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Noise Assessment – Proposed Addition to Existing Childcare Centre
61a Narang Street, East Maitland, NSW

Prepared for:

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CONTENTS

1.0 INTRODUCTION

This report presents the results, findings and recommendations arising from an acoustic assessment for the proposed extension of an existing childcare centre at 61a Narang Street, East Maitland, NSW.

The investigation was requested by Doring Desing on behalf of the proponent Orchard Kindy Patch Pty Ltd ATF OKPUT to support a Development Application to Maitland City Council (Council) to address their typical requirements for such a development.

The proposal includes the following:

- Extension and renovation of existing child care centre to build a new single storey building containing indoor play rooms, semi-enclosed outdoor play area, associated amenities, and a corridor link to the existing building, to be occupied by an additional 63 children.

Under the proposal the facility would operate within the hours of 6:30 am to 6:30 pm Monday – Friday for 52 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

Maitland City Council has provisions in their Development Control Plan (2018) specific to noise emissions from child care centres. 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.

As a measure of conservatism, the base criterion of **45 dB(A), Leq(15 min)** will be adopted for this assessment. Satisfaction of the AAAC default criterion ensures compliance with Clause C2.3(d) of the Maitland City Council DCP 2018.

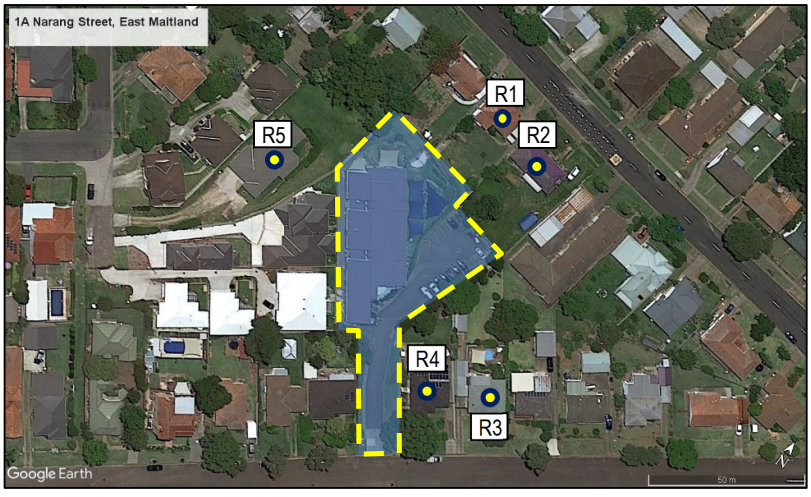

Figure 1. Project site and receivers

Receiver R1 is the worst-impacted existing residence to the north of the existing outdoor play area, R2 is the nearest existing residence to the north of the proposed addition & existing carpark, R3 is the nearest existing residence to the east of the proposed addition & existing carpark, R4 is representative of the nearest existing residences to the proposed additional car parking, and R5 is the nearest existing residence to the west of the existing indoor play areas. 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 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.

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.

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* L_{eq} (15 min) dB(A)	Amenity trigger level L_{eq} (15 min) dB(A)
Residential (Day)	40	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_{90} of the $L_{90's}$" 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 **40 dB(A) Leq (15 min)**

Night **38 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),Lmax**.

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 therefore consolidated 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

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_{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),$L_{eq(1\ hour)}$** in outdoor play areas of child care centres. This level of noise is normally experienced within approximately 150m of major freeways or 80m from arterial roads. The subject site is surrounded by local access roads and is over 900m from the New England Highway with intervening buildings. In this suburban setting, traffic noise will be significantly less than 55 dB(A) and traffic noise impact will not require further assessment.

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 2 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 4**. As can be seen the two measured levels are very similar and are equal to the levels stated in 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 0 to 2 y.o.	78	51	59	67	71	74	71	64	54
15 x 3 to 5 y.o.	88	61	69	77	82	84	79	72	61

The proposal incorporates a small additional semi-enclosed outdoor play area that adjoins the existing outdoor play area, and indoor play areas. Potential noise issues arise primarily when children are engaged in outdoor play activities.

The assessment of the proposed outdoor play areas considers two groups of 20 children aged 3-5 to be in the outdoor play areas at once, accounting for absenteeism, children participating in indoor activities, and children not actively playing. Clusters of 20 children aged 3-5 are shown as S1, and S2 in Figure 2 to allow for worst case scenario assessment of noise impacts at the residential receivers, assuming no more than 2 groups of 20 children are engaged in outdoor play at one time. Figure 2 also shows clusters of 20 children aged between 0-5, depending on the room, engaging in indoor play and these are indicated as S3, S4, S5, and S6.

Figure 2. Outdoor play areas, indoor play areas, noise sources, residential receivers, and acoustic barriers

The noise sources were propagated to the receiver points, taking into account loss for distance and barriers.

To account for the additional 5 children per noise source, a 1 dB increase will be applied to the calculated sound power levels in Table 4.

The predicted received noise levels are then compared to the adopted noise goals to determine noise impacts. **Tables 5 to 7** show the predicted noise levels at the nearest receivers to the play areas.

TABLE 5 RECEIVED NOISE LEVEL AT R1									
		Octave Band Centre Frequency, Hz							
Propagation Elements	**dB(A)**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
S1 Source Lw Leq (15 min)	89	62	70	78	83	85	80	73	62
S2 Source Lw Leq (15 min)	89	62	70	78	83	85	80	73	62
S1 Distance loss (20m)	-34	-34	-34	-34	-34	-34	-34	-34	-34
S2 Distance loss (11m)	-29	-29	-29	-29	-29	-29	-29	-29	-29
S1 Barrier Insertion (3m)		-8	-10	-12	-15	-18	-21	-24	-24
S2 Barrier Insertion (3m)		-8	-10	-12	-15	-18	-21	-24	-24
S1 SPL at R1	**38**	**20**	**26**	**32**	**33**	**33**	**27**	**17**	**7**
S2 SPL at R1	**43**	**25**	**31**	**37**	**38**	**38**	**32**	**22**	**12**
Total SPL at R1	**44**	**26**	**32**	**38**	**39**	**39**	**33**	**23**	**13**
Criterion	**45**								

TABLE 6 RECEIVED NOISE LEVEL AT R2									
		Octave Band Centre Frequency, Hz							
Propagation Elements	**dB(A)**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
S1 Source Lw Leq (15 min)	89	62	70	78	83	85	80	73	62
S2 Source Lw Leq (15 min)	89	62	70	78	83	85	80	73	62
S1 Distance loss (28m)	-37	-37	-37	-37	-37	-37	-37	-37	-37
S2 Distance loss (10m)	-28	-28	-28	-28	-28	-28	-28	-28	-28
S1 Barrier Insertion (3m)		-8	-10	-12	-15	-18	-21	-24	-24
S2 Barrier Insertion (3m)		-8	-10	-12	-15	-18	-21	-24	-24
S1 SPL at R2	**36**	**17**	**24**	**29**	**30**	**30**	**24**	**14**	**4**
S2 SPL at R2	**44**	**26**	**32**	**38**	**39**	**39**	**33**	**23**	**13**
Total SPL at R1	**45**	**27**	**33**	**39**	**40**	**40**	**34**	**24**	**14**
Criterion	**45**								

TABLE 7 RECEIVED NOISE LEVEL AT R5									
		Octave Band Centre Frequency, Hz							
Propagation Elements	**dB(A)**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
S1 Source Lw Leq (15 min)	89	62	70	78	83	85	80	73	62
S2 Source Lw Leq (15 min)	89	62	70	78	83	85	80	73	62
S1 Distance loss (13m)	-30	-30	-30	-30	-30	-30	-30	-30	-30
S2 Distance loss (29m)	-37	-37	-37	-37	-37	-37	-37	-37	-37
S1 Barrier Insertion (2.6m)		-7	-8	-10	-12	-15	-18	-21	-24
S2 Barrier Insertion (2.6m)		-7	-8	-10	-12	-15	-18	-21	-24
S1 SPL at R5	**44**	**25**	**32**	**38**	**39**	**39**	**33**	**23**	**11**
S2 SPL at R5	**38**	**18**	**25**	**31**	**32**	**33**	**27**	**17**	**4**
Total SPL at R1	**45**	**26**	**33**	**39**	**40**	**40**	**34**	**24**	**12**
Criterion	**45**								

The above calculations in Tables 5 to 7 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^2 density.

The predicted levels in Tables 5 to 7 do not exceed the adopted noise criteria.

4.2 Internal Activity Area

The internal layout of the proposed alterations & additions at the existing child care centre is shown in **Figure 2**.

Tables 8 to **10** shows the predicted noise levels at the worst-affected locations of the residential receivers from the internal play areas.

The above noise levels in Table 4 are representative of a group of 15 children running and playing freely in an outdoor area. It is not common for such noise levels to be reached for children engaging in more static activities. The proposed addition is an indoor playing and learning area, with dedicated craft areas that is more likely to be used for more focused activities, ie. Drawing, arts & craft, learning, quiet playing. Therefore, a 10 dB noise reduction from the noise levels given in Table 4 will be adopted for the assessment of noise from the internal area.

To account for the additional 5 children per noise source, a 1 dB increase will also be applied to the calculated sound power levels in Table 4.

TABLE 8
RECEIVED NOISE LEVEL AT R2

		Octave Band Centre Frequency, Hz							
Propagation Elements	**dB(A)**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
S3 Source Lw Leq (15 min)	79	52	60	68	72	75	73	65	55
Sound pressure level @ internal surface of northern façade wall	-10	-10	-10	-10	-10	-10	-10	-10	-10
SPL loss through an open window/door	-10	-10	-10	-10	-10	-10	-10	-10	-10
Distance Loss (8m)	-26	-26	-26	-26	-26	-26	-26	-26	-26
SPL at R2	**33**	**6**	**14**	**22**	**26**	**29**	**27**	**19**	**9**
Criterion	**40**								

TABLE 9 RECEIVED NOISE LEVEL AT R3									
		Octave Band Centre Frequency, Hz							
Propagation Elements	**dB(A)**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
S3 Source Lw Leq (15 min)	79	52	60	68	72	75	73	65	55
Sound pressure level @ internal surface of northern façade wall	-10	-10	-10	-10	-10	-10	-10	-10	-10
SPL loss through an open window (room)	-10	-10	-10	-10	-10	-10	-10	-10	-10
Distance Loss (12m)	-30	-30	-30	-30	-30	-30	-30	-30	-30
S3 SPL at R3	**29**	**2**	**10**	**18**	**22**	**25**	**23**	**15**	**5**
S4 Source Lw Leq (15 min)	79	52	60	68	72	75	73	65	55
Sound pressure level @ internal surface of northern façade wall	-10	-10	-10	-10	-10	-10	-10	-10	-10
SPL loss through an open door (room)	-10	-10	-10	-10	-10	-10	-10	-10	-10
SPL loss through an open window (corridor)	-10	-10	-10	-10	-10	-10	-10	-10	-10
Distance Loss (10m)	-28	-28	-28	-28	-28	-28	-28	-28	-28
S4 SPL at R3	**31**	**4**	**12**	**20**	**24**	**27**	**25**	**17**	**7**
S5 Source Lw Leq (15 min)	79	52	60	68	72	75	73	65	55
Sound pressure level @ internal surface of northern façade wall	-10	-10	-10	-10	-10	-10	-10	-10	-10
SPL loss through an open door (room)	-10	-10	-10	-10	-10	-10	-10	-10	-10
SPL loss through an open window (corridor)	-10	-10	-10	-10	-10	-10	-10	-10	-10
Distance Loss (12m)	-30	-30	-30	-30	-30	-30	-30	-30	-30
S5 SPL at R3	**29**	**2**	**10**	**18**	**22**	**25**	**23**	**15**	**5**
Total SPL at R3	**35**	**8**	**16**	**24**	**28**	**31**	**29**	**21**	**11**
Criterion	**40**								

TABLE 10 RECEIVED NOISE LEVEL AT R5									
		Octave Band Centre Frequency, Hz							
Propagation Elements	**dB(A)**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
S6 Source Lw Leq (15 min)	69	42	50	58	62	65	63	55	45
Sound pressure level @ internal surface of northern façade wall	-10	-10	-10	-10	-10	-10	-10	-10	-10
SPL loss through an open window/door	-10	-10	-10	-10	-10	-10	-10	-10	-10
Distance Loss (17 m)	-33	-33	-33	-33	-33	-33	-33	-33	-33
SPL at R5	**16**	**<0**	**<0**	**5**	**9**	**12**	**10**	**2**	**<0**
Criterion	**40**								

The predicted levels in Tables 8 to 10 show that the noise impact from internal activities will comply with all noise criteria. This assessment applies to all noise generation in the activity areas including amplified music played through a small portable system for educational purposes.

4.3 Car Park

The existing & proposed car parks are shown in **Figure 3** with entry off Narang Street. The nearest residence to the existing car park is the existing residence R3 approximately 7.5m from the centre point of the car park (CP_E(average)).The nearest residence to the proposed additional car parking is the existing residential receiver R4 approximately 7.5m from the centre point of the southern end of the car park (CP_P(average)).

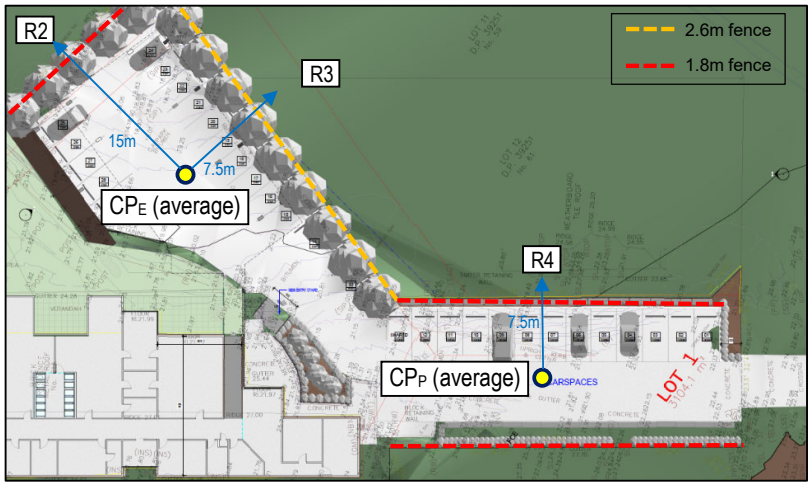

Figure 3. Car park, noise sources, residential receivers, and acoustic barriers

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 a conservative 5 dB increase for noise reflections off the car park roof, and a minimum 8 dB barrier loss from a 1.8m boundary fence adjoining R2, this equates to 37 dB(A),Leq(15min) at R2, which is below the most-stringent night time criterion of **38 dB(A),Leq(15min).** The worst case predicted cumulative noise level at R2 due to the operation of the car park and proposed indoor play areas is 39 dB(A),Leq(15min), which is below the day time criterion of **40 dbB(A),Leq(15 min)**.

Considering a 6 dB increase due to the halving of distance, a conservative 5 dB increase for noise reflections off the car park roof, and a minimum 15 dB barrier loss from a 2.6m boundary fence adjoining R3, this equates to 36 dB(A),Leq(15min) at R3, which is below the most-stringent night time criterion of **38 dB(A),Leq(15min)**. The worst case

predicted cumulative noise level at R3 due to the operation of the car park and proposed indoor play areas is 39 dB(A),Leq(15min), which is below the day time criterion of **40 dbB(A),Leq(15 min)**.

Considering a 6 dB increase due to the halving of distance and a minimum 8 dB barrier loss from a 1.8m boundary fence adjoining R4, this equates to 38 dB(A),Leq(15min), which does not exceed the most-stringent night time criterion. As R4 has been assessed as representative of the nearest residence, the boundary fence recommendation is also required for the southern site boundary, as indicated in Figure 3.

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),Lmax, a minimum 1.8m acoustic fence is required along the car park boundary that adjoins R4.

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.

5.0 CONCLUSION

An acoustical assessment of theoretical noise emissions has been carried out for a proposed alterations & additions of the existing child care centre at 1A Narang Street, East Maitland.

The noise impacts at the nearest residential receivers have been assessed, due to the operation of the child care centre and car park noise, and cumulative impacts from the existing and proposed operations.

Recommendations arising from this assessment:

No exceedances of noise limits have been predicted, subject to the construction of the acoustic fences as described in Figures 2 and 3 of this report.

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

This report shows the proposal can comply with Part C2.3 of the Maitland City Council DCP 2018.

This report contains no appendices