

**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

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**FURTHER REBUTTAL EVIDENCE OF NEVIL IAN HEGLEY  
RESPONDING TO EVIDENCE OF SB COX AND CJ BRADLEY**

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## **Introduction**

1. My name is **Nevil Ian Hegley**. I am the Principal of Hegley Acoustic Consultants.
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 Sean Cox and Clayton Bradley as far as those briefs relate to noise effects.
4. I address the evidence of these submitters in turn below.

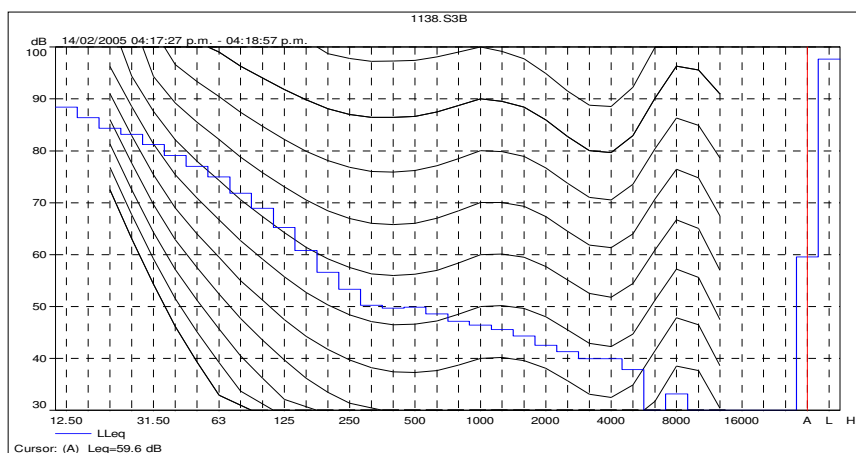
## **Mr Sean Cox**

5. I have read the brief of evidence of Mr Cox relating to noise effects. In the second paragraph of page 6 (last page) of his evidence, Mr Cox states:

*“Large amplitude very low frequency air pressure variations (including subsonics). An issue of which the only common source is large industrial scale wind turbines. My analysis of the output from Contact’s turbine array suggests that Aotea harbour will be shielded by topography. Hence I have made no personal submission about this project. I reserve the right to oblige Contact to alter operational methods if my analysis is in error and significant emissions do reach my home. Raglan however is exactly on the array axis and in some common wind directions may well suffer significant reinforcement of this problem as well as annoying and disturbing beat effects in the audible pressure wave range.”*

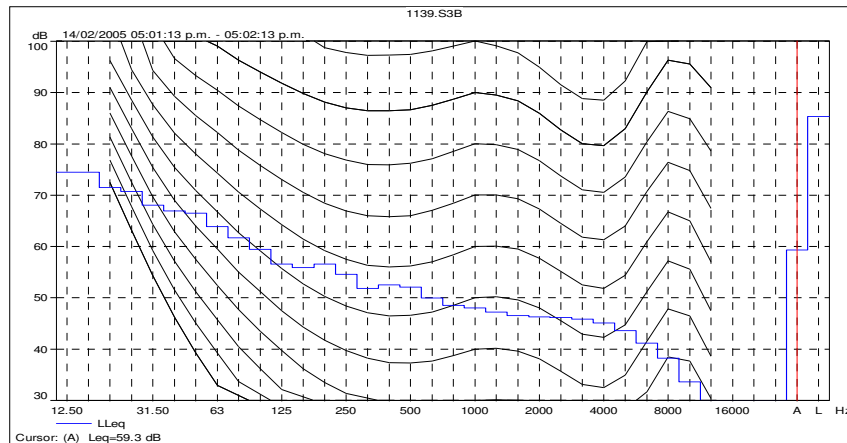
6. I address low frequency noise in paragraphs 102 – 104 and 107 of my evidence in chief, and set out my conclusion that there will not be any effects of low frequency sounds produced by the turbines. However, the following sets out some additional analysis I have undertaken on low frequency noise from wind turbines.

7. The results of a measurement undertaken at the Tararua wind farm of Vestas V90 3MW wind turbines with wind speeds of approximately 20m/s at the turbine and 15m/s at the measurement positions is shown on Figure 1. The closest turbine was 117m from the measurement position with 26 turbines visible, seven being within 400m.
8. Figure 1 shows the sound spectrum plotted against noise levels from 12.5Hz to 12.5kHz and the equal loudness curves are also shown. This plot shows there is a significant drop off in the sound from about 50Hz.



**Figure 1 Tararua Turbines, 117m to closest Turbine**

9. At the Te Apiti wind farm the turbines are slightly smaller at 70m rotor diameter. Measurements undertaken at 80m from the closest turbine with a wind speed of approximately 20m/s at the turbine and 12m/s at the monitoring position over a five minute period are shown on Figure 2. There were 9 turbines within 700m of this measurement position, the second closest turbine being 145m away.
10. Again, a similar result was obtained at Te Apiti as was measured at the Tararua site, as is shown on Figure 2.



**Figure 2. Noise at 80m from Closest Turbine**

11. As Mr Cox may be more concerned about frequencies below 12.5Hz I have also undertaken a FFT (Fast Fourier Transform) analysis of wind turbine generator noise and vibration. This form of analysis enables frequencies down to 1.6Hz and a band width analysis of less than 1Hz.
12. The results of this analysis demonstrated that there is less noise in this very low frequency band width from an operating wind turbine at distances of around 80 – 117m than is experienced from surf noise with 1.5 – 2.5m waves at a distance of typically 20m or in a house 30m from a busy suburban road.
13. I therefore reiterate the conclusion from my evidence in chief that houses in the vicinity of the proposed HMR wind turbines will experience no effects of low frequency sounds from the turbines.
14. I understand Mr Cox lives more than 25km from the closest proposed wind turbine location. As the above has been based on measurements undertaken 80 – 117m from the closest turbine I do not believe there is any possibility that low frequency noise will be of any consequence for Mr Cox and his concerns will not be realised.
15. Likewise, I understand that Raglan is approximately 8km from the closest proposed turbine. Again, it is impossible for low frequency noise from wind turbines to have any effect at that distance.

16. Mr Cox's assertions about "beat effects" are also incorrect, in my view. As noted in my evidence in chief (at paragraphs 99 - 101), some earlier models of wind turbine used in other parts of the world created some noise modulation effects. More modern turbines, such as those proposed to be used for the HMR project, do not create such effects.

**Mr Clayton Bradley**

17. Mr Bradley has indicated I may have a typographical error in my evidence in chief where <30dBA has been quoted in one place and 35dBA in another place. I have checked the levels and the level is, in fact, approximately 32dBA. This error is regretted although it does not alter my conclusions other than providing a slightly better result compared to the 35dBA I have adopted in my evidence in chief (paragraph 127).

**N I Hegley**