

ORANGE CHILDCARE CENTRE
36-40 TURNER CRESCENT, ORANGE
DEVELOPMENT APPLICATION ACOUSTIC ASSESSMENT

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AUSTRALIAN CHILDCARE SOLUTIONS PTY LTD
LEVEL 18, RIVERSIDE CENTRE
123 EAGLE STREET
BRISBANE QLD 4000

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A	Draft	21 February 2019	Remi Larmandieu	-
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GLOSSARY OF ACOUSTIC TERMS

Most environments are affected by environmental noise which continuously varies, largely as a result of road traffic. To describe the overall noise environment, a number of noise descriptors have been developed and these involve statistical and other analysis of the varying noise over sampling periods, typically taken as 15 minutes. These descriptors, which are demonstrated in the graph below, are here defined.

Maximum Noise Level (L_{Amax}) – The maximum noise level over a sample period is the maximum level, measured on fast response, during the sample period.

L_{A1} – The L_{A1} level is the noise level which is exceeded for 1% of the sample period. During the sample period, the noise level is below the L_{A1} level for 99% of the time.

L_{A10} – The L_{A10} level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the L_{A10} level for 90% of the time. The L_{A10} is a common noise descriptor for environmental noise and road traffic noise.

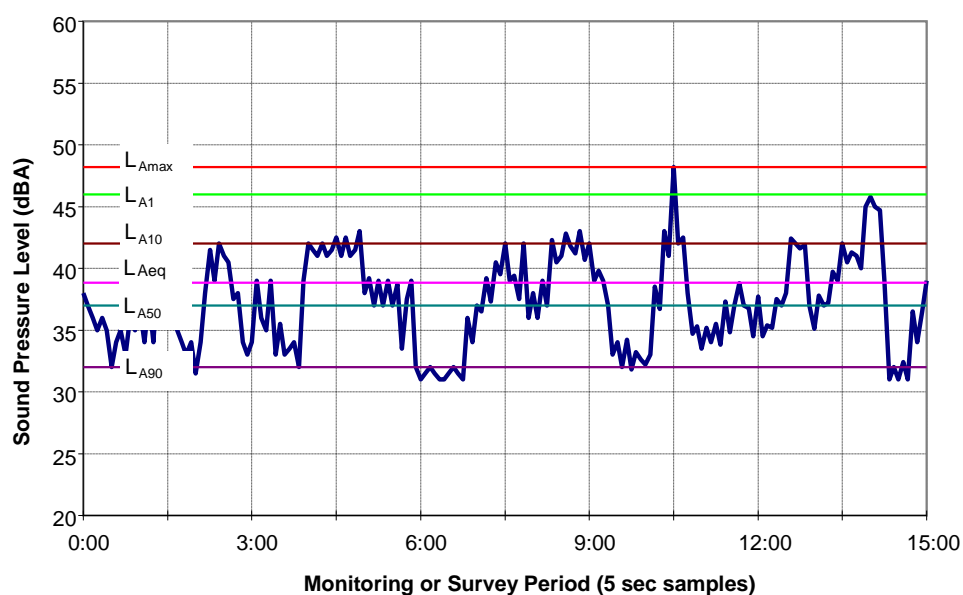
L_{A90} – The L_{A90} level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L_{A90} level for 10% of the time. This measure is commonly referred to as the background noise level.

L_{Aeq} – The equivalent continuous sound level (L_{Aeq}) is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This measure is also a common measure of environmental noise and road traffic noise.

ABL – The Assessment Background Level is the single figure background level representing each assessment period (daytime, evening and night time) for each day. It is determined by calculating the 10th percentile (lowest 10th percent) background level (L_{A90}) for each period.

RBL – The Rating Background Level for each period is the median value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period – daytime, evening and night time.

Typical Graph of Sound Pressure Level vs Time



1 INTRODUCTION

Wilkinson Murray Pty Limited has been commissioned by Australian Childcare Solutions Pty Ltd to undertake a noise impact assessment for the Development Application of a childcare centre proposed to be located at 36-40 Turner Crescent, Orange. The property is currently a vacant lot surrounded by residential properties and roadways.

This assessment has been prepared to support a Development Application to Orange Council.

This report presents the assessment of noise from external traffic noise, children playing outdoors, mechanical plant, and vehicle noise associated with the centre.

The Association of Australasian Acoustical Consultants (AAAC) *Guideline for Child Care Centre Acoustic Assessment*, and other appropriate NSW guidelines are used to assess noise issues. We note that Orange Council does not have specific noise criteria for childcare centres, however, its Development Control Plan (DCP) makes reference to the *EPA Industrial Noise Policy*, which has been replaced by the *Noise Policy for Industry* in 2017.

This assessment was based on the following architectural drawings provided by Australian Childcare Solutions.

Table 1-1 Architectural drawings used for the assessment

Drawing No.	Description	Issue Date
16004_DA1-000	COVER PAGE	5/06/2019
16004_DA1-001	SITE ANALYSIS	5/06/2019
16004_DA1-100	SITE PLAN	5/06/2019
16004_DA1-110	LOWER GROUND FLOOR	5/06/2019
16004_DA1-120	UPPER GROUND FLOOR	5/06/2019
16004_DA1-200	ELEVATIONS	5/06/2019
16004_DA1-210	ELEVATIONS	5/06/2019
16004_DA1-300	SECTIONS	5/06/2019
16004_DA1-400	PERSPECTIVES	5/06/2019
16004_DA1-401	PERSPECTIVES	5/06/2019
16004_DA1-402	MONTAGE 1	5/06/2019
16004_DA1-403	MONTAGE 2	5/06/2019
16004_DA1-500	EXTERNAL COLOUR PALETTE	5/06/2019

2 SITE DESCRIPTION

The childcare centre is located at 36-40 Turner Crescent, Orange. The site and surrounding area are presented in Figure 2-1.

The site is surrounded by residences to the south and to the west. Mitchell Highway and Northern Distributor are busy roads with medium to high traffic volumes respectively located to the east and to the north of the site.

Residential receivers adjacent the proposed site are one-storey residential dwellings. Both these residences have solid fences separating them from the site. These receivers are listed in Table 2-1.

Table 2-1 Closest noise sensitive receivers

Receiver No.	Address	Type	Existing solid fence height adjacent to proposed site
1	42 Turner Crescent	Single level residential	1.6m high
2	159 Molong Road	Single level residential	1.8m high

Figure 2-1 Location and surrounding area



The proposed layout is presented in Figure 2-2. There are 32 car parking spaces for staff and visitors to the west of the building. A single accessible space is also provided for pick up and drop off. The centre will operate from 7:00am-6:00pm, Monday to Friday.

The facility will accommodate up to 24 children between the ages of 0 and 2 years old, 30 children between the ages of 2 and 3 years old and 40 children between the ages of 3 and 5 years old.

The proposed new building consists of two levels, as shown in Figure 2-2.

Figure 2-2 Proposed floor plans



3 EXISTING AMBIENT NOISE LEVELS

3.1 Existing Noise Levels

Attended noise monitoring was conducted on Thursday 31 January 2019 between 7:00am and 11:30am. Because access was not possible at the neighbouring residential properties, long-term monitoring was not conducted.

The noise monitoring equipment used for this measurement consisted of two ARL environmental noise loggers at two different locations set to A-weighted, fast response, continuously monitoring and recording in 15-minute intervals. This equipment is capable of monitoring and storing noise level descriptors for later detailed analysis. The equipment calibration was checked before and after the survey and no significant drift was noted.

The loggers determine L_{A1} , L_{A10} , L_{A90} and L_{Aeq} levels of the ambient noise. L_{A1} , L_{A10} and L_{A90} are the levels exceeded for 1%, 10% and 90% of the sample time respectively (see Glossary of Acoustic Terms for definitions). The L_{A1} is indicative of maximum noise levels due to individual noise events. This is used for the assessment of sleep disturbance. The L_{A90} level is normally taken as the background noise level during the relevant period.

Additionally, attended measurements were conducted at several locations using a Brüel & Kjær Type 2250 sound level meter (SLM). This SLM is a type approved system, offering Class 1 performance according to IEC 61672-1:2013 *Electroacoustics – Sound level meters – Part 1: Specifications* and has current calibration with *National Association of Testing Authorities, Australia* requirements (NATA). It is calibrated in accordance with IEC 61672-3:2013 *Electroacoustics – Sound level meters – Part 3: Periodic tests*.

The A-weighting filter of the meter was selected, and the time weighting was set to “Fast”. The field calibration of the meter was checked before and after the measurements with a Brüel & Kjær Type 4231 sound level calibrator (SLC) and no significant drift was noted. This SLC is a Class 1 calibrator according to AS IEC 60942-2004 *Electroacoustics – Sound calibrators* and has been calibrated to the same Standard.

The Brüel & Kjær Type 2250 and Brüel & Kjær Type 4231 hold current laboratory calibrations in accordance with NATA and our in-house Quality Assurance Procedures.

Based on attended measurements conducted adjacent the most affected residential boundaries, ambient noise levels were determined and presented in Table 3-1. In order to adopt a conservative approach, these measurements were undertaken far away from the dominant source of ambient noise, which was the traffic on Mitchell Highway and Northern Distributor Road. See measurements locations in Figure 2-1.

Table 3-1 Attended measurements at residential receivers’ boundaries

Period	Location ⁽¹⁾	RBL	$L_{Aeq,period}$
Day 7:00am-6:00pm	42 Turner Crescent (adjacent to south-western boundary)	46	50
	159 Molong Road (adjacent to the shed on the west of the property)	47	53

Additionally, the two noise monitors were installed at the site at the location of the two proposed outdoor play areas in order to determine ambient noise levels during the morning traffic peak hours. The results are presented in Table 3-2.

Table 3-2 Noise monitoring at proposed outdoor play area locations

Time Periods	Location	
	Outdoor Play Area 1	Outdoor Play Area 2
7:00am – 7:15am	58dBA L _{eq} 50dBA L ₉₀	- (1)
7:15am – 7:30am	58dBA L _{eq} 52dBA L ₉₀	- (1)
7:30am-7:45am	- (1) 49dBA L ₉₀	- (1)
7:45am-8:00am	57dBA L _{eq} 51dBA L ₉₀	56dBA L _{eq} 53dBA L ₉₀
8:00am-8:15am	59dBA L _{eq} 52dBA L ₉₀	58dBA L _{eq} 52dBA L ₉₀
8:15am-8:30am	58dBA L _{eq} 52dBA L ₉₀	57dBA L _{eq} 53dBA L ₉₀
8:30am-8:45am	59dBA L _{eq} 53dBA L ₉₀	58dBA L _{eq} 54dBA L ₉₀
8:45am-9:00am	59dBA L _{eq} 53dBA L ₉₀	58dBA L _{eq} 54dBA L ₉₀
9:00am-9:15am	60dBA L _{eq} 53dBA L ₉₀	58dBA L _{eq} 53dBA L ₉₀
9:15am-9:30am	57dBA L _{eq} 50dBA L ₉₀	56dBA L _{eq} 51dBA L ₉₀
9:30am-9:45am	56dBA L _{eq} 50dBA L ₉₀	57dBA L _{eq} 51dBA L ₉₀
9:45am-10:00am	57dBA L _{eq} 50dBA L ₉₀	56dBA L _{eq} 51dBA L ₉₀
10:00am-10:15am	56dBA L _{eq} 50dBA L ₉₀	56dBA L _{eq} 51dBA L ₉₀
10:15am-10:30am	57dBA L _{eq} 49dBA L ₉₀	58dBA L _{eq} 50dBA L ₉₀
10:30am-10:45am	56dBA L _{eq} 50dBA L ₉₀	55dBA L _{eq} 50dBA L ₉₀
10:45am-11:00am	57dBA L _{eq} 50dBA L ₉₀	57dBA L _{eq} 51dBA L ₉₀
11:00am-11:15am	55dBA L _{eq} 49dBA L ₉₀	56dBA L _{eq} 50dBA L ₉₀
11:15am-11:30am	- (1)	56dBA L _{eq} 48dBA L ₉₀

Note (1): No data available.

4 EXTERNAL TRAFFIC NOISE INTRUSION

With regards to noise intrusion (road, rail traffic and industry) into the proposed childcare centre, the AAAC Guidelines state the following:

- *"The noise level $L_{Aeq, 1 \text{ hour}}$ from road, rail traffic or industry at any location within the outdoor play or activity area during the hours when the Centre is operating shall not exceed 55 dB(A).*
- *The noise level $L_{Aeq, 1 \text{ hour}}$, from road, rail traffic or industry at any location within the indoor play or sleeping areas of the Centre during the hours when the centre is operating shall not exceed 40 dB(A).*

Based on our monitoring detailed in Table 3-2, noise from external traffic noise would require to be mitigated to achieve the above external and internal noise levels.

The following treatments will ensure that compliance with the above noise levels is achieved:

Indoor play areas

- Standard glazing (4mm float) is recommended for indoor play areas; and
- Mechanical ventilation is provided.

Outdoor play areas

A minimum 1.8m high fence along the outdoor play areas is built around the perimeter of outdoor play areas 1 and 2; See Figure 6-1 for the proposed fence locations.

With the above acoustic treatments, both internal and external noise levels will be complied with as per the AAAC Guidelines.

5 OPERATIONAL NOISE EMISSION CRITERIA

The following operational noise should be considered for the childcare centre:

- Vehicle noise from vehicles, entering the site, parking and leaving the site;
- Noise produced by children in indoor and outdoor play areas (noting indoor noise can be controlled by closing windows); and
- Mechanical plant.

5.1 AAAC Guidelines – Child at Play, Vehicles Movements and Mechanical Plant

The AAAC Guidelines state that cumulative noise $L_{Aeq,15\text{ min}}$ generated by mechanical plant and traffic on site should not exceed the background level by more than 5dBA at the assessment location for residential receivers.

For noise generated by outdoor play the AAAC Guidelines provide different criteria depending on the amount of time that outdoor play occurs. For surrounding residential receivers, the criteria are as follows:

- Up to 2 hours (total) per day – $L_{Aeq,15\text{ min}}$ must not exceed Background Level + 10dBA
- More than 2 hours per day – $L_{Aeq,15\text{ min}}$ must not exceed Background Level + 5dBA

The adopted criteria for operational noise are presented in Table 5-1.

Table 5-1 Adopted operational noise criteria

Address	Up to 2 hours Play	More than 2 hours Play
	$L_{Aeq,15\text{ min}}$	$L_{Aeq,15\text{ min}}$
42 Turner Crescent	56	51
159 Molong Road	57	52

5.2 Additional traffic generated by the site

Additional road traffic movements generated by the proposed centre will result in increased traffic noise that may potentially impact residential receivers along Turner Crescent.

The assessment will be based on the road traffic noise assessment criteria for residential land uses contained within Table 3 of the NSW EPA *Road Noise Policy* (RNP).

Anyone using a vehicle to travel to and from the proposed Centre will pass residential receivers along Turner Crescent. As required by the *RNP*, the functional category of these roads is to be confirmed so that noise criteria can be determined.

Using the *RNP*, the applicable criteria during the daytime (when vehicular movements associated with this proposed Centre will occur) is as follows:

Road category	Type of project/land use	Assessment criteria, dBA
		Daytime 7am-10pm ⁽¹⁾
Local Roads (Turner Crescent)	Existing residences affected by noise from new local road corridors	$L_{Aeq, (1 \text{ hour})}$ 55 (external)

Note (1): These criteria are for assessment against façade-corrected noise levels when measured in front of a building façade.

6 ASSESSMENT OF NOISE EMISSION IMPACTS

6.1 Noise from Children Playing Outdoors

The AAAC document, *Guideline for Child Care Centre Acoustic Assessment* (2013), provides typical sound power levels (L_w) for groups of 10 children playing depending age. The sound power level ranges are:

- 10 children 0-2 years old 77-80dBA
- 10 children 2-3 years old 83-87dBA
- 10 children 3-6 years old 84-90dBA

As a worst-case scenario, it has been assumed that all children are emitting noise at the higher end of their range, and that all children within the childcare centre are playing in their respective outdoor area at any given time. Resulting sound power levels for each age group are shown below.

Age groups	Outdoor play area	Capacity	Resulting sound power levels (dBA)
0-2 years old	Outdoor play area 1	24	84
2-3 years old	Outdoor play area 2	30	92
3-5 years old	Outdoor play area 2	40	96

To assess the noise impact on surrounding receivers, CadnaA noise modelling software has been used. The children have been modelled in both outdoor play areas, at full capacity.

1.8m high imperforate fences (including those which have been proposed to mitigate noise from vehicular traffic from Mitchell Road and Northern Distributor Road) have been included in the modelling.

Figure 6-1 presents the proposed locations of all fences surrounding the site.

The predicted noise levels comply with all applicable criteria, including when outdoor play is to occur for more than 2 hours per day.

The predicted noise levels with the proposed 1.8m high fences, are presented in Table 6-1. No further acoustic treatments are required.

Table 6-1 Predicted noise levels from children playing, Outdoor Play Areas 1 & 2

Play area	Predicted noise levels $L_{Aeq,15 \text{ min}}$	Criteria	Criteria
		Up to 2 hours play $L_{Aeq,15 \text{ min}}$	More than 2 hours play $L_{Aeq,15 \text{ min}}$
42 Turner Crescent	47	56	51
159 Molong Road	38	57	52

Figure 6-1 Site boundary fences to mitigate external traffic noise



6.2 Noise from On-site Vehicle Movements

Thirty-two car parking spaces are proposed to the west of the site. Entry and exit to the site will be via Turner Crescent, by a driveway adjacent to both 42 Turner Crescent and 159 Molong Road residential properties.

A *Traffic and Parking Impact Assessment* referenced 18532.01FA and dated 15 March 2019 was conducted by McLaren Traffic Engineering and Road Safety Consultants.

The report indicates that the site will generate 75 vehicles movements (38 in, 37 out) during the morning peak hours of 7:00am to 9:00am and 66 vehicles movements (33 in, 33 out) during the afternoon peak hours of 4:00pm to 6:00pm.

To assess the noise impact on surrounding receivers, CadnaA noise modelling software has been used. Cars have been assumed drive at a speed of 10 to 20km per hour when entering/leaving the site and emitting an average of 85dBA sound power level. It is assumed that all cars entering/leaving the site will also use the car park.

The predicted noise levels from vehicles on site are presented in Table 6-2.

Table 6-2 Predicted noise levels from vehicles on site

Address	Predicted noise level		Criteria
	$L_{Aeq,15\text{ min}}$		$L_{Aeq,15\text{ min}}$
42 Turner Crescent	48		51
159 Molong Road	46		52

6.3 Mechanical Plant Noise

No plant has been specifically selected for this project, however:

- based on indicative information provided to Wilkinson Murray, the air-conditioning plant will be located in the services area adjacent to the lower ground floor corridor, to the west of the proposed building.
- the air-conditioning units have been assumed to consist of two units emitting 85dBA sound power levels each (conservative).

Based on the above assumptions, mechanical noise at most affected residential boundaries would be 42dBA at 42 Turner Crescent and 41dBA at 159 Molong Road, in compliance with the background + 5dBA criteria applicable for the project.

If additional plant is required, consideration should be given to the size and location of the plant, to ensure that the background + 5dB criteria are not exceeded.

6.4 Additional Traffic Noise Generated on Public Roadways

Based on the *Traffic and Parking Impact Assessment* referenced 18532.01FA, the new development will generate respectively up to 75 and 66 movements during the morning (7.00am-9.00am) and afternoon (4.00pm-6.00pm) peak hours. All vehicles would use Turner Crescent to enter and exit the site. It would be reasonable to assume outside the peak hours, there would be minimal traffic movements associated with the childcare centre.

CadnaA noise modelling software was used to assess and predict noise impacts on surrounding receivers caused by additional traffic generated by the development.

Facade-reflected noise levels have been predicted to be up to 52 dB $L_{Aeq (1\text{-hour})}$ along Turner Crescent most affected residences during morning and afternoon peak hours, in compliance with *RNP* 55 dB $L_{Aeq (1\text{-hour})}$ noise criteria.

7 NOISE CONTROL RECOMMENDATION SUMMARY

The following section summarises the noise control measures to be implemented in the design of the proposed childcare centre. Figure 7-1 details the proposed location of acoustic controls discussed below.

7.1 Road Traffic Noise Intrusion

1.8m high solid boundary fences along external play areas are proposed to mitigate external traffic noise intrusion, as shown in Figure 6-1. Fences can consist of standard lapped and capped timber, Colorbond, 10mm Perspex or the like.

Additionally, standard 4mm glazing is recommended in order to control internal noise levels. The mechanical contractor should advise whether mechanical ventilation is required to provide fresh air to indoor playrooms.

7.2 Children Playing and On-Site Vehicular Movements

1.8m high solid fences located around the perimeter of the site (see Figure 7-1) are proposed to reduce potential noise impacts to compliant levels. We note that the existing 1.8m high fence adjacent to 159 Molong Road will be sufficient and shall be retained.

7.3 Mechanical Plant

On the basis of our assumptions about AC units, compliance with background +5dBA will be achieved.

Once plant selection and design are finalised, typically at CC stage, noise generated by mechanical plant should be revised and treatments recommended if necessary.

7.4 Additional Traffic on the Road Network Generated by the Centre

No specific acoustic requirements are necessary to meet noise criteria regarding increased road traffic noise along any of the roads potentially to be used by people wishing to use this centre.

Figure 7-1 Site aerial map with proposed acoustic fences



8 CONCLUSION

Wilkinson Murray has assessed potential noise impacts from the operation of the proposed childcare centre at 36-40 Turner Crescent, Orange with respect to the requirements from the AAAC Guidelines and the NSW EPA *Noise Policy for Industry*.

The operation of a childcare centre is able to meet the requirements of Council, provided that the mitigations as recommended in Section 7 of this report are correctly implemented.