NOISE IMPACT ASSESSMENT
FOR PROPOSED MIXED USE DEVELOPMENT

106 New England Highway, Rutherford

Prepared for Urban Living Solutions Pty Ltd

Prepared by RCA Australia

RCA ref 12829-301/1

June 2017

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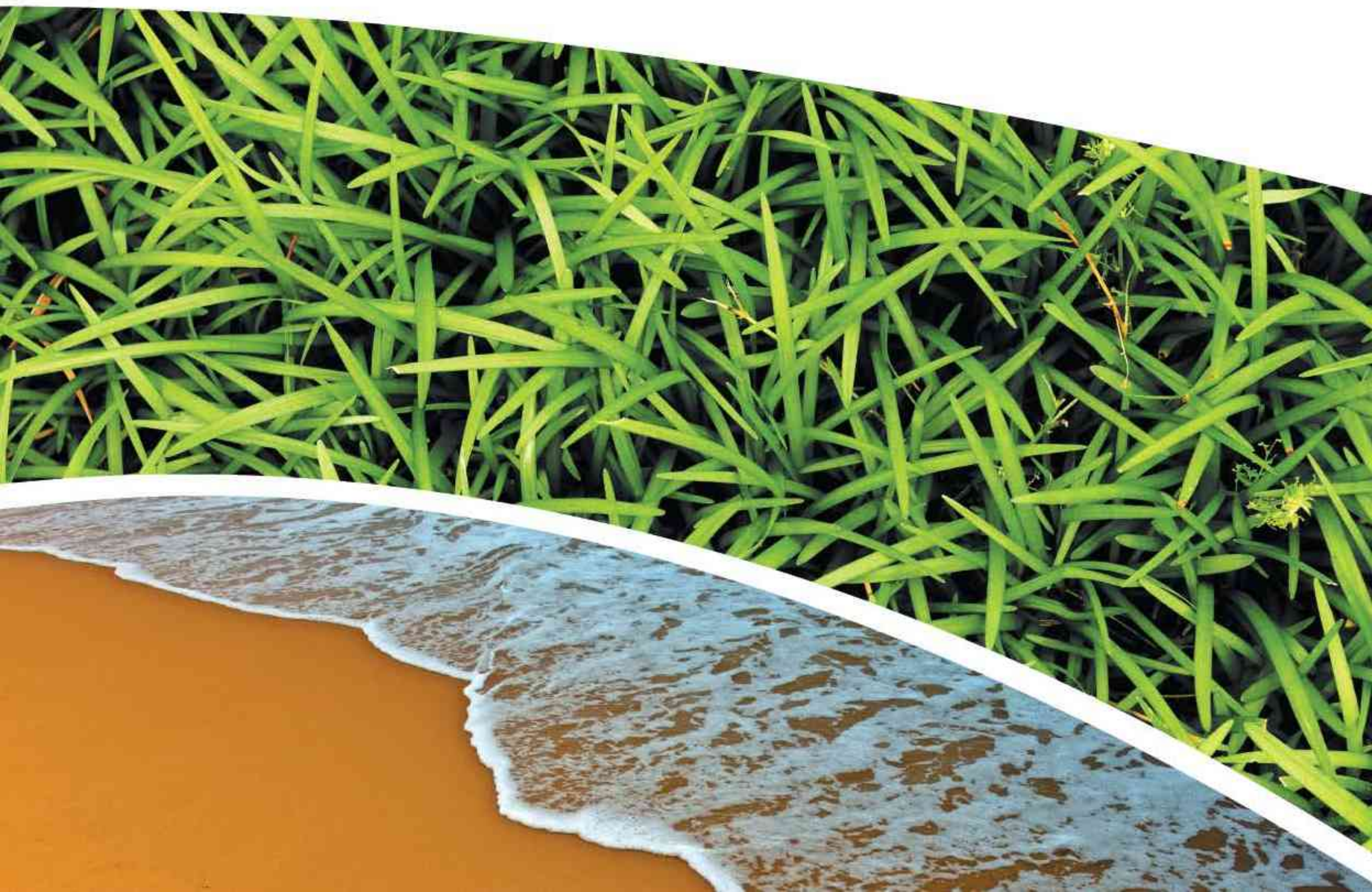

RCA AUSTRALIA
ABN 53 063 515 711

92 Hill Street, CARRINGTON NSW 2294

Telephone: +61 2 4902 9200
Facsimile: +61 2 4902 9299
Email: administrator@rca.com.au
Internet: www.rca.com.au

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2 June 2017

By email to annika@urbanlivingsolutions.com.au

Attention Annika Mudd, Project Manager

TRAFFIC NOISE ASSESSMENT
FOR PROPOSED MEDIUM DENSITY DEVELOPMENT
106 NEW ENGLAND HIGHWAY

1 INTRODUCTION

RCA Acoustics has been engaged by Urban Living Solutions (the Client) to conduct an assessment of the impact of road and rail traffic noise on a proposed medium density development to be located at Lot 3, DP 1226029, 106 New England Highway, New South Wales (NSW). The proposed medium density development is described in drawings by Urban Living (project: Proposed Medium Density Development, job no. 143/15, dated 04.11.2015), which are attached to this assessment as **Appendix C**.

This report assesses the impact of road traffic noise from New England highway and rail traffic noise from the North Coast Railway on the proposed development in accordance with relevant Australian Standards[3] and the NSW regulatory guidelines[1].

2 ACOUSTIC ISSUES

The proposed development is located at Lot 3, DP 1226029, 106 New England Highway, New South Wales (NSW). A total of seven single-storey residential units are proposed to be built on this site. For the purpose of this assessment it is assumed that a solid fence with a minimum overall height of 1.8 metres above finished ground level is required along boundaries of the site and in between residential units – see **Appendix A**.

The proposed development has the potential to be affected by road traffic noise from New England Highway and rail traffic noise from the North Coast Railway. Therefore, suitable protective measures need to be put in place to protect the acoustic amenity of the occupants of the proposed development.

The closest unit of the proposed development is set approximately 10 metres from the New England highway kerb and 20 metres from the closest rail line. Section 3.1 of The NSW Department of Planning document (*Development Near Rail Corridors and Busy Roads – Interim Guideline* (DNRCBR)[1]) requires that noise impacts be assessed if the development is within 60 metres of the operational track.

The area is defined as *Urban* in accordance with the *NSW Industrial Noise Policy* (INP)[4] and is defined as R1-General Residential in the Maitland Council LEP[6]. The acoustic climate of the area is generally controlled by traffic-related sound sources from New England Highway and the rail line. The area does not have a high level of exposure to entertainment noise or from foot traffic in the street.

This assessment involves modelling the proposed development to determine the impact of traffic noise from the New England highway and the North Coast Railway, as well as considering the noise generated by mechanical plants at designated locations in the development.

The location of the proposed development is shown below in **Figure 1**.

Figure 1 *Location of Proposed Development Area [Source: Six Maps, The NSW Land and Property Information Division of the Department of Finance and Services, 2015].*

1 EQUIPMENT

The equipment used for measuring sound levels is described in **Table 1**. In all cases the equipment was calibrated with an acoustic calibrator in accordance with AS 1055, before and after the taking of measurements and the requirement for less than 0.5 dB difference was met. Noise mitigation measures (approved 1.8 metre fence) were not in place during any of the measurements.

Table 1 *List of Equipment*

Make/Model	Serial Number	Last Calibrated
SVAN 971	55581	26/5/2016
ARL	194451	28/7/2016

2 DETERMINATION OF NOISE LEVELS AND CRITERIA

2.1 ROAD AND RAIL TRAFFIC NOISE IMPACTS ON THE DEVELOPMENT

The closest unit of the proposed development is set approximately 10 metres from the New England Highway kerb and 20 metres from the closest rail carriageway. The NSW Department of Planning has set out internal noise level criteria for residential dwellings located near busy roads or rail corridors in its document *Development Near Rail Corridors and Busy Roads – Interim Guideline* (DNRCBR)[1]. The noise criteria for internal areas affected by noise from busy roads are given in Table 3.1 of the DNRCBR and are set out in **Table 2**.

Table 2 *Internal Traffic Noise Criteria*

Type of Occupancy	Internal Noise Criteria	
	Internal Noise Level	Applicable Time Period
Sleeping Areas (Bedroom)	35 dB(A)	Night 9 hour (10pm – 7am)
Other Habitable Rooms (excl garages, kitchens*, bathrooms and hallways)	40 dB(A)	At any time

*Open plan kitchens close to habitable areas are assessed as Habitable Rooms.

The design level used for sleeping areas is the external night time $L_{Aeq\ 9hr}$ and the external $L_{Aeq\ 15\ hr}$ is used for other habitable areas, with the target noise goals set at the internal noise level criteria for the space type.

Section 3.6.1 of the DNRCBR states that if the internal noise levels, with windows or doors open by approximately 20% to provide natural ventilation, exceed the criteria by more than 10 dBA, the design of the ventilation for these rooms should be such that occupants can leave windows closed, if they so desire, while still meeting the ventilation requirements of the Building Code of Australia.

2.2 SLEEP DISTURBANCE

Despite the intensive research on sleep disturbance conducted over the last 30 years the triggers for and effects of sleep disturbance have not yet been conclusively determined. The relationship between maximum noise levels and sleep disturbance is not currently well defined. Based on a literature review by the NSW EPA, the following conclusions have been drawn:

- Sleep disturbance occurs through two mechanisms: changes in sleep state and awakenings.
- Awakenings are better correlated to subjective assessments of sleep quality than are changes in sleep state.
- Factors (other than noise) that contribute significantly to awakening reactions include sleep state and subject age.
- The maximum noise level, the extent to which that noise exceeds the ambient noise level and the number of noise events all contribute to sleep disturbance.
- Maximum internal noise levels below 50-55dB(A) are unlikely to cause awakening reactions.
- One or two noise events per night, with maximum internal noise levels of 65 to 70dB(A) are not likely to affect health and wellbeing significantly.
- Sleep disturbance may occur where the L_{max} noise level of any noise event exceeds the L90 noise level by more than 15dB(A).

No current Australian Standard deals specifically with sleep disturbance and no specific account is taken of the potential of noise to cause sleep disturbance for developments near railways in DNRCBR. For this reason this report investigates the above guidelines investigated in this study, based on the measured and calibrated L_{max} from the road and rail traffic. The adopted L90 external noise level is set as 39dB(A) which equates to an interior L90 of 30dB(A) with open windows at night.

Acoustic data logging was conducted near the proposed site under suitable weather conditions (as described in the *NSW Industrial Noise Policy*). The Rating Background Level for the daytime assessment was determined in accordance with Section 3 and Appendix B of the *NSW Industrial Noise Policy*. The background noise is measured at No. 6 Dwyer Street in December 2016, which represents the background noise at 106 New England Highway (without excessive noise from the highway and the railway).

3 METHODOLOGY

3.1 ROAD TRAFFIC NOISE ASSESSMENT

An attended traffic noise survey was conducted during the afternoon peak hour between 3:00pm and 4:00pmM on 1 May 2017 at the south-western side of the 106 New England Highway in free field conditions and 8.3 metres from the New England Highway kerb – see **Figure 1**. The results of the attended survey have been used to calibrate the model based on the peak hour traffic numbers being equal to approximately 10 percent of the Average Annual Daily Traffic (AADT).

Traffic data was sourced from the Road and Maritime Services (RMS) 2016 Average Daily Traffic Volume Map, Station ID 05140, which is located approximately 5.3 kilometres to the south of the proposal.

A 2% per annum growth has been applied to the known 2016 data to obtain the forecasted year 2017 and year 2028 AADT which are shown in **Table 3**. The 18 hour traffic volume on New England highway has been used to determine the external design levels in this assessment.

Table 3 *Traffic Flows on Mann Street*

Year	AADT Eastbound traffic	AADT Westbound traffic
2016	21014	17023
2017	21542	17448
2027	28265	22894

A noise model of the proposed development and road network was prepared within CadnaA 4.5 (CadnaA) using the United Kingdom's CoRTN (Calculation of Road Traffic Noise) algorithm.

3.2 RAIL TRAFFIC NOISE ASSESSMENT

Acoustic data logging was carried out under free field conditions between 4 PM on the 1 May 2017 and 4 PM on 2 May 2017. The logging was conducted at the top a post located at the boundary of the site and about 21.8 metres from the rail line and 39 metres from the New England highway kerb – see **Figure 1**. The microphone was located at a height of 3 metres and was oriented toward the rail track. The setup ensures that the measured rail traffic noise is at least 10 dB above the ambient noise (including the traffic noise from the highway).

The $L_{Aeq(T)}$ over the relevant time period T (15 hour day and 9 hour night) is determined by calculating the Sound Exposure Level (SEL) for train pass-by events over the relevant time period (normalised in 1 second) and averaged over the time period. SELs (for day and night), $L_{eq,\ 15\ hour}$, and $L_{eq,\ 9\ hour}$ are calculated for the 24 hour measurement using the measured $L_{eq,\ 1\ sec}$ data over the period of measurement.

The Nordic Rail Prediction Method was implemented within CadnaA for the modelling presented in this study and calibrated using field measurements. While the Nordic Rail Prediction Method alone would be considered acceptable, it is preferable to develop the model from measurement data and it should be validated for the specific project based on existing rail noise measurements.

Standard modelling factors and procedures that have been conservatively adopted for the rail noise prediction in this study are:

- Prediction, calibration and validation of the noise levels in octave bands from 63 Hz to 4 kHz.
- A ground absorption value of 0.5 is used between the railway line and noise sensitive receivers.

The model is calibrated by comparing the predicted train sound power levels to the train noise exposure measurement at location 2 – see **Figure 1**. The predicted noise levels are considered to be the worst case 10 year future predicted noise levels.

4 RESULTS

4.1 ROAD AND RAIL TRAFFIC NOISE

The results of the road and rail traffic noise assessment are shown in **Table 4**, which also provide details of the required transmission loss through the façades for the control of noise intrusion from transport noise sources. The internal noise level required by the DNRCBR can be achieved with windows and doors open provided the external noise level is less than 10 dB above the required internal noise level.

Masonry façades will be used for the construction of the development which will provide a minimum Rw of 52 dB, so the only specific treatment that is required for this development is the selection of a window system (glass panels and framing) for the windows and doors in areas that have direct exposure to road and rail traffic.

Table 4 gives the predicted external façade road noise levels for the year of 2027 as well as the existing rail noise level, which is considered to be the worst case for the 10 years predicted noise levels. **Table 4** shows that the calculated façade noise levels from roads exceed the *NSW Road Traffic Noise Policy* target noise levels of 60 and 55 dB(A) for the day and night periods respectively.

Table 4 gives the results of the sound transmission loss requirements across the façade as well as the required glazing (R_w+ C_{tr}) value needed for the building façade at each assessed location.

Table 4 *Road and Rail Traffic Noise Levels and Required Attenuations*

ID	Description	Room Type	Modelled 2027 External Sound Level (outside)			Internal criteria	Sleep disturbance criteria (inside exceedance levels)		Required Sound Transmission Loss (Rw+ Ctr)			Mechanical ventilation required
			Day	Night	LAmax		Background+15	>55	Day	Night	Glazing	
			$L_{Aeq, 15\ hr}$	$L_{Aeq, 9\ hr}$	dB(A)	SPL (dBA)	LAmax (dB)	LAmax (dB)	(dB)	(dB)		
U1 B11	Unit1, Bedroom 1, window 1	Bedroom	63.3	56.4	72.2	35	14.2	7.2	-	14	3mm float	Yes
U1 B21	Unit1, Bedroom 2, window 1	Bedroom	65.7	55.0	74.2	35	16.2	9.2	-	16	3mm float	Yes
U1 B22	Unit1, Bedroom 2, window 2	Bedroom	66.5	57.4	76.1	35	18.1	11.1	-	18	3mm float	Yes
U2 B11	Unit2, Bedroom 1, window 1	Bedroom	53.8	58.2	71.2	35	13.2	6.2	-	13	3mm float	Yes
U2 B12	Unit2, Bedroom 1, window 2	Bedroom	59.1	45.6	64.2	35	6.2	0.0	-	6	3mm float	Yes
U2 B21	Unit2, Bedroom 2, window 1	Bedroom	60.3	50.8	66.8	35	8.8	1.8	-	9	3mm float	Yes
U3 B11	Unit3, Bedroom 1, window 1	Bedroom	59.0	52.0	77.6	35	19.6	12.6	-	20	3mm float	Yes
U3 B21	Unit3, Bedroom 2, window 1	Bedroom	54.6	50.9	65.3	35	7.3	0.3	-	7	3mm float	Yes
U3 B21	Unit3, Bedroom 2, window 1	Bedroom	59.3	46.3	72.7	35	14.7	7.7	-	15	3mm float	Yes
U4 B11	Unit4, Bedroom 1, window 1	Bedroom	54.7	51.0	62.4	35	4.4	0.0	-	6	3mm float	Yes
U4 B21	Unit4, Bedroom 2, window 1	Bedroom	53.7	46.4	67.8	35	9.8	2.8	-	10	3mm float	Yes
U5 B11	Unit5, Bedroom 1, window 1	Bedroom	55.3	45.5	64.7	35	6.7	0.0	-	7	3mm float	Yes
U5 B21	Unit5, Bedroom 2, window 1	Bedroom	54.4	47.0	60.2	35	2.2	0.0	-	2	3mm float	-
U6 B11	Unit6, Bedroom 1, window 1	Bedroom	55.0	46.1	61.6	35	3.6	0.0	-	4	3mm float	-
U6 B21	Unit6, Bedroom 2, window 1	Bedroom	54.9	46.7	63.7	35	5.7	0.0	-	6	3mm float	Yes
U7 B11	Unit7, Bedroom 1, window 1	Bedroom	56.8	46.6	64.7	35	6.7	0.0	-	7	3mm float	Yes
U7 B21	Unit1, Bedroom 1, window 1	Bedroom	54.3	48.5	61.6	35	3.6	0.0	-	4	3mm float	-
U3 Di1	Unit3, Dining 1	Living	55.8	46.0	81.2	40	-	-	6	-	3mm float	Yes

ID	Description	Room Type	Modelled 2027 External Sound Level (outside)			Internal criteria	Sleep disturbance criteria (inside exceedance levels)		Required Sound Transmission Loss (Rw+ Ctr)			Mechanical ventilation required
			Day	Night	LAmax		Background+15	>55	Day	Night	Glazing	
			$L_{Aeq, 15 hr}$	$L_{Aeq, 9 hr}$	dB(A)	SPL (dBA)	LAmax (dB)	LAmax (dB)	(dB)	(dB)		
U3 K1	4.2 UNIT3, KITCHEN 1	Living	59.1	51.0	77.6	40	-	-	9	-	3mm float	Yes
U3 L1	Unit3, Living 1	Living	52.2	45.0	71.4	40	-	-	2	-	3mm float	-
U3 M1	Unit3, Media 1	Living	59.1	44.1	72.0	40	-	-	9	-	3mm float	Yes
U1 L1	Unit1, Living 1	Living	62.2	52.5	73.2	40	-	-	12	-	3mm float	Yes
U1 Di1	Unit1, Dining 1	Living	59.2	53.9	72.0	40	-	-	9	-	3mm float	Yes
U1 K1	Unit1, Kitchen 1	Living	59.2	51.0	72.7	40	-	-	9	-	3mm float	Yes
U2 Di1	Unit2, Dining 1	Living	59.0	51.3	73.8	40	-	-	9	-	3mm float	Yes
U2 L1	Unit2, Living 1	Living	54.8	50.8	76.8	40	-	-	5	-	3mm float	-
U4 Di1	Unit4, Dining 1	Living	52.3	47.2	73.3	40	-	-	2	-	3mm float	-
U4 K1	Unit4, Kitchen 1	Living	54.6	44.2	62.5	40	-	-	5	-	3mm float	-
U4 M1	Unit4, Media 1	Living	58.6	46.3	70.2	40	-	-	9	-	3mm float	Yes
U4 L1	Unit4, Living 1	Living	51.8	49.9	74.9	40	-	-	2	-	3mm float	-
U5 L1	Unit5, Living 1	Living	51.6	43.7	65.2	40	-	-	2	-	3mm float	-
U5 M1	Unit5, Media 1	Living	58.0	48.7	64.0	40	-	-	8	-	3mm float	Yes
U5 M2	Unit5, Media, Window 2	Living	58.0	49.7	64.8	40	-	-	8	-	3mm float	Yes
U5 K1	Unit5, Kitchen 1	Living	55.2	46.9	65.5	40	-	-	5	-	3mm float	Yes
U5 Di1	Unit5, Dining 1	Living	51.6	46.9	72.1	40	-	-	2	-	3mm float	-
U6 Di1	Unit6, Dining 1	Living	51.8	43.5	70.4	40	-	-	2	-	3mm float	-
U6 K1	Unit6, Kitchen 1	Living	54.9	43.6	61.4	40	-	-	5	-	3mm float	-

ID	Description	Room Type	Modelled 2027 External Sound Level (outside)			Internal criteria	Sleep disturbance criteria (inside exceedance levels)		Required Sound Transmission Loss (Rw+ Ctr)			Mechanical ventilation required
			Day	Night	LAmax		Background+15	>55	Day	Night	Glazing	
			$L_{Aeq, 15 hr}$	$L_{Aeq, 9 hr}$	dB(A)	SPL (dBA)	LAmax (dB)	LAmax (dB)	(dB)	(dB)		
U6 M1	Unit6, Media 1	Living	58.3	46.6	63.0	40	-	-	8	-	3mm float	Yes
U6 L1	Unit6, Living 1	Living	51.7	49.0	69.8	40	-	-	2	-	3mm float	-
U7 Di1	Unit6, Dining 1	Living	51.6	43.5	69.5	40	-	-	2	-	3mm float	-
U7 K1	Unit7, Kitchen 1	Living	56.7	43.4	64.2	40	-	-	7	-	3mm float	No*
U7 M1	Unit7, Media 1	Living	59.1	48.3	63.5	40	-	-	9	-	3mm float	Yes
U7 M2	Unit7, Media, Window 2	Living	58.8	50.7	63.4	40	-	-	9	-	3mm float	Yes
U7 L1	Unit7, Living 1	Living	51.7	49.1	0.0	40	-	-	2	-	3mm float	-
*	Fresh air can be borrowed from a adjacent living space with at least one window opened.											

5 RECOMMENDATIONS

5.1 TRAFFIC NOISE MANAGEMENT

In order that traffic noise levels are adequately controlled to the inner residential spaces of the proposed development the following recommendations are made.

5.1.1 EXTERNAL WALLS

Wall construction to be:

- Masonry construction with minimum mass per square meter of 260 kg/m^2.
- 90 mm steel stud frame.
- Insulate cavity within minimum R1.5 Glass Wool Batts.
- 10mm set plasterboard lining.

Or

- Fibre Cement Sheet minimum 9.5 mm thick or equivalent cladding with minimum surface mass of 10.5 kg/m^2.
- 90mm steel stud frame.
- Insulate cavity within minimum R2.5 Glass wool Batts.
- 10 mm set plasterboard lining.

5.1.2 WINDOWS AND DOORS

Glazing for road and rail traffic affected façades to be in accordance with AS 1288 with minimum requirements listed in **Table 4**.

5.1.3 VENTILATION

All bedrooms marked as needing ventilation in **Table 4** shall be provided with ventilation to meet the requirements of Part F4.5(a) of the Building Code of Australia to enable windows to remain closed to exclude transport noise.

Ventilation to be either:

- Ducted non-comfort mechanical ventilation complying with AS 1668 and AS/NZS 3666 with an in-room sound level not exceeding 30dB(A);
- Acoustica Aeropac or equivalent fitted to individual spaces; or
- SilenceAir ™ ventilation grills of sufficient area to meet the requirements of the code.

5.1.3.1 AIR CONDITIONING PLANT

The proponent has advised that a ducted air-conditioning system might be used in the proposed development. Air conditioning plant is advised to be located at ground level at the back of each building and the proposed locations of the air conditioning plant are shown in **Appendix A**. For the purposes of this assessment it is assumed that the maximum total allowable Sound Power Level (SWL) for each air-conditioning plant, if located at ground level, is 70 dB (A) with not more than 65 dB in any octave band between 63 to 8000 Hz. Condensing units should be located in this position and units located in any other part of the site will require separate assessment and evaluation. All A/C units should be installed in accordance with the ANZECC guideline for A/C installation, attached at **Appendix B**.

6 CONCLUSION

Provided the structure and façade treatments are executed in accordance with this report, the level of internal noise generated by road traffic on New England Highway and rail traffic will remain within the limits specified by the Development near Rail Corridors and Busy Roads – Interim Guideline.

Thank you for the opportunity to provide this assessment. Please do not hesitate to contact the undersigned if you have any questions regarding this or any other acoustic or environmental matter.

Yours faithfully
RCA Acoustics

Ali Ahmadi B.Eng (Mech), M.Eng (Mech), PhD (Mech)
Acoustic and Vibration Consultant

REFERENCES

[1] NSW Government Department of Planning, Development near Rail Corridors and Busy Roads – Interim Guideline, December 2008.

[2] Department of Environment, Climate Change and Water, Road Noise Policy, March 2011.

[3] Standards Australia, AS NZS 2107-2000 "Recommended design sound levels and reverberation times for building interiors", December 2000.

[4] Environment Protection Authority, NSW Industrial Noise Policy, January 2000.

[5] Environment Protection Authority, Environmental Criteria for Road Traffic Noise, May 1999.

[6] NSW Department of Planning and Environment, Planning Portal – Find a Property or Council Area. Retrieved May 2017. https://www.planningportal.nsw.gov.au/find-property-or-council-area

TERMS AND DEFINITIONS

dB(A) .... Unit of sound pressure level, modified by the A-weighting network to represent the sensitivity of the human ear.

SPL....................................... Sound Pressure Level (SPL), the incremental variation of sound pressure from the reference pressure level, 20 µPa, expressed in decibels.

SWL (L_W) .... Sound Power Level (SWL) of a noise sources per unit time expressed in decibels from reference level W_O of 10^{-12} W.

L_X.. Statistical noise descriptor. Where (x) represents the percentage of the time for which the specified noise level is exceeded.

L_{eq}... Equivalent continuous noise level averaged over time on an equivalent energy basis.

L_1 .... Average Peak Noise Level in a measurement period.

L_{10}... Average Maximum Noise Level in a measurement period.

L_{90}... Average Minimum Noise Level in a measurement period.

L_{max} .... Maximum Noise Level in a measurement period.

Background Noise Level........ Noise level determined for planning purposes as the one tenth percentile of the ambient L_{A90} noise levels.

P_O .... Reference Sound Pressure for the calculation of SPL in decibels.

W_O .... Reference Sound Power, 10^{-12} W, for the calculation of SWL in decibels.

Appendix A

Plans for Acoustic Recommendations

1.8m solid fence

Location of outdoor A/C units

Appendix B

Client Supplied Plans

See final approved stamped plans that
form part of DA consent DA 17-631

Appendix C

ANZECC Air Conditioner Guide Conditions

Air conditioner noise

Buying an air conditioner?

Then protect your investment and buy one that will not intrude noisily on your neighbours.

In Australia there are laws that stop noisy air conditioners from being used where the noise is annoying to neighbours. In fact your air conditioner may need to be inaudible to your neighbours if you wish to use it at night.

The best policy is to buy the quietest air conditioner suited to your heating/cooling needs and have it installed as far as possible from neighbours or in a well shielded location.Most air conditioners in Australia have a label which describes the amount of noise they make. **The smaller the number of dBA on the label the quieter the air conditioner.**

OUTSIDE SOUND POWER LEVEL 60 dBA

(LOWER LEVELS MEAN LOWER OUTSIDE NOISE)
THE LEVEL SHOWN ABOVE MAY BE USED TO ESTIMATE WHETHER THE OUTSIDE NOISE FROM THE PROPOSED INSTALLATION OF THIS UNIT WILL BE WITHIN ACCEPTABLE LIMITS

CONSULT YOUR SUPPLIER BEFORE INSTALLATION

(MANUFACTURER) (MODEL No.)

The number on the air conditioner you buy should not exceed the number you calculate using this guide.

Note that the back page provides a quick estimation for some commonly used air conditioner locations.

It is also recommended that you consult your air conditioner salesperson or installer before you commit yourself.

What to do

Follow steps 1 - 4 carefully or make sure that the person selling or fitting your new air conditioner makes a similar check for you.

Step 1 The closer your air conditioner is to your neighbour the quieter it will need to be. Follow the procedure in Appendix A and put your answer in Box 1.

Step 2 If there is a fence or wall between yourself and your neighbour the noise may be reduced. Check this using Appendix B and put your answer in Box 2.

Step 3 Noise can reflect off walls and make your air conditioner appear louder. Follow the instructions in Appendix C and put your answer in Box 3.

Step 4 Add the numbers in Box 1 and Box 2 then subtract the number in Box 3.

Box 1		Box 2		Box 3		ANSWER
	+		–		→	dBA

The number on the label of your air conditioner should not be more than the number in the answer box.

If you already own an air conditioner and the number on it is bigger than that in the answer box, then you may need to consider the feasibility of installing a noise control device specially designed for the air conditioner, locating the air conditioner elsewhere or replacing it.

AUSTRALIAN ENVIRONMENT COUNCIL

Appendix A

Step 1 Measure the **shortest** distance, in metres, between where you want to put your air conditioner and the nearest neighbouring fence line. Mark the distance with an X in column 1, below .

Bear in mind that to reduce noise, air conditioners are best placed in a location which provides the greatest distance between the air conditioner and neighbours. This could, for example, mean mounting your air conditioner facing the back fence or front street.

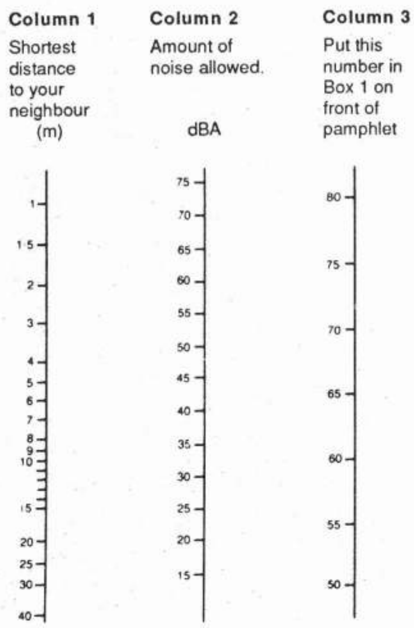
In rural areas you may consider that it is more relevant to measure the distance between your air conditioner and the nearest area used by your neighbour (such as a garden relaxation area).

Step 2 Find out if there are laws regarding noise in your State or local area. Information on who to contact is listed on the back of this pamphlet.

Mark the amount of noise allowed in your area with an X in column 2.

If there is no prescribed maximum amount of noise and you live in a quiet residential area, a mark at 40 dBA or less could be used as a guide. Alternatively you may wish to arrange to have the background noise levels in your area measured.

Step 3 Draw a straight line from the X in column 1 through the X in column 2 to cut through column 3. Write down in Box 1 on the front of this pamphlet the number in column 3 that is on the line you have drawn.



Appendix B

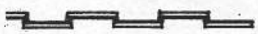
A fence/barrier can reduce the level of air conditioner noise heard in neighbouring premises. To do this a fence/barrier will need to be continuous and solid. It should contain very few gaps, particularly where the fence meets the ground. The fence/barrier must also prevent the airconditioner being seen from noise sensitive locations on neighbouring premises. Noise sensitive locations include windows of bedrooms and living rooms (including those of multistorey dwellings) and outdoor entertaining/ relaxing areas.

What to do

Carefully read through the fence/barrier descriptions below starting at point 1. Select a value that corresponds to the fence/barrier description applicable to your situation. Put this value in Box 2 on the front page.

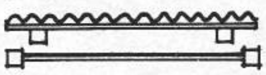
	Value for box 2
1. The fence/barrier does not prevent the airconditioner being seen from between the air conditioner and noise sensitive locations on the neighbouring premises.	0
2. The fence/barrier only just blocks "line of sight" and it is made of material having gaps, such as a standard picket fence, a brush fence or a brick fence with fancy iron inserts.	0
3. The fence/barrier only just blocks "line of sight" and is made of solid material.	5
4. Fence/Barrier with Gaps e.g. Hedges/bushes/trees Ti tree/brush Picket fence Fence in disrepair with holes or missing planks Cyclone fence Masonry fence with decorative open inserts.	0

5. The fence/barrier completely blocks "line of sight" of the air conditioner noise sensitive locations.

Typical Paling Fence  6

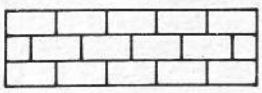
e.g. Planks overlapped by 25 mm planks, 13 mm thick. Air gaps between palings due to warping etc.

Solid Fence with no Gaps and Flush to the Ground. 10



e.g. Galvanised iron
Fibre cement sheeting
20 mm Pine planking with 35 mm overlap.

Concrete block/ masonry/brick



Special notes

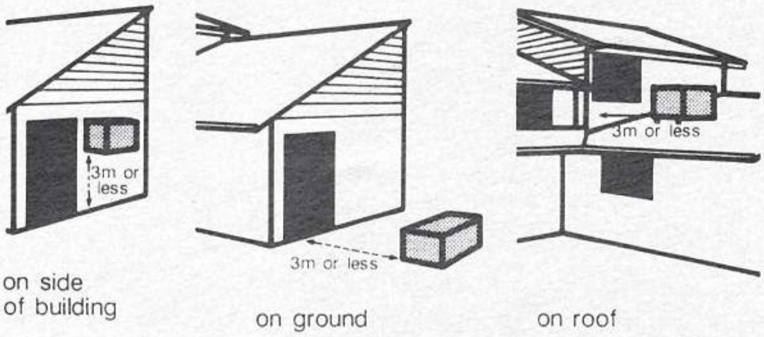
1. If you consider that your house would stop noise reaching your neighbours, consult the authority listed on page 4 for an appropriate value.

2. If in doubt about your fence type, select a low value.

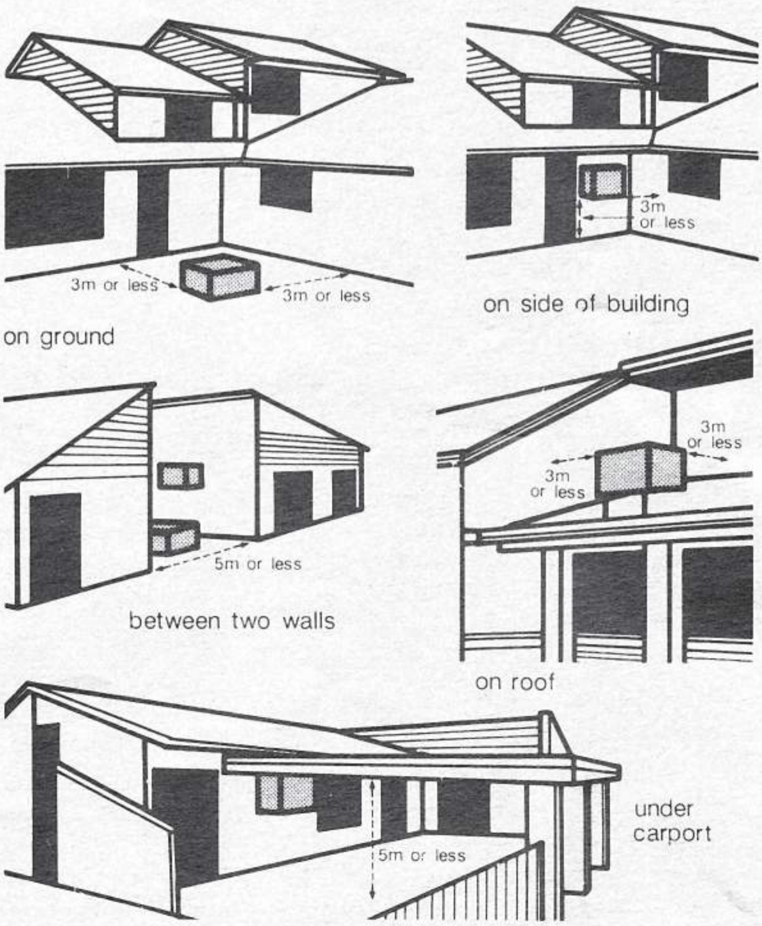
Appendix C

Just as light reflects from mirrored surfaces, sound will reflect from walls, carports, roofs and the like. Find a diagram below which would correspond to the placement of your air conditioner. Put the corresponding value in Box 3 on the front page of this pamphlet and go on to **STEP 4** on the front page.

	Value for box 3
One reflective surface	3



Two reflective surfaces	6

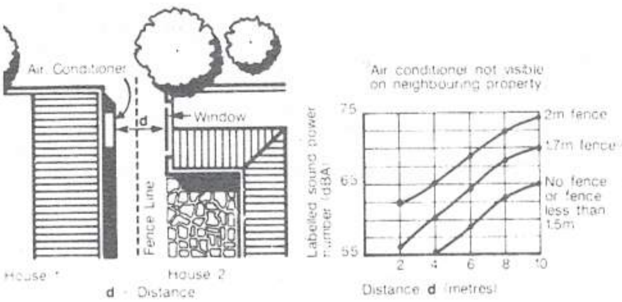


To find out how much noise your air conditioner is allowed to make talk to:

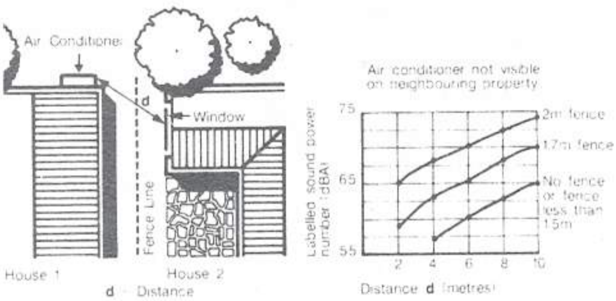
ACT	Environment Protection Section, ACT Administration
NSW	Your Local Council
NT	Your Local Council or the Conservation Commission
Qld.	Your Local Council
S.A.	Department of Environment and Planning
Tas.	Your Local Council or the Department of the Environment
Vic.	Your Local Council or the Environment Protection Authority
WA	Your Local Council or the Environmental Protection Authority

Quick estimations for commonly occurring air conditioner installation locations

Case A An air conditioner between two houses.



Case B An air conditioner against the front or back wall.



1. Measure the shortest distance d, in metres, between where you plan to put the air conditioner and a noise sensitive location on the neighbouring premises.
2. Measure the height of the fence (if any) between your house and your neighbour. Assume the fence is less than 1.5 mm high if it has openings, e.g. picket, brush, poor condition paling fences, brick walls with lots of gaps.
3. Looking at the graph find the applicable distance d then take a vertical line up to meet a line corresponding to the fence height. Read across to the left to determine the maximum sound power number that may be on your air conditioner.

Note 1. Where there is no fence or a fence less than 1.5 m high and d = 2 m, or less, there is unlikely to be an air conditioner suitable for this location.

Note 2. These examples are based on single storey homes located on flat ground. If your situation differs you are advised to use the full calculation method.

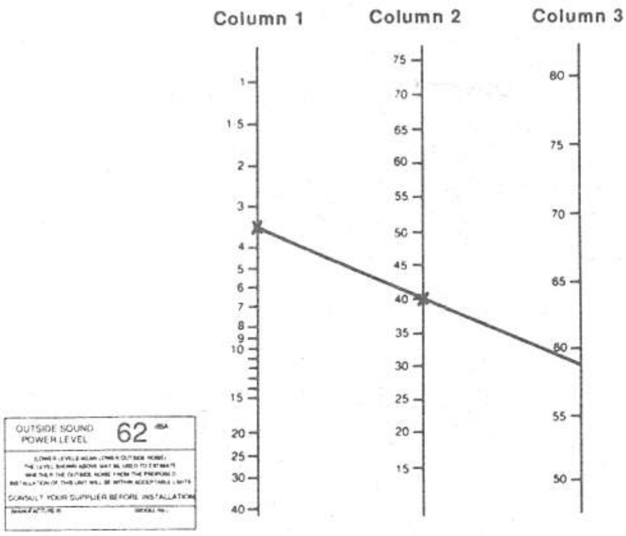
Example of full estimation method

Step 1 You plan to locate your air conditioner 3.5 metres from your neighbour's patio so you put a mark at 3.5 in column 1.
The Local Council advises you that the noise level at your neighbour's property should not exceed 40 dBA, so you put a mark at 40 in column 2. Joining these two points with a straight line through column 3 gives a value of 58.

Step 2 The fence between the air conditioner and your neighbours would block "line of sight" and is made of galvanised iron. Put 10 in Box 2.

Step 3 The air conditioner is between two walls as shown in Appendix C example 3 d. Put 6 in Box 3.

58	+	10	–	6	→
Box 1		Box 2		Box 3	



You have therefore found that the number on the air conditioner you buy should not exceed 62 dBA if you install it at this location.