

2007 CarswellOnt 4689
Ontario Municipal Board

Schell, Re

2007 CarswellOnt 4689, 56 O.M.B.R. 257

In the Matter of subsection 34(19) of the Planning Act, R.S.O. 1990, c. P.13, as amended

Appellants: Barry Schell, Lori Pearson, Geroge Langfor, Woodrow Schell, Henry (Harry) Ruetz

Subject: By-law No. 2006-152

Municipality: Municipality of Kincardine

OMB Case No.: PL060986

OMB File No. R060243

In the Matter of subsection 34(19) of the Planning Act, R.S.O. 1990, c. P.13, as amended

Appellant: Doug McEwing & Hein Walma

Subject: By-law No. 2006-156

Municipality: Municipality of Kincardine

OMB Case No. PL060986

OMB File No. R060245

In the Matter of subsection 34 (19) of the Planning Act, R.S.O. 1990, c. P.13, as amended

Appellant: William Palmer

Subject: By-law No. 2006-157

Municipality: Municipality of Kincardine

OMB Case No. PL060986

OMB File No. R060246

In the Matter of Subsection 34(19) of the Planning Act, R.S.O. 1990, c. P.13, as amended

Appellant: Jane Pether

Subject: By-law No. 2006-159

Municipality: Municipality of Kincardine

OMB Case No. PL060986

OMB File No. R060247

In the Matter of subsection 34(19) of the Planning Act, R.S.O. 1990, c. P.13, as amended

Appellant: Victoria Starkey

Subject: By-law No. 2006-160

Municipality: Municipality of Kincardine

OMB Case No. PL060986

OMB File No. R060286

In the Matter of subsection 34(19) of the Planning Act, R.S.O. 1990, c. P.13, as amended

Appellant: John Thomspen

Subject: By-law No. 2006-168

Municipality: Municipality of Kincardine

OMB Case No. PL060986

OMB File No. R060248

In the Matter of subsection 34(19) of the Planning Act, R.S.O. 1990, c. P.13, as amended

Appellant: Coenraad Smit

Subject: By-law No. 2006-169

Municipality: Municipality of Kincardine

OMB Case No. PL060986

OMB File No. R060249

In the Matter of subsection 34(19) of the Planning Act, R.S.O. 1990, c. P.13, as amended

Appellant: Paul & Sherry Herrington

Subject: By-law No. 2006-170

Municipality: Municipality of Kincardine

OMB Case No. PL0686

OMB File No. R060250

In the Matter of subsection 34(19) of the Planning Act, R.S.O. 1990, c. P.13, as amended

Appellant: Anthony Clark

Subject: By-law No. 2006-173

Municipality: Municipality of Kincardine

OMB Case No. PL060986

OMB File No. R060251

In the Matter of subsection 34(19) of the Planning Act, R.S.O. 1990, c. P. 13, as amended

Appellant: Anthony Clark

Subject: By-law No. 2006-174

Municipality: Municipality of Kincardine

OMB Case No. PL060986

OMB File No. R060252

In the Matter of subsection 34(19) of the Planning Act, R.S.O. 1990, c. P. 13, as amended

Appellant: John Thompson

Subject: By-law No. 2006-175

Municipality: Municipality of Kincardine

OMB Case No. PL060986

OMB File No. R060253

In the Matter of subsection 34(19) of the Planning Act, R.S.O. 1990, c. P. 13, as amended

Appellant: William Stark

Subject: By-law No. 2006-176

Municipality: Municipality of Kincardine

OMB Case No. PL060986

OMB File No. R060254

In the Matter of subsection 34(19) of the Planning Act, R.S.O. 1990, c. P. 13, as amended

Appellant: Paul & Sherry Herrington

Subject: By-law No. 2006-177

Municipality: Municipality of Kincardine

OMB Case No. PL060896

OMB File No. R060255

In the Matter of subsection 34(19) of the Planning Act, R.S.O. 1990, c. P. 13, as amended

Appellant: Paul & Sherry Herrington

Subject: By-law No. 2006-178

Municipality: Municipality of Kincardine

OMB Case No. PL060986

OMB File No. R060256

In the Matter of subsection 34(19) of the Planning Act, R.S.O. 1990, c. P.13, as amended

Appellant: Paul & Sherry Herrington

Subject: By-law No. 2006-179

Municipality: Municipality of Kincardine

OMB Case No. PL060986

OMB File No. R060257

J.P. Atcheson Member

Judgment: July 16, 2007

Docket: PL060986

Counsel: S. O'Melia, Eric Davies for Municipality of Kincardine

J. Pepino, Q.C., P. Harrington, S. Locacone (Agent) for Enbridge Ontario Wind Power Inc. (Enbridge)

M. Hutchison (Agent) for Kathy McCarrel & others (WAG)

No one for William Palmer

No one for John Thompson

No one for Anthony Clark

Subject: Public; Municipal

Headnote

Municipal law --- Zoning — Attacking validity of zoning by-laws — Grounds — Non-conformity with municipal plan
Energy corporation submitted application to municipality to create wind farm over 18,000 hectares of rural land — Municipality passed 105 zoning by-law amendments to permit wind farm — Proposed location of wind turbines raised concerns among residents and local nuclear facility regarding safety, noise and shadow flicker — Residents of neighbourhood brought appeals of by-laws — Appeals allowed in part — Appropriate notice and public meetings were held as required by [Planning Act](#) — Evidence did not support concerns that location of turbines was safety issue to residents or birds in area, security threat to helicopters performing inspections in area, or would negatively impact tourism — Zoning by-law amendments were consistent with provincial policy statement and county's official plan policies — Proposed development would enhance economic base of area and did not significantly impact on predominantly agricultural economy — Amendments regulations provided adequate safety for residents and activities surrounding wind turbines — Amendments regulations provided appropriate separation distances to meet provincial noise guidelines — Amendments regulations provided appropriate separation distances to minimize impact of shadow and flicker from turbines — Energy corporation had offered modifications to proposed by-laws which mitigated residents' concerns, including abandoning some by-laws and restricting number of turbines allowed — Proposed amendments were approved — Total number of turbines was restricted to 110.

APPEALS by residents and business owners of zoning by-laws amendments passed by municipality relating to wind farm project.

J.P. Atcheson Member:

1 The matter before the Board consists of a series of By-law appeals in connection with permissions for the erection a wind farm in the Municipality of Kincardine. At the time of the hearing 38 by-laws were under appeal and have been consolidated into this hearing. There were in total 105 zoning by-law amendments passed by the Municipality which would have authorized the erection of 140 wind turbines in the wind farm project. The wind farm project originally proposed by Enbridge would have had a capacity of 199.65 megawatts. A prehearing conference was held and the Board's Decision, issued on February 6, 2007, provided procedural directions for this hearing by identifying the parties, setting the date for the hearing, and indicating that a Procedural Order outlining the organization, together with an agreed upon issues list, be filed with the Board.

2 The Board subsequently, on April 12, 2007, held a second prehearing telephone conference to amend the procedural order with respect to the hearing date and the final issues list, and gave direction with respect to evidence anticipated from the Ministry of the Environment. These procedural directions formed the basis of this hearing and are found at Exhibit 4.

3 At the commencement of this hearing, the following individuals came forward seeking participant status at the hearing:

1. Mr. Ron Stephens
2. Lynne Dicocco
3. Janice McKean
4. Garry Shepherd
5. Peter Sullivan

4 The Board, after considering submissions from the parties, granted participant status to the above noted individuals and directed that by May 04, 2007 they provide an outline of the statement they intended to present to the Board to all of the parties.

The Context

5 In April of 2006 Enbridge assumed the project from Leader Wind and submitted an application which was accepted by the Municipality to create a wind farm consisting of some 154 wind turbines with a total rated capacity of 199.65 megawatts. 132 turbines were proposed to be located in the Municipality of Kincardine with an additional 22 turbines in the Municipality of Saugeen Shores to the immediate north. Associated with this application were applications for temporary use zoning amendment to permit a cement batching plant and lay down areas for the storage and assembly of some of the turbines, as well as a rezoning application for a 230kv substation. The geographic area of the wind farm totals is some 18,000 hectares in both the Municipalities of Saugeen Shores and Kincardine and is outlined on Exhibit #7. The area proposed for the wind farm is generally a rural area containing pastures, crop lands, active farming operations, natural areas as well as rural residential uses scattered through the area, with two urban nodes situated on Highway 21 known as Underwood and Bruce North. It is a typical rural area for this part of Ontario.

6 The Municipality of Kincardine is an amalgamated Municipality and the Board is advised that neither the zoning by-law for the former Municipality (The Township of Bruce) By-law 76-13, nor the new zoning by-law for the new Municipality of Kincardine By-law 2003-25 (which is partially approved), have regulations governing wind farms. There is no local Official Plan for the former Township of Bruce or the New Municipality of Kincardine. As such, the County of Bruce Official Plan is the local policy document that governs and gives the policy direction for the proposed use. During the summer of 2006 the Municipality held the prescribed public meeting on the project. The evidence is that these meetings were well attended and both Planning Committee and Council received deputations regarding the proposal. As a result, some modifications were made to the project. The zoning for the 230 kV substation is full force and effect, as are the temporary use by-laws for the lay down areas and the cement batching plant.

7 On September 06, 2006 the Municipality of Kincardine passed 105 zoning by-law amendments to permit the wind farm within the Municipality. The applications for zoning by-law amendments in the Municipality of Saugeen Shores were withdrawn

by Enbridge. 42 of the 105 by-laws passed by the Municipality of Kincardine were initially appealed to this Board. Two appeals were withdrawn by appellants and two of the by-laws under appeal were consented by Enbridge leaving 38 by-laws currently before this panel of the Board which, if approved, would sanction 55 turbine locations. The capacity of the proposed wind farm is now some 181.5MW. Exhibit 15 provides a graphic illustration of the wind farm area, those by-laws approved, and those by-laws under appeal.

8 The Board is also being asked by the proponent and the Municipality to consider modifications to the by-laws under appeal in that these by-laws now contain the precise UTM coordinates for each wind turbine location within a 64 metre square area surrounding each turbine location site to be used for support infrastructure. The by-laws also provide for a +or- 5 metre variance from the prescribed UTM coordinates. This is different to the envelope approach found in the original zoning by-law amendments passed by the Municipality. The Board is being asked to amend the by-laws under appeal to reflect the UTM coordinate approach to the locating of the turbines.

9 The outstanding issues as set out in the final procedural order are as follows:

1. Are the appealed zoning by-law amendments consistent with the Provincial Policy Statement 2005 specifically with respect to the following?

(a) Sustaining healthy, liveable and safe communities.

(b) Protecting long-term economic prosperity.

2. Are the appealed zoning by-law amendments in conformity with the County of Bruce Official Plan Policies?

3. Do the appealed zoning by-law amendments regulations provide adequate safety for residents and activities surrounding the wind turbines?

4. Do the appealed zoning by-law amendments regulations provide appropriate separation distances to meet the Provincial noise guidelines?

5. Do the appealed zoning by-law amendments regulations provide appropriate separation distances to minimize the impact of shadow and flicker?

10 The Board will give as a summary of what it perceives to be the key evidentiary components provided by the key witnesses before it makes the requisite findings on the matter. This will form the basis of the findings that the Board makes beginning on page 56 of this decision. These components have to be somewhat detailed as the varying concepts and opinions placed before the Board by the various witnesses are significant and important. The reader of this decision must therefore focus on both areas of the decision (SUMMARY OF THE EVIDENCE AND SUBMISSIONS, and FINDINGS AND CONCLUSIONS). This is done for the sake of the ease of readability so that the findings of the Board can be easily discerned.

Summary of the Evidence and Submissions

11 The Board heard from a Mr. Raymond Duhamel, a qualified land use planner with experience in wind farm policy development. He was retained by the appellants in February of 2007 to review the 38 appeals and to provide his planning opinion on the proposed wind farm project before the Board. In his evidence to the Board, he freely admits that the proposed area around Kincardine is a good area for the proposed project in that a good wind resource is present in the area and the general topography of the area is conducive to this type of development. His concerns come from a need to balance the benefits of the project with what he sees as negative impacts resulting primarily from the sighting of the turbines and their potential impacts and existing land uses in the area.

12 He freely admits that a number of the appellants are not directly affected by the by-laws that they have appealed. In his opinion, this is a function of the multiple by-law approach used by the Municipality, as opposed to its use of a single by-law

approach to regulate this project, and that their appeals should be viewed with respect to the multiple impacts that could result from the proposed wind farm and, in particular, to the regulations formulated in the by-laws that sanction the development.

13 It is his opinion that the fundamental problems from a planning perspective result from the sighting of individual turbines as reflected in a minimum setback of 450 metres..

14 He does not see any problems with the proposed wind farm land use from a compatibility perspective with the existing agricultural uses found in the area as set out in the 2005 PPS or the County Official Plan. It is his opinion that this use is recognized within these documents, and that there is a clear Provincial interest and mandate for this type of clean renewable energy. His issues with conformity to the PPS and the Bruce County Official Plan are related more to the issues of public safety and the impacts of noise and shadow flicker on existing and potential development. In his opinion the conformity issues are not with the use but with the location of individual turbines and the resulting impacts on nearby receptors. He freely admits that he has no problems with the structure of the proposed amending by-laws which utilizes a UTM coordinate to site each turbine surrounded by a 64 metre-squared buildable area. His concerns are with the regulations within these amendments which govern the wind farm operation and the individual sighting of some turbines, and their collective impact on existing and proposed land uses. He does not support or endorse the work undertaken by Enbridge in support of the project with respect to the impacts of noise and shadow flicker. He freely admits that with respect to the impacts from shadow flicker that there are no health problems that would result from the Enbridge project other than what he terms a nuisance. He relies with respect to the issue of noise on the work of Mr. Coulter and Dr. Young and proffered the opinion that, based on their work, the noise guidelines established by the Ontario Ministry of the Environment, and to whom the County relies in its planning approval process, have not been complied with as the modelling and calculations of these impacts have not been properly undertaken. It is his advice to the Board that each individual turbine is required to obtain a Certificate of Approval from the Ministry of the Environment which would certify that the Ministry's noise guidelines have been met. The issue of shadow flicker is governed by the policy directions of the Municipality.

15 In support of his position, Mr. Duhamel directed the Board to sections 1.1.1.c and g, as well as to section 1.7.1.a, e, and h, of the PPS and various sections of the County of Bruce Official Plan dealing with its vision statement, social goals, and its commercial wind generating systems policy found at section 4.14.2. His contention is that the health and safety of individuals is being put at risk due to the individual site locations of certain turbines. He clearly supports the position that the use of a renewable wind energy farm is an appropriate use for the area consistent with the clear policy directions of the 2005 PPS and is a use recognized by the Bruce County Official Plan.

16 The sections of the 2005 PPS referred to are outlined as follows;

1.1.1 Healthy, livable and safe communities are sustained by

- a. promoting efficient development and land use patterns which sustain the financial well-being of the Province and municipalities over the long term;
- b. accommodating an appropriate range and mix of residential, employment (including industrial, commercial and institutional uses), recreational and open space uses to meet long-term needs;
- c. avoiding development and land use patterns which may cause environmental or public health and safety concerns;
- d. avoiding development and land use patterns that would prevent the efficient expansion of *settlement areas* in those areas which are adjacent or close to *settlement areas*;
- e. promoting cost-effective development standards to minimize land consumption and servicing costs;
- f. improving accessibility for persons with disabilities and the elderly by removing and/or preventing land use barriers which restrict their full participation in society; and

g. ensuring that necessary *infrastructure* and *public service facilities* are or will be available to meet current and projected needs.

1.7 Long-Term Economic Prosperity

1.7.1 Long-term economic prosperity should be supported by:

- a. optimizing the long-term availability and use of land, resources, *infrastructure* and *public service facilities*;
- b. maintaining and, where possible, enhancing the vitality and viability of downtowns and mainstreets;
- c. promoting the redevelopment of *brownfield sites*;
- d. providing for an efficient, cost-effective, reliable *multi-modal transportation system* that is integrated with adjacent systems and those of other jurisdictions, and is appropriate to address projected needs;
- e. planning so that major facilities (such as airports, transportation/transit/rail infrastructure and corridors, intermodal facilities, sewage treatment facilities, waste management systems, oil and gas pipelines, industries and resource extraction activities) and *sensitive land uses* are appropriately designed, buffered and/or separated from each other to prevent *adverse effects* from odour, noise and other contaminants, and minimize risk to public health and safety;
- f. providing opportunities for sustainable tourism development;
- g. promoting the sustainability of the agri-food sector by protecting agricultural resources and minimizing land use conflicts; and
- h. providing opportunities for increased energy generation, supply and conservation, including *alternative energy systems* and *renewable energy systems*.

1.8 Energy and Air Quality

1.8.1 Planning authorities shall support energy efficiency and improved air quality through land use and development patterns which:

- a. promote compact form and a structure of nodes and corridors;
- b. promote the use of public transit and other alternative transportation modes in and between residential, employment (including commercial, industrial and institutional uses) and other areas where these exist or are to be developed;
- c. focus major employment, commercial and other travel-intensive land uses on sites which are well served by public transit where this exists or is to be developed, or designing these to facilitate the establishment of public transit in the future;
- d. improve the mix of employment and housing uses to shorten commute journeys and decrease transportation congestion; and
- e. promote design and orientation which maximize the use of alternative or renewable energy, such as solar and wind energy, and the mitigating effects of vegetation.

1.8.2 Increased energy supply should be promoted by providing opportunities for energy generation facilities to accommodate current and projected needs and the use of *renewable energy systems* and *alternative energy systems*, where feasible.

1.8.3 *Alternative energy systems and renewable energy systems shall be permitted in settlement areas, rural areas and prime agricultural areas in accordance with provincial and federal requirements. In rural areas and prime agricultural areas, these systems should be designed and constructed to minimize impacts on agricultural operations.*

17 Mr. Duhamel put forward the proposition that some vacant lands would be impacted from the setback requirements established for the wind turbines as shown on Exhibit 18. It is his contention that the 450 metre setback of the turbine from any existing receptor would restrict development on an adjacent property or place it within an impact zone for noise as set out by the Ministry of the Environment guidelines. However, on questioning from the Board, he could provide no evidence that the zoning by-law as structured would prohibit development on an abutting vacant property. Instead, the issue is one of a noise impact if development was to occur on those properties in proximity to an approved turbine location. The areas where he sees these impacts occurring are shown on Exhibit 18. The two properties he expressed particular concern for are shown in details "A" and "B" on Exhibit 18. His evidence is that the remaining vacant lots shown on Exhibit 18 would be impacted by noise only if the Board were to prefer the noise evidence of Mr. Coulter and Dr. Young. He further pointed out that he does not see the same problem when a property is owned by an individual that owns and or leases land for a wind turbine. His concern was that on vacant land some one might wish to locate a dwelling or building in closer proximity to a wind turbine than the measured distance to the proposed receptor considered at the time of the current applications and that the associated modelling undertaken for noise and shadow flicker could not be relied upon in these cases.

18 During cross-examination he conceded that it was possible to situate a residential building in the area of detail "A" on Exhibit 18 and still be outside of the 450 metre separation distance being proposed. His evidence with respect to Detail "B" is that this concern could be resolved through a notification being registered on title. However, he was unable to provide the Board with any clear indication how this could be legally implemented.

19 Mr. Duhamel then provided the Board with his opinion with respect to the impacts resulting from overshadow and shadow flicker. He proffered the opinion that there are no overshadow issues, and that due to the rotation speed of the proposed turbines, he sees no health issues resulting from shadow flicker. Instead, he sees this as nuisance issues that need to be addressed. He reviewed the various standards of acceptable levels of shadow flicker and noted that the County's Policy is that no more than 30 hours per year be accepted for any receptors when the modelling of shadow flicker is being undertaken. He concurs that the modelling program (Wind Pro) used by Enbridge's consultants is a recognized modelling program. However, it is his opinion that the consultants did not follow the County's directions when inputting data into the program. It was his evidence that a 1500 metre radius should have been used when modelling for shadow flicker and not the 1000 metres used by the consultants, and that an "astronomical worst case" assumption should have been used as well in the shadow flicker modelling and not the approach used by Mr. Baker.

20 Under cross-examination he proffered the opinion that the turbines sanctioned by the following By-laws (2006-159,2006-160,2006-168,2006-170,2005-175,2007-177,2006-178,2006-201,2006-216,2006-236, and 2006-239) would create an unacceptable shadow flicker impact on 12 receptors in the area and that of the 12 receptors impacted four were appellants. He further agreed that only 5 by-laws of the 38 under appeal (By-laws 2006-236, 2006-239, 2006-175, 2006-159 and 2006-160) would create a shadow flicker impact as he had outlined in his evidence-in-chief.

21 Mr. Duhamel's evidence with respect to safety issues are associated with tower collapse, blade throw and ice shedding and revolve around the setbacks proposed for the turbines with respect to municipal roads and some adjacent properties. Under cross-examination he agreed that the issue of ice shedding can be addressed through an operation protocol and that this was a requirement imposed by the Municipality before the holding provision of the zoning by-laws were to be lifted. He also agreed that the issues of blade throw and tower collapse could be addressed by amending the setbacks proposed by the by-laws. In this regard he relies on the report filed as Exhibit 23a by Garrad Hassan. His particular concern is with the setback being proposed of 111 metres from local municipal road allowances.

22 His evidence to the Board was that the issues of noise, shadow flicker and the safety issues were matters that could be resolved through the relocating of the turbine sites in question, although he could not provide any concrete relocation suggestions.

23 Under cross-examination he agreed that the moving of an individual wind turbine from the turbine's UTM coordinates might improve the situation for one receptor but could negatively impact other receptors and that in all likelihood such changes would require that the entire noise and shadow flicker studies be redone.

24 Mr. Duhamel's evidence with respect to the five issues identified in the appeal is that, due to the impacts of noise as identified by Mr. Coulter and Dr. Young and his concerns with respect to shadow flicker and setbacks the directions of the 2005 PPS and the County Official Plan are not met. He contends that the intent of the 2005 PPS is to avoid land use conflicts that would create unhealthy and unsafe communities and that this objective has not been met by the Enbridge project. He carries the same opinion forward with respect to conformity with the County Official Plan. He also proffered the opinion that the zoning regulations with respect to setbacks may not adequately address the physical safety hazards of turbine development and in particular the setbacks proposed from municipal roads.

25 It was also his opinion, after reviewing the work of Mr. Coulter and Dr. Young, that the by-laws do not impose appropriate setbacks to attenuate noise coming from the turbines on nearby residences. It was his opinion that many of the turbines as identified in Mr. Coulter's assessment would exceed the Ministry's noise guidelines. He also proffered the opinion that the shadow flicker study done in the Phoenix report for Enbridge did not meet the County's directions or the accepted German standard for hours of shadow flicker, and that in his opinion many of the by-laws which have identified the precise location for the turbines are deficient in this regard.

26 He concluded his remarks by proffering the opinion that the proposed zoning by-laws do not represent good planning as the zoning amendments do not adequately protect residents from the impacts associated with noise, shadow flicker, and the inherent issues of ice throw and blade failure of the turbines in proximity to local roads.

27 During the course of his evidence, Mr. Duhamel indicated that he was not opposed to the wind farm project for this area and felt that the issues he had raised could be resolved through revised sighting or a reduction in the density of some turbine arrays. He advised the Board that he supports the use of UTM coordinates as found in the revised zoning by-laws and that actual sighting of turbines should not be left to site plan control. He was unable to assist the Board in suggesting any specific changes to any turbine locations in any of the by-laws he identified in his evidence other than to suggest that new studies be done. He also freely admits that such work could affect existing approved turbine locations.

28 The Board then heard from a Mr. Daniel d'Entremont. Counsel for Enbridge raised an objection to the calling of this witness on the basis that his impact statement is not relevant to the matters before the Board and could reduce the Board's adjudicative role to one of a public inquiry on the appropriateness of the Ministry of the Environment's noise guidelines which Counsel contends is not a matter properly before the Board. The Board notes the objection.

29 The Board's responsibility is to adjudicate the matter before it based upon the best planning evidence available. The development of wind farms in the manner being proposed by Enbridge is a relatively new land use phenomenon in Ontario and the Board is entitled to consider the best evidence available on the subject. The Board is quite capable of determining its jurisdiction with respect to the Ministry's noise guidelines, the weight and relevance that should be given to such evidence, and its applicability to the appeals at hand.

30 Mr. d'Entremont lives in Nova Scotia and his home was subject to the first wind farm in that Province. His home is located immediately north of the Pubnico Point Wind Farm. This project consists of some 17 wind turbines (Model Vestas V80 1.8MW Units with a hub height of 80 metres and a rotor diameter of 80 metres) situated to the immediate south of his home as shown on Exhibit 40 page 21. The separation distances of the turbines from his home range from 300 to 1700 metres with at least 6 turbines being located within a 1000 metres of his residence. It was Mr. d'Entremont's evidence that the establishment of the wind farm has caused his family to leave their home. He attributes the noise and shadow flicker from the project as

the cause of the impacts that have forced his family to leave their home. His evidence was that the noise from the turbines would change as a result of weather conditions with the noise being more pronounced during fog conditions and at night. Mr. d'Entremont has spent a great deal of time seeking a resolution of his concerns which are beyond the jurisdiction of this Board. It is instructive to note that when the Pubnico Point Wind Farm was erected, Nova Scotia did not and still does not have noise guidelines in place. It is also clear from the studies that have been done in relation to Mr. d'Entremont's property, Exhibits 39 and 40, that noise exceedences beyond the Ontario Ministry of the Environment's guidelines for wind turbines have occurred at Mr. d'Entremont's property. It was Mr. d'Entremont's evidence that he has no objection to wind farms as a use, but that greater care and separation distances must be imposed to ensure the impacts from noise and shadow flicker do not impose health or nuisance impacts on nearby receptors.

31 The Board then heard with consent of the parties from participants Ms Lynn Dicocco, Ms Janice McKean, Mr. Andy Robinson, Mr. John Shepherd, Carol Clark, Mr. Gary Shepherd, Ron Stephens and Mr. Peter Sullivan, all local residents who live south of the proposed project with the exception of Ms Clark and Mr. Sullivan who live at Lot 1 Concession 13 and Lot 15 Concession 10, respectively. The two turbines permitted by By-law 2006-169 under appeal are the closest to the Clark property and are some 600 metres from her home. There is one turbine situated about 750 metres and three over 1000 metres from her property and are shown on Exhibit 22. She conceded under cross-examination that none of the turbines would create a shadow flicker for her property. Mr. Sullivan estimates that there are two turbines within 1000 metres of his property and about 12 within a radius of 2500 metres.

32 Mr. Blake Evans advised the Board that he operates Evans Aviation and has a flight training centre based at the Kincardine airport and is concerned that a significant portion of the wind farm proposal is within an area that Transport Canada has acknowledged as suitable for his use as a flight training practice area. The area is shown on Exhibit 55. He advised the Board that this area is used to teach student pilots and that the training associated with emergency landing techniques could be impacted by the turbine towers.

33 The concerns expressed by the participants to the Board may be summarized as follows:

1. That the location of some of the turbines along the southern boundary of the project could prove a safety issue due to their proximity to the new transmission lines being proposed from the Bruce Nuclear Project.
2. The location of some of the turbines could affect micro wave communication to the Bruce nuclear project.
3. The proximity of wind turbines to the electrical transmission towers could result in safety issues for the helicopters used to inspect and repair the transmission towers.
4. That the turbines could pose a security threat to the Bruce Nuclear facility by interfering with security radar and the safe landing of helicopters.
5. The wind farm will have a negative impact on the tourism industry in Bruce County and create a visual impact between Highway 21 and the Lake Huron shoreline.
6. The turbines could affect migratory flight paths of birds and impact negatively on the American Bald Eagle and endangered species found in the area.
7. The project does not follow the noise guidelines established by Bruce County and the Ministry of the Environment guidelines are not satisfactory.
8. The wind farm takes good agricultural land out of production and that agricultural uses should be given precedence over the siting of wind turbines.
9. The lack of a master plan by the County for wind farms in Bruce County.
10. The impact of noise and shadow flicker from the proposed turbines on livestock.

11. The proposed wind farm will negatively impact the quality of their rural way of life.
12. The lack of a decommissioning plan after the twenty-year life of the turbines.
13. The method the Municipality used to give notice of the project was not adequate.

34 The Board then heard from a Mr. Brownell who lives in Amaranth Township outside of Shelburne. His evidence to the Board is that his home is some 2500 metres south of the wind farm in this area which consists of some 45 turbines (model GE 1.5). These units have been in operation since March of 2006. His evidence to the Board is that he suffers from noise impacts particularly in fall, winter, and spring which affect his family's ability to sleep and that there is no way that he can mask the noise. His evidence to the Board is that errors were made in the noise modelling for the project in his area and that these errors have not been corrected. He places little faith in the Ministry of the Environment's Certificate of Approval process for wind turbines and the Ministry's ability to enforce its approval process once the turbines are in place. He does not feel that the current guidelines of the Ministry are appropriate for rural areas. He feels we must understand the impact of noise on all receptors from wind turbines before approving more.

35 The Board then heard from a Mr. Ernest Marshall. Mr. Marshall lives at RR6 Goderich in proximity to the EPCOR wind farm. It was Mr. Marshall's evidence that there are ten turbines (model Vesta 80) located in proximity to his residences. It was his evidence that five turbines are situated northeast of his home within 1000 metres, the closest being some 548 metres from his home, two northwest are 1500 metres away, two directly north are within 1500 metres, and one turbine is located to the east of his home some 1.5 miles away. This wind farm started up in March of 2006. It was Mr. Marshall's evidence that the noise from the turbines has exceeded Ministry noise guidelines standards at his home. He has had personal reading of 70dBa in his house. He has also experienced stray voltage in his home and advised that stray voltage in barns in the area has been recorded between 12 and 15 volts. He attributes both the noise and stray voltage impacts to the operation of the wind farm. He attributes his recent health problem to the start up of the wind farm. Mr. Marshall also described impacts on his animals which were so severe that he was required to sell his hackney ponies and to destroy two of his dogs. The problems with his animals and his personal health did not exist prior to the startup of the turbines. He has complained to the operator and the local municipality. It is clear from the exhibits filed that the EPCOR wind farm has had operational problems with both noise and stray voltage and has undertaken steps to correct the problems. It is Mr. Marshall's evidence that he has not seen any appreciable improvement in his situation. Mr. Marshall, on questioning from the Board, was unable to advise whether there were any protocols in place that would require the shutting down of the various turbines when noise guideline exceedences were experienced. Mr. Marshall suggests that a minimum separation of 1000 metres be required for all turbines from a receptor.

36 The Board also heard from a Mr. W. Connor who lives at 83794 Division Line RR1 Dungannon in the former Township of Ashfield. He owns a 117 acre parcel, which he acquired in July of 1995 as a place he intends to use when he retires. He has two Vesta 80 1.8mw turbines situated 477.85 metres and 773 metres from his house on the property. They are part of the phase one EPCOR wind farm. His complaints to the Board dealt with the visual impact of the two turbines as seen from his home and the noise his family can hear at their home. He also alleges that the noise from the turbine affects his ability to hunt on his property. He is also claiming a loss in the value of his property from the wind turbines and the loss of the quiet enjoyment of his property. The issue of the potential loss of property values is not a matter properly before this Board and is a matter in which the Board has no jurisdiction. Mr. Connor freely admits that he has hearing problems resulting from years of hunting and does not always hear the turbines, but indicates that other members of his family do complain about the noise. He has not filed any complaints with either the operator or the Municipality regarding his concerns about the noise he and his family experience.

37 The Board then heard from a Mr. William Pol, a qualified land use planner with specific expertise in wind farm policy who was retained in May of 2006 to provide planning advice on the project to Enbridge. He is the author of a planning background report on the project prepared for the use by the County of Bruce in its review of the project. Mr. Pol provided the Board with an overview of the project now proposed and the general character of the area. He notes that the turbines to be used in this project (Vesta 82) begin to operate at wind speeds of 12.6km/h and shut down at wind speeds greater than 72.0km/h. He notes that all turbines are located at least 450 metres from any residences and that most turbines are located more than 600 metres

from the nearest offsite residences. He notes that Enbridge has purchased Lot 9 Concession 7 as the location for the substation to collect the energy from the wind farm and transmit it to the provincial power grid as this property abuts an existing 230kv transmission corridor. This site is also used for the lay down area for the turbines and the storage of equipment and material needed for the project. He notes that the lands either owned or under option by Enbridge consist of approximately 4140 hectares which represents about 25% of the total project area under study. Mr. Pol, in reviewing the project area, points out that the original township fabric of lots is 400 metres wide by 1000 metres in depth.

38 This, together with the relative flat terrain and the abundance of wind energy, makes this area ideally suited for a wind farm. He further points out most farm house development has been situated on the main east/west concession roads and that many of the north/south side roads support limited development and are used for farm field access. Many of these north/south roads are closed on a seasonal basis (Exhibit 65). He also points out that only 93 non-farm lots exist in the entire project area, which represent about 16% of all of the lots in the project area. The limited number of non-farm lots in the area is due, in his opinion, to County and Municipal policies that have discouraged non-farm dwellings in the agricultural area. It was his evidence that farm lots make up 84% of the lot fabric found in the project area and that farming is the predominate use in the area. He notes that the 4140 hectares within the project area is either owned or optioned by Enbridge and consists of sites on 103 lots of which almost 70% are greater than 39 hectares in size, and that none of the 93 non-farm lots found in the project lands are to be zoned to permit a turbine. He also notes that the only concentrations of non-farm development are found in the Hamlets of North Bruce and Underwood and that the closest turbines are located some 700 metres from these settlement areas. By example, he referred the Board to the generic setbacks as set out in By-law 2006-215. The same setbacks are contained in all of the by-laws under appeal. He also pointed out that the Conservation Authority has raised no objection to the project and that the closest turbines are some 2 kilometres from McGregor Point Provincial Park, Saugeen Bluffs Conservation Authority Park, and the Lake Huron shoreline with its summer activities and seasonal cottage development. He further pointed out that the Bruce Nuclear facility is located about 5 kilometres to the west with its own 6 unit wind farm and that the transmission lines from this facility cross the subject lands and will be used to transmit the power generated from the wind farm to the provincial grid. In his site assessment he concludes that:

the topography, land uses, lotting pattern and man-made attributes of the project area make this an ideal location for the development of renewable wind energy. The turbines are a compatible use with the agricultural activities and based on the pattern and number of residential uses found will have a minimal impact on the existing development.

39 Mr. Pol provided the Board with a very different opinion with respect to the projects compliance with the policy directions of the PPS. He conducted a thorough review of the 2005 PPS policy directions and concludes on balance that the by-laws before the Board are consistent with the PPS statements with respect to 1.1.1 Healthy, Liveable and Safe Communities, and 1.71 Long-term Economic Prosperity, and meet the directions with respect to renewable energy. He sees this sighting of the turbines as to the only potential issue with the PPS and his evidence to the Board is that with respect to all of the by-laws before the Board that the sighting of the turbines is appropriate and consistent with the 2005 PPS, and that the potential impacts have been appropriately addressed. He also proffered the opinion that the wind farm project would be a direct benefit to the local economy and to individual farmers.

40 Mr. Pol then provided his opinion with respect to projects conformity with the County of Bruce Official Plan. He proffered the opinion that the wind farm proposal conforms to the vision, goals and objectives sections of the Bruce County Official Plan in that the project helps to ensure the growth of sustainable communities within Bruce County by providing a new form of economic opportunity while respecting the natural environment by creating renewable electrical energy. He notes that all turbines have been sighted outside of environmentally sensitive areas he also sees the establishment of the wind farm as an attraction in support of the area's tourism industry. In this regard, he points to the visitor centre at the Bruce Nuclear wind farm project. He notes that the nearest part of the project is located some 10km from the Kincardine airport and that the project has sought and received approval from NAV Canada. He notes that the 1999 approved Bruce County Official Plan was a very progressive document with respect to wind farm development in that it had very specific policies regarding this form of development in place well before the application by Enbridge. He also points out that the County of Bruce in its letter of June

18, 2004 (Exhibit 5c Tab 39) set out very detailed directions on the material and studies it would require in order to consider the wind farm application, which were consistent with the policy directions found in the Official Plan.

41 The County Official Plan policies with respect to wind energy systems are as follows:

4.14 Wind Energy Conversion Systems

Wind Energy Conversion Systems (W.E.C.S.) consists of mechanical devices designed to convert wind energy into electricity. These systems can occur at small or large scales in the Municipality. Small-scale systems are those, which generate less than nameplate capacity rating of 50 kW and normally comprise only one generating device. Large-scale systems are more appropriately described as Commercial Generating Systems and involve one or more generating devices, which collectively produce more than nameplate capacity rating of 50 kW. The latter systems are generally referred to as 'Wind Farms' and are usually located in areas where climate (i.e. wind) conditions create a conducive environment for W.E.C.S.

4.14.1 Small Scale Generating Systems

Small-scale generating systems produce less than nameplate capacity of 50 kW and generally tend to generate electricity only for the property owner. The establishment of a small scale generating system is normally permitted under the zoning provisions of the Municipality's Zoning By-law as a structure accessory to the principle use of the property.

4.14.2 Commercial Generating Systems

Commercial generating systems are a more intensive use and produce in excess of nameplate capacity rating of 50 kW and comprise one or more generating units. The commercial scale systems are intended to feed electricity into the transmission grid of Ontario Hydro in keeping with Ontario Hydro's policies regarding Renewable Energy Technologies.

Given the usually larger scale of Commercial Generating Systems, it is anticipated that these will tend to locate outside of urban areas. A Commercial Generating System is considerably different from the typical uses located within the Agricultural or Rural areas. The County therefore feels that it is important to carefully control the establishment of these large-scale systems, to ensure the compatibility and safety of neighbouring residents.

Commercial generating systems will be permitted by an Amendment to the Zoning By-Law. Prior to the local Council considering the approval of a Commercial Generating System the following policies should be addressed:

- (i) A professional drawing or Site Plan shall be provided illustrating the location of the proposed turbines, as well as the location and height of all existing buildings and structures on the subject property and the location and height of all existing buildings and structures within 500 metres of the subject property.
- (ii) A professional engineer shall approve the base and tower design of the turbines.
- (iii) The development shall be subject to Site Plan Control under the *Planning Act*, and an appropriate agreement may be required.
- (iv) The applicant shall review his approach with the Ministry of the Environment and Energy concerning noise attenuation, to ensure that the proposal will comply with the Ministry's requirements.
- (v) Setbacks from road allowances, lot lines, and structures (on-site and offsite) and maximum height provisions shall be established, in the Zoning By-Law Amendment.
- (vi) Commercial Generating Systems constructed within 10 km of an airport reference point will require the written approval of Transport Canada. Such approval will provide assurance that there will be no adverse effect on the instrument approaches to the airport.

(vii) Climatic conditions are the principal locational criteria for Wind Generating Systems. Such uses may be permitted in Rural and Agricultural Areas but will be encouraged to locate on lands of lesser agricultural capability where climatic conditions are of a similar nature. The County may require a report justifying the need to locate such systems on prime agricultural lands, based on the criteria described in Policy 2.1.3 of the Provincial Policy Statement. Separation distances of 400 to 700 metres should be used in proximity to urban areas, or multiple lot subdivisions depending upon the number of turbines proposed. Where potential wind farm sites are proposed within proximity to an urban area of multiple lot subdivision, the applicant's planning study shall address the potential impacts of the wind farm on these adjacent land uses and explain how such impacts may be reduced.

(viii) An amendment to the Zoning By-Law may provide for a holding provision which should be removed when a contract has been executed to allow the Commercial Generating System to be connected to a transmission grid for electrical distribution.

42 Mr. Pol's evidence is that all of the County Official Plan policies with respect to Commercial Generating Systems have been met and that the County on August 10, 2006 advised the Ministry of the Environment that it was revoking its bump up request to the ESR report prepared by Enbridge in support of the project thereby indicating its acceptance of this document.

43 Mr. Pol noted that directions set out section 4.14.2 (viii) of the Official Plan had not been included as part of the zoning by-laws' holding provisions, as Enbridge has received approval to connect to the power grid. He further noted that the by-laws before the Board contain 5 holding provisions to ensure the orderly development of the wind farm which include:

1. the filing of an operation protocol; and emergency services plan with the Town of Kincardine
2. a site plan agreement
3. a stage two archaeological study;
4. a decommissioning plan; and
5. A letter certifying that the minimum interior and rear yard setbacks requirements have been met and that abutting owners are part of the wind farm option and lease agreement where a setback has been reduced for an abutting participating land owner.

44 Mr. Pol, on questioning from the Board regarding the nature of the operational protocols set out in the holding provisions, advised that the operational protocols were to deal with the safety issues of ice throw and wind speeds which were conditions that would require the shutting down of the turbines. He noted that, to the best of his knowledge, there were no operational protocols that would shut the turbines down if noise levels, shadow flicker, or stray voltage were experienced beyond the guidelines. His evidence to the Board was that with respect to noise, all turbines are required to meet the MOE noise guidelines, but that if exceedences did occur they would be dealt with on a complaint basis, and if verified would put the project's Certificate of Approval at risk. His evidence was that the issue of shadow flicker had been modelled and that all turbines being sited meet the County's standard for shadow flicker of thirty hours/year and that the phenomenon does not pose any health risks to any of the potential receptors.

45 He also noted that one of the holding provisions requires that he certify to the Municipality when an interior side yard was less than the required 121 metres. This can occur under certain conditions as set out in [section 4](#) of the proposed by-laws.

46 He concluded his remarks regarding conformity to the Official Plan by proffering the opinion that the zoning by-law amendments before the Board conform to the policies of the Bruce County Official Plan, and that the regulations found in the zoning by-laws implement the measures set out in the environmental screening report and the other reports prepared by Enbridge in support of the project. Accordingly, it was his opinion that the undertaking represents good planning for the area and that the revised by-laws should be approved.

47 Mr. Pol then reviewed the setback requirements as set out in the by-laws before the Board. It was his evidence that the setbacks proposed in the by-laws, together with the more precise location of the turbine sites using UTM coordinates, are designed to mitigate against safety issues, noise impacts, shadow flicker, and visual impacts, while making efficient use of the land from an agricultural perspective, bearing in mind the need to apply appropriate locations to effectively harness the wind energy in the area. He notes that during the course of the review the setback standards have been modified so that for the by-laws under appeal the following setbacks for the turbines are uniformly applied and are as follows:

1. Residences 450 metres
2. Community Boundaries.....700 metres
2. Provincial Highways and County Roads 151.5 metres
3. Municipal Roads..... 111metres

Rear and Interior lot lines, 121 metres.

48 It was his evidence that the new setback systems for the by-laws before the Board adequately address the safety issues with respect to blade and ice throw and tower collapse, particularly when one considers the limited risk potential for these events to occur. In Exhibit 67, he traces the evolution of setback standards from the original submissions to those now before this Board. He freely admits that he recommended the original lower setbacks as a result of his work in other areas of the Province and was satisfied that they were appropriate. He has no difficulty with the higher setbacks now being proposed.

49 He is also satisfied that the separation distance established and the fixing of the locations of the turbines using UTM coordinates for each of the appealed turbines creates separation distances that will permit the project to meet the Provincial guidelines for noise attenuation which range from 40dBa to 53 dBa depending on the wind speed. He notes that a number of noise modelling studies have been undertaken and refined as the parameters of the proposed project and the potential turbine locations have changed over time. He notes that all of the studies including the most recent updates have used the methodology as established by the Ministry of the Environment to analyze noise and have been completed by qualified acoustic engineers through an accredited acoustic assessment firm.

50 It was his evidence that the separation distances being proposed and modelled by Valcoustics show that the Ministry of the Environment's noise guidelines for turbine noise in rural areas can be met for all receptors all of the times. In this regard he defers to the work of Dr. Lightstone.

51 He notes that no visual impacts are being alleged by the appellants.

52 Mr. Pol then advised the Board that the 38 by-laws in question create text amendments on a site specific basis to the by-laws of the former Township of Bruce (By-law 76-13) and the Municipality of Kincardine (By-law 2003-25), and that the amendments fix the location of the turbines by the use of UTM coordinates (+or- 5 metres), and further that any turbine must be located within a defined 64 metre square area as shown on the map schedule to each by-law. Mr. Pol then addressed the issue of the impact on vacant lands raised by Mr. Duhamel in his evidence.

53 There are two by-laws that Mr. Duhamel raised concerns about which are shown on exhibit 18 as Detail "A" and Detail "B". It was Mr. Pol's evidence to the Board with respect to the property shown on detail "A" that a new resident receptor could be located beyond the 450 metre setback line.

54 In the case of By-law 2006-189, Detail "B" the same person who owns the severed vacant lot also has the lease with Enbridge on the larger farm parcel and as such is aware of the potential impact according to Mr. Pol.

55 Mr. Pol then took the Board to book three of his witness statements (Exhibit 64). In this section he provides the Board with a comprehensive review of each by-law under appeal, its site characteristics, the nature of the appeal, and his summary of

the evaluation of the impacts of safety, noise, and shadow flicker resulting from the studies undertaken in support of the project. Exhibit 71 provided a chart of the by-laws to which Mr. Duhamel in his evidence raised planning concerns. The parties agree that this exhibit accurately depicts the by-laws and the particular concerns expressed by Mr. Duhamel in his evidence-in-chief to the Board. The Board, at the request of Mr. Palmer, added the issues of shadow flicker to By-laws 2006-156, 2006-157 and 2006-193, and the issue of noise to By-laws 2006-157, 2006-174, 2006-189, 2006-193, 2006-196, 2006-211, 2006-223, and 2006-228, as still being outstanding concerns even though they were not specifically addressed by Mr. Duhamel in his evidence-in-chief. These changes are shown on Exhibits 71a, b and c.

56 Mr. Pol, in a detailed review found in Exhibit 64 Book three, provides his planning assessment of each by-law under appeal as it related to the appeals filed. He also addressed the issue of the cumulative impacts that could be expected from all turbines within 1000 metres on the closest residential receptor. His evidence was that, in all cases for all of the by-laws under appeal, the anticipated noise levels from the project to either the appellant property or the nearest residential receptor would be within the Ministry of the Environment's guidelines for noise as modelled by Dr. Lightstone. He conducted a similar assessment of the appealed by-laws for the impact of shadow flicker in accordance with the County's standards as modelled by Mr. Baker. His evidence is that all of the by-laws under appeal would result in acceptable levels of shadow flicker on either the appellant's property or on the nearest residential receptor as reported by Mr. Baker. He also reviewed the by-laws with respect to the safety issues associated with ice shedding, blade throw, and the failure of the structure. His evidence was that, in his opinion, the setbacks established in the by-laws and in particular the 111 metre setback for exterior and front yards where a turbine abuts a municipal road were appropriate and acceptable considering the risk potential of such an event, the level of traffic on these roads, the proposed signage, and operation protocol that would be in place.

57 He concluded his remarks by indicating that in his opinion all of the by-laws under appeal were consistent with the policy directions of the 2005 PPS, and conformed to the policy directions of the Bruce County Official Plan. He further proffered the opinion that the zoning by-laws as constructed and before the Board provide adequate standards for the safety for the residents and the activities surrounding the wind turbines, and that the sighting of the turbines using the UTM coordinate method provides for appropriate separation distances to meet the guidelines of the Ministry of Environment for noise to the nearest receptors and the County's standards for shadow flicker to the nearest receptors, and that all of the turbines proposed were in compliance with the zoning regulations and that the amendments both individually and collectively represented good planning for this area of the Municipality and should be approved.

58 Mr. Pol under cross-examination confirmed that he had recommended a 50 metre setback for a wind farm project in Norfolk County which employs a (GE model 1.5) turbine and that to the best of his knowledge there had been one event of a blade tip failure since the start up of the project. When questioned about the setbacks suggested in a document from GE (Exhibit 74) which suggested a higher standard (243 metres), he noted that the matter had been reviewed for Enbridge by qualified experts and that he was satisfied that the setbacks being proposed in the by-laws were an appropriate response to mitigate the risks associated with ice shedding and ice throw when considered together with the protocols being proposed and the land use characteristics in the area associated with the proposed wind farm. He also noted that the GE standard was being suggested for situations where there were no other studies or protocols being undertaken which is not the case in this circumstance.

59 He freely admitted under cross-examination that the project has been evolving as a result of public consultation and the appeals filed, and that Enbridge has undertaken revisions to its studies in light of some changes requested from the appellants. He advised the Board that the project has been revised downward from its original output to 181.5 MW based upon a 110 turbines array. He noted in Exhibit 75 that the 66 by-laws are in force and effect which would permit 76 turbines and that the 38 by-laws before the Board, if approved, would sanction an additional 56 turbine locations for a total of 132 turbines, but that Enbridge has undertaken that it would only build 110 turbines. He also notes that By-law 2006-173 is an alternative location for which no turbine has been sighted. His evidence is that while the number of turbines sought by Enbridge is beyond that required, this was done in order to allow some flexibility in sighting, but that only 110 turbines would be erected. He also confirmed under cross-examination that the 450 metre separation used by Enbridge was measured to the individual receptors and not the lot line or amenity space around an individual receptor.

60 He freely admits when asked to review the protocol for operations during snow and ice hazard conditions, found at Exhibits 77 and 78, that these documents would appear to be written as operational protocols for Enbridge employees and did not provide general directions for notifying the public when climatic conditions might be such to require the shutting down of the turbines for safety purposes. Counsel for Enbridge stipulated that the protocols would be amended to reflect a general operating position before being submitted to the Municipal Council for approval, as required by the holding provisions of the by-laws now before the Board.

61 Mr. Pol maintained through his cross-examination by all of the appellants that the studies conducted by Enbridge in support of the revised applications had been undertaken, to the best of his knowledge, in accordance with the Ministry Guidelines with respect to noise, and in accordance with the directions of the County with respect to shadow flicker, and that in all cases the proposed turbines would both individually and collectively meet the standard set by these agencies. He is also satisfied that the setbacks being proposed appropriately mitigate the potential risks associated with the wind turbines from a health and safety point of view.

62 On questioning from the Board he indicated that he was not aware of any protocols that would require individual turbines to be shut down based upon a complaint from a resident that there was an exceedence of the standards for noise or shadow flicker. He proffered the opinion that it would be best if such legitimate complaints could be dealt with locally through a dispute resolution process as opposed to relying upon the Ministry of the Environment Certificate of Approval and enforcement process.

63 The Board then heard from Ms Leah Andrews a qualified land use planner employed by the County of Bruce and who had responsibility for the Enbridge applications. Her evidence is that extensive public consultations were undertaken with respect to the proposal, and that, with respect to the applications submitted, she provided a preliminary planning report to the Municipality dated June 08, 2006 in which the County expressed a number of concerns with respect to the project. These recommendations were adopted by Kincardine Council. She notes that the original environmental screening report was available to the public in April of 2006. She freely admits that in her report of June she was suggesting a setback of 243 metres from roads as a default position, but that after further analysis, including the existing wind farm at Bruce Nuclear and a review of additional information supplied by Enbridge, she is satisfied with the setbacks now being proposed in the by-laws before the Board. She notes that the Ministry of Transportation has no objections to the setbacks being proposed for turbines in proximity to Provincial Highways, and that Hydro One has expressed no objection to the project. It was her evidence that in late August the county planners were satisfied with the information supplied by Enbridge and recommended the 105 by-laws to the Municipality of Kincardine for approval. These by-laws recommended an envelope approach for the sighting of the turbines. She also advised the Board that the County defers to Nav Canada and Transport Canada with respect to the lighting and ultimate permission for the erection of the towers in compliance with their regulations. She endorses the evidence of Mr. Pol with respect to the issues of conformity with the County Official Plan and the 2005 PPS.

64 She notes that the by-laws under appeal and now before the Board are the result of discussions with the appellants and that the use of the UTM coordinates to site the proposed turbines is a refined approach to the original by-laws recommended by the County. This new approach is the result of working with the appellants and is one that she can support. She notes that the UTM locations for the turbines in all of the by-laws that the Board is being asked to approve fit within the proposed envelopes, with the exception of By-law 2006-197 at Lot 2 Concession 10, but that turbine #81's location meets all of the setbacks being proposed. She also advised the Board that the current Kincardine Council has considered the modified by-laws before the Board and by resolution Exhibit 82 endorses the changes being proposed.

65 Under cross-examination she stated that the County's standard for shadow flicker was a modelled 30 hour/year and that Bruce County had not adopted the German standard as put forward by Mr. Duhamel. When taken to draft wind farm policies being considered as part of the County's five year review of its Official Plan, she advised the Board that these were merely one staff person's proposals and that they had not been reviewed or adopted by County Council. The Board can give little weight to these draft policies for the purpose of this hearing.

66 She also maintains the position that with respect to noise, the proponent needs to demonstrate to the satisfaction of the Ministry of the Environment that its noise guidelines can be met at the outset and that this has been done for the turbine locations under appeal. She confirmed that the County of Bruce defers to the Ministry of the Environment requirements for noise attenuation as set out in the Certificate of Approval process and requires a proponent to consult with the Ministry as part of the County's review process.

67 She advised that with respect to the environmental screening report, the County had withdrawn its request for a bump up and that the Director of the Environmental Assessment and Approval Branch had not agreed to allow a bump up of the screening report as sought by some of the appellants. She conceded that at the present time requests are before the Minister to elevate the screening report, but that no decision has been made at this time with respect to these requests. However, subsequent to Ms Andrews's evidence, Counsel for Enbridge produced evidence (Exhibit 89) that the Minister of the Environment has accepted the Enbridge screening report and has confirmed the decision of the Director to deny the requests received from individuals, including some of the appellants, to elevate the environmental screening report to a full environmental assessment.

68 When questioned under cross-examination about whether the proposed turbines, given the impacts of noise and shadow flicker, could be considered as noxious uses as set out in the PPS, Ms Andrews proffered the opinion that these impacts might be considered as nuisances but would not be viewed as noxious. She maintains the opinion that the sighting of the turbines has been done in such a way as to minimize the impact on class 1, 2, and 3 agricultural lands and that the wind farm use and agricultural uses are compatible within the context of Bruce County. She continues to endorse the modified by-laws before the Board.

69 The Board then heard from a Dr. James W. S. Young. Dr. Young is a well qualified expert in the sciences of meteorology, climatology, and atmospheric science. He was retained by WAG in March of 2007 to conduct an analysis of wind conditions in proximity to the proposed wind farm and to proffer his opinions regarding the wind characteristics in the area and their impacts on the project from a noise and safety perspective. His findings are contained in the report entitled "Analysis of the Boundary Layer winds near Goderich and their Application to Wind Farms along the east coast of Lake Huron." This report is found at Exhibit 24. Dr Young provided an overview of the general characteristic of wind in the atmosphere and notes that winds found above 1000 metres are generally stable while winds below this elevation are generally dominated by either buoyancy or surface stress. He notes that the surface stress is most pronounced in the first 30 metres above the earth. He also notes that most current turbines operate above this height. Moreover, he notes that for winds within the boundary layer, the relationship between wind speed and height is affected by ground conditions. Finally, he notes that higher wind speeds at lower elevations are generally found near large water bodies which make these areas attractive locations for wind power facilities.

70 He reviewed for the Board the calculations associated with the determination of what is known as the wind shear exponent (α). His evidence is that, depending upon the value of α observed, one can predict the change in wind speed in relation to height or elevation. His evidence was that for high observed values of α it can mean that the surface winds measured at 10 metres are not connected in an average way to the higher speeds winds found at 80 metres. In other words, the wind speed at the hub of the turbine may be significantly higher in relation to wind speed found at ten metres when one, through observation, finds a higher α to be present for extended periods of time. He interprets from this that the MOE calculations for noise, in which they consider a masking effect of lower level winds, particularly in the 6m/sec range, may result in incorrect noise level calculation being predicted at individual receptors. In order to determine the wind shear values that might be expected at Kincardine, Dr. Young did an analysis of the experience observed at the Kingsbridge site near Goderich and an observation of wind speeds taken at the Goderich airport. He contends that his method of calculation would result in conservative estimates of the wind shear exponent in that he had to calculate the upper level wind speed from data associated with the power produced at Kingsbridge wind farm array. His analysis of the Goderich airport and Kingsbridge wind farm data revealed that the wind shear exponent was "greater than the $1/7$ logarithmic value 77.8% of the time and that the average value for the period measured was 0.223 with a maximum of 1.472 and a minimum value of -0.371." It was his evidence that his findings at Goderich and Kingsbridge can also be attributed to the Kincardine area and that the high wind shear events observed at Goderich/ Kingsbridge can occur for hours at a time. He notes that these elevated wind shear events occur predominately in the late fall and winter months, and at night, but can occur at any time during the day and throughout the year.

71 His evidence is that the experience at Goderich/Kingsbridge can be reasonably applied to the Kincardine project. His evidence is that this phenomenon is confirmed from his analysis of a data set provided to him by Enbridge for wind speed at 30 and 50 metres. It was his evidence that the observed wind shear exponent from the Enbridge data set that he examined was in fact higher than his calculations at Goderich/Kingsbridge.

72 It was his evidence that, as a result of his analysis of the data set at Goderich/Kingsbridge and the data sets provided for the subject property, that

there would be little or no masking of noise generated for a large percentage of the hours of operation since the wind shear exponent was observed to be significantly higher above the 1/7 logarithmic profile (0.143) normally assumed.

It was his evidence that even using the measured average wind shear exponent of 0.22, there will be a large number of hours for which the masking by surface winds will not be effective.

73 He concludes from his study of the wind conditions at Goderich/Kingsbridge and Kincardine that:

1. The behaviour of boundary layer winds near Lake Huron is a benefit to local wind producers since more power can be generated than expected.
2. The MOE wind masking method potentially does not apply in a large number of hours which, in his opinion, means that either more noise shielding or larger separation distances to receptors will be needed to meet Ministry guidelines.
3. His analysis suggests that the stresses on the blades may be higher than usually assumed for design purposes which could lead to higher failure rates.

74 It was his suggestion to the Board that during conditions when the upper level wind speed was high in comparison to very low or non-existent ground speed winds, the masking effect of ground winds would not be present. It was his opinion that in these conditions modifications to the turbine's operation would be required to modify sound levels to meet Ministry noise guidelines. He further suggested that continuous monitoring of wind speeds be undertaken at the site at 80 metres and at 10 metres which would identify high noise conditions which could require an automatic shut down or feathering of the turbine units.

75 It was also his opinion that a weather forecasting system be put in place that could predict in advance weather conditions that would result in high alpha conditions. His evidence was that the Non Hydrostatic Mesoscale Model (NMM) be employed.

76 Dr. Young under cross-examination freely admitted that he is not an expert with respect to the safety conditions or design of the Vesta 82 turbine being proposed and accepts the response from Vesta found at Exhibit 23c that the turbines in question have been designed to perform safely within the wind conditions found in Kincardine. He also admits that he was unfamiliar with the alpha exponent used by the MOE in its chart found at Exhibit 5G Tab 106, but assumes that it uses 1/7 rule (0.143) of alpha.

77 The Board then heard from Mr. John Coulter, a qualified expert in the fields of noise, vibration control, and environmental noise assessment, who was retained by the appellants to peer review the noise impact assessments prepared by Enbridge for the project and to provide an assessment of the noise impacts that might be expected resulting from the work of Dr. Young if applied to the Kincardine project. He has also provided his assessment of the variances he would expect for the various receptors as set out in the Valcoustic report prepared by Dr. Lightstone, Exhibit 92, dated May 2007, as they relate to the by-laws currently before the Board. His assessment is found at Exhibit 95.

78 It was his evidence to the Board that the Ministry guidelines, as found at Exhibit 5g Tab 97, together with their supporting instruction documents, are designed to protect against adverse impacts from noise. He notes that the guidelines would not protect all people as individuals perceive noise differently. It was his evidence that the guidelines are designed to mitigate noise impacts for about 85% of the population and that the test is not to protect against the "worst case conceivable", but instead the modelling should model for the "predictable worst case" resulting from the project. After reviewing the work of Dr. Young with respect to the high wind shear exponents and resulting wind conditions that he predicts for the Kincardine site, and after

making his own calculation of the noise one might expect during these conditions from the Vesta 82 turbines, he proffered the opinion that based upon the earlier work of Dr. Lightstone he would anticipate for about 213 hours per year one could expect a ≥ 3 dB excess over the values predicted by Dr. Lightstone and that for about 75 hours per year the excess could be ≥ 5 dB. It was his opinion that such exceedences would cause a public reaction and need to be accounted for in any of the modelling. He acknowledges that the Ministry provides no guidance in its documents with respect to what wind shear exponent one should assume when doing the noise modelling, but proffered the opinion that if you can predict a problem you are required to show under the guidelines how you can resolve the impact. He accepts that the benchmark that one is required to meet is set out in the graph found at (Exhibit 5g Tab101 p2288) which shows a rising dBa limit from 40dBa to 53dBa corresponding with increased wind speed near the ground. He also reviewed the adjustment for special quality of sound found in the publication NPC104 (Exhibit 5g Tab102) and proffered to the Board that, in his judgement, there was no need to make any additional dBa penalty adjustments for these conditions in this case. He also freely admits that he did not take into consideration the directionality of the winds in arriving at his conclusions regarding noise impacts nor could he verify what had been done for directionality in the work of Dr. Lightstone found in Exhibit 92.

79 Mr. Coulter, as a result of his calculations and review of the most recent Valcoustic report (Exhibit 92), proffered to the Board his assessment of the by-laws that should and should not be approved from a noise impact perspective.

80 It was his evidence that there were no noise impact resulting from By-laws 2006-156, 2006-157, 2006-174 as shown on Exhibit 71.

81 It was also his evidence that By-laws 2006-169, 2006-170, 2006-189, 2006-190, 2006-191, 2006-193, 2006-196, 2006-216, 2006-233 and 2006-228 should be eliminated and not approved. He noted a number of clusters on Exhibit 94 in which he indicated a decision needs to be made regarding whether one or more turbines should be removed or re-sited to meet a 35dB (he anticipates the need for a 5dB penalty), using the method and findings found in the May 17, 2007 report of Valcoustic. He proffered no specific recommendations on which turbines needed to be removed.

82 He also proffered the opinion that the Ministry guidelines could be met if any of the following actions were taken by the proponent.

1. Replace the proposed turbines with a new Vesta 82 two speed turbine shown at Exhibit 93.
2. Modify the control units on the existing proposed turbines to feather the blades in high wind conditions.
3. Modify the sighting of some of the units.

83 Under cross-examination he agreed that NPC232 is the applicable noise guideline approved by the Ministry and to which proponents must address their project and that the document known as PIBS4709e, Exhibit 5g Tab 101, together with the references outlined in that document provide the directions to proponents on how they are to undertake their modelling work with respect to noise from wind turbines, and that in this case one is required to meet the ambient sound level of the area or 40dB, whichever is the lowest. He also conceded that the PIBS document makes no references to the alpha exponent that is to be used when modelling for noise from wind turbine. When questioned whether the Ministry accepts the postulate put forward by Van der Berg, he admitted that the Ministry has not yet accepted the science, but that the matter to the best of his knowledge was under review and the Ministry might change its current position at any time. It was his opinion that there are problems with the interpretation documents and not the guidelines themselves. He maintained that the problem with high wind shear is most pronounced when the ground wind speed is in the 6m/sec range or at the break in the slope found on the graph at (Exhibit 5g Tab101 p2288) and that the findings of Dr. Young from his review of the data sets for Goderich/Kingsbridge can serve as a proxy for the Kincardine project, and would in fact be a conservative estimate of the potential for high wind shears events. He maintains that the predictions of Dr. Lightstone found at Exhibit 92 and which he has reproduced on Exhibit 95 should be bumped up by 5dB so that any reading over 36dB in Dr. Lightstone's report of May 17, 2007 should be considered in excess of the Ministry's noise guidelines based upon his interpretation of the sound that would be generated from these turbines during

a high wind shear events. He freely admits that he only looked at data sets when wind speeds were between 5 and 7 m/sec. as in his opinion this is the most critical condition.

84 He reviewed for the Board under vigorous cross-examination his calculations and formulas found at Exhibits 96, 97, and 98 that he used in arriving at his opinion, and making allowances for some small errors, and recognizing that Dr. Lightstone used an Alpha of .22 as opposed to .16 that he had assumed, he continued to maintain that a 5dB penalty should be added to all of Dr. Lightstone's results found in his May 17, 2007 report.

85 It was his opinion that the events of high wind shear were predictable in the Kincardine area and as such should form the basis of modelling for this "predictable worst case" as set out in the Ministry's guidelines.

86 He also confirmed under cross-examination that he would defer to Mr. Duhamel on the impacts of the proposed turbine locations on vacant lots found in the study area.

87 He also reluctantly agreed that the Minister of the Environment is responsible for making the final determination on whether there is compliance with the Ministry's noise guidelines and that the Certificate of Approval is conclusive evidence of such compliance, although he encourages the Board to exercise its jurisdiction on land use planning grounds and not approve the by-laws to which he believes there are noise guideline compliance issues.

88 Mr. Coulter when asked to comment on the Ministry's Frequently Asked Questions for Wind Turbine Projects (Exhibit 5g Tab103), and in particular question 19, which states as follows:

19. Are special noise reducing features for wind turbines, based on automated reduced operations, an accepted parameter for demonstrating compliance with MOE noise limits at the approval stage?

No. The Ministry's guidelines require that the noise assessment be made based on the principle of "worst case scenario" in order to demonstrate compliance with noise limits.

maintained that in his opinion the use of operation techniques to reduce noise would be an appropriate approach, but conceded that such a determination would be up to the Ministry.

89 He also confirmed that the test is the "predictable worst case" and not the "worst conceivable case scenario".

90 He also proffered under cross-examination that if Dr. Lightstone's work is accepted by the Ministry then it would be acceptable to allow the project on the understanding that you achieved the 40db standard as set out in the Ministry's noise guidelines.

91 He continued to maintain that the Ministry has not properly addressed the issue of the high alpha wind shear problem found in the Kincardine area and as such their guidelines should not be relied upon.

92 Mr. Coulter on questioning from the Board offered the opinion that operational protocols could be included as part of the Certificate of Approval and that the Ministry in the past has created site specific modifications or has required audits to ensure compliance with its guidelines. He does not believe that the Ministry's enforcement of its guidelines could be relied upon to resolve noise impacts that he anticipates coming from the proposed project.

93 He has not fixed opinion as whether the Municipality should exercise noise control by agreement or through some form of licensing of the turbines.

94 The Board then heard from a Mr. David Baker, a professional Engineer with specific qualifications in wind and atmospheric data collection and analysis, wind resource monitoring, and wind turbine facility design and performance modelling. An extensive list of his project involvements is found at Exhibit 102. Mr. Baker's firm, Phoenix Engineering, was retained by Enbridge and its predecessor to do predictions of the wind resource in the study area, design the turbine array to optimize the

wind resource based on an understanding of the wind resource in the area, the need to mitigate sound propagation, shadow flicker, and the construction costs to develop the wind farm.

95 His firm has done the Shadow Flicker analysis in support of the turbine array currently before the Board using the WindPro software modelling program found at Exhibit 100. His evidence to the Board is that he modelled 336 residences (receptors) and the 110 turbines in the area as directed by the County. The summary of his results are that only 32.44% of the residences in the study area will experience any shadow flicker at all and that less than 5% will experience shadow flicker for more than 10 hours per year. He noted that the maximum shadow flicker recorded as a result of his modelling effects one residence for 21 hours and 28 minutes at Concession 5 lot 6 (Schwandt). His evidence is that the results found in Exhibit 100 represent a conservative estimate of the shadow flicker events as predicted by the WindPro software, or, in other words, are worst case scenarios assuming the astronomical maximum shadow of the turbine with no obstructions any to the receptor. He also admits that he, in determining the worst case scenarios assuming the astronomical maximum shadow, has applied cloudy day statistics from the Wiarton airport as set out in page 2 of Exhibit 100. He also noted that the modelling was done using what he termed the "green house" mode of the software which measures total shadow flicker accumulated from all turbines from all directions at all times. He confirmed that his modelling took into consideration all turbines within 1000 metres of any receptor as directed by the County. His conclusion is that the zoning by-law separations distances and the siting of the current sites of the turbines using the UTM coordinate method are appropriate to minimize the impacts of shadow flicker and that all receptors within the study area are well within the standards for shadow flicker set by the County of Bruce.

96 In response to some of the issues raised by Mr. Duhamel, he notes that, when one takes into consideration the size and blade profile of the Vesta 82 blades, in his opinion the intensity of shadow begins to diminish at about 215 metres, and that as you move further away the intensity of the shadow continues to diminish so that at 1000 metres the blade only obscures about 20% of the incoming light radiation. He confirms that the WindPro software was set to measure the shadow flicker phenomena of all receptors within 1000 metres and he sees no relevance to the suggestion of 1500 metres put forward by Mr. Duhamel. He also notes that the standard put forward by Mr. Duhamel was not the standard required by Bruce County and that his firm has never been required to employ such a standard in any of the work his firm has done in British Columbia, Alberta, Saskatchewan, Manitoba, or Ontario. He continues to maintain that the predicted standard of 30 hours per year and as set out by Bruce County is well recognized, and in his opinion adequately addresses the impact of shadow flicker. He also does not share the proposition put forward by Mr. Duhamel that shadow flicker should be measured to amenity areas around any receptor. He notes that this is not an objective standard and needs to be tempered with time periods when these extended amenity areas would be used.

97 Mr. Baker, at Exhibit 107, ran his shadow flicker program for all receptors receiving more than 10 hours of shadow flicker in the green house mode to reflect flicker from all turbines up to 2000 metres from any directions. He notes that, in this scenario, the shadow flicker previously registered for the receptor R111 at Concession 5 Lot 6 would increase from 21 hours 28 minutes to 22 hours and 34 minutes. It was his evidence that even under this scenario all receptors within the Enbridge project would be well within the 30 hour per year standard of the County. He also provided the Board with a calculation of the impact of the blade as it passes through the sun radiation, found at Exhibit 108, and provided a series of calculations in support of his contention that at 1500 metres the blades would obstruct about 18 % of the sun light radiation and would result in one not being able to distinguish any shadow effect at this distance from the turbine.

98 Mr. Baker then addressed the issues of safety with the Vesta 82 model raised by Dr. Young with respect to:

1. High wind shear over the turbine rotor blades which could cause failure.
2. On site turbulence Intensity.

99 He notes that his firm has used a sonic detection and ranging system (SODAR) to measure wind speed between 30 and 140 metres and that the device was deployed twice by his firm for the purpose of calculating wind shear across the rotor blades. These findings were compared with results from nearby meteorological towers to verify the accuracy of the SODAR results found in Exhibit 103. He notes that the observed wind shear across the rotor blades is well within the design parameter of the Vesta 82 turbine. He also notes that three years of 10 minute data sets was used to calculate turbulence intensity at the Enbridge

site and that the average turbulence intensity was calculated for each m/s increase in wind speed at the 50 metres height. The result of these calculations, according to Mr. Baker for all wind speed above 2m/s, was an average turbulence intensity of less than 14%, and that this is well within the operating parameter of the Vesta 82 turbines, and is confirmed by Vesta in a letter dated April 19, 2007.

100 He concludes that neither wind shear nor turbulence intensity pose any safety impacts for the Vesta 82 turbines proposed for the Enbridge wind farm project.

101 Mr. Baker then outlined his concerns about the calculations performed by Dr. Young in his calculation of the shear exponent values that should be used at the Enbridge site and from which Mr. Coulter made his determination of noise exceedences. It was his evidence that he sees no linkage in the data sets used by Dr. Young for the Goderich airport and the power generation curves used at Kingsbridge to predict shear exponent values for the Enbridge project.

102 He notes that the data sets taken at Goderich are taken 2 to 10 minutes before the hour and are subject to modifications and rounding, and are used for meteorological purposes, and that due to rounding and conversion of the values there can be an under estimation of wind speed at Goderich, which in his opinion would result in an overestimation of shear exponents. He also notes that the turbines at Kingsbridge are 4.4 to 18 kilometres away from the Goderich airport and that depending on wind speed there could be anywhere from a four minute to 75 minute delay for the same wind speed event to reach the Kingsbridge site from Goderich. He sees no relationship with the wind speed measured at the ten metre height at Goderich and the calculated winds speed derived from the power output at Kingsbridge. He also expressed concern that the power curve for a single turbine is different from the power curve one would expect from a wind farm array which depending on wind speeds could result in anywhere from a 4.71% to 12% error in the calculated wind speed at Kingsbridge. He also sees other issues such as the differences in terrain roughness and differences in elevations between Goderich and the Kingsbridge site as causing errors in accurately predicting wind shear exponents that could be used for the Enbridge site.

103 At page ten of Exhibit 104 he has prepared a scatter plot comparing the Kingsbridge power output with the Goderich airport wind speeds. He notes that the lack of a defined relationship, as shown on the chart, is indicative of problems caused by the separation of the two sites and altered exposure of turbines compares to wind speeds measures at Goderich anemometer, and that such a scatter as displayed in Exhibit 104 can not be explained by simple variations in the shear exponent.

104 His evidence to the Board is that the best methodology for collecting date sets on wind shear coefficients is to use measurements taken in a vertical column over an extended period of time in proximity to the location of the turbine array.

105 He concluded his remarks in this area by proffering the opinion, after his review of the evidence and methodology used by Dr. Young to determine wind shear exponent for the Enbridge project, that the Goderich airport Kingsbridge analysis does not represent any accepted method for calculating wind shear for wind farms recognized by the industry and the results have no meaningful application to the current matter under appeal, and therefore should not be relied upon by the Board.

106 He freely admits that the three towers used to collect wind data for the Enbridge project had some problems. He notes that one of the towers located to the northeast is away from any of the planned turbine array and that a second tower never collected any more than 10% of the potential December data. He also notes that the third Foster tower has performed well over the last three years and that its date sets were relied upon for the noise calculations. He also identified conditions in the manner that the data was collected at the tower that could impact the accuracy of the observed data collected and from which wind speed and shear exponents are derived.

107 Using a one year data set (some 52,537 data sets) from the Foster tower located at Concession 7 Lot 25, and utilizing the procedure set out by Mr. Coulter in Exhibit 96, he then did his own assessment of sound using the sound table for the Vesta 82 turbine found in Exhibit 92. This procedure was applied to every 10 minute record in the 12 month period. He advised that when the turbine would not be operating he assigned a zero power level.

108 The results of his analysis are found at Exhibit 104 page 12. He notes that from this calculation his results would be consistent with Dr. Lightstone's findings 81.69 % of the time and that for 0.14% of the time or 12.3 hours per year there could be

an exceedence of ≥ 5 dBa and not the 75 hours predicted by Mr. Coulter. He concludes that if one were to accept the methodology used by Mr. Coulter, which he does not, the exceedences one might expect would not be in the range predicted by Mr. Coulter and as such Mr. Coulter's work should not be relied upon by the Board.

109 Mr. Baker also provided for the Board his calculation for shear values derived from the three towers situated on and in proximity to the Enbridge sight. He notes that this is the same data that was provided to Vesta and it was this data set that they used to produce the sound power levels charts for the Vesta 82 model which were used in Dr. Lightstone's modelling for noise guideline compliance.

110 He notes that over the three year period they calculated the shear exponents from the data sets between 30 and 40 metres and between 40 and 50 metres. As well he used a threshold of 7m/sec which he indicated is a well established standard in the wind industry.

111 His results are as follows:

Foster Tower (best three year data set)

30 to 40 metres	0.128 shear exponent
40 to 50 metres	0.197 shear exponent

Tillman Tower (11 months for 3 years situated in the centre of the project)

30 to 40 metres	0.147 shear exponent
40 to 50 metres	0.213 shear exponent

Fiete Tower (outside project area 12 month for three years data set)

30 to 40 metres	0.186 shear exponent
40 to 50 metres	0.215 shear exponent

112 He concludes from his analysis of these more complete data sets that the shear exponent suggested by Dr. Young of 0.292 is not credible as it does not take into proper consideration threshold wind speeds. He also notes that by using very low wind speed in the calculation of shear exponents, you create higher wind shear exponents which do not accurately model the real situation. He concluded his evidence by stating that in his opinion the use of a 0.22 wind shear exponent is more than reasonable when modelling impact from the proposed Enbridge project. This is the exponent that Vesta used in arriving at in the production of its sound energy profile for the turbine units in question.

113 Mr. Baker under cross-examination was questioned why he used probability of sunshine statistics from Wiarton and not the Agricultural and Agri-food Canada records that he used in his analysis of the Cruickshank wind farm located in proximity to the Enbridge project. He freely admitted that his firm is moving to the Agricultural and Agri-food Canada records for their shadow flicker analysis as they were finding that this data gives them a better approximation of local conditions. His evidence is that he continued to use the Wiarton data set in order to maintain consistency in his work on shadow flicker for the Enbridge project. He also notes that, in comparing the two sets of data, it was his opinion that the Wiarton data set on an annual basis would result in a higher prediction of shadow flicker than what one might expect if the Cruickshank parameters had been employed.

114 Mr. Baker was questioned under cross-examination about his understanding of the term "astronomical maximum shadow" as set out in the Wind Pro Algorithm found at Exhibit 5c Tab 69 and how he used the term in his modelling. It was suggested to Mr. Baker that in considering the "astronomical maximum shadow" worst case that no consideration of cloud cover should be used but instead a clear sky is to be assumed all of the time 365 days a year. It is Mr. Baker's contention that when modelling

for shadow flicker one is attempting to model or predict real world conditions, that it is appropriate to employ probability of sunshine data, and that the Wind Pro software is equipped to properly consider this input. It was his contention that what one is attempting to model is a "worst case that has a chance of happening" and that a clear or cloudless sky for 365 days of the year is just not realistic. He maintained under cross-examination that the shadow flicker study was properly done in accordance with the standard and directions established by the County of Bruce. His methodology is clearly described in all of his calculation reports of shadow flicker and has been consistent.

115 He also freely admitted under cross-examination that SODAR data in the past was not reliable in measuring high wind speeds, but that the new units were much improved. He also noted that they test the accuracy of the SODAR data with observed data taken from the meteorological towers. He continues to maintain that the data sets they have collected for the Enbridge project are appropriate for the modelling required in support of the project and are much preferable to what he terms as unreliable data and conclusions produced by Dr. Young from the Goderich airport and extrapolated from the power data taken at Kingsbridge. He also concurs that the monitoring facilities at the Goderich airport are appropriate for the purpose they are intended for, namely weather purpose in support of the Airport, but should not be used in place of the data collected on the Enbridge site. He continues to maintain that the data produced by Dr. Young is fundamentally flawed and has no value in evaluating the project before the Board.

116 Mr. Baker on questioning from the Board indicated that the Vesta 82 referred to by Mr. Coulter in his evidence is not available in Canada and this is confirmed by Vesta in a letter dated May 29, 2007 and Found at Exhibit 114. He further confirmed that he was not aware of any protocols or operating procedures that would feather the turbines in conditions of potential high noise output.

117 The Board then heard from a Dr. Lightstone a very well qualified engineer who specializes in acoustics, including architectural acoustics, environmental acoustics, and noise and vibration control.

118 He has been involved in several noise assessments for wind turbine projects and is also involved in a peer review of work being done for the Melancton 2 project. He is well versed in the requirements of the Ministry of the Environment's Certificate of Approval process for wind farms as they relate to noise impacts.

119 Dr. Lightstone was retained by Leader Wind in November of 2005 and subsequently by Enbridge to do the noise study component of the environmental screening report. He has been involved in the public consultation process and has tested various turbines arrays for compliance with the Ministry of the Environment's noise guidelines. He advises that this process is an iterative one in which his responsibility has been to test changes against the Ministry's guidelines. He advised the Board that the software package used for the modelling is known as CADNA A and that the program is used for a variety of noise modelling projects. He notes that the program has a three dimensional capacity to model for differences in terrain. However, in the current modelling he advises that no constraints have been employed for buildings or vegetation that might buffer sound propagation. He advised the Board that his modelling has been done for 120 turbines even though only 110 are proposed to be constructed. He has also included the transformers proposed for the project in his noise analysis. His evidence was that between September of 2006 and April of 2007 modifications were made to the data sets, including the UTM coordinates as now being proposed, and that this data has been included in his analysis contained in Exhibit 92 and that Exhibit 92 is the basis for the proponents submissions to the Ministry for a Certificate of Approval for the project.

120 His evidence to the Board was that the modelling up to April 4, 2007 was done on the basis of modelling all turbines within 1000 metres of a receptor, and that turbines beyond 1000 metres were not considered as important in the calculation of impact on receptors. This modelling was done based upon his interpretation of the Ministry's guidelines. He notes that in his previous submissions to the Ministry, as part of the environmental screening report and subsequent addendum reports, he had received no comments or directions from the Ministry regarding changes required to his noise modelling calculations.

121 He then advised the Board that on or about April 04, 2007 the Ministry directed that a different approach be undertaken to the modelling, being that if all turbines were more than 1000 metres away from a receptor then no noise analysis was required, but that if one turbine was within 1000 metres of a receptor then all turbines in the project must be modelled. He also advised

the Board that the Ministry, through a Mr. John Kowalewski, also directed that they wanted other changes to the method of modelling as they felt the new modelling direction was over predicting the noise impacts. These changes are contained in a memo to Mr. Kowalewski dated April 26, 2007 (Exhibit 118). Essentially the new modelling allows for wind direction corrections to the results of -1.5 dBA in the 90 degree cross wind event and a — 8 dBA adjustment in the 180 degree up wind case. There is also a sliding logarithmic scale for the dBA correction values between 90 and 180 degrees, and are shown in Exhibit 92 at figure 24. Dr. Lightstone also advised the Board that in the new modelling interpretation the Ministry does not consider participant receptors as they are deemed to be part of the proponent's project. In this regard, Dr. Lightstone referred the Board to Ministry document LU131 which contains a discussion on the psychology of sound as perceived by individuals. It was Dr. Lightstone's evidence that the new modelling found at Exhibit 92 is the result of the Ministry's new directives to him and is the basis upon which the proponent has submitted its application on May 22, 2007 to the Ministry for a Certificate of Approval for the Project.

122 It was his evidence to the Board that the new modelling Exhibit 92 demonstrates that, with the exception of participant receptors which the Ministry excludes from the modelling, the project as configured complies with the Ministry's guidelines for noise and adequately takes into consideration the condition of wind shear put forward by the appellants.

123 Dr. Lightstone also proffered the opinion that while the zoning for the project and the Certificate of Approval process are interrelated, it is not axiomatic that zoning approval means that a Certificate of Approval will be issued. However, he also notes that the Ministry will not even consider issuing a Certificate of Approval without local zoning approval. He also confirmed that while the PIBS document provides for different dBA values between day and night, the worst case that must be modelled for is 40dBA, and that any exceedence of this standard at any Ministry prescribed receptor would breach the Ministry's noise guidelines. In other words, the 40dBA guideline must be met at all receptors in order to obtain a Certificate of Approval for the project. He further indicated that the Ministry's guidelines and documents do not directly deal with the issue of sound masking although the sound graph found in PIBS 4709e does provide a relationship between sound levels and wind speed which, both he and Mr. Coulter agree, is the guideline for noise established by the Ministry for a wind turbine project, be it one or 110 turbines in the array and is measured at ten metres above the ground.

124 It was his evidence that the guidelines are an attempt to set reasonable limits on noise impacts for about 85% of the population and do not reflect a "worst conceivable case". He agrees that the test for a 40dBA limit is the "predictable worst case". He notes that table 2 in Exhibit 92 outlines the sound power levels for the Vesta 82 turbines and that these sound power levels were generated by the manufacturer in accordance with the IEC 61400-11 standard and were based upon a wind shear coefficient of .22.

125 It was his opinion that sound power levels found in Exhibit 92 are appropriate and he does not share the conclusions of Mr. Coulter that a 5dBA penalty should be added to the values developed by Vesta based upon the shear component calculated by Dr. Young. It was his opinion that doing so would more likely represent a "worst conceivable case" not contemplated by the guidelines. It was his evidence that the Ministry was aware of the differences in wind speed at different elevations above the ground when it formulated the noise criteria for wind power projects. He confirmed that his calculations were modelled for impacts at 10 metres at the outside plane of a window at the receptor as required by the guidelines. He also anticipated about a 1dBA reduction for one storey residences. It was his evidence that one could anticipate a 10dBA reduction in the sound level on the inside of the receptor and a 20dBA reduction if the windows were closed. He also provided the opinion that school residences as described by Mr. Thompson would be treated as a sensitive receptor in the modelling.

126 He also advised the Board that he has recommended to his clients that they prepare a protocol to deal with complaints received by people in the area over and above the mechanism provided by the Ministry of the Environment's Certificate of Approval process. He also advised the Board that his client would be installing sound monitoring equipment at the Tillman Tower at a height of about 2 1/2 to 3 metres and at a receptor in the area, and that his clients were committed to doing ongoing monitoring independent of any conditions that might be imposed by this Board or the Ministry.

127 He concluded his evidence by confirming that in his opinion the revised modelling as shown on Exhibit 92 is a conservative prediction of the noise impacts that could occur as a result of the project as currently proposed, that the separation

distances and the use of UTM coordinates being proposed in the by-laws before the Board are appropriate, and that the current proposal will comply with noise guidelines of the Ministry of the Environment.

128 Dr. Lightstone under cross-examination confirmed that there is no real data until the project is built and that the sound power levels are measured at the hub of the turbines and then translated to a sound power level at 10 metres above the ground for the purpose of the modelling.

129 He confirmed that the sound power levels for the 2 transformers have a NEMA rating of 83dBa, but that test data found at Appendix D of Exhibit 92 provided by the manufacturer indicated a sound power level of 73.3dBa, and that this rating, plus a 5dBa tonal penalty (78.3dBa), had been used by him for the modelling for the project, the results of which are graphically displayed on figure 22 and 23 of Exhibit 92. He freely admitted that if the sound power levels for the transformers were increased by further 8dBa, then the impacts at the receptors would go up from what was shown in his modelling calculations. He also advised that if there were any exceedences as a result of the transformers operation, then they can easily be mitigated with a sound barrier wall around the transformer.

130 When asked under cross-examination to consider his calculation for receptor R090, as shown in his revised calculation found at Exhibit 119, he continued to maintain that the analysis was done correctly and in compliance with the Ministry's most recent directions.

131 Dr. Livingstone when asked to comment on Mr. Brownell's evidence regarding his experiences at Melancton 1 could not explain the situation, but found it very unusual and suggested that it needed further investigation.

132 He maintained under vigorous cross-examination that the Ministry is aware of the work done on the effects of wind shear, that all of the Ministry's documents associated with the noise guidelines need to be followed in doing the modelling, and that this requires educated judgement calls on the part of those doing the modelling. He agrees the "predictable worst case" is not defined and needs to be considered on a case to case basis. He admits that the condition of higher winds speeds at 80 metres and lower winds speeds near the ground particularly at night can occur, but in his opinion this does not represent a "predictable worst case". He also stated that Dr. Young could not or would not provide the experts with a value for alpha that he thought they should use in the modelling of noise for the project. He still maintains that the values for alpha used by Vesta are appropriate for the calculation of sound power that he used in his modelling.

133 He freely admitted under cross-examination that noise events can occur that have not been modelled. He notes that the model is not designed to or required to predict all events that might occur at all times, nor is the test or to ensure that all individuals do not experience any impacts. The test is one of reasonableness in predicting a worst case situation. In this, he concurs with the evidence of Mr. Coulter. He continued to maintain that the modelling required by the Ministry's guidelines requires a modelling of the "predictable worst case" which he asserts has been done as set out in Exhibit 92.

134 Dr. Lightstone, when questioned by the Board about how an individual might be protected if there was an error in his predictions, and was legitimately impacted as a result, indicated that the Ministry has the ability to issue control orders, but that in his opinion he would recommend to the Board and his client that a protocol be put in place locally with clear lines of responsibility to receive and deal with legitimate complaints in a direct and orderly fashion at the local and not provincial level.

135 Mr. Pol then returned to the stand and presented to the Board Exhibit 126 which is a revised protocol proposed by Enbridge to fulfil the one of the holding provision of the zoning by-law dealing with Emergency Procedures during Snow and Ice Hazard conditions. The protocol establishes procedures to be used by Enbridge in shutting down and restarting the turbines during weather conditions when icing could occur on the turbines.

136 Mr. Pol, on questioning from the Board, admitted that the protocol (Exhibit 126) as worded provides directions to Enbridge staff regarding their responsibilities and duties during such events, but did not provide any details on how the public was to be made aware of such conditions. He concurred that the protocol needed to be reworded.

137 He then proceeded to review Exhibit 127, a report on an assessment of Blade throw similar to the study undertaken by Golder Associated for a Vesta 82 situated at the Pickering Nuclear plant. The report concludes that the maximum range for the centre of gravity of the blade is 97 metres for both the underthrow and overthrow cases, and that the maximum projection of the blade tip is 124 metres. The study also undertakes a risk assessment of the probability of blade failure for the Vesta 82 in light of its past performance and the operating characteristics of the machine. The conclusions of the report are that:

given the proved track record of the Vesta V82, its existing certified safety systems, confirmation that the site conditions are within the existing certification design parameters, and the provision of suitable operation and maintenance program Garrad Hassan fully expects that the probability of turbine blade failure during the operational lifetime of the proposed WOWP project will be significantly lower than proposed by (4). Even with blade failure rate figure proposed in (4) it is estimated that the probability of an individual being struck at a distance of 97 metres from the turbine by a blade released from failure is extremely small and less than natural hazards such as lightning.

138 Mr. Pol concluded his evidence in this matter by suggesting that the setbacks in the proposed by-laws adequately address and mitigate the safety issues associated with the blade throw and blade tip failure and are reasonable and appropriate.

139 Mr. Pol then provided the Board with a map (Exhibit 128) graphically outlining the changes to the project now being requested by Enbridge, and a book (Exhibit 129) containing all revised by-laws under appeal which incorporate the changes he outlined in his evidence in chief dealing with the UTM method of determining the precise location of the turbines. The new by-laws also add a holding provision requiring that before the H designation can be lifted

A Dispute Resolution Protocol for dealing with turbine complaints within the project area regarding noise has been filed with the Municipality of Kincardine.

140 The by-laws now being proposed, together with the by-laws already in force and effect, would result in a 132 turbine array even though Enbridge is now proposing only 110 turbines in the project.

141 Enbridge, through its counsel, stipulated that in the event the Board was prepared to approve the by-laws under appeal authorizing a 110 turbine array for the project, and on the advice of its Counsel, Enbridge would consent that the appeals against By-laws 2006-156, 2006-157, 2006-173 and 2006-174 be allowed in part and these by-laws not be approved. This would result in the reduction of 5 turbine locations.

142 Mr. Pol also advised the Board that Enbridge was also asking that, on the following by-laws, the number of permitted turbines be reduced in the following manner:

BY-LAW NUMBER	ORIGINAL # OF TURBINES	PROPOSED # OF TURBINES	
2006-159		3	2
2006-179		3	2
2006-189		2	1
2006-190		2	1
2006-236		3	2
2006-242		2	1

143 This would result in a reduction of another 6 turbines to the proposed array.

144 Enbridge, through its Counsel, also stipulated that it would within 90 days of a favourable decision from the Board seek amendments to existing by-laws (as set out in Exhibit 143 and shown on Exhibit 128) that are currently in force and effect from Kincardine Council to further reduce the turbine array to a maximum array 110 turbines consistent with the Certificate of Approval application.

145 Mr. Pol also advised the Board that Enbridge was also seeking changes to By-laws 2006-170 (part Lots 6 & 7 Concession 12) and By-law 2006-187 (Lot 2 & part Lot 3 Concession 10). The changes being proposed in these two by-laws is to increase the minimum setback from a municipal road to 121 metres and is reflected in the by-laws found in Exhibit 129. These by-laws as formerly drafted would have permitted a minimum setback of 111 metres from a municipal road. In these two locations the turbines were in proximity to the more heavily travelled east/west concession roads.

146 Mr. Pol, on questioning from the Board, indicated that the interpretation found in the parent by-law requires that the most restrictive standards found in the by-law are to apply if any conflict in standards is found. It was agreed by Counsel for Enbridge that a statement to this effect would be placed in the by-laws found in Exhibit 129 and is found at section 4(vi) in the by-laws.

147 Mr. Pol concluded his remarks by proffering the opinion that the revised turbine array for the project and implementing by-laws shown on Exhibit 128 and contained in Exhibit 129 represented good planning, would limit the project to 110 turbines and should be approved.

148 Mr. Pol under cross-examination proffered the opinion that the minor shifts in setbacks being proposed for the turbines contained by By-law 2006-170 and By-law 2006-187 would not result in any significant shift in the shadow flicker experienced by nearby receptors.

149 He also confirmed under questioning that the protocol found at Exhibit 126 was a fourth draft of the document as a result of discussions among the parties, and that, at the times of giving of his evidence on the protocol, he had received no response from Mr. Duhamel. He confirmed that the proposed protocol directs Enbridge staff to stay 305 metres away from a running turbine if icing conditions are expected. However, he admitted that the protocol provided no direction as to how the public would be informed of this condition, nor could he provide any assessment of the impacts that might result along Highway 21 from ice throw conditions. He continues to maintain that there were no public safety issues with respect to ice conditions. He notes that the few times of the year when the ice conditions might occur, the turbines would be turned off and that in his opinion the locations and setbacks being proposed were appropriate. When questioned about the experience at Huron Wind regarding the frequency of lightning strikes and the potential impacts of this event on Blade failure, he maintained that these events do occur, that the turbines are designed to receive lightning strikes, and that the setbacks being proposed are adequate to provide the appropriate level of safety. He confirmed that he was not aware of any offsite damage to property or individuals resulting from lightning events at Huron Wind, and that in his opinion the risks associated with blade failure/ throw were well within acceptable limits and that the setbacks being proposed were appropriate.

150 The Board then heard from a Mr. Brian Howe, a well qualified professional consulting engineer with many years of experience in acoustical analysis and engineering associated with wind turbines, including his work with the Canadian Standards Association in reviewing the applicability of international standards IEC 61400-11. He was retained by Natural Resources Canada to undertake a noise impact assessment of the conditions and the concerns raised by Mr. Daniel d'Entremont regarding the Pubnico Point Wind Farm in Nova Scotia. He notes that in Mr. d'Entremont's case, the 17 turbine array are all to the south of his property with the closest turbine being some 330 metres from his home. He confirmed that under certain climatic conditions, and particularly when the winds were from the south, exceedences in the order of some 13dB over the Ontario Ministry's noise guidelines were observed at Mr. d'Entremont's residence. He attributes the problems experienced by Mr. d'Entremont to a number of factors; in particular, the location of all turbines downwind from the d'Entremont residence, the direction of the prevailing south winds, the climatic conditions particularly the fog conditions in the area, and the different type of turbines employed at Pubnico Point with a higher blade operating speed. He confirmed that there were no noise standards as found in Ontario in place when the Pubnico Point Wind Farm was established, and that as constructed it would not meet the Ontario noise guidelines for wind turbine farms. It was his evidence that the experience in Nova Scotia is not readily transferable to Ontario and to the Enbridge project, nor does he see the issue of wind shear as postulated by Van den Berg as being reflective of the situation in Kincardine.

151 Mr. Howe then reviewed a report (Exhibit 137) that he authored for Canadian Wind Energy Association: "Wind Turbines and Sound: Review and Best Practice Guidelines." His evidence was that Ontario has one of the most advanced processes for

assessing noise from wind farms noise, that the ISO9613-2 standard gives a robust way of predicting the "predictable worst case", that the IEC61400-11 guideline is an appropriate method to calculate the sound power of turbines and that it is standard for these power levels to be calculated by the manufacturer as contractual arrangements are made based upon the sound performance of the turbine units. He points out that this is a well recognized process used internationally. He confirmed in his work with the Canadian Standards Association, as chair of the Technical Subcommittee on Acoustic Noise Measurements of Wind Turbines, that this subcommittee was recommending the adoption of the IEC 61400-11 standard for measuring sound power from wind turbines. He has no difficulty with the sound powers provided by Vesta and referred to in Dr. Lightstone's work (Exhibit 92). He confirmed that, in his opinion, the directions given by the Ministry to Dr. Lightstone and as reflected in his work at Exhibit 92 is an appropriate method to model the "predictable worst case". He also proffered the opinion that one size does not fit all cases and that it is appropriate for the Ministry, after considering submissions, to make changes to the interpretation directions on a site by site basis as it has done in the case of the Enbridge proposal. He also noted that the Ministry of the Environment's Certificate of Approval process is not a planning approval, but is instead on operational approval that is on going to ensure operational compliance with the noise guidelines over the term of the project.

152 Mr. Howe, under cross-examination, indicated that he did not agree that the work of Dr. Young should be relied upon to calculate sound powers as presented by Mr. Coulter. He continues to support the sound power levels generated by the manufacturer and used by Dr. Lightstone as the best data available to be used in the modelling for noise guideline compliance of the project. He confirmed that this was not done for the Pubnico project in Nova Scotia.

153 He concurs that the noise level as set out by the Ministry and reflected on table 1 of (Exhibit 92) adjusts to some degree the criteria set out in NPC 232, and as such provides criteria for the combined impact of all wind turbines in an area as a function of wind speed. He supports the noise criteria standards as set out by the Ministry as did the other acoustical experts.

154 He confirmed, on questioning from Mr. Palmer, that he had undertaken a noise assessment for a project in Grand Valley, and that in that case they had measured the impact of all turbines for all receptors. He noted that in this case the proposal dealt with 12 turbines, of a different model type that were about 400 metres apart, and that the design he was given to model did not meet the guidelines for a trailer park near the project site. He confirmed that in his opinion the ISO 9631-2 is a good standard and that he was not aware of the changes that the Ministry has imposed in the case. He did proffer the opinion that he had no problem with the interpretation changes the Ministry was imposing in the case, and that in his opinion it would provide for a more conservative modelling of noise for the project.

155 When questioned about his finding at Pubnico, he indicated that the project as constructed would not have met the Ontario noise guidelines, nor would he confirm that the sound exceedences were the result of a diurnal variation in wind speeds at the hub height compared to the wind speeds at the ground. It was his evidence that other factors such as climatic conditions, the terrain, the type of turbines, and the proximity and the configuration of the turbines all to the south of the d'Entremont property were all factors that created the noise issues for Mr. d'Entremont.

156 Mr. Howe, when questioned about the use of municipal noise by-laws, indicated that model by-laws were available from the Ministry, but that they are usually qualitative in nature and deal with issues of time and place (e.g. the use of lawn mowers). Typically these by-laws do not use a Certificate of Approval process for regulation and do not deal with on going industrial operations which fall under the Ministry of the Environment's jurisdiction.

157 He also confirmed that in his opinion a noise protocol was a good idea, that it should be in place prior to the commissioning of the turbines, and should establish a prescribed method of dealing with and logging complaints on a 24 hour basis, preferably by direct contact and not through a call centre or answering system.

158 He further recommends that monitoring of noise levels pre-construction and post-construction is important, as is confirmation of on going maintenance of the turbines to ensure compliance with the Certificate of Approval. He advised the Board that such requirements can be part of the conditions imposed by the Ministry during its approval process.

159 He also confirmed that the Ministry's changing of its interpretation rules after receiving a noise assessment was not uncommon or unfair, and in his opinion did not require an amendment to the PIBS documents. He sees this as a tightening up of the Ministry's requirements similar to the use of UTM coordinates as opposed to just setbacks or construction envelopes. It was his opinion that the Ministry has some discretion in its interpretations of how the modelling for noise is to be undertaken which in his opinion is not a problem nor is it precedent setting.

Findings and Conclusions

160 The Board, at the outset, would note that this was a very long, almost 7 week hearing with over 140 exhibits and some 22 witnesses and participants giving evidence. It is clear to the Board that the opinions held and the positions taken by the parties prior to and during the hearing were sincere and deeply held. During the course of the hearing, both sides raised allegations of misconduct. The Board understands that during the course of such a hearing and during the period leading up to the hearing, positions are taken for strategic and legitimate purposes. The Board however, during the course of the hearing, is satisfied that all parties acted appropriately, have met their obligations to the hearing process, and have brought their concerns forward in a forthright manner commensurate with the means and skills available to them.

161 The appellants have alleged during the course of the hearing that they have not been listened to by both the Municipality and the Ministry of the Environment, that there has been a failure in the local public notification and hearing process conducted by the Municipality in the processing and the consideration of the Enbridge rezoning applications. They further allege that the manner in which the 105 by-laws were passed was designed in some way to frustrate and limit their appeals of the project, and that this Board is their only opportunity to have their concerns addressed regarding potential impacts resulting from the project.

162 It is one thing for the Municipality to fail to meet the prescribed requirements of the *Planning Act* for the giving of notice and the conducting of a public hearing prior to Council making a decision on a zoning matter. Failure in this regard would result in the by-laws in question being a nullity. It is another matter to have been heard, but not to have Council adopt the positions one presents. The Board has carefully reviewed the record found in the exhibits and the testimony witnesses, particularly that of the Municipal Planner. The evidence is overwhelming that appropriate notice and public meetings were held as required by the applicable legislation and that no breach of the notice requirements has occurred.

163 The appellants also allege that the passing of 105 by-laws as opposed to one by-law for the project in some way inhibited their ability to challenge the cumulative impacts of the project. It should be noted that the project area covers some 18,000 hectares within which Enbridge either owns or has under lease approximately 4140 hectares. The rationale put forward by the Municipality is that by passing individual by-laws which are subject to site plan control, it was ensuring the consent of the individual owners to the rezoning of their property. It also felt it provided an easier method for individuals concerned with the impacts from a single turbine or specific turbine array in the immediate area of their property to appeal on a site specific basis while they might not have any concerns with turbines many kilometres away from their property. It is equally true that for those concerned with the propriety of wind farm project as a whole, its density, and its cumulative impacts, the process followed by the Municipality raises some challenges particularly if the goal is to defeat the project in its entirety. However, that being said the appellants in this case through the 38 appeals that they have filed and which are before this Board have been able to bring forward issues associated with the cumulative impacts as they see them and, if successful, would significantly modify the proposed project.

164 The Board finds there are no absolutes in the form or content of municipal zoning by-laws and their amendments, and that the Municipality of Kincardine has the jurisdiction to determine the form and style of its zoning by-laws and by-law amendments provided that they represent good planning standards, are in the public interest, and that their passage complies with the requirements prescribed by the *Planning Act*. The Board finds no defect in the methodology or structure of the by-laws passed by the Municipality to sanction the Enbridge project.

165 The appellants in their submissions to the Board alleged that the Municipality in approving the project in the form now before the Board, has abandoned its responsibility to protect the public interest and that the role of the appellants in this

hearing is, among other things, to ensure that the public interest, as set out in the 2005 PPS and the Bruce County Official Plan, is maintained, and that the community is protected from the negative impacts that they perceive will result from the approval of the Enbridge Wind Farm project. They contend that the standards being imposed by the Province and the Municipality are "simply not good enough to ensure the protection of health and safety to the residents of this community" and that some higher standards need to be considered.

166 The Board finds that the evidence from all of the experts on noise is that the noise guidelines in place in Ontario are robust and appropriate. The experts also all agree that the Ministry of the Environment is the agency charged with the approval of projects through the Certificate of Approval process, and is also responsible for the ongoing enforcement of its guidelines during the life of the project. It is clear that the positions being proffered by the appellants with respect to the issues of noise guideline calculations are known, have been considered, and not accepted by the Ministry of the Environment.

167 The Board should only impose its judgement and replace the duly approved and accepted Provincial noise guidelines through the zoning process of the Municipality if the proponent has failed to make a prima facie case to the Municipality, and alternatively this Board that it can meet the Provincial noise guidelines, or that it has failed to prove the soundness of the project on well established land use planning grounds.

168 It is also equally clear that duly elected municipal councils are charged in the first instance in creating the long term vision for their Municipality and ensuring that the public interest, as they see it, is protected. The Enbridge proposal was supported by the Council in place in 2006 and continues to be endorsed by the new Municipal Council in place in 2007. It is commonly held that the protection of the public interest lies in the first instance with the Municipal Council and that the Board should only intervene in cases where there has been a clear demonstration that the public interest has not been considered or protected by the Council. The appellants, however, do have a role and responsibility to protect their private interests both, individually and collectively, when they feel a project may negatively impact upon them.

169 The Board is satisfied from a full and fair reading of the evidence and the submissions made that the Municipality has had regard to the public interest and the vision set out for their municipality in the Bruce County Official Plan.

170 The Board heard from a number of participants many whom reside outside the immediate area of the proposed project. The fact that they live outside the project area does not disqualify or diminish their evidence in the mind of the Board. It is, in fact, the quality and veracity of their evidence to which the Board must give weight. The Board has held in a number of decisions that it is not good enough to merely raise apprehensions of impacts couched in planning jargon. Instead one is required to present genuine, legitimate, and authentic planning reasons supported by evidence.

171 The allegations put forward by the participants that:

1. the location of some of the turbines along the southern boundary of the project could create a safety issue due to their proximity to the new high voltage transmission lines being proposed from the Bruce Nuclear Project
2. The location of some of the turbines could affect micro wave communication to the Bruce nuclear project
3. The proximity of the wind turbine to the transmission towers could result in safety issues for the helicopters used to inspect and repair the transmission towers
4. That the towers could pose a security threat to the Bruce Nuclear facility by interfering with security radar and the safe landing of helicopters
5. The Wind farm will have a negative impact on the tourism industry in Bruce County and create a visual impact between Highway 21 and the lake Huron shoreline
6. The turbines could affect migratory flight paths of birds and impact negatively on the American Bald Eagle and endangered species found in the area

are not supported by the evidence before the Board.

172 The most compelling evidence is that of the Municipal Planner whose testimony is that the appropriate agencies were informed of the project and have expressed no concerns as related to their interest or infrastructure. She further notes that the local conservation authority has no difficulty with the project and that the Agriculture, Tourism and Planning Committee of the County is satisfied with the content of the environmental screening report. The Board has no evidence before it that the Bruce Nuclear facility or Hydro One transmission facilities and their associated infrastructure are negatively impacted from this project, in whole or in part, and therefore the Board can give no weight to the assertions of some of the participants in this regard.

173 Similarly the issue of migratory bird flight path was appropriately considered in the background reports prepared by the proponent in their environmental screening report and no public authority has expressed any concerns in this regard.

174 The Board would note that the County of Bruce has had in its Official Plan policies to guide the orderly development of commercial wind farms for some time and is well ahead of many municipalities and the particular project in question. This project did not proceed in a planning policy vacuum. The concern that there is no secondary or specific master plan for wind farms currently in place in Bruce County is not a legitimate planning ground to allow the appeals before the Board. The Board notes, as part of the holding provisions found in the zoning by-laws found in Exhibit 129, that a decommissioning plan is a requirement precedent to the lifting of the holding provision by the Municipality and has been properly considered by the Municipality.

175 Issues 7, 8, 10, 11, as presented by the participants are consistent with the issues agreed to by the parties in the procedural order and will be dealt with later in this decision.

176 The participants' Issue 13 regarding notice given by the Municipality has already been dealt with by the Board and bears no repeating.

177 The Board has considered the submissions of Mr. Blake Evans as found at Exhibit 55. It is clear to the Board that the area of flight training acknowledged by Transport Canada and contained in his submission is extensive and includes some of the area proposed for turbines. However, while Mr. Evans alleges a potential impact, there is nothing before the Board from the federal regulatory authorities confirming that Mr. Evans is prohibited from continuing to use the area in whole or in part for the various aspects of pilot flight training.

178 The Board, in considering the evidence of Mr. Daniel d'Entremont, Mr. Brownell, Mr. Ernest Marshall, and Mr. W. Connor, has no doubt that they and their families have been impacted or that they perceive that they have been impacted by the projects located in proximity to their property. The fundamental consideration for the Board, in considering the weight that should be given to their evidence, is whether their evidence represents a systemic condition of impacts that can be attributed to all wind farm projects or are the conditions that they so eloquently describe unique to the specific projects to which they are associated.

179 The Board accepts the very forthright and compelling evidence received from Mr. d'Entremont concerning the impacts to which his family has been subjected as a result of the Pubnico Point project. This position is sustained by Mr. Howe in his evidence found at Exhibit 40, in which he confirms that if the project at Pubnico had been subject to Ontario's noise guidelines then the project as configured and constructed would not have been permitted. It is clear to the Board that the geographic location, the concentration of turbines, the type of turbines, and their juxtaposition to the d'Entremont property are a unique situation that cannot be readily translated to the proposal before the Board in Kincardine.

180 The Board is invited by the appellants to conclude from the evidence of Mr. Howe found at Exhibit 40 that the exceedences he identified at Pubnico can be attributed to the noise modelling not accurately predicting a "predictable worst case" due to high wind shear events, particularly in the evening and under certain climatic conditions. Mr. Howe continued to maintain that the Pubnico and Kincardine project are not comparable, and that under Ontario's noise guidelines Pubnico would not be approved. After carefully reviewing the evidence and the submission made, the Board concludes that there is no evidence that the Board

can take from Mr. d'Entremont's testimony that the noise guidelines in place in Ontario are flawed and are not appropriate for the Kincardine project.

181 Similarly the Board also notes that there is no evidence as to the amount or duration of shadow flicker experienced by Mr. d'Entremont that can be compared to the work and modelling done for the Kincardine project.

182 The Board in considering the evidence of Mr. Marshall does not doubt for a minute the veracity of his evidence describing the impacts he has experienced as a result of the EPCOR wind farm. It should also be noted that there is no concrete medical evidence before the Board showing a direct link between the wind farm operation and Mr. Marshall's health problems. It is equally true from the evidence that EPCOR wind farm has been plagued with operational problems which appear to be unique to that project. If anything, his evidence demonstrates a need to have in place protocols to deal quickly and effectively with legitimate complaints at the local municipal and operator level. The evidence of Mr. Brownell would also support such a protocol being put in place.

183 The Board can take no conclusions from the evidence of Mr. W. Connor other than he opposes wind farms in proximity to his property.

184 The Board finds after considering the evidence of Mr. Daniel d'Entremont, Mr. Brownell, Mr. Ernest Marshall, and Mr. W. Connor, and the submissions made regarding the conditions they have experienced, that there are no systemic issues that can be applied to the considerations regarding the calculations of noise impacts for the Kincardine project from the situations they describe. However, that being said, the Board also finds that there is great merit in requiring a local protocol to deal with legitimate noise complaints in a timely manner.

185 The Board was invited to conclude from the evidence of Mr. Duhamel that the setbacks being proposed would not adequately protect vacant land from the wind farm project if and when future development was to occur on these lands.

186 The Board after considering the submission made prefers the evidence of Mr. Pol and does not share the view that future development on these vacant lots will be negatively impacted by the by-laws in question.

187 The Board is satisfied that with respect to the alleged impacts on vacant lands from the evidence of even Mr. Duhamel under cross-examination, that the lands in question are not impacted and that a resident receptor could be located beyond the 450 metre setback line.

The Issues to be Decided

1. Are the appealed zoning by-law amendments consistent with the Provincial Policy Statement 2005; specifically with respect to the following?

(a) *Sustaining healthy, liveable and safe communities.*

(b) *Protecting long-term economic prosperity.*

188 It is clear to the Board from the evidence of all of the planners that the development of a commercial wind farm is a defined used recognized and mandated by the 2005 PPS, and that the use is compatible with uses normally found in a predominately agricultural area. It is also equally obvious that such uses must be established in locations where there is a suitable wind energy resource as is found to exist in this part of Kincardine. There is no disagreement amongst the planners in this regard.

189 The Board concludes that the prohibition to the establishment of a commercial wind farm in this part of Kincardine could only be sanctioned if the negative impacts from the proposed development on existing development were such that they could not be mitigated to acceptable levels consistent with acceptable standards and practices. It is clear to the Board from the evidence that the proposed development will enhance the economic base of the area and does not significantly impact upon the predominantly agricultural economy of the area. The sighting of many of the turbines as shown on Exhibit 128 has been

undertaken to minimize the impact on farming activities. The Board finds that in this regard the project proposed by Enbridge and reflected in the modified by-laws before the Board is consistent with the policy directions of the 2005 PPS.

190 Consistency with the other sections of the PPS is contingent upon the Boards findings with respect to Issues 2, 4, and 5.

2. Are the appealed zoning by-law amendments in conformity with the County of Bruce Official Plan Policies?

191 The Board is invited by the appellants to conclude from the evidence of Mr. Duhamel that the by-laws under appeal do not respect the vision statement of the Bruce County Official Plan to "Protect the quality of Life of Bruce County while ensuring the growth of sustainable communities based upon diverse economic opportunities, which respect the natural environment", and that the proposal will not enhance the quality of life of Bruce County residences due to the significant impacts he believes will occur from the proposed development in the areas of noise shadow flicker and setbacks related to safety issues associated with the operation of the turbines. The planners for the Municipality and the proponent provided a very different perspective. It was their opinion that the proposed development is consistent with a full and fair reading of the County's Official Plan. They note that the County has had in place since 1999 its policies with respect to "Commercial Wind Generating Systems", Section 4.14.2, and that they have developed comprehensive requirements regarding the data and studies that must be submitted in support of any planning applications for this form of development. They require consultation with the Ministry of the Environment regarding securing a Certificate of Approval for noise prior to their consideration of any zoning amendments. They also employ the tools of site plan control and the holding provision of the *Planning Act* to further regulate and control the proposed development.

192 The Board is asked by the appellants to conclude that the County was out of its element to adequately assess a project of this magnitude and that as a result, it has not adequately addressed the impacts of the development, nor has it included appropriate standards in the zoning by-laws to ensure that the anticipated impacts from the proposal have been mitigated to acceptable standards consistent with the County's and the local municipality's development goals as expressed in the Official Plan.

193 The Board after reviewing the submissions and considering the evidence filed finds that the County and the Municipality have undertaken a full and complete planning review of the proposal in a diligent, comprehensive and open manner while freely recognizing the many challenges associated with this new form of development. They have set clear goals and benchmarks to be met by any proponent of a wind farm project. Their policy directions require site plan approval of all turbines and as well they have utilized the holding provisions of *Section 36 of the Planning Act* to secure performance from the proponent. They have required comprehensive justification studies prior to any formal planning recommendation and have consulted with the appropriate agencies and the public. During this process changes were made by the proponent to address planning concerns raised by the county planners as part of their comprehensive review.

194 The Board finds that subject to its determination of Issues 3, 4, and 5 that the zoning by-laws as amended and found in Exhibit 129 conform to the Official Plan Policies of the Bruce County Official Plan.

3. Do the appealed zoning by-law amendments regulations provide adequate safety for residents and activities surrounding the wind turbines?

195 The appellants' concerns with respect to safety issues deal with the proposed setback found in the by-laws for the turbines and relate to the matters of tower collapse, blade failure, and throw and ice shedding or throw.

196 It was Mr. Duhamel's evidence with respect to tower failure that setbacks of 121 metres or more should be considered. Enbridge has included modifications in By-laws 2006-170 and 2006-187 to comply with the 121 metre setbacks from concession roads. Their planner maintains that due to the limited use of north/south side roads that the 111 metre set back is appropriate and also functions to preserve agricultural land as it relates to the length of access roads across farm fields to the turbine sites. The Board notes that the turbine towers are certified to international standard and must be installed in accordance with the *Ontario Building Code*. The likelihood of tower collapse is remote and in all likelihood far less likely to occur than the failure of other structures currently permitted and located within public road allowances.

197 The Board finds that with respect to the issue of tower failure, the setbacks being proposed in the by-laws are more than satisfactory when one considers the practicality of such an event occurring.

198 The proponent with respect to the issues of blade failure, and blade and ice throw, has filed as part of its evidence in this matter the reports prepared by a Mr. Marc LeBlanc of Garrad Hassan Canada Inc. which are found at Exhibits 23a, 23b and 23c. Mr. LeBlanc was never called as a witness. The appellants contend that a setback of some 243 metres, as set out in a document from GE (Exhibit 74) and originally proposed by the County Planner, is the standard that should be imposed for all turbines in relation to all roads and non-project participants' lot lines. The appellants contend that the setbacks of 111 metres from side roads, 121 metres from concession roads, and 151.25 metres from Provincial Highway 21 are not adequate to protect the public and neighbours from blade and ice throw.

199 The planners for both the proponent and the Municipality indicated that they are satisfied with the revised setbacks contained in the by-laws found in Exhibit 129 which would increase the setbacks for two turbines found along concession roads 10 and 12 to 121 metres.

200 Mr. Duhamel while initially expressing some concern with the setbacks being proposed conceded under cross-examination that he would defer his opinion to the work of Mr. LeBlanc provided that Mr. LeBlanc's studies had regard to the design characteristic of the Vesta 82 turbines proposed for this project. In the absence of any other information he proffered that a setback of 150 metres was reasonable and perhaps very conservative and that the test from a planning perspective should not be to eliminate all risk regardless of its probability.

201 The Board heard conjecture from Dr. Young that the high wind shear values he predicts for the Kincardine area could stress the turbine blades resulting in failure. The appellants also suggest that lightning strikes, which are common occurrence for these turbines, can stress the blades causing potential failure and blade throw. However the best evidence before the Board is the letter from Vesta found at Exhibit 23c in which they certify that they have no concerns about the safe operation of the Vesta 82 turbine in the Kincardine environment. This is also confirmed by Mr. LeBlanc in his report marked as Exhibit 127. The Municipality, in its support of the setbacks being proposed, recommends the Board consider the real time experience of the Huron Wind farm which has been in operation since 2002 with a 6 turbine array similar to the Vesta 82. The closest turbine in the array is within 60 metres of a very busy County Road (20) with glass greenhouses on the opposite side of the road. Counsel for the Municipality notes that, notwithstanding these lower setbacks, there has not been a single incident of any actual safety related occurrence affecting the County road or damage to the greenhouse placed before the Board.

202 Enbridge has also filed as Exhibit 126 an "Emergency Procedures Snow and Ice Hazard", to be filed as part of their requirements for lifting the holding provision of the by-law. The Board has carefully reviewed the document and sees it is an important component for Enbridge employees who must operate these turbines in a safe manner, and it clearly reflects Enbridge's commitment to safety. The protocol as set out in Exhibit 126 clearly directs that the turbines will be shut down during climatic events when icing on the turbine blades can occur. The Board on reviewing the document and on questioning of Mr. Pol notes that nowhere in the document is there any recognition of a general direction to notify the general public that the turbines are being shut down due to ice conditions. The Board directs that this protocol, when presented to the Municipality, be amended to include a clause that Enbridge either through the local media or through signage will advise the public of the potential ice conditions and to stay away from the turbines in question, particularly those in proximity to municipal roads. In all other respects the Board is satisfied with the document found at Exhibit 126.

203 The Board has carefully considered the submission of the appellants as put forward by Mr. Palmer as it related to the matters of blade and ice throw in light of the fact that he was not able to cross examine either Mr. Le Blanc or Mr. Mills of Vesta. The Board has considered his arguments that the risk analysis conducted by Enbridge is flawed and should not be relied upon and that under the abundance of caution the Board should impose a 243 metre setback from all roads and lot lines from non participating property owners.

204 The Board concludes, after reviewing all of the evidence and submission, that the probability of blade failure and concurrent blade throw is very low for the Vesta 82 turbines and that similar Vesta turbines have functioned satisfactorily in other more dense traffic and population locations with lower setbacks without incident. The Board has noted the changes it directs with respect to the "Emergency Procedures Snow and Ice Hazard" protocol and with these changes prefers the evidence put forward by the planners for Enbridge and the Municipality that the setbacks found in the modified by-laws contained in Exhibit 129 are appropriate and adequately address the issues of safety placed before the Board.

4. Do the appealed zoning by-law amendments regulations provide appropriate separation distances to meet the Provincial noise guidelines?

205 During the course of this almost 7 week hearing the Board heard a divergence of opinion from well qualified scientists, engineers, and acoustical experts about whether the Provincial noise guidelines for wind turbines could be met by the project being proposed. The appellants assert that under the current turbine array, and considering the atmospheric conditions that they assert can be predicted for the area, that there will be significant time periods, particularly at night and in the fall and winter, when the noise guidelines of the Province will be exceeded. They contend that these exceedences are predictable and should form the basis of the modelling for the "Predictable Worst Case" and that this has not been done and as such the project in its present form should not be approved.

206 The only common ground upon which the experts appear to agree is that noise guideline as set out in NPC232 is the standard that the proponent is required to meet, that it is an appropriate standard, and that the final decision regarding compliances with the noise guideline rest with the Ministry of the Environment.

207 The proponent, on the other hand invites the Board to accept the work of Dr. Lightstone found at Exhibit 92 and as shown on Exhibit 128 as prima facie evidence that the turbine array for a 110 turbine project will meet the Ministry's noise guidelines and that the Board has no jurisdiction to impose its judgement in these matters in place of the Ministry.

208 The Board accepts, as have other panels of the Board, that the MOE and not the Board should make the final determination regarding compliance with the Ministry guidelines for noise, and that the Board has no jurisdiction to modify or change the guidelines or the interpretations that the Ministry may wish to impose.

209 However, the Board's jurisdiction in this matter is similar to that of the local Council in that, while not determining the outcome of an application to the Ministry for a Certificate of Approval, it must be satisfied that from a land use planning perspective the by-laws that it has before it are in conformity with the PPS and the policy direction of the Official Plan, represent good planning for their community, and are in the public interest. Not the least of which is that a prima facie case been made by the proponent that its project can meet the Ministry's noise guidelines. In this regard, it is instructive to note the policy direction in the County Official plan found in section

4.14.2 Commercial Generating Systems

(iv) The applicant shall review his approach with the Ministry of the Environment and Energy concerning noise attenuation, to ensure that the proposal will comply with the Ministry's requirements.

210 Clearly, the Municipality recognizes the role of the Ministry in administering its noise guidelines and Certificate of Approval process but has not abdicated its own responsibility as part of its planning review to consider preliminary findings of the Ministry, and the submissions of the proponent as part of its own consideration of the local planning merits of the project as they might relate to noise.

211 The Board's responsibilities are the same.

212 The appellants, through the work of Dr. Young and Mr. Coulter, contend that, due to the presence of higher than expected wind shear exponent in the boundary atmosphere found in the Kincardine area, noise exceedences of between three and five dBA beyond that predicted by the proponent expert, Dr. Lightstone, will be experienced for significant periods during the year. They

contend that these conditions are not properly addressed by the Ministry in its interpretation documents, and that the modelling of the "Predictable Worst Case" done for the project is fundamentally flawed.

213 The uncontradicted evidence before the Board are letters from the Ministry found at Exhibits 32 and 89 which indicate that it does not accept the propositions being put forward by the appellants. The evidence of Dr. Lightstone is that he has continued to update his modelling as set out in Exhibit 92 and shown on Exhibit 128 based upon directions from the Ministry and is confident that his work will comply with the guidelines and directions he has been given by the Ministry.

214 The Board is keenly aware that predictive modelling, while scientific in nature, is just that. Its application requires rigor, the use of the best data available, and most of all educated judgments. It cannot replace real world empirical experience.

215 The Board notes that the proponent and the Municipality have undertaken to develop a local "Disputes Resolution Protocol" for turbine noise complaints, and have undertaken to install noise monitoring equipment prior to the construction of the project at two locations consistent with the evidence of Dr. Lightstone and Mr. Pol. This commitment has been incorporated into the holding provisions found at clause 4 vi of the revised by-laws forming Exhibit 129.

216 The notion of prescribed generic setbacks, as normally found in comprehensive area wide zoning by-laws have little or no applicability when considering mitigating the impact of sound from sources such as wind turbines in the manner required by the Ministry's noise guidelines.

217 The site specific UTM coordinate approach for all turbines in the array provides for much greater surety both in the modelling and the enforcement of compliance and is an improvement over the envelope approach found in the original by-laws under appeal. This position was endorsed by all witnesses.

218 The Board has reviewed with great care the evidence and opinions of the experts and the thoughtful submissions from the parties. The Board notes that the propositions put forward by the appellants are known to the officials in the Ministry of the Environment, that the Minister has accepted the Environmental Screening report submitted by Enbridge, and has denied a bump-up of this document to full environmental assessment.

219 The Board also recognized that the modelling for noise has been modified subsequent to the September 2006 passing of the original by-laws authorizing the project. This, in no small part, is due to the diligence and persistence of the appellants.

220 Even during the course of this hearing the Ministry has modified its directions to Dr. Lightstone regarding his noise modelling for reasons best known to it, which is its right under the current legislation, a fact attested to by several witnesses. The Board recognized the uncertainty this can cause for the local residences when it would appear that there are no absolutes they can rely upon with respect to the modelling of noise.

221 That being said, the test before the Board must be this:

has a prima facie case been made that the by-laws before the Board, which authorize the wind farm, are constructed in such a manner that one can reasonably expect that a Certificate of Approval for noise can be secured from the Ministry.

222 Not one of the witnesses before the Board categorically claimed that the project was fundamentally flawed, they merely assert that some tweaking of turbine sites, or different turbine units, or operational protocols would address their immediate concerns that they were predicting with respect to noise.

223 The Board is satisfied after considering all of the evidence that a compelling case has been made that Certificate of Approval from the Ministry can be achieved for the project, substantially in the form prescribed by the by-laws under appeal and that the by-laws as constructed, modified, and found in Exhibit 129 provide for appropriate setbacks to meet the Ministry's noise guidelines and in this regard should be approved.

224 It should be noted that during the course of the hearing and the meeting of the expert planning witnesses that some concerns were raised by the appellants' planner regarding the method of calculating setbacks and distances from turbines to receptors

and to certain zone boundaries. The Board notes that clarifications have been included in the revised by-laws at subsection 2.vi. The Board is satisfied that the modified by-laws found in Exhibit 129 are clear and that the matter of interpretation is best left to the Zoning Administrator and Chief Building Official of the Municipality.

5. Do the appealed zoning by-law amendments regulations provide appropriate separation distances to minimize the impact of shadow and flicker?

225 During the course of the hearing the Board heard conflicting evidence regarding the impacts from the phenomena known as shadow flicker. The only consensus among the planners was that the phenomena of shadow flicker, in this case possesses no health impacts to the community, but could be construed to be a nuisance if present over an extended period of time. Mr. Duhamel's evidence is that the 30 hours /year limitation on shadow flicker from turbines was a recognized German standard, which anticipates that the modelling calculations are based upon the "astronomical maximum shadow" from all turbines (e.g. sunlight all day 365 days a year). He contends that the work done by Mr. Baker and found at Exhibit 100 neither provides for "astronomical maximum shadow" nor does it consider all of the turbines in the array. The appellants note that Mr. Baker, in his work done for the Cruickshank Project, provided calculations for both the "astronomical maximum shadow" and the "expected value" which he used in the Enbridge study. The appellants contend that there can be a 5 to 10 times variation in the values for shadow flicker when the true "astronomical maximum shadow" is used, and that as a result many of the receptors in Mr. Baker's work would be exceeding the German standard. Similarly the appellants raised issues in using the average hours of sunshine calculated from data at the Wiarton Airport on the basis that the statistics do not take into account when the cloud cover occurs and whether this is during the time when maximum shadow flicker can occur (usually around sunrise and sunset). They also assert that even during cloud events shadow flicker can occur.

226 Mr. Duhamel, as a result of some anecdotal observations, proffered to the Board that a setback of 1500 metres from all turbines to receptors should have been undertaken in the modelling calculations of shadow flicker and not the 1000 metres used originally by Mr. Baker.

227 Mr. Duhamel also proffered to the Board that a standard of 8 hours, which he then admitted could be 10 hours of real shadow flicker exposure as opposed to theoretical impacts of 30 hours per year, should be used to determine the impacts of shadow flicker. Mr. Duhamel then identified a series of by-laws which he contends would cause exceedences above the 10 hour real time standard he has proffered to the Board. He undertook no modelling or detailed analysis to substantiate his findings to the Board.

228 The appellants invite the Board to conclude that the matter of shadow flicker is not trivial from the evidence of Mr. d'Entremont, that the proponent has not met the directions set out by the County and as a result the work of Mr. Baker should not be relied upon in any way.

229 The Board notes that it has no empirical evidence before it regarding the intensity or duration of shadow flicker events at Mr. d'Entremont's property, and while it accepts the evidence of the impact experienced by the d'Entremont family, it can draw little from his evidence that would be applicable to the data presented in support of the Kincardine project.

230 The Board notes that the County Official Plan provides no clear benchmarks or standards to determine the acceptable level of shadow flicker impacts. However, it is clear from the evidence filed with the Board that the County as part of the submissions in support of a wind farm project required modelling of shadow flicker. The County's direction to the proponent was as follows: "the shadow flicker experienced at any dwelling in the surrounding area shall not exceed 30 hours per year as a result of the operation of the wind energy facility. The application shall indicate how shadow flicker has been calculated and the results of the modelling."

231 The evidence of the County planner is clear that the County has not adopted the German standard with respect to the modelling of shadow flicker being that of the "astronomical worst case". She confirmed that in her opinion the directions set out by the County for the modelling of shadow flicker have been met by the proponents.

232 The Board has reviewed the various reports prepared by Mr. Baker that have modelled the impacts of shadow flicker for the various turbine arrays. In all cases he has used the WindPro software, and has clearly indicated the parameters and assumptions he used in the modelling. In the report found at Exhibit 100, Mr. Baker modelled the 120 turbine array using the UTM coordinates contained in the modified by-laws. He proffered to the Board that the assumptions used in the model and described in Exhibit 100 would model a very conservative output of shadow flicker events. He notes that he modelled all residences and that all fell within the County's requirement of 30 hours per year. He even conducted further modelling of all receptors receiving 10 or more hours of shadow flicker and situated within 1500 metres (in the green house mode) and concluded that even in this condition none would exceed the County's standard.

233 Mr. Baker, under cross-examination, continued to maintain that the shadow flicker analysis that he conducted for the Enbridge project was consistent with the approaches he has undertaken for other projects in a variety of jurisdictions, that in his opinion the standards set by Bruce County were appropriate, and that the Enbridge project as being proposed clearly falls well below the standard of 30 hours per year for shadow flicker exposure set by the County.

234 The Board after reviewing the evidence and the submissions made prefers the evidence of Mr. Baker and that of the County Planner that the standards set by the County have been met with respect to the impact of shadow flicker and that the UTM coordinate approach to fixing the setback location of individual turbines as contained in Exhibit 129 creates appropriate separation distances to minimize the impacts from shadow flicker from the Enbridge project.

235 The Board finds that the setbacks found in the revised by-laws contained in Exhibit 129 appropriately address the impact of shadow flicker.

236 The Board notes that during the course of the hearing, Enbridge through its Counsel, proffered modifications to the proposed by-laws in an attempt to mitigate some of the concerns of the appellants and to provide clarity on questions from the Board regarding a dispute resolution protocol for noise complaints. These changes have been included in the revised by-laws found at Exhibit 129. The Board further notes that Enbridge through its counsel has undertaken to reduce the final number of turbines for the project to 110 by

1. abandoning some of the by-laws under appeal and noted earlier by the Board,
2. reducing the number of turbines allowed by some of the by-laws under appeal noted earlier by the Board and reflected in Exhibit 129, and
3. within 90 days of a favourable decision from this Board to make further applications to the Municipality to amend some of the by-law in force and effect to restrict the maximum number of turbines to 110 for the project.

237 The Board finds that the changes proffered by Enbridge are minor, appropriate, will improve the project, and should be undertaken and approved.

238 Accordingly and for the reasons outlined above,

239 THE BOARD Orders that the appeals against By-laws 2006-156, 2006-157, 2006-173 and 2006-174 of the Municipality of Kincardine are allowed in part, and

240 FURTHER the Board directs the Municipality to amend all of the by-laws found in Exhibit 129 in the manner set out in Exhibit 129.

241 The Board further directs Enbridge within 90 days of this decision to make application to the Municipality of Kincardine to amend the project area by-laws currently in force and effect, and shown on Exhibit 143, to reduce the total number of wind generating systems (turbines) for the project area such that the total number of wind generating systems (turbines) does not exceed 110 turbines.

242 The Board further directs Enbridge within 90 days of this decision to present to the Municipality of Kincardine an "Operational Protocol and Emergency Services Plan" similar to the proposal found at Exhibit 126, with the addition of a clause that Enbridge, either through the local media and or through signage, will advise the public of the potential ice conditions and to stay away from the turbines until they have been restarted.

243 The Board further directs Enbridge within 90 days of this decision to present to the Municipality of Kincardine a "Dispute Resolution Protocol" dealing with turbine noise, including the establishment of monitor stations and a complaints monitoring and action protocol as set out by Dr. Lightstone and Mr. Howe and contained in this decision, to the satisfaction of Dr. Lightstone and the Municipality.

244 The Board will withhold its final Order pending notification from the Municipality that the Board's directions have been completed.

245 The Board may be spoken to if problems should arise.

Appeals allowed in part.