

## D. NOISE & HEALTH

1. We contend that this application fails to comply with relevant sections of the RMA (1991) and with District and Regional Plans and Policies. This application fails to avoid, remedy or mitigate any adverse effects of activities on the environment and to maintain and enhance the quality of the environment; rather it has significant potential adverse effects in relation to noise impacts, contrary to Sections to Section 5 (2) (c) and 7 (c) and (f) of the RMA. The local community is part of the 'environment' as defined in a number of pieces of environmental legislation including the Environment Act 1986, and the RMA 1991 (section 5(c)). This proposal does not enable the most affected local community to provide for their social, economic and cultural wellbeing, nor their health and safety as envisaged in the definition of 'sustainable management' in section 5(2) of the Act.
2. The risk to health and safety from a proposed activity has been addressed in case law in the context of a claim that a telecommunications facility would result in harmful radiation effects. The case is *McIntyre v Christchurch City Council A15/96*. It has resulted in a package of case law respecting: a) whether the precautionary principle is enunciated in any way within the RMA, and b) who bears the burden of proof, and what is the standard of proof associated with it.
3. We will demonstrate that wind turbine noise resulting from this development is a potential health hazard, supported by evidence that will satisfy on the balance of probabilities, even one of low probability but with high potential impact.
4. This application fails to demonstrate ways in which unreasonable noise (a potential health issue) will be avoided, contrary to Section 16 of the RMA, and fails to comply with the general duty to avoid, remedy or mitigate potential adverse effects. We would have expected the applicant to have discussed in considerable detail how it intended to minimise the adverse effects of this proposal. The applicant has failed to present any substantive minimisation and mitigation methods and has therefore failed to address sections 5(2), 8, 16, 17, 104(1)(a), and Schedule 4 of the Resource Management Act.
5. Section 16 places a duty to avoid unreasonable noise, which we will demonstrate is a likely outcome of this industrial development. The occupier of land is obliged to adopt the best practicable option to ensure the emission of noise from that land does not exceed a reasonable level. "Best Practicable Option" means the best method for preventing or minimising the adverse effects on the environment having regard, among other things, to-

*The nature of the discharge or emission and the sensitivity of the receiving environment to adverse effects; and*

*The financial implications, and the effects on the environment, of that option when compared with other options; and*

*The current state of technical knowledge and the likelihood that the option can be successfully applied.*

6. Section 17 places a duty to avoid, remedy or mitigate adverse effects on the environment arising from an activity carried on by that person. The Act defines “effect: as meaning-

*Any positive or adverse effect; and*

*Any temporary or permanent effect; and*

*Any past, present, or future effect; and*

*Any cumulative effect which arises over time or in combination with other effects regardless of the scale, intensity, duration, or frequency of the effect, and also includes-*

*Any potential effect of high probability; and*

*Any potential effect of low probability which has a high potential impact.*

7. We contend that the inadequacy of the proposal to avoid, remedy or mitigate the effects of noise is contrary to Rule 9.9.2 (b) of the PNCC District Plan.

Section 9.9: Rules: Discretionary Activities (Unrestricted)

**R 9.9.2 Sawmills, Rural Industries and Windfarms**

*In determining whether to grant consent and what conditions if any to impose, Council will in addition to the City View Objectives in section 2 and the Rural Zone objectives and policies, assess any application in terms of the following further policies:*

- (a) To avoid, remedy or mitigate the effects of noise and other environmental disturbance, on the amenity of the surrounding area.**

**Explanation**

*All industrial activities in the rural area, because of their lack of services, have the potential to create adverse effects on the rural environment. Their usually, ‘one-off’ location also increases their visual impact as does outdoor storage of goods and waste. A Discretionary Activity consent process gives Council the opportunity to assess any adverse effects and to ensure that those effects are avoided, remedied or mitigated.*

***In the case of Windfarms, the largely unknown effects of the activity mean that it is essential that it be examined on a case by case basis.***

8. The application also fails to provide sufficient information to control the actual and potential environmentally adverse effects of activities in the rural area in relation to noise contrary to Section 9 –Rural Zone Objectives and Objective Policy 2.2 and 2.3 of the PNC District Plan.

**Section 9.3: Objectives and Policies (Rural Zone)**

**Objective 2:**

*To encourage the effective and efficient use and development of the natural and physical resources of the rural area.*

**Policies:**

*2.3.1 To control the actual or potential environmentally adverse effects of activities in the rural area, including the adverse effects of... noise.*

9. The application also fails to provide for the health and safety of rural dwellers by establishing specific noise limits and management plan for the rural area contrary to Section 9 Objective 3 Policy 3.1 of the PNC District Plan.
10. The objective of the *City View Objectives and Policies: The healthy community* is to promote a clean, healthy and safe environment. This application fails to demonstrate how this objective can be met. The potential adverse impacts arising from noise emissions (including vibrations) pose a serious potential adverse affect that could compromise the health of residents living nearby.
11. Even if the noise falls within the rules of a district plan or noise standard, there is still a burden of proof on the applicant to demonstrate, on the evidence adduced, and on the balance of probabilities, that that the noise will not exceed a reasonable level<sup>1</sup>.
12. We contend that the application fails to adequately protect the health and well-being of nearby residents from the adverse effects of noise and vibration. These effects will be adverse, and will be more than minor.
13. We contend that the measurement techniques described in NZS 6808 are of doubtful value in predicting the levels of noise that a person will experience inside their own dwelling, and of no value in predicting the levels of potentially health-damaging sub-sonic vibration that might occur.
14. We reject the notion that adherence to NZS 6808 will protect us from adverse health effects from this windfarm. This community is now knowledgeable with regard to impacts of a windfarm on communities in that most of us know people who have suffered adverse effects from the five existing neighbouring windfarms.
15. Mr Hegley indeed has supported this view. Presenting evidence at the hearings on Wellington City Council's proposed district plan change 32, Mr Hegley said<sup>2</sup>, "It is clear from comments around the world and locally that there is no confidence with the prediction techniques adopted in NZS 6808 to accurately reflect the noise from Wind Turbine Generators. NZS 6808 adopts a very basic method for predicting wind farm sounds. There is no allowance for the effects of noise propagation downwind, so the result is to under predict the noise in this direction".
16. We note also that the very foundation of NZS 6808 is to obtain baseline data correlating wind speed with background noise at various locations of concern. Others have commented on the difficulty in achieving a good correlation and indeed the applicant's experts note that in some cases correlation was poor.

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<sup>1</sup> Ngataringa Bay 2000 Inc v Attorney-General A16/94

<sup>2</sup> Presenting evidence on behalf of the Makara-Ohariu Community Board at the hearings on Wellington City Council's proposed district plan change 32. 14 Feb 2005

For example the Day peer review<sup>3</sup> evidence, states “at the remaining seven sites, MDA has observed that the measured noise level does not correlate well with the wind speed or shows other anomalies.” The outcome is quite likely that the noise output from the turbines can frequently be high when the background masking is very low – potentially much higher than the 5 db the Standard allows.

17. What is not mentioned by the applicant’s experts is that poor correlation of windspeed and background noise measurements also destroys the underlying principle on which NZS 6808 Standard is based and brings into question any further analysis that purports to predict noise levels at dwelling where people live.
18. The experience and knowledge of this community is validated by clinician Nina Pierpoint. Her research, currently published in draft, looks not at the decibels of noise that reaches a dwelling, but at the symptoms of the people who live in the dwelling. She has characterised the group of symptoms as *Wind Turbine Syndrome* and described families with medical problems that cannot be mitigated except by moving away.
19. The coherent cluster of symptoms named *Wind Turbine Syndrome* has been identified in people who live closer than some 3 km to large-scale turbines. This application places at risk some 1,000 residents currently living within this radius, with a potential for impacting 3,000 residents due to further planned development.
20. Many jurisdictions are mandating a setback distance which separates modern large-scale turbines from dwellings because of the weight of data backing up the assertions of wind turbine syndrome. Sadly, New Zealand or this region has no mandated setback distance. However, a set-back distance resonates well with the people of this community who are already affected by turbines close to their home. We believe that 3 km is the minimum safe setback distance in the terrain that this windfarm is planned for. A petition calling for setback distances was circulated amongst the Palmerston North community over the last few months and collected over 2,000 signatures. It was presented to Government in April 2009.
21. The rural character of the environment immediately around the turbines closest to subdivisions means that background noise levels are particularly quiet. This is especially so at night.
22. In the Motorimu case, the Commissioners determined that this low background sound required them to take a precautionary approach to potential health effects and therefore recommend a range of detailed conditions on noise (7.174):

*“The commissioners have determined that it is appropriate to take a precautionary approach and therefore recommend a range of very strict and detailed conditions, in particular a condition to control windfarm noise at times of low background sound”*
23. The environment that many of the closest dwellings are placed is identical to the area surrounding Motorimu and thus we contend the precedent set should be applied.

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<sup>3</sup> Statement of Evidence of Christopher William Day, Para 3.1

24. The Environmental Court of New Zealand issued a decision on July 20, 2007, which required that when the background sound conditions are at 25 dBA or less, the noise from a wind farm shall not exceed 35 dBA at any dwelling as an absolute limit.
25. A rewrite of NZS 6808 is nearing completion, has completed public consultation and is widely known. Clause 5.3.1 introduces a secondary noise limit of 35 dBA for use in quiet localities.
26. We find it curious that sound evidence from both applicant experts chose not to mention either the prior decisions or the upcoming Standard when reaching their conclusions. We wonder whether this omission is in keeping with the Environment Court's Code of Conduct for experts.
27. Noise can impact on amenity value, defined in the RMA as "those natural or physical qualities and characteristics of an area that contribute to people's appreciation of its pleasantness, aesthetic coherence, and cultural and recreational attributes." The proposed wind farm development targets an area of rural character, which includes a sense of spaciousness, privacy, quietness, and lack of structures and artificial features. It is these characteristics of rural serenity that have attracted people to this area. Noise emissions from the proposed wind turbines have the potential to adversely affect these residents and destroy the rural character and amenity value of the area.
28. Our objective is to demonstrate the actual (compared to the theoretical) impacts of wind turbine noise on the amenity, health and wellbeing of people living close to existing wind farms, to establish the cause of any adverse effects, and in doing so, provide a potential solution.
29. Mr Hegley, in his evidence para 7.16 says "Based on compliance with the design requirements of NZS6808, the noise effects from the proposed Turitea Wind Farm will be no more than minor in terms of the requirements of the Resource Management Act, even in a low background sound environment. We refute this.
30. In para 7.17 Mr Hegley says "At a design level of 40dBA, the noise from wind farms is still within a limit that will allow undisturbed sleep for the majority of people under all conditions.." While we have previously mentioned that we have no faith in a decibel rating to protect the health of residents, we believe that in some cases a reading of 40dBA could cause such serious health effects that some people could not live in their homes.
31. A desirable outcome of Mr Hegley's noise analysis would have been to be able to state "noise from the wind farm will be within the requirements of NZS 6808 at all times. However this is not said – the best being "Once operational, the noise from the wind farm will be able to be managed to ensure compliance with the noise requirements" and "Under some wind conditions it may be necessary to de-rate some of the closer turbines".
32. From a cursory analysis of his Fig 43 it would appear that some 40 homes could require 'management' of turbines to comply at all times with a 40 dB upper ceiling, and this could increase to 1,000 homes to comply with a 35dBA upper ceiling.
33. We have absolutely no faith in the ability of a windfarm to be 'managed'. Generally the windfarm operator is quite remote from the locality and has only passing knowledge of the site conditions being experienced. For this reason,

'management' necessarily requires the response of an affected party –often having been woken in the night, getting up and making a phone call. Even assuming a reasonable response time, the affected party, and probably many neighbours are well and truly awake and can expect to experience sleep deprivation.

34. With existing windfarms and where affected parties have woken sufficiently to phone in, there is evidence that there is no ownership of a problem between the Council Noise Control and the windfarm operator. Calls to Council Noise Control are rebuffed with “that’s not our problem – call the windfarm operator”. Similarly, calls to a windfarm operator – when not answered with a recorded message – suggest the caller contacts Noise Control.
35. Even if Noise Control took responsibility for the concern of residents experiencing sleep deprivation, we have little confidence in the process by which the Council can progress the problem with a windfarm operator. In a study *Infringement Notices: are they working?*<sup>4</sup> It is noted that amendments to the RMA act are necessary for infringement notices to be used to enforce technical conditions of consents.
36. The locality bounded by the Turitea and Kahuterawa Valleys that the proposed wind farm surrounds is a predominantly quiet rural environment, particularly at night. Appreciation of this quietness is highlighted in the briefs by many submitters, and is also clearly supported by the data provided by social polling. A number of background measurements offered in evidence are around 20-25 dBA. This is especially quiet and is a quiet that is experienced consistently.
37. The material presented here relates to the potential noise impacts of this development and is based on the “people’s perspective” rather than from an “expert” perspective, particularly the concerns from residents in relation to the potential impacts of noise on health and amenity values. Some people are more sensitive to noise/ vibration effects than others and can suffer health effects while others are not affected. A common thread runs through reports by those who live near wind turbines around the world: It is not necessarily only the loudness of the noise; it is also the character of the noise that is disturbing. The wind turbine noise is periodic; unpredictable; intermittent; ‘whooshing’ or ‘thumping’; it interferes with outdoor activities at one’s home and intrudes into people’s homes disturbing sleep or studying, ie. it severely disrupts normal family life. The peaceful night time is often reported as the most disturbed time and it is this nighttime disturbance that had led families living near existing windfarms to move so that they can achieve unbroken sleep. There are even reports of homes being abandoned due to the relentless intrusion of noise.
38. There is a consistent theme in reports from people living near industrial scale windfarms across many locations, by from many different types and heights of turbines. Adverse effects are reported both by people who initially supported turbines and by those who opposed them prior to construction. We wish to highlight recent literature that is relevant to this application:
39. In 2000, a study by Pedersen<sup>5</sup> was carried out in Sweden, which found that annoyance from wind turbines increased with noise level. While no residents

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<sup>4</sup> K De Silva, (2002), Ministry for the Environment.

<sup>5</sup> Pedersen and Persson Waye, *Storiningar fran Vindkraft, 2002, Human Responses to Wind Farm Noise – Annoyance and Moderating Factor*. Berlin Conference Oct 2005

were very annoyed at levels below 32.5 dBA LAeq, 20% were very annoyed at levels between 37.5 and 40 dBA LAeq and 36% when levels were above 40dBA LAeq.

40. This study also compared the reactions of people who described themselves as noise sensitive with those who did not. It found that there was little difference at levels below 35dBA LAeq, but that at higher levels noise sensitive people rapidly became more annoyed. These results further indicated that the NZS6808 limit of 40 dBA may not adequately protect the health and wellbeing of nearby residents. It is of particular concern to us given the number of residents that will be living within the 35dBA and 40 dBA noise contour.
41. Further, Pedersen and Persson Waye<sup>6</sup> in work following up their 2002 Study found that, once the noise levels exceeded the 35 decibel level, the percentage of people annoyed by wind farm noise rose much more rapidly than with other 'stationary' noises. This is potentially due to a link between noise annoyance and the annoyance of the flicker effect created by the blades of the turbines.
42. Many interviewees commented that they perceived the noise and visual stimulation from the turbines as intruding into their private domain, physically in the garden and the home, but also as an intruder into themselves. The noise was physically perceived in the living environments e.g. in the garden in spite of bushes and fences to keep out invaders, and was to those who could not mentally shut out the turbine noise, an obstacle to pleasant experiences decreasing the joy of daily life at home. For some of the interviewees the intrusion went into their most private domain, themselves, creating a feeling of violation that was expressed as anger, unease and tiredness.
43. Dr Nina Pierpont has written several documents relating to the health impacts of wind turbine installations including:

*Wind Turbine Syndrome: Noise, shadow flicker, and health, August 1, 2006*

*Heath, hazard, and quality of life near wind power installations. How close is too close? Malone (New York, USA) Telegram, March 2, 2005 p5.*

*Wind Turbine Syndrome: Testimony before the New York State Legislature Energy Committee, March 7 2006.*

*Health Effects of Wind Turbine Noise February 4 2006, [www.ninapierpont.com](http://www.ninapierpont.com) and references therein.*

44. The following are excerpts from Dr Pierpont's written documentation that have particular relevance to this case;

*Describing and documenting symptoms is the province of physicians. So is research on the causes of diseases. Deciding whether people have significant symptoms is not within the expertise of engineers or specialists of acoustics, even when the symptoms appear to be caused by noise. We physicians appreciate the noise data which engineers provide, but this data*

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<sup>6</sup> Pedersen CS, Moller H, Persson Wayne K. *A study of twenty-one cases of low-frequency noise complaints.* The Journal of the Acoustical Society of America. 2008 May;123(5):3139.

*has nothing to do with whether people have symptoms or not. One British acoustics expert, Dr Geoff Leventhall, is especially outrageous in this regard, insisting that people “can’t” have symptoms because turbines “don’t” he says, produce low frequency noise. His fallback, for which he is well paid by the industry, is that people make up their complaints. But he’s not trained to distinguish whether people are making up their complaints, or to know about the range of physical, psychiatric, and neurological symptoms people might have. A related point: the hallmark of a good doctor is one who takes symptoms seriously and pursues them until they are understood (and ameliorated). This includes symptoms related to the brain, our most complex organ – symptoms which may be neurologic, psychiatric, or physical.*

*Three doctors that I know of are studying the Wind Turbine Syndrome: myself, one in England, and one in Australia. We note the same sets of symptoms. The symptoms start when local turbines go into operation and resolve when the turbines are off or when the person is out of the area. The symptoms include:*

*Sleep problems: noise or physical sensations of pulsation or pressure make it hard to go to sleep and cause frequent awakening*

*Headaches which are increased in frequency or severity*

*Dizziness, unsteadiness, and nausea*

*Exhaustion, anxiety, anger, irritability, and depression*

*Problems with concentration and learning*

*Tinnitus (ringing in the ears).*

*Not everyone near turbines has these symptoms. This does not mean people are making them up; it means there are differences among people in susceptibility. These differences are known as risk factors. Defining risk factors and the proportion of people who get symptoms is the role of epidemiologic studies. These studies are underway.*

*Chronic sleep disturbance is the most common symptom. Exhaustion, mood problems, and problems with concentration and learning are natural outcomes of poor sleep.... Children, the elderly, and people with pre-existing illnesses, especially depression, are especially vulnerable to sleep disturbances.*

*Sensitivity to low frequency vibration is a risk factor. Contrary to assertions of the wind industry, some people feel disturbing amounts of vibration or pulsation from wind turbines, and can count in their bodies especially their chests, the beats of the blades passing the towers, even when they can’t hear or see them. Sensitivity to low frequency vibration in the body or ears is highly variable in people, and hence poorly understood and the subject of much debate.*

*Vulnerable groups include:*

*People with decreased personal abilities (old, ill, or depressed people)*

*People with particular diseases or medical problems*

*People (such as children) dealing with complex cognitive tasks, such as reading acquisition*

*People who are blind or who have a hearing impairment*

*Fetuses, babies and young children*

*The elderly*

*These people may be less able to cope with the impacts of noise exposure and at greater risk for harmful effects than is documented in studies. Attention needs to be paid to them when developing regulation and setback requirements for industrial wind turbines and other sources of annoying and debilitating noise.*

*To recapitulate, there is in fact a consistent cluster of symptoms, the Wind Turbine Syndrome, which occurs in a significant number of people in the vicinity of industrial wind turbines. There are specific risk factors for this syndrome, and people with these risk factors include a substantial proportion of the population. A setback of 3 to 3.5 km is recommended as a minimum protective distance.*

*Let it be understood, however, that there will still be health and life quality problems caused by wind turbines beyond this radius. People living 2.4 to 4.8km from a proposed turbine site should be notified of potential health and life quality effects.”*

45. B Frey and P Hadden<sup>7</sup> have written a comprehensive review of a wide range of published literature relating to the subject of noise impacts on people living near wind farms. This 137 page document is too large to summarize here, but the abstract of this document provides a useful summary of the key points.

*Wind turbines are large industrial structures that create obtrusive environmental noise pollution when built too close to dwellings. This annotated review of evidence and research by experts considers the impact of industrial-scale wind turbines suffered by those living nearby. First, the paper includes the comments by some of the families affected by wind turbines, as well as coverage in news media internationally. The experiences described put a human face to the science of acoustics.*

*Second, the paper reviews research articles within the field of acoustics concerning the acoustic properties of wind turbines and noise. The acoustic characteristics of wind turbines are complex and in combination produce acoustic radiation. Next, the paper reviews the health effects that may result from the acoustic radiation. Primarily, the consequent health response includes sleep deprivation and the problems that ensue as a result. In addition this paper reviews articles that report inaudible components of noise that can adversely affect the body's physiology. Research points to a causal link between unwanted sound and sleep deprivation and stress, i.e. whole body physiologic responses.*

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<sup>7</sup> Noise Radiation from Wind Turbines Installed Near Homes: Effects on Health (February 2007, B Frey and P Hadden, [www.windturbinehealthhumanrights.com](http://www.windturbinehealthhumanrights.com))

*The injuries are considered in the context of Human Rights, where it is contended that the environmental noise pollution destroys a person's effective enjoyment of right to respect for home and private life, a violation of Article 8 of the European Court of Human Rights Act. Furthermore, the paper considers the consequent devaluation of a dwelling as a measure of part of the damage that arises when wind turbines are sited too close to a dwelling, causing acoustic radiation and consequent adverse health response.*

*Key Points; The review concludes that a safe buffer zone of at least 3km should exist between family dwellings and industrial wind turbines of up to 2MW installed capacity with greater separation for a wind turbine greater than 2MW installed capacity.*

46. The Applicant states there is no evidence of health effects from noise. This is difficult to reconcile as there is substantial body of compelling evidence in the literature on adverse health effects from noise including a highly ranked international journal called Noise and Health which is dedicated to this topic. There is also a range of biomedical, medical, and environmental health literature, published both in peer reviewed reputable journal papers and peer reviewed reports.
47. The applicant states that "noise will not be a problem" with this windfarm. This is difficult to reconcile given the vast number of published papers on "this problem". Additionally the 3<sup>rd</sup> International Conference on Wind Turbine Noise is to be held in Denmark during June 2009. The Second Wind Turbine Noise conference took place in Lyon, France in 2007 with more than 150 delegates from 24 countries.

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## **IN SUMMARY**

48. We oppose turbines 52, 54, 55, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 94, 95, 96, 111, 112, 113, 114, 119, 120, 121, 122, 123, 124, 125, 127, 128, 129, 130, 131, 132, 133, 134, 135, and 136 on the grounds that they do not comply with noise conditions enshrined in case law (West Wind, Motorimu).
49. We contend that it is impractical and unenforceable to consent a windfarm that must be constantly tuned to stay within the allowable boundaries of noise pollution.
- 50.

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