

APPENDIX G | Environmental
Acoustic
Assessment

**PROPOSED CHILD CARE CENTRE
26A HARRIS STREET
BICTON**

ENVIRONMENTAL ACOUSTIC ASSESSMENT

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PROPOSED CHILD CARE CENTRE
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1. INTRODUCTION

Herring Storer Acoustics were commissioned to undertake an acoustic assessment of noise emissions associated with the proposed child care centre to be located at 26A Harris Street, Bicton.

The report considers noise received at the neighbouring premises from the proposed development for compliance with the requirements of the *Environmental Protection (Noise) Regulations 1997*. This report considers noise emissions from :

- Children playing within the outside play areas of the centre; and
- Mechanical services.

We note that from information received from DWER, the bitumised area would be considered as a road, thus noise relating to motor vehicles is exempt from the *Environmental Protection (Noise) Regulations 1997*. We note that these noise sources are rarely critical in the determination of compliance. However, as requested by council and for completeness, they have been included in the assessment, for information purposes only.

For information, a plan of the proposed development is attached in Appendix A.

2. SUMMARY

Noise received at the neighbouring premises from children playing in the outdoor areas would comply with the requirements of the *Environmental Protection (Noise) Regulations 1997* for the day period. However, it is noted that although the proposed facility would open before 7 am (ie during the night period), the outdoor play area would not be used until after 7am. Thus, noise received at the neighbouring residences from the outdoor play area needs to comply with the assigned day period noise level. However, other noise sources would need to comply with the assigned night period noise levels.

Additionally, noise from the mechanical services has also been assessed to comply with the relevant criteria.

It is noted that noise associated with cars are exempt from complying with the Regulations. Noise received at the neighbouring residences would comply with the Regulatory requirements, with the eastern boundary fence being 2.0 metres high.

Thus, noise emissions from the proposed development, would be deemed to comply with the requirements of the *Environmental Protection (Noise) Regulations 1997* for the proposed hours of operation, with the height of the eastern boundary fence increased to 2.0 metres high.

3. CRITERIA

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. For highly sensitive area of a noise sensitive premises this is determined by the calculation of an influencing factor, which is then added to the base levels shown below in Table 3.1. The influencing factor is calculated for the usage of land within two circles, having radii of 100m and 450m from the premises of concern. For other areas within a noise sensitive premises, the assigned noise levels are fixed throughout the day, as listed in Table 3.1.

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

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.

Under the Regulations, a highly sensitive area means that area (if any) of noise sensitive premises comprising –

- (a) A building, or a part of a building, on the premises that is used for a noise sensitive purpose; and
- (b) Any other part of the premises within 15 m of that building or that part of the building.

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.

For this development, as shown on Figure 01, the neighbouring residences of concern to the proposed development, are located to the north and east.



FIGURE 01 – NEIGHBOURING PREMISES

At the neighbouring residences, the influencing factor has been determined to be +7 dB. Thus, the assigned noise levels would be as listed in Table 3.3.

TABLE 3.3 - 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)	52	62	72
	0900 - 1900 hours Sunday and Public Holidays (Sunday / Public Holiday Day)	47	57	72
	1900 - 2200 hours all days (Evening)	47	57	62
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays (Night)	42	52	62

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.

4. PROPOSAL

From information supplied, we understand that the child care centre normal hours of operations would be between 0630 and 1900 hours, Monday to Friday (closed on public holidays). It is understood that the proposed childcare centre will cater for a maximum of 74 children, with the following breakdown of children :

0 – 24 months	24 places
24 – 36 months	20 places
36+ months	30 places.

It is noted that although the proposed child care centre would open before 7 am (ie during the night period), the outdoor play area would not be used until after 7am.

For reference, plans are attached in Appendix A.

5. MODELLING

To assess the noise received at the neighbouring premises from the proposed development, noise modelling was undertaken using the noise modelling program SoundPlan.

Calculations were carried out using the DWER's weather conditions, which relate to worst case noise propagation, as stated in the Department of Environment Regulation "*Draft Guidance on Environmental Noise for Prescribed Premises*". These conditions include winds blowing from sources to the receiver(s).

Calculations were based on the sound power levels used in the calculations are listed in Table 5.1.

TABLE 5.1 – SOUND POWER LEVELS

Item	Sound Power Level, dB(A)
Children Playing	83 (per 10 children)
Car Moving in Car Park	79
Car Starting	85
Door Closing	87
Air conditioning condensing Unit	4 @ 72

Notes :

- 1 Given the number and breakdown of children, acoustic modelling of outdoor play noise was made, based on 50 children playing within the first storey outdoor play areas at the one time, utilising 5 groups of 10 children sound power levels distributed as plane sources.
- 2 With regards to the air conditioning, we understand that the air conditioning has not been designed at this stage of the development. However, from the plans, it is understood that the mechanical services equipment would be located on the south east corner of the roof. The plant would be visually screened from the neighbours.
- 3 Boundary fencing to the northern boundary being 1.8 metres high, as indicated on the drawings, with the fence to the eastern boundary being 2m high. The fencing needs to be continuous in construction (ie no gaps), with a minimum density of 15 kg/m².

- 4 Noise modelling was undertaken to a number of different receiver locations for the neighbouring residences to the north and east. However, to simplify the assessment, only the noise level in the worst case location for each of these residences has been listed. It is noted that the neighbouring residence to the north is 2 storey, however, as seen in the Google Earth Street View photo shown in Figure 02, the southern windows of the residence are small highlight windows. Thus, the critical location for compliance for this residence would be the front door.



FIGURE 02 – SOUTHERN FAÇADE OF RESIDENCE TO NORTH

- 5 Modelling shows that noise received at the neighbouring residence for car movements, car starts and car doors closing would comply with the assigned noise level for the day period. However, to achieve compliance at the residence to the north and east (i.e. adjacent residences to the car park) during the night period (ie before 7am), the fencing adjacent to the car park needs to be as shown on Figure 03.

6. ASSESSMENT

The resultant noise levels at the neighbouring residence from children playing outdoors and the mechanical services are tabulated in Table 6.1.

From previous measurements, noise emissions from children playing does not contain any annoying characteristics. Noise emissions from the mechanical services could be tonal and a +5 dB(A) penalty would be applicable, as shown in Table 6.1. Noise emissions from both outdoor play and the mechanical services needs to comply with the assigned L_{A10} noise levels.

**TABLE 6.1 - ACOUSTIC MODELLING RESULTS FOR L_{A10} CRITERIA
 OUTDOOR PLAY AREAS AND MECHANICAL PLANT**

Neighbouring Premises	Calculated Noise Level (dB(A))	
	Children Playing	Air Conditioning
North	36	19 (24)
East	37	31 (36)

() Includes +5 dB(A) penalty for tonality

With regards to noise associated with cars within the parking area, resultant noise levels are tabulated in Tables 6.2 and 6.3. It is noted that noise emissions from a moving car being an L_{A1} noise level, with noise emissions from cars starting and doors closing being an L_{Amax} noise level.

Based on the definitions of tonality, noise emissions from car movements and car starts, being an L_{A1} and L_{Amax} respectively, being present for less than 10% of the time, would not be considered tonal. Thus, no penalties would be applicable, and the assessment would be as listed in Table 6.2 (Car Moving) and Table 6.3 (Car Starting). However, noise emissions from car doors closing could be impulsive, hence the +10dB penalty has been included in the assessment.

**TABLE 6.2 - ACOUSTIC MODELLING RESULTS L_{A1} CRITERIA
 CAR MOVING**

Neighbouring Premises	Calculated Noise Level (dB(A))
North	34
East	40

**TABLE 6.3 - ACOUSTIC MODELLING RESULTS L_{Amax} CRITERIA
 CAR STARTING / DOOR CLOSING**

Neighbouring Premises	Calculated Noise Level (dB(A))	
	Car Starting	Door Closing
	Night	Night
North	47	48 [58]
East	45	49 [59]

[] Includes +10 dB(A) penalty for impulsiveness.

Tables 6.4 to 6.8 summarise the applicable Assigned Noise Levels, and assessable noise level emissions for each identified noise.

**TABLE 6.4 – ASSESSMENT OF L_{A10} NOISE LEVEL EMISSIONS
 OUTDOOR PLAY (DAY PERIOD)**

Location	Assessable Noise Level dB(A)	Applicable Assigned Noise Level (dB(A))	Exceedance to Assigned Noise Level
North	36	52	Complies
East	37	52	Complies

**TABLE 6.5 – ASSESSMENT OF L_{A10} NIGHT PERIOD NOISE LEVEL EMISSIONS
 AIR CONDITIONING**

Location	Assessable Noise Level dB(A)	Applicable Assigned Noise Level (dB(A))	Exceedance to Assigned Noise Level
North	24	42	Complies
East	36	42	Complies

**TABLE 6.6 – ASSESSMENT OF L_{A1} NIGHT PERIOD NOISE LEVEL EMISSIONS
 CAR MOVEMENTS**

Location	Assessable Noise Level dB(A)	Applicable Assigned Noise Level (dB(A))	Exceedance to Assigned Noise Level
North	34	52	Complies
East	40	52	Complies

**TABLE 6.7 – ASSESSMENT OF L_{Amax} NIGHT PERIOD NOISE LEVEL EMISSIONS
 CAR STARTING**

Location	Assessable Noise Level dB(A)	Applicable Assigned Noise Level (dB(A))	Exceedance to Assigned Noise Level
North	47	62	Complies
East	45	62	Complies

**TABLE 6.8 – ASSESSMENT OF L_{Amax} NIGHT PERIOD NOISE LEVEL EMISSIONS
 CAR DOOR**

Location	Assessable Noise Level dB(A)	Applicable Assigned Noise Level (dB(A))	Exceedance to Assigned Noise Level
North	58	62	Complies
East	59	62	Complies

7. CONCLUSION

Noise received at the neighbouring residential premises from children playing in the outdoor play area would comply with the requirements of the *Environmental Protection (Noise) Regulations 1997* for the day period. It is understood that although the child care centre would open before 7am, the outdoor play area would not to be utilised until after 7am. Hence, compliance with the requirements of the *Environmental Protection (Noise) Regulations 1997* would be achieved.

With the air conditioning condensing units located on the roof, noise from the mechanical services has also been assessed to comply with the requirements of the *Environmental Protection (Noise) Regulations 1997* at all times.

It is noted that noise associated with cars movements and cars starting are exempt from complying with the Regulations. However, noise emissions from car doors is not strictly exempt from the Regulations. Noise received at the neighbouring residences from these noise sources would comply with the Regulatory requirements, with boundary fence to the east being 2 metres high.

Thus, noise emissions from the proposed development, would be deemed to comply with the requirements of the *Environmental Protection (Noise) Regulations 1997* for the proposed hours of operation, with the inclusion of the mitigation as outlined above.