

BOARD OF INQUIRY

HAUAURU MA 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 to
the Waikato Regional Council in respect of the Hauāuru
mā raki Wind Farm Proposal

And

In the matter of A resource consent application by Contact Energy Limited
to the Waikato Regional Council in respect of transmission
infrastructure related to the Hauāuru mā raki Wind Farm
Proposal

BRIEF OF EVIDENCE IN CHIEF OF VAUGHAN FRANCIS KEESING

Introduction

1. My name is **Dr Vaughan Francis Keesing**. I am a principal and senior ecologist employed by **Boffa Miskell Limited**.
- 1.0 I hold the qualification of Doctor of Philosophy (PhD) in Ecology.
- 1.1 My skills lie in community ecology, and in measuring and understanding interactions between species and their environment. I have specialist skills in the areas of limnology, entomology, zoology, botany and statistics and have worked extensively in freshwater and terrestrial habitats. My PhD thesis and subsequent research focused on community and habitat inter-relations and invasion-disturbance ecology.
- 1.2 I have been practising as an ecologist for the last 13 years, and have worked in a variety of locations including the West Coast, Canterbury, Central North Island, Lower North Island, the Far North, Auckland Region and the Bay of Plenty.
- 1.3 During that time I have undertaken a wide range of ecological surveys of natural and semi-natural sites, incorporating both botanical and wildlife values. I have provided assessments of values and significance of sites for many Councils and private clients and ecological effects of a range of activities on those sites.
- 1.4 I have undertaken research studies and assessments of at least 7 hydro generation systems, over 20 subdivisions that included aquatic issues, 42 northland streams (four years of SES long term monitoring for Council). I have surveyed over 300 streams and rivers in that time as well as assessed numerous roading, mining, quarrying, water take and other developments involving water. I have also helped design and assess stormwater devices, fish passage devices, new stream sections and wetlands in relation to improving water quality and as habitat for aquatic species.
- 1.5 Relevant especially to this application is the fact that I was involved in the following:
 - a. the ecological team that assessed the values and effects on aquatic systems of the Westwind Wind Farm application and on the Mill creek wind farm application;
 - b. assessing the impacts of the Tararua 3 extension consents;
 - c. undertaking the initial biological surveys for the Kaiwera wind farm;
 - d. invertebrate surveys for the Central wind farm;
 - e. falcon monitoring on the White hill wind farm.

I am thus familiar with wind farms, their infrastructure and requirements as well as many of their effects on natural systems.

- 1.6 I confirm that I have read the 'Code of Conduct for Expert Witnesses' contained in the Environment Court Consolidated Practice Note 2006. My evidence has been prepared in compliance with that Code in the same way as I would if giving evidence in the Environment Court. In particular, unless I state otherwise, this evidence is within my sphere of expertise and I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.

Scope of Evidence

- 1.7 The purpose of this evidence is to discuss the consent conditions involving water take and discharge as they relate to aquatic ecological matters.

- 1.8 My evidence relates to the following Consents :

WRC117913 – water take Waikawau Stream;

WRC117914 – Water take Kaawa Stream;

WRC117915 – Water take Waikaretu Stream;

WRC117916 – Water take, Waikorea Stream

WRC117920 - Water take, Whitford Quarry Spring

WRC117922 - Culvert Tauterei stream;

WRC 117923 – Bridge, Waimai Stream

WRC117924 and 117925 - discharge process water

Schedule One

Following the introduction my evidence lies under four main headings: Consents to take water, culverts and bridges, discharges and Schedule One.

Introduction

- 1.9 I have been involved in the review of the ecological aspects of the proposed Hauauru ma raki wind farm since October 2007 when I was engaged by Franklin District Council (FDC), Waikato District Council (WDC) and Environment Waikato (EW) to undertake an assessment of the sufficiency of the ecological investigations and reporting and to provide an opinion as to the results of those surveys and on the reported effects.
- 1.10 Since that time I have reviewed the pre-lodged ecological reports, undertaken two site visits, prepared a detailed review of the pre-lodgement information, consulted with the applicant in regard to that review, reviewed the lodged documents, prepared section 92 material for all three Councils regarding ecological matters, participated in consultation with the applicant on behalf of the three Councils regarding the section 92 request, reviewed the section 92 responses, participated in expert caucusing over bird strike and migration issues, consulted with the applicant over mitigation and other remaining issues, participated in Council-applicant consent condition drafting, and participated in meetings between the applicant and DOC over consent condition formation. I am therefore familiar with the project and the ecological information with which decisions are to be made.

Consents to Take water

- 1.11 Each of the four “take” consents are essentially the same in that each has a cubic meter limit per day and per annum and each has a rate between 0.9 and 1.2 litres per second.
- 1.12 In these low volume coastal streams the key to avoidance of significant adverse effects beyond that naturally experienced, is to provide flow that does not result in temperature stress, contaminant concentration, algae blooms or that blocks the movement of aquatic species, particularly fish.
- 1.13 The information regarding the values and communities of each of the streams provided by Mr Kessel’s reports and the section 92 material, adequately evaluates each of the “take” streams biotic values that are potentially susceptible to risk and identifies mechanisms to avoid significant adverse effects.
- 1.14 The flow limits proposed are appropriate and the “residual” flow is as set by the Regional Plan guidelines.

- 1.15 I had some initial concerns regarding the monitoring of the residual flow in each stream by the use of a proxy stream, i.e. the Naike stream, which is in a different catchment. Those concerns have slowly been laid to rest with the improved checks and validation systems now proposed in the take streams and with the aquatic invertebrate and periphyton monitoring in Schedule One of WRC 117927, in each of the take streams.¹
- 1.16 I was initially concerned with the potential to exacerbate low water periods resulting in water temperature issues adversely affecting aquatic life. I am now comfortable that the conditions have a suitable mechanism to mitigate this issue² and a suitable monitoring system to allow effective and timely recognition of a water temperature issue.
- 1.17 In regard to water takes, I am now satisfied that the water takes can be conducted in such a way that potential significant adverse aquatic ecological effects will not result and that there is sufficient monitoring to enable post activity determination of that fact.
- 1.18 In regard to the water take of the entire flow of the un-named Whitford Quarry spring, the applicant, through Mr Kessels, has supplied additional ecological investigations and specific species searches through the section 92 responses and discussions, regarding the absence of initial assessment. Furthermore, condition 3 of WRC 117920 ensures that the take will not be closer than 20 m to the spring head and will not affect the spring head. I am satisfied with the level of knowledge of the ecological processes and the community and species present and that abstraction of 100% of the flow will not result in the loss of a valuable aquatic feature.
- 1.19 Regardless of the full take potential, there remain several conditions that regulate the quantity and rate of take which seem appropriate and a condition that restricts the take when the seven day moving average low flow in the Naike stream criteria is triggered³. This cessation of take to allow any water to contribute to the Waikaretu Stream is appropriate.

¹ Conditions 3 – 11 of WRC 117913, 117914, 117915 & 117916

² Condition 7 of WRC 117913, 117914, 117915 & 117916

³ Condition 6 of WRC 117913, 117914, 117915 & 117916

Culverts and Bridges

1.20 The consents allowing a culvert and a bridge are appropriate, from the ecological perspective, in that they identify the need to avoid contaminating the streams through construction earth works. The consent conditions also address design issues ensuring fish passage and avoidance of erosion as well as requiring Regional Council written approval of the designs⁴.

Discharges

1.21 There are two consents to discharge water to land and to the Waikaretu Stream (water). The discharged water will come from the quarry and concrete batching plant. The primary aquatic ecological issues are sediment (dust and crushed waste) and alkaline material (limestone and lime components of concrete production). There are also the usual vehicle related contaminants from wash down stations (oils, metals, PAH⁵s etc) and other sediments.

1.22 Rapid lowering of water pH, can be a result of land based discharges of water contaminated with crushed limestone (lime) (a common ingredient of concrete making), and can result in the death of eel and other aquatic organisms.

1.23 The discharge consent carries conditions that require the catching and treating of all run off and a stormwater management system⁶. The conditions address water clarity erosion, energy dissipation, pH, turbidity, soluble aluminium and suspended solids. These are appropriate parameters.

1.24 The conditions require appropriate monitoring of discharge quality and in-stream condition associated with rain periods and relative to up-stream water condition⁷. The conditions allow treatment enhancement through use of flocculation chemicals and this is becoming standard, although some caution is required in their use as the flocculating agents used (Aluminium) in high dose are toxic to aquatic fauna.

1.25 There is a requirement for a flocculation management plan to be approved by the Regional Council and this is a good safeguard.

⁴ Conditions 5 & 8 – 10 of WRC 117922, Conditions 3 & 4 of WRC 117923

⁵ Polycyclic aromatic hydrocarbons – a pollutant often associated with vehicle emissions

⁶ Conditions 4 – 7 and 14 of WRC 117924

⁷ Conditions 11, 12 and 13 of WRC 117924

- 1.26 I concur with the project ecologist's (Mr Kessels) assessment of the waterways affected in this project in that the fauna and flora present are generally low sensitivity, robust species adapted to water quality and physical habitat stresses. This supports the concept that the risk of an adverse effect is low and that the result of a failure of protection methods would not be significant for the duration of the activity.

Schedule One

- 1.27 I note that in this Schedule, and relative to the other discharge and water take consents there is in addition to the specific monitoring of various chemical and physical factors associated with each consent a range of biological monitoring and reporting conditions⁸. These additional monitoring conditions require the monitoring of the biotic condition of the take and receiving waterways. Aquatic fauna to be monitored include aquatic macroinvertebrates, periphyton and macrophytes which cover the majority of productivity or supporting food web base organisms known to be responsive to changes in habitat quality.
- 1.28 These conditions supply the long term and trend data for assessing effects and in my opinion are appropriate.
- 1.29 At item 30 of Schedule One, where the timing of monitoring in condition 28 is stated to be 3 months before earthworks, a caveat is required to ensure that base line monitoring is not undertaken "in the dead of winter". If, for the monitoring proposed in 28(a), a winter baseline is undertaken then following monitoring must also be undertaken in winter. That is to say the baseline environmental conditions should reflect the monitoring environmental conditions. Also, in regard to 28(B) it is important that the "first flush" is measured, as that first portion of rain water discharge typically holds the greatest contaminant loading.
- 1.30 I note that the requirement to monitor through construction is on a quarterly basis and following construction the monitoring is to be annually during the summer period (January-March). The baseline, therefore, must be set in the summer months and preferably developed in the same time frame (quarterly) as the

⁸ Conditions 28 – 33 of Schedule One – General Conditions

construction monitoring. If not, then a good control comparison should be established for each affected site.

- 1.31 Schedule One also has an “Off set Mitigation for [adverse] ecological effects” section⁹. The consent conditions require the consent holder to submit an offset mitigation plan which accounts for in-stream works (taking account of discharges) and potential works affecting wetland habitats.
- 1.32 I assume that the requirement to off set wetland habitats, other than those already acknowledged in the application (i.e. the Whitford Quarry spring) is in anticipation of disturbances to as yet un-surveyed seeps and wetlands that might be required as fill sites.
- 1.33 I consider the options and goals and approaches outlined in Schedule One – General Conditions condition 8(c) and (d) (i-ii) are sufficient and appropriate where the enhancement of another seep or spring wetland occurs in a timely manner and where that feature becomes protected from future removal. I do not see a condition relating to the future protection of the enhanced mitigation feature, and I consider that such a legal protection device is required.

Conclusion

- 1.34 The applications for water take and discharge have been satisfactorily supported, in my opinion, by ecological evidence and that evidence suggests robust, typical communities that will not be significantly adversely affected, even should management systems not provide as full defence against contamination or low flow issues as expected. Proposed safeguards and monitoring in the consent conditions are, in my opinion, best practice and appropriate. The mitigation offered comes with appropriate checks and of an appropriate magnitude. The only issue I still have is the future security of the enhanced mitigation features.

Dr Vaughan Francis Keesing

25.03.2009

⁹ Condition 8 of Schedule One – General Conditions