Before a panel appointed under the Fast-Track Approvals Act 2024 **FTAA-2510-1120**

UNDER:	the Fast-track Approvals Act 2024 (**Act**)
IN THE MATTER:	an application for approvals for the Lake Pūkaki Hydro Storage and Dam Resilience Works
BY:	**MERIDIAN ENERGY LIMITED** **Applicant**

STATEMENT OF EVIDENCE OF PETER STACEY ON BEHALF OF MERIDIAN ENERGY LIMITED

Air Quality

Dated: 15 April 2026

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INTRODUCTION

1. My full name is Peter Warwick Stacey. My qualifications are a Bachelor of Science from the University of Auckland and a Graduate Diploma in Business from Auckland University of Technology.

2. I am a Member of the Clean Air Society of Australia and New Zealand and a Certified Air Quality Professional.

3. I am the Managing Director of Air Quality Consulting NZ Limited. I have been in that position since December 2021.

4. I have more than 20 years of experience assessing air discharges from a wide range of activities. My work experience relevant to this application includes:

    i. Expert witness for Agrifeeds, Glencore and ADM NZ Limited (s127 parties) as part of an appeal to the Environment Court regarding Bay of Plenty Regional Council's Plan Change 13. As part of this project I undertook an independent assessment of the dust effects from bulk handling of stock food material. This was then presented as evidence before the Court.

    ii. Expert witness for the Waikato Regional Council as part of a direct referral application to the Environment Court in relation to Waka Kotahi's State Highway 1/ State Highway 29 intersection upgrade project at Piarere. As part of this work, I reviewed Waka Kotahi's air quality assessment and prepared and presented evidence before the Court.

5. While I did not prepare the original air quality assessments submitted with the Substantive Applciation, I have reviewed and I am familiar with them.

6. I have been asked by Meridian Energy Limited to provide a response to specific matters within my area of expertise contained in the written comments on the application from persons invited by the Panel to comment under section 53 of the Act:

    a. Canterbury Regional Council

    b. NZTA

7. I have prepared this statement within the limited time available to me. Consequently, it is necessarily at a high level. I am able to provide a more fulsome response to the issues covered in this statement if the Panel requires further assistance from me.

CODE OF CONDUCT

8. I confirm that I have read the Code of Conduct for Expert Witnesses as contained in section 9 of the Environment Court Practice Note (2023), and have complied with it in preparing this evidence. I confirm the issues addressed in this evidence are within my area of expertise, and I have not omitted material facts known to me that might alter or detract from my evidence.

Canterbury Regional Council

9. I understand that engagement with Canterbury Regional Council (CRC) has been ongoing since before the Substantive Application was lodged. While I was not involved in that engagement, I am aware of the issues that have been raised by CRC and the subsequent changes to approach that have been taken to address them.

10. As raised in their s53 report, CRC have expressed concerns regarding the modelling that was undertaken with respect to the proposed activities. Notwithstanding this, I do not believe that this is an impediment to the air quality effects being considered. Based on the comments made in the s53 report and its appendices I believe that the focus going forward should be on refining the Dust Management protocols.

11. As a result of comments made by CRC, Meridian propose a number of changes to the Dust Management Plan Rock Armouring (DMP), these are discussed throughout my evidence. An updated DMP is provided with this response. With respect to the DMP for lake lowering, as noted in the evidence of Amy Callaghan, given the lack of mitigation measures available to be implemented, a traditional DMP is not considered to be an appropriate response, rather as proposed by Mrs Callaghan, consent conditions are proposed requiring Meridian to notify adjacent landowners prior to the lake going below 518 m RL and to maintain a complaints register.

Canterbury Regional Council s53 Comments – Appendix 6a (Rock Armouring)

12. Appendix 6a to CRCs s53 comments contains technical advice provided to CRC in relation to the rock armouring work from Suzanne Cawood and Mathew Noonan, both air quality scientists at Beca. CRC specifically refers to these reports and points the Panel to consider them. To further assist the Panel, I have provided a response to each of the key points raised.

13. Ms Cawood and Mr Noonan raise concerns about the haul road. Specifically they note: '*While usage of the haul roads has been included in the assessment, their construction effects (specifically the right abutment and main dam access ramps mentioned in Section 9.5.2 of the GHD Rip-rap Design and Construction Methodology (GHD DCM)) have not been assessed. The GHD DCM has indicated that these access ramps might require reinstatement works prior to each construction event to restore access affected by wave action. The construction of these haul roads could be potential sources of dust and should be included in the assessment with proposed mitigation measures.'*

14. I acknowledge that a formal risk assessment (e.g., following the MfE GPG or IAQM Guidelines) for haul road construction was not included in the rock armouring report. While the report could be amended to explicitly include this information, I consider the focus should instead be on mitigating effects. To this point I note that the dust control and mitigation activities that may be required during construction are essentially the same as those that would be required during operation. In order to ensure that this information is clear for contractors, the DMP has been updated to include a new section to provide guidance for dust control and mitigation measures to be undertaken during construction and reinstatement works.

15. Ms Cawood and Mr Noonan have previously raised issues with respect to some of the conclusions in the Air Quality assessment. In Appendix 6a they state that '*Our concerns remain regarding the level of effect of the proposed construction activities. The predicted GLC with the proposed mitigation controls are predicted to exceed the GPG Dust recommended TSP trigger level up to 640m away, indicating the amenity values and overall effect of the dust is not minimised as stated in the AQA Report. Additionally, the NESAQ criteria levels are still being exceeded with the proposed mitigation measures.*

This indicates that the proposed mitigation measures are not sufficient to manage dust from the proposed activities.'

16. I am not aware of the basis for the statement that TSP trigger levels are exceeded at distances of up to 640 m. However, I acknowledge that the modelling identified some potential for exceedances of the relevant guidelines and standards at a limited number of discrete locations, including the nearby camping ground and the Lake Pūkaki photo point/public toilet.

17. While modelling is a useful tool used to inform dust assessments, in this case I consider that it provides an overly conservative representation of potential effects. Based on my experience, unmitigated construction dust effects can extend to distances of the order of 300 m. However, with the implementation of appropriate dust management measures, effects can typically be managed within approximately 100 m of the source. This view is supported by the FIDOL assessment that has been undertaken.

18. In addition to the FIDOL assessment, inspection of wind data from the Lake Pūkaki meteorological station indicates that prevailing winds are from the northwest, with relatively few strong winds capable of transporting dust from construction activities towards the nearest receptors. These stronger wind conditions, which are infrequent, would also need to coincide with periods of construction activity during which dust control measures are not effectively implemented. In my view, this combination of factors is unlikely.

19. Overall, provided that appropriate mitigation measures are implemented as presented in the updated DMP, I consider the likelihood of adverse dust effects, including both nuisance and health effects, to be very low.

20. While I consider the modelling to provide a conservative assessment, it is useful in the sense that it highlights the importance of implementing effective dust control measures. Accordingly, the DMP has been revised and strengthened to provide for a more comprehensive and responsive framework for the management of dust discharges.

21. Ms Cawood and Mr Noonan raised concerns regarding water suppression rates. They note that *the 'AQA report stated that the MfE's recommended water suppressant rate of 1 L/m2/hr would provide the equivalent control as the Australian NPI's 2 L/m2/hr due to New Zealand conditions. The AQA report states that "default haul road watering for 50 percent dust suppression*

in NPI is based on 2 L/m²/h". The proceeding section then states "Haul road watering of greater than 1 L/m²/h is recommended to control dust emissions by 75 percent." The applicant needs to provide water suppression application rates that can support their 75% effectiveness rate.'

22. I agree that the NPI Mining EET allows for an emissions reduction of 50% for Level 1 watering (2L/m^2/hr) and 75% reduction for Level 2 watering. The rates and reductions are specifically applicable to coal mines in Australia, which typically experience much lower levels of annual rainfall and have drier soils than the project site. The intention was to state that given site-specific conditions, less watering will be required to maintain sufficient moisture levels to prevent dust lift-off from roads. 1 L/m^2/hr of water application on a surface is equivalent to 1mm/hr of rainfall on the same surface. A conservative estimate is that roads should be watered starting 12 hours after no rainfall (assuming sandy soils that dry quickly). This may be monitored using any of the existing weather stations, or by installing a rain gauge on site. The DMP has been updated to include this metric. However, I have included an additional control that if dust liftoff is observed from roads or stockpiles, water should be applied at a rate of 2 L/m^2/hr.

23. Ms Cawood and Mr Noonan have suggested that *'the predicted GLC with control factors applied for the proposed mitigation measures indicate that there is still a possibility for adverse dust effects to be experienced, up to 640m downwind. This indicates that the proposed mitigation measures are insufficient to control the dust impact offsite.'*

24. As noted above, based on my review of the application documents and discussions with the authors of the Air Quality Assessment, I am unable to determine the basis for the stated distance of 640 m, noting that the modelling results identify only limited and localised exceedances at discrete receptor locations.

25. Based on my experience, unmitigated construction dust effects can extend to distances of the order of 300 m under unfavourable conditions. However, with the implementation of appropriate dust management measures, effects can typically be managed within approximately 100 m of the source. In this context, the modelling results do not necessarily indicate a failure of the proposed mitigation measures but rather highlight the importance of their effective implementation.

26. Accordingly, the DMP has been revised and strengthened to ensure that appropriate and responsive control measures are in place to manage dust effects during construction activities.

27. Appendix 6a suggests that Ms Cawood and Mr Noonan do not consider the Draft Dust Management Plan to be sufficient for the activities, noting that it includes vague wording and insufficient mitigation measures to manage dust effects. Furthermore, they note that cumulative impacts of lake lowering and the construction activities have only been briefly mentioned and no mitigation measures are proposed due to the scale of exposed areas. They point out that there has been no mention of dust monitoring trigger levels which could be used to guide onsite teams. With respect to the DMP they suggest it should

- be more definitive in what is required, leaving no option other than for mitigation measures to be implemented. (i.e. activities should stop if dust is observed to be going beyond the site boundary)

- Provide more thorough detail to how and when mitigation measures should be implemented.

- An ambient monitoring station should be set up during construction periods to guide the on-site teams as to when to restrict dust generating activities.

- Include additional mitigation measures, (low travel speeds on unpaved roads, decrease drop heights of fine material, more frequent wetting of surfaces, more frequent inspections etc).

- Implement mitigation measures on the lake lowering and additional exposed areas of the lakeshore, within close proximity to the construction activities, to further mitigate the potential for cumulative effects.

- Inclusion of dust monitoring to help guide the onsite teams as to if additional mitigation measures are required.

- The level of dust being predicted indicates that the Dust Management Plan is critical in managing dust impacts and therefore we recommend the Dust Management Plan is independently verified and provided to Council 30 days before any activities commence.

28. With respect to these comments, I note that an effective DMP must be practical and achievable by the implementing party. I understand that the wording in the draft DMP avoids strict language such as “must” and “requires”.

This has been revised in consultation with Meridian to determine what can be practically undertaken to meet statutory requirements and community expectations regarding dust around the site.

29. Meridian intends to install an on-site weather station to monitor wind and rain conditions. Conditions will be monitored to trigger responsive action, using visible dust crossing site boundary as defined in the DMP, wind warnings, and rain warnings to trigger active response from site personnel in accordance with the MfE Good Practice Guide for Assessing and Managing Dust. The DMP has been updated to include triggers and response plans for high winds, visible dust from construction activities leaving site boundaries, and other adverse conditions. Responses will be on a cumulative, tiered response basis.

30. Overall, I consider that the changes to the DMP cover the concerns raised by CRC's reviewers.

31. In terms of dust monitoring, I do not consider it necessary for dust monitoring to be undertaken initially, but it will be included in the DMP if trigger conditions warrant its addition and use. I understand that the project will be implemented in stages, depending on access to the dam structures, which is dependent on periods of low lake levels. Accordingly, there will be various opportunities to evaluate the need for continuous dust monitoring as the works progress.

Canterbury Regional Council s53 Comments – Appendix 6b (Lake Lowering)

32. As with Appendix 6a, Appendix 6b to CRCs s53 comments contains technical advice provided to CRC in relation to the lake lowering work from Suzanne Cawood and Mathew Noonan, both air quality scientists at Beca.

33. With regard to the lake lowering, Ms Cawood and Mr Noonan raise concerns that '*the potential health effects of the proposed dust emissions have not been assessed, particularly in term of exposure of the public to fine particulate matter (PM10 and PM2.5). Whether emissions would be compliant with health based ambient air quality criteria has not been assessed. Discharges of dust have the potential to have an adverse health effects. The report notes approximately 57% of the dust generated will be in the form of PM10, and 23% in the form of PM2.5 Therefore, emissions of fine particulate matter may not be negligible during some wind conditions. The impact of these emissions is uncertain. It is noted in the report that residential dwellings are located within*

17m of the shoreline and therefore, could potentially be exposed to high levels of PM10 and PM2.5. The previous dispersion modelling presented in the Draft Air Quality Report suggests exceedance of guidelines could potentially occur at locations close to the lake. The potential health effects of the proposal should be assessed. It is also recommended that the health effects of exposure to respirable silica is considered for completeness purposes, (although it is noted that ambient concentrations are very unlikely to exceed guideline levels).'

34. I agree that the impact of emissions is uncertain, in principle. Lake levels must be low long enough for surface silt to dry and be capable of being lifted from the surface during high wind conditions. Soil evaporation is complex, and the delta is dynamic as it relies on glacial retreat, sediment supply and water flows. However, I note that a large area of the Tasman Delta is already exposed during the current operating regime when the lake operates between 532.5 - 518 m RL. The additional area exposed by lowering the lake to 513 m RL is less than a 20% increase above the existing authorised exposure. This demonstrates that the additional area exposed will not be the main driver of dust in the environment above consented levels.

35. With regard to health impacts, I understand that residents around the lake were provided with a copy of the Substantive Application which included the Air Quality assessments for comment and feedback. I understand that Meridian has received no comments or indication that dust impacts from lake lowering was impactful on their health.

36. In terms of respirable crystalline silica (RCS) exposure, in my experience health impacts due to inhalation of respirable silica is primarily an occupational exposure issue. Dust particles generated from exposed areas are expected to contain a limited proportion of particles smaller than 4 μm, and only a small fraction of those particles are likely to contain crystalline silica. Monitoring around hard rock quarries in New Zealand has not shown concentrations approaching the Office of Environmental Health Hazard Assessment (OEHHA) REL[1] annual average value of 3 μg/m^3. There is no information to suggest that exposure to respirable silica is a concern.

[1] OEHHA. Chronic Reference Exposure Levels (RELs), Crystalline Silica (respirable fraction), annual average REL = 3 μg/m³. California Environmental Protection Agency.

37. Ms Cawood and Mr Noonan raise the issue that '*the compliance of expected dust emissions against the National Environmental Standards for Air Quality has not been considered in the assessment. The National Environmental Standards for Air Quality (NESAQ) specify a minimum ambient air standard for PM10. It is uncertain if this standard would be exceeded at nearby dwellings. If exceedance of the NESAQ at locations that people are likely to be exposed, then granting a resource consent would potentially be problematic.'*

38. The assessment indicated that any increase in off-site PM_{10} concentrations associated with lake lowering is modest in absolute terms, even where relative increases of up to 30% are predicted at some locations around the northern extent of the lake. This is consistent with the fact that substantial areas of the delta are already exposed under the current operating regime, and that lowering the lake to 513 m RL increases the exposed area by less than 20% (noting that not all of this area comprises exposed sediment). As such, the predicted increase represents an incremental change to an existing source of wind-blown dust, rather than a step change in emissions.

39. Given that a number of conditions must coincide for elevated dust concentrations to occur, including sustained low lake levels, drying of surface sediments, and sufficiently strong winds blowing towards receptors, I consider the likelihood of exceedances of the NESAQ for PM_{10} at receptor locations arising from additional lake lowering, relative to existing conditions, to be low and not materially different from existing conditions.

40. Ms Cawood and Mr Noonan note concerns regarding the FIDOL assessment that was undertaken and included in Section 9 of the Air Quality Report. While I did not prepare this assessment, I have reviewed it and discussed it with the authors. The concerns raised by Ms Cawood and Mr Noonan are:

'A. Wind speed conditions considered

The FIDOL assessment only considers effects in terms of 'dust storms' , which are defined as being events for a period when wind speed exceeds 10m/s for more than 2-hours. However, dust can be generated from exposed surfaces any time that wind speeds exceed 5.5 - 7.5 m/s, even if these events occur for a short period of time (e.g. 5-10 minutes). These other wind speed conditions have not been considered in the FIDOL assessment. The FIDOL assessment therefore does not account for these conditions.

We also have concerns with how the frequency of 'dust storms' was calculated (in Section 7.5 of the report) as discussed below.

B. Level of detail provided in the FIDOL assessment

While we don't necessarily disagree with the assessment of the Intensity, Duration and Location factors presented in the report, in our opinion insufficient information has been provided. The FIDOL factors are discussed only in very general terms.

The impacts that the proposal would have on specific sensitive receptors, in particular the dwelling located near the lake which would be most impacted, are not assessed.

Overall, the there is still a high degree of uncertainty of the Air Quality impacts of the proposal.

C. Conclusions

The FIDOL assessment essentially concludes that the risk of a 'dust storm event' occurring is low, primarily as the likelihood of the lake being lowered below 518m is also considered low. We disagree with the basis of this assessment. The activity being proposed is the lowering of lake below 518m. The key consideration is the Air Quality effects of the proposal when the lake is operating under these conditions - not the likelihood of it occurring. The Meridian modelling presented in the report suggests that the lake level could be below the consented level of 518m, for up to 7 months which suggests that risk of adverse dust effects occurring could be significant.

However, even when the frequency of an event occurring is taken into consideration, the predicted lake levels (Figure 1 of the report) indicate that there is more than a 5% probability per year that lake levels would drop below 518m for more 2.5 -3 months. This would suggest there is a reasonably high probability that dust storms could occur over the 3-year period. '

41. As set out in the original assessment, the risk for dust storms and associated health impacts is already present. The primary change that would occur due to lake lowering would be along the axis of intensity and perhaps subsequent offensiveness. However, as highlighted in the FIDOL assessment, the risk faced by any given receptor during a single storm is uneven: some receptors

may be more susceptible than others due to wind conditions occurring at the time.

42. While GHD's original analysis indicated that dust emissions would increase approximately 30% as a function of lake lowering, there is no current monitoring of the area to quantify whether or not the current dust emissions due to wind erosion around the lake.

43. I do not consider there to be any assessment tools to definitively determine the actual or change in dust levels associated with lake lowering given the large number of variables involved and inherent uncertainties associated with modelling. The only practical way to determine compliance with the NESAQ would be to undertake ambient air quality monitoring before and during lake lowering events to assess any changes.

44. However, I am uncertain as to the practicability of this approach. An appropriate period of baseline monitoring would be required to characterise existing conditions; however, this would not necessarily capture conditions representative of consented discharges, particularly periods when the lake is at its lowest levels. To obtain a representative dataset, monitoring would likely need to be undertaken continuously over the three year project duration and potentially at multiple locations around the lake.

45. In addition, it is unclear what management response would be appropriate if elevated dust concentrations were measured, given the limited ability to mitigate dust generated from exposed lakebed sediments. It is also possible that dust levels are already variable and at times above the NESAQ and that lake lowering would simply alter the frequency or spatial distribution of dust events, rather than result in a step change in overall dust levels.

46. Overall, while there is inherent uncertainty in quantifying changes in ambient dust concentrations associated with lake lowering, the available assessment indicates that any increase in dust emissions is incremental relative to an existing natural process. The potential for elevated dust concentrations is already present currently and lake lowering is expected to influence the frequency and distribution of such events rather than introduce a new or substantially different effect. In this context, and taking into account the limitations of monitoring and mitigation, I consider that the overall risk of adverse dust effects, including health effects, from limited periods of additional lake lowering remains low.

47. Section 10 of the Air Quality Assessment provides a qualitative assessment of the impacts of lowering the lake on dust emissions. The Appendix 6b review considers that this analysis is largely based on the percentage increase in shoreline surface area with the lowering of the lake but does not consider the western side of the lake where a number of dwellings are located within 100m of the shoreline and could be impacted by emissions. Appendix 6b further states that the assessment has not assessed the potential for impacts on all of the identified sensitive receptors.

48. I understand that an earlier version of the Air Quality Assessment included modelling of individual receptors; however, following feedback from CRC, the assessment approach was refined, and this level of detail was not carried through in the final assessment.

49. Notwithstanding this, I consider that additional FIDOL assessments for these receptors could be readily undertaken if required. Given the limited time available to prepare this response, this has not been completed; however, I am happy to undertake further assessments should the Panel consider it necessary.

50. Finally, Ms Cawood and Mr Noonan note that they disagree with some of GHD's conclusions, namely the following

- *The likelihood of dust generation events has not been fully accounted for in the assessment. The assessment has largely focused on 'dust storm events' rather than considering all wind speed conditions when dust may be generated.*

- *The impacts of dust events has not been assessed in any detail, particularly at the dwellings located close to the shoreline, and receptors on the western side of the lake.*

- *The likelihood that lake levels will drop below 518m in any year, for a period of 2.5-3 months, appears to be approximately 5% per year, based on the Meridian Lake modelling output presented in Figure 1 of the report. This would suggest that there is approximately a 15% probability over the 3-year period that this would occur- and consequently a higher risk than suggested by the GHD report*

- *Irrespective of the probability of lake levels dropping below 518m, the primary concern is what would the Air Quality effects be when the lake does drop below 518m (this the 'activity' which is being proposed).*

- *The potential impact of the proposal has been underestimated.*

51. Similar to my comments above, due to the limited time available I have not updated the FIDOL analysis to include wind speeds greater than 5 m/s and the coincidence of lake levels being below 518 m. However, I can readily provide additional FIDOL assessments if the Panel considers that these would be helpful.

NZTA

52. NZTA have made the following comments in relation to air quality:

'Monitoring and management of dust from exposed sediment in the bed of the lake should also be required to ensure that it does not cause a safety effect on the state highway.'

53. I agree that dust has the potential to cause a safety effect on the state highway. With respect to dust from the lake lowering, I consider that the potential effects on the state highway are likely to be the similar as under the current regime. With respect to the rock armouring, dust emissions will be consistent with a normal construction process. Notwithstanding this, the DMP for rock armouring has been updated to include a process of observation and mitigation specifically in relation to the state highway.

Conclusion

54. In response to the above the following changes have been made to the DMP Rock Armouring:

- Definition of the site boundary

- Consideration of and mitigation measures associated with the construction of the haul roads.

- Requirement for Meridian to install and maintain a weather station on site for the duration of the works.

- A suite of triggers which require a dust mitigation response including sustained high wind speeds.
- Observation and mitigation in relation to the highway
- After hours response
- Triggers for when monitoring would be required.

Dated: 15 April 2026

Peter Stacey