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DA Acoustic Assessment (Childcare)

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1 INTRODUCTION

Acoustic Logic have been engaged to conduct an acoustic assessment of potential noise impacts associated with the proposed Child Care Centre which is part of the mixed-use development at 167 Northumberland Street, Liverpool.

This document addresses noise impacts associated with the following:

- Noise emissions from indoor and outdoor play areas; and
- Noise emissions from mechanical plant to service the project site (in principle).

Acoustic Logic have utilised the following documents and regulations in the assessment of noise impacts for the development:

- Liverpool City Council's *'Liverpool Development Control Plan 2008'*.
- Association of Australasian Acoustical Consultants' (AAAC) '*Guideline for Child Care Centre Acoustic Assessment (Version 3.0)'*.
- NSW EPA's '*Noise Policy for Industry'*.

This assessment has been conducted based on the architectural drawings prepared by Kaunitz Yeung Architecture (revision F, dated 05/02/2020).

2 SITE DESCRIPTION

The proposed Child Care Centre is single-storey and is planned to be located on Level 2 of the mixed-use development. As the Child Care Centre operator has not yet been determined, it is assumed that the operating hours of the centre will be from Monday to Friday, 7am to 6pm and will cater up to a maximum of 79 children (ages ranging from 0-5 years old).

A site survey has been carried out by this office to identify surrounding noise receivers, which are summarised below:

- **Receiver 1 (R1)**: 3-storey high residential property north-west of the project site.
- **Receiver 2 (R2)**: 6-storey high residential property west of the project site, across Laurantus Serviceway.
- **Receiver 3 (R3)**: Mix of commercial properties surrounding project site to the west and north.
- **Receiver 4 (R4)**: Mix of commercial properties surrounding project site to the west and south.
- **Receiver 5 (R5)**: Mix of commercial properties east of project site, across Northumberland Street.

A site map, measurement description and surrounding receivers are presented in Figure 1 below.

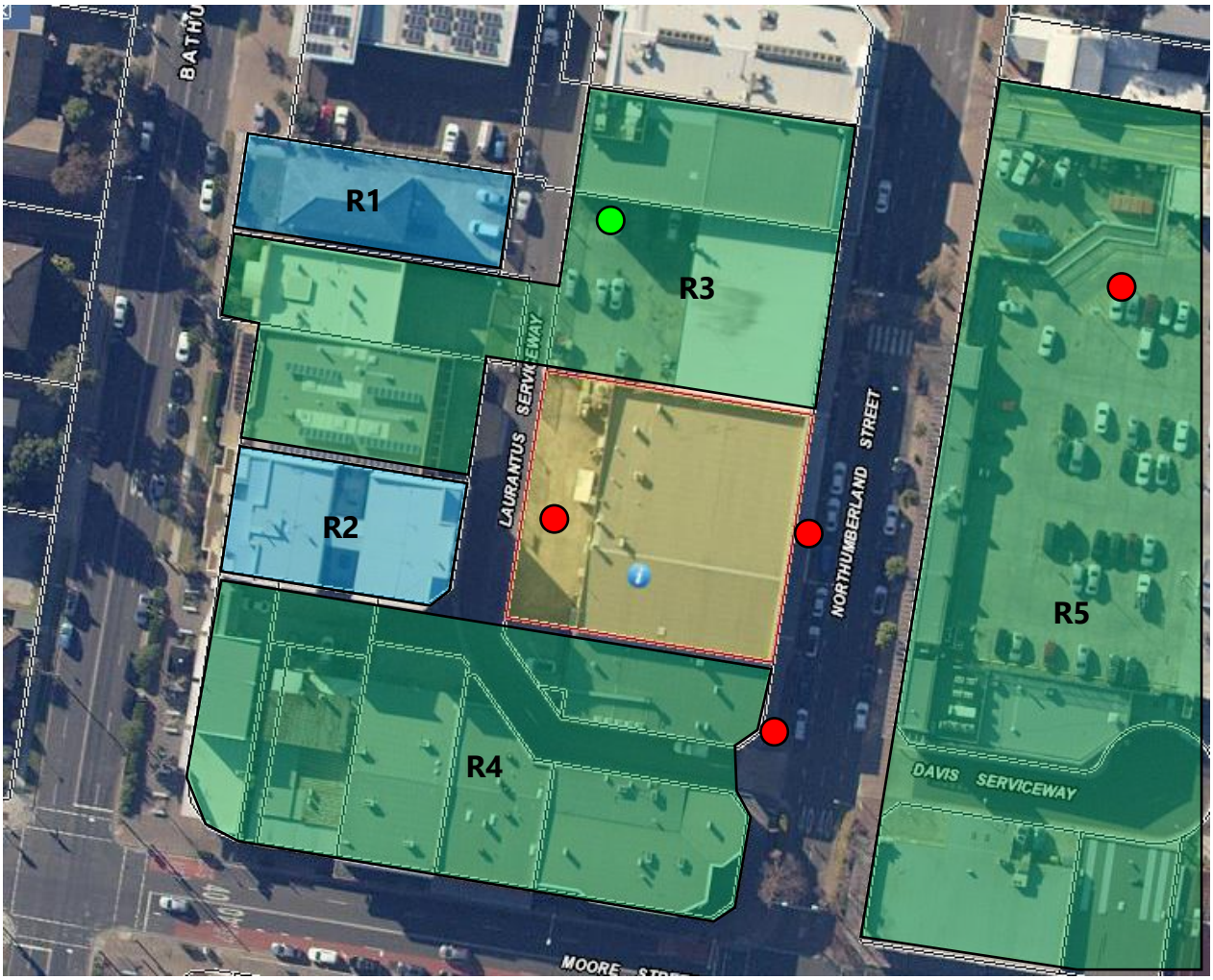

Figure 1 – Site Layout and Surrounding Receivers (Source: SIX Maps NSW)

Project Site
Residential Receiver
Commercial Receiver
Unattended Noise Monitor
Attended Measurement

3 NOISE DESCRIPTORS

Environmental noise constantly varies. Accordingly, it is not possible to accurately determine prevailing environmental noise conditions by measuring a single, instantaneous noise level.

To accurately determine the environmental noise a 15-20-minute measurement interval is utilised. Over this period, noise levels are monitored on a continuous basis and statistical and integrating techniques are used to determine noise description parameters.

In analysing 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 intervals.

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 15-minute period. L_{eq} is important in the assessment of environmental noise impact as it closely corresponds with human perception of a changing noise environment; such is the character of environmental noise.

The L_{max} parameter represents the loudest instantaneous sound pressure level during a measurement period.

4 AMBIENT NOISE SURVEY

Background noise levels have been previously measured (see Figure 1 for locations) and presented in the '*Development Application Acoustic Report'* prepared by this office (re: 20200163.1/1203A/R0/TA, dated 12/03/2020) and will be adopted as the background noise levels at surrounding residential receivers.

Table 1 – Measured Background Noise Levels

Location	Time Period	Background Noise Level dB(A)L_{90}
Surrounding Residential Receivers	Day (7am-6pm)	50

5 NOISE EMISSION CRITERIA

A noise emission assessment has been carried out to ensure noise emitted from the proposed Child Care Centre is in accordance with the requirements listed in this section.

This assessment will review noise emissions associated with the following:

- Indoor and outdoor play areas; and
- Mechanical plant (in principle).

The noise emission assessment has been assessed in accordance with the following documents:

- Liverpool City Council's *'Liverpool Development Control Plan 2008'*.
- Association of Australasian Acoustical Consultants' (AAAC) '*Guideline for Child Care Centre Acoustic Assessment (Version 3.0)'*.
- NSW EPA's '*Noise Policy for Industry'*.

5.1 LIVERPOOL DEVELOPMENT CONTROL PLAN 2008

Section 2 of Liverpool City Council's '*Liverpool Development Control Plan 2008'* contains objectives for Child Care Centres, but states that *"This section applies to the erection of Child Care Centres in residential zones"*.

Based on Liverpool City Council's *'Liverpool Local Environmental Plan 2008'*, the development is within the Mixed Use (B4) zone and not a residential zone. As such, Section 2 of '*Liverpool Development Control Plan 2008'* does not apply.

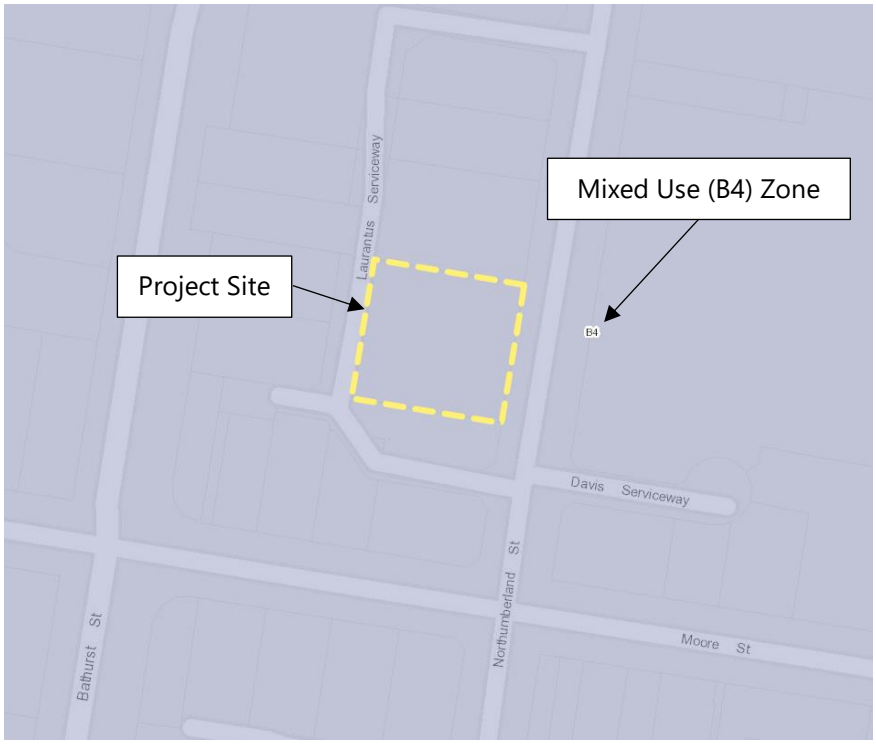

Figure 2 – Project Site Land Zoning (Source: ePlanning Spatial Viewer)

5.2 GUIDELINE FOR CHILD CARE CENTRE ACOUSTIC ASSESSMENT (VERSION 3.0).

AAAC's *'Guideline for Child Care Centre Acoustic Assessment (Version 3.0)'* states the following in relation to relevant noise emission objectives for this project site:

*"**3.2 Criteria – Residential Receptors***

3.2.1. Outdoor Play Area

The noise impact from children at play in a child care centre differs from the domestic situation in that it is a business carried out for commercial gain, the number of children can be far greater than in a domestic situation and the age range of the children at the centre does not significantly vary over time as it would in a domestic situation. However, the noise from children is vastly different, in both character and duration, from industrial, commercial or even domestic machine noise. The sound from children at play, in some circumstances, can be pleasant, with noise emission generally only audible during the times the children play outside. Night time, weekend or public holiday activity is not typical and child care centres have considerable social and community benefit.

***Base Criteria** – With the development of child care centres in residential areas, the background noise level within these areas can at certain times, be low. Thus, a base criterion of a contributed Leq,15min 45 dB(A) for the assessment of outdoor play is recommended in locations where the background noise level is less than 40 dB(A).*

***Background Greater Than 40 dB(A)** – The contributed Leq,15min noise level emitted from an outdoor play and internal activity areas shall not exceed the background noise level by more than 5 or 10 dB at the assessment location, depending on the usage of the outdoor play area. AAAC members regard that a total time limit of approximately 2 hours outdoor play per morning and afternoon period should allow an emergence above the background of 10 dB (ie background +10 dB if outdoor play is limited to 2 hours in the morning and 2 hours in the afternoon).*

***Up to 4 hours (total) per day** – If outdoor play is limited to no more than 2 hours in the morning and 2 hours in the afternoon, the contributed Leq,15 minute noise level emitted from the outdoor play shall not exceed the background noise level by more than 10 dB at the assessment location.*

***More than 4 hours (total) per day** – If outdoor play is not limited to no more than 2 hours in the morning and 2 hours in the afternoon, the contributed Leq,15 minute noise level emitted from the outdoor play area shall not exceed the background noise level by more than 5 dB at the assessment location.*

The assessment location is defined as the most affected point on or within any residential receiver property boundary. Examples of this location may be:

- *1.5 m above ground level;*
- *On a balcony at 1.5 m above floor level;*
- *Outside a window on the ground or higher floors."*

3.2.2. Other Noise Emission

The cumulative Leq,15 minute noise emission level resulting from the use and operation of the child care centre, with the exception of noise emission from outdoor play discussed above, shall not exceed the background noise level by more than 5 dB at the assessment location as defined above. This includes the noise emission resulting from:

- *Indoor play;*
- *Mechanical plant;*
- *Drop off and pick up;*
- *Other activities/operations (not including outdoor play).*

3.3 Commercial Receptors

The cumulative Leq,15min noise level emitted from the use and operation of the child care centre shall not exceed 65 dB(A), from all activities (including outdoor play), when assessed at the most affected point on or within any commercial property boundary.

5.3 NOISE POLICY FOR INDUSTRY

NSW EPA's *'Noise Policy for Industry'* has two criteria which both are required to be satisfied, namely Intrusiveness and amenity. The NPI sets out acceptable noise levels for various localities. The policy indicates four categories to assess the appropriate noise level at a site. They are rural, suburban, urban and urban/industrial interface. Under the policy, the most suitable category for surrounding residential receivers at this project site is the 'Urban' category.

Noise levels are to be assessed at the property boundary or nearby dwelling, or at the balcony or façade of an apartment.

5.3.1 Intrusiveness Criterion

The guideline is intended to limit the audibility of noise emissions at residential receivers and requires that noise emissions measured using the L_{eq} descriptor not exceed the background noise level by more than 5dB(A). Where applicable, the intrusive noise level should be penalised (increased) to account for any annoying characteristics such as tonality.

Background noise levels adopted are presented in Table 1. Noise emissions from the site should comply with the noise levels presented below when measured at nearby property boundary.

Table 2 – NPI Intrusiveness Noise Level

Receiver Type	Time of Day	Background Noise Level dB(A)$L_{90(Period)}$	Project Intrusiveness Noise Level dB(A)$L_{eq(15min)}$
Residential	Day (7:00am-6:00pm)	50	55

5.3.2 Amenity Criterion

The guideline is intended to limit the absolute noise level from all noise sources to a level that is consistent with the general environment.

The EPA's NPI sets out acceptable noise levels for various localities. The recommended noise amenity area is based upon the measured background noise levels at the sensitive receiver.

The NPI requires project amenity noise levels to be calculated in the following manner;

$L_{Aeq,15min}$ = *Recommended Amenity Noise Level – 5 dB(A) + 3 dB(A)*

The amenity levels appropriate for the receivers surrounding the site are presented below.

Table 3 – NPI Amenity Noise Levels

Receiver Type	Time of Day	Recommended Amenity Noise Level dB(A)$L_{eq(period)}$	Project Amenity Noise Level dB(A)$L_{eq(15min)}$
Residential (Urban)	Day (7:00am-6:00pm)	55	53
Commercial	When in use	65	63

6 NOISE EMISSION ASESSMENT

6.1 ASSUMPTIONS & SOUND LEVELS

Noise emissions from the operation of the proposed childcare centre have been predicted based on the following assumptions/information:

- Section 4 of the AAAC guideline provides the following typical range of effective sound power levels for groups of 10 children playing, which has been adopted in this assessment:

Number and Age of Children	Sound Power Levels [dB] at Octave Band Centre Frequencies [Hz]								
	dB(A)	63	125	250	500	1k	2k	4k	8k
10 Children - 0 to 2 years	78	54	60	66	72	74	71	67	64
10 Children - 2 to 3 years	85	61	67	73	79	81	78	74	70
10 Children - 3 to 5 years	87	64	70	75	81	83	80	76	72

Figure 3 – Effective Sound Power Levels as Presented in the AAAC Guideline

- Child Care Centre only operates between 7am to 6pm, Monday to Friday and closed during the weekend.
- The sound pressure level for indoor play areas will be taken as 70 dB(A)L_{eq} based on previous childcare centre studies and measurements conducted by Acoustic Logic.
- Up to 4 hours play per day in outdoor play areas.
- The following scenarios have been assumed as part of our assessment for outdoor play areas:
  - For outdoor play facing Laurantus Serviceway - Scenario 1
    - The usage of the outdoor play between Playroom 03 (Toddlers) and Playroom 04 (Preschool) are staggered (i.e. only one playroom is allowed outside at any one time)
    - Up to 19 toddlers using the outdoor play area (with the children evenly distributed throughout the outdoor area) at any given time.
    - Up to 30 pre-schoolers using the outdoor play area (with the children evenly distributed throughout the outdoor area) at any given time.
  - For outdoor play facing Laurantus Serviceway - Scenario 2
    - The usage of the outdoor play between Playroom 03 (Toddlers) and Playroom 04 (Preschool) is not staggered.
    - Up to 19 toddlers using the outdoor play area (with the children evenly distributed throughout the outdoor area) at any given time.
    - Up to 15 pre-schoolers using the outdoor play area (with the children evenly distributed throughout the outdoor area) at any given time.
  - For outdoor play facing Northumberland Street
    - The usage of the outdoor play between Playroom 01 (Babies) and Playroom 02 (Toddlers) is not staggered.
    - Up to 15 babies using the outdoor play area (with the children evenly distributed throughout the outdoor area) at any given time.
    - Up to 15 toddlers using the outdoor play area (with the children evenly distributed throughout the outdoor area) at any given time.

- Indoor play areas have a maximum façade opening of 5% floor area of the respective room for naturally ventilation.
- Indoor play areas:
  - Up to 15 babies using Playroom 01 at any given time.
  - Up to 15 toddlers using Playroom 02 at any given time.
  - Up to 19 toddlers using Playroom 03 at any given time.
  - Up to 30 pre-schoolers using Playroom 04 at any given time.
- Outdoor play areas contain a minimum 1.2m high solid (non-perforated, no gaps) balustrade along the full boundary.
- Recommendations in Section 7 of this report are implemented.

6.2 PREDICTED NOISE LEVELS AT RECEIVERS

6.2.1 From Outdoor Play Areas

The predicted noise levels takes into consideration any corrections expected by distance, barriers and the recommendations set out in Section 7.

Table 4 – Predicted Noise Levels at Receivers from Outdoor Play Areas (Scenario 1)

Receiver	Predicted Noise Level dB(A)$L_{eq(15min)}$	Noise Emission Objective dB(A)$L_{eq(15min)}$	Complies (Yes/No)
Receiver 1	<50	60	Yes
Receiver 2	60	60	Yes
Receiver 3	<50	65	Yes
Receiver 4	<50	65	Yes
Receiver 5	<50	65	Yes

Table 5 – Predicted Noise Levels at Receivers from Outdoor Play Areas (Scenario 2)

Receiver	Predicted Noise Level dB(A)$L_{eq(15min)}$	Noise Emission Objective dB(A)$L_{eq(15min)}$	Complies (Yes/No)
Receiver 1	<50	60	Yes
Receiver 2	60	60	Yes
Receiver 3	<50	65	Yes
Receiver 4	<50	65	Yes
Receiver 5	<50	65	Yes

6.2.2 Indoor Play Areas

The predicted levels take into account any expected noise reduction provided by distance losses and the recommendations set out in Section 7.

Table 6 – Predicted Noise Levels at Nearby Receivers from Indoor Play Areas

Receiver	Predicted Noise Level dB(A)$L_{eq(15min)}$	Noise Emission Objective dB(A)$L_{eq(15min)}$	Complies (Yes/No)
Receiver 1	<50	60	Yes
Receiver 2	<50	60	Yes
Receiver 3	<50	65	Yes
Receiver 4	<50	65	Yes
Receiver 5	<50	65	Yes

6.3 MECHANICAL NOISE EMISSION

Detailed plant selection and location has not been undertaken at this stage. Satisfactory levels will be achievable through appropriate plant selection, location and if necessary, standard acoustic treatments such as duct lining, acoustic silencers and enclosures.

Noise emissions from all mechanical services to the closest residential receiver should comply with the requirements of Section 5.3.

Detailed acoustic review should be undertaken at CC stage to determine acoustic treatments to control noise emissions to satisfactory levels.

7 RECOMMENDATIONS

The following management controls are recommended to minimise noise impact on surrounding receivers.

- No more than 79 children inside the Child Care Centre at any one time.
- No more than 4 hours play per day in outdoor play areas.
- Number of children in outdoor areas to be limited to the following:
    - For outdoor play facing Laurantus Serviceway - Option 1
        - The usage of the outdoor play between Playroom 03 (Toddlers) and Playroom 04 (Preschool) are staggered (i.e. only one playroom is allowed outside at any one time)
        - Up to 19 toddlers (whole of Playroom 03) using the outdoor play area at any given time.
        - Up to 30 pre-schoolers (whole of Playroom 04) using the outdoor play area at any given time.
    - For outdoor play facing Laurantus Serviceway - Option 2
        - The usage of the outdoor play between Playroom 03 (Toddlers) and Playroom 04 (Preschool) is not staggered.
        - Up to 19 toddlers (whole of Playroom 03) using the outdoor play area at any given time.
        - Up to 15 pre-schoolers (half of Playroom 04) using the outdoor play area at any given time.
    - For outdoor play facing Northumberland Street
        - The usage of the outdoor play between Playroom 01 (Babies) and Playroom 02 (Toddlers) is not staggered.
        - Up to 15 babies (whole of Playroom 01) using the outdoor play area at any given time.
        - Up to 15 toddlers (whole of Playroom 02) using the outdoor play area at any given time.
- Number of children in indoor play areas to be limited to the following:
    - Up to 15 babies using Playroom 01 at any given time.
    - Up to 15 toddlers using Playroom 02 at any given time.
    - Up to 19 toddlers using Playroom 03 at any given time.
    - Up to 30 pre-schoolers using Playroom 04 at any given time.
- Signs reminding staff and visitors to minimise noise at all times should be installed at ingress/egress points from the childcare centre.
- All staff should be given appropriate training in relation to the acoustic impacts and requirements in terms of operation of the facility.
- Management is to ensure children are supervised at all times to minimise noise generated by the children whenever practical and possible.
- Install a contact phone number at the entrance of the centre so that any complaints regarding centre operation can be made.
- No music systems are to be used in the outdoor play areas at any time.
- Mechanical Plant servicing the childcare are only to operate between 7:00am and 6:00pm.
- Once a Child Care Centre operator has been determined, a noise management plan and complaints handling procedure should be prepared by the operator.

8 CONCLUSION

Acoustic Logic have been engaged to conduct an acoustic assessment of potential noise impacts associated with the proposed Child Care Centre which is part of the mixed-use development at 167 Northumberland Street, Liverpool.

Provided that the recommendations presented in Section 7 are implemented, project noise objectives will be generally satisfied.

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

Yours faithfully,

Acoustic Logic Pty Ltd
Kanin Mungkarndee