

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of applications by Waka Kotahi NZ Transport Agency to Manawatu Whanganui Regional Council for resource consents associated with the construction and operation of Te Ahu a Turanga: Manawatū Tararua Highway.

SECTION 87F REPORT OF DEBORAH ANNE RYAN – AIR QUALITY

A. QUALIFICATIONS / EXPERIENCE

- 1 My full name is Deborah Anne Ryan. I am currently employed as Technical Director of Air Quality with Pattle Delamore Partners Limited (“**PDP**”). I have been in that position since April 2019. My role involves technical leadership for PDP’s air quality business, where I am responsible for overview and delivery of air quality projects for a range of industry sectors.
- 2 I have a bachelor’s degree in Biotechnology and Bioprocess Engineering from Massey University, Palmerston North (1991). I am a member of the Clean Air Society of Australia and New Zealand (“**CASANZ**”) and a Certified Air Quality Professional (“**CAQP**”) with CASANZ.
- 3 I have been engaged by Manawatū-Whanganui Regional Council (“**Horizons**”) to provide air quality expertise on resource consent applications by Waka Kotahi NZ Transport Agency for resource consents associated with the construction and operation of Te Ahu a Turanga: Manawatū Tararua Highway (the “**Project**”).
- 4 I have more than 28 years of experience in the air quality and resource management fields. I spent eight years as an Air Quality Specialist and Resource Consents Advisor with Horizons and the Waikato Regional Council. I have been employed as an Air Quality Consultant in various roles since 2000, principally with Jacobs New Zealand Limited (formerly SKM), and currently with PDP. I have extensive experience in air pollution impact studies, in particular, preparing and reviewing a wide range of air quality effects assessments and in managing and reporting on air quality monitoring programmes. As an air quality specialist, I have been responsible for reporting and presenting specialist air quality advice to councils in resource consent hearings on multiple projects across all sectors.
- 5 My experience with assessing the effects construction project includes involvement in resource consents, and/or monitoring, for the Roads of National Significance (“**RoNS**”) Pūhoi to Warkworth, and Warkworth to Wellsford, Waikato Expressway designation and consenting applications; and the Bayfair-to-Bay Park, Peka-Peka to Otāki, and Auckland Transport City Rail Link Tender Designs; and the air quality assessment for the Teraiku Land Reclamation Feasibility study. I have experience with dust-producing industries including quarry extraction and processing at McDonalds Lime (King Country), Winstones (Pokeno), Fulton Hogan (Royden & Miners Road), Glessons (Waikato); mineral extraction processes (Waihi Gold Mine); coal mining

(New Vale and Goodwin Mines, Southland, Solid Energy and Glencoal, Waikato) and landfill developments at AB Lime Ltd (Southland), Bonny Glen (Rangitikei), Victoria Flats (Otago) and Envirowaste Limited (Waikato).

6 I have advised on ambient air monitoring programmes to determine deposited and suspended particulate concentrations within and beyond quarry premises and identified mitigation measures necessary to minimise dust.

7 I am familiar with the location of the Project, although at the time of writing, I have not visited the location for the specific purpose of a site visit. Instead, I have undertaken a desktop review of the information on wind, topography, and the receiving environment. I consider this approach to be fit for purpose, jointly with my general knowledge of the Project location.

B. CODE OF CONDUCT

8 I confirm that I have read and agree to comply with the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2014. I confirm that I have considered all the material facts that I am aware of that might alter or detract from the opinions that I express, and that this report is within my area of expertise.

C. SCOPE OF REPORT

9 My report focuses only on issues related to air quality and covers the following topics:

- (a) The potential effects on air quality, principally of dust from construction works;
- (b) A review of the air quality evidence provided by the Applicant and a summation of the effects of the proposal; and
- (c) Submissions as they relate to issues concerning air quality, principally dust.

10 In addition to my own experience, I have reviewed and relied on the evidence and information provided by Mr Chilton of Tonkin & Taylor in Technical Assessment E and other supporting information from the Applicant as follows:

- (a) The Design and Construction Report (“**DCR**”) and Drawing Set;
- (b) Response to request for additional information pursuant to section 92 of the Resource Management Act 1991, 29 April 2020 (the “**Section 92 Response**”);
- (c) Erosion and Sediment Control Plan (“**ESCP**”), Appendix 3: Dust Control Procedure (“**DCP**”) from the Section 92 Response, Appendix 9.

11 I have also had regard to the s87F reports of Mr Brown and Mr Lambie.

12 I have also referenced the Ministry for the Environment’s (2018) *Good Practice Guide for Assessing and Managing Dust* (MfE Dust GPG); and the Transport Agency’s *Guide to assessing air quality impacts from state highway projects (NZTA Guide)*, Version 2.3 (October 2019).

D. EXECUTIVE SUMMARY

13 The key conclusions of my evidence are:

- (a) Sensitive receptors, potentially affected by dust from construction works, have been appropriately identified and include infrastructure assets, residential dwellings, and sensitive ecosystems.
- (b) The potential for adverse effects of dust are appropriately mitigated and managed by the Applicant’s proposed dust monitoring and dust management procedures.
- (c) The Applicant’s proposed consent conditions to control dust effects, reference LD3, should be strengthened to provide more certainty as to the requirement for monitoring and management as per the recommendations of the Air Quality – Technical Assessment E and the ESCP.

E. BACKGROUND

14 The Project involves the construction, operation, maintenance and improvement of approximately 11.5 km of State Highway connecting Ashurst and Woodville via a route over the Ruahine Range. Mr Richard Chilton, from Tonkin & Taylor, has prepared an air quality technical assessment of the roadway construction to support the regional consents for the “**Main Works**” component of the Project. This report sets out my review prepared on behalf of Horizons.

F. REVIEW OF APPLICATION

- 15 Mr Chilton reports (at paragraph 8, Technical Assessment E) that he has considered the mitigation and management practices that he expects will control dust emissions so that “offensive or objectionable dust effects beyond the boundary do not occur.” I agree that dust is the key consideration for the air quality assessment and that the avoidance of adverse effects from offensive or objectionable dust is the relevant criteria for his assessment.
- 16 Mr Chilton based his assessment on detailed design information from the DCR. I have also familiarised myself with the relevant details of the DCR and drawing set. Mr Chilton defines the "**Earthworks Footprint**" for the Project and notes that this area may give rise to dust emissions that could impact on sensitive locations and activities.
- 17 Mr Chilton states (at paragraph 14, Technical Assessment E) that the main environmental effects of dust are nuisance, soiling and abrasion effects and effects on vegetation if very high levels of deposited dust occur. Nuisance effects are further described in paragraph 25 of his report. I agree that Mr Chilton has identified the key potential impacts of dust discharges for the Project. In addition, visibility both on and offsite, and the health and safety of workers, are identified in the DCP, which is appropriate.
- 18 The main sources of dust associated with the Project are identified as vehicle movement on unpaved surfaces, haul roads and entranceways during dry weather, and from wind erosion from exposed dry surfaces (particularly fill and spoil sites in a high wind environment). I agree that Mr Chilton has appropriately identified the potential sources and issues associated with dust discharges.
- 19 Mr Chilton uses a FIDOL¹ assessment as the basis for considering the potential for dust impacts at sensitive locations. His assessment categorises locations where the risk of dust impacts is potentially high and uses this assessment to inform the basis of the recommended mitigation and monitoring. Mr Chilton summarises the high-risk locations and mitigations at paragraph 19 of Technical Assessment E. I agree with his approach and his conclusions with respect to the potential for effects and mitigation.

¹ Frequency, intensity, duration, offensiveness and location as described by Mr Chilton at paragraph 56.

- 20 Mr Chilton observes that areas around the Project are rural and generally insensitive to dust. In paragraph 37 of his report, Mr Chilton identifies sensitive locations or activities as rural dwellings, electricity infrastructure, wind farm infrastructure and a fertiliser research area. Mr Chilton states that for the wind turbines the potential adverse effect arises from deposition on the blades. There are also some rare, threatened, or at-risk ecological habitats that are identified as being potentially sensitive to dust. These are mapped on Figure E.1. I agree with Mr Chilton's assessment that these activities and locations are potentially sensitive to experiencing adverse effects from dust, principally from dust deposition. Consideration of the potential for dust to enter waterways is provided in the ESCP and DCP.
- 21 Mr Chilton also discusses the meteorology and topography relevant to the assessment of effects of dust from the Project (at paragraphs 38 to 45 of Technical Assessment E). Mr Chilton identifies that the Project alignment is exposed with elevated topography and is subject to high winds, which will be variable across the alignment due to the variable terrain. Due to the variability in terrain and elevation across the Project area, Mr Chilton has simulated a meteorological data set using the CALMET model and extracted data for four locations along the Project route as the basis on which to consider the potential effects of windblown dust. I agree with this approach. Generally, the meteorological modelling shows that there is a high frequency of winds, and particularly strong winds, from the west to northwest.
- 22 The Project has a Designation (I understand that the appeals on that matter have been resolved) that has conditions relevant to the effects of dust from the Project, as described in paragraphs 48(a), (b) and (c) of Technical Assessment E:
- (a) Designation Condition T1 requires a Management Plan that includes managing the effects of dust including on Meridian's Te Āpiti wind turbines and wind farm infrastructure;
 - (b) Designation Condition T2 relates to managing the effects on the National Grid Transmission lines, with a Management Plan intended to confirm measures to manage the effects of dust that may damage the lines. The Management Plan has the objective of avoiding, remedying, or mitigating the potential effects of

the Project on the operation and maintenance of the Mangamaire – Woodville A 110 kV transmission line;

- (c) Designation Condition T3 requires a Ballantrae Research Station and Fertiliser Trial Management Plan, which has an objective of avoiding, remedying, or mitigating the potential adverse effects of the Project on Ballantrae Farms operations and the current long-term fertiliser and grazing trial.
- 23 Mr Chilton advises that he has built on the mitigation proposed through the Designation Conditions, although he has clarified in the Section 92 Response that at the time of writing, the above management plans do not exist. I have recommended a condition which stipulates that a DCP² be included in the ESCP. The condition should also require the Applicant to comply with the DCP.
- 24 Mr Chilton uses a FIDOL assessment as the basis for considering the potential for offensive or objectionable impacts from dust to have an adverse effect. Mr Chilton has also applied the Dust Risk Index from the NZTA *Guide to assessing air quality impacts from state highway projects* (V2.3, October 2019). Under the Dust Risk Index Mr Chilton identifies that the Project has a high-risk of dust impacts, and that a 'Construction Air Quality Management Plan' ("**CAQMP**") is required. In this case, Mr Chilton advises that a DMP is proposed as part of the ESCP for the Project. I am comfortable that this fulfils the same requirements for a CAQMP as set out in the NZTA Guide. I understand that in the current ESCP³ the DMP is called the DCP as described above, rather than a DMP as referenced by Mr Chilton. I have used DCP for consistency with the ESCP in my report.
- 25 Mr Chilton has assessed the route over four sections referred to as: Ashhurst, Ruahine Ranges, Ballantrae and Woodville. The Ashhurst section is as shown in Figure E.1 and Sheet 1 of Appendix E.4 of Mr Chilton's report. A residence at R1 is located to the north and west of the alignment at least 150 metres from the dust sources. The FIDOL assessment is provided in Table E1. Overall, given the location relative to prevailing strong winds, Mr Chilton considers that the mitigation measures proposed can control dust to acceptable levels at R1. I agree with this assessment.

² At paragraph 24 I note that the DMP is referred to as the Dust Control Plan (DCP) by the Applicant.

³ The updated ESCP (Revision A, 12/2/2020) provided in the Section 92 Response now refers to a Dust Control Procedure (DCP) rather than a DMP.

- 26 The Ruahine Ranges section, as shown in Figure E.1 and Sheets 2 and 3 of Appendix E.4 of Mr Chilton's report, has ecologically significant areas and Te Āpiti wind turbines within 100 m of dust sources. The FIDOL assessment is provided in Table E2. There are sensitive receptors in this section that are downwind of strong prevailing winds and with some turbines less than 50 metres of the dust sources. Based on the location of some of the receptors relative to prevailing strong winds, Mr Chilton considers that there would be moderate to high levels of dust deposition if dust from construction activities is not well managed. He identified that the proposed mitigation measures can be used to reduce dust to acceptable levels. I agree with this assessment.
- 27 The Ballantrae section has ecological areas, Te Āpiti wind turbines and the Ballantrae Farm research area. Receptors are shown in Figure E.1 and Sheet 4 of Appendix E.4 of Mr Chilton's report. The FIDOL assessment is provided in Table E3. There are sensitive receptors in this section that are downwind of strong prevailing winds and with some turbines around 50 m or less from the dust sources. Based on the location of some of the receptors relative to prevailing strong winds, Mr Chilton considers that there would be moderate to high levels of dust deposition if dust from construction activities is not well managed. He identified that the proposed mitigation measures can be used to reduce dust to acceptable levels. I agree with this assessment.
- 28 The Woodville section has residential receptors identified in Figure E.1 and Sheet 5 and 6 of Appendix E.4 of Mr Chilton's report. The FIDOL assessment is provided in Table E4. There are seven residential dwellings in this section. R8 is identified as being moderately exposed and R4 and R5 relatively frequently downwind of dust sources under strong winds. In addition, R7 is relatively close to dust sources at 40 metres separation. Mr Chilton considers that there would be moderate to high levels of dust deposition if dust from construction activities is not well managed. He identifies that proposed mitigation measures can be used to reduce dust to acceptable levels.
- 29 I agree that (starting at paragraph 86 of Technical Assessment E), Mr Chilton has appropriately identified those locations and/or receptors at most (moderate to high) risk of dust impacts if the dust were unmitigated. In addition, in the Section 92 Response, Mr Chilton revised his assessment to conclude that R7 is a higher risk receptor due to the relatively close proximity to the earthworks, with mitigation responses and monitoring consistent with R4 and R5 also being applicable to R7.
- 30 Starting at paragraph 90, Mr Chilton identifies mitigation measures for key dust sources as:

- (a) For haul roads – dust suppression with water and/or chemical suppressants and controlling vehicle speeds;
 - (b) For fill and spoil sites - suppression using water for agglomeration, hay mulch, minimise traffic movements and stabilise, such as by grassing, as soon as practicable;
 - (c) Site entranceways - construction to minimise tracking, such as using coarse aggregates and/or wheel washes;
 - (d) Roadway formation – construction methodology that progressively rolls and finishes work;
 - (e) Digger and loader operation - staff trained to minimise drop height;
 - (f) Dust sources within 50 m of a sensitive receptor – assess the need for wind break fencing based on monitoring data.
- 31 Mr Chilton describes that the above mitigation measures are generally reflected in the DMP/DCP and therefore in line with his recommendations. I agree that the DCP provided with the S92 Response incorporates Mr Chilton’s recommendations. In addition, the DCP identifies that topsoil stockpiles will be located as far away from sensitive receptors as possible (at least 100 metres), will have a low profile and will be stabilised, for example, grassed.
- 32 The DCP identifies that a key operating principle will be a proactive rather than a reactive approach to dust management. The DCP has been prepared to address dust generation from earthworks, material movement, crushing, vehicle movements and bare soil particularly during dry, windy weather conditions; and to manage nuisance to residents, dust on local roads, health and safety of workers, sediment loads to terrestrial and aquatic habitats and effects on wind turbines.
- 33 Section 7.5 of the DCP describes monitoring, including at least daily visual observations of active areas by staff on-site, checking weather forecasts for rain and wind in relation to planning activities, and advising of dust risks, such as, considering the relative locations and any issues relating to sensitive activities in proximity to the dusty activities. The DCP sets out on-site communication procedures relating to dust sensitive zones and high wind warnings during construction.

- 34 The DCP also includes meteorological monitoring for wind speed and direction, using a 10-metre-high mast to assist with dust management. Data will be continuously logged and recorded with alerts when the wind exceeds 10 metres per second.
- 35 In accordance with Mr Chilton's recommendations, the DCP incorporates monitoring for dust in real-time using nephelometers for continuous PM₁₀ monitoring during construction at the Woodville end of the Project. The DCP sets an initial trigger concentration for the nephelometer monitoring of 150 µg/m³ as a 1-hour average. If triggered, an automatic message will be sent to activate measures to control dust, including cessation of work as required. The trigger level is consistent with the MfE Dust GPG recommendation for dust management based on PM₁₀ measurement. As identified in Section 6.5 of the DCP, operator experience and/or community feedback at the site may be used to initiate a review of the trigger level/s, for example, if triggers are demonstrated not to be protective enough. I agree with this approach.
- 36 Mr Chilton proposes dust deposition monitoring to manage effects around the wind turbines, Ballantrae and the ecological receptors. Directional deposition gauges are recommended for deposition in monitoring in relation to effects on turbines. In the DCP the recommended value for assessing the dust deposition results is 4 g/m²/30-days above background. I agree with these proposals.
- 37 To determine background levels for use with evaluating the above assessment criteria, Mr Chilton recommends establishing an additional dust deposition monitoring site upwind of the Earthworks Footprint. The site would be established upwind of the prevailing winds in an area that is well removed from the Earthworks Footprint (nominally at least 500 m setback from the nearest earthworks). The need for a background site is not reflected in the DCP, nor are other specific details of the monitoring, for example, calibration for the nephelometers. I recommend, a consent condition to provide a monitoring plan for construction activities and regular reporting to council during the construction period.
- 38 Section 7.6 of the DCP sets out the Dust Management Toolbox including: water carts, dust suppressants, progressive stabilisation, training to minimise drop heights, managing stockpiles, and controls at entranceways. The DCP includes locating stockpiles at least 100m away from sensitive receptors and controlling stockpile heights and having measures to clean roads adjacent to entranceways if vehicles do track dirt onto local roads, such as a sweeper and sucker trucks.

- 39 The DCP identifies that earthworks will be staged to minimise open areas; vehicle speeds will be limited to 20 km/hour during dry weather when sensitive receptors are within 100 metres; materials will be applied on surfaces to minimise dust generation; and pavement work will be monitored to ensure no cement dust mobilization. I note that the MFE Dust GPG recommends that dust emissions due to vehicles can be minimised by limiting vehicle speeds, for unpaved industrial sites in New Zealand with a “commonly applied” speed limit of 10–15 km/hour. The NZTA Guide also provides 15 km/hour as an example for vehicle speed controls. Because the proposed activities are temporary and relatively isolated, I am comfortable that Mr Chilton’s recommended limit of 20 km/hour is fit for purpose.
- 40 Mr Chilton concludes that the ESCP generally reflects the mitigation methods and monitoring in line with his recommendations and that provided his recommendations are implemented through the DCP, he expects that adverse dust effects should be appropriately managed and offensive or objectionable dust effects avoided.
- 41 Taken as a whole, I agree that Mr Chilton’s recommendations and the DCP provide a fit for purpose framework to manage and minimise the potential effects of dust to an acceptable level.
- 42 In addition, the potential effects of dust deposition on ecological habitats has been assessed in Table 6 of the Applicant’s ecology assessment (as amended), which is referenced in the Air Quality Technical Assessment E. Dust suppression and monitoring is identified as mitigation measures where the “old-growth forest” is adjacent to the Earthworks Footprint. Table 6 also describes that the alignment is upwind of the prevailing winds for some of the key ecological areas, so that dust deposition is likely. I am advised by the ecologist for Horizons, Mr James Lambie, that he considers the proposed mitigation is suitable to address the potential for adverse impacts of dust deposition on key ecological features.

G. SUBMISSIONS

- 43 There are two submissions opposing the application that reference effects on air quality, specifically from dust:
- (a) Transpower (Submission #10) raises concerns about the effects of dust on transmission line conductors specifically in relation to flashover and additional wear from dust. Transpower seeks management of the bulk earthworks so that

they “do not result in the discharge of dust and/or particulate matter.” Transpower states that the ESCP and dust management are not included in any detail within the application, so that Transpower is unable to comment on whether the proposed measures are sufficient.

- (b) Mr J Bent (Submission #18) raises concerns about contamination of the receiving environment, where air contaminants may deposit and enter runoff. In particular, emissions from tyre and brake wear of vehicles and other contaminants. This submission appears to be directed at ongoing stormwater effects, rather than the dispersal of dust in waterways. In any event Mr Logan Brown addresses this submission in his report, and I do not consider it further.

44 There are two submissions that support the proposal in full, with the conditions proposed in the application. They are Mr K Barnett (Submission #6) and DaSS Trust (Submission #9).

45 In relation to the submission from Transpower, I note that the ESCP and DCP have been provided by the Applicant. In my view, the mitigation measures proposed by the Applicant should be sufficient to avoid significant adverse effects from dust on Transpower’s infrastructure. In addition, I understand a specific management plan to avoid, remedy, or mitigate the potential effects of the Project on the operation and maintenance of the Mangamaire – Woodville A 110 kV transmission line is required under the Designation, which should include any specific measures as may be needed to address Transpower’s concerns.

H. DISCUSSION AND CONCLUSION

46 In the Section 92 Response the Applicant provided a revised DMP/DCP that is consistent with Mr Chilton’s recommendations in Technical Assessment E. I agree that Mr Chilton’s recommendations and the DCP provide a fit for purpose framework to manage and minimise the potential effects of dust to an acceptable level.

47 In my view, the concerns raised by the submitters are adequately addressed by the Applicant’s mitigation proposals as contained within the framework I refer to above.

I. RECOMMENDATIONS/CONDITIONS

48 The Applicant's recommended condition relating to dust forms part of the proposed erosion and sediment control conditions (as at 21 April 2020). The Applicant's dust condition is as follows: LD3 Air Quality Standard

Dust arising from works authorised by resource consents for the Project must not cause a noxious, dangerous, offensive or objectionable effect at any point beyond the boundary of the [site] as assessed using the FIDOL factors set out in the Ministry for the Environment publication 'Good Practice Guide for Assessing and Managing Dust' (2016).

49 How "the site" is defined for the purpose of the above condition will be important. Along with the Designation boundary, I am of the view that the "site" for LD3 must include spoil sites (some of which sit outside the Designation). Plan TAT-3-DG-C-3640-A looks potentially suitable, but this needs to be confirmed with the Applicant.

50 In relation to the Applicant's proposed condition LD3, my preference is to use the wording as recommended in the MfE Dust GPG to the effect that:

There shall be no noxious, dangerous, offensive or objectionable dust to the extent that it causes an adverse effect at or beyond the boundary of the site.

51 It is generally accepted that what may be offensive or objectionable under the RMA cannot be defined or prescribed except in the most general of terms.⁴ The recommended change to condition LD3 better contemplates that the threshold for objectionable or offensive adverse effects will be dependent upon an objective assessment ("in the opinion of the ordinary reasonable person"). This will require evidence gathering as described in the MfE Dust GPG. Referring to any criteria within the condition also potentially limits Horizons (and the Court) in its enforcement role. At best I prefer to see such references in advice notes.

52 The MfE Dust GPG notes that if noxious or dangerous effects are a potential concern, as could be the case for ecological receptors, then numerical assessment criteria rather than FIDOL assessment is appropriate. On that basis, condition LD3 referring to the FIDOL assessment would also not be appropriate, with the focus of this method relating to effects on amenity.

⁴ *Zdrahal v Wellington City Council* [1995] NZLR 700.

53 I note that there is an absence of conditions about the management and monitoring for dust despite these steps being required to mitigate the potential effects of dust. Proposed condition ES3a) refers to the ESCP and appendices and the ability for these to be updated by the consent holder. It is not clear to me where in the conditions the ESCP and DCP are required to be prepared and maintained and complied with. I consider that preparation of the ESCP and associated DCP should be a requirement of the consents, as recorded via a condition, and that they should be required to be complied with. I agree that amendments can be made, such as to revise dust monitoring trigger levels, subject to certification from Horizons.

54 In relation to the provision and maintenance of a meteorological station, including wind direction and strength, I note that this is identified in Section 6.3 of the DCP. In my experience, wind monitoring is something that is usually included as a condition of consent and accordingly has been included within proposed condition LD3a.

55 I would also recommend that a monitoring plan and reporting frequency be incorporated into the consents. For example:

The Consent holder shall prepare a monitoring plan which covers at least, the dust monitoring programme methods, including background monitoring for dust deposition, calibration and maintenance of dust monitors (as required); the location and maintenance and operation of the meteorological station. The monitoring plan may form part of the DCP.

56 A requirement to report to the council at a specified frequency is also recommended.

DEBORAH RYAN

25 May 2020

J. REFERENCES

Ministry for the Environment's (2018) *Good Practice Guide for Assessing and Managing Dust*, Publication number: ME 127

Transport Agency (2019) *Guide to assessing air quality impacts from state highway projects*, Version 2.3, October 2019