Before the Board of Inquiry
Hauauru Ma Raki Wind Farm Proposal

Under	the Resource Management Act 1991
In the matter of	Resource consent applications by Contact Wind Limited relating to the Hauauru Ma Raki Wind Farm Proposal
And	
In the matter of	Notices of Requirement and a Resource Consent Application by Contact Energy Limited relating to the Hauauru Ma Raki Wind Farm Proposal

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Supplementary statement of evidence of ***Dr Steve Percival***

Dated: 17 April 2009

Date of hearing: Commencing 27 April 2009

Director-General of Conservation

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S1 My full name is Dr Steve Mark Percival. I am principal of my own private practice, Ecology Consulting.

S2 I refer the Board of Inquiry to the statement of my qualifications and experience in my evidence of chief. I reaffirm my commitment to comply with the code of conduct for expert witnesses in the Environment Court.

S3 In his rebuttal evidence Mr Kessels raised a number of points with regard to my collision risk modelling and specifically requested additional information be provided. The purpose of this supplementary evidence is to provide that information for the Board of Inquiry, Contact, and submitters to consider.

S4 In para. 70 Mr Kessels states that "*I query if he has fully stated the limitations with this approach in his evidence. Like all models, the theoretical collision risk model simplifies the situation into a simple set of parameters. Simplification might make a theoretical number easier to calculate, but it does not necessary lead to a correct number and is not a replacement for observations of the true behaviour of a species.*"

S5 He then (in para. 71) raises a particular concern about the application of a 90% avoidance rate, stating that it is not substantiated by overseas studies and that further substantive evidence from me as to why this figure was used in my modelling for this wind farm proposal would be helpful. Mr Kessels does helpfully quote from the Taharoa C expert report (Fuller et al 2009) that "*the use of a highly precautionary 90% avoidance rate for the winter migration was agreed to account for the potential increased risk.*"

S6 In para. 73 he states that clarification on how my model may account for spatial variation in bird flight activity would be helpful.

S7 Hence there are four main areas for which additional information has been requested:

- Further background on the Band model;
- Explanation of how the model deals with the collision risk window;
- Explanation of how the model deals with spatial variation in bird flight activity;
- Choice of avoidance rate for the southwards migration period.

I shall deal with each of these in turn.

Further Background on the Band Model

S8 I should clarify at the outset here that the collision risk model is not 'my' model but rather the standard one developed by Scottish Natural Heritage [SNH] (Band 2001, Band et al 2007). The calculations on which the modelling is based are all explained in those publications and indeed a spreadsheet is available from the SNH web site to assist with the calculations. The Band model is a tool now widely used to assist in collision risk assessment. Here I have applied it to determine whether there may potentially be a significant collision risk for a range of shorebird species, to provide information to inform further population analysis by Dr Dowding. The model has already been independently reviewed, notably by the British Trust for Ornithology (Chamberlain et al. 2005). All of these publications were referenced in my evidence in chief (para. 50).

S9 Regarding the provision of the details of the modelling, all of the input data were detailed in my evidence [Appendix SP.1] and their source given.

The Collision Risk Window

S10 Mr Kessels raised a query with regard to how the model defines the collision risk window. This is simply the three-dimensional space within which birds would be at risk of collision. As explained in my evidence in chief (para. 58) I have taken the distance across the wind farm in the direction of the main shorebird flight movement directly from Mr Kessels' evidence (6km). The height of the window relates directly to the rotor diameter of the wind turbines.

Spatial Difference in Flight Activity

S11 Mr Kessels states that "*in reality birds will prefer particular areas in space, and aerial usage may be influenced by variation in landscape features*". This is a feature common to most wind farm sites. The Band model for the HMR site, as currently parameterised, works on the whole wind farm site and effectively works on an average value of flight activity across the whole wind farm. The currently available data (especially for the southwards migration) are not yet sufficient to enable any more precise spatial modelling to be undertaken. When more detailed baseline data do become available it may be useful to add such a spatial component to the modelling (for example modelling parts of the wind farm separately) but with the currently available information this is simply not possible.

Avoidance Rates

S12 Queries were raised by both Mr Kessels and Dr Seaton in their rebuttal evidence with regard to the avoidance rates applied, particularly the use of 90% for the southern migration. It remains my opinion that this is an appropriate precautionary approach to adopt in this case – it is the one that was agreed by the expert group for Taharoa as appropriate in this part of New Zealand and one that is tailored to the local site conditions (particularly a large migration at night for species that have not been studied in similar circumstances at existing wind farms elsewhere).

S13 My choice of a 90% avoidance rate for the HMR wind farm was based primarily on the fact that we are dealing with a novel situation. The precautionary value of 95% proposed in Band et al. (2007) is based on a range of studies from Europe and the United States but not on any studies that involved large-scale shorebird migration at night and with such a high proportion of the population involved. We are dealing with a different scenario to anything that has been studied elsewhere worldwide - and I have therefore adopted what I think is appropriate precautionary position. That novel situation includes the fact that a high proportion of several shorebird populations are likely to migrate through the wind farm site, with a high proportion of that migration likely to be at night, at least for the southwards migration, and with populations that are vulnerable to even a small level of additional mortality.

S14 Dr Seaton notes in para. 16 of his rebuttal evidence that avoidance rates may be higher and I agree with that position (it has indeed been agreed in the Expert Caucus that avoidance rates could be different to those applied here), but the position that we are at now with this novel situation is that we simply do not know this. A key piece of information here is that, as stated in Dr Seaton's evidence in chief (para. 5), there is limited information available on the avoidance behaviour of New Zealand's birds.

S15 Notwithstanding this, I have re-run the collision risk models using a 95% avoidance rate for both the northwards and southwards migration (the value proposed as a general precautionary value by SNH and by Powlesland, 2009). I do not agree that this is a more appropriate value to use in the current circumstances but present the results to examine the consequences of using that value. These results are presented in Table 1 below. The effect of the change in avoidance rate is to reduce the overall annual collision risk by approximately one third.

Table 1. Monte Carlo collision risk predictions for key migratory shorebird species: applies 95% avoidance rate for N and S migrations.

Species	Mean	Lower 95%	Upper 95%	Range
SIPO	135	39	251	1-412
Wrybill	7.7	2.2	14.3	0.1-22
Bar-tailed godwit	13.8	1.2	31.4	0-47
Banded dotterel	10.4	2.9	19.4	0.2-35
Pied stilt	5.9	1.7	10.9	0.1-17

S16 I have read Dr Dowding's supplementary evidence and note that he considers that, following his recalculation of the predicted impacts at the population level using the additional collision estimates, there are still potentially substantial effects on both SIPO and wrybill populations, and I concur with that finding.

OVERALL CONCLUSIONS

S17 In my evidence in chief I concluded that from the information currently available there is a high likelihood of substantial numbers of migrant shorebirds passing through the HMR wind farm at rotor height and hence being at risk of collision. This remains my position. Even applying a 95% avoidance rate for all flights through the wind farm, the predicted collision risk still results in a substantial population impact (as discussed in Dr Dowding's supplementary evidence following his updated population viability analyses).

S18 It remains my position that, on the information currently available, one simply cannot say whether the risk of the HMR wind farm to birds can be avoided, remedied or mitigated. It is possible that it may, but this can only be concluded with any certainty once an adequate baseline data set has been obtained.

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