

MAPA STUDIO

**COMMERCIAL DEVELOPMENT – 4 REDWOOD AVENUE
KARNUP**

ENVIRONMENTAL NOISE ASSESSMENT

AUGUST 2026

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ENVIRONMENTAL NOISE ASSESSMENT
COMMERCIAL DEVELOPMENT
4 REDWOOD AVENUE
KARNUP

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FOR

MAPA STUDIO

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1. INTRODUCTION

Herring Storer Acoustics was commissioned by MAPA Studio to carry out an assessment of noise emissions associated with the proposed commercial development at 4 Redwood Avenue, Karnup. Noise emissions from the development are assessed against the *Environmental Protection (Noise) Regulation 1997*.

The proposed development consists of two relatively small commercial units in Karnup. The tenancies are currently unknown; however, we understand that the use is likely to be office or similar. As part of the development, a provision for mechanical plant has been included, comprising external AC units.

We understand that the proposed units are to operate during mostly daytime hours, with potential for some evening use. For the purpose of this assessment, operational hours up to 22:00 have been assumed.

2. CRITERIA

2.1 REGULATIONS

The *Environmental Protection (Noise) Regulations 1997* stipulate the allowable noise levels at any noise sensitive premises from other premises. The allowable noise level is determined by the calculation of an influencing factor, which is added to the baseline criteria set out in Table 1 of the Regulations. The baseline assigned noise levels are listed in Table 2.1.

TABLE 2.1 – ASSIGNED NOISE LEVELS

Premises Receiving Noise	Time of Day	Assigned Level (dB)		
		L _A 10	L _A 1	L _A max
Noise sensitive premises within 15 metres of a dwelling	0700 - 1900 hours Monday to Saturday	45 + IF	55 + IF	65 + IF
	0900 - 1900 hours Sunday and Public Holidays	40 + IF	50 + IF	65 + IF
	1900 - 2200 hours all days	40 + IF	50 + IF	55 + IF
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays	35 + IF	45 + IF	55 + IF

Note: The L_{A10} noise level is the noise that is exceeded for 10% of the time.
The L_{A1} noise level is the noise that is exceeded for 1% of the time.
The L_{Amax} noise level is the maximum noise level recorded.

It is a requirement that noise from the site be free of annoying characteristics (tonality, modulation and impulsiveness) at other premises, 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 15dB when determined for a single representative event;

“modulation” means a variation in the emission of noise that –

- (a) is more than 3dB $L_{A Fast}$ or is more than 3dB $L_{A Fast}$ 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 $L_{A Slow}$ levels.

Where the above characteristics are present and cannot be practicably removed, the following adjustments are made to the measured or predicted level at other premises.

TABLE 2.2 – ADJUSTMENTS FOR ANNOYING CHARACTERISTICS

Where tonality is present	Where modulation is present	Where impulsiveness is present
+ 5 dB	+ 5 dB	+ 10 dB

2.2 RECEIVERS

The proposed development is located at 4 Redwood Avenue. The surrounding area comprises mostly residential, with some provision for commercial. The site itself is bound by an existing residential dwelling to the east, defined as the nearest Noise Sensitive Receptor (NSR). Other sensitive receptors are present in the surrounding area; however, the NSR bordering the development site is both the nearest and worst affected with regard to noise emission of the proposed development. As such, compliance at the nearest NSR will also demonstrate compliance at all other NSR's in the area.

TABLE 2.3 – RECEIVERS ASSESSED

Receiver	Description
NSR	Residential Dwelling on Redwood Avenue, adjacent to site.

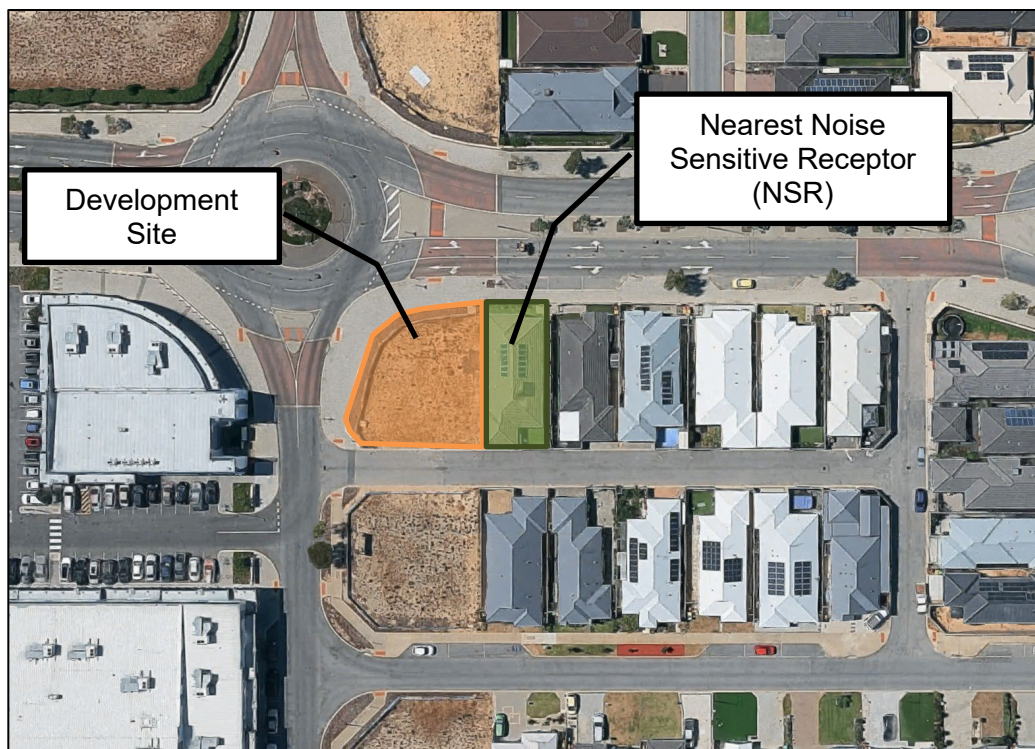


FIGURE 2.1 – DEVELOPMENT LOCATION AND SURROUNDS

The influencing factors for these receivers are calculated as in Table 2.4 below. Assigned levels are listed in Table 2.5.

TABLE 2.4 – INFLUENCING FACTOR CALCULATION

Component	NSR
Major Road within 450m	2dB
Commercial within 100m	30%
Commercial within 450m	30%
Industrial within 450m	10%
Total Influencing Factor dB (rounded)	6

TABLE 2.5 - ASSIGNED OUTDOOR NOISE LEVELS

Premises Receiving Noise	Time of Day	Assigned Level (dB)		
		L _{A10}	L _{A1}	L _{Amax}
All receivers	0700 - 1900 hours Monday to Saturday	51	61	71
	0900 - 1900 hours Sunday and Public Holidays	46	56	71
	1900 - 2200 hours all days	46	56	61
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays	41	51	61

Note: L_{A10} is the noise level exceeded for 10% of the time.
L_{A1} is the noise level exceeded for 1% of the time.
L_{Amax} is the maximum noise level.

We understand that the proposed commercial tenancies are to operate mostly during daytime hours, with potential for some evening use. As such, for the purpose of this assessment, noise emissions shall be assessed based on the assigned levels up to 22:00 as a representative worst case.

3. MODELLING AND ASSESSMENT

Noise emissions relating to mechanical plant were modelled using SoundPlan and are assessed below.

3.1 MECHANICAL PLANT

At this stage, the full details of proposed mechanical services are unknown. The client has provided specifications from previous similar projects, which have been used as an indicative assessment in this case.

It is understood that the scheme of mechanical plant is to comprise two external Air Conditioning units. The following figure presents the location of the proposed equipment.

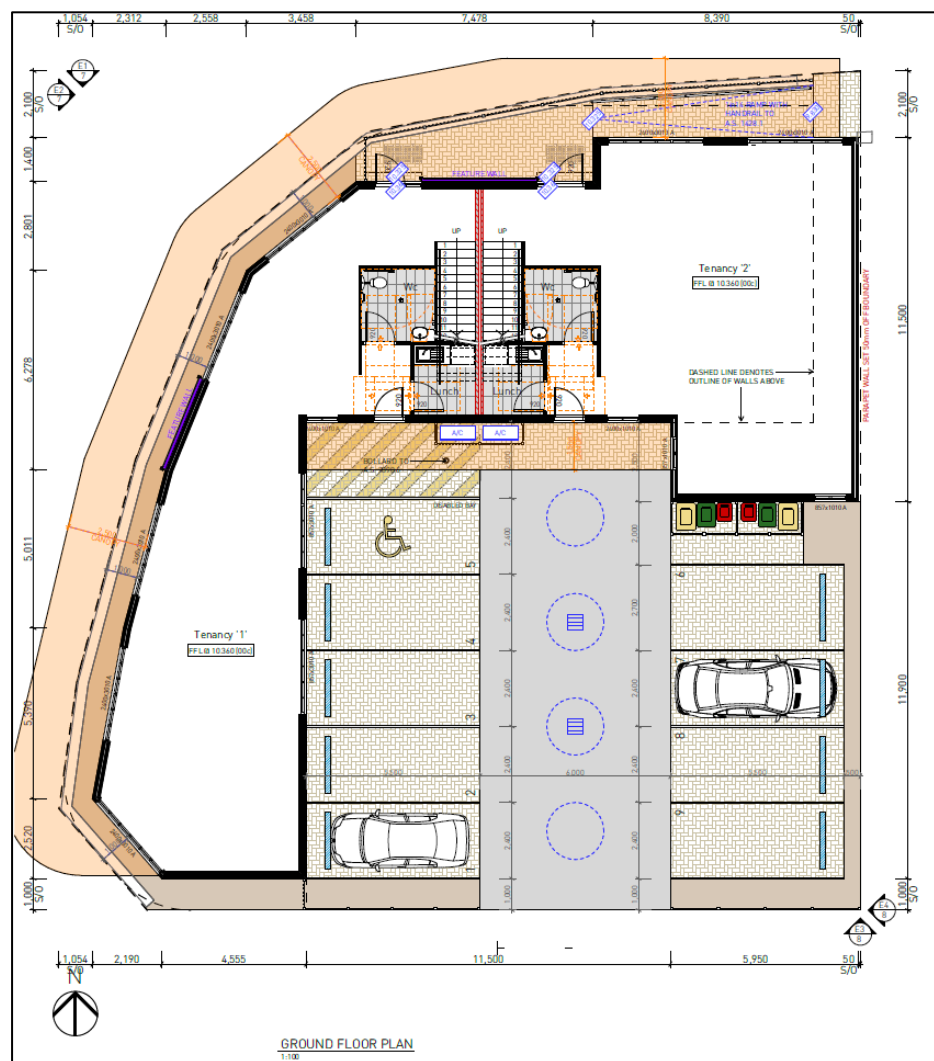


FIGURE 3.1 - PROPOSED AC UNIT LOCATIONS

At this stage, the exact equipment selection is unknown. Based on our experience and understanding of the project, external AC units of this type generate sound levels in the region of 70-75 dBA Sound Power Level.

In this case, we understand that the units are to be enclosed with some kind of barrier/ acoustic enclosure. For the purpose of this assessment, the AC units have been modelled each with a Sound Power Level of 75 dBA. The modelling results will be used to form design recommendations and fundamental Sound Power Level Limits to be achieved at the enclosure.

Mechanical plant noise emissions are often tonal in nature and hence receive a +5 dB adjustment to their assessable levels.

3.1.1 MECHANICAL PLANT ASSESSMENT WITHOUT ENCLOSURE

The following table presents the noise emissions from both AC units operating at full capacity, at the nearest noise sensitive receptor.

TABLE 3.1 – MECHANICAL PLANT NOISE LEVELS

Receiver	Noise level dB(A)	L _{A10} Evening Criteria dB(A)	Exceedance
NSR1	53 (56)	46	+10

() indicates a 5 dB adjustment for tonality has been applied

The calculations and results of noise modelling indicate that the noise emissions from proposed AC units is likely to exceed the evening criteria by 10dB. As such, mitigation measures are likely to be required.

3.1.2 MECHANICAL PLANT ASSESSMENT WITH ENCLOSURE

As indicated above, the noise emissions of the proposed units without attenuation is likely to exceed the evening criteria by circa 10 dB.

Fundamentally, the noise emissions need to be reduced at source by in the region of 10-15 dB in order to comply. This reduction is easily achievable with typical acoustic enclosures or by selecting low noise generating equipment.

For the purpose of this assessment, noise modelling has been undertaken to determine a fundamental Sound Power Level Limit at each AC unit, in order to comply with the evening criteria.

The following table presents the modelled noise emissions from both AC units with a reduced sound output of 60 dBA Sound Power Level.

TABLE 3.2 – MECHANICAL PLANT NOISE LEVELS

Receiver	Noise level dB(A)	L _{A10} Evening Criteria dB(A)	Exceedance
NSR1	38 (41)	46	Complies

() indicates a 5 dB adjustment for tonality has been applied

The calculations indicate that the mechanical noise emissions are capable of complying with the evening criteria, so long as appropriate plant selection and/ or mitigation measures are implemented.

4. SUMMARY OF RECOMMENDATIONS

An assessment of noise emissions from the proposed commercial development at 4 Redwood Avenue has yielded positive results, demonstrating compliance with relevant criteria can be achieved, indicating a likely low noise impact.

As design progresses and equipment selections are made, the following recommendations should be implemented.

Fundamentally, the noise emission of each AC unit should be limited to a Sound Power Level of 60dBA. Compliance with this limit can be achieved relatively easily by considering one or both of the following options:

- **Mechanical Plant Selection** – The assessment has currently been based on AC units with Sound Power Levels of 75dBA. Lower noise generating options are readily available. Selecting lower noise units should be the first consideration for achieving compliance.
- **Attenuation/ Enclosure** – The second line of defence with regard to noise emission from the AC units is selecting appropriate attenuation measures. We understand that the Units are to be enclosed. The enclosure should provide adequate performance such that the Sound Power Level is reduced to <60dBA at the enclosure. The fundamental performance requirement of the enclosure will depend on the final plant selection; however, it is generally recommended that the enclosure provide a minimum single figure performance of 15dBA. An enclosure specialist such as IAC will be able to provide specifications based on final plant selections.

5. CONCLUSION

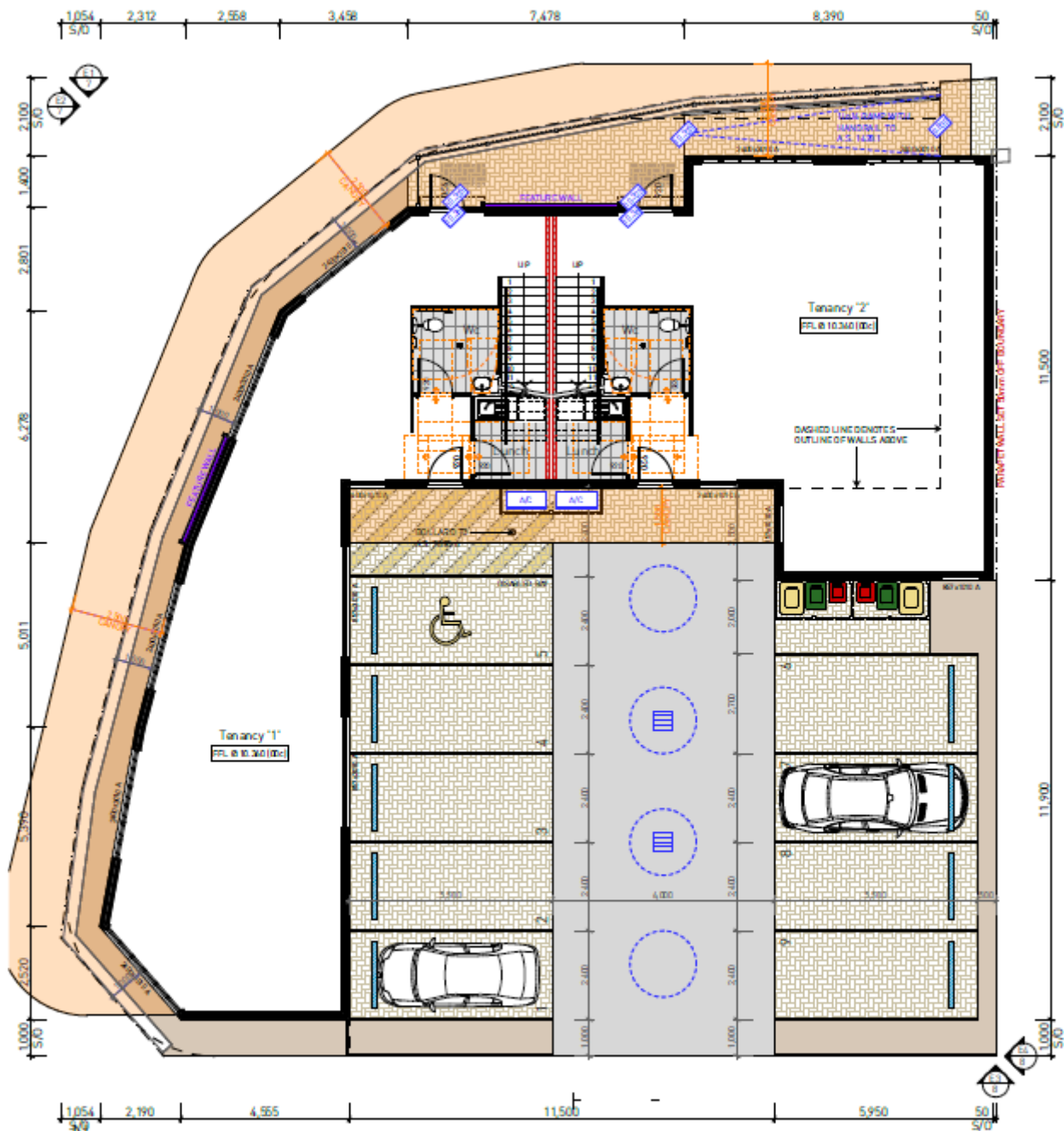
Noise emissions from the proposed commercial development at 4 Redwood Avenue have been assessed against the requirements of the *Environmental Protection (Noise) Regulations 1997*.

Noise emissions from the development are capable of complying during proposed operational hours at the nearby noise sensitive receivers, should recommendations outlined in this report be implemented.

APPENDIX A

SITE PLANS

TOTAL	AREAS	TENANCY 2	AREAS
GROUND FLOOR	35.9	GROUND FLOOR	114.7
UPPER FLOOR	29.8	UPPER FLOOR	104.6
	557.7 m ²		200.7 m ²
TENANCY 1	AREAS	COMMON	AREAS
GROUND FLOOR	14.4	COMMON GROUND	1.9
UPPER FLOOR	19.7	COMMON UPPER	2.5
	34.1 m ²		4.4 m ²



GROUND FLOOR PLAN 1:100

STAGE: DEVELOPMENT APPROVAL	REVISION: GROUND FLOOR PLAN	SUBMIT NO: 4
CLIENT: INDI DAKOTA PTY LTD	COMMENT: REVISED FLOOR PLAN OF APPROVAL	DATE: 10/10/2023
PROJ. NO: DEVELOPMENT APPROVAL	PROJ. NO: DEVELOPMENT APPROVAL	REV: 1
(Lot 392) #6 Redwood Avenue KARNUP WA 6176		OF 13
		JOB NO: P2024-0079
		CONSULTANT NO: 4.8



TOTAL	AREAS	TENANCY 2	AREAS
GROUND FLOOR	265.9	GROUND FLOOR	116.7
UPPER FLOOR	218.8	UPPER FLOOR	104.0
	524.7 m ²		220.7 m ²
TENANCY 1	AREAS	COMMON	AREAS
GROUND FLOOR	164.4	COMMON GROUND	1.9
UPPER FLOOR	167.7	COMMON UPPER	2.5
	304.1 m ²		4.4 m ²



UPPER FLOOR PLAN

1.100

STAGE: DEVELOPMENT APPROVAL	PROPERTY: UPPER FLOOR PLAN	5	OF 13
CLIENT: INDI DAKOTAPTY LTD	COMMENT: THE DEVELOPMENT OF UPPER FLOOR THE DEVELOPMENT OF UPPER FLOOR, SEE ARCH 1001-01	DATE: 10/01/2018 REV: 0	
PROJECT: DEVELOPMENT APPROVAL [Lot 392] #6 Redwood Avenue KARNUP, WA 6176		DATE: 10/01/2018 REV: 0	P2026-0079 5.8