

## APP1 – Acoustic insulation

### I. Application

- (I) This appendix is referred to in the rules related to:
- (a) Buildings for noise-sensitive activities in the noise control boundaries and buffers for:
    - (i) Hamilton Airport;
    - (ii) Te Kowhai Airpark
    - (iii) Waikato Gun Club;
    - (iv) Horotiu Acoustic Area;
    - (v) Stated building setbacks from Huntly Power Station;
    - (vi) the LCZ – Local centre zone;
    - (vii) the COMZ – Commercial zone;
    - (viii) the TCZ – Town centre zone;
    - (ix) A multi-unit development;
    - (x) A comprehensive development on Rangitahi Peninsula; and
    - (xi) Mercer Airport.

### 2. Hamilton Airport

#### 2.1 Standards for Permitted Activities inside the Hamilton Airport Noise Outer Control Boundary (previously referred to as the Waikato Regional Airport Noise Outer Control Boundary)

- (I) 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 16 – Internal noise level**

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

And

- (ii) Inside the Hamilton 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 - 'Hamilton 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 17 below

**Table 17 – 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) Tables.

The Hamilton Airport, L<sub>dn</sub> Contours for Sound Insulation Design in Figure 30 below illustrates the L<sub>dn</sub> 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 standards for permitted activities.



**Figure 30 – Hamilton Airport, L<sub>dn</sub> Contours for Sound Insulation Design**

Or

(b) Option two

(i) For any residential unit proposed to be constructed within the Airport Noise Outer Control Boundary, the acoustic design solutions listed in (b)(i) to (b)(i)(1)-(7) 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:

1. 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
2. Internal wall linings of gypsum plasterboard of at least 12 millimetres thickness or similar density material, and
3. Continuous ceiling linings without cut-outs and of gypsum plasterboard of at least 10 millimetres thickness or similar density material, and
4. Fibrous thermal insulation batts (not polystyrene) in wall and ceiling cavities, and
5. Standard roof cladding of steel, tiles, metal tiles or butynol on 17mm plywood, and
6. Standard external window and door glazing of minimum 6 millimetres thickness, or equivalent double glazing, and
7. Aluminium external joinery fitted with airtight seals throughout, and 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 18 – 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 18.

**Table 18 – Noise limits for ventilation systems**

Room type	Noise level measured at least 1m from the diffuser (L <sub>eq</sub> 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 19 adjustments to the dBA level to establish an un-weighted external source spectrum for aircraft noise.

**Table 19 – 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 20 – 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 20 – Noise limits for ventilation systems**

Room type	Noise level measured at least 1m from the diffuser (L <sub>eq</sub> dBA)	
	Low setting	High setting
Sleeping area	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 Hamilton 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 residential units 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 residential unit, 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 residential unit, 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 residential unit, 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 residential unit, 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 21 – 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 21 – Noise limits for ventilation systems**

Room Type	Noise level measured at least 1m from the diffuser (dB LAeq)	
	Low setting	High setting
Habitable rooms (excluding sleeping areas)	35	40

Sleeping areas	30	35
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- (9) Prior to the issue of a building consent for any residential unit 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 Hamilton 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 Hamilton 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 the Standards 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 Hamilton 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 Hamilton Airport obligations under this rule will be deemed to be fulfilled; and
  - (c) Where the Operator of Hamilton 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 Noise Control Boundaries identify areas that experience high noise levels from aircraft landing and taking off from the Te Kowhai Airpark. Buildings containing Noise Sensitive Activities within the Te Kowhai Airpark Noise Control Boundaries that are required to be acoustically insulated must achieve the internal noise standards specified in sections 3.1 below.

#### 3.1 Standards for Buildings containing Noise-Sensitive Activities inside the Te Kowhai Aerodrome Airport Noise Control Boundaries.

(1) Mechanical ventilation

Buildings that are required to have acoustic insulation must be designed, constructed, have installed and be maintained with a mechanical ventilation system so that windows can be kept closed. The mechanical ventilation system must achieve the following requirements:

- (a) For habitable rooms for a residential activity:
    - (i) Provide mechanical ventilation to satisfy clause G4 of the New Zealand Building Code;
    - (ii) Be adjustable by the occupant to control the ventilation rate in increments up to a high air flow setting that provides at least 6 air changes per hour;
    - (iii) Provide relief for equivalent volumes of spill air;
    - (iv) In principal living rooms, provide cooling and heating that is controllable by the occupant and can maintain the inside temperature between 18 degree Celsius and 25 degree Celsius;
    - (v) Generate less than 35 dB LAeq(30s) in bedrooms and 40 dB LAeq(30s) in living rooms when measured 1m away from any grille or diffuser.
  - (b) For other spaces, a specification as determined by a suitably qualified and experienced person.
- (2) A commissioning report must be submitted to the Council prior to occupation of the building demonstrating compliance with all of the mechanical ventilation system performance requirements in 3.1(1).

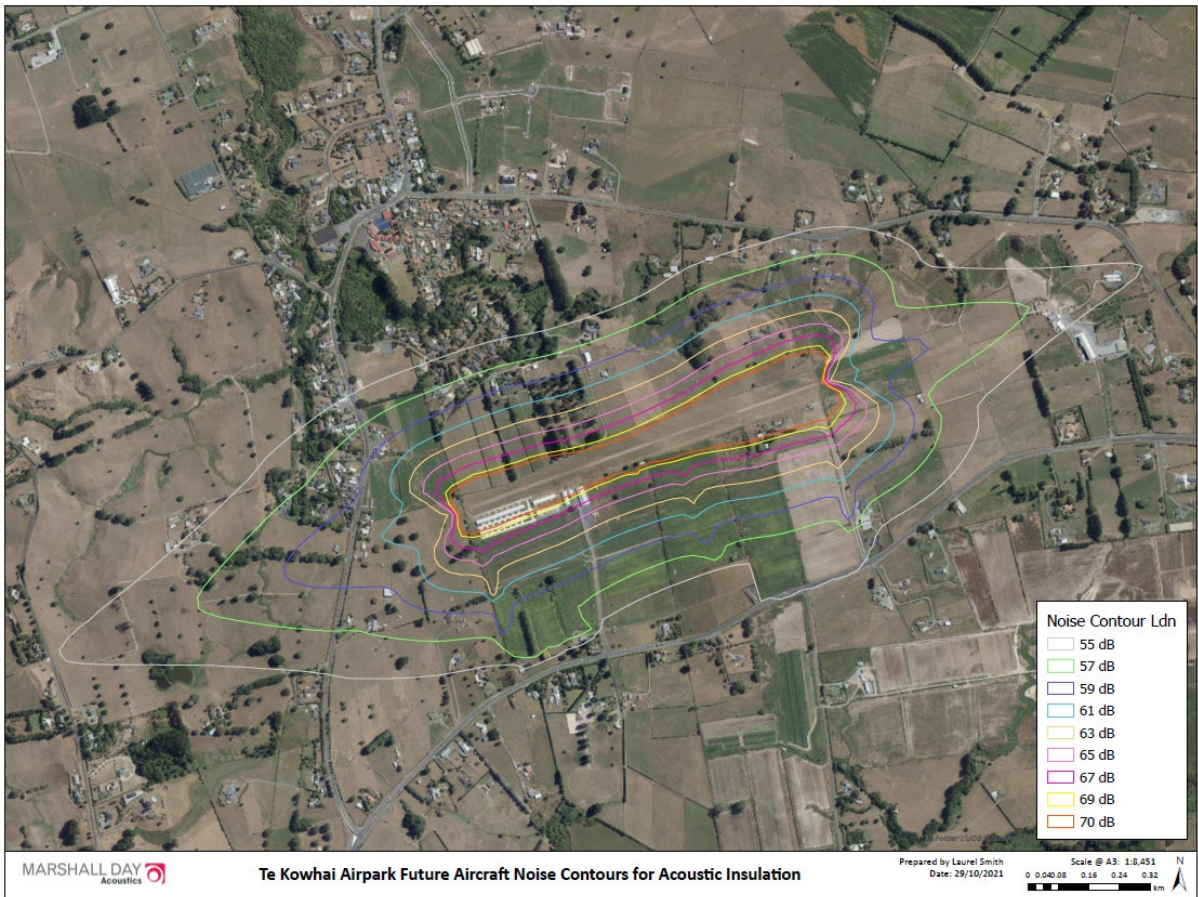


Figure 31 – Te Kowhai Air Noise Boundaries



## 4. Horotiu Acoustic Area

The Horotiu Acoustic Area is located on land within the COMZ – Commercial zone, LCZ – Local centre zone, GRZ – General residential zone and RLZ – Rural lifestyle zone in Horotiu. Acoustic insulation is required to mitigate noise from the Horotiu industrial zoning.

The internal design sound levels within the Horotiu Acoustic Area for residential units within the Residential and Country Living Zones and buildings for a sensitive land use within the LCZ – Local centre zone or COMZ – Commercial zone are listed in Table 22.

### 4.1 Standards 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 22.

**Table 22 – Internal design sound levels**

<b>Internal Design Sound Levels</b>	
<b>Type of occupancy/activity</b>	<b>Internal design sound level, dB LAeq (1hr)</b>
Residential Activity buildings: - bedrooms - other habitable rooms	35 40
Visitors' accommodation/ Home occupation / Home-stays and Papakaaingā housing: - bedrooms	35
Educational buildings (teaching spaces)	35
Hospitals - wards - all other noise-sensitive areas	3540

### Mechanical ventilation

- (2) Buildings that are required to have acoustic insulation must be designed, constructed and maintained with a mechanical ventilation system so that windows can be kept closed. The mechanical ventilation system must achieve the following requirements:
- (a) For habitable rooms for a residential activity:
- (i) Provide mechanical ventilation to satisfy clause G4 of the New Zealand Building Code;
  - (ii) Be adjustable by the occupant to control the ventilation rate in increments up to a high air flow setting that provides at least 6 air changes per hour;
  - (iii) Provide relief for equivalent volumes of spill air;
  - (iv) Provide cooling and heating that is controllable by the occupant and can maintain the inside temperature between 18 degrees Celsius and 25 degrees Celsius; and
  - (v) Generate less than 35 dB LAeq(30s) when measured 1m away from any grill or diffuser.

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- (vi) For other spaces, a specification as determined by a suitably qualified and experienced person.
- (3) A commissioning report must be submitted to the Council prior to occupation of the building demonstrating compliance with all of the mechanical ventilation system performance requirements in 4.1(2)(a).

## 5. . Waikato Gun Club - Noise Control Boundary

### 5.1 Standards 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 24.
- (2) The external level of noise shall be based on the following octave band adjustments:

**Table 23 – 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 24 – Internal sound levels**

Area	Internal design sound level
Waikato Gun Club	40 dB $L_{AFmax}$

#### Mechanical ventilation

- (3) Buildings that are required to have acoustic insulation must be designed, constructed and maintained with a mechanical ventilation system so that windows can be kept closed. The mechanical ventilation system must achieve the following requirements:
  - (a) For habitable rooms for a residential activity:
    - (i) Provide mechanical ventilation to satisfy clause G4 of the New Zealand Building Code;
    - (ii) Be adjustable by the occupant to control the ventilation rate in increments up to a high air flow setting that provides at least 6 air changes per hour;
    - (iii) Provide relief for equivalent volumes of spill air;
    - (iv) Provide cooling and heating that is controllable by the occupant and can maintain the inside temperature between 18 degrees Celsius and 25 degrees Celsius; and
    - (v) Generate less than 35 dB  $L_{Aeq(30s)}$  when measured 1m away from any grill or diffuser.
    - (vi) For other spaces, a specification as determined by a suitably qualified and experienced person.
- (4) A commissioning report must be submitted to the Council prior to occupation of the building demonstrating compliance with all of the mechanical ventilation system performance requirements in 5.1(3)(a).

## 6. Acoustic insulation for other areas

- Residential units within the LCZ – Local centre zone
- Residential units within the COMZ – Commercial zone
- Residential units within the TCZ – 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

Residential units 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 25 – Internal sound level.

### 6.1 Standards 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 25.

**Table 25 – Internal sound levels**

Area	Internal design sound level
Within 350m of the Huntly Power Station <ul style="list-style-type: none"> <li>• Residential units in the LCZ – Local centre zone</li> <li>• Residential units in the COMZ – Commercial zone</li> <li>• Residential units in the TCZ – Town centre zone</li> <li>• Within 100m of the Tamahere Commercial Areas A, B and C</li> <li>• Multi-Unit development</li> <li>• Comprehensive Development – Rangitahi Peninsula</li> </ul>	40dB L <sub>Aeq</sub>

#### Mechanical ventilation

- (2) Buildings that are required to have acoustic insulation must be designed, constructed and maintained with a mechanical ventilation system so that windows can be kept closed. The mechanical ventilation system must achieve the following requirements:
- (a) For habitable rooms for a residential activity:
- (i) Provide mechanical ventilation to satisfy clause G4 of the New Zealand Building Code;
  - (ii) Be adjustable by the occupant to control the ventilation rate in increments up to a high air flow setting that provides at least 6 air changes per hour;
  - (iii) Provide relief for equivalent volumes of spill air;
  - (iv) Provide cooling and heating that is controllable by the occupant and can maintain the inside temperature between 18 degrees Celsius and 25 degrees Celsius; and

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- (v) Generate less than 35 dB  $L_{Aeq(30s)}$  when measured 1m away from any grill or diffuser.
  - (vi) For other spaces, a specification as determined by a suitably qualified and experienced person.
- (3) A commissioning report must be submitted to the Council prior to occupation of the building demonstrating compliance with all of the mechanical ventilation system performance requirements in 6.1(2)(a).

## 7. Mercer Airport

The Mercer Airport Outer Control Boundary (OCB) identifies an area that experiences high noise levels from aircraft landing and taking off from the Mercer Airport. Habitable buildings within the Mercer Airport Outer Control boundary are required to be acoustically insulated to achieve the internal noise standards specified in sections 7.1 and 7.2 below.

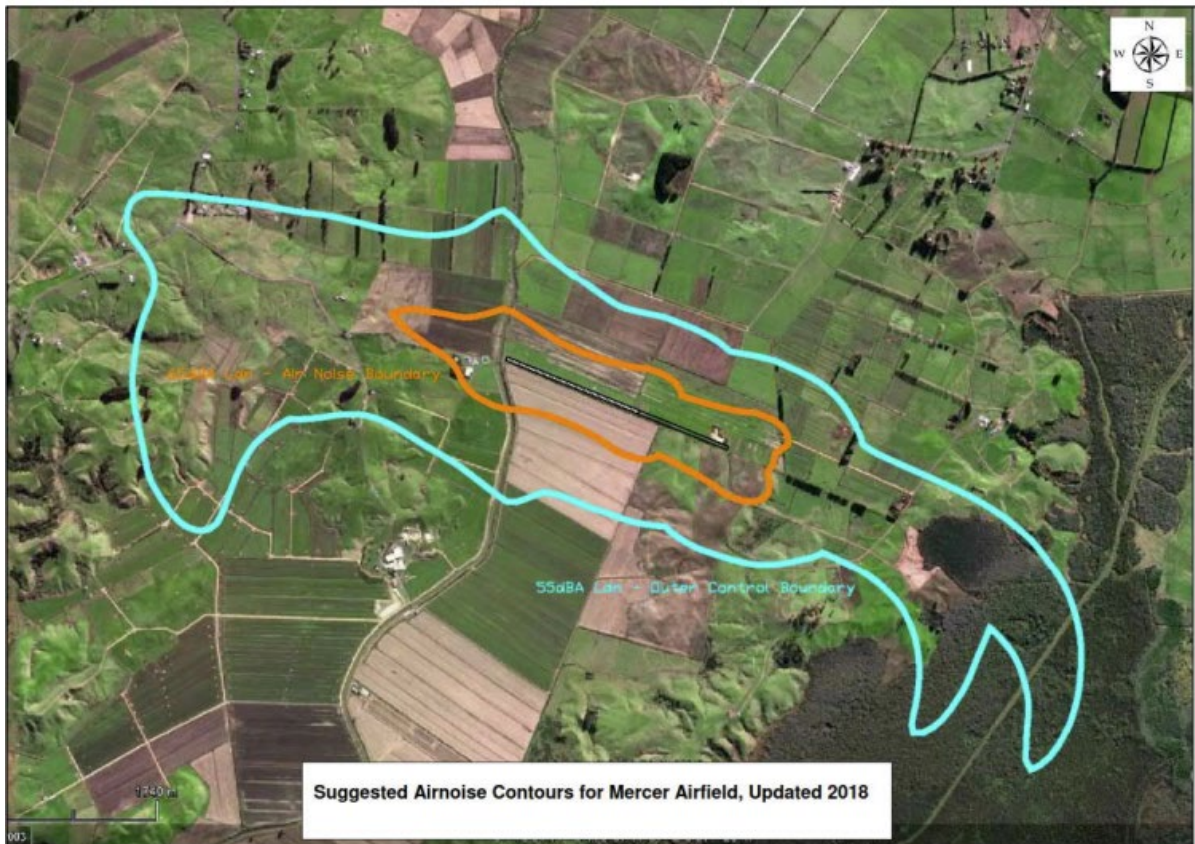
### 7.1 Standards for permitted activities inside the Mercer Airport Outer Control Boundary

- (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 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 26 below:

**Table 26 – Internal noise levels**

Area	Internal noise level
Habitable rooms	Ldn 40 dBA

- (2) The internal noise level shall be achieved based on the predicted external level at the subject site shown on Figure 32 below and in accordance with the adjustments to the dBA level to establish an un-weighted external source spectrum for aircraft noise outlined in Table 27 below.



**Figure 32 – Mercer Airport, Ldn contours**

- (3) Where a building is partly or wholly contained within the Mercer Airport OCB, 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 27 – Noise limits for ventilation systems.
- (5) Compliance with rules (4) and (5) 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 27 – Noise limits for ventilation systems**

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