



**HEGLEY ACOUSTIC
CONSULTANTS**

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Dear Ross

THE LAKES – STAGE 3AB

Thank you for the information provided on stage 3AB of The Lakes development in Tauranga. The development consists of a residential subdivision adjacent to Takitimu Drive (SH36) as shown on Figure 1. As requested I have considered the mitigation required to control traffic noise to the proposed subdivision.

Design Criteria

Rule 4E.2.5 of the District Plan provides criteria for new dwellings that are constructed next to busy roads. Strictly speaking, this rule relates to the person developing the residence rather than the subdivision, as in this proposal. However, earlier stages of The Lakes development have all been designed to control road traffic noise to the subdivision, albeit to various rules. The most recent stage 2P was subject to a resource consent condition¹ with similar requirements to Rule 4E.2.5. For this reason, and for consistency with the District Plan, the assessment of noise has been undertaken in general accordance with the District Plan noise rule, part a) which requires:

For properties within the NZTA (New Zealand Transport Agency) Reverse Sensitivity Plan Area shown on the Plan Maps (Part B):

- i) Any new dwelling shall meet an internal road-traffic design sound level of 40dB $L_{Aeq(24h)}$ inside all habitable rooms with ventilating windows open.*

This report provides a method by which noise from road traffic on SH36 will be controlled to within the 40dB $L_{Aeq(24h)}$ requirement of the District Plan to habitable rooms whilst they are adequately ventilated. The following analysis shows that the only practicable method that the land developer has of achieving this criterion is through screening the future houses from SH36 through the use of boundary noise walls. While such walls can be shown to be effective for ground floors, the barrier heights necessary to screen any future upper floors will be in excess of 3.5 – 4m. Such tall barriers are likely to result in adverse effects such as shading and be visually imposing both to the residents and motorists. As the number of floors of the future residences will be at the discretion of the individual house owners, there is no certainty that there will actually be any upper floors to protect. When considering the adverse effects to future dwellings compared to the potential benefits to upper floors from a noise wall, the approach taken by this assessment is to use a barrier to provide the necessary internal amenity to the ground floors of the future dwellings and as a consequence, to any outdoor amenity areas. Controlling the noise to any upper floors would be the responsibility of the house owner through the application of District Plan noise rule 4E.2.5.

¹ Council reference 20140205, condition 15.

The design of the barrier is therefore based on achieving 40dB $L_{Aeq(24h)}$ internally whilst the habitable rooms are adequately ventilated. On the basis that the windows will be used for ventilation in the normal manner, the level at the house façade must not exceed 55dB $L_{Aeq(24h)}$. This is based on the generally accepted 15dB reduction through a façade with windows open for ventilation.

Road Noise

Noise from road traffic has been predicted to the subdivision using the Predictor noise prediction program. Predictor uses the electronic files of the alignment and surrounding topography to build a full scale model of the road and adjacent sites. As there are no houses in the area currently being assessed, the analysis has been based on the most exposed facade of future houses being 2m from the road side boundary, which is typical of the houses that have already been constructed further north along Takitimu Drive.

Traffic noise has been predicted based on the understanding that the road has a medium grade chip seal surface. It is understood the traffic flow on SH36 adjacent to stage 3 of The Lakes will be 5,540 vehicles per day. There will be 5% heavy commercial vehicles and the speed of all traffic will be 100km/hr.

Analysis has included the noise wall proposed for stage 2 QRST of The Lakes, which is immediately to the north of Stage 3.

Barrier Mitigation

Analysis has shown that a barrier will be required to screen the future dwellings adjacent to Takitimu Drive. The barrier has been positioned between SH36 and Stage 3AB, as shown on Figure 1. It is the height of the top of the barrier that is important to the design. Analysis was based on a 2.0m high barrier sitting on the currently proposed finished ground level. Should this ground level be altered, the top of the barrier must remain at least as high as the current design. If necessary, this barrier can also be provided in electronic form.

The barrier could be constructed as a wall, a bund or a combination of each. If the wall option is selected the wall must be constructed from a material with a surface density of 10kg/m^2 or greater. Suitable materials consist of 20mm pine palings, 9mm fibre cement sheet or 20mm plywood. Concrete and masonry are also suitable. There must be no untreated openings in the wall, including at the base and if timber palings are used, they must be butted together with battens placed over the joints to control openings forming as the palings dry and shrink. Suitable construction details are shown on Figure 2 below.

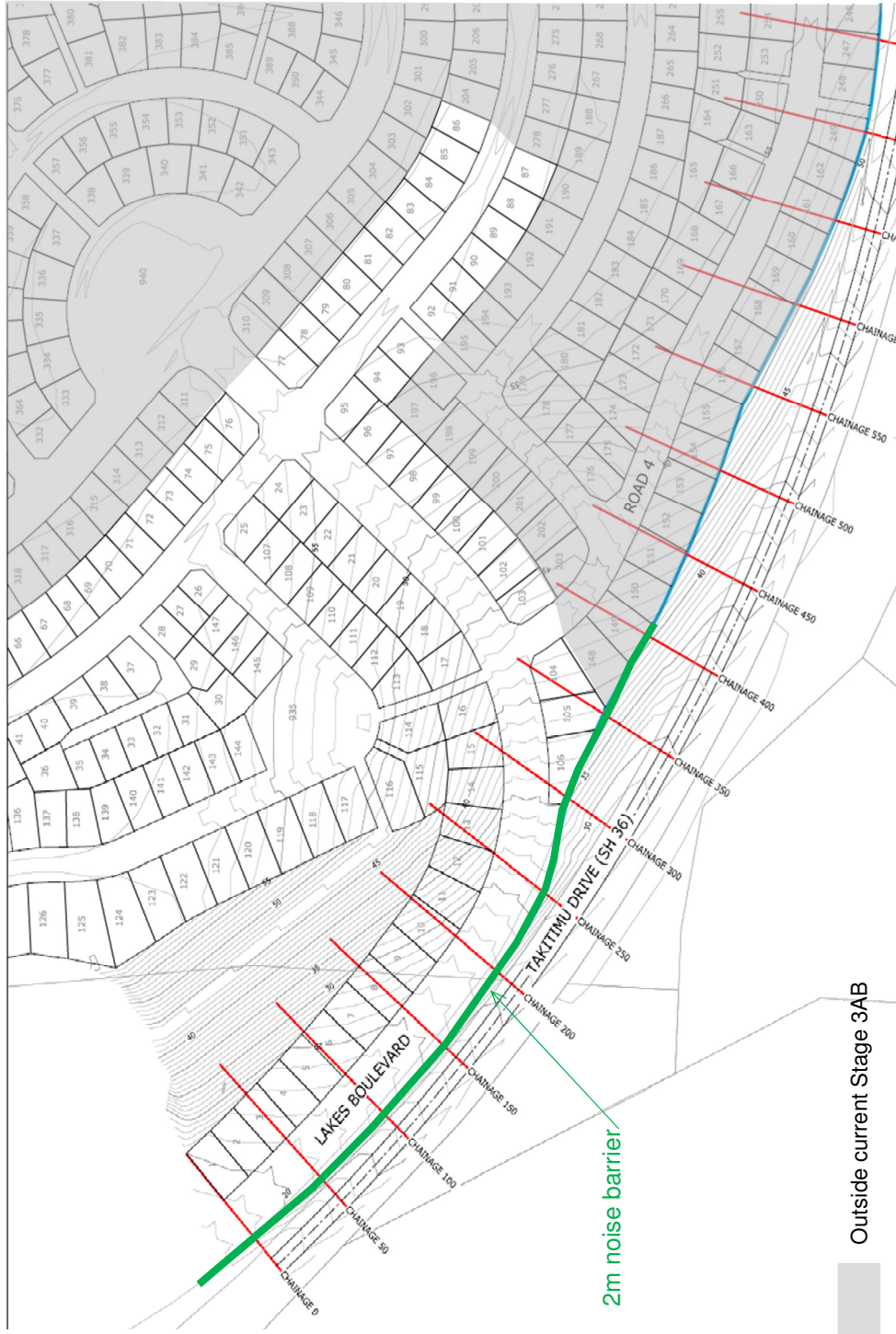


Figure 1. Stage 3AB

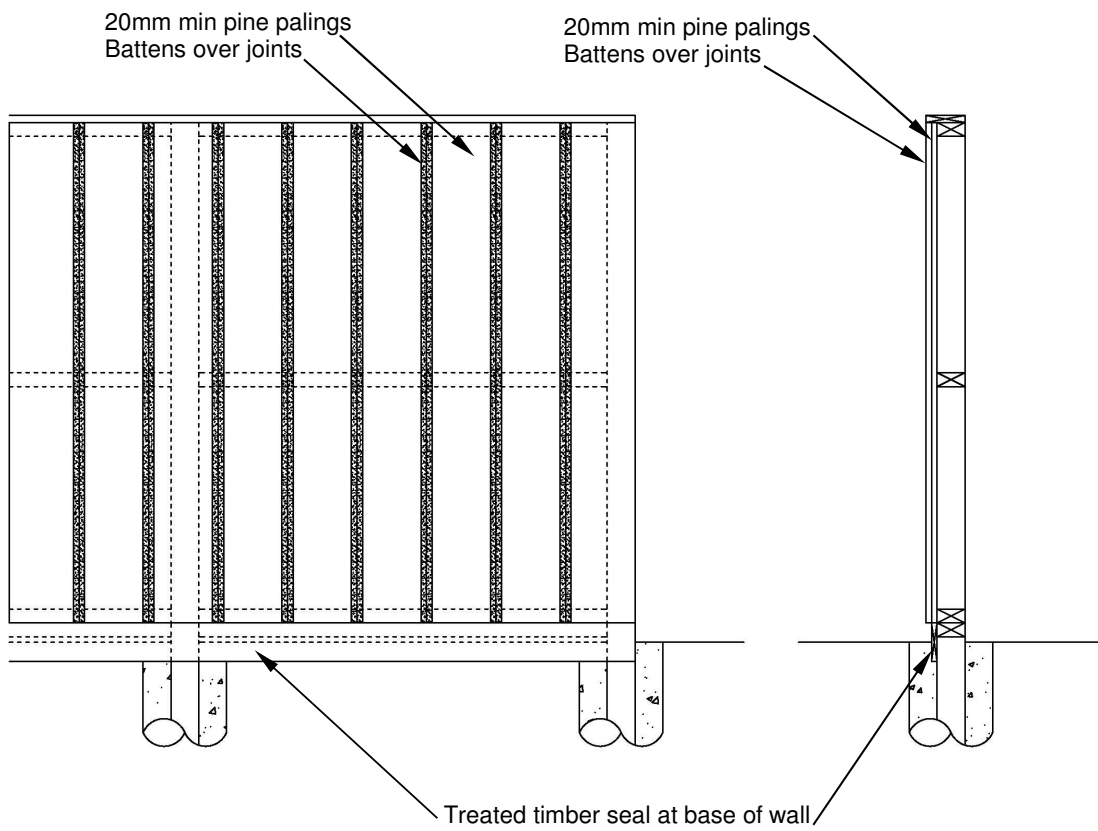


Figure 2. Suitable Timber Wall Detail

With the barrier in place, the resulting road traffic levels to selected Lots are summarised in Table 1.

Table 1. Road Traffic Noise Levels to Representative Lots

| Lot | Road Traffic Noise Level (dB L _{Aeq(24h)}) | |
|-----|--|------------------------------|
| | Future Ground Floor | Potential Future First Floor |
| 1 | 53 | 54 |
| 2 | 52 | 54 |
| 3 | 52 | 54 |
| 4 | 52 | 54 |
| 5 | 52 | 54 |
| 6 | 52 | 54 |
| 7 | 52 | 54 |
| 8 | 52 | 54 |
| 9 | 52 | 54 |
| 10 | 52 | 54 |
| 11 | 52 | 54 |
| 12 | 51 | 54 |
| 13 | 52 | 54 |
| 14 | 51 | 53 |
| 15 | 50 | 52 |
| 16 | 49 | 51 |
| 17 | 47 | 49 |
| 18 | 46 | 48 |
| 103 | 47 | 49 |
| 104 | 47 | 51 |
| 104 | 48 | 54 |
| 105 | 53 | 58 |
| 106 | 54 | 62 |
| 117 | 53 | 54 |
| 124 | 49 | 53 |
| 128 | 49 | 50 |

| | |
|--|--------------------------------|
| | <= 55dB L _{Aeq(24hr)} |
| | > 55dB L _{Aeq(24hr)} |

Table 1 shows that the 55dB L_{Aeq(24hr)} criterion can be achieved externally to the ground floor of future residences on the Lots most exposed to road traffic noise and therefore, to all Lots. The importance of this is that a level at or below 55dB externally will result in the required 40dB L_{Aeq(24hr)} or below internally.

Table 1 also provides the noise levels to any future first floor. While the majority of the Lots will be exposed to 55dB or less, traffic noise to Lots 105 and 106 is predicted to be 58 and 62dB L_{Aeq(24hr)}

respectively. Should the future dwelling to either Lot include a first floor, the building façade will have to be design and constructed to control internal levels to 40dB or below.

Façade Reductions

The upper level that any dwelling in Stage 3AB can expect at its façade is 62dB $L_{Aeq(24hr)}$. This means that the façade must be capable of achieving a reduction of at least 22dB to achieve the required internal level of 40dB $L_{Aeq(24hr)}$. To demonstrate this it is practicable to achieve this reduction, conventional façade construction has been investigated.

Conventional 4mm float glass will provide approximately 25dB reduction, depending upon its size, when closed and is therefore suitable. A standard roof construction consisting of 0.4mm profiled metal cladding, blanket and a 10mm Gib Board ceiling will provide a greater reduction at approximately 30dB. Timber framed walls with a fibre cement sheet cladding, cavity absorption and a 10mm Gib Board lining will provide a similar reduction to the roof. From the above constructions, it can be seen that even the most basic forms of construction can achieve the required reductions meaning that there are ample construction options available that will meet the District Plan criterion.

Proposed Conditions

A suitable condition for the subdivision that would ensure that the barrier adopted by this assessment is included could read:

A noise wall shall be constructed along the western site boundary to screen the Lots from road traffic noise. The barrier shall be a minimum of 2.0m high and constructed in the location described by Figure 1 of the letter by Hegley Acoustic Consultants to Harrison Grierson dated 10 December 2014. The noise wall shall be constructed from a material with a surface density of 10kg/m² or greater. There must be no untreated openings in the wall, including at its base and if timber palings are used, they must be butted together with battens placed over the joints to control openings forming as the palings dry and shrink.


To ensure that the appropriate house facades are designed to control traffic noise to all floors where the barrier will not, the following condition could be placed on the titles of Lots 105 and 106:

The first floor of any new dwelling shall meet an internal road-traffic design sound level of 40dB $L_{Aeq(24h)}$ inside all habitable rooms with ventilating windows open. Where windows must remain closed to achieve the required internal noise level, alternative ventilation must be supplied that provides ventilation in accordance with the building code. Noise from the ventilation system must not exceed 35dB $L_{Aeq(30s)}$ when measured 1 metre from any grille or diffuser.

I note that previous conditions for other stages of The Lakes development provided additional ventilation requirements for the ventilation system. While these appear sensible, I have not commented on them as they are outside of my area of expertise. It may however, be reasonable to add these ventilation requirements to any final condition.

Should you have any questions regarding the above please do not hesitate to contact me.

Yours sincerely
Hegley Acoustic Consultants


Rhys Hegley