

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 **Camilla Borger** (Air Quality) 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 SUMMARY3

EVIDENCE OF SUBMITTERS3

Wind blown sand 3

Neil and Barbara Mountier4

Paul Bruce for APSOC4

Simon Hales for APSOC.....5

Beth Lindsay for HOG7

Dr Marie O’Sullivan for APSOC.....7

CONCLUSION9

**STATEMENT OF REBUTTAL EVIDENCE OF CAMILLA BORGER FOR
THE NZ TRANSPORT AGENCY**

- 1 My full name is Camilla Elizabeth Borger.
- 2 I have the qualifications and experience set out at paragraphs 2 to 9 of my evidence in chief dated 5 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 the evidence of:
 - 4.1 Christopher and Monica Dearden [261];
 - 4.2 Loretta Pomare [309];
 - 4.3 Neil and Barbara Mountier [327],
 - 4.4 Beth Lindsay on behalf of Highway Occupants Group (*HOG*) [543];
 - 4.5 Paul Bruce on behalf of Action to Protect and Sustain our Communities (*APSOC*) [671];
 - 4.6 Simon Hale on behalf of *APSOC*; and
 - 4.7 Dr Marie O’Sullivan on behalf of *APSOC*.
- 5 While this rebuttal statement does not respond to every matter raised in the evidence of submitter witnesses within my area of expertise, that should not be taken as acceptance of the matters raised. My rebuttal evidence addresses issues in the submitters’ evidence only to the extent that those issues have not already been addressed in my earlier technical reports - Assessment of Operational Air Quality Effects (Technical Report 13) and Assessment of Construction Air Quality Effects (Technical Report 14) - my *EIC* and my Supplementary statement of evidence.¹
- 6 Consistent with my *EIC*, I have referred to the MacKays to Peka Peka Expressway Project as “the Project” in this rebuttal evidence.

¹ Supplementary evidence dated 14 September 2012, which attached my Community Exposure Assessment (entitled Supplementary Report – Assessment of Air Quality Health Effects).

EXECUTIVE SUMMARY

- 7 I have read all of the statements of evidence provided by submitters in relation to air quality. That evidence has not caused me to depart from the opinions expressed in my EIC.
- 8 The Construction Air Quality Management Plan (*CAQMP*) will provide a robust mechanism to manage and thus minimise adverse air quality effects from the construction of the Expressway.
- 9 I remain of the opinion that the operation of the proposed Expressway will have only a minor effect on both the local and regional air quality.

EVIDENCE OF SUBMITTERS

Wind blown sand

- 10 The evidence of Loretta Pomare² is concerned that "*wind blown sand will damage 1300 homes within 200m*" of the Expressway alignment and states "*cleaning and repainting of these 1300 homes must be included*"³. Monica and Christopher Dearden⁴ also raise this issue and seek "*inspection before and after the project with a commitment from NZTA to repair damage to paint and woodwork.*"⁵
- 11 I agree that excavation of sandy areas during construction could create a wind blown dust nuisance if it were uncontrolled or unmanaged. However, measures to manage these effects have been included in the proposed conditions⁶ and are described in the Construction Air Quality Management plan (Appendix G of the CEMP) and my EIC.⁷ This type of management measure is well understood in the construction industry, as demonstrated in the Tauranga Eastern Link project, which is currently under construction and is also on sand covered peat. The dust control measures used there include dust control polymers, perimeter water sprinklers and water carts used to dampen haul roads and other active surface areas several times per day.
- 12 Minimising dust generation by stabilisation of open areas and batter slopes, as described in the evidence of Graeme Ridley for control of erosion, will be very important for this Project. Stabilisation measures will include cover of aggregate on haul roads and short term batters, or topsoil and establishment of grass on final cut slopes. These measures, provided they are thoroughly implemented,

² Submitter No. 309.

³ Evidence of Loretta Pomare, page 18, paragraph 65.

⁴ Submitter No. 261.

⁵ Evidence of M & C Dearden, page 22, 3.17.

⁶ DC 26 -29, Annexure B, EIC.

⁷ Technical Report 14, sections 5.0 – 8.0. My EIC, paragraphs 89-94.

will be sufficient to minimise dust discharges under most circumstances.

- 13 I therefore do not consider the relief sought by Ms Pomare or Dr and Mrs Dearden to be either necessary or appropriate.

Neil and Barbara Mountier

- 14 Mr and Mrs Mountier⁸ express concern about the height of the proposed Expressway bridges, and claim that it would “*greatly increase the spread of impacts of artificial light, noise, dust and fumes...*”.⁹ I agree that dust and vehicle exhausts discharged from the Expressway bridges will disperse wider and further than if built at grade. However the maximum concentrations of dust and exhaust at ground level where people may be exposed will actually be lower than if the equivalent stretch of road were built at grade because the contaminants are dispersed through a larger vertical volume of air.

Paul Bruce for APSOC¹⁰

- 15 In his evidence, Mr Paul Bruce states that he has conducted an analysis of the frequency of temperature inversions occurring on the Kāpiti Coast using wind speed and surface temperature.¹¹ An atmospheric temperature inversion is where a layer of warm air traps a layer of cold air at the earth’s surface inhibiting vertical movement of air. Its relevance to air quality is that during a temperature inversion, concentrations of pollutants near the ground may increase causing poor air quality. Regularly occurring low-level inversions in urban cities are often associated with chronic air quality problems.
- 16 The frequency of temperature inversions in Kāpiti is discussed in Dr David Black’s evidence¹² in relation to a health study¹³ referenced by several submitters,¹⁴ which was based in Southern California where a high incidence of temperature inversion has a significant adverse effect on air quality. Inversions are a common feature throughout California, presenting more than 65 percent of winter days and nearly 100 percent of summer days in the South Coast Air Basin.¹⁵

⁸ Submitter No. 327.

⁹ Evidence of N & B Mountier, page 1, fact 2.

¹⁰ Submitter No 677.

¹¹ Evidence of Paul Bruce, paragraph 6.

¹² EIC of Dr Black, paragraphs 120 -122.

¹³ Ibid. A 2007 study in the medical journal “the Lancet”.

¹⁴ Including the submissions of R Blok [Submitter No. 268], R Mackay [Submitter No. 404], R Love [Submitter No. 470], R Kieboom [Submitter No. 547], W Love [Submitter No. 606], J and J LeHarivel [Submitter No. 664], E Hinkley [Submitter No. 673], and Dr Marie O’Sullivan [Submitter No. 675].

¹⁵ Iacobellis, Norris, Kanamitsu, Tyree, and Cayan, “*Climate Variability and California Low-level Temperature inversions*” California Climate Change Centre, August 2009.

- 17 Overall, I generally agree with Mr Bruce's findings that temperature inversions **may** occur at times in the Kāpiti Coast area and that "*in these airsheds air quality can differ markedly from neighbourhood to neighbourhood*".¹⁶
- 18 Mr Bruce states that "*for the Raumati M2PP site there were 42 periods of light variable winds and cold stable night conditions*"¹⁷ for the period April through October 2011. In response, I note that Mr Bruce's assessment looks at the potential for an inversion to occur, rather than measuring whether an inversion did actually occur, which requires upper air data (eg cloud cover)¹⁸. It is not certain that temperature inversions resulting in poor air quality did in fact occur on all of these 42 occasions (although it is possible).
- 19 I used the same meteorological data, as analysed by Mr Bruce, including the potential inversion conditions, in the air quality dispersion modelling for the Project described in Technical Report 14.¹⁹ My analysis of the meteorological data recorded at the Raumati Road monitoring site between February 2011 and January 2012 indicates that combinations of low wind speeds and temperatures were recorded for at least one hour on 44 different days, mostly during winter months. However, a high percentage of calm conditions (>60%) was recorded on only 5 of those days. Therefore, I conclude that thermal inversion almost certainly occurred on 5 days in 2011 and may have occurred for a period of a few hours on an additional 39 days.
- 20 In comparison therefore to Southern California, (which is the same air quality studies referred to by submitters) I consider the incidence of thermal inversions in the Kāpiti area is relatively infrequent. In my opinion, the meteorology of Southern California which contributes to chronic air quality issues, is quite different to that of the Kāpiti Coast. Therefore air quality related health impacts measured in California are not directly transferable to the Kāpiti Coast area.
- 21 In my opinion, the frequency of occurrence of thermal inversions in the Kāpiti area has been adequately considered in the assessment of air quality effects for the Project.

Simon Hales for APSOC²⁰

- 22 The evidence of Associate Professor Hales is that the "*emissions of CO₂ (and consequent climate change)*"²¹ should be considered in any

¹⁶ Evidence of Paul Bruce, paragraph 8.

¹⁷ Evidence of Paul Bruce, paragraph 14.

¹⁸ For example, in the Californian study, radiosonde measurements (upper air data) were used, which provides a detailed vertical profile of temperature, pressure and horizontal winds.

¹⁹ Section 7.4, Technical Report 14.

²⁰ Submitter No 677.

Community Exposure assessment. I agree that transport energy consumption contributes to greenhouse gas emissions in NZ. However, the Resource Management Act 1991 does not currently regulate the causes of climate change and greenhouse gases. Instead the government's principal policy tool is the New Zealand Emissions Trading Scheme.

- 23 The emissions of CO₂ resulting from vehicles using the proposed Expressway will be approximately proportional to the overall traffic volumes in the Project area, which are described in the evidence in chief (*EIC*) of Mr Andrew Murray. The key outcome of the Project is diversion of between 34-57% of the existing SH1 traffic flows onto the proposed Expressway.²² Even considering the small amount of induced traffic predicted,²³ I consider the Project is unlikely to significantly increase the net CO₂ emissions when compared to alternative SH1 upgrade options.
- 24 Associate Professor Hales' evidence also comments on the scope of the Community Exposure Assessment which I submitted as supplementary evidence and states that "*the method may underestimate effects of transport related pollution*".²⁴ I accept that the scope of this assessment could have been broadened (for example, to cover the additional variables noted in his evidence). However I am of the opinion that such a detailed analysis is not warranted, as I have concluded the level of potential air quality risk from the Project based on my technical air quality assessment²⁵ is low.
- 25 I agree with Associate Professor Hales' statement that "*it can be argued that the effects of the proposed expressway on air pollution exposures and consequent health impacts is potentially a net benefit in the short term*". However, he claims that this has not been established by the existing evidence. I agree that the potential *reduction* in air pollution exposures across the Project area has not been comprehensively assessed. The focus of my assessment was on demonstrating compliance with the relevant health based air quality standards. This requires definition of the potential worst case impacts, where the highest traffic increases will occur, rather than assessing the impacts on numerous roads²⁶ where traffic will reduce, with the associated potential air quality benefits. While it

²¹ Evidence of Simon Hales, page 2, paragraphs 3- 4.

²² Andrew Murray EIC, paragraph 135.

²³ "Induced traffic" is where changes in the number and pattern of car trips occur due to reduced travel costs, such as reduced congestion improving travel times. Ref. EIC of Andrew Murray, paragraph 238.

²⁴ Evidence of Simon Hales, paragraphs 6-7.

²⁵ Refer my EIC, paragraphs 86.1 and Technical Report 13.

²⁶ At least twelve local roads in the project area are predicted to have reductions in traffic (4%-68%), as detailed in Table 4 of Andrew Murray's EIC.

would be interesting to quantify these benefits, I cannot see that it would materially change my conclusions.

- 26 Associate Professor Hales also states that “*the overall health impacts of the proposal may well be strongly negative in the long term*”. He attributes this to a number of factors, most of which are unrelated to air pollution exposure including “*induced traffic, increases in private motor vehicle use, reductions in active transport mode shares and consequent reductions in physical exercise*”.²⁷ These matters are outside my area of expertise.

Beth Lindsay for HOG²⁸

- 27 Beth Lindsay is concerned that there would be “*demonstrable adverse health effect for residents adjacent to the 2B alignment*”.²⁹
- 28 The 2B alignment refers to the proposed Expressway route to the east of Leinster Avenue neighbourhood. This area was one of the key focal points of my air quality modelling assessment. My conclusion in relation to the residents living near this part of the Project is described in Technical Report 14.³⁰ The results show that at the closest dwellings, 24-hour average PM₁₀ concentrations are predicted to increase by 1.4 µg/m³ between ‘2026 Do Minimum’ and ‘2026 With Project’ options³¹. In summary, this means that the operation of the Expressway in this location is not predicted to cause the relevant health based air quality standards and guidelines to be exceeded.

Dr Marie O’Sullivan for APSOC³²

- 29 Dr O’Sullivan is concerned that the number of dwellings³³ and housing density used in my Community Exposure Assessment is based on 2006 census data which is out of date. In fact, my assessment of the number of dwellings was based on the latest GIS maps for the Project area between Kāpiti Road and Te Moana Road³⁴ and these maps were appended to my Community Exposure Assessment (Appendix B).³⁵ An occupancy rate (number of people per dwelling), per census block, by distance from the Expressway was calculated and this calculation included the most recent census data available (2006). While this occupancy rate may increase

²⁷ Evidence of Simon Hales, page 3, paragraph 8.

²⁸ Submitter No. 542.

²⁹ Evidence of Beth Lindsay, paragraph 5.4, based on the evidence provided by APSOC.

³⁰ Section 8.1.

³¹ This is well below the Air Quality National Environmental Standard (AQNES) for PM₁₀ which is 50 µg/m³.

³² Dr O’Sullivan is also an individual Submitter No. 675.

³³ Evidence of Dr O’Sullivan, Supplement B, paragraph 4.

³⁴ Buildings greater than 20m² in rural and residential areas were counted which could include garages and sleep outs.

³⁵ Appendix B, Supplementary evidence, Assessment of Air Quality Health Effects.

slightly once new census data is available, I note that it would have to change by orders of magnitude to change the conclusions of my assessment.

- 30 Dr O’Sullivan states that carbon dioxide has not been measured and that “CO₂... is known to cause cardiovascular damage”.³⁶ This is not correct. Extremely high concentrations of CO₂ (e.g 10-30% of total air volume³⁷) can be hazardous, but such concentrations would be rare, possibly occurring in industrial situations, but certainly not roadside ambient concentrations. CO₂ accordingly has not been measured, and is not relevant for assessing the health effects for this Project.
- 31 Dr O’Sullivan may have intended to refer to carbon monoxide (CO) which can cause cardiovascular damage. CO was measured at the NZTA monitoring site for 12 months during 2011. The highest concentrations of CO measured were one third of the ambient air quality guidelines.³⁸ CO was one of the key contaminants considered in the dispersion modelling assessment reported in Technical Report 14.³⁹ The Project is not predicted to cause CO concentrations to exceed the air quality guideline levels.
- 32 Dr O’Sullivan has correctly pointed out an inconsistency in the reported prevailing wind direction⁴⁰ in my supplementary evidence.⁴¹ My supplementary evidence (Annexure A at page 9) states the most common wind direction in Kāpiti is from the south west. This is incorrect and is an error. Prevailing winds measured at Paraparaumu airport and the Raumati Road site are northerly and north easterly as noted in my EIC.⁴² Prevailing winds are not from the south east as stated by Dr O’Sullivan.⁴³
- 33 Dr O’Sullivan states that “different sectors of the population will be differentially exposed, dependent on wind direction”.⁴⁴ I do not consider this issue to be significant for this Project. This effect has been measured in a study on spatial variation in nitrogen dioxide levels close to Auckland motorways, which showed concentrations

³⁶ Evidence of Dr O’Sullivan, Supplement B, paragraph 6.

³⁷ Carbon dioxide is normally present in the atmosphere at a concentration of 0.03 percent. OSHA. 1989. *Carbon Dioxide, Industrial Exposure and Control Technologies for OSHA Regulated Hazardous Substances*. Occupational Safety and Health Administration. U.S. Department of Labor.

³⁸ Technical Report 14, Table 13.6.

³⁹ Technical Report 14, Section 8.

⁴⁰ Evidence of Dr O’Sullivan, Supplement B, paragraphs 8 and 9.

⁴¹ First paragraph, Section 3, Annexure A – Supplementary Report – Assessment of Air Quality Health Effects

⁴² EIC, paragraph 29.

⁴³ Evidence of Dr O’Sullivan, Supplement B, paragraph 9.

⁴⁴ Ibid.

were higher on the downwind side of the motorway.⁴⁵ However, such a measurable spatial gradient is unlikely to occur at the proposed Expressway for two reasons:

- 33.1 The traffic volumes are much lower;⁴⁶ and
- 33.2 The route of the Expressway generally runs to the north and north east. Therefore, the prevailing wind will most commonly disperse pollutants along the Expressway, not either side of it.

- 34 Dr O'Sullivan requests that "*.. further explanation of wind directions in Kāpiti will be provided by expert witnesses*". In my opinion, the effects of wind direction in the Project area have been adequately assessed through dispersion modelling using meteorological data measured very close to the proposed alignment of the Expressway in Raumati. This meteorological data takes into account these prevailing winds in the Project area.

CONCLUSION

- 35 I confirm that I have read all of the evidence from submitters, which raises air quality effects. I reiterate that the key conclusions in my EIC have not changed in light of that evidence.



Camilla Borger
24 October 2012

⁴⁵ Auckland Regional Council. TP246 Nitrogen Dioxide in air in the Auckland Region: Passive Sampling Results, 2007.

⁴⁶ Ibid. ARC data was measured close to SH1 at Penrose (140,000 vehicles per day (2005)), Otahuhu (113,000 vehicle per day (2005)).