

Noise Impact Assessment

for

Multi-Unit Residential Development

Block 11, Section 6, Dickson ACT

Prepared for: Melinda Dodson Architects
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GUZ BOX design + audio

GUZ BOX design + audio has been engaged by *MDa Architects* to provide acoustic consulting services for a proposed multi-unit residential development at Dickson ACT.

Scope of work for this report includes:

1. Environmental Noise Assessment - Traffic Noise:

- Hire of handheld Sound Level Meter
- Attended noise measurements only
- Site Investigation including on-site noise assessment in accordance with *AS1055.1-1997 "Acoustics - Description and measurement of environmental noise - General procedures"*
- Analysis of data + summary of measured results

2. Acoustic Consulting – Building Acoustics:

- Determine existing traffic noise levels from measured data
- Consideration of Building Code of Australia, Australian Standards, local planning authority design guidelines and DA conditions, including ACT publication *"Multi Unit Housing Development Code"* and *AS 3671-1989 "Acoustics - Road traffic noise intrusion - Building siting and construction"*
- Discussions with Environment ACT and/or project PCA where applicable
- Review architectural documents and specification
- Detailed assessment of facade + bounding construction
- Review noise measurements + provide assessment of anticipated noise impacts on internal occupancies
- Recommendations to minimise impact of traffic noise within internal occupancies + calculation of anticipated internal noise levels
- Preparation of Traffic Noise Assessment/report for submission with DA Documentation

Following review of architectural drawings, specification and details of bounding construction, it is the opinion of *GUZ BOX design + audio* that the new building works will comply with the requirements of ACT planning legislation for multi-unit residential housing near major roads.

Installation of glazing to meet a sound insulation rating greater than 25dB to all window systems installed in sleeping and living areas throughout the proposed development, will meet the relevant Australian Standards and ACT planning legislation. This can be achieved through installation of glazing equivalent to 6.38mm laminated glass. It should be noted that doors and windows must be closed to satisfy the required internal design sound/noise levels.

1.0 Details of acoustic consultant

Tim Kuschel, proprietor *GUZ BOX design + audio*, carried out the attended measurements and has prepared of this report.

Tim Kuschel, M Des.Sci.(Audio), MAAS, MAES, MASA has more than 20 years experience in environmental noise measurements, architectural acoustics and professional sound reinforcement design. Tim is included in the *Australian Acoustical Society* Register of Nominated Areas of Competence under categories of *Environmental Noise* and *Architectural and Building Acoustics*.

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2.0 Description of site + project

For the purposes of this report, the site is described as Blocks 11-14 Section 6, Dickson ACT. The site comprises 4 blocks and is commonly identified as numbers 35, 37, 39 and 41 Lowrie Street Dickson.

These blocks are located within Land Use Zone RZ4: Medium Density Residential and situated a minimum distance of 50m from Northbourne Avenue, the main north-south road corridor to Canberra City.

Proposed works include construction of a three story multi-unit residential development consisting one and two bedroom apartments, and basement parking.

In accordance with the Building Code of Australia (BCA), this building is classified as Class 3, with Type B construction.

3.0 Development + Planning Controls

Rule 67 of the ACT *Multi Unit Housing Development Code* states:

R67

Where a *block* has one or more of the following characteristics:

- i) identified in a precinct code as being potentially affected by noise from external sources
- ii) adjacent to a road carrying or forecast to carry traffic volumes greater than 12,000 vehicles per day
- iii) located in a commercial zone
- iv) adjacent to a commercial or industrial zone

dwellings shall be constructed to comply with the relevant sections of all of the following:

- a) AS/NZS 2107:2000 - *Acoustics – Recommended design sound levels and reverberation times for building interiors* (the relevant satisfactory recommended interior design sound level)

b) AS/NZS 3671 - *Acoustics – Road Traffic Noise Intrusion Building Siting and Design*.

For other than road traffic noise, compliance with this rule is demonstrated by a noise management plan prepared by a member of the Australian Acoustical Society with experience in the assessment of noise, and endorsed by the EPA.

For other than road traffic noise, the noise level immediately adjacent to the dwelling is assumed to be the relevant noise zone standard specified in the ACT Environment Protection Regulation 2005.

For road traffic noise, compliance with this rule is demonstrated by an acoustic assessment and noise management plan, prepared by a member of the Australian Acoustical Society with experience in the assessment of road traffic noise, and endorsed by the Transport Planning & Projects Section in ESDD.

With regard to traffic noise, AS 3671 refers to AS 2107, which recommends the design sound levels, as indicated in the following table, for areas within houses and apartments, hotels and motels, near major roads.

<i>Type of occupancy/activity</i>	<i>Design sound level range</i>
Houses and apartments in inner city areas or... near major roads: <ul style="list-style-type: none"> • Apartment Common Areas (Foyer, Lift Lobby etc.) • Living Areas • Sleeping Areas (night time) • Work Areas 	45 - 50 dB L _{Aeq} 35 - 45 dB L _{Aeq} 35 - 40 dB L _{Aeq} 35 - 45 dB L _{Aeq}

The above design levels have been sourced from *AS/NZS 2107:2016 “Acoustics – Recommended design sound levels and reverberation times for building interiors”*. These recommended design sound levels are also consistent with Australian Standard *AS3671-1989 “Acoustics-Road traffic noise intrusion-Building siting and construction”*, which recognises that residences near major roads may be exposed to higher levels of road traffic noise intrusion. However, the ACT *Multi Unit Housing Development Code* requires that the relevant ‘satisfactory recommended’ interior design sound level shall be met – which is in reference to the previous version, *AS 2017:2000*. This is a mandatory requirement. For the purposes of this assessment, the lower design level in the above table has been used to determine compliance with the ACT *Multi Unit Housing Development Code*.

4.0 Equipment used for measurements

4.1 Hand-held Sound Level Meter

The following hand-held sound level meter (SLM) was used to obtain background noise measurements and reverberation times:

Brand: *NTi Audio*
Model: XL2 Analyser (Serial #: A2A-06746-EO)
Firmware: V3.23
Software: XL2 STI-PA Option (Serial #: 2081)
XL2 Data Explorer Option (Serial #: 1237)
XL2 Sound Insulation Option
Microphone: M2230 Class 1 measurement microphone (Serial #:7048)
Microphone preamplifier: MA220 (Serial #: 2630)
Calibrator: *NTi Audio/Larson Davis* CAL200 (Serial #:13765)

The SLM was calibrated before measurements and again at the end of testing. No calibration drift was noted. The SLM was set to record continuous noise measurements over the test periods.

4.2 Portable Weather Station

The following weather and environmental meter was used to gather environmental data at the compliance location:

Brand: Kestrel
Model: 4500BT

5.0 Environmental Noise Assessment - Traffic Noise

5.1 Assessment of traffic noise – measurement location

Due to site access constraints, it was not possible to locate an Environmental Noise Logger onsite to record continuous noise measurements over an extended period of time. An alternative location was determined which was readily available and represented an equivalent location from Northbourne Avenue for the assessment of traffic noise. Attended measurements were carried out over several days, with most of these during the morning peak hour to determine worst-case traffic noise from south-bound traffic.

For each of these measurement periods, the sound level meter was located within the TransACT carpark (Block 17 Section 33 Dickson) and situated approximately 50m from Northbourne Avenue. This location afforded clear line-of-sight to passing traffic. Refer attached location plan indicating measurement location.

Additionally, reference noise measurements were carried out at Lowrie Street, near to the development site, to determine noise contribution from traffic on Northbourne Avenue.

5.2 Summary of measured traffic noise data

The following table represents a summary of average traffic noise measured from Northbourne Avenue.

Location + observations	Measurement details			
	L_{A10}	L_{Aeq}	L_{A90}	L_{Amax}
Carpark, Block 17 Section 33 Dickson	57.3dB	55.2dB	51.6dB	85.0dB

5.3 General observations and measurement summary

The following was observed during the measurement periods:

- Temperature: Varied during the measurement periods, typically 15-20°C
- Wind: Varied throughout the measurement periods, typically below 10km/h
- Rain: Nil recorded during the measurement period.
- Morning traffic measurements were carried out between 7am and 9am
- Traffic noise constant during measurement period
- Some local bird noises, passing foot traffic etc...
- Vehicles on Northbourne Avenue accelerating from traffic lights, heavy vehicles, buses etc. providing increased noise source.
- Occasional care horns, louder vehicles at times
- Some local traffic in carpark – not significant
- Construction noise in distance - from tram construction works,audible but not significant

For the purpose of this assessment, both Northbourne Avenue is considered a Major Road within the Territory Plan (Section 13.1 Definitions). Traffic noise from Northbourne Avenue is audible at the development site. At ground level (Lowrie Street), traffic noise appears somewhat reduced – due to existing buildings between Lowrie Street and Northbourne Avenue. It is anticipated traffic noise from Northbourne Avenue will increase at upper levels of proposed development.

Average road traffic noise levels of 55.2dB L_{Aeq} were recorded during the measurement periods, with maximum noise of up to 85dB L_{Amax} .

5.4 Consideration of future noise from tram operations

The Canberra light rail project, currently under construction, will be operating along Northbourne Avenue and located in the median strip between north and south bound traffic lanes.

A report prepared by SLR Consulting Australia Pty Ltd as part of the proposed Canberra light rail works, '*Capital Metro, Environmental Impact Statement, Noise and Vibration Assessment*', dated 12 June 2015 provides anticipated noise levels from future light rail.

The report notes a predicted worst-case night-time noise level of approximately 55dB L_{Aeq} with maximum noise levels of up to 77dB L_{Amax} . The location of these noise levels is not adequately described in the report, however it is expected that these values would be represented by the nearest affected receivers at approximately 20m from the light rail corridor.

Airborne noise mitigation and vibration control measures have been recommended in the report to maintain acoustic amenity where possible of residential receiver within close proximity to the proposed light rail.

6.0 Construction to achieve required internal noise levels

It is recommended that building façade constructions exceeding 25dBA to all living and sleeping areas will achieve the recommended minimum internal noise levels indicated in AS2107:2016. Following review of the architectural layout drawings, it is recommended that all units within the development are provide with protection against traffic noise intrusion.

6.1 Wall Construction

Several wall systems have been documented for this project. Refer architectural drawings for details and extent of external wall cladding.

The proposed external brick veneer (BR) or in-situ/precast concrete (BPC) clad wall construction will provide noise attenuation in excess of 50dB(A).

The proposed lightweight folded metal cladding system (MC1/MC2) installed over a masonry wall construction will provide noise attenuation in excess of 50dB(A). Where the lightweight folded metal cladding system is installed over a timber or steel stud framing system, the noise attenuation is expected to be less than 30dB(A).

Recommendations

It is recommended to provide wall construction with noise attenuation greater than 45dB(A), also providing improved noise attenuation at lower frequencies.

Where the lightweight folded metal cladding system is installed over a timber or steel stud framing system, it is recommended to install a wall system equivalent to:

- Folded metal cladding system on battens with vapour barrier
- 9mm FC sheet or 18mm plywood lining, externally fixed to;
- nom. 90mm timber or steel stud framed wall system with;
- min. 50mm R2.5 building insulation infill
- 2 layers x 13mm *CSR Fyrecheck* plasterboard wall linings, internally.

The above recommended wall system will provide noise attenuation greater than 45dB(A) and also provide

6.2 Roof Construction

Metal deck roof construction with anticon over rafters lined with 10mm plasterboard ceiling and R4.0 insulation at ceiling level will provide noise reductions in excess of 45dB(A).

6.3 Window Construction

Note: Windows facing Northbourne Avenue must be closed to provide adequate acoustic attenuation of road traffic noise. A mechanical air-handling system may be required to provide fresh air in accordance with the *National Construction Code (Building Code of Australia)*.

The following table shows noise reductions for several standard glass types providing noise attenuation greater than 25dB(A):

<i>Name</i>	<i>Thickness</i>	<i>Noise reduction dB(A)</i>
Float glass	6mm	32
Standard Laminated	6.38mm	33
	10.38mm	36
Viridian VLam Hush	6.5mm	36
	8.5mm	38
Double-glazed window suite	4mm + 6mm air gap + 4mm	29
	4mm + 12mm air gap + 4mm	31
	6mm + 12mm air gap + 6mm	33

Installation of window systems in external walls to Sole Occupancy Units should be equivalent to *Trend Windows 'Quantum'* series window suites. Alternatively, a commercial window suite equivalent to *Capral 400/425* series with a high level of acoustic detailing would also be suitable. Additional noise reductions can be achieved following installation of thicker glazing systems. The *Veridian 'VLam Hush'* range also offer laminated glass thicknesses of 8.5, 10.5 + 12.5mm. Further reductions can be achieved with installation of *Veridian 'VLam Hush'* 6.5mm laminated glass in a double-glazed window suite, with the second glass of a different thickness.

Please note that some manufacturers do not provide residential double-glazed sliding window suites and others are limited by the overall width of the double-glazed window systems. Commercial window systems may allow greater air-gap between glass panes, provided better sound isolation.

Acoustic seals are to be fitted to all sliding windows, panel lift windows and sliding door/window units to maintain acoustic attenuation of the window systems when closed. A mohair seal with PVC fin or rubberised acoustic-specific seal should be provided and fitted in accordance with the window manufacturers recommendations. Care should be taken during construction to ensure the perimeter of all window systems is fully sealed against noise intrusion.

Recommendations:

Install 6.38mm laminated glass or 6.5mm VLam Hush glazing to all window systems installed in sleeping and living areas throughout the proposed development.

All other window systems may be fitted with standard 6mm float glass.

7.0 Summary

Following review of existing road traffic noise conditions and consideration of the proposed bounding construction, it is the opinion of *GUZ BOX design + audio* that the proposed residential units will satisfy the requirements of the ACT Government Environment and Sustainable Development publication *Multi-Unit Housing Development Code*, particularly with regard to *Rule R67 Noise attenuation – External Sources*.

It is also the opinion of *GUZ BOX design + audio* that the proposed development will also provide adequate attenuation of noise from the future light rail.

8.0 References

National Construction Code – Building Code of Australia (BCA)

Australian Standard AS 1055.1 1997 “Acoustics - Description and measurement of environmental noise - General procedures”

Australian Standard AS 2107-2000 “Acoustics - Recommended design sound levels and reverberation times for building interiors”

Australian Standard AS 2107-2016 “Acoustics - Recommended design sound levels and reverberation times for building interiors”

Australian Standard AS 3671-1989 “Acoustics - Road traffic noise intrusion - Building siting and construction”

ACT Government Environment and Sustainable Development publication “*Multi Unit Housing Development Code*”, published 7 September 2016

SLR Consulting Australia Pty Ltd report, ‘*Capital Metro, Environmental Impact Statement, Noise and Vibration Assessment*’, dated 12 June 2015



Diagram 1: Location plan showing site shaded and measurement location
 Image source: actmapi.act.gov.au