Outboard motor	90dB(A)	Heavy truck pass-by	100dB(A)	Jackhammer/Subway train	110 dB(A)	Rock Concert	115dB(A)	Limit of sound permitted in industry	120dB(A)	747 take off at 250 metres
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110 dB(A)	Rock Concert																						
115dB(A)	Limit of sound permitted in industry																						
120dB(A)	747 take off at 250 metres																						
<i>Decibel scale</i>																							
<i>Frequency [f]</i>	<p>The repetition rate of the cycle measured in Hertz (Hz). The frequency corresponds to the pitch of the sound. A high frequency corresponds to a high pitched sound and a low frequency to a low pitched sound.</p>																						
<i>Equivalent continuous sound level [L_{Aeq}]</i>	The constant sound level which, when occurring over the same period of time, would result in the receiver experiencing the same amount of sound energy.																						
L_{max}	The maximum sound pressure level measured over the measurement period																						
L_{min}	The minimum sound pressure level measured over the measurement period																						
L_{10}	The sound pressure level exceeded for 10% of the measurement period. For 10% of the measurement period it was louder than the L_{10} .																						

<i>L_{A90(15 min)}</i>	The sound pressure level exceeded for 90% of the measurement period. For 90% of the measurement period it was louder than the L _{A90 (15 min)} .
<i>Ambient noise</i>	The all-encompassing noise at a point composed of sound from all sources near and far.
<i>Background noise</i>	The underlying level of noise present in the ambient noise when extraneous noise (such as transient traffic and dogs barking) is removed. The L _{A90 (15 min)} sound pressure level is used to quantify background noise.
<i>Traffic noise</i>	The total noise resulting from road traffic. The L _{eq} sound pressure level is used to quantify traffic noise.
<i>Day</i>	The period from 0700 to 1800 h Monday to Saturday and 0800 to 1800 h Sundays and Public Holidays.
<i>Evening</i>	The period from 1800 to 2200 h Monday to Sunday and Public Holidays.
<i>Night</i>	The period from 2200 to 0700 h Monday to Saturday and 2200 to 0800 h Sundays and Public Holidays.
<i>Assessment background level [ABL]</i>	The overall background level for each day, evening and night period for each day of the noise monitoring.
<i>Rating background level [RBL]</i>	The overall background level for each day, evening and night period for the entire length of noise monitoring.

*Definitions of a number of terms have been adapted from Australian Standard AS1633:1985 “Acoustics – Glossary of terms and related symbols”, the EPA’s NSW Industrial Noise Policy and the EPA’s NSW Road Noise Policy.