



PROPOSED PLACE OF WORSHIP

**LOT 2021, BUILDING 3 & 4,
SANTORINI PROMENADE, ALKIMOS**

ENVIRONMENTAL ACOUSTIC ASSESSMENT
NOISE MANAGEMENT PLAN

SEPTEMBER 2023

OUR REFERENCE: 31619-1-23293

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ACOUSTIC ASSESSMENT
LOT 2021, BUILDING 3 & 4,
SANTORINI PROMENADE, ALKIMOS

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FOR

COURAGEOUS CHURCH

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1. INTRODUCTION

Herring Storer Acoustics were commissioned by the Courageous Church to undertake an acoustic assessment of noise emissions associated with the development of Lot 2021, Buildings 3 & 4, Santorini Promenade, Alkimos.

This report assesses noise emissions from the premises with regards to compliance with the requirements of the *Environmental Protection (Noise) Regulations 1997* as requested by Council for the Change of Use.

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

Information provided for the operating conditions of the proposed development are for a 200-250 person Sunday Service at 10AM, as well as general activities and gatherings at other times.

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

2. SUMMARY

For this development, noise received at the neighbouring residence, complies with the requirements of the *Environmental Protection (Noise) Regulations 1997* at all times, except for use of Car Bays 13-16 and 62-67 during the "2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays" time period.

It is understood that the church would primarily utilised during Sunday at 10AM, which is outside of the time period, however other general activities and gatherings could potentially fall outside of this core usage.

It is recommended to advise patrons of the church to not use these bays (and park closer to the church) outside of the core time period.

3. 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 Noise	Time of Day	Assigned Level (dB)		
		L _{A10}	L _{A1}	L _{Amax}
Noise sensitive premises: highly sensitive area	0700 - 1900 hours Monday to Saturday (Day)	45 + IF	55 + IF	65 + IF
	0900 - 1900 hours Sunday and Public Holidays (Sunday / Public Holiday Day)	40 + IF	50 + IF	65 + IF
	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_{A1} is the noise level exceeded for 1% of the time.
 L_{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_{Afast} or is more than 3 dB L_{Afast} 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 tonality is present	Where modulation is present	Where impulsiveness 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 impulsiveness is present
+10 dB(A)	+15 dB(A)

For this development, the closest residential premises have been identified as indicated on Figure 3.1. For a given area, the highest noise level at any individual resident or location has been used to represent that location.

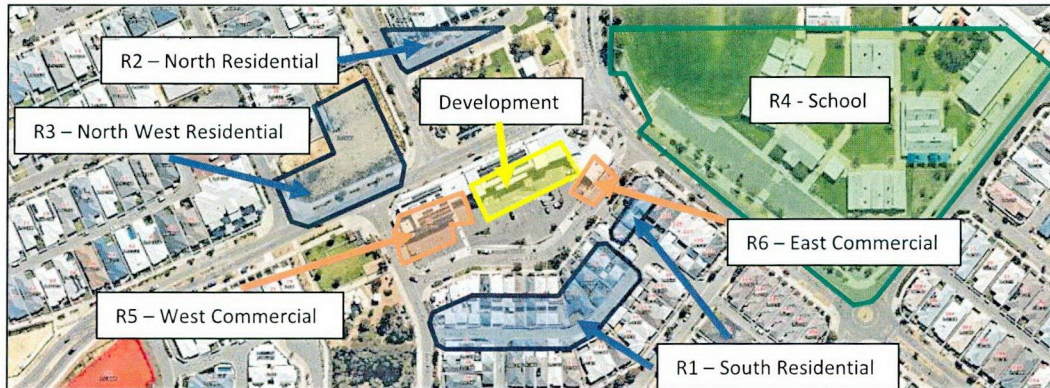


FIGURE 3.1 – NEAREST PREMISES

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

TABLE 3.4 – INFLUENCING FACTORS

IF Factor Parameter	IF Factor (dB)
Commercial Premises within the inner circle	16.2% = 1.62
Commercial Premises within the outer circle	0.8% = 0.08
TOTAL IF	+1.7 (rounded to 2.0)

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 Receiving Noise	Time of Day	Assigned Level (dB)		
		L _{A 10}	L _{A 1}	L _{A max}
	0700 - 1900 hours Monday to Saturday	47	57	67
Noise sensitive premises: Highly sensitive area	0900 - 1900 hours Sunday and Public Holidays	42	52	67
	1900 - 2200 hours all days	42	52	57
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays	37	47	57
Commercial Premises	All Hours	60	75	80

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.

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.

Similarly, as any given individual could be attending the Courageous Church or the adjacent commercial facilities, noise emissions from cars has not been assessed to the these locations.

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 / Amplified Music Inside.
- 2 Plant; air conditioning (2 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 (Roof Mounted)	2 at 60 dB(A) @ 1m
Singing / Music Inside (Amplified)	98
Singing (Unamplified)	75/m ²

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

- L_{A10} - Mechanical services and Music / Singing.
- L_{A1} - Car movements.
- L_{AMax} - Car engine starts and doors closing.

It is noted that Mechanical Services would potentially attract a +5 penalty for “Tonality”, Music/Singing a +10 penalty for “Music where impulsiveness is not present” and Car Doors a +10 penalty for “Impulsiveness”

The resultant noise levels listed in Table 4.2 for the residential locations are for the worst case operating conditions with appropriate penalties included in parenthesis.

TABLE 4.2 – WORST CASE CALCULATED NOISE LEVELS

Location	Calculated Noise Levels (dB(A))				
	Mechanical Plant	Music and Singing	Car Movements	Car Engine Starts	Car Door Closing
R1	30 (35)	32 (42)	47	56	57 (67)
R2	21 (26)	27 (37)	31	35	36 (46)
R3	17 (22)	29 (39)	26	30	31 (41)
R4	18 (23)	23 (33)	30	34	35 (44)
R5	20 (25)	35 (45)	52	N/A	N/A
R6	33 (38)	37 (47)	53	N/A	N/A

5. ASSESSMENT

5.1 L_{A10} NOISE EMISSIONS

Noise emissions from the mechanical services would be steady state and would operate continuously. These emissions have been assessed against L_{A10} criteria for all hours in Table 5.1.

Noise emissions from singing/music would be present for more than 10% of the representative period. This would only occur during the Day, Evening and Sunday/Public Holiday period. These emissions have been assessed against L_{A10} criteria for the Evening Period in Table 5.2, as this is the most stringent time period as compliance with this period would yield compliance with other time periods.

TABLE 5.1 – ASSESSMENT OF MECHANICAL PLANT L_{A10} NOISE LEVEL EMISSIONS

Location	Assessable Noise Level, dB(A)	Applicable Times of Day	Applicable Assigned L _{A10} Noise Level (dB)	Exceedance to Assigned Noise Level (dB)
R1	35		37	Complies
R2	26	2200 hours on any day	37	Complies
R3	22	to 0700 hours Monday to Saturday and 0900	37	Complies
R4	23	hours Sunday and	37	Complies
R5	25	Public Holidays	60	Complies
R6	38		60	Complies

TABLE 5.2 – ASSESSMENT OF SINGING/MUSIC L_{A10} NOISE LEVEL EMISSIONS

Location	Assessable Noise Level, dB(A)	Applicable Times of Day	Applicable Assigned L _{A10} Noise Level (dB)	Exceedance to Assigned Noise Level (dB)
R1	42		42	Complies
R2	37		42	Complies
R3	39	1900 - 2200	42	Complies
R4	33	hours all days	42	Complies
R5	45		60	Complies
R6	47		60	Complies

5.2 L_{A1} NOISE EMISSIONS

Noise emissions from car movements on site need to comply with the assigned L_{A1} noise level. 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.

These emissions have been assessed against L_{A1} criteria for the Night Period in Table 5.3 as this is the most stringent time period as compliance with this period would yield compliance with other time periods.

As mentioned previously, due to the nature of the car movements being uncontrolled, these emissions have not been assessed to the adjacent Commercial Premises.

TABLE 5.3 – ASSESSMENT OF CARE MOVEMENT L_{A1} NOISE LEVEL EMISSIONS

Location	Assessable Noise Level, dB(A)	Applicable Times of Day	Applicable Assigned L _{A1} Noise Level (dB)	Exceedance to Assigned Noise Level (dB)
R1	47	2200 hours on any day to 0700 hours	47	Complies
R2	31	Monday to Saturday	47	Complies
R3	26	and 0900 hours Sunday and Public	47	Complies
R4	30	Holidays	47	Complies

5.3 L_{AMAX} NOISE EMISSIONS

Noise emissions from car doors and starts on site need to comply with the assigned L_{AMax} noise level. 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.

These emissions have been assessed against L_{AMax} criteria for the Night Period in Table 5.4 and Table 5.5 as this is the most stringent time period as compliance with this period would yield compliance with other time periods.

As mentioned previously, due to the nature of the car movements being uncontrolled, these emissions have not been assessed to the adjacent Commercial Premises.

TABLE 5.4 – ASSESSMENT OF CAR ENGINE STARTS L_{AMAX} NOISE LEVEL EMISSIONS

Location	Assessable Noise Level, dB(A)	Applicable Times of Day	Applicable Assigned L _{AMax} Noise Level (dB)	Exceedance to Assigned Noise Level (dB)
R1	56	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays	57	Complies
R2	35		57	Complies
R3	30		57	Complies
R4	34		57	Complies

TABLE 5.5 – ASSESSMENT OF CAR DOOR SLAMS L_{AMAX} NOISE LEVEL EMISSIONS

Location	Assessable Noise Level, dB(A)	Applicable Times of Day	Applicable Assigned L _{AMax} Noise Level (dB)	Exceedance to Assigned Noise Level (dB)
R1	67	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays	57	+10
R2	46		57	Complies
R3	41		57	Complies
R4	45		57	Complies

As noise emissions from Car Door slams exceeds the assigned noise level during the most stringent period, an assessment against the “0700 - 1900 hours Monday to Saturday” and “0900 - 1900 hours Sunday and Public Holidays” time periods has been included in Table 5.6, which both have an assigned noise level 67 dB L_{AMax}.

TABLE 5.6 – ASSESSMENT OF CAR DOOR SLAMS L_{AMAX} NOISE LEVEL EMISSIONS

Location	Assessable Noise Level, dB(A)	Applicable Times of Day	Applicable Assigned L _{AMax} Noise Level (dB)	Exceedance to Assigned Noise Level (dB)
R1	67	0700 - 1900 hours	67	Complies
R2	46	Monday to Saturday	67	Complies
R3	41	Or; 0900 - 1900 hours Sunday	67	Complies
R4	45	and Public Holidays	67	Complies

If use of bays 13-16 and 62-67 are restricted during the “2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays” time period, the assessment in Table 5.7 would be applicable.

TABLE 5.7 – ASSESSMENT OF CAR DOOR SLAMS L_{AMAX} NOISE LEVEL EMISSIONS

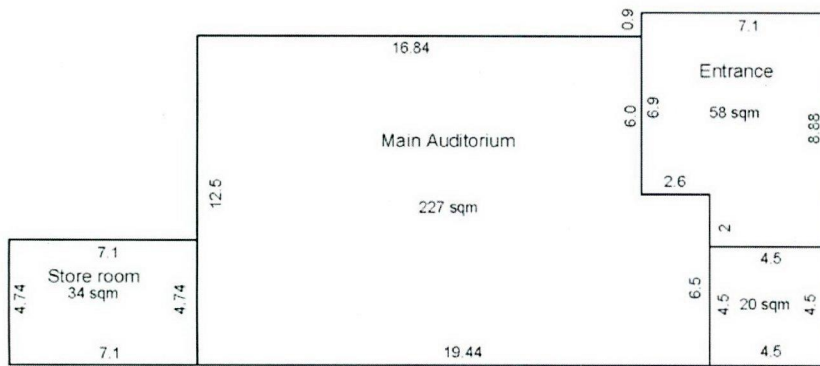
Location	Assessable Noise Level, dB(A)	Applicable Times of Day	Applicable Assigned L _{Amax} Noise Level (dB)	Exceedance to Assigned Noise Level (dB)
R1	57	2200 hours on any day to	57	Complies
R2	46	0700 hours Monday to	57	Complies
R3	41	Saturday and 0900 hours	57	Complies
R4	45	Sunday and Public Holidays	57	Complies

Finally, it is noted that the surrounded commercial area is already constructed and utilised, and as a result car movements for the area may not necessarily be related to the operations of Courageous Church.

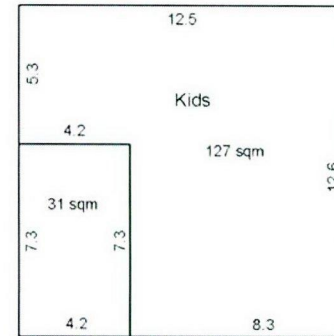
From the above assessments, it can be seen that noise received at the neighbouring residence, complies with the requirements of the *Environmental Protection (Noise) Regulations 1997* at all times, except for use of Car Bays 13-16 and 62-67 during the “2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays” time period.

APPENDIX A

PLANS



Car Park



Scale 1: 200