ACOUSTICS AND AIR

EDMONDSON PARK FRASERS RESIDENTIAL PRECINCT 1 - STAGE 2

DEVELOPMENT APPLICATION NOISE ASSESSMENT

REPORT NO. 16178-R2
VERSION A

AUGUST 2018

PREPARED FOR

FRASERS PROPERTY
LEVEL 2 , 1C HOMEBUSH BAY DRIVE
RHODES, NSW, 2138

WILKINSON MURRAY

DOCUMENT CONTROL

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GLOSSARY OF ACOUSTIC TERMS

Most environments are affected by environmental noise which continuously varies, largely as a result of road traffic. To describe the overall noise environment, a number of noise descriptors have been developed and these involve statistical and other analysis of the varying noise over sampling periods, typically taken as 15 minutes. These descriptors, which are demonstrated in the graph below, are here defined.

Maximum Noise Level (L_{Amax}) – The maximum noise level over a sample period is the maximum level, measured on fast response, during the sample period.

L_{A1} – The L_{A1} level is the noise level which is exceeded for 1% of the sample period. During the sample period, the noise level is below the L_{A1} level for 99% of the time.

L_{A10} – The L_{A10} level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the L_{A10} level for 90% of the time. The L_{A10} is a common noise descriptor for environmental noise and road traffic noise.

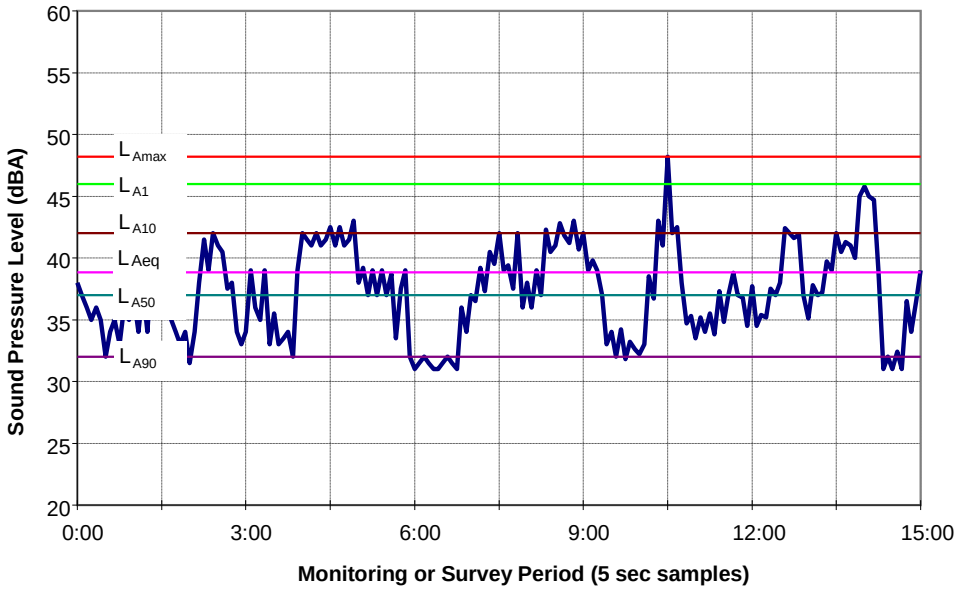
L_{A90} – The L_{A90} level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L_{A90} level for 10% of the time. This measure is commonly referred to as the background noise level.

L_{Aeq} – The equivalent continuous sound level (L_{Aeq}) is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This measure is also a common measure of environmental noise and road traffic noise.

ABL – The Assessment Background Level is the single figure background level representing each assessment period (daytime, evening and night time) for each day. It is determined by calculating the 10th percentile (lowest 10th percent) background level (L_{A90}) for each period.

RBL – The Rating Background Level for each period is the median value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period – daytime, evening and night time.

Typical Graph of Sound Pressure Level vs Time



1 INTRODUCTION

Wilkinson Murray Pty Limited has been engaged by Frasers Properties to prepare a review of the acoustical design requirements for the proposed medium density residential development at Edmondson Park Frasers residential precinct Stage 2.

This assessment involves prediction of future traffic noise levels at residential sites immediately adjacent to Campbelltown Road. The predictions have been utilised to determine the magnitude of potential traffic noise impact at the future residential properties along the road. This approach will allow traffic noise mitigation measures to be determined. These measures should be adopted for all building types proposed on the site.

The following sections of this assessment detail the methodology, assessment criteria, results and recommended noise mitigation measures.

The acoustical assessment has been based upon Group GSA architectural documentation.

1.1 Site Location

The site is located within the larger Edmondson Park precinct forming part of the South West Growth Centre. It is located approximately 40km to the south-west of Sydney CBD and is bounded by M5 Motorway to the south, the first is to the north of Campbelltown Road.

The entire site area is approximately 5.53 ha.

1.2 Project Description

Residential Precinct 1 with over 340 proposed dwellings will be developed in 3 Stages as part of a Residential Community Scheme consisting of a combination of:

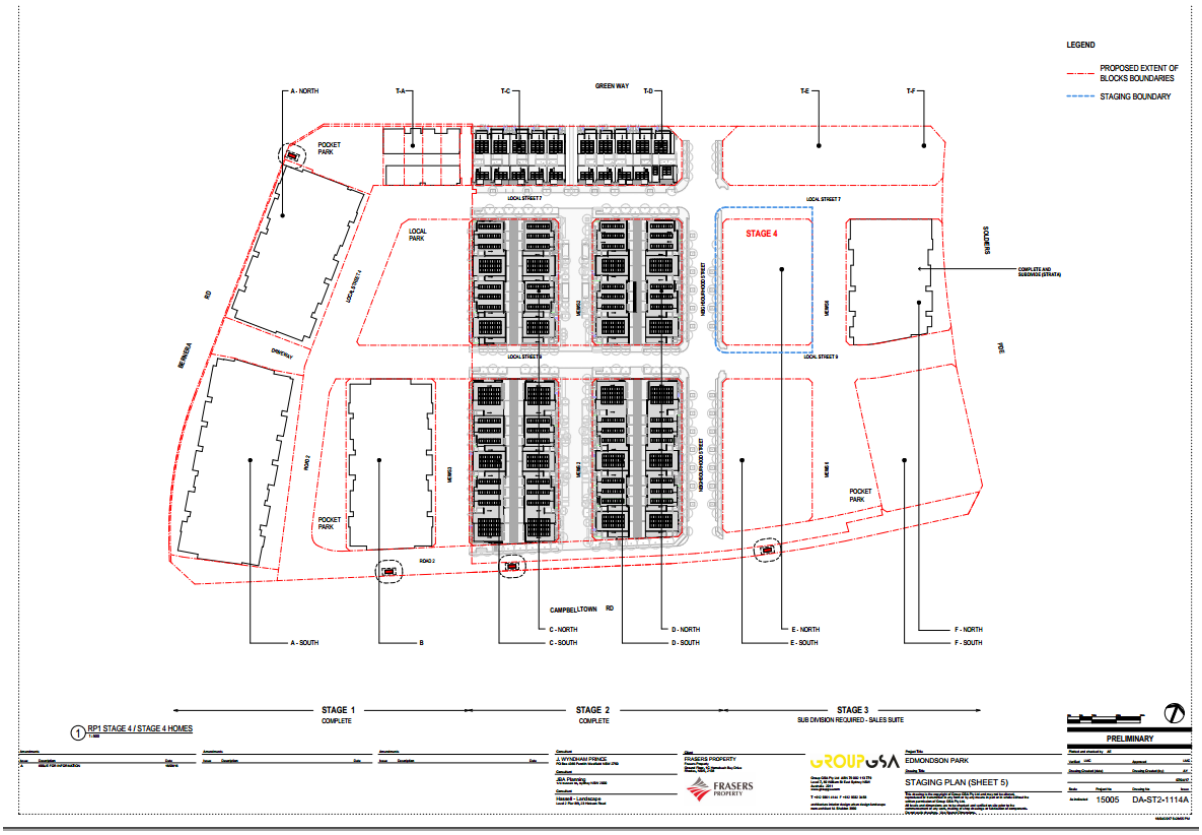
- "Mews" Town homes set with circa 11 strata schemes;
- "Paddington Terrace" style dwellings comprising stratum neighbourhood lots including over garage "Fonzie" dwellings.

Community Property will comprise:

- Community Park (facilities to include water play, BBQ and community pavilion)
- Pocket parks;
- "Mews" internal paved roads;
- Common shared zones.

Stage 2 will comprise of 128 dwellings set within 4 "Mews" Town homes Strata Schemes, Greenway Terraces in Neighbourhood Scheme and various Community Property including the Community Park. The construction of Stage 2 dwellings will include all proposed future Council dedicated roads.

Figure 1-2 Frasers Edmondson Park showing the extent of Stage 2.



2 TRAFFIC NOISE IMPACTS – RP1 -STAGE 2

The southern portion of the development including Stage 2 site is adjacent to Campbelltown Road. Therefore, consistent with council requirements, assessment with respect to applicable traffic nose criteria is warranted.

2.1 Acoustic Performance Criteria

Noise criteria relevant to the amenity of future residential development are documented in Edmondson Park South Development Control Plan 2012, November 2012.

The following provides relevant sections detailing with noise and vibration.

Noise & Vibration

As Precinct 1 of Edmondson Park South adjoins a noise generator (i.e. Campbelltown Road), it is important that new development considers the impact of this noise on the residential amenity for existing and future residents.

Objectives

1. *To achieve an acceptable residential noise environment whilst maintaining well designed and attractive residential streetscapes.*

Controls

1. *Development in proximity to the rail corridor is to demonstrate consistency with the Infrastructure SEPP 2007 and 'Development near Rail Corridors and Busy Roads – Interim Guideline'.*
2. *Development in close proximity to Campbelltown and Macdonald Roads is to demonstrate consistency with the NSW Road Noise Policy (EPA 2011).*
3. *Noise walls are not permitted on Campbelltown and MacDonald Roads. A combination of the following measures is to be used to mitigate the impacts of traffic noise on these busy roads:*
   - *a) setbacks and service roads;*
   - *b) internal dwelling layouts that are designed to minimise noise in living and sleeping areas;*
   - *c) changes in topography;*
   - *d) using attached dwellings;*
   - *e) using higher than standard fencing between separate buildings constructed with a suitably solid mass; and/or,*
   - *f) site layouts that locate principal private open space areas away from the noise source.*

4. *Development immediately adjoining the South Western Freeway (M5) is to demonstrate consistency with the Environmental Criteria for Road Traffic Noise (EPA 1999). A combination of the following measures may be used to meet the criteria:*

   a) acoustic glazing;

   b) a barrier/acoustic fence (typically 4-5m high) with reduced glazing;

   c) the adoption of the 'Quiet House' design; and/or,

   d) a combination of roadside barriers and perimeter buildings.

Where development is proposed that is affected by these controls (1 to 4), an acoustic report is required to be submitted as part of a subdivision application demonstrating that the proposed subdivision design and any required acoustic attenuation can comply with the relevant criteria. An acoustic report is also required for any non-residential use to be undertaken within a residential area.

Acoustic

Noise attenuation measures and double-glazed windows must be incorporated into all development along Campbelltown Road and Macdonald Road. A noise impact assessment may be required as part of the development application submission.

Based on the DCP Sections that relate to noise and vibration, the following is applicable to Stage 2:

- *Noise attenuation measures are to be incorporated into the facade of affected residential properties.*
- *Development immediately adjoining the Campbelltown Road is to demonstrate consistency with the Environmental Criteria for Road Traffic Noise (EPA 1999). A combination of the following measures may be used to meet the criteria:*

  - *acoustic glazing;*
  - *a barrier / acoustics fence (typically 4-5m high) with reduced glazing;*
  - *the adoption of the 'Quiet House' design, and /or,*
  - *a combination of roadside barriers and perimeter buildings.*

2.2 Traffic Noise Objectives

Future residences potentially affected by Campbelltown Road traffic noise are subject to the requirements of the Infrastructure SEPP.

Given this statement and the DCP requirements that the development be consistent with the *RNP* the objectives of the Infrastructure SEPP have been adopted for Stage 2 as follows:

If the development is for the purpose of a building for residential use, the consent authority must be satisfied that appropriate measures will be taken to ensure that the following L_{Aeq} levels are not exceeded:

- *in any bedroom in the building: 35dB(A) at any time 10pm–7am;*

- *anywhere else in the building (other than a garage, kitchen, bathroom or hallway): 40dB(A) at any time.*

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

In addition, the *'Development Near Rail Corridors and Busy Roads – Interim Guideline* has clarified that noise levels are to be the $L_{Aeq(15hr)}$ noise level for the day period and the $L_{Aeq(9hr)}$ period for the night.

The SEPP criteria can be translated to external noise levels by allowing an additional 10dBA for the noise reduction from outside to inside through an opening (window or door). The noise criteria are detailed in Table 2-1.

Table 2-1 Internal L_{Aeq} Road Noise Criteria & Related External Noise Criteria – dBA

Room Type	Internal Criteria	External Criteria	External Noise Levels for Ventilation
Bedroom (Night Only) $L_{Aeq,9hr}$	35	45	55
Any Habitable Room $L_{Aeq,15hr}$	40	50	60

2.3 Traffic Volumes

Campbelltown is a major road with a dense graded asphaltic concrete (DGAC) pavement, and has a speed limit of 70km/h for the majority of the road. It is proposed to upgrade this road to a dual lane carriageway in either direction. Wilkinson Murray has conducted noise modelling for the RMS associated with the widening which is also consistent with this assessment.

In order to assess noise impact in accordance with the established noise objectives, it is necessary to understand traffic volumes on the subject road which affect the existing and future noise sensitive receivers in the area, including the percentage of heavy vehicles for the daytime and night time periods for the year 2026.

The 2026 traffic volumes used in noise modelling are detailed in Table 2-2.

Table 2-2 Campbelltown Road Traffic Volumes 2026*

Location	Direction	Day (7am to 10pm)		Night (10pm to 7am)	
		Light	Heavy	Light	Heavy
Hume Highway to Macdonald Road	Northbound	9830	1046	2370	319
	Southbound	8374	891	1228	165
Macdonald Road to Zouch Road	Northbound	10503	1118	2533	341
	Southbound	8947	953	1313	177

*Source RMS

2.4 Traffic Noise Assessment

The approach to traffic noise assessment requires the generation of a noise model for the project based on projected traffic flows detailed in Table 2-2. Predicted noise levels at indicative future residences along the subject road have been determined and compared to established noise criteria. The entire development site has been included in the modelling.

2.4.1 Methodology of Assessing Traffic Noise Impact

Detailed noise calculations have been carried for the year 2026. All calculations and modelling are based on the traffic volumes detailed in the previous section.

The following factors are considered during the assessment process:

- Traffic volume and likely proportions of heavy vehicles;
- Topographical information along and surrounding the entire project corridor;
- Land use surrounding the project;
- Vehicle speed;
- Different noise emission levels and source heights;
- Location of the noise sources on the motorway;
- Road surface types;
- Road gradient; and
- Attenuation from noise barriers (both natural and purpose built for the project).

2.4.2 Noise Modelling Procedures

Noise levels for existing and proposed road designs were calculated using procedures based on the *Calculation of Road Traffic Noise - CoRTN* (UK Department of Transport, 1988) prediction algorithms. The standard prediction procedures were modified in the following ways.

- L_{Aeq} values were calculated from the L_{A10} values predicted by the *CoRTN* algorithms using the well-validated approximation $L_{Aeq,1hour} = L_{A10,1hr} - 3$. (NSW RTA, 2001);
- Noise source heights were set at 0.5m for cars, 1.5m for heavy vehicle engines and 3.6m for

heavy vehicle exhausts, representative of typical values for Australian vehicles. Noise from a heavy vehicle exhaust is 8dBA lower than the noise from the engine; and

- Previous research in Australia has established a negative correction to the *CoRTN* predictions of -1.7dB for façade-corrected levels (Samuels and Saunders, 1982). Corrections for Australian conditions have been included in noise modelling for this project.

The model was implemented using Cadna software (Version 4.5) with 80% ground absorption.

In addition, indicative housing has been modelled to reflect the likely lot layout and to illustrate the noise shielding of the first row of houses on a road will provide to future dwellings that are located behind these first row.

2.4.3 Results of Noise Modelling

The following sections review predicted noise levels at future residences of Stage 2 bounding Campbelltown Road.

Noise levels at facades of future residences on roads exceed noise objectives for the day and night periods at future residences two buildings adjacent to the Campbelltown Road. Table 2-3 presents predicted maximum noise levels at future residences.

Table 2-3 Summary of highest Predicted Traffic Noise Levels at Facades of Future Residences – $L_{Aeq(period)}$ – dBA

Residences	External Traffic Noise Level	
	Day	Night
Southern Facades	65-66	59-61
East West Facades	61-63	57-59

A review of the results in Table 2-3 indicates that windows on facades exposed to traffic will need to be closed to achieve the internal noise objectives in occupied areas for approximately 1/3 of the length of the two buildings (See section 2.5 for the details).

In the case of standard 5mm domestic glazing, a typical reduction of 10 dBA and 22 dBA can be expected for windows open and closed, respectively. Therefore, the following internal noise levels can be expected within habitable area directly affected by traffic noise.

Table 2-4 Predicted Internal Noise Levels (Southern Facade).

Room	Predicted Internal Noise Level – dBA	
	Windows Open	Windows Closed
Living Room	55-56	43-44
Bedroom	49-51	37-39

As a result of these findings, all windows facing the roadway, and some on facades at 90 degrees to Campbelltown Road, will require improved glazing and seals. In addition, entrance doors

facing the roadways will require door seals and mechanical ventilation may be required. Details of these measures are presented in Section 2.5.

Figure 2-1 and Figure 2-2 illustrate predicted traffic noise levels at future residences in residential precinct 1.

Figure 2-1 Precinct 1 Predicted $L_{Aeq,(15hr)}$ Daytime Traffic Noise Levels – dBA

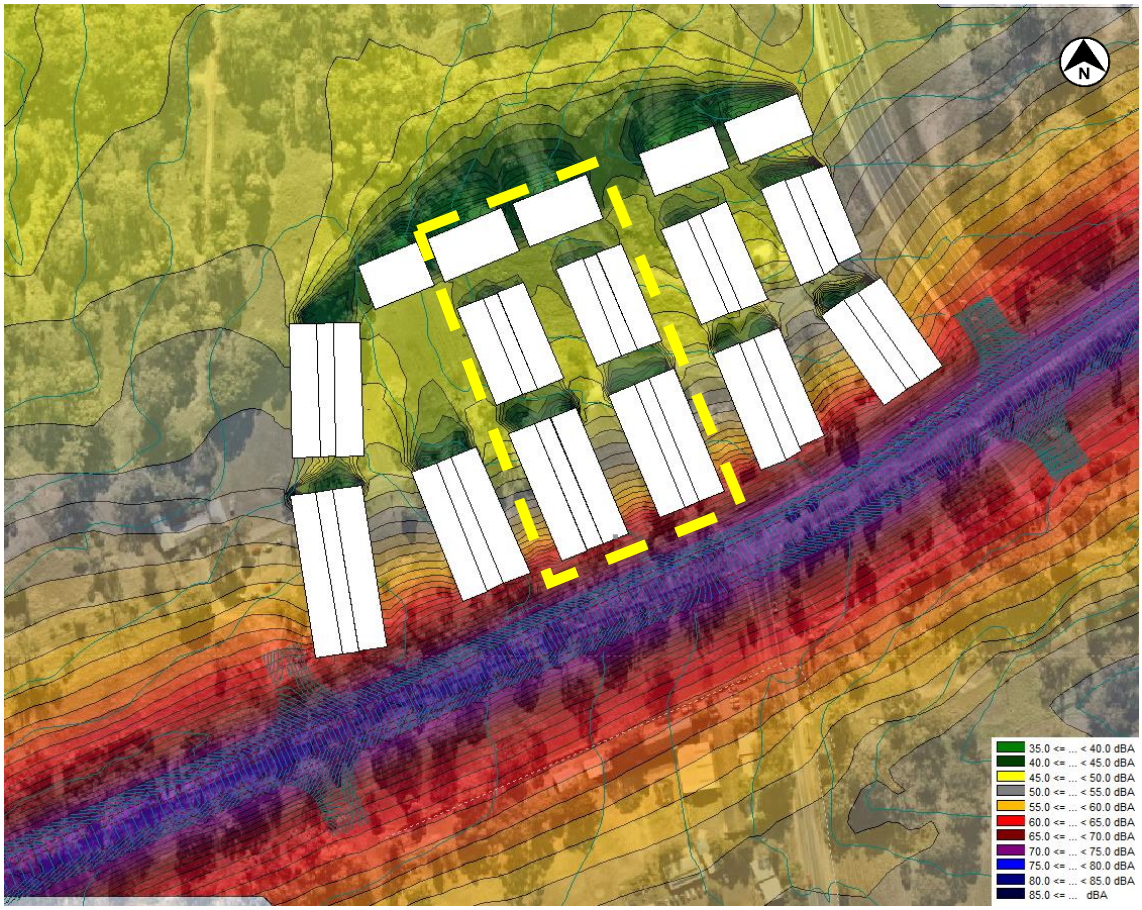
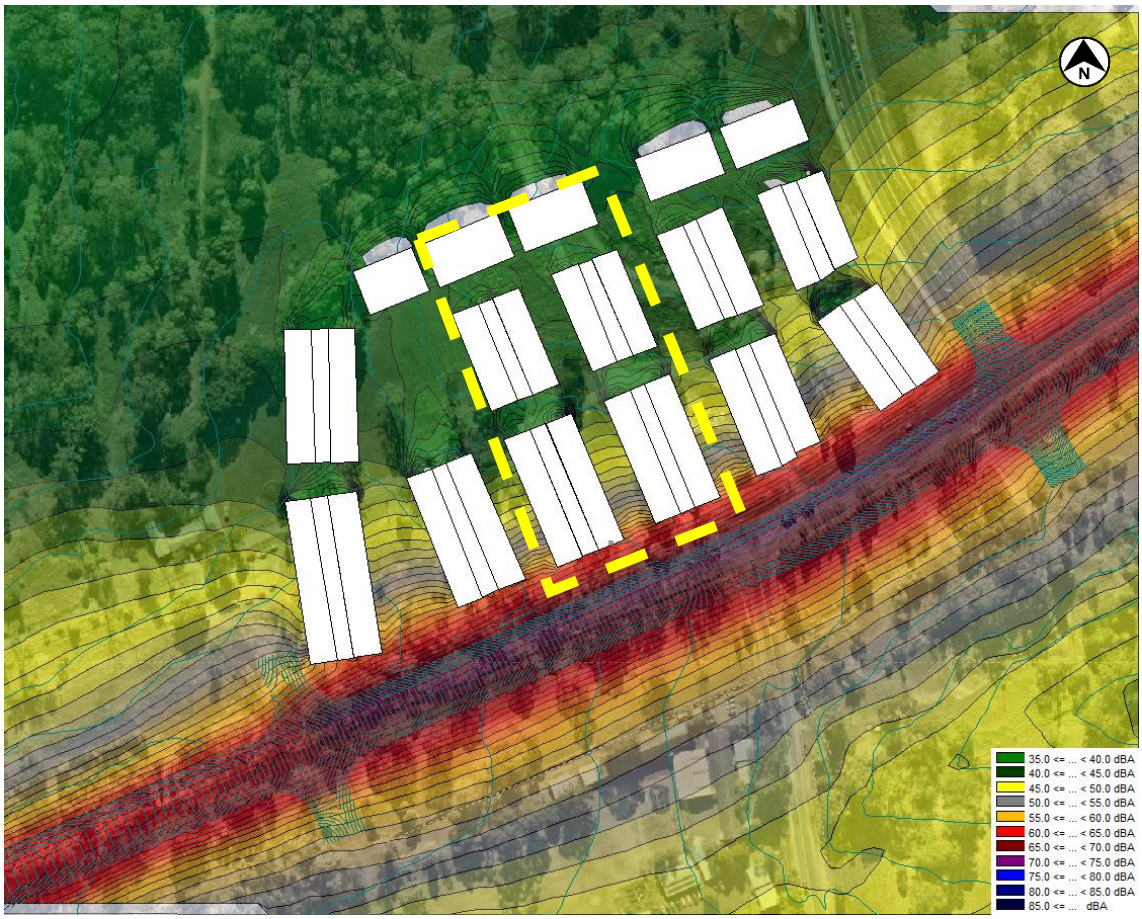


Figure 2-2 Precinct 1 Predicted $L_{Aeq,(9hr)}$ Night Traffic Noise Levels at Residences – dBA



2.5 Stage 2 Residential Properties – Noise Mitigation Measures

The selection of required building constructions depends on factors, such as:

- Type of room (furnishings, finishes and use); and
- Size of room (volume and size of each building element, i.e. glazing and door).

An assessment of "typical" brick veneer or light weight residential construction has been conducted to determine measures likely to be required to comply with the requirements of the DCP and Infrastructure SEPP.

Deemed to comply noise mitigation measures that can be adopted to address traffic noise intrusion.

The future residences in Stage 2, which require ventilation, are shown in orange in Figure 2-3. The extend to upgraded glazing, type 1 or 2 are also shown on this figure.

Figure 2-3 Affected Stage 2 Residences (Ventilation Shaded Orange)

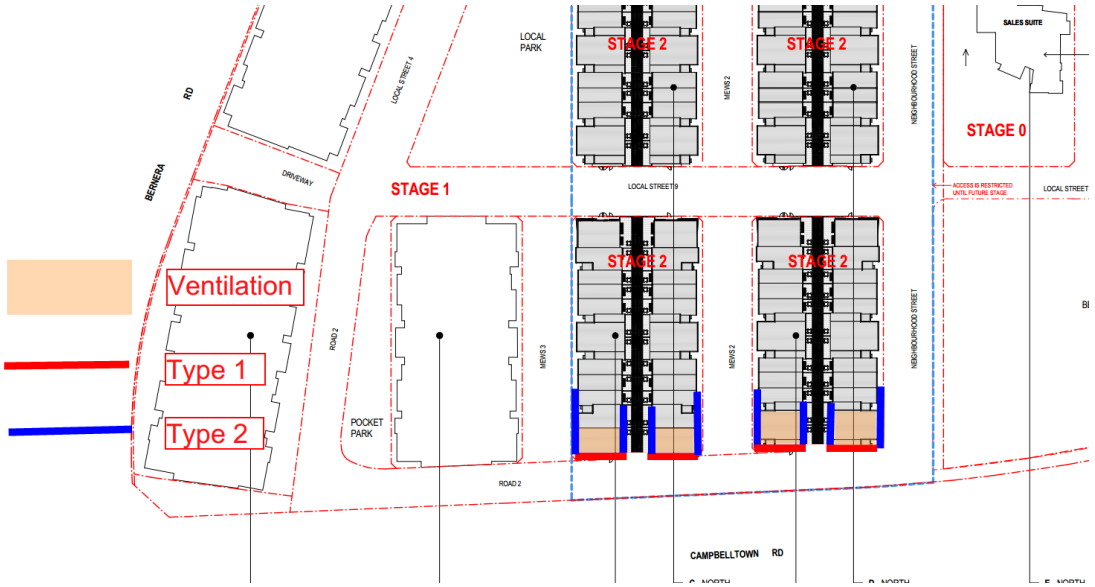


Table 2-5 details measures that can be adopted to meet internal noise criteria. Adopting these measures in identified area of Stage 2 will negate the need for individual acoustic assessments of traffic noise at each lot.

Table 2-5 Deemed to Comply Constructions Façade Exposed to Traffic Noise – Stage 2 Residential Properties.

Item	Construction	Acoustic Rating
Facades facing Campbelltown Road	Brick Veneer with bulk acoustic insulation or Lightweight fibre cement weatherboard on studs	R_W 45
Type 1 Glazing – Windows and Doors facing Campbelltown Road	All Levels – 10.38 mm laminated glass with seals	R_W 35
Type 2 Glazing – Windows and Doors Side windows of rooms facing Campbelltown Road	All levels 6.38 mm laminated glass with seals	R_W 33
Entrance Doors facing Campbelltown Road	45 mm Solid core doors with jamb seals Raven RP120 Jamb Seals Raven RP8 Drop Seals	R_W 32
Mechanical Ventilation	As detailed in Section 2-6	N/A

The above recommended construction does not preclude alternative constructions to meet the required internal noise criteria. The exact details of constructions can be detailed at the design development stage of the project.

2.6 Mechanical Ventilation

To fully comply with the internal noise levels, it is necessary that external windows and doors are kept closed in the dwellings identified in Figure 2-3. Where the natural ventilation requirements of the BCA cannot be achieved with openings that are not affected by traffic noise, the following indicative measures may be adopted to provide ventilation to affected dwellings:

- Option 1 – ducted fresh air supply;
- Option 2 – propriety Acoustic Wall Ventilators – such as an "Aeropac" Wall Ventilator www.acoustica.com.au/aeropac.html
- Option 3 – ceiling or Bulk Head Mounted In-line Ducted Fan.

It is noted that above measures do not require windows to be closed or sealed. Rather, when an occupant wishes to reduce any noise intrusion there is the facility for them to close windows and doors. When these are closed there needs to be adequate ventilation in the habitable rooms of an apartment.

3 CONCLUSION

A DA traffic noise assessment has been undertaken for Stage 2 Edmondson Park. The assessment considers future traffic flows, the requirements of South Edmondson Park DCP and the NSW Infrastructure SEPP consistent with the Part 3A Approval of the Urban Growth Precinct 1 subdivision development.

In the case of Stage 2 residential dwellings, noise mitigation for the facades of residences facing the Campbelltown Road will require improved acoustic treatment. Noise mitigation measures have been provided to address council requirements.

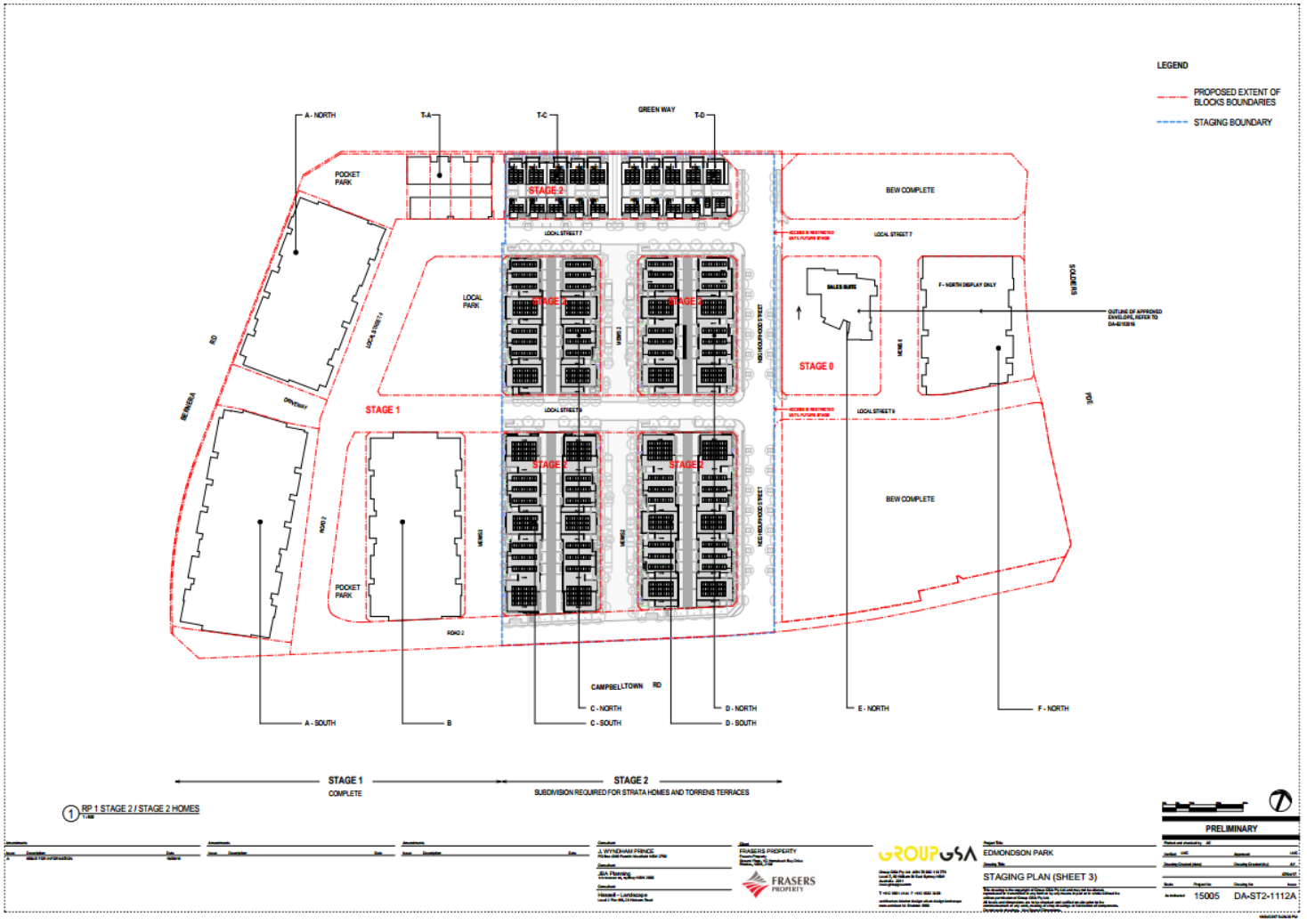
Mechanical ventilation will be required, as per BCA, in rooms of identified residences. Indicative methods for ventilation have been provided.

The adoption of the measures recommended in this report will ensure that identified properties will comply with the DCP acoustic requirements.

APPENDIX A

Proposed Staging Plan

Stage 2


LEGEND
PROPOSED EXTENT OF BLOCKS BOUNDARIES
STAGING BOUNDARY
A - NORTH
T-A
T-C
GREEN WAY
T-D
POCKET PARK
STAGE 2
BEW COMPLETE
LOCAL STREET 7
LOCAL PARK
STAGE 1
STAGE 0
SALES SUITE
F - NORTH DISPLAY ONLY
OUTLINE OF APPROVED ENVELOPE, REFER TO DA-631/2016
BENDIGO RD
DRIVEWAY
LOCAL STREET 11
ROAD 2
MEWS 1
MEWS 2
MEWS 3
NEIGHBOURHOOD STREET
LOCAL STREET 9
POCKET PARK
CAMPBELLTOWN RD
A - SOUTH
B
C - NORTH
C - SOUTH
D - NORTH
D - SOUTH
E - NORTH
F - NORTH
STAGE 1
COMPLETE
STAGE 2
SUBDIVISION REQUIRED FOR STRATA HOMES AND TORRENS TERRACES
1 RP 1 STAGE 2 / STAGE 2 HOMES
PRELIMINARY
EDMONDSON PARK
STAGING PLAN (SHEET 3)
15005
DA-ST2-1112A