BEFORE THE HEARINGS PANEL
FOR THE QUEENSTOWN LAKES
PROPOSED DISTRICT PLAN

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of the Rural Hearing Stream 2 (Rural Zone Chapter)

STATEMENT OF EVIDENCE OF CHRISTOPHER WILLIAM DAY NOISE – INFORMAL AIRPORTS

Dated this 27th day of April 2016

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QUALIFICATIONS AND EXPERIENCE

[1] My name is Christopher William Day.

[2] I am a Principal in the acoustical consultant practice of Marshall Day Acoustics Limited ("**MDA**"). I hold the degree of Bachelor of Engineering from Monash University, Australia.

[3] For the past 35 years I have worked in the field of acoustics, noise measurement and control in England, Australia and New Zealand. My work over the last 30 years has included noise control engineering and town planning work for various major corporations and city councils within New Zealand and I have been engaged as an expert witness before the Environment Court.

[4] I have a broad experience in environmental noise, with a particular emphasis on airport noise. I am currently involved with noise prediction, and/or consulting advice on the three major airports in New Zealand. At Auckland Airport MDA was been engaged by the then Manukau City Council and the Airport Company, at Wellington by the Board of Airline Representatives of New Zealand ("**BARNZ**") and Wellington International Airport Limited ("**WIAL**"), and at Christchurch by Christchurch International Airport Limited ("**CIAL**"). This work has involved noise predictions, computer modelling, noise boundary development and automated noise monitoring. MDA has also carried out the noise modelling work for the majority of the other airports in New Zealand.

[5] I have been engaged by Queenstown Airport Corporation ("**QAC**") since 1992 to advise on various noise issues including the preparation of the original noise contours to form the basis of the airport noise provisions in the District Plan in the 1990s. MDA has carried out periodic noise monitoring at Queenstown Airport over

the last five years, and carried out the recalculation of the noise contours for the recent PC35 for Queenstown Airport. I was previously engaged by Skydive Queenstown Limited ("**Skydive**") in their application to the Environment Court for a replacement resource consent for their activity at the airstrip at Remarkables Station.

[6] Although this is a Council hearing, I confirm that I have read the Code of Conduct for expert witnesses contained in the Environment Court Practice Note 2014 and that I agree to comply with it. I confirm that I have considered all the material facts that I am aware of that might alter or detract from the opinions I express. In particular, unless I state otherwise, this evidence is within my scope of expertise and I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.

INTRODUCTION

[7] I have been engaged in this matter by Skydive Queenstown Limited ("**Skydive**") to review and comment on the rules in the Queenstown Lakes Proposed District Plan ("**the Proposed Plan**") relating to Informal Airports, particularly with respect to controls on the emission of noise.

[8] Skydive has lodged a submission to the Proposed Plan seeking that a controlled activity rule apply to Informal Airports for flights in excess of the permitted activity standard[1]. The rule is based on compliance with the noise limits specified in Rules 36.5.13 and 36.5.14. I support this rule for the following reasons.

RULES 36.5.13 & 36.5.14 HELICOPTER AND AIRCRAFT NOISE

[9] Rules 36.5.13 and 36.5.14 provide noise limits and procedures that control the emission of noise from heliports and airports to ensure

[1] Notified as 3 flights per week, but s42A recommendation is to extend to 2 flights per day

they don't exceed a reasonable level of noise. The rules are based on the New Zealand Standards NZS 6805 and NZS 6807 and the noise limits specified are in my opinion reasonable.

[10] These noise controls are based on the widely accepted principle that noise exposure and community response from aircraft noise, is based on a combination of the noise level from individual aircraft movements and the total number of flights.

[11] The Day/Night Level (L_{dn}) used in these controls is based on the above concept and allows an operator to fly a small number of noisy aircraft or a larger number of quieter aircraft – the community noise exposure (L_{dn}) being the same in both cases.

[12] Rules 36.5.13 and 36.5.14 provide noise limits that are regarded as reasonable for heliports (50 dB L_{dn}) and fixed wing airports (55 dB L_{dn}). This approach of controlling noise emissions using noise limits, is an 'effects based' control as opposed to a control that limits only the number of flights. These rules specifically require the involvement of a "suitably qualified acoustic engineer" to do the calculations and analysis.

RULES 21.5.25 and 21.5.26 INFORMAL AIRPORTS

[13] Rules 21.5.25 and 21.5.26 provide a simplistic approach to control noise from Informal Airports, by allowing permitted activity status for simple applications without the need for an acoustic engineer to be involved to analyse noise levels. These rules involve controlling the number of flights allowed along with specifying a buffer distance to noise sensitive receivers.

[14] These controls are appropriately conservative as confirmed by Dr Chiles in his evidence. My analysis of the data provided by Dr Chiles for helicopters shows that this approach is conservative by

approximately 7dB. In my opinion, this is an appropriate approach for simple applications.

[15] However, in my opinion there should also be an opportunity to apply for an activity that is slightly unusual and that would require analysis by an acoustic engineer to determine whether it complies with the noise standards set out in rules 36.5.13/14. This activity might not meet the conservative flight numbers and buffer distance requirement (rules 21.5.25/26) but might very well meet the 'reasonable level of noise' set down in Rules 36.5.13 and 36.5.14.

[16] During the course of preparing such an application, the analysis by the acoustic engineer might develop a condition of consent that would restrict the number of flights per day (for practical compliance purposes), but this is dependent on the type of aircraft used and will be different for each airport and aircraft combination. The condition would be to the effect that whatever the restriction proposed in the condition, be it flight numbers, flight paths, or type of aircraft for example, there must be compliance with Rule 36.5.13/14.

SKYDIVE REMARKABLES STATION

[17] Skydive currently operates a commercial sky-diving operation from an airstrip located on the Remarkables Station south of Queenstown. The land is under lease from Mr & Mrs Jardine who own Remarkables Station. The runway is located between the Jardine's Homestead and the Jack's Point Development as shown in Figure 1 below.

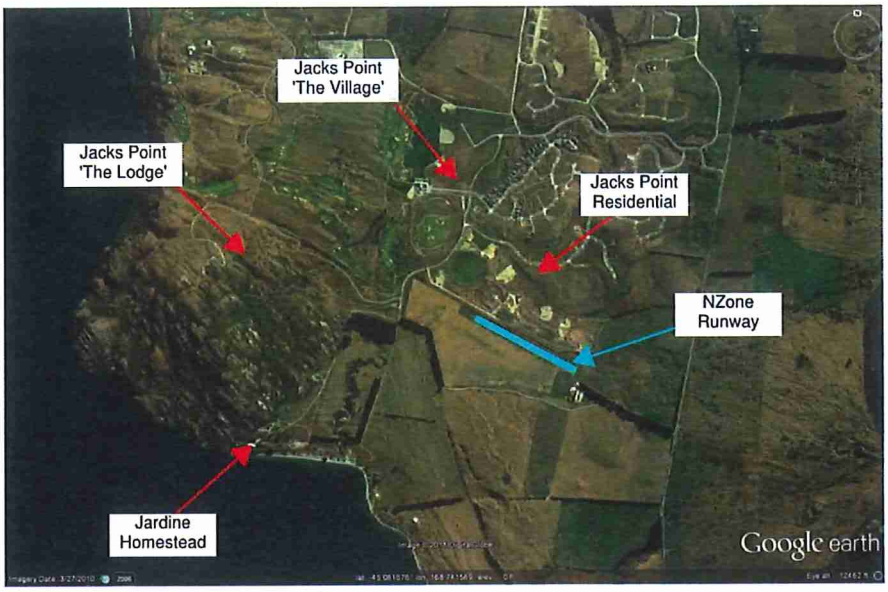

Figure 1 – Site Location

[18] This airstrip is unusual in that only 'one end' of the runway is used. The aircraft involved with the parachute activity take-off to the west and land from the west exclusively – there are no flights operating over the State Highway. The piston engine aircraft originally used by Skydive, used a flight track taking-off over Jack's Point and then doing a 'zig zag' climb close to the Remarkables. The turbine powered aircraft used over recent years use much straighter take-off and landing tracks and then climb to their 'jump altitude' over Lake Wakatipu..

[19] The old piston aircraft had a much slower rate of climb in comparison with the turbine powered aircraft. This effect is shown graphically in Figure 2 below with the climb and descent times for 15,000ft shown. This means that the length of time that aircraft are audible in the distance is significantly shorter than before.

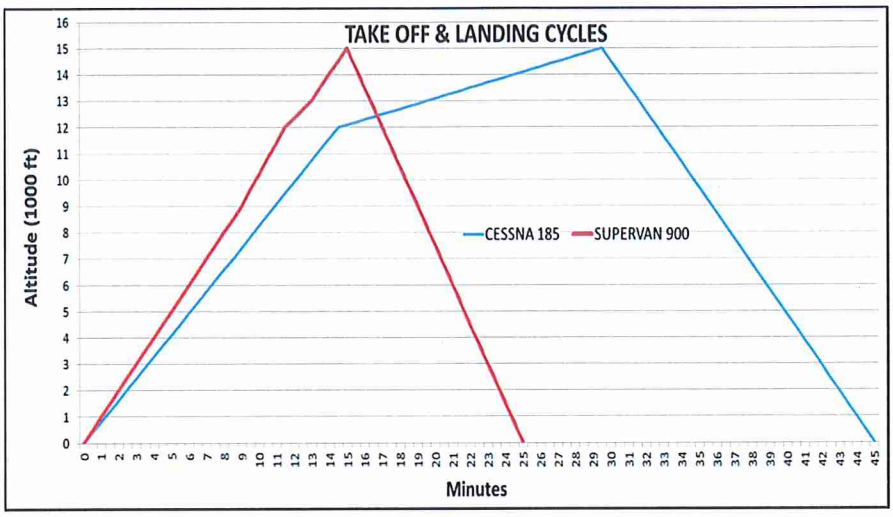

Figure 2 – Aircraft Climb and Descent Profiles

[20] Skydive was originally granted consent for the parachute operation in 1997 with a number of conditions of consent including Condition 4 which restricts the number of daily flights to a maximum of 35. It is understood that the intent of Condition 4 was to control the potential adverse noise effects from the parachute aircraft taking-off and landing.

[21] The aircraft originally operating at the site under the conditions of consent, were the Cessna 185 and the Cessna 206, both relatively noisy piston powered aircraft. In approximately the year 2000, the company started operating a Cresco 750 turbine aircraft which is significantly quieter than the original Cessna piston aircraft. More recently, the company has been replacing the Cresco with Cessna Supervan turbine aircraft. Skydive now own two Supervans and the last Cresco is up for sale. The Supervan is also significantly quieter than the originally operated piston aircraft by approximately 12dB to 20dB.

[22] Because the current aircraft are significantly quieter than those originally used at the time of consent, a 'flight numbers' control does not appropriately control the effects from the activity. The widely accepted principle that noise exposure and community response from aircraft noise, is based on a combination of the total

number of flights **and** the noise level from individual aircraft movements provides in my opinion a more appropriate approach.

CONCLUSION

[23] In my opinion the proposed controlled activity rule to allow specific applications to be assessed for compliance against Rules 36.5.13 and 36.5.14 is a sensible approach – why else are these rules in the Plan.

[24] The proposed rule allows an 'effects based' assessment and provides a useful adjunct to the simplistic and conservative permitted activity Rules 21.5.25 and 21.5.26.

APPENDIX A - GLOSSARY OF TERMINOLOGY

dBA	A measurement 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_{eq}	The time averaged sound level (on a logarithmic/energy basis) over the measurement period (normally A-weighted).
L_{dn}	The day-night sound level which is calculated from the 24 hour L_{eq} with a 10 dBA penalty applied to the night-time (2200-0700 hours) L_{eq} (normally A-weighted).
L_{95}	The sound level which is equalled or exceed for 95% of the measurement period. L_{95} is an indicator of the mean minimum noise level and is used in New Zealand as the descriptor for background noise (normally A-weighted).
L_{10}	The sound level which is equalled or exceeded for 10% of the measurement period. L_{10} is an indicator of the mean maximum noise level and is used in New Zealand as the descriptor for intrusive noise (normally A-weighted).
L_{01}	The sound level which is equalled or exceeded for 1% of the measurement period (normally A-weighted).
L_{max}	The maximum sound level recorded during the measurement period (normally A-weighted).
L_{peak}	The peak instantaneous pressure level recorded during the measurement period (normally **not** A-weighted).
Noise	A sound that is unwanted by, or distracting to, the receiver.
NZS 6801:2008	New Zealand Standard NZS 6801:2008 *"Measurement of Environmental Sound"*
NZS 6803P:1984	New Zealand Standard NZS 6803P:1984 "The Measurement and Assessment of Noise from Construction, Maintenance and Demolition Work".
Ambient Noise	Ambient Noise is the all-encompassing noise associated with any given environment and is usually a composite of sounds from many sources near and far.