

## Auckland Regional Public Health Service

Rātonga Hauora ā Iwi o Tamaki Makaurau



Working with the people of Auckland, Counties Manukau and Waitemata

## Auckland Regional Public Health Service

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Proposed Amendments to the National Environmental Standards for Air Quality  
Ministry for the Environment  
PO Box 10362  
Wellington 6143

### **Submission on the Proposed Amendments to the National Environmental Standards for Air Quality – Discussion Document**

1. Thank you for the opportunity for the Auckland Regional Public Health Service (ARPHS) to provide a submission to the Proposed Amendments to the National Environmental Standards for Air Quality – Discussion Document. ARPHS understands that there will be no submissions hearings.
2. The following submission represents the views of the Auckland Regional Public Health Service and does not necessarily reflect the views of the three District Health Boards. Please refer to Appendix 1 for more information on ARPHS.
3. ARPHS understands that all submissions will be available under the Official Information Act 1982, except if grounds set out under the Act apply.
4. The primary contact point for this submission is:

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## 1.0 EXECUTIVE SUMMARY AND KEY RECOMMENDATIONS

4. ARPHS is opposed to the proposed:
  - Relaxation of the current National Environmental Standard for Air Quality (the air quality standard).
  - Deferral of the date by which the air quality standard must be complied with.
5. ARPHS believes that it is inappropriate to attempt to “lift the performance of our economy”<sup>1</sup> by knowingly accepting damage to the health status of New Zealanders. Relaxation of the air quality standards is not a way to reduce the proportion of New Zealand’s wealth that is spent on health care or to “invest in preventing sickness”<sup>2</sup>.
6. ARPHS recommends that greater attention be given to application of the precautionary principle for any consequences of relaxing the air quality standard prior to implementing the new regulations.
7. ARPHS believes that compliance with the current air quality standard would be enhanced if the Minister used Section 27 of the Resource Management Act (RMA), as outlined in the Proposed Amendments to the National Environmental Standards for Air Quality Discussion Document (the discussion document), to help drive compliance with the current air quality regime.
8. ARPHS opposes the proposals to relax the number of exceedances and to exclude exceedances resulting from naturally occurring exceptional events.
9. ARPHS supports the mandatory use of offsets for new industrial consents in non complying airsheds.
10. ARPHS believes that there are a number of errors in the “evidence” that was used to inform the discussion document; these include:
  - The number of current jobs affected should the status quo regime be retained, was over-estimated by up to 70%.
  - The cost benefit analysis failed to consider the following:
    - Impacts on health for those aged between 1 year and 30 years.
    - Costs of lost production attributable to employee absenteeism through ill health either caused or contributed to by air pollution.
    - Preparation of a ‘high benefits / low costs’ analysis as part of the sensitivity analysis.
11. If the proposed relaxation of the air quality standard were to proceed against health advice, ARPHS would prefer Option 3 which provides the greatest overall benefits.
12. ARPHS recommends that the Ministry for the Environment (MfE) work with the Ministry of Transport and the New Zealand Transport Agency (NZTA) to ensure that the consequences of transport sourced air pollution (particularly for the Auckland Region) are considered as part of all transport policy development.

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<sup>1</sup> Key Notes Our Priorities for 2010 accessible through <http://www.beehive.govt.nz/newsletter/key+notes+%E2%80%93+our+priorities+2010>

<sup>2</sup> Prime Minister’s Statement to Parliament, February 2010 accessible through <http://www.beehive.govt.nz/speech/statement+parliament+0>

## 2.0 AIR QUALITY AND PUBLIC HEALTH

13. ARPHS believes that further reductions in PM<sub>10</sub> levels are desirable to improve public health both at the 'airshed' level and at the more localised area level, due to the consequences for the health of individuals and the costs that decreased health status imposes on individuals, the community, industry the health budget and consequently on the national economy.
14. Rather than reduce the regulatory standard or defer compliance until the proposed 2018 date, it would be better to take stronger action towards all causes of air pollution and the promotion of greener technologies.
15. Increasing population (density and numbers) means that air pollution from transport, fires, domestic heating and cooking and industry is likely to increase. It is not appropriate to permit an increase in industrial emissions until there is clear evidence that emissions from other major polluting sectors have declined.
16. Evidence accumulated over the last 25 years confirms that long-term exposure to outdoor air pollution is an important contributor to morbidity and mortality in adults and in children. The Health and Air Pollution in New Zealand (HAPiNZ)<sup>3</sup> study estimated that air pollution was responsible for 1,079 cases of premature mortality in adults aged 30 years in New Zealand in 2001. Of these premature deaths, 500 were thought to be due to vehicle emissions. Nationally in 2001, air pollution caused by vehicle emissions was considered responsible for 541 extra cases of bronchitis and related illnesses, 246 extra hospital admissions for respiratory and cardiac illnesses and 22 cases of cancer. In Auckland City, air pollution was estimated to be responsible for 7.2% of premature deaths.
17. Comprehensive summaries<sup>4</sup> of literature linking air pollution to child health outcomes are freely available from organisations such as the WHO. In brief, particulate matter (like PM<sub>10</sub> and PM<sub>2.5</sub>) is responsible for the bulk of adverse health effects from air pollution, although effects are also related to other pollutants like nitrogen oxides, carbon monoxide and carcinogenic volatile organic compounds such as benzene and 1,3-butadiene (which may be carried into the lungs by particulate matter). In adults, exposure to increased concentrations of air pollution through activities such as living near major roads is associated with increased respiratory symptoms and lower life expectancy – due particularly to cardiovascular and respiratory mortality, but also probably due to lung cancer. In children, exposure to increased levels of air pollution is associated with the following conditions: compromised lung development, development and exacerbation of asthma, respiratory infections, and possibly cancer.

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<sup>3</sup> Accessible through <http://www.hapinz.org.nz/>

<sup>4</sup> Examples of such summaries are: Kryzanowski M, Kuna-Dibbert B, Schneider J, eds. Health effects of transport related air pollution. Copenhagen: World Health Organization 2005.  
World Health Organization. Effects of air pollution on children's health and development: A review of the evidence. Bonn: European Centre for Environment and Health, World Health Organization; 2005.

### 3.0 SPECIFIC COMMENTS ON SELECTED DISCUSSION QUESTIONS

18. ARPHS has chosen to only comment on selected questions within the Discussion Document, in the main, these are those which have particular relevance to public health.

#### **Problem Definition**

##### ***Qu.1 Have the main problems been defined accurately?***

#### **Perceived stringency of the PM10 standard**

##### *Precautionary Principle*

19. Urgent attention needs to be given to “The Precautionary Principle” with regard to setting the PM<sub>10</sub> standard, the omission of studies addressing the effects of air pollution on children<sup>5</sup>, and the possible underestimation of health effects in general, as Australian studies have shown air pollution to have a greater adverse effect on health than previously predicted.
20. The Precautionary Principle<sup>6</sup> can be described as follows:

“The precautionary principle states that if an action or policy has a suspected risk of causing harm to the public or to the environment, in the absence of scientific consensus that the action or policy is harmful, the burden of proof that it is not harmful falls on those taking the action.

This principle allows policy makers to make discretionary decisions in situations where there is the possibility of harm from taking a particular course or making a certain decision when extensive scientific knowledge on the matter is lacking. The principle implies that there is a social responsibility to protect the public from exposure to harm, when scientific investigation has found a plausible risk. These protections can be relaxed only if further scientific findings emerge that provide sound evidence that no harm will result.”<sup>7</sup>

21. The Precautionary Principle provides justification for public policy actions in situations of scientific complexity, uncertainty and ignorance, where there may be a need to act in order to avoid, or reduce, potentially serious or irreversible threats to health or the environment, using an appropriate level of scientific evidence, and taking into account the likely pros and cons of action and inaction.

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<sup>5</sup> Jarosinska D, Gee D. Children's environmental health and the precautionary principle. International Journal of Hygiene & Environmental Health. 2007 Oct;210(5):541-6.  
Martuzzi M, Tickner JA, eds. The precautionary principle: Protecting public health, the environment and the future of our children. Copenhagen: World Health Organization 2004.

<sup>6</sup> United Nations Environment Programme and since adopted by the World Health Organisation accessible through <http://www.unep.org/Documents.Multilingual/Default.asp?documentid=78&articleid=1163>

<sup>7</sup> Wikipedia. Precautionary principle. [http://en.wikipedia.org/wiki/Precautionary\\_principle](http://en.wikipedia.org/wiki/Precautionary_principle)

22. The Precautionary Principle is a policy tool which is used to justify measures that protect public health and the environment in the context of uncertain risk. The principle has a long history in public health practice. It acknowledges that environmental risks are often associated with both complexity and uncertainty, and that decisions in health sometimes need to be made before definitive evidence comes to light.
23. ARPHS believes that the precautionary principle is implicitly reflected in Section 5 of the Resource Management Act which sets out the purpose of the Act as to promote the sustainable management of natural and physical resources and requires that people and communities are enabled “to provide ... for their health and safety while ... safeguarding the life supporting capacity of air... and ...avoiding ... any adverse effects of activities on the environment”<sup>8</sup>.
24. In light of this principle, the MfE may wish to reconsider substantially more stringent PM<sub>10</sub> requirements, as ARPHS believes public health may be compromised, in view of the above mentioned lack of information on the effects of such policy change and the large body of health evidence showing harm from air pollution.

#### *Number of Exceedances*

25. ARPHS is disappointed that the discussion document proposes both to increase the number of exceedances from 1 to 3 and to remove naturally occurring exceptional events such as Australian bushfires, dust storms or volcanic events from the calculation; particularly as such events will continue to contribute to the adverse effects of air pollution on population health.
26. ARPHS understands that the initial allowance of one exceedance was to account for events such as Guy Fawkes firework displays. There is no compelling reason to allow for more exceedances unless these are attributable to natural phenomena.
27. In the Auckland region on a windy day a large portion PM<sub>10</sub> particulates may comprise aerosolised sea salt (see also comments under section below entitled “Other Issues”). At the current time there is no appropriate technology for rapid PM speciation, but it would be desirable to have such technology developed and used for PM<sub>10</sub> monitoring to better understand the ratio of naturally and anthropogenically occurring PM<sub>10</sub> and PM<sub>2.5</sub> particles. The current understanding is, however, that both types of PM contribute to adverse effects on human health.

#### *Equity of current regulations*

28. Equity can be defined and assessed in a number of differing ways including; horizontal equity, vertical equity, inter-generational equity and health equity. The definitions differ in how the distribution of impacts between individuals and groups is assessed and how the ability of those individuals and groups to ‘carry the burden’ of inequality is assessed. Both the discussion document and the Technical Advisory Group’s Report adopt a simplistic view around equity whereby the current regime is viewed as inequitable solely as the burden of restrictions is placed exclusively on industry.

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<sup>8</sup> Resource Management Act 1991 Section 5 accessible through <http://www.legislation.govt.nz/act/public/1991/0069/latest/DLM231905.html>

29. ARPHS acknowledges that industry is the only group that is prevented from creating new discharges after 2013 in non-complying airsheds. To that extent the current air quality regulations may be viewed as inequitable. From the viewpoint of individuals suffering from ill health caused or contributed to by air pollution it is inequitable that:
- Increased or further discharges to air may be permitted by virtue of the Review.
  - That the date for compliance with the regulations is proposed to be deferred from 2013 to 2018.
30. Such individuals can do little to mitigate their exposure to pollutants and it is of concern that the interests of one sector are proposed to receive preferential treatment under the review.
31. ARPHS does not support any relaxation of the rules relating to limits on PM<sub>10</sub> emissions sourced from industry. If the current regime is viewed as inequitable it would be far preferable to remove that inequality by bringing the other major sources of particulates within a similar control regime to that currently existing for industrial emissions.

*Compliance with the PM10 standard by 2013*

32. ARPHS does not accept that the failure of regional councils to adequately address air pollution issues in non-complying airsheds is a valid reason to defer compliance with the PM<sub>10</sub> standards beyond 2013.
33. The failure of regional councils is however, reason for the Minister to exercise leadership around projected non-compliance and for the exercise of the Minister's powers under Section 27 of the Resource Management Act.
34. Given the varying performance between differing regional councils Ministerial oversight and pressure on regional councils to develop local solutions to local problems is likely to be necessary whether or not the compliance with the current air quality standards is deferred from 2013 to some later date.

**Qu.2 *Are there any other problems you can think of that need to be addressed as a priority?***

35. ARPHS believes that the term 'significance' needs to be defined to help create greater certainty in how the air quality standards are applied. There are wide differences between airsheds in terms of: geographic size, population densities and level of pollutants. In the following hypothetical example an identical new discharge is being proposed. In which airshed is the increase significant?

Pre-existing Particulate Release in Airshed	Proposed New Discharge	Percentage Increase
6000,000 kg <sup>9</sup>	1000 kg	0.017% increase
100,000 kg	1000 kg	1 % increase
10,000 kg	1000 kg	10 % increase
1,000 kg	1000 kg	100 % increase

36. As a public health authority ARPHS believes that the increase in each of the hypothetical examples above is a significant new discharge.
37. A further question that requires an evidence-based solution, is whether the discharge should be assessed in terms of its significance across the entire airshed, or whether it is better to assess the discharge in terms of its more localised effects?
38. As a public health authority ARPHS believes that localised issues are as important as 'whole of airshed' considerations.

**Qu.3 Do you agree with the policy objectives?**

39. ARPHS supports the three policy objectives of the regulations review of:
- Providing greater certainty around environmental expectations before the resource consent process
  - Supporting the protection of public health
  - Providing greater certainty in resource consent decision making.

ARPHS believes, however, that these policy objectives as defined in section 3.4 of the discussion document are conflicting.

40. Providing greater certainty for industry is desirable, but not if the 'level playing field' leads to an increased level of industrially sourced emissions and an increased level of emissions overall.
41. If the challenge of ensuring compliance with the current regulatory regime is viewed as an adequate reason for deferring full implementation, ARPHS has no confidence that any subsequent implementation date will be adhered to. Public health will not be supported if compliance with the regulations is deferred.

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<sup>9</sup> Approximately 6,000 metric tonnes of PM<sub>10</sub> are emitted each year in the Auckland Airshed. ARC State of the Auckland Region Report 2010 accessible through [http://www.arc.govt.nz/albany/fms/main/Documents/Plans/Reports/Full%20report%202009/Chapter%204\\_0%20-%20State%20of%20the%20environment%20and%20bioversity%20overview%20-%20%20and%204\\_1%20-%20Air.pdf](http://www.arc.govt.nz/albany/fms/main/Documents/Plans/Reports/Full%20report%202009/Chapter%204_0%20-%20State%20of%20the%20environment%20and%20bioversity%20overview%20-%20%20and%204_1%20-%20Air.pdf)

**Qu.4 Do air quality standards materially influence industry investment decisions and regional location decisions?**

42. As a public health authority ARPHS is not in a position to offer much comment in response to this question. Impact on business is frequently suggested as a reason for not changing the law (evidence given to the current Maori Affairs Select Committee Inquiry into Tobacco around retail displays being another example). ARPHS believes that there is an effect on industry from any changed regulatory regime. ARPHS recommends that in considering any submissions relating to this question that MfE have regard to the definition of competition set out in Section 3 of the Commerce Act and seeks comment from the Commerce Commission.
43. Markets in New Zealand are dynamic and changing. Both competition and regulatory change provide stimuli for industry to compete and adapt. Any claimed effects on industry around investment decisions and regional location decisions should be treated with caution as all such decisions are subject to a wide range of confounding factors<sup>10</sup>. Unless these confounding factors are fully understood it is easy for the impacts of air quality standards on business to be overstated.

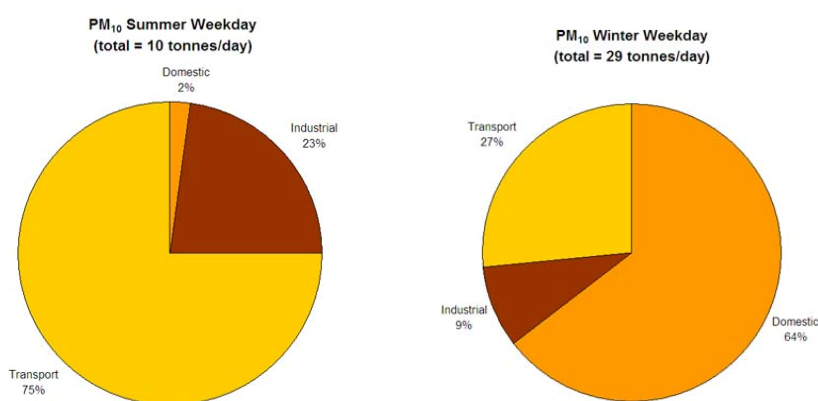
**What are the Options?**

**Qu.5 Have the options achieved the policy objectives?**

44. ARPHS does not believe that any of the options presented in the discussion document achieve the full suite of policy objectives. Deferring compliance does not support or protect the public health objectives of the air quality standards.

**Qu.6 Have the options addressed the identified problems?**

45. None of the options fully address the identified problems. As stated previously there is conflict between giving industry certainty and protecting public health.
46. In Auckland the majority of air pollution<sup>11</sup> is caused by transport and domestic heating emissions. Industry only comprises a relatively small proportion of total emissions.



<sup>10</sup> In statistics, a confounding variable (also confounding factor, lurking variable, a confound, or confounder) is an extraneous variable in a statistical model that correlates (positively or negatively) with both the dependent variable and the independent variable. It is perhaps better summarised as something that introduces uncertainty and bias into an observed outcome, complicating interpretation.

<sup>11</sup> Accessible through <http://www.arc.govt.nz/albany/index.cfm?6901EAA9-14C2-3D2D-B939-BF1991A4D1E7>

47. Auckland's air pollution challenges are different and of a greater order of magnitude to the remainder of the country.

- The region currently emits some 600,000 kg of PM<sub>10</sub> into the atmosphere<sup>12</sup>.
- The region contains the largest and most concentrated population in the country. Population projections suggest that the region's population will be over 2 million within the next 15 – 20 years.
- The density of this population is expected to increase.
- The proportion (and absolute number) of aged residents will increase<sup>13</sup>, although the region will have a younger age profile than the remainder of New Zealand.
- The number of children and young people will increase.



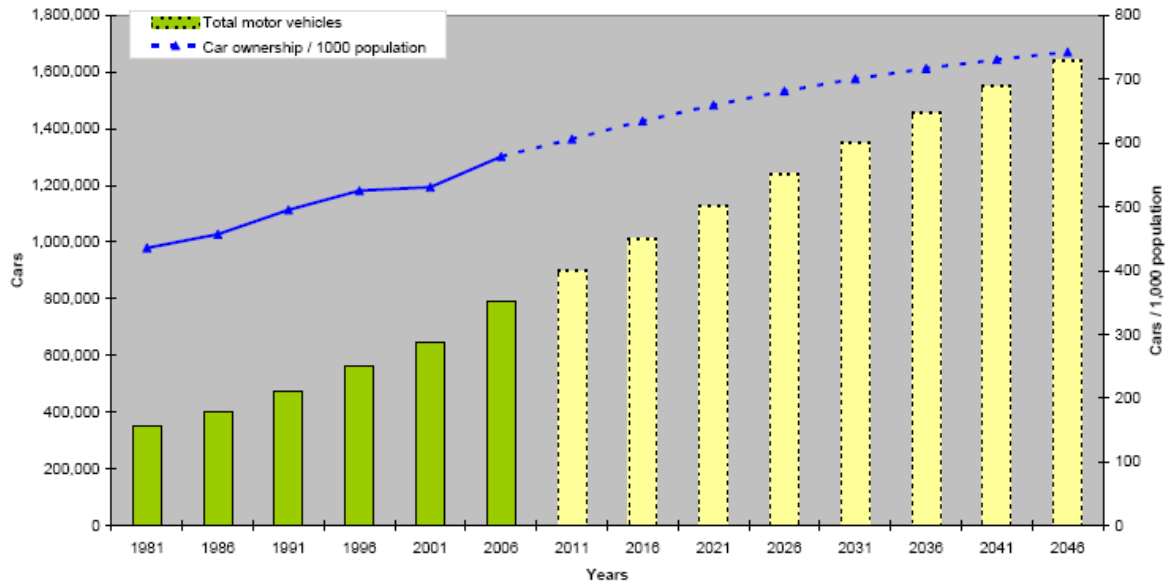
Auckland Region Projected Age Structure Change.

- Vehicle ownership is increasing both in absolute and per 1000 population<sup>14</sup> terms.

<sup>12</sup> Ibid.

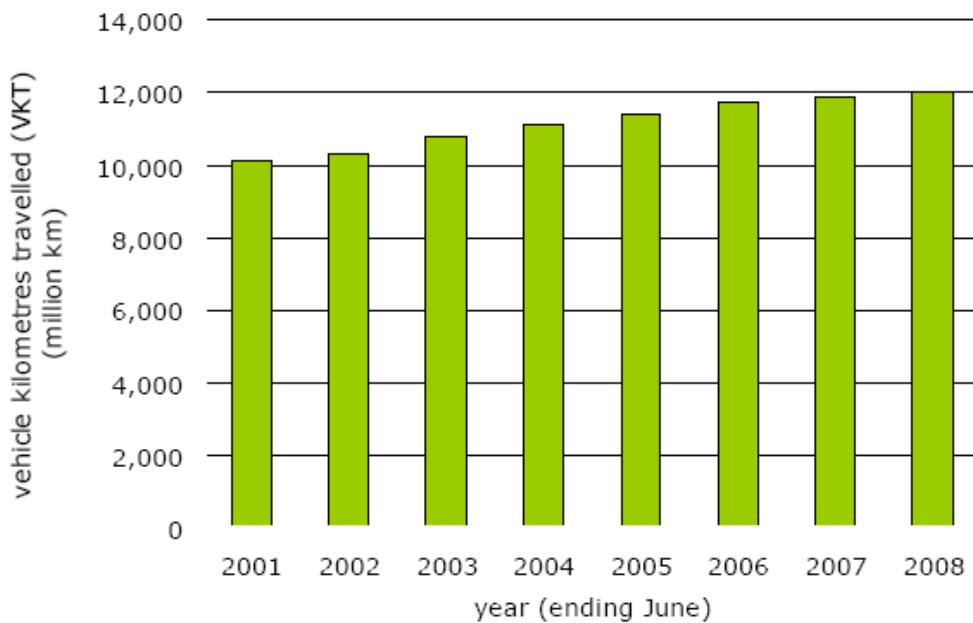
<sup>13</sup> ARPHS Demographic Profile, accessible at [http://www.arphs.govt.nz/Publications\\_reports/reports/ARPHS%20Demographic%20Profile%202006.pdf](http://www.arphs.govt.nz/Publications_reports/reports/ARPHS%20Demographic%20Profile%202006.pdf)

<sup>14</sup> ARC RLTS2010/WP08 Trends and Issues [http://www.arc.govt.nz/albany/fms/main/Documents/Transport/RLTS/RLTS2010WP08%20Trends%20and%20Issues%20\(Transport%20Challenges\).pdf](http://www.arc.govt.nz/albany/fms/main/Documents/Transport/RLTS/RLTS2010WP08%20Trends%20and%20Issues%20(Transport%20Challenges).pdf)



Car Ownership Trends and Forecast.

➤ Vehicle kilometres travelled are increasing<sup>15</sup>.



Auckland Regional Vehicle Kilometres Travelled.

48. Any attempt to address air pollution issues focusing solely around industrial sourced air pollution will ignore the major sources of that pollution. A simple pareto analysis would suggest that for the Auckland region the greatest opportunity to address air pollution would devote most attention to domestic and transport related pollution. The discussion document is largely silent in terms of how the review addresses pollution caused by these causes.

<sup>15</sup> Ibid.

49. Government programmes such as the 'Warm Up New Zealand: Heat Smart Programme' and an increasing consumer preference for heat pumps are helping to reduce the relative proportion of air pollution that is sourced from domestic emissions. Whether such programmes are enough to offset the impacts of population growth are another issue. Nevertheless, the overall aim should be to decrease air pollution levels in order to reduce the harm caused by current levels.
50. ARPHS notes the Technical Advisory Group's Annex 7 Emissions from motor-vehicles in Auckland comments and welcomes its suggestions. It is disappointing that these suggestions are not more strongly linked into the discussion document's recommendations. Transport sourced air pollution will also be impacted by other factors such as the potential relaxation of the Auckland Metropolitan Limit leading to a more dispersed land settlement pattern and initiatives of questionable benefit (at the whole of government / society level) such as the New Zealand Transport Agency's<sup>16</sup> recent adoption of its Farebox Policy.
51. A dispersed land settlement pattern coupled with more expensive public transport will exacerbate the Auckland region's current growth in vehicles and vehicle kilometres travelled with direct consequences for the levels of particulate emissions.

**Qu.7 What preferred option do you think should be considered?**

52. ARPHS does not support either option 4A or 4B. ARPHS's preferred option from the options suggested in the discussion document is Option 3 as this retains most public health benefits and has the greatest nett present value of all the options proposed.
53. With respect to option 4B ARPHS doesn't believe it is possible to both have a National Environmental Standard and then allow a council to grant a consent that would breach it, or make the problem worse post 2013-18. ARPHS also questions how such action would comply with Part 2 of the Resource Management Act: Safeguarding the life supporting capacity of air. Such action would also make an assessment of environmental effects challenging to develop appropriately.

**Qu.11 Is it practical to require mandatory offsets in over allocated airsheds?**

54. ARPHS believes it is both practical and desirable to require mandatory offsets in over allocated airsheds. From a public policy viewpoint ARPHS believes that it would be preferable for the regional council to have an oversight and monitoring role for any consent specific proposals. Such oversight will help prevent 'fraud' or 'gaming' of the process.
55. ARPHS notes that the current examples of offsets presented in various documents relating to the air quality review, mostly in the main offset air pollution by the replacement of domestic fires. ARPHS would suggest that in the Auckland airshed that consideration be given to allowing mandatory offsets to be used to provide retrofitting for heavy duty vehicles as suggested in Annex 7 of the Technical Advisory Group Report. The use of offsets on transport would bring year round improvements in air quality, whereas the use of offsets for domestic fires will only improve air quality during the winter months. ARPHS considers both domestic and transport offsets necessary.

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<sup>16</sup> New farebox policy aims to improve efficiency of public transport  
<http://www.nzta.govt.nz/about/media/releases/678/news.html>

**Qu.12 What is the scale of the economic impact of mandatory offsets on industry? We are particularly interested in:**

**12c Any other impacts you see arising from a requirement to offset emissions?**

56. A requirement to offset emissions will have some administrative 'dead weight' that would not otherwise occur. Conversely the ability to direct where offsets are applied would give the regional council additional 'tools' with which to address air quality and to target offsets in that part of the airshed where air quality was worse.

**Qu.13 Will mandatory offsets for new industries in breaching airsheds encourage industries to adopt cleaner technologies?**

57. As a public health authority ARPHS is not well placed to respond to this question. It seems probable, however, that mandatory offsets for new industries in breaching airsheds would encourage industries to adopt cleaner technologies. In New Zealand 'cleaner greener' industries have the ability to use environmental performance to their marketing advantage over their competitors.
58. Assuming a new industry will face the cost of either investing in cleaner technology for its own use or investing a similar amount in an offset it seems probable that most industries would chose to invest in their own plant and equipment and their own performance. If the cost of installing emissions reduction technologies e.g. bag houses, venture scrubbers or electrostatic precipitators was substantially more than the cost of the offset, or the payback period was longer than the life of the technology being purchased it seems likely that industry might prefer the cost of the mandatory offset.

**Qu.15 How effective are rules at the national level in addressing air quality issues (e.g. managing emissions from various sources) compared with providing regional flexibility?**

59. ARPHS believes that an effective air quality regime needs both national standards and regional flexibility. National standards are needed as a 'backstop' for those councils who have not been proactive at the local level in addressing air quality. Implementing stricter rules around domestic heating is an appropriate and effective approach, particularly where the council has provided access to a source of funding or loans for heating upgrades. As noted previously current regional approaches largely focus on domestic heating and as such ignore transport sourced emissions. It is disappointing that the Technical Advisory Group's recommendations around transport were deemed out of scope of this review.
60. ARPHS notes that the Technical Advisory Group's recommendations around transport have been referred to the Minister of Transport for further investigation. ARPHS believes that further liaison with the Ministry of Transport is required to ensure that the impacts on air quality are one of the issues that the Ministry and the New Zealand Transport Agency consider as part of all transport policy development and funding decisions.

## **Costs and Benefits**

### **Qu.16 Have we accurately reflected the range of costs and benefits arising from the proposals for a national environmental standard and who might bear the costs or receive the benefits?**

61. ARPHS believes that there are a number of errors in the analysis underpinning the discussion document and its associated documents.

#### *Potential Job Losses of Status Quo*

62. Attachment A of the cabinet paper estimates a total number of 11449 jobs in the Auckland Regional Council area. A footnote states that the:

“Number includes one hospital in Auckland that employs 10,000 people and uses a boiler which needs a consent. The regulations would directly impact on that hospital in terms of patient care but would unlikely close down in total”.

This information is incorrect. The largest health care organisations in the Auckland region are the three district health boards (DHBs). These respectively employ:

- Auckland District Health Board approximately 10,000 full and part time staff.
- Counties Manukau District Health Board approximately 6,600 full and part time staff.
- Waitemata District Health Board approximately 6,100 full and part time staff.

No private health care provider comes close to matching any of the DHBs in size.

63. DHB staff numbers are easily (and completely inaccurately) translated as hospital staff numbers. Within ADHB the 10,000 approx staff members are employed across the following sites:

- Auckland City Hospital.
- Greenlane Clinical Centre.
- A range of other community based services predominately within the ADHB area (Auckland City Council geographic area), but across the Auckland Region.

There is no single hospital site which employs anything approaching 10,000 people.

64. The statement “...would unlikely close down in total.” reflects poor knowledge of the statutory duties imposed on DHBs to provide health services to their populations. Any issues around resource consenting for a boiler would be resolved before they impacted on health service delivery.
65. Almost 70% of the “Actual Number” of affected jobs figure presented in the Cabinet paper is based on inaccurate information.

*Updated Cost Benefit Analysis – Costs of Lost Production*

66. ARPHS welcomes the updating by NZIER of the 2004 Cost Benefit Analysis in its document “The Value of Air Quality Standards: Review and Update of Cost Benefit Analysis of National Environmental Standards on Air Quality” (Updated CBA). ARPHS believes that the NZIER updated CBA is still capable of improvement as it is disappointing that the level of detail and quality of analysis around the impacts and costs of wood burners is not repeated in the remainder of the document.
67. The table below<sup>17</sup> presents an overview of the elements assessed as part of the updated CBA.

	2004 Analysis	2009 Update
<b>Benefits</b>		
Willingness to pay to avoid		
-Premature loss of life (pain & suffering)	Included	Included
-Lost output/productivity/income		
Direct benefits of avoiding GDP loss	Included	
-Indirect benefits of avoiding GDP loss	Included	Not valued
Avoided costs of medical treatment	Not included	Included
Avoided loss of long term quality of life	Not included	Not valued
<b>Costs associated with ambient air quality</b>		
-Regional councils administration/monitoring	Included	Updated
-Territorial authorities administration	Included	Zero entry
-Government information & administration	Included	Updated
-Industry site adaptation measures	Included	Updated
-Business forgone from consent constraints	Not included	Not valued
<b>Costs associated with prohibition standards</b>		
-Consenting of school & hospital incinerators	Included	Completed
-Alternatives to tar seal burning	Included	Zero entry
-Other activities: landfills, wire burning etc	Zero entry	Zero entry
<b>Costs associated with wood burner standard</b>		
-Householders costs of compliant burners	Zero entry	Included
-Suppliers costs of compliant burners	Zero entry	Zero entry
-Government/council subsidy	Included	Zero entry
<b>Factors taken into account in the analysis</b>		
Infant mortality	Not included	Included
Cost of hospitalisation (medical expenditures)	Not included	Included
Discount rate	10%	8%
Influences on the counter-factual	Not included	Allows for downward trend in wood burners & insulation/ clean heat initiatives

<sup>17</sup> Table 16 in Appendix A of the NZIER Updated CBA, accessible through <http://www.mfe.govt.nz/publications/air/national-air-quality-standards-nzier/index.html>

68. ARPHS questions how the issue of lost production caused by ill health (both restricted activity days and time off work attending or receiving treatment) has been dealt with.
69. The updated CBA appears to assess lost production only in terms of the social costs of lost wages. It makes no attempt to assess or quantify the cost of lost production and profit to industry from its employees being absent from work. This omission is disappointing as in other areas the updated CBA incorporates figures as low as the \$125,000 cost to central government of administration.
70. ARPHS believes that an estimate of this cost to the economy from lost production caused by the health effects of air pollution should have been attempted and included in the updated CBA.

#### *Updated CBA – Influence of HAPiNZ Report*

71. ARPHS acknowledges and welcomes the proposal to update the HAPiNZ report. ARPHS believes that HAPiNZ underestimates the total health consequences of air pollution. The information and figures quoted in the HAPiNZ study is highly conservative, for example: it only includes adults over 30 years, does not include young children who are the most vulnerable group, does not include the entire population (73% only) and employs an outdated and overly conservative dose-response relationship.
72. ARPHS has recently undertaken an extensive literature review as part of an inter-sectoral working group with the Ministry of Education, Ministry for the Environment, Ministry of Health, NIWA, ARC and University of Auckland on air quality issues affecting children. Internationally, there is growing concerns that the impacts of air pollution on children are significantly greater than was previously thought to be the case, see Appendix 2<sup>18</sup>.
73. The updated CBA attempts to correct for some of the inaccuracies in the HAPiNZ report by including information relevant to infants. The updated CBA still appears to ignore the consequences and costs of air pollution on individuals aged between infancy and 30.

#### *Updated CBA – Sensitivity Analysis*

74. ARPHS notes the factors tested in the sensitivity analysis. Within the sensitivity analysis each element has been tested separately. ARPHS believes that consideration should have been given to testing the combined effect of errors. On page 25 the updated CBA states “Therefore the number of deaths and the corresponding social cost are very likely to be underestimates ...”. On page 52 the updated CBA states “... the social costs are likely to be underestimated due to the non-inclusion of loss of life quality....”.
75. ARPHS believes that revised ‘worst and best’ case figures should have been developed. The comments in section 4.9.7 around high costs and low benefits should have been balanced with a separate section on high benefits and low costs as an aid to policy development.

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<sup>18</sup> See Appendix 2 of ARPHS comments to the Review of National Environmental Standards for Air Quality: Request for Submissions dated 21<sup>st</sup> August 2009 accessible through [http://www.arphs.govt.nz/Submissions/downloads/2009/20090821\\_AirQualityRegulationReview.pdf](http://www.arphs.govt.nz/Submissions/downloads/2009/20090821_AirQualityRegulationReview.pdf) reproduced as Appendix 2 to this submission for ease of reference.

## Other Issues

76. ARPHS notes that PM<sub>2.5</sub> was not addressed in the MfE's risk assessment as this was 'out of scope'. ARPHS believes that further work should be undertaken by MfE on PM<sub>2.5</sub>, its impacts on health, monitoring levels and options to reduce levels of PM<sub>2.5</sub>.
77. PM<sub>2.5</sub> needs more consideration in efforts to protect health. Due to its smaller size PM<sub>2.5</sub> can penetrate deep into the lungs and there is better correlation between health affects and particulate levels. Furthermore, PM<sub>2.5</sub> is smaller than most naturally produced particulate, such as sea salt and dust, which can contribute a significant amount to Auckland's PM<sub>10</sub> levels when meteorological conditions allow. This smaller size makes it easier to separate the impacts of anthropogenic particulate production from that which occurs naturally in the environment from time to time. Further work in this area is needed to better target efforts to reduce the occurrence and effects of these smaller particulates.

## 4.0 CONCLUSION

78. As stated by the Minister of Health "New Zealand cannot afford the cost of its health care to continue to grow in an uncontrolled way, nor can we afford poor decision-making"<sup>19</sup>. Health care is one of Government's major cost drivers and an area which suffers greater cost pressures than any other due to increasing public expectations and advances in medical treatment and technology.
79. ARPHS does not believe that the preferred options 4A and 4B which explicitly "transfers burden to the health system"<sup>20</sup> are likely to best support Government's goals for economic growth. New Zealanders living shorter, sicker, less independent and more disabled lives will not make an optimal contribution to supporting economic growth.
80. ARPHS recommends that the status quo for air quality standards be retained in preference to the current proposal, but that the Minister exercises greater direction over regional councils by using the approaches canvassed in the discussion document under Section 27 of the RMA. Ministerial direction and oversight will help ensure that air quality is continually improved in all airsheds.

Yours sincerely



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<sup>19</sup> Ministerial Foreword to the Ministry of Health Statement of Intent 2010-2013 accessible at [http://www.moh.govt.nz/moh.nsf/pagesmh/10104/\\$File/soi1013.pdf](http://www.moh.govt.nz/moh.nsf/pagesmh/10104/$File/soi1013.pdf)

<sup>20</sup> Regulatory Impact Statement: Overview of Required Information Table 2 <http://www.mfe.govt.nz/laws/ris/ris-air-quality-review.pdf>

## **APPENDIX 1 - AUCKLAND REGIONAL PUBLIC HEALTH SERVICE**

Auckland Regional Public Health Service (ARPHS) provides public health services for the three district health boards (DHBs) in the Auckland region (Auckland, Counties Manukau and Waitemata District Health Boards), with the primary governance mechanism for the Service resting with Auckland District Health Board.

ARPHS has a statutory obligation under the New Zealand Public Health and Disability Act 2000 to improve, promote and protect the health of people and communities in the Auckland region. The Medical Officer of Health has an enforcement and regulatory role under the Health Act 1956 and other legislative designations to protect the health of the community.

ARPHS' primary role is to improve population health. It actively seeks to influence any initiatives or proposals that may affect population health in the Auckland region to maximise their positive impact and minimise possible negative effects on population health.

The Auckland region faces a number of public health challenges through changing demographics, increasingly diverse communities, increasing incidence of lifestyle-related health conditions such as obesity and type 2 diabetes, outstanding infrastructure needs, the balancing of transport needs, and the reconciliation of urban design and urban intensification issues.

## APPENDIX 2 Health Effects of Air Pollution on Children

### HEALTH EFFECTS OF AIR POLLUTION

Evidence accumulated over the last 25 years confirms that long-term exposure to outdoor air pollution is an important contributor to morbidity and mortality in adults and in children.<sup>1-6</sup> The *Health and Air Pollution in New Zealand (HAPiNZ)* study estimated that air pollution was responsible for 1,079 cases of premature mortality in adults aged  $\geq 30$  years in New Zealand in 2001.<sup>7</sup> Of these premature deaths, 500 were thought to be due to vehicle emissions. Nationally in 2001, air pollution caused by vehicle emissions was considered responsible for 541 extra cases of bronchitis and related illnesses, 246 extra hospital admissions for respiratory and cardiac illnesses and 22 cases of cancer. In Auckland City, air pollution was estimated to be responsible for 7.2% of premature deaths.

Comprehensive summaries of literature linking air pollution to child health outcomes are freely available from organisations such as the WHO.<sup>4, 5</sup> In brief, particulate matter (like PM<sub>10</sub> and PM<sub>2.5</sub>)<sup>21</sup> is responsible for the bulk of adverse health effects from air pollution, although effects are also related to other pollutants like nitrogen oxides, carbon monoxide and carcinogenic volatile organic compounds such as benzene and 1,3-butadiene (which may be carried into the lungs by particulate matter<sup>8, 9</sup>). In adults, exposure to increased concentrations of air pollution through activities such as living near major roads is associated with increased respiratory symptoms and lower life expectancy – due particularly to cardiovascular and respiratory mortality, but also probably due to lung cancer.<sup>4, 10</sup> In children, exposure to increased levels of air pollution is associated with the following conditions:

- **Development of asthma.** While evidence of a relationship between childhood asthma development and ambient air pollution is mixed, there is strong and consistent evidence of an association between air pollution caused by traffic and development of asthma in children.<sup>11-26</sup> In general, studies looking at pollution from vehicle emissions and development of asthma have found around a 30% to 80% increase in the risk of asthma development in children spending large amounts of time (e.g. residing) near busy roads. Links between traffic pollution and asthma development have been stronger in girls than in boys<sup>15, 19-21, 27, 28</sup> and in younger children than in older children.<sup>16, 22, 29-31</sup> The relationship may also be stronger in children without a pre-existing family history of asthma.<sup>16, 18, 32</sup>
- **Exacerbation of asthma.** There is moderate-to-strong evidence in the literature of a causal association between air pollution and asthma exacerbation in children with pre-existing asthma.<sup>5</sup> Several papers have looked specifically at pollution caused by traffic and asthma exacerbation.<sup>25, 33-38</sup> On balance, these studies support the notion of a causal link between traffic-caused air pollution and asthma aggravation.
- **Lung development.** Development of the respiratory system begins at around 24 days after conception and continues through various distinct periods of development until adulthood.<sup>5, 39</sup> The first 18 months following birth are particularly critical to lung development, as a significant amount of structural change (including substantial alveolar proliferation) occurs during this period.<sup>5, 40</sup> Multiple cross-sectional and longitudinal epidemiological studies have examined the relationship between air pollution and lung function in children.<sup>15, 41-57</sup> These

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<sup>21</sup> Particulate matter less than 10 and 2.5 microns respectively

studies have generally demonstrated an association between high levels of pollution and low levels of lung function. Furthermore, while short-term deficits in lung function due to air pollution appear to be reversible<sup>45, 55, 58</sup>, long-term exposure to high levels of air pollution may be associated with longstanding lung function deficits that persist into adulthood, although the evidence is currently unclear.<sup>5, 59</sup> A recent review by Götschi et al of the long-term effects of air pollution on lung function, published in the journal *Epidemiology*, concluded that:

*“Support is strong for concluding that there are adverse long-term effects of air pollution on lung function growth in children, resulting in deficits of lung function at the end of adolescence. No study has, however, followed up adolescents until they reach the plateau phase of early adulthood. It therefore is not known whether growth deficits will be compensated by a prolonged growth phase, or whether these subjects will enter the lung function decline phase of later adulthood with reduced lung function”<sup>59</sup>*

The comprehensive review of literature related to air pollution and child health undertaken by the European office of the World Health Organization (WHO) concluded that:

*“...the studies suggest that the effects [of air pollution] can be cumulative over a 20-year growing period, and there is uncertainty whether the chronic effects are reversible. Furthermore, even a small shift in average lung function can yield a substantial increase in the fraction of children with ‘abnormally’ low lung function, that is, small changes in the population mean can reflect large changes in a susceptible subgroup of the population (p. 124).”<sup>5</sup>*

- **Respiratory infections.** Multiple studies have looked at the relationship between air pollution and respiratory infections in children. The WHO literature review mentioned above examines 71 such studies.<sup>5</sup> The studies reviewed by WHO included a variety of longitudinal and cross-sectional epidemiological studies which looked at both upper and lower respiratory tract infections. Specific infections examined in the studies included bronchitis, pneumonia, colds, sore throats and persistent cough, as well as doctor-diagnosed conditions like croup. The WHO literature review concluded that there was evidence of an association between air pollution and increased frequency of both upper and lower respiratory tract symptoms in children and that many of these symptoms were likely to be associated with respiratory infection. The review also concluded that although the effect estimates were often small, the population attributable risks were often high. In other words, although individual risk of respiratory infection may be only fractionally raised, the effect on the whole exposed population may be large.
- **Cancer.** The question of whether exposure to air pollution causes cancer in children is not yet resolved. Studies suggest that exposure to increased levels of traffic-related air pollution is associated with lung cancer in adults.<sup>4</sup> Volatile organic compounds found in vehicle emissions also include known carcinogens like benzene<sup>60, 61</sup> and there is epidemiological evidence suggesting that proximity

to sources of benzene may be related to childhood cancers, in particular leukaemia.<sup>62-67</sup> The WHO literature review found only 15 studies which examined the hypothesis that air pollution may cause childhood cancer and concluded that there was insufficient evidence to infer a causal relationship between the two.<sup>5</sup>

## **Susceptibility of children to air pollution**

Differential susceptibility to air pollution occurs within the general adult population. For example, research suggests that individuals with type two diabetes may be at increased risk of the cardiovascular effects of particulate matter.<sup>68, 69</sup> Children have several characteristics which make them more susceptible than adults to the effects of environmental stressors<sup>70</sup> and particularly to the effects of air pollution.<sup>71</sup>

Lung growth and cellular differentiation begins around 24 days after fertilisation and continues through various distinct periods until adulthood.<sup>5, 39</sup> A substantial amount of respiratory growth and development occurs in the first 18 months of life.<sup>5, 40</sup> Full functionality of the lung occurs at around six years of age.<sup>71</sup> The rapid changes in respiratory structure that occur during early childhood mean that the lung is particularly susceptible to the effects of potentially harmful substances during this time.<sup>71</sup> Children also have a larger lung surface area in comparison to their body weight than adults and (under normal breathing conditions) respire around 50% more air per kilogram of body weight than adults. Furthermore, young children also have incomplete metabolic and immune systems, and higher rates of respiratory infection than adults.<sup>5</sup>

Layered on top of the physiological differences between children and adults are different activity patterns that may increase exposure to air pollutants in children. Compared with adults, children spend considerably more time outside, especially in summer months and in the late afternoon.<sup>72</sup> Much of that time may be spent in vigorous activity related to play and exercise, with associated increases in respiratory rate and inspiratory volume.

## **Precautionary Principle**

The Precautionary Principle is a policy tool which is used to justify measures that protect public health and the environment in the context of uncertain risk.<sup>73</sup> The principle has a long history in public health practice.<sup>74</sup> It acknowledges that environmental risks are often associated with both complexity and uncertainty, and that decisions in health sometimes need to be made before definitive evidence comes to light. As described by Gee in 2006:

*“The Precautionary Principle provides justification for public policy actions in situations of scientific complexity, uncertainty and ignorance, where there may be a need to act in order to avoid, or reduce, potentially serious or irreversible threats to health or the environment, using an appropriate level of scientific evidence, and taking into account the likely pros and cons of action and inaction”<sup>75</sup>*

The Precautionary Principle has particular relevance to child health. Traditional approaches to risk assessment frequently fail to account for the extent of childhood susceptibility to environmental risks and children’s unique patterns of exposure to environmental toxins.<sup>74</sup> Environmental stressors often affect children differently at

different developmental stages and the impact of these stressors at each stage is often poorly understood in comparison with effects in adults.<sup>73, 74</sup> Furthermore, health impacts from environmental exposures are often characterised by delay between exposure and outcome. With more potential years of life than most adults, children also have more time to develop chronic diseases that may be triggered by early exposure.<sup>73, 74</sup>

It is important to take the Precautionary Principle into account when considering the potential impact of increased exposure to air pollution on child health.

#### **4.1 TRAFFIC-RELATED POLLUTION AND PROXIMITY TO BUSY ROADS**

Put simply, vehicle emissions originate on roads. It is reasonable to assume that individuals who spend large amounts of time in close proximity to busy roads will have greater exposure to traffic-caused air pollution and therefore greater health risk from this exposure than others. This assumption is supported by a significant body of evidence, although conclusions have not been reached on exactly what constitutes safe distance. This is partly because, for particulate matter at least, there is not a threshold concentration below which adverse health effects are not expected.<sup>4</sup> It is also due to the fact that pollutant concentrations are a function of traffic volumes, which vary between studies. A WHO review of the health effects of transport-related air pollution concluded that:

*“Most primary pollutants typically show steep gradients with distance from roads. In general, the highest exposures are found within the first 50-100m from roadways, and exposures often fall to background levels by 300m or more (p.94)”<sup>4</sup>*

Zhou and Levy quantitatively synthesized findings from peer-reviewed literature and government reports to examine distance from source at which health impacts would occur for various pollutants, termed ‘spatial extent’.<sup>76</sup> These distances were influenced by several factors, including individual pollutant characteristics, background concentrations and local meteorology. As expected, spatial extent of impact for vehicle emissions was found to vary according to pollutant type, with distances of 100-400m for elemental carbon or particulate matter, 200-500m for NO<sub>2</sub> and 100-300m for ultrafine particles. The authors concluded that spatial extent was generally within a few hundred metres of major roads.

Multiple studies have examined the health effects of childhood exposure to air pollution at various distances from major roads.<sup>11-13, 16, 18, 19, 21, 23, 25, 33, 34, 36, 41, 50, 77, 78</sup> These studies have generally shown significant associations between children spending large amounts of time near major roads and adverse health effects such as asthma exacerbation and reduced lung function. Recent work undertaken in Auckland indicates that PM<sub>10</sub> levels at early childhood centres located beside busy roads may be significantly elevated in comparison to centres located away from heavy traffic.<sup>79, 80</sup> Studies looking at the relationship between proximity to major roads and child health have used a range of different distances to assign children to exposure categories, based on knowledge of pollutant dispersion. Distances generally ranged from 50m to 300m from major roads. Evidence of adverse health effects is strongest for the largest and busiest roads, which may carry vehicles over 100,000 vehicles per day. However, there is also evidence of adverse health effects

from pollution exposure near roads carrying upwards 25,000 vehicles per day or more.<sup>81, 82</sup>

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