IN THE MATTER of the Resource Management Act 1991 ("**RMA**")

AND

IN THE MATTER of submissions by the Waka Kotahi New Zealand Transport Agency (submitter 742, further submitter 1202) and KiwiRail Holdings Ltd (submitter 846, further submitter 1272) on the Proposed Waikato District Plan ("**Proposed Plan**")

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

NOISE AND VIBRATION

1. INTRODUCTION

1.1 My full name is Dr Stephen Gordon Chiles. I have the qualifications and experience set out in my Evidence in Chief ("**EIC**") dated 29 September 2020. I confirm that in preparing this rebuttal I have complied with the Environment Court's Expert Witness Code of Conduct as set out in my EIC.

1.2 This statement of rebuttal evidence is on behalf of Waka Kotahi NZ Transport Agency ("**Waka Kotahi**") and KiwiRail Holdings Limited ("**KiwiRail**").

1.3 I have read the statement of evidence of Mr Styles on behalf of Kāinga Ora Homes and Communities ("**Kāinga Ora**").

2. PURPOSE AND SCOPE OF REBUTTAL EVIDENCE

2.1 This statement of rebuttal evidence addresses several new issues raised in the evidence of Mr Styles, and does not repeat matters already addressed within my EIC. Mr Styles appears to agree with me on the fundamental issue that land-use controls are necessary to protect new and altered sensitive land uses near state highway and railway corridors. The matters raised by Mr Styles in his evidence relate to the mechanics of how such controls are implemented. I have already addressed some of the issues Mr Styles raises in my EIC, and will not discuss those matters further in my rebuttal.

2.2 The specific matters I address in my rebuttal are:

(a) the use of a 100 metre distance from both road and rail corridors to define the area over which permitted activity standards for noise affecting new and altered sensitive land uses apply; and

(b) the use of 40 metre and 60 metre distances from road and rail corridors respectively, to define the area over which the permitted activity standards for vibration affecting new and altered sensitive land uses apply.

3. 100 METRE NOISE EFFECTS AREA

3.1 In his evidence, Mr Styles questions the use of a 100 metre distance from both road and rail corridors as the means for defining the area over which the permitted activity standards should apply for noise affecting new and altered sensitive land uses.

Road noise

3.2 With respect to state highways, Mr Styles states in paragraph 8.13 of his evidence that there is publicly available information showing a quantitative, location specific, analysis of distances over which controls should apply.

3.3 The older maps referenced by Mr Styles are still available and can be viewed online.[1] In those online maps, the "Rounded Effects Distance" is 100 metres for most of the state highway network in the Waikato District. From spot checks of this map, I have only found lesser distances than 100 metres where there are obvious errors (e.g. traffic volumes on the Ngaruawahia section of the Waikato Expressway, which was only recently constructed), or on short discrete sections of lower volume state highways that have a lower noise asphaltic surface rather than the normal chip seal surface. On the basis of these maps, I consider that a 100 metre distance is appropriate to define the extent of application for the permitted activity standards throughout the Waikato District.

3.4 In paragraph 8.14 of his evidence, Mr Styles references a second set of more detailed maps, which include noise contours for the entire state highway network. I am familiar with these maps and I agree with Mr Styles that noise contours such as this could potentially be used to refine distances over which controls apply. However, that mapping has been prepared for strategic

1 https://nzta.govt.nz/roads-and-rail/highways-information-portal/technical-disciplines/noise-and-vibration/planning/reverse-sensitivity-buffer-and-effects-areas/

purposes, and has not been subject to detailed modelling checks that would be required if it were to be used on a site-specific basis. It is also based on various assumptions and approximations that would need to be refined and verified if used for this purpose. While the mapping could provide a guide, in my opinion it would not provide a robust basis for controls in the District Plan without substantial further work.

3.5 I am aware of different distances being used for controls in other district plans, primarily where sections of the state highway network have lower traffic volumes than in the Waikato District. Compared to more remote rural districts, the Waikato District has relatively high traffic volumes with all state highways being relatively well used.

3.6 In terms of the geographic extent of noise effects from roads, there are numerous variables, and in my opinion, it is not practical to account for them all specifically in district plan rules. The variables include the traffic and road characteristics, detailed topography, screening by buildings and fences, and the orientation and design of individual buildings receiving noise. Therefore, setting a distance over which permitted activity standards apply is a pragmatic, effective and efficient approach. Development is not prevented in the 100m noise effects area, but there is a requirement to look at the site and building specific details, at the time when all those details are known.

Rail noise

3.7 In terms of rail noise, in paragraph 8.42 of his evidence Mr Styles discusses whether KiwiRail adequately manages its network in terms of noise emissions. I have extensively investigated the relevant monitoring and maintenance systems used by KiwiRail and I have found there is systematic, regular and effective monitoring and maintenance of tracks and rolling stock, which I consider to represent the Best Practicable Option for reducing noise and vibration. However, due to the nature of the rail corridor, even with appropriate maintenance, inherent railway noise and vibration cannot practicably be internalised.

3.8 In paragraph 8.39 of his evidence, Mr Styles questions the rail source noise level of 70 dB $L_{Aeq(1h)}$ proposed in KiwiRail's submission. I consider this to be an appropriate noise level. It has been drawn from a review of rail noise levels as set out in a report "Ontrack Rail Noise Criteria, Reverse Sensitivity Guidelines" by Marshall Day Acoustics, dated 22 October 2009. In my experience, this source level provides a representative and appropriate basis for land-use controls. At 100 metres away from the railway, this corresponds to

a level that could still be above 55 dB $L_{Aeq(1h)}$. With this external level, some form of acoustic treatment may be necessary to achieve reasonable levels inside buildings, as I set out in paragraph 4.3(b) of my EIC.

3.9 Mr Styles states at paragraph 8.39 of his evidence that KiwiRail's proposed noise level of 70dB $L_{Aeq(1hr)}$ at 10 metres from any railway line does not allow for the variability in frequency and type of trains using the rail corridor. While I do not have expertise in rail traffic forecasting, from my experience assessing rail noise and vibration I am aware that rail freight traffic can change significantly depending on changes to individual contracts for services provided by KiwiRail. For state highways carrying thousands of vehicles each day, changes by individual road freight operators generally has negligible effect on overall road-traffic noise. However, for railways it is common for the number of freight trains on a particular line to change, which causes a corresponding change to noise levels and effects (for example, if there were currently only two freight train movements in a particular hour but this increased to four movements then the noise level would increase by 3 dB).

3.10 Therefore, in my opinion, it is appropriate for land-use controls for permanent sensitive activities establishing near existing railways to be designed to address rail noise at the specified level of 70dB $L_{Aeq(1hr)}$. A specified noise level is necessary to ensure that, should the frequency or type of trains using the rail corridor change, any buildings containing sensitive activities in proximity to the corridor will be appropriately mitigated against any change in noise levels resulting from the change in operations on the corridor. Otherwise, it is likely that normal rail traffic variability would undermine the effectiveness of the design.

4. VIBRATION EFFECTS AREA

4.1 In paragraph 8.23 of his evidence Mr Styles questions the use of a 60 metre distance for application of a permitted activity standard relating to road-traffic vibration. As I have set out in paragraph 5.2(c) of my EIC, I agree that 60 metres is not appropriate for road-traffic vibration and I recommend this be reduced to 40 metres. I have reviewed numerous vibration measurements near the state highway network and have found levels to be highly variable even between adjacent locations. This cannot be reliably predicted and in this context I consider the 40 metre distance appropriate to define the extent of the proposed permitted activity standard. In paragraph 8.31 of his evidence Mr Styles discusses reduced vibration anticipated from newly formed roads. I agree that a new uniform basecourse and pavement (not just surface) without buried

services should have reduced vibration, however I still consider that a 40m standard is appropriate in terms of allowing the potential effects to be assessed.

4.2 In paragraph 8.44 of his evidence Mr Styles states that he considers it extremely unlikely that there will be any rail vibration effect at 60 metres from a railway corridor that requires control. However, Mr Styles provides no additional evidence to support his view. I am aware that KiwiRail has had complaints about disturbance from vibration, including in the Waikato District, at distances greater than 60 metres. The 60 metre distance proposed by KiwiRail is based on measurements at various different locations that show the 0.3 mm/s $v_{w,95}$ criterion will be regularly exceeded up to that distance from normal operation of the railway network.

4.3 Mr Styles poses four questions in paragraph 8.47 of his evidence about vibration levels from railways. In response to the first three questions (a to c), I confirm that a vibration level of 0.3 mm/s $v_{w,95}$ will be exceeded beyond most boundaries of the railway corridor, including with the implementation of the Best Practicable Option for reducing noise and vibration. Mr Styles' fourth question (d) relates to attenuation of vibration with distance and the appropriate extent of the vibration effects area. As I have discussed above, based on various measurements, I consider that 60 metres is an appropriate extent for the rail vibration effects area as it relates to the area where vibration levels above 0.3 mm/s $v_{w,95}$ are expected. As set out in paragraph 4.3(c) of my EIC, in accordance with NS 8176, 15% of the population would be expected to be disturbed by vibration at 0.3 mm/s $v_{w,95}$.[2]

5. CONCLUSION

5.1 Based on noise level data, in my opinion 100 metres is an appropriate distance for application of a permitted activity standard for both road and rail noise.

5.2 Based on vibration level data, in my opinion 60 metres and 40 metres are appropriate distances for application of a permitted activity standard for rail and road vibration respectively.

Dr Stephen Chiles
Acoustician
6 October 2020

[2] Norwegian Standard NS 8176:2017 – Vibration and shock – Measurement of vibration in buildings from landbased transport and guidance to evaluation of its effects on human beings.