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Childcare DA Acoustic Assessment

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1 INTRODUCTION

This report presents our environmental noise impact assessment for the proposed Child Care Centre at 160 Excelsior Avenue, Castle Hill. The proposed childcare centre will care for up to 44 children in total and is associated with the adjacent existing Centre at 162 Excelsior Avenue. Assessment of the impact on amenity of nearby residents is required to comply with the requirements of The Hills Shire Council DCP.

In this report we will:

- Identify potential noise sources generated by the site, and determine noise emission goals for the development to meet Council acoustic requirements to ensure that nearby developments are not adversely impacted.

This assessment has been undertaken architectural drawings provided by architect Noura Yammine.

2 PROPOSED DEVELOPMENT

The proposal is to convert the existing residential dwelling into a childcare centre with two outdoor play areas and an additional 13 car parking spaces. The centre will care children with details below:

- 0-2 Years Old: total 12 kids.
- 2-3 Years Old: total 12 kids.
- 3-5 Years Old: total 20 kids.

It is proposed that the childcare centre will operate from 7am to 6pm from Monday to Friday. Staff may normally arrive no earlier than 6:30am and depart no later than 7pm.
The nearest noise receivers are as below:

- Noise receiver 1 – Single Storey residential receiver at 158 Excelsior Avenue.
- Noise receiver 2 – Two storey residential dwelling at 184 Old Northern Road adjacent to the south western boundary with openable windows on 1st floor with full view of the project site.
- Noise receiver 3 – Two storey residential dwelling at 28 Miretta Place.
- Noise receiver 4 – Residential receivers on the opposite side of Excelsior Avenue.

A detailed site map and noise receiver locations are presented in Figure 1 below.

Figure 2-1: Site Map and Noise Receiver Locations

3 NOISE DESCRIPTORS

In the case of environmental noise three principle measurement parameters are used, namely L_{10}, L_{90} and L_{eq}.

The L_{10} and L_{90} measurement parameters are statistical levels that represent the average maximum and average minimum noise levels respectively, over the measurement interval.

The L_{10} parameter is commonly used to measure noise produced by a particular intrusive noise source since it represents the average of the loudest noise levels produced by the source.

Conversely, the L_{90} level (which is commonly referred to as the background noise level) represents the noise level heard in the quieter periods during a measurement interval. The L_{90} parameter is used to set the allowable noise level for new, potentially intrusive noise sources since the disturbance caused by the new source will depend on how audible it is above the pre-existing noise environment, particularly during quiet periods, as represented by the L_{90} level.

The L_{eq} parameter represents the average noise energy during a measurement period. This parameter is derived by integrating the noise levels measured over the measurement period. L_{eq} is important in the assessment of traffic noise impact as it closely corresponds with human perception of a changing noise environment; such is the character of traffic noise.

4 MEASUREMENT OF EXISTING BACKGROUND NOISE LEVELS

4.1 BACKGROUND NOISE MONITORING

Unattended measurements were obtained within the backyard of the project site using a noise logger in order to determine the existing background noise levels. The results of this monitoring will be used as the basis of this assessment.

4.1.1 Measurement Location

Background noise measurements were taken by a monitor placed within the backyard of the project site with microphone located close to the south western boundary as marked in Figure 1. Background noise levels at this point will be indicative of the background levels that will be present at the nearby residential receivers.

4.1.2 Measurement Equipment

Equipment used consisted of an Acoustic Research Laboratories Pty Ltd noise logger. The logger was programmed to store 15-minute statistical noise levels throughout the monitoring period. The logger was calibrated at the beginning and the end of the measurement using a Rion NC-73 calibrator; no significant drift was detected. All measurements were taken on A-weighted fast response mode.

4.1.3 Monitoring Period

Unmanned noise monitoring was carried out from the 13th June 2014 to the 20th June 2014. The results of noise monitoring are included in Appendix 2.

4.1.4 Rated Background Noise Levels

The measured background noise level from the unattended monitoring is presented below. Periods of inclement weather has been excluded for the purpose of the noise assessment as required by the Industrial Noise Policy requirements. Minimum dB(A) L_{90} levels of everyday has been used to exclude any external noise interference. Appendix 1 provides the results of the unattended noise monitoring.

Table 1 – Rating Background Noise Levels

Location	Period/Time	Background Noise Level dB(A)L_{90}
Backyard of Project Site	Day (7am-6pm)	43
	Morning Shoulder Period (6:30am – 7am)	43

5 EXTERNAL NOISE EMISSION OBJECTIVES

Noise emissions goals for the site will be developed to ensure that the amenity of nearby land users is not adversely affected.

Criteria for the following noise sources will be calculated:

- Mechanical plant noise
- Noise from the car park
- Noise from the outdoor play-areas
- Noise from the indoor activities

The Hills Shire Council DCP Appendix E states the following noise emission criteria to which noise emissions generated by the site will be assessed.

Mechanical Noise

> *"The location of air conditioning systems or any other plant equipment shall not cause 'offensive noise'. The sound level output shall not exceed 5dB above the ambient background level at any common boundary and shall not exceed the amenity criteria as specified in the Industrial Noise Policy as published by the Environment Protection Authority (EPA)."*

Outdoor Play Areas and Carpark Areas

> *"The use of the premises including outdoor play areas and carparking areas shall not give rise to 'offensive noise' as defined under the provision of the Protection of the Environment Operation Act 1997. The sound level output shall not exceed 5dB above the ambient background level at the receiver boundary."*

5.1 NOISE EMISSION CRITERIA

The following noise criteria has been summarised based on the requirements of Council and measured background noise levels.

Table 2 – Noise Emission Criteria dB(A) L_{eq}

Noise Receiver	Time Period	Criteria dB(A) $L_{eq\ (15\ min)}$
Residential Boundaries	Day (7am to 6pm)	48

5.1.1 Sleeping Arousal Early Morning

Staff use of the carpark before 7am could result in the potential for sleep arousal to the nearest noise receivers. To minimise the potential for sleep arousal the $L_{1\ (1\ minute)}$ noise level of any specific noise source should not exceed the background noise level (L_{90}) by more than 15 dB(A) outside a resident's bedroom window between the hours of 10pm and 7am. The L_1 noise level is the level exceeded for 1 per cent of the time and approximates the typical maximum noise level from a particular source.

Table 3 –Noise Criteria for Sleeping Arousal

Noise Receiver	Time Period	Criteria dB(A) $_{L1,1min}$
Residential Boundaries	Day (6:30am to 7am)	58

6 EXTERNAL NOISE EMISSION ASSESSMENT

6.1 OUTDOOR PLAY AREA NOISE IMPACT ASSESSMENT

6.1.1 Noise source of Outdoor Play Area

This assessment has been based on noise levels for a typical childcare centre similar to the proposed childcare centre. Noise levels have previously been obtained by this office and are presented below.

6.1.2 Measurements of Similar Outdoor Play Noise

Noise levels of a typical outdoor play area of a similar child care centre have previously been obtained by this office. Details of the external noise measurements are presented below. Noise measurements were taken of a typical 3 to 6 year age group at play. This group represents the most active of the age groups and hence are likely to generate the maximum noise levels.

6.1.3 Measurement Location

Measurements were taken during the morning play session within the outdoor play area with 8 children present.

The measurements were taken at noted distances to the children playing with the measured levels presented below.

6.1.4 Measurement Equipment

Noise measurements were obtained using a CEL-593 Type 1 Sound Level Analyser, set to A-weighted fast response. The sound level meter was calibrated at the beginning and the end of the measurement using a Rion NC-73 calibrator; no significant drift was detected. All measurements were taken on A-weighted fast response mode.

6.1.5 Measured Noise Levels

The measured activity noise levels from the children playing are listed below in table 5.

Table 4 - Measured Children Activity Noise Levels dB(A) LAeq

Location	Activity	Distance	NOISE LEVEL
Outdoor Play Area	Bikes + Sandpit play	3m	64
	Blocks + Sandpit play	4m	62
	Stepping Blocks + Sandpit play	4m	55
	Play gym + Sand pit play	3-4m	63

6.1.6 Outdoor Play Noise Impact Prediction

Noise levels generated by children at play have been measured previously by this office. ALC have undertaken measurements at a number of childcare centres and the average sound power level across the population from a group of 10 children of ages 0-5 years was found to be 82dB(A).

For this assessment the play areas are assumed to be operating at maximum capacity, and that the children are distributed evenly across the outdoor play area.

The noise level at the nearest residents was predicted using the above data and by taking into account any expected noise reduction provided by the building fabric, distance losses, directivity, barrier effects, etc. The following table shows the predicted noise levels from the children.

Noise levels are based on 32 children in the ground floor play area of 160 Excelsior Ave and 12 babies 0-2 on the Level 1 play area.

Table 5 –Predicted Outdoor Play Noise Emissions

Noise Receiver Location	Predicted Noise Level dB(A) $L_{eq\ (15min)}$	Criteria dB(A) $L_{eq\ (15\ min)}$	Compliance
Receiver 1	48	48	Yes
Receiver 2 – Ground Floor	47	48	Yes
Receiver 2 – First Floor	48	48	Yes
Receiver 3 – Ground Floor	≤47	48	Yes
Receiver 3 – First Floor	48	48	Yes

6.2 INDOOR PLAY AREAS

For the indoor use it was assumed that windows and doors will remain closed apart from doors and windows being opened to allow for egress. The finish inside the child minding centre was assumed to be acoustically "hard" with an indoor noise level of 75 dB(A) L_{eq}. Predicted noise emissions from indoor use are significantly lower than that generated from outdoor use and therefore as noise from outdoor play are acceptable; noise emissions from indoor use will also be acceptable.

6.3 CARPARK NOISE

This section will present the assessment of the car park, located at the north western side of the project site.

The nearest potentially affected receiver is:

- Noise Receiver 1- single storey residential building at 158 Excelsior.

Compliance at this receiver would indicate compliance at all other sensitive receivers.

Noise emissions from vehicles using the carpark will be predicted at the boundary of the residential properties based on the following assumptions:

- Cars produce a sound power level of 84dB(A)$L_{eq.}$
- Assumed use of carpark in peak hour is that it may completely fill or completely empty in a one hour period.
- The cars are driving past at an approximate speed of 10km/h.
- Door slamming noise will be 92 dB(A)L_{Max} Sound Power Level.

The noise prediction has been carried out by this office. The predicted noise level to the nearest façade of noise receiver 1, the residential property to the west of the driveway, is presented below with details calculation attached in Appendix 3.

Table 6 - Predicted Car Park Noise Level at 12A Garthowen Cr

Receiver Location	Predicted Level – dB(A)$L_{eq(15min)}$	Noise Emission Criteria - dB(A)$L_{eq(Period)}$	Complies
Ground Floor of Noise Receiver 1-1m inside noise receiver site	46	48 dB(A) $L_{eq\ (15min)}$	Yes

6.3.1 Sleeping Arousal for Staff Carpark before 7am

Noise emission from door slamming to nearest residential receiver has been predicted below.

Table 7 –Predicted Car Door Slamming Noise Level

Receiver Location	Predicted Level – dB(A)$L_{1,\ 1min}$	Noise Emission Criteria - dB(A)$L_{1,1min}$	Complies
Eastern Façade of Noise Receiver 1 (habitable space only)	$\leq$ 56	58	Yes

6.4 MECHANICAL PLANT

No mechanical design or equipment selections are available at this stage. It is recommended to limit the plant noise emission maximum 43 dB(A) to any nearest noise receivers which is 5 dB(A) lower than the overall noise criteria.

Detailed plant noise emission assessment shall be carried out at CC stage.

7 RECOMMENDATIONS

To ensure compliance with the nominated assessment criteria the following management controls and acoustic treatment are recommended.

1. A maximum of 32 children are permitted to use the ground floor outdoor play area and a maximum 12 children are permitted to play on the level 1 outdoor play area of 160 Excelsior Avenue at any one time. It is noted that the outdoor play area is not to be used prior to 7am.
2. Glazing/doors shall be of minimum 4mm thick glass with acoustic seals around perimeter which provides STC 27.
3. The underside of the roof of the covered outdoor play area shall be lined with absorptive material with an NRC of not less than 0.5.
4. Management Control:
    a. Signs reminding staff and visitors to minimise noise at all times shall be installed at ingress/egress points from the child care centre
    b. All windows and doors shall remain closed except when people use doors to enter or exit the centre/outdoor play areas.
    c. Management is to ensure children are supervised at all times to minimise noise generated by the children whenever practical and possible.
    d. Install a contact phone number at the front of the centre so that any complaints regarding centre operation can be made
    e. It is recommended for the Centre to implement a complaint handling procedure. If a noise complaint is received the complaint should be recorded on a Complaint Form. The complaint form should list:
        - The name and address of the complainant (if provided).
        - The time and date the complaint was received.
        - The nature of the complaint and the time and date the noise was heard.
        - The name of the employee who received the complaint.
        - Actions taken to investigate the complaint, and a summary of the results of the investigation.
        - Indicate what was occurring at the time the noise was heard if possible.
        - Required remedial action, if required.
        - Validation of the remedial action.
        - Summary of feedback to the complainant.
    f. A permanent register of complaints should be held on the premises, which shall be reviewed monthly by staff to ensure all complaints are being responded to. All complaints received shall be reported to management with initial action/investigation commencing within 7 days. The complainant should also be notified of the results and actions arising from the investigation.

5. Acoustic Barrier System:

- The Level 1 play area is to have a solid balustrade to a height of 1.1m above the FRL. Balustrade may be constructed of 6mm fibre cement, min 6mm toughened glass, colourbond, lapped and capped timber or approved alternative.
- The ground floor play area shall be with a 1.8m high solid fence (constructed of lapped and capped timber, min 6mm fibre cement sheeting, Colourbond or approved alternative), with a canted shade canopy above – refer to figure below for canopy construction and markup in figure 3 for finished heights.

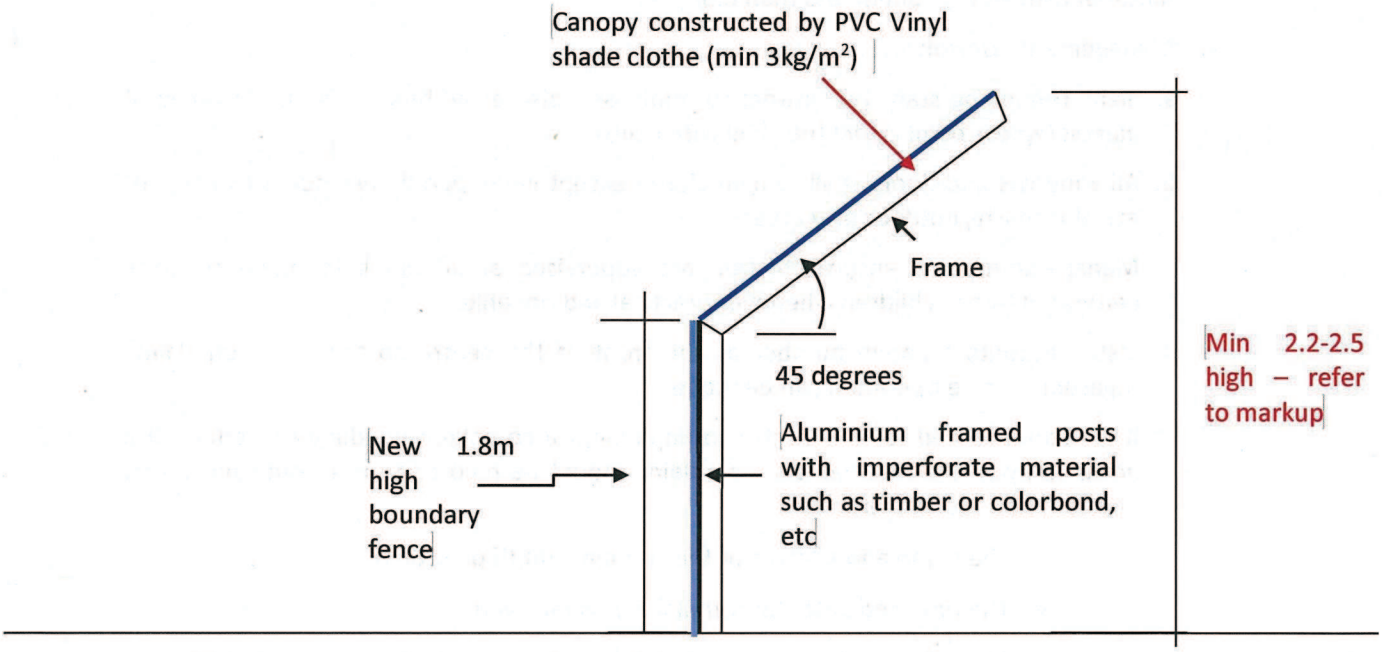

Figure 2 Shade Structure Details

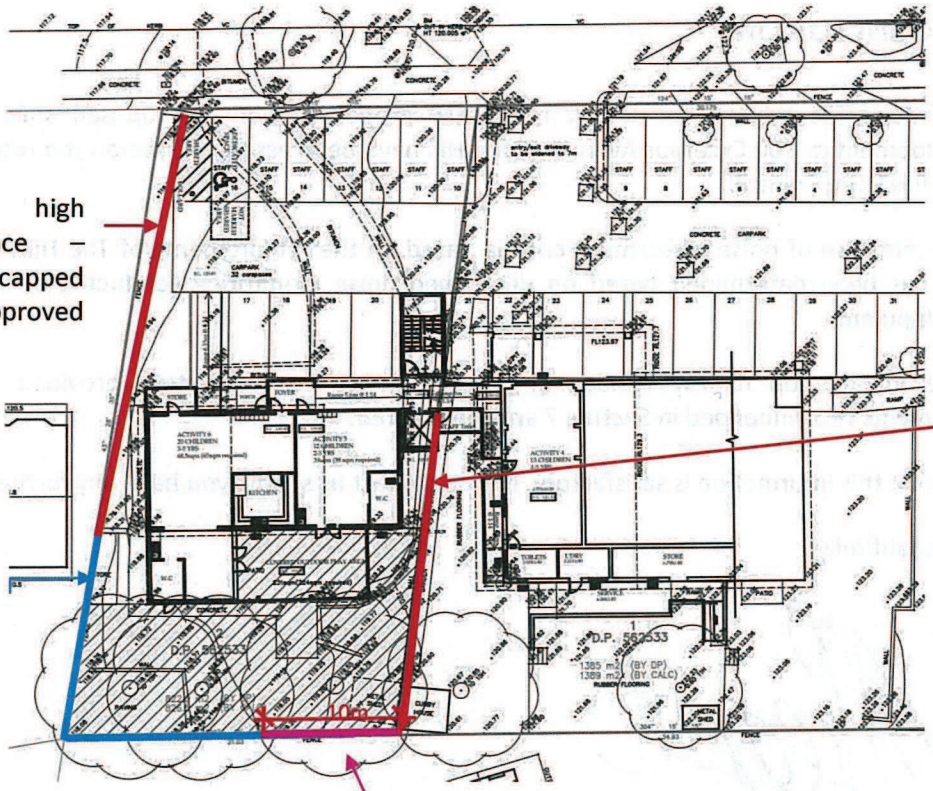

Figure 3 – Markup of boundary barrier heights.

8 CONCLUSION

Potential noise impacts on nearby residential properties from a proposed child care centre development at 160 Excelsior Avenue Castle Hill have been assessed base on the requirements of The Hills Shire Council.

Determination of noise assessment criteria based on the requirements of The Hills Shire Council DCP has been determined based on unmanned noise monitoring conducted at the proposed development.

Noise impacts on nearby residential properties will be satisfactory provided the acoustic treatments recommended in Section 7 are constructed.

We trust this information is satisfactory. Please contact us should you have any further queries.

Yours faithfully,

Acoustic Logic Consultancy Pty Ltd
Hilary Pearce