



MARSHALL DAY
Acoustics 

41-43 BRIGHAM CREEK ROAD REZONING
NOISE ASSESSMENT

Rp 001 20210114 | 13 September 2021

Project: **41-43 Brigham Creek Road**

Prepared for: **Property Group
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1.0 INTRODUCTION

You engaged us (Marshall Day Acoustics) to assess the proposed rezoning of 41-43 Brigham Creek Road with respect to noise. Our original report (revision 01 dated 11 May 2021) was provided to Auckland Council for review. This revised report has been updated to include a response to the Council comments.

Note that this report can be used for either a Plan Change or a Resource Consent application as the acoustic matters are the same.

Appendix A provides a glossary of terminology.

2.0 THE SITE

The relevant Auckland Unitary Plan (AUP) zoning is overlaid on an aerial image in Figure 1 to show the site relationship with existing land uses. In summary:

- The site is zoned *Future Urban*.
- The site is bordered by *Residential* zones to the north and east. All other surrounding sites are zoned *Future Urban*. *Business Zones* are located to the northeast beyond the intersection of Brigham Creek Road and Totara Road.
- Brigham Creek Road borders the site to the north. Mamari Road borders the site to the east.

Figure 1: AUP Zoning and Airport Noise Overlay



3.0 PERFORMANCE STANDARDS

3.1 AUP Noise Rules

The *Future Urban Zone* is a transitional zone that anticipates a future urban use (e.g., Residential). It is treated as if it is zoned Rural (Rural Production) while awaiting development. AUP rule H18.1 requires rezoning prior to development. 41-43 Brigham Road is proposed to be rezoned as a *Residential – Mixed Housing Urban* zone.

Table 1 summarises the relevant AUP noise rules. They are also reproduced in part in Appendix B.

Table 1: AUP noise rules

Rules	Controls	Time Periods	Noise Limits
E25.6.2	Between Residential sites (assessment position is anywhere within the adjacent boundary)	Monday to Saturday 7am-10pm and Sunday 9am-6pm All other times	50 dB L _{Aeq} 40 dB L _{Aeq} 75 dB L _{AFmax}
E25.6.3	Between Future Urban sites (assessment position is within the notional boundary i.e., 20m from the façade occupied dwelling)	Monday to Saturday 7am-10pm and Sunday 9am-6pm All other times	55dB L _{Aeq} 45 dB L _{Aeq} 75 dB L _{AFmax}
E25.6.15	From Future Urban sites to Residential sites (assessment position is anywhere within the residential boundary)	Monday to Saturday 7am-10pm and Sunday 9am-6pm All other times	55dB L _{Aeq} 45 dB L _{Aeq} 75 dB L _{AFmax}
E25.6.19	From Business sites to Residential sites or the notional boundary on Rural sites (including Future Urban sites) (assessment position is anywhere within the residential boundary)	Monday to Saturday 7am-10pm and Sunday 9am-6pm All other times	55dB L _{Aeq} 45 dB L _{Aeq} 60 dB L _{eq} @ 63Hz 55 dB L _{eq} @ 125Hz 75 dB L _{AFmax}

3.2 Airport noise contours

The south-east corner of the site is within the Whenuapai Airbase Aircraft 55 dB L_{dn} – 65 dB L_{dn} Noise Overlay.

AUP Section D24.4.1 indicates development of a new activity sensitive to aircraft noise (e.g., a residence) between the 55 dB L_{dn} and 65 dB L_{dn} is a **Restricted Discretionary** activity. Section D24.6 outlines the restrictions:

D24.6 New activities sensitive to aircraft noise must provide sound attenuation and related ventilation and/or air conditioning measures:

(a) to ensure the internal noise environment of habitable rooms does not exceed a maximum noise level of 40 dB L_{dn};

(b) that are certified by a person suitably qualified and experienced in acoustics to the Council's satisfaction prior to its construction; and

(c) so that the related ventilation and/or air conditioning system(s) satisfies the requirements of New Zealand Building Code Rule G4 with all external doors of the building and all windows of the habitable rooms closed.

4.0 DISCUSSION

4.1 Neighbouring sites

Noise from activities within the rezoned site will have to comply with *Residential* zone noise rules in AUP E25.6.2.

Reverse sensitivity effects are not an issue for the following sites because:

- Adjacent *Residential* sites would have to comply with Residential zone noise rules in AUP E25.6.2 at existing sites closer than the subject site;
- Nearby *Business* sites would have to comply with the Business zone interface noise rules in AUP E25.6.19 at existing Residential and Future Urban sites closer than the subject site;

However, consideration will be required for the *Future Urban (FU)* sites. There are three adjoining FU sites:

- 39 Brigham Creek Road (residential use)
- 45 Brigham Creek Road (occupied by Hydrovac environmental Support)
- 5 Mamari Road (residential use)

As 39 Brigham Creek Road and 5 Mamari Road are residential use, we will not consider them further as there would be no reverse sensitivity effects for the reasons discussed above.

However, 45 Brigham Creek Road will require further consideration. By changing the zoning of the applicant site from *Future Urban* to *Residential*, the noise assessment position moves closer towards the noise maker (i.e., the Hydrovac site). This imposes a tighter acoustic control. However, we consider that there are unlikely to be any reverse sensitivity effects in practice because:

- We understand the landowner of 45 Brigham Creek Road is aware and is accepting of the proposed plan change and residential build up.
- We understand the Hydrovac occupiers are on a short-term lease and are not likely to be occupying the land when the dwellings at 41-43 Brigham Road are to be occupied.

4.2 Road traffic noise – design for acoustical quality

Brigham Creek Road is a highly trafficked road. Whilst there is no condition requiring protection from the noise, we anticipate road traffic noise incident on the site may be significant.

We predict that the first row of buildings would receive an incident noise level of 64 dB $L_{Aeq(24hr)}$ based on an AADT of 15320 and 2.2% heavies¹. Therefore, we recommend the first row of buildings which face Brigham Creek Road should be constructed:

- To provide sound attenuation and ventilation & cooling to ensure the internal noise environment of habitable rooms does not exceed a maximum noise level of 40 dB $L_{Aeq(24h)}$ while providing appropriate thermal comfort or;
- all habitable rooms are located on the façade of the building not facing the road.

Buildings further from the road would be screened by this first row of houses and as such would not experience the same level of incident noise. We predict that buildings further back would experience incident noise levels at least 10 decibels less due to further setback distances and shielding. Given this, typical building constructions would be acceptable.

¹ <http://www.trafficcounts.co.nz/> traffic numbers obtained here and adjusted up to 2031 (the design year).

4.3 Whenuapai airbase noise contours

Any buildings constructed within the corner of the site covered by the Whenuapai Airbase Aircraft 55 dB L_{dn} – 65 dB L_{dn} noise overlay (see Figure 1) will be required to comply with the standards outlined in Section D24.6 and discussed in Section 3.2.

The future levels of aircraft noise in this part of the site will be approximately 55 – 58 dB L_{dn} based on the noise overlay. With the recommended building envelope construction in Section 5.0, we consider that Section D24.6 can be complied with.

We understand that NZDF has imposed a no-complaints covenant (see Appendix C) over the entire site. Despite this, we strongly recommend that those buildings under the aircraft noise overlay are constructed with the recommended build-up in Section 5.0 to ensure an acceptable internal acoustic amenity for those building occupiers.

5.0 BUILDING ENVELOPE CONSTRUCTION

Table 2 summarises indicative building envelope constructions to meet internal noise level criteria, as discussed in Section 4.2 and Section 4.3. Note, since we have had no information on building layouts, these constructions are non-specific. A full assessment of required constructions should be conducted as part of the design process as the design progresses, and more is known about layout and setback of buildings from the road.

Table 2: Building Envelope Constructions

Building Element	Construction
Bedrooms & Sleeping Areas	
Roof	Cladding consisting of either: <ul style="list-style-type: none"> • Warm Roof including gypsum fibre board layer (e.g. RoofLogic) • Long run profiled metal cladding with 12 mm plywood sarking Minimum 300 mm deep ceiling cavity and absorptive cavity blanket ¹ 2x13 mm high-density plasterboard ² on suspended metal ceiling batten system ³
Lightweight Wall	Steel/Aluminium cladding panels 20 mm cavity battens 9 mm fibre cement 140 mm timber studs AND resilient rubber clips (ST 001) and absorptive cavity blanket ¹ 2x13 mm Noiseline Plasterboard internal lining
Masonry Wall	Paint finish concrete panels 90 mm timber studs with absorptive cavity blanket ¹ 1x13 mm standard plasterboard internal lining
Glazing (DGU)	10.38 mm acoustic laminate / 12 mm airgap/ 6 mm monolithic
Other Habitable Rooms	
Roof	Cladding consisting of either: <ul style="list-style-type: none"> • Warm Roof including gypsum fibre board layer (e.g. RoofLogic) • Long run profiled metal cladding with 12 mm plywood sarking Minimum 300 mm deep ceiling cavity and absorptive cavity blanket ¹ 1x13 mm high-density plasterboard ² on suspended metal ceiling batten system

Building Element	Construction
Lightweight Wall	Timber/Metal cladding panels 20 mm cavity battens 9 mm fibre cement RAB 140 mm timber studs and absorptive cavity blanket ¹ 1x13 mm standard plasterboard internal lining ²
Masonry Wall	Brick Cladding 90 mm timber studs with absorptive cavity blanket ¹ 1x13 mm standard plasterboard internal lining
Glazing (DGU)	6.38 mm acoustic laminate / 12 mm airgap/ 6 mm monolithic

1 Minimum 90 mm thick and 9 kg/m³ dense fibreglass or polyester

5.1 Alternate means of fresh air ventilation would be required

Where window must be closed to achieve the internal noise levels, ducted fresh air ventilation will be required. Possible ventilation system solutions include:

- A ducted fan serving an individual or multiple rooms (e.g., NCS Acoustics AFA150 Compartment)
- A heat recovery ventilator with fresh (outside) air inlet (e.g., Cleanaire or Moisturemaster)
- A fan coil unit (ducted heat pump) with fresh (outside) air inlet

If a high wall unit was to be relied upon to achieve the thermal comfort, then it must have a low-speed mode that can both meet the temperature and noise criteria (i.e. less than 35 dB L_{Aeq}). If an occupant chooses to use the high wall unit at a higher fan speed or if the apartment complies with the thermal standard through another method, then there are no other noise controls for the unit.

If the condensers are to be located on the decks outside, then they should comply with applicable noise limits at adjacent sites/zones.

6.0 RECOMMENDATIONS

In summary:

- We consider that there are unlikely to be reverse sensitivity effects from the proposed rezoning with recommendations of this report implemented.
- Activities within the rezoned site will have to comply with *Residential* zone noise rules in AUP E25.6.2.
- Buildings constructed within Aircraft contours will be subject to internal noise level requirements of AUP D24.6.
- We recommend that the first row of houses adjacent to Brigham Creek Road be designed to meet internal noise level requirements of 40 dB L_{Aeq(24h)}.
- Indicative constructions are provided in Table 2 of this report

APPENDIX A GLOSSARY OF TERMINOLOGY

dB	Decibel. The unit of sound level. Expressed as a logarithmic ratio of sound pressure P relative to a reference pressure of $P_r=20 \mu\text{Pa}$ i.e. $\text{dB} = 20 \times \log(P/P_r)$
dB(A)	The unit of sound level which has its frequency characteristics modified by a filter (A-weighted) so as to more closely approximate the frequency bias of the human ear.
$L_{Aeq}(t)$	The equivalent continuous (time-averaged) A-weighted sound level. This is commonly referred to as the average noise level. The suffix "t" represents the time period to which the noise level relates, e.g. (8 h) would represent a period of 8 hours, (15 min) would represent a period of 15 minutes and (2200-0700) would represent a measurement time between 10 pm and 7 am.
L_{dn}	The day night noise level which is calculated from the 24 hour L_{Aeq} with a 10 dB penalty applied to the night-time (2200-0700 hours) L_{Aeq} .
Noise	A sound that is unwanted by, or distracting to, the receiver.
Sound Insulation	When sound hits a surface, some of the sound energy travels through the material. 'Sound insulation' refers to ability of a material to stop sound travelling through it.

APPENDIX B AUP NOISE RULES

E25.6.2. Maximum noise levels in residential zones

- (1) The noise (rating) levels and maximum noise level arising from any activity in the Residential – Large Lot Zone, Residential – Rural and Coastal Settlement Zone, Residential – Single House Zone, Residential – Mixed Housing Suburban Zone, Residential – Mixed Housing Urban Zone and the Residential – Terrace Housing and Apartment Buildings Zone measured within the boundary of an adjacent site in these residential zones must not exceed the levels in Table E25.6.2.1 Noise levels in residential zones below:

Table E25.6.2.1 Noise levels in residential zones

Time	Noise level
Monday to Saturday 7am-10pm	50dB L _{Aeq}
Sunday 9am-6pm	
All other times	40dB L _{Aeq} 75dB L _{AFmax}

E25.6.3. Noise levels in rural and future urban zones

- (1) The noise (rating) level from any activity in the Rural – Mixed Rural Zone, Rural – Rural Production Zone, Rural – Rural Coastal Zone or the Future Urban Zone measured within the notional boundary on any site in any rural zone must not exceed the limits in Table E25.6.3.1 Noise levels in the Rural – Mixed Rural Zone, Rural – Rural Production Zone, Rural – Rural Coastal Zone or the Future Urban Zone below:

Table E25.6.3.1 Noise levels in the Rural – Mixed Rural Zone, Rural – Rural Production Zone, Rural – Rural Coastal Zone or the Future Urban Zone

Time	Noise level
Monday to Saturday 7am-10pm	55dB L _{Aeq}
Sunday 9am-6pm	
All other times	45dB L _{Aeq} 75dB L _{AFmax}

E25.6.15. Rural – Mixed Rural Zone, Rural – Rural Production Zone, Rural – Rural Coastal Zone or Future Urban Zone interface

- (1) The noise (rating) level and maximum noise level from any activity in the Rural – Mixed Rural Zone, Rural – Rural Production Zone, Rural – Rural Coastal Zone or Future Urban Zone measured within the boundary of any site in a residential zone must not exceed the levels in Table E25.6.15.1 Noise levels at the Rural – Mixed Rural Zone, Rural – Rural Production Zone, Rural – Rural Coastal Zone or Future Urban Zone interface below:

Table E25.6.15.1 Noise levels at the Rural – Mixed Rural Zone, Rural – Rural Production Zone, Rural – Rural Coastal Zone or Future Urban Zone interface

Time	Noise level
Monday to Saturday 7am-10pm	55dB L _{Aeq}
Sunday 9am-6pm	
All other times	45dB L _{Aeq} 75dB L _{AFmax}

E25.6.19. Business zones interface

- (1) The noise (rating) and maximum noise level from any activity in the business zones must not exceed the levels in Table E25.6.19.1 Noise levels at the business zone interface when measured within the boundary of a site in a residential zone or within the notional boundary of property in a rural zone.

Table E25.6.19.1 Noise levels at the business zone interface

Time	Noise level
Monday to Saturday 7am-10pm	55dB L _{Aeq}
Sunday 9am-6pm	
All other times	45dB L _{Aeq} 60dB L _{eq} at 63 Hz 55dB L _{eq} at 125 Hz 75dB L _{AFmax}

D24.4. Activity table

Except where more restrictive provisions apply in the underlying zoning or precinct, the following rules apply to activities sensitive to aircraft noise within the Aircraft Noise Overlay.

- (1) Table D24.4.1 specifies the activity status of activities for the North Shore Airport, Kaipara Flats Airfield and Whenuapai Airbase pursuant to section 9(3) and section 11 of the Resource Management Act 1991.

Table D24.4.1 Activity table for North Shore Airport, Kaipara Flats Airfield and Whenuapai Airbase

Activity	Activity status
Development between the 55dB L_{dn} and 65dB L_{dn} noise boundaries (including Lot 3 DP 104718)	
(A1) New activities sensitive to aircraft noise	RD
(A2) New activities sensitive to aircraft noise that do not comply with Standard D24.6.1(1)	NC
(A3) Alterations or additions to existing buildings accommodating activities sensitive to aircraft noise	RD
(A4) Alterations or additions to existing buildings accommodating activities sensitive to aircraft noise that do not comply with Standard D24.6.1(1)	NC

D24.6.1. North Shore Airport, Kaipara Flats, and Whenuapai

- (1) The following activities:

- D24.4.1(A1) New activities sensitive to aircraft noise; and
- D24.4.1(A3) Alterations or additions to existing buildings accommodating activities sensitive to aircraft noise

must provide sound attenuation and related ventilation and/or air conditioning measures:

- to ensure the internal noise environment of habitable rooms does not exceed a maximum noise level of 40dB L_{dn};
- that are certified by a person suitably qualified and experienced in acoustics to the Council's satisfaction prior to its construction; and
- so that the related ventilation and/or air conditioning system(s) satisfies the requirements of New Zealand Building Code Rule G4 with all external doors of the building and all windows of the habitable rooms closed.

APPENDIX C NZDF NO COMPLAINTS COVENANT

Form B

Easement instrument to grant easement or *profit à prendre*, or create land covenant

(Sections 90A and 90F Land Transfer Act 1952)

Grantor

Grantee

Her Majesty The Queen in right of Her Government in New Zealand acting by and through the Chief of Defence Force pursuant to Section 25(5) of the Defence Act 1990

Grant of Easement or *Profit à prendre* or Creation of Covenant

The Grantor being the registered proprietor of the servient tenement(s) set out in Schedule A grants to the Grantee (and, if so stated, in gross) the easement(s) or *profit(s) à prendre* set out in Schedule A, or creates the covenant(s) set out in Schedule A, with the rights and powers or provisions set out in the Annexure Schedule(s)

Schedule A

Continue in additional Annexure Schedule, if required

Purpose (Nature and extent) of easement; <i>profit</i> or covenant	Shown (plan reference)	Servient Tenement (Computer Register)	Dominant Tenement (Computer Register) or in gross
Land Covenant	All of title	[Complete for each Residential Lot referred to in the No Complaint Covenant Condition as titles issue]	The Land referred to in Gazette Notices: -1938 p 1183 -1938 p 1932 -1940 p 1654 -1941 p 1467 -1941 p 3124 -1941 p 3126 -1945 p 1552 -1948 p 297 -1954 p 667 -1954 p 2023 -1955 p 876 -1955 p 1835 -1968 p 1596 -1976 p 813 -1980 p 623

Form B - continued

Easements or *profits à prendre* rights and powers (including terms, covenants and conditions)

Delete phrases in [] and insert memorandum number as required; continue in additional Annexure Schedule, if required

~~Unless otherwise provided below, the rights and powers implied in specified classes of easement are those prescribed by the Land Transfer Regulations 2002 and/or Schedule Five of the Property Law Act 2007~~

~~The implied rights and powers are hereby **[varied] [negatived] [added to] or [substituted] by:**~~

~~[Memorandum number _____, registered under section 155A of the Land Transfer Act 1952]~~

~~[the provisions set out in Annexure Schedule _____]~~

Covenant provisions

Delete phrases in [] and insert Memorandum number as require; continue in additional Annexure Schedule, if required

The provisions applying to the specified covenants are those set out in:

~~[Memorandum number _____, registered under section 155A of the Land Transfer Act 1952]~~

Annexure Schedule

Annexure Schedule

1. Definitions and Interpretation

In this instrument:

- 1.1 "Land" means the land contained within certificates of title
- 1.2 "NZDF" means the New Zealand Defence Force and other parties permitted by NZDF to use the NZDF Land for the Operations and Activities including, by way of example, foreign air force craft;
- 1.3 "NZDF Land" means the land described as the Dominant Tenement in Schedule A of this Instrument and adjacent airspace; and
- 1.4 "Operations and Activities" means any;
 - 1.4.1 existing or future defence operations and activities carried on by the NZDF on the NZDF Land or adjacent airspace;
 - 1.4.2 existing use rights relating to any of the activities referred to in paragraph 1.4.1 above; and
 - 1.4.3 operations and activities as may be permitted under the Defence Purposes Whenuapai Airbase Designation (no.4310) and Whenuapai Airbase Approach and Departure Plan Protection Designation (no.4311), as may be modified by the Minister of Defence from time to time.

2. Covenants

- 2.1 The Grantor will allow NZDF to carry on its Operations and Activities without interference or restraint from the Grantee on the NZDF Land.
- 2.2 Subject to such works or activities not being contrary to law, the Grantor will not in any way inhibit NZDF from carrying out any Operations and Activities.
- 2.3 The Grantor will make no complaint or submission or rejection relating to the effects of the Operations and Activities.
- 2.4 The Grantor will not:
 - 2.4.1 Make nor lodge, nor;
 - 2.4.2 Be party to, nor;
 - 2.4.3 Finance nor contribute to the cost of
any submission, application, proceeding (either under the Resource Management Act or otherwise) designed or intended to limit, prohibit or restrict continuation of the current or future defence uses carried out by the NZDF on the NZDF Land including without limitation any action to require NZDF to modify the current or future defence uses carried out by it on the NZDF Land.
- 2.5 The Grantor and its successors in title will only be liable for breaches of the restrictions which occur while they are registered as proprietor of a Servient Tenement.
- 2.6 This covenant shall be binding on all transferees, tenants (to the extent permitted by law), lessees, mortgagees, chargeholders and their respective successors in title and assigns of any interest in the Servient Tenements.