

File Ref: AC24322 – 02 – R1

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Email: amanda@remarkableplanning.nz

Dear Amanda,

**Re: RCL Henley Downs Limited Subdivision, Jacks Point, Queenstown
NZONE Skydive aircraft noise assessment**

Acoustic Engineering Services (AES) has been engaged to undertake an assessment to determine aircraft noise emissions associated with the NZONE Skydive Operation, when received over a proposed subdivision (the 'RCL Henley Downs Limited' subdivision), located at Jacks Point, Queenstown.

Our review is based on the following documentation:

- Preliminary subdivision plan titled *RCL Henley Downs Limited Queenstown*, as prepared by Paterson Pitts Group Limited, and dated the 2nd of May 2024.
- Acoustic assessment titled *Homestead Bay Trustees Ltd Subdivision, Jacks Point, Queenstown*, as prepared by Acoustic Engineering Services and dated the 18th of May 2018.

1.0 BACKGROUND

The proposed subdivision is located at Jacks Point Queenstown and is shown in figure 1.1 below, with the existing location of the NZONE Skydive operation and runway shown in red. The site is zoned a mixture of Rural and Jacks Point Resort under the Proposed Queenstown Lakes District Plan.

We understand that this will likely be a staged development. Considering that the NZONE Skydive operation is consented to operate on the site until the year 2031, it is proposed to begin residential development at the southern extent of the site, assuming that by the time residential development is close to the location of the NZONE Skydive operation, the NZONE Skydive is no longer operational.



Figure 1.1 – Site location

2.0 APPROPRIATE NOISE LEVELS

In accordance with New Zealand Standard NZS 6805:1992 *Airport Noise Management and Land Use planning*, it is generally recognized that new residential development located outside of the 55 dB L_{dn} aircraft noise contour will be acceptable without the need for any mitigation measures. For aircraft noise levels higher than 65 dB L_{dn}, residential development is generally recommended to be prohibited as adverse noise effects are unable to be adequately mitigated.

For new residential development between the 55 and 65 dB L_{dn} contours, noise effects may be acceptable if suitable mitigation measures are adopted. Mitigation measures commonly include construction upgrades, or alternate mechanical ventilation so that windows can be closed during periods of high noise. There is still a potential minor residual effect due to noise experienced in outdoor areas, which is not practicable to mitigate.

Therefore, it is of interest to determine the location of the 55 and 65 dB L_{dn} noise contours relative to the proposed subdivision. We also understand you are interested in what mitigation measures might be required to decrease the size of the noise contours, and / or ensure that any future residential development within the 55 – 65 dB L_{dn} noise contours are appropriately protected from aircraft noise, for the period up to 2031 when operations are expected to cease.

3.0 MODELLING METHODOLOGY

Aircraft noise levels over the site have been determined using previous AES noise measurements of the NZONE Skydive operation undertaken in 2018, and Version 3.0f of the Aviation Environmental Design Tool (AEDT) software package, based on the following assumptions:

- 35 'Cessna Supercub 900' movements were modelled (in accordance with Approved Resource Consent RM 960447), with 10 of these occurring during the night-time period. Consistent with the assessment methodology for an L_{dn} noise level¹, a 10 dB penalty is applied to flights occurring during the night-time period.
- It was observed during our 2018 site visit that the aircraft may idle for anywhere between 8 – 13 minutes during unloading and loading procedures. We have conservatively allowed for up to 13 minutes of idling for each operation (departing or arriving), with a worst-case aircraft orientation.
- Consistent with the activity description in the Environmental Court Decision document (ENV-2012-CHC-116, dated the 16th of May 2014), we have modelled aircraft movements departing and arriving from the west.

4.0 PREDICTED NOISE LEVELS

Noise levels from the NZONE Skydive Operation are as shown below, overlaid on the latest subdivision layout. In addition to the 55 and 65 dB L_{dn} contour bands, we have also shown the location of the 57 and 60 dB L_{dn} contour bands (which are discussed in section 5.2 below).



Figure 4.1 – NZONE Skydive noise contours

The 55 dB L_{dn} contour extends up to 400 metres into the subdivision from the idling location, tapering down to approximately 240 metres from the centre of the runway to the west. The simplest way forward would be to delay development in this area until NZONE ceases operations.

¹ New Zealand Standard NZS 6801:2008 *Acoustics – Measurement of environmental sound*.

5.0 MITIGATION OPTIONS

As requested, we have considered what options may be available to enable development within the 55 dB L_{dn} contour shown in figure 4.1.

5.1 Fencing around the NZONE Skydive operation

Noise levels near the eastern end of the runway are driven by aircraft idling noise. Therefore, there may be some scope to reduce the size of the 55 dB L_{dn} noise contour through the construction of an acoustic barrier around the idling location of the aircraft. The barrier would not be effective for noise generated by the aircraft as it departs or arrives (as the aircraft noise source will be at a higher height than the barrier). We have investigated the construction of a 6 metre acoustic barrier (i.e., 4 metre earth bund with 2 metre fence on top) in an indicative position, such as the location shown in black in figure 5.1 below, with the resulting noise contour overlaid on top.



Figure 5.1 – Noise level with 6-metre-high acoustic barrier

Based on the above, the provision of a 6-metre-high acoustic barrier may be able to reduce the extent of the 55 dB L_{dn} noise contour by up to 170 – 180 metres on the southern and eastern sides, however, the effectiveness of the barrier will gradually decrease towards the west where the barrier ends and there is a line of sight between the aircraft and receiver.

The size of the western end of the 55 dB L_{dn} noise contour could potentially be further decreased if the acoustic barrier is further extended to the west.

5.2 Acoustic upgrades for dwellings

Adverse aircraft noise effects for future residential development between the 55 and 65 dB L_{dn} noise contours may be acceptable, provided that appropriate mitigation is adopted.

An internal noise level target of 40 dB L_{dn} is typically adopted for aircraft noise received within habitable spaces of dwellings. We have the following comments:

- Typical residential building constructions provide an outdoor to indoor noise reduction of 17 dB for aircraft noise, with windows cracked open for ventilation². This means that for dwellings located between the 55 and 57 dBA L_{dn} contours, an internal noise level of 40 dBA L_{dn} can actually be achieved without any mitigation measures.
- For dwellings located between the 57 and 65 dB L_{dn} noise contours, we expect that most standard residential dwelling constructions would be able to provide a level of noise reduction such that an internal noise level of 40 dB L_{dn} is achieved, provided that doors and windows are closed. It may however be appropriate to conduct a more detailed review of any dwellings in the 60 to 65 dB L_{dn} noise contour band, to ensure they are of an adequate standard. Either way, all of these dwellings will require an alternate source of mechanical ventilation and cooling, to ensure windows do not need to be opened. There will be a potential minor residual noise effect in outdoor areas.

It may therefore be possible to construct dwellings within the 55 dB L_{dn} noise contour, whilst ensuring that noise effects on occupants are only minor.

We trust that the above of is assistance. Please do not hesitate to contact us further as required.

Kind Regards,



Robin Chen
BE Hons (Mech)
Acoustic Engineer
Acoustic Engineering Services

² Report titled *Queenstown Airport – Updated Airport Noise Contours and Assessment of Noise Effects* (Report Number 1992301A 002 R09), as prepared by Marshall Day Acoustics and dated the 6th of July 2009.