Western Ring Route-Waterview Connection

Update to the S42A report for air quality

Report prepared for
the Board of Inquiry

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Contents

1. Summary

1. This is an update of our January S42A report to the Board of Inquiry for the Western Ring Route-Waterview Connection.

2. The overall outcome of caucusing and additional evidence is that technical issues are substantially resolved.

3. However a number of matters have not been resolved. These relate to mitigation and consent conditions. These are not technical issues *per se*. The NZTA expert does not consider that mitigation or the recommended consent conditions are necessary. We disagree, and our reasons are briefly discussed in Section 3 of this report.

2. Introduction

2.1 Scope

4. This is an update of our S42A report to the Board of Inquiry. This report reflects our understanding of the outcomes of expert caucusing and further evidence and information that has been provided by NZTA since our report was submitted on 14 January 2011.

2.2 Evidence and meetings addressed by this report

5. Evidence that has been considered in our update includes Rebuttal evidence of Gavin Fisher dated 3 February 2011, and Supplementary evidence of Gavin Fisher dated 17 February 2011. Rebuttal evidence of Amelia Linzey (dated 3 February 2011) with respect to our January S42A report has also been considered.

6. A caucusing meeting was held on 18 January. The outcomes of that meeting, as well as a sub-meeting regarding traffic modelling, are reported in the expert caucusing joint report to the Board of Inquiry.

7. Additional meetings were held with Janet Petersen (Auckland Council), Gavin Fisher (NZTA) and Jayne Metcalfe on 15 February and 22 February at the Auckland Council offices.

2.3 Structure of this report

8. The report is structured as follows:

- Section 3 briefly discusses the matters where we have not reached agreement with NZTA experts and provides updated recommendations where appropriate.
- Section 4 briefly discusses the evidence and results of caucusing with respect to ventilation stack emissions.
- Section 5 provides a brief review of the recommendations from our January S42A report to the Board of Inquiry (Section 5, paragraphs 257 to 271) for completeness.

3. Issues that are not agreed

3.1 Separation distances

9. Gavin Fisher's evidence (NZTA, supplementary evidence, 17 February) suggests that separation distances between residential houses and SH16 will be increased as a result of the project.

10. On this basis, we agree that an additional ambient monitoring site is not required on SH16. Our original recommendation is updated to reflect this in Section 3.3 below.

11. The minimum separation distance that will be maintained between residential houses and the proposed motorway in Sector 9 is still unclear.

12. For the record, we do not agree with the statement in Gavin Fisher's evidence that "the experts generally agree that there will be no residences left too close to the proposed new or altered motorway routes".

13. Modelling results presented in Gavin Fisher's evidence (NZTA, supplementary evidence, Annexure C) suggest that a separation distance of 20m will be adequate to achieve compliance with the PM_{10} standard. However, we consider that the results of modelling should be treated with caution. There is considerable uncertainty in the results of air quality modelling, especially in close proximity to the road. This is a key reason why we consider that ambient air quality monitoring conditions should be altered. A specific recommendation is included in Section 3.3 of this report.

3.2 Portal emissions

14. There has been considerable discussion of portal emissions management through caucusing. We do not disagree with the current NZTA proposal, however we note that the suggested condition (OA.7) does not actually specify that ambient monitoring is required to achieve compliance with the condition. To provide some certainty, we consider that portal monitoring conditions should be specified, including duration, reporting and review requirements.

15. We understand that Auckland Council will propose new conditions to address this issue.

3.3 Monitoring

16. NZTA has proposed to undertake post project ambient monitoring at two locations, for a period of two years from the commencement of tunnel operation. We agree that two years of monitoring may be adequate,

however if the monitoring measures exceedances, we consider that there should be additional requirements.

17. The reasons for this recommendation are discussed in Section 4.9 of our January S42A report. The key issue is that there is a significant amount of uncertainty associated with air quality predictions, especially within 20m or 30m of the roadside. This is why a significant amount of emphasis needs to be placed on monitoring, validation and reporting.

18. The NZTA expert has responded in evidence (Gavin Fisher, supplementary evidence, 17 February, paragraph 45) stating that *I believe that if the 2 years of monitoring were to indicate any issues with non-compliance associated with the Waterview Project, NZTA would react effectively with programmes of monitoring, study and analysis to address these*.

19. We consider that conditions are appropriate in order to provide certainty that potential non-compliance with air quality standards and targets will be appropriately addressed.

20. Our original recommendation is updated as follows:

Additional monitoring requirements should be included in consent condition OA.2 as follows:

- <u>The State Highway 20 (Sector 9) ambient monitoring station should be in a location that is representative of the minimum separation distance between the edge of the road and residential properties; and</u>
- Post-project monitoring shall include: traffic speed and composition (%HCV) as well as traffic counts in the tunnel and close to each ambient monitoring station; and
- In-stack, or in tunnel particulate monitoring should be undertaken to measure peak as well as average operational emissions; and
- ~~Ambient monitoring shall be undertaken at a location that represents an affected residential receptor close to SH16 in Sector 1,5 or Sector 6. This is in addition to the two monitoring sites proposed in condition OA.2; and~~
- NZTA shall undertake an assessment of monitoring results, and how these compare with the assumptions and predictions included in the NZTA Assessment (NZTA 2010a), prior to cessation of monitoring at each monitoring site; and
- Monitoring shall continue at each monitoring site until the Auckland Council agrees this monitoring is no longer required on the basis that exceedance of standards or targets is considered unlikely; and
- In the event that ambient monitoring records an exceedance of a National Environment Standard or Regional Air Quality Target the monitoring period shall be extended for a minimum of two years from the date of the exceedance; and
- In the event that ambient monitoring records an exceedance of a National Environment Standard or Regional Air Quality Target the NZTA should work with the Auckland Council to develop an air quality mitigation strategy.

21. These recommendations require ongoing communication and involvement from Auckland Council. An alternative would be to establish an independent **peer review panel** to determine whether monitoring is no longer required.

22. Ongoing involvement of a peer review panel is not unusual in air discharge consents for large infrastructural projects such as waste water treatment plants and landfills, which rely on monitoring and review to ensure that project effects are similar to those predicted by AEE's.

3.4 Conditions relating to construction effects

23. We still consider that discharges from construction should **generally** be subject to Auckland Council standard consent conditions for odour, dust, hazardous air pollutants, and visible emissions.

24. The proposed consent conditions rely primarily on implementation of the Construction Air Quality Management Plan (CAQMP), which is currently in draft. The draft CAQMP recommends a range of dust mitigation measures, but the plan is not specific. We do not consider that the current draft CAQMP is enforceable.

25. The Auckland Council standard consent conditions specify the environmental performance standards that must be achieved. Management plans describe how to achieve compliance with these standards.

26. As far as we are aware, these conditions are included in all Auckland Council consents to discharge contaminants to air. The conditions are enforceable and are consistent with the recommendations of MfE good practice guides for dust and odour management.

27. The NZTA expert agrees with the "intent" of these conditions, but does not consider that the conditions are necessary.

28. New conditions are recommended as follows:

Unless expressly provided for by conditions of this consent, there shall be no odour, dust or fumes beyond the site boundary caused by discharges from the site which, in the opinion of an enforcement officer, is noxious, offensive or objectionable.

All offensive or objectionable dust beyond the boundary of the site caused inadvertently as a result of processes on the site shall be mitigated as soon as practicable in accordance with the requirements of the Construction Air Quality Management Plan.

Beyond the site boundary there shall be no hazardous air pollutant caused by discharges from the site that causes, or is likely to cause, adverse effects on human health, environment or property.

No discharges from any activity on site shall give rise to visible emissions, other than water vapour, to an extent which, in the opinion of an enforcement officer , is noxious, dangerous, offensive or objectionable.

29. These conditions provide for "inadvertent" effects, which is consistent with a recent Auckland Regional Council consent for earthworks.

3.5 Mitigation or offsets

30. Ambient monitoring has shown that existing levels of $PM_{2.5}$ already exceed the Regional Air Quality Target at NZTA's Alan Wood Reserve and Cowley Street monitoring stations.

31. This means that the airshed is already over-allocated and any increase in emissions should be mitigated or offset.

32. NZTA does not accept that mitigation or offset is necessary.

Response to questions raised by Board of Inquiry regarding offsets.

33. Before discussing whether or not mitigation is required, we will attempt to respond to an issue raised by the Board of Inquiry's Minute dated 28 January 2011 (Issue S).

34. The Board's question relates primarily to the treatment of tunnel air which is discussed further in Section 4 of this report. With respect to offsets, the Board's Minute states that "*Alternatively there may be project-related aspects, perhaps on some sort of neighbourhood basis, where project related offsets could be employed, but this is not immediately apparent to us*".

35. The national environmental standards for air quality provide for offsets of PM_{10} emissions to be implemented **on a project basis.** Offsets are described in the MfE discussion document for the NES review[1] as follows:

> *Offsets are mitigation measures included in a proposal to 'offset' predicted impacts so emissions from the new activity are 'offset' by emission reductions elsewhere in the airshed. For example, an industrial development may reduce emissions from a hospital boiler located nearby, and so the reduced PM_{10} emissions from the hospital boiler offset the proposed industrial discharges of PM_{10} from the industrial development. The air quality standards require that offsets must:*
> - *be from another source into the same airshed*
> - *take effect within one year after the grant of the resource consent*
> - *be effective for the duration of the consent.*

36. The concept of offsets recognises that even with best available emission control technology, industry will have some PM_{10} emissions. The same approach could apply to $PM_{2.5}$ emissions from this project. Specific options for an offset scheme are briefly discussed in paragraphs 52 to 60 of this report.

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[1] MfE (2010). Proposed Amendments to the National Environmental Standards for Air Quality: Discussion Document. Wellington: Ministry for the Environment, June 2010.

37. The Environment Minister recently announced[2] that air quality standards are being changed to make offsets mandatory for new industries with significant PM_{10} discharges in polluted airsheds. This means that, from September 2012, new activities which require resource consent will only be permitted to discharge PM_{10} if they reduce emissions from elsewhere so that overall emissions in the airshed stay the same (or improve).

Discussion of whether mitigation is necessary

38. The further evidence presented by NZTA's expert does not change the conclusions of our January S42A report.

39. The analysis undertaken by NZTA demonstrates that the concentration of PM_{10} and $PM_{2.5}$ will increase relative to 2006 levels in the vicinity of the new surface road in Sector 9. There is some increase relative to 2006 without the project (do minimum), however the increase with the project is larger.

40. Ambient air quality monitoring undertaken by NZTA shows that existing concentrations of $PM_{2.5}$ are already above the regional air quality target in this area. The project will make air quality worse.

41. We have suggested offsets as a realistic mitigation option, primarily for the new surface road (Sector 9), where exceedance of the regional air quality target for $PM_{2.5}$ is predicted. The NZTA expert has not suggested any alternative mitigation options.

42. There was considerable discussion regarding offsets during caucusing. The NZTA expert generally agrees that an offset scheme could be beneficial for air quality.

43. We do not consider that there are any significant "technical" issues to prevent implementation of offsets. Any uncertainty around the implementation of offsets will need to be resolved by MfE and the Auckland Council prior to offsets becoming mandatory in 2012.

44. Therefore, the key questions seem to be whether mitigation is necessary, or whether NZTA are responsible for mitigation of the project effects.

Policy Context

45. We consider that any increase in emissions, in an area where air quality is already unacceptable, is inconsistent with the objectives and policies of the *Auckland Regional Plan: Air Land and Water* and the purpose of the *Resource Management Act 1991*, regarding safeguarding the life-supporting capacity of air, and should be mitigated or offset.

46. This conclusion has been discussed in rebuttal evidence from Amelia Linzey (NZTA, 3 February). Ms Linzey states that, in our January S42A report we appear to have "limited the identification of relevant assessment matters to

[2] On 29 January 2011, Environment Minister Dr Nick Smith announced the outcome of a review of the Resource Management (National Environmental Standards Relating to Certain Air Pollutants, Dioxins and other Toxics) Regulations 2004 (the air quality standards).

Objectives 4.3.1, 4.3.2(a), and 4.3.3 and Policies 4.4.3 and 4.4.4 of the Auckland Regional Plan: Air Land and Water.

47. To clarify, our January S42A report (paragraphs 53 and 54) referred to the assessment matters Chapter of the NZTA assessment, and stated that these objectives and policies were **also** relevant and should be considered by NZTA (Objectives 4.3.1, 4.3.2(a), and 4.3.3 and Policies 4.4.3 and 4.4.4 of the Auckland Regional Plan: Air Land and Water). These policies did not appear to be considered in the original NZTA assessment.

48. We have reviewed the wider policy context, and we consider that mitigation of adverse effects is consistent with the purpose of the *Resource Management Act 1991*, the Auckland Regional Policy Statement and the Auckland Regional Plan: Air, Land and Water.

49. We recognise that the Auckland Regional Plan: Air Land and Water states the improvements in average vehicle emissions is likely to be more efficiently and effectively implemented at a national level and the discharge of contaminants from mobile sources is a permitted activity.

50. However, the Auckland Regional Plan: Air Land and Water includes specific policy for consideration of effects on a *project* basis. Policy 4.4.16 states that:

> *Any land use proposals with transportation effects, and any new transport projects or proposals for redeveloping transport infrastructure which have the potential to adversely affect air quality, should be assessed at a level considered appropriate for the size and scale of the project or proposal, and shall consider the following:*
>
> *(a) Effects on human health;*
> *(b) Effects on regional and local air quality; and*
> *(c) Any alternatives or* ***methods to mitigate effects on air quality*** [emphasis added] *or minimise the discharge of contaminants into air.*

51. To encourage effective implementation of this policy, the Auckland Regional Council contributed significantly to the development of the MfE *Good Practice Guide for Assessing Discharges to Air from Land Transport* (the transport GPG).

52. The transport GPG includes a review of relevant legislation and policy for New Zealand, and it was developed in this context. For transport projects where significant adverse effects are predicted the transport GPG recommends **mitigation**.

Recommendation for an offset condition

53. We consider that mitigation of effects is appropriate and justified for the proposed new surface road (Sector 9).

54. We consider that offsetting emissions is the most feasible mitigation option. No alternatives have been proposed by NZTA.

55. By way of example, a neighbourhood offset scheme could be achieved through development of voluntary schemes to:

a) retrofit catalytic converters or particle traps onto heavy duty diesel vehicles (including buses) that are likely to use the proposed route or other roads in the area; or
b) replace domestic wood burners or open fires in the neighbourhood with cleaner low emission alternatives such as heat pumps; or
c) replace local school boilers or other local emission sources with cleaner, low emission alternatives; or
d) a combination of the above.

56. To provide an indication of the likely costs and benefits, we have estimated the health costs of particulate emissions from motor vehicles as approximately $112,000 per tonne per annum (Appendix 1 of this report) in Auckland.

57. The costs to reduce domestic fire emissions for offsets have been estimated by MfE as approximately $21,000 per tonne of particulate for open fires and $140,000 per tonne of particulate for woodburners[3]. These are one-off capital replacement costs.

58. As discussed in our January S42A report, regional council analysis has shown that retrofit of particulate traps on diesel buses could reduce PM_{10} (and $PM_{2.5}$) emissions at a cost of $39,000 to $120,000 per tonne/annum. These are annual costs, so are comparably higher than the one-off cost of domestic fire replacements.

59. Overall, our analysis shows that the benefits of emission offsets would be approximately $112,000 per tonne of particulate, which is greater than the costs. This is consistent with the MfEfindings[3].

60. Our recommendation is unchanged. We consider that emissions of $PM_{2.5}$ in the Oakley Creek valley (sector 9 and existing sections of SH20) should be mitigated or offset.

61. We recommend that it would be appropriate to require development of an offset plan, if offsets are required. For example, conditions could require that:

NZTA shall develop a $PM_{2.5}$ emission offset plan in consultation with the Auckland Council. The plan shall be designed so that:

- *$PM_{2.5}$ emissions into the Auckland Urban Airshed are reduced by approximately 1.4 tonnes per annum[4];*
- *the offsets shall take effect prior to the opening of SH 20 (Sector 9);*
- *the offsets shall be effective until ambient monitoring has demonstrated compliance with $PM_{2.5}$ targets or standards for a minimum period of two years at the NZTA SH20 monitoring site;*

[3] *Proposed amendements to the National Environmental Standards for Air Quality, Discussion Document*. Ministry for the Environment, June 2010.
[4] This is the estimated annual $PM_{2.5}$ emission from the new sector of SH20, which we have estimated based on the information available. This value should be confirmed by NZTA if offsets are proposed.

- *as far as practicable, emission reductions shall occur in the vicinity of Sector 9 on SH 20;*
- *the plan shall describe the methods for undertaking the offsets, including proposed timeframes, targets and reporting procedures.*
- *the plan shall describe the methods for calculation of the emission offset that has been achieved.*

4. Ventilation stack emissions.

62. Further evidence has been provided by Gavin Fisher in response to concerns about the ventilation stack heights and treatment of tunnel air.

63. We confirm that, in our opinion, the modelling results provided by Mr Fisher's Supplementary evidence demonstrate that 15m ventilation stacks are appropriate.

64. The maximum predicted ground level concentration of PM_{10} predicted by modelling for the 15m stacks is 0.62µg/m^3.

65. The recent review of the national environmental standards[5] provides criteria for determining the significance of air quality effects. The regulations will be changed to require offsets from new industries with *significant* PM_{10} discharges in polluted airsheds from September 2012. The Regulatory Impact Statement defines *significant* discharges as those likely to result in an off-site increase in PM_{10} of 2.5 µg/m^3 as a 24-hour average.

66. The conclusion from our January S42A report is unchanged: The proposed Waterview tunnels will mitigate localised air quality effects through sectors 7 and 8. As noted in the assessment, removing surface traffic from heavily trafficked roads and discharge the same amount of contaminants from a ventilation exhaust (with sufficient height) results in much lower concentrations at ground level where people are most likely to be exposed.

67. Treatment of tunnel exhaust air is discussed in Mr Fisher's evidence in response to submissions as well as the Board of Inquiry's Minute dated 28 January (Issue S).

68. The Board's Minute requested a simple rough order breakdown of the costs, efficiency of the selected techniques and design life expectancy of the equipment, and additional environmental adverse effects which result (if any) from the containment by the treatment.

69. This has been addressed to some extent by Mr Fisher's evidence. However, we note that a comprehensive review of options to manage tunnel emissions was undertaken by BECA on behalf of NZTA in 2008[6]. The BECA report recognises that tunnels afford an opportunity to manage emissions, and includes a review of options available and international case studies.

70. The BECA report findings include:

- electrostatic precipitators (ESPs) are the only established technology for treatment of particulate emissions; and

[5] On 29 January 2011, Environment Minister Dr Nick Smith announced the outcome of a review of the Resource Management (National Environmental Standards Relating to Certain Air Pollutants, Dioxins and other Toxics) Regulations 2004 (the air quality standards).
[6] NZTA, 2008. *Management of Vehicle Emissions from Tunnels*. Report prepared by Beca on behalf of NZTA. August 2008.

- the removal efficiency of ESP's as reported for tunnel emissions is of the order of 70%; and

- where removal technologies have been used, it has not been possible to demonstrate a measurable improvement in air quality

- ESP's have been used primarily for management of in-tunnel air; and

- no data is available to demonstrate the effectiveness of ESP's for external air quality management purposes; and

- improvements in air quality management and technology are expected over the operational life of most tunnels; therefore design often allows room for retrofitting of future technologies (for example biofiltration); and

- As an order of magnitude guide, the report refers to the estimated cost of installing an ESP in the M5 East ventilation exhaust in Sydney at approximately A$40M.

71. The report does not include any information on the design life expectancy or operating costs of ESP's.

72. Although NZTA have not undertaken a comprehensive cost benefit analysis, an order of magnitude assessment is presented in Gavin Fisher's supplementary evidence (paragraph 77).

73. We have estimated the potential air pollution costs from each tunnel vent as $156,000 per annum (Appendix 1 of this report), which is reasonably consistent with Mr Fisher's estimate of $75,000 per annum.

74. An ESP would only remove a proportion of particulate, perhaps up to 70%, resulting in an annual benefit of up to $110,000. The indicative capital cost for an ESP from the BECA report is A$40M.

75. Overall, we consider that the BECA report as well as the indicative cost assessments support the conclusion reached during Caucusing:

It is accepted and agreed that from an air quality technical viewpoint it is unlikely that filtering the air will provide any significant benefits

5. Review of original recommendations

76. Specific recommendations from Section 5 (paragraphs 257 to 271) of the January S42A report are briefly reviewed to reflect our understanding of the outcomes of caucusing as follows.

Mitigation

77. **Original recommendation:** Emissions of $PM_{2.5}$ in the Oakley Creek valley (sector 9 and existing sections of SH20) should be mitigated or offset.

78. **Update:** This recommendation is unchanged. The potential role of offsets in mitigating project effects is briefly discussed in Section 3 of this report.

79. **Original recommendation:** Any *net* increase in $PM_{2.5}$ as a result of the project should be offset.

80. **Update:** This recommendation is resolved. It was agreed during caucusing that any offset should focus on emissions from the new road.

Consent conditions (tunnel portal management)

81. **Original recommendation:** Procedures for the operation of tunnel fans and the management of portal emissions (to be specified in the Tunnel Traffic Management Plan) should be clarified, or should be subject to **approval** from the Auckland Council.

82. **Update:** There has been considerable discussion of portal emissions management through caucusing. The issue is partially resolved. This is discussed briefly in Section 3 of this report.

Consent conditions (ambient monitoring)

83. **Original recommendation:** Additional monitoring requirements should be included in consent condition OA.2.

84. **Update:** This recommendation is partially resolved. New evidence has suggested that the separation distance between SH16 and residential houses will be improved as a result of the project. Therefore, we agree that an additional ambient monitoring site on SH16 is not required. However, the following recommendations for additional monitoring are unchanged:
    - post-project monitoring shall include: traffic speed and composition (%HCV) as well as traffic counts in the tunnel and close to each ambient monitoring station; and
    - In-stack, or in tunnel particulate monitoring should be undertaken to measure peak as well as average operational emissions; and
    - NZTA shall undertake an assessment of monitoring results, and how these compare with the assumptions and predictions included in the NZTA Assessment (NZTA 2010a), prior to cessation of monitoring at each monitoring site; and

- Monitoring shall continue at each monitoring site until the Auckland Council agrees this monitoring is no longer required on the basis that exceedance of standards or targets is considered unlikely; and
- In the event that ambient monitoring records an exceedance of a National Environment Standard or Regional Air Quality Target the monitoring period shall be extended for a minimum of two years from the date of the exceedance; and
- In the event that ambient monitoring records an exceedance of a National Environment Standard or Regional Air Quality Target the NZTA should work with the Auckland Council to develop an air quality mitigation strategy.

85. NZTA experts consider that these additional monitoring requirements are unnecessary. This issue is briefly discussed in Section 3 of this report.

Consent conditions (construction)

86. **Original recommendation:** The Construction Air Quality Management Plan, and the Concrete Batching and Crushing Plant Management Plan will need to be developed further, and should be subject to **approval** by the Auckland Council.

87. **Update**: This issue is resolved. The Construction Air Quality Management Plan, and the Concrete Batching and Crushing Plant Management Plan will be implemented through the Construction Environmental Management Plan (CEMP). The CEMP is subject to review by the Auckland Council to confirm compliance and consistency with the conditions. We agree that it is appropriate to maintain consistency in the review or approval processes for all construction management plans.

88. **Original recommendation:** Discharges from construction should **generally** be subject to the consent conditions specified below.

- There shall be no odour, dust or fumes beyond the site boundary caused by discharges from the site which, in the opinion of an enforcement officer, is noxious, offensive or objectionable.
- Beyond the site boundary there shall be no hazardous air pollutant caused by discharges from the site that causes, or is likely to cause, adverse effects on human health, environment or property.
- No discharges from any activity on site shall give rise to visible emissions, other than water vapour, to an extent which, in the opinion of an enforcement officer, is noxious, dangerous, offensive or objectionable.

89. **Original recommendation:** Any specific circumstances where compliance may not be achieved should be expressly provided for by the consent.

90. **Original recommendation:** Discharges from the concrete batching and rock crushing plants should be subject to the conditions specified above without exception.

91. Update: These recommendations (paragraphs 88, 89,and 90) are unchanged. This issue is discussed in Section 3 of this report.

92. **Original recommendation:** Consent condition AQ.8. should be modified to specify that the concrete batching and rock crushing plants shall be fully enclosed. All ventilation air from these processes should be treated in accordance with condition AQ.8.

93. **Update:** This issue is resolved. Proposed consent condition CNV.9 states that "The concrete batch plants shall be fully enclosed".

Further evidence/technical issues

94. **Original recommendation:** Further evidence should be provided to demonstrate that sensitive receptors represent the locations where effects are worst for operational effects.

95. **Update:** This issue is resolved. Further evidence has been provided by Gavin Fisher. (NZTA, supplementary evidence, 17 February, Annexure B)

96. **Original recommendation:** Sensitivity analysis should be undertaken for modelling of the effects of surface roads to reflect a "high traffic" day as recommended by the transport GPG.

97. **Update:** This issue is resolved. Further evidence has been provided by Andrew Murray (Rebuttal evidence, NZTA, traffic). This demonstrates that actual vehicle counts and speeds on a high traffic day are within approximately 10% of annual averages. This could approximately increase predictions of air quality effects by 10%, which is not significant and does not alter conclusions.

98. **Original recommendation:** Further evidence should be provided to clarify whether the use of AUSROADS will adequately predict worst case effects, particularly in the Oakley Creek Valley.

99. **Update:** This issue was resolved and is discussed in the expert caucusing joint report to the Board of Inquiry.

100. **Original recommendation:** Dispersion modelling of the ventilation stacks should be undertaken for a full year of meteorological data.

101. **Update:** This issue is resolved. Modelling has been undertaken for a full year of data and has been reported by Gavin Fisher (NZTA, supplementary evidence, 17 February, Annexure A).

102. **Original recommendation:** Dispersion modelling and sensitivity analysis should be undertaken to evaluate alternative ventilation stack heights.

103. **Update:** This issue is resolved. Dispersion modelling has demonstrated that a stack height of 15m is adequate. This has been reported by Gavin Fisher (NZTA, supplementary evidence, 17 February, Annexure A).

104. **Original recommendation:** Further evidence should be provided to clarify whether there will be any reduction in separation distances between existing residential houses and SH16 as a result of the project, and the likely effects.

105. **Update:** This issue is resolved. Gavin Fisher's evidence (NZTA, supplementary evidence, 17 February) suggests that separation distances between residential houses and SH16 will be increased as a result of the project.

106. **Original recommendation:** Further evidence should be provided to demonstrate whether proposed separation distances between residential houses and the proposed motorway in Sector 9 are adequate to ensure compliance with the PM_{10} NES and the $PM_{2.5}$ Regional Air Quality Target.

107. Update: This issue is not resolved. For the record, we do not agree with the statement in Gavin Fisher's evidence that "the experts generally agree that there will be no residences left too close to the proposed new or altered motorway routes". Modelling results presented in Gavin Fisher's evidence (NZTA, supplementary evidence, Annexure C) suggest that a separation distance of 20m will be adequate to achieve compliance with the PM_{10} standard. However, we consider that the results of modelling should be treated with caution. This is a key reason why we consider that monitoring conditions should be altered, as discussed in Section 3.3 of this report.

108. **Original recommendation:** Further evidence should be provided to clarify specific circumstances where compliance with the conditions specified above may not be achieved during construction.

109. Update: this issue has not been addressed and is discussed further in Section 3 of this report.

Appendix 1: Indicative assessment of air pollution costs

110. The cost of health effects from motor vehicle air pollution in Auckland have been estimated as $273.4 million per annum[7] for 2006.

111. The Auckland Air Emissions Inventory estimates annual emissions of PM_{10} from motor vehicles as 2450 tonnes per annum for the Auckland Region in 2004.

112. On this basis, the cost per tonne of motor vehicle PM_{10} emissions in Auckland is estimated as approximately $112,000.

113. We estimate that particulate emissions from the new parts of the project are approximately 1.4 tonnes per annum from each tunnel ventilation stack and the new surface road (so a total of 4.2 tonnes per annum from the SH20 part of the project)[8]

114. On this basis, the approximate cost of air pollution effects from the new surface road, and from each of the ventilation stacks would be $156,000 per annum (so a total of $469,000 per annum).

115. This is a simplified analysis, with a number of broad assumptions, however it is adequate to demonstrate the order of magnitude of likely air pollution costs.

[7] Kuschel, G.; Mahon, K, (2010). A Review and Update of HAPINZ for the Auckland Region, Auckland Regional Council Internal Report IR2010/004, July 2010.
[8] This is based on the assumption that emissions from the surface road are similar to the emissions from each of the tunnels. Daily tunnel emissions are estimated in the NZTA AEE