

# PROPOSED PLACE OF WORSHIP

# **5 MANGANO PLACE, WANNEROO**

# ACOUSTIC ASSESSMENT NOISE MANAGEMENT PLAN

FEBRUARY 2023

OUR REFERENCE: 30592-2-22325



# **DOCUMENT CONTROL PAGE**

# **ACOUSTIC ASSESSMENT**

5 MANGANO PLACE, WANNEROO

Job No: 22325

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FOR

# DRUKPA AUSTRALIA INCORPORATED

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#### 1. INTRODUCTION

Herring Storer Acoustics were commissioned by the Altus Planning on behalf of Drukpa Australia Inc. to undertake an acoustic assessment of noise emissions associated with the development of 5 Mangano Place, Wanneroo.

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This report assesses noise emissions from the premises with regards to compliance with the requirements of the *Environmental Protection (Noise) Regulations 1997*.

It is understood that the development is to consist of a church meeting hall, therefore noise sources considered as part of this assessment include:

- Singing / Music Inside.
- Plant by way of the air conditioning.
- Car movements on site.

From information provided, the operating conditions of the proposed development are as follows:

## Worship services:

Morning service - 9:30AM -12Noon, includes after service fellowship; Evening service - 5:30PM - 8:00PM, includes after service fellowship; Afternoon service - 2:00PM - 5:00PM, includes after service fellowship (afternoon service will be provided as needed, depending on the number of regular attendees).

#### Other activities:

Bible studies/Life groups after Worship services; Church ministry meetings - after the Worship services; Worship Team practice - available during Worship service times; Sunday School/Creche - available during Worship service times.

#### Other Parameters

Air Conditioning –Units (Ground Mounted).

It is noted that worship could take the form of amplified singing & music with individuals speaking, however there is no call to worship, bell ringing.

For information, the site plan for the proposed development is attached in Appendix A.

# 2. SUMMARY

#### **Noise Emissions**

For this development, the closest residential premises (Andrews Turn and the Ocean Reef Caravan Village) of concern are located to the west of the proposed development. Other neighbouring premises are zoned as Commercial / Industrial.

As the meeting hall could be used from 09:00 on Sundays, noise received at the neighbouring noise (highly) sensitive premises from these noise sources needs to comply with the appropriate assigned noise levels of:

**Highly Noise Sensitive Premises** 

• 19:00 to 2200 hours Monday to Saturday and after 0900 hours Sunday and Public Holidays L<sub>A10</sub> 48 dB(A), LA1 58 dB(A), and L<sub>Amax</sub> 68 dB(A).

# **Industrial Premises**

All Hours L<sub>A10</sub> 65 dB(A), L<sub>A1</sub> 80 dB(A), and L<sub>Amax</sub> 90 dB(A).

#### **Commercial Premises**

• All Hours L<sub>A10</sub> 60 dB(A), L<sub>A1</sub> 75 dB(A), and L<sub>Amax</sub> 80 dB(A).

The noise associated with car movements on site would be of short term duration and compliance with the assigned  $L_{\rm A1}$  noise levels, are required. Noise from the mechanical plant and singing / music during worship would occur for more than 10% of the time, hence noise received at the neighbouring premises needs to comply with the assigned  $L_{\rm A10}$  noise levels.

It is noted that as the development would be considered as a public place, noise emissions associated with the vehicles on site need to be considered individually.

The assessment indicates that noise emissions from cars on site would comply with the requirements of the *Environmental Protection (Noise) Regulations 1997* at all times.

Noise emissions from car doors closing and engines starting, would comply with the assigned  $L_{Amax}$  noise levels.

Finally, it is noted that noise emissions from the Place of Worship, would under the Environmental Protection (Noise) Regulations 1997 be considered as community noise and under the Regulations, Regulation 7 does not apply. Even so, information is provided with regards to the noise that would be received at the neighbouring residences from the Place of Worship.

Based on the design provided, noise received at the neighbouring premises from the development would be deemed to comply with the Regulatory requirements at all times.

#### CRITERIA

#### 3.1 ENVIRONMENTAL PROTECTION (NOISE) REGULATIONS 1997

The allowable noise level at the surrounding locales is prescribed by the *Environmental Protection (Noise) Regulations 1997*. Regulations 7 & 8 stipulate maximum allowable external noise levels determined by the calculation of an influencing factor, which is then added to the base levels shown below. The influencing factor is calculated for the usage of land within two circles, having radii of 100m and 450m from the premises of concern.

TABLE 3.1 - BASELINE ASSIGNED OUTDOOR NOISE LEVEL

Premises Receiving	Time of Day	Assigned Level (dB)		
Noise	Time of Day	L <sub>A10</sub>	L <sub>A1</sub>	L <sub>Amax</sub>
	0700 - 1900 hours Monday to Saturday (Day)	45 + IF	55 + IF	65 + IF
Noise sensitive premises:	0900 - 1900 hours Sunday and Public Holidays (Sunday / Public Holiday Day)	40 + IF	50 + IF	65 + IF
highly sensitive area	1900 - 2200 hours all days (Evening)	40 + IF	50 + IF	55 + IF
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays (Night)	35 + IF	45 + IF	55 + IF
Noise sensitive premises: any area other than highly sensitive area	All hours	60	75	80
Commercial premises	All hours	60	75	80

Note:

 $L_{A10}$  is the noise level exceeded for 10% of the time.

L<sub>A1</sub> is the noise level exceeded for 1% of the time.

 $L_{\mbox{\scriptsize Amax}}$  is the maximum noise level.

IF is the influencing factor.

It is a requirement that received noise be free of annoying characteristics (tonality, modulation and impulsiveness), defined below as per Regulation 9.

# "impulsiveness"

means a variation in the emission of a noise where the difference between  $L_{Apeak}$  and  $L_{Amax(Slow)}$  is more than 15 dB when determined for a single representative event;

#### "modulation"

means a variation in the emission of noise that -

- (a) is more than 3 dB L<sub>AFast</sub> or is more than 3 dB L<sub>AFast</sub> in any one-third octave band;
- (b) is present for more at least 10% of the representative assessment period; and
- (c) is regular, cyclic and audible;

## "tonality"

means the presence in the noise emission of tonal characteristics where the difference between –

- (a) the A-weighted sound pressure level in any one-third octave band; and
- (b) the arithmetic average of the A-weighted sound pressure levels in the 2 adjacent one-third octave bands,

is greater than 3 dB when the sound pressure levels are determined as  $L_{Aeq,T}$  levels where the time period T is greater than 10% of the representative assessment period, or greater than 8 dB at any time when the sound pressure levels are determined as  $L_{ASlow}$  levels.

Where the noise emission is not music, if the above characteristics exist and cannot be practicably removed, then any measured level is adjusted according to Table 3.2 below.

**TABLE 3.2 - ADJUSTMENTS TO MEASURED LEVELS** 

Where <b>tonality</b> is present	Where <b>modulation</b> is present	Where <b>impulsiveness</b> is present
+5 dB(A)	+5 dB(A)	+10 dB(A)

Note: These adjustments are cumulative to a maximum of 15 dB.

Where the noise emission is music, then any measured level is adjusted according to Table 3.3 below.

TABLE 3.3 – ADJUSTMENTS TO MEASURED MUSIC NOISE LEVELS

Where impulsiveness is not present	Where <b>impulsiveness</b> is present	
+10 dB(A)	+15 dB(A)	

For this development, the closest residential premises of concern are located to the west of the proposed development (as indicated on Figure 3.1). Other neighbouring premises are zoned as Industrial, as per Figure 3.2.

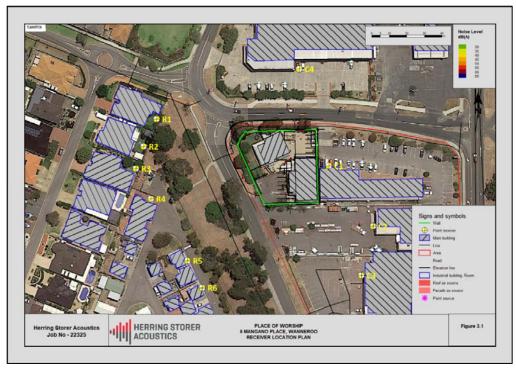


FIGURE 3.1 – NEAREST RESIDENTIAL RERCEIVER



FIGURE 3.2 - ZONING MAP

Based on the results of the noise modelling, the influencing factor (IF) at the worst-case locations, as indicated on Figure 3.1 (with regards to noise received from the proposed facility) has been conservatively estimated as listed in Table 3.4.

**TABLE 3.4 – INFLUENCING FACTORS** 

TABLE 3.4 - INTEGERING FACTORS				
IF Factor Parameter	IF Factor (dB)			
Major Road within inner circle	-			
Major Road within outer circle	+2 Wanneroo Road +2 Ocean Reef Road			
Secondary Road within inner circle	-			
Commercial Premises within the inner circle	-			
Commercial Premises within the outer circle	-			
Industrial Premises within the inner circle	+2.5 (25%)			
Industrial Premises within the outer circle	+1.5 (15%)			
TOTAL IF	+8			

Based on the above influencing factor, the assigned outdoor noise levels for the neighbouring residential locations are listed in Table 3.5.

**TABLE 3.5 - ASSIGNED OUTDOOR NOISE LEVEL** 

Premises	Time of Day	Assigned Level (dB)		
Receiving Noise	Time of Day	L <sub>A 10</sub>	L <sub>A 1</sub>	L <sub>A max</sub>
	0700 - 1900 hours Monday to Saturday	53	63	73
Noise sensitive	0900 - 1900 hours Sunday and Public Holidays	48	58	73
premises: Highly	1900 - 2200 hours all days	48	58	63
sensitive area	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays	43	53	63
Industrial Premises	All Hours	65	80	90

Note: L<sub>A10</sub> is the noise level exceeded for 10% of the time.

 $L_{\! A1}$  is the noise level exceeded for 1% of the time.

L<sub>Amax</sub> is the maximum noise level.

Additional to the above, with regards to vehicles accessing the site, we note that as anyone can access the site and the operators of the premises have no control on who can enter the car park these areas would be designated as public places. Regulation 6 of the *Environmental Protection (Noise) Regulations 1997* relates to noise emissions from public places and under this Regulation, "the person who is causing or permitting that noise to be emitted is to be treated as the occupier...". Therefore, noise emissions from each individual vehicle using the car park needs to comply with the assigned noise levels.

# 3.2 <u>APPROPRIATE CRITERIA</u>

#### Noise Emissions

Given the operating times for the propose meeting hall, i.e. Sunday after 09:00 and weeknights between 19:00 and 21:00, the most stringent noise criteria would be the Sunday / evening period with the following criteria being applicable:

## **Highly Noise Sensitive Premises**

 19:00 to 2200 hours Monday to Saturday and after 0900 hours Sunday and Public Holidays L<sub>A10</sub> 48 dB(A), L<sub>A1</sub> 58 dB(A), and L<sub>Amax</sub> 68 dB(A).

#### **Industrial Premises**

All Hours L<sub>A10</sub> 65 dB(A), L<sub>A1</sub> 80 dB(A), and L<sub>Amax</sub> 90 dB(A).

# **Commercial Premises**

All Hours L<sub>A10</sub> 60 dB(A), L<sub>A1</sub> 75 dB(A), and L<sub>Amax</sub> 80 dB(A).

#### 4. MODELLING

Predictive noise modelling has been undertaken for noise emissions from the proposed development onto the surrounding noise sensitive receptors.

# 4.1 NOISE EMISSIONS

Modelling of the noise propagation from the proposed development was carried out using an environmental noise modelling computer program, "SoundPlan". Calculations were carried out using the EPA standard weather conditions as stated in the Environmental Protection Authority's "Draft Guidance for Assessment of Environmental Factors No.8 - Environmental Noise".

To determine the noise received at the neighbouring premises, noise modelling was undertaken for the following scenarios:

- 1 Singing / Music Inside.
- 2 Plant; air conditioning (6 units).
- 3 Car movements on site.
- 4 Cars starting and doors closing.

With regards to noise emissions, the following are noted:

- 1 For the modelling of cars, the noise sources (ie cars) were located not only at the parking bays, but also at the entry crossover point to the development. Thus, ensuring noise modelling was undertaken for the worst-case locations.
- 2 Noise associated with the mechanical services does not take into account any diversity of operation. Such diversity would occur during the night period. Thus, this is a conservative assessment.

The calculations were based on sound power levels and sound pressure levels listed in Table 4.1.

TABLE 4.1 – GENERAL SOUND POWER / SOUND PRESSURE LEVELS

Item of Equipment	Sound Power Level, (dB(A))	
Cars moving	79	
Car Start	85	
Car Door	87	
Air Conditioning Units	6 at 60 dB(A) @ 1m	
Singing / Music Inside (Amplified)	98	
Singing (Unamplified)	75/m²	

The above noise sources need to comply with the following assigned noise levels:

L<sub>A10</sub> - Mechanical services and Music / Singing.

L<sub>A1</sub> - Car movements.

L<sub>AMax</sub> - Car engine starts and doors closing.

The resultant noise levels listed in Table 4.2 for the residential locations are for the worst case operating conditions.

**TABLE 4.2 – WORST CASE CALCULATED NOISE LEVELS** 

	Calculated Noise Levels (dB(A))		
Item	Nearest Residence	Nearest Industry	
Mechanical services (Air Con / Music)	38	49	
Cars (Movement)	33	41	
Car Start	36	44	
Car Door Closing	38	46	

# 5. <u>ASSESSMENT</u>

Given the above possible noise sources, we believe that assessments of the following scenarios are required.

It is noted that noise emissions from the development could be considered tonal or impulsive, however, the continuous noise levels associated with the surrounding road network and Industry would mask any annoying characteristics such as tonality and impulsiveness.

For the noise levels associated with music, a +10 dB penalty has been applied, as per regulatory requirements.

#### 5.1 L<sub>A10</sub> NOISE EMISSIONS

Noise emissions from the mechanical services would be steady state and would operate for the majority of time. For the music noise sources, it would be present for greater than 10% of the representative period. Hence noise received from these sources needs to comply with the assigned  $L_{A10}$  noise level.

The calculated noise levels were inspected for annoying characteristics, with the adjustments in Table 5.1 below are applicable.

Noise level emissions for the internal music / singing activities are considered likely to contain music, and therefore, a +10 dB adjustment is applicable – noting that impulsive characteristics are not considered likely to be present.

Noise level emissions associated with the air conditioning units are unlikely to be tonal, due to the level and ambient noise.

TABLE 5.1 – APPLICABLE ADJUSTMENTS AND ADJUSTED LA10 NOISE LEVELS. dB(A)

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		• • •	to Measured Noise Levels, B(A)		
Measurement Location	Calculated Noise Level, dB(A)	Where Noise E	Adjusted Noise Level, dB(A)		
	Level, ab(A)	Where <b>impulsiveness</b> is	Where impulsiveness is	Level, ab(A)	
		not present	present		
Nearest Residence	38	+10	-	48	
Nearest Industry	49	+ 10	-	59	

Tables 5.2 summarises the applicable Assigned Noise Levels, and assessable noise level emissions for each identified case that needed to be considered.

TABLE 5.2 – ASSESSMENT OF LA10 NOISE LEVEL EMISSIONS

Location	Assessable Noise Level, dB(A)	Applicable Times of Day	Applicable Assigned L <sub>A10</sub> Noise Level (dB)	Exceedance to Assigned Noise Level (dB)
Nearest Residence	48	Sunday / Public	48	Complies
Nearest Industry	59	Holiday After 09:00	65	Complies

# 5.2 <u>L<sub>A1</sub> NOISE EMISSIONS</u>

Noise emissions from car movements on site need to comply with the assigned  $L_{\rm A1}$  noise level. As the critical period for compliance for this source is the evening / Sunday Public Holiday (after 09:00) period, this scenario includes noise emissions from the sources associated with  $L_{\rm A1}$  noise levels. However, as under the Regulations, each of these sources needs to be considered individually, it is the highest calculated noise levels used for assessment, rather than the cumulative overall noise levels.

Table 5.3 summarise the applicable Assigned Noise Levels, and assessable noise level emissions for each identified noise.

TABLE 5.3 – ASSESSMENT OF LA1 NOISE LEVEL EMISSIONS FROM CARS

TABLE 5.5 - ASSESSIVE OF LATINOISE LEVEL ENVISSIONS TROWN CARS						
Location	Assessable Noise Level, dB(A)	Applicable Times of Day	Applicable Assigned L <sub>A1</sub> Noise Level (dB)	Exceedance to Assigned Noise Level (dB)		
Nearest Residence	33	Sunday / Public	58	Complies		
Nearest Industry	41	Holiday After 09:00	80	Complies		

# 5.3 <u>L<sub>AMAX</sub> NOISE EMISSIONS</u>

Noise emissions from car engine starts and doors closing on site need to comply with the assigned  $L_{AMax}$  noise level. As the critical period for compliance for this source is the night period, this scenario includes noise emissions from the sources associated with  $L_{AMax}$  noise levels. However, as under the Regulations, each of these sources needs to be considered individually, it is the highest calculated noise levels used for assessment, rather than the cumulative overall noise levels.

Tables 5.4 and 5.5 summarise the applicable Assigned Noise Levels, and assessable noise level emissions for each identified noise.

TABLE 5.4 – ASSESSMENT OF LAMAX NOISE LEVEL EMISSIONS FROM CAR STARTS

Location	Assessable Noise Level, dB(A)	Applicable Times of Day	Applicable Assigned L <sub>Amax</sub> Noise Level (dB)	Exceedance to Assigned Noise Level (dB)
Nearest Residence	36	Sunday / Public	63	Complies
Nearest Industry	44	Holiday After 09:00	90	Complies

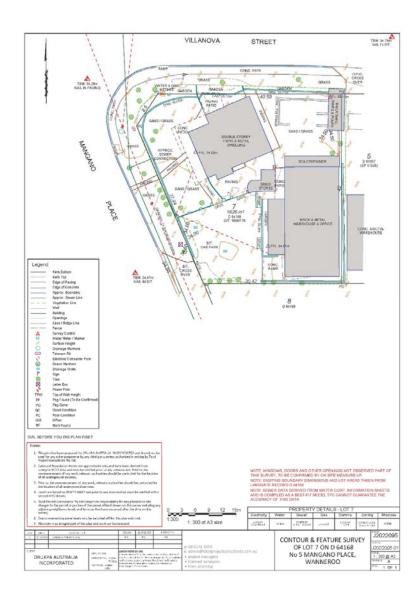
TABLE 5.5 – ASSESSMENT OF LAMAX NOISE LEVEL EMISSIONS FROM CAR DOORS

Location	Assessable Noise Level, dB(A)	Applicable Times of Day	Applicable Assigned L <sub>Amax</sub> Noise Level (dB)	Exceedance to Assigned Noise Level (dB)
Nearest Residence	38	Sunday / Public Holiday After 09:00	63	Complies
Nearest Industry	46		90	Complies

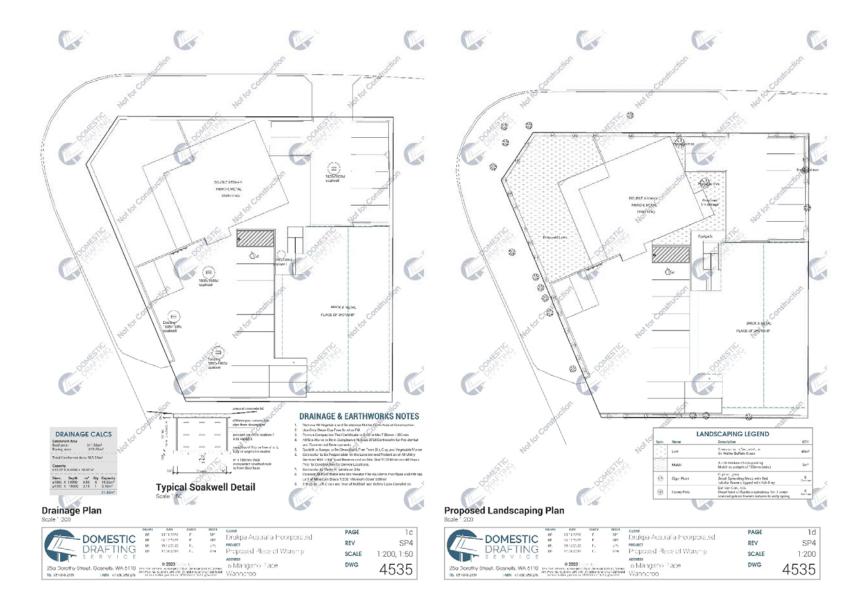
From the above assessments, it can be seen that noise received at the neighbouring residence, even using a conservative analysis, complies with the requirements of the *Environmental Protection (Noise) Regulations 1997* at all times.

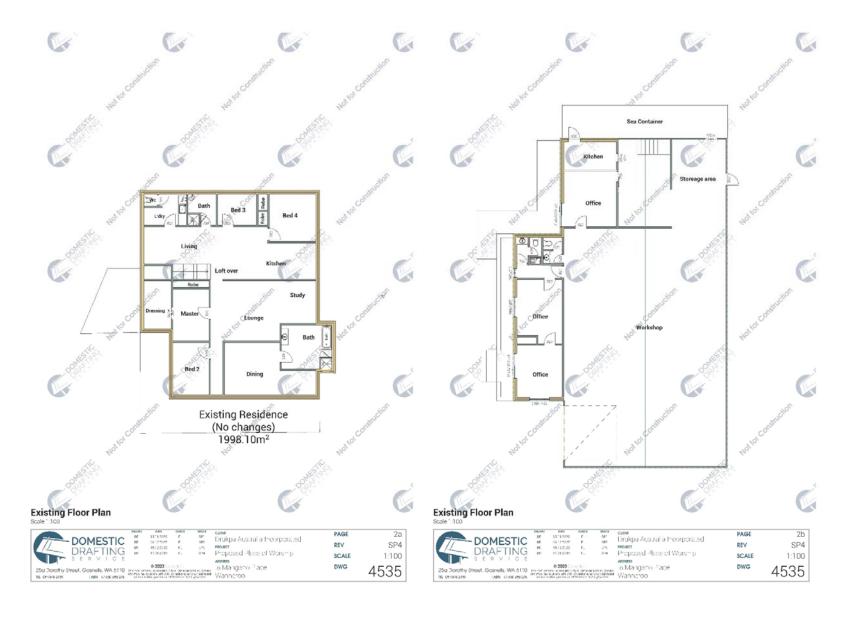
# **APPENDIX A**

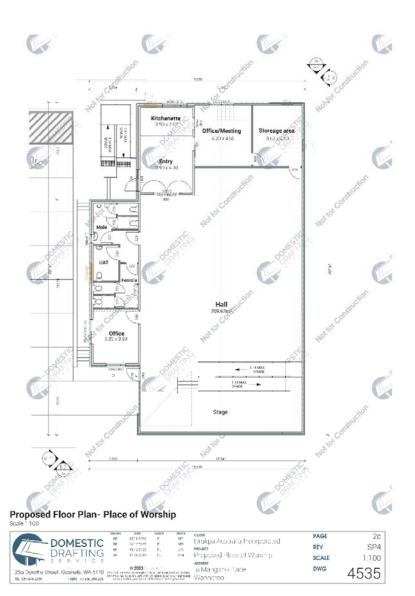
**PLANS** 

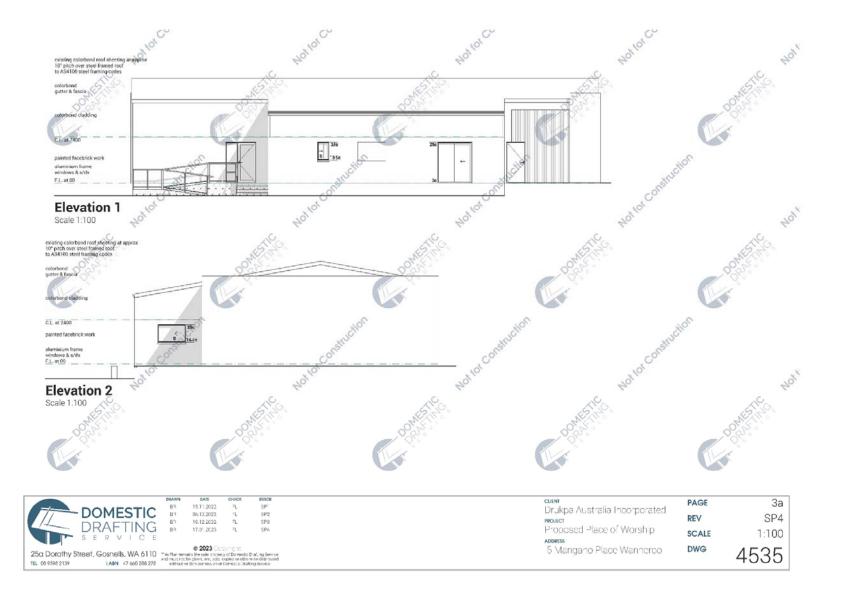


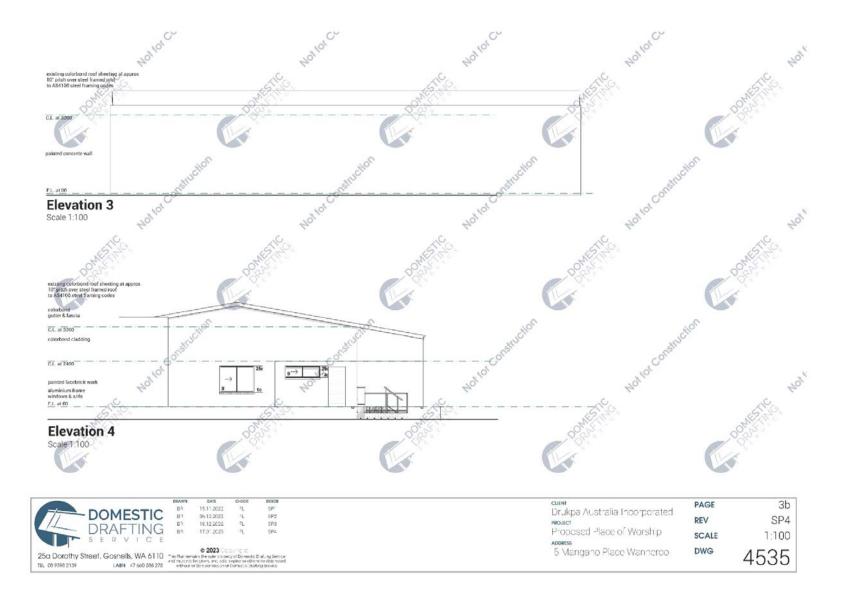












# **APPENDIX B**

NOISE CONTOUR PLOTS

