

BOARD OF INQUIRY
HAUĀURU MĀ RAKI WIND FARM PROPOSAL

In the matter of the Resource Management Act 1991

And

In the matter of resource consent applications by Contact Wind Limited in respect of the Hauāuru mā raki Wind Farm Proposal

And

In the matter of notices of requirement and a resource consent application by Contact Energy Limited for transmission infrastructure related to the Hauāuru mā raki Wind Farm Proposal

REBUTTAL EVIDENCE OF HELEN LOUISE YORKE

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Introduction

1. My name is **Helen Louise Yorke**. I am a senior member of Beca Carter Hollings & Ferner (Beca) Power Systems section. My specialist area is High Voltage (HV) transmission lines.
2. I refer the Board of Inquiry to the statement of my qualifications and experience in my evidence in chief. I reaffirm my commitment to comply with the code of conduct for expert witnesses in the Environment Court.
3. The purpose of this brief of evidence is to respond to the evidence of Eric Allan, Julian Austin, Gillian Cockerell (on behalf of the Director General of Conservation), Martin Hansen (on behalf of NA McConnell and Mana Trust), Seamus Kiernan, Dr Philip McDermott (on behalf of David and Pam Walter), Stephen Markham (on behalf of Federated Farmers of New Zealand (Auckland Province)), and Joseph Partridge as far as those briefs relate to the transmission corridor selection process and the transmission system design.
4. I address the evidence of these submitters in turn below.

Eric Allen

5. In his submission (at page 5) Mr Allan states that the transmission corridor would allow the proposed transmission line to “move considerably closer to our home than is implied by the information.”
6. The transmission corridor in this area is presently 100m wide. The worst case potential for shifting the proposed transmission line closer to Mr Allen’s dwelling is approximately 20m.

Julian Austin

7. I have read the brief of evidence of Mr Julian Austin relating to the distance between their house (N559) and transmission towers (paragraphs 24 and 25 of his evidence). I have also read his comments at paragraph 28 of his evidence that straightening the line could remove the need for heavy strain towers and reduce visual effects.
8. Tower Dev 6 is proposed to be approximately 150m away from Mr Austin’s house. The existing tower HLY-OTA 65 is approximately 97m away from his house. This tower is to be dismantled. The current proposed tower height of Dev 6 is 40m whereas the existing tower HLY-OTA 65 is 47.8m high.

9. Straightening the transmission line is technically possible which would result in moving tower Dev 6 south along the track on Mr Partridge's property. This move may result in a tower and insulator configuration similar to the existing tower HLY-OTA 65. This would remove some of the bulk of the insulator configuration from the proposed Dev 6 location. However, it moves the tower closer to the Partridge dwelling. Any gain in terms of reduced effects on Mr Austin would therefore be offset by an increased effect on the Partridge property and in particular block the access to the dwelling on his property.

Mr and Mrs Ball

10. At paragraphs 8 and 9 of their evidence Mr and Mrs Ball talk of a 400m wide transmission corridor. As stated in paragraph 38 of my evidence in chief this was the initial corridor which was generally, including over the Ball's property, reduced to 200m. At paragraph 41 of my evidence in chief I make it clear that the final easement width will typically be between 42m to a maximum of 60m.

Gillian Cockerell

11. At paragraph 192 of her evidence, Ms Cockerell considers the flexibility of the corridor width (400m) through the Te Umukaraka Bush area, and leaving the positioning of transmission structures through this area to a detailed design stage, to be inappropriate.
12. Given the mutual desire to minimise ecological effects of crossing Te Umukaraka Bush I consider that it is preferable to keep as much flexibility as possible. The corridor route has been selected to minimise the distance of the bush crossed, therefore the proposed crossing of the bush is at its narrowest point. There are a number of technical solutions that could be utilised to reduce as much as possible any potential effects.
13. Ms Cockerell refers to Mr Kessel's evidence (at paragraph 125 of his evidence) and the potential to use a natural clearing within the bush where large trees have been logged for a steel pole structure (as opposed to a tower). Ms Cockerell seeks that the Board of Inquiry require the proposed mitigation measures mentioned in Mr Kessel's evidence. However, Mr Kessel's makes it clear that site location and the ability to use a pole is dependent on ground investigations. This involves detailed geotechnical investigations of the proposed site (potentially involving drilling). It is only at that point that the type of structure (tower or pole) and the location can be determined.
14. As stated in paragraph 38 of my evidence in chief, in addition to geotechnical investigations, detailed design will also determine ground contours and tree species and locations. Reducing the width of the corridor now will reduce the mitigation options available. I therefore consider it prudent to maintain flexibility with the final line and structure placement through this bush, which will be the subject of detailed design.

Martin Hansen

15. I have read the brief of evidence of Mr Martin Hansen relating to alignment of the transmission line. At paragraph 2 of his evidence, Mr Hansen seeks that the transmission line across the wetland be moved 500m to the east. I assume Mr Hansen meant to the north as a shift to the east does not make any sense given the corridor and line configuration.
16. The alignment of the transmission line across the Wetland (immediately to the west of the switching station) took into account:
 - (a) the visual impact on all the landowners in the vicinity;
 - (b) not placing the towers in the wetland area; and
 - (c) minimising the height of towers (to reduce visual effects and the crossing point of the wetland).
17. The current proposal is that a 40m high tower is located to the west of the wetland and a 43m high tower located on the east. It may be possible to reduce the height of the tower on the east of the Wetland at the detailed design stage, when more accurate survey is obtained, in order to reduce further the visual impact.
18. However, if an alignment further to the north is considered, this would bring the towers closer to properties off the Churchill Road. The line entry to the switching station would also need to change to the northern side. These changes would require an additional large angle tower directly to the west of the wetland area, compared with the current proposal. It would also create a more complicated line entry point to the switchyard.
19. Therefore, while Mr Hansen's suggestion is technically feasible, it is not preferred as the overall effects are considered to be greater than the preferred route.

Seamus Kiernan

20. Mr Kiernan raises 4 issues in relation to the transmission corridor:
 - (a) The visual effects of lighting towers in the proposed Orton Switchyard (paragraph 12);
 - (b) the proposed realignment of the existing HLY-OTA line and its effects on his house (paragraph 13);
 - (c) the possibility of a berm (or bund) in addition to landscape planting to further mitigate the potential visual effects of the earthworks in preparing the switchyard site (paragraph 17); and

- (d) that consideration be given to moving the switchyard as far south/southwest as is reasonably practical (within the planned area) (paragraph 18).

Switchyard lighting

21. Switchyard lighting will be directed into the Switchyard and shielded as much as possible to reduce light spill. Mr Kiernan is correct the lighting will only be used for night time emergency maintenance situations. It is not intended for continuous year round use.

Proposed realignment of HLY-OTA

22. The location of proposed tower Dev 6 was based on minimal change of alignment from the existing tower HLY-OTA A 66, and not placing the tower in the wetland area. Realignment as suggested by Mr Kiernan would increase the lines visibility at other dwellings and may cause some clearance issues over the wetland. Also, such a shift may block access to Mr Partridge's property. This proposed realignment is therefore not preferred.

Construction of a berm or bund

23. I have considered the suggestion of a bund. Due to the location of the wetland there is insufficient space to construct a 5m bund without imposing on the wetland area. There is a hill between the dwelling on Mr Kiernan's property and the proposed Switchyard. This is addressed in Mr Lister's rebuttal evidence.

Moving the location of the switchyard

24. Moving the location of the Switchyard further south would take the switchyard closer to other dwellings. Also, as noted by Mr Kiernan, the topography rises in this area, so that any movement of the site to the south would require greater earthworks and a cut in the landform. As a result the current location is preferred.

Dr Philip McDermott

25. I have read the brief of evidence of Dr Philip McDermott relating to the transmission corridor. At paragraph 19, Dr McDermott comments on the importance of the directness of the route.
26. In relation to the corridor itself, Dr McDermott suggests an alternative at paragraph 27(1) of his evidence:

“One compromise may be to reroute the eastern portion of the easement currently shown on the Walter property through the gully on the recently [sic] Harford property to the east.”

27. Dr McDermott also considers the potential impacts to farming operations as a result of construction (paragraph 24(2)).

The role of 'directness' in corridor selection

28. Directness is a key consideration in corridor selection but it is not the only driver nor the determinative driver. The proposed corridor deviates in a number of respects from a 'direct' route in order to address site-specific constraints. I detail the types of site-specific constraints in my evidence in chief.

An alternative corridor

29. As I mentioned in my evidence in chief there were a number of route selection criteria including ecological issues, visual effects, distances to dwellings. From the beginning, our approach to corridor selection along the valley in this area was twofold; to reduce the visibility of the line by keeping off ridge lines where possible and to avoid if possible the QEII area on the Harford property.
30. Dr McDermott's proposal would have the transmission line running along a ridgeline and spanning the QEII covenanted bush on the Harford property. For these reasons such an alignment is not preferred.

An approximate construction period

31. Dr McDermott comments on disruption to farming practices during the construction period. An approximate (as there are many variables) average time period for construction of a transmission line is:
- (a) one day for the initial survey for each tower;
 - (b) two days for the geotechnical investigations for each tower (which may involve a drilling rig);
 - (c) two weeks for foundation construction and the erection of each tower; and
 - (d) 3 weeks for stringing of the conductors for each section (spread over approximately 10-15 towers).

Stephen Markham

32. I have read the brief of evidence of Mr Stephen Markham relating to the transmission corridor. At paragraph 5(h) Mr Markham says:

"I think the site chosen for the lines to cross my property is also not ideal because it crosses a ridge that is exposed to the natural elements, especially the wind."

33. As I have already noted, we have endeavoured to avoid transmission lines crossing ridges wherever possible, in this location it was not possible to avoid crossing of the ridge. Transmission lines and towers are designed to withstand significant winds, a windy ridge will not cause an issue to the integrity of the tower or lines.

Joseph Partridge

34. I have read the brief of evidence of Mr Joseph Partridge relating to the transmission corridor and the placement of transmission towers. Mr Partridge raises four issues:
- (a) the number of transmission towers to be placed on Mr Partridge's property (paragraphs 9 and 21);
 - (b) the accuracy of the aerial photographs and maps used in the computer based model that was developed for the design and selection of the transmission corridor (paragraph 20);
 - (c) referring to Exhibit of HY14, why Photo 6 has been "altered"; and
 - (d) the position of the transmission tower and the possibility of lightning strikes.

Number of transmission towers on Mr Partridge's property

35. For the design of the diversion line, two towers would be required on Mr Partridge's property, this was identified when the switching station was located on the adjacent property.

Aerial photographs and maps used in the computer based model

36. The aerial photographs available at the time of the preliminary design and route selection did not show Mr Partridge's dwelling. However, the dwelling was identified early in the process and is included on the dwelling list (attached as Appendix G to the Project Description attached to the AEE) as N733.

Exhibit HY14 - photo 6

37. Photo 6 in Exhibit HY14 is described in my evidence in chief as an artist impression of the proposed alignment. To obtain the 'landscape view' two photos were taken adjacent to each other and joined together to show the proposed alignment. Accurate corridor placement is contained in the plans attached to the notices of requirement.

The position of the transmission tower and the possibility of lightning strikes

38. Lightning strikes are a rare event, and the earthwire (located at the top of the tower) will dissipate any lightning strikes. Usually the highest conductive point would be hit by lightning. Therefore the presence of the tower would act as lightning protection to Mr

Partridge's house and sheds, that is, the lightning would hit the tower or earthwire before the house.

H L Yorke