PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL

Approval no: DEV2019/1013

Date: 30 April 2020

Queensland Government

Road Traffic Noise Assessment Report

Residential Subdivision Development

At 176-228 Mountain Ridge Road, South MacLean

On behalf of Orchard Property Group

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.	J. Fox	S. Yorke	Internal draft	17/01/2019
0.	J. Fox		Issued to client	18/01/2019
1.	P. Drake		Development Application	22/02/2019
2.	J. Fox		Acoustic Report – Updated Plans	13/08/2019

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Executive Summary

TTM conducted a road traffic noise assessment of the proposed residential subdivision at 176-228 Mountain Ridge Road, South MacLean. The report assessed the potential road traffic impact from both Mountain Ridge Road and the new Pebble Creek development entry road situated adjacent west of the site.

Noise modelling shows that acoustic barriers are required to achieve predicted compliance at private outdoor spaces of lots closest to the noise generating roads. The acoustic dwelling treatments were determined for each lot with the inclusion of the recommended acoustic barriers. The acoustic treatment requirements for ground floor level of dwellings range from QDC MP4.4 Noise Category 0 to 1. The acoustic treatments for first floor level of dwellings range from QDC MP4.4 Noise Category 0 to 3.

Compliance with the criteria is predicted to be achieved based on the implementation of the recommendations outlined in this report.

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1 Introduction

1.1 Background

TTM was engaged by Orchard Property Group to undertake a road traffic noise assessment of the proposed residential subdivision at 176-228 Mountain Ridge Road, South MacLean. This report will form part of the development application for consideration by Economic Development Queensland and Logan City Council.

This report is a revision of TTM report 18GCA0135 R01_1 due to a revised set of development plans and earthwork design levels.

1.2 References

This report is based on the following:

- Department of Transport and Main Roads *Transport Noise Management Code of Practice Volume 1 – Road Traffic Noise, November 2013.*
- Department of Transport and Main Roads *Development Affected by Environmental Emissions from Transport Policy, Transport and Main Roads, October 2017.*
- Economic Development Queensland *PDA Guideline No. 13 – Engineering Standards.*
- Queensland Development Code *MP4.4 Buildings in a Transport Noise Corridor.*
- Development plan by *Saunders Havill Group* dated 01/08/2019 (shown in Appendix A).
- Design levels provided by Peak Urban.
- Movement Network Infrastructure Master Plan prepared by Bitzios Consulting (ref: P2895.003R), dated 23/03/2018.
- Noise modelling conducted by TTM.

1.3 Scope

The assessment includes the following:

- Description of the site;
- Statement of assessment criteria relating to road traffic noise intrusion;
- Assessment of road traffic noise onto the proposed development;
- Analysis of predicted noise levels;
- Details of noise control recommendations to be incorporated to achieve predicted compliance.

2 Site Description

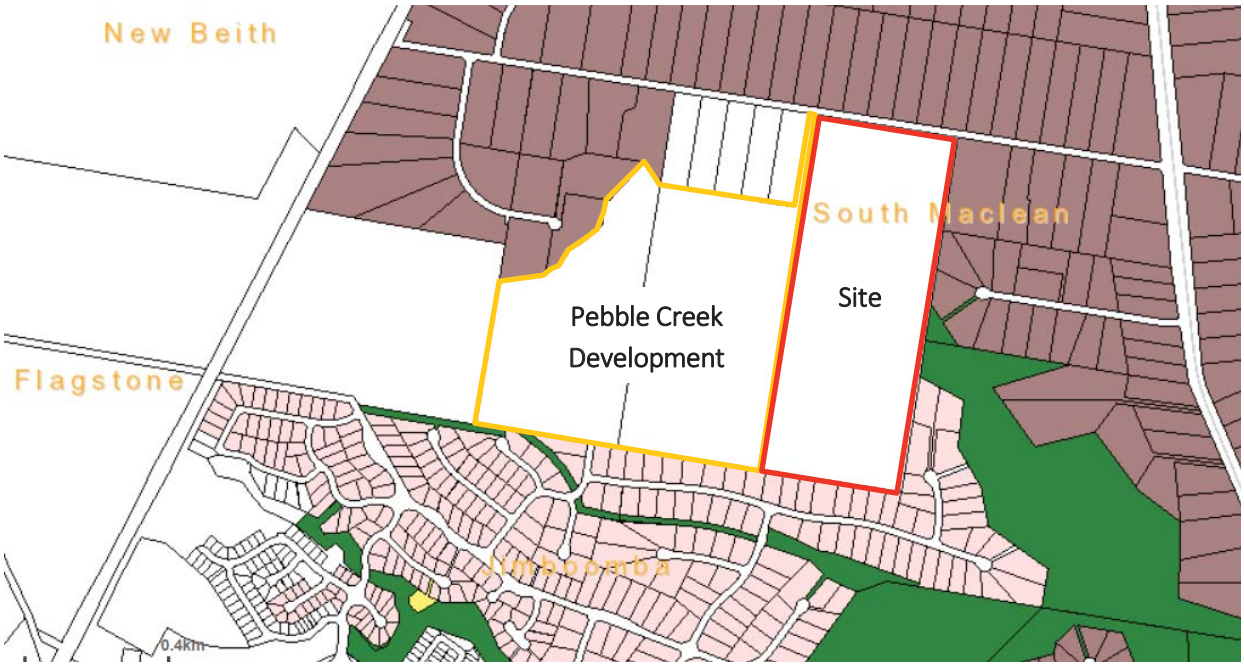
2.1 Site Location

The site is described by the following:

- Lot 30 on SP309195
- 176-228 Mountain Ridge Road, South MacLean

The site locality is shown in Figure 1.

Figure 1: Site Locality



2.2 Description of Surrounding Area

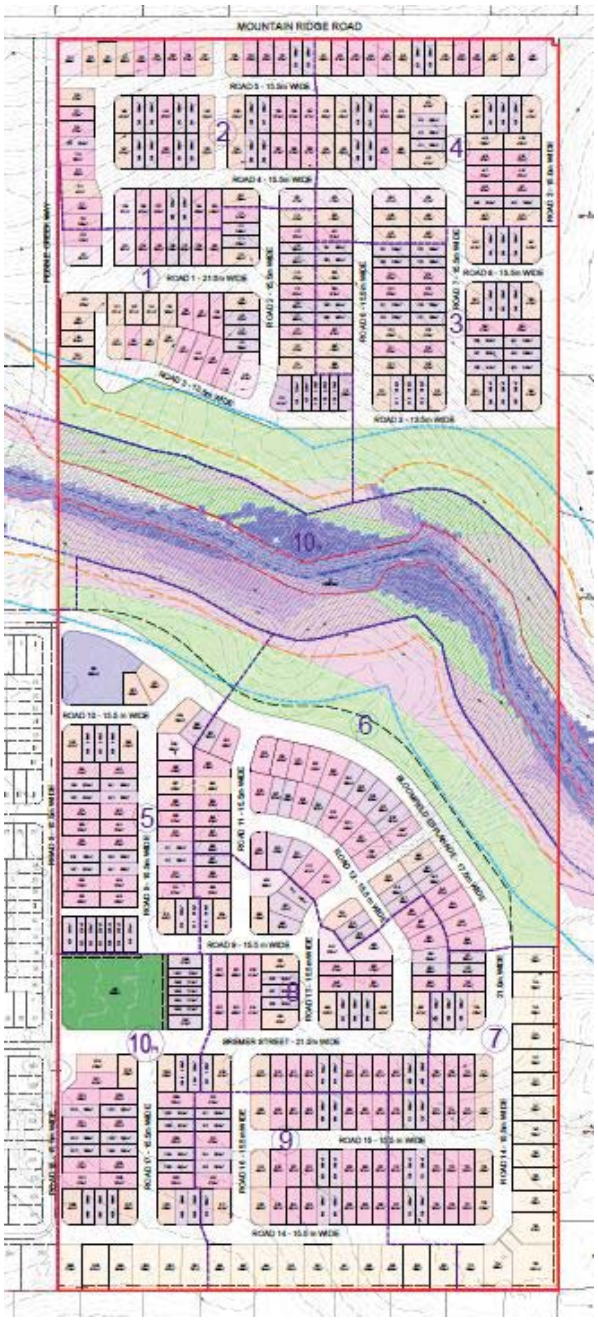
The site is bound by Mountain Ridge Road to the north, residential lots to the east and south, and the proposed Pebble Creek residential development to the west. Based on a desktop review of the site location, the current acoustic environment at the site and surrounding area is expected to be typical of a rural residential area with sounds from intermittent local traffic and the natural environment such as wind in trees and birds chirping.

3 Proposed Development

3.1 Development Description

The proposal is for a residential subdivision development comprising 515 residential allotments, parks and a childcare centre. Access to the development is proposed from the new Pebble Creek entry road. The development layout is shown in Figure 2 with other plans shown in Appendix A.

Figure 2: Development Plan



4 Noise Criteria

The proposed development is potentially noise affected by road traffic on Mountain Ridge Road and the new Pebble Creek development entry road. TTM previously carried out a road traffic noise assessment (18GCA0059 R01_0) in June 2018 of the new entry road on existing noise sensitive receivers. The new road criteria applied in that report is also adopted in this assessment for determining acoustic barrier requirements. Noise impacts on future dwellings will be assessed in accordance with Queensland Development Code MP4.4 Buildings in a Transport Noise Corridor.

4.1 Pebble Creek Entry Road

The Pebble Creek entry road along the western boundary of the development was assessed as a new road in the TTM road traffic noise assessment dated June 2018. The noise criteria used for that assessment was the New Road criteria contained in the Department of Transport and Main Roads *Transport Noise Management Code of Practice Volume 1 – Road Traffic Noise, November 2013.* This criteria is therefore adopted in this assessment to determine whether acoustic barriers are required for the western lots along the entry road.

Table 1 presents the façade corrected criteria applicable to the assessment of new roads.

Table 1: Noise Criteria for the assessment of New Roads

Category	Noise Criteria
	Existing Residences (Façade Corrected)
New Road	63dB L_{A10} (18h), where the existing level > 55dB L_{A10} (18h) or 60dB L_{A10} (18h), where the existing level ≤ 55dB L_{A10} (18h)

The applicable noise criteria is based on the existing level of road traffic noise. Mountain Ridge Road is currently a dead-end road servicing rural residential lots. Based on a traffic survey organised by Bitzios Consulting, the existing traffic volumes are approximately 275 vehicles per day. A CoRTN calculation of road traffic noise from Mountain Ridge Road to the nearest existing dwellings indicates that noise levels are less than $L_{10\,(18h)}$ 55dB(A). This is expected based on the existing environment and therefore the criteria used to determine if acoustic treatments (i.e. barriers) are required is $L_{10\,(18h)}$ 60dB(A) façade corrected.

4.2 Mountain Ridge Road

Mountain Ridge Road is an existing road controlled by Logan City Council. Logan City Council does not specify a noise criteria for private outdoor spaces therefore TMR's *Development Affected by Environmental Emissions from Transport Policy, Transport and Main Roads, October 2017* is used to establish the private outdoor space criteria for the development.

Table 2 presents the criteria applicable to private outdoor spaces of the development affected by Mountain Ridge Road.

Table 2: External Noise Criteria for the development affected by Mountain Ridge Road

Development Type	Location within development	Environmental criteria
Accommodation activities	Private and communal open space	≤ 57 dB(A) L10 (18hr) free field (measured L90 (18hr) free field between 6am and midnight ≤ 45dB(A))
		≤ 60 dB(A) L10 (18hr) free field (measured L90 (18hr) free field between 6am and midnight > 45dB(A))

The applicable noise criteria is based on the existing level of road traffic noise. As described above, Mountain Ridge Road is currently a dead-end road servicing rural residential lots. A traffic survey organised by Bitzios Consulting showed existing traffic volumes of approximately 275 vehicles per day. Given the rural residential nature of the area it is deemed that the existing $L_{90\,(18\ hour)}$ would be less than 45dB and therefore the lower of the criteria is applicable.

Based on the above, the criteria for both the entry road and Mountain Ridge Road are the same, being $L_{10\,(18\ hour)}$ 57dB(A) free-field or 60dB(A) façade corrected.

4.3 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.

The Noise Categories list the minimum acoustic R_W ratings for each building component to comply with the indoor sound levels of AS2107[1]. The triggers for each noise category are summarised in Table 3. Details regarding the noise categories and acceptable forms of construction can be found in Schedule 1 and 2 of the QDC.

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

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

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

[1] Australian Standard *AS2107:2016 Acoustics – Recommended Design Sound Levels and Reverberation Times for Building Interiors*

5 Road Traffic Noise Assessment

5.1 Traffic Volumes

Table 4 presents the relevant traffic volumes which were obtained from the Bitzios Consulting traffic engineering report (ref: P2895.003R) dated 23/03/2018. Traffic volumes are presented for the ultimate year 2031 scenario. A heavy vehicle percentage of 2% is assumed which is considered reasonable for a predominately residential area.

Table 4: Traffic Volumes used in the Noise Model

Road	Traffic Volumes (AADT)		Assumed Heavy Vehicles (%)
	2017	2031	
Mountain Ridge Road	275	12,000	2.0
Pebble Creek development Entry Road	-	4,338	2.0

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

5.2 Noise Modelling Parameters

Road traffic noise predictions were conducted using 'SoundPLAN v8.0', a CoRTN based modelling program. The basis of the 'SoundPLAN' model is as follows:

Table 5: Noise Modelling Parameters

Description	Value
Noise modelling standard	CoRTN
Angle increment	1 ^{o}
Grid spacing (noise maps)	2m squares
Road surface type	Impervious (+0dB(A))
Ground contours	Earthwork design and road design levels provided by Peak Urban
Entry Road speed limit	60km/h (based on Bitzios traffic report for a Trunk Connector)
Mountain Ridge Road speed limit	70km/h (based on Bitzios traffic report for a sub-arterial)
Noise source height above grade	0.5m
Receiver heights	1.8m above ground level
Floor heights	2.8m
Façade correction	+2.5dB(A)

5.3 Predicted Road Traffic Noise Levels

Noise modelling was conducted to determine the road traffic noise levels at the development in the 10-year planning horizon. The noise contours without and with acoustic barriers are presented below.

5.3.1 No Acoustic Barriers

Figure 3 presents the predicted road traffic noise levels without any noise mitigation treatments, compared to the private outdoor space assessment criteria of $L_{A10\,(18h)}$ 60dB(A) façade corrected.

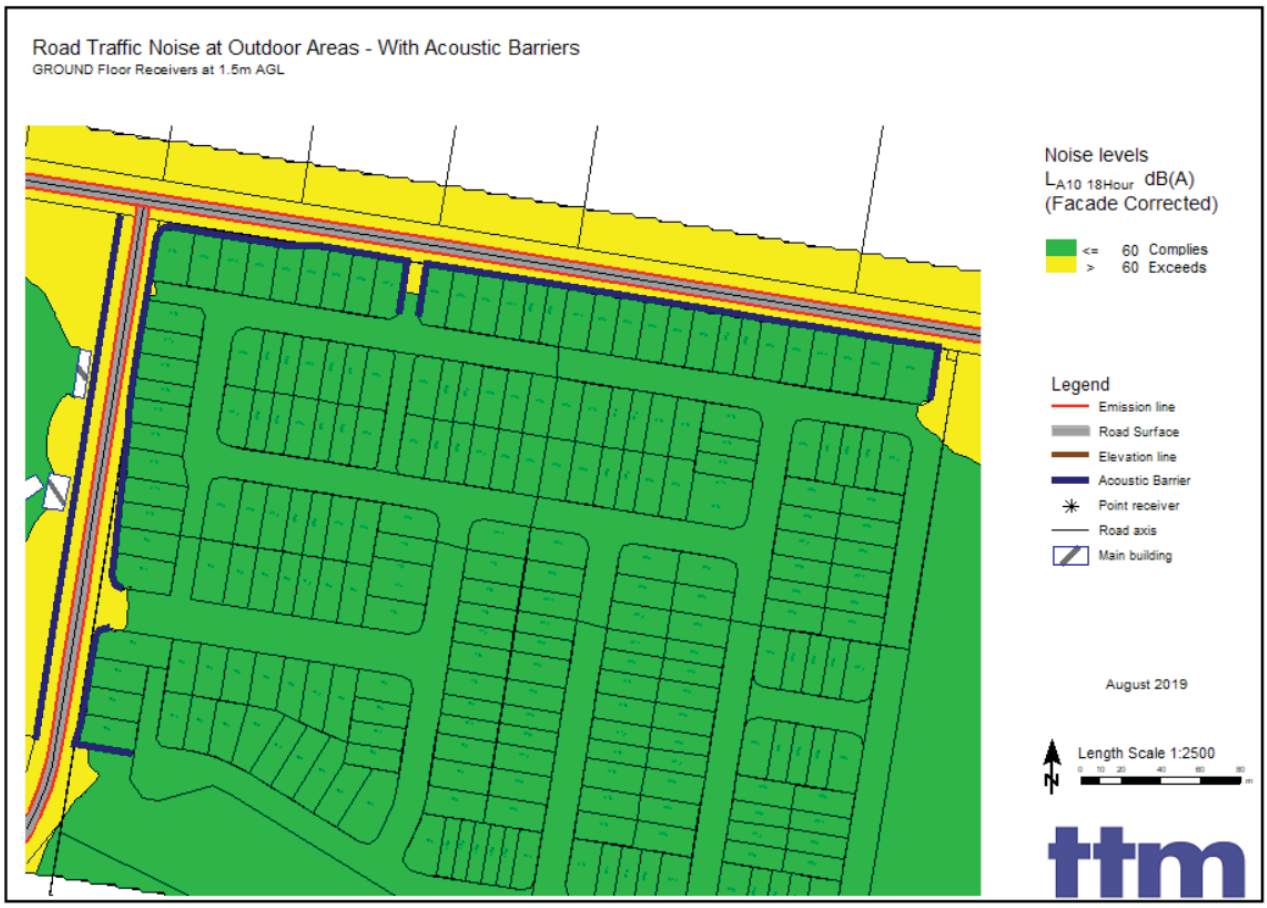
Figure 3: Predicted Road Traffic Noise Levels at Private Outdoor Areas – No Noise Mitigation

Without noise mitigation, road traffic noise levels are predicted to exceed the criteria at lots facing the entry road and Mountain Ridge Road. Therefore acoustic barriers are required to achieve compliance at the outdoor areas of these lots. The predicted road traffic noise levels inclusive of acoustic barriers are presented in Section 5.3.2.

5.3.2 With Acoustic Barriers

Figure 4 presents the predicted road traffic noise levels inclusive of acoustic barriers along the site boundary of the Pebble Creek entry road and Mountain Ridge Road. An acoustic barrier height of 1.8m is proposed alongside both roads.

Figure 4: Predicted Road Traffic Noise Levels at Private Outdoor Areas – With Acoustic Barriers



Compliance with the private outdoor criteria is achieved with the inclusion of acoustic barriers. Details of the recommended acoustic barriers are provided in Section 6.

The predicted road traffic noise contours (inclusive of the acoustic barriers) at ground and first floor level facades compared to the QDC MP4.4 criteria are presented in Figure 5 and Figure 6 below. Noise levels are compared to the criteria of QDC MP4.4 for the purposes of determining the acoustic building treatment requirements.

Figure 5: Predicted QDC MP4.4 Road Traffic Noise Levels – Ground Floor

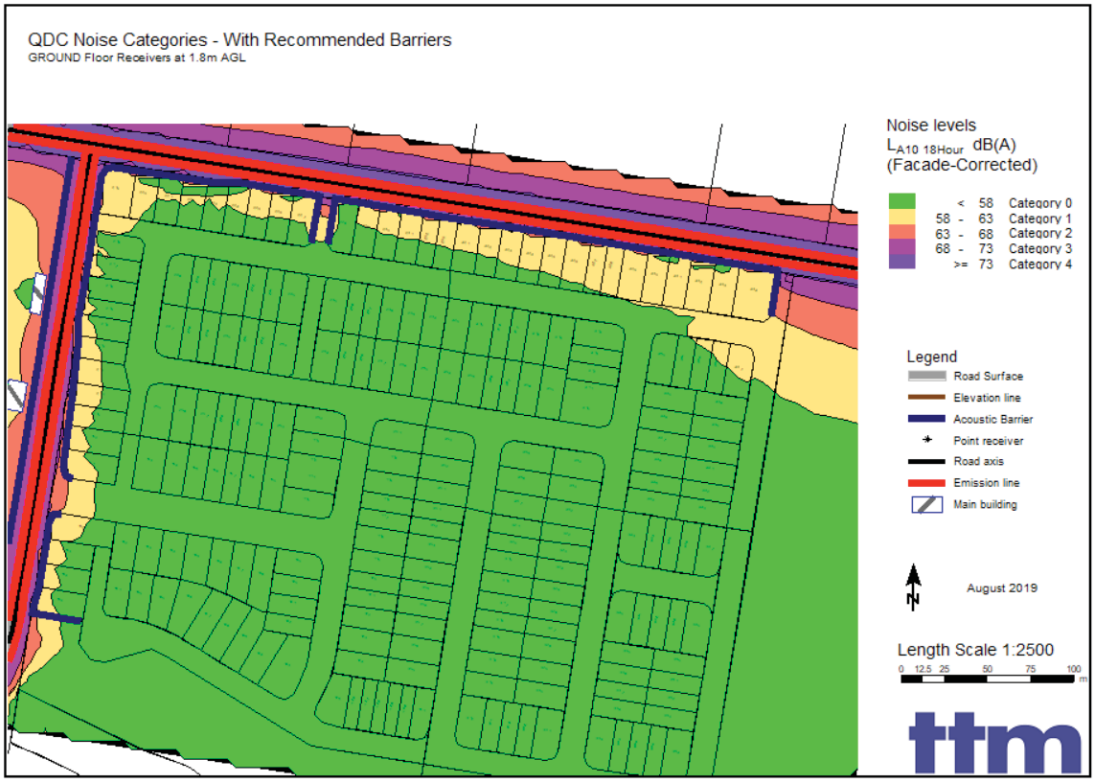
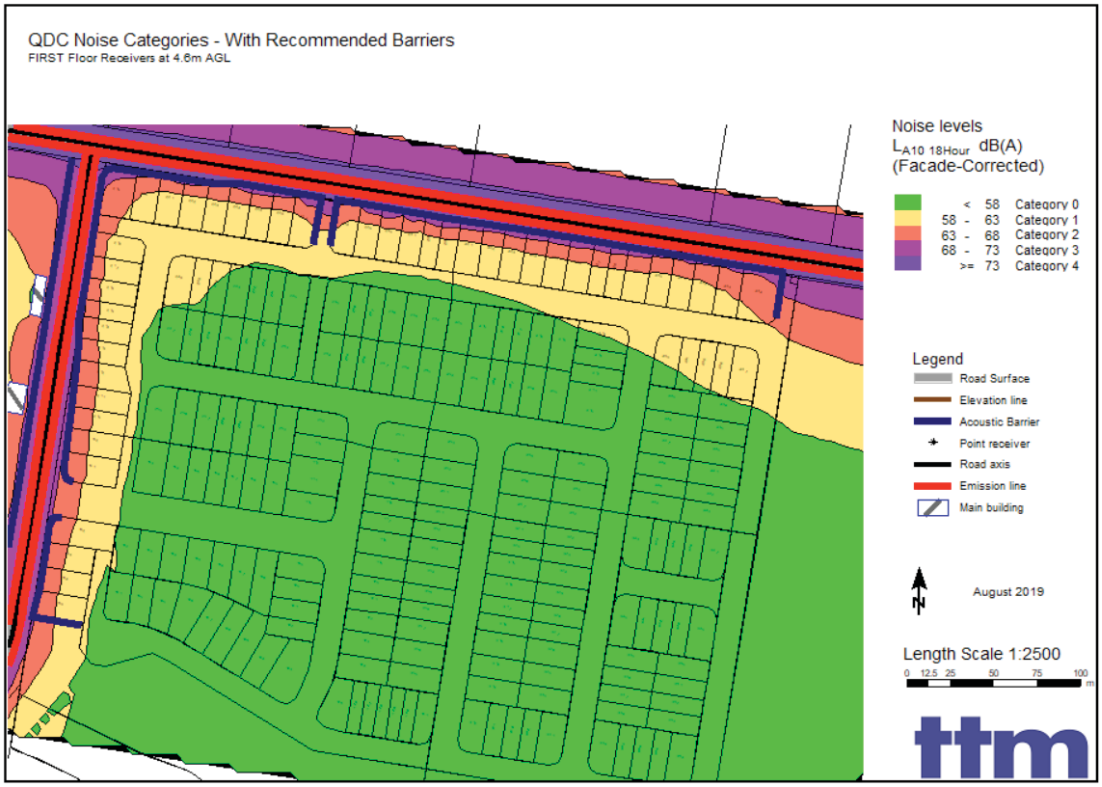


Figure 6: Predicted QDC MP4.4 Road Traffic Noise Levels – First Floor



Road traffic noise levels were predicted with the inclusion of the recommended acoustic barriers. The acoustic treatment requirements for ground floor level of dwellings range from QDC MP4.4 Noise Category 0 to 1. The acoustic treatments for first floor level of dwellings range from QDC MP4.4 Noise Category 0 to 3. Noise affected lots and details of dwelling construction requirements in accordance with the QDC are outlined in Section 6.

6 Recommendations

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

6.1 Acoustic Barrier

An acoustic barrier is recommended to comply with the private outdoor space criteria at lots closest to the Pebble Creek entry road and Mountain Ridge Road. The location and extent of the acoustic barrier is shown in Figure 7. Barrier recommendations are as follows:

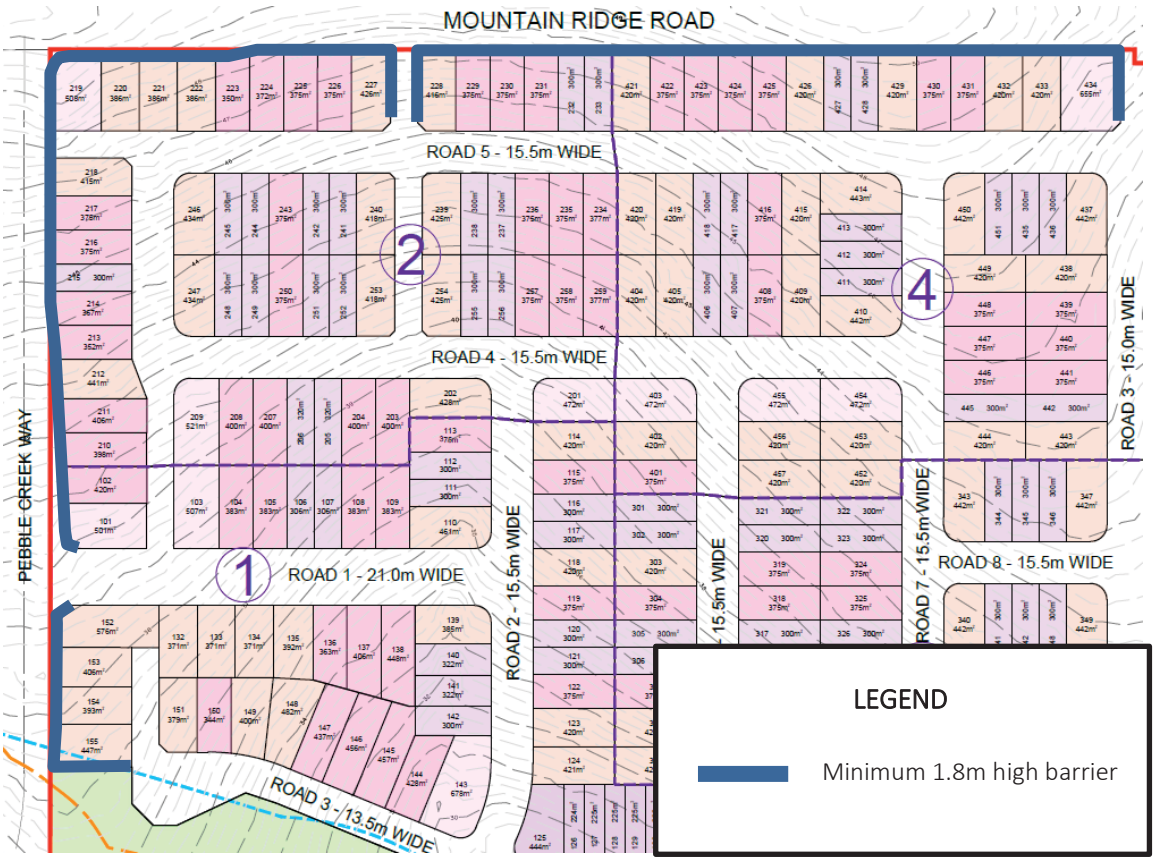
a. The acoustic barriers shall be constructed to the heights detailed in Figure 7 and be relative to the ground level on top of any retaining wall;

b. The barrier should be constructed of a material with a surface mass greater than 15kg/m^2 and comply with the requirements of *Transport and Main Roads Specifications MRTS15 Noise Fences*;

c. Suitable materials may include earth mound, modular panel walls, steel, plywood, glass, masonry, or a combination of materials;

d. No gaps or holes should be evident in the barrier construction.

Figure 7: Recommended Acoustic Barriers



6.2 Dwelling Treatments

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).

Noise Categories applicable to the development are listed in Table 6. The QDC MP4.4 requirements are specified based on the highest noise category at any part of the lot. Any lots not shown in Table 6 are Noise Category 0 and have no acoustic requirements.

Table 6: QDC MP4.4 Noise Categories Applicable to the Development

Lot	QDC MP4.4 Noise Category	
	Ground floor	First floor
101	1	2
102	1	2
152	1	2
153	1	2
154	1	2
155	1	2
210	1	2
211	1	2
212	1	2
213	1	2
214	1	2
215	1	2
216	1	2
217	1	2
218	1	2
219	1	3
220	1	2

Lot	QDC MP4.4 Noise Category	
	Ground floor	First floor
221	1	2
222	1	2
223	1	2
224	1	3
225	1	3
226	1	3
227	1	3
228	1	3
229	1	3
230	1	3
231	1	3
232	1	3
233	1	3
244	0	1
245	0	1
246	0	1
414	1	1
421	1	3
422	1	3
423	1	3
424	1	3
425	1	3
426	1	3
427	1	3
428	1	3
429	1	3
430	1	3
431	1	3
432	1	3
433	1	3
434	1	3
435	1	1
436	1	1
437	1	1
450	0	1
451	0	1

The construction requirements for each noise category are outlined in Schedule 1 and Schedule 2 of QDC MP4.4. An extract of that document is provided in Appendix B.

Where a lot has been allocated a QDC Noise Category, a site-specific acoustic assessment can be conducted in accordance with AS3671 and AS2107, once dwelling plans are finalised, to potentially reduce the acoustic treatment requirements. This is an alternative method to the construction requirements of QDC. For cost savings, we would recommend a site-specific assessment for QDC Noise Category 2 or higher.

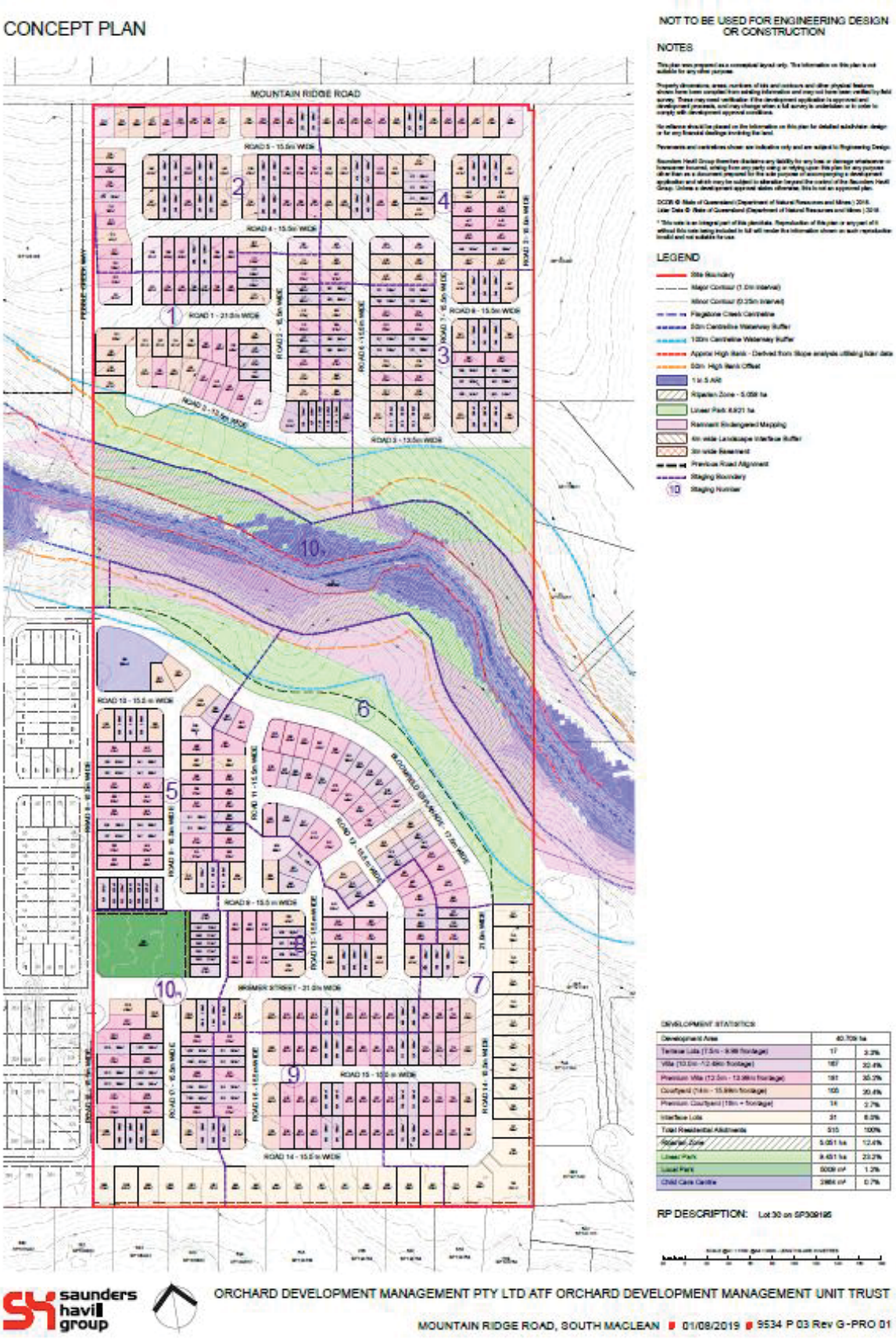
7 Conclusion

A road traffic noise assessment was undertaken of the proposed residential subdivision at 176-228 Mountain Ridge Road, South MacLean. The assessment considered road traffic noise from the Pebble Creek development entry road and Mountain Ridge Road.

Acoustic barriers are required to achieve predicted compliance at private outdoor spaces of lots closest to the noise generating roads. Acoustic dwelling treatments were determined for each lot with the inclusion of the recommended acoustic barriers.

Compliance with the criteria outlined in Section 4 is predicted to be achieved based on the implementation of the recommendations outlined in Section 6 of this report.

Appendix A Development Plan


CONCEPT PLAN
NOT TO BE USED FOR ENGINEERING DESIGN OR CONSTRUCTION
NOTES
LEGEND
MOUNTAIN RIDGE ROAD
DEVELOPMENT STATISTICS
RP DESCRIPTION: Lot 30 on SP309195
saunders havil group
ORCHARD DEVELOPMENT MANAGEMENT PTY LTD ATF ORCHARD DEVELOPMENT MANAGEMENT UNIT TRUST
MOUNTAIN RIDGE ROAD, SOUTH MACLEAN ▮ 01/08/2019 ▮ 9534 P 03 Rev G-PRO 01

Appendix B Schedule 1 & 2 of QDC MP4.4

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 *habitable room* is greater than 1.8m²)
			35 (where total area of glazing for a *habitable room* is less than or equal to 1.8m²)
		External walls	47
		Roof	41
		Floors	45
		Entry doors	33

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 *habitable room* is greater than 1.8m²)
			32 (where total area of glazing for a *habitable room* is less than or equal to 1.8m²)
		External walls	41
		Roof	38
		Floors	45
		Entry doors	33
Category 1	25	Glazing	27 (where total area of glazing for a *habitable room* is greater than 1.8m²)
			24 (where total area of glazing for a *habitable room* is less than or equal to 1.8m²)
		External walls	35
		Roof	35
		Entry Doors	28
Category 0	No additional acoustic treatment required – standard building assessment provisions apply.		

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 *acoustically rated seals*.
	38	Minimum 14.38mm thick laminated glass, with full perimeter *acoustically rated seals*; 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 *acoustically rated seals*
	35	Minimum 10.38mm thick laminated glass, with full perimeter *acoustically rated seals*.
	32	Minimum 6.38mm thick laminated glass with full perimeter *acoustically rated seals*.
	27	Minimum 4mm thick glass with full perimeter *acoustically rated seals*
	24	Minimum 4mm thick glass with standard weather seals

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/m³ or 50mm thick polyester insulation with a density of 20kg/m³ in the cavity. OR Two leaves of clay brick masonry at last 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/m³ 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.

Component of building's *external envelope*	Minimum R_w	Acceptable forms of construction
	41	Two leaves of clay brick masonry at least 110mm thick with cavity not less than 50mm between leaves OR Single leaf of clay brick masonry at last 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/m³ positioned between studs; and (iii) One layer of plasterboard at least 10mm thick fixed to outside face of studs OR Single leaf of brick masonry at least 110mm thick with at least 13mm thick render on each face OR Concrete brickwork at least 110mm thick OR In-situ concrete at least 100mm thick OR Precast concrete at least 100mm thick and without joints.

Component of building's *external envelope*	Minimum R_w	Acceptable forms of construction
	35	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) One layer of plasterboard at least 10mm thick fixed to outside face of studs OR 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.
Roof	45	Concrete or terracotta tile or sheet metal roof with sarking, *acoustically rated plasterboard* ceiling at least 13mm thick fixed to ceiling joists, cellulose fibre insulation at least 100mm thick with a density of at least 45kg/m³ in the cavity. OR Concrete or terracotta tile or sheet metal roof with sarking, 2 layers of *acoustically rated plasterboard* at least 16mm thick fixed to ceiling joists, glass wool insulation at least 50mm thick with a density of at least 11kg/m³ or polyester insulation at least 50mm thick with a density of at least 20kg/m³ in the cavity.
	41	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/m³ or polyester insulation at least 50mm thick with a density of at least 20kg/m³ in the cavity. OR Concrete suspended slab at least 100mm thick.
	38	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/m³.

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/m³ 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/m³ 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 *acoustically rated seals*.
	33	Fixed so as to overlap the frame or rebate of the frame by not less than 10mm, fitted with full perimeter *acoustically rated seals* 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/m²; or (iv) Solid core timber door not less than 35mm thick fitted with full perimeter *acoustically rated seals*.