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27 April 2023 (REF: 2303.03.Letter.A_r1)

Christopher Fenton
Landorange Partnership
Orange NSW 2800

277 Cargo Road, Orange - Concept Layout Traffic Noise Assessment

1 Executive Summary

The rezoning of the subject site for residential will require acoustic treatments for dwellings where the building façade is setback from the near kerb side of Cargo Road 78 metres or less.

Orange City Council's controls require the property boundary has a minimum setback of 15m from the road kerb. Dwellings building facades with setback at least 28 metres from the kerb side of Cargo Road require the lowest category of acoustic treatment (Category 1) as listed in the Interim Guideline for 'Development near rail corridors & busy roads' (The Guide). Dwelling with façade setbacks less than 28 metres require Category 2 acoustic treatment.

Dwellings can be designed to minimise traffic noise and building costs by locating utility or non-habitable rooms so that they face the busy road. Bedrooms and living areas, if possible, should away from the busy road.

2 Introduction

Acoustik was engaged by Christopher Fenton to provide a traffic noise assessment for the proposed development at 277 Cargo Road, Orange (Lot A – DP408148). Stage 1 of the subdivision proposes 51 lots where 2 lots have existing dwellings from the original Lot A.

This assessment is based on the recommendations of the NSW Department of Planning document[1] "Development Near Rail Corridors and Busy Roads – Interim Guideline" (The Guide).

Lots numbered by Acoustik (1 to 18) in Figure 1 have at least part of the lot closer than 78 metres from the near kerb of Cargo Road and will need to consider traffic noise intrusion and acoustic treatment during construction as specified in The Guide. Lots numbered 15 and 16 will include the existing dwellings on rezoned lots. The full concept layout drawing is enclosed to this letter.

Cargo road is an arterial road connecting Orange to Western areas. The percentage of heavy vehicles using Cargo Road is ~ 6% of the traffic flow. The closest railway corridor is the Orange – Broken Hill railway line ~ 500 m to the south of the stage 1 site and 350 m to the south of the stage 2 site. Based on recommendations from Section 3.5.1 of The Guide, railway noise will not impact either stage.

[1] Development Near Rail Corridors and Busy Roads – Interim Guideline ISBN 978-0-7347-5504-9

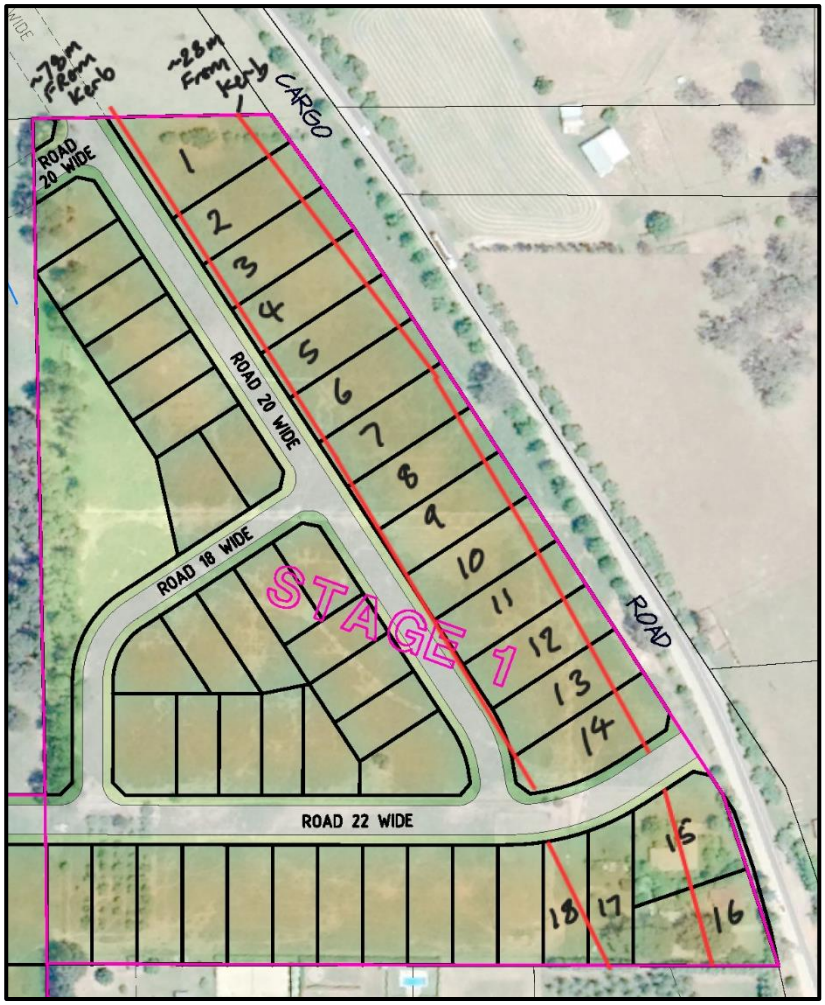


Figure 1: Stage 1 of Development – Adjacent to Cargo Road

3 Traffic Flow

Acoustik have reviewed the traffic flow data supplied by the proponent. The 10-year increase in traffic flow is presented in Table 1 below.

Table 1: Traffic Flow Data and 10-year projections

Road Name	Traffic Vol (ADT)		Heavy Vehicles	Speed	Road Pavement Surface
Cargo Road – West of Wilton Place[1]	**2023**	**2033**	6%	60 - 70 km/h	Asphalt
	4,069	6,023*			

Note 1: ADT weekday average data Supplied to Acoustik by Traffic Information Specialist based on data measured starting 1 March 2023 for a period of 7 days. The supplied data indicates that the road speed is in the range of 60 km/h to 70 km/h.

Note *: Predicted future traffic flows based on OCC annual traffic growth of 4% at 10 years from the current year of this letter.

Page 17 of the Interim Guide provides a screening test to determine the category of acoustic treatment that is applicable for single dwellings located set distances from the major road against the Traffic volumes (AADT) levels. The screening test diagram for 60/70 km/h roads for single dwellings is shown in Figure 2.

The screening test is marked for a flow of 6,023 vehicles. Residences constructed 28m to 78m from the kerb side of Cargo Road require Category 1 Acoustic treatment. For a residence constructed closer than 28m from the kerb of Cargo Road Category 2 treatment is required.

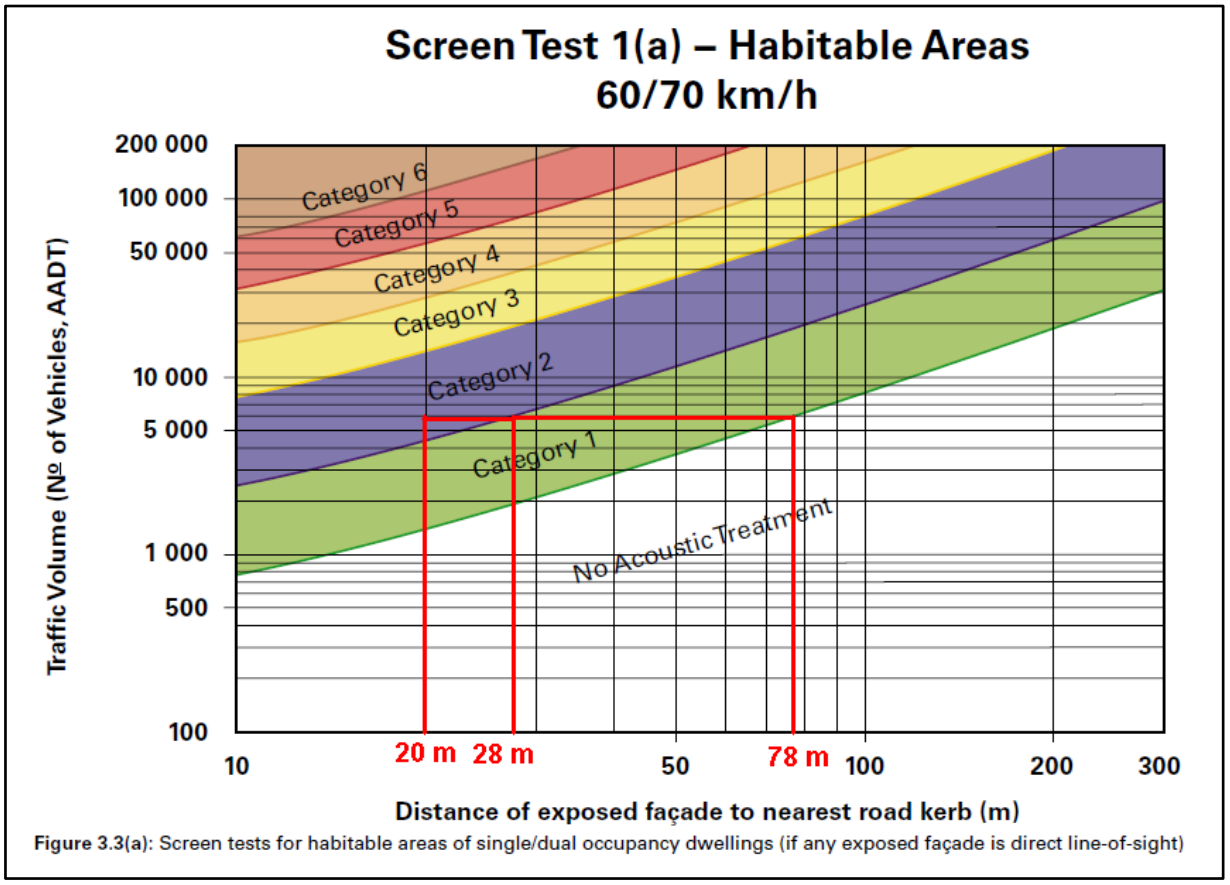


Figure 2: Screening Test, Page 17- Interim Guide, Category 1 and 2 AADT

4 Acoustic Treatments

Recommended acoustic treatments for residences within category 1 and 2 rated areas of Stage 1 are based on the measured traffic volumes allowing for the expected increase in traffic flows over the next ten years.

The recommended acoustic ratings for the building elements are listed in Figure 3 below which is extracted from Appendix C of The Guide.

ACOUSTIC PERFORMANCE OF BUILDING ELEMENTS

The acoustic performances assumed of each building element in deriving the Standard Constructions for each category of noise control treatment presented in the preceding Table, are presented below in terms of Weighted Sound Reduction Index (Rw) values, which can be used to find alternatives to the standard constructions presented in this Appendix:

Category of Noise Control Treatment	R_w of Building Elements (minimum assumed)				
	Windows/Sliding Doors	Frontage Facade	Roof	Entry Door	Floor
Category 1	24	38	40	28	29
Category 2	27	45	43	30	29
Category 3	32	52	48	33	50
Category 4	35	55	52	33	50
Category 5	43	55	55	40	50

Figure 3: Minimum R_W of Building Elements

More detailed typical constructions are included in Appendix C of The Guide which is enclosed at the end of this letter. Note that non-habitable rooms do not need to be treated for noise intrusion.

Section 3.8 of The Guide provides valuable advice about using building orientation and layout to reduce noise levels within habitable rooms of the development.

Kitchens are notionally considered non habitable rooms but open plan kitchens that form part of the living areas are common. Where the kitchen is directly open to a habitable room the kitchen should be treated as habitable so that the adjacent habitable space is protected.

Where a habitable room requires acoustic treatment due a category definition, the following noise control measures outlined below are also applicable.

4.1 Generally

Lighting: To maintain the acoustic integrity of the ceiling/roof system all lighting fixtures must be surfaced mounted. In place of standard downlights acoustically rated downlights can be fitted.

Vents: To maintain the acoustic integrity of the ceiling/roof system all air conditioning or fresh air ventilation vents must have pillow boxes above the vent. The pillow box must have a 90 degree bend connection to flexible duct. Flexible ducts cannot be directly connected to ceiling vents.

External Walls: Any external ventilation openings in external wall must be located so that they do not directly face the busy road.

Entry Doors: Any entry door to the building that is visible from Cargo Road must be fitted with a door acoustically rated according to the Category type lookup tables.

Window types – Window building element types are recommended in the Category type lookup tables.

If double glazing is used in place of the building elements recommended in the category 1 and 2 tables, the minimum R_W ratings must still be achieved, and certification provided by the supplier.

All rooms where a R_W rating is specified for windows, the windows must be closed to achieve the acoustic outcomes.

4.2 Fresh Air-Ventilation

Where windows must be kept closed, room ventilation systems must meet the requirements of the Building Code of Australia and Australian Standard 1668 "The use of ventilation and airconditioning in buildings".

Section 4.4 "Mitigation Levels" of The Guide provides the following advice regarding mechanical ventilation. For additional information Section 4 "Air Quality near Busy Roads" of the Interim Guide contains design information.

> *"Mechanical ventilation systems provide an opportunity for filtering external fresh air entering a building (eg carbon-filters or similar). Where possible, mechanical ventilation air inlet ports should be sited to maximise the distance from the road to reduce inflows of air pollutants."* Page 35 of the The Guide.

5 Qualifications

Tom Harper BE (Mechanical), BA (Chinese Studies), MAAS

Mr Harper is a full member of the Australian Acoustical Society (Member since 2002). Working as an acoustic consultant since graduating from university of NSW in 1998 both domestically and internationally in Singapore and Southeast Asian countries.

Acoustik was established in August 2013 and provides a full range of professional acoustic consulting services.

For any enquires regarding the above measurement please contact Acoustik.

Sincerely,

Tom Harper

Digitally signed by Tom Harper
DN: cn=Tom Harper, o, ou=Acoustik, email=tom@acoustik.net.au, c=AU
Date: 2023.04.27 12:05:31 +10'00'

Tom Harper
Principal Engineer
Acoustik
Enclosed:
Appendix C - Development Near Rail Corridors and Busy Roads – Interim Guideline
Concept Layout Plan

Enclosed Documents

Appendix C - Development Near Rail Corridors and Busy Roads – Interim Guideline

Concept Layout Plan

Appendix C – Acoustic Treatment of Residences

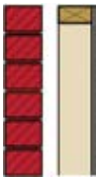
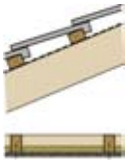
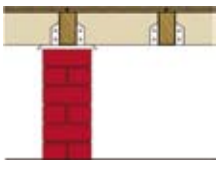
The following table sets out standard (or deemed-to-satisfy) constructions for each category of noise control treatment for the sleeping areas and other habitable areas of single / dual occupancy residential developments only. The assumptions made in the noise modelling are as follows:

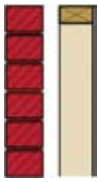
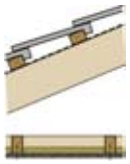
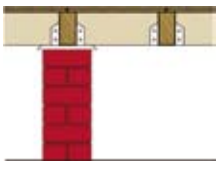
- Typical layout of a modern dwelling taken from a recent large residential development in an outer Sydney suburb
- Bedrooms and other habitable rooms are exposed to road noise

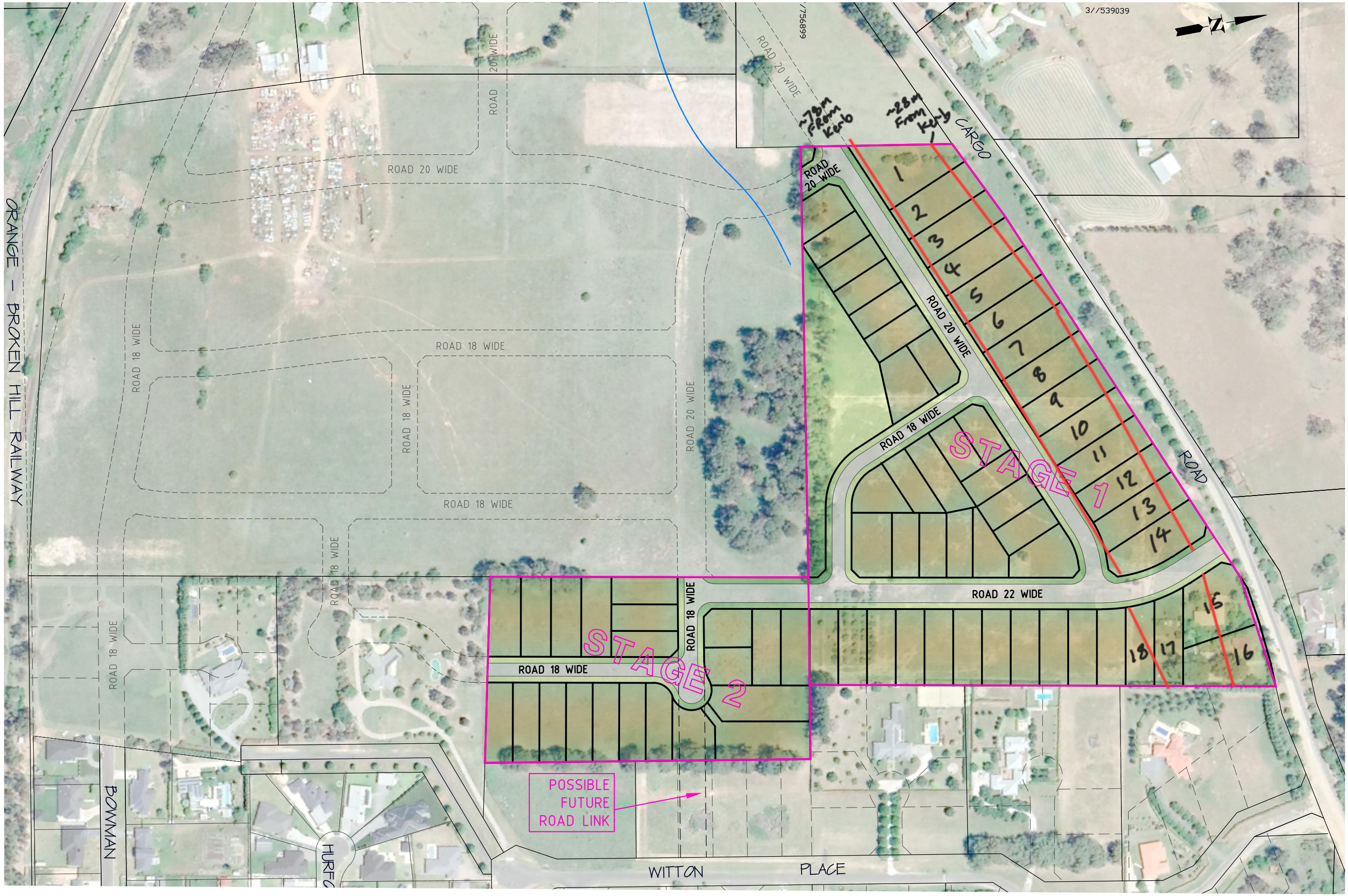
ACOUSTIC PERFORMANCE OF BUILDING ELEMENTS

The acoustic performances assumed of each building element in deriving the Standard Constructions for each category of noise control treatment presented in the preceding Table, are presented below in terms of Weighted Sound Reduction Index (Rw) values, which can be used to find alternatives to the standard constructions presented in this Appendix:

Category of Noise Control Treatment	R_w of Building Elements (minimum assumed)				
	Windows/Sliding Doors	Frontage Facade	Roof	Entry Door	Floor
Category 1	24	38	40	28	29
Category 2	27	45	43	30	29
Category 3	32	52	48	33	50
Category 4	35	55	52	33	50
Category 5	43	55	55	40	50

Category No.	Building Element	Standard Constructions	sample
1	**Windows/Sliding Doors**	Openable with minimum 4mm monolithic glass and standard weather seals	
	Frontage Facade	**Timber Frame or Cladding:** 6mm fibre cement sheeting or weatherboards or plank cladding externally, 90mm deep timber stud or 92mm metal stud, 13mm standard plasterboard internally	
		Brick Veneer: 110mm brick, 90mm timber stud or 92mm metal stud, minimum 50mm clearance between masonry and stud frame, 10mm standard plasterboard internally	
		Double Brick Cavity: 2 leaves of 110mm brickwork separated by 50mm gap	
	Roof	Pitched concrete or terracotta tile or metal sheet roof with sarking, 10mm plasterboard ceiling fixed to ceiling joists, R1.5 insulation batts in roof cavity.	
	Entry Door	35mm solid core timber door fitted with full perimeter acoustic seals	
	Floor	1 layer of 19mm structural floor boards, timber joist on piers	
		Concrete slab floor on ground	

Category No.	Building Element	Standard Constructions	sample
2	**Windows/Sliding Doors**	Openable with minimum 6mm monolithic glass and full perimeter acoustic seals	
	Frontage Facade	**Timber Frame or Cladding Construction:** 6mm fibre cement sheeting or weatherboards or plank cladding externally, 90mm deep timber stud or 92mm metal stud, 13mm standard plasterboard internally with R2 insulation in wall cavity.	
		Brick Veneer Construction: 110mm brick, 90mm timber stud frame or 92mm metal stud, minimum 50mm clearance between masonry and stud frame, 10mm standard plasterboard internally.	
		Double Brick Cavity Construction: 2 leaves of 110mm brickwork separated by 50mm gap	
	Roof	Pitched concrete or terracotta tile or metal sheet roof with sarking, 10mm plasterboard ceiling fixed to ceiling joists, R2 insulation batts in roof cavity.	
	Entry Door	40mm solid core timber door fitted with full perimeter acoustic seals	
	Floor	1 layer of 19mm structural floor boards, timber joist on piers	
		Concrete slab floor on ground	



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HEATH CONSULTING ENGINEERS

15 0 15 30 45 60 75m

SCALE 1:2500 (A3)

CONCEPT LAYOUT
LOT A D.P.408148