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# 167 Northumberland Street, Liverpool

# Development Application Acoustic Report

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# 1 INTRODUCTION

This report presents our development application acoustic assessment for the proposed mixed use and serviced apartment development located at 167 Northumberland Street, Liverpool.

This report will:

- Conduct an external noise intrusion assessment (primarily traffic noise) and recommend acoustic treatments to ensure that a reasonable level of amenity is achieved for future occupants. Traffic noise at the site have been measured and assessed in accordance with Liverpool requirements, Australian Standard 2107:2016 and NSW State Environmental Planning Policy (Infrastructure) 2007.

- Conduct background noise monitoring to determine noise emission goals for future use of the development to meet council and NSW EPA acoustic requirements.

The assessment is based on architectural drawings by SJB Architects DA-10-0100 to DA-10-1900 dated February 2020.

## 2 SITE DESCRIPTION

The site is located at 167 Northumberland Street, Liverpool. The proposed The proposed development is for the construction of a mixed-use development which will comprise of Meriton Serviced Apartments, retail uses and a child care centre.

Development in the vicinity of the site are as follows:

- Residential property to the west, approximately 20m to the west of the site; and
- A car park to the east of the site.

The surrounding streets, Northumberland Street and Laurantus Serviceway bound the site to the east, south and west and carry low to medium volumes of traffic.

Figure 1 shows the site surroundings and measurement locations.

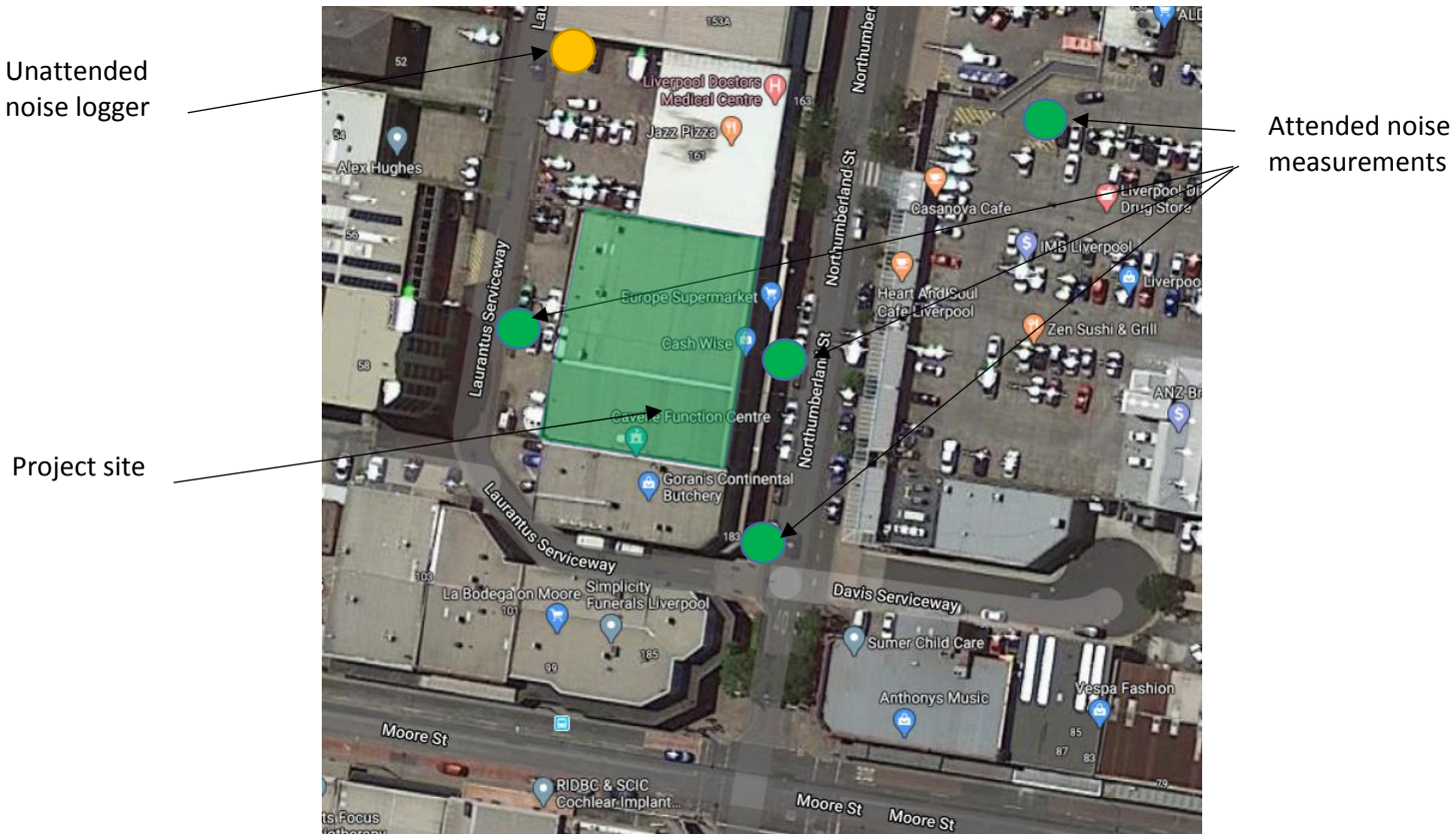



**Figure 1: Site Map and Measurement Locations**

# 3 NOISE DESCRIPTORS

Traffic noise constantly varies in level, due to fluctuations in traffic speed, vehicle types, road conditions and traffic densities. Accordingly, it is not possible to accurately determine prevailing traffic noise conditions by measuring a single, instantaneous noise level. To accurately determine the effects of traffic 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. These parameters are used to measure how much annoyance would be caused by a particular noise source.

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 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 at 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.

Current practice favours the $L_{eq}$ parameter as a means of measuring traffic noise, whereas the $L_{10}$ parameter has been used in the past and is still incorporated in some codes. For the reasons outlined above, the $L_{90}$ parameter is not used to assess traffic noise intrusion.

$LA_{max}$ refers to the maximum noise level occurring during a measurement period, and is used when assessing sleep disturbance impacts.

# 4 NOISE INTRUSION ASSESSMENT

## 4.1 PROJECT ACOUSTIC OBJECTIVES

Liverpool Council DCP states the following with respect to noise intrusion:

### 4.1.1 Liverpool Development Control Plan (DCP) 2008

*Part 3.7 – Residential Flat Buildings*

*Section 9 – Amenity and Environmental impact*

*Acoustic Impact*

*Control 1 - Noise attenuation measures should be incorporated into building design to ensure acoustic privacy between on-site and adjoining buildings.*

*Control 2 - Buildings having frontage to a Classified Road or a railway and impacted upon by rail or traffic related noises must incorporate the appropriate noise and vibration mitigation measures into the design in terms of the site layout, building materials and design, orientation of the buildings and location of sleeping and recreation areas.*

The Liverpool DCP 2008 contains no specific internal noise levels, and internal sound level limits will be determined from the Australian Standard AS2107:2016 as detailed further within this section.

### 4.1.2 Australian and New Zealand AS/NZS 2107:2016 *'Recommended design sound levels and reverberation times for building interiors'* (Rail and Traffic Noise Intrusion)

For non-residential spaces (retail / commercial) Australian Standard AS 2107-2016: Recommended design sound levels and reverberation times for building interiors specifies allowable internal noise levels for internal spaces. Table 1, in Section 5 of AS 2107-2016, gives the following maximum internal noise levels for commercial buildings near major roads.

**Table 1 – Recommended Design Sound Level**

| Space /Activity Type | Recommended Maximum Design Sound Level dB(A) $L_{eq}$ |
|---|---|
| Residential – Living Areas | 40 dB(A)$L_{eq\ (9\ hour)}$ |
| Residential – Sleeping Areas (night time) | 35 dB(A)$L_{eq\ (15\ hour)}$ |
| Commercial | 45 dB(A)$L_{eq\ (when\ in\ use)}$ |
| Retail | 50dB(A) $L_{eq\ (when\ in\ use)}$ |

Compliance with the criteria in the table above will result in compliance with Council's DCP .

## 4.2 NOISE MEASUREMENTS

Traffic measurements were taken along all future facades the proposed development. Both short term (attended) and long term (unattended) measurements were conducted.

A unattended long term monitor was installed in Laurantus Serviceway. The long-term noise monitor was conducted from 20 February to 29 February 2020. Supplementary attended measurements were taken at various locations of the site, as shown in Figure 1. The attended measurements were taken on 20 February and 29 February 2019.

The long-term monitoring was conducted using an Acoustic Research Laboratories Pty Ltd noise logger. The logger was set to A-weighted fast response and was programmed to store 15-minute statistical noise levels throughout the monitoring period. The monitor was calibrated at the start and end of the monitoring period using a Rion NC-73 calibrator. No significant drift was noted.

Attended measurements were undertaken using a Norsonic 140 sound level analyser, set to A-weighted fast response. The sound level analyser was calibrated before and after the measurements, no significant drift was noted.

The traffic noise levels listed in the table below were determined based on the logging data and attended measurements. In determination of acoustic treatments, the measured level is adjusted for distance and orientation.

**Table 2 – External Noise Level (Traffic Noise)**

| Location | Time Period | Traffic Noise Level |
|---|---|---|
| Future Eastern Façade | Day | 64dB(A)$L_{Aeq\ (15hr)}$ |
| | Night | 59dB(A)$L_{Aeq\ (9hr)}$ |

### 4.2.1 Glazing Construction

The recommended glazing assemblies are indicated in the table below. The glazing thicknesses recommended are those needed to satisfy acoustic requirements and do not take into account other requirements such as structural, safety or other considerations. These additional considerations may require the glazing thickness to be increased beyond the acoustic requirement.

**Table 3 – Building 1 - Glazing Requirements (up to level 10)**

| Façade | Room | Glazing Thickness | Acoustic Seals |
|---|---|---|---|
| Northumberland Street | Bedroom | 6.38mm laminated glass | Yes |
| | Living Room | 6.38mm laminated glass | Yes |
| South | Bedroom | 6.38mm laminated glass | Yes |
| | Living Room | 6mm glass | Yes |
| Laurantus Serviceway. | Bedroom | 6.38mm laminated glass | Yes |
| | Living Room | 6mm glass | Yes |

**Table 4 – Building 1 - Glazing Requirements (up to level 10 to 31)**

| Façade | Room | Glazing Thickness | Acoustic Seals |
|---|---|---|---|
| Northumberland Street | Bedroom | 6mm glass | Yes |
| | Living Room | 6mm glass | Yes |
| South | Bedroom | 6mm glass | Yes |
| | Living Room | 6mm glass | Yes |
| Laurantus Serviceway. | Bedroom | 6mm glass | Yes |
| | Living Room | 6mm glass | Yes |

**Table 5 – Retail / Commercial**

| Façade | Room | Glazing Thickness | Acoustic Seals |
|---|---|---|---|
| Northumberland Street | Retail | 6mm toughened | Yes |
| | Commercial | 6mm toughened | Yes |
| All Others | Retail | 6mm toughened | Yes |
| | Commercial | 6mm toughened | Yes |

**Note: Glazing to be reviewed at CC stage based on construction drawings. The recommendations within this report are for the purposes of obtaining authority approvals only.**

In addition to complying with the minimum scheduled glazing thickness, the $R_w$ rating of the glazing fitted into operable frames and fixed into the building opening should not be lower than the values listed in the table below.

Where nominated, this will require the use of acoustic seals equal to Schlegel Q-lon series *(acoustic bulb seal)* around the full perimeter of operable frames. The frame will need to be sealed into the building opening using a flexible 100% polyurethane sealant equal to Bostik Seal N' Flex. Note that mohair seals and/or mohair/plastic fin combination seals in windows and doors are **not** acceptable where acoustic seals are required.

It is recommended that only window systems have test results indicating compliance with the required ratings obtained in a certified laboratory be used where windows with acoustic seals have been recommended.

**Table 6 – Minimum STC/$R_w$ of Glazing Requirements**

| Glazing Assembly | Acoustic Seals | Minimum STC/$R_w$ of Installed Window |
|---|---|---|
| 6mm toughened | Yes | 29 |
| 6.38mm laminated | Yes | 31 |
| 10mm toughened | Yes | 33 |

### 4.2.2 External Walls

For external walls of masonry construction, no acoustic upgrade is required. There should be no vents on the internal skin of external walls. All penetrations in the internal skin of external walls should be acoustically sealed. In the event lightweight external constructions are used, these are to be reviewed at CC stage.

### 4.2.3 Roof/Ceiling Construction

The proposed concrete slab roof does not require any acoustic upgrade. Penetrations in ceilings (such as for light fittings etc.) must be sealed gap free with a flexible sealant. Any ventilation openings in the ceilings would need to be acoustically treated to maintain the acoustic performance of the ceiling construction.

### 4.2.4 External Doors

Any glass doors should be constructed using glazing thickness set out in Table 3-5. Full perimeter acoustic seals around the doors are required.

# 5 NOISE EMISSION ASSESSMENT

The external noise emission criteria are set up in this section of the report to ensure that the amenities of nearby land users are not adversely affected.

## 5.1 BACKGROUND NOISE MONITORING

A long-term unattended monitor was used for background noise measurements supplemented with attended measurements at the boundaries of the site.

**Table 7 – Measured Background Noise Levels**

| Location | Period/Time | Background Noise Level dB(A) $L_{90(period)}$ |
|---|---|---|
| Surrounding Residential Receivers | Day (7am-6pm) | 50 |
| | Evening(6pm-10pm) | 49 |
| | Night(10pm-7am) | 45 |

## 5.2 NOISE EMISSION CRITERIA

The noise emission from the project site shall comply with the requirements of the following documents;

- Liverpool Development Control Plan 2008;
- NSW *Environmental Protection Agency document – Noise Policy for Industry (NPI) 2017*.

## 5.3 LIVERPOOL DEVELOPMENT CONTROL PLAN 2008

*Part 3.7 – Residential Flat Building*

*Section 9 – Amenity and Environmental impact*

*Acoustic Impact*

*Control 3 - The proposed buildings must comply with the Environment Protection Authority criteria and the current relevant Australian Standards for noise and vibration and quality assurance.*

NSW EPA criteria relating to noise emissions is contained in the "Noise for Policy industry" as detailed further within this section

## 5.4 EPA - NOISE POLICY FOR INDUSTRY (NPfI)

Noise sources covered by this code include mechanical services noise (the identified potential noise emission source from the site). Both the Intrusiveness and the Project Amenity criteria (as set out below) must be complied with.

### 5.4.1 NPfI - Intrusiveness Noise Goals

Intrusiveness criteria permit noise generation to be no more than 5dB(A) above existing background noise levels. The criteria are as follows:

**Table 8 - EPA Intrusiveness Criteria**

| Location | Time of Day | Background noise Level - dB(A)$L_{90}$ | Intrusiveness Noise Objective dB(A)$L_{eq(15min)}$ (Background + 5dB) |
|---|---|---|---|
| Residences Surrounding the Site | Day Time (7am - 6pm) | 50 | 55 |
| | Evening (6pm - 10pm) | 49 | 54 |
| | Night (10pm - 7am) | 45 | 50 |

### 5.4.2 INP – Project Amenity Goals

Project amenity criteria are determined based on the land use in the area (residential/commercial/industrial). The residential land use is then further categorised into rural, sub-urban and urban areas. For the purpose of this assessment the existing residential dwellings will be considered suburban.

**Table 9 – EPA Amenity Noise Levels**

| Type of Receiver | Time of day | Recommended Noise Level dB(A)$L_{eq(period)}$ | Project Amenity Noise Level dB(A)$L_{eq(15min)}$ |
|---|---|---|---|
| Residential – Urban | Day | 60 | 58 |
| | Evening | 50 | 48 |
| | Night | 45 | 43 |
| Commercial premises | When in use | 65 | 63 |
| Industrial premises | When in use | 70 | 68 |

## 5.5 SLEEP AROUSAL ASSESSMENT

Potential sleep arousal impacts should be considered for noise generated after 10pm.

Sleep arousal is a function of both the noise level and the duration of the noise.

As recommended in the NPfI, to assess potential sleep arousal impacts, a two-stage test is carried out:

- Step 1 – Section 2.5 *Maximum noise level event assessment* from the NPfI states the following:

  *Where the subject development/premises night-time noise levels at a residential location exceed:*

  - *$L_{Aeq,15min}$ 40dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and/or*
  - *$L_{AFmax}$ 52 dB(A) or the prevailing RBL plus 15 dB, whichever is greater,*

*a detailed maximum noise level event assessment should be undertaken.*

Based on the above the following noise objectives apply:

**Table 10– Sleep Arousal Criteria (Maximum/$L_{Max}$ Noise Events)**

| Location | Rating Background Level dB(A)$L_{90}$ | Rating Background Level + 15dB(A) | Governing Criteria dB(A)$L_{(Max)}$ |
|---|---|---|---|
| Surrounding Residential Receivers | 37 | 52 | 52 |

- Step 2 - If there are noise events that could exceed the average/maximum criteria detailed in the tables above, then an assessment of sleep arousal impact is required to be carried out taking into account the level and frequency of noise events during the night, existing noise sources, etc. This test takes into account the noise level and number of occurrences of each event with the potential to create a noise disturbance. As is recommended in the explanatory notes of the EPA Industrial Noise Policy, this more detailed sleep arousal test is conducted using the guidelines in the EPA Road Noise Policy. Most relevantly, the Road Noise Policy states:

  *For the research on sleep disturbance to date it can be concluded that:*

  - *Maximum internal noise levels below 50-55dB(A) are unlikely to awaken people from sleep.*
  - *One to two noise events per night with maximum internal noise levels of 65-70dB(A) are not likely to affect health and wellbeing significantly.*

## 5.6 ASSESSMENT OF NOISE EMISSIONS

### 5.6.1 Mechanical plant

Detailed review of all external mechanical plant should be undertaken at construction certificate stage (once plant selections and locations are finalised). Acoustic treatments should be determined in order to control plant noise emissions to the levels set out in section 5 of this report.

While compliance with noise emission requirements will be achievable with appropriate acoustic treatment, it is highly likely that any roof top equipment which operates 24 hours per day (such as refrigeration plant) will require either enclosure in plant rooms or acoustic screens to provide a line of sight break between the equipment and any future residences.

Other equipment external items (fans) would be expected to be capable of compliance through use of internal duct lining and/or in-duct attenuators.

## 5.7 CHILD CARE NOISE EMISSION ASSESSMENT

There is currently no operator or fitout plan available for the child care centre and as such, the following assessment is indicative only. **A detailed review of the child care centre is to be conducted when a fitout plan is available at CC Stage.**

### 5.7.1 Indicative Recommendations

The following building and management controls are recommended to control noise emissions from outdoor play and indoor activities.

- A line of sight perimeter barrier (glazing) is to be provided to the western façade of the outdoor play area to screen the residential property to the west.
- Signs reminding staff and visitors to minimise noise at all times shall be installed at ingress/egress points from the child care centre.
- 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 front of the centre so that any complaints regarding centre operation can be made.
- A detailed acoustic review of the child care centre is required at CC stage when operator fitout plans and detailed information regarding the operation of the child care centre becomes available.

### 5.7.2 Retail

In the event that café tenants propose late night use of outdoor dining areas, we assume this would be part of a separate development application where detailed review of operating times and patron numbers (and the associated noise generated) would be assessed with reference to Council and (if necessary) Office of Liquor Gaming and Racing acoustic criteria.

# 6 CONCLUSION

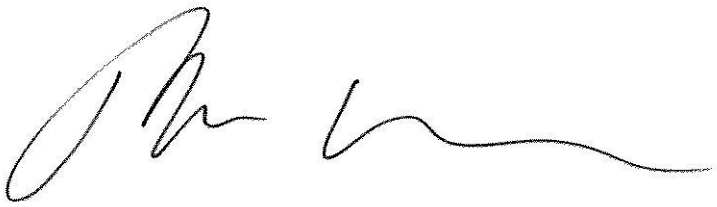
This report presents our acoustic assessment for the proposed mixed use and serviced apartment development located at 167 Northumberland Street, Liverpool.

Noise intrusion impact from traffic noise onto the future occupants of the development has been assessed in accordance with Liverpool Council DCP. The acoustic treatments in principle necessary to achieve these guidelines have been set presented within this report.

Noise emission criteria for the development site have been determined based on the site noise logging and NSW EPA Noise Policy for Industry and Protection of the Environmental Operation Act Regulation. These requirements have been presented in Section 5.

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

Yours faithfully,



Tom Aubusson MAAS

# Appendix 1

# Noise Logging Data