NVC
NOISE VIBRATION CONSULTING

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Ref: 1626-1 Clarence Lifestyle Village NIA_03

Attention: Phil Gartrell

CLARENCE LIFESTYLE VILLAGE — NOISE IMPACT ASSESSMENT

Clarence Lifestyle Village is proposing to redevelop an existing lot at 647 East Derwent Highway, Risdon. Part of the site is within the Road and Railway Attenuation Zone, and thus a noise assessment has been requested by the Department of State Growth. This letter presents the results of such a survey, completed by NVC in June / July 2023.

1. BACKGROUND

The proposed site is an existing lot located at 647 East Derwent Highway, Risdon, and is shown by the white outline in Figure 1.1. The proposal includes the expansion of the existing lifestyle village, providing 54 additional dwellings. The lot is adjacent the East Derwent Highway, with an existing multi-residential development owned by Clarence Lifestyle Village to the south-east, and a caravan park to the north-west. A residential dwelling protrudes into the lot on the site's north-western boundary.

The magenta cross-hatching adjacent the highway indicates the Road and Railway Attenuation zone, with the portion of the lot within the attenuation zone indicated by the yellow overlay.

The site is a gently sloping block that slopes down to the highway. The East Derwent Highway in the vicinity of site features a moderate gradient from the south-east down to the north-west. The speed limit immediately adjacent site is 100km/h, slowing to 70km/h further to the north-west.



FIGURE 1.1: SITE AND SURROUNDINGS

Figure 1.2 shows the proposed site layout, with the yellow overlay showing the attenuation zone across the site. As seen by the figure, seven of the proposed dwellings are within the attenuation zone (dwelling numbers 1, 27, 28, 30, 31, 44 and 45).

It is noted that the Road and Railway Attenuation Zone depicted on LISTmap[1] and the Proposed Site Plan[2] differ slightly, though the dwellings that are sited within the attenuation zone are consistent across both images.

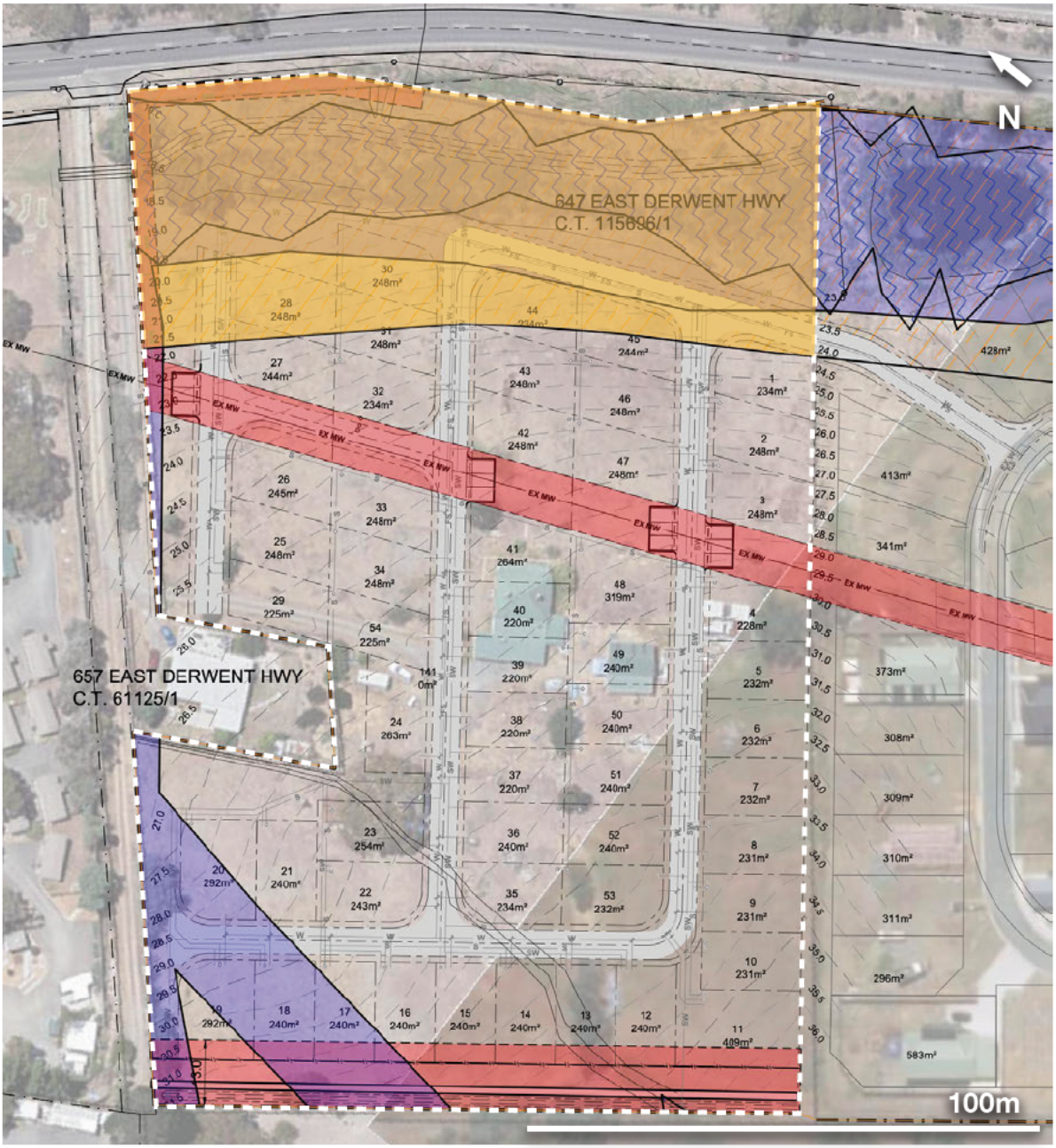


FIGURE 1.2: PROPOSED SITE LAYOUT

[1] *'LISTmap'*, Land Tasmania, Department of Natural Resources and Environment Tasmania

[2] *'Proposed Site Plan'*, Proj. No. 17E9-118, Dwg. No. C02, JSA Consulting Engineers

2. CRITERIA

The Tasmanian Planning Scheme contains, under section C3.0, the Road and Railways Assets Code. Specifically relevant is clause *C3.6.1 - Habitable buildings for sensitive uses within a road or railway attenuation area*, the objective of which is:

> *"To minimise the effects of noise, vibration, light and air emissions on sensitive uses within a road or railway attenuation area, from existing and future major roads and the rail network."*

To satisfy this objective, the Scheme provides Acceptable Solutions under A1, and a secondary Performance Criteria under P1.

> *"**A1** Unless within a building area on a sealed plan approved under this planning scheme, habitable buildings for a sensitive use within a road or railway attenuation area, must be:*
>
> *(a) within a row of existing habitable buildings for sensitive uses and no closer to the existing or future major road or rail network than the adjoining habitable building;*
>
> *…*
>
> *(c) located or designed so that external noise levels are not more than the level in Table C3.2 measured in accordance with Part D of the Noise Measurement Procedures Manual, 2nd edition, July 2008.*
>
> ***P1** Habitable buildings for sensitive uses within a road or railway attenuation area, must be sited, designed or screened to minimise adverse effects of noise, vibration, light and air emissions from the existing or future major road or rail network, having regard to:*
>
> *(a) the topography of the site;*
>
> *…"*

Relevant to this clause, Table C3.2 states acceptable noise levels within a road or railway attenuation area as:

> *"Roads: The arithmetic average of the A-weighted L10 sound pressure levels for each of the one-hour periods between 6:00am and midnight on any day [L10 (18-hour)] of 63 dB(A)."*

In Table 1 of the Noise EPP[3], a list of Acoustic Environmental Indicator levels are given for which the environmental values specified in the Noise EPP "…*will be protected for the majority of the human population where the acoustic environment indicator levels are not exceeded…"* A section of that table is reproduced here in Table 2.1.

TABLE 2.1: ACOUSTIC ENVIRONMENTAL INDICATOR LEVELS - TAS NOISE EPP

Specific Environment	Critical Health Effect	LAeq dBA	Time hrs	LAmax dBA
Outdoor living area	Serious annoyance, daytime and evening	55	16	-
	Moderate annoyance, daytime and evening	50	16	-
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	8	60

Therefore, the adopted project criterion is as follows:

63 dBA $L10_{(18\text{-hour})}$ at the facade of the worst affected residential dwelling

If the above cannot be demonstrated, the following criteria apply:

50 dBA $Leq_{(16\text{-hour})}$ at private outdoor space during the day time
45 dBA $Leq_{(8\text{-hour})}$ at the residential facade during the night time

If the above cannot be demonstrated, the following criteria apply:

40 dBA $Leq_{(16\text{-hour})}$ internally during the day and night time[4]
Private outdoor space to be located so as to minimise noise levels

[3] Tasmanian Environmental Protection Policy (Noise) 2009 (the Noise EPP)

[4] *'Recommended design sound levels and reverberation times for building interiors'*, Standards Australia, 2016

3. NOISE MEASUREMENTS

Unattended noise measurements were made on site between the 23rd and the 30th June 2023 to quantify noise emissions from the East Derwent Highway. Measurements used a Svan Type 1 sound level meter, logging in A-weighted decibels with a *Fast* response time. The data set comprised overall levels, one-third octave spectra and full statistical data at 10 minute intervals, with spectra and overall level data also recorded at 1s intervals. The measurements were made at location A (see Figure 1.1), which was selected as it was the only appropriate location providing adequate security of the noise logging equipment. This location was near the edge of the attenuation zone, nominally 62m from the road verge.

The overall noise level trend across the measurement period is shown by the noise spectrogram in Figure 3.1. As can be seen by the figure, the ambient noise during the night time is significantly quieter than the day time, which is largely controlled by noise emissions from tyres contacting the road, with some low-frequency content from heavy vehicles passing.

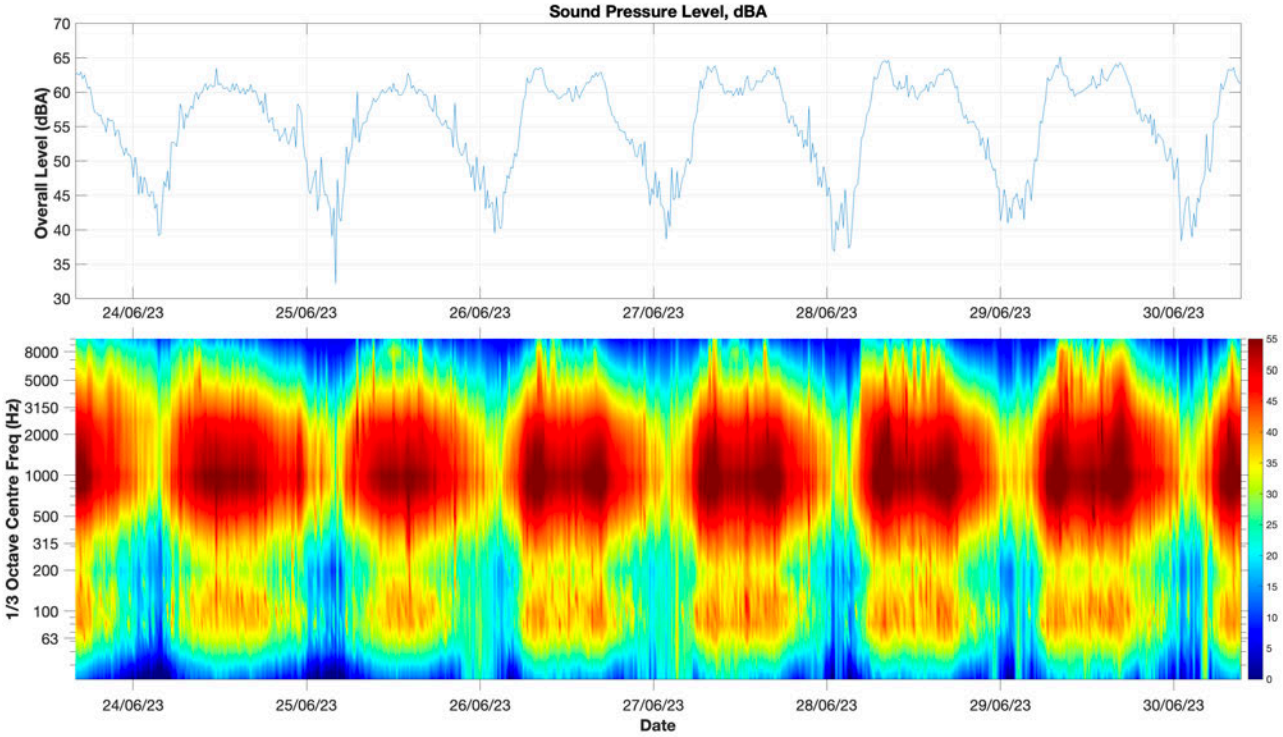


FIGURE 3.1: MEASURED NOISE SPECTROGRAM

Table 3.1 presents a summary of the measured noise levels.

TABLE 3.1: SUMMARY OF MEASURED NOISE LEVELS

Time Period	Sound Pressure Level, dBA		
	L10	L90	LEQ
Day Time (6AM - 10PM)	62	51	59
Night Time (10PM - 6AM)	49	33	47

The measured $L10_{(18\text{-hour})}$ at location A is 65 dBA. It is noted that assessment for intrusive or dominant characteristics was carried out as per the Tasmanian Noise Measurement Procedures Manual, with no adjustment required.

As noted previously, noise emissions from vehicles on the the East Derwent Highway are controlled by mid-high frequency noise, typical of high speed tyre noise. There is also significant low frequency content around the 80 - 125Hz one-third octave bands, typical of engine noise from heavy vehicles. Figure 3.2, below, shows the measured day time Leq spectrum at location A.

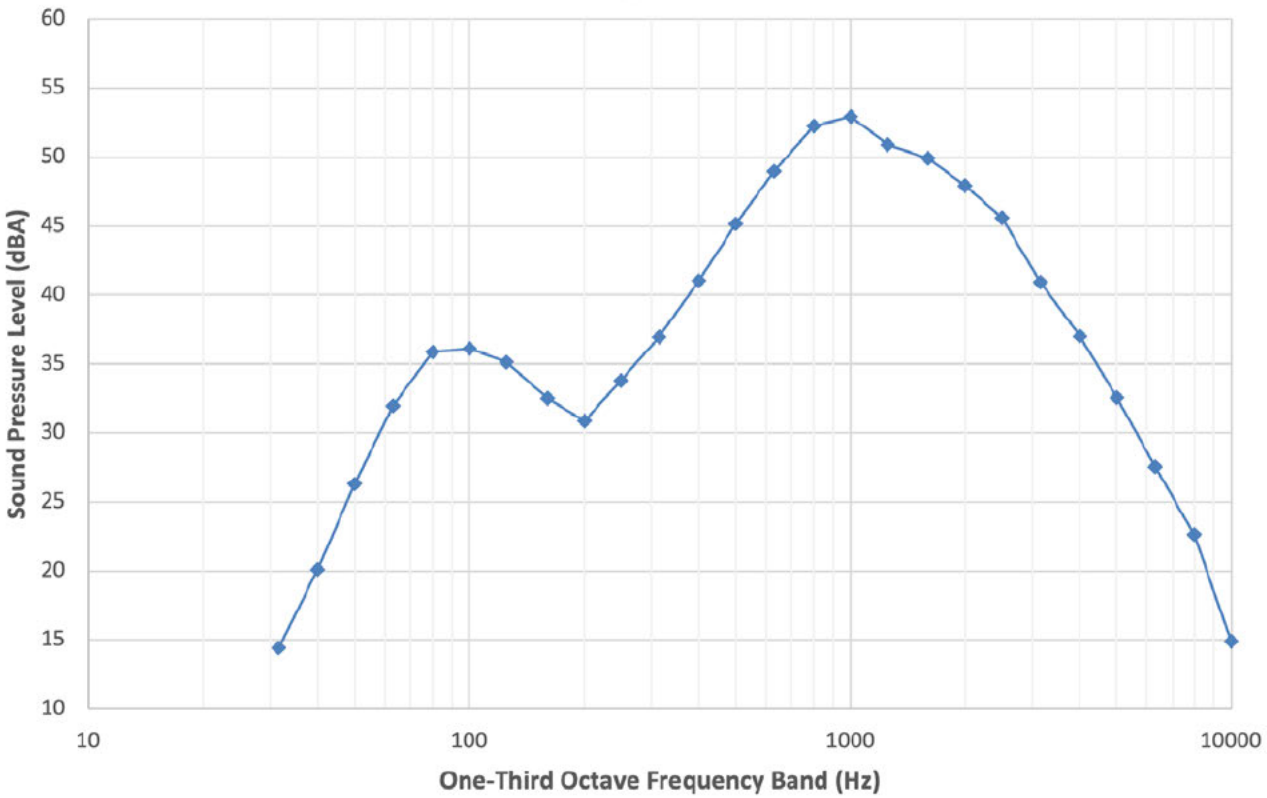


FIGURE 3.2: MEASURED ONE-THIRD OCTAVE SPECTRUM, LEQ - LOCATION A

4. Noise Predictions

Traffic noise levels across the site have been predicted using *iNoise*[5] software, which implements the ISO9613 algorithms for environmental noise. The predictions account for geometric divergence, barrier attenuation, atmospheric absorption, reflections/screening from buildings, and ground absorption. The following assumptions have been made in the predictions:

- 1m topographical contours (from LIDAR data) have been used for the site and surrounding area.
- The primary source of vehicular noise (particularly at high speeds) is the tyres, and so the source is modelled as 0.5m above the road surface.
- The vehicle sound power spectrum used is from the measured data at location A.
- Vehicle numbers were obtained from the Department of State Growth, and are based on traffic count measurements at the eastern end of the East Derwent Highway (station A0029190) in June 2021. The noise model uses the numbers extrapolated to 2041.
    - Traffic flow is modelled as an 18-hour period from 0600 to 0000 hours, as per the DIER guidelines. DSG traffic flow data showed that 98% of traffic flow occurred within this period.
- The ground has been assumed to have a ground factor of 0 (100% reflective) on the highway surface, and a ground factor of 0.5 (50% reflective) elsewhere.
- The building façades and barrier construction are modelled with a reflection factor of 0.8 (80% reflective).
    - Note that no buildings have been modelled on the proposed development.
- As per the Tasmanian Noise Measurement Procedures Manual, noise levels across the site are predicted at 1.2m above ground level.
- The model has been validated against the measurements made at location A using current traffic flow data, and has been demonstrated to be predicting noise levels within 1dB of the measured levels. The model is thus predicting traffic noise accurately.

The results are shown in Figure 4.1 via coloured noise contours. Two contours are shown, defining acceptable and unacceptable levels respectively; ≤ 63 dBA $L10_{(18\text{-hour})}$ in green, and > 63 dBA $L10_{(18\text{-hour})}$ in red. As seen in Figure 4.1, the dwellings within the attenuation zone are all predicted to experience traffic noise levels exceeding the 63 dBA $L10_{(18\text{-hour})}$ criterion.

[5] iNoise V2022.1 Pro, DGMR Software

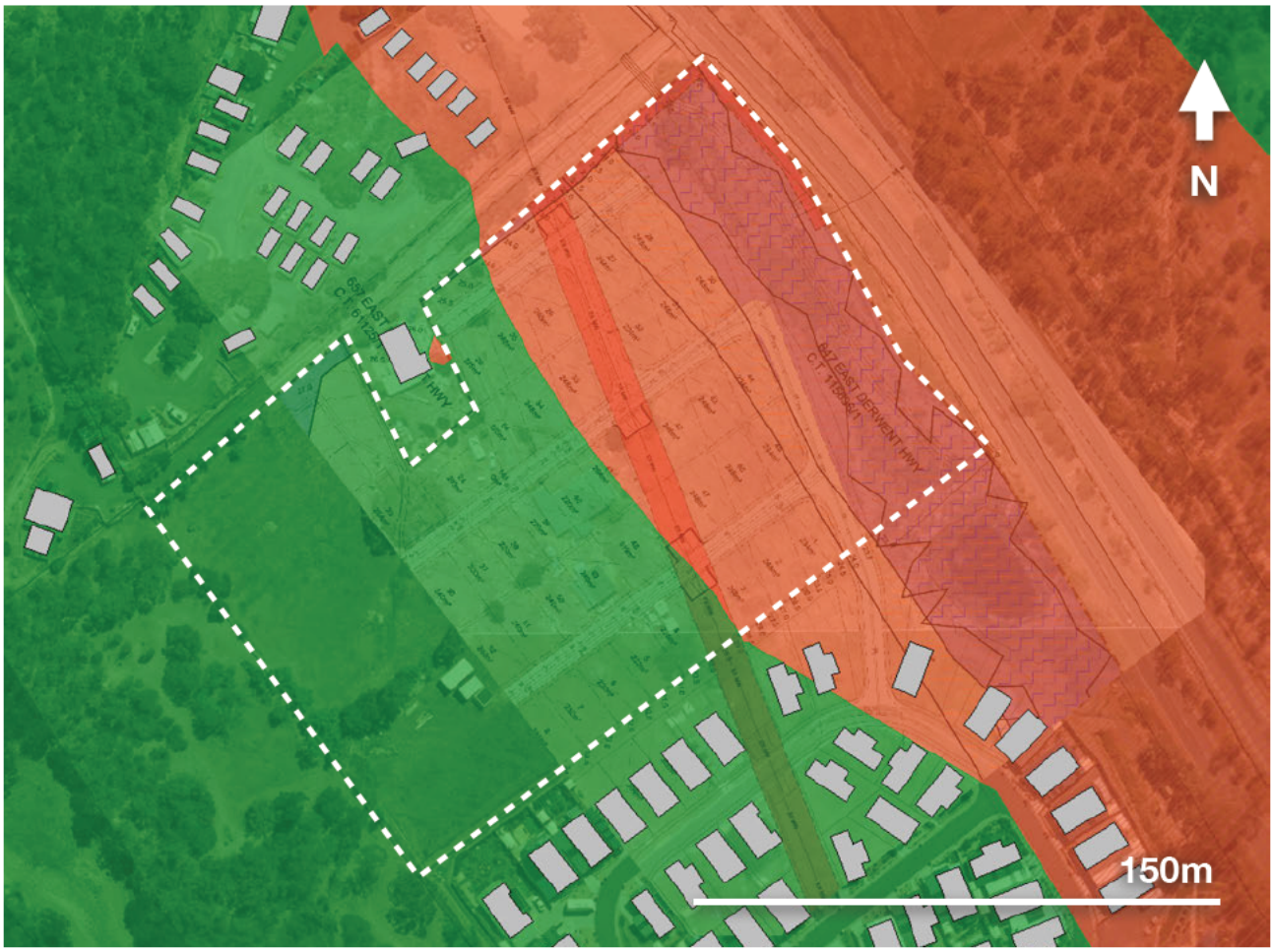


FIGURE 4.1: PREDICTIVE NOISE CONTOURS - 1.2M ABOVE GROUND

5. RECOMMENDATIONS

Given the lot slopes down toward the highway and the elevated location of the highway's road surface (see Figure 5.1, below), mitigating vehicle noise emissions via a barrier on the boundary adjacent the highway would be impractical, as it would require an extremely tall barrier to block line of sight.

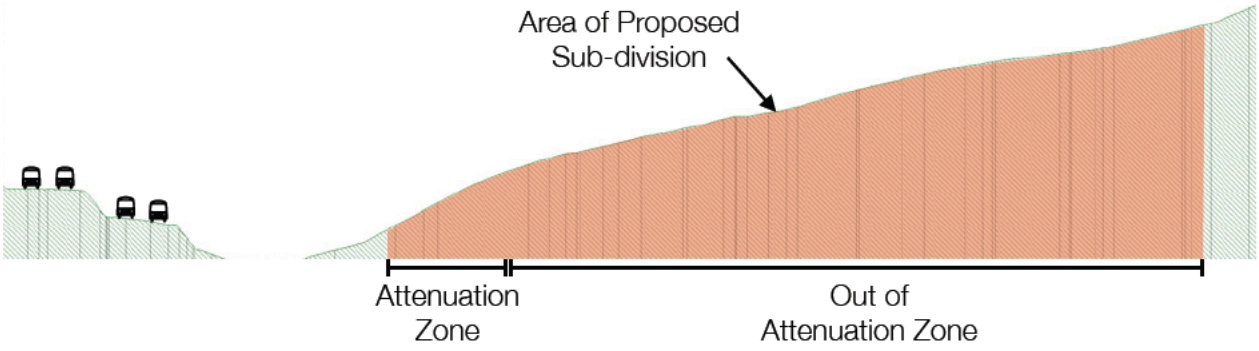


FIGURE 5.1: CROSS-SECTION OF SITE - VIEWED FROM NORTH-WEST

Therefore, to protect the residential amenity of resident's, facade treatment is required to maintain internal noise levels that are acceptable.

The following is recommended:

- The facades of all dwellings on the affected dwellings are required to achieve a minimum sound isolation of Rw 37. Examples of appropriate facade construction include:
  - Weatherboard external cladding or brick veneer on an insulated stud wall, with a 10mm fixed plasterboard internal lining.
  - 4mm float, 12mm air gap, 6.5mm acoustic glazing (6.5mm VLam Hush or equivalent) double glazing.
- All operable windows are to be awning or casement type, with full perimeter seals fitted.
- Private outdoor space is to be provided for each dwelling located on the opposite side of the dwelling to the worst-affected facade (generally to the west of the respective dwellings).
  - Private outdoor space to be screened from line of sight to the highway by a solid object with a minimum height of 2m. This may be achieved by a barrier / fence or positioning of the dwelling.
  - It is recommended that all barriers constructed comprise the following details:
    - A minimum surface mass of 15kg/m^2. Examples of appropriate construction include 20mm thick, ship-lapped timber, 12mm fixed cement sheet, or commercial noise barrier products.
    - A minimum height of 2m.
    - No gaps, including between the barrier and the ground.

Figure 5.2, below, shows example layouts in which private outdoor space (green regions) is screened from the highway by dwellings (white rectangles) and barriers / fences (broken white lines).

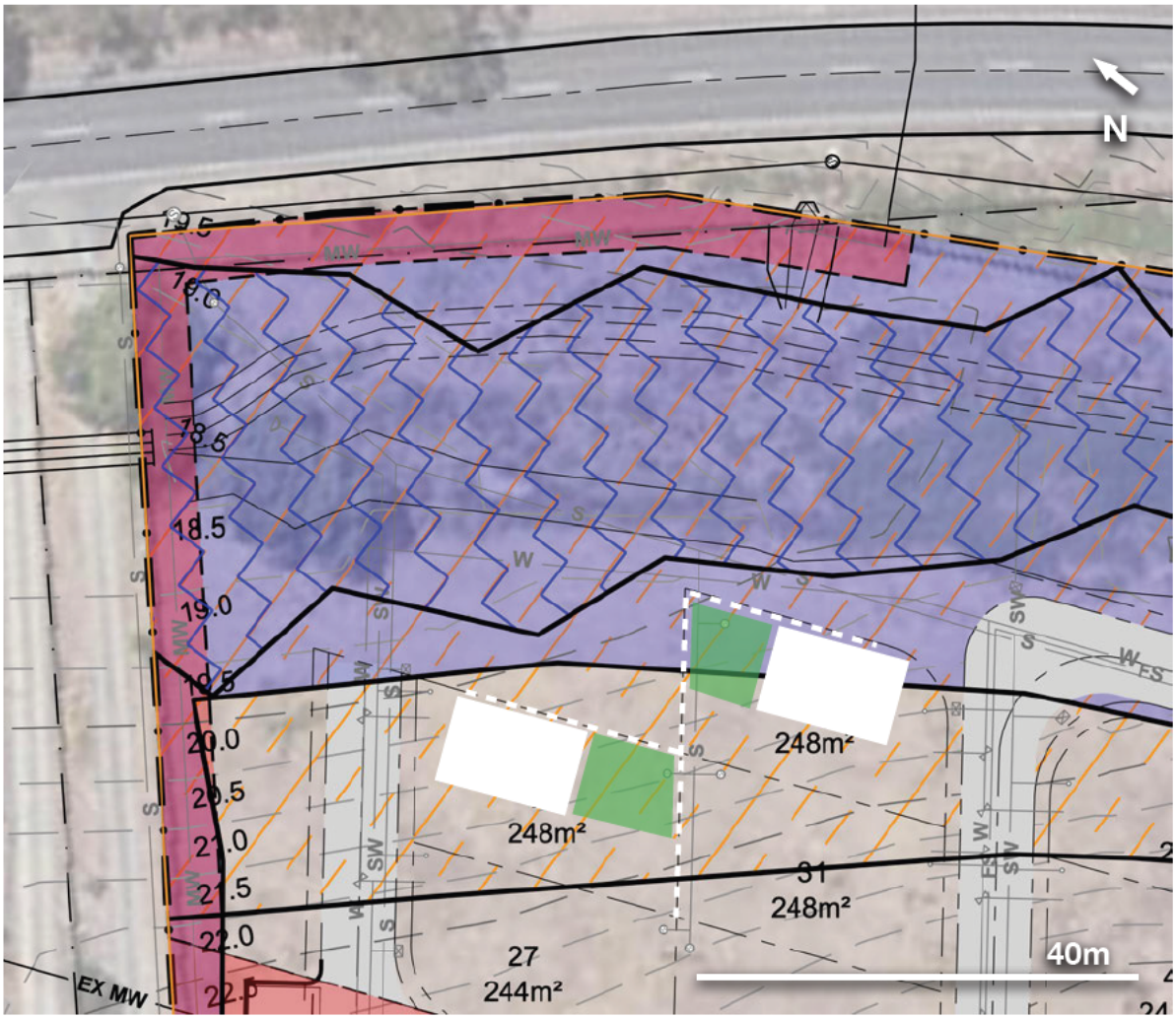


FIGURE 5.2: EXAMPLE DWELLING LAYOUTS

6. ASSESSMENT

Given the topography of the site and the surrounding area, mitigating vehicle noise emissions on the East Derwent Highway using acoustic barriers alone is not feasible. As the site slopes down to a point lower than the highway (from west to east), mitigation via a barrier alone would require it to be immediately adjacent the eastern site boundary and unfeasibly tall to provide adequate screening. Therefore, facade treatment (as outlined in section 5) is appropriate to control internal noise levels, with private outdoor space to be located on the least affected side of each residential dwelling (generally to the west / south-west of the respective dwellings) to provide an appropriate level of amenity within habitable outdoor areas.

Following the implementation of the recommendations outlined in section 5, noise levels internally are predicted to satisfy the criterion outlined in section 2.

Therefore:

The proposed residential sub-division at 647 East Derwent Highway is deemed to satisfy clause C3.6.1 of the Tasmanian Planning Scheme - Clarence.

Should you have any queries, please do not hesitate to contact me directly.

Kind regards,

[redacted]