

Under the Resource Management Act 1991

In the matter of Notices of Requirement to enable the construction, operation  
and maintenance of the City Rail Link

Between

**Auckland Transport**

Requiring Authority

and

**Auckland Council**

Consent Authority

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**Statement of Evidence of Camilla Elizabeth Needham**

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## Qualifications and Experience

1. My full name is Camilla Elizabeth Needham.
2. I am an Associate in Environmental Engineering employed by Beca Ltd (**Beca**). I have an Honours Degree in Chemical and Process Engineering from the University of Canterbury, New Zealand and I am a Chartered Chemical Engineer. I have 15 years of experience in air quality consulting and process engineering.
3. I have specialised in the following areas of air quality assessment:
  - (a) Assessment of actual and potential effects of vehicle emissions, combustion source discharges, odour emissions and industrial air contaminants;
  - (b) ambient air quality monitoring and atmospheric dispersion modelling; and
  - (c) assessment, monitoring and mitigation options for dust discharges from construction activities.
4. I have conducted a significant number of air quality assessments for transport infrastructure projects throughout New Zealand, including projects in Auckland (such as the Waterview Connection project, SH16 Te Atatu to Hobsonville, the Victoria Park Tunnel project, and the Newmarket Viaduct expansion), Tauranga (SH2/SH29 Hairini Link), Wellington (McKays to Peka Peka Expressway, and Transmission Gully), and Christchurch (Southern Motorway). I have also reviewed air discharge consent applications to provide expert assistance in the assessment of air discharges for both Auckland and Canterbury Regional Councils.
5. I have given air quality expert evidence on behalf of the New Zealand Transport Agency at a Board of Inquiry Hearing for the McKays to Peka Peka Expressway.
6. I have investigated and assessed air quality and odour issues for a wide range of industrial and municipal activities, including particulate emissions from NZ Steel in Waiuku and Pacific Steel in South

Auckland, Ballance Agri-nutrients fertiliser manufacturing plant in Whangarei, Lion Breweries new brewery site in East Tamaki, and various wastewater treatment plants including Kawerau, Kawakawa Bay, Levin and Mangere.

7. My evidence is given in support of the Notices of Requirement (**NoR**) for the construction, maintenance and operation of the City Rail Link (the **Project**) lodged with the Auckland Council by Auckland Transport.
8. The project is a 3.4km underground passenger railway (including two tracks and three underground stations) running between Britomart station and the North Auckland Line (**NAL**) in the vicinity of the existing Mount Eden Station, and an additional 850m of modifications to the NAL and local road network.
9. I am familiar with the area that the Project covers.
10. I am the reviewer of the Air Quality Assessment<sup>1</sup>, which formed part of the Assessment of Environmental Effects (**AEE**) lodged in support of the Project. The report was written under my supervision, by my colleague Charles Kirkby at Beca.
11. I have read the Code of Conduct for Expert Witnesses as contained in the Environment Court Consolidated Practice Note (2011), and I agree to comply with it as if this Hearing was before the Environment Court. My qualifications as an expert are set out above. I confirm that the issues addressed in this brief of evidence are within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

### **Scope of Evidence**

12. My evidence will deal with the following:
  - (a) My background and role in this project;
  - (b) Description of the existing environment;

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<sup>1</sup> NoR Appendix 7 - Technical Report to support Assessment of Environmental Effects (Notice of Requirement): Air Quality Assessment. (Charles Kirkby, 2012)

- (c) Assessment of construction air quality effects of the Project;
- (d) Methods for managing effects;
- (e) Response to submissions;
- (f) Proposed conditions; and
- (g) Conclusions.

### **Summary of Evidence**

13. The principal air quality issue in relation to the construction phase of the Project is the discharge of dust. The potential issues relating to dust include visual soiling of surfaces, such as cars, window ledges, and household washing, or dust deposits on flowers and gardens. Due to the proximity of the construction activities to sensitive residential and retail activities, a high standard of control will be required through implementation of the Construction Environmental Management Plan (**CEMP**), which will include provisions related to air quality management.
14. As it is proposed that once operational the network will use electric trains, there will be no adverse effects on air quality arising from the operation of trains as part of the Project.
15. A dust monitoring programme is proposed, to assist with the management of construction discharges. Total suspended particulate (**TSP**) is the main indicator used to assess the effects of nuisance and amenity effects from dust, as well as potential impacts on sensitive ecosystems.
16. In my opinion, the potential effects from dust emissions during construction can be appropriately mitigated using the proposed management procedures.

### **Background and Role**

17. I became involved in the Project at the Final Concept Design stage, which started in early 2012.

18. In my role, I have been responsible for:
- (a) Confirming the scope of the technical assessment for air quality;
  - (b) a detailed technical review of the air quality assessment; and
  - (c) recommending consent conditions and mitigation measures.

### **Existing Environment**

19. A wide range of activities are sensitive to the effects of dust discharged from construction activities, including; some retail premises, schools and childcare facilities, short-term residential premises such as hotels and general residential activities.
20. All areas of the Project where surface works will be undertaken are in close proximity to sensitive receptors<sup>2</sup>. The existing environment of the Project is described in more detail as follows.

#### *Britomart Station to Aotea Station*

21. This area of the Project comprises medium and high rise commercial buildings (including hotels) and street level retail premises and is therefore highly sensitive to dust discharges. The area is a main transport hub for the city centre, including the Britomart Transport Centre (rail and bus stations) as well as the nearby ferry terminal.
22. The proposed location of Aotea Station, between Victoria Street and Wellesley Street, is largely an 'urban canyon', with medium to high rise buildings along both sides of Albert Street. At street level there are a range of retail activities, and several hotel frontages.

#### *Karangahape Station and Newton Station*

23. Surface works associated with the construction of the Karangahape Station and Newton Station will be limited to the construction of deep

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<sup>2</sup> A sensitive receptor is a location where the land use includes exposure to people who are sensitive to the amenity effects of dust, e.g. hospitals, schools, childcare facilities, rest homes, residential properties, as well land used for retail and some commercial land uses. (Good Practice Guide for Assessing Discharges to Air from Land Transport. Ministry for the Environment, 2008)

shafts. Therefore, the air quality effects in these locations are restricted to the immediate vicinity of those access shafts. Sensitive receptors within 100m of the construction areas currently include retail premises, hotels and residential dwellings.

#### *Newton Station to the North Auckland Line*

24. The area between New North Road, Mount Eden Road and the NAL is generally occupied by a range of commercial and light industrial buildings which are considered to be moderately sensitive to dust discharges. At present, there are a small number of residential buildings – for example, the apartment buildings on the corner of Ruru Street and Nikau Street.

#### **Meteorology**

25. The prevailing winds in the Auckland region tend to be southwesterly and northeasterly. Wind speed is one of the primary factors which influence dust generation. Analysis of wind speeds recorded at a range of Auckland sites indicates that wind speeds greater than 8m/s occur for less than 1% of the time.<sup>3</sup> However, close to ground level in built-up areas – particularly in areas such as Auckland city centre with a large number of tall buildings – local wind directions are likely to be highly influenced by the local built environment.

#### **Assessment of Environmental Effects**

##### *Operational effects*

26. The CRL will be operated by electric trains. Discharges into air from electric trains are negligible, being limited to minor discharges of ozone generated by electrical arcing.
27. I understand that there will be the occasional use of diesel hauled trains for tunnel and equipment maintenance, which are only likely to occur at night or weekends. Due to the infrequent nature of such operations

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<sup>3</sup> NoR Appendix 7 - Technical Report to support Assessment of Environmental Effects (Notice of Requirement): Air Quality Assessment. (Charles Kirkby, 2012)

and consequent discharges of contaminants into air, they will have negligible effects on air quality.

28. There may be ventilation stacks associated with the ventilation systems at the Aotea, Karangahape and Newton stations. There will be no discharges of contaminants to air from these stacks under normal operation. In an emergency such as fire, these stacks may be used to control the spread of smoke and enable passengers to escape the stations safely.

#### *Construction effects*

29. The principal air quality issue during construction is dust. This includes wind-blown dust from stockpiles, road dust due to vehicles travelling around the sites, and dust from the handling of spoil, and disturbance of dry material.
30. Dust has the potential to affect amenity (e.g. soiling of surfaces such as cars and houses) if adequate controls and mitigation measures are not adopted. There can be minor health effects such as eye irritation, when dust is airborne. Visible dust discharges from earthworks are usually larger particle sizes (greater than 20 microns) and tend to settle onto the ground or surfaces (rather than being inhaled), and therefore have minimal physical health impact.
31. There are two main areas of the Project where extensive earthworks will be undertaken: the cut and cover tunnel between Britomart and Victoria Street; and the cut and cover and surface works between the northern end of the driven tunnel and the North Auckland Line. Karangahape and Newton Stations, although requiring deep excavations, will involve relatively limited surface areas.
32. The construction methodology includes removal of overlying basalt using blasting at the southern portals in Mount Eden. Blasting may cause intermittent dust discharges, for the duration that this activity occurs.
33. The progressive construction of the cut and cover tunnel along Albert Street – constructing the tunnel roof and re-instating the road surface

as soon as is practicable – will have the added benefit of minimising the exposed surface area of any earthworks, thus reducing the potential for dust discharges to occur.

34. The main construction worksite is proposed to be located in the Newton area<sup>4</sup>, as well as a laydown area along one side of Albert St, between Custom Street and Quay St. Spoil removed from the tunnels will be handled within the Newton area construction worksite.
35. Key factors that influence the degree of any adverse effects from construction dust include:
  - (a) The extent and duration of earthworks (including excavations) at any specific site;
  - (b) the proximity of the earthworks to sensitive receptors; and
  - (c) the effectiveness of control and mitigation measures.
36. Potential air quality impacts from the construction of the Project also include potential effects of odour, construction vehicle exhaust emissions and hazardous air contaminants.
37. The assessment of air quality impacts from discharges of odour and hazardous air pollutants is based on the contaminated sites identified from field investigations, determining relevant health based criteria, determining whether these contaminants could become mobile via windblown dust and prescribing additional management controls in the event that contaminated soil is excavated during construction.
38. A number of sites have been identified as potentially contaminated, as discussed in the evidence of Mr David Dangerfield<sup>5</sup>. Where these areas are disturbed, there is the potential for minor discharges of odour and/or hazardous air pollutants.
39. The contaminants that have been identified are likely to be adsorbed onto soil particles. Therefore, methods to avoid dust nuisance will also

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<sup>4</sup> Section 4.4.3, CRL NOR Appendix 7, shows the location of the construction site in the Newton area.

<sup>5</sup> Ref. Section 6.4, CRL NoR Appendix 6 – Contaminated Land Assessment

be effective in minimising the effects of discharges of hazardous air pollutants. Based on the soil investigations carried out to date, I consider the risks of hazardous contaminants from the project site are able to be adequately mitigated.

40. Given the volumes of traffic that already use roads in the vicinity of the Project, I consider that the additional traffic generated by construction activities will not result in a measurable increase in concentrations of vehicle-related pollutants. The total number of construction truck movements which is estimated to be required for spoil removal is a maximum of 256 per day<sup>6</sup>. In comparison, approximately 3000 truck movements per day use the Grafton Gully route to access the port<sup>7</sup>. Also travel demand initiatives are proposed to reduce the number of private vehicles using the city centre, and thus reduce congestion.<sup>8</sup>

### **Methods for Managing Effects**

41. As with any construction project of this size, there may be times when there is the potential for dust impacts to occur. The CEMP will include provisions related to air quality management and will be prepared prior to construction commencing. It will identify significant dust generating activities and specify suitable control measures and key monitoring requirements. The CEMP will include procedures for:
- (a) Detailed methodologies for dust control;
  - (b) monitoring dust effects; and
  - (c) rapidly responding to dust events.
42. The CEMP will be required as a condition of consent to be prepared by contractors. A high standard of emissions control and management will be employed to adequately avoid or mitigate the effects of discharges of construction dust.

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<sup>6</sup> Ref. Section 9.4.6, CRL NoR Appendix 5 -Integrated Transport Assessment

<sup>7</sup> Ref. Section 5.8 *ibid*

<sup>8</sup> *Ibid*

43. A wide range of general dust control measures which are recommended for the CEMP are described in section 6.3 of Appendix 7 to the NoR and summarised below:

**Table 1 – Potential dust sources and controls**

Source of dust	Control
<b>Stockpiles</b>	<ul style="list-style-type: none"> <li>• Spoil storage and handling from the Tunnel Boring Machine (<b>TBM</b>) to take place within an enclosed building at the main construction site. Limit the height and slope of stockpiles to reduce wind entrainment. Stockpiles exceeding 3m in height have a higher risk of discharging dust.</li> <li>• Locate and orientate stockpiles to maximise wind sheltering as much as possible.</li> <li>• Keep active stockpiles damp at all times or cover stockpiles of fine materials.</li> <li>• Dampen inactive stockpiles if they are producing visible dust emissions. Use polymer additives to assist in forming a surface crust or cover with mulch or straw.</li> </ul>
<b>Blasting</b>	<ul style="list-style-type: none"> <li>• Topsoil and loose material covering rock shall be removed prior to blasting.</li> <li>• Check weather forecast for strong winds and rainfall to plan appropriate response.</li> </ul>
<b>Unpaved Surfaces such as Roads and Yards</b>	<ul style="list-style-type: none"> <li>• Limit the amount of exposed surfaces as much as possible.</li> <li>• Keep unpaved roads and exposed surfaces damp. Typical water requirements for most parts of New Zealand are up to 1 litre per square metre per hour.</li> <li>• Roads, access ways and parking areas that are not hard paved should be kept metalled.</li> <li>• Stabilise cleared areas not required for construction, access or for parking if liable to cause excessive dust during windy conditions. Methods may include wetting with polymer additives to facilitate crusting, metalling,</li> </ul>

Source of dust	Control
	grassing, mulching or the establishment of vegetative cover.
<b>Sealed Surfaces</b>	<ul style="list-style-type: none"> <li>• Regular removal of dust through washing or vacuum sweeping.</li> </ul>
<b>Vehicles</b>	<ul style="list-style-type: none"> <li>• Limit vehicle speeds on unsealed surfaces to 10 km/h.</li> <li>• Limit load sizes to avoid spillages.</li> <li>• Cover loads of fine materials.</li> <li>• Minimise travel distances through appropriate site layout and design.</li> <li>• Minimise mud and dust track out from unsealed areas to sealed areas by establishing stabilised entranceways at all ingress and egress points to sealed roads.</li> <li>• If necessary, provide wheel wash facilities.</li> </ul>
<b>Earthworks</b>	<ul style="list-style-type: none"> <li>• Adequate irrigation systems must be available on each site to dampen areas that are to be earthworked prior to any earthwork commencing and shall be used permanently during the construction phase.</li> <li>• Limit drop heights.</li> </ul>
<b>Shot-creting plant and Cement grout mixing</b>	<ul style="list-style-type: none"> <li>• Enclosed transport, storage and handling of cement dust.</li> <li>• Venting of air through filter units.</li> </ul>
<b>Miscellaneous</b>	<ul style="list-style-type: none"> <li>• Ensure sufficient water is available on site.</li> <li>• Take account of daily forecast wind speed, wind direction and soil conditions before commencing an operation that has a high dust potential.</li> <li>• Install windbreak fences where practicable and appropriate. Effectiveness is greatest where fencing is perpendicular to the prevailing wind direction with a porosity of about 50%.</li> <li>• Minimise the area of surfaces covered with fine materials.</li> </ul>

44. The CEMP will contain procedures for management of contaminated material should contaminated material be discovered once earthworks begins.
45. A dust monitoring programme will also be put in place, including visual observations, local meteorological monitoring and continuous particulate monitoring.<sup>9</sup>
46. In my opinion, the CEMP will provide a robust and effective mechanism to ensure that adverse air quality effects are minimised during construction so that the effects will be acceptable.

### **Response to Submissions**

47. I have read the submissions that raise air quality concerns. For some submitters the CRL is seen as having a positive effect with respect to air quality, specifically by working towards reduced carbon emissions and air pollution<sup>10</sup>, thus reducing the emissions of pollutants from motor vehicle exhausts.
48. Several submissions were concerned about dust effects during construction. One particular submission [0221] from the Bear Park Child Care facility notes the sensitivity of children to the adverse effects of dust emissions from CRL construction activities, and requests that “best practice dust control methods” are implemented. I agree that best practice dust control methods should be used at all times and particular care should be taken to protect young children from potential effects of construction dust. I consider these effects will be appropriately mitigated through the requirements of the CEMP as outlined in the proposed designation condition 26 (refer below).
49. A further submission [0112] was concerned about the effects of diesel buses using the Aotea station as a transport hub. This is not part of the scope of the CRL project and therefore I haven’t specifically assessed the impacts of diesel buses on air quality.

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<sup>9</sup> Ref. Section 6.6 of CRL NoR Appendix 7 – Air Quality Assessment.

<sup>10</sup> Submission [0210]

50. One submission [0236] is concerned about the vent stacks on the mechanical plant building emitting “*dangerous extraction gases*”. The vent stacks will be discharging air from inside the stations and will not contain any dangerous gases.
51. Two submitters [0028] and [0110] are concerned about potential odour discharges due to excavation of potentially contaminated land. Such discharges, if they were to occur, would be of short duration, and based on my experience of the excavation of contaminated land as part of the Victoria Park Tunnel Project, are unlikely to cause objectionable or offensive odour at receptors located offsite.
52. Submission [0110] is also concerned about health effects of “*hazardous discharges*” from disturbance of contaminated land. In my opinion, with appropriate dust control measures, the risk of contaminated dust particles dispersing off site at a concentration (or for a duration) that would be hazardous to human health is extremely low. Specific dust monitoring at potentially contaminated sites will be described in the CEMP to monitor the effectiveness of the dust control measures, and additional dust controls would be put in place at these locations.

### **Response to Planner’s report**

53. I have read the pre-hearing report and the air quality technical report prepared on behalf of Auckland Council. The Council has recommended that independent peer review of the CEMP be carried out. I agree with this recommendation.

### **Proposed Designation Conditions**

54. Condition 26 has been specifically proposed in relation to discharges to air of dust, odour and hazardous air pollutants, and has been accepted by the Council with minor amendments. I am satisfied with the amendments.

### **Conclusion**

55. In my opinion, the construction and operation of the proposed City Rail Link Project will only have a minor effect on both the local and regional air quality.

56. Dust will be generated during the construction phase of the Project. Methods for controlling and managing construction dust will be described in the CEMP.
  
57. I support the project on the basis that the CEMP will provide a robust and effective mechanism to ensure that adverse effects are minimised so that no serious adverse affects on local communities will eventuate.

**Camilla Elizabeth Needham**

**2 July 2013**