HERRING STORER ACOUSTICS

LOT 5131 JANDAKOT ROAD, TREEBY
SUBDIVISION PLAN

JANDAKOT ROAD TRAFFIC (SPP 5.4)
NOISE MANAGEMENT PLAN

DECEMBER 2021

OUR REFERENCE: 28808-2-18220-02

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

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NOISE MANAGEMENT PLAN
LOT 5131 JANDAKOT ROAD, TREEBY

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FOR

EWH Pty Ltd

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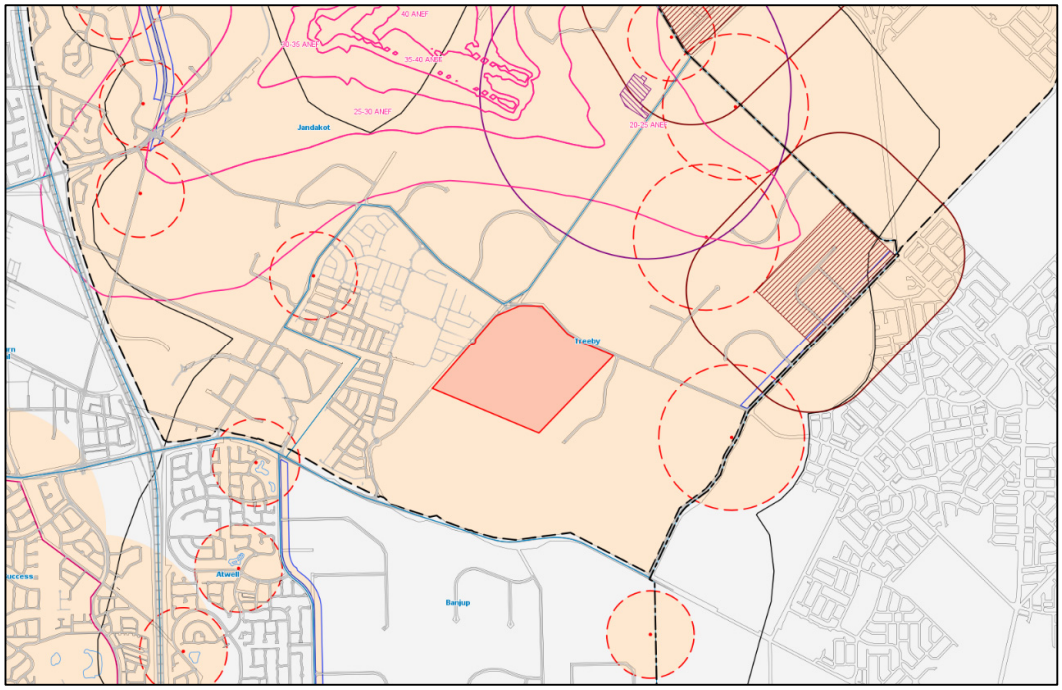
APPENDICIES

EXECUTIVE SUMMARY

Herring Storer Acoustics have been commissioned by EWH Pty Ltd to carry out an acoustical assessment of the proposed subdivision of various Lots on the norther side of Jandakot Road, Jandakot.

The proposed residential estate is potentially impacted by noise from road traffic (Jandakot Road), and aircraft associated with Jandakot Airport with the figure below showing the City Cockburn's advice in regard to noise impacts.



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

ROAD TRAFFIC

External

Day	Maximum of 55 dB(A) L_{Aeq}
Night	Maximum of 50 dB(A) L_{Aeq}
Outdoor Living Areas*	Maximum of 50 dB(A) $L_{Aeq\ (night\ period)}$

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

Internal

Sleeping Areas	35 dB(A) $L_{Aeq(night)}$
Living Areas	40 dB(A) $L_{Aeq(day)}$

AIRCRAFT NOISE

Internal

Sleeping areas	50 dB(A) L_{Amax}
Other habitable spaces	55 dB(A) L_{Amax}

ROAD NOISE

Under the WAPC State Planning Policy 5.4, for this development, the appropriate "Noise Targets" to be achieved under SPP 5.4, external to a residence are:

External

Day	Maximum of 55 dB(A) L_{Aeq}
Night	Maximum of 50 dB(A) L_{Aeq}

The policy states that the "outdoor targets are to be met at all outdoor areas as far as reasonable and practical to do so using the various noise mitigation measures outlined in the guidelines". The Policy also states, under Section 6 – Policy Measures that "a reasonable degree of acoustic amenity for living areas on each residential lot". The policy recognises that "it may not be practicable to meet the outdoor noise targets".

The Policy states the following acceptable internal noise levels:

Internal

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

For this development, compliance with the requirements of SP 5.4, noise modelling and assessment are based on the day period for residence located adjacent to Jandakot Road.

The results of the acoustic assessment indicate that noise received at residences located adjacent to Jandakot Road would exceed the "Noise Targets" as outlined in SPP 5.4. To comply with the requirements of SPP 5.4, the following noise mitigation methods are recommended:

- Construct a 2.4 metre wall along the northern boundary of the development, facing Jandakot Road.
- For residence backing on to Jandakot Road (i.e., back yards bounding the 2.4m noise wall), Quiet House design as outlined in Appendix C will be required.
- Additionally, these residences also require Notifications on Titles.

It is noted that under the policy, that for those residences where noise would exceed the "Noise Target", notification of vehicle noise will need to be stated on the titles. These residences are indicated on Figure C1, attached in Appendix C. Information on Packages A and B "Quiet House" design measures are also attached in Appendix D.

Notes:

1 Given the location of the development and the projected market, we understand that 2 storey residences are unlikely, hence the Quiet House Design is for single storey residence only. If double storey residences are proposed, then it is recommended that specialist acoustic advice be sought by the proponent.

2 We understand that the development is a structure plan stage, hence the information contained in Appendix D regarding areas requiring "Quiet House" design will need to be refined once the lots have been defined. Additionally, any modifications to the Structure Plan, would vary the noise mitigation requirements relating to barriers and "Quiet House" design outlined in Appendix C.

3 The summary of the Quiet House Design Packages are attached in Appendix D, are "Deemed to Satisfy" constructions. Alternative constructions would be acceptable, provided they are supported by an acoustic report prepared by a suitably qualified acoustic consultant.

The noise wall at the boundary of the development is required to be a minimum of 15kg/m^2 which is generally masonry / concrete or the like.

AIRCRAFT NOISE

Based on guidance from SPP 5.3, the majority of the northern section of the proposed development site is acceptable (Conditionally) for residential development, as indicated in Figure 5.3.

The blue area (ANEF 20 to 25) is also acceptable for residential development, although it requires conditions. These conditions are such that the internal noise level (for aircraft noise events) is to meet the criteria contained in AS2021. The affected lots within this development are those within the blue contour as noted in Figure 5.3.

Further to the criteria contained in SPP 5.3, the City of Cockburn LPP 1.12 contains advice as follows:

> *Consideration should be given to noise attenuation for noise sensitive premises within the Frame area corresponding to the requirements of Western Australian Planning Commission publication "Aircraft Noise Insulation for Residential Development in the Vicinity of Perth Airport" 2004 (such as the installation of 6.38mm laminated glazing), in order to ensure that residential amenity is adequately protected within noise sensitive developments.*

Hence, whilst at this stage of the development the lot configuration and layout are not known, a preliminary "deemed to satisfy construction" has been provided within this report. This can form the basis of future concept designs and can be refined at building licence staging. This encompasses the Frame Area for which the entire development is located within the boundaries.

1. INTRODUCTION

Herring Storer Acoustics was commissioned by EWH Pty Ltd, on behalf of Perron Developments Pty Ltd to undertake an acoustical assessment of noise received within the proposed Subdivision Plan at Lot 5131 Jandakot Road, Treeby.

The proposed subdivision is potentially impacted by noise from the following noise sources:

- Road Traffic Noise- Jandakot Road.
- Aircraft Noise – Aircrafts associated with Jandakot Airport.

The objectives of the study were to:

- Determine by noise modelling the noise levels that would be received at residences within the development from vehicles travelling on the future Jandakot Road.
- Assess the predicted noise levels received at residence for compliance with the requirements of the WAPC State Planning Policy 5.4 "Road and Rail Noise" (SPP 5.4).
- If exceedances are predicted, comment on possible noise amelioration options for compliance with the appropriate criteria.
- Assess the predicted noise levels received at residence for compliance with the requirements of the WAPC State Planning Policy 5.3 "Land Use Planning in the Vicinity of Jandakot Airport" (SPP 5.3).
- Consider impacts of any other noise sources, in accordance with the City of Cockburn's Local Planning Policy 1.12 (LPP 1.12).

It is noted that Jandakot Road is currently undergoing a major upgrade as a part of the City of Cockburn Jandakot Road Upgrade Project.

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

2. CRITERIA

2.1 NOISE INGRESS INTO DEVELOPMENT

The Western Australian Planning Commission (WAPC) released on 6th September 2019 State Planning Policy 5.4 *"Road and Rail Noise".* The requirements of State Planning Policy 5.4 are outlined below.

POLICY APPLICATION (Section 4)

When and where it applies (Section 4.1)

SPP 5.4 applies to the preparation and assessment of planning instruments, including region and local planning schemes; planning strategies, structure plans; subdivision and development proposals in Western Australia, where there is proposed:

*a) noise-sensitive land-use within the policy's trigger distance of a transport corridor as specified in **Table 1**.*

*b) New or major upgrades of roads as specified in **Table 1** and maps **(Schedule 1,2 and 3);** or*

*c) New railways or major upgrades of railways as specified in maps (**Schedule 1, 2 and 3);** or any other works that increase capacity for rail vehicle storage or movement and will result in an increased level of noise.*

Policy trigger distances (Section 4.1.2)

***Table 1** identifies the State's transport corridors and the trigger distances to which the policy applies.*

*The designation of land within the trigger distances outlined in **Table 1** should not be interpreted to imply that land is affected by noise and/or that areas outside the trigger distances are un-affected by noise.*

*Where any part of the lot is within the specified trigger distance, an assessment against the policy is required to determine the likely level of transport noise and management/ mitigation required. An initial screening assessment (**guidelines: Table 2: noise exposure forecast**) will determine if the lot is affected and to what extent."*

TABLE 1: TRANSPORT CORRIDOR CLASSIFICATION AND TRIGGER DISTANCES

Transport corridor classification	***Trigger distance***	***Distance measured from***
Roads		
Strategic freight and major traffic routes *Roads as defined by Perth and Peel Planning Frameworks and/or roads with either 500 or more Class 7 to 12 Austroads vehicles per day, and/or 50,000 per day traffic volume*	*300 metres*	*Road carriageway edge*
Other significant freight/traffic routes *These are generally any State administered road and/or local government road identified as being a future State administered road (red road) and other roads that meet the criteria of either >=23,000 daily traffic count (averaged equivalent to 25,000 vehicles passenger car units under region schemes)*	*200 metres*	*Road carriageway edge*
Passenger railways		
	100 metres	*Centreline of the closest track*
Freight railways		
	200 metres	*Centreline of the closest track*

Proponents are advised to consult with the decision making authority as site specific conditions (significant differences in ground levels, extreme noise levels) may influence the noise mitigation measures required, that may extend beyond the trigger distance.

POLICY MEASURES (Section 6)

The policy applies a performance-based approach to the management and mitigation of transport noise. The policy measures and resultant noise mitigation will be influenced by the function of the transport corridor and the type and intensity of the land-use proposed. Where there is risk of future land-use conflict in close proximity to strategic freight routes, a precautionary approach should be applied. Planning should also consider other broader planning policies. This is to ensure a balanced approach takes into consideration reasonable and practical considerations.

Noise Targets (Section 6.1)

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

In the application of the noise targets the objective is to achieve:

- *indoor noise levels as specified in **Table 2** in noise sensitive areas (for example, bedrooms and living rooms of houses, and school classrooms); and*

- *a reasonable degree of acoustic amenity for outdoor living areas on each residential lot. For non-residential noise-sensitive developments, for example schools and child care centres the design of outdoor areas should take into consideration the noise target.*

It is recognised that in some instances, it may not be reasonable and/or practicable to meet the outdoor noise targets. Where transport noise is above the noise targets, measures are expected to be implemented that balance reasonable and practicable considerations with the need to achieve acceptable noise protection outcomes.

TABLE 2: NOISE TARGETS

Proposals	***New/Upgrade***	***Noise Targets***		
		Outdoor		***Indoor***
		Day (L_{Aeq}(Day) dB) (6 am-10 pm)	***Night (L_{Aeq}(Night)dB) (10 pm-6 am)***	***(L_{Aeq} dB)***
Noise-sensitive land-use and/or development	*New noise sensitive land use and/or development within the trigger distance of an existing/proposed transport corridor*	*55*	*50*	*L_{Aeq} (Day) 40(Living and work areas)* *L_{Aeq} (Night) 35 (bedrooms)*
Roads	*New*	*55*	*50*	*N/A*
	Upgrade	*60*	*55*	*N/A*
Railways	*New*	*55*	*50*	*N/A*
	Upgrade	*60*	*55*	*N/A*

Notes:

- *The noise target is to be measured at one metre from the most exposed, habitable façade of the proposed building, which has the greatest exposure to the noise-source. A habitable room has the same meaning as defined in State Planning Policy 3.1 Residential Design Codes.*

- *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.*

- *The 5dB difference in the criteria between new and upgrade infrastructure proposals acknowledges the challenges in achieving noise level reduction where existing infrastructure is surrounded by existing noise-sensitive development.*

- *Outdoor targets are to be met at all outdoor areas as far as is reasonable and practical 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.*

Noise Exposure Forecast (Section 6.2)

*When it is determined that SPP 5.4 applies to a planning proposal as outlined in Section 4, proponents and/or decision makers are required to undertake a preliminary assessment using **Table 2**: noise exposure forecast in the guidelines. This will provide an estimate of the potential noise impacts on noise-sensitive land-use and/ or development within the trigger distance of a specified transport corridor. The outcomes of the initial assessment will determine whether:*

- *no further measures are required.*
- *noise-sensitive land-use and/or development is acceptable subject to deemed-to-comply mitigation measures; or*
- *noise-sensitive land-use and/or development is not recommended. Any noise-sensitive land-use and/ or development is subject to mitigation measures outlined in a noise management plan."*

2.2 STATE PLANNING POLICY 5.3 LAND USE IN THE VICINITY OF JANDAKOT AIRPORT

AS2021: Acoustics – Aircraft Noise Intrusion-Building Siting and Construction, provides guidelines for determines the type of building construction necessary to provide a given noise reduction, given that external windows and doors are closed.

Additionally, guidance has been sought from *State Planning Policy 5.3 Land use in the vicinity of Jandakot airport.*

2.2.1 Building Site Acceptability

AS2021:2015 lists the building types compared to the acceptable ANEF contour in Table 2.1 of AS2021:2015. The applicable building types are reproduced in Table 1 below.

TABLE 1 – ANEF ACCEPTABILITY FOR SITING AND CONSTRUCTION

Building Type	ANEF zone of Site		
	Acceptable	**Conditionally Acceptable**	**Unacceptable**
House, home unit, flat, caravan park	Less than 20 ANEF	20 to 25 ANEF	Greater than 25 ANEF

AS2021:2015 *"Acoustics – Aircraft Noise Intrusion-Building Siting and Construction"* provides guidelines for determining the type of building construction necessary to provide a given noise reduction, given that external windows and doors are closed.

Indoor design sound levels for determination of aircraft noise reductions are given as follows:

Sleeping areas
- 50 dB(A)

Other habitable spaces
- 55 dB(A)

For commercial buildings:

Private offices	
-	55 dB(A)
Open offices	
-	65 dB(A)
Shops, showrooms etc.	
-	75 dB(A)
Industrial	
-	75 dB(A)

We note that the above noise levels are maximum noise levels.

2.3 CITY OF COCKBURN LOCAL PLANNING POLICY 1.12 – NOISE ATTENUATION

An Acoustic Report must accompany a Structure Plan, variations to a Structure Plan that materially alter the Plans intent or a Local Development Plan. The Acoustic Report shall be prepared in accordance with the attached City of Cockburn Noise Attenuation Guidelines where:

1. Noise sensitive development is proposed in the vicinity of an existing or future major road, rail infrastructure or a freight handling facility as required by SPP 5.4.
2. The land is located within either the Core Area or Frame Area for Jandakot Airport as identified by SPP 5.3; or
3. Noise sensitive development and commercial, industrial or light industry land uses, or essential infrastructure are proposed in close proximity.

2.3.1 NOISE INTRUSION (NOISE SENSITIVE DEVELOPMENT)

1. Noise sensitive developments are to be designed to achieve the following sound levels:

   (a) L_{eq} 35 dB(A) in sleeping areas (bedrooms); and
   (b) L_{eq} 40 dB(A) in living/work areas and other habitable rooms.

   IMPORTANT NOTE:
   The L_{eq} level should not be unduly biased toward the lower frequencies of the octave band spectrum. If lower frequencies are dominant in sound levels taken during the sampling phase of reporting (below 200Hz or a 15-20dB difference between L_A and L_C levels), the Acoustic Consultant shall discuss the findings with the City in developing appropriate solutions to ensure that low frequency noise is appropriately attenuated, prior to the submission of the final Acoustic Report.

2. For all other developments, noise intrusion is to be controlled to achieve the indoor design sound levels for buildings as set out in Australian Standard AS/NZS2107: “Acoustics - Recommended Design Sound Levels and Reverberation Times for Building Interiors”.
3. For noise sensitive developments in close proximity to road and rail infrastructure, the report must address the requirements of SPP 5.4, including the requirement for a reasonable degree of acoustic amenity in at least one outdoor living area.

4. For noise sensitive developments in close proximity to freight rail infrastructure or other sources of vibration, the Acoustic Report should also address ground borne vibration levels to ensure that occupants of the development are not exposed to an unacceptable level of vibration. The report should make reference to:
   (a) Australian Standard 2670.2-1990 "Evaluation of human exposure to whole-body vibration; Part 2: Continuous and shock induced vibration in buildings (1 to 80 Hz)"
   (b) ISO 2631-2:2003 "Evaluation of human exposure to whole-body vibration Part 2: Vibration in buildings (1 Hz to 80 Hz)";
   (c) British Standard BS6472-2008: "Evaluation of Human Exposure to Vibration in Buildings (1 Hz to 80 Hz)".
5. Residential developments are to be constructed to meet the requirements of the National Construction Code (as amended) and the Building Code of Australia Part F5 (as amended).

2.3.2 NOISE SOURCE IDENTIFICATION

Acoustic reports must identify all noise sources relevant to a development, including those which may require detailed assessment at a later stage. Ambient environmental noise sources that are relevant within the City of Cockburn include the following:

1. Noise from Road, Rail and Freight Infrastructure
2. Breakout and Street Noise
3. Mechanical Plant and Equipment
4. Co-existing Land Uses
5. Noise Sensitive Developments in Proximity to Jandakot Airport

2.4 APPROPRIATE CRITERIA

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

ROAD TRAFFIC AND RAIL NOISE

External

Day	Maximum of	55 dB(A) L_{Aeq}
Night	Maximum of	50 dB(A) L_{Aeq}
Outdoor Living Areas*		Maximum of 50 dB(A) $L_{Aeq\ (night\ period)}$

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

Internal

Sleeping Areas	35 dB(A) $L_{Aeq(night)}$
Living Areas	40 dB(A) $L_{Aeq(day)}$

AIRCRAFT NOISE

Internal

Sleeping areas	50 dB(A) L_{Amax}
Other habitable spaces	55 dB(A) L_{Amax}

3. NOISE MONITORING

Due to the ongoing construction of Jandakot Road through this area, current noise monitoring is not able to be undertaken as the road traffic is not representative of normal conditions.

4. MODELLING

The future road traffic volumes were based on information provided by the MRWA traffic maps and by the Traffic Impact Assessment (Cardno reference *CW1193100*).

Predictive noise modelling has allowed for the following traffic data. It is noted that where available on the MRWA traffic maps site, current traffic counts were used.

Other information relevant to the calculations are shown below in Table 4.1.

TABLE 4.1 - NOISE MODELLING INPUT DATA

Parameter	Traffic Flow VPD Current	Traffic Flow VPD Future (2041)	Traffic Speed km/hr	Road Surface
Traffic flows VPD Jandakot Road North West Bound	*10,116 (8.3%)	22,610 (8.3%)	80	Asphalt
Traffic flows VPD Jandakot Road South East Bound	*8,145 (8.3%)	16,430 (8.3%)	80	Asphalt

* Based on current traffic counts (2019/20)

Other input data for the model included:

- Traffic data from MRWA (https://mrapps.mainroads.wa.gov.au/TrafficMap/) and Traffic Impact Assessment - Proposed MRS Amendment – Jandakot Road, Jandakot, (Cardno reference *CW1193100*) as attached in Appendix C.
- Noise source heights for the three road source strings (Passenger Vehicles, Heavy Vehicles Engine and Heavy Vehicle Exhausts) are +0.5, +1.5 and +3.6m, with a noise correction of -0.8 and -8.0 applied to the heavy vehicles engine and exhaust noise sources.
- Topographical data, with the ground level within the development based on natural ground levels as surveys conducted.
- A +2.5 dB adjustment to allow for façade reflection.
- Development receiver heights at 1.4m above ground level.
- Calculations based on CoRTN algorithms.
- Other parameter listed in SPP 5.4 as to guidance for modelling road traffic noise / assessment.

To determine the noise that would be received within the development from the surrounding road network, acoustic modelling was carried out using the computer program 'SoundPlan'.

The following scenario was modelled:

- Current Traffic flows, with existing walls and surrounding residential housing.
- Future traffic flows and road design No Noise Control.
- Future traffic flows and road design with Noise Walls

Based on the above, the noise contours plot for day period for the above modelling scenario is attached in Appendix B.

5. RESULTS / ASSESSMENT

5.1 ROAD TRAFFIC

Under the WAPC State Planning Policy 5.4, for this development, the appropriate "Noise Targets" to be achieved under SPP 5.4, external to a residence are:

External
Day Maximum of 55 dB(A) L_{Aeq}
Night Maximum of 50 dB(A) L_{Aeq}

The policy states that the "outdoor targets are to be met at all outdoor areas as far as reasonable and practical to do so using the various noise mitigation measures outlined in the guidelines". The Policy also states, under Section 6 – Policy Measures that "a reasonable degree of acoustic amenity for living areas on each residential lot". The policy recognises that "it may not be practicable to meet the outdoor noise targets".

The Policy states the following acceptable internal noise levels:

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

For this development, compliance with the requirements of SPP 5.4, noise modelling and assessment are based on the day period.

The results of the acoustic assessment indicate that noise received at the proposed residential development would generally exceed the "Noise Targets" as outlined in SPP 5.4. These are identified below in Figure 5.1 and are discussed further below.

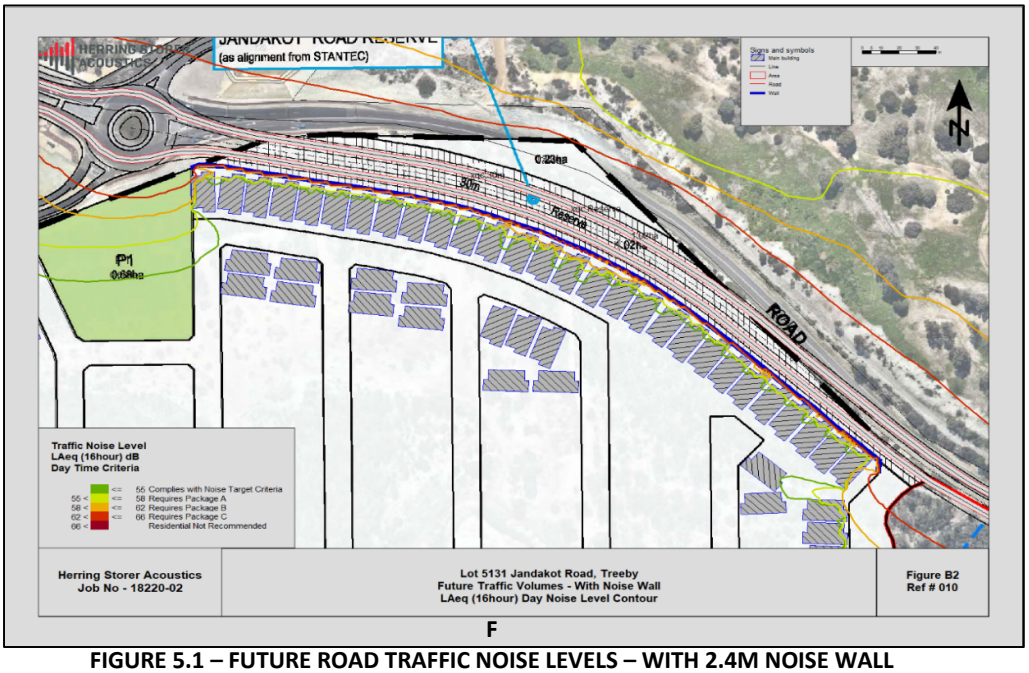


FIGURE 5.1 – FUTURE ROAD TRAFFIC NOISE LEVELS – WITH 2.4M NOISE WALL

The results of the acoustic assessment indicate that noise received at residences located adjacent to Jandakot Road would exceed the "Noise Targets" as outlined in SPP 5.4. To comply with the requirements of SPP 5.4, the following noise mitigation methods are recommended:

- Construct a 2.4 metre wall along the northern boundary of the development, facing Jandakot Road.
- For residence backing on to Jandakot Road (i.e., back yards bounding the 2.4m noise wall), Quiet House design as outlined in Appendix C will be required.
- Additionally, these residences also require Notifications on Titles.

It is noted that under the policy, that for those residences where noise would exceed the "Noise Target", notification of vehicle noise will need to be stated on the titles. These residences are indicated on Figure C1, attached in Appendix C. Information on Packages A and B "Quiet House" design measures are also attached in Appendix D.

5.2 AIRCRAFT NOISE

Based on guidance from SPP 5.3, the proposed development site is acceptable for residential development as it is outside the ANEF 20 contour, as indicated in Figure 5.2.

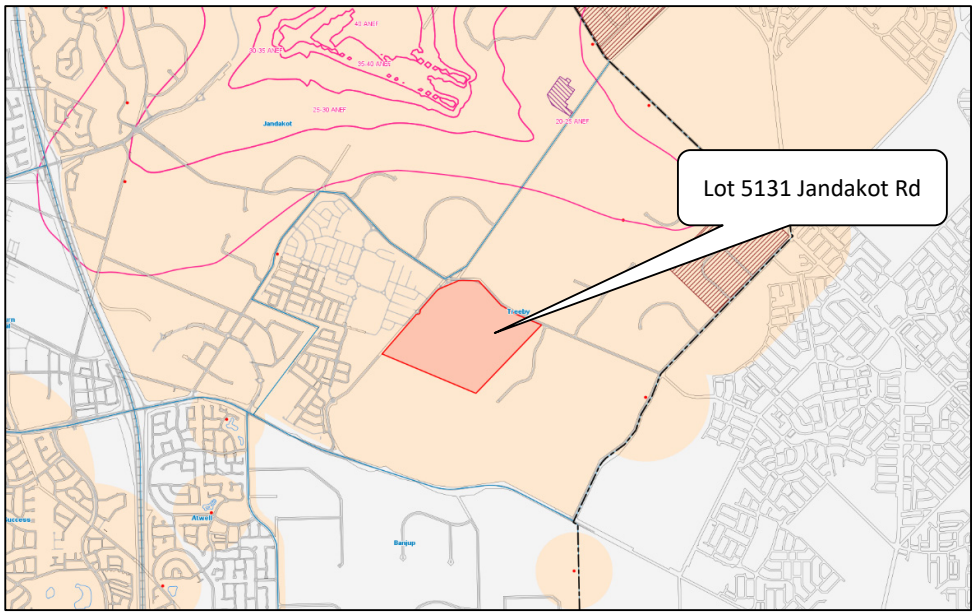


FIGURE 5.2 – JANDAKOT SPP 5.3 AIRPORT CORE AREA NOISE CONSIDERATIONS

Further to the criteria contained in SPP 5.3, the City of Cockburn LPP 1.12 contains advice as follows:

> *Consideration should be given to noise attenuation for noise sensitive premises within the Frame area corresponding to the requirements of Western Australian Planning Commission publication "Aircraft Noise Insulation for Residential Development in the Vicinity of Perth Airport" 2004 (such as the installation of 6.38mm laminated glazing), in order to ensure that residential amenity is adequately protected within noise sensitive developments.*

Figure 5.3 shows the City of Cockburn Jandakot Frame area which also requires consideration.

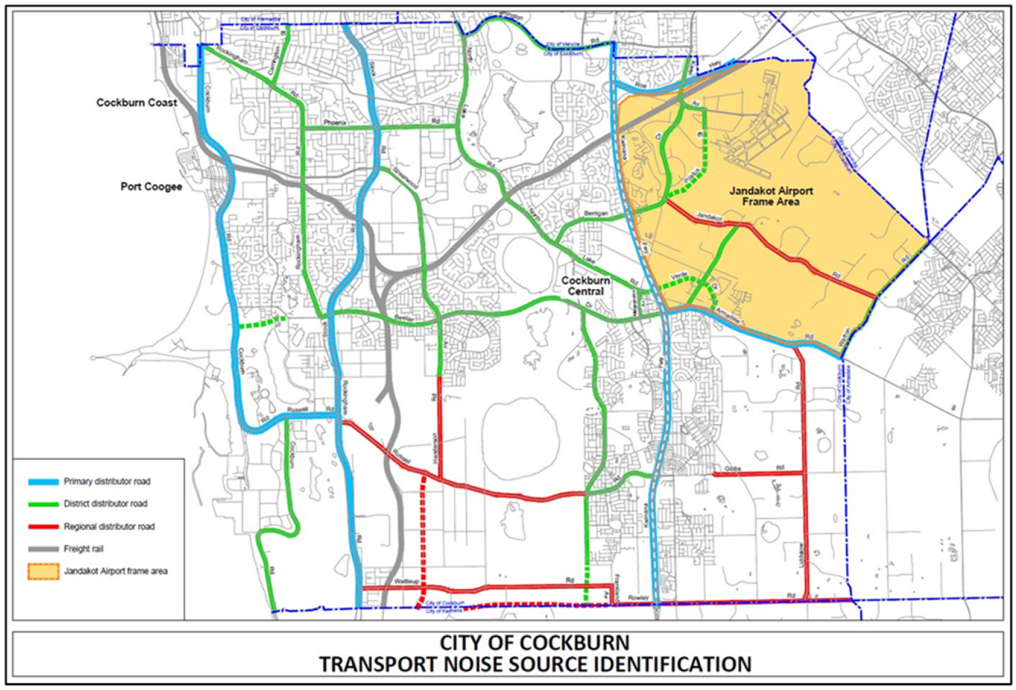


FIGURE 5.3 – JANDAKOT AIRPORT FRAME AREA NOISE CONSIDERATIONS

Whilst at this stage of the development the lot configuration and layout are not known, a preliminary "deemed to satisfy construction" has been provided below and are broken into 3 area, namely greater than ANEF 25, between ANEF 20 – 25 and Less than ANEF 20 but within the Frame Area. This can form the basis of future concept designs and can be refined at subdivision staging.

Less Than ANEF 20 – Frame Area.

From LPP 1.12, residential withing these Lots would be conditionally acceptable, with the following design considerations:

Glazing:

Bedrooms:

- Total external door and window system area up to 40% of room floor area: Windows 6 mm glazing.
- Up to 60% floor area: as per above but must be sealed awning or casement type windows (R_w+C_{tr} 28dB).

Indoor living and work areas:

- Up to 40% floor area: Sliding, awning, casement or double hung with minimum 6mm single pane or 6mm-12mm-6mm double insulated glazing (R_w+C_{tr} 25dB).
- Up to 60% floor area: As per Bedrooms at up to 40% area (R_w+C_{tr} 28 dB).
- Up to 80% floor area: As per Bedrooms at up to 60% area (R_w+C_{tr} 31dB).

Walls:

Bedroom and indoor living and work areas to R_w+C_{tr} 45dB:

- One row of 92mm studs at 600mm centres with:
  - Resilient steel channels fixed to the outside of the studs; and
  - 9.5mm hardboard or 9mm fibre cement sheeting or 11mm fibre cement weatherboards or one layer of 19mm board cladding fixed to the outside of the channels; and
  - 75mm glass wool (11kg/m^3) or 75mm polyester (14kg/m^3) insulation, positioned between the studs; and
  - Two layers of 16mm fire-protective grade plasterboard fixed to the inside face of the studs.
  - Single leaf of 150mm brick masonry with 13mm cement render on each face.
  - Double brick: two leaves of 90mm clay brick masonry with a 20mm cavity between leaves.

Roof and Ceiling:

Tiled or colorbond roof with sarking and 10mm plasterboard ceiling R_w+C_{tr} 35.

Additional to the above there is a requirement where the lots within the ANEF 20 noise contour require notifications on titles for aircraft noise. The wording for the notification on title is as follows:

Notification:

"This lot is situated in the vicinity of Jandakot Airport, and is currently affected, or may in the future, be affected by aircraft noise. Noise exposure levels are likely to increase in the future as a result of increases in numbers of aircraft using the airport, changes in aircraft type or other operational changes. Further information about aircraft noise, including development restrictions and noise insulation requirements for noise-affected properties, are available on request from the relevant local government offices."

6. CONCLUSION

Under the WAPC State Planning Policy 5.4, for this development, the appropriate "Noise Targets" to be achieved under SPP 5.4, external to a residence are:

External	
Day	Maximum of 55 dB(A) L_{Aeq}
Night	Maximum of 50 dB(A) L_{Aeq}

The policy states that the "outdoor targets are to be met at all outdoor areas as far as reasonable and practical to do so using the various noise mitigation measures outlined in the guidelines". The Policy also states, under Section 6 – Policy Measures that "a reasonable degree of acoustic amenity for living areas on each residential lot". The policy recognises that "it may not be practicable to meet the outdoor noise targets".

The Policy states the following acceptable internal noise levels:

Internal

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

For this development, compliance with the requirements of SP 5.4, noise modelling and assessment are based on the day period for residence located adjacent to Jandakot Road.

The results of the acoustic assessment indicate that noise received at residences located adjacent to Jandakot Road would exceed the "Noise Targets" as outlined in SPP 5.4. To comply with the requirements of SPP 5.4, the following noise mitigation methods are recommended:

- Construct a 2.4 metre wall along the northern boundary of the development, facing Jandakot Road.
- For residence backing on to Jandakot Road (i.e., back yards bounding the 2.4m noise wall), Quiet House design as outlined in Appendix C will be required.
- Additionally, these residences also require Notifications on Titles.

It is noted that under the policy, that for those residences where noise would exceed the "Noise Target", notification of vehicle noise will need to be stated on the titles. These residences are indicated on Figure C1, attached in Appendix C. Information on Packages A and B "Quiet House" design measures are also attached in Appendix D.

Notes:

4 Given the location of the development and the projected market, we understand that 2 storey residences are unlikely, hence the Quiet House Design is for single storey residence only. If double storey residences are proposed, then it is recommended that specialist acoustic advice be sought by the proponent.

5 We understand that the development is a structure plan stage, hence the information contained in Appendix D regarding areas requiring "Quiet House" design will need to be refined once the lots have been defined. Additionally, any modifications to the Structure Plan, would vary the noise mitigation requirements relating to barriers and "Quiet House" design outlined in Appendix C.

6 The summary of the Quiet House Design Packages is attached in Appendix D, are "Deemed to Satisfy" constructions. Alternative constructions would be acceptable, provided they are supported by an acoustic report prepared by a suitably qualified acoustic consultant.

The noise wall at the boundary of the development is required to be a minimum of 15kg/m^2 which is generally masonry / concrete or the like.

AIRCRAFT NOISE

Based on guidance from SPP 5.3, the majority of the northern section of the proposed development site is acceptable (Conditionally) for residential development, as indicated in Figure 5.3.

The blue area (ANEF 20 to 25) is also acceptable for residential development, although it requires conditions. These conditions are such that the internal noise level (for aircraft noise events) is to meet the criteria contained in AS2021. The affected lots within this development are those within the blue contour as noted in Figure 5.3.

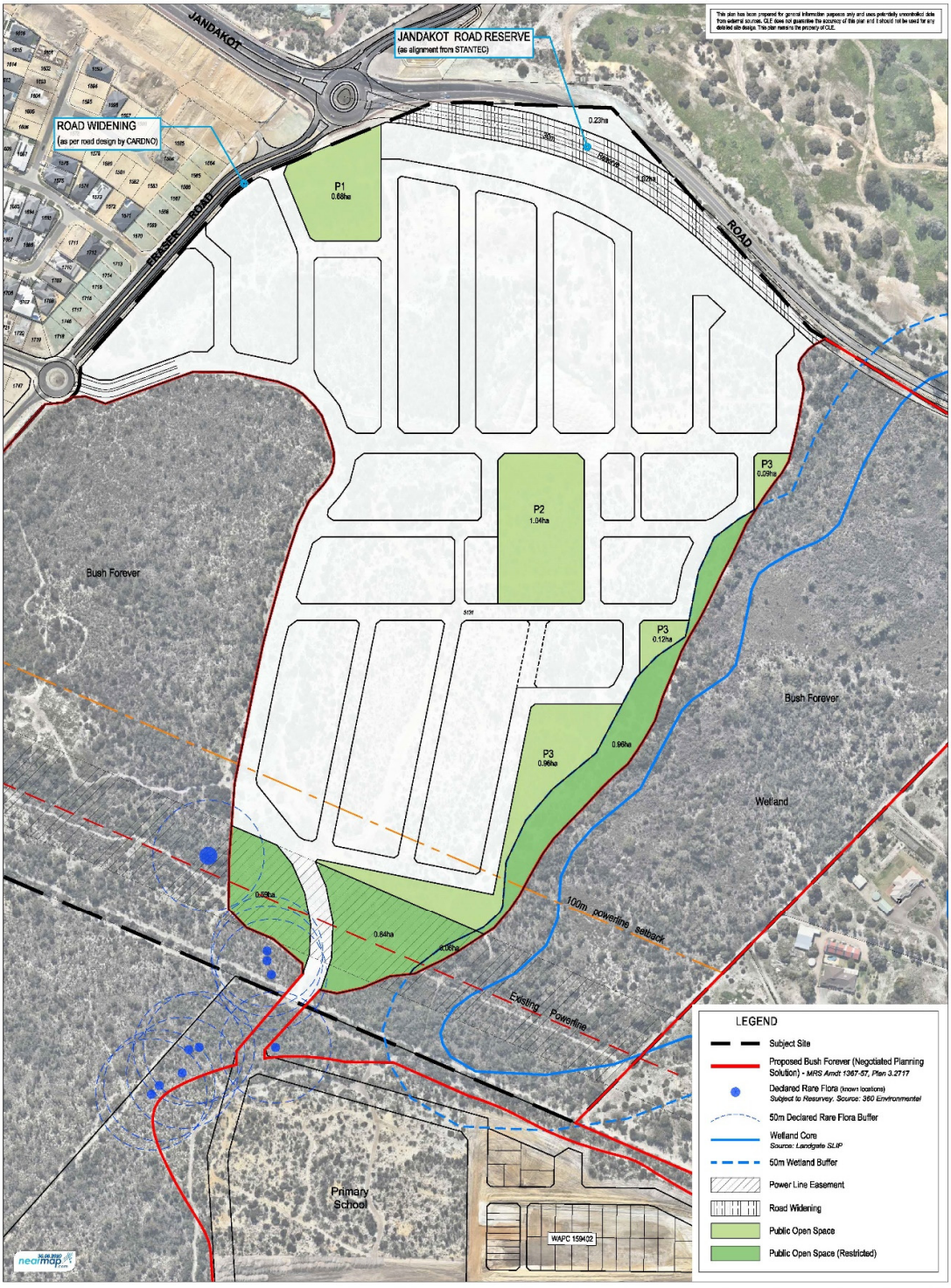
Further to the criteria contained in SPP 5.3, the City of Cockburn LPP 1.12 contains advice as follows:

> *Consideration should be given to noise attenuation for noise sensitive premises within the Frame area corresponding to the requirements of Western Australian Planning Commission publication "Aircraft Noise Insulation for Residential Development in the Vicinity of Perth Airport" 2004 (such as the installation of 6.38mm laminated glazing), in order to ensure that residential amenity is adequately protected within noise sensitive developments.*

Hence, whilst at this stage of the development the lot configuration and layout are not known, a preliminary "deemed to satisfy construction" has been provided within this report. This can form the basis of future concept designs and can be refined at building licence staging. This encompasses the Frame Area for which the entire development is located within the boundaries.

APPENDIX A

SUBDIVISION PLAN



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DEVELOPMENT CONCEPT PLAN

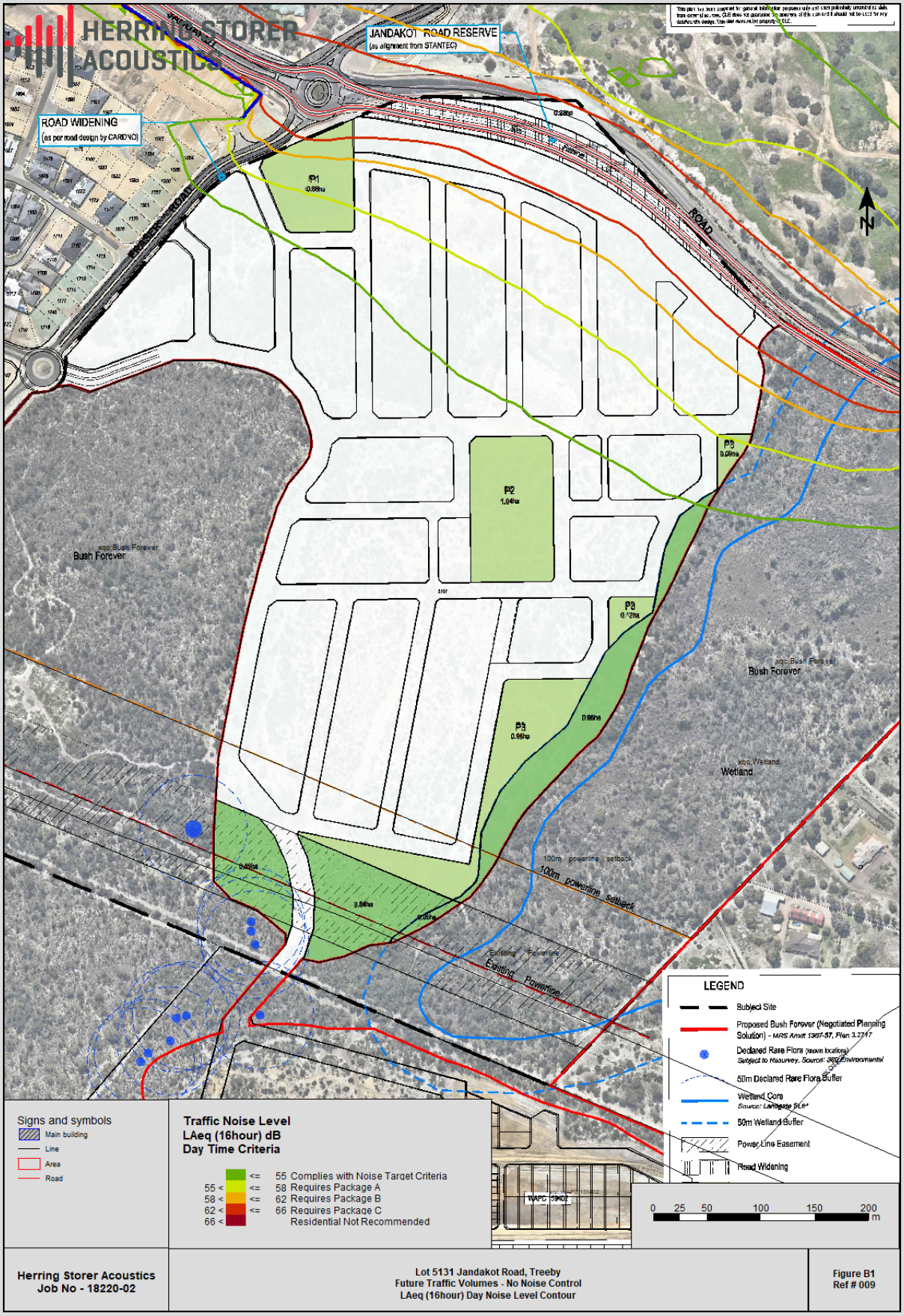
DRAFT

Lot 5131 Jandakot Road, Treeby

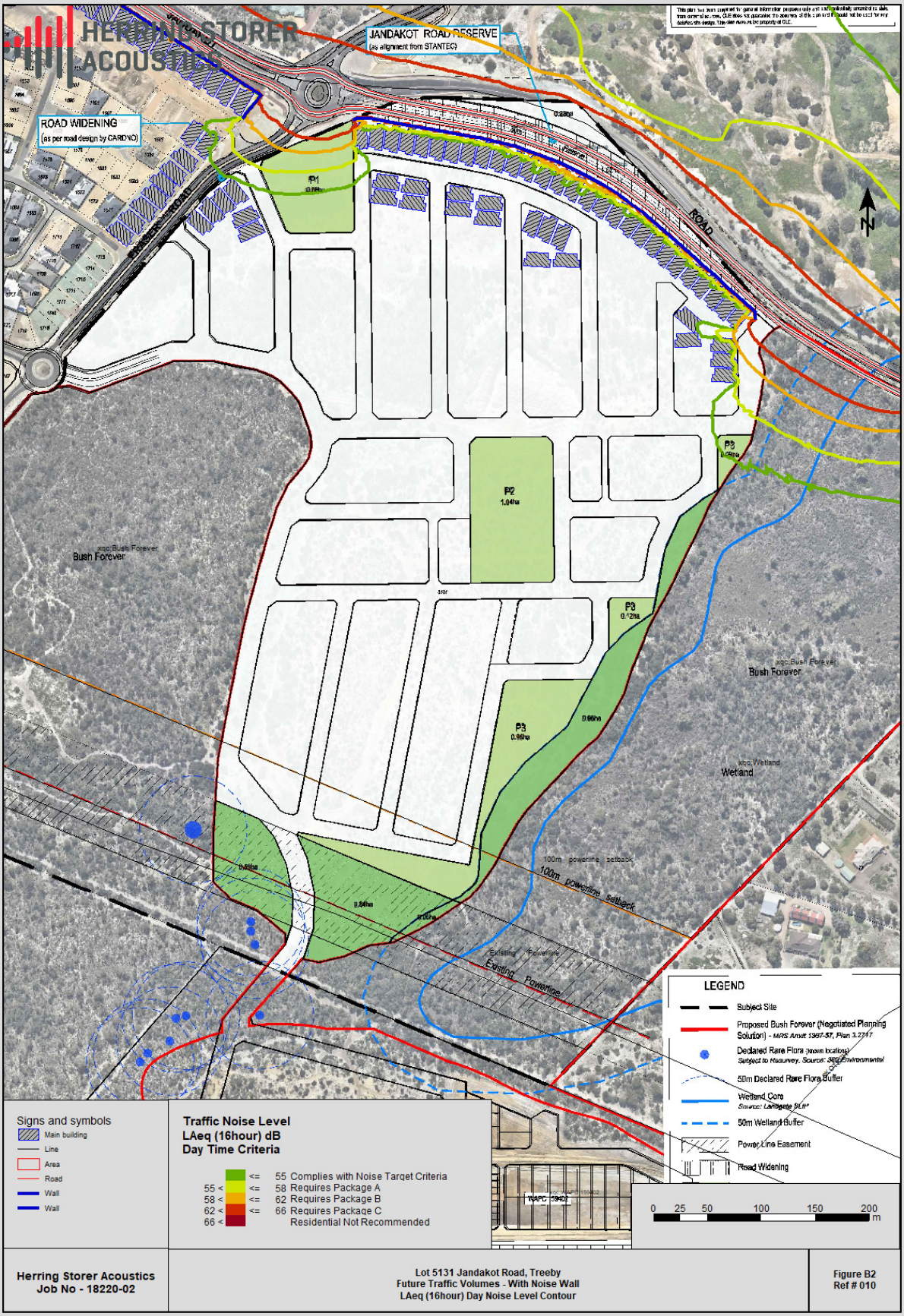
plan no: 2366-129-01
date: 1 July 2021
scale: 1:3,000 @ A3, 1:1,500 @A1

APPENDIX B

FIGURES B1 and B2
$L_{Aeq(16hr)}$ DAY
NOISE CONTOURS FOR JANDAKOT ROAD



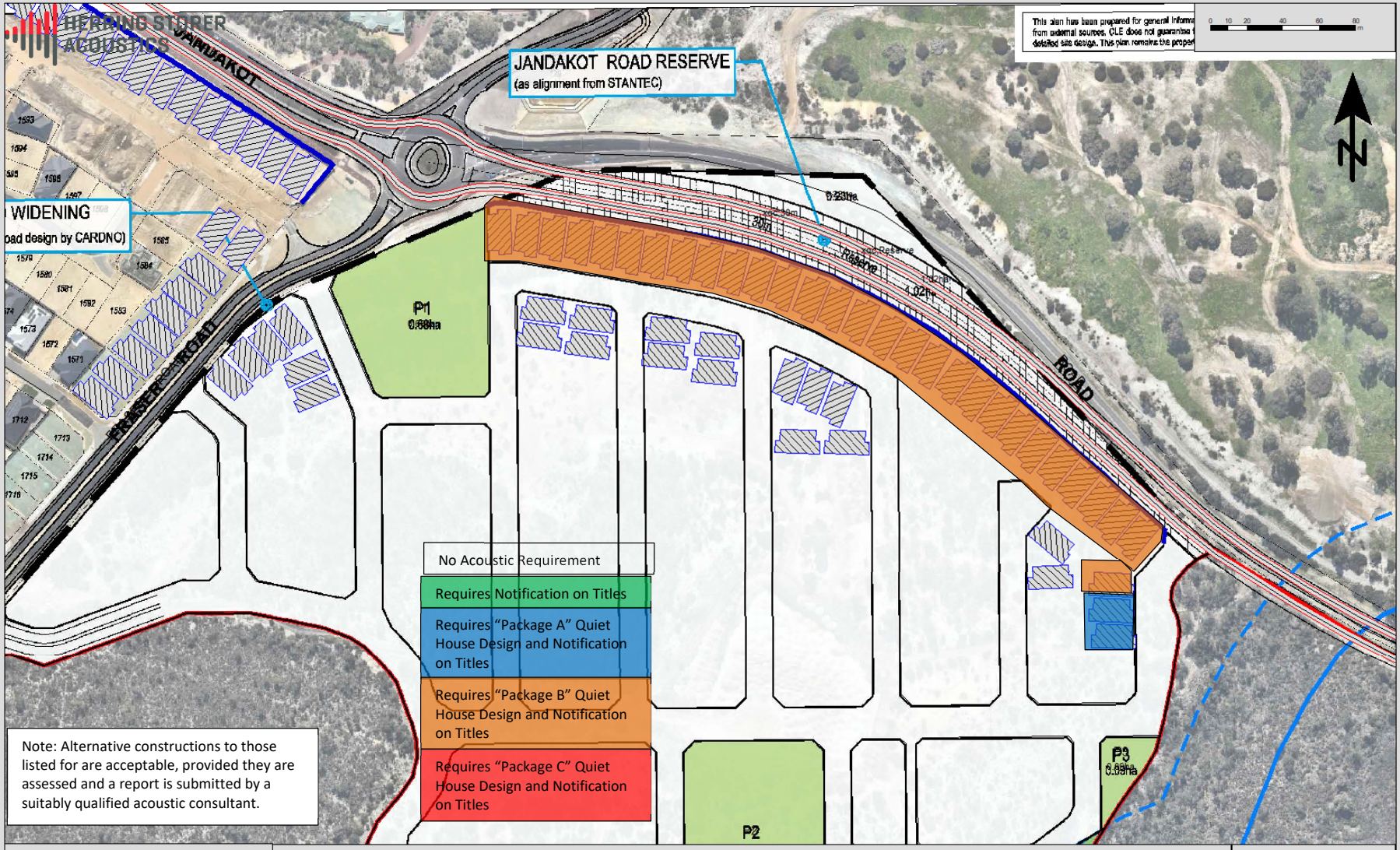
Herring Storer Acoustics **Job No - 18220-02**	**Lot 5131 Jandakot Road, Treeby** **Future Traffic Volumes - No Noise Control** **LAeq (16hour) Day Noise Level Contour**	**Figure B1** **Ref # 009**



Herring Storer Acoustics **Job No - 18220-02**	**Lot 5131 Jandakot Road, Treeby** **Future Traffic Volumes - With Noise Wall** **LAeq (16hour) Day Noise Level Contour**	**Figure B2** **Ref # 010**

APPENDIX C

LOTS REQUIRING “QUIET HOUSE” DESIGN AND NOTIFICATIONS



Herring Storer Acoustics **Job No - 18220-02**	**Lot 5131 Jandakot Road, Treeby** **Future Traffic Volumes - With Noise Wall** **LAeq (16hour) Day Noise Level Contour- QHD**	**Figure C1** **Ref # 010**

APPENDIX D

"QUIET HOUSE" DESIGN – GENERAL INFORMATION

Road Traffic and Passenger Rail - Quiet House Requirements
(*Based on Table 3 of State Planning Policy 5.4 2019*)

Exposure Category	Orientation to corridor	Acoustic ratings					Mechanical ventilation/air conditioning considerations
		Walls	**External doors**	**Windows**	**Roofs and ceilings of highest floors**	**Outdoor Living areas**	
A **Quiet House A**	**Facing**	**Bedroom and Indoor Living and work areas** ➢ Rw + Ctr 45dB	**Bedrooms**: ➢ R_w+C_{tr} 28dB **Indoor Living and work areas:** ➢ R_w+C_{tr} 25dB	**Bedrooms**: Window size dependant ➢ **Minimum** R_w+C_{tr} 28 dB **Indoor Living and work areas** Window size dependant ➢ **Minimum** R_w+C_{tr} 25 dB	➢ R_w+C_{tr} 35dB	➢ At least one outdoor living area located on the opposite side of the building from the transport corridor 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	➢ Acoustically rated openings and ductwork to provide a minimum sound reduction performance of **Rw 40dB** into sensitive spaces
	Side On		**Bedrooms**: ➢ R_w+C_{tr} 25dB **Indoor Living and work areas:** ➢ R_w+C_{tr} 22dB	**Bedrooms**: Window size dependant ➢ **Minimum** R_w+C_{tr} 25 dB **Indoor Living and work areas** Window size dependant ➢ **Minimum** R_w+C_{tr} 22 dB			
	Opposite		No specific requirements	No specific requirements			
B **Quiet House B**	**Facing**	**Bedroom and indoor living and work areas** ➢ R_w+C_{tr} 50dB	**Bedrooms** ➢ R_w+C_{tr} 31dB **Indoor Living and work areas:** ➢ R_w+C_{tr} 28dB	**Bedrooms**: Window size dependant ➢ **Minimum** R_w+C_{tr} 31 dB **Indoor Living and work areas** Window size dependant ➢ **Minimum** R_w+C_{tr} 28 dB	➢ **R_w+C_{tr} 35dB**	➢ At least one outdoor living area located on the opposite side of the building from the corridor 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	➢ Acoustically rated openings and ductwork to provide a minimum sound reduction performance of **Rw 40dB** into sensitive spaces
	Side-On		**Bedrooms** ➢ R_w+C_{tr} 28dB **Indoor Living and work areas:** ➢ R_w+C_{tr} 28dB	**Bedrooms**: Window size dependant ➢ **Minimum** R_w+C_{tr} 28 dB **Indoor Living and work areas** Window size dependant ➢ **Minimum** R_w+C_{tr} 25 dB			
	Opposite		**Bedrooms** ➢ R_w+C_{tr} 25dB **Indoor Living and work areas:** ➢ R_w+C_{tr} 25dB	**Bedrooms**: Window size dependant ➢ **Minimum** R_w+C_{tr} 25 dB **Indoor Living and work areas** Window size dependant ➢ **Minimum** R_w+C_{tr} 22 dB			
C **Quiet House C**	**Facing**	**Bedroom and indoor living and work areas** ➢ R_w+C_{tr} 50dB	**Bedrooms** ➢ No External doors to bedrooms facing the corridor **Indoor Living and work areas** ➢ Rw+Ctr 31dB	**Bedrooms**: Window size dependant ➢ **Minimum** R_w+C_{tr} 31dB) **Indoor Living and work areas** Window size dependant ➢ **Minimum** R_w+C_{tr} 31dB	➢ **R_w+C_{tr} 40dB**	➢ At least one outdoor living area located on the opposite side of the building from the corridor 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	➢ Acoustically rated openings and ductwork to provide a minimum sound reduction performance of Rw 40dB into sensitive spaces.
	Side-on		**Bedrooms** ➢ R_w+C_{tr} 31dB **Indoor Living and work areas** ➢ R_w+C_{tr} 28dB	**Bedrooms**: Window size dependant ➢ **Minimum** R_w+C_{tr} 31 dB **Indoor Living and work areas** Window size dependant ➢ **Minimum** R_w+C_{tr} 28 dB			
	Opposite		**Bedrooms**: ➢ R_w+C_{tr} 28dB **Indoor Living and work areas:** ➢ R_w+C_{tr} 28dB	**Bedrooms**: Window size dependant ➢ **Minimum** R_w+C_{tr} 28 dB **Indoor Living and work areas** Window size dependant ➢ **Minimum** R_w+C_{tr} 25 dB			

Note: The above treatments are a deemed to satisfy construction. Alternative designs are acceptable, provided they are certified by a suitable qualified acoustic consultant