

BEFORE AN INDEPENDENT HEARINGS PANEL
THE PROPOSED WAIKATO DISTRICT PLAN (STAGE 1)

UNDER the Resource Management Act 1991 (the Act)

IN THE MATTER OF Hearing 10: Residential Topic (Proposed
Waikato District Plan)

**STATEMENT OF EVIDENCE OF STEPHEN GORDON CHILES FOR
THE NEW ZEALAND TRANSPORT AGENCY (NOISE)**

DATED 30 JANUARY 2020

1 INTRODUCTION

- 1.1 My full name is Dr Stephen Gordon Chiles. I have the qualifications of Doctor of Philosophy in Acoustics from the University of Bath and Bachelor of Engineering in Electroacoustics from the University of Salford, UK. I am a Chartered Professional Engineer and Fellow of the UK Institute of Acoustics.
- 1.2 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 the New Zealand Transport Agency (**the Transport Agency**), a consultant for the international firms Arup, WSP, and URS, and for the specialist firms Marshall Day Acoustics and Fleming & Barron. I am contracted to provide the Environmental Noise Analysis and Advice Service to the Ministry of Health and regional public health services.
- 1.3 I have been involved in many situations relating to noise and vibration effects on sensitive activities establishing near existing infrastructure. I was an Independent Commissioner for plan changes for Queenstown and Wanaka Airports and a plan variation for Port Nelson, which dealt particularly with controls to manage noise sensitive activities establishing nearby. I have previously been engaged to advise KiwiRail (railways), Auckland Transport (roads), Christchurch City Council (airport) and Environment Canterbury (port) regarding sensitive activities establishing near existing infrastructure.
- 1.4 I jointly led the review of the Transport Agency's reverse sensitivity policy for state highways and development of its current guide.¹ I have presented acoustics evidence for the Transport Agency on numerous plan changes and plan reviews. I have provided advice to the Transport Agency with respect to draft provisions for a future standardised (national) approach to addressing adverse effects on new sensitive land-uses, or alterations to existing uses, near road and rail corridors. I was responsible for producing draft provisions for Clause G6 of the New Zealand Building Code controlling environmental noise entering dwellings for the Ministry of Business, Innovation and Employment.
- 1.5 In addition to work with existing roads, I have been engaged to advise on noise and vibration associated with numerous new road projects including: Ara Tūhono - Warkworth to Wellsford, Te Ahu a Turanga - Manawātū Tararua Highway, Peka Peka to North Ōtaki, Transmission Gully, Christchurch Southern Motorway 2, Waikato Expressway Cambridge and Tamahere Sections, National War Memorial Park, Tauranga Eastern Link and Mt Victoria Tunnel Duplication. I have also had peripheral involvement with most sections of the Waikato Expressway, reviewing reports or investigating noise issues for the Transport Agency.

¹ NZ Transport Agency, Guide to the management of effects on noise sensitive land use near to the state highway network, September 2015.

- 1.6 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.
- 1.7 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 material facts that I am aware of that might alter or detract from the opinions that I express, and that this evidence is within my area of expertise, except where I state that I am relying on the evidence of another person.

2 SCOPE OF EVIDENCE

- 2.1 I have prepared this evidence (to be tabled) on behalf of the Transport Agency in connection with its function as the road controlling authority for the state highway network. This is specifically with respect to the Waikato Expressway, which will include all of State Highway 1 and its interchanges in the Waikato District once current construction projects are completed.
- 2.2 My evidence relates solely to the one submission point made by the Transport Agency on Rule 16.3.9.2, P1(a)(iii) of the notified version of the proposed Waikato District Plan (**PWDP**).² The submission point seeks a minor amendment to the notified rule, increasing the permitted activity set-back distance from 25 metres to 35 metres, applying between new and altered buildings for sensitive activities and the Waikato Expressway designation. The amendment sought is to protect the health and amenity of people in those locations near the Waikato Expressway. The submission point was informed by advice I provided to the Transport Agency.
- 2.3 The Transport Agency has also submitted on broader controls to manage road-traffic noise effects in other chapters of the PWDP and I understand those will be addressed at the Infrastructure hearing. In this current evidence relating just to Rule 16.3.9.2, I have assumed that other rules sought by the Transport Agency will also be implemented to address adverse noise effects that will occur at distances beyond 35 metres from the Waikato Expressway.
- 2.4 The section 42A report by Louise Allwood recommends rejecting the submission point by the Transport Agency on Rule 16.3.9.2 (paragraph 86), stating that no information or analysis has been provided to justify the amendment of the set-back distance to 35 metres.
- 2.5 In my evidence I will provide information on noise effects on sensitive activities establishing near major roads, and I will address the appropriateness of the relief sought by the Transport Agency, from an acoustics / public health perspective.

² Submission point 742.131

- 2.6 I have prepared my evidence based on my experience assessing and managing future and existing state highway sound and vibration, at numerous locations throughout New Zealand. This includes my experience developing the Transport Agency's guide for managing noise sensitive land-use development near state highways. I have also drawn from my broader experience assessing other environmental sound sources.
- 2.7 I have separately advised the Waikato District Health Board and KiwiRail on their respective submissions on various aspects of the PWDP but will not address those matters in this evidence.

3 NOISE EFFECTS FROM ROADS

- 3.1 It is widely accepted nationally and internationally that road noise can cause adverse health and amenity effects on people living nearby. This has been documented by authoritative bodies such as the World Health Organisation ("WHO"),³ including a recent publication by WHO Europe in October 2018.⁴ These WHO publications are underpinned by robust scientific research. I am not aware of any fundamental disagreement in the acoustics profession with the information published by WHO regarding road noise effects.
- 3.2 The 2018 WHO guidelines note the following adverse effects from road noise: ischaemic heart disease, hypertension, high annoyance and sleep disturbance. Based on the strength of the evidence of adverse effects, WHO makes recommendations to policy makers to reduce road noise exposure to below a range of guideline values. I have attached a summary table from the WHO document as **Appendix A** to my evidence. The relief sought by the Transport Agency on the PWDP is consistent with the WHO recommendations to reduce noise exposure, as an integral part of its broader noise management activities.
- 3.3 Adverse effects from road noise can occur at many existing properties located near the state highway network throughout New Zealand. I have previously been, and am currently, involved in numerous different activities undertaken by the Transport Agency to manage and reduce this road noise where practicable. These include development of quieter road surfaces, installation of noise barriers, investigation into engine braking noise, and repair of road surfaces to address vibration issues. For new or altered roads the Transport Agency seeks to apply NZ 6806,⁵ which provides guidance on the assessment of noise, recommended noise criteria and potential mitigation measures. However, practicable improvements are often constrained, and the operation of the state highway network can result in noise effects which cannot be internalised.

³ World Health Organisation, Guidelines for community noise, 1999; World Health Organisation, Burden of disease from environmental noise, 2011.

⁴ World Health Organisation, Environmental noise guidelines for the European region, 2018.

⁵ New Zealand Standard NZS 6806:2010 Acoustics – Road-traffic noise – new and altered roads

4 CONTROLS FOR NEW AND ALTERED BUILDINGS

- 4.1 Acoustically, the most effective noise control is often to separate noisy and noise sensitive activities. This can provide for healthy and pleasant internal and external sound environments for noise sensitive activities, and also allows occupants the freedom to open doors and windows as required to maintain thermal comfort. However, in terms of houses near major roads, I understand from an integrated planning perspective a rigid approach of separation may give rise to undesirable outcomes, particularly in a constrained urban area. The Transport Agency guide⁶ sets out a balanced approach of avoiding sensitive activities in the most affected areas nearest to roads where practicable, and then adopting other controls such as sound insulation and ventilation upgrades further from the road.
- 4.2 The Transport Agency guide seeks to avoid sensitive activities up to 40 metres from the edge of a state highway. This is an approximate distance whereby external road-traffic noise should be below 64 dB $L_{Aeq(24h)}$, which is the threshold at which building treatment is triggered with respect to new roads under NZS 6806. While adverse noise effects still occur below 64 dB $L_{Aeq(24h)}$, this represents a pragmatic criterion to target controls where the most significant effects occur. From a public health perspective, a more stringent criterion should be adopted in accordance with the WHO guidelines shown in Appendix A, but that would prevent residential development over a wide area.
- 4.3 For the Waikato Expressway the road and traffic characteristics vary along its length in the Waikato District. However, as an example, there may be in the order of 25,000 vehicles per day (annual average daily traffic), 14% heavy vehicles and a stone mastic asphalt (SMA) surface. For these parameters and assuming no screening or gradient effects, I have made predictions of road-traffic noise levels using the Calculation of Road Traffic Noise algorithm implemented by the Transport Agency's online calculator.⁷ I have found the road-traffic noise level would be 64 dB $L_{Aeq(24h)}$ in the order of 50 metres from the edge of the Waikato Expressway. Therefore, in this instance the 40 metre distance in the Transport Agency guide is not quite sufficient. However, the guide caps the distance at 40 metres to avoid constraining development.
- 4.4 The Waikato Expressway is being implemented in stages, with some sections still under construction. The Transport Agency has sought controls for sensitive development with distances measured from the designation boundary rather than the edge of the road, because the final position of the edge of the road could not be confirmed in all locations as several sections were still being developed at the time of notification. To achieve a 40 metre distance from the edge of the road, the Transport Agency sought a separation distance from the edge of the designation boundary of 35 metres. This is consistent with the Operative Waikato District Plan. Furthermore, I understand that the 25 metres distance from the edge of the designation boundary as proposed in the PWDP would not achieve an equivalent 40 metres minimum distance from the edge of the road for large sections of the Waikato

⁶ NZ Transport Agency, Guide to the management of effects on noise sensitive land use near to the state highway network, September 2015.

⁷ <https://nzta.govt.nz/roads-and-rail/highways-information-portal/tools/road-traffic-noise-calculator/>

Expressway. This is because there is insufficient width between the edge of the road and the edge of the designation boundary in most locations.

- 4.5 In my opinion the submission point by the Transport Agency on Rule 16.3.9.2, P1(a)(iii) to increase the set-back distance to 35 metres is a pragmatic and appropriate approach, supported by my acoustics analysis, that would manage the most significant adverse effects on new and altered sensitive activities near the Waikato Expressway. In my opinion the notified rule with a set-back of 25 metres would not be adequate to manage the most significant noise effects.



Stephen Chiles
30 January 2020

Appendix A

Summary table of recommendations for road-traffic noise by the Guideline Development Group (GDG) from the 2018 WHO Environmental noise guidelines for the European region



Road traffic noise

Recommendation	Strength
For average noise exposure, the GDG strongly recommends reducing noise levels produced by road traffic below 53 decibels (dB) L_{den} , as road traffic noise above this level is associated with adverse health effects.	Strong
For night noise exposure, the GDG strongly recommends reducing noise levels produced by road traffic during night time below 45 dB L_{night} , as night-time road traffic noise above this level is associated with adverse effects on sleep.	Strong
To reduce health effects, the GDG strongly recommends that policy-makers implement suitable measures to reduce noise exposure from road traffic in the population exposed to levels above the guideline values for average and night noise exposure. For specific interventions, the GDG recommends reducing noise both at the source and on the route between the source and the affected population by changes in infrastructure.	Strong