ENVIRONMENT COURT OF NEW ZEALAND
WELLINGTON REGISTRY

I MUA I TE KOOTI TAIAO O AOTEAROA
TE WHANGANUI-A-TARA

ENV-2023-WLG-000005

Under	the Resource Management Act 1991
In the matter of	the direct referral of applications for resource consent and notices of requirement under sections 87G and 198E of the Act for the Ōtaki to North of Levin Project
By	Waka Kotahi NZ Transport Agency

STATEMENT OF EVIDENCE OF ANDREW CURTIS ON BEHALF OF WAKA KOTAHI NZ TRANSPORT AGENCY

AIR QUALITY

Dated: 4 July 2023

BUDDLE FINDLAY

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INTRODUCTION

1. My full name is **Andrew Ferguson Curtis**.

2. I am a Technical Director at Pattle Delamore Partners Limited.

3. I prepared[1] Technical Assessment C: Air Quality (**Technical Assessment C**) as part of Volume IV of the Assessment of Environmental Effects (**AEE**), which accompanied the application for resource consents and notices of requirement for designations (**NoRs**) lodged with Manawatū-Whanganui Regional Council (**Horizons**), Greater Wellington Regional Council (**GWRC**), Horowhenua District Council (**HDC**) and Kāpiti Coast District Council (**KCDC**) in November 2022 in respect of the Ōtaki to north of Levin highway Project (**Ō2NL Project** or **Project**).

4. My qualifications and experience are set out in paragraph 23 of Technical Assessment C. My evidence is supplementary to Technical Assessment C.

5. In preparing Technical Assessment C and my evidence:

   (a) I have provided advice on air quality matters related to the Project to Waka Kotahi since June 2021;

   (b) I was responsible for specifying the installation of air quality and meteorological monitoring equipment; and

   (c) I participated in a number of public meetings where I presented information on the potential air quality effects associated with construction and operation of Ō2NL.

6. Since the consent applications and NoRs were lodged I have reviewed the air quality related portions of the submissions that have been made.

Code of conduct

7. I confirm that I have read the Code of Conduct for expert witnesses contained in section 9 of the Environment Court Practice Note 2023. This evidence has been prepared in compliance with that Code. In particular, unless I state otherwise, this evidence is within my area of expertise, and I

[1] I have been assisted by Tara Hutchins (an Air Quality Scientist at PDP), responsible for undertaking the dispersion modelling and assisted with drafting of the report; Jonathan Harland (an Air Quality Service Leader at PDP), responsible for the ambient monitoring of air pollutants and review of the dispersion modelling; and Jeff Bluett (a Technical Director at PDP), the primary peer reviewer of the work undertaken.

have not omitted to consider material facts known to me that might alter or detract from the opinions I express.

Purpose and scope of the evidence

8. Technical Assessment C assesses the actual and potential environmental effects of the Ō2NL Project on air quality.

9. My evidence does not repeat in detail the matters discussed in Technical Assessment C. Rather, in this evidence I:

   (a) present the key findings of Technical Assessment C in an executive summary, updated to factor in the additional work carried out since lodgement;

   (b) comment on issues raised in submissions received in respect of the Project; and

   (c) comment on the section 87F/198D reports prepared by Horizons, GWRC, HDC and KCDC (**council reports**).

EXECUTIVE SUMMARY

10. Technical Assessment C assesses the potential effects of discharges to air associated with the construction and operation of the Ō2NL Project.

11. The assessment was undertaken using best practice methods, best available data, and adopting the recommendations of the relevant good practice guides. For these reasons, the results and conclusions presented in the report can confidently be used to assess the potential air quality impacts of the Ō2NL Project.

Construction effects of the Ō2NL Project

12. The primary potential air discharge from the construction of the Ō2NL Project will be dust, which has the potential to cause diminished amenity values. I undertook a qualitative assessment to determine the potential for the properties within 200 metres of the proposed designations to be affected by dust.[2] It is generally accepted that beyond 200m the potential for dust effects is very low and does not require further consideration. This is because for the majority of time any dust that might be generated will settle within that

[2] The number of properties is based on existing properties and new building platforms, identified in Technical Assessment B.

distance and therefore have little potential to cause any effects. Overall, within 50m of the designation boundary, the potential sensitivity of the area to dust effects on people and property is high, due to the short distances between the construction footprint and a relatively large number of potentially sensitive receptors.

13. In Technical Assessment C I identified approximately 130 properties within 50m of the proposed designation boundary, and that the unmitigated dust effects at these properties could result in nuisance effects that have the potential to be considered offensive or objectionable. Since completing Technical Assessment C I have undertaken additional work to characterise the potential number of properties within 50m of the designation and this number has increased to 216 (but my conclusions remain the same).

14. The assumed 50m buffer is conservative, as it does not take into account the distance between construction works and the designation boundary.

15. The final location of earthworks will determine what properties are within 50m of earthworks. Presently, approximately 70 properties within 50m of the proposed designation are also within 50m of the Ō2NL Project concept design (those properties are identified in **Appendix A**). If the Ō2NL Project concept design was constructed without change those properties would be close to construction activities. The best-practice mitigation measures detailed in the proposed consent conditions and the Construction Air Quality Management Plan (**CAQMP**), which is required to be prepared as per the proposed conditions, will reduce dust nuisance effects at those properties. Despite these mitigation measures, in my opinion it is likely that the residual dust effects within 50m of specific construction works and activities may be such that residents are likely to notice increased dust levels and potentially be annoyed on occasions (such that additional investigations, monitoring and mitigation may be required).

16. For the 270 properties (approximately) located more than 50m (but less than 200m) from the designation boundary, the unmitigated dust nuisance effects are unlikely to result in adverse dust effects that could be considered offensive or objectionable. Regardless of this, dust emissions will be mitigated through the consent conditions which, while focused on properties within 50m of earthworks, will benefit all properties beyond that distance. In my opinion the conditions requiring mitigation measures and a comprehensive CAQMP, which contains all appropriate mitigation measures,

will ensure that residents at these distances are unlikely to notice any changes in dust levels.

17. Overall, based on my experience, the number of properties that could be affected by nuisance dust is not unusually large for a construction project of this scale.

18. The overall mitigated construction dust effects of the Ō2NL Project on ecological areas are "low" to "very low" based on the information provided in Table J.3 in Technical Assessment J: Terrestrial Ecology.

19. There will also be minor emissions (exhaust fumes) from construction vehicles. The potential air quality effects from these emissions are negligible due to the relatively small number of vehicles that will be operating during the construction period.

Measures to mitigate construction effects from the Ō2NL Project

20. Mitigation measures have been recommended to reduce the potential for construction dust emissions, given the high-risk rating[3] for air quality effects on residential properties. These measures are required through the CAQMP (Schedule 2 to the conditions) and include (but are not limited to):

    (a) speed restrictions on construction vehicles operating on unsealed surfaces near sensitive receptors to minimise the potential for dust generation;[4]

    (b) ensuring appropriate mitigation measures are in place to minimise dust effects in areas where construction activities are occurring such as:

        (i) the use of water tankers to dampen surfaces that have the potential to create dust; and

        (ii) finished cut batters being vegetated or covered with hydroseed or mulch as soon as practicable;

    (c) having a community engagement and liaison person (Condition DCE1) which can receive and manage complaints (through the CAQMP (Condition RAQ3)); and

[3] Based on the Institute of Air Quality Management Criteria in the Assessment of Effects section of Technical Assessment C.
[4] Dust generation on unsealed roads is directly proportional to vehicle speed, with greater levels of dust generated at higher speeds. Other mitigation measures such as watering or the type of running surface will influence how much dust is actually generated.

(d) undertaking specific investigations, monitoring and mitigation for high-risk properties (if access is allowed) when specified construction works are within 50m of these properties (Conditions RAQ1A and RAQ1B). The proposed mitigation measures for ecological areas (as described in Technical Assessment J (Terrestrial Ecology)) and set out in Condition RAQ1 are:

(i) monitoring the settlement of construction dust on indigenous vegetation within identified locations that will be retained; and

(ii) where necessary, washing dust foliage within those locations.

Operational Effects of the Ō2NL Project

21. As explained in Technical Assessment C, the operational assessment was undertaken using the methodology[5] set out in Waka Kotahi guidance[6] and included a Stage 2 assessment using the Waka Kotahi Air Quality Screening Model (**AQSM**) and a Stage 3 assessment using the CALPUFF atmospheric dispersion model.

Stage 2 Assessment

22. The **AQSM** was used to assess the potential operational air quality effects for the southern portion of the proposed designations from Taylors Road to Ohau. The AQSM was developed specifically for Waka Kotahi to conservatively assess effects of vehicle emissions in New Zealand, and was validated against New Zealand monitoring data.

23. This screening model has been used to predict annual nitrogen dioxide (**NO_2**) concentrations and 24-hour particulate matter less than 10 microns (**µm**) in size (**PM_{10}**) concentrations from vehicle emissions for the opening year (2029) with and without the Ō2NL Project.

24. The screening model results show that sensitive receptors alongside the existing State Highway 1 (**SH1**) will see an improvement, or at worst no change, in air quality once the Ō2NL Project is operational. The receptors located near the proposed alignment will see either no change or a small decrease in air quality with the Project, with all predicted concentrations being below the relevant National Environmental Standards for Air Quality (**NES AQ**) set out in Table C.7 of Technical Assessment C, which are

[5] See paragraphs 33 to 37 of Technical Assessment C.
[6] Accessible at https://www.nzta.govt.nz/assets/Highways-Information-Portal/Technical-disciplines/Air-quality/Air-pollution/NZTA-Air-quality-assessment-guide-Oct-2019.pdf

intended to be protective of health for the most vulnerable members of the population.

Stage 3 Assessments

25. A detailed Stage 3 assessment using the CALPUFF dispersion model was undertaken for Ō2NL between Ohau and North of Levin. CALPUFF is the most widely used dispersion model in New Zealand, primarily because of its ability to model complex terrain. It has been widely used for assessing the effects of road emissions in New Zealand including for the Peka Peka to Ōtaki project.

26. This assessment has predicted ambient concentrations of NO_2, PM_{10}, and particulate matter less than 2.5µm in size (**$PM_{2.5}$**) (including background) from vehicle emissions using the Ō2NL highway and existing state highway network for the opening year (2029) and the design year (2039) with and without the Ō2NL Project. The assessment results indicate low concentrations of pollutants for all scenarios with no exceedances of the relevant ambient air quality standards and guidelines.

27. NO_2 and $PM_{2.5}$ concentrations decreased for all averaging periods in 2039 when compared to 2029 for both scenarios; while PM_{10} concentrations (all averaging periods) increased in 2039 when compared to 2029 (both scenarios). However, the predicted increases are very small and not considered significant, and all concentrations are below the relevant air quality standards and guidelines.

28. All modelled scenarios result in a reduction in concentrations for the 'With Project' scenario when compared to the 'Without Project / Do Minimum' for the corresponding year. The reduction in concentrations reflect the decrease in vehicle numbers through Levin town centre, the predicted changes in vehicle emission technologies and a move away from fossil fuelled vehicles over time.

29. The small, predicted increase in 24-hour PM_{10} concentrations for the With Project scenario in 2039 compared to 2029 in the Levin town centre can be attributed to the increase in vehicle numbers outweighing the benefits of enhanced vehicle emission technologies.

30. The Shared Use Path (**SUP**) is, at its closest, generally located within 10–40m of the Ō2NL highway but does veer much further away in the southern-most 3–4km of the Project, where it is located on the old section

of SH1. Users along the SUP are closer to the Ō2NL highway when compared to sensitive receptors and therefore will experience higher concentrations compared to residences, albeit for much shorter periods of time. However, these concentrations are still predicted to be below relevant air quality assessment criteria and are highly unlikely to result in any adverse health effects.

31. Overall, the Ō2NL Project will improve air quality within the Ō2NL Project area because of improved traffic flows, which corresponds to reduced traffic emissions, and which is shown in both the Stage 2 and Stage 3 assessment results.

Measures to mitigate operational effects of the Ō2NL Project

32. For both years assessed, with the Ō2NL Project constructed, it is predicted that minor increases in concentrations of NO_2, PM_{10}, and $PM_{2.5}$ will generally occur in areas located within 200m of the proposed carriageway. Regardless of the scale of any increase, predicted concentrations will remain well below relevant air quality assessment criteria and therefore the implementation of any operational mitigation measures is not required.

ADDITIONAL ASSESSMENT OF DUST RISK

33. Since I completed Technical Assessment C, I have undertaken further work following matters raised in the submissions and Council technical reports, to better understand the number of dwellings that are within 50m of the designation and have the potential to be affected by construction dust. In doing this I have identified that in total there are 216 properties that have a property boundary within 50m of the designation. This increase in numbers is primarily because some properties previously thought to be a single title, had multiple titles.

34. My initial assessment simply looked at the distance between the properties and the designation boundary. Given the number of properties within 50m of the designation, I undertook a risk assessment to determine which of these properties within 50m of the concept design are at high risk of potentially experiencing dust nuisance. I have included details of my assessment together with a series of figures identifying the specific locations of the properties in **Appendix A**.

35. In brief, my analysis was based on the dust risk index methodology described in Appendix B of the Waka Kotahi guidance document.[7] My analysis considered the following factors:

    (a) Surface Exposure: The area of ground disturbance[8] within a 200m radius of the parcel boundary.

    (b) Distance: The distance from the residence to the Ō2NL concept design.

    (c) Construction: The significance of any construction[9] within 200m of the parcel boundary. This was predominantly the creation of stormwater ponds and/or roundabouts.

    (d) Earthworks: The amount of cut/fill being undertaken[10] within 200m of the parcel boundary.

    (e) Wind: The frequency of wind directions which would result in residences being downwind of the construction activity.

36. Using these criteria, each property was given a score between 0 and 300. Any location with no construction works nearby or where the distance to the residence was more than 200m, or where there was no residence was given a score of zero.

37. The properties were then broken down into low risk (0 – 100 points), moderate risk (100 – 200 points) and high risk (200 – 300 points).

38. This resulted in 50 low; 96 moderate; and 70 high risk properties. The properties and their respective rating are shown in **Appendix A**. I recommend that at the time of detailed design the list is refined so that only those properties with dwellings within 50m of land disturbance, earthworks or haul roads that are being used by construction heavy vehicles are investigated.

39. On this basis I have recommended that after detailed design Waka Kotahi:

    (a) Identify, using the same methodology as used in my evidence to create **Appendix A** (and set out in CAQMP), high-risk properties out of all properties located within 50m of specified construction works (being

[7] Accessible at https://www.nzta.govt.nz/assets/Highways-Information-Portal/Technical-disciplines/Air-quality/Air-pollution/NZTA-Air-quality-assessment-guide-Oct-2019.pdf
[8] Based on the concept design in the Application.
[9] Accessible at https://www.nzta.govt.nz/assets/Highways-Information-Portal/Technical-disciplines/Air-quality/Air-pollution/NZTA-Air-quality-assessment-guide-Oct-2019.pdf
[10] Above n 9.

when any land disturbance, earthworks or haul roads that are being used by construction heavy vehicles) and activities under Condition RAQ1A.

(b) Undertake dust monitoring in accordance with Condition RAQ1B.

(c) Undertake (if access is granted) a baseline investigation and record of sensitive buildings, activities and/or residents on the part of high-risk properties within 50m of specified construction works and activities and identify specific mitigation measures (if any) that may be required within that area through the CAQMP (Condition RAQ1A).

(d) Thereafter, while specified construction works and activities are occurring within 50m of an identified high-risk property, undertake monthly visual inspections of dust on those parts of a property within 50m of the of specified construction works and activities, if access is granted (Condition RAQ1A) and,

(e) If the monthly visual inspections in (d) identify nuisance dust effects which a suitably qualified person considers need to be mitigated Waka Kotahi will ensure that appropriate additional mitigation as set out in the CAQMP is implemented (Condition RAQ1A) and discussed directly with the landowner.

40. I do not consider that those properties that are identified as being at moderate or low risk need individual assessments and/or monitoring, and consider that if the mitigation measures outlined in the CAQMP are appropriate implemented there is little potential for these properties to experience effects.

COMMENTS ON SUBMISSIONS

41. I have undertaken a review of the submissions that have identified air quality related issues. I have identified common themes in the issues or concerns raised which are:

(a) Potential effects from construction related dust;

(b) Potential effects from concrete dust;

(c) Potential effects on roof collected drinking water;

(d) Potential need for house washdown;

(e) Potential effects of emissions from vehicles once Ō2NL is operational;

(f) General concerns about vehicle emissions; and

(g) Concern about effects on a chicken farm.

Construction Air Quality Management Plan

42. Having reviewed the submissions, I consider that it would be helpful to further explain the purpose and role of the CAQMP.

43. As with all large construction projects, the Ō2NL Project proposes to develop management plans to manage effects in accordance with conditions. For dust management this document will be the CAQMP, and it is intended to be a single point of reference for all construction matters relating to dust (and air quality more broadly) control.

44. The purpose of the CAQMP is to set out the methods and procedures to achieve the standards required by Condition RAQ1, and to avoid, remedy or mitigate potential adverse effects of the discharge of odour and/or dust to air because of construction activities.

45. At a high level the CAQMP covers the matters identified in Technical Assessment C,[11] Waka Kotahi guidance[12] and Ministry for the Environment Guidance[13] by identifying:

(a) the sources of dust, odour and emissions that might result in effects;

(b) the locations where people or the environment might be affected by construction effects;

(c) the mitigation measures, both proactive and reactive, which will be implemented to avoid or minimise potential effects, along with any contingency measures if effects are occurring or equipment breaks down;

(d) the contact person responsible for ensuring that mitigation is implemented; and

[11] Paragraphs 274 to 288 in Technical Report C.
[12] Accessible at https://www.nzta.govt.nz/assets/Highways-Information-Portal/Technical-disciplines/Air-quality/Air-pollution/NZTA-Air-quality-assessment-guide-Oct-2019.pdf
[13] Ministry for the Environment, *Good Practice Guide for Assessing and Managing Dust*, November 2016.

(e) what monitoring will be undertaken to determine whether mitigation is being effective, and how this monitoring will be used to ensure effective mitigation is occurring.

46. CAQMPs are typically prepared by members of the project team once the exact construction methodology and sequencing is known, in conjunction with someone who is experienced in preparing such documents (typically referred to as a “suitable qualified person" or "**SQP**”). While the SQP may be part of the project team they could be employed by a third party. Regardless of who they work for, the SQP must be appropriately experienced to undertake this type of work.

47. Waka Kotahi has also proposed a consent condition (Condition RAQ4), which requires the Regional Councils to certify that the CAQMP meets the condition requirements.

48. The proposed process is used across all similar projects in New Zealand and is well tested. I consider that this is a robust process that will ensure that the mitigation measures and the processes in the CAQMP are appropriate to minimise, as far as practical, potential for dust nuisance effects.

49. In this case, while Waka Kotahi has developed a concept design for Ō2NL, the detailed design and construction methodology will be developed by the contractors who are engaged to construct the project. Part of the contractor’s responsibility will be the development of a CAQMP which will be consistent with requirements of the resource consents and Schedule 2 of the conditions, which identifies what must be included in the CAQMP.

50. The other important aspect of a CAQMP, or in fact any management plan, is that they are intended to be living documents, that is, they are reviewed and changed as required during the project to ensure that the procedures and processes are being effective at controlling effects. This requirement is also set out in Schedule 2 of the conditions.

51. I have been involved in a number of projects where CAQMPs[14] have been developed, and my experience is that when appropriately implemented they provide an effective mechanism to control dust and minimise dust nuisance effects. A good example was the plan developed for the development of the Arras Tunnel / National War Memorial in Wellington where the work was

[14] Or other plans with different names but intended to serve the same purpose.

undertaken immediately adjacent to Mt Cook School as well as several residences.

Potential Effects on Roof Collected Water

52. Several submitters[15] raised concerns about the potential for effects on their roof collected drinking water supply.

53. As I have stated in paragraph 12 above, I consider that it is extremely unlikely that any property more than 200m from construction activities will experience any dust effects, including impacts on roof collected drinking water systems.

54. As the distance between a property and the construction works reduces, the potential that some dust may land on the roof increases, with the greatest risk being for those properties within 50m. However, using mitigation measures such as those I have set out in paragraphs 276 to 288 in Technical Assessment C, which will be included in the CAQMP (as required in Schedule 2 to the conditions), any dust that is carried beyond the designation should not result in nuisance effects.

55. Nevertheless, there will be some residual dust, and whether this reaches a residence will depend on the extent and type of work that is carried out nearby, and whether the wind is simultaneously blowing towards that property.

56. If construction related dust from the Ō2NL Project were to land on a roof it would need to remain there until the next rainfall event occurred to potentially enter a roof collected drinking water system. If there were strong winds in the intervening period, then the construction dust is likely to blow away.

57. There is a requirement in the Building Code[16] that water supplies must be protected from contamination. In terms of the requirements for roof collected drinking water systems, there are several guidance documents including that developed by the Ministry of Health (**MoH**)[17] which states the following:

    (a) Use roofing materials that are safe for rainwater collection.

    (b) Use safe roof paint.

[15] H Naylor, A&J McMallum, S&M Main, M Vause, D&A Bramwell, A Jones, R&M Apatu, J Jakeman, and K Daly.
[16] Building Regulations 1992, schedule 1 clause G12.3.2(a).
[17] Ministry of Health, Water collection tanks and safe household water, revised January 2022.

(c) Use plastic pipes and gutter approved for rainwater collection.

(d) Install leaf guards on gutters and leaf screens on downpipes.

(e) Install a first flush diverter to prevent the first 20–25 litres of water, which has the potential to be the most contaminated, from entering the storage tank.

(f) Install the inlet pipe to the tank so that the roof water enters near the bottom of the tank through a 'U' bend in the pipe to avoid disturbing sediment in the bottom of the tank.

(g) Fit a floating outlet pipe to extract water from near the top of the tank.

(h) Ensuring that there are no overhanging branches. This minimises the risk of leaves and bird droppings getting into harvested rainwater.

58. The MoH also has developed a Water Safety Plan Guide[18] for roof water sources which contains very similar guidance.

59. If the requirements or guidance has been followed when designing and installing roof water collection systems on properties near to the Ō2NL Project, particularly for newer properties, there should be negligible effects from any residual dust that might land on roof.

60. Even if a property does not have any of the systems outlined in paragraph 57, the risk of material build-up in water tanks is very small. I have included in **Appendix B** some extremely conservative calculations on the potential for material to build up in water collection tanks.

61. Based on those calculations, and assuming that a property receives a significant quantity of dust on its roof every day for a year and all of that dust ends up in the water tanks, then for most[19] properties this would equate to less than 1 millimetre of sediment build-up in the tanks per year.

62. This level of sediment build-up would make no measurable difference to the water quality to residents.

63. It is also important to note that any dust that might land on roofs will essentially be the same as the dust generated by farming and horticultural activities that currently occur along the Ō2NL Project alignment.

[18] Ministry of Health, Water Safety Plan Guide Roof Water Sources Version 1, Ref S1.2, January 2014.
[19] The exception would be for properties that have very small tanks.

64. Consequently, I consider that there is no justification, on an effects basis, for Waka Kotahi to upgrade roof collected drinking water systems for properties located along the Project alignment.

65. I accept that for those high-risk properties identified, as set out in paragraph 34 above, it is appropriate for Waka Kotahi to investigate potential risks and then monitor potential dust effects (including on water supply) during specified works (Conditions RAQ1A and RAQ1B). If issues are identified, potential mitigation options can be worked out through the CAQMP and directly with the landowner.

General Effects from Construction Dust

66. A number of submitters[20] raise general concerns about the potential for dust from construction activities to result in some form of effect on their properties, ranging from reduced ability to open windows to soiling. The need for house cleaning is discussed in paragraphs 82 to 85 below. This section deals with more general effects.

67. As I have already stated in paragraph 15 above, a CAQMP will be developed to achieve compliance with the conditions and which will set out how construction activities will be monitored and managed or mitigated to avoid, remedy or mitigate potential adverse dust effects from the construction of the Ō2NL Project.

68. Regardless of the use of the dust management measures set out in the CAQMP, for those properties that are more than 200m from any construction related works, the potential for any dust nuisance effects is extremely low.

69. This is also generally true for properties that are less than 200m from the construction related work, except that as the distance reduces the mitigation measures set out in the CAQMP become more important in minimising the potential for dust nuisance.

70. For those properties that are extremely close to the construction works (less than 50m), wind direction becomes less important, and even with mitigation in place there is the potential that some increase in dust effects will be experienced, but not at a level that results in nuisance. However, as I have discussed in paragraph 33 to 40 above, some properties within 50m of the

[20] B Summers, S Henry, W McAlister-Miles, G Williams, A&J McCallum, C Wallis, G Anderson, S&M Main, M Storey, M Vause, D&A Bramwell, A Jones, J Jakeman, and K Daly.

designation have a very low risk of experiencing dust primarily because there are no significant construction activities occurring near them.

71. As mentioned above, specific investigations and monitoring will occur for dwellings within 50m of specified construction works (as set out in Conditions RAQ1A and RAQ1B).

72. The assessment of what additional mitigation measures may be required will be made by a suitably qualified person following processes set out in the CAQMP.

73. **KiwiRail** mentions a concern in its submission that "*Excessive dust could impact on visibility for trains moving along the North Island Main Trunk*". I have not undertaken a specific assessment of the potential impacts on the North Island Main Trunk, but consider that if the mitigation measures I have recommended are implemented, then there is very little potential for dust concentrations to be generated that would cause a visibility issue. I am unaware of this being an issue during the construction of the PP2Ō and M2PP state highway projects to the south of the Project area.

74. **Kāinga Ora** owns 96/98 Arapaepae Road which is a secured facility and home to offenders with high needs. While its submission mentions dust associated with construction works, it does not seek any condition in relation to dust management. While it is located upwind of the predominant wind direction, careful dust management and mitigation will need to occur near to this site. However:

    (a) The site is likely to be a high-risk property if specified construction works are ultimately located within 50m. That will provide a level of additional inspection, monitoring and mitigation as set out above; and

    (b) The site will be specifically listed within the CAQMP (Schedule 2 of the conditions), as requiring Waka Kotahi to undertake consultation with Kāinga Ora when preparing dust management measures for construction activities that have the potential to generate dust within 100m of this property.

Potential Effects from Concrete Dust

75. One Submitter (**Dakin & Ally Bramwell**) raised a specific concern about the potential effect of concrete dust and, in particular, the corrosivity of that material. While the submitter is located sufficiently far away from the Ō2NL

Project (450m) that it is extremely unlikely that they would experience any dust related effects associated with construction, it is helpful to comment on the potential for dust of this sort to be generated.

76. At this stage while the exact construction methodology is not available, Waka Kotahi has not included consideration of concrete batching plants, precast concrete yards or pugmills as part of this application. Therefore, if they are required, Waka Kotahi will apply for appropriate consents at that time. This process would include consideration of all appropriate mitigation measures to minimise effects.

77. Having said that, my experience from consenting and assessing the potential for dust discharges from several modern concrete batching plants, is that there is little potential for cement dust where cement is delivered in tankers and pumped into silos fitted with bag filters to control dust.

78. Similarly, there is a low potential for concrete dust from precast yards, with modern practice being to use dust extraction on any finishing works (grinding, cutting or drilling) that may be required on cast products.

79. Consequently, it is extremely unlikely that there will be any concrete dust generated, except where it is necessary to drill or cut into concrete. Any dust from this would be inconsequential and extremely unlikely to result in any form of effects.

80. While I have not seen any plans to do so, there is also the potential that in some locations cement or lime might need to be used to stabilise or dry earthworks materials within the alignment. However, if it is required for the Ō2NL Project it will be carried out in a way that minimises potential for dust generation with appropriate mitigation incorporated into the CAQMP to ensure that this is the case.

81. Consequently, with the required mitigation in place, I do not consider that there is potential for nuisance dust effects from this activity.

Potential Need for House Cleaning

82. Four submissions[21] consider that there is a need for houses to be regularly washed down or cleaned to remove dust build-up associated with the construction of Ō2NL Project.

[21] S&M Main, A Jones, J Jakeman and K Daly.

83. As I have already stated, I do not consider that there is any need to provide a house cleaning service for properties that are more than 200m from the Ō2NL Project alignment, as they are extremely unlikely to experience a measurable increase in dust from construction activities over and above that which naturally occurs.

84. There is potential for some of the high-risk properties that will be identified through Condition RAQ1A to experience a more noticeable increase in ambient dust in stronger wind conditions when construction works are close and there is a failure in mitigation. Consequently, there may be occasions when it is appropriate for those properties to be cleaned. The procedures to undertake any cleaning in these circumstances will be contained in the CAQMP.

85. There is one property owned by the **Prouse Trust Partnership**[22] for which Mr Bowman has recommended periodic investigation for external house cleaning due to its historic / heritage values. As this property is more than 100m from the Ō2NL designation and surrounded by mature trees; from an air quality perspective, I do not consider that an investigation for external house cleaning would normally be required, nor is cleaning likely to be required following investigation. However, the CAQMP (in Schedule 2 of the conditions) is required to include methods to monitor and contingency measures to respond to effects (if any) of dust deposition at the Prouse homestead.

Potential effects of vehicle emissions from vehicles once Ō2NL is operational

86. There are several submissions[23] which raise a concern about the effects of vehicle related emissions once Ō2NL Project is operational. This matter is covered in detail in Technical Assessment C,[24] and summarised in paragraphs 21 to 31 above. Briefly, there will be small increases in ambient concentrations of vehicle related air pollutants in locations which are near to the Ō2NL alignment which will reduce with distance so that by about 200m, concentrations are back at background levels.

87. Any increases are small and will not result in any exceedance of the NES AQ, and therefore are unlikely to result in any adverse health effects.

[22] 1024 Queen Street East.
[23] B Summers, S Henry, C Wallis, G Anderson, and A Jones.
[24] Paragraphs 217 to 273.

88. The Prouse Trust Partnership raised concerns about effects from traffic movements on an overbridge near its property. I did not assess changes in elevation in my assessment as there is little variation across Ō2NL Project and I considered that it would make little difference in predictions.

89. However, to address this submission I have set out in **Appendix C**, a screening assessment I carried out to assess the potential impact on air quality of the Queen Street overbridge at the Prouse homestead. This screening assessment indicates that there is a localised increase in concentrations of vehicle related air pollutants near the overbridge, however the concentrations remain well below the relevant NES AQ.

Concerns about effects on free range chicken farm

90. Mr Summers (**Nestbox**) raised a concern that the Ō2NL Project will have a significant effect on his free-range chicken farm.

91. The potential effects from construction of the Ō2NL Project are covered in my response in paragraphs 12 to 19 above, and I do not consider that there are any special characteristics of the submitter's site that means that it is more sensitive to construction related dust than any other site. This is based on my opinion that with mitigation applied as proposed, dust effects during construction at this location would be no worse than experienced from dust generated at present in the vicinity of the farm.

92. In any event the measures that will be contained in the CAQMP will ensure that there is minimal potential for dust to be generated that may result in off-site effects.

93. The location[25] of the free-range egg farm is not predicted to experience a significant change in ambient air quality when Ō2NL becomes operational; with 24 hour average PM_{10} concentrations (excluding background) less than 1µg/m^3 or 2% of the guideline value, and 1 hour average NO_2 concentrations less than 16µg/m^3 (excluding background) or 8% of the guideline value. This is because while there will be a slight increase in vehicle related emissions from Ō2NL there will be a decrease from State Highway 57.

94. Therefore, the predicted concentrations at the free-range farm will remain essentially the same, and below the relevant and conservative human health-based criteria. I have not been able to identify any specific guidelines for air

[25] Identified as R26 in Technical Assessment C.

quality for chickens, but based on my previous experience, it is generally considered that if the air quality effects are considered safe for humans, it is safe for animals.

COMMENTS ON THE COUNCIL REPORTS

Section 87F and 198D Reports

95. I have read the technical reporting of Mr Peter Stacey, appended to the Section 87F and 198D reports. Mr Stacey's report provides advice to all four regulators.

96. I consider that overall Mr Stacey's report provides an appropriate review of my assessment, and he agrees with me about the following:

    (a) It is properties within 150m of the Ō2NL project that have the greatest potential to experience dust nuisance during the construction phase of Ō2NL. Those properties more than 200m from Ō2NL are at little risk of any construction related effects.

    (b) Those properties that are within 50m are at the greatest risk and are likely to "*notice increased dust levels and potentially be annoyed*".

    (c) That the emissions associated with motor vehicles once Ō2NL is operational will have an effect that is less than minor.

97. The main point of difference between Mr Stacey and myself is in relation to the effectiveness of the mitigation measures, with Mr Stacey considering that a draft CAQMP should have been provided as part of the application to allow a better understanding of the likely effectiveness of the mitigation that I have proposed and described in Technical Assessment C.

98. In addition, Mr Stacey has concerns (paragraph 57) that there is:

    "*no firm commitment from Waka Kotahi that all recommended measures will be adopted and incorporated into the CAQMP. There is also uncertainty around how and when mitigation (where offered) will be delivered though the management plans, and whether it will be sufficient to manage air quality effects."*

99. I have discussed the proposed CAQMP in some detail in my evidence above. I have also worked on amending the proposed conditions and Schedule 2. Condition RGA2 requires compliance with management plans, including the

CAQMP. I consider that with the conditions proposed and attached in Ms McLeod's evidence there is sufficient certainty that the necessary mitigation set out in my evidence (and in Technical Assessment C) will be included in the CAQMP, and will be appropriately implemented.

100. I consider that it is likely that Mr Stacey's concerns relate to potential effects on those properties within 50m of construction works and activities. I have set out in paragraph 39 above a process to appropriately identify, mitigate and monitor (if access is allowed) potential adverse dust effects on high-risk properties within 50m of specified construction works and activities.

101. If issues arise in the interim the complaints procedure in the CAQMP and Condition RCM2 applies.

102. I consider that these measures address the concerns raised by Mr Stacey in paragraphs 61 and 62 of his report.

103. In paragraph 63 of his report, Mr Stacey raises a concern about dust effects on crops that may be grown in areas adjacent to the construction area which may be sensitive or affected by dust. I addressed this in Technical Assessment C and indicated that if the mitigation measures are appropriately implemented then there is a low potential for effect, especially for any crops more than 200m from the construction works. As I indicated in Technical Assessment C, crops which might be affected by dust, which will generally be located very close to the construction works, will be identified and managed like any other sensitive receptor through the CAQMP. Crops (which may or may not be present in the future when construction occurs) cannot be identified now.

104. I agree with Mr Stacey (at paragraph 69 of his report) that where real time dust monitoring is undertaken there should be appropriate trigger values for implementing mitigation, and that appropriate Ō2NL team members should receive automated alerts to ensure that mitigation measures are implemented. This process is provided for in Condition RAQ1B and the CAQMP.

105. In paragraph 72 and 73 of his report, Mr Stacey discusses the potential for there to be contaminated material along the alignment which needs to be disturbed. Mr Stacey considers that there needs to be appropriate mitigation put in place to ensure that any disturbance does not generate dust that results in adverse effects. Mr Stacey recognises that this material will need

to be controlled via a Contaminated Soil Management Plan (**CSMP**), which would contain appropriate mitigation measures, but suggests that the CAQMP also include mitigation.

106. While I agree with Mr Stacey that there needs to be appropriate mitigation, I do not support duplication of material in different documents, because it has the potential to lead to confusion as to which document has precedence. As addressed in the evidence of **Ms Kathryn Halder**, Waka Kotahi has yet to seek consents in relation to contaminated soils, and their management will be addressed through those consents.

107. In paragraphs 74 to 81 of hos report, Mr Stacey describes his reasons for Waka Kotahi providing a draft CAQMP. I agree with Mr Stacey that preparing a draft CAQMP is consistent with other projects (and not with some others such as RiverLink). I was responsible for preparing a draft CAQMP for the Peka Peka to Ōtaki project (immediately to the south of the Project). However, I am also aware from working as part of the construction team for Transmission Gully that presenting a draft plan as part of a consenting process can cause issues in the construction phase, particularly when the final design and construction methodology is different to that consented. In my opinion, if the conditions and Schedule 2 are clear (which they are) and cover the relevant matters (which they do), there is no need to prepare a draft CAQMP now.

108. Consequently, I consider that the approach adopted by Waka Kotahi is reasonable. In addition, I consider, as I have already discussed, that by specifically identifying in **Appendix A** those properties that have the greatest potential risk of experiencing dust nuisance effects (based on the concept design), I have dealt with the uncertainty that Mr Stacey has concerns about. As set out above Conditions RAQ1A and RAQ1B set out a process to identify high risk properties following detailed design, to apply mitigation as appropriate and to undertake monitoring.

Conditions

109. Mr Stacey has made recommendations about changes and additions to the resource consent conditions proposed by Waka Kotahi which he has set out in paragraph 84 of his report. While not all of these proposed recommendations are in the condition sets attached to the section 87F report, I consider that it is useful to discuss them in turn and where relevant

have cross referenced the appropriate condition in the conditions as attached to Ainsley McLeod's evidence.

110. Paragraph 84(a) of Mr Stacey's report: Mr Stacey recommends undertaking dust monitoring at all high-risk locations (dwellings or crops) where significant dust could be generated (Condition RAQ2). I see merit in using real time monitoring as one of the tools to minimise the potential for nuisance effects on high-risk receptors. I stated in Technical Assessment C that real time monitoring could be implemented if visual monitoring did not prove to be effective. I still consider that visual monitoring is an appropriate starting point before implementing real-time monitoring.

111. If real time monitoring is implemented, I do not consider that this needs to be at every sensitive location, and, given the number of potential high-risk receptors identified in **Appendix A,** it would be impractical. In any case it is common practice to have representative monitoring locations which are protective of groups of receptors and, in my opinion, a small number of monitors would provide information on most of the receptors. I note that this is consistent with paragraph 88 of Mr Stacey's report.

112. In any case, monitoring would only need to be undertaken if activities that might give rise to dust were occurring near the receptors. I agree with Mr Stacey (at paragraph 87 of his report) that the monitoring would only be necessary if "difficult to manage" activities (from a dust generating perspective) were occurring within 50m of a sensitive location. I have related this to the identified high-risk properties discussed above and the proposed monitoring is included in Condition RAQ1B. and included in the CAQMP which I consider appropriately address this matter.

113. Paragraph 84(b) of Mr Stacey's report: Mr Stacey recommends developing appropriate dust monitoring trigger values. I agree that this is appropriate and that these are also something that should be set out in the CAQMP. This is primarily because the types of dust monitors that would be used are most likely to be some form of nephelometer. These instruments often respond differently to dust than the reference instruments that were used to develop the trigger values set out in the MfE guidance,[26] such as the 1 hour average PM_{10} concentration of 150 micrograms per cubic metre ($\mu g/m^3$) recommended by Mr Stacey in paragraph 97 of his report.

[26] Ministry for the Environment, *Good Practice Guide for Assessing and Managing Dust*, November 2016

114. Therefore, to minimise the potential for dust nuisance effects, I consider the trigger values will need to be determined once it is known what monitoring equipment will be used and how the instruments will respond to dust at the site. Consequently, this means that the CAQMP is the appropriate place for the trigger values.

115. Notwithstanding this I have recommended that the 150µg/m^3 as a 1 hour average is included in the consent (RAQ1B) as a value for triggering contingency measures, with the expectation that the trigger values set out in the CAQMP will be lower and designed to ensure that the value in the RAQ1B is never reached.

116. Paragraph 84(c) of Mr Stacey's report: Mr Stacey recommends all properties within 200m of the Ō2NL project have their water system upgraded. As set out in my evidence above, I am unable to foresee any effects-based reason that would require an upgrade to roof collected water systems for approximately 400 houses, as has been proposed by Mr Stacey. Further, I am unaware of such an extensive and broadly approach previously being required for any project in New Zealand.

117. I have already discussed potential drinking water effects and consider that upgrading the systems for all of these properties is not necessary. However, as also already discussed, Condition RAQ1A sets out an additional inspection, mitigation and monitoring regime for high-risk properties that may have a rainwater tank drinking water system within 50m of specified construction works and activities. If effects are identified, mitigation can be implemented to reduce the effects as necessary in the specific circumstances covered by the CAQMP.

118. Paragraph 84(d) of Mr Stacey's report: Mr Stacey recommends that a procedure is developed for undertaking dust inspections with appropriate triggers for implementing remediation. I agree that is appropriate and considered that it was covered by items (e) and (g) in the CAQMP outline in Schedule 2 of the conditions.

119. Paragraphs 85 to 89 of Mr Stacey's report: Mr Stacy talks in more detail about why he considers real time monitoring is appropriate. I have already responded to this in paragraphs 110 to 115 above. But I do not consider that a separate monitoring plan is required, with any triggers for implementing real time monitoring set out in the CAQMP along with guidance on where the

monitoring should occur. This can all be appropriately accommodated within the CAQMP.

120. Paragraphs 91 to 96 of Mr Stacey's report: Mr Stacey makes recommendations on additional matters that he considers should be included in the CAQMP, and I have the following comments in relation to his recommendations.

    (a) I consider it is appropriate (paragraph 92 of Mr Stacey's report) for the CAQMP to acknowledge guidance documents that are used to in its preparation, including those I have used in my Technical Assessment. This has been done by way of additional requirements in Schedule 2 of the conditions, rather than a change to the conditions as proposed in the Officer's report.

    (b) I consider that it is reasonable to assume that the CAQMP will be prepared in general accordance with Technical Assessment C (paragraph 93 of Mr Stacey's report). But in my opinion, all the relevant matters have been included within the proposed conditions. Therefore, I cannot see any benefit from including a reference to Technical Assessment C in the conditions as it will only add potential uncertainty.

    (c) With the exceptions of (f) and (k), I am comfortable with the additional changes (paragraph 94 of Mr Stacey's report) that Mr Stacey has made to Schedule 2 of the conditions.

        (i) In terms of (f), as I have already discussed, I do not consider that an additional monitoring plan is required, and consider that it would be better rewritten as:

            Methods for undertaking real time monitoring, including procedures for identifying when and where monitoring will occur.

        (ii) In terms of (k), I have addressed this in paragraph 73 above and do not consider that there needs to be specific procedures to control dust effects for KiwiRail, and consider that the general mitigation measures will be sufficient to ensure that dust is not present at quantities that give rise to visibility effects.

121. Paragraphs 97 to 99 of Mr Stacey's report: Mr Stacey discusses additional conditions that he considers need to be included in the consent. While I have

already traversed some of these matters in my evidence, I have, for completeness, also made a brief comment on them here.

(a) As I have discussed I consider that there is no need for a monitoring plan (paragraph 99(a) of Mr Stacey's report) and that the requirements for real time monitoring, if considered necessary, can be included in Schedule 2 of the conditions (this would include when and where monitoring was undertaken and how monitoring information might be shared with the public).

(b) As I have discussed previously, I consider that Condition RAQ1 sets the standard that must be met, and ensuring that PM_{10} concentrations are less than 150µg/m^3 as a 1 hour average (paragraph 99(b) of Mr Stacey's report), is simply a way of demonstrating that the standard is met. Consequently, while I consider that 150 µg/m^3 as a 1 hour average is an appropriate guideline value when using reference monitoring methods, and have recommended that it is included in Condition RAQ1B as a maximum trigger value I am not sure that it will necessarily be appropriate for day to day monitoring used on the Project. Therefore, I recommend that the operational trigger values are defined in the CAQMP.

(c) Similarly with respect to Mr Stacey's recommendation in (paragraph 99(c) of Mr Stacey's report) for wind and visual monitoring triggers, I consider that the Condition RAQ1 sets the standard that must be met, and the matters traversed by Mr Stacey would be (and are) covered in the CAQMP.

(d) The same is also true with the matters covered by paragraphs 99(d) and (e), and I consider that there is no need for any additional condition in this regard.

122. Paragraphs 100 - 102 of Mr Stacey's report: Mr Stacey talks about roof collected water. I have addressed this extensively above and will not repeat that here.

123. Paragraphs 103 to 104 of Mr Stacey's report: Mr Stacey talks about inspecting those properties within 50m of the works to ensure that the CAQMP is being effective. I agree that this is appropriate and consider that change to Condition RAQ1A proposed by Waka Kotahi achieves the same end as that proposed by Mr Stacey.

Section 87F report of Mark St Clair

124. I have read Mr St Clair's report, and in paragraphs 51 to 58 of his report he summarises the main findings of Mr Stacey's report. I have already dealt with the matters he has summarised and therefore will not repeat that here.

125. However, there is one matter which I have not dealt with. In the Conditions Set attached as Appendix 19 to Mr St Clair's section 87F report, the following clause (c) has been added to Condition RAQ1:

> "*The consent holder must ensure that properties located within 200m of the designation boundary with roof-collected drinking water systems must be upgraded to an appropriate standard to ensure that the drinking water supply meets the Water Services (Drinking Water Standards for New Zealand) Regulations 2022."*

126. I have already discussed my concern about a blanket requirement to ensure that all roof water collection systems within 200m, and consider that my recommendation to monitor high risk properties within 50m of specified construction works and activities to be more appropriate.

127. However, I have significant concerns about the requirement to ensure that the roof water systems meet the requirements of the Water Services (Drinking Water Standards for New Zealand) Regulations 2022 (**Drinking Water Regulations**).

128. These Regulations were made under the Water Services Act 2021, and this legislation specifically states in Section 8 that:

> *In this Act, unless the context otherwise requires,* drinking water supplier—
>
> (a) *means a person who supplies drinking water through a drinking water supply; and*
>
> (e) *does not include a domestic self-supplier.*

Consequently, the Regulations do not apply to roof collected drinking water supplies for domestic residences, and I do not consider that it is appropriate for Waka Kotahi to be required to ensure that water supply at a residence does so.

129. Irrespective of this I, have read the Drinking Water Regulations and consider that it is inappropriate to require Waka Kotahi to install systems to meet them. This is because the only contaminant that Waka Kotahi will be

generating or have control over is dust, and that is not a substance that is covered by the Regulations.

130. Rather the Drinking Water Regulations focus on an extensive list of organic and inorganic compounds as well as bacteria. To demonstrate that Waka Kotahi was meeting the Drinking Water Regulations it would also need to undertake extensive water testing before the works began and then at regular intervals throughout the Project. There is also the issue that if the initial sampling showed concentrations above the maximum acceptable values, Waka Kotahi would be required to implement mitigation for an issue it was not responsible for causing.

131. Given that I do not consider there to be any effects basis for such a wide condition, I consider that any upgrade that might be required, which will depend on the monitoring I have proposed for high-risk properties, should concentrate on minimising the potential for increase particulate build up in the water tanks, which might require some form of first flush system and potentially a floating inlet in tanks. That can be addressed on a case-by-case basis through the proposed monitoring if required (which I consider to be unlikely).

Section 198D report of Helen Anderson

132. I have read the s198D Report of Helen Anderson. Ms Anderson also relies on Mr Stacey's report and provides a summary of the main findings of it in paragraphs 85 to 99 of her report.

133. I have already dealt with those matters, and Ms Anderson raises no new issues.

Andrew Curtis

4 July 2023

APPENDIX A

The Risk assessment considered the following factors for each property when determining the risk potential:

(a) Surface Exposure: The area of ground disturbance within a 200m radius of the parcel boundary. The following scores were given:

(i) **1**: Area less than one hectare.

(ii) **5**: Area more than one hectare but less than five hectares.

(iii) **10**: Area greater than five hectares.

(b) Distance: The distance from the residence to the construction work. The following scores were given:

(i) **100**: 0 – 50m

(ii) **50**: 51 – 100m

(iii) **10**: 101 – 151m

(iv) **5**: 151 – 200m

(v) **0**: More than 200m

(c) Construction: The significance of any construction within 200m of the parcel boundary. This was predominantly the creation of stormwater ponds and/or roundabouts. The following score was given:

(i) **40**: If construction was occurring

(ii) **20**: If no construction was occurring

(d) Earthworks: The amount of cut/fill being undertaken within 200m of the parcel boundary.

(i) **50**: If more than 2 m of fill and/or cut was being undertaken.

(ii) **25**: If no significant volumes of cut or fill are occurring.

(e) Wind: The frequency of wind directions which would result in residences being downwind of the construction activity.

The frequency of winds for each wind direction were given based on the Levin and Manakau windroses. For each direction that the property was

downwind from construction works the frequency was added to a total of **100** points.

Using these criteria, each parcel was given a score between 0 and 300.

For any parcel with no surface exposure and/or the distance to the residence was more than 200 m or which had no residence the remaining scores were all given zeros.

The parcels were then broken down into low risk (0 – 100 points), moderate risk (100 – 200 points) and high risk (200 – 300 points).

This resulted in 50 low; 96 moderate; and 70 high risk properties. The properties and their respective rating are shown in Figures A1 to A5 and in Table A1. The colours in the figure identify the level of risk (red is high risk and green is low risk) and the numbers are the Stantec identifiers used in the Application.

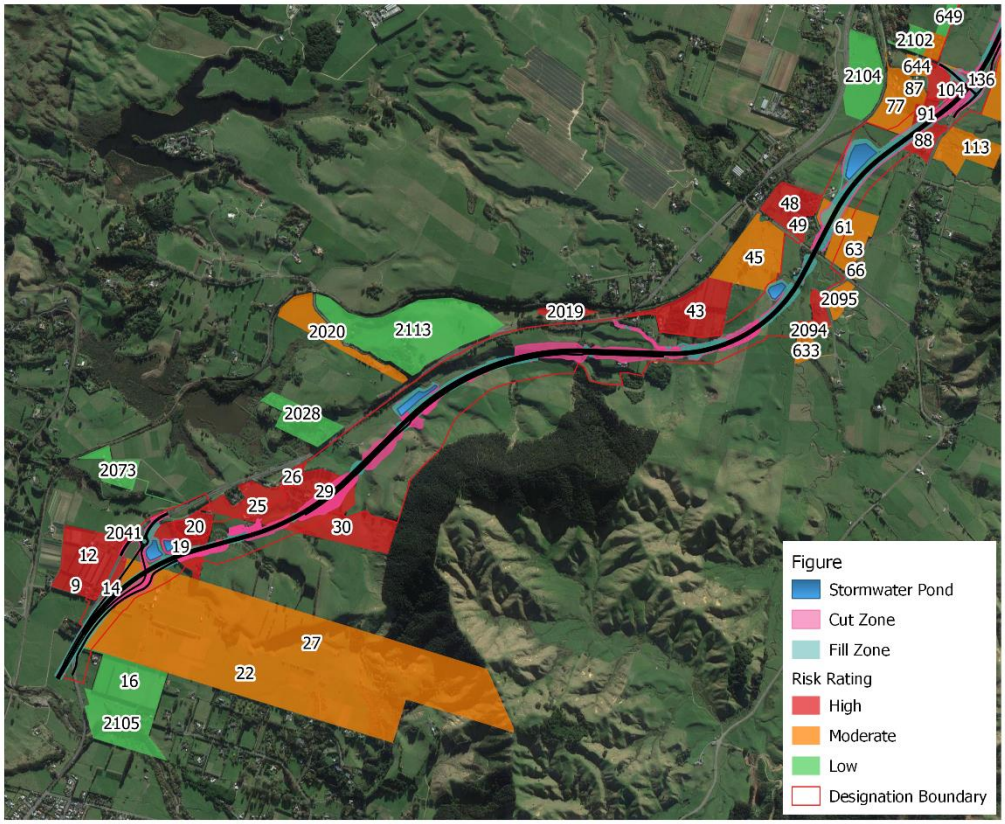

Figure A1: Section 1 Dusk Risk Analysis

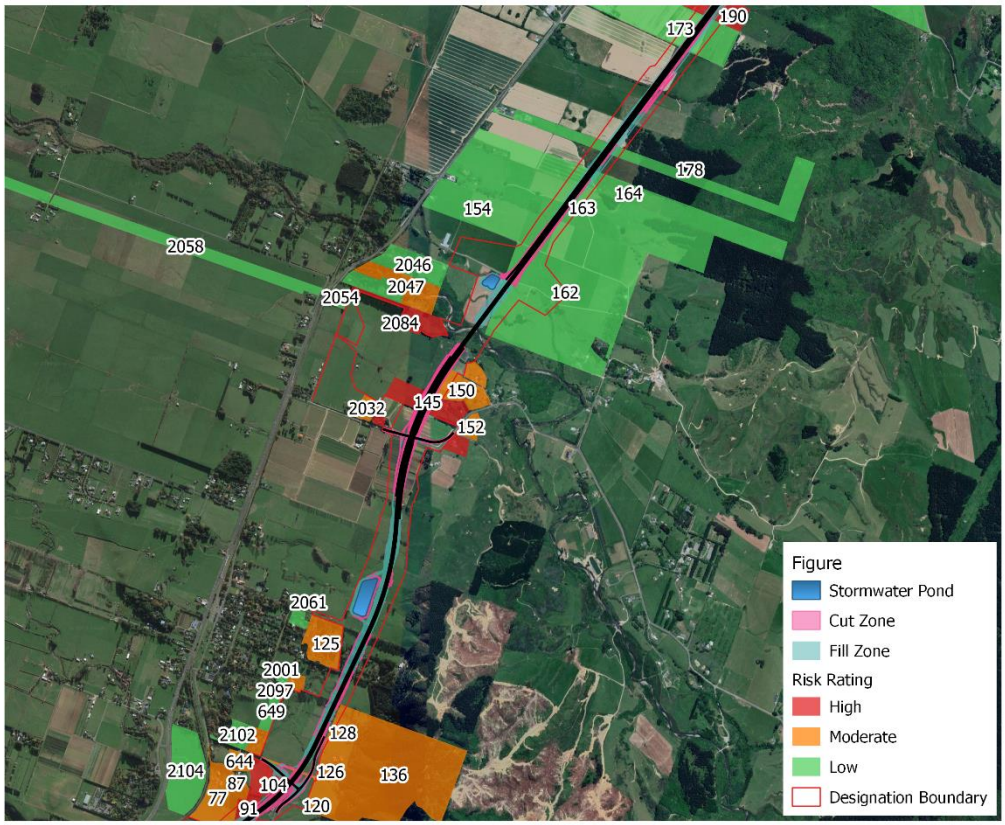

Figure A2: Section 2 Dust Risk Analysis

Figure A3: Section 3 Dust Risk Analysis

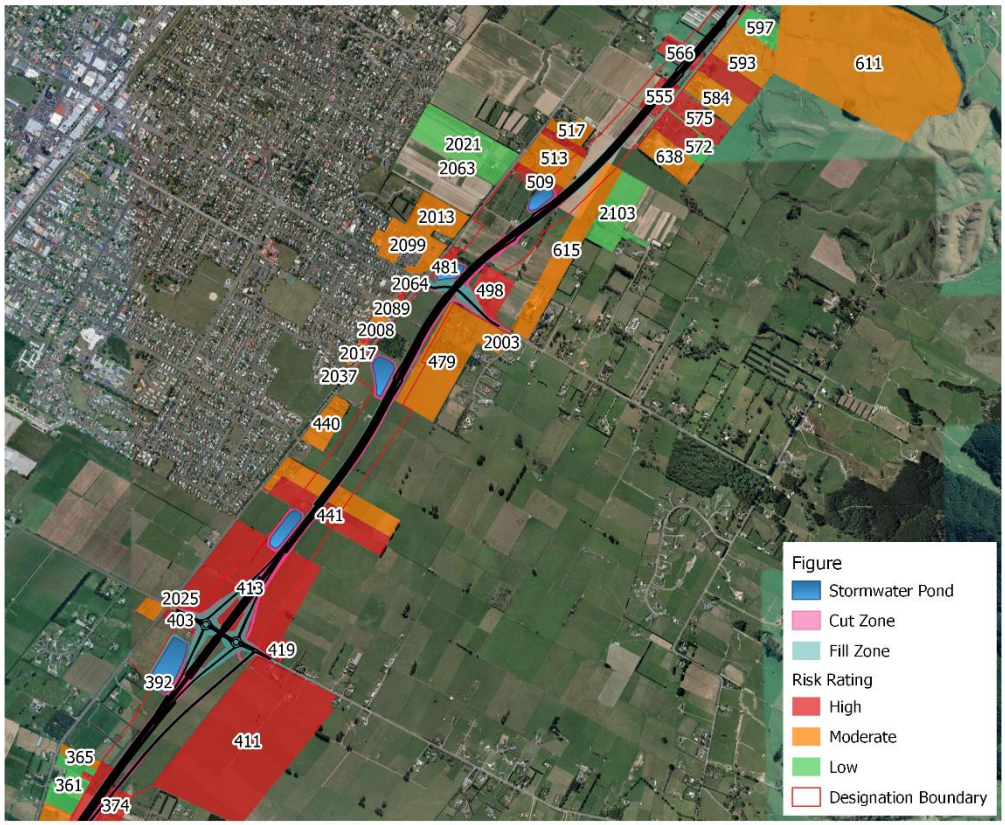

Figure A4: Section 4 Dust Risk Analysis

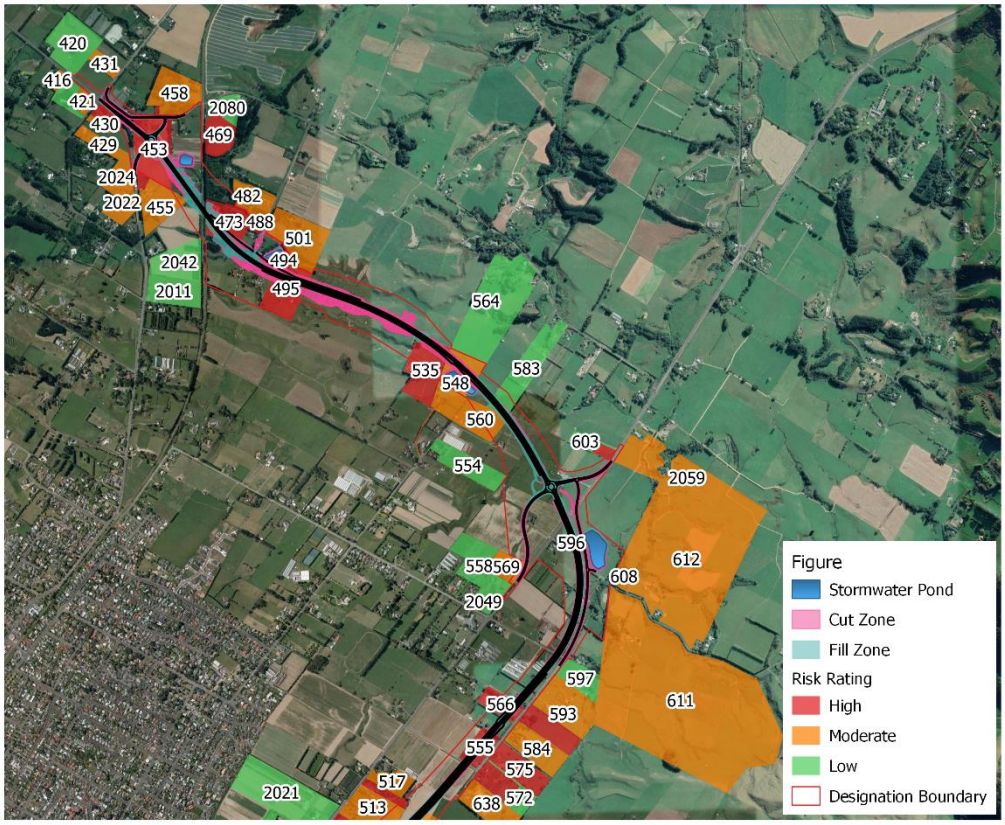

Figure A5: Section 5 Dust Risk Analysis

Table A1: Properties Identified as high risk	
Stantec Ref	**Estate Description**
9	Fee Simple, 1/1, Lot 1 Deposited Plan 27434, 20,234 m^2
12	Fee Simple, 1/1, Lot 2 Deposited Plan 60075, 65,065 m^2
20	Fee Simple, 1/1, Lot 1 Deposited Plan 57801, 21,322 m^2
26	Fee Simple, 1/1, Lot 1 Deposited Plan 73722, 8,687 m^2
30	Fee Simple, 1/1, Lot 9 Deposited Plan 87750, 86,942 m^2
43	Fee Simple, 1/1, Lot 1 Deposited Plan 50640, 84,817 m^2
48	Fee Simple, 1/1, Lot 1 Deposited Plan 369031, 42,363 m^2
49	Fee Simple, 1/1, Lot 2 Deposited Plan 369031, 9,480 m^2
54	Fee Simple, 1/1, Lot 5 Deposited Plan 394488, 3,773 m^2
88	Fee Simple, 1/1, Lot 3 Deposited Plan 349423, 24,035 m^2
98	Fee Simple, 1/1, Lot 4 Deposited Plan 408558, 13,776 m^2
145	Fee Simple, 1/1, Lot 1 Deposited Plan 50378, 44,690 m^2
149	Fee Simple, 1/1, Lot 2 Deposited Plan 435730, 9,959 m^2
182	Fee Simple, 1/1, Ohau 3A2 4B3 Block, 9,814 m^2
185	Fee Simple, 1/1, Lot 1 Deposited Plan 395949, 11,977 m^2
189	Fee Simple, 1/1, Lot 1 Deposited Plan 339388, 2,869 m^2
193	Fee Simple, 1/1, Lot 2 Deposited Plan 339388, 33,430 m^2
227	Fee Simple, 1/1, Lot 1 Deposited Plan 24322, 20,234 m^2
244	Fee Simple, 1/1, Lot 3 Deposited Plan 405024, 2,140 m^2
268	Fee Simple, 1/1, Lot 1 Deposited Plan 69565, 10,002 m^2
272	Fee Simple, 1/1, Lot 1 Deposited Plan 464458, 30,788 m^2
286	Fee Simple, 1/1, Lot 4 Deposited Plan 69565, 50,331 m^2
308	Fee Simple, 1/1, Lot 1 Deposited Plan 14604, 1,012 m^2
313	Fee Simple, 1/1, Lot 1 Deposited Plan 65350, 2,842 m^2
349	Fee Simple, 1/1, Lot 4 Deposited Plan 40890, 42,852 m^2
360	Fee Simple, 1/1, Lot 2 Deposited Plan 89825, 40,193 m^2
367	Fee Simple, 1/1, Lot 2 Deposited Plan 23429, 59,792 m^2
411	Fee Simple, 1/1, Lot 1 Deposited Plan 55498 and Part Horowhenua 3E2 6 Block, 408,406 m^2
413	Fee Simple, 1/1, Part Lot 1 Deposited Plan 4237, 288,656 m^2
419	Fee Simple, 1/1, Lot 3 Deposited Plan 65119, 6,543 m^2
428	Fee Simple, 1/1, Section 4 Survey Office Plan 436187, 5,598 m^2
454	Fee Simple, 1/1, Lot 1 Deposited Plan 18192, 1,012 m^2
469	Fee Simple, 1/1, Lot 2 Deposited Plan 342991, 28,104 m^2
481	Fee Simple, 1/1, Lot 2 Deposited Plan 422327, 9,439 m^2
486	Fee Simple, 1/1, Lot 1 Deposited Plan 13718, 2,023 m^2
488	Fee Simple, 1/1, Lot 1 Deposited Plan 69563, 2,000 m^2

Table A1: Properties Identified as high risk	
Stantec Ref	**Estate Description**
498	Fee Simple, 1/1, Lot 1 Deposited Plan 514857, 34,607 m^2
509	Fee Simple, 1/1, Lot 1 Deposited Plan 303237, 18,836 m^2
516	Fee Simple, 1/1, Part Lot 1 Deposited Plan 12297, 10,739 m^2
535	Fee Simple, 1/1, Lot 1 Deposited Plan 73153, 55,800 m^2
575	Fee Simple, 1/1, Part Lot 32 Deposited Plan 2291, 37,294 m^2
589	Fee Simple, 1/1, Lot 4 Deposited Plan 27455, 34,464 m^2
645	Fee Simple, 1/1, Lot 3 Deposited Plan 90212, 6,729 m^2
655	Fee Simple, 1/1, Lot 1 Deposited Plan 305662, 3,645 m^2
2008	Fee Simple, 1/1, Lot 54 Deposited Plan 45682, 758 m^2
2019	Fee Simple, 1/1, Part Section 29-30 Deposited Plan 415, 13,608 m^2
2025	Fee Simple, 1/1, Lot 1 Deposited Plan 15213, 1,423 m^2
2027	Fee Simple, 1/1, Lot 1 Deposited Plan 54714, 1,615 m^2
2039	Fee Simple, 1/1, Lot 61 Deposited Plan 45682, 759 m^2
2041	Fee Simple, 1/1, Lot 12 Deposited Plan 88128, 3,133 m^2
2045	Fee Simple, 1/1, Lot 4 Deposited Plan 90212, 5,500 m^2
2048	Fee Simple, 1/1, Lot 1 Deposited Plan 26381, 1,277 m^2
2052	Fee Simple, 1/1, Lot 1 Deposited Plan 76096, 3,000 m^2
2055	Fee Simple, Lot 14 DP 365181, 869 m^2
2056	Fee Simple, 1/1, Lot 3 Deposited Plan 63135, 6,000 m^2
2061	Fee Simple, 1/1, Lot 1 Deposited Plan 83058, 4,741 m^2
2064	Fee Simple, 1/1, Lot 19 Deposited Plan 51642, 886 m^2
2065	Fee Simple, 1/1, Lot 54 Deposited Plan 49423, 749 m^2
2066	Fee Simple, 1/1, Lot 58 Deposited Plan 45682, 1,095 m^2
2074	Fee Simple, 1/1, Lot 3 Deposited Plan 60075, 6,000 m^2
2084	Fee Simple, 1/1, Lot 1 Deposited Plan 362812, 34,745 m^2
2085	Fee Simple, 1/1, Lot 9 Deposited Plan 365181, 1,048 m^2
2086	Fee Simple, 1/1, Lot 10 Deposited Plan 365181, 716 m^2
2087	Fee Simple, 1/1, Lot 11 Deposited Plan 365181, 840 m^2
2088	Fee Simple, 1/1, Lot 13 Deposited Plan 365181, 928 m^2
2090	Fee Simple, 1/1, Lot 2 Deposited Plan 367566, 25,406 m^2
2092	Fee Simple, 1/1, Lot 6 Deposited Plan 394488, 3,827 m^2
2093	Fee Simple, 1/1, Lot 7 Deposited Plan 394488, 5,300 m^2
2106	Fee Simple, 1/1, Lot 2 Deposited Plan 514857, 5,086 m^2
2107	Fee Simple, 1/1, Lot 1 Deposited Plan 515048, 4,374 m^2

APPENDIX B

Table B1 and Table B2 show the amount of dust that could potentially build up on the bottom of the tank (in millimetres (**mm**)) over a 12-month period if dust was deposited at the MfE guideline value (4 grams per square metre per 30 days (g/m^2/30 days)) and conservatively double that (8 g/m^2/30 days) for comparison.

Table B1: Dust Deposition rate of 4 g/m^2/30 days for a 12-month period (mm)								
		Roof Area (m^2)						
		150	200	250	300	350	400	450
Tank Size (L)	12,200	0.6	0.9	1.1	1.3	1.5	1.7	1.9
	19,100	0.4	0.5	0.7	0.8	1.0	1.1	1.2
	27,542	0.3	0.4	0.5	0.6	0.7	0.8	0.9
	37,574	0.2	0.3	0.3	0.4	0.5	0.6	0.6
	48,963	0.2	0.2	0.3	0.3	0.4	0.4	0.5
	62,111	0.1	0.2	0.2	0.3	0.3	0.3	0.4

Table B2: Dust Deposition rate of 8 g/m^2/30 days for a 12-month period (mm)								
		Roof Area (m^2)						
		150	200	250	300	350	400	450
Tank Size (L)	12,200	1.3	1.7	2.1	2.6	3.0	3.4	3.9
	19,100	0.8	1.1	1.4	1.6	1.9	2.2	2.5
	27,542	0.6	0.8	1.0	1.1	1.3	1.5	1.7
	37,574	0.4	0.6	0.7	0.8	1.0	1.1	1.3
	48,963	0.3	0.4	0.5	0.6	0.7	0.9	1.0
	62,111	0.3	0.3	0.4	0.5	0.6	0.7	0.8

Table B1 shows that over a 12-month period depending on the size of the tank and roof area, dust build up at the bottom of the tank, could be between 0.1 mm and 1.9 mm. If the dust deposition rate doubled, Table B2, the dust levels could be between 0.3 mm and 3.9 mm.

APPENDIX C

The air quality assessment did not assess the traffic emissions on the roads to the east of State Highway 57 / the proposed Ō2NL highway as these roads have a low vehicle count and therefore the associated vehicle emissions are unlikely to result in a change in concentrations more than 200m from the roadway.

Additionally, as the emissions from the assessed roads, which have the highest vehicle traffic movements, do not result in an exceedance of the air quality guidelines, it is highly unlikely that minor arterial routes will result in an exceedance.

The Prouse Trust Partnership is concerned about the effect the overbridge will have on the air quality concentration at its property. Therefore, air dispersion modelling has been undertaken to help quantify the potential change in concentrations because of the Queen Street East overbridge.

The results are provided in Table C1 and exclude background. It should be noted that no change in elevation has been modelled, however, the change in emissions rates because of the slope has been.

The overbridge will decrease the emission rates of PM_{10}, $PM_{2.5}$ and NO_2 when vehicles going down the bridge and increase when the vehicles are going up the bridge.

Table C1: Predicted change in concentration because of overbridge

Contaminant	Original Modelling Assessment	Modelling Assessment with Overbridge	Guideline value (µg/m^3)
	Concentration at Submitters residence (µg/m^3)		
24-hour PM_{10}	0.3	0.6	50
Annual PM_{10}	0.06	0.13	20
24-hour $PM_{2.5}$	0.3	0.5	25
Annual $PM_{2.5}$	0.06	0.11	10
99.9%ile 1-hour NO_2	6.7	13.0	200
24-hour NO_2	1.9	4.8	100
Annual NO_2	0.5	1.0	40

As shown in Table C1 the overbridge will result in an increase the off-site concentrations, however, this increase will not result an exceedance of the air

quality guidelines with the off-site concentration being between 1% and 7% of their respective air quality guidelines.

Based on this, it is highly unlikely that adverse health effects will be experienced at the submitter's property or any of the other properties near the overbridge.