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WESTERN SYDNEY UNIVERSITY, MILPERRA

Acoustic Assessment for Alterations and Additions to Childcare Centre

11 December 2024

Mirvac

TN579-01F02 Acoustic Assessment for DA for Child Care Centre (r1)

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1 Introduction

Renzo Tonin & Associates was engaged to undertake an acoustic assessment for a proposed Child Care Centre (CCC) at within the WSU Campus development (Building 28) at Bullecourt Ave, Milperra.

This assessment addresses operational noise emissions from the proposed café and child care centre:

- Relevant noise emission requirements are identified.
- Noise associated from the use of the child care centre is predicted.
- Where necessary, management controls to ensure ongoing compliance with noise emission requirements will be identified.

As part of this study, in order to determine acceptable noise emission limits, we have used results of long term noise logging conducted at the site (as part of the original development application for the sub-division. This was supplemented by recent measurements on site to ensure that the original noise survey remains accurate.

This report is based on drawings by Envision Building Design Studio.

2 Project Description and Existing Development Approval for the Site.

The site is located within Building 28 of the WSU Milperra campus, in the northeastern corner of the property.

It is proposed to refurbish the existing childcare centre (population increase from 67 to 95 children) and to construct a 31 space car park.

The site is bounded as follows:

- To the north by open area within the campus. Further north is Bullecourt Avenue and industrial development.
- To the east by Horsley Road by open area/vegetation within the subdivision. Further east is industrial development.
- To the south by future residential development within the campus sub-division. Further south is Mount Saint Joseph Collage Milperra.
- To the west is an internal roadway and then future residential development within the campus subdivision.

The site is located more than 120m from any roadway, and is not affected by external noise to any significant extent.

An aerial view of the site is shown in Figure 2-1 below, showing:

- The site and adjoining land.
- The position of measurements locations from the ambient noise survey (used in setting noise emission limits for the site).

The location of nearby noise sensitive development is shown in Figure 2-2.

Figure 2-1: Subject site

The position of future residences within the sub-division is shown below.

Figure 2-2: Milperra WSU Masterplan

3 Existing Noise Environment

Renzo Tonin has previously undertaken an acoustic assessment at Planning Proposal Stage for the overall site (*Milperra WSU Planning Proposal – Acoustic Assessment* Rev 6, Ref TL127-01F04). As part of that assessment, Renzo Tonin & Associates had conducted a long-term unattended noise survey at the site to examine the background noise environment. Relevant information from that study is presented below.

To supplement the noise survey conducted as part of the original development application a further site attendance was conducted in May 2024 to ensure the data from the noise survey remains accurate.

3.1 Noise measurement location

The long-term measurement locations are outlined in Table 3-1 and shown in Figure 2-1.

Table 3-1: Noise monitoring locations

ID	Location	Description
Long-term noise monitoring (27.11.2019-13.13.2019).		
L1	WSU Entrance - Bullecourt Avenue	The noise monitor was located on the northern boundary of the Masterplan and approximately 9m to the south of Bullecourt Avenue. The noise environment was dominated by road traffic and industrial premises from the Bullecourt Avenue to the north.
L2	Mount St Joseph School Sports Field	The noise monitor was located on the north boundary of the existing school adjacent to the Masterplan. It was located approximately 11m to the north of the school's sports field. The noise environment was dominated by school activities and distant road traffic from the Horsley Road to the east.

3.2 Results and discussion

Results from long-term noise monitoring are presented in Table 3-2 below.

Table 3-2: Long-term noise monitoring results

Monitoring location	L_{A90} background noise levels			L_{Aeq} ambient noise levels	
	Day[1]	Evening[1]	Night[1]	Day[2]	Night[2]
L1 - WSU Entrance - Bullecourt Avenue	53	47	39	70	65
L2 - Mount St Joseph School Sports Field	43	44	39	57	50

Notes:
1. Day: 07:00-18:00, Evening: 18:00-22:00, Night: 22:00-07:00
2. Day: 7:00am to 10:00pm; Night: 10:00pm to 7:00am

The logging results at Location 2 will be reflective of the ambient environment at the future residences within the subdivision, and will be used when setting noise emission limits for the café/Child Care Centre.

These noise levels were verified by supplementary attended measurement on 8/5/2024 between 9am and 11am using XL2 noise meter (measurement location as per Figure 5-1). Measured noise level on 8/5/2024 was 47dB(A)L_{90} (slightly higher than the long term, historical data. Using the long term noise logging data is therefore slightly conservative).

4 Childcare Centre Acoustic Criteria

4.1 Outdoor Areas of the Child Care Centre - Bankstown Council DCP

Chapter 10.1 of Council's '*Canterbury-Bankstown Development Control Plan 2023*' (Council DCP) applies to childcare centre type developments. Section 5 of this chapter of the DCP outlines the following relevant development controls related to acoustic privacy:

Acoustic privacy

5.1 Air conditioning, mechanical ventilation or any other continuous noise source must not exceed the ambient level at any specified boundary by more than 5dB(A).

5.2 The location and design of child care facilities must consider the projection of noise from various activities to avoid any adverse impacts on the residential amenity of adjoining land. For the purpose of this clause, Council requires development applications to submit an Acoustic Report prepared by a suitably qualified acoustic consultant to determine:

(a) existing noise levels at the identified sensitive receiver locations;

(b) likely noise levels to emanate from the child care facility at the identified sensitive receiver locations;

(c) whether the development must apply measures to ensure the noise of children playing in outdoor areas does not exceed 10dB(A) above the background noise level;

(d) whether the location and setbacks of the development are sufficient to protect the acoustic privacy of adjacent dwellings;

(e) whether the location of outdoor areas should avoid living areas and bedrooms of adjacent dwellings; and

(f) whether the development must install certain noise attenuation measures to protect the acoustic privacy of adjacent dwellings.

The Acoustic Report must measure the noise readings over a 15 minute period and must provide details of all modelling assumptions including source noise data, noise monitoring positions, receiver heights and locations, prevailing meteorological conditions during the monitoring, confirmation of the methodology adopted along with a copy of the model input and output data.

5.3 The maximum height for noise attenuation walls and fences along the boundary of the site is 2m.

Canterbury-Bankstown Council DCP 2023 Chapter 10.1 Section 5.2 (c) states that noise emissions from children playing outside must not exceed 10dB(A) above the background noise level.

4.2 Indoor Areas of the Child Care Centre/Plant and Equipment Noise - Association of Australasian Acoustical Consultants (AAAC)

The Council DCP does not detail any provisions for other operational noise sources typically associated with childcare centre facilities, i.e. indoor playrooms and drop off and pick up. The AAAC Guideline is referenced for guidance

Using this criterion, the applicable noise limit for each receiver location is presented in the Table 4-1 below.

Section 3.2.2 of the AAAC Guideline nominates a cumulative assessment for operational noise impacts associated childcare centre facilities for all noise sources with the exception of activity noise from external play areas. Cumulative noise emissions ($L_{eq,15minutes}$) are recommended to not exceed the background noise level by more than 5 dB at the most affected point on or within any residential property boundary.

4.3 Summary Noise Emission Goals

The noise emission goals for outdoor play areas are as follows:

Table 4-1: Noise Criteria for Outdoor Play Areas.

Receiver Location	Noise Emission Goal
Future Residential Receivers	43BG+10 = 53dB(A)$L_{eq(15min)}$

The noise emission goals for indoor areas/plant and equipment are as follows:

Table 4-2: Noise Criteria for Indoor Play Areas, Mechanical Plant and Equipment.

Receiver Location	Noise Emission Goal
Future Residential Receivers	43BG+5 = 48dB(A)$L_{eq(15min)}$

5 Noise Emission Assessment

5.1 Assumptions Relied on for Noise Emission Predictions

The critical noise receivers are the top floor windows of the residences to the west (which would overlook any boundary fencing to the outdoor play area).

Noise emissions are predicted based on the following assumptions:

- Assumed that all children are outside at once
- Noise source height for the children is generally assumed to be 1m above ground level, which is consistent with AAAC guidelines.
- The sound power for children playing outside is as per AAAC guidelines, as detailed below. For conservatism, all children outside will be assumed to be 3-5 years (the loudest group).

Table 5-1: AAAC Sound Power Levels ($L_{Aeq, 15min}$) for Groups of 10 Children Playing

Number and Age of Children	Sound Power Level (dB re. 1pW)								
	Overall	Octave Band Centre Frequencies (Hz)							
	dB(A)	63	125	250	500	1k	2k	4k	8k
10 children ages 0 to 2 years	**78**	54	60	66	72	74	71	67	64
10 children aged 2 to 3 years	**85**	61	67	73	79	81	78	74	70
10 children aged 3 to 6 years	**87***	64	70	75	81	83	80	76	72

Note: This becomes 94dB(A) when considering a group of 50.

- For internal areas:
    - It is assumed that the sound pressure level within the space is 85dB(A)L_{eq}, (typical of a noisy indoor playroom) and
    - The windows/doors are left open (5% of floor area of the room, to enable natural ventilation of the space – approx. 10m^2 open area).
- For vehicle noise:
    - It is assumed that the sound pressure level of a car driving within a car park is within the space is 80dB(A)L_{eq}, (typical for a car driving at 5-10km/h) and
    - There are 77 vehicle movements in a one hour period (equivalent to the car park filling and emptying over a one hour period), as per traffic consultant advice from TTPP.

- In all cases, it is assumed that the acoustic treatments/management controls set out in Section 5.3 are adopted.

5.2 Noise Emission Predictions / Assessment

Noise emissions are predicted and assessed against relevant criteria below.

In each case, the predictions are made to the level 1 windows of the future residences within the sub-division. A level 1 window has the least benefit of noise screening provided by boundary fencing or for the Child Care Centre building itself, and so prediction to Level 1 windows represents a worst case scenario.

Predicted noise emissions are as follows:

Table 5-2: Predicted Noise Emissions from children playing outdoors to Receivers, dB(A)

Receiver Location / Noise Source	Predicted Noise Emission	Allowable Noise Level	Complies?
Noise to Future Residences (**West** of site):			
-Noise from Outdoor Areas:	53dB(A)$L_{eq(15min)}$	53dB(A)$L_{eq(15min)}$	**Yes**
-Noise from Indoor Areas:	47dB(A)$L_{eq(15min)}$	48dB(A)$L_{eq(15min)}$	**Yes**
-Noise from Car Park	32dB(A)$L_{eq(15min)}$	48dB(A)$L_{eq(15min)}$	**Yes**
Noise to Future Residences (**South** of site):			
-Noise from Outdoor Areas:	50dB(A)$L_{eq(15min)}$	53dB(A)$L_{eq(15min)}$	**Yes**
-Noise from Indoor Areas:	<40dB(A)$L_{eq(15min)}$	48dB(A)$L_{eq(15min)}$	**Yes**
-Noise from Car Park	35dB(A)$L_{eq(15min)}$	48dB(A)$L_{eq(15min)}$	**Yes**

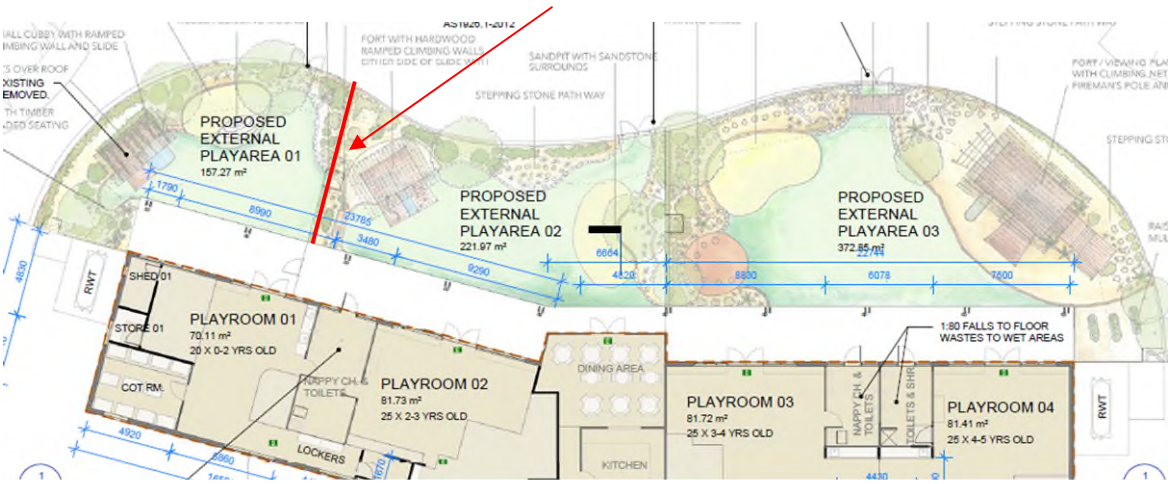
Noise emissions are predicted to comply provided the recommendations in Section 6 are adopted.

6 Recommendations

In order to ensure ongoing compliance with noise emission goals, the following is required:

- 2.1m high solid noise screen between External Play Area 1 and 2. Screen can b lapped and capped timber, masonry, Perspex or other material of equal or higher surface density.

2.1m high noise screen.



- Outdoor areas used between 7pm and 6pm.
- Children who are loudly crying outdoors should be comforted by staff and if the child continues to cry loudly then they should be taken inside.
- No music should be played in any outdoor areas at any time.
- In the event that a musical activity is to be conducted within the internal area, the doors to the internal areas are to be kept closed.
- Detailed acoustic review at CC stage of any mechanical plant (air-conditioning, kitchen exhaust fans) to be undertaken to ensure that plant noise emissions comply with the criteria set out in Section 5.1.3.

7 Conclusion

Renzo Tonin & Associates has completed an acoustic assessment of the proposed Childcare Centre at the WSU Milperra sub-division development.

This assessment has considered the operational noise impacts to nearby noise sensitive development (in this case – future residents within the campus subdivision).

Provided that the recommendations set out within Sections 6 of this report are adopted, the site is capable of complying with relevant Council DCP/AAAC noise emission requirements.

Please contact us if you have any queries.

APPENDIX A Glossary of terminology

The following is a brief description of the technical terms used to describe noise to assist in understanding the technical issues presented.

Adverse weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).
Ambient noise	The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far.
Assessment period	The period in a day over which assessments are made.
Assessment Point	A point at which noise measurements are taken or estimated. A point at which noise measurements are taken or estimated.
Background noise	Background noise is the term used to describe the underlying level of noise present in the ambient noise, measured in the absence of the noise under investigation, when extraneous noise is removed. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the L90 noise level (see below).
Decibel [dB]	The units that sound is measured in. The following are examples of the decibel readings of common sounds in our daytime environment:

threshold of hearing	0 dB	The faintest sound we can hear
	10 dB	Human breathing
almost silent	20 dB	
	30 dB	Quiet bedroom or in a quiet national park location
generally quiet	40 dB	Library
	50 dB	Typical office space or ambience in the city at night
moderately loud	60 dB	CBD mall at lunch time
	70 dB	The sound of a car passing on the street
loud	80 dB	Loud music played at home
	90 dB	The sound of a truck passing on the street
very loud	100 dB	Indoor rock band concert
	110 dB	Operating a chainsaw or jackhammer
extremely loud	120 dB	Jet plane take-off at 100m away
threshold of pain	130 dB	
	140 dB	Military jet take-off at 25m away

dB(A)	A-weighted decibels. The A- weighting noise filter simulates the response of the human ear at relatively low levels, where the ear is not as effective in hearing low frequency sounds as it is in hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter.
dB(C)	C-weighted decibels. The C-weighting noise filter simulates the response of the human ear at relatively high levels, where the human ear is nearly equally effective at hearing from mid-low frequency (63Hz) to mid-high frequency (4kHz), but is less effective outside these frequencies.

Frequency	Frequency is synonymous to pitch. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.
Impulsive noise	Having a high peak of short duration or a sequence of such peaks. A sequence of impulses in rapid succession is termed repetitive impulsive noise.
Intermittent noise	The level suddenly drops to that of the background noise several times during the period of observation. The time during which the noise remains at levels different from that of the ambient is one second or more.
L_{Max}	The maximum sound pressure level measured over a given period.
L_{Min}	The minimum sound pressure level measured over a given period.
L_1	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L_{10}	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L_{90}	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L90 noise level expressed in units of dB(A).
L_{eq}	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time.
Reflection	Sound wave changed in direction of propagation due to a solid object obscuring its path.
SEL	Sound Exposure Level (SEL) is the constant sound level which, if maintained for a period of 1 second would have the same acoustic energy as the measured noise event. SEL noise measurements are useful as they can be converted to obtain Leq sound levels over any period of time and can be used for predicting noise at various locations.
Sound	A fluctuation of air pressure which is propagated as a wave through air.
Sound absorption	The ability of a material to absorb sound energy through its conversion into thermal energy.
Sound level meter	An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels.
Sound pressure level	The level of noise, usually expressed in decibels, as measured by a standard sound level meter with a microphone.
Sound power level	Ten times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power.
Tonal noise	Containing a prominent frequency and characterised by a definite pitch.