



**Residential Subdivision  
Lot 4 Dalma Street, Ormeau Hills**

**Road Traffic Noise Assessment Report**

**Ormeau Developments Pty Ltd**

Reference: 19BRA0060 R01\_0

13<sup>th</sup> May, 2019



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ABN 65 010 868 621

Level 8, 369 Ann Street, Brisbane

T: (07) 3327 9500 F: (07) 3327 9501 E: [ttmbris@ttmgroup.com.au](mailto:ttmbris@ttmgroup.com.au)

Rev No.	Author	Reviewed/Approved		Description	Date
		Name	Signature		
A	S Yorke			Draft report	13/05/2019
O	S Yorke			Issued to Client	13/05/2019

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# 1. Introduction

## 1.1. Background

TTM was engaged by Ormeau Developments Pty Ltd to undertake a revised road traffic noise assessment for a proposed residential subdivision located at Lot 4 Dalma Street, Ormeau Hills. TTM were requested to update the previous TTM assessment (15GCA0160 Ro1\_o dated 15/02/2016) with a revised lot layout and maintaining the previous assessment approach, standards and criteria.

The assessment is based on the following:

- a. Noise criteria contained in:
  - i. *Gold Coast City Plan Version 2;*
  - ii. *Transport and Main Roads (TMR) Policy for Development on Land Affected by Environmental Emissions from Transport and Transport Infrastructure Version 2;*
  - iii. *Queensland Development Code MP4.4 Buildings in a Transport Noise Corridor.*
- b. Development plans as presented in Appendix A.
- c. Noise measurements, analysis and calculations conducted by TTM.

## 1.2. Scope

The assessment includes the following:

- i. Description of the development site and proposal;
- ii. Measurement of existing road traffic noise levels;
- iii. Statement of assessment criteria relating to road traffic noise;
- iv. Prediction of road traffic noise on the development;
- v. Analysis of measured and predicted noise levels;
- vi. Details of noise control recommendations to be incorporated to achieve predicted compliance.

## 2. Site Description

### 2.1. Site Location

The site is described by the following:

- Lot 4 on RP883725
- Dalma Street, Ormeau Hills

The site is bound by existing residential uses to the west and east and open vegetated space to the north and south. The site locality is shown in Figure 1 below.

Figure 1: Site Locality



### 2.2. Current Acoustic Environment

The acoustic environment of the site is primarily comprised of road traffic noise from the Pacific Motorway to the east which is an 8 lane concrete-surfaced carriageway and has a posted speed limit of 110 km/hr.

## 3. Proposed Development

### 3.1. Development Description

The proposal is to develop the parcel of land in to 100 residential lots. The proposed site plan is shown in Figure 2.

Figure 2: Proposed Site Plan





## 4. Measurements

### 4.1. Equipment

The following equipment was used to measure existing road traffic noise levels:

- ARL EL Environmental Noise Monitor (SN# 16-707-016);
- ARL EL Environmental Noise Monitor (SN# 16-004-037);
- B&K Sound Level Calibrator type 4231 (SN# 3009814).

All equipment was calibrated by a NATA accredited laboratory and calibrated before and after the measurement session. No significant drift from the reference signal was recorded.

### 4.2. Unattended Noise Monitoring

Unattended noise monitors were placed as shown in Figure 3 to measure existing ambient and road traffic noise levels between the 3<sup>rd</sup> and 9<sup>th</sup> December 2015. The monitors were located in a free-field position, with the microphone 1.5m above ground and had an unobstructed line of sight to the Pacific Motorway.

Figure 3: Noise Monitoring Locations



The noise monitors were set to measure statistical noise levels in 'A'-weighting, 'Fast' response, over 15 minute intervals. Road traffic noise measurements were conducted in



accordance with Australian Standard AS2702:1984 *Acoustics - Methods for the Measurement of Road Traffic Noise*.

The weather conditions during the unattended noise monitoring period included rainfall on the 3<sup>rd</sup> December. Noise data for this period has been excluded from the results. The remaining weather conditions were generally fine with light wind speeds and temperatures ranging from 15-29°C (Bureau of Meteorology).

### 4.3. Results of Measurements

The results for the unattended noise monitoring are presented below.

#### 4.3.1. Road Traffic Noise Levels

Table 1 presents a sample of the measured road traffic noise levels.

**Table 1: Measured Road Traffic Noise Levels**

Day and Date	Road Traffic Noise Descriptor	Time Period	Measured Level* dB(A)
Tuesday, 08/12/2015	L <sub>A10,18hr</sub>	6am to midnight	76.7
	Noisiest L <sub>Aeq,1 hour</sub> daytime	5pm to 6pm	77.0
	Noisiest L <sub>Aeq,1 hour</sub> night time	4am to 5am	76.0
	L <sub>Aeq, 24 hour</sub>	Midnight to midnight	74.3

\*The decimal place is detailed to show the rounding corrections used throughout the analysis.

Graphical presentation of the measured noise levels are presented in Appendix B.

#### 4.3.2. Ambient Noise Levels

Table 2 presents a summary of the measured ambient noise levels at the site based on the unattended noise monitoring data and are the arithmetic average of all non-weather affected periods.

**Table 2: Measured Ambient Noise Levels**

Location & Date	Road Traffic Noise Descriptor	Time Period	Measured Level dB(A)
Dalma Street	L <sub>A90,8hr</sub>	10pm – 6am	49
	L <sub>A90,18hr</sub>	6am to midnight	56

The data presented above was used to determine the road traffic assessment criteria for the development.

## 5. Road Traffic Noise Criteria

There are two criteria relevant to the proposed development and are specified by *Gold Coast City Plan (version 2)* and the Department of Transport and Main Roads (DTMR). As the *Gold Coast City Plan* applies the same criteria as DTMR, the DTMR criteria is detailed in the following sections.

### 5.1. Department of Transport and Main Roads

The noise criteria for land affected by emissions from road traffic activities are contained in Module 1.1 of the *State Development Assessment Provisions (SDAP)* and TMR's *Policy for Development on Land Affected by Environmental Emissions from Transport and Transport Infrastructure, Version 2*. The criteria are reproduced in Table 3.

**Table 3: Road Traffic Noise Emission Criteria for New Sensitive Land Uses**

Development Type	Location	Environmental Noise Criteria
Accommodation activities	External (All facades)	$\leq 60$ dB(A) $L_{10}$ (18h) façade corrected (measured $L_{90}$ (8h) free field between 10pm and 6am $\leq 40$ dB(A))
		$\leq 63$ dB(A) $L_{10}$ (18h) façade corrected (measured $L_{90}$ (8h) free field between 10pm and 6am $> 40$ dB(A))
	External (Recreation areas)	$\leq 57$ dB(A) $L_{10}$ (18h) free field (measured $L_{90}$ (18h) free field between 6am and 12 midnight $\leq 45$ dB(A))
		$\leq 60$ dB(A) $L_{10}$ (18h) free field (measured $L_{90}$ (18h) free field between 6am and midnight $> 45$ dB(A))
	Internal (Habitable rooms all times)	$\leq 35$ dB(A) $L_{eq}$ (1hr) (maximum hour over 24 hours)

### 5.2. Queensland Development Code MP4.4

The *Queensland Development Code Part MP 4.4 - 'Buildings in a Transport Noise Corridor'* September 2010 (QDC) specifies Noise Categories to ensure that habitable rooms of residential buildings are adequately protected from transport noise.

The QDC MP4.4 criteria has been included in this report to provide a noise level and acoustic treatment classification to aid in the acoustic design of future dwellings on noise affected lots. The noise affected lots may either be constructed in accordance with the requirements of the specified QDC noise category or undertake a site specific assessment in accordance with Australian Standard AS3671 and AS2107.

The QDC noise categories specify the minimum acoustic  $R_w$  ratings for each building component, and provide examples of the relevant systems, to comply with the indoor sound

levels as outlined in Australian Standard AS2107. Details regarding the noise categories and acceptable forms of construction can be found within Schedule 1 and 2 of the QDC document. The noise categories for road traffic impacts are summarised in Table 4.

**Table 4: Road Traffic Noise Category Levels – QDC MP4.4 (Schedule 3)**

Noise Category	Level of Transport Noise* $L_{A10,18\text{Hour}}$ for State-Controlled Roads and Designated Local Government Roads
Category 4	$\geq 73$ dB(A)
Category 3	68 – 72 dB(A)
Category 2	63 – 67 dB(A)
Category 1	58 – 62 dB(A)
Category 0	$\leq 57$ dB(A)

\* Measured at 1 metre from the façade of the proposed or existing building.

## 6. Analysis – Road Traffic Noise

### 6.1. Assessment Criteria

Based on the background noise levels measured at the site detailed in Table 2 and the criteria outlined in Section 0, the following TMR external road traffic noise limits apply to the proposed development:

- Facades: An external noise level of 63 dB(A)  $L_{A10(18\text{ hour})}$  façade corrected.
- Private Open Space: An external noise level of 60 dB(A)  $L_{A10(18\text{ hour})}$  free-field.

### 6.2. Traffic Volumes

The traffic volumes used in the noise model are presented in Table 5. Traffic volumes for the Pacific Motorway were obtained from State Government Census data for the year 2014. Annual growth rates were obtained from TTM Traffic.

**Table 5: Traffic Volumes used in the Noise Model**

Road	Traffic Volumes (AADT)			Heavy Vehicles (%)	Growth Rate (%)
	2014	2015	2026		
Pacific Motorway	14,4437	147,687	188,642	8.5%	2.25%

The 18 hour traffic volumes used in the noise model are taken to be 95% of the annual average daily traffic (AADT).

### 6.3. Noise Model

#### 6.3.1. Noise Modelling Parameters

Road traffic noise predictions were conducted using 'SoundPLAN v8.1', a CoRTN based modelling program. The basis of the 'SoundPLAN' model is detailed in Table 6.

**Table 6: Noise Modelling Parameters**

Description	Value
Angle Increment	1°
Road surface type	Impervious ( +0 dB(A))
Road speed limits	110 km/h
Ground contours	Site: levels based on design levels provided by Client (via Mortons Urban Solutions) Surrounding area: levels based on existing levels provided by DERM LiDAR data
Noise source height above grade	0.5m
Ground floor receiver height	1.8m above ground level

Description	Value
First floor receiver height	4.6m above ground level
Façade correction	+2.5 dB(A)

### 6.3.2. Noise Model Verification

To verify the road traffic noise model, the  $L_{A10,18\text{hour}}$  noise levels were modelled and compared to the measured levels as presented in Table 7. As the noise monitor was in free-field location, the predicted noise level is also shown as free-field.

**Table 7: Comparison of Measured and Predicted Road Traffic Noise Levels**

Logger	Measured $L_{A10, 18 \text{ hour}}$	Predicted $L_{A10, 18 \text{ hour}}$	Required Correction	Corrected $L_{A10, 18 \text{ hour}}$
Pacific Motorway	76.3	77.9	0 dB	n/a

The SoundPLAN noise model was within the allowable tolerance of 2 dB(A) of the measured level and therefore no correction was required.

## 6.4. Predicted Road Traffic Noise Levels

Modelling was conducted to determine road traffic noise levels at the development in the 10 year planning horizon. The predicted future noise levels take into account the 2026 traffic volumes and the proposed acoustic barrier (as detailed in Section 7).

Predicted road traffic noise contour maps illustrated as QDC noise categories at the ground floor and first floor are presented in Figure 4 and Figure 5 respectively. Receiver point noise levels are provided in Appendix C.

Figure 4: Road Traffic Noise Levels at Ground Floor with Acoustic Barrier

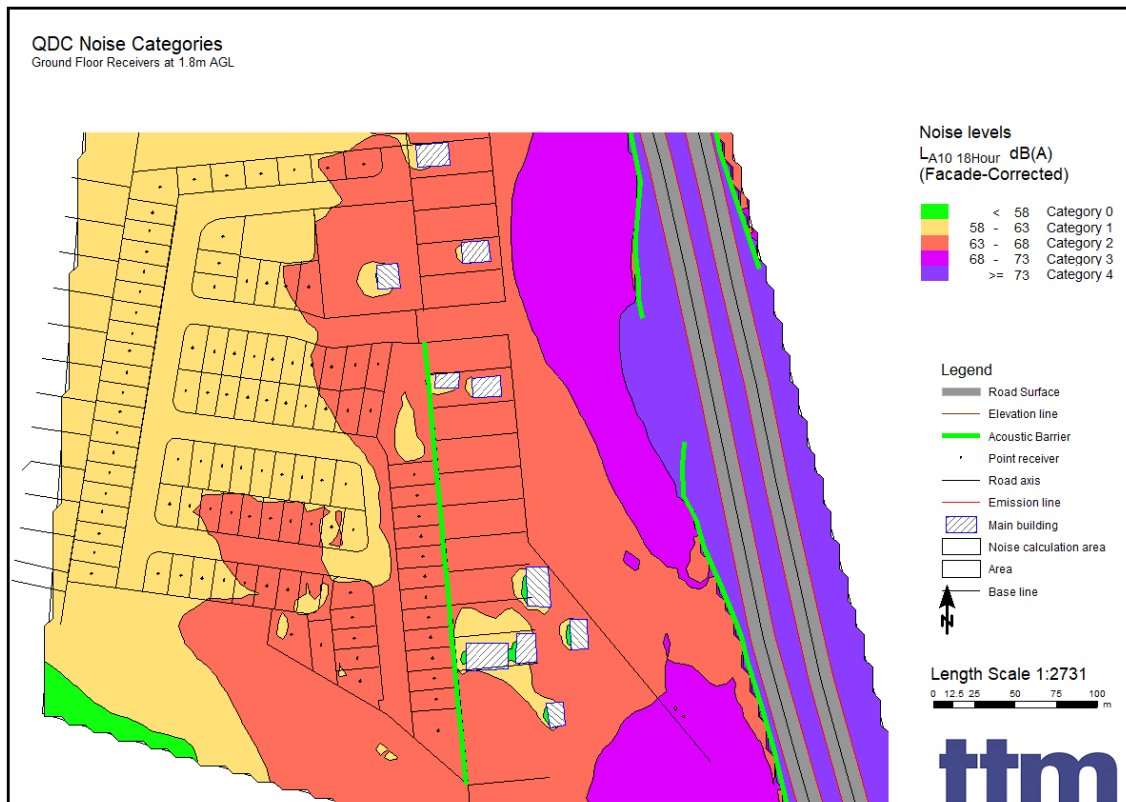
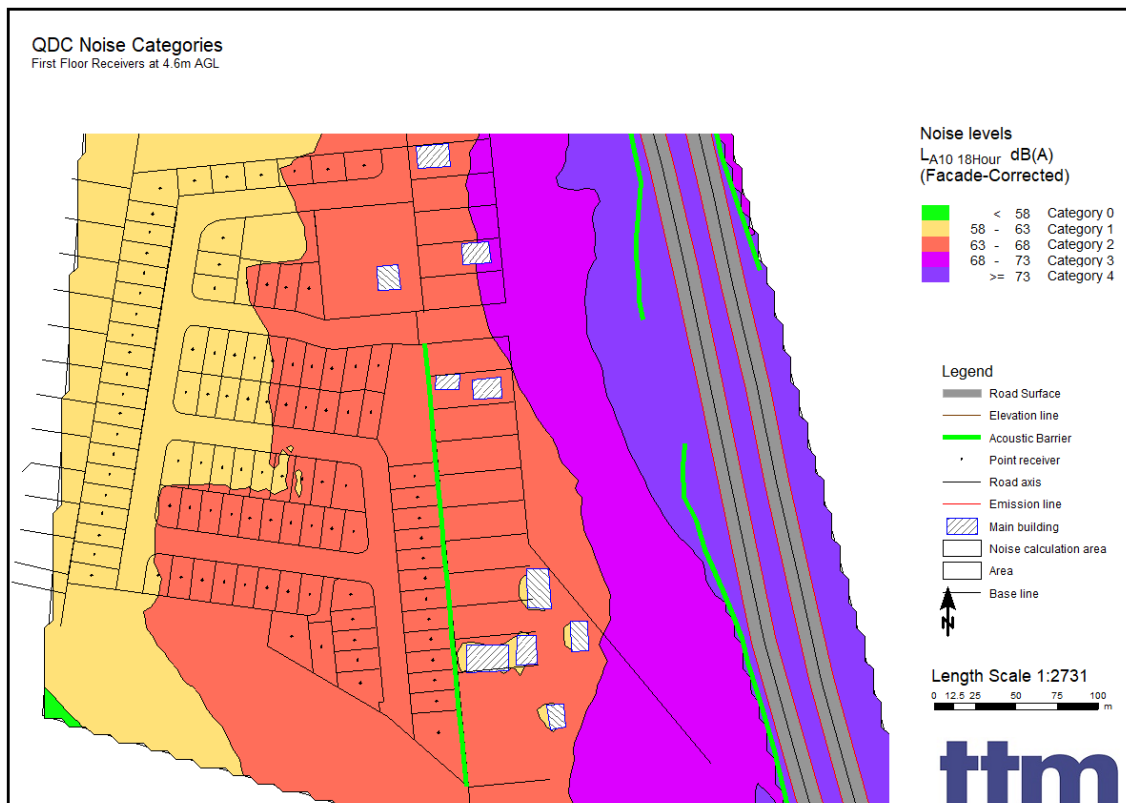


Figure 5: Road Traffic Noise Levels at First Floor with Acoustic Barrier





Based on the noise predictions with the inclusion of acoustic barriers, the lots predicted to exceed the façade external noise criteria of 63 dB(A)  $L_{A10}$  (18 hour) are listed in Table 8.

**Table 8: Lots predicted to exceed the external façade noise criteria**

Floor	Lots predicted to exceed façade external noise criteria
Ground and First Floor	26, 34, 35, 53-66, 88, 89
First Floor only	25, 32, 33, 36, 37, 51, 52, 67, 77-87, 90-97

Lots predicted to exceed the criteria (plus other lots) will require further acoustic assessment of the future proposed dwelling. The acoustic treatment requirements for noise affected dwellings are detailed in Section 7.

#### 6.4.1. Private Open Space

Noise levels at private open space areas for some lots within the QDC noise category 2 affected area (per Figure 4) are predicted to achieve marginal compliance with the criteria with an exceedance of up to approximately 1 dB. A 1-2 dB difference in sound level is considered undetectable to the human ear under environmental conditions.

For all other lots, noise levels at private open space areas are predicted to comply with the noise criteria when screening from new dwellings is included.

## 7. Recommendations

Compliance is predicted to be achieved provided the recommendations detailed below are incorporated into the development.

### 7.1. Acoustic Barriers

An acoustic barrier is recommended to improve the acoustic amenity at private open space areas. The location and extent of the acoustic barrier is shown in Figure 6.

Barrier recommendations are as follows:

- a. The acoustic barrier should be a minimum of 1.8m high above the finished ground level of the lot;
- b. The acoustic barrier should be located at the top of any retaining walls located at the barrier location;
- c. The barrier should be constructed of a material with a surface mass not less than 12.5kg/m<sup>2</sup>;
- d. Suitable materials may include earth mound, lapped timber palings (min 24mm thick), steel sheets (min 2.5mm thick), fibre cement sheeting, plywood, glass, masonry, or a combination of materials;
- e. No gaps or holes should be evident in the fence construction including at the base.

Figure 6: Recommended Acoustic Barrier Location



## 7.2. Dwelling Treatments

QDC MP4.4 noise category classifications are included here as an alternate approach to determining levels of acoustic treatment. Dwelling construction may be carried out by adopting the construction requirements detailed for the Noise Category applicable to the lot.

Noise contour graphics are presented in Section 6 which show the QDC MP4.4 noise category for ground and first floor levels of future dwellings. The construction requirements for these noise categories can be determined by referring to QDC MP4.4 Schedule 1 & 2.

The QDC MP4.4 requires that habitable rooms in residential buildings located in a transport noise corridor are adequately protected from transport noise to safeguard occupant's health and amenity.

In order to achieve the performance requirements of the QDC MP4.4, the external building envelope of habitable rooms must comply with the minimum  $R_w$  for each building component specified in Schedule 1 to achieve a minimum transport noise reduction level for the relevant noise category by either one of the following:

- a. Using materials specified in Schedule 2 of the QDC MP4.4;

OR

- b. Using materials with manufacturer's specifications that, in combination, achieve the minimum  $R_w$  value for the relevant building component and applicable noise category.

For application of Point (b), possible alternative constructions can be determined by the glazier (for glazing) and construction manuals such as 'The Red Book' by CSR (for walls and roof/ceiling).

Table 9 presents the QDC Noise Category for each noise affected lot.

**Table 9: QDC MP4.4 noise categories for each noise affected lot**

Lot	Floor Level	QDC Noise Category	Lot	Floor Level	QDC Noise Category
1	Ground	1	51	Ground	2
	First Floor	1		First Floor	2
2	Ground	1	52	Ground	2
	First Floor	1		First Floor	2
3	Ground	1	53	Ground	2
	First Floor	1		First Floor	2
4	Ground	1	54	Ground	2
	First Floor	1		First Floor	2

5	Ground	1	55	Ground	2
	First Floor	1		First Floor	2
6	Ground	1	56	Ground	2
	First Floor	1		First Floor	2
7	Ground	1	57	Ground	2
	First Floor	1		First Floor	2
8	Ground	1	58	Ground	2
	First Floor	1		First Floor	2
9	Ground	1	59	Ground	2
	First Floor	1		First Floor	2
10	Ground	1	60	Ground	2
	First Floor	1		First Floor	2
11	Ground	1	61	Ground	2
	First Floor	1		First Floor	2
12	Ground	1	62	Ground	2
	First Floor	1		First Floor	2
13	Ground	1	63	Ground	2
	First Floor	1		First Floor	2
14	Ground	1	64	Ground	2
	First Floor	1		First Floor	2
15	Ground	1	65	Ground	2
	First Floor	1		First Floor	2
16	Ground	1	66	Ground	2
	First Floor	1		First Floor	2
17	Ground	1	67	Ground	2
	First Floor	1		First Floor	2
18	Ground	1	68	Ground	1
	First Floor	1		First Floor	2
19	Ground	1	69	Ground	1

	First Floor	1		First Floor	2
20	Ground	1	70	Ground	1
	First Floor	1		First Floor	2
21	Ground	1	71	Ground	1
	First Floor	1		First Floor	2
22	Ground	1	72	Ground	1
	First Floor	1		First Floor	2
23	Ground	1	73	Ground	1
	First Floor	2		First Floor	2
24	Ground	2	74	Ground	1
	First Floor	2		First Floor	2
25	Ground	2	75	Ground	1
	First Floor	2		First Floor	2
26	Ground	2	76	Ground	2
	First Floor	2		First Floor	2
27	Ground	1	77	Ground	2
	First Floor	1		First Floor	2
28	Ground	1	78	Ground	2
	First Floor	1		First Floor	2
29	Ground	1	79	Ground	2
	First Floor	1		First Floor	2
30	Ground	1	80	Ground	2
	First Floor	2		First Floor	2
31	Ground	2	81	Ground	2
	First Floor	2		First Floor	2
32	Ground	2	82	Ground	2
	First Floor	2		First Floor	2
33	Ground	2	83	Ground	2
	First Floor	2		First Floor	2



34	Ground	2	84	Ground	2
	First Floor	2		First Floor	2
35	Ground	2	85	Ground	2
	First Floor	2		First Floor	2
36	Ground	2	86	Ground	2
	First Floor	2		First Floor	2
37	Ground	2	87	Ground	2
	First Floor	2		First Floor	2
38	Ground	2	88	Ground	2
	First Floor	2		First Floor	2
39	Ground	1	89	Ground	2
	First Floor	2		First Floor	2
40	Ground	1	90	Ground	2
	First Floor	2		First Floor	2
41	Ground	1	91	Ground	2
	First Floor	1		First Floor	2
42	Ground	1	92	Ground	2
	First Floor	1		First Floor	2
43	Ground	1	93	Ground	2
	First Floor	1		First Floor	2
44	Ground	1	94	Ground	2
	First Floor	1		First Floor	2
45	Ground	1	95	Ground	2
	First Floor	2		First Floor	2
46	Ground	1	96	Ground	2
	First Floor	2		First Floor	2
47	Ground	1	97	Ground	2
	First Floor	2		First Floor	2
48	Ground	1	98	Ground	2

	First Floor	2		First Floor	2
49	Ground	2	99	Ground	2
	First Floor	2		First Floor	2
50	Ground	2	100	Ground	2
	First Floor	2		First Floor	2

QDC MP<sub>4.4</sub> Schedule 1 & 2 which describe the level of external envelope treatment required for all facades of the proposed dwelling noise categories and associated building components are provided in Appendix D of this report.

As QDC MP<sub>4.4</sub> provides conservative treatments for each noise category, it is recommended that once individual house drawings are finalised, a site specific acoustic assessment be conducted for quality and cost savings.

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## 8. Conclusion

A revised road traffic noise assessment was conducted for the proposed residential subdivision at Lot 4 Dalma Street, Ormeau Hills. With the inclusion of the recommendations presented in this report the development is predicted to comply with the relevant noise criteria.

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## Appendix A    Development Plans

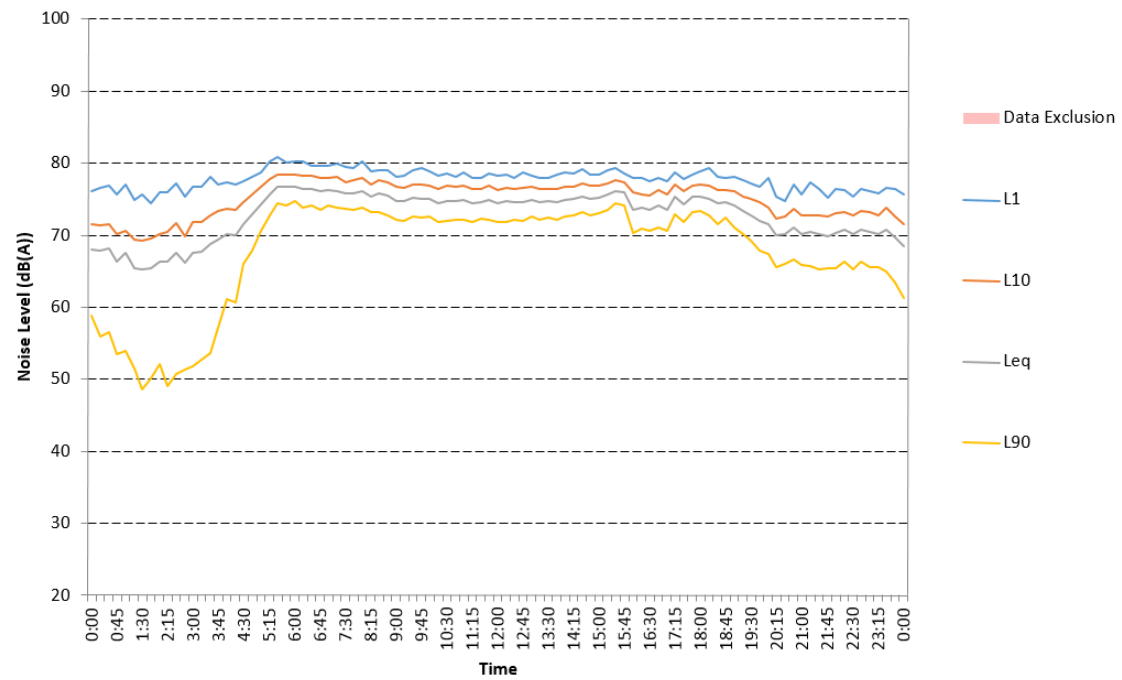


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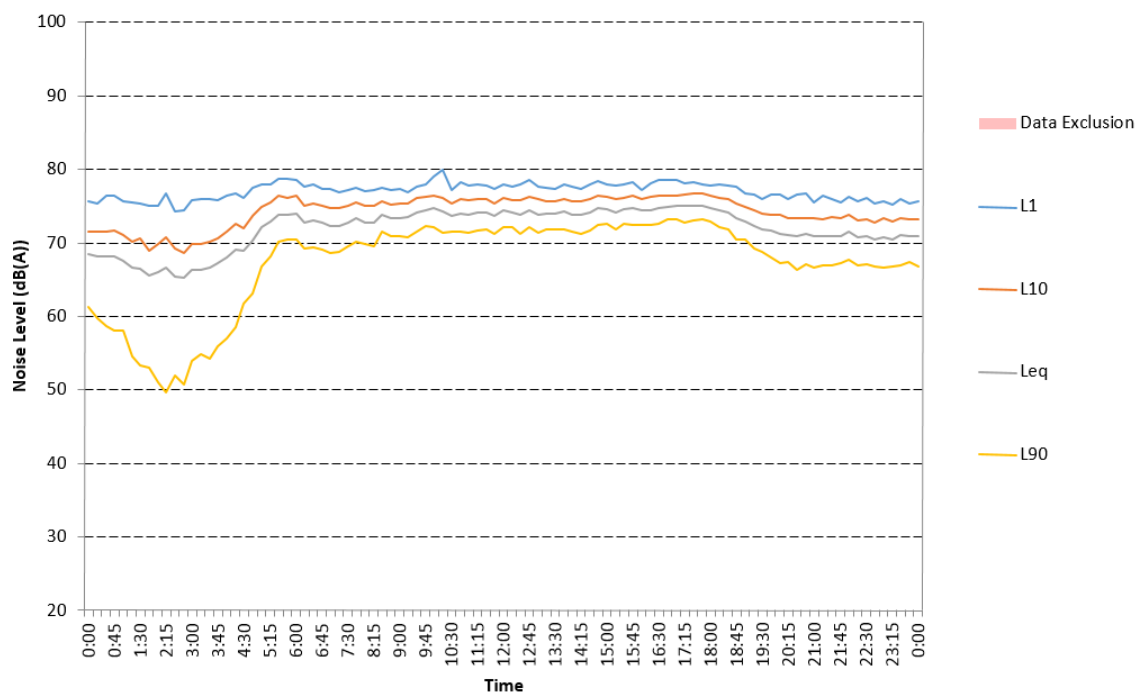
## Appendix B    Unattended Noise Monitoring Graphs



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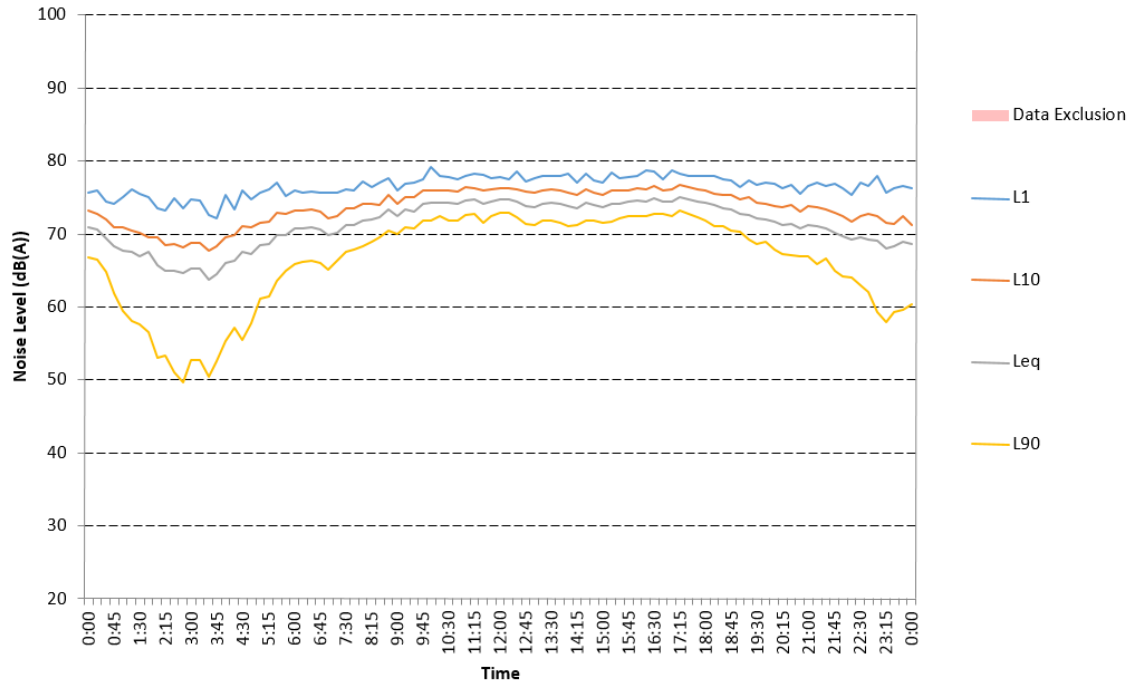


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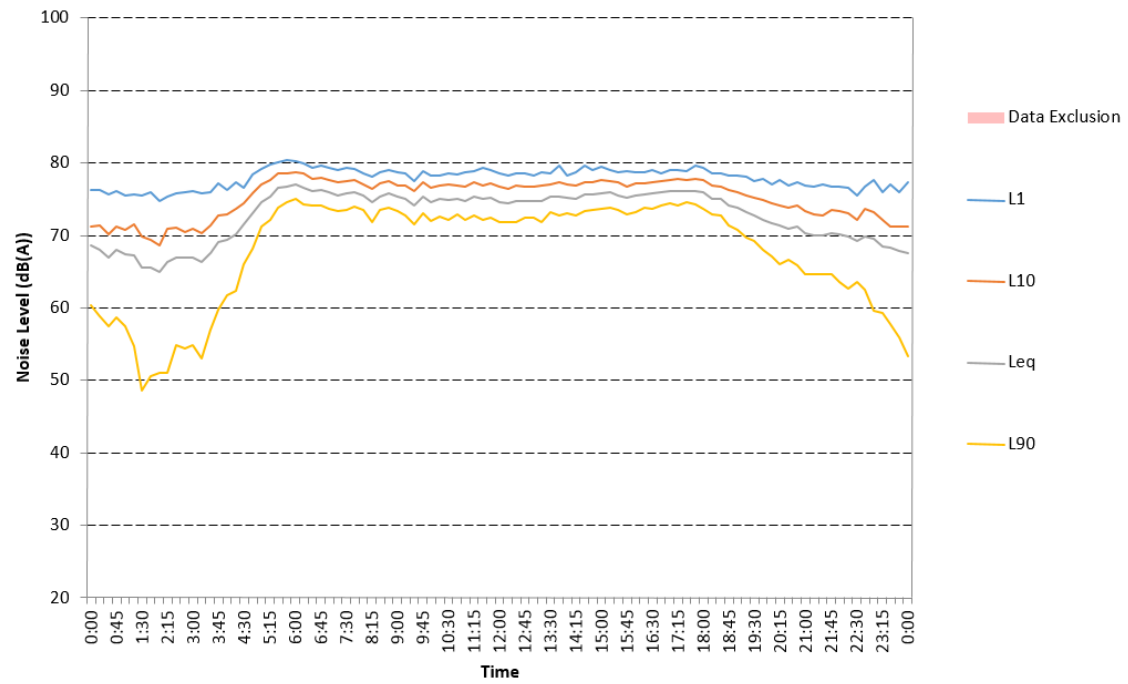
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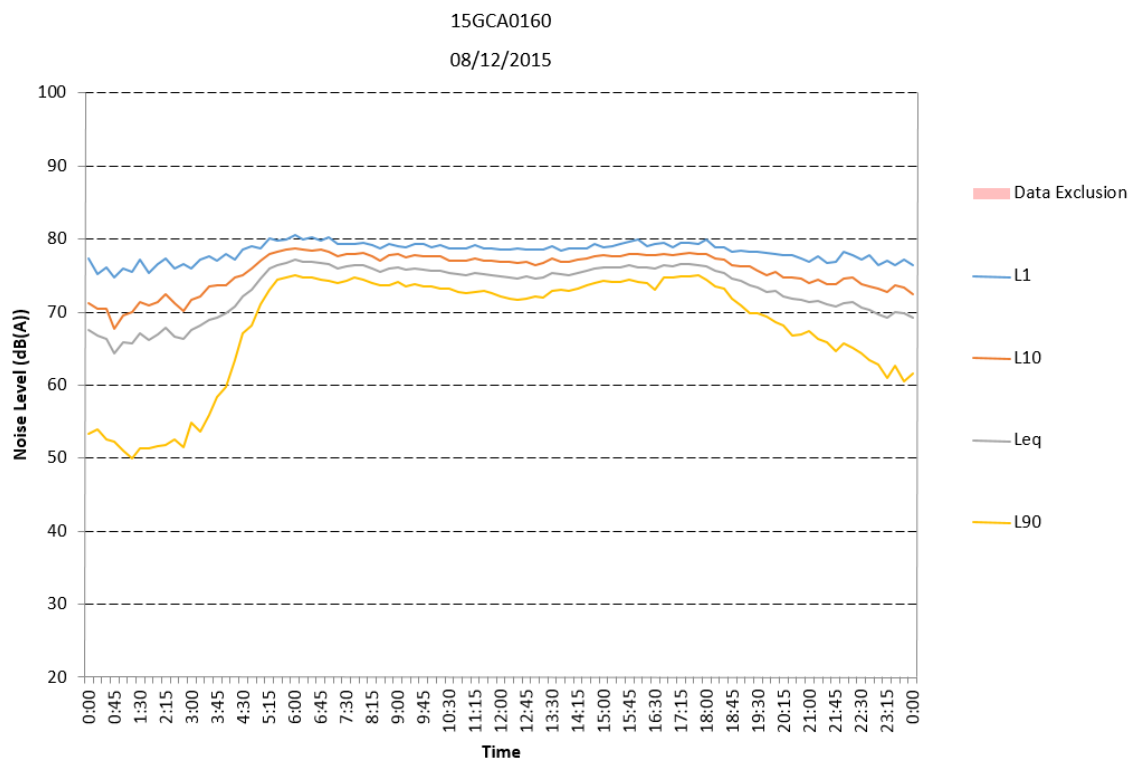
06/12/2015



15GCA0160

07/12/2015





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## Appendix C    SoundPLAN Noise Modelling Results

<p>Gold Coast Model Assessed receiver levels 15GCA0160 Verification</p>
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Receiver	FI	L10(18h) dB(A)	
Logger Receiver	G	77.9	

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	TTM Consulting (Qld) Pty Ltd Level 1 - 129 Logan Rd Woolloongabba, QLD 4102	1
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Gold Coast Model  
Assessed receiver levels  
19BRA0060 Prediction 2026 w Acoustic Barrier

Receiver	FI	Building Pad Level m (AHD)	L10(18h) Free Field dB(A)
Lot 1	G	36.98	58.4
	F2	36.98	59.5
Lot 2	G	36.95	58.7
	F2	36.95	59.6
Lot 3	G	36.95	59.1
	F2	36.95	59.7
Lot 4	G	36.34	59.2
	F2	36.34	59.7
Lot 5	G	35.35	59.0
	F2	35.35	59.7
Lot 6	G	34.15	58.6
	F2	34.15	59.5
Lot 7	G	32.95	58.3
	F2	32.95	59.5
Lot 8	G	31.75	58.2
	F2	31.75	59.1
Lot 9	G	30.64	58.2
	F2	30.64	59.0
Lot 10	G	29.44	58.2
	F2	29.44	59.0
Lot 11	G	28.24	58.0
	F2	28.24	58.8
Lot 12	G	27.04	58.0
	F2	27.04	58.6
Lot 13	G	25.85	57.8
	F2	25.85	58.5
Lot 14	G	24.65	57.7
	F2	24.65	58.3
Lot 15	G	23.55	57.6
	F2	23.55	58.2
Lot 16	G	22.34	57.5
	F2	22.34	58.0
Lot 17	G	21.14	57.4
	F2	21.14	57.9
Lot 18	G	20.14	57.3
	F2	20.14	57.8
Lot 19	G	19.55	57.3
	F2	19.55	57.8
Lot 20	G	19.22	57.5
	F2	19.22	57.9
Lot 21	G	18.95	58.3
	F2	18.95	58.9

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SoundPLAN 8.1



**Gold Coast Model**  
**Assessed receiver levels**  
**19BRA0060 Prediction 2026 w Acoustic Barrier**

Receiver	FI	Building Pad Level m (AHD)	L10(18h) Free Field dB(A)
Lot 22	G	18.90	58.9
	F2	18.90	59.5
Lot 23	G	18.90	59.5
	F2	18.90	60.1
Lot 24	G	18.80	60.0
	F2	18.80	60.8
Lot 25	G	18.70	60.7
	F2	18.70	61.5
Lot 26	G	18.60	61.4
	F2	18.60	62.6
Lot 27	G	19.44	58.6
	F2	19.44	59.3
Lot 28	G	21.05	58.6
	F2	21.05	59.4
Lot 29	G	22.37	58.6
	F2	22.37	59.3
Lot 30	G	23.00	59.7
	F2	23.00	60.5
Lot 31	G	23.00	60.1
	F2	23.00	60.9
Lot 32	G	23.00	60.5
	F2	23.00	61.3
Lot 33	G	22.45	60.8
	F2	22.45	61.6
Lot 34	G	20.95	61.6
	F2	20.95	62.4
Lot 35	G	21.55	61.2
	F2	21.55	62.0
Lot 36	G	22.36	60.8
	F2	22.36	61.6
Lot 37	G	22.76	60.6
	F2	22.76	61.3
Lot 38	G	22.96	60.2
	F2	22.96	60.8
Lot 39	G	23.30	59.9
	F2	23.30	60.5
Lot 40	G	23.35	59.5
	F2	23.35	60.2
Lot 41	G	23.56	59.1
	F2	23.56	59.7
Lot 42	G	23.76	58.6
	F2	23.76	59.3

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SoundPLAN 8.1

Gold Coast Model  
Assessed receiver levels  
19BRA0060 Prediction 2026 w Acoustic Barrier

Receiver	Fl	Building Pad Level m (AHD)	L10(18h) Free Field dB(A)
Lot 43	G	24.06	58.3
	F2	24.06	59.0
Lot 44	G	29.00	59.3
	F2	29.00	59.9
Lot 45	G	28.45	59.5
	F2	28.45	60.1
Lot 46	G	27.46	59.5
	F2	27.46	60.2
Lot 47	G	26.35	59.7
	F2	26.35	60.4
Lot 48	G	25.25	59.9
	F2	25.25	60.7
Lot 49	G	24.26	60.0
	F2	24.26	60.8
Lot 50	G	23.15	60.3
	F2	23.15	60.9
Lot 51	G	22.46	60.5
	F2	22.46	61.2
Lot 52	G	22.16	60.9
	F2	22.16	61.8
Lot 53	G	21.95	61.3
	F2	21.95	62.3
Lot 54	G	21.95	61.9
	F2	21.95	63.2
Lot 55	G	22.26	61.7
	F2	22.26	63.1
Lot 56	G	22.66	61.6
	F2	22.66	63.0
Lot 57	G	22.96	61.5
	F2	22.96	63.0
Lot 58	G	23.36	61.8
	F2	23.36	63.0
Lot 59	G	23.75	61.7
	F2	23.75	62.9
Lot 60	G	24.05	61.6
	F2	24.05	63.0
Lot 61	G	24.30	61.5
	F2	24.30	63.3
Lot 62	G	24.30	62.1
	F2	24.30	63.7
Lot 63	G	24.06	62.7
	F2	24.06	63.6

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SoundPLAN 8.1

Gold Coast Model  
Assessed receiver levels  
19BRA0060 Prediction 2026 w Acoustic Barrier

Receiver	FI	Building Pad Level m (AHD)	L10(18h) Free Field dB(A)
Lot 64	G	23.66	62.6
	F2	23.66	63.5
Lot 65	G	23.30	62.1
	F2	23.30	63.4
Lot 66	G	23.30	62.3
	F2	23.30	63.4
Lot 67	G	22.55	60.2
	F2	22.55	61.2
Lot 68	G	22.76	59.8
	F2	22.76	60.7
Lot 69	G	23.35	59.7
	F2	23.35	60.5
Lot 70	G	24.35	59.5
	F2	24.35	60.4
Lot 71	G	25.45	59.4
	F2	25.45	60.4
Lot 72	G	26.56	59.2
	F2	26.56	60.3
Lot 73	G	27.65	59.1
	F2	27.65	60.2
Lot 74	G	28.75	59.0
	F2	28.75	60.2
Lot 75	G	29.86	58.7
	F2	29.86	60.0
Lot 76	G	34.94	60.2
	F2	34.94	60.7
Lot 77	G	34.45	60.5
	F2	34.45	61.0
Lot 78	G	32.95	60.5
	F2	32.95	61.1
Lot 79	G	31.55	60.7
	F2	31.55	61.3
Lot 80	G	30.05	60.7
	F2	30.05	61.3
Lot 81	G	28.70	60.7
	F2	28.70	61.4
Lot 82	G	27.36	60.8
	F2	27.36	61.5
Lot 83	G	25.75	60.6
	F2	25.75	61.4
Lot 84	G	24.75	60.5
	F2	24.75	61.4

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SoundPLAN 8.1

Gold Coast Model  
Assessed receiver levels  
19BRA0060 Prediction 2026 w Acoustic Barrier

Receiver	FI	Building Pad Level m (AHD)	L10(18h) Free Field dB(A)
Lot 85	G F2	23.54 23.54	60.3 61.3
Lot 86	G F2	24.16 24.16	60.7 62.0
Lot 87	G F2	24.66 24.66	60.9 62.1
Lot 88	G F2	24.94 24.94	61.2 62.1
Lot 89	G F2	24.95 24.95	61.3 62.2
Lot 90	G F2	24.54 24.54	60.9 62.1
Lot 91	G F2	25.86 25.86	60.9 61.6
Lot 92	G F2	26.66 26.66	60.6 61.2
Lot 93	G F2	25.65 25.65	60.5 61.5
Lot 94	G F2	27.25 27.25	60.8 61.4
Lot 95	G F2	28.75 28.75	60.7 61.2
Lot 96	G F2	30.25 30.25	60.6 61.1
Lot 97	G F2	31.75 31.75	60.5 61.0
Lot 98	G F2	33.25 33.25	60.3 60.9
Lot 99	G F2	34.75 34.75	60.2 60.7
Lot 100	G F2	36.16 36.16	60.1 60.6

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SoundPLAN 8.1

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## Appendix D    Extract from QDC MP4.4

Noise category	Minimum transport noise reduction (dB (A)) required for habitable rooms	Component of building's external envelope	Minimum $R_w$ required for each component
Category 2	30	Glazing	35 (where total area of glazing for a <i>habitable room</i> is greater than 1.8m <sup>2</sup> )
			32 (where total area of glazing for a <i>habitable room</i> is less than or equal to 1.8m <sup>2</sup> )
		External walls	41
		Roof	38
		Floors	45
		Entry doors	33
Category 1	25	Glazing	27 (where total area of glazing for a <i>habitable room</i> is greater than 1.8m <sup>2</sup> )
			24 (where total area of glazing for a <i>habitable room</i> is less than or equal to 1.8m <sup>2</sup> )
		External walls	35
		Roof	35
		Entry Doors	28
Category 0	No additional acoustic treatment required – standard building assessment provisions apply.		

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## Schedule 2

Component of building's external envelope	Minimum $R_w$	Acceptable forms of construction
Glazing	43	Double glazing consisting of two panes of minimum 5mm thick glass with at least 100mm air gap and full perimeter <i>acoustically rated seals</i> .
	38	Minimum 14.38mm thick laminated glass, with full perimeter <i>acoustically rated seals</i> ; OR Double glazing consisting of one pane of minimum 5mm thick glass and one pane of minimum 6mm thick glass with at least 44mm air gap, and full perimeter <i>acoustically rated seals</i>
	35	Minimum 10.38mm thick laminated glass, with full perimeter <i>acoustically rated seals</i> .
	32	Minimum 6.38mm thick laminated glass with full perimeter <i>acoustically rated seals</i> .
	27	Minimum 4mm thick glass with full perimeter <i>acoustically rated seals</i>
	24	Minimum 4mm thick glass with standard weather seals

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Component of building's external envelope	Minimum $R_w$	Acceptable forms of construction
External walls	52	Two leaves of clay brick masonry, at least 270mm in total, with subfloor vents fitted with noise attenuators.
	47	<p>Two leaves of clay brick masonry at least 110mm thick with:</p> <ul style="list-style-type: none"> <li>(i) cavity not less than 50mm between leaves; and</li> <li>(ii) 50mm thick mineral insulation or 50mm thick glass wool insulation with a density of 11kg/m<sup>3</sup> or 50mm thick polyester insulation with a density of 20kg/m<sup>3</sup> in the cavity.</li> </ul> <p>OR</p> <p>Two leaves of clay brick masonry at least 110mm thick with:</p> <ul style="list-style-type: none"> <li>(i) cavity not less than 50mm between leaves; and</li> <li>(ii) at least 13mm thick cement render on each face</li> </ul> <p>OR</p> <p>Single leaf of clay brick masonry at least 110mm thick with:</p> <ul style="list-style-type: none"> <li>(i) a row of at least 70mm x 35mm timber studs or 64mm steel studs at 600mm centres, spaced at least 20mm from the masonry wall; and</li> <li>(ii) Mineral insulation or glass wool insulation at least 50mm thick with a density of at least 11 kg/m<sup>3</sup> positioned between studs; and</li> <li>(iii) One layer of plasterboard at least 13mm thick fixed to outside face of studs.</li> </ul> <p>OR</p> <p>Single leaf of minimum 150mm thick masonry of hollow, dense concrete blocks, with mortar joints laid to prevent moisture bridging.</p>

Component of building's external envelope	Minimum $R_w$	Acceptable forms of construction
	41	<p>Two leaves of clay brick masonry at least 110mm thick with cavity not less than 50mm between leaves</p> <p>OR</p> <p>Single leaf of clay brick masonry at least 110mm thick with:</p> <ul style="list-style-type: none"> <li>(i) a row of at least 70mm x 35mm timber studs or 64mm steel studs at 600mm centres, spaced at least 20mm from the masonry wall; and</li> <li>(ii) mineral insulation or glass wool insulation at least 50mm thick with a density of at least 11 kg/m<sup>3</sup> positioned between studs; and</li> <li>(iii) One layer of plasterboard at least 10mm thick fixed to outside face of studs</li> </ul> <p>OR</p> <p>Single leaf of brick masonry at least 110mm thick with at least 13mm thick render on each face</p> <p>OR</p> <p>Concrete brickwork at least 110mm thick</p> <p>OR</p> <p>In-situ concrete at least 100mm thick</p> <p>OR</p> <p>Precast concrete at least 100mm thick and without joints.</p>

Component of building's external envelope	Minimum $R_w$	Acceptable forms of construction
	35	<p>Single leaf of clay brick masonry at least 110mm thick with:</p> <ul style="list-style-type: none"> <li>(i) a row of at least 70mm x 35mm timber studs or 64mm steel studs at 600mm centres, spaced at least 20mm from the masonry wall; and</li> <li>(ii) One layer of plasterboard at least 10mm thick fixed to outside face of studs</li> </ul> <p>OR</p> <p>Minimum 6mm thick fibre cement sheeting or weatherboards or plank cladding externally, minimum 90mm deep timber stud or 92mm metal stud, standard plasterboard at least 13mm thick internally.</p>
Roof	45	<p>Concrete or terracotta tile or sheet metal roof with sarking, <i>acoustically rated plasterboard</i> ceiling at least 13mm thick fixed to ceiling joists, cellulose fibre insulation at least 100mm thick with a density of at least 45kg/m<sup>3</sup> in the cavity.</p> <p>OR</p> <p>Concrete or terracotta tile or sheet metal roof with sarking, 2 layers of <i>acoustically rated plasterboard</i> at least 16mm thick fixed to ceiling joists, glass wool insulation at least 50mm thick with a density of at least 11kg/m<sup>3</sup> or polyester insulation at least 50mm thick with a density of at least 20kg/m<sup>3</sup> in the cavity.</p>
	41	<p>Concrete or terracotta tile or metal sheet roof with sarking, plasterboard ceiling at least 10mm thick fixed to ceiling joists, glass wool insulation at least 50mm thick with a density of at least 11kg/m<sup>3</sup> or polyester insulation at least 50mm thick with a density of at least 20kg/m<sup>3</sup> in the cavity.</p> <p>OR</p> <p>Concrete suspended slab at least 100mm thick.</p>
	38	<p>Concrete or terracotta tile or metal sheet roof with sarking, plasterboard ceiling at least 10mm thick fixed to ceiling cavity, mineral insulation or glass wool insulation at least 50mm thick with a density of at least 11 kg/m<sup>3</sup>.</p>



Component of building's external envelope	Minimum $R_w$	Acceptable forms of construction
	35	Concrete or terracotta tile or metal sheet roof with sarking, plasterboard ceiling at least 10mm thick fixed to ceiling cavity.
Floors	51	Concrete slab at least 150mm thick.
	45	Concrete slab at least 100mm thick OR Tongued and grooved boards at least 19mm thick with: (i) timber joists not less than 175mm x 50mm; and (ii) mineral insulation or glass wool insulation at least 75mm thick with a density of at least 11kg/m <sup>3</sup> positioned between joists and laid on plasterboard at least 10mm thick fixed to underside of joists; and (iii) mineral insulation or glass wool insulation at least 25mm thick with a density of at least 11kg/m <sup>3</sup> laid over entire floor, including tops of joists before flooring is laid; and (iv) secured to battens at least 75mm x 50mm; and (v) the assembled flooring laid over the joists, but not fixed to them, with battens lying between the joists.
Entry Doors	35	Solid core timber not less than 45mm thick, fixed so as to overlap the frame or rebate of the frame by not less than 10mm, with full perimeter <i>acoustically rated seals</i> .
	33	Fixed so as to overlap the frame or rebate of the frame by not less than 10mm, fitted with full perimeter <i>acoustically rated seals</i> and constructed of - (i) solid core, wood, particleboard or blockboard not less than 45mm thick; and/or (ii) acoustically laminated glass not less than 10.38mm thick.

Component of building's external envelope	Minimum $R_w$	Acceptable forms of construction
	28	Fixed so as to overlap the frame or rebate of the frame, constructed of - (i) Wood, particleboard or blockboard not less than 33mm thick; or (ii) Compressed fibre reinforced sheeting not less than 9mm thick; or (iii) Other suitable material with a mass per unit area not less than 24.4kg/m <sup>2</sup> ; or (iv) Solid core timber door not less than 35mm thick fitted with full perimeter <i>acoustically rated seals</i> .