BEFORE THE HEARING COMMISSIONERS AUCKLAND

IN THE MATTER OF the Resource Management Act 1991 (the Act)
AND
IN THE MATTER Waikato District Plan – Mercer Airport

STATEMENT OF EVIDENCE OF RHYS LEONARD HEGLEY ON BEHALF OF

MERCER AIRPORT

Acoustics

17 February 2021

INTRODUCTION

Qualifications and experience

- My full name is Rhys Leonard Hegley. I am a partner at Hegley Acoustic Consultants. I hold a Bachelor of Engineering from the University of Auckland (1993) and have attended specialist courses in acoustics in Australia and America. I am a Chartered Acoustic Engineer and I am a member of the Institution of Professional Engineers New Zealand.
- 2. For the last 20 years I have specialised in the measurement and assessment of noise. This work has included the preparation of reports for resource consent applications and notices of requirement and attendance at council hearings, the Environment Court and Boards of Inquiry.
- 3. I have advised on a wide range of activities from the development of business activities such as childcare centres, service stations and workshops through to large scale industrial activities such as petrochemical plants, power stations, dairy factories and roading projects. Included in this work has been the prediction of noise from both airports and heliports and compliance monitoring of helicopters.
- 4. I confirm that the evidence I present is within my area of expertise and I am not aware of any material facts which might alter or detract from the opinions I express. I have read and agree to comply with the Code of Conduct for expert witnesses as set out in the Environment Court Consolidated Practice Note 2014. The opinions expressed in this evidence are based on my qualifications and experience and are within my area of expertise. If I rely on the evidence or opinions of another, my evidence will acknowledge that position.

Involvement with Mercer Airport

 My involvement with Mercer Airport began in 2012 when I prepared evidence for an alteration to the Airport's existing 1986 consent conditions. More recently, I prepared noise contours for operations of the Airport for inclusion in the Waikato District Proposed District Plan (PDP) and which are the subject of this evidence.

Purpose and scope of evidence

- 6. In my evidence I will:
 - a. Identify the approach taken for managing the effects of aircraft noise;
 - b. Provide suggested air noise contours for Mercer Airport; and
 - c. Provide comments on the suggested noise rules to be included in the Proposed Waikato District Plan.

Managing Noise from Airports

7. By their nature, the noise from aircraft activities is not readily mitigated meaning that management of airports is currently considered best practice for addressing noise effects to the community. This approach is described by NZS 6805:1992 Airport Noise Management and Land Use Planning ("NZS 6805") which, broadly speaking, describes suitable land uses based on the expected levels of aircraft noise. My evidence provides a description of the assessment I undertook in accordance with NZS 6805 and its outcome.

NZS 6805

- 8. The approach used by NZS 6805 is to develop contours about the airport that describe noise from aircraft activities. The contours represent levels of aircraft noise for an average day over the busiest three month period using the L_{dn} noise metric.
- The L_{dn} is an average noise level over a 24 hour period after the addition of 10dB to the sound levels at night (10pm – 7am) to take into account the increased effects of night time activities.
- 10. Based on aircraft noise generally reducing with distance from the airfield, there must logically be an area around airfield that receives relatively high levels that are incompatible with noise sensitive activities such as dwellings.

NZS 6805 describes this as the 65dB L_{dn} noise contour and refers to it as the airnoise boundary. Proposed Rule 7.2 of the Mercer Airport submission is that any habitable building proposed inside the airnoise boundary would be a restricted discretionary activity. I agree with this approach.

- 11. Beyond the airnoise boundary, the lower levels of aircraft noise make it practical to incorporate mitigation into noise sensitive activities to ensure an appropriate level of amenity. The resulting area is bounded by the 55dB L_{dn} noise contour and referred to as the outer control boundary, beyond which aircraft noise is too low to warrant specific consideration.
- 12. Proposed Rule 7.1(1) would require that any dwelling constructed within the outer control boundary be designed to achieve an internal level of no more than 40dB Ldn from aircraft noise. This matches the recommendations of NZS 6805, which I consider acceptable. Parts (3) and (4) of the rule relate to situations where the windows of any future dwellings must remain closed to control internal noise levels. These parts to the rule address the resulting ventilation requirements, which represent best practice and which I also support.
- 13. It is my view that the approach described by NZS 6805, and the proposed plan change, is current best practice for managing noise from airports. It firstly provides protection to the airport from reverse sensitivity effects whereby new users to the area could otherwise result in pressure on the legitimate activities of the airport. At the same time, the approach provides a mechanism to ensure surrounding rural activities are protected by ensuring that aircraft noise levels remain within appropriate limits.

Aircraft Noise Prediction

14. The airnoise boundary and the outer control boundary were predicted using the Integrated Noise Model, version 7.0c ("INM") computer prediction program, which is recommended by NZS 6805. This program has been developed solely for the prediction of aircraft noise and is used throughout New Zealand and extensively throughout the world. INM essentially assigns aircraft types to the different flight tracks and predicts the resulting levels of noise. The process to define the aircraft and tracks is set out below.

RUNWAYS

- The runway at Mercer Airport is 09 27 with 30% of the fixed wing movements using 09 and the remaining 70% on 27.
- 16. The current runway is 750m long and the proposal is to extend it to the east at some point in the future for a total length of 1360m. The western threshold will remain static. Both runway lengths were modelled and the contours presented are an envelope of each runway.
- 17. The Airport helipad is located at the western end of the runway.

TRACKS

There are a number of defined tracks to and from each runway and these are not expected to change. The split of aircraft using the various tracks is provided in Appendix A to my evidence.

AIRCRAFT MOVEMENTS

- 18. NZS 6805 requires assessment over the busiest three month period at some future design year. For assessment, this has been taken as the 100 daily movements specified by the existing 1986 consent condition assuming that there will be 50 take-offs and 50 landings. It is understood that this number of movements provides for the potential growth of the Airport.
- 19. As a training exercise, aircraft from other airfields sometimes approach Mercer as if to land, but rather than touching down, fly along the runway at an elevation of approximately 30m before departing again. While similar to a touch and go, this activity is outside of the control of Mercer Airport as the aircraft do not land. They are therefore not included in the 100 movements described above. While not part of the Airport, these overflights will contribute to the noise that is only present because of the Airport. As a

result, these activities have been estimated and included. On advice from the operators of the Airport, 20 overflights per day have been included in my analysis.

AIRCRAFT TYPES

20. The airfield operators have provided information as to the types of aircraft that currently use or are predicted to use the Airport at some point in the future. This information is summarised in **Appendix B** as a percentage of the total movements.

DAY / NIGHT MOVEMENTS

21. While not currently catered for, the proposal is for an estimated 5% of future movements being at night time (other than the Catalina). As described above, night time flights have 10dB added to the resulting levels before those levels are averaged. This effectively makes one night time flight equivalent to 10 day time lights.

Airnoise and Outer Control Boundaries

22. The resulting airnoise and outer control boundaries are as follows:



Figure 1. Proposed Airnoise and Outer Control Boundaries 6

- 23. This Figure matches that of proposed Rule 7.1.
- 24. Figure 1 shows that currently, there are no houses within the 65dB L_{dn} airnoise boundary. A dwelling at 590A Koheroa Road is within the 55dB L_{dn} outer control boundary but is owned by Mercer Airport. Lot 2 DP 407229 Koheroa Road is also within the outer control boundary, as shown on Figure 1. Further analysis shows that for the future 100 movements, the level of aircraft noise to this site would be 56dB L_{dn}. Given that for the year end 31 March 2020, there were, on average, 9 movements per day, the current noise level would be well below 55dB L_{dn}. Based on the information used to predict aircraft noise, there could be up to 79 movements per day (averaged over 3 months) for a level of 55dB at this property.
- 25. The predicted exceedance of the modelled contour (for 100 movements) is relatively small (a 1dB change in level would be unnoticeable by the average person). However, given that this level exceeds the 55dB threshold recommended for aircraft noise, my view is that some provision should be made in the Plan Change to address this issue, should it arise.
- 26. At the time of writing my evidence, I understand the owner of the neighbouring property is being consulted. Absent a particular agreement with the property owner, the typical method of mitigation would be through an offer to upgrade the acoustic performance of the dwelling to the same standard as would be required of any new dwelling to be constructed within the outer control boundary. This could be included as a property specific rule in the Plan Change, triggered where there were routinely more than say 70 movements per day. An example of such a rule could be set out as follows:

If Mercer Airport exceeds 70 flight movements per day averaged over a 3 month period, the opportunity for acoustic insulation shall be offered to the owners of the dwelling on Lot 2 DP 407229. The acoustic insulation shall be sufficient to achieve an internal noise level of L_{dn} 40 dBA in habitable rooms and if accepted, will be installed at Mercer Airport's expense. However, if the offer of acoustic insulation is not

accepted within 2 months of it being made in writing, then the requirements of this rule shall be considered to have been met.

- 27. The above analysis is based on the predicted Airport activity and is largely based on an expansion of the current movements. The Airport is also looking to develop a market for the servicing of small passenger jets. Given the anticipated sporadic and infrequent nature of future jet movements to the Airport, it was not considered necessary or appropriate to include their effects within the contours represented above. The reason for this is that when averaged over three months, the relatively infrequent jet movements, which by themselves would be relatively noisy, would not provide contours that accurately described the effects.
- Instead, it was decided to provide controls for the daily Airport operations
 (Figure 1) and then address jet noise separately as set out below.
- 29. The noise from a single jet movement could easily be calculated as a L_{dn} in the same way that the remaining movements at the Airport have been. The issue here is that the single movement, which might produce audible levels of noise over several minutes, would be averaged over an entire 24 hour period with no noise during the remaining time. The effect of this would be to report levels that are numerically low. Instead, I have selected a 15 minute averaging period to try and provide a more realistic understanding of what level of noise neighbours could expect.
- 30. The type of jet visiting the Airport will be limited by the length of the runway. Regardless, this still leaves a range of aircraft that would access the Airport and analysis has been based on a typical jet, the Cessna Citation. The following Figure 2 shows the resulting noise levels for a single movement on the various arrival and departure tracks associated with runway 09. Arrivals from all tracks produce similar noise contours while the louder departures vary by track. The Figure adopts the 55dB L_{Aeq} contour to provide an indication as to the extent of noise levels.



Figure 2. Jets on Runway 09

31. The corresponding contours for runway 27 are:



Figure 3. Jet Arrivals and Departures on Runway 27

32. From Figures 2 and 3, I have concluded that while noise levels from an individual jet movement will not be unreasonable to surrounding dwellings,

it will be clearly audible. In terms of mitigating effects, limiting movements so that they are both random and intermittent is considered reasonable. The proposal is for no more than 40 jet movements per year (ie 20 arrivals and 20 departures). It is relevant that the noise from arrivals is significantly less than from departures (which would be approximately 20 per year) and that those departures would be likely spread over both runways and the various tracks associated with each runway.

- 33. Based on this, I support proposed rule 29.2.12 which permits up to 40 jet movements per 12 month period. I suggest it could be strengthened by limiting jet movements to the daytime and excluding ex-military jets. My suggestion is:
 - a) The use of Mercer Airport for no more than forty (40) jet movements (20 flights) per 12-month period. <u>Jet movements shall be limited to</u> <u>between the hours of 7am and 10pm. Ex-military jets are not permitted</u> <u>to use Mercer Airport.</u>

Conclusions

34. It is my conclusion that the addition of the proposed airnoise and outer control boundaries to the Waikato District Plan and the subsequent rules addressing the construction of dwellings within each boundary will provide an appropriate mechanism through which to address the noise effects from the operations of Mercer Airport. This approach is commonly used throughout New Zealand in response to the dual requirements of protecting airport operations while at the same time ensuring appropriate noise levels to the surrounding rural community.

Rhys Hegley 17 February 2021

Appendix A – Track Usage

Runway	Operation	Track	Usage
09	Approach/	North	60%
	Departure	East	10%
		South	10%
		South Overhead	20%
	Departure	North	60%
		East	10%
		South	30%
27	Approach	North	10%
		North Overhead	50%
		East	10%
		South	10%
		South Overhead	20%
	Departure	North	50%
		North Overhead	10%
		East	5%
		Mercer	5%
		South	30%

Table 1. Fixed Wing Tracks and Usage

The exception to the above is the Cresco, which is dedicated to skydiving. This aircraft departs on specific tracks from 09 and 27 that end above the airfield. The Cresco approaches on the standard track of the appropriate as described in the table immediately above.

Table 2. Helicopter Tracks and Usage

Pad	Operation	Track	Usage
1	Approach	North	65%
		South	35%
	Departure	North	65%
		South	35%

Table 3. Over-flight Movements

Runway	Operation	Track	Usage
09	Over-flight	North	63 ¹ / ₃ %
		East	0%
		South	13 ¹ / ₃ %
		South Overhead	23 ¹ / ₃ %
27	Over-flight	North	12.5%
		North Overhead	52.5%
		East	0%
		South	12.5%
		South Overhead	22.5%

Appendix B – Aircraft Usage

Generic Aircraft Type	INM Aircraft Type	% Usage
Single Engine, Fixed	CNA172	24.5
Pitch	GASEPF ¹	24.5
Single Engine, Variable	CNA182	16.8
	Cresco	4.2
Twins	BEC58P	5.0
	DHC6	5.0
Caltilina	DC3	5.0
Helicopter	A109	3.0
	AS355	3.0
	EC130	3.0
	R44	3.0
	S70	3.0

1. Generic INM aircraft