
Noise Impact Assessment Proposed Regional Animal Care Facility 253 Old Maitland Road, Mardi, NSW

Prepared for:
Central Coast Council
c/- ADW Johnson

Document No: 222258-9800-R5

April 2025

Project name: Mardi Animal Care Facility


Prepared for: Central Coast Council c/- ADW Johnson

Client contact: Ben Jia (ADWJ)

Document control number: 222258-9800

Approved for release by: N. Pennington

DOCUMENT CONTROL				
Doc. No. / Version	Date Issued	Prepared by	Reviewed by	Issued to
222258-9800-R5	8 April 2025	NP	NP	BJ
222258-9800-R4	24 March 2025	NP	NP	BJ
222258-9800-R3	4 October 2023	NP	NP	BJ
222258-9800-R2	25 July 2023	NP	NP	BJ
222258-9800-R1	28 May 2024	NP	NP	BJ
222258-9800-R0	5 May 2023	NP	NP	BJ

PROJECT PERSONNEL				
Name	Qualifications	Associations*	Position	Signature
Neil Pennington	B.Sc.(Phys.), B.Math. (Hons)	MAIP, MAAS, MASA	Principal/Director	

*MAIP: Member, Australian Institute of Physics
MAAS: Member, Australian Acoustical Society
MASA: Member, Acoustical Society of America

DISCLAIMER

Spectrum Acoustics provides professional consulting services with the express purpose of advocating for its Clients' projects by ensuring all appropriate skills are applied with the goal of securing project approval. Spectrum Acoustics personnel endeavour to conduct themselves in business matters with respect to, but not limited to, the Australian Acoustical Society (AAS) Code of Ethics.

This document is prepared for the particular requirements of our Client which are based on a specific brief with limitations as agreed to with the Client. It is not intended for and should not be relied upon by a third party, other than the relevant regulatory agencies, and no responsibility is undertaken to any third party without prior consent provided by Spectrum Acoustics. The information herein should not be reproduced, presented or reviewed except in full.

In preparing this report, we have relied upon, and presumed accurate, information provided by the Client and/or from other sources. Except as otherwise stated in the report, we have not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate or incomplete then it is possible that our observations and conclusions as expressed in this report may change.

The information contained herein pertains to acoustics only. No claims are made and no liability is accepted in respect of design and construction issues falling outside of the specialist field of acoustics engineering including and not limited to structural integrity, fire rating, architectural buildability and BCA ventilation requirements. Supplementary professional advice should be sought in respect of these issues.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	III
1.0 INTRODUCTION.....	1
1.1 The Proposal	1
1.2 Project Description	2
1.3 Description of Terms	3
2.0 NOISE CRITERIA.....	4
2.1 Background Noise Levels	4
2.2 Operational Noise Criteria	4
2.3 Sleep Disturbance	5
3.0 RESULTS AND RECOMMENDATIONS.....	5
3.1 Sound power levels.....	5
3.2 Predicted operational noise levels	6
3.2.1 LAeq Emissions	6
3.2.2 Cumulative noise	7
3.2.3 Sleep Disturbance	7
3.3 Other noise sources.....	8

TABLES

Table 1: Definition of acoustical terms.....	3
Table 2: Measured noise levels 20-27 May 2024	4
Table 3: Base noise level objectives	5
Table 4: Lw of barking dogs Leq(15min).....	6
Table 5: Daytime Exercise Yard 1 level at R1, Leq(15min)	6
Table 6: Night time enclosed Kennel D level at R2, Leq(15min).....	7
Table 7: Night time maximum level at R1, Leq(15min).....	8

FIGURES

Figure 1: Project site location, residential receivers and noise logging location.	2
Figure 2: Proposed site layout.	2
Figure 3: Typical kennel floorplan.	3

EXECUTIVE SUMMARY

A Noise Impact Assessment (NIA) for establishment of a proposed animal shelter at Mardi, NSW, has been conducted.

The assessment has found that the design and orientation of the proposed new adoption and shelter kennels is optimal for minimising off-site noise impacts at residential receivers to the west of the site with dogs to be locked in enclosed kennels at night. The site has a small number of nearby residential receivers and the area is subjected to relatively high levels of constant traffic noise.

The assessment has found that noise levels at the nearest potentially impacted residential receivers would not exceed the project noise trigger levels both day and night.

1.0 INTRODUCTION

1.1 The Proposal

Central Coast Council has commissioned Spectrum Acoustics to prepare a Noise Impact Assessment (NIA) for a proposed Animal Care Facility (ACF) at Mardi, NSW. This study was commissioned to accompany a Development Application (DA) to Central Coast Council (Council). The third revision of this report has been prepared to address issues raised by Council in their review of the original assessment dated July 2023. Council's issues are summarized as follows:

- Original background logging was over four days. Council requires seven days of monitoring.
- A more thorough assessment of cumulative noise emissions from the site is required.

Further review by Council in September 2024 raised the following additional point requiring consideration:

- Consideration of facades and reverberant build-up within kennels.
- Openable windows on the southern side of kennels.
- Use of the overnight lockbox outside of office hours.
- Consideration of modifying factors in Fact Sheet C of the NPfl.

Regarding reverberation within kennels, note 3 to Table 2 in this report confirms that the measurements were taken within existing kennels and therefore includes reverberant build-up.

Following further external review by Council in February 2025, this revision addresses the following additional points:

Typical details to provided include

- a. reverberation time in the enclosure;
- b. the space averaged sound pressure level on the inside of the enclosure;
- c. the derived sound power level for the external face of the enclosure based on their respective size and transmission loss.

Regarding point (a) the reverberation time in the enclosure does not require to be known as the space averaged sound pressure level inside the enclosure was directly measured at 84 dB(A), Leq. The adopted sound power level of 101 dB(A) used in previous revisions of this report was back-calculated to the centre of the space using a generic equation for distance loss in a reverberant enclosure. The measured internal space averaged SPL is adopted for the assessment in this revision.

1.2 Project Description

Council has identified 253 Old Maitland Road, Mardi, as the preferred site for a new Regional ACF that will replace and combine the Erina and Charmhaven facilities which have reached the end of their functional life. Under the proposal several new dog kennels and outdoor dog run areas would be constructed and an assessment of noise impacts on surrounding receivers is required. The assessment is based on the typical regulatory requirements as contained in NSW Noise Policy for Industry (NPI).

The proposed site location, residential receivers and noise logging location are shown below in **Figure 1**, and the proposed site layout is shown in **Figure 2**. Receivers R1 and R2 are the nearest existing residence to the development. A detailed floorplan of a typical proposed new kennel is shown in **Figure 3**.

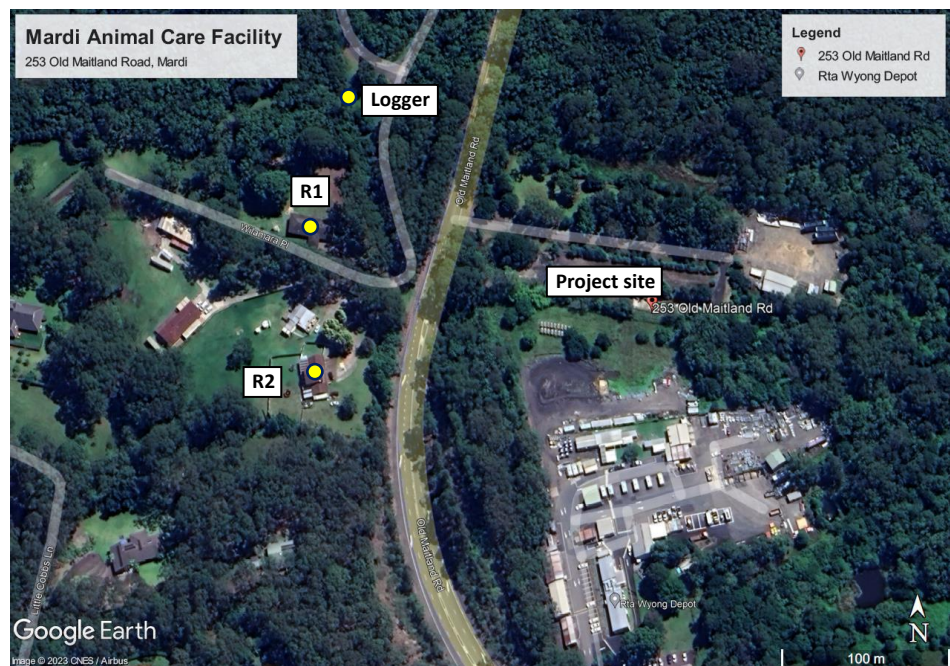


Figure 1: Project site location, residential receivers and noise logging location.



Figure 2: Proposed site layout.

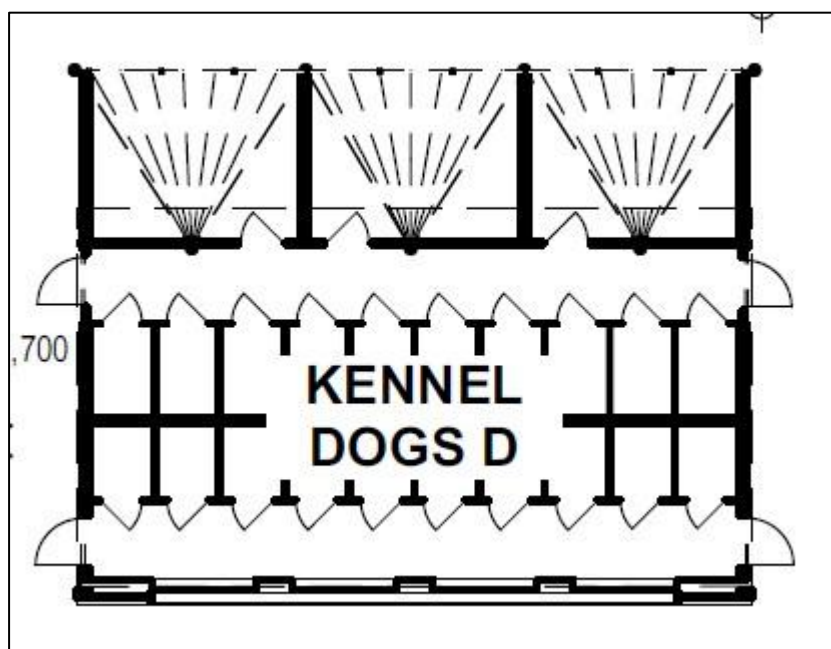


Figure 3: Typical kennel floorplan.

The layout of the new kennels is such that the admin/cattery building acts as a partial noise screen for the adoption centre day yards as shown in Figure 2. The dogs would be fully enclosed at night.

1.3 Description of Terms

Table 1 contains the definitions of commonly used acoustical terms and is presented as an aid to understanding this report.

Table 1: Definition of acoustical terms

Term	Definition
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.
L10	Average Maximum Noise Level - the level exceeded for 10% of the monitoring period.
L90	Average Minimum Noise Level - the level exceeded for 90% of the monitoring period and recognised as the Background Noise Level. In this instance, the L90 percentile level is representative of the noise level generated by the surrounds of the residential area.

2.0 NOISE CRITERIA

2.1 Background Noise Levels

Ambient noise levels were monitored by Spectrum Acoustics at the southern end of Zoriana Close from 20-27 May 2024. Data was recorded at 15 minute statistical intervals using an ARL Ngara environmental noise logger. The measurements were conducted in accordance with relevant EPA guidelines and AS 1055-1997 “Acoustics – Description and Measurement of Environmental Noise”. The noise logger used complies with the requirements of AS 1259.2-1990 “Acoustics – Sound Level Meters”, and has current NATA calibration certification.

The logger was programmed to continuously register environmental noise levels over the 15 minute intervals, with internal software calculating and storing Ln percentile noise levels for each sampling period. Calibration of the logger was performed during the instrument’s initialisation procedures, with calibration results being within the allowable ± 0.5 dB(A) range.

The logger was placed in a clearing adjacent to Zoriana Close. **Table 2** below shows a summary of the measured LA90 (background) and LAeq noise levels for the day, evening and night time 4:30-7:00am periods. The data is also shown graphically in **Appendix A**. The data is typical of an environment close to a major road with LAeq levels reasonably consistent through the day, evening and night periods. Being in a heavily treed area, the elevated background (LA90) levels during the evening are likely due to birds and/or insects.

Table 2: Measured noise levels 20-27 May 2024

		Ambient Noise Levels dB(A)		
Location	Percentile	Day	Evening	Night
Zoriana Close	L ₉₀	49	45	41
	L _{eq} (period)	61	59	55

2.2 Operational Noise Criteria

In relation to determining noise goals for the operation of facility the NPI sets out two separate sets of criteria designed to ensure developments meet environmental noise objectives. The first criteria account for intrusive noise and the others apply to the protection of amenity of particular land uses. A new development is assessed by applying both criteria to the situation and adopting the more stringent of the two.

Amenity criteria are dependent upon the nature of the receiver area and the existing level of industrial noise. The area is best described as semi-rural, although the constant and elevated traffic noise from the M1 Motorway classify it as an “Urban” amenity area. To enable a conservative assessment, the assessment considers the receivers to be in a suburban amenity area.

Table 3 below specifies the applicable base noise objectives for the operation of the carpark and facility.

Table 3: Base noise level objectives

Period	Intrusiveness trigger level* L _{eq} (15 min) dB(A)	Amenity trigger level** L _{eq} (15 min) dB(A)
Day (7am – 6pm)	54	53
Evening (6pm - 10pm)	50	43
Night (10pm – 7am)	46	38

* Rating Background Level (RBL) + 5dB. RBL is the median value of each ABL (Assessment Background Level) over the entire monitoring period. The ABL is a single figure representing the “L₉₀ of the L₉₀s” for each separate day of the monitoring period.

** Recommended level for Suburban zone Table 2.2 of NPI minus 5 dB. Correction of +3dB to convert to LA_{eq}(15min).

The project specific noise trigger levels are therefore,

Day	53 dB(A), L_{eq}(15min)
Evening	43 dB(A), L_{eq}(15min)
Night	38 dB(A), L_{eq}(15min)

2.3 Sleep Disturbance

In relation to sleep disturbance, Section 2.5 of the NPI states that where the subject development/premises night-time noise levels at a residential location exceed:

- LA_{eq},15min 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and/or
- LAF_{max} 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater,

a detailed maximum noise level event assessment should be undertaken. The measured background noise level of 41 dB(A) for the night period implies a sleep disturbance trigger level of **56 dB(A), L_{max}**. If the screening level is exceeded, the NPI requires a more thorough assessment of the potential impacts on residential amenity. In projects such as this, however, the goal is to engineer noise emission so the sleep disturbance trigger level is not exceeded.

3.0 RESULTS AND RECOMMENDATIONS

3.1 Sound power levels

Spectrum Acoustics has previously measured noise from commercial dog kennels and pet resorts. Typical levels averaged over various dog breeds are shown in **Table 4**. Previous revisions of this report had the total dB(A) listed in Table 4 but also had the octave band data listed as dB(A) when the data were actually dB. For ease of presentation, octave band data in Table 4 are now dB(A) and no A-weighting correction will be made for sound pressure levels at receivers.

Table 4: Lw of barking dogs Leq(15min)

	dB(A)	Octave Band Centre Frequency, Hz dB(A)							
		63	125	250	500	1k	2k	4k	8k
1 dog in carpark ¹	88	34	46	62	78	86	79	70	61
3 dogs in open ²	96	42	54	70	86	94	87	78	69
10 dogs in dens (SPL) ³	84	30	42	58	74	82	75	66	57
Individual dog ⁴ , Lmax	111	57	69	85	101	109	102	93	84
Individual dog ⁵ , Lmax	107	53	65	81	97	105	98	89	80

¹ Barking for one minute in transit from car to facility entry.

² Barking for five minutes in exercise yard 3.

³ Measured space average SPL at enclosure interior surface included reverberant build-up.

⁴ Measured average over one hour in enclosure.

⁵ In the open, such as being taken to the overnight lockbox, with no reverberant build-up.

3.2 Predicted operational noise levels

3.2.1 LAeq Emissions

Calculated daytime noise levels from the most exposed source to receiver R1, exercise yard 1, are shown in **Table 5**. The assessment point is 30m closer to the site than the residences in accordance with NPI requirements.

Table 5: Daytime Exercise Yard 1 level at R1, Leq(15min)

Item	dB(A)	Octave Band Centre Frequency, Hz (dB(A))							
		63	125	250	500	1k	2k	4k	8k
3 dogs in yard, Leq (15 min)	96	42	54	70	86	94	87	78	69
Distance Loss to R1 (115m)		-49	-49	-49	-49	-49	-49	-49	-49
Barrier loss [#]		0	0	0	0	0	0	0	0
Ground/Atmosphere/foilage loss [*]		-2	-4	-5	-6	-8	-12	-14	-15
SPL @ receiver Leq (15 min)	37	0	1	16	31	33	26	15	4
Daytime criterion Leq (15 min)	53								
Impact	0								

[#] Wire fence assumed, no barrier loss.

^{*} ISO 9613-2 General calculation method.

Plans of the proposal drawn by Therian in June 2022 were reviewed to determine construction materials and dimensions of the proposed kennel buildings. No construction materials are nominated at this early stage, although it is common for kennel buildings to be clad externally in sheet metal with a sturdy and washable internal lining such as 9mm fibre cement and insulation to walls and roofs for thermal purposes.

Each kennel building has a floor/roof area of approximately 60m² and windows totalling approximately 6 m² facing south (towards nearest receiver, assumed 50% open) in the case of kennels C, D, G and H. Western and southern wall areas facing residential receivers total approximately 40 m² per kennel.

External sound power levels for these surfaces were calculated by adopting a nominally Rw 25 lightweight construction for walls and roof and 10 dB loss through open windows then adding an area gain to determine sound power levels for each building component,

after subtracting a 90° directivity loss for the roof as it is almost horizontal. Adding these together gives an equivalent point source sound power level of 81 dB(A) for the kennel building, based on the 84 dB(A) spatially averaged internal sound pressure level, with the open windows contributing significantly to this value.

Table 6: Night time enclosed Kennel D level at R2, Leq(15min)

Item	Octave Band Centre Frequency, Hz (dB(A))								
	dB(A)	63	125	250	500	1k	2k	4k	8k
Kennel external Lw, Leq (15 min)	81	27	39	55	71	79	72	63	54
Distance Loss to R2 (115m)		-49	-49	-49	-49	-49	-49	-49	-49
Ground/Atmosphere/foilage loss*		-2	-4	-5	-6	-8	-12	-14	-15
SPL @ receiver Leq (15 min)	23	0	0	1	16	22	11	0	0
Night time criterion Leq (15 min)	38								
+Impact	0								

Loss through weakest element, metal roof.

* ISO 9613-2 General calculation method.

The predicted levels in Tables 3 and 4 are 14 dB and 15 dB below the respective day and night noise trigger levels.

3.2.2 Cumulative noise

Cumulative noise from recreation yards 1-2, should all yards have dogs in them at the same time, would not exceed 44 dB(A) based on the calculation in Table 3 and would remain well below the daytime noise trigger level.

Calculated levels from other sources associated with the kennels such as dogs in the northern outdoor yards of the shelter kennel (daytime only) and dogs being brought in and out of the kennel via the carpark (assumed daytime only) are 10 dB or more below the levels for the worst-case sources so cumulative daytime noise from the kennels at R1 and R2 will be approximately 9 dB below the daytime noise trigger level of 53 dB(A).

The calculated night time levels would be up to 30 dB(A) if dogs in kennels C, D, G and H are barking simultaneously, as reference to Figures 1 and 2 shows these four kennels to be most exposed to receiver R2. Kennels A, B, F and E are substantially shielded from R2 by other kennels and structures on site. Adopting a nominal 10 dB barrier loss from these structures, the cumulative noise levels from all kennels is 30 dB(A) for the worst case of all kennels fully occupied and all dogs barking at night.

3.2.3 Sleep Disturbance

Based on the adopted maximum sound power level of 111 dB(A), the predicted maximum night time level of 42 dB(A), L_{max} from dogs withing kennels at the most impacted receiver R2 is well below the sleep disturbance trigger level of 56 dB(A) with south-facing windows closed.

With the windows open, the maximum levels at the nearest receiver could be 10 dB greater, or 52 dB(A), L_{max} . This is 4 dB below the night time sleep disturbance level.

Predicted maximum noise levels at the nearest receiver R1 from a dog in the open being taken from a ranger's vehicle to the overnight lockbox are summarised in 7.

Table 7: Night time maximum level at R1, Leq(15min)

Item	Octave Band Centre Frequency, Hz								
	dB(A)	63	125	250	500	1k	2k	4k	8k
Individual dog, Lmax	107	79	81	90	101	105	97	88	81
Distance Loss to R2 (115m)		-49	-49	-49	-49	-49	-49	-49	-49
Ground/Atmosphere/foilage loss*		-2	-4	-5	-6	-8	-12	-14	-15
SPL @ receiver Leq	51	28	28	36	46	48	36	25	17
Night time criterion Lmax	56								
Impact	0								

The predicted maximum level from a dog in the open being taken from a ranger's vehicle to the overnight lockbox is 7 dB below the sleep disturbance trigger level. There are no tonal or low-frequency components to the received noise requiring assessment under these categories of noise for modifying factor corrections as defined in Fact Sheet C of the NPfI. The received noise would be intermittent and carries a +5dB modification factor, taking the assessable level to 56 dB(A) which complies with the night time noise trigger level.

3.3 Other noise sources

The major noise sources associated with the proposal are dogs outdoors during the day and indoors at night. There is no appreciable noise anticipated from the cattery/admin building and there is ample distance to residential receivers to mitigate noise from air conditioning plant.

The site is immediately accessible from the north and south via the M1 Motorway and it is anticipated that very few vehicle movements associated with the site would do so via Yarramalong Road or McPherson Road onto Old Maitland Road north of the site.

Given the already high traffic noise levels from the M1 Motorway on the section of Old Maitland Road south of the site to its connection with the Motorway, it is considered that the relatively small number of vehicle movements generated from the site will add minimal additional noise and full quantitative assessment is not required.

Movement of a ranger's vehicle onsite during night time hours may produce a sound power level in the order of 90 dB(A) which would reduce to below the night time sleep disturbance trigger level of 58 dB(A) at a distance of less than 10m, implying no potential for adverse impacts at any residential receiver.

Similarly, opening and closing of vehicle gates/cage at the overnight lockbox is unlikely to produce a sound power level of 107 dB(A), which is the level attributed to a dog in Table 7 above, and levels from this activity would be below the sleep disturbance trigger level.

APPENDIX A

NOISE LOGGER DATA CHART

Zoriana Close Mardi 20/05/24 - 27/05/24

