

Before the Hearings Commissioners
at Palmerston North

in the matter of: in the matter of Notices of Requirement by the New Zealand Transport Agency under section 168 of the RMA for the construction, operation, maintenance and improvement of approximately 11.5km of new State Highway between Ashurst and Woodville to replace the closed section of State Highway 3 through the Manawatu Gorge and associated works, known as the Te Ahu a Turanga Manawatu Tararua Highway Project ('the Project')

to: **Palmerston North City Council**

Manawatu District Council

Tararua District Council

applicant: **New Zealand Transport Agency**

submitter: **Meridian Energy Limited**

Statement of Evidence by **Christopher Simon Jones** on behalf of

Meridian Energy Limited

Date: 15 March 2019

Introduction and experience

1. My full name is **Christopher Simon Jones**. I am an Associate - Senior Project Manager at Resource Coordination Partnership (RCP). I have held this position since June 2018.
2. I am a Chartered Member of Engineering New Zealand (CMENGNZ) and hold chartered engineering status as Member of the Institution of Civil Engineers (MICE), and have a Bachelor of Engineering (Civil) degree from Auckland University.
3. I have worked in the civil engineering industry for a continuous period of over 30 years. I have worked in roles for local government, private engineering consultancies and as Client-side representatives in both New Zealand and England.
4. During this time I have led the design and construction teams for highway, water supply, coastal structures, land development and wind farm projects.
5. I have been involved in Project Management of civil engineering projects both in New Zealand and England for over 20 years. I have worked on the following wind energy projects for Meridian.
 - a. I held the position of Senior Project Manager for Mill Creek being the most recent wind farm built in New Zealand. This role required me to manage the overall construction of this Project.
 - b. I led the Project Delivery Team in the Project planning, design and procurement of Project Central Wind Farm as part of the Project's Business case submission to the Meridian Board.
 - c. Previously I held the role of Project Manager/ Construction Manager for Project West Wind Meridian's largest wind farm completed in 2009. I was responsible for the construction of a temporary wharf facility, turbine logistics from Picton to the Wind Farm via the Cook Strait, the installation of the turbines and overall project management duties for the latter stages of the Project.
6. I confirm I have read the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2014 and agree to comply with them in giving evidence in this proceeding. Except where I state that I am relying on the evidence of another person, this written evidence is within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed in this evidence.

7. In presenting this evidence I have also read the evidence prepared on behalf of Meridian by:
 - a. Paul Botha;
 - b. Tony Keyte; and
 - d. Lindsay Daysh.
8. I make this statement in support of Meridian's request that should the Notice of Requirement (NOR) decision be recommended conditions be imposed to appropriately address adverse effects arising from the Project.
9. I have visited the Te Apiti Wind Farm site.

Scope of Evidence

10. My assessment of the potential effects of the Project on the existing renewable wind farm include:
 - a. Lack of Information;
 - b. Sequencing of construction works to maintain Wind Farm Operations and overall project management;
 - c. Specific technical issues including:
 - proximity of proposed construction to turbines;
 - proximity of proposed spoil areas to existing turbines and cables; and
 - proposed cable routes.
 - d. Combined Wind Farm operational and NZTA construction traffic use; and
 - e. Scope of NZTA works to existing Wind Farm assets; and
11. Overall, I will outline the impact on the existing and long-term operation and maintenance of the Te Apiti Wind Farm arising as a result of the Project including temporary construction effects.
12. This statement provides:
 - a. Background;

- b. Existing Wind Farm;
- c. NZTA proposal;
- d. Effects;
- e. Response to s42A Officers Report; and
- f. Response to NZTA Evidence.

Executive Summary

- 13. In summary there are significant risks and potential adverse effects if the proposed Project and operational renewable wind farm are not managed accordingly. Consequently, I consider a dedicated Wind Farm Management Plan needs to be included by conditions should any approval recommending the designation be made.
- 14. I consider a Wind Farm Management Plan is required to manage the unique risks associated with the proposed Project and the Wind Farm infrastructure prior to the commencement of any activity on the wind farm site.
- 15. The Wind Farm Management Plan should be prepared to contain all relevant management procedures and processes to minimise impacts to the Wind Farm operation and be kept updated as required to Meridian's approval.
- 16. I believe NZTA are proposing effects on Wind Farm infrastructure (access roads, cabling and possibly one or more turbines) without engaging specialist wind farm advice to understand the significance of this impact. Consequently, I am unsure as to how this work is proposed to be completed expediently ensuring Meridian's design, safety and operational requirements can be met.
- 17. I further recommend that:
 - a. Meridian has an ability to peer review all Enabling Works designs.¹
 - b. That the Enabling Works, is fully scheduled and the reconfiguration of access roads, cabling etc. is undertaken and fully commissioned before any of Meridian's current assets are

¹ For completeness where I refer to Enabling Works I make these comments as it relates to the wind farm.

taken out of service to enable any Highway construction within the Wind Farm.

- c. That Meridian has representation at NZTA's project management meetings during the execution of the Enabling Works phase, and is copied into all associated Project reporting.
- d. Regular dedicated coordination meetings between Meridian Wind Farm Management and NZTA occur during the overall Highway construction phase.
- e. Meridian request the ability to review all Safety Audits undertaken by NZTA as they relate to over dimensional accesses and if needed seek peer review of any Audit findings that it considers necessary.
- f. Meridian undertakes all design work associated with cable design and NZTA uses only approved cable laying Contractors. Meridian undertakes any reconfiguration of any existing wind farm roads outside of the Designation.

Background

- 18. Meridian's Te Apiti Wind Farm (Wind Farm) is located in the Tararua Ranges 24 kilometres from Palmerston North, and 160 kilometres from Napier. The later location is where the turbine components arrived into New Zealand before being transported to Te Apiti.
- 19. Currently both farming and Wind Farm operations occur on the Wind Farm site.
- 20. The Wind Farm as it relates to the Project Site varies in elevation from approx. 200 to 450 metres above sea-level. The topography of the Wind farm features slopes ranging between 20-40%.

Existing Wind Farm

- 21. The Te Apiti wind farm gained a resource consent in 2003 and wind farm construction commenced that same year after wind turbine and balance of plant procurement had been completed. Construction of the wind farm was completed in 2004 and it was fully commissioned in that same year.
- 22. The Wind Farm comprises of 55 wind turbines, each of 1.65 MW capacity, originally manufactured by NEG-Micon of Denmark which was later purchased by the world's largest wind turbine supplier

Vestas. The turbines have a rotor diameter of 72 m and a hub height of 70 m. The electrical output from each wind turbine generator is at 690 V and that is stepped-up to 22 kV (22,000 V) via a transformer in the base of each turbine.

23. The 55 turbines are connected via 8 underground electrical feeders (circuits) each terminating at the centralized sub-station on the Saddle Road. Here the entire wind farm electrical output is transformed to 110 kV via a large transformer and that line connects Te Apiti to the Transpower sub-station in Woodville. Te Apiti was New Zealand's first transmission connected wind farm.
24. Access to the Wind Farm Site Office and Substation office is directly off Saddle Road. Access to the Wind Farm on the southern side of Saddle Road is either via Morgan and Cook roads, the Moore Farm entrance and the Viewing Platform access Road.
25. The Wind Farm has 21 kms of internal access roads. Access roads are typically 6m wide and are either metalled or have a chip seal on steeper sections to facilitate traction.
26. Earthworks cuttings are sufficiently offset from the roadway to accommodate the swing of over dimensional loads such as blades to pass around corners.
27. High voltage 22kV cabling runs from each turbine in a single 3 core cable which are "daisy chained" together from turbine to turbine. Generally, this cabling is located in the road but it's location does vary within the road corridor. There are no marker post denoting these cable locations. Asbuilt information does exist and has been provided to NZTA.
28. Similarly, dedicated Fibre Optic cabling runs from each turbine in the same cable trench as the 22Kv cabling. There are no marker post denoting these cable locations. Asbuilt information does exist and has been provided to NZTA.

NZTA Proposal

29. For the sake of efficiencies, I do not repeat the Project Site description referred to within the NOR application lodged with Palmerston North City Council, Manawatu District Council and Tararua District Council.
30. The Project will require the reconfiguration of several access tracks, the provision of direct over dimensional access from the Highway to the Wind Farm, new service roads for Wind Farm Operational and over dimensional traffic. High voltage and fibre optic cabling

between some of the turbines on the Southern Side of the Wind Farm will be affected and also require reconfiguration. Several private access roads used by Meridian for wind farm access are also proposed to be used as construction access points for the Highway construction.

Effects

31. The effect of mismanaging the construction of the Project may in the worst-case result in the wind farm being partially shut down and unable to generate electricity. Accordingly, if the panel are minded recommending the issuing of the NOR it is important to mitigate any risk by way of conditions. I have identified a number of these risks below:

Lack of information

32. Full detailed design of the Highway and associated over dimensional and service road network is not yet available from NZTA. It is therefore difficult to assess the effects of the NOR. As such I recommend Meridian is consulted on respective design input information such a design over dimensional and Operational service vehicles before this detailed design occurs, and subsequently during production of this design and construction sequencing (which may occur in parallel) as it relates to Enabling Works.

Construction sequencing of works and overall Project Management

33. The NOR outlines a possible construction programme which shows “*Te Apiti wind Farm reconfiguration and service relocation*” as one of the very early stages of the sequencing.²
34. The timing and sequencing of construction works is important as additional effects over and above that provided within the NOR may result. This is particularly a risk where significant earthworks are proposed to cut through a unique site being a wind farm. I am not aware of NZTA carrying out such work in New Zealand before and therefore my expectation is that there would be the requirement for specialist expertise and a conservative approach applied.
35. A key way to keep the Wind Farm safe and operational is to carefully sequence works so that the interruption to existing infrastructure is kept to an absolute minimum. This can be achieved

² See Section 10.3 and Section 10.4 - the Notice of Requirements outlines the Early Construction Activities – Enabling Works. Section 10.4 Te Apiti Wind Farm reconfiguration sub section notes the construction of the underpass at Ch8350m is part of the enabling works

by having replacement infrastructure in place and operational ahead of any removal or decommissioning.

36. By way of example, the ability to undertake the works early would require the proposed cable crossings and Service Road underpass being at locations where the Highway is on embankment and this is currently proposed. This means that any cabling/ ducting and or underpass can be readily constructed without having to wait for the bulk earthworks to be completed to get down to the required Highway subgrade level. This would be a key pre-requisite to enable the Wind Farm Enabling Works to be completed early on in the overall Highway construction sequencing.
37. Also in some instances the timing of the construction of the new cable routes from existing turbine sites to their Highway crossing points and onwards to their new connection points will be dependent upon the completion of new access roads through which the cables will run .e.g TAP02 to TAP06 and at TAP22 to Feeder 3. The completion of some of these access roads may require fill material from the main Highway excavation or for earthwork stability reasons have to be constructed as part of the main Highway construction. Consideration of these issues and overall earthworks mass haul for the access road will need to be addressed in the detailed design stage if these cabling Enabling works are to be achieved early on.
38. I recommend that during construction Meridian have representation at Project meetings relating to any Enabling Works and the ability to attend Project construction coordination meetings during the construction of the Highway. This mirrors an identified NZTA risk at Section 10 which states delays to essential Enabling Works activities is a key risk. As such Meridian should attend risk workshops associated with Enabling Works construction and ongoing use of wind farm assets so to provide specialist input.
39. I believe a Wind Farm Management Plan is required to manage the unique risks associated with the Project. This is because the Wind Farm has a unique set of 24/7 operational and security requirements. It is my recommendation a dedicated Wind farm Management Plan be prepared, approved by an independent expert party and kept updated. This plan will contain all relevant information of the Project-wide Management Plans mentioned as they relate to managing the specific impacts on the Wind Farm. In my view this Plan will enable those managing the Wind Farm operations and Highway construction to have a clear and definitive understanding of management responsibilities and obligations. Alternatively, if this is not provided then in my opinion the following management plans should be amended accordingly to accommodate my concerns:

Construction Traffic Management;

40. A key management plan will be the Construction Traffic Management Plan (CTMP) which is a standard management tool to control traffic activities, outline specific approved routes of access and delivery of heavy construction vehicle movements. However, this Plan will also need to accommodate possible over dimensional turbine movements, road closures associated with daily wind farm operations as well as daily wind farm operations traffic.

Management of Dust;

41. Dust from the Highway construction site can cover the turbines. Dust can compromise the performance of electronics within the turbine. Air filters exist within the turbine to manage dust ingress.
42. The management of dust will be covered by the Construction Air Quality Management Plan (CAQMP). It is recommended that Meridian has the ability to review the CAQMP with respect to dust management and turbines, substation and associated transmission lines.

Management of Vibration;

43. The Construction Noise and Vibration Management Plan (CNVMP) proposed should include commentary of the possible extent of construction related vibration. Meridian having the ability to peer review this plan and for NZTA action.

Health and Safety;

44. Both Meridian and NZTA will need to meet their respective PCBU obligations under the Health and Safety at Work Act 2015.
45. The development of comprehensive Health and Safety Plan for the Highway Project is key tool to ensure safety of the workforce during construction.
46. Meridian should have the ability to review this Health and Safety Plan to ensure there is alignment with its own Health and Safety requirements.
47. Clear demarcations onsite will be needed to confirm who is in control of the respective areas of the sites being managed by Meridian and NZTA.
48. Associated Health and Safety documentation will need to cross-reference procedures and protocols of each party to ensure there are no gaps in the management of health and safety.

Management of Security of Wind Farm;

49. Meridian has strict controls on access to the Wind Farm. These Wind Farm Site access controls may need to be refined to the accommodate the extent of the Construction workforce movements on and off the Site. These refinements will need to be agreed between Meridian and NZTA. Any such procedures will need to be included in the NZTA's Construction documentation and Wind Farm Management Plan.

Management of farming operations during construction;

50. The Wind Farm access roads are also shared with farming operations. Gate use protocols apply to facilitate containment and movement of stock. The need to obey existing gate opening closing protocols is crucial to maintaining cooperation of the Farmers.
51. Consideration may need to be given to the temporary installation of cattle stop crossings at certain current gated key access road locations. Farmer and Meridian approval are obvious pre-requisites for this means of control to occur and should form part of any Stakeholder engagement and Construction Management documentation and the Wind Farm Management Plan.

Technical matters

(a) Proximity of proposed construction to turbines;

52. The Project proposes to construct earthworks for Service Roads within 60m of the existing turbine at the following turbines TAP02, TAP08, TAP22, TAP23, TAP24.
53. In my view construction methodologies will need to be prepared by NZTA that document how sections of the service roads are to be constructed and how any construction loading and vibrational issues will be managed when working close to the Turbines. Clear demarcation of "no-go" areas will be needed to keep construction traffic off turbine platforms. Detailed engineering work will need to be carried out. This is expected to be covered in any Construction Management documentation and required by way of condition.
54. Design of the service roads in these areas must consider the location and depth of cover to protect the existing 22kv and fibre Optic cabling.
55. A very large box cut is proposed extremely close to TAP09 foundation and is likely to present stability issues not only for the current turbine but also compromise any repowering locations.

56. It is suggested that NZTA either explore alternative Highway alignments within the proposed road corridor that move the cut batter away from TAP09 or design appropriate retaining measures that ensures that the stability of TAP09 is retained.
57. Similarly, a large box cut is also proposed within 60m TAP50. This cutting is clear of the existing turbine foundation. However further specific detail of the cutting is required before any further comment can be made on any possible stability issues for any repowering locations.
58. *(b) Proximity of proposed spoil areas to existing turbines;*
59. There are several locations where proposed spoil sites are located within 60m of turbines. These locations are at turbines identified by Meridian as TAP01, TAP08 and TAP50.
60. I consider any spoil placed within these zones would need to be placed as engineered fill so as not to compromise Meridian's ability to locate a turbine foundation in these areas as part of any future repowering programme.
61. Construction methodologies will need to be prepared by NZTA that document how the spoil is to be placed and compacted and how any construction loading and vibrational issues will be managed when working close to these turbines. These methodologies will need to be peer reviewed by Meridian.
- (c) Proximity of proposed spoil areas over proposed cable routes;*
62. There are several locations where proposed spoil sites are located over proposed new cable routes. These locations are:
- (a) between TAP08 and the Highway embankments at CH7100m;
 - (b) existing cabling from TAP23 to Cook Rd (not impacted by any new road construction); and
 - (c) the new cabling from TAP50 to the Highway embankment at Ch 9650m.
63. I consider unless these cable locations are demarcated and excluded from any future spoil placement the cable trench designs will need to allow for any increased burial depth and any construction loadings such as those associated with spoil compaction. The real risk that will otherwise arise is that cables will be damaged and require fault finding activities to locate and undertake repair during which time the associated turbines or

turbine feeders will have to be taken out of service impacting on Meridian's operational commercial performance.

(d) Proposed cabling routes;

64. Existing 22kv and fibre optic cabling is generally located within the Wind Farm access road corridor. These cable routes will be severed with the construction of the proposed Highway at the following locations between TAP02 and TAP03, TAP08 and TAP09, TAP22 and TAP23, TAP27 and Cook Road/ access road intersection and TAP50 and the Feeder 7 String to the substation
65. Meridian have an operational requirement for 24/7 access to all its 22kv and fibre optic cabling to enable fault finding to occur. The impact if a fibre optic cable is damaged depends upon the location where the damage has occurred. As the turbine fibre optic cabling is "daisy chained" between turbines a cable severance could take out of service a single turbine or a group of turbines.
66. Cable crossings beneath the Highway will need to be either ducted or in dedicated cable culverts. As they will be subject to constructional and burial loadings they should be subject to appropriate specific design.
67. The steep topography either side of the cable crossings highlights the need for specialist input to planning at the detailed design stage to ensure cables can be pulled through these ducts or conduits without causing damage.

Combined Wind Farm operational and NZTA construction traffic

68. Construction access is proposed along the existing Wind Farm access roads to TAP 03, TAP05, TAP09, TAP23 Cook Road and the cable access track for Feeder 7 in the vicinity of TAP50. Morgan Road will be terminated and thereafter have no use to the Wind Farm operations.
69. Existing accesses are used daily by Meridian's Operational Team to access the Wind Farm. It is imperative that these accesses remain fit for purpose to ensure safe 24/7 access.
70. There is also the potential that the use of these roads by construction traffic will accelerate the degradation of these roads. I therefore recommend that NZTA document, as part of its Construction Management Plan, how it intends to ensure this safe 24/7 access is maintained, and that road access is provided.
71. Construction use of the Feeder 7 cable access track will need to be carefully controlled so as not to expose the cables beneath to

additional vehicular loading. This will need to be included in Construction Management documentation.

72. Existing cabling is located under most of the proposed construction access routes. In some instances, it may be possible that construction traffic may pass over these cables that are ordinarily not subject to vehicular loading. The exact nature of the intended construction traffic needs to be included in Construction Management documentation and approved by Meridian to ensure that the integrity of any existing cabling is not compromised.
73. To ensure over dimensional access to all turbines is possible during Highway construction and to minimize reliance on Highway construction completion of the direct access points I would recommend that Cook Road be upgraded to accommodate this over dimensional usage. Given its construction Cook Road will likely need to be upgraded to take construction traffic anyway. This access route would also require over dimensional access across the Highway construction area via the existing wind farm access road to TAP27 and to turbines beyond via either the existing access road network and or the new over dimensional route eastward to TAP02.

Scope of NZTA works to existing Wind Farm assets

74. NZTA require their Construction Alliance to undertake design and construction of cabling modifications and laying.
75. As such I believe Meridian should undertake the design work associated with existing and new cable modifications. This is because only Meridian have access to specialist consultants who are not only familiar with Meridian's design requirements but also the existing physical infrastructure being modified.

Response to s42A Report

76. I note paragraph 652 of the Officers Report and the associated amendment to the condition T1B that the Council planner has proposed being:

Any works required to alter the Te Apiti windfarm infrastructure, including moving turbines and relocating transmission infrastructure, must be completed prior to construction beginning.

77. I do not believe that the above condition is practical. Rather I suggest that following words be added to the condition – *“unless an alternative is agreed with Meridian.”*

78. I also note that Meridian's submission sought to address the ability to stage the adverse effects that would likely arise should the NOR be recommended. For example, as I understand Meridian sought to reduce effects by way of ensuring that mitigation was installed and provided for first. The proposed amendment now provided by the s42A Report seems to go further than this. Meridian's preference is to move as little infrastructure as reasonably possible as this will likely affect not just one turbine but potentially major parts of the Southern portion of the wind farm site.

Response to NZTA Evidence

79. If the panel recommend approving the NOR then I believe the conditions provided by Mr Lindsay Daysh at his Attachment A are appropriate. By way of additional points, I also make the following observations outlined below.
80. With respect to the new definition of Enabling Works it relates to the Te Apiti Wind Farm there is reference to "preliminary activities" including any necessary reconfiguration of the Te Apiti Wind Farm. As mentioned above some of these Enabling activities may not be able to be undertaken as early on the Highway construction as intimated. Exact timings will be subject to the development of detailed design and construction sequencing and consultation with Meridian. I therefore suggest an amendment to the definition "... any necessary reconfiguration of the Te Apiti Wind Farm as and when agreed with Meridian.....".
81. Also with respect to the Enabling Works as it relates to the Te Apiti Wind Farm there may be reconfiguration works outside of the Designation for instance in adjusting existing access tracks to accommodate over dimensional access from the reverse direction. This work will need to be undertaken in agreement with Meridian.

Christopher S Jones
15 March 2019