

Before an Independent Hearings Panel
appointed by Christchurch City Council

under: the Resource Management Act 1991

in the matter of: the hearing of submissions on Plan Change 14 (Housing
and Business Choice) to the Christchurch District Plan

and: **Christchurch International Airport Limited**
Submitter 852

Rebuttal evidence of Christopher Day (acoustics)

Dated: 14 November 2023

Counsel: A M Lee (annabelle.lee@chapmantripp.com)
J M Appleyard (jo.appleyard@chapmantripp.com)

chapmantripp.com
T +64 3 353 4130
F +64 4 472 7111

PO Box 2510
Christchurch 8140
New Zealand

Auckland
Wellington
Christchurch



REBUTTAL EVIDENCE OF CHRISTOPHER DAY

- 1 My full name is Christopher William Day.
- 2 I provided a statement of evidence in relation to the relief sought by Christchurch International Airport Limited (*CIAL*) in relation to the proposed Plan Change 14 (Housing and Business Choice) to the Christchurch District Plan (*PC14*) dated 20 September 2023 (*primary evidence*). My qualifications, experience and involvement with *CIAL* are set out in my primary evidence and I do not repeat those here.
- 3 I also participated in the expert conferencing on airport noise for *PC14* and am a signatory of the joint witness statement (*Airport Noise JWS*) dated 7 November 2023.

CODE OF CONDUCT

- 5 Although this is not an Environment Court hearing, I note that in preparing my evidence I have reviewed the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2023. I have complied with it in preparing my evidence on technical matters. I confirm that the technical matters on which I give evidence are within my area of expertise, except where relying on the opinion or evidence of other witnesses. I have not omitted to consider material facts known to me that might alter or detract from my opinions expressed.

SCOPE OF EVIDENCE

- 6 My rebuttal evidence responds to briefs of evidence from and the expert conferencing with Professor John-Paul Clarke on behalf of Miles Premises Ltd and Equus Trust.
- 7 My colleague, Ms Laurel Smith, responds to briefs of evidence from and the expert conferencing with Professor Clarke and Dr Stephen Chiles on behalf of Waka Kotahi NZ Transport Agency.
- 8 In summary, my rebuttal evidence addresses:
 - 8.1 Matters agreed and disagreed between experts in the Airport Noise JWS and my position in relation to those matters; and
 - 8.2 Professor Clarke's position on reverse sensitivity effects and his evidence as it relates to noise annoyance trends and acceptable exposure limits.

CONFERRING AND THE JOINT WITNESS STATEMENT

- 9 It is firstly useful to highlight the three issues agreed by all five experts in the Airport Noise JWS:
- 9.1 The 'Balanced Approach' to reducing the effects of aircraft noise includes four tools;
- (a) Land use planning (e.g. density controls and sound insulation);
 - (b) Source noise reduction (e.g. technology advances and aircraft type restrictions);
 - (c) Operational flight procedures (e.g. flight tracks and noise abatement procedures); and
 - (d) Operational restrictions (e.g. curfews and restrictions on total aircraft movements).
- 9.2 Four out of five experts agreed (Mr Styles "generally") that the World Health Organisation (WHO) 2018 curve provides a reference for aircraft noise annoyance response (18% to 27% Highly Annoyed at 50 to 55 dB Ldn). Professor Clarke considers that the Gjestland 2020 curve is a reasonable compromise (10% to 15% Highly Annoyed at 50 to 55 dB Ldn). The experts differ on what this data means in terms of planning outcomes in the Christchurch context.
- 9.3 The operative District Plan internal design criterion (40 dB Ldn) can be achieved by normal construction methods with open windows - no mitigation is required (in the noise band 50 to 55 dB Ldn).
- 10 The main issue of disagreement appears to be that Professor Clarke, Dr Chiles and Mr Styles consider that density controls are not required to reduce the effects of aircraft noise and that sound insulation and ventilation will solve the noise issues. As explained in my primary evidence, I disagree with this approach as it does not solve the outdoor noise problem. Also, people like to open their windows (negating any sound insulation). It is interesting to note that all experts agreed that "*a disadvantage of insulation options is that windows must be kept shut*" (Airport Noise JWS).
- 11 In addition to these reasons, I provide the following review of the conferencing discussions:
- 11.1 Having agreed that the research shows that 10% to 27% of people are Highly Annoyed in the 50 to 55 dB Ldn noise band, Professor Clarke, Dr Chiles and Mr Styles are of the opinion

that this annoyance is caused to some extent by non-acoustical factors (NAF). The experts provide no research or data to show how much of the annoyance is due to NAF and how much is due to noise effects.

- 11.2 The experts then go on to suggest that, as the annoyance is due to NAF, there is no need for density controls (even though this is an agreed tool for reducing noise effects).
- 11.3 It is then interesting to note that the way the experts propose to reduce annoyance (caused by NAF) is to provide houses with additional sound insulation. This approach appears flawed as sound insulation will reduce noise levels - not NAF.
- 11.4 In addition, even if the agreed levels of annoyance were totally due to NAF (which is not the case) then this annoyance would be reduced by keeping people away from the flight tracks – by avoiding intensification in these areas.
- 11.5 A further anomaly in the 'sound insulation solves the problem' approach arises because the operative District Plan internal noise requirement of 40 dB Ldn can be met with a standard house construction with windows open – no noise mitigation will be imposed by the planning framework for new dwelling intensification within the 50 to 55 dB Ldn band. During conferencing the experts suggested that designing to lower internal noise criteria could be required. I understand that this is not within the scope of this hearing. In any case, as discussed previously, sound insulation doesn't solve the outdoor area and open window issues – it is partial mitigation.

RESPONSE TO PROFESSOR CLARKE

- 12 During conferencing it was agreed that each witness would write two sentences for the Airport Noise JWS on their opinion on 'reverse sensitivity for airports'. In his third sentence on reverse sensitivity, Professor Clarke states; "*There are many competing factors that drive annoyance, and it is not clear that the relationship between densification and annoyance is both non-linear and increases monotonically.*" This statement is inconsistent with Professor Clarke's acceptance of the 'Balanced Approach', which incorporates density controls, as set out above.
- 13 NZS 6805 also recommends avoiding intensification inside the OCB – one of the fundamental principles of the Standard.
- 14 Schiphol Airport in the Netherlands is incurring significant costs and constraints on efficiency to reduce the number of people inside their noise contours by way of noise abatement measures, as explained

in my primary evidence. This real-world example begs the question why would you willingly allow a currently well protected airport to be compromised at this stage by intensification which would increase the number of people inside the noise contours.

- 15 Professor Clarke disagrees with my conclusion that annoyance due to aircraft noise has increased over the last 20 years. In paragraph 59 of his evidence, he states *"In contrast to these conclusions, the prevalence of high annoyance with aircraft noise has been stable over a long period of time, and there are no indications that people today are more annoyed by aircraft noise than they were, say, 25 or 50 years ago."* I disagree with this statement.
- 16 Firstly, the Gjestland 2020 annoyance curve preferred by Professor Clarke shows levels of annoyance that are double the Miedema 2001 curve at 50 dB Ldn.
- 17 Secondly, the Boeing graph in my primary evidence (Figure 3: Growth in Airport Noise Restrictions) shows a very significant growth over time in constraints on airports to reduce noise, despite the significant reduction in individual aircraft noise emissions. These constraints, which compromise airport efficiency, are due external pressure arising from annoyance due to aircraft noise (and other factors) – reverse sensitivity at work.
- 18 In paragraph 125, Professor Clarke states; *"No data has been presented that should warrant a change in today's policies regarding acceptable exposure limits for aircraft noise."* On this basis, the operative District Plan philosophy to new noise sensitive development within the 50 dB Ldn contour should be maintained.
- 19 My colleague Ms Smith addresses Professor Clarke's disagreement with the modelling projections (ultimate capacity and speculative quiet aircraft) in her rebuttal evidence. I agree with her comments.

CONCLUSION

- 20 Not allowing intensification in the noise contours avoids those residents being exposed to aircraft noise and the potential reverse sensitivity effects for the airport. Partial mitigation (sound insulation and ventilation) does not solve all the issues. If there is land available elsewhere to meet the housing demands, I recommend maintaining the current planning regime to reduce/minimise the adverse effects of noise on people.

Christopher Day

14 November 2023