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Development Application Acoustic Report

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TABLE OF CONTENTS

1 INTRODUCTION

Acoustic Logic Consultancy (ALC) has been engaged to conduct an assessment of potential noise impacts associated with the residential development to be constructed on part of Lot 3991 Jordan Springs Boulevard, Jordan Springs.

This document addresses noise impacts associated with the following:

- External noise impacts on the site (traffic noise impacts from Jordan Springs Boulevard and Lakeside Parade);
- Noise emissions from the site (primarily mechanical plant);

This assessment has been conducted using the Young and Metcalf Architects preliminary architectural drawings, dated July 2018.

2 SITE DESCRIPTION

The site is located at the corner of Jordan Springs Boulevard and Lakeside Parade. The proposed development consists of a new five-storey 144-bed residential care building.

Access to the site will be provided via a driveway on Lakeside Parade. Parking facilities will be provided on ground floor to the south of the site.

The site is bounded to the north by Jordan Springs Boulevard and to the east by Lakeside Parade. Both roads carry low traffic volumes.

The nearest noise sensitive developments to the site are:

- Residential houses across Jordan Springs Road (to the north-west);
- Future Lend Lease Retirement Living Village adjoining the site to the west and south.

An aerial photo showing noise measurement positions and surrounding noise receivers is presented below.

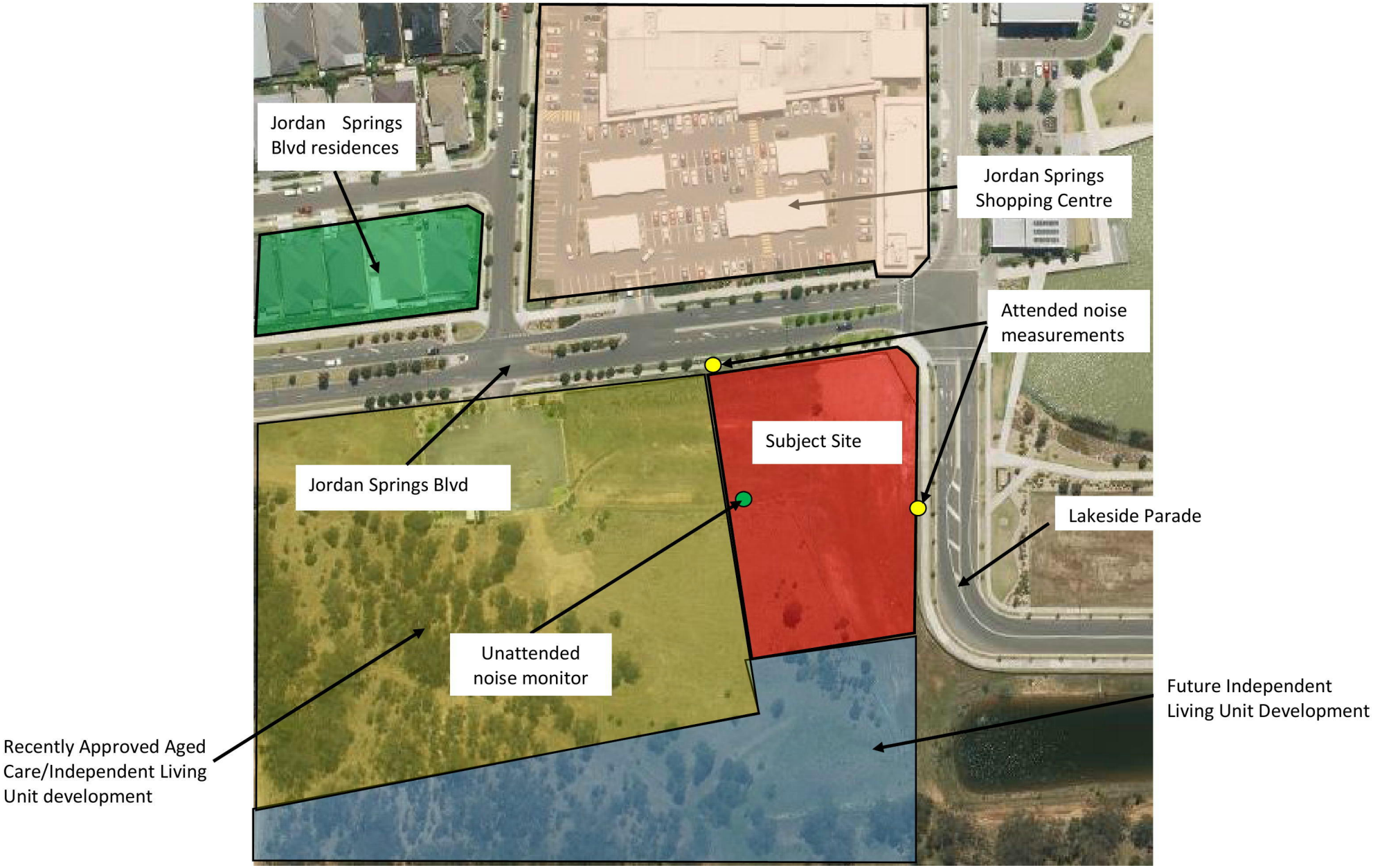


Figure 1: Site Map and Measurement Locations (Source: *SixMaps*)

3 ENVIRONMENTAL 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 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.

4 EXTERNAL NOISE INTRUSION ASSESSMENT

4.1 NOISE INTRUSION CRITERIA

4.2 CRITERIA

We note that there are no specific noise goals for Residential Aged Care Developments in the Penrith City Council DCP 2014.

The site does not lie on any major road or near any significant external noise source. As such, documents such NSW Department of Planning's '*Development Near Rail Corridors and Busy Roads (Interim Guideline)*' and SEPP Infrastructure are not applicable.

Given this, the building shell will be designed such that external noise impacts (distant traffic, school noise) will be attenuated to noise levels compliant with AS2107, as detailed below.

Table 1 – Summary of Internal Noise Level Criteria

Space	External Noise Intrusion Criteria
Bedroom	35dB(A)$L_{eq(1\ hour\ -\ night)}$
Living Areas	40dB(A)$L_{eq(1\ hour\ -\ day)}$

4.3 EXTERNAL NOISE MEASUREMENTS

Traffic noise levels at the site were measured using a combination of attended and long-term noise monitoring.

4.3.1 Measurement Equipment

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

Attended short term measurements of traffic noise which were undertaken by this office, to supplement the unattended noise monitoring. Measurements were conducted using a Norsonic 118 Sound Analyser. The analyser was set to fast response and calibrated before and after the measurements using a Norsonic Sound Calibrator type 1251. No significant drift was noted.

4.3.2 Measurement Location

The long-term logger was installed within the site boundaries, as shown in the aerial photograph in section 2. The logger had a line of sight to both Jordan Springs Road and Lakeside Parade.

The attended noise measurements were made at positions 3m from the Jordan Springs Road and Lakeside Parade kerbs.

4.3.3 Measurement Period

Unattended noise monitoring was conducted from Wednesday, 29 August 2018 to 5 September 2018.

Attended noise measurements were undertaken between the hours of 1.45pm and 2.15pm on 29 August 2018.

4.3.4 Results

Attended and unattended noise measurements have been summarised below.

Table 2 – Unattended Noise Monitor – Traffic Noise Measurements

Location	Time of day	Long Term Traffic Noise Level
Site – At Logger	Day	53dB(A)$L_{eq(15hr - Day)}$
	Night	49dB(A)$L_{eq(9hr - Night)}$

Table 3 – Attended Traffic Noise Measurements

Location	Time of Measurement	Measured Noise Level
Jordan Springs Rd (3m from kerb)	1.45pm-2.00pm (29/08/2018)	62 dB(A)$L_{eq\ (15min)}$
Lakeside Parade (3m from kerb)	2.00pm-2.15pm (29/08/2018)	60 dB(A)$L_{eq\ (15min)}$

Using the noise levels measured during attended noise measurements in addition with the day time/night time noise levels measured by the long-term noise logger, the following external noise levels impacting the site were determined:

Table 4 – Measured Existing Traffic Noise Levels

Location	Summary of Measured Existing Traffic Noise Level	
	Daytime (7am-10pm) dB(A)$L_{eq\ (15hour)}$	**Night time(10pm-7am) dB(A)$L_{eq\ (9hour)}$**
Jordan Springs Rd (3m from kerb)	62dB(A)$L_{eq(15hour)}$	58dB(A)$L_{eq(9hour)}$
Lakeside Parade (3m from kerb)	60dB(A)$L_{eq(15hour)}$	56dB(A)$L_{eq(9hour)}$

4.4 RECOMMENDED CONSTRUCTIONS

Recommended acoustic treatments to the building façade are detailed below.

4.4.1 Glazed Windows and Doors

The following constructions are recommended to comply with the project noise objectives.

Minimum glazing thicknesses and acoustic performance requirements for window/glass door systems are presented below. Thicker glazing may be required for structural, safety or other purposes. Where it is required to use thicker glazing than scheduled, this will also be acoustically acceptable.

Aluminium frames for any glass doors and windows must achieve the same R_w as the glass which is installed for that window/door.

All external windows and doors listed are required to be fitted with Q-lon type acoustic seals. (**Mohair Seals are unacceptable**).

The recommended constructions are listed in the table below.

Table 5 – Recommended Glazing Construction

Level	Façade	Space	Recommended Construction	Acoustic Seals
All	North (Jordan Springs Rd)	Living Areas	6.38mm laminated	Yes
		Bedrooms	6.38mm laminated	Yes
	East (Lakeside Pde)	Living Areas	6.38mm laminated	Yes
		Bedrooms	6.38mm laminated	Yes
	South	Living Areas	4mm	Yes
		Bedrooms	4mm	Yes
	West	Living Areas	6mm	Yes
		Bedrooms	6mm	Yes

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

Standard glazing construction (4mm glass) will be satisfactory for internal spaces (including café, staff rooms, common spaces) not listed in the above table.

In addition to complying with the minimum scheduled glazing thickness, the R_w rating of the glazing fitted into open-able frames and fixed into the building opening should not be lower than the values listed in Table 6 for all rooms. Where nominated, this will require the use of acoustic seals around the full perimeter of open-able frames and the frame will need to be sealed into the building opening using a flexible sealant.

Table 6 – Minimum Rw of Glazing (with Acoustic Seals

Glazing Assembly	Minimum R_w of Installed Window
4mm Float	27
6mm	29
6.38mm laminated	31

4.4.2 External Roof/Ceiling

Roof/ceiling construction is concrete and will not require any upgrade for acoustic purposes.

4.4.3 External Walls

Concrete or masonry external wall construction will not require any upgrade for acoustic purposes.

In the event that light weigh building elements are incorporated, minimum 75mm thick 11kg/m^3 glass wool insulation should be incorporated in any external wall cavity.

5 NOISE EMISSION ASSESSMENT

Noise emissions from the site have been assessed for noise emitted from base building mechanical plant.

The noise emission from the project site are to comply with the following:

- Penrith City Council Development Control Plan 2014;
- EPA Noise Policy for Industry; and

5.1 BACKGROUND NOISE LEVELS

Acoustic monitoring was conducted at the site to establish the background noise levels which will be used as basis for setting noise emission requirements.

5.1.1 Measurement Equipment

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

5.1.2 Measurement Location

The logger was installed at the subject site, as shown in the aerial photograph in figure 1.

Background noise levels measured at this location are representative of background noise levels at the adjacent residential developments.

5.1.3 Measurement Period

Unattended noise monitoring was conducted from Wednesday, 29 August to Wednesday, 5 September 2018.

5.1.4 Measured Background Noise Levels

Background noise levels are established from the unattended noise monitoring conducted on site.

NSW EPA's rating background noise level assessment procedure requires determination of background noise level for each day. The Rating Background Noise level is the median of the daily background noise levels measured for the entire monitoring period.

Appendix 1 provides the results of the unattended noise monitoring. Weather affected data was excluded from the assessment.

Summarised rating background noise levels are presented below.

Table 7 – Summarised Rating Background Noise Level

Location	Time of day	Rating Background Noise Level dB(A)L_{90}
Site	Day (7am-6pm)	**45**
	Evening (6pm-10pm)	**44**
	Night (10pm-7am)	**36**

5.2 NOISE EMISSION CRITERIA

5.2.1 Penrith City Council Development Control Plan 2014

Penrith Council Development Control Plan does not contain any explicit noise criteria for noise emissions. Therefore, the typically adopted NSW EPA Noise Policy for Industry will be adopted.

5.2.2 NSWEPA - 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.

5.2.2.1 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)	45	50
	Evening (6pm - 10pm)	44	49
	Night (10pm - 7am)	36	41

5.2.2.2 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, suburban and urban areas. For the purpose of this assessment the existing residential dwellings will be considered suburban.

Table 9 -EPA Project Amenity Criteria

Noise Receiver	Amenity Noise Level – dB(A)$L_{Aeq(15min)}$		
	Daytime	Evening	Night
Existing Residences (Suburban)	53	43	38

5.3 NOISE EMISSION ASSESSMENT/RECOMMENDATIONS

The primary noise source associated with the site will be mechanical plant.

Detailed plant selection has not been undertaken at this stage, as plant selections have not been determined. Detailed acoustic review should be undertaken at CC stage to determine acoustic treatments to control noise emissions to satisfactory levels. Satisfactory levels will be achievable through appropriate plant selection and 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 receivers should comply with the requirements of section 5.2.

6 CONCLUSION

This report presents an acoustic assessment of noise impacts associated with the proposed development at Catholic Healthcare, Jordan Springs.

Provided that the treatments set out in section 4.4 of this report are implemented, internal noise levels (as a result of traffic noise impacts) will comply with the requirements below:

- Penrith City Council DCP 2014; and
- Australian and New Zealand AS/NZS 2107:2016.

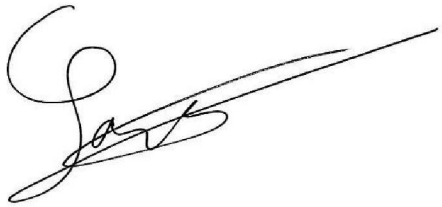
External noise emissions criteria have been set out in this report to satisfy the requirements from the following documents;

- Penrith City Council DCP 2014 and
- NSW EPA Noise Policy for Industry (NPfI).

Provided that the recommendations set out in section 5.3 of the report are adopted, noise emission goals for the development will be achieved.

Please contact us should you have any further queries.

Yours faithfully,



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APPENDIX 1 – UNATTENDED NOISE MONITORING DATA