



27 September 2019

The Lakes Tauranga
PO Box 345
Tauranga 3140

Attention: Simon Maxwell

Dear Sir

**Re: The Lakes Stage 3I
Noise Control Guidelines to Dwellings
(Revised 27 September 2019)**

As requested, we have carried out an assessment of the noise control treatment required to the dwellings constructed within Stage 3I of 'The Lakes' residential development (Pakanga Grove).

Our findings and recommendations are set out below.

1.0 Background Information

In relation to the development of the Stage 3I subdivision and the control of noise from the neighbouring State Highway 36 (Takitimu Drive):

- The subdivision is protected from noise from vehicles on the Highway, to help avoid a 'reverse sensitivity' issue arising. This is achieved by the construction of a 2.4m high noise barrier on the southern side of the Stage 3I subdivision.
- The noise modelling and details of the barrier were set out in the report from Hegley Acoustic Consultants, dated 20 April 2016.
- The requirements of Rule 4E.2.5 of the Operative Tauranga City Plan were adopted for the Hegley assessment. This Rule specifies that:

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

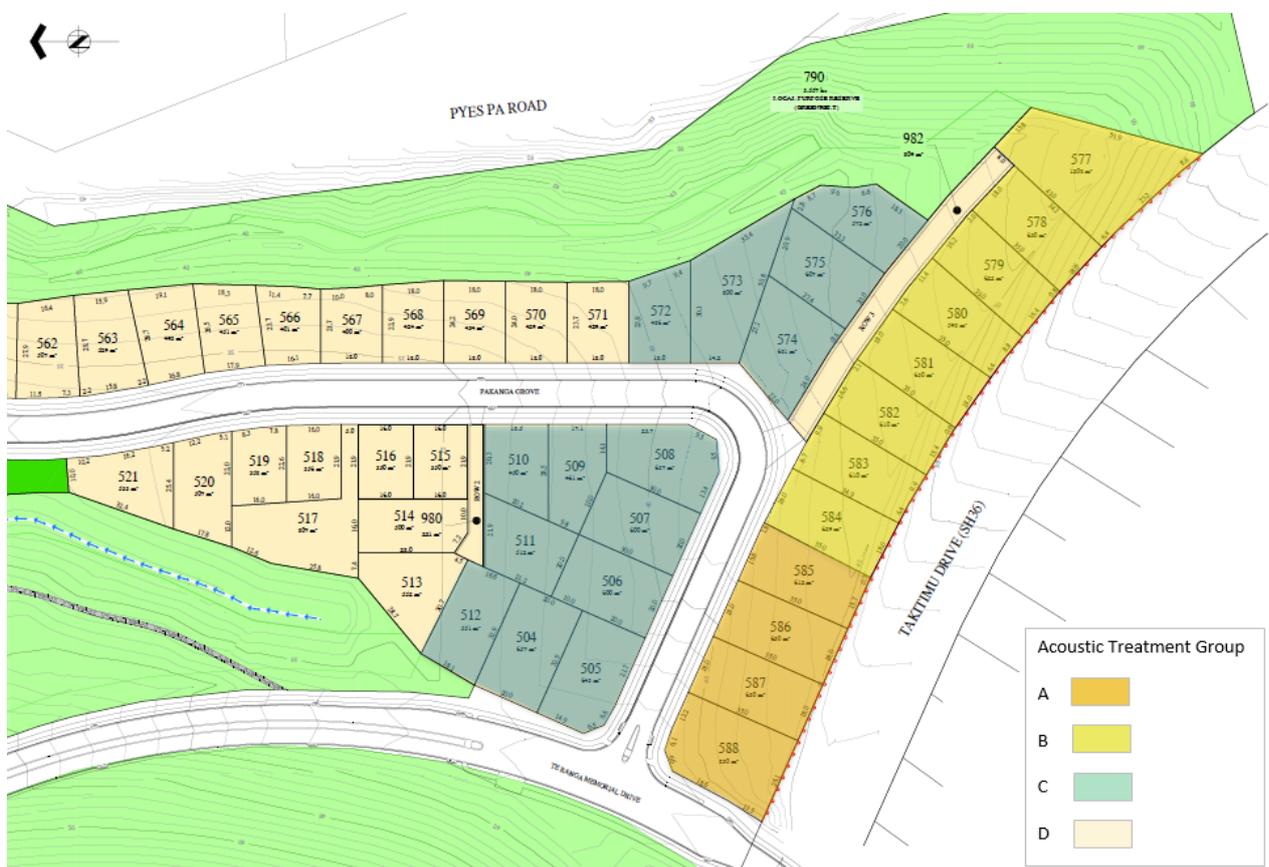
- i) *Any new dwelling shall meet an internal road-traffic design sound level of 40dB LAeq(24h) inside all habitable rooms with ventilating windows open.*
- The noise barrier was designed to mitigate noise from the State Highway. Where the level outside the façade is 55 dBA Leq24hr or less, no further acoustic treatment is required. This is because research has shown that a typical outdoor-to-indoor noise reduction of 15 dBA is achieved with windows open ajar for natural ventilation.

- The Hegley report showed that this may not be achievable for some dwellings built near to the Highway. For example, any barrier would need to be excessively high to achieve 55 dBA at some lots adjoining the Highway. On this basis, an acoustic design is required for dwellings on these Lots, setting out the noise control treatment that is required to the 'building envelope' of the dwelling. The treatment would be designed to achieve 40 dBA within bedrooms and other 'habitable rooms' within the dwelling.
- The Rule of the City Plan specifies that if compliance with the internal noise limit can only be achieved with windows/external doors to the habitable room closed, then an alternative means of ventilation is required ie. a mechanical ventilation or air conditioning system.

We have visited the subject site and carried out noise measurements across the subdivision. With this information, we have assessed the likely noise control treatment to dwellings on all lots, to satisfy the City Plan Rule.

2.0 Noise Control Treatment Guidelines

The attached guidelines are provided to assist with the design of dwellings on the stage 3I Lots. Potential owners/developers of these Lots can determine the likely cost impact (if any) at an early stage and design the building appropriately.



Dwellings in Areas A and B, on the southern side of the development near to the Highway, require acoustic treatment to the building envelope and a mechanical ventilation system.

Dwellings in Area C do not require treatment to the building envelope, but they may require a mechanical ventilation system.

Note that no treatment is required to dwellings in Area D on the northern side of the development.

We trust this information is satisfactory. Please do not hesitate to contact us if you have any questions.

Yours faithfully,
Design Acoustics Ltd

A handwritten signature in black ink, appearing to read 'Tony Windner', written in a cursive style.

Tony Windner
Director

The Lakes Subdivision, Stage 3I Noise Control Guidelines

1.0 Introduction

The following guideline recommendations should be implemented, so that the acoustic requirements of the City Plan are achieved. In general, the requirement is that the noise level inside habitable rooms within the dwelling, due to traffic on the adjoining State Highway, shall not exceed 40 dBA Leq24hr.

Note that the following applies to **habitable rooms only**. A 'habitable room' includes bedrooms, living, an office or study area, but not to any other service or transit area (eg. bathrooms, laundry, garage, corridor etc).

2.0 Assessment

The noise level inside habitable rooms depends on many factors. These include the external noise level and spectral/frequency content (varies throughout the day and night), the effect of any fence/barrier on the boundary, the types of building materials, the room layout, areas of walls, windows and doors, volume of rooms and the amount/type of sound absorbing materials inside the room (furnishings, drapes etc).

We have carried out an assessment of the noise control treatment required to achieve the internal noise criterion. Our assessment of the noise control treatment has included our best engineering estimates of the many variables associated with calculation of noise inside buildings.

3.0 Noise Control Recommendations

The degree of noise control treatment to dwellings depends on its location within **Area A, B, C** as shown below. No treatment is required to dwellings on Lots within **Area D** (as shown below and other Lots to the north in Stage 3I):



3.1 Area A

The following applies to habitable rooms of dwellings on:

Lots 585 to 588

These Lots are located on the south-western side of the development, near SH36.

For dwellings on these Lots, treatment to the 'building envelope' is required and an acoustic design certificate shall be submitted. The certificate shall be prepared by a suitably qualified and experienced acoustic consultant.

3.1.1 Single-storey dwellings

Habitable rooms on single level dwellings shall be checked for compliance with the following recommendations for noise control treatment. See Table 1 below.

A mechanical ventilation system is required to habitable rooms in a single-storey dwelling on these Lots. A producer statement may be required in relation to the provision of a mechanical ventilation system.

3.1.2 Two-storey dwellings

Lower floor

Habitable rooms on the lower floor of two-storey dwellings shall be checked for compliance with the following recommendations for noise control treatment. See Table 1 below.

A mechanical ventilation system is required to habitable rooms on the lower floor of a two-storey dwelling on these Lots. A producer statement may be required in relation to the provision of a mechanical ventilation system.

Upper floor

Habitable rooms on the upper floor of two-storey dwellings shall be checked for compliance with the following recommendations/noise control treatment, as shown on Table 2 below. Noise levels are higher at the upper floor and more noise control treatment is required.

All habitable rooms on the upper floor will require a mechanical ventilation system in accordance with the Consent Condition (See Table 2 attached). A producer statement may be required in relation to the provision of a mechanical ventilation system.

3.2 Area B

The following applies to habitable rooms of dwellings on:

Lots 577 to 584

These Lots are located on the south-eastern side of the development, near to the Highway.

3.2.1 Single-storey dwellings

Single storey dwellings on these Lots do not require any specific noise control treatment to the 'building envelope'.

However, a mechanical ventilation system is required to habitable rooms. The ventilation system requirements are shown on the attached Tables.

An acoustic design certificate is not required for single storey dwellings within Area B, however a producer statement may be required in relation to the provision of a mechanical ventilation system.

3.2.2 Two-storey dwellings

Lower floor

Habitable rooms on the lower floor of dwellings in this category do not require any specific noise control treatment to the 'building envelope'.

However, a mechanical ventilation system is required to habitable rooms. The ventilation system requirements are shown on the attached Tables.

A producer statement may be required in relation to the provision of a mechanical ventilation system.

Upper floor

Habitable rooms on the upper floor of two-storey dwellings shall be checked for compliance with the following recommendations/noise control treatment. See Table 1 below.

A mechanical ventilation system is required to habitable rooms. The ventilation system requirements are shown on the attached Table 1.

A producer statement may be required in relation to the provision of a mechanical ventilation system.

3.3 Area C

The following applies to habitable rooms of dwellings on:

Lots 504 to 512

Lots 572 to 576

3.3.1 Single-storey and two-storey dwellings

Dwellings on these Lots do not require any specific noise control treatment to the 'building envelope'.

However, a mechanical ventilation is required to habitable rooms on these Lots. The ventilation system requirements are shown on the attached Table 1 and Table 2.

An acoustic design certificate is not required for dwellings within Area C, however a producer statement may be required in relation to the provision of a mechanical ventilation system.

3.4 Area D

Single-storey or two-storey dwellings on these Lots do not require any specific noise control treatment to the 'building envelope' nor is a mechanical ventilation system required. The Lots within Area D are:

Lots 513 to 521

Lots 522 to 539

Lots 540 to 571

These Lots are located on the northern side of the development, further from the Highway.

Table 1

Noise Control Treatment/Ventilation to Habitable rooms

- **Area A – Single Level Dwellings and Lower Level of Two-storey Dwellings**
- **Area B - Upper Level of Two-storey Dwellings**

The following Table 1 applies to habitable rooms in Area A (single level and lower level of two-storey dwellings) and Area B (upper level only).

Table 1

Roof/ceiling Assemblies	External construction	Internal construction	Notes
Habitable room with pitched/trussed roof	Roof: (a) Concrete, clay or metal tiles or 0.55 mm corrugated steel over timber battens. OR Sheet membrane or bituminous tiles on 12mm plywood sarking	Ceiling: (c) 1 layer 13mm Gib Noiseline fixed to underside of trusses with fixed with Rondo or USG clip plus batten system. (e) Minimum R3.2 Batts to ceiling cavity	See Figure 1. Recessed light fittings in ceiling to be IC rated (approved insulation can be located on back of fitting) or use surface mounted fittings only.
Bedroom or other habitable room with skillion roof/raking ceiling	Roof: (b) Concrete, clay or metal tiles or 0.55 mm corrugated steel, or sheet membrane on 12mm plywood sarking. OR Bituminous tiles on 17mm plywood sarking	Ceiling: (d) 1 layer 13mm Gib Noiseline fixed to underside of rafters, fixed with Rondo or USG clip plus batten system. (e) Minimum R3.2 Batts to ceiling cavity	See Figure 1. Recessed light fittings in ceiling to be IC rated (approved insulation can be located on back of fitting) or use surface mounted fittings only.

Table 1 continued

External Walls	External construction	Internal construction	Notes
Timber (or steel) framed construction of external walls to habitable room facing south, east, or west	External cladding: (f) cladding system with minimum surface weight of 10 kg/m ² eg. Aerated concrete panels, Hardies Linea/ Oblique/ Stria weatherboards or 7.5mm Monotek, Hardiflex, Axon sheets. OR 19mm cedar or other lightweight cladding less than 10kg/m ² on cavity battens WITH minimum 6mm Hardies RAB board to outside face of frame	Internal lining: (i) 2 layers 10mm Gib Noiseline (m) Minimum R2.2 Batts to cavity	See Figure 1.
	(g) clay or concrete brick veneer cladding, minimum 100 kg/m ²	(j) 1 layer 10 or 13mm mm Standard Gib (m) Minimum R2.2 Batts to cavity	See Figure 1
Masonry Construction of external walls to bedroom or other habitable room facing south, east or west	(h) 140-190mm wide concrete block, cavities filled 100% with grout	(k) Minimum 20mm thick strapping with 1 layer 10 or 13 mm standard Gib lining. (n) 20mm thick insulation to cavity (eg. Pink Batts Masonry Batts).	See Figure 1
Windows/Doors			
To southern, eastern or western external walls of habitable rooms (facing Highway)	(o) Dual (IGU) glazing including one pane which is minimum 6.38mm mm thick laminated glass. The other pane of glass may be ordinary float glass. Maximum area of window/door 40% of external wall area	N/a	No vents in joinery system. All glazing with good gaskets to seal "airtight". Comply with NZS4223 and thermal requirements. See Figure 1
Northern external walls of habitable rooms	(o) Dual (IGU) glazing, to satisfy other requirements, using standard float glass.	N/a	No vents in joinery system. All glazing with good gaskets to seal "airtight". Comply with NZS4223 and thermal requirements

Table 1 continued

Ventilation System	Requirement	Notes
Bedrooms and Habitable rooms	<p>A ventilation system shall be installed comprising the following components and specifications:</p> <p>(a) An air conditioning or mechanical ventilation system. Ventilation to bedrooms and other habitable rooms shall comply with the requirements of Section G4 of the NZ Building Code.</p> <p>(b) Self noise from the system must not exceed 35 dB LAeq30secs in all bedrooms and other habitable rooms, when measured 1 metre away from any grille or diffuser.</p>	<p>See Figure 1 detail (q).</p> <p>(a) may be achieved by:</p> <ul style="list-style-type: none"> - Ducted air conditioning unit with fresh air supplement. - Central ventilation systems eg, Smartvent, HRV, DVS or similar. - Separate fan/duct system to each bedroom/habitable room <p>(b) may be achieved by a 'low-noise' or acoustically treated supply fan/unit in ceiling cavity, with minimum 1.5 metres of acoustic flexible duct on downstream (supply) side of the fan.</p> <p>Notes:</p> <ul style="list-style-type: none"> -Split system heat pumps are desirable for thermal control to all areas. -A mechanical ventilation system may not be required if the habitable room has a south-facing window/s, with openable area at least 5% of the room's floor area and/or complies with Section G4 of the NZ Building Code for natural ventilation.

Table 2

**Noise Control Treatment/Ventilation to Habitable Rooms
Area A – Upper Level of Two-Storey Dwellings**

The following Table 2 applies to habitable rooms on the upper level of two-storey dwellings in Area A.

Table 2

Roof/ceiling Assemblies	External construction	Internal construction	Notes
Habitable room with pitched/trussed roof	Roof: (a) Concrete, clay or metal tiles or 0.55 mm corrugated steel over timber battens. OR Sheet membrane or bituminous tiles on 12mm plywood sarking	Ceiling: (c) 2 layers 10mm Gib Noiseline fixed to underside of trusses with fixed with Rondo or USG clip plus batten system. (e) Minimum R3.2 Batts to ceiling cavity	See Figure 1. Recessed light fittings in ceiling to be IC rated (approved insulation can be located on back of fitting) or use surface mounted fittings only.
Bedroom or other habitable room with skillion roof/raking ceiling	Roof: (b) Concrete, clay or metal tiles or 0.55 mm corrugated steel, or sheet membrane on 12mm plywood sarking. OR Bituminous tiles on 17mm plywood sarking	Ceiling: (d) 2 layers 10mm Gib Noiseline fixed to underside of rafters, (e) Minimum R3.2 Batts to ceiling cavity	See Figure 1. Recessed light fittings in ceiling to be IC rated (approved insulation can be located on back of fitting) or use surface mounted fittings only.

Table 2 continued

External Walls	External construction	Internal construction	Notes
Timber (or steel) framed construction of external walls to habitable rooms facing south, east, or west	External cladding: (f) Heavy cladding system with minimum surface weight of 23 kg/m ² eg. 50mm aerated concrete panels, Hardies Linea weatherboards. OR Alternative lighter cladding minimum 10 kg/m ² eg Hardies Oblique, Stria, Monotek, Hardiplank, Axon sheets: All of above lighter cladding to be on cavity battens WITH 9mm Hardies 'RAB' board to outside face of frame.	Internal lining: (i) 2 layers 10mm Gib Noiseline on resilient channels 'Gibrails' (m) Minimum R2.2 Batts to cavity	See Figure 1.
	(g) clay or concrete brick veneer cladding, minimum 100 kg/m ²	(j) 1 layer 10mm Standard Gib (m) Min R2.2 Batts to cavity	See Figure 1
Masonry Construction of external walls of bedroom or other habitable room facing south, east or west	(h) 140-190mm wide concrete block, cavities filled 100% with grout	(k) Minimum 20mm thick strapping with 1 layer 10 or 13 mm std Gib lining. (n) 20mm thick insulation to cavity (eg. Pink Batts Masonry Batts).	See Figure 1
Windows / Doors			
To southern, eastern and western walls of habitable rooms (facing Highway)	(o) Dual (IGU) glazing including one pane which is minimum 8.38mm mm thick laminated glass. The other pane of glass may be ordinary float glass. Maximum area of window/door 30% of external wall area.	N/a	No sliding glass doors to habitable rooms on northern façade. No vents in joinery system. All glazing with good gaskets to seal "airtight". Comply with NZS4223 and thermal requirements. See Figure 1
Northern external walls of habitable rooms (facing away from Highway)	(o) Dual (IGU) glazing, to satisfy other requirements, using standard float glass but with one pane minimum 6mm thick.	N/a	No vents in joinery system. All glazing with good gaskets to seal "airtight". Comply with NZS4223 and thermal requirements

Table 2 continued

Ventilation System	Requirement	Notes
Bedrooms and Habitable rooms	<p>A ventilation system shall be installed comprising the following components and specifications:</p> <p>(a) An air conditioning or mechanical ventilation system. Ventilation to bedrooms and other habitable rooms shall comply with the requirements of Section G4 of the NZ Building Code.</p> <p>(b) Self noise from the system must not exceed 35 dB LAeq30secs in all bedrooms and other habitable rooms, when measured 1 metre away from any grille or diffuser.</p>	<p>See Figure 1 detail (q).</p> <p>(a) may be achieved by:</p> <ul style="list-style-type: none"> - Ducted air conditioning unit with fresh air supplement. - Central ventilation systems eg, Smartvent, HRV, DVS or similar. - Separate fan/duct system to each bedroom/habitable room <p>(b) may be achieved by a 'low-noise' or acoustically treated supply fan/unit in ceiling cavity, with minimum 1.5 metres of acoustic flexible duct on downstream (supply) side of the fan.</p> <p>Notes:</p> <ul style="list-style-type: none"> -Split system heat pumps are desirable for thermal control to all areas. -A mechanical ventilation system may not be required if the habitable room has a south-facing window/s, with openable area at least 5% of the room's floor area and/or complies with Section G4 of the NZ Building Code for natural ventilation.

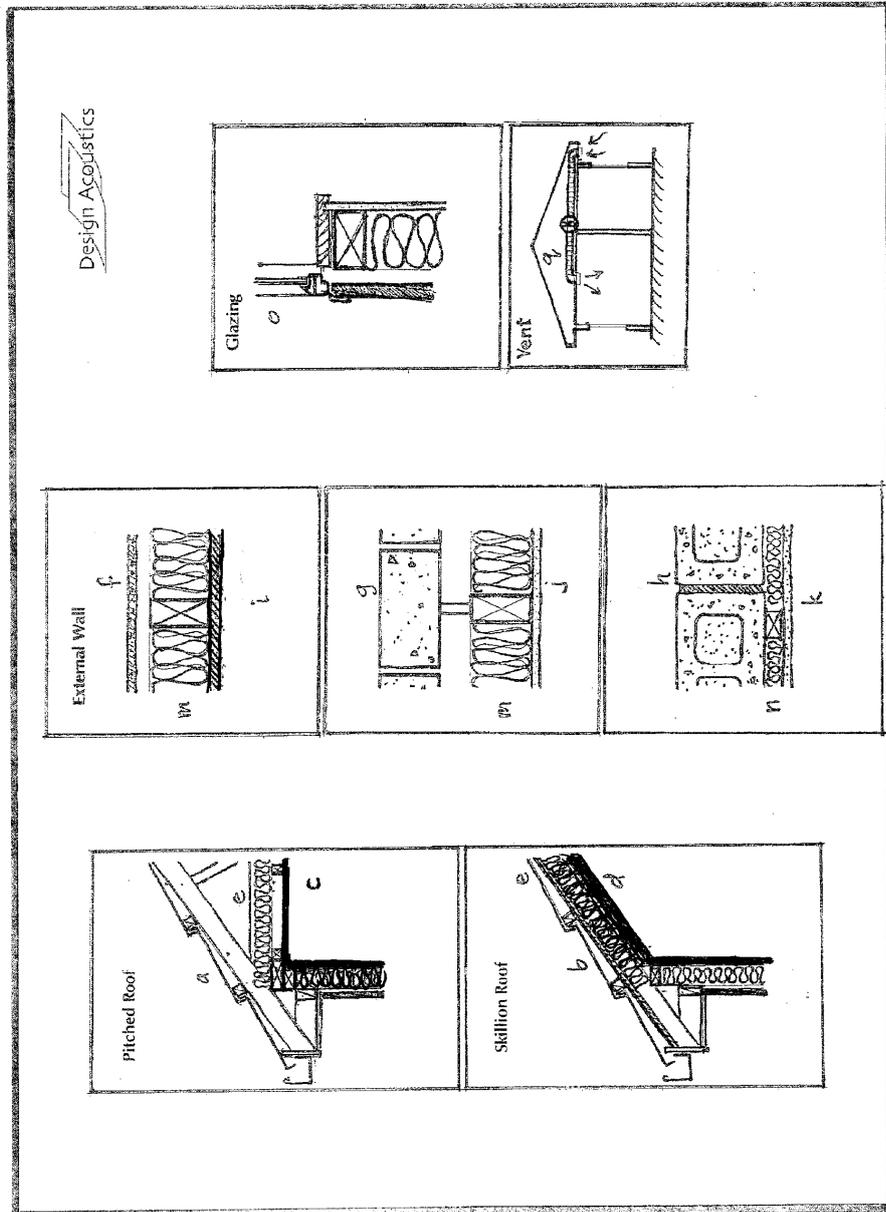


Figure 1