Before a Board of Inquiry
MacKays to Peka Peka Expressway Proposal

under: the Resource Management Act 1991

in the matter of: Notice of requirement for designation and resource consent applications by the NZ Transport Agency for the MacKays to Peka Peka Expressway Proposal

applicant: **NZ Transport Agency**
Requiring Authority

Statement of rebuttal evidence of **Siiri Wilkening** (Operational Noise) for the NZ Transport Agency

Dated: 24 October 2012

REFERENCE: John Hassan (john.hassan@chapmantripp.com)
Suzanne Janissen (suzanne.janissen@chapmantripp.com)

Chapman Tripp
T: +64 4 499 5999
F: +64 4 472 7111

10 Customhouse Quay
PO Box 993, Wellington 6140
New Zealand

www.chapmantripp.com
Auckland, Wellington,
Christchurch

TABLE OF CONTENTS

EXECUTIVE SUMMARY 3

LATE SUBMISSIONS 3

John Axe 3

Jill Short 4

Arthur Wright 4

EVIDENCE OF SUBMITTERS 5

Malcolm Hunt (KCDC) (682) 5

Emily Thomson (KCDC) (682) 13

Dr Marie O'Sullivan (APSOC) (572) 13

Lisa Wildmo-Seerup (APSOC) (572) 17

Sue Smith (WOO) (514) 18

Beth and Sarah Lindsay (Highway Occupants' Group) (543) 19

Jayne Staple (Raumati South Residents' Association) (707) 21

Neil and Barbara Mountier (327) 21

Monica and Christopher Dearden (261) 21

Loretta Pomare (309) 23

CONCLUSION 24

ANNEXURE A – PROPOSED DESIGNATION CONDITIONS REFERRED TO IN THIS REBUTTAL STATEMENT 25

ANNEXURE B – POINTS OF AGREEMENT AND DISAGREEMENT BETWEEN M HUNT AND S WILKENING 26

STATEMENT OF REBUTTAL EVIDENCE OF SIIRI WILKENING FOR THE NZ TRANSPORT AGENCY

1 My full name is Siiri Wilkening.

2 I have the qualifications and experience set out at paragraphs 2 to 4 in my evidence in chief dated 4 September 2012 (*EIC*).

3 I repeat the confirmation given in my EIC that I have read, and agree to comply with, the Code of Conduct for Expert Witnesses (Consolidated Practice Note 2011).

4 In this statement of rebuttal evidence, I respond to certain aspects of the evidence lodged by submitters as it relates to operational noise. Specifically, I:

4.1 Respond to the late submissions of:

(a) John Axe (741);

(b) Jill Short (742); and

(c) Arthur Wright (743).

4.2 Respond to the evidence of:

(a) Malcolm Hunt, on behalf of the Kāpiti Coast District Council ("KCDC") (682);

(b) Emily Thomson, on behalf of KCDC (682);

(c) Dr Marie O'Sullivan on behalf of Action to Protect and Sustain our Communities ("APSOC") (572);

(d) Lisa Wildmo-Seerup on behalf of APSOC (572);

(e) Sue Smith on behalf of Waikanae on One ("WOO") (514);

(f) Beth and Sarah Lindsay on behalf of the Highway Occupants' Group (543);

(g) Jayne Staple, on behalf of the Raumati South Residents' Association (707);

(h) Neil and Barbara Montier (327);

(i) Monica and Christopher Dearden (261); and

(j) Loretta Pomare (309-1).

5 The fact that this rebuttal statement does not respond to every matter raised in the evidence of submitter witnesses within my area of expertise should not be taken as acceptance of the matters raised. Rather, I rely on my earlier technical reports,[1] my EIC and this rebuttal statement to set out my opinion on what I consider to be the key operational noise matters for this hearing.

6 Consistent with my EIC, I have referred to the MacKays to Peka Peka Expressway Project as "the Project" in this rebuttal evidence.

EXECUTIVE SUMMARY

7 I have read the late submissions of John Axe, Jill Short and Arthur Wright as they relate to operational noise issues, and respond to the relevant sections. I have also read all of the statements of evidence provided by submitters as they relate to my area of expertise.

8 I have reviewed the proposed designation conditions as they relate to operational noise in light of the comments made by KCDC witnesses, and comment on these later in my rebuttal evidence.

9 I note that only one submitter (KCDC) has provided expert acoustic evidence (that by Mr Malcolm Hunt), and that Mr Hunt and I are in agreement on most issues.[2]

10 The submitters' evidence has not caused me to depart from the opinions expressed in my EIC in regards to operational noise.

11 I remain of the opinion that, with the implementation of the selected mitigation options, while causing an increase in currently experienced noise levels, the Project can be operated to achieve appropriate noise levels that are suitable for residential and other noise sensitive uses.

LATE SUBMISSIONS

John Axe

12 The submitter is concerned about the increase in noise levels at his dwelling[3] from the operation of the Project.[4] The dwelling is in close proximity to the Project (approximately 60 metres from the edge of the closest carriageway).

---

1 Technical Report 15, "Assessment of Operational Noise Effects".

2 A summary of points of agreement and remaining disagreement is contained in **Annexure B** of my rebuttal.

3 The dwelling is located at 44 Rata Road, Paraparaumu.

4 Axe Submission, paragraphs 4, 5 and 9.

13 The dwelling has been identified as an assessment position in Technical Report 15.[5]

14 Noise levels at the dwelling are predicted to increase by 5 decibels with the operation of the Project, a noticeable change. However, the dwelling will remain in the most stringent Category A. No specific mitigation is required for this dwelling as there is a natural barrier between the Project and the dwelling in the form of an existing dune which will be retained. In addition, the Expressway alignment in that area will be surfaced with low noise generating material Open Graded Porous Asphalt ("OGPA"). In conclusion, I consider that with the proposed design of the Project, noise levels at the dwelling will be appropriate.

Jill Short

15 Ms Short is concerned about road traffic noise in relation to her dwelling.[6] I have addressed the issue of increase in noise levels with the introduction of (any) road into the area in my EIC paragraph 102.

16 Noise levels at the dwelling are predicted to increase by about 11 decibels, however, with the proposed mitigation option (a 3 metre high bund east of the proposed Expressway and the use of OGPA) the dwelling will remain in the most stringent Category A. In conclusion, I consider that with the proposed design of the Project, noise levels at the dwelling will be appropriate.

Arthur Wright

17 Mr Wright is concerned about traffic noise effects from the proposed Expressway on his dwelling.[7] The dwelling is not a PPF[8] as it is outside the 100 metre assessment area. However, the dwelling at 10A Leinster Avenue, across the road from Mr Wright (and closer to the proposed Expressway alignment), has been assessed as a PPF and would receive similar noise levels to Mr Wright's dwelling.

18 Noise level predictions show that traffic noise at 10A Leinster Avenue will be similar to noise levels currently experienced from the existing SH1, i.e. noise levels would be only insignificantly higher than at present. Compliance with the most stringent Category A criterion will be achieved. The proposed Expressway would move only marginally closer to the dwelling and would be surfaced with OGPA. Where the proposed Expressway would be on the overpass, it

---

5 Technical Report 15, Appendix C, Sector 2 "Raumati East". The dwelling is incorrectly described as 40 Rata Road, however, the dwelling is in the correct location of 44 Rata Road.

6 The dwelling is at 63 Puriri Road which is assessed as a PPF (Technical Report 15, Appendix C, Sector 3 Kauri Road Area.

7 The dwelling is at 7 Leinster Avenue.

8 Protected Premises and Facilities.

would include solid edge safety barriers that achieve effective mitigation.[9]

19 Overall, I consider that with the proposed design of the Project, noise levels at the dwelling will be appropriate.

EVIDENCE OF SUBMITTERS

Malcolm Hunt (KCDC) (682)

20 Mr Hunt has provided expert evidence on noise issues on behalf of KCDC. Overall, I note that Mr Hunt appears in agreement with the operational noise assessment which I have undertaken for the Project.

21 Mr Hunt and I met on 20 September 2012 and discussed Project operational noise issues with the view of clarifying each other's position. Our combined meeting minutes of this meeting are attached to Mr Hunt's evidence (Appendix A).

22 In his evidence, Mr Hunt discusses a number of operational noise issues. I address each of the following issues below:

22.1 Use of NZS6806 vs District Plan noise criteria;

22.2 Extent of assessment area (100 metres vs 200 metres);

22.3 Noise level monitoring pre- and post-construction;

22.4 Interpretation of noise level increases predicted;

22.5 Alterations to selected mitigation measures in certain areas;

22.6 Effects on public and open space areas; and

22.7 Proposed changes to recommended designation conditions relating to operational noise.

NZS6806 vs District Plan noise criteria

23 Mr Hunt states that concerns were held regarding the preference of the NZS6806:2010 Road Noise Standard ("Standard") over the District Plan noise criteria for new roads.[10] I have set out in my EIC[11] that I consider the Standard to be the appropriate document to undertake a road traffic noise assessment against.

24 We discussed this issue during our meeting and I explained that for each assessment area, one mitigation option was developed that would achieve compliance with the District Plan noise criteria.

---

[9] Refer my EIC, paragraphs 141 and 142 for mitigation on bridges.

[10] Hunt Evidence, paragraphs 2.2 to 2.4.

[11] My EIC, paragraphs 98 and 170.

Where the Project team decided that this option constituted the best practicable option, this was put forward as the selected option. In 9 of the assessed 17 areas,[12] a mitigation option was selected that would fulfil or surpass the District Plan requirements.

25 Nevertheless, given that the Project will be within a designation, I remain of the opinion that the District Plan requirements are not strictly applicable and that the application of the Standard results in a more comprehensive assessment and suitable outcome. Following discussion and review, Mr Hunt is now in agreement with this.[13]

Assessment area 100m vs 200m

26 In paragraph 2.5, Mr Hunt discusses the extent of the assessment area and comments that in his opinion, all PPFs within 200 metres of the alignment should be assessed. My assessment extended 100 metres from the alignment in accordance with the requirements of the Standard for urban areas.[14]

27 This issue had been voiced by several submitters, to which I responded in my EIC in paragraphs 110 to 113 and Annexure C of my EIC. The figures in Annexure C show the noise level contours for the proposed Expressway and the 100 and 200 metre lines indicating the assessment area both in accordance with the Standard and as requested by the submitters.

28 As shown on these figures, discussed in paragraph 112 of my EIC and acknowledged by Mr Hunt in his evidence,[15] all dwellings, except one,[16] located outside the 100 metre area are within the most stringent Category A, and so the extension of the assessment area would, in my opinion, not lead to a change in the selected mitigation options.

Noise level monitoring pre- and post-construction

29 Mr Hunt suggests that the proposed designation conditions be amended to allow for:

29.1 Additional noise level monitoring to be undertaken, namely 20 sites rather than the minimum requirement of 8 sites, and states that this would "result in more representative sampling";[17] and

---

12 Hunt Evidence, Appendix A, Pre-Conference Discussion, page 2, "Mitigation".

13 Hunt Evidence, paragraphs 2.4, 7.8 and 15.3.

14 NZS6806:2010, Section 1.3.1(d) and (e), and Section 2.2.

15 Hunt Evidence, paragraph 2.5.

16 The one exception, 160 Greenhill Road, is still within Category B.

17 Hunt Evidence, paragraph 2.7(a).

29.2 Post-construction monitoring to be undertaken three times over the 10 year period following opening of the road.[18]

I disagree with both suggestions and provide my reasons below.

30 Noise levels adjacent to a major road generally vary little from one section to another, with the road being the main noise source in the area. In my opinion, choosing an appropriate sample of representative noise survey positions will provide a more meaningful overview rather than undertaking a large number of measurements which would show similar noise level results. I consider that the 8 positions chosen during the pre-construction noise level survey[19] are representative and provide a full picture of the ambient noise levels adjacent to the Project.

31 The Project has a total length of about 16 km. The entire Project was divided into 17 assessment areas,[20] each consisting of dwellings with similar orientation to the road. Adjacent to Sectors 3 and 4, residences are at very low density thus restricting the areas where noise surveys should reasonably be undertaken to determine effects on residents. Adjacent to large parts of Sector 2, dwellings are at a similar distance and within a similar environment to each other. In this area, undertaking several measurements would result in similar noise level survey results but not provide additional useful information. At present, the 8 survey locations include two each in Sectors 1 and 2, three in Sector 3 and one in Sector 4. In my option, the selected survey positions provide a representative sample. Increasing the number to 20, as suggested by Mr Hunt, is, in my opinion, excessive and unnecessary.

32 Proposed designation condition DC.50(b) requires that post-construction noise levels be measured within two to three years of opening of the road. This timeframe allows for driver behaviour to normalise and traffic volumes to settle into a normal pattern. Measured levels would be accompanied by traffic counts and survey results adjusted to reflect traffic volume increase over time up to the Design Year.[21]

33 Measuring noise early after opening of the road (e.g. 3 months after opening as suggested by Mr Hunt) will, in my opinion, provide a distorted picture of traffic noise levels. Road surface material will still be entirely fresh and likely result in noise levels that are lower than predicted. Drivers often change their driving behaviour (in terms of speed and routes) following the opening of a new road. These factors would also influence the measured noise level and

---

18 Hunt Evidence, paragraph 2.7(b).

19 Technical Report 17, Section 2.5.

20 Technical Report 15, Section 8 and my EIC, paragraph 92.

21 Technical Report 15, Section 6.2.1.

result in a distorted result. I therefore do not agree that such survey would provide accurate and useful information.

34 Mr Hunt recommends an additional two surveys, no less than four years apart,[22] on the grounds that these surveys would serve "to check on the performance of structural mitigation measures to ensure they achieve the design traffic noise levels throughout the period up to the design year of 2026."[23] I disagree that repeated surveys as proposed by Mr Hunt are the most appropriate method to ensure performance of mitigation measures is retained.

35 In my opinion, a visual inspection of barriers, bunds and road surface would better serve to ensure that maintenance is carried out as required, because such inspection would be able to involve all mitigation measures rather than only those directly affecting a survey site. A designation condition suggested by Mr Hunt requiring certification of the structural noise mitigation by a suitably qualified acoustic expert prior to opening of the road, indicates that Mr Hunt also considers such visual inspection to be of value.[24] I agree that such a condition would be valuable, and have attached relevant new wording in proposed designation condition DC.41(c) in **Annexure A**.

36 In my opinion, the noise survey results would essentially serve to verify that the noise level predictions undertaken are accurate and representative of the "as built" situation. For this to occur, surveys should be undertaken at the earliest appropriate time once people have acclimatised to the new road, which may be two to three years after opening, and at a representative number of locations, in my opinion 8 to 10 for a Project of this size and layout.[25] I note that the proposed designation condition DC.50(a) requires surveys at a <u>minimum</u> of 8 positions, thus allowing for further scope should this be required.

37 Finally, Mr Hunt suggests that monitoring locations be approved by Council. In my opinion, it is advantageous to determine survey locations in consultation with the Council, and I have proposed an amendment to condition DC.50(a) in that regard.[26]

Interpretation of predicted noise level increases

38 In his evidence, Mr Hunt makes some statements regarding the increase in noise levels and provides a cumulative data set[27] based on the tables contained throughout Section 7 of Technical Report 15. However, interpretation of the data is not correct. The figure below shows the same cumulative dataset as shown in Mr Hunt's

---

22 Hunt Evidence, paragraph 11.7(b).

23 Hunt Evidence, paragraph 2.7(b).

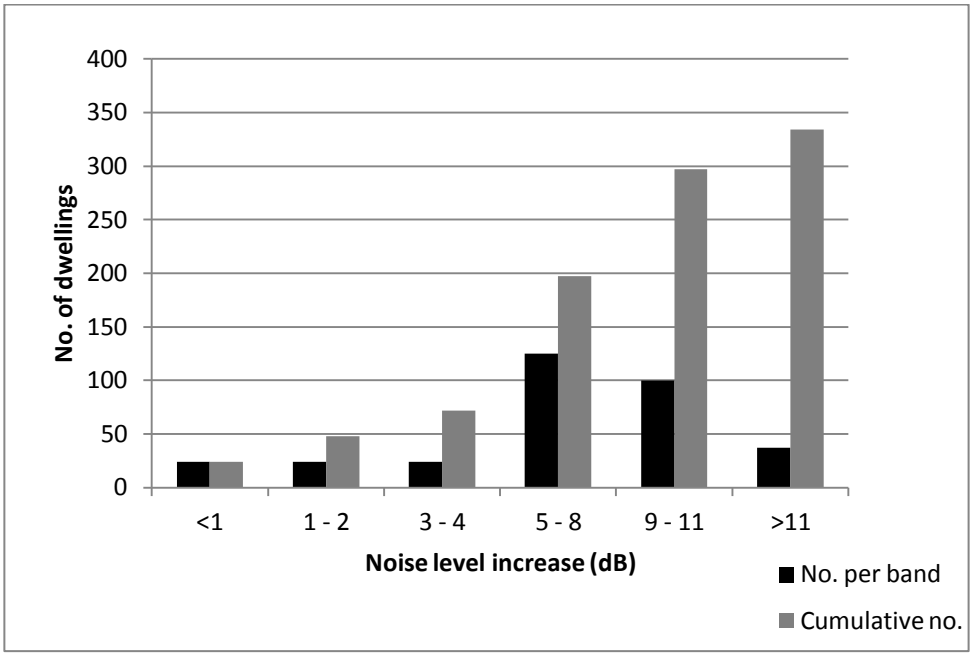
24 Hunt Evidence, paragraph 2.18.

25 Refer proposed condition DC.50, Annexure A.

26 Refer new sentence added at end of (a), Annexure A.

27 Hunt Evidence, paragraph 6.5 and Figure 1.

evidence (in grey), and I have added (in black) the number of dwellings in each of the noise level bands.



39 Mr Hunt states that "over half of affected PPFs will receive an increase in existing ambient sound levels by 9 dBA or more".[28] In fact, around 40% of PPFs (137 of 334) are predicted to receive a noise level increase above 9 decibels. The band of noise level increase with the highest number of PPFs is predicted to be between 5 to 8 decibels (as shown in the figure above).

40 Nevertheless, overall, Mr Hunt states that:

40.1 He "generally support[s] the mitigation options [the] NZTA have proposed";[29]

40.2 That noise levels up to 59 dB $L_{Aeq(24h)}$, while initially noticeable, are not excessive or unreasonable;[30]

40.3 That the increase in noise, "which will change many people's outdoor sound level [by up to 20 decibels]" are not "unacceptable or unsustainable".[31]

41 In order to reduce residents potentially feeling annoyance from noise increase upon sudden changes in traffic volume due to traffic diversions or upon opening of the Expressway, Mr Hunt suggests that notification of residents prior to such events.[32] While I am not

[28] Hunt Evidence, paragraph 6.5.

[29] Hunt Evidence, paragraph 7.4.

[30] Hunt Evidence, paragraph 7.7.

[31] Hunt Evidence, paragraph 6.7.

[32] Hunt Evidence, paragraph 6.12.

convinced that residents' reactions would be positively affected by notification in this instance, it is likely that notification will be undertaken in any event for traffic management reasons.[33]

Alterations to selected mitigation measures in certain areas

42 Mr Hunt generally supports the selected noise mitigation options[34] and concurs with my findings that the Standard methodology of developing the mitigation options is the most appropriate due to the involvement of the wider project team.[35] He has, however, some further suggestions regarding mitigation options in Sector 2.

43 In regard to the assessment area between Kāpiti and Mazengarb Roads in Sector 2, Mr Hunt discusses Mitigation Option 3 which would result in ten more dwellings being within Category A rather than Category B.[36]

44 Mitigation Option 3, however, would involve several high barriers being installed immediately along the residential property boundaries in order to achieve the most effective noise level reductions. This option was not seen to be practicable by the Project's urban design expert **Mr Baily** due to the adverse shading and safety aspects involved with high barriers to the west of the properties.[37] Mr Hunt suggests that the adverse non-acoustic effects (e.g. visual) may be preferable to adverse acoustic effects "if the community were prepared to tolerate the negative effects of vertical walls near their property boundaries".[38] In my opinion, the input from the Project team resulted in the appropriate choice of Mitigation Option 6 as the selected option after weighing up these positive and negative effects.

45 Mr Hunt suggests that this multi-disciplinary approach could mean that dwellings in Category B are "being denied the opportunity to enjoy a noticeably better noise standard ($L_{Aeq(24h)}$ 57 dB instead of 64 dB)."[39] I do not agree with this statement as it oversimplifies the noise criteria categories and does not provide an accurate picture of actual noise level changes.

46 In many circumstances, for a dwelling to move from Category A (up to 57 dB) into Category B (58 to 64 dB $L_{Aeq(24h)}$) requires a very small, often not or barely perceptible, change in noise level. It should be borne in mind that Category B is not equivalent to a noise

---

33 Such provisions are for instance contained in proposed designation condition DC.18(a)ix.

34 Hunt Evidence, paragraph 7.4.

35 Hunt Evidence, paragraphs 2.4, 7.3, 8.7 and 8.9.

36 Hunt Evidence, paragraph 8.9 and 8.10.

37 Rebuttal Evidence of **Mr Marc Baily**.

38 Hunt Evidence, paragraph 7.5.

39 Hunt Evidence, paragraph 7.9.

level of 64 dB, which is on the upper end of the Category, but rather represents a range of noise levels.

47 For example, the area in Sector 2 between Kāpiti and Mazengarb Roads would, with the selected mitigation option, have 12 dwellings within Category B. Of these, nine would receive noise levels of 1 to 2 decibels above the Category A criterion of 57 dB (i.e. noise levels of 58 and 59 dB $L_{Aeq(24h)}$). This would be an imperceptible change, as set out in Technical Report 15[40] and Mr Hunt's evidence.[41] Of the remaining three dwellings, two would receive a noise level of 60 dB (i.e. 3 dB above the Category A criterion, a just perceptible change) and one would receive a noise level of 62 dB $L_{Aeq(24h)}$ (i.e. 5 dB above Category A, a noticeable change).[42]

48 From an acoustic point of view alone, providing additional mitigation to achieve lower noise levels is preferable. However, acoustic specialists do not operate in isolation and need to take account of other discipline's issues also (such as visual and urban design).[43] This is also ultimately confirmed by Mr Hunt when he states:[44]

> I am of the view that re-assessment of the design of noise screening (for example within Sector 2 where most PPFs are affected) to reduce the number of PPFs in Category B cannot take place in isolation from decisions experts in assessing the usual and landscape need to make regarding the impact of various possible noise mitigation options.

I concur with his findings in this regard.

49 In my EIC,[45] I noted that noise reduction due to reduced traffic volume along existing SH1 will be small (around 3 dBA). Mr Hunt suggests potential additional noise mitigation be provided at the existing SH1 in the form of speed reduction to 50 km/h, and that this may provide a further 3 dBA reduction.[46] While a reduction in speed from 100 km/h to 50 km/h would achieve a noise level reduction of about 3 decibels, I note that several sections of SH1 through the townships are already restricted to 50 km/h, and little further speed reduction (and therefore noise level reduction) could be gained at these areas. I therefore do not consider that much benefit can be gained from speed reduction on the existing SH1.[47]

---

40 Technical Report 15, Section 6.5.

41 Hunt Evidence, paragraph 6.3.

42 I note that with Mitigation option 3, which is potentially favoured by Mr Hunt, two dwellings would still remain in Category B, with noise levels of 58 and 60 dB $L_{Aeq(24h)}$.

43 As noted previously in my EIC (paragraph 26), the multi-criteria analysis is available in Technical Report 15, Appendix C.

44 Hunt Evidence, paragraph 15.5.

45 My EIC, paragraph 173.

46 Hunt Evidence, paragraph 9.3.

47 The issue of speed reduction is further discussed in the rebuttal evidence of **Mr Robert Schofield** but I note that a speed reduction on the existing

Effects on public and open space areas

50 Mr Hunt comments on submissions (including KCDC's) relating to noise effects on outdoor areas. He acknowledges that none of the relevant documents (District Plan, Standard or Noise Guidelines) provide guidance relating to such amenity effects and concludes that he does "not consider the potential noise […] effects on amenity within public and open space areas to be unreasonably or unacceptably reduced".[48] I concur with these findings and have provided further discussion on this issue in my EIC.[49]

Suggested changes to designation conditions

51 Mr Hunt suggests several changes to the proposed Designation Conditions, which I discuss below.

52 Mr Hunt suggests a new designation condition requiring

> a suitably experienced acoustics expert to inspect the "as built" structural noise mitigation measures and to issue a signed certificate to Council prior to opening testifying that the mitigation measures identified within DC.39, DC.40 and DC.41 have been properly installed and constructed. This certificate is to be applied for not greater than 60 days prior to opening of the route.[50]

I have commented on this suggestion in paragraph 35 above, and agree that such inspection can be valuable as a final check prior to opening.

53 I understand Mr Hunt's wording to mean that he considers the inspection should be undertaken towards the completion of construction, within the 60 day period prior to opening of the road. I agree that setting a timeframe for such inspection is necessary. However, the suggested 60 day period is too short, in my opinion. Should the inspection show any issues that need resolving, it is unlikely that remedial work could be undertaken within this period. Therefore, I have provided amended wording to the proposed designation conditions in **Annexure A** (refer proposed condition DC.31(c)), requiring any certificate to be provided to Council within 15 working days prior to opening of the Project. This will provide flexibility for the inspection to be completed at an appropriate time, allowing for remedial work if required, and provides certainty to Council and residents that prior to opening of the road all mitigation measures have been implemented appropriately.

State Highway would need to consider non-acoustic issues and is outside the scope of this Project.

48 Hunt Evidence, paragraph 10.6.

49 EIC, Paragraph 174.

50 Hunt Evidence, paragraph 11.3.

54 Mr Hunt further suggests additional noise monitoring, both in number and frequency. I have discussed my disagreement with these issues earlier in my evidence.[51]

55 As discussed previously, further amendments which I recommend to the designation conditions are shown in **Annexure A**.

Emily Thomson (KCDC) (682)

56 Ms Thomson has provided expert evidence on planning issues on behalf of KCDC and incorporated some of the changes to the operational noise designation conditions suggested by Mr Hunt, namely those relating to the number and frequency of pre- and post-construction traffic noise monitoring.[52]

57 I remain of the opinion that the additional monitoring suggested by Mr Hunt is excessive in this instance and would not result in more accurate results. As a result, I do not agree with the changes suggested in Ms Thomson's evidence.

58 No further operational noise issues are discussed by Ms Thomson.

Dr Marie O'Sullivan (APSOC) (572)

59 Dr O'Sullivan has presented extensive evidence[53] which, in relation to operational noise, focussed on the aspects of:

59.1 Health effects from increased noise levels;

59.2 Noise guidelines and standards;

59.3 Noise level measurement and prediction; and

59.4 Noise mitigation measures.

Health effects

60 Dr O'Sullivan states that my assessment focuses on "acoustics but does not address how noise is perceived by people or the health effects of long term exposure to noise."[54]

61 This is partially correct, as my area of expertise in relation to health effects is limited to the requirements of Occupational Safety and Health Guidelines[55] in relation to long term exposure to very high

---

51 See paragraphs 29 to 36 above.

52 Thomson Evidence, paragraphs 9.15 and 9.16 in relation to proposed condition DC.50.

53 I note from her evidence (page 2) that Dr O'Sullivan has a PhD in psychology, works primarily in the field of public health, and has no qualifications in acoustic engineering. I also note that Dr O'Sullivan has lodged a submission against the Project (No. 675) in her personal capacity.

54 O'Sullivan Evidence, paragraph 216.

55 Approved Code of Practice for the Management of Noise in the Workplace, Occupational Safety and Health Service, 2002, Regulation 11.

noise levels as experienced by some people in specific work environments. Such noise levels would never be experienced by the public in a road traffic noise environment.

62 Dr Black deals with health effects in his EIC and rebuttal evidence.

63 I do, however, comment on the perception of noise level changes throughout my Technical Report[56] and have discussed this issue further in paragraph 47 above.

Noise Guidelines and Standards

64 Several times, Dr O'Sullivan appears to confuse noise guidelines and standards,[57] and their requirements in relation to road traffic noise.

65 I have set out the different guidelines and standards examined in relation to this Project in Technical Report 15, Section 5.

Choice of criteria

66 Dr O'Sullivan is incorrect in her assumption that the road would be built based on the Transit Guidelines criteria because it "cannot be built within existing NZ criteria"[58] and that there are "no ratified or normative guidelines" to apply to roading projects. As noted previously, I have based my assessment on the Standard, and not on the Transit Guidelines. I have discussed these issues in Technical Report 15, Section 5.5 and in my EIC Paragraphs 98 and 172.

67 Dr O'Sullivan is also incorrect in stating that the Standard sets an upper noise limit of 57 dB $L_{Aeq(24h)}$ for new roads.[59] I have discussed the implementation of the Standard in regards to its noise criteria categories in Technical Report 15.[60] In summary, the noise criterion category achievable with the implementation of the best practicable mitigation option should be applied, with a focus on achieving Category A where this is practicable.

68 I disagree with Dr O'Sullivan's comment that the assessment of traffic noise has been undertaken based on "outdated guidelines".[61] The Standard was published as a full New Zealand Standard in April 2010, following several years of development by the expert committee producing it and public consultation, and taking into consideration overseas studies, including the World Health Organisation guidelines, as well as New Zealand specific conditions.

---

[56] Technical Report 15, Section 6.5 and throughout Section 7.

[57] O'Sullivan Evidence, paragraphs E.27, 206, 238.

[58] O'Sullivan Evidence, paragraphs 238.

[59] O'Sullivan Evidence, paragraphs E.23, E.27, 190, 206, 211, 235, 24 (pg 82).

[60] Technical Report 15, Section 5.1.2, last paragraph on page 10.

[61] O'Sullivan Evidence, paragraphs E.27 and 206.

69 Dr O'Sullivan suggests that my noise assessment has not followed the guidance of the Standard but rather that I am "bending the rules" to suit,[62] by applying the higher noise criteria for existing roads to a new road. I have applied the "altered road criteria" for the Expressway where it ties in with the existing SH1. I disagree that this is not in accordance with the Standard's intentions, as discussed in Technical Report 15, Section 5.1.2 and in my EIC in paragraphs 63 and 83.

Assessment positions

70 Dr O'Sullivan notes that garages are not included as assessment positions or PPFs, despite often being used as sleep outs.[63] This is correct. The Standard excludes garages and ancillary buildings from assessment (similarly to campgrounds). These buildings are generally used in an informal and intermittent manner, are generally constructed to a lesser standard than dwellings in many respects (e.g. thermal, acoustic etc.) and are not designed to constitute a dwelling. Nevertheless, where mitigation is put forward to protect dwellings in an area, incidental mitigation will be afforded to these ancillary buildings also.

Noise level measurement and prediction

Noise parameters

71 Dr O'Sullivan quotes traffic noise levels from online sources[64] and presents unverified noise level measurements[65] undertaken in the vicinity of the existing SH1. Based on these values, she doubts[66] that the noise level predictions presented in Technical Report 15 are valid.

72 The noise level values stated in Dr O'Sullivan's evidence appear to be for a range of descriptors, such as a continuous sound pressure level at a distance (e.g. as stated in Figure 6 on page 37 of her evidence) or an instantaneous level (e.g. as for the Linfox truck quoted in Table 2 on page 62 and on page 64 of her evidence). These noise levels are neither comparable with those predicted in my assessment, nor are they required to be assessed by the Standard, the District Plan or, in fact, the World Health Organisation guidelines referenced repeatedly by Dr O'Sullivan.

73 Road traffic noise levels are, in New Zealand, described and assessed as a daily average noise level $L_{Aeq(24h)}$.[67] In my EIC, I have shown a representative diurnal variation in noise level over a 24 hour period.[68] The use of the L_{eq} descriptor means that each

62 O'Sullivan Evidence, e.g. paragraphs 206 and 241.

63 O'Sullivan Evidence, paragraph 232.

64 O'Sullivan Evidence, paragraphs 110 (Figure 6), 125, 212 and 242.

65 O'Sullivan Evidence, paragraph 231 (Table 2).

66 O'Sullivan Evidence, paragraph 242.

67 NZS6806:2010, Section 3.4.2.

68 EIC, paragraph 47, Figure 1.

measurement sample is logarithmically averaged thus taking into consideration all high noise events and giving them due weight.[69]

74 I am certain that the noise level predictions contained in Technical Report 15 are accurate to the degree possible in accordance with the (tested and verified) noise calculation methods utilised in New Zealand.[70]

Prediction methodology

75 Dr O'Sullivan comments that the noise level predictions leave no margin for error, scope for cumulative effects (from the entire Project alignment) or effects outside the limited set of parameters.[71] I note that all of these issues are discussed in the Technical Report.[72]

Other issues

76 Dr O'Sullivan's statement that "background noise as low as 4 db (sic) is also known to interfere with speech discrimination in people with cochlear implants"[73] is incorrect. The 4 dB value relates to the Signal to Noise Ratio, which is the difference in noise level between the "wanted" sound (e.g. from a conversation) vs the ambient sound (e.g. wind, traffic, vegetation, household noise).

Noise mitigation measures

77 Dr O'Sullivan makes several statements regarding the selected mitigation measures. These include comments about noise bunds and barriers,[74] and comments about the choice of road surface material.[75]

78 Dr O'Sullivan states that bunds and barriers often achieve only a 1 to 2 decibel noise level reduction.[76] I disagree with this statement. The assessment was undertaken on a dwelling by dwelling basis.[77] While some dwellings (e.g. those further removed from the road or already shielded by natural land forms) would receive little or no benefit from any assessed mitigation measure, dwellings immediately beside the road (and thus most affected by the Project) would receive significant noise mitigation through the use of bunds

---

69 Logarithmic or energy averaging always trends towards the higher noise levels, irrespective of duration. Therefore, high noise events such as truck passes are appropriately included in the 24-hour noise level result.

70 For further information, refer Technical Report 15, Section 6.2 and for prediction accuracy, Section 6.4.2 last two paragraphs.

71 O'Sullivan Evidence, paragraph 237.

72 Technical Report 15, Sections 6.4.2, 7.1 and 6.2.

73 O'Sullivan Evidence, paragraphs E.23 and 122.

74 O'Sullivan Evidence, e.g. paragraphs E.25, 220, 221 and 222.

75 O'Sullivan Evidence, paragraphs 224

76 O'Sullivan Evidence, paragraph E.25.

77 Refer Tables in Technical Report 15, Appendix C for noise level predictions for all PPFs in an assessment area.

or barriers. It is therefore not appropriate to "average" noise level reductions for an area. I also note that the Standard sets "minimum requirements" for noise level reductions achieved by mitigation measures to be considered best practicable options, and these have been taken into consideration during the assessment.[78] .

79 Dr O'Sullivan's comments regarding the potential for negative visual impact of bunds and barriers clearly shows that the integrated approach to noise mitigation promoted by the Standard is the most practicable and appropriate. Achieving an integrated mitigation design with the input of urban and landscape design specialists does, in my opinion, lead to a better final result for both noise mitigation and visual effects.

80 Dr O'Sullivan's comments regarding the characteristics of road surface materials are incorrect. She states that "porous asphalt will be used […] creating higher noise levels than porous chip".[79] Chip seal always creates (considerably) higher noise levels than (porous or non-porous) asphalt. There is no such road surface material as "porous chip".

81 The Te Moana interchange ramps will be surfaced with dense asphalt, while parts of Te Moana Road and the Expressway will be surfaced with porous asphalt (OGPA) which is a low noise surface and a noise mitigation measure in its own right. This is further discussed in paragraphs 111 and 112 below.

82 Dr O'Sullivan comments on the maintenance and retention of mitigation measures, specifically the road surface material.[80] I refer to proposed designation condition DC.39(b) (requiring the implementation of the road surface materials as set out in Appendix B of Technical Report 15) and condition DC.48 (requiring the maintenance of the noise mitigation measures including low noise road surface material to retain their noise reduction performance), and consider that these conditions address Dr O'Sullivan's concerns appropriately.

Lisa Wildmo-Seerup (APSOC) (572)

83 Ms Wildmo-Seerup, on behalf of APSOC, comments on noise in general, and on traffic noise in particular, which I comment on below.

84 Ms Wildmo-Seerup states that a noise level increase of 6 to 10 decibels is perceived as a doubling in loudness.[81] However, a doubling in loudness is for noise level changes between about 9 and

---

78 NZS6806:2010. Section 8.2.2, and Technical Report 15, Appendix C, Tables: line 3 "Achievement of the NZS 6806 structural mitigation performance standards".

79 O'Sullivan Evidence, paragraph 224.

80 O'Sullivan Evidence, paragraphs 227, 228 and 28 (page 83).

81 Wildmo-Seerup Evidence, paragraph 5.

11 decibels, not at changes as low as 6 decibels.[82] A noise level change of 15 decibels is not perceived as four times as loud,[83] but rather about three times as loud (a change of 20 decibels would sound four times as loud).[84]

85 Ms Wildmo-Seerup states that my assessment is based on "changes in noise levels from a noise induced hearing loss perspective".[85] This is incorrect. My assessment is based on the relevant New Zealand Standard which is concerned with "adverse effects of road-traffic noise on people"[86] and its criteria are designed "taking into account health issues associated with noise".[87]

86 In my opinion, based on experience with road traffic noise in residential environments and based on the Operational Health and Safety Guidelines[88] applicable in New Zealand, the traffic noise levels predicted for this Project are well below the noise levels to cause hearing loss.

Sue Smith (WOO) (514)

87 Ms Smith, on behalf of WOO, comments on noise effects from the elevation of the proposed Expressway and states that "it is very difficult (and expensive) to successfully mitigate" such noise impacts.[89] I have commented on noise mitigation on elevated sections of road already in my EIC[90] and I discuss it further in paragraph 101 below. I do not agree that it is difficult to mitigate noise levels from elevated roads, particularly given that relatively low barriers enable very effective shielding of the traffic noise source on a bridge or embankment.

88 Ms Smith comments that "NZTA accept that noise […] impacts will be less with the WOO options, but believe they can all be mitigated."[91] I am unaware of any discussions to this regard and have not been involved. Therefore, I restrict my comments on the alternative WOO alignment option on the information gained from the WOO evidence, particularly Concept #3 shown in Ms Smith's evidence.

---

82 Technical Report 15, Section 6.5.

83 Wildmo-Seerup Evidence, paragraph. 5.

84 As confirmed in the evidence of Malcolm Hunt for KCDC at paragraph 6.3.

85 Wildmo-Seerup Evidence, paragraph 18.

86 NZS6806:2010, Section 1.1.1.

87 NZS6806:2010, Section 3.3.2.

88 Approved Code of Practice for the Management of Noise in the Workplace, Occupational Safety and Health Service, 2002, Section A2.2: Employers shall not be exposed to noise levels above an equivalent 8 hour L_{Aeq} level of 85 dB and a peak noise level L_{peak} of 140 dB without the use of hearing protection.

89 Smith Evidence, paragraph 52.

90 EIC, paragraphs 140 to 142.

91 Smith Evidence, paragraph 84, bullet point three.

89 The alternative alignment shown on that figure would introduce Te Moana Road into an area currently used for residential purposes, specifically in an area between 174 and 180 Te Moana Road. It also shows a rerouted Te Moana Road closer to dwellings in Fairview Oakes which are currently outside the assessment area at more than 200 metres distance. In either instance, noise levels from Te Moana Road would have a greater effect on neighbouring dwellings than the present Project alignment. I note that, for the NZTA Project, particularly in the Te Moana Road area, it is the traffic noise from Te Moana Road that has been mitigated by means of OGPA road surface in order to mitigate overall traffic noise levels.[92]

90 I have not calculated the potential noise levels from the alternative WOO alignment of the Expressway,[93] which I understand is proposed to be in a cutting or at grade. However, I have provided indicative noise level contours for the Western Link Route at a depressed level,[94] which are likely to be similar to the WOO alignment, with the addition of noise from the relocated Te Moana Road. Overall, I am of the opinion that noise effects would be overall similar for houses closest to either alignment.

Beth and Sarah Lindsay (Highway Occupants' Group) (543)

91 The evidence on behalf of the Highway Occupants' Group references and supports evidence brought by APSOC.[95] The submitters' main concern relates to the choice of the southern Project alignment through Raumati South, rather than along the Western Link Road designation.

92 Specific concerns relating to noise include:

92.1 Based on APSOC evidence, adverse health effects cannot be avoided, remedied or mitigated.[96]

92.2 Noise effects on "Raumati residents whose homes would become adjacent to the proposed alignment";[97]

92.3 Existing amenity values, "in particular by the change in ambient noise levels";[98] and

---

92 Technical Report 15, Section 7.5.7 d.

93 Modelling of alternative alignment options would require a considerable amount of work and detailed input in the form of 3D digital drawing data of the suggested road alignment and surrounding terrain interface through cuts and fills.

94 EIC, Annexure D, Figure number EN-NV-305; Note that these noise level contours are based on traffic volumes, speed and road surface different to the Expressway proposal.

95 Evidence number 572 (noise aspects of the APSOC evidence have been discussed above).

96 Beth Lindsay Evidence, paragraphs 5.3 and 5.4.

97 Beth Lindsay Evidence, paragraph 7.5.

92.4 Noise from traffic on Expressway bridges, as experienced by users of local roads passing underneath.[99]

93 I have discussed the APSOC evidence in relation to health effects in paragraphs 60 to 62 above. I disagree that this Project, with the implementation of the selected mitigation measures, would result in excessive noise levels that could cause adverse health effects, particularly hearing loss. I also disagree with the assumption that noise levels cannot be sufficiently avoided, remedied or mitigated. My EIC discusses the methodology which I, and members of the Project team, followed to select the best practicable noise mitigation options.[100]

94 I acknowledge that the chosen Project alignment in relation to its southern end results in effects on a different group of dwellings than would have occurred with the existing designation of the Western Link Road ("WLR"). However, from an acoustic point of view, avoidance of the WLR alignment in the Raumati South area had benefits to the overall noise level distribution, by keeping road traffic noise sources in an existing already affected corridor. I had input in the route selection process and commented on these matters at that time.[101]

95 Noise mitigation for dwellings in Raumati South (which are adjacent to the Project alignment) includes the use of OGPA and a 2 metre high bund which will also shield traffic from the existing SH1 in addition to the Expressway. As stated in my EIC, noise level changes for dwellings in this area are generally small due to noise levels from the existing SH1 which are not mitigated.[102] I have addressed night-time noise in my EIC.[103]

96 Throughout my Technical Report 15 and EIC, I acknowledge that the change in ambient noise level for most of the alignment will be significant due to the current low noise environment for areas away from the existing SH1.[104] However, I reiterate that I consider that the operation of any new road in this area would result in a noticeable noise level increase, and that, with the implementation of the selected mitigation measures, the resultant noise levels will be appropriate for residential use.

97 In regard to traffic noise from the Expressway as experienced below the proposed bridges, I note that all bridges will have solid edge

---

98 Beth Lindsay Evidence, paragraph 8.2.

99 Sarah Lindsay Evidence, paragraph 2.32.

100 EIC, paragraph 26.

101 EIC, paragraph 11.

102 EIC, paragraph 63.

103 EIC, paragraphs 129 and 130.

104 EIC, paragraphs 58 to 60.

barriers on both sides which effectively shield traffic noise from above. The area below a bridge is most often perceived as noisy due to the reverberant space created from the local road surface, underside of the bridge and side walls. This effect can be reduced with the choice of bridge materials (e.g. by choosing patterned concrete rather than polished surfaces).

Jayne Staple (Raumati South Residents' Association) (707)

98 Ms Staple states that for residents along Main Road South in Raumati, the "sound of SH1 [is] muffled by their extensive planting and positioning of their dwelling at the end of their long properties."[105] I concur that positing a dwelling at some distance from a road results in lower noise levels due to the distance attenuation of noise. However, planting, as observed at Main Road South, would not result in a noticeable reduction of traffic noise.[106] Nevertheless, the visual shielding and masking noise afforded by the vegetation assists with the perception of additional noise level reduction beyond the normal distance attenuation.

99 I have addressed noise from trucks using the Expressway in my EIC in paragraph 132. As noted, my predictions take account of the number of trucks on the road, as well as road gradient for the direction travelled.

Neil and Barbara Mountier (327)

100 The submitters are concerned about the height of the bridges and oversize trucks on these bridges above surrounding terrain, and are of the opinion that "such a height would greatly increase the spread of the impact of […] noise".[107]

101 As discussed in my EIC (paragraphs 140 to 142), edge barriers are recommended for all bridges of the Project, which will provide shielding of the traffic noise sources. Both the height of the road above existing terrain and the edge barriers have been taken into consideration in the noise level predictions. In regards to noise effects, I consider that the mitigation proposed will effectively reduce traffic noise levels.

Monica and Christopher Dearden (261)

102 In their statement,[108] the submitters suggest that the noise criteria to which the Project has been designed are "internationally excessive". I disagree with this statement and reiterate that the traffic noise criteria set out in the New Zealand Road traffic noise Standard are comparable to criteria of other countries,[109] including Australia and many European countries. I also note that the noise

---

105 Staple Evidence, paragraph 17.

106 Refer my EIC, paragraph 119.

107 Mountier Evidence, page 1, Fact 2.

108 Dearden Evidence, paragraph 2.28.

109 Refer my EIC, paragraph 99.

criteria in the Standard have been developed by an expert committee to avoid adverse health effects for residents in the vicinity of a road.[110]

103 The submitters seek that an existing dune be retained and designed to, as far as possible, act as a secondary noise barrier[111] in addition to the proposed bund adjacent to Puriri Street. I concur that a small benefit could be gained from such a double barrier, providing additional noise mitigation in the order of 1 decibel only.

104 In addition, the submitters seek the provision of "double glazing with sound-insulating glass".[112] I do not consider that this will be required to achieve a suitable internal noise environment. The noise level at the Dearden dwelling is predicted to be approximately 50 dB $L_{Aeq(24h)}$[113] which is well within the most stringent noise criteria Category A. With an external average daily noise level, I (conservatively) predict that internal noise levels throughout a 24-hour period, even with windows open, would range from 30 to 45 dB L_{Aeq}, which is considered appropriate for undisturbed residential use. I therefore consider that no building modification mitigation would be required in this instance.

105 A further point raised by the submitters is that "the road surface to be employed in front of us is not the noisiest but the median one. We had understood that NZTA were to push for the quietest road surface: one presumes that cost dictated the downgrade. We would still seek the quietest possible surface …"[114] The road surface material to be used in the vicinity of Puriri Road (and in fact for most of the alignment apart from sections in Sector 4 where there are no residents in the vicinity) is OGPA, the quietest commonly used road surface material in New Zealand. I therefore consider that the submitters may have misunderstood the information provided in the Application and technical reports, and that their concerns are unfounded.

106 The submitters are also concerned that the NZTA may resurface the Project in the vicinity of Puriri Road with a coarser road surface than proposed.[115] I refer to proposed designation condition DC.39(b) (requiring the implementation of the road surface materials as set out in Appendix B of Technical Report 15) and condition DC.48 (requiring the maintenance of the noise mitigation measures including low noise road surface material to retain their noise reduction performance). These conditions ensure that no noisier road surface material could be installed retrospectively.

---

110 NZS6806:2010, Sections 3.3 and 4.7.

111 Dearden Evidence, paragraph 3.14.

112 Dearden Evidence, paragraph 3.15.

113 EIC, Annexure C, Figure EN-NV-224.

114 Dearden Evidence, paragraph 3.18.

115 Dearden Evidence, paragraph 3.18.

Loretta Pomare (309)

107 Ms Pomare discusses a number of issues relating to traffic noise including:

107.1 Effects of traffic noise on outdoor noise levels and conversation (paragraph 33);

107.2 Increase in noise level due to the Project (paragraph 114); and

107.3 Mitigation measures chosen (paragraphs 140 and 143).

108 The submitter is concerned that the traffic noise levels predicted from the Expressway would interfere with communication outdoors and that outdoor living and opening of doors and windows will not be possible. Predicted noise levels for the majority of dwellings will be well within appropriate residential noise levels. These levels will not lead to interference with speech intelligibility outdoors, and are experienced by residents throughout New Zealand without adverse effects. I have addressed the issues of outdoor noise in my EIC (paragraphs 104 to 107), and confirm the statements made within them.

109 The submitter seeks that any noise increase over existing noise levels is "avoided". I have discussed this issue in my EIC (in paragraph 103) and reiterate that it is not feasible to operate the Expressway, or in fact any road, including the WLR, without causing an increase in noise level over existing levels. However, the mitigation proposed is designed to achieve effective noise level reductions where required and appropriate noise levels for residential receivers.

110 Ms Pomare seeks that noise barriers be designed to consist of "grassed environmentally friendly bund[s]".[116] In several locations, bunds have been chosen by the urban design team where appropriate. In regard to noise reduction, I have commented on suitable materials for noise barriers in Technical Report 15, Section 6.3.2. While I have determined the location, length and height of any barrier required, and have provided the base requirements regarding materials, the design of the barriers (e.g. bunding, boundary fencing etc) was undertaken by the Urban and Landscape Design specialists of the Project. The design strategies for developing the design of noise mitigation to integrate them within the landscape are addressed in the Urban and Landscape Design Framework (Technical Report 5).

111 The submitter further seeks that the "highest quality" road surface material is used and that any "change to road surface, i.e. sinking and damage […] be addressed and repaired". I confirm that the proposed road surface material OGPA is the quietest commonly used

[116] Pomare Evidence, paragraph 140.

road surface material for Sectors 1 to 3 and parts of Sector 4 of the Project. Proposed designation condition DC.48 requires that mitigation options (including road surface material) be managed and maintained to ensure that their noise reductions performance is retained.[117]

112 In addition, the submitter seeks the use of "highest quality road surface material on the Te Moana Road roundabout and ramps". The roundabout and ramps are proposed to be surfaced with stone mastic asphalt, a smooth non-porous road surface material. While this material generates low noise levels compared with chip seal, it is less noise absorptive than OGPA due to the lack of pores. I understand that, on road sections that are subject to high friction (e.g. curves and areas of deceleration and acceleration), the chosen road surface material is required to provide high shear resistance.[118] Porous asphalt does not, in my understanding, provide the required durability to be safely used on roundabouts or ramps, and it is therefore not proposed to use OGPA on these sections of road. My noise level predictions are based on the road surface material OGPA on sections of Te Moana Road and on the Expressway, and stone mastic asphalt on the Te Moana Road roundabout and all Te Moana Interchange ramps.

CONCLUSION

113 I have reviewed all relevant statements of evidence, as they relate to operational noise, and have discussed the issues set out in them. I remain of the opinion that the Project can be operated so that resultant noise levels would be within acceptable residential levels. The noise mitigation measures proposed have been developed with input from the wider Project team and have been examined for all positive and negative effects, and have been designed to provide a balance between all potential effects, with a view of achieving the lowest noise levels practicable.

Siiri Wilkening
24 October 2012

[117] This is also discussed in Technical Report 15, Section 6.3.4.

[118] Refer Rebuttal Evidence of **Noel Nancekivell**.

ANNEXURE A – PROPOSED DESIGNATION CONDITIONS REFERRED TO IN THIS REBUTTAL STATEMENT[119]

DC.41	a) The Requiring Authority shall implement the traffic noise mitigation measures identified as the "Selected Mitigation Options" in Appendix B of the Traffic Noise Assessment as part of the Project, in order to achieve the Noise Criteria Categories indicated in Appendix B ("Identified Categories"), where practicable and subject to Conditions DC.39-DC.40 above. b) The Detailed Mitigation options shall be implemented prior to completion of construction of the Project. c) Prior to opening of the Project, the Requiring Authority shall engage a suitably experienced acoustics expert that shall inspect the "as built" structural noise mitigation measures and issue a signed certificate to the Manager that the noise mitigation measures identified within DC.39 to DC.40 have been properly installed and constructed. The certificate is to be provided to the Council within 15 working days prior to opening of the Project.
DC.50	a) Prior to construction, the Requiring Authority shall arrange for a suitably qualified and experienced acoustics specialist approved by the Manager to undertake a minimum of 8 (eight) representative measurements of ambient noise levels. Measurements shall be undertaken in accordance with the requirements of section 5.2 of NZS6806:2010. Monitoring sites shall be determined in consultation with the Council. b) Following completion of the work, the NZTA shall arrange for a suitably qualified and experienced acoustics specialist approved by the Manager to undertake traffic noise monitoring at the same sites surveyed in Condition DC.50a) above, within 2 to 3 years following completion of construction of the Project. Measurements shall be undertaken in accordance with the requirements of section 5.2 of NZS6806:2010. c) The results of the noise level monitoring undertaken in accordance with Conditions DC.50a) and b) above shall be used to verify the computer noise model of the Detailed Mitigation Options. A report describing the findings of the verification shall be provided to the Manager within one month of it being completed.

[119] Proposed additions are shown in underlining and deletions in strikethrough.

ANNEXURE B – POINTS OF AGREEMENT AND DISAGREEMENT BETWEEN M HUNT AND S WILKENING

(Reference to Malcolm Hunt evidence is noted for each point)

Agreement on the following points has been recorded:

1. Appropriate consideration of Transit Noise Guidelines (referenced in the KCDC District Plan) (paragraphs 2.3 and 8.8)

2. Use of NZS6806:2010 (the Standard):

    a. General adoption (paragraph 7.1);

    b. Most appropriate in defining mitigation measures (paragraph 2.4);

    c. Integration with the wider Project team (paragraphs 7.3, 7.4, 7.8, 8.7 and 8.9);

    d. Definition of PPFs (paragraph 10.5;

3. Assessment area width does not limit the assessment outcome (paragraph 2.5);

4. Ambient noise level monitoring sites, duration and distribution generally agreed (paragraphs 4.5 and 4.7);

5. Calibration of computer noise model not essential (paragraph 4.6);

6. Computer noise modelling programme and output (paragraph 5.1);

7. Reduction in traffic noise along existing SH1 due to traffic volume decrease (paragraph 9.2).

Disagreement remains on the following points:

1. Number of noise survey locations and frequency of noise level surveys (paragraph 2.7);

2. Mitigation of existing SH1 (paragraph 9.3).