

BEFORE THE INDEPENDENT COMMISSIONERS

IN THE MATTER

of the Resource Management Act 1991
("RMA")

AND

IN THE MATTER

of submissions by New Zealand
Transport Agency Waka Kotahi
("NZTA") (submitter 385 and further
submitter F20) and KiwiRail Holdings
Limited ("KiwiRail") (submitter 442) on
Hearing Stream 7 (Light, Noise, and
Temporary Activities) of the Proposed
Lower Hutt District Plan ("**Proposed
Plan**")

STATEMENT OF EVIDENCE OF DR STEPHEN CHILES ON BEHALF OF NZ TRANSPORT AGENCY WAKA KOTAHI AND KIWIRAIL HOLDINGS LIMITED

NOISE AND VIBRATION

1. INTRODUCTION

- 1.1 My 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 Limited. I have been employed in acoustics since 1996, as a research officer at the University of Bath, a principal environmental specialist for NZTA and a consultant for Arup, WSP, and URS, Marshall Day Acoustics and Fleming & Barron. I am contracted as the principal advisor to provide the Environmental Noise Analysis and Advice Service to Te Whatu Ora - Health New Zealand.
- 1.3 I have been involved in many situations relating to noise effects on new or altered sensitive activities around 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 noise effects. I have previously been engaged to advise NZTA and Auckland Transport (roads), KiwiRail (railways), Christchurch City Council (airport) and Environment Canterbury (port) on reverse sensitivity noise issues. I have presented acoustics evidence for NZTA and KiwiRail on numerous plan changes and plan reviews. I previously drafted potential environmental noise provisions for Clause G6 of the New Zealand Building Code for the Ministry of Business, Innovation and Employment.

- 1.4 I am convenor of the New Zealand reference group for "ISO" acoustics standards and a member of the joint Australian and New Zealand committee responsible for acoustics standards. I was Chair of the 2012 New Zealand acoustics standards review, Chair for the current road-traffic noise standard revision, Chair for the 2010 wind farm noise standard, and a member for the 2008 general environmental noise standards.

2. CODE OF CONDUCT

- 2.1 I confirm that I have read the Code of Conduct for Expert Witnesses set out in the Environment Court's Practice Note 2023. I have complied with the Code of Conduct in preparing this evidence and will continue to comply with it while giving oral evidence at the hearing. Except where I state that I am relying on the evidence of another person, this written evidence is within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed in this evidence.

3. SCOPE OF EVIDENCE

- 3.1 My statement relates to the potential effects of road and railway sound and vibration on new and altered sensitive activities and the need to manage those effects and activities through provisions in the Proposed Plan. I have prepared this statement for NZTA and KiwiRail as operators of the state highway and rail corridors within the Lower Hutt District.
- 3.2 I have prepared general advice on land use controls for railway sound and vibration nationally. That advice is contained in Appendix A to the Section 32 report attached to the evidence of Ms Heppelthwaite ("**KiwiRail s32 report**").¹

¹ Statement of Evidence of Catherine Heppelthwaite dated 29 September 2026.

To avoid repetition, I make reference to the KiwiRail s32 report with respect to various matters I discuss in my evidence.

- 3.3 With respect to the Lower Hutt District, I was previously engaged by NZTA and KiwiRail to give evidence in 2017 and 2023 for Plan Changes 39 and 56, in relation to Standard 6 in section 14A of the operative City of Lower Hutt District Plan (“**Operative Plan**”). I also provided advice to NZTA and KiwiRail in relation to the draft district plan in 2023/2024, which included discussions with Council Officers and assistance in preparing their submissions on the Proposed Plan.
- 3.4 NZTA and KiwiRail made submissions on the Proposed Plan seeking the following amendments, relevant to my evidence:
- (a) replacement of the High and Moderate noise overlays with a single Highway and Rail Noise Overlay, applying 100m from the rail corridor and either based on state highway noise modelling or also applying 100m from highways (NZTA and KiwiRail);
 - (b) changes to the noise standards requiring acoustic insulation and ventilation (NZTA and KiwiRail); and
 - (c) inclusion of a Rail Vibration Alert Area overlay for areas within 100m of the rail corridor boundary (KiwiRail).
- 3.5 The key purpose of these amendments is to protect the health and amenity of occupants of those buildings, and to avoid or mitigate potential reverse sensitivity effects on operations of NZTA and KiwiRail.
- 3.6 My evidence will address:
- (a) noise and vibration effects arising from road and rail infrastructure;
 - (b) methods to manage adverse effects on new and altered buildings containing sensitive activities near existing infrastructure;
 - (c) the appropriateness of the relief sought by NZTA and KiwiRail from an acoustics and public health perspective; and
 - (d) the Section 42A report prepared by Stephen Davis dated 15 September 2026 (“**Section 42A Report**”), including Appendix 3, which is a statement of evidence of Mr Malcolm Hunt dated 10

September 2026, in relation to recommendations on the relief sought by NZTA and KiwiRail.

4. NOISE AND VIBRATION EFFECTS FROM ROADS AND RAILWAYS

- 4.1 Sound and vibration from road and rail networks have the potential to cause adverse health effects on people living nearby. These adverse effects include ischaemic heart disease, annoyance and sleep disturbance for building occupants, as well as damage to buildings at greater railway vibration magnitudes than those which can cause annoyance.
- 4.2 I address these effects for railway sound and vibration in sections 2 and 3 of Appendix A to the KiwiRail s32 report. The fundamental issues and key aspects of the evidence base are common for road and rail.
- 4.3 In summary, the evidence of adverse health effects from road and rail sound is documented by the World Health Organisation ("**WHO**").^{2,3} Local research has addressed the applicability of this international data to New Zealand.^{4,5,6} The relief sought by NZTA and KiwiRail on the Proposed Plan is consistent with WHO guidelines to reduce external sound levels, as an integral part of broader noise management activities. I describe below some of the steps and actions that NZTA and KiwiRail seek to implement as part of this management approach.

5. METHODS TO MANAGE ADVERSE EFFECTS

- 5.1 In sections 7 and 8 of Appendix A to the KiwiRail s32 report, I set out approaches to manage effects of railway sound and vibration. For both roads and railways, I have been involved in numerous different activities undertaken by NZTA and KiwiRail to manage and reduce sound and vibration where practicable. For railways, these activities include installation of ballast mat, rail grinding and tamping, ballast cleaning and replacement, and automated monitoring of rolling stock wheel condition. For roads, activities include

² World Health Organisation, Guidelines for community noise, 1999; World Health Organisation, Burden of disease from environmental noise, 2011.

³ World Health Organisation, Environmental noise guidelines for the European region, 2018.

⁴ Humpheson D. and Magill K., 2024. Community response to transport noise exposure in New Zealand, Waka Kotahi Research Report 727. <https://nzta.govt.nz/resources/research/reports/727/>.

⁵ Humpheson D. and Wareing R., 2019. Evidential basis for community response to land transport noise, Waka Kotahi Research Report 656. <https://nzta.govt.nz/resources/research/reports/656/>.

⁶ Evans L. et al, 2024. Health cost of land transport noise exposure in New Zealand, Waka Kotahi Research Report 715. <https://nzta.govt.nz/resources/research/reports/715/>.

development of quieter road surfaces, investigation into engine braking noise and installation of noise barriers. For new or altered roads, NZTA applies NZS 6806,^{7,8} which provides guidance on evaluating mitigation measures.

- 5.2 However, even with practicable improvements implemented, the operation of the state highway and rail networks can result in adverse effects such as noise and vibration, which cannot be completely internalised within typical designation boundaries. These effects commonly result from the road and rail networks maintained in normal condition, and cannot be solely attributed to defects in road surface, track or rolling stock.
- 5.3 As these effects cannot be completely internalised within the road and rail corridors, in my opinion, land use controls on new and altered buildings for sensitive activities are critical to protect those activities from adverse noise and vibration effects. Such controls, in turn, are fundamental to managing the potential for reverse sensitivity effects on the road and rail networks. The location of incompatible sensitive activities in proximity to road and rail infrastructure can lead to noise and vibration effects on, and complaints from, sensitive users.
- 5.4 If it is not practicable to avoid sensitive activities near road and rail corridors, for new buildings being constructed (or existing buildings being altered), it is relatively straight-forward to control internal sound and vibration through the building location, design and systems (like acoustic insulation and mechanical ventilation). In most cases, it is practical to achieve acceptable internal sound and vibration levels using such measures. Thus, with careful design of building location, orientation and materials, future occupants of that building can be protected from the most significant adverse effects associated with road and railway sound and vibration.
- 5.5 Rules in district plans commonly control the location and design of sensitive activities, where such activities seek to locate near existing sound sources such as roads, railways, airports, ports, quarries, industrial sites, industrial and business zones, gun clubs and motorsport facilities. In the Operative Plan there are general acoustic insulation standards for noise sensitive activities in Commercial Areas⁹ and a specific standard for noise sensitive activities near state highways and railways¹⁰.

⁷ New Zealand Standard, NZS 6806:2010 Acoustics – Road-traffic noise – new and altered roads.

⁸ NZ Transport Agency, Guide to assessing road-traffic noise, 2024

⁹ City of Lower Hutt District Plan, Chapter 5, 5A.2.2.2.b and 5B.2.2.1.1.g.

¹⁰ City of Lower Hutt District Plan, 14A Appendices, Standard 6.

6. RELIEF SOUGHT

- 6.1 The notified NOISE-R6, NOISE-R7, NOISE-S5 and NOISE-S6 in the Proposed Plan replace the existing standard in the Operative Plan for noise sensitive activities near state highways and railways. These provisions in the Proposed Plan apply within mapped 'Moderate' and 'High' Highway and Railway Noise Overlays.

Extent of overlay(s)

- 6.2 The NZTA and KiwiRail submissions seek to replace the Moderate and High overlays with a single Highway and Railway Noise Overlay. This change to a single overlay is directly linked to the form of noise controls proposed by NZTA and KiwiRail in their submissions, that I will discuss below. To facilitate use of internal noise criteria I consider that a single Highway and Railway Noise Overlay is necessary (with road and rail sections shown separately as set out in the evidence of Ms Heppelthwaite).¹¹
- 6.3 For highways, the outer extent of the Moderate overlay in the notified maps is based on noise modelling, including a 100m cap on the maximum extent. The data was provided to Council by NZTA. For highways, NZTA's submission seeks to merge the existing Moderate and High overlays into a single overlay that would replicate their combined outer extent shown in the notified version of the Proposed Plan.
- 6.4 For railways, the Highway and Railway Noise Overlays in the notified maps are relatively narrow, only covering buildings within 40m of railways. KiwiRail's submission seeks to increase the extent of a single Highway and Railway Noise Overlay to 100m from the rail corridor boundary.
- 6.5 I discuss rail sound levels in section 5 of Appendix A to the KiwiRail s32 report, including a table of typical levels at varying distances from railways. I understand from KiwiRail that the Wairarapa Line has scheduled freight movements, including at night, in addition to frequent daytime passenger services.¹² Considering the combination of freight and passenger services, I consider that the typical sound levels in the KiwiRail s32 report provide a reasonable basis to determine where land use controls should apply in this instance. I have also recently overseen railway sound and vibration measurements near the Wairarapa Line between Featherston and Masterton

¹¹ Statement of Evidence of Catherine Heppelthwaite, dated 29 September 2026 at Attachment A.

¹² See statement of Evidence of Michelle Grinlinton-Hancock, dated 29 September 2026 at [2.1].

that further validate the typical levels for those same trains passing through the Lower Hutt District.

- 6.6 In my opinion, for the reasons set out above and in sections 2 and 5 of Appendix A to the KiwiRail s32 report, the notified Highway and Railway Noise Overlays, extending only 40m from railways, are inadequate to protect new and altered noise sensitive activities from adverse health effects, and 100m is a more appropriate distance.

Form of controls

- 6.7 The notified NOISE-R6, NOISE-R7, NOISE-S5 and NOISE-S6 change the fundamental basis of the existing noise standards in the Operative Plan, which currently allows a new building located near roads and railways to be designed in a way that most efficiently achieves internal noise criteria to protect the health and wellbeing of the building's occupants. The notified provisions change this approach by specifying two degrees of fixed sound insulation that apply irrespective of the road and rail noise exposure of each building, or of each floor level and each façade of a building. NZTA and KiwiRail submissions seek to replace the notified provisions with controls based on internal noise criteria, similar to the Operative Plan.
- 6.8 I discuss these two different approaches to controls in paragraphs 9.4 to 9.8 of Appendix A to the KiwiRail s32 report, in terms of internal criteria or building sound reduction performance. With reference to that analysis, I consider that controls based on internal criteria as proposed by NZTA and KiwiRail are more efficient and effective than fixed sound insulation at addressing potential noise effects. In summary this is because road and rail noise exposure of buildings and parts of buildings varies substantially, and hence varying acoustic treatment is appropriate for different buildings and parts of buildings. Internal criteria allow for this varying treatment at the least cost and always resulting in an appropriate indoor noise environment. Fixed sound insulation inherently results in inadequate or excessive treatment, at different buildings and parts of buildings.

Rail vibration

- 6.9 The Proposed Plan omits any controls for rail vibration, removing the current protection provided by the Operative Plan. KiwiRail's submission seeks a Rail Vibration Alert Area Overlay be included in the Proposed Plan. As set out in sections 3 and 6 of Appendix A to the KiwiRail section 32 report, vibration can

routinely exceed relevant criteria over 100m from the railway tracks in New Zealand.

- 6.10 I refer to Ms Grinlinton-Hancock's evidence where she advises that KiwiRail now only seeks the Overlay apply within 60m of the rail corridor boundary.¹³ Vibration levels generally exceed criteria beyond 60m from the track. From a technical perspective, it would be preferable to assess all sites within 100m or more of rail corridors and to apply land use controls to manage the vibration effects. However, despite my technical opinion, KiwiRail's submission does not seek land use controls, only an alert layer.

7. RESPONSE TO NOISE SECTION 42A REPORT

Extent of overlay (railways)

- 7.1 The Section 42A Report author (Mr Davis) discusses the extent of the Highway and Railway Noise Overlays for railways at paragraphs 247 and 248. Based on the evidence of Mr Hunt, Mr Davis recommends rejecting KiwiRail's submission seeking a single overlay apply to properties within 100m from the rail corridor.
- 7.2 In paragraphs 41, 49 and 50 of his evidence, Mr Hunt explains that the 20m and 40m distances for the High and Moderate overlays in the Proposed Plan are based on measurements of rail noise at two discrete locations, discussed below. I consider this approach unreliable as it does not account for inherent variability in levels along the line. I also consider that Mr Hunt's analysis does not adequately address effects from rail noise that, unlike highways, is not well represented by 24-hour average levels, as I have set out in paragraph 4.2 of Appendix A to the KiwiRail s32 report.
- 7.3 Council previously provided me with the raw measurement data that Mr Hunt used to draw his conclusions regarding the 20m and 40m distances. I have used that data to examine the average rail noise levels in one-hour periods during those measurements, rather than over 24-hour periods.
- 7.4 The measurement site at Ava Park was 20m from the railway. At this distance, the typical one-hour level from the KiwiRail s32 report is 68 dB $L_{Aeq(1h)}$. From the measurement data provided by Council, the measured level in the peak hour from 1600h to 1700h was 68 dB $L_{Aeq(1h)}$, exactly matching this

¹³ Evidence of Michelle Grinlinton-Hancock, dated 29 September 2026 at Evidence of Ms Grinlinton-Hancock, at [3.9].

assumption. For another six hours of the day the measurements remained within 3 dB of that level. The measurements also included a noisier period at night (0200h to 0300h) of 63 dB $L_{Aeq(1h)}$, which was potentially due to a freight train.

- 7.5 My analysis of one-hourly data above, indicates how the 24-hour average levels discussed by Mr Hunt in paragraph 41 of his evidence do not adequately represent the varying nature of rail noise. The measurements also demonstrate that Mr Hunt's assumption of average levels being 10 dB lower at night does not account for higher levels that will occur during train pass-bys.
- 7.6 The second measurement location referenced by Mr Hunt was at 3/86 North Street. I understand this location is intended to be representative of 40m distance from the rail corridor. This location is adjacent to Ava Station and appears to be partly screened from the railway tracks and trains by buildings. Further, one of the tracks is on the far side of the station platform in the order of 55m to 60m from the measurement location, rather than 40m. The measured one-hourly levels at this location which Mr Hunt relies on were typically 5 to 10 dB less than the typical 64 dB $L_{Aeq(1h)}$ level for a distance of 40m in the KiwiRail s32 report. This difference can be attributed to the location of one of the tracks being some 15-20m further away, specific localised screening, and varying train speeds associated with the station. In my opinion, due to these limitations, measurements at this location cannot represent noise levels at 40m from the railway more broadly.
- 7.7 In summary, Mr Hunt appears to have relied primarily on two measurement positions to determine distances for rail noise controls. However, the detail of those measurements shows the location at 20m had one-hourly levels consistent with the typical levels in the KiwiRail s32 report (validating those predicted levels), while the second location nominally at 40m from the railway had specific local features that are unrepresentative of other locations. I therefore consider the typical rail sound levels in the KiwiRail s32 report provide a more appropriate basis for controls on new and altered buildings for sensitive activities in this district. The 100m distance aligns with the assumed sound levels in section 5 of Appendix A to the KiwiRail s32 report. In my opinion, a 100m distance reflects a reasonable compromise to capture the most affected sites without requiring assessment where building treatment is less likely to be required.
- 7.8 In paragraph 41 of his evidence, Mr Hunt states that areas affected by the Melling Line are fully encompassed by the noise overlays for State Highway 2

(“SH2”). It appears that Council has modified the road noise overlay provided by NZTA for SH2 so that on the notified map it also extends at least 40m from the Melling Line. However, this part of the overlay would need to be adjusted to increase the distance to 100m from the railway to adequately address rail noise effects. Additionally, in other district plans it is common for the road and rail components of overlays to be shown separately, which I consider important to define which noise source(s) require consideration when designing buildings.

Form of noise controls

- 7.9 Section 4.2.3 of the Section 42A Report recommends rejecting NZTA and KiwiRail submissions for rail noise controls to be based on internal criteria. Mr Davis considers the notified provisions are more efficient and effective.¹⁴ I disagree.
- 7.10 I consider internal criteria to be more efficient because buildings only need acoustic treatment to the extent necessary to achieve healthy *internal* noise levels. In many instances, a building may be naturally screened by other structures, orientated away from the noise source, or have internal layouts that place bedrooms on quieter façades, meaning some or all façades may not require treatment at all. I also consider internal criteria to be more effective because, at locations most exposed to road and rail noise, the criteria are still achieved, whereas under the notified provisions, the fixed sound insulation requirements apply uniformly and might not be adequate at the most noise-exposed locations.
- 7.11 Section 9.7 of Appendix A to the KiwiRail s32 report summarises how the Christchurch District Plan initially had both options of internal criteria and fixed sound insulation available. However, after some years of application the provisions were reviewed and it was found that in most cases developers were choosing the internal criteria, and the fixed sound insulation option was consequently removed from that plan. Fixed sound insulation requirements have also been included in the Wellington City District Plan for road and rail noise. Shortly after those provisions became operative, I was engaged by NZTA to advise on a resource consent application by a developer to use internal criteria for highway noise in lieu of the district plan fixed sound insulation, as it was deemed excessive and inefficient. This example in Wellington is consistent with the evidence from the Christchurch District Plan

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Section 42A Report at paragraph 67.

and my experience that internal criteria are generally preferred as they avoid unnecessary expenditure on unwarranted building upgrades.

- 7.12 In paragraph 44(a) of his evidence, Mr Hunt highlights the need to properly account for low frequency performance when designing buildings. I agree with Mr Hunt that this is necessary, and I consider the provisions proposed by NZTA and KiwiRail address this issue by requiring a compliance report. Use of appropriate frequency spectra is a fundamental aspect of basic professional practice that should be addressed through this process.
- 7.13 In paragraph 44(b) of his evidence, Mr Hunt discusses monitoring and enforcement of insulation standards. In practice, I am unaware of any monitoring or enforcement in relation to such provisions in other districts, with compliance assessment being 'front-loaded' through required reports. However, if a situation was disputed, standard measurement methods are applicable to either internal criteria or fixed sound insulation, acknowledging both are relatively complex.
- 7.14 In paragraph 45 of his evidence, Mr Hunt discusses possible efficiencies of using the same acoustic insulation standards in all scenarios. In my opinion this is inappropriate. Road and rail noise exposure is fundamentally different to other general zone noise exposure addressed by acoustic insulation standards. Critically, road and rail noise exposure varies markedly on different sides of buildings, and it reduces with distance and screening from highways and railways. From a technical perspective it is inefficient to address this varying exposure with fixed sound insulation. In my opinion, the inefficiency of using fixed sound insulation outweighs any potential efficiency of trying to use the same approach for all types of noise exposure regardless of the noise characteristics and distribution.

Rail vibration

- 7.15 In Section 4.2.3 of the Section 42A Report, Mr Davis recommends a rail vibration alert overlay be rejected on planning/legal grounds. Mr Hunt does not address rail vibration. I confirm my opinion that controls for rail vibration are warranted for new and altered buildings to manage potential effects on occupants.

Dr Stephen Chiles
29 September 2026