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## Noise Assessment – Proposed Childcare Centre 29-33 Cessnock Road, Gillieston Heights, NSW

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A handwritten signature in black ink, appearing to read 'Neil Pennington'.

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## 1.0 INTRODUCTION

This report presents the results, findings and recommendations arising from an acoustic assessment for the proposed development of a childcare centre at 29-33 Cessnock Road, Gillieston Heights, NSW.

The investigation was requested by Approved Services Pty Ltd to support a Development Application to City of Maitland Council (Council) to address their typical requirements for such a development.

The proposal includes the following:

- Construction of a child care centre to build a new single storey building containing indoor play rooms, outdoor play area, associated amenities, to be occupied by 132 children.

Under the proposal the facility would operate within the hours of 6:00 am to 6:30 pm Monday – Friday for 51 weeks per year.

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 would 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 Education and Children’s Services Regulation 2020. 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 new building would be mechanically ventilated. Doors and windows may remain closed whilst the children are indoors but it is considered that they would be open at times.

## 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

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 (2020).

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.*

Section 3.2.1 of the Association of Australasian Acoustical Consultants Guideline for Child Care Centre Acoustic Assessment Version 3.0 (September 2020) outlines the base criterion of 45 dB(A) recommended for the assessment of outdoor play areas where background noise levels are below 40 dB(A). It also specifies that where background noise levels exceed 40 dB(A), applied noise criteria are higher.

Historical background noise logging has been conducted by Spectrum Acoustics at locations on Cessnock Road establishing a daytime background noise level of 47 dB(A),L90.

In accordance with the AAAC Guideline, the noise criteria for outdoor play areas are **52 dB(A), Leq(15 min)** for unlimited used of outdoor play areas and **57 dB(A),Leq(15min)** for outdoor play up to 4 hours per day.



Figure 1. Project site and receivers

Receivers R1-R3 are the nearest existing residences to the proposed outdoor play area and Receiver R4 is the nearest to the proposed car park. In this report, the proposed children in the outdoor play area are considered to be the primary noise source resulting from the proposal.

The proponent has indicated that the facility will operate from Monday to Friday, during the day period only.

In relation to determining noise goals for the operation of noise sources other than the outdoor play area the NPfI 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.

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 for residential receivers is equal to the recommended amenity limit for a suburban area minus 2 dB. The adopted criterion for the ‘place of worship’ non-residential receiver is the recommended amenity limit for a place of worship minus 2 dB.

**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 NPI criterion.

TABLE 2 BASE NOISE LEVEL OBJECTIVES		
Period	Intrusiveness trigger level* Leq (15 min) dB(A)	Amenity trigger level Leq (15 min) dB(A)
Residential (Day)	52	53**
Residential (Night)	35	38**

\* 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 “L<sub>90</sub> of the L<sub>90s</sub>” for each separate day of the monitoring period.

\*\* Suburban zone Table 2.2 of NPI.

The project specific noise trigger level for the operations of mechanical plant for residential receivers is therefore,

Day                    **52 dB(A) Leq (15 min)**

Night                    **35 dB(A) Leq (15 min)**

### 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<sub>max</sub>**.

### 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 and now 2021) 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 therefore SEPP (2021), and provides internal noise criteria applicable to sensitive developments.

Table 3.1 of the Interim guideline is reproduced below.

Table 3.1: Noise criteria		
<b>Residential Buildings</b>		
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
<b>Non-Residential Buildings</b>		
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  $L_{eq}(9h)$  (night) and  $L_{eq}(15h)$  (day). Groundborne noise is calculated as  $L_{max}$  (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 in order to achieve the recommended internal level of 40 dB(A) in the . The previously measured daytime traffic noise level adjacent to Cessnock Road was 62-65 dB(A),  $L_{eq}$ . The proposed play areas extend across the Cessnock Road frontage where a 1.8m high acoustic barrier/fence will be required to provide 8-10 dB barrier loss for traffic noise to achieve the 55 dB(A) traffic noise level in the outdoor play area.

## 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 facility.

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 3 years old were in an outdoor playground. The measurements were made from the veranda of the facility at the end of the playground. 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 about 3 and 6 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 3**. These measured values are adopted for this assessment rather than default values recommended in the AAAC Guideline.

TABLE 3 CALCULATED SOUND POWER LEVELS dB(A) Leq (15 min)									
Source	dB(A)	Octave Band Centre Frequency (Hz)							
		63	125	250	500	1K	2K	4K	8K
15 x 0 to 2 y.o.	70	44	51	58	60	66	62	57	54
15 x 3 to 5 y.o.	78	47	55	65	72	73	71	66	60

Potential noise issues arise primarily when children are engaged in outdoor play activities.

The assessment of the proposed outdoor play area considers three groups of 15 children aged 3-5, and one group of 15 children, aged 0-2 to be in the outdoor play areas at once, indicated as S1 – S4 in Figure 2. An additional assessment was conducted for the potential impacts from carpark noise on the adjoining residence.



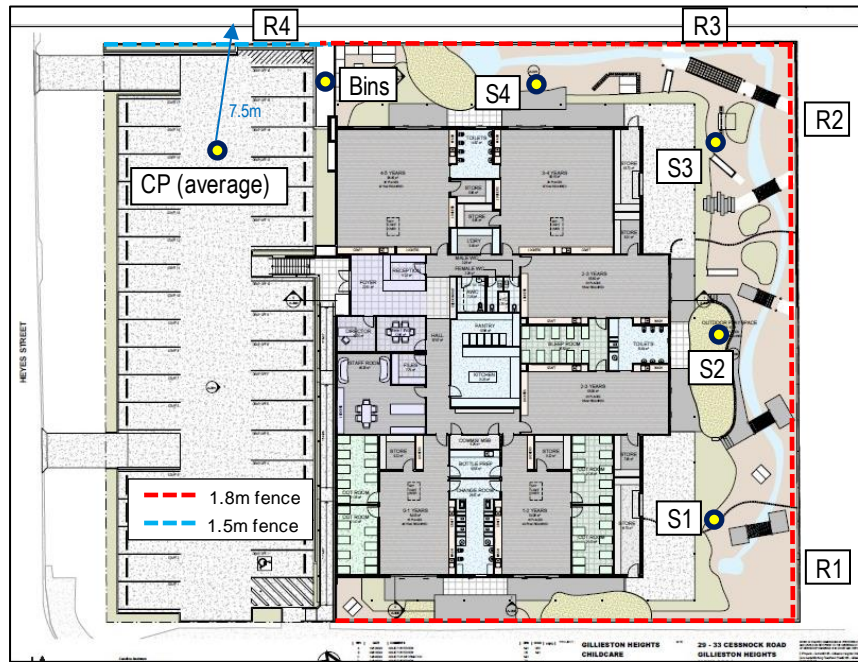


Figure 2. Outdoor play areas, car park, noise sources, receivers, and acoustic barriers.

The noise sources were propagated to the receiver points, taking into account loss for distance and barriers. **Figure 3** shows a cross-section through the site showing a cut and retaining wall along the boundary with R1 and R2. This elevation difference has been factored into the recommended barrier height, which represents the height difference between ground level in the play area and the top of the barrier. For example, where there is a 1.5m retaining wall, a barrier height of 3m indicates a 1.5m barrier/fence on top of the retaining wall. Recommended actual barrier fence heights are indicated in Figure 2. Noise sources have been modelled half way between ground level and the top of the retaining wall.

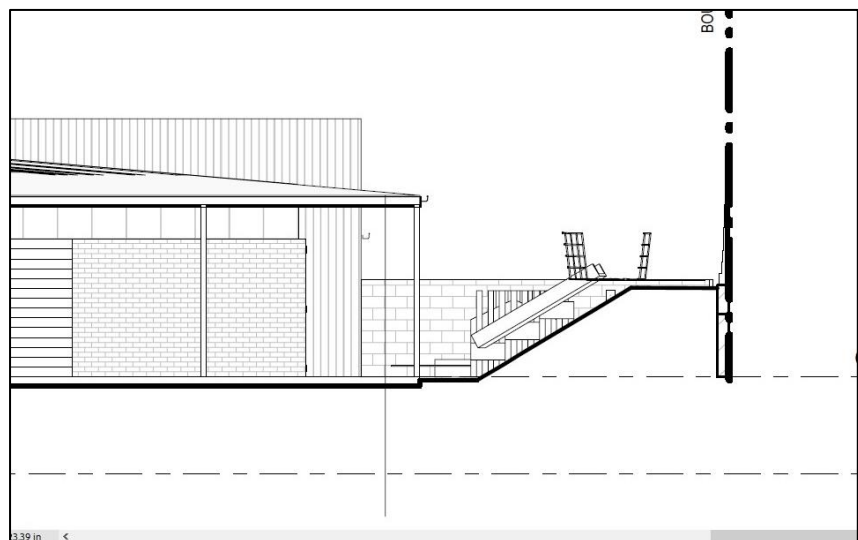


Figure 3. Elevation difference and retaining wall to outdoor play area.

The predicted received noise levels are then compared to the adopted noise goals to determine noise impacts. Calculated barrier insertion loss has been reduced by 5 dB to account for sound reflections off the childcare centre and over the boundary fence. **Tables 4 and 5** show the predicted noise levels at the nearest receivers to the outdoor play areas.

TABLE 4 RECEIVED NOISE LEVEL AT R1									
Propagation Elements	dB(A)	Octave Band Centre Frequency, Hz							
		63	125	250	500	1k	2k	4k	8k
S1 Source Lw Leq (15 min)	70	44	51	58	60	66	62	57	54
S2 Source Lw Leq (15 min)	78	47	55	65	72	73	71	66	60
S1 Distance loss (5m)	-22	-22	-22	-22	-22	-22	-22	-22	-22
S2 Distance loss (10m)	-28	-28	-28	-28	-28	-28	-28	-28	-28
S1 Barrier Insertion (2.3m)		-5	-5	-5	-5	-5	-7	-10	-13
S2 Barrier Insertion (2.8m)		-5	-5	-5	-8	-11	-14	-17	-19
<b>S1 SPL at R1</b>	<b>42</b>	<b>17</b>	<b>24</b>	<b>31</b>	<b>33</b>	<b>39</b>	<b>33</b>	<b>25</b>	<b>19</b>
<b>S2 SPL at R1</b>	<b>40</b>	<b>14</b>	<b>22</b>	<b>32</b>	<b>34</b>	<b>32</b>	<b>27</b>	<b>19</b>	<b>11</b>
<b>Total SPL at R1</b>	<b>45</b>	<b>19</b>	<b>27</b>	<b>35</b>	<b>37</b>	<b>40</b>	<b>32</b>	<b>26</b>	<b>20</b>
Criterion (no time limit)	52								
Criterion (4 hrs/day)	57								

TABLE 5 RECEIVED NOISE LEVEL AT R2 and R3									
Propagation Elements	dB(A)	Octave Band Centre Frequency, Hz							
		63	125	250	500	1k	2k	4k	8k
S2 Source Lw Leq (15 min)	78	47	55	65	72	73	71	66	60
S3 Source Lw Leq (15 min)	78	47	55	65	72	73	71	66	60
S4 Source Lw Leq (15 min)	78	47	55	65	72	73	71	66	60
S2 Distance loss (10m)	-28	-28	-28	-28	-28	-28	-28	-28	-28
S3 Distance loss (5m)	-22	-22	-22	-22	-22	-22	-22	-22	-22
S4 Distance loss (10m)	-28	-28	-28	-28	-28	-28	-28	-28	-28
S2 Barrier Insertion (2.8m)		-5	-5	-5	-8	-11	-14	-17	-19
S3 Barrier Insertion (3.1m)		-5	-5	-7	-10	-13	-16	-19	-21
S4 Barrier Insertion (2.8m)		-5	-5	-5	-8	-11	-14	-17	-19
<b>S2 SPL at R2/R3</b>	<b>41</b>	<b>14</b>	<b>22</b>	<b>33</b>	<b>36</b>	<b>34</b>	<b>29</b>	<b>22</b>	<b>13</b>
<b>S3 SPL at R2/R3</b>	<b>45</b>	<b>20</b>	<b>28</b>	<b>36</b>	<b>40</b>	<b>38</b>	<b>33</b>	<b>25</b>	<b>17</b>
<b>S4 SPL at R2/R3</b>	<b>41</b>	<b>14</b>	<b>22</b>	<b>33</b>	<b>36</b>	<b>34</b>	<b>29</b>	<b>22</b>	<b>13</b>
<b>Total SPL at R2/R3</b>	<b>48</b>	<b>22</b>	<b>30</b>	<b>39</b>	<b>43</b>	<b>41</b>	<b>36</b>	<b>28</b>	<b>20</b>
Criterion (no time limit)	52								
Criterion (2hr / half-day)	57								

The above calculations in Tables 4 and 5 consider boundary fences as indicated in Figure 2.

For this purpose, the fence should be constructed of an impervious material of a minimum 12 kg/m<sup>2</sup> density.

The predicted levels in Tables 4 to 6 do not exceed the adopted noise criteria for unlimited outdoor play.

#### 4.2 Internal Activity Area

The internal learning areas for all age groups have windows overlooking the outdoor play areas. Even with windows open, noise levels from within these spaces will be considerably lower at the site boundary than noise levels from children at play in the areas outside the windows. Since the external noise levels satisfy the noise criteria, noise emissions from within the building do not require quantitative assessment.

#### 4.3 Car Park

The proposed car park is shown in Figure 2 with entry off Heyes Street. The boundary of Receiver R4 (i.e worst-case) is approximately 7.5m from the centre point of the western third of the car park (CP(average)).

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.

Considering the standard 3dB addition per halving of distance, and a conservative 5 dB(A) barrier loss from the recommended boundary fence, shown in Figure 2, this equates to 38 dB(A),Leq(15min) at R5 which satisfies the noise criterion of **52 dB(A),Leq(15min)**.

Maximum noise levels of up to 80 dB(A) from doors closing etc are typical of worst-case noise generation from car parks. In order to achieve the sleep-disturbance noise criterion of 52 dB(A),L<sub>max</sub> should vehicles arrive before 7 am, a minimum 1.5m acoustic fence is required along a car park boundaries that adjoins R4, also shown in Figure 2.

#### 4.4 Road Traffic Impacts

Any traffic generated by the proposal would be low volume and originating from local homes with minimal influence on current traffic volumes in the area, therefore a full quantitative assessment of traffic noise impacts for this development is not considered necessary.

#### 4.5 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. 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.

#### 4.6 Waste removal

The applicant has advised that waste services would be limited to a 1.5 metre rubbish bin removed twice a week and a 660 litre recyclables bin removed twice a week. The bins would be stored as shown in Figure 2 and wheeled through a gate to the carpark for collection by a waste contractor. Being adjacent to receiver R4, waste collection should not occur prior to 6am as the resultant maximum noise level from reverse alarms would not be amenable to easy mitigation. Being daytime only, any contribution to LAeq noise emissions would be negligible.

## 5.0 CONCLUSION

An acoustical assessment of theoretical noise emissions has been carried out for the proposed development of a childcare centre at 29-33 Cessnock Road, Gillieston Heights, NSW.

The noise impacts at the nearest existing and future potential sensitive receivers have been assessed, due to the operation of the childcare centre, car park noise and mechanical plant.

#### Recommendations arising from this assessment:

No exceedances of noise limits have been predicted, subject to the construction of the acoustic fences as described in Figure 2 of this report.

For the purposes described in this report, the recommended boundary fences should be constructed of an impervious material of a minimum 12 kg/m<sup>2</sup> density.

Based on these findings, we see no acoustic reason why the proposed childcare centre should not be approved.

This report contains no appendices