

Before the Board of Inquiry
Waterview Connection Project

in the matter of: the Resource Management Act 1991

and

in the matter of: a Board of Inquiry appointed under s 149J of the Resource Management Act 1991 to decide notices of requirement and resource consent applications by the NZ Transport Agency for the Waterview Connection Project

Statement of Evidence of Dr David Black (Public Health) on behalf of the
NZ Transport Agency

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INDEX

INTRODUCTION 2

SCOPE OF EVIDENCE 3

EXECUTIVE SUMMARY 4

BACKGROUND AND ROLE..... 6

OVERVIEW OF HEALTH RELATED ISSUES..... 6

COMMENTS ON SUBMISSIONS..... 12

STATEMENT OF EVIDENCE OF DR DAVID BLACK ON BEHALF OF THE NZ TRANSPORT AGENCY

INTRODUCTION

- 1 My full name is Dr David Russell Black.
- 2 I am a medical specialist qualified in Environmental and Occupational Medicine. I am a vocationally registered specialist recognised by the New Zealand Medical Council. My medical degree is from the University of Auckland in 1981 (MBChB). I have Fellowship of the Faculty of Occupational and Environmental Medicine of the Royal Australasian College of Physicians, admitted in 1995 by examination. In 2010 I was awarded the higher medical degree of Doctor of Medicine (MD) by the University of Auckland on the basis of academic work in Environmental Medicine. I am an active Member of the Royal Society of New Zealand (MRSNZ). I am currently practising Environmental Medicine based at Auckland Medical Specialists in Gillies Avenue, Auckland.
- 3 I have been working as an academic at the University of Auckland since 1990. I currently hold the position of Honorary Senior Lecturer in Environmental Medicine at the School of Population Health of the Faculty of Medical and Health Sciences at the University of Auckland. Previously I have held the position of Senior Lecturer in Occupational Medicine in Auckland and have been responsible for postgraduate teaching in this area.
- 4 Prior to this, I was an academic at the University of Otago from 1986. Between 1989 and 1997, I was later employed by Air New Zealand Limited, firstly as their Regional Medical Officer (Northern) and finally as Chief Medical Officer. In this role I had constant involvement in Environmental Health matters during my 8 years work with the company. Since that time, my main academic interests have been in environmental medicine.
- 5 I remain an active, fully registered specialist medical practitioner in good standing with the New Zealand Medical Council and am recognised by both my colleagues and the Environment Courts of New Zealand and Australia as an expert in Occupational and Environmental Medicine. I have experience with standards setting with the World Health Organisation (WHO), Standards New Zealand (SNZ) and Standards Australia (SA), as well as other international organisations such as the Institute of Electrical and Electronic Engineers (IEEE) and the Australasian Radiation Protection and Nuclear Safety Agency (ARPANSA) in environmental exposure standards. I am a named contributor in a number of environmental exposure standards published by these organisations and which are widely relied on.

- 6 I have extensive experience extending over two decades of assessment and assistance with public concern particularly regarding actual or perceived physical hazards in areas including radio transmitters and mobile phones, electricity transmission lines and substations, wind turbines, airport noise and community noise. I have given expert evidence to the Environment Court in all of these areas. In all these matters my approach is that of an evidence based environmental physician taking note of both New Zealand statutory requirements and evolving research and in particular publications of the World Health Organisation. Whilst I have at times undertaken and published research I do not regard myself as a researcher, but as a practitioner of Environmental and Public Health Medicine. In this regard I hold the highest medical qualifications of my University (MD) and of my College (FAFOEM of the RACP).
- 7 My evidence is given in support of notices of requirement and applications for resource consents lodged with the Environmental Protection Authority (*EPA*) by the NZTA on 20 August 2010 in relation to the Waterview Connection Project (*Project*). The Project comprises works previously investigated and developed as two separate projects, being:
- 7.1 The SH16 Causeway Project; and
- 7.2 The SH20 Waterview Connection Project.
- 8 I was already familiar with the area that the Project covers, and with the State highway and roading network in the vicinity of the Project. However, after receiving instructions in this matter, I have re-familiarised myself in some detail with the locality.
- 9 I have read the Code of Conduct for Expert Witnesses as contained in the Environment Court Consolidated Practice Note (2006), and agree to comply with it. This evidence is within my area of expertise, except where I state that I am relying on facts or information provided by others. In preparing my evidence I have not omitted to consider any material facts known to me that might alter or detract from the opinions that I express.

SCOPE OF EVIDENCE

- 10 My evidence will deal with the following:
- 10.1 Executive summary;
- 10.2 Background and role;
- 10.3 Overview of health related issues; and
- 10.4 Comments on submissions.

EXECUTIVE SUMMARY

- 11 I have familiarised myself with all aspects covered in the application and evidence of others for this Project. I have identified areas which could impact on public health or the health of residents in the area traversed by the new road, and have investigated these in more detail, having regard to the expert evidence provided by others, to which I refer where appropriate.

Air Quality Effects

- 12 During the construction phase there will be nuisance dust and some machine exhaust, not present in the current environment. However, this can be appropriately mitigated and in my opinion, adequate procedures are in place to ensure this is achieved.
- 13 Regarding air quality during the operational phase, I have reviewed the evidence of Mr Fisher and I have considered the changes to the local traffic environment which will result in traffic traversing the route between Onehunga and the North-Western motorway via the Waterview Connection, instead of using suburban streets. In my opinion, the net effect of this change is likely to have, if anything, a positive benefit to public health.

Soil and Water Quality Effects

- 14 I have considered whether there are any potential adverse health effects from soil and water contamination. The risk of this would be greatest during the construction phase and it has been adequately assessed and any adverse effects will be mitigated. Satisfactory arrangements have been made for stormwater disposal during the operational phase and so none of these matters raise any issues of concern with regard to public health.

Auditory Effects

- 15 There will be noise during the construction phase, much of it not significantly different to operational noise, some of which exists now. This matter has been considered in detail by Ms Wilkening, and detailed proposals for mitigation are outlined.
- 16 During the operational phase, noise levels will be acceptable and I note that this is the first major application of the new 2010 New Zealand noise standard¹. Ms Wilkening has proposed strategies and mitigation measures to implement this Standard, using an approach of Best Practicable Options (BPO). In my opinion this approach is entirely acceptable and will minimise any risk of adverse health effects arising from noise. To the extent that there are any persistent amenity effects from noise which could arguably translate

¹ New Zealand Standard NZS6806:2010 "Acoustics – Road traffic noise - New and Altered Roads".

into a health effect, further mitigation measures are available and have been suggested.

- 17 In my opinion, the approach taken as outlined in Ms Wilkening's evidence does represent best practice and is entirely acceptable. Further, I note that the relevant New Zealand standards for construction noise² and road noise³ which are relied on are the only relevant standards documents in this area, (particularly the latter which is very up-to-date), and do in themselves provide an assurance of best practice.

Vibration Effects

- 18 Vibration effects will occur mostly during construction and to a lesser extent during operation. However, none of these are of sufficient magnitude to conceivably cause any adverse health effects.

Lighting Effects (Sleep Disturbance)

- 19 Lighting effects during construction and arising from the operation of the new highway could potentially cause sleep disruption, however these are easily mitigated and cannot be regarded as a potential concern with regard to public health.

Mental Health and Perception of Risk

- 20 Misconceptions and misunderstandings of risk are often a major cause of distress in any large construction project and the psychological mechanisms by which these occur is well understood and best mitigated by provision of full and complete information, investigation of special cases and careful communication of accurate and understandable information. Considerable efforts have already been made by the NZTA in this regard. These initiatives should continue throughout the Project.

Submissions

- 21 I have read all of the submissions provided to me and find that most of these are genuine concerns, reasonably raised. However, in the majority of cases, the concerns raised are already dealt with in the design and I have answered these in my evidence.
- 22 In special cases, where further medical investigation is required, I have undertaken to remain involved as a Specialist Medical Practitioner. In all such cases I am aware of, I have made contact and established an ongoing professional relationship with the relevant submitters.

² New Zealand Standard NZS 6803:1999 "Acoustics-Construction Noise".

³ New Zealand Standard NZS 6806:2010 "Acoustics – Road traffic noise - New and Altered Roads".

- 23 I have paid careful attention to the submission from the Auckland Regional Public Health Service (*ARPHS*), since the service is important in public health care in Auckland. However I consider that the ARPHS submission does not take adequate account of the extent to which professional assessment has already been undertaken with regard to this Project, the construction of which has been for some time the matter of established Auckland transport policy.

Summary

- 24 In summary, the potential for adverse public health impacts from this Project exist, but I cannot find any matters which have not been adequately identified and for which suitable mitigation has not been proposed. In my opinion, the net effect on public health of the Project in the operational phase is likely to be positive for both the local and the wider Auckland community.

BACKGROUND AND ROLE

- 25 I have been retained by the NZTA specifically to address the potential public health effects of the Project, given my experience in environmental medicine in which my approach is governed by my training and background as a medical specialist.
- 26 I have read the application documents lodged by the NZTA with the EPA, paying particular attention to the assessments of and potential for air quality effects, soil and water quality effects, lighting effects, auditory effects and non-audible vibration, including infrasound.
- 27 I have also read submissions lodged on the Project which raise issues relevant to my areas of expertise (and these are addressed later in my evidence).

OVERVIEW OF HEALTH RELATED ISSUES

- 28 This section of my evidence outlines and addresses issues relating to the Project that are potentially relevant to public health considerations, namely:
- 28.1 Air quality effects;
 - 28.2 Soil and water quality effects;
 - 28.3 Noise effects;
 - 28.4 Vibration effects;
 - 28.5 Lighting effects (sleep disruption); and
 - 28.6 Mental health and perception of risk.

29 Each of these issues has been separately investigated for the Project and reported on in the Assessment of Environmental Effects (AEE). I have read these reports as well as the expert evidence of Mr Gavin Fisher (air quality effects), Mr Terry Widdowson (land and groundwater contamination), Ms Ann Williams (groundwater effects), Ms Siiri Wilkening (Noise), and Mr Peter Millar (vibration). I have then assessed the potential health effects based on the conclusions of these investigations as well as my own knowledge in these fields.

Air quality effects

- 30 As outlined later in my evidence, a number of submitters have raised the issue of air quality which is a reasonable concern and a matter which has already been identified and dealt with in some detail in the evidence of Mr Gavin Fisher. There are two main sources of air contamination from this Project; firstly during the construction phase and secondly, during the operation of the motorway and the tunnel.
- 31 There will be dust and some potential discharge of contaminants during the construction phase. However, this is not significantly different to any other project of a similar magnitude and in my opinion the implementation of the NZTA's mitigation proposals for air contamination during construction will eliminate any significant or even detectable effect on the health of adjacent communities.
- 32 With regard to air contamination from operation of the highway and tunnel, the issues are substantially different. Air contamination from roads arises principally from the exhausted products of combustion of hydrocarbon fuels, as well as a significant and often detectable level of unburned volatile fuels, some of which arise from evaporative loss from fuel tanks. Both of these are matters of legitimate health concern and have been subject to substantial research.
- 33 Motor vehicle emissions contribute substantially to air pollution. Products of combustion can be harmful to health and probably contribute substantially to respiratory disease in Auckland. In my opinion motor vehicle emissions in New Zealand are a likely cause of some premature mortality each year in New Zealand.
- 34 As a result of this Project, some harmful products of combustion will be generated both on the highway and in the tunnel. However, their presence in the community is an inevitable consequence of motor vehicle running.
- 35 In addition to this, the harmful products of combustion are greater when efficient combustion is interrupted as a result of engines operating at variable speeds and stopping and starting; as is the case when driving in suburban areas. The most efficient combustion

in most internal combustion engines occurs during sustained cruising with the engine running; as is generally the case when travelling on a motorway.

36 On this basis, from an equivalent distance travelled perspective, motorway running is far preferable to suburban running from a health perspective. Therefore, the diversion of traffic to motorways from suburban streets will have a positive environmental and health effect.

37 Regarding the air quality effects of the tunnel, I refer to the evidence of Mr Fisher. His evidence includes predictive modelling of the discharge plumes from the ventilation stacks and the tunnel portals. Based on this modelling, it can be concluded that nowhere in the surrounding community will the levels of exhaust gases or their constituents exceed the safe limits or standards which are widely accepted as providing protection from health effects. The same cannot be said of many city roads, where a "canyoning" effect can, and does in Auckland not infrequently, produce unacceptable levels of exposure and as I have said probably causes disease and possibly pre-mature deaths.

Soil and water quality effects

38 During the construction phase of the Project, there will be human activity and earthmoving in areas previously undisturbed. This does have the potential to cause transient changes in water quality, which will need to be controlled. There is also the potential for spread of soil-borne contaminants through water or dust.

39 I note that issues relating to water and soil quality have been addressed by the NZTA through the establishment of a proposed Construction Environmental Management Plan (*CEMP*). The *CEMP* details programmes for monitoring water effects and provides measures to mitigate potential effects. It will also include a Contaminated Soil Management Plan (*CSMP*) to mitigate the risks of exposure to contaminants for workers during construction. The *CEMP* is described in more detail in the evidence of Mr Terry Widdowson.

40 It is my opinion that the recommendations and proposed conditions contained in the evidence of Mr Widdowson will protect against effects of water and soil contamination from a public health perspective. Once construction is complete and the motorway operational, there should not be any significant further impact on water or soil quality.

Auditory effects

41 Some health authorities (including the WHO) have become interested in the effects of noise on health and wellbeing. In that regard, the WHO has published two relevant documents: the 1999

“Guidelines for Community Noise”⁴; and the 2009 “Night Noise Guidelines for Europe”⁵. In producing these guidelines, the WHO used an evidence-based scientific approach to assess the health impacts of community noise. Guidelines were then set for noise levels based on the lowest levels of noise which would have a critical effect on health for the general population. These aim to prevent of both social impacts (such as disrupted communication) and health impacts (such as sleep disturbance) for all members of normal society, including more vulnerable groups such as children and the elderly.

- 42 As their name indicates, these WHO documents are guidelines, and are intended to direct relevant authorities, such as Standards New Zealand, when making their own Standards. The WHO guidelines were never intended as standards themselves and are not suitable for this. In fact, some of the thresholds and criteria in WHO guidelines are often aspirational rather than realistic. Furthermore, they have to be able to be used by a wide variety of communities with differing wealth, resources and infrastructure.
- 43 Having said that, the 1999 report has become a very important baseline reference for many subsequent standards. The 2009 European report was produced with the particular issues of densely populated European countries in mind, a feature of which tends to be buildings with relatively high insulation properties. However, while it is specifically intended for a European audience, it none-the-less serves as a recent update from the 1991 Guidelines for Community Noise and is valuable in that context.
- 44 Local standards such as those issued by Standards New Zealand take account of the WHO’s work and apply it in the context of local conditions. In any environment, a current local standard should always be preferable over a guideline and that is the case for this Project. Therefore, above all, I recommend compliance with the relevant New Zealand Standards, as has been proposed.

Construction Noise

- 45 Construction noise from the Project is governed by the *New Zealand Standard NZS 6803:1999 “Acoustics-Construction Noise”*. The issue of noise during construction has been addressed in the evidence by Ms Siiri Wilkening.
- 46 Ms Wilkening’s calculations show that noise from construction will be within the levels allowed by NZS 6803:1999; that is, a night-time internal noise limit of 45 dB L_{Aeq} in residential dwellings with low

⁴ World Health Organisation, *Guidelines for Community Noise*, B. Berglund, T. Lindvall, and D.H. Schwela, Editors. 1999.

⁵ World Health Organisation, *Night Noise Guidelines for Europe*, C. Hurtley, Editor, 2009.

ambient noise (Sectors 8 and 9) and a "background noise level (L_{95} or L_{90}) plus 10 decibels" limit (which in this case gives a proposed limit of 60 dB L_{Aeq}) in areas with high ambient noise (Sectors 1 to 7).

- 47 I believe that compliance with this will eliminate any risks associated with the effects of construction noise on wellbeing, including potential sleep disturbance. Levels such as this might potentially have a minor amenity effect for a few people, but should not be of wider concern for public health.

Operational Noise

- 48 Operational noise from the Project is governed by the *New Zealand Standard NZS 6806:2010 "Acoustics – Road traffic noise - New and Altered Roads"*. The issue of noise during operation of the motorway has also been addressed in the evidence by Ms Wilkening.

- 49 During operation of the highway and tunnel, there will be some noise from traffic. However, this will be similar to levels experienced near other highways in Auckland and of an acceptable level with regard to public health. Modern vehicles and contemporary road surfaces have reduced road noise substantially, although traffic intensity has to some extent negated the net benefit of that.

- 50 Road noise is an issue which has been traversed in some detail by WHO in their Guidelines for Community Noise and in the Night Noise Guidelines for Europe. This has flowed into many standards throughout the world and the general principles of this guideline have been adopted and accepted in New Zealand. This matter is discussed in more detail in the evidence of Ms Wilkening. Ms Wilkening's calculations show that with appropriate mitigation, the level of noise from operation will generally be within the criteria specified in NZS 6806:2010; that is 64 dB $L_{Aeq(24h)}$ and 67 dB $L_{Aeq(24h)}$ for outside noise (primary and secondary) and 40 dB $L_{Aeq(24h)}$ for internal noise. I note that Ms Wilkening has proposed using an approach of Best Practicable Options (BPO) to mitigate operational noise effects. I agree with this and in my opinion this approach is entirely acceptable to at least minimise and probably eliminate any risk of adverse health effects arising from noise.

- 51 I do not consider the effects of noise from operation after the Project is completed are generally an issue for public health provided the Standard is complied with and appropriate mitigation has been attended to.

- 52 I note that in the case of Sector 9, following the opening of the motorway the noise levels in the environment will rise considerably compared to the current levels. This will significantly change the character of the neighbourhood, from relatively quiet to acceptably noisy. Nevertheless, the levels will be within the limits of the

relevant Standard and, in my opinion, within a region that most people can adapt to without adverse effects. The noise will be at a level that is often found and readily accommodated near to arterial roads in New Zealand.

Vibration Effects

- 53 Vibration can occur through air conduction at frequencies below those normally heard by the human ear, sometimes called infrasound or by conduction through the ground. Vibration can be annoying and therefore have a negative aspect on amenity but does not have a direct health effect until it reaches very high levels. There will be vibration associated with the Project, particularly when hard ground is encountered during construction, which is likely in the volcanic environment to be traversed. However the amplitude of such vibration will be such that although it may be sensed or felt by residents, it will not be harmful. It will also be transient.
- 54 Once the highway and tunnel is operating, noise energy from traffic will include a subsonic element. However, this will be of a similar magnitude to low frequency audible sound and will be of a level which is already acceptable adjacent to other roads in the area.

Lighting Effects (Sleep Disruption)

- 55 There may be changes in sources of artificial light as a result of both the construction phase and the operation of the Project. These however, are not an inevitable cause of sleep disruption. Light travels in straight paths – it is generally easily screened and therefore there is no need to regard such an effect as more than a minor nuisance which is easily mitigated.

Mental Health and Perception of Risk

- 56 Whenever a new activity as significant as a roading project occurs in the community, many people become concerned over the potential risk of the activity. This subtle perception of risk depends on a number of factors;
- 56.1 The perceived magnitude of the risk;
- 56.2 Who is taking the risk; and
- 56.3 Who benefits from the activity.
- 57 Many activities also have the potential to create “outrage” which has been described in the literature as the “outrage factor”⁶.

⁶ Sandman, Peter M. (1993). *Responding to community outrage: strategies for effective risk communication*. American Industrial Hygiene Association. ISBN 093262751X.

- 58 On some occasions, people can become highly sensitised to an activity. These individuals can become distressed following a cue to an activity (such as noise or vibration or visual cue) which triggers their awareness of the new activity and leads to escalating concern about harm. Anxiety builds and a cue to the presence of an activity becomes sufficient to trigger anxiety and distress. Physiological reactions in response to anxiety can then occur, such as release of catecholamine hormones and subsequent elevated heart rate. A cascade of other symptoms of anxiety may then ensue.
- 59 Such a condition can be regarded as an effect, and can verge on a diagnosable phobia in psychiatric terms. Essentially, the main determinant of such an effect is a person's attitude to an activity. Whether or not the activity disturbs them comes down to how they perceive it in their overall environment. Such conditions can arise where there are misconceptions about effects of an activity and are much better to avoid than end up having to treat. Misconceptions can be avoided or remedied in the context of this Project by provision of full and complete information, investigation of special cases and careful communication of accurate and understandable information.
- 60 Regarding this Project, the perception of risk could be heightened by something the public are not accustomed to such as the ventilation stacks. It is, therefore, important for the community at large to recognise that there are negligible health risks from the Project. In particular, there will be no added risk to respiratory health from the Project, compared with any risk normally accepted from living in Auckland City. Once the community is assured of this and once the tunnel and motorway are operational, with the benefits of the Project becoming tangible, public concern over health issues from the highway is likely to disappear.
- 61 Regarding the ventilation stacks, in this Project, they are of the least concern to the environment and health. I also note that there will be no noticeable cues such as visible smoke, to trigger anxiety.

COMMENTS ON SUBMISSIONS

- 62 I have read submissions lodged on the Project that raise public health concerns relevant to my areas of expertise. In this section of my evidence I will address these submissions. Where multiple submissions raise the same issue, I have grouped my response by issue, rather than individual submission.

Tunnel Ventilation Stacks

- 63 Several submissions raised concern over the health impacts from the ventilation stacks.⁷ Some of these were particularly concerned

⁷ See, for example, the submissions of Paul and Kathryn Davie (Submitter No. 127), Rory and Heather Docherty (Submitter No. 127), Antony Palm and

over the fact that the output from the stacks will not be filtered. For example, the submission from Mr. and Mrs. Atherton states: "*an unfiltered stack will mean increased traffic fumes dispersed over the suburb adversely impacting the health of residents, and especially young children and the elderly*".⁸ Irene Marsters' submission states [regarding "*untreated*" stacks] "*these will blow onto all the surrounding area and will have adverse effects on people with breathing difficulties and lung problems*".⁹ While I understand that those are genuine concerns, this will not happen; on the contrary the stacks are designed to avoid these effects (as explained in Mr Fisher's evidence).

- 64 There are no filters proposed for the exhaust system or the stacks; as explained in the evidence of Mr Fisher these would be both impractical and would reduce the efficiency and efficacy of the proposed ventilation system. I agree with Mr Fisher and believe that there would be no public health benefit to be derived from the installation of filters.
- 65 Usually, motor vehicle fumes disperse around the road and gradually spread laterally, with some rising with air circulation. In the tunnels, this process can, when required, be assisted by the use of the stacks with their fans, which draw air in and push it up high into the air space above the tunnel which allows for rapid dispersal and dilution. This is a better outcome than is achieved near the ground and thus, it is arguable that the air surrounding the tunnel, including the bases of the stacks, would be better than it would be if the road ran along the surface. There is therefore no case for using filters in the stacks.
- 66 Vehicles travelling through the tunnel will be driving through a flow of contaminated air but this is not necessarily more so than would often be encountered on other roads where the local air circulation is limited in heavy traffic.¹⁰

Randi Holt (Submitter No. 63), Rebecca Stichbury (Submitter No. 56), Stephen and Julia Coles (Submitter No. 57), Living Communities (Auckland) Incorporated (Submitter No. 167), Philippa Rennie and Scott Taucher (Submitter No. 97), Rachael Morris and Jason Fishwick (Submitter No. 159), Michelle and Kim Sokolich (Submitter No. 220), Louise Taylor and Winston Aldworth (Submitter No. 200), the Eden Albert Community Board (Submitter No. 129), Jerome Buckwell and Susan Wills (Submitter No. 133), and the North Western Community Association (Submitter No. 185).

⁸ Submitter No. 231.

⁹ Submitter No. 11.

¹⁰ In my opinion, the issue of filtration for vehicle exhaust emissions goes significantly beyond the effects of this Project, and would be more appropriately addressed at a national level via vehicle fleet controls, such as the use of filters in passenger motor vehicle air conditioning systems (which are currently not mandatory in New Zealand).

- 67 In relation to more general health concerns raised in submissions about the health impacts from the tunnel ventilation stacks¹¹, as I have discussed above, the stacks are not potentially harmful to health. They are potentially beneficial to ensuring clean air in the breathing space on the ground.
- 68 Some concerns regarding the ventilation stacks focused on the issue of health impacts on a nearby school and kindergarten or the health of local children.¹² Of particular concern to some submitters is the young age of the children and the potential for risk due to their age and additional vulnerability.
- 69 I understand and can appreciate that people in the community are particularly concerned about schools. However, the fact that the base of the stack is near a school or kindergarten is not cause for concern. The distribution of the air from the stacks will follow a range of predictable movement – dispersal and dilution – forming a plume which has been modelled and defined by Mr Fisher. The air on the ground is not affected by this plume and it is arguable that it will be cleaner than air which may arise from adjacent suburban roads.
- 70 Regarding the concern that children are more vulnerable members of society, I would like to assure submitters that compliance with national air quality standards (as is proposed in this case) will protect all members of society from health effects, including children. Such standards are designed to protect the entire spectrum of “normal”¹³ society, including vulnerable members such as children, pregnant women and the elderly, with wide safety margins.
- 71 The submission from the North Western Community Association (Submitter No. 185) also raises concern over the potential for emissions to “*fall out over the [Waterview] school*”. This submission goes on to raise concern over traffic emissions combining with fireplace smoke to affect air quality, stating “*the effects of air pollution on rates of respiratory illness are well known, and due to its older housing and decile 2 character, the people and children of the area will be significantly adversely affected*”.¹⁴

¹¹ See for example the submissions of Margot Phillips (Submitter No. 36) and Talilua and Sara Ualika (Submitter No. 49).

¹² See for example the submissions of Stephen and Julia Coles (Submitter No. 57), Prue Street (Submitter No. 237), Kerry Armstrong (Submitter No. 68) and Rachael Morris and Jason Fishwick (Submitter No. 159).

¹³ Hypersensitive individuals lie outside the normal bell curve of responses and as a result cannot be included in standards setting.

¹⁴ The submission of Rory and Heather Docherty (Submitter No. 191) raises the same concern.

- 72 I agree that the health status of people living in older housing and in lower decile areas is already compromised. However, as outlined in the evidence of Mr Fisher, the design and management of this Project will not add significant pollutants to the breathing space of residents in the area, and in many cases will decrease exhaust fumes from traffic by enabling more efficient transits through the area. Therefore the potential cumulative effects of exhaust emissions from the Project and fireplace smoke are not an issue.
- 73 Other submissions call for a monitoring regime for air quality and health.¹⁵ Monitoring of air quality is a reasonable request which should be given appropriate consideration and provision for this is discussed in the evidence of Mr Fisher. However, in my opinion, monitoring of the stack outflow is unlikely to produce any information useful for health protection.
- 74 Appropriate monitoring in the area following construction is supported as it is important both to know that the predictions relied on are borne out by experience and also to understand the ongoing air quality of the area. However monitoring or assessment of the overall health in these communities would not be practical, because other issues, such as the varying standards of housing and decile levels mentioned by the North Western Community Association, would be more significant health determinants and would prove a confounder for any realistically achievable studies. Furthermore, it would be difficult to know what health outcomes to look for, in that none are seriously expected. Therefore I support ongoing air quality monitoring as is proposed by Mr Fisher, but I do not support health surveillance.
- 75 The submission from Mr Clendon, Mr Hughes and Mr Hague¹⁶ calls for "*active monitoring of air pollution and noise pollution from the construction site during construction...*"
- 76 That is a matter for compliance with standard practices which are widely used in Auckland and in my opinion will be adequate for this Project.

Portal Emissions

- 77 Some submitters raise concerns over pollution in the vicinity of the tunnel portals and the health risks of air pollution. For example, the submission from the Eden Albert Community Board states that tunnel portal emissions "*could add to other forms of night-time*

¹⁵ See for example the submissions from Living Communities (Auckland) Incorporated (Submitter No. 167), Eden Albert Community Board (Submitter No. 129), David Clendon, Gareth Hughes and Kevin Hague (Submitter No. 156) and Margi Watson (Submitter No. 225).

¹⁶ Submitter No. 156.

pollution (particularly domestic heating) and therefore to the proven health risks of air pollution".¹⁷

- 78 The levels of motor vehicle exhaust emissions in the vicinity of the tunnel portals is covered by the evidence of Mr Fisher who concludes that even very close to the tunnel portals, the air quality effects are acceptable at all times under anticipated fan operating conditions. Based on this, I do not believe that there are any health concerns regarding portal emissions. I understand the concerns about mixing discharges with those from domestic heating. However, it must be remembered that the net effect of motor vehicle discharges in the area is no greater with or without the tunnel and by the time any mixed gases became positioned so that photochemical reactions could occur, they will be well dispersed. This is however, a matter which will be subject to ongoing monitoring and assessment as described in the evidence of Mr Fisher.

Air Quality, Water Quality and Noise

- 79 Various submissions raise more general concerns regarding potential health effects relating to vehicle emissions, noise and water quality.¹⁸ For example, Mr Jinhua Wu¹⁹ raises concern for the health of his family, stating that there will be "*noise and dirty air*" from the new SH20 section near his property on Hendon Avenue. The submission from the Metro Mt Albert Football Club²⁰ raises concern over the health of children and adults playing sport "*in a construction zone*". While I agree that it is important that the design and operation of the Project is managed to avoid or minimise the negative effects on people living locally, in my assessment of the application (as outlined earlier in my evidence), that has been allowed for.
- 80 In relation to concerns raised about construction dust and debris, these are always an issue that has to be managed in any construction project, many of which are ongoing in Auckland and these days are successfully managed with minimal disruption of local communities. I am confident that will be the case in this Project, as it has been on other recently completed sections of the highway.
- 81 The submission from Marianne Riley²¹ raises concern over the placement of the replacement open space on the corner of

¹⁷ See also the submission from Living Communities (Auckland) Incorporated (Submitter No. 167).

¹⁸ See for example the submissions of the Eden Albert Community Board (Submitter No. 129), Mr and Mrs Atherton (Submitter No. 231), Jerome Buckwell and Susan Wills (Submitter No. 133) and Philippa Rennie and Scott Taucher (Submitter No. 97).

¹⁹ Submitter No. 59.

²⁰ Submitter No. 249.

²¹ Submitter No. 221.

Waterbank and Herdman, particularly the northern part of the park. Ms Riley is concerned over the placement of the field, stating *"a full adult playing field should not be provided here due to the negative effects of exercising beside a motorway"*.

- 82 I understand from the air quality assessment²² that air quality in parks even close to the motorway will comply with the relevant standards and will not be significantly different to levels found around other parks throughout Auckland. Because of this, I do not believe there is any risk to the exercising public from the Project.
- 83 The submission from Robert Clyde and Katrina Reinsfield²³ raises concern for the effects of the motorway operation and construction health of their children. Their submission states: *"We have 3 young children, 2 of whom have immune deficiencies (IGA) and are susceptible [sic] to ENT infections. Our property is in close proximity to the proposed area for Ramp 4 and the concrete batching plant (Sector 5 NOR 4). Our bedrooms are situated at the front of our property facing SH16"*.
- 84 This is a special case which I have made arrangements to look at individually. This will be done on a medical in confidence basis.

Stress and Mental Health

- 85 Another issue raised by submitters relates to potential effects of the Project on stress, anxiety and mental health.²⁴ As I have said, there will be no effect on respiratory health, and once this is understood, this will not be a source of stress and anxiety. It is likely that as the Project proceeds, there will be increased community acceptance of and even satisfaction with the completed result, which will gradually alleviate concerns. I do not anticipate that the mental health of the community will be negatively affected.

Auckland Kindergarten Association, Ministry of Education, Waterview Primary School Board of Trustees

- 86 The submission from the Auckland Kindergarten Association (AKA)²⁵ raises concern over the *"potential health impacts"* to the wider Waterview community. They are concerned about *"noise, dust, vibration, safety, social and traffic disruption, and those effects on children's learning"*.

²² See evidence of Gavin Fisher and AEE report G1 *"Assessment of Air Quality Effects"*.

²³ Submitter No. 23.

²⁴ See for example the submissions of the North Western Community Association (Submitter No. 185), Rory and Heather Docherty (Submitter No. 191), Kim Ace (Submitter No. 223), Rob Black (Submitter No. 186), Robert Guttenbeil and family (Submitter No. 230), Margi Watson (Submitter No. 225), Robyn Mason (Submitter No. 203) and the Star Mills Preservation Group (Submitter No. 199).

²⁵ Submitter No. 153.

- 87 The submission from the Ministry of Education (*MoE*)²⁶ raises concern at the effects on Waterview Primary School and Kindergarten, as they are “sensitive receptors”, both in age (are young) and ethnicity (largely Pacific Island and Maori who are “*over represented for being at risk of having poor education, health...*”), The MoE argues that the Project will not “*enable social, health’ [sic], economic and cultural well being of the people of Waterview*”. It is concerned about the “*potential health impacts*” of the Project.²⁷
- 88 All three submissions raise concern over the health effects and perception of health effects of kindergarten children as a result of the ventilation stacks, tunnel, portals and flyovers.
- 89 It is my opinion, having assessed this Project carefully and in detail, that the overall effect on the community will be to divert traffic transiting through the area away from local roads where they are likely to have the worst effect and onto a highway where the transit is achieved efficiently and with least effect. It is therefore my opinion that the MoE’s broad claim that the Project will not “*enable social, health’ [sic], economic and cultural well being of the people of Waterview*” is not soundly based, and that the potential health impacts of the Project have been considered and will be mitigated.
- Auckland Regional Public Health Service**²⁸
- 90 The ARPHS states that it has concerns regarding the Waterview Connection Project and requests that “*public health issues are addressed should the EPA grant consent to the application*”. The particular matters of concern include discharge to air, land and water and noise/vibration. The ARPHS requests that the “*a Health Impact Assessment (HIA) and a Health Risk Assessment (HRA) first be undertaken to ensure public health concerns are included and addressed appropriately.*”
- Heath Impact Assessment (HIA)**
- 91 As stated above, the ARPHS has suggested that a HIA is essential. The concept of an HIA arose as an initiative of the WHO and has been formally adopted in New Zealand. The HIA is described in detail in a June 2009 guide published by the Public Health Advisory Committee (*PHAC*). The HIA is defined as a formal way to predict the potential effects of policies on health, wellbeing and equity. The PHAC intends this publication to be used by policy-makers in central and local governments.
- 92 In giving the careful consideration to the ARPHS submission, I have read the 2005 PHAC document on HIA²⁹. It seems to me that this

²⁶ Submitter No. 176.

²⁷ The School Board of Trustees’ submission is almost identical to the MoE’s.

²⁸ Submitter No. 91.

tool is more suited to the establishment and testing of policy than to the management of a project proposal such as the Waterview Connection. I have followed the procedure recommended in this document, including the use of the checklist on page 25 (Table 1) and it is my conclusion that it is not necessary to conduct an HIA. Instead, recommendations can be made on how negative health impacts can be ameliorated.

- 93 I believe that it is unlikely that an HIA would be conclusive or provide any additional information. The matters which an HIA would cover have already been covered in far more detail by the extensive work which has gone into the AEE for this proposal. Requiring a full HIA would duplicate work already done and be unnecessarily costly to the Project.

Health Risk Assessment (HRA)

- 94 The ARPHS also recommends that an HRA should be undertaken to ensure public health concerns are included and addressed appropriately. An HRA is a more generic term in which possible adverse health outcomes are identified, the likelihood of them occurring is estimated, and thus the overall individual and cumulative risks of an activity are assessed. This is useful for establishing a management plan in which such risks can be proportionally mitigated. In my opinion, this is not a relevant tool for use in the context of a RMA application and I cannot identify any authority for suggesting that it is. The suggestion of an HRA is inappropriate in the context of this application.

Noise

- 95 ARPHS go on to discuss risks to individuals and society in more detail. The WHO publication "Guidelines for Community Noise" is quoted and a phrase extracted indicating that "*low frequency noise and vibration is specifically recognised as an environmental pollutant*". In my view, the term pollutant is inappropriately used here, particularly when we are also considering effects on air. Noise and subsonic vibration are physical effects which arise from a number of natural and man-made activities which needs to be managed appropriately. I do accept that the quoted WHO document is useful and indeed has been routinely applied as a guideline in the formulation of standards in New Zealand.
- 96 The ARPHS recommends "*strict adherence to national noise limits*" as "*imperative*", without stating which limits or standards they are referring to. In my opinion, it is more helpful and, again a step on from this approach, to specify the standards which will be applied, as has been done in the detailed work undertaken by Ms Wilkening.

²⁹ Public Health Advisory Committee, *A Guide to Health Impact Assessment: A Policy Tool for New Zealand, Second Edition*, June 2005.

- 97 The submission also makes specific mention of a forensic psychiatric hospital as a nearby sensitive receptor for noise. However, as I have described earlier in this evidence, it must be remembered that the principles of public health protection require that standards are set to protect the most vulnerable members of the normalised community. Thus, these facilities do not need special treatment, nor would their absence (if they were not there) take anything away from the requirement for the NZTA to comply with the relevant standards.
- 98 The ARPHS states that “*the Waterview Connection will, however, concurrently have an adverse effect on emissions and noise*”. That is not a well based assertion, if the cumulative effect on the community of the equivalent traffic which is currently traversing the area by local roads is taken into account. The total emissions on the highway and in the tunnel will be, if anything, less and in the area of the tunnel they will be distributed in a manner which is less likely to impact on surrounding communities.
- 99 Overall, I consider that all matters raised by the ARPHS concerning potential effects on public health have been addressed. In particular, noise, vibration, discharges to water and discharges to atmosphere have been specifically covered in considerable and adequate detail by the Project team.

General Health Concerns

- 100 Some submissions raised general concerns over the health impacts of the Project without specifically identifying a particular area of concern.³⁰ Some of these submissions call for negative health effects on the community to be avoided or appropriately mitigated.³¹

³⁰ See for example the submissions of Talilua and Sara Valika (Submitter No. 49), Janna Androutsou (Submitter No. 2, Apartments Limited (Submitter No. 72), Helena Duong (Submitter No. 232), Ping Xu (Submitter No. 224), Michael Tritt (Submitter No. 216), Kim Ace (Submitter No. 223), Rob Black (Submitter No. 186), Robert Guttenbeil (Submitter No. 230), Stephen McCurdy (Submitter No. 213), Margi Watson (Submitter No. 225) and Robyn Mason (Submitter No. 203).

³¹ See for example the submissions of Rob Black (Submitter No. 186) and Robert Guttenbeil (Submitter No. 230).

- 101 In my opinion, there is already adequate mitigation with respect to these concerns. In relation to these submissions raising general health concerns, I have covered all the potential health issues in detail already in this evidence.



Dr David Black
November 2010