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Noise Assessment – Proposed Childcare Facility
Lot 205 Ballymore Drive, Chisholm, NSW

Prepared for:

Excellence in Education c/- HPC Planning
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MEMBER FIRM

Association of Australasian Acoustical Consultants

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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 Lot 205 Ballymore Drive, within Stage 4A of the Sofia Waters subdivision development at 581 Raymond Terrace Road, Chisholm.

The investigation was requested by HPC Planning on behalf of the proponent Excellence in Education to support a Development Application to Maitland City Council (Council) to address their typical requirements for such a development.

Under the proposal the centre will cater for 106 children aged 0-5 years with normal operating hours being Monday to Friday between 6:15am and 6:15pm 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. Children will typically 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 be open at times to allow for natural ventilation. Access to the site would be off Ballymore Drive.

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.

Ambient noise levels were monitored by Spectrum Acoustics at the site from 24 June – 29 June 2024. Data was recorded at 15 minute statistical intervals using an ARL Ngara environmental noise logger. The measurements were conducted in accordance with relevant EPA guidelines and AS 1055-1997 “Acoustics – Description and Measurement of Environmental Noise”. The noise logger used complies with the requirements of AS 1259.2-1990 “Acoustics – Sound Level Meters”, and has current NATA calibration certification.

The logger was programmed to continuously register environmental noise levels over the 15 minute intervals, with internal software calculating and storing Ln percentile noise levels for each sampling period. Calibration of the logger was performed during the instrument’s initialisation procedures, with calibration results being within the allowable $\pm$ 0.5 dB(A) range.

The logger was placed in a vacant lot in the subdivision to the east of the project site, along Trampore Esplanade, at a distance to Raymond Terrace Road similar to that of the project site, and therefore representative of likely ambient noise conditions in the proposed

subdivision once constructed. **Figure 1** shows the project site, noise logger location, and residential receivers.

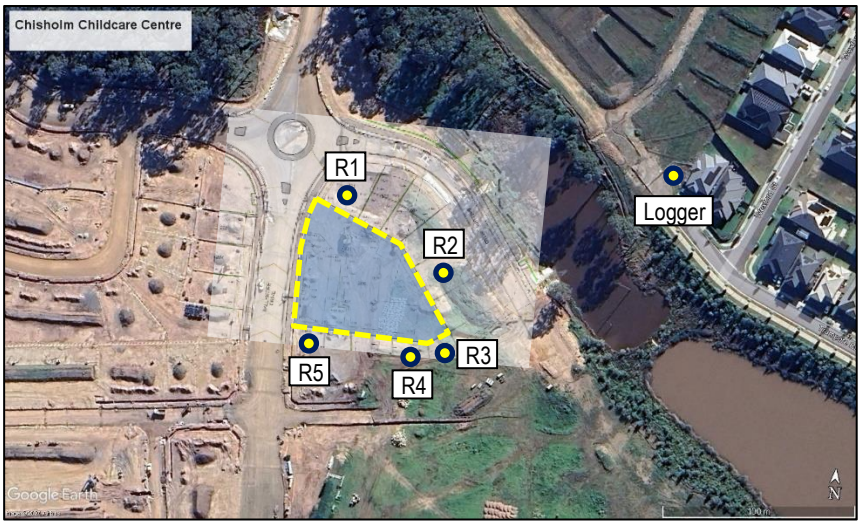


Figure 1. Project site, receivers and noise logger location.

The receiver R1 in Figure 1 is the nearest future residence to the proposed outdoor play area to the north, R2 is the nearest future residence to the proposed outdoor play area to the east, R3 is the nearest future residence to the proposed outdoor play area to the southeast, R4 is the nearest future residence to the over 36 month internal play room 'Activity 6', and R5 is the nearest future residence to the proposed carpark off Ballymore Drive.

The proponent has indicated that the facility will only operate from Monday to Friday, between 6:15am and 6:15pm. **Table 2** below shows a summary of the measured LA90 (background) and LAeq noise levels for the day, evening and night periods. The data is shown graphically in **Appendix I**.

TABLE 2
MEASURED NOISE LEVELS – TRAMPORE ESPLANADE 24-29 JUN 2024

		Ambient Noise Levels dB(A)		
Location	Percentile	Day	Evening	Night
Trampore Esplanade	L_{90}	40	39	37
	$L_{eq\ (period)}$	54	53	50

As the measured day-time background noise level is not above 40 dB(A), the base criterion of **45 dB(A), Leq(15 min)** will be adopted for this assessment. Satisfaction of this criterion ensures compliance with Clause C2.3(d) of the Maitland City Council DCP 2018.

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 is equal to the recommended amenity limit for a suburban area minus 5 dB plus 3 dB, as per Table E1.1 of the NPI.

Table 3 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 40 dB(A),L90.

TABLE 3
BASE NOISE LEVEL OBJECTIVES

Period	Intrusiveness trigger level* L_{eq} (15 min) dB(A)	Amenity trigger level** L_{eq} (15 min) dB(A)
Day	45	53
Night	42	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.
** Urban zone Table 2.2 of NPI.

The project specific noise trigger level is therefore,

Day	**45 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 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
Hospitals - 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 measured day-time noise level of 54 dB(A),Leq(period) primarily from traffic on Raymond Terrace Road indicates compliance with the traffic noise exposure criterion.

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 2 years old (including babies) 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 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 younger children (including babies) are quieter than the older children, whose noise level agrees with levels given 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 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 assessment of the proposed outdoor play areas considers two groups of 15 children aged 0-2 years, and four groups of 15 children aged 2-5 years to be in the proposed outdoor play areas. Clusters of 15 children aged 0-2 years, and 2-5 years are shown as S1, S2, S3, S4, S5, and S6 respectively, in **Figure 2**.

This assessment method allows for worst case scenario assessment of noise impacts at the residential receivers, assuming no more than 90 children are engaged in outdoor play at one time, accounting for absenteeism, children participating in indoor activities, and children not actively playing.

Figure 2. Proposed ground floor layout, noise sources, and nearest receivers.

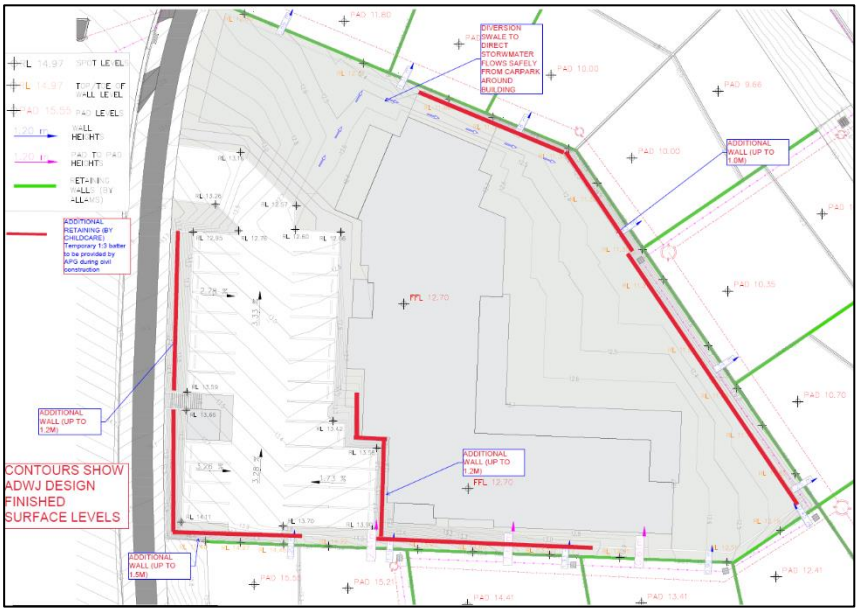


Figure 3. Proposed ground floor layout, noise sources, and nearest receivers.

The noise sources were propagated to the receiver points, taking into account loss for distance and barrier effects of play area boundary fences, as well as source-to-receiver elevation differences, as indicated in Figures 2 and 3.

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 to **8** shows the predicted noise level at the residential receivers, respectively, from the proposed Outdoor 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	78	51	59	67	72	74	69	62	51
S2 Source Lw	78	51	59	67	72	74	69	62	51
S1 Distance loss (10m)	-28	-28	-28	-28	-28	-28	-28	-28	-28
S2 Distance loss (13m)	-30	-30	-30	-30	-30	-30	-30	-30	-30
S1 Barrier Loss (1.5m)#		-5	-6	-6	-7	-9	-12	-14	-17
S2 Barrier Loss (1.5m)#		-5	-6	-7	-8	-10	-12	-15	-18
S1 SPL at receiver R1	41	18	25	33	36	37	29	20	6
S2 SPL at receiver R1	38	15	23	30	34	34	27	17	3
TOTAL at R1	**43**	**20**	**27**	**35**	**38**	**39**	**31**	**22**	**8**
Criterion (no time limit*)	**45**								
Criterion (2 hour / day)	**50**								

* From 7am-6pm.

Considering source elevation difference

The predicted levels in Table 5 did not exceed the "background + 5 dB" criteria so children's activities in the outdoor play area would not need to be restricted to a maximum of 2 hours per day.

TABLE 6
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	88	61	69	77	82	84	79	72	61
S4 Source Lw	88	61	69	77	82	84	79	72	61
S5 Source Lw	88	61	69	77	82	84	79	72	61
S6 Source Lw	88	61	69	77	82	84	79	72	61
S3 Distance loss (24m)	-36	-36	-36	-36	-36	-36	-36	-36	-36
S4 Distance loss (25m)	-36	-36	-36	-36	-36	-36	-36	-36	-36
S5 Distance loss (15m)	-32	-32	-32	-32	-32	-32	-32	-32	-32
S6 Distance loss (22m)	-35	-35	-35	-35	-35	-35	-35	-35	-35
S3 Barrier Loss (1.8m#)		-7	-9	-11	-14	-17	-20	-23	-24
S4 Barrier Loss (1.8m#)		-7	-9	-11	-14	-16	-19	-22	-24
S5 Barrier Loss (1.8m#)		-1	-8	-11	-13	-16	-19	-22	-24
S6 Barrier Loss (1.8m#)		-7	-9	-11	-14	-16	-19	-2	-24
S3 SPL at receiver R2	37	18	25	30	33	32	24	14	1
S4 SPL at receiver R2	37	18	24	30	32	32	24	14	1
S5 SPL at receiver R2	42	22	29	35	37	36	28	18	5
S6 SPL at receiver R2	38	19	25	31	34	33	25	15	2
TOTAL at R2	**45**	**26**	**32**	**38**	**40**	**40**	**32**	**22**	**9**
Criterion (no time limit*)	**45**								
Criterion (2 hour / day)	**50**								

* From 7am-6pm.

Considering source elevation difference

The predicted levels in Table 6 did not exceed the “background + 5 dB” criteria so children’s activities in the outdoor play area would not need to be restricted to a maximum of 2 hours per day.

TABLE 7
RECEIVED NOISE LEVEL AT R3

		Octave Band Centre Frequency, Hz							
Propagation Elements	**dB(A)**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
S5 Source Lw	88	61	69	77	82	84	79	72	61
S6 Source Lw	88	61	69	77	82	84	79	72	61
S5 Distance loss (30m)	-38	-38	-38	-38	-38	-38	-38	-38	-38
S6 Distance loss (14m)	-31	-31	-31	-31	-31	-31	-31	-31	-31
S5 Barrier Loss (2.0m)#		-6	-7	-9	-11	-14	-17	-20	-24
S6 Barrier Loss (2.0m)#		-7	-8	-11	-13	-16	-19	-22	-24
S5 SPL at receiver R3	37	17	24	30	33	32	24	14	0
S6 SPL at receiver R3	42	23	30	36	38	37	29	19	6
TOTAL at R3	**43**	**24**	**31**	**37**	**39**	**38**	**30**	**20**	**7**
Criterion (no time limit*)	**45**								
Criterion (2 hour / day)	**50**								

* From 7am-6pm.
# Considering source elevation difference

The predicted levels in Table 7 did not exceed the “background + 5 dB” criteria so children’s activities in the outdoor play area would not need to be restricted to a maximum of 2 hours per day.

The above calculations in Tables 5 to 7 consider boundary fences and retaining walls as indicated in Figures 2 and 3.

For this purpose, the fences should be constructed of a fully impervious material of a minimum 12 kg/m^2 density.

4.2 Internal Play Areas

The internal layout of the ground and first floors of the building are shown in **Figure 2**, with noise sources given as S7, and S8.

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 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 areas.

Clusters of children aged 2-5 years are shown as S7 and S8, in Figure 2. Only ‘Activity 6’ will be quantitatively assessed as all other internal play rooms have a lesser capacity, are a further distance from potential residential receivers, and have internal structures such as rooms and corridors or hallways in between them and potential residential receivers.

Two clusters of 15 children will be assessed from 'Activity 6', exceeding the capacity of the room by 3 children, as a conservative 'worst-case' assessment scenario and compliance with the applicable noise criterion here ensures compliance of all other internal play rooms without the requirement of full quantitative assessment.

Table 8 shows the predicted noise levels at the worst affected point of the nearest residence R4, to the internal play area 'Activity 6'.

TABLE 8
RECEIVED NOISE LEVEL AT R4

		Octave Band Centre Frequency, Hz							
Propagation Elements	**dB(A)**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
S7 Source Lw	78	51	59	67	72	74	69	62	51
S7 Sound pressure level @ internal surface of northern façade wall	-10	-10	-10	-10	-10	-10	-10	-10	-10
S7 SPL loss through open window	-10	-10	-10	-10	-10	-10	-10	-10	-10
S7 Distance Loss (5m)	-22	-22	-22	-22	-22	-22	-22	-22	-22
S7 SPL at R4	**36**	**7**	**15**	**23**	**28**	**30**	**25**	**18**	**7**
S8 Source Lw	78	51	59	67	72	74	69	62	51
S8 Sound pressure level @ internal surface of northern façade wall	-10	-10	-10	-10	-10	-10	-10	-10	-10
S8 SPL loss through open window	-10	-10	-10	-10	-10	-10	-10	-10	-10
S8 Distance Loss (5m)	-22	-22	-22	-22	-22	-22	-22	-22	-22
S8 SPL at R4	**36**	**7**	**15**	**23**	**28**	**30**	**25**	**18**	**7**
Total SPL at R4	**39**	**10**	**18**	**26**	**31**	**33**	**28**	**21**	**10**
Criterion	**45**								

The predicted levels in Table 8 for internal activities will comply with the noise criterion.

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. 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 area is shown in **Figure 2** with entry off Ballymore Drive. The nearest future residence to the carpark is the adjoining receiver R5 approximately 20m from the centre point 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 a 1 dB reduction due to the increased distance, and a conservative 5 dB(A) barrier loss from a minimum 1.5m retaining wall adjoining R5, as depicted in Figure 3, this equates to 34 dB(A),Leq(15min) at a distance of 20m which is below the most stringent night time criterion of **38 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),Lmax, the minimum 1.5m retaining wall, as depicted in Figure 3, is required.

4.5 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.

5.0 CONCLUSION

An acoustical assessment of theoretical noise emissions has been carried out for a proposed Child Care Facility at Lot 205 Ballymore Drive, within Stage 4A of the Sofia Waters subdivision development at 581 Raymond Terrace Road, Chisholm.

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

Calculation results showed that the proposed boundary fences, acting as noise barriers, would be sufficient for proposed outdoor play areas and mechanical plant to achieve the noise criteria at nearby receivers.

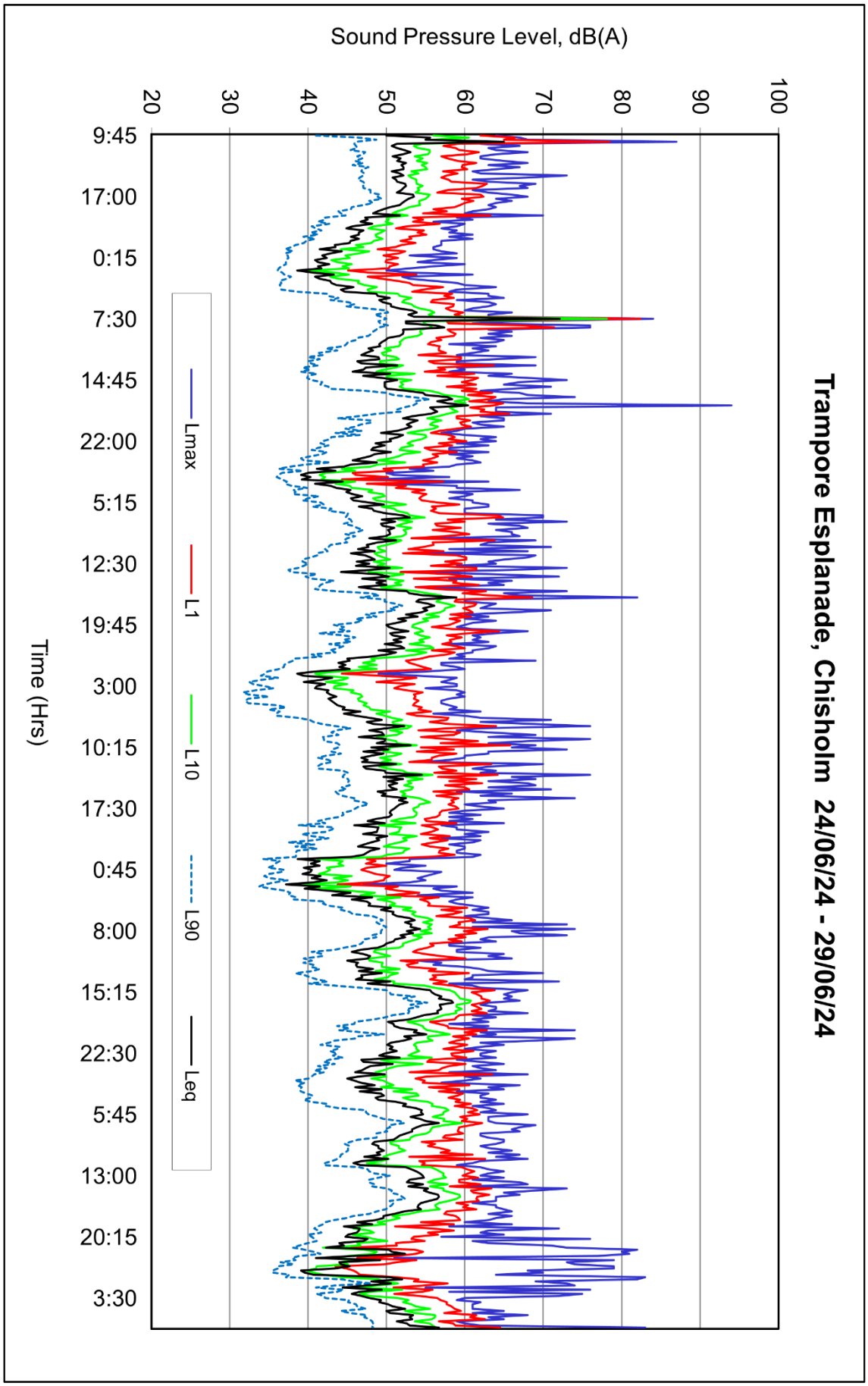
For this purpose, the recommended fences should be constructed of a fully impervious material of a minimum 12 kg/m^2 density.

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.

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

APPENDIX I
NOISE LOGGER DATA CHART


Sound Pressure Level, dB(A)
20
30
40
50
60
70
80
90
100
Time (Hrs)
9:45
17:00
0:15
7:30
14:45
22:00
5:15
12:30
19:45
3:00
10:15
17:30
0:45
8:00
15:15
22:30
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13:00
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Lmax
L1
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L90
Leq
Trampore Esplanade, Chisholm 24/06/24 - 29/06/24