



**HEGLEY ACOUSTIC  
CONSULTANTS**

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Dear Ross

**THE LAKES – STAGE 2P**

Thank you for the information provided on stage 2P of The Lakes development in Tauranga. The development consists of a residential subdivision adjacent to Takitimu Drive (SH 36). As requested, I have considered the mitigation required to control traffic noise to the proposed subdivision.

**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 will be surfaced with a medium grade chip seal. It is understood that traffic flows north of the roundabout at station 2150 are 15,337 vehicles per day while to the south the flow is 5,540 vehicles per day. There will be 5% heavy commercial vehicles and the speed of all traffic will be 100km/hr.

**Design Criteria**

Since the consent was issued, the design has changed, altering the Lot numbers. Condition 15 of the resource consent for the project provides the following criteria:

***For Lots 905 to 916 (inclusive)***

- c) An acoustic fence constituting a close board timber fence with battens over the joins as illustrated within Figure 2 of the Hegley Acoustics Consultants report dated 1 July 2013 shall be maintained on the boundary of the reserve adjacent to State Highway 36 and access lots 1072 and 1073 and Lot 916 in the location as shown within Figure 1 of the Hegley Acoustics Consultants report dated 1 July 2013. The fencing shall be maintained at all times to ensure its acoustic integrity is maintained.*
- d) Any new dwelling being constructed, or any existing dwelling being extended greater than 25% of the existing floor area, shall be designed and constructed to achieve an internal road-traffic design sound level of 40dB  $L_{Aeq(24h)}$  inside all habitable rooms with the ventilating windows open.*

*At the time of building consent application an acoustic design report shall be provided to Council from a suitably qualified and experienced acoustics expert demonstrating*

compliance with the abovementioned sound level requirement. If this cannot be achieved, then:

The windows of all habitable rooms shall be constructed with glazing that includes a laminated pane that is at least 6.38mm thick and covers the glazed area, and a ventilation system shall be installed to either:

- Consist of an air conditioning unit(s) provided that the noise level generated by the unit(s) must not exceed 40dB  $L_{Aeq(30s)}$  the largest habitable room (excluding bedrooms) and 35dB  $L_{Aeq(30s)}$  all other habitable rooms; when measured 1 metre from any grille or diffuser, or
- A system capable of providing a least 15 air changes per hour in the largest habitable room (excluding bedrooms) and at least 5 air changes per hour in all other habitable rooms, and
- The noise level generated by the system must not exceed 40dB  $L_{Aeq(30s)}$  the largest habitable room (excluding bedrooms) and 35dB  $L_{Aeq(30s)}$  all other habitable rooms; when measured 1 metre from any grille or diffuser, and
- The internal air pressure must be no more than 10 Pa above ambient air pressure due to the mechanical ventilation, and
- Where a high air flow rate setting is provided, the system must be controllable by the occupants to be able to alter the ventilation rate with at least three equal progressive stages up to the high setting.

The above requirements do not apply if it can be demonstrated by way of prediction or measurement by a suitably qualified and experienced acoustic expert that the road-traffic noise level from State Highway 36 is less than 55 dB  $L_{Aeq(24h)}$  on all facades of any addition, extension or alteration, or new dwelling which fronts State Highway 36.

With the exception of the above numerical criteria, the design has been undertaken in general accordance with NZS 6806 'Acoustics – Road-traffic Noise – New and Altered Roads'. This represents a change from earlier stages of The Lakes development, which adopted the Transit Guidelines. Given that NZS 6806 has superseded the Transit Guidelines, it is considered appropriate to update the assessment method used for The Lakes development.

As the subdivision is still under development, there is the potential for any future houses to be of two storey construction meaning that both ground and first floor receivers were considered. It is generally accepted that a top hung window that is open for ventilation will provide a 15dB reduction in road traffic noise. This means that to achieve the required internal level of 40dBA  $L_{eq(24hour)}$ , road traffic noise must not exceed  $40 + 15 = 55$ dBA  $L_{eq(24hour)}$ . To achieve this external level, the use of a barrier was investigated. Where a barrier provided insufficient noise control, such as at the upper floors, the use of the façade to control internal levels was adopted.

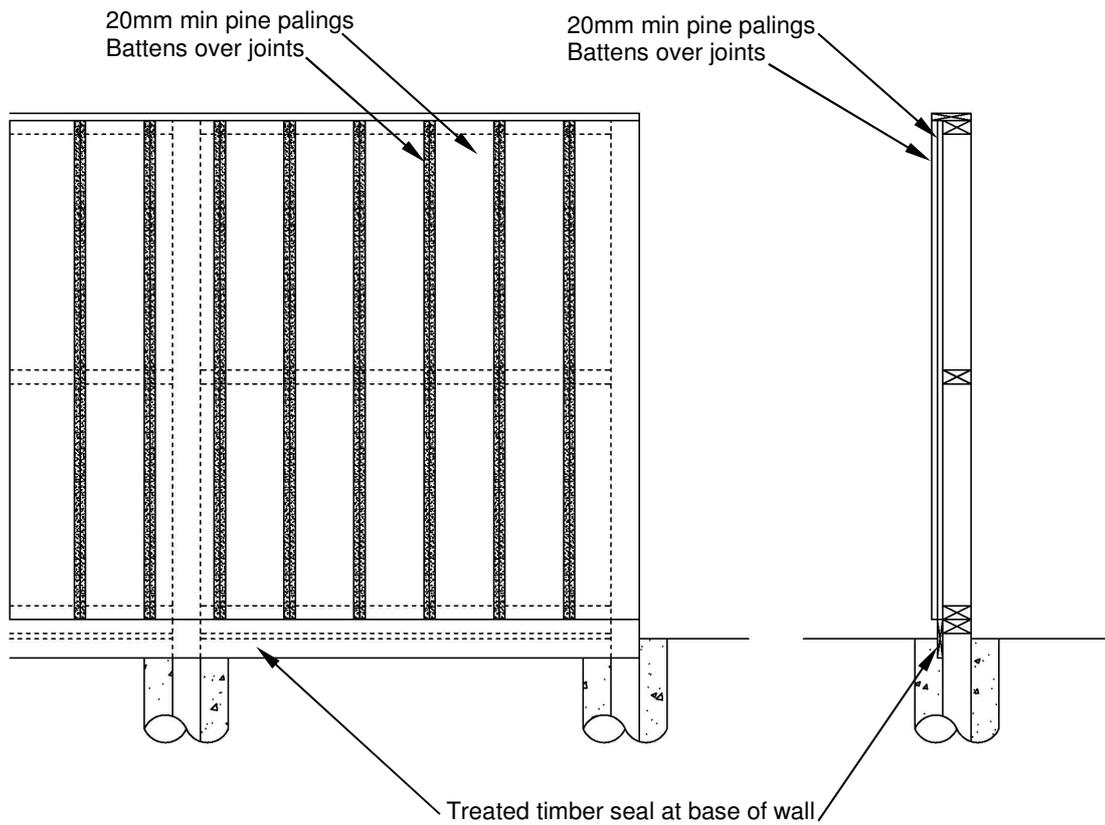
### **Barrier Mitigation**

Analysis has shown that the 2.4m high barrier will be required to screen the future dwellings adjacent to Takitimu Drive. The barrier has been positioned on the boundary between the road and Stage 2P, as described in tabular form in Table 1. The height of the barrier is important to its performance. For this reason, Table 1 also provides the level at the base of the barrier that was adopted for analysis. Should this change, the design will need to be checked.

**Table 1. Coordinates for Barrier Mitigation Option**

<b>Barrier Point</b>	<b>Barrier x- coordinate</b>	<b>Barrier y - coordinate</b>	<b>Level at Base of Barrier (Ground Level) (m)</b>	<b>Barrier Height (m)</b>
1	368,049	800,765	11.80	2.4
2	368,047	800,772	12.01	2.4
3	368,040	800,783	11.94	2.4
4	368,038	800,791	11.81	2.4
5	368,039	800,811	12.27	2.4
6	368,041	800,830	12.30	2.4
7	368,042	800,820	12.20	2.4
8	368,044	800,872	12.19	2.4
9	368,045	800,888	11.99	2.4
10	368,046	800,906	11.93	2.4
11	368,048	800,928	11.80	2.4
12	368,049	800,953	11.81	2.4
13	368,051	800,978	11.79	2.4
14	368,054	801,014	12.12	2.4
15	368,058	801,045	12.12	2.4

The barrier could be constructed as a wall, a bund or a combination of each. If a bund is selected, the coordinates of Table 1 describe the bund centreline. If the wall option is selected the wall must be constructed from a material with a surface density of  $10\text{kg/m}^2$  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 1 below.



**Figure 1. Suitable Timber Wall Detail**

With the above mitigation in place, the resulting road traffic noise levels are reported in Table 2.

**Table 2. Road Traffic Noise Levels at Assessment Point**

Lot Number	Noise Level (dB $L_{Aeq}(24hr)$ )	
	Ground Floor	First Floor
901	52	55
902	52	55
903	52	55
904	52	55
905	55	63
906	55	63
907	55	63
908	55	64
909	55	63
910	55	63
911	55	63
912	55	63
913	54	63
914	54	63
915	54	63
916	54	62

Lot Number	Noise Level (dB $L_{Aeq(24hr)}$ )	
	Ground Floor	First Floor
917	54	62
918	54	61
919	53	61
920	53	61

Table 2 shows that the 55dB  $L_{Aeq(24hr)}$  criterion can be achieved externally to the ground floor of future residences on all Lots. The importance of this is that 40dB  $L_{Aeq(24hr)}$  will be achieved within the residences without any specific acoustic mitigation. With the exception of Lots 901 – 904, the first floors of any future residences will rely on their facades to achieve the required internal level of road traffic noise. Condition 15d) above would be appropriate to apply to the upper floors of future dwellings on Lots 905 – 920.

### Condition 15b

Condition 15b requires that:

#### ***For Lots 901 to 909 (inclusive)***

- b) *Every residential building shall be designed, sited and constructed to ensure noise from non-residential activities will not exceed 35dBA  $L_{eq\ 24\ hours}$  in bedrooms and 40 dBA  $L_{eq\ 24\ hours}$  in all other habitable rooms.*

*Accompanying a building consent for a dwelling, an acoustic design report prepared by a suitably qualified and experienced acoustic engineer shall be provided to Council demonstrating compliance with the abovementioned noise limits.*

Stage 3 is immediately to the north of Stage 2P and is zoned for business activities. Given that business activities generally create more noise than residential activities, the purpose of condition 15b is to ensure that the houses of Stage 2P are designed to control the expected higher noise to internal levels that are appropriate for residential amenity. An alternative approach would be to condition the Stage 3 consent such that future activities could only generate residential style noise levels to Stage 2P, thereby negating the need for condition 15b. Such a condition could be worded as follows:

*Noise from any activity on site shall not exceed the following limits when measured anywhere within a residential Lot of Stage 2P:*

- 0700 – 2200 hours – 50dB  $L_{Aeq}$ ;
- 2200 – 0700 hours - 45dB  $L_{Aeq}$  and 75dB  $L_{Amax}$ .

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

Yours sincerely  
Hegley Acoustic Consultants



Rhys Hegley