MARSHALL DAY Acoustics

# 57 RAILWAY STREET GRIFFITH
# ACOUSTIC REPORT FOR DEVELOPMENT APPLICATION

Rp 001 20230838 | 1 December 2023

Marshall Day Acoustics Pty Ltd
ABN: 53 470 077 191
Gadigal Eora Country
C 14, 372 Wattle Street
Ultimo NSW 2007
T: +612 9282 9422
www.marshallday.com

Project: **57 RAILWAY STREET GRIFFITH**

Prepared for: **Joss Group**
**PO Box 7079**
**Albury NSW 2640**

Attention: **Martin Reid**

Report No.: **Rp 002 20230868**

**Disclaimer**

Reports produced by Marshall Day Acoustics Pty Ltd are based on a specific scope, conditions and limitations, as agreed between Marshall Day Acoustics and the Client. Information and/or report(s) prepared by Marshall Day Acoustics may not be suitable for uses other than the specific project. No parties other than the Client should use any information and/or report(s) without first conferring with Marshall Day Acoustics.

The advice given herein is for acoustic purposes only. Relevant authorities and experts should be consulted with regard to compliance with regulations or requirements governing areas other than acoustics.

**Copyright**

The concepts and information contained in this document are the property of Marshall Day Acoustics Pty Ltd. Use or copying of this document in whole or in part without the written permission of Marshall Day Acoustics constitutes an infringement of copyright. Information shall not be assigned to a third party without prior consent.

## Document Control

| Status: | Rev: | Comments | Date: | Author: | Reviewer: |
|---|---|---|---|---|---|
| Final | - | Issued for information | 1 Dec 2023 | S.Connolly | A.Bavage |

# TABLE OF CONTENTS


1.0 INTRODUCTION ..... 4

2.0 PROJECT DESCRIPTION ..... 4

2.1 Project proposal ..... 4

2.2 Site and surrounding area ..... 5

2.3 Noise sources associated with proposed development ..... 6

2.3.1 Air conditioning ..... 6

2.3.2 Automatic Carpark access doors ..... 6

2.4 Noise exposure ..... 6

3.0 CRITERIA ..... 7

3.1 External noise intrusion criteria ..... 7

3.2 Noise emission criteria ..... 7

4.0 RAILWAY NOISE AND VIBRATION ..... 8

4.1 Predicted noise levels ..... 9

4.2 Recommendations ..... 11

4.3 Ground Borne Noise ..... 14

4.4 Vibration ..... 15

5.0 MECHANICAL PLANT OPERATION ..... 15

6.0 CONCLUSIONS ..... 17

6.1 Railway Noise and Vibration Impacts ..... 17

6.2 Mechanical Plant Noise Emissions ..... 17

6.3 Automatic Carpark doors ..... 17

APPENDIX A GLOSSARY OF TERMINOLOGY

APPENDIX B NOISE POLICY FOR INDUSTRY CRITERIA DERIVATION

## 1.0 INTRODUCTION

A residential development is proposed at 57 Railway Street Griffith. The proposed development includes four levels of residential apartments above enclosed parking.

Marshall Day Acoustics has been engaged by Joss Group to prepare an acoustic report for submission with the proposed Development Application for the project.

This assessment addresses the following:

- The likely noise emission from proposed air-conditioning units
- Noise impact onto the development from the adjacent existing rail corridor.

Acoustic terminology used throughout this report is described in Appendix A.

## 2.0 PROJECT DESCRIPTION

### 2.1 Project proposal

The proposed development includes three levels of residential apartments all of which are three-bedroom arrangements. The ground level layout will comprise enclosed parking for up to 40 vehicles together with external open landscape areas.

There is allowance on the roof top for air conditioning condenser units although mechanical services designs for the building have not yet been finalised.

At this stage of the design, it is proposed that the building will comprise a concrete frame structure, with precast panels to the external façades. Apartments will include balconies with access via glazed sliding door suites. At this stage, the roof structure is to consist of a concrete slab although there may be scope to incorporate a lightweight frame system and metal deck.

The assessment is based on the architectural drawings set out in Table 1 and prepared by CohenLeigh Architects for Joss Group (the Client).

**Table 1: Drawing references for 57 Railway Street Griffith**

| Drawing | Title | Rev | Date |
|---|---|---|---|
| SK01 | Coversheet | F | 23-9-2023 |
| SK02 | Site Plan | F | 23-9-2023 |
| SK03 | Floor Plan – GF | F | 23-9-2023 |
| SK04 | Floor Plan – $L_1$ | F | 23-9-2023 |
| SK05 | Floor Plan – L2 | F | 23-9-2023 |
| SK06 | Floor Plan – L3 | F | 23-9-2023 |
| SK07 | Floor Plan – Roof | F | 23-9-2023 |
| SK08 | Elevations – Sheet 1 | F | 23-9-2023 |
| SK09 | Elevations – Sheet 1 | F | 23-9-2023 |
| SK10 | Sections – Sheet 1 | F | 23-9-2023 |
| SK11 | Sections – Sheet 2 | F | 23-9-2023 |
| SK12 | Sections – Sheet 3 | F | 23-9-2023 |
| SK13 | Area Analysis – FSR | F | 23-9-2023 |

| Drawing | Title | Rev | Date |
|---|---|---|---|
| SK14 | Perspective Views - Sheet 1 | F | 23-9-2023 |
| SK15 | Perspective Views - Sheet 2 | F | 23-9-2023 |

## 2.2 Site and surrounding area

The proposed apartments development is to be located 57 Railway Street Griffith. The site is located immediately to the east of an existing Quest Serviced Apartments Building. The remaining locale comprises the Griffith Local court and parkland to the south west, and commercial premises and the Olympic Street further to the west of the site.

A residential property is located across Ulong Street to the west, however this is located within the same zone as the surrounding commercial locale. The closest purely residential area zone R3 is located to the north, across the railway, on the opposite site of Wakaden Street. The position of the site in the context of the immediate locale is shown in Figure 1.

**Figure 1: Site locale**

**Table 2: Identified nearest receivers**

| Receiver ID | Location and description |
|---|---|
| R1 - Residential | 34 Ulong Street single storey residential dwelling |
| R2 - Residential | 281 Wakaden Street 2 storey residential apartments |
| R3 - Residential | 268 Wakaden Street single storey residential dwellings |
| R4 - Residential | 258 Wakaden Street single storey residential dwellings |
| R5 - Residential | Quest Serviced Apartments |
| C1 - Commercial | 2 Storey commercial building |
| C2 - Commercial | Law Courts Building |
| C3 - Commercial | Griffith Telephone Exchange |

## 2.3 Noise sources associated with proposed development

The residential nature of the development is such that there is limited scope for noise impacts likely to be generated by the normal residential use. Other than the Quest apartments, the surrounding boundaries are adjacent commercial areas with distant residential area concentration to the North across the rail line.

### 2.3.1 Air conditioning

Split system air-conditioning units are proposed for residential units with condensing units to be located on the roof top. While mechanical services design has not yet been finalised, a preliminary assessment has been based on a nominal sound power allowance of 70 dB $L_{WA}$ for each condenser. We have assumed there would be one condenser provided for each apartment (total 18).

There may also be ancillary ventilation fans, however it will be feasible to specify any necessary acoustic controls during the design stages of the project.

### 2.3.2 Automatic Carpark access doors

Automatically operating access door to the carpark should be selected on the basis of a low operating noise level such that they do not cause disturbance to future residents of the building nor occupants of the Quest apartments. The door mechanism should be vibration isolated from the building to limit the transmission of structure borne noise.

## 2.4 Noise exposure

The Project site is located at 57 Railway Street, Griffith, NSW. The sites are bounded by Railway Street to the south and the railway to the north.

A railway line is located approximately 20m to the north of the site. Train movements are infrequent however.

The UGL Regional Linx Standard working time, commencing 10th June 2022, indicates that freight train movements at Griffith during the night-time period of 2200-0700hrs (10pm to 7am) would consist of up to two (2) trains departing at 0329hrs and 0504hrs on a Wednesday night, with movements on other nights limited to one only.

The timetable indicates that during the daytime hours of 0700-2200hrs (7am to 10pm) there would be up to two train movements (passenger or freight).

It is also understood that some shunting activity occurs at the nearby station.

# 3.0 CRITERIA

## 3.1 External noise intrusion criteria

The relevant noise criteria are included within the *NSW Department of Planning Document Development near rail corridors and busy roads - interim guideline*.

The noise criteria in the guideline for residential buildings is as follows:

**Table 3: Guideline noise criteria**

| Type of occupancy | Noise level dBA | Appliable time period |
|---|---|---|
| Sleeping areas (bedroom) | 35 | Night 10pm to 7am) |
| Other habitable rooms (excl. garages, kitchens, bathrooms and hallways) | 40 | At any time |

Note: airborne noise is calculated as $L_{eq}$ (9h) (night) and $L_{eq}$ (15h)(day). Groundborne noise is calculated as $L_{max}$ (slow) for 95% of rail pass-by events

We also recommend that Sleep Disturbance criteria should be considered for individual noise events such as truck pass-bys and railway movements.

The Environment Protection Authority document the NSW Road Noise Policy which compares a number of sleep disturbance criteria and states the following:

- *Maximum internal noise levels below 50–55 dBA are unlikely to awaken people from sleep*
- *One or two noise events per night, with maximum internal noise level of 65-70 dBA are not likely to affect health and wellbeing significantly.*

An open window provides an outside to inside noise reduction of approximately 10dB. A standard closed window provides a noise reduction of 20-25dB. Based on the NSW EPA findings, a noise level of $L_{Amax}$ 60-65dB outside an open bedroom window would be unlikely to cause awakening reactions.

## 3.2 Noise emission criteria

Noise emissions from the mechanical plant are typically limited to an allowable margin above the existing background noise levels. Surveys of existing noise levels at the site have not yet been carried out however the EPA Noise Policy for Industry (NPfI) provides information on minimum assumed Rating Background noise levels. These set out minimum existing background noise levels for use with the NPfI and provide an expectation of the minimum existing noise levels that would be used when establishing a intrusive noise criteria

Project specific noise criteria have been derived based these minimum criteria in the NPfI. A full derivation of the project specific noise criteria is provided in Appendix B.

**Table 1: NPfI Project Noise Trigger Levels**

| Receiver | Period | Time of day | Project Noise Trigger Level, $L_{Aeq,\ 15min}$, dB |
|---|---|---|---|
| Residential | Day | 0700[1]-1800hrs | 40 |
| | Evening | 1800-2200hrs | 35 |
| | Night | 2200-0700[1]hrs | 35 |
| Commercial | When in use | | 63 |

[1]*0800 hrs Sundays and public holidays*

The above criteria would apply for the emission of mechanical services on site to surrounding neighbours.

## 4.0 RAILWAY NOISE AND VIBRATION

At this stage, a detailed noise and vibration assessment has not been conducted at the site. We have based our assessment on previous measurements at similar sites. As noted previously, train movements are infrequent and event noise is likely to vary dependant on train type and movement. For the purposes of this assessment, we have assumed that the scheduled train movements would extend past the site.

The following sound power levels have been used in our assessment.

**Table 4: Train sound power levels used in calculations**

| Description | Sound Power Level dB re $10^{-12}$ W<br>Octave band mid frequency | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | **dBA** | **63** | **125** | **250** | **500** | **1k** | **2k** | **4k** | **Hz** |
| Diesel locomotives, moving slowly (log average of file samples) $L_{eq}$ | 108 | 116 | 108 | 108 | 104 | 100 | 100 | 101 | dB |
| Diesel locomotives, idling (log average of file samples) $L_{eq}$ | 101 | 110 | 104 | 102 | 99 | 95 | 90 | 88 | dB |
| Wagons/Carriages (excluding locomotive) $L_w$ dB/m $L_{eq}$ | 89 | 99 | 93 | 89 | 86 | 82 | 82 | 78 | dB/m |

There is a rail crossing in the vicinity of the site it would be expected that a train may sound its horn on approach. Noise from the horn is difficult to predict as it will depend on the individual train, location when sounding and the directivity between the horn and the reception point. It would be necessary to establish this level on site, however the limited number of train movements would indicate that overall $L_{Aeq}$ 9hr and 15 hr noise levels are unlikely to be impacted. The sounding of horns during night-time hours would require consideration with a comparison with sleep disturbance criteria.

As a guide, data held by this office includes a sample horn level of 83dB $L_{Amax}$ at 30 metres. Based on this a level the facade position would be of the order 83 – 86dB $L_{Amax}$.

Based on the above sound power data we have carried out estimates of noise levels at the expected facade position of the apartment buildings (excluding any facade reflection component). These are shown in Table 5 below.

**Table 5: Calculated noise levels at façade position**

| Calculated noise level at future north facade position (approximately 20 metres) | Sound Pressure level dB re $2x10^{-5}$Pa Octave band mid frequency | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | **dBA** | **63** | **125** | **250** | **500** | **1k** | **2k** | **4k** | **Hz** |
| Diesel locomotives and carriages/wagons, moving slowly at 20 km/hr allowance for 1000m length train, 180 second pass-by | 77 | 85 | 79 | 76 | 73 | 69 | 69 | 68 | dB |
| Locomotive idling $L_{eq}$ | 67 | 76 | 70 | 68 | 65 | 61 | 56 | 54 | dB |
| Calculated night $L_{eq9hr}$ including 2 train movements)<br>Diesel locomotives and carriages/wagons, moving slowly at 20 km/hr allowance for 1000m length train, 180 second pass-by | 56 | 57 | 61 | 53 | 50 | 49 | 49 | 45 | dB |
| Calculated day $L_{eq15hr}$ including 2 train movements)<br>Diesel locomotives and carriages/wagons, moving slowly at 20 km/hr allowance for 1000m length train, 180 second pass-by | 53 | 55 | 59 | 51 | 48 | 47 | 47 | 43 | dB |
| Calculated $L_{max}$ noise levels (for use night time period) | 84 | 84 | 87 | 79 | 76 | 78 | 78 | 75 | dB |
| Train horns guidance level $L_{Amax}$ | 86 | | | | | | | | |

## 4.1 Predicted noise levels

Noise levels have been predicted within the apartments based on the sound data detailed in Table 4 assuming that the glazing will be standard 6 mm glass, (ie not specifically acoustic rated) or thermal double glazing with configuration of 6/8/4. Predicted noise levels are detailed in Table 6 (windows closed) and Table 7 (windows open).

**Table 6: Train noise level calculated within north facing apartments – standard glazing systems windows closed.**

| Description | Predicted noise level, dB (range dependent on standard glazing selection) | Guideline Criteria dB windows closed | Complies |
|---|---|---|---|
| Calculated night $L_{eq9hr}$ including 2 train movements)<br>Diesel locomotives and carriages/wagons, moving slowly at 20 km/hr allowance for 1000m length train, 180 second pass-by<br>Allowance for 30 minute loco idle | North Bedroom<br>40 to 45 $L_{Aeq(9hr)}$ | 35 $L_{Aeq}$(9hr) | No |
| Calculated day $L_{eq15r}$ including 2 train movements)<br>Diesel locomotives and carriages/wagons, moving slowly at 20 km/hr allowance for 1000m length train, 180 second pass-by<br>Allowance for 30 minute loco idle | North Living room<br>35 to 40 $L_{Aeq(9hr)}$ | 40 $L_{Aeq}$(15hr) | Yes |
| Calculated $L_{max}$ noise levels (for use night time period) | North Bedroom<br>60 to 65 $L_{Amax}$<br>Train horns may exceed this level, to be determined on site | Refer EPA RNP<br>50-55 maximum for awakening unlikely.<br>65-70 maximum 1-2 times per night for health and well being | No |

**Table 7: Train noise level calculated within north facing apartments – standard glazing systems windows open**

| Description | Predicted noise level, dB, allowing 10 dB windows open | Guideline Criteria dB – windows open | Complies |
|---|---|---|---|
| Calculated night $L_{eq9hr}$ (including 2 train movements)<br>Diesel locomotives and carriages/wagons, moving slowly at 20 km/hr allowance for 1000m length train, 180 second pass-by<br>Allowance for 30 minute loco idle | Bedroom<br>48 $L_{Aeq(9hr)}$ | 45 $L_{Aeq}$ (9hr) | No |
| Calculated day $L_{eq15r}$ (including 2 train movements)<br>Diesel locomotives and carriages/wagons, moving slowly at 20 km/hr allowance for 1000m length train, 180 second pass-by (2 train movements in 9 hour period)<br>Allowance for 30 minute loco idle | Living room<br>46 $L_{Aeq(9hr)}$ | 50 $L_{ea}$(15hr) | Yes |
| Calculated $L_{max}$ noise levels (for use night time period) | Bedroom<br>74 $L_{Amax}$<br>Train horns may exceed this level, to be determined on site | Refer EPA RNP<br>50-55 maximum for awakening unlikely<br>65-70 maximum 1-2 times per night for health and well being | No |

The predicted noise levels in terms of $L_{eq}$ are expected to exceed the specified criteria for bedrooms, when considered over the required time period event, although this depends on the sound reduction offered by the standard glazing systems.

The proximity of shunting activity and the possible short term maximum noise levels is also a concern on the basis that it may occur over an extended period of time. Noise levels are expected to comply with the open window criteria in the guideline within living areas, during the daytime hours of 0700-2000hrs (7am to 10pm). The open window criteria in the bedrooms is however expected to be exceeded. It would be necessary to close the windows in the bedrooms in order to minimise disturbance from train noise during the night-time hours. This may have implications achieving necessary ventilation.

## 4.2 Recommendations

Given the above, it is recommended that the glazing be provided with a specific acoustic performance requirement in order to reduce internal noise to within the recommended range.

The proposed glazing acoustic ratings at each location are shown in Figure 2 below.

It is understood from current drawings that external walls are to consist of pre-cast concrete. On this basis, no special acoustic treatment is required to fixed (solid non glazed) facade sections. The roof has been assumed to be a concrete slab or upgraded light-weight construction. The minimum required acoustic rating for the roof and ceiling is generally $R_w$ 45, except for bedrooms as noted in Figure 2 which would require $R_w$ 50.

The recommended ratings are preliminary and may vary depending on the results of site noise measurements and window sizing based around a dimensioned glazing schedule.

**Figure 2: Proposed glazing acoustic ratings.**

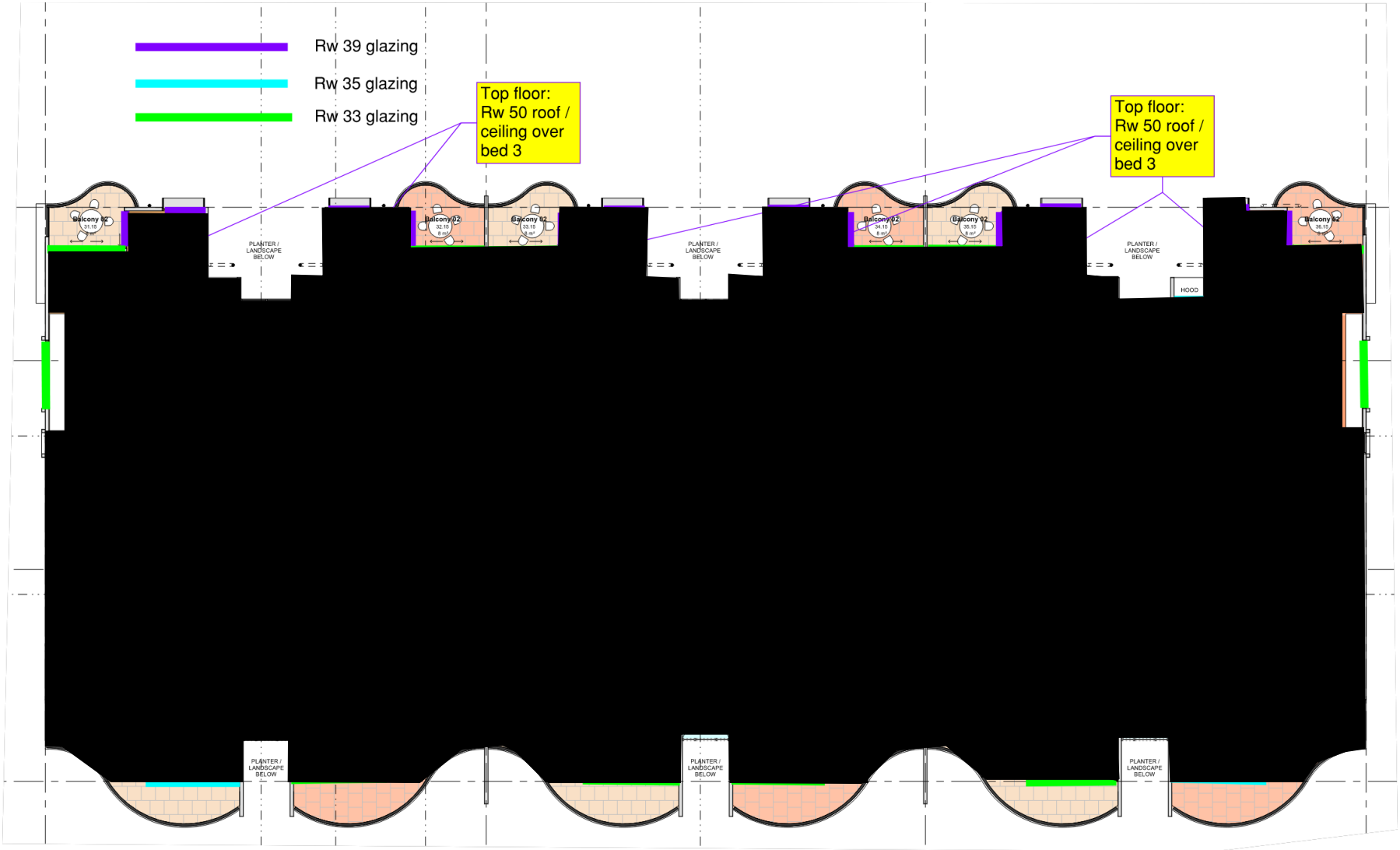


Table 8 provides a minimum acoustic performance requirement for each glazing configuration. The $R_w$ will also depend on the other components such as the frame, sash and seals and it would be necessary for a supplier to provide an acoustically tested systems meeting the required $R_w$ rating.

Table 8 also details nominal sliding door systems with complying acoustic rating provided by example suppliers.

**Table 8: Minimum and example glazing systems**

| Required acoustic rating | Minimum Glazing configuration for fixed glazing[1] | Sliding doors suites | Example sliding door suite (all acoustic ratings to be confirmed by supplier) |
|---|---|---|---|
| $R_w$ 33 | 6.38mm single<br>or<br>6.38mm laminated-12mm-6mm IGU | $R_w$ 33 | Alspec Altitude 6.38mm-6mm-6.38mm IGU<br>or<br>Capral AGS 900 Sliding door 10.38mm Laminated<br>or<br>6.38mm-12mm-6.38mm IGU |
| $R_w$ 35 | 10.38mm laminated<br>Or<br>6.5mm Acoustic laminated glass (single)<br>or<br>10mm-12mm-6mm IGU | $R_w$ 35 | Alspec Altitude 10.38mm-12mm-6.38mm IGU<br>or<br>Capral AGS 900 Sliding door 6.5mm Hush Laminated |
| $R_w$ 39 | 10.5mm Acoustic laminated glass<br>Or<br>10mm -12mm-6.38mm IGU | $R_w$ 39 | Alspec Proglide 6mm-12mm-9.52mm IGU<br>or<br>Capral AGS 900 Sliding door 10.5mm Hush Laminated on sliding panel, 12.5mm Hush Laminated on fixed panel |

[1] this is a minimum glazing configuration only and subject to manufacturers configuration requirements to achieve the $R_w$ specification. The manufacturers specification many require additional glass thickness or different configurations to achieve the $R_w$ specification.

With windows closed, the internal noise level criteria is predicted to be achieved as shown in Table 9. The noise levels predicted in Table 7 for the windows open would not change.

**Table 9: Train noise level calculated within north facing apartments with glazing per** Error! Reference source not found.

| Description | Predicted noise level, dB with glazing as per Figure 2 | Criteria dB windows closed | Complies |
|---|---|---|---|
| Calculated night $L_{eq9hr}$ (including 2 train movements.)<br>Diesel locomotives and carriages/wagons, moving slowly at 20 km/hr allowance for 1000m length train, 180 second pass-by | Bedroom<br>34 $L_{Aeq(9hr)}$ | 35 $L_{Aeq\ (9hr)}$ | Yes |
| Calculated day $L_{eq15r}$ (including 2 train movements.)<br>Diesel locomotives and carriages/wagons, moving slowly at 20 km/hr allowance for 1000m length train, 180 second pass-by | Living room<br><30 $L_{Aeq(15hr)}$ | 40 $L_{Aeq\ (15hr)}$ | Yes |
| Calculated $L_{max}$ noise levels (for use night time period) | Bedroom<br>55 $L_{Amax}$<br>Train horns may exceed this level, to be determined on site | Refer EPA RNP<br>50-55 maximum for awakening unlikely<br>65-70 maximum 1-2 times per night for health and well being | Yes,<br>Train horns may exceed this level, to be determined on site. Compliance with health and well being criteria expected provided not more that 1-2 occasions per night |

## 4.3 Ground Borne Noise

The NSW Department of Planning Document Development near rail corridors and busy roads - interim guideline provides the following comments for ground borne noise

*Generally, ground borne noise is associated more closely with rail operations than roads. Where buildings are constructed over or adjacent to land over tunnels, ground-borne noise may be present without the normal masking effect of airborne noise. In such cases, residential buildings should be designed so that the 95th percentile of train pass-bys complies with a ground-borne LAmax noise limit of 40dBA (daytime) or 35dBA (night-time) measured using the "slow" response time setting on a sound level meter.*

We would generally expect that, for apartments directly exposed to noise from the railway, the airborne noise intrusion through facade would be the dominant factor, rather ground borne noise impacts. Further there are few trains during the day or night-time period. Where ground borne noise is audible in apartment facing away from the railway (i.e. without noise exposure via windows) disturbance is unlikely. Nevertheless, this must be confirmed by suitable ground vibration measurements during detailed design.

## 4.4 Vibration

A desk-top noise and vibration review of the adjacent Quest site has been previously prepared by EMM in their letter dated 22 November 2012. The assessment concluded that vibration levels will be below recognised criteria for the effects of vibration on structures, occupant annoyance and vibration dose criteria.

We have previously undertaken a desk-top assessment of potential vibration impacts for the adjacent Quest site which confirmed that the criteria recommended by the following codes should be achieved at the site:

- Department of Transportation United States of America – Transit Noise and Vibration Impact Assessment, dated May 2006 (ground-borne noise and vibration criteria)
- Australian Standard 2670.3-1990 Vibration and Shock – Guide to the evaluation of human exposure to whole body vibration

Our predictions were based on train speeds of 60km/h, which are considered unlikely given the proximity of the station.

Compliance may become marginal if there are any track cross-overs nearby or if train suspension is particularly stiff. Given the relatively low number of train movements per day, it is expected that marginal compliance would still be considered acceptable and low risk. As for ground borne noise, this must be confirmed by suitable ground vibration measurements during detailed design.

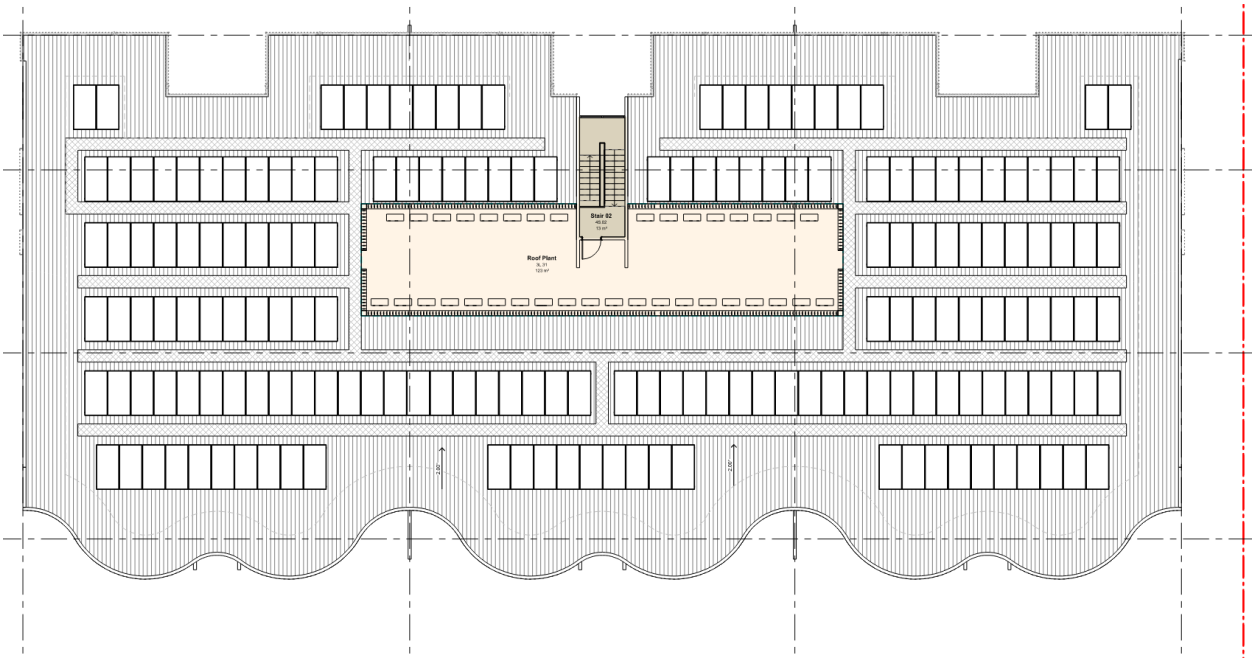
# 5.0 MECHANICAL PLANT OPERATION

While the plant and equipment selections are not known at this stage, a preliminary review has been undertaken to assess the possible noise impact to the surrounding locale allowing for the proposed roof top condenser location.

A nominal allowance for a sound power level of 70 dB $L_{WA}$ has been made for each condenser, and assuming one condenser for each of the 18 units.

The approximate location for the condensers is shown in Figure 3 comprising an extract of the roof plan.

**Figure 3: Roof plan**



Noise levels at receiver locations from operation of roof top condensers have been calculated and compared to derived project noise trigger levels for compliance and are provided in Table 10. Allowance is made for the screening effect from proposed building parapet at approximately RL 24.

No specific screening allowance is made for the surrounding plant enclosure shown on the drawings. It is assumed that all 18 condensers would operate simultaneously although this is an unlikely scenario, particularly during the night time hours.

The results are compared to the worst case night-time noise criteria.

**Table 10: Noise impact assessment Results, $L_{Aeq, 15min}$**

| Receiver ID | Location and description | Criteria (Night) | Predicted Noise level dB $L_{Aeq(15min)}$ | Complies |
|---|---|---|---|---|
| R1 - Residential | 34 Ulong Street<br>single storey residential dwelling | 35 | <15 | Yes |
| R2 - Residential | 281 Wakaden Street<br>2 storey residential apartments | 35 | 28 | Yes |
| R3 - Residential | 268 Wakaden Street<br>single storey residential dwellings | 35 | 32 | Yes |
| R4 - Residential | 258 Wakaden Street<br>single storey residential dwellings | 35 | 28 | Yes |
| R5 - Residential | Quest Serviced Apartments | 35 | 38 | No[1] |
| C1 - Commercial | 2 Storey commercial building | 63 | <15 | Yes |
| C2 - Commercial | Law Courts Building | 63 | <40 | Yes |
| C3 - Commercial | Griffith Telephone Exchange | 63. | <40 | Yes |

[1] The possible minor exceedance would be mitigated by the likelihood that not all the condenser units would operate during the night-time hours. Further, any residual exceedance could be easily accommodated by an acoustic screen around some of the plant area.

The calculated noise levels indicate that it would be feasible to locate air conditioning condensers on the roof top, while complying with relevant consent authority criteria pertaining to noise emissions from plant and equipment.

It will be necessary to carry out a more detailed assessment during project design stage based on scheduled plant and equipment and assess for compliance with Development Approval Conditions pertaining to noise emissions. Where exceedances are anticipated it will be necessary to document any acoustic screens or other controls required to reduce noise to within Consent Authority requirements.

## 6.0 CONCLUSIONS

A desktop acoustic assessment has been carried out by MDA of the proposed residential development at 57 Railway Street Griffith. The assessment has concluded that the following:

### 6.1 Railway Noise and Vibration Impacts

The site is not exposed to a large number of train movements and at this stage appears to be limited to two possible movements during a day, evening or night period.

Noise impacts from the railway to the apartments can be addressed by conventional and readily available glazing, doors and facade elements. In some instance windows may need to be closed at night and this may impact ventilation requirements.

Previous studies of the site have indicated that vibration from the railway is likely to be within acceptable criteria. Ground borne noise is unlikely to exceed airborne noise transmission via glazed elements. It is expected however that on site noise measurements would be required during the project design stages in order to further quantify possible noise and vibration impacts from the railway.

### 6.2 Mechanical Plant Noise Emissions

Specific design proposals for air conditioning and mechanical plant have not yet been developed. MDA have however carried out preliminary investigations based on the likelihood of air conditioning condensers located on the roof top of the building.

Based on the results of the assessment, it is expected to be feasible to locate air conditioning and ventilation plant and equipment on the roof top and comply with Consent Authority noise criteria.

It will however be necessary to carry out a detailed acoustic analysis based on the final equipment selections. It is expected that noise levels can comply with the Consent Authority Noise criteria. Minor acoustic screening may be required.

### 6.3 Automatic Carpark doors

Automatically operating access door to the carpark should be selected on the basis of a low operating noise level such that they do not cause disturbance to future residents of the building nor occupants of the Quest apartments. The door mechanism should be vibration isolated from the building to limit the transmission of structure borne noise.

## APPENDIX A GLOSSARY OF TERMINOLOGY

| | |
|---|---|
| **SPL or $L_P$** | Sound Pressure Level<br>A logarithmic ratio of a sound pressure measured at distance, relative to the threshold of hearing (20 μPa RMS) and expressed in decibels. |
| **SWL or $L_W$** | Sound Power Level<br>A logarithmic ratio of the acoustic power output of a source relative to $10^{-12}$ watts and expressed in decibels. Sound power level is calculated from measured sound pressure levels and represents the level of total sound power radiated by a sound source. |
| **dB** | Decibel<br>The unit of sound level.<br>Expressed as a logarithmic ratio of sound pressure P relative to a reference pressure of Pr=20 μPa i.e. dB = 20 x log(P/Pr) |
| **dBA** | The unit of sound level which has its frequency characteristics modified by a filter (A-weighted) so as to more closely approximate the frequency bias of the human ear. |
| **A-weighting** | The process by which noise levels are corrected to account for the non-linear frequency response of the human ear. |
| **C-weighting** | The process by which noise levels are corrected to account for non-linear frequency response of the human ear at high noise levels (typically greater than 100 decibels). |
| **$L_{Aeq\ (t)}$** | The equivalent continuous (time-averaged) A-weighted sound level. This is commonly referred to as the average noise level.<br>The suffix "t" represents the time period to which the noise level relates, e.g. (8 h) would represent a period of 8 hours, (15 min) would represent a period of 15 minutes and (2200-0700) would represent a measurement time between 10 pm and 7 am. |
| **$L_{A90\ (t)}$** | The A-weighted noise level equalled or exceeded for 90% of the measurement period. This is commonly referred to as the background noise level.<br>The suffix "t" represents the time period to which the noise level relates, e.g. (8 h) would represent a period of 8 hours, (15 min) would represent a period of 15 minutes and (2200-0700) would represent a measurement time between 10 pm and 7 am. |

## APPENDIX B NOISE POLICY FOR INDUSTRY CRITERIA DERIVATION

In NSW, the NPfI is the guideline for assessing noise emissions from industrial facilities and other developments with noise sources that may be considered to be industrial in nature.

The NPfI sets out a procedure where a noise source can be evaluated against a series of noise assessment levels. In the NPfI, these project specific noise levels are derived from an analysis of the ambient noise environment and zoning information.

The ambient noise levels for this project are summarised in Table C 2. In the NPfI, the background noise level is called the Rating Background Level (RBL). As the site is proposed to be used on a 24hr basis, Day, Evening and Night-time periods have been considered.

**Table C 2: NPfI time periods and minimum background noise levels**

| Period | Time of day | RBL $L_{A90,\ 15min}$ dB | $L_{Aeq,\ 15min}$ dB |
|---|---|---|---|
| Day | 0700[1]-1800hrs | 35 | 59 |
| Evening | 1800-2200hrs | 30 | 59 |
| Night | 2200-0700[1]hrs | 30 | 53 |

*[1]0800 hrs Sundays and public holidays*

*Intrusiveness noise levels*

The intrusiveness noise assessment is applicable to residential receivers and is based on knowledge of the background noise level at the receiver location. The intrusiveness level is the background noise level at the nearest noise sensitive location plus 5dB. Therefore, the noise emissions from the premises are considered to be intrusive if the A-weighted source noise level (LAeq, 15min) is greater than the background noise level (LA90) plus 5dB.

Based on the background noise data summarised in Table C 2, noise limits for Intrusiveness have been calculated in accordance with the NPfI and are presented in Table C 3.

**Table C 3: NPfI derived Intrusiveness noise levels**

| Period | Rating Background Level, $L_{A90,\ 15min}$ dB | Intrusiveness Noise Level (RBL + 5 dB), $L_{Aeq,\ 15\ min}$ dB |
|---|---|---|
| Day | 35 | 40 |
| Evening | 30 | 35 |
| Night | 30 | 35 |

*Amenity noise levels*

The project amenity noise levels are designed to prevent industrial noise continually increasing above an acceptable level. The initial stage in determining the project amenity level is to determine the recommended amenity noise levels for the appropriate amenity area and time of day.

A review of the site indicates that the development area would be classified by the EPA as Urban, given the B3 zoning, high density residential use and adjacency to the commercial district. As such, the recommended amenity noise levels for an Suburban residential receiver as described in Table 2.2 of the NPfI have been selected.

The appropriate recommended amenity noise levels are then modified to convert an $L_{Aeq}$ period time descriptor to an $L_{Aeq\ 15\ min}$ descriptor (as detailed in Section 2.2 of the NPfI), with further adjustment made to determine the project amenity noise level for the development (as detailed in Section 2.4 of the NPfI).

The NPfI project amenity noise levels applicable to the development are detailed in Table C 4.

**Table C 4: NPfI derived project amenity noise levels**

| Receiver | Period | Recommended Amenity Noise Level $L_{Aeq,\ period}$ dB | Project Amenity Noise Level $L_{Aeq,\ 15min}$ dB |
|---|---|---|---|
| Residential - Suburban | Day | 55 | 53 |
| | Evening | 45 | 43 |
| | Night | 40 | 38 |
| Commercial | When in use | 65 | 63 |

*Determination of Project Noise Trigger Levels*

The final process in determining the operational noise limits according to the NPfI is to derive the Project Noise Trigger Levels. The Project Noise Trigger Levels are levels that, if exceeded, would indicate a potential noise impact on the community, and so 'trigger' a management response; for example, further investigation of mitigation measures.

The Project Noise Trigger Levels are derived by selecting the more stringent of either the intrusiveness or project amenity noise levels. For residential receivers each assessment time period is evaluated individually. For non-residential receivers, only the Amenity noise level applies. The NPfI Project Noise Trigger Levels applicable to the site are shown in Table C 5.

**Table C 5: NPfI Project Noise Trigger Levels**

| Receiver | Period | Project Noise Trigger Level, $L_{Aeq,\ 15min}$, dB |
|---|---|---|
| Residential | Day | 40 |
| | Evening | 35 |
| | Night | 35 |
| Commercial | When in use | 63 |