

Appendix I: Acoustic Insulation

I. Application

- (a) This appendix is referred to in the rules related to:
- (i) buildings for **noise-sensitive activities** in the noise control boundaries and buffers for:
 - A. Waikato Regional Airport
 - B. Te Kowhai Airfield
 - C. Waikato Gun Club
 - D. Horotiu Acoustic Area
 - E. Stated building setbacks from Huntly Power Station
 - (ii) Dwellings within:
 - A. the Business Zone
 - B. the Business Town Centre Zone
 - (iii) Residential units within:
 - A. A **multi-unit development**
 - B. A comprehensive development on Rangitahi Peninsula.
- (b) This appendix applies to any **building** containing a **noise-sensitive activity** including:
- (i) Any **building** used for a **residential activity**
 - (ii) Homes for elderly persons
 - (iii) **Retirement Villages**
 - (iv) In-house aged care facilities
 - (v) **Travellers' accommodation**, excluding camping grounds
 - (vi) **Papakaainga housing development**
 - (vii) Marae and **marae complexes**
 - (viii) Hospitals
 - (ix) Teaching areas and sleeping rooms in an **educational facility**.

2. Waikato Regional Airport

2.1 Conditions for Permitted Activities inside the Waikato Regional Airport Noise Outer Control Boundary

- (1) Prior to the issue of a building consent for any **building** to which this rule applies, compliance with the requirements of the rule shall be demonstrated by either option one or option two below:
- (a) Option One
- (i) The production of a design certificate from an appropriately-qualified and experienced acoustic specialist certifying that an internal noise level will not exceed the following:

Table 1: Internal noise levels

Area	Internal noise level
Habitable rooms	Ldn 40dBA / SEL 65dBA

and

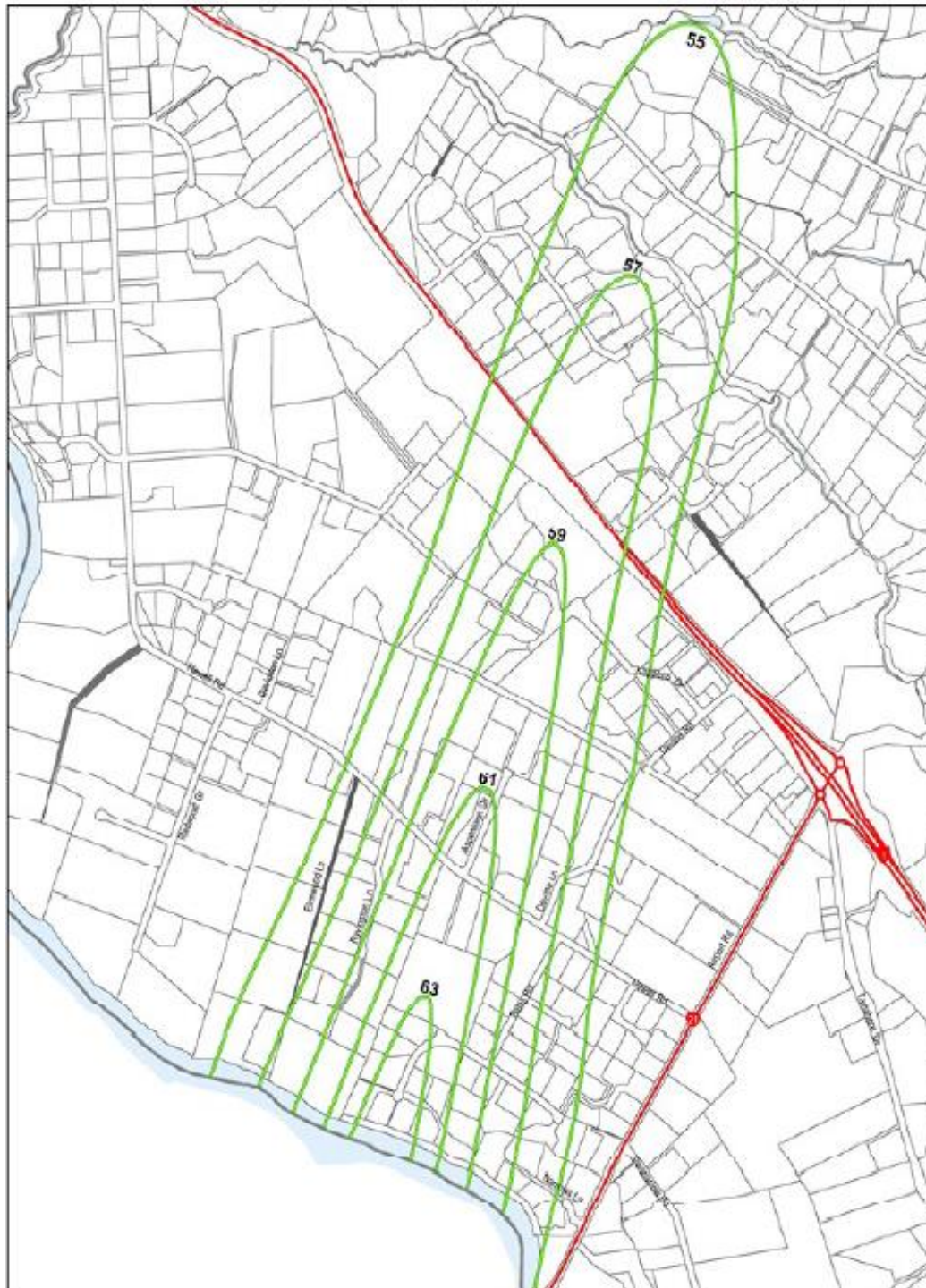
- (ii) Inside the Waikato Regional Airport Noise Outer Control Boundary the internal noise level shall be calculated in accordance with the predicted external level at the subject site shown on Figure 1 below - 'Waikato Regional Airport, Ldn Contours for Sound Insulation Design' - and in accordance with the adjustments to the dBA level to establish an un-weighted external source spectrum for aircraft noise outlined in the Table 2 below.

Table 2: External aircraft noise octave band adjustments for sound insulation design

63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4kHz
6	5	0	-3	-6	-8	-11

Adjustments derived from ASTM E 1332-90 (2003) Tables.

The Waikato Regional Airport, Ldn Contours for Sound Insulation Design in Figure 1 below illustrates the Ldn contours within the Airport Noise Outer Control Boundary (as shown on the planning maps) in two decibel increments. It is provided to calculate internal noise levels in accordance with the conditions for permitted activities.

Figure 1: Waikato Regional Airport, Ldn Contours for Sound Insulation Design


or

(b) Option Two

- (i) For any **dwelling** proposed to be constructed within the Airport Noise Outer Control Boundary, the acoustic design solutions listed in (b)(i) to b(i)(A)-(H) below are incorporated in the **building** design; all details are to be included in the building consent application and the applicant must provide a written undertaking

to Council confirming that the **building** will be constructed in accordance with the following acoustic design solutions:

- A. standard external cladding with minimum surface density of 8 kilograms per square metre such as brick, concrete, plaster, timber or plastic weatherboard and fibre cement, and
- B. internal wall linings of gypsum plasterboard of at least 12 millimetres thickness or similar density material, and
- C. continuous ceiling linings without cut-outs and of gypsum plasterboard of at least 10 millimetres thickness or similar density material, and
- D. fibrous thermal insulation batts (not polystyrene) in wall and ceiling cavities, and
- E. standard roof cladding of steel, tiles, metal tiles or butynol on 17mm plywood, and
- F. standard external window and door glazing of minimum 6 millimetres thickness, or equivalent double glazing, and
- G. aluminium external joinery fitted with airtight seals throughout, and
- H. room glazing with a total area of no more than 50 percent of the room's total floor area.

(2) For both option one and option two

- (a) Where a building is partly or wholly contained within the airport outer control noise boundary, a mechanical ventilation system or systems that will allow windows to be closed if necessary to achieve the required internal design sound level for habitable rooms is required to be installed. The mechanical system or systems are to be designed, installed and operating so that a habitable space (with windows and doors closed) is ventilated with fresh air in accordance with the **New Zealand Building Code, Section G4 - Ventilation**.
- (b) The noise generated by the mechanical ventilation system shall not exceed the noise limits set out in Table 3 – Noise limits for ventilation systems.
- (c) Compliance with this rule shall be confirmed by providing the product specifications, or a design certificate (prior to occupation) prepared by a suitably-qualified acoustics specialist, stating that the design proposed is capable of meeting the standards set out in Table 3.

Table 3: Noise limits for ventilation systems

Room type	Noise level measured at least 1m from the diffuser (L _{eq} dBA)	
	Low setting	High setting
Habitable rooms (excluding sleeping areas)	35	40
Sleeping areas	30	35

(3) Where any building listed in Section (1)(b) is proposed to be located within the SEL 95 Boundary as shown on the planning maps:

- (a) a design certificate shall be produced from an appropriately-qualified and experienced acoustic specialist, certifying that an internal noise level not exceeding Sound Exposure Level (SEL) 65dBA will be achieved in sleeping areas by construction in accordance with the proposed design.

- (b) The internal noise level shall be calculated in accordance with the predicted external level at the subject site shown on the planning maps and in accordance with Table 4 adjustments to the dBA level to establish an un-weighted external source spectrum for aircraft noise.

Table 4: External aircraft noise octave band adjustments for sound insulation design

63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
6	5	0	-3	-6	-8	-11

(Adjustments derived from ASTM E 1332-90 (2003) Table 1)

- (c) Where a **building** is partly or wholly contained within the airport outer control noise boundary, a mechanical ventilation system or systems that will allow windows to be closed if necessary to achieve the required internal design sound level for habitable rooms is required to be installed. The mechanical system or systems are to be designed, installed and operating so that a habitable space (with windows and doors closed) is ventilated with fresh air in accordance with the **New Zealand Building Code, Section G4 - Ventilation**.
- (d) The noise generated by the mechanical ventilation system shall not exceed the noise limits set out in Table 5 – Noise limits for ventilation systems.
- (e) Compliance with this rule shall be confirmed by providing the product specifications, or a design certificate (prior to occupation) prepared by a suitably- qualified acoustics specialist, stating that the design proposed is capable of meeting the activity standards.

Table 5: Noise limits for ventilation systems

Room type	Noise level measured at least 1m from the diffuser (L_{eq} dBA)	
	Low setting	High setting
Sleeping areas	30	35

2.2 Airport Noise Outer Control Boundary and SEL 95 Boundary Consent Notice

The Owner (as defined in the Resource Management Act 1991) of the land shall, on a continuing basis, ensure that:

- (1) Written notice of the following matters shall be given on the title:
- a) The land is located within either
 - (i) The Airport Noise Outer Control Boundary and the SEL 95 Boundary (as shown on the Waikato District Plan maps) associated with Waikato Regional Airport and that activities on the land will be affected by the noise of aircraft.
 - b) The noise generated by aircraft movements associated with the airport is predicted to reach levels between 55dBA Ldn and 65dBA Ldn within the Airport Noise Outer Control Boundary and up to Sound Exposure Level (SEL) 95dBA within the SEL 95 Boundary. Those noise levels, which are identified in the Waikato District Plan, may be higher than the present levels of aircraft noise affecting the land, as allowance has been made for predicted expansion of airport facilities and activities.

- c) The requirements for acoustic insulation of dwellings set out in the Waikato District Plan and in this Consent Notice are intended to manage the effects that airport noise may have on residential activity and reduce the potential for constraints on airport development and activities.
- (2) Any **dwelling**, or **building** listed in section (1)(b), which is hereafter erected on land within the Airport Noise Outer Control Boundary shown on the Waikato District Plan maps, shall be designed and constructed to incorporate appropriate acoustic insulation measures to ensure an internal Ldn not exceeding 40dBA.
 - (3) Any alteration or addition to any existing **dwelling**, or **building** listed in section (1)(b), which is on land within the Airport Noise Outer Control Boundary shown on the Waikato District Plan maps, shall be designed and constructed to incorporate appropriate acoustic insulation measures to ensure an internal Ldn not exceeding 40dBA.
 - (4) Any **dwelling**, or **building** listed in section (1)(b), which is hereafter erected on land within the SEL 95 Boundary shown on the Waikato District planning maps, shall be designed and constructed to incorporate appropriate acoustic insulation measures to ensure an internal SEL not exceeding 65dBA in sleeping areas.
 - (5) Any alteration or addition to any existing **dwelling**, or **building** listed in section (1)(b), which is on land within the SEL 95 Boundary shown on the Waikato District planning maps, shall be designed and constructed to incorporate appropriate acoustic insulation measures to ensure an internal SEL not exceeding 65dBA in sleeping areas.
 - (6) Where a **building** is partly or wholly contained within the airport outer control noise boundary, a mechanical ventilation system or systems that will allow windows to be closed if necessary to achieve the required internal design sound level for habitable rooms is required to be installed. The mechanical system or systems are to be designed, installed and operating so that a habitable space (with windows and doors closed) is ventilated with fresh air in accordance with the **New Zealand Building Code Section G4 - Ventilation**.
 - (7) The noise generated by the mechanical ventilation system shall not exceed the noise limits set out in Table A – Noise limits for ventilation systems.
 - (8) Compliance with this rule shall be confirmed by providing the product specifications, or a design certificate (prior to occupation) prepared by a suitably-qualified acoustics specialist, stating that the design proposed is capable of meeting the activity standards.

Table A - Noise limits for ventilation systems

Room Type	Noise level measured at least 1m from the diffuser (dB L _{Aeq})	
	Low setting	High setting
Habitable rooms (excluding sleeping areas)	35	40
Sleeping areas	30	35

- (9) Prior to the issue of a building consent for any **dwelling** or **building** listed in section (1)(b), compliance shall be demonstrated with the plan requirements for acoustic

design, construction and performance of such buildings located within the Airport Noise Outer Control Boundary and the SEL 95 Boundary.

2.3 Noise mitigation programme

- (1) The Operator of Waikato Regional Airport shall make an offer to the owners to install (“the Offer”), and if the Offer is accepted shall install, acoustic treatment and related ventilation measures (“the Treatment Measures”) to achieve an internal acoustic environment in the existing or consented sleeping areas of the building (with all external doors of the building and all windows of the habitable rooms closed) of SEL 65dBA, provided that no such Offer shall be required in respect of any site owned by the Operator of Waikato Regional Airport. The offer shall include all building consent and certification fees payable to the Council. The Offer shall be made within two months of the commencement of scheduled wide-body jet operations between 10pm and 7am on more than three occasions per week.
- (2) The Treatment Measures shall achieve the standards of acoustical treatment and ventilation set out in Conditions for Permitted Activities in section 2.1 of this appendix.
- (3) The Offer shall be made on the following basis:
 - (a) Any structural or other changes required under the **Building Act 2004** or otherwise, to enable the installation of the Treatment Measures shall be at the expense of the Operator of Waikato Regional Airport, except that nothing in this clause shall require the Airport Operator to fund any measures required to bring a **building** up to the standard required in any **building** bylaws or any provisions of any statute that applied when the **building** or relevant part was constructed, or to improve the standard of finishes in the **building**;
 - (b) It will remain open for acceptance on a willing participant basis for three years from the date on which it was made, after which time the Operator of Waikato Regional Airport obligations under this rule will be deemed to be fulfilled; and
 - (c) Where the Operator of Waikato Regional Airport installs any Treatment Measures, the Airport Operator shall provide Council with a certificate from a suitably-qualified person nominated by the Airport Operator and approved by the Council, that the installation of those Measures has been properly undertaken in accordance with sound practice.

3. Te Kowhai Airpark

The Te Kowhai Airpark Outer Control Noise Boundary identifies an area that experiences high noise levels from aircraft landing and taking off from the Te Kowhai Airpark. The Te Kowhai Airpark Noise Buffer identifies land within the Rural Zone around the Te Kowhai Airfield that experiences high noise levels from aircrafts using the taxiways. **Dwellings** within the Te Kowhai Airpark Outer Control Noise Boundary and the Te Kowhai Airpark Noise Buffer are required to be acoustically insulated to achieve the internal noise standards specified in sections 3.1 and 3.2 below.

3.1 Conditions for Permitted Activities inside the Te Kowhai Airpark Outer Control Noise Boundary.

- (1) Prior to the issue of a building consent for any **building** to which this rule applies, compliance with the requirements of the rule shall be demonstrated through the production of a design certificate from an appropriately-qualified and experienced acoustic specialist certifying that an internal noise level will not exceed the level shown in Table 6.

Table 6: Internal noise levels

Area	Internal noise level
Habitable rooms	Ldn 40dBA

- (2) The internal noise level shall be achieved based on the predicted external level at the subject site shown on Figure 2 below and in accordance with the adjustments to the dBA level to establish an un-weighted external source spectrum for aircraft noise outlined in the Table 7 below.

Figure 2: Te Kowhai Airpark, Ldn Contours for Sound Insulation Design

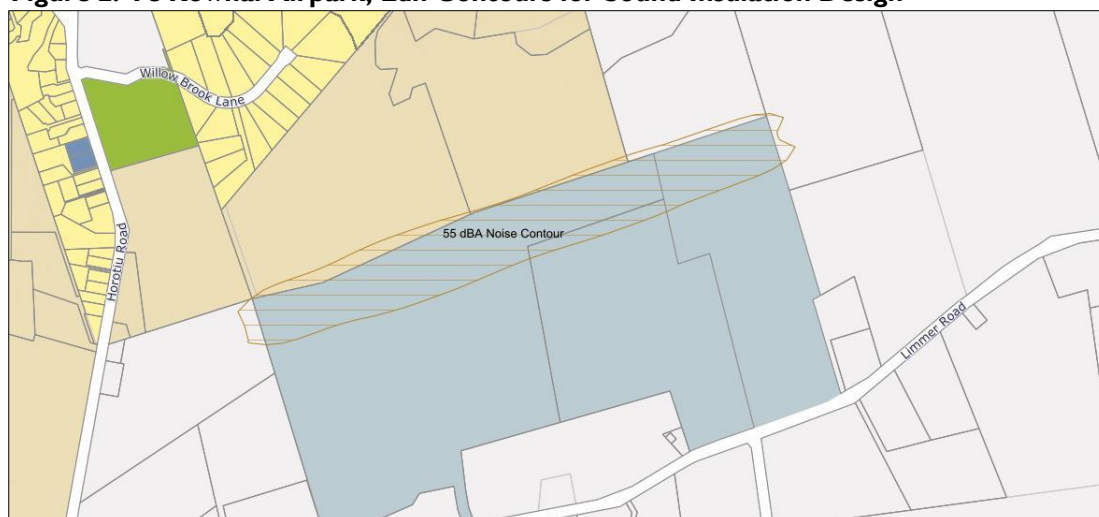


Table 7: External aircraft noise octave band adjustments for sound insulation design

63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
11	5	-3	-5	-3	-9	-13

- (3) Where a **building** is partly or wholly contained within the Te Kowhai Airpark outer control noise boundary, a mechanical ventilation system or systems that will allow windows to be closed if necessary to achieve the required internal design sound level for habitable rooms is required to be installed. The mechanical system or systems are to be designed, installed and operating so that a habitable space (with windows and doors closed) is ventilated with fresh air in accordance with the **New Zealand Building Code, Section G4 - Ventilation**.
- (4) The noise generated by the mechanical ventilation system shall not exceed the noise limits set out in Table 8 – Noise limits for ventilation systems.

- (5) Compliance with rules (3) and (4) above shall be confirmed by providing the product specifications, or a design certificate (prior to occupation) prepared by a suitably-qualified acoustics specialist, stating the design proposed is capable of meeting the activity standards.

Table 8: Noise limits for ventilation systems

Room type	Noise level measured at least 1m from the diffuser (Leq dBA)	
	Low setting	High setting
Habitable rooms (excluding sleeping areas)	35	40
Sleeping areas	30	35

3.2 Conditions for Permitted Activities the Te Kowhai Airpark Noise Buffer

- (1) New **dwelling**s inside of the Te Kowhai Airpark Noise Buffer shown on the planning maps shall be designed to achieve an internal noise level of 35dB L_{Aeq} in all habitable rooms, based on noise from Te Kowhai Airpark being equivalent to a level of 50dB L_{Aeq} at 55m.
- (2) The following adjustments to the dBA level shall be made to establish an un-weighted external source spectrum for aircraft noise outlined in the Table 9 below.

Table 9: External aircraft noise octave band adjustments for sound insulation design

63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
11	5	-3	-5	-3	-9	-13

- (3) Where a **building** is partly or wholly contained within the airport outer control noise boundary, a mechanical ventilation system or systems that will allow windows to be closed if necessary to achieve the required internal design sound level for habitable rooms is required to be installed. The mechanical system or systems are to be designed, installed and operating so that a habitable space (with windows and doors closed) is ventilated with fresh air in accordance with the **New Zealand Building Code, Section G4 - Ventilation**.
- (4) The noise generated by the mechanical ventilation system shall not exceed the noise limits set out in Table 10 – Noise limits for ventilation systems.
- (5) Compliance with rules (3) and (4) above shall be confirmed by providing the product specifications, or a design certificate (prior to occupation) prepared by a suitably-qualified acoustics specialist, stating that the design proposed is capable of meeting the activity standards.

Table 10 - Noise limits for ventilation systems

Room Type	Noise level measured at least 1m from the diffuser (dB L_{Aeq})	
	Low setting	High setting
Habitable rooms (excluding sleeping areas)	35	40
Sleeping areas	30	35

4. Horotiu Acoustic Area

The Horotiu Acoustic Area is located on land within the Business, Residential and Country Living Zones in Horotiu. Acoustic insulation is required to mitigate noise from the Horotiu Industrial Zone.

The internal design sound levels within the Horotiu Acoustic Area for dwellings within the Residential and Country Living Zones and buildings for a sensitive land use within the Business Zone are listed in Table 7.

4.1 Conditions for Permitted Activities

- (1) Compliance with the internal sound levels shall be demonstrated through the production of a design certificate from an appropriately-qualified and experienced acoustic specialist certifying that the internal noise level will not exceed the levels listed in Table 11.

Table 11: Internal design sound levels

Internal Design Sound Levels	
Type of occupancy/activity	Internal design sound level, dB L_{Aeq} (1hr)
Residential Activity buildings: - bedrooms - other habitable rooms	35 40
Travellers' accommodation/ Home occupation / Home-stays and Papakaainga housing: - bedrooms	35
Educational buildings (teaching spaces)	35
Hospitals - wards - all other noise-sensitive areas	35 40

5. Waikato Gun Club - Noise Control Boundary

The Waikato Gun Club is located on Holland Road in Eureka. The site is subject to a noise control boundary that requires dwellings within the noise control boundary to be acoustically insulated to achieve the internal sound level specified in Table 13.

5.1 Conditions for Permitted Activities

- (1) Compliance with the internal sound levels shall be demonstrated through the production of a design certificate from an appropriately-qualified and experienced acoustic specialist certifying that the internal noise level will not exceed the levels listed in Table 13.
- (2) The external level of noise shall be based on the following octave band adjustments:

Table 12: External gun noise octave band adjustments for sound insulation design

63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
6	-4	-3	-5	-4	-7	-13

Table 13: Internal sound levels

Area	Internal design sound level
Waikato Gun Club	CNR 75 (Composite Noise Rating)

6. Acoustic insulation for other areas

- Dwellings within the Business Zone
- Dwellings within the Business Town Centre Zone
- Buildings containing noise-sensitive activities within 350m of the Huntly Power Station site boundary
- Buildings containing noise-sensitive activities within 100m of the Tamahere Commercial Areas A, B and C
- Residential units within a Multi-Unit Development, and
- Residential units within a Comprehensive Development – Rangitahi Peninsula

Dwellings and other **buildings** containing sensitive land uses within high noise environments are to be acoustically insulated to an appropriate standard to achieve the internal design sound level specified in Table 14 – Internal sound level.

6.1 Conditions for Permitted Activities

- (1) Compliance with the internal design sound levels shall be demonstrated through the production of a design certificate from an appropriately-qualified and experienced acoustic specialist certifying that the internal sound level will not exceed the levels listed in Table 14.

Table 14: Internal sound level

Area	Internal design sound level
<ul style="list-style-type: none"> • Within 350m of the Huntly Power Station • Dwellings in the Business Zone • Dwellings in the Business Town Centre Zone • Within 100m of the Tamahere Commercial Areas A, B and C • Multi-Unit Development • Comprehensive Development – Rangitahi Peninsula 	40dB L _{Aeq}