



# Road Traffic Noise Assessment

Proposed Residential Subdivision

Collingwood Drive, Collingwood Park

Weiya Development Pty Ltd

19BRA0099 R01\_3



## About TTM

For 30 years, we've been at the centre of the Australian development and infrastructure industry. Our unique combination of acoustics, data, traffic and waste services is fundamental to the success of any architectural or development project.

We have over 50 staff, with an unrivalled depth of experience. Our industry knowledge, technical expertise and commercial insight allow us to deliver an exceptional and reliable service.

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## Revision Record

No.	Author	Reviewed/Approved	Description	Date
A	S Yorke	J Fox	Internal draft	26/02/2020
0	S Yorke		Client issue	26/02/2020
1	A Ashworth		Update Plans	28/02/2020
2	S Yorke		RFI Response	16/06/2020
3	S Yorke		RFI Response - New Layout	21/08/2020

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# 1 Executive Summary

TTM was engaged by Weiya Development Pty Ltd to undertake a road traffic noise assessment of a proposed residential subdivision development located at Collingwood Drive, Collingwood Park.

Unattended noise monitoring was conducted to determine the current road traffic noise levels at the development location. Noise modelling of road traffic noise from Collingwood Drive indicates that some lots are noise affected (QDC Noise Category 0 - 3) and future dwellings will require acoustic building treatment.

Compliance with the Ipswich City Council planning scheme and relevant noise criteria in relation to road traffic noise impacts is predicted based on the implementation of the recommendations outlined in Section 8 of this report.

## 2 Introduction

### 2.1 Background

TTM was engaged by Weiya Development Pty Ltd to undertake a road traffic noise assessment of a proposed residential subdivision development located at Collingwood Drive, Collingwood Park. This report will form part of the development application for consideration by Ipswich City Council.

### 2.2 References

This report is based on the following:

- Ipswich City Council *Further Advice* letter dated 24 March 2020
- Ipswich City Council Planning Scheme 2006
- Queensland Development Code (QDC) MP4.4 – *Buildings in a Transport Noise Corridor* (August 2015)
- Development plans shown in Appendix A
- Site inspection, noise measurements, analysis and calculations conducted by TTM

### 2.3 Scope

The assessment includes the following:

- Description of the site.
- Measurement of existing road traffic noise levels.
- Statement of assessment criteria relating to road traffic noise impacts.
- Prediction of future road traffic noise onto the development.
- Analysis of measured and predicted noise levels.
- Details of noise control recommendations to be incorporated to achieve predicted compliance.

### 3 Site Description

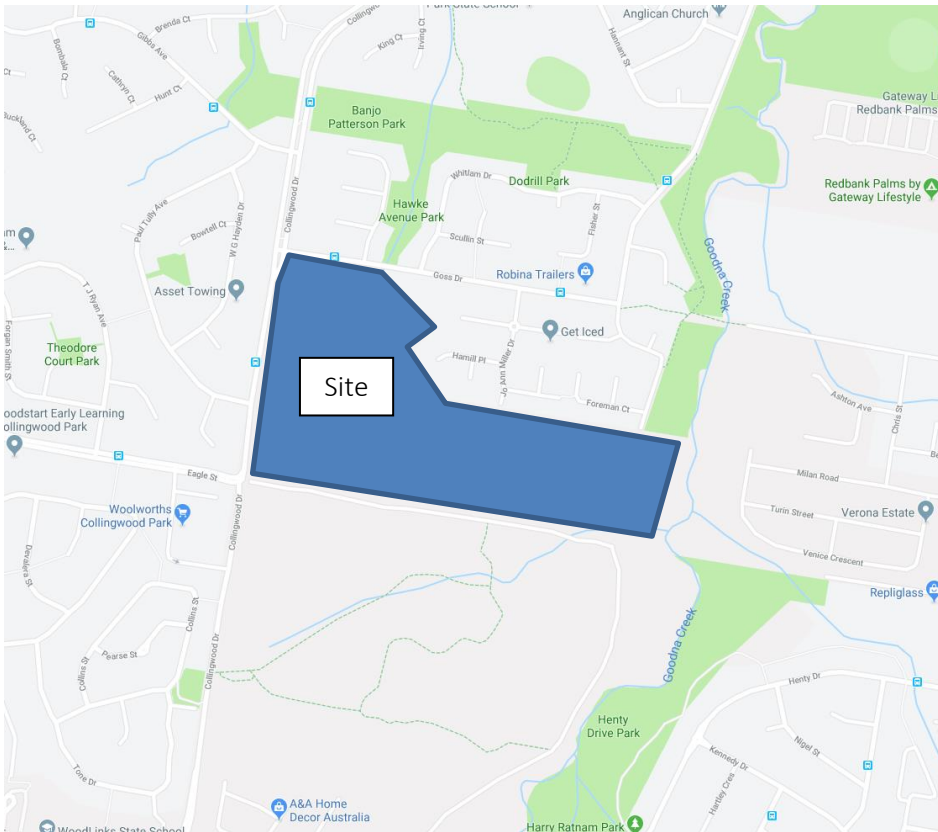
#### 3.1 Site Location

The site is described by the following:

- Collingwood Drive, Collingwood Park
- Lot 801 SP157194 & Lots 1 & 2 on RP22251

The site locality is shown in Figure 1.

Figure 1: Site Locality



#### 3.2 Current Acoustic Conditions

The site is bound by Collingwood Drive to the west, Eagle Street to the south, Goss Drive to the north, with existing residential properties to the north east. The current acoustic environment at the site is primarily comprised of noise from road traffic on Collingwood Drive.

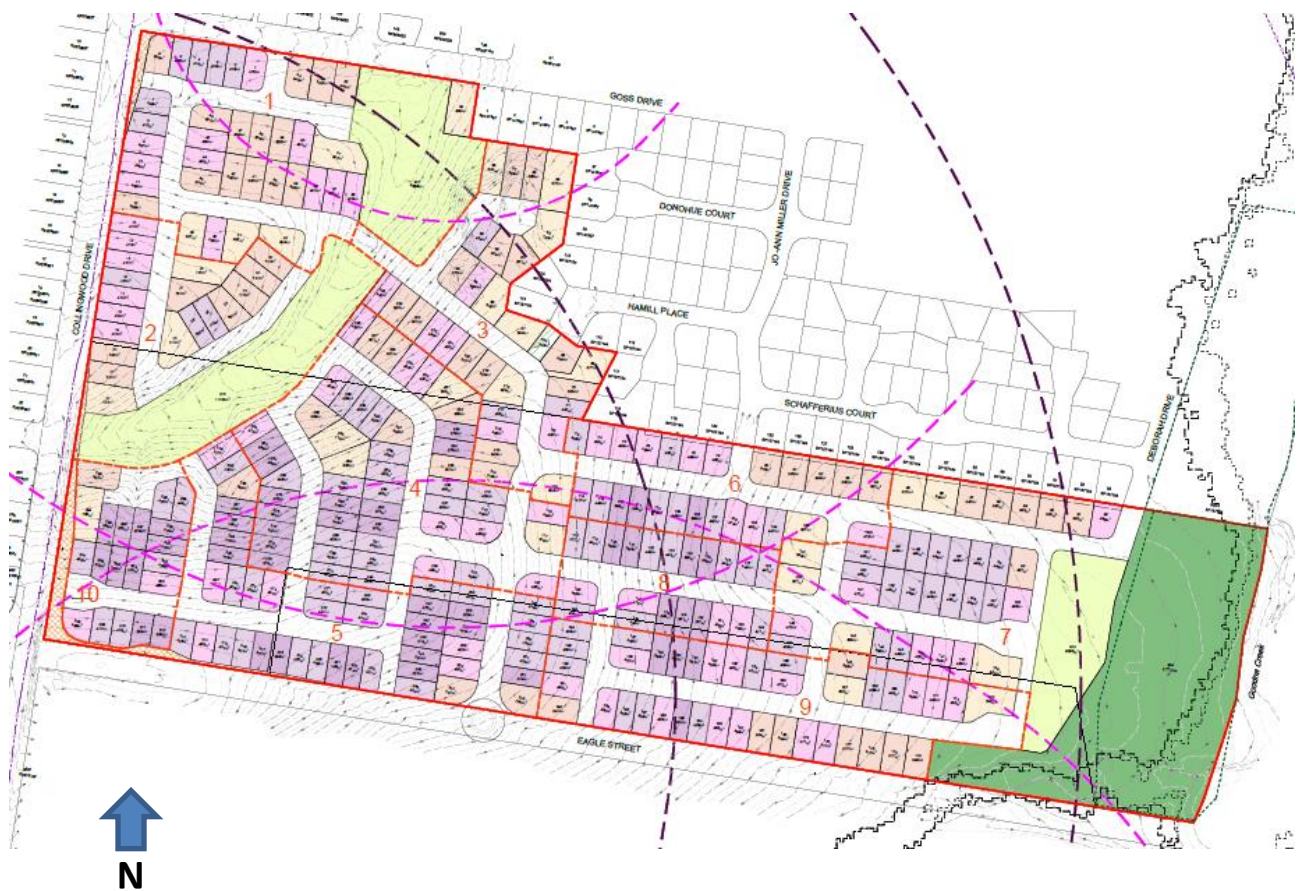
# 4 The Proposed Development

## 4.1 Development Description

The proposal is to develop the site into a residential subdivision with associated internal roads and open space.

A site plan is presented in Figure 2. Further samples of the development plans are shown in Appendix A.

Figure 2: Site Plan





## 5 Measurements

### 5.1 Equipment

The following equipment was used to measure existing noise levels:

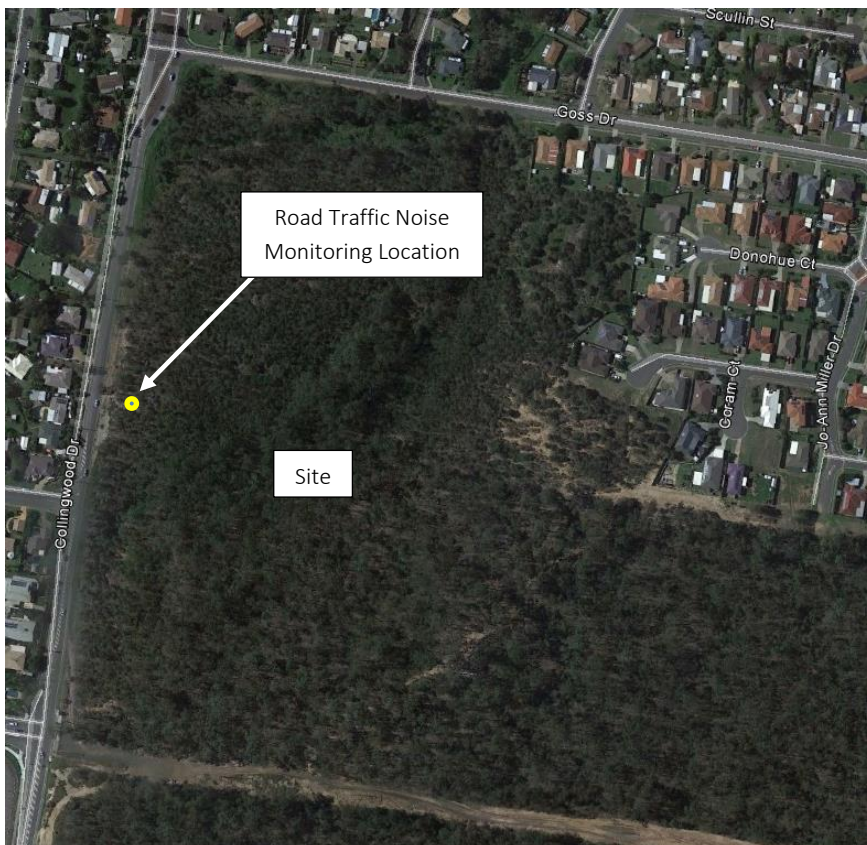
- ARL EL316 Environmental noise logger (SN# 16-306-005)
- Norsonic Nor131 Sound Level Meter (SN# 1313159)
- RION Sound Calibrator type NC73 (SN# TTMNC73-01)

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

### 5.2 Unattended Road Traffic Noise Monitoring

Unattended noise monitoring was conducted to establish the existing road traffic noise levels between Tuesday 25<sup>th</sup> June to Tuesday 2<sup>nd</sup> July 2019. The road traffic noise monitor was placed in a free-field location and 1.4m above ground level approximately 15 metres from the edge of Collingwood Drive and is shown in Figure 3.

Figure 3: Noise Monitoring Location



The noise monitor was set to measure statistical noise levels in 'A'-weighting, 'Fast' response, over 15 minute intervals. Road traffic noise levels were measured in accordance with Australian Standard *AS2702:1984 Acoustics – Methods for the measurement of road traffic noise (AS2702)*.

Weather during the monitoring period was generally fine with temperatures ranging between 7-25°C (source: Bureau of Meteorology). Data on school holiday days was excluded.

## 5.3 Results of Measurements

### 5.3.1 Road Traffic Noise Levels

Table 1 presents the measured road traffic noise levels at the unattended noise monitoring location on Collingwood Drive. Graphical presentation of the measured noise levels is presented in Appendix B.

Table 1: Measured Road Traffic Noise Levels

Location	Road Traffic Noise Descriptor	Time Period	Measured Level dB(A)
Collingwood Drive	L <sub>A10,18hr</sub>	6am to midnight	60.7
	Noisiest day-time L <sub>Aeq,1 hour</sub>	7am to 8am	61.8
	Noisiest night-time L <sub>Aeq,1 hour</sub>	5am to 6am	58.4
	L <sub>Aeq,24 hour</sub>	Midnight to midnight	57.6
	L <sub>90, 8 hour</sub>	10pm to 6am	41.9
	L <sub>90, 18 hour</sub>	6am to midnight	48.1

## 6 Road Traffic Noise Criteria

The site is within the designated road traffic noise corridor of Collingwood Drive which is a local government road. The Ipswich City Council Planning Scheme (2006) *Part 12, Division 6 Residential Code* does not reference specific road traffic noise criteria. Noise assessment in general is referenced against the Environmental Protection (Noise) Policy 2008 (EPP). The current EPP version is 2019. The EPP lists road traffic noise as an excluded noise source in relation to the Acoustic Quality Objectives.

Relevant road traffic noise criteria for dwelling internal sound levels is considered to be AS2107<sup>1</sup> internal design sound levels. A relevant and practical framework for presenting these results is the *Queensland Development Code MP4.4 Buildings in a Transport Noise Corridor* (QDC) and the noise category rating system to describe the noise impact levels. The QDC also provides dwelling façade treatment requirements which are based on achieving the internal sound levels of AS2107. The QDC prescribed treatments are typically found to be conservative when compared to the AS3671<sup>2</sup> methodology for determining road traffic noise façade treatment requirements to achieve the internal sound levels of AS2107.

The QDC noise category system is also beneficial at the development approval stage when future dwelling designs are not known in addition to being a clear and practical way of communicating noise impact levels to all various parties involved in the design and construction of dwellings. The Internal criteria for future dwelling design can be targeted to the mid-level of the AS2107 acceptable sound level range.

### 6.1 AS2107:2016

AS2107 specifies recommended internal sound levels for residential buildings. These are reproduced in Table 2.

Table 2: Internal Design Sound Levels for Residential Buildings - AS2107:2016

Type of Occupancy	Design Sound Level Range L <sub>Aeq,t</sub> dB(A)
<b>7. RESIDENTIAL BUILDINGS</b>	
Houses and apartments near major roads -	
Living areas	35 - 45
Sleeping areas (night time)	35 - 40
Work areas	35 - 45

<sup>1</sup> AS2107:2016. Acoustics - Recommended design sound levels and reverberation times for building interiors

<sup>2</sup> AS3671:1989 Acoustics – Road Traffic Noise Intrusion – Building Siting and Construction

## 6.2 Queensland Development Code MP4.4

The *Queensland Development Code Part MP 4.4 - 'Buildings in a Transport Noise Corridor'* August 2015 (QDC) specifies Noise Categories to ensure that habitable rooms of residential buildings are adequately protected from transport noise over a 10-year planning horizon from completion of the development.

The Noise Categories list the minimum acoustic  $R_w$  ratings for each building component 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 and reproduced in Appendix D. The triggers for each noise category are summarised in Table 3.

Table 3: 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.

## 7 Analysis - Road Traffic Noise

An assessment of road traffic noise onto the proposed development was conducted to determine the acoustic treatment requirements for predicted compliance with the relevant criteria.

### 7.1 Traffic Volumes

Existing traffic volumes and growth rates were obtained from HTC traffic engineers. The existing and future planning-horizon traffic volumes used in the noise model are presented in Table 4.

Table 4: Traffic Volumes used in the Noise Model

Road	Traffic Volumes (AADT)		Heavy Vehicles (%)	Growth Rate (%)
	2019	2030		
Collingwood Drive	10,690	12,592	2.0	1.5

The 18-hour traffic volumes used in the noise model are taken to be 95% of the AADT (Annual Average Daily Traffic).

### 7.2 Noise Model

#### 7.2.1 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 presented in Table 5.

Table 5: Noise Modelling Parameters

Description	Value
Noise modelling standard	CoRTN (UK)
Grid spacing (noise maps)	3m
Road surface type	Impervious (+0 dB(A))
Ground contours	Design bulk earthwork levels provided by Peak Urban
Collingwood Drive speed limit	60 km/h
Noise source height above grade	0.5m
Ground floor receiver height	1.8m above ground level
First floor receiver height	4.6m above ground level
Façade correction	+2.5 dB(A)

## 7.2.2 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 6. As the noise monitor was in a free-field location, the predicted noise level is also shown as free-field.

Table 6: Comparison of Measured and Predicted Road Traffic Noise Levels

Measured $L_{A10, 18\text{ hour}}$	Predicted $L_{A10, 18\text{ hour}}$	Required Correction
60.7	61.9	0

The modelled level is within the allowable tolerance of +2 dB(A) of the measured level, therefore no correction is required to the model.

## 7.3 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 2030 traffic volumes.

Predicted road traffic noise contour maps at the ground and first floors are presented in Figure 4 and Figure 5 respectively. SoundPLAN receiver point results are shown in Appendix C.

Figure 4: Predicted Road Traffic Noise Levels – Ground Level

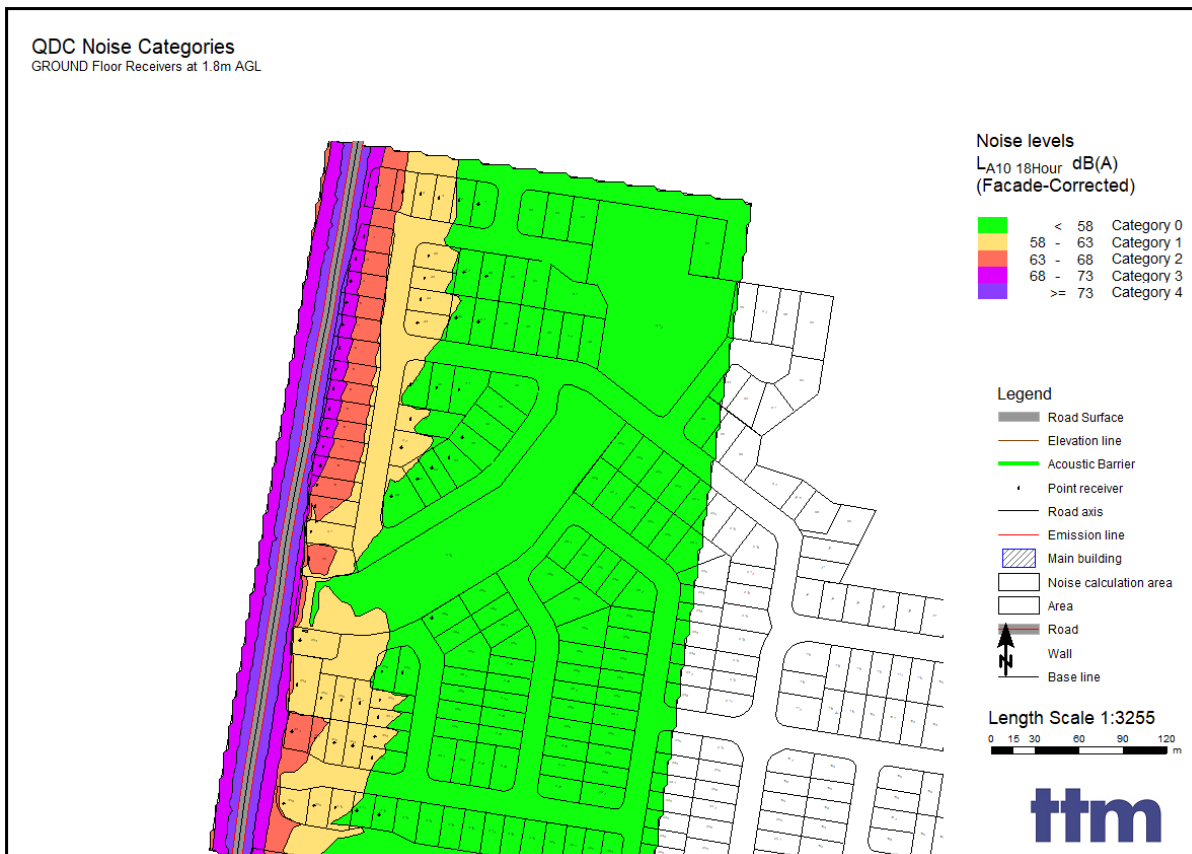
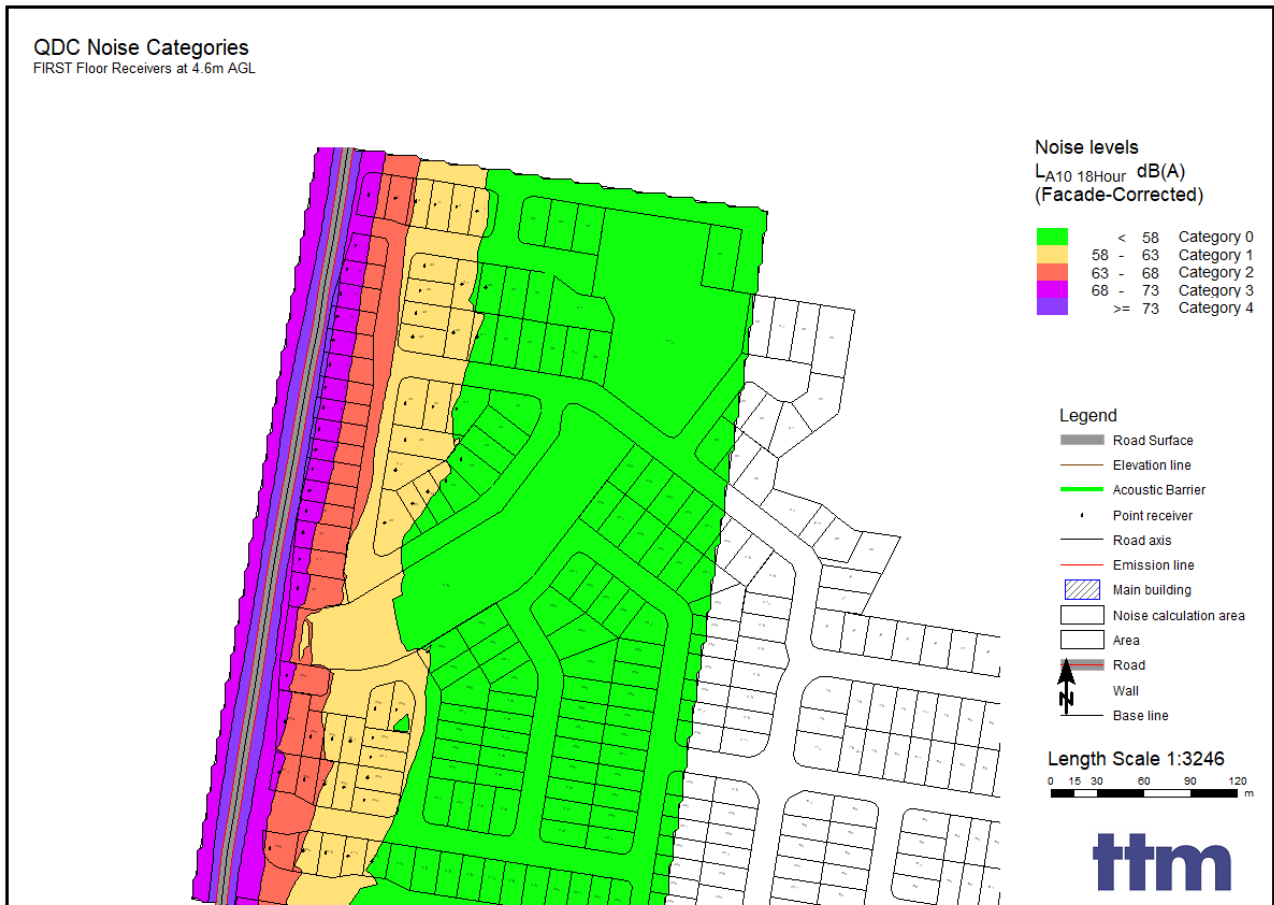


Figure 5: Predicted Road Traffic Noise Levels – First Floor



Road traffic noise levels are predicted to range from QDC MP4.4 Noise Category 0 - 3 for ground floor and 0 - 3 for first floor.

Recommendations for the noise affected lots and associated QDC noise categories are detailed in Section 8.

## 8 Recommendations

The recommended acoustic treatments are presented in the sections below to achieve predicted compliance with the relevant assessment criteria.

### 8.1 Dwelling Treatments

This section summarises the noise affected lots and associated acoustic treatment required for road traffic noise to achieve compliance with the Queensland Development Code (QDC) MP4.4 and AS2107 internal sound levels. For the purposes of the development application, the QDC provides a conservative design approach to the treatment of habitable rooms within dwellings.

To achieve the performance requirements of the QDC MP4.4, the external 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 7 presents the acoustic treatment requirements for habitable rooms in accordance with the QDC MP4.4 policy.

Table 7: QDC MP4.4 Noise Categories For Each Lot

Lot	Floor Level	QDC Noise Category	Lot	Floor Level	QDC Noise Category	Lot	Floor Level	QDC Noise Category
1	Ground	0	21	Ground	1	293	Ground	1
	First Floor	1		First Floor	3		First Floor	3
2	Ground	0	22	Ground	2	294	Ground	1
	First Floor	1		First Floor	3		First Floor	3
3	Ground	1	23	Ground	0	295	Ground	1
	First Floor	1		First Floor	0		First Floor	2
4	Ground	1	24	Ground	0	296	Ground	1
	First Floor	1		First Floor	1		First Floor	1
5	Ground	2	25	Ground	0	297	Ground	1



	First Floor	2		First Floor	1		First Floor	1
6	Ground	3	26	Ground	0	298	Ground	0
	First Floor	3		First Floor	1		First Floor	1
7	Ground	3	27	Ground	1	299	Ground	0
	First Floor	3		First Floor	1		First Floor	1
8	Ground	3	28	Ground	1	300	Ground	1
	First Floor	3		First Floor	1		First Floor	1
9	Ground	3	29	Ground	1	301	Ground	1
	First Floor	3		First Floor	1		First Floor	1
10	Ground	3	30	Ground	0	302	Ground	1
	First Floor	3		First Floor	1		First Floor	1
11	Ground	3	31	Ground	0	303	Ground	1
	First Floor	3		First Floor	0		First Floor	1
12	Ground	3	35	Ground	0	304	Ground	1
	First Floor	3		First Floor	0		First Floor	1
13	Ground	3	41	Ground	0	305	Ground	1
	First Floor	3		First Floor	0		First Floor	1
14	Ground	3	42	Ground	0	306	Ground	2
	First Floor	3		First Floor	1		First Floor	2
15	Ground	3	43	Ground	1	307	Ground	2
	First Floor	3		First Floor	1		First Floor	3
16	Ground	3	44	Ground	1	308	Ground	1
	First Floor	3		First Floor	1		First Floor	2
17	Ground	3	45	Ground	1	309	Ground	1
	First Floor	3		First Floor	1		First Floor	1
18	Ground	3	46	Ground	1	310	Ground	1
	First Floor	3		First Floor	1		First Floor	1
19	Ground	2	47	Ground	0	311	Ground	0
	First Floor	3		First Floor	1		First Floor	1
20	Ground	2	284	Ground	0	312	Ground	0

	First Floor	3		First Floor	1		First Floor	1
All Other Lots: Not Noise Affected (QDC Noise Category 0)								

Details regarding noise categories and associated sound reduction ( $R_w$ ) requirements for habitable rooms can be found within Schedule 1 of the QDC MP4.4. QDC Schedule 1 is reproduced in Table 8.

Table 8: QDC Rail Noise Categories and Associated Sound Reduction Requirements (QDC MP4.4 - Schedule 1)

QDC Noise Category	Required Sound Reduction Rating ( $R_w$ ) for Habitable Rooms			
	Glazing > 1.8m <sup>2</sup>	Glazing ≤ 1.8m <sup>2</sup>	External Walls	Roof and Ceiling
Category 4	Rw 43	Rw 43	Rw 52	Rw 45
Category 3	Rw 38	Rw 35	Rw 47	Rw 41
Category 2	Rw 35	Rw 32	Rw 41	Rw 38
Category 1	Rw 27	Rw 24	Rw 35	Rw 35
Category 0	None	None	None	None

Details regarding sound reduction ratings ( $R_w$ ) and acceptable forms of construction can be found within QDC MP 4.4 Schedule 2. QDC Schedule 1 and 2 are provided in Appendix D of this report.

Dwellings on noise affected lots may be constructed in accordance with the QDC Noise Category construction requirements for the nominated lot. However, the QDC construction requirements are general and conservative, therefore we recommend an individual acoustic assessment be conducted for each noise affected dwelling, once building plans are available, to optimise acoustic treatments for quality and cost savings.

## 9 Conclusion

TTM was engaged by Weiya Development Pty Ltd to undertake a road traffic noise assessment of a proposed residential subdivision development located at Collingwood Drive, Collingwood Park.

Compliance with the Ipswich City Council planning scheme in relation to road traffic noise impacts is predicted based on the implementation of the recommendations outlined in Section 8 of this report.

## Appendix A Development Plans

**NOT TO BE USED FOR ENGINEERING DESIGN OR CONSTRUCTION**

**NOTES**

The plan was prepared as a guide only for information purposes and is not intended to be used for engineering design or construction. It is the responsibility of the user to verify the accuracy of the information provided and to ensure that the plan is used in accordance with the relevant legislation and standards. The plan is not to be used for engineering design or construction. It is the responsibility of the user to verify the accuracy of the information provided and to ensure that the plan is used in accordance with the relevant legislation and standards. The plan is not to be used for engineering design or construction. It is the responsibility of the user to verify the accuracy of the information provided and to ensure that the plan is used in accordance with the relevant legislation and standards.

**LEGEND**

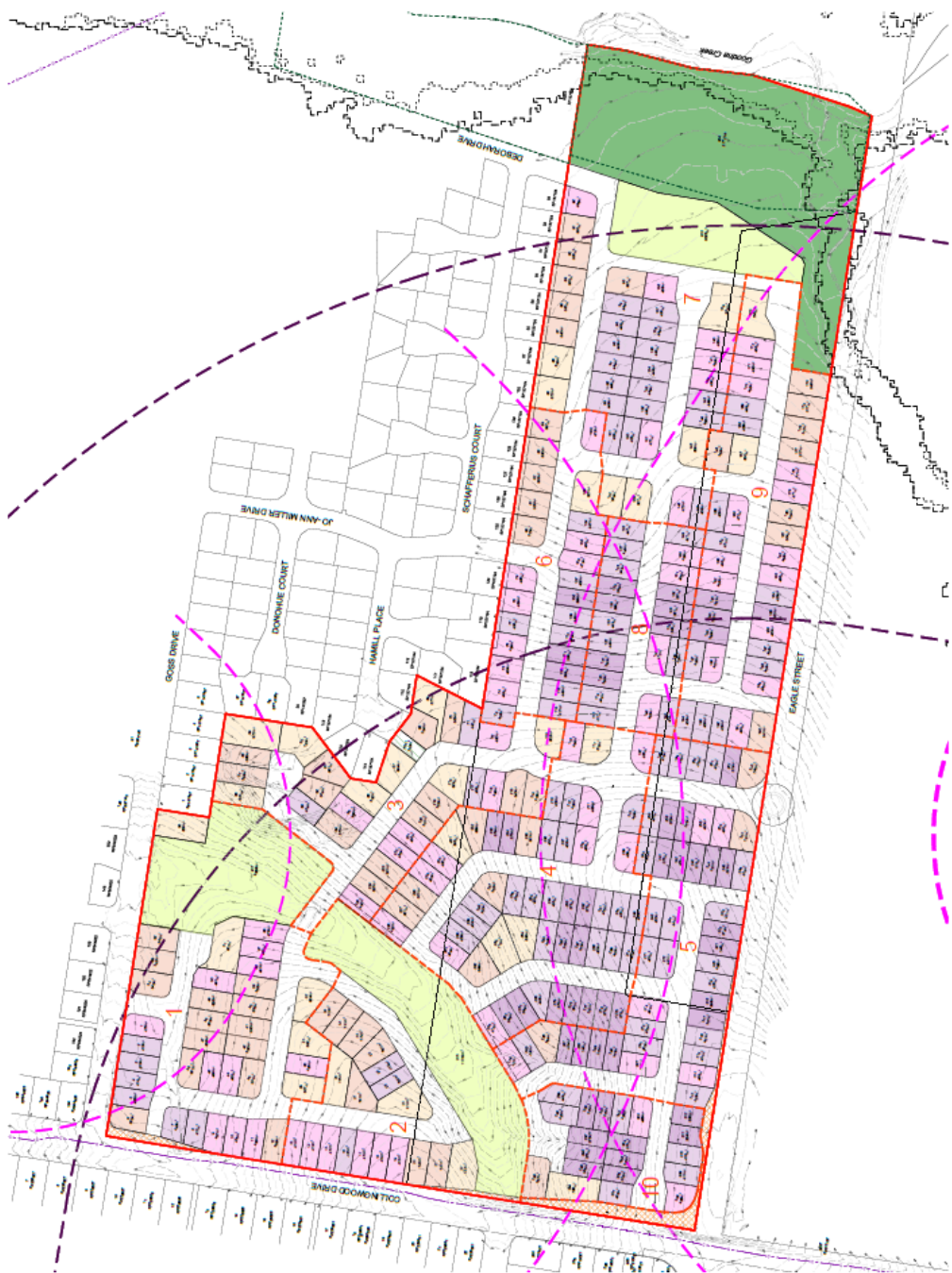
- Site Boundary
- Major Colour (1.5m Interval)
- ICC DV 11 High Pressure Gas Line
- Plot Offset
- Commuterial Offset
- G1000
- G20
- Stage Boundary
- Stage No.

RESIDENTIAL ALLOTMENTS	Lot	No.
350m <sup>2</sup> - 380m <sup>2</sup>	53	15.6%
400m <sup>2</sup> - 440m <sup>2</sup>	103	31.6%
450m <sup>2</sup> - 490m <sup>2</sup>	74	22.9%
500m <sup>2</sup> - 550m <sup>2</sup>	65	19.9%
600m <sup>2</sup> +	30	9.3%
<b>Total Residential Allotments</b>	<b>325</b>	<b>100%</b>
Average Lot Size	477m <sup>2</sup>	
Dwellings per ha (ex. Detention & Openback)	15 dw/ha	
Area of Subject Site	27,891 ha	
Residential Lot	310 m <sup>2</sup>	0.1%
Greenfield/Residential	2,772 m <sup>2</sup>	10.2%
Change/Compliance	2,819 m <sup>2</sup>	10.4%
Road Dedication/Reinstatement	2,607 m <sup>2</sup>	9.4%
Total Area of New Road	6,073 m <sup>2</sup>	21.7%
Total Length of New Road	3,588 m	1.2%

RP DESCRIPTION: Lot 801 SP157194 & Lots 1 & 2 on RP23251



**PROPOSAL PLAN**



**WEIYA DEVELOPMENTS PTY LTD**  
 COLLINGWOOD DRIVE, COLLINGWOOD PARK ■ 04/08/2020 ■ 8641 P 20 Rev A - PRO 01

## Appendix B Unattended Noise Monitoring Graphs

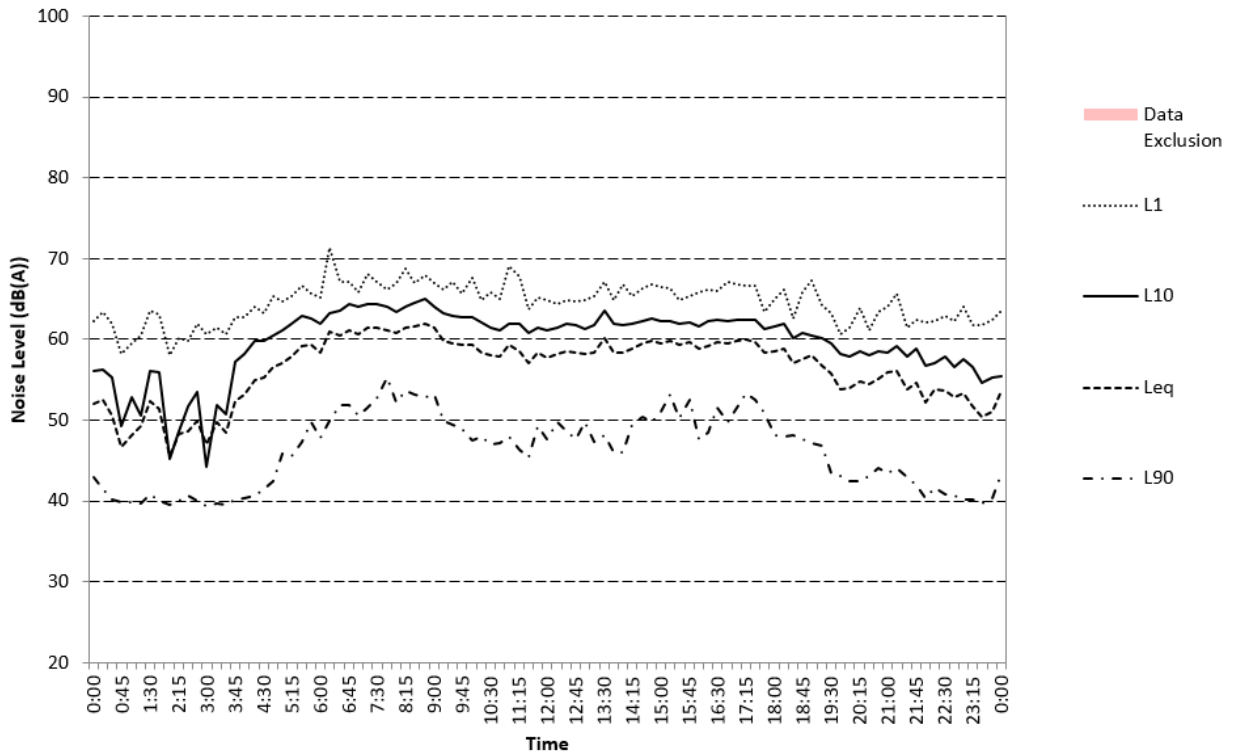
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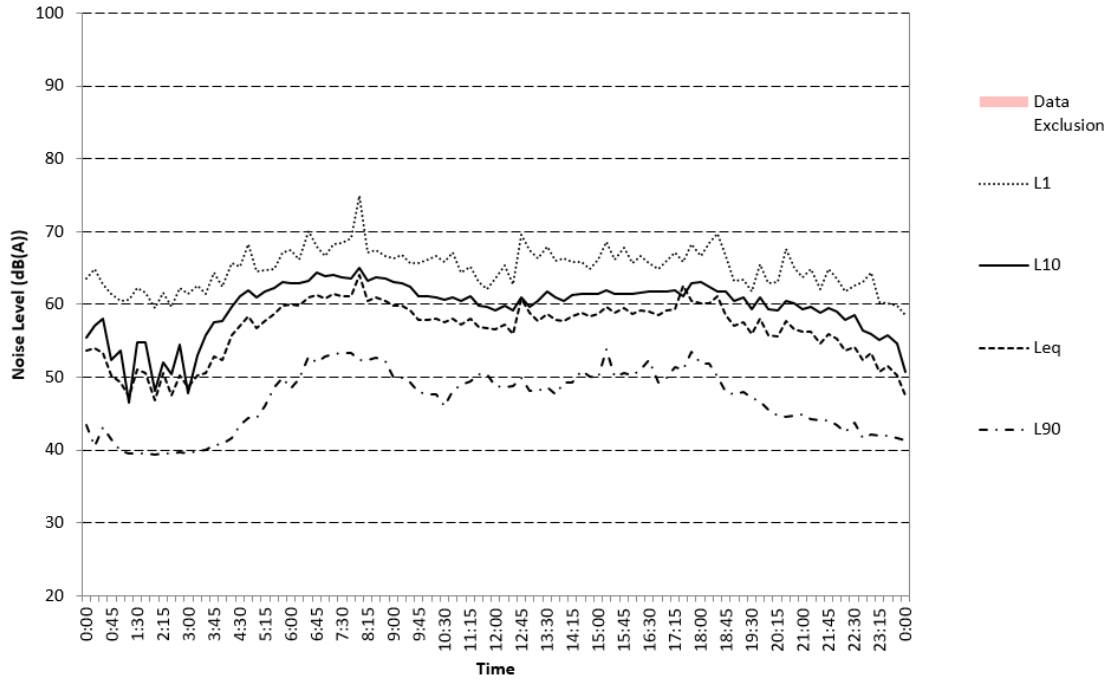
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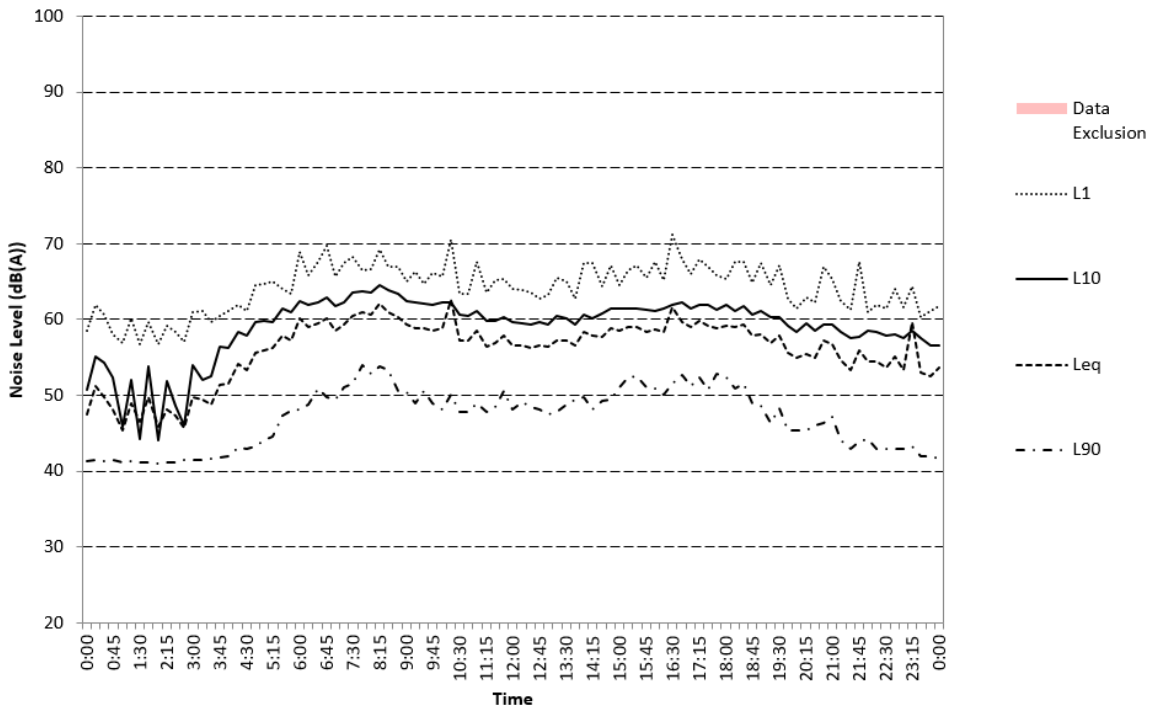
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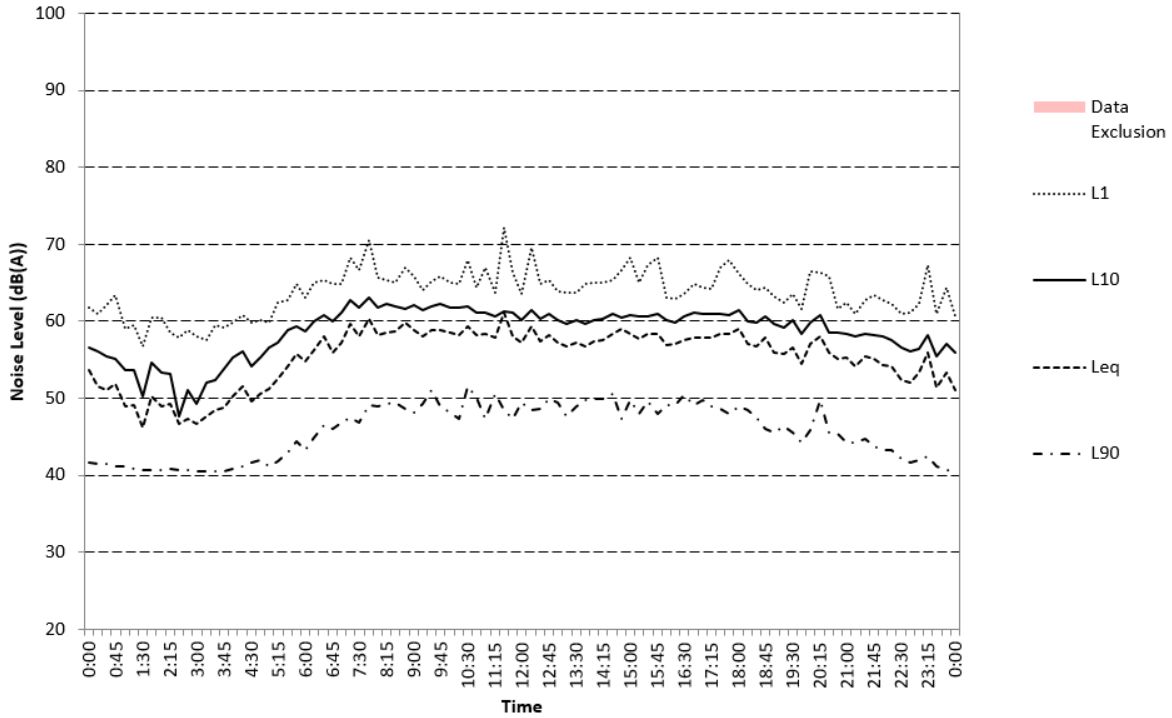
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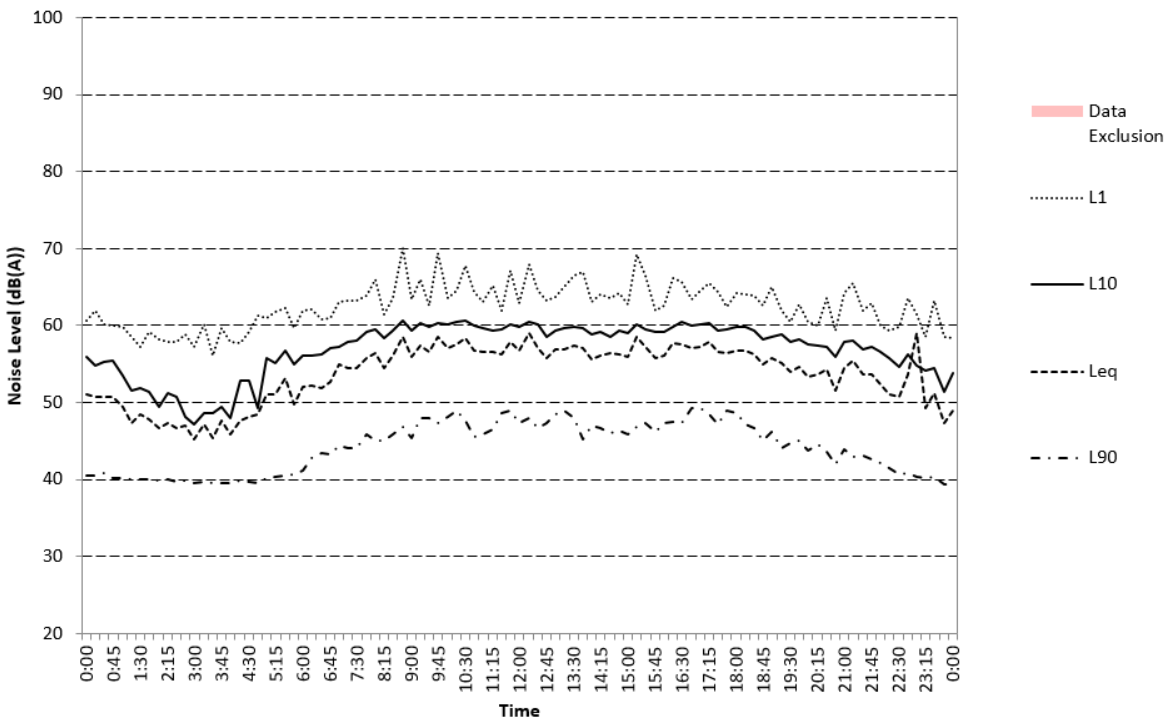




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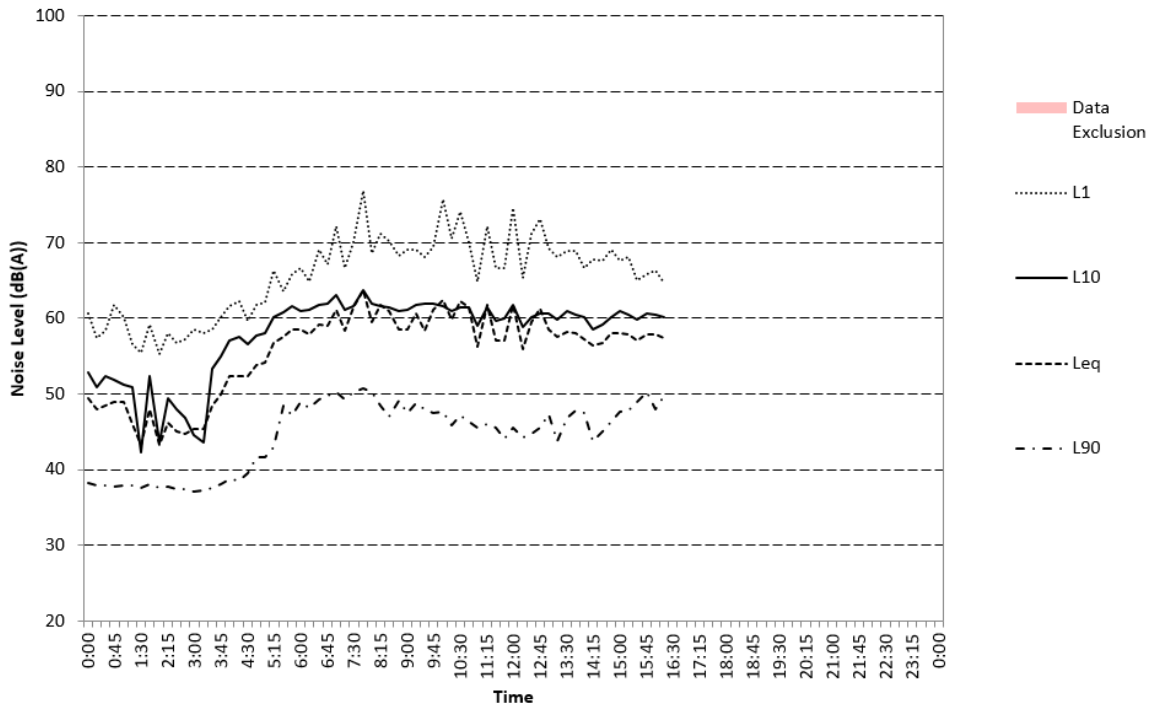
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01/07/2019



19BRA0099

02/07/2019



# Appendix C    SoundPLAN Noise Modelling Results

Collingwood Drive, Collingwood Park  
RTN Assessment  
Verification 2019

Receiver	FI	L10(18h) Free Field dB(A)	
Logger receiver (60.7dB)	GF	61.9	

	TTM Consulting Pty Ltd	1
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SoundPLAN 8.1

Collingwood Drive, Collingwood Park  
Assessed receiver levels  
Prediction 2030

Receiver	FI	Building Pad Level m (AHD)	L10(18h) Free Field dB(A)
Lot 1	GF	30.83	54.4
	F 1	30.83	56.0
Lot 2	GF	30.82	55.3
	F 1	30.82	57.1
Lot 3	GF	30.92	56.5
	F 1	30.92	58.5
Lot 4	GF	31.42	58.1
	F 1	31.42	60.2
Lot 5	GF	32.02	60.6
	F 1	32.02	62.6
Lot 6	GF	32.42	65.6
	F 1	32.42	67.4
Lot 7	GF	32.13	66.5
	F 1	32.13	68.0
Lot 8	GF	32.53	68.1
	F 1	32.53	69.0
Lot 9	GF	33.14	68.8
	F 1	33.14	69.5
Lot 10	GF	34.12	69.0
	F 1	34.12	69.7
Lot 11	GF	35.23	69.4
	F 1	35.23	69.9
Lot 12	GF	36.33	68.9
	F 1	36.33	69.7
Lot 13	GF	37.34	68.7
	F 1	37.34	69.7
Lot 14	GF	38.83	68.5
	F 1	38.83	69.5
Lot 15	GF	39.73	68.3
	F 1	39.73	69.4
Lot 16	GF	40.40	67.8
	F 1	40.40	69.3
Lot 17	GF	41.27	67.5
	F 1	41.27	69.1
Lot 18	GF	41.54	66.3
	F 1	41.54	68.8
Lot 19	GF	41.64	64.9
	F 1	41.64	68.4
Lot 20	GF	40.95	60.8
	F 1	40.95	67.5
Lot 21	GF	41.14	59.2
	F 1	41.14	67.4

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SoundPLAN 8.1

Collingwood Drive, Collingwood Park  
Assessed receiver levels  
Prediction 2030

Receiver	FI	Building Pad Level m (AHD)	L10(18h) Free Field dB(A)
Lot 22	GF	41.94	60.9
	F 1	41.94	67.1
Lot 23	GF	36.54	53.6
	F 1	36.54	55.3
Lot 24	GF	37.25	53.9
	F 1	37.25	56.0
Lot 25	GF	37.55	54.1
	F 1	37.55	56.5
Lot 26	GF	37.59	53.0
	F 1	37.59	57.2
Lot 27	GF	40.25	57.6
	F 1	40.25	59.1
Lot 28	GF	37.89	56.5
	F 1	37.89	58.4
Lot 29	GF	35.02	55.6
	F 1	35.02	58.1
Lot 30	GF	34.61	54.0
	F 1	34.61	56.7
Lot 31	GF	33.82	52.7
	F 1	33.82	55.4
Lot 35	GF	35.29	52.9
	F 1	35.29	54.8
Lot 41	GF	33.32	53.8
	F 1	33.32	55.4
Lot 42	GF	33.92	55.2
	F 1	33.92	56.8
Lot 43	GF	34.08	57.3
	F 1	34.08	59.1
Lot 44	GF	33.66	57.7
	F 1	33.66	59.3
Lot 45	GF	32.16	57.1
	F 1	32.16	58.9
Lot 46	GF	31.96	57.4
	F 1	31.96	59.0
Lot 47	GF	30.91	53.9
	F 1	30.91	56.1
Lot 48	GF	30.42	52.4
	F 1	30.42	54.8
Lot 284	GF	40.83	54.1
	F 1	40.83	55.5
Lot 293	GF	43.33	59.3
	F 1	43.33	66.5

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SoundPLAN 8.1

Collingwood Drive, Collingwood Park  
Assessed receiver levels  
Prediction 2030

Receiver	FI	Building Pad Level m (AHD)	L10(18h) Free Field dB(A)
Lot 294	GF	45.93	59.6
	F 1	45.93	65.6
Lot 295	GF	45.95	58.5
	F 1	45.95	61.8
Lot 296	GF	45.57	57.3
	F 1	45.57	59.8
Lot 297	GF	45.35	56.5
	F 1	45.35	58.5
Lot 298	GF	42.30	55.1
	F 1	42.30	56.7
Lot 299	GF	42.37	54.4
	F 1	42.37	56.0
Lot 300	GF	46.43	56.4
	F 1	46.43	57.9
Lot 301	GF	47.72	56.3
	F 1	47.72	57.6
Lot 302	GF	49.62	56.3
	F 1	49.62	57.6
Lot 303	GF	50.47	55.9
	F 1	50.47	57.3
Lot 304	GF	50.62	57.5
	F 1	50.62	58.9
Lot 305	GF	50.72	58.8
	F 1	50.72	60.4
Lot 306	GF	50.84	60.5
	F 1	50.84	62.3
Lot 307	GF	50.93	63.2
	F 1	50.93	65.6
Lot 308	GF	52.40	58.2
	F 1	52.40	63.9
Lot 309	GF	52.31	57.8
	F 1	52.31	60.3
Lot 310	GF	52.22	56.5
	F 1	52.22	58.5
Lot 311	GF	52.13	55.2
	F 1	52.13	56.9
Lot 312	GF	51.93	53.8
	F 1	51.93	55.5

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SoundPLAN 8.1

## Appendix D QDC MP4.4 Schedules 1 and 2



### Schedule 1

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 4	40	Glazing	43
		External walls	52
		Roof	45
		Floors	51
		Entry doors	35
Category 3	35	Glazing	38 (where total area of glazing for a <i>habitable room</i> is greater than 1.8m <sup>2</sup> )
			35 (where total area of glazing for a <i>habitable room</i> is less than or equal to 1.8m <sup>2</sup> )
		External walls	47
		Roof	41
		Floors	45
		Entry doors	33

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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
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
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
	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	Two leaves of clay brick masonry at least 110mm thick with: (i) cavity not less than 50mm between leaves; and (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. OR Two leaves of clay brick masonry at least 110mm thick with: (i) cavity not less than 50mm between leaves; and (ii) at least 13mm thick cement render on each face OR Single leaf of clay brick masonry at least 110mm thick with: (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 (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 (iii) One layer of plasterboard at least 13mm thick fixed to outside face of studs. OR Single leaf of minimum 150mm thick masonry of hollow, dense concrete blocks, with mortar joints laid to prevent moisture bridging.

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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> .