HERRING STORER ACOUSTICS

PARCEL PROPERTY

LOTS 1006,1007 & 1272 BALDIVIS ROAD & LOT 1 SERPENTINE ROAD, BALDIVIS

LOCAL STRUCTURE PLAN

ROAD TRAFFIC NOISE ASSESSMENT

NOVEMBER 2018

OUR REFERENCE: 23719-3-18183

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FOR

PARCEL PROPERTY

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EXECUTIVE SUMMARY

Herring Storer Acoustics were commissioned by Parcel Property to carry out an acoustical assessment of noise received at the proposed development located at Lots 1006, 1007 and 1272 Baldivis Road, and Lot 1 Serpentine Road, Baldivis. This assessment was based on the structure plan, as attached in Appendix A.

The development abuts Kwinana Freeway on the eastern boundary and has an existing 2.4m noise wall situated at the boundary, between the development and the Freeway. This noise wall was constructed as a part of the design work for this section of the Freeway, therefore future noise levels onto the development have previously been considered.

Under the Western Australian Planning Commission (WAPC) Planning Policy 5.4 “Road and Rail Transport Noise and Freight Considerations in Land Use Planning” (SPP 5.4), the appropriate criteria for assessment for this development are:

EXTERNAL

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

Additional to the above, noise received at an outdoor 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.

For this development, the difference between the $L_{Aeq(16hr)}$ and the $L_{Aeq(8hr)}$ would be less than 5 dB(A). Therefore, the more critical period for compliance is the night period, hence if compliance with the night period criteria is achieved, then compliance with the day period criteria would also be achieved.

Noise modelling shows that noise received at some of the residence within the development would exceed the Policies "Noise Targets". However, for this development, due to the 2.4m Noise Wall previously constructed, noise levels for the future traffic flows are less than the Policies "Noise Limits". Therefore, to comply with the requirements of SPP 5.4, “Quiet House” design as shown on further in this report.

Additionally, notifications on titles are required are required for those residence where the noise received exceeds the “Noise Targets”.

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

> *This lot is situated in the vicinity of Kwinana Freeway and is currently affected, and / or may in the future be affected by transport noise.*

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1. INTRODUCTION

Herring Storer Acoustics were commissioned by Parcel Property to carry out an acoustical assessment of noise received at the proposed development located at Lots 1006, 1007 and 1272 Baldivis Road, and Lot 1 Serpentine Road, Baldivis. This assessment was based on the structure plan, as attached in Appendix A.

The development abuts Kwinana Freeway on the eastern boundary and has an existing 2.4m noise wall situated at the boundary, between the development and the Freeway. This noise wall was constructed as a part of the design work for the of this section of the Freeway, therefore future noise levels onto the development have previously been considered.
As part of the study, the following was carried out:

- Monitor noise levels at the proposed development site for current traffic flows on Kwinana Freeway.
- Determine by noise modelling the noise that would be received at residences within the development from vehicles travelling on the roadway (Kwinana Freeway) for the future.
- Assess the predicted noise levels for compliance with the appropriate criteria.
- If exceedances are predicted, comment on possible noise amelioration options for compliance with the appropriate criteria.

2. CRITERIA

2.1 STATE PLANNING POLICY 5.4

The 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 the development, 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 the following information regarding "Notifications on Titles" :

"5.7 - NOTIFICATION ON TITLE

If the measures outlined previously cannot practicably achieve the target noise levels for new noise-sensitive developments, this should be notified on the certificate of title.

Notifications on certificates of title and/or advice to prospective purchasers advising of the potential for noise impacts from major road and rail corridors can be effective in warning people who are sensitive to the potential impacts of transport noise. Such advice can also bring to the attention of prospective developers the need to reduce the impact of noise through sensitive design and construction of buildings and the location of outdoor living areas.

The notification is to ensure that prospective purchasers are advised of –

- *the potential for transport noise impacts; and*
- *the potential for quiet house design requirements to minimise noise intrusion through house layout and noise insulation (see the guidelines).*

Notification should be provided to prospective purchasers and be required as a condition of subdivision (including strata subdivision) for the purposes of noise-sensitive development as well as planning approval involving noise-sensitive development, where

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).

noise levels are forecast or estimated to exceed the target outdoor noise criteria, regardless of proposed noise attenuation measures. The requirement for notification as a condition of subdivision and the land area over which the notification requirement applies, should be identified in the noise management plan in accordance with the guidelines.

An example of a standard form of wording for notifications is presented in the guidelines."

2.2 APPROPRIATE CRITERIA

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

External	
Day	Target of 55 dB(A) L_{Aeq} ; Limit of 60 dB(A) L_{Aeq}
Night	Target of 50 dB(A) L_{Aeq} ; Limit 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) $L_{Aeq(day)}$

We note that there is a Draft State Planning policy currently out for comment. Although not applicable for this development, we note that draft policy applies an outdoor criteria to one outdoor area on each lot and then applies an internal criteria. Thus, under the draft policy, the acoustic criteria would be:

One Outdoor Area	
Day	Maximum of 55 dB(A) L_{Aeq}
Night	Maximum of 50 dB(A) L_{Aeq}
Internal	
Sleeping Areas	35 dB(A) $L_{Aeq(night)}$
Living Areas	40 dB(A) $L_{Aeq(day)}$

Although, the draft policy basically eliminates the Noise Limits, the requirements at an outdoor living area are the same for the current and draft policy. Therefore, for this development, the requirements of the current and draft policies are the same, and compliance with the current will also achieve compliance with the draft policy.

3. NOISE MONITORING

Noise logging was conducted on the site over a continuous period commencing Thursday 11th October 2018 to determine the existing traffic noise levels. The test location was approximately 35m from the nearest running edge of Kwinana Freeway and approximately 7m from the existing noise wall. Test instrumentation comprised an NGARA Noise Logger and Rion Calibrator. All equipment is NATA or factory calibrated with certification available upon request.

Additionally, short term hand held, observed measurements were conducted on site at two locations, the first within 10m of the noise wall and the second 150m from the noise wall, towards the centre of the development. The purpose of these measurements was to establish the drop off of noise levels into the development, hence quantifying the effect of the noise wall. These measurements were conducted at around 3pm as this is the time of day the traffic volumes are at a peak, as referenced by the MRWA traffic count website.

The test results are summarised in Table 3.1 with the graphical results contained in Appendix D.

TABLE 3.1: SUMMARY OF CONTINOUS MEASURED NOISE LEVELS

Parameter	Measured Level dB(A)	Difference between Parameters dB(A)
$L_{A10\ (18\ hour)}$	55.2	N/A
$L_{Aeq,\ day\ (6am\ to\ 10pm)}$	53.6	= $L_{A10\ (18\ hour)}$ – 1.6
$L_{Aeq,\ night\ (10pm\ to\ 6am)}$	49.6	= $L_{Aeq(day)}$ – 4.0

* It is normal practice to quote decibels to the nearest whole number. Fractions are retained here to minimise any cumulative rounding error.

TABLE 3.2: SUMMARY OF SHORT TERM MEASURED NOISE LEVELS

Parameter	Measured Level dB(A)	
	Location A (10m from Noise Wall)	Location B (150m from Noise Wall)
$L_{A10\ 15min}$	55.4	46.5
$L_{Aeq,\ 15min}$	52.5	45.3

* It is normal practice to quote decibels to the nearest whole number. Fractions are retained here to minimise any cumulative rounding error.

Figure 1 – Site Measurement Location Map

4. MODELLING

To determine the acoustic requirements, noise modelling was carried out using the computer program 'SoundPlan'. Modelling was carried out for road traffic flows 20 years in the future.

TABLE 4.1 - NOISE MODELLING INPUT DATA

Parameter	Value
Traffic flows (vehicles per day) 2018	50,000 vpd
Traffic flows (vehicles per day) 2031	65,000 vpd
Heavy Vehicles (%)	12.6%
Speed Limit (km/hr)	110
Road Surface	Chip Seal
Façade Correction	+2.5 dB(A)

Noise modelling was undertaken for the following scenario:

- 2018 traffic flows, existing noise wall configuration (calibration purposes).
- 2031 traffic flows, existing noise wall configuration and future residential development.

The results of the noise modelling are attached as noise contour plots in Appendix B.

5. PREDICTED FUTURE NOISE LEVELS

The noise level within the LSP for future road traffic volumes has been assessed as between 50 to 55 dB(A) during the most critical, "night period" at the façade of Lots abutting Kwinana Freeway. Detailed day and night period noise contour plots are contained in Appendix B.

Figure 5.1 below shows an example of the future road traffic volumes noise contour plot.

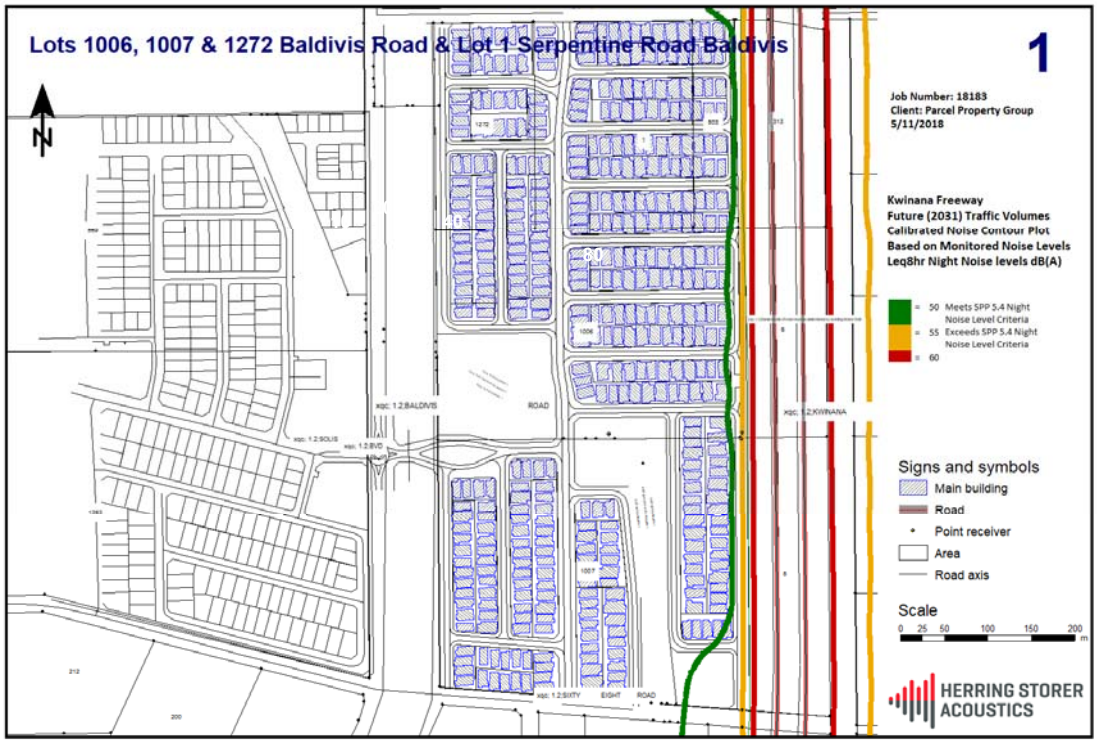


Figure 5.1 –Noise Contour Plot – Future Traffic

6. RECOMMENDATIONS

Noise modelling shows that noise received at some of the residence within the development would exceed the Policies "Noise Targets". However, as shown by Figure 6.1, for this development, due to the 2.4m Noise Wall previously constructed, noise levels for the future traffic flows are less than the Policies "Noise Limits". Therefore, to comply with the requirements of SPP 5.4, “Quiet House” design as shown on Figure C1 in Appendix C is required for these Lots.

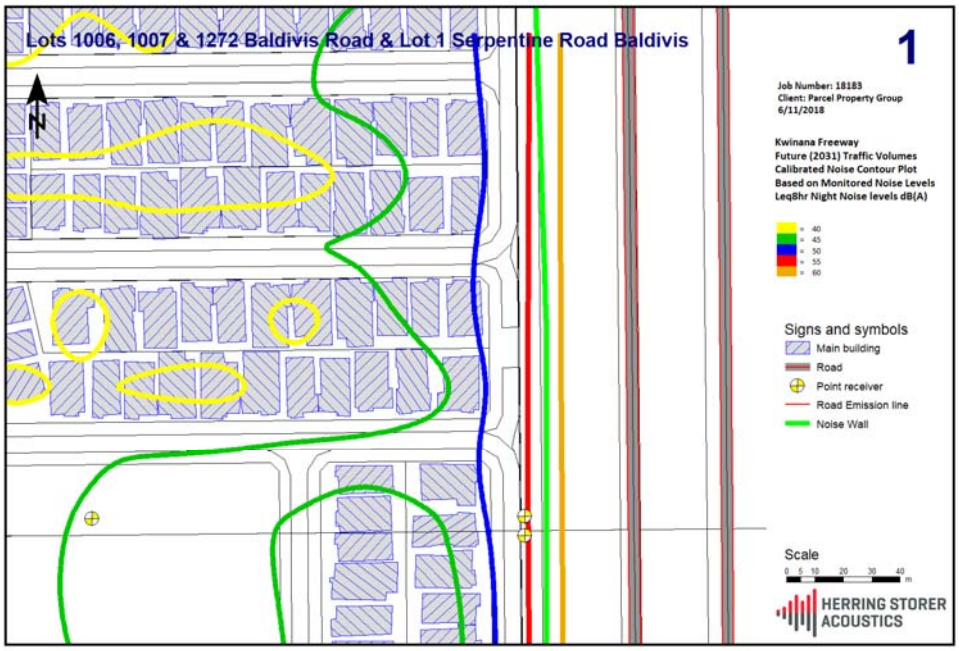


Figure 6.1 –Noise Contour Plot (Detailed) – Future Traffic

Due to the orientation of the Lots, i.e. generally facing Kwinana Freeway, the outdoor living areas are orientated towards the rear of the buildings, hence are shielded from road traffic noise. For the Lots which are side on to Kwinana Freeway the outdoor living area will be protected by side fencing. Therefore, noise received at the outdoor living areas will achieve an L_{Aeq} of 50 dB(A) or less during the night period.

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 and B “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 Kwinana Freeway and is currently affected, and / or may in the future be affected by transport noise.

Note: Alternative constructions to those listed for “Quiet House” Packages A and B are acceptable, provided they are assessed, and a report submitted by a suitably qualified acoustic consultant.

7. CONCLUSION

Under the Western Australian Planning Commission (WAPC) Planning Policy 5.4 “Road and Rail Transport Noise and Freight Considerations in Land Use Planning” (SPP 5.4), the appropriate criteria for assessment for this development are:

EXTERNAL

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

Additional to the above, noise received at an outdoor 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.

For this development, the difference between the $L_{Aeq(16hr)}$ and the $L_{Aeq(8hr)}$ would be less than 5 dB(A). Therefore, the more critical period for compliance is the night period, hence if compliance with the night period criteria is achieved, then compliance with the day period criteria would also be achieved.

Noise modelling shows that noise received at some of the residence within the development would exceed the Policies "Noise Targets". However, for this development, due to the 2.4m Noise Wall previously constructed, noise levels for the future traffic flows are less than the Policies "Noise Limits". Therefore, to comply with the requirements of SPP 5.4, “Quiet House” design as shown on further in this report.

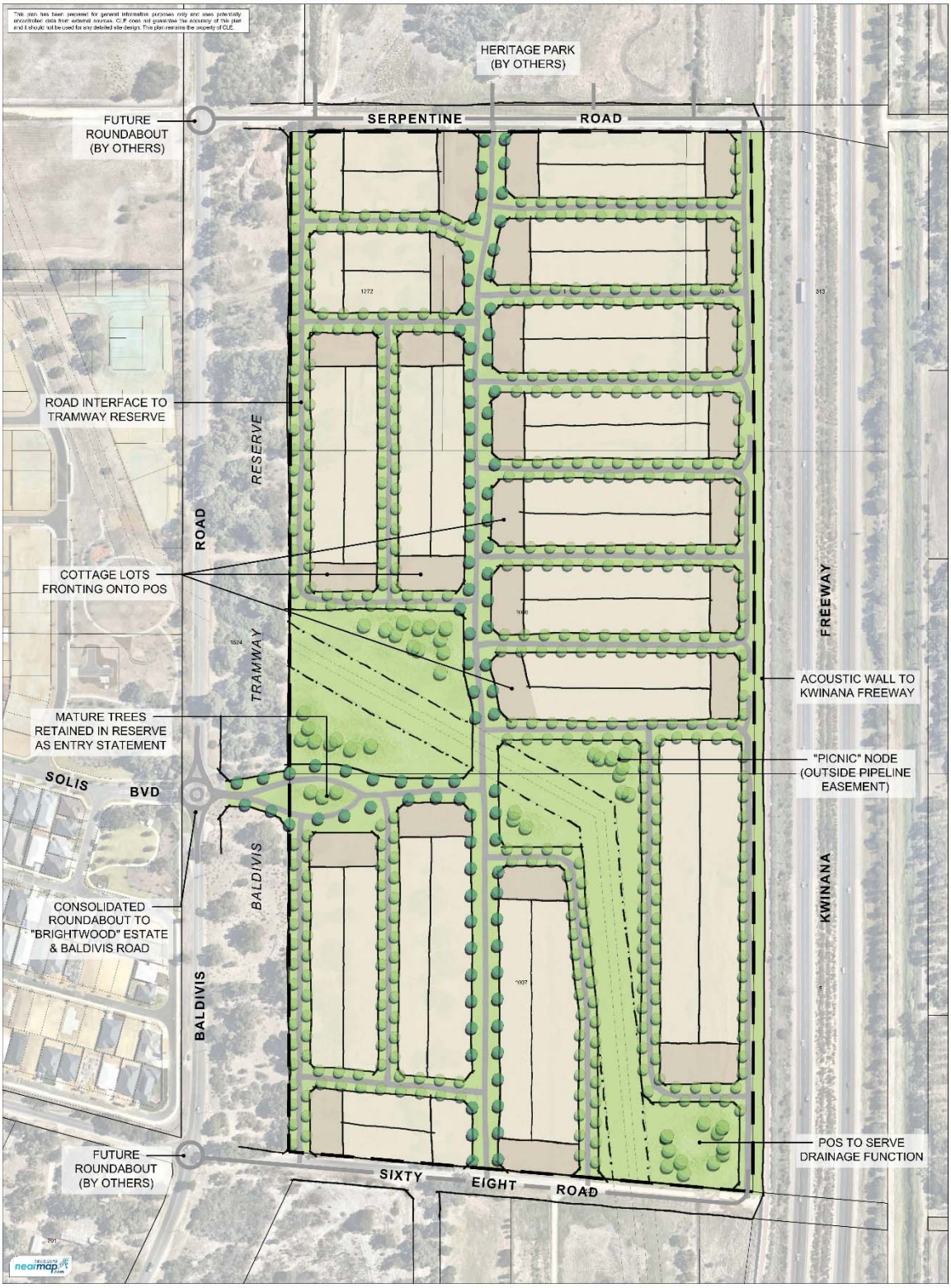
Additionally, notifications on titles are required are required for those residence where the noise received exceeds the “Noise Targets”.

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

> *This lot is situated in the vicinity of Kwinana Freeway and is currently affected, and / or may in the future be affected by transport noise.*

APPENDIX A

SITE LAYOUT



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DEVELOPMENT CONCEPT PLAN DRAFT

Lots 1006, 1007 & 1272 Baldivis Road & Lots 1 & 503 Serpentine Road, Baldivis

plan no: **3407-37-01**
date: 11 November 2018
scale: 1:2,500 @ A3, 1:1,250 @A1

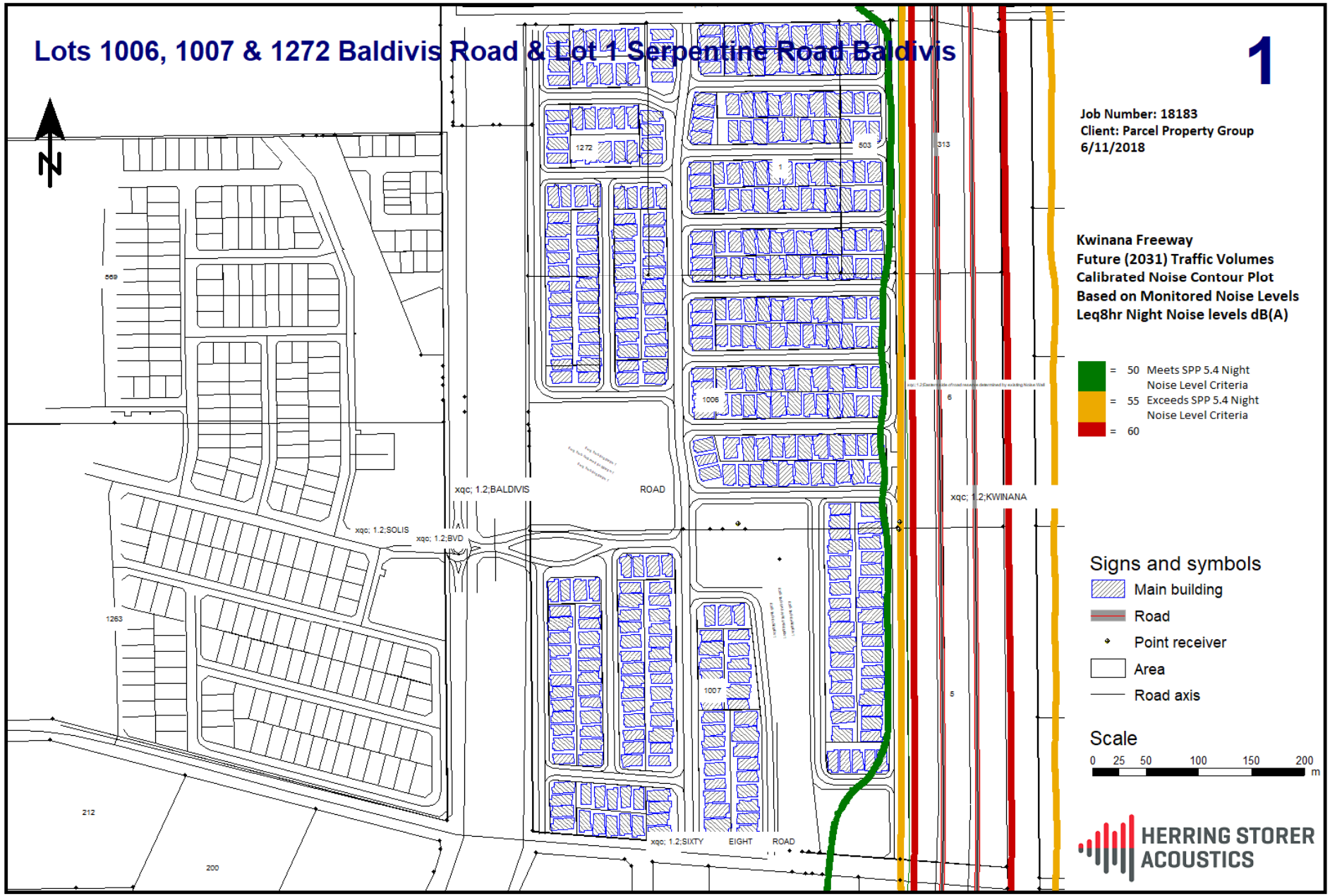
N

APPENDIX B

NOISE CONTOUR PLOTS

Lots 1006, 1007 & 1272 Baldivis Road & Lot 1 Serpentine Road Baldivis

1



Job Number: 18183
Client: Parcel Property Group
6/11/2018

Kwinana Freeway
Future (2031) Traffic Volumes
Calibrated Noise Contour Plot
Based on Monitored Noise Levels
Leq8hr Night Noise levels dB(A)

= 50 Meets SPP 5.4 Night Noise Level Criteria
= 55 Exceeds SPP 5.4 Night Noise Level Criteria
= 60

Signs and symbols

- Main building
- Road
- Point receiver
- Area
- Road axis

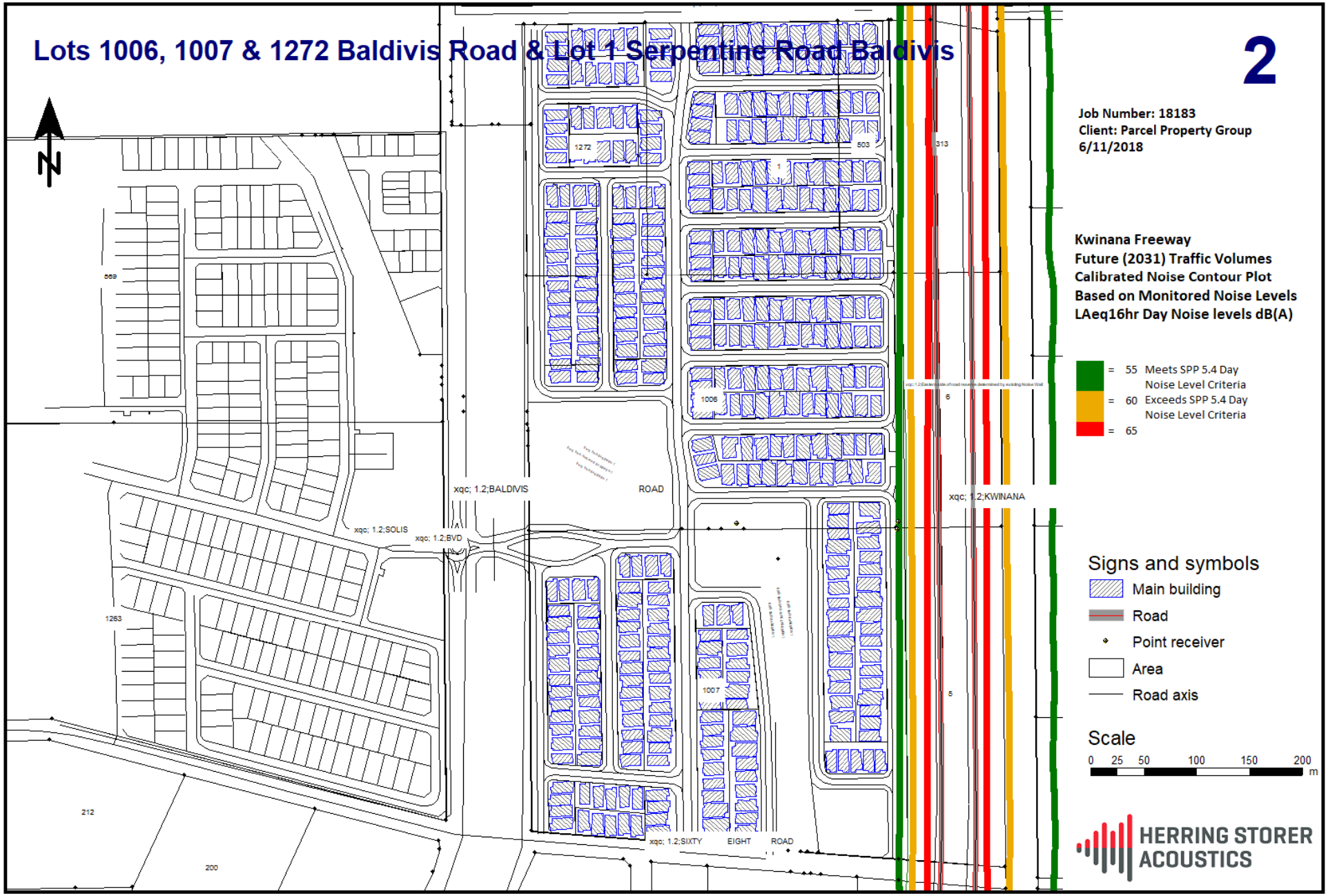
Scale

0 25 50 100 150 200 m

HERRING STORER ACOUSTICS

Lots 1006, 1007 & 1272 Baldivis Road & Lot 1 Serpentine Road Baldivis

2



Job Number: 18183
Client: Parcel Property Group
6/11/2018

Kwinana Freeway
Future (2031) Traffic Volumes
Calibrated Noise Contour Plot
Based on Monitored Noise Levels
LAeq16hr Day Noise levels dB(A)

= 55 Meets SPP 5.4 Day Noise Level Criteria
= 60 Exceeds SPP 5.4 Day Noise Level Criteria
= 65

Signs and symbols

- Main building
- Road
- Point receiver
- Area
- Road axis

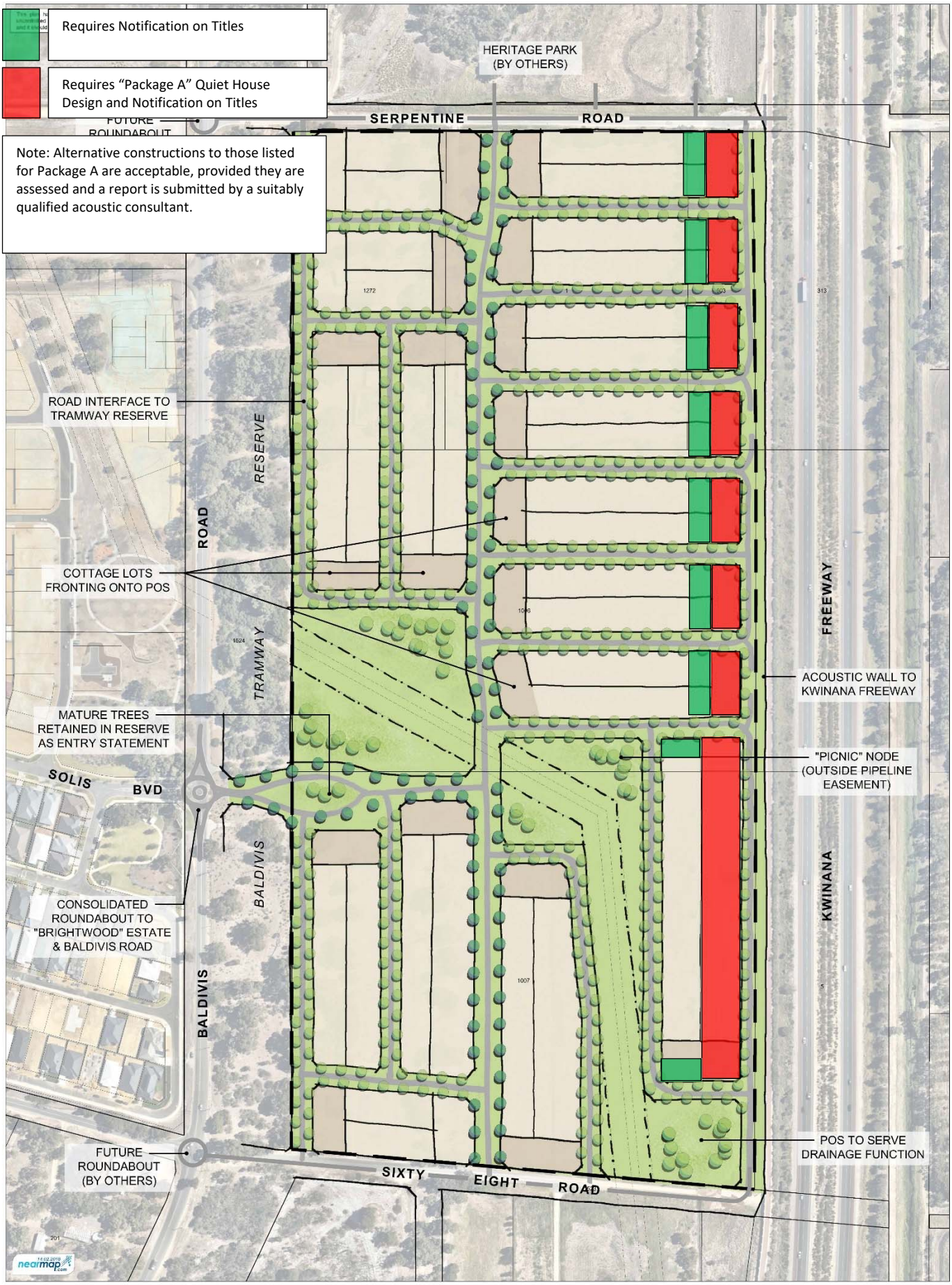
Scale

0 25 50 100 150 200 m

HERRING STORER ACOUSTICS

APPENDIX C

QUIET HOUSE DESIGN



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DEVELOPMENT CONCEPT PLAN DRAFT

Lots 1006, 1007 & 1272 Baldivis Road & Lots 1 & 503 Serpentine Road, Baldivis

plan no: 3407-37-01
date: 11 November 2018
scale: 1:2,500 @ A3, 1:1,250 @A1

N

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

For those residence exposed to traffic noise, the deemed to satisfy Quiet House Design requirements are as outlined below.

AREA TYPE	ORIENTATION	PACKAGE A
Bedrooms	Facing Road	Casement or awning windows with 6.38mm laminated glass Enclosed eaves No external doors No vents to outside walls/eaves
	Side-on to Road	Casement or awning windows with 6.38mm laminated glass Enclosed eaves
	Away from Road	No Requirements
Living and Work Areas	Facing Road	Casement or awning windows with 6.38mm laminated glass Enclosed eaves 35mm (min) solid core front door with acoustic seals Sliding doors to be fitted with acoustic seals No vents to outside walls/eaves
	Side-on to Road	Casement or awning windows with 6mm glass Enclosed eaves
	Away from Road	No Requirements

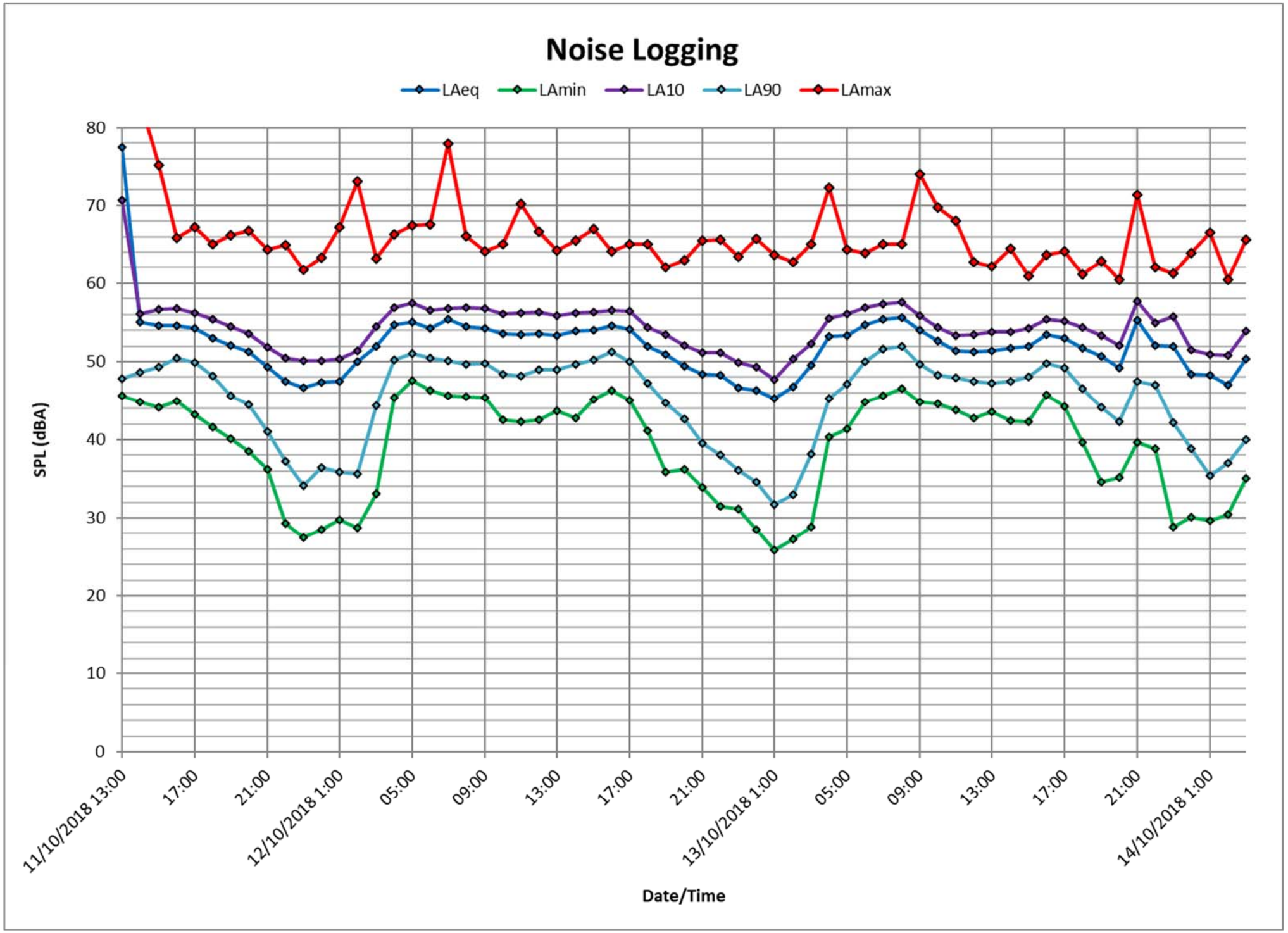
Notes :

1. Alternative constructions are acceptable, provided they are assessed to comply with the internal acoustic criteria as outlined in State Planning Policy 5.4 and a report is submitted by a suitably qualified acoustic consultant.

   Where mechanical ventilation / air conditioning is installed then it shall not compromise the internal compliance for noise levels.

APPENDIX D

MONITORING DATA


Noise Logging
LAeq
LAmin
LA10
LA90
LAmax
SPL (dBA)
80
70
60
50
40
30
20
10
0
11/10/2018 13:00
17:00
21:00
12/10/2018 1:00
05:00
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Date/Time