KEYCLUB HOLDINGS PTY LTD

LOT 9 HOLMES ROAD, SOUTHERN RIVER

SUBDIVISION DEVELOPMENT

NOISE MANAGEMENT PLAN

JANUARY 2018

OUR REFERENCE: 22690-1-15212-02

Rochdale Holdings Pty Ltd A.B.N. 85 009 049 067 trading as:
HERRING STORER ACOUSTICS
P.O. Box 219, Como, W.A. 6952
(08) 9367 6200
hsa@hsacoustics.com.au

DOCUMENT CONTROL PAGE

NOISE ASSESSMENT
LOT 9 HOLMES ROAD, SOUTHERN RIVER

Job No: 15212-02

Document Reference: 22690-1-15212-02

FOR

DYNAMIC PLANNING

DOCUMENT INFORMATION			
Author:	Paul Daly	**Checked By:**	Tim Reynolds
Date of Issue :	12 January 2018		

REVISION HISTORY				
Revision	**Description**	**Date**	**Author**	**Checked**

DOCUMENT DISTRIBUTION				
Copy No.	**Version No.**	**Destination**	**Hard Copy**	**Electronic Copy**
1	1	Dynamic Planning – Edward O'çonnell edward.oconnell@dynamicplanning.net.au		✓

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1. INTRODUCTION

Herring Storer Acoustics were commissioned by Dynamic Planning and Developments, on behalf of Keyclub Holdings Pty Ltd to carry out an acoustical assessment of noise received at a residential development located at Lot 9 Holmes Street, Southern River.

The development is situated to the west of Holmes Street between Matison and Passmore Street. Currently Holmes Street is a minor road, with less than 6000 vpd. Future development has targeted Holmes road as a major upgrade which will join Garden Street, providing access through to Tonkin Highway. Therefore, the road adjoining the proposed development site will be considered as a major road in the future.

As part of the study, the following was carried out:

- Determine by noise modelling the noise that would be received at residences within the subdivision from vehicles travelling on the proposed new roadway (Holmes Street).
- Assess the predicted noise levels for compliance with the appropriate criteria.
- Provide detailed information as to noise control requirements such as quiet house design, noise wall and notification on titles for inclusion in the LDP.

For information, the development plan is attached in Appendix A.

2. SUMMARY

Under the Western Australian Planning Commission (WAPC) Planning Policy 5.4 *"Road and Rail Transport Noise and Freight Considerations in Land Use Planning"* (SPP5.4), we believe that the appropriate criteria for assessment for this development are as listed below for "Noise Limits".

EXTERNAL

$L_{Aeq(Day)}$ of 60 dB(A); and
$L_{Aeq(Night)}$ of 55 dB(A).

INTERNAL

$L_{Aeq(Day)}$ of 40 dB(A) in living and work areas; and
$L_{Aeq(Night)}$ of 35 dB(A) in bedrooms.

Noise received at an outdoor living area should also be reduced as far as practicable, with an aim of achieving an L_{Aeq} of 50 dB(A) during the night period.

The noise modelling indicates that noise received within the proposed sub-division from vehicles travelling along Holmes Street in the future (at the ground floor of the residence) would be within the 5 dB(A) margin (i.e. between the Noise Targets and Noise Limits) with the inclusion of a 1.8 metre wall. Therefore, to comply with the planning policy, it is recommended that "Quiet House" design be implemented for residence as well as the inclusion of a wall or barrier along the Holmes Street façade.

Noise control methods have been included in this study with the recommendations also to be included within the LDP once the subdivision plan is approved.

Due to the orientation of the Lots, with all Lots facing away from the future Holmes Street, the outdoor living areas are orientated towards the rear of the buildings (towards the roadway), hence the inclusion the noise wall shields the outdoor living area from road traffic noise. Therefore, noise received at the outdoor living areas would comply with the required criteria.

Additionally, notifications on titles are required for those residence where the noise received exceeds the "Noise Targets". The lots requiring notifications are also shown on Figure C1 in Appendix C.

3. ACOUSTIC CRITERIA

3.1 WAPC PLANNING POLICY

The Western Australian Planning Commission (WAPC) released on 22 September 2009 State Planning Policy 5.4 *"Road and Rail Transport Noise and Freight Considerations In Land Use Planning"*. Section 5.3 – Noise Criteria, which outlines the acoustic criteria, states:

"5.3 - NOISE CRITERIA

Table 1 sets out the outdoor noise criteria that apply to proposals for new noise-sensitive development or new major roads and railways assessed under this policy.

These criteria do not apply to –

- *proposals for redevelopment of existing major roads or railways, which are dealt with by a separate approach as described in section 5.4.1; and*
- *proposals for new freight handling facilities, for which a separate approach is described in section 5.4.2.*

The outdoor noise criteria set out in Table 1 apply to the emission of road and rail transport noise as received at a noise-sensitive land use. These noise levels apply at the following locations—

- *for new road or rail infrastructure proposals, at 1 m from the most exposed, habitable façade of the building receiving the noise, at ground floor level only; and*
- *for new noise-sensitive development proposals, at 1 m from the most exposed, habitable façade of the proposed building, at each floor level, and within at least one outdoor living area on each residential lot.*

Further information is provided in the guidelines.

TABLE 1 - OUTDOOR NOISE CRITERIA

Time of day	*Noise Target*	*Noise Limit*
Day (6 am–10 pm)	$L_{Aeq(Day)}$ *= 55 dB(A)*	$L_{Aeq(Day)}$ *= 60 dB(A)*
Night (10 pm–6 am)	$L_{Aeq(Night)}$ *= 50 dB(A)*	$L_{Aeq(Night)}$ *= 55 dB(A)*

The 5 dB difference between the outdoor noise target and the outdoor noise limit, as prescribed in Table 1, represents an acceptable margin for compliance. In most situations in which either the noise-sensitive land use or the major road or railway already exists, it should be practicable to achieve outdoor noise levels within this acceptable margin. In relation to greenfield sites, however, there is an expectation that the design of the proposal will be consistent with the target ultimately being achieved.

Because the range of noise amelioration measures available for implementation is dependent upon the type of proposal being considered, the application of the noise criteria will vary slightly for each different type. Policy interpretation of the criteria for each type of proposal is outlined in sections 5.3.1 and 5.3.2.

The noise criteria were developed after consideration of road and rail transport noise criteria in Australia and overseas, and after a series of case studies to assess whether the levels were practicable. The noise criteria take into account the considerable body of research into the effects of noise on humans, particularly community annoyance, sleep disturbance, long-term effects on cardiovascular health, effects on children's learning performance, and impacts on vulnerable groups such as children and the elderly. Reference is made to the World Health Organization (WHO) recommendations for noise policies in their publications on community noise and the Night Noise Guidelines for Europe. See the policy guidelines for suggested further reading.

5.3.1 Interpretation and application for noise-sensitive development proposals

In the application of these outdoor noise criteria to new noise-sensitive developments, the objective of this policy is to achieve –

- *acceptable indoor noise levels in noise-sensitive areas (for example, bedrooms and living rooms of houses, and school classrooms); and*
- *a reasonable degree of acoustic amenity in at least one outdoor living area on each residential lot[1].*

If a noise-sensitive development takes place in an area where outdoor noise levels will meet the noise target, no further measures are required under this policy.

In areas where the noise target is likely to be exceeded, but noise levels are likely to be within the 5dB margin, mitigation measures should be implemented by the developer with a view to achieving the target levels in a least one outdoor living area on each residential lot[1]. Where indoor spaces are planned to be facing any outdoor area in the margin, noise mitigation measures should be implemented to achieve acceptable indoor noise levels in those spaces. In this case, compliance with this policy can be achieved for residential buildings through implementation of the deemed-to-comply measures detailed in the guidelines.

1 For non residential noise-sensitive developments, (e.g. schools and child care centres) consideration should be given to providing a suitable outdoor area that achieves the noise target, where this is appropriate to the type of use.

In areas where the outdoor noise limit is likely to be exceeded (i.e. above $L_{Aeq(Day)}$ of 60 dB(A) or $L_{Aeq(Night)}$ of 55 dB(A)), a detailed noise assessment in accordance with the guidelines should be undertaken by the developer. Customised noise mitigation measures should be implemented with a view to achieving the noise target in at least one outdoor living or recreation area on each noise-sensitive lot or, if this is not practicable, within the margin. Where indoor spaces will face outdoor areas that are above the noise limit, mitigation measures should be implemented to achieve acceptable indoor noise levels in those spaces, as specified in the following paragraphs.

For residential buildings, acceptable indoor noise levels are $L_{Aeq(Day)}$ of 40 dB(A) in living and work areas and $L_{Aeq(Night)}$ of 35 dB(A) in bedrooms[2]. For all other noise-sensitive buildings, acceptable indoor noise levels under this policy comprise noise levels that meet the recommended design sound levels in Table 1 of Australian Standard AS 2107:2000 Acoustics—Recommended design sound levels and reverberation times for building interiors.

These requirements also apply in the case of new noise-sensitive developments in the vicinity of a major transport corridor where there is no existing railway or major road (bearing in mind the policy's 15-20 year planning horizon). In these instances, the developer should engage in dialogue with the relevant infrastructure provider to develop a noise management plan to ascertain individual responsibilities, cost sharing arrangements and construction time frame.

If the policy objectives for noise-sensitive developments are not achievable, best practicable measures should be implemented, having regard to section 5.8 and the guidelines."

The Policy, under Section 5.7, also provides information regarding "Notifications on Titles".

3.2 APPROPRIATE CRITERIA

Based on the above, the following criteria are proposed for this development:

External	
Day	Maximum of 60 dB(A) L_{Aeq}
Night	Maximum of 55 dB(A) L_{Aeq}
Outdoor Living Areas*	Maximum of 50 dB(A) $L_{Aeq\ (night\ period)}$
Internal	
Sleeping Areas	35 dB(A) $L_{Aeq(night)}$
Living Areas	40 dB(A) $L_{Aeq(day)}$

*This is a suggested noise level; noise is to be reduced as far as practicably possible.

2 For residential buildings, indoor noise levels are not set for utility spaces such as bathrooms. This policy encourages effective "quiet house" design, which positions these non-sensitive spaces to shield the more sensitive spaces from transport noise (see guidelines for further information).

4. MEASUREMENTS AND OBSERVATIONS

To determine the requirements of any noise amelioration, acoustic modelling was carried out using the computer program 'SoundPlan'. Acoustic modelling was carried out for road traffic flows in the future (2031).

TABLE 4.1 - NOISE MODELLING INPUT DATA

Parameter	Holmes Street
Future Traffic flows	40,000
Heavy Vehicles (%)	4%
Speed Limit (km/hr)	60
Road Surface	Dense Grade Asphalt
Façade Correction	+2.5 dB(A)

From noise monitoring of similar projects (further along Garden Street, Canning Vale), it has been assumed that difference between the $L_{A10,18hour}$ and $L_{Aeq,8hour}$, and the $L_{Aeq10,18hr}$ and $L_{Aeq,16\ hr}$ is 8.5 and 3.

Noise modelling was carried out for noise received within the development with a 1.8m wall along the eastern boundary abutting Holmes Street. This was identified as being the appropriate height to achieve noise levels between the target and the Limit.

5. RESULTS

Under the WAPC State Planning Policy 5.4, for this development, the Noise Limits as listed in Table 1 are the appropriate noise criteria for this development. From noise monitoring undertaken, we believe that the difference between the $L_{Aeq(16hr)}$ and the $L_{Aeq(8hr)}$ would be greater than 5 dB(A). Therefore, if compliance with the day period noise limit is achieved, then compliance with the night period noise limits would also be achieved. The policy also states that the outdoor criteria applies to the ground floor level only, however, it also states that noise mitigation measures should be implemented with a view to achieving the target levels in least one outdoor living area.

For residential premises, the Policy states that residence should be designed to meet the following acceptable internal noise levels:

Living and Work Areas	$L_{Aeq(Day)}$ of 40 dB(A)
Bedrooms	$L_{Aeq(Night)}$ of 35 dB(A)

Additionally, it is recommended that noise mitigation measures be implemented, as far as practicable, so at least one outdoor living area complies with the Target Noise Level.

Initial noise modelling indicates that noise received within the proposed development from vehicles travelling along Holmes Street would exceed the WAPC State Policy 5.4 Noise Limits; therefore, further modelling was carried out to include a 1.8m wall on the eastern boundary, abutting Holmes Street. Appendix B shows contains the noise contour plots for the future road traffic (with future residential buildings included), both with and without noise control in the form of a 1.8m wall.

6. RECOMMENDATIONS

Based on the calculated noise level the following is required and should be included within the LDP once subdivision approval is finalised.

TABLE 6.1 – LDP INCLUSIONS

Lot Reference	Recommendation for LDP
Lots between the 55 and 60 dB(A) Noise Contour	Notification on Tile Quiet House Design – Package A

Note : Given the location of the development, Lot sizes and the projected market, we understand that 2 storey residence are likely. Therefore, Quiet House Design for double storey residence it is recommended and specialist acoustic advice is sort by the proponent.

It is also noted that once residential houses are constructed, the façade buildings will provide a barrier for noise for those located behind. Therefore, it is likely that notifications and "Quiet House" design is only required for the Lots fronting Holmes Street.

Additionally, notifications on titles are required are required for those residence where the noise received exceeds the "Noise Targets". The lots requiring notifications are also shown on Figure C1 in Appendix C.

For information, Package A "Quiet House" requirements are attached in Appendix C.

An example of a suitable notice, as provided within the Guidelines is:

This lot is situated in the vicinity of Holmes Street and is currently affected, and / or may in the future be affected by transport noise.

Note: Alternative constructions to those listed for "Quiet House" attached in Appendix C are acceptable, provided they are assessed and a report submitted by a suitably qualified acoustic consultant.

7. CONCLUSION

In accordance with the WAPC Planning Policy 5.4, an assessment of the noise that would be received within the development from vehicles travelling on the future Holmes Street has been undertaken.

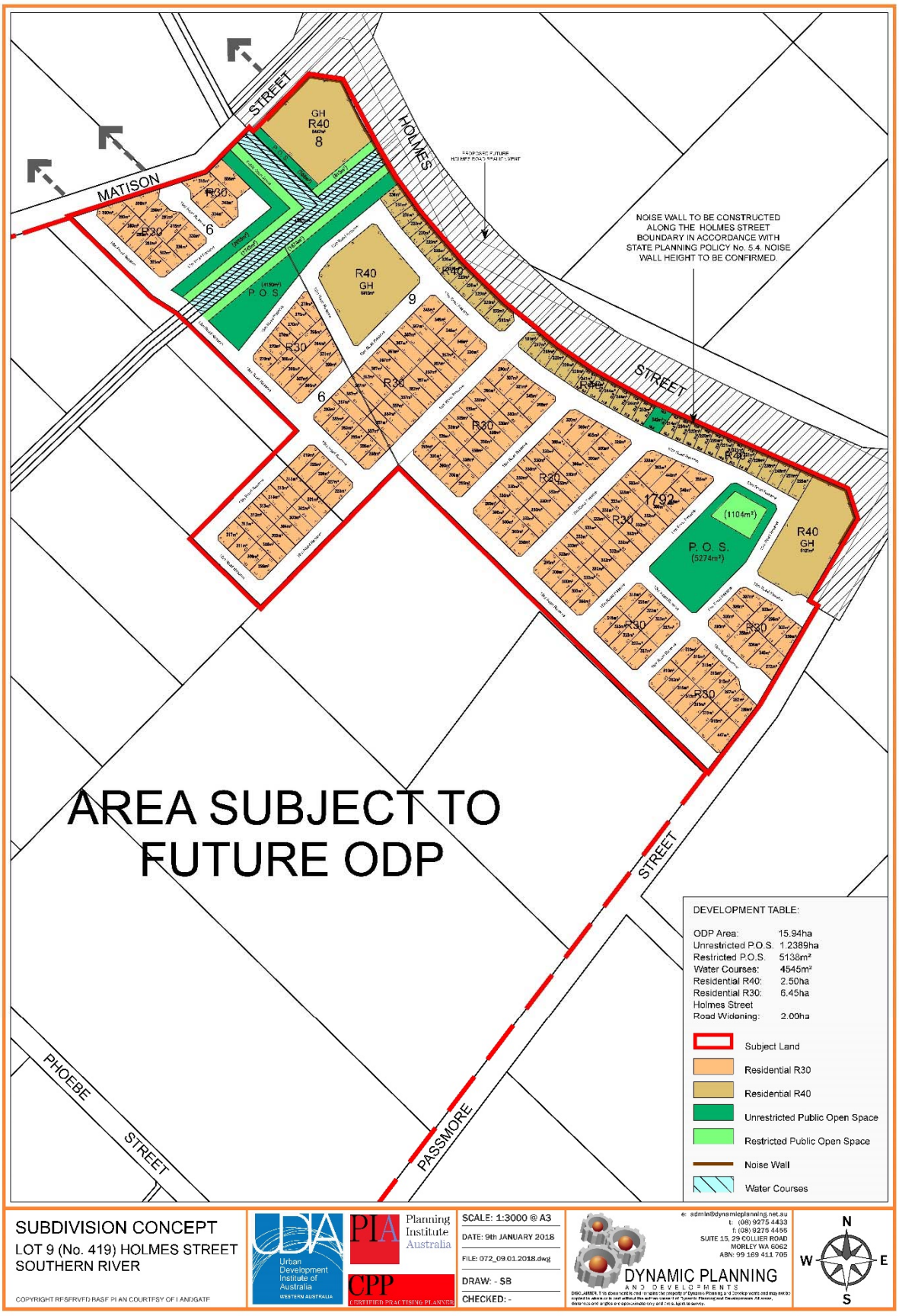
To comply with the requirements of SPP 5.4 the following has been recommended:

- Quiet house design in the form of Package A and Notification on Titles for Lots identified in Appendix C.

APPENDIX A

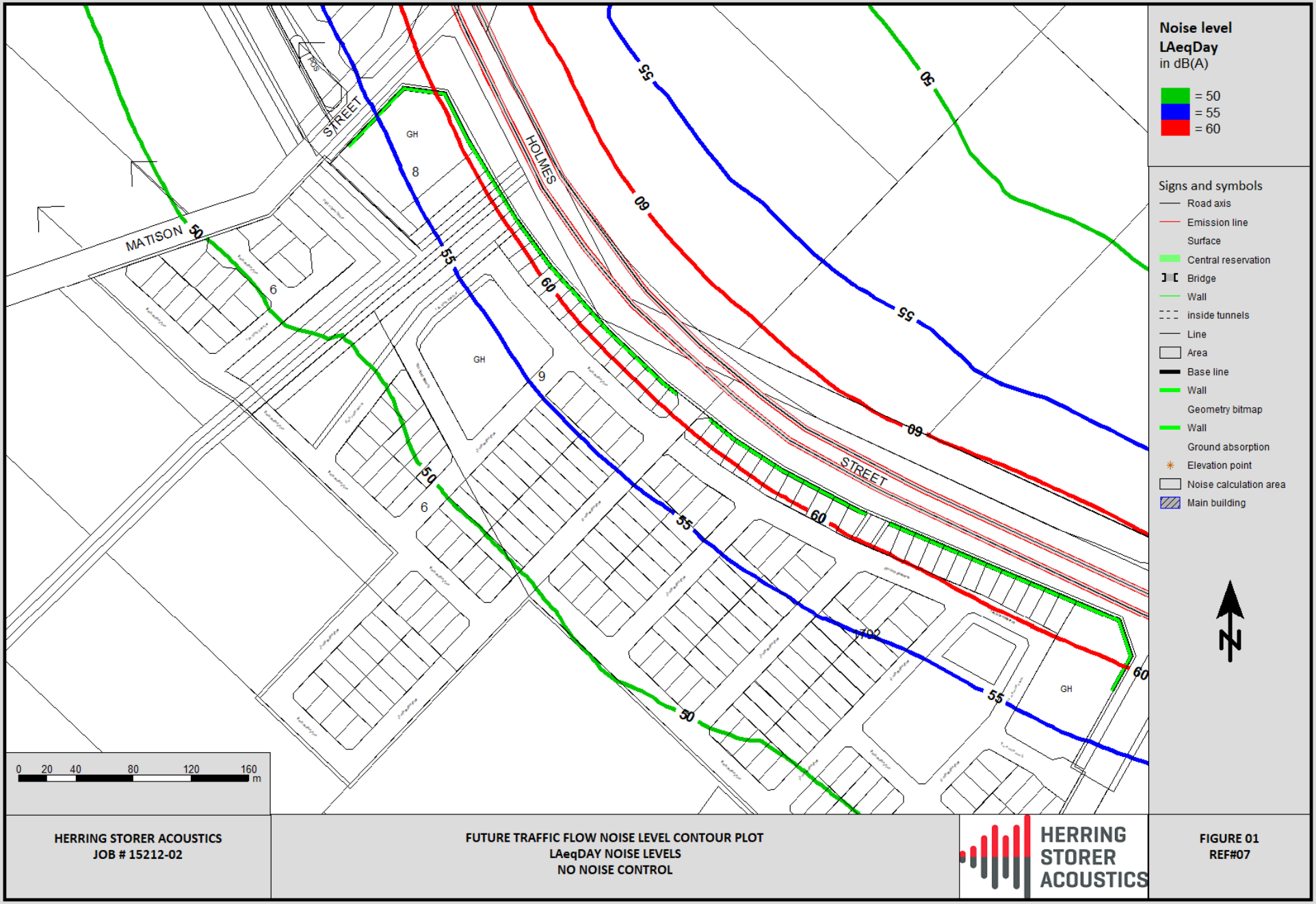
DEVELOPMENT PLAN

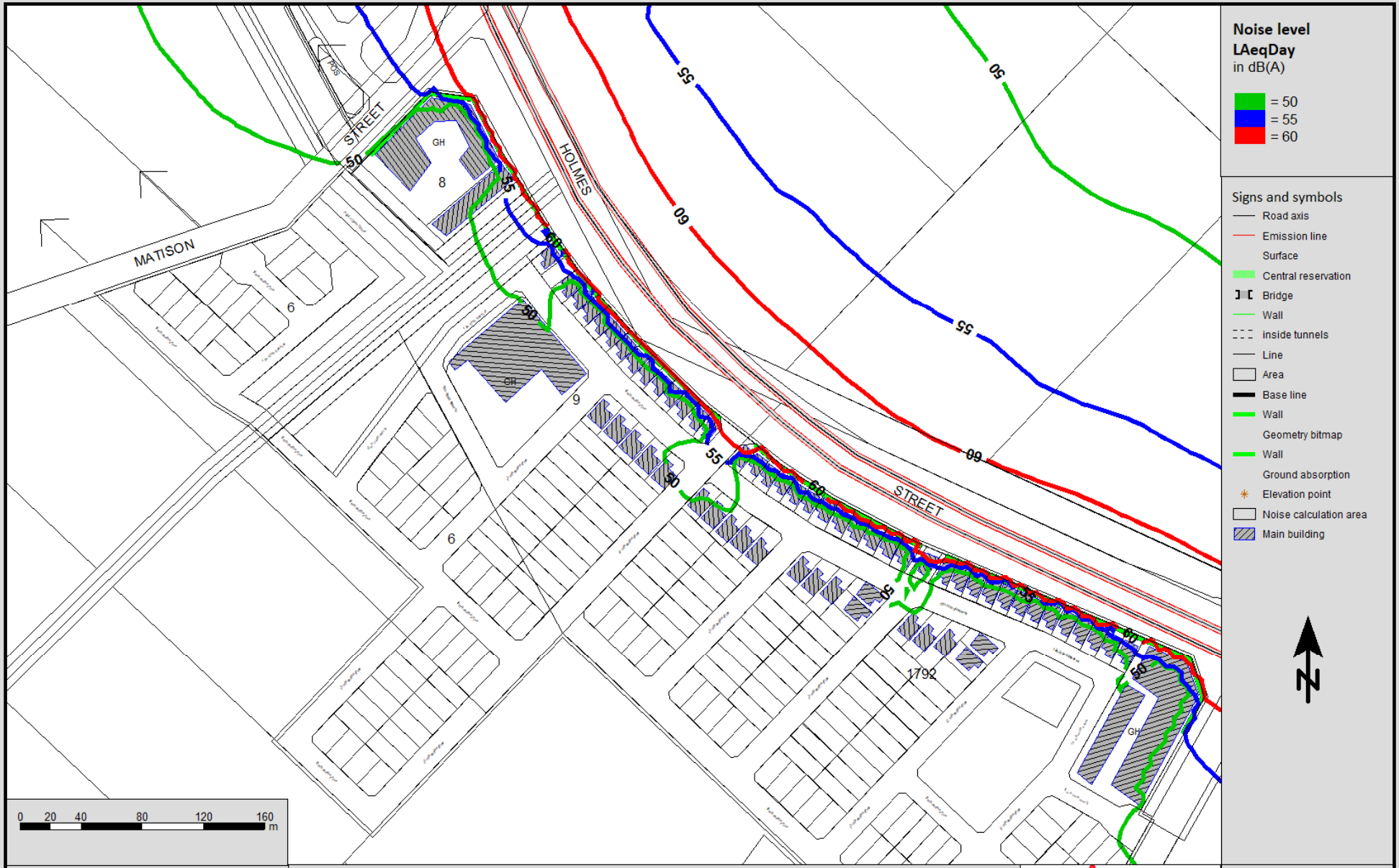
FIGURE A1 – CONCEPT SUBDIVISION PLAN



APPENDIX B

NOISE CONTOUR PLOT
FOR DAY PERIOD





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FUTURE TRAFFIC FLOW NOISE LEVEL CONTOUR PLOT
LAeqDAY NOISE LEVELS
INCLUDES 1.8 METRE WALL AND FUTURE RESIDENTIAL HOUSING

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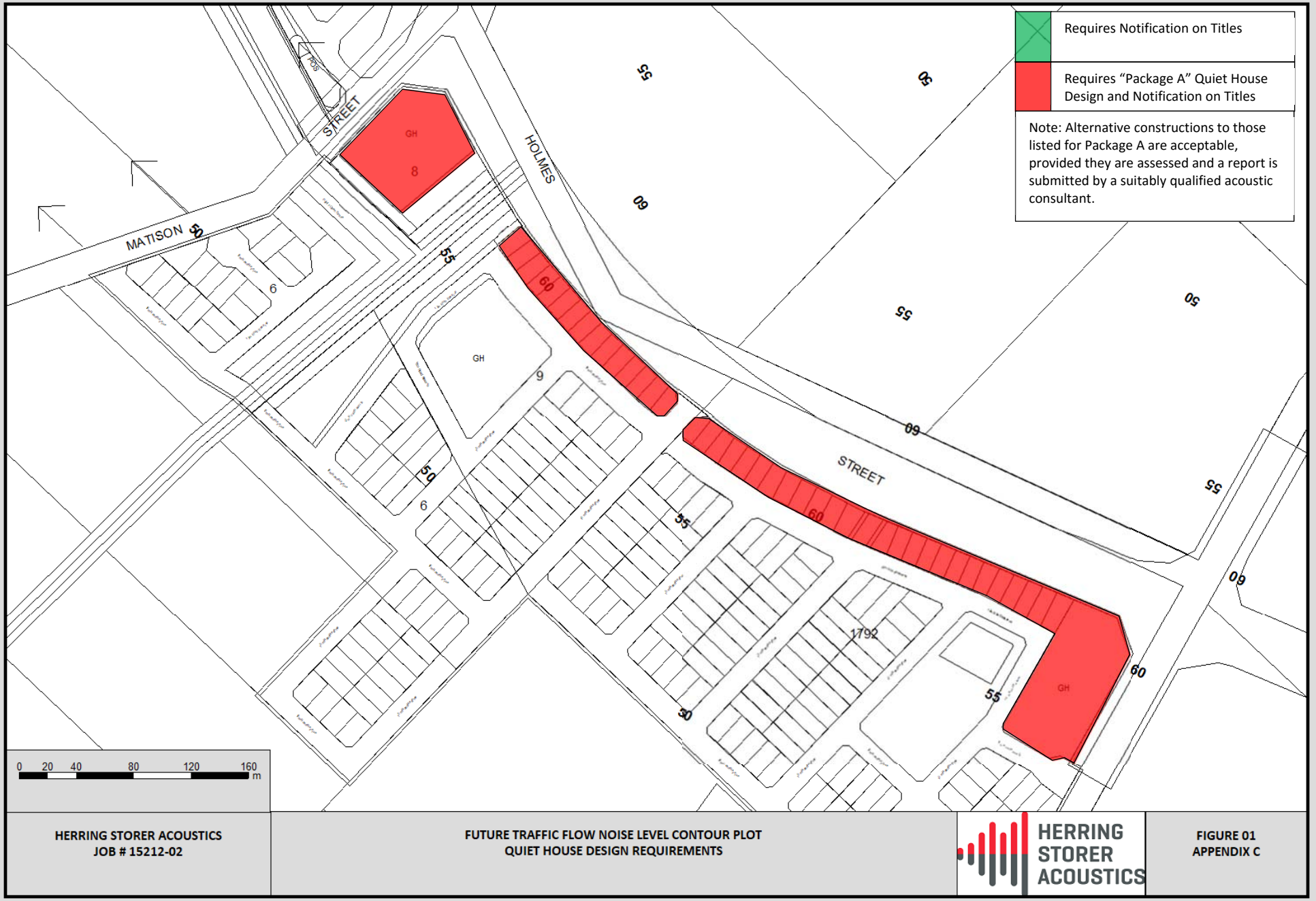
FIGURE 02
REF#13

APPENDIX C

"QUIET HOUSE"
DESIGN REQUIREMENTS



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FUTURE TRAFFIC FLOW NOISE LEVEL CONTOUR PLOT
QUIET HOUSE DESIGN REQUIREMENTS

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FIGURE 01
APPENDIX C

QUIET HOUSE DESIGN PACKAGES FOR RESIDENCE
AS TO BE NOTED ON THE LDP

Area	Orientation to road or rail corridor	Package A L_{Aeq},Day up to 60dB L_{Aeq},Night up to 55dB	Package B L_{Aeq},Day up to 63dB L_{Aeq},Night up to 58dB	Package C L_{Aeq},Day up to 65dB L_{Aeq},Night up to 60dB
Bedrooms	Facing	• Walls to R_w+C_{tr} 45dB • Windows and external door systems: Minimum R_w+C_{tr} 28dB (Table 6.4), total glazing area up to 40% of room floor area. [if R_w+C_{tr} 31dB: 60%] [if R_w+C_{tr} 34dB: 80%] • Roof and ceiling to R_w+C_{tr} 35dB (1 layer 10mm plasterboard) • Mechanical ventilation as per Section 6.3.1	• Walls to R_w+C_{tr} 50dB • Windows and external door systems: Minimum R_w+C_{tr} 31dB (Table 6.4), total glazing area up to 40% of room floor area. [if R_w+C_{tr} 34dB: 60%] • Roof and ceiling to R_w+C_{tr} 35dB (1 layer 10mm plasterboard) • Mechanical ventilation as per Section 6.3.1	• Walls to R_w+C_{tr} 50dB • Windows and external door systems: Minimum R_w+C_{tr} 34dB (Table 6.4), total glazing area limited to 40% of room floor area [if 20% of floor area or less, R_w+C_{tr} 31dB] • Roof and ceiling to R_w+C_{tr} 40dB (2 layers 10mm plasterboard) • Mechanical ventilation as per Section 6.3.1
	Side-on	•As above, except glazing Rw+Ctr values for each package may be 3dB less, or max % area increased by 20%		
	Opposite	• No requirements • As per Package A 'Side On' • As per Package A 'Facing'	• No requirements • As per Package A 'Side On' • As per Package A 'Facing'	• No requirements • As per Package A 'Side On' • As per Package A 'Facing'
Indoor living and work Areas	Facing	• Walls to Rw+Ctr 45dB • Windows and external door systems: Minimum Rw+Ctr 25dB (Table 6.4), total glazing area limited to 40% of room floor area. [if Rw+Ctr 28dB: 60%] [if Rw+Ctr 31dB: 80%] • External doors other than glass doors to Rw+Ctr 26dB (Table 6.4) • Mechanical ventilation as per Section 6.3.1	• Walls to Rw+Ctr 50dB • Windows and external door systems: Minimum Rw+Ctr 28dB (Table 6.4), total glazing area up to 40% of room floor area. [if Rw+Ctr 31dB: 60%] [if Rw+Ctr 34dB: 80%] • External doors other than glass doors to Rw+Ctr 26dB (Table 6.4) • Mechanical ventilation as per Section 6.3.1	• Walls to R_w+C_{tr} 50dB • Windows and external door systems: Minimum R_w+C_{tr} 31dB (Table 6.4), total glazing area up to 40% of room floor area. [if R_w+C_{tr} 34dB: 60%] • External doors other than glass doors to R_w+C_{tr} 30dB (Table 6.4) • Mechanical ventilation as per Section 6.3.1
	Side-on	• As above, except the glazing R_w+C_{tr} values for each package may be 3dB less, or max % area increased by 20%		
	Opposite	• No requirements	• As per Package A 'Side On'	• As per Package A 'Facing'
Other indoor areas	Any	• No requirements	• No requirements	• No requirements
Outdoor living areas	Any (Section 6.2.3)	• As per Package C, and/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	• As per Package C, and/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	• At least one outdoor living area located on the opposite side of the building from the transport corridor