

**In the Environment Court
I Mua I Te Kōti Taiao O Aotearoa**

Under the Resource Management Act 1991

and in the matter of the direct referral of an application for resource consents by Meridian Energy Limited in respect of the proposed Mt Munro wind farm under section 87G of the Resource Management Act 1991 (**RMA**).

Meridian Energy Limited
Applicant

and

Tararua District Council, Masterton District Council, Manawatū-Whanganui Regional Council and Greater Wellington Regional Council (Councils)
Consent Authorities

and

s 274 Parties

Statement of Rebuttal Evidence of Glen Andrew Wright on behalf of Meridian Energy Limited

6 September 2024

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INTRODUCTION

1. My full name is Glen Andrew Wright. My statement of evidence in chief dated 24 May 2024 addresses the lighting effects of the proposed Mt Munro Wind Farm. My qualifications and experience are set out in that statement of evidence, and I reaffirm my commitment to comply with the code of conduct for expert witnesses.
2. The purpose of this rebuttal evidence is to provide a summary of the matters relevant to my area of expertise which have arisen since my evidence in chief was filed, through mediation and expert conferencing, and to respond to the evidence of the section 274 parties and the evidence of John McKensey on behalf of the Councils.
3. Mr McKensey and I participated in expert conferencing in relation to lighting issues, and reached agreement on all matters, as is reflected in the Joint Statement of Lighting Experts (the **JWS**).
4. Since filing my evidence in chief, I have clarified a point in relation to lighting which was raised at mediation. This clarification was included in the letter dated 27 June 2024, which was circulated to the parties, and is attached as **Appendix A** to this statement. The query was in relation to ground shielding of aviation warning lights, and my response is summarised in the response to s 274 party evidence further in my evidence.

RESPONSE TO COUNCIL EVIDENCE

5. I have reviewed the evidence filed for the Councils in relation to lighting effects, and I note that I am in full agreement with statement of evidence of Mr McKensey.

RESPONSE TO S 274 EVIDENCE

6. I have reviewed the evidence filed by Ms Janet McIlraith, Mr Robin Olliver, the Hastwell/Mt Munro Protection Society Inc. and Mr John Maxwell (the **section 274 parties**) and have considered the concerns raised in relation to lighting. These are primarily effects from the

aviation warning lights. Most of the points raised in this evidence have been addressed in my evidence in chief, and in the JWS. I have reviewed Mr McKensey's responses to the s 274 evidence, and I am in full agreement with his opinions in relation to the matters raised.

7. I have provided some further opinion on some lighting issues in the sections below.

Ground shielding

8. I reviewed and had input into the clarification provided regarding aviation warning lights in the letter dated 27 June 2024, which I understand was requested at mediation. The relevant section of the letter noted the following:

Meridian confirms that the medium intensity aviation warning lights on the top of the nacelle will be 'ground shielded'. However, it is important to note that being shielded below the horizontal plane means that the intensity of the light below the horizontal is progressively reduced, as shown in the figure in Appendix A of the Lighting Report which is also included in Appendix C to this letter. It does not mean that the light will not be visible at all from the ground. Further, the low intensity aviation lights at half height would have a 120 degree beam (60 degree below their horizontal and 60 degree above), but are very low intensity, with only a 32 candela beam. Further information on this can be found in the Lighting Assessment Report, and in the evidence of Glen Wright and Rhys Girvan.

9. As recorded in the **JWS**¹ I have determined that receivers within two kilometres of a turbine with the 'ground shielded' medium intensity aviation warning light on the top of its nacelle will experience less than 3% of the 2,000 candela maximum intensity of such lights, which is 60 candela. This is because the receiver viewing angle at 2km is around 8.5° which is below the 5° / 3% intensity angle. Refer to Appendix B of this statement, where I have added the 2km and 1.6km receiver viewing angles to the Proposed Orca L550 medium intensity aviation warning lights intensity distribution diagram that was included in my Lighting Assessment Report.

¹ Lighting JWS, at page 4, item 13

Level of effects of aviation warning lights

10. Much of the lighting issues raised in section 274 party evidence relate to their concerns about the brightness of the aviation warning lights. I have carried out calculations of the spill light that would be produced at various receiver distances from these lights at night, and the results are listed in the table below. The lux levels of aviation lights are extremely low, with a maximum value of 0.006 lux for a receiver at 100m from a ground shielded nacelle light. This is significantly less than moonlight, which is typically 0.0 lux through to 1.0 lux for a full moon on a very clear night.
11. This level of light (0.006 lux) would not be detectable by the human eye, so it cannot affect sleep, regardless of whether it is constant or flashing light.
12. The lux levels of the half height aviation lights are even less.

Distance from aviation warning light	Low intensity lights at half height – 32 candela intensity	Ground shielded nacelle lights – 60 candela intensity
100m	0.0032 lux	0.006 lux
500m	0.000128 lux	0.00024 lux
1km	0.000032 lux	0.00006 lux
2km	0.000008 lux	0.000015 lux
3km	0.0000036 lux	0.0000067 lux

Night sky

13. Ms McIlraith expressed concerns that her views and those of at least two of her neighbours, of Matariki rising will be lost, as will their Dark Sky, to the north and the west². Mr Olliver raises concerns that he will

² At page 5

no longer be able to see Matariki or the stars, and the lights may affect the Dark Sky Reserve³

14. The quality of views of the dark sky are reduced by increases in the brightening of the sky from artificial light. The amount of light the aviation warning lights would project into the sky will be insignificant and will not contribute to a detectable brightening of the sky, and therefore won't diminish the quality of views of the dark sky.
15. It is the visual presence of the lights when in a person's view that has an effect on their amenity (here the effect is assessed as less than minor), not a loss of the quality of views of the stars. The Dark Sky Reserve will not be affected, as per **JWS**⁴.

CONDITIONS

16. As recorded in the **JWS**⁵ Mr McKensey and I agree that the Construction Environment Management Plan can in principle accommodate and provide for the recommended construction lighting mitigation. However, I agree that all the matters raised by Mr McKensey need to be specifically included in conditions.
17. I have reviewed the August Proposed Conditions attached to the evidence of Mr McGahan, and am satisfied that the proposed Construction Environment Management Plan conditions appropriately address and provide for construction lighting issues.

CONCLUSIONS

18. It remains my opinion that the lighting effects associated with construction will be less than minor, and no more than minor in relation to the aviation warning lights.

³ At pages 4 & 5

⁴ Lighting JWS, at page 5, item 10

⁵ Lighting JWS, at page 5, item 13

19. The lighting effects associated with the proposed Mt Munro wind farm are therefore acceptable, and can be managed satisfactorily through the proposed conditions.

Glen Wright

6 September 2024

Appendix A: Letter dated 27 June 2024

27 June 2024

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Tēnā koutou parties

ENV-WLG-2024-001- Meridian Energy Limited (Meridian) – Mt Munro Wind Farm – Information supplied post-mediation

This letter contains the information that Meridian agreed it would provide during court-assisted mediation, held in Palmerston North on 18 and 19 June 2024. This letter is limited to the information that the parties to mediation agreed would be provided by 27 June 2024, to assist the s 274 parties in the preparation of evidence.

Landscape and visual effects

Cut location

1. Mr Hunt sought clarification as to the location of the proposed 25.5m cut on the project site. This is identified in the figure attached as **Appendix A** to this letter.

Concrete Batching Plant

2. Meridian agreed to confirm whether or not the Concrete Batching Plant (**CBP**) would be visible to residents to the south east of the project site, and if so, to what extent. The CBP will be located over 800 metres from the nearest dwelling and over this distance is likely to represent a minimal temporary component of views obtained from beyond the Site. Mr Girvan's assessment is that the CBP will result in low visual effects which are assessed as being acceptable from landscape and visual amenity perspectives.¹ This includes effects on views from dwellings to the south east of the site.
3. Given that the final locations of the turbines within the envelopes will be confirmed during detailed design, Meridian is unable to confirm the precise location of the CBP at this stage, with the risk being that a specified location might conflict with a desired turbine site. However, Meridian has proffered a condition requiring the CPB to be located within either the Turbine Envelope Zone or Turbine Exclusion Zone, and it is therefore likely that it will be located along the ridgeline, where it is closest to the turbine platforms.² .
4. There are multiple potential locations along the ridge where the CPB might be located, several of which are shown in the figure attached as **Appendix B** to this letter. An operational requirement is that the CBP is shielded from the wind, meaning it will need to be located in a sheltered area which is located low along the ridgeline or is recessed behind the top of the ridge. As a result, the CPB will be partially shielded from views from outside the Site.
5. Mr Girvan's assessment has assumed the CBP would avoid the Construction Laydown Area in closer proximity to dwellings along Old Coach Road and would be located internally within the Site along the main ridges, or saddles on the access roads. To assist him to further assess potential effects, Mr Girvan was provided a likely location of the CBP in the vicinity of turbine 7 which is located over 1.2 kilometres from the nearest offsite dwelling³. At this location any temporary adverse landscape effects resulting from the concrete batching plant where visible have been assessed as limited and well absorbed within the surrounding working rural context within which it may

¹ Evidence of Rhys Girvan at [228]

² CB4

³ s.92 Further Information Request – Landscape, 7 September 2023.

appear. Regardless of where the CBP is located within the Turbine Envelope Zone or Turbine Exclusion Zone, the visual effects on dwellings outside the Site will remain low.

6. Despite the low, temporary visual effects of the CPB, a condition which sets parameters for the identification of suitable locations within the Turbine Envelope Zone or Turbine Exclusion Zone (for instance, that it is recessed), is something which could be further discussed by the landscape experts at conferencing.
7. Meridian agreed to confirm why maximum height parameters for the concrete batching plant structures were not set in Meridian's proffered condition CB1. The dimensions of the structures in the concrete batching plant area were noted as 'indicative' in the AEE⁴ and were not specified in the conditions proffered by Meridian in the AEE. As noted in the evidence of Mr Anderson, the details of the plant are not yet known, but are not anticipated to create adverse bulk and location effects on any neighbours.⁵
8. However, based on concrete batching plants used at other Meridian wind farm projects, we anticipate that the height of the plant equipment will be at most 7 m and Meridian is willing to agree that restriction in proffered conditions.

Planting in gullies

9. Meridian agreed to investigate opportunities for onsite planting in gullies, and whether such planting might soften the visual effects of the wind farm. The advice received from Mr Girvan is that this would have a negligible effect in mitigating the visual and landscape character effects of the wind farm. Meridian is unwilling to propose further constraints on the landowners' farming operations where there would be no practical difference in effects. However, we note that there are several areas of naturally regenerating scrub in gullies on the site which Meridian understands will continue to be left to naturally re-establish.

Buffer planting at substation

10. Meridian agreed to confirm the proposed conditions as to buffer planting for terminal substation and expected timeframe for effective screening and monitoring. Meridian confirms the condition as proffered, and has had confirmation from Mr Girvan that the height of trees at the date of planting or construction is less important than selecting and maintaining healthy plant specimens suited to this environment which will thrive. This planting is in addition to the existing shelterbelt along the south-east boundary, and is intended to provide additional buffering of the fleeting or transient views of the terminal substation from northbound traffic along SH2.⁶ Mr Girvan considers that the time taken for the plants to mature is not a material factor when considering the existing level of containment provided to this site, and that this is a relatively small installation sited in a discrete location.⁷
11. Regarding the monitoring period, Meridian is willing to agree that this is extended from 18 months to two years, so that two seasons of growth can be taken into account.

Aviation Warning Lights

12. Meridian confirms that the medium intensity aviation warning lights on the top of the nacelle will be 'ground shielded'. However, it is important to note that being shielded below the horizontal plane means that the intensity of the light below the horizontal is progressively reduced, as shown in the figure in Appendix A of the Lighting Report which is also included in **Appendix C** to this letter.⁸ It does not mean that the light will not be visible at all from the ground. Further, the low intensity aviation lights at half height would have a 120 degree beam (60 degree below their horizontal and 60 degree above), but are very low intensity, with only a 32 candela beam. Further information on this can be found in the Lighting Assessment Report, and in the evidence of Glen Wright and Rhys Girvan.

⁴ Section 2.4.7 of the Assessment of Effects on the Environment

⁵ Evidence of Thomas Anderson, at page 95

⁶ Evidence of Rhys Girvan at [191(g)]

⁷ Evidence of Rhys Girvan at [204]

⁸

Concrete Batching Plant and Mobile Aggregate Crusher

13. Meridian agreed to investigate the parameters of the operation of the Concrete Batching Plant (CBP) and mobile aggregate crusher, including the likely location and extent of the operations on the ridgeline the scale of machinery, and the visibility of the plant to the southeast. We refer to the response in the landscape section above, noting that the same general principles apply to the location of the CBP and mobile aggregate crusher.

Operational Noise

14. Meridian agreed to provide further information as to the level of noise associated with turbine foundation pours at its other sites, and whether foundation pouring has been required outside standard construction hours.
15. We confirm that concrete pouring has on occasion been required throughout the night at previous wind farms (depending on foundation type and operational requirements). However, with only 20 wind turbines being proposed for Mt Munro, the overall number of occurrences of pouring, and so the associated night time operations related to this, will be relatively limited. Further, as noted in the evidence of Mr Halstead, given the location of the CBP within the Site (i.e. that there will be a 'setback' between the CPB and dwellings external to the Site), the noise from this activity will be reasonable and will not give rise to nuisance effects, even when this occurs as necessary at night.⁹

Meteorological Mast

16. Meridian agreed to consider and advise on the ongoing need/potential for early removal of the existing meteorological mast.
17. The data from the mast is required during construction, to provide real time wind speed data which will be used to determine whether turbine components can safely be lifted at heights. Further, recent and ongoing wind data is required by the original equipment manufacturers (OEMs) to determine detailed design and procurement requirements. However, as per Meridian's previous offer, we are happy to undertake noise measurements at receptors to inform a noise assessment and will continue to undertake the annual maintenance on the mast, including checking guy wires.

Freshwater Ecology

18. Meridian agreed to confirm water sampling locations in relation to the project.
19. The selection of water sampling locations is described in Section 3.4 and 3.6.3 of the Ecological Assessment, which was attached as Appendix C of the Assessment of Effects on the Environment. These excerpts from the Ecological Assessment, together with maps of the water sampling locations, are attached as **Appendix D** to this letter. We note that the water sampling locations are also identified in paragraphs 57-67 and the maps attached in Appendix C of the Evidence of Dr Keesing.
20. For completeness, we note that the first s92 response included a memorandum from Dr Keesing explaining the stream classification work (i.e. whether waterways are perennial, intermittent or ephemeral), which was also a subject discussed during mediation.

Air Quality

21. Meridian agreed to confirm whether there had been any instances of nuisance caused by uncontrolled dust at its previous wind farm projects.
22. The Environmental Compliance Manager for Meridian's Harapaki wind farm (which is Meridian's most recent wind farm and is currently under construction) has confirmed that the potential for dust generation has primarily been from trucks on the internal access roads. This has been controlled by applying either water or 'DustX' (a compound which is added to make suppression more effective in areas where there are sensitive receivers), and no nuisance effects were reported.

⁹ Evidence of Mr Miklin Halstead, [53] and [54].

23. Particular care was taken by the Construction Team at Harapaki where any 'dust-sensitive' areas were identified near exposed areas. For example, a neighbouring property had stock grazing immediately beside a wind farm access road, separated by a standard wire fence. The Construction Team applied dust suppression on the access road near this fence line and was able to effectively control dust at this location.

Ngā Mihi | Kind regards,

Ellie Taffs

Senior Legal Counsel - RMA

Meridian Energy Limited



Enclosed:

- Appendix A: Figure identifying the location of the 25.5 m cut
- Appendix B: Potential locations for the Concrete Batching Plant
- Appendix C: Aviation warning light intensity distribution diagram
- Appendix D: Excerpts from the Ecological Report on water sampling locations.

Appendix B

Proposed Orca L550 medium intensity aviation warning light – Intensity distribution diagram – With 2km and 1.6km view angles added

