DIRECTORS
MATTHEW PALAVIDIS
VICTOR FATTORETTO
MATTHEW SHIELDS

3 William Street, Fairfield

Environmental Noise Impact Assessment

SYDNEY
A: 9 Sarah St
MASCOT 2020
T: (02) 8339 8000

SYDNEY MELBOURNE BRISBANE CANBERRA
LONDON DUBAI SINGAPORE GREECE

ABN: 11 068 954 343

DOCUMENT CONTROL REGISTER

Project Number	20180913.1
Project Name	3 William Street, Fairfield
Document Title	Environmental Noise Impact Assessment
Document Reference	20180913.1/0212A/R4/EC
Issue Type	Email
Attention To	Karlos Charly

Revision	Date	Document Reference	Prepared By	Checked By	Approved By
0	16/07/2018	20180913.1/1607A/R0/EC	EC		TT
1	27/07/2018	20180913.1/2707A/R1/EC	EC		TT
2	9/1/2019	20180913.1/0901A/R2/EC	EC		
3	11/09/2019	20180913.1/1109A/R3/EC	GW		GW
4	2/12/2019	20180913.1/0212A/R4/EC	GW		GW

TABLE OF CONTENTS

1 INTRODUCTION

This report presents an analysis of acoustic impacts associated with the proposed mixed-use development at 3 William Street, Fairfield.

In this report we will conduct an external noise impact assessment (primarily traffic noise) and recommend acoustic treatments to ensure that a reasonable level of amenity is achieved for future tenants.

The analysis will be undertaken with reference to the architectural drawings with the Project Number 17411, dated 5th September 2018 and provided by Mode Design.

The details of the architectural drawings are shown in Table 1 below.

Table 1 – Architectural Drawings Details

Drawing Number	Drawing Title	Revision
0000	Cover Sheet	2
0100	Site Analysis	1
0101	Site Photos	2
0102	Existing Site Plan	2
0200	Demolition Plan	2
1000	Feasibility Study	1
1001	Proposed Site Plan	2
1002	Boarding House Basement Level	2
1003	Boarding House Ground Level	2
1004	Boarding House First Level	2
1005	Boarding House Second Level	2
1006	Boarding House Third Level	2
1007	Boarding House Roof Level	2
1050	Area Plans	2
1100	Sections	2
1200	Boarding House Elevations	2
1201	Boarding House Elevations	2
1210	Heritage Elevations	2
1300	Shadow Diagrams Winter Solstice	1
1400	3D View	1

2 SITE DESCRIPTION

The proposed development consists of a single storey retail to be located in the existing fire station at 3 William Street, Fairfield and the construction of a 4-storey Boarding House at the western side of the site directly behind the fire station. The site is bounded as follows;

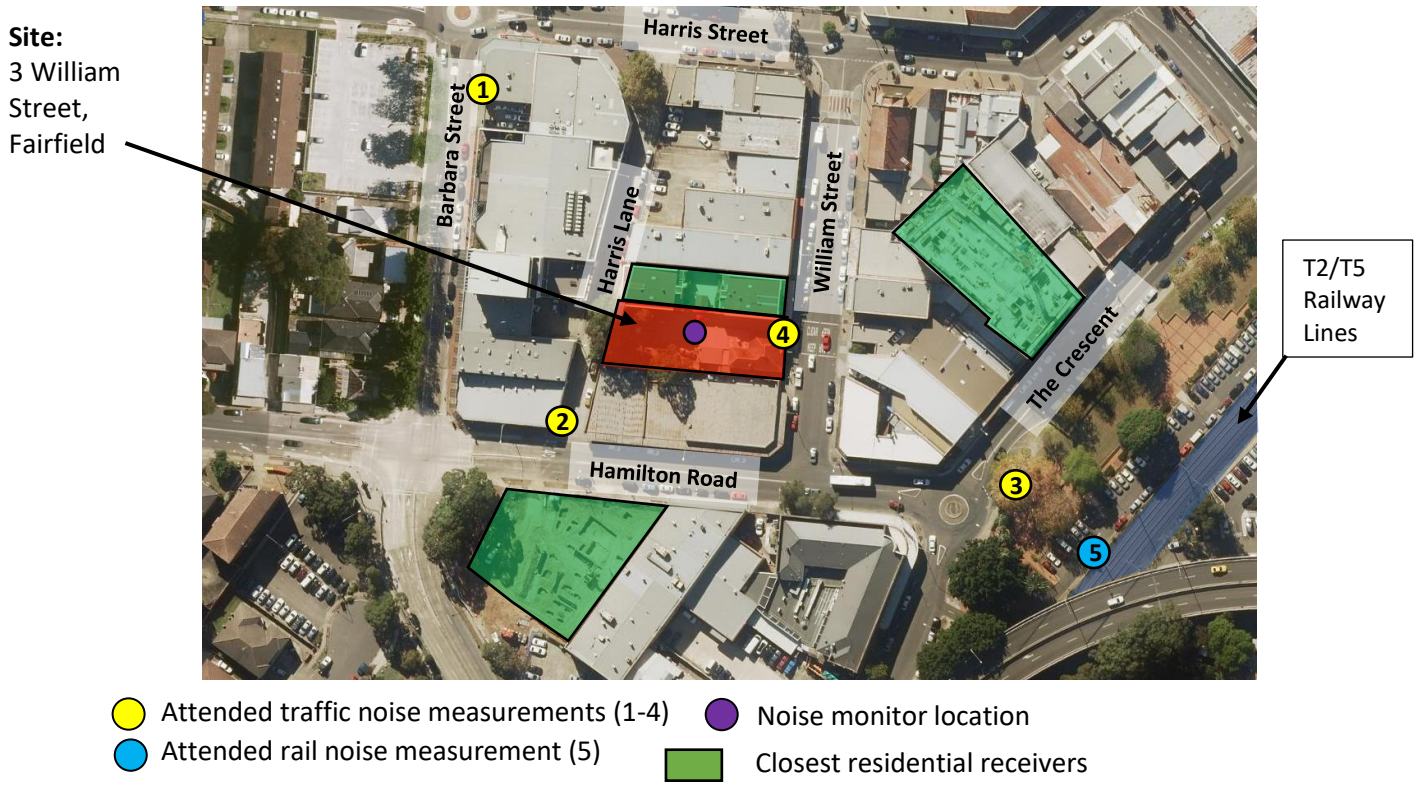
- Attached to the northern boundary is a three-storey mixed use development including a commercial dwelling on the ground floor and residential apartments on the two upper levels. Further to the north of the site are existing two level commercial developments and further than this at approximately 80m from the northern boundary is Harris Street, which carries medium to high volumes of traffic flow;

- Attached to the southern boundary is a single level commercial building. Further to the south of the site is Hamilton Road which carries medium to high volumes of traffic flow. On the opposite side of Hamilton Road are commercial and residential developments;

- Directly to the east of the site runs William Street which carries medium to low volumes of traffic flow. At the opposite side of William Street are existing commercial and residential developments. Further to the east at approximately 70m from the eastern boundary is The Crescent which runs high volumes of traffic flow. Directly opposite The Crescent is The Crescent Reserve and further to the east, at approximately 130m from the eastern boundary of the site run the T2 and T5 rail lines.

- Directly to the west of the site is Harris Lane which provides access from Hamilton Road to Harris Street. Harris Lane also provides access to the back of the developments along William Street and Barbara Street. Further to the west at the opposite side of Harris Lane are existing commercial developments and further to the east at approximately 50m from the western boundary is Barbara Street which carries medium volumes of traffic flow.

Figure 1 – Proposed Development Site



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.

4 EXTERNAL NOISE INTRUSION CRITERIA

The most significant noise emissions are caused by traffic from surrounding roads. Noise impacts from the road traffic noise should comply with the requirements of the Fairfield City Council DCP 2013, NSW Department of Planning's 'Development Near Rail Corridors and Busy Roads (Interim Guideline)' and the Australian/ New Zealand Standard AS/NZS 2107:2016.

4.1 ACOUSTIC OBJECTIVES

4.1.1 Fairfield City Council DCP 2013

There are no specific noise goals stated in the Fairfield City Development Control Plan 2013 for boarding houses and retail,

4.1.2 Australian/New Zealand Standard AS/NZS 2107:2016 – Recommended Design Sound Levels and Reverberation Times for Building Interiors

Australian/ New Zealand Standard AS/NZS 2107:2016 recommends the following internal noise levels within habitable spaces:

Table 2 – AS2107 Acoustic Criteria

Type of Occupancy	Room Type	Time Period	Criteria/Descriptor dB(A)L_{eq}
Houses and apartments in suburban areas or near minor roads	Sleeping Areas	10:00pm – 7:00am	35 dB(A)
	Living Areas	7:00am – 10:00pm	40 dB(A)
Commercial	Small retail stores	When in use	50 dB(A)

4.1.3 NSW Department of Planning's 'Development Near Rail Corridors and Busy Roads (Interim Guideline)'

Section 3.5 of the NSW Department of Planning's 'Development Near Rail Corridors and Busy Roads (Interim Guideline)' states:

"The following provides an overall summary of the assessment procedure to meet the requirements of clauses 87 and 102 of the Infrastructure SEPP. The procedure covers noise at developments for both Road and Rail.

- *If the development is for the purpose of a building for residential use, the consent authority must be satisfied that appropriate measures will be taken to ensure that the following LAeq levels are not exceeded:*
  - *in any bedroom in the building: 35dB(A) at any time 10pm-7am*
  - *anywhere else in the building (other than a garage, kitchen, bathroom or hallway): 40dB(A) at any time."*

4.2 SUMMARY OF NOISE INTRUSION CRITERIA

This assessment shall be conducted in accordance with the most stringent criteria specified above, which is summarised below:

Table 3 - Internal Noise Level Criteria

Location	Time Period	Criteria
Bedrooms	10pm to 7am	35 dB(A) $L_{eq\ (worst\ 1\ hour)}$
Living Areas	7am to 10pm	40 dB(A) $L_{eq\ (worst\ 1\ hour)}$
Commercial	When in use	50 dB(A) $L_{eq\ (worst\ 1\ hour)}$

5 TRAFFIC NOISE MEASUREMENTS

Traffic noise measurements were taken at the site of the proposed development. Measurements were performed generally in accordance with the Australian Standard AS1055 – "Description and measurement of environmental noise – General Procedures".

5.1 UNATTENDED NOISE MEASUREMENTS

A long-term noise monitor was used to record background noise levels. The monitor was situated at the back of the existing dwelling approximately 8m from the southern boundary, 27m from the eastern site boundary, 10m from the northern site boundary and 25m from the western site boundary. The noise monitor was left on site 4th and 11th July 2018 (refer to Figure 1 above for location and Appendix 1 for unattended noise monitoring data).

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.

5.2 ATTENDED TRAFFIC NOISE MEASUREMENTS

Attended noise measurements were undertaken to compliment long term monitoring on the 11th July 2018 between the hours of 4:00pm and 5:00pm. Attended noise measurements were conducted at the surrounding roads listed below (also shown in Figure 1);

1. At the corner of Barbara Street and Harris Street, approximately 2m from Barbara Street kerb and 8m from Harris Street;
2. Approximately 3m from Hamilton Road kerb;
3. Approximately 3m from The Crescent kerb;
4. At the eastern boundary of the site which is approximately 5m away from William Street kerb.

Measurements were undertaken using a Norsonics Type 140 precision sound level analyser, set to A-weighted fast response. The precision sound level analyser was calibrated before and after the measurements using a Norsonics 1251 precision sound level calibrator. No significant drift was recorded.

5.3 MEASUREMENT RESULTS

The traffic noise levels listed in the Table below were determined based on the testing done on site. In determination of acoustic treatments at each façade, the measured level is adjusted for distance and orientation.

Table 4 - External Noise Level at the Retail façades (Traffic Noise)

Facade	Time Period	Noise Level dB(A)
Northern Façade	Day (7am – 10pm)	55 dB(A) $L_{Aeq\ (worst\ 1\ hour)}$
Southern Façade	Day (7am – 10pm)	55 dB(A) $L_{Aeq\ (worst\ 1\ hour)}$
Eastern Façade	Day (7am – 10pm)	58 dB(A) $L_{Aeq\ (worst\ 1\ hour)}$
Western Façade	Day (7am – 10pm)	58 dB(A) $L_{Aeq\ (worst\ 1\ hour)}$

Table 5 - External Noise Level at the Boarding House façades (Traffic Noise)

Facade	Time Period	Noise Level dB(A)
Eastern Façade	Day (7am – 10pm)	55 dB(A) $L_{Aeq\ (worst\ 1\ hour)}$
	Night (10pm – 7am)	52 dB(A) $L_{Aeq\ (worst\ 1\ hour)}$
Western Façade	Day (7am – 10pm)	61 dB(A) $L_{Aeq\ (worst\ 1\ hour)}$
	Night (10pm – 7am)	58 dB(A) $L_{Aeq\ (worst\ 1\ hour)}$

6 EVALUATION OF NOISE INTRUSION

Internal noise levels will primarily be as a result of noise transfer through the windows, doors and roof, as these are relatively light building elements that offer less resistance to the transmission of sound.

The predicted noise levels through the windows, doors and roof are discussed below. The predicted noise levels have been based on the measured level and spectral characteristics of the external noise, the area of building elements exposed to traffic noise, the absorption characteristics of the rooms and the noise reduction performance of the building elements.

In all cases, the recommended constructions (refer below) reduces internal noise levels to within the nominated criteria for the various space types.

Noise intrusion recommendations have been provided to attenuate noise from surrounding road traffic.

6.1 RECOMMENDED GLAZING

The Table below details the recommended glazing assemblies for this project to achieve the internal traffic noise requirements. All external windows and doors listed are required to be fitted with Q-lon type acoustic seals.

The glazing thicknesses recommended are those needed to satisfy acoustic requirements and do not take into account other requirements such as thermal, structural, safety or other considerations. These additional considerations may require the glazing thickness to be increased beyond the acoustic requirement. In such cases, thicker window glazing will be acoustically acceptable.

Table 6 – Minimum Glazing Thickness Recommendations

Building	Room	Glazing thickness	Acoustic Seals
Commercial (Fire Station)	Retail (windows facing William Street)	6mm float	Yes
	Retail (remaining windows)	4mm float	Yes
Boarding House	All Bedrooms facing west	6.38mm laminate	Yes
	All Bedrooms facing east	6mm float	Yes
	Lobby/ Communal Room	6mm float	Yes

In addition to complying with the minimum scheduled glazing thickness, the STC rating of the glazing fitted into operable frames and fixed into the building opening should not be lower than the values listed in Table 7 for all rooms. Where nominated, this will require the use of acoustic seals around the full perimeter of operable frames and the frame will need to be sealed into the building opening using a flexible sealant. **Note that mohair seals in windows and doors are not acceptable where acoustic seals are required.**

The window/door suppliers should provide evidence that the systems proposed have been tested in a registered laboratory with the recommended glass thicknesses and comply with the minimum

listed STC requirements. Also, the glazing installer should certify that the window/doors have been constructed and installed in a manner equivalent to the tested samples.

Table 7 - Minimum STC/Rw of Glazing Requirements

Glazing Assembly	Acoustic Seals	Minimum STC/Rw of Installed Window
4mmn float	Yes	27
6mm float	Yes	29
6.38mm laminate	Yes	31

6.2 EXTERNAL WALLS

Walls of a masonry construction will not require further acoustic treatment.

6.3 ROOF / CEILING CONSTRUCTION

The concrete tile roof of the retail area is proposed to be retained and will not require any upgrading for achieving the acoustic requirements.

The roof of the boarding house is proposed to be constructed from lightweight materials. In order to achieve the acoustic requirements, the roof/ceiling construction of the top level of the boarding house shall adopt the following construction recommendations.

Penetrations in all ceilings (such as for light fittings etc.) must be acoustically treated and sealed gap free with a flexible sealant.

Table 8 – Roof/Ceiling Construction (Boarding House)

Space	External Lining	Ceiling Cavity	Internal Lining
All areas	Metal Sheet	Large ceiling cavity with 75mm thick 11kg/m^3 glass wool insulation (or similar) in cavity	10mm Plasterboard

6.3.1 Ventilation Requirements

With respect to natural ventilation of the dwelling, the NSW Department of Planning document "Development near Busy Roads and Rail Corridors - Interim Guideline" dictates that:

- *"If internal noise levels with windows or doors open exceed the criteria by more than 10dB(A), the design of the ventilation for these rooms should be such that occupants can leave windows closed, if they so desire, and also to meet the ventilation requirements of the Building Code of Australia."*

With windows open, the allowable internal noise goal is permitted to be 10dB(A) higher than when the windows are closed (i.e. – allowable level in bedrooms becomes 45dB(A), and 50dB(A) in living rooms).

The internal noise goals will be achieved with the windows open for natural ventilation in all areas of the proposed development except of the bedrooms facing to the west.

Although windows on these facades can be *openable*, the required internal noise level for rooms on these facades is only achieved when the windows are closed.

Should any supplementary fresh air for these rooms (ventilation system or other) be required, it should be acoustically designed to ensure that the acoustic performance of the acoustic treatments outlined above are not reduced and does not exceed Council criteria for noise emission to nearby properties.

Remaining facades will achieve suitable internal noise levels with the windows left open.

7 NOISE EMISSION ASSESSMENT

Noise emissions from the site should be assessed to ensure that the amenity of nearby land users is not adversely affected. Noise generated by mechanical plant servicing the development and noise from the communal areas have been identified as the sources of potential noise emission from the development.

A long-term noise monitor was installed at the back of the existing dwelling at 3 William Street, approximately 8m from the southern site boundary, 27m from the eastern site boundary, 10m from the northern site boundary and 25m from the western site boundary. (Refer to Appendix 1 for unattended noise monitor data).

See Table below for resulting background noise levels

Table 9 - Measured Background Noise Levels

Location	Period/Time	Rating Background Noise Level dB(A) $L_{90(period)}$
3 William Street, Fairfield (Proposed Site) (Refer to Figure 1) @8m from southern boundary, 27m from eastern boundary, 10m from northern boundary and 25m from western boundary of site	Day (7am-6pm)	47
	Evening (6pm-10pm)	47
	Night (10pm-7am)	44

7.1 ACOUSTIC OBJECTIVES

Acoustic objectives will be based on:

- Fairfield City Council DCP 2013; and
- NSW EPA – Noise Policy for Industry (NPfI).

7.1.1 Fairfield City Council DCP 2013

Chapter 10 of the Fairfield City Council DCP includes the following in regards to Visual and Acoustic amenity impacts from Boarding Housing developments.

10.7.8 Visual and Acoustic Amenity Impacts

b) Council may require an acoustic report prepared by a suitably qualified acoustic consultant, if there is the potential for significant impacts from noise emissions. The investigation shall include but is not limited to the following:

a. the identification of sensitive noise receivers potentially impacted by the proposal;
b. the quantification of the existing acoustic environment at the receiver locations;
c. the formulation of suitable assessment criteria;
d. details of any acoustic control measures that will be incorporated into the proposal;
e. the identification of all noise that is likely to emanate from the boarding house and the subsequent prediction of resultant noise at the identified sensitive receiver locations; and

f. a statement certifying that the development is capable of operating without causing a nuisance or result in an 'offensive noise' as defined in the Protection of the Environment Operations Act 1997 at any adjacent developments.

There are no specific criteria stated in the Fairfield City Council DCP relating to acoustic noise amenity from mechanical plant, therefore criteria will be from the EPA Industrial Noise Policy and The Protection of the Environment Operations Regulation Act 2000, as described below.

7.2 NSW EPA - NOISE POLICY FOR INDUSTRY (NPFI)

Intrusiveness, amenity and sleep disturbance criteria are applicable, and are detailed below.

7.2.1 Project Intrusiveness Criteria

Intrusiveness criteria requires that noise from the site not exceed background noise level by more than 5dB(A)$L_{Aeq(15min)}$.

For the proposed residential development, the following goals will apply:

Table 10 – Intrusiveness Criteria

Time of Day	Background Noise Level (Measured) dB(A)L_{90}	Intrusiveness Noise Emission Objective dB(A)$L_{Aeq(15min)}$
Day (7am-6pm)	47	52
Evening (6pm-10pm)	47	52
Night (10pm-7am)	44	49

For future residential development:

- As per section 2.4.3 of the NPfI, for sites where changing land use is expected to change the existing acoustic environment, it is appropriate to use the Amenity Criteria (based on the zoned use/density) as opposed to the Intrusiveness Criteria.

- The applicable Amenity Criteria are detailed in the following section.

7.2.2 Project Amenity Criteria

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 proposed residential dwellings will be considered urban.

Table 11 – Project Amenity Criteria

Noise Receiver	Amenity Noise Level –-dB(A)$L_{eq(15min)}$		
	Daytime (7am – 6pm)	Evening (6pm – 10pm)	Night (10pm – 7am)
Neighbouring Residences	58	48	43

7.2.3 Summarised noise emission criteria

The most stringent noise criteria between intrusiveness and amenity criteria have been adopted for each time period. The summarised noise emission limit is below:

Table 12 – Summarised Noise Emission Criteria

Noise Receiver	Day Time	Evening Time	Night Time
Residential Boundary	52	48	43

7.3 MECHANICAL PLANT

Mechanical plant items are not typically selected at DA stage.

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 5.2/5.3 of this report.

All plant can be satisfactorily attenuated to levels complying with noise emission criteria through appropriate location and (if necessary) standard acoustic treatments such as noise screens, enclosures, in-duct) treatments (silencers/lined ducting or similar).

7.4 NOISE EMISSION FROM OUTDOOR/INDOOR COMMUNAL AREAS

7.4.1 Outdoor communal area

The outdoor communal area has been assessed for gatherings of the tenants of the boarding house. This assessment has been based on the following:

- Up to 15 people will be using the outdoor communal area at the same time.
- Based on previous measurements in similar outdoor spaces, the sound power level of a patron talking with raised voice will be 74dB(A)L_{10}.
- 1 in 3 people talk with raised voice at any one time.

With respect to noise transmissions from the outdoor communal area to the closest residential receivers, the noise levels in the Table below have been predicted.

Table 13 – Noise Emissions from the External Communal Space

Space	Receiver	Predicted Noise Level (L_{Aeq})	Noise Emission Criteria (Day) (L_{Aeq})	Compliance?
External Communal Area	Closest residential to the north @yard	<45	52	Yes
	Closest residential to the north @level 3 window*	52	52	Yes

*A worst-case scenario location, as at the level 3 windows, there is effectively no noise screening provided by boundary fencing.

7.4.2 Indoor communal area

The indoor communal area noise emission assessment has been based on the following assumptions:

- Up to 30 people will be using the indoor communal area at the same time (assumption based on one person from each unit will be at the indoor communal area at the same time).
- Based on previous measurements in similar indoor spaces, the sound power level of 10 patrons talking will be 76dB(A)L_{Aeq}.
- The windows to the north were assumed to be open for an area of approximately 7m^2 to allow for natural ventilation, while the indoor communal area is occupied.

With respect to noise transmissions from the indoor communal area to the closest residential receivers, the noise levels in the Table below have been predicted.

Table 14 – Noise Emissions from the External Communal Space

Space	Receiver	Predicted Noise Level (L_{Aeq})	Noise Emission Criteria (Day/Evening) (L_{Aeq})	Compliance?
Internal Communal Area	Closest residential to the north @yard	<45	52	Yes
	Closest residential to the north @window	<50	52	Yes

7.5 VEHICLE NOISE

We note that the car park is located underground, with the driveway entrance located in the south-western corner of the site (away from the residential development to the north).

Noise from the use of the car park will comply with the noise emission criteria set out in section 7.1

8 DISCUSSION

In order to comply with the noise emission and noise intrusion criteria as detailed in the previous sections, the following building and management controls are required:

- Up to 15 people to be using the outdoor communal area at any time during the day.
- Up to 10 people to be using the outdoor communal area at any time during the evening.
- Communal areas (indoor or outdoor) are not to be used for parties.
- The outdoor communal area should not be used between the hours of 10pm to 7am.
- All windows of the indoor communal area should be minimum 6.38mm thick with acoustic seals around the perimeter.
- All windows of the internal communal area should be closed between the hours of 10pm to 7am.

9 CONCLUSION

Potential noise intrusion and noise emissions into and from the proposed Boarding House and Retail developments at 3 William Street, Fairfield have been assessed.

Provided acoustic treatments in Sections 6 and 8 of this report are adopted, traffic noise impacts on the proposed development will comply with the requirements of Fairfield City Council DCP 2013, NSW Department of Planning's 'Development Near Rail Corridors and Busy Roads (Interim Guideline)' and the Australian/New Zealand Standard AS/NZS 2107:2016 – Recommended Design Sound Levels and Reverberation Times for Building Interiors.

Potential noise emissions associated with the proposed development have been assessed with reference to NSW EPA Noise Policy for Industry (NPfI) and presented in Section 7.

Please contact us should you have any further queries.

Yours faithfully,

Eleni Chrysafis

APPENDIX 1 - UNATTENDED BACKGROUND NOISE MEASUREMENTS