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Noise Impact Assessment
Proposed Residential Subdivision Development
Lochinvar, NSW

Prepared for:
Lochinvar Developments Pty Ltd
c/- ADW Johnson
7/335 Hillsborough Road
Warners Bay NSW 2282

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EXECUTIVE SUMMARY

A Traffic Noise Impact Assessment (TNIA) for the proposed residential subdivision at Lots 2, 3, 4, 5, & 6 New England Highway, and Lots 9, 12, & 13 Wyndella Road Lochinvar, NSW, has been conducted.

The site is adjacent to New England Highway and as such a quantitative traffic noise impact assessment is required. The assessment has found that Category 1 standard construction requirements will satisfy the internal traffic noise criteria given in Section 3.5 of the Interim Guideline for this development.

Based on the results of this assessment, it is our professional opinion that adoption of the recommendations within this report will result in compliance with noise conditions as set out in the SEPP (Infrastructure) 2007, which are the same as the updated SEPP (Transport and Infrastructure) 2021.

1.0 INTRODUCTION

1.1 The Proposal

ADW Johnson Pty Ltd has commissioned Spectrum Acoustics, on behalf of the proponent Lochinvar Developments Pty Ltd, to prepare a Traffic Noise Impact Assessment (TNIA) for the proposed residential subdivision development encompassing Lots 2, 3, 4, 5, & 6 New England Highway, and Lots 9, 12, & 13 Wyndella Road, Lochinvar, NSW. This study was commissioned to address Maitland City Council's DCP, as seen below:

15. Subdivision design and lot layout must ensure that any future residential housing will not be adversely affected by noise or vibrations from rail movements along the Main Northern Railway Line or from vehicle movements along the New England Highway.
16. Development Applications that include development on land within 120m of the New England Highway will require preparation of an acoustic assessment to determine individual construction standards for residential buildings within the performance- based area shown in Figure 56.
17. Future residential buildings within 120m of the NEH will be required to achieve the following mandatory internal noise goals (measured in LAeq) contained within Clause 102 of State Environmental Planning Policy (Infrastructure) 2007:
    - In any bedroom in the building – 35dB(A) at any time between 10pm and 7am;
    - Anywhere else in the building (other than a garage, kitchen, bathroom or hallway) – 40dB(A) at any time.

Design noise levels referred to in term 17 of the DCP remain the same in the SEPP (Transport and Infrastructure) 2021.

1.2 Project Description

Under the proposal there would be a residential subdivision developed over 22 hectares with the southern boundary of the site adjoining the New England Highway and being a noise sensitive development, an assessment of traffic noise impacts is required. The assessment is based on the typical regulatory requirements as contained in the SEPP (Infrastructure) 2007, which remains constant in the SEPP (Transport & Infrastructure) 2021.

1.3 Description of Terms

Table 1 contains the definitions of commonly used acoustical terms and is presented as an aid to understanding this report.

Table 1: Definition of acoustical terms

Term	Definition
dB(A)	The quantitative measure of sound heard by the human ear, measured by the A-Scale Weighting Network of a sound level meter expressed in decibels (dB).
SPL	Sound Pressure Level. The incremental variation of sound pressure above and below atmospheric pressure and expressed in decibels. The human ear responds to pressure fluctuations, resulting in sound being heard.

STL	Sound Transmission Loss. The ability of a partition to attenuate sound, in dB.
Lw	Sound Power Level radiated by a noise source per unit time re 1pW.
Leq	Equivalent Continuous Noise Level - taking into account the fluctuations of noise over time. The time-varying level is computed to give an equivalent dB(A) level that is equal to the energy content and time period.
L1	Average Peak Noise Level - the level exceeded for 1% of the monitoring period.
L10	Average Maximum Noise Level - the level exceeded for 10% of the monitoring period.
L90	Average Minimum Noise Level - the level exceeded for 90% of the monitoring period and recognised as the Background Noise Level. In this instance, the L90 percentile level is representative of the noise level generated by the surrounds of the residential area.

2.0 NOISE ASSESSMENT

2.1 Ambient Noise Levels

Ambient noise levels were monitored by Spectrum Acoustics near the site from 27 April – 2 May 2017. Data was recorded at 15 minute statistical intervals using an Rion NL-42 sound level meter set up as an environmental noise logger. The measurements were conducted in accordance with relevant EPA guidelines and AS 1055-1997 "Acoustics – Description and Measurement of Environmental Noise". The noise logger used complies with the requirements of AS 1259.2-1990 "Acoustics – Sound Level Meters", and had current NATA calibration certification.

The logger was programmed to continuously register environmental noise levels over the 15 minute intervals, with internal software calculating and storing Ln percentile noise levels for each sampling period. Calibration of the logger was performed during the instrument's initialisation procedures, with calibration results being within the allowable ± 0.5 dB(A) range. The logger was placed at the existing boundary fence of a nearby site. **Figure 1** shows the project site, and noise logger location.

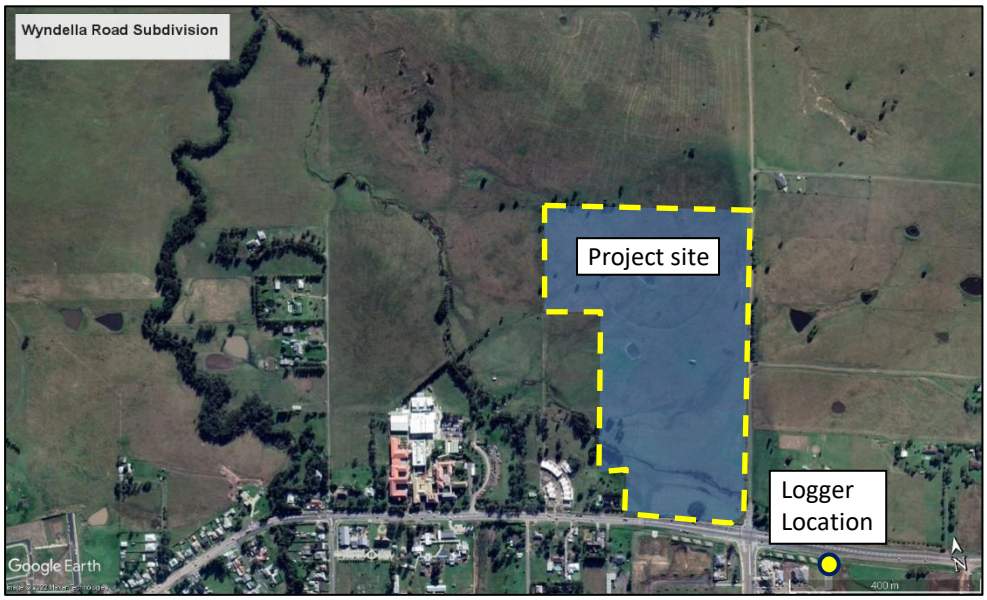


Figure 1: Site location and monitoring location

Ambient L_{Aeq} and background (L_{A90}) noise levels, obtained from the logger, are summarised below in **Table 1** and shown graphically in **Appendix A**. The data is typical of the acoustic environment close to a road.

TABLE 1
MEASURED AMBIENT NOISE LEVELS 27/4/17 to 2/5/17

Location	Day	Night
New England Highway	46 dB(A) L90	40 dB(A) L90
	58 dB(A) Leq	56 dB(A) Leq

In considering potential noise impacts on a residential subdivision it is usual for Transport for NSW (TfNSW) to look at traffic noise levels projected for 10 years from the timing of a development.

The subject site forms part of the Lochinvar Urban Release Area as identified in the Maitland Development Control Plan (DCP) (2011). The DCP outlines the future staged development of the entire Urban Release Area with much of the area being planned for development as residential housing.

With the increased development of the entire Urban Release Area the traffic flow on the New England Highway will also increase. To consider a conservative scenario an increase in traffic volumes of approximately 35% over the measured levels has been used to determine potential impacts. Such a growth in traffic volumes would result in an increase in traffic noise of about 1.3dB(A).

Proposed dwellings are also not permitted to be constructed within 30m distance of the New England Highway. Since the measured traffic noise levels were obtained from approximately 15m setback from the New England Highway, a reduction of 3 dB will be applied to account for this doubling of distance.

This results in predicted future traffic noise levels of **56 dB(A),Leq(day)** & **54 dB(A),Leq(night)** at 30m distance from the New England Highway.

2.2 Noise criteria

2.2.1 Traffic noise impacts

The development is for residential use and as such the internal traffic noise criteria given in Section 3.5 of the Interim Guideline are:

- In any bedroom in the building: **35 dB(A),L_{eq}** at any time 10pm – 7am, and
- Anywhere else in the building (other than a garage, kitchen, bathroom or hallway): **40dB(A),L_{eq}** at any time.

These criteria originated from the Rail Infrastructure Corporation (RIC) publication "Consideration of Rail Noise and Vibration in the Planning Process" (2003) where it is explicit that the criteria apply with windows and doors closed. The criteria correspond

to those in AS/NZS 2107, where the noise is considered to be "quasi-continuous" in nature.

2.3 Assessment Methodology

Figure 2 is a reproduction of Figure B2 from the Interim Guideline (2008) showing a typical situation of a dwelling adjacent to a busy road and calculated internal noise levels relative to external noise levels using the UK Calculation of Road Traffic Noise (CoRTN) methodology. Figure 2 shows a traffic noise level of 68 dB(A) at windows W1 and W2 directly facing the road. Windows W3 and W4 are on facades perpendicular to the road, thereby being shielded from 50% of the traffic noise by the building structure, and noise levels are 2-3 dB below the traffic noise level at W1 and W2. Window W5 is approximately twice the distance from the road as W4 and experiences an external traffic noise level 4 dB below the level at W4.

Figure 2 also gives the traffic noise loss for three construction scenarios labelled A, B and C. The following specifications for these construction scenarios are reproduced from the Guideline. The specification for walls includes insulation in the wall cavity, however brick veneer achieves Rw >45 without insulation, which will not reduce the overall noise insulation of the room as a whole, since windows are the acoustically weakest elements. Any recommendations regarding the following construction specifications assume no insulation in facade walls.

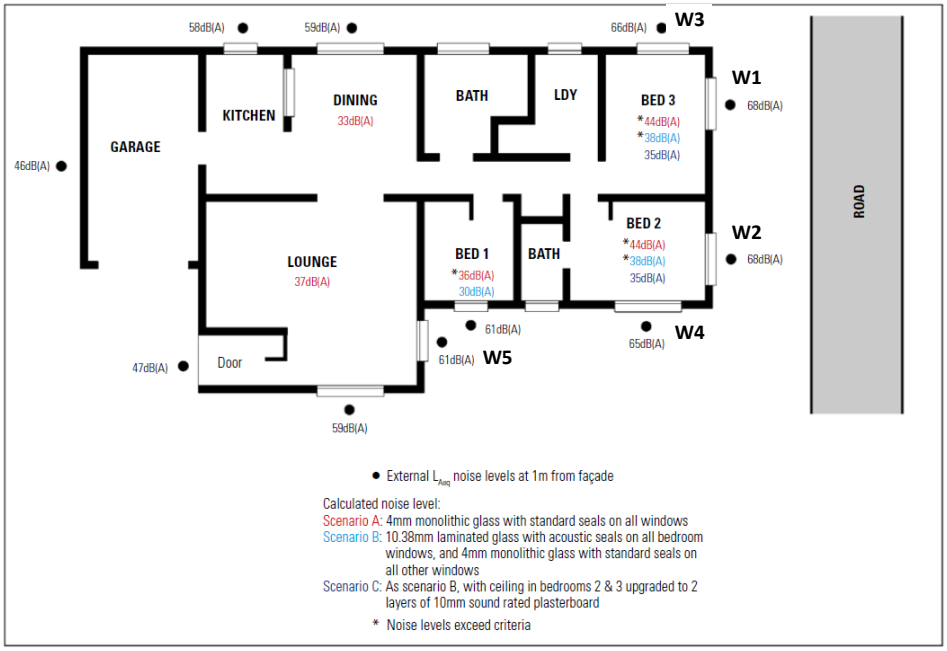


Figure 2: Traffic noise reduction for various construction types.

Specification A

Windows	standard 4mm monolithic glass with standard weather seals on all windows	(Rw 25)
Doors	30mm solid core timber – lounge room aluminium framed glass sliding door – lounge and dining rooms	(Rw 24)
Walls	brick-veneer and standard plasterboard on timber studs with insulation in cavity	(Rw 52)
Roof	tiled roof and standard plasterboard ceiling with insulation	(Rw 43)
Floor	concrete slab	

Note: 'Rw' is the weighted sound reduction index of a building element

Specification B

Windows	10.38mm laminated glass with acoustic seals on all bedroom windows, standard 4mm monolithic glass with standard seals on all other windows	(Rw 35)
Doors	30mm solid core timber – lounge room aluminium framed glass sliding door – lounge and dining rooms	(Rw 24)
Walls	brick-veneer and standard plasterboard on timber studs with insulation in cavity	(Rw 52)
Roof	tiled roof and standard plasterboard ceiling with insulation	(Rw 43)
Floor	concrete slab	

Note: 'Rw' is the weighted sound reduction index of a building element

Specification C

Windows	10.38mm laminated glass with acoustic seals on all bedroom windows, standard 4mm monolithic glass with standard seals on all other windows	(Rw 35)
Doors	30mm solid core timber – lounge room aluminium framed glass sliding door – lounge and dining rooms	(Rw 24)
Walls	brick-veneer and standard plasterboard on timber studs with insulation in cavity	(Rw 52)
Roof	as per Specification B, except the single layer of standard plasterboard ceiling is replaced with a double-layer of 10mm sound-rated plasterboard ceiling	(Rw 52)
Floor	concrete slab	

Note: 'Rw' is the weighted sound reduction index of a building element

Table 3 summarises the traffic noise reduction provided by each construction scenario for the cases in Figure 2 where a room contains either one or two windows.

Table 2: Traffic Noise reduction levels

Construction scenario	Noise reduction (2 windows)	Noise reduction (1 window)
Scenario A	23	25
Scenario B	29	31
Scenario C	32	34 (estimated)

Between the minimum 23 dB reduction for Scenario A and minimum 29 dB reduction for Scenario B lies what will be called Scenario A/B in which 23-28 dB traffic noise reduction is required[1]. This will be achieved with the same construction as scenario B except using 6.5mm Vlam Hush (or equivalent) in lieu of the 10.38mm glazing (8.5mm Vlam Hush provides the same acoustic rating as 10.38mm). This conservative measure is based on adopting the 23 dB noise reduction for 4mm glass, whether there are one or two windows in the room.

3.0 RESULTS AND RECOMMENDATIONS

3.1 Traffic Noise Impacts

Figure 3 shows predicted future day time and night time traffic noise levels extrapolated out to the potential nearest building facades along the southern boundary of the subject site. The building facades would be approximately double the setback distance of the noise logger location from the New England Highway. The applied noise levels at the exposed façades are indicated below by the blue dotted line.

[1] The value of 23dB has been included in the Scenario A/B category as a measure of conservatism.

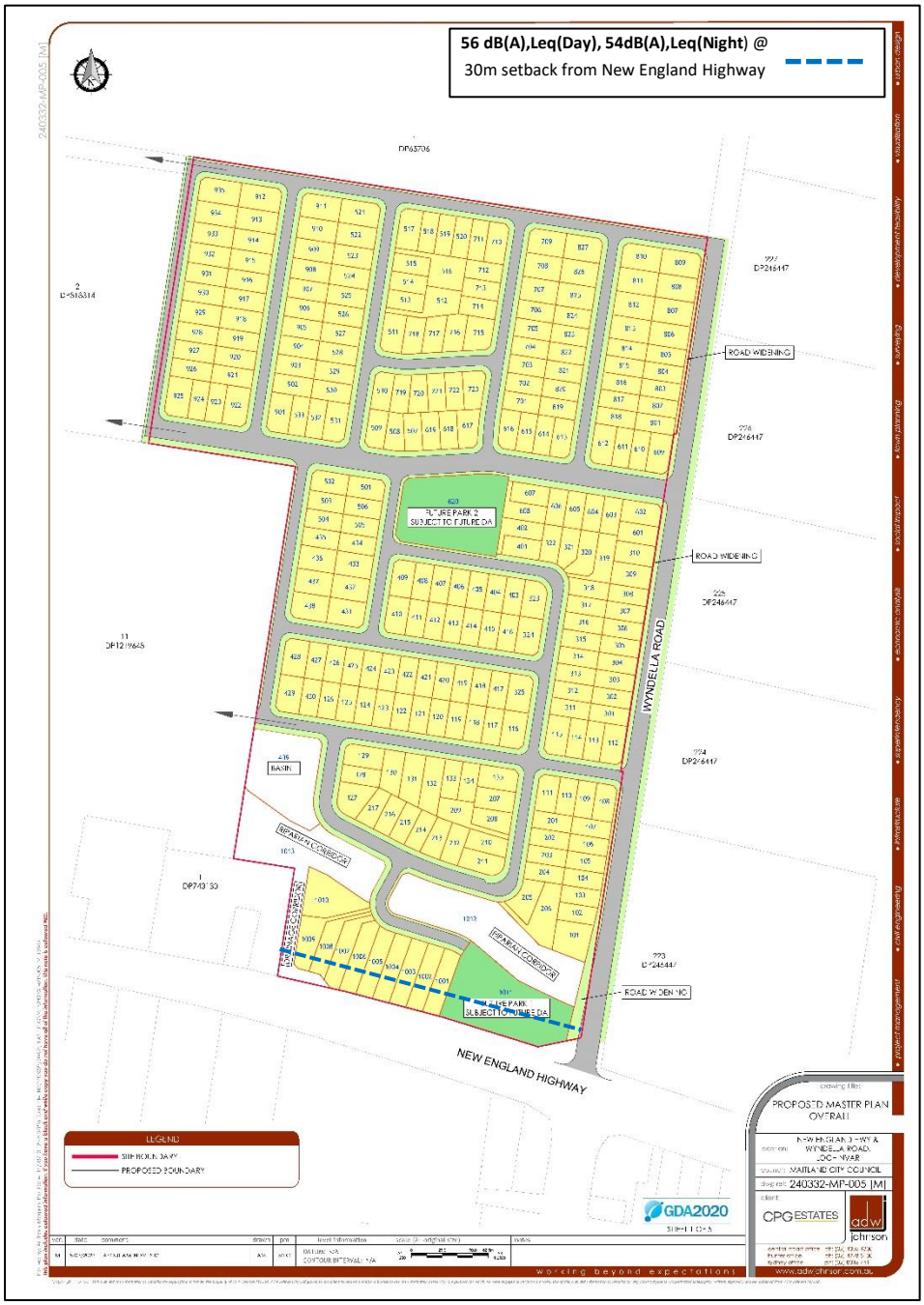


Figure 3: Traffic noise levels at potential facades exposed to New England Highway.

The required traffic noise reduction (TNR) through the potential building facades on the assumed directly exposed future lots is no more than 16 dB for living rooms and 19 dB for bedrooms, without the consideration of any acoustic barriers or intervening structures between the development and New England Highway.

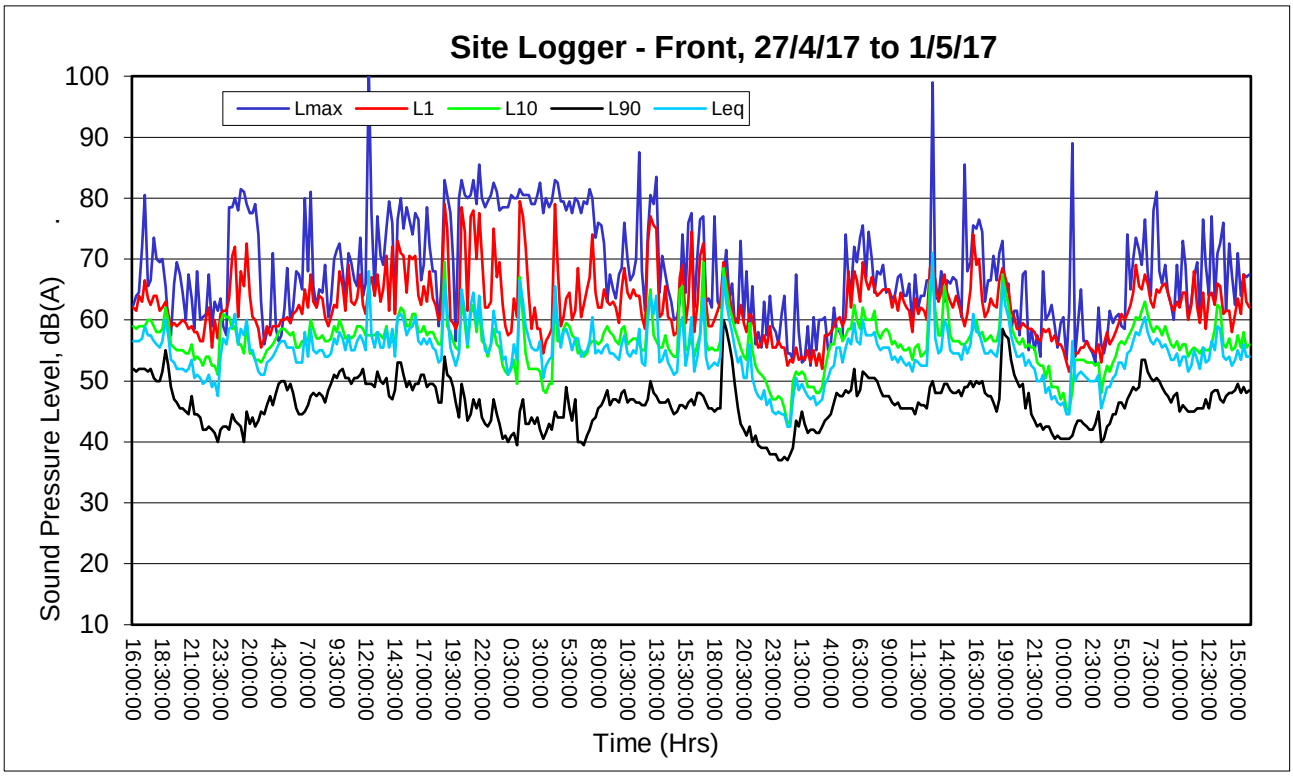
Australian Standard AS 3671-1989 provides calculation methodologies for traffic noise intrusion and the acoustic rating (Rw) is generally equal to the TNR plus 5 dB. The required minimum values for living rooms and bedrooms facing the New England Highway are therefore **Rw 21** and **Rw 24**, respectively.

Consequently, the internal noise levels in the SEPP (Transport and Infrastructure) 2021 will be achieved by Category 1 standard construction, as per the Interim Guideline (2008) insert below.

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 1 standard construction requirements from Appendix C of the Guideline are reproduced in **Appendix B.**

APPENDIX A
NOISE LOGGER RESULTS


Site Logger - Front, 27/4/17 to 1/5/17
Lmax
L1
L10
L90
Leq
Sound Pressure Level, dB(A)
100
90
80
70
60
50
40
30
20
10
16:00:00
18:30:00
21:00:00
23:30:00
2:00:00
4:30:00
7:00:00
9:30:00
12:00:00
14:30:00
17:00:00
19:30:00
22:00:00
0:30:00
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19:00:00
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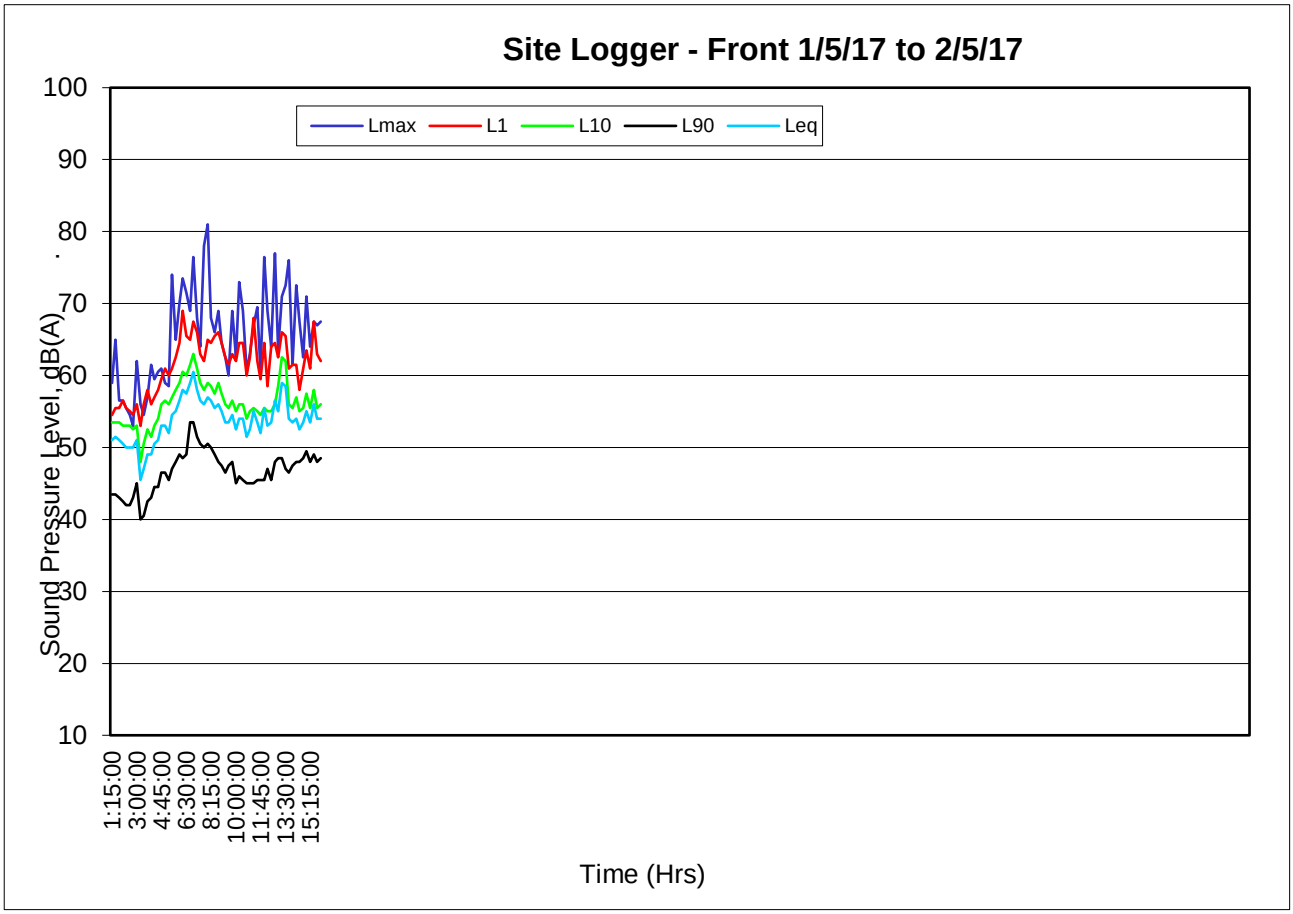
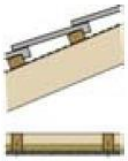
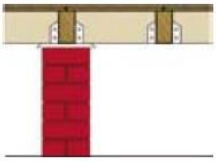
7:30:00
10:00:00
12:30:00
15:00:00
Time (Hrs)


Site Logger - Front 1/5/17 to 2/5/17
Lmax
L1
L10
L90
Leq
Sound Pressure Level, dB(A)
100
90
80
70
60
50
40
30
20
10
1:15:00
3:00:00
4:45:00
6:30:00
8:15:00
10:00:00
11:45:00
13:30:00
15:15:00
Time (Hrs)

APPENDIX B
CATEGORY 1 STANDARD CONSTRUCTION REQUIREMENTS

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	

NOTES:

1. Some of the samples are indicative only and exceed the required Rw rating.
2. For walls, the required Rw rating will be achieved by 70mm timber studs in lieu of the 90mm timber or 92mm metal studs mentioned in the examples.
3. Internal plasterboard may be 10mm for Category 1.
4. The spacing of both brick veneer and cavity brick walls can be any industry value standard and not necessarily 50mm.