

Ko au Helen Boleyn  
 Ko Kaihinu te maunga  
 Ko Nguturoa te awa  
 He pakeha au no tawahi oku tipuna  
 Ko te wairua toko waka

(I am Helen Boleyn  
 Kaihinu is my mountain  
 Nguturoa is my river  
 My people are from the other side of the world  
 The spirit brought me here.)

I live at Millricks Line, Linton, and I have to say that we are very relieved that it is now so much less likely we will have a row of turbines louring over us, at about 1.5 kms distance. We support sustainable energy, but also are very concerned about the effects of the proximity of turbines to housing, and especially the effects of the sound on the development of children.

### 1.1

For more than 30 years I worked in the field of early childhood, and lately also with older children who have learning difficulties. My training for this was a course based on the work of Dr Rudolf Steiner, and offered from Australia. During my years of teaching I have noticed a great change in the children. My first groups included one or two with medical problems, mainly asthma, but in my last groups the majority had difficulties of one kind or another, from autism, Asperger's Syndrome, and Attention Deficit Hyperactivity Disorder to some serious allergies. Early childhood centres everywhere now have policies on behaviour management, something unheard of 20 years ago, and at conferences this is a necessary topic.

### 1.2

Children react to noise in different ways. They may seem oblivious to it but a little observation shows that it is otherwise. A child may retire to a corner and play quietly alone, but put hands over ears every now and then. A child may come and complain, asking for something to be done about the noise. A child may try to attack another child who is perceived as making too much noise. Fingers in ears and refusal to take part in activities that are too noisy is an obvious response. So is the response of a hyperactive child who used to put his fingers in his ears and scream. And that of one who covered her ears and wept. Early childhood teachers have been aware of rising noise levels in centres, and have felt that this is a response – there *is* more noise, so children make more noise.

### 1.3

Childrens' health is being ruined by the pollution of their environment. They eat foods that are produced from soils treated with weedicides, crops treated with pesticides, plants bred for their keeping and handling qualities rather than their vitality, milk from herds fed imported oil palm waste boosted with artificial supplements. (One could list hundreds of food additives that are used only for the convenience of storage or appearance, or to sweeten the tasteless. These do nothing for childrens' nutrition, merely tempting them to overeat.) The environment also contains a bewildering mass of colourful advertising, in shops, on hoardings, on TV, and a continual bombardment of noise. It adds up to sensory overload, which young children are not able to screen out as adults can. They particularly need to have calm and quiet when they go to sleep.

2

One of the main problems faced by parents now seems to be getting children to sleep; the sensory overstimulation they face during the day often means they find it impossible to 'switch off' and settle down. Even when they collapse from exhaustion, they often sleep for a short time and are raring to go again when their parents are trying to get some sleep themselves.

1.4

Continual background noise is part of the problem, as the young child's nervous system is unable to relax. Any sound, audible or not, is a pressure wave, and is bound to have an effect. Especially in the case of the unborn child, it is a formative force, and I am concerned that the noise of wind turbines, whether low frequency or not, will have a detrimental effect. Growing children have great tasks in respect of forming healthy bodies that they can use to express their full potential. If their sensory development is impaired they struggle at school, and often express their difficulties in bad behaviour. If they have been unable to integrate their senses properly in the early stages of their development, they may have speech problems. The acquisition of language can be disrupted by a noisy environment, as can the formation of a young child's organs.

1.5

Particularly worrying damage is done by noise (both audible and inaudible) to a child's vestibular system. This is the system of balance, found in the inner ear and made up of two main parts, the semi-circular canals and the fluid-filled utricles, and it is the oldest system in the body, already myelinated at birth. After birth the system grows to include the oculo-motor system (the eye), the cervical system, the spinal postural system, and the controlling cerebellum and parts of the brain stem – a very complex system. The hearing ability of the ear is also included, enabling orientation in darkness or fog. Together the vestibular system and the proprioceptive system enable us to move and to balance and to know where we are in space.

Damage occurring at any stage will hinder learning in various ways. In order to write, eyes have to track and co-ordinate with hand movements. Eye tracking is also crucial to reading, and if balance is upset, there may be enormous effort needed to sustain eye movement needed to follow lines of print. The intense effort will quickly lead to tiredness and irritability, followed by disruptive behaviour if no one realises the child's difficulty. Any remedial work is useless if the noise that causes the trouble is not removed.

1.6

A child is born with a number of primitive reflexes, all part of the survival mechanism (examples are palmar reflex, asymmetrical tonic neck reflex), and in normal circumstances these reflexes transform in the months following birth, into postural reflexes, fitting the child for adult life. The transformation is related to the development of the senses and the nervous system and cannot take place if there is disturbance to the vestibular and/or proprioceptive system. Retaining the primitive reflexes puts further strain on the child. A lot of energy is required to manage simple tasks if the child is impeded by retained reflexes. He or she may have to strain eyes or ears, sit at a twisted angle to write, wriggle about in order to receive enough sensory input to know what the body is doing. The efforts made will be tiring and contribute to poor concentration and difficulty in taking in the whole of a set of

3

instructions. Clumsiness and frustration result. Pressure to get the child to perform can lead to anger and behaviour problems.

1.7

Hearing develops in early childhood as a child is exposed to sound and learns to make sense of it, identify its source, and so on. There is no escape from noise, even in sleep. Our auditory systems are continually open – unlike the eyes which we can close, the ears stay open and we have no way to stop sound except with physical ear protection. Too much noise can damage the development of hearing in various ways. The eardrum itself can be damaged so that sound is not perceived and actual hearing loss results. The inner ear can be hurt, with resulting loss of hearing or of balance. A small child still learning to understand what sound is about, will be greatly disturbed by continuous noise. The acquisition of language may be made very difficult, however rich the child's environment, if there are sensory problems brought about by too much exposure to noise.

1.8

As far as I can discover, studies are focussed on adults, but because children, especially in their earlier years, are so much more vulnerable simply because they are still in a state of development, symptoms in their case will be much more severe. Besides hearing, the heart and circulatory system may be affected. A child damaged in this way cannot look forward to a good quality of life and health, and increasing numbers of children damaged in this way will cost us dearly.

1.9

I know that my concerns are shared by health workers and researchers worldwide. A number of doctors in several different countries noticed that patients who live close to wind turbines display clusters of similar symptoms, and decided to term the phenomenon 'Wind Turbine Syndrome.' Defining the risk factors and the prevalence of the syndrome enable plans for treatment and prevention to be made.

The report "Noise Radiation from Wind Turbines Installed Near Homes: Effects on Health" (Feb 2007) noted whole body physiologic responses to both the audible and inaudible components of noise, quite contrary to assurances from industry consultants that audible noise has minimal consequences and infrasound is inaudible and weak, and not a health risk as it is part of the normal environment.

1.10

Dr Nina Pierpont, a North American paediatrician, recently took time off from her practice to research wind turbine syndrome, and has published a peer reviewed study. She is asking for a setback distance for wind turbines of at least 2 kms from homes, schools and other inhabited structures. I expressed my concerns about childrens' development to her, and she has agreed with me. (\* 1. letter)

George Kamperman, an American noise consultant and noise engineer, says that noise level criteria are desperately needed, and recommends a similar setback distance.

Dr Christopher Hanning, who founded Leicester Sleep Disorders Service, and has lectured and written extensively on sleep and its disorders, has no doubt that wind turbine noise emissions cause sleep disturbances and ill health. He says that "the only mitigation for wind turbine noise is to place sufficient distance between the turbines and places of human

habitation.” He is also concerned that sleepy people have an increased risk of traffic and other accidents.

Dr Amanda Harry (U.K.) is also concerned about her patients’ wind turbine symptoms. She found that near 16 turbines, 13 out of 14 people surveyed had increased headaches, and 10 reported sleep problems and anxiety. Other symptoms included nausea, migraines, dizziness, palpitations, stress and depression. (2.)

#### 1.11

Sound is carrying a lot further than anticipated, in the Manawatu terrain. At the Moturimu hearings we heard of people in the Pohangina Valley who heard wind farm noise under some conditions, some 15 kms away from the turbines. I woke at about 2a.m. one night some time ago and was puzzled by an unfamiliar sound. I got up and tried to identify it, after having decided it was not my own heartbeat. I noticed that there was no air movement whatever outside, the night was cold, and in the moonlight I could see lenticular cloud over the ranges to the north, indicating conditions of temperature inversion, which were causing the sound of the newly built Tararua 3 turbines to carry along the hills to us. It was a very distant noise, (some 14 – 15 kms from us) not annoying, but I was amazed that I could hear it at all. At the time we were waiting to hear the outcome of the Moturimu case in the Environment Court, and I realised that we were right to be concerned about noise from that wind farm, which would have been very near us.

#### 1.12

As a last comment about noise and its effects – think of this room. We have been bringing a noise meter with us to this hearing, using it both in the Travelodge conference room and here. In the Travelodge room, background noise (with the outside doors shut and no one speaking, with only one or two people in the room before a session started) was about 42 db. With 36 people in the room, and quietness just before a session began, it was about 45db. With one speaker, and sound amplification, the noise level rose to about 52db. When the outside doors were open, one or two people present and no conversation, it was around 48.5db. With a speaker, this rose to 53db.

Here in the McMillan Lockwood Room there have been several factors making a difference. When there was no wind, background noise averaged 42db when no one was speaking.

A speaker using amplification raised the level to 50db.

With a light wind blowing, and no one using sound amplification (some quiet conversation), background sound was about 44db.

With a speaker using amplification it was 54.5.

As the wind rose, the background noise with no speaker rose to 50db, and to 55db with a speaker.

Unfortunately we left the sound meter at home on the day when the wind was strongest. The air conditioning here raises the background noise level from 40db (in calm conditions) without it to 48.5; we all relax when it is turned off. This response was very evident at the Moturimu Commissioners’ hearing; on the very first day, when it was turned off late in the afternoon, the relief of everyone was palpable. Yet the meter later showed that the difference between having it on and off was only 3db. We are adults – the effect on the unformed body of the child is immeasurably greater.

## 2.1

## Weather

We would like it known that there can be some interesting results from 'extreme weather events' in this region. Although we live at Millricks Line, and our almost 40 years' collection of weather data relates to our property there, we know that storms and heavy rain have more effect in the heights above us.

On New Year's Day 1974 we had a family picnic. Two carloads of us went up Scotts Road, as far as we could go by car. We had barely finished our lunch when black clouds rolled up and heavy rain began to fall. As there were fords to cross we hastened to get out. One car was manhandled through a ford, engine spluttering, the other driver waited. The downpour was incredible. A farm garden we had admired on the way in was totally absent – washed away – as we passed on the way out. We later heard that someone in the area had recorded 6 inches of rain in 20 minutes. The sun came out and the day was beautiful – but the road was blocked because boulders, trees and chunks of fences had been rolled down the gullies onto the road. (We walked out and were taken home by a farmer who lived down the hill. Later that evening Kairanga County workers came with bulldozers and opened the road so that we could retrieve the cars. The good old days!!) There had been practically no rain at Millricks Line, but neighbours had seen a moving sheet of water on the hills.

A similar event blocked Scotts Road again in more recent years. We can imagine what would happen to silt traps and road works in the Turitea under such circumstances.

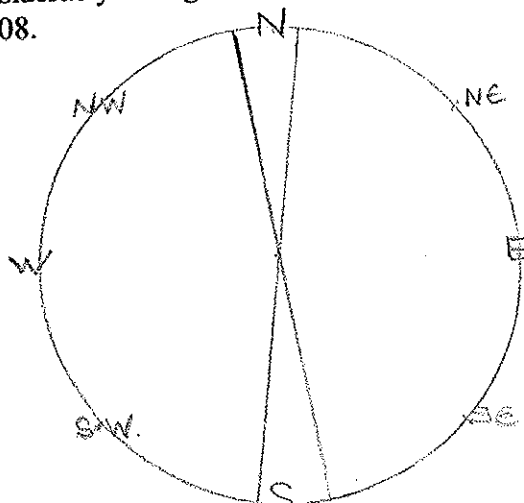
## 2.2

If the wind may be considered an outstanding natural feature, we should understand that it is a changing one. When I first came to live in the Manawatu area, (early 1960s) I was aware of seemingly incessant westerlies. They started in spring and spoiled the summers, blowing grit in one's face and making visits to the beach unpleasant. In the later autumn they came again. Trees all over the plains, especially from Kairanga to the coast, were stunted and flattened in a direction away from the wind. We resigned ourselves to having unevenly grown shrubs when we began planting at Millricks Line – and westerly shelter was a priority. However, our trees are straight. The westerly wind has diminished, and whether for reasons of climate change or some other cause, easterlies have increased. Stephen's (my husband) early diaries show frequent westerlies in spring and autumn in particular, but of late the westerlies have been almost absent in some years, and the easterlies have increased.

## 2.3

A graph, for the months from January 2008 to March 2009 only, showing the wind directions. This relates to the chart on Page 6.

The figures on the chart relate to the Beaufort Scale, which Stephen used before he had an anemometer, to estimate wind strength. It is clear from the chart that while there have been more days of westerly winds (a total over the period of 286, as against 177 days of easterly winds), the east winds have been considerably stronger. Beaufort points for westerly winds add up to 491, and for easterlies to 508.



2008 month	NORTH		WEST SW - W - NW		EAST NE - E - SE		SOUTH	
	days	B tot	days	Beaufort total	days	Beaufort total	days	B total
Jan	2	1	16	22	7	54		
Feb			19	28	10	30		
Mar			17	28	17	55	1	
Apr			11	14	17	54		
May			8	8	20	52	3	6
Jun			22	23	9	19	6	7
Jul			17	19	6	24	6	6
Aug			20	30	12	27	4	5
Sep			24	36	10	22		
Oct			24	54	7	13	1	2
Nov			24	49	8	22	1	
Dec			20	36	11	34		
2009								
Jan			27	56	8	25		
Feb			19	32	12	31		
Mar			18	36	15	36		

If a day has had a wind change (e.g. S > SE > E > W) each direction is noted – therefore, there can be more numbers than days in a month.

If there is variable wind speed, the highest Beaufort number has been used.

In Stephen's diary some days have a direction note, but no wind speed; this is because there may be higher cloud movement, but no wind at ground level.

### 3.1

#### Visual Effects

We would be very sorry to see the ranges around Turitea covered with turbines. As a submitter pointed out, and some of us tested yesterday, you do not see the hills when you look at the area where turbines are. The movement catches your eye, and you look at the turbines. It takes purposeful concentration to notice the land on which they stand.

### 3.2

For years I worked in a top floor laboratory in the city, and had a view of the ranges. I watched their changing faces, and was particularly glad when we found a place to live, almost 40 years ago, that was against the hills. During that time I have come to feel at one with the landscape, and to understand the words of the psalmist – "I lift up mine eyes to the hills,

7

whence cometh my help” – and the Irish legends that tell of the “star-hearted mountains, whose wisdom is greater than any druid has, and the feelings expressed here yesterday by tangata whenua. The landscape is more than a view, it is Papatuanuku.

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Lastly, we think that Mighty RIVER Power would do well to look at putting turbines into the Cook Strait current, where no one is going to hear them or be affected by their noise; there won't be any. The Strait has a current that never stops, unlike the fickle wind.

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(1) Letter from Dr Nina Pierpont:

"a. First, I think Mrs Boleyn is correct about the importance of sound, and mapping and orienting to sound and language, in the development of young children. Because of this general knowledge, and given what's known about wind turbines producing noise (at least in some locations), I feel strongly that until more is known about wind turbine noise (and, for that matter, visual disturbance to humans), turbines should not be placed within a mile, minimum, and preferably not within two miles of homes, schools, and other places where there are young children.

"b. Second, some children are especially sensitive to noise. Many kids struggle with their concentration. Look on my website ([www.ninapierpont.com](http://www.ninapierpont.com)) > Publishing > Wind energy > Articles by Nina Pierpont) at the World Health Organisation (WHO) study I refer to. The parts I quote are very specific about people (meaning, in large part children) who are engaged in learning language-based skills being highly susceptible to the adverse effects of noise. This is particularly true for children with learning disabilities."

(2) Symptoms of Wind Turbine Syndrome.

1. Sleep problems – noise or physical sensations of pulsation or pressure make it hard to go to sleep and cause frequent waking.
2. Headaches which are increased in frequency or severity.
3. Dizziness, unsteadiness, nausea.
4. Exhaustion, anxiety, anger, irritability, depression.
5. Problems with concentration and learning.
6. Tinnitus.
7. Premature aging of the myocardium.
8. Hypertension
9. Cardiac arrhythmia.

Risk Factors

- a. Sensitivity to low frequency vibration
- b. A pre-existing migraine disorder. Migraine is a complex neurological phenomenon affecting vision, hearing and balance, and can affect motor control, and consciousness.
- c. Age-related changes in the inner ear.
- d. Damage to the ear or hearing, from previous noise exposure.
- e. Psychiatric problems. (These tend to escalate or resurface with prolonged exposure to wind turbine noise.)