

#### **ASK Consulting Engineers Pty Ltd**

ABN: 55 622 586 522 ACN: 128 491 967 PO Box 3901 South Brisbane QLD 4101 P: 07 3255 3355 www.askconsulting.com.au mail@askconsulting.com.au

# **Boutique Kennel**

25 Rainforest Drive, Julatten

# Noise Impact Assessment

Report: 9263R02V03.docx

#### **Prepared for:**

Alicia Knudsen

23 May, 2018





## Document Control

Document Ref	Date of Issue	Status	Author	Reviewer
9263R02V01_draft	30 April, 2018	Draft	Stephen Pugh	Bill Elder
9263R02V01	3 May, 2018	Final – includes minor changes and noise contours	Stephen Pugh	Bill Elder
9263R02V02	17 May, 2018	Revision – minor changes	Stephen Pugh	-
9263R02V03	23 May, 2018	Revision – minor changes	Stephen Pugh	-

Document Approval	
Approver Signature	Sfl
Name	Stephen Pugh
Title	Director

**Disclaimer:** This document and associated tasks were undertaken in accordance with the ASK Consulting Engineers Quality Assurance System, which is based on Australian Standard / NZS ISO 9001:2008. This document is issued subject to review, and authorisation by a Senior Consultant noted in the above table. If the table is incomplete, this document shall be considered as preliminary or draft only and no reliance shall be placed upon it other than for information to be verified later.

This document is prepared for our Client's particular requirements 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 and no responsibility is undertaken to any third party without prior consent provided by ASK Consulting Engineers. The information herein should not be reproduced, presented or reviewed except in full. Prior to passing on to a third party, the Client is to fully inform the third party of the specific brief and limitations associated with the commission.

The information contained herein is for the identified purpose of 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 fit-for-purpose, waterproofing, safety design and the like. Supplementary professional advice should be sought in respect of these issues.

Copyright: This report and the copyright thereof are the property of ASK Consulting Engineers Pty Ltd (ABN 55 622 586 522). It must not be copied in whole or in part without the written permission of ASK Consulting Engineers Pty Ltd. This report has been produced specifically for the Client and project nominated herein and must not be used or retained for any other purpose. <u>www.askconsulting.com.au</u>



## Contents

1.	1. Introduction					
2.	Stu	dy Area Description	5			
3.	Pro	pposed Development	7			
4.	Ac	oustic Criteria	8			
	4.1	Overview	8			
	4.2	Mareeba Shire Planning Scheme	8			
	4.3	Environmental Protection (Noise) Policy	8			
	4.3.1	Overview	8			
	4.3.2	Background Creep	8			
	4.3.3	Acoustic Quality Objectives	9			
	4.4	Criteria from Court Judgement of Other Kennels	10			
5.	Ac	oustic Measurements	11			
	5.1	Attended Noise Measurement	11			
	5.2	Noise Logging	11			
6.	Ке	nnel Noise Assessment	14			
	6.1	Noise Limits	14			
	6.2	Noise Modelling	14			
	6.2.1	Model Inputs	14			
	6.2.2	Calculated Noise Levels from Outdoor Dogs	14			
	6.2.3	Calculated Noise Levels from Dogs in Kennels	16			
	6.2.4	Noise Barrier Requirements	17			
	6.3	Summary	18			
7.	Re	commendations & Conclusion	19			
A	ppend	ices				
Ap	pendix A	Glossary	21			

Appendix B	Project Drawings	22
Appendix C	Noise Contours	23



## 1. Introduction

ASK Consulting Engineers Pty Ltd (ASK) was commissioned by Alicia Knudsen to provide acoustic consultancy services for the proposed Boutique Kennel being constructed at 25 Rainforest Drive, Julatten.

This acoustic report is to accompany a Development Application for consideration by Mareeba Shire Council for a development permit. The application is made over land at 25 Rainforest Drive, Julatten QLD 4871, and described as Lot 10 on RP747823.

The proposed development includes 8 dog kennels and an exercise area.

The purpose of this report is as follows:

- Outline the relevant project noise criteria.
- Present the results of noise monitoring.
- Predict and assess the noise emissions from the development.
- Describe noise mitigation requirements, if any.

To aid in the understanding of the terms in this report a glossary is included in **Appendix A**.



## 2. Study Area Description

The proposed development is to be located at 25 Rainforest Drive, Julatten. The site location is shown in **Figure 2.1** (source: QLD Globe Aerial Photography).



#### Figure 2.1 Subject Site, Noise Measurement Location A and Street Numbers of Nearby Residences

The site is currently residential property with vacant land.

The proposed development is surrounded by the following uses and premises:

- Agricultural land to the north.
- Parkland and sports field to the east.
- Residential premises to the west, south, south-east and north east, including:
  - 85, 86,118, 120, 136, 174, 178, 188 and 194 Highland Drive.
  - 20 Windsor View Road.
  - 1000, 1094 and 1108 Mossman Mount Molloy Road.



The proposed development has the potential to create noise impacts on nearby residences due to dogs barking on site. This potential impact is required to be considered in the project design.

If predicted noise emission levels are compliant at the receivers listed above, then it is considered that all noise emission levels are compliant.



## 3. Proposed Development

The proposed development includes the following components:

- There are 8 chalets (i.e. kennels) and up to 10 dogs (total) onsite.
- Dogs will generally have their own individual timber chalets, although multiple related dogs could be grouped together in a kennel.
- Kennels have their own individual fenced area/balcony, and are to be rotated through a large separate outdoor run during the day.
- Dogs will be inside kennels at night with music playing.

The location of the kennels and outdoor area is included in **Figure 3.1**. The outdoor area is along the northern section of the eastern site boundary, and is to be enclosed with 2m high acoustic barriers. The extent of the area is approximately 45m long x 10m wide, and is located approximately 5 m from the northern site boundary. The barrier can include variations of +/- 1 metre to allow for step-ins, recesses or other such design features. The timber kennels are located on the western side of the outdoor area with doors facing into the outdoor area in a E/ESE direction. The kennels may be fully contained within the outdoor area, or fully excluded from the outdoor area with only their front entrance facade contained within the outdoor area.

Building plans are included in **Appendix B**, though these drawings are superseded by the recommendations of this report.

The kennel will operate 24 hours per day, and 7 days per week. Dogs will be outside kennels only within daytime hours (7am to 6pm).



Figure 3.1 Location of Kennels and Outdoor Area (Bounded by Barrier)



## 4. Acoustic Criteria

### 4.1 Overview

The Project is located within the Mareeba Shire Council area and therefore is required to comply with the requirements of Mareeba Shire Council in addition to state legislation.

The relevant policies, guidelines and criteria to be considered include:

- Mareeba Shire Council planning scheme QPP version 4.0 (8 January 2016).
- Department of Environment and Heritage Protection (EHP) Environmental Protection Policy (Noise), Environmental Protection Act and relevant guidelines.
- Relevant noise standards and guidelines.

### 4.2 Mareeba Shire Planning Scheme

The Mareeba Shire Council planning scheme QPP version 4.0 (8 January 2016) includes the following general requirements for noise:

- Part 3 Strategic Framework
- 3.4 Natural resources and environment
- 3.4.8 Element Air and noise quality
- 3.4.8.1 Specific outcomes

(1) The health, well-being, amenity and safety of the community and the environment is protected from the impacts of air emissions, noise and odour through appropriate management and adequate separation distances.

(2) Mareeba's major industry area accommodates uses with the potential to impact on air and acoustic qualities.

(3) Land uses which emit high level of noise, including for example motor sports, gun clubs and the like will be appropriately located and managed to mitigate acoustic impacts.

(4) Sensitive land uses are appropriately separated from areas containing or designated for activities that generate noise and air emissions.

There are other references to noise, but they appear limited to maintaining (or not detracting from) general noise amenity.

In terms of specific noise criteria, it is proposed to reference other documents including state legislation.

#### 4.3 Environmental Protection (Noise) Policy

#### 4.3.1 Overview

In respect of the acoustic environment, the object of the Act is achieved by the Environmental Protection (Noise) Policy 2008 (EPP (Noise)). This policy identifies environmental values to be enhanced or protected, states acoustic quality objectives, and provides a framework for making decisions about the acoustic environment.

#### 4.3.2 Background Creep

The EPP(Noise) contains noise criteria for controlling background creep, which are to be applied "for an activity involving noise". The criteria are as follows:



To the extent that it is reasonable to do so, noise from an activity must not be-

- (a) for noise that is continuous noise measured by  $L_{A90,T}$ —more than nil dBA greater than the existing acoustic environment measured by  $L_{A90,T}$ ; or
- (b) for noise that varies over time measured by  $L_{Aeq,adj,T}$ —more than 5dBA greater than the existing acoustic environment measured by  $L_{A90,T}$ .

The EPP(Noise) does not define "continuous noise", but by definition, the "continuous noise" would be required to occur for at least 90% of a measurement period (typically 15 minutes or 60 minutes). Thus this criterion could apply for equipment such as mechanical plant.

The criterion for "noise that varies over time" is appropriate for noise sources operating for less than 90% of a measurement period, and could apply to intermittent events (e.g. vehicles) or mechanical plant that does not run continuously (e.g. air-conditioning).

#### 4.3.3 Acoustic Quality Objectives

The EPP (Noise) contains a range of acoustic quality objectives for a range of receptors. The objectives are in the form of noise levels, and are defined for various periods of the day, and use a number of acoustic parameters.

Schedule 1 of the EPP(Noise) includes the following acoustic quality objectives to be met at residential dwellings:

- Outdoors
  - $\circ$  Daytime and Evening: 50 dBA  $L_{Aeq,adj,1hr}$ , 55 dBA  $L_{A10,adj,1hr}$  and 65 dBA  $L_{A1,adj,1hr}$
- Indoors
  - $\circ$  Daytime and Evening: 35 dBA  $L_{Aeq,adj,1hr}$  40 dBA  $L_{A10,adj,1hr}$  and 45 dBA  $L_{A1,adj,1hr}$
  - $\circ$  Night: 30 dBA  $L_{Aeq,adj,1hr}$  35 dBA  $L_{A10,adj,1hr}$  and 40 dBA  $L_{A1,adj,1hr}$

In the DEHP EcoAccess Guideline "Planning For Noise Control" documentation it is proposed that the noise reduction provided by a typical residential building façade is 7 dBA assuming open windows. That is, with an external noise source, a 7 dBA reduction in noise levels from outside a house to inside a house is expected when windows are fully open. Thus the indoor noise objectives noted above could be converted to the following external objectives (with windows open):

- Daytime and Evening: 42 dBA LAeq, adj, 1hr, 47 dBA LA10, adj, 1hr and 52 dBA LA1, adj, 1hr
- Night: 37 dBA  $L_{Aeq,adj,1hr}$ , 42 dBA  $L_{A10,adj,1hr}$  and 47 dBA  $L_{A1,adj,1hr}$

A sensitive receptor is defined as "an area or place where noise is measured".

The EPP(Noise) states that the objectives are intended to be progressively achieved over the long term. However, as this project involves the introduction of new noise sources it would seem reasonable that the acoustic quality objectives are achieved upon commencement of operation of the project, and this may be the intent of the policy. Therefore, consideration to achieving these acoustic quality objectives will be included in the design noise limits for the project.



### 4.4 Criteria from Court Judgement of Other Kennels

The Planning and Environment Court Judgment for a dog kennel application has been reviewed due to it including significant acoustic analysis. ASK had been involved in undertaking a peer review of a noise report for the development. The Judgment is No. 936 of 2014 relating to a kennel in Somerset Regional Council.

Part 6.8 of the Judgment includes the following noise limits:

- Average maximum noise level (L<sub>max,T</sub>) of dogs must not exceed:
  - Day (7am to 6pm): Background noise level L<sub>90,T</sub> + 10 dBA or 38 dBA whichever is greater
  - Evening (6pm to 10pm): Background noise level L<sub>90,T</sub> + 5 dBA or 30 dBA whichever is greater
  - Night (10pm to 7am): Background noise level L<sub>90,T</sub> + 5 dBA or 27 dBA whichever is greater
- Average noise level (L<sub>Aeq,15mins</sub>) from the facility must not exceed:
  - Day (7am to 6pm): Background noise level L<sub>90,T</sub> + 3 dBA or 35 dBA whichever is greater
  - Evening (6pm to 10pm): Background noise level L<sub>90,T</sub> + 3 dBA or 30 dBA whichever is greater
  - Night (10pm to 7am): Background noise level L<sub>90,T</sub> + 0 dBA or 25 dBA whichever is greater

In the DA noise report for the development the average minimum background noise levels were reported as 27, 26 and 22 dBA  $L_{90,15min}$  for the day, evening and night periods respectively. It is likely that these levels, or similar, were used to establish the absolute  $L_{max,T}$  limits noted above in the Judgment.

The above criteria will generally be adopted for this project, with some adaptation where deemed appropriate.

It is noted that the proposed noise limits are more stringent than the EPP(Noise) Background Creep Limits in **Section 4.3.2** and significantly more stringent than the EPP(Noise) Acoustic Quality Objectives outlined in **Section 4.3.3**.



## 5. Acoustic Measurements

Acoustic measurements consisted of an attended noise measurement and noise logging. The noise measurement location is shown in **Figure 2.1**. The noise monitoring was undertaken in general accordance with Australian Standard AS1055 Acoustics – Description and measurement of environmental noise and the EHP Noise Measurement Manual 2013.

### 5.1 Attended Noise Measurement

An attended noise measurement was undertaken at Location A as shown on **Figure 2.1**. Location A was located midway along the western boundary of the site.

The measurement was undertaken at 3:30pm on Thursday 1<sup>st</sup> February 2018 over a 15 minute period using a field and laboratory calibrated Norsonic NOR140 sound level meter. The microphone height was approximately 1.3m above natural ground level and was located in the free field. Weather during the time of monitoring was fine, warm/hot, 30% cloud cover, with a slight breeze at approximately 0 to 3 m/s.

The measured noise levels are summarised in Table 5.1.

**Table 5.1 Attended Noise Measurement Results** 

Location	Date & Time	Period (Minutes)	Results & Notes
А	3:30pm 01/02/2018	15	Statistical noise levels: L <sub>10</sub> 57 dBA, L <sub>eq</sub> 53 dBA, L <sub>90</sub> 42 dBA Insects 48, 49, 56, 50, 53, 54 dBA
			Birds 49, 51, 51, 51, 58, 56, 55, 59 dBA
			Distant airplane barely audible
			Distant car engine approximately 40 dBA

Note: \* The reported noise levels, excluding the statistical noise levels, are the instantaneous levels read from the sound level meter, and generally represent the range in noise levels or maximum noise levels for a particular noise source.

### 5.2 Noise Logging

Noise logging was undertaken at Location A as shown on **Figure 2.1**. Logging was undertaken from 3:45pm Thursday 1<sup>st</sup> February to 11:45am Thursday 8<sup>th</sup> February 2018 using a field and laboratory calibrated Larson Davis LD831 environmental noise logger. Noise logging was undertaken in the free field.

Data from the Bureau of Meteorology (Cairns) indicates that weather during the monitoring period was generally fine and warm, but with significant rainfall on Tuesday 6<sup>th</sup> February 2018.

The measured noise levels and rainfall (millimetres) are shown in **Figure 5.1**. The background noise level  $(L_{90})$  data in this figure has been filtered for insect noise by removing the noise level contribution of the 4 kHz and 8 kHz octave bands.





#### Figure 5.1 Graph of Noise Logging Results at Location A

From the noise logging the statistical results have been summarised in Table 5.2.

Table 5.2 Statistical Noise Levels at Location A
--

Parameter	Noise Levels dBA [Maximum-Top 10%-(Average)-Bottom 10%-Minimum]						
	Day	Evening	Night				
L <sub>max</sub>	79-70-(63)-58-48	77-69-(61)-54-46	74-67-(58)-46-42				
L <sub>1</sub>	73-66-(58)-49-44	76-67-(56)-49-44	70-64-(51)-41-38				
L <sub>10</sub>	70-64-(53)-43-38	74-66-(54)-47-42	69-63-(48)-39-36				
L <sub>eq</sub>	67-62-(50)-41-36	72-64-(51)-44-40	68-61-(46)-38-36				
L <sub>90</sub>	65-59-(40)-34-31	63-62-(47)-39-34	65-57-(43)-35-34				
L <sub>eq</sub> (less insects)	67-62-(50)-41-36	72-64-(51)-44-40	68-61-(46)-38-36				
L <sub>90</sub> (less insects)	63-58-(35)-27-24	62-59-(36)-26-23	64-51-(33)-19-18				

The background noise level was effected by insect noise. As the insect noise is likely a seasonal influence, the noise level data has been filtered to remove the insect noise. The resulting background noise levels calculated using the lowest 10<sup>th</sup> percentile method are shown in **Table 5.3**.



Period	Measured Background Noise Level L <sub>90</sub> dBA	Filtered (Less Insect Noise) Background Noise Level L <sub>90</sub> dBA		
Day (7am to 6pm)	34	27		
Evening (6pm to 10pm)	39	25		
Night (10pm to 7am)	35	18		

#### Table 5.3 Background Noise Levels (Measured and with Insect Noise Removed) at Location A

From the results above the following comments are made:

- The dominant noise was insects and birds. Due to the wet period, it is likely that frog noise was also dominant at times.
- When insect noise is filtered from the data, the background noise levels are low, and typical of rural residential properties.



## 6. Kennel Noise Assessment

### 6.1 Noise Limits

Based on the background noise level in **Table 5.3** (less insects) and the noise criteria in **Section 4.4**, the calculated noise limits are as follows in **Table 6.1**.

#### Table 6.1 Project Noise Limits

Time Period	Background Noise Level (less insects) L <sub>90,15mins</sub> dBA	Average Maximum Noise Level Limit L <sub>max,T</sub> dBA	Average Noise Level Limit L <sub>eq,15mins</sub> dBA		
Day (7am to 6pm)	27	37	35		
Evening (6pm to 10pm)	25	30	30		
Night (10pm to 7am)	18	23	25		

It is proposed that the maximum noise level be assessed based on the sound power level of a single dog barking, and the average noise limit be assessed based on the sound power level of 5 dogs barking simultaneously (i.e. 50% of the total 10 dogs proposed).

### 6.2 Noise Modelling

#### 6.2.1 Model Inputs

A model of the kennels has been setup using the SoundPLAN v7.4 modelling software. The model includes the existing terrain, and the following sound power levels for barking dogs:

- Maximum sound power level (L<sub>w,max</sub>)
  - $\circ$  Large dog : 108 dBA<sup>1</sup>
  - Medium dog: 104 dBA (estimate)
  - Small dog: 100 dBA<sup>1</sup>
- Average sound power level (L<sub>w,eq</sub>)
  - Large dog: 101 dBA
  - Medium dog: 97 dBA
  - Small dog: 93 dBA

The model includes 2m high solid and continuous barrier to the four sides of the kennel facility.

#### 6.2.2 Calculated Noise Levels from Outdoor Dogs

The predicted noise levels from dogs in the outdoor yard are as follows in **Table 6.2**. The outdoor yard is only used in the daytime (7am to 6pm) and thus the noise levels are only assessed against daytime noise criteria.

Noise contours for the L<sub>max</sub> noise levels with medium dogs are included in Figure C.1 in Appendix C.

<sup>&</sup>lt;sup>1</sup> 2013 Rondebush Pty Ltd, Proposed Boarding Kennels, Lowood – Noise Assessment, LHK-R1-310813



Receiver	Average Level Lin	Average Maximum Noise Level Limit L <sub>max,T</sub> dBA			Average Noise Level Limit L <sub>eq,15mins</sub> dBA			
	Large	Medium	Small	Large	Medium	Small		
	aog	aog	aog	aogs x 5	aogs x 5	dogs x 5		
LIMITS		37			35			
20 Windsor View Road	33	29	25	31	27	23		
20 Windsor View Road	35	31	27	33	29	25		
85 Highland Drive	33	29	25	32	28	24		
85 Highland Drive	35	31	27	34	30	26		
86 Highland Drive	30	26	22	29	25	21		
86 Highland Drive	33	29	25	32	28	24		
118 Highland Drive	40	36	32	38	34	30		
118 Highland Drive	41	37	33	38	34	30		
120 Highland Drive	39	35	31	36	32	28		
120 Highland Drive	39	35	31	37	33	29		
136 Highland Drive	37	33	29	35	31	27		
136 Highland Drive	38	34	30	35	31	27		
174 Highland Drive	28	24	20	27	23	19		
174 Highland Drive	28	24	20	27	23	19		
178 Highland Drive	32	28	24	32	28	24		
178 Highland Drive	33	29	25	32	28	24		
178 Highland Drive	33	29	25	33	29	25		
178 Highland Drive	33	29	25	33	29	25		
188 Highland Drive	39	35	31	38	34	30		
188 Highland Drive	40	36	32	38	34	30		
188 Highland Drive	40	36	32	39	35	31		
188 Highland Drive	41	37	33	39	35	31		
194 Highland Drive	32	28	24	30	26	22		
194 Highland Drive	32	28	24	31	27	23		
1000 Mossman Mount Molloy Road	23	19	15	22	18	14		
1000 Mossman Mount Molloy Road	24	20	16	23	19	15		
1094 Mossman Mount Molloy Road	25	21	17	25	21	17		
1094 Mossman Mount Molloy Road	26	22	18	26	22	18		
1108 Mossman Mount Molloy Road	25	21	17	24	20	16		
1108 Mossman Mount Molloy Road	26	22	18	25	21	17		

#### Table 6.2 Calculated Noise Levels from Outdoor Dogs (Daytime Only)

From **Table 6.2** it can be seen that noise levels are acceptable at all receivers with small and medium dogs. With large dogs, the noise levels are excessive at some nearby residences.

Based on the above results, it is proposed to limit the kennels to small and medium dogs. There is no detailed data on noise levels for specific dog breeds or specific sizes, but rather the noise levels are calculated based on averaged noise levels. From a review of online literature regarding dog sizes, it is proposed to limit dogs to those up to 30 kg in weight.



#### 6.2.3 Calculated Noise Levels from Dogs in Kennels

In the evening and night dogs will be locked into kennels. The kennels are to be acoustically treated to minimise noise emissions during the particularly noise sensitive night period. The kennel construction drawings are included in **Appendix B**, and construction is as follows:

- Dimensions: Approximately 3m x 3m floor, with enclosed area approximately 3m x 2m, and the remainder being deck. The deck side is to face into the fenced outdoor area.
- Walls: weatherboard (timber or fibre cement) cladding, minimum 50mm glasswool insulation, 6mm fibre cement internal sheeting.
- Floor: 15mm compressed fibre cement sheeting.
- Roof: metal roof sheeting (e.g. corrugated Colorbond roof), minimum 50mm thick Anticon or glasswool insulation, 6mm fibre cement ceiling.
- Door: minimum 35mm thick solid core door facing into the dog outdoor area. The door is to include minimal gaps so as to minimise acoustic leakage. If a half/dutch/stable door is proposed, then the join is to be either rebated or include a cover strip to minimise noise leakage.
- Windows: minimum 5mm thick glass or 10mm thick Perspex. Windows are to remain closed in the evening and night.
- Ventilation: the ventilation is not to compromise the acoustic performance of the kennel building envelope. Suitable ventilation could consist of (maximum) 300x300 metal ducts with 25mm internal acoustic lining to a 1 metre length. An duct could be added at the lower wall of the kennel, and a second exhaust dust with fan at the roof/ceiling of the kennel. Alternative designs would be possible, but should be approved by an acoustic consultant. The ventilation is to be protected from the dog, and may require a solid cover to prevent air flow in cooler months. Note: the kennel management plan may include air change requirements.
- Absorption: An area of 2m<sup>2</sup> of acoustically absorptive product (minimum NRC 0.65) is to be included into the room (e.g. 50mm insulation covered by perforated foil/steel/fibre cement/fabric, proprietary acoustic product (e.g. megasorber, stratocell whisper) or similar). The absorption should be added to upper wall areas or ceiling to avoid damage by dogs.
- General: The kennel is not to include any other penetrations, gaps or holes that would compromise the acoustic performance of the above building elements. For example, lighting should be surface mounted and not cut into the ceiling/wall.

The predicted noise levels from dogs in the kennels are as follows in **Table 6.3**. Noise contours for the  $L_{max}$  noise levels with medium dogs are included in **Figure C.2** in **Appendix C**.

The kennels could be used in the daytime, evening or night. Noise emissions are compared against the most stringent limits, being those imposed at night.

From **Table 6.3** it can be seen that noise levels are acceptable at all receivers, for dogs of all sizes.



Receiver	Average Maximum Noise Level Limit L <sub>max,T</sub> dBA			Average Noise Level Limit L <sub>eq,15mins</sub> dBA			
	Large dog	Medium dog	Small dog	Large dogs x 5	Medium dogs x 5	Small dogs x 5	
LIMITS		23			25		
20 Windsor View Road	14	10	6	13	9	5	
20 Windsor View Road	14	10	6	13	9	5	
85 Highland Drive	16	12	8	15	11	7	
85 Highland Drive	16	12	8	15	11	7	
86 Highland Drive	11	7	3	10	6	2	
86 Highland Drive	13	9	5	12	8	4	
118 Highland Drive	18	14	10	16	12	8	
118 Highland Drive	20	16	12	17	13	9	
120 Highland Drive	17	13	9	15	11	7	
120 Highland Drive	17	13	9	16	12	8	
136 Highland Drive	14	10	6	14	10	6	
136 Highland Drive	15	11	7	14	10	6	
174 Highland Drive	5	1	0	4	0	0	
174 Highland Drive	8	4	0	6	2	0	
178 Highland Drive	13	9	5	11	7	3	
178 Highland Drive	13	9	5	12	8	4	
178 Highland Drive	13	9	5	12	8	4	
178 Highland Drive	14	10	6	13	9	5	
188 Highland Drive	20	16	12	18	14	10	
188 Highland Drive	21	17	13	19	15	11	
188 Highland Drive	22	18	14	19	15	11	
188 Highland Drive	22	18	14	19	15	11	
194 Highland Drive	11	7	3	9	5	1	
194 Highland Drive	13	9	5	11	7	3	
1000 Mossman Mount Molloy Road	3	0	0	3	0	0	
1000 Mossman Mount Molloy Road	5	1	0	4	0	0	
1094 Mossman Mount Molloy Road	7	3	0	6	2	0	
1094 Mossman Mount Molloy Road	8	4	0	8	4	0	
1108 Mossman Mount Molloy Road	7	3	0	5	1	0	
1108 Mossman Mount Molloy Road	8	4	0	6	2	0	

#### Table 6.3 Calculated Noise Levels from Dogs in Kennels

#### 6.2.4 Noise Barrier Requirements

The noise barrier in **Figure 3.1** may be constructed in accordance with a number of alternative designs including via timber, brick, concrete block, sheet metal or earth mound.

The solid walls of the dog kennels can form part of the noise barrier, as long as the wall is solid from ground level to 2m above ground. If the dog kennels are to be raised off the ground, then the area between the dog kennel floor and ground is to consist of a noise barrier.

The noise barrier may comprise a combination of an earth mound or crib lock wall and a timber fence on top. A solid timber barrier with overlapping palings is usually the most economical. The minimum acoustic requirement of the noise barrier is that it be solid and continuous with negligible holes and gaps between



palings or panels or near the ground. The barrier is to be constructed with a material with minimum mass of 12.5 kg/m<sup>2</sup> or minimum acoustic rating of Rw 23. The mass requirement is achieved with the construction detail options in **Figure 6.1**.

Barrier Construction Requirements									
Material	Thickness (mm)	Overlapped CC	A Treated	Pine Timbe	r Palings -	dimensions	Densi	ty (kg/m <sup>2</sup> )	: 12.5
Fibre cement	8.3								
Compressed fibre cement	6.6			100	mm wide p	aling			
steel	1.6			←───		$\rightarrow$			/
concrete block (hollow)	6.9	$\downarrow$	1			_			>
hebel powerpanel	20.8	16mm thick (	2						1
glass	5.1	/		$\longleftrightarrow$	$\leftrightarrow$	•			
plywood	22.3			min 30mm	max 40mm	1			
aluminium	4.3			overlap	spacing				
perspex	10.5								

#### Figure 6.1 Noise Barrier Construction Options (12.5 kg/m<sup>2</sup>)

#### 6.3 Summary

Based on the above results, it is proposed to limit the kennels to small and medium dogs, i.e. those up to 30 kg in weight. Kennels are to meet the construction and ventilation requirements of **Section 6.2.3**.

If there are other shelter structures in the dog outdoor area, e.g. communal dog area. Then it is required that the underside of the shelter roof be lined with minimum 50mm thick insulation with a perforated foil facing. The intent of this insulation is to minimise noise reflecting off the roof and over the surrounding noise barrier.



## 7. Recommendations & Conclusion

It is considered that noise emissions from the proposed kennel facility would be compliant with the following requirements:

- A 2m high noise barrier is to be constructed around the kennel outdoor area as per **Figure 3.1** and the construction details in **Section 6.2.4**. Any gates in the barrier are also to meet the acoustic requirements. The extent of the area is approximately 45m long x 10m wide, and is located approximately 5 m from the northern site boundary. The barrier can include variations of +/- 1 metre to allow for step-ins, recesses or other such design features.
- The timber kennels are located on the western side of the outdoor area with doors facing into the outdoor area in an E/ESE direction. The kennels may be fully contained within the outdoor area, or fully excluded from the outdoor area with only their front entrance facade contained within the outdoor area.
- The solid walls of the dog kennels can form part of the noise barrier, as long as the wall is solid from ground level to 2m above ground. If the dog kennels are to be raised off the ground, then the area between the dog kennel floor and ground is to consist of a noise barrier.
- Kennels are to be limited to housing small and medium sized dogs up to 30 kg in weight. This is to reduce the average dog barking noise level.
- In the evening and night dogs will be locked into kennels.
- The kennel construction drawings are included in **Appendix B**, and construction is as follows:
  - Dimensions: Approximately 3m x 3m floor, with enclosed area approximately 3m x 2m, and the remainder being deck. The deck side is to face into the fenced outdoor area.
  - Walls: weatherboard (timber or fibre cement) cladding, minimum 50mm glasswool insulation, 6mm fibre cement internal sheeting.
  - Floor: 15mm compressed fibre cement sheeting.
  - Roof: metal roof sheeting (e.g. corrugated Colorbond roof), minimum 50mm thick Anticon or glasswool insulation, 6mm fibre cement ceiling.
  - Door: minimum 35mm thick solid core door facing into the dog outdoor area. The door is to include minimal gaps so as to minimise acoustic leakage. If a half/dutch/stable door is proposed, then the join is to be either rebated or include a cover strip to minimise noise leakage.
  - Windows: minimum 5mm thick glass or 10mm thick Perspex. Windows are to remain closed in the evening and night.
  - Ventilation: the ventilation is not to compromise the acoustic performance of the kennel building envelope. Suitable ventilation could consist of (maximum) 300x300 metal ducts with 25mm internal acoustic lining to a 1 metre length. An duct could be added at the lower wall of the kennel, and a second exhaust dust with fan at the roof/ceiling of the kennel. Alternative designs would be possible, but should be approved by an acoustic consultant. The ventilation is to be protected from the dog, and may require a solid cover to prevent air flow in cooler months. Note: the kennel management plan may include air change requirements.
  - Absorption: An area of 2m<sup>2</sup> of acoustically absorptive product (minimum NRC 0.65) is to be included into the room (e.g. 50mm insulation covered by perforated foil/steel/fibre cement/fabric, proprietary acoustic product (e.g. megasorber, stratocell whisper) or similar). The absorption should be added to upper wall areas or ceiling to avoid damage by dogs.
  - General: The kennel is not to include any other penetrations, gaps or holes that would compromise the acoustic performance of the above building elements. For example, lighting should be surface mounted and not cut into the ceiling/wall.



- If there are other shelter structures in the dog outdoor area, e.g. communal dog area. Then it is required that the underside of the shelter roof be lined with minimum 50mm thick insulation with a perforated foil facing. The intent of this insulation is to minimise noise reflecting off the roof and over the surrounding noise barrier.
- It is recommended that kennel drawings be signed off by an acoustic consultant prior to construction to confirm acceptability.
- The kennel should include a management plan, and the aforementioned Court Judgment includes significant detail which should be considered where appropriate. The management plan would likely address owner-operator responsibilities, kennel staff, animal husbandry, and housing.



# Appendix A Glossary

Parameter or Term	Description
dB	The decibel (dB) is the unit measure of sound. Most noises occur in a range of 20 dB (quiet rural area at night) to 120 dB (nightclub dance floor or concert).
dBA	Noise levels are most commonly expressed in terms of the 'A' weighted decibel scale, dBA. This scale closely approximates the response of the human ear, thus providing a measure of the subjective loudness of noise and enabling the intensity of noises with different frequency characteristics (e.g. pitch and tone) to be compared.
Day	The period between 7am and 6pm.
Evening	The period between 6pm and 10pm.
Night	The period between 10pm and 7am.
Free-field	The description of a noise receiver or source location which is away from any significantly reflective objects (e.g. buildings, walls).
L <sub>1</sub>	The noise level exceeded for 1% of the measurement period.
L <sub>10</sub>	The noise level exceeded for 10% of the measurement period. It is sometimes referred to as the average maximum noise level.
L <sub>90</sub>	The noise level exceeded for 90% of the measurement period. This is commonly referred to as the background noise level.
L <sub>eq</sub>	The equivalent continuous sound level, which is the constant sound level over a given time period, which is equivalent in total sound energy to the time-varying sound level, measured over the same time period.
L <sub>eq</sub> ,1hour	As for $L_{eq}$ except the measurement intervals are defined as 1 hour duration.
L <sub>max</sub>	Maximum A-weighted sound pressure level.
L <sub>eq</sub> (24 hour)	The average $L_{eq}$ noise level over the 24-hour period from midnight to midnight.
L <sub>10</sub> (18 hour)	The arithmetic average of the one-hour $L_{10}$ values between 6am and midnight. This parameter is used in the assessment of road traffic noise.
R <sub>w</sub>	Weighted Sound Reduction Index – is a single number evaluation of the property of a partition to attenuate sounds. For the majority of partitions, the value of Rw will be similar to the value for STC. Partitions with particularly poor performance at 100 Hz may have lower values for Rw than for STC. Conversely, partitions with poor performance at 4000 Hz may have higher Rw than for STC. (As per AS1276.1-1999).
Habitable Rooms	According to the "Building Code of Australia" a Habitable Room is: " a room used for normal domestic activities and <b>Includes</b> a bedroom, living room, lounge room, music room, television room, kitchen, dining room, sewing room, study, playroom, family room, home theatre, and sunroom, but
	<b>Excludes</b> a bathroom, laundry, water closet, pantry, walk-in wardrobe, corridor, hallway, lobby, photographic darkroom, clothes drying room, and other spaces of a specialised nature occupied neither frequently nor for extended periods."



# Appendix B Project Drawings

### REAR VIEW



#### FRONT VIEW

#### SIDE VIEW





2M HIGH X 45M LONG TIMBER FENCE

SCALE 180:1

## FENCED AREA WITH 8X CABINS



# Appendix C Noise Contours



D:\Models\9263\9263R01V01\9263\_Figure\_C.1.sgs



D:\Models\9263\9263R01V01\9263\_Figure\_C.2.sgs