REVERB ACOUSTICS

Noise and Vibration Consultants

Noise Impact Assessment
Special Disability Accommodation
75-77 Elgin Street
Maitland NSW

November 2022

Prepared for Core Project Group Pty Ltd
Report No. 22-2793-R1

Building Acoustics-Council/EPA Submissions-Modelling-Compliance-Certification

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1.1 INTRODUCTION

Reverb Acoustics has been commissioned to conduct a noise impact assessment for proposed special disability accommodation at 75-77 Elgin Street, Maitland. The purpose of this assessment is to determine the noise impact from passing road traffic and commercial activities within habitable spaces of the development and to ensure that noise levels comply with the requirements of the Roads and Maritime Services (RMS), Department of Planning and Environment (DPE), NSW Environment Protection Authority (EPA) and Maitland City Council (MCC). Further assessment has also been carried out to determine the noise impact activities and equipment associated with the development may have on nearby neighbours (i.e. mechanical plant, vehicle movements).

The assessment was requested by Core Project Group Pty Ltd to form part of and in support of a Development Application to MCC and to ensure any noise control measures are incorporated into the design of the site.

1.2 TECHNICAL REFERENCE / DOCUMENTS

AS 2107-2016 *"Acoustics-Recommended Design Sound Levels and Reverberation Times for Building Interiors".*

AS 1276.1-1999 *"Acoustics – Rating of sound insulation in buildings and of building elements. Part 1: Airborne sound insulation".*

Department of Planning and Infrastructure (2008). *"Development near Rail Corridors and Busy Roads - Interim Guidelines".*

NSW Environment Protection Authority (2013). *Rail Infrastructure Noise Guideline.*

NSW Environment Protection Authority (2011). *NSW Road Noise Policy*

NSW Roads and Traffic Authority (2001). *Environmental Noise Management Manual*

NSW Environment Protection Authority (2017). *Noise Policy for Industry*

Plans supplied by Kennedy Associates Architects Pty Ltd, dated October 2022. Note that variations from the design supplied to us may affect the acoustic recommendations.

A Glossary of commonly used acoustical terms is presented in Appendix A to aid the reader in understanding the Report.

SECTION 2
Existing Acoustic Environment Assessment Criteria

2.1 EXISTING ACOUSTIC ENVIRONMENT

A background noise level survey was conducted at a nearby development in Steam Street. The selected location is representative of the acoustic environment in the receiver area and is considered an acceptable location for determination of the background noise in accordance with Appendix B of the EPA's Noise Policy for Industry (NPfI).

Table 1 shows a summary of our noise survey, including the Rating Background Levels (RBLs) for the day evening and night periods, calculated in accordance with the procedures described in the EPA's NPfI and by following the procedures and guidelines detailed in Australian Standard AS1055-1997, "Acoustics - Description and Measurement of Environmental Noise, Part 1 General Procedures".

Table 1: Summary of Noise Logger Results, dB(A)

Time Period	Background L90			Ambient Leq		
	Day 7am-6pm	Evening 6pm-10pm	Night 10pm-7am	Day 7am-6pm	Evening 6pm-10pm	Night 10pm-7am
RBL	45.6	41.8	37.9	--	--	--
LAeq	--	--	--	60.9	58.3	57.1

Additional attended road traffic noise level monitoring was conducted at the west site boundary, approximately 5 metres from the near lane of traffic on Elgin Street. All measurements were conducted using a Svan 977 Sound Level Meter. This instrument is Class 1 accuracy, in accordance with the requirements of IEC 61672, and has the capability to measure steady, fluctuating, intermittent and/or impulsive sound, and to compute and display percentile noise levels for the measuring period. The instrument was calibrated with a Brüel and Kjaer 4230 sound level calibrator producing 94dB at 1kHz before and after the monitoring period, as part of the instruments' programming and downloading procedure. Table 2 shows a summary of monitoring results at the site.

Table 2: Measured Road Traffic Noise Levels, dB(A)

Time	Date	Lmax	Leq
08:45	3/11/22	83.0	66.5
23:00	3/11/22	85.5	60.6

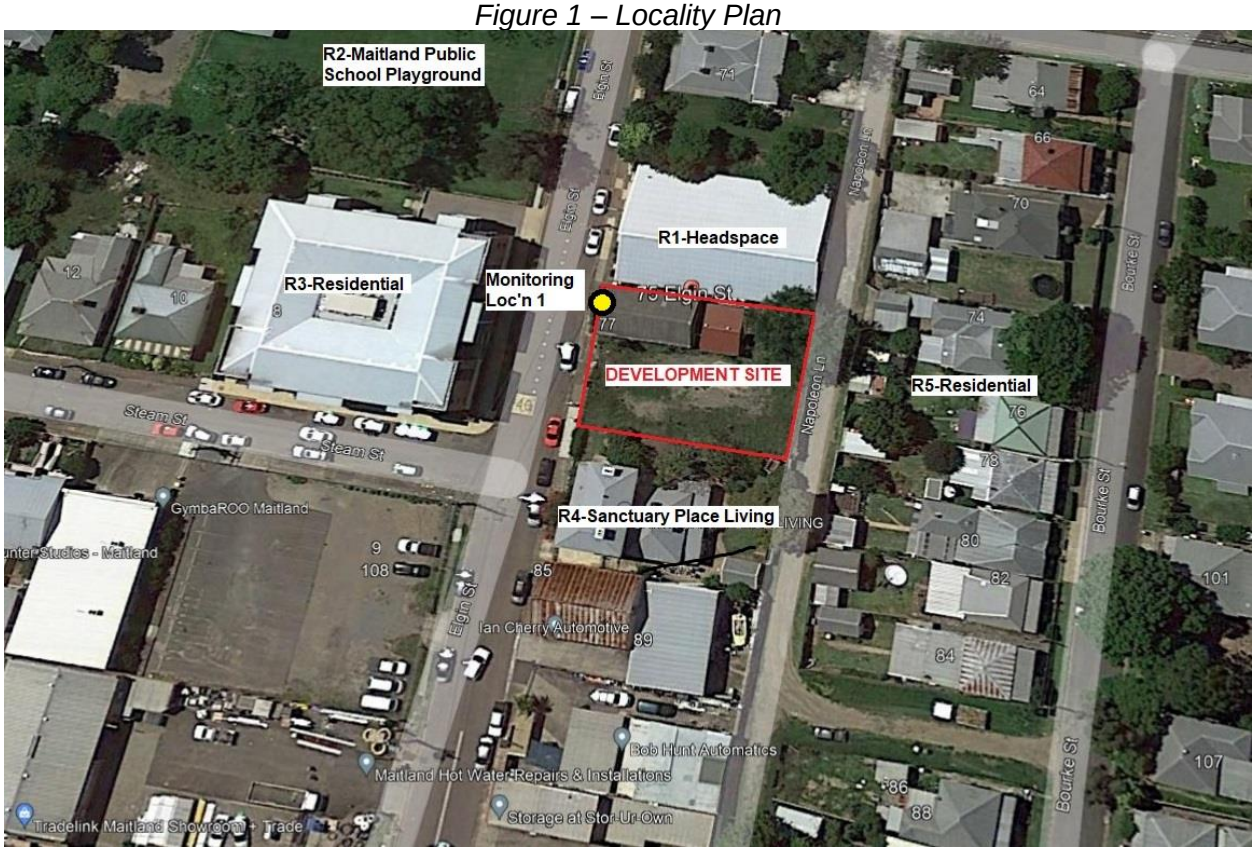
Site, weather and measuring conditions were all satisfactory during the noise survey. We therefore see no serious reason to modify the results because of influencing factors related to the site, weather or our measuring techniques.

The Sound Pressure Level's (SPL's) of additional noise sources identified during our site visits are listed below:

Item	*SPL dB(A)*	*Comments*
Children in school playground (S1)	58	@ 10m
# Workshop activities (S2)	48	@ 20m

Includes vehicle revs/startup, general workshop activities over extended period.

Figure 1 – Locality Plan



Source: Google Earth

2.2 CRITERIA

2.2.1 Road Traffic

Criteria for the assessment of quasi-steady-state noise sources, such as continuous road traffic and mechanical services, are sourced from AS/NZS 2107-2016 *"Acoustics-Recommended Design Sound Levels and Reverberation Times for Building Interiors"* and are detailed below.

Room Type	dBA
RESIDENTIAL BUILDINGS	
Houses and apartments near major roads	
Living areas	35 – 45
Sleeping areas	35 – 40
Common areas (foyer, lobby)	45 – 50

DPE's *"Development near Rail Corridors and Busy Roads - Interim Guidelines*" (released in December 2008) describes criteria for assessment of road traffic noise impacts on residential developments. Limits specified within the Policy, which are virtually identical to those in AS/NZS2107-2016 are shown below:

Type of Occupancy	*Noise Level in dB(A)*	*Applicable Time Period*
Sleeping areas (bedroom)	35	Night 10pm to 7am
Other habitable rooms (excluding garages, kitchens bathrooms & hallways)	40	At any time

Table 3 summarises satisfactory internal noise levels for residences, used for the basis of this assessment.

Table 3: Internal Traffic Noise Level Criteria (Residential)

Location	Criteria – dB(A),Leq		Remarks
	Day	Night	
Sleeping areas	-	35	Windows closed
	-	45	Windows open
Other habitable rooms	40	-	Windows closed
	50	-	Windows open

Note that limits specified in the AS/NZS 2107-2016 are in agreement with those contained in DPE's Guideline. Therefore, the aim of the assessment is to ensure that the allowable noise levels shown above and in Table 2 are not (theoretically) exceeded within any habitable room due to road traffic noise. Transmission paths considered in the assessment are windows and doors with allowances made for shielding by balconies, intervening acoustic barriers, buildings/terraces, etc.

2.2.2 Commercial Activity / Mechanical Plant

Noise from industrial noise sources scheduled under the Protection of Environment Operations Act is assessed using the EPA's NPfI. However, local Councils and Government Departments may also apply the criteria for land use planning, compliance and complaints management. The NPfI specifies two separate criteria designed to ensure existing and future developments meet environmental noise objectives. The first limits intrusive noise to 5dB(A) above the background noise level and the other aims to protect against progressively increasing noise in developing areas, based on the existing (Leq) noise level from industrial noise sources. Project Noise Trigger Levels are established for new developments by applying both criteria to the situation and adopting the more stringent of the two.

The existing L(A)eq for the receiver areas is dominated by traffic on nearby roads, and commercial/light industrial activity during the day, evening and night. Reference to Table 2.2 of the NPfI shows that all receiver areas are classified as urban. The Project Amenity Level is derived by subtracting 5dB(A) from the recommended amenity level shown in Table 2.2.

A further +3dB(A) adjustment is required to standardise the time periods to LAeq,15 minute. The adjustments are carried out as follows:

Recommended Amenity Noise Level (Table 2.2) – 5dB(A) +3dB(A)

In high traffic areas where the existing traffic noise levels are 10dB or more above the recommended amenity level, the Amenity Level is derived by subtracting 15dB(A) from the existing traffic noise level.

Table 4 below specifies the applicable project intrusiveness and amenity noise trigger levels for the proposed redevelopment.

Table 4: - Base Noise Level Objectives

Period	Intrusiveness Criteria	Amenity Criteria
Day	51 (46+5)	58 (60-5+3)
Evening	47 (42+5)	48 (50-5+3)
Night	43 (38+5)	43 (45-5+3)
Receiver Type: Urban (See EPA's NPfI - Table 2.2)		

Project Noise Trigger Levels, determined as the more stringent of the intrusiveness criteria and the amenity / high traffic criteria, are as follows:

Day	**51dB LAeq,15 Minute**	7am to 6pm Mon to Sat or 8am to 6pm Sun and Pub Hol.
Evening	**47dB LAeq,15 Minute**	6pm to 10pm
Night	**43dB LAeq,15 Minute**	10pm to 7am Mon to Sat or 10pm to 8am Sun and Pub Hol.

2.2.3 Maximum Noise Level Event Assessment - Sleep Arousal

Section 2.5 of EPA's NPI requires a detailed maximum noise level event assessment to be undertaken where the subject development/premises night-time noise levels exceed the following:

- LAeq (15 minute) 40dB(A) or the prevailing RBL plus 5dB whichever is greater, and/or
- LAFmax 52dB(A) or the prevailing RBL plus 15dB, whichever is greater.

The detailed assessment should cover the maximum noise level, the extent to which the maximum noise level exceeds the RBL, and the number of times this happens during the night period.

SECTION 3
Noise Impact Assessment

3.1 METHODOLOGY

3.1.1 Site Noise/Mechanical Plant

The sound power level of each activity impacting on the site was determined according to the procedures described in AS2102 or AS1217 as appropriate, and theoretically propagated at to nearby receivers. Propagation calculations were carried out using the following equation. Where noise impacts above the criteria are identified, suitable noise control measures are implemented and reassessed to demonstrate satisfactory received noise levels in the residential area.

Equation 1:

$$L_{eq},T = Lw - 10 \log (2 \pi r^2) + 10 \log \frac{(D \times N)}{T}$$

Where Lw is sound power level of source (dB(A))
R distance to receiver (m)
D is duration of noise for each event (sec)
N is number of events
T is total assessment period (sec)

3.1.2 Road Traffic

Applicable noise level metrics, namely, Leq (day peak) and Leq (night) are those calculated from our measurements at the site, following the methodology outlined in the EPA's RNP. A +2.5dB(A) adjustment is not required, as measurements were conducted at the existing building facade.

measured noise (free field) + facade correction = received noise

Applying the above formula gives:

Day	66.5dB(A) + 0.0dB(A) = **66.5dB(A) Leq15hr**	7am – 10pm
Night	60.6dB(A) + 0.0dB(A) = **60.6dB(A) Leq9hr**	10pm – 7am

No current RMS traffic station is located near the site along Elgin Street. We have therefore assumed 12,000 vehicles pass the site each day for the year 2022. A figure of 5% heavy vehicles has also been adopted. The AADT's for the year 2022 were applied to our computer programme, based on the EPA and RMS approved CoRTN Method of Traffic Noise Prediction, and noise levels were calculated to the theoretical facade at each level of the development. The adopted AADT figures and CoRTN values are merely arbitrary, as calculated noise levels are adjusted to correlate with our measured peak external noise levels, with the intention is to provide a (theoretical) means of determining the degree of noise control required for a particular building component.

The EPA released their ECRTN in June 1999 and RNP in 2011, which specify modified assessment periods for day and night, namely, Leq,15hr (7am to 10pm) and Leq,9hr (10pm to 7am). These assessment periods have rendered the original Australian version of the CoRTN model invalid, which was designed to assess the impact over a single 24 or 18 hour period. Consequently, modification of the Model is required to adequately describe the new metrics.

The CoRTN algorithm pertaining to traffic flow percentages has been modified by inserting all AADT figures for arterial roads, contained in RMS publications - Traffic Volume Data for Hunter and Northern Regions, and establishing AADT figures for the applicable day and night periods. Our CoRTN model was then calibrated against long term measurements made at locations with reliable AADT figures.

3.1.3 Mechanical Plant

Selection of mechanical plant has not been finalised at this stage. We have therefore sourced manufacturers' noise emission data for similar sized developments. We understand that air conditioning plant may be located on individual balconies or at the rear of the building at ground level. Noise produced by proposed plant is propagated to residential locations taking into account sound intensity losses due to geometric spreading, with additional minor losses such as molecular absorption, directivity and ground absorption ignored in the calculations. As a result, predicted received noise levels are expected to slightly overstate actual received levels and thus provide a measure of conservatism. Comparison of the predicted noise levels produced by the plant and the allowable level are compared to give the noise impact at the receiver.

3.2 ANALYSIS AND DISCUSSION

3.2.1 Road Traffic (Impact on Development)

Shown below is a sample calculation detailing the procedure followed in order to calculate required glazing for the Bedroom of Unit 5 on Level 2, facing Elgin Street. The traffic noise level at the outer face of the glazing is calculated as follows,

Table 5: Sample Calculation - Traffic Impact at Bedroom Windows – Unit 5

		Octave band Sound Pressure Levels, dB(A)							
Propagation calculation	**dB(A)**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
Facade traffic noise, Leq[1]	61	42	49	50	54	56	53	57	39
Architectural shielding[2]		-2	-2	-2	-2	-2	-2	-2	-2
Directivity/distance Correction[3]		-1	-1	-1	-1	-1	-1	-1	-1
Traffic noise at window	58	39	46	47	51	53	50	54	36

1. Traffic noise level 2022. 2. Enclosed balustrade/intervening structures. 3. Includes angle of incidence & distance correction.

As the criterion for the Bedroom is 35dB(A), see Section 2.2.1, the required traffic noise reduction is *TNR* = 57-35 = 22dB(A). The traffic noise attenuation, *TNA*, required of the glazing is calculated according to the equation given in Clause 3.4.2.6 of AS 3671,

$$TNA = TNR + 10\log_{10}[(S/S_f) \times 3/h \times 2T_{60} \times C] \qquad \textit{equation 1}$$

where
S = Surface area of glazing = $4m^2$
S_f = Surface area of floor = $13m^2$
h = Ceiling height, assumed to be 2.6m
T_{60} = Reverberation time, s
C = No. of components = 3 (glazing, wall, roof)

Assuming that the room is acoustically average (neither too 'live' nor too 'dead') equation 9.26 in *Noise and Vibration Control*, L.L. Beranek, 1971, gives a reverberation time of 0.46s. Consequently, the value of 0.5s was used in equation 1.

Using the values listed above gives

TNA = 22dB(A) for the glazing

Substituting this value into the equation given in Clause 3.4.3.1 of AS3671 gives

$Rw = TNA + 6 \approx 28$

Published sound insulation performance in terms of Rw or STC ratings relate to partitions tested in ideal laboratory conditions or opinions based on such measurements. Field conditions (eg. flanking paths, penetrations, air leaks etc) caused by lack of supervision of workmanship or inadequate attention to detail at design/specification stage can reduce the Rw rating. For this reason, we recommend selecting partition systems with a laboratory Rw rating 1-2dB higher than required on site. Therefore, the window in the Living Room must have a tested Rw30 rating. Based on typical laboratory performance data the glazing would consist of single-glaze laminated or Vlam Hush glass fitted with acoustic seals at sliders. Similar calculations to those above have been performed for windows and doors on affected facades. From these calculations, a glazing schedule has been compiled. See Section 4.

3.2.2 External Noise Sources (Impact on Development)

The following Tables show sample calculations to predict received noise levels from activities/equipment associated with nearby commercial development propagated to nearest residential units. All calculations are based on distances scaled from plans supplied by Kennedy Associates Architects Pty Ltd and through measurement during our site visits.

Table 6: Received Noise – External Noise Sources, dB(A),Leq
Propagated to Nearest Residential Units

Activity	Children (S1)	Workshop (S2)
Lw dB(A)	86	83
Ave Dist to rec (m)	45	30
Duration of event	15 minutes	15 minutes
Barrier loss/Dir	6	14
Rec dB(A),Leq	**38**	**32**
Combined	**39**	
Criteria (D/E/N)	**51dB(A),Leq / 47dB(A),Leq / 43dB(A),Leq**	
Impact	**0/0/0**	

Table 7: Received Noise – Short-Term Events, dB(A),Lmax
Propagated to Nearest Residential Units

Activity	Children (S1)	Workshop (S2)
Lw dB(A)	96	95
Ave Dist to rec (m)	45	30
Barrier loss/Dir	6	14
Rec dB(A),Lmax	**N/A**	**44**
Criteria (Night)	**58dB(A),Lmax**	
Impact	**0**	**0**

As can be seen by the above results, noise from nearby external activities/equipment is predicted to comply with the overall criteria at nearest residential units. Therefore, no special acoustics modifications will be necessary. However, Section 3.2.1 indicates that acoustic modifications will be necessary to comply with road traffic noise criteria. See Section 4.

3.2.3 Ventilation Requirements

DPE's Guideline states that if road traffic noise criteria cannot be met with windows open then they must be shut, if desired, while also meeting the ventilation requirements of the Building Code of Australia (BCA).

Recent studies have conclusively proven that a typical open window will reduce noise by up to 15-20dB(A) when contained within a masonry structure with no exposed flooring. Table 8 shows road traffic design criteria at exposed facades and the predicted internal noise levels with windows open, to determine compliance.

Table 8: Internal Noise Assessment – Windows Open

Time Period	Predicted Traffic Noise level L(A)eq		Internal Criteria L(A)eq	Compliant YES/NO
	External	Internal		
Day	63	48	50	YES
Night	57	42	45	YES

Results in the above Table predict that internal traffic noise levels are compliant with the criteria with windows open to provide natural ventilation. Therefore mechanical ventilation is not mandatory.

3.2.4 Mechanical Plant (Impact from Development on Neighbours)

Council prefers the background noise level of the area to be maintained, although, in certain circumstances may permit the noise level in question to exceed the prevailing background noise level by 5dB(A), provided the sound is bland and free from impulsive and/or tonal components. This is in agreement with conditions contained within EPA's NPfI. In respect to the above, a planning limit of **43dB(A),Leq** for night (10pm-7am) has been adopted at the boundary of nearest residential neighbours.

As previously stated, air conditioning plant will be located at ground level along the façade of each new Lot. As the exact type of plant is not known at this stage, we have sourced information from our library of technical data. The sound power of the proposed plant is propagated to residential locations taking into account sound intensity losses due to geometric spreading and barrier insertion loss provided by intervening structures, with additional minor losses such as molecular absorption, directivity and ground absorption ignored in the calculations. As a result, predicted received noise levels are expected to slightly overstate actual received levels and thus provide a measure of conservatism. Comparison of the predicted noise levels produced by the plant and the allowable level are then compared to give the noise impact at the receiver.

Shown below are calculations to predict the noise impact from proposed air conditioning plant, propagated to nearest residential receivers.

	Air Con on Balconies	*Air Con at rear GL*
Lw dB(A)	69	69
Distance to receiver (m)	8,-26dB	10,-28dB
Barrier loss	5	0
Virtual source	+2	+2
SPL at Receiver	**40**	**43**
Criteria, dB(A),Leq	**43**	**43**
Impact	**0**	**0**

Results in the above Table show that noise impacts from air conditioning plant associated with the development are predicted to comply with the criteria, based on the proposed location, i.e. at rear of building or on balconies, providing enclosed balustrade is erected at balcony perimeter, i.e. safety glass, stud wall, or similar. See Section 4 for required noise control modifications and strategies

SECTION 4
Summary of Recommended Noise Control

4 NOISE CONTROL RECOMMENDATIONS

4.1 Glazing Construction

4.1.1 Similar calculations to those in Section 3 were performed for all building elements. From these calculations, a schedule of required glazing has been compiled, shown below. The glazing systems, sighted in the following Table, are presented as a guide for the supplier:

Glazing Systems: Type A: Standard glazing. No acoustic requirement.
Type B: Single-glaze 5-8mm clear float glass.
Type C: Single glaze laminated or VLam Hush glass

Note: The typical glazing shown in the following Tables should be used as a guide only. The supplier of the window/door must be able to provide evidence that the complete system will achieve the specified Rw performance, i.e. do not simply install our recommended glass in a standard window frame.

Table 10: Glazing Schedule – Lot 6

Facade	Location	Required Rw Compliance Requirement	Typical Glazing System (Not for Specification)
GROUND LEVEL			
West (Elgin Street)	Office		Type C
	Entry		See Note 1
	Unit 1 Liv/Din/Kit	**31**	Type C
	Unit 1 Bedroom 1.1	**30**	No acoustic requirement
North/South/East	All	**-**	No acoustic requirement
FIRST LEVEL / SECOND LEVEL			
West (Elgin Street)	All Bedrooms	**30**	Type C
	All Liv/Din/Kit Doors	**28**	See Note 1
	All Liv/Din/Kit Windows	**30**	Type C
North/South/East	All	**-**	No acoustic requirement

4.2 Roof/Ceiling Construction

4.2.1 Roof construction may consist of sisalation or wire mesh laid down on roof purlins. This is to be completely covered with a 30-40mm foil faced building blanket hard under the roof sheeting (in situations where joists are at centres close enough to avoid excessive sagging of the blanket, the sisalation/wire mesh may be omitted). Close off gaps between purlins and roof sheeting with Unisil Eaves Filler Strips, bituminous compound, or similar. Install an impervious ceiling of 1 sheet of taped and set 10mm plasterboard. To further assist in low frequency attenuation, all ceiling voids should contain a layer of fibreglass or rockwool insulation. The insulation is to be installed in addition to, not in lieu of the building blanket. Specialised acoustic insulation is preferred, however, dense thermal insulation (eg, R3 batts) will suffice and is much less expensive ($15/m^2 for Rockwool 350 and $5/m^2 for R3 batts).

4.3 Wall Construction

4.3.1 Brick veneer/cavity brick//masonry construction is acceptable. Where external brickwork stops below the height of the stud frame, plasterboard, Villaboard, or similar, is to be fixed to the outside of the stud frame to fill the void. The infill material is to extend from the top of the top plate to a point in line with the bottom of the top course of brickwork.

4.3.2 Lightweight cladding (i.e. Shadowclad, Colorbond, or similar) should include internal lining 1 sheet taped and set 13mm plasterboard on the west facade and 1 sheet 10mm plasterboard on other facades, and a cavity infill of R1.5/S1.5 fibreglass or polyester insulation.

4.4 Mechanical Plant

4.4.1 No acoustic modifications are necessary for individual items of air conditioning plant that satisfy the following noise emission limits:

Item	*Max SPL at a Dist of 3 metres*	*Lw*
Air Conditioning Condenser	49dB(A)	66dB(A)

4.4.2 Where air conditioning is located on balconies, enclose balustrade is required to a minimum height of 900mm above FFL. A gap of 50mm is allowed at floor level to aid in drainage.

4.4.3 Where plant intended to be installed produces noise in excess of levels specified above in Item 4.4.1, noise control will be required to ensure satisfactory noise emissions. The contractor responsible for supplying and installing the plant should be asked to supply evidence that installed plant meets this noise emission limit, or that noise control included with the plant is effective in reducing the sound level to the specified limit.

4.4.4 It should be noted that no penalties have been applied for tonality in our calculations, therefore the tenderer's attention is drawn to the fact that mechanical plant may be near sensitive receivers, and it is vitally important that units are free from specifically annoying characteristics (eg. tones, squeaks, pulsations etc). Careful selection of plant, equipment, piping and ducting systems is recommended to ensure quiet and vibration free operation in compliance with the specified noise criteria. Replacement and/or modification will be necessary to all systems causing undue noise or vibration exceeding the specified criteria.

SECTION 5
Conclusion

5.1 CONCLUSION

A noise impact assessment for proposed special disability accommodation at 75-77 Elgin Street, Maitland, has been completed, resulting in noise control recommendations summarised in Sections 4 of this Report. The report has shown that the site is suitable for the intended purpose, providing our recommendations are implemented. An assessment of external noise impacting on the development has resulted in the compilation of a schedule of minimum glazing, wall, roof construction, etc, to meet the requirements of the EPA, DPE and RMS. The recommended construction shown in Tables 10 and 10 should be used as a guide only. The supplier of the window/door must be able to provide evidence that the complete system will achieve the specified Rw performance. Do not simply install the recommended glazing in a standard frame.

The guidelines herein are preliminary in that the selection of building materials depends on user/client requirements, space limitations, budgetary constraints and practicalities that relate to the acoustic design of suites. Adequate building facade design may be achieved through many different combinations of materials, all of which may achieve the same result, subject to review by us.

We have designed exposed facades of the building to ensure maximum noise level passbys from heavy vehicles are below 55-60dB(A). This upper limit is generally considered the threshold at which awakenings may occur.

In conclusion, providing the recommendations given in this report are implemented, external noise impacts (i.e. road traffic, commercial activities, etc), will comply with the requirements of the EPA, RMS, DPE and MCC within habitable spaces of the proposed development. We therefore see no acoustic reason why the proposal should be denied.

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Principal Consultant

APPENDIX A
Definition of Acoustic Terms

Definition of Acoustic Terms

Term	Definition
dB(A)	A unit of measurement in decibels (A), of sound pressure level which has its frequency characteristics modified by a filter ("A-weighted") so as to more closely approximate the frequency response of the human ear.
ABL	*Assessment Background Level* – A single figure representing each individual assessment period (day, evening, night). Determined as the L90 of the L90's for each separate period.
RBL	*Rating Background Level* – The overall single figure background level for each assessment period (day, evening, night) over the entire monitoring period.
Leq	Equivalent Continuous Noise Level - which, lasting for as long as a given noise event has the same amount of acoustic energy as the given event.
L90	The noise level which is equalled or exceeded for 90% of the measurement period. An indicator of the mean minimum noise level, and is used in Australia as the descriptor for background or ambient noise (usually in dBA).
L10	The noise level which is equalled or exceeded for 10% of the measurement period. L_{10} is an indicator of the mean maximum noise level, and was previously used in Australia as the descriptor for intrusive noise (usually in dBA).