

41.4972.R1:ZSC

5th December, 2011

McKees Legal Solutions
Baulkham Hills BC
PO Box 7909
BAULKHAM HILLS NSW 2153

Attention: Mr G. McKee

Dear Sirs,

ACOUSTIC ASSESMENT
PROPOSED RESIDENTIAL DEVELOPMENT
751 – 757 WARRINGAH ROAD. FORESTVILLE

The purpose of this letter is to provide the results of an assessment of the proposed residential development at 751-757 Warringah Road, Forestville.

We are instructed a development application has been submitted to Warringah Council with the application being referred to the JRPP.

A report from Council officers recommends the application be refused citing under clause 102 of the SEPP (Infrastructure) the absence of an acoustic assessment for the development.

Clause 102 of the SEPP (Infrastructure) requires for a residential building adjacent a road with an annual daily traffic volume of more than 40,000 vehicles the LAeq levels are not to exceed 35 dB(A) in any bedroom between 10pm and 7am and anywhere else in the building (other than a garage, kitchen, bathroom or hallway) 40 dB(A) at any time.

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The NSW Department of Planning document *Development near Rails Corridors and Busy Roads – Interim Guideline* (the “*Interim Guideline*”) supports the specific rail and road noise provisions of the State Environmental Planning Policy (Infrastructure) 2007.

By definition the LAeq parameter requires reference to a time period.

The SEPP does not specifically identify in Clause 102 the time period for the application of the Leq level. However, Table 3.1 in the SEPP identifies the airborne noise is calculated as a daytime LAeq(15 hr) assessment period of 7am to 10pm, and a night-time LAeq(9hr) assessment period of 10pm – 7am.

The Site

Appendix A identifies the location of the site and measurement location used for this investigation.

Appendix B sets out a plan of the proposed residential development.

For the purpose of this assessment attended measurements were carried out in the evening peak period on Thursday 24th November 2011 utilising a measurements location at the current building alignment to Warringah Road, and adjacent to a building so as to include façade reflections (as required for trad traffic noise assessments).

Measurement Techniques

Noise measurements were taken in accordance with the Australian Standard AS1055 “*Acoustics - Description and Measurement of Environmental Noise*” and the requirements of the noise measurement survey sheets contained in the “*Environment Protection Authority - Environmental Noise Control Manual*” and the ambient background measurement procedures set out in Appendix B of the EPA’s *Industrial Noise Policy*.



The attended sound level measurements were recorded using a NATA Calibrated Brüel & Kjær Modular Sound Level Meter Type 2260 with Enhanced Sound Analysis Software BZ7206. The reference calibration level of the meter was checked prior to and after measurements using a Brüel & Kjær Sound Level Calibrator Type 4231 and exhibited no system drift. The NATA Calibration of the sound level meter is current.

The measurement results are shown as four 15 minute time splice graphs in Appendix C reveal the variation in the A-weighted level over time. The following table presents the statistical levels for each 15 minute period and the results for the full 1 hour period determined by the Bruel & Kjaer Evaluator Program.

TABLE 1: Attended Measurement Results – dB(A)

Start time	L90	Leq	L10	L1
5.15 pm	64	71	74	77
5.30 pm	65	72	74	76
5.45 pm	65	72	74	76
6.00 pm	65	71	74	76
Combined	65	72	74	76

Assessment Procedure

For road traffic impacting upon residential dwellings the *Interim Guideline* utilises a screening test for two different traffic speed zones, 60/70 km/h and 100/110 km/h to ascertain if treatment is required.

Warringah Road has a posted speed of 70 km/hr at the site. RTA AADT information for 2002 indicates for monitoring location V55.044 (west of Melwood Avenue) a value of 68284 vehicles per day.



Utilising Figure 3.3(a) from the *Interim Guidelines* for an AADT of 70,000 reveals that at the front of the site would be a Category 6 classification, 20 metres from the traffic would be Category 5 and 30 metres from the kerb would be Category 4.

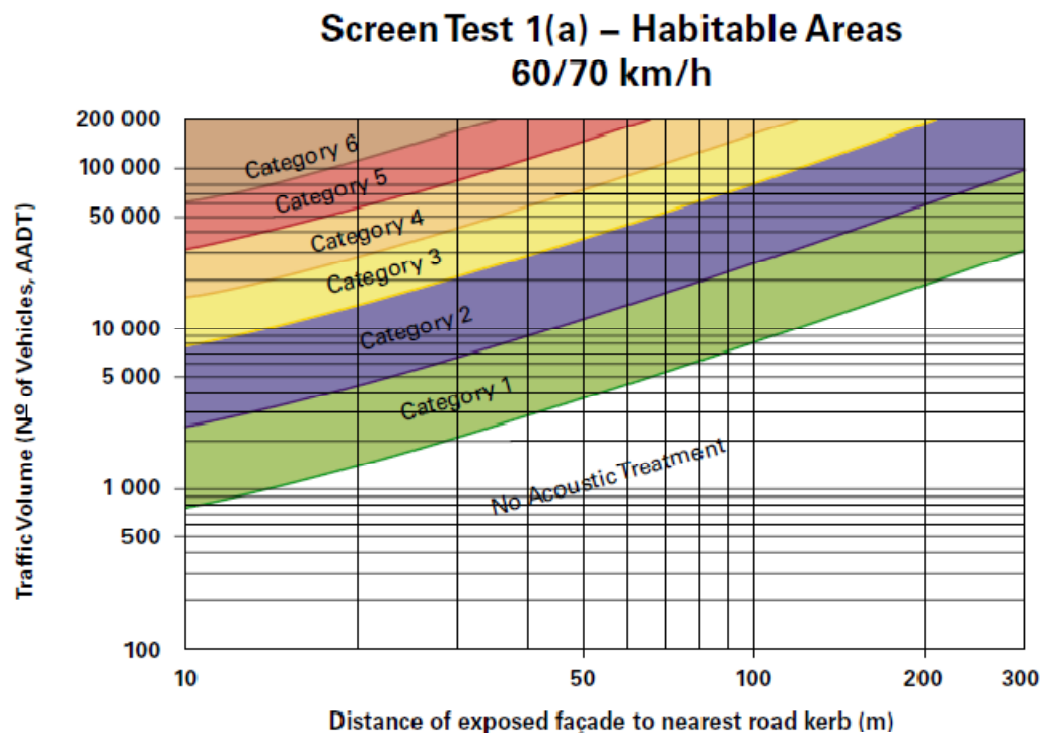


Figure 3.3(a): Screen tests for habitable areas of single/dual occupancy dwellings (if any exposed façade is direct line-of-sight)

The above Screening test reveals an acoustic assessment is required and the degree of noise controls anticipated for the development will be significant.

Actual sound level measurements of the traffic noise indicate lower Categories that the Interim Guidelines would suggest.

The qualification for the time period for the Leq assessment comes from Table 3.1 of the Interim Guidelines as reproduced below.



Table 3.1: Noise criteria		
Residential Buildings		
Type of occupancy	Noise Level dBA	Applicable time period
Sleeping areas (bedroom)	35	Night 10 pm to 7 am
Other habitable rooms (excl. garages, kitchens, bathrooms & hallways)	40	At any time
Non-Residential Buildings		
Type of occupancy	Recommended Max Level dBA	
Educational Institutions including child care centres	40	
Places of Worship	40	
Hospitals	- Wards	35
	- Other noise sensitive areas	45

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.

The EPA had previously used for road traffic noise the *Environmental Criteria for Road Traffic Noise* that specified higher internal noise limits than shown above.

The *Environmental Criteria for Road Traffic Noise* policy has been replaced by the DECCW Road Traffic Noise policy.

In terms of the DECCW (EPA) *Road Traffic Policy* document Warringah Road would be classified as an arterial road and under the RTP the external day/night L_{eq} target for new residential dwellings is 60/55 dB(A), which is exceeded at the northern side of the site.

For internal noise targets the RNP refers to the SEPP (Infrastructure) and as such represents more stringent criteria than the ECRTN.

Acoustic Assessment

The assessment procedure set out in Appendix D of the *Interim Guideline* assumes an external L_{eq} noise level (with facade reflection) of 68 dB(A). For this external level the Interim Guidelines nominates typical room sizes for a residential building, from which an analysis of various constructions are considered with respect to the sensitive rooms towards the traffic noise source and then oriented away from the traffic source to then consider the degree of attenuation required to comply with the internal design levels.



In this situation the *Interim Guidelines* indicate more extensive noise control measures that obtained from the actual site measurements.

The *Interim Guidelines* indicate substantial noise controls are required for the portion of the development exposed to Warringah Road traffic but do not allocate any allowance for shielding.

As one progresses into the site the front two blocks will provide acoustic shielding and therefore less road traffic noise impact/levels. However the site is subject to Warringah Road noise passing over the building on the subject site and over the adjacent properties that negate to some extent the direct shielding from the proposed development itself.

The 72 dB(A) Leq (1 hour) level set out in Table 1 is a façade reflected level and represent the level obtained during the peak traffic period. When taken as a 15 hour LAeq level the external level for the front façade of the building has been set at 70 dB(A). For the night time LAeq level a level of 65 dB(A) has been allocated.

The noise levels reflect the acoustic impact of Warringah Road and the need for positive noise control measures.

The site plan shows the front façade of the front blocks to have living areas with the bedroom to the rear of the living rooms. This results in some acoustic shielding of road traffic noise at the rear of those blocks but not sufficient to eliminate noise control measures.

On the basis of the nominated external level of 70 dB(A) the living areas for the front blocks require an attenuation of not less than $70 - 40 = 30$ dB(A).

The bedrooms of those apartments for the western front block are at the rear of the block (with no windows on the side) leading to an external noise target of 55 dB(A) for the bedrooms. This would require a minimum attenuation of $55 - 35 = 20$ dB(A).



Whilst the external and internal noise targets are expressed in terms of an A-weighted value, the selection of building elements is expressed in the weighted reduction index (Rw) which is an acoustic parameter that has a different frequency response to the A-weighted level. For general noise assessments when comparing the performance of a building element the Rw that approximates an A-weighted value is some 6 - 7 units greater than the desired A-weighted reduction.

If one considers a design Rw target of 10 above the required dB(A) attenuation then for the western front block the glazing to the front is to be Rw 40 whilst the bedroom glazing (to the rear) is to be Rw 30.

From the above required attenuation in terms of the *Interim Guideline* the living rooms to the front of the blocks closest to Warringah Road would be Category 3 whilst the bedrooms at the rear would be Category 2.

Appendix D sets out generic noise control measures (being Appendix C of the *Interim Guideline*).

Appendix E sets out a schedule of required attenuation for the ground floor plan shown in Appendix B. The Table in Appendix E indicates the minimum glazing thickness required for Blocks A, B, C, D and F. There are no acoustic upgrading required for blocks E and G.

For an open windows situation there is an allocation of 10 dB(A) reduction from outside to inside. As a general concept where the glazing is required to be upgraded it is necessary to provide mechanical ventilation to those spaces as indicated in the Table.

Conclusion

We are instructed Council require the proposed development at 751 – 757 Warringah Road, Forestville to be assessed in accordance with the requirements of Clause 102 of the SEPP (Infrastructure).



The SEPP refers to the *Development near Rails Corridors and Busy Roads – Interim Guideline* (the “*Interim Guideline*”) that provides a screening test and generic noise controls. However the traffic volume past the subject site requires acoustic measurements for the determination of the noise controls.

A site visit has been conducted to obtain traffic noise levels during the evening peak period from which an analysis of the proposal has been conducted to derive the noise control measures required to satisfy the SEPP (Infrastructure) noise limits. The recommend noise controls which may be included in a condition of consent are set out in Appendix E.

Yours faithfully,

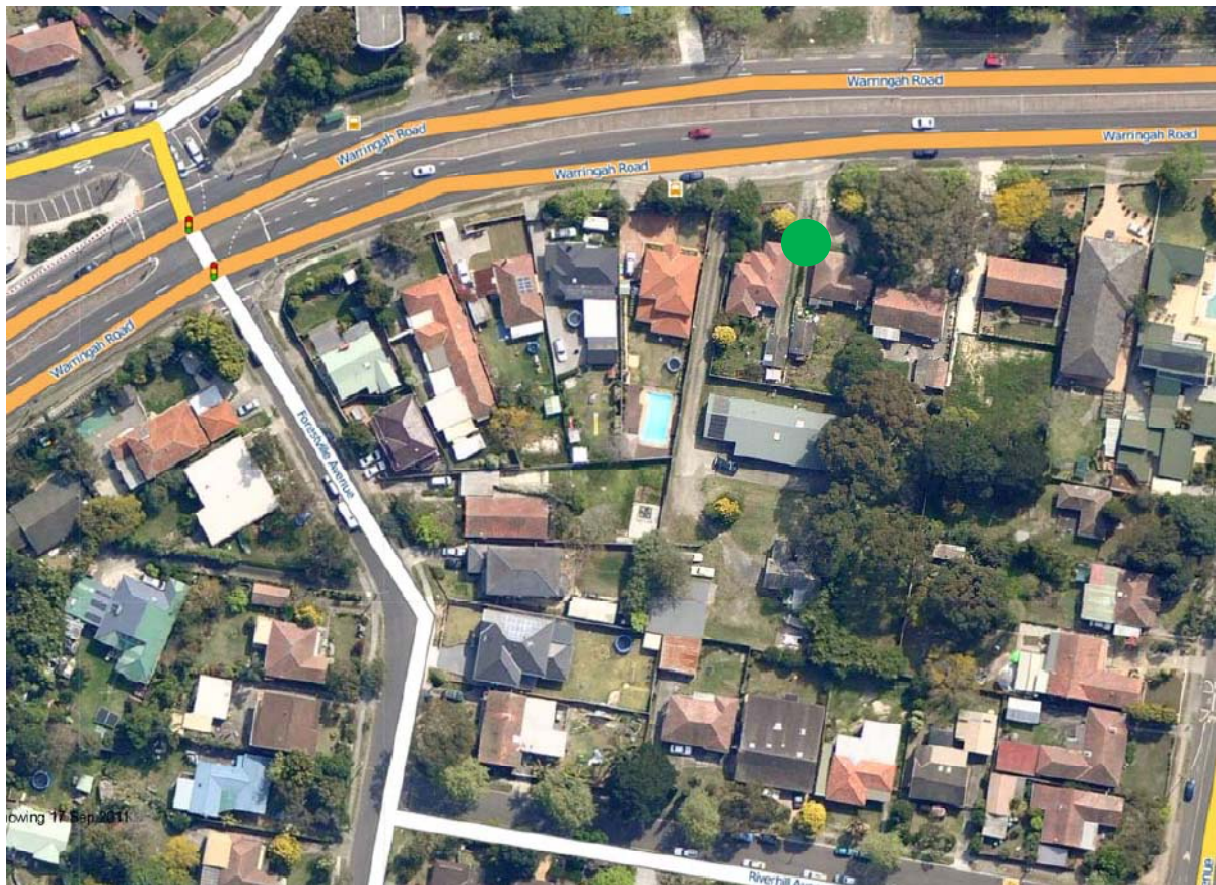
THE ACOUSTIC GROUP PTY LTD


STEVEN COOPER



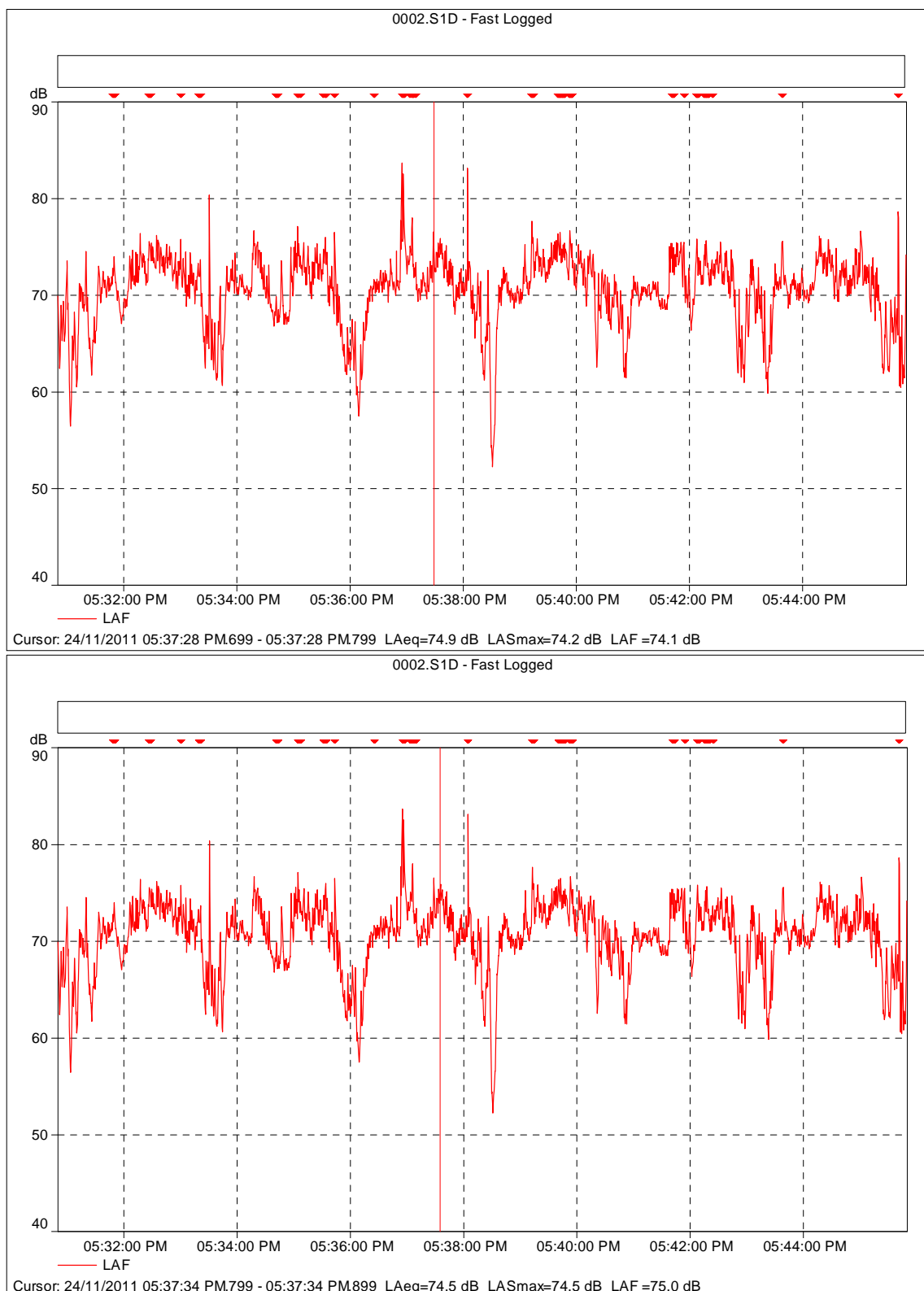
APPENDIX A: Site and Measurement Location

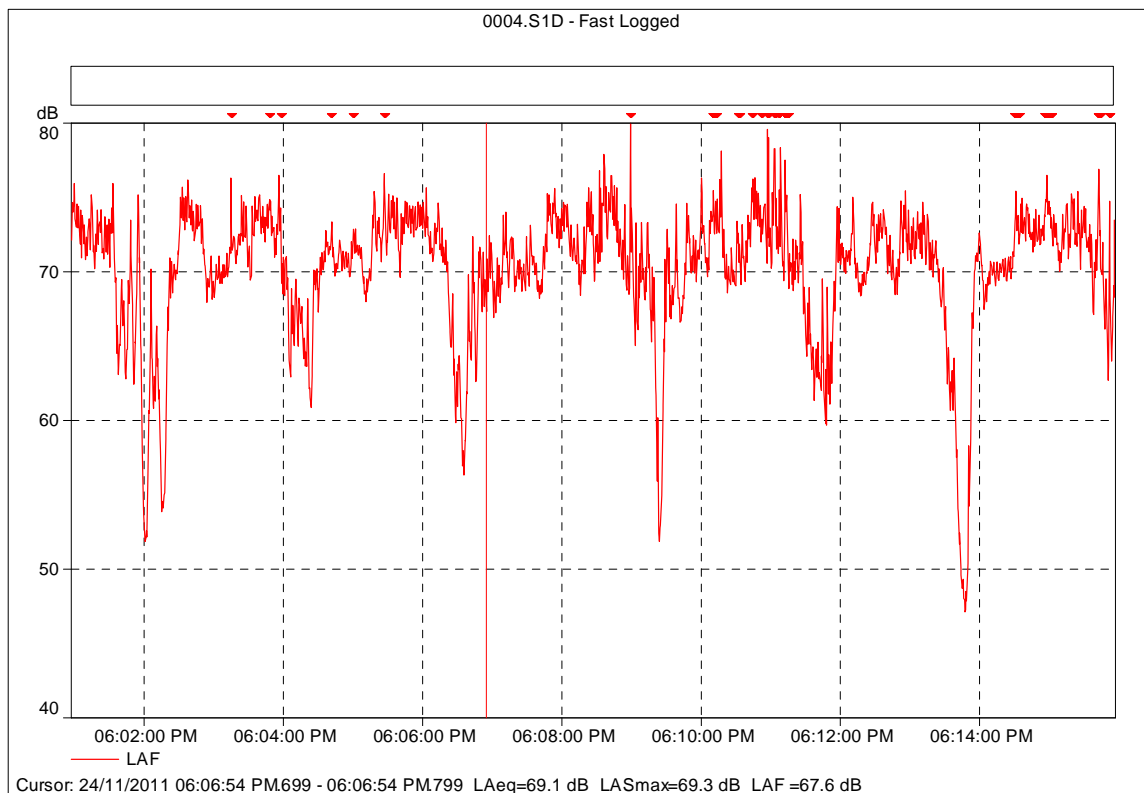
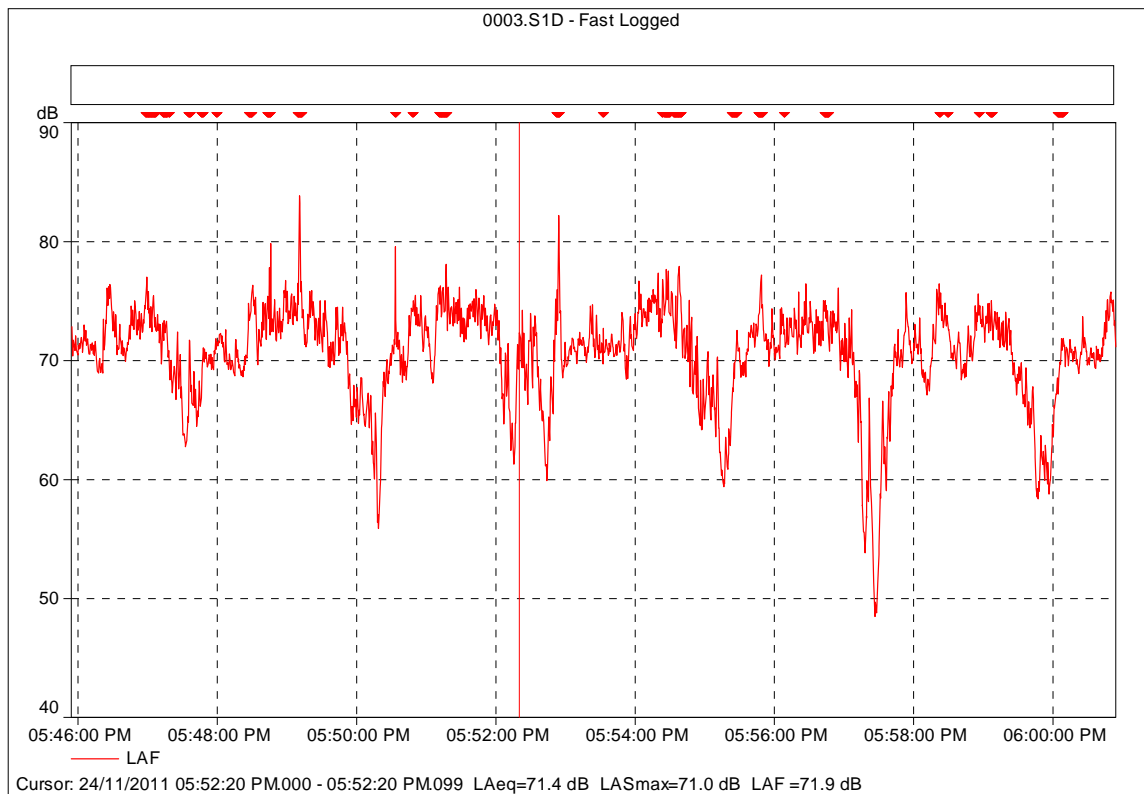




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Appendix C: Measurement Results





Appendix C – Acoustic Treatment of Residences

The following table sets out standard (or deemed-to-satisfy) constructions for each category of noise control treatment for the sleeping areas and other habitable areas of single / dual occupancy residential developments only. The assumptions made in the noise modelling are as follows:






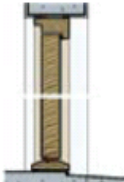
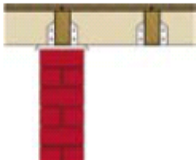

- Typical layout of a modern dwelling taken from a recent large residential development in an outer Sydney suburb
- Bedrooms and other habitable rooms are exposed to road noise

ACOUSTIC PERFORMANCE OF BUILDING ELEMENTS




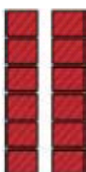
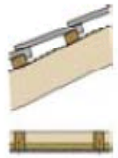

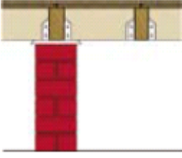

The acoustic performances assumed of each building element in deriving the Standard Constructions for each category of noise control treatment presented in the preceding Table, are presented below in terms of Weighted Sound Reduction Index (R_w) values, which can be used to find alternatives to the standard constructions presented in this Appendix:

Category of Noise Control Treatment	R_w of Building Elements (minimum assumed)				
	Windows/Sliding Doors	Frontage Facade	Roof	Entry Door	Floor
Category 1	24	38	40	28	29
Category 2	27	45	43	30	29
Category 3	32	52	48	33	50
Category 4	35	55	52	33	50
Category 5	43	55	55	40	50









Category No.	Building Element	Standard Constructions	sample
1	Windows/Sliding Doors	Openable with minimum 4mm monolithic glass and standard weather seals	
	Frontage Facade	Timber Frame or Cladding: 6mm fibre cement sheeting or weatherboards or plank cladding externally, 90mm deep timber stud or 92mm metal stud, 13mm standard plasterboard internally	
		Brick Veneer: 110mm brick, 90mm timber stud or 92mm metal stud, minimum 50mm clearance between masonry and stud frame, 10mm standard plasterboard internally	
		Double Brick Cavity: 2 leaves of 110mm brickwork separated by 50mm gap	
	Roof	Pitched concrete or terracotta tile or metal sheet roof with sarking, 10mm plasterboard ceiling fixed to ceiling joists, R1.5 insulation batts in roof cavity.	
	Entry Door	35mm solid core timber door fitted with full perimeter acoustic seals	
	Floor	1 layer of 19mm structural floor boards, timber joist on piers	
		Concrete slab floor on ground	









Category No.	Building Element	Standard Constructions	sample
2	Windows/Sliding Doors	Openable with minimum 6mm monolithic glass and full perimeter acoustic seals	
	Frontage Facade	Timber Frame or Cladding Construction: 6mm fibre cement sheeting or weatherboards or plank cladding externally, 90mm deep timber stud or 92mm metal stud, 13mm standard plasterboard internally with R2 insulation in wall cavity.	
		Brick Veneer Construction: 110mm brick, 90mm timber stud frame or 92mm metal stud, minimum 50mm clearance between masonry and stud frame, 10mm standard plasterboard internally.	
		Double Brick Cavity Construction: 2 leaves of 110mm brickwork separated by 50mm gap	
	Roof	Pitched concrete or terracotta tile or metal sheet roof with sarking, 10mm plasterboard ceiling fixed to ceiling joists, R2 insulation batts in roof cavity.	
	Entry Door	40mm solid core timber door fitted with full perimeter acoustic seals	
	Floor	1 layer of 19mm structural floor boards, timber joist on piers	
		Concrete slab floor on ground	







Category No.	Building Element	Standard Constructions	sample
3	Windows/Sliding Doors	Openable with minimum 6.38mm laminated glass and full perimeter acoustic seals	
	Frontage Facade	Brick Veneer Construction: 110mm brick, 90mm timber stud or 92mm metal stud, minimum 50mm clearance between masonry and stud frame, 10mm standard plasterboard internally.	
		Double Brick Cavity Construction: 2 leaves of 110mm brickwork separated by 50mm gap	
	Roof	Pitched concrete or terracotta tile or sheet metal roof with sarking, 1 layer of 13mm sound-rated plasterboard fixed to ceiling joists, R2 insulation batts in roof cavity.	
	Entry Door	45mm solid core timber door fitted with full perimeter acoustic seals	
	Floor	Concrete slab floor on ground	



Category No.	Building Element	Standard Constructions	sample
4	Windows/Sliding Doors	Openable with minimum 10.38mm laminated glass and full perimeter acoustic seals	
	Frontage Facade	Brick Veneer Construction: 110mm brick, 90mm timber stud or 92mm metal stud, minimum 50mm clearance between masonry and stud frame, R2 insulation batts in wall cavity, 10mm standard plasterboard internally.	
		Double Brick Cavity Construction: 2 leaves of 110mm brickwork separated by 50mm gap	
	Roof	Pitched concrete or terracotta tile or sheet metal roof with sarking, 2 layers of 10mm sound-rated plasterboard fixed to ceiling joists, R2 insulation batts in roof cavity.	
	Entry Door	45mm solid core timber door fitted with full perimeter acoustic seals	
	Floor	Concrete slab floor on ground	



Category No.	Building Element	Standard Constructions	sample
5	Windows/Sliding Doors	Openable Double Glazing with separate panes: 5mm monolithic glass, 100mm air gap, 5mm monolithic glass with full perimeter acoustic seals.	
	Frontage Facade	Double Brick Cavity Construction: 2 leaves of 110mm brickwork separated by 50mm gap with cement render to the external face of the wall and cement render or 13mm plasterboard direct fixed to internal faces of the wall.	
	Roof	Pitched concrete or terracotta tile or sheet metal roof with sarking, 2 layers of 10mm sound-rated plasterboard fixed to ceiling joist using resilient mounts, R2 insulation batts in roof cavity	
	Entry Door	Special high performance acoustic door required - Consult an Acoustic Engineer	Door to acoustic consultant's specifications
	Floor	Concrete slab floor on ground	
6	All	Consult an Acoustic Engineer	



APPENDIX E: Noise Control Measures

Block	Unit	Living		Bedroom	
		Glazing	Mech	Glazing	Mech
A	101	10.38mm + balcony screen, or Double glazed 6mm + 5mm with 50mm gap	yes	5mm	yes
	102	As per 101	yes	wps	yes
	103	As per 101	yes	wps	yes
	104	As per 101	yes	5mm	yes
B	105	As per 101	yes	10mm	yes
	106	As per 101	yes	10mm	yes
	107	6.38mm	yes	wps	yes
	108	6.38mm	yes	wps	yes
C	109	7.26mm	yes	wps	no
	110	7.26mm	yes	wps	no
	111	10.38mm	yes	6.38mm	yes
	112	-	-	6.38mm	yes
	113	7.26mm	yes	wps	no
D	114	6.38mm	yes	wps	no
	115	6.38mm	yes	wps	no
	116	6.38mm	yes	wps	no
	117	-	-	7.26mm	yes
	118	6.38mm	yes	wps	no
F	121	wps	yes	wps	no
	122	wps	yes	wps	no

Where wps means weight per size

