

Before an Independent Hearings Panel
appointed by the Waimakariri District Council

under: the Resource Management Act 1991

in the matter of: Submissions and further submissions in relation to the
proposed Waimakariri District Plan, Variation 1 and
Variation 2

and: Hearing Stream 7: Residential, Large Lot Residential,
Ecosystems and Indigenous Biodiversity, Variation 1
and Variation 2

and: **Christchurch International Airport Limited**
Submitter 254

Summary Statement of Laurel Smith (Acoustics)

Dated: 17 September 2024

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SUMMARY STATEMENT OF LAUREL SMITH

INTRODUCTION

- 1 My name is Laurel Jean Smith and I am a consultant at Marshall Day Acoustics Limited. I have undertaken noise prediction and provided consulting advice for a number of airports across New Zealand.
- 2 I prepared a brief of evidence addressing the relief sought by Christchurch International Airport Limited (*CIAL*) on the proposed Waimakariri District Plan and the Variation as relevant to Hearing Stream 7. This summary statement focuses on matters relating to Christchurch City Council's Intensification Planning Instrument, Plan Change 14 (*PC14*).
- 3 In preparing this summary I have also reviewed the legal submissions filed on behalf of Momentum Land Limited and Mike Greer Homes NZ Limited. The legal submissions reference several paragraphs of the PC14 IHP Recommendations Report. My summary accordingly addresses:
 - 3.1 the adverse health effects of aircraft noise;
 - 3.2 outdoor noise effects and the limitations of acoustic insulation; and
 - 3.3 potential operational restrictions as a result of reverse sensitivity effects.

ADVERSE HEALTH EFFECTS OF AIRCRAFT NOISE

- 4 The Momentum/Mike Greer legal submissions refer to paragraph 312 of the PC14 IHP Recommendations. I do not agree with some of the IHP conclusions relating to health effects. In my view, in paragraph 312, the IHP has mistakenly understood high annoyance, in the context of aircraft noise effects, to relate simply to an amenity effect and not a significant one. On the contrary, the 2018 WHO guidelines identify high annoyance as a health effect.
- 5 One of the main objectives of airport noise management is to minimise noise effects on people, such effects causing adverse effects on people's health. The main points from my evidence in chief (*EIC*) in this respect are:
 - 5.1 High annoyance is a widely recognised measure of transportation noise effects that is defined as a health effect.
 - 5.2 The 2018 WHO guidelines recommend reducing aircraft noise exposure to below 45 dB L_{dn} as aircraft noise above this level is associated with adverse health effects.

- 5.3 Sleep disturbance is an adverse health effect related to aircraft noise and is particularly relevant for Christchurch International Airport (*Christchurch Airport*) which operates 24 hours a day.
- 5.4 The 2018 WHO guidelines recommend reducing night-time aircraft noise exposure to below 40 dB L_{night} as aircraft noise above this level is associated with adverse effects on sleep.
- 5.5 The 2018 WHO guidelines are generally considered aspirational and difficult to implement retrospectively. However, in my opinion the targets are relevant when considering decisions relating to changes in land use that would increase residential intensification above these noise levels.
- 6 Comparing the land use approach at Christchurch Airport against other airports provides a useful benchmark, however I caution that established noise management frameworks are based on older research, are slow to evolve and are often hindered by existing incompatible land use. Such benchmarking compares current practices, but these do not necessarily reflect current knowledge of aircraft noise effects.
- 7 The 50 dB L_{dn} contour used for land use planning around Christchurch Airport is a lower threshold than at most other airports but it is higher than the 2018 WHO recommended threshold, and it covers a smaller area than the WHO night-time threshold. Therefore, in the context of the recent health evidence and WHO recommendations, maintaining land use controls at 50 dB L_{dn} is not overly conservative, instead it is a compromise that does not fully achieve the WHO targets.
- 8 My assessment of noise effects for the May 2023 Remodelled 50 dB L_{dn} Outer Envelope Air Noise Contour shows that the currently permitted increase in residential activity enables an appreciable increase in adversely affected residents in Waimakariri. Relaxing the operative density controls would increase this even further.
- 9 I consider that paragraph 211 of the IHP Recommendations report in fact supports my view that decision-makers rely on objective data and that ultimately, increasing the size of the affected population influences the future balance of health and air transport outcomes.
- 10 In my EIC, I referred to the report of Professor Charlotte Clark filed for CIAL which sets out the current knowledge regarding the health effects of aircraft noise exposure. I note that Professor Clark's report is not being considered by the Hearings Panel at this time. However, I confirm that my EIC I discuss the health-related effects

of aircraft noise, in particular annoyance and sleep disturbance, and the current methods for quantifying these.

ACOUSTIC INSULATION

- 11 The PC14 Recommendations include acoustic insulation as a (primary) means of addressing aircraft noise effects. In my view, acoustic insulation does not mitigate all the effects of aircraft noise, and it introduces compromised living conditions.
- 12 My EIC sets out several reasons why I consider that acoustic insulation is an inferior outcome for residents and is less effective than avoiding airport noise effects through appropriate land use controls. In particular, acoustic insulation requires windows and doors to be closed which then requires mechanical ventilation and thermal control. In New Zealand, this is a compromise with associated operation costs, undesirability of living/sleeping in air-conditioned spaces, and disconnection from the outdoors.
- 13 Fundamentally, acoustic insulation does not address noise effects in outdoor living environments.

AIRPORT OPERATIONAL RESTRICTIONS

- 14 The Momentum/Mike Greer legal submissions refer to paragraph 312 of the PC14 Recommendations report, where the IHP considers that the only mechanism by which reverse sensitivity could affect airport efficiency is by frequent and persistent complaints from residents forcing the airport to scale back its lawfully established activities. As described in my EIC, there are many ways that operational restrictions are imposed on airports. The international and New Zealand experience clearly demonstrates many examples of airport operations being constrained due to noise effects. The ICAO Balanced Approach was developed in response to an increasing trend in airport restrictions being imposed.
- 15 In paragraph 209 the IHP finds that *a high proportion of residents being highly annoyed is not itself conclusive as to the extent of any associated reverse sensitivity risk*. I address the issue of conclusive evidence of reverse sensitivity risk below.
- 16 One of the main objectives of airport noise management is to minimise operational restrictions on airports. It is widely recognised that exposing more people to adverse noise effects increases the risk of future airport operational restrictions as evidenced by noise management frameworks worldwide seeking to minimise incompatible land use near airports.
- 17 At recent hearings, I and other experts have been asked for evidence that allowing residential intensification inside 50 dB L_{dn} will

lead to reverse sensitivity effects which will result in operational restrictions on Christchurch Airport. I believe it would be difficult for any infrastructure operator to provide conclusive evidence that reverse sensitivity effects will restrict operations. In my view, assessing the risk of operational restrictions can be guided by the following considerations:

- 17.1 Evidence of reverse sensitivity and operational restrictions occurring elsewhere; and
 - 17.2 Evidence of adverse noise effects that could be relied on to warrant operational restrictions.
- 18 In my EIC I provide many examples where aircraft noise effects on residential communities have resulted in operational restrictions being imposed on airports including restrictions on lawfully established operations.
- 19 In these case studies, the affected airports were not able to predict that operational restrictions would be imposed. I am not aware of a mathematical relationship between the size of an affected population and probability of operational restrictions therefore I cannot quantify the probability of reverse sensitivity. However, there are methods to quantify and monetise health effects from aircraft noise and in my view, it makes sense to use the same method to assess the risk of reverse sensitivity effects.
- 20 When a community rallies to oppose airport operations for whatever reason, and an inquiry takes place, then authorities rely on assessing the noise effects objectively. Decision-makers must determine whether health outcomes outweigh air transport outcomes. The size of the affected population controls the ultimate health cost in this assessment. Therefore, it follows that enabling an increase in affected population has an impact on future decisions involving airport operational restrictions.

CONCLUSIONS

- 21 There is clear evidence of adverse health effects from aircraft noise exposure at 50 dB L_{dn} . Increasing the number of residents inside the 50 dB L_{dn} contour would increase the health effects which in turn increases the risk of operational restrictions on the airport. Acoustic insulation cannot be relied on to solve the issue. Therefore, from a noise effects and airport safeguarding perspective, I support land use controls that minimise the number of residents inside the May 2023 Remodelled 50 dB L_{dn} Outer Envelope Air Noise Contour.

Dated: 17 September 2024

Laurel Smith