

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of Notices of Requirements for new designations by Wellington International Airport Ltd for the Main site area (SR455891) and the East side area (SR462159)

**STATEMENT OF EVIDENCE OF STEPHEN GORDON CHILES
FOR REGIONAL PUBLIC HEALTH
IN RELATION TO ACOUSTICS**

12 May 2021

QUALIFICATIONS AND EXPERIENCE

1. My full name is Dr Stephen Gordon Chiles. I am self-employed as an acoustician through my company Chiles Ltd. I have been employed in acoustics since 1996, as a research officer at the University of Bath, a principal environmental specialist for Waka Kotahi NZ Transport Agency, as a consultant for the international firms Arup, WSP, and URS (now AECOM), and specialist firms Marshall Day Acoustics and Fleming & Barron.
2. I am currently subcontracted by Southern Monitoring Services to provide the Environmental Noise Analysis and Advice Service, advising the Ministry of Health and public health services on environmental noise.
3. I have degrees of Doctor of Philosophy in Acoustics from the University of Bath, and Bachelor of Engineering in Electroacoustics from the University of Salford. I am a Chartered Professional Engineer in acoustics and a Fellow of the UK Institute of Acoustics. I am a certified independent commissioner.
4. I was previously employed by the UK Royal Air Force and worked on a wide range of airport environmental noise assessment and control matters. I was a commissioner, hearing plan changes and notices of requirement relating to aircraft noise at Queenstown and Wanaka Airports. I was engaged by the Christchurch City Council to advise on district plan noise controls for Christchurch International Airport. I worked for a developer regarding potential noise issues from Omaka Airfield, and for the Queenstown Lakes District Council with respect to proposed district plan aircraft noise provisions and for numerous airfields and helicopter landing areas. I have worked on a wide range of infrastructure projects in addition to airports. I have extensive experience drafting noise controls in plans and conditions, implementing noise controls, and auditing/reviewing their practicality and effectiveness.
5. I am the noise discipline lead for the Ministry of Transport, *Domestic Costs and Charges Study*, including airport noise health effects, and I am a member of steering groups for Waka Kotahi research projects: *Social cost (health) of land transport noise exposure in New Zealand* and *Community response to noise*. I have extensive experience in the application of health based (and other) criteria for environmental noise.

6. I am convenor of the New Zealand reference group for "ISO" acoustics standards, an observer of the "IEC" committee for acoustics instrumentation standards, and a member of joint Australian and New Zealand committees for acoustics standards. I was Chair of the 2012 New Zealand acoustics standards review, Chair for the development of the 2010 wind farm noise standard, and a member for the 2008 general environmental noise standards. I am a member of the World Road Association (PIARC) technical committee for noise.

SCOPE OF EVIDENCE

7. I advised Regional Public Health (RPH) regarding its submissions relating to environmental noise, including the detailed reasons set out for each submission point.
8. My evidence provides independent information relating to operational noise exposure of residents around Wellington International Airport, and the efficacy of proposed designation conditions for managing that noise and its effects on residents. My evidence should be read in conjunction with that of Stephen Palmer, which addresses the public health effects arising from airport noise exposure.
9. My evidence addresses operational noise. I have not reviewed construction noise and vibration matters, as there are standard processes to manage those adverse effects.
10. I have read the Marshall Day Acoustics (MDA) report dated 26 February 2020, responses to requests for further information items 15 to 20 (Main site) and 1 to 6 (East side), Wellington Airport Noise Management Plan dated 15 February 2018, evidence of Matthew Borich dated 27 April 2021 (including a summary of submissions relating to noise), and evidence of Laurel Smith dated 5 May 2021. I have also referred to other relevant parts of the Notices of Requirements and associated information.
11. I have not made a site visit specifically in relation to this matter, but I am familiar with the general area. At the time of preparing my evidence I have not specifically visited the properties in Bunker Way and Raukawa Street.

12. I took part in conferencing and contributed to the Joint Witness Statement dated 10 May 2021 with Mr Borich (for Wellington City Council, WCC) and Ms Smith (for Wellington International Airport Ltd, WIAL).
13. Because of the overlap in the timing of my evidence preparation and conferencing, I have focussed my evidence on matters not addressed at conferencing and matters where there is disagreement. For other issues, my opinions are reflected in the reasons set out for each point in the RPH submission.
14. I have relied on the noise modelling and other data prepared by Ms Smith and MDA. I have not made separate measurements or predictions.
15. My evidence will address:
 - a. Airport noise effects,
 - b. Existing controls,
 - c. Main site NoR, and
 - d. East side NoR.
16. While this is a Council hearing, I confirm that I have read and agree to comply with the Code of Conduct for Expert Witnesses in the Environment Court Practice Note 2014. This evidence is within my area of expertise except where I state that I am relying on facts or information provided by another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

AIRPORT NOISE EFFECTS

17. Airports often have a relatively large noise footprint, in part due to the elevation of intense noise sources (aircraft taking off and landing), with sound propagation less impeded by terrain and buildings compared to other activities. People living around an airport may experience disturbance from noise of individual events, and annoyance associated with the overall exposure. There are also other adverse health effects associated with exposure to aircraft noise as set out in the evidence of Dr Palmer.

18. There has been substantial research over an extended period into adverse effects of aircraft noise on people. A rigorous and comprehensive review of this research is summarised in the 2018 World Health Organisation *Environmental Noise Guidelines for the European Region* (the Guidelines). The title of the Guidelines relates to Europe, but they state: *"In terms of their health implications, the recommended exposure levels can be considered applicable in other regions and suitable for a global audience."*
19. In paragraph 159 of her evidence Ms Smith discusses how evidence in the Guidelines is not conclusive, and then states in paragraph 160 that she considers reliance should be placed on NZS 6805. Ms Smith states that National Planning Standards mandate use of NZS 6805 in plan rules. The 2019 *Noise and Vibration Metrics Standard* only mandates the *"noise measurement methods and symbols"* in NZS 6805 (i.e. use of L_{dn} for noise limits), and does not mandate the application of guideline levels or any other aspect.
20. In my experience, the extent of health effects arising from long-term exposure to environmental noise is never determined with absolute certainty. However, when considering the available evidence, the WHO Guidelines made "strong" recommendations, described as:

A strong recommendation can be adopted as policy in most situations. The guideline is based on the confidence that the desirable effects of adherence to the recommendation outweigh the undesirable consequences. The quality of evidence for a net benefit – combined with information about the values, preferences and resources – inform this recommendation, which should be implemented in most circumstances.

21. For aircraft noise the first of three strong recommendations made in the Guidelines is:

For average noise exposure, the GDG [Guideline Development Group] strongly recommends reducing noise levels produced by aircraft below 45 dB L_{den} , as aircraft noise above this level is associated with adverse health effects.

22. A 45 dB L_{den} contour for Wellington International Airport would extend well beyond the light blue 55 dB L_{dn} contour shown in the MDA report figures C1 to C3.

23. In my experience, in existing developed areas it is often impractical to fully comply with WHO Guidelines for environmental noise, even in the medium to long term, due to constraints of cost, other functional requirements, existing urban form and geography. Internationally, I am not aware of any country where all environmental noise immissions comply with WHO guidelines.
24. In my experience, when New Zealand Standards for environmental noise are developed, they consider applicable WHO guidance alongside other information. From this, pragmatic criteria for noise exposure are recommended that provide reasonable protection from noise while allowing for society to function and develop. The criteria in New Zealand Standards are not set to avoid all adverse health effects. In the case of aircraft noise, NZS 6805 gives guidance with reference to exposures of 55 dB L_{dn} and 65 dB L_{dn} . I consider these thresholds remain generally appropriate as pragmatic controls, although in my opinion caution is needed given that much of the large body of research underpinning the recommendations in the 2018 Guidelines (45 dB L_{den}) was not available at the time NZS 6805 was published in 1992.
25. All criteria I have discussed above for aircraft noise relate to the total exposure of residents. Health based immission criteria do not allow for exclusion of certain activity, such as military aircraft. The noise exposure of residents and the resulting effects arise from all aircraft operations. If there is complexity in administering such holistic criteria, in my opinion that is best managed by an airport operator, rather than distorting the criteria by excluding certain activities.
26. In her evidence Ms Smith discusses effects of changes in noise exposure in terms of a 1 dB change being imperceptible and a 4 dB change being just perceptible. I am not aware of any evidence supporting this categorisation of effects in response to changes in long-term environmental noise exposure. In my experience, people can notice and be sensitive to relatively small changes in long-term environmental noise exposure. A change of 3 dB would correspond to twice as many aircraft movements.

EXISTING CONTROLS

27. In accordance with NZS 6805, the district plan includes an "Air Noise Boundary" (ANB) based on a predicted future 65 dB L_{dn} contour. However, the district plan deviates from NZS 6805 in that it does not include an Outer Control Boundary based on a larger 55 dB L_{dn} contour. In my opinion, this means the district plan rules do not address significant adverse noise effects likely to be occurring throughout a wide area around the airport in the 55 dB L_{dn} contour. Let alone the even wider area out to 45 dB L_{den} where the WHO Guidelines indicate adverse health effects.
28. In paragraph 19 of her evidence Ms Smith states "*...and as for all New Zealand airports, the NZS6805 recommendations have been adapted to suit the local situation.*" In my experience, adaptations at other airports generally provide additional more stringent control of noise effects to protect people, such as by extending the Outer Control Boundary to 50 dB L_{dn} (Christchurch), or by requiring additional treatment of existing houses (Auckland, Rotorua and Queenstown). In my opinion those adaptations at other airports are distinctly different to the situation at Wellington where a recommended control has been omitted leaving a known noise effect unaddressed. In my opinion this omission is not somehow counteracted by the partial curfew at Wellington, which due to the L_{dn} metric in fact consequentially allows for disproportionately more daytime activity. Other airports such as Queenstown also have curfews, as well as more stringent controls than recommended in NZS 6805.
29. I understand the shape of the ANB in the district plan is influenced by noise characteristics of older aircraft types that are no longer in use in New Zealand. Therefore, while the ANB does provide a control, this is only based on a critical segment of the ANB and in my opinion it does not represent a realistic noise exposure that a resident could or should expect in future under the district plan. This can be seen by comparing figures C1 and C3 in the MDA report, whereby the contours in figure C3 have a different shape caused by modelling of current rather than outdated aircraft types. I also understand there may be other physical constraints preventing the level of aircraft activity represented by the ANB in the district plan.

MAIN SITE NOR

30. In their respective statements of evidence, Ms Smith (paragraph 27) and Mr Borich (Section 3) appear to have essentially dismissed noise effects associated with the NoR for the Main site. Their approaches seem to reach an immediate conclusion based on a planning/legal interpretation in relation to the existing district plan controls, without considering the actual noise effects experienced by people.
31. For the reasons I have set out above, I consider that there are significant adverse noise effects that are not addressed by the existing district plan controls and are not acknowledged or addressed by the Main site NoR. In accordance with my advice, the RPH submission sought changes to the proposed designation conditions to partially address these significant adverse noise effects. I will discuss two key submission points.
32. RPH submission point 8 recommended adding a requirement for the Noise Management Plan to include procedures to acoustically treat existing houses affected by aircraft noise beyond the ANB. The submission did not seek to prescribe the procedures for treating buildings, but rather left it open for the appropriate extent and practical details to be developed by WIAL. In my opinion, acoustically treating houses, primarily through the provision of ventilation, is a pragmatic mitigation measure that can reduce noise exposure of residents inside their homes and consequently reduce adverse health effects. The evidence of Ms Smith and John Kyle for WIAL does not appear to directly address this submission point on the Main site NoR either way, but from the conditions attached to the evidence of Mr Kyle, I infer it has not been accepted by WIAL.
33. In paragraph 129 of her evidence Ms Smith refers to treatment of existing houses as "best practice" when exposures are 60 dB L_{dn} (i.e. beyond the ANB). This is essentially what is sought in relation to the Main site by RPH submission point 8. Despite explicit acceptance by Ms Smith and Mr Kyle in their evidence of this "best practice" for the East side NoR, there is no discussion or explanation why such practice has not already been implemented for the Main site as a matter of course, and why it is not proposed to be implemented now through the Main site NoR. The examples of such practice at

other airports referenced by Ms Smith all include treatment to address existing airport operations and not just changes to operations.

34. RPH submission point 3 seeks to remove the proposed exclusion of military aircraft from noise controls. In response to this submission point, Ms Smith states in paragraph 30 of her evidence that military aircraft would still be subject to noise limits in the district plan. Such an approach would mean there would be disjoint noise criteria that are not correlated to noise effects on residents, and would make the regulatory system opaque for most people. In my experience implementing and auditing the effectiveness of noise controls, I have found it critical that controls are coherent, transparent and unambiguous. In my opinion this is not achieved by the proposed approach to military aircraft noise being excluded from the Main site NoR. I will discuss the relationship of different controls further with respect to the East side NoR.

EAST SIDE NOR

35. I consider that the East side NoR is fundamentally flawed by the introduction of inconsistent overlapping noise controls with the Main site NoR and the district plan. As I have set out above, for noise controls to be effective I consider it essential for them to be coherent, transparent and unambiguous. Even as an experienced acoustics expert who had studied the proposed East side NoR controls, I found during conferencing that I had not correctly understood how the rules might be applied.
36. I understand that WIAL is proposing:
 - a. Some activity (military aircraft) operating in the Main site designated area to be controlled only under district plan rules, despite the NoR stating there appears to be a lacuna with respect to these rules;
 - b. Most activity on the Main site designated area to be subject to designation conditions that are similar to the district plan rules but not identical; although it isn't clear whether some or all activity could still be selectively operated under the district plan rules rather than designation conditions; and

- c. The same activity on the Main site (other than military aircraft) also to be subject in parallel to different rules when assessed in combination with additional activity on the East side designation.
37. Response to noise can be strongly influenced by non-acoustical factors. While not reducing noise exposure, in my opinion having coherent, transparent and unambiguous noise controls can assist in fostering community acceptance, or at least understanding, of the noise exposure they face. I consider it technically straightforward to implement a regulatory regime that the community can understand, but in my opinion this has not been achieved in any version of the designation conditions for the Main site and East side NoRs.
38. I consider there should be a single set of noise controls. If for legal/planning reasons different aspects/areas of the airport operations need to be authorised through different designations/plans, as a minimum, I consider exactly the same controls (including control lines) should be duplicated under each designation and the district plan. In my opinion, criteria and requirements for monitoring and reporting should apply to noise from all activity at the airport, as received by residents, without distinction as to where/how it arose.

Dr Stephen Chiles
12 May 2021