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WILTON SOUTH
EAST PRECINCT STAGE 1
ROAD and RAIL NOISE
PLANNING ASSESSMENT

48.7096.R1:GA/DT/2018

Rev 03
12 June 2018

Prepared for: Walker Corporation Pty Ltd
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12 June 2018

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1.0 Introduction

The Wilton Junction Master Plan Rezoning Study, Noise and Vibration Management Assessment prepared by *Atkins Acoustics* dated November 2013 identified that the Wilton South study area is subjected to noise from road traffic and potential impacts from the development of the Maldon-Dombarton Rail corridor. Feasibility studies undertaken for the Maldon-Dombarton Rail corridor reported that the rail link, if economic, would be designed to accommodate high tonnage freight trains. As part of the Wilton Junction Master Plan the *Walker Corporation* is seeking to develop Wilton South-East Precinct (Stage1) *(Figure 1).*

Atkins Acoustics was retained by *Walker Corporation* to prepare a noise assessment report for Stage 1 of the Wilton South-East Precinct, Residential Subdivision.

The main aim of the investigations was to address likely noise exposure and conceptual mitigation options for the development of residential accommodation (Stage 1). The report is intended to provide guidance for the preparation of a Development Application and assist purchases, developers and Council with the design of future residential accommodation.

The structure of the report includes:

- the identification of likely noise catchment areas;
- measurement and assessment of existing road traffic noise;
- forecast traffic volumes for Picton Road and the main internal collector service roads;
- review of noise assessment objectives referenced to the State Environmental Planning Policy (Infrastructure) 2007;
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- modelling and assessment of projected road traffic noise;
- review likely noise and vibration impacts associated with the Maldon-Dombarton Rail corridor; and
- develop conceptual 'deemed to comply' noise mitigation strategies where predicted noise levels exceed assessment objectives.

The report has been prepared for the particular noise and vibration investigations described. No part of the report should be used in any other context or any other purpose without written approval from *Atkins Acoustics* and *Walker Corporation.*

2.0 Development and Site Description

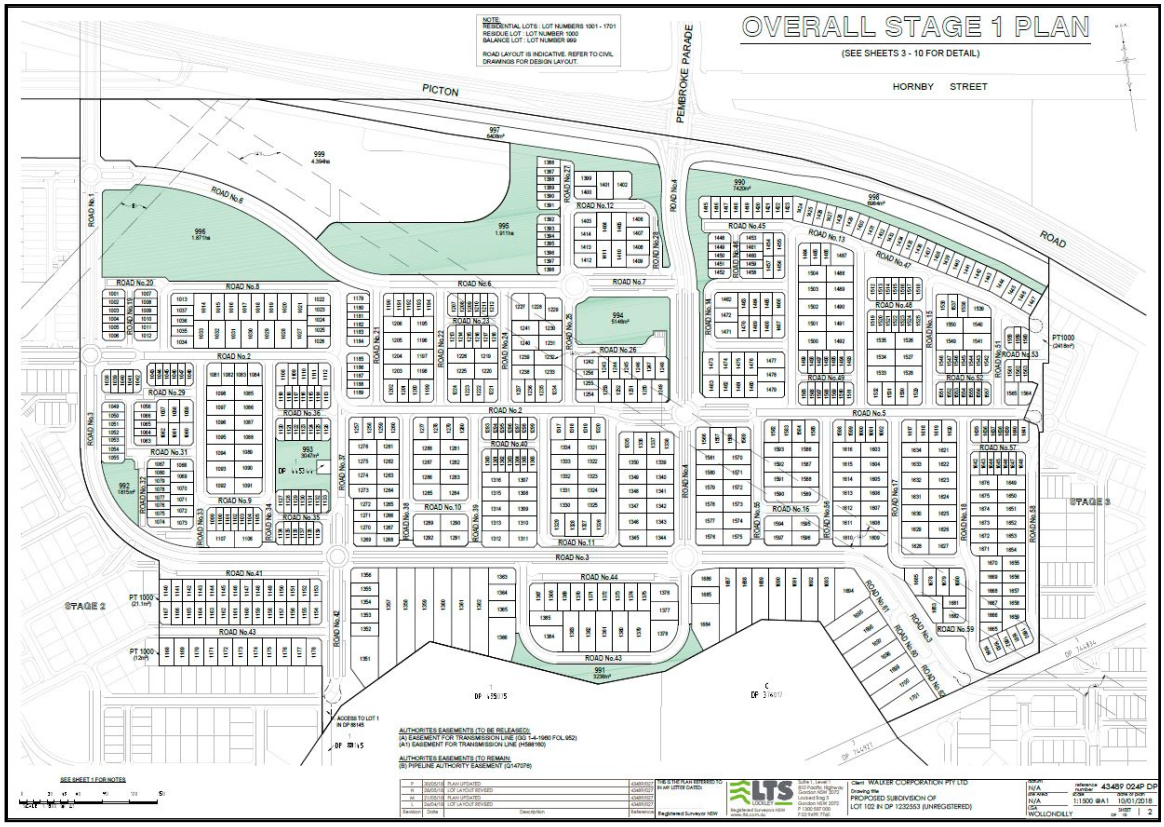
Planning the Staged Wilton South East Precinct subdivision provides for 3431 residential lots. Stage 1 provides for six hundred and ninety three (693) residential lots, in addition to commercial and warehouse development on the Picton Road frontage (subject to future DA Approval). Vehicle access to the Wilton South-East Precinct (Stage 1) is provided at the Pembroke Parade junction and a proposed new overpass at the western end on Stage 1. *Figure 1* provides a layout for the Wilton South East Precinct (Stage 1).

Preliminary investigations identified that the Stage 1 study area is exposed to traffic noise from Picton Road. Picton Road provides a transport corridor to service Wollongong and Port Kembla. It is understood that future planning for Picton Road includes for additional bi-directional traffic lanes.

The Maldon-Dombarton Rail corridor is located to the west and south of the South-East Precinct subdivision land. At its closest point the separation distance to the Stage 1 residential lots is approximately 350 metres *(Attachment 1)*.

Conceptual road traffic noise mitigation strategies considered for Stage 1 include noise walls along the Picton Road frontage, site specific building selections at the Estate Gateway (Pembroke Parade) and 'deemed to comply' noise attenuation guidelines for future residential accommodation.

Figure 1. South East Precinct Residential Layout (Stage 1)



3.0 Road and Rail Traffic Noise Goals

Procedures, guidelines and goals for assessing road and rail traffic noise are published in the State Environmental Planning Policy (Infrastructure) 2007, the Campbelltown City Council Growth Centre Precinct DCP , the Department of Planning *Development near Rail Corridors and Busy Roads – Interim Guideline,* the NSW, EPA, Road Noise Policy (RNP), Australian Standard AS 3671 Acoustics-Road traffic noise intrusion-Building siting and construction for assessing building constructions and Australian Standard AS 2107 Acoustics- Recommended design sound levels and reverberation times for buildings.

3.1 State Environment Planning Policy (Infrastructure) 2007

SEPP Infrastructure (2007) Clause 87 refers to assessing noise and vibration on land for residential accommodation that is adjacent to non-rail developed rail corridors, Clause 102 refers to road traffic noise.

3.1.1 Mandatory requirements

Clause 102 of the SEPP refers to road corridors where mandatory requirements under the Policy apply to roads carrying an Annual Average Traffic Volume (AADT) greater than 40,000 vehicles.

However, as the Picton Road AADT traffic volumes are less than 40,000 the mandatory SEPP requirements do not apply.

3.1.2 Non-mandatory recommendations

For new residential accommodation along road corridors carrying between 20,000 and 40,000 AADT, it is expected that in most situations road traffic noise will adversely impact these locations. For these road corridors there are no mandatory requirements to assess mitigation options to address road traffic noise and as 'best practice' the SEPP internal noise levels should be considered.

3.1.3 SEPP (Internal) Design Noise Levels

The SEPP (Infrastructure) 2007 road and rail traffic noise design assessment goals for residential accommodation are:

(a). in any bedroom in the residential accommodation - 35dBA at any time between 10.00pm and 7.00am; and

(b). anywhere else in the residential accommodation (other than the garage, kitchen, bathroom or hallway) - 40dBA at any time

In addition the NSW Department of Planning ' Development near Rail Corridors and Busy Roads - Interim Guideline) states:

'If internal noise levels with windows and doors open exceed the criteria by more than 10dBA, the design of ventilation for these rooms should be such that the occupants can leave windows closed, if they so desire, and meet the Building Code of Australia (BCA) ventilation requirements'.

3.2 Road Noise Policy

The EPA, Road Noise Policy (RNP) sets out a range of measures to assess and mitigate traffic noise from new and redeveloped road projects, The RNP target noise goals are referenced to particular types of projects, road categories and land uses and assessed at external building facades.

For residences affected by noise from existing freeway/arterial/sub-arterial road corridors the recommended external L_{Aeq} levels are:

- $L_{Aeq\ 15\ hours}$ 55 Day (7.00am and 10.00pm)
- $L_{Aeq\ 9\ hours}$ 50 Night (10.00pm and 7.00am)

For residences affected by noise from local roads the recommended external L_{Aeq} levels are:

- $L_{Aeq\ 1\ hour}$ 55 Day (7.00am and 10.00pm)
- $L_{Aeq\ 1\ hour}$ 50 Night (10.00pm and 7.00am)

3.3 Campbelltown Growth Centre Precincts Development Control Plan

The Campbelltown City Council Growth Centre Precincts DCP (DCP) (Table 4-7) sets out the following *(Table 1)* non-mandatory internal target noise goals for residential accommodation exposed to traffic noise. Where a naturally ventilated/windows open condition cannot be satisfied, the internal design goals apply with the addition of mechanical ventilation compliant with AS1668 and the Building Code of Australia.

Table 1. Internal Road Traffic Noise Levels

Description	Sound Pressure Level dBA	
	Sleeping Areas	Living Areas
Naturally ventilated/windows open to 5% of the floor area (mechanical ventilation or air-conditioning systems not operating)	$L_{Aeq\ 15\ Hours}$ 40dBA $L_{Aeq\ 9\ Hours}$ 35dBA	$L_{Aeq\ 15\ Hours}$ 45dBA $L_{Aeq\ 9\ Hours}$ 40dBA
Doors and windows shut (mechanical ventilation or air-conditioning systems are operating)	$L_{Aeq\ 15\ Hours}$ 43dBA $L_{Aeq\ 9\ Hours}$ 38dBA	$L_{Aeq\ 15\ Hours}$ 48dBA $L_{Aeq\ 9\ Hours}$ 43dBA

NOTE:
These levels correspond to the combined measured level of external sources and ventilation system operating normally. Where a naturally ventilated/windows open condition cannot be achieved it is necessary to incorporate mechanical ventilation compliant with AS1668 and the Building Code of Australia

3.4 Department of Planning - Development near Rail Corridors and Busy Road - Interim Guideline

Referring to the SEPP, the NSW Department of Planning - Development near Rail Corridors and Busy Road - Interim Guideline (December 2008) *(DPIG)* provides target noise levels for assessing rail and road noise for residential and non-residential buildings. A summary of the Department of Planning *(DoP)* target assessment levels is provided in *Table 2.* For sensitive development adjacent to a road with an average daily traffic volume of 20000-40000 vehicles, *DPIG* refers to the target assessment levels for providing best practical advice.

Table 2. Internal Target Noise Levels for Rail and Road Traffic

Type of Occupancy		Noise Level dBA	Applicable time period
Residential Buildings			
Sleeping Areas (bedrooms)		35	Night 10.00pm to 7.00am
Other habitable rooms (excl. garages, kitchens, bathrooms and hallways		40	Anytime
Non-Residential Buildings			
Type of Occupancy		Recommended Max Noise Levels dBA	
Educational Institutions including child care centre			40
Place of Worship			40
Hospitals	Ward		35
	Other noise sensitive areas		45

If internal target design levels from rail or road infrastructure with windows/doors open exceed the criteria *(Table 2)* by more than 10dBA, the *DPIG* recommends that the design of ventilation for the exposed rooms should be such that occupants can leave the windows/doors closed, if they desire, and also meet the ventilation requirements of the Building Code of Australia. With windows/doors open for natural ventilation, typical noise attenuation across exposed building facades would be in the order of 10dBA. Standard window/door configurations with standard weight per size glazing typically attenuate external noise by 20dBA with the windows/doors closed.

3.5 Outdoor Living Areas

Where reasonable and feasible outdoor living areas should be located on the opposite side of the building from the road corridor. Alternatively, the design of outdoor living areas could include onsite structures or solid continuous fences of minimum 2 metres height above finished paved or ground surface.

3.6 Project Traffic Noise Assessment Objectives

From the above assessment guidelines, the Campbelltown City Council Growth Centre Precincts DCP the internal target levels *(Table 1)* were adopted for addressing traffic noise from Picton Road. For addressing traffic noise from the main internal local collector roads the RNP $L_{Aeq\ 1\ hour}$ noise descriptor and the Campbelltown City Council

Growth Centre Precincts DCP internal target levels were adopted. For assessing noise from the Maldon-Dombarton Rail corridor, Clause 87 of the SEPP Infrastructure has been considered.

3.6 Notification on Title

Where traffic noise levels following the completion of noise control structures exceed target outdoor noise goals, notification should be provided to prospective purchases/developers. In addition it should be notified on the certificates of title and/or advice provided to prospective purchases/developers advising of the potential for impacts of transport noise. Such advice can bring to the attention of prospective purchasers/developers the need to reduce the impact of noise through sensitive building design and construction and the location of outdoor living areas.

4.0 Road Traffic Noise Modelling Methodology

Road traffic noise modelling for the Stage 1 was developed from the UK Department of Transport Calculation of Road Traffic Noise (CoRTN) algorithm and the RTA Computer Model. CoRTN with suitable corrections has shown to give accurate predictions for Australian conditions and endorsed by the RMS and EPA. The model takes into account source directivity, terrain, shielding, air and ground absorption, distance attenuation and attenuation from noise walls.

CoRTN predicts $L_{A10,\ 1\ hour}$ levels rather than L_{Aeq} levels as required by the SEPP, RNP and the DCP. The L_{Aeq} levels were calculated by adopting a 3dB(1) difference between the L_{A10} and L_{Aeq} levels. Noise source heights were set at 0.5m for cars, 1.5m for heavy vehicles and 3.6m for heavy vehicle exhausts. Corrections of -0.6dB and -8.6dB were applied to CoRTN for heavy vehicle engines and truck exhausts, respectively.

Modelling included the following:

- reported traffic projections (WSP Parson Brinckerhoff (June 2014))
- existing traffic counts for Picton Road (Reference Station 6179);
- ground topography for the subdivision;
- sub-division lot and road layout;
- projected traffic flows including percentage heavy vehicles;
- posted traffic speeds 80kph and 50kph for Picton Road and internal collector roads, respectively;
- two storey houses with living areas at ground floor and first floor bedrooms;
- building facade set-backs 10-15m from closest edge of collector roads (nominal set-back 12m);
- building facade correction +2.5dB;
- ground floor slabs 300mm above ground level;
- top first floor 3.0m above ground slab; and
- first floor eaves 5.1m above ground slab.

4.1 Road Traffic Volumes

Existing (2017) traffic counts for Picton Road are referenced to Count Station 6179. The reported weekday twenty four (24) hour traffic count was 20574 vehicles with 26.6% heavy vehicles, the average seven day twenty four (24) hour count was 19619 vehicles with 23% heavy vehicles. *Figure 2* presents the 2017 hourly bi-direction road traffic profile and traffic composition for Picton Road.

Projected (2036) road traffic volumes for Picton Road provided for the study area (Parson Brinckerhoff (June 2014)) indicate that traffic volumes east of the Hume Highway, would increase by up to 45%.

For the main internal collector roads projected $L_{Aeq\ 1\ hour}$ peak hour traffic projections for the developed South-East Precinct are summarised in *Table 3*.

(1) Reference. RMS Model Verification Guideline

Figure 2. Picton Road Daily Traffic Profile (2017)

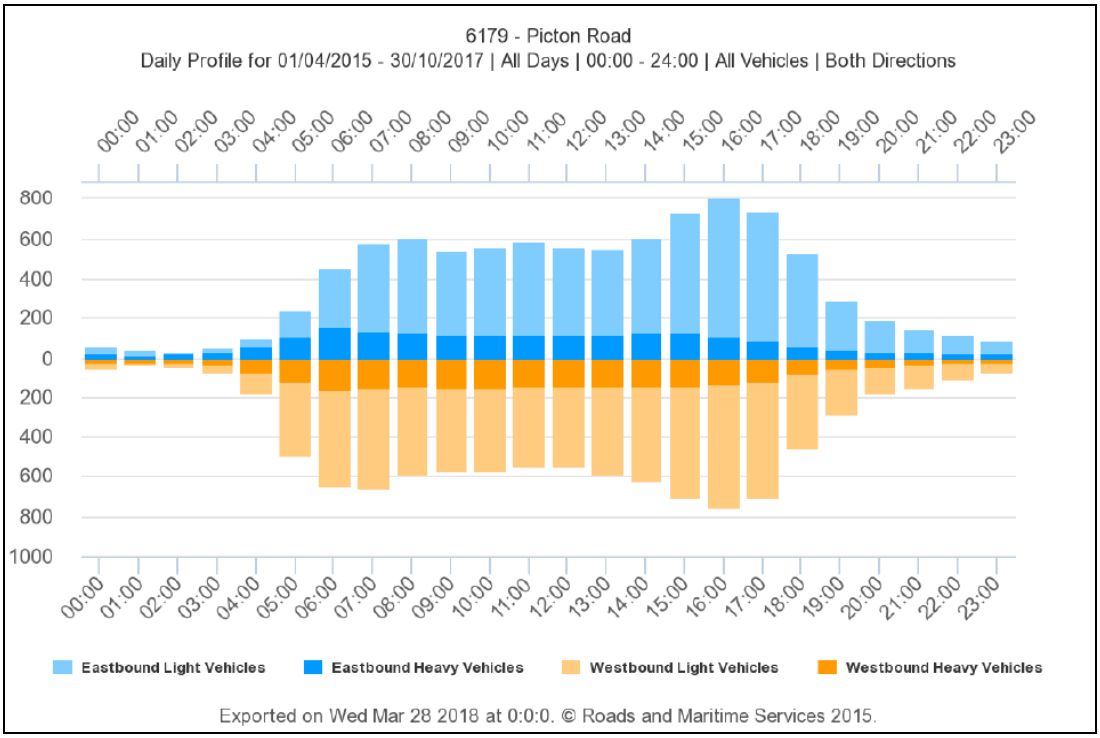


Table 3. Projected Peak Hour Traffic Volumes

Road Description	Peak Hour Traffic Volumes V/Hour
Road No. 1 (between Picton Road and Road 2)	907
Road No 3 (between Road 2 and Roads 37/42)	667
Road No. 3 (between Roads 37/42 and Road 4)	560
Road No. 3 (east of Road 4)	885
Road No. 4 (between Road 3 and Roads 2/5)	316
Road No. 4 (between Roads 2/5 and Picton Road	506

4.2 Noise Model Verification

Validation of the noise model was undertaken ultising 2017 traffic volumes, the existing road alignment and the existing ground contours to predict levels for comparison with measurements conducted at two (2) referenced assessment locations. The predicted and measured levels are shown in *Table 4.*

Table 4. Noise Model Validation

Reference Location	Predicted Noise Level		Measured Noise Level		Difference	
	$L_{Aeq\ 15\ hour}$	$L_{Aeq\ 9\ hour}$	$L_{Aeq\ 15\ hour}$	$L_{Aeq\ 9\ hour}$	$L_{Aeq\ 15\ hour}$	$L_{Aeq\ 9\ hour}$
Location M1	67	65	66	65	+1	0
Location M2	62	60	62	61	0	-1

The validation results in *Table 4* are within the allowable tolerance of ± 2dBA and indicate that no additional model correction factors are required.

4.3 Predicted External Road Traffic Noise Levels

Modelling shows that without noise walls, road traffic noise exposure for Stage 1 from Picton Road extends across the site and exceeds the recommended external noise levels at a number of building lots.

As part of the sub-division planning strategy to reduce traffic noise exposure 3.6m high noise walls were introduced along the Picton Road frontage with returns at the Pembroke Parade intersection and purpose built residential accommodation proposed at the Gateway entrance (Pembroke Parade) *(Attachment 2)*. Traffic noise plots for projected future traffic volumes (2036) on Picton Road with the addition of the noise walls are shown in *Attachment 3*. The traffic noise plots in Attachment 3 provide no allowance for onsite attenuation from built structures/dwellings constructed within the sub-division. It is expected that structures/dwellings constructed within the sub-division between Picton Road and potential noise receptors would provide additional acoustic shielding for the receptor location.

For building lots fronting Picton Road, predicted daytime traffic noise levels of $L_{Aeq\ 15\ hour}$ 65-66 exceed the external target design level $L_{Aeq\ 15\ hour}$ 55. For the night period, the predicted levels of $L_{Aeq\ 9\ hour}$ 60-63 exceed the external target design level of $L_{Aeq\ 9\ hour}$ 45.

The *Attachment 3* noise plots identify building lots that require additional noise mitigation to address residual exposure referenced to the internal design target noise levels. Referenced to Australian Standard 3671 assessment procedures for addressing traffic noise intrusion, 'deemed to comply' building insulation treatments are presented in *Attachment 4*.

As part of the noise mitigation planning strategy for Stage 1, building lots numbered 1400 to 1403 and 1441 to 1445, inclusive, are to be designed and developed with purpose built terrace/town house style residences backing onto Pembroke Parade.

Planning for Stage 1 provides for future non-residential 'Enterprise Development' between residential zoned land and Picton Road. Development on the 'Enterprise' land would provide additional acoustic shielding for the exposed residential land to the south and reduce the requirement for noise walls along the Picton Road frontage.

For residential lots with exposed boundaries to the main internal collector roads identified in *Table 3* predicted daytime peak hour traffic noise levels for Road 4 range between $L_{Aeq\ 1\ hour}$ 62-64dBA and $L_{Aeq\ 1\ hour}$ 65-67 for Roads 1 and 3. The predicted external levels exceed the target design levels $L_{Aeq\ 1\ hour}$ 50-55dBA. To address the residual noise exposure referenced to the internal target design levels ($L_{Aeq\ 1\ hour}$ 40-45dBA), traffic noise reductions of up to 22dB (living areas) and 27dBA (sleeping areas) are predicted. Section 4.5 presents traffic noise reduction categories for the assessment of conceptual building design elements. *Attachment 3* presents 'deemed to comply' building insulation treatments for exposed building lots along the internal collector roads *(Table 3).*

4.4 Rail Noise and Vibration

The Maldon - Dombarton Rail Link Feasibility Study (September 2011) reported that with two 1500m passing loops and scope for a third loop, if required, would enable the line to allow the projected 25 freight train movements per day, increasing to 60 train movements per day.

With respect to freight train noise ARTC and Rail Corporation of NSW are licensed by the NSW, EPA. An objective of EPA Licenses is to progressively reduce noise from freight trains with the implementation of Pollution Reduction Programs. As part of the Environmental Protection Licenses noise limits are set for various operating conditions. One Condition requires the maximum noise level for all service conditions referenced to AS2377-2002 (Acoustics- Methods for the measurement of rail bound vehicle noise) not to exceed 87dBA (Max) referenced to 15 metres from the centre of the rail track. Other Conditions relate to stationary noise compliance testing.

For the purpose of assessing possible noise and vibration exposure and mitigation options, acoustic planning strategies are provided in the Department of Planning document *Development near Rail Corridors and Busy Roads – Interim Guideline (DoPIG).*

Where no noise contour mapping is available based on actual operating conditions, *DoPIG* refers to assessment zones based on offset distances from the operational track (not corridor). The zones are indicative acoustic assessment zones where sensitive land-uses are likely to be adversely affected. *DoPIG* does not require acoustic assessment for sensitive land-use development greater than 60m from a rail line with speed limit less than 80kph. At the closest point the separation distance between the Maldon-Dombarton Rail corridor and the Stage 1 residential building lots is approximately 350 metres.

Referenced to ground vibration the *DoPIG* assessment zone for residential development is within the 25 metres of the railway corridor.

Referring to the Department of Planning *Development near Rail Corridors and Busy Roads – Interim Guideline,* Stage 1 residential development areas are outside the acoustic assessment zones where sensitive land-use developments are likely to be adversely affected.

4.5 Building Treatment Categories

Procedures for determining required traffic noise reductions (TNR) and elements for building construction required to achieve these reductions are referenced in Australian Standard 3671. *Table 5* refers to typical TNR categories for the assessment of conceptual building design elements.

Table 5. Traffic Noise Reduction Categories

Description	Traffic Noise Reduction TNR	Construction Overview
Category 1	<10	Standard construction, openings, including open windows/doors (up to 10% of exposed facade)
Category 2	10-20	Standard wall and roof constructions, except light weight elements such as fibrous cement or metal cladding or all glass facades. Windows/doors selected with and installed with Q-Lon or equivalent acoustic rated seals. Windows/doors and other openings closed. Mechanical ventilation
Category 3	20-25	Upgraded wall and roof constructions. Windows/doors selected with and installed with Q-Lon or equivalent acoustic rated seals. Windows/doors and other openings closed. Mechanical ventilation
Category 4	25-30	Upgraded wall and roof constructions. Windows/doors selected with and installed with Q-Lon or equivalent acoustic rated seals. Windows/doors and other openings closed. Mechanical ventilation
Category 5	>30	Special acoustic design advice required with Mechanical ventilation

5.0 Discussion

The road traffic noise modelling results for Stage 1 with provisions for 3.6m noise walls along the Picton Road frontage are presented in *Attachment 3*. For building lots fronting Picton Road, predicted daytime traffic noise levels of $L_{Aeq\ 15\ hour}$ 65-66 exceed the external target design level $L_{Aeq\ 15\ hour}$ 55. For the night assessment period, predicted levels of $L_{Aeq\ 9\ hour}$ 60-63 exceed the external target design level of $L_{Aeq\ 9\ hour}$ 45. For development lots where predicted levels exceed the external target design levels $L_{Aeq\ 15\ hour}$ 55 and $L_{Aeq\ 9\ hour}$ 45, acoustic design treatments and closed windows/doors are required to address the residual noise levels. To address the residual noise exposure referenced to the internal target design levels ($L_{Aeq\ 15\ hour}$ 45 and $L_{Aeq\ 9\ hour}$ 35) traffic noise reductions (TNR) of up to 21dB (living areas) and 28dBA (sleeping areas) are predicted

For residential lots with exposed boundaries to the main internal collector roads identified in *Table 3,* predicted daytime peak hour traffic noise levels for Road 4 range between $L_{Aeq\ 1\ hour}$ 62-64dBA and $L_{Aeq\ 1\ hour}$ 65-67 for Roads 1 and 3 exceed the target design levels $L_{Aeq\ 1\ hour}$ 50-55dBA. To address the residual noise exposure referenced to the internal target design levels ($L_{Aeq\ 1\ hour}$ 40-45dBA), traffic noise reductions (TNR) of up to 22dB (living areas) and 27dBA (sleeping areas) are predicted.

As a general rule noise attenuation across a standard residential building façade with windows/doors open (10% floor area), is in the order of 10dB. On that basis, opening windows/doors in dwellings located in areas where external traffic noise levels exceed the recommended internal levels by more than 10dB, need to be closed. With the windows/doors closed, noise reductions in the order 20dBA are expected. For areas where attenuation greater than 20dB is required, secondary acoustic design considerations are required to address window/door glazing, façade types and roof/ceiling upgrading. Where windows/doors are required to be closed in order to satisfy internal design noise levels, alternative means of ventilation should be considered in accordance with the Building Code of Australia and AS 1688.

Table 5 presents traffic noise reduction categories for the assessment of conceptual building design elements.

The following section of the report provides in principal design features for residential accommodation located in areas identified for residual acoustic treatment. The features include purpose built townhouse building at Pembroke Parade Gateway entrance and "deemed to comply" categories to address recommended internal design noise levels *(Table 1).*

The conceptual indicative acoustic design recommendations *(Attachment 4)* are presented to inform and assist the community, developers and Council with respect to the likely exposure to transport associated noise and building considerations to address noise exposure.

5.1 Noise Control Treatments for Residential Accommodation

The following section presents in principal 'deemed to comply' acoustic design recommendations to address residual traffic noise levels. The recommendations are provided as acoustic ratings for a hypothetical typical modern 'project home' constructions.

For reference the acoustic recommendations are based on modifications to standard brick veneer structure with internal plasterboard linings or double brick, concrete/terracotta tiles or metal deck roof with bulk insulation and plasterboard ceilings, external solid core doors, fitted with acoustic rated seals and mechanical ventilation/air conditioning. For building Category 5 acoustic performance certification should be sourced by builders/project managers/developers prior to installation.

Table 6 presents a summary of building lots identified from *Attachment 3* with residual noise exposure and required noise mitigation categories.

Table 6. Building Lots Identified for Residual Noise Treatment

Referenced Building Lot	Acoustic Construction Category
Picton Road Frontage	
Ground Floor	
1380, 1381, 1382, 1393, 1395, 1396	3
1400 - 1403 (inclusive)	4
1409 - 1440 (inclusive)	3
1441 -1445 (inclusive)	4
First Floor	
1380 - 1383 (inclusive)	4
1384, 1385, 1393, 1994, 1395, 1396. 1399	3
1400 - 1403 (inclusive)	4
1409 - 1440 (inclusive)	3
1441 - 1445 (inclusive)	4
Internal Collector Road 4 + one lot back from round about intersections	
Ground Floor	3
First Floor	3
Internal Collector Roads 1 and 3 + one lot back from round about intersections	
Ground Floor	3
First Floor	4

NOTES.
1. For Category 3 buildings acoustic performance certification documentation should be sourced by builders/project managers/developers prior to installation.
2. Minimum building requirements included 6mm glazed windows/doors with acoustic rated seals and provisions for mechanical ventilation/air conditioning.
3. To assist with design development, acoustic performances of Rw22-28 are normally achieved with single glazed 6mm glass, Rw28-32 with 6.38mm laminated glass, Rw32-34 with 10.38mm laminated glass and Rw34-36 with 12.38mm glass or 6.5mm VLam Hush installed in acoustic rated frames with acoustic seals. Acoustic performance up to Rw38 may be achieved with 8.5mm VLam Hush when installed within an acoustic designed, manufactured and rated frame and would typically be a awning or casement window / hinged door. Typically for acoustic performances greater than Rw36 double glazed or dual window / doors systems are typically required

6.0 Conclusion

Atkins Acoustics was retained by *Walker Corporation* to prepare a road and rail noise assessment report for the Wilton South-East Precinct, Residential Subdivision (Stage 1).

Investigations identified that the Stage 1 study area is exposed to traffic noise from Picton Road and internal sub-division service roads. A corridor for the Maldon-Dombarton Rail link is located to the west and south of the South-East Precinct subdivision land. Referring to the Department of Planning *Development near Rail Corridors and Busy Roads – Interim Guideline,* Stage 1 residential development areas are outside the acoustic assessment zones where sensitive land-use developments are likely to be adversely affected.

For assessing road traffic noise exposure, the Campbelltown City Council Growth Centre Precincts DCP internal target design levels *(Table 1)* have been adopted.

As part of the sub-division planning strategy to reduce road traffic noise exposure 3.6m high noise walls were introduced along the Picton Road frontage, with returns at the Pembroke Parade intersection and purpose built residential accommodation proposed at the Gateway entrance (Pembroke Parade) *(Attachment 2).*

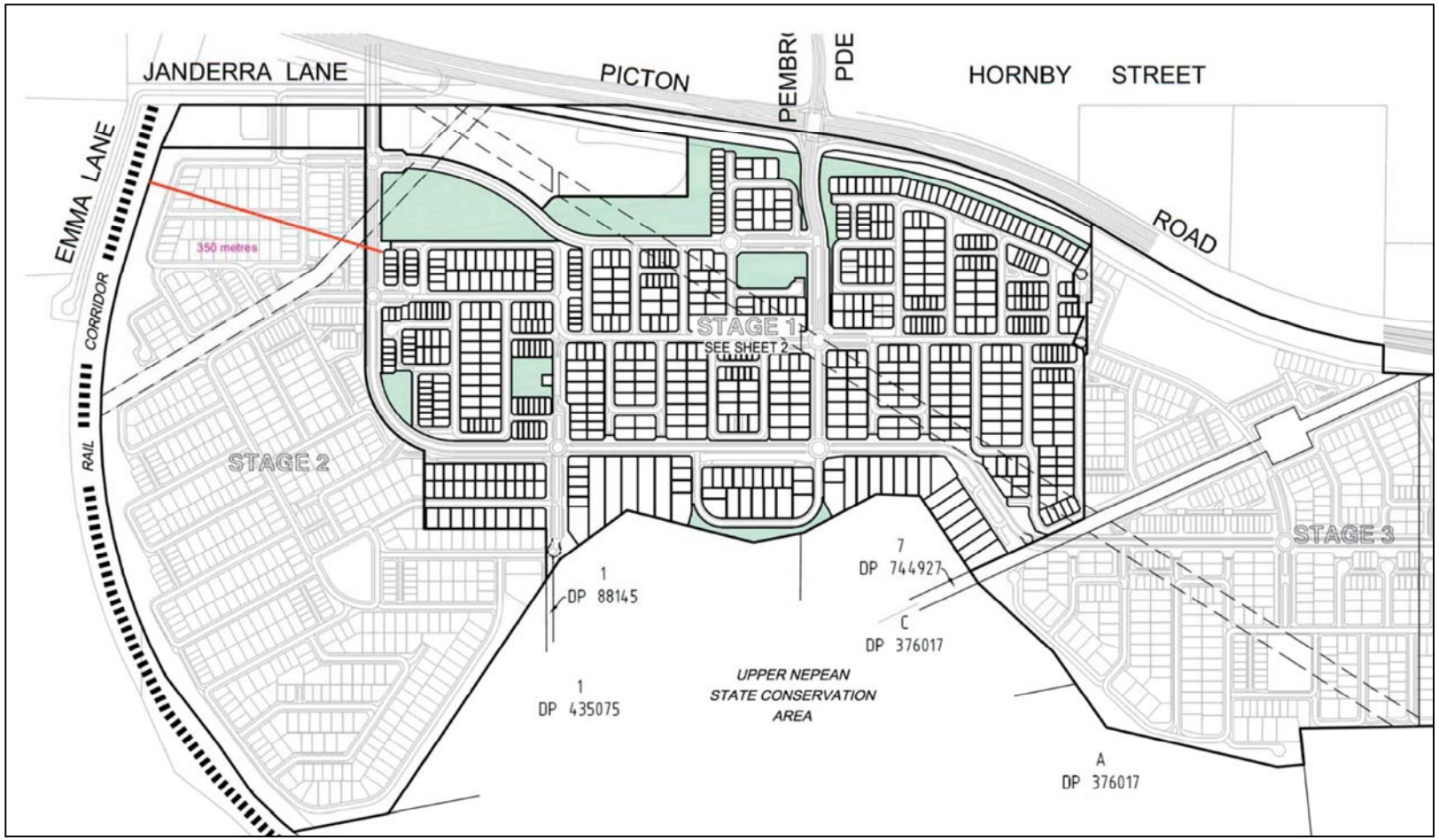
Traffic noise plots for projected future (2036) traffic volumes on Picton Road with the addition of the noise walls are shown in *Attachment 3.* The traffic noise plots *(Attachment 3)* provide no allowance for onsite attenuation from built structures/dwellings constructed within the sub-division. It is be expected that structures/dwellings constructed within the sub-division between Picton Road and potential noise receptors would provide additional acoustic shielding for the receptor location.

As a general rule noise attenuation across a standard residential building façade with windows/doors open (10% floor area), is in the order of 10dB. On that basis, opening including windows/doors in dwellings located in areas where external traffic noise levels exceed the recommended internal levels by more than 10dB need to be closed. With the windows/doors closed noise reductions in the order 20dBA are expected. For areas where attenuation greater than 20dB is required, secondary acoustic design considerations are required to address window/door glazing, façade types and roof/ceiling upgrading. Where windows/doors are required to be closed in order to satisfy internal design noise levels alternative means of ventilation should be considered in accordance with the Building Code of Australia and AS 1688.

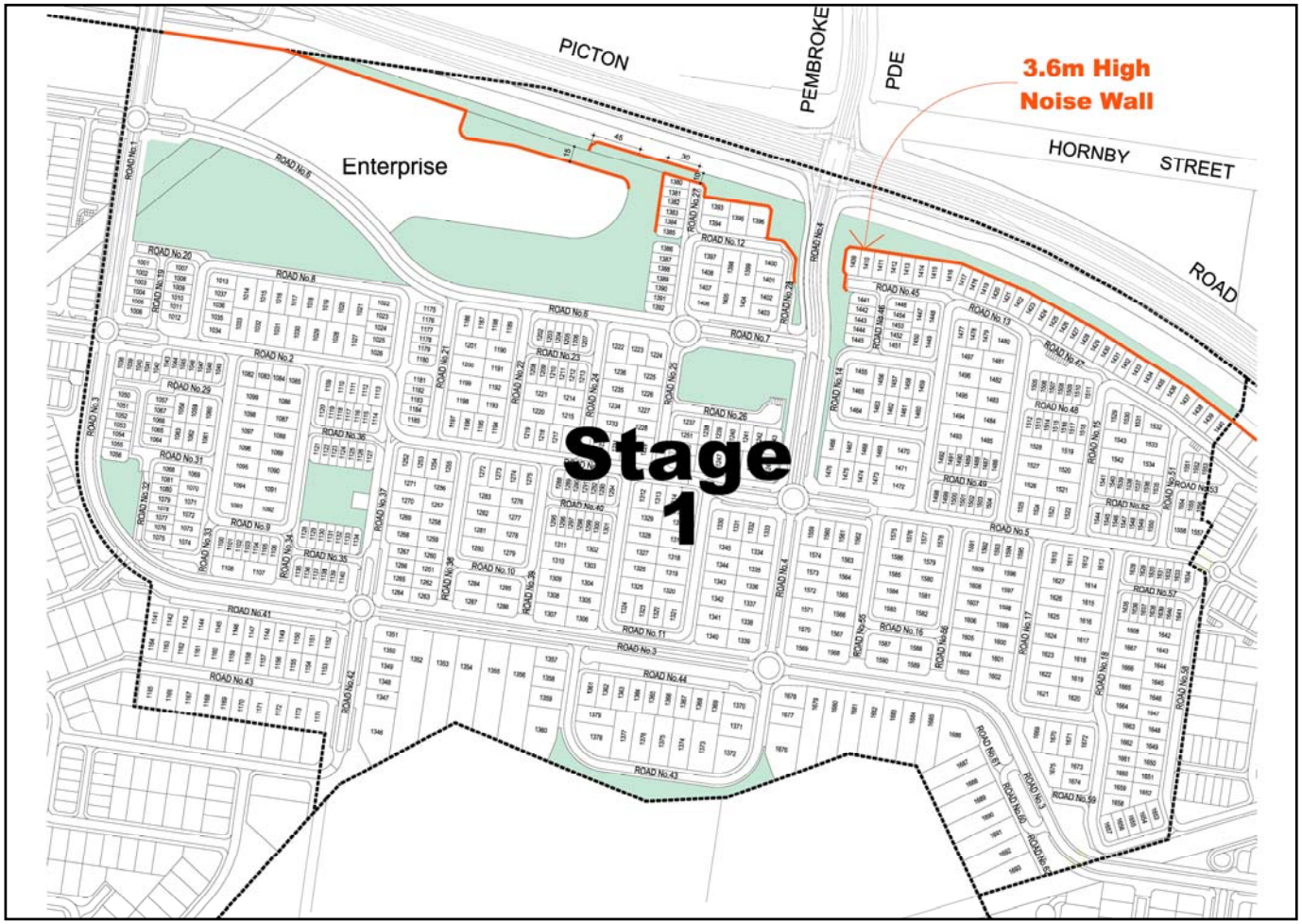
For development lots where predicted levels exceed the external target design levels, acoustic design treatments and closed windows/doors are required to address residual levels.

Recommendations in Section 5 of this report provide a summary of minimum traffic noise reduction categories for building lots identified with residual traffic noise exposure. 'Deemed to Comply' indicative noise treatments for these building lots are summarised in *Attachment 4.*

ATTACHMENT 1. Stage 1 Subdivision Layout with Road and Rail Corridors

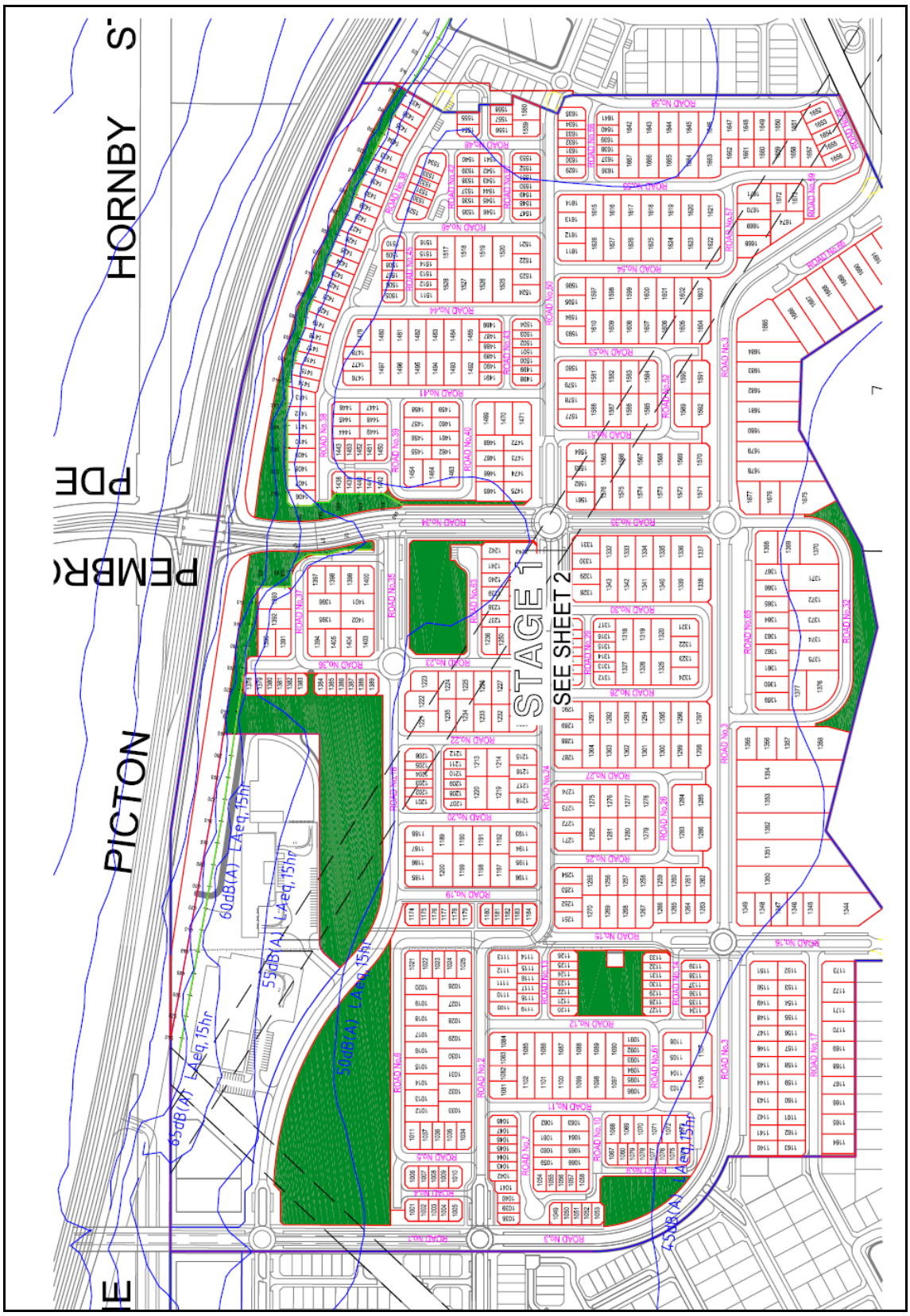


ATTACHMENT 2. Picton Road Noise Walls



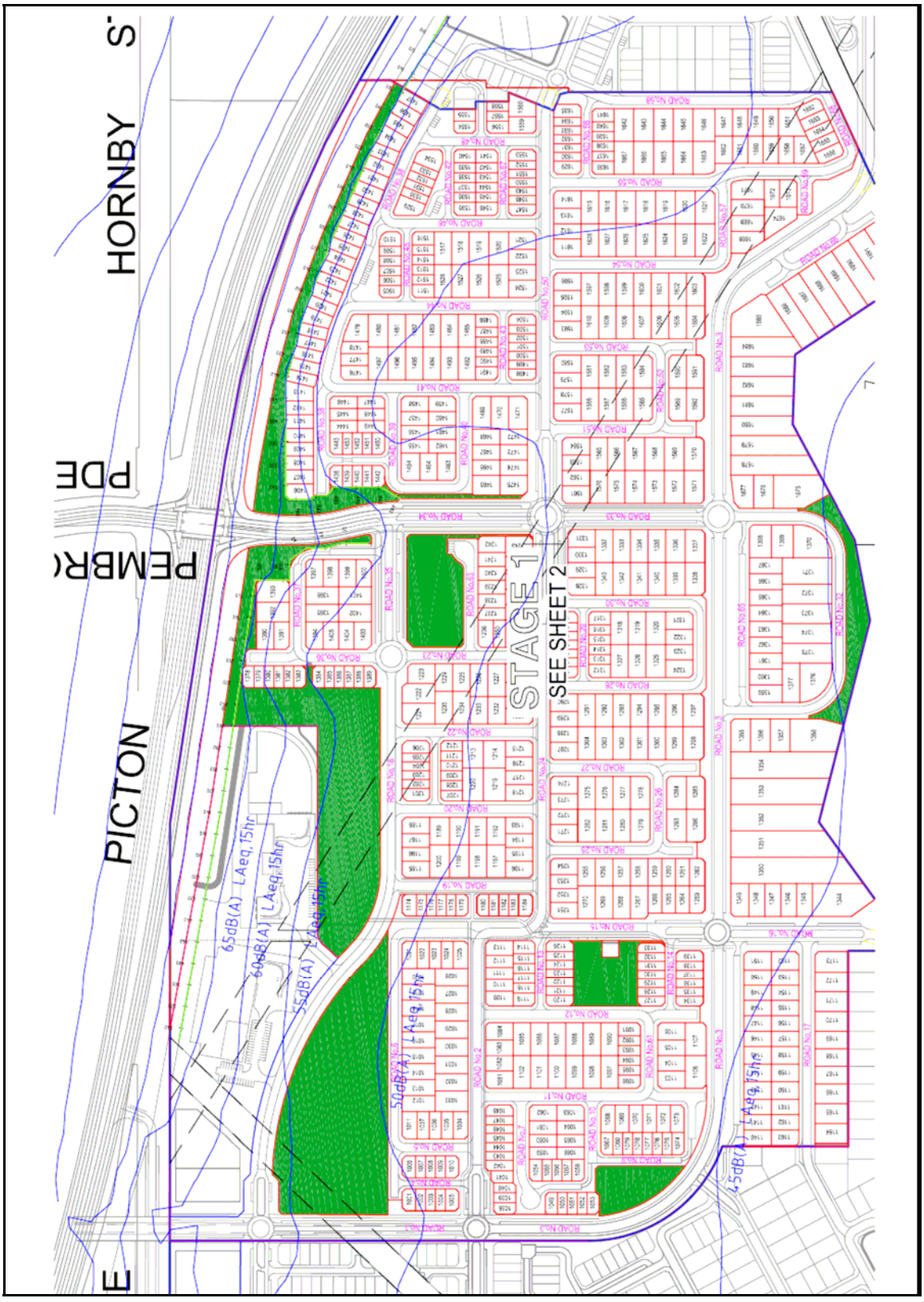
ATTACHMENT 3. Picton Road (2036) Traffic Noise Plots

$L_{Aeq\ 15\ hour}$ Ground Level

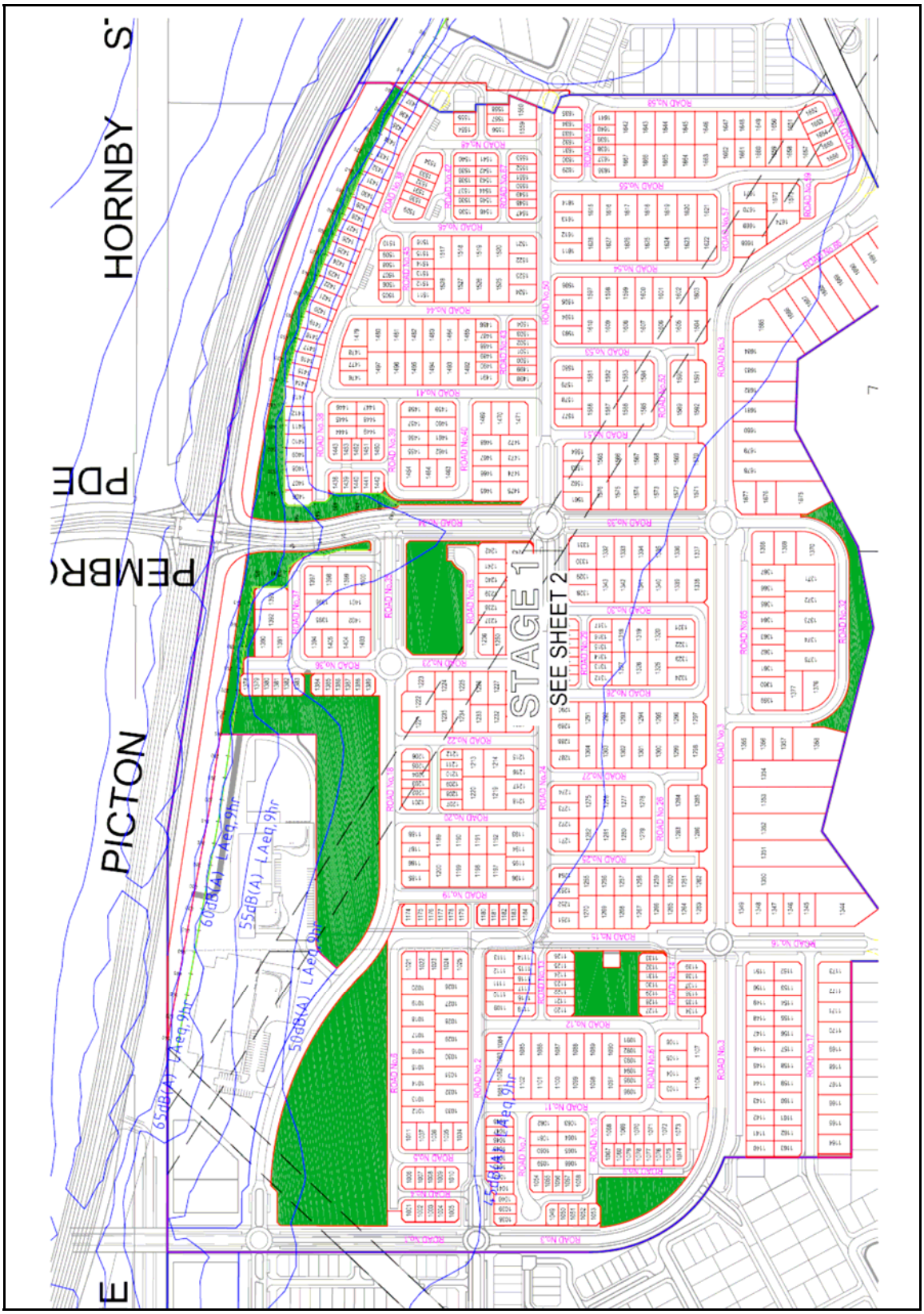


ATTACHMENT 3. Picton Road (2036) Traffic Noise Plots

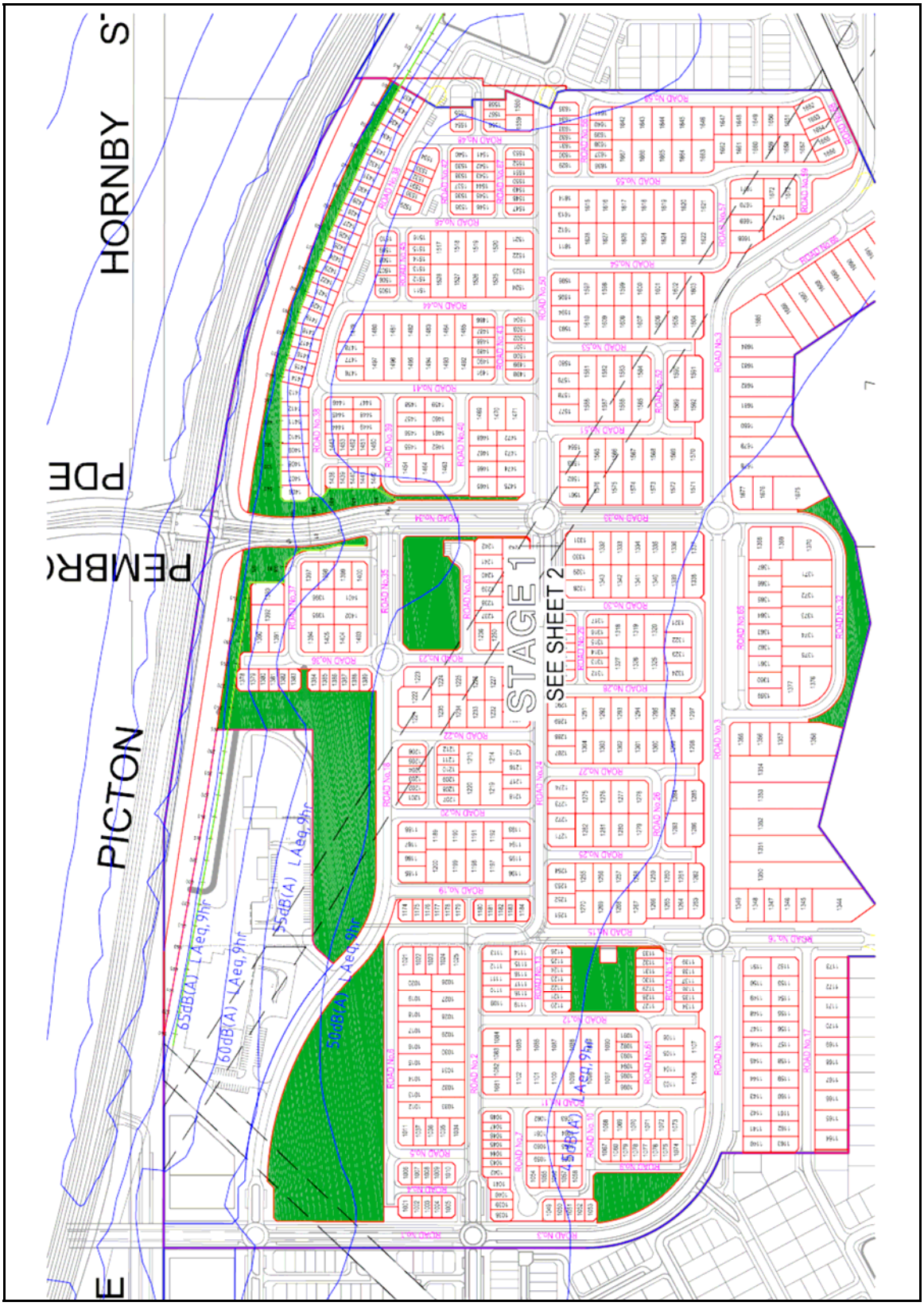
$L_{Aeq\ 15\ hour}$ First Floor Level



ATTACHMENT 3. Picton Road (2036) Traffic Noise Plots
$L_{Aeq\ 9\ hour}$ Ground Level



ATTACHMENT 3. Picton Road (2036) Traffic Noise Plots
$L_{Aeq\ 9\ hour}$ First Floor Level



ATTACHMENT 4. Category 1 'Deemed to Comply' Indicative Noise Treatments

The following noise insulation package is designed to meet the Campbelltown City Council DCP indoor target noise levels.

Area	Orientation to road corridor	Category 1 L_{Aeq},Day up to 55dB L_{Aeq},Night up to 45dB
Bedroom	Facing	• Standard wall, roof and ceiling constructions • Nominal glazing external windows and doors with acoustic rated seals.
	Side On	• Standard wall, roof and ceiling constructions • Nominal glazing external windows and doors with acoustic rated seals.
	Opposite	No requirements
Lounge Living Rooms	Facing	• Standard wall, roof and ceiling constructions • Nominal glazing external windows and doors with acoustic rated seals.
	Side On	• Standard wall, roof and ceiling constructions • Nominal glazing external windows and doors with acoustic rated seals.
	Opposite	No requirements

ATTACHMENT 4. Category 2 'Deemed to Comply' Indicative Noise Treatments

The following noise insulation package is designed to meet the Campbelltown City Council DCP indoor target noise levels.

Area	Orientation to road corridor	Category 2 L_{Aeq},Day 55-65dB L_{Aeq},Night 45-55dB
Bedroom	Facing	• Standard wall, roof and ceiling constructions • Nominal glazing external windows and doors with acoustic rated seals. • No vents to outside walls/eaves • Closed eaves • Closed windows/doors • Mechanical ventilation/air conditioning
	Side On	• Standard wall, roof and ceiling constructions • Nominal glazing external windows and doors with acoustic rated seals. • No vents to outside walls/eaves • Closed eaves • Closed windows/doors • Mechanical ventilation/air conditioning
	Opposite	No requirements
Lounge Living Rooms	Facing	• Standard wall, roof and ceiling constructions • Nominal glazing external windows and doors with acoustic rated seals. • No vents to outside walls/eaves • Closed eaves • Closed windows/doors • Mechanical ventilation/air conditioning
	Side On	• Standard wall, roof and ceiling constructions • Nominal glazing external windows and doors with acoustic rated seals. • No vents to outside walls/eaves • Closed eaves • Closed windows/doors • Mechanical ventilation/air conditioning
	Opposite	No requirements

NOTE: To assist with design review, acoustic performances of Rw22-28 are normally achieved with single glazed 6mm glass, Rw28-32 with 6.38mm laminated glass, Rw32-34 with 10.38mm laminated glass and Rw34-36 with 12.38mm glass or 6.5mm VLam Hush installed in acoustic rated frames with acoustic seals. Acoustic performance up to Rw38 may be achieved with 8.5mm VLam Hush when installed within an acoustic designed, manufactured and rated frame and would typically be a awning or casement window / hinged door. Typically for acoustic performances greater than Rw36 double glazed or dual window / doors systems are typically required

ATTACHMENT 4. Category 3 'Deemed to Comply' Indicative Noise Treatments

The following noise insulation package is designed to meet the Campbelltown City Council DCP indoor target noise levels.

Area	Orientation to road corridor	Category 3 L_{Aeq},Day 65-70dB L_{Aeq},Night 55-60dB

Bedroom	Facing	• External walls Rw 45
		• Casement or awning windows
		• No external doors
		• Glazed windows and doors:
		  • Minimum Rw 31dB total glazing area up to 40% of room floor area.
		  • R_w 29 if glazing 20% of floor area or less,
		• Roof and ceiling to Rw 40 (1 layer 13mm plasterboard + bulk insulation)
		• No vents to outside walls/eaves
		• Closed eaves
		• Closed windows/doors
		• Mechanical ventilation/air conditioning

	Side On	• External walls Rw 45
		• Casement or awning windows
		• Glazed windows and doors:
		  • Minimum Rw 28dB total glazing area up to 40% of room floor area.
		  • R_w 26 if glazing 20% of floor area or less,
		• Roof and ceiling to Rw 40 (1 layer 13mm plasterboard + bulk insulation)
		• No vents to outside walls/eaves
		• Closed eaves
		• Closed windows/doors
		• Mechanical ventilation/air conditioning

	Opposite	As per Category 2 'Side on'.

Lounge Living Rooms	Facing	• External walls Rw 45dB
		• Casement or awning windows
		• Solid core doors with acoustic seals Rw 32
		• Glazed windows and doors:
		  • Minimum Rw 28 total glazing area up to 40% of room floor area.
		  • Rw 30 up to 60% room floor area
		  • Rw 33 up to 80% room floor area
		• Roof and ceiling to Rw 40 (1 layer 13mm plasterboard + bulk insulation)
		• No vents to outside walls/eaves
		• Closed eaves
		• Closed windows/doors
		• Mechanical ventilation/air conditioning

	Side On	• External walls Rw 45dB
		• Casement or awning windows
		• Solid core doors with acoustic seals Rw 32
		• Glazed windows and doors:
		  • Minimum Rw 25 total glazing area up to 40% of room floor area.
		  • Rw 27 up to 60% room floor area
		  • Rw 30 up to 80% room floor area
		• Roof and ceiling to Rw 40 (1 layer 13mm plasterboard + bulk insulation)
		• No vents to outside walls/eaves
		• Closed eaves
		• Closed windows/doors
		• Mechanical ventilation/air conditioning

	Opposite	As per Category 2 'Side on'.

NOTE: To assist with design review, acoustic performances of Rw22-28 are normally achieved with single glazed 6mm glass, Rw28-32 with 6.38mm laminated glass, Rw32-34 with 10.38mm laminated glass and Rw34-36 with 12.38mm glass or 6.5mm VLam Hush installed in acoustic rated frames with acoustic seals. Acoustic performance up to Rw38 may be achieved with 8.5mm VLam Hush when installed within an acoustic designed, manufactured and rated frame and would typically be a awning or casement window / hinged door. Typically for acoustic performances greater than Rw36 double glazed or dual window / doors systems are typically required

ATTACHMENT 4. Category 4 'Deemed to Comply' Indicative Noise Treatments

The following noise insulation package is designed to meet the Campbelltown City Council DCP indoor target noise levels.

Area	Orientation to road corridor	Category 3 L_{Aeq},Day 70-75dB L_{Aeq},Night 60-65dB

Bedroom	Facing	• External walls Rw 50
		• Casement or awning windows
		• No external doors
		• Glazed windows and doors:
		  • Minimum Rw 36dB total glazing area up to 40% of room floor area.
		  • R_w 34 if glazing 20% of floor area or less,
		• Roof and ceiling to Rw 45 (2 layer 10mm plasterboard + bulk insulation)
		• No vents to outside walls/eaves
		• Closed eaves
		• Closed windows/doors
		• Mechanical ventilation/air conditioning

	Side On	• External walls Rw 50
		• Casement or awning windows
		• Glazed windows and doors:
		  • Minimum Rw 33dB total glazing area up to 40% of room floor area.
		  • R_w 31 if glazing 20% of floor area or less,
		• Roof and ceiling to Rw 45 (2 layer 10mm plasterboard + bulk insulation)
		• No vents to outside walls/eaves
		• Closed eaves
		• Closed windows/doors
		• Mechanical ventilation/air conditioning

	Opposite	As per Category 3 'Side on'.

Lounge Living Rooms	Facing	• External walls Rw 50dB
		• Casement or awning windows
		• Solid core doors with acoustic seals Rw 32
		• Glazed windows and doors:
		  • Minimum Rw 33 total glazing area up to 40% of room floor area.
		  • Rw 35 up to 60% room floor area
		  • Rw 38 up to 80% room floor area
		• Roof and ceiling to Rw 45 (2 layer 10mm plasterboard + bulk insulation)
		• No vents to outside walls/eaves
		• Closed eaves
		• Closed windows/doors
		• Mechanical ventilation/air conditioning

	Side On	• External walls Rw 50dB
		• Casement or awning windows
		• Solid core doors with acoustic seals Rw 32
		• Glazed windows and doors:
		  • Minimum Rw 30 total glazing area up to 40% of room floor area.
		  • Rw 32 up to 60% room floor area
		  • Rw 35 up to 80% room floor area
		• Roof and ceiling to Rw 45 (2 layer 10mm plasterboard + bulk insulation)
		• No vents to outside walls/eaves
		• Closed eaves
		• Closed windows/doors
		• Mechanical ventilation/air conditioning

	Opposite	As per Category 3 'Side on'.

NOTE: To assist with design review, acoustic performances of Rw22-28 are normally achieved with single glazed 6mm glass, Rw28-32 with 6.38mm laminated glass, Rw32-34 with 10.38mm laminated glass and Rw34-36 with 12.38mm glass or 6.5mm VLam Hush installed in acoustic rated frames with acoustic seals. Acoustic performance up to Rw38 may be achieved with 8.5mm VLam Hush when installed within an acoustic designed, manufactured and rated frame and would typically be a awning or casement window / hinged door. Typically for acoustic performances greater than Rw36 double glazed or dual window / doors systems are typically required