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Noise Assessment – Proposed child care facility 14 Brennan Avenue, Kincumber, NSW

Prepared for:

Kids Klubs
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1.0 INTRODUCTION

This report presents the results, findings and recommendations arising from an acoustic assessment of a proposed Child Care Facility at 14 Brennan Avenue, Kincumber.

The investigation was requested by Wales & Associates Pty Ltd on behalf of the proponent Kids Klubs to support a Development Application to Central Coast Council (Council) to address their typical requirements for such a redevelopment.

Under the proposal the centre will cater for 92 children aged 0-5 years with normal operating hours being Monday to Friday between 6:30 am and 6:00 pm for 52 weeks per year. There will be 16 child care staff.

Modern child care centres function as early learning facilities rather than simply for child minding. As such, there is emphasis on the guided development of children with organised activities and set objectives. Typically children will be distributed throughout play areas in supervised groups. From an acoustic point of view this means there is no unrestricted play time during which children could create excessive noise. Activities are supervised at all times by qualified and trained staff members.

The Department of Family and Community Services (FACS) ensures that child care centres comply with the Children's Services Regulation 2004. Under this regulation services must comply with the NSW Cancer Council guidelines which state "Care should be taken to minimise the time spent outdoors between 11 am and 3 pm daylight saving time (10 am and 2 pm Eastern Standard Time), when daily UVR levels are generally at their peak".

As a result of these guidelines children are not typically outside during the hours outlined or if they are then usually for relatively short periods. The time spent outdoors is also subject to weather conditions.

The indoor areas of the buildings would be mechanically ventilated. Doors and windows would usually remain closed whilst the children are indoors but it is considered that they could be open at times. Access to the site would be off Avoca Drive via Brennan Avenue.

2.0 TERMS AND DEFINITIONS

Table 1 contains the definitions of commonly used acoustical terms and is presented as an aid to understanding this report.

TABLE 1 DEFINITION OF ACOUSTICAL TERMS	
Term	Definition
dB(A)	The quantitative measure of sound heard by the human ear, measured by the A-Scale Weighting Network of a sound level meter expressed in decibels (dB).
SPL	Sound Pressure Level. The incremental variation of sound pressure above and below atmospheric pressure and expressed in decibels. The human ear responds to pressure fluctuations, resulting in sound being heard.
STL	Sound Transmission Loss. The ability of a partition to attenuate sound, in dB.
Lw	Sound Power Level radiated by a noise source per unit time re 1pW.
Leq	Equivalent Continuous Noise Level - taking into account the fluctuations of noise over time. The time-varying level is computed to give an equivalent dB(A) level that is equal to the energy content and time period.
L1	Average Peak Noise Level - the level exceeded for 1% of the monitoring period.
L10	Average Maximum Noise Level - the level exceeded for 10% of the monitoring period.
L90	Average Minimum Noise Level - the level exceeded for 90% of the monitoring period and recognised as the Background Noise Level. In this instance, the L90 percentile level is representative of the noise level generated by the surrounds of the residential area.

3.0 NOISE CRITERIA

3.1 Noise Emission criteria

In the absence of specific Council DCP's in NSW, there are no detailed regulations or guidelines that cover the operation of a child care centre. The facility will operate as a commercial enterprise and, as such, guidance for the assessment of noise impacts has been taken from the NSW Noise Policy for Industry (NPI), NSW Land and Environment Court precedents and the Association of Australian Acoustical Consultants (AAAC) Childcare Centre noise Assessment Guideline (2009).

The NPI advises that noise emissions from commercial premises should ideally not exceed the ambient background noise levels by more than 5 dB at residential receivers, for up to continuous 24 hour operation.

The issue of noise emissions from child care centres was included in a discussion paper prepared by the Southern Sydney Regional Organisation of Councils (SSROC) in 2005. As stated in the discussion paper, an assessment of 13 Land and Environment Court cases relating to child care centres revealed the following quotation from a Court judgement:

Council may require that a suitably qualified acoustic consultant undertake an acoustic assessment, which includes recommended noise attenuation measures.

Noise readings (measured at any point on the boundary of the site between the proposed Child Care Centre and adjoining property), should not exceed 10 dB(A) above the background noise levels during the hours of operation of the Centre. The noise measurements are to be measured over a 15-minute period and are to be undertaken in accordance with the requirements of the NSW Department of Environment and Conservation (now OEH).

The SSROC discussion paper also noted that:

Noise from children playing was a common issue before the court. The court generally imposed a condition that noise not exceed background noise + 10dB.

In order to achieve this standard, several acoustic reports submitted to the court recommended that the time spent by children in the outdoor play areas be limited. Some consents limited outdoor play to 2 hours per half day.

A criterion of 'background + 10dB' for a total of two hours outdoor play time per day is recommended in Section 5 of Association of Australian Acoustical Consultants (AAAC) *Child Care Centre Noise Assessment Technical Guideline* (November 2009). The standard INP criterion of 'background + 5dB' is applicable for other noise sources on the site.

In order to measure ambient noise levels and establish suitable noise limits for the neighbouring residences, background noise monitoring was conducted at the site between 10 and 16 December 2019 at a location as indicated in **Figure 1**. A Rion NL-42 noise logger was placed near the southern boundary of the adjoining residential property and programmed to continuously register environmental noise levels over 15 minute intervals.



Figure 1. Project site, receivers and noise logger location.

The receiver R1 in Figure 1 is the nearest residence to the east of the site. Receiver R2 is nearest to the west of the site and R3 is nearest to the proposed carpark.

The proponent has indicated that the facility will only operate from Monday to Friday, during the day period¹. Observations made during a site investigation indicated that the acoustic environment of the area was dominated by traffic on Avoca Drive. **Table 2** below shows a summary of the measured LA90 (background) and LAeq noise levels for the day, evening and morning shoulder periods. The data is shown graphically in **Appendix I**.

TABLE 2 MEASURED NOISE LEVELS – BRENNAN AVENUE 10-16 DEC 2019				
		Ambient Noise Levels dB(A)		
Location	Percentile	Day	Evening	6:30-7am
Brennan Avenue	L ₉₀	39	40	43
	L _{eq} (period)	53	48	48

In relation to determining noise goals for the operation of mechanical plant at the site the NPI sets out two separate sets of criteria designed to ensure developments meet environmental noise objectives. The first criteria account for intrusive noise and the others apply to the protection of amenity of particular land uses. A new development is assessed by applying both criteria to the situation and adopting the more stringent of the two.

¹ There would be children dropped off and picked up during the morning shoulder period 6:30 am – 7:00 am. Ambient levels during this period have been calculated and included in Table 2.

Amenity criteria are dependent upon the nature of the receiver area and the existing level of industrial noise. The area is best described as “suburban” and, as current industrial noise is insignificant, the adopted criterion is equal to the recommended amenity limit for a suburban area.

Table 2 below specifies the applicable base noise objectives for the operation of mechanical plant at the child care centre being assessed based on the lowest recorded background noise level, being 41 dB(A),L90.

TABLE 2		
BASE NOISE LEVEL OBJECTIVES		
Period	Intrusiveness trigger level* L _{eq} (15 min) dB(A)	Amenity trigger level** L _{eq} (Period) dB(A)
Day	44	55
Morning shoulder	48	50

* Rating Background Level (RBL) + 5dB. RBL is the median value of each ABL (Assessment Background Level) over the entire monitoring period. The ABL is a single figure representing the “L₉₀ of the L₉₀s” for each separate day of the monitoring period.

** Suburban zone Table 2.1 of NPI.

The project specific noise trigger level is therefore,

Day	44 dB(A) Leq (15 min)
Morning shoulder	48 dB(A) Leq (15 min)

For conservatism, the lower daytime criterion will be applied at all times. As per the discussion detailed above the noise from children in the outdoor play areas will be assessed against the shorter duration criterion of “background + plus 10” or;

Day	49 dB(A) Leq (15 min)
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3.2 Sleep disturbance

The NPI default minimum sleep disturbance trigger level for maximum noise events from vehicle movements before 7 am is **52 dB(A),L_{max}**.

3.3 Traffic Noise

Noise impacts from road traffic are assessed separately to site noise using the EPA Road Noise Policy (RNP).

The RNP, as adopted by Roads and Maritime Services (RMS) NSW, defers to the Infrastructure SEPP (2007) regarding traffic noise impacts on new developments. Provisions relevant to child care centres are included in Appendix C10 of the SEPP as follows:

For new sensitive land use developments around existing busy roads in NSW, such as educational institutions, child care facilities, places of worship and hospitals, both suggested internal acoustic performance requirements and design principles are provided in **Section 3.6.1** of the interim guideline.

The acoustic design advice in the guideline may be considered when designing such a development near any type of road.

In certain circumstances, the Infrastructure SEPP imposes a requirement on councils to consider these guidelines before determining development applications for noise sensitive developments.

The DP&E “Development near rail corridors and busy roads – Interim guideline” supports the SEPP (2007) and provides internal noise criteria applicable to sensitive developments.

Table 3.1 of the Interim guideline is reproduced below.

Table 3.1: Noise criteria		
Residential Buildings		
Type of occupancy	Noise Level dBA	Applicable time period
Sleeping areas (bedroom)	35	Night 10 pm to 7 am
Other habitable rooms (excl. garages, kitchens, bathrooms & hallways)	40	At any time
Non-Residential Buildings		
Type of occupancy	Recommended Max Level dBA	
Educational Institutions including child care centres	40	
Places of Worship	40	
Hospitals	- Wards	35
	- Other noise sensitive areas	45

Note: airborne noise is calculated as $L_{Aeq}(9h)$ (night) and $L_{Aeq}(15h)$ (day). Groundborne noise is calculated as L_{Aeq} (slow) for 95% of rail pass-by events.

The AAAC advisory guideline recommends a maximum traffic noise impact of **55 dB(A), $L_{eq}(1 \text{ hour})$** in outdoor play areas of child care centres.

4.0 NOISE ASSESSMENT

4.1 External Play Areas

To assess potential noise impacts from the proposed child care centre, noise levels were taken from the Spectrum Acoustics technical database. This contains measurements made at existing child care facilities that are similar in acoustic nature to the proposed child care centre.

The database contains noise measurements made in outdoor play areas as well as indoor areas. All sound levels have been measured with a Bruel & Kjaer Type 2250 Precision Sound Level Analyser with calibration performed before and after the survey.

One set of outdoor measurements was made over a 15 minute interval during a morning activity session whilst 15 children aged up to 1 year old were (babies) in an outdoor play area. The measurements were made from the veranda of the facility at the end of the play area. The noise source (i.e. the children) was in motion about the area with an average distance of approximately 15m from the sound level meter.

Similar measurements were made over 15 minute intervals during a morning activity session whilst 15 children aged between 2 and 5 years old were in an outdoor playground. Measurements were made near the ends of the playground, which had dimensions of approximately 5 x 15 m. The noise source (i.e. the children) was in motion about the area with an average distance of approximately 8m from the sound level meter.

Calculated Leq sound power levels based on the measured noise levels are shown below in **Table 4**. As can be seen the babies are quieter than the older children, whose noise level agrees with levels given in Section 6 of the AAAC guideline.

TABLE 4									
CALCULATED SOUND POWER LEVELS dB(A) Leq (15 min)									
		Octave Band Centre Frequency (Hz)							
Source	dB(A)	63	125	250	500	1K	2K	4K	8K
15 x < 1 y.o.	78	51	59	67	71	74	71	64	54
15 x 2 to 5 y.o.	88	61	69	77	82	84	79	72	61

The proposal incorporates both indoor and outdoor play areas. Potential noise issues arise primarily when children are engaged in outdoor play activities.

The proponent has advised that the assessment should consider 60 of the 92 children 2-5 year old to be in outdoor play areas, allowing for OOSH attendance, absenteeism and children involved in activities within the building.

Based on the proposed layout of the outdoor space, and the discussion above, it was assumed there would be four groups of 15 children aged 2-5 distributed in **Figure 2** and indicated as S1 – S4. Children will access the play areas directly from the building.

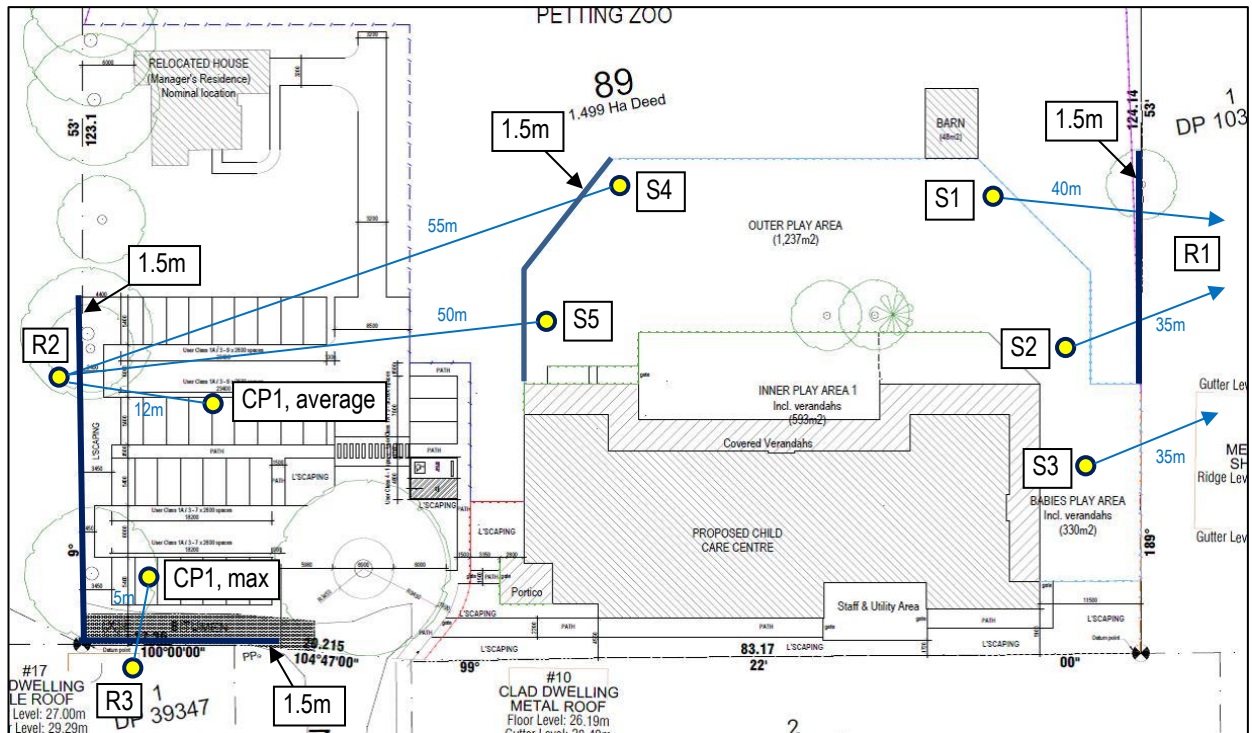


Figure 2. Proposed Site Layout, noise sources, proposed noise barriers and nearest residences

The noise sources were propagated to the receiver points, taking into account loss for distance and barrier effects of an existing metal shed and proposed noise barriers as indicated in Figure 2.

Barrier insertion loss is calculated using the Maekawa edge diffraction model as used in many available computer models of outdoor sound propagation and accounts for the natural elevation differences between the sources and receivers, as well as the barrier dimensions.

For the calculations, a source height of 1 m was used to approximate the height of a child's mouth. The predicted received noise levels are then compared to the adopted noise goals to determine noise impacts.

Tables 5 and 6 show the predicted noise levels at the nearest residences to the play areas.

TABLE 5. RECEIVED NOISE LEVEL AT R1, Leq(15min)									
		Octave Band Centre Frequency, Hz							
Propagation Elements	dB(A)	63	125	250	500	1k	2k	4k	8k
S1 Source Lw	88	61	69	77	82	84	79	72	61
S2 Source Lw	88	61	69	77	82	84	79	72	61
S3 Source Lw	78	51	59	67	71	74	71	64	54
S1 Distance loss (40 m)	-40	-40	-40	-40	-40	-40	-40	-40	-40
S2 Distance loss (35 m)	-39	-39	-39	-39	-39	-39	-39	-39	-39
S3 Distance loss (35 m)	-39	-39	-39	-39	-39	-39	-39	-39	-39
S1 Barrier Loss (1.5 m)		-5	-6	-6	-8	-8	-12	-14	-17
S2 Barrier Loss (1.5 m)		-5	-6	-6	-8	-8	-12	-14	-17
S3 Barrier Loss (2 m)#		-7	-8	-9	-11	-13	-16	-19	-21
S1 SPL at receiver R1	39	16	23	31	34	36	27	18	4
S2 SPL at receiver R1	40	17	24	32	35	37	28	19	5
S3 SPL at receiver R1	26	5	12	19	21	22	16	6	-6
TOTAL at R1	43	20	27	35	38	40	31	22	8
Criterion (no time limit*)	44	* From 7am-6pm.							
Criterion (2 hour / day)	49	# Nominal height of existing shed.							

TABLE 6. RECEIVED NOISE LEVEL AT R2, Leq(15min)									
		Octave Band Centre Frequency, Hz							
Propagation Elements	dB(A)	63	125	250	500	1k	2k	4k	8k
S4 Source Lw	88	61	69	77	82	84	79	72	61
S5 Source Lw	88	61	69	77	82	84	79	72	61
S4 Distance loss (55 m)	-44	-44	-44	-44	-44	-44	-44	-44	-44
S5 Distance loss (50 m)	-42	-42	-42	-42	-42	-42	-42	-42	-42
S4 Barrier Loss (1.5 m)		-5	-6	-6	-8	-8	-12	-14	-17
S5 Barrier Loss (1.5 m)		-5	-6	-6	-8	-8	-12	-14	-17
S4 SPL at receiver R2	35	12	19	27	30	32	23	14	0
S5 SPL at receiver R2	37	14	21	29	32	34	25	16	2
TOTAL at R2	39	16	23	31	34	36	27	18	4
Criterion (no time limit*)	44	* From 7am-6pm.							
Criterion (2 hour / day)	49								

The predicted levels in Tables 5 and 6 are below the “background + 5 dB” criterion of 44 dB(A) applicable to outdoor play area use with no restriction on hours.

4.3 Mechanical Plant

Air conditioning will typically be provided by split system units. The requirement for any additional external condenser units is yet to be determined although, if required, would logically be contained within or immediately adjacent to the building footprint.

Condenser units for similar applications, typically, have sound power levels in the range 65 to 70 dB(A) when they are operating at full capacity. The plant will be contained within the building footprint, either at ground level or on the roof, and will be at least 10m from the site boundary. Calculations based purely on distance loss show a level of up to 42 dB(A) which is below the background + 5dB criterion of 44 dB(A). Air conditioner selection and location should be reviewed by the acoustical consultant at

the design documentation stage to ensure compliance with the criteria established in this report.

4.4 Car Park

The proposed car park is shown in Figure 2 with entry off Brennan Avenue. The nearest residences are approximately 10m from the centre point of staff car park (R2, CP1(average)) and 5m from the southernmost car parking space (R3, CP2(max)).

Noise compliance measurements taken by Spectrum Acoustics at a similarly sized child care centre at Wamberal recorded a level of 40 dB(A),Leq(15min) at a distance of 15m from the nearest point of the carpark during afternoon pick-up time. This equates to 44 dB(A),Leq(15min) at a distance of 10m which is equal to the daytime noise criterion. 1.5m barriers have been recommended as shown in Figure 2 to reduce car park noise levels by 7 dB and allow for additional noise from play areas and mechanical plant without the cumulative noise emissions exceeding the criterion.

Maximum noise levels of up to 80 dB(A) from doors closing etc would reduce to 51 dB(A) at R3 and R4 with the distances and 1.5m barriers as shown in Figure 2. These levels are below the adopted sleep disturbance trigger level of 52 dB(A),Lmax for the period 6:00-7:00 am.

4.6 Road Traffic Impacts

Table 2 gives a daytime traffic noise level of 53 dB(A),Leq which is 2 dB lower than the AAAC recommended level of 55 dB(A). The logger location included natural noise associated with surrounding trees/birds and a contribution from road traffic. As such, the traffic noise contribution to the measured LAeq was less than the total 53 dB(A). Attributing nominally half of the total noise to traffic gives 50 dB(A). The proposed new play areas are further from Avoca Drive than the logger location. Applying a nominal -3 dB for a doubling of distance from a *line source* gives an estimated 47 dB(A) of traffic noise at the southern facade of the proposed childcare building.

Allowing for the generally accepted 10 dB loss through a normally open window, the internal traffic noise level would be 37 dB(A). This is below the RNP recommended level of 40 dB(A).

Although an estimate, this level of traffic noise is not sufficiently high to warrant detailed quantitative investigation of potential traffic noise impacts.

5.0 CONCLUSION

An acoustical assessment of theoretical noise emissions has been carried out for a proposed Child Care Facility at 14 Brennan Avenue, Kincumber.

The noise impacts at the nearest residential boundaries have been assessed, due to the operation of the child care centre, mechanical plant and car park noise.

Calculation results showed that noise barriers would be required for proposed new outdoor play areas and car parks to achieve the noise criteria at nearby residential receivers.

Any external mechanical plant (air conditioning) must be reviewed by the acoustical consult during the design stage to confirm compliance with the noise criteria established in this report.

Based on these findings, we see no acoustic reason why the proposed Child Care Facility should not be approved.

APPENDIX I

NOISE LOGGER CHARTS

