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Transportation Noise Assessment

Lots 9003, 809, 805, 9001, 117 & 9002 Hammond Park

Reference: 21026117-01e

Prepared for:
Qube + Primewest

Reference: 21026117-01e

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03-Jun-21	2	Updated Draft report	Terry George	-
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18-Oct-23	D	Updated subdivision and address comments	Terry George	-
27-Oct-23	E	Report finalised.	Terry George	-

CONTENTS

1. INTRODUCTION.....1

2. CRITERIA.....2

3. METHODOLOGY 4

 3.1. Ground Topography 4

 3.2. Road Surface.....5

 3.3. Vehicle Speed 5

 3.4. Traffic Volumes.....5

 3.5. Ground Absorption 6

4. RESULTS 6

5. ASSESSMENT 9

List of Tables

Table 2-1: Noise Targets for Noise Sensitive Land-Use 3

Table 2-2: Noise Targets for Roads.....3

Table 3-1: Noise Relationship Between Different Road Surfaces 5

Table 3-2: Traffic Information Used in Noise Modelling 5

List of Figures

Figure 1-1: Subdivision Location (Source: DPLH PlanWA) 1

Figure 1-2: Subdivision Layout.....2

Figure 4-1: Future $L_{Aeq(Day)}$ Noise Contour Plot – Ground Floor Level.....7

Figure 4-2: Future $L_{Aeq(Day)}$ Noise Contour Plot – First Floor Level 8

Figure 5-1: Future $L_{Aeq(Day)}$ Noise Contour Plot Including Noise Wall – Ground Floor Level 10

Figure 5-2: Future $L_{Aeq(Day)}$ Noise Contour Plot Including Noise Wall – First Floor Level 11

Figure 5-3: Noise Mitigation – Ground Floor Level 12

Figure 5-4: Noise Mitigation – First Floor Level..... 13

Appendices

Appendix A – Quiet House Packages 14

Appendix B – Letter from Main Roads WA..... 20

Appendix C – Terminology..... 22

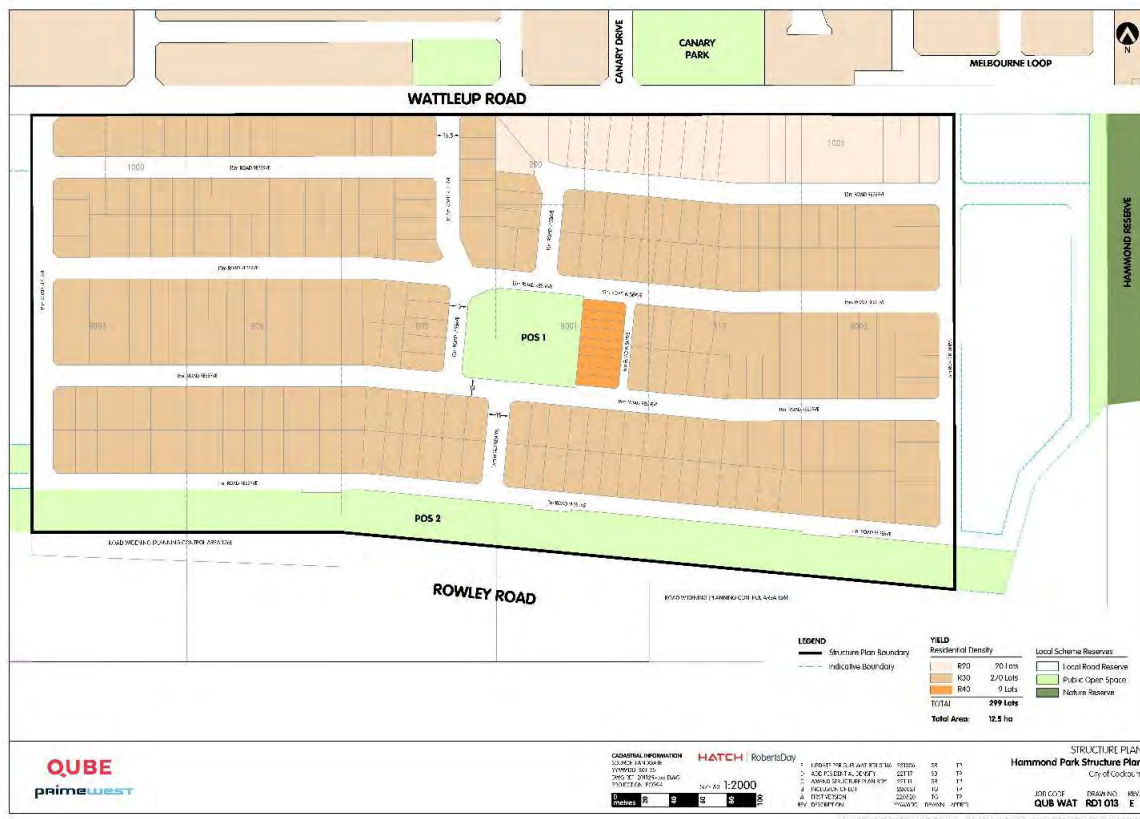


Figure 1-2: Subdivision Layout

2. CRITERIA

The criteria relevant to this project is provided in *State Planning Policy No. 5.4 Road and Rail Noise* (hereafter referred to as SPP 5.4) produced by the Western Australian Planning Commission (WAPC). SPP 5.4 is supported by the *Road and Rail Noise Guidelines* (the Guidelines) and the Department of Planning, Lands and Heritage mapping. The objectives of SPP 5.4 are to:

- Protect the community from unreasonable levels of transport noise;
- Protect strategic and other significant freight transport corridors from incompatible urban encroachment;
- Ensure transport infrastructure and land-use can mutually exist within urban corridors;
- Ensure that noise impacts are addressed as early as possible in the planning process; and
- Encourage best practice noise mitigation design and construction standards.

Table 2-1 sets out noise targets that are to be achieved by proposals under which SPP 5.4 applies. Where the targets are exceeded, an assessment is required to determine the likely level of transport noise and management/mitigation required.

Table 2-1: Noise Targets for Noise Sensitive Land-Use

Scenario	Outdoor Noise Target		Indoor Noise Target	
Noise-sensitive land-use and/or development	55 dB $L_{Aeq}(\text{Day})$	50 dB $L_{Aeq}(\text{Night})$	40 dB $L_{Aeq}(\text{Day})$ (Living and Work Areas)	35 dB $L_{Aeq}(\text{Night})$ (Bedrooms)

Notes:

- Day period is from 6am to 10pm and night period from 10pm to 6am.
- The outdoor noise target is to be measured at 1-metre from the most exposed, habitable¹ facade of a noise sensitive building.
- For all noise-sensitive land-use and/or development, indoor noise targets for other room usages may be reasonably drawn from Table 1 of Australian Standard/New Zealand Standard AS/NZS 2107:2016 *Acoustics – Recommended Design Sound Levels and Reverberation Times for Building Interiors* (as amended) for each relevant time period.
- Outdoor targets are to be met at all outdoor areas as far as is reasonable and practicable to do so using the various noise mitigation measures outlined in the Guidelines.

The application of SPP 5.4 is to consider anticipated traffic volumes for the next 20 years from when the noise assessment has been undertaken.

Table 2-2 sets out noise targets that are to be achieved by new or upgraded roads, under which SPP 5.4 applies.

Table 2-2: Noise Targets for Roads

Scenario	Outdoor Noise Target	
Road Upgrade	60 dB $L_{Aeq}(\text{Day})$	55 dB $L_{Aeq}(\text{Night})$

Notes:

- Day period is from 6am to 10pm and night period from 10pm to 6am.
- The outdoor noise target is to be measured at 1-metre from the most exposed, habitable¹ facade of a noise sensitive building.
- Outdoor targets are to be met at all outdoor areas as far as is reasonable and practicable to do so using the various noise mitigation measures outlined in the Guidelines. For example, it is likely unreasonable for a transport infrastructure provider to achieve the outdoor targets at more than 1 or 2 floors of an adjacent development with direct line of sight to the traffic.

In this case, Rowley Road extension will be a new road and therefore the 55 dB $L_{Aeq}(\text{Day})$ and 50 dB $L_{Aeq}(\text{Night})$ criteria of Table 2-2 are applicable. If these criteria were achieved by the road builder, there would be no mitigation requirements to the subdivision.

¹ A habitable room is defined in State Planning Policy 3.1 as a room used for normal domestic activities that includes a bedroom, living room, lounge room, music room, sitting room, television room, kitchen, dining room, sewing room, study, playroom, sunroom, gymnasium, fully enclosed swimming pool or patio.

3. METHODOLOGY

Noise modelling has been undertaken in accordance with the requirements of SPP 5.4 and associated Guidelines. As this section of Rowley Road does not yet exist and the existing section does not carry representative traffic volumes, noise monitoring has not been undertaken.

To predict the noise emissions, the computer program *SoundPLAN 8.2* was utilised incorporating the *Calculation of Road Traffic Noise* (CoRTN) algorithms, modified to reflect Australian conditions. The modifications included the following:

- Vehicles were separated into heavy (Austroads Class 3 upwards) and non-heavy (Austroads Class 1 and 2) with non-heavy vehicles having a source height of 0.5 metres above road level and heavy vehicles having two source heights at 1.5 metres and 3.6 metres above road level;
- A -0.8 dB correction has been applied to the lower level heavy vehicle noise source and -8.0 dB to the higher level noise source based on the *Transportation Noise Reference Book*; Paul Nelson (1987), so as to provide consistent results with the CoRTN algorithms;
- Adjustments of -0.8 dB and -1.7 dB have been applied to the predicted levels for the 'free-field' and 'at façade' cases respectively, based on the findings of *An Evaluation of the U.K. DoE Traffic Noise Prediction*; Australian Road Research Board, Report 122 ARRB – NAASRA Planning Group (March 1983).

Predictions are made at heights of 1.4 metres above ground floor level for single storey buildings and 4.2 metres above ground floor level for possible first floors of double storey buildings. The noise is predicted at 1-metre from an assumed building façade, resulting in a + 2.5 dB correction due to reflected noise.

Various input data are included in the modelling and these are discussed in *Section 3.1* to *Section 3.2*.

3.1. Ground Topography

Finished lot levels and road design data for this project were provided by Cossill & Webley dated 17 May 2022, as a 3D AutoCAD file. The road design is understood to be the latest provided by Main Roads WA, however is subject to change noting there is no planned timeframe for the construction of this road.

Indicative building outlines have been included as these can provide barrier attenuation when located between a source and a receiver, in much the same way as a hill or wall. All buildings are assumed to be single storey with heights of 3.5 metres. This means where modelling is undertaken to a possible upper floor, the noise is predicting above these building outlines.

3.2. Road Surface

The corrections applied for different road surface finishes are provided in *Table 3-1*.

Table 3-1: Noise Relationship Between Different Road Surfaces

Chip Seal				Asphalt			
14mm	10mm	5mm	Slurry	Dense Graded	Novachip	Stone Mastic	Open Graded
+3.5 dB	+2.5 dB	+1.5 dB	+1.0 dB	0.0 dB	-0.2 dB	-1.5 dB	-2.5 dB

Given the obligations for a new road to achieve the outdoor noise target, the assumed road surfaces are:

- Rowley Road – Dense Graded Asphalt; and
- Hammond Road – Dense Graded Asphalt.

3.3. Vehicle Speed

The posted speeds are assumed to be:

- Rowley Road – 80 km/hr; and
- Hammond Road – 70 km/hr.

3.4. Traffic Volumes

Forecast 2041 traffic volumes were obtained from Main Roads WA to City of Cockburn (Lang Fong, Planning Information Manager, Email dated 24 January 2022). *Table 3-2* provides the traffic volume input data in the model.

Table 3-2: Traffic Information Used in Noise Modelling

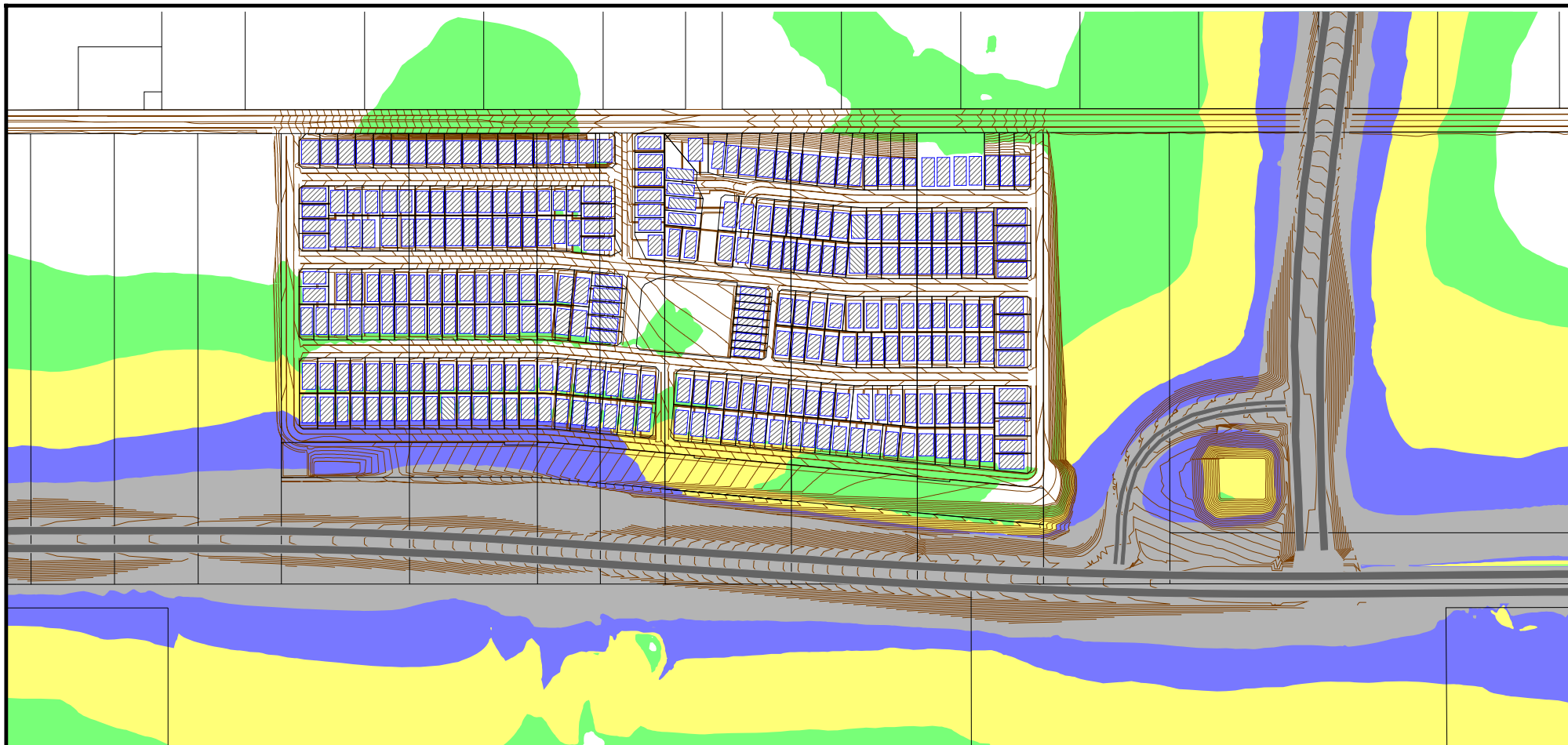
Road	Section	Direction	Traffic Volume	% Heavy Vehicles
Rowley Road	West of Hammond Road	Eastbound	19,200	19
		Westbound	14,900	19
	East of Hammond Road	Eastbound	17,700	19
		Westbound	15,700	19
Hammond Road	North of Rowley Road	Northbound	16,600	5
		Southbound	14,000	5
	Interchange	Northbound	12,700	5
		Southbound	11,600	5
	On/Off Ramps	Northbound	4,800	5
		Southbound	3,300	5

3.5. Ground Absorption

The ground absorption has been assumed to be 0.0 (0%) for the roads and 0.5 (50%) through the subdivision, noting that 0.0 represents hard reflective surfaces such as water and 1.0 represents absorptive surfaces such as grass.

4. RESULTS

The noise modelling results are provided in *Figure 4-1* and *Figure 4-2* as $L_{Aeq(Day)}$ noise level contour plots, being for the future traffic conditions at ground floor height and first floor height level. It can be seen that the outdoor noise target will be exceeded.



Lots 9003, 809, 805, 9001, 117 & 9002, Hammond Park - Future 2041 $L_{Aeq(Day)}$ Noise Level Contours to Ground Floor

Assumed Road Surfaces are:
Rowley Road: Dense Graded Asphalt
Hammond Road and Ramps: Dense Graded Asphalt

SoundPLAN v8.2
CoRTN Algorithms

17 October 2023



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Length Scale 1:5000



Figure 4-1

Signs and symbols

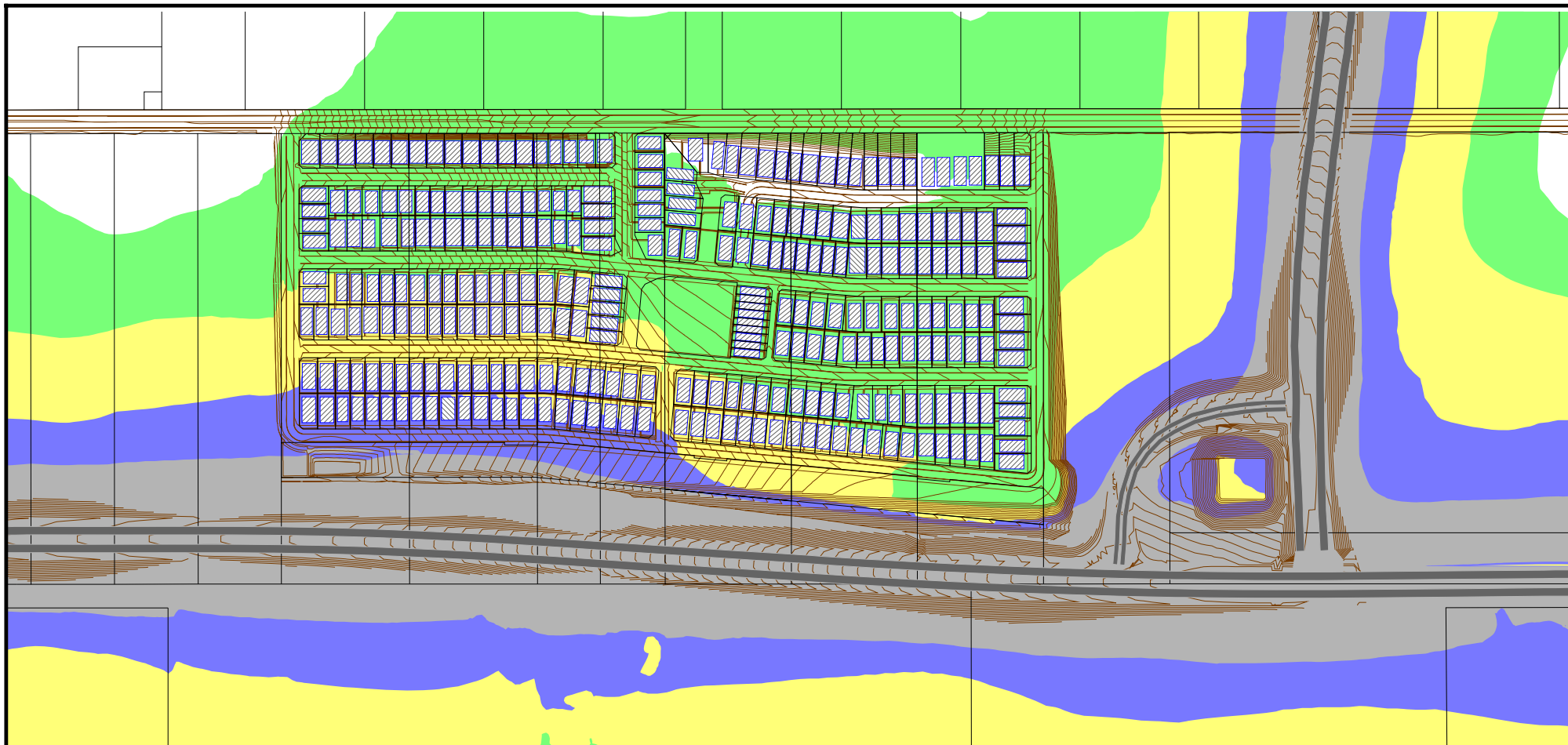
-  Road
-  Indicative Building
-  Elevation line



Noise levels $L_{Aeq(Day)}$ dB

	<= 55	
	<= 56	Exposure A
	<= 57	
	<= 58	
	<= 59	Exposure B
	<= 60	
	<= 61	
	<= 62	
	<= 63	Exposure C
	<= 64	
	<= 65	
	<= 66	
	> 66	Exposure D

SPP 5.4 (Sep 2019)



Lots 9003, 809, 805, 9001, 117 & 9002, Hammond Park - Future 2041 $L_{Aeq(Day)}$ Noise Level Contours to First Floor

Assumed Road Surfaces are:
Rowley Road: Dense Graded Asphalt
Hammond Road and Ramps: Dense Graded Asphalt

SoundPLAN v8.2
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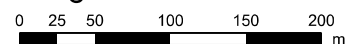


Figure 4-2

Signs and symbols

- Road
- Indicative Building
- Elevation line



Noise levels $L_{Aeq(Day)}$ dB

≤ 55	
≤ 56	Exposure A
≤ 57	
≤ 58	
≤ 59	Exposure B
≤ 60	
≤ 61	
≤ 62	
≤ 63	Exposure C
≤ 64	
≤ 65	
≤ 66	
> 66	Exposure D

SPP 5.4 (Sep 2019)

5. ASSESSMENT

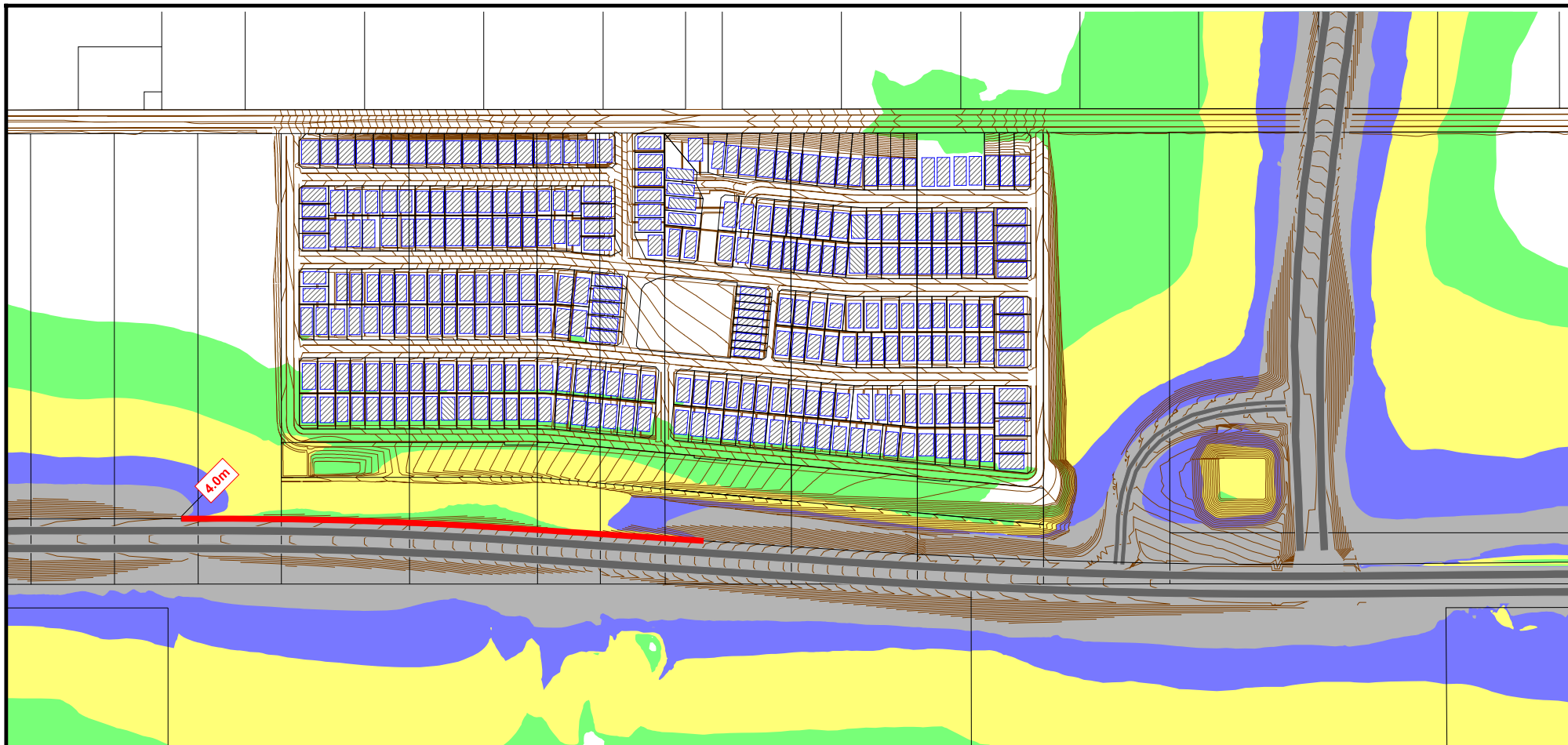
The objectives of SPP 5.4 are to achieve:

- Indoor noise levels specified in *Table 2-1* in noise-sensitive areas (e.g. bedrooms and living rooms of houses); and
- A reasonable degree of acoustic amenity for outdoor living areas on each residential lot.

Where the outdoor noise targets of *Table 2-1* are achieved, no further noise controls are necessary. With reference to *Section 4*, it is evident the outdoor noise target will be exceeded at some lots. Following discussions between stakeholders (refer *Appendix B*), the preferred noise mitigation strategy is:

- Road builder to construct a 4-metre high wall alongside the road or mitigation to provide an equivalent result;
- Developer is to incorporate Quiet House Packages to affected lots, including notifications on lot titles. *Appendix A* provides the Quiet House Packages, as taken from the SPP 5.4 Guidelines. Alternatives to the provided Packages can be accepted if supported by a report from a suitably qualified acoustical consultant (member firm of the Association of Australasian Acoustical Consultants (AAAC)) once the specific house plans for the lot are available.

The noise contours associated with the above are provided in *Figure 5-1* (ground floor) and *Figure 5-2* (first floor) with the noise mitigation shown on *Figure 5-3* (ground floor) and *Figure 5-4* (first floor).



Lots 9003, 809, 805, 9001, 117 & 9002, Hammond Park -
 Future 2041 $L_{Aeq(Day)}$ Noise Level Contours to Ground Floor
 Includes 4.0m High Wall to Achieve Exposure A at Ground Floor

Assumed Road Surfaces are:
 Rowley Road: Dense Graded Asphalt
 Hammond Road and Ramps: Dense Graded Asphalt

SoundPLAN v8.2
 CoRTN Algorithms

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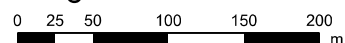


Figure 5-1

Signs and symbols

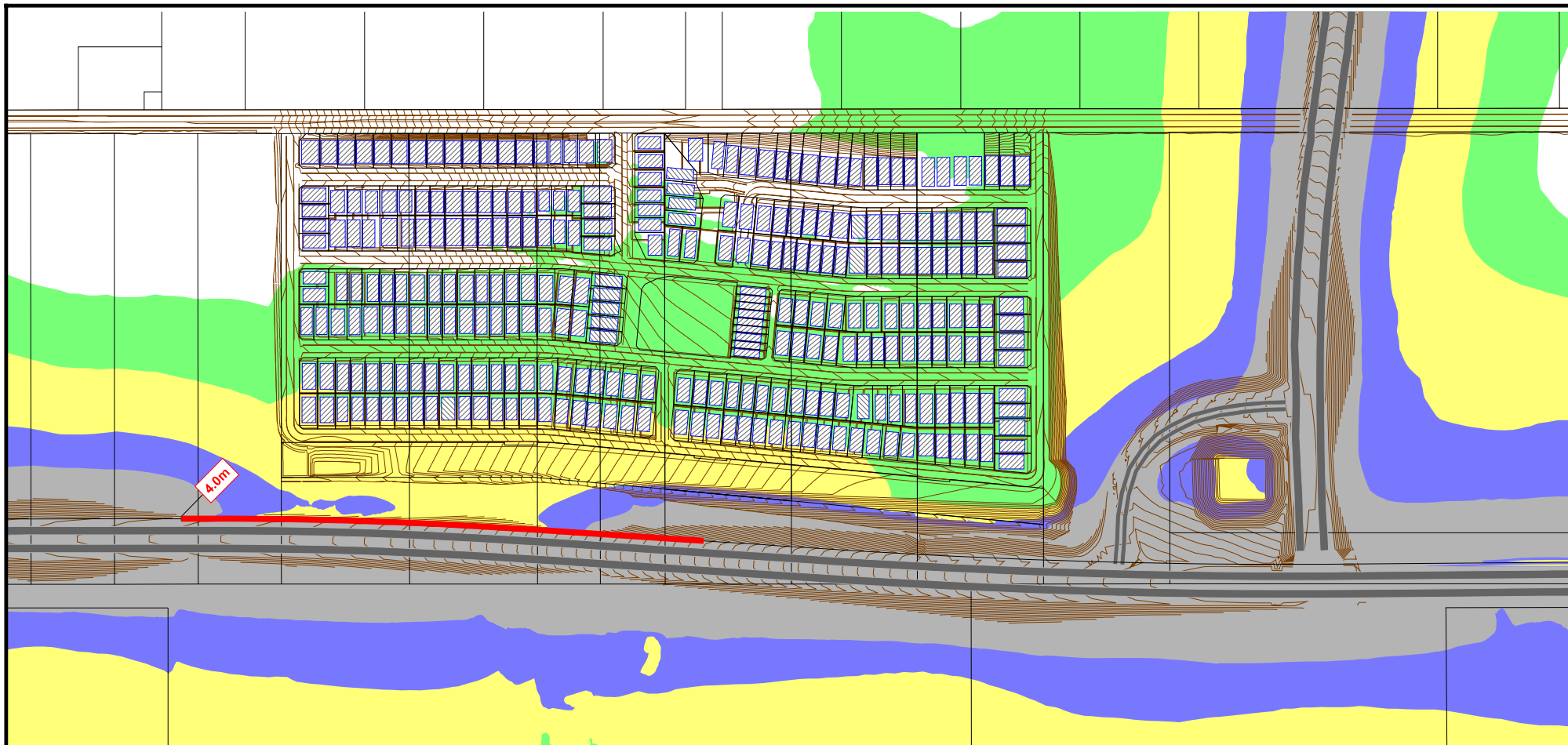
- Road
- Indicative Building
- Elevation line
- Wall



Noise levels $L_{Aeq(Day)}$ dB

	<= 55	
	<= 56	Exposure A
	<= 57	
	<= 58	
	<= 59	Exposure B
	<= 60	
	<= 61	
	<= 62	
	<= 63	Exposure C
	<= 64	
	<= 65	
	<= 66	
	> 66	Exposure D

SPP 5.4 (Sep 2019)



Lots 9003, 809, 805, 9001, 117 & 9002, Hammond Park -
 Future 2041 $L_{Aeq(Day)}$ Noise Level Contours to First Floor
 Includes 4.0m High Wall to Achieve Exposure A at Ground Floor

Assumed Road Surfaces are:
 Rowley Road: Dense Graded Asphalt
 Hammond Road and Ramps: Dense Graded Asphalt

SoundPLAN v8.2
 CoRTN Algorithms

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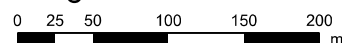


Figure 5-2

Signs and symbols

- Road
- Indicative Building
- Elevation line
- Wall



Noise levels $L_{Aeq(Day)}$ dB

	≤ 55	
	≤ 56	Exposure A
	≤ 57	
	≤ 58	
	≤ 59	Exposure B
	≤ 60	
	≤ 61	
	≤ 62	
	≤ 63	Exposure C
	≤ 64	
	≤ 65	
	≤ 66	
	> 66	Exposure D

SPP 5.4 (Sep 2019)



Lots 9003, 809, 805, 9001, 117 & 9002, Hammond Park -
 Noise Mitigation to Ground Floor
 Wall to Achieve Exposure A to Ground Floor

Assumed Road Surfaces are:
 Rowley Road: Dense Graded Asphalt
 Hammond Road and Ramps: Dense Graded Asphalt

SoundPLAN v8.2
 CoRTN Algorithms

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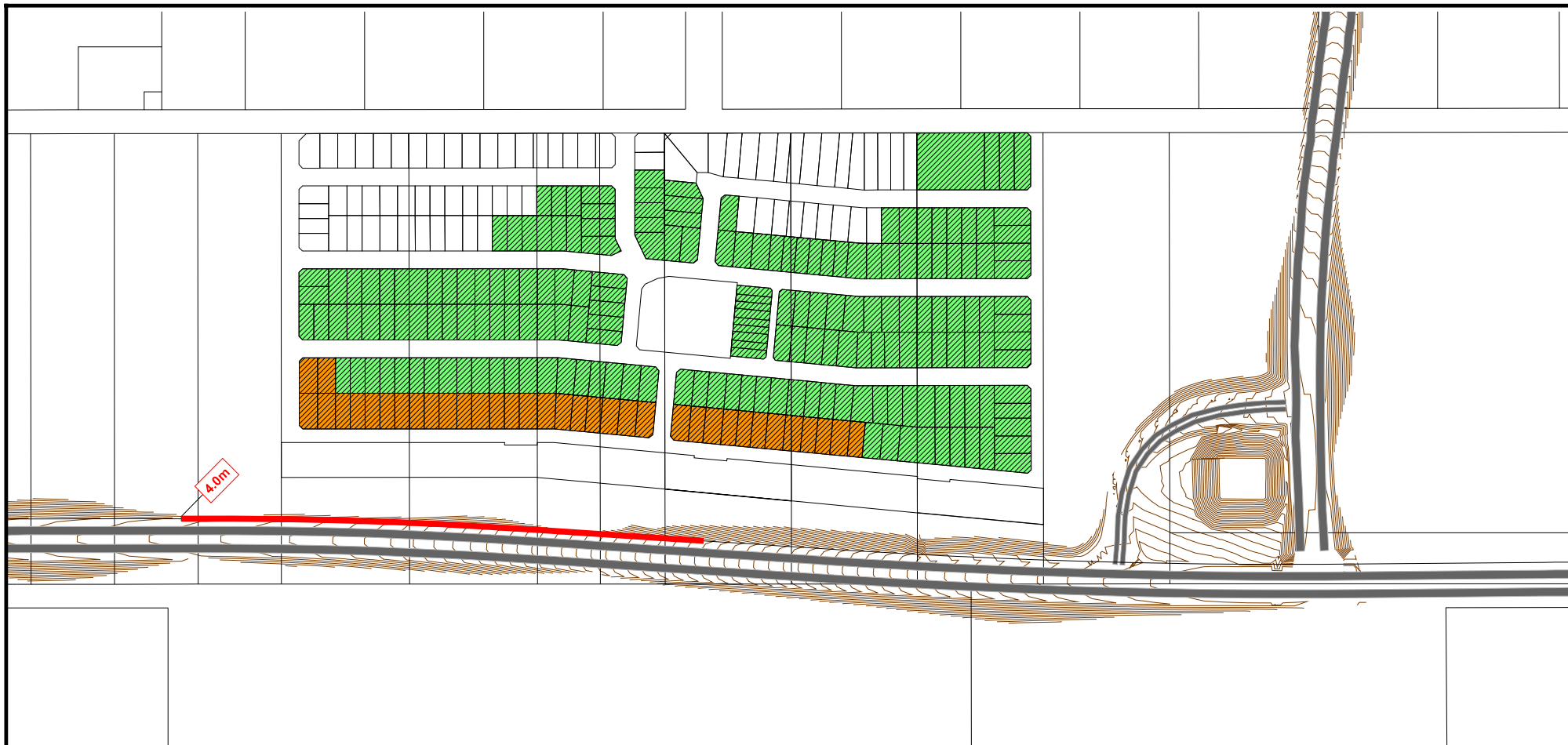


Figure 5-3

Signs and symbols

-  Road
-  Wall
-  Elevation line
-  Quiet House A
-  Quiet House B
-  Quiet House C





Lots 9003, 809, 805, 9001, 117 & 9002, Hammond Park -
 Noise Mitigation to First Floor
 Wall to Achieve Exposure A to Ground Floor

Assumed Road Surfaces are:
 Rowley Road: Dense Graded Asphalt
 Hammond Road and Ramps: Dense Graded Asphalt

SoundPLAN v8.2
 CoRTN Algorithms

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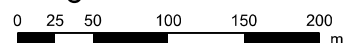


Figure 5-4

Signs and symbols

- Road
- Wall
- Elevation line
- Quiet House A
- Quiet House B
- Quiet House C



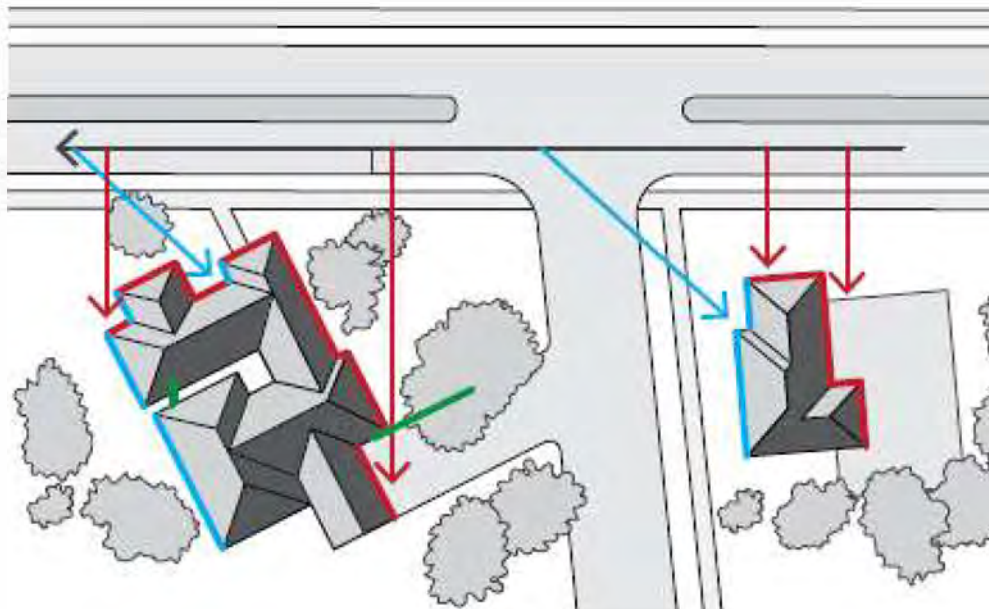
Appendix A – Quiet House Packages

The packages and information provided on the following pages are taken from *Road and Rail Noise Guidelines* (September 2019).

Where outdoor and indoor noise levels received by a noise-sensitive land-use and/or development exceed the policy's noise target, implementation of quiet house requirements is an acceptable solution.

With regards to the packages, the following definitions are provided:

- **Facing** the transport corridor (red): Any part of a building façade is 'facing' the transport corridor if any straight line drawn perpendicular (at a 90 degree angle) to its nearest road lane or railway line intersects that part of the façade without obstruction (ignoring any fence).
- **Side-on** to transport corridor (blue): Any part of a building façade that is not 'facing' is 'side-on' to the transport corridor if any straight line, at any angle, can be drawn from it to intersect the nearest road lane or railway line without obstruction (ignoring any fence).
- **Opposite** to transport corridor (green): Neither 'side on' nor 'facing', as defined above.



Quiet House Package A

56-58 dB $L_{Aeq}(\text{Day})$ & 51-53 dB $L_{Aeq}(\text{Night})$

Element	Orientation	Room	
		Bedroom	Indoor Living and Work Areas
External Windows	Facing	- Up to 40% floor area ($R_w + C_{tr} \geq 28$): - Sliding or double hung with minimum 10mm single or 6mm-12mm-10mm double insulated glazing; - Sealed awning or casement windows with minimum 6mm glass. - Up to 60% floor area ($R_w + C_{tr} \geq 31$): - Sealed awning or casement windows with minimum 6mm glass.	- Up to 40% floor area ($R_w + C_{tr} \geq 25$): - Sliding or double hung with minimum 6mm single or 6mm-12mm-6mm double insulated glazing; - Up to 60% floor area ($R_w + C_{tr} \geq 28$); - Up to 80% floor area ($R_w + C_{tr} \geq 31$).
	Side On	As above, except $R_w + C_{tr}$ values may be 3 dB less or max % area increased by 20%.	
	Opposite	No specific requirements	
External Doors	Facing	Fully glazed hinged door with certified $R_w + C_{tr} \geq 28$ rated door and frame including seals and 6mm glass.	- Doors to achieve $R_w + C_{tr} \geq 25$: 35mm Solid timber core hinged door and frame system certified to $R_w 28$ including seals; - Glazed sliding door with 10mm glass and weather seals.
	Side On	As above, except $R_w + C_{tr}$ values may be 3 dB less.	
	Opposite	No specific requirements	
External Walls	All	$R_w + C_{tr} \geq 45$: - Two leaves of 90mm thick clay brick masonry with minimum 20mm cavity; or - Single leaf of 150mm brick masonry with 13mm cement render on each face; or - One row of 92mm studs at 600mm centres with: - Resilient steel channels fixed to the outside of the studs; and 9.5mm hardboard or fibre cement sheeting or 11mm fibre cement weatherboards fixed to the outside; 75mm thick mineral wool insulation with a density of at least 11kg/m³; and 2 x 16mm fire-rated plasterboard to inside.	
Roofs and Ceilings	All	$R_w + C_{tr} \geq 35$; - Concrete or terracotta tile or metal sheet roof with sarking and at least 10mm plasterboard.	
Outdoor Living Areas		At least one outdoor living area located on the opposite side of the building from the transport corridor or at least one ground level outdoor living area screened using a solid continuous fence or other structure of minimum 2 metres height above ground level.	

Quiet House Package B

59-62 dB $L_{Aeq}(\text{Day})$ & 54-57 dB $L_{Aeq}(\text{Night})$

Element	Orientation	Room	
		Bedroom	Indoor Living and Work Areas
External Windows	Facing	- Up to 40% floor area ($R_w + C_{tr} \geq 31$): - Fixed sash, awning or casement with minimum 6mm glass or 6mm-12mm-6mm double insulated glazing. - Up to 60% floor area ($R_w + C_{tr} \geq 34$): - Fixed sash, awning or casement with minimum 10mm glass or 6mm-12mm-10mm double insulated glazing.	- Up to 40% floor area ($R_w + C_{tr} \geq 28$): - Sliding or double hung with 6mm-12mm-10mm double insulated glazing; - Sealed awning or casement windows with minimum 6mm glass. - Up to 60% floor area ($R_w + C_{tr} \geq 31$); - Up to 80% floor area ($R_w + C_{tr} \geq 34$).
	Side On	As above, except $R_w + C_{tr}$ values may be 3 dB less or max % area increased by 20%.	
	Opposite	As above, except $R_w + C_{tr}$ values may be 6 dB less or max % area increased by 20%.	
External Doors	Facing	Fully glazed hinged door with certified $R_w + C_{tr} \geq 31$ rated door and frame including seals and 10mm glass.	- Doors to achieve $R_w + C_{tr} \geq 28$: 40mm Solid timber core hinged door and frame system certified to $R_w 32$ including seals; - Fully glazed hinged door with certified $R_w + C_{tr} \geq 28$ rated door and frame including seals and 6mm glass.
	Side On	As above, except $R_w + C_{tr}$ values may be 3 dB less or max % area increased by 20%.	
	Opposite	As above, except $R_w + C_{tr}$ values may be 6 dB less or max % area increased by 20%.	
External Walls	All	$R_w + C_{tr} \geq 50$: - Two leaves of 90mm thick clay brick masonry with minimum 50mm cavity between leaves and 25mm glasswool or polyester (24kg/m³). Resilient ties used where required to connect leaves. - Two leaves of 110mm clay brick masonry with minimum 50mm cavity between leaves and 25mm glasswool or polyester insulation (24kg/m³). - Single leaf of 220mm brick masonry with 13mm cement render on each face. 150mm thick unlined concrete panel or 200mm thick concrete panel with one layer of 13mm plasterboard or 13mm cement render on each face. - Single leaf of 90mm clay brick masonry with: - A row of 70mm x 35mm timber studs or 64mm steel studs at 600mm centres; - A cavity of 25mm between leaves; 50mm glasswool or polyester insulation (11kg/m³) between studs; and - One layer of 10mm plasterboard fixed to the inside face.	
Roofs and Ceilings	All	$R_w + C_{tr} \geq 35$: - Concrete or terracotta tile or metal sheet roof with sarking and at least 10mm plasterboard ceiling with R3.0+ fibrous insulation.	
Outdoor Living Areas		At least one outdoor living area located on the opposite side of the building from the transport corridor or at least one ground level outdoor living area screened using a solid continuous fence or other structure of minimum 2.4 metres height above ground level.	

Quiet House Package C

63-66 dB $L_{Aeq}(\text{Day})$ & 58-61 dB $L_{Aeq}(\text{Night})$

Element	Orientation	Room	
		Bedroom	Indoor Living and Work Areas
External Windows	Facing	- Up to 20% floor area ($R_w + C_{tr} \geq 31$): - Fixed sash, awning or casement with minimum 6mm glass or 6mm-12mm-6mm double insulated glazing. - Up to 40% floor area ($R_w + C_{tr} \geq 34$): - Fixed sash, awning or casement with minimum 10mm glass or 6mm-12mm-10mm double insulated glazing.	- Up to 40% floor area ($R_w + C_{tr} \geq 31$): - Fixed sash, awning or casement with minimum 6mm glass or 6mm-12mm-6mm double insulated glazing. - Up to 60% floor area ($R_w + C_{tr} \geq 34$): - Fixed sash, awning or casement with minimum 10mm glass or 6mm-12mm-10mm double insulated glazing.
	Side On	As above, except $R_w + C_{tr}$ values may be 3 dB less or max % area increased by 20%.	
	Opposite	As above, except $R_w + C_{tr}$ values may be 6 dB less or max % area increased by 20%.	
External Doors	Facing	Not recommended.	- Doors to achieve $R_w + C_{tr} \geq 30$: - Fully glazed hinged door with certified $R_w + C_{tr} \geq 31$ rated door and frame including seals and 10mm glass; 40mm Solid timber core side hinged door, frame and seal system certified to $R_w 32$ including seals. Any glass inserts to be minimum 6mm.
	Side On	As above, except $R_w + C_{tr}$ values may be 3 dB less or max % area increased by 20%.	
	Opposite	As above, except $R_w + C_{tr}$ values may be 6 dB less or max % area increased by 20%.	
External Walls	All	$R_w + C_{tr} \geq 50$: - Two leaves of 90mm thick clay brick masonry with minimum 50mm cavity between leaves and 25mm glasswool or polyester insulation (24kg/m^3). Resilient ties used where required to connect leaves. - Two leaves of 110mm clay brick masonry with minimum 50mm cavity between leaves and 25mm glasswool or polyester insulation (24kg/m^3). - Single leaf of 220mm brick masonry with 13mm cement render on each face. 150mm thick unlined concrete panel or 200mm thick concrete panel with one layer of 13mm plasterboard or 13mm cement render on each face. - Single leaf of 90mm clay brick masonry with: - A row of 70mm x 35mm timber studs or 64mm steel studs at 600mm centres; - A cavity of 25mm between leaves; 50mm glasswool or polyester insulation (11kg/m^3) between studs; and - One layer of 10mm plasterboard fixed to the inside face.	
Roofs and Ceilings	All	$R_w + C_{tr} \geq 40$: - Concrete or terracotta tile roof with sarking, or metal sheet roof with foil backed R2.0+ fibrous insulation between steel sheeting and roof battens; - R3.0+ insulation batts above ceiling; 2 x 10mm plasterboard ceiling or 1 x 13mm sound-rated plasterboard affixed using steel furring channel to ceiling rafters.	
Outdoor Living Areas		At least one outdoor living area located on the opposite side of the building from the transport corridor or at least one ground level outdoor living area screened using a solid continuous fence or other structure of minimum 2.4 metres height above ground level.	

Mechanical Ventilation requirements

In implementing the acceptable treatment packages, fresh air requirements of the National Construction Code must be satisfied on the basis of windows closed. Whilst not the only solution, the most common is mechanical ventilation / air-conditioning is installed with the following considerations:

- Acoustically rated openings and ductwork to provide a minimum sound reduction performance of R_w 40 dB into sensitive spaces;
- Evaporative systems require attenuated ceiling air vents to allow closed windows;
- Refrigerant based systems need to be designed to achieve National Construction Code fresh air ventilation requirements;
- Openings such as eaves, vents and air inlets must be acoustically treated, closed or relocated to building sides facing away from the corridor where practicable.

Notification

Notifications on title advise prospective purchasers of the potential for noise impacts from major transport corridors and help with managing expectations.

The Notification is to state as follows:

This lot is in the vicinity of a transport corridor and is affected, or may in the future be affected, by road and rail transport noise. Road and rail transport noise levels may rise or fall over time depending on the type and volume of traffic.

Appendix B – Letter from Main Roads WA



mainroads
WESTERN AUSTRALIA

Enquiries: Michelle Ferraro on (08) 9323 6390
Our Ref: 21/1076 (D22#1028706)

23 September 2022

Avril Thomson
Cossill & Webley
B12, 431 Roberts Road
SUBIACO WA 6008

Email: avrilt@cosweb.com.au (via email)

Dear Avril,

**TRANSPORTATION NOISE ASSESSMENT - LOTS 117, 805, 809, 9001 AND 9003
WATTLEUP ROAD, HAMMOND PARK**

Main Roads refers to your correspondence dated 11 August 2022 relating to the above approved subdivision.

Main Roads has reviewed the following documents:

External Reference	Document Title
21026117-03	Lloyd George Acoustics Transportation Noise Assessment

Please be advised that Main Roads finds the above revision of the Transportation Noise Assessment acceptable and agrees to Option 3 – Shared Noise Control Responsibility between the developer and the road builder subject to the relevant Quiet House design packages being applied to the subject lots by the developer.

In relation to works impacting the Rowley Road Planning Control Area, please continue to liaise with Lindsay Broadhurst (Director Road Planning) on 9323 4511.

If you require any further information regarding the above please email planninginfo@mainroads.wa.gov.au.

Yours sincerely

Maryanne Thornely
Road Access and Planning Manager

Appendix C – Terminology

The following is an explanation of the terminology used throughout this report:

- **Decibel (dB)**

The decibel is the unit that describes the sound pressure levels of a noise source. It is a logarithmic scale referenced to the threshold of hearing.

- **A-Weighting**

An A-weighted noise level has been filtered in such a way as to represent the way in which the human ear perceives sound. This weighting reflects the fact that the human ear is not as sensitive to lower frequencies as it is to higher frequencies. An A-weighted sound level is described as L_A , dB.

- **L_{eq}**

The L_{eq} level represents the average noise energy during a measurement period.

- **L_1**

The L_1 level represents the noise level exceeded for 1 percent of the measurement period and is considered to represent the average of the maximum noise levels measured.

- **L_{10}**

The L_{10} level represents the noise level exceeded for 10 percent of the measurement period and is considered to represent the “intrusive” noise level.

- **L_{90}**

The L_{90} level represents the noise level exceeded for 90 percent of the measurement period and is considered to represent the “background” noise level.

- **$L_{Aeq(Day)}$**

The $L_{Aeq(Day)}$ level is the logarithmic average of the L_{Aeq} levels from 6.00am to 10.00pm.

- **$L_{Aeq(Night)}$**

The $L_{Aeq(Night)}$ level is the logarithmic average of the L_{Aeq} levels from 10.00pm to 6.00am.

- **$L_{A10,18hour}$**

The $L_{A10,18hour}$ level is the arithmetic average of the hourly L_{A10} levels between 6.00am and midnight.

- **$L_{Aeq,24hour}$**

The $L_{Aeq,24hour}$ level is the logarithmic average of the L_{Aeq} levels from over an entire day.

- **Noise-sensitive land use and/or development**

Land-uses or development occupied or designed for occupation or use for residential purposes (including dwellings, residential buildings or short-stay accommodation), caravan park, camping ground, educational establishment, child care premises, hospital, nursing home, corrective institution or place of worship.

- **R_w**

This is the weighted sound reduction index. It is a single number rating determined by moving a grading curve in integral steps against the laboratory measured transmission loss until the sum of the deficiencies at each one-third-octave band, between 100 Hz and 3.15 kHz, does not exceed 32 dB. The higher the R_w value, the better the acoustic performance.

- **C_{tr}**

This is a spectrum adaptation term for airborne noise and provides a correction to the R_w value to suit source sounds with significant low frequency content such as road traffic or home theatre systems. A wall that provides a relatively high level of low frequency attenuation (i.e. masonry) may have a value in the order of – 4 dB, whilst a wall with relatively poor attenuation at low frequencies (i.e. stud wall) may have a value in the order of -12 dB.

- **About the Term ‘Reasonable’**

An assessment of reasonableness should demonstrate that efforts have been made to resolve conflicts without comprising on the need to protect noise-sensitive land-use activities. For example, have reasonable efforts been made to design, relocate or vegetate a proposed noise barrier to address community concerns about the noise barrier height? Whether a noise mitigation measure is reasonable might include consideration of:

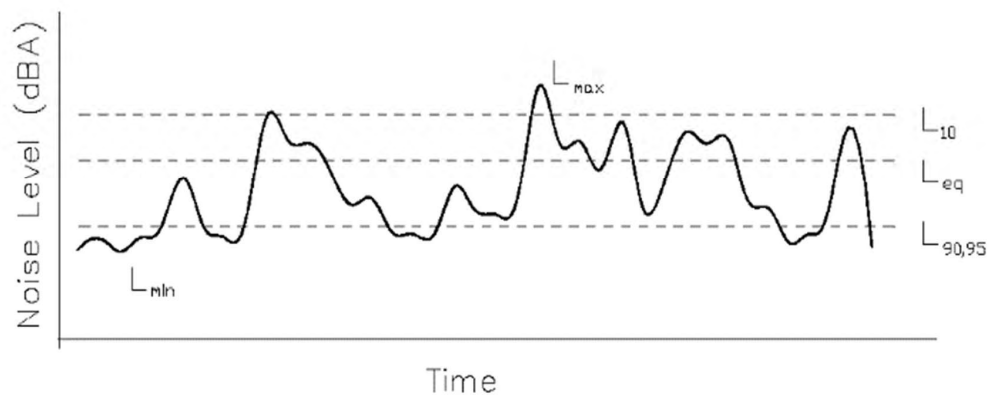
- The noise reduction benefit provided;
- The number of people protected;
- The relative cost vs benefit of mitigation;
- Road conditions (speed and road surface) significantly differ from noise forecast table assumptions;
- Existing and future noise levels, including changes in noise levels;
- Aesthetic amenity and visual impacts;
- Compatibility with other planning policies;
- Differences between metropolitan and regional situations and whether noise modelling requirements reflect the true nature of transport movements;
- Ability and cost for mobilisation and retrieval of noise monitoring equipment in regional areas;
- Differences between Greenfield and infill development;
- Differences between freight routes and public transport routes and urban corridors;
- The impact on the operational capacity of freight routes;
- The benefits arising from the proposed development;
- Existing or planned strategies to mitigate the noise at source.

- **About the Term ‘Practicable’**

‘Practicable’ considerations for the purposes of the policy normally relate to the engineering aspects of the noise mitigation measures under evaluation. It is defined as “reasonably practicable having regard to, among other things, local conditions and circumstances (including costs) and to the current state of technical knowledge” (*Environmental Protection Act 1986*). These may include:

- Limitations of the different mitigation measures to reduce transport noise;
- Competing planning policies and strategies;
- Safety issues (such as impact on crash zones or restrictions on road vision);
- Topography and site constraints (such as space limitations);
- Engineering and drainage requirements;
- Access requirements (for driveways, pedestrian access and the like);
- Maintenance requirements;
- Bushfire resistance or BAL ratings;
- Suitability of the building for acoustic treatments.

- **Chart of Noise Level Descriptors**



• Austroads Vehicle Class

VEHICLE CLASSIFICATION SYSTEM		
AUSTRADS		
CLASS	LIGHT VEHICLES	
1	SHORT Car, Van, Wagon, 4 WD, Light Bicycle, Motorcycle	
2	SHORT TONNAGE Trailer, Caravan, Boat	
HEAVY VEHICLES		
3	TWO AXLE TRUCK OR BUS *2 cabs	
4	THREE AXLE TRUCK OR BUS *3 cabs, 2 axle groups	
5	FOUR (or FIVE) AXLE TRUCK *4 (5) cabs, 2 axle groups	
6	THREE AXLE ARTICULATED *3 cabs, 3 axle groups	
7	FOUR AXLE ARTICULATED *4 cabs, 3 or 4 axle groups	
8	FIVE AXLE ARTICULATED *5 cabs, 3+ axle groups	
9	SIX AXLE ARTICULATED *6 cabs, 3+ axle groups or 7+ cabs, 3 axle groups	
LONG VEHICLES AND ROAD TRAINS		
10	EIGHT (or HEAVY) TRUCK AND TRAILER *7+ cabs, 4 axle groups	
11	DOUBLE ROAD TRAIN *7+ cabs, 5 or 6 axle groups	
12	TRIPLE ROAD TRAIN *7+ cabs, 7+ axle groups	

• Typical Noise Levels

