

IN THE MATTER OF

The Resource Management Act 1991

AND

IN THE MATTER OF

Notices of requirement for designations under section 168 of the Act, in relation to Te Ahu a Turanga; Manawatū Tararua Highway Project

BY

NEW ZEALAND TRANSPORT AGENCY
Requiring Authority

**STATEMENT OF EVIDENCE OF DR STEPHEN GORDON CHILES (NOISE
AND VIBRATION) ON BEHALF OF THE NEW ZEALAND TRANSPORT
AGENCY**

8 March 2019

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INTRODUCTION

1. My full name is **Dr Stephen Gordon Chiles**.
2. I am self-employed as an acoustician through my company Chiles Ltd.
3. I prepared Technical Assessment #2: Noise and Vibration ("**Technical Assessment 2**"), which is in Volume 3 of the Notices of Requirement ("**NoRs**"), and which supports the Assessment of Environmental Effects ("**AEE**"), lodged in respect of Te Ahu a Turanga; Manawatū Tararua Highway Project ("**the Project**").
4. My qualifications and experience are set out in paragraph 5 of Technical Assessment 2.
5. In preparing Technical Assessment 2 and my evidence I have:
 - (a) visited the area around the Project on several occasions in 2017 and 2018 and inspected locations of nearby houses, including in Ashhurst and Woodville; and
 - (b) met with some individual residents who have raised concerns about noise from the Project with the New Zealand Transport Agency ("**Transport Agency**").
6. I participated in conferencing with Nigel Lloyd (engaged by the Manawatū District Council, Tararua District Council, and Palmerston North City Council; the "**Councils**") and we prepared a Joint Witness Statement ("**JWS**") dated 13 February 2019. That JWS is Attachment B to the Pre-Hearing Meetings Report dated 1 March 2019, and is also Appendix A to the evidence of Nigel Lloyd dated 25 March 2019.

Code of Conduct

7. I confirm that I have read the Code of Conduct for expert witnesses contained in the Environment Court Practice Note 2014. My evidence has been prepared in compliance with that Code, as if it were evidence being given in Environment Court proceedings. In particular, unless I state otherwise, this evidence is within my area of expertise and I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.
8. The assumptions and exclusions applied in my assessment are set out at paragraphs 14 to 16 of Technical Assessment 2.

Purpose and scope of evidence

9. Technical Assessment 2 assesses the Project's operational and construction noise and vibration effects, and recommends measures to avoid, remedy or mitigate those effects.
10. My evidence does not repeat in detail the technical matters set out in that assessment. Rather, in this evidence I:
 - (a) present the key findings of Technical Assessment 2 in an executive summary;
 - (b) comment on submissions received in respect of the NoRs;
 - (c) respond to questions from the Hearing Panel set out in its third minute dated 27 February 2019; and
 - (d) comment on Reporting Officers' section 42A reports.

EXECUTIVE SUMMARY

11. As noted above, in this section of my evidence I summarise the key aspects of my technical assessment.

Project description

12. The main aspect of the Project is the construction of a new section of State Highway 3 ("**SH3**"). The Project will also cause changes in traffic volumes on other existing roads. In Technical Assessment 2, I have assessed noise and vibration effects both for the new section of road and over a wider area including in Ashhurst and Woodville, beyond the area proposed to be designated.

Existing environment

13. I have assessed the existing environment based on site observations, acoustics modelling of existing road-traffic and measurements. The existing environment includes State highway traffic on Saddle Road, and currently there are relatively high road-traffic noise levels in parts of Ashhurst and Woodville near connecting roads.
14. The proposed designation is near a few houses at the western roundabout, where there are currently moderate road-traffic noise levels from existing roads in the vicinity. There are no houses near the designation on the main western or eastern slopes, or through the wind farm area. On the lower eastern slope there are two houses near the designation where existing sound levels are relatively low, reflecting the rural environment. In the vicinity

of the proposed eastern roundabout there are numerous houses which are currently exposed to road-traffic noise from existing roads.

Methodology

15. I have assessed effects of operational road-traffic noise both with reference to criteria from the relevant New Zealand Standard (NZS 6806), and also through broader consideration of changes in sound levels and potential sound characteristics. I have considered effects at 20 houses near the proposed designation, and at a further 518 locations in the wider area.
16. For operational road-traffic vibration I have made a screening assessment to check whether any houses could be close enough to a new section of road to be at risk of exceeding guideline criteria.
17. I have used criteria from New Zealand Standard NZS 6803 to assess the effects of construction noise, and for construction vibration I have used criteria published by the Transport Agency based on international standards. For both noise and vibration, I have identified locations where there is risk of exceeding criteria, and then investigated the practicality of management measures for construction activity.

Model forecast

18. I have predicted road-traffic sound levels at all receivers for five scenarios, addressing the pre-existing (2016) and existing (2018) situations, as well as future scenarios in a design year of 2041 without the Project, with the Project without any mitigation, and with the Project including mitigation.
19. I have used data from previous projects to determine distances at which there may be risk of exceeding operational vibration and construction noise and vibration criteria.

Project shaping

20. I provided advice on potential noise and vibration issues during the route selection process in 2017 and during the shaping of the designation for the selected route in 2018. During the route selection I did not identify any significant issues with the selected option, Option 3. Subsequently, during the shaping process for the selected option I did not identify any areas where noise and vibration were critical, and they have not been a major factor in that process.

Assessment of effects

21. In my opinion the Project will have a significant positive effect, reducing road-traffic noise levels through Ashhurst and around the outskirts of Woodville.
22. Without mitigation, the Project could have significant adverse noise effects due to increased traffic on Napier Road in Ashhurst and Vogel Street in Woodville. There could also be significant adverse effects due to sound characteristics of individual vehicles braking and accelerating at the two roundabouts and on the lower eastern slope.
23. Operational road-traffic should have minor vibration effects due to the separation of the new road from houses.
24. With normal good practice management, construction noise and vibration effects should be minor due to the separation of works from most houses. Noise from construction traffic should generally have a minor adverse effect but could potentially be significant if bulk imported fill/aggregate passes through Ashhurst, particularly at night.

Measures to avoid, remedy or mitigate actual or potential adverse noise and vibration effects

25. In Technical Assessment 2 I recommended use of asphaltic road surfaces on Napier Road in Ashhurst, Vogel Street in Woodville and on the lower eastern slope, to mitigate operational road-traffic noise effects in those locations.
26. To moderate vehicle sounds at roundabouts I recommend bold landscape treatments in those locations, and separation from houses of at least 100 metres for roundabouts and 200 metres for the alignment on the lower eastern slope.
27. I consider that construction noise and vibration effects should be managed in accordance with standard practice. I recommend that construction traffic passing through Ashhurst is minimised, particularly at night.

Conditions

28. To give effect to my recommendations and to maintain the assumptions of my assessment, I have recommended prescriptive designation conditions that require specific control measures. In the case of landscape and traffic controls, I recommend that these matters should be addressed through the Cultural and Environmental Design Framework (“**CEDF**” (formerly the ECDF)) and Construction Traffic Management Plan (“**CTMP**”) respectively.

Conclusions

29. With the mitigation and conditions I have recommended, the residual adverse noise and vibration effects of the Project are all likely to be minor. There will be significant positive noise effects associated with reductions in traffic volumes through Ashhurst and around the outskirts of Woodville. The construction and operational activity will be clearly audible over a wide area, but at reasonable levels that should be compatible with the environment. In my opinion the noise and vibration effects of the Project are likely to be acceptable.

COMMENTS ON SUBMISSIONS

30. I have read all submissions that raise issues relating to noise or vibration. I will comment on each of those submissions below.

AgResearch Ltd (submission 312)

31. The AgResearch submission primarily relates to route selection and the consequential effects on a long-term farming trial at the Ballantrae Hill Country Research Station ("**Ballantrae**"). These are not matters related to noise and vibration, but in the event the NoR is confirmed, the submission also raises potential operational and construction noise effects on stock at Ballantrae.
32. In terms of operational road-traffic, the effect of the Project will be to reduce noise across Ballantrae, as can be seen by comparing the sound level contours in figures N-03 (future without the Project) and N-04 (future with the Project) from Volume 4 of the NoR. This is because the existing State highway traffic on Saddle Road passes through Ballantrae, whereas the new highway would pass to closer to the edge of Ballantrae, partly screened by the terrain (as it would be mainly in cut). This is a positive effect, with less potential for disturbance to stock from road-traffic noise.
33. The Project will result in temporary construction sound audible across parts of Ballantrae. This is a common situation for construction of most rural highways and other infrastructure, with wind farms being a local example. Adverse effects can be managed through a Construction Noise and Vibration Management Plan ("**CNVMP**"), primarily through liaison and coordination with the landowner so that stock are not adjacent to any particularly noisy construction activities.

Barbara Cooke (submission 105) and Nicholas Shoebridge (submission 103)

34. These are two separate submissions, neither of which explicitly state the address of the property. I understand that both submitters are residents at 49846 Napier Road (SH3). Both submissions raise issues relating to operational and construction noise, with particular concerns about effects arising from proximity of the proposed eastern roundabout and construction yards.
35. This house is adjacent to the existing SH3 and, in Table 2.4 of Technical Assessment 2, I predicted a pre-existing road-traffic sound level at this house of 66 dB $L_{Aeq(24h)}$ in 2016 prior to the closure of the Gorge. With the Project, including mitigation, I predicted a future level of 56 dB $L_{Aeq(24h)}$. This reduction in road-traffic noise is because the Project will result in the SH3 traffic lanes moving from being immediately adjacent to the house to being separated from the house. This predicted future level with the Project complies with the NZS 6806¹ “Category A” 64 dB $L_{Aeq(24h)}$ criterion for an altered road. Even if this were assessed as a new road in a green-field site, the predicted level would still comply with the most stringent NZS 6806 57 dB $L_{Aeq(24h)}$ criterion.
36. Despite a reasonable overall predicted sound level in compliance with applicable criteria, I agree with the submitters that the eastern roundabout will alter the character of road-traffic sound at this location, and potentially cause disturbance if it is not mitigated. I discuss this issue in paragraphs 114, 129, 136, 137, 147(c)/(e) and 149 of Technical Assessment 2. In summary, while there is a significant potential adverse noise effect associated with the roundabout, in my opinion this effect can be adequately mitigated by maintaining a minimum separation distance of 100 metres between traffic lanes on the roundabout and houses, and by designing the road environment to moderate vehicle speeds and behaviours, as required by proposed conditions 11(f) and 28(a) attached to the evidence of **Ainsley McLeod**.
37. The indicative alignment shown on drawing A-09 in Volume 4 of the NoR shows that within the proposed designation it is practical to maintain separation of 100 metres between the roundabout traffic lanes and the house at 49846 Napier Road. I understand from **Chris Bentley** that it is practical to use bold landscaping and planting to clearly signal the presence of the

¹ New Zealand Standard NZS 6806:2010 Acoustics – Road-traffic noise – New and altered roads.

roundabout and a change in speed environment as vehicles descend the eastern slope approaching the roundabout.

38. I understand that in response to this submission, in addition to maintaining the 100 metre separation from the roundabout that I have recommended, the Transport Agency is proposing to construct a bund by this property if practicable. There is constrained space between the existing SH3 and the property, and there is driveway access required. However, if a bund is practicable it would provide a noise benefit over and above the scenario I have assessed and consider reasonable. This matter is included in proposed condition 12(e)(vi) attached to the evidence of **Ms McLeod**.
39. As set out in our JWS, Mr Lloyd and I agree it is appropriate for a post-construction review of noise mitigation for the Project to include sound level measurements at this property to verify the modelling. This requirement is included in proposed condition 29A(a)(iii) attached to the evidence of **Ms McLeod**.
40. Finally, the submitters refer to a location of a construction yard directly opposite the house. Construction yard locations will not be determined until a contractor has been appointed, and at this stage any sites shown on drawings are only indicative.
41. As a matter of normal construction noise and vibration management, a major construction yard would not be located immediately adjacent to an occupied house. Unlike many urban projects, the site is not overly constrained around the lower eastern slope, and there are several viable options for construction yards. Noise effects of occasional daytime use of laydown areas and stockpiles can usually be managed to an acceptable degree even when close to houses, but any major construction yard with intense activity should be separated from houses in this environment.

Janette McHugh (submission 238)

42. This submitter lives at 95 Vogel Street, State Highway 2 (“**SH2**”) and raises concerns with noise and vibration from heavy vehicles on Vogel Street. I identified adverse noise effects in this location in paragraphs 115, 116 and 128 of Technical Assessment 2. The potential effect primarily relates to an increase in light vehicles with the Project rather than heavy vehicles. I understand there is a bridge with a weight restriction on Oxford Road, so

heavy vehicles currently using Saddle Road still pass through Vogel Street, and would continue to do so if the Project does not proceed.

43. The submitter proposes a Woodville ring road to reduce traffic on Vogel Street. I agree a ring road would effectively reduce adverse road-traffic noise effects in Woodville, although as set out in paragraph 117 of Technical Assessment 2 I understand this is beyond the scope of the Project.
44. In paragraphs 133 to 135 of Technical Assessment 2, I recommended that Vogel Street (SH2/SH3) in Woodville be resurfaced with an asphaltic surface to mitigate the potential noise effect from increased traffic. This surface would reduce road-traffic sound levels with the Project to below levels that would occur without the Project. Resurfacing would also be beneficial in terms of reducing any vibration. As such, with an asphalt surface the Project will have a positive noise and vibration effect in this location. While a ring road could provide a greater benefit and address legacy issues of the SH2 and SH3 in Woodville, it is not necessary to address noise effects of the Project.

John and Wendy Napier (submission 296)

45. These submitters live at 75 Hope Road in the vicinity of the lower eastern slope. I have met with the submitters at their house on 23 November 2018 to discuss the concerns they have raised, primarily with respect to operational road-traffic noise.
46. The submission refers to parts of Technical Assessment 2 containing my assessment of effects at this property. In summary, although I have predicted that road-traffic sound levels will be within acceptable criteria, even with mitigation the Project will alter the environment at this location. I understand the submitters are long-standing residents, and the environment they are accustomed to will be detrimentally changed by the Project. An unavoidable result of the designation being confirmed would be that these residents would need to adapt to a degree of change.
47. The submitters propose four mitigation measures to ameliorate the adverse noise effects they will experience at 75 Hope Road. I will comment on each of the mitigation measures requested in the submission in turn:
 - (a) I agree that the section of the new highway in this vicinity should have a porous asphalt surface to reduce road-traffic sound levels. This mitigation measure or an equivalent is required by proposed condition 29 attached to the evidence of **Ms McLeod**.

- (b) The submitters seek a 3m high noise bund or barrier. Due to the wide angle of view of the road from the house, to be effective a bund or barrier would have to extend for a significant distance and would have to block the line-of-sight from the road. In my experience this is unlikely to be practicable. Furthermore, while a barrier or bund could reduce overall sound levels, with a porous asphalt surface on this section of the highway, levels are already predicted to be relatively low at 52 dB $L_{Aeq(24h)}$. A barrier or bund would not address sound from engine braking, which can emanate from exhausts at the top of trucks. Engine braking sound may even become more prominent if general road-traffic sound is further attenuated.
- (c) Planting of trees on the property boundary would not materially alter measured road-traffic sound levels, but would provide a noise benefit as the perception of sound is generally reduced when the source is not visible. There may also be a slight benefit from vegetation providing a degree of masking sound when there is wind, reducing the prominence of road-traffic sound. While not essential to mitigate the noise effects of the Project, planting of trees on the property boundary could provide additional mitigation. In response to this submission, provision of planting in this location is included as a requirement in proposed condition 12(e)(iv) attached to the evidence of **Ms McLeod**.
- (d) The main adverse noise effect at 75 Hope Road relates to outdoor amenity. The submission suggests treating the building with sound insulating glazing and ventilation to reduce indoor sound levels. In my opinion, such treatment is not warranted in this instance as reasonable internal sound levels would be achieved even with existing windows open for ventilation. However, as set out in the JWS, I agree with Mr Lloyd that if engine braking noise causes sleep disturbance, consideration could be given to acoustic treatment and ventilation of bedrooms at this house.

Murray Ramage (submission 170)

- 48. The submission refers to adverse operational noise effects on a future lifestyle house that the submitter intends to build in the vicinity of the lower eastern slope. I understand the land adjoins 75 Hope Road.
- 49. In accordance with NZS 6806, my approach in preparing Technical Assessment 2 was to consider noise effects only at existing houses and

future houses with building consent already granted. For linear infrastructure passing through a rural area it would be impracticable, and potentially prohibitive, to assume that a future house could be built at any location. However, in this instance it is likely that even if I had assessed a future house in this area it would not have altered my findings, as the noise exposure and effects are already addressed through consideration of 75 Hope Road.

50. I have recommended that the new road has an asphaltic road surface on the lower eastern slope which should reduce sound levels as far as practicable in this area. I consider it would be practicable to locate and design a future lifestyle house on a large block to achieve acceptable rural living conditions. Based on the predictions for 75 Hope Road, the levels should be well within the 57 dB $L_{Aeq(24h)}$ criterion from NZS 6806.

Nick Rogers and Tiffany Wendland (submission 366)

51. These submitters live at 1213 Fitzherbert East Road by the intersection of SH3 and State Highway 57 (“**SH57**”). I have met with the submitters at their house on 23 November 2018 to discuss the concerns they have raised, primarily with respect to operational road-traffic noise associated with the proposed new western roundabout.
52. As for my comments with respect to the eastern roundabout above, I agree with the submitters that the western roundabout will potentially cause noise disturbance if it is not mitigated. I discuss this issue in paragraphs 107, 129, 136, 137, 138, 147(c)/(d)/(e) and 149 of Technical Assessment 2. As for the eastern roundabout, while there is a significant potential adverse noise effect associated with the western roundabout, in my opinion this effect can be adequately mitigated by maintaining a minimum separation distance of 100 metres between traffic lanes on the roundabout and the submitters' house, and by designing the road environment to moderate vehicle speeds and behaviours. I recommend enhancement or replacement of the existing earth bund by the house.
53. The submission includes a proposal for replacing (or supplementing) the existing earth bund with a bund adjacent to the new road alignment. The location for a bund shown by the submitters has potential to be acoustically effective, but would need to be subject to detailed design to confirm if it is practicable. As previously set out in Technical Assessment 2, I recommend that the development of an enhanced bund in this location be subject to

consultation with these submitters. Proposed condition 12(e)(v) attached to the evidence of **Ms McLeod** requires a bund in this location.

54. The submitters propose that the roundabout should be at least 250 metres from the house. While I agree that the roundabout should be located as far as practicable from the house to minimise noise effects, as set out in Technical Assessment 2, I consider that a minimum distance of 100 metres is sufficient to result in minor noise effects. The existing environment includes a sharp 90 degree turn between SH3 and SH57, so a degree of vehicle acceleration and braking sound is already present. This existing intersection is approximately 60 metres from the house with the approach to the intersection on SH57 passing by slightly less than 20 metres from the house. Proposed conditions 28(a) and 5(e)(vi) attached to the evidence of **Ms McLeod** respectively specify a minimum 100 metres separation distance between the roundabout and the house, and also require this distance to be maximised during the detailed design.
55. The submission also requests sound level monitoring, double-glazing and mechanical ventilation. Pre-construction sound level monitoring has been conducted at this location, as set out in Appendix 2.C of Technical Report 2. While post-construction monitoring could be conducted, it would not alter any outcomes as the noise mitigation has been determined by what is practicable rather than to achieve a specific noise limit. Even allowing for substantial uncertainty the predicted sound level of 58 dB $L_{Aeq(24h)}$ at this house will comply with the relevant 64 dB $L_{Aeq(24h)}$ NZS 6806 Category A criterion. I do not consider post-construction sound level monitoring to be necessary.
56. In terms of upgraded glazing and ventilation, this house has always been immediately adjacent to the intersection of SH3 and SH57 and the Project is not predicted to significantly alter sound levels. As such, given that sound levels are within NZS 6806 Category A, I do not consider that building treatment is warranted.

Charleen Cudby (submission 239)

57. The submitter lives at 4 Franklin Road adjacent to the existing SH3 between Woodville and the Manawatū Gorge. The submission questions whether noise effects have been considered, and what control measures are proposed.

58. I confirm that noise effects have been explicitly considered at this house, and it is included in Table 2.4 of Technical Assessment 2, which considers predicted sound levels at relevant Protected Premises and Facilities ("PPFs"). With the Project, road-traffic sound levels at this house are significantly reduced compared to the pre-existing (2016) scenario, as the new SH3 is significantly further from the house than the existing SH3. Compared to the existing (2018) scenario, the future sound levels with the Project do not change. This is primarily because a low-noise road surface is proposed for the lower eastern slope, which provides effective noise mitigation in this location.

John Bent (submission 243)

59. The submitter asserts that there has been a complete lack of consideration of adverse effects arising from construction. In terms of construction noise and vibration I confirm that I have considered adverse effects as set out in detail in Technical Assessment 2.

60. As identified in Technical Assessment 2, various adverse construction noise and vibration effects will arise in locations nearer to the Project. I have recommended control measures in Technical Assessment 2, so that these construction effects should be kept to an acceptable degree.

61. I note that this submitter lives well away from the Project, in Palmerston North.

Anonymous (submission 740)

62. I understand that this submitter has asked that their contact details be withheld. For the purposes of responding to the issues raised in the submission, however, I have been made aware of the location of the property the submission refers to. The submission raises a general concern with noise effects at the property.

63. With the Project, road-traffic sound levels at this house are significantly reduced compared to the pre-existing (2016) scenario, as the new SH3 is significantly further from the house than the existing SH3. The future sound levels are mitigated by the low-noise road surface proposed for the area nearest to this property, and the resulting predicted sound level of 54 dB $L_{Aeq(24h)}$ complies with the most stringent Category A criteria from NZS 6806.

Department of Conservation (submission 369)

64. The Department of Conservation raises concerns with potential adverse noise and amenity effects in the Manawatū Gorge Scenic Reserve western car park and information area.
65. Before the Gorge road closed, the western car park and information area were always adjacent to a busy State highway. This area had relatively poor acoustics amenity, and it was a location used for convenience or necessity rather than one sought out for tranquillity. There are many examples around the country of similar rest areas and car parks located adjacent to State highways. Drawing N-01 in Volume 4 of the NoR shows that sound levels at the car park and information area in 2016 will have been in the order of 65 dB $L_{Aeq(24h)}$. This is relatively noisy, and would not be perceived as tranquil.
66. Under the current scenario with the Gorge closed, the only traffic near the car park is vehicles accessing the car park itself. As a result, road-traffic sound levels have dropped significantly. However, the overall amenity remains constrained by the physical and visual presence of the State highway and the large parking area with minimal landscaping.
67. Figure 2.4 in Technical Assessment 2 shows sound level contours with the new road. It is assumed the information area and any picnic tables will be located on the Gorge side of the new bridge, at the edge of the blue sound level contours representing 55 dB $L_{Aeq(24h)}$. While this will be noisier than the current temporary situation, it will be significantly quieter than the situation before the Gorge closed, and represents a significant improvement in amenity in this area. The reason the levels are lower than pre-existing is that the proposed new road will be elevated above this area, and will have a concrete safety barrier along the edge of the bridge and embankment providing acoustics screening.
68. As has always been the case, road-traffic noise will still be clearly audible at this location, and this will still not be perceived or expected to be a remote natural area. However, the amenity will be improved to an extent whereby picnic facilities are more likely to be used than when the Gorge road was open.

RESPONSE TO QUESTIONS OF THE HEARING PANEL

Why does the CTMP not also propose to minimise night time construction traffic through Woodville?

69. Woodville is different to Ashhurst in that traffic passes through Woodville on long-established State highways rather than on residential streets, as is the case in Ashhurst. However, I acknowledge that there are still potential noise effects in Woodville, and accordingly proposed condition 22(h) attached to the evidence of **Ms McLeod** now requires the CTMP to minimise night-time construction traffic through Woodville as well.

The Construction Noise and Vibration Management Plan makes no mention of mitigating noise and vibration. Please comment.

70. Proposed condition 21(a) requires the CNVMP to demonstrate how performance criteria in conditions 19 and 20 will be achieved. In many areas it is likely that no specific mitigation will be required. In other areas closer to houses, mitigation and management is likely to be required and will have to be detailed in the CNVMP to demonstrate how compliance with criteria will be achieved.

Describe the circumstances in the other board of inquiry cases where notwithstanding compliance with NZS 6806, additional mitigation was required.

71. For the new road section of the Waterview Connection (SH20 north of Maioro Street) the designation conditions require building treatment if internal levels are above 40 dB $L_{Aeq(24h)}$ with windows closed. This is more stringent than the NZS 6806 threshold of 45 dB $L_{Aeq(24h)}$, although that applies with windows open if required for ventilation.
72. The designation conditions for Transmission Gully require PPFs by a new section of road to be assessed for building treatment if they are in Category B, which is more stringent than NZS 6806 which only requires building modification in Category C.
73. Neither of the above situations arise on this Project.
74. Boards of Inquiry for Puhoi to Warkworth and the Northern Corridor Improvements in Auckland did not directly impose additional mitigation but did restrict changes to predicted sound levels, which could potentially result in additional mitigation.

75. I have not reanalysed all Board of Inquiry decisions to answer this question, but to my knowledge the above represent the main augmentations to NZS 6806 with respect to mitigation.

Why is building consent chosen as a trigger for consideration for noise effects of future developments? What about permitted activities under the district plans as an alternative?

76. This is a planning or legal matter rather than an acoustics matter. I have applied the requirement of NZS 6806. From a technical perspective, it is not sustainable to mitigate noise over an extended length of infrastructure to allow for any future development.

Where within the designation is blasting to occur?

77. It is unknown at this stage whether or where any blasting will occur. However, blasting could only be required in areas of cut where material is being removed. For the indicative alignment, areas of cut are shown on Drawings A-01 to A-10 in Volume 4 of the NoR. Due to the topography any variations to the indicative alignment would still not result in significant areas of cut near houses.

Are you aware of any contention or debate over the altered versus new status described in that paragraph? [84]

78. Mr Lloyd has questioned the categorisation of houses by new and altered roads. We discussed this matter in conferencing and our JWS sets out our agreement that this is complicated by the presence of the existing SH3 currently without State highway traffic volumes.

79. The noise mitigation proposed has been designed to achieve the best practicable option rather than being designed as the minimum needed to comply with a particular criterion, be it altered or new.

Are the soils located within the construction area more or less susceptible to vibration effects than would commonly be the case? If so, how does the model take into account this susceptibility?

80. I have not analysed vibration for the specific soils in this area, which will affect the distance at which the criterion is achieved. The nearest houses to the new sections of road (as opposed to altered sections of road near

Ashhurst and Woodville) will be at least 200 metres away, which far exceeds the distance at which compliance will be achieved in any ground type.

By reference to appropriate maps or plans, could you draw attention to the PPFs you are referring to in the latter part of that paragraph? [89]

81. Drawing N-12 in Volume 4 of the NoR shows 50 metre and 200 metre buffer areas around the proposed designation. The 50 metre buffer is the green dashed line and houses are shown as red shapes. It can be seen that there is one house within the 50 metre buffer by the western roundabout, and six houses within or adjacent to the 50 metre buffer by the eastern roundabout.

Please explain what you mean when you record “in response to community feedback, based on economic considerations the project has been constrained so State highway traffic remains travelling through the centre of Woodville”.

82. The evidence of **Sarah Downs** and **Scott Wickman** explain why the Project does not incorporate a bypass of Woodville, which I understand was as a result of these factors. In terms of noise effects there would be a significant potential benefit to bypassing Woodville, however my assessment has only considered options with traffic remaining on Vogel Street through Woodville.

Given the designation area is large, how does the model and modelling for noise and vibration effects take account of or provide for possible variations in the final location of the road service and of construction activity.

83. Drawing N-12 in Volume 4 of the NoR shows construction noise buffer areas from the designation boundary with no regard to the indicative alignment or earthworks. In effect I have considered construction activity for a worst-case situation of works at the edges of the designation.

84. For operational noise I have reviewed specific locations of houses where changes in the alignment might alter predicted levels. I have then recommended minimum separation distances to ensure that any variations do not materially alter my assessment. Those minimum separation distances are included in proposed condition 28 attached to the evidence of **Ms McLeod**.

This paragraph [124] discusses night works near PPFs. Are there conditions that constrain night works, and if so what are they?

85. The 45 dB L_{Aeq} noise limit for all night periods in proposed condition 19 constrains night works near to houses.

In that same paragraph [124], when you use the word “minor”, what do you mean?

86. With the controls proposed I consider that construction activity should not cause undue noise disturbance for most people, such that they find it acceptable.

Do you know whether or not the bulk of imported fill will pass through Ashhurst or not?

87. I understand it is likely that bulk fill will need to pass through Ashhurst.

In these paragraphs [133-134], you refer to utilising porous asphalt surface as a mitigation measure. Has the use of porous asphalt been confirmed, and is this use referred in proposed conditions?

88. The use of a low noise surface in these areas outside the designation has been confirmed and is required by proposed condition 27. There are a number of low noise options that would meet that condition; I note that for Vogel Street in particular a Stone Mastic Asphalt or Asphaltic Concrete surface may be used rather than a Porous Asphalt surface due to the increased stresses from turning movements.

Are your conclusions/recommendations set out in paragraphs 30, 31, 32, 136 and 138 addressed in the NOR conditions offered by NZTA?

89. Yes. I have worked closely with **Ms McLeod** on the proposed conditions in the NoR and the updated version of the proposed conditions attached to her evidence. The Transport Agency has accepted all of my recommendations.

Please explain the significance of meteorological conditions on noise measurements.

90. Sound level measurements should not be conducted in wind or rain as both can interact with microphones creating anomalous sound. People commonly experience this with wind blowing on a mobile phone microphone when outdoors.

91. Wind also causes vegetation to move which creates sound. This vegetation sound is part of the environment people experience. During sound level measurements reported in Appendix 2.C of Technical Assessment 2 there were elevated wind speeds recorded at nearby weather stations. However, the monitoring locations themselves had some shelter and the measured sound levels were dominated by vegetation movement, which is part of the existing environment.

COMMENTS ON REPORTING OFFICERS' SECTION 42A REPORTS

92. Mr Lloyd has reviewed noise and vibration aspects of the NoRs for the Councils, primarily with respect to my work in Technical Assessment 2. As set out above, Mr Lloyd and I conferenced on 13 February 2019. Prior to that conferencing Mr Lloyd provided me a “will say” statement, and in addition to Technical Assessment 2 I provided him a draft of this statement of evidence.
93. As set out in the JWS, Mr Lloyd and I do not have any areas of disagreement on technical matters. Mr Lloyd’s section 42A report dated 1 March 2019 is consistent with the JWS. As such, there are still no technical issues on which I disagree with Mr Lloyd. For completeness, I note there may be some nuances between how we each approach and describe various matters, but these do not appear material and we have reached the same conclusions.
94. Further to the JWS, Mr Lloyd makes various comments on how noise controls should be implemented through designation conditions. In my opinion the conditions attached to the evidence of **Ms McLeod** appropriately address these matters.

CONCLUSION

95. I have assessed operational and construction noise and vibration associated with the Project, and I have recommended measures to avoid, remedy or mitigate adverse effects. For this work I have adopted standard methodologies in accordance with recognised practice, which is consistent with numerous other recent roading projects. I have applied learnings from other projects, and have consequently recommended greater mitigation than would be required by strict adherence to the relevant standards.
96. The Transport Agency has accepted my recommendations for mitigation and these are included in the proposed designation conditions attached to the evidence of **Ms McLeod**.

97. I have reviewed submissions that raise noise and vibration issues. In my opinion the mitigation I have recommended adequately addresses the specific issues raised by the submitters.
98. The Hearing Panel has asked questions relating to Technical Assessment 2. I have provided clarification of those matters and indicated how they are addressed by the proposed conditions attached to the evidence of **Ms McLeod**.
99. I conferenced with Mr Lloyd and we agree on all technical matters as set out in our JWS.

Dr Stephen Chiles

8 March 2019