

**DEVELOPMENT WA**

**EDITH COWAN UNIVERSITY REDEVELOPMENT SITE  
MT LAWLEY**

**SPP 5.4 NOISE MANAGEMENT PLAN  
PRECINCT STRUCTURE PLAN**

OCTOBER 2025

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Job No: 24160-02

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FOR

**DEVELOPMENT WA**

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## 1. INTRODUCTION

Herring Storer Acoustics were commissioned through Development WA to carry out an acoustic study with regards to traffic related noise for the precinct structure plan (PSP) associated with the ECU Mt Lawley Redevelopment Site.

The PSP outlines a clear vision for the redevelopment of the ECU Mount Lawley Campus, which currently comprises the University campus and the WA Academy of Performing Arts (WAAPA).

The PSP provides the framework to guide future land use and development, supporting residential and mixed-use outcomes alongside education facilities and community spaces. The PSP Part Two Map is provided in Appendix A.

The purpose of the study was to:

- Assess the noise that would be received within the PSP area from vehicles travelling on Alexander Drive and for future traffic volumes.
- Compare the results with accepted criteria and if exceedances exist, develop the framework for the management of noise.

## 2. SUMMARY

The noise modelling indicates that noise received at the proposed development from vehicles travelling along Alexander Drive in the future (2045) would exceed the Western Australian Planning Commission (WAPC) State Planning Policy (SPP) 5.4 "Road and Rail Transport Noise and Freight Considerations In Land Use Planning" "day time limit" for the northern most portion of the site. As a result "Quiet House" Design Packages for Residential areas and acoustic amelioration in line with AS2107:2016 would be required in locations shown in Appendix C.

## 3. ACOUSTIC CRITERIA

### 3.1 NOISE

The Western Australian Planning Commission (WAPC) released on 6<sup>th</sup> 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**

<b>Transport corridor classification</b>	<b>Trigger distance</b>	<b>Distance measured from</b>
<b>Roads</b>		
<b>Strategic freight and major traffic routes</b> 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
<b>Other significant freight/traffic routes</b> 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
<b>Passenger railways</b>		
	100 metres	Centreline of the closest track
<b>Freight railways</b>		
	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 <sub>Aeq</sub> (Day) dB) (6 am-10 pm)	Night (L <sub>Aeq</sub> (Night)dB) (10 pm-6 am)	(L <sub>Aeq</sub> 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 <sub>Aeq</sub> (Day) 40(Living and work areas) L <sub>Aeq</sub> (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.”

**4. ACOUSTIC ENVIRONMENT**

The noise measurements were conducted on 12 September 2024 to 19 September 2024 over a short term period during peak hour to determine the L<sub>A10</sub> noise level.

The results of the measurement of the L<sub>Aeq(Day)</sub> and L<sub>Aeq(Night)</sub> are shown in Table 3.

Noise measurements were conducted with a NSRT Noise Logger. The logger was calibrated prior to and after use with a Bruel and Kjaer 4230 Calibrator. All equipment used is currently NATA laboratory calibrated. Calibration certificates are available on request.

**TABLE 3 : SUMMARY OF MEASURED NOISE LEVELS**

Measurement Location	Measured/Calculated Noise Level, dB(A)		
	L <sub>A10</sub>	L <sub>Aeq, day (6am to 10pm)</sub>	L <sub>Aeq, night (10pm to 6am)</sub>
Alexander Drive	65.1	63.2	59.7

**5. MODELLING**

To determine the noise levels from traffic on Alexander Drive, acoustic modelling was carried out using Sound Plan, using the Calculation of Road Traffic Noise (CoRTN)<sup>1</sup> algorithms.

The input data for the model included:

- Topographical and cadastral data supplied by client.
- Existing road layout.
- Traffic Data provided from MRWA Traffic Map (Shown in Appendix D)
- Adjustments as listed in Table 5.

<sup>1</sup> Calculation of Road Traffic Noise UK Department of Transport 1987

**TABLE 4 - NOISE MODELLING INPUT DATA\***

Parameter	Alexander Drive (Current) 2020	Alexander Drive (Future) 2045
Traffic Volumes	29,740 - 13 Hour Total	44,200 vpd - 13 Hour Total
Percentage traffic 0600 – 2400 hours (Assumed)	94%	94%
Heavy Vehicles (%) (Assumed)	4%	4%
Speed (km/hr)	60 km/hr	60 km/hr
Road Surface	Chip Seal	Dense Graded Asphalt

\*Extrapolated to 2044 based on an assumed 2% per annum increase.

**TABLE 5 – ADJUSTMENTS FOR NOISE MODELLING**

Description	Value
Façade Reflection Adjustment	+2.5 dB
Conversion from $L_{A10}$ (18 hour) to $L_{Aeq}$ (16 hour) (Day)	-1.9 dB

## 6. TRAFFIC NOISE ASSESSMENT

Using the data contained in Tables 3, 4 and 5, modelling was carried out under existing conditions for calibration. The Sound Plan model for the site has been set up for the 2044 scenario as defined in Table 4. The following assumptions have been made:

- 18 hour traffic count will be 94% of daily figures.
- Noise model calibrated to measured noise level as per Table 3.
- The same diurnal relationship will exist in the future between the  $L_{A10}$  (18 hour) and the  $L_{Aeq}$  parameters; and
- 2.5 dB(A) has been added to the results for façade reflection.

Noise contours are shown in Appendix B with lots requiring “Quiet House” Design shown in Appendix C.

For reference the State Planning Policy 5.4 Implementation Guidelines “Quiet House” Design Packages are shown in Appendix E.

It is noted that these requirements pertain to acoustic requirements only, with regard to *State Planning Policy 5.4*, and may be superseded by other requirements (BAL, Thermal, etc).

## 7. CONCLUSION

In accordance with the WAPC Planning Policy 5.4, an assessment of the noise that would be received within the PSP area from vehicles travelling on Alexander Drive has been undertaken.

In accordance with the Policy, the following would be the acoustic criteria applicable to this project:

### **External**

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

### **Internal**

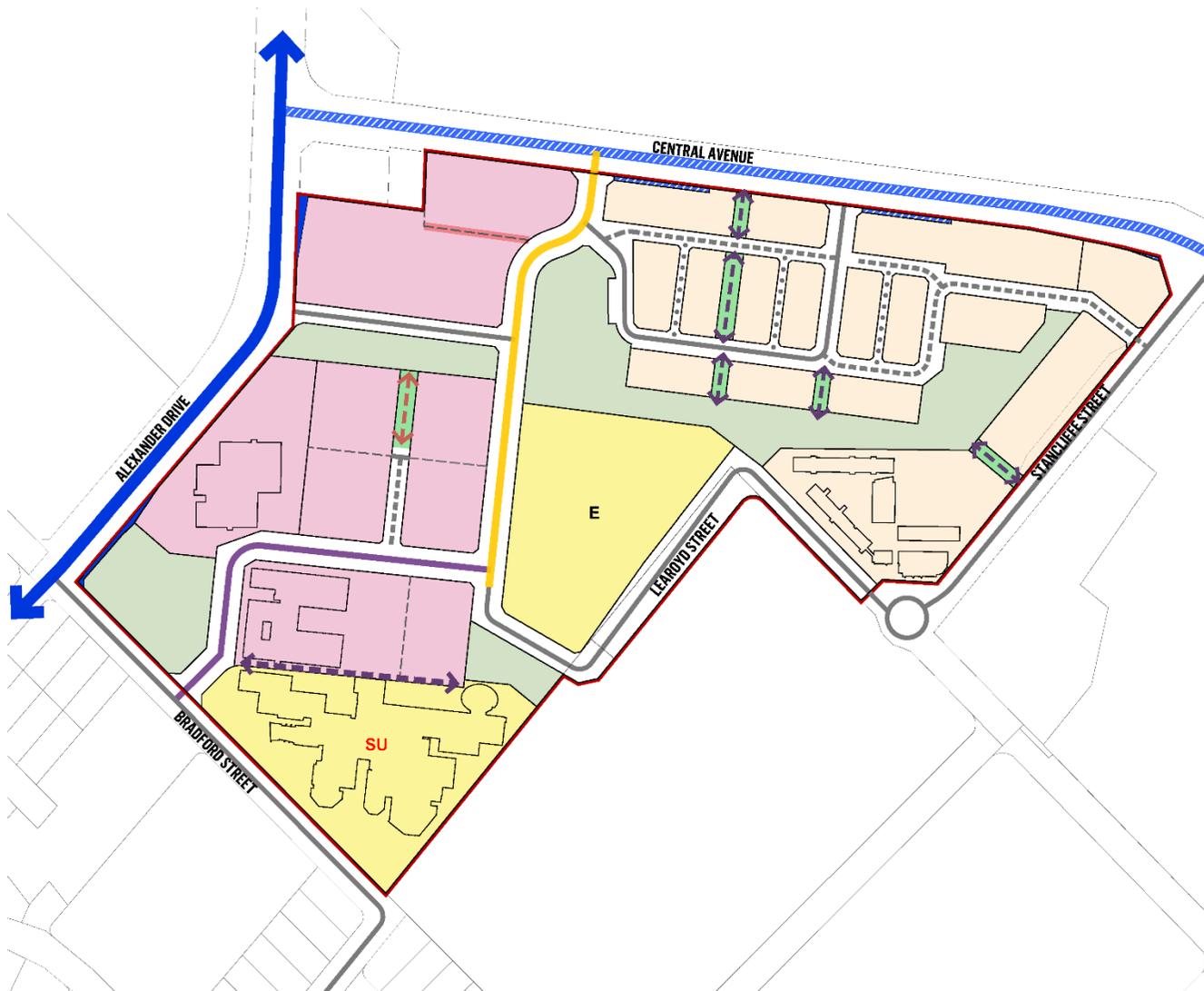
Sleeping Areas	35 dB(A) $L_{Aeq(night)}$
Living Areas	40 dB(A) $L_{Aeq(day)}$

The results of the acoustic assessment indicate that noise received at the development from future traffic, exceed external noise level criteria at the western portion of the site.

Therefore, any residential or mixed use development that falls within the noise affected area would require "Quiet House" design package as nominated in Appendix C, and any commercial development would require investigation dependent on specific use in line with "AS/NZS 2107:2016 Standard - Acoustics - Recommended design sound levels and reverberation times for building interiors".

# **APPENDIX A**

PRECINCT STRUCTURE PLAN MAP



### LEGEND

- Precinct Structure Plan Area
- REGIONAL RESERVES**
- Other Regional Road
- SU** Public Purposes - Special Uses
- LOCAL RESERVES**
- Public Open Space
- E** Public Purpose - Education
- District Distributor Road
- ZONES**
- Mixed Use
- Residential
- OTHER**
- Neighbourhood Connector Road
- Access Street
- Mews Road
- Laneway
- Pedestrian Priority Street
- Shared Access Easement
- ↔ Key Pedestrian Link
- ↔ Opportunity for Pedestrian Link
- Public Access Way
- Opportunity for Building Retention
- Indicative Lot Layout



## Precinct Structure Plan Map - Part 2 ECU Mount Lawley Precinct Structure Plan

Level 6, 1 William Street | Perth WA 6000 Australia | +61 8 9345 0500 | URBIS Lic | ABN 50 105 258 226

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#### CLIENT

DevelopmentWA

1:2,500 @ A3  
0 10 20 50m



PROJECT NO.  
P0048853

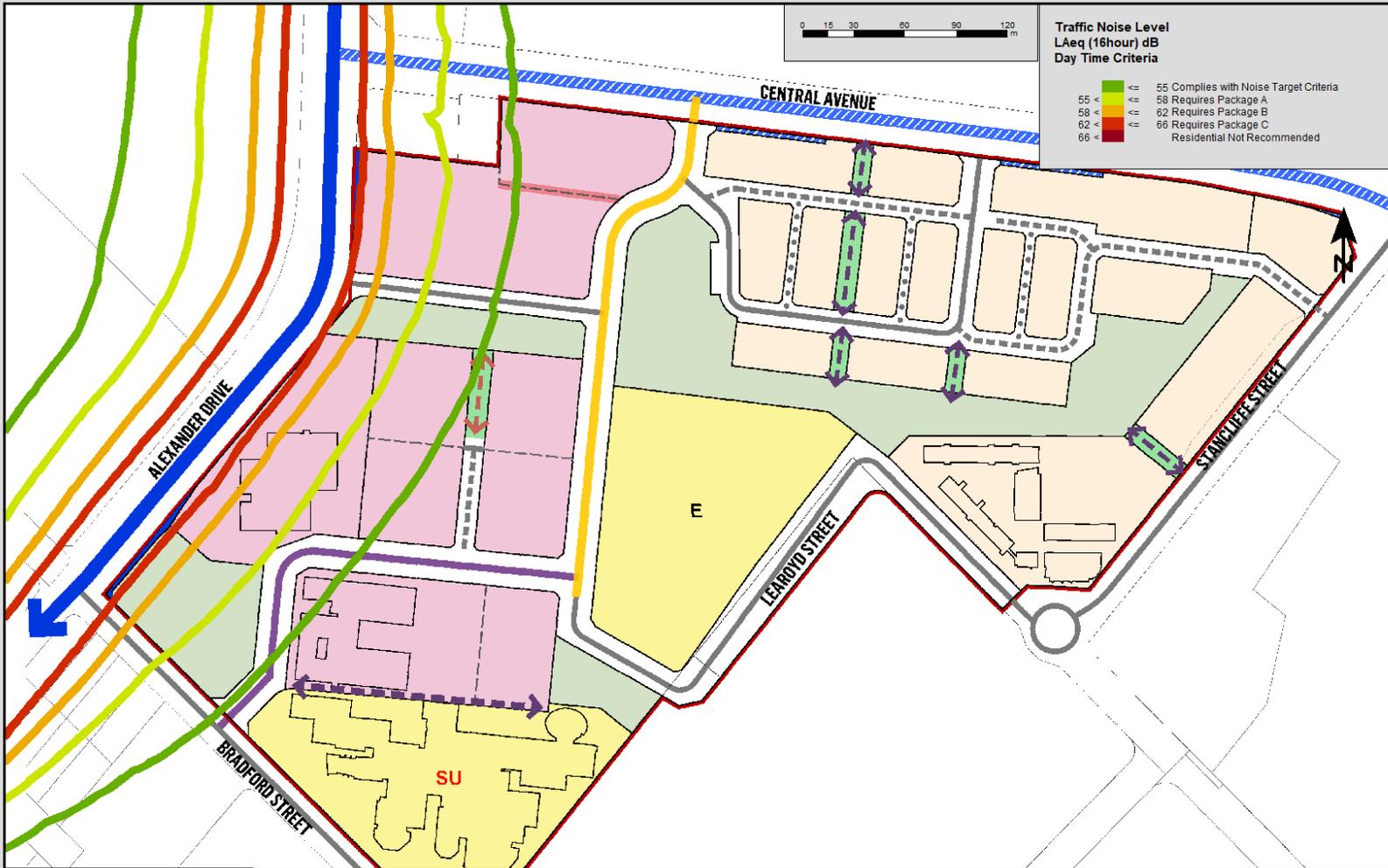
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REVISION  
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## **APPENDIX B**

Future Traffic Noise Contours



Herring Storer Acoustics  
Job No - 24160-02

EDITH COWNA UNIVERSITY MT LAWLEY DEVELOPMENT  
Future Traffic Volumes  
LAeq (16hour) Day Noise Level Contour

Figure 01  
Ref # 002

## **APPENDIX C**

Lots Requiring “Quiet House” Design



# **APPENDIX D**

MRWA Traffic Flows

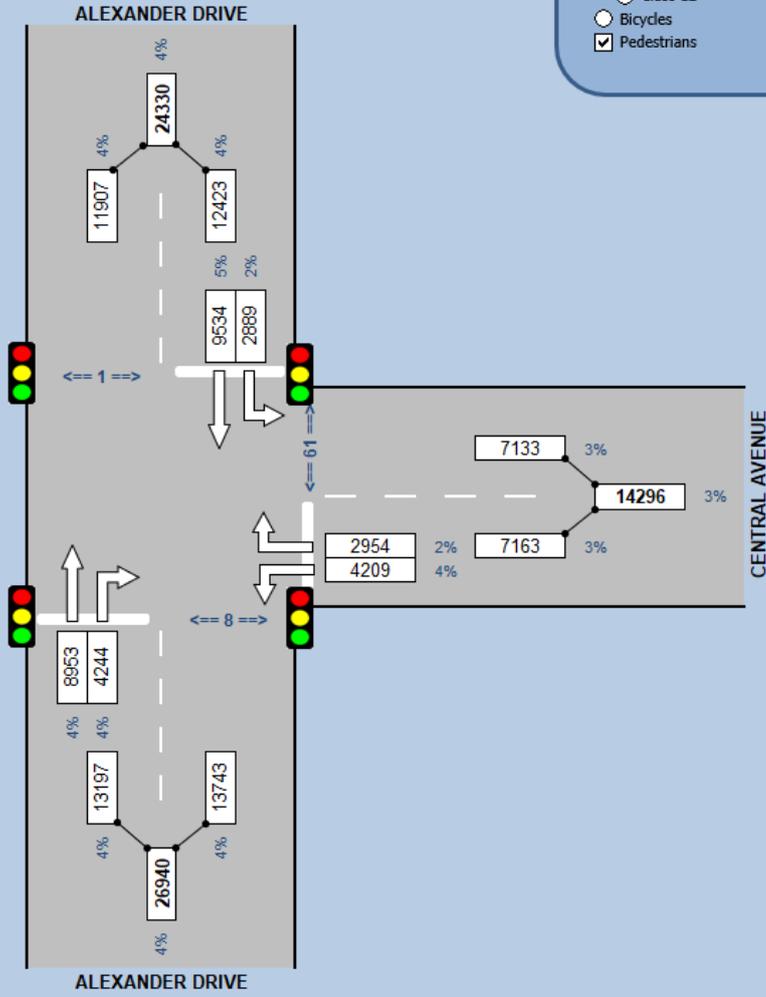


**Survey Time: 13 HOUR TOTALS**

All Vehicles  
 (% Heavy Vehicles)

13 HOUR TOTALS

- ALL Vehicles  Heavy %
- Class 1
- Class 2-5
- Class 6-9
- Class 10-11
- Class 12
- Bicycles
- Pedestrians



## **APPENDIX E**

State Planning Policy 5.4 “Quiet House” Design Packages



Table 3: Quiet house requirements

Exposure Category	Orientation to corridor	Acoustic rating and example constructions					Mechanical ventilation / air conditioning considerations		
		Walls	External doors	Windows	Roofs and ceilings of highest floors	Outdoor living areas			
A Quiet House A	Facing	<b>Bedroom and indoor living and work areas to Rw+Ctr 45dB</b> <ul style="list-style-type: none"> <li>One row of 92mm studs at 600mm centres with:                             <ul style="list-style-type: none"> <li>Resilient steel channels fixed to the outside of the studs; and</li> <li>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</li> <li>75mm glass wool (11kg/m<sup>3</sup>) or 75mm polyester (14kg/m<sup>3</sup>) insulation, positioned between the studs; and</li> <li>Two layers of 16mm fire-protective grade plasterboard fixed to the inside face of the studs.</li> </ul> </li> <li>Single leaf of 150mm brick masonry with 13mm cement render on each face.</li> <li>Double brick: two leaves of 90mm clay brick masonry with a 20mm cavity between leaves.</li> </ul>	<b>Bedrooms:</b> <ul style="list-style-type: none"> <li>Fully glazed hinged door with certified Rw+Ctr 28dB rated door and frame including seals and 6mm glass</li> </ul> Other external doors to Rw+Ctr 25dB, e.g. <ul style="list-style-type: none"> <li>35mm solid core timber hinged door and frame system certified to Rw 28dB including seals</li> <li>Glazed sliding door with 10mm glass and weather seals</li> </ul>	<b>Bedrooms:</b> <ul style="list-style-type: none"> <li>Total external door and window system area up to 40% of room floor area: Sliding or double hung with minimum 10mm single or 6mm-12mm-10mm double insulated glazing (Rw+Ctr 28 dB). Sealed awning or casement windows may use 6 mm glazing instead.</li> <li>Up to 60% floor area: as per above but must be sealed awning or casement type windows (Rw+Ctr 31dB).</li> </ul> <b>Indoor living and work areas</b> <ul style="list-style-type: none"> <li>Up to 40% floor area: Sliding, awning, casement or double hung with minimum 6mm single pane or 6mm-12mm-6mm double insulated glazing (Rw+Ctr 25dB).</li> <li>Up to 60% floor area: As per Bedrooms at up to 40% area (Rw+Ctr 28 dB).</li> <li>Up to 80% floor area: As per Bedrooms at up to 60% area (Rw+Ctr 31dB).</li> </ul>	<b>To Rw+Ctr 35dB</b> <ul style="list-style-type: none"> <li>Concrete or terracotta tile or metal sheet roof with sarking and at least 10mm plasterboard ceiling</li> </ul>	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.	<ul style="list-style-type: none"> <li>Acoustically rated openings and ductwork to provide a minimum sound reduction performance of Rw 40dB into sensitive spaces</li> <li>Evaporative systems require attenuated ceiling air vents to allow closed windows</li> <li>Refrigerant-t based systems need to be designed to achieve National Construction Code fresh air ventilation requirements</li> <li>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</li> </ul>		
	Side on							As per 'Facing' above, except Rw+Ctr values may be 3dB less, e.g. glazed sliding door with 10mm glass and weather seals for bedrooms.	As above, except Rw+Ctr values may be 3dB less, or max % area increased by 20%
	Opposite							No specific requirements	
A Quiet House A+	All	As per Quiet House A, except double leaf masonry / brick construction only.	As per Quiet House A.	As per Quiet House A, except that <ul style="list-style-type: none"> <li>'Side-on' requirements same as 'Facing'.</li> <li>All windows comprise minimum 6 mm thick laminated or toughened glass in sealed awning or casement frames. Polymer (e.g. uPVC) window framing should be used. Evaporative air conditioning systems are not recommended.</li> <li>No external doors for bedrooms with entry 'Facing' transport corridor</li> </ul>	No specific requirements				
B Quiet House B	Facing	<b>Bedroom and indoor living and work areas to Rw+Ctr 50dB</b> <ul style="list-style-type: none"> <li>Single leaf of 90mm clay brick masonry with:                             <ul style="list-style-type: none"> <li>A row of 70mm x 35mm timber studs or 64mm steel studs at 600mm centres;</li> <li>A cavity of 25mm between leaves;</li> <li>50mm glass wool or polyester cavity insulation (R2.0+) insulation between studs; and</li> <li>One layer of 10mm plasterboard fixed to the inside face</li> </ul> </li> <li>Single leaf of 220mm brick masonry with 13mm cement render on each face</li> <li>150mm thick unlined concrete panel or 200mm thick concrete panel with one layer of 13mm plasterboard or 13mm cement render on each face</li> <li>Double brick: two leaves of 90mm clay brick masonry with:                             <ul style="list-style-type: none"> <li>A 50mm cavity between leaves</li> <li>50mm glass wool or polyester cavity insulation (R2.0+)</li> <li>resilient ties where required to connect leaves</li> </ul> </li> <li>Double brick: two leaves of 110mm clay brick masonry with a 50mm cavity between leaves and R2.0+ cavity insulation</li> </ul>	<b>Bedrooms</b> <ul style="list-style-type: none"> <li>Fully glazed hinged door with certified Rw+Ctr 31dB rated door and frame including seals and 10mm glass</li> <li>Other external doors to Rw+Ctr 28dB, e.g.</li> <li>As per Quiet House A Bedrooms.</li> </ul>	<b>Bedrooms:</b> <ul style="list-style-type: none"> <li>Total external door and window system area up to 40% of room floor area: Fixed sash, awning or casement with minimum 6mm single or 6mm-12mm-6mm double insulated glazing (Rw+Ctr 31 dB).</li> <li>Up to 60% floor area: as per above but must be minimum 10 mm single or 6mm-12mm-10mm double insulated glazing (Rw+Ctr 34dB).</li> </ul> <b>Indoor living and work areas</b> <ul style="list-style-type: none"> <li>Up to 40% floor area: Sliding or double hung with minimum 6mm single pane or 6mm-12mm-6mm double insulated glazing (Rw+Ctr 28dB). Sealed awning or casement windows may use 6 mm glazing instead.</li> <li>Up to 60% floor area: As per Bedrooms at up to 40% area (Rw+Ctr 31 dB).</li> <li>Up to 80% floor area: As per Bedrooms at up to 60% area (Rw+Ctr 34dB).</li> </ul>	<b>To Rw+Ctr 35dB</b> <ul style="list-style-type: none"> <li>Concrete or terracotta tile or metal sheet roof, sarking and at least 10mm plasterboard ceiling, R3.0+ insulation</li> </ul>	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			
	Side-on							As per Quiet House A 'Facing' above (Rw+Ctr values may be 3dB less, or max % area increased by 20%).	
	Opposite							As per Quiet House A 'Side-on' above.	
B Quiet House B+	All	As per Quiet House B example above, except use double leaf masonry construction only.	As per Quiet House B, except <ul style="list-style-type: none"> <li>No external doors for bedrooms with entry 'Facing' or 'Side-on' to transport corridor</li> </ul>	As per Quiet House B, except that <ul style="list-style-type: none"> <li>'Side-on' requirements become the same as Quiet House B 'Facing'.</li> <li>All windows comprise minimum 6 mm thick laminated or toughened glass in sealed awning or casement frames. Polymer (e.g. uPVC) window framing should be used.</li> <li>Evaporative air conditioning systems are not recommended.</li> </ul>	As per Quiet House C (to Rw+Ctr 40dB).				

Cont. next page



Exposure Category	Orientation to corridor	Acoustic rating and example constructions				Mechanical ventilation / air conditioning considerations
		Walls	External doors	Windows	Roofs and ceilings of highest floors	
C Quiet House C	Facing	Bedroom and indoor living and work areas to Rw+Ctr 50dB • As per Quiet House B example above	<b>Bedrooms</b> • External doors to bedrooms facing the corridor are not recommended. Other external doors to Rw+Ctr 30dB, e.g. • Fully glazed hinged door with certified Rw+Ctr 31dB rated door and frame including seals and 10mm glass. • 40mm solid core timber frame and door (without glass or with glass inserts not less than 6mm), side hinged with certified Rw 32dB acoustically rated door and frame system including seals	<b>Bedrooms:</b> • Total external door and window system area up to 20% of room floor area: Fixed sash, awning or casement with minimum 6mm single or 6mm-12mm-6mm double insulated glazing (Rw+Ctr 31 dB). • Up to 40% floor area: as per above but must be minimum 10 mm single or 6mm-12mm-10mm double insulated glazing (Rw+Ctr 34dB). <b>Indoor living and work areas</b> • Up to 40% floor area: Sliding or double hung with minimum 6mm single pane or 6mm-12mm-6mm double insulated glazing (Rw+Ctr 31dB). Sealed awning or casement windows may use 6 mm glazing instead. • Up to 60% floor area: As per Bedrooms at up to 40% area (Rw+Ctr 34 dB).	<b>To Rw+Ctr 40dB</b> • To all bedrooms, 2 layers of 10mm plasterboard, or one layer 13 mm high density sealed plasterboard (minimum surface density of 12.5 kg/m <sup>2</sup> ), affixed using steel furring channels beneath ceiling rafters / supports. • R3.0+ insulation batts laid in cavity. • Concrete or terracotta tile roof with sarking, or metal sheet roof with foil backed R2.0+ fibre insulation between steel sheeting and roof battens.	As per Quiet House B • Acoustically rated openings and ductwork to provide a minimum sound reduction performance of Rw 40dB 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
	Side-on		As per Quiet House B 'Facing' above (Rw+Ctr values may be 3dB less, or max % area increased by 20%).			
	Opposite		As per Quiet House A 'Facing' above.			
C Quiet House C+	All	As per Quiet House B example above, except using double leaf masonry construction only. • Double brick: two leaves of 90mm day brick masonry with: – A 50mm cavity between leaves – R2.0+ cavity insulation – resilient ties where required to connect • Double brick: two leaves of 110mm clay brick masonry with a 50mm cavity between leaves and R2.0+ cavity insulation	As per Quiet House C, except • No external doors for bedrooms with entry 'Facing' or 'Side-on' to transport corridor.	As per Quiet House C, except that • 'Side-on' requirements same as Quiet House C 'Facing'. • All windows into habitable areas comprise minimum 6 mm thick glazing in sealed awning or casement frames. Polymer (e.g. uPVC) window framing and hardware which cannot rattle loose should be used throughout. • Evaporative air conditioning systems are not recommended.	<b>To Rw+Ctr 45dB</b> As per Quiet House C, except • the roof must be concrete or terracotta tile construction with sarking (i.e. no steel sheet roof option). • Ceilings to bedrooms must be constructed from at least 2 overlapping layers of flush plasterboard.	

**Footnotes:**

- The airborne weighted sound reduction index (Rw) and traffic correction term (Ctr) are published by manufacturers/suppliers, can be determined by acoustical consultants or measured in accordance with AS ISO 717.1. Higher Rw+Ctr values infer greater sound insulation. All values are minimum Rw+Ctr (dB)
- Example construction for different external wall ratings of Rw+Ctr 45dB and 50dB are provided and are listed within Specification F5.2 in Volume 1 Part F of the National Construction Code. These values are based on the installation and sealing of joints and penetrations in accordance with Specification F5.2.

- Window and external door sound reduction values provided are based on the provision of suitable acoustic seals to prevent sound leakage. To comply with the above ratings, all external glass windows and doors specified under requirements A, B and C must have the following:
  - Operable windows and external doors must have a seal to restrict air infiltration fitted to each edge and doors must have a drop seal to provide an airtight seal when closed
  - Within doors or fixed framing, glazing must be set and sealed using an airtight arrangement of non-hardening sealant, soft rubber (elastomer) gasket and/or glazing tape, or be verified by manufacturer or approved person that the construction system as to be installed achieves the relevant Rw+Ctr value

- In this context, a seal is foam or silicon based rubber compressible strip, fibrous seal with vinyl fin interleaf or the like. Brush / pile type seals without this seal included are not allowed.
- Glazing referenced can be monolithic, laminated or toughened safety glass
- Any penetrations in a part of the building envelope must be acoustically treated so as not to degrade the performance of the building elements affected. Most penetrations in external walls such as pipes, cables or ducts can be sealed through caulking gaps with non-hardening mastic or suitable mortar