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Traffic Noise Intrusion Assessment Proposed Residential Subdivision (rezoning)

Lot 1 DP 707300, Lot 5 DP 74052, Lot 8 DP 258605 & Lot 101 DP
South Kiama, NSW 2534

Prepared for:-

White Constructions Pty Ltd
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1. INTRODUCTION AND SUMMARY

Harwood Acoustics was requested by Unicomb Development Services Pty Ltd, on behalf of White Constructions Pty Ltd, to carry out a Traffic Noise Intrusion Assessment across Lot 1 DP 707300, Lot 5 DP 74052, Lot 8 DP 258605 & Lot 101 DP South Kiama, NSW 2534. These lots combined are referred to as the Site henceforth.

The Site is located on the western side of the Princes Highway between Weir Street and Saddleback Mountain Road and is currently zoned, predominantly, RU2 Rural Landscape under Kiama Municipal Council's Local Environment Plan (LEP) 2011.

White Constructions are preparing a gateway Application to Kiama Municipal Council seeking to have the land rezoned to R2 Residential in order to permit a residential subdivision development across the Site. The subdivision will comprise approximately 403 residential lots serviced by internal road networks accessed via Weir Street and Saddleback Mountain Road.

The Site is shown in Figure 1 and an overview of the proposed subdivision is shown in Figure 2. Full details can be seen in Site Plus Pty Ltd's drawings for job number 15158, dated March 2016.

The closest potential future dwellings to the Princes Highway will be located at a distance of approximately 20 metres and the furthest at a distance of approximately 380 metres. The topography of the land is such that the Site undulates significantly where some areas of the Site have direct line of sight to the Highway and some areas are acoustically shielded.

It is a requirement of Kiama Municipal Council that an assessment of the traffic noise levels potentially affecting future residences within the subdivision is undertaken.

Council generally requires that new residential dwellings constructed near busy roads require an assessment to be undertaken in accordance with 'Development Near Rail Corridors and Busy Roads – Interim Guidelines 2008'.

The Guidelines refer to Clause 102 of the State Environment Planning Policy (Infrastructure) 2007 (SEPP) which sets internal noise level criteria from road traffic noise emission. These are 35 dBA (L_{eq}) inside bedrooms between 10 pm and 7 am and 40 dBA (L_{eq}) inside all habitable spaces at any time.

A combination of unattended and attended noise measurements have been used to establish typical current Traffic noise levels across the entire Site. Traffic noise levels range between 63 and 50 dBA $L_{eq, 15 \text{ hour}}$ during the day and between 60 and 47 dBA $L_{eq, 9 \text{ hour}}$ during the night, at the closest and furthest / shielded future dwellings to the Highway respectively.

The measured external noise levels have therefore been used to determine the potential for compliance with the internal noise limits in typical future dwellings. An assessment of the potential noise intrusion from road traffic into a selection of potential future dwellings on the Site has been undertaken based on typical living room and bedroom sizes.

Acoustical treatment will be required for the majority of dwellings within 150 metres of the Highway. Acoustical treatment will not be significantly onerous and examples are given in Section 5 of this Report. Final assessments will be required prior to the issue of a Construction Certificate for any dwellings within 150 metres of the Princes Highway.

2. SITE AND PROPOSED SUBDIVISION DESCRIPTION

The subject comprises Lot 1 DP707300, Lot 5 DP740252 & Lot 101 DP1077617 and is located on the western side of the Princes Highway, as shown in Figure 1 below.

The subdivision will include 403 residential lots of varying sizes, serviced by an internal road network with access from Saddle Back Mountain Road. Full details can be seen in 'Site Plus Pty Ltd' Proposed Subdivision layout drawings, reference 15158.RZ.C01 to C04 inclusive.

The nearest proposed future dwellings to the closest point of the Princes Highway will be at a distance of approximately 20 metres and the furthest at a distance of approximately 380 metres as shown in Figure 2.

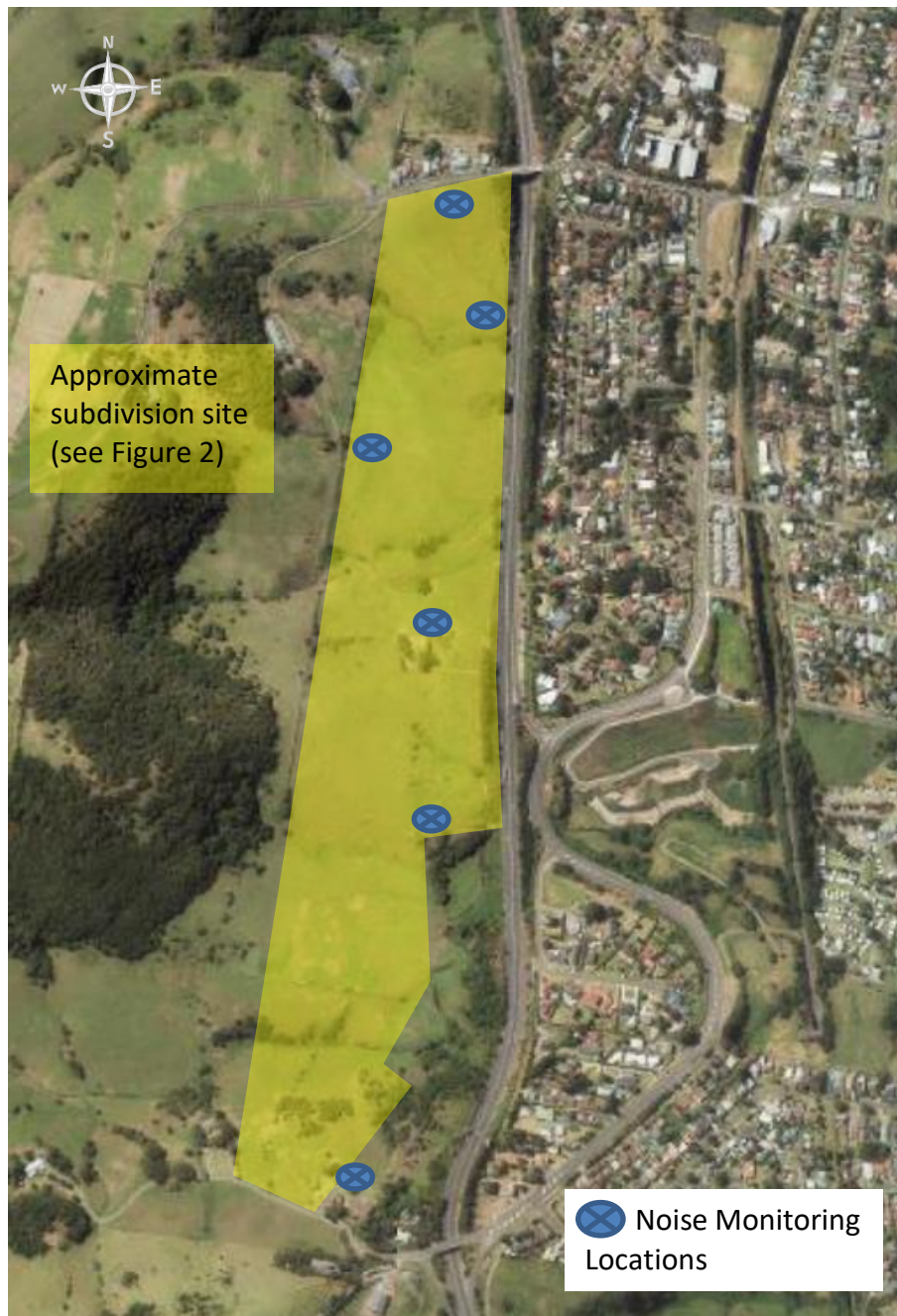


Figure 1. Location Plan – Proposed Subdivision Site, Kiama, NSW

(source: NSW Government Spatial Information Exchange ©2017)



Figure 2. Overall Subdivision Plan, South Kiama, NSW

(source: Site Plus Pty Ltd, Proposed Subdivision, Overall Subdivision Plan, drawing reference 15158.RZ.C01)

3. NOISE CRITERIA

3.1 Clause 102 - State Environment Planning Policy (Infrastructure) 2007

Clause 102 of the State Environment Planning policy states:-

“102 Impact of road noise or vibration on non-rail development

(1) This clause applies to development for any of the following purposes that is on land in or adjacent to the road corridor for a freeway, a tollway or a transitway or any other road with annual average daily traffic volume of more than 40,000 vehicles (based on the traffic volume data published on the website of the RTA) and that the consent authority considers is likely to be adversely affected by rail noise or vibration:

- (a) a building for residential use,*
- (b) a place of public worship,*
- (c) a hospital,*
- (d) an educational establishment or child care centre.*

(2) Before determining a development application for development to which this clause applies, the consent authority must take into consideration any guidelines that are issued by the Director-General for the purposes of this clause and published in the Gazette.

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

- (a) in any bedroom in the building-35 dB(A) at any time between 10.00 pm and 7.00 am,*
- (b) anywhere else in the building (other than a garage, kitchen, bathroom or hallway)-40 dB(A) at any time.”*

The NSW Department of Planning published the “Development Near Rail Corridors and Busy Roads – Interim Guidelines” in 2008 (the Guidelines). The Guidelines refer to the internal noise limits set by Clause 102 and in addition, states:-

“If internal noise levels with windows or doors open exceed the criteria by more than 10 dB, 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”.

An assessment of whether or not the ‘trigger’ levels for the need for natural ventilation are exceeded, is undertaken in Section 5.3 of this report.

4. MEASURED TRAFFIC NOISE LEVELS

The author visited the Site to undertake traffic noise surveys throughout the months of June, July and August 2016.

Noise surveys included long-term unattended monitoring as well as attended noise surveys at several locations across the development Site as shown in Figure 1.

Noise measurements have been used to establish the day time and night time traffic noise levels at the various locations shown in Table 1. The topography of the Site is such that areas to the north and south and west are elevated with clear line of sight to all lanes of the Highway, whereas sections in the centre and eastern side of the Site are shielded, at least in part.

Table 1 below shows traffic noise levels at the nearest most exposed portions of the Site, at the furthest most exposed areas and in the centre with and without acoustical shielding.

The instrumentation used during the noise surveys is shown in the attached Appendix A.

Table 1 **L_{eq} Traffic Noise Levels – Various locations across the Site**

| Traffic Noise Levels | dBA | Sound Pressure Levels (dB) at Octave Band Centre Frequencies (Hz) | | | | | | | |
|---|-----|--|-----|-----|-----|----|----|----|----|
| | | 63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k |
| Nearest future dwellings | | | | | | | | | |
| Daytime L _{eq} , 15 hr | 63 | 67 | 64 | 56 | 60 | 60 | 54 | 45 | 34 |
| Night-time L _{eq} , 9 hr | 60 | 64 | 61 | 53 | 57 | 57 | 51 | 42 | 31 |
| Centre future dwellings (not shielded) | | | | | | | | | |
| Daytime L _{eq} , 15 hr | 58 | 65 | 62 | 54 | 58 | 58 | 52 | 43 | 32 |
| Night-time L _{eq} , 9 hr | 55 | 63 | 59 | 51 | 55 | 55 | 49 | 40 | 29 |
| Centre future dwellings (acoustically shielded) | | | | | | | | | |
| Daytime L _{eq} , 15 hr | 50 | 54 | 51 | 43 | 47 | 47 | 41 | 32 | 21 |
| Night-time L _{eq} , 9 hr | 47 | 51 | 48 | 40 | 44 | 44 | 38 | 29 | 18 |
| Furthest future dwellings | | | | | | | | | |
| Daytime L _{eq} , 15 hr | 52 | 56 | 53 | 45 | 49 | 49 | 43 | 34 | 23 |
| Night-time L _{eq} , 9 hr | 49 | 53 | 50 | 42 | 46 | 46 | 40 | 31 | 20 |

Spectra are based on measured traffic noise levels in the centre of the Site at approximately 100 metres from the Princes Highway with direct line of sight.

The required traffic noise reduction is as follows:

Nearest future dwellings to Highway

- (63 – 40 =) 23 dB for all Living areas; and
- (60 – 35 =) 25 dB for all sleeping areas

Centre future dwellings to Highway (unshielded)

- (58 – 40 =) 18 dB for all Living areas; and
- (55 – 35 =) 20 dB for all sleeping areas

Centre future dwellings to Highway (acoustically shielded)

- (50 – 40 =) 10 dB for all Living areas; and
- (47 – 35 =) 12 dB for all sleeping areas

Furthest future dwellings to Highway

- (52 – 40 =) 12 dB for all Living areas; and
- (49 – 35 =) 14 dB for all sleeping areas.

5. NOISE MODELLING AND RECOMMENDED ACOUSTICAL TREATMENT

5.1 Noise Modelling Methodology

Design and layout of any potential future dwellings are unknown at this stage. For the purpose of modelling and assessment we have therefore assumed typical living areas and bedroom sizes, as follows:-

- Bedroom, carpeted – 4 metres x 5 metres x 2.7 metres with one window (2100 mm x 1800 mm) and one glazed sliding door (2400 mm x 2100 mm) facing the highway; and
- Open plan Living / Dining / Kitchen, timber or tile flooring – 6 metres x 7 metres x 2.7 metres with sliding glass door (2400 mm x 2100 mm) and two windows (1800 mm x 2100 mm each) all facing the highway.

The internal noise level can be calculated using the formula: -

$$L_{p2} = L_{p1} - R_w + 10 \log_{10} (S/A) - K + 6 \text{ dB}$$

Where:

- L_{p1} is the external freeway noise level;
- R_w is the weighted sound reduction index of the partition;
- S is the area of the partition (e.g. wall, roof, window or glazed door);
- A is the acoustic absorption of the room;
- K is an angle of view correction.

5.2 Building Construction Recommendations

The level of traffic noise intrusion has been calculated through the roof, floor, walls, glazed doors and windows.

The required internal noise levels set by Clause 102 of the SEPP (Infrastructure) 2007 can be met using the following construction methods and materials.

The following are examples only for houses located within each of the area specified in Table 1 of this Report. This is for the purpose of determining the potential type of construction that may be required in order to satisfy the requirements of the SEPP Clause 102.

Individual assessments for certain properties may be required once the subdivision is created prior to the issue of Construction Certificates for each dwelling. This may be done through the establishment of 88b instruments.

5.1.1 Closest dwellings to the Highway

Walls

- External walls may be of brick veneer or other masonry construction; or
- Cement composite external cladding, for example Hardies 'Scyon', 'Linea', 'Stria', or equivalent with equivalent minimum surface density; and
- Internal plasterboard wall lining may be of standard 13 mm thick plasterboard construction with standard thermal insulation in the external wall cavity with masonry construction; or
- Minimum 13 mm thick fire rated or sound rated plasterboard if using cement composite cladding construction.

Ceiling and Roof System

- Concrete tile or metal deck roof with minimum 13 mm thick fire rated or sound rated plasterboard ceiling below the living area ceilings and thermal insulation in the ceiling cavity.

Windows and Glazed Doors

- Windows and glazed doors may be fixed, sliding, awning, casement or double hung style in aluminium or timber frames;
- Windows in the living areas will require glazing with a minimum weighted sound reduction index (R_w) 35 – e.g. 10.38 mm thick laminated glass; and
- Windows in the bedroom will require glazing with a minimum weighted sound reduction index (R_w) 32 – e.g. 6.38 mm thick laminated glass.

5.1.2 Centre dwellings acoustically unshielded

Walls

- External walls may be of brick veneer or other masonry construction; or
- Cement composite external cladding; and
- Internal plasterboard wall lining may be of standard 13 mm thick plasterboard construction with standard thermal insulation in the external wall cavity.

Ceiling and Roof System

- Concrete tile or metal deck roof with minimum 13 mm thick fire rated or sound rated plasterboard ceiling below the living area ceilings and thermal insulation in the ceiling cavity.

Windows and Glazed Doors

- Windows and glazed doors may be fixed, sliding, awning, casement or double hung style in aluminium or timber frames;
- Windows will require glazing with a minimum weighted sound reduction index (R_w) 29 – e.g. 5 mm thick float glass.

5.1.3 Furthest dwellings to the Highway

Walls

- External walls may be of brick veneer or other masonry construction; or
- Cement composite external cladding; and
- Internal plasterboard wall lining may be of standard 13 mm thick plasterboard construction with standard thermal insulation in the external wall cavity.

Ceiling and Roof System

- Concrete tile or metal deck roof with minimum 10 mm standard plasterboard ceiling below the living area ceilings and thermal insulation in the ceiling cavity.

Windows and Glazed Doors

- Windows and glazed doors may be fixed, sliding, awning, casement or double hung style in aluminium or timber frames;
- Windows may be of standard thickness glazing with a minimum weighted sound reduction index (R_w) 24 – e.g. 4 mm thick float glass.

5.1.4 Discussion

It can be seen that dwellings within close proximity to the Highway will require varying degrees of acoustical treatment to ensure that the internal noise limits set by Clause 102 of the SEPP (Infrastructure) 2007 can be met.

The extent of acoustical treatment will depend on several factors including the size of rooms, portion of glazing, orientation of glazing, type of floor coverings, acoustical shielding from other buildings and boundary fences and whether the dwellings are single or double storey.

A final assessment of individual dwellings within 150 metres of the Princes Highway should be undertaken prior to the issue of a Construction Certificate to ensure the internal noise limits will be met, once architectural or building design plans are available.

Given the topography of the Site, roadside noise barriers will not provide significant attenuation across the entire Site, particularly given the cost to potential noise reduction ration.

In any event, for even the closest dwellings to the Highway, the construction methods and materials required to ensure the internal noise limits set by Clause 102 will not be significantly onerous.

5.3 Mechanical Ventilation Requirements

The NSW Department of Planning's document Development near Rail Corridors and Busy Roads – Interim Guideline 2008 states:-

"If internal noise levels with windows or doors open exceed the criteria by more than 10dB, 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."

The external noise level from road traffic at the closest façade of the nearest future dwelling to the Highway is 63 dBA in the day and 60 dBA at night.

A reduction of up to 10 dB from outside to inside is typically achieved with the windows/doors open. This results in an internal noise level of 53 dBA during the day and 50 dBA during the night.

As detailed in Section 3.2, the internal assessment trigger level for the requirement for natural ventilation is 10 dB above the acceptable internal noise level when the windows or doors are partially open. This results in trigger levels of $(40 + 10 =) 50$ dBA (day time) and $(35 + 10 =) 45$ dBA (night time).

The predicted levels of 53 dBA and 50 dBA respectively are potentially above these trigger levels for future homes closest to the highway and these homes are required to be ventilated in accordance with the Building Code of Australia.

A final assessment of individual dwellings will be required prior to the issue of a Construction Certificate.

6. CONCLUSION

A traffic noise intrusion assessment has been undertaken for a proposed residential subdivision to be constructed at Lot 1 DP 707300, Lot 5 DP 74052, Lot 8 DP 258605 & Lot 101 DP South Kiama, NSW.

Traffic noise levels across the Site range between 63 and 50 dBA $L_{eq, 15 \text{ hour}}$ during the day and from 60 to 47 dBA $L_{eq, 9 \text{ hour}}$ during the night.

These measured noise levels have been used to determine the potential for compliance with the noise limits set by Clause 102 of the SEPP Infrastructure 2007.

Internal noise level recommendations set by Clause 102 of SEPP (Infrastructure) 2007 can be achieved for any future residences based on typical constructions outlined in Section 5 of this report.

A further assessment of dwellings within 150 metres of the Princes Highway will be required prior to the issue of a Construction Certificate for each dwelling. Any acoustical treatment, if required will not be onerous.



Matthew Harwood, MAAS

Principal Acoustic Consultant

Attachments:-

Appendix A – Noise Measurement Instrumentation

Note that all excel statistical logger noise measurement data has been retained on file for future reference.

| | |
|-------------------------------------|-------------------|
| Noise Survey Instrumentation | Appendix A |
|-------------------------------------|-------------------|

The instrumentation used during the noise survey consisted of the following

| Description | Model No. | Serial No. |
|------------------------------------|------------------|-------------------|
| Svantek Sound Level Meter | 977 | 36848 |
| Svantek Acoustical Calibrator | SV 31 | 43177 |
| Infobyte Noise Logger (Type 2) | iM4 | 104 |
| Condenser Microphone 0.5" diameter | MK 250 | 104 |
| Infobyte Noise Logger (Type 2) | iM4 | 104 |
| Condenser Microphone 0.5" diameter | MK 250 | 104 |

The sound level meter conforms to Australian Standards AS IEC 61672.1-2004: 'Electroacoustics - Sound level meters – Specifications' as a Class 1 precision sound level meter. The infobyte noise loggers # 104 & 110 conform to Australian Standard AS 1259 as Type 2 sound level meters.

The calibration of the meters was checked before and after the measurement period. No significant system drift occurred over the measurement period. The sound level meter and calibrator have been checked, adjusted and aligned to conform to the factory specifications and issued with conformance certificates as required by the regulations.