Health Canada Submission
Wind Turbine Noise and Health Study

filed with David Michaud – Principal Investigator
Health Canada

Submitted by
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Representing
Health Affected Residents Meetings (H.A.R.M.)

a sub group of
Central Bruce Grey Wind Concerns

Appendices Attached:

I. Case Studies compiled by Catherine Crawford
II. HARM meeting minutes with Enbridge & M.O.E.
III. Carmen Krogh Biography
IV. Map of the Municipality of Kincardine

Introduction

We commend the Government of Canada and Health Canada for undertaking this study and welcome the opportunity to contribute comments on the study design.

Our group, H.A.R.M. or Health Affected Residents Meetings, came into being in 2010, as a sub-group of Central Bruce Grey Wind Concerns. Prior to the formation of H.A.R.M., residents from the area affected by the Underwood Enbridge Wind Project had been contacting Central Bruce Grey Wind Concerns directly. A special subgroup was created to deal with these issues and it has met regularly since 2010, providing information and support to residents in the community that have been affected by the wind turbines.

One activity of the group has been to document the health impacts of the turbines on the residents. Within or close to the Enbridge project area, there are currently residents living in 18 homes that have acknowledged negative health impacts related to wind project operations. These families have reached out to us in confidence. We attach a document that summarizes 10 of these cases. The document formed part of a presentation to the Municipal Council for Kincardine and to protect the privacy of the individuals, their real names have been replaced by alternate names.

H.A.R.M., together with Councillors from the Municipality of Kincardine have also tried to resolve the issues with both Enbridge as well as various provincial government agencies. As you can see from the attached minutes of the meeting with HARM, Kincardine Council, Enbridge and the MOE, neither the wind company nor the government agencies involved are taking action to address these residents' suffering. Due to the lack of effective standards that align with the reality of wind turbine operations, both the government and the wind company can point to each other as the group responsible for the problem. Meanwhile, our residents are continuing to suffer adverse health effects for over 3 years.

We see a study by Health Canada as a key step forward in understanding the impacts of human health in the expectation that this understanding will help us move these existing problems forward to resolution and prevent future problems from occurring. Those of us who are living with the problems caused by wind turbines are looking for a science-based study that will not only contribute to the existing evidence base, but also provide definitive answers that can support the standards that are needed to protect human health. In the Kincardine area, we live in close proximity to the Bruce Nuclear but are not concerned about the risks posed by that facility as it operates under tight federal government regulation. In our view, similar crisp standards are needed to govern the development of new wind turbine projects and the operation of the existing facilities so that they are not causing further harm to the health of nearby residents. If the current design of the Health Canada study will not provide these definitive answers, then the design needs to be revised.

We would hope our experiences and community connections will qualify our community as a candidate for testing under the Health Canada study. Not only do we have experience with an existing large-scale turbine development, but it is also significant that more turbines are proposed for our area. This combination of circumstances would allow Health Canada to obtain data that can be used as a control group in the study from a nearby similar area prior to the installation of turbines.

Background

The Municipality of Kincardine is located in southern Bruce County on the eastern shore of Lake Huron. The total population of the Municipality of Kincardine is approximately 11,200 of which

6,500 (58%) live in the urban settlements of Kincardine and Tiverton with the remaining 4,700 (42%) living in the surrounding in small hamlets and on farms in the rural area.

This rural community has had the unfortunate distinction of having direct experience for the past three and half years of living with the 110 industrial wind turbines (IWTs) of the Enbridge Underwood Project and 5 from the Cruickshank Project now owned by Enbridge. These turbines are located too close to homes and similar in pattern to that experienced on a widespread basis around the world, health problems linked to these turbines have been getting progressively worse.

The Enbridge Wind Project, located in the northern portion of the Municipality of Kincardine is unique the world over. There is not another project with 110 industrial wind turbines in such a small area, with so many IWT's located so close to homes. Non-resident landowners account for 75% of the land leased for this project. These landowners live elsewhere, leaving the non-participating resident population to deal with the effects of the turbines.

Reports from these residents indicate that the boundaries of land owned by the participating landowners fail to contain the audible and low frequency noise as well as the electrical pollution that is created by these installations. These issues carry over to the lands owned by non-participating landowners, meaning that the health, safety and sanctuary of these residents has been violated as their private property, has in effect, been trespassed. The reports from these affected residents very much bring into question the 550m setback currently in place in the Province of Ontario. Problems being reported up to 2.3 kilometres away provide support in a Canadian context for the setbacks of 2 kilometres in place in parts of Australia.

The Federal Government is participating in the Enbridge project through Natural Resources Canada's ecoENERGY Renewable Power incentive program (Reference No 5911-L2-1). Enbridge has received approximately $12 million from this program since operations began in February 2009 despite the problems that it is causing for local residents and evidence that the actual noise levels at homes were above the approved levels. Health Canada was involved in the Federal Environmental Assessment (Registry Number 07-01-35693) and identified receptors that would be exposed to noise levels in excess of the guidelines at that time. As part of the Health Canada review of wind turbine noise, it would be very appropriate for post-implementation of the testing of actual noise levels to confirm the validity of the earlier Health Canada assessments. Our community has been targeted by additional wind projects sponsored by a series of companies:

Project Name	No. of Turbines	Turbine Size	Status
Enbridge Underwood	110	1.65 MW	Operational
Cruikshank's Project	5	1.65 MW	Operational
Bruce Energy - Huron Wind	5	1.8 MW	Operational
Samsung/Pattern Armow	90	2.5 MW	FIT contract
Leader	32	2.5 MW	Signed leases
Toronto Renewable	10	2.0 MW	Signed leases
Majestic Wind	3	2.5 MW	Signed leases
Total	255		

If these additional turbines are approved, our community will be host to a total of 255 turbines. Please refer to the attached map that will assist you in visualizing the pervasive coverage and density of turbine developments that are being proposed for our community.

Most of the rural areas affected by future projects contain higher human population densities than that of the Enbridge wind project. Two of the planned projects, including Armow Wind, are presently proposed to be installed and operating before the announced date for completion of the Health Canada study. The Municipality of Kincardine has asked the wind companies for greater set-backs from designated growth areas for the town of Kincardine as well as from the rural hamlets within the project area to limit the number of people being affected by these projects. These requests are being ignored in the project site plans.

The Chief Medical Officer of Health for Grey- Bruce, Dr. Hazel Lynn, is following the local health impacts closely. On January 25, 2011, she issued a special report on Industrial Wind Turbines to the Grey-Bruce Public Health Board. It summarized her findings and recommended 8 specific areas for further study. Many of these recommendations from our senior local medical official are directly applicable to the design of the Health Canada study.

Lessons Learned Applicable to Health Canada Study Design

Our work with residents of a wind turbine project whose health has been affected by these turbines has given H.A.R.M. some unique, first-hand insights into the challenges that will be faced by the Health Canada study. We are passing on some of our most important lessons learned but would be pleased to work with the Design Team to assist with their work in designing a study that will allow appropriate assessment of the issues being reported.

Documented Concerns

The study design calls for a randomized selection of homes in the study area for interviews. This seems to be a costly approach to identifying individuals with health problems. If this project were selected as a study site for the Health Canada study, H.A.R.M has already documented concerns of 10 of the 18 families in the Enbridge Underwood wind project that are reporting health concerns due to the wind project operations.

The approach proposed for the study will likely also not be successful in mature projects as people who are most affected by the wind turbines are the ones who are the most likely to move to another location and not be available to be captured in a random sample based on the population present at the time of the study. The study may be statistically 'correct' but the sample will likely be drawn from a non-representative population that is skewed towards individuals that are less or not affected by wind turbines.

People who were seriously affected by turbines, may now be represented by;

- abandoned homes that people cannot sell,
- empty homes that have been purchased by wind companies,
- homes that have been demolished.

To obtain a sample that is truly representative of the people impacted by turbines, a pre-study would be needed to identify changes in resident population that have taken place since the turbines began operation. The previous population at the time the project began operations could be sampled and steps taken to locate any individuals that have relocated. Some people may be

available as they may have moved into Kincardine or another nearby urban settlement but others may have moved greater distances, even outside the area, and may not be found. When a roster of people who are reporting actual health problems related to wind turbines is available, it would seem more reasonable to study those people to determine if the reported symptoms and the contributing environmental conditions can be confirmed.

Reluctance to Come Forward

This report indicates that the study will only include those who have volunteered to come forward. Again our experience is that this will only reflect a portion of the residents that have been affected by the existing wind turbines. As this is a small community, we are aware of many individuals who will not come forward, even to our local group, out of a fear of speaking out. Some are landowners who have signed option agreements containing gag clauses which impose and enforce silence upon them in any public statements deemed contrary to the IWT developer interest. We understand that others fail to speak out for fear that this public acknowledgement will further devalue their greatest asset — their home. A few have sold their homes and moved away without disclosing to the new owners the problems they experienced. Another group representing those with deeper roots and more longstanding affection for their properties have felt that governments at all levels have made them the object of ridicule, and that speaking out will only invite more ridicule.

Each of these attitudes represents a barrier for the Health Canada study to succeed. To overcome them, it is essential that the study have a local partner-champion that will encourage participation as well as the ability to meet with someone from the design panel that they can trust. For this reason, we think it is essential that Carmen Krogh, Bsc Pharm, be added to the design panel. Through her diligent and ongoing research into the negative health effects impacting citizens across Ontario, she has earned the trust and respect of those who are suffering in the Kincardine area as well as other turbine projects across Ontario. She is also a recognized international expert on the issue of health impacts of wind turbines (see attached biographical information). She plays a consultative role for other governments and we need to leverage this Canadian-based resource for this important Canadian study.

A great deal of scepticism and distrust has formed through the lack of positive communication with those involved in the University of Waterloo study funded by the Ontario government. We do not want to see the same mistakes repeated. Carmen Krogh is well aware of the sensitivities of this situation and is the perfect candidate to strengthen this study. It is important that the study design recognizes that these victims of wind turbines will need to feel secure inviting government scientists into their homes.

Understanding the Noise Generated by Turbines

The proposed design seems to be focused on the World Health Organization's noise thresholds. Our experience with turbine noise is that this definition does not apply. A key aspect that is not covered in the WHO definition is the special audible characteristic of industrial wind turbine noise referred to as tonal noise. It is heard as a repetitive whoosh, whoosh, whoosh - a sound that residents in our community likened to Chinese water torture.

The study needs to include actual sound measurements, with the appropriate equipment to assess audible and low frequency sound, both inside and outside of the residences belonging to people who are reporting health problems which appear to be related to the wind turbines. The computer noise modeling provided to date by developers in Ontario is inaccurate, and existing industrial wind turbine projects are out of compliance.

International noise standards recognize that tonal noise, due to its repetitive nature is vastly more

annoying and apply a 5 dBA penalty for these cyclical noises suggesting that the benchmark should be 35 dBA. The Ontario Ministry of Environment does not include this penalty in their models, making them out of step with other jurisdictions. The base benchmark for the Health Canada study should use the more accepted approach.

In addition to noises in the audible frequency range, low frequency noise and infrasound need to be key foci of the study. For rotating sources, such as fans, specific frequencies are often generated which relate to the number of blades and the speed of rotation. This is referred to as blade pass frequency, making the source of the LFN identifiable. In very general terms, the larger the physical size of the source, the lower the frequency of the noise is likely to be.

Our work with the residents suggests that it is not the intensity of the Low Frequency Noise penetrating homes but rather the periodicity, the repetitive, cyclical nature of this sound, which is creating so much damage. The human body is covered in hundreds of pressure sensors. When these sensors detect cycles back and forth, such as ocean waves, seasickness can be generated. Infrasound and Low Frequency Noise are pressure waves that are detected by these pressure sensors on human body. Certain parts of the human body can also resonate at various low frequencies. For example, the chest wall can resonate at frequencies of about 50 to 100 Hz and the head at 20 to 30 Hz.

LFN and infrasound can travel great distances and be carried further by the wind. Their interaction with the curved surface of the IWT tower creates a complex shedding of directions that these sound waves travel. To capture the conditions being experienced by people living within affected homes, sound pressure measurements need to be taken using high resolution FFT (Fast Fourier Transform) analyser inside the home. Further multi-channel measurements need to be explored relating the tones from the turbine to the tones inside the home. The type of equipment needed to complete this necessary analysis is not identified for use in the study in the published design. Inside a home there are compounded issues of resonance within a building's structure where nodes (quiet areas) and antinodes (loud points) are created. These depend upon the specific room dimensions and room resonance which can create elevated levels of low frequency noise at points within a room.

The study needs to include actual sound measurements, with the appropriate equipment to assess audible and low frequency sound both inside and outside the residences of people reporting health problems related to wind turbines.

Summary

We very much want the Health Canada study to succeed and below we summarize the key enhancements to the study design most needed to best facilitate that result.

1. Study Subjects

Considering the work required, the budget is small. A totally randomized study would be wasteful and likely not representative unless difficult corrective measures are undertaken. Much is already known about wind turbine noise penetrating homes. It will not be hard to identify homes from which health issues have been reported and homes that have been abandoned or bought out by developers. These locations will provide highly relevant data, It is our position that the focus of your research should be on them.

2. **Composition of the Design Panel**

Recruit Carmen Krogh and immediately gain the trust of those whose cooperation is needed for the study to succeed. In light of victims' opinions regarding the University of Waterloo study, ORC

RETH, please do not underestimate the impact of this mistrust and the level of respect and participation that Carmen Krogh will bring to your study.

3. **Noise Definition**
The study needs to move beyond the World Health Organization definition of noise and the threshold of 40 dBA. Noise generated by wind turbines is much more complex than the noises considered by this standard and the study must be designed to consider a wider definition of noise.

We commend Health Canada for undertaking this study of an industry that has already negatively impacted the lives of many Canadians. The resources of H.A.R.M. are available to assist you in contacting the people in the Kincardine area that have been affected by the wind turbines.

In closing, we are asking Health Canada to respond appropriately on behalf of those experiencing health impacts from wind turbines. We need a science-based study that will provide definitive answers that can support the standards that are needed to support human health.

We know that what is happening in our small community in Kincardine is not unique. As well, for us, the health impact of wind turbines is not an abstract concept bantered about in politically glamorous articles about renewable energy. It is actually ruining real people's lives here, our neighbours, as documented in Appendix I, and we need a Federal government that does not doubt its citizens, and who will go to bat for them.

May these stories of H.A.R.M. figure prominently as a wakeup call for what can happen when the greed for green goes wrong.

Sincerely,

Rachel Thompson & Bill MacKenzie
Representing H.A.R.M.

APPENDIX I:

"HEALTH IMPACT IN TWO LOCAL WIND PROJECTS"

CASE STUDIES COMPILED BY:

CATHARINE CRAWFORD
M.Ed. (Counselling Psychology),
Psychotherapist, OACCPP certified

On behalf of
H.A.R.M. (Health Affected Resident Meetings)
and
Central Bruce Grey Wind Concerns

Introduction
The following case studies related to two wind projects both of which are in the Municipality of Kincardine and are owned by Enbridge Ontario Wind Power. The Underwood Project comprises 110 turbines, and the project south of Tiverton, known as the Cruikshank's Project, has 5 turbines. Both projects came on line in 2008.

In the fall of 2010, due to the communication of health complaints from the community to us, Central Bruce-Grey Wind Concerns began to facilitate Health Affected Resident Meetings (HARM), offering information and resources to those in the Enbridge Underwood and Cruikshank's and Projects. Catharine Crawford and Patti Hutton co-facilitate this group, with support from Rachel Thompson and Bill MacKenzie. The goal is to help people feel less isolated and to understand their right to complain. We have never advertised, but through word of mouth have a list of 20 or more families who are suffering the health effects of living in a wind project. The number of affected individuals known to us increases weekly but not all residents choose to attend meetings.

Resident's names have been changed for this summary, as these residents did not wish to come forward. Permission has been sought in order to share their health impact experience. It is important to note that sharing personal health information about the effects of wind turbines upon oneself and one's family is not easy for anyone to do publically, particularly when your government, the wind company and the media, maybe along with your doctor and your neighbours, are telling you there is no scientific evidence for what you are experiencing---- that it can't be true that wind turbines hurt people. We hope more residents will be able to speak out in their own voice; however we understand why people are hesitant to do so.

This presentation describes the health distress of 10 households in the above-named wind projects was included with a presentation to the Kincardine Municipal Council on March 16, 2012. In all cases discussed, the setback distances from turbines range from 450-1500 m.

Resident Family #1
Closest Turbine: 1 km
Other Turbines: 4 more within 1.6 km.

Debbie and Russell have a farm in Kincardine Township. Debbie writes about their situation: "The closest turbine to our residence is 1 km away. When the first wind projects were being proposed in the community, the MOE and proponents stated that a 350m setback would be adequate to protect neighbouring homes from adverse effects. Therefore, we were not expecting any problems from noise or shadow flicker.

"When the turbines began operating, we discovered that they were not 'whisper quiet'. The sound varied from a jet-over-the-house sound, to a gentle whoosh, to a deep beating sound and on some days, to no sound at all. We could not hear them in the house with the doors and windows closed.

" I began to notice pressure in my ears after being outside for any extended period of time, and found myself going inside quite a bit, or wearing earplugs, for relief.

"After the first winter, we began to notice headaches, which have increased in frequency. In the

last 6 months, I have noticed a high-pitched ringing tone in my ears. We find the symptoms are more severe in winter than in the summer.

"This winter, we have been coping with the health impacts by leaving our farm to spend time in town or neighbouring communities. We have purchased a trailer and rented a site at a nearby campground in order to get away from the wind turbines on a regular basis during the warmer weather. However, this can only be considered a temporary solution."

Debbie continues: "I have spoken with other residents who are experiencing similar problems, but they are not willing to discuss them publicly. I have also spoken with people who have wind turbines on their property and are suffering ill effects, but they cannot come forward due to provisions in their lease agreements.

"The government simply cannot keep ramming these industrial installations into rural areas until they address the existing problems. The 350m setback and the new 550m setback are based on computer noise modelling. However, computer models do not trump real world observations and everywhere that large industrial wind turbines have been built, similar health problems have been reported".

Resident Family # 2
Closest Turbine: 455 m
2nd Turbine: 548 m
Other Turbines: 4 more within 1.3 km.

Donna lives with her husband in the Enbridge Project. She reports that since the turbines came on line it takes her 2-3 hours to get to sleep, and the sound of the turbines "comes through her pillow". Whether the winds are calm or high, her sleep is disrupted 50 % of the time. Donna describes the noise as a "roaring freight train" going through her home. She also has a tightness in her chest and heart racing, which comes on when she is at home, and not when she is at work. She has developed high blood pressure. She is tired at work due to not sleeping well and reports that her home is no longer a place where she can relax. Her spouse has sleep disruption as well, and notes that it is noisier in different parts of their home, including where they sleep. Both Donna and her husband have noted since the turbines started that there are electrical problems in their home (electrical pollution due to the transmission lines and substations required for the project). Three times they have touched metal door knobs and been thrown backward and landed on the floor due to an electrical charge. They have witnessed bolts of electricity when turning on light switches. This never happened before.

When asked why they have not complained as yet to Enbridge and to the MOE, Donna replies that she fears nothing will be done, and that complaining would be very difficult emotionally. She is very angered by these changes in her health, and reports none of these adverse health effects were present prior to the turbines.

Donna reports that when something is mechanically wrong with the turbines near her home, just like a light switch, the trucks seem to be dispatched to the area to stop the clanking and clunking. She wishes if only the wind company could demonstrate as much concern about the humans living near them as it is concerned about the quick resolution of the mechanical malfunctioning of the turbines themselves.
(Specific turbine distances for other turbines – 888m, 1000m, 1200m & 1300m plus 1.2km from

substation)

Resident Family # 3
Closest Turbine: 500 m
Other Turbines: 3 more within 1.0 km.

Kim and Mark report that the noise level in their two-story home is very high and that sleeping is a problem. They also report that their home "vibrates". Kim has developed headaches, dizziness and light-headedness, and is going for her second MRI related to these symptoms. Their quiet country property, complete with night-time sounds of crickets, distant coyotes, and the chirping of many birds is now completely changed by indoor and outdoor noise, sleep deprivation, flicker, and disturbing health symptoms which did not exist before.

Resident Family # 4
Closest Turbine: 616m
Other Turbines: 3 more within 1.5 km.

In this household, Jim is much more affected than his spouse, Ida. Jim developed sleeping problems right away. When he wondered out loud to his physician about the possible link to turbines, the doctor replied to Jim, "That is nonsense. Take these pills for sleep and anxiety". His sleeping problems were temporarily solved, but after a month or two, the pills no longer worked. Jim often sits up all night and cannot sleep. He has taken several dizzy spells at home and is prone to falling, feels dizzy when driving his car, and has experienced a seizure. He has headaches, heart palpitations, and blood pressure problems. Ida reports he has become forgetful and disorganized. When Jim goes away on vacation, he sleeps like he did before the turbines. When he returns home, his health problems resume.

Jim complained to Enbridge, and sound testing was completed at his home over several weeks by the same company which did the initial sound assessment for Enbridge in 2007 (Valcoustics). Both sound measurements taken in 2009 and 2010 proved that Enbridge was out of compliance with MOE (Ministry of the Environment) regulations[1], but nothing as yet has been done.

Resident Family # 5
Closest Turbine: 600m
Other Turbines: 4 more within 1.50km.

Jessie reports that since the Cruikshank's turbines started up she is tired all the time, and never feels rested and relaxed. Her husband Dave, who never before had headaches, now has them frequently. Their teenage son and daughter are constantly tired and have headaches which go away when they leave home for periods of time. Jessie says that certain parts of their home are very noisy, and that she cannot enjoy her property, including gardening and other recreational pursuits on her land. Her rights to health, well-being, and pleasure in her property have been taken away.

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[1] Results of this report and a review of the findings can be made available if requested.

Resident Family # 6
Closest Turbine: 560m
Other Turbines: 10 more within 2.0 km.

This 3-person dairy farming family noticed health impact one month after the project started in Fall 2008. Each member of the family developed headaches and ear aches. Their physician said wind turbines could not be the problem. For nearly 2 ½ years they have been living with noise in the home, which disturbs their sleep. When Jack, the father in this home goes away on farming business he feels better. When he gets within the wind project boundaries on his way home, he begins to feel unwell again.

Jack reports that his dairy cattle began to have decreased milk production after the turbines began. The cows were hesitant to drink from their troughs and were agitated and kicking more in the milking parlour. The cats disappeared from the parlour too. Dairy production was down 20%, and so was their income.

Since involving the resources of an expert in electrical pollution, and the installation of mitigating devices, the cattle are no longer hesitant to drink from their troughs, the cats are back, and milk production is up to normal. These devices of course do not mitigate noise and sound problems related to the turbines. These farmers report that with the loud sound of the turbines on the land, they can no longer hear the sounds of nature which used to give time-tested cues as to when to plant crops. The farmland has become industrialized. It has been changed, and important ecological cues erased.

Jack's wife Denise reports that she felt her body began to "vibrate" with the onset of the turbines. She has developed ringing in the ears, loss of concentration, and heart palpitations. Two to three times a night she has to get out of bed due to sleep disruption, and she is restless during the day. Some mornings she wakes up having had a good sleep and notices that the turbines were not running. Switching to grounded telephones in the house has assisted with electrical pollution, and Denise reports that her heart palpitations have decreased. However, she still has tinnitus, a sense of vibration in her body, lack of sleep, and poor concentration.

Their son who assists with the family farm began to get "sharp, spiking headaches" when the project started, and also suffers from tinnitus, nausea, and exhaustion. When he goes to town, the symptoms of nausea and tinnitus go away.
(Specific distances for other turbines – 1150m, 1300m, 1400m, 1450m, 1500m, 1550m, 1700 m, 1750m, 1800m & 1900m)

Resident Family # 7
Closest Turbine: 495m
Other Turbines: 8 more within 2.0 km.

Rilla and Jake noticed a change in their health within one month of the turbines spinning. They had a noise increase in and outside of their home. Jake has headaches, especially when the turbine noise is louder in the home. He has taken to spending more time in the cellar, rather than the main floor, as his headaches ease up when he goes underground. Rilla has had headaches since the start of the project, which go away when she leaves for work. She has also developed nausea and lowered appetite and is "up half the night tossing, turning, and walking around due to noise".

Jake recalls a mechanical failure of a turbine near his property 3-4 months into them coming on line. There was a very loud explosion, and smoke began to pour out of the engine. Several parts

fell away off the engine, but the blades remained on. Jake reports that the cranes and trucks arrived nearly instantaneously out of nowhere to fix the turbine, replace parts, and get it running again. To his knowledge, it was never reported to the public. While this is not a health related incident, it does demonstrate how quickly the wind company can take action when it chooses to. (Specific distances for other turbines – 600m, 805m, 1150m, 1400m, 1500m, 1700m, 2000m & 2010m)

Resident Family # 8
Closest Turbine: 714m
Other Turbines: 4 more within 1.0 km.

Within a day of the start of the turbines, Kirk noticed the noise in his home. He has to have the television volume up much higher than average to mask the sound of the "whoosh, whoosh, whoosh". He has developed ringing in his ears and chest tension. When outside in certain parameters of his property, he gets an unusual vibration across his chest. His spouse Anne, who was a vibrant, healthy person who fell asleep easily, now cannot sleep. She is sleep-deprived continually, and has encountered "hassles" at work due to her fatigue and stress. She has also developed tinnitus.

When asked why they have not yet complained to Enbridge or the MOE, Kirk replies that he believes it would "go nowhere with Enbridge… Enbridge is out for profit". When it comes to the MOE, Kirk reports a lack of trust for a government body that has handed out the regulations for wind projects. What good will it do, he asks.
(Specific distances for other turbines – 768m, 810m, 850m & 968m)

Resident Family # 9
Closest Turbine: 2.3 km
Other Turbines: 4 more within 3.0 km.

Mary in the Cruikshank's Project reports that "the continuous rumbling sound of the turbines disturbs my days and particularly my nights". She suffers from insomnia, headaches and ringing and pain in her ears. She likens the noise in her home to the "continuous sound of a generator", which was not there prior to the erection of the turbines. When the MOE came to her home and discovered the turbines were 1- 1.5 km from her home she was told the turbines "were too far away from her and there was nothing they could do". She has requested that the MOE come to do noise testing and to date no one has come.

Resident Family # 10
Closest Turbine: 453m
Other Turbines: 4 more within 1.0 km.

Louise began to notice her sleep deprivation some months after the turbines started. She also developed headaches, unusual sensations in her ears, pressure in her head, restlessness at night, unexplained nausea, motion – sensitivity, and an overall feeling that "something was not right" with her health. Louise, a typically highly organized and effective person noticed a change in her cognitive functioning: Over time, she could no longer prioritize her day or multi-task. She could barely carry on. She quit her job, a very significant part of her life that much more than a mere job.

She became nauseated around the turbines and dizzy intermittently. Louise began to develop

tinnitus, like a high-pitched tone in her ears, intermittently. She lost body weight due to vomiting from migraine and nausea. Her headaches became constant and she began receiving treatment at headache and pain clinics.

Dr Nina Pierpont, Scientist, Physician and Author in Malone, NY has diagnosed her, by an in-person examination, with Wind Turbine Syndrome. Louise's Specialists and GP have told her she must leave her home. When she retreats away to the cottage she can eat, she can sleep, and the pressure is relieved from her ears.

Louise has lost her career and the safety of her home. She cannot live there and she cannot work. The disruption of the wind factory on her life is of massive proportions. Her health, well-being and livelihood have been harmed beyond the scope of your and my imagination.

When Louise reported to Enbridge that she had made health complaint reports to the MOE, and asked the Enbridge Operations Manager what he was going to do about it, he replied, "Absolutely nothing. We have been given a license by the government and we are going to continue".

Summary Comments:

• As a citizen's advocacy group, we know not everyone is affected in the same way by wind projects. Some people live near them with less or no effects. But clearly, significant numbers of people living a range of distances from turbines in these 2 projects are very disturbed by them. [2]

• We are aware that what we are presenting is qualitative and anecdotal in nature. We are in favour of a 3rd party, neutral, scientific study to ascertain what, if any distance, is safe for all human and livestock receptors. The need for a scientific study does not negate the validity of these resident health experiences[3]. They are real, and they are not being adequately addressed. A moratorium on any further industrial wind development until a study determines health and safety risks is absolutely necessary.

• People are struggling every day. They are struggling with a force in their lives they did not choose, nor were they given the opportunity to choose. The lack of transparency on behalf of the Proponent in the planning stages ensured that people could not know the full impact and potential of the project. The Proponent continues to do very little to assure residents their concerns are serious and real.

• Complaining to the wind company, one's municipal government, the MOE district office[4] and keeping records of your own health and phone calls pertaining to your health are daunting tasks to most people, let alone for people who are sick. We will never stop inviting residents to voice their

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[2] The Society for Wind Vigilance, an international federation of professionals promoting the development of protective health guidelines where industrial wind turbines are concerned have collected Health Surveys from Ontario residents for more than a year. For 700 turbines in Ontario, over 100 surveys have been returned by individuals identifying health impact. In addition, dozens more contact calls were made to a Wind Vigilance help line by individuals who did not fill out a survey.

[3] At the International Symposium on the Wind Industry and Adverse Health Effects (October 2010), Dr. Carl Phillips stated "The claim that there is no evidence of negative health effects from wind turbines near residences is clearly false since there are ample credible reports of people experiencing problems."

[4] It has been our observation that the Owen Sound District office of the Ministry of the Environment has begun to regard citizen complaints with increased concern. Some MOE staff have expressed sincere efforts to assist residents, within the confines of their mandate and current equipment.

concerns, but asking people to complain to 3 or more institutions and bodies of government with no guarantee of being believed, about something which has made them sick and which is very personal, is asking a lot from the innocent public.

APPENDIX II:

MINUTES OF JUNE 19, 2012 MEETING
AT THE UNDERWOOD COMMUNITY CENTRE

Representation from:

- Municipality of Kincardine
- Office of Lisa Thompson, Huron-Bruce MPP
- Ontario Ministry of Environment, Owen Sound District Office
- Enbridge Green Energy Group
- Ontario Ministry of Environment, Owen Sound District Office
- Enbridge Green Energy Group
- H.A.R.M. (Health Affected Resident Meetings)
- Central Bruce Grey Wind Concerns

Health Affected Residents Meeting. (H.A.R.M.)

This meeting was held with the intention of resolving problems that have been present in the Enbridge IWT project since operations started in 2009. It was organized to offer unique opportunities to all concerned to help solve issues that have been the results of complaints over the last 3 + years of this project's operations, providing an opportunity for members to talk directly with Enbridge and the MOE in the hope that the process of remedial action can begin.

Rachel Thompson chaired the meeting. It was attended by three representatives from Enbridge, two from the MOE, four Kincardine Councillors, HARM members and 3 HARM coordinators along with 2 members of the Central Bruce-Grey Wind Concerns Group. It was noted that health affected residents from 4 out of the 18 homes experiencing problems within this project were unable to attend this meeting.

Central Bruce Grey Wind Concerns
Rachel Thompson, Chair & HARM Co-facilitator
Catherine Crawford, HARM Co-facilitator
Patti Hutton, HARM Co-facilitator
Karen Breitbach, CBGWC member
Bill Palmer, CBGWC member
Jeff Hemming CBGWC member
Marion Rahn CBGWC member
14 HARM members were in attendance. To respect their privacy, their names are not included.

Office of Lisa Thompson, Huron-Bruce MPP
Lynne DiCocco

Ministry of Environment, Owen Sound District Office
Victoria Black, Environmental Officer
Heather Pollard, District Supervisor

Enbridge Green Energy Group
Ian MacRobbie, General Manager
Usman Bhatti, Site Supervisor Cheryl
Levy, Community Relations

Municipality of Kincardine
Anne Eadie, Deputy Mayor Ron
Coristine, Councillor Jacqueline
Faubert, Councillor Randy
Roppel, Councillor

The meeting commenced at 7:10pm.

Approximately one year ago following a HARM meeting attended by the same four Kincardine Councillors present at this meeting, it had been decided that Anne Eadie would contact Ian MacRobbie to follow up with the electrical problems being experienced within the Enbridge Project. Anne Eadie at that time proceeded to submit a list with contact details of four homes experiencing problems to Ian MacRobbie.

As follow up business arising from the earlier meeting the Chair requested Ian MacRobbie to detail his actions taken to resolve these complaints.

Ian MacRobbie summarized actions Enbridge has undertaken in the interim to check out any faults there might be with the electrical lines. He pointed out that all lines were separate but above ground lines were parallel system as per Hydro One code. Electrical ground lines were not crossing the neutrals. Ian MacRobbie had visited with the Schwandt's who had complained about an untenable situation in their homes involving electrical pollution that has caused a range of problems from very uncomfortable electrical tingling sensations throughout their bodies to headaches that had them combating this problem by having to stand on rubber mats, completely turning off the power at night so that they could sleep. Enbridge had not fed any information back to the Schwandt's as a result of their monitoring, but he had reported to Ann Eadie. Wayne Schwandt noted that Enbridge had said call Hydro One; while they said contact Enbridge or his MPP. No one is helping.

Ian MacRobbie pointed out that as Enbridge is not the electricity distributor and that this is the responsibility of Hydro One. Enbridge could do further studies, and would need to have Hydro One involved.

The question that perhaps something could be wrong at the turbine itself was raised. Another point raised was that lines supplying domestic power were running parallel above each other with those supplying power to the grid was raised as a possible source with one affecting the other. Discussion ensued regarding a third party's involvement and Ian MacRobbie agreed he would be prepared to accept this. AMEC was the initial company offered, it was discussed that as they were contracted to construct the electrical aspects of the project it would be more appropriate to work with a third party company. Questions were raised about the anticipated time frame in light of what had not happened in the last year. Ian MacRobbie committed that progress would be forthcoming within the next three months.

It was further committed by Ian MacRobbie that Enbridge will bear costs if they engage a third party, and they will take into consideration citizens' choice of an independent consultant, as long as this was from a reputable company.

With regard to the difficulties experienced in the past in getting Hydro One to act, Anne Eadie pointed out that no doubt it would bring quicker results for action if Ian MacRobbie were to contact Hydro One. Ian MacRobbie stated he did have contacts on the transmission side and through those contacts would undertake to make connection with the right party to expedite action in finding where the problem lay.

Randy Roppel suggested that use of the political arm of the Municipality of Kincardine could also be used to encourage Hydro One's timely response in finding and resolving these electrical problems.

Discussion ensued regarding the burying of electrical lines as was done in the Ripley project to correct similar problems and is currently being negotiated with Samsung and Pattern who have committed to over 90% of electrical lines being buried in the proposed Armow Project. This had

not been a design requirement at the time the Enbridge Project received permits from the municipality but might offer a solution at least for the homes that are presently affected by electrical pollution problems. Ian MacRobbie stated that Enbridge would give this consideration. He is to take this up with Cindy Graham at head office.

Heather Pollard stated that Electrical Pollution is outside of the MOE's jurisdiction.

The meeting proceeded with discussion on another follow up action from one year ago. Jeff Hemming had reported problems with undue noise emissions, lodging complains both to Ian MacRobbie of Enbridge and the MOE in 2011. Ian MacRobbie acknowledged he had yet to get back to him and indicated that he or his new site supervisor would now be following up.

Jeff Hemming further stated that the MOE representative visiting the problem area informed him he did not have the ability to measure the sound emissions emanating from the turbine(s) in question. With this history of frustration in mind, Jeff Hemming was now requesting information on the chain of command within the MOE and Enbridge.

Councillor Coristine stated that Premier McGuinty himself had said that MOE were the ones to go to in order to have sound measured.

Ian MacRobbie mentioned he reported to Cindy Graham, Director of Green Power Operations, who reported to Don Thompson, Vice President of Green Energy. Heather Pollard noted she reported to Rick Chappel, the District Manager, who reported to Kerina Fletcher, the Regional Director, and up the chain through the Director of Operations, to the Deputy Minister, to the Minister of the Environment. This information is to be confirmed in writing along with email addresses by Heather Pollard of the MOE.

In response to the MOE's inability to properly assess sound emissions not in compliance with GEA noise standard regulations, Heather Pollard briefly recounted the MOE history in this regard. She explained that the MOE had to wait for a new draft protocol to be developed internally and put in place to correctly measure turbine noise emissions. The new Protocol was made public in September of 2011, has been published on the Ministry website as being the appropriate standard for noise testing. They are continually updating and revising it.

Heather Pollard further explained that sound testing was not a simple one step process as it is, for instance, in an industrial environment due to wind and other atmospheric variations that needed to be included in forming the protocol.

Discussion ensued in regard to the length of time necessary to obtain testing results and at what time of year these tests should be done. Heather Pollard pointed out that instrumentation could freeze up in the winter, when it was more likely that strong winds could place turbine noise to be "out of compliance". Suggestion was made by Anne Eadie that testing be done to include spring and fall since over the summer winds were very low and summer measurements alone would not reflect accurate representation of overall noise issues on their own.

Anne Eadie said burying lines does not always work, but is generally seen as best practice, and wondered if MOE knows of cases where it has worked. Heather Pollard replied, saying that MOE

does not.

As for testing for electrical pollution, Heather said MOE cannot do anything in that area.

The fact that industrial wind turbines were allowed to be placed into operation without a protocol to verify compliance as set out in GEA regulations was mystifying to concerned residents and was cause for considerable discussion and comment.

With regard to the new draft protocol, Anne Eadie asked "If noise exceeds guidelines, what is the mitigation?"

Heather Pollard replied that compliance is applied in stages. At a first stage, the offending company is asked to comply voluntarily. Ian MacRobbie pointed out that if non-compliance with the Certificate of Approval was found, then he would contact Vestas and some steps could be taken to correct this, such as changing the blade pitch.

The existence of "dampening software" that could be used to make changes to the pitch of the blades was raised. Ian pointed out that Enbridge had limited control to make adjustments on the older Vestas turbine design used in this project.

If the MOE issues an order for a mitigation measure, the time frame depends on the circumstances which are weighed up by using the "informed judgement matrix "to help them decide as to how to proceed.

As a second stage, MOE issues an order for a mitigation measure. The time frame depends on the circumstances which are weighed up by using the "informed judgment matrix" to help them decide as to how to proceed.

In the matter of Compliance and in answer to questions regarding financial penalties assessed for companies where operating turbines were out of compliance, the MOE representative, Heather Pollard replied that generally complaints were resolved on a voluntary basis, but if not mitigated, then penalties were set out in the Environmental Protection Act. This represents the third and final stage for compliance available to the MOE.

The MOE to date has no record of Enbridge being out of compliance.

Bill Palmer noted that he had submitted a report in January 2010, based on sound monitoring at the Smit home by the Enbridge acoustical consultant that identified that the sound at midnight exceeded the predicted value fully 50% of the time, and was more than 3 dB over the predicted value (and over the regulatory limit) 25% of the time. A response from the MOE had only been received after 9 months, identifying that the monitoring of the consultant was not in compliance with the new MOE protocol, and identifying that further monitoring would be required. Now, 9 months later, there had been no further communication regarding this additional monitoring, or explaining why the data provided by the acoustical consultant, already taken which identified sound in excess of the regulatory limit had not been acted on, even if it was not taken in compliance with the new protocol. The wind turbines have now been in operation for over 3 years, and nothing has been done to address noise complaints. He pointed out how this gave little credibility to the MOE or to Enbridge as actually attempting to operate in compliance, or to address identified complaints.

Ian MacRobbie explained that monitoring had now been ongoing since March and that they were half-way through the process at this time for two homes.

Heather Pollard explained that MOE takes no measurements during winter months, as instruments can freeze up.

Repeatedly throughout the discussion regarding the noise issue, Heather Pollard explained that measures to confirm the matter of compliance and thus mitigation had been impossible due to the lack of a protocol. Previous results had been inadmissible due to this same lack of an acceptable protocol.

This appeared to be small consolation to the group of people looking to both, Enbridge and the MOE for mitigation of their complaints.

In keeping with Bill Palmer's identification of problems he requested a copy of information in this regard and was directed to request an FOI from the EAAB.

"No" was the answer to the question Ron Coristine raised regarding if there were an overall regulatory body here that had overarching responsibility for control as we see in the nuclear industry?

The possibility of examination of the issue of low frequency noise and infra-sound as described in the study by Ambrose and Rand was asked of Ian MacRobbie by Bill McKenzie. Bill MacKenzie asked Ian MacRobbie if Enbridge has ever made the effort to measure sound by G weighted or unweighted protocols rather than A weighted.

Ian MacRobbie replied that Enbridge follows the MOE guidelines. MOE at present has no protocol for LFN. Heather Pollard stated the MOE are working on a draft protocol, but not aware of when it would be complete.

A point of further study suggestion was to follow up with the Ministry of Labour in regard to effects of noise annoyance on people who live and work at home within Industrial Wind Projects as Heather Pollard pointed out the Ministry of Labour are responsible for LFN in the work place.

Lynne DiCocco raised the subject of winter situations where roads are closed during storms and residents must remain in their homes as shut-ins while the turbines were operating continuously in high wind conditions. She suggested amendments be made to provide for a winter noise protocol due to the fact that people can be trapped in their houses unable to escape the adverse noise conditions.

Anne Eadie took the opportunity to rise and directly address industry and governments representatives regarding both the reality and the severity of noise and annoyance problems experienced within Industrial Wind Projects placed into quiet rural areas close to homes. She pointed out that rural residents living in proximity of wind turbines have been stigmatized as not being of sound mind and their complaints trivialized to the point of non-existence. Citing first her own experience while resident near turbines in Huron Kinloss, as well the example of one couple in attendance who had lived on their land for 40 years, Anne Eadie stated that the average citizen in this area living within the proximity of wind turbines had strong, in many cases, hereditary

attachment to their homes and farms. They were committed to contributing to strengths within their community. Their complaints were not imaginary and should not be trivialized.

The MOE's position, however, was that they require proof of a causal link and that had not been established, To date direct negative health effects cause by turbines based on literature reviews are denied. Rachel Thompson made the point emphatically that given the gravity of our situation, residents here have no time to wait for causal link. The example of the tobacco industry using the argument for proof of causal link to hold critics at bay for years cannot be repeated here.

Heather referred to the ongoing research programs, such as that being conducted under the auspices of RETH at the University of Waterloo. The point was raised that the results from RETH would likely be years away.

The urgency to help people living within the Enbridge project that are experiencing problems with their health since operations began, however, is of immediate urgency. The feeling expressed was that they could not wait another 3 years for mitigation to commence.

A request for assistance of the health affected residents by providing respite in alternate accommodation away from turbine operations was made.

Ian MacRobbie stated that this would be a difficult matter to get approved by his superiors, particularly so since because Enbridge is in noise compliance.

The remaining complaint issues relating to annoyance factors were:

View shed and Shadow Flicker:
Rachel Thompson and Jeff Hemming suggested to Ian MacRobbie that trees be planted to assist restoration of view shed, and to act as a barrier against the irritating sound emanating from the turbines. Jeff Hemming also requested his existing large windows, approximately 80 square feet, be altered to prevent the image of the blade rotations having a detrimental effect on any person sitting near them and wanting to observe activities outdoors, quietly read or listen to music. In other words enjoy a normal life style.

In other cases, would Enbridge consider paying the cost of installing blinds to block shadow flicker? Ian MacRobbie stated that Enbridge is willing to consider a tree planting program. The problem of shadow flicker noted needs to be followed up.

Radio and Other Communication Interference:
General current and possible future problems arising from turbine operations interfering with electronic communications were raised, noting in particular HAM radio and GPS equipment.

Ian MacRobbie is to follow up with police and fire departments to verify the situation relating to emergency communication interference and report on status.

Coenraad Smit is a ham radio operator and since turbine operations commenced he has been unable to use his equipment. Enbridge did place a taller aerial to correct this problem, but the problem has not been fixed. McRobbie is to follow up to replace the antenna with one that will work.

Jeff Hemming noted that he has had problems with his GPS re-calculating and the strange performance of his batteries completely emptying of power and failing to maintain a charge for the normal period of time on his palm pilot. He further stated that he has been monitoring his electrical service for the past 14 years and has noted increased instability only since turbines started operations.

Jeff Hemming asked for follow up information on the issue of shielding the flashing red aircraft warning lights so that they would be less visible at ground level. He felt that the red lights are an irritation, and for some people a safety hazard for people and drivers because they cause disorientation.

Ian MacRobbie replied that Enbridge had taken this issue to Nav Canada, and that the regulatory agency would not allow any alteration of the existing light system.

General Discussion tabled various other areas of concern and suggestions for remedial actions worthy of consideration:

Effect of Turbines on Home Values:
It was mentioned by Trix Schmidt that in many cases people wanted to move out of an Industrial Turbine project area, and even if they were willing to absorb the loss of value of their home, they felt it was not ethical to pass the same problems on to another person.

To this Jacqueline Faubert pointed out a recent real estate ad that offered a property for sale located within a wind turbine "exclusion zone" — indicating this as a example of listing a desirable feature.

A question was asked as to how Enbridge can help people wishing to leave the project area? Would Enbridge cover cost of appraisals?

Mitigation Suggestions:
Can the turbines be shut down at night for a month so that a determination can be made if this will help residents cope with sleep disturbance issues? It was pointed out that other forms of electrical power are now being paid for "de-rating", so why not wind ?

It was further suggested that Enbridge be financially compensated by the Ontario Government for the time turbines are shut down. Bill Palmer point out that building 10,000 MW of wind turbines in Ontario (roughly as predicted to occur by 2015 in the FIT Review) and then requiring them to be shut down for the duration of their 20 year contact so as to not be annoying is a cost commitment of about $250 Billion for nothing – effectively a 20 year commitment of $1000 per person per year – each year, for the next 20 years. He suggested consumers would find this undesirable.

In concluding the summary of this meeting, it is well to remember Bill Palmer's statement to Ian MacRobbie the effect that," You are causing health issues. It is time to address the concerns of citizens, not to hide behind inadequate regulations. Major problems, if not addressed then create a situation that will get out of hand."

It was suggested that to assist in resolving these issues it would help if in the near future Enbridge gave a delegation to Kincardine Council. Ian Mac Robbie agreed to this and suggested that within a period of 3 months this would be followed up to assess progress.

To summarize below are items identified for further follow up, it was acknowledged that further constructive open dialogue would commence via email.

Enbridge and Hydro One will investigate electrical pollution identified at four homes.
If Enbridge could please share Hydro One contacts with the Municipality so that our elected officials can also pursue dialogue with them?

A reputable independent electrical expert will be retained to conduct further investigations other than AMEC.

Two properties have requested that trees be planted to restore view shed and dampen the effects of audible noise.

Further dialogue is required to establish what can be done for those who no longer want to live within the Enbridge Project who are experiencing problems since the IWT's came on line.
There are people who cannot sleep in their homes within the Enbridge Project but sleep fine when they are away. What should these property owners do? They do not want to pass on their problems to a potential buyer, but no longer want to live in their homes. In good conscience they feel they could not morally put their homes on the market.

Is Enbridge willing to provide alternative accommodation for a period of one year? Is Enbridge willing to cover the costs for real estate appraisals ?

Further investigation must be undertaken to understand why so many people can feel themselves vibrating, the anecdotal evidence points to low frequency noise. Would Enbridge be willing to contribute funds to a municipal lead investigation as the MOE will not be looking into this?

The meeting concluded at 10:00 pm

APPENDIX III: CARMEN KROGH, BSc Pharm

Carmen Krogh is a retired pharmacist with more than 40 years of experience as a health professional. Krogh worked at Health Canada for eight years as Consultant to the Director's Office, Bureau of Human Prescription Drugs.

Krogh also co-chaired the North American Free Trade Agreement (NAFTA) Technical Working Group for Pesticides while at Health Canada.

Krogh spent twelve as Director of Publications and Editor-in-chief of the *Compendium of Pharmaceuticals and Specialties (CPS)*, used by physicians and health professionals for prescribing information in Canada. She was Director of Pharmacy at Edmonton General Hospital and Drug Information Pharmacist, Drug Information Centre, Ottawa.

Krogh is widely recognized in Ontario, Canada and internationally for her research, peer-reviewed articles, public information sessions and other educational activities regarding adverse health effects and industrial wind turbines (IWTs).

Carmen Krogh offers her time and expertise to individuals, community groups, and to the public, private, and non-profit sectors, industry, government officials and others at no cost. Her research is grounded in the real-life experiences of people who live amongst IWTs in Ontario and other jurisdictions. Her goal is evidence-based siting of IWTs that protects human health. Her research and educational efforts are self-funded.

Results of her work over the past three years include:

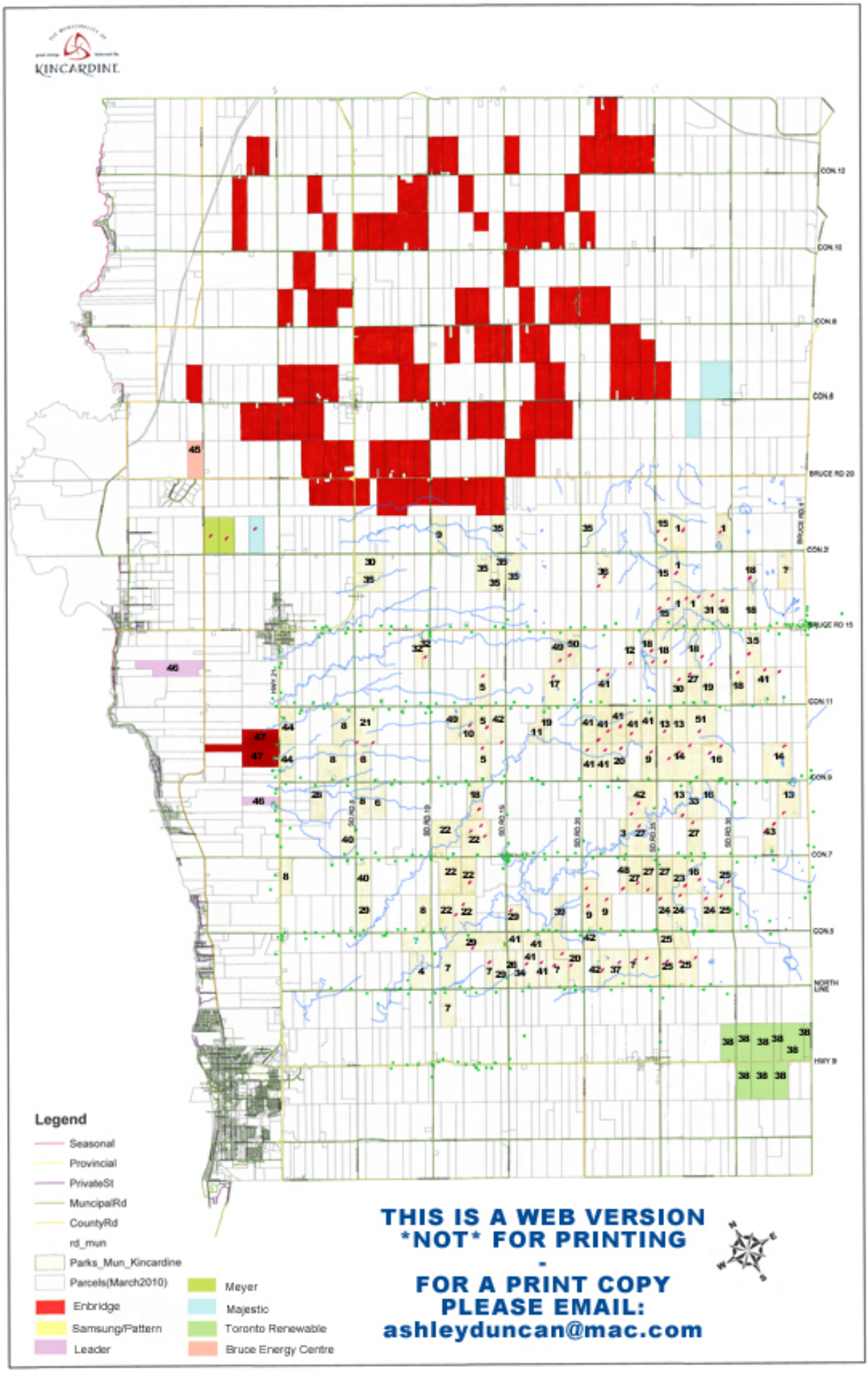
- numerous peer-reviewed scientific articles on IWTs and adverse health effects; occupational risks; social - community; and environmental impacts;

- a self-reporting health survey WindVOiCe © (Wind Vigilance for Ontario Communities) for people reporting adverse health effects from IWTs, published in a peer reviewed journal and cited in the British Medical Journal;

- co-founder of the *Society for Wind Vigilance,* an international federation of physicians, acousticians, epidemiologists, social scientists and others fostering international collaboration for safe siting of IWTs;

- presentations across Canada and in the United States including the Federal *Standing Senate Committee on Energy the Environment and Natural Resources*

- InterNoise (INCE) Conference August 2012, New York, Ms Krogh presented 3 papers reflecting the health impacts as a result of chronic exposure to wind turbine noise and its harmful effects.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HWY 21
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